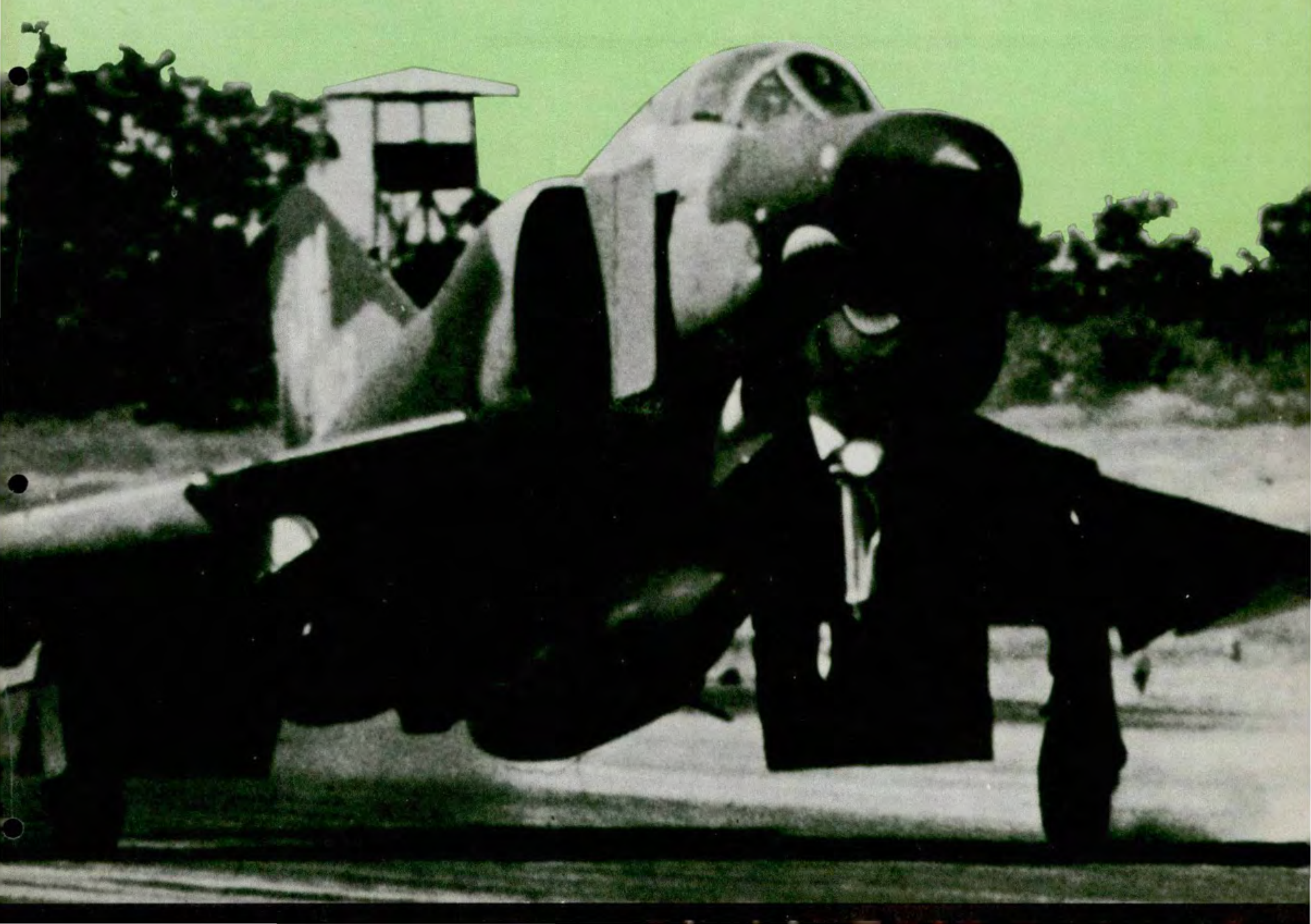
UNITED STATES AIR FORCE • APRIL 1970

Aerospace SAFETY

FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS



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April 1970 AFRP 62-1 Volume 26 Number 4

SPECIAL FEATURES

A BIG MAN IN YOUR LIFE . . . what do you owe him? 1
MAULING MORIBUND MUSTANGS . . . or beating dead horses 4
WHICH FUEL? . . . agrees with your engine? 5
ANALYSIS OF AN INCIDENT . . . orderly route to failure 6
FROM INSTRUMENT TO CONTACT . . . low viz landings 10
T-39 ENGINES . . . respond to TLC 14
EXPERTS TALK ABOUT THOSE ROUND ENGINES . . . Part II for recip drivers and mechs 16
WELDING SAFETY . . . supervision and control "makes it" 18

REGULAR FEATURES

IPIS APPROACH 9 • X-C NOTES FROM REX RILEY 15 • TOOTS 21 • EXPLOSIVES SAFETY 22 • AEROBITS 25 • MAINTENANCE BRIEFS 26 • WELL DONE 29.

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Perhaps it's a bit early, but as we finish production of this second issue of the combined *Aerospace Safety* and *Maintenance Safety* magazine, we wonder if we're on the right track. You are the customer and we would like for you to tell us, whether you are a maintainer, aircrew member or in any support function. Let us hear from you by card or letter. Your comments and suggestions will help us help you.

This month there's a pretty good mix of maintenance and operations material ranging from an article on the problems and successes of instructor pilots to one on reciprocating engines.

"A Big Man In Your Life," page 1, is about IPs. Every Air Force pilot has flown under the surveillance of many IPs and many pilots are, have been or will be, IPs. In this article IPs will recognize some of the facets of their job. For you someday-to-be instructor pilots the article may provide some insights into what to expect.

Both maintenance and the aircrew figure in "Analysis of an Accident," page 6, and T-39 Engines," page 14.

Strictly for aircrews is "From Instrument to Contact," page 10, while "Welding Safety," is addressed primarily to you maintenance types. ★

A BIG MAN IN YOUR LIFE

From 1967 through 1969 instructor pilots saved   air- craft. If anyone can furnish a number to fill the above blank we would appreciate a call from him. So far the phone hasn't rung.

By changing the wording in the first paragraph, we can provide a number: From 1967 through 1969 there were 69 accidents in which IPs were involved. Thus, we can record an IP's failures but not his successes.

This is one of the frustrations of the IP's job. Seldom does any one, perhaps not even he himself, know exactly how much he contributed to the successful training of a student. The student may satisfactorily complete the course, but he may have been able to do it on his own. This is not strictly true of pilot students simply because of the physics of flight. But once the student has got the feel of the airplane, does he really need an instructor? Could he, through practice and study, make it on his own?

You may have heard it said that teachers teach because they can't do. This is probably seldom true in any discipline and is totally unrealistic when applied to instructor pilots. In order to succeed, the IP must combine a thorough knowledge of the aircraft he is instructing in, the general store of knowledge and technical competence that all pilots must possess, plus that rare ability to relate to others and motivate them toward a learning goal.

Placing a pilot on orders as an instructor does not make him one. About all this really *guarantees* is that there will be two pilots in the aircraft, one of whom is qualified to fly it.

Most of us could write a book on "IPs I Have Known." Some of these would surely make interesting reading. Equally interesting would be one about a student pilot with chapters by his various instructors.

In the flying business one is eternally a student. First, you learned from a series of instructors in undergraduate pilot training. Once you got your wings you immediately went back into student status while you checked out in an operational aircraft. From then on throughout your career, every time you switched to a new airplane, it was an instructor pilot who helped you through the transition.

IPs occasionally fail. Some of these failures go undetected—a student (perhaps an experienced pilot in other type aircraft) certified as qualified when, in reality, he isn't, or is only marginally so. This may not show up until years later when his ineptness finally catches up with him and he makes the accident files. Other IP failures appear as accidents in which the IP was either the primary or a contributing factor. Most of the reports on IP-involved accidents contain words to the effect that "the IP allowed the student to place the aircraft into a position from which recovery was impossible!"

This was the board finding following an accident that occurred a couple of years ago. During a transition training flight in an F-4D, the aircraft broke left from initial and was then observed on downwind in a rolling descent until it struck the ground. The crew went in with the aircraft.

The approach and landing phase of flight is the most demanding and the least forgiving, because of the proximity to the ground, maneuvering that must be done and low airspeed. This is the regime of the classic instructor-involved accident. The IP is in a precarious position. He must bring to bear all his experience, a shrewd judgment of the student's ability and predictability, along with a sort of sixth sense that helps him determine how far to let the student go and at what point he should take control.

This is the moment of truth for the instructor, the point at which the real instructor emerges, or just a pilot on orders as an IP.

Occasionally — and fortunately these occurrences are fairly rare— an instructor creates his own mishap. Such as when, at a critical point on final approach, an IP shut down two engines on a four-engine transport. The pilot lost control and the aircraft stalled off the end of the runway.

In a somewhat similar accident involving a C-123K, a simulated engine-out landing was being performed with the jets at idle, one recip at 1700 rpm and the other at 2600 rpm. Despite a Dash One warning against single-engine go-arounds, when it became obvious that the pilot could not make a landing the IP called for a go-around. In the ensuing crash, the aircraft was destroyed and one crewmember seriously injured.

The factors leading to these accidents can be called errors of commission. There are also errors of omission. Among the IP's responsibilities is that of safety pilot. He is the pro who, for example, doesn't permit a landing without the gear down. Yet in 82 reported gear-up landings from 1964-1969, the IP did just that 18 times. While this may indicate that IPs are just human, it also leads to the suspicion that at least some of these were IPs simply because they were on orders as such.

Before we condemn the IP for his mistakes, let's look at some of the facets of his job. Since he flies a great deal he is expected to be highly proficient. But, depending somewhat on the type of aircraft and curriculum, he may not perform some maneuvers very often. For example, he may defer to his students and not make very many landings himself. This is something he has to guard against.

Major William P. Hurn addressed this problem in his article, "The SAC IP," in the January 1970 issue of *Combat Crew*. ". . . The best flying approach I have heard of to date came from a 15th Air Force Accident Cause Elimination program brochure: 'First You Fly the Airplane.' This approach applies to student flying as well as when the IP is at the controls. Few inflight emergencies are worse than losing control of the airplane, or letting someone lose it for you. I believe that stick and rudder skill is the single most important factor in the recovery of many serious aircraft emergencies. Sure, any pilot can make a landing but suppose you have to put it on a narrow strip of foam—or . . . on the end of the runway with no flaps—or your controls don't work just right—or the weather is in the woods. The IP cheats his students as well as himself if he lets his own proficiency deteriorate to an unsafe level."

There is also the fact of high exposure. Most IPs fly a great deal; therefore, they are more exposed than the average pilot to problems resulting from maintenance errors and materiel malfunctions and failures.

The IP is placed in a particularly vulnerable position because he does not fly as part of a thoroughly trained team. In the case of the multi-engine bomber, the IP is not part of a regular crew that works day after day together. Except for the fact that several aircraft may be involved, the fighter IP has the same problem—shortly after his students get proficient they are gone and he starts over with new students. Consequently, in an emergency the IP does not have an experienced, well coordinated crew to work with and may even be hampered in handling the emergency by the action of the student. Imagine the IP's emotions after the following incident:

On final approach the student pilot inadvertently feathered one of the two engines. In the instant it took to analyze what had happened, the IP increased power on the good engine. Thinking they were going around, the student retracted the gear. The IP immediately ordered the gear lowered and the student got the flap handle instead. Meanwhile, the IP told the engineer to bring the engine back in. Unfortunately, the engineer hit the wrong button and feathered the remaining engine. The IP put the gear down himself and made a successful landing, despite the confusion. Then to cap this incident, the engineer moved the gear lever to "Positive Lock" and the gear collapsed on the runway.

His exposure to many different students with their different abilities and personalities requires the IP to be constantly alert. He simply can't afford to relax as much as he could if he were flying as a regular crewmember. When a crew works together for some time they become a team and each member gains a pretty good idea of what to expect from the other members.

Working with students, the IP must be much more thorough in his preflight briefings. He can't afford to leave anything to chance, and he must do everything possible to make sure that the student knows what will be expected of him especially in an emergency. The accident files contain examples of situations in which apparently no one was flying the aircraft, and, conversely, some in which both the student and IP were trying to control the bird and working at cross purposes. Flying down final approach is a poor time to accomplish the briefing that should have been made prior to the mission.

Just last year an IP was discussing a procedure with a student as they were on the approach for a touch and go. Concentrating on the item under discussion, they lost their continuity on the checklist and made a gear-up landing. This despite the warning horn which operated, and a flight engineer who didn't.

The problems of an IP are many and he has a job that is both mentally and physically fatiguing. He is responsible to the Air Force, the student and himself. He deals with many different personalities, including officers who outrank him. He is expected to be both an excellent technician and an effective instructor.

The rewards cannot be measured in any finite way. He doesn't receive any extra pay. He frequently works long hours. The element of risk is high. He often prevents accidents that would have occurred except for his actions. Only he and the student—and some times not even the student—know of these saves. It is just part of the day's work.

Every pilot owes something to some IP back along the line, although he may even have forgotten his name. But you remember him, perhaps because he saved your life, or he was patient and understanding when that was called for, and always demanding that you produce the best in you.

Your success as a pilot is a measure of his success as an IP. How good was he?

ED. NOTE. Since practices vary among commands with different missions, each statement referring to IP problems and practices does not apply to every command. To be specific would result in excess verbiage and, in the author's judgment, would unnecessarily complicate the intended message. ★

MAULING MORIBUND MUSTANGS

Maj W. M. Thompson, Hq ATC

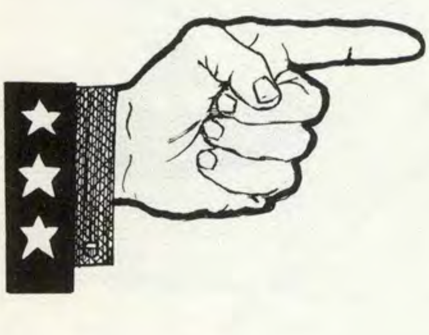
While safety types are sometimes accused of beating dead horses, we occasionally find ourselves whupping one that ain't dead yet. One mustang that keeps getting up off the mat is the Intrepid Aviator Syndrome. Whether we like to admit it or not, most of us airplane drivers suffer from this affliction to some degree. If we didn't we'd probably be raising cattle or selling insurance, or broking stocks, instead of muscling aluminum around the airpatch every day. The problem isn't so much that we're motivated. That's good! Rather, the problem is controlling that motivation, so we can operate rationally in a profession which is literally a running series of life and death situations.

So what is the Intrepid Aviator Syndrome? It's hard to define exactly, but the symptoms run the spectrum from sheer irresponsibility, through false pride, and all the way to the kind of mission dedication that causes people to give up their lives to accomplish a maneuver. Here are some actual examples of the Syndrome at work:

- An instructor and his student were motoring joyously up a canyon one day. All went well until they struck a cable, abruptly terminating the mission (and, incidentally, their lives.)
- An adverse crosswind and a tight pitchout caused a solo student to overshoot the final turn. His pride evidently outweighed the good advice he was getting from the RSU, because he kept trying to bring it around until he spun it in.
- A student botched up a maneuver so badly that the aircraft entered a high speed dive. Hoping to make the best of a bad situation and get the mission done, the instructor decided to grade the student's recovery, rather than assuming control and recovering himself. You guessed it. The student botched that up, too.

So grows our accident file. You have 'em, we record 'em, hopefully with a lesson learned and another dead horse we can stop beating. Sadly, in the case of the Intrepid Aviator Syndrome, the odds are roughly six to four that the next accident will make us wish we'd said all this better.

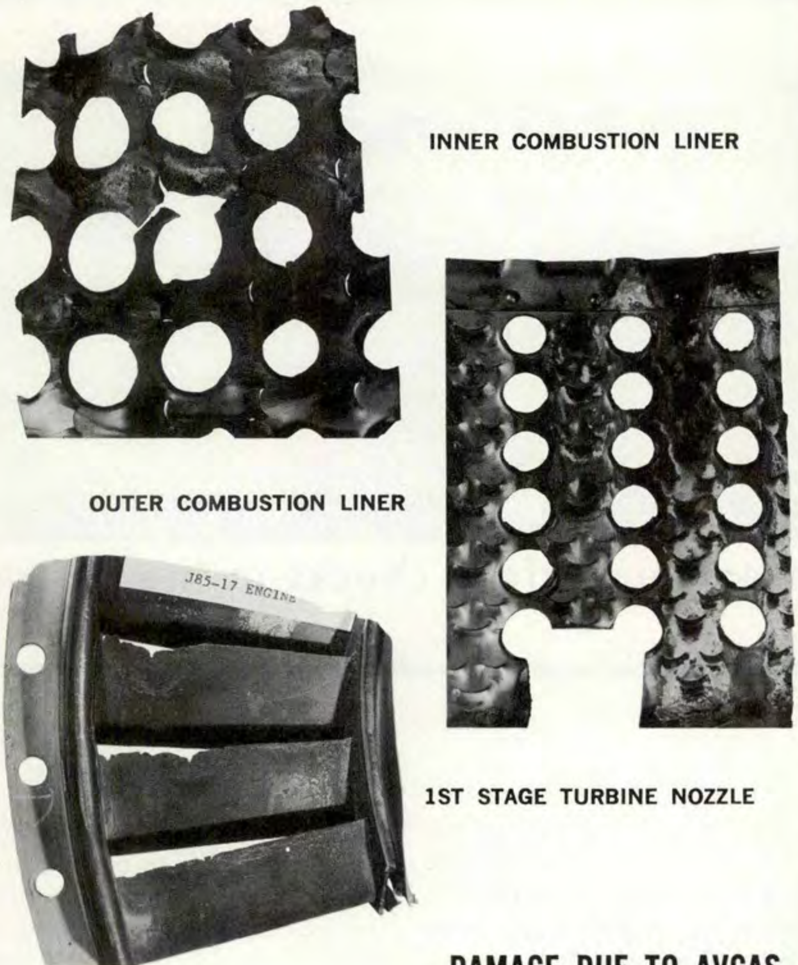
(Reprinted from ATC Safety Kit) ★



P47 THUNDERBOLT PILOTS' REUNION
IMPERIAL HOUSE, NORTH
DAYTON, OHIO
MAY 8, 9, 10, 1970
For Information Contact:
Robert Forrest
Ohrbachs Inc.
Market & Halsey Streets
Newark, NJ 07102
Telephone: (201) 643-0400

384th BOMB GROUP REUNION

The 384th Bomb Group plans to have its second reunion at the Palmer House in Chicago, July 10 through 12. For more information write to the 384th Bomb Group, Inc., P. O. Box 766, Wall Street Station, New York 10005.



DAMAGE DUE TO AVGAS

which fuel?

A serious fuel-engine mismatch occurs when a reciprocating engine is serviced with JP-4. The jet engine, however, will digest a relatively wide band of fuels, from JP-5 to gasoline within certain limitations.

Normally, the limitations involve reduced performances because of volatility differences between alternate fuels and JP-4. For example, difficulties in starting (especially air starting) have been experienced when using JP-5 in standard Air Force engines. The engines can be modified to operate efficiently on JP-5, but at a prohibitive cost.

For two very good reasons, use of gasoline as an emergency fuel in jet engines should be carefully controlled. The least critical is the lack of lubricating properties in gasoline which can affect P and D valves, governors, pumps, and fuel control operation. The more serious effect of prolonged use of AVGAS in a jet engine is extensive hot section deterioration.

There are a few recip aircraft equipped with auxiliary jet engines that burn AVGAS. They are the C-119Ks and the C-123Ks used in SEA, where a little extra thrust is always welcome. These J85-17 engines have been operated for enough hours to provide sufficient knowledge of the effects of continuous use of gasoline as fuel. The results graphically emphasize the necessity of limiting the use of gasoline to emergency operations. The difficulties include slow acceleration, hung starts, and an average of approximately 250 hours between hot section maintenance in a 400-hour periodic inspection cycle.

The accompanying pictures show deteriorated parts removed from a new J85-17 engine after only 193 operating hours. Most of the damage was caused by lead compounds in the gasoline combining with the engine base metal. This creates an alloy with a low melting point, resulting in accelerated erosion of hot section parts. Increased corrosion, including the intergranular type, is also experienced.

One or two tanks of AVGAS won't cause the damage illustrated in the pictures, but there will be some deterioration—which is the reason for gasoline being declared an *emergency* jet fuel. To prolong the life of the engine and lengthen the span of time between hot section maintenance actions, just fill the tanks with good ol' lubricating JP-4. ★

ANALYSIS OF AN INCIDENT

people problems defeated four safety checks in the system

BLC boundary layer control, on the F-4 increases lift and allows lower takeoff and landing speeds. It does this by blowing hot air from the engine over the wing and the trailing-edge flaps while flaps are extended. With flaps up, the air is shut off. But when something goes wrong, and the hot air does not shut off and is trapped in the wing by flaps in the raised position, you've got trouble.

That's how it was for an overseas F-4 crew early this year. They found a BLC warning light staring them in the face when they retracted flaps after takeoff. While they were decelerating to flap lowering speed, the warning light went out. And the "wheels" light did not flash. Normally it will flash when hot air burns through the wiring for the BLC light.

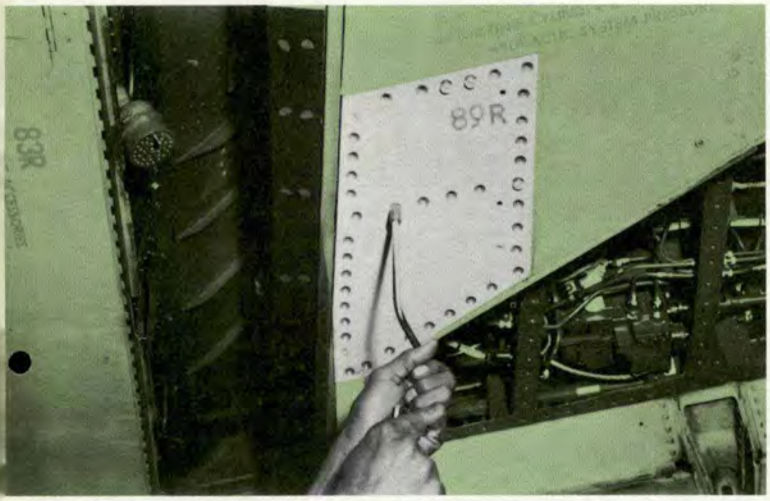
The crew, thinking the BLC valve had closed and shut off the hot air, decided to press on with their gunnery training mission.

About 20 minutes later, when the external fuel tank lights should have illuminated, the aircraft commander found the entire telelight panel was inoperative. More checking revealed that the warning light circuit breaker had popped. And it would not reset.

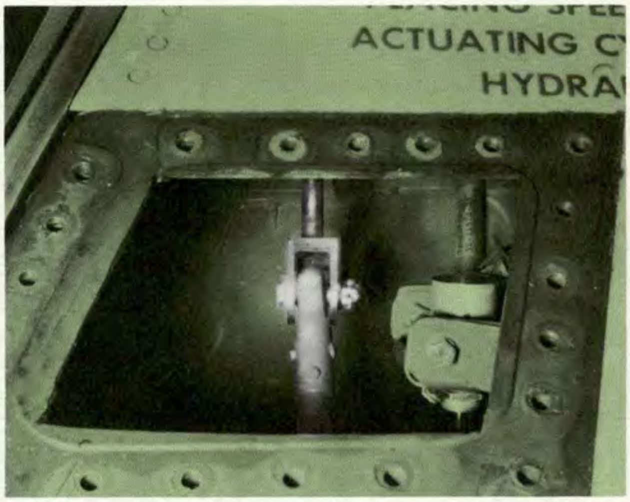
But while he held the circuit breaker in momentarily, the aircraft commander saw the "wheels" light flashing. Realizing that the components within the wing had been exposed to extremely hot 17th stage air since flap retraction, the crew immediately (and belatedly) turned for home base and tried to lower the flaps. But by now the flap circuit breaker had popped. They had to use the emergency system. Making a reduced power descent, they returned to the field and landed without further incident. Damage from the hot air required replacement of the right trailing edge flap, its actuator and BLC duct, the right BLC valve and three limit switches.

The present F-4 Dash One doesn't say anything about a BLC light that comes on when flaps are raised and then goes out in a few seconds (this one lasted about seven seconds). Previous publications have contained cautions about this type of situation, warning of just what happened to this crew. The absence of a flashing "wheels" light after the BLC light goes out does not necessarily mean that all is now okay. As in this incident, it may mean that more than just the BLC valve is damaged. And more damage will follow if you don't do something about it pronto!

Or look at it this way, when the



Door 89R was secured. Flight Line didn't inspect under it.



BLC rods on the left had been connected, but not on the right.

BLC light goes out treat it as you would a fire warning light—check the circuit.

Maintenance caused this one. The aircrew was set up for their procedural error by lack of communication between maintenance work centers and a brief, inadequate 781 write-up. Here's how it happened:

Nine days before this flight, the airplane went into maintenance for an aircrew BLC write-up. In the course of troubleshooting, all BLC rods were disconnected. A Form 781 entry was made stating, "Trailing edge and leading edge BLC rods disconnected FOM" (to facilitate other maintenance). The rods were all removed and replaced, but before the job was completed, the aircraft was moved to another work center for other maintenance. During the transfer someone secured door 89R without making an entry in the form. When flight line personnel completed their checks they signed off the forms with the entry, "TE & LE BLC rods connected." Since door 89R was secure when his troops got the airplane the supervisor assumed that maintenance had not been performed in that area and signed off the inspection without checking.

In fact, the right trailing edge valve-to-bellcrank link rod was not connected. That was why the right trailing edge BLC air did not shut off after takeoff when the flaps were raised. Normally this situation would be identified by the crew chief during the before-taxi BLC check. However, investigators found it is possible to position the trailing edge valve actuator rod in such a manner that the butterfly valve will be closed, but when BLC air pressure increases the valve is forced open. In this case the valve probably remained closed until power was applied for takeoff.

This incident occurred, or more specifically the airplane was damaged, despite four checks built into the system to prevent it. First, the requirement to record the start of the work on the BLC system as a Form 781 entry which must be cleared before flight. Second, the requirement that this work will be inspected and signed off by a maintenance supervisor to insure it is completed correctly. Third, the BLC check performed by the crew chief after the aircrew has engines running, before takeoff. And fourth, the aircrew's emergency procedure when a BLC warning light illuminates.

Each one of these checks was circumvented, the damage

ANALYSIS OF AN INCIDENT

occurred. The Form 781 entry, "TE & LE BLC rods disconnected," was not specific, accurate nor detailed enough. An entry that read "RH & LH TE & LE BLC rods disconnected," would have prompted the inspecting supervisor to look inside door 89R.

Flight line personnel, closing up the job, *assumed* that only one side had been worked on. And then the maintenance supervisor bought their assumption. To be thorough he should have checked both sides, since the original form entry did not specify one side or the other.

The crew chief's BLC check was performed the way it is supposed to be. It was circumvented by a chance positioning of the disconnected BLC rod. The oversights and omissions which preceded it invalidated the crew chief's check.

Finally, the aircrew made an assumption which permitted the damage to become as severe as it did. Perhaps, if the aircraft commander had checked the warning light circuit when he saw the BLC light go out, he would have been able to minimize the damage to the airplane by lowering flaps immediately and getting the airplane on the ground as soon as possible.

Assumptions, inaccuracies, oversights and omissions defeated the safeguards in the system which are supposed to prevent damage, accidents, injuries. Put another way, the system broke down because the people in it did less than their best.

Systems, procedures, and safety checks don't prevent accidental damage and injury.

People do. ★

The crew chief's BLC check was invalidated.

The GUNFIGHTERS of the 366th TFW are having their first practice reunion for all officer members in Tampa, Florida, 19-21 June. All members, past and present, are requested to write for details and submit their address to: "GUNFIGHTERS," Box 6586, MacDill AFB, FL 33608.

THE I.P.I.S. APPROACH

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

TRY THIS QUIZ ON FLIP TERMINAL CHARTS

1. On the profile view on an ILS approach, outer markers usually have numbers in light print. What are they used for?

a. Mandatory altitude for crossing outer marker while on ILS.

b. Altimeter check with glide slope centered.

c. Minimum altitude over outer marker for localizer only approach.

2. What is the obstruction clearance difference between Emergency Safe Altitude and Minimum Safe Altitude?

a. Emergency safe 1000′ and 2000′ in mountainous terrain.
Minimum safe 1000′

b. Emergency safe 1000′
Minimum safe 1000′

c. Emergency safe 2000′
Minimum safe 1000′ and 2000′ in mountainous terrain.

3. Some low altitude approach charts depict a minimum safe altitude while others depict minimum sector altitudes. What's the difference?

a. Minimum safe altitude is depicted when the obstruction height throughout the area is uniform.

b. Minimum sector altitude is used in mountainous terrain only.

c. Minimum safe altitude is used in mountainous terrain only.

ANSWERS: 1. b, 2. a, 3. a

AIM

Q Are we required to comply with the Airman's Information Manual (AIM)?

A No. AFM 60-16 states in paragraph 1-2 that Air Force pilots are operationally governed by 60-16 as supplemented by appropriate authority, FLIP, USAF Foreign Clearance Guide, NOTAMs, Aircraft Flight Manuals and instructions issued by air traffic control agencies. However this does not preclude Air Force pilots from becoming familiar with the AIM. There is considerable information of worth for all pilots.

WEATHER FORECAST

Q The weather forecaster put a forecast of intermittent 100 feet obscured and 1/4 mile visibility in the destination forecast block on the DD Form 175-1. In the Remarks block he forecasts a prevailing condition for the destination of 500 feet overcast and one mile visibility. With published minimums of 200 and 1/2 can I legally file to that destination?

A Yes. AFM 60-16, 17 July 1969, cleared up several "gray areas" about destination and alternate weather requirements for IFR flight. These requirements can be summarized as follows:

1. Use prevailing conditions to determine if your destination is above minimums for filing purposes. (AFM 60-16, par 8-4, NOTE)

2. Designate an alternate if the *worst* forecast condition (prevailing or intermittent) at your destination is less than 3000 feet ceiling and three miles visibility or two miles more than the lowest published landing minimum, whichever is greater. (AFM 60-16, par 8-5)

3. To determine if an airport will qualify as an alternate, use the worst (intermittent or prevailing) conditions forecast. (AFM 60-16, par 8-6)

In most situations, forecasts for intermittent conditions will be for lower weather than prevailing. Air Force pilots will use the worst (intermittent or prevailing) forecast as the determinant for filing requirements in all cases, except for determining if the proposed destination is above minimums.

The Air Force rationale is to provide the pilot with maximum latitude when selecting a destination while insuring that an alternate is available in the event conditions deteriorate while enroute. The IPIS would remind all pilots that there is no better way of updating weather forecasts than PFSV and Flight Service. ★

The critical time in an instrument approach with restricted visibility is when the pilot transitions . . . .

from instrument to contact

Maj Donald L. Carmack, Test and Evaluation Branch, IPIS
Randolph AFB, Texas

Transition from instrument to visual conditions during an approach in obscured weather is seldom distinct. This type of weather presents pilots with a number of problems not encountered during an approach that is either hooded or has a cloud base ceiling. At the point where the hood is pulled or the aircraft breaks out below the ceiling, the visual cues used to control the aircraft are usually clear and distinct, and there is instantaneous recognition of the position of the aircraft in relation to the runway.

With obscured ceilings or partially obscured conditions the reverse is usually true; visual cues are indistinct and easily lost. Discerning aircraft position laterally and vertically in relation to the runway is difficult. It is essential to consider every factor that might have a bearing on the final stages of an approach and landing, e.g., the visibility, type of weather, expected visual cues and even crew procedures and coordination. Preparation and understanding are keys that will make the transition smooth and precise; to accomplish the transition safely and routinely, the pilot must have a thorough understanding of the weather environment and how it affects the availability and use of visual cues.

RESTRICTIONS TO VISIBILITY

Rain, smoke, snow, haze restrict visibility but the most common restrictive element is fog, which may be encountered in a number of different forms, each with its own particular hazards. When visibility restrictions exist and the sky is totally hidden from the observer, the sky is reported as obscured and the reported ceiling is the vertical visibility from the ground. A pilot executing an approach in an obscured condition will not normally see the approach lights or runway environment as he passes the level of the obscured ceiling. He should be able to see the ground directly below him; however, the transition from instrument to visual flight will occur at an altitude considerably lower than that reported for the vertical visibility.

In partially obscured conditions, vertical visibility is not reported since the ground observer can see through the obscuration or a portion of the sky is not hidden by the obscuring phenomenon. But when clouds are visible with a partial obscuration their heights and amounts are reported. The amount (in tenths) of the sky or clouds obscured by a partial obscuration is included in the remarks section of weather reports. Although this may help clarify the reported conditions, it still does not provide an idea of the height at which visual cues will be sighted or give the slant range visibility. In some cases the partial obscuration can be associated with shallow patchy fogs, so the pilot can expect to lose visual references once the fog is entered.

Also of concern to the pilot is the visual range at which he will be able to discern visual cues for runway alignment and flare. He must be aware that the reported runway visibility or runway visual range (RVR) may not be representative of the range at which he will sight the runway. In fact, the pilot's slant range visibility may be considerably less than the reported RVR. Another factor that he must consider is the decrease in the visual segment due to an aircraft's downward vision angle (angle from the pilot's eyes over the aircraft's nose measured from the horizontal). This also may be several hundred feet.

Once all of these factors and the destination weather are understood, the pilot will possess the knowledge to effect a safe, smooth transition from instrument to visual flight. Restrictions to visibility Air Force pilots may encounter include, but are not limited to, the following:

Shallow Fog: Seldom exists to a height of over 200 feet and is usually associated with partially obscured conditions. Since the fog may be patchy, it is possible that the visual segment may vary considerably during the approach and rollout. Also, the pilot may be misinformed if RVR is measured by a transmissometer located in an area of good visibility.

The most serious problem with this type of fog stems from the abundance of cues at the start of the approach. The pilot may see the approach lighting system and possibly even some of the runway environment during the early stages of an approach. However, as the fog layer is entered, most or all the cues may be lost. If the pilot is not flying instruments, he may become confused and disoriented. In the shallow fog condition, pilots should not rely entirely on visual cues for guidance. They can be brought into the cross-check to confirm position, but instrument flight must be maintained until visual cues are perceived and can be kept in view, and the runway environment provides sufficient references for flare and alignment.

Deep Fog: Exists to a height of several hundred feet and is usually associated with obscured conditions. The pilot will not normally see cues during the early portion of an approach. More likely, he will view cues from only the last one thousand feet of the approach lighting system. With a U.S. Standard A approach lighting system, in rapid succession he will probably see cues from the thousand foot bar, the last one thousand feet of the centerline approach lights, red terminating bar, red wing lights, green threshold lights and the high intensity runway edge lights.

At night if the strobe lights are on, they may produce a blinding effect. Landing lights may do the same. The transition from a deep fog approach involves the integration of visual cues within the cross-check during the latter portion of the approach. Again, it is essential to be thoroughly familiar with the approach lighting system in order to develop the proper perspective between these cues and the ensuing runway environment.

Cloud Base Fog: Usually forms above the surface of the runway and is associated with low ceilings. Since this type fog forms more of a definite ceiling, better visibilities can be expected once the ceiling is passed. Therefore, the transition from instrument to visual flight is sharper with more pronounced use of visual cues after passing the ceiling. Night approaches may produce the sensation the aircraft is high once the cloud base is passed. The pilot should continue on instruments, cross-checking visual cues to confirm runway alignment. During flare the pilot may experience a sensation of descending below the surface of the runway. This will be especially pronounced at facilities with 300 foot wide runways. In either case, the pilot must avoid large attitude changes which

from instrument to contact

CONTINUED

might produce a duck-under or over-rotation.

Sea Fog: In most fogs the pilot expects very little wind and is not too concerned with side slip or decrab procedures. Sea fogs, however, can present pilots with wind and turbulence problems not associated with other fogs. Because of the turbulence, it is more difficult to maintain precise instrument flight, and the pilot can encounter sea fogs with characteristics similar to shallow, deep or cloud base fogs. The characteristics of sea fog are related to the wind speed, for the fog deepens as the wind speed increases. Winds greater than 15 knots usually form a cloud base fog, due to the lifting action of the turbulence.

The pilot's best procedure is to be aware of the conditions which might be encountered and to integrate visual cues within the cross-check during the latter portion of the approach. Since crosswinds do exist, the pilot must be prepared to decrab while avoiding large attitude changes which might produce an undesirable touchdown attitude. Also, airspeed must be more closely monitored because of the effects of turbulence and the decrab.

Ice Fog: Most common to the arctic region; however, can occur in other areas if the air temperature is below about —25°F. It consists of a suspension of ice crystals in the air and is mainly an artificial fog produced when hydrocarbon fuels are burned. When there is little or no wind, it is possible for an aircraft to generate enough fog during landing or takeoff to cover the runway and a portion of the field. When atmospheric conditions are such that ice fog may form, careful preflight planning is a must.

Rain: Approaches and transition to visual flight can be very hazardous since moderate to heavy rain conditions may seriously affect the use of visual cues. Night approaches in these conditions can be even more critical as the pilot may be blinded by flashing strobes or runway end identifier lights. Transition to visual flight can be severely hampered by the pilot's inability to adequately maintain aircraft control and interpret his instruments in gusty or turbulent conditions. Moderate or heavy rain can render the rain removal equipment ineffective and cause obscuration of visual cues at a critical time during the transition. In these conditions the pilot must have an alternate course of action and be prepared to act without hesitation.

Snow: Blowing snow is accompanied by many of the same hazards as rain, such as turbulence, difficulties in reading the flight instruments, obscured visual cues and aircraft control problems. Of special interest will be a lack of visual cues to effect runway identification for the visual portion of the approach. The approach and runway lights will provide some identification; however, runway markings and the contrast between the runway and its surroundings will be lost in the whiteness. Depth perception may be difficult; therefore, the pilot must place more emphasis on instrumentation for attitude control. It is extremely important to avoid large attitude changes during approaches in snow.

VISUAL CUES

Approach lights, runway markings, lights and contrast are the primary visual cues. At some facilities touchdown zone and centerline lights may also be available. To be effectively prepared for the transition to visual flight, the pilot must become familiar with the lighting and marking patterns provided at his destination and correlate them with the weather. In minimum visibility conditions, the visual cues and references for flare and runway alignment are extremely limited compared to the normal references the pilot uses during a visual approach. Therefore, projected touchdown point may not be within the pilot's visual segment until he is considerably below published minimums. Any abrupt attitude changes to attempt to bring the projected impact point into the pilot's visual segment may produce high sink rates and thrust/lift management problems at a critical time. These so-called duck-under maneuvers must be avoided during the low visibility approach.

Another type of duck-under is encountered when the pilot attempts to land within the first 500 to 1000 feet of the runway after breaking out of an overcast. In this case the pilot attempts to establish a visual profile similar to the one he uses most often. Establishing the visual profile usually involves power reduction and an attitude change to aim the aircraft at some spot short of the end of the runway. In this maneuver a pilot attempts to use as much of the available runway as possible and justifies the maneuver due to shortness of the runway or poor braking conditions. This type of maneuver is not recommended since high sink rates and poor thrust relationships can develop which may cause undershoots or hard landings. The pilot should base his landing decision upon the normal touchdown point from the instrument approach and, if stopping distances are insufficient, proceed to an alternate.

DOWNWARD VISION ANGLE

There is an area which the pilot cannot see from the cockpit because it is hidden by the nose of an aircraft. If a line from the pilot's eye is projected over the nose of his aircraft, this line will form an angle with the horizontal determining the pilot's downward vision angle. The area hidden from the pilot's view can then be determined from a trigonometric relationship based on aircraft elevation and cockpit cutoff angle. An aircraft with a 14 degree downward vision angle 100 feet above the surface will conceal about 400 feet beneath its nose.

Consider an approach in 1600 feet visibility. This means the pilot's visual segment at 100 feet elevation with a 14 degree downward vision angle will be reduced to about 1200 feet. Other factors, such as a nose-high pitch attitude and a slant range visibility less than the RVR, can further reduce the pilot's visual segment.

PILOT REACTION TIME

At 100 feet elevation on a three degree glide slope an aircraft is approximately 1900 feet from the glide path intercept point (GPIP). If your aircraft's final approach speed is 130 knots (215 feet/sec) you have about nine seconds to bring visual cues into the cross-check, ascertain lateral and vertical position, determine a visual flight path and establish appropriate corrections. More than likely, three to four seconds will be spent integrating visual cues before making a necessary control input. By this time the aircraft will be 600 to 800 feet closer to the GPIP, 40 to 60 feet lower and possibly well into the flare. Therefore, it is absolutely essential that you be prepared to use visual cues properly and with discretion during the final stages of a low visibility approach. You must be positive the patterns developing during the visual cross-check are related to the runway environment and that your visual perspective for flight path control is adequate prior to total reliance on the visual information.

CREW PROCEDURES

A fully qualified and proficient copilot can be used to assist the aircraft commander in a number of ways. He can fly the approach, control airspeed, be responsible for communications, direct the checklist, perform the missed approach, establish aircraft configurations or any other duties assigned by the aircraft commander. However, it is essential for the copilot to understand exactly what his duties and responsibilities are prior to initiating the approach.

One successful technique has been to allow the copilot to fly the approach, while the aircraft commander makes the decision to land/go-around at decision height, saying either "go-around" or "I have the aircraft." He assumes control if a landing is to be made; if not, the copilot executes the go-around. This procedure has unburdened the aircraft commander, allowing him more time to obtain information from the visual cues for landing.

If the approach is unsatisfactory or insufficient visual references are available to execute a landing at decision height, the copilot, since he is on instruments, is prepared to execute a missed approach on command. If the aircraft commander executes the approach, he may allow the copilot to control power-/airspeed until decision height where the aircraft commander assumes control for the landing or missed approach.

Studies of the low visibility landing environment and a series of flight tests by IPIS pilots, in conjunction with the Air Force Flight Dynamics Lab, have been probing a regime of flight few pilots are familiar with. It is immediately obvious that we must thoroughly understand this demanding environment, develop new procedures to cope with it and train crews to a peak of proficiency if we are to progress into regular landings in Category II, and eventually Category III weather. ★

PROPER MAINTENANCE AND OPERATION WILL PROLONG THE LIFE OF

T-39 engines

Maj Ray D. Rittenhouse, Directorate of Aerospace Safety

The T-39A and B airplanes are powered by a pair of Pratt and Whitney turbojet J60-P-3 or -3A engines. These engines have proved their reliability, but field reports occasionally indicate a need for further amplification of maintenance and operational procedures.

At one base, engines were being trimmed for 100 per cent thrust with the throttles full forward against their mechanical stop. When this procedure is used, adequate thrust for takeoff may not be obtainable under certain ambient temperature conditions. At another base, throttle adjustments were not being made during climbs to altitude. This practice can lead to engine overboost. Exhaust total pressure should always be computed periodically during the climb, and the throttles adjusted accordingly.

The J60 engines are defined as "flat-rated" engines and when properly trimmed, military thrust for takeoff will be obtained at something less than the full-open throttle position. The basic design of the fuel controller and the parameters it senses are such that, to obtain the required thrust for the varying ambient conditions, the pilot must have available a range of throttle travel. To produce maximum allowable thrust from the engines, the engines must be properly trimmed.

Engine trimming is a maintenance function performed by adjusting the fuel control. The maintenance trim check, commonly referred to as a "part-power trim check," will permit the pilot to obtain military thrust at less than full throttle under a wide variety of ambient conditions.

The frequency of part-power trim checks is given in the Manual of Inspection Requirements TO 1T-39A-6. The procedures for accomplishing these checks are given in TO 1T-39A-2-2 "T-39A and T-39B Engines and Related Systems," and TO 1T-39A-2-3-1, "T-39A and T-39B Power Plant Ground Operation and Conditioning."

For proper operation of the J60 engine, there are three basic limits which are to be observed: exhaust total pressure (Pt5), exhaust gas temperature (EGT), and RPM. If any one of the three is exceeded, the throttle should be retarded until the engine is again within proper operating range. This is true for both normal rated and military thrust settings.

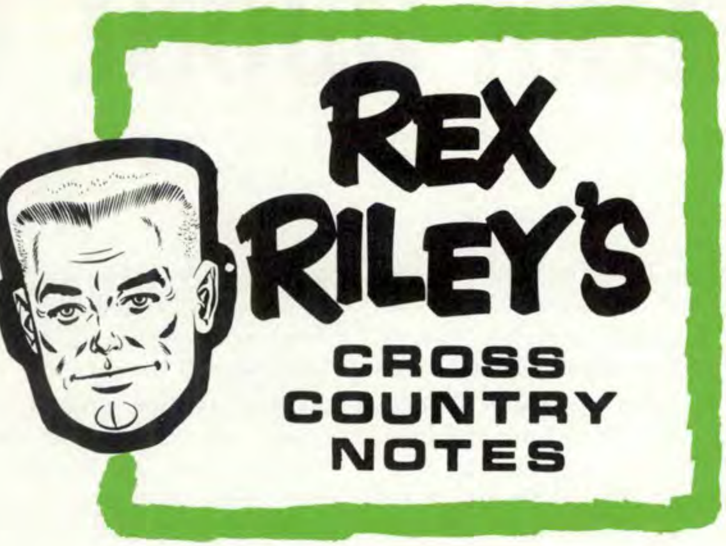
The Pt5 gages in the cockpit are the primary instruments for setting engine thrust; Pt5 is the measurement of total pressure (just aft of the turbine wheel) in the engine. To obtain the proper Pt5 value, before setting the throttle, use (1) the J201 engine thrust computer, (2) the graphic charts in Appendix 1 of the Flight Manual, TO 1T-39A-1, or (3) the tabular charts in the Pilot's Checklist. The computed Pt5 is just as much an engine "red line" limit as the red line EGT or RPM limit and is normally the first indication you will see as the throttle is advanced.

During a military thrust scheduled climb, if the EGT limit of 677°C is exceeded, the pilot should retard the throttle to lower the EGT as explained in the "Operating Limitations" section of TO 1T-39A-1. When this is done, the EGT becomes the governing limit.

The same would apply for a normal rated thrust scheduled climb; however, excessive EGT at normal rated thrust (over 565°C) is not as detrimental as excessive EGT during military thrust. An engine that has a tendency to exceed its EGT limit before achieving the Pt5 value limit may be malfunctioning because of one of the following: dirty engine (deposits causing hot spots), improperly functioning burner, defective fuel nozzle, broken or out-of-rig bleed strap, or faulty instrumentation. The EGT cannot be decreased by advancing the throttle except, possibly, in the case of an engine with a malfunctioning burner or fuel nozzle (giving a hot spot at some particular thrust setting).

Engine life is shortened by "overboosting." An overpressure or overboost condition can occur when a normal rated thrust or military thrust climb is being performed without the throttle being reset from the initial setting selected for the recommended climb schedule. In such case, temperature variation with altitude change can result in a higher Pt5 than the chart limit. Therefore, it is necessary that Pt5 be monitored during the climb to avoid engine overboost.

When any engine limit is exceeded, the life of that engine is shortened. The amount of harm done depends on (1) which limit has been exceeded, (2) how much it was exceeded, and (3) how long it was exceeded. ★



TRANSIENT MAINTENANCE people on bases throughout the Air Force can be proud of the accident-free flying record being compiled by Facility Checking Squadrons of Air Force Communications Service.

Flying world-wide while checking NAVAIDS and Air Traffic Control facilities, their T-33s, T-39s, C-140s and C-47s are constantly on transient status at the bases they are checking. The 1866th FCS recently completed its eighth year without an aircraft accident since activation in 1962. The 1867th, 1868th and 1869th concurrently completed five straight years without an aircraft accident.

This record attests to not only the excellence of the AFCS aircrews and maintainers, but the general high quality of USAF transient services around the world.

SOME FOLKS just won't give up! Like the C-130 type trying to park in front of the terminal building at a Navy base. Following a marshaller's signals, he started a right turn into the parking place. In the turn it looked like the building was coming awful close to his left wingtip. But another marshaller was out there, watching the wingtip and a drainpipe that protruded from the building. Knowing that these alert troops would stop him if things got too tight, he pressed on.

And soon both marshallers were giving him the stop signal. The lumbering transport continued to move, and both marshallers switched to the emergency stop signal. The NAVY emergency stop signal!

After his wingtip struck the drainpipe, the C-130 pilot decided to taxi on up to the parking place. It wasn't until he'd moved another 30 feet that he took out the second drainpipe.

Then he stopped and shut down.

If you plan to land at a non-USAF field, look up the appropriate signals. FAA, Navy, Army and ICAO stop signals are not the same as ours!

And unless you have really strong feelings about drainpipes, how about just settling for one at a time . . . ?

THE

REX RILEY
Transient Services Awar

LORING AFB	Limestone, Me.
McCLELLAN AFB	Sacramento, Calif.
MAXWELL AFB	Montgomery, Ala.
HAMILTON AFB	Ignacio, Calif.
CHANUTE AFB	Rantoul, Ill.
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.
HICKAM AFB	Hawaii
LUKE AFB	Phoenix, Ariz.
RANDOLPH AFB	San Antonio, Tex.
ROBINS AFB	Warner Robins, Ga.
TINKER AFB	Oklahoma City, Okla.
WETHERSFIELD AB	England
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.
WRIGHT-PATTERSON AFB	Dayton, Ohio
LITTLE ROCK AFB	Jacksonville, Ark.
TORREJON AB	Spain
TYNDALL AFB	Panama City, Fla.
OFFUTT AFB	Omaha, Nebr.
ITAZUKE AB	Japan
ANDREWS AFB	Washington, D.C.
McCONNELL AFB	Wichita, Kans.
NORTON AFB	San Bernardino, Calif.
BARKSDALE AFB	Shreveport, La.
HOMESTEAD AFB	Homestead, Fla.

experts talk about tho

CLEAN OIL SYSTEMS

G. F. Heins, SAAMA (SANTTB), Kelly AFB, Texas

An engine oil system is in some ways similar to the human blood system. Impurities in either will cause serious trouble, so let's look at this vital lifeline for the engine.

The life of a reciprocating engine is lengthened by using care in starting and taking adequate warm-up time before operation at advanced power settings. It is very important to give all engine parts enough time to expand to designed operating clearances and to permit the oil to heat and thin to the right viscosity. This insures good lubrication, cushioning and cooling.

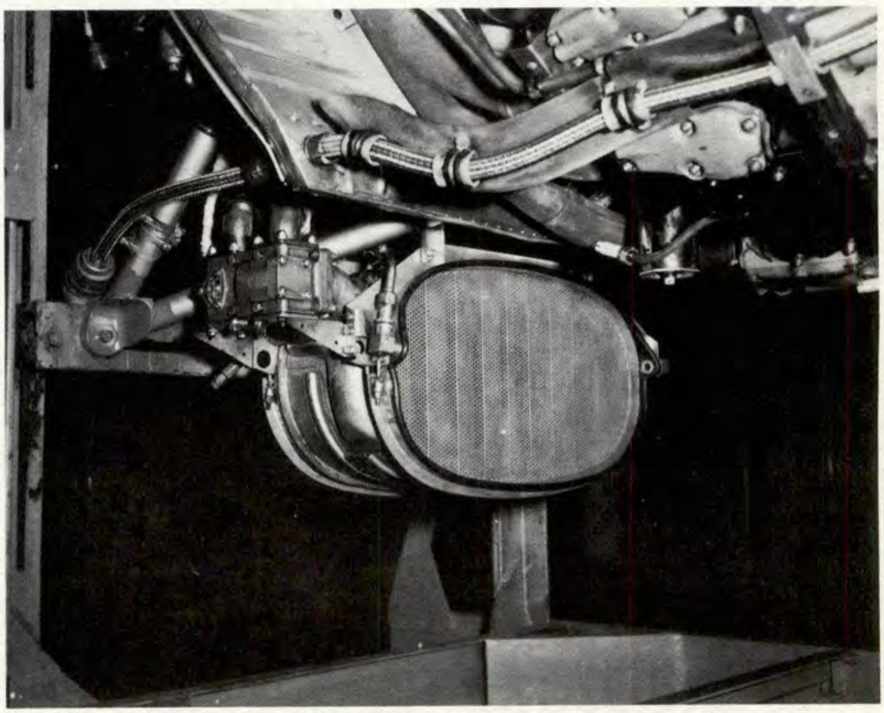
Proper and continuous lubrication in the cylinder area is particularly important when you consider "piston miles per operating hour." The Air Force has always been concerned with long cylinder barrel life, ring wear, deposits and general engine cleanliness which affect barrel life. Excessive and rapid piston ring wear often develops into ring feathering. Feathered rings result in blow-by which shortens the life of the cylinder and leads to excessive oil consumption.

Dirt, sand, dust and other impurities which enter the engine cause damage to master rod and other bearings, as well as the cylinders themselves.

Initial engine runs are extremely important. It is during this wearing-in that ring fuzz is generated from the piston rings. This fuzz damages cylinder barrels, bearings and other close tolerance areas. It will also get into chip detectors and lead to a warning light. When this occurs in flight on a tactical mission, the pilot must jettison stores, declare an emergency and land as soon as possible.

To minimize mission aborts caused by chip warning lights, oil should be changed per TO directions with particular attention to cleaning oil screens. If desired, local inspection criteria may require oil change on a more frequent basis, to eliminate fuzz or dust and dirt from unprepared fields. Oil changes are cheaper than aborted missions or letting harmful deposits ruin engines. ★

Keeping oil screen clean will allow it to function properly.



Clean, unobstructed oil cooler is essential if oil system is to perform effectively.

se round engines PART II

THOSE R-2800 CYLINDER FAILURES

C. A. Saathoff, SAAMA
(SANTTA), Kelly AFB, Texas

During 1968 a problem of piston rings scuffing cylinder barrels developed, resulting in many premature engine failures. An investigation showed that oil scraper rings did not have sufficient radius incorporated and that the inadequate radius caused the scuffing. This was noticed primarily during the first hours of operation.

The problem was alleviated by removing all defective rings from stock, vapor honing barrels number 8, 9, 10 and 11, lubricating cylinder barrels and pistons with a mixture of engine oil and an anti-friction additive during assembly, and borescope inspection after test block run.

Cylinder head cracks were the result of cyclic loading and time. (The term cyclic loading is defined as the magnitude [power] of the cycle, frequency of the cycle, and temperature change applications.) From this it can be seen that short missions are harder on engines than long ones. Cyclic loading is at maximum during takeoff when the frequency of the cycles is increased and extreme temperature changes are encountered. Under these conditions, cylinder heads age rapidly.

During overhaul every effort is made to put the newer cylinder heads in the most critical locations on the engine. To detect cracks, engine overhaul specifications were changed to require use of improved magnification equipment on all heads. In addition, specifications now call for new or non-rebarreled cylinders in critical positions such as the numbers 2 and 18 positions on all R-2800 engines and 1, 2, and 18 position on the -99W engine.

Many failures were due to low compression. Therefore, Dash 6 inspection requirements will be changed to require a compression check during each phase inspection. All cylinders having less than 50 psi compression will be replaced. Normal inspection and maintenance still cannot be overemphasized.

Broken cylinder hold-down bolts and studs have been encountered on engines which have been operated beyond Tech Order limits. Many of these failures have been experienced in SEA because of the operational environment and mission requirements. Failures can also result from loose or improperly torqued cylinder hold-down nuts. At the time of overhaul each stud and bolt is checked for stretch and any that are not within specifications are replaced. If a nut is found loose or a stud has failed, that stud and the two adjacent studs are replaced. When more than two adjacent studs have failed, or more than two adjacent nuts are known to have been loose during engine operation, all studs on that pad are replaced. ★

Cylinder compression tests reveal ring or valve failure.

Borescoping is effective method for detecting internal failure.

WELDING SAFETY

Carl S. Norstedt, Directorate of Aerospace Safety

Welding is a process used in day to day repair of Air Force equipment, from planes to PSP. And welders are important people in keeping this huge assortment of hardware moving in the right direction. Most welding is routine — no problem. But occasionally there is an accident. Hence this article.

Welding is required for a variety of items, large and small, involving many different shapes of both ferrous and nonferrous metals. Also the welding torch is used as a cutter. In addition, there are a number of methods, such as oxygen-gas (acetelyne and hydrogen), electric resistance welding using copper electrodes, and arc welding with carbon or metal electrodes. Gas shielding is used to prevent metal oxidation. Extremely high temperatures are involved, up to 9400°F. Obviously, welding is not a task to be haphazardly approached.

Successful welding depends not

only on design considerations, but also on environmental conditions such as accessibility and safety. If the design favors welding as the means of repair, and if the welding can be accomplished in place, this is usually the least expensive and most desirable means.

For any type of welding the most serious hazards are the possibility of fire, noxious gases, and physical burns. If the welding must be done at any location other than the welding shop, these hazards must be given full weight in deciding how and where the job will be done. The main concern is, of course, the health and safety of the workers. However, there is also the problem of possible fire damage to the equipment and structure, or damage from an explosion generated directly or indirectly by the welding process. The smaller and more restricted the work area, the greater the possibility of damage and injury.

Injuries commonly seen include eye damage from extremely bright arc flashes or grinding. Hot slag causes burns; respiratory damage may occur from gases and fumes. Hands, arms and legs are subject to cuts from rough or sharp edges, or hands and feet may be crushed by heavy objects. Strains and sprains occur from handling heavy metal items or from falls from ladders and high work places. Head injuries occur in close work areas or during overhead work unless the welder is careful in moving around.

Electric shock is a possibility that is largely within the control of the welder; therefore, it is especially important that he be thoroughly instructed in detail on how to avoid shock. Because welding voltages do not always cause severe injury or shock, they are apt to be handled carelessly. But these voltages are sufficiently high that, under some circumstances, they may be dangerous. Even mild shocks, not dangerous in themselves, from normal working voltages or from high frequency stabilizers, can cause involuntary muscular contraction, leading to injurious falls from high places.

Severity of shock is determined largely by the path and amount of current flowing through the body and this, in turn, depends on the voltage and contact resistance of the area of skin involved. Clothing damp from perspiration or wet working conditions can so reduce contact resistance that an imperceptible current may increase to a value high enough to cause violent muscular contraction that could prevent the welder from letting go of the live part.

The welder should never permit the live metal parts of an electrode holder to touch his bare skin or wet clothing. He should also protect himself from electrical contact with the work or ground with dry insulating material, particularly when working in a sitting or prone position. Dry gloves are also recommended. He should not use electrode holders for manually shielded metal-arc welding without well-insulated jaws in good repair. Electrode holders must not be cooled by immersion in water. Water-cooled holders for gas tungsten-arc and gas metal-arc welding must not be used if any water leak exists.

Special precautions should be taken to prevent shock-induced falls when the welder is working

Poor example! Heliarc fuses should be properly shielded and mounted to prevent damage, assure easy access.

Proper venting is essential for heliarc welding in confined areas.

above ground level. Never coil or loop welding electrode cable around parts of your body. Don't use cables with splices within 10 feet of the holder.

MAINTENANCE

Proper maintenance of arc welding equipment is a must, as are periodic inspections. Report any equipment defect or safety hazard to your supervisor and don't use unsafe equipment. Repairs should be made only by qualified personnel.

Rotating and moving components should be kept properly lubricated. Work and electrical lead cables should be frequently inspected for wear and damage. See that cables with damaged insulation or exposed bare conductors are replaced. Joining lengths of work and electrode cables should be done by use of connecting means specifically intended for the purpose. The connections must have insulation adequate for the service conditions.

PROTECTION OF THE AREA

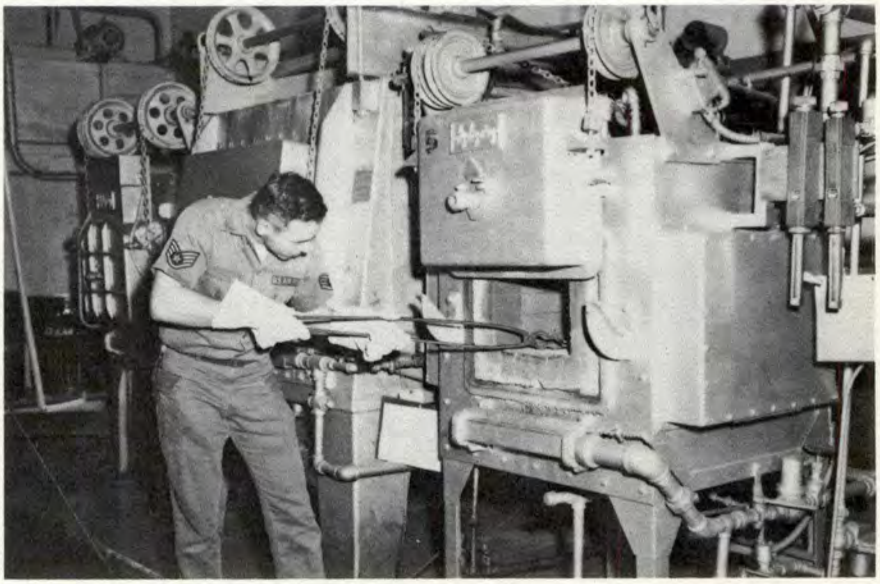
Detailed written procedures should be prepared to cover handling of flammable materials. (Some areas to be covered are the use of explosimeter tests, blanking off main line connections, providing for fire extinguishers, and leaving vessel joints open to the atmosphere.)

The necessary welding blankets should be strategically located, and any vessels and open lines should be purged as required by applicable safety codes. Cylinders should be secured to carts, walls or structural posts.

Good housekeeping demands the use of warning tags to prohibit use of oil or grease on oxygen cylinder mechanisms. Don't permit anyone to handle cylinders with greasy hands, gloves, clothing, or tools. Hose lines must be kept off the floor or ground, away from oils and possible damage. Pressure gages, hose lines, and connections should be inspected regularly.

For portable operations a fire watch should be posted and equipped with necessary extinguishing aids such as water, sand, and the proper type of extinguishers. He may need to remain at least an hour after the job is completed and check periodically thereafter.

Carelessness and ignorance in welding can and has caused catastrophes. But with proper supervision and controls, welding can be a safe operation. ★



Removing item that has been heat treated from furnace. Note man in lower photo is wearing long sleeves, mask. SSgt in upper photo is unnecessarily risking injury.

Toots

is interested in your problems. She spends her time researching questions about Tech Orders and directives. Write her c/o Editor (AFIAS-E1), Dep IG for Insp & Safety, Norton AFB CA 92409.

Dear Toots

I am perplexed, please help me out. I am an instructor in the Aircraft Maintenance Officer Course at Chanute AFB. I teach the 781 series forms. Recently, through the grapevine and AFR 0-9, we learned of a new form, the AFTO 781M. I have several questions which you may be able to assist me with.

First, why are we in Air Training Command not informed of pending changes in forms, TOs, etc., and given the philosophy behind the change? The initiation of the 781M is just an example of what seems to be a recurring situation. The first example was the AFTO 781B when it was replaced by the AFTO 781J and AFTO 781K. We were not provided with any advance notice hence were in a "fog" for a while. Now we have the 781M. Why? What do we place in the rear cover of the aircraft forms binder now, the AFTO 781M or the AFTO 781G?

Is there any way a better information flow can be achieved between the origination of the revised forms, TOs, etc., and people here at the Aircraft Maintenance Officer Course?

Teach

Dear Teach

You are in a quandry!! I agree—it would seem that the Training Command should be consulted prior to any change to an AFTO form, especially if it is a form that is being taught. However, I suggest that you have your Publications Distribution Officer get the Publication Bulletin (P.B.) for you. It is distributed weekly and lists all new and/or revised forms along with their intended purpose. New forms usually appear in the P.B. 30 to 60 days prior to distribution.

In reply to your second question, the 781M is a new form and does not replace the 781G. Its purpose, as stated in the P.B., 2 May 1969, is to record status symbols, system numbers, and system titles to be used to record data pertaining to discrepancies encountered during flight to support the AFM 66-1 Data Collection.

Toots

EXPLOSIVES SAFETY

FOR SUPERVISORS

IT IS axiomatic that you do not assign a person to work on an aircraft unless he is qualified to perform the task assigned. Yet accidents and hazardous incidents continually occur because someone did not follow this precept.

Case in point: An airman was sent to place a cushion in the rear seat of a T-38. The canopy was closed and, not knowing his business, the man thought the way to open it was by pulling the external jettison handle. When he did, the canopy jettisoned.

Moral: Supervisors who make assumptions while making assignments can expect trouble.

MA-4A BOMB RACKS

RECENTLY an F-100 activity started having difficulties with its MA-4A practice bomb racks. Although everything appeared in working order before takeoff, the pilots were unable to get bombs to release from the racks. The rack electrically unlocked in each case, but the mechanical locks did not release and the hooks did not open. When two of the racks were submitted to the AMA for investigation, it was discovered that the hooks released sluggishly. A load of 10 to 15 pounds was required to open the hooks. These hooks should snap open when the rack is in good condition. It didn't take long for the investigators to determine that the hooks were sluggish because the racks were dirty.

Functional checks of the racks need to be emphasized. If the hooks don't snap open when they're released, either the mounting bolts have been overtightened, or the racks are dirty. Training and supervision can quickly eliminate both these causes for malfunction.

STATIC CHARGES

MUNITIONS PEOPLE in a SEA unit recently were surprised to find that a static electric charge had built up on adapter boosters they were unpacking from foamed plastic containers. During unpacking, handlers were receiving discharge sparks up to three-eights inch long.

Apparently the static charges were built up when items shifted within the packing containers during the shipment.

On the same base, similar static charges were noticed when ATU-35A/B arming vanes were being unpacked. Since these vanes are non-explosive items, the main damage would probably result from the handler receiving a charge, making an abrupt motion and dropping the item.

Also when the ATU-35A/B arming vane case lid was removed, gas under pressure was heard to escape and ignition of the container occurred. The container is made of foamed plastic sealed in barrier paper inside a pine box.

An ALSAFECOM message from the Directorate of Aerospace Safety recommends discharge of static electricity when a charge is evident or suspected and that the contents be grounded. Also individuals should discharge themselves or equalize their static potential to that of the explosive item being handled.

DANGEROUS SOUVENIRS

AN AIRMAN attempted to fabricate a souvenir ashtray by soldering a "live" 20mm HEI projectile to a used 20mm cartridge case. The intense heat of the torch detonated the projectile. The airman received minor injuries.

This airman had been personally warned of the hazards of collecting and altering munitions for souvenirs, in addition to periodic warnings via bulletin boards, etc.

In a similar mishap a sergeant obtained a 20mm shell which he planned to make into an ashtray. Working at his desk, he sawed the cartridge in half and poured out the powder. Then he went to work with an electric drill. While drilling through the base of the projectile it exploded, severing part of his left hand and causing facial injuries. The explosive was detonated by heat from the drilling process, not from actual penetration of the drill bit.

The admonitions on the sign over the sergeant's desk, shown in the accompanying photo, obviously did not overcome his ignorance or his carelessness.

FALLING FLARES

EVEN THOUGH the loading crew was adhering strictly to established procedures, they allowed a MK-24, Mod 4 flare to slip while loading SUU-25B dispensers. The flare fell and actuated causing damage to adjoining dispensers and flares. The 16°F temperature may have contributed, although the crewmembers were wearing gloves.

The crewmember involved thought the flare was inserted far enough to keep it from falling. It wasn't. As a preventive action, the unit built a table containing an extension of the chute which would aid in positioning flares for insertion and also prevent flares from falling.

SOUVENIRS AGAIN

DESPITE RESTRICTIONS and continuing education against individuals carrying explosive souvenirs aboard aircraft such incidents still occur. Most recent case involved two MK-1, Mod 2 illuminating grenades that were found on an aircraft carrying passengers. One grenade was found just prior to taxi for takeoff, the other during an ensuing search by EOD personnel.

The possible consequences of carrying explosives of this nature aboard passenger-carrying aircraft are extremely serious. Continuing education by supervisors is essential, along with the exercise of common sense on the part of anyone contemplating such an action.

WHO'S RUNNING THE STORE? The crew of two, an IP and pilot, were taking off in an O-1 when the small bird wanted to go to the left. The pilot got it straightened out, but the bird was determined to go left so he used right brake. The IP (in the back) thought, enough of this, and decided to abort as the aircraft neared the left edge of the runway. He pulled off the throttle, applied right brake and rudder but failed to mention this decision to the pilot. The IP's throttle pulling had no effect and the bird continued along the runway shoulder, left gear in the grass. Finally they got back on the runway and both pilots saw that they were pretty well aligned, with the aircraft beginning to show a tendency toward a right turn.

The pilot, seeing that his air speed was between 35 and 40 knots, got off the brake and tried to continue the takeoff. He had a little problem, though, because his friend in back had both of his boondockers on the pedals. From there to where the O-1 left the runway, its motion could be traced by the prominent black rubber marks on the pavement.

Finally the bird went off the side, down a slope, into a marsh where it dug in and flipped onto its back. The pilot promptly egressed, but the IP, trying to go out through the rear side window, got hung up by his back type parachute. He finally got out and both pilots walked away without serious injury.

The Board considered many things, including the effect of turbulence from the rotor wash of a helicopter, the existing crosswind, the flight controls, brakes and engine and could find nothing. They finally concluded that the pilot contributed because he was slow in taking corrective action to keep the aircraft properly aligned with the runway. The primary cause, they said, was the IP who was determined to abort but didn't tell the pilot who was equally determined to take off.

FOD FOR THOUGHT. Most FOD stories are written about, or for the benefit of, maintenance people. Here's an item with a little different twist. The crew landed their F-4, went through the de-arm area and pulled up at the hot refueling pits for a bit of petrol. After taking on a load, the pilot added power to move out, but the RPM and EGT failed to rise and the left engine started vibrating. They shut it down and discovered that the ejection seat pin bag had fallen out of the cockpit into the left intake when the canopy was raised during taxi. Apparently during ACM the bag was dislodged from its stowed position, and the crew forgot to check for it prior to opening the canopy.

DRAGGED CHUTE. As the Air Evac crew turned off the runway after landing, their landing lights illuminated an object on the pavement in front of them. Immediate braking action brought the C-131 to a stop just short of the object—a drag chute left there by a fighter aircraft. While the pilots were in the act of shutting down Nr 2 engine, the chute billowed up in front of them. Helpless, they watched the shroud lines tangle in the propeller, and the heavy attachment fitting swing up and impact against the fuselage. The damage required 100 manhours to repair.

The drag chute had been on the taxiway for about 17 minutes. That's not excessive on a busy airfield, but someone on the airfield should be responsible for retrieving drag chutes as quickly as possible. At night, it helps to tell Ground Control where you dropped your chute. (Off the taxiway, if possible!)

But the primary lesson for pilots is that whenever you see an object in your taxi path that could be sucked into propellers or intakes, stop *well* short of it. If hard braking is required, use it.

TRIM. Although it could happen in any fighter aircraft, severe pitchdown at the time of ejection has been reported on three occasions during low altitude escape from the F-106. In the most recent case, the pilot found his engine had flamed out when he rolled wings level on downwind for landing. After three unsuccessful airstart attempts, he released the control stick and reached for the ejection handles. The aircraft pitched approximately 50 degrees nose-down and he was ejected in a horizontal trajectory at about 800 to 900 feet above the ground. His parachute streamered and he impacted in soft, marshy terrain. The soft landing saved his life. The two previous pitch down ejections ended in fatalities.

Failure of the chute to open was caused by a malfunction, but it is problematical whether a properly functioning parachute would have had time to decelerate the pilot under the conditions of the horizontal ejection. Investigators theorized that when he ejected the pilot most likely had not trimmed out nosedown aerodynamic forces as he decelerated in the break to about 190 knots, with the gear down.

SPEAK UP! A recommendation which followed a SEA F-4 accident could well be applied to all aircraft carrying more than one crewmember:

" . . . Normal Procedures, Descent, should be expanded to include: 'Prior to starting an approach, the minimum indicated altitude for the approach will be announced by the Aircraft Commander and acknowledged by the other crewmember.'"

SEEING IS BELIEVING. Case history in point—recently, an F-4 type flying machine had a head-on with a B-I-R-D. Although the bird came out on the short end, it successfully penetrated the windscreen depositing fragments in both cockpits. The starboard engine was also *fodded.*

But another event took place that should never have occurred, or at the very least could have been effectively minimized. *Both crewmembers were injured as a result of neither having his protective helmet visor down.*

It's true that hindsight is a heapsight better than foresight. But if you are interested in protecting your eyesight, then make sure you have the dual visor assembly installed, and take that extra second or two to lower your visor before you leave the chocks.

(Reprinted [verbatim] from USN CROSSFEED)

SAFETY SURVEY DISCREPNACIES. One major flying command reviewed the safety survey discrepanies which occurred most frequently on its bases during 1969. Many safety management lapses on their list could have been observed at bases in any command.

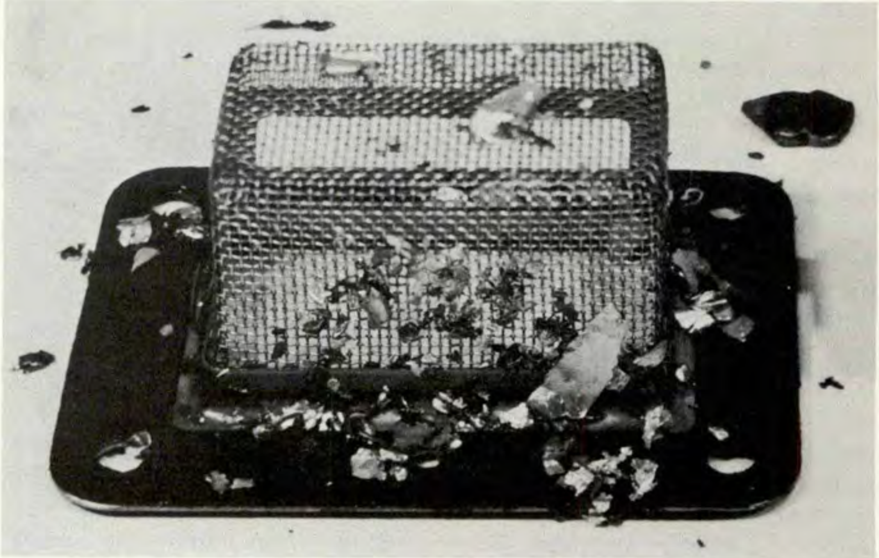
- Distribution of safety educational material within the maintenance activity was unsatisfactory.
- Aircraft fuel sampling was not being conducted as outlined in aplicable TOs.
- Aircraft were on jacks in the Maintenance hangar without proper warnings posted.
- Maintenance preflight work cards were not being correctly followed by personnel performing preflights.
- Crash grid maps were not standard nor were they being reviewed annually as required.
- During engine maintenance, fuel and oil lines were not being capped.
- Unauthorized obstructions were located in airfield lateral safety zones.
- Violations of AFM 86-8 were not identified and covered by waivers.
- Excessive number of persons were authorized to sign off red cross items.
- Erosion was observed in runway shoulder areas.
- Static grounds on ramp were overdue inspection.
- Oxygen mask washing facilities in PE areas were inadequate.

MAINTENANCE briefs

soap is great, but...

MOST DEFINITIONS of SOAP (Spectrometric Oil Analysis Program) include a statement similar to the following: Submicroscopic particles of metals are worn off contacting surfaces and are gathered and held in suspension by the lubricating oil. Now keep that in mind.

A J79 engine was removed from an airplane for P.E. The scavenge filter and the transfer gearbox magnetic plugs and screen were removed and found covered with large particles of metal. The oil jet for the Nr 3 bearing had small shavings in the orifice. The entire oil system was found to be contaminated.



Note again that this was found during a P.E. The engine had apparently been running satisfactorily with no signs of any difficulty. But why was the contamination not found during the routine SOAP examinations?

Look at the pictures and remember what was said in the opening paragraph — submicroscopic particles suspended in oil. The junk in this lube system was too heavy to be suspended. It just gathered in the filters, screens, and lube jets, and on magnetic plugs.

Was there a way to tell that the system was contaminated? We have no way of telling for sure, but there's a good chance that oil pressure may have been higher than normal.

At any rate, don't put all of your eggs into one basket. SOAP is great, but it doesn't show up all forms of contamination. Watch the gages and check the filters and screens. (GE Jet Service News)

WHO IS MIKE?

f-4 fuel system "weirdo"

Maj Raymond C. Ramsey, Directorate of Aerospace Safety

AFTER 40 MINUTES of normal flight, an F-4 aircrew was astounded by a fuel low level warning light. Fuel at this time was a healthy 4800 pounds over 5500 pounds with no indications of any malfunction. A quick feed tank check confirmed the low level light with a reading of only 900 pounds. A very wise aircrew promptly landed at an auxiliary airfield without incident.

Maintenance investigators traced the malfunction to a faulty check switch for the number six tank transfer pump. This switch is located in the left wheel well and is spring loaded to the OFF position. Seems the spring broke and the switch remained unnoticed in the CHECK POSITION. This condition closes the number one and two transfer level control valves. The only method of obtaining fuel, then, is by gravity feed. External and internal wing fuel will transfer normally to the fuselage tanks and then by gravity to the feed tank.

This may seem like an isolated case, but "for the want of a nail . . . ."

someone missed the boat

Immediately after takeoff a C-135 crew experienced control problems. After gear and flaps had been retracted, gradually increasing right control wheel pressure was required to maintain straight and level flight. Control response to the right was very poor. At times the control wheel would have to be jerked before the pilot could get any response. The outboard spoilers were observed to be operating erratically and would occasionally stick in the up position. At times they would not extend at all. The inboard spoilers would raise only a few inches when a right turn was made and at times would not raise at all. A left turn was normal except for a slight tendency for the aircraft to roll left. The outboard spoiler switch was placed in cut-off and the outboard spoilers were observed to be working intermittently. When the speed brakes were raised to 40 degrees and the outboard spoiler switch placed to cut-off, the outboard spoilers remained up. This procedure was followed again and the spoilers worked normally. Several additional repeats produced the same inconsistent operation.

A control check at 13,000 feet showed approximately five degrees of right control wheel deflection was required to maintain wings level at approach and touchdown speeds. The aircraft was landed with 40 degrees of flap without further incident. Investigation revealed maintenance had replaced control system cables 14, 15 and 16, due to corrosion. After replacement of the cables the spoilers had been improperly rigged. Maintenance missed the boat by not following tech data.

MAINTENANCE briefs

7/16 inch —big difference

A C-141 PILOT write-up indicated an elevator trim malfunction that required excessive back pressure to rotate during takeoff and to maintain climb to 300 feet. Normal nose down trim immediately after liftoff was not required. He landed the big bird at his first stop, using 4.5 units nose-up trim which was considered normal. The next takeoff required the same excessive back pressure for rotation and climb to 300 feet. After he landed at his next destination, Maintenance investigated the problem and found the elevator rigged 7/16 inch down from neutral. After rerigging, an FCF indicated the system was okay. How did the elevators get 7/16 inch out of rig? There is a maintenance man somewhere who has the answer.

shimmy

AFTER AN F-100 aborted because of nosewheel shimmy, Maintenance found that the nose gear scissor link pin was missing. It was found on the runway, 1600 feet from the start of the takeoff roll. The pin was improperly installed and neither the pilot nor maintenance man found it in the walkaround. This sort of thing makes an impression on pilots (they are riding in the airplane) and this pilot will undoubtedly remember this item from now on. But what about the Maintainer? How do we insure his attention to such details?

everybody knows...

WELL, ALMOST everybody. It was just a minor accident, but with the half-a-hundred passengers aboard and circumstances slightly different, it could have been a major catastrophe.

The C-130, landing out of a night GCA approach, touched down right gear slightly left of the centerline because of the crosswind. As the pilot corrected back toward the centerline, the left outboard engine struck something. The prop ripped off and the fuel tank was punctured, which started a fire. The crew got the airplane stopped and the passengers out. The fire department was on the ball and quickly extinguished the fire.

The object the engine hit was a forklift parked about one foot from the edge of the runway. Its headlights had been used to light the M-21 barrier, which was being repaired. The tower had been informed that the forklift was clear of the runway. It was—12 inches. Apparently EVERYBODY DOESN'T KNOW that you don't park vehicles on the edge of the runway. ★

U. S. GOVERNMENT PRINTING OFFICE 1970-391-397/8

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.

Major George W. Cowgill

APRFE Detachment 1,
APO San Francisco 96340

On 2 May, 1969, during a functional check flight in an F-100D aircraft, Major Cowgill experienced serious flight control difficulties when a stabilator bungee failed shortly after takeoff. Major Cowgill suddenly found that he could not move the stabilator. The control stick would not move fore and aft even when he applied maximum pressure with both hands on the stick. Using stabilator trim and throttle, he was able to continue to climb, turn to avoid overflying the city of Tainan, and level the aircraft. He established an orbit over water while he discussed his problem with ground personnel, but no one was able to offer a solution. Although it was suggested that he abandon the aircraft, Major Cowgill performed stability checks with speed brakes and landing gear extended. Satisfied that he could control the aircraft, he flew a series of simulated landing patterns at 10,000 feet to determine the amount of trim and power required for safe approach speed and descent rate. Taking into account the 10,000-foot runway available and the presence of a BAK-12 arresting barrier, he decided he had sufficient safety margin to attempt a landing. He used trim and power to set up an 800-foot-per-minute descent on a straight in approach, then increased power one-half mile from the runway to decrease his descent rate to 400 feet per minute. Taking advantage of ground effect to assist in roundout, he touched down smoothly, 1500 feet down the runway. Major Cowgill's calm application of professional skill and knowledge, and his careful analysis of this serious emergency enabled him to save a valuable combat aircraft. WELL DONE! ★

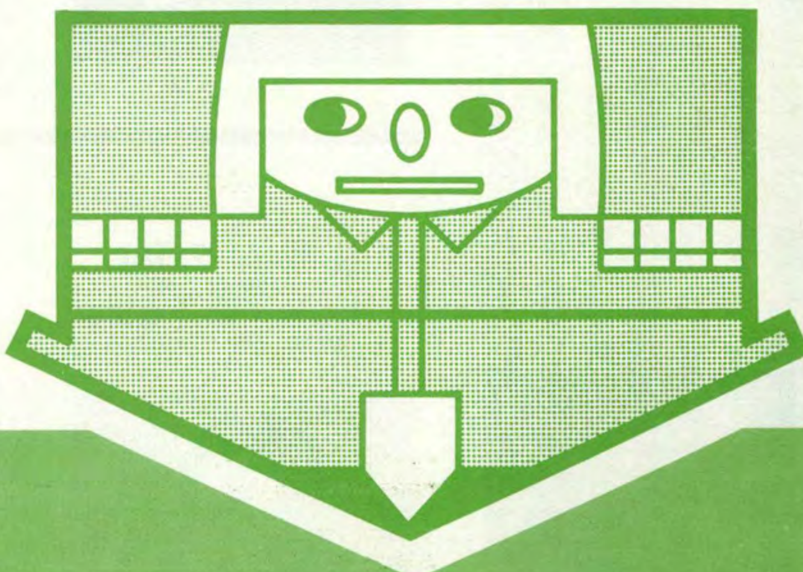
1 Lt Nguyen V. Tam

RVNAF
4441 Combat Crew, Training Squadron,
Williams AFB, Arizona

During takeoff roll, the right engine of Lieutenant Tam's F-5 caught fire. He climbed to a safe ejection altitude, analyzed the engine instruments, and then retarded the right engine to idle. His aircraft was configured with a centerline fuel tank which should have been jettisoned, but no jettison area was readily available. Rather than jettison the fuel tank over a populated area, he immediately prepared for a single-engine, heavy-weight landing. Executing a perfect approach and touchdown, Lieutenant Tam was able to stop well before the end of the runway, thus preventing further damage to the aircraft. Lieutenant Tam's accurate and level-headed assessment of this emergency plus his professional airmanship reduced a potential hazard to a routine precautionary landing. WELL DONE! ★

HOW'S YOUR SHAPE?

EVELYN LUNDE



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