UNITED STATES AIR FORCE • JANUARY 1971

Aerospace SAFETY

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JANUARY 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

JANUARY 1971 AFRP 127-2 VOLUME 27 NUMBER 1

WORRIED?

WHO?

ME?

Col Richard A. Yoder, Deputy Commander Materiel, 62 Military Airlift Wing, McChord AFB, Wash.

How often have you heard it said: "Why worry?", or "Don't worry about it." Unless we are discussing yesterday, I say that is wrong. We need to worry, because that's the way we solve problems, make improvements and avoid complacency.

One of my former commanders was extremely conscious of the dangers of complacency as it applied to aircraft operations and maintenance, as well as all support areas. He described complacency as "satisfaction to the point of stultification." So, if you don't want to be stultified—worry!

Now, if you are going to worry, you might as well do a good job of it. There is a maximum of 24 hours of worry time available to each of us every day. Then when you subtract things like eating and sleeping, doing a good job, going to meetings, having a good time, etc., they really cut into your available worry time to where you may end up with only a few hours a day. So, it is essential that you use your worry time efficiently and effectively.

Commanders are especially good worriers. They can worry a little bit about a lot of things and start a whole chain reaction of worrying among their subordinates. For example: If the comander worries about the young airman, immediately the first sergeant and senior NCOs start worrying also. If he worries about mission delays, then Operations, Traffic, Maintenance, Supply and support functional managers start worrying, too. When he worries about base appearance a whole myriad of area managers start worrying. And with all this concentrated worrying, things just have to improve.

Another facet of quality worrying is the time factor. It is my view that the time to worry about anything is *before* the fact. It is only then that something can be done—changes made. And, really, that's the result we want from worrying—change for the better, problems resolved, and complacency avoided. So, if you subscribe to my thesis you will not waste worry time on yesterday, but really zero in on tomorrow. Yesterday is history and we can learn much from it—but we can't change it, so why worry? Tomorrow is the future and our golden opportunity to improve.

Worry a little bit. It's good for you! ★

landing fighter aircraft

Col Edward P. McNeff
Commander, 835th Air Division,
McConnell AFB, Kans.

Dear Fellow Fighter Pilots

Every flight terminates in some kind of landing, and a short tour in mobile will show our landings come in many variations. Unfortunately, some end in tragedy. So the age-old problem of landing fighter aircraft safely is still very much alive.

Out of a total of 190 fighter aircraft accidents within TAC, USAFE, and PACAF during 1969 and through 21 August 1970, 22 were caused by pilot error during some phase of landing. These accidents happened during both single ship and formation landings.

So it goes, with little or no room for debate, that, in spite of all the data published and all the flying courses taught, far too many techniques and procedures for landing jet fighters have been only momentarily remembered, forgotten in part, or simply ignored.

Accidents are pure losses of man power and equipment. But they don't have to be total losses if the knowledge acquired from them is applied toward preventing others. Learn from the mistakes of others, because no one pilot has enough lives and flying years to make them all himself.

Let's discuss separately the two classifications of fighter landing accidents which still plague us.

SINGLE SHIP

Accidents during single ship landings cover a multitude of improper techniques. These consist of being too high on airspeed and altitude, too low on airspeed and altitude, failure to use landing aids, or a combination of any of these and others unmentioned.

VASI is one of the greatest aids provided for landing aircraft since the GCA and ILS, particularly for VFR landing patterns. Although the IFR Supplement, dated 15 October 1970, shows 18 USAF bases in the U.S. without VASI, accidents reflect that where VASI is installed it is still grossly misused or ignored completely. There have been instances where pilots were asked if they used VASI indications during landings and they replied in the negative, or, more surprisingly, some could not positively state that they actually saw the VASI lights.

It is realized that VASI indications do not satisfactorily accommodate every aircraft of varied landing configurations and airspeeds to an optimum point of touchdown. But a pilot's sense of judgment, which he supposedly maintains along with proficiency, should provide him with the necessary insight to judge just how far on final approach he should use the VASI before eliminating it from his cross check. The fact that VASI provides glide slope guidance to parallel or closely parallel those of GCA and ILS is by design. This means that, wherever a pilot makes an IFR or VFR approach in the U. S., using any one of the above-mentioned devices, he can expect a glide slope reasonably close to those at other installations. This standardization serves two useful purposes: aid the pilot and prevent accidents.

Drag chute complacency has taken an unwarranted toll in our landing accidents. Drag chutes came into being with the advent of aircraft that land at high rates of speed and/or heavy gross weights. The intent of drag chutes, to aid in decelerating aircraft to preserve tires and brakes, has too often been changed by pilots to that of salvaging poor landings created by bad approaches. This practice is hard on tires and brakes and sets the stage for other serious damages.

It appears that numerous pilots continue to ignore one of the basic rules for landing high speed aircraft equipped with drag chutes. The rule, "treat every landing as if it's going to be a no-chute," is just as valid as it ever was.

Improper techniques employed during landings on wet runways have also resulted in numerous accidents. Many aircraft have failed to stop on the runway and overran the far end (unless barrier engagement was made) where they were badly damaged. To land on a wet runway and suddenly experience your flying machine hydroplaning is nothing new, and is a definite possibility. We don't know yet all there is to know about hydroplaning, but sound recommended precautions do exist. First, if there is a heavy downpour, consider holding until the water drains from the runway. If conditions do not improve to your satisfaction, serious consideration should be given to diverting to an alternate with more favorable conditions. Second, once you decide to land, use whatever aids are available to assist you in aligning your aircraft with the optimum touchdown point. Remember, when you are finally committed to landing, the runway behind you serves no purpose. Third, apply maximum aerodynamic braking followed by maximum effective braking as recommended for your particular aircraft.

FORMATION

Mission requirements under various conditions clearly dictate the need for formation landings. While this need has decreased, a fighter pilot must maintain proficiency. It is obvious from the outset that both the flight leader and the wingman have definite responsibilities. Both must remain constantly aware that, as pilots of jet aircraft, they must

CONTINUED

anticipate and remain well ahead of any situation to avoid tragedy. This is especially true for landing jet fighters in formation. The following are firmly established, basic guide lines that must be emphasized in all briefings for formation landings.

FIGHT LEADER'S RESPONSIBILITIES:

His first obligation is to determine (1) if conditions are suitable to make a formation landing, (2) that a requirement exists, followed by (3) insuring that the wingman is on the upwind side. Ordinarily, Lead should refrain from using speed brakes on final approach. This allows the wingman to carry a higher power setting than the leader for quick engine response. Smooth throttle and control movements are mandatory throughout the entire approach. If flight to the optimum touchdown point cannot be made with smooth throttle and control movements, the approach should be aborted. Final approach airspeed is to be based on the heavier aircraft for weight and wind factors. After touchdown, delay chute momentarily to allow wingman to deploy his.

WINGMAN RESPONSIBILITIES:

He also must be proficient and smooth. The position to hold on final is basically the same as that in normal close formation, but flying at least level with, or stacked slightly higher than, the leader. This is to provide for simultaneous touchdown and to keep the unwary wingman from landing in the trees or the overrun. This position should be held all the way to touchdown, with the wingman refraining from dropping back when the runway is in sight. Even though the runway is in sight, formation should be flown to the point of touchdown. Deploy drag chute immediately after touchdown. Although not required, if speed brakes are used it will necessitate additional power providing greater lift and aircraft control. It will also lessen the tendency to move in front of the leader at power reduction.

Two recent incidents involved formation landings. In one case, the wingman dropped low and landed in the overrun, knocking his nose wheel off. We were most lucky to avoid a catastrophe there. On another occasion two Phantoms landed in formation and the wingman jousted the leader for position by knocking wingtips together. Lucky again.

Many of the accidents that occur on a slippery runway also involve crosswinds. If there is any question about such adverse conditions, simply avoid making formation landings or takeoffs. Plan your approach to land on the upwind side of the runway and be especially careful in your drag chute operation. Once deployed, jettisoning it to reduce weather-vaning may be necessary.

In summary then, there is nothing really new about landing jet aircraft singly or in formation. So one can justifiably ask the question, why do we continue to have landing accidents? We may never know all the answers to that question. However, it is readily apparent that there is complacency and an obvious lack of the necessary professionalism from the supervisory level down to the junior wingman. There is a definite need to refocus our attitudes and training programs toward this problem and strive to become TRUE PROFESSIONALS. ★

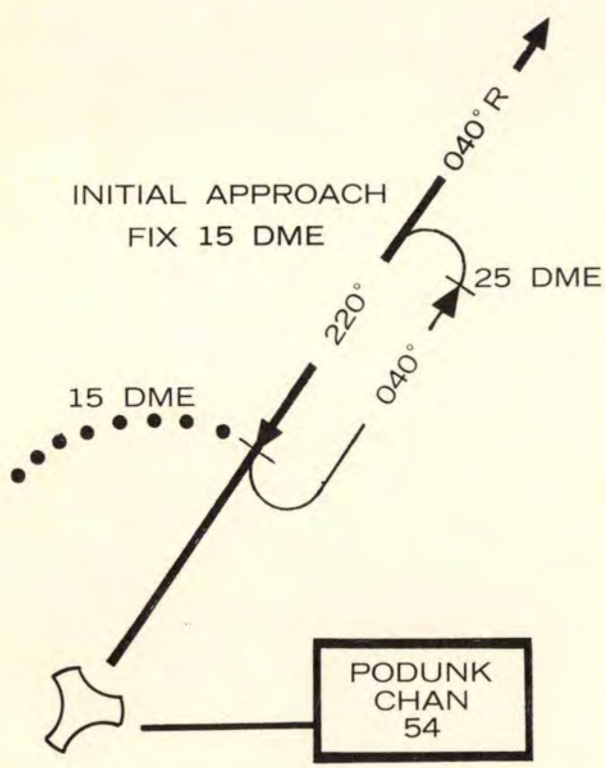
Colonel Vere Short, Deputy Commander for Operations for the 443rd Military Airlift Wing, Altus AFB, Okla., is presented a plaque by General Jack J. Catton, Commander of the Military Airlift Command, recognizing Colonel Short's record of 25,000 accident-free flying hours. Looking on during the presentation is Colonel George Maurice Wentsch, Wing Commander.

THE I.P.I.S. APPROACH

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

TACAN ARC PENETRATION

Q Some TACAN instrument approaches have an IAF which is formed by the intersection of a holding radial and the penetration/approach ARC. Consider yourself holding in the example below. After being cleared for the approach, must you cross the IAF, or do you lead the turn to the ARC; secondly, when can you begin descent?



A You should apply a lead point and turn on the ARC. Techniques for determining the lead point for 90 degree ARC interceptions are in AFM 51-37. Descent may be started when the aircraft is established on an *intercept* to the ARC and is abeam or past the IAF in *relation to the initial penetration track*. In this case you are past the IAF and on an intercept to the ARC as soon as you start the turn.

IFR SUPPLEMENT

Q "Reduced Runway Standards in Effect" are noted in the IFR Supplement Remarks section for some airfields (example, Andrews AFB). Just what does that mean?

A By reducing runway standards, the tower controller may allow an aircraft to land although another landing aircraft has not cleared the runway.

TRY THIS QUIZ

1. You are planning an IFR flight to Brennan AFB. An alternate will be required if the weather is:

A. 3000 and 3.

B. 3000 and 5, intermittent 3 miles with blowing dust.

C. 5000 and 3, intermittent 2 miles with haze.

D. None of the above.

2. You are holding in a published TACAN holding pattern where the IAF and holding fix are not co-located. Two-way radio failure procedures require you to:

A. Be at the IAF at your EAC.

B. Leave the holding fix at your EAC.

C. Leave the IAF at your EFC.

3. You are at FL 230 proceeding to an IAF which has FL 200 as the initial penetration altitude. ATC clears you for the approach. You may descend to FL 200:

A. At your discretion; however, you should call, "Leaving FL 230."

B. Once you are in the holding airspace.

C. At the IAF in the holding pattern.

4. You have been cleared for an approach and are approaching the IAF on a course which is 180° from the penetration course. You should:

A. Use the holding airspace to conveniently align yourself with the penetration course.

B. Turn the shortest direction to the penetration course immediately after passing the IAF.

C. Either A or B.

NOTE

Whenever ATC requests your distance from a VORTAC, VOR/DME or TACAN—give your DME reading; do not subtract slant range from the DME reading.

ANSWERS TO QUIZ: 1.C; 2.A; 3.A; 4.B

P.S. If you would like to have copies of all the IPIS Approach articles since inception, write to the USAF IPIS (FTYI), Randolph AFB, Texas 78148. ★

LIGHTNING does STRIKE

"Lightning never strikes twice in the same place."

That old saying has long since been disproved. But leave it to a couple of Air Force types to give it a new twist. They moved the *place*—the place being an RF-4C.

On climbout while passing through 2000 feet, they got a lightning strike that knocked out the interphone and the inertial nav system. They climbed to VFR on top at FL 245 and declared an emergency. Another RF crew heard the emergency call and looked over the

TWICE

aircraft, reporting only a brown smudge on the side of the radome.

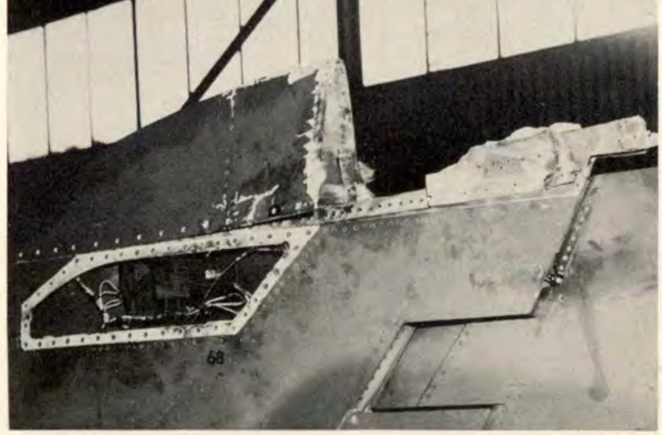
The struck aircraft then started a single ship random radar approach to home base, but on downwind at 3000 feet they received another, more serious strike. This one knocked off most of the radome and took out the pitot system, angle of attack and generators.

The generators were recycled and they climbed back on top and called MAY DAY on guard. Another RF crew took a look and gave them the bad news: radome and a large piece of the vertical stabilizer missing.

Now the supervisor of flying advised a landing at a nearby base where the weather was better. The crew joined up on the other RF and made a no-flapper at 190-200 knots to an approach end arrestment.

The aircraft was immediately impounded and held in a hangar until investigators could take a look at it. What they saw was appalling. The radome was destroyed and the antenna dish blown from its mounting. All but one camera window had been blown out. Debris had entered the engines, damaging the inlet ramps and doing minor damage to the engines. Other debris struck and damaged the left speed brake as well as the external fuel tanks and leading edge flaps. A small hole was burned in the trailing edge of the left outer wing section. The most serious damage, however, was to the vertical stabilizer. The rear section of the upper cap was torn away. Several other sections were buckled and warped. Wiring was burned and the main spar and rib had been split.

In case you're wondering about the weather, the forecast called for a few isolated thunderstorms. The first strike was the only evidence of a T-storm seen by the crew, who saw only three during their entire flight. In fact, of the six other aircraft that departed on the same course, none experienced any T-storm activity. Apparently active cells were imbedded in stratus clouds and, therefore, not visible from the ground. ★



Below are essential excerpts from an approach control transcript tape following an F-4 accident:

LIST

Time	Agency	
1929:38	Approach Control	"Turn right heading 180, descend and maintain eight thousand."
1929:42	Aircraft	"Right 180 out of 15 thousand for two thousand." (Aircraft's readback was interrupted by a transmission from another aircraft and not acknowledged by approach control.)
1931:08	Aircraft	"Steady 180 and passing 10 thousand for two thousand."
1931:11	Approach Control	"Roger."
1931:22	Approach Control	"Your position 12 miles southwest of airport, maintain eight thousand feet."
1931:30	Aircraft	"Roger, passing nine for *two.*" (This transmission was not acknowledged by approach control.)
1933:05	Approach Control	"Your position 19 miles southwest of the airport turn right 200 for slight pattern extension."

Radar and radio contact was lost at this time—

The previous transmissions occurred between an approach control agency and the crew of an F-4 during the final portion of what should have been a routine IFR radar penetration and landing at destination.

The single aircraft departed home base for an instrument training/cross-country flight to an Air Force base which the pilot had flown into twice within the previous 11 days. The backseater had also worked the same approach control three times previous to the accident. The biggest question concerning the mishap is why was the crew so convinced their descent altitude was 2000′ instead of 8000′? There was a hint of radio receiver difficulty on only one transmission which was apparently rectified by a radio check which was further substantiated by subsequent transmissions.

When approach control gave instructions to turn right 180, descend and maintain eight thousand the read back from the aircraft stated the correct heading but

HEARING BUT NOT ENING?

2000′ as the descent altitude. This reply was partially cut out by a transmission from another aircraft and the approach controller failed to acknowledge it. From this point until collision with the ground the crew obviously had the 2000′ descent altitude locked into their minds.

* * * * * *

The above is quoted from a report by another service on a fatal accident. Similar events in the past in which Air Force crews were involved raises the question of why?

We know that people frequently see not reality but what they expect or want to see. This no doubt accounts for some misreadings of altimeter indications. We are also selective listeners—either hearing what is expected, or completely tuning out. Even when we hear correctly and repeat instructions, warnings or routine transmissions we sometimes do the opposite or simply reply parrot-like without performing a required check or function. An example would be the pilot who replies to the controller, "gear down," and proceeds to land on the belly.

We know from experience that fatigue, anxiety or preoccupation are conducive to such reactions. Familiarity, which frequently leads to complacency, is also a factor. Usually, however, there are stimuli which tend to alert us. These stimuli take many forms, the most obvious of which probably are those which tend to alarm us. A more subtle one would be conditions that require extra care or certain precautions simply because they are there.

In the accident described above, there was a stimulus that seemingly would have kept this crew more conscious of their situation. The minimum safe altitude within 25 miles of the airport is specified on the approach plate as 7900 feet. Also, more than 60 per cent of their route was over mountains. Therefore, it would seem that terrain clearance would have been uppermost in their minds. It may have been, however, that complacency set in because they were under a radar controlled approach.

Accident investigators concluded that the cause factor was human error on the part of both the crew and the controller. The important thing we can learn from this tragic accident is that humans are susceptible to these mental lapses. We've all experienced this phenomenon but most of us have been lucky. Unfortunately there have been those who ran out of luck.

Recognition of this human trait is essential to controlling it. This is particularly true in the three dimensional environment in which aircraft operations are conducted, especially at night and during IFR weather. ★

sleeping beauty

It is a pretty little thing with its little blue and white lines and neat lettering. You turn it over, and around, and look at it from every direction and think: how neat, substantial, solid and trustworthy it is. Nothing could go wrong with such a well-packaged article.

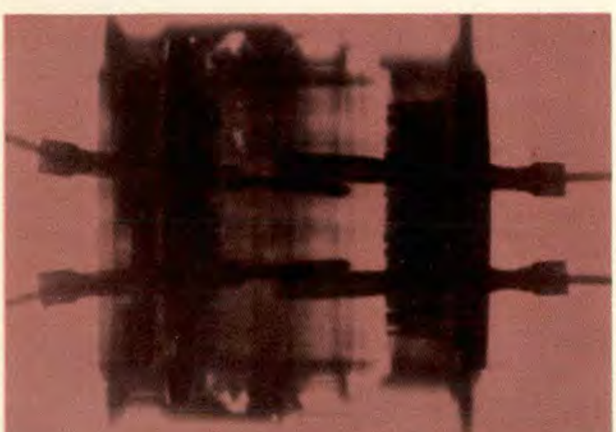
Don't you believe it! It is like a snake! If you get careless, mistreat it or handle it too much, it will bite, or even kill. It is an accident waiting to happen simply because it is an interface or connection which, logically, is always where something can fall through the crack. It's a sleeper. It is an electrical connector.

What makes it dangerous are bad assumptions. The engineers seem to have forgotten that if it is remotely possible for something to go wrong, it probably will. They *assumed* that because the pretty straight lines on their drawings aligned the pins and sockets within a few thousandths of an inch that they would always stay there. They *assumed* that the proper manufacturing procedures called out on the drawing would always be followed. Add a few more assumptions made by the depot repair and field maintenance troops, and you arrive at a sick situation.

Here are some real sick situations: Ground launched missiles fail to leave the ground, air launched missiles launch on the ground, missile payloads inadvertently propel themselves when the booster refuses to go, aircraft drop out of the sky, and worst of all, people are killed because the ejection system didn't work properly, or are electrified to the ultimate.

Imagine, if you will, an assembly consisting of a few generals, a few more colonels, a bunch of lieutenant colonels, and a whole band of "ordinaries" standing not too far from a big, exciting hole, waiting. They wait, expectantly and impatiently, to see the launch of a real true life, roaring, fire-belching bird. The countdown goes as scheduled, but that's all that happens. No bird. No smoke. No nothing. Why? A bad umbilical (electrical) connector.

Now, how would you feel if you were a pilot, in the cockpit of an F-4 fully loaded for a combat mission, and you are going through the preliminaries when suddenly one of



your missiles goes through a nearby bunker? You think you feel bad? How about that poor airman out there lying motionless on the ramp? He will spend a few months in the hospital. What happened? A fault in the connector between the aircraft and the launcher betrayed everyone involved. Stray voltage checks had been made. The first check indicated something wrong. A later check indicated that everything was in order, so the airman assumed that it was. But when he removed the safing device, that pretty little thing bit him—bad!

How much money did we lose when, for no apparent reason, a high altitude payload decided to complete the mission without the help of the booster? How come? Prelaunch preparations and countdown proceeded normally until T-zero when the firing voltage was

James L. Sparkman, Directorate of Aerospace Safety

FIGURE 1

FIGURE 2

FIGURE 3

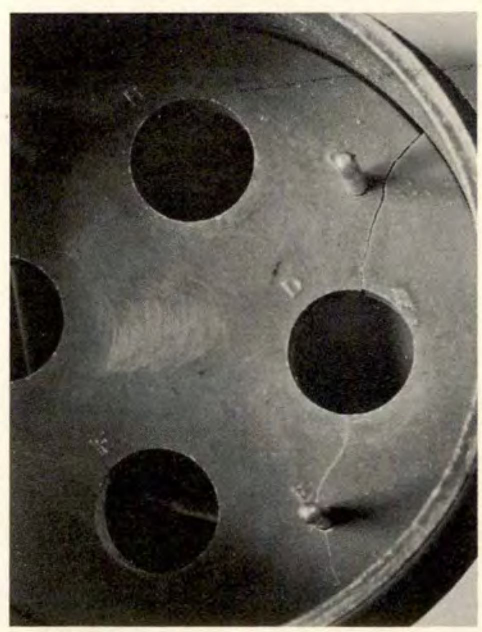
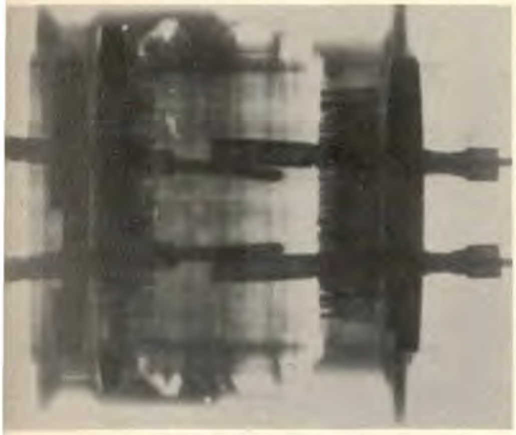


FIGURE 4



applied. The booster refused, but after a 165 second scheduled time delay, the payload decided to go anyway. It went 30 yards downrange. Investigation revealed that a pushed back pin in the male portion of a connector had caused a fault in the system. Figure 1 is a photo of a connector showing it can happen.

Talk to the crew of an F-4 who found themselves in a situation where practically nothing of real value in the cockpit worked right. It's enough to get a master caution light with a fuel level low light, but when you—lose communication, get an inertial navigation system light, see blinking generator lights and bus tie lights, hear a loud thump, lose pressurization, get a tumbled attitude indicator, notice horizontal situation indicator headings varying all over and feel sloppy controls—the situation gets almost intolerable.

With all this, they were faced with a penetration, but they pressed on only to find that the throttles and control sticks had a personality all their own. They wanted to move back and forth of their own free will. Now add smoke in the cockpit.

This wasn't their day. They couldn't find a place to dump the external wing tanks and two other fighters tightened the screws further by getting in the way. Somehow they pressed on through a second letdown only to have afterburner trouble in the pattern, then gear and flap troubles with a tendency to roll on final.

The navigator ejected after touchdown 760 feet from the overrun. Maybe the fact that they had just gone through a tree and the perimeter fence got on his nerves. He couldn't take anymore.

Now ask this crew what they think of depot level assembly of connector plugs. The little beauty that caused their problems is shown in Figure 2, the aircraft in Figure 3. The depot level quality control people plus others assumed that the connector was put together correctly.

Have you had enough examples? Hold for one more. Look at Figure 4 real hard and remember it! That one was involved in the electrocution of a man. One of its contacts was out of place and he failed to ground it properly.

If you still aren't convinced that you must pay a lot of attention to these sleeping beauties and treat them gently and with a lot of respect, here are the statistics. In those mishaps where an electrical factor has been involved, roughly 25 per cent involved connectors as either the primary or contributing cause. During the period 1969 to date, we know of 114 aircraft, 10 missile, and 6 explosives mishaps involving connectors. These are conservative figures. Many incidents are either labeled "cause unknown" or provide insufficient detail.

It is probable that if the connectors were looked at more closely during the investigation we would find a lot more mishaps attributable to them. Validity was recently added to this statement by an EUMR submitted on AIM-4D8 missiles. Quote "Six out of 33 AIM-4D-8 missiles inspected had male and/or female pins located in center splice connector P/N 247601 and P/N 248603 defective. (TO 21M-AIM4D-4, Figure 26, Index 41, and Figure 27, Index 14, respectively.) The pins had broken loose from the phenolic material of the connectors. This condition results in pins that are partially pushed back which may result in continuity being broken. . ."

The problems involved are simple and boil down to about seven: (1) bent pins, (2) pushed back receptacles and pins, (3) pins slip, (4) frayed or loose wire at or in the rear of the connector, (5) shorting at the connector interface due to moisture and/or corrosion, (6) foreign materials such as solder cause various kinds of malfunctions, and (7) the connector retainers become loose and allow separation.

Fortunately, a better connector design that will help alleviate the problems is on the way. But don't hold your breath while waiting for it. Take all those good quality control, maintenance, and inspection actions which you know are needed. Whatever you do, don't become careless with this little bundle of dynamite. ★

(The author wishes to thank Mr. Harry King, In-service Engineering Division, SMAMA, for providing information upon which parts of this article are based.)

Aircraft Seat Belts

Maj John P. Garbe, Directorate of Aerospace Safety

A recent incident involving a passenger-carrying aircraft has disclosed a practice that can be injurious to passengers' health.

The aircraft was a routine passenger-carrying mission flying in and out of cirrus clouds. Cloud buildup was displayed on the aircraft's radar scope; however, lightning had not been observed which would indicate a thunderstorm. As a precautionary measure the pilot turned on the "fasten seat belt" sign and made an announcement over the aircraft PA system to observe the seat belt sign. Shortly thereafter the aircraft encountered turbulence that was reported as moderate to severe.

Unfortunately several persons had ignored the announcement as well as the sign. As a result, they found themselves bouncing off the ceiling of the aircraft. The ceiling remained intact but there were several dented heads and one broken leg.

All of these injuries were preventable. The illumination of the seat belt sign coupled with the PA announcement was sufficient warning for everyone to buckle-up.

There has not been a system devised yet that will accurately forecast and measure the severity of turbulence; let's reduce the impact by fastening seat belts when instructed to do so.

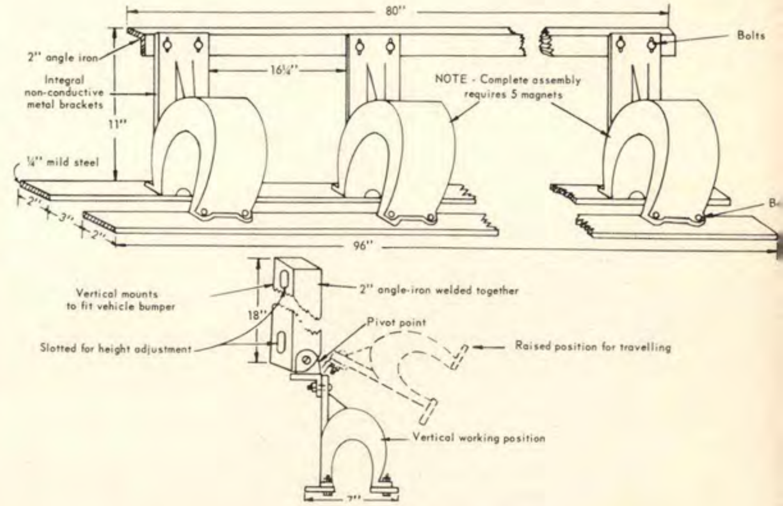
FOD Picker

This magnetic sweeper has been added to the anti-FOD campaign at CFB Chatham. It is the result of inexpensive local manufacture using permanent magnets which are normally converted to scrap metal. The magnets are obtained from Magnetron Tubes used in ground radar equipment.

Best results are achieved with the bar set at 1 to 1½ inches off the ground, at 5-7 miles per hour. Trials in this configuration have shown excellent effectiveness with fallen bristles and most metallic FOD, including metal filings generated by snow and ice removal equipment scraper blades and shoes. The magnet bar can be quickly cleaned off by hand or with a stiff broom.

A one-way pivot anchor point enables the magnet bar to be raised well off the ground when traveling over rough terrain. ★

Reprinted from Canadian Forces Flight Comment



REX RILEY'S CROSS COUNTRY NOTES

We have had numerous requests from the field as to what criteria Rex uses for the evaluation of a base's transient facilities. There are a number of reasons why a base receives an evaluation. First of all, Rex or one of his representatives might conduct an incidental evaluation while on a cross-country. Second, the evaluation might be planned due to a number of complaints from the traveling Air Force that they are not receiving quality service from a base that may or may not be on the Rex Recommended list.

In any event the evaluation begins when the inbound aircraft is turned over to approach control and is concluded when it is outbound and leaves the departure control frequency. True, this covers many functions and we are aware that some of the factors evaluated are outside the control of the base. However, in many cases problems can be resolved when liaison is established between, for example, the base and an FAA approach control.

The radar control facility serving the base is judged on its ability to professionally handle traffic. For example, when a controller issues instructions to an aircraft, he must be positive that the proper pilot received the instructions. No small number of accidents have occurred because of a mix-up on just who was supposed to have descended and who was supposed to have maintained altitude. Frequently the evaluation pilot will simulate an emergency to check procedures, if such an action does not interfere with traffic.

Contact with the tower on a roll-out from GCA or ILS should not require more than one radio call unless something is wrong with the equipment. The tower operators should have you in sight and be awaiting your call. "Turn right at the next taxiway" is okay, but much better if "at the three thousand foot marker" is added. If a follow-me is not immediately available, then ground control instructions must be specific—not just, "cleared to the ramp."

One of the most important yard sticks used by our evaluators is how quickly fuel is available if the mission dictates a quick turn-around. In most cases the request for this rapid service is indicated on the 175 and confirmed by contacting the "Pilot to Dispatcher" frequency before landing. When the pilot goes through this exercise, he should reasonably expect a fuel truck to be waiting unless there are extenuating circumstances. The same is true if maintenance is required and operations has been notified. If a radio needs attention, why can't a comm man be standing by?

We know that in some cases your transient ramp is full but why, when ample space is available, is an aircraft requesting a quick turn parked a ten-minute drive from operations? Some of the more prevalent complaints: "after installing the chocks everyone disappeared"; "no ladder available although Ops was aware of our requirement at least 30 minutes before arrival"; "no transportation available for a Code 7 though his deplaning was noted on the 175".

If a pilot has to RON at a base he expects such basic services as adequate food and quarters. Fatigue plays its insidious role in many of our accidents, so a good night's rest is a must. This is a little difficult if billeted with your copilot. He may be your best friend but this doesn't keep him from being a loud snorer. What may even be worse, is being sound asleep in a two-man room which is invaded at 0300 by a crewmember from another aircraft trying to find some place to lay his weary head.

Many pilots out on a cross-country have a tight schedule, often subject to change at any moment. It may be necessary for his Ops officer to contact him and alter his plans. Therefore, it is a must that a paging or phone system be established to provide this service.

Returning to the flightline the next morning we find another standard complaint—forms improperly filled out. In one instance, the wrong fuel quantity was entered. These little items hint that someone is not doing his job properly.

When requesting our clearance,

we have gotten fairly used to hearing the phraseology, "stand by for your departure time" or "no delay expected." The last remark indicates that we should expect to have our clearance within 15 minutes. If you're in a recip it's at best irritating to wait 30 minutes, but in a jet it could result in a back-to-the-ramp act to top off.

To complete the cycle, taxi information to the active should assume the pilot has never landed at your base and directions should be given accordingly. With the handoff to Center the evaluation is complete.

There are a number of other things that impress Rex. The cheerful attitude of the Transient personnel, the willingness of Base Ops dispatchers to provide information, prompt transportation when required, neat and comfortable quarters, and last but certainly not least, the availability of a clean place to eat at any hour.

Rex has been swamped with evaluations of various bases by you pilots, some of them complimentary, and some not so good. We do our best to insure that the base commander receives a copy of your kudos or complaints. If we find that complaints are the rule rather than the exception, we expect the base commander to take action to correct the discrepancies. If his base is on the Recommended list and no action is taken, we assume he has no interest in remaining on the list. As yet, we haven't found any commanders who were indifferent about their transient service. If problem areas do exist, in most cases the commander isn't aware of them, nor is he likely to be unless you let him or us know. So it's up to you, the traveling Air Force, to make your gripes known. If they are valid Rex is willing to bet something can be done to make your trips more pleasant. ★

THE

REX RILEY
Transient Services Awar

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.
HICKAM AFB	Hawaii
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
ANDREWS AFB	Washington, D.C.
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.

SSE SYSTEM SAFETY ENGINEERING
MODERN APPROACH TO ACCIDENT PREVENTION

Col David M. Critchlow
Chief, System Safety Engineering Group,
Directorate of Aerospace Safety

You are working today in the safest period in Air Force history. Our accident rate has decreased in all areas, with notable reductions in aircraft and automobile accidents. Air Force safety personnel have established and implemented extensive training and educational programs to help protect you during the accomplishment of your everyday duties. Yet, those accidents that still persist are a continuing challenge that motivates us to look for new solutions to the accident prevention program. The newest of these concepts, and the one we look to for dramatic results in the future, is System Safety Engineering.

System Safety Engineering simply starts the accident prevention program on the designer's drawing board. System safety analysis techniques enable us to identify hazards early in the development program so that effective corrective action can be made with a minimum of cost, thereby preventing loss of equipment and injury to personnel. This approach can aid us in reducing design deficiencies such as selection of improper materials, improper design of the equipment for the environment in which it will operate, and also minimize design-induced pilot and maintenance errors.

It should be understood that the system safety effort is not a sudden harsh criticism of the capability of system designers. However, no matter how experienced, conscientious, or patriotic a designer might be, with the complexity of today's weapon systems, he cannot always envision his design's effect on other system components, or how they, in turn, may degrade the operation of his design. Thus, it becomes a responsibility of the contractor to insure that the system safety function is performed as part of the design before his item is received into the Air Force inventory. The fact that

Colonel Critchlow entered military service in 1942 as an Aviation Cadet and was commissioned in June 1944. He served in the Occupation of Germany, 1948-1949, where he flew 210 trips to Berlin on the Airlift. After serving in Germany, Colonel Critchlow flew as a test pilot, 1950-1956, and was Aircraft Commander of the B-52 that dropped the hydrogen bomb at Eniwetok, 21 May 1956. He served in DCS/Research and Development at the Pentagon, 1964-1968, and was subsequently assigned to Vietnam as Deputy Science Advisor to MCPV 1968-1969. Upon his return to the States, Colonel Critchlow was assigned as Deputy Director of Flight Test, Edwards AFB, California, 1969-1970, and moved to DIGIS as Chief of the System Safety Engineering Group 1 July 1970.

formal system safety programs are now contractually required on all new systems being developed will provide a better probability that the new system, when introduced into the inventory, will be significantly more hazard-free than are present systems.

The job of implementing a new engineering technique is a complex one. Presently, appropriate Air Force documents are in the process of revision to give Air Force agencies guidance in the management and conduct of system safety programs. Additionally, eight engineers are currently assigned to the Directorate of Aerospace Safety to provide system safety engineering guidance and assistance to all Air Force development agencies in performing the system safety effort. Now let's look at some results of applying these new ideas.

The first Air Force system to which system safety was applied was the Minuteman Missile. Most of the techniques used today, many of which have been improved upon, originated with this development. The documented results are impressive; the accident rate for the Minuteman has been a fraction of what it was for some of the earlier missiles. Naturally, not all of this improvement can be attributed to system safety but we believe it did make a substantial contribution.

The first aircraft to which System Safety Engineering was applied was the C-5A. Indications are that the contractor system safety efforts will be rewarding because of the analyses conducted early in the design phase. Over a hundred safety-related changes were made to the aircraft and its support equipment before it flew for the first time. While most of these changes were minor, some corrected potentially catastrophic deficiencies. For example, the cargo compartment in the C-5A is a double deck arrangement with the floor of the upper deck serving as the ceiling or overhead for the lower deck. This floor was a rigid structure and acted as a pressure seal between the two compartments. Additionally, the flight control cables were routed through this floor.

The system safety anaysis showed that if rapid decrompression occurred, the floor would buckle, due to the differential pressure, which would cause loss of control of the aircraft and probably result in an accident. The solution to this problem turned out to be very simple. Vents were provided through the floor to provide equalization of pressure between compartments in the event of an explosive decompression. We must point out that system safety is not the cure-all—as is evidenced by the C-5A accidents that have occurred. But, we do think that the number of hazards has been significantly reduced.

A system safety analysis on an air-launched missile currently in development also revealed an interesting situation. The preflight test safety analysis showed that an accidental rocket motor explosion could occur in a worst case condition with a probability of approximately one in a hundred. To preclude a catastrophic event of rocket motor explosion within the lethal envelope of the delivery aircraft, the test parameters were modified so that rocket motor ignition was delayed after release until it reached safe separation distance from the aircraft. Interestingly enough, subsequent motor explosion failures within a series of static firing tests were attributed to this very combination of fabrication and testing techniques. The problem has subsequently been corrected.

So much for examples, the point is that design intuition is no longer adequate to achieve a safe, effective weapon system. Some rather sophisticated special system safety analysis techniques have been developed and proven as necessary adjuncts to before-the-fact accident prevention.

Naturally, specialized training is required for personnel managing and performing these analyses. The Directorate of Aerospace Safety sponsors the System Safety Officers' Course at the University of Southern California and the System Safety Analysis Course at the University of Washington.

The future of System Safety Engineering is a bright one. Our Air Force systems are of rather complex design, but think of the worthwhile results this design safety discipline can achieve when applied to simpler equipment used by people every day. The many safety problems of common household appliances, TV sets, and even children's toys, can be solved during their design by the appropriate system safety analyses. With the increasing emphasis on pollution control, System Safety Engineering techniques will be almost mandatory to insure that the pollution control devices themselves do not fail due to design-induced failure conditions. The design of highway systems, cars, commercial aircraft, transportation of hazardous material for industrial uses, and low cost housing could all profit from the application of System Safety Engineering. For all of us, it will mean that we can live a little easier with less fear of injury and death from design-induced accidents.

The Air Force had a clear choice to make. Either implement System Safety Engineering or continue to suffer needlessly catastrophic accidents due to design deficiencies. We chose the System Safety Engineering route. ★

the simple time-consuming chore of servicing tires

"I'm Sergeant Daly. I run a transient maintenance crew and I want to talk about a problem we have with a relatively simple job that really bugs us, especially during a quick turnaround.

"Yesterday morning at 0830 I was notified that a C-141 would land at 1130 for a three-hour ground time. They were scheduled to onload 20,000 pounds of cargo and, after a through-flight inspection, would be on their way. One of the things I had to think about was that the change in gross weight would mean a change in tire pressure. Anyway, by the time the bird landed we had everything ready for what I thought would be a quick and efficient turnaround.

"With fuel servicing and cargo

OPPOSITE PAGE: Connecting gage is difficult and time consuming.

LEFT: If used properly service through gages will save time.

BELOW: If everything works perfectly they'll finish before the flight crew arrives.

loading complete, we proceeded with the rest of the through-flight, which included checking the tires. My guys aired up the tires and completed the job about 15 minutes before the flight crew arrived to start their walkaround prior to departure.

"I know this all sounds pretty routine and you are probably asking, 'what's the big problem?' Well, if you really analyze the situation you'll find that we are really crowding the maintenance crew with the tire checking and servicing bit, especially when we have one of those real short turnaround times. In case you don't know what I mean, let's take a look at the tire servicing procedures.

"To use the equipment authorized to service aircraft tires, the mechanic must first attach the gage to the valve stem and check the existing pressure. Then he removes the gage and connects the servicing line to the valve stem. Then either you need a second man to turn on the valve at the compressor or, if only one man is doing the job, he must run back and forth from the compressor to the tire. He uses his judgment as to how much air to put in, then disconnects the line and attaches the gage to check the pressure. He may have to go through this several times until the pressure is right.

"Now you may be wondering why we go to all the trouble of connecting and disconnecting the service line and gage. Why don't we use a service-through type gage? That's exactly what we do when we have a serviceable service-through type gage. But we seldom have one. Seems that every time we send one to PEML for a calibration check, if it is out of calibration, the gage comes back with the service-through part capped off. So then it's just another pressure gage.

"If you are crewing, say, an F-100 you may not have much sympathy for us. But think about what is involved when you have to service 10 tires on one airplane such as the C-141. It's a pretty time consuming operation."

The sergeant certainly has a problem for which there is currently no firm answer. As of this writing, MAC was running a test that called for servicing C-141 tires to a set pressure of 185 $\pm$ 5 psi for all gross weights. However, enroute stations still have to check the tire pressure for each tire on each airplane. There has been a suggestion that has yet to be approved but seems to have merit. According to the suggester, it would both simplify tire servicing and make it safer. The suggestion calls for installing a shutoff valve on a service-through gage. With this kind of equipment one man could turn on the pressure, then monitor and regulate the input to the tire at the aircraft. It would also allow the mechanic to move to the front or rear of the tire, out of the danger area.

Perhaps what has been said here will give some of you hard-thinkers an idea and you'll come up with a suggestion that will make you some money as well as help the Air Force. Then we won't hear the lament, "Sarge, I can't make it in that length of time. Just servicing the tires will take too long." ★

OPS topics

TOUCH AND NO-GO

An OV-10 pilot experienced Nr 2 engine failure while in the traffic pattern. He attempted to land but touched down long. He realized his mistake and decided to go around. Unfortunately, due to the low airspeed, flight control response was insufficient to maintain aircraft directional control with the power that was necessary on the good engine. He delayed his ejection until his chances for a successful ejection were minimal. In the ensuing ejection the rear seat occupant survived but the pilot was killed because of failure of the seat to function in the low speed/low altitude mode. For some undetermined reason, the seat sensed the high speed mode which gave an excessive delay at low altitude. The other seat worked properly, deploying in the low speed mode. Had the pilot landed the aircraft at the normal touchdown point, most likely he would be alive today. Or, if he had not attempted a go around with all the odds against him, his chances of survival would have been better than risking a low altitude ejection. ★

HIDE 'N SEEK

Flying at night without lights is like playing Russian Roulette. You might luck out, then again you might not. Here's a couple of birds who did and didn't. They collided in the air but managed to land safely.

An O-2 had flown a blackout entry to the pattern at a SEA base with the tower's approval. At about 500 feet on final he turned on his navigation lights and rotating beacon and was advised that a UH-1 helicopter was making a missed approach in the opposite direction. The crew couldn't find the chopper, which was also blacked out. Over the overrrun at 300 feet the O-2 jock turned on his landing lights and spotted the chopper. Both aircraft took immediate evasive action but the right wing tip of the O-2 struck the right roof area of the helicopter. Close, but not fatal—both maintained control and landed. ★

GOOD SHOW

A recent explosives accident resulted in some outstanding actions by those involved. The right engine of an F-4 was being started for an ADC scramble mission. During the start the engine starter cartridge exploded not once but twice. A sergeant standing by the fire extinguisher ducked under the bird in an effort to put out the fire. However, the cartridge exploded a third time. The sergeant reeled back and CB from the extinguisher was deflected off the aircraft into his face causing chemical burns around the eyes, incapacitating him. An A1C immediately went under the aircraft, put out the fire and pulled the sergeant from under the bird. The primary cause: engineering-material failure in that the cartridge ruptured. It is suspected that the propellant deteriorated due to age. Fortunately the airplane was saved and the two airmen involved escaped serious injury. Quick action by these two men averted a major aircraft loss. ★

F-102 MOD

The F-102 (MB-5) simulators of the 4780th Air Defense Wing at Perrin AFB have been modified to allow the emergency gear extension system to function exactly like the aircraft. The need for this modification evolved as a result of a recent incident when the pilot was unable to pull the emergency extension handle, even though the system was operating in accordance with the Dash-One.

This mod can be accomplished in approximately five hours and requires no special parts. Units possessing F-102 simulators who would like detailed instructions on the mod may contact:

4780th ADW (DOTWS)
Perrin AFB, TX 75090.

Capt Lionel A. Boudreaux
Stan/Eval Officer
4780th ADW

JIGGLE, JIGGLE, JIGGLE

By now we have just about convinced all T-Bird jocks of the need to recheck the gear handle in the down-and-locked position before landing. Now we need to extend the process a bit further to insure the gear is up and locked after takeoff. A minor accident occurred when Gs were exerted on a T-33 for an Immelmann. The gear handle moved from the *up* position to the *down* position. As the airload caught the right main gear it carried it to an over-center position which caused a failure of the gear actuator where it attaches to the airframe. This in turn caused a tension failure of the hydraulic down line and twisted the shuttle valve loose from its mount, breaking the seal. The normal hydraulic system bled out through the broken line. When the emergency system was selected and the pump activated, the shuttle valve worked properly but the pressure escaped around the broken seal preventing adequate pressure from building to unlock the left main gear and lock the nose gear down.

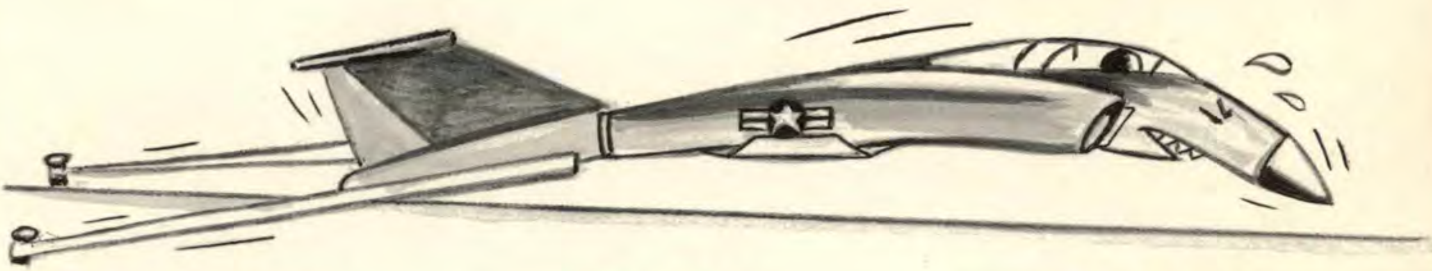
A ground check of another T-33 proved that it was possible to raise the gear handle, get an indication of up and locked but with the gear handle not *locked* up. Best jiggle check, fellows, and make sure your gear won't come *down* when you put a few Gs on the aircraft. ★

FLIP CHANGES

VIP Remarks: The pickup and drop off point for VIP passengers should be listed in the Remarks section of the DD-175, see FLIP Planning Section II, North and South America.

FLIP Terminal: As an aid in identifying current volumes, the expiration date will be printed on the backbone of all FLIP Terminal volumes. This practice began with the December issue of the U.S. Low Altitude Terminal booklets and will be subsequently extended to other FLIP Terminal products, on a world-wide basis, as production schedules permit.

VFR Products: The VFR Supplement and the Aerodrome Sketches for the United States are now being produced only every six months. Periodic updating will be accomplished through Military Aviation Notices (MANs). ★



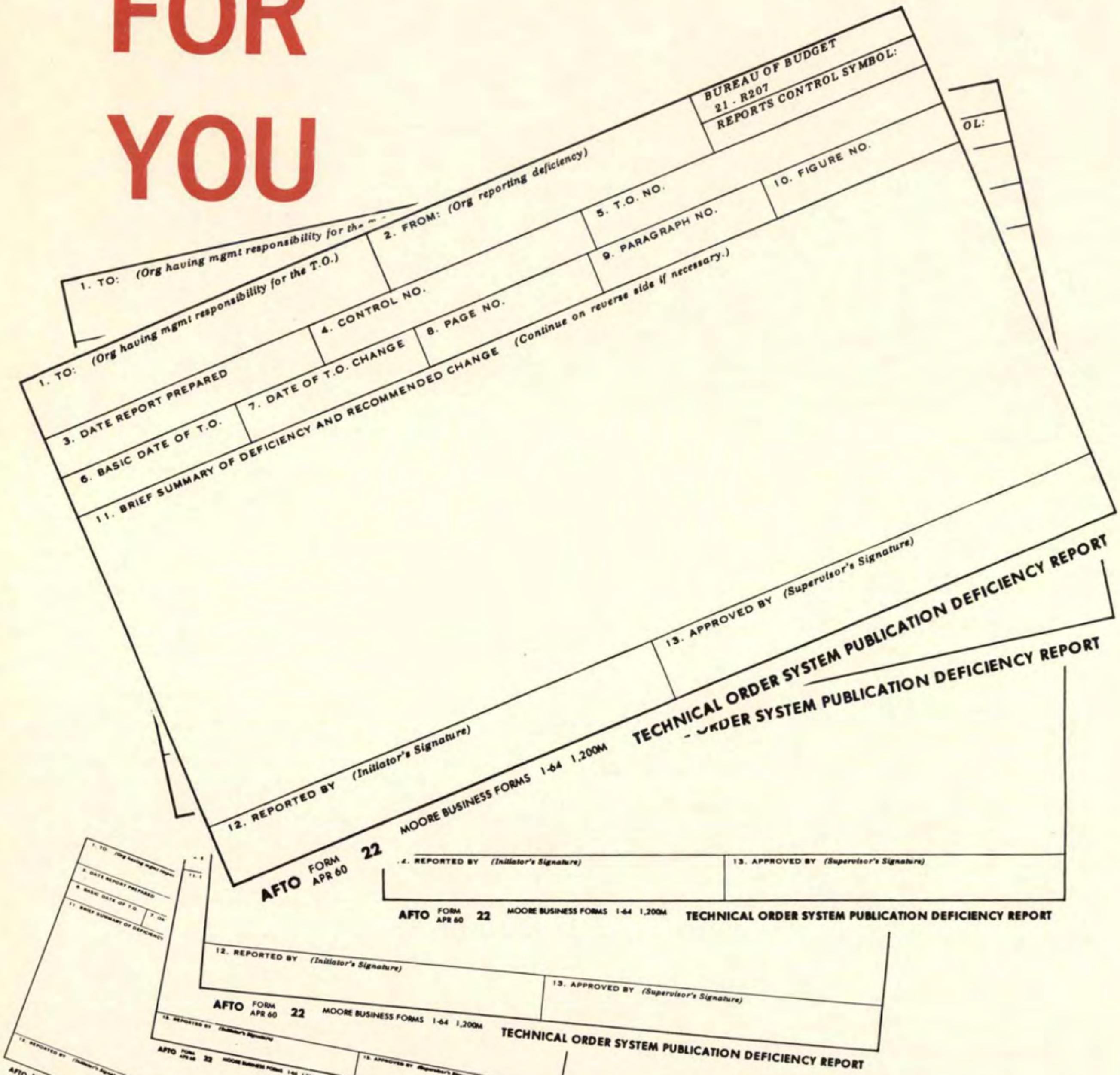
RUBBER BAND EFFECT

During straight-in GCA recovery the F-4 began uncommanded yaw and roll. As airspeed was slowed below 190 knots, gear and full flaps down, oscillations in yaw and roll increased to approximately 15 degrees. Aircraft commander initiated a go around and declared an emergency. As airspeed increased, oscillations decreased but were still noticeable in turns at 300 knots. A controllability check was flown at 200 knots, gear down, flaps up. Roll and yaw stab augmentation were disengaged; ARI, aileron trim, rudder trim and trim control circuit breakers were pulled with no effect noticed. A GCA was flown planning an AEBE, BAK-12. Airspeed on final was 200 knots. As airspeed was reduced below 200 knots over the overrun, the oscillations again increased. The aircraft commander deployed the drag chute which stabilized the aircraft just prior to touchdown.

A successful engagement was made at approximately 190 knots. All tape was pulled from the BAK-12 and a severe roll back and swerve occurred. The aircraft was turned 90 degrees to the left and was departing the runway when the tail hook dug into the soft earth. The tail hook buckled and the aircraft stopped with no additional damage. The aircraft commander attempted to stop the rollback with maximum braking but the brakes were not effective. Aircrew statements indicate that the snap back and swerve were violent.

The moral to this story is that this type of reaction can be expected anytime weight and airspeed force you into Regime IV of the Dash-One. If you don't "rubber band" back you'll probably break the tape. Be aware! ★

MAKE THE '22 WORK FOR YOU



Maj Donald M. Cassiday, Jr.
Hq 3AF, APO New York 09125

Little Elmo went to the base library and asked for a book on penguins. Given a scholarly tome on the subject, he repaired to the stacks and began to read. Ten minutes later he was back at the librarian's desk, returning the book. "My goodness, Elmo, you're a fast reader to finish that so soon," said the librarian. "Oh, I didn't finish it—it had more on penguins than I wanted to know," the lad replied.

Many maintenance folk feel about tech data the way little Elmo felt about penguins. They've been deluged with pleas to follow tech data until they just don't want to know anymore.

Such saturation should have borne fruit by now but who has seen an inspection report lately without a write-up like this: "A technician was observed performing maintenance without using tech data." Time and time again we read of these incidents until one gets the impression—wrongful, I believe—that no one ever uses tech orders.

There are some exceptionally good reasons why tech data should be used on all maintenance tasks. Murphy's law is and probably always will be valid. Old sarge may have changed 1000 F-100 wheels before, but there is no guarantee that he hasn't done it incorrectly 1000 times. Even if he did it right the first 1000, a late pay notice, junior's tonsils or that bad ice he got at the club last night might lead to his doing it wrong on the 1001st time. Suffice it to say that tech data is the best insurance we've got against Murphy's law.

In spite of this you can usually find a few old heads who will tell you several reasons why people can't be bothered with using tech data. Let's explore a few of these reasons and see how valid they are.

I don't have to go far to find a Chief who says, "It's that lousy tech data we've got. It's so fouled up that you just can't use it." I would like to suggest that AFLC's tech data authors have given you every opportunity to help them improve their product. The AFTO Form 22, Technical Order System Publication Deficiency Report, is the vehicle to be used to tell AFLC how to improve their tech data. A little thought by the experts who are on the end of the wrenches and a little care taken in preparing the AFTO Forms 22 might do wonders for the whole TO system. Just remember, if it's bad, you share some of the blame!

A similar complaint involves the unhandy format of TOs. Anyone who's tried to use a 300 page tech order on a Kansas flightline while the wind is gusting at 30 knots knows what I'm talking about. Similarly, the mechanic who has tried to take a TO into the cockpit on an F-4 while working on the bucket knows the meaning of unhandy. There are a couple of answers to this.

The AFTO Form 22 applies to format as well as content and your ideas for improving format and design are certainly welcome. Until the better designs and formats come along, though, the man doing the job still needs tech data. Perhaps a "two-man policy" might solve some of these problems. There's nothing to prevent Airman Minion from reading the book to Sergeant Clever while he's standing on his head to tighten a widget.

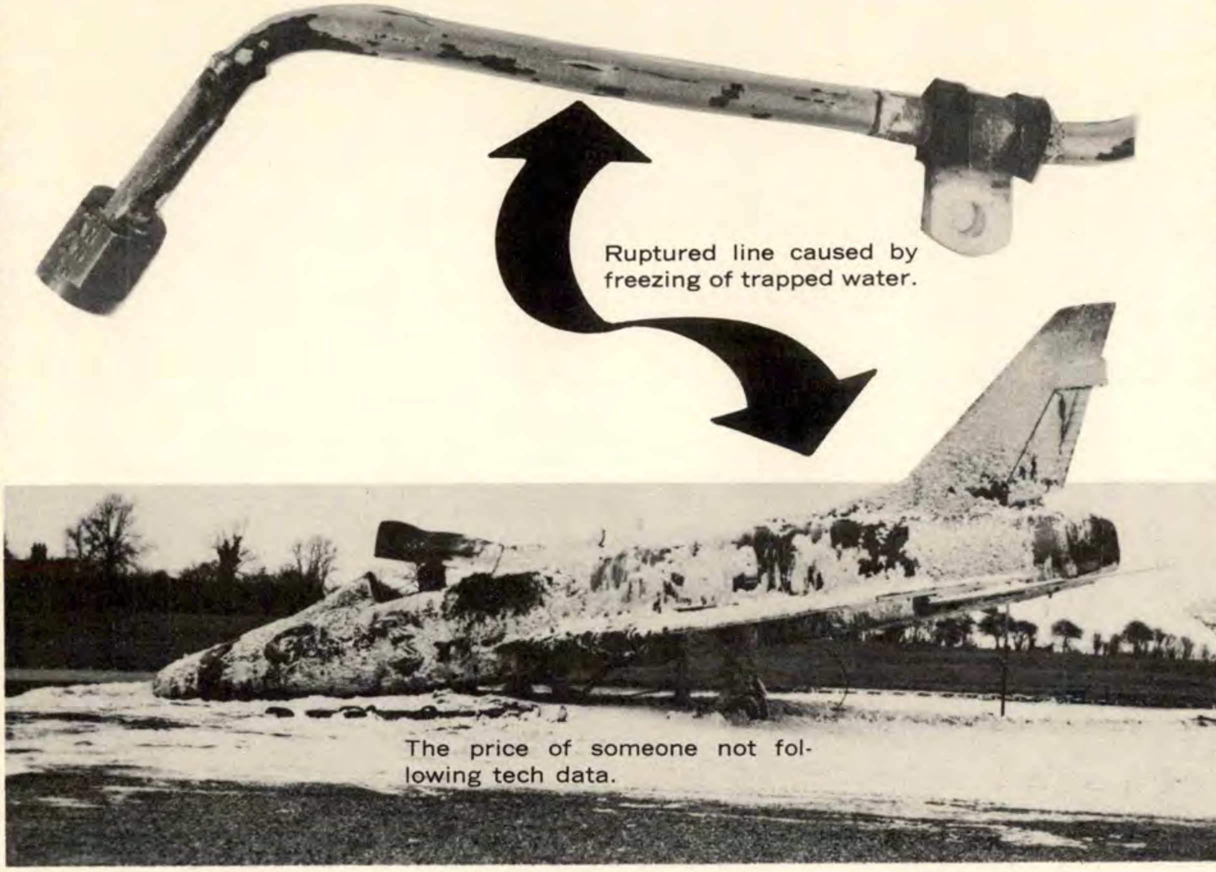
Another line of argument has to do with the simplicity of some tasks and the skill of some people. Who would deny that there are some folk around who are smart enough to do some jobs without a checklist. The problem comes in identifying who and which. The number of variables associated with the men and the jobs is so great that it is just not possible to draw a dividing line.

The simplest of jobs can become tough during cold weather or after the equipment has aged. Any individual's ability to do the job will vary with his health, emotional state and even the time of day. In light of factors which affect task performance, it is impossible to establish an absolute rule for when tech data should be used and when it isn't needed without leaving ourselves vulnerable to the effects of Murphy's law.

In the final analysis there's only one goal to shoot for and that has to be 100 per cent. We should do all we can to see that the tech data we have is the best possible and in the most effective format, but we also must be sure that we use what we have. The stakes we are playing for are too high to settle for anything less than perfection. ★

save 5 minutes... LOSE 1 AIRCRAFT...

Capt Rafael A. Goyco, Directorate of Aerospace Safety



Ruptured line caused by freezing of trapped water.

The price of someone not following tech data.

I have just finished reviewing an accident report involving an F-100 aircraft destroyed by fire following an aborted takeoff. The airspeed indicator gave the pilot erroneous readings and he chose to abort the takeoff and engage the barrier. After engaging the BAK-9 at a high rate of speed, the nose landing gear collapsed and the pitot tube went under the MA-1A barrier cable. The cable tore the wing tanks open and the spilled fuel ignited. Fire destroyed the aircraft, but the pilot managed to get away from the accident without injuries.

The airspeed indicating system was not working properly because of a ruptured drain line located in the left side of the fuselage behind access door F33. The inspection of drain lines was signed off by the crew chief, but when questioned, he said he had not drained that specific line because he did not know its location. But he signed off the inspection! Investigation revealed that water had frozen in the line causing it to break and provide erroneous airspeed indications.

Now, I wonder—why didn't this crew chief check the applicable technical order to make sure that he was doing the right thing? There are several possible answers that I can give you. One, he may have been in a hurry to get home. Or he relied on his experience (or lack of it.) Finally, he may have asked another crew chief, who gave him incomplete information. Supervisors, beware! Make certain that your mechanics know the tech order systems and insist they use them at all times.

There is no substitute for using technical orders. They were published in the first place to aid the mechanic in solving the problems that are encountered with today's complex weapon systems. In this specific instance, the mechanic was negligent in not checking TO 1F-100D(I)-2-1, pages 3-40 and 3-41, Figure 3-21—the pitot-static system section of the airplane general technical order for organizational maintenance.

It took me about five minutes to locate the correct procedure for draining these lines. The crew chief saved those five minutes, but he lost his airplane. Read and follow the tech orders and you can prevent accidents like this. ★

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 would appreciate further clarification on signatures required in Block F of AFTO 781J. Our interpretation is that there is a requirement for signatures in this block only when we (being at squadron level) are inspected by a group or higher echelon. Right or wrong?

SMSgt L. M. Cox
126 CAMS, Ill ANG

Dear Sergeant Cox

Block F of AFTO Form 781J is to provide a record of inspections performed by personnel from a higher echelon, such as the Wing QC Officer or higher. However, if the squadron commander desires, he can require a signature in this block by almost anybody above the crew chief, such as the line chief, maintenance officer, etc.

Toots

Dear Toots

Your old flame is writing again, this time in reference to the Operational Check. When an entry is made to say "Operational Check Due for Installation of an Indicator" and a pilot performed the operational check by runup or inflight check, which does he sign—the "corrected by" block or the "inspected by" block of the AFTO 781A? I know that when he performs an FCF he signs the "inspected by" block but nowhere does it say how to sign off an operational check. A long time ago, TO 00-20-5 specifically stated that operational checks would be signed off in the "corrected by" block, but not now. What's up, Doc?

MSgt Patrick A. Bowers
Det 12, 43 ARRS
Randolph AFB, Texas

Dear Pat

The people responsible for 00-20-5 feel that since there is nothing that specifically covers inflight operational checks, other than FCF, the local units should establish their own policy for signing off any such checks. However, I agree with you. The TO should cover it, but it seems the only way to get it into the TO is by submitting an AFTO 22. So, how about it?

Toots

Dear Toots

Please help me clarify a matter we have discussed for some time. It is in regard to aircraft engine removal. My question is this: If on a multi-engine aircraft you must remove the engine(s) for inspection of engine mounts, must you remove one engine at a time or more than one engine and FCF the aircraft after one engine or both engines?

Please answer with either reference to TO or your opinion.

MSgt John Jesse
143 Sp Ops Sq, RIANG

Dear Sergeant Jesse

In reply to your question regarding the requirement for performing a FCF after installing the engine or engines that were removed for the purpose of inspecting the engine mount:

(1) The Dash 6 inspection requirements (for whatever type of aircraft you're working on) spells out the conditions under which an aircraft will require an FCF.

(2) TO 1-1-300 leaves the decision for an FCF up to the maintenance officer. It also indicates that good sound judgment should be used to avoid scheduling unnecessary sorties on an aircraft.

So, first off, it's the maintenance officer's responsibility to make a decision. Second, if the Dash 6 of a twin-engine aircraft requires an FCF for removing and replacing the same engine, for engine mount inspection, and if both engines require the same inspection, it stands to reason that you would save time and money by completing them both, then flying only one FCF. However, as I pointed out earlier, this would be a decision for the maintenance officer.

Toots

Tech topics

briefs for maintenance techs

handle compressed air with care

Handling an air hose filled with compressed air could be like handling a loaded rifle. Both are special tools that will do the job. And both could cause serious injury if used improperly. To alert you to the dangers of compressed air, we are adapting some information from General Electric Safety Bulletin Nr 15.

Although accidents due to compressed air are uncommon, they are apt to be serious when they do occur. For example, it is the practice of many workers to dust themselves off with compressed air after the day's work. The compressed air hose is readily available and it does a good job of cleaning. Unfortunately, the hazards connected with this practice outweigh any possible advantages.

There is danger of the air entering the body through several normal openings: the nose, mouth, ears, or rectum. This could cause a rupture of the lungs, the stomach, or the intestines. This is a high price to pay for the cleaning of your clothes, especially when your clothes can be cleaned by a safer method.

When compressed air is used to clean parts held in the hand, there is danger that particles can be driven into the skin or through the air at another person.

In addition, the compressed air may contain large amounts of impurities. If this air enters the body, the foreign matter could result in infection and illness.

To avoid possible injury or illness, observe the following suggestions:

- Never point the compressed air hose at anyone.
- Do not repair air tools or change from one tool to another without shutting off the compressed air supply.
- Do not use compressed air for sweeping the floor and cleaning off the work bench or the material where you are working. If it is necessary to use compressed air to clean your work, always wear suitable eye protection and follow normal safety practices.

Using compressed air improperly is like placing a loaded rifle in the hands of a three-year-old child. The results are almost predictable. Handle compressed air as you would a loaded gun.

(General Electric Jet Service News)

checklist discipline

Probably you have seen one of those movies in which the hero removed the detonator from a bomb just seconds before the thing would have blown up and destroyed the whole city. During those tense moments there are few people who would notice whether the hero used a checklist.

We rationalize and say to ourselves that the movies can simulate anything, and that nobody would attempt such a task without a checklist in real life. Wanta bet? All too often explosives accidents and incidents can be traced to a checklist not being used, or one or more of the steps being missed. The following will illustrate what we mean.

A certified crew was dispatched to functionally check a SUU 21/A and load it with practice bombs. While performing step 20, which called for the bomb release button to be depressed, the SUU 21/A was jettisoned onto the ramp. Turned out the previous flight had been

with a travel pod attached with ejection cartridges installed. The pod had been removed and the dispenser uploaded but the aircraft was never de-armed or safety pinned as called for in the checklist.

Or, when the pilot attempted to release a MK 106 practice bomb the dispenser and all went. In this case the load crew, after uploading the bombs but prior to performing the required functional check, left the aircraft for another job. It was also discovered that the bombs' single shorting plug was still installed in the do-all receptacle of the right inboard pylon. What happened to this crew's checklist?

Then there was the sergeant who successfully installed the seat kit in the front cockpit of an F-4 then blew it when he went to work on the rear seat. He attempted to insert the ring of the seat kit deployment lanyard over the guillotine sear pin by applying pressure from the rear of the pin assembly with a screw driver. With no safety pin installed, the sear pin moved to its full extent and fired the guillotine cartridge. This man did not have a checklist in his possession.

The last one we will cite involved a crew performing an electrical check of an F-4 armament system. They did a beautiful job of letting the loaded centerline multiple ejection rack jettison onto the ramp. No checklist!

And so ad infinitum. Where's the discipline and the supervision?

closing the barn door

During an operational check of all eight B-52 engines the starting sequence was normal and engines were advanced to 1.5 EPR to check and adjust throttle alignment. The throttles were rigged and power advanced to 2.0 EPR to check throttle alignment above bleed valve closing. Power was then reduced to make final rigging adjustment and again advanced to 2.0 EPR for a final alignment check. At this time the aircraft rolled over the chocks and ran into a parked metro-van, crushing the metro into the dock door. The aircraft traveled approximately 80 feet and the nose section passed through the empennage opening in the dock door, causing damage to the radome and the lower forward fuselage skin. The immediate cause of this fiasco was that maintenance personnel deviated from tech data by not assuring adequate hydraulic pressure prior to engine start.

Dum-dum, you say. Maybe so, but prior to this incident engine run-up technicians were not required to receive training in hydraulic system operation. This unit has since started an accelerated training program for run-up people on the hydraulic system "need to know" items.

Tech topics

CONTINUED

hot ground wire

We hear frequently that smoking is bad for our health. However, here is one case where, if the man had been a smoker, he might still be alive.

A three-man maintenance team decided to take a smoke and coffee break prior to performing a pitot static check on an AGM-28. One of the team members, a non-smoker, left the break area approximately 10 minutes ahead of the other two. When the remaining two airmen returned to the work area they found the non-smoker lying across the cable tray, unconscious.

While removing the stricken member from the cable tray, they discovered he was clutching in his hand an alligator grounding clamp from the S2-14M-A. It was also discovered that power was on the S2-14M-A, and that the alligator grounding clamp was hot. All efforts to revive the airman failed.

Power was supplied by the power unit through a receded pin in a connector. Readings of 250 volts and 5 amps were found at the ground wire.

The lesson we are trying to point out is not that we think you should be a smoker, but rather, (1) unless it is absolutely necessary never connect or disconnect a wire (even ground wires) with power on the equipment, (2) if you must work on equipment with power on, *use the buddy system*. If you are in doubt about the buddy system, see AFR 127-101, paragraph 10-6.

panel problems

Just prior to flight the F-106 technicians were trouble-shooting a nucleonic oil quantity malfunction. One technician found a broken fastener on one of the inspection panels. After securing the panel with four good fasteners, he wrote up the broken fastener in the 781 forms, identifying it as panel Nr 198. He then notified the sheet metal shop directly. A sheet metal man was promptly dispatched, but was unable to find anything wrong with the fasteners on panel Nr 198. He did find a broken fastener on another inspection panel, replaced it, and signed off the discrepancy in the forms.

You may be wondering, so what? What's the problem? Well, the next postflight revealed a panel missing. You're right; it was the same panel the trouble-shooting technician had found with a broken fastener; however, it was not panel Nr 198.

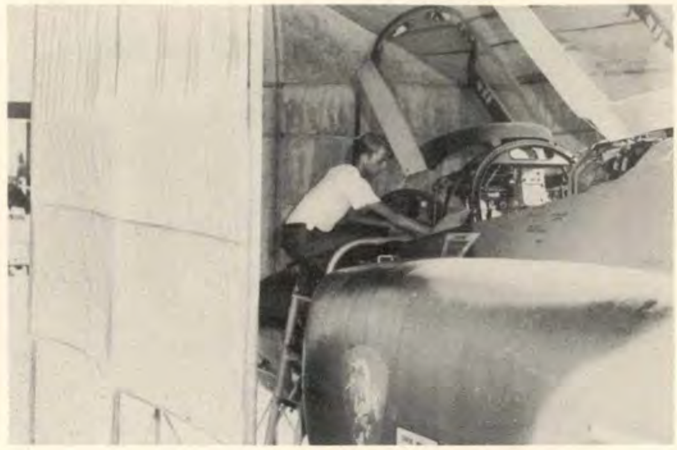
riven rivets

The following C-7 incident indicates the pilot must have had his hands full and, also, a job well done in getting the bird back on the ground.

During a crosswind takeoff the pilot noted extreme stiffness in the aileron controls, accompanied by moderate airframe vibrations. At 1000 feet the flight mechanic observed the right outboard aileron cocked up approximately six inches. At this time the pilot performed a controllability check and found that with full left aileron, he could safely control the aircraft. Due to the crosswind and the lack of crash equipment at the local base, he decided to recover at an alternate. No difficulties were encountered enroute. However, due to previous difficulties at slow airspeeds, touchdown was made at 110 knots with no flaps. Severe vibrations were encountered during initial deceleration; however, they subsided at approximately 40 knots. As the aircraft cleared the runway the flight mechanic reported the right outboard tire blown.

The immediate cause of the control problem was that the right aileron hinge arm had sheared and approximately five feet of rivets had been popped in the upper shroud area along the right outboard flap. A detailed investigation of the hinge channel indicated that the lower attachment rivets had sheared and the center channel had pulled loose. The culprits were those who installed cherry rivets in lieu of solid rivets at an undetermined time and place. ★

PORTABLE DOCKS



It gets hot in Thailand—and wet, conditions that are a way of life for maintenance men assigned to Southeast Asia. At Ubon RTAFB, Thailand, somebody decided to do something about it, so the welding and fabric shops of the 8th FMS got busy and turned out some neat portable shelters.

The shelters are made of metal pipe frames covered with aluminized canvas which is waterproof and reflects heat. Wheels make the shelters easily movable from one aircraft to another. ★

Photos by A1C Roger Crescentini, 600 Photo Sq, AAVS

PROJECT CLEANSWEEP

Sgt Richard Davis, 307 FMS, operates high powered stream of water to flake paint off a B-52 engine cowling.

Part of the Project Cleansweep operation is the repainting of the aircraft. Sgt Lawrence J. Smith, 307 FMS, sprays a B-52 with camouflage paint.

TSgt Ray A. Gant, a 307th Headquarters Squadron Section Quality Control & Evaluation inspector, administers a "follow-up" inspection on corrosion control maintenance performed on one of the Cleansweep B-52s.

Busy aircraft flying frequent missions tend to accumulate numerous minor discrepancies. To prevent these from becoming a major problem, the 307th Strategic Wing at U-Tapao Airfield, Thailand, clears the squawks on its B-52s one aircraft at a time under a program called *Operation Cleansweep*.

Selected aircraft receive a concentrated maintenance attack over a five-day period. Not only are all discrepancies cleared, the aircraft are painted inside and out, new decals are installed and even new light bulbs. Sixteen men from the 307th Maintenance Squadrons are assigned to the program, 12 working the day shift and 4 at night. ★

Photos by SSgt D. P. Jenkins

NUCLEAR SAFETY AID STATION

TWO-MAN VIOLATIONS

What happens when a lone individual crosses the boundary of a no-lone zone and approaches a nuclear weapon loaded aircraft? Usually he will hear a loud whistle and quickly become the center of attention of several persons. Right? Usually! Recently several violations occurred that were not immediately detected. The violation was discovered only after an inventory or upon noticing something misplaced (such as a roll of toilet paper on top of a B-52 wing). A few violations that had the desired result have been caused by someone absent-mindedly stepping across the line, others by a change in working habits (two men leaving a third, not normally a part of the team, in the cockpit), or a boredom which led to unauthorized activity (controller left the Command Post to visit with a passerby.)

Through October 1970 there were 14 two-man violations. Three of these required re-evaluation of the violators' qualifications under the Human Reliability Program. The others have been mostly a result of "contempt bred by familiarity" caused by hearing the "same old briefing" so many times that it has become "old hat." How about giving the two-man policy a little extra attention—vary the briefings to make them as interesting as possible and motivate the team to adhere to the no-lone zone policy and keep violations to a minimum.

5TH WHEEL

A team was dispatched for a Guidance and Control unit change. The operation progressed normally until the team began backing out of the site and preparing the semitrailer for departure. Two topside personnel lowered the front of the semitrailer and removed the rear jacks. The trailer brakes were set and the tractor was backed under the semitrailer. At this point no one was assisting the driver and he could not confirm that the semitrailer was raised by the 5th wheel. He noted that the 5th wheel lock pin moved forward and he successfully completed the two pullaway tests. No one bothered to make a visual check of the 5th wheel locking jaws. After the front jacks were raised and equipment stowed, the semitrailer was pulled from the launcher—and then it happened! During the first turn and after traveling approximately 60 feet, the semitrailer fell free from the tractor. Rotten luck usually accompanies personnel error.

PUSHED AROUND

To facilitate positioning a reentry vehicle (RV) in an RV transport van, maintenance personnel moved the pusher unit from its normal storage position and temporarily tied it down. (The pusher unit is used to open the missile silo closure.) After positioning the RV, the maintenance team neglected to return the pusher to its proper location and to tie it down in accordance with technical order requirements. In transit, the dolly mounted pusher broke loose and rolled to the front of the van where it struck and damaged the RV spacer unit. That ole gremlin called "NEGLIGENCE" works hard to degrade safety and professionalism. Don't permit him to push you around.

ERRATA

The article "Air Force Nuclear Weapon System Safety," November 1970, contained three charts which were mislabeled. The charts are reproduced below with corrections shown in color.

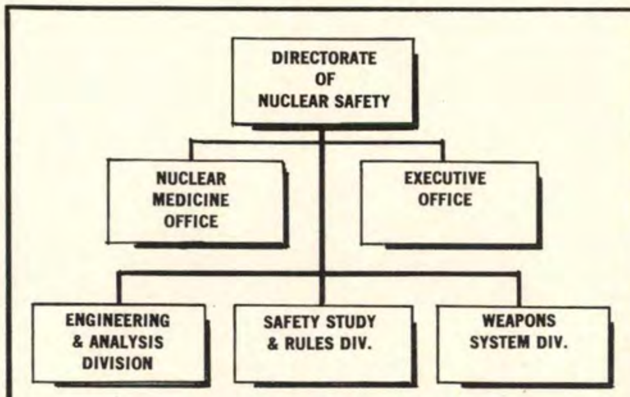


FIG. 1 DIRECTORATE OF NUCLEAR SAFETY

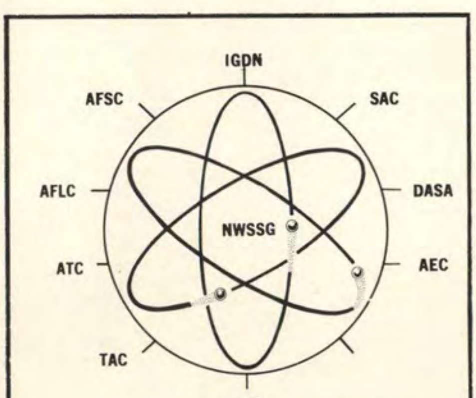


FIG. 2 MEMBERSHIP OF NWSSG

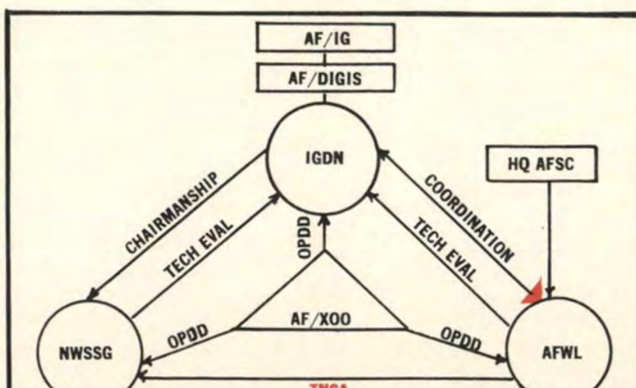


FIG. 3 MAJOR RELATIONSHIPS OF IGDN, NWSSG, & AFWL

HELLO? HELLO?

Sure do enjoy reading your fine magazine. Saw something in the August issue that might explain what might be the trouble with your headset (if any).

IT'S ON BACKWARDS . . .

LCDR C. Wawrzynski
CGAS, San Francisco

With our model, who cares?

A-1E INDIGESTION

At one of our bases in SEA, an electronics specialist was dispatched to remove and replace a defective component in an A-1E. While removing the old component, the specialist found a pocket knife in the fuselage bay containing the electronic equipment and flight control cables and pulleys. A further search revealed the following items:

1 metal spring
3 metal parts
5 bolts
3 nuts
5 pieces of plastic
14 metal washers
50 pieces of safety wire
5 rocks

The items were turned in to the maintaining unit's Ground Safety officer who showed them to the Wing Safety officer and the A-1 unit commander.

Only pure negligence can account for so many foreign objects being found in the face of the constant emphasis on the possibility of jammed flight controls or shorted electrical circuits.

Shortly before this incident, the A-1 unit had an aircraft impact into a mountainside for no apparent reason. If you were a pilot, how would you feel about flying with this kind of maintenance being performed?

In case this sounds exaggerated, I was the specialist who found the items mentioned and who arranged them for the picture before they were taken to the Wing Safety officer.

Sgt Howell H. Hughes, Jr
4429 CCTS
Cannon AFB, NM

SEPTEMBER ASM COVER PHOTO

Undoubtedly many of your readers had questions about the beautiful color cover on your September 1970 issue. Just for the record and to answer some of these questions, here is the background.

The photo was taken between Osan, Korea, and Guam in November 1969. The F-106s were part of the 94th Fighter Interceptor Squadron, then at Selfridge and now at Wurtsmith AFB, Michigan. The unit was returning from a six-months deployment to Korea as part of the Aerospace Defense Command air defense for free world forces in Korea. ADC first demonstrated global capability after the Pueblo was seized. While ADC no longer has the Korean commitment, it still has the ability to deploy anywhere in the world to provide air defense.

Mr. Kenneth Hackman took the photo with a 35mm lens on a motorized Nikon. Film was Kodachrome II, shot at f5.6 at 250.

Lt Col Arthur F. McConnell, Jr
Director of Information, ADC

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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 James E. Oliver

1st Helicopter Squadron, Andrews AFB, Wash. DC

On 17 September 1970, Major Oliver was flying an administrative support mission when he experienced a power failure on takeoff in a single engine CH-21B helicopter. Major Oliver had boarded a General Officer at Washington National Airport and was following tower instructions for takeoff and climb when, at approximately 200 feet above the ground, the engine failed.

The aircraft, at the time, was above one of the most congested areas in metropolitan Washington, D.C. Within a few seconds Major Oliver executed the necessary emergency procedures, alerted his crew chief and passenger, and autorotated the helicopter into the only suitable landing area in their gliding distance.

Major Oliver skillfully avoided numerous buildings, city streets, electrical poles and wires, and other obstructions as he executed a minimum roll, no power landing. All this was accomplished without injury or damage of any kind. WELL DONE! ★

3.0%

TO THE MEN AND WOMEN RESPONSIBLE FOR THE LOWEST ACCIDENT RATE IN THE HISTORY OF THE UNITED STATES AIR FORCE