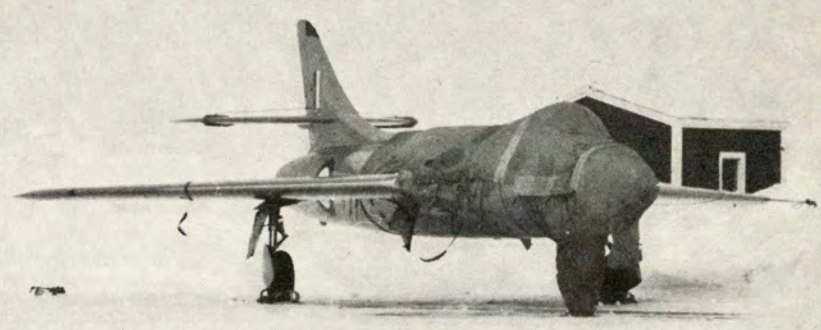
AEROSPACE

SAFETY

UNITED STATES AIR FORCE

NOVEMBER 1964



Wintersfullofhazards . . . Wintersfullofhazards . . . Wintersfullofhazards . . . *page seventeen*

AEROSPACE SAFETY

CONTENTS

Lieutenant General Keith K. Compton	The Inspector General, USAF
Major General Bertram C. Harrison	Deputy The Inspector General, USAF
Brigadier General Jay T. Robbins	Director of Aerospace Safety
Colonel Charles L. Wimberly	Chief, Flight Safety Division
Colonel James F. Risher, Jr.	Chief, Ground Safety Division
Colonel Edward D. Leahy	Chief, Missile Safety Division
Colonel Jerome I. Steeves	Chief, Safety Education Group

Editor • Maj Thomas J. Slaybaugh
Managing Editor • Robert W. Harrison
Feature Editor • Amelia S. Askew
Art Editor • David Baer
Staff Illustrator • SSgt Bill Foster

SUBSCRIPTION — AEROSPACE SAFETY is available on subscription for $3.00 per year domestic; $4.00 foreign; 30c per copy, through the Superintendent of Documents, Government Printing Office Washington, D.C. 20330. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony and conclusions of aircraft accidents printed herein have been extracted from USAF Form series 711, and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in the Aerospace Safety Magazine. Contributions are welcome as are comments and criticism. Address all correspondence to the Editor, Aerospace Safety Magazine, Deputy The Inspector General, USAF, Norton Air Force Base, California 92409. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from AEROSPACE SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will insure complete accuracy of material, amended in light of most recent developments. The contents of this magazine are informational and should not be construed as regulations, technical orders or directives unless so stated.

AFRP 62-1 NOVEMBER 1964 VOLUME 20 NUMBER 11

FALLOUT

ASK AND YOU SHALL RECEIVE

The September 1964 issue just distributed had one slight inaccuracy which apparently slipped past your proof readers. In the article entitled "Ask and You Shall Receive" by Major Palmore, he cites the list of VHF and UHF frequencies which may be used for contact with the FAA Flight Service Stations as 134.9, 122.1, 126.7 and 255.4. First of all, the 134.9 cited in the article is not correct. That frequency is not available at any FSS. Secondly, FSS do not have transmission capability on 122.1. A quick check in the Enroute Supplement will show that the correct and complete list of standard FSS air-to-ground communications frequencies is: 135.9, 126.7, 122.1R, 122.2T, 272.7 and 255.4 mc.

I bring the above discrepancy to your attention in the interest of assisting you in maintaining the general high quality of presentation to which we readers have become accustomed.

Maj. Fredrik E. Anderson
Ohio Wing, CAP

WHAT IS SAFETY

I was interested in your editorial, "What is Safety?" (ASM, May 64) because of the various concepts of safety. In line with this, I would like to offer one not mentioned that I believe is most important of all.

Safety is a habit!

It is the habit of fastening a seat belt every time you sit in a car. A habit so instilled that it is fastened naturally, without thought. It is the habit of completely stopping at every stop sign regardless of the hour or how clear the field of vision. It is the habit of performing maintenance inspections according to the procedures established by experts; the habit of resisting short cuts to save time or because of a momentary inclination toward complacency.

It is the habit of being safety conscious; of taking precautions. It is the habit of expecting the worst turn of events in any situation — a child darting out from behind a parked car as you are driving down the street — another driver not yielding the right of way. It is the habit of gingerly checking your brakes on icy roads or during wet weather so that you will know what braking action to expect and can make necessary allowances.

The list goes on and on.

The inclination to relax a safety habit is often very strong, especially if it appears to be insignificant. However, consider the driver who had a habit of checking behind his car before he backed out of his driveway. After years and years of practicing this habit, can you imagine his trembling relief when one time he found a small child innocently playing in the sand behind his rear wheel? You can be sure that he will be eternally grateful for establishing that safety habit.

Maj Roger B. Condit, Jr
Selfridge AFB, Mich

BAILOUT FROM A KC-135

On the evening of 10 July the first recorded bailout from a jet transport occurred. Two members of the crew successfully bailed out, the rest of the crew stayed with the aircraft which subsequently landed safely. Since this incident is a first *and the information it furnishes may help others, the following account of the experience by the navigator, Captain Robert A. Searle, is presented.*

We took off as second ship in a three ship MITO (Minimum Interval Takeoff). Approximately six minutes later we experienced a small explosion and simultaneously a fire warning light from Nr 3 engine. As most people know, a fire in a jet engine is not normally considered serious because they tend to extinguish as soon as fuel is shut off to them. However, this fire continued to worsen and the boom operator, who was scanning from the overwing position, reported the fire was beginning to burn into the wing.

We had already left the formation and were descending, building up airspeed attempting to blow out the fire. We were at 11,000 feet when the incident started; when the aircraft commander decided on bailout he leveled the aircraft at 9000 feet.

I had been busy talking to Clinton-Sherman ground control and hadn't gotten around to putting on my hard hat. Since we were as low as 9000 feet and I did not need oxygen, I decided against taking the extra time needed to put on my helmet and attach my oxygen mask to the bailout bottle. I immediately proceeded to the escape hatch to activate the chinning bar which would jettison the door and extend the spoiler. I had difficulty extracting the safety pin and called on the boom operator for assistance. He was successful in removing the pin although he did have difficulty. (Since this incident, a change calling for removal of the pin while on the ground prior to flight has been made on the preflight checklist.)

As soon as the hatch was jettisoned there was a loud roar from the rush of air. The noise level was so high that we communicated through hand motions and shouting. In addition to the normal alarm bell, we have a klaxon type horn which sounds along with the bell for emergency signals. When testing this system during preflight I find this horn aggravatingly loud. However, with the escape hatch gone, the noise level is so high that the horn can barely be heard. If I had not been watching the copilot make the positive motion of ringing the alarm bell, I probably would not have associated the faint noise with that of the horn because it was only a hint of additional sound.

As soon as I saw the pilot retard the throttles and extend the speed brakes I got on the chinning bar, facing aft, lifted my knees to my chest and pushed myself away from the bar and through the chute. I crossed my arms grasping the harness and tucked in my head. I tried to make myself into the smallest ball possible. The boom operator reports that the airspeed when I left the aircraft was 330 knots indicated airspeed. I got quite a jolt when I hit the slipstream and I started to tumble immediately. I estimate that I passed under the left wing root and cleared the fuselage by three to five feet. If the gear had been down I think it would be questionable as to whether or not I would have cleared it. As soon as I saw that I was completely clear of the aircraft, I extended myself some and pulled the ripcord of my chute.

I was rotating, facing the ground, when the chute popped. The opening shock was less than the shock of first entering the slipstream. As soon as the chute blossomed and I was safely sitting in my harness, I looked over my shoulder to see if everybody else made it. I could not see the aircraft, but I did see the boom operator's chute opening about a mile away from me; I could not see anyone else. I then started thinking about where I was, where I was going to land, and how I was supposed to land and spill the chute. I saw that I was about seven miles west of Clinton-Sherman AFB and about four miles south of Route 66. I started drifting rapidly north and I was becoming concerned about landing on Route 66 amid all the traffic. However, I was very fortunate in that I landed in a cotton field about 200 yards south of the highway. As soon as my feet touched the ground I started activating my quick release. I rolled along the left side of my back and my chute spilled immediately.

I gathered up my chute and started walking out of the field toward a dirt road where a car containing three young civilians was waiting for me. They had seen the whole thing and came looking for me. We stopped another car and we all went looking for my fellow crewmembers. When we got to the field where I estimated the next man would have landed, my companions went into the field to search and I went to a farm house to call the command post. While I was on the phone talking to the controller, he received word that the rest of the crew were safe. I then started to the base.

In critiquing this incident later, one thing became prominent as a possible major contribution toward our successful bailout. When we departed at such a high speed the pilot had the speed brakes extended while maintaining a level attitude. This forced the aircraft into a nose down attitude. This attitude might have given us the additional clearance we needed to clear the fuselage with as much space as we did.

A Landing Accident Study shows that one-third of all Air Force aircraft accidents occur .....

When It's Almost Over

In today's Air Force one of the most satisfying individual thrills that remain for the pilot is a good landing.

In some cases, in the older birds (a la C-47) the satisfying "squeech, squeech" is still the mark of success at this point. In others, because of high wing loadings, high pressure tires, stiff struts and safety dictated considerations, a good solid, no bounce arrival is the optimum.

It would appear logical for pilots, being professionally proud, to always concentrate every bit of ability and skill on making good landings — this maneuver alone being the best way in which they can exhibit mastery of their profession to fellow crewmembers, passengers and onlookers.

There is another reason, not as satisfying perhaps, but certainly just as compelling. When the mission has been flown, when it's almost over, this is the point in time when one-third of all Air Force aircraft accidents occur. Moreover, almost half of these accidents are charged to pilot error.

Every third day, sometimes more often, an Air Force aircraft is damaged in a landing accident. Aircraft are invariably heavier on takeoff, but two to three times as many accidents occur on landing. Although the inflight phase accounts for the greatest total number of accidents, weight must be given to the fact that the time exposure during the inflight phase is much greater than the time exposure during the landing phase.

The fact that the landing phase is particularly hazardous has long been known, and considerable work has been done to reduce both the number and severity of such accidents. Runways have been lengthened, overruns stabilized, drag chutes installed, tire treads changed, lighting improved, approach zone and runway weather reporting made more accurate, barriers installed, braking conditions reported, techniques refined and publicized — these are but a sampling. It's a little terrifying to contemplate what the landing accident rate would be without such work.

ANALYSIS

The 195 landing accidents in the 17 month period ending 31 May 1964 accounted for approximately one-third of all aircraft accidents during the period. (Table 1)

Table 2 breaks down these accidents by causative agency. From this table it can be seen that pilot error is the cause of more such accidents than any other single factor. Nearly one-half of the landing accidents are pilot caused, whereas only one-third of all aircraft accidents are charged to pilot error. Figures for the first five months of 1964 indicate that pilot error as a landing accident cause factor may be on the increase.

Table 3 breaks down the landing phase into approach, flare-out and landing roll, and then by causative agency. Since flare-out is a small part of the landing phase, the number of accidents is proportionately small. This table shows that the number of pilot error accidents is about the same on the approach as on the landing roll. However, materiel failure accidents occur more frequently on the landing roll, as might be expected.

PILOT FACTOR

Table 4 provides a breakdown of pilot factor accidents during the 17-month study period. This chart discloses that the largest single cause of pilot error landing accidents is landing short. Of the 17, in only two were emergency problems associated with the landings. In one case the throttle was stuck at 90 per cent and in the other the only problem was a minimum fuel condition. Fifteen of the landing short accidents occurred with normally operating aircraft and must be attributed to misjudgment on the part of the pilots concerned. In one case GCA instructed the pilot to go around because the aircraft was too low. The pilot decided to attempt to land, reporting that he had the runway in sight. In one case a pilot tried to exceed the aerodynamic capability of his aircraft when he attempted to line up with the runway late in the approach. One accident resulted from an aircraft being caught in vortex turbulence prior to touchdown and others were due to attempted flight on the backside of the power curve.

The second greatest cause of pilot factor landing accidents was attributed to gear up landings or retracting of the gear after touchdown. Typical of this type of accident is the following: Pilot was lead for landing. Speed brakes extended on descent. They were retracted and a call made to the tower that gear was down and brakes checked. Aircraft landed gear up. Pilot forgot to lower gear or make check.

In the 11 cases in which accidents resulted when pilots lost control during the approach, most indicate failure to abide by Dash One procedures. For example: A pilot was making SFO's for upgrading. On turning final he stated that he was going around. The aircraft got into a nose high attitude and the pilot was unable to recover. The subsequent low altitude ejection was unsuccessful. Cause was attributed to poor judgment and improper SFO and go-around procedures. Sometimes an emergency or distraction lures the pilot into a fatal trap. It is basic that aircraft always be flown within safe airspeed and altitude parameters during the approach and landing phase. No emergency or distraction can be permitted to override the primary consideration for maintaining safe altitude, attitude, and airspeed. Here's an example. The T-33 pilot flew by

TABLE I
MAJOR/MINOR AIRCRAFT ACCIDENTS BY PHASE OF OPERATION

	1963		Jan - May 1964	
PHASE OF OPERATION	NR	PCT	NR	PCT
Eng. running, not taxiing	8	2%	2	1%
Taxiing	14	4%	5	3%
Takeoff	52	13%	28	16%
Inflight	173	43%	87	48%
Landing	142	35%	53	29%
Go-around	10	3%	5	3%
TOTAL	399	100%	180	100%

TABLE II
LANDING ACCIDENTS BY CAUSATIVE AGENCY

	1963		Jan - May 1964	
Causative Agency	NR	PCT	NR	PCT
Pilot (and co-pilot)	58	40%	28	53%
Other Personnel	18	13%	9	17%
Materiel Failure	51	36%	15	28%
Misc	7	5%	0	0%
Undetermined	8	6%	1	2%
TOTAL	142	100%	53	100%

TABLE III

	1963				Jan - May 1964			
	Approach	Flare-out	Roll	Total	Approach	Flare-out	Roll	Total
Pilot	21	14	22	57	10	9	9	28
Other Aircrew	0	0	1	1	0	0	0	0
Supervisory	5	2	3	10	0	0	0	0
Maintenance	4	2	1	7	3	1	4	8
Other Persons	0	0	1	1	1	0	0	1
Mat. Failure	20	3	28	51	4	4	7	15
Airbase	0	1	3	4	0	0	0	0
Weather	0	0	1	1	0	0	0	0
Misc. Unsafe Cond.	2	0	0	2	0	0	0	0
Undetermined	6	0	2	8	1	0	0	1
Total	58	22	62	142	19	14	20	53

TABLE IV
PILOT FACTOR LANDING ACCIDENTS

Landed short	17
Gear up or retracted after touchdown	14
Bounced or poor landing	11
Lost control on approach	10
Lost control on rollout	7
Failed to execute missed approach	4
Drag chute failure	4
Blew tire	4
Went off end	3
Descended below minimums	2
Crashed on emergency landing	2
Adverse winds	2
Asymmetrical reversing	1
Miscellaneous	5

the tower to confirm that the landing gear doors were slightly cracked. The pilot was cleared for a short initial approach for a full stop landing. After the turn to base, the nose of the aircraft continued to drop to 45 to 70 degrees below the horizon until the aircraft crashed into trees. This one was charged against supervision on the basis that the IP allowed the pilot to fly the aircraft into a position from which he could not recover.

In another case the pilot was making a precautionary landing and allowed bank to become progressively steeper as he turned final. Ejection was too late.

Most of the 10 accidents that occurred as a result of bouncing or poor touchdown stemmed from such things as high, steep approaches, low airspeeds, rounding out too high, failing to round out in time, etc. They didn't all happen in the supersonic birds. A gooney bird pilot bounced, pushed forward on the control column, allowed the aircraft to veer off the runway, got it back on again, went off the other side and sheared the gear. The pilot of another prop-pulled aircraft failed to round out and knocked the nose gear off. An IP, demonstrating short field landings, caused an accident by directing the pilot in the left seat to arm the reverse mechanism with the aircraft still airborne. One prop went into reverse and a hard landing ensued.

In the eight cases during which control was lost in rollout, poor crosswind landing technique entered the picture, as did other failures to follow Dash One procedures.

MATERIEL FAILURE

Materiel failure was listed as the primary cause in 66 landing type accidents experienced during the period of this study. Accidents caused by this factor have not been included in this statistical breakdown and but a brief sampling follows as there is little, if anything, the pilot can do to prevent accidents caused by materiel failure. In fact, it should probably be noted that aircrew members, faced with materiel failure problems, have, by professional execution of emergency procedures, prevented many accidents.

Failures in gear, struts and gear actuating systems accounted for 29 of the accidents. Steering malfunctions caused nine accidents, brakes two, and tire failure but one. Although materiel failure type accidents encompass a broad spectrum, a few samples follow to give the reader some idea of the range of problems facing the Air Force in this area.

Following touchdown, the aircraft vibrated severely and ran off the runway. Several accidents of this kind occurred during the period and stemmed from such causes as binding of the steering mechanism, faulty components parts, failure of steering arms, jamming and bending.

The left main tire failed on a scramble takeoff. A piece of the tire hit the left upper gear door, driving a hydraulic brake line against the door attaching point and puncturing the line. No brakes were available on landing and the aircraft ran off the runway.

On gear retraction the pilot heard a loud thump and was informed that the left gear was hanging. By yawing the aircraft he was able to obtain a gear down indication. On landing roll the left main gear collapsed as a result of failed rivets in the gear attachment assembly.

On takeoff the left main wheel and tire assembly separated from the aircraft. Fibre locking nuts on wheel tie bolts had failed.

At 400 feet on final approach the engine RPM decayed suddenly to 1800. Engine and rotor RPM were synchronized but then RPM dropped to 1500 RPM. The pilot autorotated the helicopter into trees prior to ground contact.

MAINTENANCE FACTOR

Maintenance gets into the picture too — often because of little things overlooked, forgotten or not properly taken care of. Here's an example: After a normal landing following an air/ground gunnery mission the pilot was unable to engage nose wheel steering. The aircraft drifted to the right, the nose wheel went off the runway, struck a runway light and collapsed. Inadequate safetying procedure resulted in loss of a gland nut locking screw on the steering-damper unit, primarily attributed to inadequate assembly at the depot.

Here's another. During flight the low level wing fuel light came on. All tanks showed empty, or nearly so. The pilot attempted an emergency landing at a civil airport. He undershot the runway, then the aircraft bounced onto the runway and burst into flames. Because of improper installation, the main fuel strainer on the the left engine malfunctioned causing rapid exhaustion of the aircraft's fuel supply.

In another case, after engine failure, the pilot attempted a flameout landing. He undershot and the aircraft bounced into the air. The pilot ejected, unsuccessfully. The engine fuel pump spline drive shaft gear had failed due to improper installation.

On GCA final both engines of a twin-jet aircraft

flamed out because a T.O. had not been complied with. The crew had to eject.

A cotter pin was left out. This allowed the steering damper to move only to the right. When nose steering was engaged on the landing the aircraft ran off the right side of the runway.

AIRBASE FACILITIES

Airbase facilities were a major factor in only four of the landing accidents. Three of these involved landings on assault type strips, with inherent hazards much greater than found on normal runways. One occurred following a BAK-6 engagement.

In one of the most unusual landing accidents a T-33 was damaged when, following touchdown in extremely poor weather, the pilot had to leapfrog an F-100 to avoid a collision at the intersection of runways. The T-Bird was damaged when it mushed back onto the runway.

UNDETERMINED

Cause of nine of the landing accidents was listed as undetermined. In two cases the pilots lost control on turn to final, two others hit short and there were two ground loops. One pilot crashed after reporting he would land from a closed pattern and another flew into the water while circling for landing. One swerved to the right and ran off the runway.

CONCLUSIONS AND RECOMMENDATIONS

This study of landing accidents during the 17 month period ending 31 May 1964, discloses that prevention attention is needed because:

- Approximately one-third of all aircraft accidents occur during the landing phase.
- Half of the landing accidents are pilot caused.
- Landing short and gear up landings are the two leading factors in pilot error landing accidents.

Analysis and recommendations made by investigators of these accidents indicate that compliance with known approach and landing procedures would have prevented many. Selected at random, but typifying the suggestions made, are the following:

Use approach aids as a cross check during the approach — glide slope, GCA, VASI lights.

Never descend below approach minimums unless VFR.

Abide by recommendations of GCA when directed to make a missed approach.

If weather becomes IFR, don't attempt to continue VFR.

Compute approach and landing speeds and fly them.

IP's must not let a situation deteriorate beyond a point from where they can safely recover.

Attempting to make a good landing out of a poor approach is not as safe as executing a missed approach.

Pulling the nose up will not stretch the glide.

No emergency overrides the necessity of maintaining control of the aircraft — eject if the situation is untenable, and eject at or above minimum altitudes as specified in the Dash One.

On multi-engine aircraft maintain safe engine-out airspeed and altitude.

Apply brakes after landing — not before.

Slow to a safe speed before turning off the landing runway.

Comply with current directives on aircraft spacing.

Lower the gear before landing and don't pull the gear up after landing.

Divert to an alternate or hold if weather precludes a safe approach.

Go around, don't attempt line-up turns late in the approach.

If overshooting, go around.

Flare so as to not land nose wheel first.

If disoriented, ask. Don't land at the wrong field.

Remember that one of the safest recovery techniques from a poor touchdown is to go around.

Tightening the final turn to line up with the runway is not as safe as starting the turn sooner and, if necessary, shallowing the bank to line up.

Depth perception deteriorates over water, at night, over snow-covered surfaces, when terrain slopes, during precipitation, on overcast days, when the pilot is fatigued and when he does not use oxygen.

During gusty wind conditions, don't fly at minimum control speed.

Study NOTAMs before departure. Know and plan for hazards of airfield construction.

Pre-brief — avoid confusion in the cockpit.

Use checklists. ☆

One wintry day back in 1959 an observer on the flight line at Wright-Patterson AFB might have noticed that an unusual number of aircraft were aborting their takeoffs. Had he investigated further he would have found that the stops were not due to malfunctions but that the aircraft were being deliberately stopped in tests to obtain stopping distances. On the sidelines men were busy checking the stopping distances against Runway Condition Readings (RCR) obtained with a gadget called the James Brake Decelerometer (JBD).

Flight test engineers of the Directorate of Flight and All-Weather Test had just initiated a program to correlate deceleration readings from the JBD with the actual stopping distance of various aircraft. As the program progressed it became evident that an accurate system could and should evolve.

Aircraft used in that test were a T-33, F-100, 101, 102, 106, B-47, KC-135 and a C-131. With about two inches of slush on the runway they were accelerated to 100 KIAS, the pilot would call "brakes now" and the stopping distances were recorded. The JBD reading and slush depth, which had been obtained immediately before each run, were then correlated with the stopping distances.

Information of this type continues to be gathered on aircraft such as the T-37, T-38, T-39, F-105 and the F-4C during the Category II All-Weather Test programs. Slush, ice, packed snow and wet runway information has been accumulated, sorted and plotted. The end results are the data sheets you find in the Dash One.

This program of data gathering has some shortcomings and problems. Flight test personnel felt from the beginning that a valuable tool was available and they started out to exploit this value. However, initial support and directives to proceed full-scale were either weak or nonexistent. Typically, the decision to conduct a flight test program is the result of hazards involved versus priority of the requirement. In this case it was decided not to continue exposing a highly instrumented fleet of test aircraft to possible damage. For instance, during the initial phases of the slush test described above, the F-102 aquaplaned off the side of the runway into the soft dirt and bounced up over a taxiway. Luckily no damage was done and the tests proceeded without further incident. After the fact thoughts of possible damage or loss of aircraft during these tests, slowed the program. Finally, all that was being obtained was by-product data from Category II and other test flights. Subsequently, USAF dictated that our present program be implemented; i.e., T.O. 33-1-23, AFR 60-13 and all that goes with them.

RCR's are not as accurate as they could and should be; however, they are not dangerous! On the contrary, they are, in most cases, on the safe side; so, go ahead and follow them. The present system is a long step in the right direction, but here are some of the problems.

- About five years ago, a T-33 delayed braking on a wet runway at Farmingdale, New York, and skidded off the end. Investigation showed that the sealant used on this asphalt runway was very slick. JBD was 16 on a dry surface when the average should be 23 to 25.
- An air base in Michigan had continuous problems with F-102's off the side and off the end of its runway during rainy weather. Same problem—runway sealing compound.
- During Category II All-Weather tests in Alaska, the task force noted very good braking was available on packed snow when low temperatures existed. At or near the freezing mark, packed snow becomes slicker. Around 0° F. or below, JBD readings were much higher and stopping distances were shortened.
- Variables can and do exist on wet runways due to differences in runway surfaces, age of the runway, aggregates used in construction and type of runway sealants used. In some cases, dust on the runway can act as a lubricant when it becomes wet. Aircraft will aquaplane on standing water, whereas the vehicle obtaining JBD readings will

Lt Col Richard R. DeLong,
Directorate of Aerospace Safety

not—at least, not to the same extent. Long before JBD, AFR 60-13 and T.O. 33-1-23, I watched a B-29 aquaplane off the side of the runway when landing on a sheet of running water about one-half inch deep during a heavy rain. The runway was not crowned, but gently sloped from one side to the other. Not much damage, but "hairy" to say the least.

Another problem we have is in the directives covering the subject. First, the guidelines for average JBD readings in T.O. 33-1-23 are somewhat negated for reasons herein stated; i.e., variables due to temperatures and runway surface conditions. Second, the weather sequence doesn't indicate the percentage of runway that is clear or covered. It merely designates these conditions as patchy. It is not impossible that a 50 per cent patchy runway could give a lower reading than a 75 per cent patchy condition. It all depends on where the readings are taken. Hypothetically, take a runway with 50 per cent packed snow. The weather sequence could be reported as PSR 11 P. Eight of ten readings could be on the packed snow at JBD indications of 08. The remaining two readings could be on clear runway at JBD indications of 24. In this case we would have PSR 11 P. A more accurate weather sequence would be: RCR 24 PSR 50 per cent P 08. In other words, the clear runway is 24 and the patchy packed snow is 08. Should complete PSR exist, the sequence would then read: RCR 08 PSR.

The last problem, and perhaps the most important, is the lack of data on all aircraft under all conditions. A test task force of this magnitude would be difficult to justify and impossible to approve in these days of austerity.

Now, let's suggest some solutions.

1. Flight Safety Officers: Make this article required reading for all pilots and review it along with AFR 60-13 and T.O. 33-1-23 at a Flying Safety Meeting in the near future. If you need technical or operational assistance, write to Hq ASD, ATTN: ASZO, W-P AFB, Ohio, 45433. This is the Flight Handbook section and it has overall management/coordination responsibility for this data and the publication of charts for the Dash One handbooks. They also have immediate contact with the flight test engineering agency that coordinated the original tests described herein.

2. Operations Officers: Note in the remarks section of the AFTO Form 277, Results of Runway Braking Tests, the stopping distances required for aircraft under the conditions reported on this form. This is not to recommend that all bases conduct slick runway tests! (Leave the test business to the flight test people.) But, when extremely slick runways exist, it is assumed that the aircraft will, in many instances, be stopped in as short a distance as possible. In such cases, record the distances and the type aircraft on the Form 277. This information can be used by ASD to establish more accurate landing roll charts for the aircraft concerned. Make sure your Forms 277 are accurate and that personnel obtaining the RCR readings are experienced. (I have recently reviewed a package of Forms 277 from "X" air base which I strongly suspect were filled out and submitted for the sake of filling the squares. These were sent to me by ASD with the same suspicion indicated in their correspondence.)

3. Change the weather sequence to give a more realistic picture to the pilot, especially when patchy conditions exist.

4. Conduct a flight test program requiring that JBD correlative data be accumulated on the complete USAF aircraft inventory. This would permit braking tests to be conducted on any aircraft at any time a particularly desirable weather situation presents itself. These data can be obtained on landings or on accelerative ground runs.

5. DTIG will publish a report on procedures for taking JBD readings which documents results of a test program recently conducted by ASD (ASTFP). This report will be in the December-January FSO Kit. Reproduce it, distribute it, educate with it! This taking of JBD readings is not a horrendous, technically involved engineering task when everyone understands what it's all about.

Remember! The system is good; it can and should be used; it's an excellent, valid safety and operational tool; and YOU CAN HELP IT WORK! ☆

T-Bird Rocket Ejections

Maj Richard M. Chubb, Life Sciences Division, Assistant for Medical Services

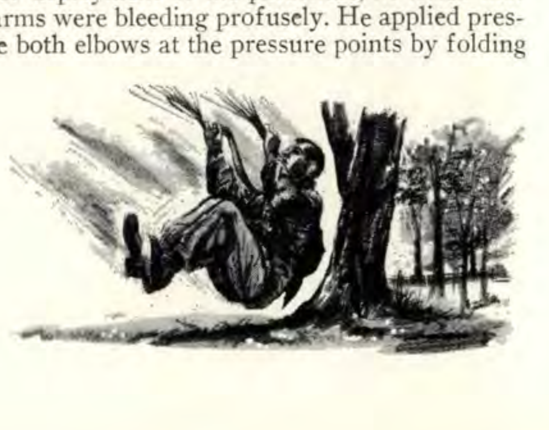
A recent inflight emergency resulted in the first two T-33 ejections with the new rocket seats, at an altitude of 29,000 feet and 200 KIAS. Major injuries sustained by both pilots were carefully evaluated. None of the injuries could be attributed to the fact that rocket seats had replaced the ballistic catapult seats. There were a total of five major injuries, probably resulting from five separate causes, and a number of lesser injuries.

The pilot leaned forward as he pulled the trigger and felt his back snap with the initial thrust. A compression fracture was confirmed by X-ray. His malposition is confirmed by the fact that he was looking at the rocket smoke during propulsion. Although his chin strap was fastened and his visor was lowered, he lost his helmet as soon as he cleared the cockpit. The snap fastener for the chin strap was torn from its moorings, and the strap caused an abrasion as it passed under the jaw. He felt his right arm flail laterally and aft into the seat at about the same time. This resulted in his second major injury, severe contusions and a puncture wound above the elbow.

The seat separator worked as advertised and separated him forcefully. This started him in a forward somersault from which he managed to recover. He eventually stabilized on his back, with his head below his feet. He held his injured right arm at his side and kept his legs straight and his feet together. He then used his left hand as a rudder to hold himself in what amounted to a dive. He consciously refrained from opening his parachute because of the high altitude. He heard the chute deploy and saw it go past the back of his feet. His streamlined position gave him a nearly maximum descent rate and the greater than average shock was absorbed by his shoulders, producing severe contusions on top of both. A friendly aircraft circled during the parachute descent and he rather enjoyed the oscillations of 30-40 degrees produced by the prop wash. He descended gently through some trees and came to rest suspended in his harness about 4-5 feet from the ground. He lowered himself by jerking at the risers until he could touch the ground and then unbuckled his harness with some difficulty. He managed to walk a short distance before ground personnel met him.

X-rays of his pelvis revealed a linear fracture at the hip joint. It seems most probable that it occurred during opening shock of the parachute. We have no record of such a fracture being produced by ejection force. In addition, there were absolutely no bruises or tenderness over any portion of the hip to indicate a direct blow. He steadfastly denied any significant blows while descending through the trees, but it is possible that the tree landing was harder than he remembered.

The rear seat occupant had ejected first. He consciously positioned himself in what he thought was optimum position, raised both armrests and squeezed the trigger. He could see nothing until after seat separation when his helmet left him "like a bullet" as he started tumbling wildly. His chin strap had been fastened, but his visor was up. The oxygen mask was apparently forced upward and the plastic shield probably produced a minor laceration he had above the right eye. He was unable to stabilize his free-fall with any of the maneuvers he had studied. He satisfied himself that his automatic timer lanyard was gone and waited for deployment. After deployment of the parachute, he noted that both forearms were bleeding profusely. He applied pressure above both elbows at the pressure points by folding



his arms and concentrated on slowing the flow of blood. He, too, encountered severe oscillations from prop wash, but failed to enjoy the thrills provided. During descent he attempted voice contact with the other pilot, but was unsuccessful in this. While looking about for the closest help on the ground, he was distracted by a large power plant, a wide river, and high voltage power lines in his line of drift. He passed safely over the power plant and river, but his course was disconcertingly parallel to the power lines and directly over them. As he descended, he was near one side of the lines and over a cleared strip adjacent to them, with his back to the clearing. He therefore pulled hard on the aft risers and retracted his landing gear in order to make certain he cleared the wires. He almost immediately went through some small trees and came to rest sharply in the sitting position with his back squarely against a small second-growth tree. Although he at first described the landing as gentle, he did admit to seeing a few flashing lights, stars, and lightning flashes at that moment. The pull on the risers at the last minute probably started an oscillation that swung him against the tree. He had started to cut some shroud lines for tourniquets when he heard rescuers calling him.

Examination revealed a fracture of the spine, undoubtedly from his "gear-up" landing against a tree in an oscillation. The symmetrical lacerations of the upper forearm were almost certainly due to contact with the cockpit during ejection. It appears probable that his forearms were resting on the guards intended to contain the elbows rather than on the flat portion of the armrests. It is also possible that he moved his elbows laterally as he raised the armrests.

It is fortunate that few ejections result in so many examples of injury causation. Even in the rocket systems (which have less maximum thrust forces), a compression fracture can result if one leans forward. Both pilots were wearing underarm life preservers, and it is especially important to remember to pull the elbows in with these on. If necessary, the elbows may have to be forward slightly to allow clearance. Proper body position for parachute opening (bent slightly forward at the hips) is still a good practice. Parachute landing is difficult among trees and power lines and injuries are frequent. The Four-Line Cut (see "Better Break on Bailout," AEROSPACE SAFETY, July 1964) would have made both of these men more comfortable during descent and probably would have prevented one fractured spine. This modification is ideal for this situation. By cutting the two central shroud lines on each of the aft risers, a pouch is produced at the back of the canopy that dampens oscillations, slows descent, imparts 3-4 knots forward velocity, and provides steerability. These lines will be marked with red tape in the near future and instructions for this procedure will be forwarded to the field in T.O. 14D1-2-1.

The relation of these stories is meant in no way to be critical of these pilots. Both men had considerable presence of mind and did a great number of things better than the average ejectee. It is meant to show, however, that there are pitfalls that can be fatal in any ejection. These men were observed during their descent by another aircraft and by a large number of people on the ground. What if it had been a snowy night in a remote area? ☆

PEACHY'S DEAD . . .

DOGGONE!

Maj L. Berlow, Armed Forces Institute of Pathology, Washington, D.C.

Resting in peace at the tender *old* age of 17 is an unusual B-47 casualty.

It's in a small grave back of a Capehart house at Altus Air Force Base, Okla.

Peachy was neither pilot, navigator nor engineer — just plain ol' cocker spaniel.

Back in 1947, Moses Lake Air Force Base, Washington (it's called Larson AFB now), hummed with activity. Boeing's first XB-47 was being tested. Representing the United States Air Force was Captain (now Lt Colonel) Stephen A. Starr. Representing Steve — his faithful cocker, Peachy.

Captain Starr's job, aside from Base Commander, was to assist the 100 plus Boeing people in the shake-down of their new plane. This kept Captain Starr hopping from hangar to runway, busy with the million and one things required to get the plane operational.

And everywhere the Captain went his dog was sure to go.

That's where the problem began. Within a year Captain Starr noticed that Peachy was having trouble hearing. She'd stay closer to him and even had to be awakened by his shaking her. Veterinarians, after looking the patient over, announced that Peachy would never hear again. Over-exposure to jet noise, they said.

"I had been haphazard about earplugs for myself, and gave even less thought to the dog's hearing," reminisced Colonel Starr. "It took her sad condition to show me the way."

The moral of this story? Well, it all just goes to prove (somehow) that dogs and earplugs are man's best friends. ☆

When it comes to operation of two wheelers, Captain C. Z. Chumley learns it pays to....

Heed the Speed

Archie Caldwell – Directorate of Aerospace Safety

The early Sunday morning tranquility of 3115 one-eighty-first was being gradually shattered by a constantly increasing high pitched whine. The long suffering wife of the "World's Greatest Pilot" stirred uncomfortably in her bed and the fantastic thought of some monstrous wasp or hornet about to descend from outer space onto her house crossed the mind of Mrs. C. Z. Chumley.

The sound grew louder and Mrs. C. instinctively sat up in bed and reached for the reassuring form of her husband and provider. C. Z. was not there. A glance at the alarm clock showed it was 6:42 (A.M.).

"No, he couldn't have, even if he said he might!"

Mrs. C., hair curlers trailing, ran to the front door. The sound throughout the Wherry area had reached the staccato of a machine gun. She opened the door and took two steps onto the grass just in time to observe the hunched form of Captain C. Z. Chumley rounding the corner astride what appeared to be a two-wheeled, one cylindered cross between an English bicycle and a Highway Patrol Harley Davidson.

Chauncey broke into a broad grin as he shifted into a lower gear and the machine spat more fiercely. Pulling into the neighbor's driveway, up onto the sidewalk, C. Z. steered for Mrs. C. As the motorcycle hit the grass, Mrs. C. leaped into the doorway just in time to see C. Z.'s grin fade and the rear of both machine and rider disappear into the neighbor's hedge. The sound of the angry hornet stopped and Chaunce unceremoniously walked the machine into his driveway.

"Foot slipped off the brake," he offered in a joking way.

"More like your brain slipped," Mrs. C. tartly replied. "What is it?"

"It's a genuine BRATSAMARU, 150 cc motorcycle, that's what it is, and are we going to save the money on this one! Why, I can ride to work and the Jag can sit here for you. The little jewel gets 120 miles per gallon, speeds up to eighty, foot shift, all those chrome goodies. I tell you, my love, we have something here!"

Mrs. Chumley replied as to what *she* thought *she* had, but saw it was no use to push the conversation. C. Z. had a new toy and it would only be a matter of time.

Months passed. C. Z. had acquired a muffler in place of the "competition tube" (much to the relief of the neighborhood), purchased a safety helmet (required by base regulations), and had indeed saved money on gasoline by riding the motor to work. It was even refreshing for C. Z. to feel the breeze on those hot summer and fall days. But there was a nip in the air and a few sprinkles had already fallen. Roads were often slippery and the mornings and evenings were cold.

"Maybe it's time to put the motor up," Mrs. C. offered at breakfast as a light drizzle was falling outside.

"Nonsense, my dear, still months before the first snow will fall. It may be a little dampish, but nothing the old road runner here can't handle."

Chaunce gulped down his 19th Shredded Wheat, looked at his watch and with one effort knocked over his coffee cup, started for the back door and kissed his wife of many moons.

"See ya after the salt mines close." Chaunce popped his helmet to a jaunty angle, hit the starter and with a roar slipped the hand clutch. The "bike" shot out of the garage into the dreary morning. C. Z. was in second before he hit the street and was doing 40 before he got the corner. On the road to operations, Chaunce wished he had one of those face shields, or at least some goggles. The drizzle was turning to rain.

"Hmmmm—might just have to retreat and regroup," C. Z. thought. "Maybe it *is* about time to consider that a closed car would be better than being subjected to the elements." Chaunce mentally drew a picture of himself, snugly nestled in the warm confines of the new XKE Jag. His failing peripheral vision picked up a gray form coming in at 3 o'clock. A quick eye movement showed it to be a late model four door sedan.

"Look Out! You idiot . . . " C. Z. yelled, simultaneously hitting the horn and brakes of the motor. The BRATSAMARU reacted exactly like any motorcycle (or two-wheeled vehicle) would on such a slick pavement. The rear end shot out from under Chaunce like the hips of a cha-cha dancer, the front wheel cocked full over and both rider and machine began to scribe graceful loops across the street. The dance ended when the rear wheel slammed into the curb and C. Z. was catapulted like a falling cat across the grass of the headquarters lawn. He could feel the helmet part company and briefly caught sight of the sedan running over the curb on the other side of the street—then a red flash, shades of gray and darkness.

The heavy arm cast prevented the required salute so C. Z. smiled through two broken front teeth. His commanding officer, who had gained a reputation of having the patience of Job with Captain Chumley sat with palms together.

"Captain, I had hoped that we had dispensed with our little post accident talks. However, it seems that I just can't outguess your next moves. Now the accident report shows that among other things, you failed to yield the right-of-way, were exceeding the posted base speed limit, were not riding with due consideration to the road and weather conditions, failed to have your helmet chin strap fastened and . . . "

"It wouldn't have happened if that guy in the sedan hadn't turned right into me," C. Z. interposed.

"Several eye-witnesses have stated that Major Lee was completely without blame. You practically chased him onto the curb before you saw him and skidded. Now don't think you're the only lad that's ever checked out on a motorcycle. I've ridden them myself and still do—but with a liberal amount of caution. Any beginner knows enough to slow down when it's slick, or when visibility is cut down, and not to lock up both wheels with the brakes if at all possible. You should have cut your speed considerably as a result of the restricted vis, and the slippery footing."

"But I've gotten to know that motor of mine. I've got so I can feel the way . . . "

"You've gotten complacent, that's what you've gotten, Chumley, and that's what gets a lot of riders of motorcycles, scooters and other powered two-wheelers. In the years 1962 and '63, the Air Force lost 53 of its personnel in fatal accidents such as the type you had. And motorcycle fatalities rose last year over the previous. While they are a safe and sane way to travel, we just can't afford to sit back and accept an average of 400 accidents every year on two-wheelers. Ignorance of the machine is a prime factor in accidents although I must say it wasn't in your case. But we get too many cases of a fellow borrowing a motorcycle and finding the power and acceleration too great a temptation. It isn't pretty to pick up the pieces after a bike has hit something solid at say 80 or 90 miles an hour. Anyway, I'm revoking your base privilege for your motor until you can show you know how to use it with common sense. I also am establishing a formal course of riding instruction which will be supervised by the air police and ground safety. This course will be required for all motorcycle riders. You and I will attend the first class. Do you understand me?"

"Oh, yes, sir, from now on it's safety first, last and always. You'll see, it'll be low and slow. You'll see a change—that I can promise you."

"Very well, Chumley. Dismissed."

The Colonel sat alone pondering the effect of his little talk. Maybe Chumley would change. At least the problem had been brought to a head by Chumley's fiasco. He had been hard at work on the PMV problem, now he was determined to crack down on the motorcycle and motor scooter riders.

The adjutant opened the door and came in, shaking his head. "Never saw anything like it," he said in response to the colonel's, "What's the matter?" "Just had a captain stop and ask where to volunteer for some motorcycle safety school. Why, when I was a young fellow . . . "

"Haa-r-r-umph!"

"Sir?"

"The school starts Monday. Work out the details with Ground Safety and the Air Police. That captain—Chumley's his name—was right for once in his life."

The adjutant knew the Old Man's moods. He did the only thing he could, "Yes, sir!" ☆

I GOT A RIGHT

Lt Col John D. St. John, Chaplain, AFLC, Wright-Patterson AFB, Ohio

Nothing is more typically American than to stand up and shout: "I got a right!" Our intellectuals tell us that "natural rights" are an outmoded 18th Century ideology that no intelligent person holds today. But the vast majority of the American people, and the intellectuals themselves in practice, believe not only in natural rights but in far more such rights than can possibly exist together in the same society.

We have all been taught that the Founding Fathers held "these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable rights." If these words were only a phrase in the Declaration of Independence, they would be of merely historical interest. In fact, they state a principle that is still deeply rooted in our natural conscience and should by the same token be embedded in the individual conscience.

For many years now in magazine articles, in lectures, at Commanders' calls, mighty emphasis has been placed upon "Safety" and rightly so. Much emphasis too has been placed upon "Dollar Savings" as a direct end product of more "Safety". This too is most commendable especially in this day and age of "Project ICE," "Gold Rush," "Clearwater," and what have you. Yet I think it is opportune at this stage of the "Safety" campaign to emphasize another facet of motivation in this matter, viz., that of conscience. We as Americans are proud and happy to know that we have as a matter of constitutional decree as well as the natural right common to all of God's human creatures the "right to life, liberty and the pursuit of happiness." Therefore I maintain that the careless mechanic, the reckless driver, the sloppy pilot, the slip-shod flight engineer, the lackadaisical depot technician—all infringe upon our right to "life, liberty and the pursuit of happiness." Their irresponsible and inexcusable and, might I go so far as to say, sinful carelessness, has jeopardized our natural, God-given, and constitutional "right to life."

All of us have, I dare say, had harrowing experiences which subsequent investigation has shown were caused by some careless slob. I remember flying across the Atlantic a few years ago in a military transport plane. The passengers were about evenly divided between military personnel and their dependents, some of whom were infants in arms. A serious electrical fire broke out and panic spread rampant among some of the mothers. As a chaplain I was asked by the plane commander to assist in allaying their understandable fear and to help in preparing for ditching. I couldn't help but wonder what to do with the infants when and if we should hit. A chaplain is supposed to be a morale builder but, brother, my morale was pretty low just at that time! There was no other chaplain around to punch my card but this was not so disturbing when I could go to the Top via direct communication. I know that He heard our prayer. Tragedy was averted and we limped back to the Azores.

An investigation showed that a sloppy wiring job had caused the fire. Someone along the line "goofed" and may God forgive him for the soul-racking emotional distress and the needless suffering caused by his irresponsible action. In my opinion this careless person had made an indirect attack on the "right to life" of every person on board that aircraft.

We could go on and on relating similar experiences. All of us who have been in the Air Force for any length of time have "sweated it out" many times. But what about the good guys we have lost in accidents written off with a back of the hand—"cause of accident unknown." God knows the cause of the accident and so does the one who caused it in many instances. He sees in his anguished nightmares the twisted bodies, the charred remains, the bloated floating corpses—the memory of which will come back to haunt him to his dying day. Would that it were possible to take this criminal along when the chaplain goes to tell a heart-broken wife and mother and her children that their husband and daddy won't be coming home tonight.

We have the further right to "liberty and the pursuit of happiness." It is almost banal to say that we cannot attain liberty or pursue happiness in a coffin. Nor can we do the same on crutches or in a back brace or blinded or paralyzed to the full extent that Almighty God intended that we should and could be happy and healthy on this earth.

When we signed up for a tour of duty with the United States Air Force we did so with the clear understanding that we would defend our country against its enemies external and internal. This might and could mean that we would have to sacrifice our lives or our health in fulfillment of this ideal. We will do so gladly if necessary. However, it does not mean, nor even imply, that we must be willing to sacrifice our health or lives because of the carelessness or the neglect of another who is also wearing a blue uniform.

"I got a right"—we hear so often. Yes, we have a right to "life, liberty and the pursuit of happiness." Every time someone cuts corners in safety procedures he infringes upon my natural and constitutional rights. Every right has a correlative duty. So when we are tempted to cry out "I got a right" remember the rest of it too: "I got a duty"—a duty to respect my fellow citizens' rights because we are our brothers' keepers.

Let's keep that built-in safety check—"CONSCIENCE"—on "ON" all the time. ☆

MISSILANEA

"BALL PEEN" MAINTENANCE. Murphy's law and "ball peen" maintenance still plague the missile fleet. Two young lads, one with five years' experience and the other with over three years', were dispatched to install a new L-12 filter in the propellant loading system. Difficulty was experienced in placing the filter in its casing. When the filter appeared to be in the proper location, it would not move all the way forward in the casing. Here, Murphy's law took over and the old bit about "don't force it, use a bigger hammer" came into play. The maintenance troops secured the blind flange on the rear of the filter casing with two bolts and forced the filter forward. They took off the blind flange and the filter appeared normal. They then installed the required gasket and torqued the blind flange. Eleven days later, during a verification inspection of the site, the damage was discovered.

QUESTION: What could have happened if the site had been required to be exercised during the 11-day period?

QUESTION: Did a supervisor observe the activity and sign off the completed work?

When a situation is encountered which indicates abnormal accomplishment of maintenance, the wise thing to do is to check with the supervisor and not follow Murphy's law or try "ball peen" maintenance. An accident could have been caused by this example and, as in all accidents, it would have been completely needless.

Maj Curtis N. Mozley,
Directorate of Aerospace Safety

SWINGIN' GATE — A Mace missile was being moved from the maintenance complex to the launch site. As the vehicle operator approached the maintenance complex gate, the security guard opened the double gate but failed to notice that one gate did not lock properly. While the missile was passing through the gate, the wind evidently caused the unlocked gate to strike the missile wing support mechanism at the tip of the leading edge of the wing. There was no damage to the transporter, but the missile wing was damaged to the tune of an estimated 10 manhours to repair.

This accident was caused by personnel error, in that the gate security guard failed to properly secure the gate. Also, there was supervisory error because the gate security guard did not have a written SOP to govern his actions. Further, the gate security guard had not received a verbal briefing on his duties and responsibilities.

Gate security guards now have a written SOP which they are required to read and initial prior to start of guard duty. This SOP contains a note which requires guards to insure gates are locked prior to allowing vehicles to proceed.

Lt Col John A. Worhach
Directorate of Aerospace Safety

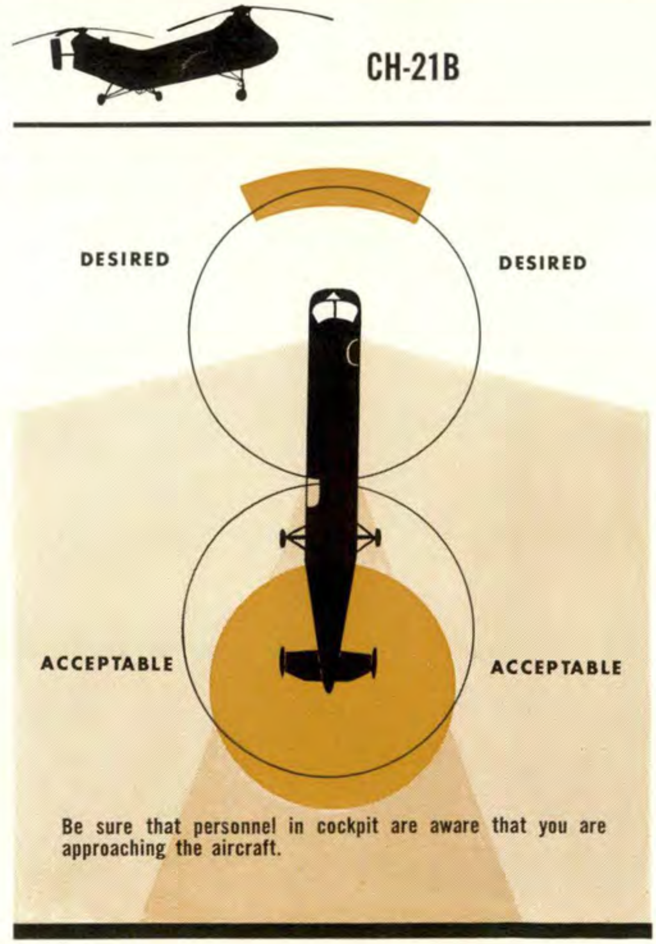
DROPSY. An AMA team had completed its work on the silo door mechanism of a Titan II complex and were descending on a portable ladder to Level 1 of the launch duct. As one technician descended, he carried in one hand an unsecured pneumatic drill with bit inserted. As might be expected, the drill slipped from his grasp, falling through an opening in the work platform, richochetting off various protuberances before it came to rest on a thrust-mount at Level 7. A check revealed that in its fall, the drill had dented the electrical conduit and autogenous line cover of the missile in five places.

In one respect it can be said that this was a lucky mishap—that it didn't strike the missile skin proper—perhaps only a few inches making the difference between a mishap and an accident.

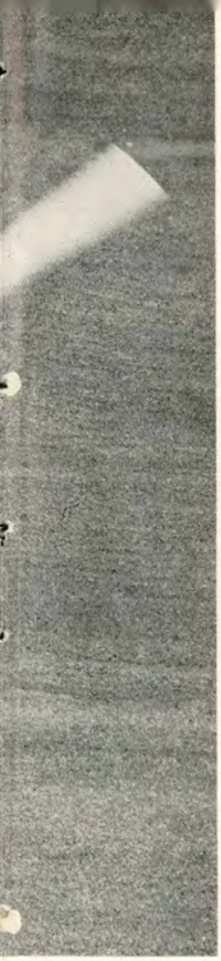
The need to brief an experienced technician on how to move equipment from one level to another may not always be this obvious. Nevertheless, as shown by this example, even the most experienced people sometimes become careless because they may not be thoroughly familiar with their working environment. Personnel should be thoroughly briefed on the handling of equipment in missile environs, emphasizing that unless equipment is small enough to be safely secured to the person, it will not be carried when climbing from one level to another. ☆

Maj Kearn H. Hinchman
Directorate of Aerospace Safety

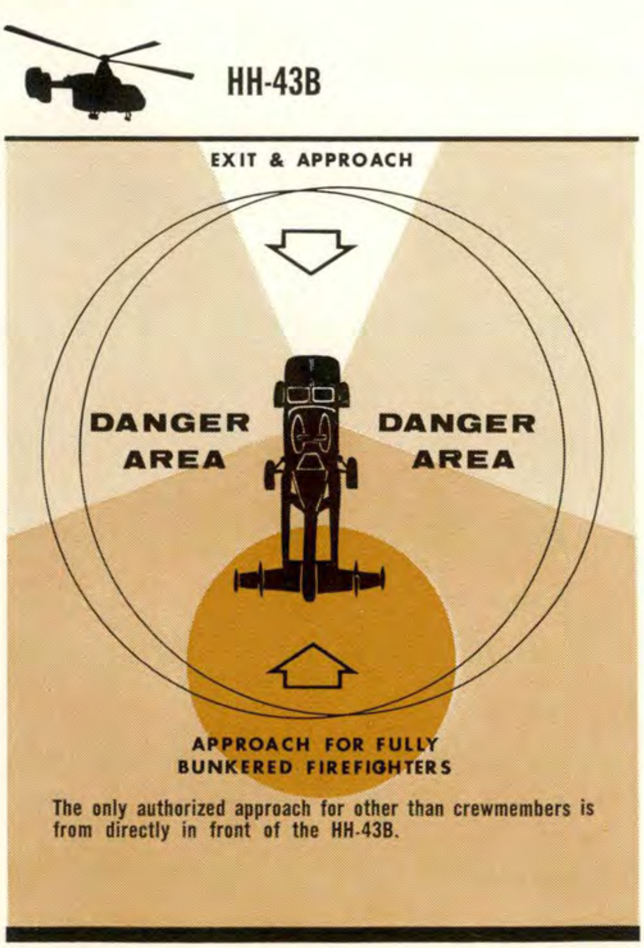

UH-19B
DESIRED
ACCEPTABLE
ACCEPTABLE
PROHIBITED
PROHIBITED
DANGER
Be sure that personnel in cockpit are aware that you are approaching the aircraft.


CH-21B
DESIRED
DESIRED
ACCEPTABLE
ACCEPTABLE
Be sure that personnel in cockpit are aware that you are approaching the aircraft.

CHOPPER ZONES



How do you safely approach a helicopter when it's running? From the front? Rear? Side? Does it make any difference whether the bird is an H-19 or a CH-3C? The editors didn't know and a few cautious questions revealed that there are a lot of others just as ignorant. So we wrote to the helicopter school at Stead AFB, with the results shown on these two pages. Our thanks to Major Donald E. Post, Director of Safety, Hq 3635 Flying Training Wing, Stead AFB, for arranging for this material. As a suggestion, these pages might be posted in a prominent place for all to see. — Ed. ☆



The only authorized approach for other than crewmembers is from directly in front of the HH-43B.

Be sure that personnel in cockpit are aware that you are approaching the aircraft.

Changing the Flight Manual is not difficult. The Chief of the Flight Handbooks Office tells how.

Lt Col Edwin B. Gilmore, ASD, Wright-Patterson AFB, Ohio

I have read with considerable interest (and some slight irritation) several articles which point out weak points in the Flight Manual, or Dash One, of the aircraft being written about.

It is understandable that these weaknesses should creep into, and be pointed out by, the pages of various magazines because the system of submitting Flight Manual "squawks" is not very well known. The fault for this lies, probably, in the office of the Flight Manual Manager. He is being blamed here because he has inserted into the Foreword of every Flight Manual specific directions on how to request changes, ask questions, or obtain other information, and has been naive enough to believe it would be read.

Sometimes, the Flight Manual Manager suspects that the Dash One is considered as a tool to be used by accident investigation boards to assign responsibility for an accident, and by the pilot to find a loophole to avoid that responsibility. After the above loopholes are found, requests arrive for supplements to the manual. A face-saving request received recently, asked that a statement be included in the Dash One to state, in effect, "Do not throw your landing gear safety pins into the jet air intake to preclude damaging the compressor blades." (This warning actually appeared, but worded so as to take out the implication of stupidity).

How do you get your suggestions into the Flight Manual? The last paragraph of the Flight Manual Foreword asks for your comments. You will note that it says "through your command headquarters." This means through channels for coordination. Complaints from the field that have not been coordinated by the various agencies require much study and must be returned to the command channels eventually because, logical as the suggestion is to the reader, the overall mission of the command may be compromised if the change is accepted. The total effect of not submitting through channels is to delay adoption of the suggestion for at least three months. Nevertheless this office still welcomes your remarks. If a unit bypasses normal submission channels consistently, it is reminded of its responsibilities (one such reminder backfired, and we were accused of non-support of our own system). Submission of a squawk to the Dash One does not automatically indicate acceptance for publication.

To sum up: The Flight Manual is YOUR book. Ignore it and it will die, and you may also. If you know where it is weak, tell us, don't spring it on us through the pages of another publication.

AFM 60-1, revised 15 May 1964, contains the latest form for submitting Flight Manual Changes (AF Form 847, which is standard for TAC, PACAF and USAFE and appears in AFM 60-2). We'd prefer the AF Form 847, but we will start acting on any suggestion, no matter what form it is written on, even if it's on a lunch wrapper. ☆

This year, in an effort to get a new angle into the winter hazard story, we went north of the border and searched for tips on winter operations from the pages of the RCAF's Flight Comment magazine, As could be expected, the winter environment reacts similarly on all aircraft, regardless of insignia. Their problems are the same as USAF problems under comparable conditions. But because a review is good for all, and for many provides something new, let's glean away. In the vernacular of the call of the lead character of their bird watcher's corner.

WINTERSFULLOFHAZARDS

WINTERSFULLOFHAZARDS
WINTERSFULLOFHAZARDS

ICED STATIC PORTS

This one the Canadians picked up from TAC's *Attack*.

I had heard that the T-Bird static ports would ice up, but really hadn't given it much thought until today.

We were in it solid all the way down and picked up the usual ice on the windscreen. Nothing serious. GCA picked us up and cleared us to 2500. We leveled at that altitude and 190 knots, picked up the boards. We were getting more ice and I decided we would be better off under the clouds. I asked GCA if they could drop us down a bit. They said they could, and cleared us to 1500. At 1500 we were still in the soup and

CONTINUED ☞

Pilot of CF-101, shown on previous page inverted in snowbank, is removed from aircraft. Crew spent 10 minutes buried in snow before rescue crew got them out.

still picking up ice. GCA told us to descend to 1000 and since I had the gear down by then, I eased the stick forward and reduced power but got no indication of a descent. Nothing changed. Airspeed was steady on about 170 and the altimeter was on 1500.

I knew I was below 1500, but how far below? Even if I'd been expecting this to happen it would've been a shock.

I increased power to 85 per cent to hold the descent and the airspeed jumped to 200 knots. I used the attitude indicator to establish a climb . . . at least I hoped it would be a climb.

Really, thinking back, we didn't have too much of a problem. We had plenty of fuel and our alternate was quite good. I could've climbed back up and gone to my alternate, which is what I was starting to do when I broke out.

FROZEN CONTROLS

A transport was descending to its home base at the completion of a transatlantic flight when the captain noticed the elevator control was becoming progressively stiffer until finally, at 2000 feet, it locked solid. He could control the aircraft using elevator trim but the response, of course, was much slower. Without telling anyone of his problem he decided to land, using trim and power.

Fortunately, the landing turned out OK, but we think he took quite a chance. There is a strong possibility that something could have upset the final approach so that the trim would not have given sufficient or quick enough elevator response to prevent a fatal accident. The aircraft has free-floating controls, and therefore an artificial feel system is incorporated. However, if this system should fail, manual can be selected so that control is not lost. In this case ice in the artificial feel system caused the apparent locking of the elevators and so if this had resulted in a fatal crash, the most diligent accident investigation board would probably never have discovered the cause.

As this incident occurred near home base it is most difficult to understand why the captain did not declare an emergency and request technical advice through the tower. Surely, after a consultation, the aircraft would have been landed with the controls in manual and therefore no unnecessary risk.

INVERTED AT ZERO FEET

Snow plowing had been in progress 12 hours before flight time but considerable drifting from a strong wind retarded clearance. Finally, the north half of the runway (for the full length) was reasonably clear except for windrows of snow. It was decided that this would not seriously hamper takeoff and two sections of CF-101Bs were cleared to go. It was hoped that the runway could be entirely cleared by the time the aircraft returned. However, by the time the first section was on its way back, there was still a ridge of compacted snow about 18 inches high, six to eight feet wide, down the entire length of the runway just south of the centerline. The north side was reasonably clear, but covered with loose snow.

Luckily the first two pilots landed without mishap but the leader experienced a bad skid which he was only just able to control. He advised the tower of the snow ridge with the comment "Just about bought the farm." In spite of this, no action was taken to close the airfield and the second section was not even warned of this extremely hazardous condition.

The leader of the next section executed a GCI-GCA to runway 09. With just under 6000 pounds of fuel, he calculated his approach speed to be 190K and touchdown

speed 170K. The aircraft broke out of cloud just after commencing final descent at six miles. The pilot could not distinguish the runway ahead due to a white-out condition. At about 2½ miles the runway became visible and the pilot observed that the north side appeared reasonably clear but was snow covered and that the south side had not been plowed. The aircraft touched down with 4800 pounds of fuel at 170K on the north side of the runway. The pilot immediately deployed the drag chute and the aircraft began to "weathercock" into the 20 mph crosswind which induced a skid to the right towards the center of the runway. He was unable to control the skid and jettisoned the drag chute in an attempt to correct the swing. He then lowered the nosewheel to the runway and tried to control the aircraft with nosewheel steering. However, it was to no avail and the aircraft continued skidding sideways until the right main wheel contacted the snow ridge.

The ridge of snow, acting with considerable force on the right wheel, caused the aircraft to swing around sharply to the right so that the aircraft now began skidding towards the side of the runway, left wing first. The pilot flamed out the engines but could do nothing to control the aircraft. The extreme side loads broke off the nosewheel and then the left main wheel so that the port wing dug into the snow. This caused the aircraft to flip on its back in a five-foot snowbank on the south side of the runway. The navigator noticed the airspeed as 125-135K. The momentum carried the aircraft on its back 150 feet before it finally came to rest, 3300 feet from touchdown.

The pilot and navigator found themselves upside down, uninjured, still strapped in their seats and in total darkness. The cockpit was buried completely in snow but the windscreen and canopy were still intact. The navigator, had the presence of mind to set his stop watch when they first came to rest. It took exactly 5½ minutes for the crash crew to reach the aircraft and start digging in the snow. They broke the canopy with axes and in another five minutes had both the pilot and navigator safely out. The speed and efficiency with which the crash crew worked is indeed commendable.

This rather spectacular accident was assessed "Ground-Air Traffic Control." There was no element of pilot error because the pilot had not been warned of the runway conditions and once the swing started, there was absolutely nothing he could have done to control it. On the other hand, Air Traffic Control personnel who were continually monitoring the snow removal operation were well aware of the runway condition and should have declared the runway unserviceable. ☆

Pilot was not warned of compacted snow ridge on runway. Picture above shows result.

WINTER CHECKLIST

Finally, to wrap up this north of the border report on hazards of winter operations, we reprint a checklist that Flight Comment published last winter.

FLIGHT PLANNING

- Clothing and Survival Equipment.
- Sun Glasses.
- Runway conditions and braking action,
  Base of departure,
  Destination.
- Icing conditions require more power (fuel).
- Check pilot reports.
- NOTAMs on obstructions and hazards.

PREFLIGHT

- Preheat batteries, APU's, engines.
- Airfoils free of ice, snow and frost.
- Static vents and drain holes clear.
- Microswitches free of ice.
- Anti-icing and deicing equipment.
- Ice grip chocks.
- Wheels and brakes not frozen.
- Operate flaps and controls full travel.

GROUND OPERATION

- Ground handling equipment and vehicles clear of the aircraft.
- Oil temperature and pressure limits.
- Taxi slowly-nosewheel steering less effective.
- Avoid throwing slush and snow over aircraft surfaces on runup.
- Watch for sliding during runup.

BEFORE TAKEOFF

- Re-check flight controls—unlocked and full travel.
- Instrument letdown plates available.
- Navigation radios tuned.
- Flight instruments—set for departure procedure.
- Takeoff data—computed for existing conditions.
- Brief crew on departure.

TAKEOFF

- Do not overboost engines.
- Check nose steering after lift-off for indication of frozen strut.
- Exercise wing flaps and gear.
- Make radio calls when safe to do so.

CRUISE

- Operate flight controls and trim tabs periodically.
- Pilot reports on conditions.

APPROACH

- Obtain weather and runway data Temperature and braking action.
- Check landing data for actual conditions.
- Brief crew on approach.
- Clear windshield.
- Ask tower for obstruction briefing.
- Cross check altimeters throughout aircraft.
- Copilot call altitudes on descent.

LANDING

- Landing flap setting to prevent slush damage.
- Use reverse thrust judiciously.

PARKING AND SECURING

- Use wing walkers if ramp markings are obscured.
- Taxi cautiously.
- Oil dilution requirements.
- Ice grip chocks in place.
- Release brakes to preclude freezing.

the COLD, COLD FACTS

E. R. Roth, Directorate of Aerospace Safety

The accompanying picture of a Minuteman site expresses better than words the problem of keeping sites sufficiently free of snow and ice during the winter months ahead. By now those responsible should have checked cold weather operating instructions and snow removal plans; reviewed past mishaps caused by adverse winter conditions; assured that proper clothing and equipment is available; and trained personnel in winter hazards and precautionary measures so that accidents will be prevented.

A cross section of previous missile mishaps related to winter season operation and maintenance functions should serve to illustrate what happens when we fail to observe simple precautions. Some of the examples also point out winter type facility design deficiencies.

Minuteman - LGM-30

Instrument air lines from the compressor to the brine chiller moisture accumulator and to the lower level equipment room electrical surge arrester (ESA) area in the launcher have been found blocked with ice. In the former, the moist air in the line froze because the air line was attached directly to the building roof with no insulation between the line and the roof. In the latter, the 45 feet of conduit that contains the air line was buried in the ground above the frost line and sealed at both ends. Proposed actions included lowering the air line in the soft building, removing the caps at both ends of the conduit and removal of ESA panel to permit warm air flow through the conduit. In addition, emphasis was placed on purging water from the drain line as per T.O. 21SM80A-2-7.

Hound Dog - AGM-28B

An airman lost his grip on a wet, icy engine screen; it fell and damaged the leading tip of the nose cone deicer.

While transporting a missile, the trailer slipped into a rut in the snow and struck a Coleman tractor. The exhaust cone had to be removed and replaced.

Falcon - AIM-4A

During transfer of the missile from the coffin to the handling frame, an airman slipped on the ice. As he fell, the missile hit the ramp, denting the stabilizer. In another mishap, the missile slipped from the handling bar back into the handling frame, damaging the fins.

Because of packed snow and ice, the uneven surface conditions contributed to a missile container sliding off the side of a pallet while it was being fork-lifted onto a missile trailer.

Titan I - HGM-25A

Ice and snow were lodged between the antenna door environmental seal, door hinge, and abutment in the trunnion area. The accumulation of the ice was attributed to a lack of positive pressure in the antenna silo (air intake malfunction in the powerhouse). This permitted water to drain into the area and freeze. During the antenna door operation, the environmental seals were dislodged and a large section of concrete broken off.

Atlas F - HGM-16F

Extensive maintenance was being performed in subzero temperatures (—11°F) with the silo doors open for over 24 hours and the missile in the up and locked position. An engine flush and purge was started but could not be completed because the purge cart valves froze. The launch platform was lowered but the silo doors were kept open pending arrival of a re-entry vehicle (RV). Several hours later, subsequent to closing the doors, it was noticed that the chilled water supply and return lines to the pod air conditioner quick disconnects had burst as a result of ice in the lines. Weather limitations were specified for propellant loading exercises (PLX), however, there was no guidance to limit maintenance operations due to the cold factor.

Several Atlas F incidents have been attributed to ice and snow accumulation in silo door hinge pivot well areas:

- During RV installation ice impeded silo door movement preventing it from coasting to the full 95 degree open position. Since the door did not reach the required overbalance position, it began to close slowly and contacted the underside of the MC-1 crane boom. As the door was reopened, the boom separated the RV from the missile. Fortunately, the RV remained attached to its cradle.
- In another mishap, the door

Like this Minuteman site, most missile launch facilities are located in a cold climate which presents a variety of safety problems for missilemen.

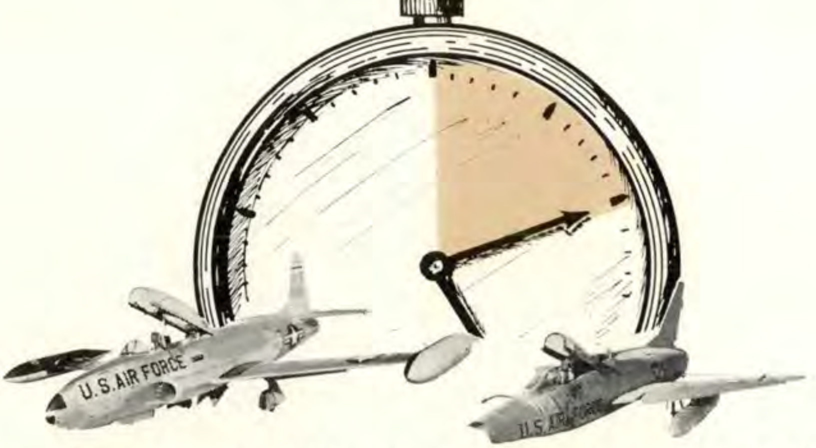
angle was deformed while the door was being opened. During door closing, the lip seal channel was stripped and the bolts sheared.

Winter storms can completely bury roads, vehicles, and facilities causing serious personnel hazards. At some locations, maintenance personnel and crews may encounter severe winter weather with temperatures below —20°F and winds exceeding 50 mph. When such emergencies occur, individual ability to survive depends on such factors as: availability of proper equipment and clothing, knowledge of survival techniques, preparation for environmental conditions, physical condition. Emergency rations should be provided as there is the possibility of being temporarily stranded in an underground launch control center (LCC).

The above examples are by no means all inclusive, but they do suggest a number of other-than-normal conditions that require pre-planning to prevent winter accidents. The following list of prewinter reminders may be helpful:

- Review existing snow removal plans. Insure that one individual is completely responsible for snow removal control and availability of equipment. Avoid the use of chemicals to melt snow and ice in the vicinity of launch sites. Chemicals tracked into silos and LCCs can cause corrosion. Use dry sand to prevent slipping hazards.
- Use care in handling smaller missiles (AGMs, AIMs, etc.) or their support equipment on icy surfaces. Take special precautions during lifting (fork lift) and transporting missiles on trailers. Proper tie downs and use of missile covers as specified are also important.
- Do not perform maintenance under conditions that will expose missile facility water lines to freezing temperatures.
- Keep silo doors free of snow and ice. Inspect and clean the door well hinge area prior to activating the door. Properly balance air conditioning systems to preclude moisture being drawn into the silo. Maintain protective covers in good condition.
- Purge air lines and other pneumatic lines to eliminate water, in accordance with T.O. instructions. Route such lines so they do not freeze. Ascertain that underground conduits are buried below the freezing line and that air line moisture removal equipment is located adjacent to instrument air compressors.
- Assure that personnel are warmly dressed; clothing should not restrict movement to the extent that proper job performance is jeopardized.
- Train personnel in winter survival techniques. Assure availability of protective clothing and survival equipment to mobile maintenance teams.
- Establish a plan or scheme for winter season operation to assure that an organized system is readily available to help personnel under other than normal conditions. ☆

TWO in TEN



From an essay by a student safety officer, Flying Safety Officer Course, Univ. of Southern Calif.

It was a cold, wintry, February day at an upper midwestern municipal airport. The average annual snowfall in that part of the country is around 40 to 45 inches. However, the winter was a very unusual one and the snowfall had already reached well over 60 inches. In the previous week, there had been six inches of snow which did not get removed prior to some aircraft landings and quite a bit of vehicular traffic. As it turned out, when the snow removal crews did get to work on it there was a layer of ice and snow firmly packed on the runways.

The two runways concerned here were Runway 35, 150 feet wide and 6600 feet long with no overruns, and 31, 150 feet wide and 9000 feet long with 1000-foot overruns on each end. Since the airport was municipally operated, it was maintained by civilian personnel. Their equipment consisted of some excess plows and blowers which were given to the city by the USAF when they moved off the airport several years earlier. Consequently the machines were not in the best of shape.

One day I was assigned a T-33 transition ride with a pilot who had not flown in over two years. He was new to our squadron and I was given the job of checking him out. Bob had arrived at operations at about 1000 hours that morning and after the coffee and bull session we started to brief for a 1400 takeoff. Due to the runway condition I had changed the mission to instruments. He had only two previous rides in the front seat and I didn't feel that these were the type of conditions in which we should be shooting landings. Because of bad weather around the area, I had decided we would stay in the local area and practice instrument departures and recoveries. With a full fuel load we could get four or five approaches and still have enough fuel to make it to an alternate if necessary.

Because of the very poor braking action, we would be the only ones airborne from the squadron. I say very poor in reference to the U.E. aircraft which were F-100C's. I don't recall at this time what the stopping distance for a T-33 would be under these conditions, but the 9000-foot runway was very adequate. However, to stop an F-100C with ice and snow on the runway requires 7000 feet if the drag chute works, and 9800 feet if it doesn't! The length of the runway left no room for errors. Fortunately we weren't too far behind on training requirements, so felt it wise to cancel F-100 flying for the day.

At about 1300 I called the weatherman and he assured, as best he could, that the weather would remain good with a 3000- to 4000-foot ceiling and no less than five miles visibility at the worst. This would be in snow showers and for short duration. I copied his forecast and filed a clearance with the local FAA Tower.

At about 1340 I was cranked up and ready to taxi. I called the tower for taxi and takeoff instructions and my ATC clearance. I was cleared as filed and instructed by the Center to remain on local approach at all times. The takeoff runway was 13 and I was cleared from the squadron area up Runway 31 into position. This gave me the opportunity to taxi the full length of the runway and see the condition it was in.

As I taxied northwest I noticed high snow banks on both sides of the runway but thought no more about them. I continued on up the runway and was cleared into position to hold and advise when ready for departure. A few moments later I was cleared for takeoff and started my takeoff roll.

We broke ground at the right distance and were soon in the weather and climbing to VFR conditions on top. We broke out at 12,000 feet and continued our climb to 20,000. By the time we reached 20,000 feet, we had been cleared right back down on a standard VOR penetration and an ILS approach. Everything was uneventful and as we executed our approach we were cleared back to VFR on top. The weather had been just as the forecaster had said so we were given approval for another penetration.

This time everything seemed the same except that in the penetration turn I noted that the ceiling had lowered 800 - 1000 feet and a snow shower was just a little further out. I couldn't tell the direction of its movement but I wasn't too concerned anyhow. After we made another missed approach and were climbing out, I heard "Stagger 13" call in for a penetration and landing instructions. "Stagger 13" was an F-100 that had been stuck at an alternate for about five days due to the weather and runway conditions. After I took off he called and asked whether he should come home or wait a little longer. The decision was made to take a calculated risk and let him come home.

The aircraft was due to go to IRAN and the maintenance officer was a little anxious to get it home.

"Stagger 13" was cleared for a penetration and approach to Runway 31. The weather was 3000 overcast and 10 miles visibility and the wind was northwest at 10 knots. "Stagger 13" penetrated and broke out underneath at 3000 feet and had to fly VFR to burn out fuel prior to landing.

I was then cleared for a penetration. As we got below the clouds this time we decided to stay VFR underneath and shoot ILS approaches. During the penetration I noted that the snow was becoming more general and that it appeared to be all around the area. As I reported this to the tower, they told me that it was snowing very lightly at the field also.

I was getting light on fuel and decided to go ahead and land. I called the tower and was given Runway 31. I turned initial a few minutes later and as I turned base I was broken out of traffic for a light airplane. I took it around and on the go noticed that it had started snowing quite a bit harder. As I was on the go, the tower gave me Runway 35 with instructions to expedite and let the F-100 in on Runway 31. I thought for a moment and said I would accept 35. I turned initial, broke and reported on base leg with "gear, brakes and pressure." I knew that, since Runway 35 was only 6600 feet long, I would have to be accurate on my touchdown point. I was shooting for the first 500 feet. The snow in the final approach area was about six to 10 inches deep about a mile out and rose to 39 inches at the approach end of the runway.

During the snow removal process, apparently no thought was given to the overrun or approach area.

As I turned final and started to let down, I could not see the change in depth of the snow. Just after I felt the throttle hit the stop and I had settled down to the job of landing, I felt a tremendous thud and was thrown against the shoulder straps. The next thing I realized the aircraft was sliding down the runway minus the nose gear. Fortunately there were no injuries to either of us other than a strained neck for me.

I got the engine shut down and was out of the aircraft by the time the emergency equipment arrived. The pilot in the back seat was also out and shaken up just a little. The flight surgeon arrived and was putting us in the ambulance for the trip to the hospital and the normal post accident checkup when the F-100 was turning final for his landing on Runway 31. We stood there and watched, because at best we knew he would experience a *little* difficulty due to the runway condition.

As he rounded out he looked good from our position; however, the same thing happened to him that had happened to me. His depth perception played tricks on him and the next thing we saw was what appeared to be an explosion in the snow. It was the F-100 hitting 325 feet short in two feet of snow. He slid 8000 feet straight down the runway minus a nose gear.

This sequence of events happened over a 10-minute period, thus it was entitled "2 in 10."

Some of the things that were brought out in the accident investigations were that we should not be so complacent about the snow, even though we deal with it for about five months out of the year. Second, maybe a closer look at our snow removal procedures was in order, and third, don't let get-home-itis get the best of us. ☆

An Air Weather Service specialist explains why we need

APPROACH ZONE PIREPS

Maj Wilson V. Palmore, Air Weather Service

"A pilot will make inflight reports to the appropriate agency (approach control, GCA, or tower) when an IFR approach is made to an airfield and the weather conditions are noted to be below minimums or to differ appreciably from the last official observation received. Reports will include an estimated value of conditions encountered, which will be immediately sent to the weather station by the receiving agency." So reads paragraph 29b of AFR 60-16A.

Presently, surface observations are taken at a fixed point on an airdrome. At USAF bases the observing point is selected to give the best possible view of conditions pilots will encounter on the approach. Observing instruments have been located in approach zones and beside runways to give representative observations. (At most USAF bases equipment for measuring ceilings, visibility and surface wind are located at the approach end of each runway with precision approach.) Air Weather Service has made much progress to improve quality and quantity of surface observations. At present the entire function is being reviewed to improve observing procedures to present a more realistic observation to pilots for landings.

With all the advancements, the conditions encountered by a pilot making an approach may differ from the conditions reported to him. Why? There are numerous reasons: rapidly changing weather conditions, limitations of observing equipment, human limitations in interpreting instrument readouts, variability of conditions around an airdrome, slant range visibility as observed by the pilot vs. horizontal visibility measured on the ground, and restrictions to pilot's vision caused by windscreen construction, especially when exposed to snow or rain. Because of these factors, the pilot making an approach is in the best position to report the weather conditions in the approach zone. This is why pilot reports are required.

The approach zone PIREP satisfies two needs. It helps the weather observer and other pilots. Here is an actual case. The weather wasn't too bad for a European base — 800 foot ceilings and visibility two miles restricted by fog and drizzle. Two fighters were upstairs waiting to penetrate. Number one came down all right. Number two broke out to the left of the runway, tried a quick "S" turn, did not level soon enough and damaged the aircraft.

During the investigation the lead pilot said that during his approach he almost went around because his effective ceiling and visibility were not as reported. However, at the time, no PIREP was given. Other pilots said the same thing — at the investigation — but not during the actual situation.

From post analysis it appeared that the surface observations were accurate. The conditions were lower in the approach zone. This information would have been most valuable to the number two pilot.

You will note that the approach zone PIREP should be given to the appropriate agency controlling the approach. In this manner they can immediately pass the word to other pilots awaiting an approach. The controllers are then required to pass the word to the weather station.

Other sub-paragraphs of 29 require PIREPs under other circumstances. At this time we only want to clarify one other problem area. When making an approach your PIREP should be made to the controlling agency; after landing talk it over with the forecaster. In flight, your reports should be made to a forecaster over PFSV or to an FSS. These two agencies can enter PIREPs into weather teletype networks. It is not a duty of ARTC personnel to collect or transmit PIREPs. If they receive a PIREP and have time they must call the report to a Weather Bureau or FSS facility before the report can be entered on the weather network. ☆

False Security

Lt Col Garn Harward, USAFE

How many times have you received a route weather briefing like this? "Generally good weather can be expected for route of flight except for an area of a few thunderstorms."

You accept this weather picture with glee and proceed enroute on an IFR flight plan. The FAA Air Traffic Control Center keeps close tab on your whereabouts to insure that you will not meet another IFR flying machine coming in the opposite direction. Provided your aircraft is above all the rock-filled clouds, about the only hazards you are likely to encounter are birds, areas of severe turbulence, or thunderstorms with hail.

Are we, as pilots, becoming too complacent about enroute weather while under the control of ARTC? Do we fully understand the primary responsibility of FAA Air Traffic Control and their capability for vectoring aircraft around or through areas of weather hazardous to flight?

Examine with me a recent accident in which the aircraft disintegrated as a result of severe turbulence with a loss of all personnel aboard.

The pilot had received the weather briefing as stated above. The APS-42 airborne radar was inoperative; however, based on the forecast weather, this would not ground the aircraft, which departed on an IFR flight plan during the hours of darkness and under the control of ARTC. (Thirty minutes prior to the accident the Weather Bureau issued a severe weather warning which was broadcast over the VOR stations. It is not known whether the pilot heard this broadcast.) When the pilot requested information from ARTC concerning possible thunderstorm activity, he was advised of some precipitation to the east of his position. However, the intensity of the precipitation was unknown. When he reported "heavy precipitation and moderate turbulence" a clearance was approved to divert off course around the storm area. The Center replied that the aircraft was evidently encountering something not observed on the FAA radar scope.

We know the results: total disintegration of the aircraft. We immediately ask, could this accident have been avoided? And many other questions such as, what is the responsibility of ARTC? Was the severe weather area known to anyone? If so, why wasn't the aircraft vectored around it. Did the pilot query Air Force Metro on en route weather conditions? Did the pilot monitor en route weather broadcasts?

The normal and accepted procedures of ARTC radar identification and subsequent radar vectoring to circumnavigate storm areas encourage pilots to reply almost completely on the ARTC radar. However, even though various FAA control facilities are equipped with radar they may not have the capability or be in a position to *provide assistance* for circumnavigation of a severe weather area. That FAA is not *primarily* responsible for vectoring aircraft away from severe weather areas may come as a shock to most pilots. (Note: Air Traffic Control agencies are not required to utilize their radar in the normal mode which will paint most areas of heavy precipitation. Normally, in order to better control traffic, radar is used in the beacon mode; therefore, pilots must realize that weather conditions may not be known by the controller. Pilots must not become apathetic and assume that their aircraft will be vectored around thunderstorms along their route of flight.) The weather information relayed to the pilot by ARTC is based on in-flight reports from pilots, Weather Bureau forecasts and radar, which detects only the heaviest precipitation areas.

FAA has the primary responsibility for control of all aircraft on IFR flight plans and also to advise pilots of *known* or forecast severe weather. As a secondary function, it also provides assistance for circumnavigation of severe weather areas when they are *known* to the controller. Due to the limitation of the control center radar in identifying severe weather areas and the primary responsibility of aircraft separation, weather advisories through this medium will not always provide the pilot with the actual weather picture along his route of flight. Until such time as all controlling agencies have the radar capability and/or effect the necessary coordination for advising the pilot of a hazardous weather condition, aircrews must:

- Monitor the scheduled weather broadcasts on FAA stations;
- Request the controller to keep them advised of any severe weather;
- Query the nearest Air Force Metro for an up-to-date weather briefing along the route;
- If a visual observance indicates a severe weather condition, take an alternate route or make a 180-degree turn before it is too late.

Under the present system, the primary responsibility for en route weather analysis remains with the pilot. Until such time as the system is changed, weather advisories forwarded by control centers are only as realistic as the Weather Bureau forecast and preceding pilots make them. ☆

Aerobits

EJECTION FROM THE F-102. When an F-102 pilot is confronted with a situation requiring ejection the success of past experience should provide confidence in the reliability of the egress system. With the realization that we do not have a zero-zero capability, even with the present rocket catapult (installed in some aircraft), the following F/TF-102 ejection experience is significant.

Year	F/TF-102 Ejections	Number Successful
1957	6	5
1958	8	7
1959	14	13
1960	8	6
1961	15	14
1962	19	18
1963	18	14
1964 (6 mos)	4	4
Total:	92	81

The definition of a successful ejection as used in the above tabulation is an ejection that does not result in a fatality. With this fact in mind, a look at the 11 fatal ejections during this seven and one-half year period reveals the reliability and capability of the system.

The 11 fatal ejections were as follows:

Eight pilots attempted ejection at or below 500 feet and were fatally injured.

One pilot ejected between 500 - 600 feet, but did not separate from the seat since the lap belt failed to open.

One pilot ejected at 8000 feet but was drowned at sea.

One pilot ejected above 5000 feet at high speed in a near vertical dive and was fatally injured — probably as a result of being struck by the seat.

The conclusions are obvious — if you have sufficient altitude when you eject you'll probably be back on alert the next day.

Ejection experience of those F-102 aircraft equipped with rocket catapults reveals essentially the same success rate as that of ballistic catapults. Twelve of the 92 ejections were made via rocket catapult. Ten of these were succssful. The two unsuccessful attempts were made below 500 feet and are included in the figures shown above.

There have been some questions regarding rocket catapult ejections in the TF and the possibility of burns sustained by the second pilot to leave the aircraft. Our records show that one TF equipped with rocket seats has been successfully abandoned in flight. The second crewmember to eject was not adversely affected by the rocket blast of the first seat.

This brief summary of ejection experience again emphasizes the necessity of not delaying a decision to eject. At least 2000 feet above the terrain is MINIMUM recommended ejection altitude when conditions permit. (Controlled emergency above 2000 feet.)

Engine failure on takeoff or on final, however, will not necessarily allow this comfortable 2000 feet minimum ejection altitude. The decision to eject in a situation such as this depends on the varied circumstances at hand. The success rate for ejection from the F/TF 102 at or below 500 feet reveals that 13 pilots have tried it and only five have been successful. Tests and some actual ejection experience have shown that successful on-the-runway ejection is possible with a 120 knot forward speed. However, it must be emphasized that this is predicated upon ideal conditions of flight such as the aforementioned forward speed, proper aircraft attitude and proper functioning of *all* components of the escape system. When a choice of ejecting at higher altitude is available, it is totally unrealistic to delay the decision in order to comply with the emergency minimums in the Dash One.

A high impulse rocket catapult is presently under consideration for installation in all F-102 aircraft. We are lending full support to this program; however, until such time as F-102's are equipped with a proven zero-zero system, the emergency minimums stated in the Dash One are, and must be, considered a last resort measure.

Capt Vernon G. Knourek
Directorate of Aerospace Safety

BE WELL-DRESSED. The average Air Force pilot is a pretty well-dressed guy. He spends lots of money to maintain a good-looking uniform for all occasions and in addition, maintains a complete set of civilian clothes for off-duty wear. Another complete set of clothes is provided by the Air Force for wear while flying.

It seems a real shame, then, that some of us refuse to be properly dressed for the occasion. Oh, I'm not referring to the Mess Dress required for certain formal occasions. No officer would ever show up out-of-uniform for a Dining-in. He wouldn't run the risk of an on-the-carpet chewing by the Old Man. But if he were to show up improperly clothed for flying it could be much worse — it could be his life.

Illogical as it would seem, it's done.

An Air Force pilot from one of our northern bases is still missing as a result of an accident in which the other crewmember spent 14 hours in a survival situation in snow-covered rugged terrain prior to rescue. The accident report states the missing pilot was not properly dressed to allow himself maximum protection under arctic conditions.

Regardless of the reason, whether it be lack of action on the part of supply personnel, personal equipment types or your commander, or simple individual carelessness — it would be a shame to lose your life because you were not "well-dressed."

Major William R. Detrick
Directorate of Aerospace Safety

AIR MOISTURE vs. ENGINE THRUST . . . Controversy sometimes arises as to whether more jet engine thrust can be obtained from moist ambient air or dry ambient air. The answer can be found by comparing the molecular weight of dry air and water vapor. According to Avogadro's hypothesis, a fixed volume of gas entering the engine inlet *at a constant temperature and pressure* will contain the same number of molecules regardless of the chemical composition of the gas. Because the molecular weights of water vapor and dry air are approximately 18 and 29 respectively, it can be seen that the greater the percentage of dry air, the heavier the inlet air will be. Since thrust increases with air density, more thrust can be obtained from a given volume of airflow on a dry day than on a humid day.

A question may also arise as to why water injection on the J57 engine increases engine thrust on a warm day.

On a hot day at a given throttle setting essentially the same volume of air will enter the engine as on a cold day. However, the decreased density of the air causes a loss in weight (mass) flow through the engine. To compensate for the reduced density of the air and corresponding thrust loss, water is injected into the engine during takeoff and initial climbout. The vaporization of water cools the air and increases its density. For a given volume of air a greater mass is therefore possible. More and cooler air entering the burner section permits more fuel to be burned before the maximum allowable temperature in the turbine section is reached. The combination of greater air mass and added fuel flow increases thrust.

Boeing Service News, Issue 286
July-August 1964

Aerobits

WHICH WAY DID THE RUNWAY GO? — As practically any pilot knows, a white concrete runway set in a surrounding of green grass and trees will stick out like a sore thumb. If the weather is clear with 50 miles visibility, even the old folks can dispense with bifocals to find the landing strip. But, what if a runway is surrounded by snow covered terrain, or is located in sandy desert area, or is a narrow asphalt strip located in dark green surroundings and the visibility is poor? Under these circumstances many airfields have runways which are hard to see all or part of the time, and the problem gets worse when an approach is made into a rising or setting sun.

Standard runway and approach lighting systems help to solve the runway recognition problem at night, but in broad daylight, when visibility is less than optimum, finding the runway can be rather difficult. It is not hard to find reports of pilots landing on a taxiway or on the ramp because of mistaken identity.

Is there a positive solution to this problem? The answer must be no; however, a suggestion, which has been tried with good results, is the use of strobe lights in daylight. A large number of military and civil airfields have been equipped with strobe light systems. They may have one or two flashing strobe lights at the approach end of a runway, or a much more sophisticated system of sequenced strobe lights that flash a path toward the runway threshold. If these lights are operated during daylight for some of the hard-to-see runways, pilots will be relieved of some of the mental burden involved in getting their airplanes safely back on the ground. The result may well be the prevention of an accident. The use of every aid to find a runway is essential, regardless of whether it is day or night, clear or cloudy. The cost of operating strobe lights is negligible when equated against prevention of an accident. TRY IT BEFORE YOU SAY NO!

Lt Col I. D. Rothwell
Directorate of Aerospace Safety

EXCHANGE OFFICER HONORED — A USAF pilot, Captain R. A. Burpee, has been honored with a "Good Show" in the RCAF safety magazine, Flight Comment, for his performance during a T-33 emergency. While giving a routine T-33 checkout, and on go-around from an instrument approach, a loud bang was heard, accompanied by severe vibration. Altitude was approximately 50 feet, airspeed was 140 knots, and the aircraft was just passing the upwind end of the runway. Captain Burpee took control, declared an emergency and nursed the aircraft into a gentle climbing turn, aiming for a low key position from which they could either bail out or make a forced landing. Captain Burpee was able to land the aircraft and investigators found that a piece of broken guide vane had caused considerable internal damage. ☆

Maj Robert D. Hale, Director, Operations
USAF Central Coordinating Staff — Canada
Ottawa, Ontario, Canada

WELL DONE

CAPT. ALAN L. LOMAX

318 FIGHTER INTERCEPTOR SQUADRON,

Captain Lomax departed McChord AFB on a low altitude intercept training mission. After completion of the final intercept, a climb was initiated to VFR on top with 3200 pounds of fuel remaining. Shortly thereafter he tried to trim out left aileron pressure and found that the aircraft did not respond to trim nor was he able to correct a right roll with normal stick force. Hydraulic pressures were 2900 pounds primary, 3300 pounds secondary. The use of both hands was required to prevent right roll while stick movement in other directions had no feel force. Then the control stick and flight controls began random movement as if someone were cycling the control rods in the engine bay. As the random flight control movement continued, stick movement aft of neutral became restricted. Captain Lomax could maintain level flight only by terrific force with both hands and then only for a short period since the force required rapidly fatigued his arm muscles. By removing one hand intermittently from the control stick and allowing some right roll to continue he was able to retard the throttle and reduce airspeed to 230 knots at 32,000 feet.

When different modes of operation were attempted with no affect, Captain Lomax left the mode switch in direct manual position and decided to attempt a landing at McChord. The aircraft seemed slightly more controllable as speed was reduced, although the oscillations continued for the duration of the flight and extreme stick forces persisted. When 50 miles from station speed boards were extended (with no affect on oscillations) and a reasonably controlled descent set up. Weather was 5500 feet broken with five miles visibility in rain. After breaking out of the overcast at 5500 feet he extended the gear normally and slowed to final approach airspeed for a simulated landing. He then determined that he had control enough to attempt a landing.

A right hand base leg was initiated four miles from the runway and different speeds and power manipulations were made in an effort to obtain a landing attitude. Captain Lomax was unable to get all the up elevator action needed, however, he was able to make a satisfactory landing and touched down 1500 feet down the runway. Captain Lomax's judgment and analysis of the situation saved a highly potent weapon system. Well Done! ☆

☆ U.S. GOVERNMENT PRINTING OFFICE: 1964 751-211/2