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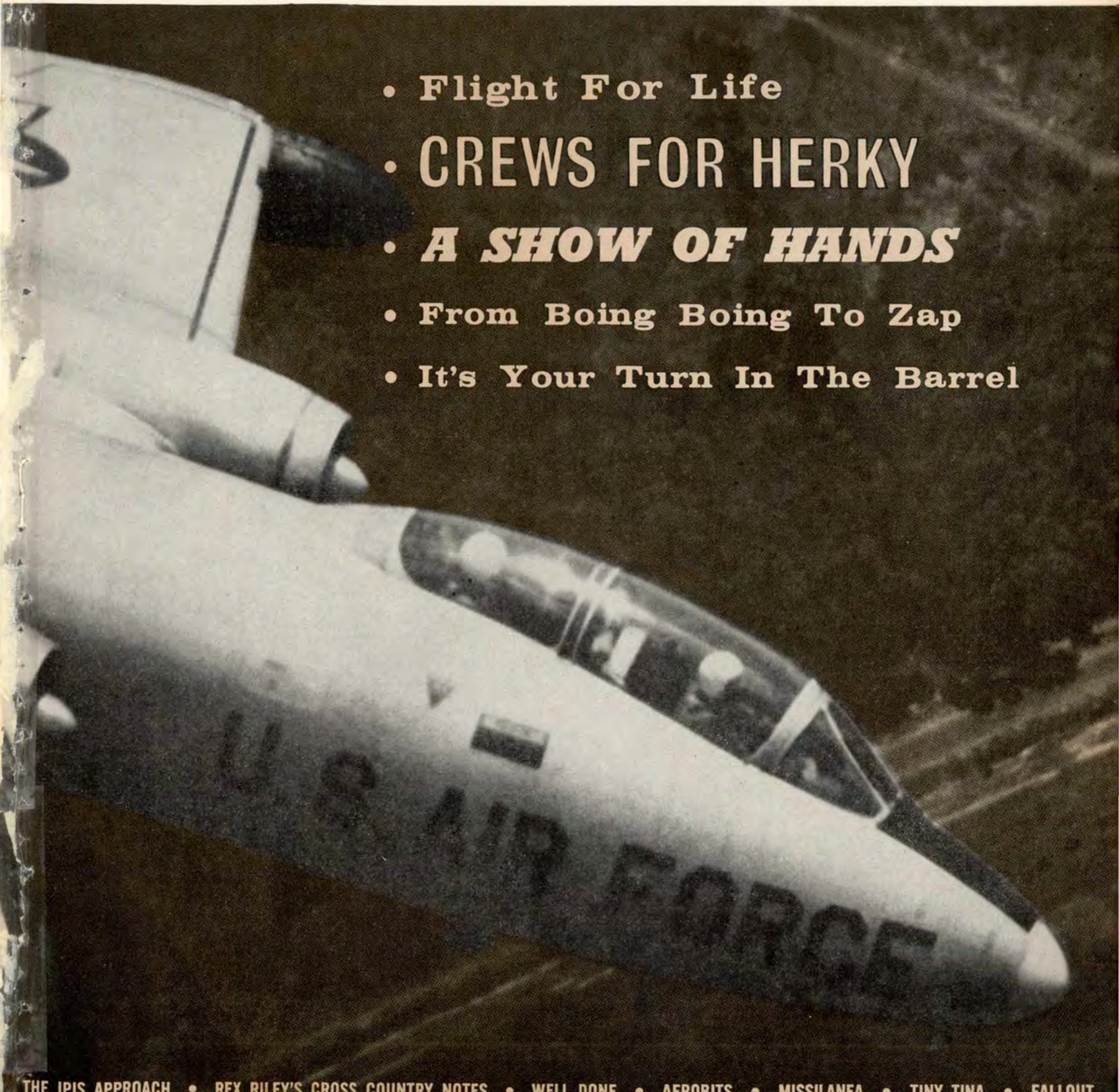
Aerospace SAFETY

THE MAGAZINE DEVOTED TO YOUR INTERESTS IN FLIGHT



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- *A SHOW OF HANDS*
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FEATURE ARTICLES

REGULAR FEATURES

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Fallout

LETTERS TO THE EDITOR

CROSS CHECK

Your excellent article about instrument flying ("Cross Check", July 1966) has been noted with a great deal of interest. However, I find that once again we fail to discuss an additional and excellent aid for orientation or recovery when pilots have become disoriented or are involved in an unusual attitude. I write of the *operational and checked-out* auto pilot.

Although we do demonstrate the capability of the auto pilot to return the aircraft to straight and level flight from an unusual position, we in fighters usually do not stress the importance of this aid, nor do we usually make any great effort to insist that auto pilots are maintained at peak standards. Perhaps you could discuss this procedure in a future article and possibly we may be able to save additional aircraft or crews.

Col Delbert J. Light
Chief, Tactical Operations
Hq 363 Tac Recon Wg (TAC)
Shaw AFB, South Carolina 29152

Following are the author's comments on your letter:

"You are right. The autopilot can be used to recover from unusual attitudes in some aircraft. Unfortunately, however, it won't work in most of our fighter aircraft because when the autopilot is engaged it will maintain the attitude the aircraft was in at the time of engagement. A quick canvass of the project officers revealed that this is the case in the F-101B, F-102, F-104, F-105 and F-106. The F/RF-101 and F/RF-4 autopilots will roll the wings level if the autopilot is engaged within limits, ± 35-degree pitch and 45-degree bank in the F-101, and ± 70-degree pitch and 70-degree bank in the F-4. Pitch control can be regained by use of the stick or the auto hold switch.

I agree wholeheartedly with your comment about not insisting that our autopilots be maintained at peak standards. Many fighter jocks feel it is a disgrace to plug in "George." I remember when I did. It is a little humiliating to discover that it can

continued on page 28

NOTICE—CORRECTION

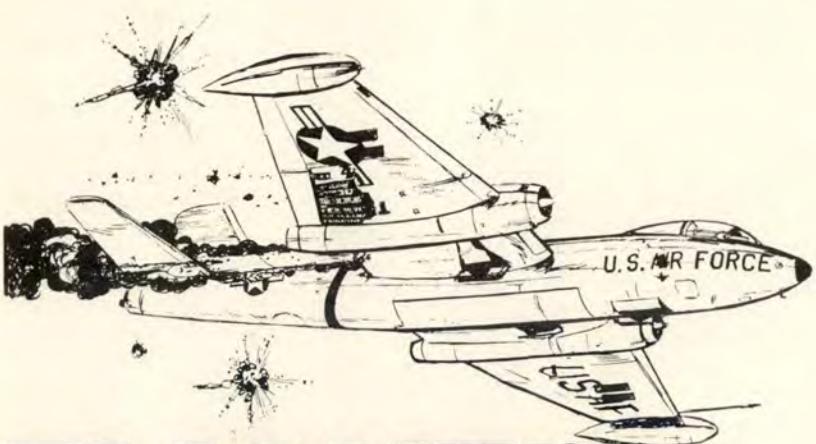
After the article on Pilot to Forecaster Service frequency assignments, page 11, was already printed, we were notified of some changes. Since we couldn't change the article, here are the corrections:

In the first group, 268.2 mcs, delete Norton, Peterson and McChord. These will be as follows: Norton and Peterson 375.2 mcs and McChord 342.5 mcs. The 268.2 mcs frequency should be changed to 239.8 mcs.—Ed.

FRONT COVER

This month's cover picture shows a B-57 doing its job in South Vietnam. Similar aircraft was flown by crew featured in story on Page One and in Well Done feature, Page 29.

THE NAVIGATOR HANDED THE PILOT OF THE B-57 A BLOODY NOTE WHICH READ: "HIT BADLY—ARM AND LEG—LOSING BLOOD." BAILOUT NOW WAS OUT OF THE QUESTION. THE PILOT HAD TO KEEP THE WRECK IN THE AIR. IT WAS A . . .



FLIGHT FOR LIFE

A TRUE ACCOUNT

This month's Well Done Award (inside back cover) was conferred on Captain Larry B. Mason, a B-57 pilot based in South Vietnam, for an outstanding feat of airmanship and heroism. The restricted space in the award did not permit telling the entire story upon which this award was based. We thought our readers would like more details, so the entire story, as provided by PACAF, is presented here.—Ed.

The flight was a routine interdiction mission for two B-57's, one flown by Captain Mason with Captain Jere P. Joyner as navigator. After the aircraft had completed their bomb runs, the FAC reported a group of about seven enemy trucks on a road 10 miles away. Captain Mason led the flight in the direction of the trucks intending to strafe with his four 20mm cannons. He located the trucks in the haze and rolled in on his strafing run. Suddenly the sky was filled with anti-aircraft fire. Captain Mason's B-57, wracked by several hits, rolled to an almost inverted attitude and the cockpit filled with smoke and debris. The whole aircraft was vibrating violently and the control column was buffeting back and forth through an eight-inch arc.

As he fought for control of the bucking aircraft, Captain Mason noted that the fire warning light for Nr 2 engine had come on, and the fuel low pressure light was illuminated. Thinking only of getting the aircraft out of the immediate target area and to a safe bailout altitude, he immediately selected emergency fuel and fuel by-pass, but left the engines running. As Captain Mason managed to get the aircraft under control and out of the enemy fire, his navigator, Captain Jere P. Joyner, managed to pass a blood stained note that read, "Hit badly—arm and leg—losing blood." Fortunately, Captain Mason had a tourniquet in his pocket and was able to pass it back to Captain Joyner.

Faced with a severely wounded navigator who very possibly would not survive a bailout, Captain Mason elected to try to fly the aircraft to his home base, 145 nautical miles away. Just as he began to start a systematic evaluation of the damage to the aircraft, the vibration in the left engine increased, and the oil pressure gage showed excessive pressure. Retarding the throttle to 75 per cent rpm reduced the vibration and pressure. He then turned his attention to the right engine which still had the fire warning light illuminated. Just as he was about to shut down the right engine, the vibration in the left engine became violent again and the oil pressure went way out of limits. The decision then was to shut down Nr 1 while hoping that Nr 2 would continue to run since the engine instruments at least were within limits.

Captain Mason's B-57 had been badly mangled by three direct hits and one near-miss. One shell had hit and exploded in the lower right side of the cockpit directly to the right of the navigator. This shell riddled the navigator with 46 separate fragments in his legs and right arm. As this shell exploded in the side of the cockpit, it severed a wire bundle and oxygen lines, which left the aircraft with no interphone, UHF radio, navigation radio, gyro instruments, fuel quantity gage, or oxygen. The only instruments operating were the airspeed indicator, altimeter, vertical speed and standby compass. Unknown to Captain Mason, this shell also created a short in the landing gear extension system that caused

Damage to aircraft is shown in these photos. Shell bursts caused loss of hydraulic fluid, put electrical systems out of commission, and injured navigator.

all three landing gears to extend and lock down. However, the selsyn indicators in the cockpit showed left main and nose gear intermediate and right main gear up.

Two other shells hit the right wing. One hit outboard of the engine just behind the main spar. The explosion tore a 30-square-foot hole in the lower wing surface and a 4 x 5-foot hole in the upper wing surface. The other shell hit in the inboard flap area destroying the flap, severing a hydraulic line and putting several holes in the tail pipe. The hydraulic leak ignited and burned part of the wing trailing edge until the hydraulic fluid was exhausted.

During the 45-minute flight back to Danang, Captain Mason was able to maintain only 200 knots with a slow descent to a minimum altitude of 3000 feet. He tried to increase the power on the one remaining engine but the aircraft buffet became so severe that, since he was able to maintain 3000 feet, he decided to continue back to his base at that altitude. As he came within sight of Danang, Captain Mason faced the problem of landing a badly damaged aircraft at a congested air base, with no radios, unknown fuel quantity, and a seriously wounded navigator.

As they approached the base, Captain Joyner regained consciousness enough to attempt contact on guard channel using a URC-10 survival radio. However, no contact could be made so Captain Mason entered the traffic pattern and made a pass across the field at 500 feet both to determine landing direction and to let the people on the ground know he did not have a radio. An F-4C pilot in the pattern noted the damaged aircraft and alerted the tower and thereby the crash rescue network.

As he started a wide turn to final, Captain Mason put the gear handle down but the gear indicators continued to show left main and nose gear intermediate and right main gear down. Captain Mason then pulled the emergency gear extension handle out but still had no indication of safe gear. Since to land with this indicated gear condition would be very hazardous, and because he was too close to complete emergency pumping of the gear, Captain Mason again made a single engine go-around at 300 feet. The aircraft descended to almost 50 feet before starting to level off, beginning a slow climb. The airspeed dropped to a low of 140 knots, but Captain Mason was able to control the aircraft as he began a slow climb to a downwind. During this time he managed to pump more than the recommended 450 strokes on the emergency gear extension system with no positive results.

Realizing that a gear up landing was safer than one with a gear partially extended and that the pumping was having no effect, Captain Mason placed the gear handle and emergency extension handle in the gear up position. As he again turned final, he planned a gear up, no flap landing because he needed to get his seriously wounded navigator on the ground for medical attention. The approach was skillfully done and much to his surprise the aircraft settled smoothly on its gear and rolled out on the runway. Captain Mason gently applied the brakes, using hydraulic fluid and pressure remaining in the brake system and brought the aircraft to a smooth halt with all the gears still down. Since there was no hydraulic fluid remaining, the rescue crew had to jettison the canopy to get Captain Mason and his semi-conscious, still bleeding navigator out of the aircraft.

As the result of Captain Mason's determination to get his navigator safely back to base for medical attention, Captain Joyner survived and has since recovered from his wounds. ★

CREWS FOR HERKY

Col Robert D. Brown, 4442 CCTW commander, left, and the late Col William H. DeLacy, commander of the 839 Air Division, TAC. Col DeLacy died on January 2, after this story was written. Aerospace Safety is grateful for his courtesy and assistance in the preparation of this article.

When 2d Lt Lawrence Stone graduated from flying school and received his wings last September, his ambition was to fly the C-130 Hercules and he wanted to be assigned to the Far East. He got his first wish and soon found himself learning all about the Hercules at Sewart AFB, Tenn.

Perhaps to his surprise, he found himself sharing the cockpit with another pilot with thousands of hours of flying time, 20 years service and old enough to be his father. It was obvious that many of the "students" were in the same category—old-timers going back to the cockpit after three-five-ten years of desk work. Some had maintained their skill through proficiency flying in C-47s, T-29s, T-33s, etc., but others hadn't flown at all for several years.

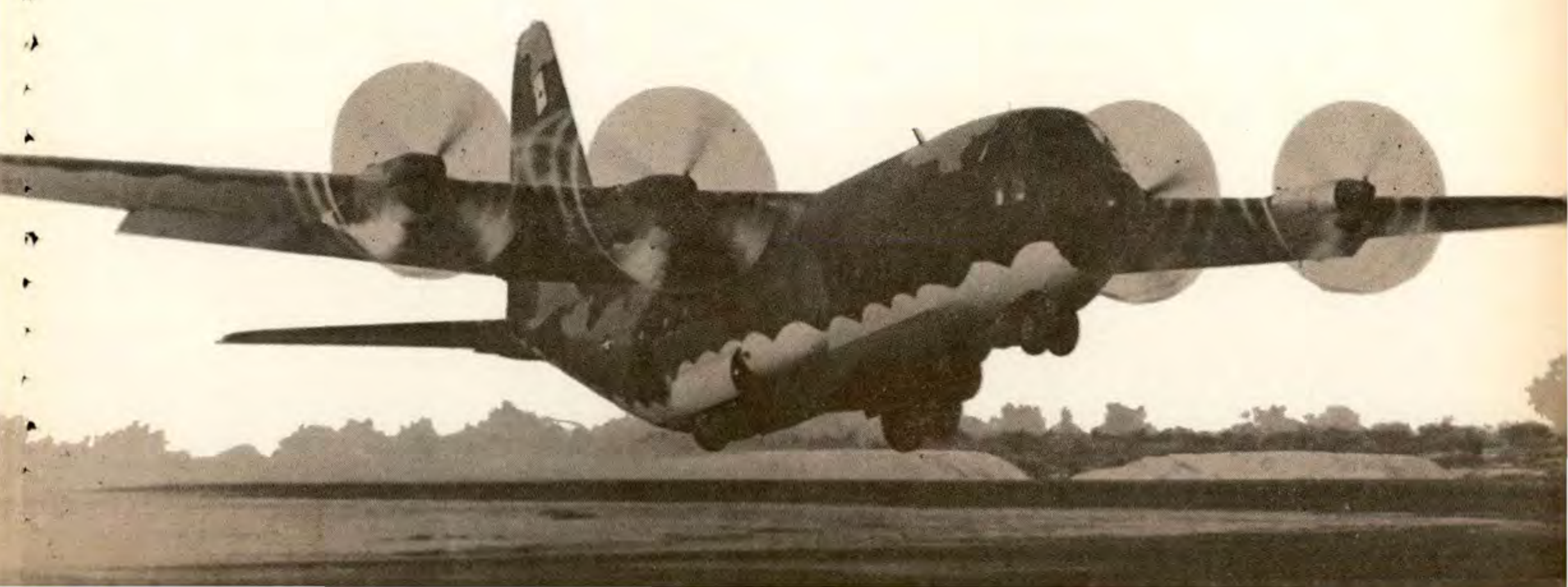
These, then, represent the extremes to be found in pilots being trained to fly C-130s by the 4442 Combat Crew Training Wing, Sewart AFB. In addition to pilots, the Wing also trains flight engineers.

The Wing began as a provisional squadron back in 1962, but as the demand for C-130 crews grew, the squadron became a group and finally, on Oct. 1, 1965, a wing. Its present commander is Col Robert D. Brown. The change to wing was coincidental with a tremendous increase in the number of crews to be trained. This required more instructors, additional aircraft and a considerably larger maintenance organization. Accompanying the buildup, of course, was an increase in the number of problems. That these have been successfully solved is attested to by the fact that the Wing has been meeting its training obligations and has been doing so safely. In fact, it hasn't had a major aircraft accident since November 1962.

The Wing is part of the 839 Air Division commanded by the late Col William H. DeLacy, as is the 64 Troop Carrier Wing. The 64th, like other TAC Troop Carrier Wings, takes graduates from the 4442d and molds them into crews qualified to perform such diversified missions as troop transport, PLADS drops (parachute low altitude delivery system), moving cargo and troops into remote areas requiring landings and takeoffs in small airfields with strips that are marginal, to say the least.

When pilots and flight engineers report to the 4442d they can expect three weeks of classroom training (four weeks for engineers) on the aircraft systems presented by the Field Training Detachment, two weeks—10 three-hour sessions —in a C-130 simulator and two weeks of flying—35 to 55 hours.

Pilots who apply themselves get through the seven weeks of train-



Thirty hours in the C-130 simulator may seem like a long time, but students testify as to the value of this training.

ing with little trouble, and those fresh out of flying training do very well. A few old-timers find it a chore to work back into the study routine, but on the whole, do quite well.

The simulator—usually considered anathema by pilots—is an important part of the training and all of the students interviewed by this writer consider the time thus spent as extremely valuable. Each simulator session duplicates a flight profile and students prepare for it by completing assignments in the study guide. Prior to each simulator mission, students are briefed by instructors who check the students preparation, review study guide questions for that mission and brief and instruct on operation of the systems to be covered in the mission. Immediately after the mission the students are debriefed and their progress discussed.

Lesson plans in the flying phase provide concurrent pilot and flight engineer instruction and are designed to assure that all students receive the same training. Included in the preflight portion are flight planning, performance data, Form 781 and weight and balance. Then the student moves on to aircraft flight characteristics, system operation, malfunctions and emergency operations. The average sortie is 4.2 hours in length during which there are usually 10 or more landings. In fact, landings are running about one every 24 minutes of flight. This means that the aircraft systems receive considerably more exercise than do those of the average C-130.

This increased operation of aircraft systems imposes an additional maintenance workload, and much of the Wing's excellent accident record is due to the high quality of maintenance the aircraft receive.

INCREASED CREW NEED

In the fall of 1965 the requirement for qualified C-130 crews had grown to the point where it was necessary for the Wing to more than double its output. Additional instructors, aircraft and maintenance personnel were assigned. Instructors were quickly trained but maintenance manning was another thing. The Wing found itself with approximately 50 per cent of its maintenance people consisting of new three level trainees. This meant a massive OJT program. The FTD was available, of course, and upgrading the trainees began, along with the continuing job of maintaining the aircraft. As of last November many of these men had been upgraded to five level skill and 90 per cent of those tested made the grade.

The 4442d has a total of 47 aircraft and flies 30 sorties a day with 15 of these and two spares. This kind of schedule leaves little room for down time. Several actions taken by the maintenance people keep the aircraft flying safely. For one thing, turnaround time was reduced from three hours to an hour and 45 minutes by having a maintenance supervisor and specialist meet each incoming aircraft with a bus. While the crew is riding in from the aircraft, they are debriefed by the maintenance team. Any squawks are quickly obtained and acted on prior to the next flight, except, of course, those that require more time.

After the aircraft are through flying for the day, the Servicing Support section services the aircraft and performs a post flight inspection. This information helps determine the next day's workload and as men come on duty they are not kept standing around while the workload is being figured out but can go right to work with a minimum waste of time.

To prevent FOD from becoming a serious problem, FOD inspections were made a requirement for both postflight and preflight crews.

It is axiomatic that the success of any organization depends basically on how well its resources are managed. Realizing this, the maintenance people went to work on getting maximum utilization out of all resources. When parts were in short supply, and the NORS rate started climbing, controlled cannibalization became the name of the game. However, a careful record was made of all parts thus obtained for replacement when they became available.

As for people, the most experienced were assigned to quality control and as supervisors of the trainees.

Student flying presents its own set of safety problems. Most of this work is done in the most hazardous phases of flying—takeoff, approach and landing and low level work. A few statistics will illustrate: Through October of 1966 the 4442d flew 36,520 hours, shot 82,000 landings and 51,310 instrument appoaches. In fact, one ex-B-47 copilot made more landings during two hours in the C-130 than he had made in 1300 hours in B-47s. Many of these landings and approaches were made at other bases and civilian airfields located within a 300-mile radius of Sewart. Inevitably this brings in the problem of light aircraft and airliners in the traffic patterns of these fields. Close cooperation with the FAA has minimized this hazard.

First class maintenance is required if wing is to meet training schedules. Down time has been kept to minimum.

Students come from all commands and occupations and most of those who have been desk bound welcome a flying assignment. Many came from SAC when the B-47s were phased out. Others from MAC will return to Air Weather Service and Air Rescue where they will be flying special modifications of the C-130. Navy, Marine and Coast Guard crews are trained by the 4442d as well as crews from several foreign nations. Most graduates, however, go to TAC Troop Carrier Wings.

BACK TO THE COCKPIT

When Lt Stone and other young pilots like him reported to Sewart they found classmates like some of these: a Lt Colonel who got his wings in 1944. For a year prior to reporting for C-130 training he hadn't flown anything, although he had previous experience in a number of aircraft including the T-33 and B-66.

Another Lt Colonel who had been flying since 1942 but hadn't been in a cockpit for three years. Prior to that he had spent three years on proficiency flying in the C-47.

Or the Lt Colonel who had been 16 years in research and development with his last assignment at USAF headquarters where he flew the T-39. Previously he had flown C-54s and 47s and presently owns his own light plane and two sailplanes. Men like this like to fly and this pilot is no exception.

Flight engineers have similar backgrounds of experience. One Tech Sergeant who volunteered for C-130s had spent the past five years in quality control and flight test. Previously he had crewed F-86s and F-102s. At one time he was a flight engineer in B-50s and wanted to get back to flying.

There probably isn't any "typical" C-130 trainee, but the above should give some idea of the different backgrounds of experience these pilots and flight engineers bring with them.

PREVENTING ACCIDENTS

Safety, of course, is a major consideration in any training program. Several approaches to preventing accidents are used by the 4442d. Probably the two most important factors are excellent maintenance and highly qualified instructors. (Some of the IPs who left the Wing for a Vietnam tour are back and passing on their wisdom to their students.) Other items include an intensification of operational hazard reporting and incident reporting. Each incident is thoroughly investigated and the findings are publicized to appropriate personnel. Safety personnel visit the flight line frequently and when they observe an unsafe condition such as dust excluders askew, lack of pins, etc., they take pictures and send these with a memo to the chief of maintenance. On occasion, accidents are simulated and a practice investigation is carried out.

One means of keeping abreast of potential hazards and eliminating them before accidents occur is the Wing Aerospace Safety Council which meets monthly. Attendance consists of representatives from Operations, Maintenance, Supply, Safety and other functions. Some of the items handled at a recent meeting were OHR reporting, improperly painted emergency exits, C-130 retaining harnesses, C-130 and C-7A compatibility in the traffic pattern, the mid-air potential at civilian fields, FOD problems. As these subjects are dealt with a hazard is removed, a procedure improved and, possibly, an accident prevented.

By the time this article is in print, the 4442d will have an additional responsibility, that of training crews for the C-7A—the twin engine Caribou which is being acquired from the Army. The first aircraft were to be received in December and classes were scheduled to begin early in February. It looks like a busy year ahead for the 4442d. ★

WHEN WILL WE LEARN?

Lt Col Thomas J. Cribbs, Directorate of Aerospace Safety

Controlling the movements and activities of a squadron-load of fighter-pilots while they are on the ground is next to impossible. However, when they are airborne they are generally a well-disciplined group of tigers. They will respond to most any command from an authoritative source that is—or appears to be—authentic. This is where *"responsibility of supervisors"* is printed in bold type. It's bad enough when the leader of a two-ship formation gives an unfounded order to his wingman and gets him into trouble, but it is almost criminal when a poor direction is given to the entire squadron's airborne effort. There are cases occurring quite frequently where it is obvious that without the comments or directions from higher authority, the incident/accident would never have occurred.

In order to stimulate thinking by supervisors, I wish to convey a few of my own experiences that bring out this point loud and clear.

While in advanced flying school, during the WW-II era, I was privileged to fly the mighty P-40. I received 8:20 hours before I graduated, so you can realize my experience. On one of these flights I decided to proceed on my own from Foster Field, Texas, to San Antonio and return. I took off on runway 12 and made my 180-degree turn, found the highway and headed out on course. The ceiling was about 3000 feet but the visibility was relatively good so I bored on with no further concern. When I approached San Antonio the overcast had vanished and it was a balmy, sunny, Texas day. I flew across the city, made a one-eighty, picked up the highway and started back. At this time I heard the phrase that is now din to my ears: "All aircraft flying out of Foster return to the field and land immediately, weather is deteriorating."

"Immediately," in my situation, meant 30 minutes no matter how you cut it. The old P-40 wasn't as fast as present day vehicles. I kept my mouth shut and spent the next 25 minutes trying to stay under the overcast and keep that highway in sight. I finally arrived over Aloe field (an airdrome just across town from Foster) and flew direct to Foster. The tower at this time was directing everyone to land straight in.

Approaching the field from the northwest, I put my gear down and was hanging on for dear life intending to land on runway 12. I called "final" to the tower and he cleared me to land. At about one-half mile out I realized I was landing against traffic, so with all the ingenuity and quick thinking of a would-be fighter pilot, I did not raise the gear but just veered slightly to my right so my flight path would be right over the ramp, just above and to the north side of the tower. As I approached the key position, I calmly pressed the mike button and transmitted: "Tower, would you check my gear?" He agreed it was down and I'm sure he deserted his post to help my instructor build the scaffold so there would be no delay of the hanging after I landed.

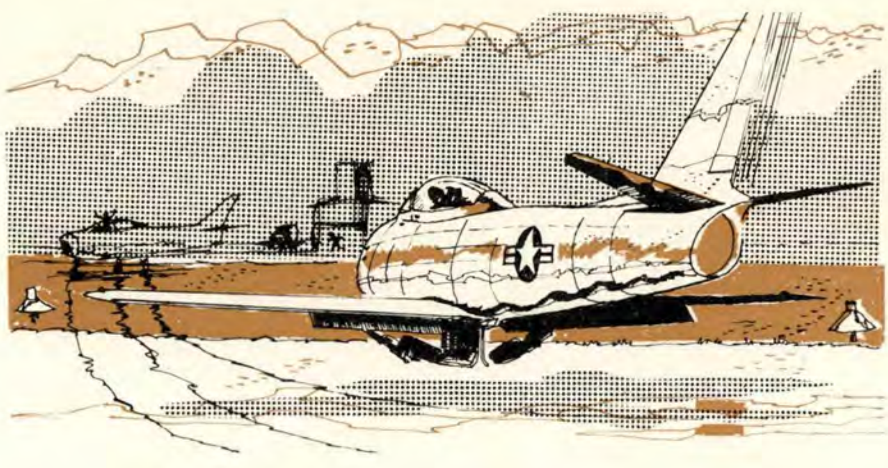
I proceeded out beyond the runway and my first awareness of other aircraft in the area was when I looked straight into the prop of another P-40. From where I sat it was 80 feet across the arc. Panic, instinctive quick reaction, and the help of the Almightly averted the collision. I then became aware that the sky was littered with aircraft. There was no general pattern and we were all milling around under a low overcast with restricted visibility. I managed to keep clear until my turn came to land, but just prior to entering a long final approach the radio went wild. One of the boys ahead of me forgot to extend the landing gear and bellied the bird in. Scratch one P-40! They lined the remainder of us up with another runway and we all recovered safely. My little performance was forgotten in all the hubbub. My buddy who bellied in beat me to the scaffold.

Time passed to the jet age and the F-86A. One night in the United Kingdom, one squadron had 12 aircraft performing familiarization training. After we had been airborne about 20 minutes, the mobile control officer announced over the radio: "There is a thundershower just south of the field, moving this way. All aircraft return and land."

The first flight to return peeled off and by the time the lead got down the rain was covering half the runway. Six thousand feet of wet asphalt is a poor recovery area at best. Nr 1 was able to slow his aircraft enough to turn off to the left at the end. Nr 2 slithered to a stop on the warmup pad at the right end of the runway. Nr 3 landed a wee bit long and when he saw he wasn't going to make it, he guided his craft off the left side of the runway. He then realized he would collide with Nr 1 if he kept going so he retracted the gear. The bird responded but got badly ruptured in the process. Nr 4 waved off, proceeded ten miles down the road and landed safely as did the other two flights.

About two years later I was flying from Marseilles, France, to Wiesbaden, Germany, in the trusty T-Bird. Cruising along at 30 thousand I was above all clouds, but from where I sat I could tell it wasn't too pleasant on the ground. The sun had set about 30 minutes previously and the large cumulus clouds were billowing all around. Alone, with total darkness all but upon me, I decided to while away a few minutes listening to the radio chatter on the standard tower frequency. As I reached for the tuning knob I heard the now infamous transmission on guard channel. "This is XXXX mobile control, all craft flying from XXXX air base return to land; there is a thunderstorm three miles south approaching the field." This was like sitting at ringside just before the bell rings for the first round. I knew there was going to be some action. I switched to tower frequency and had to wait only a short time. The Nr 3 man of the first flight forgot to lower his gear and mobile control did not catch it until too late. The Nr 4 went down the road a piece and landed safely as did all the remaining flights.

Now, 10 years later I still hear phrases like "All T-38s flying from XXXX air base return and land." Each time I cringe and think to myself, *when are we going to learn?*



With this background and experience, which I hope will assist other supervisors, I never submit a flight plan without consideration of an alternate air field, regardless of the type of weather in which I intend to fly. Although inclement weather is a rarity at some airfields, there is always a possibility that a diversion may be required at a crucial moment. Situations involving the worst possible conditions should be always present in the supervisor's mind so that when the pressure is on, his decisions are preplanned and not a matter of snap judgment. There is nothing worse than recalling 20 some airplanes and expecting them to land at the same time! ★

better crushed...

Maj David L. Elliott, FSO
4520 Combat Crew Trng Wing
Nellis AFB, Nev

Michael is two-and-a-half years old. He has very blond, curly hair and more energy than a thermonuclear device. He can't be still even when he is asleep. He is either extremely happy or "crushed." His motto is: "Never walk anywhere when you can run," and he loves to go for rides in the car with his mommy and daddy. Yesterday Michael almost lost the privilege of growing older. The incident was typical of everyday rushes, trying to get this done prior to that, everyone in a hurry.

My wife said, "Honey, will you go to the annex and get a loaf of bread, and take the boys with you, please?" So I gathered up the boys and told them to hop in the car. But before I left, I had to go back in the house to find out what I was supposed to pick up; I had already forgotten.

When I came back to the car both boys were in it but I did not see Kim, their little sister. I checked round the car, then went back in the house and asked my wife if Kim were there. "Yes," she replied, "she is in here with me."

Thus assured, I went back to the car, got in, and instinctively yelled, "Sit down!" I started the automobile, shifted it into reverse and started backing out of the driveway. I first looked to the right and down Spring Street to see if anyone was coming. It was clear, so I turned my head over my left shoulder, looked down McCarran, and started backing out of the driveway.

When the boys got into the car, they had brought their plastic submachine guns—they make a noise like a real sub-machine gun—and both had been firing their guns in their daddy's ear just prior to my pulling out on McCarran Street. I was looking over my shoulder and I heard a noise that sounded like one of the sub-machine guns had been dropped on the floor. I continued backing out, but for some reason I turned my head to the right and saw that the car door was open and the machine gun was lying on the ground.

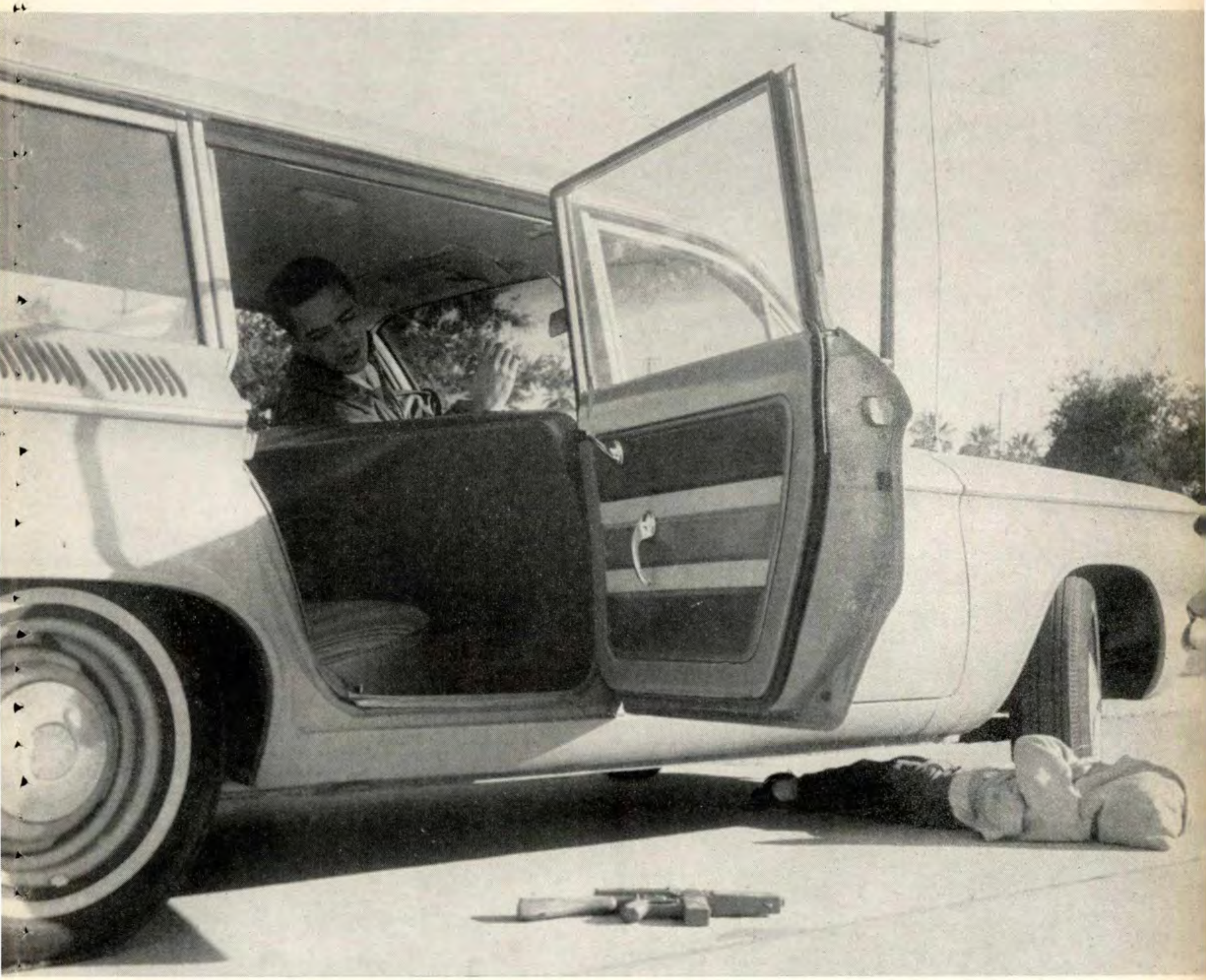
I stopped and then discovered that my number two son, Michael, was not in the car. I locked the brakes, shut off the engine in the middle of McCarran Street, ran around and looked under the car.

Directly behind the front wheel lay a stunned and frightened Michael. I gathered him up, put him back in the car and then realized I had almost run over my son. I sat down in the middle of McCarran Street blocking both lanes of traffic and began to shake.

Later, I asked myself how this happened. Why did I STOP? I don't know. I didn't stop because I am such an excellent driver or because I realized that Michael had fallen out of the car. Why did I look to the right? I don't know. Probably the sound of that plastic sub-machine gun hitting the pavement got my attention. How did the door get open? Well, obviously I assumed that it was closed. Where was Michael when he fell out? Where Michael always would be, hanging on the door. Naturally, when I turned my wheels to the left as I was backing out, the centrifugal force of the automobile swinging to the right, opened the door and he fell to the ground.

I'm like most other drivers; I know that the kids should be sitting in the car, strapped in. I know it probably more than most people on the base; I'm one of the safety officers here. But when you get in

Emotionally



a hurry, you tolerate the nonsense of a two-year-old who is so happy and bubbling, with his curly hair dangling in front of his eyes. You know when you say, "Sit down and strap yourself in," that he is going to be "crushed," so you sometimes forget the formalities and proceed.

Now I have a new check prior to pulling out of the driveway. I now can account for all three kids as I did before. I check the back of the car because the kids' motorpool generally is located directly behind my car; and I also now check all doors. I check to make sure that all passengers are firmly buckled in.

It will probably take a little education on the part of the boys to realize that whenever they go riding in the car they are going to have to sit down with seat belts wrapped firmly around their middles and they are not going to be able to see over the door handle.

They will probably be "crushed," but better to be "crushed" emotionally than to be "crushed" with the front wheel of an automobile. ★

REX RILEY'S CROSS COUNTRY NOTES

LIKE IT OR NOT flight line safety is every crewmember's responsibility. I was on a many legged trip recently and noticed one glaring deficiency at *every* station I visited, from the west coast to the east coast, and from Massachusetts to Florida—nobody is religiously grounding aircraft of any type, even while refueling.

One POL man was asked if grounding was practiced at his base. He replied, "Yes, we usually do." This hot-shot was standing in front of a transient bird which was being refueled without benefit of grounding. Needless to say, he quickly produced a ground wire. Come on, troops, look for these small but very significant safety practices. Insist that your machine, and anybody else's for that matter, be properly handled.

A HUMOROUS FELLOW recently threw a "non-explosive" smoke grenade into a group of men to frighten them. The grenade exploded and showered white phosphorous over ten people. Eight lucky guys were treated and returned to work, but the other two will be out for at least five days. How many, many times have we all been warned against horseplay?

STROBES—Upon questioning several pilots as to when strobe lights would be turned on, I received several answers. One pilot said the strobes are turned on at the request of the pilot. Another said the tower operator turned them on when an aircraft is turning final approach. Another said, "When the visibility is less than a mile."

These conditions probably do exist at certain airfields, but strobe beacon usage should be standardized in accordance with Table 1 of T.O. 35F5-3-1-1, 24 Mar 66. It directs that strobe lights be on in daylight conditions when the ceiling is less than 400 feet or when the visibility is less than three miles (when the ceiling or viz are reported variable, ragged, indefinite, etc., the lowest value applies). For night operations, the T.O. directs that strobe beacons be on when the visibility is less than three miles and the ceiling is 500 feet or less. No less important are the following notes, also included in the tech order:

"Frequently traffic pattern and approach zone weather conditions are considerably *less* than reported for the airfield. These situations normally occur when thunderstorms, snow or rain showers or low stratus clouds are present in the airfield vicinity. Under these conditions or when an emergency or difficulty of any type occurs where positive orientation and airfield identification *might be helpful to the pilot, turn the approach and runway lighting on.* The highest position available may be used if weather, distance or other factors make this action advisable to insure positive identification.

"The strobe beacons occasionally are objectionable to pilots in the last portion of the approach due to the flash intensity and halo effect. Controllers should be alert and promptly turn the strobe beacons off at pilot's request."

NEW PFSV FREQUENCIES ASSIGNED IN CONUS. In the near future we will have new frequencies assigned to the pilot-to-forecaster facilities at 43 AWS detachments in the CONUS. There will be a total of four METRO frequencies in use, although only one has been assigned to any given base. The original frequency of 344.6 mcs will now be known as the "Local and Terminal PFSV" while the new ones will be designated "Primary Enroute PFSV." This new nomenclature is terminology only; the service is the same on any of the four frequencies—call any of the stations you desire.

No coordinated implementation date for the change-over to the new frequencies was established by USAF. This has resulted in some confusion. AFCS has attempted to establish 16 Jan 1967 as the date upon which all bases assigned the new frequencies would make the change-over at one time. Since the PFSV facilities are base owned and not directly controlled by AFCS, their efforts to obtain a uniform change-over may not be successful in all cases. Some bases may begin using the new frequencies sooner than others.

The addition of new PFSV frequencies should solve a prevalent problem. We are all familiar with the saturation of PFSV calls in many areas. Operations officers should monitor the installation of the new frequencies and assure that a NOTAM is promptly published. ACIC should also be promptly notified to make necessary FLIP enroute supplement changes.

PFSV FREQUENCY ASSIGNMENTS

1. 268.2 mcs—New frequency
   - McChord AFB, Wash
   - Davis-Monthan AFB, Ariz
   - Grand Forks AFB, NDak
   - Webb AFB, Tex
   - England AFB, La
   - Wurtsmith AFB, Mich
   - Langley AFB, Va
   - Norton AFB, Calif
   - Malstrom AFB, Mont
   - Peterson Fld, Colo
   - McConnell AFB, Kans
   - Scott AFB, Ill
   - Robins AFB, Ga
   - Plattsburg AFB, NY
2. 342.5 mcs—New frequency
   - Loring AFB, Me
   - Dover AFB, Del
   - Shaw AFB, SC
   - McCoy AFB, Fla
   - Offutt AFB, Nebr
   - Kirtland AFB, NMex
   - Minot AFB, NDak
   - Castle AFB, Calif
   - Lockbourne AFB, Ohio
   - Eglin AFB, Fla
   - Blytheville AFB, Ark
   - Duluth, Minn
   - Carswell AFB, Tex
   - F. E. Warren AFB, Wyo
   - Mt Home AFB, Idaho
3. 344.6 mcs—Old frequency
   - Altus AFB, Okla
   - Amarillo AFB, Tex
   - Andrews AFB, Md
   - Brookley AFB, Ala
   - Bunker Hill AFB, Ind
   - Cannon AFB, NMex
   - Chanute AFB, Ill
   - Charleston AFB, SC
   - Clinton Sherman AFB, Okla
   - Columbus AFB, Miss
   - Dobbins AFB, Ga
   - Dow AFB, Me
   - Dyess AFB, Tex
   - Ellington AFB, Tex
   - Forbes AFB, Kans
   - George AFB, Calif
   - Griffiss AFB, NY
   - Hamilton AFB, Calif
   - L. G. Hanscom AFB, Mass
   - Holloman AFB, NMex
   - Glasgow AFB, Mont
   - Little Rock AFB, Ark
   - March AFB, Calif
   - MacDill AFB, Fla
   - Mather AFB, Calif
   - Maxwell AFB, Ala
   - McGuire AFB, NJ
   - Myrtle Beach AFB, SC
   - Nellis AFB, Nev
   - Olmsted AFB, Pa
   - Otis AFB, Mass
   - Oxnard AFB, Calif
   - Patrick AFB, Fla
   - Pope AFB, NC
   - Selfridge AFB, Mich
   - Sheppard AFB, Tex
   - Stewart AFB, NY
   - Suffolk Co AFB, NY
   - Tinker AFB, Okla
   - Travis AFB, Calif
   - Turner AFB, Ga
   - Cairns AAF, Ala
   - Lawson AAF, Ga
   - K. I. Sawyer AFB, Mich
   - Keesler AFB, Miss
   - Kelly AFB, Tex
   - Kincheloe AFB, Mich
   - Kingsley AFB, Ore
   - Laredo AFB, Tex
   - Laughlin AFB, Tex
   - Tyndall AFB, Fla
   - Vandenberg AFB, Calif
   - Westover AFB, Mass
   - Whiteman AFB, Mo
   - Wright-Patterson AFB, Ohio
   - Walker AFB, NMex
4. 375.2 mcs—New frequency
   - Fairchild AFB, Wash
   - Luke AFB, Ariz
   - Ellsworth AFB, SDak
   - Bergstrom AFB, Tex
   - Truax AFB, Wisc
   - Homestead AFB, Fla
   - Pease AFB, NH
   - Beale AFB, Calif
   - Hill AFB, Utah
   - Reese AFB, Tex
   - Richards-Gebaur AFB, Mo
   - Seymour Johnson AFB, NC
   - Sewart AFB, Tenn
   - Barksdale AFB, La

FOREIGN OBJECT DAMAGE

The most worrisome acronym in Air Force use could be FOD. Rex Riley returned from a trip the other day and reported that FOD is still one of the most cussed and discussed causes of accident/incidents. Recent examples of *foreign object* damage to an aircraft resulted from engines slurping up a flashlight, flip chart, a stone, piece of tire, screwdriver, bolts, copilot's jacket, a pilot's cap. Such objects have frequently been the cause of engine malfunction, sometimes resulting in a major accident.

Now we all know that an engine doesn't go out of its way looking for some object to devour; those objects come to the engine! Last year this problem cost the Air Force forty million bucks. The picture for this year is even gloomier since the cost for the first six months was approximately 25 million dollars, an estimated annual increase of 25-30 per cent. (During this period, one command alone had 52 engines damaged at an FOD cost of 90 thousand dollars.) At the rate we've been going, the 1966 tab is going to figure out at about fifty million bucks.

Probably every type of aircraft the Air Force owns has been a victim of FOD. Recently a new F-111's engine got away with the mechanic's cap and ear protectors. FOD plays no favorites; it can also cripple a helicopter.

Lady Luck frequently tags along. For example, following a recent overwater flight of a transport, the in-shop inspection revealed compressor damage consisting of dents, tears, knicks and blade tip curling. The culprit? A solid object—possibly a bolt—that was ingested by Nr 1 engine. The FOD prevention program for this Wing now includes a mod for all intake dust plugs. It is using rivets to replace nuts and bolts, thus reducing the possibility of loose bolts being dropped (inadvertently, of course) from the dust plugs into engine intakes.

In the August 1966 issue of AEROSPACE SAFETY, mention was made of Safety Film TF 5614 FOREIGN OBJECT DAMAGE, a 16-minute description of the Air Force program to reduce costly jet engine damage resulting from ingestion of foreign objects. The film shows runway testing techniques that include debris patterns, vortex formations and tail blast effects.

Another film on this subject is SFP 1263 FOREIGN OBJECT DAMAGE TO JET ENGINE AIRCRAFT. It provides graphic examples of the dangers involved in flight, takeoff, taxiing and ground running of jet engines resulting from FOD. We recommend another look at these films.

Some bases are trying a method which has been effective in reducing the FOD problem: A LOST and FOUND Bulletin is made up as often as necessary, and posted. It tells crewmembers *what* they have lost while working on and around aircraft; it also tells them *where* the objects were found. If the owners can stand to look at the bits and pieces, they may claim the lost article(s). ★

LOST AND FOUND

Hose clamp	in an F-104 engine
Zip-log receptacle misplaced, remained loose in aircraft*	lodged between left engine throttle control quad fuel cutoff
Alternator, disintegrated	piece got into the engine
Small bolt	between 1st and 2nd row of stator blades, J-57 engine
Washer	inadvertently left in cockpit . . . caused warning light to come on.

*Whenever a loose object is lost in cockpit area and cannot be found, the aircraft must be placed on a RED CROSS until missing object or item can be found.

The pilot was tired. After a long cross-country flight with several refueling stops enroute, he was arriving at his planned overnight stop—a large air station belonging to a sister service. The weather was bad with light rain in all quadrants. Darkness was approaching and the pilot had just completed a rough but safe penetration to a landing at minimums. "Just a few more minutes and I can park this beast. Then to BOQ, a hot shower, and dinner at the Club. Let's see now, here's the taxiway turn-off ,and there's the parking area. Looks pretty crowded.

"Where's my parking spot? There's the taxi director giving me a left turn. Ah, that must be it just the other side of that Navy bird. Gee, it sure is getting dark. Can't see too well in this rain. Looks like I'm clear. Now, I'll just taxi down between these parked planes and I can turn into my spot. What is the taxi director waving for? Does he want me to stop, or what?" . . . . CRUNCH!!!

Although this accident is hypothetical, it could easily happen to you Why? Because of lack of knowledge of existing aircraft handling signals used by other services. What brought this subject to mind was an accident similar to the one described above at a large southern Naval Air Station.

A SHOW OF HANDS

Cmdr Daniel A. Webster, USN
Flight Safety Liaison Officer
Directorate of Aerospace Safety

There have been a number of reports received at Navy installations of pilots of other services failing to heed "STOP" and "EMERGENCY STOP" hand signals. Investigation has shown that this was primarily due to a lack of understanding of the signals used by the Navy. To complicate matters, there are variations in the STOP and EMERGENCY STOP signals used by the Army, Navy, Air Force, Federal Aviation Agency (FAA), and International Civil Aviation Organization (ICAO). These are illustrated on page 15.

In general, aircraft marshalling hand signals of all services conform to those used by the International Civil Aviation Organization, with some notable exceptions. These exceptions represent a definite hazard to transient pilots who are not fully cognizant of the signals used by the other services. In some cases, it is not feasible to standardize hand signals. Such is the case with the STOP and EMERGENCY STOP signals used by the Navy, which are not standardized due to the peculiarities of operation and special requirements for signals used aboard ships.

Navy signals must be compatible with the aircraft carrier operating environment. This environment includes high winds over the deck, minimum light, and exceedingly close quarters, together with multiple aircraft in precise taxi movements occurring simultaneously. These maneuvers include frequent stops and come-ahead signals, wing fold, etc. Under these conditions, each signal must be unique and not subject to misinterpretation.

Adoption of the ICAO STOP and EMERGENCY STOP signals is not desirable for Navy usage because of the arm movement involved. Any movement of the arms could be interpreted as a come-ahead signal. This could result in havoc on a carrier deck. As can be seen on page 15, the ICAO STOP signal consists of repeatedly crossing arms above head level, whereas the Navy STOP and EMERGENCY STOP signals are a distinct positioning of forearms without further movement.

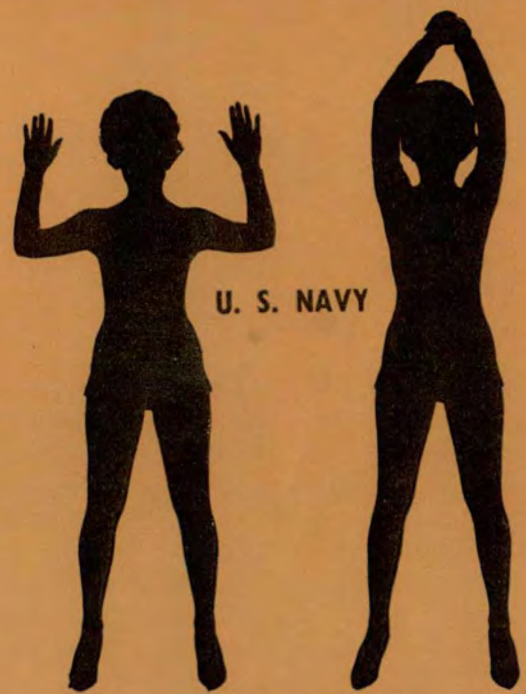
Because the ICAO signals do not lend themselves to uniform adoption, the existing inconsistencies become a problem of education of pilots. Information concerning variations in hand signals used by all services and ICAO should be widely promulgated to all personnel operating aircraft into and out of fields belonging to other services. With an understanding of what to expect, pilots will be better equipped to prevent that mishap that could otherwise "spoil your whole day." ★

U. S. AIR FORCE

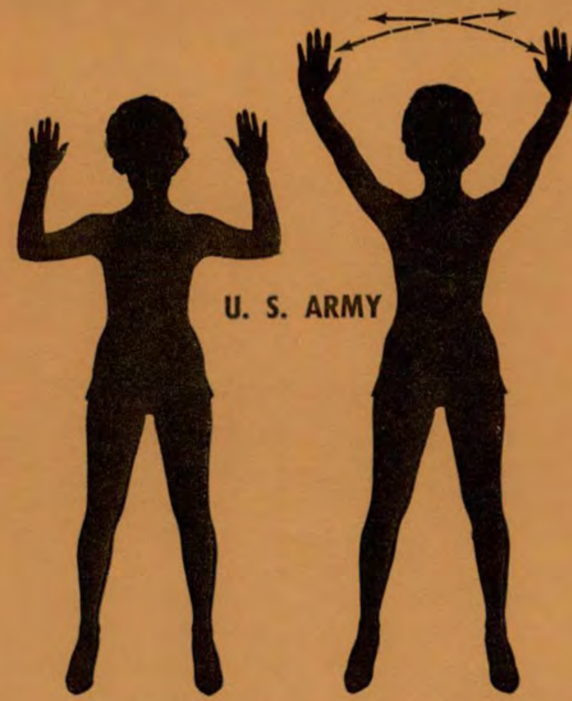
STOP

Arms repeatedly crossed above head (the rapidity of the arm movement should be related to the urgency of the stop, i.e., the faster the movement the quicker the stop).

Reference AFR 60-11, March 1965, page 7



Reference NWP-41(B) June 1966



Reference AR 95-13, October 1960, page 4

NORMAL STOP

DAY — Raises both hands at eye level, palms to pilot, in policeman's "stop."
NIGHT — same except with wands, held vertically.

EMERGENCY STOP

DAY — Crosses forearms overhead with fists clenched.
NIGHT — crosses wands overhead.

NORMAL STOP

Elbows flexed, palms at eye level turned toward aircraft, arms motionless.

EMERGENCY STOP

Arms repeatedly crossed above head.

STOP

Arms repeatedly crossed above head (the rapidity of the arm movement should be related to the urgency of the stop, i.e., the faster the movement the quicker the stop).

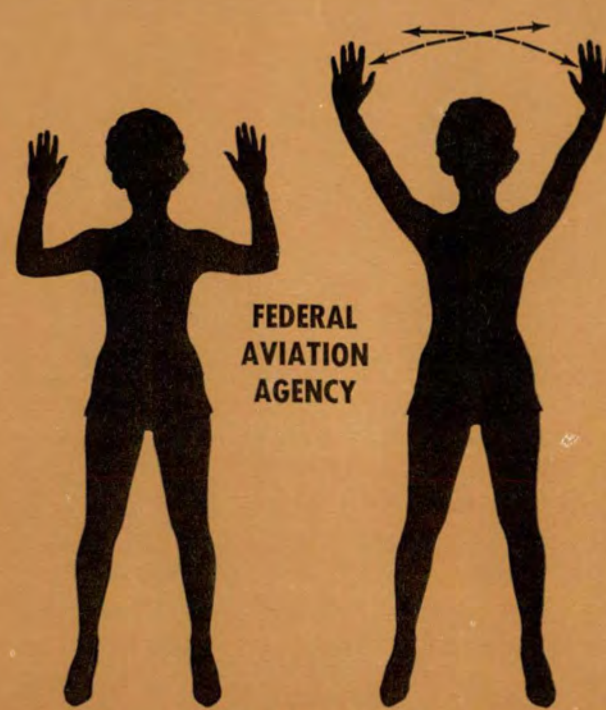
NORMAL STOP

Elbows flexed, palms at eye level turned toward aircraft, arms motionless.

EMERGENCY STOP

Arms repeatedly crossed above head.

Reference Annex 2, Rules of the Air, Fifth Edition, March 1966, page 21



Reference AIM, August 1966

THE IPIS APPROACH

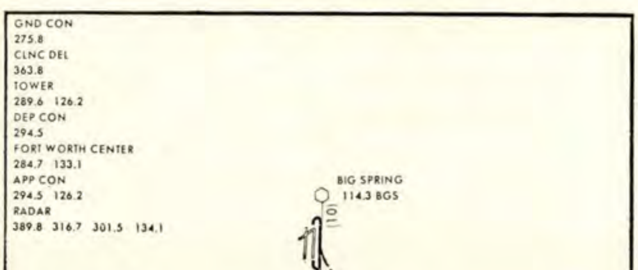
By the USAF Instrument Pilot Instructor School, (ATC) Randolph AFB, Texas

AMENDED CLEARANCES

Some pilots apparently misunderstand air traffic control procedures that apply when an aircraft is rerouted (including vectors) from a previously assigned route that included altitude restrictions crossing specified fixes/radials. Some assume that *all* previous altitude restrictions remain in effect, even though the amended route may no longer require the aircraft to pass over some or all of the previously assigned fixes/radials. Others assume that issuance of vectors (departures or enroute) automatically cancels the altitude crossing restrictions.

The answer is—an altitude restriction associated with a specific fix is applicable only *at that specific fix.* An altitude restriction associated with a radial is applicable anywhere the aircraft flight path crosses that radial. For example:

A pilot received departure clearance to destination airport to maintain FL 270, cross Midland VORTAC



087 radial at or below 7000, Davis intersection at FL 180 and San Angelo VORTAC at FL 230. After takeoff, prior to crossing Midland VORTAC 087 radial, the clearance is amended to direct San Angelo VORTAC (vector or nonradar). The aircraft will now intersect the Midland VORTAC 087 radial at a different point and will by-pass Davis intersection. However, the flight *is still required* to cross the Midland VORTAC 087 radial at or below 7000 and the San Angelo VORTAC at FL 230. The crossing altitude restriction for the Davis intersection is no longer applicable since the aircraft does not pass over that fix. Therefore, after crossing the Midland 087 radial at or below 7000, the flight should climb to cross the San Angelo VORTAC at FL 230 and then climb to the enroute FL 270.

If there is any doubt about altitude restrictions on amended clearances, ask the controller. Remember the above rule concerning altitude restrictions when crossing fixes vs. radials in the event of two-way radio failure after receiving an amended clearance.

Q AFM 51-37, page 11-16, High Altitude Penetration and Approach, contains the following statement: "When departing the station, make a *level* turn in the shortest direction to *parallel* the penetration course." Does the procedure apply to all penetrations? For example, some TACAN penetrations may require high rates of descent, e.g., 20,000 feet in 20 miles. Delaying descent while turning to parallel the penetration course only adds to the problem by decreasing the distance available for descent.

A No, the procedure on page 11-16, AFM 51-37, requiring a level turn to parallel the penetration course applies only to high altitude *non-DME teardrop* penetrations.

As you know, when performing a VOR teardrop penetration, beginning descent too soon may result in arrival at the penetration turn altitude before intercepting the outbound penetration course. Additionally, commencing the descent too soon may result in completion of the penetration turn too close to the final approach fix. In such a situation, aircraft positioning and configuration changes for the final approach may be difficult. Turning to parallel before beginning descent merely aids in preventing this from occurring.

For all other type penetrations, e.g., straight-in, arc, offset (VOR or TACAN) maintaining altitude until parallel to the penetration course is not required; however, descent will not begin until over or abeam the IAF outbound in the direction of the penetration course. ★

MISSILANEA

ANYTHING YOU CAN DO I CAN DO BETTER

VERSE ONE: (Pianissimo)

Forty-eight Falcon missiles were loaded on four pallets (12 per pallet) on a 40 foot trailer for transportation. Enroute with the load, the driver made a right turn onto an unpaved smooth dirt road. The load shifted, breaking the single tiedown strap on the third pallet. Nine of the 12 Falcons fell to the ground. (Extracted verbatim from the Aug 66 issue of AEROSPACE SAFETY magazine.)

VERSE TWO: (Forte)

Sixty Bullpup warheads were loaded on five pallets (12 per pallet) on a 40 foot trailer for transportation. Enroute with the load (actually only a few feet) and at a crawling pace, the driver made a left turn. The trailer's left rear wheels crossed onto the shoulder of the road surface and cut into the soft shoulder. The load shifted, breaking the tiedown straps holding the pallets. Sixty of the 60 Bullpup warheads fell to the ground. (Info taken from a preliminary explosive incident report which occurred after *publication and distribution of the above magazine item.)*

Note that the Falcon-laden pallet had an *individual* tiedown strap—yet tumbled to the ground. Now, let's examine the corrective action the VERSE TWO people are going to take: "An adequate quantity of tiedown straps will be used to permit *each pallet to be individually secured* to the trailer." It appears the Bullpup load was fastened (?) down by stretching the nylon straps over the entire load, i.e., over all five pallets. Ah! One more factor: The trailer happened to be modified with a 463-L conveyor system. So now we have to contend with a "roly-roller" platform on which to secure our pallets. This, of course, leads us into a consideration of what constitutes an "adequate quantity" of tiedown straps for such a situation. Well, I don't think anyone but the people involved can really come up with an answer to that—and I'm sure they already have—perhaps belatedly.

The book says, "Explosive containers will be loaded in such a way to prevent movement or blocked and braced and/or otherwise properly 'tied down' or secured to the vehicle." (Par 0712, 7-(6), AFM 127-100). Isn't that clear enough?

Finally, we get to the crux of the problem, as I see it, and that is the failure to learn from other people's experiences. We in the safety business put out poop by the tons, it seems. Not because we like to write, but because we're trying to get a message across. Admittedly, some material is repetitious and perhaps a new approach is needed. (We can't hit commanders and supervisors across the snout like the proverbial farmer did to his mule in order to gain his attention). Perhaps, though, if commanders and supervisors would only use the material furnished the first time around, there would be less repetitious safety literature, fewer accidents, and a more efficient operation. Perhaps there would be no third verse to this ditty we started earlier.

VERSE THREE

Contributing unit unidentified as of this writing. Will it be YOURS? ★

Maj Lewis C. Lemon
MSO, Hq 7th Air Force, PACAF

TO TELL THE TRUTH..

Maj Donald R. O'Connell, Directorate of Aerospace Safety

Would you tell us your name, please?

My name is Smoldering Boulder Slickwing, 1/Lt, USAF. I am the hottest rock in the blue. I have little experience but make up for it with aggressiveness a-go-go and lightning-like reflexes.

My name is Cool Daddy Starwing, Capt, USAF. I am the smoothest jock on the patch. I blend mature judgment with solid flying experience. My combination of sagacity and still-youthful reflexes makes me the greatest of pilots.

My name is Old Head Wreathwing, Major, USAF. I am the old steady head who can fly anything in the inventory. In fact, I'm so well rounded I spend most of my time flying a desk. I don't need lightning reflexes because my experience indicates, and philosophy dictates, "Let's walk down, son, and get 'em all."

Will the real aircraft smasher please stand up?

WHO would get your vote?

There is much concern about the increased number of accidents during 1966 and many possible explanations have been developed. The first, and certainly most logical, is that the Air Force is doing more flying and therefore there is more opportunity for accidents. This is especially true in SEA where the flying time in the first six months increased two and one-half times over that flown in the same period in 1965. This is particularly significant because much of this flying has been conducted from fields that are below Air Force standards. This greatly increases the accident exposure index.

Just as important is the fact that most of this increased flying time has been performed in fighter aircraft, which possess a high accident rate. On the other hand, traditionally low accident rate aircraft such as bombers have flown less.

Another feasible reason for the increase in accidents is the decrease in experience level of maintenance men. All units have been drained of 5- and 7-level airmen. In return the units have gotten 3-level recruits rights out of school. This has put a tremendous burden on the few experienced workers and supervisors left behind. They are not only forced to train these new heads, but, in most cases, they must also support an increased flight schedule. More work by fewer people leads to fatigue which leads to careless mistakes which lead to more accidents. There are several other possible reasons for the increase in accidents. They include more wear and tear on already old aircraft, supply shortages and pilot shortages. This

last area is becoming more acute as many good young officers find it difficult to turn down the opportunities presented by civilian firms, especially airline companies. It is hard for the Air Force to match the lure of twice as much money plus "Coffee, Tea or Me." However, a review of the flying time of pilots involved in first half 1966 accidents also revealed another possible cause—upgrading into higher performance aircraft.

As Safety Project Officer for the F-101, I became inquisitive when I noted that seven of the fourteen F-101 accidents this year involved pilots with less than 70 hours in the F-101. There were two other pilots who either had little flying time in the bird over a long period of time or very little in the particular model. Seven of these nine pilots had accidents in which pilot factor has been initially assessed as the primary cause. Total time of these pilots ranged from 293 hours to almost 4000. A look at the F-105 accidents showed the same problem. Four of the eight accidents in May and June involved pilots with less than 100 hours of F-105 time. Three of these four were assessed pilot factor and all three of these pilots had over 3800 hours total time.

There were 177 USAF major flight accidents in the first half of 1966. A breakdown by pilot total flying hours is as follows:

Pilot Hours	Per Cent of Accidents	Per Cent of Active Pilots
0- 999	17	12
1000-1999	20	12
2000-2999	35	21
3000+	28	55

Total Time	Model Time Hours Accidents 0-99	100-499	500+
0- 999	4	22	6
1000-1999	6	15	11
2000-2999	11	27	25
3000+	8	18	24
	29	82	66

As you can see, over 60 per cent of these accidents involved pilots with over 2000 hours. Twenty nine of these accidents involved pilots with less than 100 hours in the specific model. Fourteen of these twenty-nine accidents occurred in May and June, and eleven of these fourteen pilots had over 2000 hours of flying time.

This started to look like a case against the old star and wreath-wingers and since this hit mighty close to home, it called for further investigation. A check with the personnel shop at Randolph confirmed that about 75 per cent of our active flying pilots have over 2000 hours. Thus, 75 per cent of the pilots have had only 63 per cent of the accidents so it hasn't gotten too far out of proportion—yet. However, the demands of SEA have forced the Air Force to train and re-train many behind-the-lines pilots in high performance jets and older unfamiliar propellor planes. Most of these pilots have lots of total flying time but many of them got it a long time ago, or by riding along while "George" or someone else was driving. History has proven that the accident potential of jet transition flying is about three times higher than normal. As can be expected too, flying time of the pilots being transitioned is not as important as the type of flying and when this flying was performed. The potential goes even higher with pilots over 35 years old. Therefore, many of these old heads have a couple of strikes against them already. There is one more that is becoming more and more apparent. Most of these troops are tickled pink to be unchained and back in the driver's seat, but a few are not too hot for the program. They don't particularly want to drive a fighter, plus the fact that they know where they will be headed as soon as they get checked out. This doesn't help their initiative or attitude. Consequently, they find themselves behind the power curve and unable to cope with the fighter driving pace, especially in emergency situations.

These are the troops who get my vote. I feel we have got to realize that all pilots do not have the aptitude or the desire to fly fighters. This does not mean that they are not capable pilots and of great value to the Air Force in another flying capacity. It will behoove everyone associated with our jet fighter up-grading programs and replacement training units to look closely at the pilots going through the programs. Those officers who are not suited for the role must be pinpointed and released from the programs before they are involved in an accident that may cost the Air Force a critically short aircraft and a valuable pilot—a pilot too valuable to lose trying to be converted into something he isn't. ★

At a time when discoveries that stretch the limits of imagination are being made daily, we should all take a closer look at the FREQUENCY SPECTRUM . . . from . . .

BOING BOING TO ZAP

Edwin R. Roth, Directorate of Aerospace Safety

It is truly amazing that so much of what we can or cannot sense is a matter of radiation, resonance, oscillation, and vibration. The safety officer should be familiar with these phenomena as they will give him an appreciation of the common properties involved. Through this article, it is hoped to further this appreciation and relate significant frequencies to long-standing safety considerations.

The entire known frequency range from 5×10^{-4} to 6×10^{22} cycles per second is shown on the accompanying chart. (See T.O. 31Z-10-3 for a detailed chart of the frequency spectrum.) The wave lengths vary from the diameter of an electron to four times the distance between the earth and the sun.

The chart consists mostly of the electromagnetic spectrum. To provide an interesting comparison, as well as for completeness, it also includes mechanical and sonic frequencies on the lower portion of the scale. All electromagnetic waves are closely related. They propagate through matter or vacuum with the speed of light; they are all absorbed by objects in their direct or reflected paths and eventually converted to heat. The principal differences between them are the frequencies in which they vibrate, the manner in which they are produced, and how they manifest themselves. For example, as the frequency of a ray increases, its photon (a unit or particle of electromagnetic radiation) energy also increases. Up to the start of the ultra violet band, photon energies are nonionizing; that is, they will not ionize the matter directly in their path. Radiation having frequencies beyond this point, however, (photon energies greater than several electron volts) can sufficiently excite outer electrons to dislodge them from their outer orbits and produce ions. The waves from the ultra violet to cosmic region are therefore referred to as ionizing radiation. Another significant difference between rays is their relative ability to penetrate materials. This is a function of the frequency and intensity of the radiation. The frequency chart helps to bring out these differences.

Now, let's briefly discuss the spectrum from a safety standpoint.

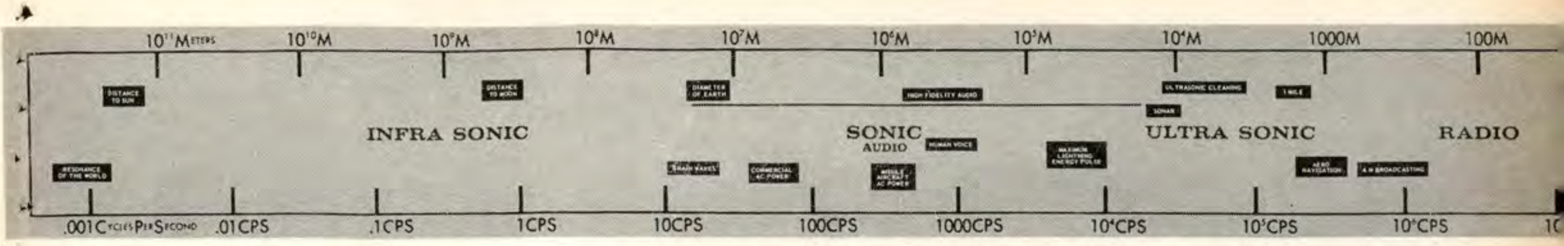
In the lower portion of the spectrum, the various mechanical and sonic vibrations can degrade the structural integrity of materials by generating resonant frequencies of maximum amplitude which may cause failure of the item or by long-term, cyclic-stress fatigue phenomena. Sound vibrations of high intensity can also cause structural failure of material due to the pressure wave generated (sonic booms). The hazard to the human ear due to high-intensity noise is well known. Also of significance is the seismic vibration connected with earthquakes. Such ground waves may be induced from explosions.

ELECTRICAL HAZARDS

Electrical phenomena and electrical frequencies worthy of mention are also in the lower portion of the spectrum. The commercial AC power of 60 cycles per second is most hazardous to the human; for example, 70-200 milliamperes of 60-cycle current through the heart area is usually fatal.

Alternating currents such as 400 cycles per second can, of course, induce currents in adjacent lines. In critical adjacent circuitry (for example, ordnance systems), the induced current could initiate electroexplosive devices. The lightning energy pulse occurs from about 4 to 10,000 cycles per second. Such pulses produce high-power fields which can induce currents in circuitry of sufficient magnitude to burn out lines, fuses, electronic tubes, and initate electroexplosive devices.

Electromagnetic Range. The range from just below .03 megacycles (MC) (Very Low Frequency) to 300,000 MC (Extremely High Frequency) is known as the radio frequency (RF) spectrum. The remainder of the frequency



spectrum above the RF range is also electromagnetic in character, but the energy of radiation is not produced by electric circuit elements in the usual sense. Some of the safety considerations in the electromagnetic range are as follows:

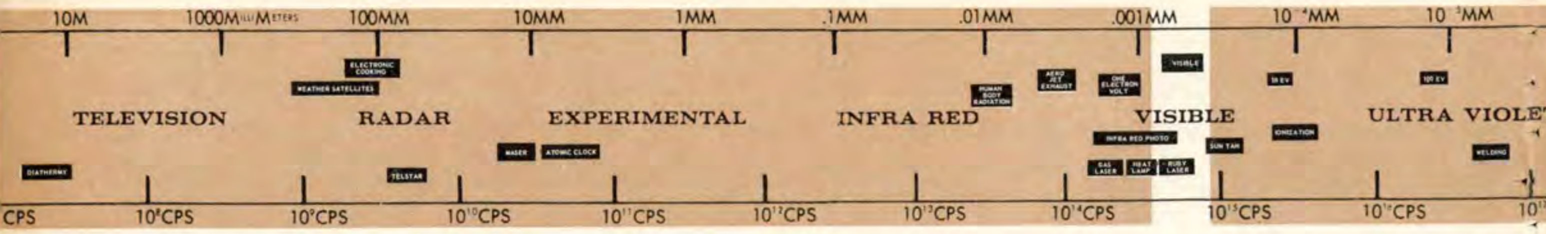
RF Range. The frequencies may inadvertently initiate electroexplosive devices by induced radio frequency energy. Chart 6-1 of AFM 127-100, Explosives Safety Manual, has recently been changed to a nomogram to give more accurate guidance on the safe distances between transmitter antennas and electroexplosive devices. The RF frequencies may also induce electrical fields strong enough to initiate sparks; this, of course, poses a serious hazard where there are flammable fuel vapor concentrations such as in aircraft and missile refueling areas. Sparks have been observed at various points on aircraft structures in the vicinity of RF radiation when touched by portions of the human body or by metallic objects. Light metals in the RF beam, such as dry steel wool, may become sufficiently hot to ignite, or a flash bulb can be heated to the point of incandescense, and explode.

Excessive exposure to RF frequencies 300 to 56,000 MC in the radar (microwave) region can be injurious. Frequencies in this range have wave lengths whereby, as the frequency increases, a man's body dimensions exposed to this RF represent an increasingly greater number of electrical wave lengths. For example, using 1.7 meters as a man's height, 300 MC (P band) has a 1-meter wave length which would fit into a man's height 1.7 times, whereas 10,000 MC (X band) or a .03-meter wave length is equivalent to 56.6 times the dimension of the man's height. When RF contacts dielectric materials such as exist in human tissue, a portion of it is absorbed by the tissue. In this process, the electrical charges in the molecules and atoms undergo rapid rotation and heating occurs. In certain organs (with limited blood circulation and perspiration) such as the eye, gall bladder, etc., the heat produced is not readily dissipated and, if the field is strong enough, serious damage can result.

The lower microwave frequencies (less than 1000 megacycles) are particularly hazardous because they can penetrate into the deep tissues of the body (where sensory nerves are few) and a dangerous rise in body temperature can occur without the individual being aware of it. As pointed out above, RF energy will cause voltage to be induced in metal objects which can act as a receiving antenna. Such induced voltages may cause shock to personnel, or, when these objects become sufficiently heated, they can cause burns.

To minimize the microwave hazard, minimum distances between radar antennas, personnel and fuel areas can be calculated based on safe intensity levels established in T.O. 31Z-10-4. These boundary areas should be posted with warning signs and devices and be closely monitored. Maintenance personnel who must service the equipment should wear protective clothing such as eye shields and absorption suits. For details on hazards and controls, refer to T.O. 31Z-10-4 and AFM 161-7.

Infrared Region (IR). The IR region lies between the microwave portion and the visible light region of the spectrum. The nature of IR is that the waves are readily absorbed by most substances. Certain gases, however, such as hydrogen, nitrogen, and halogens do not absorb infrared energy. Although IR does not exist as heat waves, they readily convert to heat energy on absorption (striking an object). This unique principle is used in the design of vapor detection devices, spectrophotometers, target detection, and missile guidance systems, to name just a few. All heat sources emit IR radiation. As IR is absorbed by the skin within three millimeters of its surface, the feeling



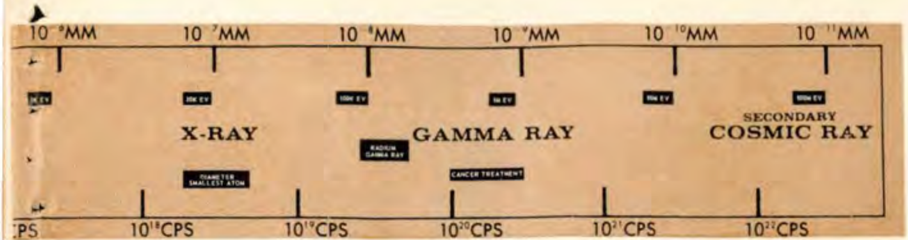
of warmth is immediately sensed. The human eye is susceptible to damage by IR since it may cause cataracts or opacities in the same way RF tends to do. The best protection for workers continually exposed to radiant heat is to wear specially tinted glasses and reflective clothing.

Laser. Since the first laser apparatus was flashed in 1960, the technology has made enormous strides. Communications, range finding, tracking, initiation of explosive devices, surgical techniques, visibility and meteorological data systems, welding and drilling of metals and refractory materials are some of the applications being researched and developed. The term *laser* is an acronym for *light amplification by stimulated emission of radiation*. The laser beam is characterized as an unusually intense and narrow inphase beam of a monochromatic (single wave length) frequency primarily visible in the light wave region. Some laser devices produce frequencies in the infra red and ultra violet bands. The beam wave length depends on the type of active element stimulated (solid state, gas, or semi-conductor). Both continuous wave and pulsed beams can be generated. Some solid state lasers use a ruby crystal of aluminum oxide in which some of the aluminum atoms have been replaced by chromium atoms. When the ruby crystal is "pumped" by an external flash tube, it causes electrons in the inner orbit of the chromium atoms to jump to the outer orbit. Photons of wave length 694.3 millimicrons, a red color, are emitted as these atoms randomly return to their normal state. As these electron transitions take place, the silvered parallel ends of the slender ruby rod cause the waves to be reflected back and forth within the ruby. These photons stimulate other excited chromium atoms to return to the ground state prematurely. This results in a cascade of resonating photons all at the same wave length and in phase. The energizing light which then bursts forth from the partially reflective end of the rod is unidirectional, coherent, monochromatic and very intense. The gas lasers use a gas or combination of gases such as helium and neon as the active element whereas the active element in the semi-conductor type consists of a tiny specially treated semi-conductor such as gallium arsenide. The stimulation processes for these beams are similar, however the energy and power level produced are less.

Since a laser beam can burn a hole through a diamond and generate temperatures over 10,000°F, it is apparent that it could also ignite materials and destroy living tissue.

Most of the work in the Air Force to date has been in the experimental (laboratory) research area. Whatever the ultimate use, the primary hazard is the possible absorption of the high intensity beam. Experiments have confirmed that even relatively low dosages of laser radiation can result in permanent damage to the eyes and serious skin burns.

Due to the many variables involved, safe energy density levels (joules/cm^2) and power density levels (watts/cm^2) have as yet not been established by the Surgeon General. Some of the experimental work referred to above deals with biomedical testing in this area. Emphasis must therefore be placed on controls to prevent the laser beam or its reflection from impinging on personnel or from being absorbed by materials which could easily ignite. Other hazards also exist but they are associated with equipment used to operate the laser. These include: poorly shielded flash lamps, exploding wires or chemical explosions used to "pump" the laser and generate brilliant light flashes that could cause flash blindness; implosions of flash lamps, exploding wires, chemicals, capacitors and laser coolant (cryogenic) vessels which may explode due to overpressure; harmful X radiation which may be produced by power supplies in excess of 10 kilovolts; high and low voltage electrical shock; and cryogenic burns and oxygen depletion when coolant vapors escape. The primary



safety controls are to preclude direct and off-axis viewing of the laser beam; require the wearing of protective goggles with special filters; certification of personnel as trained on use of equipment and hazards of the laser operation; preceding all laser firings with a countdown and the use of the buddy system; warning signs and devices to signal laser is being flashed or is running; operating laser in well lit rooms to reduce extent of retinal exposure; use of diffusing and absorbing paints on walls and ceilings; special controls to prevent accidental exposure to people who may cross the beam path outdoors; and periodic eye examinations of all persons exposed to laser devices.

Other controls for miscellaneous hazards include: enclosures to protect personnel from exploding fragments; insulating high voltage equipment and components; providing electrical interlocks; grounding all conductive parts to a single point ground system; equipping capacitors with bleeder resistors to discharge them when not in use; insuring that all electrical equipment complies with applicable provisions of AFM 127-100, AFM 127-101 and the National Electric Code; handling cryogens with proper protective clothing, providing adequate ventilation to prevent accumulation of toxic or inert gases; installing relief valves in cryogenic systems to prevent explosion or rupture of pipes due to pressure buildup.

Visible. The next region is the visible portion of the spectrum. For all practical purposes, this band (as the IR band) can be considered harmless with the exception of retinal burns and thermal burns of the skin from exposure to strong light sources.

Ultraviolet (UV). The next higher region of the spectrum is the UV. Exposure to low levels of this light are beneficial because it reacts with the skin (to a depth of one millimeter) to produce vitamin D and a sun tan. Too much UV under the sun lamp or on the beach will, of course, result in a sunburn. The conjunctiva of the eye is extremely sensitive to UV light. The UV radiation is also given off during welding. To protect welders from the arc's radiation, proper goggles should be worn at all times to prevent conjunctivitis.

X-Rays and Gamma Rays. The lower frequency X-ray regions are called "soft" X-rays, as they have very little penetration and produce burns like those from UV. As we increase the frequency, the resulting rays are termed "hard" as their penetrating capability increases. As the X-ray penetrates an object, it causes orbital electrons to escape, creating ions. In human tissue, the ionized atoms react chemically with other atoms in the tissue to produce toxic materials. Shielding is, therefore, required to protect personnel from these X-rays. The gamma rays in the last region of the spectrum are produced during the disintegration of radioative material; they are equivalent to X-rays generated by a very high-power X-ray machine.

This brief journey through the frequency spectrum has emphasized some major safety hazards relating to the phenomena of vibrations, oscillations, and radiations. The subject is a fascinating one, so don't stop here. Further study of the details is time well spent for the safety officer. A thorough understanding of the factors discussed herein is a prerequisite for establishing controls to prevent mishaps. The following Air Force publications are recommended reading:

31Z-10-4, Electromagnetic Radiation Hazards

AFM 161-7, Control of Hazards to Health from Microwave Radiation

AFM 127-100, Explosives Safety Manual

AFM 127-101, Accident Prevention Handbook

AFM 127-201, Missile Safety Handbook.

T.O. 42B1-1-1, Use and Disposition of Fuels. ★

IT'S YOUR TURN IN THE BARREL

Lt Col Ray C. Gordon
Directorate of Aerospace Safety

It will soon be your turn!! The day will come when you will be a member of an aircraft accident board. Like it or not, you'll be stuck with it, so don't wait till you are confronted with a "smoking hole"—start your conditioning now. You can help improve the quality of aircraft accident investigations in which you participate, but first, you need a clear understanding of the purpose of such investigations.

The purpose of each investigation is to find out WHAT happened, HOW it happened and WHY. When we have answered these questions, we will then be able to provide information on which to base recommendations for preventing further accidents. Also, valuable additions will be made to the statistical data used to evaluate the overall accident experience so that effective corrective action can be taken, throughout the Air Force. The purpose is clear; however, several recurring problems make producing the desired results much more difficult than defining the objective.

The first of these problems is created by the confusion which frequently occurs when the Accident Board arrives at the accident scene. Too often it has taken several days to complete the initial organization and start working as a group. The next problem results from the often repeated use of preconceived solutions and inflexible patterns for investigation conduct.

Some members of the board forget or don't know that every accident is different and the environmental conditions and circumstances vary widely. Although the board must size up the situation as quickly as possible and plan their actions accordingly, premature decision must be avoided at all costs. There are always some of the *so-called* experts who, forgetting that they should be after facts, come up with a personal version of the primary cause. More often than not, because of their position on the board, or their professional reputation pseudo-experts influence board members to the detriment of the entire investigation. Time is lost, more confusion is introduced, and an orderly conclusion to the investigation is very difficult. Following a set pattern, regardless of the nature of individual investigations, can be just as devastating as the use of preconceived ideas or solutions. Another important problem is low qualifications of individual board members.

In too many cases, personnel of varying degrees of experience and technical qualification are assigned at random to accident investigation boards. Board assignments are often influenced by existing workloads, and the most qualified personnel are not assigned to the job. All too often board members, even though highly qualified in their specialized field of endeavor, may not be inclined toward accident investigation or possess any of the other qualifications required of a professional investigator. These are but a few of the problems encountered in accident investigations for which there are workable solutions. The problem areas discussed here have something in common; all of their solutions involve personnel selection and training.

It is impractical to form, on a moment's notice, a new team for each major aircraft accident. Because the Air Force cannot afford the luxury of highly trained and qualified mobile boards to investigate all accidents, we must continue to use additional duty talent to best advantage and train this resource to effectively serve the board president. Local accident boards must be composed of the best qualified personnel available with the best potential personnel as their understudies. As a colleague has said "An analogy would be an attempt to win a National Collegiate Athletic Association football game with a coach who may never have witnessed a game before and with a group of players who have never met or practiced together prior to the game's opening whistle. The chances for success are mighty slim." If the president and his board do not function as a smooth, well-coordinated team, each specialist will participate as an individual in his own area without proper regard for the overall requirements of the investigation. The results will be a lack of coordination and unnecessary loss of time. The team must train together.

An excellent place to start training is by studying AFM 127-1. Before starting self study the board should be briefed by the local safety officer or an experienced investigator, who is also an experienced instructor and who uses an objective approach. This briefing should include a study outline and a handout of some basic rules on how to start an investigation in the field. An example of such a list of basic rules, a start at least, would be:

1. Secure the area.

2. Senior board member present takes command. Until a board member arrives, the Safety Officer or senior officer present takes command.

3. Each board member carefully and deliberately surveys the crash scene.

4. Senior member designates an officer to start plotting the wreckage.

5. Start acquiring photographic evidence.

6. Maintenance member starts identifying and tagging detached parts, being careful to leave them where they are until otherwise directed.

In summary, I repeat that every investigator must know the true purpose of aircraft accident investigations: To find out WHAT happened, HOW it happened and WHY. The criteria for a good investigator are integrity and humility. He must at all times remain impartial. In the initial stages of investigation, he should look at everything and not for anything specific. He should not condemn and must constantly guard against the normal tendency to jump to conclusions which might lead in the wrong direction. The investigator must strive to avoid the common failing of using preconceived standards which may be entirely unrelated to the circumstances and environmental conditions of the accident being investigated. These are the qualities which are necessary if the aircraft accident investigator is to fulfill the responsibilities of his position. Development of these qualities is prerequisite to efficient use of AFM 127-1 and its related regulations and manuals. Boards must train together, guided by an experienced safety officer or investigator, and have a guide for study. The mechanics of properly starting an investigation must be stamped in the mind of each board member because he may find himself the senior member present. A final point, don't overlook the many good films available for this training.

When is the initial meeting going to be held at your base? Ask your safety officer. ★

AEROBITS

THE IP TOOK THE CONTROLS and the big multi-jet transport went quickly into a right climbing turn. Another mid-air disaster was averted because the right seater was doing his job visually, sweeping the gages and sweeping the sky. The pilot of the light aircraft which was over the middle of the runway at low altitude owes his life to the gentleman who realizes that there is still no substitute for the airman's swivel neck. The radar folks are a big help, but they are just that—help. This one happened overseas but should serve to warn light plane drivers of all services and aero clubs everywhere to know what local area heavy traffic is doing. If light planes must use the runways of airports where there is dense or frequent heavy weight or jet traffic, they belong over the runway only when landing and taking off.

S. C. ANG SAFETY—Chalking up another day of accident-free flying by ANG pilots is Miss Martenza Jones, of Columbia, S. C., Miss National Teenage Safety. With Miss Jones is Lt Col Robert A. Johnson, Sr., commander of the 157th FIS, 169th Ftr Gp. The Group has gone well over 20,000 hours of flying without a major accident, covering a period of 42 months.

HYDRAULIC FLUID FIRES—Commanders in Southeast Asia are seeking to reduce the number of lost aircraft due to pilot ejection by eliminating hydraulic fluid fires. With a nonflammable hydraulic fluid, some of the damaged aircraft may be able to return to their base if the fire hazard were not present. The search for a nonflammable replacement for the currently used MIL-H-5606B hydraulic fluid has been given a renewed emphasis. A 45-page report from AFSC describes an investigation conducted to determine what state-of-the-art fluids, if any, could be utilized to solve this problem.

The investigation showed that no completely nonflammable material meets the requirements without extensive, prohibitive retrofit due to compatibility problems. Included in the review, however, were many fluids which have greater fire resistance than MIL-H-5606B.

Of these fluids, the only materials with any real promise of successful replacement (without retrofit) are super-refined mineral oils. One of these fluids, MLO-7277B, has a flash point at least 200°F higher than MIL-H-5606B, and a spontaneous ignition temperature no less than 700°F. On the basis of the need for expediency, the super-refined mineral oil known as MLO-7277B is recommended for tests in contemporary aircraft hydraulic piston pumps to determine its performance capability prior to its recommendation as a replacement for MIL-H-5606B hydraulic fluid in aircraft operating in Southeast Asia.

AFML-TR-66-173, June 1966
AF Materials Lab., Research and Tech. Div., AFSC, W-P AFB.

IT IS STILL HAPPENING TO T-BIRDS. Two aircraft made precautionary recoveries at the same southern air base on the same day, one in the morning, the other in the afternoon. The first one flamed out while flying in clouds at FL220, temperature minus 15 degrees Centigrade. As the RPM decreased through 50 per cent, the throttle was placed in idle and the gangstart activated. No altitude and only 30 to 40 knots of airspeed were lost because the relight was immediate. Just after restart and again about five to seven minutes later a thump was heard. We don't know precisely what causes these thumps, but we do know that they indicate engine icing and impending trouble.

The second bird had been flying in clouds for about 45 minutes at FL240, temperature minus 23 degrees Centigrade and encountering light rime ice when a two per cent decrease in RPM was observed. Just after this, a thump was heard and a second larger thump a short time later. After the second thump, the RPM decreased another five per cent and the fuel pressure started fluctuating. RPM stabilized when the pilot reduced power to 80 per cent. During descent, three more thumps were heard, the fuel pressure fluctuated and the RPM again fluctuated (this time between 65 and 71 per cent).

Both landings were made on the emergency fuel system. The normal fuel systems, JP-4 fuel and high and low pressure filters checked O.K. after landing. Both aircraft were operating in known icing conditions and both apparently encountered engine ice. In 1966 there were more than a dozen flameouts reported where engine ice was definitely indicated. All of these restarted safely by use of the gangstart and all recovered safely using emergency fuel.

ALL AERO CLUB TYPES take special note of this one because it could happen to you! REFUELING + PLASTICS = STATIC DISCHARGE. You have been warned before against the use of plastic containers and funnels for refueling. Plastic articles can accumulate a heavy static charge. Because the plastic will not conduct electricity the charge cannot be drained off properly by grounding cables and clips. A statically charged plastic utensil can therefore quite easily cause a spark when placed close to metal fittings such as a fuel tank filler neck or a refueling hose nozzle.

Short of fuel, the aircraft had made a precautionary landing on a roadway in a remote area and had sustained minor damage. Mechanics went to the site and repaired it for ferry flight. When it was ready a pilot arrived to fly it out. He had brought with him two four gallon drums of avgas, and he set about fueling the aircraft.

AEROBITS

First of all he grounded the aircraft by forcing a long screwdriver into the earth and connecting it to a grounding lug on the aircraft. Using a plastic funnel, over which he had placed a dry chamois, he tried to pour the contents of one drum into the right tank, but found he could not hold the funnel and pour the fuel at the same time. After he had spilled a small amount of fuel he asked one of the mechanics to help him. The mechanic took the drum while the pilot held the funnel and the chamois. More fuel was spilled when the mechanic tried to pour with the neck of the drum downwards. He then turned the drum around so the neck was uppermost and began pouring again, but after about a half gallon had flowed into the tank, fire broke out at the filler neck and spread quickly. The aircraft was destroyed.

There is no doubt that the fire was started by a static discharge. The static electricity hazard involved in using a plastic funnel that cannot be effectively grounded is serious enough at any time but it was compounded on this occasion by the extreme heat of the day. The spilled fuel quickly formed dangerous vapor that required only the slightest spark to ignite it.

The likelihood of a static discharge could have been eliminated by ensuring that the aircraft, the drum and the funnel were all the same electrical potential. This is normally achieved by electrically bonding the three elements, but such bonding can never be effective while one link of the chain, the funnel, is nonconductive plastic.

Aviation Mechanics Bulletin
Flight Safety Foundation, Inc.

Fallout

LETTERS TO THE EDITOR

continued from inside front cover

do a better job of driving than we can—if it is working right. The only way to get it to work right is to check it out and write it up.

Thanks for your interest and comments."

Maj Donald R. O'Connell
Directorate of Aerospace Safety
Norton AFB

Dear Sir,

I've been reading your articles in Aerospace Safety for some time now but just never got around to writing you a letter. Each time I think of Safety, I can't help but think of the many hours we spent training in safety practices alone at Misawa. Many times our younger airmen would say to me (after I'd caught them without a checklist or some other breach of safety practice): "But Sarge, I know it like the back of my hand."

Then one day we found ourselves in Vietnam working under combat and adverse weather conditions, and *safety* started paying off. Conditions many times called for speed and maximum teamwork to get the job done and launch our aircraft without a hitch. It did my heart good to see the men work as they did; it seemed like a well rehearsed play where every actor knew his part and executed each and every move to perfection.

During the two tours I spent in Vietnam I cannot recall an incident or accident that could be blamed on *safety (sic)*. These men were pros at their jobs and I've never heard one ask, "But Sarge, why do I have to use the Checklist?"

MSgt Frank H. Milotte
16 Tac Ftr, Ex 45 TRS Crew Chief
Eglin AFB, Fla. 32542

This letter was mailed to the Editor for Maj O'Connell. We liked the message and with Major O'Connell's okay, are presenting it as a matter of interest.

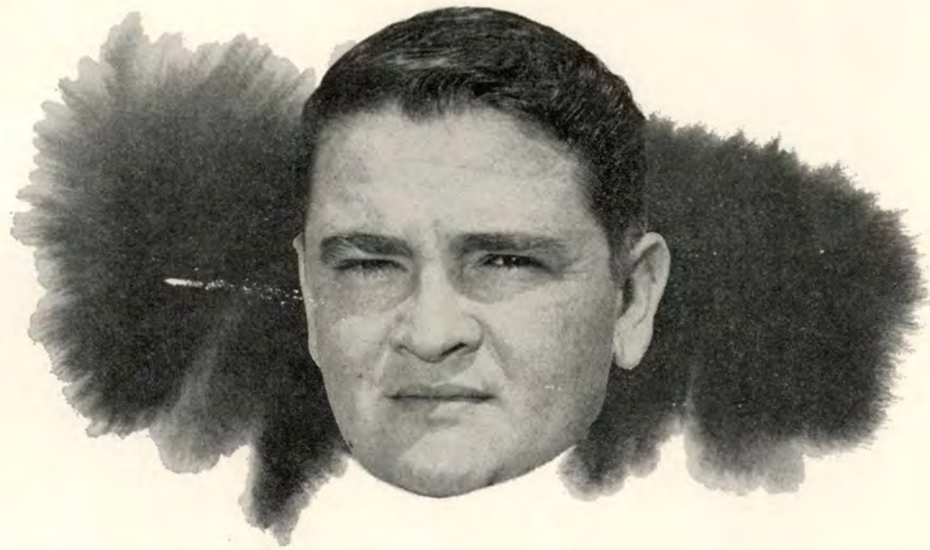
AN OUNCE OF PREVENTION

Due to the importance of your article entitled "An Ounce of Prevention" (Nov 1966) with regards to our T-29, 340, and APJC aircraft, we request permission to reproduce the material for use by our maintenance personnel here at the Aircraft Services Base and in the field. This article will be more helpful and will preclude the possibility of damaged or misaligned leading edge wrap seals on our aircraft.

Robert W. Frieburg
Chief, Quality Control Branch
Aircraft Services Base
FAA, Aeronautical Center,
Oklahoma City, Okla. 73101

Be our guest.

WELL DONE



CAPTAIN LARRY B. MASON

8TH BOMBARDMENT SQUADRON, CLARK AIR BASE, PHILIPPINES

Captain Larry B. Mason was pilot of a B-57 engaged in a strafing run on enemy trucks in South Vietnam when his aircraft was hit by anti-aircraft fire. The damage was so severe that the aircraft rolled almost inverted. After getting the aircraft under control, Captain Mason's first thought was that he and the navigator, Captain Jere P. Joyner, would have to bail out. Then Captain Joyner passed him a blood-stained message: "Hit badly—arm and leg—losing blood."

Realizing that Captain Joyner possibly would not survive bailing out, Captain Mason passed him a tourniquet and determined to try to fly the crippled B-57 to his home base. He was successful in returning to the vicinity of the base, but the landing gear indicators showed left main and nose gear intermediate and right main gear down. Unknown to Captain Mason, was that one of the shell hits caused all three gears to go to the down and locked position and the cockpit indication was erroneous.

Faced with the necessity for getting his navigator to medical aid, and unable to get a safe gear down indication, Captain Mason placed the gear handle in the UP position and made what he thought would be a gear-up landing. To his surprise, the aircraft landed smoothly on the extended gear and made a normal rollout.

Captain Mason's skill in the handling of multiple emergencies probably saved Captain Joyner's life. For his superb airmanship and devotion to his crew, WELL DONE! ★

TINA AND HER TIMELY TIPS

There was an aircrewman named Dundee,
Who flew his craft through an oak tree.
When asked how he messed up,
He readily 'fessed up,
I was where I oughtn't to be.

GET YOUR JOLLIES BEING A-1 SHARP . . . NEVER PRACTICE BUZZING OR UNAUTHORIZED MANEUVERS.

February 1967

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1st REUNION 384th BOMB GROUP April 14th through 16th — New York Hilton For information contact: Charles H. Roché P.O. Box 1942, Ft. Washington, Pa., 19034.			**1** First chance this month to PLAY IT SAFE.	**2** Ground Hog Day for grounded road hogs.	**3** Make this a Good Friday— THINK SAFETY, ACT SAFELY.	**4**
5 Leave the fifth alone while driving.	**6** Capt O. I. Droppit survives 9000 ft. fall without parachute. 1923.	**7** Capt "Shorty" Droppit decorated for his tremendous feat. 1923.	**8** Ash Wednesday.	**9** Sons of Icarus, N.Y. chapter, outlaw sun worshipping during daylight hours. 1949.	**10** Fast.	**11** Pegasus Day—for pilots who like to horse around.
12 Abraham Lincoln's Birthday, 1809.	**13** NOTICE: Friday the 13th falls on a Monday this month.	**14** St. Valentine's Day. TINA.	**15** Day after St. Valentine's Day.	**16** ALWAYS USE YOUR CHECK LIST.	**17** Slow.	**18**
19 The best angle to approach a job is always the TRY-angle.	**20**	**21** Only 314 shopping days left until Christmas.	**22** HOLIDAY George Washington's Birthday. 1732.	**23**	**24** Happy Hour originated by Lts C. I. Guzzlemore and Red I. Snorts. 1917.	**25** Unhappy Hour—for those troops who were too happy at Happy Hour.
26 Snurdley Oddfellow, pioneer of inverted flight, originates inflight ejection. 1911.	**27** Henry Wadsworth Longfellow's Birthday. 1807.	**28** Last chance this month to improve your safety practices.	Last Quarter—1st	New Moon—9th	First Quarter—17th	Full Moon—24th

HAVE ANY AEROSPACE ANNIVERSARIES? Send them to: Tiny Tina, 1002 IG Gp (AFIAS-E1), Norton AFB, Calif. 92409