FLYING SAFETY

UNITED STATES AIR FORCE

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AIR TRAFFIC CONTROL PROCEDURES

IN THIS ISSUE

THE EDITOR'S VIEW

The term "flying safety," although widely used and accepted when we speak of Air Force operations, is also widely misunderstood. Most of us use the term much as we use the name of any object, such as apple, shoe, or automobile. The truth is that flying safety is not an object or an entity in itself. It is rather a part of and a by-product of doing something right. And it is just one facet of the end result of an operation. Another facet is mission accomplishment, and this is of course what we strive for in Air Force operations. It would obviously be foolish for a mission planner to go through all the usual steps of his preparation and at the end say "And then we add flying safety to round out the job." If all details in the preparation and execution of a mission are properly attended to there is no such thing as adding flying safety, for it is already included.

It seems rather strange that "selling" flying safety has been such a long and arduous task, when we think of it in this respect. Many commanders in the past, some in pretty high places, resisted the emphasis on safety in operations. They considered it something which they would attend to when all the other ducks were in a row.

And to some commanders, the idea of having a safety officer at the primary staff level was a foreign concept. What they just couldn't realize was that safety is in all the way or not at all, and that without this ingredient their mission was doomed from the start. What then is more logical than to have a staff officer with this duty, thus assuring that a pinch of safety is a part of every mission recipe? Our safety record for this past year proves that many commanders now understand the real meaning of flying safety, for without this understanding we could not have lowered the major accident rate yet again from 10.4 in 1958 to approximately 8.3 in 1959. Things are indeed looking up with flying safety in the picture.

CROSSFEED

LETTERS TO THE EDITOR

Unusual Card

I am sending you this rather unusual frequency card that is presently in use in T-33s here at Offutt AFB. It is unusual in that the frequencies rather than the channels are listed in order of ascending value. The frequency changes that are encountered in flight are generally given by stating the frequency, not the channel. By using the old method, the pilot is often distracted from instrument flying while taking a glance at the side-mounted frequency card (T-33 aircraft). This one may very well reduce cockpit distraction, a factor greatly emphasized today. It can be scanned quickly and can be cemented to the instrument panel in any convenient spot, in some T-Birds, alongside the remote channel indicator.

Incidentally, the 20-channel card fills the bill for all T-Birds, whether ARC-27 or ARC-34 equipped. When 18 channels are employed, such as in ARC-27 equipped aircraft, a thin strip of black plastic tape can be used to block out two channels.

Well, that's about it. The praise and comments from T-Bird pilots here at Offutt have proved the value of this card in reducing cockpit distractions. I hope you can use this item in FLYING SAFETY MAGAZINE.

Capt. Roy C. Ihde
Director of Safety
Offutt AFB, Nebraska

Standard UHF Channels (20)

Freq.	Chann.	Service
236.6	1.	TOWER PRI
257.8	4.	TWR CIVILIAN
262.5	2.	OFFUTT TWR
263.0	7.	DEP CONTROL
270.6	16.	NAF GCA AF
272.7	5.	ATCS PRI IFR
275.8	3.	GND CONTROL
279.6	9.	HI ALT CTR
289.4	18.	GCA FINAL
301.4	6.	ARTCC/ATCS
305.4	14.	UHF/DF
317.6	12.	HI ALT CTR
323.0	8.	HI ALT CTR
335.8	17.	GCA SEARCH AF
344.6	13.	PILOT/FOR
351.9	11.	HI ALT CTR
352.0	19.	HI ALT CTR
363.8	15.	APP CONTROL
364.2	10.	RADAR ADVIS
379.9	20.	HI ALT CTR

243.0 MIL. EMERGENCY
T-33 AIRCRAFT

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Three Factors . . .

A few factors seem to have been overlooked when taking the pictures published on pages 1 and 3 of the November issue. The factors I refer to are as follows:

- On page 1. The parachute dangling on the leading edge of the T-Bird, and a crewmember walking on top of the wing. Crewmembers servicing tiptanks and allowing fuel nozzle to rest on the side of the tank. This has resulted in many manhours for replacing and repainting T-33 tiptanks. And may I ask why the contents of Par. 8.1.8 from T.O. 00-25-172, were not complied with? Also, where is the fire extinguisher located?

- On page 3. The mechanic has done the unpardonable. Where are the guard rails for this maintenance stand?

Your magazine is read by all members of this base and is of great importance to the personnel concerned with aircraft maintenance. It contains helpful information about the Do's and the Don't's.

I know that your magazine is devoted to flying safety, but why should you overlook ground safety practices, along with good maintenance practices? To me all three factors tie together in close harmony. Observance of all three is necessary for all maintenance personnel and for the protection of aircraft.

MSgt Harold E. DeSpain
Hq Sq Sec, 7486th AB Gp
APO 115 New York, N. Y.

We promise to scrutinize pictorial contributions more closely. Thank you for writing. This is your magazine too, you know!

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Letdown Chart Holder

There has been much talk about the need for a letdown chart holder and now we feel that our squadron has a workable assembly. Here's a picture of this useful gimmick. Although it was designed primarily for use in the front cockpit of a T-33, its adaptability appears feasible for other aircraft types. *(Picture at right.)*

The pilot can select the required page in the letdown book and mount it before starting his flight, then quickly set the holder in place before reaching his letdown fix.

This holder was designed by Captain G. W. Vaughn, Engineering Officer, 3561st Flight Line Maintenance Squadron, and built by the 3560th Field Maintenance Squadron here at Webb. It is easily detachable from its mount on the railing and it doesn't block any essential instrument from the pilot's view. The oxygen blinker and pressure gage are not entirely visible but they can be seen easily if the pilot leans slightly forward. Landings can be made without any difficulty with the holder in place, and it does not hinder ejection. If the pilot should hit it during ejection, it would easily fall out of the way.

We hope that our idea will be of use to other units.

Maj. A. A. Adair, USAF
Commander
3560th Maint & Supply Gp
Webb AFB, Texas

Linespeed Radar Check

For some time now I've wondered why the Air Force couldn't use the highway speed radar to check aircraft acceleration and linespeed on takeoff. The unit is accurate and could be set up at the 2- or 3000-foot markers, and a pilot could be given his linespeed over the radio. This could be an "on request" service and a GCA unit or tower personnel could handle it.

The pilot would compute the linespeed for the location of the unit and the operator would not have to know the computed speed. All he'd have to do would be to read his speedometer and call the speed to the pilot who would make the decision to "go or no go."

This is just an idea but you may be able to get some of the wheels and bright young engineers interested in it. We've talked it over here in the office and think it might have a point or two!

Maj. Robert D. Hupp
Hq Sq Sec, Hq 14AF
Robins AFB, Georgia

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An Interested NCO

I'm a non-flying NCO and work in the Comptroller's Stat. Services Division here at Kirtland AFB. Quite by chance I picked up a copy of the December issue of FLYING SAFETY in the Flight Surgeon's office and after reading the Editor's View, decided to comment on your magazine. I thought you wouldn't object. I realize that my comments will have little bearing on future publications, but after reading FLYING SAFETY I find it one of the more informative publications for Air Force consumption.

Even though I am a layman in terms of the flight line, I found the article on the Thunderchief F-105 remarkably interesting. And, in the article "Taking the A-Train," I discovered facts about our Atlas Intercontinental Missile that astounded me. Because of this newly acquired knowledge, I now have a greater appreciation of the jobs other people are performing in the Air Force. Thank you for your time.

SSgt John Konitzer, Jr
DCS/Comptroller Stat. Services
Kirtland AFB, New Mexico

Been wondering what FAA and USAF are doing to improve approach and departure procedures? The answer is . . .

Help is on the Way!

Maj. R. A. Beckham, Jr., USAF, and Mr. G. E. Robertson, Air Traffic Management, FAA, Washington, D. C.

AF-54321: "Redfield approach control, this is Air Force jet 54321, two zero thousand, estimating Hunt Omni at zero two, over."

REDFIELD APPROACH CONTROL: "Roger Air Force jet 54321, Redfield approach control, maintain two zero thousand, unable to descend you in penetration all the way at this time but I can descend you to 5000 feet via the Hunt VOR penetration and vector you to the outer compass locator (LOM) for an ADF approach."

AF-54321: "Roger, that'll be okay."

REDFIELD APPROACH CONTROL: "Air Force 54321 cross Hunt VOR at two zero thousand cleared for a standard Hunt VOR penetration to 5000. Do not descend below 5000 in penetration. Report over Hunt outbound and report penetration turn. Redfield weather measured ceiling 800 overcast, visibility 3, light rain, haze and smoke, altimeter 29.91, over."

AF-54321: "Roger."

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The stage is now set. The air traffic controller now assumes that AF-54321 has the capability to make his VOR penetration to 5000 feet, be radar vectored to the LOM and from there on, conduct an ADF approach to the airfield. However, is the pilot aware of what he must accomplish? Does he have the necessary publications/charts available to properly conduct the latter portion of this approach? He has implied, by his acceptance, that he is capable of following the clearance as issued.

The pilot of this fictional account descended to 5000 feet and the aircraft was radar identified. He was given radar vectors, further descended to 1500 feet, and was advised that he was 2 miles east of the LOM intercepting final approach course. At this time he was advised to take over and complete the approach, then contact the tower on 236.6.

Everything was proceeding smoothly as far as the air traffic controller could tell. But something must have gone wrong between intercepting the final approach course and touchdown, for our hypothetical pilot landed short and severely damaged the main gear. He escaped without injuries, but the bird was tied up in maintenance for weeks. What happened?

Since we invented this incident—though its details are drawn from many an unfortunate experience recorded in the Forms 14—we can tell you precisely what went wrong. The pilot misinterpreted the kind of approach to be made and assumed he would be given an ASR *(Surveillance Radar)* approach. Because he did not have an approach chart for an ADF approach using the LOM, he couldn't know either the LOM's frequency or its distance from the airfield, or the minimum altitude to be observed. As a result, the pilot completed the descent to minimum altitude long before he expected the field in sight.

A question may be raised as to why AF-54321 couldn't have been cleared for a penetration all the way, utilizing the Hunt VOR. Let's say the reason was that conventional traffic was conducting approaches from the opposite direction, utilizing the ILS. To clear a jet aircraft for a penetration all the way under such circumstances would necessitate stopping the traffic flow until the jet completed its approach. Such a stop-and-go operation would play havoc with an orderly and efficient landing sequence.

Although our example is fictitious, a number of similar incidents at joint use airports have indicated that the type of operation described is sometimes confused with a radar approach. Actually, the air traffic control facility is using the radar to accomplish minimum spacing of arriving and departing aircraft. Surveillance approaches for arriving aircraft are not normally used by Federal Aviation Agency *(FAA)* facilities as this approach requires detailed handling of, and complete attention to, each aircraft. This limits the acceptance rate of the system and creates extended intervals between arriving aircraft. However, surveillance approaches are available at selected locations where the radar equipment meets specific criteria for the conduct of these approaches. These locations are listed in the Flight Information Publication; checking them should be viewed as part of preflight action if a surveillance approach will be required because of equipment limitations.

An arriving aircraft is normally cleared to an outer fix appropriate to the route flown. Jet aircraft are cleared to the fix where they will execute a penetration. After the aircraft reaches the fix it is vectored to the final approach course *(ILS, VOR, ADF)*. Radar vectors and altitude assignments between the fix and final approach are issued as required for spacing and separating aircraft. The aircraft is vectored so as to be established on the final approach course prior to reaching the approach fix. This does not mean that the radar controller establishes the aircraft on the final approach course, but only that the aircraft will be placed with the final vector in such a position that the pilot, through routine navigation, can establish the aircraft on the course prior to reaching the approach fix.

The final vector for intercepting the course is usually within 30° of the approach course. Upon receiving the final vector, the aircraft is cleared for an approach and the pilot is expected to complete it, utilizing the existing navigational aid as his primary means of navigation. Otherwise, he executes the missed approach procedure for that airport.

This is quite different from a precision or surveillance approach wherein the pilot is furnished both navigational guidance and letdown instructions. The problems associated with execution of this approach in a jet fighter aircraft are recognized. The use of combined VHF and LF aids during any approach or departure is undesirable. Although controllers are required to know every approach authorized for an airport, it would be unreasonable to expect them to be familiar with the capabilities of all the aircraft and pilots using the airport. It is therefore incumbent upon the pilot to make known any information he believes the controller should have; in particular, he should inform the controller of his inability to comply with a clearance or approach procedure issued, if such is the case.

As stated previously, when the pilot accepts a clearance, the controller assumes that he can comply with the instructions issued. If at any time the pilot cannot comply with a clearance, or if doubt exists as to the procedure to be used, the pilot should immediately advise the controller and/or request additional information. In spite of the fact that this requires additional radio transmission, it is considered good pilot technique and has on occasion prevented a possible aircraft accident.

When a pilot cannot accept a clearance as issued, it may be necessary for ATC to delay a new clearance until such time as traffic conditions permit the issuance of another. This delay normally will not affect conventional aircraft; however, a problem may be encountered by jet fighter types because of limited fuel capability. The pilots of jet aircraft, therefore, should not hesitate to make known minimum fuel condition *(in time remaining)*, and/or emergency situations, as soon as they are evident.

This may result in disruption of normal traffic, but once minimum fuel or an emergency has been declared, landing priority for that aircraft is recognized by all concerned. The FAA does not receive complaints from civil or military pilots when they have encountered delays because a jet with an emergency was given priority to land. Actually, the FAA has found that those affected are very cooperative in such situations. Most pilots realize that this could also happen to them.

The problems associated with the operation of jets in the air traffic control system are becoming more widely recognized throughout FAA facilities. This has been particularly true since military personnel have been assigned to the FAA. As experienced pilots in military aircraft operations, they have contributed immeasurably to the recognition of these problems and to the development of procedures to cope with them.

High altitude evaluation flights in T-33 aircraft are now being conducted by military pilots assigned to the FAA. An experienced air traffic controller normally occupies the rear seat of the T-Bird, and recordings are made of all radio communications, both terminal and en route. The T-33s presently utilized for these flights belong to the USAF and Air Force call signs are used. Thus, air traffic controllers cannot identify them as FAA evaluation flights and *no* special handling is received. As a matter of fact, we believe we can match any existing "hairy" ATC clearance story you may have heard as we've had some real duzies too!

This evaluation flight program is proving extremely helpful in alleviating problems associated with the control of jet aircraft. Facility monitor reports of all evaluation flights are prepared and supervisory personnel within the area of the flight are briefed at its termination. Incidentally, the playback of recorded transmissions is usually quite convincing, particularly when it is played back by an air traffic control supervisor who just happened to be riding in the back seat of the T-Bird. It is apparent, then, that action is underway to help the harried jet pilot on an instrument flight plan when he runs into "thorny" situations.

It appears, however, that the majority of the day-to-day problems encountered by jet pilots are associated with instrument departure procedures. Although arrival procedures are not to be neglected, and action is being taken to improve both arrival and en route operations, the most urgent emphasis has been placed on improvement of departure procedures. Through coordinated efforts of the USAF and the FAA, a method has been established for developing and using Standard Instrument Departures *(SID)*.

A letter of 25 November 1959, pertinent to Standard Instrument Departures, was prepared by the FAA's Washington Office and forwarded to its regional administrators and facilities. Extracts from this letter follow:

"The basic principles of flying safety must not be prejudiced by the use of intricate and complicated clearances which are sometimes difficult if not impossible to comply with. We must continually be aware of the safety elements involved when issuing departure instructions or clearances and must strive to eliminate any undue burden on the pilot to comply with such clearances.

"The period immediately following takeoff is a critical time in aircraft operation because of the many cockpit functions which must be performed in a logical and rapid sequence. This is particularly true in the case of single pilot jet aircraft. For these reasons, it is essential to reduce and simplify routings for departing aircraft.

"To achieve these objectives, we should like to emphasize the use of radar departure service. A radar departure is fast, efficient, and best liked by the average pilot. We must, therefore, strive to offer such departures whenever possible. When radar departure service is provided, it must not be terminated until the aircraft is established on course on the appropriate navigation aid. In the absence of this radar service, Standard Instrument Departures should be employed whenever possible for participating agencies.* We should resort to impromptu clearances only when all possibilities for the use of radar and/or SID's are exhausted. Controllers shall not insist on the use of SID's by pilots who do not desire this service. . . .

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**EDITOR'S NOTE: Headquarters USAF has developed a new regulation which will direct commanders of military bases and agencies on joint civil-military airports to establish and publish standard instrument departure procedures at bases where the Air Force conducts instrument departures. This regulation should reach the field about the time you read this article, and it is expected that the provisions contained therein will be complied with within 6 months after date of issue.*

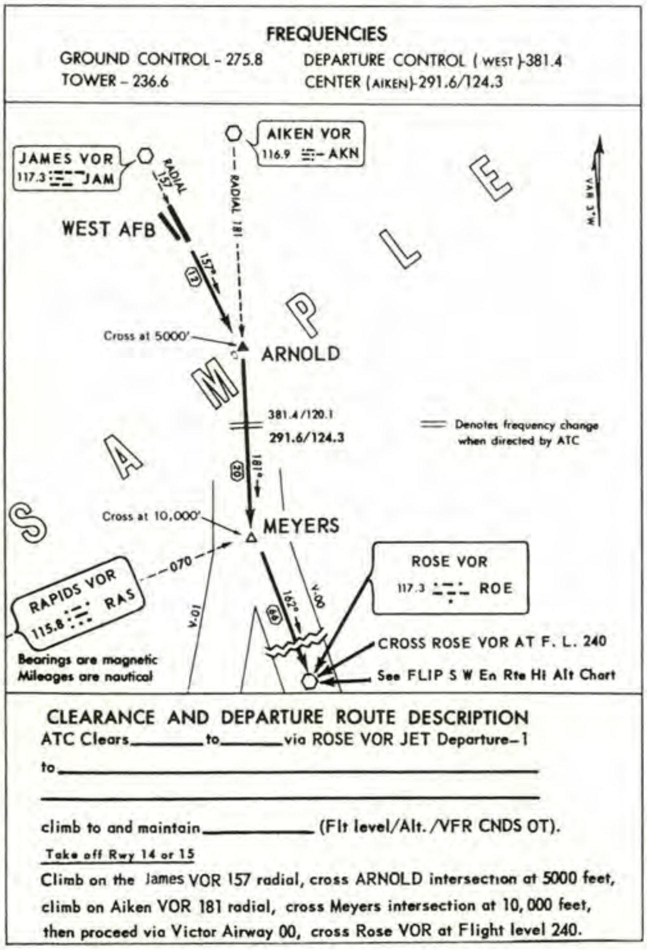
In the past, basic principles of flying safety have been compromised by use of lengthy and complicated departure clearances which have been difficult and sometimes nearly impossible to comply with. Numerous course and frequency changes at low altitudes have placed an undue burden on pilots, especially the pilots of single cockpit jet aircraft. It has also been determined that complicated departure procedures have caused or contributed to aircraft accidents by diverting the pilot's attention from the many cockpit functions which must be performed during flight under actual instrument conditions. Standard instrument departure procedures embodying the principles of clarity and simplicity should alleviate the hazards inherent in present IFR departure clearances.

"The SID is a pictorial representation of a departure route with specific details for that departure printed below it. . . . *(See Figure 1.)*

"All Air Force bases will brief departing pilots as to the use of these departure procedures and furnish them copies when a flight plan is prepared. When a departure clearance is issued to a pilot, the en route portion of the clearance will be preceded by the assigned name and number of the SID to be used. The instructions contained in the SID will not be transmitted to the pilot unless he requests it. The pilot will not be required to read back his clearance unless an amendment to the SID is issued; then he must read back his entire clearance. The pilot shall, however, confirm the SID he is issued, by name and number.

Figure One

ROSE VOR DEPARTURE - JET 1 WEST AFB



ROSE VOR DEPARTURE - JET 1

"A review of some of the existing SID's indicates that both L/MF and VHF navigation aids are being used for a single departure routing and that some routings do not terminate at a designated fix. Whenever possible, one type of navigation aid should be used, either L/MF or VHF. Intermixing the aids requires too much attention to tuning and selection on the part of the pilot with an accompanying decrease in his ability to comply with instructions. If feasible, each Standard Instrument Departure should join an airway or route system at a designated fix. Whenever an airway is used for these routings, it should be so identified on the chart portion of the SID. . . .

"No amendment to published SID altitudes or routes shall be made by an air traffic controller unless the clearance, including the entire departure procedure, is transmitted to the pilot."

The effort directed toward improvement of air traffic control handling of jet aircraft must of necessity be a coordinated one. We have found at several locations that air traffic controllers have never been either briefed or provided with information pertinent to the operational characteristics and navigational capability of the jet aircraft they are controlling in day-to-day operations. As has been stated previously, a controller cannot be expected to maintain knowledge of this information for all aircraft; however, it would assist him immeasurably to have available this pertinent information on the type of aircraft that usually operates within the area of his control responsibility.

USAF aircraft operations supervisory personnel should brief local FAA personnel any time that new or different aircraft are put into operation or when new equipment is installed in the aircraft that may affect air traffic control. In addition, supervisors should also make known the approaches desired and/or required for aircraft under their operational control.

Again, we would like to remind pilots of the following:

- Always advise air traffic control when your aircraft is not equipped, or its performance is insufficient, to comply with an issued air traffic control clearance, including approach/departure clearances.
- Request a different clearance if you feel you have information which would make another course of action more feasible.
- Notify the controlling agency as soon as possible when you suspect that a critical fuel condition or an emergency situation may develop.
- Do not hesitate to declare "minimum fuel" or an "emergency" when such a condition is evident.

Feel free to visit any of the FAA facilities and observe their operations whenever you have the opportunity. They will welcome the chance to explain their functions and problems to you. ▲

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"The basic principles of flying safety must not be prejudiced by the use of intricate and complicated clearances which are sometimes difficult if not impossible to execute."

REFLECTIONS *on the rocks*

Maj. Roy J. Broughton, Hqs Air Training Command

As I sat on a rock that night waiting for the helicopter, I had plenty of time to reflect. Earlier, when the T-Bird struck the ground and made its short but bumpy ride across the toolies, my conscious thought was "*** ! ! @%, that GCA crew flew me flat into the ground." Since then I had done a few things: helped my passenger out of the rear seat, walked to a farmhouse to report the crash, then returned to the aircraft. Although the night wasn't too cold, I covered Pete with my jacket. He wasn't feeling good and complained that his back hurt. After all this was done, I had time to think.

Maybe I was just a bit hasty when I first blamed the GCA lads. After all, the weather was good VFR and the GCA was only for practice. Let me tell you about it.

I arrived over the beacon on schedule, VFR on top. There was only a slight delay and I was cleared for penetration, with GCA pickup at completion of penetration turn. Everything was routine and I heard approach control give a clearance to the aircraft behind me. The aircraft's pilot disturbed me. He was the "smart remark and bright answer" type—you know, the fellow who tells the tower sarcastically, "Anytime this week," when asking for a clearance.

Anyway, the GCA pickup was normal, and they checked my position with a Parrot change. Then they said they had me. How wrong they were.

I was cleared for a straight-in approach for 27, and for a descent to 3000 feet. No sooner had we passed the beacon than the final controller took over and told me to start my descent. I complied, and double checked my gear and flaps.

The next thing I remember was the controller telling me I was high on the glidepath. I increased my rate of descent only to have him tell me I was getting higher on the glidepath! Now, you've got to admit this was disconcerting! Here I was, with a nonrated passenger, goofing up a GCA!

Well, I increased my sink some more. I was hitting 1000 feet per minute when the controller gave me the "high" pitch once more. Right then my peripheral vision picked up an increase in darkness and I pulled back on the stick. The increase in darkness told me I was on the deck. I was! Immediate contact with ole Mother Nature was made. The impact wasn't too bad and I was able to blow the canopy after we stopped. You can sure get out of one of these birds in a hurry when you want to.

That's the story, up to the time you got here in the 'copter. But I said I had plenty of time for reflection, and if we can go over this right now, maybe we can answer that question, "How stupid can we get?"

It seems to me that my initial mistake was asking for a GCA in the first place. I *know* that 60-16 bit about descending below 2000 feet on a practice instrument approach without a safety observer qualified in the aircraft. But I didn't give it a thought—'til sitting over there on that rock. My IFR clearance was no excuse either, because I knew the cloud bases were at 5000 feet.

Maybe you'll say my second mistake was not briefing my passenger on what I was doing, and not asking him to keep his eyes open. This old cliché stings a bit right now but I'm going to use it anyway: "This'll kill you!" Pete tells me that he saw the base long before we hit. He sure is the closemouthed type!

Error No. 3 touches on the defroster, I think. I checked, and you'll find it OFF. I can't prove it, but maybe my canopy was a bit clouded. Either that, or there's no need for me ever to use a hood for practice. Apparently, I wouldn't look outside if my life depended on it—as it just did.

You'll probably count my basic instrument procedures as error No. 4. Where the altimeter was in my crosscheck, I'll never know. I did, however, come to one conclusion during my reflection on the rock: when the controller kept insisting I was high, I still had confidence in the boy and figured I didn't need the altimeter just yet. As it turned out, I needed it real bad. I should have been crosschecking it.

And that just about covers it. Pull up a rock and you can tell me the rest, like how did GCA get fouled up, for instance.

* * *

Joe wrapped it up pretty well, and we used most of his ideas in writing up the accident report. Maybe it was his honesty, or maybe it was in deference to his broken ankle, but things didn't go too bad for him. The bird? It was a complete washout and has been scratched from the inventory.

We were able to show Joe how the GCA crew got confused, too. It seems that the clown who was cleared for approach behind him "expedited" a bit on the way down and, when under the clouds, pulled in his boards and scooted for the base. As luck would have it, he passed Joe at just the right time; thus the GCA lads started scoping the wrong aircraft. To cook the cake, old "expediter" requested a straight-in approach. He didn't use a long, flat approach, though, and this gave GCA the "high" indication. The results are history.

It happened just as Joe told it to me that night on the rock. He's learned a few things about flying from it, and believe me, so have I! In my book, it all goes to prove that the basic flying rules, the Flight Handbook procedures, and the fine points of flying preached by the IPs can promote a lot of living. ▲

The strobeacon lights can be seen below the 5 high intensity lights. Flashing at 20 million candlepower, for 1/5000th of a second, the non-blinding "strobes" appear to move in sequence to the threshold.

Project NARROW *Gauge*

Lt. Col. Roy L. Strong, Directorate of Operations, Hqs. 7th Air Div., (SAC)

In August, 1959, FLYING SAFETY Magazine published a most interesting article titled, "The Small End of the Funnel." It is necessary for me to quote the opening sentence since the subject listed is directly associated with my subject matter. I quote: "It has been said that the most critical phase of flight is the approach and landing." I am convinced this is a 100% true statement when we are discussing poor weather flights or flights during periods of darkness. I should say this *has* been so. Recent technical advances in the field of visual aids have now made safe all weather aircraft recovery a reality—*but*—there is a good chance that you, as a pilot, have not yet gotten the word. It is for that reason that I have written this and the publishers of the cheapest insurance policy in the world, FLYING SAFETY Magazine, have published it.

The old axiom, "you can't hit what you can't see," applies as much to landing a high performance aircraft under adverse weather conditions as it does to hitting a fast change-of-pace pitch thrown by a major league pitcher. Accidents during night landings or poor visibility conditions have occurred far too frequently and, until recently, we have had no positive recommendation to make except to not attempt an approach any time that a safe landing is doubtful. An interesting fact associated with this type accident is the lack of a trend related to pilot experience. Such accidents can, and do, involve pilots of all experience levels; therefore, it is logical to assume that one could happen to you no matter how good you think you are, or how carefully you plan your mission.

In the recent past, three major accidents occurred within a single numbered Air Force over a period of less than 90 days. The circumstances surrounding the accidents were nearly identical. The only factor that did not appear as constant was the pilot experience. It varied from 1500 hours total flying time to 5000. For the purpose of portraying my point, I will describe the second accident, which occurred at a Midwestern base last summer. As a pilot, you may have been placed in a similar position by fate, but perhaps so far the results have been more favorable, due to *luck*.

A KC-97 was returning to home base in the early hours of the morning. Weather was clear and 7 miles, with a one degree spread and a very light wind. Forty minutes after initial arrival, the pilot was cleared for his approach. Patches of ground fog and low clouds were now in the area with the weather reported as 800 feet scattered and 3 miles visibility. On the downwind leg, the airfield lights were visible to the crew, but the aircraft was frequently in and out of the lower scattered clouds, and patches of ground fog were visible below. The crew still had fuel for diversion, but the field was well above minimums—or was it?

On final approach, the aircraft commander flew a precise GCA approach. At 200 feet and one-half mile from the end of the runway, exactly at precision minimums, the copilot announced that he had the field in sight, ahead and to the right. The pilot, reacting as you or I might have done, went visual, and started a slight alignment correction to the right. Then, the field boundary lights were again swallowed up by fog patches after the crew was committed, now below minimum, to land on a runway they could not see. Power was added for a go-around, but the aircraft did not respond. One engine and a wing tank struck the ground; the gear also was damaged. The aircraft staggered back into the air and proceeded to the alternate, where a partial gear up landing was made. This same type accident occurred 3 times in 90 days, and all were officially listed as accidents caused primarily by operator techniques.

One contributing cause factor listed by the boards was the lack of an adequate visual approach system. In my opinion a properly designed approach lighting system, familiar in design to the flight crew, would have eliminated not one, but all three of these accidents.

I doubt seriously that the majority of pilots could describe the type of approach lighting system installed in their home stations, except those who are now stationed at Dow AFB, March AFB, and Westover AFB, plus a few other air bases which have already installed the configuration "A" lighting system with stroboscopic condenser discharge lights. I cannot blame the other pilots who don't know what visual aids are available, since we have some 20 different existing systems, each possessing one or more qualities which make them unacceptable for modern day aircraft. And—in addition—we can't learn them all! The problem of nonstandardization and improper design has been familiar to many all-weather flying groups in all areas of flying interest. The military requirement has been further amplified by the rapid technological advances and operational capabilities in the development of current tactical aircraft.

For these reasons, the Air Force, in conjunction with the FAA and civil aviation, conducted the most comprehensive and realistic tests ever attempted, under actual weather conditions, of an integrated visual approach and landing aids system *(IVALA)*. The results were more favorable than had been imagined. Actions have been taken to insure a standardized visual presentation so that pilots can effectively utilize a known system, any time, anywhere.

The recommendations prepared as a result of these tests, when implemented, should do much toward reducing drastically the number of accidents during approach and landing in poor visibility conditions. Perhaps we can still the cry of "there's the runway," which has so often prefaced a serious accident, by providing the visual link between an electronic approach and a safe touchdown. The *(IVALA)* system does permit *safe visual* approaches and landings under all visibility conditions.

Now let me describe the scope of these tests, the objectives, and some of the ground rules that were followed by participating crews.

The aircraft you fly probably was among the 31 different types that participated. *(From Century Series fighters down to the old B-25, including a couple of Navy jet fighters.)*

In every instance, tactical aircraft were flown by well qualified, but not especially trained, line pilots. The only personnel who participated that had special training were from the FAA, the all-weather test group at WADC, and the project officer.

The cross section of the aircraft inventory was obviously adequate and the crewmembers were typical first line pilots of the various service branches. Before outlining the test objectives, let's survey the approach aids available to insure that our all-weather visual aids system was not an unnecessary addition to some highly sophisticated electronic approach system. It wasn't. The ILS glide slope at the test base would never pass a flight check, and, in addition, there was no outer marker installed at the time of the tests, so ILS assistance was nonexistent. A GCA unit *was* available, manned by highly trained operators. The operators were never worked harder than during the evaluation program, with approaches made every 6 minutes for continuous periods as long as 6 hours. The disparity in scope return size, approach speeds, and pattern sizes caused many approaches to be poorer than desired from the pilot's standpoint. To make the course more sporting, test rules required that GCA transmissions be cut off at the decision bar *(1,000 feet short of the runway threshold)* and from this point

At left is shown the complete test system (Configuration "A" and Narrow Gauge). Note in the picture to the right (visibility 1 mile) 3 pairs of roll bars cannot be seen. Tests showed that the roll bars were located too far from centerline to be seen during poor visibility.

on, no further assistance was rendered by GCA. No other equipment, other than the IVALA system, was available to aid the pilot in getting his bird safely on the runway.

The complete system was installed at Dow AFB, Maine, to insure that its evaluation would be conducted under some of the poorest weather available in the continental U.S. Although many people may think their home base would have been a better testing ground, meteorological history would prove them wrong.

The objective was to determine if an *adequate* integrated visual *approach* and *landing* aid system would permit safe recovery of all type operational aircraft under the poorest of visibility conditions, down to and including reported zero-zero. (AFR 60-16, Naval and civil regs were waived.)

Each aircraft type was programmed to make a minimum of 8 approaches and landings under visibility conditions of one-half mile or less. This is no little task, when you realize that over 50% of the visibility restriction in Maine in the winter is from snowfall. Braking action was nearly always a problem. Blowing snow and high crosswinds frequently added to the interest.

All crews were given a thorough briefing on the test objectives, the safety considerations, and on the system. Then, crews were required to accomplish 15 night GCA approaches and landings for familiarization. These were accomplished in visibilities of one mile or better. Following this, crewmembers were given a questionnaire on the description of the system.

They were now ready to start to fly for record evaluation. When all other aircraft in the area were forced to stay on the ground because of bad weather, the project crews were launched. After the familiarization flights, all crews were enthusiastic and eagerly anticipated their foul weather flights. It was the unanimous opinion of all that system familiarization enhanced pilot ability by instilling confidence. Out of the 1248 landings made in the 6-month period of evaluation, 160 pilot comments were recorded on runs in below ½ mile visibility conditions. Thirteen of these landings accomplished were in reported zero zero conditions. The landing system light pattern had to be extended during the tests as aircraft were becoming "lost" on the runway, after a safe touchdown. Pilots were seldom concerned about getting on the ground, but were concerned about getting stopped on the ice and snow covered runway.

There is no doubt about the test results. Ninety-one pilots, flying 31 types of aircraft accomplished 1248 safe, incident-free landings under all-weather conditions. They made 128 full-stop landings in less than one-half mile visibility. An interesting note is that the lightning-fast Lockheed '104 was the first aircraft type to complete the all-weather phase. Other items of interest are: of 1248 landings during the 6-month test period, there was only one aircraft diversion, a B-52, due to a series of unsatisfactory GCA approaches under weather conditions of zero and ⅛th. A C-124 from MATS accomplished 27 full-stop landings in a 6-hour period, 21 of them in below half-mile visibilities with zero to 200-foot ceilings.

The IVALA system proved to be a significant step forward in aviation. The FAA, the civil aviation industry and the military establishments expedited action to install all or the primary part of this IVALA system at airfields throughout the U.S. Instrument minimums can be lowered with safety, recoveries will be easier and diversions can be virtually eliminated.

Let's take a look at the method that can accomplish this miracle. The IVALA system consists of 3 distinct portions. First, the approach. In this sector we have what has now been accepted as our national standard and which is referred to as the Configuration A centerline approach lighting system. This configuration will eventually replace the outmoded systems in use at many airfields today. A large share of the success of the Dow tests must be given to the Configuration A system, since a good approach will do much toward insuring a good landing. The Configuration A centerline approach lighting system begins 3000 feet from, and ends at, the threshold. High intensity light bars are spaced from the 3000-foot point to the 300-foot point at 100-foot intervals, and are supplemented at each station by a condenser discharge light. At a point 200 feet from the threshold, a 50-foot bar of aviation red lights has been located and referred to as the termination bar. One hundred feet from the threshold, and located even with the extended runway edge lights, are red pre-threshold light bars, 5 lights to the bar. A standard green threshold identifies the beginning of the landing area. All lights, except those in the terminating bar and the pre-threshold lights, are aviation white.

All lights in the overrun area *(threshold to the decision bar)*, are flush mounted to prevent aircraft damage in the event of an undershoot or an overshoot.

The most unusual item in this lighting system is the condenser discharge light referred to as the "strobe beacon." These lights, flashing brilliantly in the approach zone, appear to move in sequence toward the runway threshold at a speed of nearly 4100 mph. Each lamp in the 2700-foot string flashes twice per second, is electrically sequenced, and emits a peak candlepower of 30 million for 1/5000th of a second. This brilliance, combined with the short duration, provides a nonblinding light source of an easily identifiable nature, especially under the worst weather conditions. On clear nights, these lights can be observed at distances up to 75 miles.

A primary advantage of the centerline approach lighting system is its compatibility with modern precision ap-

Here, 3800 feet of centerline lights start 200 feet past end of narrow gauge lights, providing visual reference for landing roll and taxiing.

proach methods. Transition from GCA, manual ILS and/or automatic coupler approaches can be effected with a minimum effort and interpretation. Configuration A lighting, with strobes, provides the pilot with early system recognition, adequate length for alignment corrections utilizing high performance aircraft, roll and height guidance during all stages of approach, and directional guidance to bring him in on the extended centerline of the runway.

The only wide, white light bar in the configuration identifies the 1000-foot point from the threshold, where the overrun commences, from which point all subsequent light fixtures are flush mounted. This is also the point at which the pilot will elect to land or to go around, hence the nickname "decision bar."

The strobes have enabled pilots to observe the approach lighting at distances up to *four times* that of the *reported* visibility at night, and *twice* the *reported* visibility during the daylight, resulting in early system identification and orientation. The centerline light bars are 15 feet wide and provide the roll and pitch guidance necessary to continue visually with safety.

Configuration A lighting system was the approach aid responsible for the safe recovery of the test aircraft and was reliable down to conditions of zero ceiling and 1/8-mile visibility. When worse weather conditions prevail, additional visual aid is required for a safe flare and landing. The second component of the IVALA system Narrow Gauge Touchdown Lighting provided this.

The Narrow Gauge system is 3000 feet long, and consists of two parallel rows of light bars, 60 feet apart, each placed equidistant from the runway centerline. Light bar pairs were spaced 100 feet apart longitudinally and were wired so that alternate rows could be illuminated. Testing indicated that 200-foot spacing would be adequate for future installations. The light fixtures are designed to provide the maximum visual guidance for pilots during flare and landing under adverse weather. Five light intensities are available. The fixtures are virtually flush, and are designed to withstand high impact loads without damage to fixture or aircraft. Heaters and underground drains provide a virtual all-weather operational capability.

Fixtures in each light bar are toed in toward the center line, to provide maximum intensity when properly aligned. Each fixture has a sharp horizontal cutoff characteristic. When misaligned, the pilot will note a sharp decrease in intensity of the near row of light bars.

In brief, this series of flush mounted light bar pairs provides the pilot with visual information from which he can safely flare and land the aircraft. The lights are close enough so that normal visual reference will provide excellent height and roll guidance under both poor visibility and night visual conditions.

These Narrow Gauge flush lights provided the additional data necessary to permit recovery of all aircraft when the visibility dropped below the minimum for the Configuration A alone, and were capable of recovering aircraft safely under reported zero zero weather. Again, pilot reactions were unanimously in favor of the Narrow Gauge lighting as a natural extension to the Configuration A approach lighting and as a minimum visibility landing aid. Height and roll guidance was even provided under visual night conditions which resulted in an unusually high percentage of excellent touchdowns without the assistance of landing lights. This is easily explained in that the series of light bars permits pilots to select a flare reference for night landings as they normally do during daylight conditions. Normal runway edge lighting is too far to the side for this reference.

With Configuration A approach lighting augmented by strobe lights and Narrow Gauge lighting, approaches and landings could be safely accomplished in weather conditions down to zero ceiling and 800-foot runway visual range *(the distance a high intensity light can be observed on full brightness. These conditions are often reported as zero zero)*.

An additional requirement was realized when aircraft were becoming lost on the runway after accomplishing a safe approach and touchdown. As the Narrow Gauge lighting was left behind at the 3000-foot point, high performance aircraft were still rolling in excess of 120 knots and had no directional reference. The answer was provided with the installation of 3800 feet of flush centerline lights, starting 200 feet past the end of the Narrow Gauge light complex. This system, installed during the final weeks of the evaluation, proved operationally suitable and introduced a new concept in airfield lighting by using a high frequency of low intensity lights.

That, then, is IVALA as tested at Dow AFB, Maine. It is most important that you, as a pilot, become familiar with the system as soon as possible for the following reasons:

- Installation of the complete, integrated system is already underway at several civil and military bases.
- Visual aid to all-weather aircraft recovery is desired by pilots.
- All aviation agencies accept IVALA as a major step forward in aviation progress.
- Learning the system is a prerequisite of optimum system use.
- Approach lighting, Configuration A with strobes, has been installed at 37 U.S. bases already, with more to come.

Specific recommendations extracted from the test report include:

- Lower instrument minimums where IVALA is installed.
- Lower alternate minimums where IVALA is installed.
- Permit low approaches to minimum altitude, regardless of visibility, when the completely integrated system is available, and down to reported zero and 1/4-mile visibility with Configuration A alone.
- Procure visual aid simulator attachments and require system familiarization for all Air Force pilots.
- Include IVALA in all future airfield construction in poor weather areas.

An Air Force film report titled "Operation Zero Zero" has recently been released on tests conducted at Dow, and includes photographic runs taken under visibility conditions of 1/8-mile. This film is another part of the educational program for AF pilots so they can do their part in preventing the type accident described earlier in this article. There will be no "paralysis by analysis" in time consuming studies of the report—the system tests were conclusive and positive action has been taken to make your job safer.

Don't close your eyes to the visual aid that can insure you a safe recovery under all visibility conditions! I believe, because "I've seen the light." ▲

Are you

Night flight can be "a many splendored thing." Probably every crewmember can recall moments of unusual beauty when flying over land on a clear night. The stars above and scattered lights below evoke a feeling of suspension and to describe the feeling to one who has not flown is impossible. Even weather flying at night has its moments of peace, quiet and beauty. The reflection of your navigation lights on the clouds, the low cockpit lighting—you are wrapped in solitude, a hard-to-get item nowadays.

This beauty can change to a nightmare when an emergency occurs and the crewmember is faced with abandoning the aircraft. A multitude of problems immediately face him: ejection, separation, parachute, survival kit, landing, survival. Too late he wonders if he is ready for the total problem of night bailout.

Recently, the serenity of a routine night flight was interrupted by the pilot's crisp order "Get rid of your canopies and go—Eject 3-2-1." This emergency resulted in a series of incidents which are worth repeating. The three crewmembers ejected at approximately 27,000 feet and Mach 1.0.

The pilot didn't hit the bailout switch—his hands were occupied trying to gain control of the gyrating aircraft. He yelled "bailout" a couple of times before he realized he wasn't depressing the mike button. When he did give the "hot" order, he immediately heard at least one of the stations go. He then pulled his own next o' kin handles.

The force of the ejection lowered his helmet visor as he left the aircraft. He said, "When I hit the airstream, it felt as if someone had picked me up and slammed me against a wall." He gyrated wildly after leaving the seat, describing the sensation as being similar to having weights attached to his head and feet and being whipped around with his middle as a fulcrum. He pulled his D-ring and found that the chute was already deploying. Then the quiet of the descent began.

His left arm had been broken sometime during the ejection and was completely useless to him during the entire episode. He doesn't remember placing his arms within the armrest guards. He tried to focus on distant objects below to gage his height above the ground and before he realized it he was swinging down through the treetops and landed almost gently, falling over on his right side.

His difficulties had just begun.

First, with the use of only one hand, he had real difficulty loosening his oxygen bailout hose. Next, he tried to free himself of the chute harness and found this just as frustrating. Third, with only one hand and in darkness, his search for something useful in the survival kit was futile. Fourth, during his 3-hour trek through dense woods and black oozing swamps, he bumped into trees, crashed through brush and fell over fences—and all this with a cracked vertebra and a broken arm.

The second station operator was completely unaware of the crisis and, to put it mildly, was quite surprised to hear the pilot's first order to bail out. The second time he heard it, a matter of one or two seconds, he too pulled his handles. During ejection when entering the windstream he received injury to both eyes because he did not lower his helmet visor. After leaving the seat he was thrown around somewhat, but managed to stabilize himself into a face-down, spread-eagle position. Almost immediately he began to rotate violently. Sensing a blackout he pulled his D-ring and centrifugal action ceased. He planned to release his survival kit about 1000 feet above the ground; however, thinking he was still four to five thousand feet in the air, he struck the ground. The survival kit pulled him down hard onto his buttocks and his head slammed back on the ground with a severe jolt.

Ready?

Major Kenneth W. Baumann
Bomber Branch
DFMSR

He lay still, thinking "this little man has broken every bone in his body."

He raised one arm, then the other and realized he was still in one piece. Later medical examination revealed that he too had a cracked vertebra. His helmet, retained through a supersonic bailout, had almost surely saved his life *(all crewmembers retained helmets and masks—Lombard helmets and Hardmann retention kits)*.

It was dark, real dark. He opened his survival kit and to his dismay could not find a flashlight or flare. After much effort and fumbling in the darkness, he built a fire and by its light assembled and used the emergency radio when he heard the searching helicopter. As the searchers approached, he pinpointed his location by firing the survival rifle; rescue followed very soon.

The third station crewmember was not as fortunate. He apparently initiated ejection in the regular manner but the canopy didn't jettison normally. It was subsequently unlatched and pushed off by the ejection seat, which is the backup hatch removal system. The possibility exists that the canopy malfunction delayed his ejection while he tried secondary methods of releasing the canopy.

The secondary canopy release lever on the left armrest was found in the actuated position but this lever could have been released upon ground impact. Following ejection the operator failed to separate from the seat and was killed. He was found in the ejection seat with his chest strap open. The lap belt initiator had fired, opened and automatically released the shoulder harness and crotch strap. The kit release *(banana handle)*, which separates the survival kit from man, had not been actuated; however, the survival kit D-ring attachment was open on the right side.

Examination of the survival seat revealed that the kit to seat disconnect had failed to separate. The lower half of the disconnect with a 25-inch length of oxygen line, designed to remain with the aircraft, stayed with the seat. As a result, the fitting on the disconnect end of the oxygen line caught on the aft edge of the hole in the seat pan and prevented the kit and man from separating from the seat.

Monday morning quarterbacking comes naturally to most of us and to criticize the shortcomings of others is human nature. However, several valuable lessons can be gleaned from constructive criticism of this episode.

- The emergency developed so rapidly the pilot did not activate the bailout alarm, nor was he sure—prior to his ejecting—that the other two crewmembers had understood his verbal order.
- In all probability, the major injuries received by the two surviving crewmembers could have been prevented. None of the crewmembers lowered his helmet visor prior to ejecting.
- Neither of the surviving crewmembers released the survival kit prior to landing. *(The Flight Manual states that the kit should be released at approximately 1000 feet above the terrain during parachute descent.)*
- Both surviving crewmembers landed when they thought they were still several thousand feet in the air.
- Rescue was greatly impeded because the downed crewmembers didn't have flashlights for attracting the attention of rescuers.
- The third station operator's failure to release the seat survival kit indicates lack of understanding of release mechanisms.

Bailout and survival are hazardous at best, and night time presents additional problems for crewmembers to solve. Only through indoctrination, training, drill and more drill can reflexes be so tuned that bailout procedures become automatic.

Are you ready? ▲

List

There were 16 incidents during 1959 that involved T-37 canopy losses. They resulted from inadvertent actuation of the jettison system for various reasons:

- **Failure to insert the seat pins**
- **Raising the leg guards from body movement in the cockpit**
- **Failure to insure that the canopy was fully locked**

Recommendations have been made to redesign the system and/or to provide additional protective guards. These recommendations have not been concurred in partly because of the expense involved and because of the operational losses that would be incurred during a retrofit program. Therefore students and instructors are cautioned and urged to exercise more care in moving about in the cockpit and to be more thorough in checking the canopy system during both preflight and postflight checks.

Mr. Charles R. Leurs, Accident Analysis Br., DFMSR

Recently, an interested reader of this column handed us an item which he considered as appropriate today as it was when first published a couple of years ago. It is entitled "Takeoff Accidents" and starts off with a question: Why have airplanes been "piloted" back into the ground after normal takeoffs? The following paragraph sheds some light on such accidents, particularly those occurring on dark nights.

An article in "Combat Crew" quite some time ago points to gyro errors that can result from acceleration of the aircraft. By way of explanation, the article states, "The axis of the gyro aligns itself relative to the apparent force of gravity. This force is perpendicular to the ground when no other force is applied. But when high acceleration is applied, the apparent force of gravity then shifts by an amount equal to the rate of acceleration. Thus, rapid acceleration will tilt the horizon bar, giving an indication of climb when no climb actually exists and this error will prevail as long as acceleration continues." The article further cautions that "sole reference to the attitude gyro (on takeoff) may result in flying into the ground."

When airspeed has been stabilized, as during a flaps-down climbout, the gyro will provide a reliable indication. But when the flaps are retracted and acceleration begins again, a false indication will reappear. All aircraft—jet or piston-powered, transport or interceptor—are affected in proportion to their rate of forward acceleration. The antidote is to crosscheck instruments; otherwise the plane may be flown into the ground with a nose-high indication on the attitude gyro!

Flight Safety Foundation

July 1, 1960, is the effective date of FAA's new rule to raise the floor of controlled airspace. Civil Air Regulations Amendment 60-14, "Definition of Control Areas," was adopted by the CAB in December, 1958, and originally scheduled to be effective January 1, 1960. The amendment provides additional uncontrolled airspace by raising the base of controlled airspace from 700 to 1500 feet above the surface. The significance of the additional uncontrolled airspace is in the visibility minimums of the Civil Air regs. Flight visibility of 3 miles or more is required for VFR operation in controlled airspace, while flight may be conducted VFR in uncontrolled airspace with flight visibility of one mile or more.

The days of the 31-second Mustang overhead traffic patterns are gone forever. Or, so we thought! After reviewing some of the accidents which occurred in 1959, however, apparently a few pilots (no longer with us) hadn't got the word. Seven major accidents involving jet fighters and trainers occurred as a result of pilots' losing control of the aircraft in the landing pattern during turns to either base leg or final approach. Results: eight pilots were killed and seven aircraft destroyed. The aircraft were two T-33s, three F-86D/Ls, one F-89 and one F-84F. Oddly enough, there were no Century Series fighters involved.

Five of the accidents occurred during the turn to final approach when the pilots either overshot the turn to final or had increased the angle of bank excessively to avoid overshooting it. In all cases the angle of bank was excessive for the gross weight of the aircraft and the airspeed during the turn, and all seven airplanes stalled and crashed. Five of the pilots were relatively inexperienced, with low total hours and an average of 55 hours in the model. Two, however, were well experienced and had over 750 hours in the model.

A lot has been said and written during the past few years about the need for loose patterns and flat power-on approaches for the Century Series fighters. But how about our older jet birds? Are we overlooking a fertile field for accident prevention?

At least one major command recognized the problem and has taken corrective action that produced results far better than it had dreamed of. In the spring of 1959, the Air Training Command introduced in its basic flying schools a slightly different pattern. Basically, it places the aircraft at ¾ of a mile and a minimum of 500-foot altitude from the end of the runway when completing the turn to final approach. The remainder of the approach is relatively flat and requires power. After this pattern was adopted, the undershoots, overshoots, and hard landings decreased appreciably, and there were no fatal final turns. Since ATC is the prime user of the T-Bird, in all probability this new pattern has contributed to the all-time low major accident rate of 9.4 for that aircraft during 1959.

Now we will be the first to admit that you can still stall the bird if you pull it in tight enough during the final turn no matter how far the base leg is from the end of the runway. Therefore the pitch must also be conservative enough to place the downwind leg at a reasonable distance to permit the turn to base and final without exceeding the angle of bank for your bird.

Each flight manual contains a chart listing the stall speed for angle of bank, gross weight, and speed for aircraft configuration. Every pilot should know what these speeds are, as related to degree of bank. There is absolutely no need for an extremely tight traffic pattern today, be it in a T-33, an F-86, '89, or what have you. Next time you enter the pattern, stay loose and live!

Lt. Col James W. Bradford, Fighter Branch, DFMSR

Hand signals are important when driving both ground and air vehicles. Sometimes we who fly forget hand signals which are not used very often and at critical moments our forgetfulness can result in the loss of an aircraft.

Recently a T-33 pilot on an IFR/VFR-on-top navigational flight lost his electrical system. He was fortunate enough to see another T-Bird, latched onto the wing in tight formation, and attempted to tell the pilot by sign talk that he had electrical failure and wanted to penetrate the undercast in formation. The lead T-33 pilot assumed that his newly acquired wingman had radio failure only, and was very accommodating in trying to get him safely down—except for one thing.

As the leader throttled back and popped the speed brakes the wingman overshot to the extent that he lost the lead aircraft because without electrical power, the speed brakes cannot be actuated. To make a long story short the wingman finally was forced to eject because he was without flight instruments.

Had the wingman used the proper hand signal (and had the leader understood the signal) *it is probable that the penetration could have been safely completed, and one T-33 aircraft saved.*

We have a system known as HEFOE, identified by patting the top of the head with the hand and holding up the appropriate number of fingers to denote the nature of the emergency. The procedure is as follows:

- *Hydraulic .... one finger*
- *Electrical .... two fingers*
- *Fuel .... three fingers*
- *Oxygen .... four fingers*
- *Engine .... five fingers.*

The signals should be relayed by each member of the flight (if more than two aircraft) *to make sure that each pilot receives them.*

Electrical system failure may also be indicated by the pilot clinching his fist and holding it at the top of the canopy. AF Regulation 60-15, dated 18 November 1958, lists the standard hand signals that are common to all aircraft. Each unit should place emphasis on those signals pertinent to its specific aircraft. Your responsibility then is twofold: first, know the aircraft you are operating; second, if you must talk about it with your hands, know your sign language!

Lt Col James W. Bradford, Fighter Br., DFMSR

The pilot may soon become his own radio communications and emergency GCA site. Since 1955, USAF supply has handled some 20,000 miniature, communications radio stations called the Personal Radio Set AN/URC-11. This set is a natural outgrowth of its predecessor, the AN/URC-4, which found some very effective use as intended and on occasion a variety of other uses in the Korean conflict.

The AN/URC-11 radio set is about the size of two decks of cards and it weighs 15-16 ounces. The pocket size battery carried inside the clothing weighs 2½ pounds. When combined the set gives the pilot—or a downed crewmember—a two-way radio *(voice)* communication on the international rescue frequency of 243.0 meg *(Guard Channel)* and a transmit tone position for beacon facility. The beacon mode, when using the UHF homing and DF equipment, is most effective in alerting Guard Channel listeners and providing a radio frequency signal for search aircraft to home on.

The voice mode is used most effectively for final guidance *(GCA)* of the aircraft to the crash or emergency scene by "talking the pilot down" to make the pickup. Over the years, the Air Force has learned that under emergency conditions, men on the ground can see more in the air than pilots in the air can see on the ground. Therefore, a ground-air voice facility is still a "must" in our emergency procedure profile. Under open country or rolling pastoral conditions, voice and tone ranges up to 50 miles ground-to-air can be expected. Because of radio propagation characteristics at 243 meg, however, jungle and mountainous terrain may reduce the operating range considerably.

At present the Air Force lacks an effective power supply for this communication set in the operating temperature range of +40F. to −40F. Also needed is a battery or other type of single electric power supply for operation in the temperature range of +130F. to −40F.

The Air Force is presently evaluating an "Operating System" simulator and checkout equipment for maintenance bench testing the entire series of personal radio sets AN/URC-4 *(VHF-UHF)*, AN/URC-11 *(UHF only)*, and AN/URC-14 *(VHF only)*. The purpose is to provide maintenance personnel with a more accurate and expeditious functional checkout of an entire radio set under a closed circuit situation. As yet, this specific checkout equipment has not been named.

The picture here shows the present production radio set. A continuous product improvement program is in force and with each new production contact, possible improvements are considered for inclusion in engineering changes.

Interested military personnel may obtain additional specific information about this personal radio set by referring to T. O. 12R2-2URC11-2 and -4. ▲

Mr. S. L. Stutz, Commun. & Nav. Lab, WADC.

REX Says . . .

Once in a while a report comes in which indicates that many pilots probably do not fully realize their responsibilities in connection with reporting incidents. The following account is a good case in point.

The pilot of a T-33 had just completed a climbout to 27,000 feet, 45 minutes after takeoff, when the engine flamed out. As the RPM dropped to 40 per cent the pilot placed the starting fuel switch in the manual position and hit the airstart ignition switch without getting a light. Next an automatic airstart was made and the RPM rose to 100 per cent, back to 90 per cent, then stabilized at 100 per cent again. Flight was continued to destination and en route the RPM dropped 2 or 3 degrees intermittently although fuel deicer was being used. The fuel deicer had not been used prior to takeoff and the surface temperature was well above freezing.

Maintenance personnel at destination checked the engine and replaced the low pressure fuel filter. An engine runup was then made with 80 per cent being the maximum which could be obtained. This discrepancy was carried forward to the next day since darkness was near. The following morning another crew tested the engine and got normal response. This information was entered in the forms and the aircraft was cleared for flight.

The pilot of the T-33 questioned the maintenance personnel and was told that the engine trouble was apparently a result of water being in the fuel system and that this water had cleared through the engine. This the pilot rightfully did not buy and insisted on another engine check with a base test pilot in the cockpit. Another runup was good but they both noted that the engine was idling at a bit less than 30 per cent in the normal system. Now they rechecked the idle RPM in the emergency system and the throttle was advanced for the change over to the emergency system. RPM remained at its previous setting even though the throttle was ¾ open. The engine was shut down and the main fuel control, two-way check valve and fuel pump were changed. Test flight was now OK and the aircraft accepted.

REX SAYS—*Here we have an example of thorough attention to maintenance by the pilot involved. The only trouble was that the same attention was not given to the reporting of the incident. Home base of the T-33 did not hear of the trouble until an Operational Hazard Report came in 4 days later. Two days later home base asked destination base authorities to conduct an investigation of the incident in accordance with paragraph 6k, AFR 62-14. The destination base could not do this because of the 6 day lapse between the incident and the request for investigation, for in the meantime the removed aircraft parts were placed in normal supply channels for routine inspection and overhaul. The result of all this was of course that home base made an incomplete investigation of the incident and nothing concrete could be learned. An excellent opportunity to prevent future flameouts was thus lost. Pilots should know that inflight flameouts are reportable incidents in accordance with AFR 62-14, and they should be aware that all available information must be given to the Office of Flying Safety immediately after landing. When the cause of failure in fuel system components cannot be determined, an emergency UR must be submitted so that the parts can be shipped for priority teardown inspection and repair.*

★ ★ ★

After completing a normal day's duty in their administrative positions, a pilot and a copilot were scheduled for a 2000-hour departure in a C-45 to pick up parts. A maintenance delay prevented takeoff until 0035. The aircraft landed at its first destination, after an intermediate fuel stop. The flight departed after five hours ground time and landed at another en route base at 1835. The crew took off for the next parts pickup point at 0645 the next morning and after two more en route stops departed on the final leg to the home base at 1555. Cruising altitude was 7000 feet. Forty-five minutes later the pilot declared "Mayday," stating that the aircraft had lost a propeller and that he was going to land at a CAA airfield which he estimated was 10 minutes away. The pilot was then heard to transmit that he had the field in sight and that he was down to 1900 feet altitude. Shortly after passing over the field, the aircraft commenced a left turn. In the turn the aircraft stalled, crashed and burned adjacent to the airport. The pilot was killed and the copilot was severely burned.

REX SAYS—You can't argue that had the prop not been lost, the chances are good that the mission would not have ended in an accident. But neither can you argue that the pilot used poor judgment in even

attempting the flight. The pilot and copilot had only 4 hours sleep (in a chair at the civilian air terminal) during the previous 60 hours. Even "young bucks" are in a bad state of fatigue with 4 hours sleep in 2½ days. Physically and mentally you aren't in shape to perform ground duties, much less fly and cope with an emergency. One of the reasons they had no sleep: they had been "out on the town" the night before the accident.

★ ★ ★

This past summer the VOR station at Macon, Georgia, ceased operation for approximately seven days to change frequencies from 117.9 to 110.8 mcs. However, prior to shutdown, Robins AFB issued NOTAM NR 7, dated 11 July 1959, indicating that Macon Omni Range would be off the air beginning 17 July 1959 for approximately seven days for a frequency change from 117.9 to 110.8 mcs. On 13 July 1959, Robins AFB issued NOTAM NR 9 indicating that the cut-off date for the Macon Omni Range had been changed to 27 July 1959, NOTAM NR 9 cançelled NOTAM NR 7. The same day that Macon VOR ceased operation, Turner AFB, Albany, Georgia, began operating a TVOR on Macon's former frequency, on a test basis. Almost immediately, Robins AFB operations received reports from a total of 10 incoming pilots that they had either flown, or started to fly, off course until they realized that the signal they were receiving was not Macon's.

REX SAYS—Besides being downright dangerous, it would be extremely embarrassing to find yourself at a point where you shouldn't be. It might indicate you're not the "pro" you should be. It may take 10 seconds to make a positive identification by listening to the "dit-dah's" but it might be a real important 10 seconds.

★ ★ ★

During the past two years a total of nine aircraft accident/incidents occurred when pilots attempted emergency landings on public roads and highways in various types of aircraft. As typical of most emergency situations the circumstances in each case were considerably different. This includes the type of inflight difficulties, weather conditions, and various factors concerning the road or highway used.

Four major aircraft accidents occurred when the pilots became lost and attempted a highway landing. A C-45 pilot experienced icing conditions and then became lost during an IFR letdown. He broke out of the overcast at 7000 feet and decided to land on a highway. The left main gear and left propeller struck a highway guard rail during the landing and the pilot stopped the aircraft on the highway.

A T-37 pilot became lost while on a navigational training flight and elected to land on a highway. The pilot lost control after touchdown and the aircraft crossed a ditch and struck a fence.

The pilot of a T-33 was lost after experiencing electrical failure while flying on top of an overcast. He descended through a hole in the overcast and attempted a landing on a highway in very rugged terrain. The pilot accomplished the landing after passing under some power lines that crossed the highway. About 700 feet after touchdown, the wing tips contacted embankments on both sides of the highway causing a loss of directional control and the aircraft was destroyed.

An F-86D pilot was lost and low on fuel when he crash-landed on a dirt road. After rolling 2000 feet the nose gear sheared and the aircraft veered off the road into a ditch and was destroyed. The pilot was not injured.

During this period, four other pilots attempted forced landings on highways after experiencing inflight difficulties. A C-123 pilot landed on an eastern state parkway when he ran out of gas at 8000 feet over a residential area. During the landing, the aircraft struck four lamp posts, extensively damaged three civilian cars, and slid under an overpass and ripped off portions of both wings. One civilian was killed, two civilians and one crewmember received major injuries, and one crewmember received minor injuries.

A T-33 pilot experienced an engine explosion and flameout at 35,000 feet and decided to land on a dirt road. The pilot landed gear up and slid 4500 feet on the 16-foot wide road. The aircraft received considerable damage.

Another T-33 pilot attempted a highway landing after he felt severe engine vibrations and shut down the engine at 6000 feet. Immediately after touchdown the pilot applied heavy braking action to avoid overtaking a truck, and the left tire blew out. The aircraft went off the highway, struck a fence, and received minor damage.

An F-86L pilot experienced a flameout at 5000 feet and landed on a gravel road. One civilian car was damaged during the landing. The pilot was uninjured.

A T-33 pilot with a low fuel condition landed on a road when advised that his destination weather was below IFR minimums. He had failed to provide a fuel reserve for such a contingency. The aircraft received minor wing damage.

These nine aircraft accident/incidents resulted in six destroyed or considerably damaged aircraft and three with minor damages. Other results include one civilian killed, two civilians and one crewmember with major injuries, two crewmembers with minor injuries, four civilian cars damaged, and various other property damages as indicated.

REX SAYS*—These accident/incident reports indicate many of the hazards involved in emergency landings on public roads and highways. The outstanding danger is a possible collision with vehicular traffic which would most likely result in major injuries to the aircrew members and motorists involved.*

Deadstick landings on highways are extremely hazardous because an emergency climb to avoid utility lines, vehicles, or to go-around would be impossible.

Other hazards are highway markers, bridges, shoulders, ditches, fences, and adjacent trees and utility lines.

An outstanding recommendation included in one of the cited accident reports is that pilots do not use highways as emergency landing areas unless deemed absolutely necessary as a last resort. All factors involved should first be analyzed by the pilot to insure that such an emergency landing would not be an unacceptable risk which may result in damage to public property, or injury to personnel, military or civilian. ▲

the Other Side

From the viewpoint of the manufacturer the current boom in private flying is an event to be underscored in scarlet crayon, and is met with little cries of delight by the stockholders of the various private and business aircraft industries. And who can blame anyone for chuckling as he rushes off to the bank with a fat dividend check?

That's one perspective for this rash of private airplanes in the air; there are others with equal the fervor, but here the cries are of dismay and woe. No matter how you look at it, the sky gets more crowded with every passing month, and what we believed to be congested airspace in former days will one day come to be regarded as the wide open spaces. Accompanying this explosive growth, however, there seems to be a commendable sense of heightened airspace-user responsibility on the part of the flying fraternity.

Flying safety extends far beyond the province of the commercial airlines, the highly skilled business aircraft industry, and the military. The airlines and the military constitute what amounts to flight that is "under control." It is subject to so many regulations, beyond the Civil Air Regulations, imposed by the user agencies, the airlines and the military organization, that it may truly be classified as "controlled flight." Business flying is essentially what the name implies: flying for business in a scientific and precise manner, and where safety is paramount because the user can afford the best of equipment and the best of skilled and experienced pilots.

This leaves what may be considered the "freewheeling element"—personal flying. In respect to all the others, it is the only segment of flight remaining where a man can truly haul himself off the ground and roam through the skies for the sheer heady wine of flight. For the most part this flying is also conducted in a precise manner, in modern airplanes which carry an imposing array of instrumentation.

Yet it is the full gamut of fliers in this group that at times leaves the sister branches of aviation more than a little green. Here you have behind the stick or the wheel everyone from the kid who soloed yesterday on his 16th birthday, to the grandmother at 68 who has passed her physical and, to her immense pleasure, clutches her little white slip of paper that gives her legal access to the same airspace in which she may meet a man flying a heavy supersonic fighter, the weighty C-124 or the C-133, or a commercial jet filled with no less than 120 people. This is what causes the spasmodic shuddering that many military and commercial pilots feel is an affliction commensurate with modern day flight!

Don't misconstrue this writer's attitude as being opposed to private flying. Far from it. I'm one of private aviation's most active supporters. I am a private pilot, and my capabilities remain within that category. I *like* to fly. It's important to me for personal as well as business reasons. And, like any other private pilot, I'll raise all kinds of merry hell to protect what I believe to be unjustified denial of airspace.

Unlike most of the clan, however, I've been fortunate enough to sit in the other fellow's seat. I've flown in the T-33, T-37, the TF-102A, and other military jets. I've flown the Beech MS-760 four-place business jet, and this from Teterboro Airport in New Jersey, one of the busiest flying fields in the world. I've sat up front in everything from the C-45 to the C-133, and I've spent more than a little time in commercial equipment, from the DC-3 to the '707. I've been at the controls of aircraft from the diminutive Mooney Mite to the four-engined airliner; I state this to point out that I am cognizant of the problems of the man who, when he flies, carries a greater load on his shoulders than I do in a Tri-Pacer or a Comanche, and who is responsible for the safety of many more people.

Today, legally, the man in the private airplane is guaranteed the same rights to airspace as anyone else in the bigger, faster, more powerful, more-difficult-to-fly military airplane. He has the same legal right to airspace with airplanes that will stall out at speeds much higher than his maximum. Essentially, this should be his due.

Flying in this nation rests on a solid foundation of many "little people" who saved nickels and dimes to earn their wings. Many of the outstanding pilots of WW II or Korea received their start in the fabric-covered flivver and graduated to the Jugs and Forts, and went out to win a war.

But the fountain that spills future pilots into the military and the commercial airlines does *not* stem from those organizations; the river runs strongest in the field of private flying. To attempt to stifle private flying simply because the pilot of the modern jet or other military or commercial aircraft must face the problems exploding from so great a difference in training, capability, and performance is ridiculous. And it won't happen because there is equal and legal right to the air, as—basically—there should be.

Yet there can be no denying that there exists also a crying need for a clarification of specifically serious airspace problems, and for some steps to resolve these more dangerous elements of this conflicting use of airspace. Because any attempt to restrict private flying—general aviation—in the past has usually been made on the basis of blind officialdom and blanket oppression, the private flier today screams immediately and with enormous gusto when the subject is raised of adding further controls to his use of airspace. He cannot be blamed for this attitude. As I stated before, the majority of private pilots who spend a substantial number of hours in the air annually are capable, cautious and responsible.

But what about the others? Let's set up an example with Idlewild International Airport, New York. If a spanking-new private pilot with 42 hours to his name has an old J-3 Cub with a two-way radio with the proper frequencies, he has full legal right to the use of that airport. He enjoys absolute legality—and equality—in trying to land at Idlewild, if for no other reason than that he damned well pleases to do so.

The fact that this man is unqualified to move into Idlewild airspace has nothing to do with the matter!

MARTIN CAIDIN

Pilot, writer, lecturer, and airpower exponent.

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Martin Caidin, at 32, is one of the nation's most prolific magazine and book writers, particularly on general aviation and missile topics. By the time he was 17, over 150 of his articles had been published in a variety of magazines. He has been hard at it ever since.

In addition to serving in the Merchant Marine during WW II, Mr. Caidin later served in the USAF in Intelligence and Public Information, of which two years were spent in Japan. From this tour came three of Mr. Caidin's best-known books: Zero!, The Zero Fighter, and Samurai! The last is the story of Saburo Sakai, Japan's greatest living fighter ace.

For four years after his Air Force hitch, Caidin was the Atomic Warfare Specialist with the New York State Civil Defense Commission. During this stint he wrote his first four books dealing with rockets, missiles, and space flight. He has won the James J. Streibig Memorial Trophy as the nation's outstanding aviation writer. He was formerly the Consultant to the Commander of the Air Force Missile Test Center at Cape Canaveral and Patrick Air Force Base.

Among some of his other books are: Spaceport U.S.A., Thunderbolt! and, soon to be released, The Night Hamburg Died. Mr. Caidin is a FLYING SAFETY subscriber. Welcome to our pages.

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Should there be a greater *specific-area control* of the private pilot in order to achieve greater safety because of such conflicting high-density airspace interests? As a private pilot I personally detest the application of addi-

THE OTHER SIDE OF THE FENCE (cont.)

tional controls to private flying; there are enough now to make us resent the further encroachment of officialdom. Yet in all fairness I must submit that in order to fit the private airplane into the high-density airspace demands of the future, some additional control is not only necessary—it is imperative.

Such restrictions appear to be inevitable, just as there will come the day when there will exist a federal requirement that all private aircraft be equipped with a two-way radio. Why anyone would want to chance stumbling cross-country without a two-way radio is difficult to understand, but again, this is a legal right held by any pilot under VFR conditions. A man can fly minus benefit of radio navigation, or airborne weather flashes and alerts, or of notification of any special danger that may occur while he is aloft.

It is unfortunate that the rules of common sense, self-imposed by the majority of private pilots, do not apply to all. So far there haven't been any major disasters to focus attention on these gaps where control is going to be needed. But it seems impossible to avoid the day when this will happen, and then *all* private flying will suffer, unfairly, because of a single incident that stresses the inadequacy of the pilot involved in some flaming catastrophe.

And without some imperative need for changing existing rules, it is going to be difficult, if not impossible, to get controls on the books. The military pilot who is aggravated by his own problems may find it difficult to understand this, but the private pilots as a collective body have some powerful arguments in their favor. After all, they can say, simply look at the record.

In broad daylight and under perfect visibility, two airliners *under airways control* smash into one another and kill dozens of people. A military transport and a commercial airliner at night, under conditions of excellent visibility, collide, and are destroyed. In absolutely clear air, an F-100 smashes into a commercial airliner. Another commercial airliner, flying on IFR, collides with a T-33, and all passengers are killed.

In some instances, it is the military pilot who is the violator. One example will suffice, and this is personal experience. Many times I have entered the traffic pattern for Melbourne Airport which, although a private-commercial field in the vicinity of Patrick Air Force Base, lacks tower control. With as many as three or four aircraft in the pattern, the pilots would be forced to scatter wildly as a C-124 roared directly across the field at an altitude of 600 to 1000 feet, bulling right through the pattern in direct violation of half a dozen Civil Air Regulations. The Globemaster was on a long final for Patrick AFB, and the pilot chose the most expeditious route to the runway, his gross neglect of the rights of other aircraft notwithstanding. This remained a potentially fatal habit until the anguished screams of the protesting pilots in the area—who stayed clear of the military field—resulted in corrective action. I bring this incident to light only to stress that there are two sides to the fence.

Yet there have been virtually no collisions between the private airplane and the large commercial airliner. The fact that we have managed so far to avoid a rash of disasters is *not* due to the safety inherent in the present situation; it's because a lot of people are flying hard by their eyeballs. Most of us are so scared silly of the mid-air collision that extreme caution is exercised.

This is strictly a stopgap expedient. Pilots will always have to fly with plenty of eyeball movement, but in the next several years things are going to get even stickier than they are now for the military pilot. He is already sorely overburdened by the need to have six arms and four legs during his approach in a machine that barrels in at 200 plus to stay above critical minimum speeds.

As a private pilot I do *not* overly like regulations, and I howl as loudly as anyone else at regimentation. But I have also been in the TF-102A that sets down at 170 knots, when the pilot at my left was descending in IFR conditions, and then marginal weather, concentrating on his initial approach in the terminal area, when that area was crowded with other non-controlled traffic.

We never saw the first airplane. I heard the words snap out from radar control about a target right in front of us and a sharp "*Break right!*" The captain hauled the '102 out of the way, and a Bonanza sailed by, the pilot blissfully unaware of our presence. The second airplane—an old Cub waltzing along at perhaps 80 mph—I saw, and called him out. We passed behind him.

Now the point is, how often will the laws of chance tolerate a situation of this nature, repeated thousands of times, until we have those big, black headlines? Is the answer to this situation a safety airspace zone around these military fields? More than a few people who have every right to be regarded as competent authorities think the answer might be yes.

But—and this is a very loud and valid but—will such regulation be carried out as it was so often in the past? Heavy-handed, one-sided, and without equal representation for all the flying elements involved?

Somewhere along the line there must be an agency—and perhaps it will be the FAA—that must plan for that tomorrow when we double and perhaps even triple the number of private and business airplanes in the sky, and watch our problems mushroom. As the years pass and we witness this influx into the air of many thousands more airplanes, we will either have some system of additional control which reconciles the divergent needs of the military, the commercial carrier, and general aviation—*on an equitable basis*—or there must one day come the crippling "crash legislation" exploding from disasters that can only be inevitable.

Speaking now as a private pilot, I would be more than willing to give something away in respect to where I can fly, as regards terminal areas, because this control, *if* equitable, also affords me greater safety. If this means edging around military fields where a B-52 in marginal weather needs a 30-mile IFR approach, then a "forbidden zone" of 20 or 30 miles around that field, extending several thousand feet above immediate terrain, isn't going to cause me that much difficulty.

I know many other pilots who share my feelings on the matter. It's not at all easy to resolve, however, because what the hell do you do in those areas where the civilian fields have been around for years, and both military and civilian must barrel through the same airspace to reach their respective fields?

If you ever want to get some grey hair while you're still on the ground, come out to Zahns Airport on Long Island, not too far east of Mitchel Air Force Base. Right across Highway 109, which separates the two fields, is Republic's field. From this latter airport, test pilots take out the F-105, and the traffic patterns of the two fields are as close to scraping as you can possibly get.

At Zahns, which is regarded as the busiest private airport in the world, you can in a single glance take in anywhere from 6 to 18 aircraft in the pattern, including everything from weaving Cubs to sightseers in Tri-Pacers, to T-6s and Mallards and Comanches, Bonanzas, L-19s, DC-3s and the like.

There is no radio control at Zahns (only Unicom). There is no tower. It's all done by staying in the pattern *(although it gets awfully ragged at times)*, while a few hundred yards away, and sometimes only a few hundred feet from the weaving line of Cubs, an F-105 screams out with its afterburner blazing, bellowing thunder across the fields. The two airports use opposite traffic patterns. If Zahns has a right-hand pattern, then the big Thunderchiefs whistle in to the left. When the wind shifts they reverse roles, coordinating by telephone, between the Zahns office and the Republic tower.

And there has never been a single accident resulting from this amazing proximity! By some miracle these people have recognized their problem; they live with it and apparently they have resolved differences to live together in peace.

In this same general area you have the traffic for Idlewild, LaGuardia, Newark and Westchester. Nestled in the lap of LaGuardia is Flushing, a private field. There's Mitchel AFB and Floyd Bennett NAS. There's Grumman at Bethpage and at Peconic, where the '707s practice. There's Deer Park and Mastic and East Hampton and Montauk and Suffolk AFB and MacArthur, and all those dozens of fields in neighboring Westchester County, Connecticut, and New Jersey, and I've never heard of a mid-air collision in this vast airspace *except among the light planes.*

Going by the record, then, the danger of collision appears to be more fear than fact. The record, unhappily, doesn't tell all. It doesn't record all the near-misses, the heart-stopping moments, the sudden frantic maneuvers. In the LaGuardia and Idlewild areas, new and better radar equipment assures more safety than has ever been possible. But this is only in the terminal areas. Everywhere else the students and other pilots who soar from 1000 on up to 10,000 feet do so in the midst of descending and climbing military aircraft and airliners.

What about that congestion—airspace congestion that is valid from the viewpoint of the military pilot who is burdened with all his problems on that IFR approach in marginal weather when the light planes are flying, and full radar scanning isn't available?

Right now, and speaking from both sides of the cockpit, you cannot beat the eyeball. There just isn't anything else that can replace it; *there isn't any other assurance under present conditions of avoiding a possible mid-air collision.*

Unless you are guaranteed an inviolate airspace that is scanned constantly and with complete effectiveness by height-distance-speed-course radar, the eyeball is the only safe protection.

The bulk of competent private pilots in this country will argue with damning logic, however, that in marginal weather it is impossible to assure that a large number of aircraft—military, civilian or commercial—will be guaranteed to avoid a specific block of airspace. It is the military contention that the untrammeled use of approach and landing airspace in marginal weather makes it impossible for the pilot of the high-performance aircraft on his descent and approach to assure the safety of his own and other machines in respect to mid-air collision.

No one argues that point. The gist of the problem is that, supposing such a block of restricted airspace were created, what assurance does the military pilot have that one or more private airplanes, flown by inexperienced pilots in weather marginal but legal for flight, won't blunder into the restricted area?

Absolutely *none.* Under this system there never can be a guarantee of uncluttered airspace, restricted or otherwise. Stringent laws to punish the erring flier, even if he could be identified, won't undo the results of any collision. Therefore, even were the restricted airspace created, one could argue, the military pilot must still revert to the limited effectiveness of eyeball vision, and then hope for the more coveted element of complete, blanketing radar surveillance and control.

Perhaps the most vociferous argument raised from the other side of the fence—that of the private pilot—is that the existence of this block of airspace does not guarantee *him* any safety from the military aircraft that does not remain within the airspace. And since the yielding of this airspace is, to him, a one-sided affair, he will resist wildly any attempts to usurp his freedom.

Impasse.

Is maximum radar surveillance, in respect to height, speed, course, and distance possible? Because of low altitudes flown and ground clutter on the scopes, must every airplane be equipped with a radar transponder to assure clear scope acquisition, so that the military *(and commercial pilot as well)* is assured that he will be spared a mid-air collision?

The point that must be emphasized is that some measure must be taken *now* to study this affair and to anticipate that moment when things may reach out beyond our control. But one premise must, I believe, be accepted now. Despite the bad taste it may leave, private and business flying must inevitably suffer some extended restriction in terminal areas.

It may be distasteful to the individual with his small airplane—and I admit quickly enough that it is—but it is also impossible to avoid in the face of multiplying airspace users. And from this one pilot's viewpoint, I would rather see any future restrictions come about on the basis of careful and planned study in which the private pilots, through their representatives such as the AOPA, can have their full say in the matter, thereby assuring that what must be done comes about solely on the basis of the reconciliation of all the needs of flying, and of all its elements. ▲

"SNOWBALL"

Capt. John W. MacDonald, 3908th Strategic Standardization Group (SAC), Barksdale AFB, La.

This is the story of how "snowballing" events came close to killing four men in one of those unexplainable accidents which happen from time to time. It all started when the evaluator walked out to Teacup 64, a B-47 at March AFB, California, and announced to the aircraft commander that his crew had been chosen for a no-notice check. Naturally, the AC was a bit nervous, but he conducted the preflight inspection normally with the assistance of the substitute copilot. They were a little rushed though because the evaluator requested that they not divide the external inspection, as is usually done.

Things proceeded normally until, on the takeoff roll at about 74 knots, the AC noticed that the oil pressure on No. 4 engine had dropped radically. He aborted the takeoff immediately, using approved procedures, and everything was fine, except that the brake chute didn't blossom.

After taxiing back, and while the mechanics were working on the engine, the flight crew went to look at the chute, to see why it hadn't blossomed. They found the chute risers stowed tightly in the pack; this, they felt, in combination with the low airspeed, was responsible for the non-deployment. A blown fuse had put the No. 4 oil gage out of commission. Mechanics replaced the fuse, and the bird was ready to go again.

Just 2 hours and 55 minutes after the scheduled takeoff time, the plane was finally airborne. All indications were normal until power was reduced for the climb, when the AC found that the No. 4 oil pressure gage had frozen during takeoff. Once again he had no pressure indication. After level off at altitude the AC decided to shut down No. 4 engine as a precautionary measure. This was fine, except that he put No. 5 throttle to CUTOFF, and then pulled No. 4 Fire Shutoff Switch. Both No. 4 and 5 stopped churning. In a minute or so he realized what he had done and restarted No. 5. Not a very good start—wrong engine shut down on an evaluation ride.

He was scheduled for a night heavyweight refueling with a KC-135, but after trying for 10 or 15 minutes to catch up with the tanker, pulling full power on the five remaining engines, he called to ask the tanker to descend. They were unable to accommodate, because of restrictions in their clearance, so the refueling was called off.

The crew went on to fly their planned night celestial pressure pattern navigation leg. When they got back over March, their wing control room called with the cheerful word that they would have to divert to Davis-Monthan AFB, Arizona, because of fog and low visibility at home base.

The evaluator got in the back seat to grade the penetration and landing at Davis-Monthan. Although the AC handled the plane fairly well, he didn't pace himself properly, and so failed to get his flaps down until he was on final approach. As a consequence, his airspeed was high all the way down the GCA final, but a safe landing was made.

Next came the hassle of trying to find beds in the Transient Quarters at five-thirty in the morning. It was about six-thirty before the crew got to bed—just when everyone else was getting up. At eleven they got up again, unable to sleep any longer. Wing policy required a minimum of 12 hours on the ground, so that was all the AC planned to take. The plane was fixed, so Maintenance said, and there was nothing to delay the return flight. The evaluator told the crew that the evaluation was over—on the way home he was just a passenger.

The takeoff, 12 hours and 10 minutes after landing, was normal, but once again, on climbout, the No. 4 oil pressure gage was inoperative. This time, with his recent practice, the AC shut down No. 4 engine without a hitch and proceeded on towards home. Because the plane was too heavy to land when the home station was reached, the AC entered the holding pattern over Thermal VOR to burn off fuel before the descent. At this time the weather at March AFB was about 2300-foot broken, 3000-foot overcast with 3 miles visibility, and tops reported at about 6500 feet MSL.

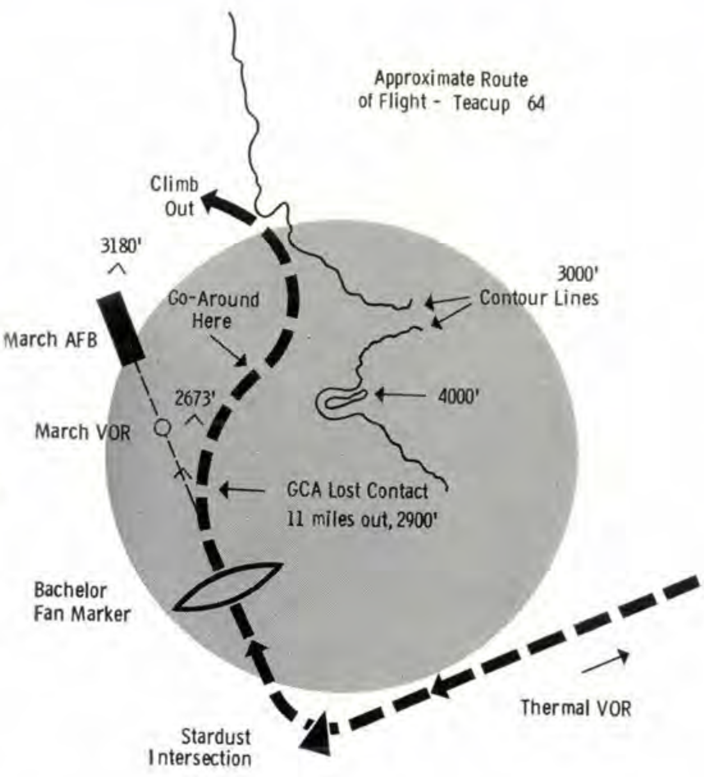
After two or three circuits of the pattern the crew heard a "clunk" and discovered that the two outriggers had dropped to the down and locked position. No switches or levers had been touched! The landing gear handle was put to the UP position and the outriggers came up just like they were meant to. But then the gear handle was put to OFF, and "clunk" again—once more they dropped down and locked. Wing control was notified of the problem and, after consulting with the Boeing Tech Rep, they recommended that, after putting all the gear down for the penetration, the copilot pull the outrigger circuit breakers to insure that the gear would stay down for the landing.

March Approach Control had given Teacup 64 an expected approach clearance time of 1818, which the AC hit right on the nose. He called over the Thermal omni fix and received a "Roger," which he interpreted as his clearance for the penetration. Radio reception was a bit garbled at times because of interference from San Diego Approach Control; another station on the same channel didn't help.

Unfortunately, Approach Control had merely acknowledged 64's call and had not given clearance for the approach. The AC discovered this when he called in three minutes later, starting his descent, and was told he hadn't been cleared. He had to turn around and go back to Thermal. He was cleared for penetration 13 minutes later.

The run from Thermal VOR to Bachelor fan marker was fairly good. Since it was nighttime, the anticollision lights were on. When the plane reached the fan marker it entered the clouds and things began to happen.

RAPCON had picked up the plane in the penetration turn and was giving instructions for the approach. The AC had been cleared to descend to 3700 feet after passing the fan marker. As he passed through 3200 the copilot asked him what he was doing. He replied that he understood that he had been cleared down to 3200, but he continued his descent to 2900. By this time both the navi-



gator and the copilot were calling him on interphone, advising him that he was too low. The evaluator, down in the aisle, couldn't get a word in edgewise so he just sat and waited. GCA was instructing the AC to turn *left* to get back on track, but he began turning *right*, and told the copilot he was turning correctly.

At 11 miles GCA advised that they had lost radar contact, but they were too busy in the cockpit for any reply. The copilot, getting no response to his advice, and realizing that the situation was not normal, tried to help the AC on the controls, but with no results. Shortly after this, the copilot took the bull by the horns and initiated a go-around. He put the power on all five engines to 100 per cent, raised the gear—the outriggers didn't come up; the circuit breakers were out, remember?—and eased the flaps up to 50 per cent to cut down on the drag.

The navigator's comment about this time was, "Pull up, Ace, all I can see on the scope is mountains."

Finally, the AC realized that something was not right and a go-around was in order. He jerked back on the wheel, hard, and with the change in attitude the airspeed went to "best flare speed" minus 6 knots—on the infamous "back side of the power curve."

Things were pretty critical by now—4 minutes flying time from the 11-mile point, at an altitude of 2850 MSL with a gradual turn to 75 degrees right of the inbound bearing. A look at a map of the area around March AFB will show that by this time or shortly after, Teacup 64 should have been spread over the California countryside—but it wasn't. The plane gradually staggered back up through the cloud layer in a slow turn to the left until it broke into the clear on top.

A thoroughly "shook" AC and crew diverted to George AFB where the sky was clear and visibility excellent. For this landing the evaluator got into the back seat as a precautionary measure, although the AC brought it in.

Except for the very important fact that the B-47 did not crash, this would have been one of those unexplainable accidents. An investigator's report would have read: "A senior crew commanded by a man with over 3000 hours—who had passed an instrument check three months earlier with no grade lower than S-3—had, for no apparent reason, gotten lost on an instrument approach and crashed 13 miles east of March AFB just below the 3000-foot contour line."

What caused this almost-accident? The primary cause seems to have been severe and incapacitating vertigo, which not only prevented the AC from flying good instruments and following GCA instructions, but which also kept him from understanding or believing the other crewmembers.

Contributing causes? Many, and some are listed below, in a more or less chronological order.

- Checkitis—a strange copilot, and an evaluator grading the mission.
- Aborted initial takeoff, with subsequent three-hour delay.
- Engine shutdown in flight, with the evaluator watching him shut down the wrong engine.
- Aborted inflight refueling—more points lost with his squadron.
- Eight-hour night mission, landing at an unfamiliar field.
- Crew rest—possibly 4 hours sleep during 12 hours on the ground.
- Engine shutdown on the return flight—same one, same reason.
- Outrigger gear malfunction — one more thing to worry about.
- Interference from other stations on the radio, leading to:
- Misunderstanding of approach clearance time, and consequent delay.
- Checkitis again—although the evaluator wasn't grading this flight.
- Anticollision lights on while penetrating clouds—this alone has caused fatal accidents before.
- Farsightedness—not bad, but a little more strain.
- Vertigo and instrument fixation.

No one of these things is serious in itself, but the sum total came close to killing four men.

What can be done to avoid situations like this? Not too much—you can't practice not having vertigo. You can try to stay alert to it, though, and be ready to call for help or even give the plane to the copilot, if you get vertigo. Copilots can be extra alert, monitoring the letdown and approach.

Forget about rank, experience, pride or anything like that if the man on the controls begins doing something out of the ordinary that is clearly dangerous. First, ask him what he's doing; next, complain loudly if he keeps on doing it; and finally, take the controls if necessary.

You are in that plane just as much as he is, so if you can save him you'll save yourself too. The old proverb, "Better to be safe than sorry" still applies. ▲

According to Mr. Brown and Mr. Moulton, Lockheed now has . . .

THE BEST SEAT IN THE HOUSE

R. J. Brown, F-104 Assistant Project Engineer
R. H. Moulton, F-104 Escape Systems Engineer

The Starfighter now possesses a new, improved escape system that can toss a pilot "sky high" for a safe ejection while the plane is still hurtling down the runway. Designated the C-2 seat, it incorporates rocket-catapult devices and techniques that were not available when the F-104, with its downward-ejection seat, was first introduced.

The development of new devices and techniques made it possible to give F-104 pilots the additional safety factor of escape at zero altitude. The seat was designed, built, and sled-tested to the satisfaction of Lockheed and the Air Force. Conclusive proof of its efficient design, however, was not available until last October, when an Air Force pilot became the first to eject upward successfully from the Starfighter.

The C-2 seat, currently being retrofitted into F-104A/C aircraft—and to be retrofitted in all F-104B/D two-place, trainer types—is an upward ejecting, rocket propelled, advanced version of the C-1 downward seat. To accomplish this change, desirable features of the C-1 seat were retained and additional improvements made.

The most significant improvement to the seat is its on-the-deck escape capability. The XM-10 rocket catapult makes this possible, giving the advantage of extra height and greatly reducing the G forces of the standard catapult. This is because the rocket acts as a sustainer after initial vertical acceleration is applied during catapult stroke of the unit. The next most significant improvement is the incorporation of a separation device that forcibly ejects the pilot from the seat one second after it has been catapulted from the aircraft.

On the C-2 seat, back-up initiators in all pyrotechnic circuits provide the highest degree of reliability. In effect, the initiators give duplicate pyrotechnic circuits to all vital seat functions. Lockheed's study included static firings of the seat assembly and a program of sled ejections for both the single- and two-place '104. During early phases of the test program, failure of the test dummy to separate from the seat pointed up the need for a positive seat separation device.

Experience with other escape systems had not shown such a requirement because of the erratic and sometimes violent pitch, yaw, and roll moments of the ejection seat that forced the crewmember's separation.

Introduction of the rocket catapult unit to the C-2 seat changed this performance drastically. It provided the seat with such smooth separation from the rails in the cockpit —almost as though they were extended several yards above the fuselage—that the seat appeared to be almost stable except for yaw moments which acted on the seat near the end of the period of rocket burning.

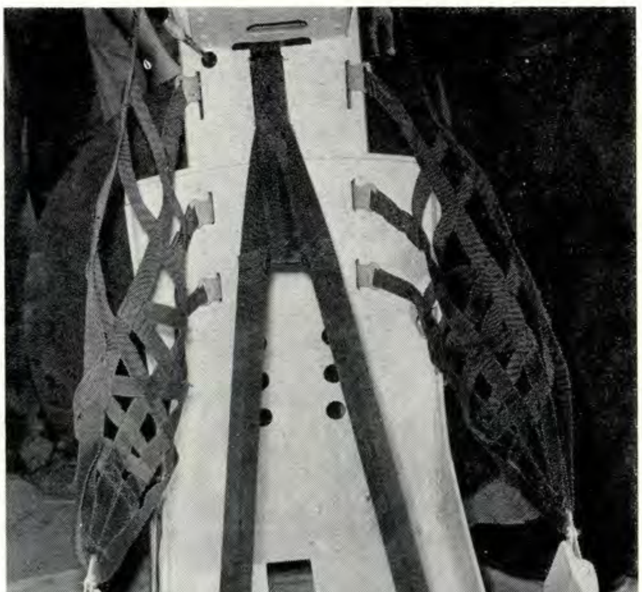
It soon became apparent that precisely controlled and timed seat-man separation was a mandatory requirement of on-the-deck escape systems. Photographic records and instrumentation data showed the lap belt and all other pilot retention units releasing the dummy as programmed, yet the seat and dummy remained in proximity until ground contact. Another consideration was that a crewmember might even subconsciously retain his grip on the seat after being released.

As recently as November 18, 1959, the Air Force Times published an article entitled "Impulse to Cling to Ejection Seat Eyed as Cause of Bailout Death." The story reported fatalities caused by crewmembers failing to release their grip on the seat after ejection. An F-86 pilot, unhurt despite a fairly low bailout *(2500 feet)*, reported "I wondered if the chute had opened. I looked and saw that I was still gripping the ejection seat handles. When I released my grip, I immediately separated from the seat."

To solve this problem of providing separation after ejection, drogue chutes automatically deployed in proper sequence were considered. This solution was discarded because of a chute's dependence on air drag to guarantee separation, which would impose a definite low velocity limit on any system utilizing drogue chutes. Also, at high speeds the forces became excessive and dangerous.

Expanding bags were considered and actually tested, but were found unreliable. They were vulnerable to service damage, and deficient because of the limited stroke they provided. Then it was determined that a strap or sling arrangement, wound on a reel to automatically separate the pilot from the seat, offered the greatest degree of reliability. Such an arrangement could cover the range of velocities required for this escape system and even provide protection well below the minimum guarantee of 120 knots, and at runway altitudes.

Upper left. The dummy is in the position of a pilot anchored to the seat by G forces and wind pressure after ejection. Upper photo. The power of the butt snapper is graphically illustrated by the distance it throws the dummy from seat. Below. Close-up of seat's features.



Ground tests conducted on the separation device showed great promise. The first sled demonstration was conducted 23 December 1958, at Edwards AFB. A near-perfect recovery from a 120-knot zero altitude sled run resulted, the dummy descending vertically with complete parachute deployment. The dummy was intact. The zero time parachute lanyard was hooked up on this sled run and films later revealed momentary snagging of the pilot chute around the seat leg-guard member. Subsequent investigation to eliminate this deficiency resulted in sled-testing the configuration with the zero lanyard deleted and the timer hooked up and set at one second. Because of trajectory heights attainable with the XM-10 rocket catapult and the positive separation of the dummy and seat after ejection, this configuration demonstrated complete recovery at ground level, 300 knots EAS.

One of the most valuable features of the C-2 seat system, which contributes to its consistent ejection performance, is the Lockheed-conceived foot retraction and retention system. The occupant's feet are drawn up to the foot rests on the forward face of the seat bucket and locked, thus achieving the smallest possible frontal area of the crewmember. This reduces the total drag and pitching moment of the seat-man package, and protects the occupant during the decelerations following high-speed bailout.

Cables that retain the feet in this position are severed by cartridge-actuated guillotines on the same ballistic circuit as the automatic lap-belt release. These two items separate one second after ejection by automatic firing of the system's initiator. A two-second back-up initiator fires into the opposite side of the guillotine device by the follow-through pull of the ejection D-ring, providing double safety.

In all recent tests conducted on the '104B and D two-place aircraft, the B-5 personal parachute and F-1B timer system have been used. During a 300-knot sled run conducted at Hurricane Mesa, Utah, a photo sequence was taken which showed the F-1B timer operating perfectly at a one-second delay.

Both dummies were ejected in this test with a one-second interval between ejections. Both were recovered intact. It was evident from the photographs that even at this velocity the trajectory height obtained was sufficient for full parachute deployment. One sequence showed a plume of vapors escaping from the headrest area on the seat. This proved that the separation device was operating against the dampening oil cushion in the unit.

The same sequence revealed clearly that the dummy's feet had been separated from the footrests. One second later the F-1B timer released the dummy's parachute. More than adequate separation of the dummy and the seat at the time of parachute deployment was illustrated.

Although the C-2 seat is not equipped with stabilizing surfaces, installation design of the rocket unit has provided the seat with the best possible performance. At zero velocity, the XM-10 rocket catapult propels the seat to heights of 230 feet. This height capability decays with vehicle velocity because of the inherent negative lift of the ejection package.

However, the system gives ample height for safe ejection at runway altitudes and has been demonstrated with perfect recovery during sled tests from 101 through 300 knots EAS. The seat in the upper end of the velocity range has been ejected at 420, 550 and 670 knots. At 670 knots, however, structural integrity was the only requirement to be demonstrated.

This test, conducted at Edwards AFB, established the structural integrity of the seat and demonstrated that its trajectory would more than clear the aircraft's tail at this velocity. Tests at 670 knots are underway at Hurricane Mesa on the F-104 two-place airplane track sled.

Another feature of the C-2 seat is the automatically erected leg guard which prevents a pilot's knees from spreading due to strong windblast. The guards keep the knees contained within the lateral limits of these two supports. Arm net webbing attached to the upper end of the leg guards is deployed from stowage clips at the sides of the seat bucket when the leg guards are erected. A shoulder harness reel lock is also actuated by the motion of the leg guards. Force to accomplish these deployments is supplied by a ballistic thruster unit.

Ejection operation of the C-2 seat is initiated by the single motion of pulling the control D-ring located on the forward edge of the bucket lip. Actuating this handle jettisons the canopy and initiates the pre-ejection portion of the system, which is completed in 3/10 of a second. Then the rocket catapult is fired!

G forces of the XM-10 catapult have been recorded on all test firings and have not exceeded 14G. As the pilot is ejected the seat automatically disconnects and actuates his oxygen system. The seat is equipped with provisions for diluter demand oxygen or high altitude equipment. The global survival kit oxygen hookup is used when high altitude—above 42,000—operations are being conducted. The C-2 seat is equipped with a Phase IV, hard box automatic survival kit.

This kit, developed with the aid of WADC and various vendors with experience in development and operation of survival kit components, includes the latest automatic equipment. For example, there is improved disconnect hardware, automatic life raft inflation, high pressure emergency oxygen bottles with a 15-minute duration, and a Firewell regulator suitable for use with a partial pressure suit above 42,000 feet. The oxygen equipment compartment is inclosed by a hinged top-back panel to provide quick removal and replacement of oxygen components. The hinged panel includes a separate access door so that the bottles can be filled without removing the kit from the seat.

There has been one live ejection of the C-2 seat. On 28 October 1959, Captain Robert Brockman, on a flight out of George Air Force Base, California, encountered an emergency situation in an F-104C. Here is a partial statement describing his ejection:

"I leaned as far back as I could, pulling my feet in, and held the stick with my right hand while I pulled the ejection ring with my left. This was at 4000 feet, or about 1500 feet above the ground. After a slight hesitation — which seemed quite lengthy — I was blown clear. I was blacked out but felt as though I was tumbling very fast. I felt a hard jolt and then I was dangling in the chute. I was facing the aircraft and saw it fly for about 2 seconds before striking the ground and exploding. I heard the explosion and then looked at the ground. I floated for a short time and then struck the ground. Two men saw the aircraft hit, then saw me floating by — almost on top of them. They helped me with my chute and took me to a farm."

Captain Brockman was examined, X-rayed, and returned to flying status almost immediately. However, a persistent pain in the area between the shoulder blades precipitated a very careful re-evaluation of his spinal X-rays, revealing a 2 mm. compression of the anterior portion of the seventh thoracic vertebra. There was no lateral asymmetry. As a result, Captain Brockman was temporarily removed from flying status and bed rest prescribed. No body cast was required. He is expected to fly again soon.

The reason for Captain Brockman's injury probably lies in the fact that he was looking down at the D-ring when the rocket catapult fired. As a result, his upper spine was in a poor position to withstand the 12G vertical acceleration force produced by the weight of his head. After pulling the D-ring, less than half a second will elapse before the rocket-catapult fires. Brief as this time interval is, it is long enough for a pilot to question and glance down to see if the D-ring has been fully pulled. This tendency should be avoided.

Modifying the F-104A, B, C, and D to the C-2 upward system, the standard side-hinged, manually operated canopy for normal entrance and exit is being retained. However, the canopy system has been altered so that during jettisoning the left-hand hinge member is released from the left sill as the right-hand hold-down hooks release the canopy from the right sill. This allows the canopy to rotate freely about an aft floating hinge member mounted on the seat track support structure.

The emergency jettison system is operated completely by pyrotechnic devices. They unlatch and apply a rotational movement to the canopy by striking energy absorbing pads mounted on the front brow ring with telescoping piston devices. This part of the C-2 upward system operated flawlessly during all F-104A and C sled runs, including zero ejection of the canopy during simulated ground emergency operation. Air loads on the canopy, while the aircraft is flying, assist in the jettisoning operation because of lift forces at work as velocity increases. Development work on this system for the F-104B and D is almost completed.

Lockheed is constantly endeavoring to keep in advance of the state of the art in escape-system design. Although our C-2 upward seat is considered to be a major improvement, we do not claim it to be the answer in every special emergency situation that may be encountered. However, low-level low-speed and moderate-speed escape capabilities up to approximately 600 knots definitely have been improved with the C-2 seat system beyond any escape system designed to date. ▲

WELL DONE

CAPTAIN *LANGDON D.* HARRISON

AF Missile Development Center ARDC
Holloman AFB, New Mexico

Captain Harrison made a normal start, taxi, and takeoff in his B-57 for a scheduled test hop. He checked the aircraft over thoroughly and completed the mission, noting only minor discrepancies until the aircraft was in the traffic pattern for landing. Then, when he attempted to lower the gear, it would not come down.

He left the pattern and attempted to lower the gear again. At this time the hydraulic pressure was zero. He used the emergency gear lowering procedure but when the emergency lanyard was pulled, the handle came off in his hand. This left him with no means of getting the gear down.

The Mission Section was contacted on the radio and all available information was researched, to no avail. The B-57 units at Biggs AFB, Texas, and Kirtland AFB, New Mexico, were contacted for possible solutions. Martin Aircraft Co., in Baltimore, Maryland, was consulted. None of them could offer any advice.

Finally, Captain Harrison decided to attempt to reach the extension lanyard by chopping a hole in the instrument panel. With the aircraft fire axe, passed to him by the crew chief in the rear seat, he made a hole in the panel and managed to get the lanyard in his hand. Holding the lanyard fully extended, he pumped the gear down, using approximately 500 cycles of the hand pump. But when the main gear indicated down and locked, the nose gear showed unsafe.

By this time the runway had been foamed. Since he was low on fuel, Captain Harrison decided to land. His approach and touchdown were smooth. After contacting the foam, the aircraft was brought to a stop without damage and without collapse of the nose gear.

Although the emergency was over, Captain Harrison still had troubles; he could not open the canopy. In short order, however, he and the crew chief were able to get out when maintenance personnel crimped the leaking hydraulic line in the bomb bay and pumped the canopy open.

In his handling of this emergency, Captain Harrison not only displayed exceptional flying skill but a thoroughly professional and superior knowledge of his aircraft. These attributes enabled him to save an expensive machine and prevent a serious accident. Well Done! Captain Harrison. ▲

Get off.... Get off..

LCdr. H. E. Johns, USN, Liaison Officer

Last summer one of our Air Force pilots wrote us quite a dissertation—accompanied by recommendations—concerning the careless use of Guard Channel 243.0. It warranted space in the Crossfeed section of the July 1959 issue. On page 1 of the September issue appears evidence that our pilot's letter was read by personnel of the U. S. Coast Guard, of the 11th District, Calif.

Now, a Navy Liaison Officer with the Search and Rescue Section of the 5th Coast Guard District, Norfolk, Va., writes about the action taken by that organization in its effort to reduce the number of non-emergency transmissions on 243.0 and 121.5 mcs. This pertinent information is important to everyone using Guard Channel.

As a Navy Liaison Officer with the SAR Section of the Fifth Coast Guard District *(Norfolk Search)*, I should like to mention the action taken by this organization in attempting to reduce the number of non-emergency transmissions on 243.0 and 121.5 mcs. For the past year we have been publishing reports about the misuse of the Guard Channel and distributing them to all local commands as well as SAR organizations throughout the United States. This publication is called the Monthly Summary of Aircraft SAR Incidents. The offender's command or agency is sent a copy of the summary in the hope that this *(no-teeth)* type report will encourage these commands to re-emphasize to their pilots the importance of the proper use of Guard Channel. We can not say as yet that the system is effective since misuse continues.

One point that should be brought to light is the *interpretation of emergency*. It is felt that many misuses on Guard Channel are caused by a misinterpretation of what constitutes an emergency, particularly by those agencies or facilities of the Federal Aviation Agency.

This misunderstanding of what constitutes an emergency may be traced back, in part, to the radiotelephone procedures in the "Radiotelephone Procedures and Techniques" section, Flight Information Manual, Volume 12, 1958. On page 13 of the publication under the paragraph "Use of Emergency Frequencies," 121.5 and 243.0 mcs, is a definition of what constitutes an emergency, as far as the FAA is concerned. It is believed that this interpretation is in error. For the information of your readers, the paragraph in question is quoted:

"Use of Emergency Frequencies 121.5 and 243.0 mc. The emergency frequencies 121.5 and 243.0 mc are available to provide clear channels between aircraft in distress or conditions of emergency and ground stations. They are not assigned/licensed to aircraft unless there are also assigned/licensed and available for use other frequencies to accommodate the normal communications needs of the aircraft. The term "emergency" is interpreted as not to be confined to the condition of the aircraft but also to be applicable to the provision of adequate communication such as initiation of call-up when the proper frequency is not known or available or when radio equipment failure prevents the use of regularly assigned channels.

"The emergency channels are available for:

1. *Communication between aircraft in distress or condition of emergency and ground stations, also between aircraft under these circumstances.*

2. *Search and rescue operations to provide common VHF and UHF communications channels between aircraft and surface stations, as well as aircraft to aircraft. (121.6 mc is assigned for use between aircraft and ground vehicles engaged in search and rescue operations.)*

3. *Emergency direction-finding purposes.*

4. *VHF and UHF air-ground communications between aircraft and surface stations when service on other VHF and UHF channels is not available.*

(a) *The frequencies 121.5 mc and 243.0 mc may be used to provide air-ground-air communications when equipment failure prevents the use of other regularly assigned channels.*

(b) *The frequencies 121.5 mc and 243.0 mc may be used to make an initial call requesting information re-*

..Get off....Get off

Fifth Coast Guard District, Norfolk, Virginia

garding the frequencies available for routine communications. Both the aircraft and surface station must shift to their respective routine communication frequencies as soon as the requested information is supplied.

(c) *The frequencies 121.5 mc and 243.0 mc may be used for communication between aircraft and surface station AFTER it has been determined definitely that no other common channel exists between the aircraft and the surface station. This use must be restricted to a nonroutine basis and considered a communication emergency.*

(d) *The frequency 121.5 mc may be used to provide radar advisory service to assist aircraft in avoiding areas of potentially hazardous weather. Normally, radar advisory service shall be provided on regular communication channels and the emergency channel 121.5 mc should be used ONLY after it has been determined that the emergency channels are the only common channels existing between the aircraft and the radar facility. (When VFR aircraft not equipped for direct Air Route Traffic Control Center communications desire radar advisory service from an ARTC center, the aircraft must first contact the centers associated with the ARTC Center to determine the availability of the service, and to set up common communication channels between the aircraft and the ARTC Center.)"*

Certainly, communication emergencies do occur and may lead to a true emergency situation if radio communication is not established. However, routine communications difficulty does not seem to warrant equal consideration with a bailout or impending crash.

The Chief of Naval Operations has defined what the Navy considers proper uses of Guard Channel in OPNAV Instruction 3730.6 of 23 September 1958. The pertinent section of this Instruction is quoted:

"**3.** Limitations on Usage. The military emergency and distress frequency, 243.0 mc will be used only to provide a communications channel to and from airborne and ground stations or surface craft involved in an actual emergency or distress condition. This includes immediate assistance by other aircraft or surface units in the vicinity acting to alleviate or avert the distress or emergency condition, but does not include communications incident to a coordinated search and rescue operation. Search and rescue communications are to be conducted on the frequency 282.8 mc or other appropriate frequency as directed.

a. Due to the current equipment limitations of Ocean Station Vessels, the extremely limited number of UHF contacts, and their remote location where risk of emergency channel interference is very small, it will be necessary for Ocean Station Vessels to continue to list 243.0 mc for communications on an "on request" basis to receive safety of flight reports from aircraft having only UHF capability. This is an interim measure that will be reconsidered when increased requirements for UHF communications with Ocean Station Vessels justify the expense of ship alterations to accommodate another remotely controlled circuit."

It is true there is a wide divergence of opinion as to what constitutes an emergency. Some of the local FAA personnel feel that they are forced to use Guard Channel because aircraft are being cleared without proper en route and terminal frequencies. This could be controlled by the clearing agency and the agency should not accept flight plans when the aircraft is not equipped with all necessary en route and terminal frequencies. Actual equipment failure could be considered to be a true emergency as this is not so frequent as to cause undue traffic on Guard Channel. However, the lack of proper frequencies should not be and is not a reason for or an excuse to revert to Guard Channel.

From the standpoint of search and rescue, it has become difficult to assist pilots in need, since it is practically impossible to run a good DF-bearing with other aircraft also transmitting on Guard. In many cases, attempts by search and rescue forces to contact pilots on 243.0 mc for information pertaining to emergencies are impossible. The volume of nonemergency transmissions on Guard make it impossible to monitor, in connection with the operational frequency. ▲

Tips For T-Bird Drivers

Major Wallace W. Dawson, Fighter Branch, DFMSR

H***i, Jocks, how ya' doin'?*** Must be time for a little chitchat since the bar isn't open yet. Here's a few choice morsels we've gleaned from hyar and thar that you might be interested in. These are all "as of" items and let's say the "as of" date was in December. Only Mr. Anthony knows what may be *what* by the time you read this.

The nickel cadmium battery program is doin' fine and sometime early this year, every bird should have 'em.

The 577 mod, big generator and inverter is doin', but that's about all. Some changes have been made to the basic Tech Order and others are in the mill or soon will be. Our brothers to the north, in the land of SMAMA, tell me the final look in 577 modified birds will be a return to the single bus setup so that if you lose the generator *(which you shouldn't)*, nothing goes with it except the IFF.

In the meantime, *be sure* that you understand the bird you fly if it has been modded by 577. Sometime later, after the T.O. that takes out the Cook pressure switch has been accomplished, we'll probably go back to the separate Batt-Gen switches.

T.O. 222 will move the seat belt hose so that it will no longer wear a hole in your right arm.

Finally, all birds are going to get an over-center bungee arrangement. All birds after 57-611 have it now and soon the others will. T.O. 565 makes this change and you can take my word for it, it's a good one. Too often we have the bash where the gear handle pops out of the detent and the casters fold.

New and reworked buckets are still rolling off Allison's production line at the rate of 750 pairs a day. 'Fore long, every wheel should be sportin' new *(reworked)* buckets guaranteed not to rip, ravel or tear. At least not past the tip. I guess we will always have a certain number of tip failures. You can usually get one of these back home, however, as the weight of the metal no longer present is not so serious that bad vibration and a busted rear bearing *have* to follow.

Wheels. We are now inspecting the older BLK wheels every 500 hours at the depot and we keep 'em if they're good and throw 'em away if they're cracked. To keep the birds flying, 1809 new *(BLAL)* wheels were bought and they are proving out real good *(knock on wood)*. The contract for BLAL wheels runs through mid-'60, and already we have suggested to old moneybags that it might be a good idea to order more of 'em right now so that when the old contract runs out, the line can just keep rollin' until every bird has a new BLAL wheel and there'll be enough in supply for backup. This has only been suggested—remember!

Now we come to a subject dear to my heart: *fuel system icing*. A lot has been done on this problem; a lot is being done now and probably a lot more will have to be done, before it is licked—if it ever is. Meantime, here goes!

Some time ago, procedures came out in the Dash One telling us how to use the deice system as a preventive measure rather than as a "close the barn door after the horse is gone" type of thing. This is the procedure depicted on the T-Bird poster showing a bird in flight coming at you out of a blue background. Now, we don't say this procedure is a cure-all for fuel system icing. In fact there are two other separate projects under development right now to attack the problem: One is a heat exchanger and the other is a possible re-arrangement of the entire fuel system. We do say, though, to use the alcohol deice system as a preventive measure is the best we've got right now. The only fly in the ointment is the fact that too few pilots are using it. Many reports have been received indicating the "motor" stopped; the guy does or does not get a relight, and down in the fine print it says he never did use deicing alcohol until after the flameout. Nobody knows any better than I how ridiculous it seems to hit the alcohol switch when you're ginnin' along at 35,000; the kitten behind you is purrin' and outside the greenhouse it is loud and clear. But let's look at it this way: Water and JP-4 love each other so the chances of your taking off with anywhere near completely dry fuel is about the same as the proverbial snowball in you know where. Let's face it, you've got H_2O in your JP-4 at takeoff. As you depart terra firma, climb higher and use more fuel, the experts tell me that condensation occurs. This adds more moisture to the fuel. We all know that the freezing level gyrates up and down like a yo-yo, depending on the time of year and the location. However, it is almost a certainty, even in summer, that you will find freezing temperatures as low as 20,000 feet, and over Arizona yet. So, as you and the pride of Lockheed ascend with your watery fuel, you're almost bound to encounter freezing temperatures. Now you take water, or moisture, and lower its temperature and if you don't know what you get, take a look in your highball tonight.

Sure the engine doesn't quit *every* time, if you don't use alcohol, but after all, who wants it to quit *anytime?* Or, let's look at it this way: What could you possibly have *against* giving her a 15-second shot every half hour? Well, you say, how do I know it's gonna work, even if I do hit the switch?

Okay. On your preflight you have checked the alcohol tank for "quantity, cap secure," 'cause that's what it says to do in step 5, paragraph F, page 2-8 of the Dash One. Finding out if the pump's workin' is no sweat. Just hit the switch momentarily on the ground or in the air and check the loadmeter. So—pump working, tank full, a 30-second shot before takeoff, 15 seconds every half hour in flight, 30 seconds before descent, and 30 seconds before entering the pattern. What could be simpler? A reminder: 30 seconds and 15 seconds mean just that. Don't get over eager, like some have done, and interpret 30 seconds and 15 seconds to mean one minute or more.

Well, time to close up shop, the bar *is* open. I'll try to keep you posted on the latest from this end. How about your keeping us posted on the latest where you are? You're the guys who fly the bird and I know that something you know will help *somebody*. Drive carefully! ▲

CROSSFEED

(Continued from page one.)

Orange Smoke

The article, "Down to the Sea," by Lt. E. E. Parsons (October 1959), has been read with some personal interest inasmuch as the UF-2G search aircraft which sighted him was from this activity. However, there was a bit of misinformation which should be brought to the attention of those who may be in the same "seagoing" situation at some future date.

It was stated that the shark repellent stain was visible before the orange smoke day signal. This is totally incorrect. In fact, the orange smoke was the aid which was sighted and without it, a sighting would probably not have been made.

The difficulty in sighting a small raft can be shown by the fact that out of a total of about four passes made over Lt. Parsons *after* his position had been marked, he was only resighted *two* times. It is believed that this sighting difficulty was compounded by a large portion of the yellow raft being covered by the blue-gray suit worn by the survivor.

LCdr P. M. Hildebrandt, USCG
Air Det. NAS Quonset Pt. R. I.

Thank you for the correction, Commander. As for the flight suits, experiments with brilliant orange ones are now going on and some have been in use in the Air Force for many months.

★ ★ ★

Air Clues

I should like permission to reprint in "Air Clues," the article entitled "Standing on a Tail of Hot Gas," which appeared in the November issue of your magazine. "Air Clues" is the RAF training magazine for air crewmembers. I've also written to the Ryan Aeronautical Company, asking for its blessing and for more pictures than you were obviously able to use. Credit would, of course, be given to FLYING SAFETY Magazine and to the author.

Ernest E. Stott
Editor, "Air Clues"
AIR MINISTRY, WHITEHALL GARDENS
London, S.W. 1.

★ ★ ★

Old "P.D."

Occasionally, when reading articles of personal experiences, I think of a game of chess that is being watched from the sidelines. The kibitzer sees moves that go unnoticed by the players.

I read the article entitled "Don't Throw in the Sponge," in the January issue and saw such a move that could have been missed. I say this because there was no mention of this move, either by the author or the editor. The one I have in mind is the P. D. McCRIPE checklist. I shall always remember this name from the precise and complete training received at the Lowry AFB altitude chamber.

I feel that the P. D. McCRIPE checklist could have prevented a second occurrence of the trouble noted by the author and suggest that added emphasis be placed on old "P.D." because I've seen it ignored too many times by flight crewmembers of interceptor aircraft. At high altitudes, oxygen is your life sustaining supply line and the equipment should be given the best care and attention.

TSgt John H. Kopka
Hq ADC, ADMLP-CB
Ent AFB, Colorado

A welcome reminder.

★ ★ ★

Drag Chute for Dogs and —

We here at Perrin believe we've proven that a positive approach can overcome problems in the "They said it couldn't be done" category. This one is about the drag chute.

For many years the drag chute on the F-86D/L was looked upon as something that was nice to have when it worked but it didn't work very often. For a three-month period in the past year we have had 1016 drag chute deployments and all except 2 were successful. The credit for this accomplishment cannot be given to any one person or to any one organization at this base. Many people have devoted much honest effort to cure a condition which at its best was a hazard to flight safety, if not to the life of the pilot.

Suggestions for modification of the drag chute system were received in great numbers; they were evaluated and the best have been incorporated in our aircraft. These changes didn't take very long to accomplish and they weren't expensive.

Copies of the modifications have been forwarded to Sacramento Air Materiel Area, McClellan AFB, California, and assembled there under drawing number NEF E/S SM9-1399R1. They should be available to all who need them.

Maj. William H. Allen
FSO, 3555th FTWg (Adv. Int.)
Perrin AFB, Texas

The efforts of everyone at Perrin are appreciated.

★ ★ ★

"Normal" Emergency Procedures

Here you see a jumpmaster about to practice what he had preached just a few minutes before he leaped into space. *(Picture below.)*

Lt. Harry J. Hatch, jumpmaster for his aircraft—a C-119—had briefed his 40 troopers on "normal procedures" just in case one of them might get caught, to dangle underneath the boomtail of this big Boxcar. He had advised his troopers to place one hand on their helmet and the other on the handle of the reserve chute. He was last to jump and he got caught.

Lt. Hatch said, "As soon as I realized I was dangling, I placed my left hand on my helmet and felt the metal of my reserve chute handle fit into the palm of my right hand."

Specialist Charland, a photographer in another C-119 nearby, was alert enough to get this picture. He said that he noticed Hatch being lowered very slowly and suddenly buffeted a little. His canopy then billowed out over his head. The entire sequence took just 5 seconds. Hatch landed on the drop zone, none the worse for hanging!

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