AUGUST 1965

AEROSPACE

SAFETY

UNITED STATES AIR FORCE

AEROSPACE SAFETY

CONTENTS

Lieutenant General William K. Martin	The Inspector General, USAF
Major General William B. Campbell	Deputy The Inspector General, USAF
Major General Jay T. Robbins	Director of Aerospace Safety
Colonel Charles L. Wimberly	Chief, Flight Safety Division
Colonel Willis H. Wood	Chief, Ground Safety Division
Colonel Edward D. Leahy	Chief, Missile Safety Division

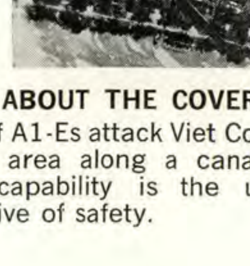
Editor • Maj Thomas J. Slaybaugh
Managing Editor • Robert W. Harrison
Feature Editor • Amelia S. Askew
Art Editor • David Baer
Staff Illustrator • SSgt Dave Rider

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. 20402. 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 informative and should not be construed as regulations, technical orders or directives unless so stated.

AFRP 62-1 AUGUST 1965 VOLUME 21 NUMBER 8

6th ANNUAL USAF SAFETY CONGRESS

Methods of preventing accidents throughout the Air Force will be the topic for consideration when the Sixth Annual Air Force Safety Congress convenes at Maxwell AFB, 10 August for a three-day meeting. Approximately 200 key Air Force command and safety personnel will attend the Congress and actively participate in working seminars. Attendees will delve into complex problems in the flight, missile, ground and nuclear safety areas in an effort to provide recommendations for resolving or reducing these problems. The agenda will include items from the Directorates of Aerospace and Nuclear Safety as well as safety subjects submitted by major commands.



ABOUT THE COVER

Pair of A1-Es attack Viet Cong barracks area along a canal. Mission capability is the ultimate objective of safety.

SAFETY TARGETS

"As accident rates get lower, accident prevention gets tougher." Obviously true. It is equally true that if we are to expect the present downward trend in accident rates to continue, we will all have to increase our efforts. The important question is, where do we best place our efforts in order to realize our safety goals?

The road of progress has invariably been constructed from new ideas, new approaches, new methods. I sincerely hope new and better accident prevention methods and procedures will be developed; and I strongly encourage the creative thinking of all of us to this end. However, while these new approaches are in the formative stages, let's take a good look at our known, tried and proven methods to insure they are being effectively employed.

We have a reporting system that includes UR's, OHR's, incident/accident reports, and 66-1 data, with hundreds of qualified and dedicated employees paid to analyze this information. However, what is the benefit of reports not submited or submitted incomplete? First, let's make sure we are submitting *all* of the pertinent information, *all* of the time. Second, let's have *all* echelons make a sincere effort at analyzing these data so that we may identify trends and detect soft spots.

There are a couple of other old "standbys"—Safety Surveys and Safety Councils. The good book tells us "Safety is a function of command." What better way can the commander place emphasis on safety than by insuring rigid, timely, periodic and unbiased safety surveys? How can he better display his personal interest than by organizing, and participating in, an effective periodically-convened Safety Council? Our surveys show that these programs tend to slip because of the pressures of other so-called "overriding requirements" or because of the belief that normal staff action will take care of the problem. Yet, the one big item most evident after we visit an organization is *the commander's safety interest and emphasis or the lack of it.* I strongly recommend that safety survey schedules be reviewed to insure they are properly scheduled and comprehensive and that the survey team is comprised of qualified personnel from all involved elements of the organization. Then ask yourself these questions concerning the Safety Council:

- Has it been regularly convened?
- Was the staff well represented?
- Were agenda items meaningful and pertinent?
- Was corrective action in order? Was it taken? Completed?

A Safety Council that lacks top level support and participation, or lacks solid, down-to-earth, pertinent agenda items can be a waste of time. Conversely, a properly directed program can bring to light some serious problems and can isolate and rectify some existing or developing accident potentials.

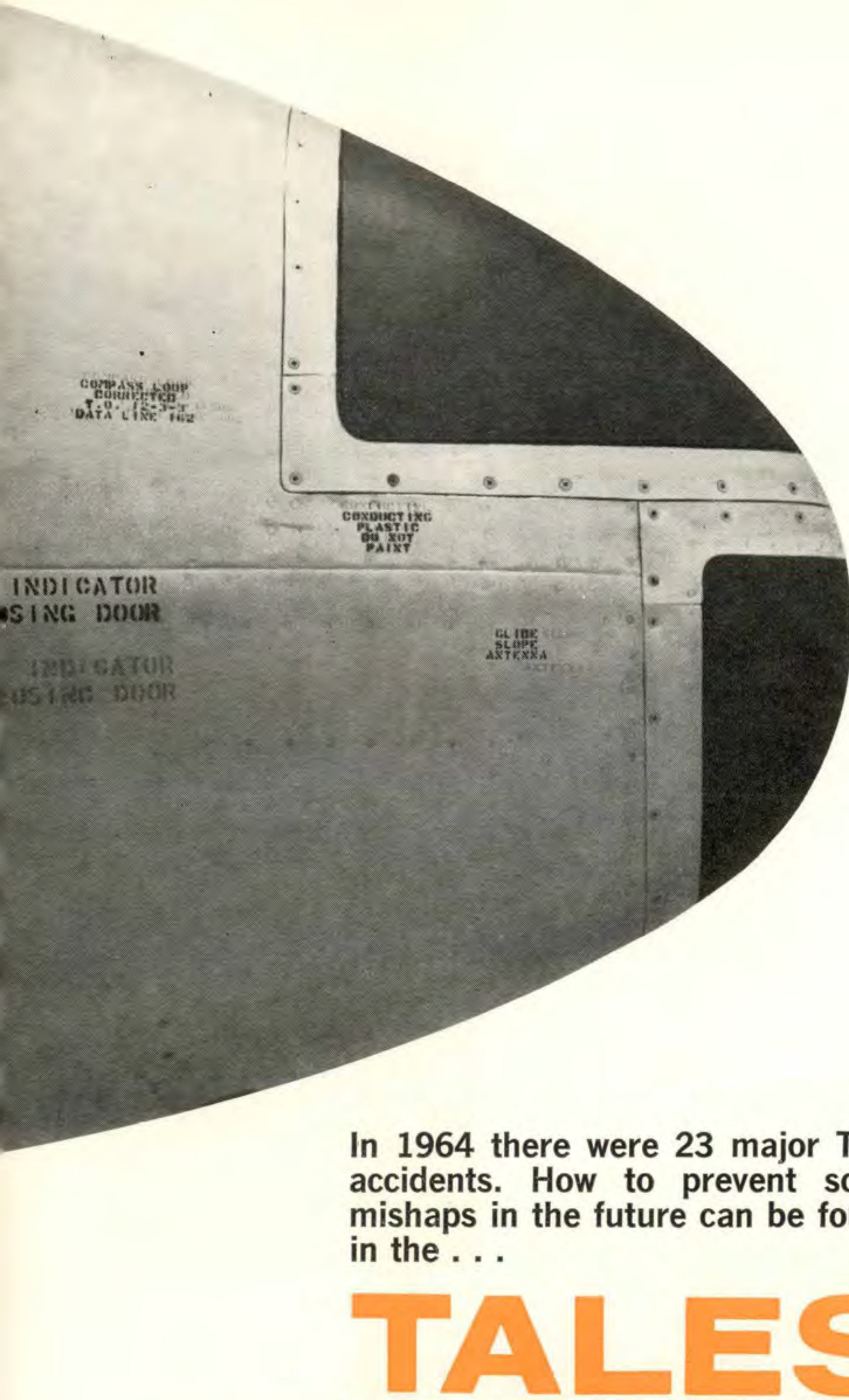
Another disconcerting item revealed by our surveys is the absence of a current Pre-accident Plan. This plan is an essential component of any dynamic accident prevention program. It should be tailored to the unit mission, capabilities, and facilities; then it should be periodically exercised, to insure prompt, effective response in the event of an accident. This plan should provide for the education and training of the accident board members as well as establish the *modus operandi.* In its true light, an accident is a failure of our accident prevention program. The pre-accident plan will not in itself prevent an accident, but it will set the stage for a better and more timely accident investigation. Good investigations give us a better insight as to the causes of accidents and the weaknesses of our preventive efforts, and indicate the need for improved design, or the requirement for better supervision and training.

This brings me to the last item on the list of accident prevention measures deserving special attention: *Safety training and supervision.* Just as pilots lose flying proficiency, individuals lose safety motivation and knowledge unless there is continuous re-emphasis and retraining. For a safety program to be dynamically effective, every supervisor must be aware of and analyze each function being performed by his people. He must ferret out the complex and possibly hazardous operations, then, insure that the necessary training, supervision and retraining is done so as to provide for the efficient and safe accomplishment of each function. To make safety training meaningful, and personnel responsive to the training presented, each commander will find it in his best interest to publicize his personal concern in safety. We know from experience that when the people get the word direct from the commander that safety is not a "tongue-in-cheek" exercise but a matter of vital concern to the Commander, the Air Force and the Country, they are understandably more responsive.

We cannot refute the fact that accidents are caused primarily by people. Of greater importance is the understanding that only people can prevent accidents. Therefore, it is axiomatic that an accident prevention program be dynamic and aggressive, and be of concern to and have the support of us all. ★

Jay T. Robbins

JAY T. ROBBINS, USAF
Major General
Director of Aerospace Safety



In 1964 there were 23 major T-33 accidents. How to prevent some mishaps in the future can be found in the . . .

TALES THE T-BIRD TELLS

Ubiquitous is the name for the T-33 but the old bird doesn't get around as much as it used to. The Gooney Bird of the jet set is gradually phasing out, but, although it's getting rather respectable in its old age, it had 23 major accidents last year.

The T-Bird is tried and, we have to admit, pretty true, but it just can't survive all the things people do to it – like the three times its crew flew it into the ground short of the runway. Or when the man in the rear disagreed with the man up front on takeoff. That one pranged on the runway after about two minutes of flight.

A glance at the cause factors can be revealing (Fig. 1). Percentagewise, pilot factor has remained roughly the same during the past three years and is down considerably from the 49 per cent in 1961. Maintenance factor, according to the figures, hasn't changed much in numbers but has advanced considerably percentagewise. Incidentally, two of the four accidents attributed to maintenance in 1964 occurred on the ground.

The big improvement is obviously in the Materiel column. Accidents caused by materiel factor have been reduced drastically, but this may indicate better maintenance and, possibly, better accident investigation. Curiously, the only two accidents in T-Bird history attributed to Other Crew Member occurred during 1964. We wonder too, so your guess is as good as ours.

Let's take a real brief look at those 23 major accidents last year; maybe there are some clues that will help prevent some future accidents.

The crew was making a night approach with 3000 ceiling, 2½ miles, light snow and haze. The aircraft hit a pair of unlighted radar antennae 600 feet short of the threshold, bounced a couple of times and touched down on the overrun. It finally stopped at the 3000 foot mark. The antennae were 78 inches high but extended only 1½ feet above runway level. PILOT FACTOR.

Shortly after the aircraft became airborne witnesses noticed a brief interruption in engine noise. Takeoff was continued and the aircraft was seen to make a climbing turn to about 600 feet, then enter a steep dive to the left and crash behind a cluster of trees. One pilot never got out and the other ejected too low. Cause. UNDETERMINED.

A student misunderstood the instructor and jettisoned the canopy in flight. The aircraft eventually crashed, although the IP ejected safely. Cause: OTHER CREW MEMBER.

During ground check of the engine by maintenance personnel, RPM increased rather than decreased during switch from normal to emergency fuel. After several attempts to adjust linkage, the fuel control was changed and another check made. Two start attempts with the automatic starting system failed to produce combustion. More trouble-shooting and an attempt at a manual start which resulted in an overheat condition and explosion in the aft section. MAINTENANCE FACTOR: engine technician did not turn off starting fuel switch when combustion occurred during manual start.

During left turn out of traffic, instructor and student noticed fumes and RPM decrease to 70 per cent and finally to 30 per cent with full throttle. Airspeed was maintained for landing and aircraft touched down 1260 feet short of the overrun. After shedding parts it stopped 20 feet short of the overrun and the crew evacuated safely. MATERIEL FAILURE, source unknown. The hose assembly between flow meter and starter fuel control had deteriorated internally and was the prime suspect.

During a night cross-country training flight, student returned to home base and said he would fly awhile to burn off fuel. Four minutes later he called and said he was in a spin. He never got out of the aircraft although he said he was going to. The aircraft crashed in a high speed dive. PILOT FACTOR (spatial disorientation).

The aircraft was taking off in a crosswind, visibility one-half mile, light and blowing snow, runway covered with puddles of water. At 115 knots the T-Bird got airborne but the attitude was not to the copilot's liking so he pushed forward on the stick. The man up front disagreed and tried to hold the attitude, whereupon the copilot retarded the throttle. The pilot reapplied power but the copilot had also extended the speed brakes and the aircraft came back down on the runway, sheared the pod, nose gear and left gear, took out some landing lights and finally stopped to the left of and 975 feet beyond the end of the runway. The crew got out safely. Cause: OTHER CREW MEMBER.

During a chandelle the nose got too high and during rollout the aircraft seemed to be about to stall. While attempting recovery the student pilot lost control and the bird went into a flat spin or tumble. When the aircraft passed through 10,500 without appearing to recover the pilot ejected. PILOT FACTOR.

During an SFO in an aircraft with chaff dispensers installed, configuration was throttle 50 per cent, 150 knots, gear and flaps up, speed brakes down. Speed brake switch in front was "down" and rear seat occupant was not advised to place his switch "up." Pilot made a tight turn to base and lowered flaps and gear. At this point the pilot decided he couldn't make it so he started a go-around. Throttle was advanced to full open and flaps retracted. A rapid sink rate developed and the T-Bird hit the ground in a full stall attitude 600 feet short of the overrun. PILOT FACTOR in that the pilot deviated from Dash One procedure.

After level-off at FL 290, power was reduced to 93 per cent with all instrument indications normal. Soon smoke filled both cockpits and the fire warning light came on. Throttle was reduced to idle and the fire overheat warning test switch actuated. Both lights illuminated and the fire warning stayed on when the switch was released. The crew ejected. Cause: UNDETERMINED. Most probable cause was Maintenance Error — the "B" nut on the fuel vent line was not properly connected.

During takeoff the controls "felt mushy" so the student pilot aborted at 110 knots 2000 feet from the far end. Barrier engagement with

PRIMARY CAUSE FACTORS

	1961	1962	1963	1964
Pilot	38	14	8	8
Other Crew	0	0	0	2
Supervisory	8	2	3	0
Maintenance	1	2	1	4*
Materiel	18	13	10	4
Undetermined	8	7	2	4
Miscellaneous	5	1	0	1
Other Personnel	0	0	2	0
Total	78	39	26	23

*Includes two non-flight accidents

TALES THE T-BIRD TELLS

speed brakes lowered was unsuccessful and the aircraft finally stopped 339 feet beyond the end of the overrun. PILOT FACTOR: takeoff was unnecessarily aborted. The student was not aware of the extended takeoff roll that would result from braking to obtain directional control.

When power loss occurred just after the aircraft became airborne, the pilot aborted. Throttle was placed at idle and speed brakes lowered in an attempt to get back onto the runway in time to catch the barrier. Touchdown was about 50 feet in front of the barrier at 125 knots. The speed brakes deflected the barrier cable and the aircraft went off the end, losing the landing gear along the way. Cause: FOD which caused partial loss of power.

Touchdown was smooth but the left wing started dropping. The student pilot tried to correct by using aileron and brake but to no avail. The tip tank slid along the ground and the aircraft left the runway. PILOT FACTOR: gear was not locked down.

Shortly after takeoff RPM unwound to 30 per cent. Gangstart failed to produce a light and both pilots noticed fire reflecting on the tip tanks. The copilot ejected and the pilot stayed with the aircraft to clear a populated area. He then ejected safely. MATERIEL FAILURE, probably fuel system.

During landing with right brake inoperative, the aircraft touched down 200 feet past the threshold of a 12,000 foot runway. Flaps and speed brakes were retracted, throttle was stopcocked and the canopy opened. The MA-1A barrier was not engaged and the aircraft eventually ran into a chain link fence which overrode the aircraft and seriously injured the pilot. MAINTENANCE ERROR (improper inspection, failure to install proper length hose assembly).

The pilot informed the center that he was working between 15,000 and 20,000 feet in an acrobatic area. This was the last known contact with the pilot. About 30 minutes later the aircraft was seen to crash out of a steep, high speed dive. UNDETERMINED.

On initial solo flight student was attempting aileron rolls at 12,000 feet. The aircraft entered a spin and the pilot was unable to recover so he ejected successfully. Ejection was at about 60 feet above the ground while the nose was oscillating. Apparently the pilot got out at the highest pitch point. PILOT FACTOR: student was performing acrobatics with fuel in the tip tanks. The aircraft stalled and spun in.

Flight of two was making a penetration when wing man noted that he was falling back and RPM was decreasing. The engine could not be restarted and the pilot ejected at 7000 feet. MATERIEL FAILURE, probably due to electrical malfunction in the fuel shutoff valve electrical receptacle.

The pilot's write-up was "Emergency fuel jumped from 55 per cent to 65 per cent in emergency system." After checking, maintenance personnel replaced the emergency fuel control. During the ensuing ground check the engine appeared to operate normally until the crew chief decided to check the emergency fuel idle RPM. As he advanced the throttle through 70 per cent, the EGT went to 1000° and there was an explosion in the engine bay followed by fire. Cause: MAINTENANCE SUPERVISION. Prior to this occurrence, the engine had been changed and while the replacement engine was being installed the hose assembly (flow meter to starting fuel control) kinked. The mechanic assigned to eliminate the kink had trouble so he disconnected the clamps to relieve pressure on the hose assembly. A senior mechanic inspected the assembly and found it satisfactory with no kinks. Then during the ground check the lock nut which secures the elbow filtering for the flow meter loosened and a severe fuel leak resulted in fire.

The landing was proceeding normally until touchdown when the right tire blew out. The aircraft left the runway and hit a drainage ditch where the nose and right main gear folded and the left main sheared. MAINTENANCE FACTOR: the navigation publication holder was not properly secured, came off and lodged under the left rudder pedal preventing pilot use of the left pedal and brake.

The engine flamed out on downwind and the pilots ejected. MATERIEL FAILURE of undetermined cause but probably because of a malfunction of the electrical circuit connecting the emergency fuel control solenoid to the engine wiring harness.

During a low level solo target mission the T-33 target aircraft crashed in weather described as variable snow showers and changing visibility. Cause: UNDETERMINED, however it was thought that the pilot was either disoriented or attempted to fly VFR in IFR conditions.

During a GCA-monitored ILS final the IP took over about two miles out. The aircraft hit short and bounced up onto the overrun. Both pilots received back injuries. PILOT FACTOR: the aircraft was allowed to stall on final and the IP did not use pitot heat with visible rime ice on the wings. Contributing was the IP's marginal proficiency in the aircraft.

For the past three years the T-Bird accident rate has remained substantially the same, 3.9 in 1962 and 3.2 during '63 and '64. This is not the irreducible minimum, as indicated by the findings in the 23 accidents related above. A little more care, more attention to detail would have prevented several of these mishaps.

During the first quarter of this year there were four major accidents. T-33 pilots and maintenance personnel have the answer to the question of how many more there will be during the balance of the year. ★

THE PRESSURE FACTOR

By a Student Attending the FSO Course at USC

The pressure factor of an organization is directly proportional to the unit's standing during the last three weeks of the quarter, inversely proportional to the pilot's experience level and directly proportional to the push of the commander, operations officer, or maintenance officer, who in turn is attempting to prevent another late takeoff, abort, etc. There are many other variables that can be added to this equation, but I'll let you decide which these are when you objectively compute the pressure factor of your unit.

I was a member of an organization that had a high pressure factor. One clear, warm, Wednesday morning, the third week of the quarter, I was scheduled for a refueling mission which I had performed many times before.

The aircraft preflight went like clockwork; in fact not a single discrepancy was noted. The engine runup was completed and everything was as it should be. Three minutes prior to scheduled takeoff I taxied to the active, completed the checklist, and started my roll. The takeoff proceeded as it always had until the flight engineer reported that torque on Nr 4 was 5 pounds below reject and the copilot called line speed 5 knots below predicted. The takeoff was aborted. After clearing the active the engineer rechecked the engine. The engine checked perfectly. The Command Post was informed of the problem. The controller (an old head) came back with a solution by advising me that he had flown aircraft in World War II (or was it World War I?) and they never had torque meters, but were still able to hack the mission without them. (Another small problem — our aircraft was scheduled to refuel the Wing Commander.)

I advised the controller that we would try again and taxied to the end of the runway. Prior to taking the active, we again checked the Nr 4 engine. Still no problem. Everything checked perfectly. On the second attempt Nr 4 torque was 10 pounds below reject, and line speed was 15 knots below computed. We aborted. As we cleared the active we shut down Nr 4. The engineer pulled the mixture control to idle cutoff and the propeller stopped abruptly. I notified the Command Post and taxied back to the hard stand. As I taxied in my reception committee had already assembled.

I completed the checklists and deplaned to greet the squadron operations officer and the chief of maintenance. As requested, I again covered the reasons for aborting the mission. The only response to my statement was from the operations officer who said, "There damn well better be something wrong with the engine." When maintenance personnel attempted to move the propeller it wouldn't budge. The engine had frozen.

As I walked back to the squadron with my crew I thought to myself — what would have happened had I continued the takeoff and the Nr 4 engine had frozen just at lift off? At maximum gross weight, that old bird just won't climb on three engines when the weather is beautiful and warm. Gee, but the pressure factor of this outfit is high!!

Let's examine the equation once again. Our unit was way down on the totem pole. This factor was enough at times to push the pressure factor way up. I had a fair amount of experience in the aircraft so this offset the other factors to some degree. Our operations officer was a real pusher, you know the type. This really increased the pressure factor.

What can you do to keep the pressure factor at a low level? You can increase your proficiency and knowledge of the aircraft to such a degree that the push factor has little effect. And you can assist maintenance by making entries in the Form 781 clear and concise. A well maintained aircraft really helps.

Now, think it over — what is the pressure factor in your unit? Let your Dash One be your guide. ★

MATERIEL FAILURE

By Col John A. Brooks, III
Tactical Air Warfare Center
Eglin Air Force Base, Fla

This story is not about pilot error, supervisory error, or materiel failure of the aircraft. This is one about materiel failure of the pilot while on a routine proficiency flight.

The cross-country west with Captain Stan Pyne was uneventful. Where? Nellis natcherly. The F-100F worked perfectly and everything turned out just right.

We had the usual visit with friends at Nellis, the usual round of lounge shows in town. Even the usual amount of sleep – well almost – but adequate.

We agreed to arise (Sunday) about 1000 local, however the next morning Captain Pyne got up a little early and had the flight plan and clearance completed before I arrived on the scene. Remembering what experience and the good flight surgeon says, I ate a regular breakfast, but must confess I more or less bolted it, in an effort to catch up with Stan.

On the way out to the aircraft, and again once or twice while waiting for the starter unit, I noticed a fairly sharp pain in my stomach. All this I dismissed from mind rather readily, blaming myself for eating breakfast too fast.

By the time we were strapped in and ready to go, the pain was gone and I thought no more of it – that is until the climbout. An afterburner climb to 18,000 feet was in order because of the short departure leg to Cannon AFB, and here's where trouble reared its head again. The short sharp pains I had blamed on breakfast now returned with a vengeance and lasted throughout the climb, so much so that I overshot the planned cruising altitude by 1000–1500 feet. After

level off the pain varied in intensi-
fast — electrocardiograms, blood
tests, x-rays — you name it and they
ty, but never stopped completely. I warned Stan of the situation and we planned to let down to 10,000 feet over Albuquerque and then gradually at Cannon. It was VFR all the way. At the lower elevations the pain lessened and during the landing at Cannon it was hardly noticeable. In fact, one of the best '100 landings I have ever made.

The wing commander of the 474th Tactical Fighter Wing at Cannon, met me on the line and we exchanged the usual kidding about being too old to fly, etc. At this point, I wasn't too sure. I notified Stan to plan to take the front seat for the last leg from Cannon to Eglin.

By the time we were turned around and ready to depart, I wasn't much better, so I went to see the Flight Surgeon on duty at the hospital for a checkup.

The doctor confirmed my diagnosis, gas pains, and gave me some medicine for relief. He preferred that I remain overnight, but advised that I should at least stay on the ground until the pain completely subsided.

I agreed and obtained a suite in the VOQ where Stan could watch TV or visit friends until I felt able to continue the flight. I had no doubts we would be able to take off in two or three hours. I even dropped off to sleep for a short while. But, when I awoke I realized something was really wrong and asked Stan to notify the hospital.

The reaction was immediate. The hospital commander and senior flight surgeon came over, checked me briefly, and away I went for my first ride in the meat wagon. The reaction in the hospital was equally did it. They even called in a consultant surgeon from town. By 10 o'clock that night the cause was still a mystery.

The tests continued the next morning, Monday, but still didn't provide any positive answers.

About 1400 hours, the hospital commander came in to see me. The look on his face told me a decision had been reached. He said the tests had ruled out many possible causes, but had not revealed the true cause, and that exploratory surgery would be necessary.

This would come as something of a surprise, if not a shock, at home. The family realized I was just out flying to keep my hand in, but to end up a thousand miles away, facing a knife, I'll have to admit my mind searched for ways of trying to get home. Yet the facts were inescapable, it would have to be done and the sooner the better. About 45 minutes later (1450 hours), I rolled onto the operating table.

I remember being awakened later that night. I got up and walked a little, with considerable urging and help I might add. But it was the next day before I really learned what had happened.

It turned out I had a hole in the mesentery tissue of my back. (This tissue supports the intestines, kidneys, etc.) It is possible for the small intestine to work itself into such a hole. The doctors tell me this could have happened dozens of times without discomfort. However, it happened once again at the time of climbout. The gas in the small intestine expanded and eight inches became strangulated in the hole. Although the pain subsided on let down, the irritation or injury was such that the condition persisted and the operation became necessary.

As I relive the experience, I strive to figure out what could have been done differently. True, I shouldn't have bolted breakfast, but to me the pains before takeoff were not nearly severe enough to abort the flight. They were the mildest kind of warning, but a warning nevertheless. After level off they were not severe enough to impair flying in any way. On let down and landing they subsided, but I still saw a flight surgeon — a sensible decision.

I asked the doctors what would have happened if I had continued the flight to Eglin, even in the back seat. They were unanimous in their opinion that I would have aborted the flight almost immediately and could have suffered further physical damage. As I look at that six inch scar I wonder how much further!

It was a weird experience to say the least. I pass this story on not because it is likely to happen to you but to illustrate what could happen. Now, back on flying status, my thoughts return with many thanks to the correct decisions that were made; (another hour or two delay and I would have lost 18 inches of my intestine), and to the excellent care I received.

Almost forgotten are the eight days of intravenous feeding, the ten days with a tube in my stomach, the endless tests, etc.

Not forgotten is the fact that I was extremely lucky. And besides, I got a free appendectomy — and the best executive physical exam one can get. Too bad it wasn't closer to my birthday. ★

THE BENDS

By 1/Lt Jerry B. Smiley, FSO, Webb AFB, Texas

SCRAMBLE!

I ran to my bird, hurriedly climbed the ladder and jumped into the cockpit. The crew chief started the aircraft as I checked in with Blue Lead.

Start, taxi and takeoff were normal; however, during the climb I noticed that the cockpit pressurization system was inoperative. I knew I should not continue, but I would not abort if there were a combat mission. I pressed on!

Flight lead contacted the ground controller. We were not committed against a target; our mission was combat air patrol at 35,000. I thought, "This altitude will be no problem without pressurization." I was correct. After one hour of combat air patrol, we returned to the base. I had encountered no difficulty.

During an exercise such as this we were allowed only 15 minutes after landing to return an aircraft to five minute alert status. I told the crew chief of the pressurization problem and instructed him to correct it if he could, but the aircraft would have to be placed on five minute alert within the allowed 15-minute time period.

I returned to Ops for debriefing and rebriefing. Suddenly the scramble signal appeared for four flights. I was number two in the fourth flight. As I hurried up the ladder, the crew chief reported that the pressurization system was still inoperative. Again, I pressed on!

This time we made an afterburner climb to 45,000. When we leveled off at assigned altitude, I experienced difficulty breathing against the oxygen pressure in my mask. I had almost decided to return to the base when the flight leader's radar became inoperative. With this change in the situation, I felt that I must intercept that target.

I assumed lead of the formation and began the intercept. Suddenly I had pain in my arms and shoulders. The bends! But I was too close to quit. I completed the intercept at 51,000 feet.

I initiated a rapid descent to penetration altitude when Blue One instructed me to maintain present altitude. He had lost AC power and wanted to join on my wing for the weather penetration. I leveled off at 40,000, but the pain was severe by this time.

My arms were almost useless. When I attempted to apply stick and throttle corrections the pain was almost unbearable. I advised that I could not maintain present altitude and initiated a maximum rate descent to 20,000 feet. When I leveled off the pain was gone.

I landed without further difficulty. I noticed an ambulance as I taxied into the parking area. The flight surgeon came running up to the aircraft. He scrambled up the ladder to the cockpit. I told him that everything was all right; however, I had had a few uncomfortable moments at high altitude. He was very understanding. I was confined to the hospital only one night and to mobile control for only two weeks.

Ed. Note: A flight surgeon, through whom this article was coordinated, asked that this note be added: "This intrepid birdman was extremely lucky. Hypoxia and/or bends could easily have resulted in another CAUSE UNDETERMINED accident!" ★

ONE INCH TO SURVIVAL

The mission had been routine, now, 30 minutes out, we were giving our offload information to the Airlift Command Post controller. He copied our message and ad[illegible]ised us of the weather. The altimeter set[illegible]ting he gave us was a low-low readin[illegible]g of 29.68. The co pilot copied the [illegible] altimeter setting, and questioned me [illegible] on the meaning of the prefix "low-low." I had never heard it before, but since the altimeter setting was lower than usual, we assumed it to be a matter of little

By Capt Fred G. Knieriem, 133 Air Transport Wing (NJ ANG), Newark Airport, Newark, N. J.

concern and decided to ask about it on the ground. It was high time to get a descent clearance.

We were anxious to get down and I fear we listened to the descent clearance from Center, and to little else. An altimeter setting of "low-low" 28.68 never rang a bell. I was calling for lower power settings from the engineer to get the Connie down faster, and also telling the copilot to start the descent checklist. I thought he was doing a great job, reading off the items on the checklist and replying to approach control at the same time. As we passed through our transition altitude, we calmly set in our altimeters the 29.68 reading he had copied.

I asked my copilot to request a VOR approach, and proceeded outbound at approximately 4000 feet, still descending and starting to slow down. Minimum procedure turn altitude was 1500 feet. We were well out over the water when I began my procedure turn at 2000 indicated. As I watched my localizer needle begin to move toward the center, I began to level the wings. Then my heart skipped a beat as the flight examiner standing behind me screamed that we were too low and would hit the water. Almost instantaneously I pressed forward on the throttles, yelled for "max" power, and looked out in front of the aircraft while pulling back on the yoke. Although the altimeter read 1400 feet, the water below us seemed practically in the cockpit.

Then approach control called. They said they had lost us on their radar screen, asked if we were in any difficulty and requested us to check our altimeter setting of 28.68. Then we knew. At 29.68 we had misset our altimeters by one inch. This put us ONE THOUSAND feet below the altitude we were indicating. Had the weather been bad or had we been making this same approach at night, someone else probably would be writing this episode as part of an accident report. Luck was with us. I am able to make this report in hopes that some other airman may benefit.

We later learned that a weather man had written a sloppy eight and it looked very much like a nine. An honest error (if there is one) but almost very costly. Even though this error was made at both ends of the field (weather and Airlift Command Post) and no doubt would have been considered as a contributory factor had there been an accident, *we* carried the ball the entire length of the field.

To begin with, the weather advisory given to us by the ACP should have been considered as an advisory and nothing more. The weather given to us by approach control is the information we must use in making an approach or planning to proceed somewhere else should the field be declared below minimums. The new expression "low-low" should have been questioned by us at the time, and not later on the ground. Of course a big cause factor was our desire to hurry. We had spent six hours getting to our destination, yet we had to try and save a minute or two at the end.

I know I learned a lesson and so did the crewmembers with me. It is not often that so small a measurement as ONE INCH may mean survival. ★

TRAINING DRIVERS TO Live

By Bob Harrison

Did you know that if you have been in the Air Force for 13 to 18 months that your chances of having had an injury-producing automobile accident were 26 per cent?

Or that, if you've been around for three years, the probability dropped to six per cent?

So you've been in for 10 years and have yet to have your first auto accident. Well, read on, because chances are you supervise some younger airman or officer and what happens to him is your concern.

Air Force concern from the top right on down to your squadron has been growing to the point where a million dollar program is about to go into effect in an effort to save lives and money through the prevention of traffic accidents involving USAF personnel. This program is probably the most ambitious yet undertaken by any agency in terms of cost and numbers of people involved. And the USAF expects to make a profit out of this endeavor. You as an individual stand to gain too, hence the following to give you an idea of where you fit into the picture.

ACCIDENTS COSTLY

It is easy to see why the Air Force has plunged into a program of this magnitude. From 1954 through 1964 this service has lost nearly 5700 people as a result of motor vehicle accidents at the staggering cost of $229 million dollars (Figs. 1 and 2).

Over the years, various training programs and disciplinary actions have been tried with questionable results. Finally an Air Force-wide program aimed at getting the young officer and airman as early as possible in his military career is about to begin. The goal is to reduce the number of accidents by improving individual driving habits. The primary target is the young man under 26, but the program will track him until the day he retires. The sequence of events will be essentially as follows:

At the induction center the new airman will fill out a questionnaire as to his pre-service driving experience and training. (Officers will complete the form at their first base of assignment.) The questionnaire will record his vehicle ownership, traffic violations, accident record, operator license and training. This form will become part of his personnel records until he arrives at his first duty station.

There he will be tested on his attitude toward driving and his accident susceptibility factor, prior to completing a 20-hour junior college level driver training course. Two hours of this course will consist of local indoctrination, the balance will be on traffic safety.

FOLLOW-ON TRAINING

After completion of the standard course each individual will go through a four hour refresher course two years later. From then on he will receive a two-hour local indoctrination at his new base after every PCS. Meanwhile, however, when an individual builds up six points, based on accidents and moving traffic violations, he will be subject to a 10-hour driver improvement course designed to correct the specific habits that got him into trouble.

The program at each base will be conducted by the safety office, which will maintain records on each individual, provide instruction and collect data for evaluation of the program. Instructors are presently being trained by the contractor, Edex Corporation, Mt View, California, who provides both the program content and equipment. They will then be assigned to the safety office at air bases where they will conduct training and maintain the equipment.

The 20-hour course is based on the premise that young men coming into the Air Force know the mechanics of an automobile, probably have had previous driving experience and some training. How-

Audio-visual equipment for use of slides, movies, film strips, tape.

Student responder.

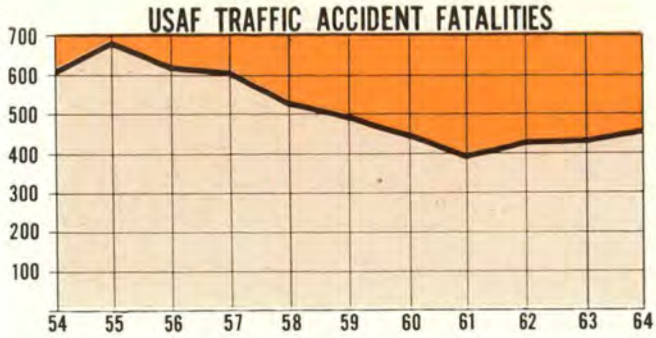


Figure 1

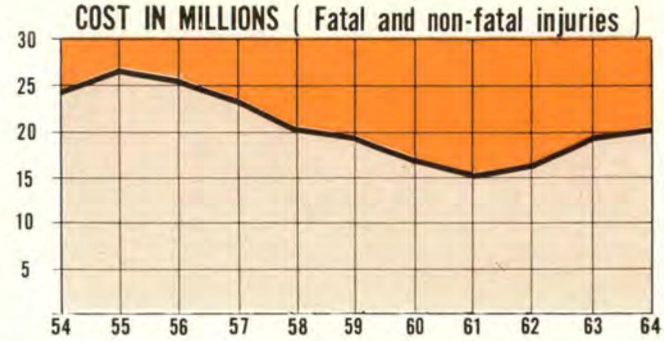


Figure 2

ever, it is recognized that they need to be fully indoctrinated in their obligations behind the wheel as members, and consequently representatives, of the Air Force. Therefore, the aim is to acquaint the young driver with the many hazards of the hostile environment in which he drives an automobile. The limitations of the human being and the vehicle he drives, the roads, weather, are all factors with which he must contend in the safe operation of an automobile and which are covered in the course.

LATEST EQUIPMENT

Audio-visual equipment will present traffic problems. Students observe the problem on a screen, then answer questions by pushing buttons on individual consoles. The answers are recorded instantly, thus giving the instructor an indication of individual and group understanding.

Since 55 per cent of automobile accidents occur within a 15 mile radius of the base and 70 per cent within 25 miles, the two-hour local orientation course to be presented to personnel on arrival at a new base will stress local laws and customs and hazards in the vicinity of the base.

Periodically a summary will be prepared of information gathered from the bases where training is being conducted, major commands, bases designed for quality evaluation, and from the 6570 Personnel Research Laboratory at Lackland AFB. Revision of the program will be based on analysis of this information.

The scope of this program is evident from the projected training requirements through FY 67. It is anticipated that about 145,000 will complete the basic course during FY 66, which includes a backlog who entered the service during FY 65, and 105,000 in FY 67.

Although the cost in time and money for a program of this size is considerable, a conservative estimate of savings during the first two years is 150 lives and $7.5 million. In addition, a number of bonus results are expected, such as training of government vehicle operators, an improved Air Force image and possibly use of the training equipment for other programs.

For the Air Force this program will pay big dividends. But the biggest winner will be those who otherwise would have been merely statistics in the lives-lost column. ★

TAPE DRAGONS

New members of the Grand Order of the Tape Dragons at the 539 FIS, McGuire AFB, N. J., are, front row (left to right): Captains Billy R. Givens, John C. Barnes, H. K. Spiker and Leslie C. Conwell. Back row (left to right): Captains John K. Featherstone, Thomas W. Beaghen, David Steinke, and Joseph P. Ries. Absent when photo was taken were Captains Manford C. Holly, Hermon A. Dungan, John O. Hastings, Donald C. Windrath and Owen J. Giblin. Membership criterion is a successful emergency engagement of an aircraft arresting barrier. Certificates state the award is for "heads up excellence in the art of snaggin' and draggin' the nylon tape of land-based aircraft arresting equipment, and turning an emergency situation into a happy landing."

THE IPIS APPROACH

By the USAF Instrument Pilot Instructor School, (ATC)) Randolph AFB, Texas

Q. Please explain how a VOT (VHF Omni Test) operates and the proper method of checking a VOR receiver with a VOT. What is the acceptable tolerance if I use a VOT in flight? *(Capt Perry A. Hudel, Andrews AFB)*

A. To put it simply, a VOT always transmits an in-phase signal. Regardless of your position relative to the VOT, your receiver always reacts as if you were located on the 360 degree radial. If you select 000 in the course selector window, the TO-FROM indicator should show FROM, the CDI should center and the bearing pointer should point to 180 degrees. If you select 180 in the course selector window the TO-FROM indicator should show TO, the CDI should center and the bearing pointer should again point to 180 degrees. (To refresh your memory on what we mean by the term in-phase signal, check AFM 51-37, ch. 10, pp 10-1, 10-2.)

The acceptable tolerance when using a VOT is ± 4 degrees. This tolerance applies whether you are in flight or on the ground.

For the pilot who has never used a VOT, these facilities are low powered VOR stations located on most of the large civilian airports. They provide an excellent means of checking the accuracy of your VOR receiver since you don't have to taxi to a ground check point or make a guess as to the correct bearing from your position to the station. VOT frequencies are listed with airport information in the Facility/Directory portion of the FAA Airman's Information Manual (AIM). If this publication is not available, check with the tower, Base Ops, ATC or the Flight Service Station and they can tell you the frequency.

POINT TO PONDER

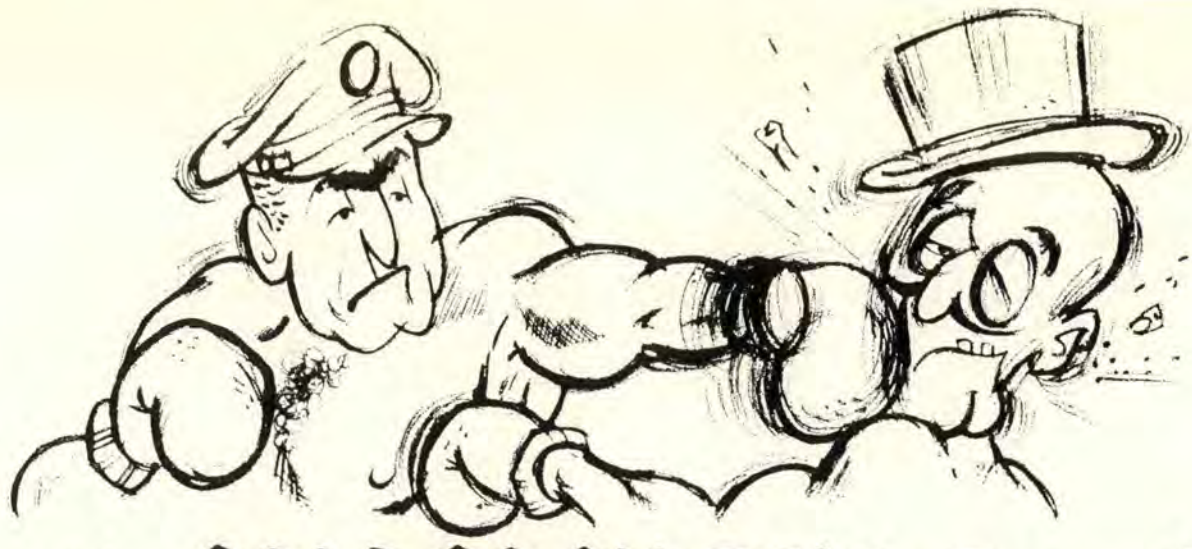
We would like to direct this month's Point To Ponder toward something that has a direct effect on every pilot in the Air Force — instrument panel design.

Here at IPIS we have done extensive work with instrument arrangement and we have some opinions we would like to share with you.

First, let's face the fact that in attitude instrument flying, it is the Attitude Indicator that should be the focal point of the cross-check. Therefore, the ideal arrangement is to have this instrument in the center of the panel. Next, let's consider the information the pilot needs when a change in pitch is made either intentionally or inadvertantly. Vertical velocity and airspeed seem to fit the bill here. Of course, altitude is very important too, but since the Vertical Velocity Indicator will give the first indication as far as a gain or loss of altitude is concerned, we can use this instrument very effectively. Having settled on these parameters it would seem logical to place the Vertical Velocity Indicator and the Airspeed Indicator on either side of the Attitude Indicator. As far as pitch control is concerned, this arrangement requires a minimum of eye movement. What do we do about bank control? Place the Heading Indicator directly underneath the Attitude Indicator. Here again, eye movement is held to a minimum and vital information is presented in a logical arrangement. Now if the Altimeter is placed underneath the Vertical Velocity Indicator and the Course Indicator put on the other side of the Heading Indicator, the instrument panel arrangement is all but complete. Of course, we realize that different aircraft have different instruments available and this will require some other type of arrangement, but the basic idea can still be applied. The relative position of instruments within the pure basic six concept is not too important — it is only when the instrumentation has been changed to the extent that basic six is no longer recognizable that performance is significantly jeopardized.

We have a T-29 and a T-39 here at IPIS with this arrangement installed, and it works. Makes the cross-check much easier and precision is much more easily achieved.

Unfortunately, there are some panel arrangements in use today that almost defy a pilot to achieve a high degree of proficiency when he is "on the gages." We wish we could say that these poor arrangements are the exception rather than the rule, but, unfortunately, they are not. When you stop to consider how many instruments are obscured by control columns or are located in such a way as to create real problems with parallax, this situation takes on added significance. The mission of a particular aircraft will dictate panel arrangement to some extent, but it would appear that in most cases no real thought has been given to the problem. ★



Let's COLDCOCK Ol' Murph!

By Lt Col Frederick C. Blesse, Directorate of Aerospace Safety

For many years now, we in the Air Force have been quoting "Murphy's Law" (If an aircraft part can be installed incorrectly, someone will install it that way) and chuckling about how some unthinking maintenance technician installed some simple little part backwards. Maybe at one time it was funny because aircraft were relatively simple and the result was not usually catastrophic. A Murphy these days is no brush with Blackie Carbon. It's a serious design error that must be coped with by operational and maintenance personnel on a daily basis.

If you'll stop to consider how long we have been talking about Murphys, you will begin to have an appreciation for the seriousness of the problem. This problem is growing with the complexity of our aircraft and so is the seriousness of each Murphy we uncover.

Let's take our newest aircraft, the F-4C. Certainly, all the latest design features have been incorporated and there should be as few here as anywhere. What would you guess? Five? Twenty? Thirty? If you were only right, our problem would be easier than the one we have. At this point there really is no way to determine how many F-4C Murphys we do have but constant scanning of Navy and Air Force data has revealed the absolute presence of 105.

The collection of these was effortless in a way. No real drive was initiated; they just kept cropping up with such regularity that someone decided to record them. A complete list of these may be obtained, if desired, from the Directorate of Aerospace Safety, Flight Safety Division, AFIAS-F2, Norton AFB, California.

If you have Murphys that aren't included in the booklet you receive, fire them off to Norton and they will be added to the list and circulated. Only in this way can we help to lick Ol' Murph.

We want to do more than just eliminate him from the F-4C, however. To do otherwise would be like brushing the ants from the top of their mound as a solution to the problem of too many ants. Sitting on that solution would be a lot more pleasant than sitting on the Murphy solution as we have been doing for the past 10 years.

Here are some examples in the F-4C of how serious these Murphys can be. The integrated power control cylinder can be wired in reverse. The result will be a violent aircraft yaw/roll oscillation. Electrical connections can be cross-connected to the stabilizer augmentor servo control valve. This mistake will cause violent rolling tendencies in flight at 230 knots. Pitot static lines can be cross-connected causing erroneous readings. A number four cell fuel transfer pump can be installed in the number six fuel cell. Use of the short pump will leave about 300 pounds of fuel unused in the number six cell. The canopy pneumatic flow restrictor valve PN 8A7644-39 can be installed in reverse. This will allow the canopy to slam closed when actuated. I could go on and on. Each one a potential death trap – maybe for the pilot, maybe for the maintenance man who next works on the system. All unnecessary.

We absolutely must design Murphys out of our aircraft systems – even then there will be some that creep in. To cope with our present situation, industry as well as the Air Force must design operating procedures to eliminate Murphys when discovered. A central office, possibly, with all known Murphys on the aircraft could advise when modifications are requested on any area of the aircraft. From the looks of our TCTO backlogs, every part in the aircraft is modified at least five times. During one of these mods, design the "Murphy" out. Operational personnel should be constantly on the lookout for such things. Maintenance personnel in tactical units should be ever watchful and AFR 127-4 should be revised to require the reporting of a discovered Murphy regardless of the weapons system involved. Depot personnel, too, are in an ideal position to uncover the insidious fruits of poor design.

We have lost almost two billion dollars worth of aircraft since 1955 –that's a million dollars a day, and don't kid yourself – Murph is getting his share.

Let's coldcock Ol' Murph. ★

By S/L G. C. Letcher, RCAF
(Reprinted from Flight Comment, Mar-Apr 1965)

Recently a CF-104 pilot aborting a takeoff decided that there was sufficient runway remaining to stop without deploying the dragchute. He probably reasoned: there's 9000 feet of dry runway ahead of me and the AOIs indicate that I can stop in half that distance. Why bother with the dragchute and put the groundcrew to all the extra work of picking it up, repacking it and installing another in the aircraft? The photos here give the grim answer.

Did this pilot consider all the factors in making such a decision? Obviously not—the aircraft suffered "D" category damage.

The pilot had no difficulty stopping, or for that matter, starting back to the ramp, but obviously there is more to braking than this pilot knew at the time. So loosen that grip on the latest Playboy and give a close look to some other figures. Although not as pleasant to contemplate, they may prove hotter than you think. Before deciding why our jockey found it necessary to dismount the noble steed with embarrassing haste while getting it back to the barn, a few facts might be recognized to make the discussion understandable.

First, let's agree that energy cannot be destroyed; it is only convertible to some other form. Thus, in stopping an aircraft the kinetic energy of aircraft motion plus the energy from the idle thrust of the engine, is converted to heat energy by the wheel brakes. To simplify calculations we will ignore the low aerodynamic drag of the CF-104, the heat created by rolling friction and tire flexing (which can be considerable), and the runway profile (in this case, practically level). So much for the theory, now the facts:

CF-104	170 kts
Aircraft weight	21,000 lbs
Runway remaining	9000 ft
Engine thrust (idle)	400 lbs

BRAKING...A HEA

Now, using the formulas: $KE = \frac{1}{2}MV^2$ and $W = FXD$ to find the aircraft's energy plus the energy due to engine idle thrust, we compute the total kinetic energy the brakes converted to heat energy as 30,800,000 ft lbs. Dividing this figure by 778 converts the foot pounds into heat energy units — British Thermal Units —or 39,500 BTUs.

What does this mean to the fellow who doesn't carry a slide rule as a status symbol? In the colorful prose of Don Stuck, experimental test pilot for McDonnell Aircraft, it's equivalent to the energy required to lift a five-ton elephant more than 3000 ft in the air, or enough heat to melt 146 lbs of steel!

To equate these images with something more practical, let's compare it to the BTU limitations of the brakes. The brake designer's biggest headache is the effect of heat on components; the components weaken with heat — something is going to give if things get too hot. The Bendix brake used on the 104 has a normal use capability of 50 stops at 7700 BTU and an emergency one-stop capability of 12,800 BTU. During the stop we described, the brakes generated one and a half times more heat than they are built to withstand during an emergency stop. It is important to realize, also, that the heat generated by brakes is dissipated largely by air flowing past the wheels, brakes, and tires, while the aircraft is moving.

At this point you may be inclined to say, "So, the pilot goofed — it won't happen to me." But before returning to the petite heat of Playboy let's have a look at another recent incident.

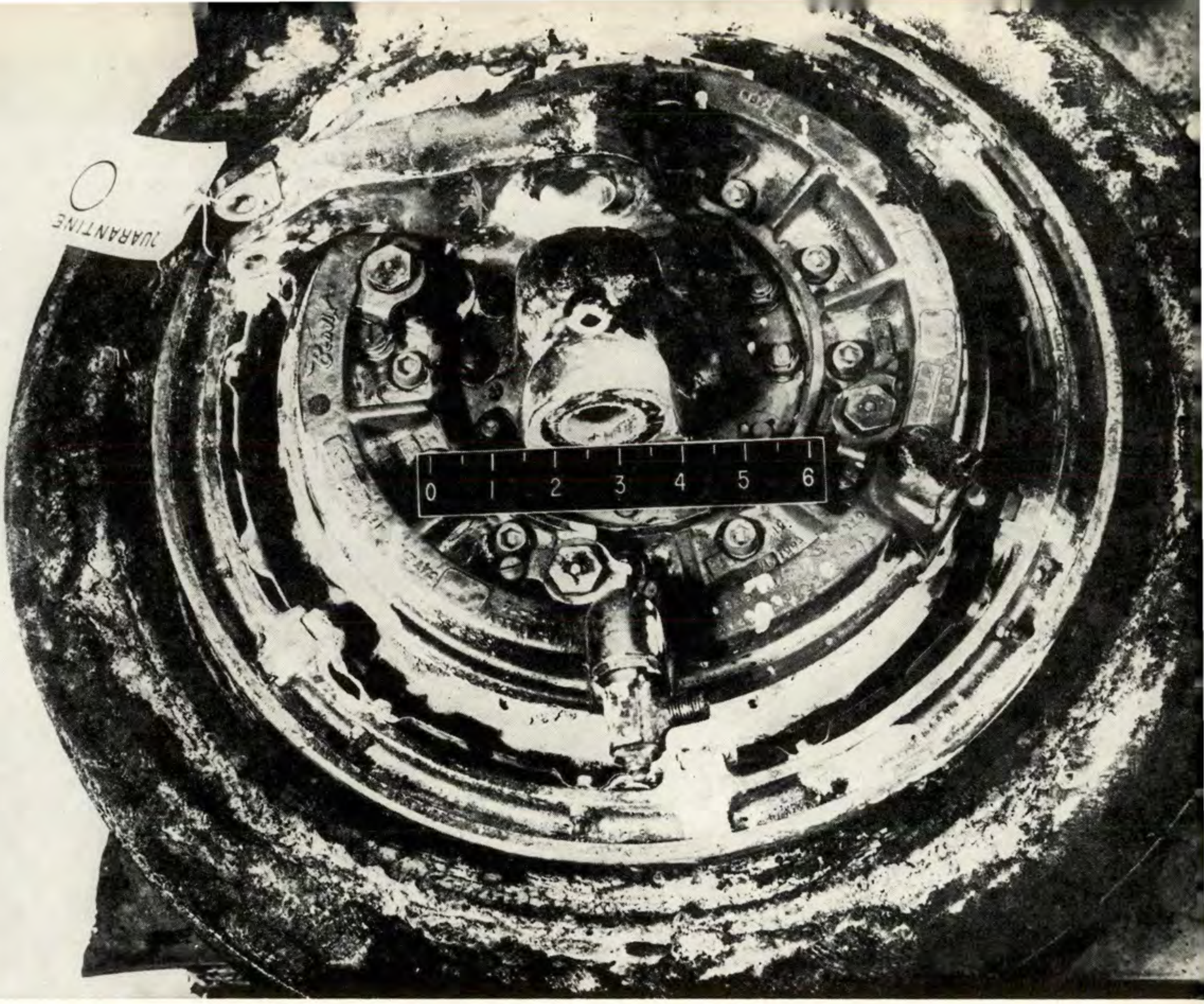
A CF-101 crew were detailed to take part in a National Research Council noise level study. The exercise required them to line up at the end of the 10,000 ft runway, cut in the afterburners and immediately abort the takeoff roll. Four of these runs were made; each time the pilot employed maximum aerodynamic braking — quite effective on the 101. The aircraft rolled the full length of the runway on each run, then returned to the starting point. The brakes were used only on the first run and then very sparingly. On subsequent runs no brakes were used and only nose wheel steering was used for turning. As the aircraft cleared the runway at the end of the fourth run the brakes seized and were so hot they welded the wheels to the forks of the undercarriage!

Sure enough, the AOIs place a restriction on how far the aircraft can be moved without allowing a cooling period because of insufficient dissipation of the heat created by disc brakes, rolling friction and tire flexing. The restriction is there but it doesn't exactly jump out off the page at you. (In the meantime you may rest assured that a closer look will be taken at the information given in the CF-104 and 101 AOIs.)

For those who are still skeptical that the problem of heat in the wheels of high-performance aircraft is worthy of consideration here is an even more startling case.

A civilian airliner's takeoff was delayed due to fog. The captain decided to lend Nature an assist by using the jet exhaust to heat things up a bit. A takeoff roll was commenced and aborted; the aircraft was returned to the takeoff position, by which time the fog had dutifully lifted. The aircraft got safely airborne only to crash a few minutes later killing all 80 persons on board. The investigation revealed that shortly after takeoff an overheated wheel exploded in a wheel well rupturing a hydraulic line and causing the aircraft to catch fire.

Got the message? We don't expect pilots to work out snap calculations of KE and BTUs every time they apply the brakes, but to avoid the stench of molten metal, smouldering rubber, and the slow burn of the supervisor, you should utilize, at all times, such decelerating devices as the dragchute, aerodynamic braking and reverseable thrust. These are your primary braking devices. When you do resort to wheel braking, don't assume since you had no trouble stopping that you've got it made — maximum heat in the wheels is not reached until 25 to 30 minutes after the stop. ★



TED DISCUSSION

Why use the drag chute during an abort? Here's why. During this stop brakes generated 1½ times more heat than they were built to withstand.

BROWN SHOE CLICHÉ

By Major Moses R. Box
Directorate of Aerospace Safety

Back in the old "brown shoe" Air Corps there used to be a saying, "You look after your men and they'll look after you." The color of the uniform has changed and some people seem to think the cliche has changed, too. But, believe me, it still holds true with the "Blue Suiters." If you are the supervisor (and if you are not, no time like the present to start preparing) and can get your men to cooperate with you in doing a good job, YOU are the one who gets the credit.

If you aren't getting the cooperation you should, don't simply blame your people. Run a checklist on yourself. Maybe:

- You don't help others.
- You break your promises to your men.
- You throw your rank around and have a superior attitude.
- You "ride" your subordinates.
- You pass the buck (both up or down)
- You show partiality and favoritism among your men.

This list is not all inclusive, it's a sample to emphasize the point that you don't get cooperation from others unless you yourself cooperate.

"I can't make you do that, but I can make you wish you had!" was another old brown shoe cliche. Sure, by using coercion and threats you can probably get your men to do their job, but you won't stimulate much interest for their jobs or foster a spirit of cooperation.

Cooperation depends on attitudes and past treatment. Taking the positive approach to the above negative characteristics, we come up with the following suggested actions for all supervisors:

- Be fair in dealing with your men.
- Make constructive suggestions, but don't "nag."
- Show consideration for your men.
- Always keep your promises if at all possible; when not possible, explain why.
- Maintain a truly open-door policy.
- Take a sincere interest in your men and their activities.
- Assume responsibility for the actions of your men and the actions of your supervisors; i.e., don't pass the buck either up or down the chain of command.
- Take responsibility for your actions and admit when you have made mistakes.

What does all this cooperation have to do with safety? No matter how much coercion is used, safety becomes a fact and way of life ONLY when your men want to work with you and help you do your job.

How is safety reflected in an Air Force unit? Some units wait for a rash of accidents to break out, then they go to work to prevent similar accidents. This results in a periodic letup of the emphasis on safety, with spurts of activity at accident prevention. The accident rate chart looks like saw teeth.

Although not as spectacular as the all out drive *against accidents*, the approach of being *for safety* can be very effective. The supervisor must talk and live safety. He must set the example. We talk operational readiness, cost and quality control, so why not include safety? A supervisor can make safety a part of every meeting and briefing and never run out of material. Here are a few subjects, as examples: Material handling; man-machine interfaces; the use and care of tools; good housekeeping practices to prevent fire and injury; traffic within your area; the use and care of protective clothing and equipment and electrical hazards.

To hold the interest of your men, concentrate on the tools, equipment and areas which affect them. Another "attention getter" is encouraging participation in safety discussions. Don't lecture your people; get them to discuss their problems and experiences. Before long, these safety meetings will become safety conferences with stimulating inputs by all. Here are suggested tips:

1. Get participation first by asking for it; then by calling on others to contribute their ideas.
2. Let others lead the discussion; this is excellent for motivation. Outside assistance, such as contractors and Air Force engineers, would also be helpful.
3. Demonstrate and use visual aids. This is much more effective than straight talking.
4. Where special safety problems are involved, discuss them with the small group concerned — not with everyone.
5. Form a Safety Committee, assigning new men every few months so that everyone gets the experience. Also, give committeemen badges or pins of some type to identify them. This committee should be a working group, reporting on accidents and safety hazards.
6. Don't forget reminders. Use safety posters, and change frequently.

These are just a few suggestions you, the supervisor, can use to encourage safety in your unit. Set the example, then solicit help from your people: You can't do a complete job by yourself, but if you are safety oriented, practice safety at every opportunity and instill cooperation in your people, you won't have to spend much time explaining accidents. ★

FAA ADVISORIES

Bob Terneuzen
FAA Liaison Officer
Directorate of Aerospace Safety

WHAT'S NEW IN SINGLE FREQUENCY APPROACH (SFA)—The USAF and FAA have been working most diligently for the past few years to hurry the installation of equipment necessary to provide SFA service. As of 8 March 1965 the following priority one USAF bases were all that remain to complete this phase:

Base	Per Cent Completed	Estimated Completion Date
Charleston	0	1/11/65
Dayton/Clinton Co.	20	30/ 4/65
Davis-Monthan	90	18/ 3/65
Ellington/Houston	20	1/ 4/65
Kelly/San Antonio	0	1/11/65
Lockbourne/Columbus	75	30/ 3/65
Moody/Valdosta	5	14/ 5/65
Nellis/Las Vegas	98	18/ 3/65
Olmstead/Harrisburg	70	30/ 6/65
Perrin Rapcon	0	15/ 4/65

Langley, Lincoln, Little Rock and Olathe (Richards-Gebaur) have recently been completed.

Installation programs at priority two bases will begin just as quickly as priority one bases are completed and funds are procured. Priority bases are:

Byrd Field/Richmond	Portland
Fresno	Siskiyou County
Grand Island	Truax
Kirtland	Toledo Express
Logan	Volk Field
Niagara Falls	Walla Walla
Phelps Collins	Wright-Patterson

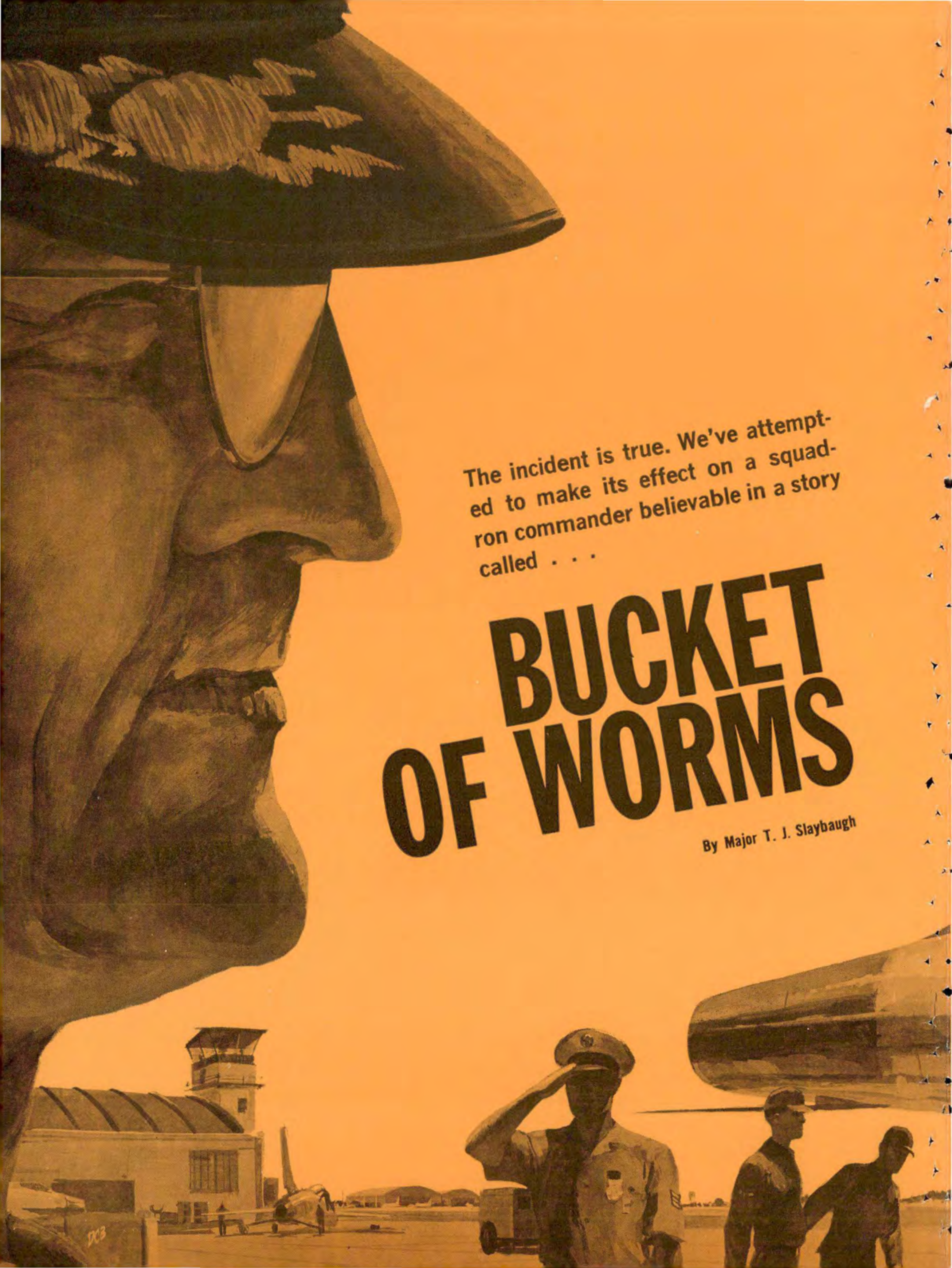
Priority three bases are:

Bakalar	General Billy Mitchell	Peterson
Buckley	Hutchinson	Pope
Dobbins	Maxwell	Sewart
Forbes	McCoy	

RETENTION OF VOICE RECORDING TAPES. The FAA formerly retained air traffic voice recording tapes for 30 days. This retention time has been reduced to 15 days, unless connected with a specific accident or incident.

To assure that all facts are available when USAF personnel consider it necessary to file Operational Hazard Reports involving FAA air traffic services, prompt reporting and processing will be required. Too often in the past tapes had already been demagnetized because reporting personnel did not act promptly.

Now, more than ever, timely reporting of hazardous operation is essential if corrective action of valid complaints is to be accomplished. ★



The incident is true. We've attempted to make its effect on a squadron commander believable in a story called . . .

BUCKET OF WORMS

By Major T. J. Slaybaugh

He'd been awake since 0330. He had gotten a drink of water and for an hour had been staring at the shadows on the ceiling. No matter how he tried to redirect his thoughts, his concentration would relax and again he would be thinking of yesterday's incident.

Finally he got up, dressed and drove to the squadron. The first tinges of gray were beginning to lighten the eastern sky. He switched on the light in his office, picked up the bundle of records and started to go through them again, looking for clues. First, he reread the pilot's statement.

He had been briefed by the pilot who had previously flown the airplane that, with the autopilot engaged, the plane would pitch down when the control stick was moved to the right. The discrepancy had not been written up. The pilot proceeded with his mission. About an hour after takeoff, in cruise condition, the autopilot was engaged with heading and altitude hold. A control stick check was made and each time the stick was moved to the right the aircraft pitched down. The pilot leveled off, then found that he could not move the stick forward or back. Aileron and rudder operation were normal. He pressed the autopilot emergency disconnect and pulled the circuit breaker. Pitch control did not improve. Trim had no effect. Suddenly the stick came full aft and he could not dislodge it, even with both hands. The nose came up and, finally, in an effort to get the nose down, the pilot slammed full right rudder, chopped the throttle and opened the boards. The nose came back to the horizon and he was able to start a descent, using rudder, aileron, speed brake and partial power. At approximately 10,000 feet he was able to get the stick forward to neutral, but could not force it beyond. A long final and landing were accomplished with the airplane still in this condition.

Inspection revealed these discrepancies.

- The horizontal stabilizer actuator contained residues from previous seed blast-cleaning.
- Artificial feel bungee contained bent rod and out-of-round sleeve.
- Horizontal stabilizer trim actuator limit switches improperly adjusted.
- Fluid samples taken from both flight control and utility hydraulic systems in stabilizer and autopilot areas contained metallic particles (greater than 100 microns) and water.
- Filter elements in all three hydraulic systems contained excessive contamination.
- Trim control and other circuits in the field break area indicated bare wires.
- One wire bundle was found with the back shell adrift from the electrical connector.
- An open-end wrench was discovered in the aft torque tube balance weight compartment.

This last, it had been generally agreed, had been the direct cause of the incident. He studied the photographs again. The balance weight had two sets of deep cuts that exactly fit the open end of the wrench. When the wrench was fitted into these cuts the opposite end jammed into an indentation in the aft bulkhead. With the wrench so positioned the stick was jammed in the full aft position.

The Lt Colonel leaned back, hands clapsed behind his head. This time, thanks to a very cool headed pilot and some good luck there had been but an incident. As he thought about it, he began to concern himself more with other aspects than just the wrench. The wrench was merely symbolic of the bucket of worms he had to deal with day in and day out. It wasn't the probability of another wrench in the controls that concerned him; it was the fact that, with this type of problem, he could anticipate more such incidents, and probably accidents.

He could explain it; he couldn't solve it. Again, as analytically as he could, he went over the explanations, hoping he might yet catch the clue as to a solution to his problem.

Maintenance was short of people; they had to work extra hours, all too often. He knew the Director of Maintenance had held open suggestion meetings, soliciting ideas, and had approved some reshuffling in an effort to achieve greater efficiency. Still there was overtime.

The experience level of the maintenance people was low. Qualified people were spread so thin they had to be used to inspect and supervise. The work had to be done by airmen with limited experience. Mistakes, honest mistakes, showed up.

There was not always enough care – the wrench was a good example. Always, it seemed, there was a search for ways of motivating people. But it's hard to motivate the hydraulic specialist who has worked all day, then gets called out at 0300 to repair a bird just in from a cross-country. There had been no alternative; a cracked strut had been found on the only backup for the morning gunnery mission.

The pilots were wrong this morning. The first one should have written up the control problem. Sure, the second mission wouldn't have gotten off, and they were behind schedule, and the wing commander reminded his commanders of this the day before, but no amount of desire will offset bad machinery.

The aircraft were getting old; there was wear, maladjustment and contamination. But he had to meet his commitment as safely as he could with what he had to work with.

Each day the weight on his shoulders grew heavier. Which worm would show up next? The more he studied the problem the more frustrating it became. He prowled the shops, the line, the PE section and cautioned his pilots continually.

He started, blinking in the bright sunlight, then recognized one of his flight commanders standing in the door. "Oh, sorry, sir," the man said. "I didn't know any one was here. It's early."

"I know," the squadron commander said, "that's O.K. I came out early – thought maybe I could find some clear answers. Guess I must have dozed off."

"I'll plug in the coffee pot."

"Good . . . and bring in the mission schedule. I want to brief each pilot this morning. Starting today, anyone who discovers a flight control discrepancy is to write it up and report it to me or the Ops Officer before the bird flys again. After the briefing, I'll get with the DM again." Then he added, to himself as much as to his flight commander, "All I can do is keep chipping away – there is no sure solution to all the problems." ★

Here, in an article prepared expressly for AEROSPACE SAFETY readers is a how-it-flys story about a new aircraft, the V/STOL XC-142A.

Tilt-Wing Transport

By Stu Madison, Sr Experimental Test Pilot LTV Vought Aeronautics Div., Dallas, Tex

Composite photo shows phases of takeoff in horizontal mode to conventional forward flight.

The title of this article could have been "From Zero to 350 Knots on a Wing that Won't Stall" for this is the story of the new V/STOL assault transport, the XC-142A, currently undergoing Category I testing at the LTV Vought Aeronautics Division facility in Dallas, Texas.

As a project pilot on the machine, I would like to bring you up to date on this new way to save on runway construction.

A total of five XC-142A aircraft were contracted for early in 1962. This was a tri-service contract for a full scale, tilt-wing, V/STOL assault transport capable of operational testing. From this tri-service test and evaluation will come a definitive specification for V/STOL transport airplanes. The design objective of the XC-142A was to combine the helicopter and transport design specifications into an airplane which would take off and land vertically and be capable of conversion to and from conventional flight and not require unusual pilot techniques. The contract specification also required that the airplane be capable of an instrument mission from vertical takeoff to vertical landing; therefore, excellent flying qualities were high on the list of objectives.

A description of the XC-142A should perhaps begin with the variable incidence wing. The wing can be positioned through a total of 100 degrees. Angles are referred to from the full down (0 degrees) position upward to 100 degrees. The added 10 degrees beyond vertical is to allow the airplane to lift into a hover with a tailwind. The wing is powered by two hydraulic screwjacks and is controlled by a variable rate "beep" switch, mounted on the collective power lever (more on this later). This variable rate switch allows the pilot to move the wing in either direction at any rate up to a maximum of approximately eight degrees per second. Rate control is a function of the amount of switch displacement, or, in other words, the harder you press, the faster it moves. Leading edge slats and trailing edge full span flaps are automatically programmed with wing motion so that optimum flap/slat settings are made without pilot attention to the chore.

The next feature that allows the XC-142A to safely hover and takeoff or land at speeds less than Vmax for an average motor scooter is the cross-shafting. Each of the four T-64 engines drives its respective propeller gearcase though an over-running clutch. The four propeller gearcases are interconnected by shafting, such that when the first engine is started and begins driving its propeller gearcase, all four propellers begin turning—a very peculiar sight for a multi-prop transport jockey to witness. As each subsequent engine is started, it merely contributes its part to the whole, and, conversely, if Nr 4 should flame out right at liftoff speed or during conversion, the pilot just pulls a bit more power from the remaining three engines and continues without trim change or control problems. This cross-shafting also contributes power to a tri-directional gearcase in the center of the upper fuselage where the power shaft for the tail propeller originates.

Now let's see how this machine is controlled in the hover and during conversions to and from conventional flight. With the wing at 90 degrees, pitch control is provided by the horizontally situated tail propeller mentioned above. This tail propeller is the prime mover in the pitch axis at all speeds below approximately 70 knots where the horizontal tail goes into retirement for well-known aerodynamic reasons. Roll control while hovering is produced by increasing propeller pitch on one side and simultaneously decreasing pitch on the other. Heading control, with the wing at 90 degrees, is by differential deflection of the ailerons which are submerged in propeller slipstream. As the wing is lowered from 90 to 0 degrees, the ailerons are phased out of the yaw control system into the roll control system and differential propeller pitch control for rolling inputs is phased out—period.

The control system phasing, so glibly mentioned above, is accomplished by mechanical means with no "black boxes," wires, or less dependable gadgets. Insofar as the man on the stick is concerned, airplane reaction to a given control input is the same regardless of wing angle with no mental gymnastics required.

Awhile back, I promised some words about the collective power lever. The location and function is nothing new to the helicopter types, but it is something new to those accustomed to a handful of throttles. In order to achieve precise altitude control while hovering, the collective power lever controls, directly, main propeller blade angle giving instant thrust response. In addition, it is "hooked-up" to the four engine throttles so that an increase in blade angle is accompanied by near optimum increase in engine torque output. A propeller speed governor applies "topping" signals to maintain precise set RPM. The collective is used during all vertical and STOL flight and "unhooked" and stowed for conventional flight where we find ourselves with a handful of throttles and the governor as primary propeller speed control.

One more descriptive item before we "kick the tire and light the fire." In order to achieve the stability required for instrument flight at low speeds where natural stability is long gone, the airplane is equipped with an attitude and rate damper in the pitch and roll axis and a yaw rate damper. These are dual channel, monitored systems, i.e., the monitor continually compares the behavior of the two channels and shuts off the particular damper if a disagreement exists. To the pilot this means that before a hardover or other undesirable input can occur as a result of a stab system problem, the monitor will sense the discrepancy, shut off the damper, and return the surface involved to neutral.

So, let's "saddle up" and look at the flight characteristics of this new and different bird. The cockpit area follows fairly standard transport layout with a few exceptions, the most impressive of which is the visibility over the nose and down the sides. The collective power lever, mentioned above, is a new item and is located to the left of each seat ala standard helicopter practice. The next more or less unusual item is the control stick which is a stick and not a yoke. Hovering with a wheel control would, it was believed, be a bit unusual and more difficult. All controls and flight instruments are duplicated for both seats, so the airplane can be flown from either side.

For the first go, we'll make a STOL takeoff, fly the pattern, and make a full stop STOL landing. When lined up on the runway, the wing is raised to 35 degrees with programmed 30 degree flap deflection.

Straight up! Props are interconnected, if one engine should fail others will drive that propellor by means of cross-shafting. Aircraft cruises on two engines turning all four props.

Control stick is a stick, not a yoke. Note collective power lever between pedestal and seat.

With brakes held, the collective is raised above the taxi range until about 30 per cent engine torque is developed. As the brakes are released the collective is raised to pull 60-70 per cent torque, and before you can shoot a look at the airspeed, the airplane is off and climbing in a level fuselage attitude. No rotation is required and the ground roll was approximately 140-150 feet at a gross weight of 39,000 pounds. We are flying now at about 45-50 knots, so to hasten our pattern a bit, we'll lower the wing to 10 degrees, automatically retaining 30 degrees flaps. This results in a trim speed of 90 knots. As we turn on to base leg, landing flap program is selected and we extend flaps to 60 degrees for a trim speed of 65 knots. On final approach the wing is raised to 35 degrees and our fuselage level trim speed is 35 knots.

Several characteristics, by now, are readily apparent. First, and foremost, is the tremendous power available in this bird. Very small changes in collective lever position are all that are required to alter flight path. Along with this, is an almost unalterable speed stability with fuselage attitude constant. All this means that once we are established on final, with landing wing angle set, we merely control our approach angle with the collective power lever down to the runway. Because the wing is completely immersed in slipstream, small increases or decreases in power cause an instant increase or decrease in lift and, hence, an instantaneous decrease or increase in glide slope angle. Once the airplane is landed, the collective is lowered completely resulting in negative blade angle and reverse thrust. With moderate wheel braking, this results in a ground roll of approximately 200 feet.

Let us now rise vertically and repeat the trip around the field, ending with a vertical landing. With the wing at about 86 degrees, the collective is again raised until the airplane begins to get light on the gear. At this point, unless wing angle is correct, the airplane will have a tendency to move forward or backward until a small wing angle correction is made to yield an equilibrium condition for the ambient wind condition. As power is further increased, the airplane leaves the ground. The transition from ground to hover is amazingly free of transients and completely without downwash re-circulation effects. A slow ascent is made to 20 feet where we stabilize momentarily. Of the first seven pilots to hover the airplane, all agreed that the XC-142A hovers as well or better than any helicopter in their experience. Height control is positive with no lag and control about the three major axes is precise.

Increasing hover height to 50 feet, the wing is started down. The most noticeable effect is that of acceleration as a function of wing angle. Although going from 90 degrees to 60 degrees produces only 20 knots of forward speed, as the wing progresses downward from 60 degrees acceleration amounts to approximately two knots/degree. This is all accomplished with little or no trim change and a gradual power reduction. Should power remain fixed at that level required for hover, a climbing conversion will ensue.

The reconversion to hover follows a normal STOL approach, described above, except that with a 30 degree to 35 degree wing angle altitude is kept at or near 50 feet until approaching the intended hover point. At this time, wing angle is increased, incrementally, until a stabilization hover is reached with a wing angle dependent upon wind velocity. During the final reconversion to hover, the collective power level is raised as wing angle is increased and aerodynamic lift is traded for propeller lift. The descent to the ground, again, is free of surprises or negative ground effects.

In conventional flight with wing down and on throttle control, the airplane handles in a conventional manner. Maneuvering characteristics have been described as "crisp" by one military evaluation pilot, which is to say that airplane response about any axis is more reminiscent of a fighter than a heavy transport. The airplane is designed to cruise at 20,000 to 25,000 feet from 220 to 250 knots. Due to the tremendous amount of installed power, cruising on four engines would cause rather inefficient operation; therefore, the airplane is cruised on just two engines turning all four propellers through the cross-shafting system. So, in effect, during cruising flight the XC-142A is a twin engine airplane with two spares.

Before closing I'd like to say a few words about this business of flying a fully immersed wing. The concept is not especially new, just highly refined in the XC-142A. With the wing at any angle up from zero, the most noticeable effect of having the wing immersed in slipstream is "instant lift." By this I mean that descent or ascent rate can instantly be changed with power. In addition, wing stall will not occur with sufficient power on the airplane. In a conventional airplane the airspeed indicator is a rather high priority instrument for takeoff and landing approach to insure an adequate stall margin. In the XC-142A, airspeed is of academic interest only during a STOL approach and during conversion from or to VTOL configuraton. The reason, of course, is lack of wing stall. A pilot flys wing angle and power, keeping fuselage approximately level, and couldn't care less whether he's flying at 80, 60, 40 or 20 knots.

With that as food for thought, I'll close with the wish that you'll be "converted" in the not too distant future. ★

Missilanea

ACCIDENT PREVENTER. Second Lieutenant Inocencio De la Cruz, assigned to Hq SBAMA as an ICBM development engineer for Titan II, was called to a site for technical assistance in the malfunctioning of the missile prevalves. While on this assignment, he noticed that an oxidizer hose assembly is connected from the rocket engine oxidizer discharge line quick disconnect to the oxidizer facility drain. According to instructions, the oxidizer N_2O_4 is gravity drained and dumped into one side of the "W" flame deflector without being neutralized. Also, a fuel hose assembly is connected from the rocket engine lube oil cooler quick disconnect to the fuel facility drain. Again according to instruction, the fuel Aerozine-50 is gravity drained and dumped into the other side of the "W" flame deflector without being neutralized. Research of the Silo Operational as-built drawings revealed however, that the two four-inch drain pipes installed (one on each side) at the bottom of the "W" flame deflector drain to a *common sump*. Consequently, the hypergolic propellants may ignite and explode upon contact in the common sump.

Thanks to Lt. De la Cruz' observation and report, the Systems Support Manager was alerted and mods as necessary to eliminate the hazard are anticipated.

Maj Gene G. Halvorsen
Norton AFB (SBNEPB)

WHEREZIT??—Probably every car owner has experienced the shock of having his keys locked inside his automobile. Such carelessness often creates considerable inconvenience and embarrassment, but is seldom a hazard. However, the same is not true with a missile weapon system. Recently, a helpful missile maintenance technician (MMT) opened a Minuteman launch facility for a contractor-installed modification. The accommodating MMT was so eager to assist that he rushed through the prescribed sequence of operations. Apparently the checklist was a retardant, so he placed it in a secure place and relied on his memory. The checklist was so unimportant to the MMT that he inadvertently left it within the launcher!!!

Fortunately, the silo was secured without mishap. But, alas! Another entry was required. The MMT possessed great skill and confidence. He reopened the launcher—again without benefit of checklist or technical data (even though a technical order was in a nearby vehicle).

This MMT is a skilled (?) but careless workman. Does he work for you? Or, does he work against you?

Lt Col Valdean Watson
Directorate of Aerospace Safety

SAFETY FILMS—At the 5th Annual Safety Congress it was recommended that the Directorate make available safety films of 15 to 20 minutes duration, that are missile oriented and depict the roles of the Commander, the Safety Officer and supervisors in accident prevention. Missile Safety films, in color, available are: TF 5600 MISSILE SAFETY SURVEY, 20 min. Instruction and guidance for commander and staff in planning, scheduling and conducting safety surveys.

•

TF 5437a MINUTEMAN WEAPON SYSTEM SAFETY—Introduction, 19 min. Familiarizes personnel assigned to operate or support this weapon system.

•

TF 5437b MINUTEMAN WEAPON SYSTEM SAFETY—Maintenance, 14 min. Stresses safety measures necessary to maintenance of the weapon system.

•

TF 5522a, b, c, d, e. MAN AND SAFETY, 27 min. each. A series of five films highlighting man's "built-in" limitations.

•

SFP 1139 THE USAF SAFETY STORY, 30 min. Historical development of the safety program from early Signal Corps days to the present.

•

FTA 510 A PIECE OF PAPER, 10 min. Teaches how to recognize, identify and report missile hazards.

Requests from ZI bases should be sent through local facilities to the AF Film Library Center, 8900 S. Broadway, St. Louis, Mo. Requests from overseas bases should be sent to the local film servicing unit or to the overseas central or branch film library listed in the AFP 95-2-1. ★

The only excuse for putting a human being in charge of an aircraft today is that he can do **one** thing machines cannot: **exercise judgment!**

moments of decision

By Lt Col William R. Detrick, Aviation Physiologist, Asst for Medical Services, DTIG

Most of the decisions made in an emergency or hurried situation are the right, or correct, ones. These are the times when everything turns out well and no one, except perhaps the man himself, is really aware that a right decision was made. Perhaps the individual is even criticized for making that decision.

There are other times when the decisions were the wrong ones. Or no decision was made. The accident files contain many such cases: A jet bomber lines up on the runway for a heavy weight takeoff. For some reason the pilot's actuation of the water-alcohol switch does not produce the required results for a full power, heavy weight takeoff. Rather than abort, he elects to continue the takeoff attempt. The big jet staggers off the ground as it runs out of runway, only to crash in flames a few hundred feet beyond, killing all on board . . .

A twin-jet fighter beginning a takeoff roll gets an afterburner light on only one engine. The pilot elects to continue. Several hundred feet down the runway, the remaining afterburner is observed to go out. Much later the takeoff is aborted but the aircraft crashes out of control off the runway. A pilot dies in the ensuing fire . . .

A century series jet fighter lands on the runway following the pilot's futile attempts to lower the landing gear. As the aircraft slides to a stop in a cloud of dust, the pilot is observed to be moving around in the cockpit. A few seconds later he ejects himself from the aircraft in a fatal attempt to blow the canopy, forgetting for a moment he was using a single-motion ejection seat on which the arm rest handle, when raised, fires both the canopy and the seat . . .

A flight of two jet fighters rolls down the runway for a formation takeoff. In an attempt to stay behind the flight leader the wingman asks him to "push it up" as he adjusts power to minimum afterburner. On rotation of the aircraft, the wingman actually passes the leader who drags the tail pipe of his heavy fighter in an attempt to force it into the air. Approximately 30 feet of altitude is gained before the aircraft quits flying and crashes . . .

The GCA final controller informs the pilot making an instrument approach that he is dangerously low on the glide path. The pilot replies that he has the runway in sight but crashes short . . .

> **No one gets ready for an emergency in a moment. What a person does in an emergency is determined by what he has been regularly doing for a long time.**
>
> **(SAFE WORKER, National Safety Council.)**

The pilot of a four-engine transport hurriedly orders his passegers to bail out when an engine fire is discovered, forgetting perhaps that is is night time and that the aircraft is over arctic waters. The aircraft lands safely after the fire is brought under control but all but one of the parachutists are lost in the icy water . . .

The pilot of a jet fighter ejects from his out-of-control aircraft just prior to impact. Although the ejection seat clears the aircraft, nothing short of an Atlas Booster could have counteracted the downward speed in time to save the pilot's life. His out-of-control condition had been reported at a fairly high altitude.

Now compare these examples to the many untold and unreported times when: Pilots have safely aborted a takeoff that did not seem quite right; a crash landing was made and the pilot meticulously turned off all switches and radios before safely abandoning the aircraft; two century series pilots successfully ejected seconds after takeoff and just prior to a crash caused by control malfunction; many times pilots have broken off approaches that didn't seem right, or went to an alternate when conditions were just about at minimums at destination.

My point is this: Although most hurried decisions are sound and correct, many are wrong — deadly so. How then do we make sound and correct decisions under stress?

All decisions, whether studied or hurried, should be based on careful evaluation of the circumstances. Sounds easy, but how about when the situation is blowing up around you and action must be taken NOW? The only answer is that hurried decisions must be at least partially thought out ahead of time. This implies a thorough knowledge of the aircraft and its performance as well as some idea of one's own abilities and limitations. This is where education and training come into play. This is the reason for set procedures, technical orders and standard operating procedures. Pilots well drilled in emergency procedures usually react with little or no delay during emergencies.

During emergencies decisions must be made quickly, while there is still time for the pilot's actions to produce correct results — aborting the takeoff early, ejecting while there is still enough altitude to get out safely, starting a go-around from a bad approach while time and altitude remain to do it safely.

Have you trained yourself to the point where you can answer the following questions to your own satisfaction? What would I do if the engine quit now? What would I do about an inflight fire? What if my destination is socked in?

As students we were all pretty alert for possible forced landing sites, since we never knew when the instructor might pull off the power. What do you plan to do if an engine quits just after liftoff and you have no more runway ahead and insufficient altitude and air speed to eject? Do you have an alternate decision as well as an alternate airport at all times?

If you have the emergency procedures cold and have thought through all of the possibilities ahead of time, the final decision — that critical, make-or-break one — will be much easier. The attitude "it can't happen to me" has probably killed more people than we'll ever know.

Preparation is the key to those critical Moments of Decision. ★

Don't Ditch the Centuries

Here's what happens when a jet fighter ditches under near ideal conditions. At approximately 1500 feet, after takeoff, the engine flamed out and couldn't be restarted. The pilot ejected successfully and the aircraft ditched in a generally good ditching attitude. Later a diver took these pictures of the aircraft, upright, in 38 feet of water. Note that damage was extensive, the fuselage broke at the cockpit area and the nose section folded under. The cockpit floor was completely destroyed by impact, the engine intake being forced into the lower cockpit area. ★

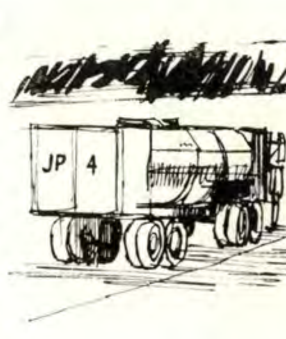
Aerobits

STATIC RAINCOATS. It has been discovered that the new Air Force issue raincoat (man's coated nylon twill) generates excessive amounts of static electricity when worn. This hazard is considered tolerable, provided the raincoat is worn as intended — as a dress item of issue. It is not intended for wear on the flight line or in hazardous environments where ignition sources are prevalent.

For persons performing maintenance or other duties in hazardous environments during inclement weather, Uncle Sam authorizes: overalls, wet weather, cotton sheeting, rubberized S/N 8405-725-2812 and rain jacket, cotton sheeting, rubberized, S/N 8405-682-6776.

WRONG JUICE. After having been serviced from a contract fuel facility, a C-124 was started and taxied out for a transocean flight. During engine runup the flight engineer noted abnormal engine instrument readings and that the cylinder head temperatures were approximately 20 degrees high. He informed the pilot. While they were discussing possible causes and actions they should take they were called by the tower. A B-50 had air-aborted and an after-landing examination disclosed that it had been serviced with JP-4. The tower operator advised that possibly the C-124 had also been serviced with JP-4. The C-124 was taxied back to the ramp where tanks 2, 5, 8 and 11 were found to have been serviced with approximately 6000 pounds of JP-4. Although all circumstances are not known, masking tape had been used to cover one side of the truck, which had "JP-4" painted on it.

Moral: When instruments don't read right — there's a reason. Find it!



CHUTE SHOCKER. During an ORI a pararescueman jumping from 1000 feet noticed a delay in parachute deployment. Then, when the chute opened, all of the suspension lines to the right front riser connector link came loose. Since there was no significant change in the rate of descent, the parachutist did not deploy his reserve chute and descent and landing were normal.

Later it was determined that the yoke on the right front connector link apparently slid off on chute opening. But here's the shocker! The yokes from the right rear and left front connector links were also missing, and, although the left rear connector link yoke was in place, it slid off easily when checked.

This was a new, recently assembled chute with no evident defacing of the connector links. Therefore, it is apparent that the set screws were not tightened during assembly of the parachute. Whether the parachutist made the proper decision in not deploying his reserve chute is open to debate. The point we would like to make is that apparently an oversight caused this hazard. This emphasizes the need for constant surveillance by personnel in the business of handling vital life-saving equipment.

This same type connector link is used on most personnel type parachutes. In an emergency bailout or ejection there is no backup.

Robert H. Shannon
Safety Officer
Assistant for Medical Services, DTIG

UNSTUCK DIPSTICK—It took the combined efforts of Albuquerque Center, the New Mexico state police and the crew of a U-3B, but good work on the part of all prevented an accident. The mishap also provided a clue to a problem that had not been solved in several previous incidents.

Prior to flight, the crew was checking the aircraft and one of the pilots had trouble with the oil dipstick — couldn't get it properly inserted and locked. The crew chief then installed and locked the stick and the pilot noted that it was properly in place. As the flight neared Otto VOR east of Albuquerque, at 10,000 feet, the Nr 2 engine oil pressure dropped to zero, the engine began vibrating and the propellor surging. Since altitude could not be maintained on one engine, descent was begun and at Otto the aircraft was down to 8000. The crew queried Albuquerque Center as to altitude along flight route and was informed that the terrain got up to 7900 feet.

The pilot asked for airports and was informed that there was an abandoned strip four miles east of Otto VOR. By now the aircraft was down to 6500, so pilot advised that he would have to try a landing there. Darkness had set in so the Center called out the New Mexico police who sent some cars to the field. They parked their cars to provide lights from their headlights and a successful landing was made. Because of vegetation growing on the strip and location of the cars, the pilot actually landed on a sandy, overgrown piece of desert. After inspection and servicing the aircraft was released for flight.

Several similar incidents had occurred at this base and it was thought that the dipstick had simply not been correctly installed. In this case both a crew chief and pilot observed that the dipstick was properly in place; the real culprit was inadequate depth of the channel in the phenolic locking block. A recommendation has been made to secure a more positive dipstick lock.

SHORT RIGGING — As we were making the last pass, even the range officer complimented us on the mission. It was a fine feeling. All we had to do was go home. It looked like a perfect weekend.

It started as I was making my turn for rejoin. Nr 2 tucked it in. Nr 3 was closing and 4 wasn't far behind. Nr 3 dropped his boards to slow down and he dropped back. I was about to comment on the sloppy join-up when he called "utility failure."

Things went from good to not-so-good in a hurry. I sent Nrs 2 and 4 back, and got on Nr 3 to chase him home.

Utility failure in the F-100C isn't a dire emergency, but you have to lower the gear manually, you have no nosewheel steering and only three shots of brake. The wind was light and right down the runway. It didn't look like much sweat.

We had plenty of fuel so we took our time. I read the checklist (gear extension procedures) while he did it. We slowed to 220 knots. He put the gear handle in the down position and pulled the manual release. The main gear up locks released and the main gear fell out of the wells, down and locked. The nose gear remained up and locked. Now things started to look black.

We called mobile to see if he had any ideas. He looked in the good book but we had already done everything.

Landing a tricycle gear aircraft three-point didn't appeal to Nr 3, especially when the nose was one of the points. We decided to try one more.

He gave a couple of thumbs, nose-up trim, let go of the stick and grabbed the release with both hands. Now wasn't a time to be dainty. After he gave a mighty pull, the nose gear came down and locked. After heaving a big sigh of relief (both of us) he landed without any further difficulty. When we investigated, we found the cable in the manual release rigged about a quarter of an inch too short. Only a very hard pull could release it. Because of this quarter of an inch we almost lost an expensive aircraft and possibly a pilot.

So remember, fellas, keep watching for those little things. They can kill you just as dead.

Capt Harold E. Buckley
131 Tac Ftr Gp (ANG)
Lambert Fld, St. Louis, Mo.

Aerobits

LOOSE SCREW — During preflight, controls checked okay, but on takeoff the pilot noticed the elevator control felt stiff. The copilot investigated and found a one-eighth by one and one-eighth inch screw lodged between the control column and the cover over the control cables. After considerable work, the copilot was able to remove the screw with his knife; however, while he was working the screw it became lodged in a vertical position which prevented forward movement of the control column. After the screw was removed normal operation was possible and the mission continued as briefed.

Apparently this screw was dropped during replacement of the copilot's airspeed indicator.

CASE BUSTER — Seems the pilot had started his T-bird and everything was checking out fine until he got to the emergency fuel check. At this time, the pilot inadvertently activated the GANG-START switch instead of the EMERGENCY FUEL SWITCH. He realized his error and simply returned the gangstart switch to the off position without retarding the throttle. This action produced a very loud rumble and the engine was shut down. Investigation revealed a badly cracked engine compressor case caused by over-pressure in the engine compressor section.

The error made by this pilot is understandable since the two switches are located adjacent to each other. Therefore, it's important to remember that the gangstart switch parallels the function of the emergency fuel switch. Consequently, returning the gangstart switch to the off position must be done in the same manner as switching from the emergency to the normal fuel system.

ALL OPERATORS: Assure the throttle is retarded and the engine is in a coast-down condition when switching the gangstart system OFF or returning the emergency switch to NORMAL.

ATC Safety Directorate

HELP! — The Directorate of Aerospace Safety is frequently required to make presentations concerning *materiel* failures and *maintenance errors* in support of your field efforts.

A requirement exists for high quality, professionally produced 35mm color slides that may be used as examples of these irregularities.

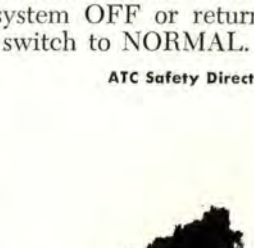
We need your help!

Request all suitable subjects be given professional photographic coverage by base photographers and that 35mm slides in color be forwarded to the Directorate of Aerospace Safety, Deputy TIG USAF (AFIAS-F3), Norton AFB, with a factual explanation of the circumstances surrounding the incident. In those cases where AF Form 711s have been submitted, only slide identification and a reference to the report is necessary.

Suitable subjects referred to above are not limited to, but should include such things as materiel failure, design deficiencies that hamper maintenance, improper maintenance and items received that indicate poor quality control at the source.

Your assistance in this effort will be greatly appreciated. ★

Lt Col Harold K. Boutwell
Directorate of Aerospace Safety



☆ U. S. GOVERNMENT PRINTING OFFICE 1965 751-220/11

WELL DONE

1st LT. ROBERT L. CLINKENBEARD

2D FTR INTCP SQ, 52 FTR WG, SUFFOLK COUNTY AFB, N.Y.

On 8 April 1964, First Lieutenant Clinkenbeard took off in an F-101B from Suffolk County AFB, New York, on an operational deployment mission. Weather was 400 foot broken ceiling with one mile visibility in rainshowers and fog. Immediately after takeoff, Lieutenant Clinkenbeard experienced severe control difficulties. He immediately raised the wheels and flaps and climbed straight ahead. All instruments were in the green, but when he used ailerons the aircraft went into a violent dutch roll. He quickly climbed for altitude. The same control problem was encountered at all airspeeds. A gentle turn was initiated to determine controllability and the radar observer noted the left aileron fluttering in the turn. These flight stability tests were accomplished in very heavy weather at 3000 feet. Emergency position was selected on the aircraft transponder equipment and Suffolk GCA was contacted on Guard Channel. Lientenant Clinkenbeard experimented with the aircraft to attain the best control airspeed and configuration for landing. He followed GCA instructions and made a successful landing in gusty winds and marginal weather with a heavy aircraft. Maximum aerodynamic and wheel braking techniques were used to stop on the rainslick runway. Inspection disclosed that the aileron position transmitter was out-of-null.

The professional skill, knowledge of the aircraft, and calmness exhibited by Lieutenant Clinkenbeard in an emergency during minimum weather conditions prevented the loss of a first-line United States Air Force fighter interceptor aircraft. WELL DONE! ★

NEAR MISS

REPORT IT!