Aerospace SAFETY

UNITED STATES AIR FORCE • MARCH 1971

COVER PHOTOGRAPH BY SSGT ROBERT WICKLEY, AEROSPACE AUDIO VISUAL SERVICE.

MARCH 1971

UNITED STATES AIR FORCE

Aerospace SAFETY

FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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MARCH 1971 AFRP 127-2 VOLUME 27 NUMBER 3

BRIGADIER GENERAL ROBIN OLDS NEW DIRECTOR OF AEROSPACE SAFETY

Brigadier General Robin Olds, former Commandant of Cadets, U.S. Air Force Academy, has been assigned Director of Aerospace Safety. He replaces Brigadier General Benjamin H. King who retired 1 February.

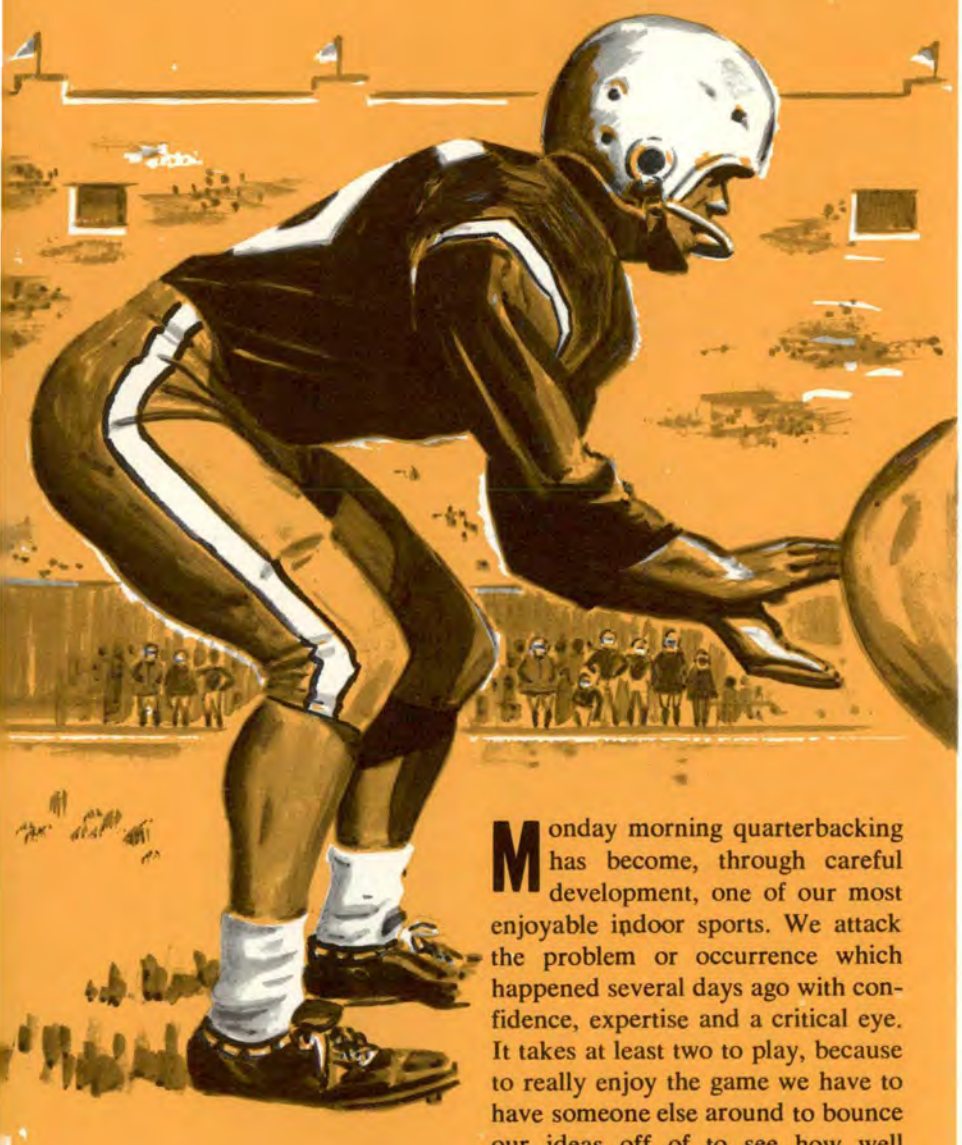
General Olds graduated from the U. S. Military Academy on 1 June 1943. During World War II he flew 107 combat missions in P-38 and P-51 aircraft, destroying 13 enemy planes in the air and 11 on the ground.

In the years after World War II, General Olds served in a number of assignments here and abroad. He was one of the first American jet pilots, flying the P-80 at March AFB in February 1946. He was wing man on the first jet acrobatic team in the Air Force and he won second place in the Thompson Trophy Race (Jet Division) at Cleveland in 1946. General Olds participated in the first one-day, dawn to dusk transcontinental round trip flight in June 1946 from March Air Force Base, California, to Washington, D.C.

General Olds returned to combat in October 1966 when he began flying missions from Ubon Royal Thai Air Force Base in F-4 aircraft. He flew 152 combat missions and destroyed four MIGs over North Vietnam.

As Director of Aerospace Safety, General Olds is responsible for USAF accident prevention and investigation programs for aircraft, missiles, ground and explosives safety. ★

IT'S EASY ON MONDAY



Monday morning quarterbacking has become, through careful development, one of our most enjoyable indoor sports. We attack the problem or occurrence which happened several days ago with confidence, expertise and a critical eye. It takes at least two to play, because to really enjoy the game we have to have someone else around to bounce our ideas off of to see how well we've developed our approach. Almost invariably we can solve the problem in a much better manner than the individual personally involved. In other words, twenty-twenty hindsight is a gift denied no one and any number can play.

In the safety business, we think Monday morning quarterbacking has its place. If someone commits a faux pas we like to air it, not for the purpose of embarrassing the culprit but in the fervent hope that from this poor guy's mistakes we may perhaps learn a lesson the easy way.

Safetywise, 1970 was a banner year. Through the efforts of everyone in the USAF, we managed to break the magic barrier of a 4.0 accident rate. The 3.0 accidents per 100,000 flying hours was the lowest rate in the history of military aviation. Okay, take your bow, but look out while you're doing it that something doesn't catch you from behind while you're in that position. Resting on our laurels is one sure way of guaranteeing we stay where we are or, more likely, go back to the 4.0 plus.

It doesn't take a mental giant to determine from the statistics where our accident potential is the greatest. Anyone remotely interested in safety will admit that pilot factor claims a lion's share of the accidents which occur each year. In the education business, we are talking not about pilot factor as a gross figure but, instead, breaking it into bits and pieces that are more easily digestible. In one of our current issues, we talked about the failure of a pre-decision—ejection vs. forced landing (*Aerospace Safety*, February 1971). This is always a meaty subject for our post mortems because everybody has an opinion on this one. Having already kicked this subject around for a few pages, let's now take a look at another pre-decision we should store away in our mental computer: At what point do we decide whether to abort or press on with our takeoff?

In hopes that you can learn something from others' misfortunes we

are going to brief some accidents that might have been prevented had there been preplanning or forethought. Most of the information is verbatim; some has been paraphrased but the facts are all there.

F-4D MAJOR

The takeoff roll and liftoff appeared to be normal. Immediately after becoming airborne, the copilot felt there was a lack of acceleration and a leveling of the aircraft a few feet above the ground. A check of the airspeed indicated 200 knots. When asked what was wrong the pilot said he didn't know. When advised the nose was gradually lowering toward the runway the pilot raised it. The aircraft touched down in a normal landing attitude, right of centerline after being airborne about 3500 feet. The drag chute was immediately deployed with the airspeed at 180 knots. The pilot transmitted that the throttles were at idle, barrier hook was down, and he was aborting the takeoff. Five seconds later he again stated he was aborting and was going into the barrier. The departure end BAK-12 barrier had been removed for maintenance (and was NOTAMed out). The aircraft passed the barrier still maintaining 180 knots. After departing the runway both main tires were blown.

The copilot observed the overrun behind him and obstacles ahead. He stated, "I'm ejecting," and pulled the face curtain. The ejection occurred with the aircraft in a slight nose-high attitude, airspeed 150 knots, at ground level. The seat attained an altitude of 200 feet and the parachute opened immediately after seat separation. The parachute was slipped away from the fireball and the pilot landed in some trees. The risers were released immediately and he fell about five feet. The survival kit restraining strap caught on the tree and stopped his fall. It was released and he fell about eight feet to the ground. He sustained superficial abrasions. The aircraft struck the ILS course array antennas, mounted on a three foot embankment, almost simultaneously with his ejection.

The external fuel tank exploded and the aircraft bounced across the ground. It went over a cliff and burst into flames. The pilot did not attempt ejection. *He probably did not recognize the hopelessness of the situation and could have been seeking a solution that would save the aircraft.*

Commentary: Why abort anyway? We wonder how many accidents we have had where there was nothing wrong with the bird except "it just didn't feel right"? This seems to be especially true in fighter aircraft. In this case, the rear seater realized the futility of staying with the machine and is around today. Another little factor, the barrier was NOTAMed inop—supervisory factor played a part in this one as the pilots were not specifically briefed on the barrier status. Had this fact been clear in his mind, the pilot might have taken a different course of action. Notice that the GIB ejected at ground level, 150 knots, with a slightly nose high attitude. Put yourself in the pilot's position and decide what you would have done. You probably haven't been there yet but someday you might be! !

F-100 DESTROYED

The F-100D was lead of a two ship flight departing on a day cross-country aircraft delivery mission. At about the 1500 foot line the nose wheel began to shimmy. At 145 knots the pilot decided the aircraft was not accelerating properly and would not become airborne, so he aborted.

The nose gear collapsed prior to the MA-1 barrier. The pitot boom passed under the MA-1 pendant and caused it to go over the drop tanks.

IT'S EASY ON MONDAY

The drop tanks were torn open and fuel spilled out. The aircraft was still moving forward with smoke and fire on both sides. When forward motion ceased the cockpit area was engulfed in flames. The elastic characteristics of the BAK-9 tape pulled the aircraft backwards approximately 100 feet and out of the flames. When it stopped, the flames again covered the cockpit area. The pilot contemplated waiting for the fire fighters but saw an area clear of fire and decided to evacuate the aircraft. He used his right hand to release the restraining straps while simultaneously raising the canopy electrically with his left hand. The canopy was slow in raising. When it was sufficiently high the pilot exited over the right side.

Commentary: This is another one where the pilot survived but the bird was destroyed. The investigators decided that the pilot was at fault in that he delayed his decision to abort. An interesting contributing factor—"unit personnel non-compliance with TOs resulted in an airspeed indicator malfunction. The pitot drain line ruptured due to trapped water and a hard freeze."

Do you depend entirely on the airspeed or do you use other gages to determine when to go or abort? Do you suspect pitot problems when all the engine gages are normal? Did the pilot compute his line speed? If so, this figure should have suggested an airspeed malfunction. If not, was it better for him to attempt a zoom and a boom or to take the action he did? It's easy now to look back and say, "Okay, the aircraft is going to be destroyed anyway, why ride it out?" Do you know the capabilities of your egress system well enough to determine where you can and cannot expect to have a successful low altitude ejection?

B-52 DESTROYED

The B-52D was the last aircraft in the second cell to launch. At 70 knots on the pilot's airspeed indicator the copilot's instrument read 85 knots but abort was not called for IAW the Dash-One. At 95 knots the copilot read 105 knots and the takeoff was aborted. There was a delay in deploying the drag chute and putting the air brakes at position six; this plus water on the runway (hydroplaning) prevented a stop on the runway. The pilot attempted to turn off the runway onto a taxiway prior to the end but the aircraft left the side of the overrun, broke up and was desroyed by fire/explosion. All six crewmembers escaped.

When the pilot attempted to turn into a taxiway, during the abort, the forward trucks went off the side of the overrun and collapsed. Structural break-up occurred. The gunner jettisoned his turret just as the "abandon aircraft" light came on. The seat belt and shoulder harness released normally. While removing the parachute, one side hung up momentarily on his LPU. More difficulty was experienced in unhooking the oxygen hose connector from its attachment. Most of these problems were due to panic. The escape rope was deployed and he started down. He lost his footing and slid 15 feet to the ground. He was not wearing flying gloves and sustained second degree friction burns to both hands.

The EWO attempted to manually unlock and discard his escape hatch. It would not release so he stood up and pushed it open, but could not find the escape rope. After holding the hatch open for the two navigators he slid down the side of the fuselage. The escape took about one minute. On ground impact the zippers on his quick don flying boots popped open. He then got away from the burning aircraft.

The navigator was delayed in exiting because his left foot was momentarily caught under the seat. The oxygen hose or interphone cord was across his chest and caused about a three-second delay in removing the parachute harness. He discarded his helmet and went out the EWO's hatch. He also was not wearing flying gloves. When he reached the ground, after sliding down the side of the aircraft, the zipper came open on his left boot. It took about 75 seconds for him to get out.

The radar-navigator released all restraints, discarded his parachute, and went to the EWO's hatch. Again no gloves. He didn't attempt to find the escape rope but slid down the side of the fuselage.

The copilot discarded his parachute and helmet and went out the EWO's hatch. He made no attempt to use his primary emergency exit. His escape took about 90 seconds.

The pilot attempted to contact the crewmembers on interphone after the aircraft stopped. When no answer was received he proceeded to the lower compartment. Finding it empty he returned upstairs and went out the EWO's hatch. He retained his helmet but not his gloves. It took about two minutes for him to get clear of the aircraft. All crewmembers were picked up by ground vehicles. A jet engine mechanic sustained minor injuries when the internal weapons exploded ten minutes after the accident. He was struck in the face by a fluorescent light bulb guard.

Commentary: Okay, so the pilot was slow in deciding to abort. Had the crew, I wonder, determined how much more distance was required to abort due to the wet runway? It is a factor, you know, and obviously a rather critical one. Egress from the burning aircraft was a total farce. It seems to us, in retrospect, that the mere desire for self preservation would compel an aircrew member to know thoroughly his egress procedures. I'll bet this crew knows how to do it now.

We could go on and on with abort briefs but these are rather representative of those that have occurred over the years. They follow a general pattern, and point to a lack of knowledge on the part of the aircrew of either their abort procedures, or their ejection system, or of their egress procedure. Granted, one of the most difficult tasks is to decide whether to press on when things don't feel right or to attempt to stop it on the runway with drag chue, brakes and barrier. One conclusion is that if you can't stop the machine on the runway, chances are there will be a major accident in which somebody is going to get hurt or killed, and the airplane may end up as a total loss. Beyond a certain point the pilot has little or no control over the end result.

We pay a lot of lip service to our egress training, but it's obvious that too many of our crews don't know how to get out of their aircraft in a hurry. Sure, there's a chance you will sometime find yourself in a panic situation, but if your procedures are sound, your actions will be automatic. Give yourself and all those with you a little extra margin of safety and *know* how far down the runway you can go and still stop on the concrete. Make sure everybody knows how to rapidly evacuate should this become necessary. The price for this information is free and the dividends high—your life for a few minutes of preplanning. ★

While this article refers specifically to the F-5, and the performance figures are for the F-5 only, the principles discussed apply in general to all high performance aircraft. Recommended reading for fighter pilots.

GLIDING

C. H. Vance
Senior Performance Engineer
Northrop Corp.

The Director of Aerospace Safety recently reported that, during the past 22 months, there were at least 22 cases in which USAF aircraft ran out of fuel and 13 cases where the engines flamed out because of fuel starvation due to a system malfunction. The majority of the fuel problems occurred during scheduled training and cross-country flights. Most of the pilots involved were experienced, and many were instructor pilots or flight leaders. It was interesting to note that many of the critical fuel situations became major accidents within sight of the intended landing field. The majority of these situations occurred during night navigation flights in adverse weather conditions or when circumnavigating severe weather and overextending the aircraft range. There were no F-5 aircraft involved.

An insufficient fuel situation is an emergency condition and should always be treated as such. It does not mean instant disaster. However, it does require some instant thinking and a thorough understanding of the aerodynamic aspects of power-off gliding flight. The purpose of this article is not to tell you how to avoid a minimum fuel situation but how to get the most from your aircraft and remaining fuel if the situation should arise.

Do you know how far the F-5A can glide? The effects of wind on glide airspeed? Can the glide distance be stretched by reducing the sink rate or increasing the angle of attack to reduce sink rate? Which is more critical in obtaining maximum glide distance, a higher airspeed or a minimum sink rate? How about the effects of gross weight or maneuvering flight? And most impor-

FLIGHT

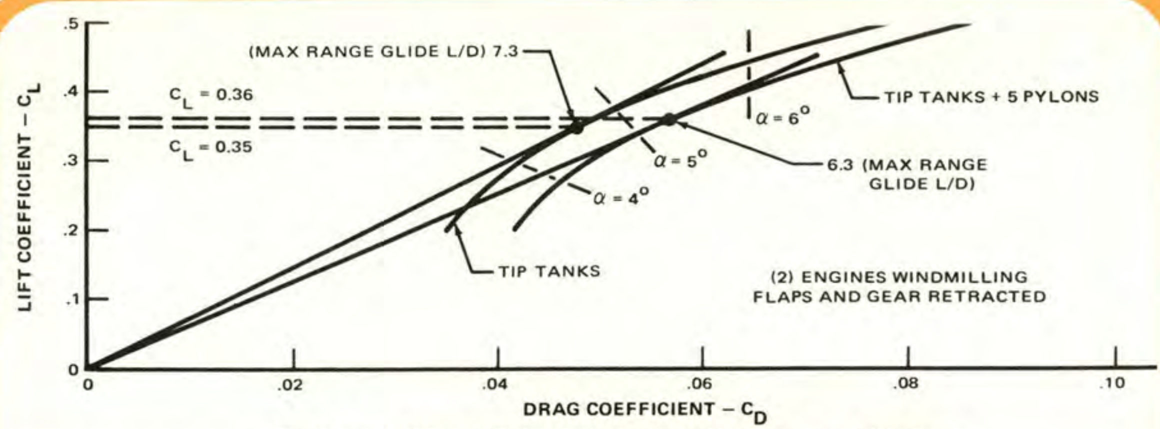


Figure 1. Use of Drag Polar for Determination of Maximum Range Glide Speed

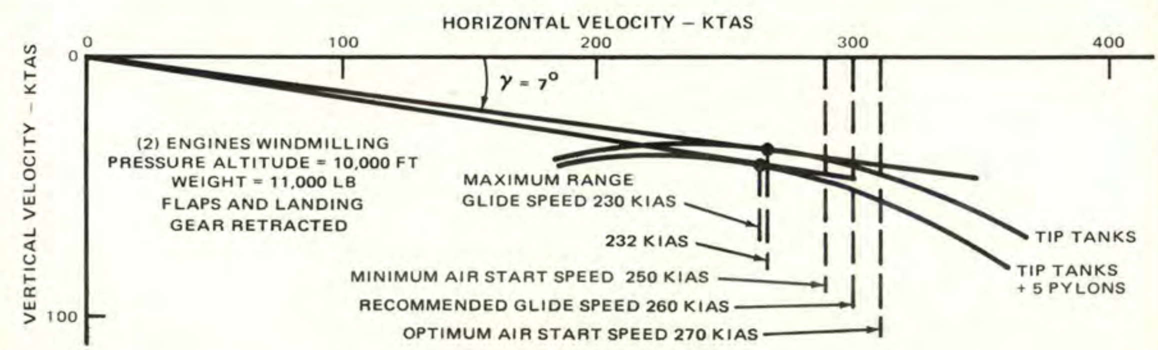


Figure 2. F-5A Glide Polar

tant, can a power-off flare and landing be safely negotiated if it becomes necessary?

The primary concern to the pilot is not how to achieve the least amount of sink rate but how to achieve the greatest horizontal glide distance with the least loss of altitude. If it is desired to restart the engines during the glide, consideration should be given to proper restart airspeed. A recommended glide airspeed of 260 KIAS and distance can be found in the flight manual.

Although the F-5A is a high-performance aircraft with a relatively low aspect ratio wing, the lift-over-drag maximum ratio of 9.2 to 1 with tip tanks only is comparable to that of other high-performance aircraft. What this means to the pilot is that the F-5A is capable of producing 9.2 pounds of lift for every pound of drag, or the F-5A is capable of

GLIDING FLIGHT

gliding with zero thrust 9.2 miles for each mile of altitude. However, the actual power-off glide performance that can be obtained with two windmilling engines is about 7.0 to 1 at 260 KIAS. This is due to the engine windmilling drag and the necessity to fly "off optimum" to satisfy the engine restart speed requirements. This is reflected in the flight manual as a glide ratio of 1.2 nautical miles for each 1000 feet of altitude.

Flying the maximum glide ratio of 7.3 to 1 (Fig. 1) would obtain the greatest horizontal glide distance with the least loss of altitude; not considering the engine restart requirements, maximum range glide speed is determined by the use of the equation:

$$V_{glide} = \sqrt{\frac{295 \quad (W/S)}{\sigma \quad C_{L_{glide}}}} \quad \text{(KTAS)}$$

where W is the aircraft weight and S is the reference wing area of 170 square feet. The factor σ is relative ambient density, which is available from the flight manual. Conversion to KIAS is made with the aid of data in the TO 1F-5A-1 appendix. A study of the F-5A hodograph or glide polar (Fig. 2) indicates the airspeed that produces the minimum glide angle, and the maximum horizontal glide distance is the airspeed that corresponds to the L/D_{max} angle of attack. This represents a glide angle of nearly 7° and an airspeed of about 232 KIAS at a gross weight of 11,000 pounds. However, the best glide speed is below the minimum engine airstart speed (250 KIAS) shown in the F-5A flight manual. Optimum engine airstart speed is 270 KIAS. The recommended 260 KIAS glide speed is a compromise between the minimum and the optimum airstart speed. If maximum glide distance is desired, the 232 IAS (tip tanks only) glide speed would have to be used.

The aircraft gross weight will have no effect on the glide distance since the glide ratio is based only on the relationship of the coefficient of lift-over-drag ratio of the aircraft. It is this L/D ratio that determines the distance an aircraft can glide. Any two airplanes of the same L/D_{max} values have the same glide ratios, regardless of their gross weight. However, an increase in gross weight will reduce the time to descend by virtue of the increased glide speed.

In comparing the gliding characteristics of an F-5A grossing 11,000 pounds with a lightweight 10,000-pound F-5A, the additional lift required by the heavier aircraft is not obtained by increasing the angle of attack, but by increasing the glide speed by approximately one knot for each 100 pounds of fuel remaining. The heavier aircraft has a faster glide airspeed and descends at a higher rate. However, the glide angle and horizontal glide distance will remain identical. Only the time the aircraft will glide varies; consequently, the heavier aircraft will use less fuel during a maximum range descent than the lighter aircraft if the engines are running. The best glide speed for tip tanks plus five pylons is 230 KIAS (weight = 11,000 pounds) which is two knots slower than tip tanks only. The additional drag of the pylons puts the F-5A at a higher lift coefficient (0.36 versus 0.35) which reduces the glide speed and the L/D (6.3 versus 7.3). Hence, the glide distance per thousand feet of altitude is 1.2 nautical miles for tip tanks and 1.0 nautical mile for tip tanks plus five pylons.

A no-wind power-off glide from 40,000 feet with an airspeed of 260 KIAS will cover a distance of 47 nautical miles in about 8.3 minutes. The rate of sink will be about 4900 feet per minute. Do not attempt to fly a minimum rate of descent glide if distance is critical. Even though the rate of descent can be minimized by slowing to 205 KIAS, the glide angle is increased and the slower airspeed results in a decrease in horizontal glide distance of nearly 5.0 per cent.

The gliding performance is also affected by atmospheric winds, and the wind should be considered any time its velocity is a substantial percentage of the aircraft gliding airspeed. The airspeeds mentioned earlier, associated with various glide criteria, were for a no-wind condition. It should be noted that the airspeed should be increased with a headwind and decreased with a tailwind by two knots for every 10 knots of wind. This information is not included in the flight manual, since glide airspeed is rather insensitive to wind and the variation in glide range with wind is very small.

There is always a tendency to attempt to stretch a glide by increasing the angle of attack hoping to decrease the glide angle. A momentary decrease in the rate of descent is a misconception of stretching a glide. If the aircraft is gliding at its minimum glide angle and the angle of attack is increased by slowing down, the glide angle will increase, thereby decreasing the horizontal glide distance. This fact can be appreciated by studying Figure 2. It should be noted that an aircraft cannot glide at any angle shallower than its minimum angle of glide. There is another point to keep in mind: rolling into a gliding turn increases the rate of sink, due to the rapid increase in drag as more lift is developed during the bank.

The windmilling engine glide slope of 7° is double that to which you are accustomed during landing with power and is much more difficult to judge. A great amount of drag is quickly introduced during the low-speed flare maneuver, as the wing of a gliding high-performance aircraft does not decrease the rate of descent when the angle of attack is increased beyond that corresponding to minimum sink rate. It actually increases the rate of sink during the flare maneuver. Now add the probability of loss of hydraulic power to the flight controls during the flare, and you will understand the basic reasons why deadstick landings are not recommended in the F-5A aircraft.

The windmilling engine hydraulic output has proved adequate for power-off glides to restart altitudes or to an area for safe ejection but not sufficient for safe landings under other than ideal conditions. Four high-performance aircraft with similar hydraulic and flight control systems were deadstick landed at Edwards AFB by experienced test pilots under ideal conditions. Two were preplanned flight test evaluations and two were inadvertent. The low flight control response rates available from the windmilling engine-powered hydraulic systems and the rapid drainage of hydraulic power through use of the flight controls preclude safe deadstick landings in an operational environment. The flight crew should eject rather than attempt a deadstick landing.

If complete fuel exhaustion is imminent and a suitable landing field is within gliding distance, you may elect to declare an emergency; shut down one engine, reduce the other to idle before the fuel level reaches a minimum of 200 pounds remaining and establish an optimum glide toward a high key position. Restart the windmilling engine at high key, and complete a simulated single-engine pattern landing. Shutting down one engine and operating the remaining engine at idle as a precautionary measure will increase the glide distance by about 10 per cent as compared to both engines windmilling. An idling engine will consume about 40 pounds of fuel during a descent from 30,000 feet. Please keep in mind that during a minimum fuel situation, a moderate climb or dive may uncover the fuel boost pump inlets and cause the engine to flame out due to air entering the fuel lines. Flying a level or slightly nose high attitude will delay or prevent uncovering of the inlets and assure maximum utilization of the trapped fuel. Air entering the fuel lines during single-engine operation can only be purged by the engine-driven fuel pump. The fuel boost pump is ac driven and inoperative under this condition. The air must be purged in order to obtain a restart. There is another point to consider. If the pilot decides to shut down both engines, he must conserve the aircraft battery for restart ignition. Shutting down both engines also means the loss of all communications, navigation, and ac-powered equipment. However, fuel quantity may be monitored by using the static inverter ac power through use of the fuel and oxygen gage test quantity check switch.

You should also consider the accuracy of the fuel flow and fuel quantity indicators. The fuel flow indicator is supposed to be accurate to ± 50 pounds per hour; the fuel quantity indicator, to ± 25 pounds.

An insufficient fuel situation is an emergency condition and should always be treated as such. Deliberate preflight planning to extend the range of your aircraft through this system is in violation of AFM 60-16 and foolhardy. ★

(Northrop F-5 Service News)

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FOUR MINUTES

Friends, if you will give me approximately four minutes of your time, I will give you a few interesting facts about the birth and life of Tech Data. This isn't going to be a lecture, it's just a short item designed to give you a little better insight into the reason behind Tech Data.

When the manufacturers sell us a new airplane they sell us the books that help us keep it flying. They spend a lot of time and money thinking ahead to what kind of problems we can expect to run into and how to fix what goes wrong. All this thinking takes the final form of Tech Data. It doesn't stop there, that's only the beginning. Let's take the inspection work cards for example.

Now, those card items weren't put there just because some weenie behind a desk thought it would be a good idea for us to inspect something. Other than those items that have obvious safety of flight potential such as fuel leaks, the items listed in the cards were included only after thousands of your AFTO Forms 349 were made out and sent to AFLC for analysis. When the pre-determined number of forms has been submitted they finally get the idea that this particular Dohinky is breaking pretty often. Now, they figure the best way to keep a good Dohinky in each airplane is to inspect it often enough to detect a possible failure just before it happens. This is done by putting it in the cards.

This tells us three things: (1) The AFTO Forms 349 that you make out are very important because they, when added to all the rest, total many thousand from which a good analysis can be made; (2) Even though you have never seen this particular Dohinky go bad in all your experience, it is evident that some of them are going bad or they wouldn't have been put in the cards to begin with; (3) The cards mature along with the airplane. As the airplane gets older, we find more problems and the cards change to include the big ones.

But how about checklists? They just slow you down, right? Well, let's see. Take a Bomb Disposal troop; do you know how his checklist is written? Generally it is from the mistakes of others and in many cases those mistakes were fatal. When they disarm a bomb there is a man on headset communication with the guy who is risking his life. That is so the guy can tell him everything he is doing, and I mean EVERYTHING down to the smallest detail. Why? Because if something goes wrong, someone will know exactly where the mistake was made and he can spread the word to the other troops. Good thinking, right?

We have the same set up in aircraft maintenance. Our headset communication is the checklist. It was made with a lot of foresight and common sense and has changed for the better through the mistakes of the other guy. The danger is not as obvious as with the Bomb Disposal troop but it is still there. So, does the checklist really slow you down? Not if you're used to working with it DAILY. NOT using it could slow you PERMANENTLY. Don't be the cause of the next change to the checklist, unless you do it with an AFTO Form 22. That's a small piece of paper for you to use to show the Tech Order writers that they don't have all the smarts. If the checklist is wrong or confusing, you have a means of getting it changed.

But do I need a TO when I do a particular job every day and sometimes two or three times a day? Let me answer that question with a question. Why shouldn't you use it? Don't take it as an insult to your intelligence. Remember, the pilot who flies that airplane every day uses his checklist religiously and all he has to do is keep the damn thing straight and level. Look at it another way, EVERYONE all the way up to the Secretary of the Air Force is behind you when you go by the book, but you're all alone when you don't. Oh, you might get lots of sympathy from your best buddy, but that doesn't help much when you're in trouble.

Remember, the "book" is an accumulation of the ideas, experience, and mistakes of every man in maintenance. We made the book through our AFTO Forms 349, AFTO Forms 22, and unfortunately, our mistakes. Why should you go by the book? Because YOU wrote it, YOU changed it and updated it, and YOU can really be proud of the work YOU have done. ★

WORKING OUR WAY DOWN

Anchard F. Zeller, PhD, Directorate of Aerospace Safety

The Air Force in 1970 set a safety record that is going to be a hard act to follow. Hardware savings alone were impressive, but more important was the remarkable decrease in lives lost. There were 75 fatal accidents in the year just past, in contrast with 116 in 1969 and 110 in 1960. The marked decrease in 1970 would suggest that a new downward trend may have been initiated, or at least that a lower pleateau may be anticipated.

Pilot fatalities reflect this same improvement. In 1969 there were 389 fatalities in aircraft accidents, including 139 pilots. It is disturbing to note that as far back as 1960 there were 275 fatalities, 125 of which were pilots. These figures emphasize the relatively static nature of the accident record in the 10 years prior to 1970. They also serve to emphasize the remarkable record obtained in 1970, when there were 92 pilot fatalities, the lowest number recorded in a single year in the history of the Air Force as a separate service. Through the first 11 months of 1970, an equally impressive record obtained in the total number of lives lost in Air Force aircraft. This changed suddenly with two accidents which added 123 fatalities. Such occurrences emphasize the rapidity with which good records can dissolve and the need for constant vigilance.

Note that the discussion has been couched in terms of numbers rather than rates. The rate pattern is comparable, but it is numbers which more vividly express the real magnitude of the problem and which emphasize clearly how far removed a good record is from a perfect record.

How gratifying it would be, if we could assume that the 1970 record was actually the initiation of another major downward trend and that the 1971 record would result in equally impressive gains. Before arriving at such an optimistic, rose-colored conclusion, however, an attempt should be made to examine not only the numerical trends, but also some of the other variables which may have been associated with the 1970 experience and which may have equal but different results in 1971.

I am sure all of you are acquainted with trend analysis as applied to everything from business statistics and stock market analysis to accident statistics.

There are several approaches, but regardless of the method used, there is always one basic problem: the findings are presented in terms of overall pictures and patterns, and seldom attempt to predict the outcome for an individual in a specific instance.

Predicting individual performance, however, is highly desirable because it is individuals who have accidents, it is individuals who destroy aircraft, it is individuals who are killed. Although the 1970 statistics reflect a desirable trend in the number of accidents directly attributable to, for example, the pilot operator, collectively, human failure is still the most frequent cause factor in accidents and is increasing in relative importance. It would seem, therefore, that the most profitable area for exploration would be in evaluating the role which the individual has played in past accidents as well as projecting the kinds of human pressures which can be anticipated in the future. From the integration of these methods, some reasonable projection can be made of accidents as they will occur in 1971—with perhaps some indication of the kinds of individuals and accidents which will require particular attention.

Although hardware is not the specific area under discussion, the hardware problems of 1971 will no doubt resemble those of 1970. No new aircraft will be introduced. The usual problems that come with new aircraft designs have already been experienced with the F-111 and C-5. It would appear that there should be no aggravation of these problems within the next year, and presumably, with the passage of time, the problems which have been identified will be corrected. On the other hand, there are aging airframes, but none which have demonstrated a pattern of deterioration capable of producing a rash of materiel failures.

In the human areas, however, there are important changes. We know, for example, that the first hours of operational flying are the most hazardous in a pilot's life. In the past we have attempted to reduce this high accident potential by modifying and increasing training hours. However, a program is now under way to decrease the number of hours allocated to primary pilot training from 240 to 208 or, in some instances, to 188. The Air Training Command has embarked upon this program in a systematic, carefully controlled way with the conviction that the resultant product will be as capable as were pilots in the past who were given more hours of training. Time will tell. Certainly the relation between experience and accidents is well documented. When more pilots with less training come into the system, the effect on the accident record could be quite deleterious. In this regard, USAF planners project that the majority of pilots in the Air Force five years from now are either presently in training or will have been trained during that period.

This implies a requirement for improved supervision. While individuals may be trained to fly in fewer hours, their limited experience in the Air Force system will place a heavier requirement upon supervisors to assure that these neophyte airmen are used to best advantage.

Past experience, including 1970, indicates that in the history of flying there has been little change in human limitations. Many of the problems of the past can be expected to remain in 1971. Although accidents were reduced, in both number and rate, in 1970, and although accidents attributed primarily to pilot error were also reduced in number, the trend for a greater proportion of accidents to be attributed to overall human error continues. Collectively, accidents attributable to human error remain the biggest single factor in losses sustained. Pilots commit errors because of preoccupation with other duties, inadequate understanding of the aircraft systems, calculated risks that were not calculated at all, inadequate knowledge of emergency procedures, inadequate knowledge of survival equipment, and the inability to make up their minds as to a course of action. Infrequent, but still present year in and year out, are violations which, while so hard to understand, still occur. Crew station design misconceptions continue to place excessive demands on pilots. Maintenance personnel continue to omit, misalign, inappropriately torque equipment and perform faulty service such as filling reciprocating aircraft with jet fuel.

It is no secret that within the past several years there has been growing public concern over our involvement in Southeast Asia. Questions have been raised not only by liberal students, but also by many respected members of the Congress and other concerned citizens. This increased questioning is, in turn, a reflection of a major social revolution which is taking place in the cultural group from which the members of the armed forces are drawn. The proportion of younger people in our population is rapidly increasing, and the technical age in which this group has been reared has focused their attention upon new problems, resulting in a cultural outlook different from that of their elders. It is necessary to realize that young military members are a reflection of the culture from which they are drawn.

In popular wars of the past, recruiting offices were swamped with volunteers ready to preserve their ideologies and save their countries. Today, non-rated quotas are largely filled either by the draft or fear of it, and the number of individuals actively engaged in resisting this is only another indication of the change in cultural outlook. When national pride and national protection are at stake, the soldier is a symbol of all that is good, heroic, and patriotic. When an unpopular (and, in the minds of many, meaningless) conflict is under way, the soldier becomes the object of censure, not praise. It is only natural that the individuals who are part of the armed forces feel this pressure. For the young person who already questions older values, whose sympathies are basically with his civilian counterparts, who was forced into the service against his will (or volunteered to keep from being forced into something he considers worse), it is difficult to maintain an esprit de corps.

When some campuses are discontinuing or actively considering discontinuing ROTC programs, when academic credit for ROTC programs is withdrawn, and when ROTC graduations cannot be conducted without fear of an open demonstration, it is not surprising that many young men have doubts about their choice when they embark upon a military career. Not only does this background censure affect the young; it also affects their elders. A man who has given the greater part of the best productive years of his life to a service of which he is proud, and who has been engaged for the latter part of this service in what is the culmination of any military service, active combat, feels that he deserves the acceptance of his fellow countrymen if not their applause. When he finds that he is not universally admired, but may actually be censured in some circles, it is quite natural that he begin to experience some doubts about his own value system.

Some philosophically oriented professional military men can remember times of feast and times of famine, in terms of public approval. For them, the current phase is merely one to be lived through and one which will undoubtedly be replaced by happier times. For every one of these, however, there are many who feel only the censure. So we arrive at the simple question: What is the worth of a soldier—both in the minds of those whom he represents and in his own mind? Regardless of the answer at which each arrives, the very fact that the problem is presented, so that it needs consideration, is in itself a detriment to safe accomplishment of precision operations.

This brings us to the heart of the matter. What actions in 1971 can result in a continuation of the fine safety record established in 1970?

New times, new missions, new requirements, new hardware, all require modifications in operational aproach and a consequent shift in safety programs. Without abandoning the other time-honored management tools, greater emphasis must be place upon individual attitudes and motivations if improved safety records are to be achieved. That the climate in which the military systems operate has undergone modification is obvious. The wise commander and his safety specialists will modify their approach to accident prevention to reflect these changes. It should be noted, however, that the very changes which require consideration also affect those who must give them consideration. This paradoxical situation means that the individual must not only recognize the symptoms reflecting a need for change but must also be able to maintain a detached viewpoint so that he can counteract the problems within himself.

These changes will not only affect aircrews, but maintenance personnel, armament crews, other support personnel, managers, directors, and safety officers as well. Fortunately, one of the major advantages which the human has over other creatures is that he is able to benefit from rational analysis. We must be aware that the changes taking place will have a significant effect on safety. With this awareness and analysis of the implications, added emphasis can be placed upon professional operation and self-discipline. Moreover, added efforts must be made to assure that standard procedures and technical orders are followed, that individuals are encouraged—even forced—to accomplish assigned tasks in an optimum manner. Those responsible for assuring that this is done must be constantly alert to the dangers of complacency, anxiety, diminished feeling of worth, and all of the other emotional attitudes associated with the discontinuance of a once highly viable and ego-satisfying project. If this is done, the dire predictions for the future can perhaps be obviated. If this is not done, the expected will probably happen and safety will suffer. ★

THE I.P.I.S. APPROACH

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

AREA NAVIGATION

Q What is area navigation?

A Area navigation (RNAV) is a method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals (such as VOR/DME, TACAN) or within the limits of self-contained navigation system capabilities independent of ground facilities.

Q What are some of the major advantages of area navigation?

A There are four principle operational features which offer many advantages to users equipped with area navigation equipment: (1) direct flight (or nearly so) from point of departure to destination; (2) flight in terminal areas to allow arrivals and departures over multiple prescribed flight paths; (3) instrument approaches within certain limits of accuracy to airports with no local landing aids; and (4) vertical climb and descent guidance while enroute and for making approaches. Depending on the system, positive course guidance is displayed to the pilot in one of three methods: (1) symbolically such as on the course deviation indicator and bearing pointer; (2) pictorially on a map display; and (3) as a digital readout display.

Q Do any Air Force aircraft have area navigation capability?

A Several Air Force aircraft have inertial navigation systems with area navigation potential. However, according to the Federal Aviation Administration, no Air Force aircraft has been certified by them for area navigation. Furthermore, no Air Force aircraft has been equipped with the area navigation equipment that is now available to civil aviation. If you desire more information, the IPIS has published "Summary of Area Navigation Systems and Proposed Usage in the U. S. Airspace System," which is yours for the asking.

RECOMMENDED ALTITUDE

Q Most high altitude approach procedures depict a recommended altitude at the initial approach fix (IAF). If cleared for an approach which has a recommended altitude at the IAF, do I have to cross the IAF at this altitude or could I descend prior to the IAF?

A In discussing this with FAA we find that normally ATC controllers expect you to cross the IAF at or above the recommended altitude. The IPIS recommends the depicted altitude be the minimum altitude crossing the IAF unless a lower altitude is assigned by ATC.

OFFSET ILS

Q I've noticed several offset ILS depictions in both high and low altitude instrument approach procedures, e.g., Carswell AFB. Are offset ILS's correct and how much turn will I have to make at decision height (DH) in order to align myself with the runway? Additionally, are minimums higher for an offset ILS?

A Where a unique operational requirement indicates a need for an offset course, it may be approved provided the course intersects the runway centerline at a point 1100 to 1200 feet *toward* the runway threshold from the DH point on the glide slope and the *angular divergence of the course does not exceed three (3) degrees.* The minimums are not affected.

POINTS TO PONDER

AFM 51-37, page 11-14, states that the *initial* outbound leg for holding shall be flown *for* the appropriate time depending upon altitude. FLIP states that the first outbound leg after *initial* holding fix passage *will not exceed* one minute at or below 14,000 feet and one and one-half minutes above 14,000 feet. The *revised* AFM 51-37 has been changed to correspond with FLIP. ★

REX RILEY'S CROSS COUNTRY NOTES

REX'S COMMENTS

These two letters from our troops in the field reflect the sub-standard performance by some transient facilities. Letters such as these highlight a particular base and it is put on "Consider for Elimination" if we have other derogatory comments. We hope you fellows who encounter such problems will let us know—we'll take action if the evidence indicates a poor transient facility.

Dear Rex

In our modern aerospace force, the day of the "propeller" aviator seems to be drawing to a close. We are receiving some unwanted assistance in this direction from unusual areas. Let me relate a recent experience to you in hopes that it may stimulate an article or even some follow-up checking by you on the subject.

On the 8th and 9th of December, I made scheduled stops at ____ AFB in my trusty T-29. On 8 December I could hardly believe my eyes when the fuel truck drove up with "JP-4" painted all over it. That set the stage for the hour and a half servicing stop. The truck driver stated that he was told it (my bird) was a T-39. I shudder to think what might have happened if it had been dark and my flight engineer had not been alert. Next came the oil gambit. I was told that SAC had taken their oil trucks out of service since they were no longer needed. The oil was delivered in five-gallon cans. Transient Alert men did not stay to help the engineer pour the oil and hold the funnel. I had to help him with this when I returned from Base Operations. Next I tried to find a power unit. I couldn't even find anyone on the ramp from Transient Services. Since the Code 7 I had on board was getting hot on the ramp, I went to the Base Operations Officer for assistance. He was nowhere to be found and the dispatcher didn't know where he was. I then walked over to the Transient Services building and found four men drinking coffee and smoking. I, not too respectfully, requested a power unit as a personal favor and was finally launched by a grumpy civilian.

Being a little wiser from my first experience, I stopped again at the "Friendly Air Patch" and was subjected to another Chinese Fire Drill on 9 December. For a base that has no further need for an oil truck I was surprised at the "recip" activity. There were a C-118, a C-119, a C-124, and three T-29s on the ramp. This time I managed to get fuel OK, but the oil gambit came back to haunt me. Again oil was delivered to me in five-gallon cans and you won't believe the funnel! They could not find the funnel I had used on the 8th. (I didn't have it.) The only substitute item was a cone-shaped rubber road construction marker with the end cut off. Then I went looking for a power unit again. The crew of the C-118, both colonels, said they had been waiting for a fire guard for nearly an hour. So after dispatching my navigator in search of a power unit, the engineer and I went over and removed the ramp from the rear service door, stood fire guard, and walked the C-118 out of the parking area. Finally I received the necessary support, jumped into my bird and disappeared into the east (never to return again, I hope).

I'm afraid that ____ is one base looking for an accident to happen. I sincerely hope that you can help the fading recip jocks from becoming extinct before their appointed time. We really want to keep 'em flying, especially with the crowd we normally have on board. Maybe the next time you feel a trip coming on, you'll grab a T-29 and a funnel and try out a few spots.

One last question. Has anyone ever toyed with the idea of putting a different grounding plug and receptacle on recips and AVGAS trucks? That way you could not properly ground a JP-4 truck to a prop bird, even in the dark. It wouldn't be foolproof, but it would make it harder on "Murphy."

Thank you for all the good work in the past, and I wish you a happy and safe 1971.

An Unhappy Traveler

Dear Rex

On 4 Dec 70 I arrived at ____ AFB at 1930 local in an A-7D. Approach aids, runway lighting, etc., were excellent and I was promptly met by a Follow Me truck and parked. I deplaned, personally bled my accumulators, checked the oil, and filled out the T.A. debrief sheet requesting only JP-4. No special maintenance other than a normal preflight for a 1000 hours departure the next day.

Transportation was available to an excellent BOQ. Excellent dining facilities were available at the Club. Breakfast the next morning at the flight line snack bar was excellent.

I changed my departure time to 1140 local and arrived at Base Operations at 1000 for flight planning. Weather briefing and flight planning facilities were excellent. After completing flight preparation, I handed my DD-175 to the dispatcher who said T.A. would be notified of my departure. He said they were busy and that there might be some delay but to catch a crew bus to my aircraft (one half mile from Operations) and "grab" a T.A. truck, which should be on the line.

After waiting approximately 12 minutes for transportation, I was driven to my aircraft. I got off the bus, huddled under the wing of my A-7D (temperature 35° and rain) to await T.A. They didn't show! After 30 minutes of this I, along with two other officers in an F-4D who suffered the same fate, walked back (one half mile) to Operations in the rain.

All the operations personnel thought our plight was extremely humorous. The A.O. was as helpful as he could be, but his effectiveness was limited by the attitude and capabilities of T.A.

When I finally departed, one hour and 30 minutes late, I was also cold, wet, and disappointed in the continuing decline of proper military operations in the USAF.

As a bit of additional information, I would like to add that my aircraft forms were not complete, the aircraft was not preflighted (neither was the F-4), and at least part of the T.A. crew was in the snack bar after we walked in from the flight line.

I am writing this letter not so much as a complaint but as a documentation in the hopes that similar situations at ____ can be prevented in the future. I honestly feel it is a valid Flying Safety hazard to start a flight under these conditions.

An A-7D Pilot ★

THE

REX RILEY *Transient Services Award*

LORING AFB	Limestone, Me.
McCLELLAN AFB	Sacramento, Calif.
MAXWELL AFB	Montgomery, Ala.
HAMILTON AFB	Ignacio, Calif.
SCOTT AFB	Belleville, Ill.
RAMEY AFB	Puerto Rico
McCHORD AFB	Tacoma, Wash.
MYRTLE BEACH AFB	Myrtle Beach, S.C.
EGLIN AFB	Valparaiso, Fla.
FORBES AFB	Topeka, Kans.
MATHER AFB	Sacramento, Calif.
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, Tex.
MARCH AFB	Riverside, Calif.
GRISSOM AFB	Peru, Ind.
PERRIN AFB	Sherman, Tex.
CANNON AFB	Clovis, N.M.
LUKE AFB	Phoenix, Ariz.
RANDOLPH AFB	San Antonio, Tex.
ROBINS AFB	Warner Robins, Ga.
TINKER AFB	Oklahoma City, Okla.
HILL AFB	Ogden, Utah
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, N.C.
ENGLAND AFB	Alexandria, La.
MISAWA AB	Japan
KADENA AB	Okinawa
ELMENDORF AFB	Alaska
PETERSON FIELD	Colorado Springs, Colo.
RAMSTEIN AB	Germany
SHAW AFB	Sumter, S.C.
LITTLE ROCK AFB	Jacksonville, Ark.
TORREJON AB	Spain
TYNDALL AFB	Panama City, Fla.
OFFUTT AFB	Omaha, Nebr.
ITAZUKE AB	Japan
McCONNELL AFB	Wichita, Kans.
NORTON AFB	San Bernardino, Calif.
BARKSDALE AFB	Shreveport, La.
HOMESTEAD AFB	Homestead, Fla.
CHANUTE AFB	Rantoul, Ill.
KIRTLAND AFB	Albuquerque, N.M.

OPS *topics*

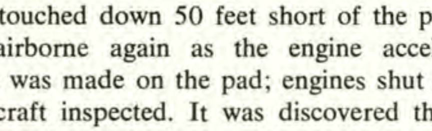
OOPS AND . . .

A CH-3 student was practicing a simulated single engine, minimum roll landing. On short final, the rotor rpm was dropped to 96 percent. The instructor pilot called this to the student's attention while simultaneously advancing the speed selector on the simulated failed engine and blocking the collective pitch to prevent further increase until rotor rpm was regained. The helicopter touched down 50 feet short of the pad but became airborne again as the engine accelerated. A landing was made on the pad; engines shut down, and the aircraft inspected. It was discovered that the tail had dragged and the intermediate gear box fairing was damaged.

Later the same day another CH-3 student was making an auxiliary servo-off approach. The final approach speed was slightly high, and at the last minute the student flared abruptly to slow the aircraft. The instructor pilot assumed control but his action was too late to prevent the tail from striking the ground. Again the intermediate gear box fairing sustained damage.

OOPS AGAIN!

Maj Gerald A. Jones
Directorate of Aerospace Safety



CONTROLLERS CITED

Air Force Communications Service controllers were credited with 85 "saves" during 1970. Of the total, 67 were military and 18 civilian aircraft with 170 crewmembers and passengers aboard.

A "save" is defined as "the safe recovery of an imperiled aircraft through extraordinary and timely application of air traffic control knowledge, techniques and procedures where there is reasonable doubt that the aircraft could have been recovered without such action."

Our AFCS controllers continue to be one of the pilots' best friends. Well Done!

LAISSEZ FAIRE SUPERVISION

Occasionally, an accident report will reveal that supervision within a flying unit is far from uniform. Interest tends to focus on the primary mission, sometimes at the expense of the support mission. Supervisors must be alert for the kinds of complacency revealed in this extract from an investigation of a T-33 landing accident:

Board Member: "In your opinion what have we learned from this accident?"

Officer-in-Charge of T-33 Training: "Well, I think in a lot of accidents you learn maybe that you're too complacent in places and assume too much about what people ought to know and I have also learned that a greater effort has to be made or emphasized by the bosses to make time available for flying [the T-33] for training as well as [on target missions]. I think people don't have bull sessions about flying the T-bird anymore but they do about the [interceptor.]"

This supervisor's training program had consisted of periodically handing out some reading matter.

When was the last time you, the commander, took a cold, hard look at the training program of your unit's support aircraft? And at your intermediate level supervisors?

Maj David H. Hook, Canadian Forces
Directorate of Aerospace Safety

DELAYED STOPOVER?

Ever been on an IFR stopover flight and had to cool it on the ground waiting for departure clearance? And then been told that Center didn't even have your flight plan? It happens every day to someone, but it's probably because he didn't comply with paragraph 3-3, AFR 60-16. Here's the way the system is supposed to work: Your flight plan goes to each stopover tie-in flight service station. They hold it (as advertised) until they receive your ETD. Then they call it in to Center and presto! No problem.

Next time you start to steam while waiting for clearance for your *NOW* ETD, remember that it takes a while for the word to go through channels to Center and back to you.

The solution is really simple: Next time, as you approach your stopover point, call the tie-in FSS listed in the FLIP IFR Supplement on 255.4 Mhz and give them your ETD. Your clearance will be ready when you are.

(Salt Lake City FSS)

ANYTHING ELSE, CHIEF?

Controller: **"Air Force 123, say altitude."**

Pilot: **"Altitude."**

Controller: **"Air Force 123, say altitude, please."**

Pilot: **"Altitude."**

Controller: **"Air Force 123, say IFR cancelled."**

Pilot: **"Air Force 123 passing 14 thousand."**

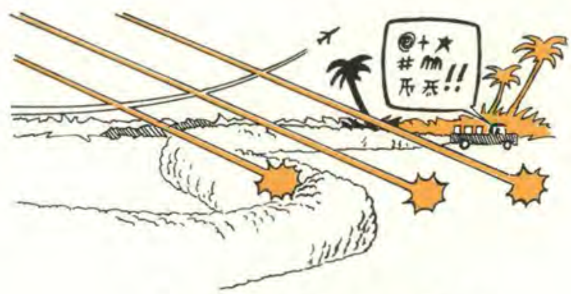
ANOTHER FORM OF FOD

The F-4 pilot was on an upgrading mission, with an instructor in the back seat. They had just begun evasive practice maneuvers, involving slight negative G push-overs followed by positive G pulls when the aft canopy initiator fired. Best guess is that the IFR Supplement drifted out of its case during negative G and wedged between the guillotine hose and the aft canopy initiator linkage, then applied sufficient force to the linkage during positive G to fire the initiator. Grey paint on the Supplement matched missing paint from the initiator linkage arm. The IP bought this one—but in his defense, the back seat book box in the F-4 just isn't big enough to hold all the stuff we have to carry. Local mod design to provide more storage space was already underway when this accident occurred. Other units would do well to examine their own cockpit security, and if a storage problem presents similar hazards, submit their suggestions to the major command for approval.

FLIP CHANGES

Effective with the 4 February 1971 issue of the US Enroute Low Altitude Charts, Chart L-23 was expanded Northward to provide a better presentation of the Muskegon-Detroit area. Also two new Area Charts were added to Chart A-1/2. These charts provide improved presentations of the Washington D.C. and the Denver-Colorado Springs areas which had previously been shown on various charts with different scales.

Autovon and commercial telephone numbers are no longer published in the Aerodrome Remarks sections of the US IFR and VFR Supplements.



BAD TRADE

There are darned few instances of an airplane coming out on top in a contest with a tree, and the pilot of an A-37 recently proved the point. The target was the north end of a truck headed south, on an open road through jungle with foliage up to 150 feet high. The target was "hot" and the pilot rolled in with an intentional overshoot, planning a double jink on final to avoid the ground fire on his low-angle napalm pass. His problems were complicated by a late clearance from the FAC, providing a momentary distraction while he armed his ordnance. Pulling off target, he took out pieces of jungle with his right wingtip and both external fuel tanks. A controllability check at altitude provided some more bad news, so the pilot made a controlled ejection and was picked up in short order by a chopper. That's a relatively happy ending, but there's one bird that won't hit any more trucks. Pressing to improve accuracy is usually a bad bet—and a truck for a fighter aircraft is a really bad trade. Besides—he missed the truck.

We don't know if anyone ever said it in just these words, but every pilot knows the value of air beneath him and runway ahead of him. Some, however, must not have got the whole message because from 1965 through 1970, 121 of our birds struck trees, poles or wires while flying close to the ground. Trees were the favorite target, followed by wires and a couple of poles. Oh, yes, there was one tower and that was bad news; it cost us an airplane.

Our aircraft are pretty well put together, or we're lucky, because nearly two-thirds received less than minor damage. Eighteen were dented to the extent that they were classified as minor damage, 10 were substantially damaged (that means they were pretty well beat up) and 20 were destroyed.

Fighters (for convenience we included recce versions, the T-33, T-37, T-38 and A-1 in this category) accounted for more than half with helicopters adding 22 to the total. Thirteen small aircraft, O-1, U-10, etc., got into the act, seven C-130s were involved, a B-57 and even a T-29.

Most of these collisions occurred during weapons deliveries, but don't jump to the conclusion that our troops in SEA were the culprits for pressing too much. Only 34 took place in combat weapons deliveries.

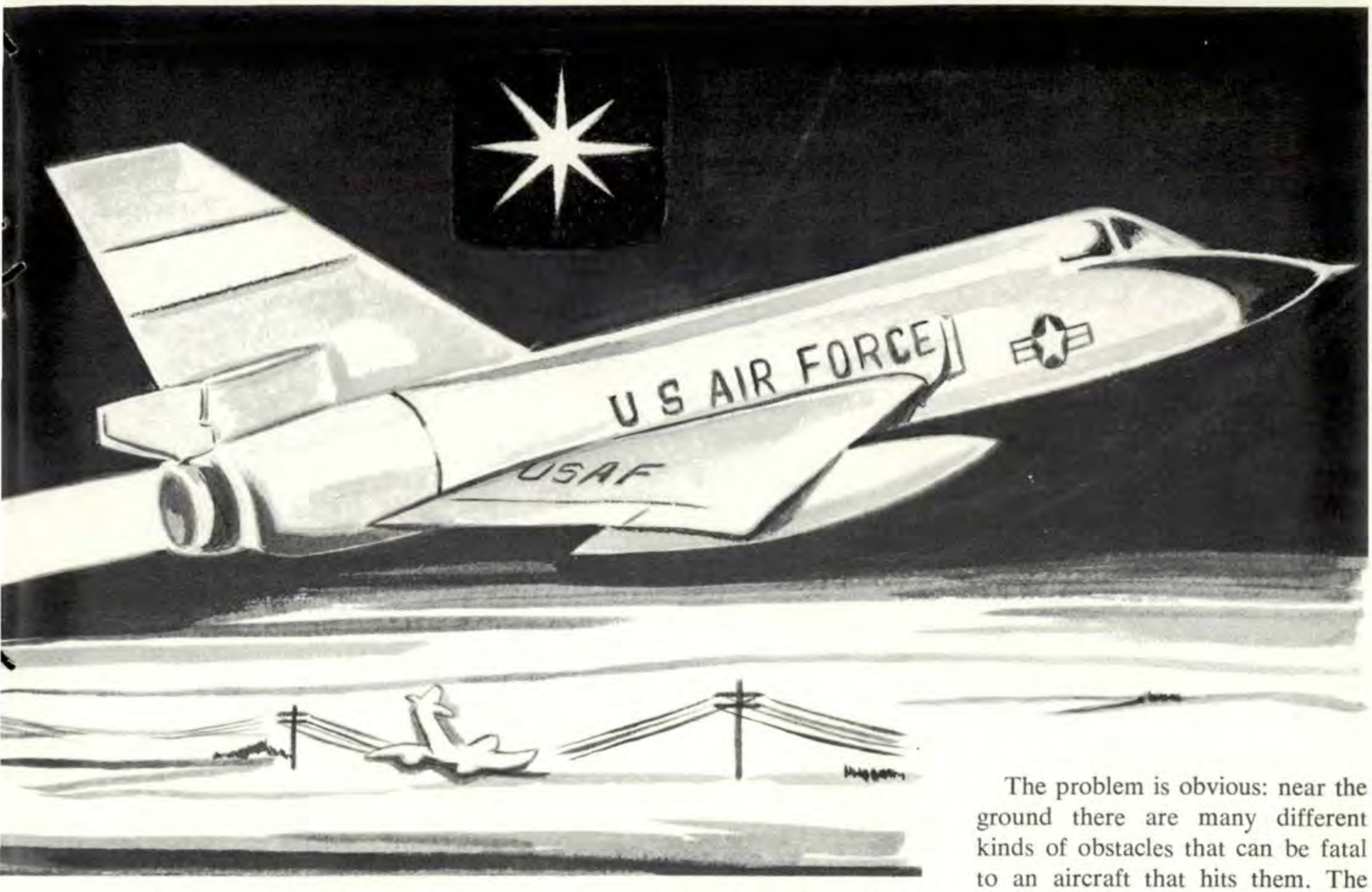
There's one thing managers, include safety types, like to get their teeth into and that is finite figures on past performance. For example, they like to think, well, we have had 15 of those a year for the past five years, so we'll go after the problem and shoot for a reduction of, say, five. That's 33 percent less, pretty good performance guaranteed to get one at least a pat on the back, possibly a commendation, and it won't hurt at ER time.

There's nothing wrong with such thinking; the record shows that we have been fairly consistent and can stand some improvement. The record reads like this: 1965—20, 1966—28, 1967—13, 1968—23, 1969—24, 1970—13.

A review of the past leads to the prediction that there will be perhaps a dozen or more collisions with trees, wires or other obstacles during 1971. However, if we really concentrate on avoiding this kind of mishap we undoubtedly could get through the year with none. To give an idea of what to look for, here's a brief rundown on some of the low level collisions that resulted in fatalities and destroyed or substantially damaged aircraft.

In 1965 an HH-43 flying in a canyon hit wires and crashed, killing the crew. Last year another HH-43 flying above a river hit power lines the pilot didn't see and crashed into the river. The crew was only shaken up but a passenger was severely injured.

Six aircraft were destroyed in 1966. In one case a pilot of a T-38



was flying local to reduce fuel and hit a tower. The collision ripped off most of a wing, forcing the pilot to eject. He made it okay. In the other one the pilot of a U-10 swerved to miss some birds shortly after takeoff and hit a stump sticking up 30 feet. The pilot received only minor injuries but the aircraft was destroyed. An O-1 crashed and the pilot was severely injured when the aircraft hit a tree. A helicopter flew into a power line and all aboard were killed.

There were three bad ones in 1968. An aircraft on a low level navigation training mission hit power lines that were not marked on the pilot's map and went into a lake. There were two fatalities in that one. Then an F-102 was substantially damaged when the pilot saw some people he knew on a golf course near the base, made a low pass and hit a utility pole. An F-100 also received substantial damage when the leader of a three-ship flight hit guy wires supporting a 1034-foot tower.

The Air Force lost five aircraft and two pilots in 1969, one a helicopter that hit static wires 27 feet above a high voltage power line and the other an A-37 that hit a tree during a low angle pass while attacking trucks in SEA. That pilot successfully ejected but the chopper pilots were killed. Also that year an RF-84 was seriously damaged when the pilot, flying a low level photo recce mission, hit a tree about 90′ AGL.

Last year things improved but two birds were destroyed, an HH-43 and an F-100. A T-33 received substantial damage. The T-bird was on a test flight to determine the accuracy of a new altimeter at low altitude and high speed. Unfortunately, the pilot was flying into the setting sun and didn't see some power lines 50 feet above the ground and hit same. Mark up a damaged T-bird and a lucky pilot—he was able to fly it back and land safely.

The problem is obvious: near the ground there are many different kinds of obstacles that can be fatal to an aircraft that hits them. The solution is equally obvious: Don't fly in the vicinity of these obstacles. There's not much excuse for hitting these things anyway. There is seldom any reason for flying so low that obstacles 30-50-100 feet AGL are a menace. In those areas where very low operations are conducted, all obstacles must be catalogued and annotated on pilots' maps.

Pilots should understand that any canyon may have wires strung across it. Flying through a canyon may be thrilling, but not half so thrilling as hitting a three-inch cable and staring death in the face. Remember this: Above lines carrying high voltage are smaller wires, for grounding, that are harder to see.

As for low level weapons deliveries, the urge to hit the target, the drive to excel are understandable, but there is seldom, if ever, any requirement to go so low that the aircraft can't be recovered without taking leaves and branches with it. ★

TECH

briefs for maintenance techs

TOPICS

do it right the first time

It only took two manhours to install the clamp. No damage had been done. However, it doesn't take much imagination to realize the potential danger described in the following incident.

The IP in a T-38 at FL 300 noted the left engine EGT to be only 550 degrees C. The throttle setting was mil power, rpm 100 per cent, fuel flow 1200 pph, so a decision was made to put the bird back on the ground. While on a straight-in approach for landing, the IP attempted to make a throttle adjustment, but the left engine remained at 89 per cent with the throttle in the idle position. The fuel shutoff switch was used to shut down the left engine in the flare and a successful landing was accomplished without further incident.

Maintenance found the push-pull throttle control assembly had become separated from the throttle flexible control support clamp, which had not been properly installed. Only two manhours to reinstall the clamp, true; but the whole incident should never have happened. Right?

jammed controls

Few things frighten a pilot more than the thought of finding his controls jammed at an awkward moment. We were lucky on this one, but it's not hard to imagine the possibilities.

An F-4E crew was on a day gunnery range mission in the sunny southland. On his third dive bomb pass, the pilot discovered that the control stick would not move right of center. He recovered to level flight and headed for home, performing a controllability check en route. Now the stick moved freely in all directions! No further problems were encountered until the landing roll when once more the stick would not move to the right.

Inspection disclosed a ⅜ inch hex-head steel bolt lying loose in the rear cockpit stick well, and the malfunction was duplicated by placing the bolt between the stick and the torque tube. Marks on the bolt indicated that it had been lodged in this position.

Suppose, just for a moment, that the bolt had lodged so as to have restricted *aft* movement of the stick. The pull-up after bomb release is *not* the time for that kind of a problem. We can all thank our lucky stars that nobody had to pay with his life for someone else's thoughtlessness—not this time, anyway.

proper procedures could prevent dropsy

The following incident makes one wonder just how often work is performed in such a haphazard manner. If you follow the sequence of events, it's not hard to reach the conclusion that this procedure had been followed before. Otherwise, why didn't someone along the way stop it before it became an incident?

An F-100 returned from a combat mission, with a writeup in the 781—dim light on gear handle inoperative. An electrician was dispatched to trouble shoot and repair the discrepancy. Unable to find anything wrong with the landing gear panel while it was installed in the aircraft, he removed the panel for in-shop bench check and repair and made the following entry in the 781-A, "Landing gear panel removed for repair." Symbol used was a red diagonal. At the electrical shop he turned the panel over to a second electrician who checked it, found it serviceable, and returned it to the aircraft where he connected it electrically.

After further trouble shooting he decided that the dimmer relay located under the floor boards would have to be checked. He was able to get one of the floor boards up, but the second one had screws in it that he was unable to remove. About this time a weapons loading crew arrived, so the electrician, not wanting to stand in the way of progress, turned the ship over to the loading crew who proceeded to upload six each MK 82LD bombs and install all ejector cartridges. They also notified job control that the aircraft was loaded HOT.

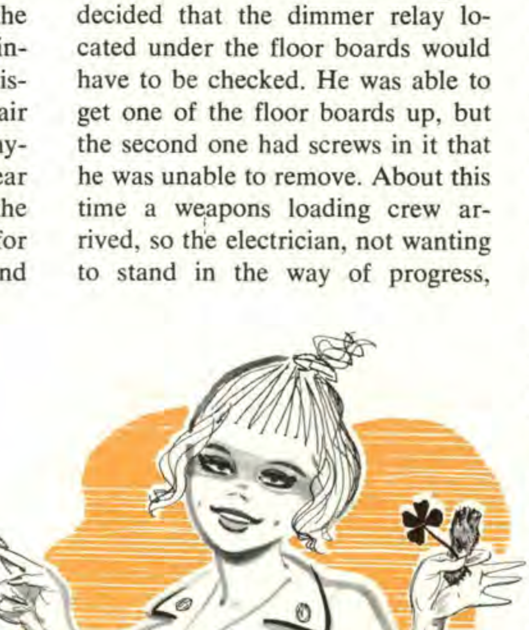
The crew chief then removed the stubborn screws from the floor board so the electrician could get back in and R&R the dim control box. A functional check proved the landing gear lights to be operational. The electrician then proceeded to reinstall the landing gear control panel. He had the bottom two screws installed and was attempting to install the upper left screw. Then, while the flightline supervisor was standing on the aircraft ladder checking on the electrician's progress, the electrician inadvertently pushed the emergency jettison system. The wings were cleared of two TERs, two Type I pylons, two Type III pylons, and two 335 gallon fuel tanks.

Investigation did not reveal any problems with the emergency jettison system. All pylon safety pins including tank pins were installed.

This incident raises a few questions:

- Why did job control allow the aircraft to be loaded before it was in commission?
- Shouldn't the removal of the landing gear panel for in-shop bench check and repair call for a red cross?
- Would this unit still be operating the same way if this incident hadn't occurred?
- How many other units throughout the Air Force are following similar procedures, just waiting for an incident or accident to happen?

don't depend on luck



The F-100 mission had progressed quite normally until, during a turn, the pilot discovered he could not push the right rudder pedal past neutral. After reducing his fuel load he made a successful approach end barrier engagement.

Investigators found two screws missing from the left console panel adjacent to the left rudder pedal. This allowed the panel to protrude several inches and block the aft movement of the left rudder pedal past the neutral position. If this could happen in the neutral position it's not hard to visualize the same thing happening at any position within the travel range of the rudder pedals. Luck prevailed in this case, but there is no room in aircraft maintenance for luck.

TECH

briefs for maintenance techs

TOPICS

a gremlin in a C-7

The pilot of a C-7, while performing the before-landing checklist, noted the left main gear failed to indicate down and locked. Observation revealed the left main gear to be in the intermediate position. Emergency procedures were attempted, but the gear remained in the intermediate position. Following the Dash One, the pilot lowered the nose wheel and retracted the right main, in preparation for a wheels up landing. Twenty-five hundred feet of the runway was foamed, and the pilot set the aircraft down in the first few feet of foam. It slid to a stop approximately 30 feet beyond the foam. Damage was considered minor. The problem: a piece of metal cotter key was left in the shock strut housing by person or persons unknown.

smell, yes–seep, no

Shortly after takeoff the load master of a C-141 detected strong fumes in the cabin. The aircraft commander directed all crewmembers and the one passenger to go on oxygen. The scanner isolated the source of the fumes—pallet position six. No spillage was apparent so the aircraft commander elected to depressurize the aircraft. A precautionary landing was made without further incident. Approximately 15 minutes after landing the loadmaster and scanner reported they felt nauseous and had headaches. They were sent to the hospital for examination. After the suspect cargo was removed from the aircraft and impounded, the fumes were found to be coming from deteriorated containers of methyl ethyl keotone. The containers were rusted at the seams; however, fluid was not seeping out. It was apparent that fumes would emanate as the pressure changed inside the aircraft with the increase in altitude.

F-4 egress system

Judging from the number of accidents and incidents involving the F-4 ejection system, it's imperative that maintenance and flight crews take a real close look at their procedures, and that only fully qualified personnel be allowed near the cockpit.

Two recent incidents occurred while the crew chief was attempting to assist a member of the flight crew. In one the navigator was seated and strapped in the aircraft when he discovered the map case on his left was open and that he could not close the zipper. He asked the crew chief to reach in and close the zipper for him. All safety pins except the face curtain and banana link pins had already been removed. The canopy was fully extended. The crew chief attempted to close the zipper with his left hand only but was unable to do so with one hand. So, in the process of putting his right hand in to steady the bag, the sleeve of his parka caught on the canopy initiator linkage forcing it downward and actuating the initiator. Damage was somewhere around $325.00 for equipment and manhours.

The second incident, only a few days later but in a different part of the world, reads almost identically. The only difference was that the crew chief in the second case was trying to unfasten the map case to place seat pins in it. He also inadvertently activated the canopy initiator.

A third mishap with a different set of circumstances produced the same results. In this one the seats were removed in preparation for phase inspection. The airman was entering the cockpit to inspect the cockpit and canopy. He had placed his left foot inside and was bringing his right foot in when it struck the initiator firing linkage bell crank, withdrawing the initiator sear pin and firing the initiator.

It would be worthwhile to take a look at your egress system training procedures now.

human fod

Fortunately few of us ever experience or witness a human being sucked into a jet intake. Surely no one wants to be the victim or even witness such an event. Even so, once in a while someone ends up as human FOD.

When the pilot of an F-4 preparing for takeoff was unable to get the centerline fuel tank to feed, he returned the bird to the hard stand for troubleshooting.

After installing the chocks, the crew chief came on interphone and requested 85 per cent rpm for a pressurization check. After about 10 seconds at 85 per cent the pilot felt and heard a thump. He immediately shut down and egressed.

A fuel cell maintenance man had been checking the pressurization of the centerline fuel tank. For some unknown reason he walked out from under the aircraft, in front of the left intake duct, and was sucked into the intake. He struck the bellows air probe in the left intake which undoubtedly prevented his being sucked farther into the engine and saved his life. His glasses and other personal items were ingested into the engine.

This airman was lucky. Not too many go through the same experience and live to tell about it. If you value your life, be sure you know the danger areas of the aircraft you're working on.

wheel bearing failures

The following, from the Canadian Armed Forces Directorate of Flight Safety, addresses specifically a problem with the CF-104, but it could apply to any aircraft! If the shoe fits. . . .

During the first years of the CF-104 program, wheel bearing failures occurred with unsettling regularity. Bearings in most cases were ground and welded together into a potpourri of metal art forms. In the other cases, the balls rolled along the ground instead of in their races.

UCRs (Unsatisfactory Condition Report) flew around the system faulting the lubricant, the bearings and the wheels, and each wheel bearing was sent to the Materiel Lab for analysis. No materiel changes were incorporated as a result of the UCRs, but the wheel bearing failures gradually began to diminish.

The reason for the decrease in failure incidents was attributed to more vigilant and careful maintenance:

- Tire bays were cleaned up and provided with better cleaning and greasing equipment, eliminating micro-FOD that could foul the bearing races and balls;
- Bearing cups and cones were kept as matched sets (the tolerances of bearing components are extremely small);
- And finally, the correct wheel installation procedures were emphasized. (The torquing procedure appears to be redundant but it is there for a good reason—to protect the bearing.)

Wheel bearing failures are not isolated incidents, but they still occur, and the causes of failure have a familiar ring. Cleanliness and adherence to the EOs (Engineering Orders) will keep the failure rate down. ★

THE HERO WORKER

Incident reports and UMRs indicate that there has been a marked increase in engine spline coupling failures. In this article an old hand with jet engines offers some wisdom and advice on how to prevent spline problems and accidents.

Complex machinery, like society, has its unsung heroes. They usually perform in an admirable manner, are well qualified, dependable, unobtrusive, well liked and unheralded. Before you reach the conclusion we are speaking of you, we have to announce our subject, in this instance, is the aircraft engine *spline coupling*.

This mechanical object is a precision machined shaft that transmits power train torque loads to a generator, hydraulic pump, CSD or starter. In the case of a starter, it carries the torque in reverse. The spline coupling usually has a necked down area between its splined ends that is designed to fail at a torque value that would not cause failure of the engine gear train system should the accessory seize or lock up for some reason. Occasionally it has a short, double end shaft that acts as a go-between, or it can be an integral part of a pump or starter drive. The photos above show some different forms a spline shaft can take. Notice the various degrees of wear on the unserviceable exhibits.

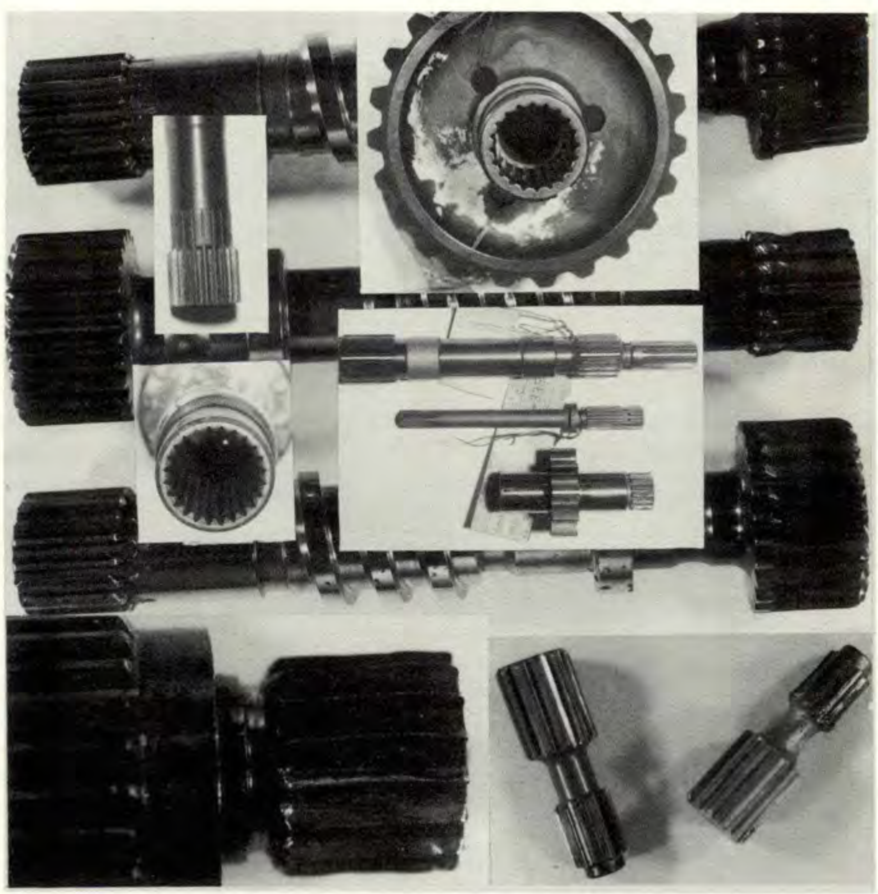


FIGURE 1

In order to appreciate why we feel this part is a HERO, you must realize the Herculean task these splines perform. It is not uncommon to have accessories that require or produce loads of 20 hp or more. For example, the F-105 utility hydraulic pump pulls four horsepower at its rated 24 gpm flow. Visualize the size of a four horsepower motor! This will give you an idea what our "Hero" has to contend with for thousands of hours. Remember, too, in many instances the loads are not smooth torque but are subjected to pulsations and chatter.

Because of the high torque loads and pulsations, splines must be cleaned and lubricated with the correct lubricant each time an accessory is installed. Without this lubrication the metal to metal contact will produce rapid wear and, eventually, complete failure. Figure 1 shows typical failures. Remember, when a spline gives up the ghost there is a sudden stoppage of an important aircraft power plant accessory. Should it be a high pressure fuel pump spline on a single engine fighter you automatically have an unpowered glider with dubious gliding abilities.

The most prevalent "spline killer" is the absence of lubrication or the use of the wrong type lube. When a spline starts to wear through its case hardening, rusting accelerates its destruction and the process is fairly rapid. When you notice a spline assembly that contains an abrasive red oxide rust material or caked grease, it is usually a sign that it has been operating with the incorrect lubricant or without lubricant altogether.

We failed to mention that there are two general types of spline applications, *Wet* and *Dry*. The *wet* pad spline operates in a bath of oil, usually from the gear box system, and requires no special attention except for making sure it is clean, that the gasket on the mounting pad is new, and that accessory attachment torque values are correct. The *dry* spline is the one that is not getting the treatment it deserves. Don't be fooled into thinking that there is no relative movement in a spline coupling so, therefore, there is no critical need for lubrication at assembly.

The chart (Fig. 2) shows some of the different types of high pressure lubricants that are called for in the

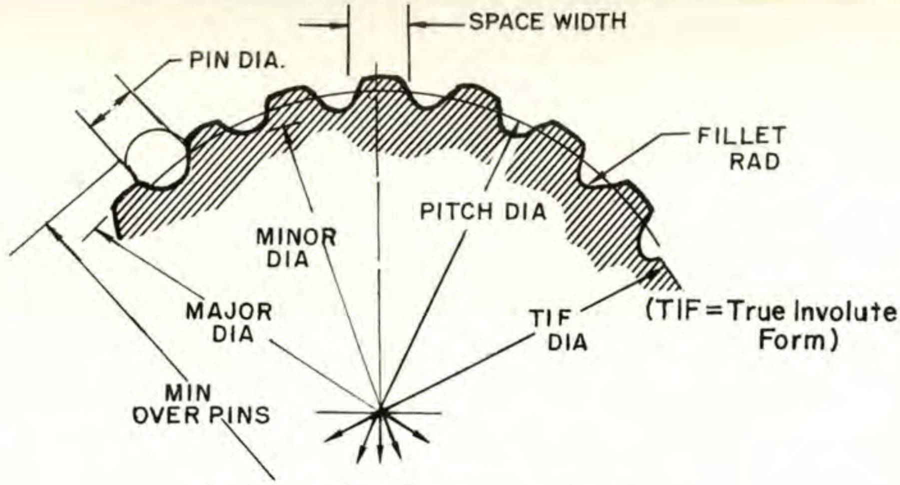
SPLINE

A-7D Starter	MIL-G-81322
OV-10 Fuel Pump	MIL-G-81322
F-105 Fuel Pump	MIL-G-3545
F-105 Generator	MIL-G-3545
F-105 Hydraulic Pump	MIL-G-3278
F-84F Starter	Eclipse Pioneer #3
F-100 Hydraulic Pump	Plastilube #3 or MIL-G-21164
F-100 Fuel Control	Plastilube #3
F-100 Cartridge Starter (Wet Spline)	No Grease
F-100 Pneumatic Starter	Plastilube #3
J-57-13 Fuel Pump	Plastilube #3 or Moly #3
T-28 Oil Pump (Wet Spline)	MIL-L-6082 Grade 1100 Engine Oil
T-28 Fuel Pump (Wet Spline)	MIL-L-6082 Grade 1100 Engine Oil
T-39 Fuel Control (Wet Spline)	No lube
H-53 (H) Starter	Corrosion Preventive Compound (MIL-C-6529 Type 1)

Note: The above listing is for reason of illustration and is subject to changes. Consult your maintenance instructions for latest information.

FIGURE 2

HERO
Continued



FILLET ROOT EXTERNAL SPLINE

See Specification NAS 881 for Additional Data

various maintenance manuals. Don't guess as to the type of lubrication that your equipment requires; it could be a costly guess! Consult the maintenance instructions, use the exact type mentioned and apply as recommended. Before you re-install an accessory with a spline shaft be certain you research the tech order to determine whether it requires special lubrication, and note the proper application technique. Remember also that we can sign the death warrant for a *wet* spline if we fail to use a new base flange gasket or fail to adhere to the attaching hardware torque values. A leaking spline cavity can cause a *wet* spline to wear prematurely and eventually lead to complete failure. As you can note from the accompanying photos the wear takes the form of "hardly perceptible" to "no question."

There are two methods of checking spline wear. One is by use of special go-no-go gages, usually found in a factory or overhaul agency. The typical field method, "mike and wires", should be accomplished by a machinist using the proper NAS 581 measuring criteria. You must clean both the male and female spline parts and inspect visually. If there appears to be wear, measure to determine if the parts are airworthy and relube as directed in the installation technical order.

The other problem connected with rapid spline wear is caused by a bent spline coupling, which usually results from a heavy accessory being allowed to hang on the spline during installation. Some accessory gear box pad studs or adapters do not have precision aligning pins, shoulders or studs that can support the weight of the unit until the unit is up against the flange. So the mechanic must provide a method of supporting the full weight of the accessory during the installation and at *no time* allow the weight of the accessory to be supported by the spline shaft. If this is allowed to happen a bent spline can result. I realize that most accessory compartment areas are congested and not the easiest places to man-handle a 20 to 50 pound accessory. It is here that Yankee ingenuity can be put to use. Some late model aircraft have AGE slings and lift supports for this operation. (I saw an improvised device back in 1948 made by modifying an adjustable swivel chair. It did a fine job until the Wing Commander noticed an identifying mark that caused him to recognize his long-lost office furniture.)

As suggested in the popular (in my day) song, "Try a Little Tenderness," try a little with our unsung hero, the spline. One thing is certain, longer spline life will result and, who knows, maybe your attention to detail, without your ever realizing it, will save a valuable pilot and aircraft. ★

Toots

is interested in your problems. She spends her time researching questions about Tech Orders and directives. Write her c/o Editor (IGDSEA), Dep IG for Insp & Safety, Norton AFB CA 92409

Dear Toots

I read with avid interest your December issue and enjoyed each article. Of particular interest to me was TOOTS' questions and answers about AFTO 781 series forms. While they constituted an excellent review of the material, I feel compelled to mention a not insignificant error. The answer to question number 11 referred to TO 00-20-2. The actual reference is TO 00-20-1, paragraph 3-10, dated 15 Mar 70, Change 1, 1 Jun 70.

TSgt James A. Nield
42 ARRS
Hamilton AFB, Calif

Thanks, you're right.

Toots

* * *

Dear Toots

This pertains to the batteries of all types that are used with and in emergency communications radio sets used in survival kits or deployed from airplanes. Something somewhere stipulates these three restrictions:

1. Batteries will not be used or installed when their age has exceeded their shelf life, or will exceed the shelf life before the next scheduled inspection.

2. A battery will not be installed in a radio set or used with a radio set for more than one year even though it has not exceeded its shelf life and still tests serviceable.

3. Spare batteries will be installed in survival kits when the radio sets are such that the batteries can be easily changed, and the same rules apply as for installed batteries.

I have seen these instructions and complied with them in USAFE, but now I cannot find anything on it.

MSgt Alfred W. Berntson
443 AMS
Altus AFB, Oklahoma

Dear Sarge

Two of the three restrictions that you recall relative to personnel locator beacons (PLB) and survival radio batteries are still valid.

The applicable technical orders state that batteries with an accumulated service and shelf life of 24 months will be replaced regardless of condition. Battery life limitations are the same for spare batteries. The above restrictions are for the URT-27 PLB (para 2-4c, TO 12R5, 2URT 27-2), RT-10 (Fig 1-8, TO 12R2-2URC10-2), URC-64 (para 2-12d, TO 12R2-2URC-64-2), and the PRC-90 (para 2-13, TO 12R2-2PRC90-2) survival radios. Paragraph 3, TO 12R5-2URT33-2, establishes a 21-month replacement criterion for the URT-33 personnel locator beacon battery. As a result of your letter, I questioned the Life Support Inventory Manager on this variance since URT-27 and -33 batteries are interchangeable. The URT-33 technical order will be changed to reflect 24 months.

The second restriction you recall for one-year replacement of batteries from installed date was a Tactical Air Command restriction outlined in their 501 series Life Support regulations. This restriction has since been deleted.

Spare batteries are authorized for installation in survival kits and vests at the option of the using command. This requirement is currently stated in various command Life Support regulations (e.g., TACR 501-4, PACAFR 501-6).

Toots

NUCLEAR SAFETY AID STATION

NO AID REPORT NO ACTION

A nuclear-capable aircraft crashed recently and was destroyed due to the failure of a component in the bomb rack. The accident oceurred during the release of a bomb dummy unit (BDU) at low altitude. The accident investigation revealed that some malfunctions and failures of the rack had been occurring over the past four

DISCONNECT -THEN TEST

Would you use a nuclear weapon to test Aircraft Monitor and Control (AMAC) circuitry? I hope you have all answered NO! Would you try to duplicate an AMAC malfunction if one is reported during an alert preflight inspection? Now the answer may not be so positive—but it should be. Trying to duplicate AMAC malfunctions on a weapon loaded aircraft *does* amount to using the weapon as a tester. As general nuclear safety philosophy, once an AMAC malfunction has occurred don't try to get everyone and his brother to verify it. The two-man concept already insures verification—of procedures and results. The errant system should be shut down and both the munitions maintenance supervisor and the safety supervisor should be informed. Then, if troubleshooting is required, unload the weapon, or at least disconnect it. If weapon characteristics are important to troubleshooting, use a proper type training weapon. Remember, the answer to both of the questions in the beginning of this article is an emphatic NO!

A MID-WINTER REMINDER

Well, it has been cold, but it could get colder and more snow is surely coming. Although your operations have been going well, another reminder should help avoid problems. Several areas require special attention. Inspection requirements for convoy routes should be reviewed and strict compliance enforced. Do they include snow removal criteria? Reduced speed limits? Increased spacing? Equipment inspections should emphasize items such as hydraulic lines, electrical cables, and pneumatic brake lines which are more likely to be damaged in cold weather. Vehicle operation is also an important area. Reduced visibility and slippery pedals and shoe soles tend to cause trouble. Increased emphasis on chocking is also a good idea. During aircraft loading and unloading there are always problems of connector mating and cable routing. Adding numb fingers and brittle material doesn't help things. Be particularly careful, especially when you are cold and anxious to finish the job. The added time increases the misery but not as much as an AID investigation. ★

years. In one case, a rack failure was apparently not reported at all. In several other cases, rack deficiencies were reported in Materiel Failure Reports but not as nuclear mishaps. AFR 127-4, Atch 3, directs that malfunction or failure of suspension and release systems must be reported as a Dull Sword when nuclear safety is involved. Such an occurrence on a rack capable of carrying a nuclear weapon certainly involves nuclear safety regardless of what (if anything) was on the rack at the time of the occurrence. The prevention of AIDs relies in large part on trends revealed through our reporting system. Had all failures and malfunctions on this rack been reported as AIDs, it is possible that the rack deficiencies would have been corrected and this accident prevented, thus saving millions of dollars and a vital combat aircraft. Your full participation in reporting AIDs is necessary for the nuclear safety program to work. It depends on you.

EXPLOSIVES SAFETY

John H. Kawka, Directorate of Aerospace Safety

never make the same mistake once

But until we reach that very desirable goal, we have to learn as much as we can from the other guy's mistakes as well as our own.

The best part of our progress in explosives accident prevention results from recognizing mistakes that have been made and applying the knowledge gained to our own jobs. To do this properly we need tools, and the USAF Ground/Explosives Safety Kit, which contains articles and briefs on accidents, along with recommendations for preventive and corrective actions, is one of the best tools available.

If an accident occurs at one base, it can occur at another—that's basic. People who live through an accident quickly learn what is needed to prevent recurrence—that's also basic. It seems reasonable that people at other bases can learn just as quickly from that experience, without having to undergo the painful personal involvement.

Of course, the corrective actions and precautionary measures recommended in the articles are often old-hat to our more experienced explosives safety people. Nevertheless, explosives accident reports usually tell of people *who knew the accident potential,* but who failed to apply those necessary precautions.

When an explosives accident is briefed or featured in the safety kit, supervisors and affected individuals in all similar units are expected to review their local operations and take immediate steps to insure that such a mishap won't happen to them. But when an identical mishap does occur, it's obvious that the articles received little attention.

The old wartime slogan said, "We do the best we can with the tools we got." Some of your tools are the "Explosives Safety" briefs and features published in this magazine, in the Explosives Safety portion of the USAF Ground/Explosives Safety Kit and in TIG Brief. They just *might* help you avert a turn in the barrel. ★

IT'S A MANUAL

Your January issue contains an article titled, "Hot Ground Wire" in the Tech Topics feature. You reference AFR 127-101 in closing the story. Our office copy of AF Regulation 0-2, dated 25 August 1970, lists AFM 127-101. I can find no AFR listing. Could the reference possibly be an error?

Paul E. Robinson
21 Air Force
McGuire AFB, NJ

You are right, it's a manual, not a reg.

* * *

"WHAT'S A LEFT DOWNWIND?"

The item in your December issue, "What's a Left Downwind?", makes everyone a little disgusted, not just military pilots. But I am almost certain that this particular knothead is a direct example of the kind of primary instruction he had been receiving. I don't suppose I would know what a left downwind was unless somebody told me, which a good instructor did a long time ago. But the run-of-the-mill, mediocre instructor these days is prone to this sort of thing. He certainly should never have turned a student loose with that little knowledge.

If you will look just a little behind the pilot of Cessna 123, you will probably find a careless and indifferent instructor, and therein lies the trouble.

Max Karant
Senior Vice President
AOPA, Washington, DC

I AM AN INSTRUCTOR?

Several years ago I bought a 1954 Ford. After driving it for a short while, I found that it possessed a few built in problems. The most troublesome problem, by far, was that for some unexplained reason the lights would periodically go out. Having less money than time, I raised the hood and traced the problem to a circuit breaker in the engine compartment. I found that when the lights went out, a slight tap on the circuit breaker would restore operation.

Being dutiful and safety minded, I explained to my wife about the little black circuit breaker and how to tap it to make the lights operate.

A few nights later, my wife attended a PTA meeting. It was very late when she finally returned home. The car lights were out when she drove into the driveway. I asked why she was so late and why the lights were out. Her sad story (in no uncertain terms) was touching to say the least. As she left the school, she explained, the lights on the car went out. She informed me that she knew exactly where the circuit breaker was and just how to tap it, if ONLY she had known how to raise the hood!

MORAL: If not thoroughly given in proper detail, instructions and procedures are usually wasted effort.

MSgt Gerald M. Lewis
ATC Flight Safety Kit

☆ U.S. GOVERNMENT PRINTING OFFICE 1971 431-461/7

UNITED STATES AIR FORCE WELL DONE AWARD

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

COLONEL Joe H. Joiner

MAJOR David H. Pinsky

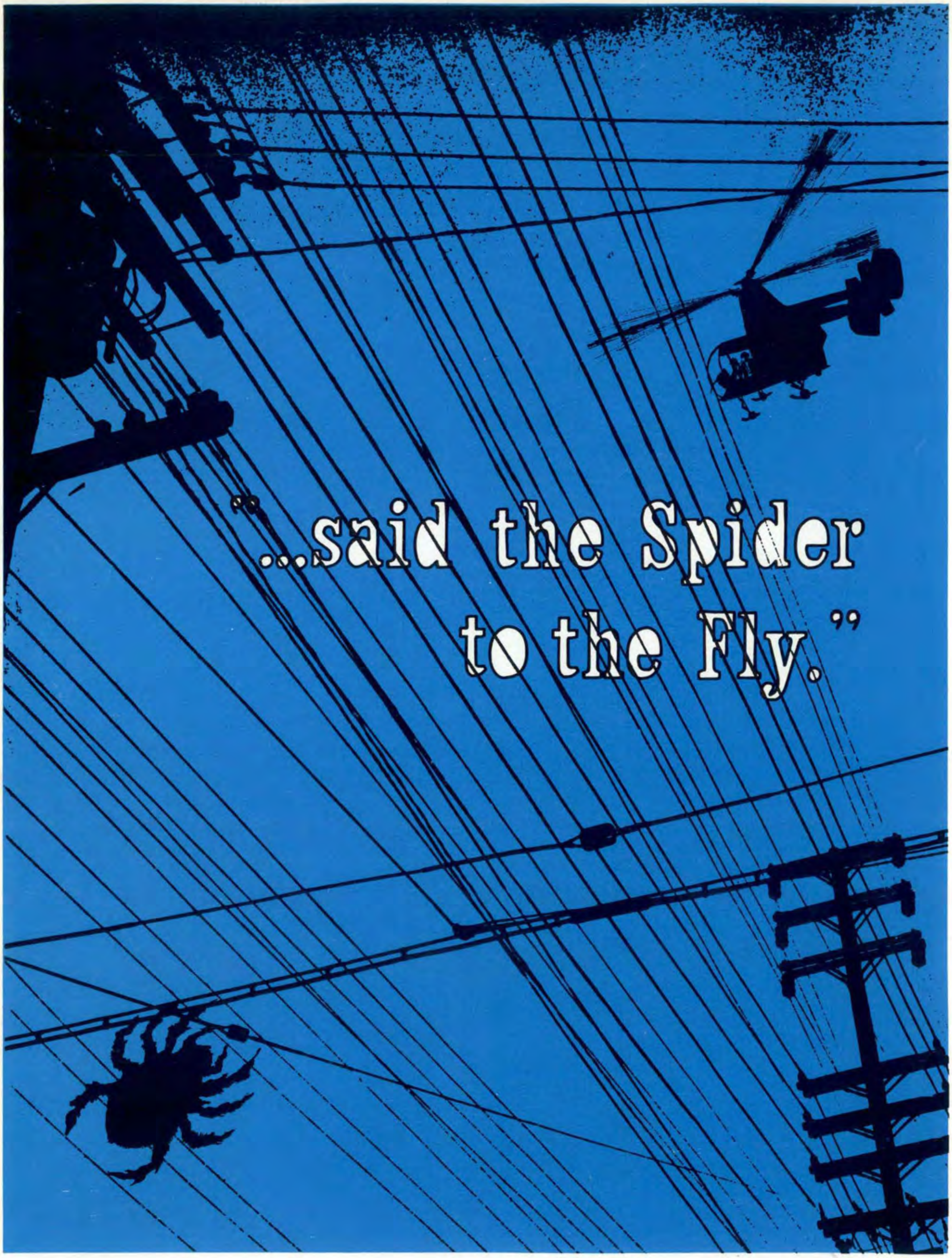
48th Fighter Interceptor Squadron, Langley AFB, VA.

On 19 November 1970, Colonel Joiner and Major Pinsky departed El Paso International Airport in a T-33 on an IFR flight to Little Rock AFB, Arkansas. After 20 minutes at cruise, both pilots heard a muffled explosion and noticed an immediate decrease in RPM through 85 percent and a slow decrease in EGT. The throttle was retarded and a right turn initiated in the direction of Abilene for an emergency landing. A check of aircraft systems revealed that the left rudder pedals in both cockpits were useless, and that any power setting above idle caused severe vibration. Declaring their emergency with Fort Worth Center and requesting vectors to the nearest suitable runway, the pilots continued a right descending turn while establishing best glide speed and completing the flameout and loss of oil pressure checklists. Selecting Abilene Municipal Airport as their best emergency landing site, the pilots jettisoned the external tanks over the desert.

Approach Control advised that no barrier was available, nor was any crash support equipment on station. Shortly thereafter, the pilots were plagued with intercom problems, making cockpit communication difficult. Ejection was considered at several points throughout the descent, and both pilots accomplished their pre-ejection procedures. Each time, the alternative of ejecting was held in abeyance since the flameout approach seemed to offer a reasonable chance of success. Major Pinsky, in the front seat, assumed control of the aircraft at 10,000 feet MSL. Passing through 7000 feet they sighted the runway at their 11:30 position. Surface winds were reported as 260 degrees at 15 knots, gusting to 25 knots.

Major Pinsky made a left turn to place the aircraft on base for runway 17 and lowered the landing gear with the normal system. The left gear indicated unsafe, and the system was immediately recycled. All gear indicated safe on the second attempt. During this time, the intercom system became operative again. Major Pinsky selected half flaps and aimed for a point 2000 feet down the runway. As he initiated the flare, the aircraft yawed to the right into the wind and, as the flare continued, yaw became more pronounced. The right yaw had to be countered with left aileron, since the left rudder was inoperative. The aircraft touched down approximately 1500 feet down the runway. Major Pinsky applied brakes and raised the canopy to slow the aircraft, halting the aircraft on the runway with no further damage.

Inspection revealed that high-velocity debris from failed turbine buckets had severed the left rudder cable and torn a large hole in the left side of the fuselage. The superb skill of both pilots, and their ability to act as a team in an emergency situation, resulted in a serious emergency being handled without injury and with minimum damage. WELL DONE! ★



See Fly High
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