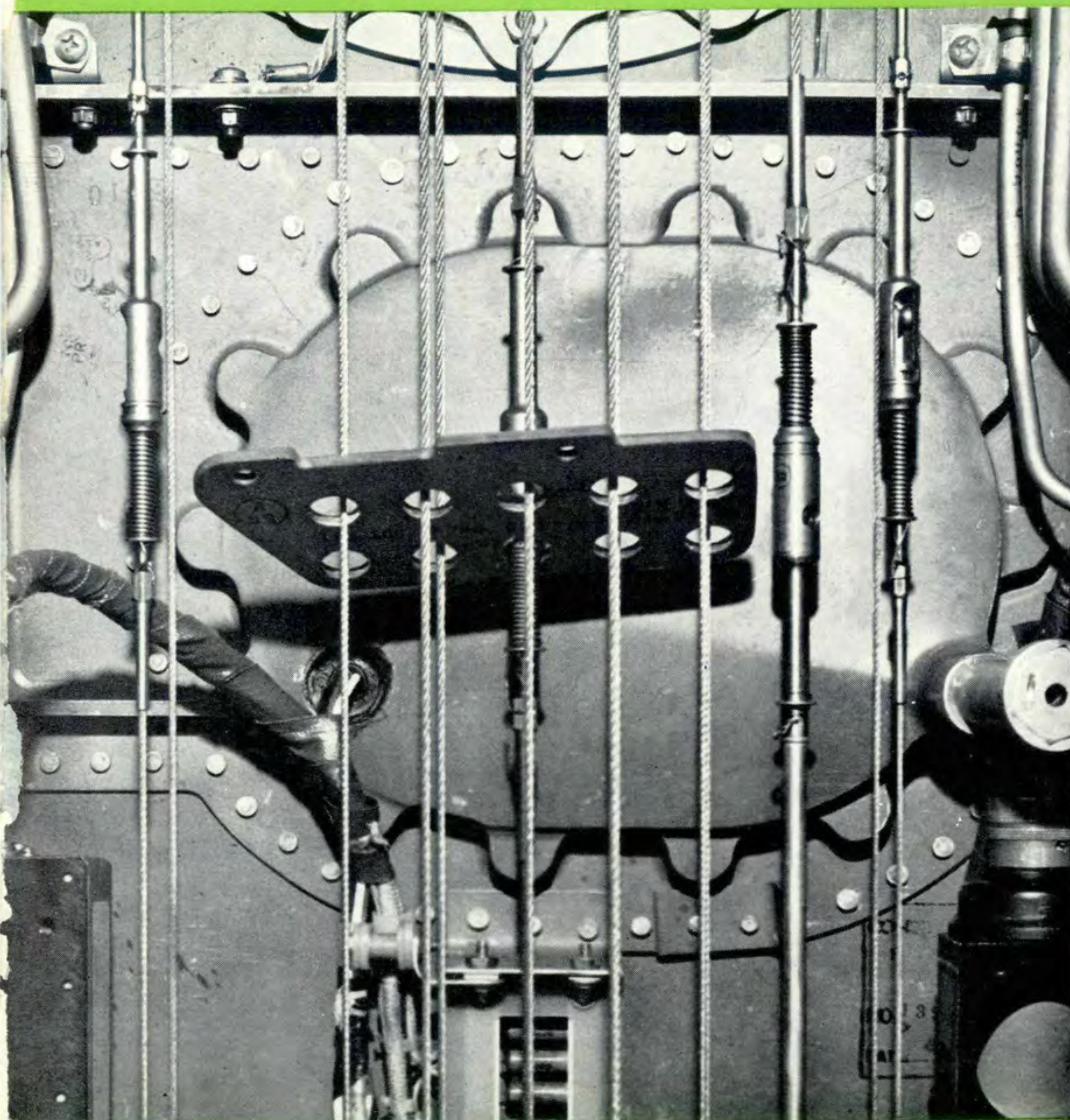
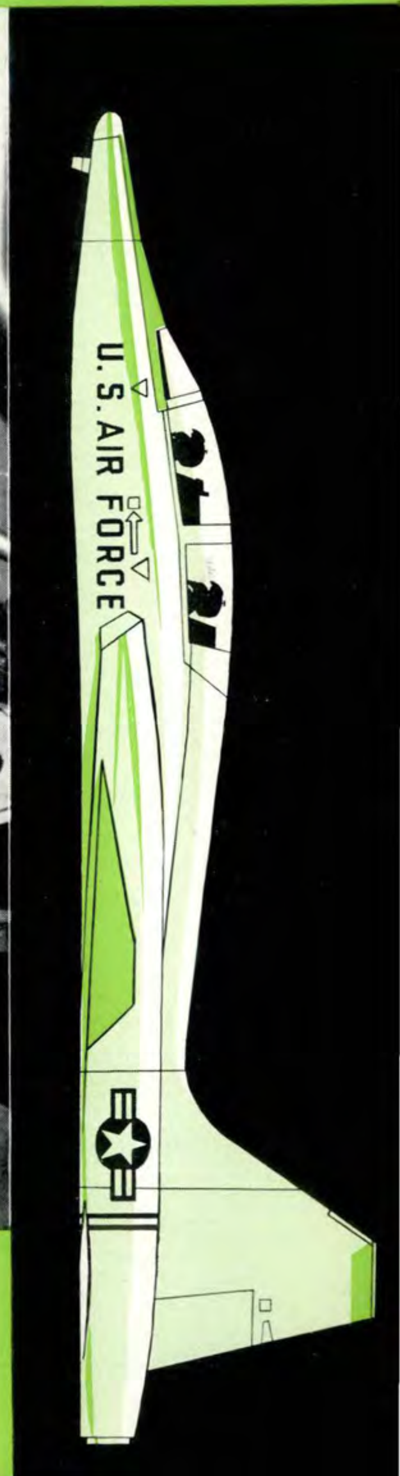
AEROSPACE

SAFETY

JULY • 1961

UNITED STATES AIR FORCE





We chose the above picture for our cover because it illustrates one of the T-38 Talon's many safety features—staggered flight control quick disconnects. More about this amazing new trainer on Page 2.

THE ENEMY

I am more powerful than the combined armies of the world. I have destroyed more men than all of the wars of the nation. I massacre thousands of people in a single year. I am more deadly than bullets and I have wrecked more homes than the mightiest of guns. I steal in the United States alone over $500,000,000 each year. I spare no one and I find my victims among the rich and poor alike; the young and the old; the strong and the weak; widows and orphans know me to their everlasting sorrow; I loom up in such proportions that I cast my shadow over every field of labor. I lurk in unseen places and do most of my work silently; you are warned against me yet you heed me not. I am relentless, merciless and cruel. I am everywhere—in the home, on the streets, in the factory, at railroad crossings, on land, in the air and on the sea. I bring sickness, degradation and death—yet few seek me out to destroy me. I crush, I maim, I devastate; I will give you nothing and rob you of all you have. I am your worst enemy. I am CARELESSNESS!

U. S. Naval Aviation Safety Center, Norfolk, Virginia

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The Inspector General, USAF

Major General Perry B. Griffith
Deputy Inspector General for Safety, USAF

Brigadier General Walter E. Arnold
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VOLUME SEVENTEEN NUMBER SEVEN — USAF RECURRING PUBLICATION 62-1

★

THE KOLLIGIAN TROPHY AWARD

★

CAPTAIN JEROME F. KING

★

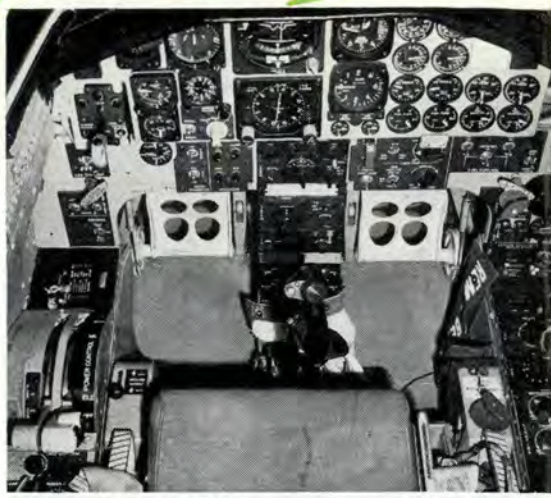
The Kolligian Trophy, the Air Force's coveted Flying Safety Award, has been presented to Captain Jerome F. King for his outstanding skill and judgment in coping with an inflight emergency. The presentation was made by Gen. Curtis E. LeMay, Chief of Staff, USAF, during ceremonies at the Pentagon.

Captain King, 30, an aircraft commander on temporary duty at Rhein-Main, Germany, distinguished himself on 24 October 1960, when he safely landed a C-124 aircraft despite adverse weather, two engines out and a third performing erratically. Taking off from Westover AFB, Mass., for Lages, Azores, the Douglas Globemaster was at maximum gross weight of 185,000 pounds. Aboard were six crewmembers, four passengers and a heavy load of high explosives. Within an hour after takeoff, Captain King was forced to shutdown the No. 1 and No. 2 engines and, with the aircraft unable to maintain altitude, he declared an emergency. Quonset Point Naval Air Station was selected for a landing, and a ground controlled approach was established.

During the approach, No. 4 engine became erratic and began to lose power. At this point the aircraft was on final approach with two engines feathered, one on minimum power, and one running at maximum power. The landing was further complicated by a 70-degree crosswind with gusts to 33 knots and a runway made slippery by rain and snow. Despite all these adverse factors, Captain King landed the aircraft smoothly, and skillfully utilized his brakes and remaining engines to keep it aligned with the runway, thus saving his crew, passengers and cargo.

Captain King is married to the former Waltraud E. Zirzow of Detroit, Mich. They have a ten-months-old daughter. He enlisted in the Air Force in 1951 and was graduated as a pilot in April, 1954. Currently assigned to the 53d Troop Carrier Squadron, Captain King is on his third temporary duty tour at Rhein-Main.

The award was established four years ago by the father of the late Lt. Koren Kolligian, Jr., an Air Force pilot. ★



TALONS FOR THE EAGLETS

Legion are the records and honors won by Air Force pilots, but a distinction no other pilot can ever claim will come to graduates of Air Training Command's basic pilot training class, number 62F.

In many respects these class members are much the same as any other group of student pilots, having been raised on the usual diet of corn flakes and Sunday roasts, driven second-hand cars to high school, bought the purple orchid for their girls before the prom and having decided to be pilots on joining the Air Force.

Just what will make them a select group is the fact that they will be the first pilots to fly a supersonic training plane before they earn their "wings."

Their highly advanced basic trainer, the Northrop-built T-38 Talon, is an aircraft that not only bridges the speed gap between trainers and combat aircraft, but it also introduces students into an actual equipment environment comparable to today's complicated offensive and defensive aerospace weapon systems.

The supersonic jet training era brings with it many operational advantages, but this rapid evolution of faster and more complex trainers spawns many training problems. For one, the student's time element error margin is again narrowed due to the T-38's higher speeds. This alone compounds the need for improving built-in safety features in the craft itself and for implementing a flight safety program second to none in order to produce live pilots.

The fact that this need has been met is shown by the paradoxical downward curve in training accident rates contrasted against the upward curve in training speeds.

Consider that the cruising speed of the World War II advanced trainer, the T-6, was less than the final approach speed of the T-38. When the T-6 became a primary trainer in 1948, skeptics who were inclined to associate speed and accidents, predicted dire consequences. The thought of an undergraduate pilot flying a jet at supersonic speeds raised the same doubts.

ATC training experts are very optimistic about the safety of its all-jet training program, culminating in the supersonic T-38, for these reasons:

Flying safety practices have been geared up to keep pace with the quantum leap in speeds, and aircraft design and reliability have risen in proportion.

Flight safety indoctrination is the foundation of ATC's flying safety program. Orientation in flight safety philosophy starts as soon as the student begins his primary training.

Military flight instructors augment this by on-the-

Talon, Air Force's new jet trainer, features twin engine reliability, supersonic speed, fine visibility. Photos show panel, twin canopies, liquid oxygen refill from ground level, excellent, non-obstructed view from cockpit. In picture above, T-38 is welcomed to ATC at Randolph AFB. Photos of exterior view of T-38 showing twin canopies and dual tailpipes, courtesy of Mr. Les Bland.

line safety training through flight instructors and flight commanders. What results is a safety-conscious, professional air crewman.

This psychological conditioning, coupled with supersonic undergraduate training, promises to produce top pilots for such exotic craft as the B-70 and Dyna-Soar.

ATC flying safety personnel actually had a voice in the design of the T-38. Flying safety personnel as members of the command project team worked with the manufacturer from the drawing board on in the safety development of the new aircraft. When ATC issued its requirements for a new trainer, the primary reason was to keep a logical flying training sequence between trainer and the combat aircraft already on the drawing boards.

By early 1956 general specifications for the second phase training aircraft were completed and by mid-year Northrop Corporation was awarded the contract to develop the aircraft.

The Talon evolved as a two-place, high altitude, supersonic, low-wing, twin-engined, jet propelled aircraft with pressurized cockpits, enclosed by individual jettisonable canopies, tandem seating arrangement, with rocket ejection seats provided for both crew members.

Fuselage lines are characterized by "coke-bottle" curvature at the wing junction point, in conformance with the "area rule" theory. Wings, placed toward the rear of the fuselage, just aft of the air scoops, have a swept leading-edge. This wing design lets the plane transition to supersonic speeds without "tuck" or "pitch."

The T-38 is equipped with conventional ailerons and rudder and an all-movable horizontal tail.

Its two 7.3 thrust-to-weight ratio General Electric engines, equipped with afterburners, can lift the aircraft after a takeoff run of 2600 feet. It climbs at a sea level rate of 30,000 feet per minute and can operate at a ceiling above 55,000 feet. The Talon slices through the air at a top speed in excess of Mach 1.2. The T-38 is a high-sink-rate aircraft and power must be used throughout normal landing approaches.

To ATC these high-performance characteristics mean that major categories of basic pilot training can now include flying techniques peculiar to the newest Century Series fighters.

When the T-38 was still an embryo three prime requirements as to what the finished product would have to incorporate were considered. These were performance capabilities similar to supersonic combat aircraft; economy of maintenance and operation, and flying qualities consistent with safety requirements for trainer aircraft. Much time was devoted to avoiding the "building-in of accidents" into the aircraft.

In regard to the latter, ATCs flying safety program capped a historic first when the command's T-38 project team, made up of hand-picked personnel, actually aided the manufacturer in the safety planning and development of the aircraft before it was ever accepted by the Air Force.

The consequence of this close association between the actual user and manufacturer resulted in improved slipstreaming of certain access doors, the inclusion of an improved audio and visual landing gear warning system, and the logical placement of instruments and radios on the instrument panel to prevent spatial disorientation.

TSgt. Johnny N. Harms, Air Training Command, Randolph AFB, Tex.

To further avoid the possibility of "built-in accidents," the "Murphy Team" concept was instigated to circumvent "Murphy's Law" . . . an old military term referring to the fact that "If it's possible to do it wrong someone will do it wrong."

An example of "Murphy's Law" prevention was the recommendation by ATC's T-38 project team for the staggered location of flight control quick disconnects. The stagger makes it impossible to cross-connect cables which would reverse action of flight controls.

Another "built-in" safety feature was size variations of the hydraulic disconnect fittings, also making cross connection impossible.

In preventing possible "Murphyisms" the team helped eliminate many hazards and problems before they had a chance to occur.

For ease of engine removal and installation the aft portion of the T-38's fuselage, excluding the vertical stabilizer, is detachable. An overhead track and roller arrangement in each engine bay is another boon to this process.

Mounting such accessories as hydraulic pumps and generators and their engine driven gear boxes to the airframe structure further simplifies the engine removal-installation sequence. An engine can be changed in about twenty minutes. A complete double change would take close to two hours.

The T-38 uses full-power flight control systems for the operation of the ailerons, rudder and the all-movable horizontal stabilizer. Either engine can supply the hydraulic power for flight control operation.

Aileron and rudder "feel" are provided by control force springs, and longitudinal "feel" is provided by a control force spring and bob-weight combination. Longitudinal and directional stability augmenters are installed in series with the control system. The aircraft can be flown and safely landed using one aileron.

Selective position speed brakes are located on the underside of the T-38's fuselage, just forward of the main landing gear doors. They are used for rapid descent from high altitudes and for reducing air speed.

The T-38's landing gear group is tricycle design with steerable nose wheel. The nose gear retracts forward and the main gear struts are pivoted inboard from the outer wing.

Possibly one of the greatest pilot bonuses is the accessibility of the cockpit controls. No controls are located aft of the pilot's elbows. Also the windshield is hinged so that it can be swung out of the way for cockpit maintenance. Visibility from within the cockpit is excellent. This is due to the cambered nose design and the fact that the rear seat is positioned 10 inches higher than the forward seat.

Another outstanding safety feature, so important in training the fledgling pilots, is two-engine reliability. Two engines reduce the possibility of aborted takeoffs, inflight power failure or electrical system failure. Each General Electric J85-5 engine weighs 538 pounds and delivers at least 3850 pounds of thrust. This gives the Talon performance capabilities in the Century Series fighter class at far less weight and cost. The T-38 is capable of single-engine takeoff and landing at maximum weight.

The engine fuel system is made up of two independent supply tanks, one for each engine. Fuel for the right engine is fed from a forward fuselage tank and a dorsal tank located just aft of the canopy. The left-hand engine is supplied by center and aft fuselage tanks. All tanks are bladder-type cells. Fuel switches are located on the cockpit panel—two for "supply" and one for "crossfeed."

Fuel sequencing or crossfeed is not necessary during normal flight. However, a manual crossfeed is provided so that all fuel can be sequenced to one engine. In the event of fuel boost pump failure, fuel can be gravity fed.

Electrical power for the aircraft is generated by two independent AC systems and a DC system. During normal operation each generator supplies half the electrical load. If one fails, an automatic switchover cuts in and causes the remaining generator to supply the total load.

The hydraulic power units for the T-38 also come in pairs. Each unit is identical in operation but differs in the systems they supply. Hydraulic, electrical and fuel systems are capable of full operation in single engine flight.

The ejection system is rocket actuated. In fact ejection can be safely made at deck level during takeoff because the rocket will blast the pilot high enough for the parachute to open and let the pilot down easy. Should the need to eject arise while in flight, the pilot pulls his feet back and straightens his head against the headrest. He then pulls up on one or both hand grips at the side of the seat. This raises the braces for the legs, locks the shoulder harness and arms a trigger under the fingers. All he has to do now is to squeeze the trigger. This jettisons the cockpit canopy and rockets the pilot out. Once clear of the aircraft, the pilot is automatically separated from the seat and the automatic parachute system does the rest.

The Talon T-38 is something new in the way of USAF flying classrooms—combining trainer safety with supersonic performance and reversing the trend toward greater system complexity and higher cost.

As more Talons are produced and delivered to Air Training Command the present T-33, veteran of many years successful use in pilot training, will be phased out of basic flying training. From then on future pilots will have but one step to supersonic training via the T-37, a sub-sonic twin-jet.

ATC instructors and flight safety personnel are confident that students can take this giant step. Flying safety statistics bear them out. Even though a high percentage of ATC's flying hours are logged by student pilots whose experience level would suggest that they were accident vulnerable, the Command's aircraft accidents constitute a smaller percentage of total Air Force aircraft accidents than ever before in its history.

The man who heads Air Force training sees the newly arrived Talon as a logical step toward preparing student pilots for the era of manned space flight.

Lt. General James E. Briggs, commander of the Air Training Command, says, "Some of the men who are flying B-52s and B-58s today were trained in 70-mile-an-hour aircraft. If we have leaped that wide performance gap in so short a time, it is not hard to imagine the young students who will train on the Talon eventually becoming pilots of Dyna-Soar and other space-going vehicles." ★

C·NOTES

In a recent F-106 accident, the pilot ejected following a flameout landing and was fatally injured. It could not be determined with certainty if the ejection was intentional or inadvertent. However, there is a strong possibility that the pilot confused the one-motion ejection system employed on the F-106 interim seat with the two-motion system used in most other aircraft escape systems. In an attempt to jettison the canopy for immediate ground egress, he raised the right handle and ejected himself from the aircraft. The following are some known pertinent factors concerning this accident:

- The ejection occurred approximately five to ten seconds after the aircraft came to a complete stop.
- Prior to ejecting, the pilot was observed to be making coordinated movements within the cockpit.
- A dense cloud of dust enveloped the aircraft after it came to a stop and just prior to ejection.
- The right armrest was found out of detent, but not in the full up-and-locked position.
- Inspection of the seat revealed no malfunction that would have caused it to fire inadvertently.

• The Board concluded that the most probable cause of the ejection was mistaking the right hand seat handle for the Survival Kit release handle, because of the closeness and similarity of these two handles. Because of the pilot's extensive background and intimate knowledge of the operation of the seat, his confusing the one-motion system with the two-motion system was considered by the Board to be only a remote possibility.

I can not agree that the pilot's confusing the two systems is only a remote possibility. It is not unusual for an individual to revert to original habit patterns under conditions of severe stress, in spite of extensive current experience. There was an excellent illustration of this in a recent F-102 accident involving an emergency landing, The pilot, who also had an extensive background including 480 hours in the F-102, raised the right handle to jettison the canopy instead of using the prescribed alternate release on the left armrest. He stated that in his haste to leave the aircraft he used the technique that first entered his mind, even though he was fully aware of the proper and safest method. Needless to say, had this aircraft employed the one-motion system, as in the F-106, this mistake would have resulted in inadvertent ejection of the seat.

With regard to the F-106 pilot, the coordinated movements in the cockpit and the time lapse before ejection indicates he was probably in control of his faculties. It is highly probable that the dense cloud of dust that enveloped the aircraft was mistaken for a severe fire. In an attempt to leave the aircraft as rapidly as possible, the canopy was jettisoned by the first known and most familiar method.

Rotation of either seat handle on the F-106 seat sets the ejection sequence in motion. The handles do not have to be raised to the full up-and-locked position. This system does not allow a margin of error such as the mistake made by the F-102 pilot.

It is not the intent of this note to criticize the one-motion system. Eliminating the need for squeezing the trigger not only saves time, it provides added insurance when G forces are present. The possibility of mistaking the actuating handles during a ground emergency is a subject of concern, however, and one that requires immediate attention. This problem must be resolved through complete and frequent indoctrination for crewmembers of aircraft incorporating the one-motion ejection system until the proper response to an emergency becomes automatic. Furthermore, pilots should not be suddenly exposed to an aircraft that utilizes a drastically different method for inflight and ground egress without adequate indoctrination.

Robert H. Shannon, Professional Branch, Assistant for Life Sciences, Norton AFB.

HOT and HIGH

Capt. Donald E. Thoman, USAF
Weapon System Project Officer, TITAN
Norton AFB, California

IT'S **summer time** and the heat beating off the runway makes it look like a lake shimmering in the sun. There are enough BTUs without an afterburner singeing the turnip tops on an I-hope-I-make-it takeoff!

Last winter it was ice on the runways and snowbanks to add to the fun. Now the warm season has brought along its own set of problems for the jet jocks to solve. We receive reminders of these problems annually and we should all be well versed in the planning, techniques and precautions for warm weather takeoffs. I have jotted down a few notes for myself and thought I'd pass them on to you.

Suffice to say that the record book is filled with statistics of accidents involving hot weather takeoffs and especially those takeoffs combining hot weather with higher field elevations. All of us can recite the flight planning procedures and takeoff techniques required to leap safely into the blue. Why then is this record book opened so often for new entries?

There is one broad answer: Pilots are not paying attention to details. The information is used, takeoff rolls and airspeeds are calculated, even the various forms of a linespeed are calculated. All the proper techniques are apparently used. But too often something goes wrong, leaving planes, pilots and crews scattered in the vicinity of the end of the runway. Investigators and boards work long and hard to uncover the exact reason for these losses and invariably they find that some detail or seemingly minor point was neglected.

Visualize your own sequence of operation from the preflight planning phase through to the point that tells you that you're on your way safely into the blue. This might be that road to town or an orange grove, or any local landmark that you might notice about two miles off the end of the runway. Now, if you will, pick out some of the points where a small detail pertinent to a safe takeoff could be overlooked. Okay?

How about the runway temperature and pressure altitude? Did you read station temperature or dew-point? Did you read the correct column to obtain pressure altitude from the altimeter setting? Okay, so at your base the weatherman gives you runway temperature and pressure altitude. Someday you'll land at a base where they use a do-it-yourself system.

Now, you start your chart work. The accuracy of each step is important, but after a short time those little squares cross the eyeballs, don't they? Give the same problem to several pilots and then compare the calculated ground run distance. Want to bet that you'll find large variances? While looking at your charts, pay particular attention to the change in the slope of the parameters when they get into the region of high temperature and/or high pressure altitudes. If you will make a couple of quick runs through the takeoff ground run graph and compare the results, you will see that weight, wind, and runway slope have more effect on takeoff roll when you're hot or high than they do when you're cold or low. This effect is not a straight line proportion but rather a non-linear proportion. This means that you cannot use any easy rule of thumb or some other guesstimate.

Two factors, however, tend to help the pilot in the hot or high region. These are the characteristics of the refusal speed and distance. The hotter or higher the airfield the lower the refusal speed, and you will reach that speed with more runway in front of you. Moreover, the lower the refusal speed the less difficulty in getting the bird stopped should something go wrong.

One phase of the preflight planning that increases in meaning when the conditions are hot or high is the obstacle clearance after takeoff. During the cooler season this calculation is very often neglected because the obstruction clearance criteria for Air Force runways is sufficiently stringent to avoid close shaves during "normal" operation. According to the good book (AFM 86-8), there should not be an obstacle 50 feet above the runway within 3500 feet of the end of the runway; nor 500 ft. obstacle within 11,000 feet of the end of the runway. In hot or high conditions our jets will perform so that they will clear these obstacles, but the safety margin is greatly reduced.

It is true that the obstruction clearance criteria are stringent, but the actual situation is not always according to the book. For example, when an airfield is planned, the performance of current aircraft is considered and not the performance of future aircraft. This may result in an obstacle—be it trees, poles, or terrain—which still further reduces the safety margin.

Another example is the private-public property conflict. Remember all the farmhouses on knolls off the end of the runways? They use two 50-foot oaks for shade. The Air Force has legal recourse, but it often takes years to obtain such a settlement. Cases like this present a situation where the details of your flight planning again play an important role. If you are transient, the AO or operations personnel will be able to advise you of the local characteristics.

Now that you have planned yourself into the blue, all you have to do is get there. Just about the time you strap yourself into your bird you realize a fallacy in my article. By diligently accomplishing every task and every suggestion pertaining to your preflight you find yourself about one hour past your estimated time of departure. Actually this is not a fallacy, but it does emphasize the next detail to which you should pay close attention.

In the mid-morning hours a temperature rise of 10 to 15 degrees is not uncommon, particularly in the Southwest. There are even 20 degrees rise during an hour on record. Again run through your takeoff distance graphs and note what these temperature rises do to your takeoff roll. The associated hazards can be avoided by using a forecast temperature for takeoff time or by calculating a maximum temperature for the particular field.

The next important squence is the pre-takeoff checks concerning the condition of the engine. All the takeoff graphs and charts are based on theory and flight tests, using or assuming equipment which is in top notch condition. As a result, they are often incorrect to a minor degree. This margin of error is understandable, considering the differences in the condition of the equipment. The point is, don't increase the error by allowing yourself to accept equipment that is obviously outside of published tolerances. The engine instruments in the newer aircraft will tell you whether or not the thrust is correct, but you'll have to know how to interpret what the instruments tell you. The engine pressure ratio of an engine is not the complete information on thrust. If, however, the engine pressure ratio, fuel flow and EGT are within tolerance, the thrust is assuredly correct.

The margin of error between the equipment and the graphs is beyond your control; but the margin of error between the instruments and the throttle *is* within your control and can be reduced to zero, if the pilot is exacting and attentive to details.

Takeoff techniques will vary with each aircraft and situation, so I cannot get specific. It is important, though, to realize that there *are* specific techniques for hot and high conditions. When you learn these techniques and practice them, you and your aircraft receive multiple benefits. As mentioned earlier, the parameters of weight, wind, and runway slope have a more pronounced effect on takeoff roll in the hot and high conditions. And please note that these effects are not a straight line curve, but rather a "snowball" curve. So, by not lengthening your ground run, you will have an appreciable amount of extra runway in front of you. Also, by not increasing your takeoff airspeed, you will impose less stress on the landing gear assemblies.

In formation takeoffs there is a complicated sharing of responsibilities. The flight commanders and element leaders must avoid jeopardizing the wing men by poor techniques. The wing man must be able to divide his attention between his formation techniques and takeoff techniques. The result for the wing man is that he operates his aircraft by instinct and the leader leads him through the techniques.

We are professional pilots and as such are responsible to the people of this nation to perform likewise. Strict attention to every facet of your job is a necessity in order to perform properly. Obviously we cannot all be expert mathematicians or data analysts, but the necessary information, procedures and techniques are adequate. The knowledge and practice of these will determine the degree of your professional ability.

Here's to many more safe views of that road to town or that orange grove! ★

They're Driving Me

Distraction while flying—particularly distraction contributing to an aircraft accident—is difficult to isolate. Webster defines the word as the drawing of the sight, mind or attention to a different object or in different directions; to divert, hence confusion and disorder.

If this applies, then some of us are flying in this state continually! (It might even apply to some freeway flyers.) Seriously, as our air-vehicles have become more complicated and increased in performance, the problem of distraction has also increased.

Many of the functions of a skilled pilot reflect actions stemming from the conditioned responses rather than conscious deliberate acts. This is necessary in order to cope with the highly complex task of flying an airplane. All lesser, routine actions must be automatic if you're going to have time for the critical processes of reasoning, reflecting, and decision making.

It is both necessary and desirable for a pilot to form good habit patterns. We spend many valuable hours in flight instruction drumming such habits into neophyte pilots. Until these habits are formed, we know that the pilots in new or different aircraft are flying their dangerous hours. They may know the procedures, but accomplishing them occupies too much conscious thought which overtaxes their ability to perform safely. To assist in habit formation, certain memorization tricks are encouraged, such as those used to remember takeoff and prelanding checks. Danger is ahead when these automatic checks are interfered with or if a habit pattern is broken, because then a conscious effort must be made to resume the chain of automatic responses at the proper place. We must never let the habitual checks become so automatic that the habit pattern cannot be broken without omitting some vital part when later resumed. Let me cite you some examples.

• A flight of two was on a night training mission. After the pitchout for landing, No. 2 man had difficulty seeing the lead aircraft because the leader's lights had been on dim for ease in formation flying. Apparently the tower operator also had difficulty seeing him because, as the flight turned downwind, he called, "Zero four and number two man, let's have lights on bright, please."

No. 2 found and positioned his navigation light switch to DIM just prior to turning base leg, *flying with his left hand.* On base he noticed he was cutting off the leader and shallowed his bank to gain separation. In the final turn, his landing lights on, he reported "gear down" to the tower. It was not until his aircraft was floating in to touchdown that he realized the *gear was not extended.* It was too late for a go-around.

In this case it was highly improbable that he could lower the gear at the usual time since his left hand was busy doing something else when it should have been lowering the gear.

• In the next case, after pitchout, when normally he would be dropping the gear the pilot was distracted by another aircraft making a closed pattern. On base leg the instructor pilot made a gear check to Mobile Control. However, as the aircraft rolled out on final the Mobile Control Officer observed that the gear was not down. He called the aircraft on final and notified him of this condition. The transmission wasn't heard by the IP or student pilot.

The aircraft touched down on the speed brakes and slid to a stop. In this case, both pilots were distracted at a crucial time in the landing sequence.

• In another case, upon pullup from the third touch-and-go landing, a pilot observed another aircraft entering the downwind leg for landing. Noting the other aircraft in the pattern, this pilot attempted spacing by reducing power. He shut off the landing gear warning horn and continued his approach.

When the aircraft was approximately 100 feet in the air on final approach ,the tower called for the aircraft *to pull up.* This pilot, thinking the call was for another aircraft, continued his approach, landing gear up. In this instance the pilot was distracted by the landing gear horn's having to be squelched, departure from the normal sequence, and having to extend his downwind leg for spacing.

Other distraction accidents follow a slightly different pattern. In these, the pilot or crew is distracted during a highly critical maneuver or time in flight when full attention must be given to the very exacting task of control. This type usually is more serious than the gear-up accidents given as examples above.

• The copilot was flying the jet bomber as penetration was started from a night round-robin mission from an initial altitude of 27,000 feet. After turning inbound, descent was continued in order to reach the fan marker fix at minimum altitude. A report, the last transmission, was made at the fix. The aircraft passed the fan marker approximately 1000 feet above the minimum altitude and the IP assumed control of the aircraft. Shortly after this, the IP indicated he had two booster pump warning lights on. The next indication to the copilot was an abrupt backward motion of the control column followed by contact with the ground. There were three fatalities in this accident; the copilot was the only survivor. Undoubtedly the booster warning lights were a distracting factor at a crucial point in the letdown.

• Immediately after takeoff into a low ceiling and fog, the pilot reported his departure to the controller. The aircraft was not being painted on the departure scope so the pilot was requested to select Mode 3, Code 12, Low, on his IFF-SIF. The pilot asked for a repeat of this transmission and the request for beacon transponder code was made again. After this, the pilot failed to respond and further contact was never made. The wreckage was found four nautical miles from the base. The aircraft had crashed in a steep left turn at a high rate of speed. The Board concluded that the aircraft never attained more than 200 feet altitude at any time. This is the oft-repeated story in which chang-

To Distraction!

ing channels or SIF codes close to the ground has proven to be a fatal and costly error.

• Another distraction accident involved two aircraft taking off on a night refueling mission. The weather was 400 feet scattered, three miles visibility, with ground fog. It was a dark night—no moon. Takeoff was over an unlighted area and there was no visible horizon. The element broke ground in good formation and commenced a shallow climb using afterburner power. At approximately 200 feet they leveled off and began a descending turn which ended in a disintegrating explosion and fire. Radio transmissions show that there was some concern by the leader over his wingman. The wingmans' answer, " . . .one three here, coming up on you now," led the Board to believe that the wingman was out of formation and that the flight leader diverted his attention to ascertain the wingman's position. This was the distracting element during a highly critical phase of flight. Because of the perceptual delay and simple reflex time, it was impossible for the flight leader to divert his attention to his wingman and back to his instruments, at this altitude and speed, without getting into a dangerous and, in this case, fatal situation.

• Another very similar accident occurred on a routine low-level training mission. The aircraft was flying at 500 feet above the terrain at an indicated airspeed of 360 knots. The pilot's attention was diverted to map-reading for an excessive period of time. When he looked up from his map he started an immediate pullup, but not soon enough to avoid contact with trees on a small hill. Fortunately, the aircraft landed safely.

• Even during a non-critical part of the operation, distraction can be costly, in dollars as well as to one's ego. The after-landing checklist on a transport aircraft had been accomplished up to the point of retracting flaps. When this item was called, the IP reached for the flap handle. Before completing this act he looked up and out the left side of the aircraft to check on the student's clearance with another aircraft. Meanwhile he grasped a control handle, squeezed it and raised it upward. Realizing instantly that he must have raised the gear handle, he pushed it down immediately—however, the plane settled on its nose. This pilot must have felt as embarrassed as another officer I once observed who stood at a flying safety meeting and tried to explain *why* he pulled the gear up after landing and not the flaps. Any attempt at explanation is futile, yet the fact remains *it continues to happen.*

Basically we have outlined two kinds of distraction accidents: One occurs as a result of distraction while performing a pre-landing or after-landing checklist, and the aircraft ends up on the concrete sans gear and sometimes without a few other things as well.

The other type of distraction accident, which is often fatal, occurs during the critical phases of flight usually close to the ground when some distracting influence takes the pilot's attention away from his primary task of controlling his aircraft.

After all this, you must be wondering if there is a cure? Perhaps not. Certainly there isn't a single answer. There are, however, several suggestions for reducing your potential, such as:

• During critical phases of flight and when close to the ground, try to ignore distracting influences. Remember that changes of attention take time. Changes from instruments to visual, from visual to instruments, from near vision to distant vision, from formation to instruments, and so on, all require precious seconds. The most distracting influences can be safely ignored until you can get enough air space beneath you to allow a margin of error.

• When a check is interrupted, particularly a pre-landing check, be especially careful to go back to complete it. Don't let it become so automatic that it doesn't register on your consciousness when the gear is indicating *up* instead of down-and-locked. Double-check that landing gear handle on final *before* you round out. Until there is a system that will automatically lower the gear, it will continue to be *our problem.*

• Ground checks (after-landing, pre-shutdown, and so on) *never* have to be accomplished in such a hurry that anything less than your undivided attention is acceptable.

Remember, never get into the situation where you must say, "They're driving me to distraction." ★

Maj. William R. Detrick, USAF, Aviation Physiologist, Deputy Inspector General for Safety

Rx FOR SURVIVAL:

Survival gear in B-58 escape capsule is vacuum packed and designed to protect downed airman on land and sea. During tests men have lived in relative comfort in capsule for three days.

Before the end of this year B-58 Hustler flight crews will be provided with a new escape system that promises improvement in mission efficiency through tremendous increase in crew comfort during flight and during stand-by or continuous alert. Cocoon-like escape capsules will be provided for each crewmember in the B-58. These capsules, because of the original design requirement to replace an open ejection seat, are adaptable to other supersonic aircraft.

Adoption of the escape capsule system recognizes that thousands of hours are flown per crewmember without incident. In view of this, why should these flight crews be burdened with equipment and clothing that serves no useful purpose whatever during normal flight, in fact is an actual detriment to performance? With the concept of stand-by or continuous alert, the adoption of the escape capsule eliminates the need for combat crews to wait in ready-rooms attired in partial or full pressure suits. Obviously, then, it also eliminates the need for special ventilation and air conditioning provisions for crewmembers during the ready periods. Certainly all the protection features must be provided when needed. But is the growing list of protective gear worn on the back of the combat crewman the right solution, especially considering the extensive logistic and maintenance problems it poses? Similarly, since present and planned operational aircraft are capable of supersonic dash and cruise, it is reasonable to expect escape systems to provide adequate emergency escape capability at these speeds and altitudes regardless of the terrain below.

It is significant to note that the escape capsule system goes much further than merely separating the crewmember from the disabled aircraft. The capsule concept of escape is survival from aircraft separation through descent to landing and thence to give the occupant at least three days survival capability in any part of the world without additional aid.

Occupants need wear only the flight suit and MB-3 helmet, and they sit in an adjustable seat that is cushioned for real comfort on all contact surfaces. In addition to conventional vertical seat adjustment, the forward portion of the seat pan may be manually adjusted in flight to redistribute body weight. Although automatic retraction of the feet and torso is provided for emergency, there is no need to attach or entwine straps about the legs. The restraint harness is worn comfortably loose over the chest and there are no other attachments to the individual. The capsule contains more survival equipment than an ejection seat, none of which is attached to the man in any way.

The user is completely protected from the wind blast encountered in high speed ejection that in conventional ejection seats commonly strips off helmet and mask, shreds clothing, and breaks flailing limbs. Statistical data accumulated over the past ten years indicate that

One Capsule Per Man!

They finally did it; they've packaged man. New B-58 escape capsule, above, and, left, on land and water, is designed to protect crewman from supersonic ejection to rescue. Top photo left shows inhabited capsule striking concrete in drop test.

the vast majority of ejections are at low speeds and altitudes, but as more and more supersonic flight time is logged and the operational subsonic aircraft are phased out of inventory, it is inevitable that the frequency of high speed emergencies will increase. Ground level escape has been one of the more important considerations in the capsule design. The timing system and thrust combination utilized provides off-the-deck capability at takeoff speeds and deletes the necessity of man-seat separation from the escape sequence which significantly enhances this low level capability. Moreover, the capsule is automatically stabilized in flight to prevent tumbling and to maintain deceleration at tolerable levels. Finally, the occupant lands in the capsule, thereby deriving maximum protection from the hazards of landing in high or gusty winds.

Reliability of operation has been paramount in design of the capsule from the beginning and the systems and mechanisms that are vital to emergency use are duplicated. It is even possible to run through a complete cycle of door closure and capsule pressurization twice and, in addition, the B-58 capsules can be ejected with doors open should battle damage prevent normal functioning. In short, the specification prepared by Convair engineers in collaboration with the Strategic Air Command and experts at Wright Air Development Division took full advantage of the experience gained since World War II with escape systems. To insure reaching the desired system reliability goals, the developer of the capsule, Stanley Aviation, has established a formal reliability program that goes far beyond statistical and model analysis. Comprehensive programs of detail drawing review, failure reporting, trouble and action reports and reliability testing are underway in order to make this B-58 capsule the most nearly optimum escape system ever developed.

Operation of the capsule is simple and will be completely familiar to everyone acquainted with previous USAF upward ejection seats because the controls are the same. There are the usual dual handgrips containing guarded triggers, one assembly on each side of the seat. Pulling up either or both of the handgrips initiates action; first the front edge of the seat and the leg retraction mechanism lift up the thighs and then padded ankle bars positively tuck the feet back out of the way of the door. A powered inertial reel pulls the body back into position so that the doors can close. When they do, the capsule immediately pressurizes to the equivalent of 37,500 feet altitude, drawing upon the airplane system for pressure if available, but switching automatically to the emergency source within the capsule if needed.

The pilot's capsule contains the airplane control stick, on which are mounted appropriate flight control switches, and each of the capsules has a large window in the middle of the three retractable doors so that all crewmembers can view their panels. Thus it is possible to continue flight after encapsulation and the aircraft can be flown down to an altitude where it is safe to open the capsule doors and resume normal operation. The nice thing about these capsules is that if this is done and then another emergency arises, the complete door closure cycle can be repeated at any time.

Should ejection become necessary, the escape sequence is completed by squeezing either of the ejection triggers that are exposed after the handgrips are raised. When this is done, the capsule is launched by means of a twin-tube rocket catapult that initially produces about the same acceleration as the M-3 catapult. However, the rocket motors ignite at the end of the catapult stroke to drive the capsule far above the airplane. This use of a dual unit is typical of the B-58 capsule system and, although the coupling of their ignition systems makes failure of one unit practically impossible, either one will provide safe escape over approximately 75 per cent of the performance envelope.

As the capsule is proceeding up its tracks a small ribbon parachute is ballistically deployed so that it is open and working as the capsule separates from the airplane. At this time a tail boom stabilization frame is deployed behind the capsule, where its fins and attachment to the drogue give forward-facing stability while the capsule slows down and reaches the peak of its trajectory. After the capsule has descended to 15,000 feet (if it was above this altitude when ejection began) the main recovery parachute is positively deployed from the bottom of the capsule. This action is automatic but the occupant has the option of deploying this parachute at any time above 15,000 feet altitude by pulling a manual override inside the capsule. Following recovery parachute deployment and disreefing, the capsule automatically repositions to the ground landing attitude and the stabilization frame is retracted. Telescoping outriggers are also automatically deployed at this time and serve a dual function. Primarily they are required for capsule stabilization in high seas following a water landing. The occupant automatically inflates flotation stabilization cells when he pulls the parachute release handle. The secondary purpose of the outriggers is to absorb energy on ground landing.

The capsule's unique ground and water landing system has already undergone hundreds of human drops with no ill effects. Inhabited capsules have been dropped repeatedly on concrete under the worst conditions of recovery parachute descent rate and drift. Under these same maximum conditions human drops have been made in water to verify the capsule's self-righting characteristics. Further human testing on various soil surfaces is in progress now utilizing a specially constructed monorail drop facility. The capsule's flotation stability characteristics and the occupant's ability to survive for three days under extreme weather conditions have twice been verified by test under the surveillance and jurisdiction of the WADD AeroMedical Laboratory, Wright-Patterson Air Force Base. A series of warm weather tests was conducted at Key West followed by a cold weather test in mid-winter on Lake Erie. In both cases the occupant was launched in the capsule and survived without ill effects after three days in seas up to seven feet, living entirely in and on the capsule and from its survival contents.

After landing, the doors can be opened from within or outside the capsule, although when using it as a raft only the upper door is opened. The full complement of survival equipment desired by SAC is carried in individual sealed packages with those most important for use after water landing located for best accessibility. A URC-4 radio is an important part of this gear, enabling fast location by rescue craft and communication with them to facilitate the recovery operation.

The restraint harness mentioned previously is a major improvement over conventional lap belt and shoulder harness, in keeping with the objective of obtaining maximum benefit from the "shirt sleeve" operation concept on which the capsule is based. This design allows the airman to wear his harness in a comfortably loose fashion during long missions. However, if the encapsulation procedure is initiated the harness is retracted by the inertial reel, automatically positions itself on the torso, and retracts the upper torso against the seat back. The harness provides approximately 25 per cent more bearing area than standard operational harness and requires no adjustments. The elimination of the requirement for fitting eliminates buckles and prevents misadjustment which might cause localized harness loading beyond tolerance limits during crash or ejection conditions. The harness fits across the torso in an "X" fashion with a single disconnect point at a breast pad on the sternum. Adjustments to accommodate five to ninety-five percentile types are automatically taken up in the reel itself.

Two series of tests conducted at the AeroMedical Daisy Track Facility at Holloman AFB, New Mexico, have recently been completed to check the restraint characteristics of the harness under various conditions of acceleration and direction of loading. In both test series the expectation of this new harnessing method were met and exceeded. In addition, hundreds of Air Force personnel have occupied a capsule and have confirmed the comfort and egress features. Human vibration tests with the capsule mounted on a shake table were to be conducted at the WADD Laboratories.

High altitude capsule drops from a B-47 have established that the capsule has a stable descent to 15,000 feet at which point the recovery parachute is deployed. The capsule roll-rate during its descent was well within human tolerances. The reliability of the capsule recovery system has been demonstrated by a series of development tests from the B-47, ejections from the B-58 sled at Hurricane Supersonic Research Site and drops made in the Denver area from a modified T-28. The final series of development tests to check capsule stability under various conditions of speed and initial aircraft yaw will be run in the immediate future. This includes a Hurricane Supersonic Research Site ejection with a live chimpanzee to check the physiological reactions. A series of ejections from a modified B-58 will be conducted by the Air Force and Convair, Fort Worth personnel to test the capsule under actual flight conditions at various speeds and altitudes which cannot be tested on the track at Hurricane Supersonic Research Site or Edwards AFB. Some of these tests will be human ejections. Most of the capsule system components have successfully completed qualification tests and a series of capsules are being fabricated for complete system qualification tests.

This program promises to give the B-58 Hustler, our only operational supersonic bomber, the most thoroughly tested escape and survival system ever, one which covers the flight spectrum and which gives the maximum guarantee of survival. ★

M. E. Bleck, Vice President, Engineering, Stanley Aviation Corp., Denver, Colo.

• TIPS FOR T-BIRD DRIVERS •

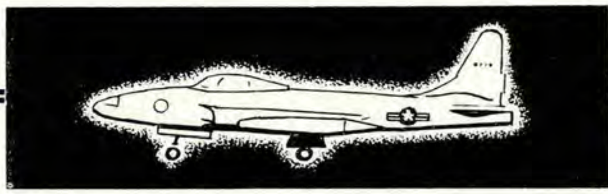
Within a span of fifteen months, four T-Bird jocks found themselves confronted with a rather unique problem: hurtling down a runway with one brake out! Obviously they hadn't given a thought to such an eventuality and the reaction of each pilot after discovery of brake failure could best be described as *some dismay,* immediately followed by a *lot of indecision.* Three of the four birds ended ignominiously fractured—but good; "height—distance" criteria was no problem because each aircraft rested quite a distance from the side of the runway.

The frequency of brake failure seemed to warrant a recommended solution, therefore a query was sent to major commands requesting a recommended procedure following discovery of brake failure. The answers to the query were not in total agreement. Next, barrier engagements by T-Birds were checked. The barrier does a right fine job under optimum conditions, but by the time a T-33 rolls the full length of the runway without power, the conditions could be altered from optimum.

We then checked gear-up landing and gear collapses. Of twenty-eight mishaps, only eight ended as major accidents. This didn't look too bad. Then we got 10 jocks together and threw them this information and we got 10 probable solutions. *This* was not good! So we kept on haggling. Finally all ten agreed on the following procedure and submitted it for inclusion in the Pilot's Handbook:

"In the event of known brake failure to one or both main landing gear wheels, make a minimum run landing on the longest runway most nearly aligned into the wind; stopcock the throttle at touchdown and use aerodynamic braking by holding the nose gear off the runway as long as possible. After the nosewheel contacts the runway retract the speed brakes, keep the stick full aft until indicated airspeed is 50 knots, raise the canopy full open to provide additional drag, and use rudder as long as it is effective to steer the aircraft toward the barrier. If the aircraft veers off the runway, or does not make a barrier engagement, the landing gear may be retracted to prevent entry into rough terrain. If brake failure is discovered after landing, use as much of this procedure as possible." ★

R & A Division, DFSR



PLAN AHEAD

Here is a flight problem for you T-Bird jocks. How far can you fly before flameout if you take off at sea level with internal fuel only and cruise at 9500 feet at normal cruise power for that altitude?

We'll wait for those of you who have to go look for your Dash One. If you don't know right where it is, try the trunk of the car or the baby's toy box. After you have found it, dust it off and open it. For those who have taken the trouble to keep the book up to date, the proper chart will be found on page A4-7.

One pilot we knew came up with approximately 300 miles as an answer and he was quite correct. His only problem was that he didn't solve the problem until 300 miles after takeoff and he was still 10 miles from his destination.

Unfortunately, we will never know why the flight was conducted as it was, for the resulting accident was fatal to the pilot. We can only *assume* that the short distance involved influenced the pilot to make the flight with no external fuel. Since he filed VFR we may also assume that the weather forced him to stay at low altitude. It is obvious though that he had not yet solved the above problem at the 200-mile point, for that was where he overflew the second satisfactory airfield along his route.

This accident can be a lesson to all of us. Seldom do we fly the T-33 on cross-country flights with reduced fuel loads or at low altitudes. However, there may be occasions when either or both conditions would be appropriate or desirable. Such an occasion would be a reduced fuel load for takeoff at high altitude on a hot day. Also, one might want to fly at low altitude in an effort to remain VFR after the loss of radio or in the event of malfunction of the oxygen system.

In any case, remember—

• First, be particularly careful in your preflight planning when you anticipate conditions which are different from those you're used to.

• Next, be prepared to promptly recompute (in flight) your fuel requirements any time there is a change in the quantity available, the rate of consumption or the estimated time en route.

• Always plan an alternative course of action in case things don't pan out, and make your decisions based on realities rather than on wishful thinking often followed by panic. ★

Lt. Col. Robert D. "Jim" Price, Fighter Branch, DFSR

A New Dimension

All available fire fighting equipment from Larson AFB and the Boeing Flight Center was in position. Ambulance crews and rescuemen, wearing aluminized protective clothing, were positioned at strategic locations along runway 32.

Overhead the H-43B Huskie helicopter orbited, fire suppression kit slung underneath, waiting for the arrival of the damaged B-52 carrying 10 crewmen.

Men and equipment were ready. All that could be done now was wait . . . wait and hope.

As suddenly as it had begun, the waiting was over. The B-52 appeared on final approach and rapidly descended toward the runway. The pilot made a beautiful landing and all was normal until the aircraft decelerated to about 20 knots. At this point the right wing separated from the aircraft, and fire broke out. The B-52 lurched to the left and came to a stop as rescue and fire fighting units moved in.

The helicopter pilot had timed his last orbit to join up with the B-52 at touchdown and paralleled the bomber down the runway at about the same speed. When fire broke out, and the plane stopped, he dropped the fire suppression kit and moved into position off the left nose of the B-52. By this time part of the 126,000 pounds of fuel aboard the bomber had spread over the runway, and it looked like the entire aircraft would be engulfed in flames, trapping the 10 crewmembers.

Pulling up to hover about 18 feet above the B-52, the helicopter angled its rotor wash across the escape hatches back toward the main part of the flames. This provided cooling air for fire fighters and rescue crew, kept smoke and flames away from escape hatches and prevented fire from spreading forward in the spilled fuel.

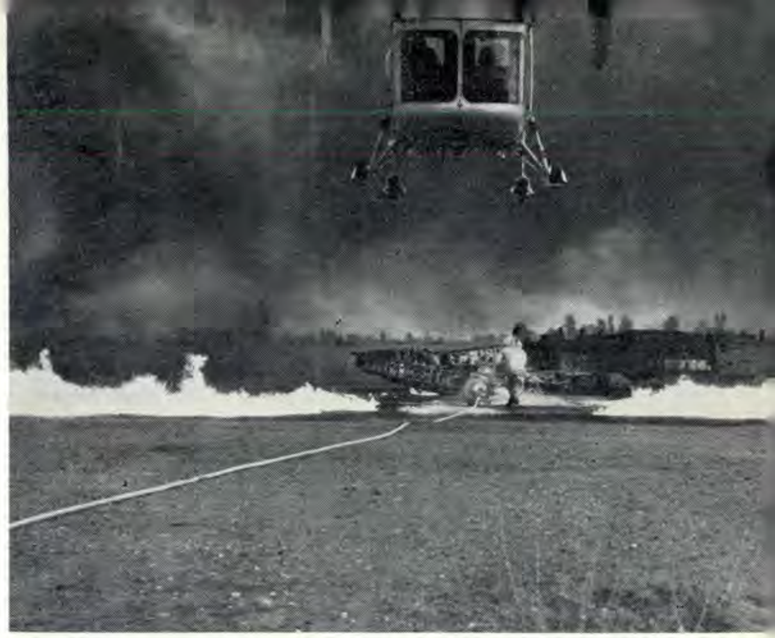
The helicopter was pushed back several times by explosions in fuel tanks, but each time the pilot returned to force back smoke and fire. The full effect of the rotor wash was demonstrated by these temporary losses. Each time the helicopter was blown back, flames rushed forward and the heat forced firemen to pull back until the H-43B returned to its position. Fortunately, the crew had evacuated the B-52 by the time the serious explosions occurred.

Crewmen of the B-52 credited the helicopter's action with probably saving their lives and definitely saving them from serious burns. "We hardly felt the heat from the fire until we got out of the rotor wash and then it was really hot," they said. Ground observers remarked that, "If the helicopter hadn't been able to hold back the fire we probably would have lost some people." The fire chief said the cooling effect of the rotor wash allowed his men to get in much closer with hand lines and enabled the crew to escape without serious burns or fatalities.

The crew of the H-43B were Capt. Howard J. Cochran, pilot; 1st Lt. Donald R. Couture, copilot; MSgt. Samuel R. Hoar and TSgt. Henry M. Ivey, rescuemen. They attended the rescue school at Stead AFB, Nevada, and used procedures taught at the school in the rescue operation. The same procedures are used in local practice exercises and include participation by fire department and hospital personnel.

The H-43 helicopter crash-rescue system in the above report adds a new dimension to aircraft rescue and fire fighting. Many Air Force fire fighters have penetrated the flaming wreckage of crashed airplanes to save the crews. But sometimes the firemen have bitten their lips in frustration as they watched from afar the black smoke rise. The airplane could have become a funeral pyre because it crashed in an area inaccessible to heavy, slow-moving fire trucks.

The H-43 system combines the speed and agility of the helicopter over rough terrain with the fighting ability of a fire truck. The downward blast of air from its rotor blades forces the flame away from the fire-fighting crew, helping them control and extinguish the fire. More than 30 Air Force bases have H-43s on 24-hour alert. Some of them are piston-engine A models; others are the newer B model, with a turbine engine that needs no warm-up. They can be airborne in seconds. Each month more bases receive their quota of two Huskies each.



Firefighting/rescue takes on new meaning with H-43B Huskie. Sequence above illustrates use of this new lifesaving tool. Left, Huskie approaches burning aircraft with foam tank dangling below. Firemen are unreeling hose and approaching flames (center) from foam tank precisely spotted by helicopter which then hovers over flames using downwash to create a path of cool air to facilitate crew egress and firefighting effort.

Next to the alert Huskie stands a round red tank known as a Sputnik. It is a 1000-pound fire suppression kit with water and foaming agent that mix into 850 gallons of foam. In cold weather the water is kept from freezing by a small gasoline heater. The kit is carried aloft dangling from the helicopter's cargo hook.

Although the H-43A cannot get airborne as rapidly as the B model, once it is in the air it performs the same job. It was an A model that recently rescued the crew of a KC-97 tanker that crashed near Randolph AFB, Texas. The tanker was en route from Davis-Monthan AFB, Ariz., to its home base at Plattsburg, N. Y. Near San Antonio the Commander declared an emergency, reporting one of his inboard engines was running rough and that he had feathered the propeller. With the increased demand for power on the remaining engines, the other inboard engine failed and was also feathered. A third engine then caught fire.

Meanwhile, Capt. Charles R. Pinson, pilot, and his two fire fighters, S/Sgt. Donald L. Baker and A/1C Robert C. Birch, were scrambled with their H-43A to intercept the distressed aircraft.

Unable to maintain altitude, the tanker pilot crash landed in an open field seven miles short of Randolph. As the giant tanker with its right outboard engine in flames, skidded across the field, its tanks ruptured spilling thousands of gallons of fuel. When it came to a stop, Capt. Pinson set the fire-suppression kit down beside it. The fire fighters jumped from the helicopter, pulled out the Sputnik's 100 feet of hose and extinguished the engine fire before it could spread to the spilled fuel.

While the firemen were putting out the engine fire, Capt. Pinson flew two injured men to the base hospital. Then he returned to the crash site where he picked up five uninjured crewmembers. After he had taken off on his second trip, ground fire equipment from the base, seven miles away, arrived. The four remaining crewmembers were flown out on a third trip.

The unique H-43 rotor arrangement, which can clear a path through the flame for firemen or escaping crew members, is known as a synchropter—the two rotors intermesh like an eggbeater. Driven by a powerful turbine engine, they provide the H-43B with the capability of transporting the fire suppression kit at high altitude bases.

Of course, fire fighting is just one of the many missions of the H-43B. Mountain rescues that previously were either impossible or very risky have become routine to the powerful '43B. This high altitude capability was demonstrated in December 1959 when Majors William J. Davis, Jr., Aeronautical Systems Center H-43B Project Officer, and Walter J. Hodgsdon, Air Force Flight Test Center Test Pilot, set a new world's record of over 30,000 feet for helicopters in the Huskie's weight class.

Capt. Walter C. McMeen and 1st Lt. Ryland Dreibelbis of Luke AFB recorded the Huskie's first rescue in the Superstition Mountains of Arizona when ground rescue efforts failed. Three teenage boys were trapped halfway up the face of a 2000-foot sheer cliff. As the helicopter hovered above the boys' heads, the tips of the rotor blades cleared the face of the cliff by a mere five feet. The boys were hoisted aboard by the rescue sling.

While spectacular and risky, the rescue didn't require the H-43B's tremendous power. A night rescue of a girl injured in a rock slide at the 8500-foot level near Donner Pass in California provided a better test. The Huskie is capable of hovering over any peak in the United States.

Kaman Aircraft Corporation and the Air Force developed the H-43B. Surface Combustion Corporation's Janitrol Division supplied the fire suppression kit. Lt. Col. John C. Schwartz is the Chief of Engineering Development on the H-43B, Wright Air Development Division; and John E. Hart, Jr., is Project Engineer for the fire suppression kit.

It has been demonstrated that rescue procedures taught at Stead AFB, training and practice with base units, plus a helicopter with the capabilities of the H-43 add up to a successful rescue operation. ★

Col. Everett W. Best, Commander, 4170th Strat. Wing, Larson AFB, Washington

THE MAN

The Air Force has established an enviable record in its aircraft accident prevention and safety efforts. With the march of progress, however, and with the development of the missile, a new problem area has developed which again challenges the ingenuity of those concerned with accident free operation.

There is no clear cut point where the problems of the past cease and those of the future begin. Missile development illustrates this well. When missiles are launched from manned aircraft, the missile is an integral part of the weapon complex and accident prevention efforts are aimed at the complex as a whole. Missiles that are essentially only guided aircraft present much the same problems as those that occur with manned aircraft. True, the operator has been removed from the cockpit, but he continues to perform pratically the same functions with similar equipment from the ground.

With ground-to-air and ground-to-ground missiles it would seem that the break with the past is complete and that a new era of accident prevention efforts has arrived. At first glance it would appear that this new preventive effort should focus primarily upon the reliability of a mechanical system. After all, there is no longer an airborne pilot, so many of the human error problems so characteristic of aircraft accidents must disappear. Accident prevention, then, should be much simpler.

Let us not delude ourselves with this kind of thinking. Instead of becoming simpler, accident prevention may become a much more complex problem, related to a concept of reliability expanded beyond the present horizons and to include near perfection. Reliability cannot be concerned only with the mechanical system, which is the center of the weapon system, but must be considered in terms of the system as a whole. This includes the entire functional operation including the vehicle, support equipment and personnel of the maintenance, ground, launch and guidance crews.

Regardless of how it is defined, simply stated, reliability is the mathematical probability that a defined action will occur when a set of predetermined circumstances are fulfilled. Seldom is there "a reliability." Rather, it is the product of all the reliabilities of all the subsystems and their components. And reliability must be considered as a factor covering the entire life of the system from design to impact on a target. Further, in some instances portions of the weapon system are not expendable, so true reliability must involve a repeat performance capability.

When this broadened concept is considered, it becomes apparent that a simple statement of reliability, considering only the probability of proper mechanical function of the air vehicle itself, is totally inadequate as a useful concept. It is also clear that although man is not now an active passenger in the air vehicle, he is still an important link in the fundamental man-machine relationship and must be so considered. (Manned space vehicles is another story beyond the scope of this article.) We have removed the man temporarily from the cockpit but it is not possible to remove him from the system.

Although reliability and safety are not necessarily synonymous, as the concept of reliability is extended it includes more and more factors generally considered to come under the heading of safety. Even so, there still remain safety considerations that are outside of the area of reliability. For example, under the weapons system reliability concept launch crews must be preserved for repeat operations. But certain safety measures not applied need not necessarily compromise reliability, as long as this is not directly related to the individual's life span as a launch crewmember. However, from a practical viewpoint in terms of its potential effect upon society, or from a humanitarian viewpoint these factors are pertinent and must be considered. It is possible that some of the safety precautions that may not be directly related to accidents may become increasingly important because of the nature of some of the materials involved.

Summed up: We must continue to consider the man in any realistic appraisal of the system. It follows, then, that we must define those stages at which the human is an important factor, and evaluate his functions in order to prevent accidents to which he contributes. Is this really anything new or different?

IN THE SYSTEM

For both missile and aircraft the human factor must be considered in the design stage. In any design the reliability resulting from a sound mechanical system is the foundation upon which successful accident prevention must be based. Closely following in importance is the human, whether he be concerned with maintenance, support or operation, once the equipment has been successfully produced, tested and put into service.

Basic reliability can be compromised by failures in mechanical design as the result of either inadequate human knowledge or human miscalculation. In the former it is unreasonable to blame the designer. Materiel failure resulting from miscalculation, however, can be laid at the designer's feet. Failure to consider the maintenance man or operator in the original design can result from inadequate information, but also from failure to include human limitations as they are affected by assigned duties.

One of the most common design fallacies is the failure to recognize the experience levels of the individuals who will be responsible for various functions associated with use of the equipment. Air Force missile operations do not suggest that the human experience level will be any higher than with manned aircraft. Unfortunately, closer tolerances and the greater demands placed on the equipment may result in lower reliability and greater accident potential.

There appears to be little hope for major improvement in the operator field. Although there are many new pilots each year, a continuing nucleus of highly experienced individuals serves to stabilize aircraft operation. The limited number of missiles and their short flight time provide little opportunity for extensive practice through actual operation. This indicates the need not only for critical consideration of all factors at the design phase for maximum simplicity but also for carefully designed training devices for developing operator experience. Retrofit seldom compensates adequately for faulty original design. It has, as a matter of fact, created other problems. It is emphasized, therefore, that there is no substitute for adequate consideration of all features of a piece of equipment at the earliest conceptional stage.

Not only is the manufacturer responsible for accident free operation in the preliminary design stage, but he is also responsible for implementing the design so that no accident inducing factors are introduced. It is pertinent here to point out that foreign object damage has played havoc with the reliability factor of many aircraft engines. A particularly vicious kind of FOD results from odds and ends of all kinds being left in various parts of the engine during assembly. Careful quality control and inspection are the only answer to this problem.

Once the equipment has been turned over to the operator it is his responsibility. At this point, regardless of any inadequacies in design or production, the equipment must be successfully used.

It is here that careful operator selection and training come into the picture. How these are done is critical to successful operation of the equipment. Casual assigning of individuals to responsible positions without careful consideration of natural aptitudes, motivation, emotional stability and physical compatibility can result in major difficulties. Normally among people new to a field a high probability of error can be expected. The missile field is one in which these errors cannot be tolerated. In no other operation at any other time has the possibility of such disastrous results as a result of human error been so pronounced. Aircraft accidents, regardless of damage or loss of life, pale beside the devastation that can result from certain types of missile mishaps. The training then must be such that only experienced individuals are placed in the position of having responsibility for critical functions.

From this it is obvious that these critical functions must be thoroughly defined prior to training, and that careful position analysis and personnel selection must precede the training effort. From past experience we can see that effective training methods and aids must be devised and used in the most effective manner possible. No less important are the training problems and the instructors.

Training must be realistic and take into account procedures for actual emergencies. When little background experience is available, every effort must be made to identify anticipated emergencies and reduce these to practical training problems.

The selection and development of instructors offer a fertile field for maximum exploitation. Unlike some of our single-seated aircraft where the pilot must operate the equipment without instructor assistance, in no phase of missile operation is space so restricted that instruction can not be given for every phase of actual operation.

Although the need for training in the operation of basic equipment is generally recognized, specialized training in the use of auxiliary equipment is not always given proper emphasis. This is a mistake, because the use of such equipment and the correct performance of emergency procedures is as vital to over-all reliability of any system as is precision knowledge of the fundamental task itself. The hazards of explosive, toxic and corrosive materials used in missile operations require specially designed protective clothing and careful preplanning for emergency action if highly injurious accidents are to be avoided.

Basic to effective normal and emergency operations is good supervision of the entire operation. Every individual involved must know his role in relation to every other individual; each must know precisely to whom he is responsible and what is expected of him.

Although external supervision is in many ways the keynote to successful operation, in the final analysis it is the critical self-supervision of the individual himself which determines whether the accident prevention program will be successful. The fact that the biggest single primary contributing factor in aircraft accidents is pilot error emphasizes this.

Firing and controlling a missile may represent only a fraction of the time required in getting it ready to go. Consequently, it is essential that everything done during this short time be accomplished with precision and

Anchard F. Zeller, Ph.D., Office of the Asst. for Life Sciences

appropriate timing. The short time leaves no margin for correcting errors, even if they are noted.

As in all other types of operation a human caused accident is the direct result of the demands of the situation exceeding the capability of the humans involved. Here again, a familiar stage is reached as precisely the same type of logic has dictated the various evaluations which have been made of human limitations in the manned aircraft field.

There are many systematic approaches to the determination of which human variables need be evaluated and to their evaluation. One which has proven beneficial has been the consideration of limitations under physical, physiological, psychological and pathological headings. A disadvantage of this approach is that it suffers from the same limitations inherent in any attempt to study man item by item rather than as a whole. Physical limitations merge into the physiological and psychological; physiological and psychological limitations are very closely related, and all overlap into the pathological areas. In spite of these limitations, the method serves a useful purpose.

Burns and injuries resulting from being crushed by great weights are two of the physical hazards associated with missile operations. Burns may be caused by intense heat or result from chemicals in contact with the skin. Prevention can be guaranteed only by careful handling procedures, specially devised handling equipment and adequate protective clothing worn in the prescribed manner.

It's in the physiological and psychological areas, however, that the greater number of new hazards become apparent. The highly corrosive and toxic materials associated with missile operation make physiological damage a potential problem. Human damage may result from bodily contact or from air contamination. Hence the stress on the development of adequate protective clothing and handling procedures designed to minimize injury from direct contact or inhalation of toxic or corrosive substances.

Not only must care be taken to control those physiological hazards relatively unique to missile operations, but equal attention must be directed toward controlling those common to missile as well as all other operations. Fatigue can jeopardize successful operation, therefore, sound operational principles involving crew rest and recreation are a requirement. Depressed physiological conditions resulting from over consumption of alcohol or other physical excesses are incompatible with successful missile operation and should be controlled. This is relatively easy in a test situation, but far more difficult in actual operation where the need for effective action may come with very little warning. A systematic rotation of crews and tight restrictions on preready state activities may prove not only desirable but necessary.

Also to be considered is fatigue resulting from boredom. This may become very pronounced at sites where long term isolation with a minimum of activity is the rule.

Just as pilots commit inadvertent errors, so may missile crews. The final solution of this problem has not been found, but there is plenty of evidence that it exists, e.g., the pilot who lands gear up regardless of warning devices and experience. In missile operation such errors require careful attention to eliminate them from the system.

Related to this problem of inadvertent forgetting is the problem of forgetting under stress. As a result of stress, even well learned and practiced patterns of behavior become disrupted. Complete forgetfulness, partial omissions, or reversion to previously learned patterns of behavior occur. This is one of the reasons for the demands for standardization of cockpits.

This habit interference can be expected to become a major problem in missile operation. At present this problem may not assert itself as strongly as in the future, since each missile is being developed by a different contractor and operated by a different group of individuals. But as different missiles are introduced into the same unit and personnel have to contend with different types of operation, the problem can become serious. It would be highly desirable now, in the early days of the missile program, to at least establish broad criteria for the maximum operational standardization possible. This may be difficult, but in the long run it will undoubtedly pay off.

Another grave problem in missile operation is the emotional stability of the personnel concerned, particularly those responsible for firing operational missiles. Chaos could result from improper procedures or inadvertent firing of a missile by a person upset by personal troubles. This problem is particularly acute with the smaller missiles, such as those carried aboard aircraft, where elaborate launching procedures are not required. But it can be a serious problem even with the larger missiles once firing has been reduced to a relatively simple procedure.

Even more serious is the problem of major emotional maladjustment which might result in premeditated premature firing. Evidence from other areas indicates that this is a possibility. In aircraft accident history such experiences are rare, but they do occur. In an area where not even one major event of this kind can be tolerated, every precaution must be taken to select individuals who are emotionally stable and to check them periodically to determine that no recent experience has made them otherwise. The authority given to flight surgeons to ground crews will have to be extended to the missile area, and individuals even remotely suspected should be removed from the opportunity to precipitate a major uncontrollable situation. Each person associated with missile operation should be made aware of this and should be prepared to accept it without feeling that there is any degree of stigma associated with such a decision.

A careful consideration of the problems that have been presented indicates clearly that the hopeful assumption that missile operation can be reduced to a matter of mechanical reliability is unfounded. Probably even more than in other types of operation the human element is equally as important as the mechanical features. Unless full cognizance is given to the fact that the missile, like the manned aircraft before it, is a total man-machine complex, unfortunate and preventable accidents will occur. Full recognition of the role of the human and critical evaluation of his functions in the man machine complex can reduce and, hopefully, even eliminate these human error accidents. ★

WELL DONE

Captain Jack E. Shepard

91st Tactical Fighter Squadron, USAFE

Last Fall while piloting an F-101C on a routine bombing mission out of RAF Station Bentwaters, Captain Shepard demonstrated some quick thinking and fine airmanship which prevented a serious aircraft accident. The flight was normal—and uneventful in all aspects—until completing a penetration on the Bentwaters TACAN which was to terminate his mission. Penetration was made with throttles in idle to facilitate reaching assigned altitude for GCA pickup. Upon reaching level-off altitude, as airspeed bled off to 250 knots, the speed brakes were retracted, and gear and flaps lowered for GCA final.

As the airspeed neared recommended final approach speed, Captain Shepard attempted to advance power and found both throttles stuck in the idle position. No amount of physical effort would move either throttle. He immediately selected the emergency fuel system, but throttle movement did not improve.

With airspeed dangerously low and decreasing rapidly, Captain Shepard unfastened his safety belt, braced his left foot behind the throttles and with considerable effort was able to advance the power. Each time he'd remove his foot, however, the throttles would return to idle. This meant he had to fly the entire final approach in this difficult and uncomfortable position. To further aggravate an already hazardous situation, tranverse pressure on the throttles by his foot caused the afterburners to cut in and out intermittently, making it extremely difficult to control airspeed and judge his final approach. Despite this condition, a safe landing was made on the first attempt, with no damage to the aircraft except for two slightly bent throttles.

After the engines were shut down, both fuel controls were found to be frozen so that the throttles could not be manually moved beyond idle position.

Captain Shepard's initiative and superior manner in handling this emergency undoubtedly prevented a major accident and the loss of an airplane. His actions reflect great credit upon himself and the U.S. Air Force.

Well Done, Captain Shepard! ★

"No Maintenance Required"

After all these years of teaching and preaching ground and flying safety to Air Force personnel I'm still finding maintenance problems with aircraft that would make your hair stand on end. I do not have an answer for these problems but I am firmly convinced that something must be done *immediately* if we are to save the lives of the men who fly these air machines daily.

As the NCOIC of the Base Flight and Transient Maintenance Section at Sewart Air Force Base, Tennessee, I have seen many different types, models and series of aircraft. I have also seen many different types of maintenance performed on these aircraft—some good, some bad, some lousy and some excellent. A new wrinkle entering the picture now is coming from the pilots who fly these birds. "No maintenance required," they say!

I can remember the time—we were operating under the Crew Chief type system—when our pilots could write up more discrepancies on one flight than a Crew Chief could repair in an entire day. Also, we are often reminded that, "Accidents don't just happen; they are caused." All maintenance people are aware of this old saying and, in many cases, that these accidents are caused by some person who has failed to do his job, either on the ground or in the air. We also know that since aircraft accidents are caused, they can be prevented. But, tell me how all the quality maintenance in the world can help to prevent an accident if maintenance personnel are not aware of a malfunction in a particular aircraft. There are so many pilots in a hurry to get back to their home stations that Transient Maintenance is not being given an opportunity to repair aircraft that are badly in need of it. The pilots refuse to wait for parts, or to have their aircraft tied up for a couple of hours for such repair.

So often, obvious discrepancies make it mandatory for the mechanics to pull T.O. 00-20A-1 and show the pilot *where* he is required to sign his aircraft forms stating that *he does not want maintenance performed*. This sometimes causes the pilot to change his mind and wait for necessary repairs to be made. This may be a rather minor problem, compared with others, but it's often a series of little things that help the younger pilots to become older pilots, and older pilots to reach retirement.

This brings to mind the two T-Birds we had here a few weeks ago. During refueling one took 804 gallons of JP-4 and the other 790. The irony of the first T-Bird is that the pilot was shooting touch-and-goes prior to landing for service. A T-Bird holds 825 gallons of fuel, of which 813 are usable.

Many times I have been afraid some of these pilots would not be able to limp on home and have been concerned enough to check at their home stations for their arrivals to see if they made it. I think our concern for these people really goes deeper than what appears on the surface, otherwise we wouldn't be willing to pile up more maintenance on already under-manned maintenance sections.

Here are a few examples of major aircraft discrepancies that were waiting to cause an accident:

Recently a T-33 landed at our station under normal conditions. The Transient Alert airman met the aircraft and parked it on the fuel pits. Upon checking with the pilot of this aircraft, the airman was informed that "No maintenance is required." However, the pilot asked that his emergency hydraulic reservoir be checked to ascertain that it was full. The pilot didn't write up this discrepancy in the aircraft forms but the Transient Alert crewman entered the remark on his "inbound sheet."

Servicing was completed, emergency hydraulic reservoir checked, aircraft fire-guarded, and the pilot took off. After takeoff, the landing gear would not retract so after a 50-minute, uneventful flight, the T-Bird returned. The pilot *then* entered in the forms that the landing gear would not retract and the aircraft was towed to the hangar to be jacked up for a complete retraction test. During the jacking process the right wing made a couple of loud cracking noises and the jacking procedure was stopped immediately. Upon a closer examination of the aircraft several major discrepancies were discovered:

- First, the right main gear was found to be bent backwards at a very slight angle.
- Second, the main spar behind the gear was found to be cracked four inches.
- Third, the right main gear wheel had a big hunk knocked out of the inner rim. (This may have been overlooked because it could have been underneath or behind a fairing door.)
- Fourth, during this retraction, it became known that the pilot had used the emergency system to get the gear down the first time he had landed, and furthermore the statement was made that the aircraft had received no hard landing.

It will cost a few thousand dollars to repair and put this aircraft back into flyable condition. I ask myself, "Why weren't these discrepancies reported before someone risked killing himself in this aircraft?"

A week later, another T-33 landed at this station and hit short on a 5000-foot runway. (The long runway—8000 feet—had been closed temporarily for repair of a few lights.) The Transient Maintenance Section was notified that the T-Bird had a left main tire flat and

proceeded to change the tire. By this time the long runway was opened. The pilot did not write up the flat tire nor the fact that he had landed short. And at this time, the Transient Alert personnel did not know that the aircraft had landed short.

Early the next morning a series of events occurred. It was discovered that the aircraft had landed short and knocked out a runway light. We then asked and received permission to call the Naval Air Station in Pennsylvania for the purpose of informing the pilot to have a retraction check made on his aircraft and to have it inspected for structural damage. The pilot was reached by telephone and given this information. However, he still did not think he had landed short.

A couple of days later, this aircraft came back through our station on the way to its home base. I asked the pilot if a retraction check had been performed on his T-Bird and received a negative answer. We immediately grounded the aircraft and completed a retraction check, also a visual inspection of all structural members with no discrepancies being discovered at this time. How safe was this aircraft? Pictures of the runway and the missing light indicated the necessity for a thorough inspection.

As previously stated, aircraft accidents can be prevented by professional flying and quality maintenance. Good maintenace is our business. We're not in the business of trying to hang someone—we leave that to the hangman. If the professionals who are flying these aircraft do not let the maintenance people know what is wrong with their aircraft, they can never get the quality of maintenance that is desired by Air Force standards.

The next time you visit a transient base, inform the maintenance people of your maintenance discrepancies so that they may give you better and safer service. "No maintenance required" went out the window years ago, and if you have to be convinced, try to find an old bold pilot. They are few and far between because they have ignored the plea of qualified maintenance personnel to allow time for repair of a crippled bird. They have failed to report a malfunction that would definitely give them trouble and have made their futile attempts to limp on home, arriving instead at their new eternal station where they will trade their old wings for new ones. Only then can they be secure in stating, "No Maintenance Required." ★

SMSgt Int A. Morris, 839th Operations Sq (TAC)
Sewart AFB, Tenn.

Damaged runway light attests to short landing by T-Bird. Pilot disclaimed knowledge of short landing and failed to write it up or that he had a flat main tire. He also felt a retraction test was unnecessary.

GLOBEMASTER GAUGE

Positive thinking by a MATS line chief has put the damper on a safety hazard by inventing a nosewheel gauge for C-124 aircraft. CMSgt James I. Wells, Jr., a professional maintenance superintendent, assigned to the 1502d Flightline Maintenance Squadron since August 1960, has designed a gauge which is a positive method to check proper saw teeth mesh of the nosewheel clutch plate and axle nut. The device, called a "Go No Go" gauge, is slipped through the hollow axle after the wheel installation is complete. If the gauge fits between the axle nuts on both wheels, the installation is proper. When it doesn't fit, the saw teeth are point to point, and unsafe.

Backing the 1502d moto that "Safety is Everyone's Business," the 18-year veteran paved the way for corrective action when several C-124s landed with loose nosewheels. They created a dangerous shimmy and heavy vibration throughout the aircraft, a condition which has taken its toll on communications equipment.

Wells, a safety-conscious MATSman, attacked the problem by researching the methods of installation and checking, and discovered that the method of checking saw teeth mesh wasn't accurate in every case. Today, the "Go No Go" gauge is a part of the C-124 nosewheel change special tool kit. It is constructed of a 1/4 inch steel bar 47 7/8 inches long. Two crossbars are welded on the main bar.

Lt. Col. William E. Barber, Jr., Chief of Maintenance, 1502d Air Transport Wing, commented: "Wells' gauge will go a long way in preserving the flying safety record of MATS and the 1502d ATW." The Wing's strategic airlift force has logged 295,333 flying hours without an accident. This is no doubt one of the reasons the Wing won the MATS Outstanding Unit Flying Safety Award for accomplishments from January 1 to December 31, 1960. Cited for flying 52,231 accident-free hours in 1960, plus more than four years and 250,000 flying hours since the last accident, the 1502d ATW has a record to be proud of.

Congratulations! ★

The Name of the Game

In flying throughout these United States it has slowly, but surely, dawned upon me that pilots and tower operators have established a very subtle and most times friendly battle of wits. For lack of a better name we'll call it Dog Eat Dog.

Actually, it's a traditional game that has gone on for years, but until now no method of keeping score has been devised. I intend to lay down some general rules and as you readers come up with your own ideas it won't be long before we will be able to dream up a score card and turn it in to the Ops Officer after every flight. The tower operators can send their's to the Federal Communications Commission in order to draw incentive pay for hazardous duty.

Anyway, it's fun, and a standard opening goes like this:

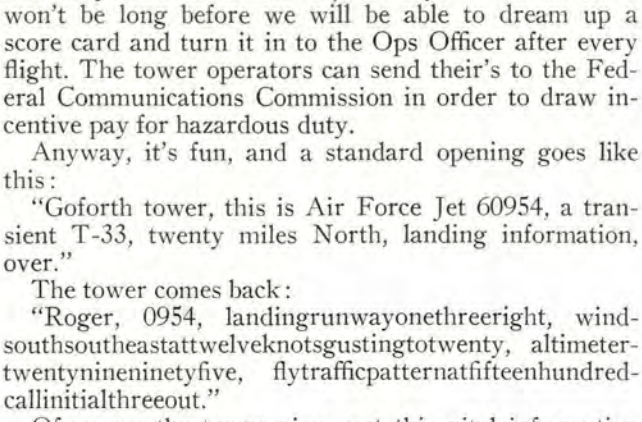
"Goforth tower, this is Air Force Jet 60954, a transient T-33, twenty miles North, landing information, over."

The tower comes back:

"Roger, 0954, landingrunwayonethreeright, windsouthsoutheastattwelveknotsgustingtotwenty, altimetertwentynineninetyfive, flytrafficpatternatfifteenhundredcallinitialthreeout."

Of course the tower gives out this vital information in such a machine gun rapid burst of phrases that it completely defies understanding. The pilot is still trying to figure out what in heck has been said, but like the stalwart trooper he is he comes back with:

"Roger, Goforth," and starts fumbling through the letdown book to find a diagram of the field. If he's lucky Goforth will only have one runway and then all he has to figure out is which way the wind is blowing. He



might even be luckier and spot an aircraft landing or taking off, then he's got the direction hacked. The rest of the junk he can fake.

The tower knows that the pilot hasn't understood one word of the landing instructions and hasn't the faintest idea of where he is, but he knows where the pilot is, so when the T-Bird should be on initial (provided, of course, the pilot has flipped a coin, guessed right, or lucked out and has the landing direction figured) the tower operator picks up his spy glass, waits until the pilot is $3\frac{1}{8}$ miles out and beats him to it:

"954, threeoninitial, you'reclearedforarightbreak, callbasewithgeardown."

SCORE: Tower—1; Pilot—0

Then the tower closely watches the pitch into traffic and as the nose gear locks he beats him to the punch again. For effect, this simple statement is given slowly and distinctly, "54, recheck gear down, cleared to land."

SCORE: Tower—2; Pilot—0

The essence of this friendly game lies in the fact that no pilot wants to admit that he can't understand simple (even though rapid fire) landing instructions. After all he's a pylut and it's really only a courtesy that he called the tower in the first place. If he doesn't want to play the game he can untrap himself by saying:

"Gorforth tower. You were cut out. Please repeat landing instructions, starting with landing runway and slow down a little bit, will ya?"

This is clearly a foul, and forfeits the game. A guy like this would use a checklist, change underwear every day and attend flying safety meetings.

To preserve the game, therefore, ways must be devised to let the defense catch up with the offense. As is common in these affairs, this means developing an offensive weapon for the defense.

This must begin with the initial call, he must never say:

"This is Air Force Jet 60954, a transient T-33, 20 miles north."

He must say only:

"Goforth, this is 954, landing instructions."

This makes the tower think he should recognize the aircraft and you make small points if he comes back with:

"Aircraft calling Goforth, say again your complete identification, please."

The pilot says, "AF 60954." Then complete silence.

You now have the tower on the run. He's even forgotten why you called, much less know who you are and where you are. You force him to say:

"AF 60954, what is present location, are you a conventional or jet and what do you want?"

Like Tic Tac Toe, this is the key move—you must make him drag all this poop out of you—above all—don't volunteer anything. Then you say:

"Goforth, this is Jet 54, I'm over the 'big trees,' landing instructions."

Naturally the tower doesn't have the faintest idea where the "big trees" are but you have made him think he should know and he is flat shook by this time. He is so shaken that he gives you the landing info at a speed that even you can understand.

Then he picks up his spy glass to find out just where in the blazes you really are.

SCORE: Pilot—1; Tower—0

For extra points, you can reopen the game by saying:

"Goforth, am I cleared into initial before these two other '33s out here?"

You've got him on the ropes now and he's almost panicked 'cause he didn't know any other traffic was in the neighborhood (maybe there really isn't but why let him off easy?). He comes back bravely:

"Roger, 54, cleared No. 1. The two other aircraft northsouth eastwest of the field, pullup, break out and re-enter traffic."

SCORE: Pilot—2; Tower—0

There *are* other ways to make points and I'll list some briefly. This isn't complete 'cause by using ingenuity, a cunning and devious mind, you can come up with at least one every flight.

• Listen to the tower give landing instructions to another aircraft, and when you make initial contact, you give the tower the landing instructions. Score 2 points, one for initiative, one for trapping the tower.

• Circle the field, listen to the tower instructions, don't say a word until you've pitched, then tell the tower where you are. This is sometimes dangerous but score 1 point anyway.

• Wait until you're one mile out and request a straight in approach. This is very effective, particularly if you have reason to believe the tower troop has just poured himself a hot cup of coffee. Score 2 points, one for fiendishness, one for timing.

• When cleared for a touch and go landing, change your mind at the last minute and ask for a full stop. If there's another bird on the active, take 2 points.

• When you get ready to taxi out, don't tell or ask

the tower. Just go. When the tower sees you moving around he'll have to ask you who you are and where you're going. Score 1 point.

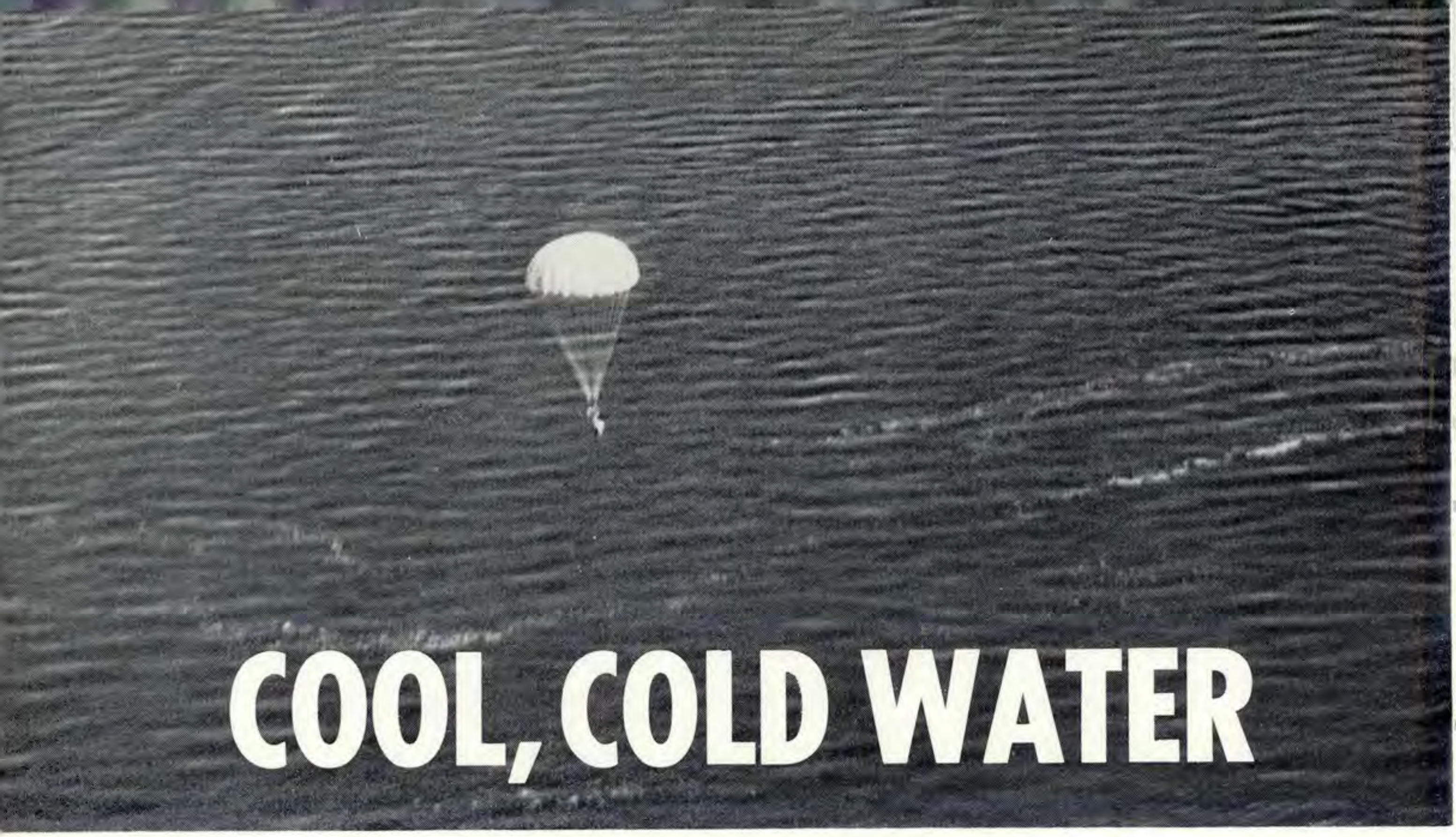
• Try to schedule your taxi to takeoff so you get to the No. 1 spot just as another plane is on a close final. Pretend you're going to take the active and listen to the immediate response from the tower. If you get away without a violation, score 3 points.

• Read back a very complicated and detailed departure without a single mistake. You've won the game for the whole day 'cause you've outhassled the ARTC sneakers and you've out shorthanded the tower.

Follow these rules carefully (plus those you make up) practice a few hours a day and in a few months you will find that you have become a consistent winner. GOOD LUCK!

P. S. Please pass on any locally devised, underhanded, clever and/or cunning traps you think of. I'm always trying to add on to my list. Besides some of the tower operators have caught on to my tricks. Got skunked the last time out, 2 to zero. ★

JLT.



COOL, COLD WATER

Major Glenn Crum, Fighter Branch, DFSR

Got a most unusual Operational Hazard Report through the mail the other day. This was an agonized wail from an ops officer near a sea shore base to the effect that transient jet pilots continually came into his base and departed same without any water survival equipment on board. (The unusual thing about the report was the fact that this same ops officer had one of his own troops bail out into icy water not long ago sans his form fitted exposure suit. A quick chopper rescue directed by another aircraft witnessing the bailout prevented his having more than two days of severe clanks and chilblains.)

Apparently this gentleman got religion after this episode as he is now personally wearing orange colored flying suits, poopy suits, dog tags, and is sending in OHRs to get everyone else to do likewise.

But in checking around a bit, we find that not only is this fellow's wail legit—it's common to many other proprietors of seaside AFBs. We find it's common for transients to clear in and out of bases such as Hamilton, Eglin, Charleston and Patrick, with no sign of water survival gear. (Or probably any other type, for that matter.) Most seaside bases have SOPs for local troops pertaining to use of water survival gear. They know that many instrument arrival and departure procedures may take them over the water for unspecified distances—regardless of how they may flight plan. And this is the big point.

Par 24a, AFR 60-16 directs that "adequate survival equipment" will be aboard all single-engine and twin-engine aircraft making flights over water and *not within power-off gliding distance of land.*

Most pilots make two mistakes when they clear into or out of bases near large bodies of water. (1) They assume erroneously that they can plan their flight to avoid flying over the water. (2) They feel they can glide to land per AFR 60-16 if they do have trouble.

Now let's just review all F-105 bailouts to date to see if option two could have been carried out when the moment of truth arrived:

- Aircraft exploded and flight controls lost while in high speed, low level flight. Pilot ejected within seconds after loss of control at approximately 500 knots at 500 feet.
- Pilot bailed out intentionally over water because of a dangling main landing gear.
- Essentially same type of predicament. Pilot bailed out over land, aircraft crashed into water.
- Engine failure and loss of flight controls just after roll out on top from a LABS maneuver. Pilot bailed out almost immediately, and both aircraft and pilot landed in the water.
- Engine flameout because of ATM failure and loss of boost pump pressure. Pilot in this case was able to glide several miles prior to ejection.
- Engine failure occurred during supersonic low level speed run. Pilot was able to pull up to 14,000 before loss of flight controls necessitated bailout.
- Engine failure and loss of flight controls just after roll out on top from a LABS maneuver. Pilot headed aircraft for shore, but loss of flight controls and fire necessitated bailout over water.

In four out of seven cases above, the pilot had little choice as to when he spoke sayonara—in 3 of 7 cases the pilot landed in the water and in 4 of 7 the aircraft crashed into water.

Now just in case you think there's something unique about the F-105 in that more likely than not you may have to leave it without lengthy reference as to your geographical position, let's look at some other Century Series birds to see what caused the ejections. (T-Bird thrown in for staff officer edification.) Figures are for an 18 month period, January 1959 through June 1960:

CAUSE OF EJECTION

	Fire/-Explosion	Eng. Fail	Mid-Air Collision	Loss of Control	Other	Total
F-100	29	25	8	22	7	91
F-101	2		4	8	7	21
F-102	4	9		2	2	17
F-104	5	13	1		3	22
F-106	1			1		2
T-33	8	41	20	9	15	93

Now I'm not going to review all these separate reports to see how many of the airplanes involved in "Fire/Explosion, mid-air collisions, control loss and some of the 'others'" could have been flown to a nice, level, dry, soft piece of terra firma before catching the down express, had the need arisen. Most fighter troops will recognize the need for post haste deplaning from many of the above situations.

Which brings us back to the original point. Proper survival equipment must be worn for the areas you're traversing. If there is any chance that your departure procedure, inflight route, or arrival procedure may take you over any appreciable body of water, whether or not you could conceivably glide to land, your minimum equipment is a Mae West. You be the boss as to whether you also need a dinghy or survival suit. (Twenty-eight per cent of the total unsuccessful ejections for the first six months of 1960 were caused by drowning.)

Some fighter pilots used to avoid flying over water when they could because they claimed their engine went into "automatic rough" when they left the shore. But these same troops had no qualms about flying over rugged mountainous terrain with only a ciragette lighter for survival equipment, thinking they'd glide over to the next warm valley should the engine conk out. Again, the statistics for the first six months of 1960 indicate that survival equipment of some sort was needed, BUT NOT AVAILABLE, in 10 cases of ejection over flat terrain, 2 over the mountains, 4 over hilly country, 2 in the desert and 7 into wooded areas, for a total of 25 times when survival gear was not provided.

As to when to go all the way, and use the uncomfortable survival suit, we saw an interesting phrase in a paper the other day to the effect that, "You set an exact value on your life, and we'll set an exact water temperature that requires a survival suit."

With the help of Commander Jeff Stone, our Naval Liaison brother who helps us mind the store, we can be a little more specific. He says standard Navy rule of thumb is to use the survival suit whenever the water temperature is below 60°, or when the water temperature and air temperature add up to less than 120°. For example, water temperature of 55° requires the suit regardless of air temperature; a combination of water temperature of 65° and air temperature of 50° would require the suit; 60/60 would be borderline, and 60/70, no suit.

Commander Stone says the Navy troops don't relish wearing the survival suit any more than we do . . . but they wear it. If you don't like the idea, send your complaints to him. I'll be out buying a set of long johns. ★

DON'T SIT ON YOUR LIFE INSURANCE!

William Noe, Auto-Crat Mfg. Co., Los Angeles, Calif.

Nowadays, automobile safety belts are not uncommon. You see them installed in many of the new cars and you read about their worth almost daily—a pretty important feature of safety. USAF interest in preventing loss of its personnel before they get off the ground goes back a long ways.

During the past five years, 45 airmen of the Air Defense Command have "donated" more than $6,000,000 to the Air Force. This "donation" was made as a result of their investing approximately $300 in safety belts for their personally owned automobiles. These 45 airmen—by using their belts—have survived auto accidents which would otherwise have caused the Air Force to "write off" all monies spent in their training, plus their life insurance. According to Mr. Ralph M. Riley, Chief of Ground Safety, Hqs Air Defense Command, these 45 airmen and investigating officers agree that the safety belts definitely saved their lives, hence the "donation." No record is available which would show how many other airmen, involved in accidents, have avoided serious injury because they were wearing safety belts. Only those accidents wherein a disabling injury occurred are recorded.

In September 1955, approximately 100 traffic safety specialists, including engineers, crash injury researchers, doctors, and state police officers, were invited to Detroit for a National Safety Forum sponsored by the Ford Motor Company. During the event, crash injury specialists from all over the nation exchanged information and discussed progress made in auto crash research. Methods of research were demonstrated to show how the findings had been translated into product developments to make the motor car safe.

The forum included evaluation studies and full scale crash tests using lifelike dummies. These dummies have the same weights and dimensions as average motorists and can be adjusted to react in a relaxed or tense manner under crash impact. Demonstrations included actual crash tests to show how these dummies recorded the force of the blows they received in the staged accidents. The recording was done by means of sensitive electronic attachments from which signals are transmitted from the crash car to a nearby instrument van where receiving equipment tabulates these time and force messages.

In a typical crash test, the crash car is towed into a heavy timber barrier or another vehicle at a predetermined speed and direction. The towline is tripped just before impact. The instrument van rides along beside the crash car, connected by a 20-foot length of electronic cable. Borne out in these tests was the fact that the driver who is restrained snugly behind the steering wheel by his seat belt was less likely to lose control of his car during a minor accident or incident and, as a result, be injured in a secondary collision. The severity of injuries was lowered more than 60 per cent. When the individual was prevented from being thrown from the vehicle or kept packaged in the car he was five times safer.

Following the vehicle crash forum in Detroit we joined Mr. Riley in a program to lower the high accident rate of ADC's airmen when driving their personal vehicles. At the request of Major General Joseph D. Caldara, then Director of Flight Safety Research, we agreed to offer to Air Force personnel the identical belt demonstrated at the forum. This program was triggered in 1956. An analysis of Air Force experience showed that in the 17-25-year-old bracket, 73 per cent of the serious injuries and deaths were attributable to vehicle operation. Over one-third of these individuals were thrown from their vehicles and almost as many stated they had lost control of the vehicle.

Let's review a couple of the 45 cases of survival. Three airmen left the base at 1900 hours to visit a nearby town. They visited a friend and proceeded to drive to another city. At a stoplight, another car passed them at a high rate of speed, badgering them into a race. All three of the airmen wore safety belts. When they caught up with the car ahead, it would speed up in order to prevent them from passing. This probably accounts for the high rate of speed they attained—65 mph. Both cars attempted to make a sharp turn to the right. The car ahead made the curve and continued on its way. The airman lost control of his car and ran off the highway, and crashed into a powerline pole. The point of impact was just to the rear of the left front door. The force of the impact snapped the pole, and the car skidded 132 feet. It turned over but ended right side up. Its driver and two passengers sustained slight cuts and minor bruises. It is the opinion of the driver, his passengers and medical personnel that the restraining devices—the safety belts—saved their lives and lessened the severity of their injuries.

An Air Force pilot and his wife were returning from their vacation in Minnesota. Both were wearing safety belts. As they approached a rise in the highway, the wife removed her belt so she could turn to look toward the back seat. A car passing another came over the rise and the two cars met head-on! The officer's wife sustained multiple fractures and lacerations when thrown against the dash and windshield. The officer sustained slight bruises but was not even taken off flying status. The wife was hospitalized for a period of seven months, and the car was a total loss.

It is estimated that over 25,000 belts are installed in cars belonging to airmen of the Air Defense Command. The Commander and the majority of his staff have them installed in their cars. Great effort has been put forth to stock belts in Base Exchanges and Safety Offices so they may be obtained readily and at near cost prices. Auto safety belts are given as prizes for accident- and citation-free records of ADC personnel.

Through the cooperation of the Ground Safety organization our representatives attended safety conferences like the one held at Holloman AFB in November 1956. At this meeting, Colonel John P. Stapp conducted demonstrations on the "Daisy" and "Bopper" tracks for the benefit and education of some 300 doctors and interested safety officials. The demonstrations included animals as well as human beings. A live bear and a pig, and finally volunteer airmen were used to prove that seat belts do not cause injuries when worn comfortably snug. This conference resulted in the recommendation and approval of safety belts by the American Medical Association and the U. S. Public Health Service.

According to Mr. John O. Moore, formerly Director of the Automotive Crash Injury Research project at Cornell University, and long an advocate of the ground and flight safety program, good seat belts are the only known devices that can be inexpensively installed in a vehicle that can prevent or minimize injuries normally sustained in the average accident.

Through research and development and full quality control the industry requirements have been raised to the 5000-pound body load specified by General Services Administration. As a result of a four-year study of human factors involved in the use of seat belts, many improvements have been made. For example, belts are now human-engineered and can be easily adjusted both ways with one hand.

We do not believe, however, that safety belts can ever replace good sane defensive driving, or that they can save lives in all cases. There are a number of good belts available and they are designed to give the maximum protection in the average accident.

"Donate" your life to your family and loved ones. Install your seat belts immediately, then wear them. Don't sit on your life insurance! ★

FROM THE HORSE'S MOUTH

Editor's Note: Because of several recent accidents in which there was a misunderstanding between the supervisor and the pilot, one SAC Wing Commander took the bull by the horns and set about to give the ungarbled word to each of his pilots. It's a classic. After reading it, I'm sure you'll agree that each pilot in his command knows exactly where he stands with respect to supervision by proxy.

SUBJECT: Responsibility of Commanders*

TO: Commanders *

1. I am writing to you directly because I want you to get this straight from the "horse's mouth." I am not bypassing your squadron commander. He knows the situation and supports my position.

2. As the commander of an aircraft you can do more to prevent an aircraft accident than any other individual directly involved in supervising or operating aircraft. Your potential in this respect has been considerably degraded by a misunderstanding of the role of the Command Post and the Supervisor of Flying. Let me set this straight right now. The job of the Command Post and the Supervisor of Flying is to insure that you get all the information and expert advice that you need to successfully complete your mission and to assist you in coping with an emergency. They have authority over you only insofar as the mission itself is concerned. When it comes to safety of flight, their position is reduced to an advisory capacity. You, and you alone, are responsible for a decision involving safety of flight. The Command Post and Supervisor of Flying will get you the most expert advice available and I expect you to fully consider this advice in making the decision. But, the decision is yours.

3. This is clear cut in the case where a definite emergency already exists. What about the case where there is no emergency, but there is an unusual situation and the mission cannot be flown as originally planned? Again, the decision is yours if safety of flight is in any way involved. You have not only the authority, but the responsibility, to countermand and/or deviate from any orders given you by the Command Post or Supervisor of Flying if, in your opinion, such orders cannot be carried out with a full degree of safety. This is nothing new. It has existed in AFR 60-16 throughout the 20 years that I have read and studied the regulation.

4. I don't want you to feel that I lack confidence in the Command Post or Supervisor of Flying. To the contrary; they are some of the most experienced pilots in the wing and have been handpicked and personally approved by me for these highly important and critical positions. I have the utmost confidence in them. However, they are not flying the aircraft and are, therefore, not in a position to fully comprehend the situation. They can be of invaluable aid to you if you keep them fully informed of your situation.

5. You must realize the tremendous confidence that CINCSAC and the President have placed in you, in entrusting you with the authority to fly around the country, and even outside the country, armed with thermonuclear weapons. All I have said in this letter takes on immeasurably increased importance on missions where you are carrying nuclear weapons.

6. Our aircraft accident rate in the wing is excellent. I want you to help me to keep it that way. In the fierce competition that we entered with the 1 April training quarter, don't allow your competitive spirit to jeopardize safety. Don't cut into your safety margin in order to make an on-time takeoff or to complete a mission. I would much rather explain why I am low in the SAC MCS *(Management Control System—Ed.)* than to explain an accident to your family and to General Power.

RALPH W. STANLEY
Colonel, USAF
Commander, 3238th Strategic Wing (SAC)
Barksdale AFB, Louisiana

**In SAC, the term "Aircraft Commander" has been changed to "Commander."—Ed.*

FALLOUT

LETTERS TO THE EDITOR

Crew Rest

The following letter from Colonel R. S. Garman to all units of his command resulted from action taken by the Flying Safety Council at the Air Force Missile Development Center to alleviate the possibility of fatigue as a contributing cause to an aircraft accident or incident:

"1. Effective this date, all pilots and supervisors of pilots assigned to this Center will schedule workloads in such a manner that the policy outlined below can be followed:

a. Any pilot who is assigned as a crewmember on an aircraft departing this station will arrange his assigned duties in such a manner as to allow him at least three hours of non-duty time prior to takeoff. It should be recognized that discretion must be exercised in the occasional exception to the above policy which will have to be made in those instances when pilots are required to depart on unscheduled and emergency trips.

b. Each pilot is charged with the responsibility for using the allotted non-duty time prior to flight for the sole purpose of rest and preflight planning.

"2. The policy outlined above is being adopted by this Center in an effort to prevent aircraft accidents in 1961 in which *fatigue* may or could be a contributing factor . . ."

Capt. Kenneth E. Harman
FSO, AF Missile Development Center
Holloman AFB, New Mexico

Altimeter Setting

I have just read the March issue of *Aerospace Safety Magazine* and have noticed what appears to be a misprint of some significance. The mistake appears in the letter from Captain William Pierson on altimeter setting. In the third paragraph I believe 28.82 should be changed to read: 29.82. I hope this letter is one of many on the same subject.

Lt. Lavens D. Folths
FSO 99th Bomb Sq, Mtn Home AFB.

You are right and, so far, the only one to write us. Thanks for taking the time.

The 'Gator Clamp

This refers to an incident that happened more than two years ago; however it might still be of interest and may possibly avoid an embarrassing abort mission since the T-Bird is still being used. The mission was a night cross-country flight in a New York ANG T-Bird, from Niagara Falls, New York, to Kansas City, with a refueling stop at O'Hare, near Chicago.

The refueling at O'Hare was performed by the night alert crew and the T-33 was preflighted (I thought completely) by myself with the aid of a T-wrench and flashlight.

On takeoff the nosewheel would *not* retract, after several attempts, and it was necessary to burn off fuel and land at O'Hare. Inspection revealed the large alligator clamp used for attaching the refueling ground wire to the aircraft was still on the nose strut casting, sticking straight out and preventing the nosewheel doors from closing!

Maj. William C. Powell
Chicago, 7, Illinois

Thanks for sending us this note. Like you say, the T-Bird is still around and this incident report might just serve to avoid an embarrassing abort.

Flying Safety Ribbon

It appears that most of us have ribbons for everything from being a good boy to goofing up an entire command. Many people sport three complete rows and have yet to leave the States.

The insignia, badges and ribbons worn on the uniform are supposed to tell a story. Now that the ribbons have become a mandatory part of the uniform, why can't one of them tell of a job well done in the cockpit? A flying safety ribbon with several clusters would really point out the hot pilots and could be worn with pride by anyone who qualifies . . .

I would recommend a flying safety ribbon for 1000 hours of logged time without an accident, and a cluster for each additional 1000 hours. For single engine jet time perhaps the requirement should be cut in half. Any pilot error accident, say at 2700 hours, would require the pilot involved to have a total of 3700 before he would receive his second cluster. The accident would therefore cost him 700 hours against his next cluster.

Many ribbons seem to be blue. However, since most pilots prefer that color of sky, I think the flying safety ribbon should have a sky blue background. AFR 60-2 requires each pilot to fly a bit at night and a bit of weather, each year. Because of this, the ribbon should have an occasional band of black for night and gray for weather. To get real fancy, it should have some white to represent the few clouds that are often in the sky.

I think the medallion should pay homage to the old Gooney Bird which has probably flown more accident-free hours than all other military aircraft combined. Superimposed on the Gooney would be a delta wing fighter to indicate the progress that has been made to our present-day supersonic manned fighting systems.

This letter was written primarily with the pilot in mind; however, in many aircraft the pilot alone is not enough. I should like for any crewmember, so qualified, to be able to receive this ribbon. Also I should like to hear other crewmembers' comments since they're backing the man at the wheel.

Capt. John S. Wright, USAF
Aeronautical Sciences, Medical Service School
Gunter Air Force Base, Alabama

We, too, would like to hear what the troops in the field have to say about Capt. Wright's proposal. Don't be bashful, speak up!

Army Aviation

The Seventh Army publishes a quarterly aviation safety bulletin to provide material for unit safety meetings. Other articles of general interest are included.

"Aerospace Safety" is read here with interest. The format is excellent and contents are well written and contain much useful information. We find that some of the articles are suitable for Army use, without editing. Others, with a small amount of editing for terminology and Army orientation, have application to Army aviation.

Request that permission be granted to Seventh Army to publish in its Aviation Safety Bulletin articles and pictures from "Aerospace Safety." Credit will be given to your magazine and individual authors. If the articles are edited for Army orientation in any manner, a notation to that effect will be included.

Col. Jack W. Hemingway, Inf.
Army Aviation Officer
Hq 7th Army APO 46, US Forces.

Have at it, Colonel. Glad to be of help.

Speed—Not Height

In his article "Get The Point" (Page 10, March issue), Captain Tommy I. Bell may not have stressed enough that it is excess speed over the touchdown spot—not height—that causes the actual touchdown spot to be well down the runway. My calculations show that if an aircraft is 12 feet high over GCA touchdown point when using a 2½ degree glideslope, it should touch the runway 275 feet past touchdown point. Roughly, this means that every foot over GCA touchdown point will cost you 25 feet of runway. If you're 50 feet high, this will cost you 1250!

Now, using another rough-rule-of-thumb that every 10 knots of excess speed above intended touchdown speed will cost you 1000 feet (not a bad rule for the T-33 and some Century birds, although I'll agree they vary, depending on drag devices, etc.), you'll see that a 20-knot final approach speed higher than intended touchdown speed will cost you 2000 feet of runway to dissipate. This is a much more severe penalty than the 50 feet high glideslope over intended GCA touchdown point.

Speed, then, not height, over the GCA touchdown, is the *major* factor in landings past the "spot."

J. F. STONE
Cdr USN

T-Bird Quiz

Reference is made to the T-Bird Quiz answers in the April issue. It appears the answer to Question No. 3 left out an important step in getting a restart after flameout, namely supply of ignition to get the fire going again.

Or is there a new airstart procedure which we don't know about?

A. L. Lewis
Hq Portland Air Defense Sector
Flight Sec, Adair AF Station, Ore.

The symptoms given in question No. 3 were possibly presented in the wrong light. As you will note in the answers, engine RPM is still available, however, not in the desired amount. This would tell the pilot that he did not have a flameout condition and as long as there is fire in the combustion chambers, no need to hit the ignition switch.

T-Bird Quiz

Have just finished reading the April issue and taking the T-Bird Quiz on page 9. As usual I found many jewels of wisdom, and only one mistake. It occurs in the answer on page 13 to Question No. 12 of the quiz concerning runaway trim.

According to the Dash One, for all runaway trim, first retain or regain control of the aircraft, then slow aircraft, then use the override switch as applicable. The procedure has been renumbered in the Dash One as follows:

Runaway nose-down trim.

- Control Stick—Apply back pressure to hold nose up.
- Throttle—Retard, necessary to reduce speed.
- Speed brake—Down.
- Elevator trim override switch—Nose up (if installed).

Runaway Nose-up trim.

- Control stick—Apply forward pressure to hold nose down.
- Throttle—Retard as necessary and roll into banked attitude.
- Elevator trim override switch—Nose down (if installed.)

I thought the quiz was real fine. Maybe it will inspire more pilots to brush up on their emergency procedures. The professional pilot flying today's aircraft must be able to think quickly and act accordingly in an emergency situation. To know the emergency procedures properly can surely reduce reaction time. Hope this information is of some help.

1st Lt William H. Jones
IP Instructor School
James Connally AFB, Tex.

Let's go back a minute, Lieut. You say the Dash One shows the new procedure. Can't buy this. The latest page (as of this writing, 30 Apr 61) is dated 1 June 1960 and contains the info as given in the T-Bird Quiz. At the last T-33 Handbook conference it was recommended that the runaway trim procedure be changed as per your letter. The new Handbook should be in the field by 1 August. Isn't it nice the way it turned out? We're both right! Thanks for writing to us.

Get Out!

I've read the April issue of *Aerospace Safety Magazine* and find in it very informative and valuable information. However, in the article entitled "Get Out!" by Captain Victor E. Schulze, Jr., I note something which apparently is not in agreement with the latest data we have. On page 28 he states that the nose of the aircraft should be pulled up high and the seat actuated as the aircraft stalls. Both of our current Dash Ones—for the T-33 and the T-37—recommend that in low altitude ejections 120 knots *minimum*, considerably above stall for these aircraft, be used to assure rapid deployment of the chute.

Capt. Horace W. Miller
3615th Pilot Tng Gp
Craig AFB, Ala.

You are correct on the 120 knot minimum ejection speed and we're glad to hear from you. The T-33 Dash One backs you up and naturally it should be followed in the event you have to make the unfortunate decision to get out at the minimum altitude. It should be pointed out, however, that Captain Schulze's ideas about using the zoom to get as much altitude as possible, even to the stall point, was an across-the-board recommendation for all type jet fighters or trainers. I don't think there's any argument that even 25-50 feet can sometimes make the difference between a successful ejection and a major injury—or a fatal ejection.

WEATHER SAFETY ADVISORIES

The U.S. Weather Bureau has recently announced its revision of inflight weather safety advisory procedures. The former term "flash advisory" has been replaced by two new ones: SIGMET and ADVISORY FOR LIGHT AIRCRAFT. Some of you may have had an opportunity to read about this revision in the Airman's Guide (FAA). For you who have not, I'll give it to you briefly:

- *SIGMET*. This procedure applies specifically, although not exclusively, to the multi-engine transport and military aircraft over 12,500 pounds gross. As in the case of flash advisories, the new SIGMET procedure will apply in the 48 contiguous States. It's an advisory concerning significant meteorological developments of such severity as to be potentially hazardous to transport category and other aircraft in flight, and will cover these conditions:
    - Tornadoes.
    - Lines of thunderstorms (squall lines).
    - Hail ¾″ or larger.
    - Severe and extreme turbulence.
    - Heavy icing.
    - Widespread dust and/or sand storms lowering visibility to less than two miles.

Following is a sample: SIGMET NO. 3. WISCONSIN SOUTH OF LINE FROM LACROSSE TO GREEN BAY, HEAVY ICING IN CLOUDS 4000 TO 8000 FEET MSL.

- *ADVISORY FOR LIGHT AIRCRAFT*. This is an advisory concerning weather that is considered potentially hazardous to lighter or less rugged aircraft (single and twin-engine of 12,500 pounds gross *and less*). This procedure will cover:
    - Moderate icing.
    - Moderate turbulence.
    - The initial onset of phenomena producing extensive areas of visibilities less than two miles or ceilings less than 1000 feet, including mountain ridges and passes.
    - Winds of 40 knots or more within 2000 feet of the surface.

Here's a sample: ADVISORY FOR LIGHT AIRCRAFT NO. 1. TENNESSEE SOUTH OF LINE FROM DYERSBURG TO NASHVILLE TO CROSS CITY, CONDITIONS LOWERING RAPIDLY IN RAIN AND FOG TO BELOW 800 FEET AND TWO MILES BY 1200C. HIGHER TERRAIN OBSCURED.

Messages from both the SIGMET and ADVISORY FOR LIGHT AIRCRAFT will be broadcast on FAA navigational-aid voice channels similar to the former flash advisories. Also of importance is the fact that the messages of both procedures apply to the operation of light aircraft. As an additional service to IFR traffic, an alerting broadcast will be made on traffic control frequencies to alert IFR flights whenever pertinent SIGMET information is being broadcast on nav-aid voice channels.

And this is it, for now. If more information is received, I'll report it in the next issue. Watch for it! ★


Mal Function
Picture Mal a bright young Lieut,
Fresh from training at Chanute.
His job assignment? To be brief,
"Assistant to the Maintenance Chief."
Boss gets sick and Mal takes charge,
Chance to prove himself is large.
T.O.
T.O.
But not for Mal to use TOs,
That's for those less brainy Joes.
Says, "Men, let's make it quick and dirty,
Beer call starts at sixteen-thirty."
Result? Of course! All ailing birds,
And Mal reduced to Airman Third.