FEBRUARY 1960

# FLYING SAFETY

UNITED STATES AIR FORCE

## SAC'S TOP TEAM

(AIRCREW PROFESSIONALISM)

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**• VOLUME 16 NUMBER 2 USAF PERIODICAL 62-1 • AIRCREW PROFESSIONALISM •**

***About the Cover.*** *The top crew in SAC's 1959 World Series of Bombing, officially the 11th Annual Bombing, Navigation and Aerial Refueling Competition, was headed by Major Robert C. Cope of the 100th Bomb Wing, Pease AFB, N. H. With his able crew, Captain F. W. Francke, bombardier-navigator, and Lt. Jack Koppin, pilot, Major Cope's B-47 racked up 454 points of a possible 500. This top professional team modestly and correctly gives much of the credit to the ground crews who worked night and day to keep the plane in top condition. In an edition devoted to Aircrew Professionalism, this magazine is proud to have Major Cope and his crew on the cover.*

# • A GUEST EDITORIAL •

Traditionally, inspectors have been viewed by their Air Force contemporaries with something less than sincere affection. As a matter of fact, in the not too distant past, notice of an inspection visit was greeted with the same degree of enthusiasm as was the news of a new series of mandatory inoculations. But this attitude toward inspections and inspectors has been going through a gradual change and, today, most commanders wholeheartedly welcome the inspector's official visit.

Much of the credit for this changing attitude must go to the man who, in December, vacated his assignment as The Inspector General, USAF—Lt. Gen. Elmer J. Rogers, Jr. During his six year tour of duty General Rogers initiated many changes in the basic concepts of inspection and greatly increased the productivity of the inspection function.

Early in his tour he realized that the ever increasing complexity of Air Force resources, and the mounting demands upon limited budgets, required a more comprehensive and searching type of inspection than was then employed. In the months that followed, General Rogers implemented his ideas of an inspection system attuned to today's Air Force. The inspection effort was directed to the broader aspects of management analysis, weapon systems adequacy and operational readiness policies. As a result, the inspection function today serves the Chief of Staff as a valuable management tool, and the inspection process has gained the respect of commanders throughout the Air Force.

General Rogers also had a deep appreciation for the necessity of conserving and protecting our Air Force resources. Under his guidance increased emphasis was placed on safety in all aspects. The soundness of his direction is shown by the notable improvement in Air Force accident rates during his tour of duty as The Inspector General.

As General Rogers moves on to his new duties as U. S. Representative of the Baghdad Pact, he carries with him the respect of all those who served with him in the Office of the Inspector General, and their sincere wishes for his continued success in the service of his country.

***CHARLES W. SCHOTT***
***Major General, USAF***
***Deputy Inspector General, USAF***

# IN THIS ISSUE



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**Hat Rack**

Many of us believe that ample information has been published about "foreign object damage" (FOD) to fill several volumes but apparently the old adage, "A Word To the Wise is Sufficient," is really *not* sufficient.

As a "for instance," we have recently received two incident reports that involve FOD in the form of pilots helmets. The helmets were placed on the windshield during engine runup prior to takeoff. A gust of wind and/or aircraft vibration caused them to fall off the windshield into the engine inlet duct. BAM! Up went the expenditures for repair of a valuable flying machine.

What were the causes reported by the investigating officer? One report stated that there was "no designated location to place the helmet" or "there were no instructions to tell the pilot where to place the helmet." A close call but he got through that one all right.

The other stated that the primary cause was "materiel failure of the engine due to ingestion of a foreign object." True, how true, but we all know, including the less informed, that materiel failure of the entire aircraft will occur if the aircraft, in a vertical dive, hits terra firma at 500 mph.

Our reply to these reports could have been this: "We consider the pilot's head the most appropriate location for the helmet and what's inside the head sufficient to dictate where to place the helmet." But we didn't say this.

Our consensus is that pilot personnel have knowledge, training and obligations to think for themselves (regardless of what type cigarettes they smoke) in the proper use and protection of their personal equipment and to be especially vigilant during engine operation. Also, we feel that publicizing these comments will impress on pilots the importance of caring for personal equipment, and on investigators the necessity of reporting facts when arriving at specific cause factors in aircraft mishaps. We further realize that pressure applied sometimes may influence the investigator to call a spade a club. While widespread publicity may not be a "cure-all," it may minimize the recurrence of similar incidents. And if the investigators' superiors read it, they will be aware of the many ramifications of accident reporting.

Recently when we were visited by a colonel whose unit is flying the same type of aircraft involved in this incident, we told him about the "helmet fiasco." He had not heard about it, but because some of his pilots were guilty of such helmet treatment he was glad to have the information to pass on to them.

Name Withheld By Request—

## CROSSFEED
LETTERS TO THE EDITOR

**Let Go!**

I've read the December issue and agree with you that there must be a lot of "bar flying" exchange of hairy tales that could develop into life-and-accident saving ideas.

One example: in the January 1959 issue of the 14th AF Flying Safety and Aircrew Standardizaion Bulletin is a piece which I've called "Ejection—When?" Naturally, as in a lot of other fly safe info, some of the material was sheer plagiarism; however, one idea on ejection which we emphasized was to pick a "decision altitude"—like low key in a flameout pattern—and eject, if of course, all the factors aren't on the plus side for the pilot. This same type of information was published as a Safety of Flight Supplement in April 1959 for all jet fighters. Perhaps we should have sent this info out last January 1959? Who knows, we might have saved a life or two.

Along this same line of thought, it has come to my mind that a great deal of concern is expressed about pilots successfully ejecting, but *not* releasing the ejection handles soon enough for the chute to deploy. A lot has been written on this subject but no one seems to have the answers. I've been through the mill on ejection but do not claim to be an expert. However, I have four ideas in mind which, with a simple, inexpensive modification on present day ejection seats, might save a few pilots. These are only my ideas, but knowing jet pilots and the "genius" type of slipstick boys, you just may get enough response and new ideas to warrant the space given them. Here they are:

- Idea No. 1 is to modify the ejection seat handles so they'll "break away" after the seat ejects. The pilot may float to earth grasping two handles but with an overwhelming chance of being in the chute in the accepted manner.
- No. 2 is to stake a serrated, sharp sawtooth piece of spring steel on the trigger itself, sharp enough to sting through gloves to "remind" the pilot to let go, but not sharp enough to mangle his hand.
- No. 3 is to modify the canopy ejection handle and trigger with a strong spring to pull the handles and triggers down out of the pilot's hand *after* firing—much on the order of a springloaded solenoid or a double-action revolver.
- And No. 4 is to mount a springloaded plate flush on the bottom of the seat which, after the seat ejects, would provide a secondary push on the pilot's buttocks to clear him of the seat. A strong six-inch push should do it but it should be tied in with the automatic belt release to avoid squeezing the pilot.

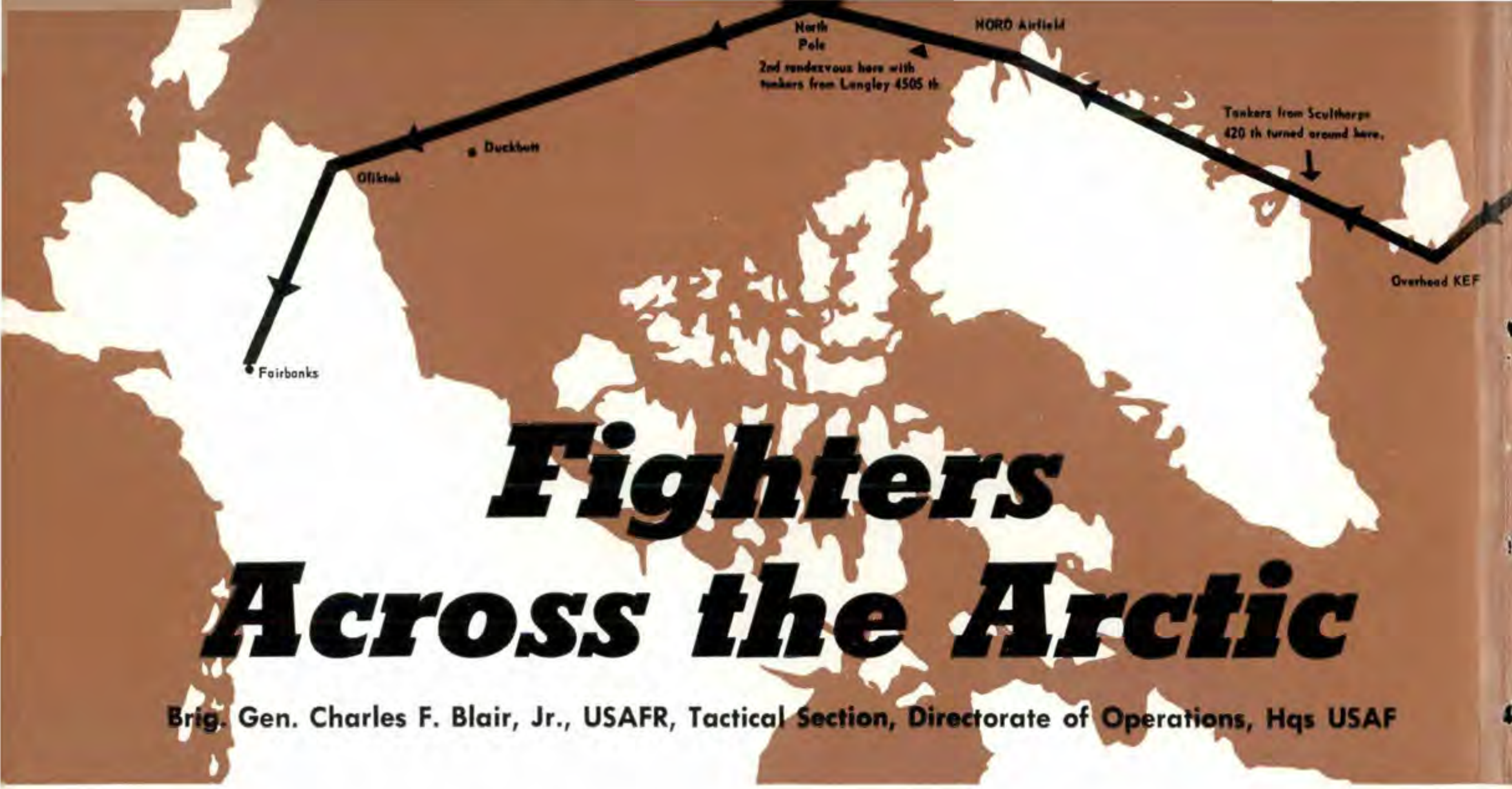
Naturally, every jet pilot would like an encapsulated, foolproof escape system—good from the parking ramp to the moon and from zero speed to super-supersonic—but this is drawing board stuff yet and will not make today's birds!

At any rate you know we're reading and thinking flying safety and hoping for a solution to the problem of getting the pilot to let go of the seat so the automatic chute can do what it is designed to do!

Maj. Warren J. Arey
Directorate FS and Stand.
Hq 14AF, Robins AFB, Ga.

*Fly-safe suggestions are always welcome. We all know that ejection and seat separation procedures are a real concern to flying personnel and we are pleased to report that seat modification ideas are making headway. In fact we are now working on an article that ties in material from various sources about this equipment labeled "the butt snapper." See the photograph shown here.*

*More about this in the near future. Watch for it!*




# Fighters Across the Arctic

Brig. Gen. Charles F. Blair, Jr., USAFR, Tactical Section, Directorate of Operations, Hqs USAF

*General Blair, attached to the Tactical Section of the Directorate of Operations, Headquarters USAF, was in over-all charge of this project and its crew of three other pilots.*

*In their study of polar navigational problems, this foursome took off in a pair of F-100s and headed for the North Pole. The only usable navigation instrument for that region is a directional gyro which frequently suffers from random precession. To solve this problem the pilots "shot" the sun with astrocompasses in order to feed upward data into the directional gyro. And it worked!*

* * *

Like that old one about the mighty oak and the acorn, a good trip can sometimes grow out of a seemingly brief jaunt. This is the way it was with Air Force project "Julius Caesar" which started out innocently enough from the North American Aviation blowtorch facility at Inglewood in June, 1959. Eight weeks later, it wound up back at the same place with an odd assortment of navigational tests plus the North Atlantic, Arctic, and the north geographic pole dangling from the escutcheon.

The "acorn" in this story sprouted early in 1959 in the dry lakebed near Edwards Air Force Base, also out in California, when a pair of F-100F-20 birds were testing a newly acquired Doppler navigation system. These tests were being conducted by Captains Bob Titus and Lou Setter. Bob has a lot of experience as a fighter test pilot and was taking his first fling at new navigational gadgets. Lou, also an experienced fighter pilot, is known as a navigational expert.

It soon became apparent out there at Edwards that one of the better tests for shaking down navigational apparatus would be to take a long flight involving some navigational exercise when the chips were down. And what better place exists than the Arctic for putting the "heat" on a so-called capability? This viewpoint was supported by Major General Marcus Cooper, then Commander at Edwards AFB, and by Colonel Gordon Graham, Chief of Tactical Fighter Operations at Headquarters USAF. Frankly, not everyone went along at first, but as time went on, the project broke into the clear.

As a dividend that could eventually exceed the value of merely testing navigational gadgets it was decided to make this a route survey to test the potential of transferring tactical fighters across the Arctic regions, although not as far north as this trip was flown. If the far northern routes proved to be feasible, it would be in the cards to transfer these potent little packages between the Far East and Europe, or vice versa, in less than a day. This meant a potential for going to work quickly in either theatre that could hardly be sneezed at.

**Julius Caesar,** incidentally, turned out to be the first crack at crossing the Arctic and North Pole by jet fighters. As such, it became a project that was spread over a wide cut of the Air Force. It was under operational control of the Tactical Division, Directorate of Operations, Hqs USAF and in the special care of Lt. Col. John Stirling.

The airplanes belonged to Hqs Air Research and Development Command, out of the Flight Test Center at Edwards. The tankers were from 3rd Air Force out of USAFE and from the Tactical Air Command. Colonel Jay Robbins' 20th Tac Fighter Wing at Wethersfield RAF Station, United Kingdom, supported us on the ground. Communications were handled by SAC, by way of the Seventh Air Division in England, and Hq 8th Air Force at Westover, which also furnished its top polar navigator for flight planning. MATS furnished air rescue duckbutt support in coordination with the Alaskan Air Command, and PACAF gave us two pilots.

According to our flight plan, the route would start at

Wethersfield RAF Station, the home of USAFE's 20th Tac Fighter Wing on the outskirts of London, to Keflavik, Iceland, proceed due north to the first tanker rendezvous on the Arctic Circle 150 miles north of Keflavik, then continue north across the Denmark Strait and along the east coast of Greenland over the Nord airfield on Greenland's northeastern extremity.

The second tanker rendezvous would be on track toward the North Pole at 82 degrees north latitude, shortly after passing over the Nord radio beacon.

Fighters would stay with tankers to 90 degrees north, starting the top-off of fuel shortly before the Pole for the 1522 nautical-mile southbound run from the Pole to Eielson AFB, Alaska. The total flight plan distance showed 4115 nautical miles.

Captain Titus and I were lucky to have a pair of copilots, assigned by PACAF, who were expert F-100 pilots. Captain Al Kucher from the 8th Tac Fighter Wing flew in my aircraft and 1st Lt. George W. Wooddy of the 21st Tac Fighter Wing flew with Titus.

The Arctic would be just another ocean to all four of us. We had island-hopped the Atlantic in June with the same pair of F-100s from Langley AFB to England then to Italy, via Harmon and the Azores. Our mission in Europe had been to help test a tactical Decca navigation chain at the Italian Air Force Test Center at Practica di Mare near Rome. Anticipating heavy exposure to the antiquities, we borrowed the old soldier's name—Julius Caesar—as a call sign before departing the ZI.

The airplanes, incidentally, were scheduled for eventual delivery to PACAF in Japan. Since we were westbound, it was our desire to take them all the way nonstop, if possible, or with a single stop at Eielson AFB, Alaska. However, because of previous tanker commitments, we were obliged to terminate our flight in California after notching our machines with the Arctic.

There's an ancient cliché that we borrow from the Boy Scouts when we take a trip. It has to do with *preparation*, which is the crux of the matter if we wish a serene journey. This is a pregnant fact of life that's too easy to forget, no matter how often we remind ourselves. Of course, a good measure of luck can come in handy at times, but it's bad business to take for granted any such will-o'-the-wisp.

We took particular care on this trip not to defy the infallible axiom—Be Prepared!—for fear that our expedition might suddenly come apart at the seams, a decidedly unfashionable predicament in the unforgiving Arctic.

In making preparations, it is of special importance to look for and find the hidden gimmicks that lie under the rug, so to speak. A likely place to find such clinkers is the well-intentioned rendezvous with tankers. The writer has a few painful memories of these, experienced while leading fighters across the North Atlantic a few years back. We were lucky that time, but it could have been different. The discrepancy was in a three weeks time lag between the original tanker briefing and the execution of the mission. Something had changed in the meantime, somewhere along the line, and the result was a misunderstanding about an alternate rendezvous. This could have cost our good Uncle a few F-84Fs, not to mention being the cause of cold-soaking three thin-blooded aviators.

This time, however, we filled the potential pothole by making last minute personal sorties to the place of abode of our tanker men, namely, to the 420th Air Refueling Squadron in England, and TAC's 4505th Tanker Wing at Langley AFB, Virginia. While there, we and our tanker colleagues frisked every detail to make sure it wasn't loaded.

In this coordination we were expertly guided by Major Norm Blomgren at Hqs TAC, and Major Bob Novotny at Hqs Third Air Force in the United Kingdom.

Besides making sure that there is a solid tanker-receiver understanding, it is always a little neater—and a lot safer—if a fellow doesn't fumble around with that drogue. This called for all pilots to practice refueling operations from their respective stations. The practice sessions were started at Aviano in Italy, and finished off in England, the day before departure. Being engaged part of the summer shepherding my Pan Am Boeing 707 back and forth across the Atlantic, I missed some of the refueling practice. This, besides a certain preoccupation with navigational details, put the burden as primary refueler on Al Kucher, who was razor sharp from the back seat.

Tied to this business of getting airborne fuel was the problem of preflight communications, and in the Far North, this can be a tough nut. With the TAC tankers from Langley staging at Thule, the critical rendezvous was at Nord on Greenland's northeastern tip. This is 625 nautical miles northeast of Thule, which is a considerable run for the KB-50J tankers scheduled to go all the way to the Pole. We would have been highly embarrassed if these gentlemen had made any runs over Nord only to discover that the F-100 troops were sunning themselves at Wethersfield. And I needn't mention the inconvenience of our possible arrival over Nord with a pair of thirsty F-100s, to find a sky empty of tankers. The emphasis here was on precise, almost simultaneous arrival over Nord for tankers and fighters. This was further tied to a need to know the Iceland-Greenland weather picture.

There was a SAC solution to this problem, which we used, utilizing their efficient communications network in the form of forward scatter and single side-band. As a result, no one suffered any embarrassment in this department.

This capability was illuminated for the writer when Colonel Dick Lassiter, commander of the 99th Bomb Wing, visited Westover. Colonel Lassiter, a veteran of Thule operations, also furnished helpful hints on the summer fogs at Thule, plus valuable details pertaining to low instrument approaches. We'd have need for this information in the event we should abort in the high latitudes and return to a fogbound Thule.

***We took particular care on this trip not to defy the infallible axiom—Be Prepared!***

## *Fighters Across the Arctic (Cont.)*

Further briefing on the weather and airport characteristics in Greenland and the Canadian archipelago was given by Bernt Balchen. He, of course, is the pioneer who had so much to do with the origin of Arctic air explorations, and who later helped establish the military installations which embellished the Far North.

The trip weather and winds aloft were put together by Major Welton King and his highly efficient staff at Wethersfield. The best testimonial that could be given for the capability of the Air Weather Service was the accuracy of the flight plan we used in which the maximum digression at any check point en route was six minutes.

Because a navigational mistake in the Arctic can make a fellow wish he'd stood in bed, we searched behind the navigation woodwork with a microscope. Having been across this ocean before from Norway to Fairbanks in an F-51, I had no particular qualms about steering by the sun. But there was always the odd chance that the lead aircraft could come a cropper, leaving the remaining troops to tackle the steering chore on their own. This business of steering involved some knowledge of celestial navigation because the gyros in our present fighters don't fulfill polar steering requirements over extended time periods without celestial assist.

To cover this discrepancy, SAC's Major Dave Haney was imported into Wethersfield. His polar navigation experience has been exceeded by no one. Major Haney took over the job. He instructed the pilots in grid navigation and celestial steering, worked out the celestial precomputations, and generally rode herd on the flight planning.

For celestial steering, each airplane was fitted with a World War II sun compass. These cost $14.95 each. Although primary steering was by reference to the indicator of the standard J-4 compass in D.G. *(directional gyro)* mode, it was vital to feed sun compass corrections to the J-4 indicator at frequent intervals. This was not only to assure accurate steering, but to give reasonably precise steering inputs to our Doppler navigation computers.

Captain Titus handled the backup steering jobs in the second aircraft. Although he had never seen a sun compass until undertaking this trip, he mastered the technique in short order.

In addition to my other navigation equipment I also carried an MA-1 Kollsman hand sextant to implement refinements of course between Greenland and the Pole, and for speed lines at 80 degrees north on the run south from the Pole. The sun bearing was directly abeam on the approach to the Pole and directly over the nose 2½ hours after making our turn at 90 degrees north. Batori computers were available to make off-course corrections and ETAs.

Installed in the lead aircraft was a 25-pound *un*complicated Doppler computer attachment called the ASN-25. This instrument gives the pilot a navigational picture in terms of distance to go, and distance right or left of a preselected grid or magnetic track, with steering commands by the vertical steering needle on the standard ID 249 omni bearing selector. It is thus possible to fly Doppler radials *(corrected for cross track and drift)* from


General Blair climbs out of his F-100 after the 9-hour flight that started near London. The "over-the-top-of-the-world" flight was to test the feasibility of deploying fighter aircraft via the polar route.

any desired point in the same manner that we fly a VOR radial. This allows better track acquisition than is possible with the standard Rho Theta style "course-to-destination" pointer.

Captain Titus' aircraft was fitted with the larger ASN-7 computer. For use in high latitudes an arbitrary grid was established covering the polar regions. Used in this manner, the latitude-longitude display was presented in the form of grid coordinates of the high latitudes. Distance to destination and course to steer *(Rho Theta)* were also displayed.

Besides helping with a number of arrangements relating to Arctic survival, Captain William Stanford, the flight surgeon at Wethersfield, assisted us in solving the problems of personal comfort which sitting some 10 hours in a small cage presented. The dietary and liquid intake restrictions he suggested were effective to the point that we could have overflown Eielson and gone through to Japan without discomfort. At the other end of the line, Lt. Colonel George Sabin, Eielson flight surgeon, saw to it that the steam room operator and masseur were ready for us to take all the kinks out.

Extra arrangements for emergency communications between aircraft included grease pencil and placards for the inscription of certain vital statistics such as fuel remaining, frequency in use, and so on, in the event of UHF trouble.

The top preoccupation of all was, of course, the airworthiness of our two birds. After functioning perfectly all summer, my airplane became somewhat indisposed in its electrical vitals the day before departure. But after a woeful night in the hangar, it showed signs of getting well. We left behind a maintenance crew, including North American tech reps Sandy Sandeval and Bob Parker, some what frazzled by the experience.

Julius Caesar got away on 7 August, the day advertised several weeks earlier, but missed the appointed takeoff time by 23½ minutes because of the aforementioned indisposition of the lead aircraft.

But from here on out the clock gave no more trouble as it ticked off the flight plan. We were only one minute behind schedule hooking up with tankers on the Arctic Circle. The navigational score was *zero* over Nord, Greenland, and we were six minutes ahead departing the Pole after some 450 miles of formation with the TAC tankers.

**Arrival over Eielson was on schedule:** 9 hours, 30½ minutes out of Wethersfield, thus breaking exactly even with Lt. Wooddy's flight plan crystal ball left behind in Wethersfield.

I have made a few ocean crossings before, including some 900 across the Atlantic, but it took a fighter to help me hit the precision jackpot. The six minute bonanza picked up with the tankers between Greenland and 90 degrees north was lost on the southward run to Alaska when the forecast tailwind failed to blow. It was nip and tuck to hit schedule, in spite of our pouring on the coal in descent.

Tanker support, par excellence, was the key to this good fortune. Major Clyde Miller with three KB-50Js of the 420th out of Sculthorpe, U.K., and the second group of TAC's 4505th out of Langley via Thule, led by Colonel H. B. Tara, were in position exactly as briefed. In both join-ups the rendezvous were effected by tanker radar. The northernmost join-up took place at 24,000 feet in intermittent visibility of zero to five miles—a most effective demonstration of the worth of tanker radar.

At no time was Julius Caesar out of range of the abort alternate if one of the aircraft had failed to get its fuel, nor were the fuel reserves uncomfortably low at any point. Keflavik, Iceland, was the abort alternate for the first rendezvous; Thule was the alternate for the second rendezvous, as well as for the top-off at the North Pole.

Fueling took place without incident except at 90 degrees north when the lead aircraft latched onto a defunct drogue. The hose further complicated matters by suddenly snaking to such a degree that it seemed the probe might go *one* way and we the other. We forsook this hose in a hurry and went looking for a better one.

Duckbutt support was simplified by use of our tankers as duckbutts across Denmark Strait, and from Greenland to the Pole. On the Alaskan side of the Arctic a lone duckbutt maintained watch 200 miles north of Flaxman Island, Alaska. This aircraft tracked us effectively with radar soon after we crossed the 75th parallel.

Navigational digressions were in a minor key. After departing England, I was a little flabbergasted to discover that one of the reference marks for alignment of the sun compass had disappeared. However, it was soon eyeballed into reasonably accurate alignment.

The wobble of the sun compass mount did produce some inconsequential error on the run south from the Pole. Being aware of this possible discrepancy, I judiciously applied body English a few degrees right of flight plan track, thus favoring a better radio landfall on the Alaskan coast.

After passing north of Scoresby Sound on Greenland's east coast, we were out of luck for a glimpse of the terrain or for the navigational luxury of flying the coastline. The 800 nautical mile run above cloud to the first radio checkpoint at Nord put a little heat on the steering job, but we made it by using the sun as our essential guidepost.

During this long northward run to Nord there was one discordant note to jar our navigational complacency: the reading of the standby compass was an obnoxious 25 degrees too high, as judged by the position of the sun. This was odd, because on the east coast of Greenland a magnetic compass would usually be fairly accurate.

The 25 degree error stuck in my craw and for a short while I entertained pessimistic visions of flying off into the ocean void that lies between Greenland and Spitzbergen, a flight path that would bring navigational disgrace, as well as disaster. This caused a trace of perspiration to gather around my collar. However, a fast and furious workout with the sun compass gave me a figure that was verified an hour later when the ADF pointed directly over the nose at the Nord beacon. This experience proved again the everlasting truth that the sun never errs in its journey across the heavens. But standby compasses do have their little foibles.

**What did we learn today?**

Of course we knew in advance that had our able tanker men been flying KC-135s, all of the big problems—staging, communications, rendezvous, en route weather and so on—would have been short-circuited out of the picture. We could have snuggled up with a single jet tanker over England, kissed her goodby at the Pole and then gone about the business of our downhill flight to Alaska. The tanker could then have flown thousands of miles in another direction to tend to other business.

In fact such a marriage with jet tankers has potentially divested the fighter-bomber of its short pants, thus making the little bird a truly long-legged weapon. Moreover, its zoot jacket fair-weather stigma has been stripped off by the miniaturization of all-weather navigation equipment. With these discrepancies out of the way, the fighter stands on a triple-threat threshold, capable of strategic, tactical, or air defense employment.

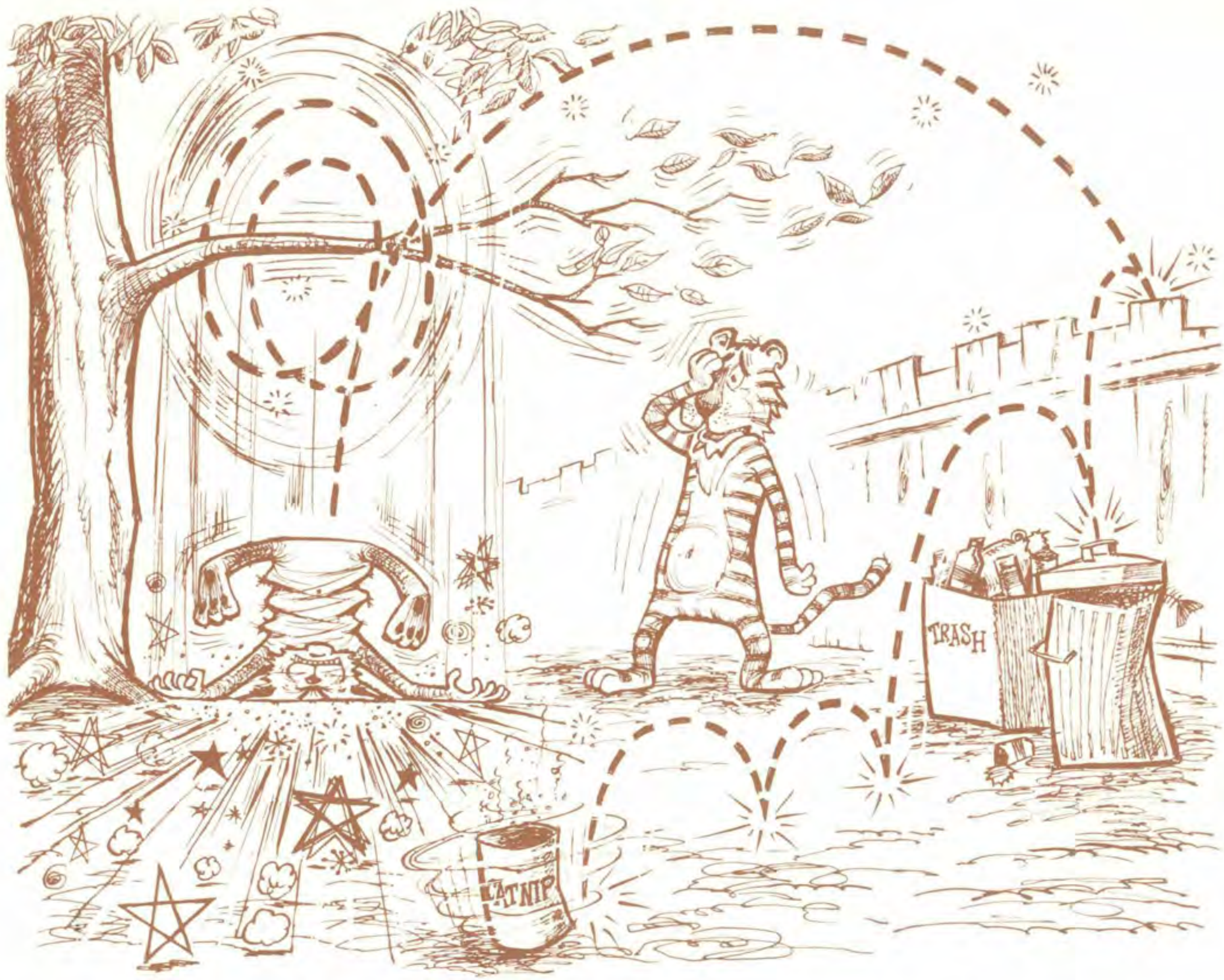
We became more aware today that the Arctic is just another ocean, although one with its own special problems. Of course a deployment route between USAFE and FEAF would lie far to the south of today's track. On our trip we were looking for that certain magic spot at the top of the earth's axis.

But a deployment route would be correspondingly simple, with way points at Keflavik, Thule, Eielson, overheading Shemya to Japan, with the critical leg lying across the *magnetic* north pole between Thule and Eielson. With minor strengthening of facilities at Resolute Bay, Mould Bay and Sachs Harbor, there would be a fast and sure avenue across the Canadian archipelago if we assume minimum tanker support at Thule or Eielson. The DEW line itself would provide significant navigational assistance.

It occurred to us today that with our two-seater fighters, it would have been little trouble to push through to Japan. All we needed was a tanker to drop us off beyond the far end of the Aleutians. With single seaters, however, a crew rest at Eielson would undoubtedly be necessary.

We had good Doppler performance across the Arctic ice. We also learned a little more about Doppler computers, particularly that a simple, accurate, easy-to-interpret—and switch—fighter computer can sometimes come in a small, less expensive package. This could be a break for the taxpayer and the pilot as well.

In spite of exhaustive preflight planning, there are always a few difficulties that are not easy to foresee. Shortly before our arrival, a bull moose infiltrated the base at Eielson to stand astride the single runway. However, the hospitality of Colonel Stephen Henry, Base Commander, and his deputy, Colonel Beall, was not to be denied. An impromptu Alaska-style rodeo sent the disenchanted invader hightailing it across the tundra and our landing was serene and unchallenged. ▲




# Stability, Tigers and the F-100

*Alvin S. (Al) White, Engineering Test Pilot, North American Aviation, Inc., Inglewood, Calif.*

You've probably heard the old saying, "Curiosity killed the cat." Like most of the old saws, it has an element of truth. Often enough, some young cat gets a snoot full of catnip, features himself somewhat of a tiger, and leaps into a situation about which he knows very little. Odds are that very shortly thereafter he's up to his ears in trouble.

The wrong kind of curiosity can be dangerous for pilots too. Those who are prone to leap into a situation without first becoming thoroughly familiar with the flight characteristics of their airplane are likely to find themselves in more trouble than they can cope with. In the F-100, this trouble often takes the form of an inadvertent spin, as indicated by the recent rash of reports. The problem is complicated, I'm sure, by the multitude of store and pylon combinations for F-100 series airplanes.

Almost without fail, each time serious trouble is encountered we are asked to add to, or write, a Flight Safety Supplement for the Flight Manual, explaining in detail the flight characteristics in the particular configurations. The end result of this approach would be such an enormous volume of information that no pilot could make effective use of it.

There is an easier way to eliminate the spin problem. It is for the pilot to use that troublesome curiosity to save his own skin. This curiosity involves searching even beyond the Flight Manual to understand the flight characteristics of your airplane. If every F-100 pilot would learn the fundamentals of airplane stability and, in general, how this stability is affected by external stores, the detailed explanations not only would make more sense, but would also be easier to remember.

To start with, airplane stability can be broken down into longitudinal, directional, and lateral stability. Let's take them one at a time.

***Longitudinal stability.*** Consider a clean F-100 in straight-and-level flight at a given airspeed and altitude. Now, suppose a gust load pitches the nose of the airplane up, causing an increase in angle of attack. Since lift varies with angle of attack, the lift forces on the tail and wing will both increase. However, the increase in tail lift force acting on a relatively long lever arm provides a larger pitching moment about the airplane CG than the pitching moment from the wing *(wing lift times its lever arm)*. The resultant unbalanced pitching moment then tends to return the airplane to the original angle of attack. This is positive longitudinal stability. In general, longitudinal stability is a measure of the tendency of the airplane to return to the flight condition it was in before it was disturbed.

Now let's exchange the clean airplane for one with stores flying at the same speed and altitude. It encounters a similar gust which causes the same change in angle of attack. This time, the tail force is less because of the effects of stores on airflow over the tail surfaces. Also, the stores can affect airflow over the wing so as to increase the destabilizing effects of wing lift. Consequently, for a given change in angle of attack, the unbalanced pitching moment *(or tendency to return as previously described)* is less than in the case of the clean airplane. If the stores are mounted on the airplane so that the CG is moved aft, the lever arm to the tail force is shortened; consequently, here is another cause for reduction in longitudinal stability.

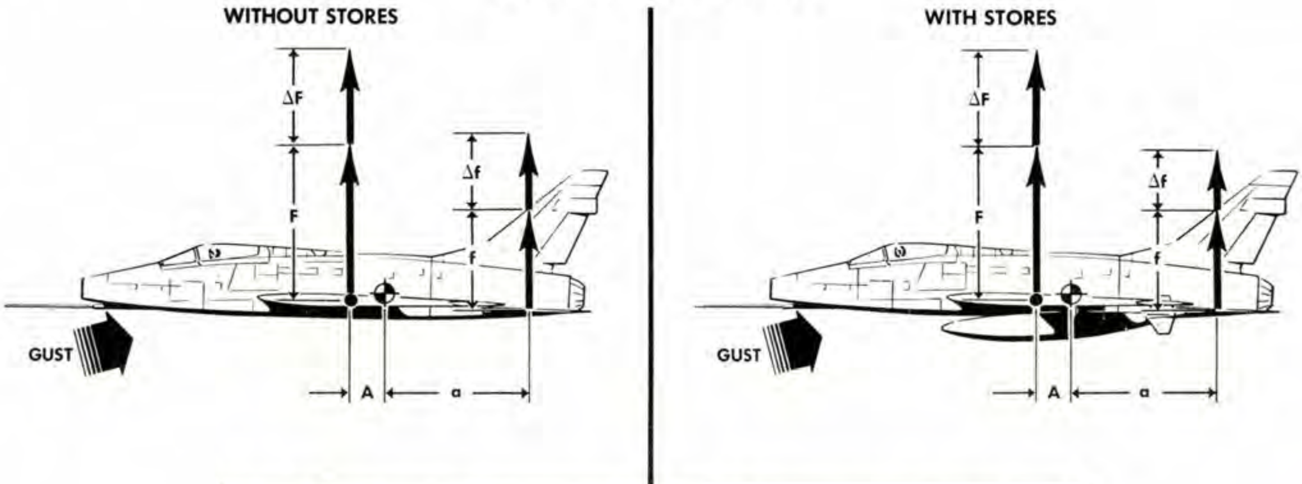
You will be aware of this decrease in stability as a loss of some of the longitudinal stiffness of the airplane. The airplane is more easily disturbed and returns to trim condition at a slower rate than a clean airplane. Also, you will note that less control is needed to maneuver the airplane, therefore less stick force is required to pull into an accelerated stall.

***Directional stability.*** The effect that the installation of stores, or pylons alone, has on directional stability depends largely on where they are mounted. Stores or pylons mounted so that the greatest portion, or all of the lateral flat plate area, is forward of the center of gravity are destabilizing. *(The lateral flat plate area is the area seen when the airplane is viewed in profile.)*

The airplane gains directional stability from the vertical stabilizer in much the same manner as it gains longitudinal stability from the horizontal stabilizer. This directional stability is a function of the area of the vertical stabilizer. When the stores or pylons are mounted forward of the center of gravity of the airplane, the added lateral flat plate area of this installation cancels some of the effect of the vertical stabilizer. Therefore, the airplane has less directional stability.

Again, you will be aware of this decrease in stability as a loss in some of the directional stiffness of the airplane. As in the case of longitudinal stability, the airplane is more easily disturbed directionally, and it returns to the trim condition at a slower rate than a clean airplane. If you help the airplane maintain zero yaw with the rudder, you will find that the airplane is easier to overcontrol directionally. Because of the lack of directional stiffness, it takes less rudder to push out against the effect of the vertical stabilizer. This does not mean that the airplane has become unstable; how-

**LONGITUDINAL STABILITY**




$F$ = Wing force
$\Delta F$ = Increase in wing force
$A$ = Wing force moment arm
$f$ = Horizontal tail force
$\Delta f$ = Increase in horizontal tail force
$a$ = Horizontal tail force moment arm
$FA = fa$
$(\Delta F + F)A < (\Delta f + f)a$

ever, directional stability will have deteriorated slightly. To you, the pilot, it means that in maneuvering the airplane, you will find yourself expending a little more effort and concentration to keep the ball centered, and this becomes very important at or near an accelerated stall.

***Lateral stability.*** Installation of stores on the F-100 has little effect on lateral stability and reduces aileron effectiveness only very slightly. Nevertheless, you will experience a slight reduction in lateral controllability. This is because of the inertia effects of the stores.

The maximum roll rate obtained at any given aileron deflection will be approximately the same with or without stores, but it will take longer to reach this roll rate with stores because of the mass that has to be set into motion. Similarly, if you desire to roll a given bank angle, it is more difficult to stop exactly on this bank angle. In other words, the accuracy of your lateral control has been slightly decreased.

The so-called "lateral instability" often associated with the F-100 airplane is improperly called instability. The difficulty that you encounter in keeping the wings level is a control problem caused primarily by friction in the control system. At altitude with stores on—or in maneuvering flight—when the slats begin to work, this difficulty in accurately controlling the lateral attitude of the airplane is increased slightly. If we combine the effects of the decreased longitudinal and directional stability with this decrease in accuracy of lateral control, it is obvious that we have an airplane that is less desirable for aerial combat than a clean airplane. In other words, in your training program, if one of your buddies bounces you with a clean airplane when you're carrying stores or pylons, recognize the fact that he has a distinct advantage over you, and then act accordingly *within the limits* of the airplane configuration that you are flying. (These limits are called out in the Flight Manual.) You must realize, however, that getting whipped and being kidded later in the barracks is better than spinning in.

If during your maneuvers you get into an accelerated stall with any store configuration, recovery technique is just the same as it always has been. Take the load off the wings and the airplane will recover itself. I remember an instructor pilot telling me to grab my ears and yell "Mama mia" and this would effect recovery—and it usually does.

If you persist in pulling the airplane in after it stalls, it's going to spin. Once you learn to recognize the onset of an accelerated stall, regardless of the configuration, you'll never have to worry much about spin recovery techniques.

***Asymmetrical store loading.*** Up to this point, we have assumed that the stores were mounted symmetrically on the airplane. However, a general discussion of airplane stability would not be complete without some general explanation of the characteristics encountered with asymmetrical store loadings. An asymmetrical store configuration causes asymmetrical drag on the airplane and, therefore, causes a directional trim change. The amount of drag asymmetry varies with speed. Consequently, the trim change will vary with airspeed. The asymmetrical configuration will also cause asymmetrical aileron trim, to support the heavily loaded wing, which contributes to the directional problem. As you pull G's in maneuvering flight, you will have to use more aileron to support the heavily loaded wing.

Obviously, there are speed and G combinations where full aileron is required to hold the rate of roll to zero. Beyond this, the airplane is out of control. Knowing that these trim changes will occur, and at the same time that airplane stability has deteriorated because of the stores, you can expect to work harder during maneuvering flight to keep the ball in the center.

These same principles apply to takeoff and landing, with additions. On takeoff, the tire friction under the heavily loaded wing causes a directional trim change from the moment the airplane starts to roll. Nose wheel steering is capable of handling this condition and must be used up to the speed where rudder power can overcome the yawing moment. At the point of disengaging nose wheel steering, or a nose wheel lift-off, the pilot should be prepared to feed in more rudder because from that point on, rudder power alone is balancing the yawing moment due to the asymmetrical drag.

In the landing pattern, the primary problem is the amount of aileron required at this low speed. The wing heaviness will increase appreciably if the airplane is allowed to yaw, so concentrated effort should be extended to keep the ball centered. Under normal conditions, plenty of aileron and rudder control are available to make the approach and landing at speeds quoted in the Flight Manual for that particular gross weight. When you anticipate jet wash, crosswind, or gusty air, raise the speed according to Flight Manual figures and you will have sufficient control.

Generally, the points outlined apply to any configuration that you may fly. If you study them, you will understand why there are certain restrictions on your airplane with stores installed, and it will be easier for you to recognize when you are approaching the limits of the configuration which you are flying. Knowing both the limits of the airplane and the feel of the airplane when it is approaching these limits are very important. Lack of knowledge of either one of these things may some day cause you to inadvertently exceed the limits and get into some difficulty. As I think back on my career, it has always been a lack of knowledge rather than inability to perform that has caused me to get into trouble. I can think of one example involving a sweet little thing in Dallas — well, you can probably think of your own examples.

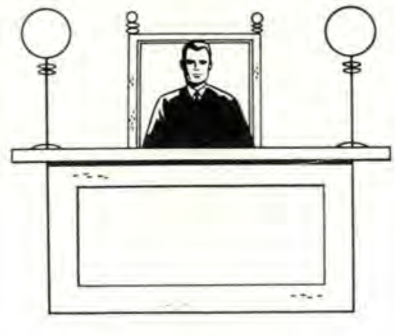
*Once again, accelerated stalls and uncoordinated maneuvers, or a combination of them, are easier to come by when you have stores and/or pylons installed.* Learn to recognize the stall, and break it immediately, and inadvertent spins will become a thing of the past. Be sure of this—the pilot who is most familiar with his airplane will be consistently highest on the proficiency list and will perform the prescribed mission with the greatest margin of safety. He is the one who will be the most reliable leader — why shouldn't he be you? ▲


### ABOUT THE AUTHOR

*Al White joined North American in May of 1954 as an engineering test pilot. This followed 11 years of service with the U. S. Air Force, part of which was as an experimental test pilot at Edwards AFB. His flying career began in 1941 when he joined the Army Air Corps.*

*As a company test pilot, Al has flown all models of the F-86 Sabre Jet and the F-100 Super Sabre series. He is also alternate pilot for the X-15.*

# *YOU.....*
# *Be The Judge*



**Lt. Col. James W. Bradford, Fighter Branch, DFMSR**

How long can you fly a T-Bird before your posterior begins to ache, you long for a cigarette or a cup of coffee, or your hard hat and mask begin to feel like a hot poker burning into your face and head? Many troops agree that 2 hours 15 minutes to 2½ hours is enough to fly that little monster without time out for a break—be it a cigarette, coffee, leg stretch or what have you.

Why some pilots on administrative and CRT flights continue to file unnecessarily for a 2:50 to 3:10 leg on a cross-country flight is a mystery. But what makes the whole situation so ridiculous is that some of the heads aren't making it to their destination—at the expense of $125,000 to Uncle Sam, and considerable embarrassment to themselves—to say nothing of depleting the rapidly diminishing inventory of T-33 aircraft. And all the heads who are goofing, aren't new heads! There are many old ones pulling the same stunt.

Within recent months, two such accidents have caused supervisors to want to throw in the towel. In both cases the pilots were well qualified and had scads of time in the bird. The only sore spot was that they didn't make it to their destination with enough JP-4 to get the "T" safely on the ground. We'll have to admit that they came close, but close only counts in horseshoes.

The first pilot to come "close" had cleared for a distance of approximately 1150 nautical miles and he would have made it too except that when he arrived at his destination he had to make a penetration. He flamed out within sight of the runway and didn't think he could glide to the runway with any of the garbage out, so he left the gear up in order to make the field. Then he bellied in one each T-33 on the runway.

The next throttle-manipulator did a little better. He cleared IFR at 26,000 feet (he had asked for 25,000 feet, but that was the wrong altitude for the direction he was going so the AO clued him in on the proper flight level) to a destination 848 miles away. The weather en route was not a factor unless you care to call a skinny 15- to 20-knot headwind a factor. This troop made out a very thorough Form 21A, too. In fact, he computed that he would reach his destination with 55 U.S. gallons. When he overflew the first usable USAF airpatch about half way to his destination, he was 20 gallons behind fuel schedule. When he overflew the next airbase some 80 miles from destination he was still 20 gallons short, according to the fuel counter. But everybody knows that fuel counters aren't *always* accurate. So, on he bored!

When he was 57 miles from destination, the fuselage low level fuel warning light had been on for several minutes. Our boy throttled back, started a descent clean, contacted the tower for a straight-in approach and declared minimum fuel. The straight-in approach was approved and landing runway given, along with the usual stuff about altimeter setting, "call when you're three out," and so on.

Since it was right at dusk, the runway lights did not stand out too well and this pilot made a beautiful landing on a closed runway and flew, skipped and rolled through trenches, ditches, and I don't know what-all, until he came to a culvert 10-foot deep, 26-foot wide, with an 8-foot mound of dirt on the opposite bank right in the middle of the closed runway. The T-Bird wrestled with the mound of dirt, but needless to say, the mound of dirt won. The control tower was watching for the bird at the approach end of the designated runway but since the pilot didn't use landing lights, they did not see the aircraft until it was too late to send him around.

Okay, so he didn't run out of fuel short of his destination. He had a whole 28 U. S. gallons left and he would have had it hacked if he hadn't landed on a closed runway. Sure he would have! And had he personally checked the NOTAMs he would have known that that particular runway was closed. And if he hadn't been in a sweat on fuel he would have made a normal overhead pattern and would have seen the lights on the *other* runway; several more "and if he had of's" could be added.

Is 28 gallons—or even 55 gallons—sufficient fuel for 20 minutes flight at 10,000 feet? Paragraph 33c *(2)* of AF Regulation 60-16 states: "In no case will fuel reserve be less than that required for 20 minutes flight. For clearance purposes, the fuel reserve over destination will be computed from the Maximum Endurance Chart at 10,000 feet fuel flow with all engines operating as shown in the applicable Flight Handbook for the type, model, and configuration of the aircraft concerned."

Referring to the T-33 Flight Manual Maximum Endurance Profile Chart on page A5-4, it shows that a T-33 with empty tips can loiter at 175 knots CAS at 72 per cent rpm at 10,000 feet. And the fuel flow will be 240 gallons per hour. Now, one doesn't have to be a mathematician to divide 240 by 3 *(20 min. fuel)*. No matter how you look at it, it comes out to 80 gallons. And 80 gallons is pretty cotton-pickin' close to 10 per cent of the fuel capacity of the T-33. And the intent of AF Regulation 60-16 is that you have 10 per cent fuel reserve but not less than 20 minutes.

So, the next time you are planning a cross-country flight and you compute your AF Form 21A and find that you can't reach your destination *(VFR)* with 80 gallons, or your destination plus alternate *(IFR)* with 80 gallons, *you're not legal*. Best you fly a shorter leg. ▲

A real pro team was glad to get home. Kneeling, l-r, Major C. A. Dryer, Flight Examiner; Major Paul D. Floyd, Aircraft Commander; the author, Major J. L. Tissue; 1st Lt. Robert W. Ginn, First Pilot. Standing, l-r, SSgt Richard K. Baker, Loadmaster; TSgt William W. Willis, First Engineer Technician; 1st Lt. Lee B. Savage, Navigator; 1st Lt. James G. Wilhelm, Navigator; TSgt Raymond L. Jolly, Flight Engineer Technician; A/1C Milo V. Gillaspy, Crew Chief, and MSgt Harold A. Burks, Flight Engineer Technician.

**He is many things but most of all the real pro is . . .**

# THE FINISHED PRODUCT

One fine day not long ago the boss nonchalantly came out with "How would you like to go to Europe?" "Let's see, it's 10 o'clock now, I doubt if I could be ready before noon." It turned out the boss had been working on a deal with MATS to make an Atlantic flight as an additional crewmember in order to do an article on Aircrew Professionalism and the C-133. After the arrangements were complete, he found he couldn't hack it, but the invitation still stood. With tears in his eyes, he watched my pre-leaving arrangements. The people at the 1607th Air Transport Wing *(Dover)* had said, "Be glad to have you along." They also had advised me to bring my passport, dog tags, an up-to-date shot record *(this meant getting four shots and a vaccination)*, oxygen mask, TDY orders for 15 days, flying clothing, and civilian clothes. Civilian clothes! Sacre Bleu! Paris here I come! There were C-133 flights leaving Dover on the 5th to Mildenhall, England, on the 7th to Chateauroux and another Mildenhall trip on the 8th.

Finally, everything was in order. Almost, that is. Instead of driving a T-Bird to Dover, I could look forward to 14 hours in a C-47. How lucky can you get! But in every cloud there's a small ray of sunshine. This gave me a chance to find out a little bit about the C-133. At least I'd know the proper door by which you mount this half jet—half conventional—flying machine. Passing slowly over Arizona and New Mexico, I learned that this latest cargo addition to the USAF inventory is quite an airplane. It's over half a football field long and the wing span is even longer. Any way you cut it, that's a big bird. Power is from four Pratt & Whitney turboprop engines *(T-34)* capable of producing a total of 26,000 equivalent shaft horsepower. Design gross weight is 275,000 pounds. Remember when a 40,000 pound airplane was considered enormous? You mount the bird from the right forward side via convenient steps. From the cargo compartment a stairway leads to the flight deck. That's enough statistics for now. I know what it looks like and how to get into it.

Let's see now, I'm supposed to write about aircrew professionalism. Just exactly what is it? Couldn't find a good definition of it. The Air Force dictionary doesn't carry a definition at all. Webster says, "a professional is skilled, trained, expert, finished, paid or hired"; also, "as opposed to the amateur." Not too bad for a start. Let's add judgment, technique, maturity, teamwork, discipline and the stamina to perform the mission. These, then, are the necessary ingredients that make a professional aircrew. Just as in a good cooking recipe, if you leave out one essential element the result may be completely amateurish. These are the factors I would look for. Maybe I'd find them, maybe I wouldn't.

The letter from the 1607th ATW had advised me to contact the Wing Chief of Safety, Major Thompson, after arriving. Let's see now, it's 1430, might as well give him a call before going to the VOQ. Maybe I can get in a

1st Lt. James G. Wilhelm, Navigator, completes a celestial shot. Celestial navigation is primary method on extended overwater flights.

couple of hours background work before they knock off work. Little did I know!

"Hi, Doug. This is Eltey here."

"Who?"

"Jay Eltey from Flight and Missile Safety Research at Norton. Just got in and I'm still at the terminal. Thought I'd give you a call before I went any farther."

"Glad you did. Stay where you are. Be right over."

After the greetings and salutations were over we went over to the Transport Control Center, where Major Ben Armstrong is chief honcho. It's best to stop here and explain to the non-MATS types something about the Transport Control System. This system was established to provide MATS commanders operational control over aircraft and insure preventive action in flying safety at all times regardless of location. I really like a particular paragraph in the Transport Control Manual. It reads, "a calculated risk in MATS peacetime operations will not be fostered, condoned, or accepted." This philosophy is quite evident in all operation and support functions in MATS and undoubtedly plays a major part in the fine MATS accident rate of 1.9 per 100,000 hours.

To make the system work, Transport Control Centers *(TCC's)* are set up at headquarters, areas and bases throughout MATS world-wide responsibilities. The TCC's are best described as the nerve system of MATS. The functions are many, diversified, and important. Just to give a quick and partial rundown: they control, direct or coordinate such things as ground handling, flight progress, communications, weather watch, crew duty time and flight advisories. Let's end by saying that the system works like a well-oiled machine. It gives the commanders the control they need and provides safety, economy and efficiency in operations.

Meanwhile, back at TCC, Ben suggested that I take the flight which was blocking at 2330Z rather than wait over.

"This should be a good one for you," commented Ben. "Major Paul Floyd is the Aircraft Commander and he's up for his semiannual line standardization flight. Major Charles Dryer is the Flight Examiner."

"Fair enough, where and when do I report?"

"Three hours before block time the crew is alerted [*block time is considered as the time when chocks or blocks are pulled from a departing aircraft or replaced on arrival*]. That's now, so you're hereby alerted. Have a good trip and I'll see you in two or three days."

What's wrong with this guy? We'll spend at least two or three days in jolly old England, or else I won't get to London. He must be kidding.

Before briefing, I nosed around a little bit to see what I could find out about the AC, Paul Floyd. His Form 5 showed over 9000 hours—not bad for a start. Started flying the C-133 in August '58 (the 39th ATS got its first bird about a year earlier.) Averages 70 to 80 hours a month. He looks good to me. Time to get over to TCC. Here we are—all eleven of us. Eleven? How come? Let's see now, the AC, Flight Examiner, copilot, two navigators, two flight engineers and the loadmaster—that's a normal crew for an extended flight. But on this trip there was a student flight engineer, and a crew chief. I noticed that the officers were in class "A" uniform; shined up, creases, the whole bit. Was this a little "put on" for my benefit? They looked like they were going to a party rather than on a grueling 14½ hour mission.

**The introductions over, the show got on the road.** The 10 professionals went to work with one thought in mind — to perform the mission as efficiently and as safely as they could. There was no panic or last minute gaggles. Unlike the amateur, they didn't run around wondering what they were to do or how to do it. Each team member had been well trained many years for the job he was to do. It was kinda' like giving Sam Snead a set of golf clubs and saying, "Sam, go out and play a good round of golf."

First, we all signed in. Then the crew went over to the briefing room where the TCC navigator gave them the essential details, such as trip number, aircraft number and ramp location, fuel on board and fuel required to the first landing at Harmon. Also covered was pre-departure information, route to be flown, weather, destination and alternate, pertinent NOTAMs, restrictions on airfields, procedures inbound to penetration points, danger and prohibited areas en route. The briefing ended with specific information on crew staging, crew duty time and an emergency UR on the C-133 nose wheel.

Now came the Aircraft Commander's final briefing of the crew. *(The detailed briefing had been before my arrival.)* Major Floyd didn't waste his breath either. It went something like this: "This is a 'special mission.' [*Ed. note—cargo and destination are classified*] Dover to Harmon to 'destination' to Mildenhall. If we have enough fuel we'll go direct to 'destination' from Harmon, then on to Mildenhall for crew rest. Loadmaster, since we have more than 10 crewmembers, install two seats in the main cabin. Check with each officer two hours before each takeoff and see if he wants a flight lunch for that leg. Check your cargo. Fill out the Form F *(WT and Balance)* and let me know at once if there are any discrepancies.

Transport Control Center navigator briefs crewmembers on route, NOTAMs, penetration points, and the predeparture information.

## *The Finished Product (Cont.)*

Second pilot, make the exterior and interior preflight and report back to me. One of the navigators check all navigation equipment aboard. Engineer, run your preflight and let me know the actual fuel on board. Anything which might delay our blocking time report to me at once. That's all. Everybody have at it." They scattered. One hour 40 minutes to block time.

**Slowly but surely it all fell into place.** The endless pre-departure forms were completed. The Dash One was pulled out. The AC and Flight Examiner went over the charts in the appendix to get the ground run, torque pressure determination, refusal speed, velocity during takeoff roll, and the go-no-go speed tolerance.

The reports came in—everything checks out, over to Weather went the Aircraft Commander, Flight Examiner, Second Pilot and both navigators. The weather briefing was thorough and comprehensive. The weather isn't too good at Harmon. The AC makes his decision—we're going. All the paperwork turned into TCC, clearance signed, the 175 to Base Operations and 45 minutes to block time. Time for a quick cup of coffee.

Thirty-five minutes to block time and it's pitch dark. Once in the airplane we get out of these class "A's" and into flying suits. The AC, still under the Flight Examiner's *(let's call him Chuck from here on 'cause that's his name)* close scrutiny makes his own check of the bird. We look here and there, checking and checking. It begins to get real noisy.

"What the devil is all the noise about?"

About half way down the fuselage on the left side, Paul raised a couple of doors and pointed.

"Those are the two GTU's *(ground turbine units)*. They use the same fuel as the main turbines. From these we get pressurization, air conditioning, preheat and power for starting the main engines. They also drive the hydraulic pumps and operate the auxiliary alternator. Without both of them operating we don't go."

Mounting the steps to the flight deck you have a fine view of the cargo compartment. Gad, what a cavern; 13,000 cubic feet and it's all pressurized. Aboard is a payload of 69,000 pounds and there is still space left. We can't take any more on board though because the takeoff from Harmon will be at maximum gross weight.

Everyone is in place. The copilot begins with the before-starting checklist. With an eleven-million buck aircraft, 11 lives, plus several million dollars' worth of cargo, you can't afford to miss a thing, and they didn't. The copilot challenges each item—the pilot responds. The engineer and navigator have completed their checks. One by one the jet engines whine to life, the props start turning. Before taxi checklist complete.

"Pull the chocks." It's 2330Z. We've met our block time.

"Copilot. This will be a standard MATS C-133 takeoff. Set No. 1 ADF on Dover beacon, No. 2 ADF on the outer marker of Dover ILS in case we have to return to base after takeoff. We'll make a left turn after takeoff, intercept R-77 and proceed to Port Norris, climbing to 14,000 feet per departure clearance.

"Navigator, listen on UHF and VHF during takeoff, climbout, descent and landing. Copy the departure clearance and let me know if it's not repeated back correctly.

"Loadmaster, after takeoff you will check the cargo for security."

**The AC finished his pre-departure briefing.** We started to taxi. There were two wingwalkers and a crew chief guiding us out to the taxiway. The IFR departure was the standard Dover departure. En route clearance was as filed. The engine runup checklist now—everything in order. The before takeoff checklist came next. The engineer reports his takeoff checklist complete. We're cleared into No. 1 position for takeoff. All four engines to 25 PSI torque, release brakes, maximum power and we're rolling. This bird is sure slow accelerating. That's what I thought until I checked the airspeed—we're at 70K already. It's the size of the machine that gives the impression we're not going anyplace. At 108K light pressure on the wheel and takeoff attitude is assumed. At 122K we lift off, altimeter on the rise, airspeed increasing, gear up; 142K—flaps up. Airspeed increased to 180K and power was reduced to normal rated. Left turn now—we're on our way for good.

At 14,000 we level off and reduce power to cruise (based primarily on a true airspeed of 260K—torque, fuel flow, EGT and per cent RPM figure in this setting). The true airspeed indicator is setting right on 260K. To Harmon the route is airways with good radio aids all the way so the navigators can take it easy. They monitor radar for thunderstorms and take fixes if needed. There goes New York City on our left. It's only a 4½-hour flight into Harmon—should be in around 2300 local time. The crew settled into a relaxed well-trained routine. Those who had duties were alert, the others ate their dinners, drank coffee, read, or hit the sack. (There are two good bunks on the flight deck and two noisy ones in the cargo compartment. With ear plugs and a tired body you can sleep pretty good downstairs.) Half an hour out of Harmon, people started moving around.

"Just talked to a Connie that was inbound to Harmon and he's diverting to Goose," the AC told me. "Right now they've got 300 feet and one mile in light rain and fog. That's right on their GCA minimums. Goose is expected to hold above alternate minimums, and . . ." Harmon approach broke in giving us en route descent instructions. Just before Approach Control turned us over to GCA the AC gave his descent briefing via interphone.

"We'll make a standard MATS GCA at Harmon. Landing minimums are 300 feet and one mile. Existing weather is 300 feet and one mile. Navigator, call out 500 feet absolute. Copilot, call out 100 feet above minimums. That's 486 feet. Call out when minimums are reached, also runway in sight, right or left. Warn me anytime the airspeed is 5 knots high or low on final. Our gross weight is 228,000 pounds. Airspeed on final will be 145K, flare at 121K and touchdown 112K. I'll reverse all four. Any questions?" There were no questions. Boy, when the weather troops at Harmon say 300 feet, that's what they mean—we broke out at 390 feet indicated. Sure is nice to see the airpatch all lighted up, kinda' like a candle in in the window back at the farm.

"Paul, why did we waste so much time looking for a place to park?"

"With 179 feet between wingtips, if one set of wheels is one inch lower than the other, the wingtip on that side will be down 17 inches. That can mean you may not be able to get 500 gallons of fuel aboard that you could if the wings are level. And we are going to need all the fuel we can get aboard for this next leg."

As we shut down, a whole "gang" surrounded the airplane. Fuel and oil trucks were ready to go. Gallons of fresh hot coffee were put aboard. The aircraft was policed. Forty-five minutes before we landed the AC had radioed in that the VHF was acting up. [*Ed. note—Aircraft status is given well before landing so that parts and technicians can meet the airplane.*] There was a radioman with a replacement VHF set. A crew transport bus was waiting.

**Now what was going on?** Darned if they weren't shucking their flight suits and getting into class "A's." What the hell! We're just going to eat and file a flight plan. Well, when you're in Rome . . . and there we were, all dressed again like we were going to a party. One thing you've got to admit, we look like Air Force people, rather than escapees from a boiler room. Maybe it's like the razor ad says, "Look sharp, feel sharp, be sharp."

My stomach and the clock said it should be late dinner time but we must have eaten breakfast since they served eggs, bacon, creamed beef and cereal. Back at the TCC, the flight plan showed that Major Floyd was right about the fuel. To get to 'destination,' alternate, plus reserve, we'd be grossing 275,000 pounds at takeoff. Again each crewmember went about his duties in a quiet business-like way. I looked over everybody's shoulder during this *most* important facet of the flying racket—preflight planning. Each one knew what to do, how to do it, and then he did it. This shows me a lot.

Down time at Harmon was scheduled for three hours total and exactly three hours after we landed we were airborne. Our first altitude was 15,000 feet. As we burned off fuel and the bird got lighter, we'd step climb to 21,000. The navigators get a good chance to display their skill on this leg. Every 5° longitude or every 10° if the flight time doesn't exceed 1 hour and 20 minutes a position report must be made to Oceanic Airways. The position report also gives endurance, winds, and weather.

I asked the Navigator, Lt. Lee Savage, what, if any, was the primary method of keeping us on course.

"Celestial navigation is primary," he said. "For a secondary method, we use pressure pattern, LORAN and any radio aids we're able to receive. Here's something that might interest you. We call it "How Goes It," but it's really a chart showing fuel consumed for the distance we've gone compared to the proposed fuel. If the two lines are together we're on the money. But if the fuel used line goes higher than the proposed line and stays there, we get real concerned and make plans to divert. Also there is a point on the chart called PSR—Point of Safe Return. It is here the AC must decide whether to continue to destination or return. This decision is based primarily on the "How Goes It." Once the PSR is passed you don't turn around; you're committed.

**And again the inflight routine sets in.** The loadmaster periodically checks the cargo for secureness. The pilots swap off positions. I take a hand at driving the big bird. The controls are pretty sensitive for a craft this size. The seat tilts and moves in most any direction you want. The heading indicator is huge—no trouble holding a heading.

We've step climbed to 21,000. Flying to the east the night is short and it's already dawn. We're on top of the overcast. The bird wallows some in clear air turbulence. Five more cups of coffee and we spot the coast line of Scotland. From here we'll be on airways. Many frequencies later we're on another GCA into the classified destination. It's 1530 local time, Friday. We've got to offload the cargo and refuel before dark because the RAF people who run the base quit and go home until Monday morning. We'd be stuck and it's a long way to London from here. There's no dilly-dallying. The back end of the '133 opens wide and out comes the cargo. Fuel goes aboard—plenty of it.

We're off again. Mildenhall weather holds up and we're down at 1830 hours. Now the crew rest starts—this is for me! Then came the rude shock—crew rest is 21 hours. We'll be alerted for the return flight at 1530 tomorrow! Great balls of fire I can sleep that long. "J. E, the only way we'll get to London is to have the airplane break real good, the English fog sock in tight, or get 'bumped' by the '133 crew that's ahead of us. If their bird goes sour they take ours and we wait for theirs to be fixed."

Major Floyd finished with, "Either that or we bump the next crew in." The tears were flowing freely down my tired cheeks as I once again manfully shrugged into class "A's." What would old C. Z. Chumley do in a case like this? I brightened at the thought. Friday night! It's two for one night at the club. I'll drown my sorrows in lemonade! Four or five lemonades and a lobster dinner tucked away, I realized that I hadn't had a real bed under me for—what was it? Two or three days? London didn't quite have the appeal it once had.

Sure enough, at 1530 the next day, we were alerted. The airplane was in fine shape, the weather perfect, and the crew ahead of us had just taken off so we wouldn't be bumped. Two hours before block time we're at the TCC. As before, everything whips into shape. Flight plan, preflight, weather, load, more forms, briefing, go to the bird, change clothes, inspect, checklists, forms, checklists. Again I become aware that these troops are real professionals. Not one detail is forgotten, overlooked, or pushed under the rug. Check and double check. They put their long training into actual use. They are doing the mission safely and efficiently.

**Block time is 1830 hours.** We blocked at 1830. It's dark again as we leave Mildenhall. Airborne for Dover you can see the fog starting to blanket out the towns. The flight to Dover was very similar to the other legs. It might be exciting to have reported engine failure, feathered props, electrical failure, or some other emergency but it just didn't happen that way. We did run into a good bit of weather, encountered St. Elmos fire for a while, some ice and some rain. The navigators teamed up to help insure they hit COD intersection on their estimate. *(COD is a point over water which is a controlled penetration point to the ADIZ. Miss it by 5 minutes and/or 10 miles and the AC gets a violation.)* Nantucket Island shows up —we've been over water for 11½ hours. Another GCA into Dover and we're back—mission complete. It's 0500 and still dark. How about that? We took off in the dark, flew 14½ hours and it's still dark. Sack, here I come!

Well, I'd gone looking for aircrew professionalism and I'd found it—but good. I had found skill, training, expertness, *the finished product.* I'd also seen maturity, teamwork, judgment, ground and air discipline and stamina. This typical MATS crew was not amateur.

There are professional aircrews and aircrew members throughout the rest of the Air Force. SAC, TAC, ADC, USAFE, and the rest have them. *How about you?* Could you pass the test? If you're flying an airplane for the Air Force you're not an amateur but ARE YOU REALLY AND TRULY an honest to God professional? ▲

# ★ OPERATION STAR BLAZER ★


**Brig. Gen. Avelin P. Tacon, Jr., Commander 831st Air Div. (TAC) George Air Force Base, Calif.**

Operation Star Blazer was conceived, planned and executed with only one goal in mind: to prove the capability of the F-104C to deploy nonstop to overseas areas. Not until this capability had been demonstrated successfully could the Star Fighter be considered a full-fledged member of the Tactical Air Command weapon system.

The actual deployment flight was an anticlimax because, as in any successful operation, most of the hard work had been accomplished before the first aircraft was airborne on the deployment. Our preparations for the Star Blazer flight were broken down into a series of these logical steps:

- Plan the profiles and decide upon the best one.
- Correlate the cruise control figures in the Dash One to formation flights.
- Decide upon a configuration for the flight.
- Flight test the entire profile and configuration in the same size formation that we would use on the trip.
- Pick the pilots and give them whatever extra training might be considered necessary for the flight.
- Prepare the aircraft.

Deciding upon the profiles was a time consuming job. The route to be flown was the standard Tactical Air Command deployment route through the central Atlantic from Myrtle Beach AFB, South Carolina, to Moron, Spain. Various combinations of refueling areas and recovery bases were discussed. The recovery bases along this route are rather limited so the discussions were more concerned with the minimum fuel requirements that we should establish for aborting aircraft. We did not want to use the minimums established for our other fighters because our F-104/J-79 combination has better fuel consumption at light weights—when you're sweating out those last few pounds—than other fighters seem to have. Less fuel is required for the instrument letdown and GCA pattern so we felt that we could safely establish lower fuel minimums, thus increasing the probability of getting all the aircraft over without compromising safety in any way. In profile planning for a deployment such as this, the recovery fuel minimums are the baseline from which we work to plot our refueling areas.

Our concept of peacetime deployments does not include air refueling beyond the point of no return. After trying several combinations, we finally decided upon a profile which met the essential conditions of safe fuel minimums over recovery bases and destination, including weather


Above, General Weyland accepts the first F-104C from Lockheed Vice President Burt C. Monesmith. Below, 1st Lt. David L. Perry, George AFB, briefs crewmembers on use of personal equipment.

Above, one of the three refuelings that enabled General Tacon's flight to fly nonstop to Spain. Below, to the victor go the spoils. General Tacon is blinded by the beauty of two welcoming Senoritas.

alternates, and the minimum number of refuelings compatible with this so that we would not waste tanker sorties. The mission profile and the exact location of refueling areas is classified information, but in general terms, the refuelings were in the Bermuda and Azores areas.

While performing the profile planning, we were verifying the Dash One cruise control figures. Every fighter pilot knows that the difference between fuel consumption for the leader and for Tail End Charlie can vary from quite a bit to ridiculous. What we needed were averages for the formation, as well as techniques that would reduce to a minimum fuel variances between the different formation members. As our plan called for deploying in a six ship section, this was the size formation we were interested in.

After many trial flights in two ship elements, we finally came up with what we considered the optimum configuration and profile. The next step was to test this on a simulated deployment flight to Moron, Spain. The total distance over the planned route from Myrtle Beach to Moron is 3672 nautical miles.

The next step was to get out the map of the Western United States and figure a simulated deployment route that would give us the exact total distance and properly timed refueling intervals. As we had only one refueling area that could be used for this operation, all the flight lines had to converge periodically on this one area.

Anyone who doesn't believe it is a problem should try laying out a flight route under these conditions, especially when the entire route must be kept in the general West Coast area so that in the event aircraft do abort they are not strung out all over the country. After all of the lines were drawn on the map, picking another name for the exercise could have been a cinch—Operation Spiderweb!

**Finally we were ready,** and a practice mission was laid on. Tanker sorties were allocated, ATC clearances obtained, and data cards given to each pilot to record the cruise control information we needed. The flight was to be made with six primary aircraft, with two spares going to the first refueling area northwest of Las Vegas. We planned on having two aircraft abort to Nellis AFB to test our planning figures for aborting aircraft.

It would be nice if we could say that the practice mission went well and according to plan. It didn't, not by any stretch of the imagination, which is probably why we have practice missions. We were plagued with aborts, both receiver and tanker, so we plotted quite a bit more data on aborting aircraft than we either planned or wanted. We did get four F-104Cs around the entire circuit, however, and obtained the formation cruise control data we needed. With our planning figures confirmed, we knew the flight was feasible. Only one other factor had to be considered before we requested authority for the flight: aircraft and engine reliability.

The first F-104C arrived at George Air Force Base, California, in October, 1958. As is usual in a new weapon system, we had aircraft and engine problems. Before launching on a transatlantic flight we wanted to be sure that the aircraft and engine were ready, that we were not rushing things. Nothing can set a program back faster than dumping an aircraft in the Atlantic somewhere off the Azores on its maiden deployment flight. This line of reasoning was not entirely objective, either: there were eight pilots who took a rather subjective viewpoint of this aspect of the exercise!

Five of the six pilots making the trip are shown, l to r: Capt. John S. Burklund, Capt. David G. Harston, 1st Lt. Robert Cordle, Maj. Robert O. Shimp, Gen. Tacon. Missing is Capt. David B. Clardy.

Our greatest problem with the aircraft had been afterburner nozzle failures while in flight. A fix had been made which an accelerated flight program on selected aircraft had verified. We were convinced that neither the aircraft nor engine would let us down, so authorization for the flight was requested. We received approval and 25 August 1959 was the date set for departure.

**On 23 August 1959,** we left George AFB for Myrtle Beach with 10 F-104Cs. The plan—to fly nonstop with one air-to-air refueling near Wichita Falls, Texas—went according to calculations, except for one aircraft which exceeded fuel minimums for hookup and had to abort into Tinker AFB, Oklahoma. This aircraft rejoined us at Myrtle Beach the next day. The flight from the air-refueling area to Myrtle Beach was uneventful. Our en route maintenance team arrived at Myrtle Beach shortly after we did and the aircraft were turned over to them for final preparation for the flight.

Launch hour was set for 1000 Zulu time, 0500 local. This meant a predawn takeoff and join-up. In anticipation of this we had given every pilot a recent afterdark takeoff. Although our weather in the desert is almost always clear, the nights are pretty black, so we had been able to get some black-night, no-horizon takeoffs. Training like this is mandatory for predawn takeoffs in a coastal area such as Myrtle Beach. As it turned out, we didn't need the extra training because the weather for our predawn takeoff was clear with a final quarter moon shining. But we were prepared for the worst.

On the afternoon of 24 August we held a general briefing to go over the mission once more and to re-emphasize the air rescue portion of the flight. Although we had covered these things at previous briefings at George AFB, we again went over the en route air rescue facilities and communications, and the proper techniques for overwater bailout so that the maximum chance of pickup would be assured. Since this briefing was given by local air rescue people, we were certain the information was accurate and up to date.

At the termination of the general briefing we went into crew conditioning. Myrtle Beach has the best crew-conditioning facilities I have ever seen; the base is to be complimented. The facilities are in a permanent building near the hospital, completely air conditioned and completely blacked out. The convenience and comfort this affords can be appreciated only by those who have tried to sleep in the middle of a hot, bright summer afternoon, before an important mission!

Briefing was set up for 0200 local time following flight planning at 0100. Actual flight planning for all flights was performed by the mission leader and mission operations officer. I am a firm believer in having the mission leader do the final planning and take care of making out the flight plan and log. This is the only way he can get a feel for the mission. There is nothing worse, in my opinion, than just handing a mission leader a flight log, strapping him in an airplane, and giving him the go signal.

**The final briefing was not too long.** It covered only last minute details on direction of takeoff, form-up, and times and fuel consumption figures for flight logs. We allow plenty of time between briefing and start-engines so that the pilots are not rushed during their preflight walk-around inspections of their aircraft. We believe that on missions such as this the pilots should be fastened in the cockpit and have completed his final cockpit check at least five minutes before start engines. This gives him time to settle down and get all squared away for the mission; it is not the time or place for hurrying!

Takeoff, by individual aircraft, was on time. As previously mentioned, the weather was clear with a last-quarter moon. The F-104 accelerates rapidly on takeoff and is extremely hard to spot in the dark; this makes night join-ups difficult. Our join-up was spotty, with one or two elements together and some separated. Since we had anticipated this, we'd arranged for the nearby radar stations to vector us together for join-up. The GCI station did an excellent job and in about 10 minutes we were in formation—six primary and two airborne spares—and on our way.

About 20 minutes prior to our first refueling, we established radio and radar contact with our tankers for vectors and ranges to the rendezvous. We made visual contact and hooked up without incident. Drop-off was effected at the predetermined coordinates and the six primaries continued on to the next refueling. Two somewhat disappointed airborne spares turned around and headed back to Myrtle Beach.

The other two refuelings were exact replicas of the first. Radio and radar contact with our tankers was excellent; we were vectored to the rendezvous points without any problems whatever. Our experience had been that air-to-air refueling hookups in the F-104 were comparatively easy. It was certainly verified on this flight.

The weather was clear throughout the flight, with the exception of about 15 minutes of instruments in some high cirrus. Landfall off the southwest tip of Portugal was made on time; 7 hours and 22 minutes after takeoff we were over the high cone at Moron Air Force Base. After a formation fly-by, we landed a little tired but very well pleased with the entire operation.

The return flight was as uneventful as the flight over. We did experience one day's delay because of weather at an alternate air base in the Azores, and then several days' delay due to higher priority missions going through and using our tankers. On 2 September, at 1000 Zulu time, we launched for Myrtle Beach. Just 5 hours and 30 minutes after takeoff, we were over the high cone at Myrtle Beach.

After a rapid turnaround, we departed for Tinker AFB as the next stop on the way home. At Tinker, we all seemed to run out of steam simultaneously, so rather than risk a tired-pilot type accident, we decided to fold up for the night. The next day we had to wait out a typical Oklahome thunderstorm before we could get off. It was here that our first aircraft went out of commission. We had gone all the way to Spain and back to Oklahoma without an abort or any trouble. Perhaps because of the soaking from the hard rain, when we started engines one of the aircraft had so many warning lights flashing in the cockpit that it looked like a pinball machine! Leaving the broken bird at Tinker, the five remaining aircraft proceeded to George AFB without further incident.

The ease with which the deployment was accomplished certainly belied the hard work that many people put into the preparation. Maintenance personnel spent long hours both in support of the preparatory training missions and in readying the aircraft for the actual flight. The pilots, too, expended many hours both in training flights and in ground training. We tried not to overlook any possibility that might contribute to the successful execution of the mission. For example, we had the pilots perform in the instrument trainers all of the published instrument letdowns along the route and at the terminals so that they would be familiar with them in case of recovery in weather. We practiced wet dinghy drill to polish up our techniques in releasing the parachute canopy disconnect and in getting into the dinghy. This drill also served to test our anti-exposure suits for leaks. Although predicted water temperatures indicated no requirement for the suits, again we wanted to be prepared. It was fortunate that we tested the suits because most of them leaked.

The myriad of little details such as these can mean the difference between success and failure. Once the mission is launched, you are entirely dependent upon the effort you have expended in preparation. You just can't beat the timeworn concept that having well-trained pilots flying properly maintained aircraft on well-planned missions will inevitably result in successful operations. ▲

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# CROSSFEED (continued from page one)

### Helmets

I am a crew chief on T-33 aircraft and during the past few months have noticed what I think could be a hazard to flying safety. It's about helmets. I have in mind the glaring mistake that 9 out of every 10 pilots make as they leave the cockpit after a flight.

I've watched pilots extract themselves from a T-Bird cockpit and leave their helmets perched on the control stick grip. The stick rests in the forward position and with the numerous projections sticking out from the sides and visor on the helmet, all it takes to stir things up is a good gust of wind, or a line mechanic to move the ailerons or visually check the elevator control surfaces on a walk-around. The control stick really bangs things around if the controls are moved without first checking the cockpit. All sorts of things happen, such as broken instrument glasses, broken or damaged helmets, to say nothing of the possibility that one of the protruding objects on the helmet could very easily hit the tiptank jettison switch. Then someone wonders why the tiptanks fell off.

In several instances I've had to replace broken instrument glass; this does get tiresome. More important to me, however, is the danger that could result from this treatment of the helmet. I suggest that this hazard be eliminated by properly using the helmet bag which Personal Equipment provides for just such a purpose.

Here's thanks for a topnotch magazine. Keep up the good work!

A/2C George Markl, AF18514797
3560 Fld Maint Sq, Webb AFB, Tex.

★ ★ ★

**Without warning, these eleven F-100 pilots of the 4515th Training Squadron, Luke AFB, were given a test in flying safety procedures in the F-100 aircraft. Lt. Col. Waring W. Wilson (standing), chief of a survey team, Fighter Branch, DFMSR, made the surprise visit. Tests will also be given at other bases. Oh yes, the Luke pilots passed!**

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### MA-2 Life Preserver

The top picture (right) of an MA-2 underarm life preserver shows Murphy's Law applied to the installation of a carbon dioxide cylinder which will prevent inflation of the cell.

This particular item was found in use by an unsuspecting Flying Safety Officer during a demonstration, in the base theater, of the proper use of personal equipment to all pilots of the wing. Consequently, we had an impromptu demonstration of the oral inflation procedure.

Capt. John C. Trobaugh
FSO, 81st Tac Ftr Wing
APO 755, New York, N. Y.

*The photograph at right, showing the correct way to install the carbon dioxide cylinder, was furnished by the Personal Equipment Section, Norton AFB.*

# Discipline vs Disciplinary Action

**Colonel Gerald G. Robinson, Commander, 95th Bomb Wing, Biggs Air Force Base, Texas.**

I have never seen *discipline* mentioned to a group of people without an immediate reaction indicating thoughts of Courts Martial, Articles 15, reprimands, extra duties and loss of stripes. We all seem hesitant in the use of the word because it somehow conveys the atmosphere of punishment. To the contrary, in my mind, *discipline* is the finest insurance against *disciplinary action*.

Every organization in the Air Force can look back on incidents and near accidents experienced over the past few months and see clear-cut examples of the results of discipline and/or lack of discipline. For example, on a recent T-33 flight, the pilot experienced gear malfunctions and loss of DC power. By proper analysis and application of emergency procedures, he managed to land the aircraft safely at his destination. While remedying the above discrepancies, Maintenance discovered that the canopy thruster had been deactivated. The discrepancy had not been entered in the 781-2, yet the aircraft had been inspected and released for flight. The possible results are obvious. Had the pilot been forced to eject, one more fatality would have been added to the statistics. The cause would have been "lack of maintenance discipline."

Contrast the above incidents with the one where the pilot experienced engine malfunctions on all 8 engines on a B-52 at 42,000 feet. He immediately took steps to analyze the difficulty. Having studied all pertinent data on fuel icing problems, he immediately followed the proper procedures, obtained the proper clearances and landed his aircraft without further incident. The basis for this splendid performance was personal discipline in maintaining professional skills.

On the face of the problem it may appear that different disciplinary rules are being illustrated—but are they? Each man in the Air Force is faced with the need for attaining an ever-higher professional skill level. He must direct his efforts into the most productive channels. A cursory glance at a tech order prior to accomplishing a given maintenance procedure, for example, is not sufficient. Instead, the tech order must be studied, the work program laid out, and proper inspection procedures and sequences established and accomplished. This is true of every job performed in maintaining, inspecting or operating our aircraft, and can only be done by disciplining ourselves to learn and apply the knowledge gained. *Self-discipline* is the "before the fact" action that prevents the unsafe act or hazardous condition. *Disciplinary action* is remedial in preventing recurrence by the same personnel, and is "after the fact" action brought about by an original lack of self-discipline.

We speak constantly of many types of discipline: *flight line*, *supply*, *maintenance* and *aircrew* discipline. To me, they all add up to one basic discipline, namely *self-discipline*.

The individual who establishes a high standard of *self-discipline* and lives up to it, automatically and without special effort, usually lives up to the same high standard in all other types of discipline, no matter what his job may be.

The individual who operates his vehicle carefully—in compliance with all traffic regulations and with consideration for others — is the individual who can be depended on to take a few extra minutes to properly check out the job he is doing on an aircraft—to inspect it and properly document it in the 781.

The character who drives to work at 90 mph through a congested area is probably wearing polka dot socks with his uniform and didn't quite have time to shave this morning, and he is undoubtedly the same character who didn't take time to properly complete, safety, and inspect the job he did on the airplane. This is the same undisciplined individual who let the aircrew down with an incorrect entry on the 781, thereby establishing the potential loss of a multi-million-dollar aircraft and an inestimably valuable crew.

*Discipline* has been described as "that state of training and mental attitude that makes adherence to directives and the following of procedures instinctive under all circumstances." To me that means "to know your job and to do that job safely and to the best of your ability." If every individual did just that, we could meet all requirements in a four day week with no overtime, take a three day weekend every week, and still have a far safer and more efficient operation.

I wonder how many of us realize that the state of discipline and the disciplinary training expected of us today is not much different from that expected of us from the day we were born. To begin with, we were disciplined not to cry too much and then not to be afraid of the dark. Later, we learned about discipline in picking up our toys and keeping our rooms neat and orderly. Next, we started school and learned discipline in getting along with other children and applying ourselves in our studies. Then we entered high school and began to learn *team discipline* when we became part of a basketball or football team.

There we learned that life is not an individual effort but that everything we do depends upon teamwork and getting along with our associates. Along about that time you probably learned more about *self-discipline* the first time you parked your car in the local lover's lane with your girl friend after the school dance. Yes, all our lives we are learning discipline from someone in authority. At first, it is our mothers, then our teachers and then our athletic coaches. Now, it happens to be a senior NCO or officer in the Air Force, but the basic concept of learning discipline from someone in authority has not changed in any respect.

All along the way the lack of acceptance of that discipline has resulted in *disciplinary action* in some form. At first, it was a scolding or a spanking for not picking up toys; then it was wearing a dunce cap or staying after school. Later on, it was sitting out the big game on the bench for not being a part of the team, or a slapped face for not playing according to the rules of personal discipline. When you first got your driver's license you probably got a traffic ticket and a fine for not observing the local traffic rules of discipline. That, too, was *disciplinary action*.

*Discipline* or *disciplinary action*—which will it be? On the T-33 accident described in the opening paragraphs, lack of *self-discipline* on the part of all principals—maintenance men, supervisors and inspectors — brought immediate disciplinary action in the form of reprimands, Articles 15 and removal from position. How much better if *self-discipline* had prevented the error of failing to document the maintenance action on the 781-2, the slipshod inspections, and the over-all poor supervision. A close look at the incident/accident statistics and our own individual organization's activities will reveal any obvious lack of discipline or outstanding self-discipline displayed in day by day operation.

We are constantly reading statements such as:

• aircraft damaged or destroyed because crew did not use checklist.

• aircrew destroyed; crew fatally injured because of nonstandard maintenance practices.

• aircraft damaged considerably because of failure to comply with existing tech orders.

• airman and family killed in automobile accident—driver neglected to observe speed limits.

Each of the situations described in these statements and the subsequent disciplinary actions they entailed could have been prevented by *self-discipline* and/or conscientious supervision.

As we go through life, the penalties for lack of discipline become greater with the years. Now we face disciplinary actions in the form of Courts Martial, Articles 15, reductions or eliminations. Again, may I point out that the greatest insurance against *disciplinary action* is a high standard of *self-discipline*. If we know our jobs and perform our duties to the very best of our abilities, we can save paying the penalties of loss of aircraft or irreplaceable aircrews. You may possibly save paying that greatest of penalties — loss of your own life—*through discipline, not disciplinary action*. ▲

# sound your R's

***Major Wallace W. Dawson, Fighter Branch, DFMSR***

Just got a hot blast from the weather types. Guess this is something we all know, or at least should know, but sometimes don't do. I have in mind the words to use when talking to a forecaster, say on Lucky 13.

The big bone of contention is that too many guys just ask for the "weather at such and such a place." Now, this is just dandy if you are at such and such a place, but then if you are, you wouldn't be asking for the weather at that place anyway. Of course, when a forecaster gets a request such as this, he gives what he's asked to give: the latest available weather observation at such and such a place. To get this weather he must consult the teletype sequences. These can be about Rip Van Winkle's age in some garbled cases. Even normally, they can be an hour old, without even trying.

Now let's take a good hard look at this situation. When we are en route and want to check the weather ahead, we don't really care what the weather has been or is. What we want to know is, *what is the weather going to be when we get there?*

Let's say we are interested in weather 200 miles ahead of us—about 30 minutes flying time—and the forecaster gives us weather that is about one hour old. We have to hold a few minutes, and it takes a few minutes to shoot a penetration. This makes the weather we are actually penetrating about two hours different from the weather we were told about. In a stable situation, this wouldn't make much difference but in a rapidly changing situation, look out! This has actually happened more than once and accidents have resulted because of it. One guy flew 600 miles and every time he asked for destination weather he got the same reply: 7000 scattered, 9000 broken, 8 miles. Imagine his surprise when he got where he was goin' and found 300 overcast and 2 miles in rain and fog. He pranged!

So far, all we've talked about is how *not* to do it. Now, let's talk about how to do it, and I sure wish the solution to all our problems was as simple as this one. All we have to do is remember that when we are talking to a weather forecaster, never to say "weather" unless we say "forecast" before or *after*. Now that's really simple, isn't it, and several T-Bird bashes this year wouldn't have happened if the pilots had done this.

You probably know what happens when you ask for an ETA forecast. You cause the forecaster to dig a little—to think, and to compare—then come up with a *forecast* for the place and time you are interested in. Armed with this information you can make your decision to go on or to land at Amarillo *(or whatever other nice VFR base you're over)*.

So, how about it? Think you can remember to sound your R's—like in *F-O-R-R-R-E-C-A-S-T?* ▲

*Prepare yourself now,*
*for on your next flight it may be your turn to . . .*

# GO CAMPING IN THE WOODS

***MSgt. Keith R. Clemmons, Arctic Survival School, Ladd Air Force Base, Alaska.***

It is wintertime and in the North country the leaves have long since dropped from the trees. Many areas are turning white and still from the inevitable blanket of snow. The birds have disappeared and bear have found their dens. It is winter time! With the coming of winter the potential survivor is confronted with new problems. He must keep from freezing and he must keep warm and dry.

Have you ever considered what a trial of cold weather survival would be like? Does the thought of such a thing make your blood turn cold? Do you get an empty feeling in your stomach? It bothers some people and for good reason. They are of that group who won't admit they might be confronted with such a task. Some of them have already given up. They are like the fighter pilot who successfully crash-landed his plane, got out, looked around, then got back into his plane and blew his brains out. This is a horrible, needless waste. It need not be like that.

Let's discuss some of the things that you can do to insure a successful survival incident in cold climate. We'll assume that you have just bailed out of your aircraft and landed safely and are not hurt. But you are alone.

As soon as you get over the shock of your experience, look around and size up your situation. Most likely the weather is bad, but don't get excited and don't give up! Gather up your parachute and survival kit then look around for a campsite, the basic requirement being a place that will protect you from the elements. A simple shelter will suffice for the time being. If all of this should be going on at night, don't move around very much. Wait until daylight. In your survival kit is a single sleeping bag. If it is colder than −20°, you will probably sleep rather cool. Additional warmth can be gotten by wrapping a few layers of nylon around the bag. It will also help to protect the bag from snow and dampness.

It's a good idea to remove a couple of your flares from the kit and keep them handy in case a plane should come by. If you can locate firewood in the dark you should build a fire. This will serve not only to keep you warm but also act as a very good signal for searchers or other crewmembers, who bailed out with you. You can expect to be quite restricted in some areas due to heavy snowfall. Don't waste your strength floundering around in the snow, particularly at night. Make yourself as comfortable as possible and wait for day.

Fight off the first desires to eat. Most likely you had a good meal within the past few hours, and other than a few hunger pangs you will suffer no ill effects for several hours. Save your food; you'll need it later on.

Comes the dawn and you can see the country around you. It could be that you are in timber or at least near it. Most likely it will be spruce or some other coniferous tree.

The first things to consider are difficult to set down. Should you build a shelter first or should you do something to attract attention? If you have flares in your survival kit the way is clear. Build your camp but keep the flares handy and ready to use.

Your choice of shelters will depend largely upon the materials at hand. Tests have shown that the teepee is the most desirable; but if you are alone it is the most difficult to erect and requires more material. Something simpler might prove to be the wisest choice. A shelter known as the fallen-tree might be your best choice. If you are in country where there are no large trees the willow shelter would be your best bet. We will assume that you are in a heavily wooded area. To build the fallen-tree you must first locate a tree such as a spruce that is fairly heavy with foliage and about 8-10 inches in diameter at the base. Using the tree trunk as a starting point, dig a trench in the snow about 3 feet wide and 7 feet long. Dig down to

A willow shelter as shown at left will keep rain or snow off you and your gear. Make it simple but finish it before night falls. Above, get a fire going — soon. Fire built on green logs will prevent its melting into deep snow. Build fire close to shelter entrance.

the ground. At a point on the tree trunk about four feet up, cut the tree off. Fall it over the trench. If the two butts separate lift the butt of the tree back up onto the stump. Cut the limbs away from the underside of the tree so that you can get back under the tree trunk. This is where you will be lying. Use the limbs that you cut away to thicken up the roof of your shelter. Weave them into the thinner spots. For complete coverage, cover the entire shelter with part of your chute and pile with snow. Before you cover up, though, be sure and remove the last 10-12 inches of each limb on the tree. You will need these limb tips to make your bed. To do this, check your trench for sticks and rocks that might cause hard sleeping. Start at one end of the trench placing boughs, sticking the butts of the boughs down into the moss. Stand the boughs almost straight up and one over the other in a shingle effect. Don't make the bed to large, but just big enough for you to sleep on. Continue this process until you have the desired length. As you use the bed it will mat down. Rejuvenate it by adding new boughs in the same manner. Build a fire at the entrance to your shelter. It is now ready for occupancy.

To build the fire, you should gather all the materials together before you attempt to ignite it. Dry, standing timber 2 to 3 inches in diameter is most desirable. This you can break loose from the ground, and into fire-size pieces by breaking between two standing trees. By doing this you save the energy that would be expended chopping with an axe or snowsaw. Gather quite a little pile together and protect from wetness. After you have acquired a good pile of fuel you will need some tinder. Tinder can be an easily burned material such as birchbark, cattail down, spruce feathers or plain cotton. If none of the tinders are available or are too wet to burn, split a piece of the dry fuel. Split to a size approximately the size of a pencil. Next take your knife and make a pile of shavings about the size of a grapefruit. Place the shavings where you want your fire and light them. After the shavings are lit and burning, add small sticks carefully. Once they are burning, add larger pieces of fuel. Do all of this carefully so as not to smother your fire. Large pieces can be added as though you were building a small log cabin. Don't overdo it by building your fire too large. There is an old Indian adage that says: "White man builds big fire, sits way back. Indian builds small fire, sits close." This is quite often the case. A big fire drives you away from it and burns up too much wood.

You now have a good camp with a tight shelter, a good bed *(very important in cold weather)* and a fire burning, with fuel to back you up.

Your next step is to attract attention. By now you have been reported overdue and a search is being made. There are several ways that you can "yell for help." Remember that nature is a series of lines and designs without rhyme or reason. The first sign of a human is a straight line or disturbance of nature's serenity. A crashed aircraft can be hidden from view in tall trees but an experienced rescue man can spot the plane. He does this by looking for a straight line, broken treetops, snow knocked from trees, and disrupted terrain.

If you bail out, however, you will not have terrain disturbances. Many parts of the North are covered with scrub spruce only a few feet high. In the dead of winter these trees are covered with snow. All you have to do is shake each tree a couple times and in a short time

Above, without axe, dry fuel is broken between trees. Collect firewood to last through night. Avoid trying to burn green or live trees. Below, if you've eaten before takeoff, you won't need food for several hours. If hunger persists, drink water or coffee. Save your rations!

you have a good signal. I have even seen crews spell out words using this method. Another thing you can do is to spread your chute, or parts of it *(if it is colored)*, out on the ground. Some crews that I have worked with made flags which they raised on the ends of tall trees. These are very noticeable from the air. If you are near a lake or river that is frozen over, you can lay out symbols of the Ground-to-Air Emergency Code. One crew I helped to rescue had a large "O" laid out on a lake. Instead of making the "O" a solid circle they used small piles of boughs laid in a circle. We spotted it quite readily from the air. We spotted another crew from 10,000 feet after they had laid out a similar code signal.

Do anything you can to disrupt the design of nature. I know of a fighter pilot who bailed out over Norton Sound, Alaska. He got wet but made it to a cabin on shore. He left nothing on the outside to indicate that he was inside. Just a T shirt on the cabin roof would have done the trick. He was inside and too weak to get up when rescue planes buzzed the cabin. They picked him up shortly afterward, nonetheless.

The signals need not be large, just something to change the ground's appearance. Another helpful item is to build a fire ready for instant lighting when you hear the search aircraft. As soon as the fire gets hot, pile on great bunches of spruce boughs. This will produce a large column of white smoke. Once you can see aircraft you can add to your signal by popping the day end of your day-night flare and holding it in the column of white smoke. This tints the smoke and it can be seen for miles. Together you have three times the attracting power that you would have with either one by itself.

By now you have opened your rations. You have discovered that they don't taste like fried chicken. The people who dream up the survival rations seem to have gone to great pains to make them taste bad. There are very important reasons for this. Due to the small size of the survival kit the rations must be small or concentrated. They must be of a substance that will not spoil readily. That way they may be stored in the kits for long periods of time and still be edible when you need them. Because of the small quantity you could easily sit down and eat your whole day's food in one meal. But you must not do this. The ration is highly concentrated and will make you violently ill. The proper way and the way that you will find most comforting is to eat smaller amounts more often. Drink plenty of water with each meal. This will help the ration to reconstitute and replace much needed body fluids. You may not realize it but you can dehydrate as fast in very cold weather as you can in the desert at 100 degrees.

Try to supplement your rations with fish or game. You have a survival fishing kit and a survival rifle with ammunition in your basic survival kit. The salt water fish can be eaten raw and are particularly good if frozen. Fresh water fish should be cooked. If you get game, especially a large animal, try to eat as much fat as you

Above, survivor places rabbit snare on small game trail. Below, he arranges spruce branches on open area to form letter "F" which is signal for food and to attract attention. The larger the signal the better.

Above, damp sox invite frostbite. Dry them over fire and finish off in sleeping bag. Below, snowshoes are from native wood and shroud lines. Pot and skillet are from ration cans. Keep flares handy.

do lean meat. It should be cooked. Boiling is the best but you may be limited to small quantities due to lack of cooking containers. Another method and one that I have found to be very delicious is to cut the meat and fat into about two-inch cubes. Skewer a piece of lean and a piece of fat on a small stick. Continue this until you have enough to make a meal. Hold near the fire but not over it, especially if you are burning resinous trees such as spruce or birch for your fire. Cook until well done. Turn often to allow melting fats to baste the lean meat.

Another good method to secure additional animals for food is snaring. Set your snares in game trails, which you can easily spot in the snow. The most common animal will be the rabbit. Small wire made into a loop about 5 inches in diameter and securely fastened to a bush or a large stick will hold him. Set the snare across his trail or path and have it resting so that the bottom of the loop is about 2 inches above the trail. Traps and snares work for you 24 hours a day. Make good use of them and save your energy. Check them regularly to prevent predators from eating your catch.

If conditions permit and the country offers game, you should hunt. The survival weapon, whether it be the single barrel .22 hornet or the double barrel .22 hornet—.410 shotgun *(over and under)*, has taken large game animals.

You may want to enlarge your camp. Maybe another one of your crew has shown up or maybe you just want something to do. This last "something to do" is very important. You shouldn't overwork yourself to the point of exhaustion, but you shouldn't sit idle either. There are many things that you can do to keep busy. Enlarge your camp or build a better shelter such as a teepee. If the snow is deep and you are having difficulty in moving around, make yourself a pair of snowshoes. Use small limbs for the frames and the suspension line from your chute for the lacing. With a knife, a file, and a pair of pliers, you can fashion just about anything you can think of from your chute, ration cans, and nature. The important thing is not to become despondent or depressed. Keep active and interested in keeping alive. You can do it. I know of a man who spent 31 days in the Alaska wilderness. He was 55 years old and crippled. He walked over 200 miles through wild country. He started this trip with no food, light clothing, a 30.06 and six rounds of ammunition. He knew generally the "lay of the land" but he wasn't sure of where he was when he started. He

Survivor dries his sleeping bag where ice has formed around head. It must be dried as much as possible to function properly. In a tight, warm shelter, living conditions can be reasonably pleasant.

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## ABOUT THE AUTHOR

***MSgt. Clemmons entered the service in 1945 and was graduated from the Army Parachute School and assigned to the 13th Airborne. He later re-enlisted in the Air Force, and was assigned to the 10th Air Rescue Squadron at Elmendorf AFB, Alaska, in 1947. He has been on several rescue missions from the Arctic Ocean to points South, and was one of the first four men to set up and operate a floating ice station. He instructed in the Para-Rescue School at McDill AFB, Florida, for two years and helped set up the MATS Survival School at Mountain Home, Idaho. He was assigned to the Arctic Survival School at Ladd AFB Alaska, from 1953-58, with a one year break at Stead AFB Nevada Survival School, then reassigned to the Arctic Survival School at Ladd in 1959.***

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made it with no serious after effects. He, like the fighter pilot mentioned earlier, could have been rescued sooner had he made himself known.

The do's and don'ts of survival go on forever. Each bit of terrain and country offers different survival situations. The most important thing of all is to recognize the fact that each time man goes into space in an airplane, he is a potential survivor. Prepare yourself now, for on your next flight it may be your turn to "go camping in the woods." Find out what is in your kit, and how to use it to the best advantage. Fly with it either fastened to your harness or *(if possible)* where you can get it quickly. Make yourself a personal survival kit that you can stick in your pocket. Wear the proper clothing for the temperature OUTSIDE the plane. This will mean that the cabin heat must be turned down a little.

Probably the most important thing is to cast aside any feeling you may have that it can't happen to you. If you do this, all of the above mentioned things will be taken care of.

If, then, on your next flight you find yourself sitting under a cold, snow-covered spruce tree talking to yourself, you will most likely be getting the right answers and doing the right things.

A carefully planned survival trip NOW will net you nothing more than a mildly unpleasant camping trip later on, if you should be so "selected."

Good luck and good flying. ▲

*Editor's Note: It is obvious that MSgt. Clemmons is writing of what might be called an "ideal" emergency situation in which the survivor is fortunate enough to have a full complement of survival gear. If you ever go down, chances are you won't be this well equipped—but you can try to be. Then your emergency will, we hope, be little more than the "mildly unpleasant camping trip" the Sergeant describes. A lot is up to you.*

*A veteran CONVAIR test pilot gives his views on what a pilot should know in order to qualify as a real pro in The Air Force.*

# The Professional Airman

**C. E. "Chuck" Myers, Jr., Chief Engineering Test Pilot, CONVAIR, Edwards AFB, Calif.**

"Devotion of time and effort, for money, toward improving the state of the art for the good of your fellowman." This is my definition of a professional.

As I slump wearily into my leather chair in the evening after a typical day of complex activities and relationships with people and high-performance aircraft, I wonder whether I would have leaped into aviation so eagerly 16 years ago had I been given a pitch on becoming a professional airman.

During the World War II era, the emphasis was on daring, desire, and natural aptitude. These attributes and a bit of luck would see you through. Flying was then actually less dangerous than today, although the accident rates were much higher. We enjoy today's lower accident rates because the "tiger" has learned to live in this more dangerous, high-performance jungle. He enjoys longevity because he has waged a battle on all fronts; he has demanded a higher degree of reliability, improved escape systems and pilot equipment, fought for better cockpit instrumentation, controls, and improved visibility. He has influenced all operational procedures, the procurement of navigation devices and lobbied for funds to improve airport facilities. The professional airman, the old tiger in disguise, has made a game of improving flying safety; he united industry and the public in a desire for safe operation of aircraft. We play a far more dangerous game today with complex machines which are less forgiving of errors than the P-47 or the B-25. The machinery continues to increase in complexity and the operational environment becomes more hazardous. Survival in our present and future environment is dependent upon the total effort exerted by the thousands of pilots and crewmembers in the field.

The degree to which we will continue to advance safely beyond the horizon is a function of our willingness to become completely involved and to participate on a fulltime basis. Such participation requires sacrifice of personal time and pleasures—this is part of being a professional.

The fledgling will enter this era effortlessly, having been presented an accurate picture of the field prior to entry. It is the veteran who has the most difficulty, the pilot who entered aviation primarily for the pure love of flying and the glamor which is associated with it. Repression of the desire to revert to the "old days" is difficult. I recall a spontaneous roll immediately after takeoff which brought the wrath of management upon me three years ago. Such releases cannot be tolerated with today's expensive equipment. To those tigers who have not yet converted to the professional attitude, let me present a compilation of terms, activities and methods which must become common with your way of life if you are to aid in advancing the art. This presentation is made with the assumption that you have already proven your ability to maneuver aircraft with great skill and daring, relying on natural aptitude and an ultrasensitive posterior.

**In 1943,** the ability to manipulate miles, minutes and gallons to obtain mph and gph was enough to handle the problems of the day. Such little goodies as "2% per thousand feet" and "2000 rpm and 30 inches" would suffice in the absence of computers and cruise control charts. The most intricate problem was the computation of the C.G. on a multi-engine airplane, which when completed was usually disregarded if in conflict with the mission requirement. Today the professional airman should fully understand and be able to communicate to his fellow airmen in terms of basic formulas. He must:

- Understand the $C_L$ vs $\alpha$ and Drag vs $\alpha$ characteristics for his airplane.

$$\text{Lift} = C_L \tfrac{1}{2} \rho V_2 S \ \#$$

- Realize the significance of a change in airspeed to the "q" force experienced by the aircraft:

$$q = \frac{\rho V^2}{2} \ \#/\text{ft}^2$$

- Be cognizant of the effect of speed on kinetic energy, i.e., that which must be dissipated during a landing roll:

$$\text{K.E.} = \frac{MV^2}{2} \ \#\text{ft}$$

- Realize both the magnitude of heat generated during such a process and that this quantity of heat must be absorbed by the brakes and magnesium wheels.
- When considering drag chute deployment, remember the function of airspeed in developing the total drag:

$$\text{Drag} = C_D \tfrac{1}{2} \rho V^2 S \ \#$$

- Have a full understanding of aerodynamic heating and be able to determine the stagnation temperatures encountered during high speed flights, and know the temperature vulnerable areas of his aircraft.

$$\text{Temperature Rise} = \left(\frac{V_{mph}}{100}\right)^2, \text{oC}$$

- Develop a capability for making the basic conversions from indicated airspeed to true airspeed and mach number, and know the relative magnitude of normal instrument errors and static source position errors.

- Understand the fact that mach number is a function of temperature (g, $\gamma$, R are all constants for the range of speeds and atmosphere in which we are working):

$$V_{acoustic} = \sqrt{g \gamma RT}$$

The professional pilot must understand his world and be able to communicate in the language of his profession.

**Know and understand your operational procedures.** Inquire as to "why" operations are conducted as they are; an understanding of "why" will make it much easier to remember the rule. Keep in mind that there is usually more than one solution to any problem; for our work it is most important that we standardize on procedures. If you disagree with a current procedure, follow it until you can take the necessary action to have it reviewed and altered. In case of procedures presented in flight handbooks, when in doubt, require an answer from the source of the information. When you feel the information or procedures should be changed, initiate the required paper to bring about a change. Complaining over coffee in the ready room won't alleviate your problem. The professional pilot understands and adheres to the aeronautical rules of conduct and stands ready to improve the regulations through official channels.

Good maintenance is dependent upon a pilot's ability to recognize deficiencies and communicate the problem to the maintenance personnel. In addition, the pilot must insist that the maintenance activity keep the airplane systems in good working order. Accepting airplanes with known discrepancies for the sake of accumulating flying time is a policy which breeds poor maintenance and accidents. An example is flying an F-102 or F-106 with a stability augmentation system not working. It is safe to take the aircraft aloft and drive it about the sky in order to log flight time, but the airplane is limited without the system, especially when one considers that the automatic flight control system is dependent upon the dampers. The best means of overcoming the maintenance problems associated with such systems is to insist on proper systems operation for all flights. Without such an attitude, the pilot will find that no modern airplane will ever be more than half a weapon. In addition, the maintenance personnel, if not required to cope with our present problems, will not be capable of handling our future, more complex problems.

An unyielding attitude on the part of the pilots will also stimulate the supply system, forcing more efficient paper shuffling, procurement and transportation. Sacrificing flight time to force improvement of maintenance and supply systems will pay dividends in safety and combat capability. The pilot who stands firm in this area is exhibiting a professional attitude.

The engineering test pilot devotes a great deal of effort toward improving the airplane. The improvement of an airplane requires a team effort. Your portion in promoting product improvement is equally as important as ours, especially since you are the customer and, believe it or not, the customer is still regarded as "always being right."

I can recall a half-dozen improvement items which were never accomplished because "engineering" could point to the fact that the customer had never complained. In some cases, I can remember the customer issuing complaints at the club over a martini. Unfortunately, this channel seldom penetrates the procurement and development agencies who must formally request aircraft changes. I would like to quote Major Robert A. Coffin, Chief of Safety, Headquarters, Central Air Defense Force, on the subject of safety:

*"Our aircraft accident prevention program is based on a continuing interchange of information between the lowest level unit responsible for operating the equipment in which an accident may occur and the highest levels of authority responsible for defining the type of equipment to be used, and the mission to be performed. This type of accident prevention effort must be characterized by well integrated and organized supervision and manned by capable conscientious personnel."*

The professional pilot is capable of and will initiate the paper required to bring about improvements to our aircraft and associated equipment.

Management and supervision is the area wherein the pilot can do most to improve his lot, where he can increase flying safety and unit effectiveness. Each pilot must recognize that he is capable of and is expected to play a part in that portion of the organization referred to as management. The commander has the responsibility, not only of leading in the air, but of establishing procedures and policies which will accomplish the ground activity required to support the air activity. The prosecution of the procedures and policies is the moral responsibility of the pilots under his command. The flying safety record of an organization is a direct function of the degree to which the policies and procedures are prosecuted. Let us not forget that the followers are expected to do more than follow blindly; they are expected to observe and report to the leader any deficiencies they may observe in the system. They can also aid by providing personal contact with the ground support activities, encouraging the men whose jobs are less in the spotlight, showing an interest in their problems, and bringing these problems to the attention of management. A professional pilot, regardless of rank, assumes some portion of the management and supervision task.

Many pilots are not really interested in professionalism. They are happy living on chance, their skill in the air, and the knowledge that what they neglect will be accomplished by some more interested person. Those who are eager to participate must keep in mind that to be a professional in any area of endeavor requires complete involvement, full-time participation. Analyze your present degree of participation and establish a program to increase it.

Most of all, develop the attitude that this is your Air Force and your U. S. A.; these are your airplanes and it's your life that is at stake. You will then become an integral and active gear in the machinery which decides what equipment we will buy and how it will be operated. Such participation cannot be conducted for prolonged periods in the absence of good health. Tony LeVier, a colleague and competitor, wrote a wonderful article recently for the PACAF magazine titled "Take Good Care of Yourself." I recommend this as required reading for all who would press on into the high-performance era: self-maintenance is another responsibility assumed by the professional airman.

I was asked about professional aircrewism and I have presented my views, all except one—keep in mind that flying is fun; when it ceases to be fun, quit! Be a full-time participant—when you no longer enjoy this route, look for other employment; make room for your contemporaries who are eager to contribute. This is part of the ethics of the profession. ▲

# Weather As You Like It

**Captain Ivan R. Frey and Captain Francis H. Miller**
**Hqs Air Weather Service, Scott Air Force Base, Ill**

Since the end of World War II, the United States Air Force has progressively developed into what is now an all-weather fighting force. Two factors have entered into this development:

- Planes and airfields have been equipped with precision instrumentation.
- Pilots have been trained to use this equipment.

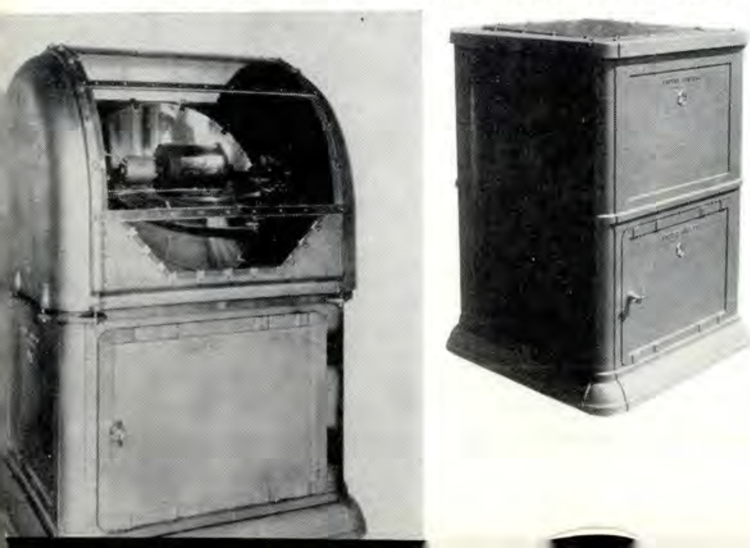
Early in this development period, the Air Weather Service realized that it would play an important part in determining the degree of success of such a program, for without accurate and precise measurement of weather parameters at each air base, the Air Force's all-weather capability would be limited. This fact became even more evident with the advent of the jet aircraft with its high performance, and its high fuel consumption rate at low altitudes.

To meet the new requirements, the AWS inaugurated a two-point program. First, it updated its procedures and made maximum use of the weather instrumentation on hand. This was, and still is, a continuing process because the all-weather capability of the Air Force is ever increasing.

Second, the AWS established a program with the Air Research and Development Command to develop new precision weather instrumentation. This second point of the AWS program is just now starting to bear fruit. The Ground Electronics Engineering Installation Agency *(GEEIA)*, the installation division of Air Materiel Command, is presently installing such newly developed equipment as the rotating beam ceilometer, transmissometer and temperature-humidity sets. In addition, GEEIA is relocating many of the wind measuring sets.

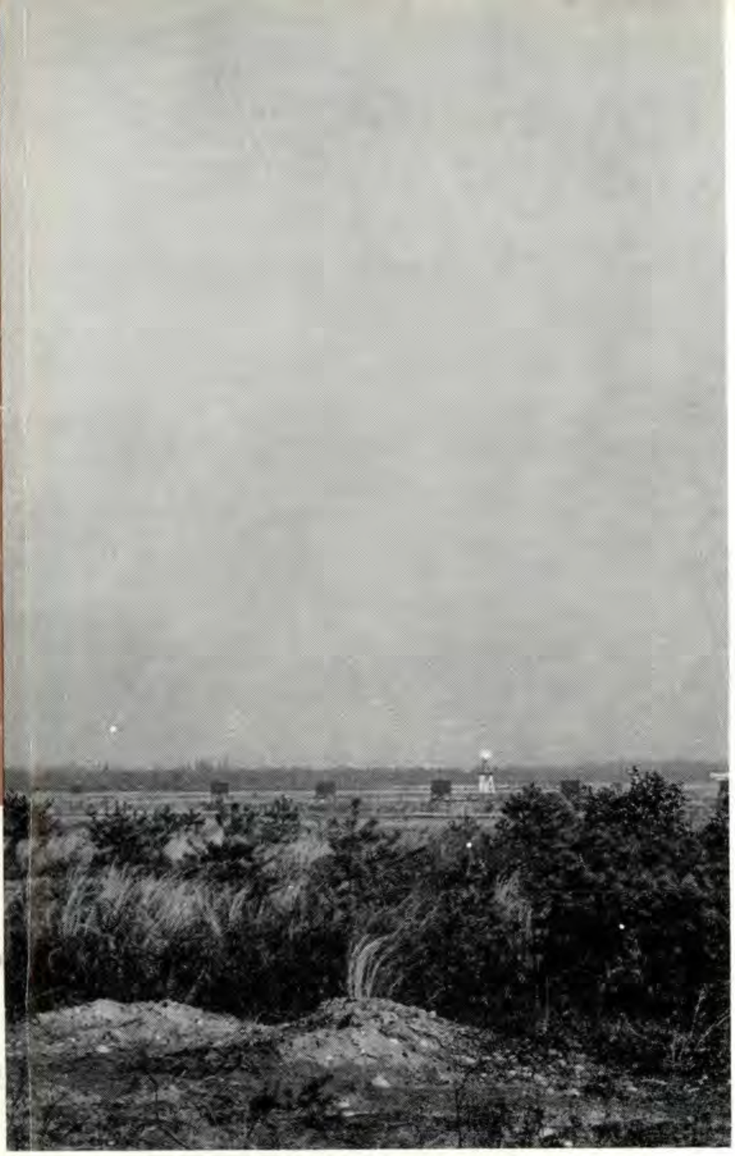
Under the present concept, the equipment is being located on the airfield complex at the points which will

Rotating beam ceilometer—projector (left), detector (right).



yield to the pilot the information which he most desires. Thus, the wind set and the transmissometer *(pseudo-visibility measuring device)* will be located adjacent to the touchdown point of the primary instrument runway; the rotating beam ceilometer will be located in the approach area approximately below the point where the GCA glide slope meets the GCA minimum altitude; and the temperature-humidity set will be located at a point which is most representative of the conditions that a jet aircraft will encounter during takeoff.

This equipment will yield no new information to the pilot. However, it will yield information that is more accurate, current, and relative to his needs than he has ever received in the past. The rotating beam ceilometer *(RBC)*, takes a cloud-height measurement every 6 *seconds* instead of every 6 minutes as did the old fixed-beam ceilometer. The measurement of low clouds will be more accurate because the distance between the projector and receiver has been shortened under the new installation criteria. After the installation of the RBC it might be expected that the familiar vertical shaft of light associated with the old fixed-beam ceilometer will be replaced by a rotating one. It won't. The RBC operates with infra-



Left, transmissometer consists of a horizontal light projector and light sensitive receiver, installed 500 feet apart. Above, temperature-humidity set gives up-to-the-second indications on the runway complex. More accurate runway temperatures are expected.

red light, hence the shaft cannot be seen.

The transmissometer is a new piece of equipment. The sensing elements consist of a horizontal light projector and a light sensitive receiver. The two elements are installed 500 feet apart and as near parallel to the runway as possible. The amount of light reaching the receiver from the projector is a function of the transmissivity *(transparency)* of the air between the two elements. Assuming that the air in the vicinity of the airfield is homogeneous, the measurement of the transmissivity of the air can be converted directly into field visibility. Recent tests, though inconclusive because of limited data, have indicated that not only will the transmissometer give visibility measurement at the point of touchdown, but it will also consistently give information which is more accurate than what a human observer standing in the same area would give. It must be pointed out, however, that when the air inside the range of visibility is not homogeneous, as in a patchy fog condition, the transmissometer will not give accurate visibility measurements and a human observer will still be necessary to complete the picture.

The temperature-humidity set is an electromechanical, remote indicating, temperature-humidity sensing device. It presents to the weather observer an accurate and up-to-the-second indication of the temperature and humidity in the runway complex. These parameters provide valuable information for the jet pilot. It might be pointed out that during the test of this set it was found that if the set is properly orientated it will yield an accurate indication of the "runway temperature." Thus the old rule of thumb of adding three degrees to the field temperature reading to obtain "runway temperature" does not apply when using this device.

Sufficient equipment has been bought to weather-instrument the primary precision approach at each Air Force base during the next 12-18 months. Much of this equipment is now being installed by the GEEIA. Additional precision approaches will be weather-instrumented during the fiscal year 1962. The GEEIA people are working very hard to get engineering completed so that the equipment can be installed. The Rome Air Materiel Area has been monitoring the program closely through the Meteorological Equipment Management Group, chaired by Mr. Edwin Buckley, to insure that equipment and cables will be ready at the proper time. The major air commands have been supporting the program to the fullest extent possible.

Commanders of flying units should contact their weather station commanders to see when observations will be taken in the approach landing areas. Any support given him may help to insure that the equipment will be installed as soon as possible. ▲

# List

Discussion continues regarding the use of the zero lanyard in low altitude LABS maneuvers. Two points mentioned in T.O. 1F-100D-1, Section III, were brought out in a recent accident during a LABS. During a dry toss at full military power, 100 feet altitude and 500k IAS, a slight vibration started which increased rapidly until an explosion in the aft section occurred. The pilot raised the nose of the F-100 aircraft 20 to 30 degrees above the horizon. He then ejected about 1800 feet at an airspeed near 480 knots. The automatic functions of the lap belt and parachute worked as designed. The zero second lanyard was not connected. The pilot was shaken by the air blast, the opening shock of the chute and the landing but he was not injured.

The technique used by the pilot was in accordance with T.O. 1F-100D-1, Section III, page 14 which states: "For low altitude ejections *(below 2000')* the technique that results in higest possible altitude for parachute deployment is pulling the airplane nose above the horizon before ejection *(zoom-up maneuver)*." The procedure suggested in the graph on page 13 of the same T.O. was also used. This graph shows that regardless of the type of parachute or altitude, the zero second lanyard should not be hooked at speeds above 400 knots. The above procedures used in accordance with instructions in the T.O. may assist pilots flying LABS in their decision as to when the zero second lanyard should be used.

*Dean Thorpe, Aero Medical Safety Division, DFMSR*

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**All commanders are reminded that appropriate action should be taken to insure that flying personnel are aware of the hazards of winter flying. Adequate flying clothing will be worn appropriate to the mission performed. Personnel should be cautioned not to exceed their personal capabilities or equipment limitations pertaining to winter flying operations. *(From an all major commands message issued by Headquarters USAF.)***

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In a recent ejection three unrelated problems were encountered which point up the need for special emphasis in FSO briefings. The pilot had difficulty with the helmet visor, chute oscillation, and release of the parachute canopy. Before ejection the pilot positioned himself properly and lowered the helmet visor, but the visor snapped to the up position before ejection was initiated. Fortunately, the helmet was modified with the Hardman retention kit and was not lost. Cause of the visor difficulty was apparently improper fit in that the visor did not clear the oxygen mask when lowered. Crewmembers must insure that the helmet visor is properly integrated with the mask.

During descent the parachute started to oscillate and attempts to control the oscillations were unsuccessful. The pilot was improperly positioned for landing and touched down extremely hard. He was dragged 300 feet before he could release the canopy. Parachute landing accidents are the largest single cause of major injuries sustained during bailout/ejection, and poor landing technique accounts for a significant number of these injuries. Crewmembers must be thoroughly familiar with bailout procedures as outlined in Section III, paragraphs 24-53, of T.O. 14D1-2-1. And supervisors must check crewmember knowledge at frequent intervals.

*Robert H. Shannon, Injury and Survival Branch DFMSR.*

✔

**Air Force Manual 64-2, National Search and Rescue Manual, has been published. It is dated 1 July 1959, and is under Distribution F, which means it must be ordered by the bases. Every base operations office and FSO should have a copy for use in formulating base search and rescue plans.**

✔

Recently a B-66 pilot came close to eternity because an oxygen hose came loose at the ejection quick disconnect fitting. The first hint of trouble came when the pilot thought the navigator's routine course correction was the most hilarious remark he had ever heard. When cabin pressure was lost simultaneously, the pilot sobered sufficiently to select 100 per cent oxygen and begin an emergency descent. The pilot told the crew that he would descend to 12,000 feet and ordered them to eject if he should fail to pull out above 10,000. However, a safe pullout was made and everything settled back to a routine precautionary landing.

In tracing the cause of the hose disconnect, it was found that an 'insignificant' note in paragraph 2-1, Section II of T.O. 15X5-4-2-41 had been overlooked. The note is a caution indicating that when adapting the CRU-8-P connector for securing the oxygen mask hose to the parachute, *additional* hose from the regulator may be required in the aircraft.

In the aircraft concerned, a pilot who had been at the controls previously had some trouble connecting his mask so he had pulled a few inches of hose through the seat clamp to make a comfortable hookup. The next pilot either made a seat adjustment while airborne, thus severing the connection or, more likely, omitted his pretakeoff oxygen check and left the ground with a disconnected hose. A likely cause of hose disconnection in the B-66 is the positioning of the seat to the full aft position, normally done after engine shutdown. This is the stuff of which accidents are made.

*Major Robert R. Jensen, FSO, 67th Tac Recon Wg (PACAF)*

✔

**You've heard about emergency situations which were compounded because of ignorance or failure to follow prescribed procedures. A C-130 came very close to inflight destruction recently because of one or both of the above reasons. After having rapid decompression at 26,000 feet the pilot entered a high speed descent *(approximately 15 knots above limit airspeed and mach number)*. During the descent the empennage began to flutter and received structural damage. Now, the Flight Manual for the C-130 very clearly outlines a procedure for emergency descent after the aircraft has rapid decompression. This procedure calls for slowing the aircraft to appropriate speeds for lowering landing gear and 100 per cent flaps and then descending at 145 knots IAS. AFR 60-16**

**contains a requirement that crewmembers have helmets on with oxygen mask attached and that passengers have oxygen equipment readily available when the aircraft is above 25,000 feet. So why the panic? Because this pilot did not follow prescribed procedures this "incident" could just as well have been an "undetermined" major aircraft accident with seven fatalities.**

*Maj. David R. Lewis, Cargo Branch, DFMSR*

✓

Last winter several aircrews were lost because of accidents which occurred during flights in severe weather. Low visibility, plus windshield, wing and carburetor ice teamed up with such things as poor judgment, faulty maintenance and low aircrew proficiency to exact a tragic toll of lives and equipment. None of us wants this to happen again.

A pilot of a twin-engine aircraft cleared into an area of forecast sleet and low visibility. On GCA final, his No. 2 engine began to backfire. The copilot feathered the No. 2 prop without telling the pilot. The windshield was so badly iced up the runway wasn't visible and the passengers had no safety belts. It was dark. The crash resulted in one fatality and four persons were injured. The command concerned took immediate steps to insure that this would not happen again. But that happened last year. Each year the accident files are increased because of an accident or two just like this one.

✓

**A review of several T-33 major accidents has revealed the commission of errors indirectly related to cause factors and directly related to personnel survival. These errors, which reflect a lack of professionalism in flying and a disregard for safety, include supervisory acts of omission that adversely affect the necessary procedures in flight.**

**Some reports indicate that pilots are failing to turn off all unnecessary electrical equipment, thus reducing the life of the aircraft battery following flameout. This is especially harmful during the winter season because, when exposed to freezing temperature, the battery has limited life. Panic or forgetfulness when flameout occurs may account for some pilots neglecting to conserve battery power. In one command, however, supervisory personnel have certainly contributed to this by not emphasizing in the T-33 checklist the necessity for conserving battery power after flameouts.**

**In other cases, supervisory personnel have contributed to errors in airstart procedure by publishing command checklists which omitted the required descent to 25,000 feet before attempting an airstart. Pilots have failed repeatedly in getting airstarts above 25,000 feet and have given up the attempts below 25,000 when one might have been successful in the first instance below 25,000 feet. Command checklists with improper fuel system deicing procedures have contributed to flameouts and unsuccessful airstarts. Needless to state, these condensed checklists should conform to the appropriate flight manual and be kept current.**

✓

He should have stood in bed. In a recent report of an F-100D accident, in which the primary cause was operator error, one of the findings reads: ". . . the flight leader did not comply with accepted physical conditioning in that he had not been to bed during the night preceding the flight." However, further ". . . *(this)* was not considered a factor in this accident for the following reasons:

- He had obtained much more than the normal required rest for the three previous days.
- The clearance officer, intimately familiar with the pilot's acts and reactions, deemed him to be alert and in a normal, unfatigued condition.
- His acts after the emergency occurred were above reproach and indicated a complete control of all mental faculties.

These findings and opinions are somewhat alarming inasmuch as they show a lamentable lack of knowledge about the nature of sleep, fatigue and rest. The following facts should be known to all aircrew members and their supervisors:

- Sleep or rest cannot be "stored" and then called upon to meet a lack of sleep or rest at some future time. They are recurring requirements which must be satisfied in point of time cycles.
- A dangerously fatigued individual may appear to be alert under the stress of tension or excitement. Therefore, a one time observation is not a valid criterion for estimating a man's fitness to operate an aircraft safely.
- An individual's conduct after an accident occurs may be above reproach but this is an after-the-fact virtue which does not help in accident prevention.

*Col. K. E. Pletcher, Chief, Aero Med Safety Div., DFMSR*

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**Have just received a copy of Col. A. M. "Chic" Henderson's new book, "It's Your Life, Joe." In my opinion there is much of value therein for the USAF crewmember. Col. Henderson discusses everything from parachutes to bends, in an easy to read manner. Check your base library or book store for this volume because used with your official manuals, it may save your life. Incidentally, the artwork was done by Al Fortune, who once drew our Mal Function page.**

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On 14 May 1959, Hqs USAF wrote all major commands in the ZI about the preparation and coordination of high altitude terminal charts. Briefly, the letter explained the need for the charts, what should appear thereon, how they should be arranged, plus a suggestion that establishment and coordination of the charts be expedited. The expediting part hasn't happened! At last count there were only 51 locations which had high altitude terminal area charts, while there are 855 letdown plates in the four books. As you can see, this is a very poor percentage.

The reason for our concern is that it's a rare day when some jockey doesn't write us to complain about the number of charts he's forced to use in a single-place fighter in order to find fixes and other necessary information. With terminal area charts these gripes would diminish. To go cross-country, one would need only the local departure routes, two en route high altitude charts and the letdown books *(FLIP Terminal, High Altitude)*. The pilot would use the departure route to get on his way, the en route charts during flight, and the terminal area chart when he's within 300 miles of destination. How simple can it get?

Do you have terminal area charts for your base? If not, why not? Let's make it as easy and safe as we can.


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