AEROSPACE

SAFETY

UNITED STATES AIR FORCE

ONE CANDLE FOR A PIECE OF CAKE

SEE PAGE TEN

JULY 1964

AEROSPACE

SAFETY

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VOLUME TWENTY NUMBER SEVEN — USAF RECURRING PUBLICATION 62-1

FALLOUT

QSY TO XXX.X MC IMMEDIATELY

The needle jiggles, DME runs out, you are RAPCON cleared Nr 1 for penetration. It's a dark and stormy night except for the occasional flashes of lightning. So—out with the garbage, back on the throttle and into the CB's. Rate of descent is like a free floating manhole cover; the brain bucket bounces around under the canopy; the panel dances in front of your eyes; and all of a sudden the gages say it's time to turn and roll out on final.

The controller hands you off to GCA final *XXX.X MC IMMEDIATELY*. Now let's see, what channel is XXX.X MC? Where did I put my flashlight and magnifying glass? Oops! (Gad! this little mother is touchy in roll.) Oh, here it is—button #17.

MORAL: Revise your frequency cards and modify the hot frequencies to bold print so the jet types can get the information real quick like. You may save another "cause unknown" type investigation.

Maj Carter H. Phillips
Training & Stand. Branch
Hq 2851 ABWg (AFLC), Kelly AFB, Tex.

P.S. The Recip types might want it too!

Here's a sample Major Phillips sent along.

STANDARD UHF CHANNELS

236.6	USAF Twr/2nd	**2**	**320.1**	Kelly Tower	**1**
243.0	Mil. Emerg.	**G**	**340.2**	Navy Tower	**7**
255.4	Flt Svc VFR	**11**	**344.6**	Forecaster	**13**
257.8	Civil Tower	**4**	**353.5**	SAT Apr Cont	**15**
269.1	SAT Apr Cont	**16**	**354.4**	SKF Flt Test	**12**
272.7	Flt Svc IFR	**5**	**364.2**	G.C.I.	**10**
275.8	Gnd Control	**3**	**372.2**	Base Ops	**6**
305.4	UHF/DF	**14**	**381.4**	SAT Dep Cont	**8**
317.5	SAT Dep Cont	**9**			

KELLY GCA FREQUENCIES

327.5	**17**	**389.9**	**19**
338.6	**18**	**396.1**	**20**

AFPS SA MAR 64, 50

STANDARD ALTIMETER

I've read with great interest your article "Airspeed Out" in the May issue on the loss of the pitot-static system in a jet aircraft. The test group did a fine job in giving us some tips on flying safely with one or more air pressure instruments inoperative, but haven't they overlooked one very important instrument? The cabin altimeter is standard on the T-33 and most jetaircraft. It is independent of the pitot-static system and accurate to about 1000 feet with the heat off and the speed brakes up. In case of altimeter failure, a pilot could dump his cabin pressure and read his altitude so that another aircraft could rendezvous with him. He could probably let down slowly too if he remembered that the cabin altimeter has a lag and is giving pressure altitude only.

Please continue with your extremely useful articles.

Lt Robert Boring (student pilot)
3550 Student Squadron
Moody AFB, Georgia

A COMMANDER'S REMINDER

ssance Squadron (MATS)
NITED STATES AIR FORCE
Hunter Air Force Base, Georgia

REPLY TO
ATTN OF: 53WRSC

13 Nov 1963

SUBJECT: Flight Safety

TO: All Aircrew Personnel

1. This period of transitioning into a new mission for most of us, and into a new aircraft for some of us creates, in itself, a situation conducive to mistakes. Mistakes, of course, lead to accidents. I urgently ask that all aircrew members take full cognizance of our susceptible situation and make it a matter of individual challenge to avoid all possible risk of accidents.

2. Avoidance of accidents must be the personal goal of each of us. To be effective at this we must make accident avoidance a part of our way of life; we must consider it a science, and learn that science to the letter.

3. The most important principle of the science of accident avoidance is to avoid exposure to accidents. Obviously, if we stop flying we will avoid flying accidents, but we can't do this because flying is our business. There are some things, however, which we can and must do to lower our exposure to flying accidents and thereby avoid them. First, we must avoid marginal situations. For example, each flight should be planned with a little extra, as a margin for error. Look very carefully at your reserve fuel; always have an alternate airport. Don't under any circumstances participate in unauthorized maneuvers. Don't fly formation, except in cases of dire emergency. Don't hesitate to make intermediate precautionary stops when any valid reason presents itself. If you're an instructor, don't hesitate to take over, even for a moment. Don't, under any circumstances, think you can make the aircraft do anything it's not designed to do.

4. There are some who have the feeling that a positive, aggressive attitude toward safety means a negative attitude toward the mission. This is not so. Our mission requires continuous and dependable daily reconnaissance flights. Unless we make safety our first and most important mission, we cannot expect to be dependable or "continuous" regarding the rest of our mission. There are some who are embarrassed by taking positive precautions to avoid accidents such as by a "go around" or by proceeding to an alternate landing field. This is childish. It's far better to feel embarrassed (even though you needn't) than it is to "buy the farm."

5. Gentlemen, we have a great number of fine assets: good aircraft, highly qualified crews, and an interesting, high priority mission. Let's take the challenge and, through good sense, intelligent caution, and unswerving crew discipline, show the world that it's possible to run a highly mission conscious outfit with complete avoidance of accidents, now and in the future. Thank you.

ARNOLD E. ZIMMERMAN
Lt Colonel, USAF
Commander

Tips on T-Storms

Thunderstorm activity will reach its annual maximum in the few months ahead. Pilots and navigators who have to deal with thunderstorm phenomena can benefit from a quick refresher. Following is a summary of thunderstorm features, beginning with some definitions, prepared primarily by United Airlines.

SIGMET. A Weather Bureau advisory concerning significant weather developments of such severity as to be potentially hazardous to transport category and military aircraft. SIGMETS are for periods of two to four hours and cover (1) tornadoes, (2) severe turbulence, (3) squall lines, (4) dust-sand storms, (5) hail three-fourths inch or more, (6) heavy icing.

AVIATION SVR WX FCSTS (WW). Warnings for civil aviation are issued by the Weather Bureau Severe Local Storms Center (SELS) at Kansas City, and are basic forecasts that are issued farther in advance and for longer periods than the SIGMETS. They are used by FAWS centers for guidance in issuing short-period advisories. Military Weather Warning System (CONUS only)—this system provides four scheduled weather warning advisory charts issued by the Kansas City Centralized Forecast Center. These forecasts are transmitted via COMET II weather teletype circuit every six hours and are valid for the ensuing 12-hour period. In addition Kansas City Centralized Forecast Center provides spot weather warnings to over 500 military locations when required. Warnings are issued for the following criteria: (1) tornadoes, (2) thunderstorms (regardless of intensity), (3) hail, (one fourth inch or larger), (4) surface winds (exceeding 35 knots), (5) rainfall (more than two inches in 12 hours), (6) freezing precipitation, (7) snowfall (more than two inches), and (8) severe dust storms. These forecasts and warnings are tailored to meet the requirements of the USAF, US Army, ANG and Air Force Reserve units.

SEVERE THUNDERSTORM. For the purpose of the WW, the Weather Bureau defines a severe storm as one that has (a) surface wind gusts of 65 knots or more or (b) sustained winds of 44 knots or more or (c) three-quarter inch hail or (d) severe turbulence.

THUNDERSTORM GEOGRAPHY. Where are tornadoes found most frequently? In "Tornado Alley" which runs from Oklahoma NNE to Iowa. In this band, which has no known counterpart anywhere in the world, there is a pronounced maximum centering on Wichita where six tornadoes occur every average year within an approximate radius of 55 miles. There is a second "Little Tornado Alley" in the south running from Jackson, Mississippi, to Columbus, Georgia. Charleston, West Virginia, enjoys the least exposure of any United terminal east of Grand Junction.

Where do nocturnal thunderstorms occur most often?

The maximum is closely parallel to Tornado Alley running from Oklahoma to Iowa but the belt is broad. Chicago lies well within the eastern edge and North Platte the western fringe. A second area of high frequency is found along the gulf coast at New Orleans, Mobile and Tampa.

Are there favored areas for squall lines to form?

We can forget the true squall line as an operating problem west of Denver. They have occurred but only at the rarest intervals. From Denver east severe squall lines may occur anywhere each year. If there is any favored section for formation, it would be to the southeast of Lakes Michigan, Erie and Ontario in March, April and May when the lakes are still cold in comparison with the Tropical Gulf airmasses moving in against them.

Where is the "Marfa Front" found?

The Marfa Front lies, day after day in summer, in a north-south line running typically along the eastern borders of Colorado and New Mexico and thence south to Marfa, Texas, where the name originated. It is a dewpoint "front" separating moist Gulf air with dewpoints in the 60s on the east side from continental air and dewpoints in the 20s and 30s on the west side. It has great significance in connection with development of squall lines and tornadoes. It may be entirely cloudless.

Where do we find our most troublesome orographic storms?

Orographic thunderstorms are more frequent in the four-state area of the southern Rockies in July and August but these storms don't compare in potency with those found in the southern Appalachians from northern Georgia to Pennsylvania. Storms in Arizona and Colorado often have surface dewpoints in the 30s but those in the southeast are invariably in the 60s.

Are there favored areas for big hail to form?

Yes! The worst hail belt in the country is a band running north-south from about Miles City, Montana, to Rapid City, South Dakota, to Sidney, Nebraska, to Goodland, Kansas, to Amarillo, Texas, to Marfa, Texas. (Note how this parallels the Marfa Front). There are counties near Goodland where ranchers must pay prohibitive premiums of more than $20 per hundred to insure their crops against hail damage. Big hail can also occur all through the east and midwest but with nothing like the frequency found in the high plains. Air Force jets have encountered four-inch hailstones at 30,000 feet and three-inch hailstones at 40,000 feet through the Marfa Front zone at Amarillo and Goodland. Three-inch hailstones occur somewhere in this belt on the ground every year.

Are there favored areas for static discharges to occur? Yes. The recent UAL survey showed maximum piston cases from Lake Erie eastward to New Jersey while the maximum jet incidents were found in the Chicago traffic pattern.

Rather surprisingly, one of the most susceptible airway segments (on the UAL system) seems to be the Portland-Seattle. This is the best proof we have that active thunderstorms are not necessary to produce the discharge. They will occur wherever we have a high exposure to IFR flight through clouds with temperature near 32°F and icy-type precipitation occurring.

THUNDERSTORM PHYSICS. Why would

Tornado Alley (Okla. NNE to Iowa), Little Tornado Alley in Southeast US, and nocturnal thunderstorm area (hatched area) are shown above.

The Marfa (dewpoint) Front lies day after day in summer from Marfa, Texas, northward along eastern borders of New Mexico and Colorado.

Storm A be rough and Storm B smooth when they look alike from outside?

Storm A is in the building state, Storm B in the decaying stage. Even radar may miss this distinction at the first stage of development. To the experienced observer, the hard cauliflower outlines of the cumulonimbus are the tipoff the storm is new and building.

Can damaging hail occur at 40,000 feet?

Yes! A number of Air Force jet aircraft have been badly beaten up at that level in Texas and Kansas. Typical "last words" read like this, ". . . we were flying IFR in cirrus type clouds" or ". . . we had just entered altostratus type clouds."

What causes nocturnal thunderstorms?

A low level jet at 3000 to 8000 feet and strong warm air advection at those levels are generally considered to be the prime ingredients. The jet is from S or SSW and often exceeds 50 knots at 3000 msl. Over the ocean, where storms also show a maximum at night, the explanation has to be different. In areas like the Gulf of Mexico it seems likely that slight cooling at upper levels is what upsets the delicate stability balance prevailing in the tropical air.

Why does Omaha, for example, have more thunderstorms at night than during the day?

Because it lies right in the path of the low-level jet stream from the S or SSW at 3000 to 8000 feet that invariably reaches a maximum speed during the period from midnight to 0500 CST. This jet characteristically brings in warmer air from Texas to steepen the lapse rate and cause overturning.

Tall thunderheads that have lightning flashing incessantly are most likely to spawn tornadoes.

Do nocturnal thunderstorms always have high bases?

Don't count on it. Some nocturnals generate full-fledged squall lines attended by hail, severe surface gusts and thick scud clouds or roll clouds.

Does lightning have anything to do with tornadoes?

It has been observed that tall thunderheads that have lightning flashing incessantly are most likely to spawn tornadoes. Some scientists believe electricity has an important role in generating large tornadoes.

How high do tornado funnels extend? There is increasing evidence that they reach up to 30,000 feet or higher at times.

There was one instance several years back in Arkansas where an airline captain reported a funnel reaching down from a cumulonimbus overhang starting at 30,000 feet estimated. More recently a U-2 aircraft at 65,000 feet photographed a tornado-spawning cumulonimbus with a hole in the top at 51,000 feet which was 6.3 miles in diameter and rotating. Speed of rotation was estimated at 90 knots near the top and considerably higher down inside.

What is the role of electricity in the thunderstorm mechanism?

We don't know. In the past it was always assumed that shattering raindrops generate lightning discharges. The Arthur D. Little researcher, Dr. Bernard Vonnegut, has turned up impressive evidence that electrical charges in the atmosphere may precede the development of large cloud drops and rain.

What conditions precede a static discharge?

This we do know, thanks originally to a study by TWA's E. J. Minser back in the '30s. The factors that Minser discovered to be associated with the static discharge on the DC-2 and DC-3 are just as appropriate today with the subsonic jets. These are typically:

1. Flight on instruments or in and out of clouds.
2. Air temperature 40° and lower (true). (A recent UAL survey of 100 jet discharges showed 67 per cent between 30°F and 45°F.)
3. Active precipitation with some icy types involved.
4. St. Elmo's Fire. (Not always visible.)
5. Radio static. (This not as severe today.)

Do the jets have a lesser exposure to static discharges?

Given the same meteorological conditions, the jet should be more prone to discharges. Since the jets are not exposed to the same conditions at cruising levels (because of low temperatures and minimal water content), they are experiencing fewer "strikes" than the pistons and turboprops. (In the recent UAL survey, 78 per cent of the jet discharges occurred during climb or descent.)

Can anything be done to avoid static discharges?

The only sure evasive action is to avoid IFR flight through clouds and mixed precipitation types. Radar can help on this—winter as well as summer—but traffic rules and procedures obviously conspire to make this impractical in most instances. It is unnecessary for radar to show "cells"—grainy or fuzzy echoes may produce discharges. As increasing signs point to an impending discharge, the only defense is to turn up the cockpit lights brightly and to have one pilot concentrate on looking away from the windshield for protection against the blinding flash. The discharge flash may be the only "lightning" observed. ☆

When the whole works goes sour the pilot will yelp for help! But the wise man knows that when trouble begins is the time to . . .

GET THE WORD OUT!

Headquarters Air Rescue Service, Orlando AFB, Fla.

Maybe you've never had a serious aircraft emergency — good. Maybe you never will have one —even better. But for the thousands who have had 'em and for the other untold and unnumbered thousands who will one day face their own personal moment of truth in the sky, there is some consolation in knowing you are not alone. A lot of thought, planning, expense and experience has gone into helping you —and others like you—out of desperate jams. The machinery stands ready. The big question is: Do you know how to help youself?

The National Search and Rescue Plan, AFM 64-2, integrates all United States agencies, military and civil, having search and rescue facilities, into a powerful force for the protection of life and property—namely, yours. It also provides for the effective use, on a voluntary basis, of a wide array of specialized search and recovery groups, state, municipal and private, who are constantly ready to contribute their skills and facilities to the humanitarian effort.

Within the Continental United States, the organization which directs the employment of this widespread network of search and rescue facilities is the Air Rescue Service. And through a world-wide network of Air Rescue centers, squadrons and detachments, the ARS is constantly on the alert to provide professional aid and assistance on a global basis. On any given day, Air Rescue personnel may be participating in the recovery of an astronaut returning from outer space, an emergency medical evacuation in Panama, a search for missing boy scouts in Indiana, in the escort of a crippled airliner over the Atlantic Ocean—or saving *your* life.

In order to perform its humanitarian mission, however, the Air Rescue Service must be aware of the need for assistance. The private pilot who departs on a cross-country flight without filing a flight plan, the military pilot who neglects to report a malfunctioning engine in flight, or any pilot who is reluctant to admit that he is lost, is contributing to a situation where extensive delay may occur before knowledge of the need for emergency assistance is made known to Rescue forces. All the rescue facilities in existence will be valueless to a victim until his need is known. In brief, if you don't get the word out, chances are you're a gone gosling.

The importance of the time factor cannot be over-emphasized. Minutes mean lives! The probability of finding survivors and their chances of survival diminish with each minute that passes after an incident occurs. Records have proven that the life expectancy of injured survivors decreases as much as 80 per cent the first 24 hours following an accident, while the chances of survival for even uninjured survivors rapidly diminish after the first three days. Naturally, individual incidents will vary with local conditions such as terrain and climatic factors, ability and endurance of the survivors, emergency equipment available to the survivors and other critical variables.

The filing of an accurate flight plan before departure is of utmost importance. While this is a matter of routine for military pilots, many Air Force personnel are engaged in aero club or private flight activity, and should be thoroughly indoctrinated in the necessity for this procedure. As a minimum, before takeoff every pilot should leave information of his destination and proposed route of flight with a reliable person. Almost equally important is the necessity of closing the flight plan upon arrival at destination or alternate. Failure to do so may result in wasted and costly search effort and even the risk of death or injury to search personnel.

A recent ARS mission is a case in

GET THE WORD OUT! *continued*

ARS HH-43 helicopters provide fast, airborne rescue service. They lower fire suppression kits and use rotor wash to blow flames away from cockpit areas.

point. Happily, as things developed, it involved no loss of life. As a matter of fact it did not even involve an aircraft accident although the pilot's lack of professionalism and lack of consideration for others might very easily have caused one during the search phase of the mission.

The pilot of a four-place, single engine, light aircraft took off from Cincinnati. He filed no flight plan but well founded rumor had it that his destination was a large city in the blue grass regions of Kentucky not too far from Churchill Downs.

Enroute to his destination, the pilot of the missing aircraft reported to an accompanying aircraft that he was unable to keep pace with him. Moreover, it was known that the pilot of the missing aircraft did not have charts of the area but did have two-way VHF. The pilot of the accompanying aircraft had charts but his transmitter was not working. The pilot of the accompanying aircraft made two 360-degree turns but was unable to locate his "buddy." He then proceeded direct to his destination and landed. After waiting "a considerable time" the pilot notified FSS of the missing aircraft.

The incident occurred during a period of high flood waters and all airfields on both sides of the cresting Ohio River were checked with negative results. Civil Air Patrol of Kentucky, Indiana and Ohio flew 48 sorties and logged 76 hours and 15 minutes in miserable weather looking for the missing aircraft. The weather was reported as follows: "ceilings 1500 to 3500 with scattered thunderstorms; heavy rains with gusty winds and turbulence in the most probable search area."

Including numerous state police and other agencies, hundreds of people were involved in the search. The pilot was located the following day because he called his place of business. Incredibly, he was calling from Las Vegas, New Mexico.

You, the pilot of an aircraft encountering an emergency, should perform the following actions:

1. If the aircraft is equipped with IFF, place the selector to "Emergency."

2. Immediately contact the communications agency controlling your flight, and advise them the nature of the emergency and your immediate intentions.

3. Transmit MAYDAY or PAN, depending on the degree of urgency, over the emergency frequency followed by the information listed in the back of the FLIP Enroute Supplement. If you are unable to contact the controlling agency, the information should be passed to any agency capable of receiving it.

In accordance with the National Search and Rescue Plan, the emergency report will be passed to the appropriate Air Rescue Center, which in turn will alert and dispatch such assistance as the circumstances dictate.

There are three primary means by which a pilot can make his emergency known: through the transmission of an emergency message; by placing his IFF switch to Emergency, and by flying a triangular pattern. The left triangular pattern will indicate a loss of both radio transmitters and receivers; a triangular pattern to the right will indicate to the radar controllers that messages can be received but not transmitted.

What is an emergency? The dictionary defines it as "a sudden, generally unexpected occurrence or set of circumstances demanding immediate action." The trouble is, the term emergency means different things to different persons. The loss of an engine is infinitely more distressing to the pilot of an F-102 than to another pilot cruising along in a C-130.

Regardless of the type aircraft being flown however, one conclusion is quite clear—when mechanical difficulties develop that could lead to real trouble later on, or if you are uncertain of your position, or if weather is getting the better of you —Get the word out! If time is available contact a ground station; if that is not possible, notify anyone in radio contact and give them the essential facts. Do this even though you feel that no emergency yet exists. Further developments may follow so rapidly and be so critical that further transmissions may be impossible.

Bear in mind that it is far better to over-estimate your difficulty and get an alert message out early than to let false pride cause you to delay calling until it is too late. Once Air Rescue is in possession of this vital information, 90 per cent of the job is done because locating the scene of an emergency incident or crash is the time-consuming task. Recovery is relatively simple.

With the operational use of high-speed jet aircraft, the problem of intercept and escort of these new types of relatively slow Rescue aircraft has become more difficult. However, this problem has been partially overcome by a technique known as the "Maximum Rescue Coverage (MRC) Intercept." Upon receiving a call for intercept, the rescue aircraft proceeds to a point considerably ahead of the high speed aircraft in distress and on its inbound track. On reaching this predetermined point, the Rescue aircraft turns and takes up the same course as the distressed aircraft which is some distance astern. Both aircraft proceed in the same direction until the Rescue plane is overtaken by the distress aircraft which then draws ahead of the Rescue plane. While the Rescue aircraft is only briefly in the immediate vicinity of the other aircraft, the turning point is so calculated that it is at all times in a position to give maximum protection over a maximum period of time to the crew of the distressed aircraft.

If the distressed aircraft is ditched, crash lands, or the crew bails out, the Rescue aircraft will reach the scene within a relatively short time. By tying down the transmitter key, the radio operator can make it possible for the Rescue aircraft to home on, and pinpoint the exact site even after bailout or ejection.

On the other hand, if the commander of the aircraft in distress is reluctant to transmit a call for assistance, he is very likely to be cutting his own throat. Should he eject, bail out, ditch, crash land, or just plain auger in, he is not reported overdue by communications until one hour after his next scheduled reporting time. A thorough communications check is then initiated and, should this prove negative, a search plane is dispatched. During such a period of time, today's high speed aircraft can cover a sizeable chunk of real estate.

Should the pilot be on course when things get out of hand, he is in luck—and congratulations are in order to whomever is navigating. But to find him still requires a large scale route search. If he is off course, the chances for locating him diminish drastically. The search becomes a major effort, and can consume days, even weeks. Bad weather and terrain can complicate things even further.

Every year ARS futilely searches thousands upon thousands of square miles of assorted terrain for aircraft that might have been saved if only word had reached ARS soon enough. Typically tragic is a mission which concerned an aircraft enroute to a Maritime Air Base from Keflavik. Over destination he changed his flight plan for another base, reporting five hours fuel aboard. At 1638 he gave his position and stated he was returning to the original destination at 7000 feet, maintaining altitude with two engines feathered. No intercept was called for. Last

The HC-54D Rescuemaster, for years a workhorse in the ARS stable, is slated to be replaced by newer and faster aircraft. For years, intercepts by this aircraft have been welcomed by airmen in distress.

contact was at 1646 when the distressed aircraft requested destination weather and gave an ETA of 1700. At 1737 ARS assistance was requested and a Rescue aircraft was airborne 18 minutes later to attempt an intercept.

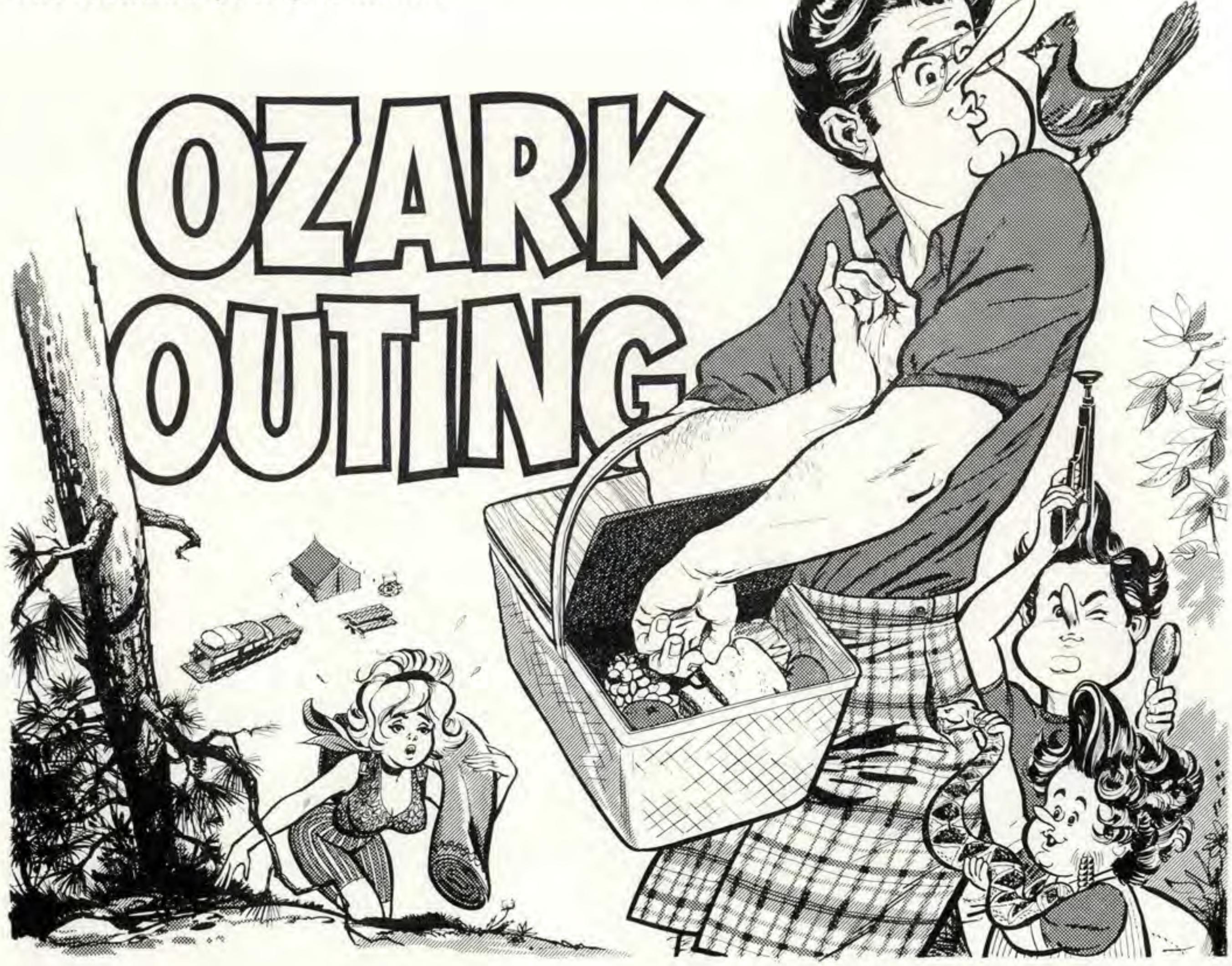
The weather was not the greatest. At the time of the alert the ceiling was 1800 feet and lowering; a solid overcast existed up to 15,000 with an unhealthy icing layer on top and it was getting no better fast. After over two futile hours of effort trying to make contact, the Rescue aircraft returned and the next day a large scale search of the area began. After 11 days, hundreds of sorties, and countless false leads, the mission was suspended.

Four months later when the snow melted, the wreckage of the aircraft was spotted 120 miles off course. Fifty-seven minutes elapsed from the time trouble was known to exist before ARS was called into the act. An earlier call might have enabled the Rescue aircraft to make contact and offer a few constructive navigation suggestions. The men on board might very well be alive today.

If there is no doubt that an emergency exists, use the phrase, "I declare an emergency" when you make your transmission. Don't wait; time is vitally important. Set in motion, as soon as possible, the vast and complex mercy machine that can save your life. The fact that it is better to err on the early side than to be fatally late cannot be over-emphasized. We seldom get much argument on this score but when the chips are down we often find that a false sense of pride will cause a man to delay calling until he's in real trouble. It's the same philosophy that causes a guy to ask for a "practice" DF steer instead of being honest and screaming for the frantic kind. Possibly it's just that we all rather hate to admit that there are times when we aren't in complete command of the situation. Much as we'd like to crystal ball these matters, the fact remains that unless Rescue knows of the problem, we can't help you. Get the word out. ☆

With typical lack of preparedness and know-how, our hero treats his family to an . . .

OZARK OUTING



"There's a rockin' chair in Arkansas, and there I'm gonna go!" So spoke Chauncey Z. Chumley, sometime aviator, Captain, USAF, and summer leave taker with the strongest of get-away-from-it-all motives. The rocking chair bit had to do with nebulous retirement plans, much too distant to concern this carefree individual. All it did indicate was a typical degree of unpreparedness on the part of this safety officer's nemesis. He had two weeks to fritter away. He planned to head a bit south of east, and Arkansas was about as good a tentative goal as any. He'd heard the food was good, living was reasonable, fishing was above average, and casual dress was the going garb.

And, by golly, he'd decided with typical lack of investigation that he'd make this a real family outing; togetherness would reach a new high and the Chumley tribe would commune with nature. No radios, no telephones, no newspapers . . . above all, no TV.

He had seen the brochures (it never rains on a brochure) and had succumbed to the pictured tranquility of the state parks. He had bought a tent, axe, plastic bucket, one-wick gasoline lantern, icechest and various folding accouterments including a stove, stools, table and a frail circular canvas, aluminum and plastic convenience for the youngsters' night-time needs.

They didn't get off to a real good start. One of the kids (his mother always said this one took after his father) got his little finger stuck in the bathroom sink drain when he poked after the toothpaste tube cap. Chum had been roping the tent and other assorted gear on the top of his wife's station wagon when he had to drop everything to try his hand at plumbing. He finally wrenched the pipes loose below the sink—making a mess on the floor in the process—and worried the small digit free. This operation was accompanied by considerable caustic comment which only made the kid bawl louder. Finally, late and ill-natured, the vacationers were aboard and Chaunce rammed out of the driveway in reverse at a speed that might regain a fraction of a second. Going wasn't so bad, but stopping was a bit unhandy. Reverse acceleration had rolled a tiny toy Jaguar out from under the seat and in the way of the brake pedal. Oh well, the skin on the neighbor's tree would grow back, and the right rear fender already had a dent in it anyway.

Near the edge of town Chumley pulled over, then over some more, and finally to the very edge of the pavement in response to a persistent honking by the driver behind. "Why doesn't the idiot pass?" he asked his wife.

The "idiot" didn't pass. He held position alongside, motioning until Chumley rolled his window down, then yelled, "You're losing things off the top."

Chum stopped, got out and took stock of things on top. Sure enough, he hadn't finished his tie-down job. Rope and canvas were streaming and there was only one towel left in the stack he had put up there. He guessed nothing else had been lost. This was more or less verified when retracing of their route for the past few blocks turned up three towels and a wash cloth.

One flat tire, one broken spring, one wheel bearing and one grease job later they rolled past a "Welcome to Arkansas" sign. Mrs. Chum had merely nodded when the fellow who replaced the wheel bearing and greased the chassis commented, "Oughta always have a car gone over and prepared for a trip—saves a lot of grief on the road." To herself she thought, "If I'd said that he'd of hit me."

They found a state park, much like the one in the brochures but with extras like mosquitos and a nest of wasps that one of the small Chumleys discovered with a bare foot. One thing, he had good lungs. The entire camp was soon aware of this. Fortunately, a bearded, tobacco-chewing local slapped some cool mud on the swelling and this cut the decibel level from a piercing scream to an acceptable whimper. "Never saw a kid that didn't like mud, Ma'm," the man said.

Chaunce was in high spirits. He couldn't understand why so many had pitched tents on that rocky old hillside and overlooked the perfectly beautiful, shaded spot here in the glen. In fact, the soft mossy ground underneath the canvas floor gave a carpet effect. He became enthusiastic with the discovery of unknown tent erecting skills and drew the ropes taut. He even bragged to his wife, "I like a neat camp—shows a little pride. Did you notice how many of the other tent guy ropes are loose and sloppy?"

"Oh, boy, now I'm a horse," Mrs. Chum said to herself as she gamely lugged the rear end of the heavy picnic table to the special spot her husband had selected.

Something was wrong with their new stove. It worked fine if you wanted an eight inch flame, but when turned lower it made a noise like "poof" and went out. But the kids were hungry and Mrs. C. well realized that her ever-lovin's ability frequently fell far short of his confidence. She wasn't about to ask him to fix the stove. Somehow, by alternately moving the skillet on and off the fire, she fried up a pan of hamburgers. She grimaced when a drifting leaf fell into the beans, but gamely lifted it out and served.

After dinner her great outdoorsman decided he would try out his new hatchet and split some wood for the fire. She suggested they use it as already cut, but, as usual, he wouldn't listen. It could have been worse. Her worst fears (that he would chop off a thumb) didn't materialize, but she did have to probe with the tweezers to remove a long, ugly splinter.

That night Chumley learned why so many tents had been pitched on the hillside. He didn't know why his wife woke him just because it was raining. "Good for sleeping," he mumbled, rolling over on his cot.

"Get up," she commanded.

"Eee . oo . . ww!" he cried, holding his feet up after he'd stuck them over the side of the cot. The water was a good four inches deep—and cold. "Now I remember," he moaned, "I should have dug a trench around the tent. I knew there was something I'd forgotten."

"Wouldn't have done any good," his wife replied, "every bit of water in the whole park undoubtedly drains into this hole you selected. And see how that side's collapsed—you like a taut tent, you said."

Chumley suggested they stick it out—maybe the water would subside. But when the water level reached the low point on the cots, osmosis had set in and posteriors began to get cold and damp, his wife insisted that they move to the station wagon. They hiked pajama bottoms to half-mast position and waded out, Chum carrying the kids. He didn't say much.

Next day they moved to higher ground and by the afternoon of the second day they had dried out the tent and bedding. Mrs. C. and their eldest had caught colds and made everyone else miserable with their constant sniffling and sneezing, but other than that things weren't too bad. Chum's spirits were still dampened and he had long since given up reminding his brood of the good time they were having.

But they were game. By the end of the week they had been fishing twice, once even catching a fair mess of crappies. They didn't get to eat them though as Chum merely wrapped them in newspaper and left them on the picnic table—he'd clean them first thing in the morning. He didn't have to; a raccoon cleaned them thoroughly, leaving nothing but the skeletons. The kids thought their dad walked funny ever since he had gone horseback riding. Their mother explained that all cowboys walk that way at first. Some things could have been worse, like they didn't have to go into town for chigger bite medicine, the park store carried a supply. Midway in the second week, when they had to break camp and start the trek homeward, they had become fairly well acclimated. They all scratched a lot, but their ruddy complexions looked good—from a distance. Peeling sunburns are never attractive up close. The chigger bites seemed to have been neutralized and Chum's limping was hardly noticeable—or else they were all used to it. Mrs. C. had become resigned to seeing her family in wrinkled clothes and she automatically shook everything she picked up to make sure any bugs would fall out.

Their own driveway—even with the skinned tree across from it—had never looked so good. And their own bed, that was the greatest. Mrs. C. slept and slept and slept. When she did finally get up, around noon, the first thing she did was call the base paper and place an ad. "FOR SALE: Complete set of camping equipment, used less than two weeks. Umbrella tent, bottled gas stove, icechest, folding chairs, much other equipment. Bargain for quick sale." ☆

Major T. J. Slaybaugh

ONE CANDLE FOR A PIECE OF CAKE

Lt Col Frederick C. Blesse, Directorate of Aerospace Safety

On the 4th of February 1964, the F-4 had its first USAF birthday. If the size of the birthday cake were determined by the success of the first year of operation, the cake would stretch from coast to coast. A group of hard working Air Force people in our first USAF F-4 unit have set a precedent with this new fighter—a precedent that should be a challenge to every unit scheduled to receive the F-4.

Our Air Force objective of course is to transform every new unit into a combat organization without the loss of a single pilot or aircraft. The 4453rd CCTS at MacDill AFB, Florida, has proven that it can be done. Maybe by telling their story, by sharing their problems and solutions, their near misses that could have been accidents, the next transitioning unit can do their job just a bit easier and safer. This is my objective.

Training of pilots and maintenance personnel began long before the 4th of February, 1963, but the story I want to tell began on that day. The 4453rd CCTS received the first of twenty-nine F-4B's from the Navy that day to begin the training of all F-4 pilots in the Air Force. The Commander, Colonel F. K. "Pete" Everest, was the first to start training. Other key supervisors and instructors soon followed. Students arrived in the October-November 1963 period and the unbreakable chain of student training began. The rest is history and detail—but such history and detail that other activating units are destined to suffer in comparison unless they take advantage of every piece of information that can be gleaned from the MacDill operation.

By 31 December 1963, the 4453rd CCTS had flown 6491 hours in the Navy F-4B. An additional 124 hours had been flown in the USAF F-4C—a total of 6615 hours. These hours were flown without major or minor accidents in our fastest and most versatile fighter. The F-4 thus became the only high performance fighter in our inventory with a zero accident rate for 1963.

The utilization rate for the first 11 months was 30.9 hours per aircraft. Work continued. A few close calls alerted everyone to the fact that things were not perfect. Procedures changed. Flying hours mounted. By the 30th of April 1964 the unit had flown a total of 11,756 hours in both models of the F-4. This now represented 15 accident free months—all of which involved transition, instrument flying, formation, navigation, air combat maneuvering, missile firing, rocket firing, dive bombing, skip bombing, aerial refueling, and night flying.

The title of this story might fool you. The wonderful handling characteristics of this fighter make it a piece of cake to fly, but achieving such an enviable record for the first year of operation can hardly be attributed to good fortune. Let's see what was responsible. Obviously, some factors were favorable. The better the planning the more of these you will have.

Operational and maintenance personnel were carefully selected when the unit activated. Supply lines were direct from McDonnell Aircraft Corporation rather than through Air Force base supply channels. Much experience was derived from the Navy, which had been operating the aircraft since 1961. McDonnell personnel were on hand to aid in the training of personnel and trouble shooting the aircraft. These were all significant advantages, most of which will not be available to the average unit transitioning from F-84's or F-100's into the F-4C. This doesn't mean it can't be done without these factors; it does mean more careful supervision, more detailed planning may be necessary to come up with the desired result. There were other factors too, some the result of good command practices, some the result of efforts by the engine and aircraft manufacturer, and some just from good fortune.

The squadron established a solid safety program to include foreign object damage (FOD) emphasis (one damaged engine in 15 months operation) and prompt identification of problem areas. The culmination of every unsatisfactory condition was a strong push for corrective action through Operational Hazard Reports (OHR's), etc.

To aid the squadron with their new aircraft an F-4C Operational Engineering Division (OED) team was constantly investigating problems and receiving aid in their solutions from Tactical Air Command headquarters. Such problems as F-4C main wheel bearings, fire warning and overheat system, control of cockpit temperature, wing tip position lights, in-flight refueling, and many others were investigated by this team. The team was of invaluable assistance to the commander.

The performance delivered by the General Electric J-79-8, and -15 engines had a great deal to do with the squadron's success during the first year. Although the -8 and -8A engines showed some evidence of hot section distress during periodic inspections, the characteristic operation of both series engines was trouble free from periodic to periodic. This is a new plateau for high performance engines for fighters and safetywise is difficult to improve on.

Still another factor that helped make the '63 operation spotless was the unbelievable flight handling characteristics of the F-4. It would be a serious error to overlook the part this feature played in eliminating pilot error accidents. Any century series pilot who has had to cope with the all-weather European operation from 8000 usable feet of runway will understand that comment. No one will argue that the century series birds (170K final approach) we have been flying can be stopped in 5000 or 6000 feet without a drag chute. But mix a crosswind, a pinch of rain and a drag chute failure (and this is easier to find in Europe than a seven in Las Vegas), and that 8000-foot runway can become nine pounds in an 8-pound bag before you know it. The luxury of a 135-knot final approach in a high performance fighter is hard to underestimate.

There are other things, too, that contribute. Twin engine reliability, for instance. Generator failure, CSD failure or any of a dozen critical emergencies in a single engine fighter suddenly become routine when the engine can be shut down and the aircraft returned to the base for maintenance.

It seems that with all those things working for you, any operation could be a huge success. That's probably true providing there were no items on the other side of the scale. Let's have a look at that now because there were some significant factors affecting the squadron adversely.

It was obvious immediately that this aircraft had one thing in common with her century series sisters: she was going to require "around the clock" maintenance if the operation was to be a success. Three 8-hour shifts were formed and that maintenance procedure still exists.

Aerospace Ground Equipment (AGE) was critically short the entire year and, in fact, still is.

Test equipment in some cases was hardly off the drawing boards, to say nothing of being available in the squadron for use.

A new breed of pilot (Pilot Systems Officer—PSO) had to be trained to operate hand in glove with the pilot. Training him to operate the radar and naviga-

LtCol Bill Menaker, Director of Maintenance; Maj Ralph Parr, Operations Officer; LtCol Jerry Hogue, Squadron Commander; Col Ernie Biggs, Director of Operations; LtCol Stud Allen, another Squadron officer, and Col Frank K. "Pete" Everest, Squadron Commander.

ONE CANDLE FOR A PIECE OF CAKE

tional equipment was not the area where emphasis was needed. These lads were pilots too and regardless of their previous pilot experience (and some of it was extensive) they wanted to fly the aircraft, not ride in the back seat. This problem was dealt with (only time will tell how effectively) by establishing a minimum tour of 200 hours in the F-4 and 500 hours total. He may then enter the pilot training course commensurate with existing vacancies. The responsibilities of the PSO are numerous. He

- plans the mission
- assists the aircraft commander in preflight
- advises maintenance of inflight radar and navigational problems
- preflights and operates navigational equipment
- performs navigation, bombing and radar functions
- pilots the aircraft when necessary
- operates communication equipment
- maintains back seat landing proficiency
- provides inflight relief and emergency assistance as required.

In addition to those rather general problems, others developed with the aircraft that made the possibility of an accident-free year look extremely remote. The first problem was an operational one:

A night checkout with a steep landing approach resulted in two blown tires, extensive damage to fairing gear doors and dents in trailing edge flaps. This easily could have been the first accident, had good fortune not prevailed. The loophole was closed. Final approach glide angle was changed to two and one-half degrees and, in somewhat of a coincidence, a Visual Glide Slope Indicator was installed about that time. No further problems have been encountered in this area.

Minor problems continued to present themselves such as control of cockpit temperature, fog and moisture, wingtip position lights, main wheel bearings, and a score of others.

The next major problem arose, however, when a malfunctioning nose gear steering unit gave a hard-over signal during landing roll-out. Others occurred, giving serious problems of aircraft control from blown tires. The result was the curtailment of formation landings and takeoffs. Unsatisfactory reports were first submitted in June of 1963 on this item but it still remains a problem to the squadron.

Utility Hydraulic System failures occurred with unbearable regularity. More than 40 were recorded. These usually were the result of reservoir seal failures, hydraulically operated fuel transfer pump seal failures, broken lines, and O-ring seal failures in actuators. (Over 30 rudder actuator failures, for example.) Corrective action provided an improved shaft seal in the transfer pump and new reservoir seals (called "Green Tweed" seals). Steel lines replaced aluminum lines; maintenance care and caution was increased during disassembly of struts and actuators.

One utility system failure occurred concurrently with emergency brake failure. Again good fortune prevented an accident. The aircraft, after rolling the entire length of the runway, threaded its way through the runway threshold lights before contacting a runway light control box. Only one flap was damaged. The failure was caused by a leaking seal in the rudder damper actuator. The emergency brake didn't work because the accumulator O-ring seal failed which in turn permitted loss of the pneumatic pre-charge.

Of all the incidents which easily could have resulted in a major accident, those involving clamp bolt failures were the most serious. These T-bolts are used in some 30 to 35 locations throughout the aircraft, many of which are in the fuel and boundary layer control systems. On three separate occasions T-bolt failures in the fuel system were responsible for loss of tremendous amounts of fuel. All three cases, fortunately, occurred on the ground.

Newer bolts manufactured to specification are now available. Where possible substitution of old bolts is in progress. An additional precaution of safety wiring the most critical areas has paid off on several occasions for the Navy. These occurrences make it plain that no picnic was going on in the maintenance area.

Another problem plagued both operation and maintenance. From February through December, 1963, pilots and maintenance personnel were learning to fly and maintain the Navy F-4B. In December, 1963, the C model arrived on the scene. Although a high percentage of items are similar, many significant differences exist in the two models requiring retraining of both pilots and crew chiefs. A few of these were the change from the Dash 8 to the Dash 15 J-79 engine, a pneumatic starter, battery, dual instead of single wire systems on the ignition harness, different hydraulic pumps, different aerial refueling system (boom instead of probe and drogue), larger tires, hydraulic instead of pneumatic emergency brakes, an anti-skid system, diluter demand instead of pressure oxygen system, plus some other changes in electronics and in cockpit arrangement of switches and instruments. Concerning these changes most pilots will agree that:

(1) The battery and cartridge starter are really the

Col Everest insists on careful preflight planning.

answer to some much needed self-sufficiency.

(2) The bigger tires on the C are good. They are tough, durable and dependable. Some tires get as high as 80 landings but the average is about 50 per tire, outstanding when compared to other first line fighters.

(3) The anti-skid system has a bug at present and is undergoing a modification. Its capability to stop the aircraft in 1800 feet in condition for another immediate takeoff has been well demonstrated, and there is little question that its addition augments the tactical capability considerably.

(4) The C brakes appear spongy to most pilots at low speeds. They prefer the pedal pressures on the B.

(5) The emergency brake system on the C is not as good as that on the B model. The B had trapped accumulator pressure for about six applications for directional control. The hand operated control lever beside the seat for both brakes was excellent. Also, in the B, emergency system pressure could be checked by the crew before flight.

Actually the gage should be in the cockpit where the pilot can tell if he has emergency braking pressure in event of a Utility Hydraulic System failure.

(6) The Diluter demand oxygen system on the C is a real delight to the pilot after the pressure system on the B.

(7) The intercom system on the C is much more quiet, far superior.

(8) The refueling receptacle on the C is probably superior but some of the pilots are having trouble getting used to it. They trap the boom in its lower forward limits and damage the receptacle. Also utility hydraulic failure could produce a problem on a deployment since utility pressure is needed to extend the receptacle.

(9) The rear cockpit in the C has some improvements to visibility. Back seat landings are easier. All controls essential to landing are available in the rear cockpit and the instrument layout in back is an improvement. Scope location is not quite as good as on the B.

(10) Inertial platform—more test equipment is required to obtain desired navigational accuracy.

(11) The radio and navigational equipment in the C is not as good in some ways. You have to go through 18 preset positions to get to manual or Guard. Homing or tracking is not possible with the gear down, due to signal distortion. This apparently is caused by the fact that the antenna is too close to the nose gear door.

(12) Bombing system—an excellent layout in rear cockpit. The unit has achieved 100 per cent release reliability during exercises with good bomb scores. Wings should achieve excellent scores with the F-4C.

Capt (now Major) Cliff Allison, Safety Officer.

Obviously, these are unofficial opinions but usage will probably prove them to be fairly accurate.

The squadron faces a move this July which means 1000 personnel will go from MacDill AFB, Fla., to Davis-Monthan AFB, Ariz. Soon after arrival the complement will swell to 1500 as personnel for Wing manning become available. Training is continuing (only one class was cancelled) throughout the move in spite of the fact that by 1 July training was required at both bases. By the end of July, all F-4C's (about 50) will have been transferred and the 4453rd will be a complete unit for the first time since early spring.

The plans for moving the unit are typical of their operation. Every member of the unit was issued maps showing the preferred routes to Davis-Monthan AFB, complete with day and night speed limits in all States and construction areas on the given routes.

In addition, each person received a booklet giving useful data required for the move. A list of just a few reads like this:

Data for transportation of household goods.

Insurance review data.

Readying the family and car tips.

Recommended RON locations plus motel listings and approximate rates.

Speed limits and State driving laws of all States on the route.

Do's and Don'ts for good driving.

Instructions in case of arrival delay.

This is not a complete list but it is complete enough to show what goals a "thinking" organization can strive for to ensure safe arrival of much needed personnel.

Well, that about covers the first year or so of activity. For the 4453rd CCTS it was a year marked by some close calls, each one considered a challenge by a group of dedicated professional officers and pilots. The Squadron was expanded to a Group, and now to a Wing. Their fantastically responsive supply system through McDonnell Aircraft Corp. in St. Louis has become a thing of the past, and all F-4C supplies now must come through AF Base Supply. Some of the highly qualified personnel will soon be filling overseas quotas but others will take their place. They too will be subjected to the exacting demands of Commander "Speedy Pete" and they too will do things they didn't know they could do.

When asked about his record zero accident rate for the first year of F-4 operation, Col Everest's remark, accompanied by a shrug of the shoulders was, "A little work but mostly luck, I guess." After careful consideration I am forced to agree it is pure luck—just like playing the violin. ☆

Simple modification makes chutes steerable, pr

Better Break on Bailo

Aircrewmen forced to bail out are going to get a better break with a new midair parachute modification that will provide better landing characteristics. The new procedure has the man in the parchute cutting four suspension lines. This action can prevent some of the many injuries crewmen have suffered upon or after landing.

The modification was brought about by a Qualitative Operational Requirement (QOR) submitted to Hqs USAF by the Life Sciences Group, DTIG. Concerned by the number of landing injuries (one-third of the major injuries during ejection occur during landing), escape system specialists investigated various parachute configurations used by sport jumpers and U.S. Forest Service fire jumpers. The QOR resulted from these studies.

The parachute modification that is scheduled appears as a revision of T.O. 14D1-2-1 and was developed by the Systems Engineering Group (SEG) of AFSC's Research and Technology Division. The mod provides for identification of the lines to be cut by wrapping a four inch portion of the lines with colored tape. The tape to be used is a waterproof, pressure sensitive adhesive tape of specified red or orange color.

Tests with dummies and live parachutists were performed to develop a modification that would reduce the number of landing injuries and fatalities by providing the parachutist with a means of steering his parachute and lessening oscillations. Of course, there could be no compromise of escapability or reliability. Testing was done with the standard C-9 personnel parachute canopy. Following are some of the conclusions reached:

- Improved control results without compromise of overall parachute performance.
- Rate of descent was 2.8 per cent less and oscillations were reduced.
- Since the modification is made during descent, opening characteristics and canopy strength are unaffected.
- A short training film would be of further benefit to aircrews in becoming familiar with the line cutting procedure. (Such a film is under consideration.)

The proposed revision to the technical order includes instructions for the suspension line cutting procedure which, if followed, will permit the parachutist to safely reduce oscillations and steer and turn his canopy. A warning note cautions that the procedure should not be attempted when the parachute opening occurs below 500 feet.

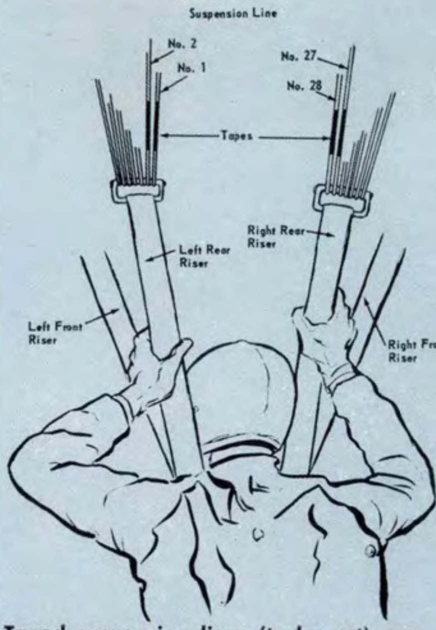
Proposed revision to T.O. 14D1-2-1:

1. Make a knife accessible. The standard hook blade riser knife is recommended when available.
2. Visually locate the lines to be cut.
3. Starting with either rear riser, pull the riser down and grasp the two marked suspension lines with one hand.
4. Holding the knife in your free hand, sever the two marked suspension lines.
5. Repeat steps 3 and 4 on the remaining rear riser to complete the midair canopy modification.
6. The cutting of the four suspension lines will cause a large "lobe" or "scallop" to form in the rear center portion of the canopy skirt.
7. The "lobe" provides a facility for turning the canopy at the approximate rate of 30 degrees per second and will also significantly reduce oscillations.
8. To turn the canopy, grasp the appropriate rear riser (i.e., right rear riser for a right turn and conversely) and pull down. Release the riser when the turn has approached the direction in which you wish to be oriented.
9. The modified canopy will inherently glide in the direction you are facing at a rate of 3 to 4 knots in still air. Use this inherent drift to your best advantage when maneuvering toward a suitable landing area by either increasing or counteracting the drift caused by prevailing winds.
10. Always give yourself time to turn the canopy so that you are facing into the wind for landing, and get this done before you reach 200 feet from the ground so that you are not in an awkward landing attitude. This "upwind landing" permits the inherent canopy glide to counteract the prevailing wind to some degree, and reduces rather than adds (as in a "downwind" landing) to chances of landing injury. ☆

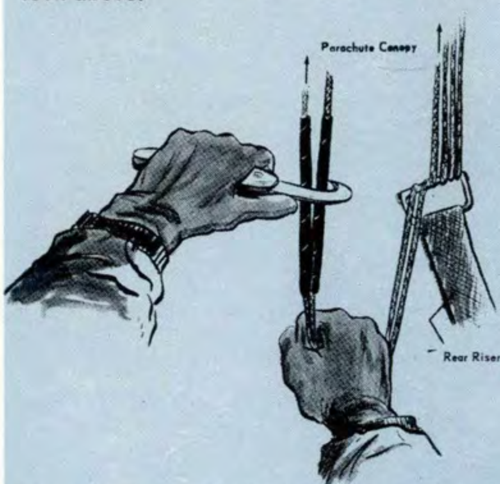
events oscillations.

ut

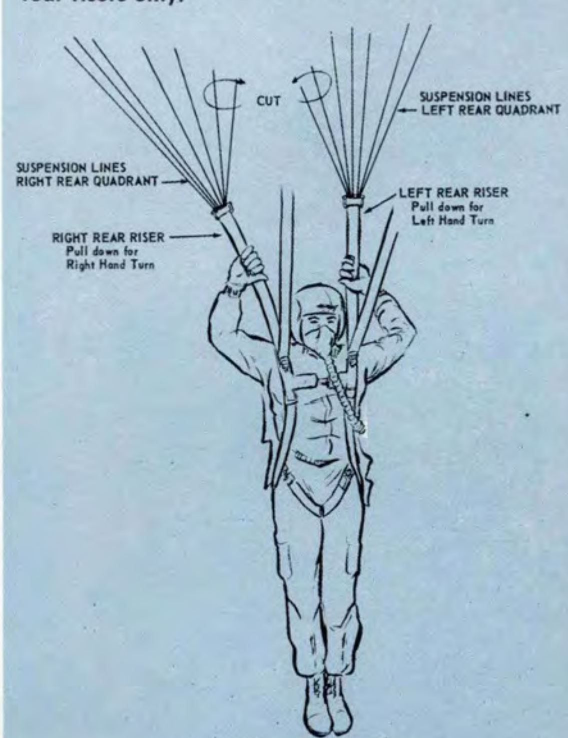
Photos above show chutes with four suspension lines cut on rear risers, an inflight mod.



Taped suspension lines (to be cut) are seen above.



Pull down and cut the taped lines on rear risers only.



Two survive low altitude, high speed ejections and . . .

Lake Bed Landings

Worn and bloodied flight suit and flying jacket indicate seriousness of being dragged, even over flat, level area.

Ed. Note: Early this year two fighter pilots were forced to eject when their aircraft went out of control shortly after takeoff. The rear seat pilot retained his helmet, but suffered facial injuries when the plastic frame of his oxygen mask shattered. He released his chute immediately upon ground contact. The front seat pilot lost his helmet, was unable to actuate the chute quick release and was dragged approximately 300 yards. Both are now strong exponents of helmet chin straps, workable parachute quick releases and the importance of getting free of the chute immediately upon ground or water contact. Following are the statements they prepared for AERO-SPACE SAFETY magazine readers.

REAR SEAT PILOT

I was forced to eject from the rear cockpit very shortly after takeoff. The aircraft had entered a violent roll to the right almost immediately after establishing a climb attitude of 20 degrees nose up with an IAS of approximately 450 knots. After confirming instructions from the pilot to bail out, I initiated the ejection lanyard with both hands. I had previously put my hands on the lanyard and had experienced some difficulty in doing this because of centrifugal forces resulting from the roll rate of the aircraft which I estimate was in excess of 400 degrees per second.

Immediately after pulling the ejection lanyard, I heard the very loud explosion of the thrusters followed by the noise and tremendous force of the wind blast as I left the aircraft. I do not recall any gyrations of my body prior to chute deployment which was actuated by the zero delay lanyard, as it was still connected.

My next problem was separating from the seat. I was not sitting in the seat but it was in some way attached to my right foot. I recall kicking and pushing at the seat with my left foot until it fell away from me. The parachute descent was uneventful — almost pleasant so I took inventory of myself and found that my oxygen mask was gone but my helmet was still on. My eyes and face felt as if they had been burned and my face was bleeding. The burning was associated with the windblast at the time of ejection. Minor cuts were noted on my forehead in the mid line from the shattered plastic frame of the oxygen mask.

As I approached touchdown I was aware of the rapid drift that I was experiencing and recalled the wind velocity of 12 to 15 knots which was given to us at takeoff. I knew I had to get out of the chute as soon as I touched down so I removed the guard on my left quick release and held my right hand on the release which I pressed either just prior to, or upon, touchdown.

I touched down facing the direction of the wind drift but do not recall rolling or falling upon contacting the ground. I had experienced no difficulty in actuating the parachute quick release which I attribute to extensive training necessitated by a considerable amount of over water flying. The rescue helicopter transported me directly to the base hospital. I recall sustaining a marked whiplash type force on my neck. This was due to my head being flexed at the time of ejection.

FRONT SEAT PILOT

A mandatory ejection was dictated by the following circumstances:

a. Aircraft out of control.

b. Flight control system not effective.

c. Descending through approximately 1500 feet.

d. Right wing believed partially missing.

The canopy was not jettisoned prior to ejection because I was unable to reach the handle due to the severity of aircraft roll.

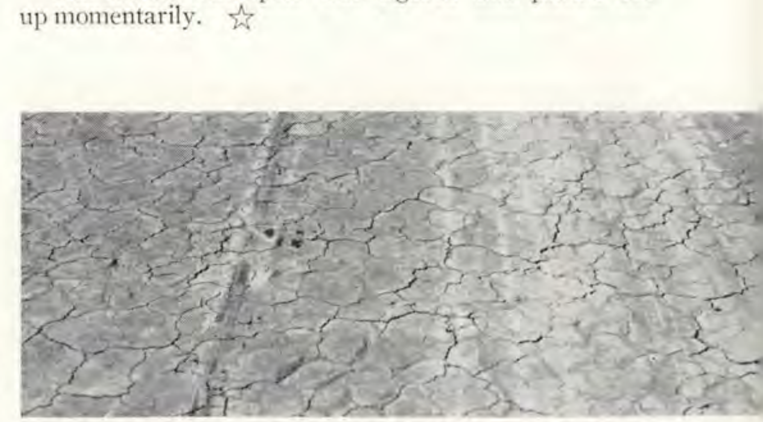
After insuring rear seat vacancy I reached down with both hands and actuated the ejection handle—only the right hand caught the lever. My left hand missed due to, again, the severity of the roll.

I ejected with the zero lanyard hooked and helmet visor down. After ejecting my first recollection was that of attempting to actuate the parachute D-ring. I looked up and saw the chute deployed. I also noted a large obstacle (I think it was the ejection seat) entangled in the shroud lines just above my head. The object dislodged, striking me on the head and then falling away. I put my gloved hand up to where I had been struck and noted blood on the glove. At this time it became obvious I had lost my helmet and mask. I was wearing a Lombard Helmet and MBU-5/P mask. The helmet was without a chin strap.

Just prior to ground contact, I put my right hand on the left parachute release and noted a rather high drift velocity across the lake bed. Upon ground contact, I was rolled over backward. Before I could relocate and activate the parachute release, I was being violently dragged on my stomach. I was unable to reach the parachute release while being dragged.

After several attempts, I was successful in pulling in one set of chute risers, thus collapsing the chute. Once the chute was collapsed, I stood on top of it and took my chute harness off.

The rescue helicopter was sighted and picked me up momentarily. ☆



Trail across lake bed (opposite page and at right) was made by the pilot. He was dragged approximately 300 yards before he could collapse the chute.

For the past five years, 18 per cent of the aircrewmen who've made water landings found themselves in . . .

Watery Graves

The time sequence went like this:

1415 pilot ejected, aircraft on fire.

1425 pilot in water.

1430 pilot sighted, in life raft.

1445 rescue attempts by two helicopters completed, both unsuccessful.

1450 launch alongside.

1453 pilot aboard launch.

The narrative sequence is a bit more dramatic:

On climbout a heavy fuel leak occurred in the Century Series fighter and fire broke out in the engine compartment. The pilot ejected and went into an undercast. He was first spotted by the crew of one of two searching helicopters. He was in his life raft. By the time the choppers could move in to make the pickup he was in the water, beside his raft. Both sides of his underarm life vest were inflated. A winchman from one of the choppers went into the water and aided the pilot in getting into the sling. Lift was started, pulling both the pilot and the winchman toward the door of the chopper. This operation was normal until the pilot's chute canopy started to clear the water. Drag increased, the pilot slipped out of the sling and fell back into the water. One-half of his life vest was lost at this time.

The second helicopter moved in for a rescue attempt. The pilot had slipped out of his parachute harness. On this lift attempt the pilot only cleared the water a few feet when drag was encountered. He was dropped again. By now both sides of his underwater life preserver had deflated. He hung onto the side of his life raft to remain afloat. The chopper crew now realized that the pilot was still entangled in his chute harness and shroud lines. They prepared to put a man into the water to cut him loose. This plan was abandoned as a rescue launch was approaching. The launch came alongside and the crew threw a line to the pilot.

The pilot grabbed the line, let go of the raft, and immediately sank beneath the surface. Two crewmen from the launch dove into the water, but they could not locate the pilot. Raft, chute and pilot were pulled aboard in that order.

The pilot had drowned. He had not released his quick release, nor had he attempted to cut himself free.

Because of the thin line between life and death in this case, it is more heart-rending than some post-landing fatalities, but it is not an isolated example. A recent Life Sciences report discloses that during the five-year period ending 31 December 1963, a total of 150 parachute water landings were made after bailout and ejection from Air Force aircraft. In 27 cases crewmembers succumbed to effects of post-landing environmental conditions.

From the same study, following are remarks, selected at random, but representative of parchute line entanglements following water landing:

"Before I could say 'Jack Armstrong' completely fouled." Rescue party had to cut lines to pick survivor from water.

"Couldn't swim to dinghy because lines tangled around my legs."

Fishermen had to cut shroud lines to recover body.

Feet entangled in shroud lines, extreme difficulty, pulled from the dinghy, almost drowned during rescue as parachute caught in ship, had to be cut loose.

Had to cut lines off with survival knife.

Completely entwined by shroud lines, great difficulty.

Missing, observed in normal descent with equipment deployed, last seen climbing into dinghy. Possible entanglement.

"The more I moved and cut the more I became entangled."

Pilot was found entangled in shroud lines of his own and radar observer's chute.

Entire entanglement of chute and lines around pilot's legs, both feet, ankles and legs tightly bound. Drowned.

The reason for relating the one experience, and briefs of others is, of course, to emphasize the seriousness of this problem. It was further underscored during the making of the parachute film, "Passport to Safety." On two occasions professional parachutists (also experienced in SCUBA diving) became helplessly entangled in sinking suspension lines in a matter of seconds following water landings, and had to be rescued by standby safety personnel.

The problem is well documented. What should crewmembers do to ensure their chances, should they ever be required to make an overwater bailout or ejection? Two things: First, they must fully understand and practice in order to immediately release the canopy upon water contact. The parachutist must give the canopy every opportunity to drift beyond him before it hits the water. Second, always carry the knife, know where it is, how to get at it quickly and how to use it. Best of all, go through a water landing survival school such as the one TAC conducts at Langley AFB.

These are also good tips for anyone having to make a parachute landing on land (Ref: Lake Bed Landings, page 16).

This problem continues to be a major concern, Air Force-wide. Chutes are being modified with an improved canopy quick release (page 19) and a method of treatment of parachute suspension lines and canopies with a solution to make them waterproof is under study. Members of DTIG Safety have conducted a preliminary test by comparing floatability of standard suspension lines treated with a commercial water repellant and untreated lines. The untreated lines sank quickly while the treated lines remained afloat indefinitely.

As has been well documented in the Air Force, survival after parachute water landings is a major problem. For anyone facing such a situation knowledge of present equipment and prompt action is absolutely essential. ☆

NEW MODEL Canopy Release

As an old familiar saying goes, "Everybody talks about it but nobody DOES anything about it." This has generally been applied to the weather, but the saying has had particular application to the present canopy release on our parachutes.

Most vociferous, and understandably so, have been those who were dragged across the ground or anchored to a soggy chute and five miles of risers in water. Their complaints about the release have been both bitter and valid. Now, however, the talk is over and somebody has done something about this equipment. A modification kit including tools has been developed along with modification data for use by base level activities in converting releases in service. According to MAAMA, kit delivery will start this month and should be completed by December, 1964. Surveillance will be maintained for ways to improve the delivery schedule when possible.

The new release is essentially the same as the old one but with one big difference: operation has been changed from a "squeeze and pull" to simply a "pull" operation. The squeeze buttons have been eliminated and replaced with a cable. Here's how it works:

Unsnap the safety guard in the usual manner. This frees a cable loop that is stowed under the guard and acts as its own spring to pop into prominent position for the next release action. A sharp tug on the cable loop with one or two hooked fingers causes the latch arm to swing out and down. This releases the canopy.

ASD gives the following instructions for three possible landing situations.

• GROUND LANDING. Unless there is a very high ground wind (more than 15 knots) do not touch the canopy releases before reaching the ground.

• IN HIGH WIND. Immediately after ground impact release one riser group by operating the canopy release (use either release, usually one release is sufficient to spill the canopy). If there is a high ground wind (15 knots plus) remove the safety guard from one release while you're 200-500 feet above the ground. After that don't touch the release until your feet touch the ground. Then actuate the release from which you've removed the guard; follow through with the other release to make sure the canopy spills.

• LANDING IN WATER. At about 200 to 500 feet above the water, remove one or both safety guards from the releases. Don't move hands or arms around the releases any more than necessary until your feet touch the water. Then pull and follow through. ☆

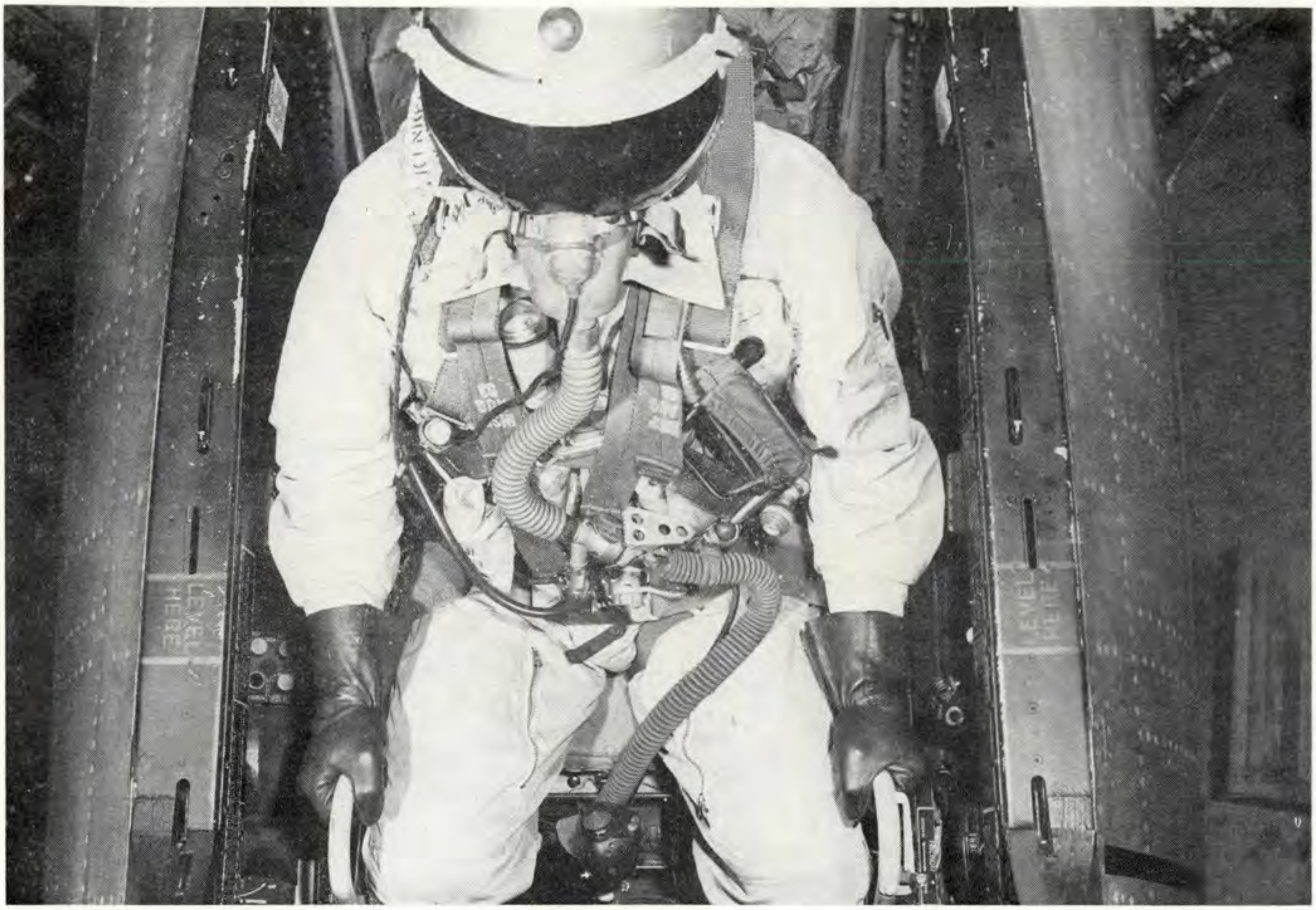
Systems Engineering Group, AFSC

1. Step Nr 1 is to unsnap the safety guard in the normal manner.

2. Next, slip one or two fingers through the cable loop as shown.

3. A sharp tug will cause the latch arm to swing out and down.

4. The canopy is now released. Either release will spill the chute.



There are exactly 100 reasons why this article is being written.

In the three-year period, 1961 through 1963, there were an even 100 Air Force crewmembers who ejected and died.

We can do better. Seventeen per cent of the ejectees didn't have to die. The 21 per cent of those who survived shouldn't have received major injuries.

If you don't remember anything else from this article, here is one tip you should remember above all else: never eject below Dash One specified altitudes if this can be avoided. Of the 100 who didn't make it during the past three years, over half tried it from 500 feet or less. Now note the following facts: ten years ago the success rate was 79 per cent; five years ago it was up to 88 per cent—the highest ever. In 1963 two significant things happened: there was an increase in the number of low level escape attempts and the success rate dropped to 80 per cent.

Since low altitude punchouts are the number one ejection killer, and since more were tried last year, additional explanation would appear to be in order. Both in 1958 (another year with a success rate reversal) and in 1963 the increased incidence of low level ejection attempts may be directly related to the availability of equipment designed to enhance low level ejection success. In 1958 it was automatic parachutes, automatic lap belts and the zero second deployment lanyard. In 1963 it was the rocket boosted ejection system. It is possible that the publicized capabilities of these innovations influenced crewmembers to stay with their aircraft until conditions were such that survival was doubtful.

As of today, even with the latest type rocket assist seat in Air Force aircraft, *there is no true zero-zero capability*. A forward speed of 80 to 160 knots, depending upon the system, is still required for successful completion of the ejection sequence.

In an emergency requiring ejection the crewmember often must make a marginal attempt, for which he is not criticized. However, there are too many cases where ejection was delayed to a low altitude. And the accompanying high fatality rate in such cases warrants the reminder.

In contrast with the poor low altitude success rate, high altitude ejections have not proven to be nearly as hazardous. Four fatalities occurred out of 37 ejections above 20,000 feet.

Acquisition of faster aircraft has not resulted in higher ejection speeds. Of the total number of ejections for which speed was reported, 95 per cent were below 400 knots.

Difficulties during ejection occurred in approximately 30 per cent of the cases. These can be categorized as difficulties occurring before ejection, and those after ejection.

Because, last year, one out of five who ejected didn't make it, we present basic ejection do's and don't's in an article titled . . .

PUNCH OUT PROGRESS

Difficulty in locating and operating ejection controls and a lack of time were the major pre-ejection problems. Frequent and realistic training is the best cure immediately available here.

Seat-chute entanglement and holding onto seat actuating controls were the most often reported post ejection problems. Post ejection difficulties have continued to decrease, with the seat-man separators thought to be a major contributor. In 15 cases automatic lap belt failures or difficulties were encountered. Damage to the mechanism during the initial ejection sequence or early, inadvertent actuation of the manual release were the cause factors.

Now, post ejection. Of those who ejected successfully, 21 per cent suffered major injuries. Over half of these injuries were fractures. Most hazardous is the parachute landing phase. Training would also appear to be the greatest single antidote to post ejection problems.

Violent ground or water contact, usually after low level escape, is the single major cause of fatalities, accounting for 73 of the 100 during the three year period of this survey. Eighteen drowned or are missing following over-water ejection. Five were fatally injured as a result of striking aircraft parts or debris. Three were lost when dragged in rugged terrain by high surface winds. One presumably succumbed to high "Q" forces.

Worth of the zero second lanyard continues to be demonstrated in Air Force equipment. In general, ejections below 1000 feet with the lanyard engaged were 60 per cent successful as compared to 20 per cent when the lanyard was not attached. There were no fatalities in ejections above 10,000 feet with the lanyard attached.

Rocket powered ejection seat experience deserves special mention. More and more USAF aircraft are being equipped with this system and last year 42 ejections were made using it. We know that this is not the cure-all for the escape problem. Total rocket ejections have been 76 per cent successful as compared to an 85 per cent success rate for ballistic systems. However, in the low altitude regime (below 500 feet) rocket ejections had a higher success percentage (36 to 31). As was pointed out earlier, the success rate in the below-500-foot category is far from satisfactory. Admittedly, the majority of the fatalities were the result of ejection attempted under extremely marginal, if not impossible conditions. Few, if any, reflected adversely on a system meeting its design capabilities, but they do underscore the fact that the systems now in use are not capable of successfully extricating aircrewmen from some emergency conditions they face. Indicative of possible undue confidence is the fact that approximately two and one-half times as many low level (below 500 feet) attempts were made with the rocket system as with the ballistic system.

During the three-year period 38 bailouts were made from non-jet aircraft and 37 of these were successful. Of the conventional bailouts from jet aircraft, 40 per cent were unsuccessful. Almost invariably such bailouts are from jet bombers that are in severe, uncontrollable conditions. Under such circumstances difficulty and delay is experienced in clearing the aircraft as well as a greater probability of striking aircraft structures.

In summary, the largest single cause of ejection fatalities is the result of attempts beyond the performance envelope of existing systems, i.e., low altitude, low air speed and unfavorable attitude. The second leading cause of fatalities is the inability to survive water landings.

Low level ejection with rocket powered systems is more successful than with ballistic systems, but the margin is not as great as had been expected. Further refinement as well as more stringent aircrew education and training is indicated.

Credit: This article was adapted from a report on USAF Ejection Experience prepared by DTIG Life Scientists, Robert H. Shannon and Samuel P. Chunn, Major, USAF (MC). ☆

The pilot is dead now.
Probably no one knows for certain why, but here's the story. Draw your own conclusions . . .

WHY?

Robert L. Terneuzen, FAA Liaison Officer
Directorate of Aerospace Safety

Takeoff from the midwestern base was routine. As the pilot of the fighter settled down to the relatively short hop ahead, everything apparently checked okay. After about 30 minutes of flight, at 2145Z, he received 2058Z destination weather: estimated 2500 broken, visibility seven miles, wind 240 degrees at eight knots, altimeter 29.07. A few minutes later he was in contact with the center nearest his destination, which advised they had radar contact and would have a clearance any time he wanted to start descent.

At 2208Z the flight was given a clearance to descend from FL 330 to 210; the pilot acknowledged and was advised that the altimeter setting of 29.07 was very low. The controller then asked if the pilot wanted an "enroute descent or a penetration." The reply was, "I'll take a radar controlled penetration."

Controller: "You want an enroute descent straight in. Is that right?"

Pilot: "Affirm."

It was now 2214Z as the aircraft began a decent to 5000 feet. Another altimeter setting was issued as 29.04.

Again the pilot acknowledged.

Now the Center controller began his verbal coordination with approach control, determining between them the point that would be used for the radar hand-off and the type approach to be conducted. A new heading and clearance to the local VOR were given to the pilot with the two controllers again coordinating. The pilot reported "Passing through 6000 feet and I'm TACAN only." The controller acknowledged the transmission but evidently missed that portion of the transmission about "TACAN only."

The radar hand-off was completed to approach control at 2218Z; however, the controller was unable to receive the pilot's transmissions for two minutes. The pilot responded to clearances by complying with requested turns. At 2220Z the pilot's transmissions were again received normally whereupon the flight was descended to 1500 feet.

The clearance issued by approach control was, "This will be a vector to VOR final approach course, runway three-three, straight-in approach." The weather was also given as, "Estimated ceiling two thousand broken, four thousand overcast, visibility two miles, light rain, wind three three zero variable to three zero zero degrees at niner. Altimeter is two niner zero three."

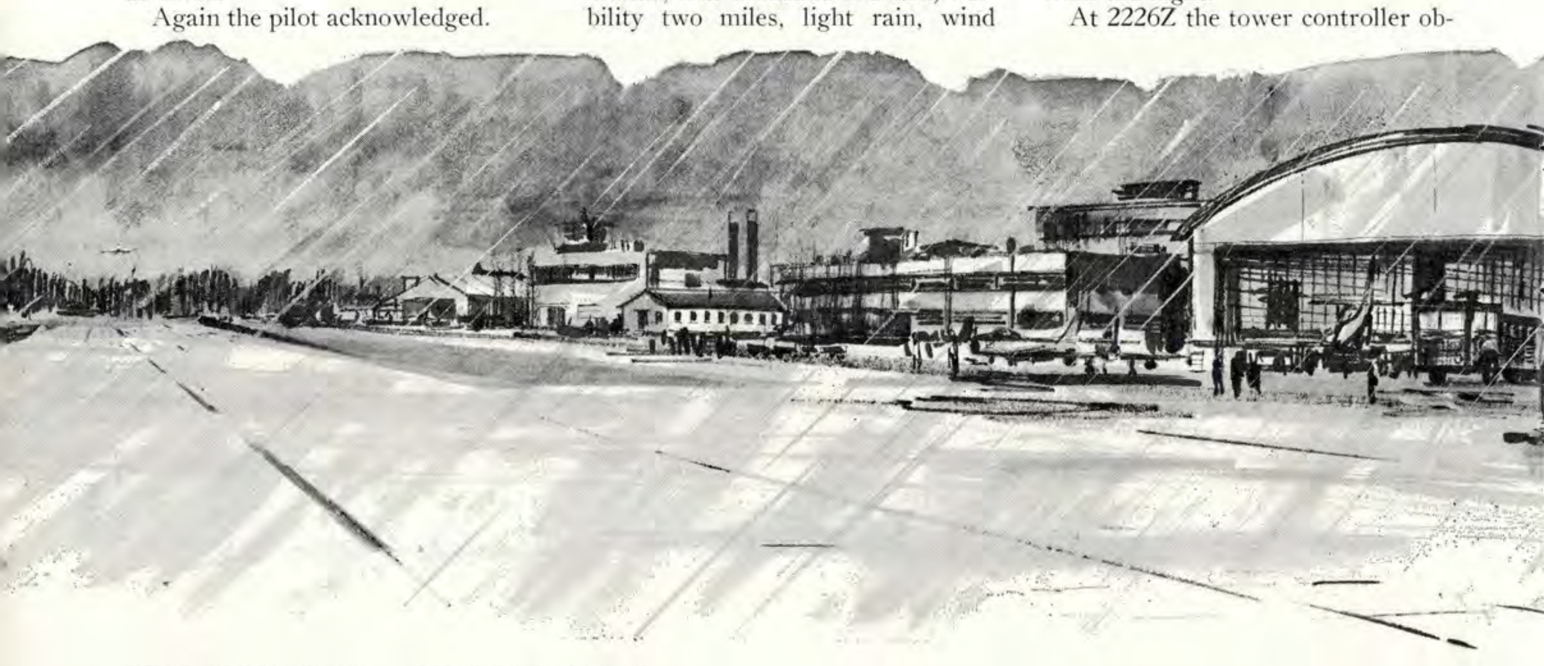
Again the pilot acknowledged and repeated the altimeter setting.

At this point the controller transmitted, "I will advise you when you are at the five nautical mile radar fix on your approach so you can continue descent to the minimums."

Additional headings were given to vector the flight to an intercept heading of the inbound course. Finally when eight miles from the runway, the pilot was advised of his position with reference to the inbound course and was cleared for a straight-in VOR approach. The controller stated, "You should intercept the one three eight degree radial approximately now."

At 2224Z the aircraft reached the five nautical mile radar fix at which time the controller stated, "Passing the five nautical mile radar fix slightly right of course," then cleared the flight to land. The pilot acknowledged with, "Roger." Again the controller cleared the flight to land and again the pilot rogered. No further transmissions were received from the flight.

At 2226Z the tower controller ob-



served a large ball of fire appear approximately two and one-half miles from the field as the aircraft struck the ground.

What went wrong?

By starting at the beginning it was learned that the pilot failed to insert "TACAN only" in the "remarks" section of his 175. Small point? Perhaps, but this omission caused ATC to be unaware of the NAV limitations of the aircraft. Another incidental point, the controller failed to hear the pilot when he reported this fact.

When the VOR approach clearance was delivered, the pilot did not question the controller. Should he have requested a TACAN approach, complete radar approach, or at least advised ATC that he had no plate for the VOR? (The VOR approach was not published in the JAL Handbook.)

Radio acknowledgments by the pilot were prompt and conveyed no apparent apprehension. The controller may have instilled a feeling of security in the pilot through his transmission concerning "enroute descent straight in," leading the pilot to believe this was to be a radar vector, descent and approach to the airport. Actually a Radar Enroute Penetration can terminate in a number of ways, such as complete GCA to the runway, surveillance radar approach to within a mile of either the instrument runway or other designated airport runways or it could also terminate, as in this case, with the aircraft on an interception heading to the final approach radial of the VOR.

Now, effective May 28, aircraft on an IFR flight plan may be radar vectored to a position in VFR weather to the airport traffic pattern. (See box this page.) This information will be included in an amendment to the Flight Information Manual.

This particular air base was not equipped with precision radar; however, the JAL Handbook stated, "RADAR AVAILABLE," as it does for all air bases having radar. The term applies to both precision and/or surveillance radar, again misleading the pilot.

Witnesses stated that the aircraft was low at 12 miles out on final (estimated 700-800 feet above the ground) and that it was extremely low when it passed over a house about one mile from impact.

An attempt was made to re-create the final portion of flight by flying a T-33 over the course with the altimeter set to an equivalent of 30.03 at the time the aircraft crashed. This placed the test aircraft 900 feet low.

One of the witnesses who observed the fighter also observed the T-33. He stated the two altitudes were about the same.

How about radar? The test aircraft was flown to within 50 feet of the trees with two accident investigators watching the scope. The radar return was normal for a T-33. Other tests indicated that the aircraft could have been flying 800-900 feet low and still show a normal radar return.

Although the primary cause of this fatal accident was concluded to be pilot factor in that the pilot misset the altimeter, there are other factors needing correction through better procedures or pilot education. For example, we're working on improving the JAL Handbook and informing pilots of the importance of using the "remarks" section of the 175.

Low altimeter settings will continue to exist and all that can be done is to alert pilots when these occur. The pilot in this story was alerted on more than one occasion during his approach, yet it was found that witnesses testified to the extremely low altitude of the aircraft when still several miles from the airport. Check your altimeter. It's possible that this pilot mis-set the instrument to 30.03. It wouldn't be the first time this has happened. Perhaps it's happened to you! (Investigators were unable to determine the actual setting due to instrument destruction.)

Past investigations have revealed the importance of inserting "TACAN ONLY" in the "remarks" section of the DD-175. This information will be passed on by Base Ops to the FAA Center and they in turn will see that this information reaches the final air traffic facility which will insure the assignment of the proper approach procedure regarding your flight.

Check the Enroute Supplement NOTAMs prior to takeoff to be certain of the radar capability at your destination (PAR or ASR).

Last but by no means least—understand the controller's intention regarding your approach and the procedure to be used.

When in doubt, VERIFY.

RADAR VECTORS IN VFR WEATHER

Effective May 28, 1964, IFR aircraft may be descended to the minimum vectoring altitude and vectored to a position in the airport traffic pattern whenever the ceiling is at least 500 feet above the minimum vectoring altitude and the visibility is at least three miles. This procedure will afford a more expeditious service to arriving aircraft and preclude unnecessary vectoring to the final approach fix to a published instrument approach procedure.

1. Pilots will be advised of the purpose of the vector in the following manner:

"Depart (fix), or Turn Right/Left Heading (degrees) for Vector to Runway (runway number) Traffic Pattern."

2. Radar separation will be provided between IFR aircraft until the aircraft are in sight of the tower controller and transfer of control jurisdiction is completed.

3. Prior to being changed to the tower frequency, pilots will be advised of their position with respect to the airport.

The provisions of paragraphs 2 and 3 will not apply when:

1. An IFR aircraft, not yet in sight of the tower controller, is positioned behind another arriving aircraft which the pilot reports sighting, and

2. He is instructed to follow that aircraft and is cleared for a "visual approach."

With a "visual approach" clearance, the pilot operating on an IFR flight plan in VFR conditions may deviate from the prescribed instrument approach procedure and proceed to the airport with visual reference to the surface. Radar service will be terminated when aircraft are told to contact the tower. The tower will assign a landing sequence number.

The following article expresses some thoughts by Colonel George T. Buck, Chief, Missile Safety Division, as he prepared to leave for his new assignment as Chief, Research and Technology Laboratory, Wright-Patterson AFB, Ohio

MISSILE SAFETY COMES

I vividly recall a colonel friend of mine asking if I thought a Missile Safety effort as a distinct entity within the Air Force were really necessary. This occurred in mid-1959, just after General LeMay had issued a directive to the Inspector General Group to organize such an effort. I thought it necessary then, and I am more convinced now after working in this endeavor for the past five years. Today, I believe Missile Safety has come of age and can take its proper place alongside the older safety organizations.

Missile safety, as is true of other elements of Aerospace Safety, is not a job to be left to the professional safety people alone—operation of a successful program requires the wholehearted cooperation of everyone involved in any portion of the life cycle of a missile system. In particular, it is important that a concerted effort be made during the design phase of any system to identify safety goals and see that the means to meet these goals are incorporated into the initial design. One of the tools with which to accomplish this has been provided in MIL S38130. It is gratifying that Systems Command is beginning to use MIL S38130 in negotiating contracts for new systems; we hope this use will continue and increase.

Organized safety inputs to the Category I, II and III test plans are now established procedures and are paying dividends. Test procedures are being evaluated from a safety viewpoint and in many cases, tests are designed to prove the validity of safety procedures and the usefulness of safety items of hardware.

Technical data have been improved tremendously over the past few years. But there are still some relatively serious shortcomings and occasionally omissions are uncovered.

Using commands have, for the most part, well organized and smooth functioning missile safety organizations. Air Training Command has incorporated safety indoctrination into missile courses and the Logistics Command is beginning to organize an effective missile safety effort in the support role.

All told, a great deal of progress in the field of missile safety has been made over the past few years. From here on in, it would appear that continued emphasis on, and a gradual refinement of, the program is in order throughout the Air Force.

As a parting shot, I would like to discuss three aspects of the USAF Missile Safety Program which I believe require additional command attention. Not necessarily in order of importance, these are technical data, training, and the unit missile safety officer's role.

Perhaps more than with any previous military weapon, the introduction of missiles into the Air Force weapons inventory has underscored the need for clear, concise and explicit instructions to the operator and maintenance personnel. It is of paramount importance that maintenance technicians and operators understand, precisely as the writer intended, those procedures spelled out in the technical data. Commanders and safety staffs and airmen should review critical portions of technical orders to insure that misunderstanding is not likely.

Technical data should be screened for completeness; omissions are dangerous and can cause catastrophic results. For example, as of a year ago, the technical data for countdown (PLX) of an Atlas F contained instructions to abort the countdown if the gaseous oxygen (GOX) content exceeded the upper limit. This seems clear enough, but there were no instructions in the T.O. as to whether a PLX could be run with the GOX detectors inoperative.

Some crews had concluded that if the GOX detectors were operative, and the content exceeded the upper limit, they would have to abort, but if the GOX detector were not operative and the GOX content were unknown, they should proceed.

This situation, of course, has since been corrected, but it serves to illustrate the type of omission that can spell trouble.

Training of maintenance and operator personnel requires continued emphasis. Missile systems are so sophisticated and complex that no one person will ever completely know all the many sub-systems and support equipment. Critical systems, those whose malfunction will surely have catastrophic results, can and must be understood thoroughly. Training in the realm of trouble-shooting should be accomplished on a continuing basis.

In most missile systems, it is impractical, if not impossible, to introduce malfunctions for the purpose of training on operational systems. However, skull sessions and blackboard talks will certainly fill a large part of this need. Every unit and crew commander should know in detail the consequences of any action he takes and the probable effect it will have on the failure of any of the critical systems. There are many cases on record to indicate that incorrect analysis of a failure was made, or that improper action was

OF AGE

taken simply because the crew or maintenance technician did not thoroughly understand the system.

Then, there is always the individual who will attempt to perform a job on a missile system by taking short cuts; in most cases, he does this because he does not understand why the tech data require certain steps. Lack of proper training, discipline, or shortcomings in the tech data are usually the reason. The same individual will follow maintenance instructions to the letter when working on his own pet hot rod—he must be made to do so when working on missile systems!

The commander's right-hand man is his unit Missile Safety Officer who assists him in carrying out the safety responsibilities. If the MSO is not used by the commander—if he is not given the necessary authority and does not have access to the commander—he will gradually recede into the background and become ineffective. When this happens, the commander has just issued an engraved invitation to disaster. This is not to say that the MSO should be giving operations-type orders (except in rare critical cases agreed on by the commander), but the commander should certainly require his advice before making decisions that will have significant safety overtones.

The commander who takes a serious interest in what his safety officer is doing and how he is going about his job will seldom have serious safety problems. The professional safety people are doing their best to see that the mission can be accomplished in the safest manner possible, consistent with operational requirements. ☆

Aerobits

Planning a cross-country flight? Like to have transient aircraft maintenance meet you on arrival? You better check the TRANSIENT MAINTENANCE hours of operation at USAF bases listed in the Enroute-Supplement, Flight Information Publication. Why? Well, after many years of providing around-the-clock transient aircraft maintenance capability at most all USAF bases, Headquarters USAF took a look at the actual transient arrivals.

The facts were rather startling. Two hundred and one bases around the world are listed as having USAF operations. Sixty-three per cent of all these bases did not have more than one transient aircraft a day between 2400-0800. Thirty-three per cent of the bases did not have more than one transient aircraft a day between 1700-2400. Manpower authorizations were being provided to insure a minimum of three transient aircraft maintenance personnel on duty for an around-the-clock capability at all but some Continental Air Command and Air Training Command bases.

It was also found that the bases receiving a large number of transient aircraft were short manpower to provide adequate maintenance support. A new standard for transient aircraft maintenance was developed to match the workload with manpower requirements.

New Transient Aircraft Maintenance Base Designations that became effective 1 April 1964 were:

Transient Maintenance Status

No transient aircraft maintenance available (27 bases).

Transient aircraft maintenance available 0800-1700L, Monday through Friday (17 bases).

Transient aircraft maintenance available 0800-1700L (31 bases).

Transient aircraft maintenance available 0800-2400L (47 bases).

Unrestricted transient maintenance (79 bases).

So what does this mean? It means you should receive better maintenance at all unrestricted bases because they have been authorized more maintenance personnel for your support. Bases restricted to certain hours of operation will be supporting your maintenance requirements only during these designated hours. The restrictions apply only to transient aircraft maintenance support (parking, fire guard, maintenance). The tower, runway, crash-rescue, etc., will remain in operation. If you land at a base during the hours transient aircraft maintenance is closed down, you will be responsible for the safe taxiing and parking of your aircraft in compliance with AFR 62-10 in the same manner you would if landing at a civilian field without USAF transient aircraft maintenance support. You can still obtain fuel, but you or your crew will be required to do the servicing. Regularly scheduled transport aircraft supported by MATS enroute maintenance activities, aircraft on known maneuvers or aircraft operating with prior approval of the base concerned are not affected.

So, be sure to check the Transient Maintenance Status in the Flip Enroute-Supplement for your intended destination. Chances are it won't be restricted. If it is, you had better pick another and enjoy the transient maintenance service.

Maj. Thomas J. Barr Hq. USAF

FIRE DETECTOR PERFORMANCE. False fire warning statistics, obtained from FAA data, disclose considerable variance—both by type equipment and operators. Examination by individual airplane types and individual operator records shows that false alarms vary from more than one per airplane down to one per 20 airplanes.

How can we get better performance from our fire detector? First, deficiencies in the installation must be corrected. In the case of the continuous detector, the sensing element and its connecting wire must be arranged so that it will not chafe on nearby structure; it must be out of the way of frequent maintenance activity, and it must be properly supported so it will not break. Second, once the element routing and mounting are properly established, they must be maintained. The sensing element and connecting wires must be inspected at frequent intervals for damage or for evidence of chafing. Third, failures will occur, even though, we hope, rarely. Effective trouble-shooting techniques must be established to prevent one failure from causing multiple false alarms. There is a case on record of 19 false alarms on the same engine detector system in a two-month period—18 of them should have been prevented by effective trouble-shooting.

I realize that trouble-shooting for detector system faults is difficult, especially when they are frequently intermittent; and I realize there are many systems in the airplane for the technicians to master, but we are talking about eliminating false fire warnings because they are a threat to flight safety. Can we do less than to keep hammering away at the do's and don't's of proper maintenance?

Roger B. Jones
Kidde Aero-Space Division

PROPER ROTATION PROCEDURE—On takeoff roll, the pilot rotated the T-39 at the precomputed rotation speed of 112 knots. Takeoff speed had been computed at 126 knots. At approximately 130 knots the pilot thought the aircraft was airborne and he applied brakes prior to gear retraction. The tires were still in contact with the runway, resulting in a left blown tire and scrubbing of the right tire. Rubber coming off the left tire bent the left gear actuating arm and caused slight skin damage to the panel back of the left wheel well.

All T-39 pilots at that base have been counseled on proper rotation procedure. Also, the base has recommended a change in the Dash One that would require cross reference with the vertical speed indicator to determine that the aircraft is airborne with a positive rate of climb prior to retraction.

THE PRICE IS HIGH—The party broke up about 0230 in the morning. The six airmen had had a big time dancing and drinking it up, now it was time to get back to the base. They climbed into the old convertible parked outside, belonging to one of their group, a 19-year-old airman. The car was later determined to have been generally in serviceable condition, however it had no seat belts and the speedometer didn't work.

One of the group asked the driver how he felt. "All right," was the reply. They drove down the road to the main highway, turned left and continued on their way back to base. At a point where the road begins to curve slightly to the left, the driver steered into the left lane of the eastbound side of the divided highway then drifted toward the right side of the road allowing the wheels of the car to strike the right curb.

The vehicle, going about 60 mph, jumped the curb, proceeded upright along the grass for 116 feet, re-entered the road and started rolling over. It tumbled 352 feet, finally stopping against the left curb. Three airmen, including the driver, were dead, the other three seriously injured. Two of the men were trapped in the wreckage, the others thrown out. Investigators found that the driver was driving at excessive speed while

- Fatigued
- Under the influence of alcohol. ☆

MISSILANEA

AGM-12B COMMAND LINK AND POWER-ON CHECKS—A recent AGM-12B incident and investigation verified the importance of the command link and power-on ground checks. The involved aircraft had completed several consecutive successful missions when it suddenly could not pass a command link check. The pilot aborted the mission and returned to home base.

Ground checks revealed a low output on the transmitter, but the system passed all function checks. The aircraft transmitter antenna was replaced and the aircraft launched on another mission. Again the command link check was failed. On return from this mission, the systems were checked with the engine running and "everything seemed to fail."

Careful tracing of the aircraft's missile control system revealed the cause to be a loose fuse receptacle (115vAC-F503-66; Panel #81 on the F-100F). The command link check averted launching a missile which could not have been controlled by the malfunctioning aircraft system. The power-on ground check substantially aided in duplication, isolation, and correction of the problem. The value of these checks is again proven.

Major H. M. Butler
Directorate of Aerospace Safety

EXCUSES! EXCUSES! Human nature is such that all of us will invariably attempt to excuse away our shortcomings or actions. Take the Surgeon General's recent report on the effects of smoking. Some people have undoubtedly quit smoking as a result of the report. Many others will continue smoking and rationalize this habit by saying, "Well, if I quit, I'll put on weight," or "I'm not a heavy smoker and besides, I'm not convinced that what they say is true," or "I'll switch to a pipe or cigars and reduce the hazard." The same type of excuses frequently appear in missile mishap reports when the individual or supervisor involved attempts to give reasons for the mishap.

Let's assume that a missile operation is not covered by the technical order or that the existing procedure is considered inadequate. A good supervisor will take a close look at the operation and if an SOP is considered necessary, he'll publish one; if the existing procedure is inadequate, he'll submit an AFTO 22 to change it; if the required operation is not considered safe with the current equipment design, he'll take action to have the equipment modified. He will *not* sit twiddling his thumbs over his coffee cup, hoping nothing will happen.

How nice it would be if all supervisors actually responded in this manner. However, past experience indicates that this is not the case. Frequently, no evaluation is made of a new task. As long as no problems are encountered in the performance of the task, little or no action is taken to correct an existing deficiency. No SOPs are written. No proposed changes are made to the Tech Order. But the moment a mishap occurs, the cry of "Tech Data Deficiency" or "Design Deficiency" immediately echoes across the missile complex.

Granted, there are times when tech data and design deficiencies are really the culprits, and corrective action should be taken immediately. However, too often the cry is a shallow attempt to rationalize or create a smoke screen for action that should have been taken.

Put yourself in the position of a supervisor in whose section a mishap has just occurred. For six months your troops have been performing an operation which was not covered by a technical order or a local SOP. When the commander visits your section, as most of them do when trouble occurs, you tell him that the cause of the mishap was technical order deficiency with design deficiency as a contributing factor. He looks you right in the eye and the conversation goes something like this:

"How long has the operation been performed in this manner?"

"Six months, sir."

"Has any corrective action ever been taken to remedy the problem?"

"No, sir," is your meek reply.

"Was the operation evaluated for safety consideration prior to being put into effect?"

"Well, sir, I didn't think it was hazardous and the troops looked like they knew what they were doing."

The next logical question is, "Well, if the cause factors of T.O. and design deficiency are so obvious now after the mishap has occurred, why were they not equally obvious at some previous time—like the first time you did it without a hitch?"

"Well, sir, I guess we overlooked it at the time and besides, I'm not the regular crew chief."

The deeper he probes, the more embarrassing it gets. Finally, after you have sweat about 20 pounds and developed the first signs of ulcers, the boss nails the coffin shut with this remark: "Looks like a case of supervisory error—not T.O. or design deficiency!"

At this point you wish that you were on that slow boat to Viet Nam.

Some of you supervisors may be sitting back on your upholstered office chairs—with medium pressure on the chest buttons of your shirt—thinking "This has never happened to me." But, can all the activities in your section successfully survive the close scrutiny of an irate commander or investigating officer or board?

Let's quit making excuses after the fact and take corrective action before the fact!

Lt Col John A. Worhach
Directorate of Aerospace Safety

WELL DONE

1ST LT. HOWARD J. BEAR

558 TACTICAL FIGHTER SQUADRON. MACDILL AIR FORCE BASE. FLA

First Lieutenant Howard J. Bear was flying one of three F-84s in formation on a cross country navigation training mission. Forty minutes after departing Wright-Patterson AFB, Lt Bear experienced complete loss of hydraulic pressure. He immediately shut off the spoilers and pneumatic compressor to reduce the load on the system and notified his flight leader of the emergency. After initiating a left turn at 22,000 feet for return to Patterson, he declared an emergency with Patterson tower and was cleared to approach runway 05L. When at approximately 15 miles out, an emergency gear extension was accomplished and a safe indication received. Shortly afterward, the aircraft lost power pressure and the emergency hydraulic system was actuated; however, in a few seconds this system also failed, causing the control stick to freeze in neutral. Lt Bear immediately realized that ejection over the heavily populated Dayton area could be disastrous and elected to remain with his crippled aircraft. With conventional rudder the only control available, he maneuvered the F-84F to a successful landing without flaps or speed-boards. Despite a high-speed touchdown, the drag chute was successfully deployed, bringing the aircraft to a stop without damage.

To Lt Bear, for his professional handling of an emergency situation, his skillful control of a disabled aircraft, and utmost regard for the safety of a civil population, WELL DONE. ☆

THE KOLLIGIAN TROPHY

PRESENTED TO

CAPT. CHARLES W. BROZ

Captain Charles W. Broz of Wagner, S. D., was awarded the Koren Kolligian, Jr. Trophy for 1963 during ceremonies May 7 in the Office of General William F. McKee, USAF Vice Chief of Staff. The award is presented annually to the Air Force pilot who responded most successfully to an emergency in flight.

Captain Broz was selected from 22 nominees for his professional skill in coping with extreme difficulties while flying a TF-102 jet fighter at 3[illegible],000 feet over Labrador.

During an attempt to retract the armament bay doors, an explosion occurred, air rushed in around the cockpit, the aircraft began to vibrate violently, and the right front windshield tore loose.

Noise, vibration, windblast, and the extreme cold of 60 degrees below zero prevented communication between the pilots or with ground radar. After approximately 45 minutes and an unsuccessful attempt to penetrate the weather, Captain Broz closely followed another aircraft down through the heavy clouds, broke out at 500 feet above the ground, and made a successful landing. His action saved the life of his copilot, Captain Arthur P. Kearney, Seattle, Wash., who was numbed by the cold and windblast.

Captain Broz is the seventh recipient of the Kolligian Trophy, established by Mr. and Mrs. Koren Kolligian, Cambridge, Mass., in memory of their son, an Air Force jet pilot who was lost on a T-33 flight off the Farallon Islands, Calif., September 15, 1955. ☆

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