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FLYING SAFETY

UNITED STATES AIR FORCE

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THE EDITOR'S VIEW

Air Force pilots are the richest people in the world. Just ask any taxpayer, or take a look around yourself. Not only do they fly the best—and incidentally, the most expensive—airplanes in the world, but they have the best support equipment. Much of this equipment, and the facilities at which it is located, is for the exclusive use of the Air Force crew.

An Air Force pilot might be likened to the owner of a fabulous home: one equipped with all the necessities of life and many of the conveniences. Locate this home in the midst of a grand resort area abounding with beaches, lakes, mountains and all the "good things of life," and you have a fairly accurate parallel. The owner may content himself in his own back yard, where almost every need is answered, or he may go abroad to entertain himself with the facilities available to all. How can he ever be bored? Or, how can it be that he could ever reach that stage of having "nothing to do?"

While this picture is hardly conceivable to most of us, a parallel does exist in the way that most of us fly. Look at the luxuries available to you in the form of flight facilities: Flight planning rooms, elaborate weather stations, maps and charts of every description, flight planning equipment and personal equipment to meet every need; GCA for takeoff and radar monitored climb, low frequency radio ranges, VOR, and even a few VAR, TACAN, LORAN, DF services to suit almost any equipment; ILS, GCA and RAPCON for landing; radar sets installed in aircraft, Pilot-to-Forecaster Service and GCI for inflight advisories. All this and more—backed up with CAA, Navy, Marine and Coast Guard Equipment. So how can we reach that stage of having "nothing to do"—or more appropriately, "nothing to use" when the chips are down?

It happens. And pilots continue to get lost, and run out of fuel, and work themselves into hazardous situations they were not aware of, but could have been. And some are no longer around to tell the tale of the facilities they could have used, but didn't. It is still legal to use more than one piece of equipment to give you essentially the same information. And that figures to be a lot better than starving to death in the midst of plenty.

CROSSFEED

LETTERS TO THE EDITOR

Water Landings

The following correspondence between Col. A. M. "Chic" Henderson and M/Sgt. Lonnie D. Brereton, USAF Academy, was exchanged via FLYING SAFETY MAGAZINE *Office. Both letters are quoted, since Col. Henderson's reply may answer the same question in the minds of other crewmembers.*

Sgt. Brereton writes:

Your article entitled "What About Today?" in the August 1957 issue of FLYING SAFETY was of particular interest to me as it was the first up to date article of its kind that I have been privileged to read. I am in complete accord with all of your views, and I've used the entire contents in a series of lesson plans which I've prepared for use by first-year cadets at the USAF Academy.

There are, however, a couple questions which I'd like to ask. The first is in reference to water landings with fully inflated life preservers. We have a Lieutenant in our organization who is an ex-paratrooper, and he says that this is all wrong, as a man would break his neck.

The second question pertains to the life raft. If you are equipped with an automatic kit, it is the contention of this ex-paratrooper that were the life raft inflated, there would be a tendency to fall right through it.

As stated above, I am in complete agreement with the entire article. However, if you have any data pertaining to the above questions I would be very grateful if you would let me hear from you.

Lonnie D. Brereton, M/Sgt.
USAF Academy
Flying Training
Colorado Springs, Colo.

Col. Henderson replies:

Thank you, Sergeant Brereton, for your kind words about the article. Stick to your guns.

The procedures as outlined in the article are correct. Hundreds of test jumps have been made into water with fully inflated preservers, both the B-5 (Mae West) and the underarm types, in reasonably high winds (25-30 mph), without injury to the preserver or the jumper. Of course, if the B-5 is being worn, the chest strap should be loosened prior to inflation. Otherwise one gets a good squeeze and after inflation the buckle is very difficult to open.

With regard to the inflated life raft the answer is the same and we haven't had anyone go through one yet. Normally, the raft is dangling 10 or 15 feet below the jumper on a lanyard. The lanyard is 25 feet long and on the far end is the waterproof kit of accessories. The raft, because of its inflated bulk, will oscillate some even in a slight wind and chances of landing in or on it are almost nil. If you happen to land on an inflated edge, the best you will do is bounce off. Of course if you had the misfortune to hit right in the middle of it, you would no doubt go through. You may verify these procedures with the Air Force if you so desire by writing to Major Robert Oakley, Wright-Patterson AFB (WCLS).

I've recently completed a small book on this subject. It is lightly written and is illustrated by sketch. It's called "IT'S YOUR LIFE, JOE."

If I can be of any further service, please do not hesitate to write. Give my best regards to the ex-paratrooper and tell him that I'm an "ex-," also, but time changes everything.

Col. A. M. "Chic" Henderson,
USAF (Ret)
7343 W. 88th Street
W. Los Angeles 45, Calif.

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Glide Ratio

In one of your recent FLYING SAFETY MAGAZINES I read an article about GCA glide ratios. As it said, Glide Ratio is effected by three components:

- GCA glide slope angle.
- TAS of airplane.
- Wind.

As you know, for a given Glide Slope, TAS and Wind, there is only one glide ratio.

I checked AFM 51-37 for GCA voice procedures. It is in the standard procedures for GCA operator to ask airspeeds on base and final.

I believe it will be very useful for the pilot if GCA tells him his approximate glide ratio for given airspeed and present wind. Maybe you already do it as a standard procedure in the USAF. But if you don't, I'm sure it would be a very nice thing to hear the operator saying something like "Your glide ratio will be around 950 fpm."

By the way, your Special Study Kits are very helpful to me and it is very kind of you.

1/Lt. Sadi Kaban, 3 Filo,
Ogrt. Yet. Kol
Gaziemir - Izmir
Turkey

Existing regulations make it optional for the GCA operator to suggest an initial rate of descent as the aircraft enters the final approach phase. We gather it is encouraged, but recognize that due to wind variations near the surface, such estimates cannot be relied upon for all the altitudes you'll pass through. Remember the wind shear problem? See "Change Without Notice," FLYING SAFETY, *April 1956.*

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Rex Says

I was very much interested in your item in "Rex Says," page 26 of the August issue, concerning two "old heads" who did not use the emergency fuel system after experiencing malfunctions on the normal. We encountered this problem many times with students in the All-Weather School for the F-86D. They flew flameout patterns and brought back aircraft that were surging badly rather than switch to emergency. As a result we emphasized calling it an alternate fuel system. I believe if many systems in Air Force aircraft were renamed "Alternate" instead of "Emergency" that, psychologically, pilots would be more willing to use them.

The word "Emergency" often seems to present an unnecessary mental block to taking the appropriate action of switching to an alternate system.

Capt. William H. Ginn, Jr.
Tyndall AFB, Florida

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Memo for Professional Pilots

I would like permission to have the editorial, "Memo for Professional Pilots," which appeared in the June 1958 issue of FLYING SAFETY, reprinted in several local newspapers.

As you well know, there have been several articles published in leading magazines which have been rather uncomplimentary to the Air Force. Certainly they did not state all the facts. We feel that your well-written article would give the public a better understanding of the problems we in the Flying Safety business are faced with.

Maj. Samuel B. Hoffman
FSO, 3525th CCTWG (Ftr)
Williams AFB, Arizona

Permission granted. We need much more understanding of the problem in and out of the services. Public opinion will play a large part in the final decisions.

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Oops!

Reference is made to the picture on page one of the August issue of FLYING SAFETY. The pilot is obviously "—Not at all" if he is testing his helmet headset and mask microphone. He is not plugged in to test the headset/mike.

Here is a photograph of the combination mask, mike and headset tester used in the five Combat Crew Training Squadrons of our Group for the past two years. These devices, locally manufactured, have practically eliminated aborts for headset/mike/mask malfunctions even though we have flown as many as 500 jet sorties per day. We attribute this to the SOP requiring a check prior to each flight.

Capt. Joseph H. Turner
FSO, 4510th CCRTRAGRU (TAC Ftr)
Luke AFB, Arizona

You're so right! You have to go all the way.

MAZE IN MIDAIR

Daedalus, Father of Flight in Greek Mythology, is also credited with inventing "The Maze." In the last fifty of the three thousand years since, we have combined his inventions into an elaborate system at which even he would marvel.

I could see fifty miles, from the window of base operations. There wasn't a thing out there to obstruct the visibility, but West Texas itself.

According to the sequence in the Weather Office, there was not a cloud in the sky for four hundred miles in any direction. At this time of evening, just at sunset, traffic had slowed down somewhat. Training missions were in that in-between stage of day/night operation—the itinerant civilian flyer had called it a day—and there was little left going on except around-the-clock routines.

But the book states that despite all these considerations, I should file an "instrument flight plan." Not that I objected to doing it—I didn't. If somebody wanted to "control" my flight in the T-Bird, that was okay with me. It was the seeming paradox of the whole idea that struck me. I was going on a "controlled flight." But as long as I could see, I would still be responsible for separating myself from anything else that happened to come along. "Well, that's the way it is," I thought. "Let's get on with the clearance." And I did.

The winds were light at altitude. Summertime stuff. Looked as though somewhere in the neighborhood of 35,000 feet would be the best. I whipped out the chart to see how this was going to work out with the new setup. Going east, and IFR, 33,000 seemed to be as good a compromise as one could make. That figured to give me an easy fuel margin when I got to my destination. The winds were helpful, and the altitude factor wasn't critical below 34,000. Thirty-three, it is! Should be no problem getting what you ask for on a night like this.

With practiced care, I filled in the rest of the blanks: Estimates of time to climb—to cruise—to use up fuel—to penetrate—to land—to go to an alternate (although none was required)—and with even an appropriate amount left over for a reserve—a slush fund of time and fuel. On a night like this, these calculations are just for practice. Like the Englishman who was marooned on an island—always dressed for dinner, just so he wouldn't lose touch.

It was dark when we got to the plane. I had a few nervous minutes when my flashlight didn't want to work. But I coaxed, and it did. Seems like those engineers can building anything but a reliable flashlight.

The walk-around showed nothing unusual, but I was a little apprehensive about the luggage carrier that was strapped underneath. The reports from the Flight Test Center at Edwards had said that it didn't make any appreciable difference in flight—but I had never tried one. Guess everybody has some misgivings. We'd see, shortly.

Funny how thoughts run through one's head during times like these. It's not that you don't concentrate on what you're doing. Must be that things just don't happen fast enough to keep your mind completely occupied.

I signalled to the alert-man for plug-in of the APU and checked with the Colonel in the back seat to make sure the interphone was still going. First time I had flown with him. New "Boss," and he'll be around for a while. He'd flown the first leg and now it was my turn. First impressions are pretty important, I guess. Better make a good one. The five thousand flying hours that show on my Form 5 won't make near the impression that the first five minutes of this flight will.

Automatically, I reached for the ignition switch and hit the starter. Light was good. Engine instruments checked okay. Looked like we were ready to go.

"Did you get your ATC clearance yet?"

I could have sworn that was the Colonel. And it was. Here I had been musing and not thinking. Sure, it was VFR. And I had even requested a VFR climb. But that didn't change the shape of things. I should have gotten that clearance before I cranked up. Surely it can't be delayed with weather like this though.

I mumbled something to that effect as the tower came through with taxi instructions. But even I wasn't convinced. First impressions? I had given him a great one! Matter of fact, I wasn't so well impressed with myself. This was the sort of thing a basic student might do.

"Play the odds," I said to myself. "The clearance can't take any time to come through on a night like this."

It was seven minutes later at the end of the runway that it came. Just rule-of-thumb figuring told me that I had just lost 50 to 75 miles of cruising flight by that bit of stupidity. At this point I'm even less impressed with me and—I'll bet—so is the Colonel. I copied the clearance.

". . . Clears 07863 to the Podunk radio beacon via Victor 16 to maintain 25,000 feet—climb under VFR conditions to 25,000 feet—report reaching 22,000—read back."

"But it's VFR!" I felt like screaming. And that is not what I asked for! It was 33,000 that I wanted. And it was J-4 and J-42 Victor Airways that I'd asked for. Victor 16 doesn't even take me over the same reporting points. I don't have flight plan one for this sort of flight. The whole thing is different. All I've got now is a Colonel in the back seat who has every right in the world to blow his stack in 10 seconds flat!

I wouldn't have blamed him at all. At that point, he should have ejected me, and gone on alone. There we were—ready for takeoff—burning up ten miles of cruise every minute—no alternate flight plan for what might have been expected—it's dark—and it's no place to be fumbling with a G.I. flashlight and a Fac Chart trying to revise the plan.

Abort? No. Past experience, coaxed by false pride and embarrassment, told me I could make it. The first leg was the same, except lower. When I got to altitude I could make out a new flight log, maybe before we got to Dallas. Besides, it was a clear night and maybe we could get a new clearance and the high altitude route that we'd planned for before then. "My impression" might be worth the gamble, provided it paid off. This didn't necessarily check with my past performance at Santa Anita, but I glossed over that thought while we lined up between the runway lights.

With things falling away as they had, there wasn't much to do except start the fuel count from whatever was left when we got to assigned altitude. That wasn't encouraging at all, because it took more time and fuel to climb to 25,000 than the chart said it should take for a climb to thirty-three. Must be that luggage carrier. But come to think about it, they weren't talking about climb performance when they mentioned the little difference it made.

Dallas came up late, according to the original plan. And the fuel, of course, was shorter. Better give the request-for-change idea a go, or things may get more than critical before destination comes up. What a time to have radio problems! Can't raise Fort Worth Center on its frequency. Better go back to Channel 5 and try Dallas Radio. Nothing there either. Try Sulphur Springs. Oops—no voice there. There's Dallas, after all.

"Roger—understand ATC clears 863 to climb immediately to 26,000, maintain 26,000."

Funny. I thought that was a west-bound altitude. Guess it is, but he knows what he is doing. That's his prerogative—to put people where he wants them. I just hope that everybody else up here is playing this thing according to Hoyle. Not much help at that. Still doesn't put me above 27,000 into the high altitude airways. And that fuel is going down too fast for comfort. The way things are going, we ought to have maybe 75 gallons left at destination, but that's not much. There's a better answer than this.

Hey—that's me they want. "Roger, Dallas, 863 here."

". . . 07863, Fort Worth Center requests that you reverse course immediately, descend to 26 thousand immediately, and report over Dallas Omni . . ."

Descend? Reverse course? But I'm headed East! I'm practically over Texarkana right now. That's over a hundred miles extra they want me to fly. At this altitude I'll never make it. It'll never happen.

"Dallas Radio, this is 863—unable to comply and continue flight plan. Advise if emergency exists."

"Roger, 863, conflicting traffic over Texarkana scheduled to arrive within four minutes of your ETA at your altitude. Will you accept a VFR-on-top clearance from your present position?"

Is he kidding? Of course, I'll accept "On-Top." People are waiting on the ground for me right now. And as far as that conflicting traffic over Texarkana is concerned, we'll put some altitude between us. Thirty-three thousand will put us a mile apart, and give me more fuel to play with.

I pushed forward on the throttle and watched the RPM climb to a hundred per cent. Glancing up from the panel, I was suddenly transfixed! Covering my entire windshield—my canopy—all I could see, a hurtling shape! I heard or felt or imagined a rush of air and a sudden roar that was lost as quickly as it had come. In a space of time faster than I could turn my head, it had come and gone.

Was the night playing tricks on me? Was it the altitude? If it was the "conflicting traffic," why had I not seen a light? Was my eagerness to get to my destination and my anxiety over time and fuel affecting my vision or imagination?

It was there. It had to be. I had just missed somebody in something by a matter of inches, or he had just missed me.

Why had he not seen me? My lights were working. But the fact remained that he had not. And I had not seen him. In those short moments while I had watched the tachometer climb a bare ten per cent, destiny had approached and, by the Grace of God, passed.

I was thoroughly "shook," but at 33,000 I felt safer. After that brush with whatever it was, this seemed like a real fine altitude.

I still had the shakes the next morning and I tried to drown them in black coffee while I waited for the Colonel to finish up his conference with the local commander. While the "near-miss" still dominated my thoughts, the events leading up to and following it, crept in.

For instance, look at what happened right after the "near-miss." I climbed to 33,000 and flew there on a heading of eighty-two degrees. IFR-on-top on that heading, I should have been at 34,000. Nobody called me on it in my subsequent position reports, but they could have. It is one of those changes of altitude assignments that came out last August and I didn't double-check the chart. At 33,000 I was using an altitude over which ATC controllers thought they had complete control. I wondered if they had known.

I wondered too, if the Colonel had known, or if he might later recall. Here I was—doing the best I could and lousing up the act all the while. I almost loused it up forever.

And while there was not a thing in these thoughts that was comforting, another more chilling thought occurred. At that new altitude I had once more unwittingly and unintentionally exposed myself, my new "Boss," my aircraft and heaven knows who else to another mid-air collision hazard.

Something was wrong. I wasn't convinced it was entirely me. Sure. I had made my share of mistakes. But it seemed to me that somebody else must be making some, too. Maybe if they weren't making mistakes, they were building procedures so complicated that errors come easy.

I had planned a good flight, but the complications of airways, altitudes, varying fuel consumption, and a lot of other traffic had shot that flight plan right between the eyes. So I had to revise the plan. I tried to make the revision inside the cockpit on a dark night with the aid of an unreliable flashlight, while my engine was running. Try studying a congested area page of the Radio Facility Chart with even a good flashlight sometime. Do all those lines have to be on those things? Even with what is there, you have to look at another chart to find the rest of them—the high altitude routes.

This is compound, complex complication. But why?

Maybe, I mused as I poured another cup, instead of merely airways and airplanes, this thing involves and stems from something a lot bigger. Like society, or the "American way of life," or something on this scale.

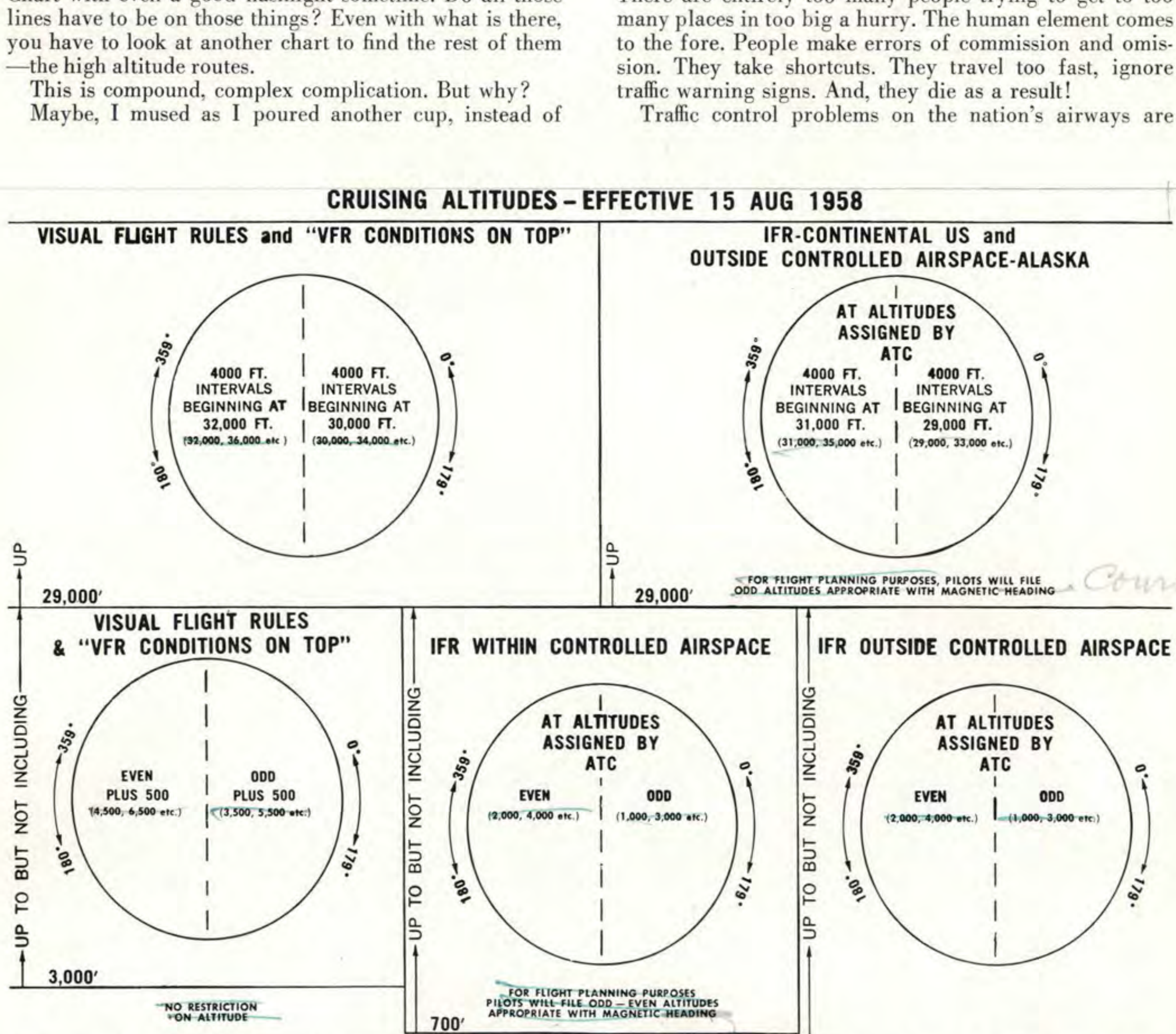
It's true that Americans are the "travelingest" people in the world. Every year, millions of Americans travel billions of miles over the nation's highways, airways, railways and waterways.

Control of traffic on the highways is a two-dimensional problem. It should be relatively simple in the future, thanks to electronic control systems now on the drawing boards. However, at the present time it is a headache-provoking matter to which any highway traffic engineer will testify. And, any driver!

Superhighways, cloverleaves and myriads of traffic signs have helped to control highway traffic. Railroad traffic is controlled by a complex electronic system. Traffic on the water is supposed to stay within prescribed shipping lanes. These are facts.

And yet, accidents in all phases of our transportation system continue to occur. Why? The answer is simple. There are entirely too many people trying to get to too many places in too big a hurry. The human element comes to the fore. People make errors of commission and omission. They take shortcuts. They travel too fast, ignore traffic warning signs. And, they die as a result!

Traffic control problems on the nation's airways are



compounded by the fact that aircraft are three-dimensional machines. On the ground, a machine can go forward, backward, right or left. In the air, a machine can do the same things but it also can go up and down. And therein lies the problem.

Mid-air collisions, of course, can be the result of any of these dimensional movements. Airplanes can overtake other airplanes; they can climb or descend into other airplanes and they can turn into other airplanes.

On the highways, speed is blamed for many accidents. In the air, this also is true, but it is airspeed that keeps an aircraft flying. Highway statistics have been published for years which show that stopping distance depends on the speed of the moving vehicle, individual reaction time, muscle movement and other variables.

In the air, there is no such thing as stopping distance but there are many variables, the most important of which is the rate of closure between two fast-moving aircraft.

In many instances the rate of closure is so great that pilots simply do not have time to perform physical acts which, in turn, will alter an airplane's course.

So, what is to keep these aircraft from colliding with great frequency, rather than rarely?

Basically, the answer is traffic control. We all know that the Government has set up certain "highways of the air"—our airways system. There are aerial cloverleaves, superhighways, sideroads, traffic signals and even "traffic cops." These men are the personnel of the Civil Aeronautics Administration. They are human beings, too, working with complex radio and radar equipment—controlling aircraft that fly at speeds of less than 100 to more than 1200 miles per hour.

The CAA Traffic Controller can make mistakes, just as pilots can make mistakes. Unfortunately, there are no "perfection pills" available for human consumption. A moment of confusion, a slight diversion, a wrong decision, a crowded telephone circuit, an airplane in distress; any one of these factors and many more can result in a mid-air collision.

Earlier this year there was one in just about the same area that I was flying. Two cargo airplanes collided near theie. Eighteen men died when the two aircraft plummeted to earth from seven thousand feet.

The pilots of both airplanes were flying on Instrument Flight plans—at what they believed were their assigned altitudes. They were under CAA control. One dimension—up and down—was eliminated in this accident, but the other two were very much in evidence. One airplane crashed into the other at direct right angles. It never will be known whether either pilot saw the other aircraft.

The investigation pointed out that one pilot had filed a clearance with CAA to fly from Point A to Point B. He requested an altitude of four thousand feet. The CAA gave him a clearance to fly his intended route, but changed the altitude. The copilot copied the clearance. It contained specific climbout instructions: To climb----.

But let's see how sharp you are. This is the clearance. "ATC clears Air Force 12345 to the Podunk Omni via Victor Airways zero two. Maintain eight thousand. Maintain six thousand 'til fifteen miles northwest. Over."

You copy that and finish your pre-takeoff checklist. When you are ready to line up, you advise the tower, and this is what you hear?

"Roger. Right turn after takeoff. Climb to seven. Climb on the three two two degree radial of the Omnirange to seven thousand before proceeding on course, and maintain six thousand until fifteen miles northwest. Over."

What are you going to do? And without reading further, what altitude are you going to "maintain" after your climb? These pilots interpreted the instructions pertaining to the seven thousand feet segment of the flight as a change to the original clearance that specified "maintain eight thousand feet." Did you?

The fact that they did is borne out by the flight plan form found in the wreckage. The figure "seven" was superimposed over the "eight" that was copied by the copilot when the original clearance was received.

An experiment shortly after the accident showed that 50 per cent of the 12 pilots who were issued a similar clearance, either questioned the clearance or leveled off at the wrong altitude. These experiments were conducted in a flight simulator.

Approximately two to three minutes before the collision, the pilot called in a position report to the Airways Radio Station, saying that he was at seven-thousand feet. It is extremely doubtful that this information could have been acted upon in time to take corrective action.

The mechanics of getting changed instructions to the pilot involved four separate transmissions. The radio station would have to call the control center, which, in turn, would have to recognize the fact that the aircraft had reported at the wrong altitude, and that a hazard to other aircraft existed. The Controller would have to decide what sort of a revision in flight plan to issue and possibly coordinate his action with other Controllers. He would then have to contact the Radio Station to tell that operator of the revision in order for him to relay it to the pilot. You can complicate this procedure even further with high density conversations going on at the time the operator tries to get the revised clearance through.

The only way in which this complication may be bypassed is for the Controller in the Center to recognize the imminence of the hazard, and to transmit direct to pilots on "Guard" channel. While purely in the realm of speculation, such a call might have averted this collision.

With the increase of mandatory instrument departtures and letdowns imposed by recent restrictions on military air traffic, burdens on controllers as well as pilots have multiplied. Controllers are forced—in order to move traffic at all—to issue complex clearances, departure restrictions and arrival and letdown restrictions. Restrictions have been increased on Controllers in the type of clearances issued and methods of routing traffic. While every attempt is made to simplify requirements, a certain amount of confusion is bound to result, both in Control Centers and cockpits.

For non-tactical flights, such as mine had been, the problems are worse. No longer is it possible to make one hard and fast flight plan with the complete assurance that this is the one that will be used. Air Traffic Control agencies can offer no such guarantee, unless you want to wait. And even then, there can be no guarantee that your own personal plan can be approved. In many cases, there is just too much traffic to be moved.

In order to "Plan your flight and fly your plan," you must have a plan with enough reserve built in so that you know the plan is possible.

The fact that we're faced with these problems is no news to anybody. People have been working on various facets of the thing for a long time. And despite the tragedies of recent midair collisions, some of the greatest work that has ever been done in the field of traffic control is going on right now. Many lives have been lost, it's true, but out of the loss, good is going to come.

But until many of these projects are finalized, the burden remains with pilot and controllers. It is a big team, but everybody has to play, all the time. The controllers have to know more about airplanes and their capabilities than ever before. And we have to know more about the control function, regulations and facilities than we've had to know before.

The rules are rough and the facilities sometimes meager. But until more and better equipment becomes available, I guess these rules are going to have to substitute. It is something like having an automobile that will do 300 miles per hour. You couldn't drive it on today's highways anyhow.

"What's that? . . . Oh, Yes sir, Colonel. I'm in good shape now. All set to go whenever you are." ▲

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Here are the most recent rule changes based on ALZICOM Message 187/58:

For the purpose of standardization of interpretation, "Non-Tactical Flight" as used herein is defined as any flight other than one directly contributing to operational readiness of units having a tactical mission assignment. This clearly classifies as "Non-Tactical" such flights as CRT, administrative, logistic, flight check, research and development, flight test, student pilot and combat crew training.

Reference Par. 29, AFR 60-16, an organization commander may establish additional flight rules and clearance requirements applying only to pilots and aircraft assigned or attached to his organization for flying. Procedures, flight rules or clearance requirements more restrictive than those contained herein and AFR 60-16 will not be applied to transient pilots until approved by Headquarters USAF and published in appropriate NOTAMS, Radio Facility Charts or Flight Planning Document.

All non-tactical jet flights will operate IFR, except:

- *Flights to be conducted above 20,000 feet.*
- *Flights off airways.*
- *Flights proceeding directly between (to and from) their base of operations and 20,000 feet.*
- *Flights proceeding directly between (to and from) their base of operations and off airway airspace below 20,000 feet.*
- *Flights proceeding directly between (to and from) their base of operations and a satellite auxiliary base on routes planned to avoid airways where possible.*

Nothing in the above is to be construed as limiting the authority of a pilot's operating on an IFR flight plan, outside of positive control airspace, to request and accept a VFR climb or descent or "VFR-on-top" clearance.

Local VFR operations may be conducted on airways in areas under jurisdiction of approach control (conventional or radar) provided the pilot maintains a listening watch on appropriate Approach Control frequency at all times to receive traffic advisories that may be issued.

Where it is necessary that volume practice approaches be conducted VFR through airways to accomplish necessary training, special arrangements will be made with CAA.

All jet aircraft are prohibited from landing or taking off from civil airports, except:

- *Those aircraft of units occupying facilities at a civilian airport under a joint-use agreement.*
- *In an emergency.*
- *Official travel flights to subordinate units within a command.*
- *Official business flights between organizations of different commands when approved on an individual basis at numbered Air Force level or higher.*
- *Recovery flights of ADC active scramble aircraft.*
- *Aircraft being operated by or under cognizance of AMC necessary for procurement, acceptance, modification, test or delivery of aircraft.*
- *Flights necessary to the accomplishment of unit maneuvers and unit exercises where prior coordination has been effected with airport authorities involved and major commands have granted waivers to permit use of airports involved.*

This restriction does not preclude use of civil airports for accomplishment of essential approach and low approach training which cannot be accomplished at a military airfield, provided prior coordination has been effected with airport authorities concerned.

Civil airports may be used as alternate airports when military alternates are not available.

Civil airports are defined as those listed in Radio Facility Charts under Directory of Aerodromes, as "P", "PC", "CAA" and those where military designation is enclosed in parentheses.

All Air Force jet and conventional flights operated via airways between 10,000 and 20,000 feet msl will be conducted IFR at an assigned altitude, however, VFR climbs and descents through and within these altitudes are authorized.

"VFR-on-top" or full VFR will be used at these altitudes when operating via airways only where essential to tactical missions.

Crossing airways is not considered "via airways."

Commanders will insure that local flying conducted in local areas is adequately controlled so as to minimize the probability of midair collisions and near-miss incidents, and that all pilots are indoctrinated with the provisions of AFR 55-19 with special emphasis on flying within local flying areas and pilot procedures pertaining to coordination with CAA when practicing simulated IFR approaches at civilian facilities. ▲

In the Montgomery, Alabama, Air Safety Council the approach to safety of flight is making sure that . . .

all the hats are in the ring

Co-operation is defined in Mr. Webster's plotless book as: "Collective action for mutual profit or common benefit."

Anyone who has spent any time in the rural areas of our nation have seen co-op stores and businesses. As the abbreviation implies, a co-op is a group of folks working together for the common good.

Just such an operation is working right now in the Montgomery, Alabama, area. Basically, it's a group of flying types and some other types who're engaged in aviation in a business sense, plus some aviation-minded civic leaders. It's called the Montgomery Air Safety Council, and it's the brain-child of Major Harold W. See, Flying Safety Officer at Maxwell AFB.

Major See dreamed up the group in April, 1957, as a means of promoting better relations between the military and the civilian aviation groups and to talk over mutual air traffic problems. Maxwell is "home" to about 150 T-Birds, plus the usual quota of Bug-Smashers, Gooney Birds, T-29s and a few miscellaneous birds.

Dannelly Field, seven miles distant, is home to an Air National Guard squadron, which flies F-84Fs. Of course, there are all sorts of light planes being flown from the field too, and two commercial carriers, Eastern and Delta, operate from the airfield. In addition, there is another small airport in the vicinity, which houses a busy charter and flight instruction operation.

There are 18 Victor and Colored airways around and over the Montgomery area, and at one time recently there were 71 airplanes at different fixes in the area, all under control of the Atlanta Center. To say that the sky is full of airplanes is putting it mildly.

Of course, this is not a unique situation. There are all sorts of cities in the nation plagued with the same crowded air space problems, but the council *is* unique and the pleasant relationship that exists is a fine example of understanding and cooperation.

The council is composed of about 20 members. As is the case with all committees or councils, attendance at the monthly meetings vary. But, if every one showed up at one time the roll call would read something like this:

- The Montgomery Mayor and City Commissioners.
- Flying Safety Officers from Maxwell, Craig and the Air National Guard.
- Airport Directors from Dannelly Field and Allenport Field.
- Chief, CAA Communications, Dannelly Field.
- Watch Supervisor, CAA Communications, Dannelly Field.
- Watch Supervisor, CAA RAPCON/Tower Maxwell/Dannelly
- USAF Advisor to Air National Guard.
- Agent in Charge, Eastern Airlines.
- Agent in Charge, Delta Airlines.
- CAA Weather representative.
- Alabama State Director of Aeronautics.
- Alabama Highway Patrol representative.
- Civil Air Patrol.
- Montgomery Aero Club.
- Army Aviation representatives from Fort Benning, Ga., and Fort Rucker, Ala.

Major See reports that the local newspapers, TV and radio stations have been very cooperative in publicizing the efforts of the council. The base Information Services Office has been working closely with Major See in the preparation of a weekly TV show which is designed to acquaint the civilian populace with what is being done to insure safe air operations around Montgomery. The local newspaper features a weekly aviation column which is widely read.

It looks to us like a pretty fair setup. As stated earlier, Montgomery doesn't have a monopoly on this crowded air space business, but it does look like the Montgomery Air Safety Council has a monopoly on getting together a whole big bunch of folks with diversified interests. Getting them together is the toughest part. Working out the problems comes easy after that.

Like Webster says: Co-operation is working together for the common good. ▲

Your aircraft is a marvel of electronics. The men on the line have tuned and shined it to perfection for your flight. Your flight planning proved to be good. The question now is, will you be . . .

Safe At

The obstruction may be snow on the overrun.

Despite what they say in the newspapers and on the radio, more accidents occur in the home than in any other place. Of course, these home accidents don't merit the big headlines and the gory pictures, but the fact remains that more than a million folks per year are either killed or maimed in the "sanctity of the home."

So, what's this chap trying to tell me, you may say?

Well, sirs, here's the way it looks from where we're sitting. The airfield, or the "airpatch," if you will, is home sweet home to all of you who drive airplanes. That's where the birds are serviced and housed. And, as a matter of fact, that's where your needs are taken care of during many hours of the day and night.

This home is not always the safest place to be either. Home area booby traps can trip us up on the airfield just as they can in the kitchen or the bathroom. If the surface area of the airfield is neglected, costly and inexcusable accidents can and do occur.

The surface area is all encompassing. It includes not only the actual aircraft movement areas of the runway, taxiway and ramp, but it also includes the overrun, the runway shoulders and the adjacent areas. The hazards that are found on this surface are not too dissimilar to the hazards in your own backyard.

Or it could be soft sand more fit for sidewinders than aircraft tires.

Sometimes a ditch is handy for removing the bird's landing gear.

The best barrier in the world needs to have a stabilized overrun for good results. The one shown here was obviously too short for the job.

Harrie D. Riley
Facilities Branch
Directorate of Flight Safety Research

Home?

The first things we have to consider are the obstructions. An obstruction may be considered an object that interferes with the normal flight path of an aircraft taking off or landing. The same is true for the normal path of an aircraft while on the ground. These obstructions are such things as trees, buildings, poles or towers which violate the 50:1 obstruction criteria for the landing approach area. The obstruction may be a mound of dirt, a ditch, a fence, a snowbank, a canal or protruding light bases in the overrun. They be taxi direction signs, distance markers, vehicles, contractors' equipment on or adjacent to taxiways, runways or ramps.

These items have all been involved in major aircraft accidents. When any of the obstructions are involved in an accident they indicate a lack of good housekeeping and a lack of proper supervision and inspection.

In the past four years there have been 251 accidents involving aircraft striking an obstruction on the airfield. Some of these accidents occurred because the object had not been detected and removed. Others were results of failures to properly mark or illuminate the obstruction.

The favorite location for obstructions is the overrun. This little piece of real estate is 1000 feet long and as wide as the runway plus the width of the shoulders. The overrun is not intended as a landing area, however it is to be cleared of all obstructions to allow for an emergency landing or aborted takeoff. In this area are often found the "best" booby traps. Fifty-six per cent of the aircraft accidents involving obstructions occurred on the overrun.

Here are some examples:

The F-89 touched down 381 feet short of the runway. As the nose gear touched the ground it struck a mound of dirt 18 inches high, causing damage to the gear. The nose gear collapsed as the aircraft rolled down runway. The mound of dirt was the only one in the overrun.

The right landing gear of a C-119 aircraft struck a boulder 98 feet from the approach end of a runway during an approach. The right gear collapsed. The aircraft caught fire and was destroyed.

A C-124 was on final and its main gear struck a snowbank across the end of the runway. The gear did not collapse but the No. 3 engine caught fire. The aircraft received substantial damage. Why wasn't the snowbank removed? Previous complaints had been made about it, but it wasn't until after this accident happened that all snowbanks in the area were removed.

The pilot of an F-100 was aware of a ditch, a pipe conduit and piles of dirt at the end of the runway. He was not informed or aware however, of a crane operating 300 feet off the end of the runway. The boom of the crane was extended to 20 feet above the ground. Just after takeoff the airplane came in contact with the boom, two feet from the top of the extension. Damage was caused to the right main gear, the right tiptank and the right horizontal stabilizer. The construction company had neglected to let base ops know that the crane would be working near the runway.

The accidents involving the kinds of obstructions cited could have been prevented by the very simple method of removing the object. Now there is one kind of obstruction which has not been mentioned in the examples above and is peculiar only to the overrun area. It has occurred in 46 per cent of the accidents involving obstructions in the overrun area.

This obstruction is the runway lip and it continues to be a source of aircraft accidents. When an aircraft touches down short of the runway and incurs major damage as

When an aircraft touches down short of the runway and incurs major damage as the gear hits the unimproved lip, the contributing cause must fall to the persons responsible for proper maintenance of that area. Forty-six per cent of accidents involving overruns are a slip at the lip.

the gear contacts the lip of the runway, the contributing cause can be only improper maintenance of the overrun area.

The following extracts from Form 14 histories indicate the serious consequences of failing to "button up the lip."

The F-86D touched down three feet short of the runway. The left gear collapsed upon impact with the lip of the runway. The pilot was not injured. The left and right wings however, were buckled and the left and right landing gear destroyed. Inspection of the overrun disclosed a two-inch lip.

The pilot of an F-89 undershot the runway by 180 feet. The nose gear sheared on contact with the runway lip and the remaining nose gear component was forced up through the cockpit floor. Inspection showed a four-inch lip.

The F-86F landed short. The right gear contacted the lip at the end of the runway damaging the wheel and blowing the right tire. The aircraft skidded off the runway and into a ditch. It was destroyed.

An F-100 touched down at the beginning of the runway. The left main gear contacted an eight-inch lip. The main gear strut was bent and compressed, and the engine damaged beyond repair.

The initial impact of the aft main gear of the B-47 was immediately in front of the blast pad. The soft condition of the ground caused excessive drag forces on the gear resulting in structural damage. The No. 6 engine pod struck the blast pad, and the ensuing fire destroyed the aircraft. An inspection of the overrun blast area showed a five-inch incline between the ground and the blast pad. It was caused by jet blast and water erosion.

This concrete manhole was only six feet from the runway. The tire was blown and the gear failed a few feet farther on. What price neglect?

The end of this runway looks like the remains of the Maginot Line. How little would stabilized fill have cost? One-tenth as much?

Wet weather can turn a normally usable overrun into a bog. High pressure aircraft tires and mud don't mix. Check before the next rain.

The second item that raises its ugly head is the soft, muddy, uneven or rough surface. This condition more often occurs in the overrun area or on the shoulders of the runway, however, rough and uneven surfaces of the runway contribute their share. Included are bumps and inclines in the runway.

The very nature of some soft or rough surface conditions preclude any corrective action, however, there are some conditions that can be eliminated or worked on to reduce the seriousness of the accident. There certainly is no excuse for a hole in the runway. There is no reason why drifting sand ridges cannot be removed. Ruts in the shoulders and overruns can be filled in and smoothed over.

Now the third hazard is the ditch. You don't expect to find a ditch in the runway and you probably won't. But they are close by. There were 51 aircraft accidents involving ditches during the past four years. The majority of these ditches were located in the overrun area. Some of them were concrete drainage ditches, some were irrigation ditches; others were caused by runoff of natural water drainage and still others created by construction.

Occasionally, a ditch is found in the shoulder area of the runway. This usually is a ditch resulting from installation or repair of runway lighting system. You cannot fill in an irrigation ditch or a concrete drainage ditch however, consideration should be given to either re-routing the ditches or covering them over.

Natural drainage areas should be inspected after rainy weather to detect erosion. These areas can be filled in and re-graded. Continued checks must be made of runway shoulder areas that have been under construction to insure that ditches are properly filled in and re-graded.

Failure to comply with current directives on constructing and maintaining runway overruns has contributed materially to aircraft damage and fatalities and injuries to personnel. The operating surface areas facilities must be carefully investigated. The time for inspecting these areas is governed primarily by periods of construction, periods of inclement weather and extent of usage by aircraft or vehicular traffic.

Of course, the inspection and investigation referred to here is the one for which the Base Operations Officer and the Installations Engineer are responsible. Just as important, or perhaps even more so, is the continuing inspection and report that you make. Remember, you're the one who has to use these surfaces—mounds, ditches, lips and all—unless you tell someone they're there. ▲

Gloomy Sunday....

T/Sgt. Forrest D. Perkins, 3380th Tech. Trng. Wing (ATC), Keesler AFB, Miss.

So this is what it's like. You've finally killed. You've wondered many times what it'd be like to kill a human being—and now you know. You didn't kill just one though — nothing small time about you. Thirty—all at once, quickly, simply and unnecessarily.

You keep telling yourself and anyone who'll listen, "I didn't mean to!" (The thirty people in that black, ripped, fuselage can't hear you.) What an excuse. Think back over it. Slowly. Remember every detail. Yes, remember every detail for the rest of your natural life.

It was a gloomy Sunday. Just like the song, hours numberless, cold and gloomy, clouds on the ground, treetop level. Nice day for a fireplace. But not for you. You've got work to do. So, you and your three-man crew bounce around the back end of the relief truck on your way to the weather station. Bouncing roads, sharp bumps and the cold air knifing through your GI overcoat. You get the weather forecast and get back in the truck for more bumps to the GCA trailer.

Looks like an easy night. No birds up in that murk. Out come the cards for the nightly pinochle game. Just as you're about to deal, the operations phone rings.

"Get the trailer warmed up, Jim, you guys got a customer—one each Gooney Bird coming in from Germany. Tried to make it to London. No can do, so we're his alternate. He'll give you a call in about ten minutes for an approach. Call sign—five-three-niner-seven-two. Are you ready, Hessy?"

"Right-ee-yo', matey, we're ready when he is."

"Fox Dog."

"Right, Fox Dog, Tango Lima here."

You turn to your crew. "Okay, boys." (You didn't have a chance in the pinochle game anyway.) "Let's crank up the scopes and check out the radios. We got a customer."

With skilled precision, you and your crew check out the trailer. Ten minutes later the radio receiver comes to life.

"GCA, this is five-three-niner-seven-two, how do you hear me, over."

Your ten years experience in the GCA trailers take over. You become the bodyless voice the pilot follows instinctively.

"Roger, five-three-niner-seven-two. GCA here. Read you loud and clear. We have a target fifteen miles south. Turn right heading zero-three-zero for positive radar identification, over."

"Roger, turning right zero-three-zero."

The speck of light on the scope turns and you advice the pilot, "niner-seven-two in radar contact twelve miles south, descend to fifteen hundred feet, the latest weather is three hundred feet overcast, one mile visibility, winds calm, altimeter setting three-zero-two-six. Over."

"Roger, understand altimeter, three-zero-two-six."

"Nine-seven-two, you need not acknowledge any further transmission. Turn left, heading three-six-zero for final approach. You will be landing on runway three-six. It is nine thousand feet long, three hundred feet wide. You are now seven miles from touchdown. What is your present altitude? I do not have you on the elevation scope, over."

"Roger. Fifteen hundred. Over."

"Roger, continue your present heading. You are now five miles from touchdown. Is your altimeter working properly, over?"

"Roger, I think so."

"Roger, descend to one-thousand feet. That should bring you on the elevation scope. You are four miles from touchdown. On course. I still do not have you on elevation."

Frantically, you work the servo up and down. If he's on the azimuth scope, he should be on the elevation scope. But he isn't. Wait a minute. That could be him there at the bottom. But that's impossible. He's supposed to be at one-thousand feet.

"Nine-seven-two, final controller, climb straight ahead. ACKNOWLEDGE."

"This is nine-seven-two, you're coming in weak, say again. Over."

"Nine-seven-two, PULL UP, PULL UP, ACKNOWLEDGE."

No reply.

"NINE-SEVEN-TWO. PULL UP! PULL UP!" You're screaming now in contrast to that well-modulated voice you were using a minute ago. No reply—and you're afraid. You're shaking and the sweat begins to bead on your forehead. Mechanically, you whisper prayerfully, "Nine-seven-two-do-you-hear-me? Pull-up-nine-seven-two, Over."

No, he doesn't hear you. You know that.

"Crash station, this is GCA, I think we had a C-47 crash three miles south. Send some equipment down there. Yeah, directly south of the main runway. Keep me informed. . . . No I don't know how many persons aboard. I'll check with ops. Stand by. . . . Base ops says three-zero, no cargo."

Thirty people . . . thirty people . . . thirty people.

"Weather, this is GCA, gimme a special weather report. I think we had a plane crash three miles south . . . . Oh yeah, let's check the weather we were using. Righto . . . go ahead . . . three hundred overcast, one mile calm. . . SAY AGAIN THAT ALTIMETER SETTING! THAT'S IMPOSSIBLE. WE'RE CARRYING THREE-ZERO-TWO-SIX!"

The phone drops from your hand. How could you have written down three-zero instead of two-nine?

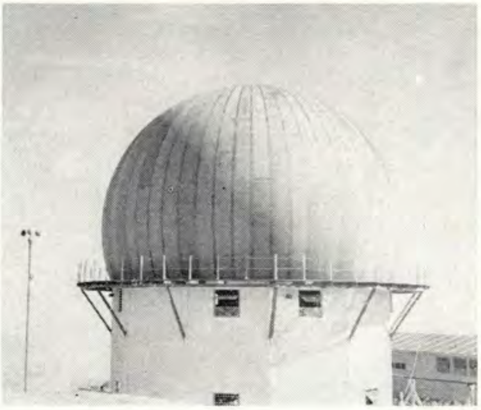
Thirty instead of twenty-nine. Thirty people instead of twenty-nine. No! You're talking nonsense. Thirty people. All for one number, and one number for all. You pick up the phone and put it on the hook.

Gloomy Sunday— ▲

Today a radar assist is a commonplace miracle. But it still takes a timely radio call to make sure the "Stargazers" . . . .

"SEE" you tomorrow

Capt. James A. Hrabetin, 668th AC&W Sq. (ADC), Mather AFB, California.



" 'Clarinet Control' . . . 'Clarinet Control,' this is 'Shirt tail Three Four.' Over."

The call came in loud and clear from the monitor box. I reached for the handset on the desk before me and acknowledged his call. I recognized the tactical call sign of the pilot as that of a friend with whom I'd formerly flown in an interceptor squadron in Alaska.

His subsequent messages dampened my good humor.

"Roger, 'Clarinet Control.' Is 'Clarinet One Four' on duty? Over."

One Four was my personal designator. Each Aircraft Controller at our ADC radar sites is assigned such a number for reasons of expediency and security. Appropriately—though lacking in proper formality—I replied, "Affirmative, Casey. What can I do for you? Over."

"Roger. I departed Oxnard for 'Home Plate' at one-five-three-five. Estimate my present position about two zero miles southeast of San Jose. My radio compass is inoperative, and it looks like Moffett Field is socked in. I have a solid undercast as far as I can see. How about a little help, buddy? Over."

It wasn't at all difficult for me to recognize that my friend was in need of more than just "a little help." He had taken off at 1535 and it was now 1710. I knew from experience that his F-94 had approximately 35 minutes of fuel remaining—depending, of course, upon what power settings he had used, how high he'd flown, wind conditions, and whether or not he'd taken off with a normal fuel load.

The flight from Oxnard to his home base was not an unusually long one, and the pilots flying this route under good weather conditions often were a bit lax with their fuel management practices.

All these thoughts went racing through my mind. One by one, the pieces of the jig-saw puzzle fell into place and the resultant picture darkened. Where had he been all this time? Why hadn't he called someone before now?

The answer to the latter question was simple. I had flown long enough to realize that there are more than a few otherwise excellent pilots who possess an almost lethal degree of professional pride. Some have been known to cling to that pride until too late.

"Casey" was a pilot with such inclinations. Back in our old outfit in Alaska I was not alone in my observation of this particular trait of his. He had courage to spare. Fortunately, however, his courage was always accompanied by a very cool, clear head, and an exceptionally high degree of pilot proficiency.

I checked my Electronic and Weather Status Boards and more pieces of the puzzle fell into place. The GCA unit at the home base was inoperative and the reported weather there was now "1100-foot overcast, 8 miles visibility." To divert the interceptor to an alternate base was out of the question. There wasn't sufficient fuel, and naturally there wasn't enough time.

I advised Casey of the circumstances with which we were now confronted and told him I'd have to bring him in all the way. He knew that this involved flying dangerously close to some three-thousand-foot "rocks" during his letdown and approach. He also knew he'd be on instruments "in the soup." I asked him if he concurred and whether or not he wished to declare a "minimum fuel emergency." Declaring an inflight emergency is always left to the discretion of the pilot, for no one is in a more qualified position to logically evaluate his own situation.

The answer came back promptly and with conviction: *"Affirmative—Emergency!"*

"Roger. You've done it before. You ought to be able to hack it this time."

That started the ball rolling.

My recovery technician and I hopped down to the recovery scope. He contacted CAA, declared the emergency and our white-collared friends immediately started clearing all other air traffic from the area. He then notified the approach control facility at the base of intended landing and obtained all the necessary information pertinent to the radar recovery and landing details.

While he was busily conducting his often-practiced duties as precisely as though he were my right hand, I proceeded with the business of locating Casey and guiding him to his initial recovery point.

I detected a target 35 miles west of San Jose. That's a fair distance out over the ocean and I didn't really expect it to be the blip I was seeking. Nevertheless, I instructed Casey to turn 60 degrees to the right and to hold the new heading for 30 seconds. I waited tensely and it appeared to be my boy. I further confirmed his identity by the use of IFF.

I advised him of his position and gave him a heading to his initial recovery point. I checked the latest winds aloft information and discovered he was heading into a 40-knot wind at his altitude of 30,000; the wind at 20,000 was quartering off his tail, and its velocity would give him about a 25-knot boost in speed. I told him to throttle back and to begin a gentle descent to 20,000 feet. This placed him about 5000 feet above the top of the undercast.

Each time he reached a point five miles nearer the initial recovery point I advised him of the new range to the fix. A few minor heading corrections were also required. As the Starfire drew closer to the fix, the control became closer. When the blip reached a point ten miles from the initial recovery point, I transmitted again: "Shirt tail Three Four, this is Clarinet Control. Point Baker twelve o'clock, ten miles. Descend to and maintain 18 thousand, speed two five zero. Over."

Case acknowledged the transmission and repeated it. Shortly after beginning his descent, Casey reported that he was "Popeye." This is an ADC term to briefly state that the aircraft's in the cloud layer. He could see nothing outside his cockpit, save, perhaps, his wingtips. This condition was to exist the rest of the way down.

When the blip was just short of reaching the initial point, 24 miles out to sea, I gave Casey a new heading and told him to descend to 4000 feet at a pre-determined rate of descent and advised him that the radio beacon near his home base was dead ahead, at 31 miles. With a few minor drift corrections we kept his path of flight directly over the desired track.

He gave me his altitude when he reached 10,000 feet—a few moments later, at 5000, and finally, when he was leveling at 4000. I felt myself relax a little and I knew that Casey would be relaxing too because we had it made over the mountains.

I told him to decrease his speed to 200 knots and prepared to turn him onto the first leg of his landing pattern. He then told me that his airspeed indicator had ceased to function and that his windshield and canopy was "frosting" up.

Without regard for his pride now, I immediately asked him if his pitot heater was turned on. He said "yes." There was no point in my telling him what he had to do now. Casey had many hours in jets, as well as plenty of actual instrument time. Any jet pilot who has completed a tour in Alaska should be qualified to fly under the most adverse weather conditions.

We had no choice but to continue with the recovery as planned. I knew Casey had already begun substituting for his inoperative airspeed indicator, by continually checking his power setting, altimeter and rate of climb indicator.

The radar scope told me the aircraft was now over the radio beacon. I gave him a new heading, told him to descend to 3000 feet, and advised him he was on course on his crosswind leg. Maintaining a constant course and altitude without an airspeed indicator doesn't present too serious a problem but changing heading and altitude in this situation can be tricky business. Casey's experience and superior ability as an instrument pilot were showing up real well. The Starfire is a remarkably stable and responsive airplane, and Casey handled his superbly.

Everything seemed to be going well now and we made a right turn onto the downwind leg. Casey brought the "bird" down to 2500 feet, then to 2000. He kept his course with precision and made his initial pre-landing check. I then told him to descend to 1500 feet and gave him a new heading, to place him on base leg.

One more turn and we'd be on the final approach! The runway now lay eight miles to his right. He lowered his landing gear and extended the flaps—running methodically through his final pre-landing check. Then he called to advise me that his windshield and canopy were becoming clear and that the clouds were beginning to thin out a bit. I could "feel" the tone of relief in his voice.

A moment later I received the following message:

" 'Clarinet,' this is 'Three Four.' In the clear at sixteen hundred feet. 'Tally-Ho'—'Home Plate!' Thanks a lot, Dad. Goin' to tower frequency now——."

"Roger, Casey. See you tomorrow. Clarinet Out."

"See you tomorrow,"—those words seemed to cling to my lips as I reached for the hot line to notify the tower that "Shirt tail Three Four" was coming home. My technician had already taken care of the matter ("There goes my 'right hand' again," I mused—). I became aware that I was soaked with perspiration, and noticed that the technician was too. We looked at each other and grinned like a couple of bashful schoolboys. Not a word passed between us—nothing more than a foolish, understanding grin. ▲

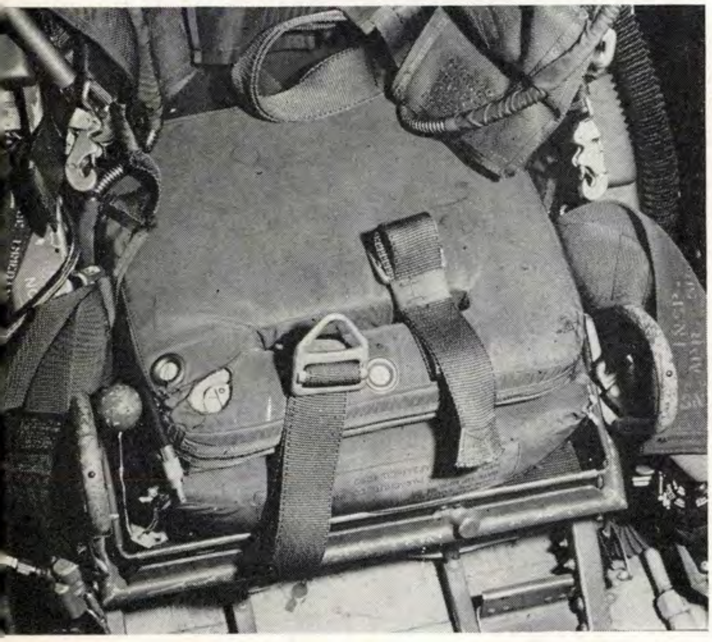
Air Force drawings are being revised to assure future procurement of lanyards having snaps with sufficient clearance between the spring loaded guard and nose of the hook. The same difficulty was found with the new type quick release snap fastener on the harness hardware is and being corrected.

Notes On

The Product Improvement Digest is published every other month by the several Air Materiel Area headquarters. MAAMA at Olmsted AFB, Pennsylvania, being the prime AMA for parachutes and related equipment, collected and published the design deficiencies illustrated here.

The new seat style parachute assembly, No. 50C7025-17, usually referred to as the SA-17 seat pack is designed for use in T-33 and B-57 aircraft. Personnel using this equipment are reporting difficulties with this seat pack and FSM suggests that the pictures here be prominently displayed on squadron bulletin boards.

Operational reliability of the SA-17 parachute has been proved by 100 live jump tests over the past two years. The design deficiencies are being corrected either through depot modification or amendments of current production contracts. The problem involving the seat pack binding in the T-33 bucket seat cannot be verified in those aircraft having seats of latest design, or modified in accordance with T.O. 1T-33A-258. Variations in packing techniques is undergoing study as a possible cause.



The problem of the seat pack binding in the T-33 bucket seat is an old one. No trouble is found with the new seat or the old, modified by T.O. change.

Crewmembers are reporting that the metal connectors and adjustment fittings of the SA-17 harness chafe the groin area, as shown. Others find that the snap lever of the chest strap ejector can be inadvertently closed on the ripcord grip. This can be fatal!

Nylon

An old irritant and danger point is still with us. The ripcord grip will still fall out of its pocket. The single harness, adjustable to personnel 5' 4" to 6' 6", just didn't work out. Amendment of current production contracts is the best answer here.

ever been

Six hundred and fifty-eight pilots of the United States Air Force have been arrested in the past three years. Strangely enough, everyone of them was quite happy about it. Elated, in fact. And if you keep your ears open on your next visit to the officers club, you might just hear one of these pilots bragging about the whole bit. You might also hear that the true hero of the piece is an item called the MA-1 or the remote controlled MA-1A Runway Overrun Barrier.

These barriers have been shipped to most bases throughout the world, where fighter aircraft are flown. The primary purpose of the MA-1 is, of course, the saving of pilots' lives. The secondary purpose, also a worthy one, is the saving of aircraft and the prevention of damage to aircraft and other property. Its design is based on the same principle as those used aboard aircraft carriers.

The nylon webbing assembly is stretched across the runway so that upon engagement with the aircraft, it triggers a steel cable in a manner that the cable engages the main landing gear struts. The kinetic energy of the aircraft is absorbed by having the cable reel out heavy anchor chain which is placed parallel to the runway. The drag force applied to the main landing gear through the inertia of the chain decelerates, and finally stops the aircraft.

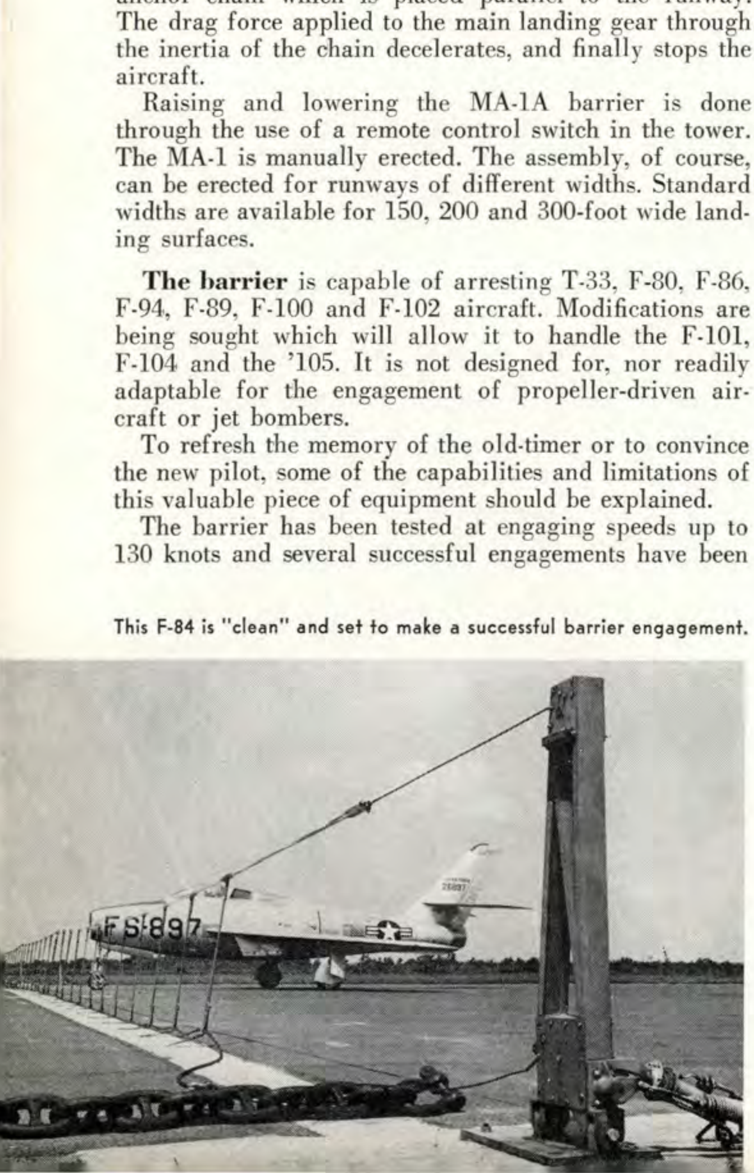
Raising and lowering the MA-1A barrier is done through the use of a remote control switch in the tower. The MA-1 is manually erected. The assembly, of course, can be erected for runways of different widths. Standard widths are available for 150, 200 and 300-foot wide landing surfaces.

The barrier is capable of arresting T-33, F-80, F-86, F-94, F-89, F-100 and F-102 aircraft. Modifications are being sought which will allow it to handle the F-101, F-104 and the '105. It is not designed for, nor readily adaptable for the engagement of propeller-driven aircraft or jet bombers.

To refresh the memory of the old-timer or to convince the new pilot, some of the capabilities and limitations of this valuable piece of equipment should be explained.

The barrier has been tested at engaging speeds up to 130 knots and several successful engagements have been

This F-84 is "clean" and set to make a successful barrier engagement.



RUNWAY OVERRUN BARRIER CONTACTS — 3 YEARS
JULY 1955 - JUNE 1958

	Total No.	Successful No.	Successful %	Unsuccessful No.	Unsuccessful %
All Acft.	**1094**	**658**	**60%**	**436**	**40%**
Century Series Acft.	**346**	**173**	**50%**	**173**	**50%**

DEFINITION: A successful engagement is one in which the barrier arrested the aircraft.

made at speeds of approximately 150 knots. All of the fighter aircraft listed will engage at 150 knots, however, the energy absorbing capacity of the equipment is limited. The 90,000 pounds of chain normally supplied with the barrier will arrest an 18,000-pound aircraft within 1000 feet, at speeds of 90-100 knots.

It must be remembered, however, that these figures are for concrete or asphalt overruns. Runout will be as much as 30-40 per cent less for unstabilized overruns and 20 per cent more for surfaces of pierced steel planking.

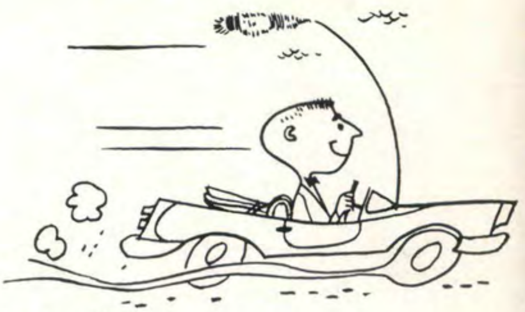
If an aircraft engages at high speeds, the ends of the chain may whip violently when its entire length is set in motion. Pilots should not avoid engagement for this reason however, for they will, in all probability, be better off ducking chain links than assuming the right-of-way on a four-lane highway or the Southern Pacific main line.

Some aircraft cannot be engaged if external stores are carried. The answer, of course, is to jettison in the air if a known emergency exists. If this is not possible the stores should be dropped on the runway. The dive brake must also be retracted when it is located on the underside of the fuselage between the nose gear and the main gear. Otherwise the arresting cable will be deflected and will not engage the main gear. If target flags are attached to the barrier webbing adapter it is advisable to avoid hitting the webbing right at the flag. It's possible that the flag will foul the webbing and prevent engagement. Revision of T.O. 35 E8-2-2-1, dated 4 Dec 57, requires removal of bull's eye flags. It has been noted that some flags are still installed.

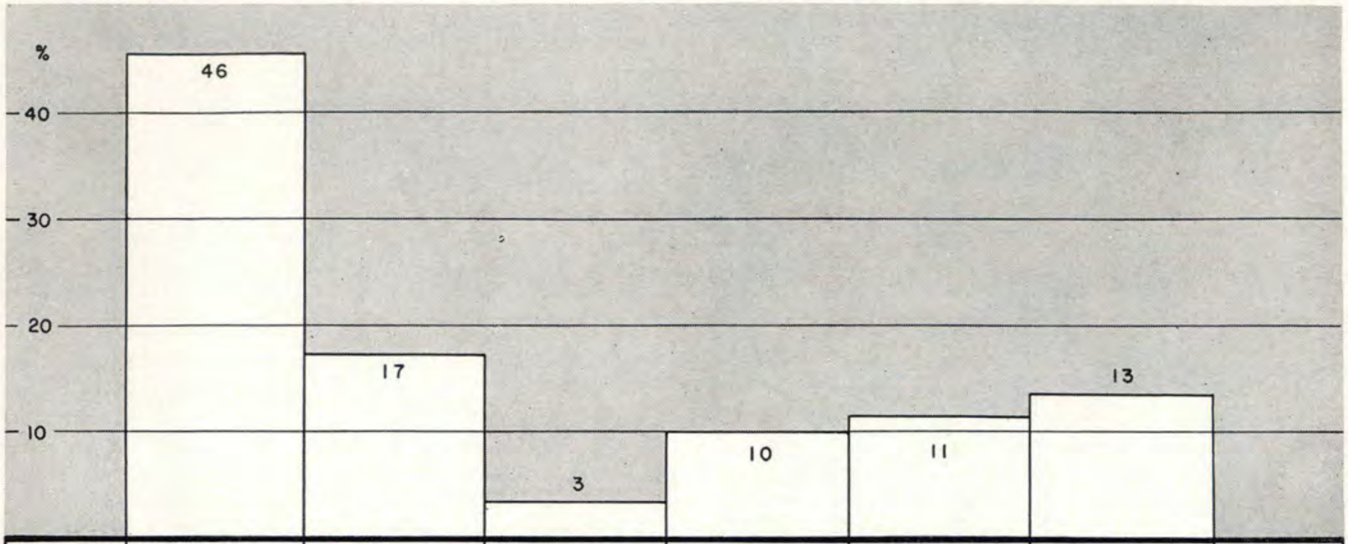
Let's take another look at the box score! Overall, there were 1094 runway overrun barrier contacts from July 1955 to June 1958. As mentioned before, 658 aircraft were stopped successfully—a batting average of 60 per cent. Three hundred and forty-six of the overall number were Century Series aircraft, and in this category, the average was 50 per cent.

A breakdown of the 436 unsuccessful engagements shows that 200, or almost half of these resulted from

arrested?



The runway overrun barrier annually saves the Air Force millions of dollars and countless lives. If you're flying the "hot stuff" you'll be interested to know the score, to date, and the type of equipment we have or plan to have.



CAUSE	CONTACT SPEED TOO SLOW	AIRCRAFT CON–FIGURATION	WEBBING ASSEMBLY ROLLED DOWN BY ACFT.	BARRIER NOT FOR TYPE AIRCRAFT	OTHER	UNDETERMINED	
NO.	200	72	15	43	48	58	

Figure One. Causes of unsuccessful engagements from July 1955 to June 1958.

too slow a contact speed. The next most common cause of failure was improper aircraft configuration, external stores and speed brakes interfering. Other factors are shown on the accompanying chart. (Figure One.)

One of the most serious limitations of the MA-1 type barrier is the time consumed in resetting the mechanism for reuse after engagement. Re-positioning the anchor chains with their 45-55 pounds per foot is a cumbersome task and can't be done in time to be ready for the jets that might still be in the air awaiting their turn to set down.

To solve the problem of the chain, one manufacturer, the All American Engineering Company has come up with an energy absorber that uses the "water squeezer" principle. (Figure Two.) The tapered tubes are buried beneath the level of the runway to eliminate obstructions, but if desired they can be mounted above ground.

The tubes are filled with an anti-freeze solution to meet the all-weather problem. In each tube a steel purchase cable is threaded through a bushing and drawn to the rear of the tube where it is attached to a conical piston. To the rear of the piston is fastened the retrieving cable or rope. Leading out the forward end of the 920-foot tubes are purchase cables that pass around a pulley and attach to the runway pendant of the barrier.

When the barrier is engaged, the forward velocity of the aircraft pulls the pistons through the fluid, thus absorbing energy. Regardless of the speed that the barrier is engaged, the G forces applied to the landing gear struts by the "water squeezer" energy absorber will remain well below the safe limits. As the constant diameter pistons are pulled down the tapered tubes, the orifice formed by the perimeter of the pistons and the inner walls of the tube is programmed to effectively absorb the energy at almost

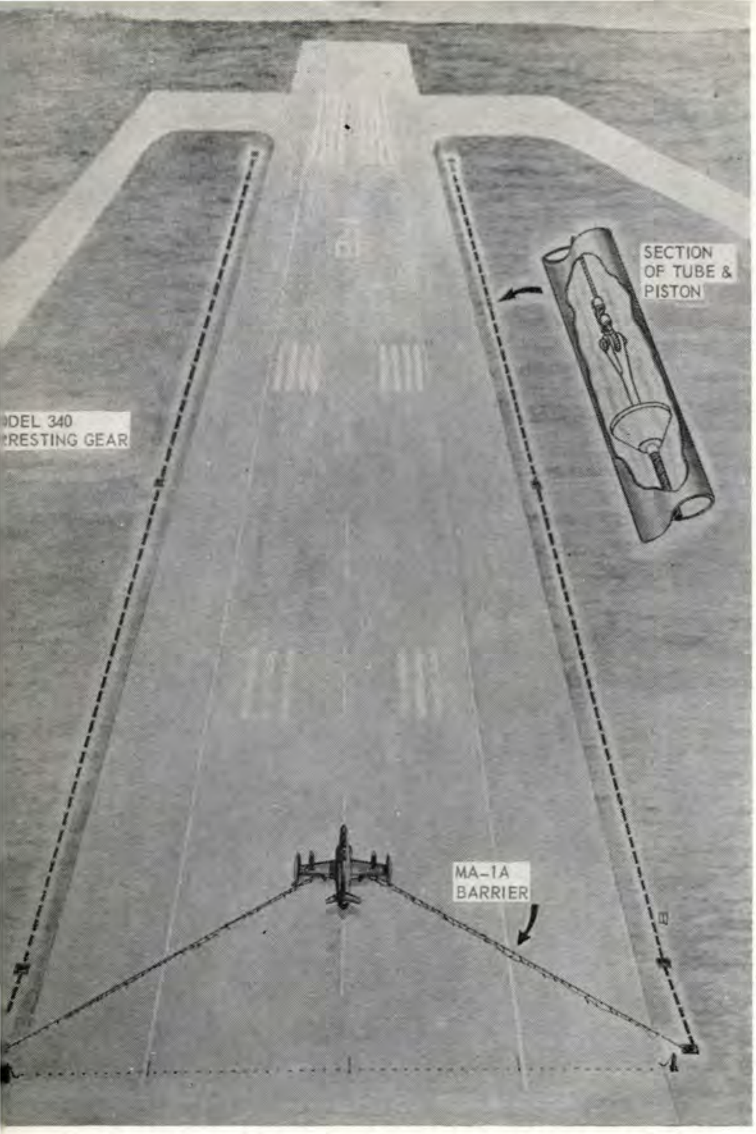


Figure Two. "Watersqueezer" energy absorber as used with MA-1A.

a constant decelerating load until the aircraft is brought to a safe stop.

The runout of the aircraft, in the speed range of 75-160 knots, remains almost a constant 900 feet. At slower speeds the runout is proportionately less. It is claimed that the "water squeezer" can effectively handle weights varying between 100,000 and 400,000 pounds at speeds in excess of 125 knots for the big birds.

According to Dave McAllister, Chief of Engineering Flight Test of All American Engineering Co., one of the sweetest features of the "water squeezer" rig is its retrieving mechanism. A half-inch rope is attached to the rear of the piston in the device, and as this piston is pulled down the tube, the rope feeds from a coil. To re-set the pistons, the rope is attached to a vehicle and the piston is pulled back to the ready position in a matter of five minutes or less. For even faster recovery, an engine or motor-driven winch can be used.

Engineers of the E. W. Bliss Company also think that they have built a better mouse trap. Early in February of this year, they set out to prove their claim by putting it in place at the Van Nuys Air National Guard Base in Southern California. Their trap, or barrier—if you will, has been baited primarily for the F-86Es and Fs, now being flown by the pilots of the 146th Fighter Interceptor Wing. In test runs with an F-86, the bird was brought to a stop in 191 feet after an engagement at 78 knots and in 248 feet after an engagement at 106 knots. It is set to take a maximum engagement speed of 120 knots. Above that speed, of course, the aircraft should be airborne.

Their new barrier uses essentially the same principle and hardware for engaging the main gear as most of its predecessors. (Figure Three.) The nosewheel hits a nylon web and triggers the cable which in turn catches both main gear. From that point on, things happen differently. Instead of the conventional chain, the stopping force of this new barrier is out of sight, underground. The whole braking mechanism weighs just 3700 pounds and here's how it works.

The wheel engaging cable is attached at each end to a six-inch wide nylon fabric belt. This belt in turn is fed around a large size pulley wheel and passed underneath the ground to a point halfway between the sides of the overrun area just 20 feet from the end of the runway. At this midway point, buried about 10 feet in a concrete and metal box is a hydraulic brake, B-52 model. When engagement is made, the movement of the cable and belt is sensed immediately in the braking mechanism and according to the magnitude and speed of the force being applied, a compensating braking action is started.

During tests, the local ground crews—though untrained—were able to reset the webbing and cable for another engagement in about 20 minutes. They expect to be able to reduce this recovery time to about five minutes with a little practice. Time and further tests will show whether this is indeed a better mousetrap. So far it looks pretty good. The pilots at Van Nuys hope it proves out, since they have a busy highway at one end of their only landing strip and a railroad track at the other.

Wright Air Development Center has developed and satisfactorily tested an energy absorber, the XMB-1, to be used with the engaging device of the MA-1A arresting barrier. This device was developed to increase the reliability of arresting systems for heavy, high speed fighter aircraft. Tests of the equipment were completed in January, 1958. These tests have demonstrated that the equipment will safely engage and stop aircraft weighing from 10,000 to 25,000 pounds at speeds up to 180 knots. At gross weights ranging from 25,000 to 45,000 pounds, the safe engagement speed declines from 180 to 125 knots.

The Air Force also has under development by Van Zelm Associates, Inc., through ARDC, a linear friction brake type energy absorbing device. It is intended to replace the present barrier chain configuration. It can be used with the engaging device of the MA-1 barrier to engage unmodified aircraft or with an arresting cable suspended six inches above the runway for aircraft equipped with a trailing hook.

When something new has been added and is being tested . . .

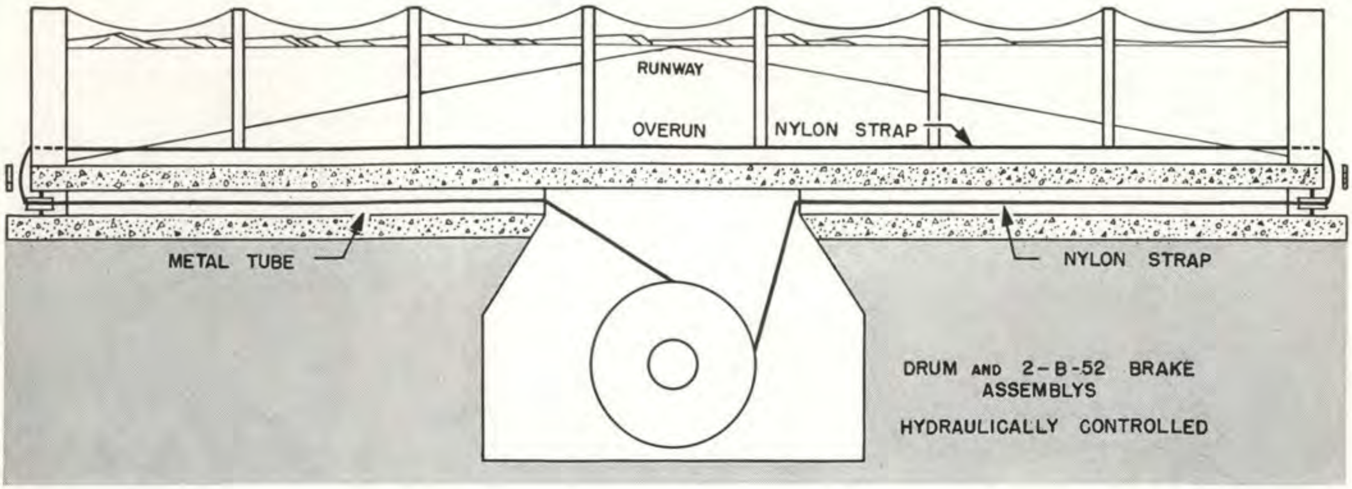


Figure Three. Instead of the conventional chain, the stopping force of the E. W. Bliss barrier is underground. Webbing is still conventional.

Mr. W. D. Van Zelm states that the arresting engine, with an energy absorption capacity of 100-million foot pounds is the largest ever built in this country. It is designed to stop B-47s at a landing weight of 200,000 pounds at an engagement speed of 110 knots with a 1000-foot runout. It is said also to be ideally suited for use with the DC-8 type commercial jet transport. With the tailhook feature in mind, recommendations have been made that a hook be installed on all USAF jet aircraft, and the USAF Handbook of Instructions For Aircraft Designers has been amended to include the hooks on high performance aircraft.

This latter recommendation grew out of the fact that the problem of engagement is of greater concern now than the problem of stopping. Designs for hooks for routine operational engagement by F-100, F-89 and F-105, and for emergency engagement of F-102 and F-106 aircraft are being worked out. Test installations have been made on B-47 and F-84 type planes.

More immediate improvement in barrier engagement, even with the present MA-1 barriers is expected to result from improved webbing adapters. Tests will determine the dimensionally optimum new webbing adapter to be used.

With all this background material in mind, it will be well now to review the proper procedure to follow if you are faced with the precarious position of having all the runway behind.

For purposes of illustration the procedure for MA-1A barrier engagement as outlined in T. O. 1F-100D-1 is reprinted below. Appropriate tech orders should be consulted for other types of aircraft. These steps should be taken to ensure a clean catch of the F-100.

- Nosewheel steering engaged. Aim for center of the barrier.
- Speed brake in to prevent deflection of cable under the main tires. Speed brake and nosewheel steering will be inoperative if utility hydraulic system failure occurs. Use differential braking and rudder for directional control and move speed brake emergency dump lever to its forward (dump) position.
- Excessive braking should be avoided during engagements to prevent blowing tires and possible loss of control just before, and during engagement.
- Jettison external load because cable striking load can be deflected under the main gear tires. However, jettisoning of the inboard drop tanks on the runway is considered extremely dangerous because of their position in front of the main landing gear. In many cases it could be more dangerous to drop the inboard tanks than to miss the barrier. In cases of known emergency, jettison external loads before landing.
- Throttle off.
- Pull drag chute handle.
- Turn engine master switch off.
- Turn generator switches off.
- Turn battery switches off. Note that battery switch must be on if nosewheel steering or anti-skid is required.

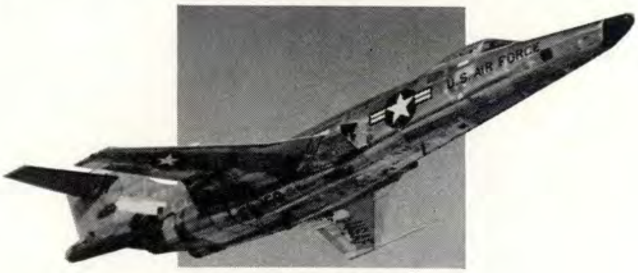
As a final note on the barrier subject: Make sure the barrier is erected for your possible use before you touch down. The tower operator at a joint-use airdrome is one of the busiest men in the world. You are expected to tell him when you want him to activate the barrier mechanism. Remember, there are times when it's nice to be arrested. ▲

. . . the working troops get a lot of supervision, free.

Pilots who have stalled out trying to top a towering cumulo-nimbus know what it means to find themselves quite suddenly much . . .

TOO HIGH • TOO HEAVY

Lt. Col. Michael J. Quirk
Fighter Branch, Directorate of Flight Safety Research.



Pitch-up is not a new term in the airman's vocabulary, but in its newer meaning it is not fully understood by many of our flying personnel. Some of our aircrews who should thoroughly understand this phenomena—those who fly the F-101 series, for example—either do not get the "big picture" or view pitch-up as a minor problem. This is evidenced by the number of inadvertent pitch-ups which have been reported, especially during instrument flight conditions.

Do not let the fact that most of these incidents have resulted in no more than a thoroughly shaken pilot, give you the erroneous impression that pitching up a swept-wing aircraft is not a highly dangerous maneuver.

Let's look first, without being too technical, at just what pitch-up is and what causes it. We will use the F-, RF-101 series aircraft for an example of our pitch-up problems.

All of us are familiar with a "normal" aircraft stall. Some new swept-wing aircraft, unlike older designs, do not stall in the conventional manner.

The old, "conventional" one consisted of something like this sequence of events: Buffet, airflow breakdown, nose dropping through the horizon, and if control forces (up elevator) continued to be applied, eventual loss of directional control was experienced. This aircraft—the '101—does not stall. From strictly an aerodynamic standpoint, it cannot because another phenomena occurs before the stall is fully developed. This is commonly referred to as pitch-up, accompanied by high sink rates, nose-high attitudes and a complete loss of control.

The onset of this condition in 1G subsonic flight can be recognized by the sink rate, a nose-high attitude and a need for constant directional corrections. Supersonically, or above .9 Mach, there is no warning.

When the warning occurs, a slight back pressure (aft-stick force) on the stick or nose-up trim will rotate the aircraft sufficiently to induce the pitch-up condition.

The pitch-up is a nose-up rotation which, in the beginning, has to be caused by something the pilot does. However, once this condition is started, it is self-generating, and will continue to worsen. In short, the aircraft goes out of control. Only proper recovery techniques and sufficient altitude will enable the pilot to recover. "Pitch-up tendency" is that condition wherein the airplane assumes a more-nose-up attitude with no increase in elevator deflection. If full nose-down elevator cannot overpower this tendency, the pilot has no control available to prevent the airplane from nosing-up out of control. This is pitch-up.

Anytime the aerodynamic moments on the wing-fuselage combination is greater than the moments caused by the elevator, this condition exists. On a swept-wing airplane, this tendency exists since (at the point of stall) the wingtips generally stall out first. The total remaining lift of the wing comes from the remaining lifting areas (inboard of the stalled portion), causing an overall forward movement of the center of pressure. This, then, is the real cause of the large nose-up tendency.

On swept-wings, the stall begins at the outer extremity and progresses inboard. As it progresses, there is less and less wing area producing lift. This means also that the stall begins at the aft-most portion of the wing—resulting in the overall effective lift progressing further and further forward. This is the forward movement of the center of pressure.

The fuselage also causes a nose-up and when this is combined with the forward moving center of pressure and the nose-high attitude, the tail surfaces can be, and is, partially or completely "blanked out"—and there you go. It's the same effect as if you had put too much ballast in the tail.

As the wings are still giving lift, the aircraft continues a nose-up rotation until a high angle of attack is reached. It then rolls, pitches and yaws unpredictably, out of control until it either recovers or enters a spin. This blanking out of the elevators can result from flying at too low an IAS for the weight of the aircraft or subjecting the airframe to too high a G force for the airspeed being flown.

As we can see from the above, adequate airspeed and moderate stick rate movement are the prime considerations in preventing pitch-up. If a pilot never allows his airspeed to get below that recommended for his aircraft weight and never applies too many or too rapid G forces (beyond prescribed limits) to his aircraft, he will never encounter pitch-up. It's that simple!

Now, what is causing the majority of pitch-ups being reported, and what can be done to prevent them?

The single factor that stands out in almost all pitch-up reports is that the pilot was trying to top weather—either to remain "VFR-on-top," or to get above a thunderstorm.

When we combine weather with pitch-up we add a factor that complicates normal recovery, thus aggravating an already dangerous situation.

In practically all pitch-up reports the inhibitor system was fully or partially inoperative—either because the pilot had elected to turn it off or because of some malfunction.

A typical incident report reads: "I estimated I could top the storm at 42,000 to 43,000 feet. I did not want to use afterburner in the climb as the excessive fuel consumption would not allow me to continue to my destination with an adequate fuel reserve. When it became evident that I would enter the storm, I turned off the inhibitor system so that turbulence would not cause the horn to blow continually and the pusher to nibble at the stick.

"I encountered moderate turbulence and continued to try to climb above the storm. I was experiencing frequent compressor stalls and attempted to eliminate them by reducing power. The aircraft suddenly pitched up. I deployed the drag chute, neutralized controls, full forward stick and came out of the clouds in a 45-degree dive then leveled off. I landed without further incident."

This pilot, as well as all the pilots who have experienced pitch-up in weather, violated what he had been taught, in that he did not follow recommended flight manual procedures. In Appendix 1, Part 4 of the Flight Manual (mission profile charts) is the recommended Mach number and TAS to fly at various weight configurations.

Using the speed recommended will enable the pilot to obtain not only the optimum performance from his aircraft, but will give him a safe operating range well within the performance envelope.

The airplane will penetrate thunderstorms successfully using recommended procedures, but as any wise pilot knows, it is usually better to circumnavigate—visually or with GCI assistance.

If this is impossible or not feasible, abide by the book and you are much better off than taking a chance of entering an uncontrolled maneuver from which you must recover solely by reference to oscillating and spinning gages. And you can't forget the distracting factors of turbulence, hail, ice and lightning.

Millions of dollars were spent developing an inhibitor system to warn the pilot when his aircraft was near the pitch-up zone. By the flick of a switch, this pilot deprived himself of this valuable aid just when he needed it most. It is true this system has its limitations. But it is a far more reliable warning device than the seat of the pants.

If the inhibitor is properly calibrated and proper airspeeds are maintained, extremes of turbulence will not actuate it. To insure further improvement of this system, aircrews, maintenance personnel and supervisors should continue to point out all malfunctions encountered through Unsatisfactory and Failure Reports. Indoctrination of maintenance and aircrew personnel in the importance of this warning device is a must!

To sum up, by developing fantastic performance in fighter aircraft, it has become imperative that the pilot fly the aircraft in a precise manner. If he violates the basic principles outlined in the flight manual, he can find himself in serious trouble—and quick. Remember—these power planes go faster; and if you violate basic flight safety principles, they are less forgiving than the birds of yesteryear. ▲

The stall begins at the tips of the wing, progressing inboard. The remaining lifting portion of the wing becomes smaller in area, reducing the amount of lift produced, as shown by the arrows. Also as shown, the center of pressure moves further and further forward—pitch-up!

To the Editor—

We have noted with interest the comments of fourteen officers of the 480th Fighter-Bomber Squadron, England AFB, Louisiana, which you sent to us with your letter of 12 June. As you request, here's some information on which to base a reply.

The dissatisfaction expressed by the pilots of the 480th Fighter-Bomber Squadron is not new to our ears and rather than comment on individual complaints, we believe a resumé of things to come will answer their questions more effectively.

The content of the U. S. Jet Pilot's Handbook has grown to major proportions over the last five years. Jet penetration procedures have increased from approximately 170 to about 650. This is caused by an increase of high altitude operational activity which is readily understandable, considering the majority of USAF aircraft are jet.

To overcome the problems of field maintenance and Pilot Handbook utility, this Center has proposed the adoption of three U. S. bound PHBs to replace the existing East and West looseleaf editions. This bound concept of the PHB would be issued once every month with very little revision activity required by the individual users. This would be made possible by a control of the effective date of new procedures and/or changes to published procedures. Commands would be requested to establish effective dates to coincide with the production schedule of each bound edition.

Implementation of this new concept cannot be initiated until USAF approval is received. Comments received from Headquarters USAF indicate ACIC recommendations for a new U. S. High Altitude Pilot's Handbook series are being favorably considered and approval is expected within the near future.

The following article describes in more detail the makeup of the individual instrument approach chart.

get it in a package

Maj. Marvin G. Buel and Edward G. Shack, Aeronautical Chart & Information Center.

"You ain't got nuthin' but a bird dog."

This paraphrase of a popular rock 'n roll folk-ditty documents a situation that no longer exists in today's "black box" Air Force. You may still have a "bird dog," but you've probably got VOR as well, possibly DME, and soon TACAN—to say nothing of ILS.

All of these systems have one thing in common. When the weather map resembles a Dali finger-painting and the isobars have vertigo, the little black boxes will help to get you through the murk and mush and back safely to the home planet.

Notice, I say "help to." Sure, the engineering types are working the slide rules overtime in an attempt to make everything automatic, but there's still a lot of "do it yourself" involved in flying. There are two additional vital factors besides electronic equipment contributing to a safe instrument letdown: YOU and your Instrument Approach Chart, the three-dimensional radio road map that shows you the way down.

Of course, with the laws of gravity still on the statute books, going down doesn't present much of a problem. In fact, it is inevitable, so why not relax and enjoy it? Precisely what we did in the old VFR Air Corps.

But in the modern all-weather Air Force, going up does not defer to the elements; therefore, coming down is often more than a mere matter of reducing the thrust and letting Nature have her way.

In choosing clouds through which to descend, it is the better part of valor to select those which are not loaded with solid objects. It is also good sense to know where the floor is and the amount of clearance between it and the ceiling. In short, there are many important things to consider in an instrument letdown, and your Pilot's Handbook contains the blueprints for safe procedures.

Those of you who've been flying the gages for a good many years now have undoubtedly noticed many changes in Instrument Approach Charts. The latest model incorporates within the limits of production feasibility, the results of a complete awareness of current operational considerations and the specific requirements of the customer—You.

Probably the first thing you'll notice is the new size. The old "bed sheet" concept is out the window. Standard plates (low altitude) are 5.1" x 8", the jet (high altitude) 4.5" and 6.9". Not only do you not need a sheet the size of a newspaper, but in today's cockpits, with time and space at a premium, you can't live with it.

We realize, of course, that it takes all types to make an Air Force. There are a great many pilots in command of aerial parlor cars, with roomy cockpits, numerous assistants and aides, and with one page boy specifically designated to carry the Handbook, open it to the correct page and read the instructions.

On the other hand, there is a growing preponderance of fighter types who are captain, crew and general factotum all wrapped up in a single package, with only one head and two hands. In order for this type to be able to strap the machine on at all, miniaturization and subminiaturization of electronic elements have been necessary.

By the same token, a Handbook that is to be of any use to those fighter pilots also requires miniaturization. Be it a C-124 or an F-102 that you manipulate, the library that you are required to carry and juggle aloft will now be somewhat smaller.

The next important change to consider is that which makes the Pilot's Handbook strictly functional. To borrow from a current commercial, "No fads, no frills, just a good Instrument Approach Procedure." No doubt you remember Kipling's famous lines:

"O, IFR ain't VFR,
And never the twain should meet;
One slight touch of vertigo
Can wrap you up real neat."

That title in the upper left hand corner (INST APCH PRO) now means precisely what it says. You are either on instruments or you are not on instruments. Like taxes and dope, there's no such thing as a "little bit." If you are VFR, you don't need the Instrument Approach Procedure. And if you are IFR, the procedure is all you need until the beautiful runway appears directly ahead, just the right distance below your aircraft.

In realization of this fact, and to keep the sightseeing instinct dormant when you should be concentrating solely on the needle, suction gage and ash receptacle, all scenics, except land/water differentiation, have been removed from the charts.

The procedures have been formulated in accordance with JAFM 55-9 (US Manual of Criteria for Standard Approach Procedures), dated September, 1956. No need to sneak a peek outside the cockpit to see if all's going well (like some of you drivers did on your last instrument check), just follow the procedure as portrayed and all will be well.

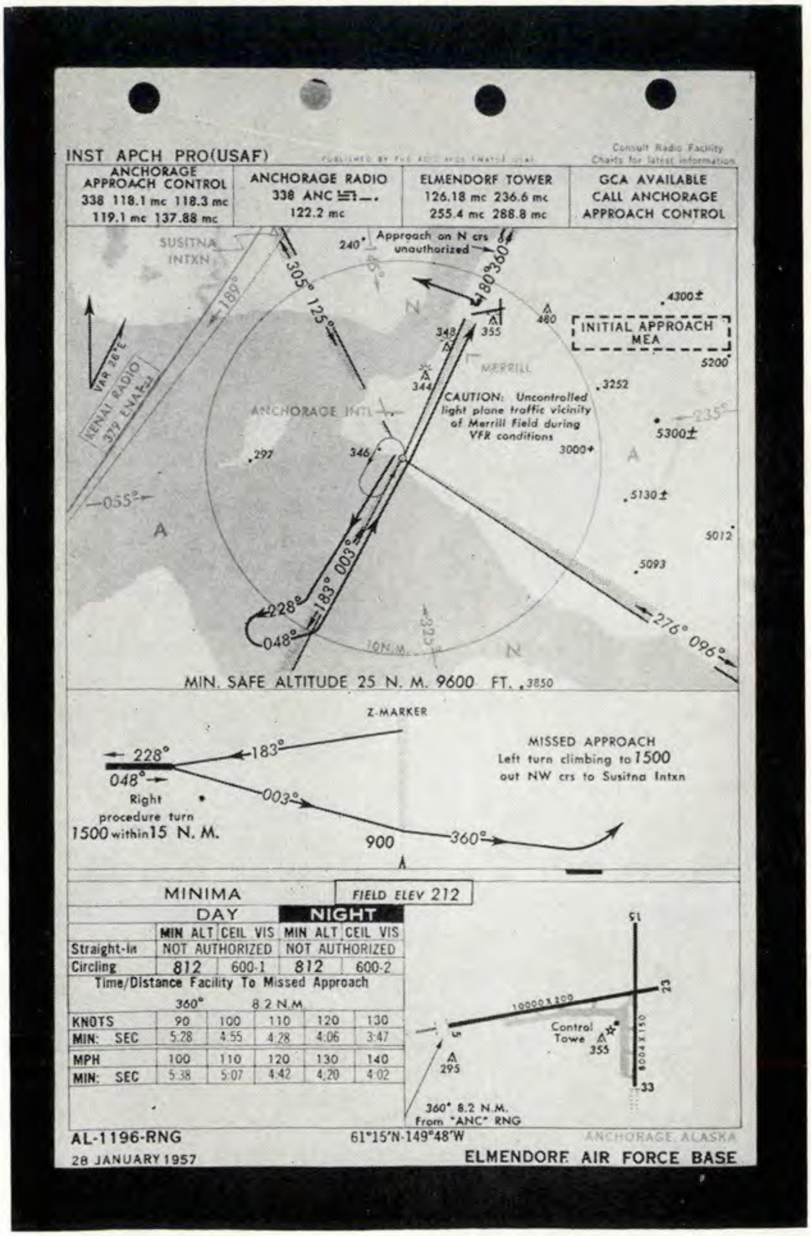
By removing terrain detail and using space more judiciously, the aerodrome sketch could be moved to the front side of the plate. All data required for an instrument letdown and landing are now on one page. No more flipping back and forth, wishing for two heads and another pair of hands. Finally, back-to-back printing is made possible, reducing the overall bulk of the publication.

So much for the individual letdown chart. As they say on Madison Avenue, "We've got a hot item here—now let's get it into a package."

As we mentioned a while back, the new format has resulted in a less bulky volume. The package consists of a loose-leaf binder, but the binder which you are now using is interim in nature. As one pilot pointedly remarked: "A footprint doesn't make a good overprint."

As long as a binder is looseleaf,

Your Instrument Approach Chart, the three dimensional radio road map shows the way down.



Be it a C-124 or an F-102 that you manipulate, the library you carry will now be somewhat less.

people are going to loosen the leaves, remove them, step on them, tear them and maybe lose them. Obviously, the powers can legislate and regulate the heck out of this situation, but plates will continue to be removed from Pilot's Handbooks. Why? Simply because it is inconvenient, if not impossible, to use the plate in the book, particularly in single place high performance aircraft.

Obviously, then, the book must be made so convenient to use that there can be no reason to remove pages. You want a complete back-to-back folding feature, so that the book will lie flat wherever you open it. You need a book that will fit conveniently in the clip of your flying suit, or under the clip of your standard clipboard. You require—and have every right to expect—a book that is complete and up-to-date.

But you can't spend an hour or so before each flight checking every page against the contents and an amendment sheet.

So, what is being done about it? The answer is "a number of things." The present looseleaf binder is classed as interim because research and development are in constant progress to produce a better looseleaf binder—one that will satisfy all of your requirements and eliminate "page snatching."

Another effort involved the development of a bound type Pilot's Handbook with a plastic binding that provided the flat-fold feature and precluded the removal of individual plates.

With this type of binding, of course, the entire publication must be reissued periodically, rather than just a number of revised pages. Thus, while field maintenance is virtually eliminated and a complete and current handbook assured, problems such as effective dates of procedures may enter the picture.

In any case, a full field test of the bound book, as against the interim looseleaf type, was recently completed within PACAF. A majority of the respondents expressed a preference for the bound PHB and Headquarters USAF has approved production of a bound PHB Far East to replace the present looseleaf.

However, many problem areas are involved, including the applicability of the concept to different regions of the world, and the final decision will come from Headquarters USAF.

In any event, the smaller size, single color, strictly functional, one-page Instrument Approach Chart is with us and undoubtedly here to stay. National coordination has been effected so that the USAF, the Navy and the Department of Commerce will all produce the same type of chart. This chart has also been recommended to ICAO for international use.

The only real problem remaining is that of binding. Whether the final decision is for looseleaf or bound type, the binding eventually adopted will be that which satisfies as far as possible the requirements of all.

So there you are.

Whether "you ain't got nuthin' but a bird dog," or if you are surrounded by a full complement of black boxes, regardless of whether your "go" is from a blowpipe or a fan, the blue printing on the new Instrument Approach Charts is your blueprint for a "down to earth" approach. ▲

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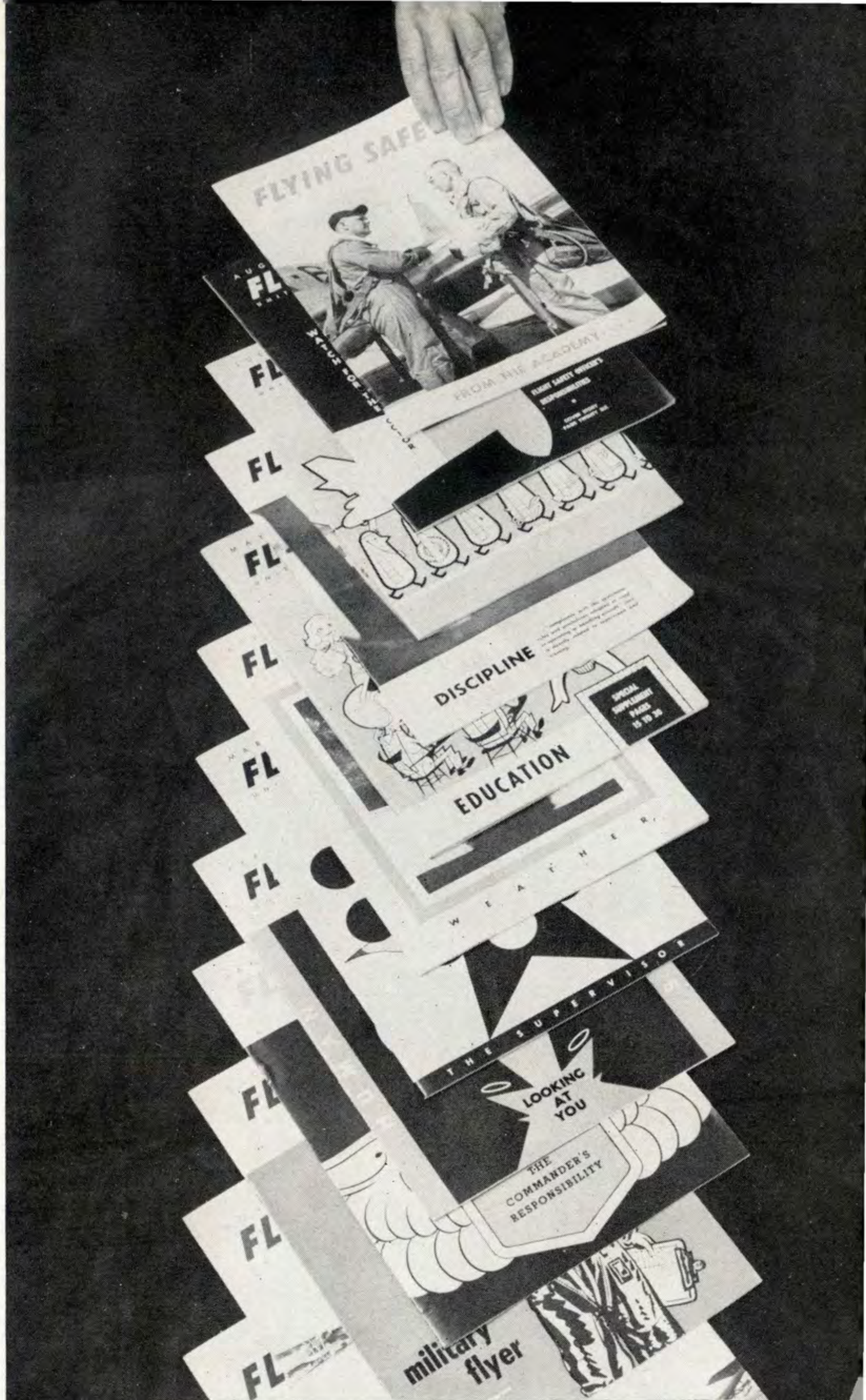

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This was the transmission from the GCA site to the leader of the flight of three on final glide path to their home base in Europe. It was a normal operational day in NATO. Weather, as reported, was ceiling 400 feet, visibility 5/8 mile. Precision GCA minimums: 300 feet, 1/2 mile.

"No sweat on penetration with 400 feet," thought the flight leader, but after this word from GCA the complexion had suddenly changed.

Down to 300 feet already and still no "breakout." The flight leader executed a missed approach and requested another GCA. The second approach was similar to the first, except that the flight leader held his altitude after being informed of reaching GCA minimums and continued following azimuth instructions.

He saw the runway on this run but was unable to land because of excessive altitude.

Another run was immediately requested, with ensuing like results. Because of a fuel shortage, an emergency was declared and GCI vectored the flight to another nearby airbase. Better weather conditions existed and GCA recovered them on a straight-in approach from a GCI hand-off. Two aircraft in the flight indicated approximately 50 pounds of fuel remaining when contact was made with the runway. Close? Lucky?

It would appear on initial and maybe even subsequent observation that this was simply a case of ceiling deterioration, poor GCA control or both.

However, this was not the case.

This flight was a typical example of the consequences that consistently result from lack of knowledge of published GCA minimums.

First, let's review the sequence of events.

- "You are now passing through precision minimums."
- What did this mean to the pilot?
- What did this mean to the GCA operator?
- What does this mean to you?
- Where—exactly—was the pilot?

The published minimums were 300 feet and 1/2 mile. Where was the pilot when precision minimums were called? Three hundred feet above the runway elevation, one half mile from touchdown, or both?

If you can answer this question, then you need not continue reading. Reason? Because the shocking fact is that the ceiling and visibility minimums, as published, are almost always separate and distinct points along the glide path and therefore do not coincide in any manner. (Figure 1.)

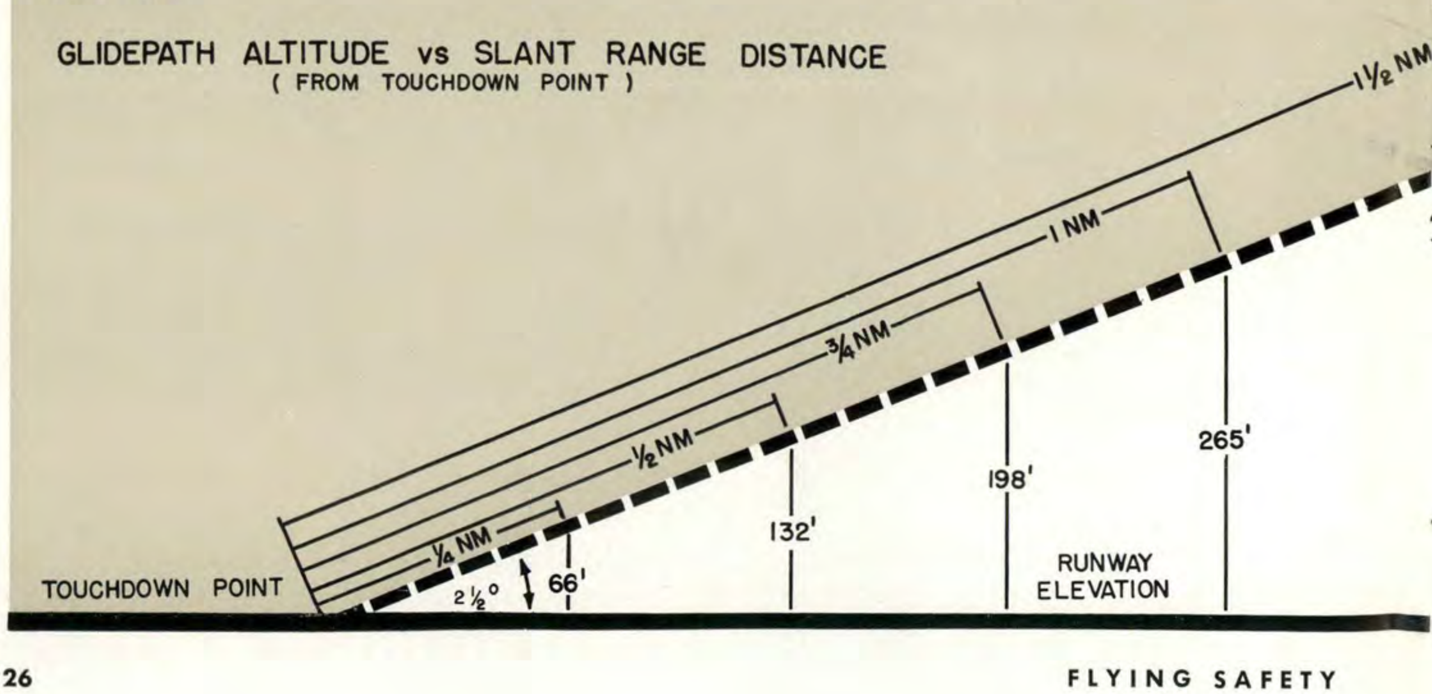
The first error in indoctrination has now been clarified. Sufficient visibility existed to insure that the aircraft could have landed. The pilot was broken off at a ceiling minimum and never reached the visibility minium, as published.

Second, the flight leader commenced this approach with the false illusion that because the ceiling was 400 feet, he would "break out" in that proximity. The ceiling *was* 400 feet but the pilot was unaware of this transition because of visibility. To the pilot there is no specific difference between ceiling and visibility when the visibility is restricted because they apparently merge.

From his previous indoctrination, the pilot should have recognized the fact that in order to see the runway in a visibility of 5/8 of a mile, he *must*

Published Ambiguity

FIGURE ONE



be ⅝ mile slant range from the runway. This, of course, places him on the glide path two-and-a-half degrees at an altitude of 165, not 400 feet, where he expected to break out and certainly not at 300 feet where the minimum was actually called by GCA.

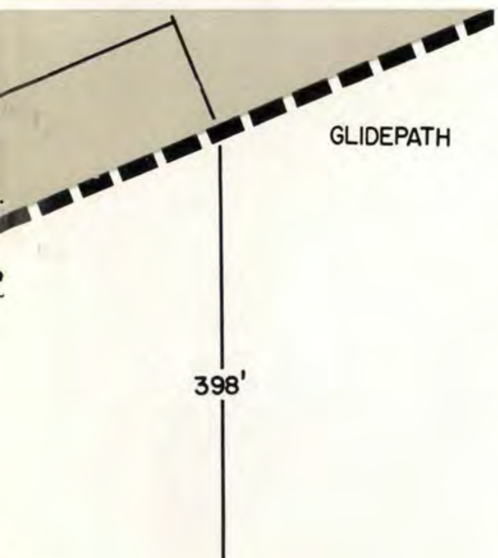
He saw the runway on each of the last two runs exactly where he should have seen it: ⅝ mile slant range and 300 feet above it. This is approximately 135 feet above the glide path, an altitude which completely precluded the possibility of a successful landing on a NATO airfield (7900 feet). In addition, this position would almost have doubled the glide angle (four-and-one-third degrees, plus) required to utilize the runway.

Why is there confusion on this subject? Exactly what do the published minimums mean?

Air Force Regulation 55-24 states, "The following are the lowest ceilings and visibilities the Air Force will accept for publication."

The lowest minimums listed in this regulation (100 feet, ¼ mile) of course, do not coincide, as one point,

Maj. William G. Dilley, Jr
Fighter Branch
Directorate of Flight Safety Research



on a standard glide path. (Figure 1.)

The Radio Facility Chart states, "The weather minimums listed are ceiling and visibility minimums which have been established to provide an adequate margin of safety for an aircraft making a radar approach."

Although these publications deal with minimums, none states *how* they are obtained or *what* they mean.

For example: With GCA minimums of 100 feet and ¼ mile and if GCA minimum is called at 100 feet, it is legally impossible to utilize a visibility of ¼ mile. Conversely, if GCA minimum is called at ¼ mile, the 100-foot-ceiling is meaningless, since it is much farther back on the glide path than the ¼ mile point.

To land from a given ceiling minimum, obviously the existing visibility must coincide with the slant range distance from that ceiling point to the airdrome. Otherwise the pilot still will be IFR and have a forward visibility of zero at the declared ceiling point.

Missed approach procedures dictate that the pilot must initiate a missed approach if he has not established contact when informed of passing the GCA ceiling minimum. No clarification is given, however, as to what that contact must be.

Obviously the pilot will be able to see straight down long before he is able to see the landing runway. This certainly does not establish contact with the runway and he must continue to follow GCA instructions and fly instruments when he does not possess the forward visibility required to land the aircraft from that point.

Publications outlining the establishment of the glide path (ANC Manual and JAFM 55-9) concern themselves with terrain clearances only and are of no help to the Commander in establishing minimums.

AFR 55-22, in outlining the responsibilities of the GCA, gives the only real information in general terms:

"Provide information to the pilot to permit him to execute an approach, under IFR conditions, to a point over the end of the runway from which a successful landing can be made." It should be noted that the control is to a *point*—not point*s*—as exists at present.

Before fighter units can successfully fly in adverse weather conditions the following facts must be recognized and procedures changed accordingly.

- GCA ability to recover is based directly upon linear distance.
- Pilot ability to see (and recover) is based directly upon linear distance.

Therefore, when an airdrome is establishing minimums, the final figure should be one of a given proficiency (hit the runway) from a minimum slant range, based upon the speed with which the aircraft covers this distance. It is apparent immediately, that the linear distance will increase as the speed of the aircraft increases, and that real identical minimums cannot exist for all types of aircraft. This empirical minimum then will, of course, be one point on the glide path and may be resolved into either slant range visibility, ceiling or both.

With respect to the pilot's ability, however, it has already been stated that either ceiling or visibility presents itself to the pilot in terms of visibility. The obvious course of action then is to ignore ceiling, and establish the minimum in terms of slant range visibility, located as one point on the GCA glide path.

Now we have a logical minimum based upon true abilities and, most important, one that is not ambiguous in any sense.

An effort is being made to establish GCA minimums in terms of one point from which a successful landing can be accomplished visually. Until such time as this is realized, the "ambiguity problem" will continue to exist. Therefore, when you fighter pilots file into visibilities of one half mile or less, remember to recognize *before takeoff* that you must descend on glide path to an altitude above the airdrome of at least 130 feet (dependent upon glide slope) before visual contact can be established with the landing runway.

Of interest to base commanders, the following information is also given:

At the time of this writing, and considering only those Air Force bases listing a visibility minium of one-half mile, there were 55 with published ceiling minimums of from 200 to 500 feet.

All that is asked, in the interest of safer flying, is that you mark on the chart here the GCA minimum as published for your base.

Do you have a minimum? Or do you have two? ▲

After departing Toul on an ordered mission, an F-86H pilot arrived with his wingman over a control point when his receiver failed and transmitter partially failed. Altitude at the time was 39,000 instrument weather conditions. The wingman contacted Rhine Control to cancel the mission and received clearance back to Toul Beacon.

As the flight approached the French border, the lead aircraft experienced fluctuations of the RPM, and fuel flow indicators, tailpipe temperature and oil pressure gages, followed by a zero RPM indication. The pilot decided to land at Landstuhl, the closest base. En route to Landstuhl, oil pressure dropped to zero. The pilot squawked emergency and switched to guard channel as he began his penetration. He entered solid clouds at 38,000 feet and broke out over Landstuhl at 9000. Immediately thereafter the cockpit filled with black smoke. The pilot selected 100 per cent oxygen and ram dump and set up a flameout pattern. After stopcocking the throttle on touchdown, the engine froze. Inspection showed an engine starter oil seal had ruptured, causing loss of engine oil.

Rex Says*—This pilot should be commended for his quick thinking and cool-headedness during an emergency situation that could have easily cost an aircraft. The incident highlights the well established fact that the pilot who knows his aircraft and procedures thoroughly can often bring back a crippled bird without further damage.*

★ ★ ★

No, Smirdley, your wife does not get supervisory error for keeping you up late last night.

★ ★ ★

A lone T-Bird pilot took off at Vance AFB around 1600 even though he "wasn't feeling very well." He didn't feel "actually sick" but he also knew he wasn't up to par. After refueling at Louisville, he filed IFR on top, to Dover, Delaware. He reworked his log and started up, and at the end of the runway his clearance was changed again, with other reporting points. He sat there—burning up fuel—and refiguring by flashlight.

Right after takeoff he called, as instructed, and was asked to give an estimated time passing the 196 degrees radial of Cincinnati Omni. After several more changes of instructions, he levelled off happily at 24,000 feet, just grateful that he didn't have to eject on takeoff. Seat pins now checked and removed! Checked weather on Channel 13 and was told that he'd have to change his alternate, since the whole East Coast was covered with severe thunderstorms with zero zero conditions at times. On all channels—5, 6 and the discrete frequencies—he had difficulty receiving instructions.

Andrews Omni as well as the low frequency radio—outranked by thunderstorms—was out. Going into Dover AFB the pilot couldn't raise anybody so he entered the holding pattern, intending to let down on ETA. He thought his UHF was out. Finally, he got Dover and was told to hold for 20 minutes and was given an approach time and descent to 20,000.

Just then—"vertigo"! The pilot had to fight himself at every turn. He dropped his letdown chart four times and couldn't even hold on to his flashlight. On his penetration turn he reached 11,000 feet and convinced himself he was at 1000! He leveled off and again fought himself to let on down.

Finally he broke out about 3000, but was frosted over so he flew around in order to be able to see. By this time it was raining and the visibility was 2 miles, so he couldn't see much anyway. The landing was good.

The pilot, however, was not so good. He was so exhausted he could hardly get out of the bird. Next day he went into the hospital—with measles.

This pilot had every confidence in the T-33. Even though he had only 200 hours in the aircraft, most of it had been on long cross-country flights by himself, with quite a bit of night and weather. With 150-200 hours of weather time and a certificate from the USAF Instrument School, he had complete confidence in his ability to fly instruments. But he overestimated himself this night. Were it not for his ability, he might not have made it.

***Rex Says**—It's one thing to know your own ability. But it is something else to recognize your overall capability. That's what your Flight Surgeon is there for: to help you come to the right decision—or make it for you. "Not feeling well" could be more than a "measly" condition.*

★ ★ ★

Recently a T-33 pilot departed a southern Air Force base on an IFR flight plan to his home station which was located in a metropolitan area. The flight plan itself posed no problem. The time en route was less than two hours and he listed two hours and 30 minutes fuel aboard. His destination forecast weather conditions well above IFR landing minimums. His alternate was forecast at minimums but was located in the same metropolitan area as his home station. His estimated ground speed was 425 knots.

One hour and 15 minutes after departure, he made a position report, and comparing the distance to the time flown, his actual ground speed was 392 knots. His time en route was now estimated at approximately two hours. Eight minutes after the pilot made his position report, his destination reported weather conditions below IFR minimums.

The T-Bird pilot continued his flight and when he arrived over the metropolitan area there was a delay in receiving approach clearance to his destination. His destination weather continued to be below minimums. By now his alternate was also below landing minimums.

The increased en route time and the holding delay (holding delays are not unusual in this area) caused the pilot to declare an emergency and make a below-minimums GCA landing. The incident report stated that "this landing was made without sufficient fuel for a go-around as the aircraft had only 20 gallons of fuel after landing."

***Rex Says**—Let's review a couple of things this pilot could have done to prevent this "sweat job."*

First, he could have kept a constant check on his destination weather. He could have anticipated a delayed approach clearance and recomputed his remaining fuel over destination when he made his first position report. With this information available he could have diverted to a more suitable destination.

Second, his destination (home base) could have provided the necessary information through the tower which had contact for more than the final 30 minutes of flight and directed him to proceed to an area of more suitable weather. If his destination wasn't able to provide the information, it could have advised Flight Service that the aircraft was inbound to the station and requested assistance.

It's the base commander's responsibility to identify the problem and prepare the advisory whether issued through the local facilities, CAA or Flight Service. Advising CAA or Flight Service that the station is below minimums will not get advisories to inbound aircraft.

What have you done at your base to insure compliance with AFR 60-16 to prevent a "sweat job?"

At 1507 hours, Flight Service was advised that a T-Bird student pilot was lost. Laughlin DF reported a Class A bearing of 042 degrees on the aircraft which, at this time had only 100 gallons of fuel remaining, and was at an altitude of 25,000 feet. The Flight Service Direction Finding net was immediately altered and Class A bearings were received from DFs at both Goodfellow and Bergstrom. Reception of the three Class A bearings enabled the clearance officer to plot a fix on the aircraft's position, which was established at 1509.

The T-33 was located 75 miles west of Bergstrom. A weather check revealed westerly winds of 75 knots. Therefore, weather and lack of fuel would make Bergstrom the only base the aircraft could reach. This information was relayed to the pilot, and San Antonio ARTC advised of the emergency.

Another DF fix at 1515 placed the aircraft 35 miles west of Bergstrom. San Antonio ARTC cleared all altitudes below 25,000 feet at Bergstrom and further cleared the T-Bird to make any type approach the pilot desired.

At 1527, Bergstrom GCA made contact with the aircraft, and the student pilot said he was in solid clouds. A successful GCA was accomplished and the T-Bird touched down at 1539. At 1540, while taxiing to the ramp, the aircraft flamed out—fuel starvation.

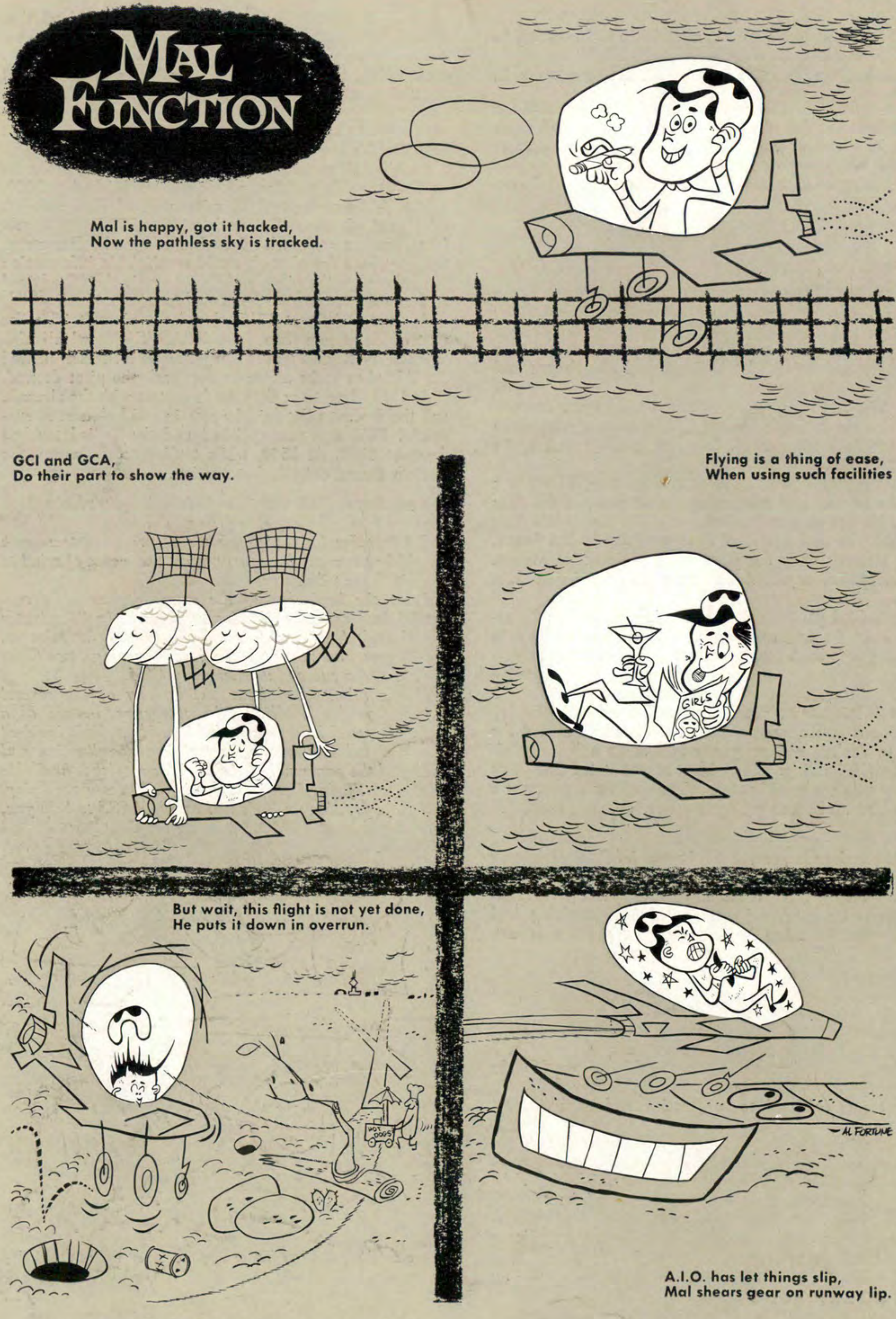
***Rex Says**—This DF "save" is evidence of the high degree of effectiveness born from the merger of AACS and Flight Service. This example of precision teamwork should be a source of encouragement and peace of mind to the Air Force pilot.*

From the beginning of the emergency until its successful landing, only 32 minutes elapsed. In 33 minutes the aircraft had flamed out. During those 32 minutes, AACS personnel rendered 27 Class A bearings, two Class A fixes and a successful emergency GCA.

If one minute had been lost by any of the several AACS Agencies handling this emergency, instead of a "save" it could have been a fatal accident. This incident is a real indorsement of the training, coordination and ability of the personnel of AACS. This service is available to any pilot flying in the ZI. Use it! When you are flying, call for a practice fix. This will enable AACS to help you, should you need it as much as this student pilot did on his flight.

★ ★ ★

You must think of some better ways to lower the rate Smirdley.



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