MARCH 1958

FLYING SAFETY

UNITED STATES AIR FORCE

Lieutenant General Elmer J. Rogers
The Inspector General USAF
Department of the Air Force

Major General Howard G. Bunker
Deputy Inspector General
The Inspector General USAF
Department of the Air Force

Major General Joseph D. Caldara
Director of Flight Safety Research
Norton Air Force Base
California

Colonel Daniel M. Lewis
Supervisor of Flight Safety
Publications

Lieutenant Colonel Ralph R. Springer
Chief, Editorial Branch

•

Editor
Major Vernon R. Stutts

Assistant Editor
Major Francis D. Hessey

Managing Editor
William Johnston

Art Editor
M/Sgt Steven A. Hotch

Production
Major Ben H. Newby

Editorial Assistant
Amelia Askew

Distribution
WO Robert Blum

•

Volume Fourteen

Number Three

•

SUBSCRIPTIONS—FLYING SAFETY is available on subscription for $2.50 per year domestic; $3.50 foreign; 25c per copy, through the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Changes in subscription mailings should be sent to the above address. No back copies of the magazines can be furnished. Use of funds for printing this publication has been approved by the Secretary of the Air Force and the Director of the Bureau of the Budget, 18 July 1956. Facts, testimony and conclusions of aircraft accidents printed herein have been extracted from USAF Forms 14, and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in the Flying Safety Magazine. Contributions are welcome as are comments and criticism. Address all correspondence to Editor, Flying Safety Magazine, Deputy Inspector General, USAF, Norton Air Force Base, San Bernardino, California. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from FLYING SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will insure complete accuracy of material, amended in light of most recent developments. The contents of this magazine are informational and should not be construed as regulations, technical orders or directives unless so stated.

editor's view

The job of accident prevention, like many others, entails an endless search for new angles. New ways to attack the problem. New programs and procedures must be tried to get the message of safety across to everyone in the Air Force and industry. Many times we fail because we don't really identify the problem before we start looking for ways to solve it. Many more times we find we have a measure of success and don't really know just how that success was attained. Therefore, when we want to repeat the magic formula that gave us a particularly good month or week, accident-wise, we find we can't put our finger on just what it was that we did. We know we did right, but what was it?

This might sound like a bunch of malarky, but if each of us will take a few moments we can remember many instances when we've asked ourselves the same question, not only in work but equally often in sports. Did you ever get off a particularly good drive in golf or lay that perfect backhand passing shot right on the chalk mark then stop and ask yourself, "What did I do that time that I don't usually do? What did I do right?" Or, have you ever heard your wife ask herself why the piecrust is just right this time and not the last? I think we've all had similar experiences.

The point is that in the flight safety business we've got to be right all the time and we have to know when we are. And we have to know how to repeat our right moves so that our accident rate will grow progressively lower. Let's keep on looking for those right moves and when we find 'em let's hang on to 'em so we can use 'em again. Keep a record of all your efforts toward aircraft accident prevention. Analyze their effectiveness against the results obtained to the best of your ability. Then drive hard on the proven methods while looking for even more effective ways to do the job. Rex has this in mind when he asks the pilot on the back cover, "What did you do right?"

Vernon R. Stutts

contents

USAF PERIODICAL 62-1.

CROSS FEED

LETTERS TO THE EDITOR

Deceleration—Acceleration

I was reading through the fine article entitled "What About Today?" by Col. A. M. Henderson, and noted the portion devoted to parachute opening stated, "At 7000 feet the opening acceleration is 8 to 9G, whereas at 40,000 it averages 33G." A free fall, however, from a higher altitude to 7000 feet (with gradual reduction in terminal velocity) followed by parachute opening would bring about deceleration rather than acceleration. Doing a little research, it was found that a free falling body is traveling 180 feet per second at 7000 feet altitude. The descent speed after parachute is fully open at 7000 feet is 17 fps, therefore the body will decelerate from 180 fps to 17 fps during parachute deployment. "G" forces encountered would be from deceleration rather than acceleration.

A nitpicker I am not, but to clear some of the existing confusion which is exhibited daily during classes at our unit on parachute opening shock is the sole purpose of this letter.

S/Sgt Jimmy L. Whitley
Physiological Trng. Unit
Langley AFB, Virginia

Depends on how you think of it. The G force felt by the body is caused by the acceleration of the body as it is thrown against the harness. This acceleration is caused by the parachute canopy which is decelerated by the shock of air upon opening. Simple, no?

Operation Fast Switch

Knowing how to switch channels on the UHF set without looking at the indicator is quite important in weather flying. To do this in any aircraft, try this procedure first on the ground by looking at the selector and then with your eyes closed until you are proficient.

Turn the selector to Guard Channel. Note that the indicator knob is in the vertical position with respect to the bottom of the panel. In the T-33, the knob is aligned in the wingtip-to-wingtip position. Next, select Channel 5. You'll find that you've turned the knob exactly 90 degrees. Channel 10 is again in the vertical position and Channel 15, like 5, is in the horizontal position.

With this system you can feel the knob for Channels "G", 5, 10 and 15, and you're never more than two click stops from the desired channel. It took me about five minutes to master the UHF set in the T-Bird.

Capt. Robert D. Hook
Area "B," WADC,
Wright-Patterson AFB

Sounds like there may have been method in the madness of channel selection!

Active Doctors

I fight a steady battle to get our doctors more interested and more active in the flying programme.

Would you please send me AF Regulation 160-109, Medical Service, Medical Investigation of Aircraft Accident Fatalities (October 1956) plus a copy of Physiological Near Accident Report, introduced in ATC (Flying Training Air Force.)

Bent E. Amled
Major, Royal Danish A.F.
Vedbaek, Denmark

You shall have them! Best wishes to all of our friends in the Royal Danish Air Force.

K-2B15 Cotton!

While reading the August '57 issue of FLYING SAFETY, a paragraph in the File Thirteen section caught my eye. The statement is made that the K-2B Flying Suit was made out of nylon and had been withdrawn from use.

The original K-2 and K-2A Flying Suits were made out of nylon material but the K-2B suit has always been made out of cotton twill material and is still a standard item of issue.

I would also like to thank you for a very fine issue dealing with personal equipment. It not only stresses the importance of items that most aircrew members sooner or later take for granted, but it points out the great responsibility that individuals in the personal equipment career field have toward the rated and non-rated flying personnel.

T/Sgt. Norman L. Panzer
449th FIS, APO 731, Seattle

You are so right about the K-2B suit, Sarge. The proofreaders missed it. Thank you for your kind comments about FLYING SAFETY.

Bird Trap

Thank you so much for your very valuable help. I find the Special Study Kits very useful. There is one more thing that I need your help on.

We've had fatal F-84G and T-33 accidents because there isn't any crash barrier at the end of our runways. In FLYING SAFETY Magazine I read many things about it. But I couldn't find any technical information. I wonder if it's patented; if it isn't, is it possible for you to send me the technical data about it. We have old chains in the Navy and I think I can find some steel wire and maybe I can use some thick rope for the net. I know it may be a very difficult job to perform alone. But with a little understanding I believe I can do it.

Lt. Sadi Kaban, Flying Safety Officer
Hv. Egt. Kor. K. 2 Filo
Gaziemir-Izmir, Turkey

Your letter was forwarded to the Foreign Release Branch, WADC. Perhaps by now you've rigged up a trap to catch those birds.

Ingenuity

The technicians in our Personal Equipment shop have developed an ingenious little gimmick that increases the comfort and facilitates the operation of fitting the oxygen mask equipped with the MC-3 Connector.

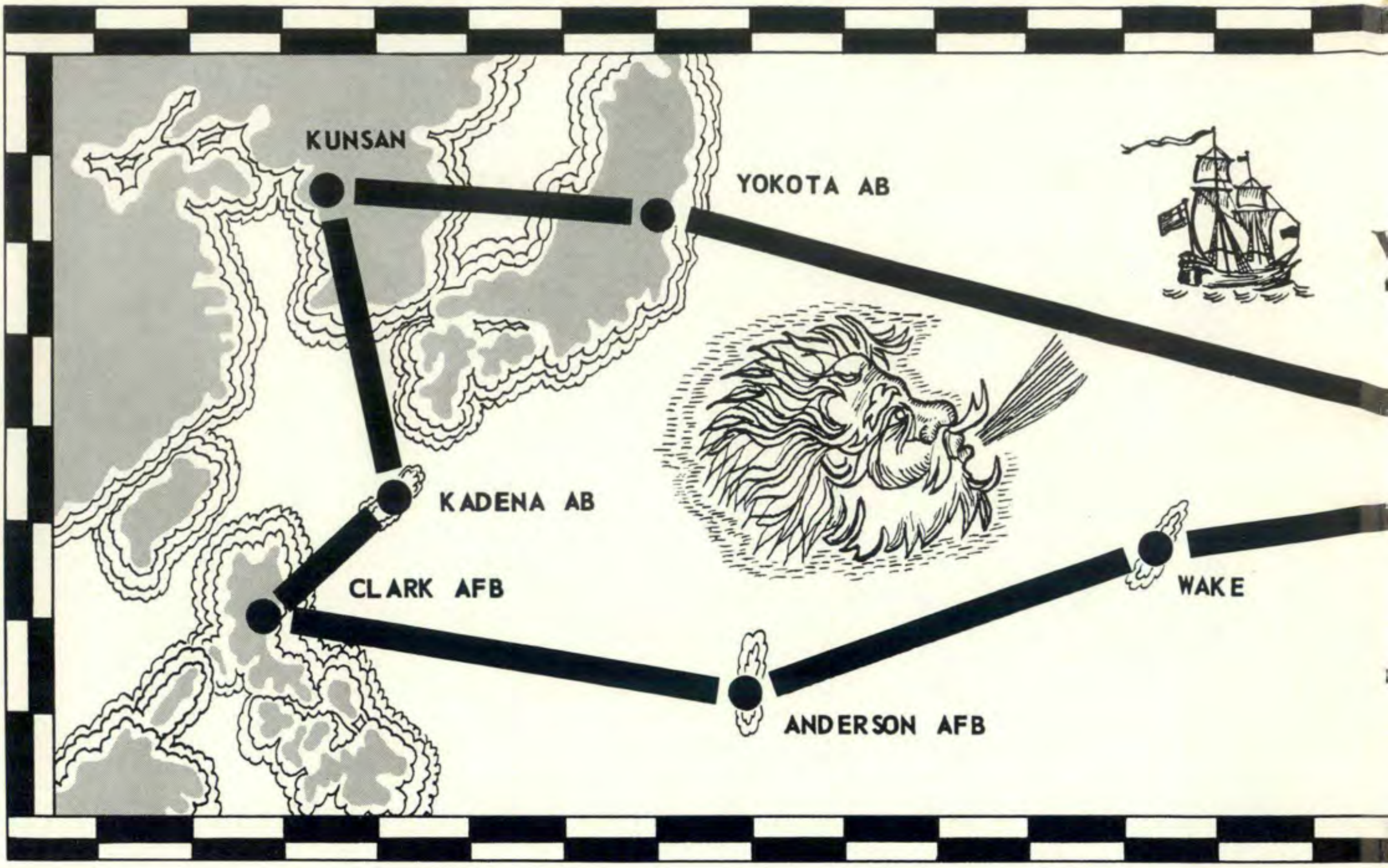
It consists merely of a piece of "U" shaped, spring steel that is pinched together and inserted in the end opening of the connector, and then released. The clamp holds the valve open, thus allowing the individual to continue breathing (very desirable function under most circumstances) while the mask is being fitted. When the springs, which are lightly coated with rubber cement to prevent scratching, burring and so on, are withdrawn, the valve returns to normal operation . . .

Capt. John M. Dore
FSO, 3750th TT Wg (ATC)
Sheppard AFB, Texas

Kudos to T/Sgt Urbank and the others for putting their ideas to work!

THE COVER

Our Art Editor, Steve Hotch, figured that the average Air Force supervisor often had to be something of a juggler to make his men and machines add up to mission accomplishment. With this in mind he fashioned the stylized figure for this month's cover. We figure he's hitting pretty close to the truth because we don't recall seeing a good supervisor who wasn't a very busy boy. Admittedly, some of his projects are up in the air, but like the juggler he has only two hands. Handling everything in its proper turn is the method of most good managers.



Maj. Wesley S. Mink,

"MOBILE

On 12 November the 386th Fighter-Bomber Squadron left home, Cannon Air Force Base, New Mexico, for George Air Force Base, California, and on the 13th took off from George on Operation "Mobile Zebra." Its mission was to deploy to an overseas theater and to fly combat profiles in a sustained operation. Twenty-one F-100Ds took off from George, five as spares. The sixteen primary aircraft completed the mission and returned to George on December 6th.

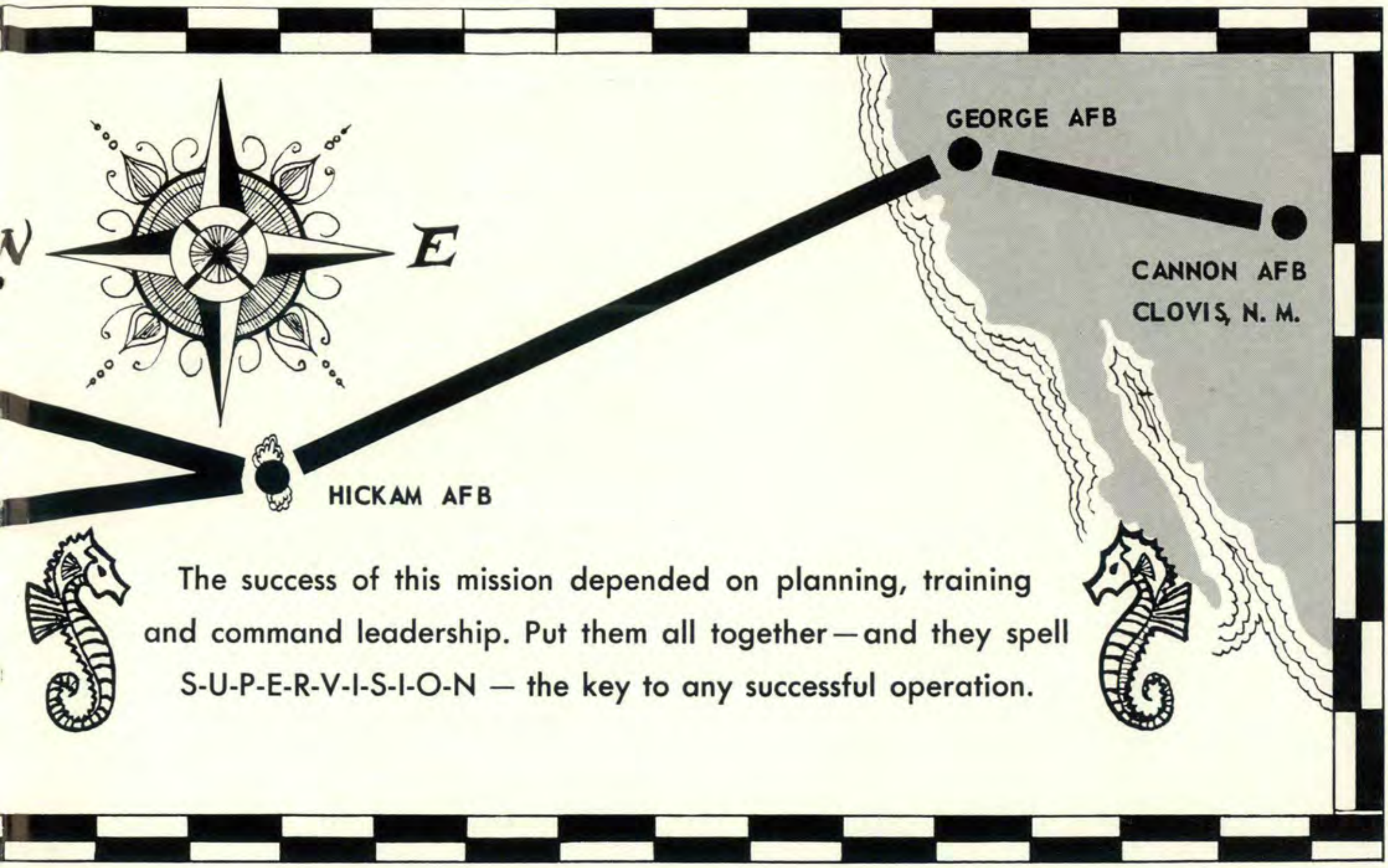
In the 24 days they'd been gone, sixteen airplanes had flown 785 hours in 12 flying days, covering a distance of 19,047 miles. The operation was a complete success, flown without accident. Not only that, two records were set. One was on the leg from Yokota AFB to Honolulu, six hours and twenty-one minutes, the fastest time ever recorded for this flight.

A second record was set for the flight from Honolulu to George. The first flight of nine aircraft made the 2640-mile trip in four hours and twelve minutes. The second flight of eight took four hours and thirteen minutes. It was the first time a combat ready force of this size broke two speed records consecutively while flying a combat profile.

How did the 386th do it? Why were they picked to fly the mission in the first place? "Because we've got the lowest squadron number in the Wing," the Squadron Commander, Major Ray L. Obenshain grinned. But the fact of the matter is, the 386th has always had a reputation for doing things right.

What's the right way to take a combat ready fighter squadron half way around the world without an accident, busting a couple of records on the way?

"Pre-planning," said Colonel Arlie J. Blood, Commander of the 312th Fighter Bomber Wing, who flew the mission with the 386th. "You've got to fly the whole mission, every step of it, before you get off the ground."



Research & Analysis Div., DFSR

ZEBRA"

"Pre-planning," said Major Obenshain, who made the trip too. "You have to go completely through every phase of the operation before you leave, through every leg of the flight.

"For example," he pointed out, "We flew simulated profiles of each leg of the trip. We had pictures of every place at which we planned to land and we really had to scramble to get them. But the scrambling paid off. No matter where we went in, although it was to a new base, there were familiar landmarks. And terrain on which we'd all been briefed. We had complete maps for every area. Further, before we left, we practiced in the Link every possible letdown we might need—all possible letdowns to every destination and to every alternate base."

Before we left—that's when this mission was made, that's when they tied it up and put it in the bag. From beginning to end, the keyword and the theme of the mission was pre-planning, command leadership and thorough supervision.

But far above everything else that contributed to the 386th's successful part in "Mobile Zebra" is the fact that from beginning to end, the big wheels went along, and not just for the ride. The 386th's success began with Colonel Blood's philosophy of leadership. You can't lead if you're not there. You can't supervise a letdown at Kadena from a desk in Clovis. You've got to be where the problems are.

There was another command decision that set the character of this mission: The decision to take the squadron as it existed, as it would have to go under combat conditions, with the planes and men available. There wouldn't be any stacking of the deck, no borrowing of pilots or equipment from next door. This meant not that you'd set minimums and scramble for men and equipment to meet them, but that you'd have to take what planes and

men and equipment you had and work them up to meet the requirements you'd set.

It meant that the squadron had to be readied long in advance of takeoff time. Everything and everyone involved in the mission had to be in first class shape. And that's where the planning began that paid off in success.

"We sat down and figured out what we'd have to do to make it," said Major Obenshain, "and then we did it."

Take the pilots. Five of the squadron's pilots were barely out of flying school. But the decision had been made to take them all along. So pilot minimums were established. Each would have to have a hundred hours in the F-100D. He'd have to have made at least eight night letdowns, one strange field letdown, eight eight-ship formation profiles with two instrument letdowns and two refuelings; ten GCAs, ten ILDs, five DF steers with letdowns, thirteen dry hookups and seven wet.

He'd have to know his plane and its systems. He'd have to know his personal equipment. He'd have to be in the best possible physical condition. So a pilot training program was established that foresaw the demands that might be placed on the pilots during the operation and one that met them in advance.

Pilots were briefed not only on the areas in which they would fly and on the profiles of targets assigned to them, but on escape and evasion, emergency procedures concerned and what would be done in every emergency that could be foreseen.

"We insisted too," said Major Obenshain, "on all our officers knowing their planes, really knowing them. In Okinawa, for instance, battered by typhoons Kit and Lola when we got there, only five or six maintenance men were available. Our pilots changed wheels, packed drag chutes and so on. Their know-how really paid off in a fast turnaround."

Then take the planes. Long before the 386th left Cannon, the total time needed on each aircraft was worked out and an inspection schedule programmed so that no periodic inspections would have to be made en route. The published flyaway kit was not adequate for their plans. This was amended by the squadron and added to on the basis of its training experience.

What's the right way to take [illegible] squadron half way around the world? Col. Arlie J. Bloou, ..iow, Commander, 312th F-B Wing, knows the answer to that one. He's qualified. Why? He did it!

Further, performance data on the F-100D, with two 450-gallon drop tanks was not available. This meant the squadron had to work out its own performance data and this was no small job. Data were maintained on all simulated profiles flown by the squadron. Never on any leg of the flight was the actual fuel consumption off more than a few pounds of the amount predicted.

Then, finally, take the operation as a whole as it was flown. You read the final report of the squadron's participation and repeatedly find the words and phrases that keynote leadership and supervision and tell with unequivocal simplicity of all the hours spent in planning, in training and in practice: . . . *arrived without incident . . . made a rendezvous with tankers . . . rest of the flight to Hickam was uneventful . . . made rendezvous at Midway . . . refueled without incident . . . rendezvous over Wake . . . refueled without incident . . . proceeded to Guam without incident . . . all bombs expended on target with excellent results . . . all aircraft recovered at Yokota . . . made rendezvous with tankers and landed at Hickam . . . both sections made excellent rendezvous with their tankers . . . no accidents . . . effective operationally, logistically and administratively . . . proved the concept for rapid deployment.*

There were no accidents. There were, however, a number of incidents which could have been worse. And here again, considering these, you can see where the planning, the training and the leadership paid off. The report continues:

"Shortly before takeoff for Hickam on 13 November we received a message . . . that two F100Cs from another unit would be given priority on the tankers even at the cost of not getting all of the 16 primary F-100Ds to Hickam. When first contact was made with the tanker aircraft, it was learned that due to an air abort there would be only nine tankers. This left the second section (of F-100Ds) without a spare tanker.

"The first section made rendezvous with their tankers but let down short due to erroneous rendezvous information received. Seven F-100Ds made contact and received fuel. One F-100D returned to George due to a heat and vent overheat light that came on while he was attempting to refuel.

"But the pilot had been [illegible] in advance on what to do if this particular emergency came up. He left the flight and returned without incident to George, while the second section made a good rendezvous with the tankers and all eight aircraft received fuel. The spares returned to George, as there was no spare tanker. The rest of the flight to Hickam was uneventful. Fifteen F-100Ds arrived . . ." And if the F-100Cs hadn't taken the spare tanker, sixteen would probably have arrived at Hickam as the squadron had planned. The sixteenth primary F-100D and the seventeenth (a spare) arrived at Hickam the next day.

Another incident took place on 18 November on the leg to Guam. "The second section made a good rendezvous at Midway and refueling was almost completed when 'Income Gray No. 1' tanker flew through the propwash of the preceding tanker while his fighters were hooked up. The result was a broken canopy on the fighter and a bent probe on the other." And once again there was no confusion. Following pre-established emergency procedures, the two F-100Ds landed at Midway for repairs, later rejoining the squadron in the Philippines.

The third incident took place shortly after refueling over Wake. After dropping the tankers, "it was noticed that one of the fighters was syphoning fuel overboard. The pilot was unable to correct this condition . . ." The pilot was the Wing Commander, Colonel Blood. But once again there was no strain because, as the Colonel reported, "I didn't have to think about it and make a choice between alternates. We'd decided in advance just what to do in a case like that—worked it out in terms of where you'd be and how much fuel you had. Of course, we didn't anticipate the immediate cause—there was a rag in the forward tank or a piece of canvas—but we'd anticipated the general situation and all I had to do was check the emergency procedure and go ahead. As soon as my drop tanks were empty, I let them go and climbed to altitude—and that was all worked out in advance for me—I got to the altitude at which I could make the destination.

"Another pilot in my flight dropped his tanks too and went along with me because that was our predetermined emergency procedure too and we went on to Guam without any further incident. Believe me, I was very happy at the time that we'd foreseen this particular type of emergency."

What else had they foreseen? Well, they'd foreseen that they'd deploy with 91,721 pounds of supplies and equipment and re-deploy with 3773 pounds less than that, and they did. They foresaw that they'd need some line items that hadn't been authorized and "because of our experience in air refueling training, these items were thought to be necessary," so they took them along: Two canopy seals, two canopies, six IFR probes, two slats, two RH flaps. And they needed them, as they'd foreseen.

They foresaw too that no matter how well they might plan, they might need something they hadn't brought along with them. So they planned for that, determined in advance the nearest point to which they'd go for whatever items they might have to have. There were two AOCPs. One part was airlifted from George to Hickam in 24 hours. The other came from Itazuke to Yokota in 17 hours. Everything else had been foreseen. There were no engine changes during the entire operation. There were no personnel shortages. Everything worked like clockwork.

Away from their home base, relying on local facilities wherever they happened to be and whatever they were (and they were uniformly good), the 386th methodically hacked away at its mission. The squadron logged 785.05 hours of flying time; 389 total sorties; 15:50 hours were flown at night, 165:30 on instruments or in weather. And speaking of weather, there was lots of it and the minimums established were realistic.

They departed on December 3 from Yokota Air Base on the first leg of the flight home. This 3900-mile trip was the longest leg of three before reaching home base at Cannon.

On 4 December the squadron departed Hawaii with their seventeenth member for George. The first section consisting of nine aircraft, departed Honolulu International Airport at 0730, followed 20 minutes later by the second section of eight aircraft.

This was the climax to their part in "Mobile Zebra"; this was the conclusion of one more successful flight. This was the result of planning, training, leadership. And that's what buys a roundtrip ticket home. This was in the citation recommending the 386th Fighter-Bomber Squadron for the Mackay Trophy. And that, we'd like to be able to report, is the happy end of the story. ▲

OSS

OPERATIONS SAFETY SURVEY

"He elected to steer the B-58 off to the side of the runway."

To many of you the abbreviation "OSS" still stands for the cloak and dagger outfit which was so effective during World War Two. To those of you who've come into contact with one of the Operations Safety Survey Teams of the Directorate of Flight Safety Research, the letters have come to mean quite another thing entirely.

OSS—CIRCA 1940's

Far from being part of an undercover agency, these teams make a fetish of bringing accident-inducing hazards to the light of day. This information, when properly used and followed up, can be a potent instrument toward lowering the flying accident rate on your particular airpatch.

For instance, here's how one of these team visits paid off for Kirtland Air Force Base as recently as last November. The visit of the team to Kirtland had been requested by Maj. Gen. William M. Canterbury, Commander of the Air Force Special Weapons Center. Among the many suggestions and recommendations made by the team was one which led directly to the saving of a very expensive aircraft.

Specifically the team pointed out that drainage manholes throughout the airfield constituted a hazard to any aircraft leaving the runway or any prepared surface. Many of these manholes were almost hidden by brush and most of them, as a result of erosion, protruded four to six inches above the level of the surrounding terrain.

The team recommended that the approaches to these manhole drains be filled in and stabilized. Air Installations made the necessary repairs within a few days. And none too soon, for one of those one-in-a-million-chances came through.

A B-58 landing on the main runway lost its wheel braking action, normal and emergency. The drag chute deployed but had little effect. The pilot found himself staring over the end of the hard surface. He elected to steer the B-58 off to the side, counting on the softer surface to furnish enough wheel drag to stop him. (His other alternative was to leave the end of the runway straight ahead and go down a steep slope.)

His prompt action paid off and the bird came to rest, with no damage. There wasn't even a blown tire or a bent fairing door! And sure enough, the left main wheels passed directly over one of the manholes.

Chalk up a save for what looked to be a fairly minor point in the overall team report. After all, the drain was over a hundred feet from the edge of the runway and the odds were heavy against an aircraft wheel's ever finding that path to take across the tumbleweed area.

Unfortunately, prompt and positive command action is not always in evidence as it was at Kirtland. At an eastern base recently, similar recommendations by an OSS team did not result in adequate action and there is now one less T-33 in the USAF inventory. In fact, the commander involved sought to place the blame on a civilian construction crew—claimed the T-Bird came to rest in an unauthorized hole. However, the OSS team had also recommended strict control of all vehicular traffic and construction on the airfield.

Operations Safety Survey teams are not exactly a new gimmick. They've been in existence since July, 1955, when the first team was formed and paid a visit to Tinker AFB, Oklahoma. Since that time they have called at 28 bases, including some in Europe and in the Far East.

Physically, the teams consist of from 10 to 20 members. Members of the teams are chosen from among the personnel of the Directorate of Flight Safety Research and sometimes from industry. The background of the members will depend of course on the mission and aircraft of the base to be visited. On the average, the team will spend about two days per tactical squadron at any one station. At the end of its day, a critique is held and a report is left with or sent to the commanders concerned, as soon as the paper work can be finished.

OSS—TODAY

It should be made clear that these teams have no inspecting job to do. They are sent out to furnish help and guidance to supervisors in the field. If the visited commander keeps this in mind throughout the team's stay, the results are sure to pay off. It is only through full cooperation on both sides that the job can be done.

There are three ways by which a team might visit your station: By your request; by request of the Chief of Staff of the Air Force and as thought necessary by the Director of Flight Safety Research. No matter what prompts their visit, a wise commander should be ready to take advantage of the help they can give and put out a welcome for the OSS. ▲

The main left wheel passed directly over one of the manholes and there wasn't even a blown tire or a bent fairing door.

Somebody Else's Sky

Blind reliance on habit is not the answer when flying aircraft. When you know you are right, double check.

Lt. Col. William L. Anderson, First Missile Div. Inglewood, Calif.

After takeoff the C-47 gently nosed down to an angle of 20 degrees and struck the ground at 120 knots. The pilot and copilot were killed. There was no materiel failure and both engines were operating. The weather was VFR and the winds calm. In fact, the takeoff had been routine.

Such accidents, springing from obscure and puzzling circumstances, ordinarily require talents of an engineer, logician and humanist in the investigator. In this case an accurate reconstruction was possible because pilot-passengers survived to provide the necessary facts. So let us go back to the beginning and follow the event from the filing of the clearance to the finality.

This accident really began on the ground. It began in a sense on the drawing board. For the most part, it began with a habit too long in the possession of a crewmember. The pilot had over 3000 hours, the copilot even more. The '47 was in excellent condition. The pilot, newly assigned, was under a stress, for one of his passengers was his division commander—a senior colonel.

The copilot was seasoned. He'd flown the '47 a great deal. However, he had one disquieting characteristic. He tried to do cockpit procedures too rapidly. Somehow he was reminiscent of the fast-acting youngster just out of flying school but he lacked the easy dexterity of youth.

Engine runup was routine. Mags dropped less than 50. Controls were free. With the tower's okay, the throttles were advanced and the Gooney rolled smoothly down the runway with just a little tail-swishing. At the second marker the bird lifted easily, wheels came up and a nice attitude was established. The pilot began to feel that flow of confidence that comes when things are going so right. Besides, the old man was in the back end and it would be nice to give him a good ride.

Power was eased back and the props initially adjusted for climb to cruising altitude. The pilot reached for a cigarette and gave it a couple of taps on his GI watch. It would be only forty minutes to destination.

In the passenger compartment, the old man was enjoying the luxury of the recently installed airline-type seats. Like most pilots, he really didn't like to have some other gent doing the driving. But things were going okay and he was looking forward to getting home. The trees and buildings of the vast base beneath were slowly going out of view as the plane purred toward the shoreline.

Then, an unexpected, but a slow, positive power reduction was felt in the passenger compartment, an unnatural quiet instantly recognized. The vibration of the climb was missing. A glance out the window and the ground was

coming back. Everything seemed ridiculously routine. It was just as if they were on final. The trees were coming closer and the wings were level.

There was no panic; you just wondered if the impact would be at a slight angle so the bird would slide along. Of course there was concern over ground obstructions. But as may be the case in every like situation, the passengers were supremely resigned to the crushing inevitability of what was about to happen. To sit there, helpless in the clutch of events, produced a complete and passive acceptance. There was no fear.

The pilot and copilot were fully engaged. As the ground came up, closer and closer, their eyes were glued to the instrument panel. Each knew something was wrong—each desperately searching for the cause—each entranced! The more pressing became the circumstance, the more hardened the hypnotism. There was not even a realization of the attitude of the plane. Neither looked out the window and neither realized the closeness of the crash. The grip on each man's attention was complete. Each head was inclined over the wheel, vainly searching, almost as if in prayer.

We know what was wrong. Instead of making a second climb adjustment to the props, the copilot had retarded the throttles. As it had to happen sooner or later, a habit caught up with him. He'd been flying a B-25 and its prop controls are in the middle of the quadrant. On the Gooney Bird, however, the throttles are in the middle. So it was simple. All this accident needed to make it happen was a guy with a B-25 background, who liked to be in a hurry. When he reached up and snatched back the throttles, entrancement settled in on both drivers.

The C-47 impacted about a mile from the end of the runway. At 120 knots, the pilot's compartment was badly crushed. There was no fire in spite of a full fuel load. The passengers were uninjured.

One thing is incorrect about this account. The accident *did not* happen. Seconds before the impact, one of the pilot-passengers rushed forward, leaned over the pilot and shouted, "THE GROUND!" and grabbed for the wheel. Instinctively, the pilot, aroused, pushed up the throttles and the old bird responded. The ground was almost brushed. A row of trees was skimmed.

A couple of jiggers of hypnosis, a dash of cockpit standardization flavored by a slice of the rush act—and you have it! As the ol' Gooney Bird finally passed the 2000-foot level and then the 3000, everybody on board breathed easier—even the copilot. He too breathed easier . . . and a lot slower. ▲

The★BEST★Squadron in the Air Force

Colonel Russell E. Schleeh, Director of Safety, 15AF, March AFB, Calif.

Today we are faced with many complexities of life which tax our very existence. As opposed to this, we are also living in an age in which technological advances and scientific progression in general have provided us with the luxuries of life which were never dreamed of by our forefathers.

Progress during the past few decades has been astounding, and there is no limit to scientific achievement in the future. Man will probably be traveling thoughout the universe in the not too distant future, providing he is able to cope with the intelligence of the man-made machine.

It is unfortunate that we are occasionally destroyed by the machine which was conceived and built by man. If this is the case now, is there any hope for our survival in the machine age of the future? If man's scientific progress provides him with the know-how essential to design a machine or a weapon, he certainly has the intelligence to safely control that machine or weapon. There is no limit to man's ability, providing he educates his mind and learns to accept the proven doctrine which is the result of experience.

You, as the squadron commander, have direct control over the destiny of your crews. You are the leader. Whether you are the commander of a squadron of our present day Air Force or are destined to command a space squadron of the future, the safe accomplishment of your assigned mission is directly related to the degree of training, supervision and air discipline which exists in your unit. These three factors are essential to the effectiveness of any unit and will insure successful accomplishment of your mission.

You are the key man in your organization. You must set the example and guide your personnel in this manner. You must demand compliance and obedience to basic doctrines. When this is realized, you will have a professional unit and can say, "I have the best squadron in the Air Force."

I have found that one of the main problem areas in every organization is a failure to get the word to the troops. The old saying which has been around SAC for some time now, "Some people never get the word," is more truth than fiction.

The personnel in your squadron who are not getting the word can be the nucleus of a serious accident potential. Those people may be either aircrew or maintenance personnel. Regardless of any reason which may exist for their lack of knowledge, it is basically caused by a supervisor not doing his job.

In a few cases, I have observed that even the squadron commanders have indicated a lack of interest in certain areas of dissemination, the most critical area being current accident information. We cannot prevent repetition of personnel error type accidents unless the facts concerning the accidents are adequately disseminated. In the first place, we want to avoid accidents. If a preventable accident does occur, we certainly cannot afford to allow a repetition of the same type of accident.

I have heard many of our personnel say that accidents are inevitable. As long as we have airplanes we will continue to have accidents. This is one of the most overworked phrases in the Air Force today. It wasn't but a few years ago when Strategic Air Command was working toward an all-time low accident rate of 25. By this I mean 25 accidents per 100,000 hours of flying time.

This accident rate of 25 was established as an irreducible minimum. Strategic Air Command did not accomplish its objective this particular year, as the end rate was 30. After a thorough study of what the statisticians considered to be the accident potential, they determined that a rate of 25 was still the irreducible minimum. So, this figure was used as the ultimate goal for the following year.

When that year ended, they were amazed that the over-all SAC rate was down to 18, which was well below the figure they considered to be the irreducible minimum. The accident rate has continued to drop each year until our present day.

We cannot establish any irreducible minimum accident rate other than zero. This is our goal for 1958 and we will not accept anything else with respect to personnel error type accidents. If we could have eliminated the avoidable personnel error accidents this year, we would now have an accident rate of one.

The solution to our 1958 goal is very fundamental and demands your full support. Your flight crews, maintenance personnel and supervisors must do the job in a professional manner. When this becomes a reality, such accidents as those caused by hasty action, lack of knowledge of the technical order, non-compliance with established directives, maintenance malpractice and supervisory deficiency will not occur.

In our Air Force of the future, aircraft will become more complex and speeds will increase to the extent that any personnel error will most probably result in disaster. This is basically true today when we consider the performance of our highly complex aircraft. The saving of life and equipment is as important to our present day mission as it will be in our mission of the future.

Our combat potential is directly related to the capability of our weapons system. I include as part of the weapons system the combat crews who are trained to deliver the lethal cargo and the skilled personnel who maintain the aircraft. A deficiency in either of these areas will certainly reduce the effectiveness of our weapons system.

I encourage each of you to personally review your problem areas. The fact that you have not had any accidents does not necessarily mean that you have eliminated the basic accident cause factors.

Effective supervision throughout your organization and a complete acceptance of procedures and doctrines by your crew and maintenance personnel is a requirement. When your personnel comply because they realize that personal safety and preservation of our equipment are directly related to the professional manner in which they perform their job, then you can say that you have the best squadron in the Air Force. ▲

WHO WATCHES THE WX

Here's another in the series prepared for you by the Air Weather Service. This time the Base Ops Officer is the man whose job it is to watch that weather.

Who watches the weather?

I do! I'm the Base Operations Officer. I'm responsible for the safety and efficiency of a lot of flying operations. Believe me, just one wrong sensitive weather decision can shoot down the result of our whole year's flying safety effort. And that ain't good.

Take this morning for example. The ceiling was cutting more capers than a monkey on a twenty-foot grapevine. The "derring-do" lads were swearing the weather observations couldn't change so quickly. I, on the other hand, was swearing they could. Throughout the frontal passage, the weatherman and I were yakking at each other so much, folks thought we were Siamese twins!

It was a time fraught with peril! A moment of decision. The weatherman had to figure out the odds that his forecast would verify, and if it did "bust," he had to figure out which way and how much. I, on the other hand, had to evaluate the effect his forecast would have on my operations.

Should I divert that inbound T-33? What would I use for an alternate for him? Should I turn the snow removal crews loose 'til later on this evening? On and on it went.

Being the inward type who enjoys an occasional chat with himself, I began chatting.

"Daddy-O," I said, "only seven nights in an oriental harem could involve as many diversified problems as this job entails. No time now for running around like a blind dog in a meathouse. Ya' gotta make them decisions."

And that's the way it went. Hour after hour. Decision after decision. Decisions calling for tact and good ole horse sense, based on 15 years experience. Look back with me and listen to me spout off.

"Sorry, sir, we've canceled all local C-45 flying. Yessir, I know you've had no trouble. You always set such a fine flying safety example. I'm sure you wouldn't want our junior birdmen to see you flying when the crosswind exceeds the local minimums. . . ."

"Lieutenant, how about stopping at Scott to refuel? Weather tells me your destination may be marginal and you'll really be stretching that T-Bird to make your alternate."

"Tough deal, Mike! I know you're supposed to lead the Saint Patrick's Day parade, but New York is 'way down—and you don't have a valid instrument card."

"Yes, Ma'am! Lieutenant Ferguson got weathered in at El Paso last night. Yes, Ma'am, I know El Paso's close to Juarez, Yes, Ma'am, it's okay now. The weather's good and he should have no trouble getting back today."

Well, sir, I'm sure you're not surprised that with problems ranging from keeping the little woman advised, to helping pilots plan flights that are both legal and safe—the common denominator is weather.

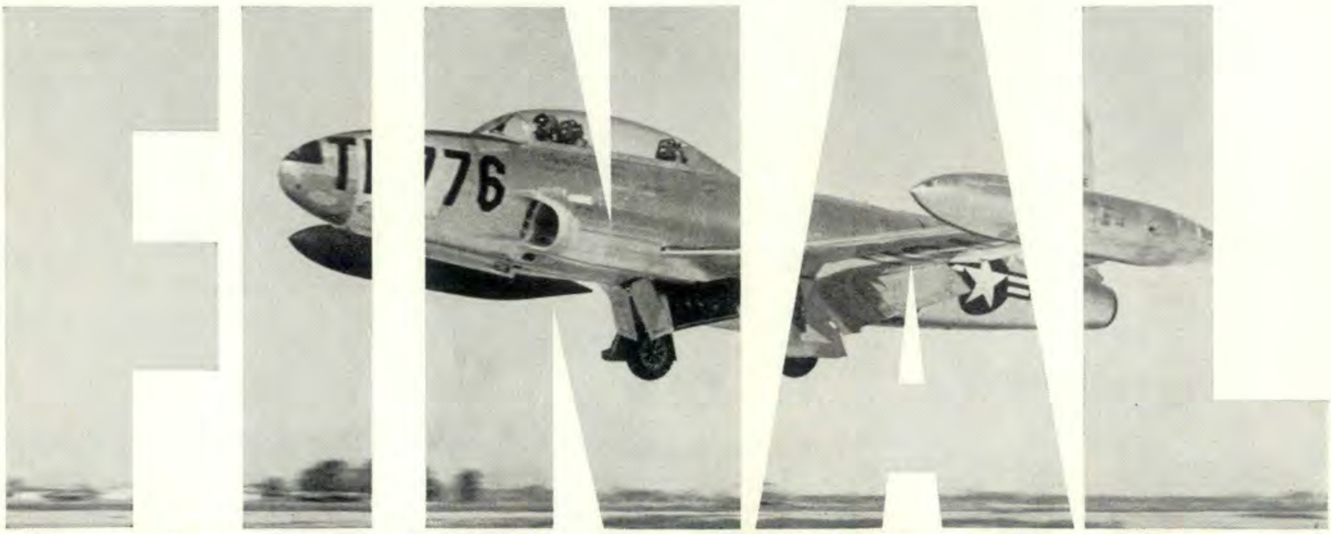
Most everything else is pretty much black or white. Either you have enough fuel or you don't. Parachutes, flashlights and NOTAMs, easily can be resolved by a firm "yea" or "nay" answer. But—weather—well, it can account for most base ops officers bearing a striking resemblance to that Yul Brynner.

Yessir, I watch the weather. I'm the Base Operations Officer. Even now I'm gratefully aware that it's CAVU. Orderly confusion once again dominates the Ops complex. The GCA lads are back in the barracks and some of the field graders have been enticed aloft. All things considered, I am for the nonce, feeling pretty smug.

Like I always tell myself, "Daddy-O," I always say, "if you can keep your head around this place, you just don't comprehend the whole program!" ▲

It's that last inch that can hurt you. The secret is to plan for that one too, before you make your . . .

FINAL COMMITMENT



Robert H. Shaw, Air Safety Investigator, Directorate of Flight Safety Research

Discussions about airplane accidents occasionally wind up with the statement, "The guy was committed, what could he do?"

That's a pretty good question, as they say, and the follow-up question immediately comes to mind, "Why did he commit himself to such an extent that an accident was inevitable?"

Human beings are so paradoxical it's small wonder that the head-shrinkers are able to determine any sort of behavior patterns for the biological category known as homo sapiens.

Paradoxical? You bet!

When we get ready to crank up the family sedan for an outing in the country, we usually make a project out of it. Out come the road maps, we take a trip to the service station, make arrangements for stopping the milk and the newspaper—all sorts of planning things like that goes on for weeks.

It's almost inconceivable that we wouldn't make proper arrangements to get where we're going and back again. We've planned our trip well and get a kick out of telling the next door neighbor, "George, we're going up to the lake for a while, be back next Tuesday."

Simple? Sure it is. Okay, then how is it that we can go out to the base a couple of days after getting back from the lake and our well-planned trip, then proceed to bend or break one of Uncle Sugar's flying machines?

Basically, we either fail to plan—make commitments, or we make commitments in good faith with most of our good judgment still up at the lake, riding around in an outboard or splashing around the shoreline.

The record books are full of stories about pilots who made commitments and couldn't cut the mustard. The reasons are many and varied. The old bugaboo, "get-home-itis" takes a heavy toll every year. Impatience is one of the worst offenders. The "hot-pilot" complex comes in for its share of the blame, and this one isn't confined to the second-balloon just out of Luke or Nellis. And don't forget fatigue!

We're all familiar with these things, so familiar in fact, that this familiarity often breeds contempt, just as the old saying goes. What can we do about it? Well, we can review some of these things we're so familiar with. And we can read about some pilots who committed and lost.

Take the case of the low-time second John who wanted to get back to the base before the day was over. Said he wanted to be fresh for alert duty the next morning. Alert Duty? His intentions were good, but they exceeded his ability by a country nautical mile. He was lucky though.

He took off on instruments and headed for home. He expected to make it in one hour and 45 minutes. He passed his first checkpoint okay and then went through a period when his radio equipment gave him fits. To put it another way, he got lost.

He finally contacted a GCI station and was given a vector to his destination. He made out okay on this one and started a jet penetration. It got real silent, real quick. Flamed out between the range station and the field. He was too low to eject so he set up a minimum rate of descent and dropped his bird, gear-down, in a level field. Wasn't even scratched.

What did he do wrong? Well, he was able to tell us about it. In the first place his planning was negligible. Secondly, he passed over three good landing fields along the way. Thirdly, he jockeyed his altitude and power settings. Then, he started his letdown 150 miles out; he didn't know the emergency procedures and he didn't bother to declare an emergency. He was lucky though!

Here's another one.

A first lieutenant with quite a bit of jet experience flew all the way across the country and checked out another pilot en route. No sweat. He decided to take another little trip however, and took off late at night.

Shortly after takeoff, the left gun bay door came open and the bird vibrated, quite some. The pilot attempted to close the door by extending the dive brakes and yawing but couldn't cut it. He wisely decided to return to the field. He crossed the fence at 140 knots, 65-70 per cent rpm. The gun bay door moved to the full open position and the airplane stalled out. The ensuing hard landing drove the right gear strut through the wing and the airplane skidded to a stop. Airplane—bent and broke. Pilot—not a scratch!

He, too, was able to tell the investigators about it. He said he wanted to complete the last leg of an extended cross-country. There's no doubt about it, he was tired. He hadn't been to bed for 19½ hours and had spent 11 hours either flying or fixin' to. The fact that he was unfamiliar with emergency procedures to be followed when the gun bay door came open clinched things for sure. Oh yes, he used a small pocket-type penlighter instead of a regular flashlight for his preflight.

Here's the last one.

Two experienced jet pilots bought the farm in a Tee Bird because of a completely unexplainable commitment. They were on a cross-country flight and the fuel gage showed that hitting their destination would be strictly a mebbe-yes, mebbe-no deal.

Air Traffic Control advised that two suitable alternates were within reach, but for reasons unknown, the pilot selected an alternate which was reporting a 300-foot ceiling and freezing drizzle. GCA was inoperative and the pilot made three passes. He was game for the fourth try however, and advised that if he didn't make it he and the back-seat man would eject.

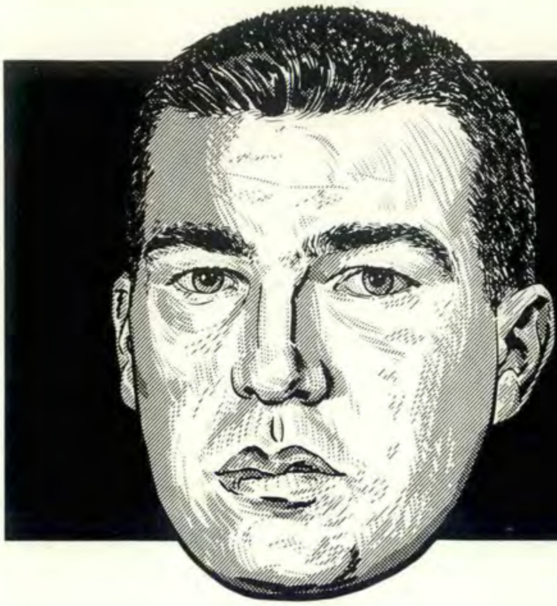
Three minutes later the airplane crashed on an inbound heading. The tower operator later stated that the pilot had advised that the radio had been operating intermittently; forward visibility was restricted because of the ice, and that the radio compass was malfunctioning.

Why did the pilot pass up two good weather alternates to get to a field with deteriorating weather conditions? As it turned out, he had committed himself to eject, but didn't.

During 1956 the Air Force experienced considerably more than 1000 major accidents. A substantial portion of these were charged to pilot error. It is highly possible that many of these pilot error accidents resulted directly from commitments which could not be met or commitments made in bad judgment.

Why all these words just to say, "Don't make commitments you can't meet?" Because we all naturally feel that it can't happen to us. But it can. It does—on an average of three per day, 365 days out of the year. ▲

WELL



First Lieutenant

STANLEY L. WIGGINS

45th Fighter Day Sq.

1st Lt. Stanley L. Wiggins was flying as wingman in an element of F-100C aircraft during an Air Defense exercise. His element had been scrambled to intercept a B-47 and after two successful runs, the flight leader lost his utility hydraulic pressure.

A failure of this kind results in loss of nosewheel steering and an excessive landing roll. The home runway was shortened because of construction so the leader elected to go to an alternate, although the fuel aboard both aircraft would be low on arrival. At this time the leader also lost his UHF Radio.

Lt. Wiggins remained with his leader, carrying on the necessary emergency transmissions. As they reached the alternate airport at 10,000 feet, Wiggins' F-100 flamed out from fuel starvation, although his fuel indicator showed 250 pounds remaining. At this time the leader was in good position for a successful landing so Wiggins set up for his own flameout approach. The F-100Cs were then landed, with no damage to either aircraft.

This Lieutenant's actions are certainly deserving of recognition. His loyalty and professional skill can be of inspiration to all of us. Well Done, Lt. Wiggins!

Second Lieutenant

CHARLES D. TREVENA

325th Fighter Interceptor Sq.

2nd Lt. Charles D. Trevena, piloting an F-102A, was returning to base, flying at 40,000 feet, after a local radar mission. As he passed over the TVOR, he retarded the throttle slightly and felt a series of severe compressor stalls. Immediately thereafter the engine flamed out. Weather at the time was solid overcast, 14 to 38 thousand feet, no precipitation.

Trevena started a letdown through the overcast in a starboard orbit around the TVOR and tried two unsuccessful airstarts. He broke out of the clouds directly over the field and set up a flameout pattern with his high key point at 12,000 feet. The landing gear was lowered and the ram air turbine extended. The F-102 touched down in the first 2000 feet of the 7600-foot runway, and with the help of the drag chute and brakes, Lt. Trevena brought it to a stop without damage.

At the time of this incident, this young pilot had a total of 434 hours in the air. Of this time only 31 hours had been spent flying the F-102. This fine job of flying in the face of an extreme emergency is certainly worthy of recognition throughout the Air Force. We always can use more young pilots like him. Well Done, Lieutenant Trevena!

DONE

TRAINING

First Lieutenant

SAMUEL F. MARKS

461st Fighter Day Sq.

1st Lt. Samuel F. Marks was flying Number Three in a flight of three F-100s en route from Hahn Air Base, Germany, to Sidi Slimane Air Base, French Morocco. Weather was good, with scattered clouds at 12,000, six miles visibility in haze, and the wind coming from 270 degrees at 10 knots.

Ten minutes after takeoff, Lieutenant Marks lost his generator. His attempts to re-set the circuit failed so he turned off all of the electrical equipment except the emergency tie-in switch. This he positioned "On" so that he could communicate with the flight leader.

An immediate return to home base by the entire flight was made and at that time Marks found that he had complete electrical failure. This fact he hand-signaled to his leader and an orbit at 15,000 feet was set up to burn off the excess fuel aboard all of the aircraft in the flight. When the leader's aircraft indicated 5500 pounds of fuel remaining, Lt. Marks' F-100C flamed out, with no possibility of re-start. He set up a perfect flameout pattern, lowered his gear by emergency system, engaged his ram air turbine, and put his bird down 250 feet from the approach end of the runway. A safe stop was made in 4000 feet. Well Done, Lieutenant Marks!

First Lieutenant

EUGENE C. BUTTYAN

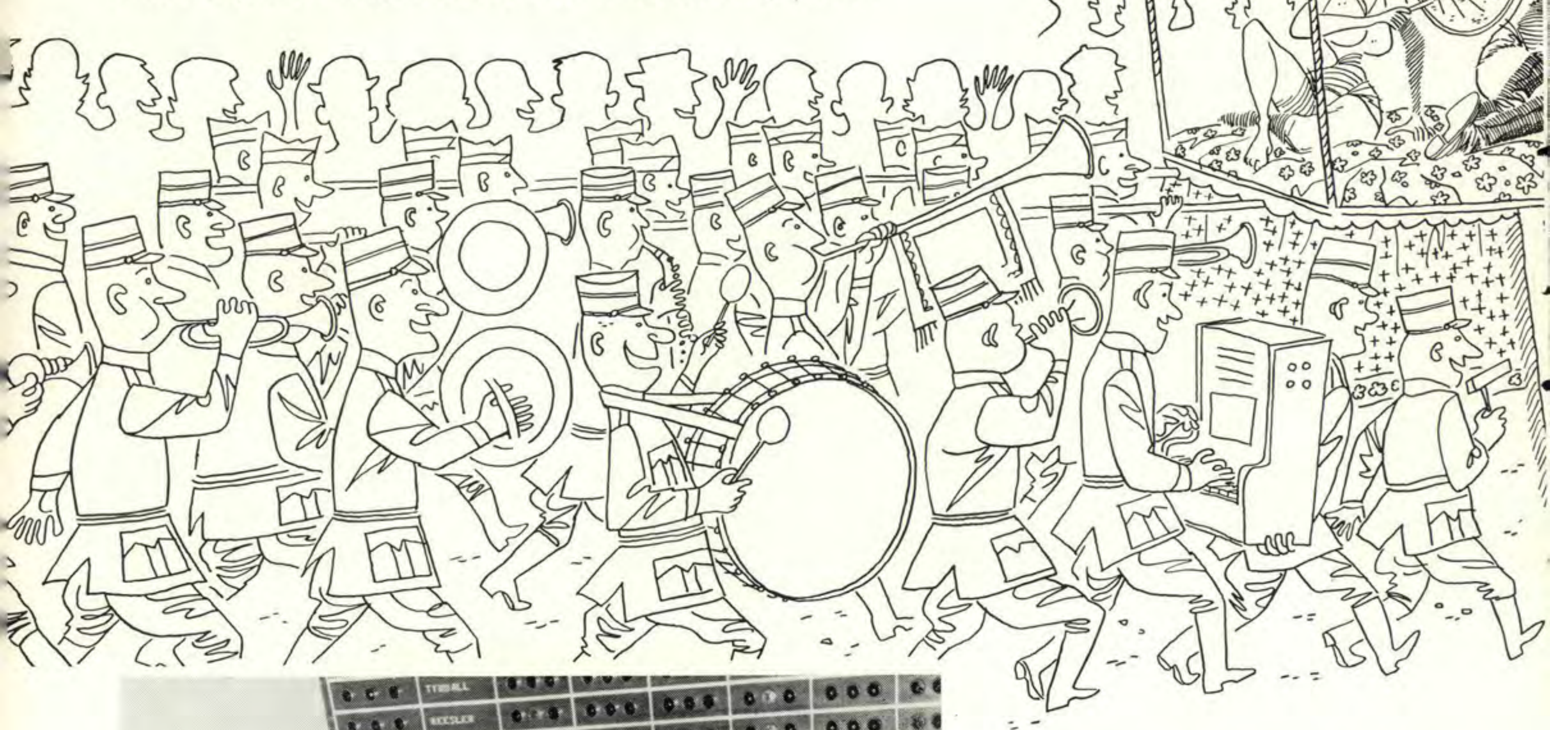
3598th Flight Maintenance Sq.

1st Lt. Eugene C. Buttyan had just taken off for a test flight of an F-100 recently and was unable to retract his landing gear. He maintained a low airspeed and tried again to raise the gear but was unsuccessful. He then began a spiral climb to burn off excess fuel while remaining over his home station. As he climbed through 6500 feet, a faulty release mechanism caused his drag chute to deploy. At this time he was carrying 92 per cent of power and holding 210 knots.

Buttyan next turned his plane toward the target drop area, expecting to jettison the chute. Just as he began his turn he felt a loss of engine thrust. He first tried the 100 per cent position—with no results—then retarded the throttle to idle and engaged the emergency fuel system.

The emergency system caught and he was able to get 92 per cent power for his landing try. Lt. Buttyan was just able to reach the end of the runway with an airspeed of 140 knots for a successful landing. Just eight months later, this young pilot had an engine explosion and flameout while on another test flight. Five airstarts and five minutes later he had made a perfect deadstick landing, without further damage to his F-100. Well Done, Lt. Buttyan!

We can't guarantee that you'll get the velvet carpet treatment shown in the illustration. But, the operations folks at Maxwell Air Force Base have come up with an idea that has proved itself many times. Flight Advisor and Weatherman give. . . .

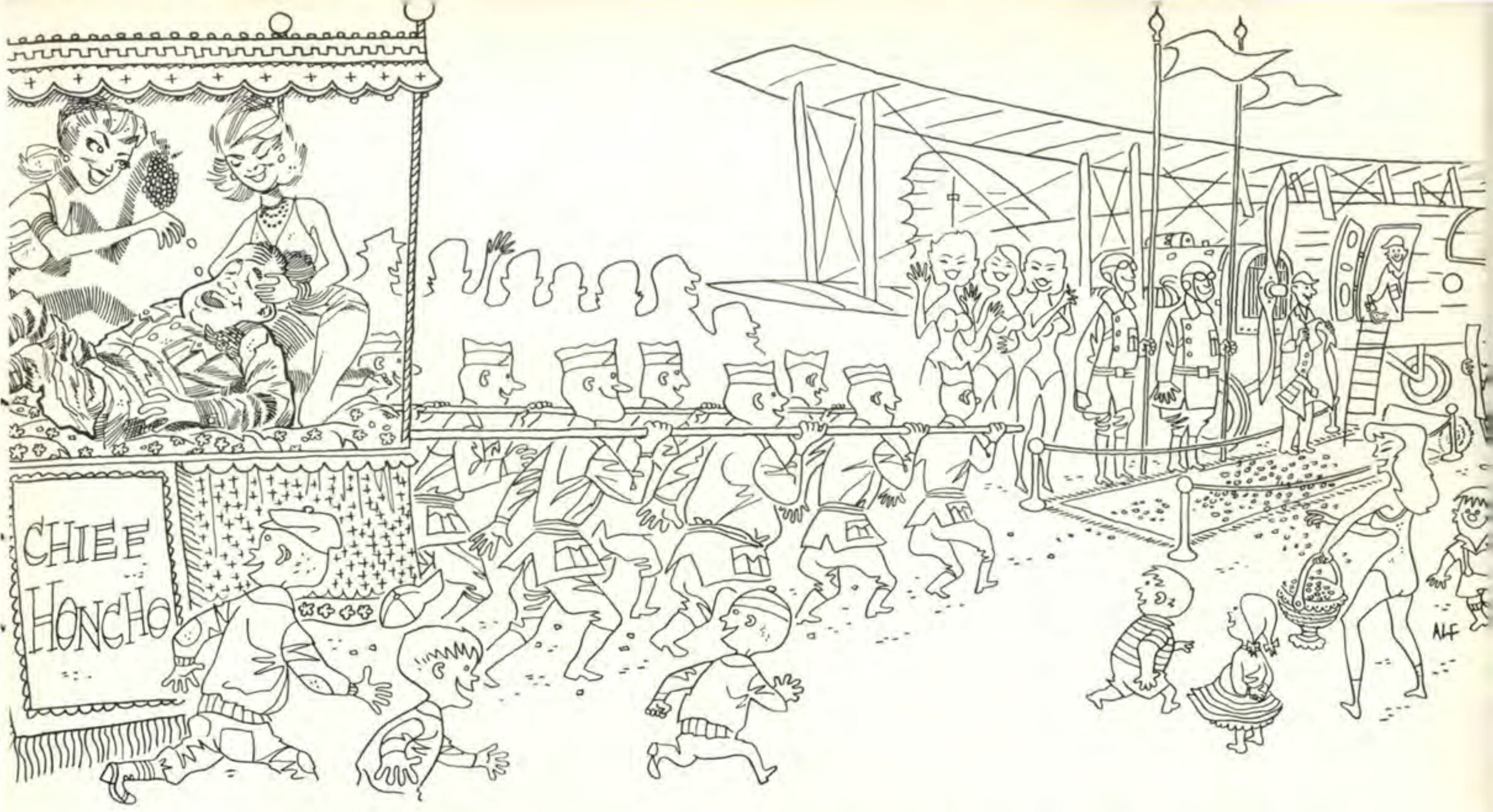


Advisor works at console; has flight service drop-line, NOTAM file, base communications phones.

Back in the good old days when recips were the vogue and the jet was a gleam in someone's eye, flying an airplane was solely the pilot's responsibility. Oh sure, he had lots of fellas to help him, but in the final analysis, the pilot was the number one honcho.

Just as they have in the length of women's dresses, things have changed, but good. The modern complex airplane requires a considerable number of supporting services in order to accomplish a mission. These include maintenance, communications, navigational aids and adequate weather information. It stands to reason then that the complex airplane needs complex supporting services.

Because of the rapid fuel consumption of jet aircraft, accurate information on terminal and en route weather and on alternate courses of action is necessary. The pilot who commits himself to descend from his optimum altitude, often doesn't get a chance to reconsider. Every aid toward making the best decision before the pilot makes his letdown commitment must be available.



"MAX" EFFORT

Let's take a look at a typical operations office at a base in Alabama. As a matter of fact, it isn't a typical base ops office at all. Rather, it is located at Maxwell Air Force Base and is known far and wide as "The Maxwell Advisory Service."

Here's how it works, and we'll take some dramatic license here and dream up a hypothetical case.

The 24-hour clock on the wall indicates 1015 CST. A young, jet-qualified officer is sitting in a glassed-in booth. He's known as the "Flight Advisor." Directly behind him sits a weather forecaster. Both men are busily writing.

The advisor stops. "Say, Dan, we've just received a late flight plan on Jet Pinball One, inbound from Des Moines, IFR at thirty-seven thousand. He's estimating Maxwell at one-zero-two-five, CST and his alternate's Eglin. How does the picture look for terminal and alternate weather?"

"That doesn't give us much time to operate, Jim. We've got two hundred feet and half-a-mile here. Thunderstorms and heavy rain. Doesn't appear to be much chance of improvement for the next three hours. Eglin's reporting zero-zero in fog and stratus without a prayer for improvement. Moody looks good, though. They've got two thousand scattered and ten miles. They're forecasting it to go to two thousand broken in two hours.

Jim picks up the hot-line. "Rapcon, this is Maxwell flight advisor. Maxwell's now below GCA minimums, two hundred feet and half-a-mile in heavy rain, severe thunderstorms. Request you notify Pinball One that Maxwell and Eglin are below minimums. Also request you notify him that flight advisory service is available."

As the Rapcon operator puts down the phone, the silence is broken by a staccato call, "Maxwell Rapcon, this is Pinball One, over."

"Pinball One, Maxwell Rapcon. Over."

"Maxwell Rapcon, Pinball One, I was cleared to you by Montgomery approach control, estimating Maxwell range at one-zero-two-five. Thirty-seven thousand. Request clearance for penetration. Over."

"Pinball One, you are cleared to the Maxwell range at twenty thousand for standard jet penetration. Call over the range. Maxwell flight advisor states Maxwell is below GCA minimum. Your alternate also is below GCA minimums. If you want advisory service, contact Maxwell flight advisory on Channel 13."

"Roger, Maxwell Rapcon, switching to Channel 13."

"Maxwell flight advisor, this is Pinball One, Over."

"Pinball One, this is Maxwell flight advisor, how do you read Channel 13? Over."

"Read you five by five, Advisor."

"Pinball One, the present Maxwell weather is two hundred overcast, half-a-mile in heavy thunderstorms and rain. Your alternate, Eglin, is zero-zero in fog. No change forecast for three hours. Present weather at Moody, two thousand scattered, ten miles."

"Roger, Maxwell flight advisor. Can't make Moody on my fuel. What's the weather at Dobbins?"

"Pinball One, weather at Dobbins eighteen hundred overcast, five miles in light rain. Forecast to lower to fifteen hundred and three by eleven hundred hours CST."

"Roger. I'm not sure I can make Dobbins either. I'm declaring an emergency. How far is it over there?"

"Pinball One, for flight planning assistance to Dobbins, request hours of fuel, last known position, and present altitude. Over."

"Roger . . . stand by. I have forty

minutes of fuel. I was over Maxwell range at twenty six, one-thousand on top, thirty seven hundred. I don't think I can make Dobbins. What's the weather at Birmingham?"

"Pinball One, stand by."

Jim hands the mike to Dan.

"Pinball One, this is Maxwell forecaster. Birmingham weather is one hundred overcast, one mile in heavy rain. Here's the flight advisor."

"Pinball One, you have sufficient fuel to make Dobbins from your present position and have twenty minutes of fuel remaining for penetration and low approach. Heading to Dobbins from Maxwell range is zero-five-zero degrees; distance one two five miles. Your ETA is approximately one-zero five-zero. Turn IFF to emergency. Flight advisor will notify Dobbins tower and Flight Service of your emergency. Advise you request DF steer from Dobbins tower. Do you need any further assistance? Over."

"Roger, what's the frequency of the radio facility at Dobbins? Over."

"Pinball One. Lost Mountain beacon frequency is three-one-four kaycees. Identification LSM. Over."

"Roger, Maxwell Flight Advisor, proceeding to Dobbins. Out."

Jim picks up the Flight Service phone.

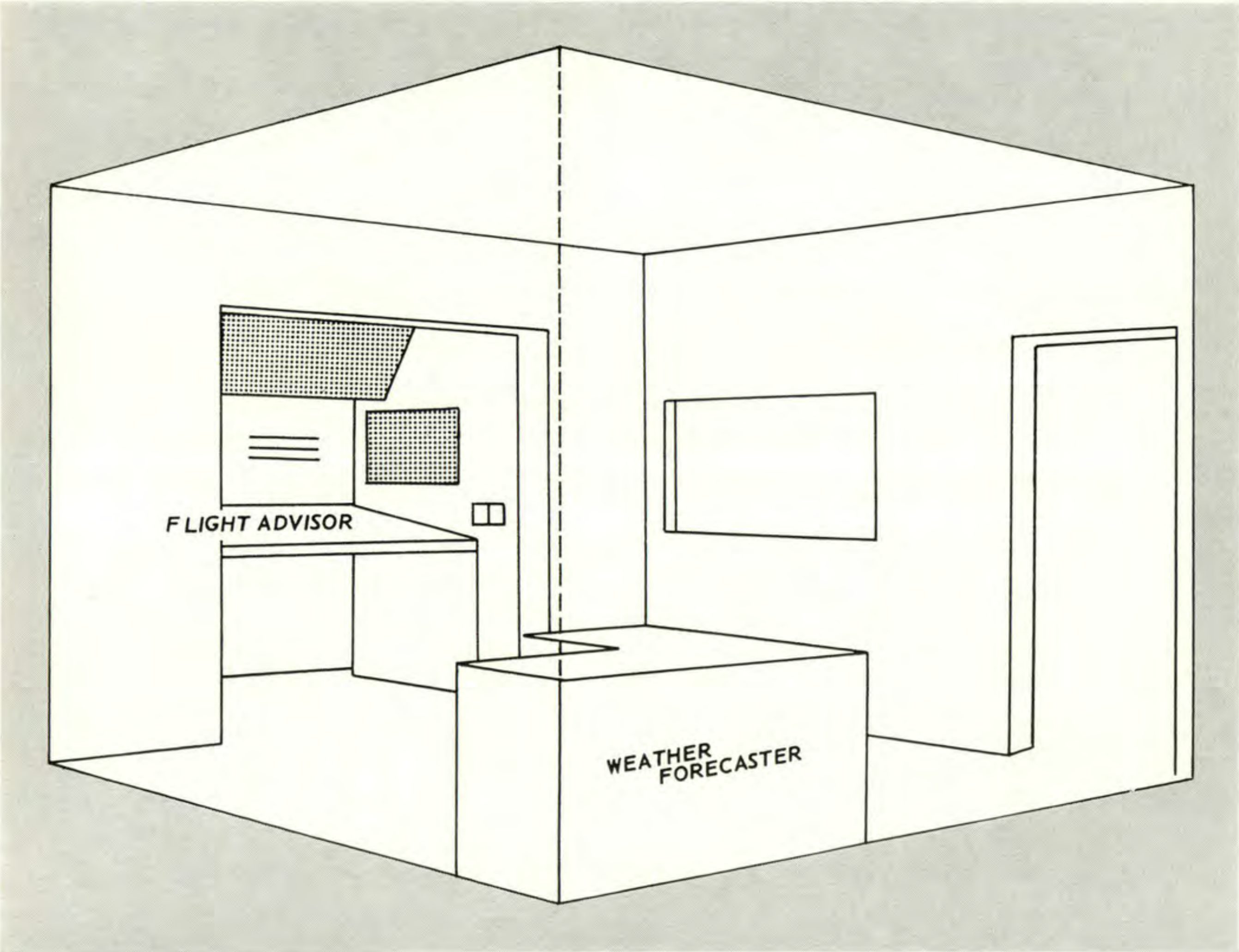
"This is Maxwell flight advisor. Flight Service Operations Officer, here's an emergency. Request you notify Dobbins DF that Pinball One declared emergency over Maxwell at one-zero-two-seven and is proceeding direct to Dobbins. Approximate ETA Dobbins is ten fifty CST. He's requesting DF Steer."

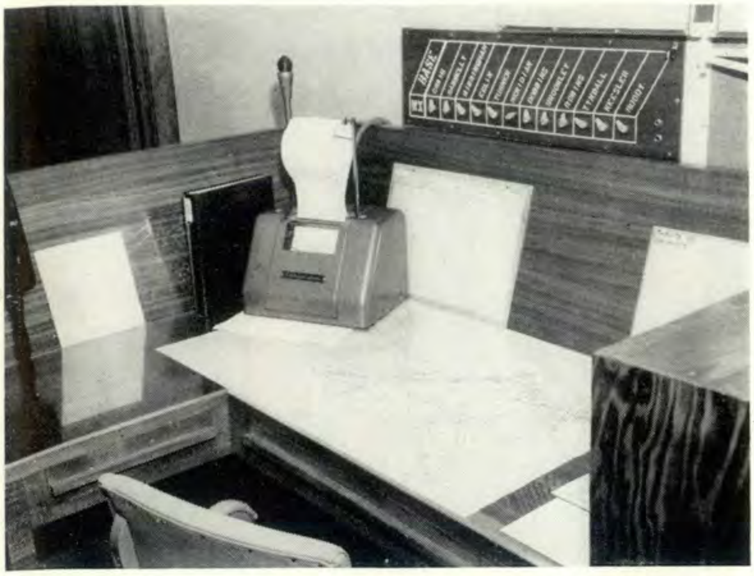
The hypothetical case dramatized above is really an accurate example of what is now happening on any bad weather day at Maxwell Air Force Base. As is true of most improvements in flight safety technique, this one grew out of tragedy.

Eighteen months ago at Maxwell a similar incoming T-Bird without the benefit of terminal monitoring carried two colonels to sudden death in the piney woods, half way between Montgomery and Birmingham. There was a suitable alternate 12 minutes away at cruising speed and altitude.

It was this accident and similar ones that spurred on the efforts of the men of the 3901st Operations Group at Maxwell to devise a method which would prevent this needless waste of man and flying machine. Their studies of the problem resulted in a new concept of operational service that has now been put into being. Supporting these studies were recommendations made during the world-wide Flying Safety Officers Conference of 1956 and a weather element

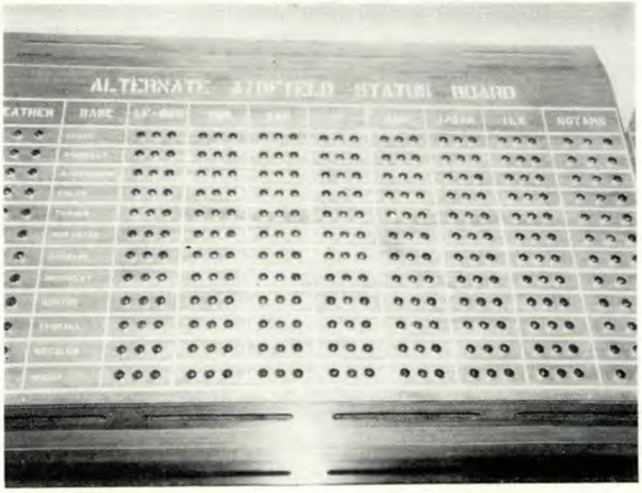
Flight advisory platform showing relative positions of weather forecaster and flight advisor.



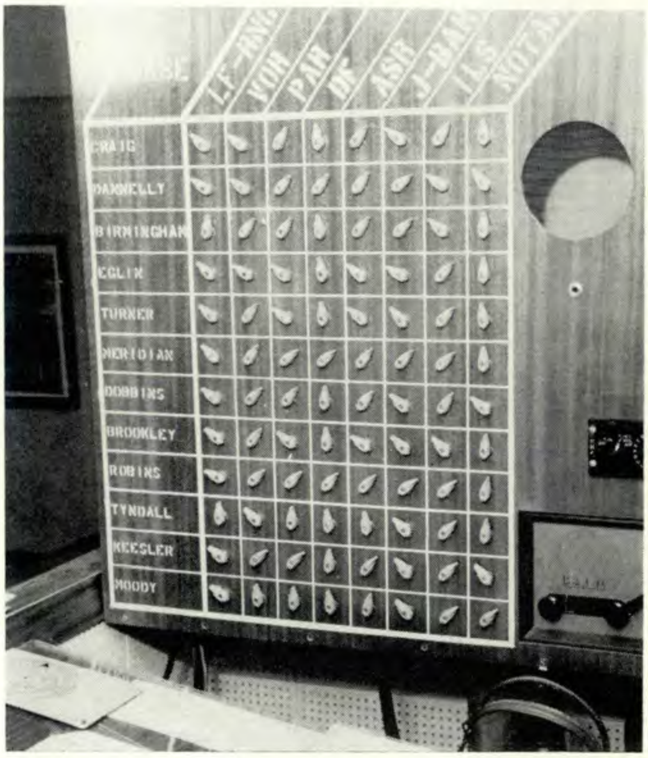


Weather console with alternate status board and teleautograph.

GPS-9 Weather radar unit which is in close proximity to booth.



Flight advisors alternate status board with red, amber and green lights. Weather portion is controlled from weather console.



Flight advisors' console showing alternates status controls and communications facilities. All of the advisors are jet-qualified pilots.

study made by the Directorate of Flight Safety Research.

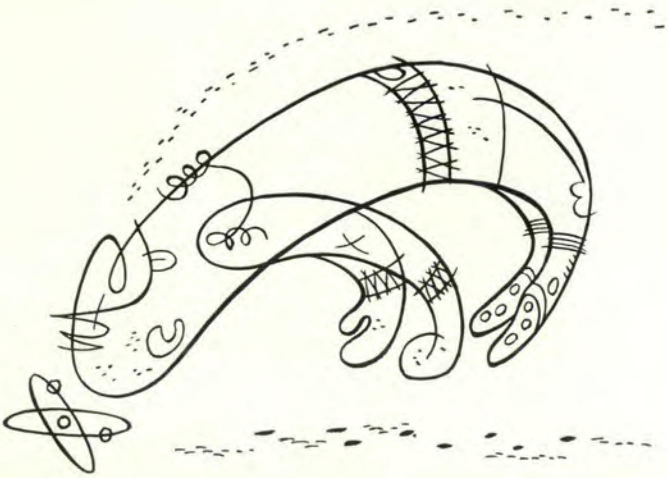
Basically the new concept is for base operations to collate the raw data of weather forecasts, airfield status, navigational status and expected traffic delays. Base ops can then issue to the incoming pilot a single inclusive message and a recommended course of action where appropriate. For outbound DD-175 flights as well, this service insures that the flight as planned is within the capability of the aircraft, and that en route and terminal facilities are adequate. After the pilot has departed from base operations he can still be advised of any newly developed situation that might jeopardize the safety of his proposed flight.

Two officers, a weather forecaster and a jet-qualified operations officer, work together as a team to render this service. They are provided with a flight-movements board, a status board for all alternate fields within a 160-mile radius, and direct communication with RAPCON, tower, flight service and pilot. Five jet qualified, experienced officers have been assigned full time duty to provide this service at Maxwell. They work on a shift basis twenty-four hours of each day. The cost of the physical layout including communications equipment and labor has been put at $4,959.31, according to the base commander, Col. Mills S. Savage. The cost of one T-33 pro-rated over the years will pay for this service for a long time.

Although it is not true that adverse weather makes accidents likely or inevitable, it does create additional hazards which in combination with pilot error, aircraft design deficiencies and equipment malfunction, result in aircraft accidents.

The frequency of inadequate flight preparation and planning as accident cause factors indicates that pilots are not always aware of the limitations of their aircraft and navigational equipment.

Maxwell Flight Advisory Service is certainly a big step in the right direction. ▲



a difference

Maj. Wallace W. Dawson,

They say that in order to have an argument, you've got to have a difference of opinion. This is true! However, a difference of opinion as to *who's* flying a two-seated bird like the old reliable T-33 can end up in a bent and broken machine. And—there's no argument about that!

Naturally, most of these differences of opinion result from the instructor pilot's assuming too much. It's the old routine. "I figured he knew what he was doing." "I thought he was going to go around!" All sorts of things like that.

Here's a good example: The night was dark and the runway was short—at least on one end. The airplane pitched for a touch-and-go. The airplane hit the ground 1200 feet short. It was the pilot's first night checkout. An instructor pilot was in the rear seat (Wonder what he was thinking about at the time?).

Mr. Webster says an instructor is "One who instructs, imparts knowledge; a teacher." It figures then that an Instructor Pilot is one who instructs, imparts knowledge or teaches something pertaining to Flying.

In other words, the instructor pilot goes along to:

- Teach the student something.
- To ensure himself that the student knows something.
- To keep the student out of trouble until he can stay out of trouble by himself.

As the teacher, the instructor is in charge. Being in charge automatically makes him responsible for the safety of the mission.

While looking over accident reports at the Directorate of Flight Safety Research, it is evident to us that some instructor pilots take this responsibility too lightly, or—worse still—are not qualified to begin with. On many occasions the "student" on the ride is a pilot of proven proficiency. This fact can lull the instructor pilot into a false sense of security.

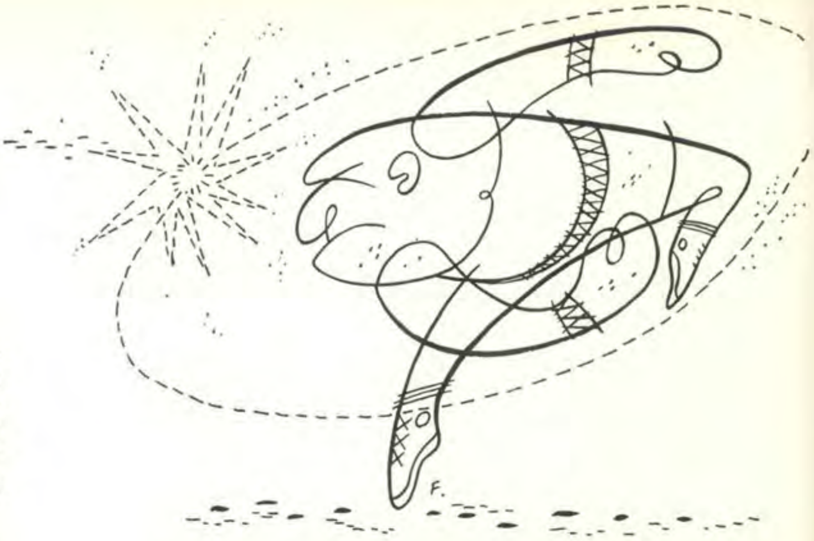
Here are some "for instances":

TOO LATE, TOO LATE! Since 1 January 1954, fifteen major T-Bird accidents have resulted while hooded takeoffs were in progress. There was not even a hint of materiel failure or maintenance error in any of these accidents. This is supervisory error in its purest form. This is poor judgment, lack of attention and maybe even complacency. This is also the stuff of which accidents are made.

I THOUGHT HE'D CHECKED IT! A pilot and his instructor preflighted for a night transition mission. Everything was normal on takeoff except that the airplane blew up! The investigator found the fuselage tank cap on the engine inlet screen. It hadn't even been put on the tank.

I THOUGHT HE HAD IT! The T-Bird was descending. When the airspeed indicator reached 10 knots above the red line, both pilots started a recovery. Result: A bent T-Bird. Both pilots thought the other man was flying the machine.

of opinion!



Research & Analysis Div., DFSR

THERE COMES A TIME! Yes, there comes a time during every simulated forced landing when you should break it off and call it bad or continue, because you *know* you've got it made. A student was shooting his first dual simulated forced landing. Instead of "breaking it off" in time, the instructor pilot allowed him to stretch it. The airplane hit short and cracked the left main spar.

CHECK AND RECHECK. The student pilot was shooting touch-and-go landings. When the tips ran dry, the instructor told the student to turn on the main wing tank switch. The student didn't do it. The instructor didn't check him. The engine flamed out during a go-around because of fuel starvation.

WHAT'S YOUR HURRY, BUB? The student was shooting touch-and-go's. He landed the airplane, applied power and got it airborne again. The gear handle was raised and—you guessed it! The T-Bird settled back in, scraped along for a while and stopped for sure.

There's another facet to the problem of supervision concerning T-33s. That's the problem of the supervisors who supervise the supervisors. Too often the rating (or duty) of instructor pilot is carelessly awarded. Here's one:

During a hooded takeoff the airplane veered and struck a snowbank. Regulations in the command required that to ride front seat during a hooded takeoff, the individual had to be on orders as an instructor pilot. This front seat pilot was not on orders because he did not possess the instructor pilot qualifications required by the command concerned.

Another case in point. The T-33 was cleared for a flight of 470 nautical miles. This isn't excessive for a T-Bird under normal circumstances. It was excessive in this case however, since it only had internal fuel aboard. It didn't quite make it.

Supervision of flying activities is another area where trouble can occur. A recent Operations Safety Survey showed that one tactical squadron was trying to keep all of its assigned pilots current in the unit's two T-33s. The result was that a lot of pilots were getting a little flying time periodically. Actually, very few really were qualified in the bird.

It often happens too, that the youngest pilot in the outfit tows the targets and takes the administrative trips. This is good practice and is an excellent experience-builder, providing he gets the proper supervision.

It all amounts to supervision, be it on the ground or in the cockpit. It all amounts to accident prevention. It all amounts to saving the equipment we have. The going rate for the T-Bird these days is about 125,000 bucks per each. What with the emphasis on supersonic stuff and missiles, replacements may not be so easy to come by.

So, you supervisors, supervise whether your job is in the air or on the ground. An efficient operation is a safe operation. A safe operation will preserve our stock of hardware and we'll have T-Birds to fly for the next ten years. This is quite important. Who can visualize an Air Force without T-Birds? ▲

When commercial airlines of the world take delivery of their new fleets of propjet airlines I predict a new era in operating economy, flight safety, on-time scheduling and faster and more comfortable flights for air travelers and airline operators.

It is not hard to arrive at this conclusion after piloting a USAF YC-131C transport, military version of the popular Convair 340, modernized with Allison Model 501-D13 Propjet engines and Aeroproducts Turbo-propellers.

For the past four months, three teams of pilots, copilots and engineers have been paralleling commercial airline schedules block-to-block across the airways of America, seven days a week. The program is labeled "Operation Hourglass," and is aimed at accumulating 1000-hours of valuable engine and propeller flight operating data for the military services, commercial airlines and airframe manufacturers. The plane used is one of two USAF transports which in 1955 and 1956 conducted a 1500-hour flight test program with YT56-A-3 Propjet engines, prototype of the military counterpart of the commercial Model 501-D13 engines.

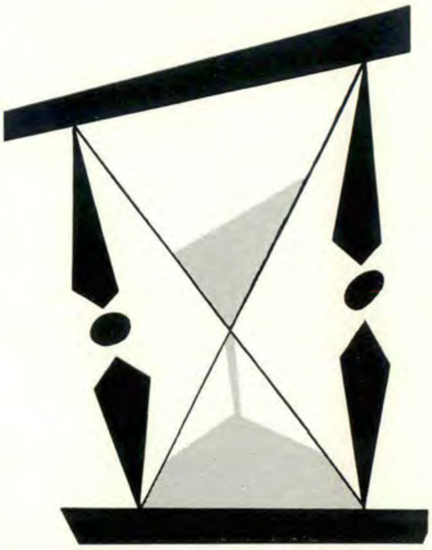
Allison leased from the Air Force the YC-131C for the "Operation Hourglass" program.

We have flown routes as long as 1200 miles non-stop and as short as 60 miles. We have passed with cruising power the very latest transports and still the propjet powerplants retained 10 per cent reserve power. On one flight from Indianapolis to St. Louis we departed immediately after a standard piston-powered Convair 340 and arrived at Lambert Field 21 minutes ahead of it. And, on most of our flights we gross out heavier than the standard 340 or 440.

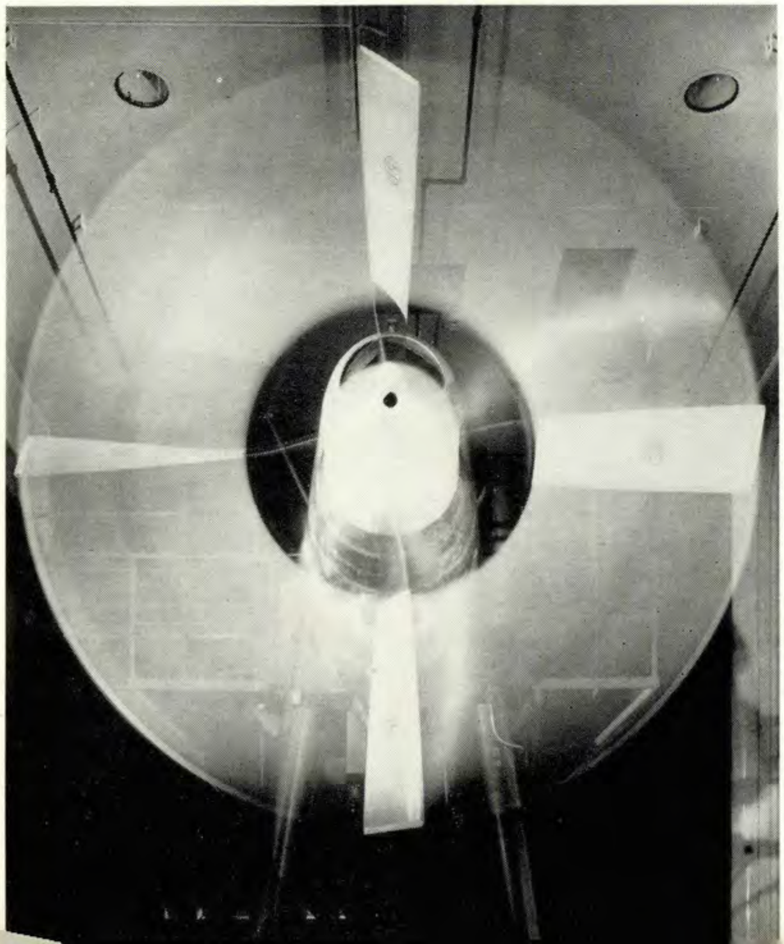
We made 426 flights during our first 625 hours and visited 50 cities in 22 states. We averaged 11.3 hours a

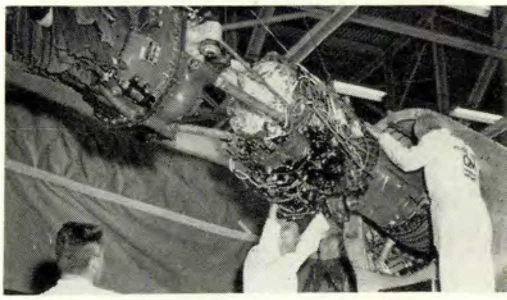
The Air Force certainly doesn't have a corner on the "supervision market." Some of our industry counterparts at Allison are showing that supervision pays off.

OPERATION



Robert C. Wendling, Test Pilot, Allison Div.





Above: A 501-D13 prop-jet engine is eased into the nacelle of a transport. Below, Don J. Nolan (R), superintendent of experimental flight test receives reports from pilot Robert Wendling and Robert Reed, supervisor of flight test.

day, flight time. Not once during this gruelling demonstration has the plane been grounded because of engine or turbo-prop trouble. The engines used in "Operation Hourglass" started the program with over 2900 hours on one and over 1600 hours on the other powerplant. They were used for other programs on test stands before being overhauled and installed in the YC-131C for the accelerated flight program.

Before joining Allison as a test pilot I was a Captain with one of the airlines. While flying in and out of Weir Cook Municipal Airport in Indianapolis, I saw the Allison-Turbo-Liner, a standard Convair 240 converted to prop-jet power, operating from the Allison Test Facility on the south side of the field. When the Turbo-Liner's props bit into the air, the modernized 240 was air borne in a matter of seconds. I believed such a feat was easy since the Turbo-Liner undoubtedly wasn't loaded to full gross as we did in the commercial business.

Well, I was in store for a surprise when I joined Allison and was assigned to "Operation Hourglass." The standard 340 with R-2800-CB-16 engines, developing 2400-hoursepower each, has a CAA-approved gross takeoff weight of 47,000 pounds. The newer 440 Metropolitan series, with CB-17 engines developing 2500-horsepower each, has an increased gross takeoff weight to 48,000 pounds. The maximum gross takeoff weight of "Hour-

HOURGLASS

glass" is 53,200 pounds. I can't remember taking off during our program to date under 48,000 pounds.

To give you an idea how "Hourglass" climbs, we break ground on takeoff in about 1800 feet and trim for a minimum rate of climb of 4000 feet per minute. As you look over your left shoulder while climbing you could swear you're in a World War II twin-engine fighter! And, this is not "flat-hat" flying! We simply must assume this angle of climb if our throttles are set at normal rated climb power or the airspeed runs away and we can't get the wheels up. On a standard day we can make a 180-degrees turn after takeoff and when we are at the landing end of the active runway, we are at 5000 feet, climbing. Our average time to 20,000 feet is eight minutes. The throttles are not pushed through the firewall to do this but are set at normal rated climb power settings which is 895°C. turbine inlet temperature (TIT).

After arriving at selected cruising altitude we establish 90 per cent normal rated power (849°C. TIT) which is the cruise power settings for the new Lockheed Electra. And "Operation Hourglass" tools through the sky like the queen that she is. It is not uncommon for us to cruise at 20,000 feet at 398 mph TAS. In a twin-engine Convair this makes for a lot of ground passing under you in a short span of time!

Letdown in "Hourglass" is another operation which the pilots cherish. At 20,000 our descent is started at 750°C. TIT which gives us 1500-hoursepower, 230 knots and a rate of descent of 1000 feet per minute. We find this to be the most comfortable rate of descent for the con-

Pilots Robert Wendling (L) and Joseph Thomas amiably discuss range approach procedure as they sit in cockpit of "Operation Hourglass."

verted Convair, since the pressurized cabin rate of descent stays between 300 and 500 feet per minute. For test purposes only we have made letdowns as fast as 6000 fpm, simulating emergency descents.

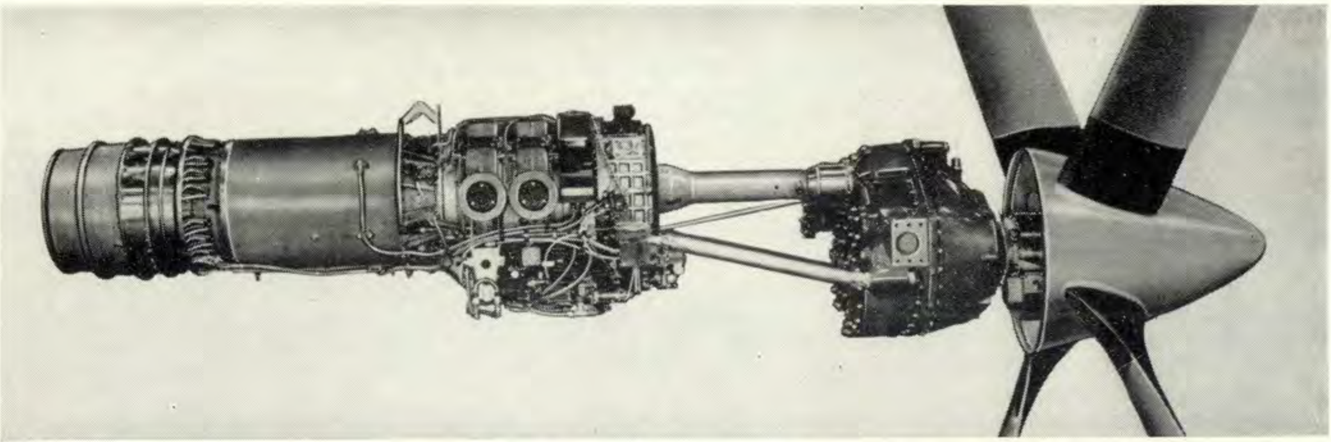
Only minor power adjustments are required to maintain 1000 fpm and 230 knots. When "Hourglass" is three miles from our destination we make a normal entry pattern and slow to 187 knots (600°C. TIT or 200-horsepower) and lower 10 degrees flaps. Our speed drops to 174 knots and then we lower the wheels as we rollout on our downwind leg, maintaining 1500 feet. Ten degrees more flap (now 20 degrees total) is lowered when we near our final turn position. Our final turn is made at 800 feet altitude and we roll out about ¾ mile from runway, lined up for landing. Here, we drop an additional 10 degrees flap and ease back on the twin-throttles as required to hold 800 fpm rate of descent and 110 knots as we cross the fence. We then reduce our rate of descent and touch down at 90 knots.

As soon as the nosewheel touches the runway the throttles are placed in Ground Idle position and the pilot's left hand reaches for the steerable nosewheel ring. We do not touch the brakes! The turbo-props, in Ground Idle position, produce enough drag to slow the plane to a safe speed for turning off the active runway. The only time we use foot brakes is to stop the airplane completely or to taxi in tight spots. We can, of course, stop the plane by using the full reversible pitch feature on the props, or, for that matter, back the airplane into a parking spot or perform other ground maneuvers.

The Ground Idle position produces enough power for the plane to taxi comfortably and once we set the throttles we can carry out all taxi requirements without interruption. The Ground Idle position reduces the turbine engine speed from 13,820 rpm to 10,000 rpm and lowers the speed of the props from 1020 to 740 rpm. Needless to say this also reduces ground noise considerably, making the airplane welcome at any airport.

By using this feature instead of foot brakes we made 426 landings on the same set of tires. This is more than twice the number of landings on the same set of rubber as reported to us by airline operators with their piston-powered Convairs. Strangely, we were not aware this could be accomplished. So, our maintenance and purchasing personnel laid in a supply of 12 new tires for the 1000-hour "Operation Hourglass" program. Outwardly, the removed tires appeared to have many landings still left on them.

I have watched the enthusiasm which other pilots demonstrate as they fly this modernized medium-and-short distance airplane. One of my duties has been to



The Model 501 propjet measures only 27 inches in diameter, is 145 in. long and weighs only 1750 pounds. Prop is 13½ feet in diameter.

check out other test pilots in this airplane. Five hours of dual time is all that is required for a pilot with average multi-engine experience and flight ability before he is capable of commanding the aircraft.

I laughed recently at one of our pilots—an ex-jet bomber pilot. He believed it would be quite a let-down, returning to prop planes again. His attitude changed quickly when he advanced the throttles to 100 per cent power and found himself airborne in less than 1200 feet, with the airspeed indicator charging rapidly toward 200 knots.

I advised: "Pull back on the yoke and let 'er climb!" He eased the yoke back and again, I said: "Haul 'er back! Get that airspeed to 120 knots and then retract your wheels."

He pulled the yoke toward his stomach, the airspeed dropped off to a steady 130 knots and he flipped the wheel handle. We let the airspeed rise to 200 knots and the rate of climb settled at 4500 fpm. "Hourglass" was airborne about two minutes when a broad grin crossed his face. He excitedly pointed to the altimeter which was pleasantly passing 9000 feet. We leveled off at 15,000 feet, set the throttles for 90 per cent rated power (849°C. TIT) and cruised over Indiana farmlands.

Back on the deck an hour later, he confided: "I've never seen anything like it! Who said propeller planes are on their way out?"

I knew immediately that we had another exponent of prop-jet power.

We run "Operation Hourglass" as closely as we can according to commercial airline schedules. After each flight we shut down the engines for 20 minutes simulating normal turn-around periods. We believe this interruption —in a practical manner—provides maximum test conditions on all parts. The major difference between our time and airline time is that we cut up to 40 per cent off the published schedules for Convairs.

Our three crews are scheduled eight hours each on three shifts a day. Instead of grounding the airplane at the end of 125 hours for the required checks we ground the plane from nine o'clock in the morning 'til noon each day, running progressive maintenance checks on certain items of the 125-hour check the first day, other items the second day and so on. In this manner only a few items come up on any one day for the 125-hour periodic check.

The 3750-horsepower propjet engines are a lot of power for a twin-engine aircraft; four of these engines on the Electra will give the transport a total of 15,000-horsepower. Reserve power always has been good insurance toward flight safety. To demonstrate the ability of the Model 501-D13 propjet engines, I recently flew copilot on a pilot checkout flight. We grossed out a little over 48,000 pounds.

Just as the plane broke ground I chopped the starboard engine and told the pilot to keep climbing. With the starboard engine idling and his port engine at normal rated climb power, we bore through the clouds indicating 160 knots and 1500 fpm rate-of-climb. We leveled off at 22,500 feet. This is a real single-engine performance!

To further demonstate the flexibility of this remarkable propjet engine I gave a wave-off to a pilot who had just crossed the fence at 100 feet altitude. He quickly advanced the throttles to 100 per cent power, retracted the wheels but left the flaps in the 30-degrees down position. I told him to retract the flaps immediately. He did not need them. He hauled back on the yoke, set the power for normal rated climb and crossed the end of the 6000-foot runway at 4000 feet altitude.

In a critical situation like this, not uncommon at high density airports, it takes exactly one-fifth of a second to advance the throttles from Flight Idle position (34 per cent power) to full power position. And, you get *instant response*. Maximum allowable engine overspeed has been established at 106 per cent power. Occasionally, the turbine engine will momentarily overspeed but well within limits.

The propjet engine in the flight regime (Flight Idle to Full power) is turning over at 13,820 rpm and the constant speed prop is stabilized at 1020 rpm. Regardless of whether the plane is taking off, climbing, cruising, or letting down for a landing, the engine and propeller are turning up 100 per cent.

Power is obtained by moving the throttles which meter the amount of fuel to the engines. While this change in fuel flow is taking place, the blade or pitch angle of the prop automatically changes. The greater the fuel flow, the greater the pitch. For takeoff and climb the blade angle is greater, of course, than for normal cruise and letdown for landing.

By virtue of this constant speed system, power is instantaneously available; there is no "build-up" as in piston engines. There is no juggling of propeller and throttle and mixture controls and no worry about exceeding brake mean effective pressure limits.

We have found that this instant response and reserve power greatly simplifies instrument approaches, field departures and holding patterns. As a matter of fact we have to reduce our climb power settings considerably below normal rates to stay within operational limits of Airport Surveillance Radar. These engines simply have performance to spare.

Recently, we departed Phoenix en route to Burbank. Because of mountainous terrain en route, departing aircraft must not leave Hassayampa Omni until 13,000 feet altitude has been attained. The omni site is 47 miles west of Phoenix and the Phoenix tower operators tell us most commercial planes have to circle once and often twice over the Hassayampa before reaching the 13,000-foot minimum. We departed Phoenix in "Hourglass" and crossed the omni at 18,000 feet, still climbing at 300 feet a minute to our assigned altitude.

Without elaborating, the Phoenix tower operator was shook! Later we departed Burbank for Edwards Air Force Base and as we lifted from the Burbank runway we requested a right-hand turn out of the field. The tower operator, who had seen "Hourglass" accomplishments earlier in the day, returned our call: "Right hand turns from active runway 35 are not normally approved because of 4000-foot mountains. However, permission granted." We banked the converted transport into a climbing 90-degrees right hand turn and streaked across the mountains some 1800 feet below us.

As mentioned earlier we have tried to duplicate airline schedules around the country by visiting fields of varying elevations, lengths and in a gamut of weather conditions. Early one afternoon we approached Flagstaff which is the highest airport in the United States served by Commercial airlines—a field elevation of 7010 feet. The main runway is 6200 feet long.

We made a normal approach. Our landing weight was down to 45,000 pounds. We touched down at the end of the runway, pulled the throttles back to Ground Idle position and let 'er roll. We didn't touch the brakes until we reached taxi speeds. We wanted to see what "Hourglass" would do. At taxi speeds we feather-touched the brakes, coming to a complete halt in 3500 feet from touchdown.

After taking on additional fuel we grossed out at 49,500 pounds at takeoff. With full rated power (971°C. TIT) we were airborne in less than 3000 feet. Each engine was indicating 3500 shaft horsepower at field elevation.

On another flight we ran into moderate icing conditions between Indianapolis and Miami. We were 20,000 feet above southern Tennessee. We recorded no loss in airspeed, no prop vibration and there was no indication of loss of engine efficiency or power throughout the 20-minute period. The ice did, however, scratch the seven-foot high Hourglass elaborately painted on each side of the vertical fin.

The propjet engine is really a remarkable engineering accomplishment. Never before has a commercial engine produced nearly 2.2-hoursepower per pound of engine weight. The little engine weighs only 1750 pounds and produces 3750-horsepower. It measures only 27 inches in diameter and 145 inches in length. This means that the Model 501 has one-third the diameter and one-half the weight of today's most advanced piston engine, yet produces more power.

Although the commercial specifications call for 64A grade kerosene fuel, the propjets can use JP-4 as an alternate fuel. And, fuel consumption is economically low. In our first 625 hours of operation, the total fuel consumption for the two engines was 208,300 gallons. The engines have met or bettered the Specific Fuel Consumptions specifications throughout block-to-block operations from sea level through 20,000 feet cruising altitudes. When the project is completed it will be an unprecedented demonstration of modern propjet power.

Greatly contributing to this feat is the USAF Lockheed C-130 Hercules combat cargo-transport, now in operational service in Tactical Air Command Wings both in the United States and in Europe. The component parts of the T56-A-1 propjet engines and turbo-props which power the Herky-Bird are 75 per cent interchangeable with the commercial Model 501-D13.

Additionally, Lockheed designers and builders of the ultra-modern Electra, are flying similar demonstration programs with a Super Constellation converted with four Allison propjet power packages identical to those which will power the Electra. Also flying is another Lockheed Constellation with one of the power packages mounted on the right wing outboard nacelle position.

Perhaps you can now see why I believe propjet power will have its place in this jet-age for many years. It will be a money-maker for the airlines and bring jet-age comfort and speed to the millions of passengers who fly the medium and short-range segments, routes which comprise 98 per cent of all United States air travel.

The versatility of these engines and propellers permits rapid conversion of Convair 340 and 440s, Super-Constellations and DC-7s, all in wide use with the airlines. Both the Air Force and Navy have Convair-type piston-powered transports. What an airplane these would make if converted to propjet power. Speeds up to 80 mph faster, yet retaining the inherent ability to land and take off from *any* military or commercial field.

Allison engineers and eleven of the world airlines believe that we have a real winner in this turbine engine-propeller combination. And I know nine test pilots and engineers who'll stake their futures on it. ▲

As FLYING SAFETY went to press, it was learned that HOURGLASS was completed 24 January. The airplane made 657 separate flights and averaged 12 hours of flying time daily. Allison advised Flying Safety Magazine that normal line maintenance was all that was required.

Major R. D. "Jim" Price, Fighter Branch, DFSR

That Sudden

Approach and landing accidents are still tops in the "cause factor" department. Proper supervision can help reduce them.

"**To be or not to be**, that is the question."

You've all heard that famous quote from Shakespear's *Hamlet* but how many of you know what comes next? Well, here is some of it:

"Whether 'tis nobler in the mind to suffer the slings and arrows of outrageous fortune or to take arms against a sea of troubles and by opposing end them."

Shakespeare had a good point. If we translate it into modern English it would read, "If you have a problem, are you going to sit back and suffer with it, or are you going to do something about it?"

Well, we have a problem: Landing our modern, high performance aircraft. If you're not aware of this problem, let's look at some statistics which will give you an idea of what we're up against.

- More major accidents happen during the approach and landing than in any other phase of flight.
- Approach and landing accidents account for almost half of all USAF aircraft accidents.
- About one out of every four pilot fatalities results from a landing accident.
- About 55 per cent of all accidents are the result of human error (most often on the part of the pilot).

Bearing these facts in mind, I think that you will admit that landings are a problem. So, let's take Mr. Shakespeare's advice and see what we can do about it.

Two of the most common types of landing accidents are *hard* landings and *short* landings. Both of these result from the same causes: Improper control of either the rate-of-descent or the airspeed, or both.

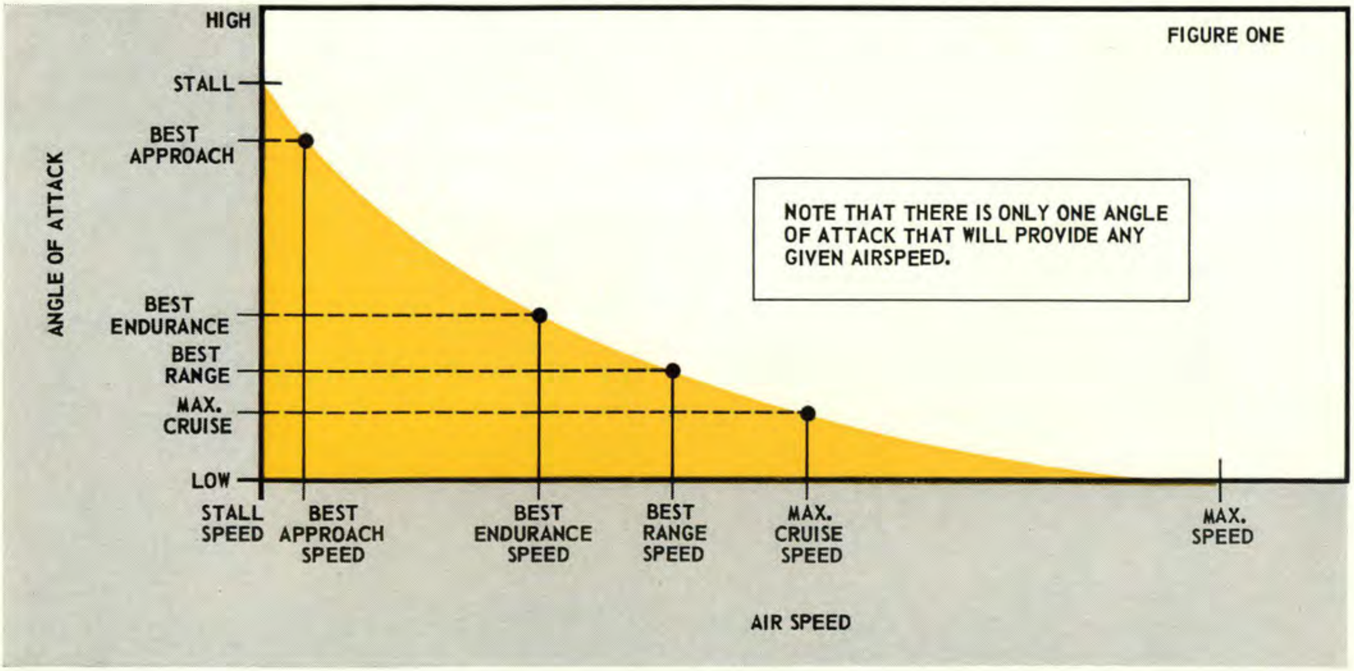
So it seems that rate-of-descent and airspeed are the factors on which we should concentrate our efforts in order to greatly reduce landing accidents.

Of course, rate-of-descent and airspeed are inter-related in that both have to be right to assure a proper landing and the pilot must control them both at the same time. But for the purposes of discussion, I will deal with them separately.

Airspeed Control

First, an aerodynamic fact: In unaccelerated (1G) flight, at any one angle of attack, there is only one

Figure 1. Typical Angle of Attack vs. Air Speed Curve for flight under unaccelerated (1G) conditions.



STOP

equivalent airspeed at which an aircraft can fly. (Fig. 1) This is true whether the aircraft is climbing, descending or in straight-and-level flight. It is also true whether you are at full power, low power or power off. Also, the airspeed varies inversely with the angle of attack. The higher the angle of attack, the lower the airspeed and vice versa. From this we can see that angle of attack is the primary factor in the control of airspeed.

In landing, a good, steady airspeed on the approach is highly desirable. This speed will vary for different types of aircraft, but each one has its best speed based on its stall speed, aspect ratio and other aerodynamic characteristics. So it must follow that if each aircraft has one best angle of attack for flight on final approach, and if you—as the pilot—place the aircraft in that angle of attack, you will automatically realize the proper airspeed. It should be noted that for our modern high performance fighters which have a very low aspect ratio, it requires a high angle of attack to maintain low speed flight.

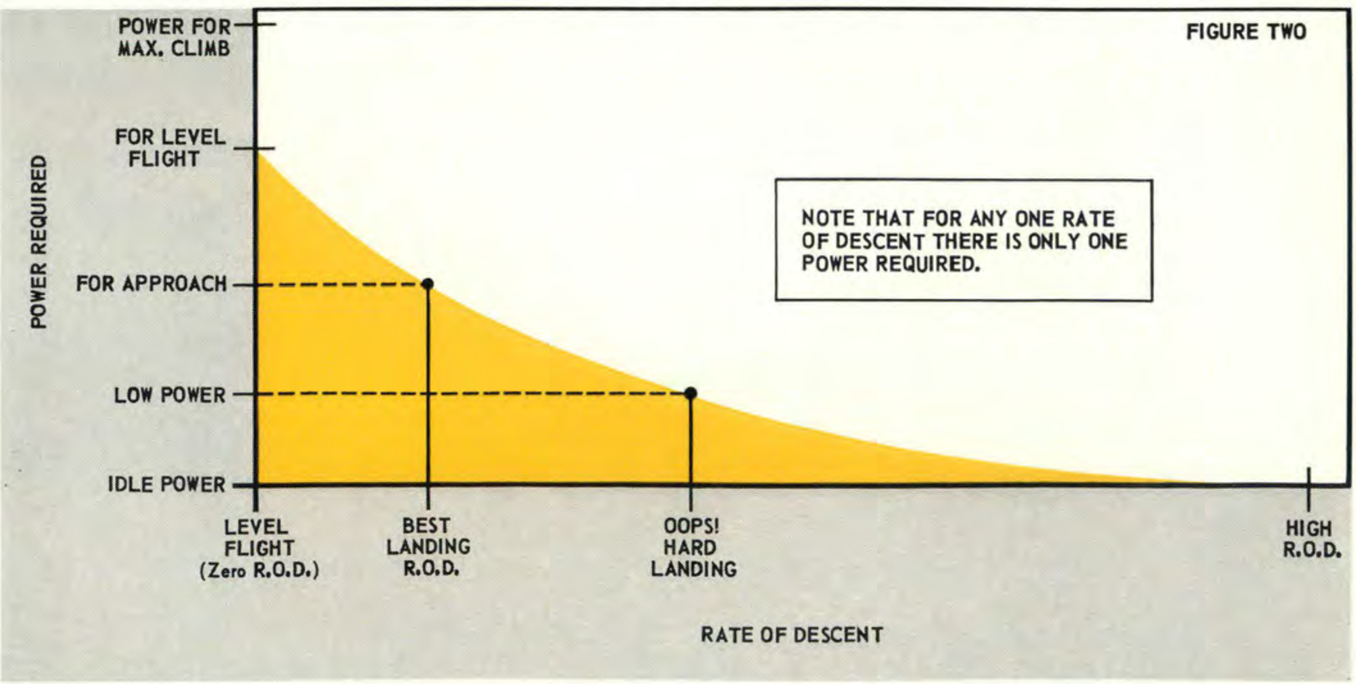
Rate-of-Descent

Another aerodynamic fact: For a given angle of attack-airspeed combination, there is only one quantity of thrust or power which will produce a particular rate of descent. (Fig. 2.) Also, the rate of descent will vary inversely as the thrust.

In other words, the throttle is the primary control for rate of descent. High power settings produce low rates of descent and low power settings produce high rates of descent. However, rate-of-descent and power are not completely independent of angle of attack. If the angle of attack is changed, the power required to maintain the particular rate of descent must also change. (Higher angle of attack, higher power required, and vice versa.)

Here again, we find that different aircraft have their own best rate-of-descent for consistently good landings. The best rate-of-descent for a given type of aricraft is determined by its aerodynamic characteristics. Some of the most important factors are aspect ratio, wing loading, best approach speed and sink rate. Aircraft with high wing loading experi-

Figure 2. Typical Power Required vs. Rate of Descent Curve for constant Angle of Attack and Air Speed.



"From there on in, the final approach resembles a roller-coaster!"

ence extremely high rates of descent at low power settings.

Flareout

If you were to try to land out of a Mach One dive, you'd have to start your flareout at some point well above 15,000 feet, not because of your high airspeed but because of your high rate-of-descent.

Proper determination of the point to start the flare is very critical to a good landing and in this case would be beyond the capability of the pilot to judge.

From this extreme example, we can draw the conclusion that it is more difficult to judge the point of flare when you are in a high rate of descent than in a low rate of descent. This is because at a high rate-of-descent, the amount of flare or degrees of rotation required is greater; the vertical distance required to perform the flare is greater, and the pilot's judgment must be accurate from a greater distance.

Although, in normal traffic patterns you won't encounter any Mach One rates-of-descent, it is very easy to slip into a rate of descent so high that you can't cope with it within the altitude remaining.

Let's review the major points covered so far, so that we can start putting these disjointed facts together to create a good landing.

- First, airspeed is controlled primarily by the angle of attack.
- Second, rate of descent is controlled primarily by power and the power required is directly affected by the angle of attack.
- Third, the point at which flareout should begin is a function of the rate of descent.

These facts may seem pretty basic to you and you are probably wondering why I am presenting them to experienced pilots. I should point out that those accident statistics which I quoted earlier were not statistics on inexperienced people. They include all of us.

Unfortunately, there are many pilots who know basic principles of flying but don't operate according to them. There are many "old heads" who still try to decrease their rate of descent by coming back on the stick. This actually increases the rate of descent if they don't have sufficient power or airspeed. It is the old story of stretching a glide.

And then there are those who try to reduce their speed on the final by chopping all the power. They end up with a rate of descent that is excessive, so back on goes the power and back comes the stick. From there on in, the final approach resembles a roller coaster!

Final Approach

The importance of a constant angle of attack or attitude on the final approach can best be emphasized with this reminder. When you're on final approach in most aircraft you'll be flying on the back side of the power curve. If you let your airspeed (angle of attack) wander, particularly to the low side, you can easily end up in a situation where the only way to regain your airspeed is to sacrifice altitude. And on the final approach you don't have much to play with.

Well, how should you fly the final approach? Here is my recommended procedure.

- Put your base leg far enough out to insure a long, straight, relatively shallow, *power-on* approach.
- On the approach, try to nail the proper attitude and airspeed with the stick and then trim the aircraft for "hands-off" flight.
- Find the constant power setting that will nail the proper rate of descent.
- Cross-check airspeed indicator and vertical speed.
- Make any adjustments in rate of descent with the throttle.
- Make adjustments in airspeed with the stick, but remember that changes in angle of attack require power changes to maintain the desired rate of descent.
- Flareout. If you are on a shallow power-on approach, the flareout should be no problem. You have very little rotation to accomplish and your rate of descent is low. It should be easy for you to judge your flareout point.
- Touchdown. Proper level-off and touchdown are mostly a matter of your technique and judgment with respect to the type aircraft you're flying. However, a good approach will make a good touchdown much more easy to accomplish even if your techniques and judgment have taken the day off.
- If you louse up your approach, go around! There are fewer accidents during go-arounds than in any other phase of flight. Conversely, many accidents are caused by failure to go around.

One final word. The next time you fly, go to altitude and practice some power-on descents—using throttle to control rate of descent and stick to control airspeed. Check your instruments regularly and see how easy it is to nail airspeed and rate of descent with this method.

If this procedure seems foreign or awkward to you, you've probably been doing it wrong for lo these many years. You won't be alone though. There must be many of us or I wouldn't have been able to quote the accident statistics that I did.

So, take Shakespeare's advice. Don't sit back and suffer with your problem. Do something about it! And remember, it takes more practice to learn to do something right—after you've been doing it wrong—than it took to learn it originally. ▲

the Supervisor

The little lady obviously in command here has some pretty definite ideas on supervision. Mainly, she specializes in saying No. And with Chumley, her errant spouse, it's probably a good approach. We predict he'll change his ways or at the very least, learn how to be more discreet.

The completely negative approach just won't work for the supervisor in the Air Force. With aviation progress being what it is, the guy in the saddle has to come up with some positive thinking to accomplish the mission assigned to his outfit. And he's not going to lower the accident rate just by publishing regulations against bending air machines.

It takes a new idea now and then to get the message across. When any of you supervisors in the field come up with a gem of a thought which you think others can use, let us have a look. We'll be happy to pass your brain child on to the readers of FLYING SAFETY so that all can benefit.


LT. COL.
REX RILEY
AIRCRAFT ACCIDENT INVESTIGATOR
by
M/SGT.
YOU HAD A LOWER ACCIDENT RATE LAST YEAR.... WHAT DID YOU DO RIGHT ?
" I WAS MORE THOROUGH IN MY PREFLIGHT PLANNING AND INSPECTIONS.... SAFE GROUND HANDLING PRACTICES CUT DOWN MY TAXI ACCIDENTS..........
....I FLEW MY AIRCRAFT IN ACCORDANCE WITH DASH ONE PROCEDURES AND DID NOT IGNORE THE LIMIT-ATIONS OF THE POWER PLANT........
U.S.
....THROUGH BETTER FUEL MANAGEMENT AND PROPER