AEROSPACE

SAFETY

UNITED STATES AIR FORCE

JULY 1962

CONFUSION? or COMMUNICATION

The recent Project Beacon Report on air traffic control requested by President Kennedy and prepared by the Federal Aviation Agency indicates that substantial improvement in the application of electronics to assist in traffic control must take place between now and 1970.

Statistics show that while the volume of air traffic in the United States is expected to increase about 44 per cent between 1962 and 1975, controlled traffic, which is handled by the air traffic control system, will increase 300 per cent. Improvements and expansions are planned, of course, but as with highway systems, services and facilities never quite seem to keep up with continually increasing demands. As in the past, the communications network between the pilot and controller will probably be the first link in the traffic control system to be saturated.

A survey made among traffic controllers showed a unanimous opinion that military pilots frequently make position reports that add or delete necessary items or the items are not in the correct order. Position reports that follow the format prescribed on the back cover of the Enroute Supplement make it easier for the controller to copy. Admittedly, military pilots do not usually have the advantage of flying fixed runs as familiar as the back of one's hand. In spite of this and other circumstances, the proof of pilot professionalism must be displayed in the cockpit.

If you pride yourself as a professional, ask yourself: *"Do I make unnecessary position reports or cause the controller to ask me questions because I leave pertinent information out of my position report?"* Now is the time to review communication procedures — not during the next flight.

- When told to monitor a new frequency, it is not necessary to make a radio check unless, after a reasonable amount of time, you hear no transmissions and suspect radio failure.
- When making initial contact, state the fix you are over or if between fixes, state the next fix on your route so that it will be unnecessary for the controller to search his whole board to locate your flight strip.
- Planning ahead is a vital factor to insure timely and concise voice reports. The knowledge, from memory, of mandatory reports, will help insure that you won't be caught short and give an inaccurate, incomplete or incoherent report when surprised by a request from the controller.
- You should be able to name the following mandatory reports from memory:

a. Over compulsory reporting points or points named in clearance.
b. When the estimated time of arrival over the reporting point changes more than three minutes.
c. When a change of flight plan is anticipated or desired.
d. Before changing true airspeed by plus or minus 10 knots from that specified in your flight plan.
e. When directed to report by ATC.
f. When unexpected or unusual flight conditions are encountered.
g. When reaching a holding fix or point to which cleared.
h. When executing a missed approach.
i. When vacating any previously assigned altitude/flight level for a newly assigned altitude/flight level. When VFR above FL 240 advise ATC prior to making a flight level change.
j. When leaving final approach fix inbound on final approach, low cone, TACAN gate, and outer marker.
k. When leaving assigned frequency, unless instructed to do so by ATC.
l. When leaving assigned holding fix or point.
m. When ETA at destination is going to be missed or changed more than 30 minutes.

It's quite a long list, but after you are sure you know it, ask your buddy and see how many he misses or adds to the list, which could cause unnecessary radio transmissions.

The Air Force pilot is a professional. Before your next flight, review position reporting in the procedures section of the Enroute Supplement. Improve your radio voice procedures and do your bit to put off the time when your radio communications network will become saturated. Hold your position reports to those that are required; make them complete and in the proper sequence. This allows the controllers to copy them in the shortest time without having to ask you questions, and gives the other pilot a chance to give his position report or receive a clearance. A good rule of thumb is to think over what you are going to say before you say it, and if you are not sure, refer to the back cover of the Enroute Supplement first.

Major Ralph A. Hoyt, ACIC
St. Louis, Mo.

NATIONAL SAFETY COUNCIL AWARD

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For the 12th consecutive year, the United States Air Force has won the National Safety Council Award of Honor. Presented for outstanding achievement in accident prevention, the award is the highest recognition given by the National Safety Council.

Air Force commands also receiving the award were Air Force Communications Service, Air Force Systems Command, Pacific Air Forces and Air Training Command. Awards of Merit, second highest award, went to the Military Air Transport Service and United States Air Forces, Europe.

To qualify for the awards for the first time an organization must show a 10 per cent reduction in frequency and cost of ground accidents. Subsequent awards are based on a five per cent reduction under the previous year. Performance is based on improvement in such areas as military injury rate, civilian injury rate, government motor vehicle accident rate, military fatality rate, and accident costs.

A significant point is that each organization competes against itself, which signifies that accidents can be prevented through effective command and staff action in the performance of the Air Force mission.

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IN THIS ISSUE

50th AIR FORCE-INDUSTRY CONFERENCE

On 20 June, the 50th Air Force-Industry Conference will convene at Riverside, Calif., for two and one-half days.

Following opening remarks by Lt. General W. H. Blanchard, The Inspector General, and Maj. General Perry B. Griffith, Deputy Inspector General for Safety, the Director of Missile Safety, Colonel George T. Buck will introduce the conference subject, Missile Electrical-Mechanical Safety Problems.

Discussions will center on related electrical-mechanical problems which may contribute to missile accidents. Emphasis will be on improving compatibility of design features with operational and maintenance concepts.

Each session will open with several technical presentations on a particular subject. Panel discussion designed to assure maximum opportunity for exchange of information will follow presentations. Speakers' subjects include: Design Safety Criteria and Technical Data, Electrical Circuitry Safety, Exploding Bridge Wires, Electro Explosive Devices, Lightning Protection, Electrical Connectors, Overvoltage and Overcurrent Protection, Logic Circuitry, Pneumatic and Fluid System Safety, Missile Piping Systems, and High Pressure System Safety.

The conference is the 50th in the series of joint sessions which began in 1954. The first conference had a total of 13 persons attending. During the past four years that number has risen to an average of between 250 and 500. Four hundred are expected to attend the latest meeting in the series. ★

Cover Photo: Gleaming Skybolt missiles and fan jet nacelles of B-52H make unusual picture.

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VOLUME EIGHTEEN NUMBER SEVEN — USAF RECURRING PUBLICATION 62-1

It's all gone

Everything shouted warnings . . . You're

Capt Robert E. Evans
4510 CCTGp, Luke AFB, Ariz

The vibration started with a shudder from aft of the seat and rustled forward. The engine instruments dipped for a long moment; the tachometer, fuel pressure, fuel flow all surged together. The red fire warning light flickered on and off and then glared steadily. Everything shouted warnings — **You're on fire!** Get the power back! Turn! Bail out! I tightened my hand around the stick and grabbed back on the throttle. The vibration eased. Engine instruments settled as the fire warning light glimmered and then darkened.

"I'm on fire, John—power back." I thumbed the mike button and eased the F-86 into a left turn. My wingman dropped back, down and then surged forward. I eased the nose upward and struggled for altitude. The airspeed indicator fell off, 240-230-190—nose down now. Best glide 185 knots. Check the gages. Everything O.K. Still a bad surge. Flameout! The engine quieted now as the tachometer windmilled down.

The radio crackled in the headset, "Going to Guard channel, Bob, squawking emergency." My wingman's words shook me. UHF radio to Guard, IFF to emergency.

Easy now, easy, nose down. Heading back to Maxwell about 090 degrees, I glanced over the canopy rail. The overcast seemed solid except for a few dark rifts to the east. If I could get through there, I could see what I was doing. Must be a field somewhere.

"Maxwell radar, this is Air Force jet 25413. This is Mayday! I'm on fire, flamed out, 20,000 feet, 35 miles northwest of your station." The feedback from my headset seemed silent for hours. Why don't they answer? I've got to get down; must be a field clear around here I could glide to.

The answer was garbled, but they were there—they had me!

"Roger, AF jet 413, understand your emergency and position. Squawk Mayday for identification."

"I'll call, Bob, save your battery."

John's voice drew my attention to the gages; the bright yellow light indicated generator failure; altitude was falling off, 18,000 . . .

"Maxwell radar, this is dash two squawking emergency. Aircraft in distress silencing squawk."

I reached down and switched off the IFF.

"Roger, dash two. Understand wingman squawking emergency. Turn left for positive identification."

I eased the left wing down.

"Never mind, Bob, I'll turn; maintain your glide."

on fire! Get the power back! Turn! Bail Out!

I straightened out now and saw my wingman ease under and by the left wing. A few scattered patches of clouds coasted by. The overcast looked lower, about 6000. Passing through 17,000 feet now—maybe I could restart—a bit too far out to make it from here deadstick.

"Roger, we have you in positive contact now about 23 miles northwest of Maxwell. Course to Maxwell 130 degrees."

I eased the stick to the right.

"Roger, turning 130 degrees, now passing through one seven thousand." Never make it from here . . . getting dark. What are they carrying for weather?

"Maxwell radar, what's the latest weather at Montgomery?"

"Roger, 413, latest Maxwell weather is 600 feet overcast, visibility variable, five miles in rain showers. What are your intentions?"

A decision—some definite action.

"Stand by, radar."

Never hack it from here . . . got to get out or try a restart . . . everything seems normal now. I glanced out at John hanging in close. He could see any fire indications. Maybe it was a false light. Not likely, but maybe.

"Check me over, John. Any indication of fire?"

He slid behind and under.

"Four-one-three, what are your intentions?" Radar again.

"Rog! I can see a few breaks in the overcast to the east. Are there any available fields I could get into from here?" If I can only get below the undercast and see what I'm doing.

"Stand by, 413."

"No fire, Bob. You've got fluid streaming out of the aft section . . . looks like hydraulic."

The fumes were strong now. Could be oil. No! It's hydraulic. A haze drifted up and clung lazily against the top of the canopy. The setting sun glinted through the plastic and outlined the white curling wisps of smoke. Hydraulics—break in the lines. I reached forward and shifted the hydraulic pressure gage to the normal system: 600 pounds, no alternate warning light. I moved the stick. The pressure didn't change; I was on alternate. I threw the switch down and watched the alternate pressure dip. Generator warning light was out, engine windmilling. No sweat there. I must still have the generator to feed power to the alternate pump . . . shouldn't be working off the battery . . . couldn't depend on the battery for long.

"Four-one-three, Montgomery ra-

It's all gone

dar."

"Roger, go ahead, radar."

"Roger, what is your present altitude and heading?"

I glanced at the altimeter. "Now passing through 15,000, 130 degrees."

"Roger, you are ten miles west of a 4000-foot strip. There's a 2000-foot strip to the south."

"Can't make it; not long enough. Anything else?"

"Nothing within glide distance."

"Roger, vector me to a clear area for bailout."

"Understand, 413. Steer right, heading 180 degrees. You're approximately 15 miles north of Maxwell . . . will advise when over clear area for ejection."

"Roger."

I eased over into a right bank. Everything looked good: no vibrations, engine windmilling, no generator warning light. I doubted myself now. If I could only get some power I could make it back to the field. Radar was really on the ball. Maybe I could make it, maybe a restart—couldn't be on fire now. Just 70 to 75 per cent power would be enough.

"See any indications of fire, John?"

"Nothing."

"Rog."

"My right hand went forward to the emergency ignition switch. Throttle outboard—look for fuel flow. No fuel flow! I heard the rumble—a restart. Everything seems normal. No! Engine gages out! Nothing! No fuel flow! Tachometer! Tailpipe temperature! All out! The power took hold and the airspeed indicator crept forward. I eased the nose up, a good light—no problem, no smoke, no vibration. Not too much power though, don't want things to fly apart now. Got it made. Got it made.

"I've got a light, John, but the engine gages are out."

"Rog . . . looks like you're carrying 85 per cent."

This was it. I knew I could hack it now—just get the thing on the ground and fast.

"Montgomery radar, 413 here. I'll try it now if you can get me down in five minutes."

"Roger, 413. Heading to Maxwell now 170 degrees, 12 miles. What's your altitude?"

"Passing through one three thousand."

"Four-one-three, your approach will be straight in to runway 18 . . . 7000 feet long, no barrier, current weather 600 feet overcast in rain showers, four to five miles visibility."

"Roger, request emergency vector for bailout in case I can't hack it."

"Your emergency vector will be 270 degrees."

Decisions seemed easy now. No vibrations, John would tell me if he saw smoke, fire must be out, plenty of altitude. Weather's bad, but when I break out I'll have time to decide . . . 11,000 feet.

"I'm going to try it, John. Gear down!"

I flicked the round gear handle. Nothing! Nothing! Hydraulic switch to utility—no pressure. Pull out the emergency gear lanyard. The nose dipped, three soft thuds as the gear locked; 10,000 now, right above the clouds.

"Don't try it, Bob." John's voice came pleadingly over the radio.

"No problem! She's running! I've got my emergency hydraulics and a good battery."

"Get out of it, Bob."

"I'll get her down and if I don't like the looks of it I'll eject."

I was sure now—surer than I had ever been. I knew what I was doing—3500 hours of experience, 1500 hours in the 86 alone. Somehow I

knew that it was a safe bet even though everything seemed to be snowballing: fire, smoke, vibration, generator failure, normal flight control failure, utility system failure, 10,000 feet. . .

"Four-one-three, steer right 180 degrees. Your position ten miles north of touchdown."

"Roger, flaps down."

I flipped the flap handle down. The flaps hesitated then moved. The nose lowered. Everything O.K. Rate of descent increased—2500 feet a minute, 9000 feet now . . . 8500. A dark cloud bank rose ahead—a thunderbumper. I eased to the right and skirted the clouds. John was still there.

"Your navigation lights are out, Bob."

"Rog."

It would be tough for him to hang in close now; no lights to fly off of, almost dark. Radar's voice was reassuring.

"Four-one-three, steer left 170 degrees, your position seven miles north. Your altitude?"

"Seven thousand."

Descent seemed more rapid. The overcast flattened out below. John moved in closer. We're going in. We were skimming over the top of the dark clouds and then submerged. No cockpit lights, can just see the instruments through the gloom, airspeed 185K, still got the power, 5000 now.

"Four-one-three, your position five and a half miles from touchdown. Altitude?"

"Four thousand."

"Roger, you're on the left side of center line. If you desire we can vector you to runway 14."

Too late for that—no time left—too busy—committed now. "Negative, request straight in."

"Roger, clear to continue your descent."

Now I had it, everything was for me: flight instruments pegged, good steady descent. I glanced to the right, John was still there. Good boy! 3500, 3000. The altimeter wound steadily earthward. Dark in here—overcast getting thicker. The rain flecked steadily on the windshield. Harder—can't see forward. I concentrated on the flight instruments. Only about 2500 above the ground. Come on, give me a call, radar!

Where am I? Should be seeing something soon. Just a break in the overcast, that's all I need now.

"I've lost you in the soup, Bob, breaking off." John's voice crackled through the headset along with the call from radar.

"Four-one-three, your position three miles from touchdown. You're on course."

Too low! I'm too low! Why didn't he call sooner! Milk the flaps up a bit, get a better glide now. I flicked the flaps handle up. Airspeed dropped to 170. Sinking a bit now; less sink rate, less descent, power still in, 1500 feet. Should be seeing something. Good descent, power holding, 1100 feet. I lifted my eyes from the instrument panel and strained a glance through the spattering rain. Got to break out soon. Overcast seems thinner now. Break out! Break out!

The clouds broke from around me. In the clear! The river!

"Radar, I'm over the river. What does that mean?"

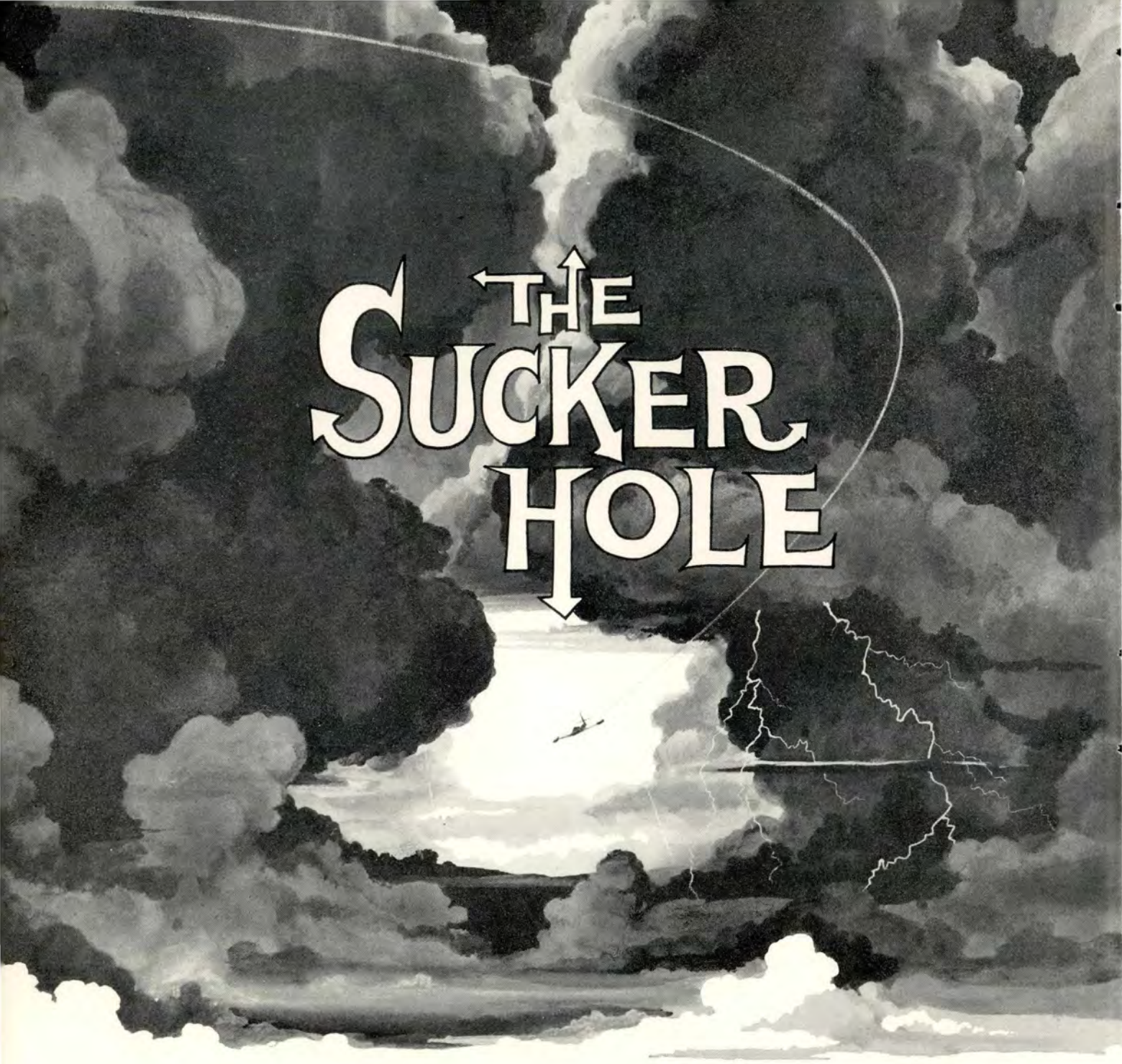
"Roger, 413, your position two miles from touchdown."

1000, 900—there we are, just above the trees. I could still see the river—800, 700, across the bank. The runway—only about a mile. 600 feet, just a little more power to lift me over. I pushed forward on the throttle. Easy! Easy! You've got it! You've got it! More thrust! Mushing toward the trees. I pushed forward on the throttle—a rumble! A flash of fire—smoke billowing—no thrust—Sinking—the trees. I hit the mike button.

"It's all gone! All gone, John!"

The fuselage twisted and shook from below. The vibration roared through the cockpit.

A few hundred yards north of Maxwell Air Force Base the flood waters of the Albama river are receding. If you were to walk along the bank of the river you might be able to see a few pieces of plastic and shrapnel-sharp bits of metal embedded in the soft muddy shoals. Looking skyward you'd see a broken highway of splintered, burned trees curving down to the river bank. They are the only visible signs that are left of a January disaster when an Air Force pilot made a courageous, but ill-fated, attempt to save a disabled fighter. ★



I've been around this Air Force for more than a few years (gray hair shining through here and there), and so far I haven't busted up or even scratched a single airplane. I did have a couple shot out from under me during the police action in 1942-1945 but I mean I really haven't contributed to what the safety types call "the accident rate."

Now, one reason I've escaped appearing before an accident board is that I'm just plain lucky (as you'll see in a few minutes). Another reason is that I do listen real good to other pilots' tales of woe and I read a lot—like this Flying Saf . . . Oops! I mean Aerospace Safety Magazine. I figure a lot of the things that I've read and listened to have saved me from making the same mistake. So I feel I have an obligation to pass on a story that might save one of you all from making the same mistake some time. It's kinda' like the article in one of the civilian flying magazines called "I Learned About Flying From That . . ."

What got me to thinking about this was a thunderstorm article I just read and it told all about them: how to miss them, how to fly through them, what to do and what not to do, but it just didn't have the human touch in it. This story does.

Anyway, to launch this tale I'll start off in the west. (You'll notice a certain amount of hedging here

and there 'cause while I'm willing to help my fellow-pilot, I'm not willing to be the source of snide and smart alec wisecracks for the rest of my career. In other words, I'm *Anonymous.*) The object of our trip was to get to San Antonio, where Red Parker was to attend a meeting the next day. It was late spring and the 100 kt winter west winds had quieted down to a murmuring 20-25 kts. Kelly weather wasn't bad, 1000 broken and 3, but it was just bad enough that we had to have an alternate, and the T-Bird doesn't have enough fuel to go one thousand nautical (with poor tailwinds), get a legal alternate, have a legal reserve, etc. So we flight planned to Biggs AFB for the first leg. Everything went fine—a VFR climb, good en route weather and 435 kts ground speed.

Then as we approached El Paso you could see a line of thunderbumpers right across our path. Damn, if the line didn't look like it ran 2000 miles north and 200 south. One good thing—the tops didn't seem to be over 35,000 and there were breaks where a guy could sneak through at 25,000. I checked the fuel counter and we still had about 360 gallons left; in fact, the tips ran dry just about then.

I propositioned Old Red: "'Hey, check those bumpers up ahead."

"Yeh."

"What do you say we press on? We've plenty of fuel to make Dyess and we can jump the thunderstorms now." Now that I look back I shouldn't have asked him a bloody thing. I was front seating this leg and outranked him real good. But I'd known Red a long time and was trying to be congenial.

Red came back with, "Need a cigarette bad, getting real hungry, bottom is sore and the relief tube is too short." I can't really say that I wasn't in the same boat so I canceled my IFR, dumped the boards and gave away 34,000 beautiful feet. Ten minutes later we were on the ground and, man, that first cigarette did taste good. I've often wondered why, after sucking on dry old oxygen for two hours or so, and your mouth dry as a bone, that the first cigarette tastes so good. Back to my confession.

We refueled the plane and ourselves and started making motions to get on to Kelly. You've got to admit flight planning for 425 NM with good weather at both ends isn't the most exciting job in the world but we went through the motions with the 21A, fuel, distances, time, etc. My usual "slap some weather on this clearance, I'm going anyway" didn't get the hilarious guffaws that it normally receives. I've always been suspicious of those weather troops at Biggs anyway—too close to that Mexican border. I could have made the forecast myself — destination 1500 scattered, five miles vis in smoke, line of thunderstorms oriented north-to-south, tops 35 to 40,000 feet, hail, etc., etc., etc. In the hour and a half or so we'd been on the ground those things had sure popped up. I mentioned those valleys between the tops that I'd seen and the weather type grudgingly allowed I could probably sneak through.

With a pat on the back the AO saw us off and then we had a real good look at the squall line. It seemed a lot closer to us than before and a lot higher. During the VFR climb to VFR/top, I kept up the usual chattering with ATC and before I knew it I was staring smackdab into one each real black thunderstorm—my altitude, 19,000 feet. I told ATC my problem and advised I would 180 and climb to the west in a racetrack pattern. Even this was a chore but finally I brought the beast staggering up to 32,000, and I do mean staggering. Headed again towards Kelly, once more we approached the thunderstorms. The tops were a good 40,000—45,000 feet, but once in a while a suckerhole or valley would appear. With plenty of fuel and more confidence than good sense, I headed for a spot of blue sky off to my left about 30 degrees. It was a little higher than I thought and in climbing my airspeed dropped off to 200 kts—the controls felt sloppy and I just couldn't pick up any more air speed. Another light spot off to the right—this required a little more climb and now my airspeed had dropped to 180. Then a low spot straight ahead — that's better I picked up 10 kts and then lost 15 trying to get over and into another clearing and then didn't make it. I was on the gages at 175 kts, 35,000 feet, with a pitch attitude of about 10 degrees nose-high. Nuts to this—so I dropped my nose to pick up some airspeed. Ahead it was looking real black. I made my decision—the next time I broke out, I'd do a 180 degree turn and get ourselves back to Biggs, just like the book says.

Hot Diggety! I broke out, not in the clear but at least where I could see something and settle down a little bit. While in a big 360 degree "settling down" turn my decision to return to Biggs was upset somewhat because the weather back that way was just as bad as any other I could see. What I'd done was to twist my tail, dodge, dart, climb and duck my way into the middle of this bloody squall line. Now wasn't this a big mess? I wasn't far off course according to the Omni, and I'd advised ATC what had happened, so I was clear there for awhile. But I was sweating, literally and figuratively. Very frankly, I didn't want to tackle what I knew was ahead of me regardless of the direction I turned. I had to do something in a few minutes, even though I was fat on fuel right now.

Now I know it would make a better story if I told you all I'd busted into that black rascal and got spit out the side or bottom, flamed out, etc. etc. But that isn't what happened. You remember, I mentioned "luck" earlier in my tale? Well, here it comes. During one of my turns I saw a kind of light-looking spot off to the northeast and low. I dropped down (still in my sucker hole) a couple of thousand feet, and that area looked even better. I went on down to 20,000 and was pretty sure this was the way. I advised ATC of my intention and took off. Back to 65 per cent, airspeed 250 kts, and go, man, go! Finally, at 6000 indicated, I could look straight out and see sunlight, and that's about it. We made Kelly with fuel to spare and Red made his meeting the next morning.

But that night I went back over that whole flight in my mind to see just where I made my first mistake and how that one bit of bad judgment led me into making other mistakes. Now I'm not going to itemize my errors for you and then preach a sermon 'cause if you haven't spotted and condemned my errors by now, pointing them out isn't going to help. Maybe you've never been trapped real good—if you haven't, you've got a thrill. If you have been, you've probably enjoyed reading this. I know one thing: I learned something that day. ★

SAFE SKIN AND SCUBA DIVING

Richard L. Brown, Director, Water Safety
American Nat'l Red Cross, Washington, D. C.

When pilots take off on a mission they, reasonably, expect to return because they are well-versed in all the technical and safety knowledge needed to insure their return to base. Millions of Americans who have taken to America's waterways for swimming, boating, skin and scuba diving not only have little if any knowledge of swimming and boating safety but also are totally ignorant of the rules of safety and dangers of the most challenging of all the water sports, skin and scuba diving.

This article was written for airmen who spend much of their free time off the job in sports activities. Because of their interests, youth and vigor, many of them participate in America's currently favorite recreation—water activities such as swimming, boating, fishing, skin and scuba diving.

The fascination of the water's depths, the opportunity to explore the mysteries of a largely unknown world, the challenge of staying below the surface of the seas for periods of time are siren calls to adventurous people of all ages whether they are qualified swimmers or not. Many airmen, accustomed to high altitudes and the use of oxygen will be challenged by the fun of skin and scuba diving—adventure not only in the sky but in the world's undersea depths.

Because of the great interest being shown in skin and scuba diving the Red Cross, with the cooperation of skin and scuba clubs throughout the country, has conducted a survey which reveals the following safety facts about these sports:

• *SKIN DIVING*

The greatest number of accidents in skin diving (diving with fins, mask and snorkel) occur to persons swimming alone. There are some *musts* surrounding the safe participation in this sport.

A participant should:

- Be able to swim well—at least 440 yards
- Be able to surface dive and swim under water for a distance of at least 75 feet
- Sustain himself at the surface for at least five minutes
- Know lifesaving, particularly some of the carries
- Know how to swim in the surf if swimming in the ocean—have a knowledge of rip tides and how to get through them
- Have a knowledge of first aid—especially artificial respiration
- Have excellent health—both physical and mental

The following safety tips are suggested:

Safety Tips for Skin Diving

- Never swim alone
- Be a better than average swimmer
- Always wear or have a flotation device handy
- Treat spear guns as dangerous weapons
- Avoid the combination of surf and rocks
- Practice self control
- Be in good physical and mental condition
- Use good equipment

From a safety standpoint we'd suggest the young lady not load her gun out of water . . . no other adverse comment appears appropriate. Diver pictured in center is more noted as the first American astronaut to orbit the earth.

- Learn how to use your equipment
- Avoid overeating or use of carbonated liquids before diving
- Know and respect your limitations
- Know and respect the condition of the area in which you are diving
- Know the location of your partner at all times
- Think—don't take chances
- Learn how to give artificial respiration
- Leave the water when cut or bleeding
- Stay away from piers or pilings
- Stay close to a boat on the surface
- Always carry a knife and in a safe manner
- Learn first aid
- Be alert for moving objects under water
- Give dangerous fish a wide berth unless experienced and well equipped
- Don't dive into the water while wearing a mask
- Avoid a deep dive—30 feet should be deep enough
- Stay away from rip tides
- Stay upcurrent from the boat
- Look up as you surface from a dive
- Never enter a hole unless you know you can get out

• SCUBA DIVING

Minimum standards for scuba diving (diving with a self-contained unit), as determined by the Red Cross survey, indicate that the diver must have better than average swimming ability. He should be able to swim at least 440 yards, swim under water about 75 feet, be able to surface dive, to tow a victim, to remain afloat with a minimum of trouble, have a knowledge of first aid, and especially artificial respiration.

The personal practices which cause most accidents to scuba divers are similar to those of skin divers. As in skin diving, most people get into trouble when diving alone. Other major causes are: over-confidence, panic, carelessness, disregard for safety rules, surfacing too quickly, over-exertion, showing off, diving too deep, failure to recognize personal limitations, drinking alcoholic beverages before diving, and diving too soon after eating.

Here are safety rules which every scuba diver must follow to protect his life:

- Use good equipment
- Learn how to use your equipment
- Examine your equipment before each dive
- Keep your equipment in good condition

Special Notice to Aviation Personnel Who Engage in Scuba Diving

The School of Aviation Medicine at Pensacola has recently completed an evaluation of scuba diving hazards to flying personnel. A formal directive will be published in the near future on the subject. In the interim, wide dissemination should be given to the following safety rule.

"All personnel who have engaged, either on a recreational or line of duty basis, in Scuba, or any other type of diving utilizing underwater breathing apparatus of any type to depths in excess of 30 feet (or who have been exposed to equivalent pressures in excess of this depth in a recompression chamber) should not fly to cabin altitudes in excess of 18,000 feet (or make decompression chamber ascents above this altitude equivalent) within 12 hours following the termination of such a dive or recompression chamber descent. (AVMedDIV, BuMed)"

- Always use good, clean, filtered (compressed) air
- Never dive with a cold or sinus condition
- Ascend slowly
- Continue to exhale while ascending
- Always have a flotation device with or near you
- Avoid deep dives
- Use quick release for weights—never cover weights
- Remain calm
- Develop emergency procedures
- Be in good mental and physical condition
- Learn about the area in which you plan to dive
- Know and respect your limitations
- Avoid exhaustion
- Don't fill tanks beyond rated pressure
- Don't dive in rough water
- Avoid dropping air tanks
- Avoid diving at night

It was also agreed that all scuba divers should have the prerequisites of a skin diver and be experienced in skin diving.

Since 1914 the American Red Cross has instructed and certificated many millions of Americans in swimming and life saving, small craft handling and safety. Each year some 30 National Red Cross Aquatic schools in various parts of the country are held to prepare advanced swimmers for their work as Water Safety Instructors in their communities. "Learn to Swim" programs are conducted by some 2800 local Red Cross chapters in all parts of the country and on military bases in the United States and overseas.

Since recreation in, on, and around the water has become the number one family fun, learning to swim, like learning to walk, has become mandatory for every American. Inquire about courses at local Red Cross chapters or at the office of your base field director. ★

There is an excellent Air Force film titled "Water Safety, Guam." This film, TF-1-5416, covers scuba diving and many of its hazards, and may be obtained through normal channels. ★

FOR COPILOTS ONLY!

"And the copilot was busy taking a fuel reading!" How many times have words similar to these found their way into accident reports? They have a familiar and saddening ring for anyone who has spent much time studying accident testimony. On the many accidents where there are no survivors around to testify, you can't help wondering what the copilot was busy doing when the pilot lost control of the aircraft or flew back into the ground after takeoff on a dark night. Time after time, accident boards have concluded that a contributing cause factor was the failure of the copilot to properly monitor the aircraft's attitude. Here are some examples taken from accident and incident reports.

• A B-52 was letting down prior to entering a low level route when the pilot allowed the aircraft to enter a 100-to 105-degree bank with a high rate of descent. Bailout was ordered and the aircraft crashed. The accident board concluded that a contributing cause of the accident was that the *copilot allowed other duties to distract him from adequately monitoring the aircraft attitude during a complicated penetration procedure.*

• A B-47 was climbing after takeoff in day VFR weather *and the copilot was concentrating on receiving "Noah's Ark" traffic!* At about 15,000 feet the copilot suddenly realized that the aircraft was in a very steep left bank, that the nose was well below the horizon, and that the airspeed was excessive. He pulled the throttles to idle, punched the interphone button, and shouted at the pilot. Almost immediately the nose came up, the wings leveled, and the aircraft disintegrated.

• A KC-97 received major damage during the landing phase of an instrument approach at a far northern base. The aircraft stalled just before touchdown. *The accident board concluded that a contributing cause was that the copilot failed to advise the pilot of the low airspeed condition during the final phase of the approach.*

Major Robert P. Rothrock
Bomber Br., Bomber-Transport Div, D/FS

• A B-47 made a takeoff under conditions of low visibility. Upon reaching an estimated altitude of 200 feet the aircraft went into a gradual right descending turn and crashed one and three-fourths miles from the end of the runway. *The accident board concluded that the most probable cause was that the pilot permitted the aircraft to fly into the ground and that the copilot failed to monitor the attitude of the aircraft.*

• A B-47 was making a standard jet penetration and GCA during weather conditions. The aircraft crashed on final approach seven and one-half miles from the station, a mile and a half to the right of the runway centerline. The accident board concluded that the pilot, engrossed in maintaining headings and airspeeds during penetration, allowed the descent to continue until the B-47 hit the ground. *A contributing cause was that the copilot did not properly monitor flight instruments during the approach.*

• A B-52 was on a combat-type bomb run against a mid-western bomb plot. At bombs away, a bank was established by using the autopilot and then steepened manually. As the pilot began to return the aircraft to

level flight, *the copilot was busy making a radio call giving heading, altitude and true airspeed.* As the aircraft came toward level flight a sharp pitchup was felt by the copilot, followed by a rapid nose-over into a steep dive angle that continued to terminal velocity and breakup.

• A B-52 was executing a missed approach procedure following a GCA "wave off." The aircraft went out of control and crashed. The accident board concluded that a contributing cause of the accident was that the pilot allowed himself to be distracted during a critical phase of flight *and no assistance was requested of or rendered by the copilot.*

The copilot on a modern multi-engine bomber or transport has his hands full keeping up with all the required recording and reporting procedures, but as a pilot he also has a primary responsibility for the safe operation of the aircraft and should be monitoring altitude, attitude and speed during all periods of maneuvering flight. It would appear that many copilots trust their pilot implicitly to the point of believing he is incapable of making a mistake or misinterpreting the instruments. Why else would so many copilots be so completely absorbed in recording and reporting duties that they are unaware of the attitude or speed of the aircraft during critical phases of flight? The frequent re-occurrence in accident reports of words similar to those at the beginning of this article indicates that many copilots have allowed themselves to become so involved in other duties that they have forgotten their primary responsibility for the safe operation of the aircraft.

Here are some suggestions for copilots which could increase the life expectancy of crewmembers and drastically reduce the number of pilot factor accidents:

1. **Inform** the pilot flying the aircraft any time he exceeds 30 degrees of bank or varies from the desired airspeed by ten knots.

2. **Accomplish** your recording and reporting procedures during period of level cruising flight if at all possible. For those times when it isn't, be sure to keep one eye on the instrument panel or horizon so that you are aware at all times of the aircraft's flight condition.

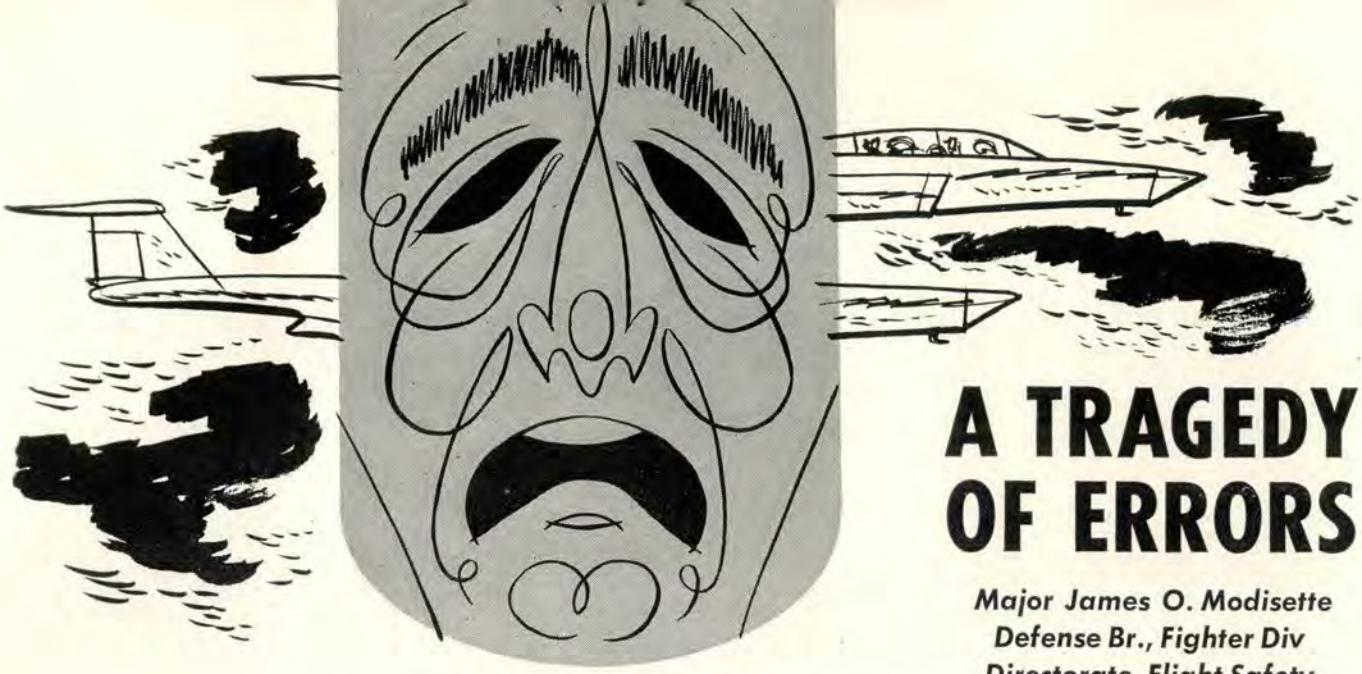
3. **Recommend** simplification or reduction of unnecessary reporting requirements. ★

• • •

EJECTION SURVIVAL

The following pilot's statement was taken from a *Report on Use or Attempted Use of Ejection Seat.* It is a lucid report and one which requires no further moralizing or comment. "I was slammed against the side of a steep ravine, rocky, on the downswing of an oscillation. My ankle was sprained badly and I was somewhat bruised and stunned." (The ejection and landing was as described above.)

"It was dark. My chute snagged on a bush on the steep rocky slope of the ravine. I stayed put all night wrapped up in the chute. I had on a summer flying suit, no jacket. The temperature was 35° and it rained all night. Never was so cold in all my life. At the break of dawn I proceeded to do the exact opposite of everything I'd been taught of survival. I left my chute bundled up and started walking down the ravine and followed the creek. I walked about 12 miles out of the ravine creek bed to a farm house where a helicopter spotted me and picked me up. If I had any survival equipment including a signal mirror I would've stayed with the chute, which I should've done anyway. Even without any survival equipment I could've built a fire and rescue would've found me easily as they were looking for a fire having already determined from my operations that we had no survival equipment. The experience will probably do me no good as I expect to be grounded permanently as a result of the accident and will never get a chance to use the correct procedures again. Rather nasty way to terminate my career of 8 years of jet fighter flying. My first, last, and only accident!" ★



A TRAGEDY OF ERRORS

Major James O. Modisette
Defense Br., Fighter Div
Directorate, Flight Safety

PRODUCED BY CROSS-COUNTRY PLAYERS, INC.

Would your flight leaders "press on" into night weather conditions with known flight instrument malfunctions? Would they fly without flight briefing, or without leadership and supervision? Would they fail to follow the published letdown; place their wingmen in precarious positions of low airspeed, altitude, and RPM on the instrument approach? If your answer is *No!*—not in today's Air Force with its emphasis on professionalism, and its checks and balances of recurring ORIs, TAC/Evals, etc.—you are wrong. Following is an account of a recent accident. The names and places have been changed, but the facts remain.

A flight of two fighter-interceptors (twin crew type) was returning from a navigational training flight. The flight leader (Lt. Brown) noticed that his heading indicator was malfunctioning. He had his wingman (Lt. Smith) take the lead and a successful formation weather approach was made. Lt. Brown's heading indicator seemed to operate normally after he took the wing position so he made no report to maintenance. The pilots went ahead with flight planning for the final leg.

Lt. Brown filed the IFR clearance. Forecast weather for home base was 500 scattered, 1000 overcast, five miles visibility with fog and light rain. Lt. Smith did not attend the weather briefing. Neither pilot conducted a flight briefing. Lt. Smith led on takeoff. After reaching cruising altitude, Lt. Brown was supposed to assume the lead for the penetration and approach. After level off, Lt. Brown advised that his flight instruments were malfunctioning. Lt. Smith remained in the lead. Now we have a situation in which the flight leader knows neither the forecast weather conditions at destination nor the alternate airfield. Although the DD Form 175 reflected that the NOTAMs were checked, Flight Leader Smith was not aware of the NOTAM that approach control radar was inoperative at destination.

They pressed on.

As the flight neared destination, weather was reported as 500 feet overcast, three miles visibility with fog, snow and ice on the runway. Lt. Smith requested a random radar approach. The request was denied because the approach control surveillance radar was inoperative. Lt. Smith then requested a VOR penetration with a precision approach. He was advised that the precision radar was inoperative. (However, precision radar *was* operational and manned at this time.) Finally, the flight was cleared for a VOR/ILS to the primary instrument runway and penetration was started. At 5000 feet a procedure turn was initiated over the middle marker instead of the outer marker. Lt. Smith reported procedure turn. At this time, he was advised to change to tower frequency and to report inbound at the outer marker. The RIO immediately changed radio channels without permission and without advising Lt. Brown. Lt. Smith called for speed boards and gear as the flight was in a descending turn. Lt. Brown came abreast of the lead aircraft, then moved back into position. He also reported in on tower channel. Lt. Smith called for flaps down. The No. 2 aircraft again moved even with the lead aircraft, then back to normal position. Throughout the entire procedure turn and after rollout from the turn, Lt. Brown was having difficulty maintaining his wing position. The flight was high on glide path and left of centerline. No. 2 was observed with its belly directly toward the lead aircraft. Shortly afterward, the No. 2 aircraft disappeared in the "soup". Moments later, both crewmen in the lead aircraft observed a fire on the ground. Lt. Smith made a missed approach, then landed.

Lt. Brown and his RIO were found in their seats. Both sustained instantaneous fatal injuries on impact. The aircraft's right tip tank struck a small house which was destroyed by fire. One occupant received minor injuries.

Investigation of the wreckage revealed that landing gear were extended, wing flaps down, and speed brakes full open. Elevators were in a nose-up position.

• *Findings*

Primary cause was attributed to pilot error. Lt. Smith failed to follow the published letdown procedure

and continued a faulty procedure turn and approach while unaware of his true position.

Contributing causes were:

(1) Lt. Smith used poor technique and judgment by placing his wingman in an untenable position of low airspeed, low RPM, and low altitude on a night weather approach.

(2) Evidence indicated poor technique by Lt. Brown. On final, Lt. Brown lowered his landing flaps while the gear was down and speed brakes extended. Flight characteristics of this type aircraft are such that level flight cannot be maintained with this configuration at reduced power.

(3) Lt. Brown was assessed pilot error. He failed to have maintenance performed on a known flight instrument malfunction. Also, he continued the flight into an area of known minimum weather conditions.

(4) Supervisory error on the part of Lt. Brown. He failed to provide adequate briefing for the flight, weather at destination and alternate, selection of alternate, in-flight procedures, letdown procedures, availability of navigational aids, NOTAMs, and emergency procedures as required by AFR 60-16 and major command directives. This was also in violation of their squadron SOPs.

(5) Supervisory error on the part of Lt. Smith. He failed to provide command responsibilities during the letdown. He didn't inform his wingman of radio channel changes or require acknowledgment of commands. This violated local squadron SOPs.

(6) Communications Service factor—RAPCON provided misleading information in stating that the PAR was not available when it was operational and available.

(7) Aircrew member factor in that Lt. Smith's RIO changed radio channels without being ordered to do so by the pilot.

(8) Aircrew member factor in that Lt. Smith's RIO did not monitor his airborne radar during the approach.

(9) Weather factor in that actual weather during the approach was 300 feet overcast and three miles visibility with fog.

(10) Supervisory factor in that an adequate briefing was not conducted prior to departure from home base.

(11) Supervisory factor in that flight orders did not designate a flight leader for the mission. Violation of AFR 60-16, Paragraph 5.

(12) Materiel factor due to malfunction of the heading indicator.

This sequence of errors culminated in the destruction of a fighter aircraft and the death of two aircrewmen. Evidence indicated *lack of operational supervision, air discipline, leadership,* and *flight proficiency.* Could this happen in your squadron? ★

• • •

BY GEORGE! . . . *THAT WAS A CLOSE ONE!*

Fire In the Hole. The U-3B was parked in front of base operations on a heading of east. Winds were light from the south. After a clearance was filed for Offutt AFB, an attempt to start No. 1 engine on the battery was made without success. Using a power cart both engines were successfully started. No. 1 engine was retarded to decrease the propeller blast on the ground crewman removing the chocks. Reapplication of power allowed the engine to continue running. When the power was retarded on No. 2 engine for the same purpose, the engine died. The fire cart was positioned and 30 to 45 seconds later an attempt to start the No. 2 engine was initiated. This start was aborted due to an apparent lack of combustion. However, it did permit a combustible mixture to be vented into the engine nacelle due to a wind shift which allowed a westerly tail wind to blow up the augmentor tubes. At this point the nacelle became saturated with a combustible mixture. The checklist was gone over again to assure correct positioning of all items. After a two minute wait, the next start was attempted. Approximately 10 seconds after cranking was initiated, ignition occurred at the exhaust tubes and the engine nacelle exploded blowing and ripping off the nacelle side panels and bending the fire wall, oil pan, and an augmentor tube shroud.
NOTE: TO 1U-3A-SF-1-3 dated 14 Feb, if followed, will prevent repetition of this incident.

Low Down. While in the crossover maneuver during an aerial demonstration, an F-100 hit a two and one-half inch metal flagpole damaging the left wing and tip of the left stabilator. As soon as the pilot cleared the other aircraft in the crossover, he gained altitude, performed a minimum control airspeed check and landed without other damage. The left wing was something to behold.

The flagpole was located on a banked turn of a race track which is 25 feet above the surrounding terrain. The flagpole was 27 feet high. The F-100 knocked off the top three feet. Simple arithmetic figures the F-100's height above the race track turn at 24 feet — altitude above the ground at 48 feet. That's way down.

At a pre-demonstration meeting nobody mentioned the fact that the flagpole plus three others were around; neither did they show up on photos and blueprints of the area and finally, the flagpoles weren't flying flags that day.

Bombs Away. During a LABS maneuver an M-76 25 pound practice bomb decided to let go at the wrong time. Damage: front bedroom wall — six inch hole; broken mirror; three inch hole in bedroom floor; six inch hole in basement floor. The report didn't state whether or not the occupants were dodging the M-76 or merely returned home to find they had been visited.

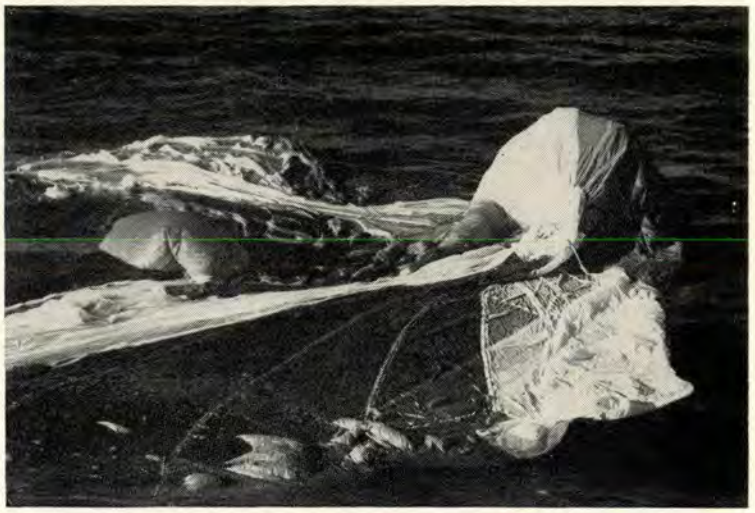
Missed Approach. The weather was in the weeds (400 feet overcast, 2 miles in fog and haze) and deteriorating rapidly. The T-Bird pilot was on a precision approach but wasn't lined up with the runway. When he saw that he couldn't twist the tail fast enough to land, he executed a missed approach. Here's the kicker — during the low-go the T-33 (with gear down) touched down on the runway and scraped both tips badly enough that holes were worn through. Now, anyway you look at it, that's a lot of bouncing around. At last report the tip tanks were the only portions damaged to any extent.
P.S. The pilot made good his go-around and landed at another base with better weather.

No Rollers. The F-100 was No. 2 in a two ship cross-country with a landing at George AFB. After a normal overhead pattern, the control tower operator noticed that the F-100 was trying to land without its gear down. The pilot heard the tower operator's transmission of warning but didn't have time for the power to take effect. Initial runway contact was made on the extended dive brakes, aft section and then the drop tanks. The '100 slid for 5000 feet. Damage was limited to gear doors, dive brakes and aft section.
P.S. This one was below the criteria for a minor accident and is classified as an "incident."

High Density Traffic. The T-37 was in climbing turn out of traffic at 1000 feet when it hit a large type bird. The first indication of a collision was a dull thud and blood on the right windshield. The pilot landed with no difficulty. The bird (probably a buzzard) took its toll: a damaged beyond repair right door and a couple of other dents requiring patching. Collisions with birds are not particularly unusual but the TWX was. Under paragraph S (for action taken) is the following: "No action taken as this is not a congested bird area." ★ **Rex Riley**

OUT FROM UNDER!

Completely covered by parachute canopy, Sgt Bentley, TAC Deep Sea Survival School, starts procedure for removing canopy. Second photo, palms down on top of head with elbows straight ahead provides space for breathing. Moving canopy to rear of the head and dropping behind permits seeing canopy movements.



If you can crawl from beneath an electric blanket, you can survive on over-water bailout. What's the connection? (A good question for an electric blanket story.) Easy! The chute canopy. One big thought, one fearsome thought, haunts nearly every aircrewman when he considers a chute drop over the H_2O. He fears the canopy will drop on top of him—and he knows that means "curtains." He's heard dozens of stories that have the "He-would've-made-it-if-he-hadn't-got-fouled-up-under-the-silk" type endings.

Such bathroom banter has generated considerable and needless fear about a survival technique that will work everytime if the individual remains only normally scared, normally determined to survive, and normally informed on the straight facts.

Let's look at the facts.

First, most bailouts are successful. Nearly every bailout is better than nearly every crash. This includes over-water exits. In short, bailouts are for survival.

Next, most emergency bailouts are for the first time. So, the average bailer-outer is more than scantily scared but, unfortunately, a few get terrified. These latter are the lads who panic; lose faith in the equipment, and trade training for a trance. Mental discipline gives way. Such a boy will claw at his D ring and later report a timer malfunction. (Actually he failed to permit the ejection sequence to run its designed course.)

Even the billowing silk above isn't enough to quell such self induced panic. As he floats to the sea surface, the old tales of canopy claustrophobia crowd into his anguished memory. In this muddled state, he's ready for the worst—not prepared, only ready—and the worst for this boy would be the canopy falling over his head.

Is this likely to happen? Answer: No, not likely. (Time for another fact.) It can happen, but the chances of a no-wind, no-drift water landing are as remote as a successful clambake on Mt. Everest. If such ideal conditions did prevail, chances are the chute canopy would, because of its unbalanced weight, topple to one side as the jumper's weight settled into the water. He'd be in the clear.

Knowing all of the above, the jumper is likely to have remained calm throughout his descent. He is also the type of individual who is thoroughly familiar with his gear. He knows how it works and when to work it. You are that type, aren't you?

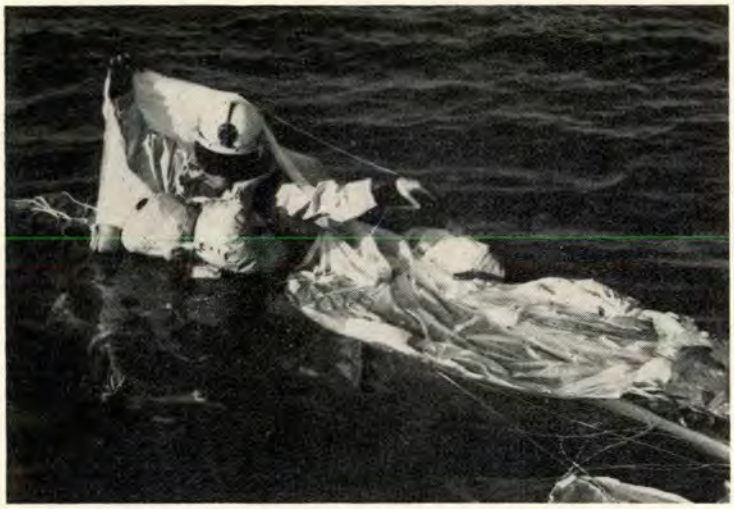
Take the underarm life preserver, types LPU-2P, LPU-3/P, MA-2 and the old B-5. You know that according to TO 14S2-3-21 the proper procedure is to inflate your preserver while descending. (If you're wearing the B-5, inflate one side only until you're clear of your chute harness.) The new types not only hold your head out of the water but provide your body with a high flotation characteristic.

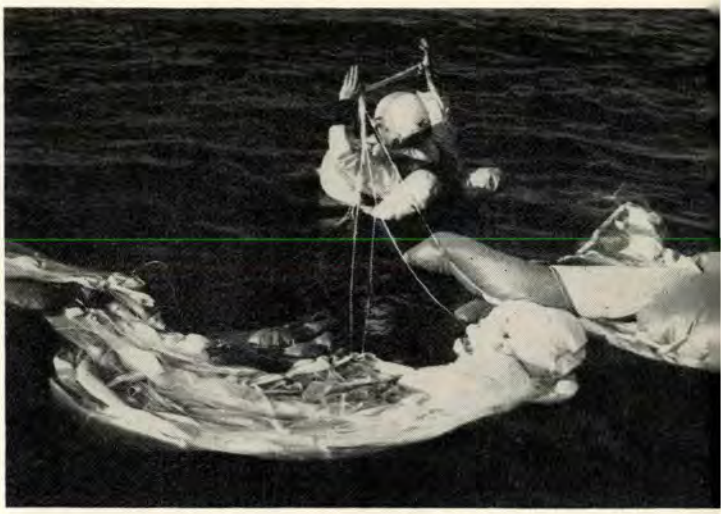
Your life preserver is inflated and you slide into the water. You're still calm despite that remote possibility of the canopy falling over you. You're under the silk, but you know that the preserver will hold you well out of the water. The only thing left to do is to remain calm and to peel the canopy off your head.

Here's another reason for keeping your wits well about you: There is no other way. To struggle is not only foolish but illogical. Why? You are dealing with 64 square yards of nylon that tests at 1500 pounds per square foot, and 633 feet of shroud line with a pretty high breaking point. You just can't accomplish anything by strength or pressure—you have to outthink the mess.

...easy if you know how.

After working his way out from under the canopy, Sgt Bentley begins to collect shroud lines. He has put the visor down so that visor knob will not catch on lines and nylon. Get clear of chute lines by using thumbs and stretching arms high and apart to pass lines over head and to the rear.





Capt. Frederick B. Ewing
Personal Equipment & Survival Officer
Hq TAC, Langley AFB, Va.

To prevent the lines from entangling your feet and legs, maintain yourself in as near an upright (standing) position as possible. Hold your feet and legs close together.

If you have followed your TO instructions on the use of the underarm life preserver, you will have both cells snapped together in the front. This prevents shroud lines from working their way under the preserver cells and causing entanglement in that area. To remove the canopy, place both hands on top of your helmet or head, palms down, with the arms and elbows extended out from the chest straight ahead. This will allow sufficient air space to breathe; *even a wet canopy will filter enough air through for this purpose.* With one hand, lift the canopy up and, in the same motion, move your hand to the rear of your helmet. Then, with the other hand, lift up the canopy and move it to the rear of the helmet. Keep the elbows pointed straight ahead at all times. Withdraw one hand and arm while retaining the canopy pinched with the fingers of the remaining hand. Repeat this process with slow determined strokes until either the skirt of the canopy or the folded edge is reached. Then, with both hands, lift the edge over your head and drop the canopy behind. Check to assure that it is clear of the back part of your underarm preserver.

Next, release the riser with the quick release; lift it high, fold it twice and throw it toward or on top of the canopy. (Parachutes with one quick release require the cutting of the other riser with the MC-1 knife.)

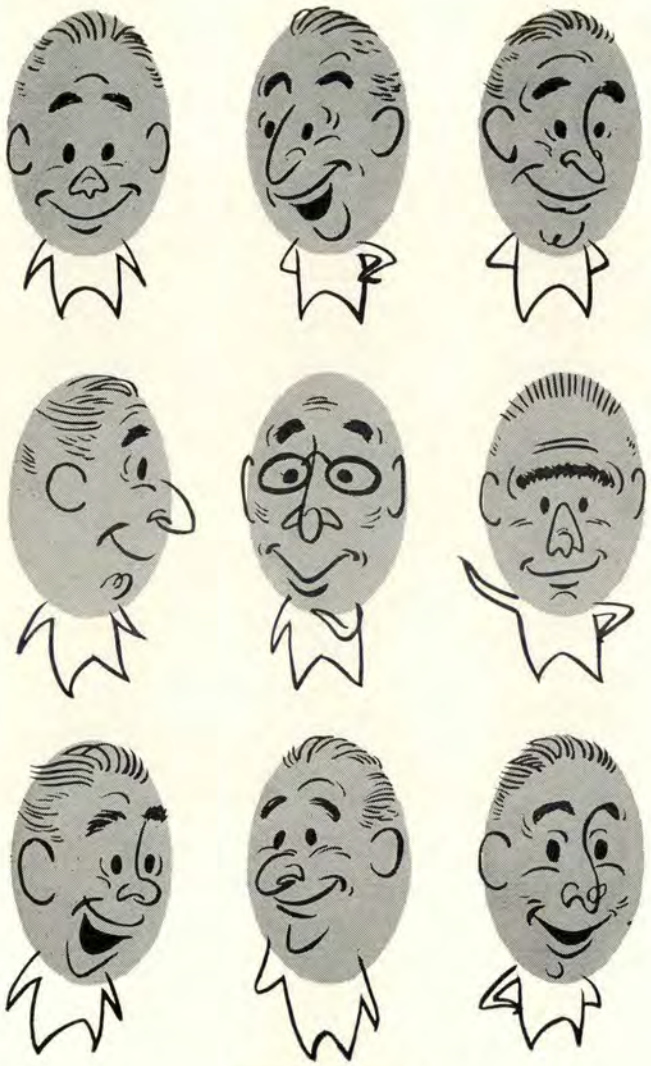
The remaining task is to prevent additional tangling of your arms and legs in the shroud lines. This phase of escape from the parachute and canopy can be exasperating, especially to a man suffering from a light case of shock. His temper will be short and, unless he controls himself, he could be fighting these lines as he would a spiderweb he had walked into between two trees.

Stay away from the canopy and keep the feet together; rest on the life preserver and slowly paddle away. If tension is felt on the body which indicates a line wrap-around or a snag, locate it if possible and examine it. Remove it. If you are unable to untangle and remove it, you must use the hook blade of your MC-1 knife to cut the line.

The MC-1 knife is required to be worn in a pocket on the outer flying garment with the hook blade in the open position. This simplifies cold water operation of the knife and provides a readily available cutting edge for such an emergency.

Boarding the one-man dingy is virtually impossible with a number of shroud lines tangled around the arms and legs, so carefully get rid of them all.

Once free of your parachute, stay away from it and board your raft. The smart airman will already have at least 20 to 30 feet of nylon cord secretly stored in an outer pocket for just such an emergency. Don't risk further entanglement in a sinking parachute canopy and lines by going after additional line. It has served its purpose. Let it go. You can't pitch a tent at sea. Settle down in that one-man dingy, rest, and plan your survival and rescue. Good luck! ★



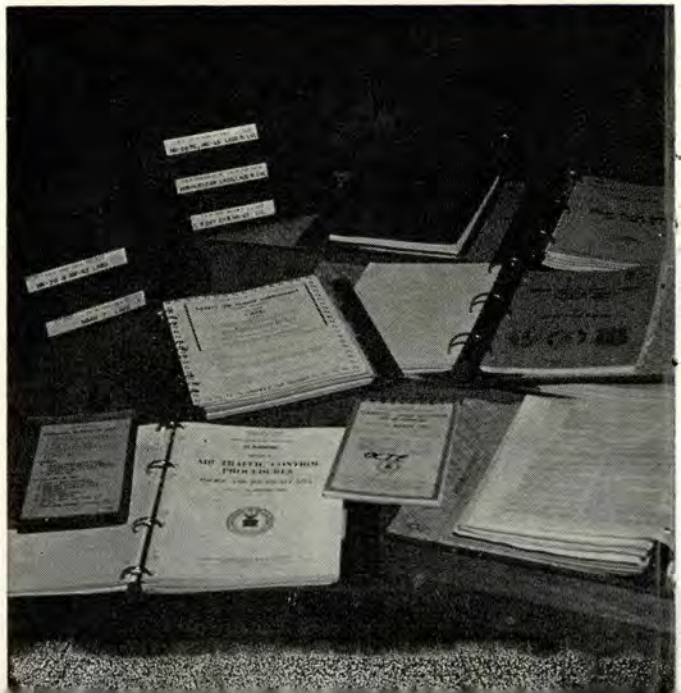
THE 10 PERCENTER

"**Don't take the machine into the air** unless you are satisfied it will fly. . . . Never leave the ground with the motor leaking. . . . Pilots should carry hankies in a handy position to wipe off goggles. . . . Before you begin a landing glide see that no machines are under you. . . . Don't attempt to force machines onto the ground with more than flying speed. The result is bouncing and ricocheting."

The above directives are extracted from flying regulations dated January 1920. Ever since the beginning of military aviation, we have been writing procedures to improve mission effectiveness and safety. For just as long commanders and supervisors have been plagued with the problem of the *ten percenter*—that minority that never gets the word. They have devised methods, ways and systems; they have written SOPs all aimed at insuring that *all* crewmembers would know *all* they need to know in order to accomplish the mission safely and efficiently.

Without organization and constant followup, this education process can be a hopeless venture resulting in duplication of effort, over-emphasis in some areas, lack of adequate emphasis in others, conflicting information and lack of standardization. Too often the operations staff establishes a procedure by covering it in a pilot's meeting, by writing an unnumbered letter to the squadrons, or by calling the squadron operations officer on the phone. Without followup by a written directive, these methods are often ineffective. The person who passed the information out has a clear conscience; he feels he has done his job. The procedure itself, however, seldom becomes firm because the spoken word is soon forgotten and often not even received except second, third, or fourth hand; in the process it is usually altered. As for the unnumbered letter, it is usually hung on the bulletin board or filed in the PIF and there it stays long after the specific procedures it established are changed or rescinded.

Every flying organization is faced with the task of developing effective and safe procedures and making these procedures known to crewmembers. Because of changing mission requirements and as a result of lessons



Capt Edward Stellini, 18 Tactical Fighter Wing, APO 239 San Francisco, Calif.

learned by mistakes, these procedures are often changed. When these changes occur, it is necessary to insure that everyone is aware of them; consequently, a continuous education process is necessary. How successful a unit is in keeping aircrews informed depends on how the unit approaches the task.

In the 18th Tactical Fighter Wing the problem of aircrew education is considered all-important. Therefore, it has been given a great deal of attention. Through the efforts of the Tactical Evaluation and Standardization Board, an aircrew education program has been established with the purpose of eliminating the "ten percenter." The Board is set up in accordance with PACAF Manual 60-1. It is presided over by the wing commander and includes the directors of operations and materiel, the squadron commanders, the Tac Eval/Stand Team, the flying safety officer, and members of the operations and maintenance staffs. The education program established by this board was developed by the process of determining the need and developing a method.

The first step was to determine what information an aircrew must have in order to perform its mission and to present this information in a well-organized manner.

First, all the directives relating to mission performance were listed. These included over 1200 pages of tech orders, manuals, pamphlets, operations plans, regulations, and letters. Since this wing had little control over directives established by higher headquarters, the decision was made to concentrate on doing something about its own directives.

The PIF included 15 wing operations regulations, 17 numbered letters, and numerous unnumbered letters. Over the next two months, the procedures established by these directives were reviewed for currency, changed as necessary, and then developed into an aircrew operations manual. This manual, 18TFWM 55-1, is organized as follows:

Part 1—General
Part 2—Aircrew Training, Scheduling and Evaluation
Part 3—Normal Briefing Procedures
Part 4—Normal Ground Operations
Part 5—Normal Flying Operations
Part 6—Navigation
Part 7—Range Procedures
Part 8—Weapons Delivery
Part 9—Emergency Procedures
Part 10—Target Operations.

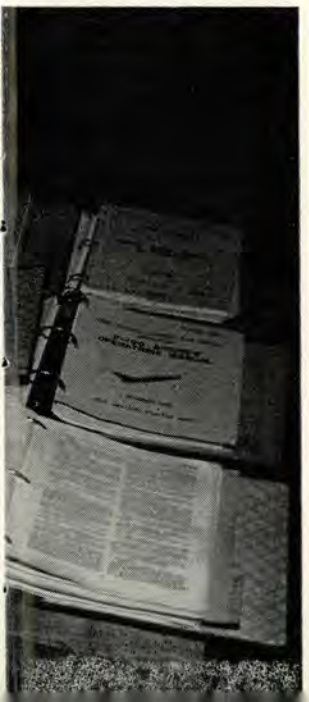
Each part is further broken down into chapters, i.e., under Weapons Delivery are LABS Bombing, LAY-DOWN Bombing, Dart Tow and Firing, etc.

The responsibility for writing and making changes to this manual was delegated to the Tac Eval/Stand Section for three reasons: first, by nature of their position, the members of this section are the best qualified to evaluate new procedures in the light of mission requirements. Secondly, it is the primary job of this section to evaluate compliance with these wing-established procedures. And, finally, by relieving the Operations and Training Division of this responsibility, that staff agency would have more time to devote to the daily tasks of scheduling tankers and ranges, coordinating with maintenance and preparing reports.

To keep the manual current, a change is published every 45 days. If a change in procedure is considered in the interim, it is put on the agenda for the next Tac Eval/Stand Board meeting which convenes just prior to the next scheduled change date. If a new procedure must go into effect immediately, it is written as a numbered letter and included in a section of the manual that is set aside as a file for these letters. These letters are valid only until the next change to the manual, at which time they are included in the related chapter.

By this procedure we had eliminated numerous individual directives by organizing their contents in a logical order under one cover; we had established a

Manuals and directives (lower left) are kept up to date, aircrews tested on their contents. Weak areas are subject of special briefings at pilot meetings. Every Monday morning a closed book quiz tests pilots' knowledge of directives.



THE 10 PERCENTER

system for making periodic and immediate changes to procedures; and, we had established a single agency as task organization for developing and monitoring all operations directives. The next step was to evaluate the extent of aircrew knowledge of, and compliance with, the established procedures. This, along with evaluating the pilot's ability to perform his tactical mission, is the continuing business of the Tac Eval/Stand Team.

Working within the parameters of directives established by higher headquarters, we established a program of administering written exams and conducting simulator and flight checks designed to educate, evaluate, and correct. On a monthly basis, we conduct a *Directives Refresher Course* consisting of eight hours of classroom discussion of all operations directives. All operations manuals and regulations are covered by Tac Eval/Stand Team members; GWP operations plans are covered by intelligence and plans officers. Aircrews due for tactical evaluations are required to attend this course prior to taking their written exams, simulator and flight checks. After completing this short course, aircrews take a written exam which includes more than 100 closed book and 20 open book questions, mostly of the fill-in type (multiple choice and true/false type questions are avoided in order to preclude guessing). Six exams are made up from a master card file of over 400 questions with no two exams being exactly alike. This master card file covers 12 major areas—normal procedures, cruise control, emergency procedures, weapons delivery, etc. Each card is referenced and dated. To keep the file current, every new Safety-of-Flight Supplement, Dash One change, and manual and regulation change is reviewed for possible new questions, deletions, or revisions. To stimulate interest in learning this new information, we advertise that questions will be asked on all changes and new directives.

After each pilot completes his exam, it is graded and critiqued with him. A record is kept of the number of times each question is used and the number of times it is answered wrong. This analysis lets us know whether the question is poor or a knowledge deficiency exists. If the latter is the case, measures are taken to educate all aircrews in the specific area. This is usually done by covering the subject in the pilot meetings.

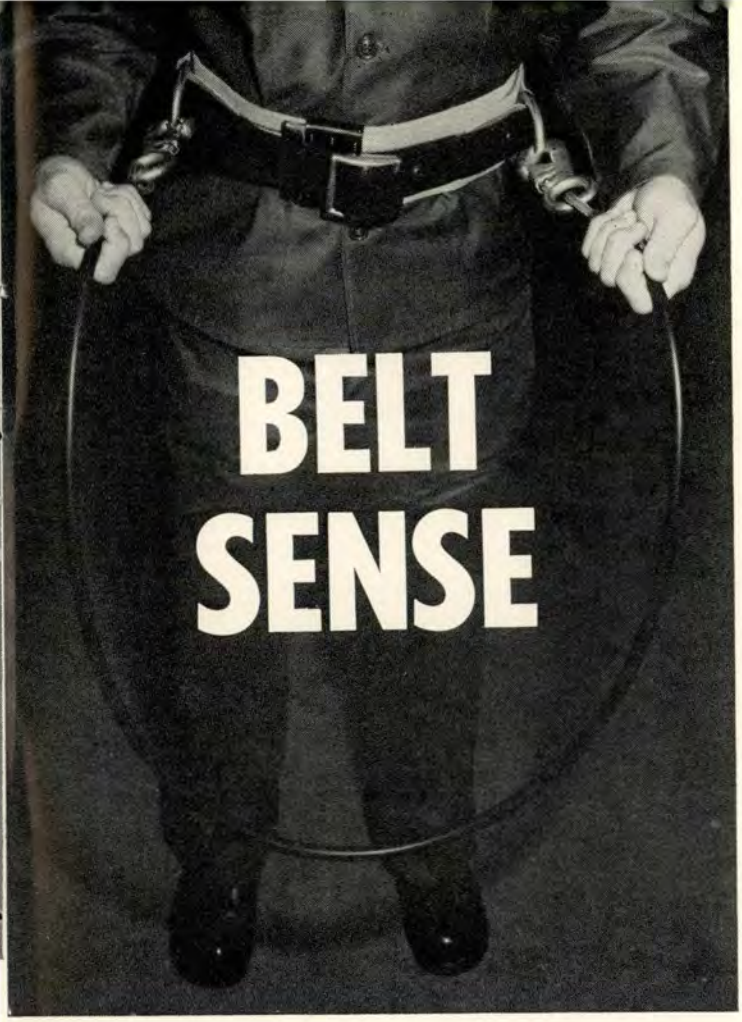
Weak areas are also documented during flight checks. After each flight, the evaluator makes notations of improper procedures in the "Flight Check Discrepancy Book." For example, if the examinee entered the holding pattern improperly or did not make a mandatory radio call the evaluator would check the Discrepancy Book to see if these discrepancies are listed. If they are, he will add a check mark; if they are not, he will write them in. From this book trends are noted which indicate a need for emphasis in a specific area. Again, followup action is taken by making the weak area a special subject at pilot meetings. In the example above, one briefing would be given on all holding pattern procedures and another would cover all radio procedures used in instrument flying.

We also correct areas of weakness by publishing special subject letters. For example, on several flight checks it was noted that some pilots were not familiar with factors involved in determining LABS delivery settings and pull-up offsets. So we published "An Analysis of LABS Planning Factors," a detailed letter covering all aspects of the problem.

Also a part of our evaluation process is our records and publications check. While the pilot is taking his written exam, an evaluator will check his Form 5, training folder, Flight Handbook, checklists, and the operations and training manuals maintained by the pilot's flight. The Form 5 and training folder are checked for proper and accurate certificates, orders, forms, and entries, while the manuals and checklists are checked for completeness and currency. Any discrepancies noted must be corrected within 10 days. This check insures that each man has completed the required training and that he is not using out-dated publications.

The final step was to establish a system that would keep the individual's knowledge of operations procedures at a high level between Tactical Evaluations. We realized that the average pilot seldom spends an evening at home reading a training manual. As a matter of fact, many pilots go to the PIF only to certify that they have read and understand it. To encourage continuous study of directives, we set up what we call an "Aircrew Refresher Program." Here is how it works: every Monday, Wednesday and Friday we have a mandatory pilot's meeting. At every Monday meeting we give a closed book quiz on a specified directive. We announce the subject to be covered at least one week in advance so pilots will have a chance to thoroughly study the directive. (If the directive is a manual, we limit the subject to one chapter or section.) Since emergency procedures are so important, Section III of the Flight Handbook is the subject for every fourth or fifth quiz. After we give the quizzes, we grade them and send them to the individual so he will know which questions he missed. Again we record which questions were missed most to determine weak areas. When we have covered all 1200 pages of directives, we start over.

The aircrew education program in the 18th Tactical Fighter Wing is backed strongly by the wing commander and has the whole-hearted support of all the squadron commanders and operations staff. The Tac Eval/Stand Team and the flying safety officer have the primary responsibility for conducting the program and the overall supervision is under the director of operations, who insists on keeping the aircrews informed and eliminating the "ten percenters." ★



Missilemen working in high places at Atlas and Titan sites are provided safety belts. A recent mishap, in which the snap ring on the tail line worked its way out of the dee ring attachment on the belt, brought out the fact that misuse of the equipment could result in injury or, possibly, a fatal fall.

The belt is of web construction and is treated to resist acid. It has a three-inch wide body pad and a dee ring attached to each side. (Some models have only one dee ring.) The wearer straps on the belt, making sure that it is properly adjusted. After the belt is buckled it should be looped back over and through the buckle. This prevents slippage and provides protection between the tension part of the belt and the buckle to prevent any possible cutting action on the belt.

The tail line is attached to one side of the belt, looped around a sturdy object such as an "I" beam, and attached to the other side of the belt. The tail line is a six foot, flexible, neoprene covered steel cable with drop-forged steel snaps at both ends. The snaps should be turned in, toward the wearer's body, where they are protected from other objects. When the wearer moves to another position, he should carefully release tension on the tail line and slide it into position without twisting. Twisting on the tail line and the steel snap caused the mishap mentioned above.

In that case the dee rings were teardrop shaped. New belts have round dee rings and all belts in the inventory should be modified with the round rings. To modify those belts having the old (teardrop shaped) dee rings, it is necessary to remove the stitching and rivets, replace the ring with the round ring, then restitch and rerivet. Any parachute shop should be capable of doing this.

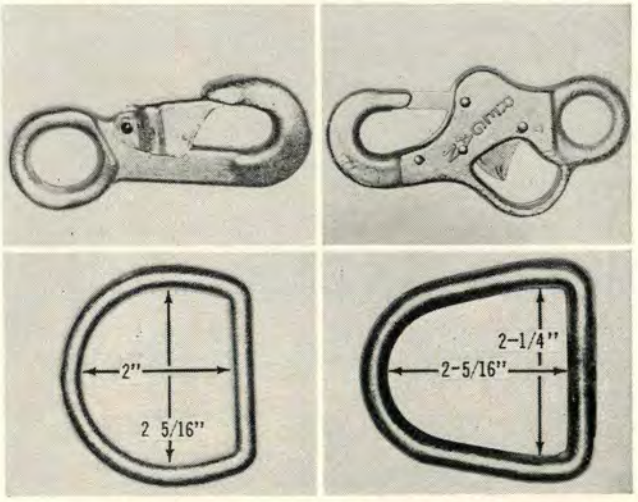
If you have any belts equipped with the old type dee rings and need help, contact the prime AMA, Warner Robins, NQSC.

A couple of points for users of this equipment:

- Remember to always keep the tail line taut as possible. It is not elastic.
- Use care in fastening the snap on the tail line to the ring on the belt. *Look at it* and make sure it's fastened before you put your weight on it. ★

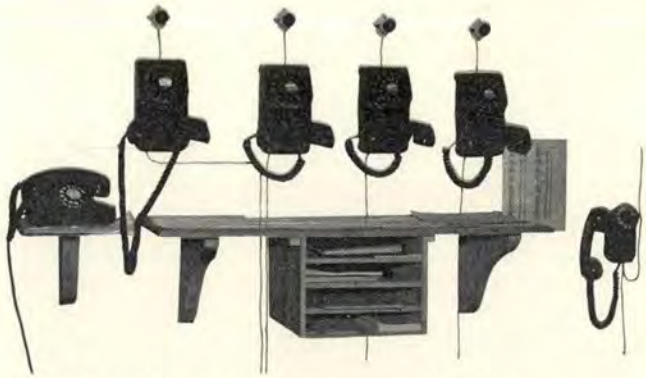
Airman (left) demonstrates proper method of buckling safety belt and attaching tail line snaps to dee rings on belt. Picture below illustrates tail line looped around sturdy fixture to prevent fall.

Snaps used to fasten tail line to belt. Careful maintenance is required on snap at right to insure that keeper and spring are in good shape.



Two types of dee rings that may be found on safety belts. Belts equipped with teardrop shaped ring at right should be modified by replacing teardrop ring with round ring.

Cocked! Alert! Ready!



Seconds count, communications must be adequate.

A race against time . . . T-Bird emergency.

The T-33 touchdown, as seen from the chopper.

RECIPE FOR RESCUE

Take one pilot with an emergency—add one well oiled helicopter (trade name Huskie)—stir in a trained and proficient rescue team of pilot and firefighters—add the potential of baking in an "oven" fired by JP-4.

The recipe is complete, and now it is time for rescue. To make the H-43B rescue system work, there are a few basic requirements. The rescue needs today are greater than in the H-19 era, because the operational capability is greater. Time is more important because crash rescue is now a proved probability. Mission planning must be done well in advance.

First thoughts indicate a need for an aircraft, available and in-commission. "Available," has new meaning with the Huskie. It means a bird, pre-checked and "cocked" for rapid starting. It means a clear area for fast takeoff, INTO the wind. It means a power unit, plugged in and ready. It also means an alert location with the least possible separation between crew and aircraft.

Let's stumble on the last requirement. Just how near should they be? To answer the question, apply a bit from junior's math book; distance equals rate x time. Assume the H-43B can cruise at 90 knots. Place the aircraft so that the crew requires one minute to travel to the aircraft. By that one minute you have reduced the radius of rescue by a mile and one-half. The greater the separation between crew and aircraft, the less rescue capability.

While we're doing arithmetic, we can apply the same formula to determine alert location. Pick the most convenient location for helicopter alert, then measure the distance to your runways, approach zones, and overruns. At 60 knots ground speed (to account for headwind) what is your radius of action in three, four, and five minutes from first warning? Not good enough? The test of time and distance often proves the covenient location is not the best. With less than the best, rescue capability is lost.

Once the helicopter rescue unit is properly located, based on radius of rescue, the next question is "how are they alerted?" Too often the answer is: "Give them an extension on the crash phone," or "Have Ops call if there's a crash."

Neither of those answers meets the test as good enough.

For helicopter rescue to work, the crew must respond without delay. A half a minute to answer a crash phone reduces radius of rescue by 3000 to 4500 feet; maybe half the length of your runway. There has to be a better system—a scramble bell or an extra man to answer the phone, for example.

Advance warning greatly increases the odds of successful rescue. This requires aircrew indoctrination. It also requires that the word reach the rescue unit. Illustrated is a system used at an Air Training Command base. The four direct-line telephones provide for rapid reporting from the runway supervisor of each

A detailed map, appropriately tabbed.

Pilots and firefighters respond to hot line call.

Should the emergency come to this, Rescue is ready. And injured are delivered direct to the hospital.

Maj Roy J. Broughton, Jr
6314 Support Wing, APO 970 San Francisco

runway, the control tower, and base operations. A red light illuminates when the phone rings, to prevent confusion.

Helicopter rescue demands that the rescue pilot know where to go and what to do, without delay. To be completely effective, all mission planning must take place before the fact, and plans must be exercised during training periods. An emergency during minimum weather conditions requires that the pilot have an intimate knowledge of all local obstructions to flight. He must also be pre-cleared for emergency scramble, without clearance delay. A long range mission requires knowledge of the local flying area, location of all medical facilities, refueling possibilities, and law enforcement agencies.

The photo above shows an area locator map in use at one base. The name, telephone number, and location of each hospital, sheriff's office, or ranch headquarters is located for quick reference. Much valuable time can be saved by such means as this.

Training facilities are important. Lacking an area to practice fire suppression, or hoist pickups, or confined area operation, rescue crews will not function properly in emergency. Constant and realistic training is a requisite.

How would an injured pilot be delivered to the hospital? At many bases a transfer from helicopter to ambulance must take place on the ramp. This takes time and requires extra handling. An added problem is the capability of the helicopter to carry more survivors than can be conveniently transferred to one ambulance. The answer, of course, is a heliport at the base hospital, for direct delivery.

The ingredients of rescue capability, then, are these: a carefully thought out alert location, with the crew on duty nearby; a complete alerting system or scramble warning, which prevents time delays; pre-planning and training to cope with any emergency. What will all of this produce? Take a recent test at Reese AFB, Texas, as an example. A T-33 pilot declared an emergency while in the landing pattern. Exactly two minutes later he was intercepted, at touchdown, by a skilled rescue crew and their Huskie.

Once intercepted, survival chances of the crew are immeasurably improved. Facilities, training, and the desire can make such performance routine at any base.

The Recipe for Rescue:

one pilot with an emergency
a pinch of panic
one H-43 rescue crew
season well with training and experience
test often to insure proper development.
The result? Rescue is a piece of cake!

Oh yes, and how about the frosting? The many aircrew members already rescued by the H-43 system, and the many more waiting to be rescued. ★

MISSILANEA

Improper wiring is a serious problem in ballistic missile operations, particularly during verification in the installation and checkout phase of site activation, and in the period during and immediately following malfunction troubleshooting. The Atlas system alone has experienced damage ranging from shearing of bolts to complete destruction of the missile.

Wires have been lifted from terminals for circuitry isolation during troubleshooting and not returned to the proper pin, by-passing portions of the logic circuitry. Sneak circuits, wired in to keep parts of a circuit hot for a phase of operation and not removed, have nullified master switches.

Then there are "Kluging" and "Rinky Dinking." Kluging is the fine art of placing jumper wires between pieces of equipment to make them appear to operate properly. Rinky Dinking is the use of illegitimate practices in order to make the equipment operate.

As with other discrepancies, improper wiring is often accompanied by other cause factors. Some of these are:

- Lack of supervision.
- Failure to follow authorized procedures and checklists.
- Long periods during which the supervisor or technician may have worked several consecutive shifts.
- Failure to comply with Break of Inspection (BOI) procedures.
- Lack of discipline in the use of emergency switches.
- Failure of supervisors to insure that adequate technical data are available and followed.

During these early phases of ICBM life cycle, all supervisors must insure that adequate procedures are available and enforced. Everyone concerned must be alert for unidentified wiring circuits and unauthorized modifications. Unsafe troubleshooting practices must be eliminated.

Maj Charles W. Flanders
Directorate of Missile Safety

Two GAR-2A Inadvertent Firing, Improper Procedure. While on a practice intercept the F-101B fire control system indicated an abort within the system. The pilot, without releasing the trigger, moved the armament selector switch to missile trigger salvo position and the missiles were launched in a safe, non-guided configuration into the Atlantic Ocean.
FINDINGS: Operator error in that improper procedures were used to clear the abort.
RECOMMENDATION: That proper switch positions be stressed during pilot briefings.

GAR-2A WSEM, Hail Damage. On the climbout of two separate F-101B aircraft (ten minutes separation) the WSEM nose glass and guidance units on WSEMs aboard both aircraft received damage which appears to have been caused by hail. Turbulent clouds and rain were penetrated.

☆ ☆ ☆

During the climbout phase of the intercept training mission a heavy thunderstorm was penetrated in the F-101B. Heavy air turbulence, rain and hail was encountered. Post flight of the WSEM aboard the aircraft revealed that the guidance unit dome had been shattered. Inspection of the aircraft showed signs of minor hail damage.
FINDINGS: Hail damage in both cases.
RECOMMENDATION: Avoid known storm areas when carrying external missiles.

GAR-2A, Hot Day—Sticky Tar—Nicked GAR. While downloading an F-102, the aft launch lug on the GAR was about five inches from being disconnected from the rail and the missile began jamming on the launcher. The crewmember handling the front end stated that when the weapon jammed he rotated the GAR both ways with a slight tug and the GAR moved forward. He glanced to his left to clear himself and the weapon from the aircraft. When he returned his gaze to the rear of the weapon again, he saw that the rear crewman was down on his knees and forearms with the rear of the GAR resting on the concrete. The aft crewmember stated that when the GAR became jammed he exerted additional forward force on the weapon to free it. The weapon loosened and moved forward rather quickly. As he started to move forward to maintain his balance under the weapon his right foot stuck momentarily in some tar on the ramp which caused the weight of the GAR to carry him forward and down. Rather than lose his grip on the weapon he fell to his knees and elbows. The weight and momentum of the weapon was too much for him to handle in this position and he allowed the rear of the weapon to strike the ramp.
FINDINGS: Uncoordinated efforts on the part of the loading crew coupled with sticky tar on the ramp which hampered footwork.
RECOMMENDATION: Survey work areas for hazards underfoot prior to commencing the operation. Practice coordination of effort when handling heavy objects. ★

MISSILE SAFETY AWARDS

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Ten missile units representing five commands have been selected first winners of the new Air Force Missile Safety Award. The winners were picked for their outstanding achievements in maintaining combat readiness, while training air and ground crews and conducting R&D operations. With the awards go handsome plaques which portray a silver missile badge, a bold golden streak, with the USAF seal in the lower right hand corner below the legend: "For Outstanding Achievement in Missile Safety."

These achievements included developing and testing new concepts in missile maintenance, handling and operation. Among the problems to be overcome by the winning organizations were those associated with extremes of adverse weather, hundreds of movements of missiles on sites or between aircraft and storage and maintenance areas, test and training launches, development of new procedures, and improvements designed to reduce accident potentials.

Each award is testimony to outstanding leadership and the ability of maintenance, storage and operational personnel in developing and maintaining fine accident prevention programs under trying conditions, and often with unfamiliar equipment.

27 Fighter Interceptor Squadron
Loring AFB, Maine ADC

30 Air Defense Missile Squadron
Dow AFB, Maine ADC

6555 Aerospace Test Wing
Patrick AFB, Florida AFSC

97 Bombardment Wing
Blytheville AFB, Arkansas SAC

567 Strategic Missile Squadron
Fairchild AFB, Washington SAC

392 Missile Training Squadron
Vandenberg AFB, California SAC

354 Tactical Fighter Wing
Myrtle Beach AFB, South Carolina TAC

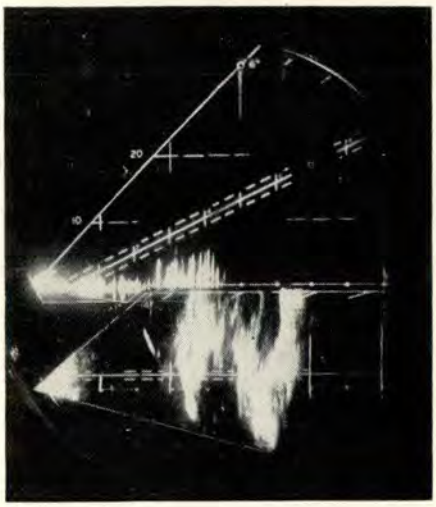
4520 Combat Crew Training Wing
Nellis AFB, Nevada TAC

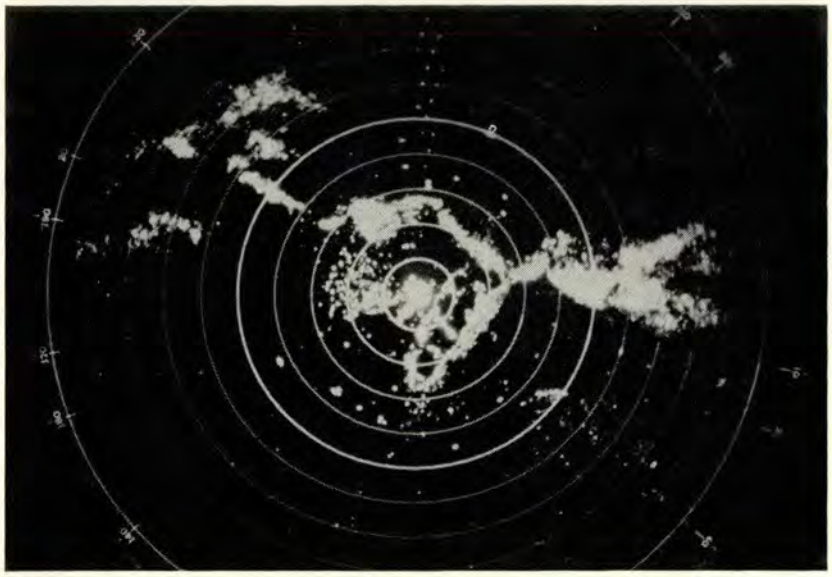
38 Tactical Missile Wing
Sembach AB, Germany USAFE

86 Air Division
Ramstein AB, Germany, USAFE

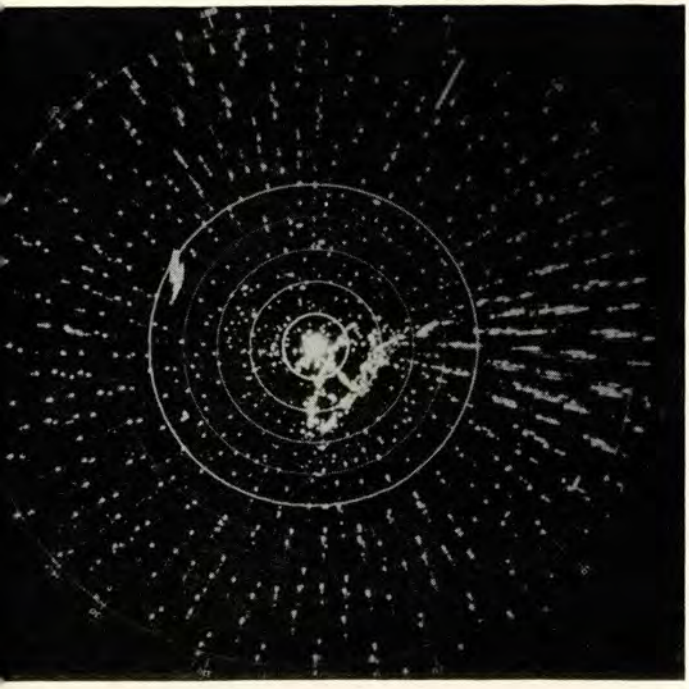
PILOTS, THUNDERSTORMS AND RADAR

Lt Col R. C. Carnick, Director, Flight Facil
Far East Communications Region, AFCS,
APO 925, San Francisco, Calif.





Above is a 10 mile PAR Scope return during moderate to heavy rain squalls. Circular polarization grating is installed on the elevation antenna only. Normal weather return on an SAR scope is shown at right. Note that only the heaviest precipitation areas appear (below) when circular polarization is used to cut down weather return to enable better target tracking. As the author points out, use of CP may prevent RAPCON from steering the pilot around all turbulence.



Photos: Courtesy FAA, Los Angeles, Calif.

During a radar approach you are slightly shaken when the controller transmits, "AFJ99221, use caution, you will be vectored around only the heaviest precipitation areas; you can expect to fly through precipitation not visible on our radar scopes."

What's this? Anyway, you Roger and start following their instructions to the letter. Suddenly, BLAM! The bottom drops out. You advise radar to get with it and vector you around the bumps. Radar advises there is no heavy precipitation in the immediate vicinity; the nearest return is three miles south of present position. You feel like squawking, but continue the approach and encounter a few more bumps and jolts of sufficient magnitude to keep the adrenal glands active.

After parking on the ramp, you give the bird a quick check and discover a catastrophe. The yaw string is missing and maintenance reports they don't have one in stock. Regretfully an RON is filed.

Since you have time on your hands you decide to go see the radar people and find out why they drove you

through that thunder bumper and then had the audacity to say there wasn't any weather out there.

As you enter the RAPCON you are greeted by the AACS watch supervisor, who inquires if he may help you. Your reply by now is a cool affirmative and you politely inquire why you were vectored through a cumulo bumpus and then told it wasn't there by his radar people.

The watch supervisor advises you it was necessary for the controller to use circular polarization to enable him to vector your aircraft without losing radar contact because of the precipitation returns on his scope. He also asks if you received a transmission advising to, "Use caution, you will be vectored around only the heaviest precipitation areas; you can expect to fly through precipitation not visible on our radar scopes."

Your reply is, "Roger, but what does this have to do with driving us through that turbulence and rain shower?"

He replies, "If you will follow me, I think I can demonstrate rather than explain how circular polarization is used." He leads you further into the RAPCON and shows you a radar scope that is used by approach control. Traffic being nil he proceeds with the demonstration. He points to a target 22 miles NW and explains that it is an overflight heading SE on an airway that passes over their radar unit.

Next, you are shown a precipitation area that starts four miles north of the station and extends 17 miles NW. Together you monitor the target along the airway until it starts to blend into the precipitation return and cannot be distinguished.

At this time the watch supervisor says, "Watch the scope closely," as he operates a switch on top of the radar cabinet.

Merlin the magician couldn't have done a better job of making the large precipitation area vanish and reappear as two smaller returns on the scope. The overflight target also appears between the two small remaining returns. It's an easy job to follow the big bird now. He is obviously using his aircraft radar to circumnavigate the precipitation areas.

Joe, my copilot, remarks, "What happened to all the weather we had on the scope? Did you change channels?"

The watch supervisor replies, "No, we are now observing the precipitation areas with circular polarization. Circular polarization cancels or removes 30 per cent or more of the precipitation area that would be displayed by normal radar. Moderate or heavy precipitation will show through the CP. Using CP we can vector aircraft around the heaviest precipitation areas but a pilot can expect to fly through precipitation that has been cancelled by CP. This is the reason you were advised of the precipitation areas prior to starting your approach. When you elected to continue your approach you were then advised, 'AFJ use caution, you will be vectored around only the heaviest precipitation areas. You can expect to fly through precipitation not visible on our radar scopes'."

Joe inquires, "What about thunderstorms and turbulence, can you vector us around that stuff?"

"We can vector you around the precipitation that is produced by a thunderstorm, but we have no way of detecting if the precipitation is a thunderstorm or not," the watch supervisor replies. "Turbulence is another problem. We cannot see turbulence on our radar. Do you have any further questions?" Your reply is negative and you thank the watch supervisor for his info.

As you proceed to the VOQ, Joe makes the excellent suggestion of, "Let's scrap the OHR and hit the pad."

KICKBACK

An Air Force employee was seriously injured when he kicked an object on the ground which looked like a valve of some type. The object was a cartridge actuated device (CAD). It fired and the employee sustained a compressed skull fracture when struck by a portion of the object. An investigation disclosed the object was a Drag Parachute Ejector (P/N 57791) used on the F-106 aircraft. This ejector is designed to fire a 13 ounce steel slug at a velocity of 200 FPS.

Investigating personnel traced the ejector to an F-106 aircraft which had crashed and burned at the base a few months earlier. There were 30 explosives egress system devices on the aircraft at the time of the crash. The remaining 29 explosives devices from the crashed aircraft were accounted for after intense search by EOD, A&E, Reclamation, and Safety personnel. All of these explosives devices had been subjected to the shock and heat of a crashed and burned aircraft, yet local EOD personnel at a later date inerted some of the devices in violation of paragraph 0202, AFM 32-6. Several more of these items were transported hundreds of miles in a combat-type aircraft endangering lives of the crew and possible loss of an aircraft.

Cause of the accident which injured the employee can be directly attributed to the lack of control of explosives items when removed from the F-106 aircraft.

All explosives devices involved in major aircraft accidents should be removed from the aircraft by qualified personnel and placed in segregated storage in a locked magazine. No attempt should be made to disassemble, inspect, or function these devices. Disposition instructions will be furnished by the prime AMA (OOAMA) upon request. Devices which have malfunctioned or are suspected to have malfunctioned should also be reported to OOAMA for disposition instructions. Reference paragraph 1-9, TO 11P-1-2. ★

Francis M. Ashcraft, OOAMA
Hill AFB, Utah

AEROBITS

BOMBERS

• B-52

A B-52 tail gunner had his hands full when he noticed smoke coming from the fire control system central computer located above the gunner's entrance hatch. The gunner went on 100 per cent emergency oxygen, shut down the fire control system and deactivated all electrical circuits. As he removed the main access cover, flames appeared near the base of the unit. Using a CB extinguisher, the gunner put out the flames, but they reappeared shortly. He then removed a small access plate at the bottom of the computer and used the extinguisher a second time, successfully putting out the fire.

Mist put out by the extinguisher irritated the man's eyes and caused them to water, hampering his vision somewhat until the flight surgeon cleansed them with a saline solution.

All flight crews should remember the importance of getting uncontaminated air into crew quarters as soon as possible following the use of a Bromochloromethane fire extinguisher.

CARGO

• C-47

Improper fuel management recently caused the crash of a C-47 equipped with long-range fuselage tanks. This crew was fortunate—their lack of knowledge of the proper procedures did not cause them to ditch in the middle of the Atlantic Ocean, which they had crossed on the previous leg.

When the accident occurred the aircraft was en route from an eastern base to a base about 750 miles away. (The aircraft had departed with full main and auxiliary tanks with 50 gallons in each of two long-range tanks.) Flight was proceeding normally with both engines being fed from the main wing fuel system.

For some reason the decision was made to go on the long-range fuel system. At this time the pilots determined, by dipstick, that each long-range tank held 50 gallons of fuel for a total of 100 gallons. Transition to the long-range fuel system was accomplished without incident. After a short operation on the long-range system the auxiliary tanks were selected and the flight continued for a few minutes, then both engines cut out from fuel starvation.

What happened? The long-range fuel tank valves had not been turned off at the time the auxiliary tanks were turned on. This allowed the remaining fuel in the long-range system to be used by the engines and to flow by gravity to the auxiliary tanks. When the fuel was exhausted from long-range tanks, the system developed an air lock and the engines ran out of gas. The aircraft was crash landed and sustained major damage.

There was no malfunction of any aircraft component during the flight. Materiel failure or maintenance error was not a factor in this accident.

Section I and Section VII of TO 1C-47B-1, dated 1 January 1957, was not followed. A warning on page 1-23 states, "Because the long-range fuel tanks are mounted on a higher level than the main fuel tanks, the fuel flows by gravity into the main fuel system and will overflow the main tanks if the main tank fuel selector valves are in the ON position when the long-range system is being used. Because of this feature the system that is not in use must always be OFF. When the long-range tanks are empty the valves must be in the OFF position or air will be drawn from the tanks, causing air locks in the fuel system."

Section VII (page 7-3) states, "The long-range fuel tank shutoff valves will be turned to the OFF position in sufficient time to maintain a minimum of 25 gallons of fuel in each tank. Since the fuel booster pumps are installed downstream from the main, auxiliary, and long-range tanks, they have a tendency to pump air from the empty tanks or leaking valves; therefore, the fuselage tanks should not be permitted to run dry in flight unless the fuel is needed for emergency purposes."

It further states, "In the event that air locks occur with the fuel boost pumps operating, the condition will in all probability be aggravated."

A CAUTION on page 7-6 reads, "DO NOT operate with both normal and long-range fuel systems on at the same time; turn OFF the long-range fuel system shutoff valves when operating on main or auxiliary tanks to prevent air locks."

Manuals are not published to provide ballast for the aircraft. They provide correct, proven operating procedures and careful adherence will eliminate these "preventable" accidents.

Lt Col Robert P. Paulin, Transport Br, D/FS

• KC-135

Until shortly after takeoff, the acceleration check had gone pretty much normal for the crew of a KC-135 on its scheduled heavy-weight air refueling mission. The initial takeoff roll was normal, and when the acceleration check of 120 KIAS at 18.5 seconds was made good, it looked as if another air refueling sortie was under way. However, after reaching 150 KIAS at a distance of approximately 7500 feet down the runway, complete loss of thrust was experienced on the No. 4 engine. In an effort to offset the effects of asymmetrical power, full left rudder and partial left aileron were used to continue the takeoff. The copilot advanced No. 2 and 3 engines to full increased thrust; however, acceleration was extremely slow, probably due to the extra drag of the deflected control surfaces and the veering action of the aircraft during the initial power loss.

The decision to roll on had been made and the crew stayed with it until all the runway was behind them. At this point, and at an estimated speed of 165 knots the aircraft was rotated into the blue. Now if this extended takeoff roll had not removed the starch from the crew, the next malfunction should have completed the job. After rotation and at approximately 170 KIAS the pilot called for gear up; however, the gear failed to retract. The second attempt to raise the gear proved successful.

Now let's examine the flight path up to the point of gear retraction. Investigation revealed that the initial unstick point was 96 feet beyond the runway overrun, a distance of 12,696 feet from brake release point. The aircraft again contacted the ground at a point 13,290 feet from the brake release point. At a distance of five-eighths of a mile from the initial unstick point, the aircraft struck three high tension and telephone lines approximately 30 feet off the ground. Climbout continued and gross weight was reduced by fuel dumping.

With their plague of emergencies behind them, the crew landed the ground lover without further incident. This incident fortunately ended with only very minor damage to the aircraft, and the lights and power were restored to the village without delay.

The primary cause of the incident was materiel failure of the No. 4 engine driven fuel pump. This failure resulted in the immediate and complete loss of thrust from No. 4 engine. The failed pump has been submitted for TDR and engineering analysis of the pump and pump shaft to determine cause of failure. Re-evaluation of gear spline and gear shaft wear limits has also been requested.

Lt Col Gordon D. McBain, Jr., Transport Br., D/FS

FIGHTERS

• RF-101

Once upon a time there was an RF-101 jock who shoulda stayed in bed. It just wasn't his day. This pilot was No. 2 man on a local night navigation and formation flight. During a turn he got a pitch control system warning horn followed by pusher engagement. Looking around for lead, he noticed that he had to look up and to the right to spot him.

As the pusher continued to push the stick forward, the aircraft entered a violent maneuver and the pilot deployed the drag chute. When the gyrations stopped, the pilot sensed negative G and tried to bring the stick back to neutral, but that just started the gyrations again. By this time this unfortunate jock was so shaken he couldn't read the instruments and, because of the darkness, had no horizon. He tried to read the altimeter but couldn't, although he saw a hand pass seven and figured it must be either 17,000 or 7000. At this point our boy decided to execute that classic maneuver and grabbed the handles. The aircraft struck the water, caught fire and sank.

Rapidly the pilot ran through his survival procedures. He deployed the dingy, inflated his preserver and struck the water. There was some wind, so he operated the quick release and the chute collapsed. A short time later he was picked up by a Marine helicopter.

That last part sounds simple, but let's break it down a

bit. It took this man four tries to get the quick release open. First, he had a hard time finding and getting hold of it. He managed to open the safety clip but had a devil of a time trying to squeeze hard enough for it to release. Finally he took off his gloves and got the thing open.

Some new chute canopy releases are currently being evaluated for AF use. We don't know how long it's going to take to get a better item of equipment in the inventory. In the meantime every potential chute user should practice like mad with this present gadget until he can operate it in his sleep. It could well mean the difference between a successful and unsuccessful ejection.

• F-104

LAND FLAP GO-AROUND—I'm sure all you young tigers with '4s strapped to the seats of your pants are familiar with the problems involved in initiating a go-around with land flaps extended. But take an old pro who has been cooling his heels at a desk for some two years and see what happens. The chorus goes something like this:

Base "X" 6000 feet elevation, temperature 92 degrees F., winds calm, one F-104D tips empty and 4000 pounds internal, a keen IP in the rear, and the old pro up front.

You can see it coming, but no one can be that dumb, OR CAN HE? The break looks good, takeoff flaps, gear out on downwind, land flaps prior to base, holding 200 KIAS through turn to final. The IP informs his lordship that a little too much altitude was lost on base, so our hero increases throttle to hold 185 KIAS and flatten his approach. The result: too hot, too high and too slow retarding the throttle.

The song changes to "floating down the runway," and "Orville"—without informing the IP—advances the throttle to full Military, retracts the speed brakes at the same time and, much to the IP's horror, retracts the gear! No chance of a touch-and-go now. Needless to say, the IP has both hands on the flap lever and makes like Caruso: "Don't touch that flap lever!" The old D is slowly settling at 168 KIAS and all those square feet of hard surface rapidly disappearing under the nose.

No, they didn't make the statistics file at Norton; luckily, the land falls off into a wide valley and the IP is able to drop the nose a little, and the airspeed increases to 190 K and he can hold 500 fpm climb. At 2000 feet, the flaps are retracted and two very relieved pilots are able to try it again.

The mistakes made are too numerous to elaborate on, but the old pro was accustomed to flying from a base considerably lower and temperatures not so high, and just didn't realize the effect the higher altitude and temperature have on the go-around characteristics of the '4. Two important areas arise from a situation such as this and they are:

First, "the double edged sword"—the ramp cam. If full military thrust is only capable of 165-170 KIAS and possibly in a slight descent then the thrust loss by opening the nozzle on the cam (full A/B position) could cause such a rapid decrease in speed that minimum control speed might be exceeded. Of course, the above caution is cited only when the A/B fails to light. Therefore to minimize the loss of thrust while waiting for the A/B to light, the selection of minimum A/B is worthy of thought.

Second, there is a speed below which raising the flaps from land to takeoff actually increases drag. Still, it is desirable to increase the thrust by cutting out the BLC. These two facts are not completely compatible; the decision to raise flaps to increase thrust could increase drag to a point to negate the advantage. Space does not permit me to elaborate on these subjects, but a session with the *thrust vs. drag curves* might prove fruitful in the ensuing hot weather months.

The question, "Did the old pro pass his recheck?" may be asked. Yes, he went on and finally into the "C" and you can be sure that over many martinis and on into the night the melodious strains of "Back in the Saddle Again" could be heard. Good to be with you again.

Maj Daniel D. Hagarty, Tactical Br, Fighter Div., D/FS

(In case you missed it, see Don't Let the Heat Get You Down by Capt. Russell Rogers, Aerospace Safety Magazines, June 1962.)

HELICOPTERS

• H-19

The pilots of a flight of two H-19s filed their VFR flight plan for the second leg of a ferry mission. Normal starting, taxiing and before-takeoff checks were accomplished and no discrepancies were noted. A normal takeoff was made and both helicopters departed on course, climbing to approximately 700 feet above the terrain.

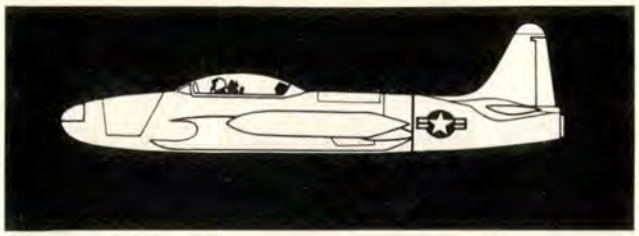
After about 10 minutes of flight, the crew of the lead H-19 detected an odor of burning oil. At this time the No. 2 helicopter crew notified the lead H-19 that his aircraft was trailing heavy smoke. The pilot immediately initiated an autorotation and accomplished engine shutdown.

A four-point touchdown was made, with practically no forward movement, in a wet, freshly cultivated field. The helicopter bogged down in the mud and the extended front landing gear struts sheared, causing it to rock forward on the engine clamshell doors. As it settled back on the rear landing gears, the tail cone collapsed downward. The crew was not injured and was able to evacuate the aircraft.

The primary cause of this incident was materiel failure of the No. 6 engine cylinder. Having to make an emergency landing in soft, muddy terrain was a contributing factor, as was the noncompliance with T.O. 1H-19-599, 15 Feb. 60, "Installation of Engine Chip Detector Warning Light."

Lt Col James F. Fowler, Transport Br., D/FS

TRAINERS



• T-33

Little things cause big exasperations—and sometimes awesome conflagrations. Take this and masticate it for a moment: The T-33 rear seat jock draped his oxygen hose about the throttle and deplaned (see photo). The front seat pilot stopcocked, noted usual engine indications of deceleration in RPM and decrease in TPT. But then the engine commenced acceleration. The pilot and crew chief held the throttle fully aft and tightened the friction lock. RPM fell to zero and the pilots then started to depart the area. Their pedestrian perigrinations took them aft of the machine in close proximity to the tailpipe. They saw a fire therein and sounded an alarm. The crew chief placed the main fuel shutoff switch to the OFF position and tried to extinguish the fire by windmilling the engine. The crew chief's effort to extinguish the fire proved futile and burning continued until the minions of the fire department arrived. With promptness the fire was dispatched. This little episode created a bundle of work, not to mention expense, to the maintainers. The engine was removed for inspection and overhaul, because of minor damage to tailpipe and hot section.

Capt David N. Leavitt, 3555 FTW, Perrin AFB, Tex.

• T-33

Water in T-Bird Fuel. One writer has pointed out that in a pilot's normal preflight, all tanks considered, as much as one-fourth cup of water can be introduced into the JP-4. The recessed cap tops can trap moisture. These recesses are not drained by the scupper drains. If the caps are tipped as they are raised for servicing or preflight, this moisture can be spilled into the tanks. However, if servicing personnel follow instructions outlined in TO 1T-33A-2 they will remove all snow, water, ice and mud from these filler caps before opening. Operating personnel must be equally careful. The AMA reports that if these practices are followed foreign material and moisture will not be spilled into the tanks when the caps are remoevd.

AERO CLUBS

Fuel contamination causes more than its share of aircraft accidents. A good preflight should always include draining a quantity of fuel to check for water.

However, recent studies by the Bureau of Flight Standards indicate that most pilots are not draining enough fuel nor are they checking close enough for water contamination in fuel tanks and lines.

At periodic intervals the following maintenance precautions should be conducted:

Inspect and clean the tank fuel outlet strainer. Inspect and clean the inlet carburetor screen. Flush the carburetor bowl.

Preliminary tests made on a high wing aircraft revealed certain potentially dangerous conditions which most pilots may have forgotten.

Water was removed from the fuel system and then three gallons of water was added to a half-tank of fuel. After a few minutes the fuel strainer was checked. It was necessary to drain ten ounces of fuel before any water appeared. This is considerably more than most pilots drain when checking for water.

In the second test the aircraft was placed in a flying attitude and one gallon of water added to a half tank of fuel. More than one quart of fuel was drained before water appeared.

In both of the tests, about nine ounces of water remained in the fuel tank after the belly drain and the fuel strainer had ceased to show any trace of water. This residual water could be removed only by draining the tank sumps. ★

Safety TIPS from AFLC

First Set of Flying Rules—Circa 1920
Air Service (Signal Corps) Regulations

"Don't turn sharply when taxiing. Instead of turning short, have someone lift the tail around."

*U. S. GOVERNMENT PRINTING OFFICE 611219