SEPTEMBER-OCTOBER 1972

UNITED STATES AIR FORCE

Aerospace SAFETY

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FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS

SEPTEMBER-OCTOBER 1972

[redacted]

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SEPTEMBER-OCTOBER 1972 AFRP 127-2 VOLUME 28 NUMBER 9

THE PENNY PINCH

Our regular readers will have noticed, by the time they get this far, that our four-color cover is missing. There are other changes, too, and we may as well point them out here and try to explain why they were necessary.

Beginning this month, we have cut our pages by four. In addition, as things stand, we will publish only nine issues during the next 12 months.

The reason for this, quite s[illegible] is budget. We regret the cutb[illegible]s, of course. But rest assured that the staff of AEROSPACE SAFETY will continue to be as selective and yet diverse as possible in bringing you accident prevention material.

AEROSPACE SAFETY is proud of its 26 year history of combating accidents. We think a part of the credit for our continued improvement in safety is due to the safety education material presented over that 26 years. (A recent survey indicated that 21 percent of the officers and 17 percent of the airmen polled had been helped in an emergency by something they found in these pages.)

So we will continue the fight, with every means at our disposal. And we actively solicit your help: your comments, your ideas, your gripes—can be instrumental in help[illegible] help the Air Force. ★

Hey, Sam

Hey, Sam, you with the tool box. Could I have about five minutes of your undivided attention? I suppose that if you read this magazine very often you check out the Tech Topics. They're meant primarily for you guys in Maintenance. And you've probably noticed that most of them describe something some maintenance man did that was wrong. Perhaps you also noticed that it's the supervisor who quite often takes the lumps.

Let's forget the supervisor for a minute and get to the real nitty gritty, the guy with the wrench in his hand—YOU! You're the guy who does the work. It's you who torques—or doesn't torque—that fitting. It's you who installs that clamp—correctly or incorrectly. Who makes those hydraulic line connections, or hooks up the wires? YOU! Not your seven- or nine-level boss. And when the work is done, who buttons up the panels? You know.

Now some guys have been known to make a stab at a job, assuming that if there is anything wrong QC or somebody will catch it. But we know from bitter experience that it just doesn't work that way. Sometimes they do and sometimes they don't. Like when the tip tanks on a T-33 fell onto the runway and ruptured. Fortunately, no fire. When they dug into that one, they found that two wires to the left tip were crossed and another wire was connected in error to the tip and bomb release circuit breaker in the aft cockpit. The wire should have been capped and stowed.

The work was done during a TCTO mod and the people performing the operational check didn't follow tech data. Sounds familiar, doesn't it?

Sometimes when the pressure is on things get pretty tight. Ops wants a bird, Job Control puts you on a short schedule, and about that time Supply can't seem to come up with the part you need. But this is a way of life—and not just in the Air Force. Admittedly, at times like this getting the job done right is tough. But it has to be done right. Excuses don't stand up very well when they dig through the wreckage and trace the fault back to you. No matter what the reasons or how many excuses you have.

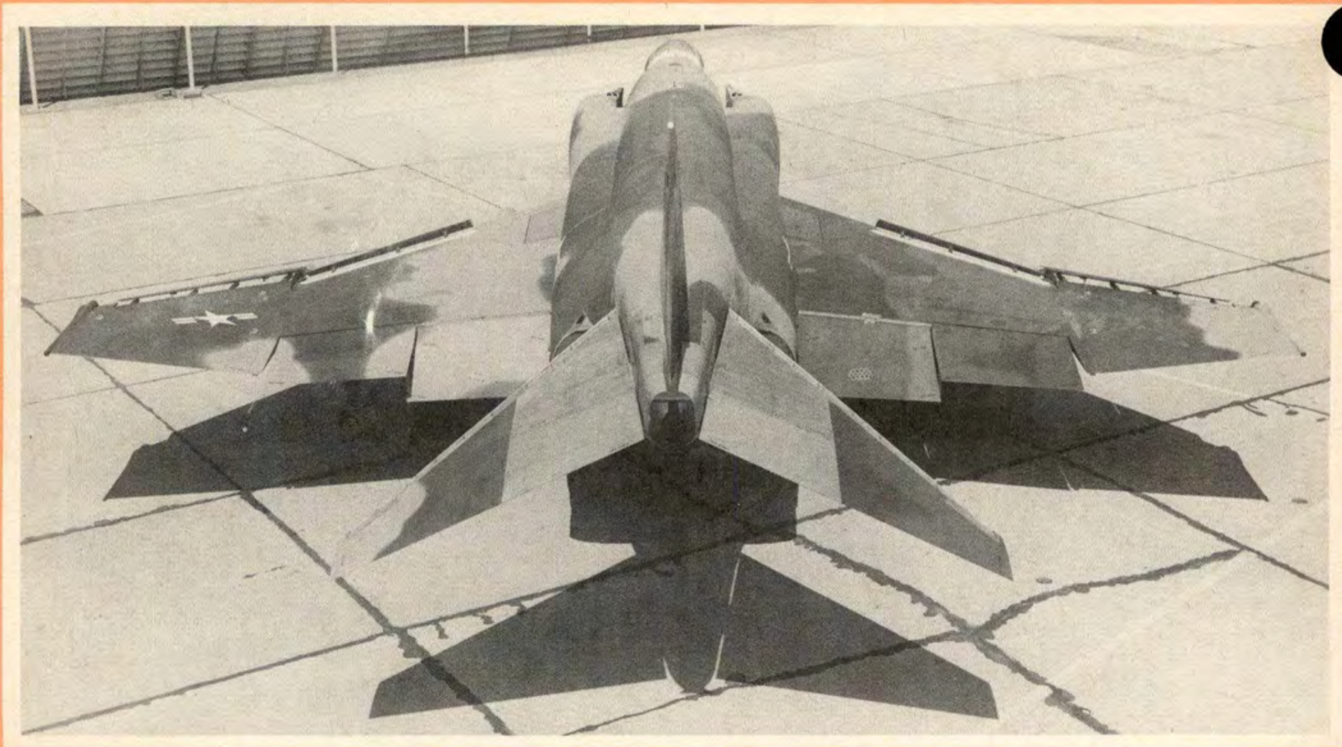
A crew chief found himself in this position when an engine took off in a test cell because the man failed to install the thrust restraining rods that secured the engine to the dolly. There were several things involved. The crew was rushing to meet a deadline. Supply was deficient on part support, which resulted in a backlog of engines, overtime, and a lot of pressure on the engine shop people. Despite all that, if tech data had been used this accident might have been averted.

Speaking of pressure, pilots have their problems, too. Imagine yourself in the cockpit of a single engine fighter. Suddenly you lose AC power because the generator failed, then your secondary hydraulic pressure goes because of metal fatigue of the line to the emergency AC generator. Things get real sticky when you discover that you can't get the nosegear down with the emergency lowering system. So you eventually land on the mains and the nose of the aircraft.

Think of your feelings when it is discovered that the nose gear wouldn't extend because someone tightened the nut on the top drag brace pivot pin beyond clearance limits and the pivot pin and bushings were improperly lubricated.

And so it goes. There are enough of these things in any 30-day period to fill a book. Most of them are picky little things that don't seem too important until one of them costs a life and/or an airplane. Then those seemingly insignificant things like a cotter pin forgotten, safety wire not installed, a couple of lines or wires crossed, torque values exceeded or not achieved, panels not fastened, become very important.

Generally at this point a writer sums up with a sermon or a lecture. But I'm not very good at sermons and lectures. So you can write your own. Have at it. ★



Slats are Better!

IRV BURROWS
Chief, Experimental Test Pilot
McDonnell-Douglas Corp.

Ready or not, the slats are coming! June delivery F-4Es were slatted—they look and feel different from your average old F-4C through E; and though there ain't nothing in them that'll jump up and bite you, a few words of enlightenment may be in order.

TWO POSITIONS

Let's cover mechanization first. Each wing incorporates two sections of slats—inboard and outboard. Both are hydraulically actuated via the utility hydraulic system. The inboard section moves between the extended (high-lift) position and the retracted (clean) position. The outboard section moves from a high-lift position to a cruise position, which is not retracted but simply rotated (see slats/wing cross-section illustration on page 3).

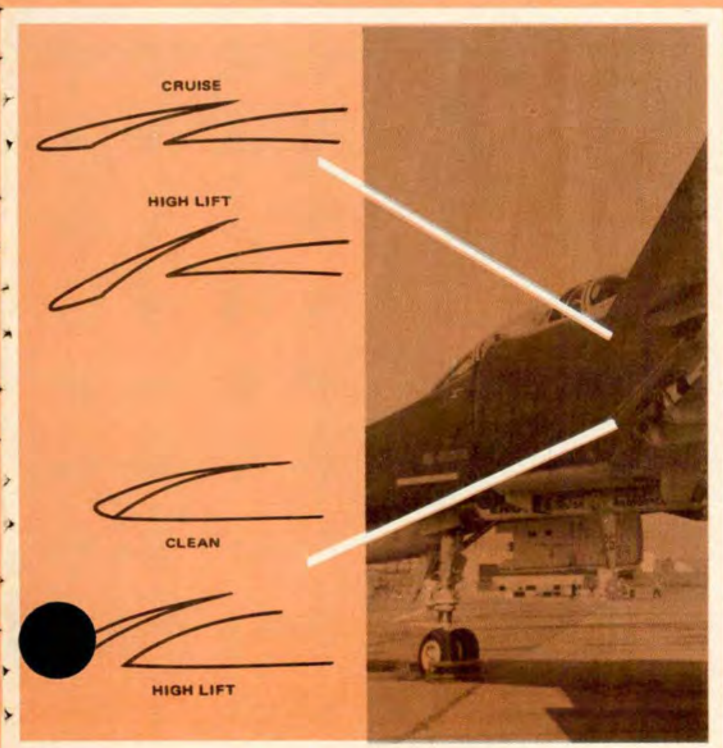
Both slat sections move in unison, and the total movement is accomplished in about one second. Happily, the movement also takes place very smoothly, relatively quietly, and with almost imperceptible effect on aircraft pitching movement. The net effect is that 90 percent of the time, if you're not watching or listening for them, you won't know when the slats move. Once again for emphasis—they are *two-position* slats—not modulated.

SWITCHOLOGY

A few items have been changed in the cockpit to accommodate this new "toy." The heart of the slats control is the old FLAPS switch which still has three positions but is relabeled from top to bottom as NORM, OUT, and OUT AND DOWN. NORM applies to almost all flying between the takeoff and landing phases. In this position, you have a slat system which is autoatically positioned as a function of angle of attack. o thinking is required—when alpha exceeds 10 units, the slats move out; when it decreases below eight units, they come back in. Two units hysteresis is built in, of course, to keep them from chattering in and out around cruise. Okay? Auto slats in NORM.

The next position down (OUT) gives you a manual slats-out position—anytime this position is selected, those hummers go to high-lift position *unless* one of two conditions prevails: either the OVERRIDE switch is IN, or airspeed is in excess of 600 knots. Any other time, the OUT position should command just that, thereby providing a manual slats mode.

The bottom position (OUT AND DOWN) can be considered normal landing and takeoff selection. You'll get slats and flaps. (Forget about ½ or full flaps—they're now the same; i.e. 30° flaps is the *only* flaps-down position). Now, right here, we felt we saw a Murphy. F-4 drivers the world over have been moving that flap switch one notch down for takeoff. With our original slat mechanism, this position would give you a no-flap, slats-out takeoff—not necessarily a problem, t potentially one if the pilot isn't on his toes (possible errotation). Our solution here is to interlock the flaps and gear so that if the gear is down (specifically, if the nose gear is down), the OUT position will also run the flaps down. This does not mean that as soon as the gear is retracted after takeoff, the flaps will come up



too. The circuitry is designed so that the flap switch must be placed in NORM (or the flap blow-up speed exceeded) before flaps will retract. This eliminates premature flap retractions after a heavy takeoff.

How about a quick review of that: Flaps are lowered whenever OUT or OUT AND DOWN positions are selected with the gear down; with gear up only the OUT AND DOWN notch gives you flaps. Thus, if you've selected OUT with gear up, you'll get no flaps until the gear is lowered—then, down they come. Flaps are raised *only* by placing the switch in NORM.

If I haven't lost you yet, hang in there and I'll try harder.

Earlier I mentioned the SLATS OVERRIDE switch. This is a new addition to the cockpit: a two-position switch guarded to the NORM position with the other selection being IN. If it, in fact, is positioned to NORM,

the functions I've ascribed to the FLAP/SLAT switch will prevail. However, if you move it to IN, all other slat selections are overridden, and the slats should come in. The logic here was to provide a capability to retract everything rather than have an asymmetric slat extension due to battle damage or malfunction.

Pneumatic emergency flap extension will give you what you'd normally want under those conditions—flaps and slats—the landing configuration.

So that's it for controls. All the options are available: automatic slats (which I will consider the normal case); plus manual in and out.

NEW INDICATORS

In our slats-equipped F-4Es some new and different indications are presented. The old leading-edge flap

Slats are Better!

CONTINUED

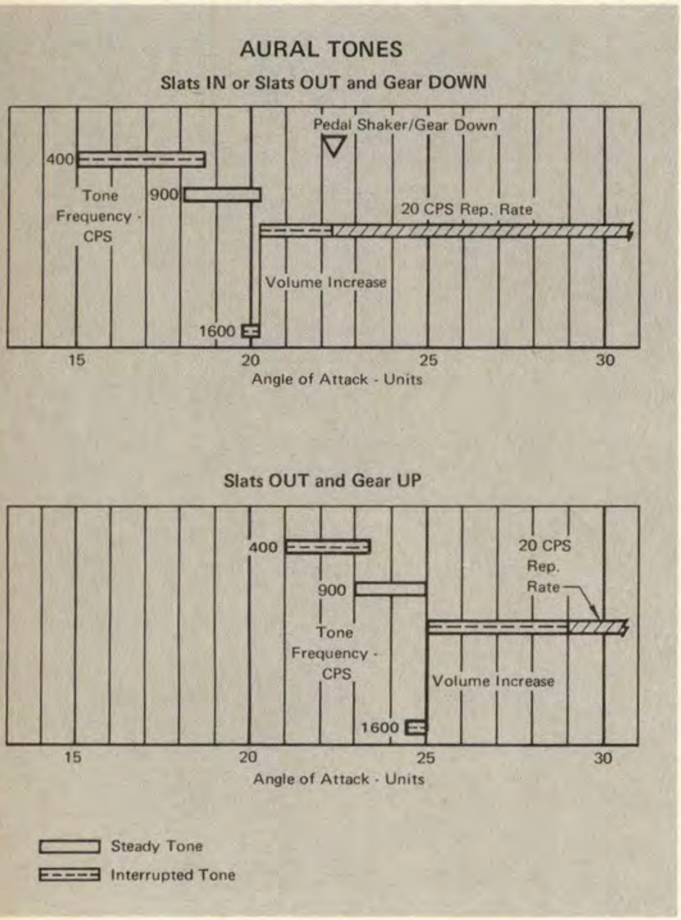
indicator is now a *slat* indicator which moves from IN to barber pole to OUT as the slats move. A new SLATS IN light has been added to the telepanel; it will come on whenever the override IN position is selected. And the old WHEELS light logic has been changed so that it now flashes whenever you're below flap blow-up switch speed (approximately 230 knots) and the gear isn't down.

MORE AURAL TONES

As you'll soon see, the maneuvering handling qualities with slats out are significantly improved. This being the case, it was quite obvious that a change was required in the aural tone pattern. Now we have an airplane which maneuvers at 25 AOA with slats out but which still approaches for landing at 19.2. By the same token, should slats not extend for any reason when scheduled, we're back to a basic F-4 for maneuverin[g]. So what we really need are two tone patterns—one f[or] slats out and one for otherwise. Accordingly, the new schedule (see below) was developed to go along with the old basic schedule, with slats-out logic being obtained from the four limit switches in series. Thus, the familiar old F-4 aural tone pattern will apply anytime one or more slats are still in, *or* for the landing configuration. When slats are out for clean maneuvering, the new tone schedule will be heard.

Your representatives and our guys agreed on the new pattern, feeling that: (a) 23 to 25 was probably going to be the prime maneuvering range; (b) above 25, volume should be at a level that couldn't be turned off; and (c) 29 was a good point for stall warning. Rudder shaker at 22.3 is retained only for the landing configuration—for a 25 unit maneuvering airplane it's obviously undesirable and hence has been deleted.

So much for mechanization. The obvious question now is: How does it fly?



UP AND AWAY

Let's go through the normal flight sequence, whic[h] all other things being equal, requires takeoff to occur first.

The airplane is longitudinally more responsive at low speeds—a fact which will be obvious when full aft stick starts the old nose coming up at something less than 100 knots. Takeoff techniques remain the same as in the non-slat aircraft, but you should be prepared to stop the pitch attitude change a little earlier. We've found that the three units nose-down trim previously recommended for the basic F-4E is still okay. Of course, if the slat switch is left up (NORM) for takeoff, it'll be the same as a clean F-4 takeoff. (With weight on the wheels, slats are driven to the cruise position on the ground.) However, as soon as weight is off the wheels, the slats will come out (AOA higher than 10 just after takeoff). This transient is insignificant and won't be a problem.

CHARACTERISTICS

A rundown on handling characteristics will show some which are consistent and repeatable. There are other subtle quirks that, as in all airplanes, will va[ry] from F-4 to F-4, or from pilot to pilot. Generally, t[his] is what happens:

CLEAN—Buffet is less at all angles of attack. I think this will be quite obvious to you the first time you honk it in, particularly at high altitude. Next, I think you'll notice an increase in "comfort" at high alpha—maneuvering from 20 to 25 units is routine. In fact, optimum maneuvering is (at this time) recommended at 23 to 25; and the aural tone will so state.

Aileron effectiveness diminishes above 20, but good roll rates are available with rudder. Above 25, some wing rock will generally start to develop. The exact point it starts, the rate it builds up, the associated yaw, etc., are all variable; and I think it's sufficient to say that anything above 25 units is not considered optimum for maneuvering. The aural volume increase will start here (25); and if perchance you should miss that but begin to feel wing rock and yaw, I would suggest moving the stick forward smartly to decrease alpha below 25. I don't intend to sound an alarm here—we've spent a lot of time above 25 (in fact, above 30). We've encountered some departures (generally between 30 and 35, which we classify as very gentle), but there is absolutely no point in flirting with out of control, and slats, friends, are *not* advertised to prevent out of control. Forestall it, yes; pacify it, yes—but not prevent it. Incidentally, the AOA indicator will still read 0-30, and 30 units will constitute an upper maneuvering placard.

Of course, the obvious capability to pull more Gs (or alpha) for a given airspeed/altitude combination is there. Likewise, specific excess thrust is improved—you can fly formation with a non-slat F-4 in high AOA turns using considerably less power.

One G flight (clean) is also characterized by increased comfort. The airplane can be one G (clean) stalled with only mild buffet and sometimes little or no wing rock. I've seen cases of stick back on the stop, and alpha well above 30 for several seconds, while the airplane simply drops like a rock, but does little else—similar to a delta-wing stall. They're not always this stable, and increasing wing rock from 25 to 30 units is more often the case, but it is significantly more comfortable than the basic F-4.

DIRTY—If we have to tone down our bragging a little bit, it's in the landing configuration arena. We've traded a little here to gain a lot of combat capability. Basically, the aircraft approaches about 8 to 10 knots faster than a full-flap no-slats F-4E at the same alpha. While it's doing this, the roll response is just a tad less than you're used to and maybe it's a little tougher to track a constant AOA. On the other hand, there is more stabilator effectiveness, which allows the airplane to be flared a bit before touchdown. Thus some of that extra speed can be bled off and actual ground roll is not excessively lengthened.

A power approach stall is not greatly different from the basic airplane. Buffet is greater, and perhaps so is wing rock (starting at about 25 units). Neither of these detracts from the approach, but they do provide stall warning that is probably more noticeable. There is an area of almost neutral stick force stability (i.e., increased alpha for very slight increased stick) between 23 and 25 units, but we do not feel this is of serious concern since it's very slight and well above normal approach alpha.

THE BEST F-4 YET

So, that's it, guys! As of this writing, the slats program is still underway, and all the returns are not in yet. An upcoming Air Force evaluation, plus some of our own thoughts, may revise a few of the items I've mentioned. For example, the 8 to 10 unit actuation point is up for grabs. It was designed this way based on analysis; it works, but may not be optimum. Other things are under consideration, but won't be determined by the time this article goes to press. Whatever changes may occur from what I've said here should be for the better, and they'll just make it more pleasant for you to fly what we consider to be *the best F-4 yet!* ★

(McDonnell Douglas *Product Support Digest*)

NO DAMAGE UNTIL...

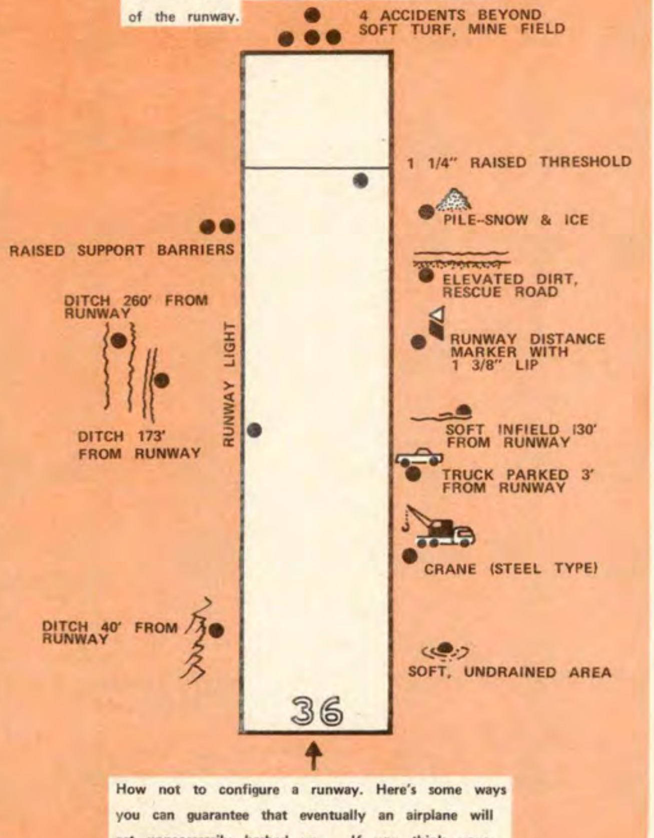
Make a guess. How many times have pilots had a fair chance of getting off more or less unscathed after sliding or running off the runway only to find some kind of obstruction which damaged the airplane? Leaning on the computer for our data, we found that 85 times, from 1968 to date, airplanes suffered damage when they might have gotten away with an incident. We destroyed 27 of these, caused major damage to 29 and minor damage to another 29. We don't mean to say that we would have had 85 undamaged birds out of 85, but we do know a goodly number would have sustained significantly less damage had they not had to run over barrier supports, leap ditches or plow a furrow through soft turf.

A lion's share of these 85 accidents was caused by a ditch near the runway. In fact, ditches, trenches and culverts were the culprits in 25 of the 85 accidents.

Some interesting things came to light looking through the list of events. In one case, a drainage ditch had been dug without the knowledge of the commander, ops or safety officer. It was an unusual set-up, to say the least, but how does a team of engineers with their assorted equipment manage to dig a ditch without knowledge or approval of *somebody?*

An alert ops and safety officer acted in the nick of time to prevent a similar type accident from occurring again within two weeks. They got the clue after the first one and managed to get some corrective action by CE. The initial event occurred when an F-100 got to the extreme side of the runway and hit some runway lights. The lights were constructed so that the mounting base was perpendicular to the runway surface. When the bird ran over it the tire blew and caused the aircraft to swerve into some soft dirt. Result—one minor accident. The simple solution was to flange the mounting base, ramp fashion. Two weeks later another aircraft hit runway light mountings but this time, no blown tire and the pilot managed to get the airplane back toward the center. We can't *prove* that an accident was prevented here but the evidence points that way. In any case, it seems like a sound piece of advice that if you have some runway lights at your base which protrude at a 90 degree angle, why ask for trouble? Smooth 'em out!

Plot of 18 representative accidents which occurred after the aircraft slid or ran off the main part of the runway.



How not to configure a runway. Here's some ways you can guarantee that eventually an airplane will get unnecessarily bashed up. If you think your airpatch is safe, so did some of these.

Ditches aren't the only way to trap a stray airplane. Here's some other ways you can do it.

- Ditches, trenches, culverts—25
- Unprepared runway shoulders/overrun—15
- Barrier stanchions, BAK-12 type housings—9
- Runway/overrun lights, poles/supports or markers—9
- Vehicles or buildings—7
- Construction areas—7
- Plowing into road (from soft surface)—5
- Snowbanks—4
- Lakes, creeks, marshes—3
- Other hazards—1

Many of our problems arise from abuse of the waiver route. A base will be granted a legitimate waiver. After a while, whenever anyone asks about an airfield hazard, the canned answer is "Oh, that's on a waiver." One base managed to parlay this condition for six years—until it contributed to a major accident. The hazard became such an accepted thing after a few years that nobody exerted pressure to get it fixed. (Do you have any of these old waivers lying around your base?)

Something is being done to remedy the waiver problem. AFM 55-48 tells ops, the safety guy and CE that they *have* to get together at least once a year and review all these hazardous things we sidestep and see what is being done to fix them.

Of course, nothing will get done if you don't know a hazard exists. Have you ever seen a hazard and wondered if somebody with a little authority was aware of it? Did you continue to wonder until somebody got hurt or did you bring it to the attention of ops or safety? We insist that these individuals who can do something know all; but it's possible to overlook a hazard now and then, so give them a hand. Once you have identified a hazard and find that nothing can be done about it until tomorrow morning, make sure that everybody who may have an occasion to use the airpatch *knows* about it. Brief it, NOTAM it and put it in the Enroute Supplement—but don't ignore it! ! ★

big wind

Two recent mishaps stress the need for care and planning when a C-5 is on the airpatch. In one case a VASI light box was blown off its mounting and destroyed. The VASI was 400 feet behind the aircraft.

The other case involved a step van and driver. The blast from the engines of the C-5 blew the van onto its side and off the taxiway. Distance from the engines to the van was measured at 312 feet.

In both cases circumstances contributed to the accidents. In the first, the primary C-5 runup pad was occupied, so clearance was received for a maintenance engine run on another pad. The van driver was at fault in the other accident because he was driving in a prohibited area. Contributing circumstances guaranteed trouble. The aircraft was parked adjacent to another C-5 which screened the van from the ground scanner until too late for him to have engine power retarded in time. Coincidentally, another C-5 was blocking out and the van driver assumed the noise was coming from that aircraft. Finally, all four engines had been modified to a smokeless configuration so the normal smoke was not present.

P.S. The van driver was not injured; he was wearing his seat belt! ★

THE IFC APPROACH

By the USAF INSTRUMENT FLIGHT CENTER
Randolph AFB, Texas, 78148

REVIEWING AN INSTRUMENT APPROACH PROCEDURE

The IFC receives many questions related directly to the interpretation of instrument approach procedures. In order to clarify some points, this article is directed toward a simple systematic plan to review an approach. Hopefully, your knowledge of the symbols shown in the approach procedure legend and thorough analysis will contribute to a safely executed approach in every case. Major Gary Crew, an instructor in the IFC, offers a plan to those attending his IRC class. He recommends the following:

1. PLAN VIEW—Review for LEAD POINTS:

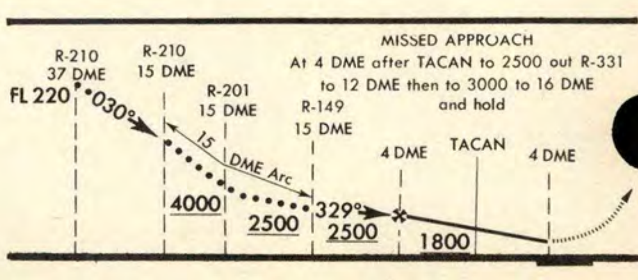
Mentally fly the approach from the IAF to the MAP and determine all lead points for radial and/or arc interceptions. Identify the point where the aircraft should be configured for landing. In the example above, note the 15 DME arc interception followed by the 149 degree radial. The landing configuration must be established prior to 4 DME (FAF). Procedural steps and techniques for arc and radial interceptions are found in AFM 51-37, *Instrument Flying.*

While reviewing the Plan View, you will undoubtedly notice headings, nav aid frequency and location, and the holding pattern. Other information available to you and often questioned warrants further discussion:

FEEDER ROUTES are designed to channel aircraft from the enroute structure to the *IAF*. They are published only if they provide an operational advantage and coincide with the normal local air traffic flow. The feeder route length may exceed the operational service volume area of the navigational aids if the FAA has flight checked the route for accuracy. What you see published guarantees nav aid reception along the depicted route.

MINIMUM SAFE ALTITUDES provide the pilot *at least* 1000 feet of obstacle clearance within a specified distance from the navigational facility upon which the procedure is predicated. An emergency safe altitude provides a 1000 foot obstacle clearance within 100-mile radius of the nav facility, or 2000 foot obstacle clearance where the radius encompasses designated mountainous areas. A minimum sector altitude is used to offer relief from obstacles within specific sectors of the minimum safe area as determined by the operational needs of the aerodrome.

2. PROFILE VIEW—Review for ALTITUDES AND DESCENTS:

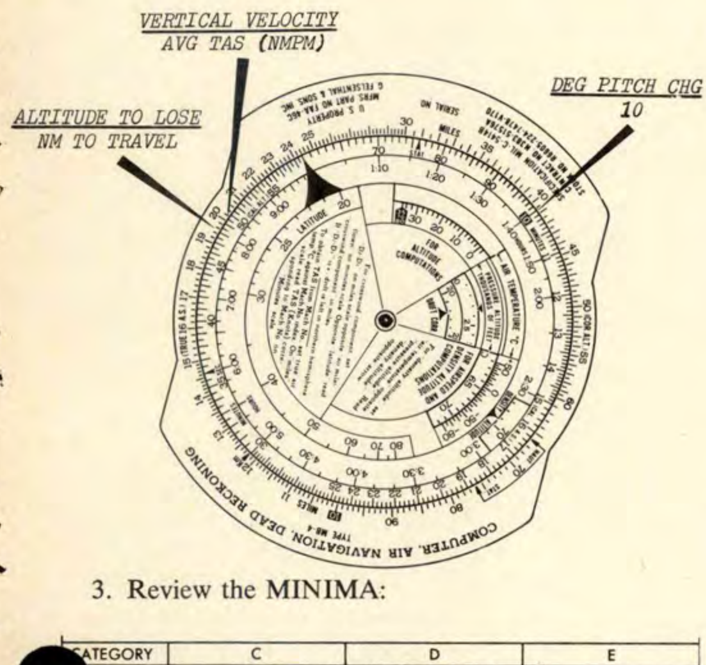


Observe the altitude restrictions and know where they apply. Minimum, maximum, mandatory, and recommended altitudes PRECEDE the fix or facility to which they are intended. If this is not the case, an arrow will indicate exactly where the altitude applies.

Determine your rate of descent and pitch attitude necessary to attain the descent gradient. In the above example, note that up to 19,500 feet can be lost in 48 NM (FL 220 at IAF 37 DME to 2500 feet at FAF 4 DME). Your computer can be used to figure an approximate descent gradient for any aircraft at any airspeed as follows:

$$\frac{\text{Altitude to Lose}}{\text{NM to Travel}} = \frac{\text{Vertical Velocity}}{\text{Average TAS (NM per minute)}} = \frac{\text{Degrees Pitch Change}}{10}$$

For example, if the average TAS is 5 NM/Min, a 4° pitch change will produce a VVI indication of slightly over 2000 feet per minute. This computation may determine your descent configuration and save fuel at the same time.

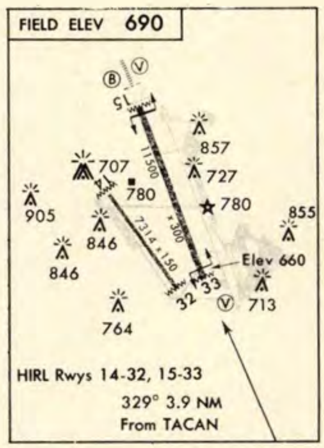


3. Review the MINIMA:

CATEGORY	C	D	E
TAC-33	1060/50 400 (400-1)		
CIRCLING	1200-1½ 510 (600-1½)	1240-2 550 (600-2)	
S-PAR-33	960/40 300 (300-¾) GS 2.5°		

The pilot obviously needs to know how low he can descend, and must determine the field weather conditions in order to comply with AFM 60-16, *General Flight Rules*. Minimums for your aircraft category should be firmly in mind.

4. Review the Aerodrome Sketch for AIRFIELD AND LIGHTING:



Check the field elevation, which incidentally is the highest point on the usable landing area. Additionally, note the direction and distance of the runways from the nav facility. In your search for visual cues available in the example, note that high intensity runway lighting is available; however, there are no approach lights for Runway 33. VASI is available to assist you during your visual approach.

As a final word of caution, review carefully for notes on the approach procedure. Notes are used to identify either non-standard terminal instrument approach criteria or emphasize areas essential for the safe accomplishment of the approach. For example, refer to the Plan View in paragraph 1.

The bulk of our telephone inquiries plus indications from our students at IPIS concern one thing: TEACH ME TERPS! (AFM 55-9) Remember that TERPs is a technical manual to assist approach designers. The KEY to a pilot understanding the approach is not his knowledge of TERPs, but his ability to quickly and efficiently analyze the approach. Hopefully, the above technique will assist you in developing your own *systematic* approach to the instrument procedure; a piece-by-piece review provided leads, vertical velocities, pitch changes, nav facility locations, etc. Follow this technique if you desire, or develop your own system. ★

A-7

APN-190 ANTENNA and RADOME HANDLING

P. E. MILLER
Lead Avionics Quality Engineer
Vought Aeronautics

The APN-190 is a solid state radar set which uses the "Doppler" principal for continuous measurement of ground speed and drift angle. The APN-190 consists of three Line Replaceable Units; a Control Indicator, Receiver-Transmitter, and Antenna. The receiver-transmitter transmits RF energy through antenna to the ground and measures the shift in frequency (the doppler shift) of the reflected energy returned to the antenna. Using this frequency shift, the logic in the receiver-transmitter computes aircraft ground speed. Through the use of a special beam configuration, aircraft drift angle is also computed. Both ground speed and drift angle are displayed on the control indicator. The APN-190 is contained entirely in the aircraft and is independent of ground-based aids.

Because of the precise construction of the antenna and the radome, it is extremely important that they be handled properly. This article will discuss recommended handling and care of the Doppler antenna and radome.

Due to the high degree of ground speed and drift angle accuracy required by the A-7 Navigation and Weapons Release system, it is necessary to consider the small physical differences (surface finish, slotted hole size and shape, etc.) of each antenna array (see Figure 1). Physical differences between antenna arrays, if not compensated for, can cause ground speed and drift angle errors; therefore, all antennas are flight calibrated by the supplier prior to shipment to VAC. From these calibration flights, an antenna calibration constant is determined for each antenna. The calibration constant value is indicated on the antenna; and the ground speed calibration (Vg Cal) circuitry on the antenna is programmed to reflect this value. Based on the value of this constant, the Vg Cal signal is sent to the digital card in the receiver-transmitter to correct the doppler ground speed output to the Navigation Weapons Delivery Computer and to the Control Indicator. Drift corrections are made by a bias adjustment on the antenna. The value of this calibration constant cannot be determined on the ground; thus, any physical change to the antenna arrays and associated waveguides will cause errors. Because of the criticality of this constant, it is extremely important that the arrays do not come into contact with hard surfaces that may damage their finish, change their slotted hole shapes and sizes, or cause other physical change.

Each spare antenna is shipped to the field on a special wooden mount to protect the antenna array from damage. Vought Aircraft Quality Engineering recommends that any time an antenna is not in an aircraft or being tested, it should be stored on that mount. When removing or replacing an antenna on an aircraft, care should be exercised to assure that the arrays do not come in contact with the ground or other hard surfaces. Under no circumstances should an antenna be placed on a ramp or hangar floor. Remember that if any physical damage occurs to the arrays, the antenna calibration constant may be degraded to such a degree that navigation accuracy will be unacceptable. The only way a more accurate calibration constant can be determined is to return the antenna to the supplier for range tests and a calibration flight.

As previously mentioned, the RF energy is transmitted by the receiver-transmitter through the antenna to the ground and the reflected energy is received by the antenna and sent to the receiver-transmitter for processing. The antenna is protected from weather and other elements by a radome. The APN-190 radome is carefully constructed to allow the

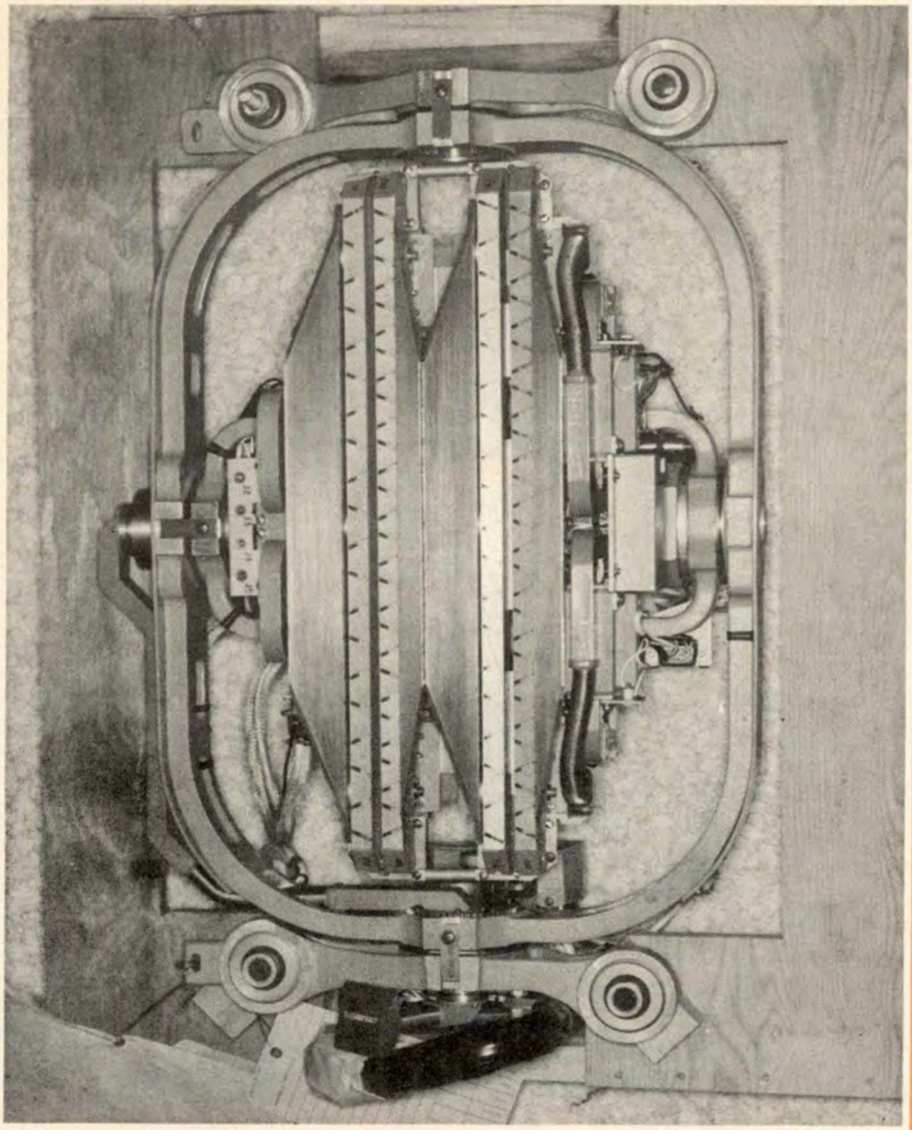


FIGURE 1. Antenna Array

narrow beams of RF energy to be transmitted to the ground with a minimum amount of distortion. Any distortion of this energy severely affects doppler accuracy. It is extremely important that both the exterior and the interior of the radome be free of grease, grime, hydraulic fluid, and compounds containing metals which will distort the transmitted and received RF energy. In addition, care must be exercised to assure that screws and other metal objects are not left in the radome when it is installed. VAC Quality Engineering recommends that before each flight, the exterior of the radome be checked for cleanliness. If it is excessively dirty, it should be cleaned with a mild detergent (soap and water). Also, whenever a radome is removed, its interior and the antenna compartment should be checked to assure that they are free of dirt, grime, hydraulic fluid and metal filings before re-installing the radome. Since the radome material is highly absorbent, it is protected by a special paint which prevents hydraulic fluid and grease from being absorbed by this material. If this paint is excessively chipped or scratched (as determined by TO 1A-7D-3) the radome should be removed and refinished. Therefore, the exterior of the radome must not come in contact with the ground or other hard surfaces which may cause scratches or chips.

Remember, protect the antenna arrays from damage and keep the radome clean and free of chips and scratches. If these practices are followed, the APN-190 should maintain a high degree of system accuracy. ★

(VAC Field Service ***Maintenance Digest***)

HANGAR FLYING ?

The script (incident report) read something like one of those oldtime comedies they run on the late, late TV shows. The pictures on this page show the results; now let's fill in the details.

The F-100 was in for an engine run. However, one of the day shift mechanics thought they were preparing the bird for engine removal so he disconnected the throttle. When the swing shift came on, they finished removing the tail section and prepared for the engine run. The bird was put in the hangar and the tiedown bridles connected by an experienced mechanic and a new guy, each taking one. Then the experienced man inspected the other man's work but did not detect slack in the bridle cables.

Everyone went to dinner.

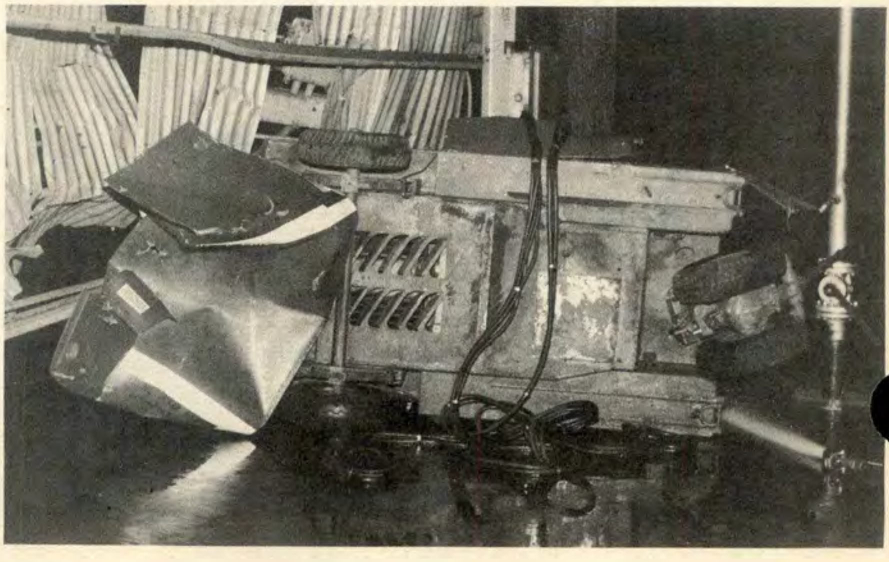
Upon their return the engine run mechanic and two technicians prepared for the engine run. Now trouble was guaranteed. The engine run mech pulled a cockpit inspection but he failed to accomplish a full engine pre-start check, and he did not make any false starts as specified in the directives. Furthermore, the chocks in front of the mains were allowed to remain loose to allow for tightening of the bridle cables during engine run.

Now, without the disconnected throttle being detected, the engine was started. Acceleration to idle was normal, but continued up to about 87 percent. At 70 percent the mechanic put the throttle to off, which helped not a whit. He then closed the main fuel shutoff valve but the engine was slow in getting the message.

Next, the right bridle cable came loose from the attaching ring and the aircraft pivoted left and into the wall. It must have been a sight—the pitot boom struck through the wall like a giant mosquito's stinger, sparks flying from the tail pipe from various objects being ingested by the engine, maintenance stands flying. The exhaust blast turned over a power unit, and its fuel tank ruptured. It caught fire from the engine exhaust.

Luckily—and it must have been pure luck—no one was injured, but when the damage was added up, the tab came to $32,444.

Presumably this crew will never again take anything for granted. ★



REX RILEY'S CROSS COUNTRY NOTES

876-2633 AUTOVON

The Budget Pinch has found its way into the transient pocket and as a result we see more and more notes in the Enroute Supplement saying "Extremely limited transient service." It's a fact of life that something must give and the only one that can decide where the cut is to come is the individual who runs the station. However, on the other side of the coin there are many bases that are somehow managing to maintain the high standards required to remain on or qualify for the Rex list. So what I'm saying is that we cannot lower our standards while some bases are able to provide sustained outstanding service. If a base is selected for the Rex award, a pilot transiting that base should expect nothing but the best. If your base is now on the list and you have to eliminate some of the desirable services, it may be that you will have to be removed from the recommended list.

Feedback: It always is nice to hear from you guys in the field if only to reassure us that you read my column. A few months ago I mentioned a problem concerning the servicing of recips with oil. The reg does not authorize a base an oil truck unless it pumps a specific amount each month. Most of the complaints indicated that it was very time-consuming to pour the oil in the engine a quart at a time. In case you are not aware, oil is available in five-gallon cans, so I am informed by one transient troop. It seems to me that the best "fix" would be a 55-gallon drum with a simple handcrank on it. Does anybody have one of these?

It Is Gratifying that so many of the bases have written me saying they feel they are ready and willing for an evaluation for the Rex award. Many of you have sent loads of evaluations to us here, all extolling the virtues of this or that transient organization. Unfortunately, immediate response to your request is in most cases impossible. There just aren't that many airplanes available to do the job. So, bear with me. As soon as we possibly can we'll arrange a special visit. No, I'm afraid I can't give you any prior notice, though I'm sure it wouldn't spur you to provide something extra. Incidentally, in case you haven't noticed, we place much more weight on the evaluation of a captain or lieutenant than we do a code seven or above. The reason should be obvious. If I do get a poor evaluation from a code, I can just imagine what kind of treatment a new slick wing lieutenant will get. ★

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.
CANNON AFB	Clovis, N.M.
LUKE AFB	Phoenix, Ariz.
RANDOLPH AFB	San Antonio, Tex.
ROBINS AFB	Warner Robins, Ga.
TINKER AFB	Oklahoma City, Okla.
HILL AFB	Ogden, Utah
YOKOTA AB	Japan
SEYMOUR JOHNSON AFB	Goldsboro, N.C.
ENGLAND AFB	Alexandria, La.
KADENA AB	Okinawa
ELMENDORF AFB	Alaska
PETERSON FIELD	Colorado Springs, Co
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.
McCONNELL AFB	Wichita, Kans.
NORTON AFB	San Bernardino, Ca
BARKSDALE AFB	Shreveport, La.
KIRTLAND AFB	Albuquerque, N.M.
BUCKLEY ANG BASE	Aurora, Colo.
RICHARDS-GEBAUR AFB	Grandview, Mo.
RAF MILDENHALL	U.K.

A CLASSIC CASE

IX. **FLIGHT SURGEON'S COMMENTS, ANALYSIS AND RECOMMENDATIONS**

The aircraft was a single ship xxxx which departed xxxx hours on a rotational cross-country flight. Approximately 45 minutes into the flight, the pilot noticed that the cabin altitude was 24.5M. Both crewmembers went to 100% O_2 while the pilot attempted to regain pressure; however, the navigator had, throughout the flight, been flying with a loose face mask because it did not fit comfortably on his face. While attempting to regain pressurization, the pilot and navigator discussed what measures should be taken if pressurization could not be regained.

They concluded that they would continue at altitude on 100% O_2 and discuss any symptoms which might arise; if one developed symptoms of pain in the joints or back they "would not move or rub the affected part."

The decision to remain at altitude was based on the fuel status of the aircraft. Although they felt that they probably could reach base if they flew at a lower altitude, they would arrive with very little fuel left. The pilot attempted to increase cabin pressurization by increasing the heat and antifog, but the navigator could not tolerate this, and they had to return to a setting which yielded 23.5M cabin altitude. At this point the navigator noted both arms becoming numb, and he had tingling in his hands. He removed one glove and saw a bluish color of the skin. He then told the pilot that he was hypoxic. During this time he also noted greying of vision, dizziness, and extreme anxiety. The pilot began a spiraling descent and the navigator became very disoriented and was "babbling." At the time he declared hypoxia, he went to emergency oxygen. After reaching 10M, all of his symptoms resolved except for anxiety, nausea, and some tingling of his fingers. At 10M the pressurization system suddenly functioned, and again because of the fuel status, they began a cautious ascent. Cabin pressurization held at 10M all the way back up to the assigned flight level, and the remaining 40 minutes of flight were uneventful. About 10 minutes from base, the pilot declared an emergency and the aircraft was met by the usual crash/rescue group. One of the crewmembers later

How many of you take your O_2 system for granted? Here's a true story that illustrates what can happen if you do.

commented that "if he had known how much trouble this would cause we wouldn't have told anyone."

In addition to an analysis of the crewmembers blood, an (gaseous) oxygen sample was obtained from the cockpit and sent to McClellan for analysis. The results indicated contamination with atmospheric gases during the sampling. The rear seat oxygen regulator was checked and found to work properly and mask and connector were tested in the altitude chamber with normal results.

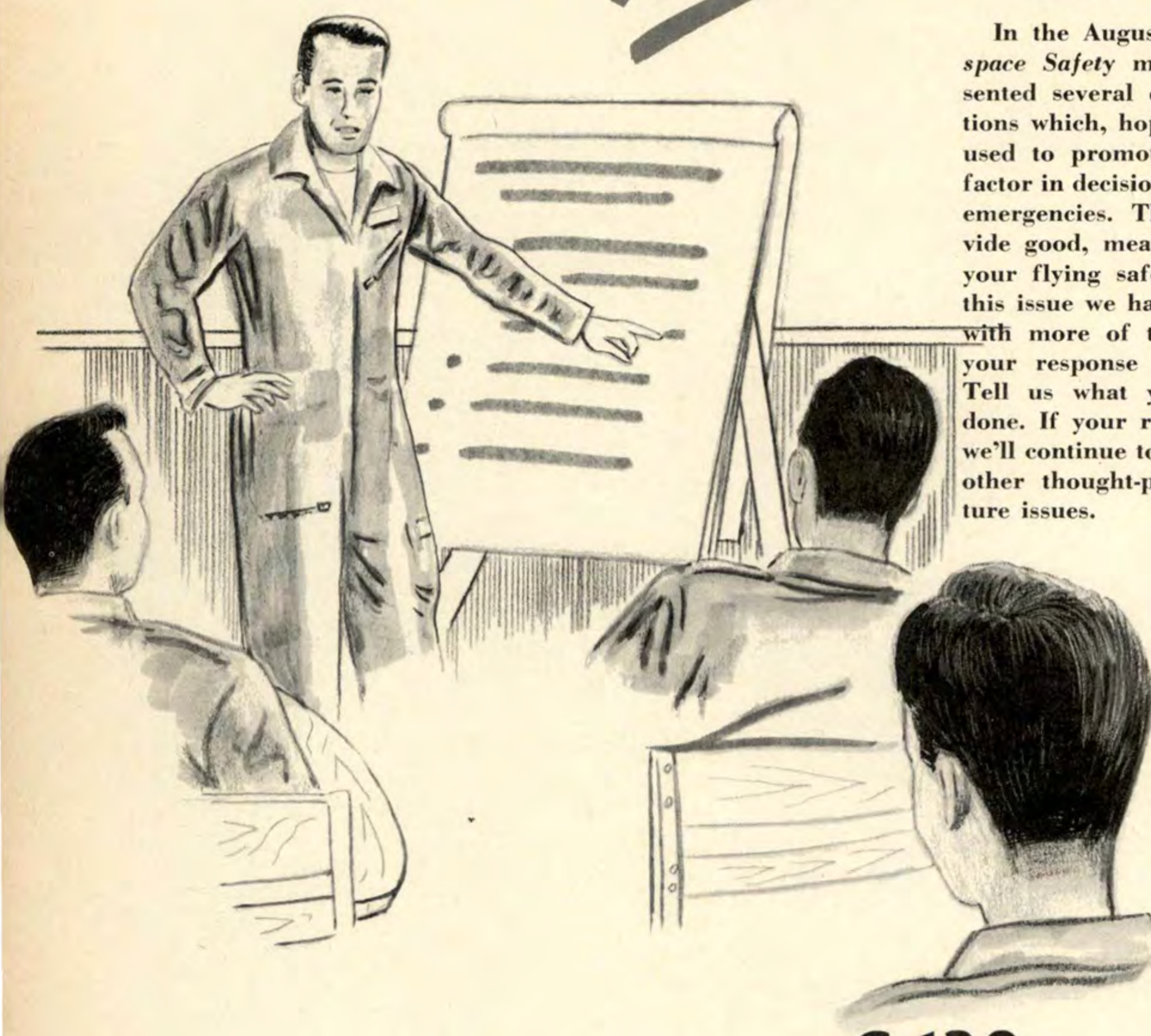
COMMENTS: It is believed that this represents a true case of hypoxia caused by several factors. After the aircraft was impounded, a malfunctioning front canopy seal mechanism was identified, so that the loss of pressurization was explained. The combination of a poorly fitting face mask, loosely worn, and the insidious loss of pressurization during the flight produced the incident. Several points emerged here which are important and should receive wide dissemination in flying safety meetings.

The first is the requirement that the flyer himself tell someone if personal equipment does not fit properly. Neither the Flight Surgeon nor the Personal Equipment Officer were aware of any such problem.

A second point is the misapprehension about the significance of bends. It will be obvious that the primary concern of bends is not just painful joints. Additionally important is the "let's don't cause trouble" attitude regarding incidents of this nature. After lengthy explanation with illustrations of what could have happened, both crewmembers now understand why reporting of this incident was important. Finally there is a very important problem with attitude about personal equipment. In essence, it can be described as "being spoiled by the reliability of life support systems." It applies not only to reliance upon cabin pressurization systems, but also upon masks performing properly and ejection mechanisms functioning perfectly. Confidence in the systems is certainly desirable, but the blithe assumption that "this will be just another routine flight" can kill.

MORE EMERGENC[Y]

CAPT KERRY G. HERRON
Directorate of Aerospace Safety



In the August issue of *Aerospace Safety* magazine we presented several emergency situations which, hopefully, could be used to promote the judgment factor in decision making during emergencies. They should provide good, meaty discussions at your flying safety meetings. In this issue we have provided you with more of these and solicit your response from the field. Tell us what you would have done. If your response is good, we'll continue to try and publish other thought-provokers in future issues.

C-130

SITUATION: You are the aircraft commander of a C-130E, cruising at FL220, midway on a flight from CCK to DaNang. You have six passengers and four pallets of cargo. The ramp pallet is hydraulic fluid, and the other three are building materials. The weather is layered cirrus from 5000 to 30,000 feet.

EMERGENCY: The loadmaster reports black smoke in the aft cargo section, and after investigation, reports to you that the packing material of the pallet next to the ramp pallet is smoldering, emitting dense acrid smoke and a few open flames. His attempts to extinguish the fire with a portable extinguisher have had no apparent effect.

ANALYSIS:

1. What are the critical action items to be accomplished?

2. Would you concentrate on at-

tempting to extinguish the fire, or would you jettison the cargo?

3. If you decide to descend, describe the descent profile.

4. If you attempt jettisoning:

a. At what altitude?

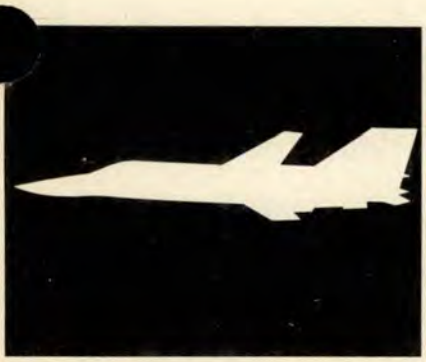
b. Discuss passenger considerations.

c. What sequence of jettisoning would be used?

d. Describe the aircraft configuration.

e. What are the smoke and fume elimination procedures?

f. If cargo was jettisoned, what actions should follow the jettisoning?



F-111

SITUATION: You are the aircraft commander for an F-111 night low level TFR training mission which departed Nellis AFB at 2000 local. You have just begun the low level portion of the leg, 150 miles north of Nellis. Your TAS is 480K, altitude 1000 feet AGL, and you are on auto TF and roll autopilot. Your left utility hydraulic warning light illuminates; you check the utility hydraulic pressure gage and it reads 300 psi. You abort the run and initiate a climb for RTB. Then the right utility hydraulic, pitch, roll and yaw damper warning lights illuminate, and system pressure drops to zero and shows no sign of recovery.

A weather check of Nellis determines that the current observation and one hour forecast is intermittently 500 feet overcast, two miles visibility with heavy rain from a series of thunderstorms. Winds are reported at 270°/20G30K. The nearest suitable alternate is Mt Home AFB with 1200 broken, 4000 overcast, five miles, wind calm. Your fuel state is 23,000 pounds.

ANALYSIS:

1. What has occurred?

2. Which system will be completely inoperable?

3. Would you attempt to reset the dampers?

4. Discuss systems requiring alternate power sources, and the source for each system.

5. Where would you recover?

6. Would you dump fuel, and if so, down to what state?

7. What type of approach would you request?

8. Discuss the order of landing configuration changes.

9. Discuss position, airspeed, and method of lowering slats and flaps.

10. Discuss position, airspeed and method of gear extension.

11. What would you do if the landing gear warning lamp remained lighted after gear extension?

12. If the slats and flaps did not extend when selected, what should be checked before attempting a no-flap landing?

13. Discuss directional control and braking technique during landing roll.

14. If brake pressure is lost, what would you do?

15. If recovering at Nellis, would you make an approach end barrier engagement?

T-33

SITUATION: You have departed K. I. Sawyer AFB for a target trip to North Bay, Canada (225 miles). Departure weather at Sawyer was 400 overcast, visibility one mile in light snow showers, with tops reported at FL250. The three-hour forecast indicates no change.

EMERGENCY: At 5000 feet on the climbout, the generator out warning light illuminates and the loadmeter reads zero.

ANALYSIS:

1. What important steps should be among your first reactions?

2. How much battery life could you expect to have?

3. What equipment would you turn off?

4. What equipment would be lost with the standby inverter selected?

5. How much fuel would be available to you?

6. Would you attempt a landing at Sawyer? If so, what type of approach? Would you jettison the tips?

7. If the closest usable alternate was Duluth AFB (200 miles) with 1500 broken and three miles, would you go there?

8. If the closest usable alternate was Kinchloe AFB (120 miles) with 1500 broken and three miles, would you go there?

9. If your battery failed during the landing approach before you had the runway in sight, what would you do? ★

Ops topics

UNSAFE GEAR

The crew of the transport had started the enroute descent after an 18-hour flight. Passing FL380, the gear was lowered; both mains indicated down and locked, but the nosegear showed intermediate, the light in the gear handle was illuminated and the warning horn was blowing.

All associated circuit breakers checked okay, and, continuing descent, the crew decided to recycle the gear. The gear came up and locked all right, but when it was lowered again, the problem was still there.

They tried to get a visual check on the gear, *but the alignment stripes were so badly deteriorated that they were unusable*. The crew went through the emergency landing gear extension procedures—no help. They tried positive G—with negative results. Hydraulic assist was applied—but that didn't work either.

Descent was continued to 10,000 feet. Radio contact was made with hydraulic specialists at the arrival base, and they recommended that the nose gear inspection window be removed and the nose gear locking pin be inserted. Frustration mounted as the crew discovered that the screws securing the window, because of their offset location, could not be removed with an ordinary Phillips-head screwdriver. Finally, they taped the inspection window and broke the glass with a crash axe. The pin then had to be inserted by feel and that took almost an hour. Once the pin was in place, the lanyard was secured. An uneventful landing followed—19 hours and 45 minutes after takeoff.

The cause? A wire in the cannon plug to the nose gear position switch had shorted, giving the unsafe indication. The gear was down and locked all the time!

The unit recommends the following actions:

• Assure that alignment stripes on all aircraft are in good repair.

• Place a textured finish around the hole for the gear pin.

• Include a tool kit aboard the aircraft with the tool(s) necessary to get the inspection window out.

• Consider modification of windows to incorporate wing nuts instead of screws.

A TIME FOR EVERYTHING

The polls are closed, the votes are counted, and once again the results are conclusive: Squat switches don't always work.

Touchdown on the touch-and-go (following an instrument approach) was about 3000 feet down the runway. The pilot applied power for takeoff and immediately raised the gear handle, and the hapless airplane slid to a stop some 2000 feet later. The IP cut the throttles, pulled the T handles and raised the canopy, and both pilots got out of the airplane. About two minutes later the airplane was engulfed in flames and was a total loss.

All the safety devices in the world cannot replace the grey matter between the ears. With the brain in stopcock, you're an odds-on candidate for an accident. This fellow was elected.

A TWO-HOLER IN ONE

The Gooney Bird had just pulled out of the chocks, and the crew had completed the brakes check. The pilot taxied forward until the copilot, observing the wing-walker's signal, gave the order to stop. The wingwalker walked directly under the wingtip to check the clearance, then signaled that the crew was clear to taxi forward and turn left. The copilot told the pilot that he had about five feet clearance and that a hard left turn was needed, so the pilot added power on the right engine, unlocked the tailwheel and released the right brake.

The aircraft had just started to turn left when the right wingtip hit a latrine building. Both the marshaller and the wingwalker were signaling to come forward at the moment of impact.

There's nothing really complicated about the rules governing the ground handling of aircraft. If you're 25 feet away from an obstacle, you can taxi. If you're ten feet away, you need a wingwalker to taxi. If you're closer than ten feet, shut down and ask for a tow.

A small portion of common sense would have made life easier for a whole lot of people—especially that poor guy in the latrine.

CANCEL IFR

An Air Force transport aircraft was approaching one of our larger military bases. It was night, and the pilot may have been in a hurry to get it on the ground before the club closed. For whatever reason, 20 miles east of the field the pilot asked Approach Control to cancel IFR and requested a visual approach to landing. Approach Control approved his request (Approach Control really had no choice) and, when the aircraft was ten miles east, instructed the pilot to contact tower.

The pilot called the tower and a short time later reported four miles on final. Tower advised him to check wheels down, that he was not in sight, and cleared him to land.

Moments later the tower controller asked the pilot to show a landing light—and the pilot replied that his lights were on! The controller immediately advised the pilot that he was *not* where he said he was, and that possibly he was lined up on a small civil airfield six miles south.

A telephone call to the civil tower confirmed suspicions. The jet transport had progressed to about a half-mile final (to a 4,000 foot strip) before going around. Fortunately, there was no conflicting traffic at the civil airport.

FAA (and some military) approach controls use visual approach procedures quite effectively to expedite the flow of terminal traffic. But pilots flying into congested, high-density areas at night should think twice about requesting or accepting this type of approach—especially when there are instrument approach aids serving the same runway. As this case shows, orientation can be a problem.

TAKEOFF FACTOR

A recent incident involved one of our STOL aircraft which went through a fence at the end of the runway. Conditions were normal—the same as they had been for many other takeoffs, EXCEPT:

- There was a slight tailwind factor.
- The ambient temperature was much higher.
- The last 327 feet of the 1400-foot runway was unusable due to recent rains.
- Runway condition was soft, with uncut grass 18 inches long for the first 200 feet and six to eight inches long for the remaining runway.

Nobody has yet been able to provide us with a chart to compensate for wet, uncut grass, although older heads have advised that that condition alone was probably enough to have caused the incident.

Admittedly, the problem of compensating for grass condition isn't one which confronts us on a daily basis. But the problems of compensating for non-standard conditions do confront us daily—and complacency can raise its head and bite us anytime we care to give it the opportunity.

Take a closer look the next time "everything's normal —EXCEPT . . ."

FLIP CHANGES

Establishment of Defense Mapping Agency (DMA): Department of Defense Directive 5105.40, dated 1 Jan 72, established the Defense Mapping Agency (DMA) by combining the separate Mapping, Charting, and Geodetic organizations of the Military Departments. Effective 1 Jul 72, USAF Aeronautical Chart and Information Center was redesignated as:

Defense Mapping Agency
Aerospace Center,
St. Louis AFS, MO 63118

Under the direction of the DMA, the Aerospace Center will continue to manage the DOD Flight Information Publication (FLIP) Program to assure accurate and timely flight information is provided to the U. S. Military aviation community. Current policies regarding the distribution and requisition of DOD FLIP products remain in effect.

CORRECTIVE ACTION OF THE MONTH

"Pilots of this unit will be briefed not to depress bomb button unless ordnance is to be dropped."

Ops topics

CONTINUED

BIKE STRIKE

The Gooney Bird was headed home after completing the mission, but found the way blocked by an extensive line of thunderstorms. The pilot first attempted to climb over the top (!), and when that failed he entertained briefly the idea of slipping underneath. Radar showed a solid line, however, so the pilot retrenched and came up with a third alternative: spying an airfield on his side of the storm line, he decided to set down and wait it out.

He flew the plane to an 85-knot full-flap final approach. Touchdown was good—but during the rollout a motorcycle with two people on it crossed in front of him. The pilot yanked back on the yoke and firewalled the throttles, and managed to clear the cyclists. But he stalled out and contacted the runway again in a right skid, applied brakes and tipped the airplane far enough forward to take both props off.

Probably no "normal" situation is more ripe for an accident than the unplanned diversion to an alternate. Certainly the pilot has the responsibility to be aware of changing conditions and to keep his mental "contingency plan" updated. And certainly the pilot must be aware of the hazards involved in a hurried landing at an uncontrolled airfield.

But this accident probably could have been prevented at the supervisory level, through increased control and a comprehensive diversion plan.

IFR (I follow river)

The O-2A pilot departed an Air Force Base, heading back to home station. He'd filed a VFR flight plan and, after takeoff, he flew north until intercepting a major river which guided him west to his destination.

Now, this is what FACs are supposed to do. It's essential to FAC operation that the pilot be able to navigate solely by pilotage and terrain reading. Rivers, of course, are very good for this sort of thing; they don't change much, except in extreme flooding and such, and they usually offer many distinctive landmarks for pinpointing one's position.

Even so, the pilot almost didn't get home. And he almost didn't make it because he hit a powerline across the river—*at about 65 feet AGL!*

Pilots complain loud and long about the gradual extraction of decision-making authority away from the cockpit. But it's surely irresponsible behavior such as this that makes the increased supervision a tempting alternative. One instance of blatant unprofessionalism —such as this one—hurts every pilot in the force.

CONTROLS FREE?

Day in and day out, pilots pull, push, and twist the controls and never really expect them to operate in other than a normal manner. Imagine the surprise of the B720 captain who accelerated 210,000 pounds of aeroplane to its V_R of 131 KTS, applied back pressure and found he couldn't move the elevator column! The takeoff was aborted successfully by using both f[illegible] reverse and hard braking.

Investigation revealed the elevator control crank had been installed upside down during maintenance service just prior to this "flight"!

(Flight Safety Foundation)

DOING THE JOB

There it sat on the runway, the dust settling around it; a jet fighter resting firmly on its main gear doors.

There was no evidence that the gear folded after touchdown. In fact, the pilot admitted that the first time he *really* checked the gear indicators was when he heard that awful scraping sound. The people in mobile control stated that, just before touchdown, they noted that "something was wrong" but didn't have time to do anything about it.

It appears that, once more, complacency rose up and socked us in the nose. The pilot *assumed* that when the handle went down, so did the gear (the warning horn was inop). The mobile controllers *assumed* that when the gear started down in the base turn, everything wo[illegible] be ops normal.

And each of them *assumed* that the other guy was doing the job. ★

TOOTS

is interested in your problems. She spends her time researching questions about Tech Orders and directives. Write her c/o Editor, Aerospace Safety Magazine, AFISC, Norton AFB, CA. 92409.

Dear TOOTS

I am confronted with a problem affecting all the SAC units concerning installation and removal entries of engines installed on aircraft. Being in a position to review all SAC unit engine jacket files, I see no uniformity whatsoever.

We have been using the AFTO Form 98 for all installation and removal entries of B-52 and KC-135 aircraft engines. TO 00-20-5, paragraph 3-38, states the form is optional for use on all except T-76 engines. I cannot find any reference stating the AFTO Form 98 will be used for engine installation and removal entries in conjunction with the engine AFTO Form 95.

There are also no references in TO 00-24-4 saying these entries are required, although paragraph 2-12q 1 through 6 spells out clearly that installation and removal entries are required on the AFTO Form 95 for Continental Packette engines installed in AGE.

I feel a true readout needs to be accomplished so a uniform system can be achieved throughout SAC and other commands. Should these entries be required on the AFTO Form 95? I would gladly submit an AFTO Form 22 requesting a change to TO 00-20-4 saying "installation and removal entries on engine AFTO Form 95s are required."

SSgt Arthur W. Martin, II
307 Strategic Wing
APO San Francisco 96330

Dear Art:

You're right, the system appears to be unclear. I talked with AFLC and they agree and are considering a change to 00-20-4 requiring the use of the AFTO Form 95 to record all engine removal and installation. However, I recommend that you submit an AFTO 22 in support of their considerations.

Thanks for writing.

Toots

Dear TOOTS

I am very concerned about the policy governing aircraft overflights on runways during hot convoy crossings. This base presently permits direct overflights of down to 1000 feet.

Being a frequent convoy commander, I am convinced that a serious potential accident situation is created when aircraft are permitted to fly over the runway at an altitude during convoy crossings—especially those involving explosives. Once the control tower gives clearance for a convoy to cross, it would seem logical to assume exclusive priority of the runway (outside of emergencies) from ground level up.

I have personally experienced an incident where an A/C on runway approach with landing lights on, shook convoy personnel so badly that the tow vehicle operator refused to cross the runway. When questioned, tower merely announced that the A/C was under their control. A convoy crossing takes maybe five minutes or less. Isn't it worthwhile to give priority to an explosives convoy and get them out of the way first (except when an A/C emergency exists), rather than to compromise safety and have two runway situations existing simultaneously? Convoys enroute to alert A/C and mass load areas may be carrying nuclear weapons. I believe nuclear safety should merit precedence over routine A/C situations—especially when the time factor is so small.

AF Form 457 was not submitted on this item because the base is aware of the situation and has already established policy, which in my opinion is unsatisfactory. I think the problem should be looked into and perhaps investigated for safety's sake.

Convoy Commander

Dear CC

Your letter stirred a lot of research for many!

It looks as though you have identified a very real hazard—and the solution. Overflight at 1000 feet seems reasonable, since aircraft can fly that low anywhere. In fact, since traffic over the runway is controlled, you may even be safer.

Low approaches—so low as to scare the troops—are something else. Under those conditions, an error in judgment or a mechanical failure could be disastrous.

If the Base Reg says "1000 feet" and the birds are flying lower than that, you need to make a fast visit to your friendly safety office.

Give the Safety Officer the story, and he'll run with it!

Toots

Tech topics

briefs for Maintenance Techs

missing wheel bolts

Did you ever have the feeling that the bird was trying to tell you something? Here's a KC-135 that tried real hard but maintenance took a while to get the message.

On the 17th of the month, the Nr 7 brake was changed. Now everyone knows that to change a brake the wheel must be removed; however, no form entry was made to that effect. So we must assume that after wheel replacement the work was never inspected. Thirteen days later the aircraft was written up for slight brake chatter during taxi. Corrective action was to bleed the brakes. Ten more days went by and the brakes were written up again: "Right brake chatters severely at low taxi speed." This time Nr 8 anti-skid detector was replaced.

Two days later, following touch and gos and a full stop, a crewmember reported vibration in the right main gear area. The pilot felt that the brake was grabbing or a tire was low. After engine shutdown, the axle, bearings, anti-skid and retaining nut were found to be extensively damaged. The cause: the axle nut retaining bolts were not installed when the wheel was replaced following brake change.

Read on. This unit inspected all installed wheels and one other KC-135 was found with the retaining nut bolts missing from one wheel. The nuts had backed off approximately 8 turns.

Needless to say, had the proper form entries been made, this incident could have been prevented. One good thing came to light from this episode: it focused attention on the reliability of this unit forms maintenance and inspection system.

FOD strikes again

As the B-52 lifted off, both drop tanks departed. The aircraft was flown for 2 plus hours to burn down fuel, then landed without further incident.

The cause: a piece of steel safety wire had shorted the X1 to B1 terminals on the R2-94 drop tank relay in the forward wheel well. Aluminum shavings and a washer were also found in the immediate area. This should be a reminder to every maintenance man of the critical need to account for every piece of material when a job is completed.

T-29 AG oil line leak

During postflight inspection at a transient base, the AG (alternator-generator) pressure manifold-to-return line was found leaking. The line was removed, used as a sample and a new line made, installed and pressure checked. Next day the T-29 returned home where the line was inspected and found okay.

Nineteen days later the same line was found ruptured on preflight. A new line was made using the old line as a sample.

Seven days later the line was found ruptured on postflight—again at a transient base. The line was used as a sample to make two lines, one to install and one as a spare.

Two days later the same line and same problem. This time the aircraft was grounded pending a positive fix.

The spare line was checked and found to be one-fourth inch short of tech order specifications. Since all lines were made using the failed line as a sample, it is believed that all were short, causing overstress of the flare when torqued. A new line was made to tech order specifications, tested to 4000 psi on a test stand, installed and pressure checked satisfactory.

This T-29 flew one local flight and at last report was on an extended cross-country and the ruptured line problem appeared to be cured. Too bad these troops didn't get the tech order specifications to begin with. It would have saved a lot of time and effort.

Crossed cables

The F-105 was in a 30 degree left bank at 350 knots when the rudder went full right, then full left. The emergency AFCS disconnect was pulled and the aircraft settled down with the ball about halfway to the right of center. A visual check showed the rudder to be four inches left of center. The rudder would tend to center, then oscillate back and forth causing fishtailing. The load was jettisoned, a controllability check performed and landing accomplished at home base.

The cause: the aft section had been removed for maintenance prior to this flight and during reinstallation, the rudder cable and drag chute cable were crossed where they pass through the split line. The rudder cable had become shredded which caused binding in the bulkhead holes. This binding resulted in erratic movement of the rudder. Needless to say, proper routing of the cables would have prevented this incident.

out o' spacers?

Word comes to us from one of our TAC bases that some T-33s and T-39s (transient type) have not had proper tire maintenance performed. In changing tires on some of these airplanes it was noted that some were not equipped with a wheel spacer that is required by TO W1-7-1313. This spacer is required to be installed between wheel halves to prevent a reverse bending load through the web area which can result in fatigue cracking radiating from the axle hole. This can lead to complete failure of the wheel and you know what that can lead to.

A quick check now can eliminate a lot of grief later.

(TAC ATTACK)

tech data

With all the tech data and servicing equipment available, we still have some crew chiefs who think that the eye is better than the gage, and proceed with total disregard for tech data.

In one such case a crew chief noted that the main upper strut cylinders were low. While servicing the upper strut he did not use a direct reading gage, nor follow tech data. He had performed this job many times before and knew exactly how to do it.

Just after takeoff, when the pilot selected gear up, an unsafe indication was received in the cockpit. The wing man confirmed that both main gears were overextended and had contacted the inner doors. The gear handle was placed down, the mission aborted and the aircraft returned to base.

The overserviced condition of the upper strut had caused both shrink rods to fail during retraction. Needless to say, the use of proper servicing equipment and tech data would have prevented this incident and a lot of red faces.


Note in this photo the wheel spacer is missing.


Here's what it should look like with the spacer properly installed.

Tech topics

no training this flight

A T-38 was in the hangar for scheduled maintenance to replace the gear handle interconnect cable.

Both seats and canopies were removed by egress personnel; the rear cockpit control stick horizontal tail control rod was disconnected at the control stick end by a mechanic who then went to the shop office to make the appropriate form entries; however, he entered the discrepancy in the wrong aircraft form.

Work progressed through the day and the job was turned over to the night shift at 1600. The night shift completed installation of the gear handle interconnect cable but failed to notice the stick control linkage disconnected. The supervisor who cleared the work also failed to detect the disconnected linkage. A gear operational check was completed, seats and canopies installed, forms checked, all discrepancies cleared and the aircraft was called in operational.

Next day the bird was scheduled for a student training sortie. The before taxi flight control check by the IP in the front cockpit appeared normal. During takeoff roll the student could not get rotation, so the IP took control at 180 knots and climbed to a safe altitude, performed a controllability check and took the bird safely home to maintenance.

Could poor forms management and/or inefficient supervision lead to such an incident as this in your organization? This is a very good example of how a seemingly small error can lead to a dangerous flight emergency.

they had it wired

During an F-106 practice intercept mission at 345 knots, the landing gear unsafe warning bar illuminated, and the left main gear extended. The target aircraft confirmed that the left main was, in fact, extended and the inner fairing door was missing. The emergency extension was selected and the aircraft returned to base with three in the green.

This incident began when the bird was placed on the trim pad for maintenance troubleshooting. The left main gear door switch was safety-wired to the closed position to burn down fuel in the drop tanks. No entry was made in the 781 concerning the saftied switch. After maintenance was completed the wire was not removed. The crew chief and pilot both failed to detect the saftied switch on their preflights.

During gear retraction after takeoff, the gear hydraulic system depressurized as soon as the right main gear door switch closed. Most likely the left main door lock had not completed its travel when the system was depressurized which allowed the door to open under airload.

fuel contamination

Investigation into a major aircraft accident which occurred following a double flameout disclosed some interesting information about fuel sampling.

In one experiment conducted by the board, a 230 gallon external tank—of the type used by the accident aircraft—was filled with 220 gallons of JP-4. The filler cap was replaced but left unlocked. During the next hour eight gallons of water were poured into the tank, despite the presence of the filler cap!

With the same technique used by crew chiefs on preflight, samples were taken from the drain. The samples drawn were clear—like JP-4; they smelled like JP-4; they tasted like JP-4; they felt oily like JP-4; but they were nearly 100 percent water.

Since JP-4 contains no dye, a container of JP-4 and a container of water look alike. A careful visual inspection will easily pick up a mixture—say half and half, of water and JP-4—because the liquids will separate. But a crew chief looking for two obvious liquid layers in a sample could easily mistake a nearly pure water sample for JP-4.

Surely the easiest way to avoid fuel contamination of this sort is to make sure that the filler caps are locked down tight—always. If there is any doubt of JP-4 being contaminated with water, follow the procedures in TO 42B-1-1, paragraph 5-46 (Water Content of Aviation Fuel).

[f]ree floating aileron

Immediately after takeoff the KC-135 began a left roll, which was corrected with rudder and aileron. The pilot climbed to a safe altitude where visual inspection showed the left outboard aileron to be high.

The pilot tried every possible procedure, including flap repositioning and turns, but the left aileron never moved. Fuel was dumped, and after a controllability check a safe landing was accomplished.

What did they find? The left outboard aileron lockout link had disconnected from the control rod. This allowed the aileron to free-float, regardless of the flap position. During flight, air pressure in the balance bay forced the aileron up, giving the rolling movement.

This was the first flight following phase inspection, during which maintenance was accomplished in this area. Come on Maintenance, surely you can do better than this! Where was quality control when this bird was paneled up?

throttle rigging

[A]lmost daily there are incident [re]ports of improper or incomplete throttle rigging. After all that has been said in the safety manuals and magazines and the emphasis that is placed on the use of tech data and supervisory inspections, there still seems to be those who don't get the word. Here are a few examples:

- A C-47 IP was demonstrating a full flap pattern and landing. When the throttles were advanced to adjust airspeed, Nr 1 engine failed to respond. The throttle control rod lock nut was not properly torqued during maintenance. The nut backed off allowing the linkage to disconnect.
- Nr 1 engine on a B-52 could not be retarded below 88 percent. The throttle control rod bolt was improperly installed and came out in flight.
- When a C-130's engines were [r]eversed on landing, Nr 3 lost [pow]er and flamed out. Improper [rig]ging of the fuel control caused this one.
- Nr 1 engine on a T-37 flamed out when the throttle was advanced to 60 percent during start sequencing. The throttle rigging was out of limits.

In each of these incidents maintenance goofed. Proper use of available tech data and a sound supervisory program would have prevented every one.

pay attention

The Sarge had just completed the flap security and boundary layer control check at the half-flap position. With his right hand resting on the edge of the flap, he gave the crew chief (who was on the headset) the All Clear sign, which the crew chief, in turn, passed to the pilot of the RF-4C. The pilot moved the stick, the aileron moved down and the sergeant's fingers were pinched between the aileron and flap. Although the man's fingers were lacerated, they were not completely severed.

And just think—he gave the signal himself!

foaming oil—A-7D

After fifteen minutes of flight the oil pressure started fluctuating three to five PSI and slowly dropped from 32 to 22 PSI for 30 seconds, then returned to normal. This pressure fluctuation and drop occurred three times before the pilot got back on the ground.

Foaming oil caused the problem. The A-7 has a smaller oil tank capacity (1.20 gallon usable) than most aircraft; therefore, it is more susceptible to oil foaming problems.

Agitating the oil can before servicing will insure that the heavier silicone anti-foaming agent is mixed with the oil. A requirement is forthcoming in a change to TO 1A-7D-2-1 which will require agitating the oil before servicing.

overserviced strut

When the OV-10 pilot raised the gear handle after takeoff, the nose gear indicator showed unsafe, the handle warning light was on and the hydraulic pump continued to run.

Attempts to recycle the gear with the pump on and off were unsuccessful, as were "G" maneuvers. A chase aircraft confirmed the intermediate position of the nose gear, so the pilot landed on a foamed runway with a partially extended nose gear.

This incident was caused by a mechanic who overserviced a strut with hydraulic fluid, which prevented its normal extension during retraction. The strut assembly then contacted the door linkage bracket and jammed.

Remedy: Follow the TO. ★

NUCLEAR SAFETY AID STATION

KEEP IT IN NEUTRAL

During a download, the weapon had been lowered on a lift truck below the aircraft bomb rack. Before the pullout cable could be disconnected, the driver momentarily let up on the clutch with the gear shift in reverse. Although the lift truck wheels were chocked, the movement of the truck was enough to damage the break pin on the pullout connector. To stress the obvious—keep the gear shift in neutral anytime a bomb is being raised or lowered.

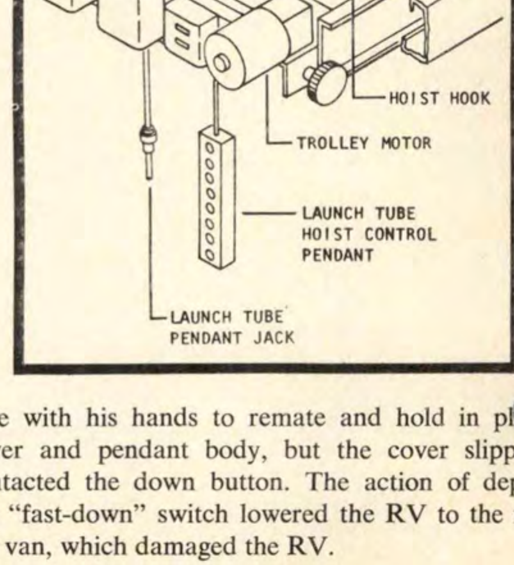
DON'T BANG THAT BOLT

While changing wheel bolts on a Model 3030 Aircraft and Missile Engine Trailer, Munitions Maintenance Squadron technicians noted cracks radiating from four of the five lug bolts to the perimeter of the aluminum hub. A check of all other assigned 3000 and 4000 series trailers turned up two more damaged hubs. In response to the EUMR, WRAMA replied that one crack per bolt hole in aluminum hubs is acceptable, in accordance with TO 35D3-26-11. These cracks will be found mainly in hubs made before 1964 when a new specification increased tolerances on the bolt holes.

All well and good. Then why are we discussing this? Because several of the cracks were caused or accelerated by a maintenance man using a hammer to install the lug bolts, rather than taking the time to have them pressed in. Nuclear safety requires total elimination of short-cut procedures and improper tools. And DON'T BANG THAT BOLT!

AND THE CHIPS FLEW

During a routine missile guidance set recycle which included a reentry vehicle (RV) removal, a screw fell out of the hoist control pendant, Figure 1-6, TO 36A9-8-40-1. The hoist control pendant cover separated from the pendant body. The technician applied external pres-



sure with his hands to remate and hold in pl[illegible]e cover and pendant body, but the cover slipped and contacted the down button. The action of depressing the "fast-down" switch lowered the RV to the floor of the van, which damaged the RV.

WHEN WILL THEY EVER LEARN?

So goes the chorus of an old popular song. The question here is: When will we ever learn to follow technical orders step-by-step and avoid unauthorized procedures? Cases in point:

• Two technicians thought they were following the TO, but missed several steps after completing part of the work. The result was improper status indication on three missiles, loss of alert time, and another Dull Sword.

• During a parachute change, a weapon technician applied force on a shoulder bolt and self-locking hex nut rather than on two internal wrench bolts as directed by the TO. The shoulder bolt sheared off, requiring additional maintenance and another Dull Sword.

• During another parachute change, a self-locking n[illegible] was found cracked and with stripped threads. Pr[illegible]e cause was listed as failure to inspect for burrs and foreign materials (as called for in the Dash 1 TO) and/or overtorque.

When will we ever learn:

• To do *everything* the TO says and in the proper sequence?

• To avoid unauthorized procedures? As the Director of Special Weapons at one Air Force Base stated, "The TO can't possibly list them all."

• Not to skip parts of any procedure? Mark or check steps as performed. Paper clips, pencils, erasers, and common sense are cheap. Nuclear accidents/incidents/deficiencies (AIDs) are not.

DULL SWORDS- 48 HOURS

AFR 127-4 requires Dull Sword reports to be submitted within 48 hours after the deficiency is noted. The Directorate of Nuclear Safety records show some units delay submitting reports.

Rationale given for the delays falls into three groups:

• Additional investigation was necessary.

• Another base or safety office was asked to submit the report and failed to submit it on time.

• No reason included, just late.

"Additional investigation needed," is not a valid reason for delay since it is conducted *after* the preliminary report, not before. If additional data is required, state on the preliminary report that this information will be forwarded when available. Your absence when the deficiency occurs is also not a valid reason since the responsibility for submitting timely reports is still yours. Follow up on "courtesy reports" that others say they will submit for you. The "no reason" response indicates poor management practices and a disregard for safety and authority.

The system is designed to conserve Air Force resources. Ensure that your Dull Swords are reported on time (within 48 hours after discovery), to the right people, and that follow-up action is taken when required.

Remember, deficiencies cannot be resolved in a timely manner unless they are reported promptly.

WRONG-WAY CORRIGAN

The Reentry System Convoy was enroute to a launch facility. Along the way they made a wrong turn on an unmarked county road and the rear wheel of the payload transporter became stuck.

The primary cause was personnel error in that the convoy commander turned into the wrong road. Contributing was the poorly marked route of travel. Launch facility markers are being constructed and will be strategically located in the missile complex area. ★

"ONE MAN AGE"

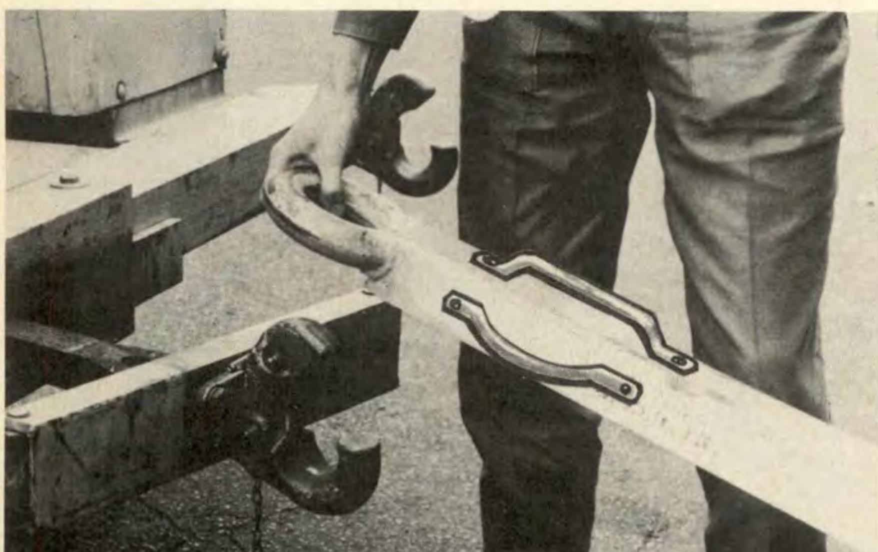
The photograph accompanying the article, "One Man AGE" in the May issue brought back memories of an accident which I witnessed at Furstenfeldbruck AB in 1949. (That's a long time to remember.)

In almost the same position as that in the photograph, I saw a young airman's hand crushed horribly when the CG of a heavily loaded trailer being hooked to a tug shifted as the trailer tongue was lowered toward the pintle hook. Holding the tongue in the manner illustrated in the photo, the unexpected downward momentum of the tongue and hitch, combined with the man's desire not to drop the tongue and upset the load cost him a finger and much suffering.

As a fix, we attached lifting handles to the tongue of every piece of AGE on the base (if not already installed). I sincerely hope your photo is not representative of the manner of handling this potential finger flattener.

Lt Col Henry C. Rhodes, Jr.
Patrick AFB, Fla.

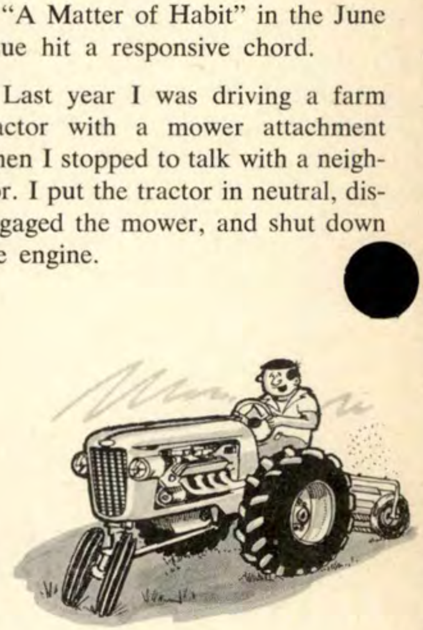
Editor's Note: Your point is well taken. The photo illustrates what some outfits have done to eliminate the hazard.



"A MATTER OF HABIT"

"A Matter of Habit" in the June issue hit a responsive chord.

Last year I was driving a farm tractor with a mower attachment when I stopped to talk with a neighbor. I put the tractor in neutral, disengaged the mower, and shut down the engine.



When I was ready to go, the neighbor's son was leaning on the mower with his fingers between the knives. Without giving the matter any conscious thought, *strictly through habit* with aircraft engines, I was unable to start the tractor until he was clear of the mower. When I finally started the tractor, I was startled to see the mower go into operation—a defective clutch.

Force of habit saved some fingers that day. If only all our habits co[illegible] be good ones!

Thomas O'R Gallagher
ATR, Pilot Examiner
Sayville, NY

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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.

Captain JOHN M. O'NEILL

554th Reconnaissance Squadron, APO San Francisco 96310

On 2 November 1971, Captain O'Neill launched his QU-22B aircraft over a hostile area of Southeast Asia at night. During the climb, passing FL 110, Captain O'Neill noticed a drop in manifold pressure from normal climb power of 35 inches to 30 inches. He immediately followed specified emergency procedures for partial power failure and turned back to base. Thirty seconds later the manifold pressure dropped below 30 inches, and a heavy stream of sparks came from the left lower portion of the engine, followed by smoke and odors entering the cockpit. Taking immediate action Captain O'Neill checked that he was on 100 percent oxygen, ventilated the cockpit, and made an immediate decision to divert to an alternate airfield. Although the possibility of an inflight fire was imminent, Captain O'Neill stayed with his aircraft in an effort to make a safe landing. He then began his approach and called the controlling agency at a forward operating base for landing instructions. Although his radio transmissions were being understood on the ground, the ground controllers were forced to relay their instructions to Captain O'Neill through another airborne aircraft. He elected to land downwind so that his approach would avoid a high-density population area that lay directly beneath the active runway approach. At approximately eight miles from the runway a spiral descent was established, and an emergency landing pattern was begun 3000 feet over the runway. A high sink rate was encountered, and when Captain O'Neill attempted to increase power there was no engine response. Captain O'Neill then raised the landing gear, and on short final lowered full flaps and extended the landing gear just before touchdown. The landing was completed and the aircraft stopped without further damage.

Captain O'Neill saved a valuable combat aircraft. A study of the fleet led to discovery of flaws, similar to the one that caused his problem, on other aircraft, which prevented further damage to those and possibly saved the lives of other pilots. WELL DONE! ★

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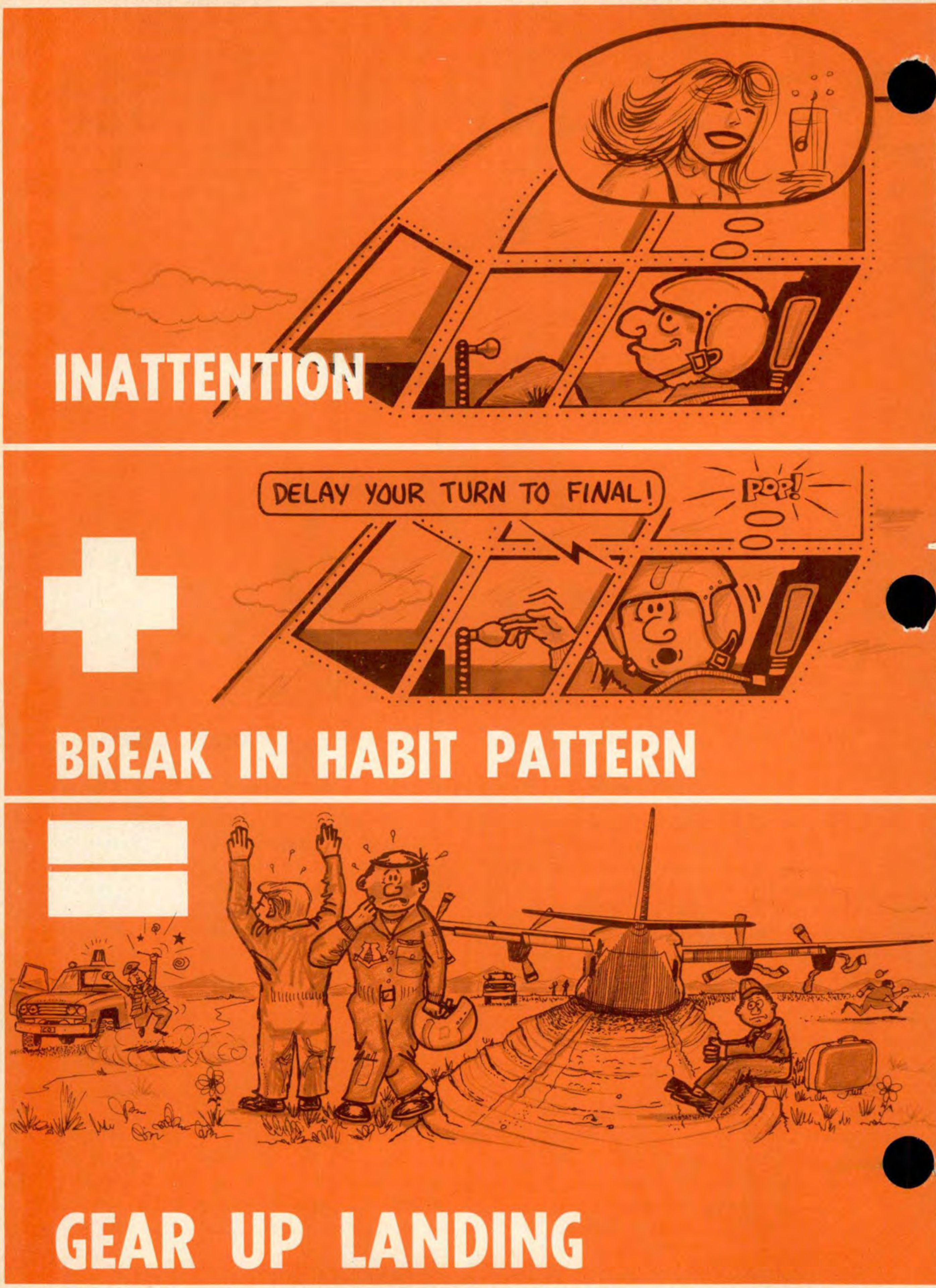
INATTENTION
DELAY YOUR TURN TO FINAL!
POP!
BREAK IN HABIT PATTERN
GEAR UP LANDING

Place colored marker
to show November
issue missing

PHYSICAL ORIGINAL PAGES

TORN
OR
MISSING