JUNE 1958

FLYING SAFETY

UNITED STATES AIR FORCE

AIR DISCIPLINE ISSUE

. . . "compliance with the systematic rules and procedures adopted or used in operating or handling aircraft," and is directly related to supervision and training.

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the editor's view . . . . . .

My boss here has a red-ink ballpoint pen. When he writes a buck slip, or just makes notes in the margin of the mail, it's "writ in blood." We do what the little notes say and things get done—no questions asked—no delay.

Men do things better if they are well disciplined. A good commander insures that they are. He supplies the substitute for what most of us lack—self discipline.

The absence of air discipline in a new pilot is sometimes understandable. "He is young," we say, "he hasn't established his 'set of values'—he hasn't properly assessed his 'moments of terror'—but he will grow." That is, he can—if he will. The obit columns of the Air Force Times are mute evidence that some do not grow with the years and the hours of experience. That vital trait has not developed and blossomed into the strict self discipline that is required of the flyer. Experience does get many of us out of the jams that our carelessness gets us into, but too often, this type of save falls into the category of conditioned reflex and sometimes it doesn't work at all.

An occasional flight won't hack it. Nor will several flights without adequate preparation and conscientious practice of procedures. Years of previous experience will not substitute for hours of recent exposure.

It takes a lot of self discipline for a crinkle-eyed old eagle to decide that he is not qualified for a flight. And it takes a lot to make yourself study the book, especially the red-bordered pages. But these too are "writ in blood"—to save yours.

Vernon R Stutts

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Memorandum for Professional Pilots Subject: Las Vegas Collision

Editorial

Yesterday was Monday, April 21st. Yesterday morning, one of the most spectacular aircraft accidents in USAF history occurred. It was the mid-air collision of an Air Lines DC-7 and an Air Force F-100F. Two men rode in the F-100. Forty-seven passengers and crewmembers rode the DC-7. All were killed.

Yesterday afternoon "Extras" screamed in five-inch headlines. Radios and television sets blared the news. Today, Congressmen, Legislators, Governors, Mayors and just about everyone who could speak, spoke.

There were words spoken in haste. There were words used inadvisedly. There were some implied threats—and there were some implied promises. But the words, the threats and the promises were all the same.

"Something has to be done."

Out of all this, action must surely come. It will come—just as it came from our recent grave (and as we see it now—our eleventh-hour) warning at Pacoima, California. But the action to be taken now will be farther reaching, more all-encompassing, more restrictive and probably more explosive than any that has yet been seen.

As this is being written, there are multiple investigations of the accident in progress. Other investigations are being scheduled. And each of them will be reported to an outraged and emotionally distraught public. On the day that you read this, the odds are good that you can also find a story concerning the accident or the action in your morning newspaper.

What the findings of these investigations will be is, as of now, purely conjecture. They may still be when you read this. What actually happened in this disaster may always remain a mystery. Certainly there is no one left to talk to, who really knows. Among other things, it is highly unlikely that we will ever know if either crew ever actually saw the other aircraft—or if either could—or should have seen the other.

Does this seem strange? Look at it this way. It is possible that either one or both did see the other, and failed to act soon enough to avoid the collision. How long does it take to see, recognize, decide, react and cause a response? It is also possible that either or both should have seen the other, had proper vigilance been maintained. What could have distracted attention? It is possible that each could have seen the other, had each pilot a slightly different environment in which to work. Possibly a cockpit with better built-in visibility—or a less complicated airstart procedure. But these again are conjectures. They may always be.

But what of action? Local newspapers tonight suggest that there is no longer room enough in the sky for both military and civilian airplanes. Others suggest that military Air Bases should be removed to remote locations where conflicts of air traffic will be "impossible." Still others say that the airway system must be re-done. Unfortunately, too, there are dark hints of dereliction and gross negligence.

To you and me, who consider ourselves professional pilots, such statements are unacceptable. No one could possibly desire that safety-in-flight be guaranteed more than do you and I. The sky is our element. That is our world. And to a large extent, it is we and our brother professionals, the airline pilots, who will take the general public into that world—in fact and fancy.

It may be, however, that we have forfeited our birthright. Until now, it has been largely ours to control the rules of the sky. It has been ours—professional pilots—to maintain safety in flight, and to a great extent, to establish the basis, the airways, and the navigation aids to be used. It has been ours to control and discipline ourselves.

How have we done? In the fifty short years of flight (we've just celebrated our Golden Anniversary) we have progressed in speeds from the gallop of a horse to those which allow us to place satellites in orbit—over 18,000 miles per hour.

The rate of progression has been geometric, and will continue to be. Many thinking individuals who have long been acquainted with the facts-of-life versus collisions have expressed surprise that an incident such as this has not happened before. We have tried desperately to maintain safety considerations in pace with technological capability, military necessity and civil demand. In the main, we have succeeded. In some cases we

have had to substitute restrictions in lieu of desired and sought-for equipment. But these have been calculated restrictions, well thought out, in the calmness of cold reason.

One of the ironies of the Las Vegas collision arose from this very thing. Immediately, newsman sought a "human interest" angle. They found one in the fact that another aircraft had crashed in the same general vicinity some years back. A little known facet of that crash was that the pilot of the plane had previously been suspended from duty as a result of his disobedience of flying regulations. He was placed back on his job at the insistence of and under pressure from persons outside his company. On the day of the crash, he was running late. Instead of following his prescribed takeoff and climb clearance, he chose to take a short cut across the mountains. He caught up on his schedule—his destiny.

Restrictions are made for a purpose. In the flying game, they must be observed for the safety of all concerned. We can only hope that the restrictions expected to come out of the last great disaster will be made in the absence of hysteria, and pressure from agencies not fully informed and experienced in the problems involved.

Memories are fiickle. Not many months ago when another mid-air collision spilled bodies on the floor of the Grand Canyon, two civilian airliners were involved. It was military aircraft that hauled out the bodies and wreckage. Then there were words of praise for military aviation.

True, there was much discussion about procedures and traffic control. But it was "a problem limited to civilian enterprise."

Then there was another collision between a Navy aircraft and one belonging to the Air Force. There were headlines for a day. That was purely "a military problem which should be taken care of within the joint services."

A third collision involved two Air Force aircraft—which failed to make headlines except within the local area. "The Air Force had done it again."

Comes now what may turn into a "scapegoat," and open-season apparently has been declared by unknowing, unthinking, albeit well-meaning individuals.

The fault may be our own that some of these mis-impressions are formed. Mr. and Mrs. John Q. want to know and need to know the facts about safety in the air. The responsibility for us to tell them may be largely a moral one, but it is nonetheless, there. Pilots are reluctant to do this, it seems. Why? We are the natural spokesmen for our profession, and many times, the most reticent. Remember. A story is going to be told—whether it be printed or whispered across the back fence of your neighbor. Everyone is interested. They should be informed by people who know. How long has it been since you discussed the serious side of your work with your civilian neighbor—or even your crew chief?

It is extremely unfortunate that civilian enterprise has lost personnel, equipment and money in this crash—and can foresee the loss of future business (and hard cash) as a result of adverse publicity arising from the Las Vegas collision. Such things can greatly affect the capacity for cold logic and clear thinking.

It is equally regrettable that some foresee gain for personal enterprise in the outcome of investigations and subsequent action, should it go the right way for them. Such thoughts are ominous clouds to reason.

Perhaps worst of all is the compulsion felt by many who seek public recognition, to comment on the matter at all. Especially where few facts are available, and past experience does not provide a modicum of understanding of the problems involved. It is hardly acceptable to suppose that wholesale restrictions and ironclad separation of military and civilian air traffic is a reasonable solution to the problem. This is like trying to separate trucks and automobiles on a highway. Both have valid reason to use the same chunk of space. To carry out the defense mission of the nation, the military plane must fly, and have access to every cubic inch of sky covering the entire nation. To carry out the transportation demands of the nation, the civilian plane must fly—within these same cubic inches.

Control is a different kettle of fish. Last December the Civil Aeronautics Administration inaugurated new control areas for those altitudes above 24,000 feet. Have all pilots taken the trouble to learn the procedures involved? In recent months, the

CAA has added to its staff of air traffic control personnel. Can we assume that they are informed as to capabilities and limitations of high performance aircraft?

More extensive and more reliable navigation aids have been installed and commissioned. And there are more to come. One of these days we shall even have the long heralded anti-collision device. But what about today? Flying—and the danger of mid-air collisions—has not changed appreciably since yesterday at Los Vegas. There is no greater margin for safety than there was then—unless you and I make it so. Restrictions and regulations exist now, and they will increase. We can only hope that when the new ones come, they will reflect the best possible solution—drawn up without emotion, shortsightedness, or ignorance of the basic problem, but rather with the best of intelligence, common sense and scientific and flying know-how of which our generation is capable.

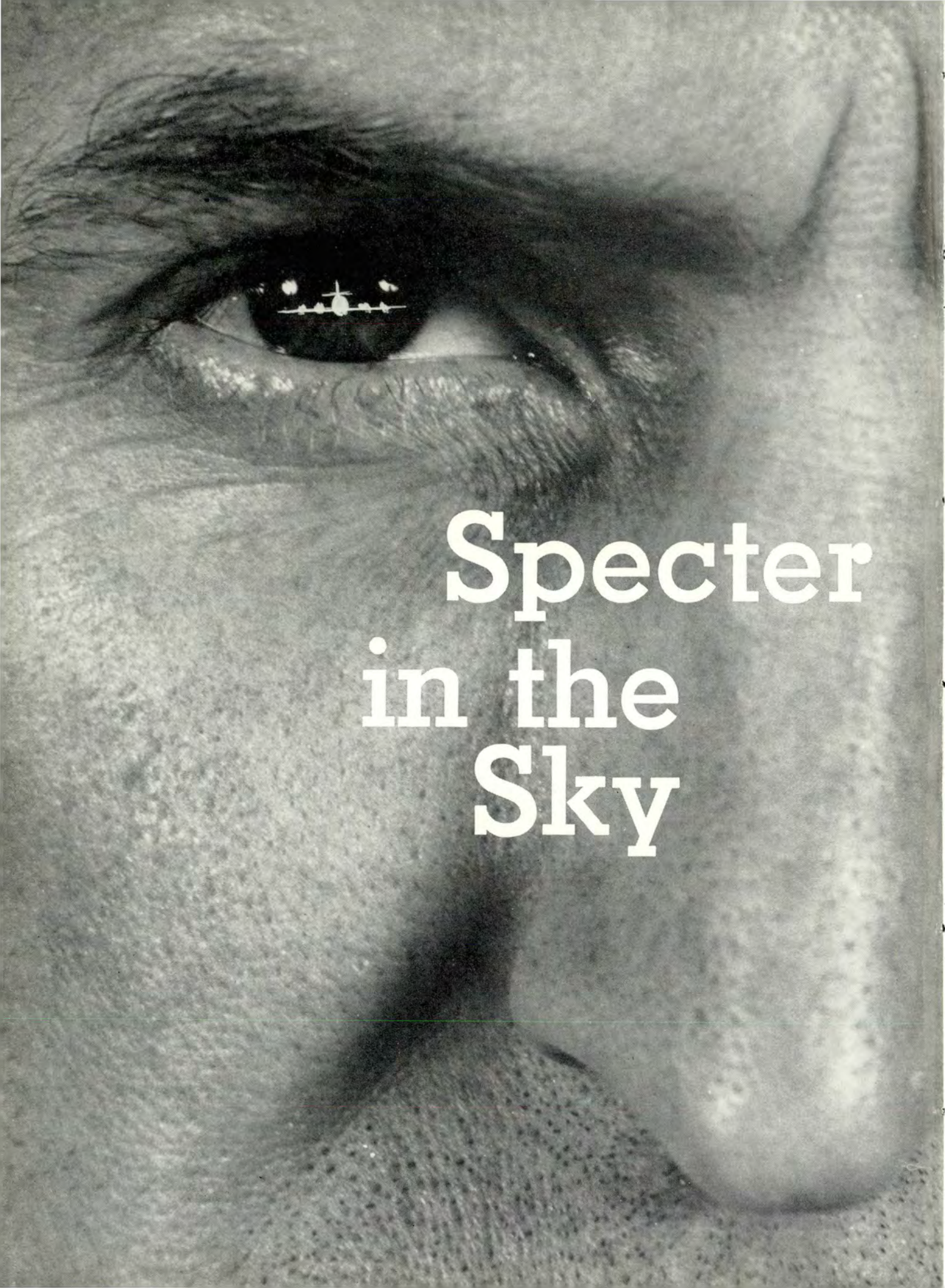
For now, we have a good set of rules and procedures. If we abide by them, most of us will stay out of trouble. I've never heard anyone say that complying with regulations is easy. Quite the contrary. It's hard. Especially when things get bent out of shape. Take, for instance, an engine failure on a multi-engine aircraft. No real emergency exists, but it is next to impossible to take your eyes off the engine or the instruments, or the procedures being accomplished by someone else—or even by you. Obviously, if you can't take your eyes off these things you can't watch for other traffic. Someone must!

Compound this situation a bit by imagining that you are flamed out in a single place jet. You are alone. Someone must watch the skies around you. And someone must perform an airstart. At low altitudes of course, you quickly reach the "damned if you do and dammned if you don't" point. This is not true of high altitudes however—provided you know your procedures without having to concentrate entirely upon them. And even if you know them, it will take all the will power you've got to cover the

outside as well as the cockpit. This is Air Discipline. One of the hardest forms of discipline ever produced.

In past issues of FLYING SAFETY, we've pointed out some of the problems associated with the danger of mid-air collisions. You must have read some of them. In this issue there are more. The article beginning on page 4 carries a list of suggestions on how to avoid a collision. Here are some further additions:

- Never assume that you are the only one in your particular chunk of sky.
- If possible, stay away from "hot" altitudes: 19,000 to 21,000 is one of the hottest for both civil and military aircraft. It's comfortable, but deadly. If you must fly there, keep a shap lookout, especially when on or crossing airways.
- Do not prolong a steep turn. You can mush right into the "little man who wasn't there" when you started.
- When planning a flight, check your Directory of Aerodromes section of the Radio Facility Chart. The "remarks" portion of this section is the only place where you can find out about the high density traffic around airfields en route. One says, "Extensive jet instrument training. CAUTION—heavy traffic all altitudes." Another, Luke AFB, says, "CAUTION—heavy traffic between 2000 feet and 10,000 feet from Luke AFB to Williams AFB Auxiliary Number 5. Extensive tow target operations. CAUTION—extensive student traffic below 25,000 feet 100 mile radius." Others located in the center of airways, say essentially the same thing. It is not enough to check your destination alone.
- If someone is with you in the airplane, have him call out every "bogey" that he sees. Point out to him, the ones you see. And never assume that he will see and keep track of it unless you tell him to. This is defensive flying but it's good insurance.
- File Operations Hazard Reports (OHRs) whenever you feel that one is justified. This is no longer a matter of bull-headed sensitivity. It's one of the ways that you can "live and let live."
- Regardless of what happens, don't keep your head in the cockpit, unless you have ordered someone else aboard to maintain a watch on the sky.
- All of these things can be combined into one. We must discipline ourselves. Discipline? That is "Obedience and proper conduct—instinctive under all conditions." ▲



Specter in the Sky

Black headlines during the past few months have reiterated the fact that the mid-air collision problem continues to take a staggering toll. Solutions to the problem are many and varied. What's the answer?

Jeff Sutton, Research Engineer, CONVAIR, San Diego.

The specter of mid-air collision rides every cockpit. The large majority of pilots will fly throughout their careers without this specter materializing. A small minority will be less fortunate. The job is to keep from falling into this latter category.

We are here chiefly concerned with mid-air collision under daylight VFR—with skies clear and visibility unlimited. Under these conditions we should expect the eye to return the greatest amount of flight information; yet this is when the greatest number of near-misses and mid-air collisions occur.

Three factors are operating to make daylight mid-air collision a full-blown ogre of the skies:

- Increased air traffic
- Its growing diversity
- Sharply climbing aircraft performance.

The military is concerned with an increasing number of high-performance aircraft maneuvering in space shared with low-speed aircraft. These factors have sharply stepped up the costs of such accidents in terms of human life, equipment and morale. Near-misses, once a rarity, regrettably have become an almost accepted part of flying.

What then to do about mid-air collisions under daylight VFR conditions: The obvious answer is an adequate proximity warning device, but this still lies in the future. Controlled separation of aircraft is not fully feasible with present equipment and air traffic density.

This leaves only one other method—visual search. Many qualified experts have pointed out that increased performance has largely negated the warning value of the human eye. The long chain of events lying between the visual stimulus and aircraft response is simply too time-consuming for the aircraft speeds involved, particularly where Century Series capabilities are concerned. Total response time of pilot and plane is at least five seconds—the equivalent of thousands of feet in the faster hardware.

Despite this, the human eye appears to be the best warning device presently available. Properly used, it can keep a lot of accident boards from convening. This is borne out by near-miss analyses which indicate that perhaps the majority of such incidents could have been averted under proper visual scan by either or both pilots. If we grant that the eye can still cope with perhaps the majority of convergence incidents, what are the main pitfalls to watch for?

Analyses show that near-misses and mid-air collisions, not counting ground gunnery and tow target types, occur most often under the following conditions:

- Daylight VFR.
- Straight and level flight.
- Low altitudes (under 3500 feet).
- Relatively slow rates of closure.
- Flight in terminal areas.

Other data indicate that crossing courses, changing altitude and overtaking other aircraft serve as the main flight patterns of near-misses and collisions, in just about the order named. These then are the danger areas and situations requiring utmost constant vigilance. It may be noted that these are not factors in which insufficient reaction time is the chief culprit. Rather, they indicate events which might have been avoided by proper visual search.

At the present time there is no ready answer to the mid-air collision problem. However, the situation can be improved—through pilot education and improved aircraft design. The Air Force is pursuing the first course in a three-pronged attack. Its highlights:

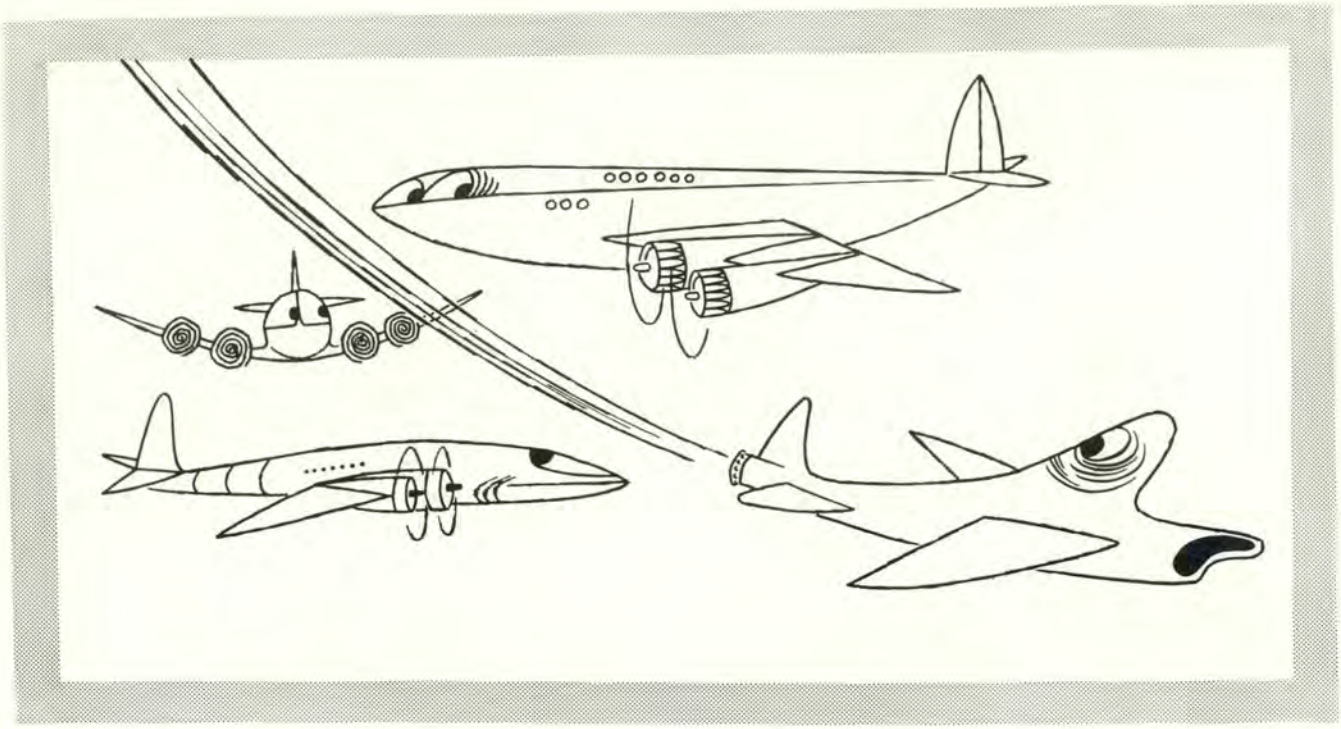
- Experience, research, accident investigation and flight safety symposia. Information from these sources is channeled to training commands and flying personnel and, when design incorporation is indicated, the airplane manufacturer.
- Training. Pilot practices are emphasized which are slanted toward safe air traffic navigation. [SEE AND BE SEEN is the watchword.] Visual vigilance is essential.
- Flying safety bulletins and publications. This approach capitalizes on the fact that its information reaches the man most concerned—the pilot.

Airplane manufacturers are mainly concerned with the second course, improved aircraft design. At CONVAIR—San Diego, for example, extensive research, much of it on a continuing basis, has been done in the following areas:

- Exterior paints. The visibility potential of aircraft is studied under different ambient environments and illuminations to determine optimum color according to aircraft mission.
- Pilot seating and mobility. Investigations are made to determine optimum seating for each aircraft configuration relative to operating requirements and visual fields. Equipment is designed to provide maximum pilot mobility and freedom from restraint.
- Glare shields. Experiments to reduce or eliminate glare have involved new types of panel glare shields, their placement and control, glare-resistant coatings, and elimination of glare-producing surfaces.

A full-scale cockpit mockup of the 880 Turbojet Transport was constructed to study such visual problems as field of view, differential illumination, glare and optimum cockpit lighting environment. Results of these studies were incorporated into the airliner design with result that the 880 Transport will provide its crew with a visual field superior to that of its predecessor transport aircraft.

Of course, none of these methods are as good as an infallible proximity warning device—but they will help until such a device comes along. Meanwhile, even with



such design and training improvements, the job of air navigation safety still depends on the pilot's eyes—and how well he uses them.

The pilot is operating a variable-speed vehicle in three-dimensional space, the greater part of which is not visible from any given aircraft attitude. He is blind to areas above, below and to the rear of his flightpath. Certain structural features of his aircraft (to which he may be accustomed and consequently disregard) may obscure areas of forward vision. Yet it is within such blind areas that much of the hazard lies. In this respect he is dependent upon the constant vigilance of his fellow pilots. By the same token he is responsible for areas within his visual scan. Overtaking another aircraft can be just as fatal as being overtaken.

Within his accessible visual field the pilot is further limited by his physiology. Under the best of daylight conditions his eye can detect a fighter aircraft at perhaps seven or so miles, and larger hardware at perhaps sixteen or eighteen miles, dependent upon the profile presented. This is not much in terms of time when high-speed and head-on closure are involved. This visual distance falls off rapidly as contrast differences between intruder aircraft and background diminish.

But even under high contrast conditions the eye has to be on the other aircraft before recognition occurs. It is a speck in the air ocean which must be discriminated. It is seldom picked up by chance. It must be sought. A target which covers one minute of visual angle may be visible to a person with 20/20 vision if conditions are right and the eye is properly fixed and focused. However, the visual angle presented by the target aircraft must be ever larger as its image recedes into the edge of the visual field.

The greatest danger in straight and level flight lies ahead, with threat from the sides and rear diminishing as speed is increased. For extremely high-speed aircraft, the chief source of danger lies in a fairly narrow angle straight ahead. When jaunting along through open sky at a fairly low rate of speed, the flightpath should be scanned with main emphasis on the horizontal plane (near horizon) with occasional search out to 90 degrees on either side, without neglect of space above and below.

The area within 30 degrees of the flightpath should be watched almost continuously. As speed is increased the angle of scan should be pulled in more and more toward the line of flight. Occasional head movement should be made to take care of possible structural or physiological blind spots which may, unknown to the pilot, obscure part of his visual field.

Several points of caution here. The eye sees only when it is fixated. Do not scan with continuous sweeps. Move the eyes in short jumps with short fixations between movements. Secondly, the edge of the eyes has poor resolution but is excellent for detecting motion. We tend to become dependent upon the eye's peripheral areas as early warning systems, and thus relegate the entire warning job to them.

However, when aircraft are on collision course (constant angle) there is no relative movement. This is another good reason for occasional slow head movement. It may give apparent movement to objects in the periphery of the eye when relative movement is otherwise absent. Fast movement may cause vertigo. Finally, visual scan requires mental alertness. The saying, "looking without seeing," summarizes the condition where pilot preoccupation with other detail prevents visual information from "getting through." In this case the pilot's eye might just as well be disconnected from the brain.

Collision courses may be established when coming out

of an aerobatic maneuver, or during or following exposure to G loading, when orientation is uncertain and reaction time is slowed. Pick your aerobatic areas with care.

Daylight VFR near-misses and collisions have been reported where, strictly speaking, the failure was not visual. These involve misjudgments of distance and/or failure to properly evaluate the danger. In the latter instance, final recognition of danger may occur too late for appropriate avoidance action. Because of aircraft speeds, judgments of relative speed, course, and so on, should be made the moment an aircraft enters the visual arena.

Determination one: Is the other aircraft above, below or on the horizon? If it is on the horizon, it is roughly at same altitude.

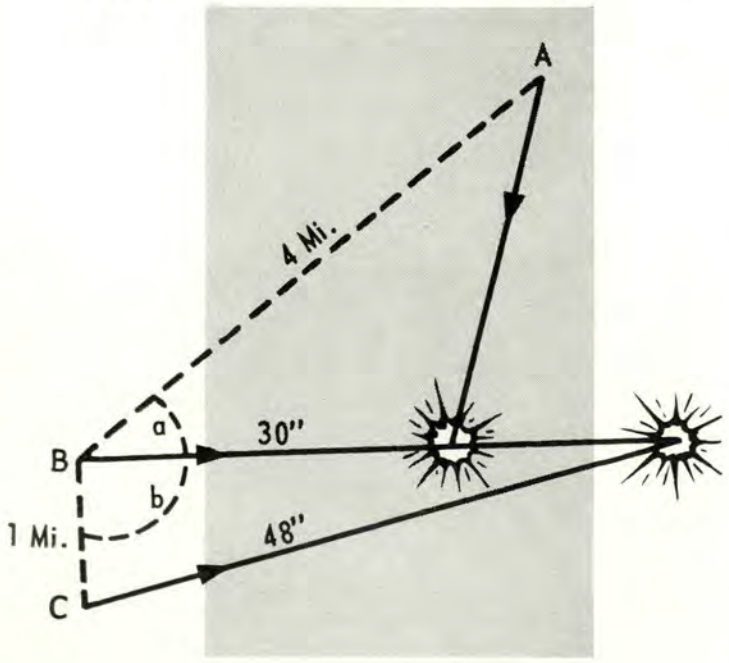
Determination two: Is angle of closure increasing, decreasing or constant? If constant, you're on collision course.

A slowly changing angle of closure indicates a close approach to collision conditions. This can be especially dangerous because a last moment "correction" by either pilot could convert a potential near-miss into a mid-air debacle. An avoidance maneuver should follow promptly any recognition of danger, and should be made to increase the angle of closure.

A new factor crops up when two or more aircraft intrude into your airspace. Distance, speed and course judgments become complicated. Closure time, the ratio of range to closure rate, is the important variable. Closure time is the time it would take two aircraft to collide if both continued the approach at a constant closure rate. The problem is to single out the greatest threat.

The accompanying diagram shows the courses of aircraft at A, B and C, traveling at 300 mph with closure angles "a" and "b" constant. Aircraft A and B, separated by four miles, would close in thirty seconds. Aircraft B and C, separated by one mile, would close in forty-eight seconds. The closest aircraft is not always the greatest hazard.

Distance is not always a true indication of the time available to avoid a collision, as this illustration graphically shows.



WHAT TO DO

- *Search first 30 degrees to each side of flightpath almost continuously, with occasional glances out to 90.*
- *Move eyes in short jumps with fixations between movements.*
- *Move head occasionally to see around blind spots.*
- *Scan area into which turn is contemplated before starting turn.*
- *Interrupt long turns briefly for re-scan of future flightpath; look backward as well as forward.*
- *Make evasive maneuvers that most quickly increase angle of closure.*
- *Keep windshield and canopy spotless.*

AND NOT DO

- *Don't go VFR in marginal weather.*
- *Don't neglect blind areas.*
- *Don't look without seeing.*
- *Don't wait to see miss distance. (Alter course immediately.)*
- *Don't be misled by slant visibility. (Forward visibility may be much less.)*
- *Don't change altitude on straight-line airpath in terminal areas.*
- *Don't enter terminal areas at excessive speed.*

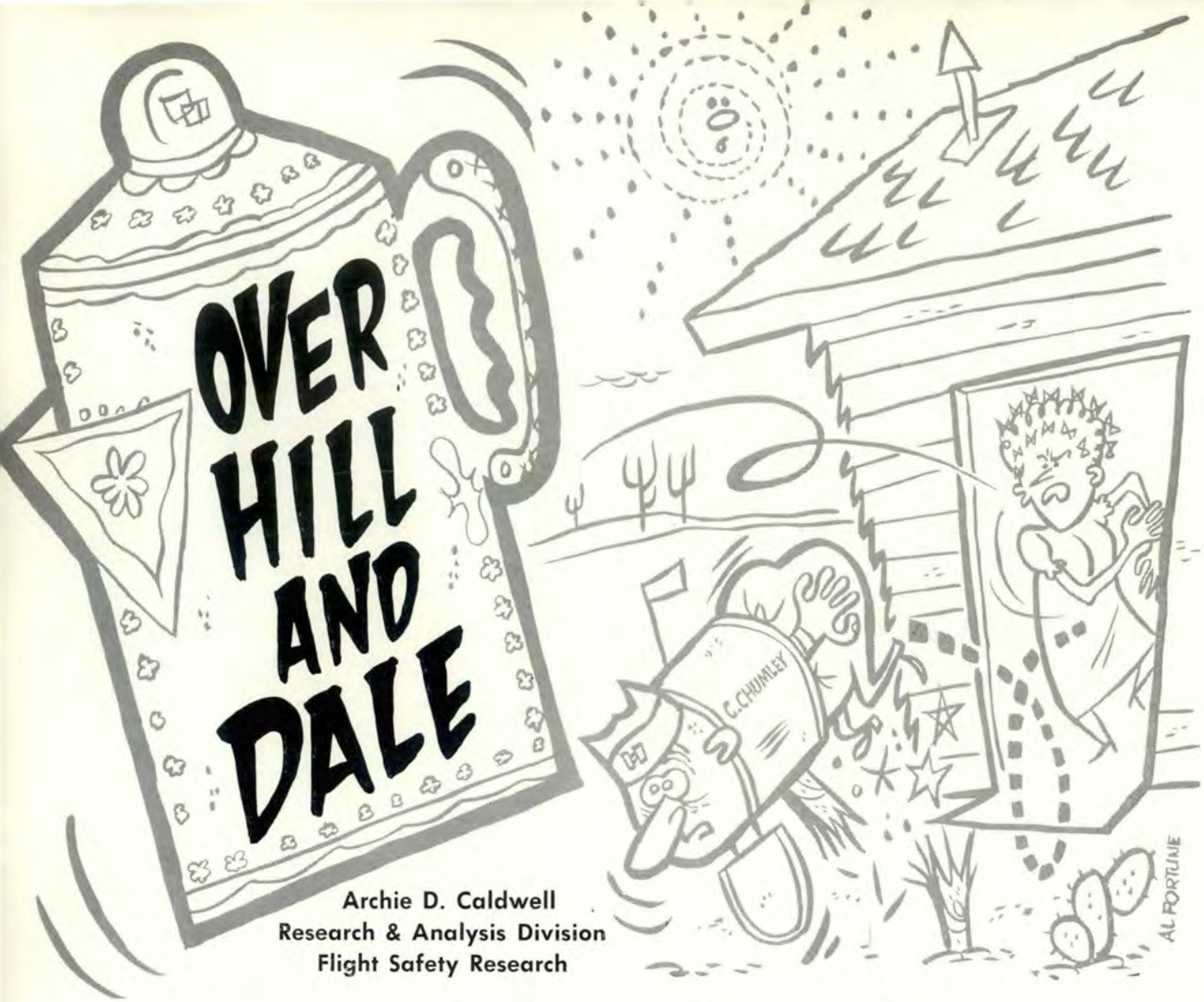
Other dangers involve flying near the base or top of overcasts (you never know what's coming through!), flying into the sun, and containing another aircraft within a blind area. Blind area collision courses may be reduced by not changing altitude on a straight-line airpath. Turn about 10 degrees (at approximately five degrees bank), hold for a moment and indicate return sweep. A zig-zag course can be used to place aircraft far enough to either side or the true flightpath to sweep critical blind areas around the intended flightpath.

The accompanying table gives a few tips to help avoid daylight VFR midair collision during cruise and when entering terminal areas. Terminal area flight is especially hazardous. Air traffic may be dense and include diverse aircraft types and speeds. The pilot is occupied with his instruments, radio communications and air traffic, and he may be letting down into reduced atmospheric visibility due to presence of dust, haze or smoke. Other aircraft are hard to see against the ground, blind areas are involved, and you may be moving in another aircraft's blind area. Hazards are multiplied—constant vigilance is required.

Scan the entire area into which a turn is to be made before initiating it. If the turn is a long one, more than 90 degrees, interrupt it for additional visual information. This is particularly important when air traffic is dense. Know where you're going before letting down. Finally, maintain visual alertness through the entire ground-handling phase. It's never too late for an accident. ▲

OVER HILL AND DALE

Archie D. Caldwell
Research & Analysis Division
Flight Safety Research



The desert sun beat down, but hard, on the Wherry dwelling occupied by Captain Chauncy Z. Chumley and his brood of dependents.

Inside, the kitchen clock chimed off eight bells. The world's greatest instrument check pilot drained his coffee cup and looked across the table at his life-partner.

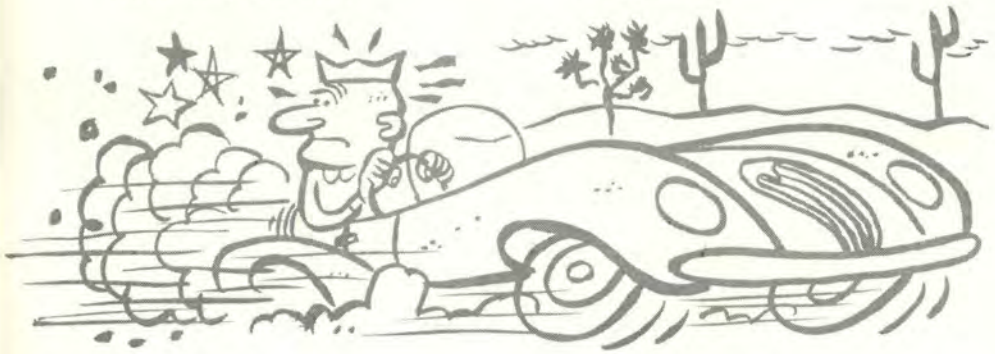
"Blasted hot, wot?"

Mrs. C. stared back from under a crown of pin-curlers.

"You make a pretty good tiffin there, Tondalayo, remind me to bring you some pretty beads from the General Store. They'll go good with that Mother Hubbard you're wearing."

(For the sake of sensitivity on the part of some of our bachelor readers, the next few remarks must, by necessity, be left to the imagination. Married types will understand.)

Chumley slapped the table with his swagger stick.



"Enough of your prattle, woman! I must away to yon airbase. Giving an instrument check this afternoon and I don't want to become upset so early in the day. Have dinner ready on time and I shall bring you some silk cloth *plus* the pretty beads."

Chumley neatly dodged the percolator and skipped eagerly to the garage. He made a clean Le Mans start in the Jag and arrived at his office just in time for the coffee break. By the time he had worked the daily crossword, checked on Steve Canyon and read the Daily Bulletin, it was time for lunch.

The afternoon sun beat down, but harder!

"Hey there tower, how about a green for go. Eight-seven-six-four pointed down the runway—ready to roll."

The tower operator cringed. The voice was unmistakeable. He licked his lips and spoke.

"Air Force Jet eight-seven-six-four cleared for takeoff, wind calm, altimeter two-nine-nine-zero."

Chumley settled in his seat.

"Okay, Sam, you're all lined up nice and pretty; ninety per cent on the clock and the brakes are yours."

Thus, Chuckhole AFB's famous instrument check pilot prepared to sweat out another 60-four check. Major Sam Bass carefully tucked himself under the T-Bird's hood and prepared to sweat, too. The memories of some of Chumley's past misadventures crossed his mind. He took a deep breath, released the brakes and concentrated on the clocks.

Chumley's cracking tenor pierced the earphones. "Roll along covered wagon, roll all—long!"

Chumley always was in good voice during takeoff, the engine noise helped somehow. He held both arms high as possible to let the groundlings know that he had a reckless confidence. He *was* intrepid, was ol' C.Z.

"Doin' real great Sam, couldn't hold better direction myself—eighty-five knots, better start easing the nose off. You're doin' gre—YIPES! Get a hunnert per cent Sam, quick!

Two hands hit the throttle simultaneously. RPM moved rapidly to 100. Chumley made a mental note always to insure that the throttle is advanced as the brakes are released. The T-Bird was getting ready to fly, then KERWAMP! KARWUMP! It was shaking like a leaf!

"Tower, seven-six-four aborting! C'mon out Sam, the bird just broke. I have the aircraft, never fear, but I need some help with the brakes."

With amazing alacrity, the world's most valiant aeronaut put the throttle in IDLE, got on the brakes and scanned the horizon for a place to go.

"That taxi-way forty-five to our heading looks like a good turn-off place, Sam. Should make it no sweat. I have it now, no need for your assistance, old horse."

The laws of gravity, propulsion and inertia soon overcame Chumley's confidence. The T-Bird refused the panicky request to turn. Rather, it skidded momentarily, bounced a bit, clipped two runway lights and ended up at the bottom of an embankment.

" 'Pon my soul," Chauncey coughed, as the dust swirled about his head. "Something must have gone wrong with the brakes, Sam. Remind me to speak rather firmly to Sergeant O'Toole about them, will you?"

"He might have a few words to say to you, under his breath, of course. C.Z., look at the condition of this bird!"

"Yes, Sam, see what you mean. Bent it some, didn't we?"

A king sized tranquilizer had taken most of the fight out of the Colonel when Chumley reported to the C.O.'s office. This last one had almost been too much. The door to the large, model festooned office swung open. Chauncey smiled and saluted weakly. He was ordered into a chair.

"Well, Chumley, our enemies ought to be proud of you; you've done it again."

"It was a bucket failure from the turbine wheel this time, Colonel. We found a big hole in the ——."

"I have the maintenance officer's report here and am fully aware of the conditions necessitating the aborted takeoff. What I am hinting about are your actions which assured you of compounding a bucket failure into a sure major accident."

"I didn't think I was going as fast as——."

"For once you're right, Chumley, you didn't think. In case you don't recall, the configuration of the aircraft at the time of its demise was: throttle, IDLE; canopy CLOSED; flaps down and full tiptanks retained."

"I still say, sir, that I thought I could have made it safely. It wasn't until the last second that circum-

stances arose that even I couldn't overcome."

"Now look here, Chumley, I've got a few hours myself. When you heard the buckets go, felt the vibration and saw the lights for the overtemp, you knew right there and then that the flight was terminated. The emergency procedures in the Dash One clearly state that should a partial power loss occur on takeoff and you make the decision to cut the power off, you should proceed as if a *complete* power failure had occurred. In case I should decide to ever let you fly a T-Bird again, let me run over what you should have done:

"Throttle—OFF, not to IDLE. This cuts off all thrust and also puts the fire out, reducing the fire hazard. We don't have a barrier here so we may skip that step. Wing flaps-UP, to improve braking action; get on the brakes, which is the only thing you *did* do. Canopy-OPEN, when it's up, it claws a lot of air and will help to slow you down. And, if there is *any* doubt about being able to stop, jettison those tiptanks if they contain fuel. Understand??"

"Yes, sir. But some of those steps didn't occur to me. Everything happened so fast. Besides those tips could have ruptured if I had jettisoned them and caught fire I wouldn't have dropped them even if I had of remembered."

"Probably so——. Weren't you the one who advised against ejection from the first F-80s with seats because you thought that the canopy bow would cut your legs off at the knees? Don't you know that those things written in the Pilot's Handbook are the best known methods and procedures of handling the aircraft during any given situation?"

"But how could I be guaranteed that the tips wouldn't catch fire?"

"You couldn't. I don't think you'll find anything in this world except death and taxes that you can be guaranteed about. The Flight Safety people have come up with some interesting facts about aborted takeoffs and tiptanks in T-33 aircraft. During 1956 and 1957, there wasn't a single major T-33 accident occurring during discontinued takeoff where the tiptanks were jettisoned and caught fire.

On the contrary, those major accidents which involved post-crash fires or explosions and those in which injuries or fatalities resulted were the ones in which the tips were retained. Unfortunately, the safety people have no way of knowing how many aircraft have been saved by timely jettisoning of the tanks during T-Bird aborts."

Chumley looked at his hands and shuffled his feet as if about to speak. The 'oleman' never gave him a chance.

"Now mind you, that I said *timely* jettisoning of the tanks. It won't do you much good to punch them off when you're stopped or bouncing along at five knots. Now in your case, when you called the pilot in the rear to help you with the brakes, it indicated there was some doubt as to whether you thought you could make it. Your judgment of the stopping distance was based on past experience, that is, after landing in a light aircraft. That one and a-half *tons* of fuel and tanks—had they been jettisoned at the start of your abort—would have reduced the distance you needed to stop the aircraft by over 900 feet. I think that you can see that the turn off the runway could have been made then as you say, with no sweat. Raising the flaps and canopy would have reduced the stopping distance even more so."

"Sir, I promise that from now on I'll be trustworthy, loyal, helpful, courteous, kind, obedient, cheerful . . . ."

"Chumley, the way I feel toward you right now, you'll be lucky if you're anything from now on. Now leave my office, the tranquilizer is wearing off.

"And Chumley . . . what the devil are those beads doing hanging out of your hip pocket????" ▲

FLIGHT SAFETY AWARDS

★

On the following two pages are listed the twenty-four units which were the flying safety leaders of the United States Air Force for the last half of calendar year 1957. The Selection Committee wishes to congratulate all those organizations nominated, and FLYING SAFETY salutes the winners!

★

AIRPOWER — GUARDIAN OF THE NATION • FLYING SAFETY — GUARDIAN OF AIR POWER




AWARD WINNERS

460th Fighter-Interceptor Squadron
Portland International Airport, Portland, Oregon. ADC

The 460th Fighter Interceptor Squadron has completed 24 months of operations without a major or minor aircraft accident. In its around-the-clock Air Defense mission, it was scrambled from alert hangars and was required to be airborne in five minutes or less, regardless of weather conditions. It operated from one of the busiest civilian airports in the nation, without a single violation.

★ ★ ★

84th Fighter Interceptor Squadron
Hamilton Air Force Base, California. ADC.

Flying F-89s and T-33s, this unit was accident-free for the entire year of 1957. While carrying out its mission, approximately 75 per cent of the flying time was accomplished on simulated combat missions against high altitude, high airspeed targets in 'round-the-clock operations. The unit underwent two tactical evaluations with the highest grades ever achieved in the Air Defense Command.

★ ★ ★

Air Force Special Weapons Center
Kirtland Air Force Base, New Mexico. ARDC

The mission of the AFSWC is to accomplish necessary development, testing and engineering support of atomic weapons, systems components, associated equipment and evaluation of personnel hazards associated with the development test, operation and use of atomic weapons. While accomplishing this mission, the Center flew almost 20,000 hours in 14 different types of aircraft during the award period.

★ ★ ★

3079th Aviation Depot Wing
Wright-Patterson Air Force Base, Ohio. AMC

No accidents were recorded against the Wing during the award period. It has flown more than 17,000 hours, 4121 of which were under actual instrument conditions. The Wing attributes its success to its aircraft commanders and all personnel who support it. The nature of its mission requires rapid and accurate performance of the numerous details of an assignment anywhere on the globe.

★ ★ ★

3305th Pilot Training Group
Malden Air Force Base, Missouri. ATC

This contract Primary Unit has flown nearly 40,000 accident-free hours and logged 66,286 landings during the award period. Approximately 98 per cent of the flying time was accomplished with a non-rated student pilot at the controls. Flying T-28s and T-34s, this Unit measurably reduced its accident rate from that of the preceding period.

★ ★ ★

3552d Combat Crew Training Squadron
Moody Air Force Base, Georgia. ATC

During the award period, the Squadron has flown over 10,000 hours in carrying out its crew training mission. It experienced one major T-33 accident early in the period but followed up quickly with over 9500 accident-free flying hours for the rest of the time. Conversion to new type aircraft was carried on without accident. At least one-half of the time flown was by solo students.

U.S. Air Attache Organization
Headquarters United States Air Force

Since February, 1952, this organization has amassed a total of over 75,000 accident-free flying hours. During the past 70 months there has been more than a 200 per cent turnover in flying and maintenance personnel. Its aircraft are stationed in 36 countries throughout the world. In addition to the language barrier, other problems are unfamiliar geographical conditions, inadequate, strange and sometimes nonexistent facilities.

★ ★ ★

1611th Air Transport Wing (M)
McGuire Air Force Base, New Jersey. MATS

During the award period, aircraft under the operational control of this Wing, flew 74,283 hours, over a distance of 17 million air miles. There were no accidents during the period. The Wing's mission is airlift—the major portion of which is accomplished over the Transatlantic aerial routes. Operations into remote bases such as Thule and Sondrestrom constitutes a part of the normal schedule.

★ ★ ★

1705th Air Transport Group (H)
McChord Air Force Base, Washington. MATS

While flying missions throughout the Alaskan Theater, to Japan, the Philippines, Okinawa and Pacific Island bases, this unit amassed 20,168 accident-free hours during the award period. The transition from the severity of the Alaskan winter to the tropical weather of the Pacific routes requires crews to be constantly on the alert to changing weather procedures which affect the safety of flight. The Group attributes its success to excellent planning, crew coordination and aircraft maintenance.

★ ★ ★

8th Bombardment Squadron
Johnson Air Base, Japan. PACAF

No major aircraft accident has occurred in this Squadron since August, 1955. Since that time, the Squadron has successfully converted from B-26 to B-57 aircraft. The conversion was accomplished despite poor weather conditions and the problems encountered with navigational facilities, which are low powered and frequently unreliable. The Squadron flew 230 hours of actual weather during the award period.

★ ★ ★

40th Fighter Interceptor Squadron
Yokota Air Base, Japan. PACAF

This organization was accident-free during 1957. The primary mission of the Squadron is all-weather air defense. This requires alert duties and actual flights day and night. Hot scrambles are often made under most adverse weather conditions. From July, 1956, until the end of the award period, the organization accrued over 7000 flying hours during night and weather conditions.

★ ★ ★

99th Bombardment Wing (H)
Westover Air Force Base, Mass. SAC

During the award period, the 99th logged over 8000 accident-free flying hours. This is the first fully combat-ready B-52 unit to reach this status accident free. At the close of the award period, its record stood at 28 months without an accident. Careful planning and execution of missions are cited as primary reasons for its success. Maintenance crews were praised for providing over 100,000 jet engine hours without engine damage serious enough to require off-base repairs or overhaul.

376th Bombardment Wing
Lockbourne Air Force Base, Ohio. SAC

Formerly designated as the 91st Strategic Reconnaissance Wing (M), the 376th is described as the "oldest and safest jet wing within the Strategic Air Command." The Wing has been accident-free for 51 consecutive months. Planning, supervision, constant vigilance for hazards, education and individual awareness is described as the essence of the program of prevention.

★ ★ ★

38th Air Division
Hunter Air Force Base, Georgia. SAC

This Division, equipped with B-47 and KC-97 aircraft, was accident-free during the award period and for an eight-months-period prior to this time. Units of the Division spent 83 days operating without incident at Goose Air Base with the temperature as low as 25 below. Other aircraft from Hunter also operated in the Arctic, North Africa and the Middle East, as well as Stateside.

★ ★ ★

21st Fighter Day Squadron
George Air Force Base, California. TAC

The outstanding safety record of this organization is the result of wholehearted cooperation and unstinting efforts of each officer and airman of the squadron. Flying F-100 type aircraft, the unit operated 18 months without an accident. While participating in extensive operations and deployments, the unit successfully trasitioned to F-100Cs, and, more recently, to the 'Ds without incident.

★ ★ ★

29th Tactical Reconnaissance Squadron
Shaw Air Force Base, South Carolina. TAC

While successfully accomplishing the mission of photographic reconnaissance, the 29th has also had the task of training new pilots. Incoming pilots often had little or no RF-84F experience. They had to be trained. At the end of the reporting period, another transition problem was beginning, involving supersonic aircraft. Since March, 1954, the Squadron has flown over 10,000 hours, sustaining but one major aircraft accident and no minor accidents.

★ ★ ★

38th Bombardment Wing
Laon Air Base, France. TAC (USAFE)

A zero aircraft accident rate was recorded during the award period, coupled with over 9000 flying hours. More than 11,000 hours have been flown since the last accident to the squadron. This flying program included the qualification of all assigned tactical aircrews as Bomb Commanders and the transitioning of aircrews in B-57 aircraft.

★ ★ ★

7167th Air Transport Squadron (M)
Rhein/Main Air Base, Germany. USAFE

December, 1957, completed a 59-month period with over 95,000 hours of flying time in which no 7167th Air Transport Squadron aircraft or crewmember has been involved in an aircraft accident. During the special transport mission throughout Europe, North Africa and the Middle East, members of this unit conducted their trips safely and without incident, in spite of unreliable weather data, inadequate navigational facilities and a lack of published approaches.

23d Fighter Day Squadron
Bitburg Air Base, Germany. USAFE

During the reporting period, the 23d flew more than 9000 hours in the primary mission aircraft, the F-100C. Its missions were accomplished despite poor weather conditions and congested facilities. The high quality of supervision, maintenance procedures and techniques, and aircrew training is said to have contributed largely toward giving the squadron an accident-free record for the award period.

★ ★ ★

7499th Support Group
Wiesbaden, Germany. USAFE

Operating eleven different types of aircraft—ranging from light, single-engine models to four-engine bombers and transports, both jet and conventional, this unit accrued over 14,000 flying hours during 1957, and all of it accident-free. In its support function, the unit logged over 4800 hours of weather time and accomplished more than 2500 actual instrument approaches.

★ ★ ★

434th Troop Carrier Wing
Bakalar Air Force Base, Indiana. AFR

During the award period this unit flew more than 8000 hours without a major or minor accident. The primary mission of the Wing was to operate the CONAC C-119G transition school. Students undergoing transition came from F-84, C-46 and C-47 units to be trained during their fifteen-day active tour of duty.

349th Troop Carrier Wing
Hamilton Air Force Base, California. AFR

This unit began conversion from F-80 and F-84 aircraft to C-46s in March, 1957. During the award period it continued transition training, flying over 6000 hours without an accident. The 349th provides fully trained crews for Operation Swift Lift. During the award period, 376,169 passenger miles and 18,269 ton miles were flown.

★ ★ ★

188th Fighter Interceptor Squadron
Albuquerque, New Mexico. ANG

These Weekend Warriors have accomplished a total of over 16,000 accident-free flying hours since September, 1954. During the award period, the unit accomplished 200 air-to-air gunnery missions, 800 sorties and 200 tow missions.

★ ★ ★

159th Fighter Interceptor Squadron
Jacksonville, Florida. ANG

Over 12,000 accident-free flying hours is the claim of this unit. During the award period, the Squadron accomplished almost 3000 flying hours without an aircraft accident. This record was established while the unit transitioned from F-80 to F-86D aircraft. This flying safety achievement is attributed to thorough checkouts, excellent maintenance and close supervision.

1ST LT. DAVID D. ELLIOTT

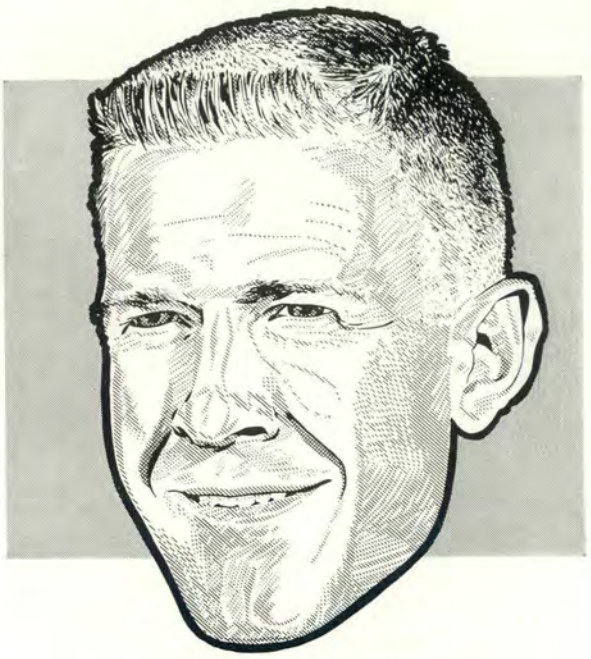
2ND LT. RICHARD D. RINEHART

1ST LT. JOHN L. HANSEN

WELL DONE

★ ★ ★

KNOWLEDGE — TRAINING



First Lieutenant

DAVID L. ELLIOT

3527th Combat Crew Training Squadron

Flying an F-86F with the right aileron in the full "up" position is not recommended for the average pilot. And Lt. Elliott certainly proved himself to be well above the average.

He was flying as chase pilot on an initial checkout of a student in the Combat Crew Training Program at Williams Air Force Base, Arizona, when the right aileron actuator became disconnected from the mechanical linkage. This caused the aileron to move to the full "up" position. The aircraft immediately rolled rapidly to the right and started a split "S."

When Elliott applied left aileron to stop the roll the plane pitched up violently into an accelerated stall. The throttle was then retarded and speed brakes extended. Another accelerated stall! Finally, with full left aileron, full forward stick and left rudder, Lt. Elliott was able to regain control of his aircraft.

The pitch-up tendency was reduced slightly when the landing gear and wing flaps were extended, and he was able to control the plane to a speed as low as 165 knots. With this much control Elliott elected to land the plane instead of ejecting.

Using extreme care and a fine sense of judgment, this young pilot used his engine power to control the rate of descent. A successful landing was made at home base without damage to the '86F, and Lt. Elliott climbed down from his bird to receive the congratulations of his fellow pilots.

His excellent appraisal of the situation, together with his high degree of professional ability, saved the Air Force a valuable aircraft and set an excellent example of airmanship for the students at Willy Field. Well Done, Lt. Elliott! ▲

Second Lieutenant

RICHARD D. RINEHART

3625th Combat Crew Training Wing

In his F-86D, Lt. Rinehart had just completed a low altitude radar mission near Tyndall AFB, Florida. His altitude was 16,000 feet as GCI turned over the control of his plane to GCA for a straight-in landing.

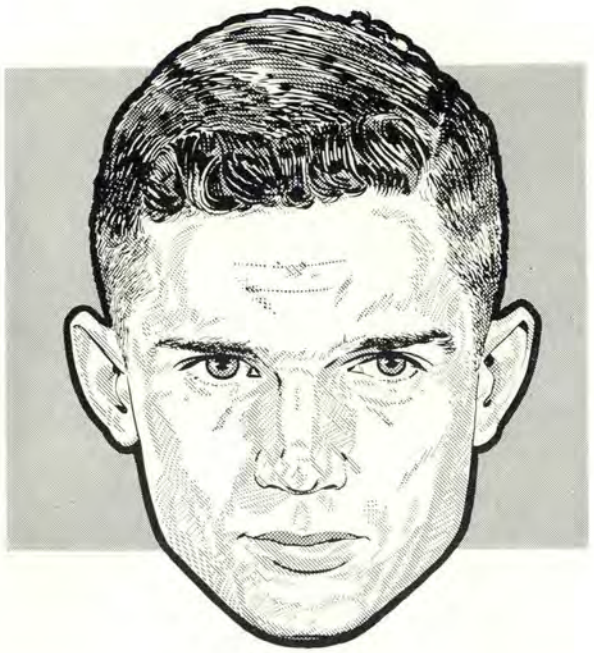
GCA was unable to make radar contact and advised him to make an ADF low approach. Rinehart completed this approach but was unable to sight the field when he reached minimum allowable altitude so he made a missed approach procedure. Just at this time he spotted a familiar landmark and so advised GCA. GCA picked him up on the scope and set him up on a downwind leg for a minimum fuel approach.

The control tower now told Rinehart that the airbase had gone below minimums in a heavy rain shower, and GCA again lost contact with the F-86D on the base leg. The rain shower had done it again.

The Base Commander, who had gone to the tower, advised Rinehart to bail out as fuel was practically gone from the tanks. Rinehart was preparing to comply when he again saw a familiar landmark. He made a close-in low visibility approach and landing in the heavy rain and was forced to shut down the engine on the runway since he was unable to see well enough to taxi in.

Lt. Rinehart, at the time, had a total of 302 flying hours of which only six were weather. Forty-two of these hours had been flown in the '86D. He was in weather from the time he started his penetration until he was able to find the field and land.

His resourcefulness under very difficult circumstances, especially for a pilot of his experience, was superior. The Air Force is proud to salute this young pilot officer. Well Done, Lt. Rinehart! ▲



First Lieutenant

JOHN L. HANSEN

186th Fighter-Interceptor Squadron

At 2145 on a dark night last December, two young first lieutenants took off in their F-89s for the last leg of an extended cross country flight. Home base was Great Falls, Montana, and they had just broken ground at Cheyenne Airport when the lead plane piloted by Lt. Hansen had landing gear trouble.

His wingman, Lt. E. L. Cunningham, flew close under his leader's F-89 and with the aid of his flashlight was able to see that the left main gear had swivelled 90 degrees from the normal position. Obviously a broken torque arm was the culprit here.

Lt. Hansen decided to change destination to Lowry AFB, expecting to find better crash rescue facilities there. While 100 miles north of Lowry, Lt. Hansen contacted Rocky Road, the Aircraft Control & Warning Site. With its cooperation he was able to make contact by radio and phone patch with his Operations Officer.

Captain Bob Sherman, his ops officer, fully agreed that the lieutenant had made the right choice and suggested that Lowry be requested to foam a portion of the runway. He further suggested that Hansen unbuckle his chute and re-install the seat safety pin before touching down. At touchdown, the left main gear castered to the trail position but the aircraft finally veered to the left side of the runway and off into the dirt. As the plane left the hard surface, Hansen ducked his head and blew the canopy.

The aircraft came to rest a few feet from the edge of the runway and aside from the broken landing gear torque arm, the only damage was that caused by the canopy striking the empennage on its backward arc.

Here's an example of teamwork paying off. Lt. Hansen used all the members of his team: His wingman, his ops officer, and AC&W to save another of Uncle Sam's aircraft. Well Done, Lt. Hansen! ▲

Lt. Gen. William E. Hall, left, accepts the Daedalian Trophy from Lt. Gen. Elmer J. Rogers, right, Air Force Inspector General. Center, Maj. Gen. Charles C. Chauncey, USAF Retired, Wing Commander of Daedalians.

THE DAEDALIAN

On April 12th, at Kelly Air Force Base, Continental Air Command received the United States Air Force's highest flying safety award, The Daedalian Trophy. The CONAC Commander, Lt. Gen. William E. Hall, received the silver cup from Lt. Gen. Elmer J. Rogers, Air Fore Inspector General, who represented Gen. Thomas D. White, Air Force Chief of Staff.

The presentation was the highlight of the annual national meeting of the Order of Daedalians, an organization of World War I pilots. Presiding at the meeting was Lt. Gen. Barney M. Giles, USAF (Ret.). Prior to the actual ceremonies, Gen. Thomas D. White had announced that CONAC had the most effective aircraft accident prevention program of all major air commands which had flown more than 100,000 flying hours during the calendar year 1957.

To quote General White: "This enviable flight safety record (only one fatality in an aircraft accident during 1957) demonstrates continual professional application of flight safety principles by all Continental Air Command personnel. It also reflects skillful use of comprehensive unit flight safety programs designed for diversified flying training activities . . . The Continental Air Command has made a significant contribution to the United States Air Force mission by saving irreplaceable lives and valuable equipment."

In accepting the trophy, General Hall paid special tribute to the reserve members of the Air Force. In his words, "The 1957 Flying Safety Record of CONAC is a tribute to all personnel responsible for this enviable record, but particularly to the Nation's air reserve forces who figured in more than 70 per cent of the total hours flown. The men of the reserve are largely responsible for my being here today to receive this trophy."

TROPHY

The history of the Daedalian Trophy goes 'way back into Greek mythology—to the myth of Daedalus, the famous Greek architect, and his son, Icarus. According to the myth, Daedalus and his son were imprisoned by the King of Crete in an intricate labyrinth, and rather than remain prisoners forever, Daedalus designed wings for himself and his son, in order to escape.

The famous architect made the wings and after repeated cautions to his son not to venture too high, lest the sun's heat melt the wax fixing the feathers to the frame, Daedalus bade his son to don the wings and fly to a country where they would be free.

> "'*My Icarus!*" *he says, 'I warn thee fly*
> *Along the middle tracks: nor low, nor high;*
> *If low, thy plumes may flag with ocean spray;*
> *If high, the sun may dart his fiery ray.'*"

Delighted with this new mode of travel, Icarus flew swiftly along. Then he forgot the danger and his father's caution, and rose up higher and higher until he could bask in the direct rays of the sun. The heat soon softened and melted the wax on his wings; and Icarus, no longer supported by the light feathers, fell into the sea where he was drowned—mythological victim of a lack of air discipline. In memory of him, the lake into which he fell, bears the name of Icarian to this day.

From the Greek myth the story shifts to the Order of Daedalians, named after Daedalus, who was the first exponent of safety in flight. It is indeed fitting that he should thus be honored by the perpetual award given to others who have made distinguished contributions to aircraft accident prevention.

Commenting on safety effort within the Air Force, General Rogers said, "Our over-all Air Force accident picture is an encouraging one. Since 1947, our major accident rate has steadily decreased from 44 per 100,000 flying hours to 13.6. But the Air Force is not necessarily satisfied with a rate of 13.6. This is not regarded as the irreducible minimum. We do not know what that minimum is, but present analysis of flight safety information, data and records leads us to believe that a further rate of reduction is possible. Although we take pride in the progress the Air Force has made in reducing aircraft accidents, we do not permit our pride to make room for complacency or to lull us into a slumber of satisfaction. We consider that the only acceptable number of accidents is no accidents at all and we shall strive toward that end.

"General White established the parameters for this effort in these terms, 'The Air Force must be able to defend the national interest anywhere, anytime, under any conditions. High performance aircraft and trained airmen comprise the combat capability to accomplish this mission. We are doing our maximum to conserve them both. There are certain inherent risks in training operations to develop this capability. Acquiring experience in the air exacts its price, but with the application of a dynamic aircraft accident prevention program this price can be minimized. The Air Force accident prevention program is an inherent part of every operation leading to the attainment of this goal. This is in consonance with our desire to make military flying safer in order to maximize the combat potential of the United States Air Force.'" ▲

Flying was fun back in the good old days. It was a challenge — but fun. The challenge is still there but pilots are no longer airplane drivers. They must be bookkeepers.

Lt. Col. Thomas M. Hergert
USAF
Director of Safety,
9AF Shaw AFB

Air Force pilots are no longer airplane drivers, they're bookkeepers!" How often have we heard this little gem dropped along the wayside—whimsically by some grey-haired birdman, or bitterly by some frustrated youngster? Contrary to popular advertising there are a few old bold pilots still burning J. P. They are the ones who get the deep glaze and dreamy look when, if you can penetrate the nostalgic barrier, speak of "fun" of flying in the good old days.

We can't help but regard with the utmost respect these pilots with five to six thousand hours of single-engine time under their belts. In all probability they do have more time on their backs than we have straight-and-level, and some of them can do things with a modern airplane that many of us never will be able to do. They have had an opportunity to reduce the man-machine equation by experimentation with low performance equipment to the point that they have a precise knowledge of their personal capabilities. We never will have that opportunity. Let's take a little closer look at why, today, the "old man" doesn't get quite the same charge out of flying that he once did.

Let's look into the area of that oft misused and loosely defined term "professionalism" that has been touted recently in USAF slanguage. First, let's keep in mind the approved definition: "Compliance with the systematic rules or procedures adopted or used in operating or handling aircraft." For obvious reasons the narrowing process will have to be continued a bit further, so let's select the area of flight operation of most concern to all of us. Statistics through 1956 indicate that 44 per cent of all major accidents occurred in the approach and landing phase, and, OUCH! 25 per cent of all fatalities. The cost per error has increased itself nine times in two years and there's no sign that the trend is changing.

As humans, we know that the will to live won't change. As Americans we also know the strength of the dollar—result: The human factor of the man-machine combination must yield. Professionalism must replace the freedom of arbitrary decisions that have been so happily enjoyed the last twenty years.

Let's compare the oldtimer's approach and our approach to the landing phase problem. He would probably say, "No problem; lack of airspeed meant landing short so we added five knots for the wife, five for junior and maybe another five for good luck." Not a bad answer with a bird that lands at, say, 90 knots, but what happens when we step up the landing speeds to 135 knots? The landing distance happens when we step up the landing speeds to 135 knots? The landing distance in feet can be computed by an equation which considers the landing in knots, the coefficient of friction and the lift drag ratio in landing confiuration.

The landing configuration lift-drag ratio of aircraft of the same type has not changed sufficiently during the period of this discussion to materially effect a comparison, and the coefficient of friction is a property of the runway surface (as long as we still use rubber tires).

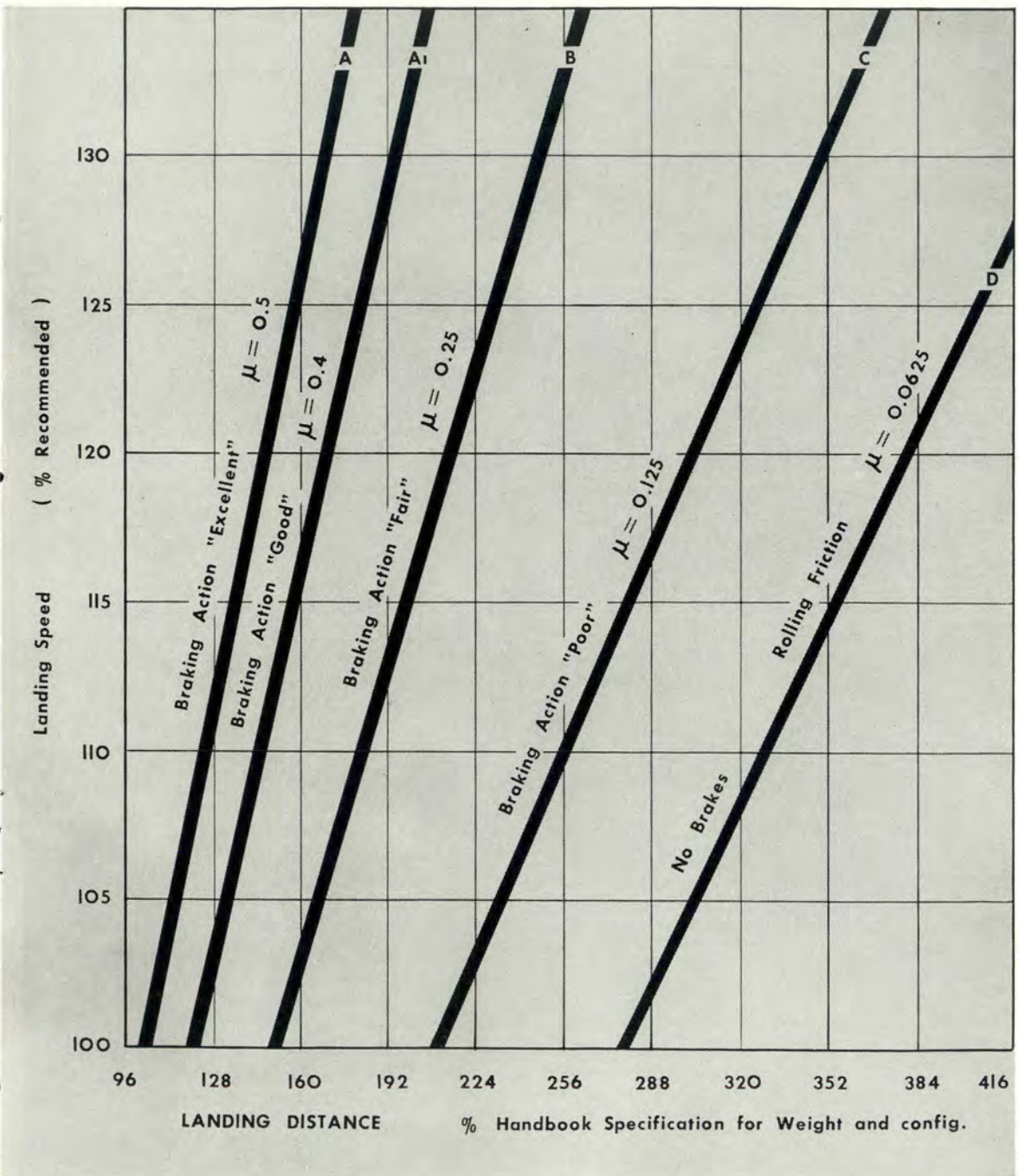
For purposes of comparison we can see that the landing distance will vary approximately with the square of the landing speed. Or, for example: An F-100 touching down at 135 knots requires about double the landing area that the old Jug did, touching down at 95 knots.

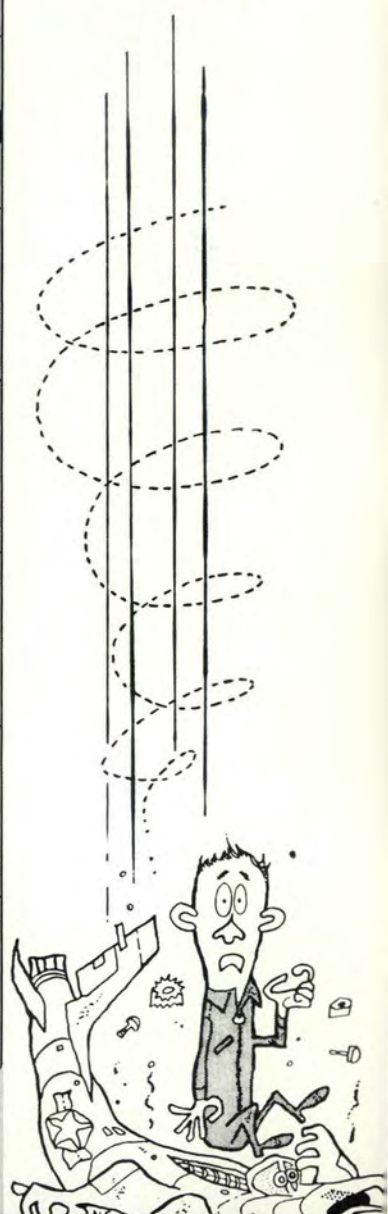
Today, we have a runway requirement double that of the 1944-45 era. Our available runways have not grown in the same proportion as our requirements —the average runway has increased from five to eight thousand feet, or an increase of about two-thirds, yet our requirements have doubled. The margin between available and required, enjoyed yesterday but gone today, must be absorbed by the human part of our man-machine combination. If we were to use the old rule of thumb and land our bird at 160 knots when the book said at that weight it was designed to land at 135 knots, we increase our stopping distance by more than one-third. Construction problems have removed the luxury of swapping one per cent approach speed for two per cent increase of landing distance. You may say that aircraft development has kept pace with the problem by para-drag devices. Possibly, but if you use that as a down card, you'll be a statistic off the far end with the rest of the five to six per cent chute failures.

Chart 1 portrays stopping distance under varying landing speeds and braking conditions. The graphs represent reduction of braking action in respective steps of 50 per cent each. Braking action "Good" is probably the normal optimum condition that you will encounter; "Excellent" condition represents a runway surface that we will rarely see. "Poor" compares to ice or standing water such that the tires cannot penetrate. The classification used here is for illustrative purposes only and must

OFF THE END

Stopping distances under varying landing speeds and braking conditions in percentage of handbook specs.





remain so until such time as routine, reliable, braking action checks are made standard operating procedures at Air Force installations.

Suppose we were making a GCA approach in a bird designed, at that weight, to touchdown at 135 knots and come to a full stop in say, 4000 feet. We have a light rain but braking action is still reported "Fair," the GCA run is good and we set 'er down on the 1500-foot line. We were a bit concerned about weather and visibility so we touched down at 148 knots (just 10 per cent above that recommended). Our roll has suddenly jumped from 4000 feet to 178 per cent of 4000, or 7120 feet. The touchdown adds another 1500 feet, or a total of 8620 feet of runway must be available. This further assumes that our deceleration is constant and our braking technique is perfect, without properly used anti-skids——?

Too high! Too fast! An old trick was to pull the nose up, establish a rapid sink rate to the desired flightpath, then put the nose back down and go about your business. When you consider the back side of the power curve and the terrific induced drag characteristics of low aspect ratio, you will quickly realize that one more crutch has been removed.

It appears that the modern fly boys are nervous about overshooting. No sweat. We used to back off deliberately low and when all squared off, pour on the coal, climb to the flightpath, chop the throttle and fill out the form one. He probably didn't even look at his engine instruments but pulled the throttle back half way on the quadrant for half power or to the approximate relative position that represented the amount of power he wanted. We'll assume here that you are familiar with power requirements for your aircraft when operating on the back side of the power curve: "The less the speed the more you need." Put the present day aircraft in the sneaky type approach and see what happens. You finally decide that you are low and slow, and it's about time to advance the throttle and regain a more respectable flightpath.

Low performance equipment permitted a wide variety of landing techniques, and still permitted a reasonable margin of safety. The high performance equipment does not permit this flexibility in individual experimentation.

If you are operating a single spool engine and advance the throttle for 10 per cent increase (about one inch on some quadrants), a change let's say from 80 to 90 per cent will result in a change of thrust by 50 per cent.

If you are operating a twin spool engine, the change will be about 80 per cent. For the curious ones, thrust is proportional to engine RPM: 3.5 for single spool engines and RPM 5.0 for twin spool. In simple terms the terrific increase of thrust necessary to get your bird to move out of the induced drag effect and regain the flightpath, coupled with the momentum effect of your increased weight plus the sensitivity of your power selecting apparatus spells a YO-YO that will give you, your wingman, and the GCA operator, a fit!

It may appear from this discussion that "they" have been stacking the cards against us all along. Economic problems say we can't have longer runways and we must reduce accidents, yet our equipment is of increased performance and higher cost. The "fun of flying" that induced the dreamy far-off look is a reflection of the operational flexibility permitted by the variety of techniques that could be used with low performance equipment and still have a reasonable margin of safety.

Our high performance equipment does not permit this flexibility, particularly in the landing phase, and certainly does not provide a margin for individual experimentation. Our interests have not been overlooked; we have been dealt some mighty strong down cards: Improved pilot handbooks, more accurate test and performance data and better mechanical reliability. Your down card is worthless unless you know what it is and how to use it.

Know your aircraft. Know operational procedures; practice approved procedures and make the aircraft do what you want it to do! If you attempt to salvage a bad approach in today's equipment, you'll probably be an undershoot or overshoot statistic. Know and fly your performance data. If you don't you're drawing to an inside straight! ▲

Look Out for the Little Ones

It isn't always the big guy who throws the big punch—the little ones can be dangerous, too. This is true not only of people but also of the planes they fly. Take the "L" models that are in the inventory. They sit on the ramp overshadowed by B-47s, C-124s or F-100s. Pilots and non-pilots alike often get the feeling that there is one plane that "flies itself."

There are a number of these liaison aircraft in the Air Force inventory today. And if statistics mean anything, they're man-killers. Accident rates on these high performance flying machines are considerably above the overall average for the Air Force. Particularly is this true with the L-20 and the L-27.

Some of the "L" types are fairly new in the inventory. They are widely scattered. Perhaps the fact that only one or possibly two of them are located on a base adds to the impression of simplicity, and lack of relative importance. Many bases see very little of them, sometimes only when they land for fuel or on a passenger stop.

But this is all the more reason for taking that added precaution with the "little one."

A review of the accident summaries on the liaison type aircraft for the past year and the first part of this year, shouts for more attention in these areas:

- Instructor pilot qualifications.
- Pilot checkout requirements.
- Better supervision, especially during periods of marginal wind conditions.
- Compliance with recommended procedures and maximum operating conditions published in the Dash One.

Winds have figured strongly in the accident rate for this type aircraft. So far this year, 40 per cent of the accidents have occurred when take-offs and landings were attempted during gusty and crosswind conditions. On one base, a pilot was cleared for a flight when gusty crosswind conditions exceeded the recommended maximum in the Dash One. A short way down the runway the aircraft veered to the left. Unable to correct back to the runway, he cut the power and the aircraft struck a snowbank.

Downdrafts can play havoc also. Another pilot had performed a normal takeoff, traffic break and climb in his "little one." He then proceeded on his scheduled two-hour local flight. Planning a turn-around near one of the local mountains, he headed that-a-way and began his turn to the left. He encountered a severe downdraft.

Realizing that mountains never move out of the way, he advanced the throttle and raised the nose in an attempt to climb. Instead of going up, he went down. Within a few seconds, his propeller was clipping the brush and, a moment later, the ground. A slight bounce and another 50 feet of travel—then real trouble. The plane crashed on its nose and right gear, spun to the right and slid down a 20-degree incline for 75 feet, minus the left wing and a few other items.

Winds may "Blow the Man Down" but there are other ways to get there.

Take the case of the pilot who did not use the prescribed emergency procedures when he found himself in serious trouble. Shortly after takeoff with an estimated 105 mph indicated, and 75 to 100 feet altitude, he experienced a total loss of power on the right engine. He attempted a quick 180, in order to land on the runway. But the airplane, conceding to the increased drag of the wind-milling engine, the loss of lift imposed by the turn, the adverse picture of the Power Curve, followed the law. It crashed with the right main tank exploding on impact. The five occupants got out, but the aircraft was totally destroyed by fire.

The pilot had not used the prescribed emergency procedures of the T. O. The prop had not been feathered. This was the most elementary mistake he made. By his failure to treat his machine as the airplane it was, he overlooked two of the most basic laws of aerodynamics: Loss of lift in a turn and the effects of the power curve. They've killed many a predecessor.

These are only a few of the examples which have caused the accident rate on the "L" to be more than it should be. If "Eight's the Rate for '58," is to apply to the "little ones," somebody — supervisors, instructor pilots, pilots, maintenance men—better get busy! ▲

Down

Alaska means Eskimos, blubber, Thlingit Indians, totem poles, beaded moccasins, hand-carved doodads from ivory, little fat-faced babies with dark eyes, and broad-beamed girls giggling outside a bakery winddow. And to those who have not gone far beyond Jack London's exciting stories, Alaska means Athapascan Indians slipping across an endless waste of snow on whispering snowshoes and the long, eerie howling of wolves in perpetual darkness.

In Alaska, the airplane has turned life upside down, squeezed the Territory into a vest pocket atlas, and chased the colorful dogteams into the Territorial museum. There is a great dependence on bush pilot and military flying to carry on the business of Alaska. Alaskan flying is accomplished in both good and bad weather. There are cold, clear nights, misty rains, snow and more snow, falling temperatures and "Matanuska" winds. Some places are better weatherwise than others. Anchorage, for instance, claims a 3000-foot ceiling 90 per cent of the time.

Pilots look down on an Alaska marked with a variety of colors ranging from the white crown of Mt. McKinley to the green and brown of the Interior and the jet black of the waters of the Panhandle. And as the sun goes down into Cook Inlet, in November, and the cold chill comes on, airplanes are still winging their way up and down the airways of Alaska. Some are even off airways, flying perilously close to tall glacial mountains.

The unpredictable weather elements and the rugged terrain in Alaska necessitate strict flying requirements. Knowing the exact geographical position at all times, use of all navigational facilities, proper navigational procedures, and religious adherence to flight plan, are *musts* to remain within the bounds of safety.

These musts are accomplished by complete air discipline, crew coordination, assumption of responsibility and a high degree of flying proficiency. For the crew of the bomber coming down from the summit to Anchorage, these musts were extremely important.

As the Sergeant searched with the Aldis lamp for the green and brown through the mist from the scanner's position, his thoughts might have been along these lines. Whatever they were he did not see the green and the brown, and he did not have long to look in the semi-darkness. The tremendous jar of the airplane's contact with the biting snow shattered his thoughts and placed him in the middle of death and destruction.

The sergeant was indeed lucky to be alive, as were the navigator, the flight engineer and the left scanner of the 10-man crew. More than that, he appeared to be uninjured. Along with this he knew about Alaska. He was weatherwise and he had self-discipline. He stood up and hit the Aldis lamp a couple of times but the light was gone. Then he thought of "Mac."

"Mac, are you hurt?"

Mac answered that he had a bad leg. As the sergeant pushed his way out, he found the navigator, who was also injured and needed help. After assisting the navigator out of the wreckage, he found a light in his bag and then took care of Mac.

Three hundred feet up the line, on a slight rise in the

Flying has become a way of life in Alaska. Unfortunately it also has become a way of sudden death. Proper air discipline could have prevented this needless loss of lives when no one assumed responsibility.

Robert H. Shaw, Research & Analysis Division, DFSR

From The Summit

terrain, lay the remainder of the crew—half dead, half alive—buried in the snow amid the twisted cockpit section. The flight engineer, severely injured, was calling for help. The sergeant found a seat cushion and maneuvered himself across the distance over the loose snow. It took 15 minutes to get there.

The sergeant found the others in the cockpit section beyond help and started down again with the flight engineer after wrapping him in a jacket and a piece of parachute. It took almost two hours to slide him across the snow on a piece of upholstering that he found in the cockpit.

After placing everyone together, the sergeant broke open the bailout kits that he could find and bundled the men in sleeping bags and placed extra clothing on top of them. It was 3:30 the following morning before he could get them all quieted down and have a moment to himself. His thoughts turned to rescue and he opened the flare kits and read over the instructions.

About 5 o'clock, a C-47 flew over but the sergeant didn't have the flares positioned properly. Later he broke out the "Gibson Girl," but was unsuccessful in inflating the balloon for the antenna. About this time another aircraft flew over, and he shot off the flares. At 10 o'clock, an SA-16 flew over, and he shot off his remaining flares. The SA-16 began to circle and soon after, helicopters came to rescue them.

The sergeant accomplished a commendable job in taking care of the crew after the crash. By keeping them warm and protecting them from shock and frostbite, he

saved their lives. He rates an award. But the sergeant and the crew could have been spared this 16-hour ordeal of shock and pain, for this accident need not have happened at all. The flight was not dangerous in itself, but was terribly unforgiving of the carelessness, incapacity and neglect.

The flight was well planned, up to a certain point, specifying 1800 nautical miles of IFR flight at 20,000 feet, direct from point to point, except on the last leg which was airways from Nenana radio range to Elmendorf. The estimated time en route was 10 hours, with enough fuel for 14. There were last minute changes. Both navigators and the copilot were shifted from another flight and the APQ-13 radar went out.

Takeoff was made at 0954 AST and the flight plan was made good until arrival over Nenana radio range at 1722 —seven hours and 34 minutes later. Just prior to arrival over Nenana navigation responsibilities were shifted from one navigator to another. Shortly thereafter, the instructor pilot moved into the left pilot seat vacated by the copilot. After passing Nenana the navigator ceased to plot

the aircraft's position on the map. From there on the aircraft continued to drift left of course.

At 1749 the instructor pilot reported over Summit, the next checkpoint. In reality the aircraft was 10 miles east of Summit. At this time the navigator determined that the aircraft had made good a true course of 179 degrees instead of the estimated 184 degrees and was one minute late in arriving. Assuming that the wind conditions had changed, he computed a new wind condition.

At 1801 the aircraft was cleared to descend to 12,000 feet and to the Susitna Intersection via Airway Blue 26 and direct to Susitna. The pilot began an immediate descent with gear down and flaps at 25 degrees.

At 1804 a ground radar station at Anchorage plotted the aircraft's position 20 miles east northeast of Talkeetna on a track of 145 degrees magnetic.

At 1811 the pilot advised that the aircraft had passed over Talkeetna at 1807, at 15,700 feet, IFR conditions, and that he was estimating Willow Intersection at 1817.

At 1813 the pilot acknowledged instructions to descend to 6000 feet. At 1818 the ground radar station lost contact with the aircraft.

The aircraft flew into the open end of a horseshoe range of mountains, 27 miles east of course, and crashed into 5600-foot snow-covered terrain on a heading of 140 degrees. Within a mile ahead on the flight path, the terrain rose to 7000 feet and several 7000-foot peaks reached upward on both sides.

The real killer elements in this accident were not the high mountain terrain, the hazardous weather elements or the poor radio reception. They were faulty procedures, for coordination between the instructor pilot and the navigator, inattention to duty, and complacency.

At the start of the flight the last-minute crew changes and the change of route, without a doubt, prevented the pilots and navigators from preparing a well-coordinated flight plan and discussing each other's responsibilities.

A seven-degree easterly variation error, somehow set into the master compass direction indicator at the start of the flight, greatly assisted in placing the aircraft off course. And from Nenana on, since no corrections were applied by the navigator or the instructor pilot, the aircraft continued to drift left of course.

Before reaching Nenana, the navigator closed out his log and put his maps in his briefcase, depending on the instructor pilot to navigate by radio range. Notations made by the IP on the Radio Facility Chart indicated that he was depending on the navigator for course and distance information. Neither accomplished a proper position fix past Nenana, and the IP descended the aircraft into instrument weather conditions without a known position fix.

Air discipline means many things to many people. Within its realm are descriptive adjectives which, when taken by themselves and applied, will build a bulwark of accident prevention. Personal integrity, self-discipline, leadership, responsibility, all will give us the courage, the stamina, the aggressiveness and the decisiveness for the necessary obedience to orders and conformance to rules. The knowledge of doctrine and directives, the willingness and ability to command, and the complete acceptance of a task will effect the application of standards and insure standards of performance.

To effectively apply these elements of air discipline, we must first know ourselves. By knowing our own capabilities and limitations, both mentally and physically, we will insure the success of a given task and prevent ourselves from accepting impossible ones. By so governing ourselves we will have applied personal integrity and self-discipline. Also we will have displayed responsibility and leadership and prepared ourselves for compliance and conformance.

We must have confidence in ourselves, and we must be responsible people. Confidence is an element that we must cultivate continually, without it we will never do anything successfully. By keeping within our capabilities we will build confidence in ourselves. With this confidence we can accept responsibility. To be a responsible person we must accept and apply responsibility. And with confidence and responsibility we can effect leadership.

Above all, we must keep physically fit. Without it, we will not have the good health to maintain the confidence that will allow us to accept the responsibility that will provide our leadership. Our leadership will insure the courage, the stamina, the aggressiveness and the decisiveness to effect the obedience to orders and the conformance to the rules.

A part of this all-important air discipline is knowing the equipment and the procedures. Without it we could not effect complete acceptance of the task at hand, we could not assure control, we could not have standards of performance and it could detrimentally affect our ability to command. Knowing the equipment and procedures means knowing the components, the systems and the capabilities and limitations of each. By successfully accomplishing this part of air discipline we apply the ethics of professionalism and insure the success of the mission.

Though we know ourselves and are well schooled in equipment and procedures, we can not progress far if we do not know the medium through which we operate, and all of its elements. These elements become extremely important as we change our positions geographically. And to cope with these elements successfully we must apply the rigorous requirements of air discipline.

It has been said that the greatest tragedy of our safety effort is that the greatest portion of all our accidents could be prevented by the crew flying the aircraft.

Lack of air discipline killed some of these men coming down from the Summit. It's as simple as that! ▲

REX SAYS:
FLY BY THE RULES

A young red-hot student pilot type took off from one of our Primary Training bases. He'd been briefed to practice air work maneuvers. Takeoff time was 1045 and at 1100, the base was notified that the T-28 had crashed near a small town.

An exhaustive investigation failed to reveal the reason for the crash.

Witnesses who saw the aircraft prior to the accident said the T-28 had circled town at about 250 feet. It then dove to about 100 feet, entered a climb and rolled to the inverted position. It crashed as the pilot apparently attempted a half roll recovery.

By questioning the pilot's friend, it was determined that he had been dating a young lady who lived in the outskirts of the town. As a matter of fact, our young Lothario pranged only 1000 feet from her bedroom window. It was all in vain, however, for she was not at home at the time.

★ ★ ★

This Air Route Traffic Control Center is experiencing an increasing problem of frequency saturation in the UHF band and a very noticeable disregard for adherence to reporting procedures by Air Force pilots.

"We have logged a large increase in the volume of military traffic in this area and are of the opinion there must be some remedy for the above situation.

". . . The following Special Notice is carried in the Radio Facility Charts:

"Voice Communication Procedure When Contacting CAA Centers:

"Effective 1 February 1956, all pilots are directed to include fix or geographical local in their initial call-up when contacting CAA Air Route Traffic Control Centers. Example: 'Washington Center, this is Air Force 12345, Huntington, over.' This procedure will enable those centers having communications channel shared by two or more sectors to immediately determine the sector location of the aircraft, thereby eliminating time-consuming oral coordination among controllers. CAA will not object to the use of the procedure when contacting airway communication stations.'

"It is imperative that this reporting procedure be emphasized to all pilots, since direct pilot to controller communication provides the fastest and most efficient method of the exchange of control information and in the near future will be the most accepted procedure for reporting and receiving control instructions. Unless the pilot states his position in the initial call-up, the efficiency of this system of communication is considerably impaired.

"Improper reporting procedures and exclusive use of Channel 6 UHF leads to a second problem: Frequency saturation of Channel 6. This causes a breakdown in communications which at times requires restricted traffic."

Rex Says — *The procedure has been in effect long enough that all should know it. The second problem is to make yourself use it. For a while, there was a problem of frequencies available. The Radio Facility Chart dated 28 March 1958 carries the following notice:*

"Unless instructed otherwise by ATC, aircraft operating on IFR flight plans below 27,000 feet will make their initial call-up and position reports to the Center on this (Channel 6) frequency.

"This frequency is also a back-up for each Center area discrete frequency. . . .

"NOTE: 'Discrete' frequencies are frequencies other than those listed in the above standard channelization."

As you will note in your next review of the High Altitude Facility Chart (19 March 1958 and subsequent). Different frequencies are set up for different Control Center areas. With the introduction of the ARC-34 UHF radios in some of our aircraft, it is possible for you to set up any frequency that may be required. Use of the frequencies designated can only result in better service to you.

★ ★ ★

An information copy of a message from the Commander, Air Defense Command to all subordinate commanders, came across my desk the other day. It reads:

"ADC has experienced two unintentional gear-up landings within the past four days. One of these resulted after several touch-and-go landings. The other occurred after the pilot had flown a simulated ILS approach.

"The gear-up landing usually stems from pre-occupation during the landing operation or an interruption of the normal pre-landing duties causing the pilot to omit an important part of his tasks. Unless commanders continuously and emphatically emphasize to their aircrews the reasons for the unintentional gear-up landing, this problem cannot be controlled.

"A strict compliance with ADC Operating Procedure by aircrews, mobile control officers, and chase crews is imperative. Pre-landing gear-down check point and gear-down transmission must be accomplished, or landing permission should not be given. Commanders of all ADC flying activities will immediately conduct the necessary educational program in order to eliminate the unintentional gear-up landing."

Rex Says — *Congratulations to Commander of Air Defense Command for his "Correct it now" policy and his prompt action in this case. This is a refinement of the "Find it—Fix it" idea—the timing is essential.* ▲

Research and Development must take in procedures as well as equipment and materials. For pilots who find themselves in unusual positions, here are some new . . .

Rules for

Captain William E. Wharton, ANGUS, 3565th Navigator Training Wing, Connally AFB, Texas.

The possibility of encountering an unusual attitude during instrument flight has long created icy feelings up and down the spines of aviators. Present all-weather operational requirements, the high performance of modern aircraft, and current tactical procedures have undoubtedly increased these possibilities. As a pilot your best life insurance is proficiency in normal instrument procedures sufficient to avoid unusual attitudes and the ability to apply effective recovery procedures when necessary.

Once an unusual attitude is encountered, the effectiveness of your recovery procedures will determine whether you continue with your flight plan a more experienced pilot or hurl yourself and aircraft against the mother planet. The advantages of a successful recovery are apparent.

Unusual attitudes are defined as any attitude of the aircraft not required for normal instrument flying. In actual practice, these attitudes may vary from an inadvertent 35-degree bank to complete loss of airspeed, altitude and ideas. By presenting procedures for recovery, this article is intended to assist pilots in avoiding the loss of ideas and retaining sufficient airspeed and altitude to keep from cluttering up the real estate. These procedures are the result of a recently completed project conducted by the USAF Instrument Pilot Instructor School. Since they are a departure from those presently outlined in Air Force Manual 51-45, "Instrument Flying Techniques and Procedures for Jet Aircraft," publication is accomplished here for rapid circulation pending the revision of the manual.

Some important background material must be firmly fixed in our minds before discussing procedures. We must carefully consider the factors which influence the developing and practicing of such procedures. A bit of honest soul searching reveals that one very important factor is the feeling of apprehension and confusion experienced by a pilot involved with an unusual attitude.

Furthermore, since unusual attitudes are just not practiced under actual conditions, "opportunities" to complete recoveries under actual conditions are widely spaced—as widely spaced as is humanly possible. Also, for aircraft equipped with only one set of controls, no practical method has been devised for simulated practice. The preceding factors establish the need for developing, practicing and learning procedures whereby instrument interpretations and aircraft control are as simple as possible.

The following factors must be considered when establishing the proper sequence for instrument interpretations and control responses. When in a diving attitude and banked beyond 90 degrees, back stick pressure will aggravate the loss of altitude and increase of airspeed. This back pressure and airspeed fixation are, in view of increasing airspeed and diving sensations, normal tendencies which unfortunately lure a pilot into slow bank corrections during a situation in which rapid, accurate bank control is the one most critical requirement. Forward stick pressure during moderate to steep climbs, another unfortunate normal reaction, will assist very little in regaining airspeed, will create uncomfortable sensations, and if the aircraft is inverted may lead to a very undesirable situation. Since a wing-over type of recovery is required for these nose-high attitudes, proper bank control is again of prime importance. While throttle responses need never be delayed due to a condition of bank which must be first corrected, we must note that power and pitch interpretations are very closely related and our procedures must provide for the important cases in which pitch responses definitely must follow bank interpretation and control. In view of the preceding, procedures are so designed that bank interpretation, and control if necessary, always precedes pitch and power interpretations.

The procedures that follow are for use with the J-8 and similar types of non-tumbling Attitude Indicators and fully utilize the instrument. Experience has shown that modern Attitude Indicators very rarely fail and will be properly functioning during the vast majority of unusual attitudes encountered. Attempts to recover by needle-ball-airspeed often lead to a split-S type of recovery or stalling the aircraft in a very nose-high attitude. An inverted spin or a split-S hardly qualify as acceptable recoveries. The following procedures will provide proper, safe recovery.

The First Step—Refer to the Attitude Indicator for the

Recovery

purpose of noting whether the position of the bank index pointer is in the lower half of the instrument case. Make an immediate bank correction to bring it toward and into the upper half. Since the bank index pointer moves opposite to the direction of control pressures there is a tendency to correct the wrong way on this instrument. You can consider this pointer as always pointing to "up" or as a so-called "sky pointer" and remember to roll towards the pointer to return to right-side-up.

Also, you can remember that if the pointer is on the right side of the case you must use right aileron and if on the left side you must use left aileron to return to right-side-up. A little practice using these memory gimmicks will result in very rapid, accurate bank corrections. When initiating bank corrections, make it a point to insure that the bank index pointer moves in the desired direction.

The Second Step—when you have insured that the above bank correction is properly initiated, determine (principally by reference to the Airspeed Indicator and Altitude Indicator) whether in a climb or dive. As previously stated, when the bank index pointer is in the lower half of the case, a pilot's main concern is proper bank control.

Until the bank is reduced to 90 degrees the best pitch control procedure is to hold just enough back stick pressure to keep comfortably seated. It is not desirable to make any deliberate attempt to determine the pitch attitude while the bank is more than 90 degrees. What little you gain by speeding up power response will be more than offset if you are lured into an improper sequence of pitch and bank corrections. The Airspeed Indicator provides a good reference for pitch attitude interpretation but the Attitude Indicator is also very useful.

The following memory keys are offered:

If the horizon bar and bank index pointer are separated by the miniature aircraft, the aircraft is in a climb.

If the horizon bar and bank index pointer are close together and not separated by the miniature aircraft, the aircraft is in a dive.

The Second Step (Continued) if Diving—Roll (or continue rolling) to wings level. Simultaneously reduce the power to idle and extend the speed brakes. Do not apply back stick pressure until the bank is less than 90 degrees. When the horizon bar and miniature aircraft fuselage dot of the attitude indicator come together, maintain a level flight indication and resume a normal cross-check. In aircraft having a pitch-up tendency due to speed brake action, and if the limiting airspeed is not likely to be exceeded, it is advisable to delay speed brakes until the bank angle is less than 90 degrees.

The Second Step (Continued) if Climbing—Roll to place the bank index pointer on the nearest 90-degree index mark. Simultaneously add full power. Maintain 90 degrees of bank and enough back pressure to keep well seated (avoid negative G) until the horizon bar and miniature aircraft fuselage dot of the Attitude Indicator come together. Roll out (remember to use aileron into the bank index pointer) to a wings level, slightly nose low indication and resume a normal cross-check.

In brief review, the steps for recovery are:

- First—Bank interpretation (bank index pointer) and if necessary, bank control to bring this pointer toward and into the upper half of the instrument case.
- Second—Pitch interpretation (Airspeed Indicator and Attitude Indicator) to determine whether climbing or diving and: *If diving*, correct bank and pitch attitudes to establish a level flight indication on the Attitude Indicator. Simultaneously reduce power to idle and, if desired, extend the speed brakes. *If climbing*, establish and maintain 90 degrees of bank, full power, and slight back pressure until the horizon bar and miniature aircraft fuselage dot come together. Recover to a wings level, slightly nose low indication on the Attitude Indicator.

Once again. Develop your instrument flying ability to a point where you can avoid unusual attitudes. If you do get caught short that's the time to know and apply the procedures outlined here. The instrument interpretation processes and sequences of control responses for these recovery procedures can be effectively learned in the synthetic trainer. Right now would be a good time to start becoming proficient. ▲

Major
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JET AGE DELINQUENTS

Moe hit Smoe over the head with his stone club. Smoe figured this shouldn't happen, even to a cave man, so he asked the big boss of the tribe to do something so Moe couldn't do it again. In this way LSPL (Lower Slobovia Public Law) number one was passed.

Ever since this occurrence men have been passing laws and rules by which to regulate and govern themselves. Some of these laws or rules were unpopular and/or unenforceable. The 18th Amendment was a good example of one of these. Most of the rules by which we govern or regulate ourselves, however, are good, necessary and carefully thought out before they become effective. This is particularly true of the rules that govern our flying.

These rules were not just dreamed up with the aid of a crystal ball. They were written only after long and tedious research, and study of facts gathered from experience. These flying rules can irk us at times, like sitting in the cockpit for three solid hours with the APU plugged in, waiting for an IFR clearance.

What we sometimes lose sight of is the fact that these flying rules were passed to protect us. "Us" means everybody who flies, and today that means many more bodies than somewhat.

Obviously, rules can be broken. Just because "they" say in a written regulation that you can't fly closer to a cloud than 1000 feet vertically on a VFR clearance is no sign that you can't—because you can. If you do, you'll break the regulation. If you break the reg, you may be punished, if caught. Worse (sob), you may be killed.

That's what happened to this pilot. This one was a 3000-hour-type with over 500 jet. A senior pilot.

Weather briefing at point of departure was "comprehensive." The pilot requested a VFR climb to 10,000 because the standard jet departure for the base concerned was north, and he was going south. This was approved.

After takeoff and while climbing on course, the pilot requested an unrestricted climb to 35,000 feet. This was disapproved because of other traffic. Sometime later the ARTC Center, concerned, asked the pilot—through one of its range stations—for a position report. He reported "approaching (a fix) at 15,000 feet," and again requested an unrestricted climb to a higher altitude. This was again disapproved because of other traffic.

At this point it is almost certain that the pilot was in solid instrument conditions in violation of AFR 60-16. Pilot reports had placed solid weather between 14,000 and 27,000 throughout the entire area and ground stations were reporting ceilings of 400 to 800 feet. Shortly after giving his position report, the pilot received a very complicated and detailed clearance involving four radio fixes, a route other than the one he had planned, three altitudes, two headings and all to an intersection he had never heard of. Three minutes later the aircraft crashed in a 60 degrees dive. The pilot apparently made no attempt to eject.

The Board rightfully came up with the finding of "undetermined" as a primary cause factor because the real cause of the accident could not be proven. However, one will get you ten that the aircraft got into an uncontrollable maneuver while the pilot was vainly searching the Radio Facility Chart for the unfamiliar intersection of two radials of two different Omni stations to which he had been cleared. He had been cleared to the intersection VFR (on his own word) to climb in the holding pattern to a higher altitude.

Let's analyze a little. The intersection to which the pilot had been cleared *was* in the Radio Facility Chart although there were 23 other intersections on the same page. The pilot *would* have found the one he wanted, though it might have taken a little time. But if he had actually been in the clear—like he said he was—he could have circled and kept control of the bird while he was looking. Chances are he would have rightfully refused the clearance when he found out it was the intersection of two Omni radials; he had only one Omni receiver. This he could have done and requested different climb instructions—if he had actually been in the clear. SO! What's the answer? A tragic accident—a senior officer killed, an airplane destroyed — all because of a "small" breach of air discipline.

Sometimes a trite phrase *is* good and so let's mention our "diminishing" airspace. (Actually, I found out, the airspace is as big as it ever was but now there are just more airplanes in it.) At any rate, as the crowd aloft gets bigger it becomes more and more important to one and all that one and all play by the rules.

New rules and procedures are being formed to meet this situation. The continental control area is an excellent step toward tighter supervision. However, it still hinges on one thing and that's the black box with a brain we call a pilot. The people on the ground can make rules 'til the Sputnicks come home but if pilots don't follow those rules, they're useless.

So, the next time you are tempted to break the rules "just a little," remember that breaking rules is like being dead. There isn't any such thing as "just a little." This is Air Discipline. ▲

Hot weather causes all sorts of things. For one, this little doll heads for the water. Hot weather also causes hot runways—which in turn causes hot tires—which in turn causes increased stopping distances. Heed the story beginning on Page 18, or, like her, you may be "Off The End."

REDUCE THE ACCIDENT RATE IN 1958

MAL FUNCTION

Medic labors many years
Bending pilots' tinny ears.

AL FORTUNE

"Watch your diet," is his fix.
"Altitude 'n beer don't mix."

"Starch and fats and olive pies
"Swell the midriff giant size."

Mal ignores the words of Doc
Likes to gobble kraut 'n Bock.

Behold him now with anguished look
Plane's too small, Mal's all shook.

*U.S. GOVERNMENT PRINTING OFFICE 441796