UNITED STATES AIR FORCE • JUNE 1972

Aerospace SAFETY

COVER—oil on canvas. One of a series of paintings contributed to ASM by well-known aviation artist Douglas Ettridge of Surrey, England, and Santa Barbara, Calif.

UNITED STATES AIR FORCE **JUNE 1972**

Aerospace SAFETY

FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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JUNE 1972 AFRP 127-2 VOLUME 18 NUMBER 6

SIXTEEN TONS

Maj WALTER I. BOSTWICK, HQ USAFE

"Excuse me, Major, but aren't you flying this evening?" Major Bud Johnson sighed and glanced at his watch. "That's right, thanks for reminding me. I'm so far behind with this paperwork I'd forgotten all about it. Please button up the shop, Sergeant—see you in the morning."

As Bud drove toward the flightline, he reflected that the weatherman had been right. The ceiling and vis were still good, but light rain had started as scheduled and the gray afternoon foretold of layers and layers of clouds. "I sure hope we can top this stuff," he mused. "If not I'll be a tired boy after 2.3 of night wing weather."

Major Bud Johnson was, in fact, a pretty tired boy already. After years of learning the ins and outs of squadron operations, his new job in ops and training was both strange and trying. Early mornings and late nights had become his routine, and still too much of his work came back from the DO with the note:

SIXTEEN TONS

CONTINUED

"Good start. Scrub it down again, coordinate with the DM, and run with it."

It was a quarter to five when Bud walked into the squadron—plenty of time to climb into a flight suit and scan the FCIF before briefing.

Suited up, he checked by the duty desk. "Are we going to have some birds tonight?" he asked. The duty officer quickly checked the schedule board. "Looks real good as far as the aircraft are concerned, but the tankers may be called off because of weather. We're waiting for the command post to get that finalized and will let you know as soon as we can."

After filling his coffee cup, Bud joined his GIB and the other crew in the flight briefing room. He was greeted with a cheerful "Hello, wing weenie" from his old squadron mates and retorted with a short comment on their backgrounds. As Bud took his seat, the flight leader began the briefing. Once the time hack and aircraft assignments were made, Bud's thoughts drifted to other things.

"I wonder if I was smart to take this job," he thought. "The timing was certainly bad. Here it is the start of summer and the whole family was really set on taking that leave. The boys have been working on getting the camper squared away and the wife has enough travel books to choke a horse. But there was just no choice. If you pass up a chance to move up, you just don't get another. Maybe next year."

The duty officer interrupted the briefing with news that the refueling part of the mission had been canceled. "Sorry, but weather has PIREPS that this stuff is fairly well layered up to over 30 thou. The field should hold up fine so the mission can go—just no tanker square to fill."

"That's just great!" the flight leader exclaimed sarcastically. "We all have more than enough night time—the tanker was the only reason we were going to fly anyway. Just abso-bloody-lutely great! Now we can bore holes for 2.0."

The briefing was quickly concluded. After minor changes in EACs and a quick check on the flight plan were made, there was still time for a final cup before going out to the aircraft.

Captain Joe Miller was flying with Bud. A sharp WSO with more than two years in the squadron, he sensed a change in Bud's usually outgoing manner. "Bud, you're being awful quiet. Anything wrong?" he asked. "Your wing job can't be all that bad."

"Well, it's more than I figured it would be, but what really tears it is the fact that the boss is leaving in a couple of weeks and the new guy won't be in for over a month, so I had to cancel my leave."

"I'll bet the dearly beloved was torqued down pretty tight when you told her about that!"

"She sure was—and still is," Bud replied. "But she'll get over it after a while. She's been around the Air Force long enough to know that these things happen. Well, I guess it's time to get on with the flying business—the fun and games of a night round-robin!"

With a final pit stop and the usual pocket-slapping check to make sure gloves and other miscellaneous gear were on hand, the flight members hopped in the bread truck for the ride to the aircraft. A few words and a reminder from the flight leader: "See you on button eight at three zero."

The preflight went rapidly, the way they always do when it's raining. Once in the cockpit, they ran the checklist items down to engine start.

"Well, it all looks good to me," Bud muttered. "I wonder why the bird always breaks when it's day VFR and on a night hole-boring mission you can't find anything wrong even if you try. I'd much rather be sitting at home right now than strapped to this machine."

"Yeah, I know what you mean," said Joe. "I've got a date with a real honey tonight and I'll be dragging so much after this that I'll hardly be sociable."

Engine start and the after-start checks passed quickly, and they followed lead to the quick-check area. "Say, Bud, it took eight minutes to get an alignment after the heat light went out, and the ground speed is up to 50 knots already. INS may not be too shiny tonight."*

"Rog. Everything else seems OK except that we don't have a TACAN lock-on yet—it should be there, but let's give it a couple more minutes."

The quick-check progressed with its usual boredom and lead's thumbs-up was returned. Switch to tower freq—check-in—ready to go. "Cobra Flight, this is Tower, hold one. The SOF is checking with command post."

Bud and Joe wondered aloud about what the SOF might have in mind. Maybe the tanker would make it after all.

"Cobra, this is the SOF. Bring 'em back in and shut 'em down. The TACAN is off the air. Maintenance says it'll be a couple of hours before

**Reference is to Inertial Guidance System.*

they can get it back on. The mission's canceled."

"Another practice engine start—great fun!" Bud remarked. "Let's clean it up and head for the barn."

Taxi back—chocks in—throttles off. "Let's get out of this old girl, Joe. See you on the ground."

While waiting for the other crew to join them in the truck, Bud and Joe were strangely silent. Then Joe said, "Bud, I don't want to shake you up, but do you realize that your lower ejection guard wasn't up when you climbed out?"

"You're kidding?! Damn, I'm glad I didn't hang a leg strap in that beauty. I may not be too sharp tonight, but that's one thing I never thought I'd forget."

"Bud, I know you want to get home, but would you mind stopping by the club with me for a cool one. There are some things I need to talk to you about. You know, kind of privately."

"Sure, Joe, but only one. It's too late for dinner with the kids, but if I hurry I'll have a little time with them."

Driving toward the club after a short debrief, Bud wondered what kind of problem Joe might want to talk about. "Joe's a nice kid," he thought. "Probably got girlfriend troubles and I guess he thinks I have all the answers. What a laugh!"

Joe was already seated at the nearly deserted bar when Bud walked in. The bartender served a frosty mug as he sat down. "What's troubling you, Joe. One of those sweet young things trying to pin you down?" Bud jokingly asked.

"Don't take me wrong, Bud, but it isn't me with the troubles—it's you. Tonight you really scared me. I knew you were tuned out at the briefing, but I wasn't really concerned until you blew three or four items on the checklist. Honestly, I was damned glad we aborted!"

With a sigh, Bud glanced around and then took a long sip. "It really shows that much? I thought that with as much time as I have in the bird I'd be able to fly a simple mission without any trouble. The problem is that I'm tired. Oh, I could pass a flight physical right now—it's just that everything seems to be piling up and there's no light at the end of the tunnel."

"Bud, why don't you hang up the old G suit for a couple of weeks. Tell squadron ops you need a little time off from flying."

"Joe, the wing type that always checks the weather and then finds his staff meeting schedule getting tighter as the ceiling's getting lower has always shown me nothing. What's more, when the squadron finds out that they can't depend on you and knows that they're going to pick up a deviation about half the time you're on the schedule, then you can just kiss the good flights goodbye. Not for me."

"Bud, you'll end up in a smoking hole with some poor GIB three feet at six o'clock if you don't stop trying to play superman."

Bud waved to the bartender and signaled for two more beers.

"You're right, Joe, and thanks—I mean it, thanks. It's hard after all these years to admit that I can't hack it, but it's true. I appreciate how you must have been gritting your teeth this evening and will make one promise—I'll never try to hack a mission again when I know I'm not in shape, either mentally or physically, to do a first-rate job."

"Sounds great, Bud. When you get back on the schedule, count on me for your back seat, OK?"

"It's a deal." ★

THE L.P.L.S. APPROACH

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

WHAT'S IN A NAME?

The designation of an instrument approach procedure can be a source of confusion to pilots.

STRAIGHT-IN PROCEDURES: Naming a straight-in procedure is fairly simple. The identification of such an approach must include the type facility which provides final approach course guidance and the runway to which the final approach course is aligned; for example, ILS RWY 18, TACAN RWY 23, etc.

CIRCLING PROCEDURES: Approaches which do not meet the criteria for straight-in minimums are identified by the type facility which provides final approach course guidance plus an alphabetical suffix. Examples are: VOR-A, NDB-A, etc.

DUAL FINALS: The charting specifications permit two final approach courses to be portrayed only on military approach procedures. The name of the procedure will include both navigational facilities. The full name of the procedure is normally used in air traffic control and the type of final approach actually flown is left to the pilot.

HIGH vs LOW: Virtually all high altitude approach identifications are now preceded by the letters "HI." This was done to prevent misidentification and possible confusion with low altitude approaches. Numbers will be used where there is more than one approach using the same facility for course guidance to the same runway; e.g., HI-TACAN 1 RWY 18R, HI-TACAN 2 RWY 18R, etc.

VORTAC: A VORTAC navigational facility may be used for either VOR, VOR-DME, TACAN, or VORTAC approaches. The name VORTAC used in an approach identification implies that the approach may be flown using either VOR-DME or TACAN equipment and that DME is required. DME is not required to fly a VOR approach based on a VORTAC facility though the pilot should use available DME information in order to remain position oriented.

NDB is the abbreviation for Non-Directional Beacon, a general term encompassing both low frequency and UHF radio beacons. Where the approach name does not specify either ADF or UHF receiver requirements, check the transmitter frequency to be sure. For example, 283 (kHz) would indicate a low frequency NDB and 283.0 (mHz) would indicate a UHF beacon.

Under the present system the approach identification might not include the facilities required for maneuvering prior to final approach. For example, a HI-ILS procedure would require VOR, TACAN, ADF, or DME in order to fly the approach as published. The pilot must study and analyze the approach he intends to fly to insure that it is compatible with the equipment aboard his aircraft.

Remember that you may not fly an approach for which there are no minimums published for your aircraft. The appropriate category minimums must be available and you must use the appropriate navigational guidance. Thus, you may not use TACAN to fly a VOR approach based on a VORTAC facility.

"FL 180" WHERE ARE YOU?

SITUATION: High altitude penetration. IAF altitude is *FL 180.* You are holding at FL 190. Local altimeter setting is 29.86" Hg. When you are cleared for the approach, you may:

A. Descend immediately to FL 180, proceed to IAF, and begin the approach.

B. Maintain FL 190, proceed to the IAF, and begin the approach.

Minimum usable flight levels, discussed in FLIP Section II and IFR Supplement, are established in 500-foot increments. However, only 1000-foot increments are normally used in air traffic control. If the controller clears you for an approach from FL 190 (such as described above), delay your descent and your questioning of his motives until you check the local altimeter setting. Clearance for the approach includes clearance to the altitude from which the approach begins. The only trouble is, sometimes FL 180 just isn't there. The USAF IPIS discourages the use of FL 180 in the design of instrument approach procedures for this reason. (The correct answer is "B.")

HOLDING (TIMING)

Until the last issue of AFM 51-37 was published, there were no written words to tell the pilot exactly when to start timing the inbound leg of a holding pattern. The manual now states,

> "Start the inbound timing when the aircraft crosses the holding course inbound or wings level, whichever occurs first." (Page 11-38)

Judging from the calls and letters, these words are apparently causing more "heartburn" than any others in the manual. In an effort to clarify the situation, let's look at three possibilities:

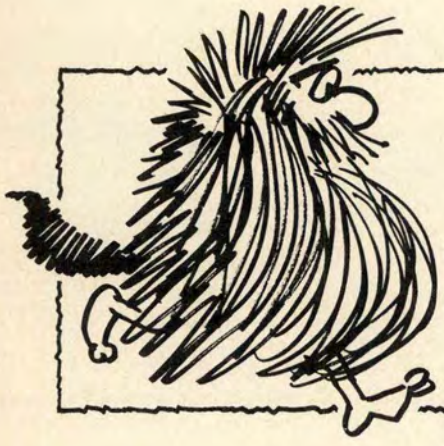
1. You undershoot the holding course. Start timing when you are wings level with an intercept established.

2. You overshoot the holding course. As you cross the holding course, your heading is **not** within 90 degrees of the holding course. Start timing when you are wings level with an intercept established.

3. You overshoot the holding course. As you cross the holding course your heading **is** within 90 degrees of the holding course. This constitutes crossing the holding course inbound so start your timing at that point.

Timing the initial inbound leg of a holding pattern is somewhat inaccurate at best. For inbound timing to be valid, the outbound timing must start at the proper point and the aircraft must be reasonably close to course at the completion of the inbound turn. The pilot should use the available techniques to position his aircraft so that the turn inbound will place the aircraft on the holding course. Accurate and valid timing may not be possible until the second circuit of the holding pattern. This will be further clarified in Change 1 to AFM 51-37. ★

A MATTER OF HABIT



HAIRY TALES

The Hairy Tales column is open to anyone who has a message concerning safety, but would like to remain anonymous. If you have one of these experiences buried in your bosom, write it down and send it to us, signed or unsigned. Maybe your* HAIRY TALE *will save someone's life.

Man is a creature of habit. The fact itself is indifferent—it neither helps us nor hurts us. But properly applied—i.e., in the conscientious effort to cultivate beneficial habits—the ability can be a tremendous boon.

Back in Colorado, while I was in college, one of the local boys' clubs sponsored a seat-belt installation campaign. The statistics on the benefits of seat-belts were just then reaching the irrefutable stage, even to a liberal arts major, and my wife and I decided to have them installed in our 1954 Chevvy. We weren't willing, however, to spend the money and then end up with seat-belts that were cut and crimped from having the door closed on them or dirty from lying on the car floor. Before the installation we made a pact to nag each other unmercifully until

the fastening of the seat-belt became a painless habit.

It took about a month—maybe bit more—but the habit formed and did become painless. It persists to this day, stronger than ever through

several years of reinforcement, to the point where I fasten the seat-belt to move the car across the street (or to a point where I have to make a conscious effort to override the habit—and suffer the resulting nagging discomfort). On the rare occasions when I'm sucked into riding with someone who doesn't have seat-belts (a vanishing breed, thank goodness) I'm nervous.

Some years later, I was happily engaged as an IP in the O-2A, flying twice a day and teaching big airplane drivers about little airplanes. My first mission on this particular day was a transition mission with a fairly new student, and one of the syllabus items was no-flap landings.

I demonstrated the first one; alled for closed pattern, pulled up on downwind, talking a mile a minute over a hot mike trying to point out power settings, pattern placement, aircraft attitude—all the things that were different. Abeam our intended touchdown point I pulled the power to idle, still talking —then shut up and listened to the gear warning horn tell me what a jerk I was. Great blushing and reddening of face.

I made the best of it. Put the gear down, continued the approach and landing and made a pitch to the tune of "See? It can happen to anyone!"

But I didn't let it bother me for too long, dismissing it as a checklist inadequacy that didn't really have much practical application anyway; in this bird the checklist sequence goes flaps-gear. I didn't go flaps, so I didn't go gear.

I had about dismissed the incident from my mind by the time the second mission rolled around. Different mission, different student, same airplane. Approaching the traffic pattern after some airwork, I pulled the throttle back to check the warning horn . . . *and the horn didn't work!*

Well, that got my attention! It didn't take any great smarts to figure out that if that little item had decided to goof off about three hours earlier, it would have been the sickening screech of metal telling me what a jerk I was—followed

in rapid succession by a major, a lieutenant colonel, a colonel and maybe a brigadier general.

After mulling over the problem for awhile, I decided that a deeply ingrained habit pattern was the best answer—just like the seat-belts in the Chevvy. For the next month or so I made a diligent effort to nag at myself about landing configuration. I chose two points: abeam the departure end of the runway on downwind and on short final approach.

(These two points don't apply to all aircraft, of course. I chose them because they were particularly well suited to the O-2 and the way we flew it.)

And it worked! After a month or so, I couldn't pass the departure end of the runway or the approximate mid-point of final approach without getting fidgety—and the only way I could relieve the fidgets was to make a conscious and *positive* gear check. (In the case of the O-2, a green light, handle in the

down neutral position and a visual check of the gear itself.)

As a result, I ended up with what I think is a heck of an asset; I get some free insurance against a red face and writer's cramp from the paperwork (and, maybe, in some other type of bird, something a lot worse). It requires no conscious effort, I didn't have to work very hard to acquire it, and I feel a whole lot more comfortable in a traffic pattern.

So I recommend it just like I got it—free. Pick yourself a couple of memory crutches and nag yourself for a month or so. It might turn out to be the best investment you could make. ★

PILOT'S QUIZ

1. You arrive over the station (VOR or ADF) for a teardrop penetration and are below the published IAF altitude; you should

A. Begin an immediate penetration but do not descend below procedure turn altitude until established inbound.

B. Maintain the outbound published course and establish a slow rate of descent to compensate.

C. Use any method as long as you do not descend below penetration turn altitude.

D. Maintain altitude and proceed outbound 15 seconds for each thousand feet below published IAF altitude before beginning descent.

2. If a penetration turn altitude is depicted, do not descend below this altitude until you are within, and will remain within, 10 degrees of the inbound course.

A. True
B. False

3. Air Force pilots should disregard the inbound and outbound 45 degree off course bearings depicted on the head of the barb symbol used on the procedure turn plan view ( ) on the approach plate.

A. True
B. False

4. On a VOR approach with radar monitor you will receive (from radar)

A. Traffic advisory
B. Course information
C. Glide path information
D. Missed approach point (MAP) information
E. All of the above.

5. On a PAR, decision height can be determined by either the cockpit altimeter or when advised by final controller, whichever occurs first.

A. True
B. False

6. Execute a missed approach when

A. At DH and you cannot see the runway environment clearly enough to land

B. A safe landing is not possible

C. When directed to do so by the controller

D. All of the above.

7. At three miles on ILS final the glide slope indicator is displaced one dot; you are

A. 55 ft.
B. 78 ft.
C. 110 ft.
D. 200 ft.

from being exactly on the glide slope.

8. As a rule of thumb you should not make a ground speed check on TACAN closer than 20 NM to the station.

A. True
B. False

9. You are being radar vectored to an ILS approach and the controller tells you "cleared ILS approach."

A. You are cleared to descend to the glide path interception altitude at that time.

B. You are cleared to descend to the glide path interception altitude when the CDI moves away from fully deflected.

C. You are cleared to descend to the glide path interception altitude when the CDI is "captured," i.e., when it is within one dot of centered.

D. You must intercept the glide path from your last assigned altitude and execute the published approach.

10. When executing a low altitude procedure turn you should start initial descent from procedure turn altitude when

A. You are within 10 degrees of the procedure turn course and on an inbound intercept heading.

B. You are within 20 degrees of the procedure turn course and on an inbound intercept heading.

C. The aircraft is outbound in relation to the published procedure turn course.

D. Your heading is within 10 degrees of the procedure turn course.

ANSWERS

1. D (AFM 51-37, p. 15-7)
2. B (AFM 51-37, p. 15-7)
3. A (AFM 51-37, p. 15-13)
4. A (Airman's Information Manual, p. 1-64)
5. A (AFM 51-37, p. 16-7)
6. D (AFM 51-37, p. 16-7)
7. B (AFM 51-37, p. 17-8)
8. B (AFM 51-37, p. 12-9)
9. A (AFM 51-37, p. 17-7)
10. A (AFM 51-37, p. 15-14) ★

MISUSE OF OXYGEN SYSTEMS

Lt Col RONALD J. D'AIUTO, Directorate of Aerospace Safety

A few months ago a sister service lost an aircraft when the pilot disconnected his oxygen mask for some reason and lost consciousness. Two Air Force interceptors flew on the wing of the stricken aircraft at 33,000 feet for ten minutes trying to arouse the pilot or turn the aircraft. All efforts were unsuccessful as the autopilot held the aircraft on its altitude and heading. The aircraft subsequently crashed at sea.

In January 1972, the pilot of an Air Force jet fighter took off with his oxygen mask disconnected and climbed to altitude. At 18,000 feet, when the pilot connected his mask, he found the oxygen system was depleted. In spite of this, he elected to press on since the cabin pressurization functioned properly and flight at *high altitude* was planned to be brief. These plans soon went awry. To accomplish the mission he loitered at high altitude (above 30,000 feet), became hypoxic, extremely disoriented, and nearly crashed.

The major commander concerned summed up Air Force policy on the use of oxygen when he sent the following message to his commanders:

"AFM 60-16 requires that the quantity of oxygen aboard an aircraft before takeoff be sufficient to accomplish the planned mission. It also requires use of oxygen if the cockpit altitude exceeds 10,000 feet. In addition, this command . . . requires aircrews of ejection seat equipped aircraft to have oxygen masks secured prior to takeoff and during all flight operations. The incident . . . could easily have cost a pilot and an aircraft. While I can appreciate the candidness of the pilot in relating his experience so that others might learn, I cannot allow the continuance of such actions. That a pilot would press on to higher altitude without oxygen is inconceivable to me. It is equally difficult to understand why pilots fly without their oxygen masks hooked up, although I have been informed that this is not an uncommon practice.

"I require that each commander make known to all aircrew members my position on this matter. The deliberate violation of flying directives, serious breach of flight safety principles, or inability to exercise the ordinary common sense expected of any military pilot cannot and will not be condoned." ★

GROW OLD ALONG WITH ME

ROBERT W. DUNCAN
Professor of English
Southern Illinois University

The author, now a professor at Southern Illinois University, served as a Naval pilot from 1941 to 1945 and as a Naval Reserve pilot from 1949 to 1957. He had extensive experience in the F-4F, F-6F and F-4U. Although the article was written several years ago, shortly after the author concluded his military flying career, the wisdom it contains has stood the test of time and is as pertinent today as the day it was written.

Recently I took what I am sure was my last flight as a pilot of a military aircraft. I was a member of an outfit which was eliminated in the defense expenditure cutback, and I have ranked and aged myself out of active reserve duty. I would be less than human if I did not, at this time, look back on my years of flying and try to evaluate the factors which operated to keep me alive, as well as those mistakes which might have killed me.

I felt a resurgence of the impulse to buttonhole young men and women just beginning, whether in private or military flying, and say the magic words which will keep their bones intact and send them home each evening, a joy to spouse and children.

I can say what I have to say without pride or arrogance, because I was a mediocre pilot. I learned slowly; I was not by any stretch of the imagination a "natural." My awareness of my limitations, I am sure, is one important factor to which I owe my life.

I did not have the skill to toy with chance and stretch my craftsmanship beyond its capabilities. I would not slow-roll at less than 5000 feet, because I scooped out at least half the time; nor would I practice spins unless I had so much altitude that the ground seemed as remote as the moon.

There are two kinds of pilots who get hurt: clever ones and poor ones. The clever ones gradually acquire a confidence which may mislead them, and tempt them to cross the safety margin once too often; the poor ones are merely incapable. But there is one common attribute which both types possess: they lack imagination. Their thinking is narrow; they fail to consider the possible consequences of a breach of flight discipline, a disregard for regulations, or an overextension of their abilities.

They assume that **all** conditions at **all** times will be normal. They assume that the ground is flat without obstructions, that the old altimeter setting is good enough, that there is no other plane in the air, that the weather will hold, that the obsolete chart is reasonably accurate, that the fuel tank was topped, that the field is open, that the mags will clear in the air, and that the runway is long enough despite the temperature.

These are foolhardy assumptions, resulting from laziness and wishful thinking. If there is one thing we can be sure of in this journey through the cosmos on this thin-skinned pea of an earth, it is that change is constant; nothing is ever the same.

It is apparent to me that the human race is invincible. You need only consider the fact that a man who knows he has only one life to live will offer it to eternity because he is too lazy, or too unimaginative, to take an extra minute to ask a mech how much oil was put in. This brand of courage exceeds that of the tiger.

I distilled a single rule from the potpourri of experience, a rule which contains just about all there is to flight safety. It is, however, a mere phrase, unless we extend it through every flight activity. It is simply:

NEVER TAKE ANYTHING FOR GRANTED.

There are plenty of things which we are forced to take for granted without adding to the list. We must accept the evidence of our eyes and nose that the liquid in the tank is aviation gas or JP, that the length of the runway is 8000 feet if En-route-Supplement says it is, and that the fuel control will compensate for changes in altitude. We lean heavily on properly trained authorities for vital information, and if they fail us we cannot help it.

But there are those factors which can be checked personally, which should *never* be taken for granted. I learned one lesson fairly early, and the nearness with which I came to killing, not only myself, but another pilot, had an extremely sobering effect.

I was lined up on the runway's centerline with a student under the hood in the rear cockpit, preparing for an instrument takeoff. Another plane was lined up ahead for the same purpose. My student was on the brakes, ready for full throttle when I gave the order. While I could not see over the nose of my plane, I did observe the wings of the first plane recede and disappear as it started down the runway. After a decent interval I told the student to roll, and I stayed on the interphone to advise and correct him. He did so, and a few seconds later my guardian angel stepped in.

"Now look, buttonhead," he said to me, "the first plane started rolling, and you figure that he is airborne at the end of the runway by now. But you don't see it. You're just taking it for granted."

I took control, hit the brakes, and throttled back. My aircraft stopped 20 feet short of the No. 1 plane, which had aborted, probably because the student was veering off heading. I would unquestionably have chewed through at least one cockpit if I had continued.

I owe to a certain vice of mine a good bit of the credit for the fact that my wife was cheated out of $10,000 of government insurance: I am an experience thief. I steal the experience of others.

Your own experience is the worst possible teacher, despite the famous dictum. It is much too expensive. I enjoy the nasty habit of appropriating that of other pilots.

Every time I read or heard of an accident I would ask myself: "Do I fly in such a way that it could have happened to me?" If the answer was yes, I did my best to correct my habits. Like a parasite, I stayed alive on the flesh and blood of others, and I admit it without shame.

I love the taste of hamburgers with catsup and onions, and I love my wife's embrace in front of the fireplace on a fall evening. My imagination is a vivid one, and when I fail to see the other plane in the traffic pattern when tower informs me it is there, I panic.

No more hamburgers? No more kisses? The cold sweat breaks out, the head is swiveling like a Grimes light. No more baseball with my boys? The heart beats faster. The blood pressure rises. No more cans of beer on a hot afternoon? The breath comes short and hot.

Where in hell is that other plane?

I bank right and left to find it. I drop first the right wing, then the left.

Tower: "Nine zero four, are you having difficulty?"

Oh, no. How can the thought of a midair collision at 1000 feet suggest difficulty?

I make my voice calm. Nobody must know that I am afraid of a midair collision. After all, am I not a pilot?

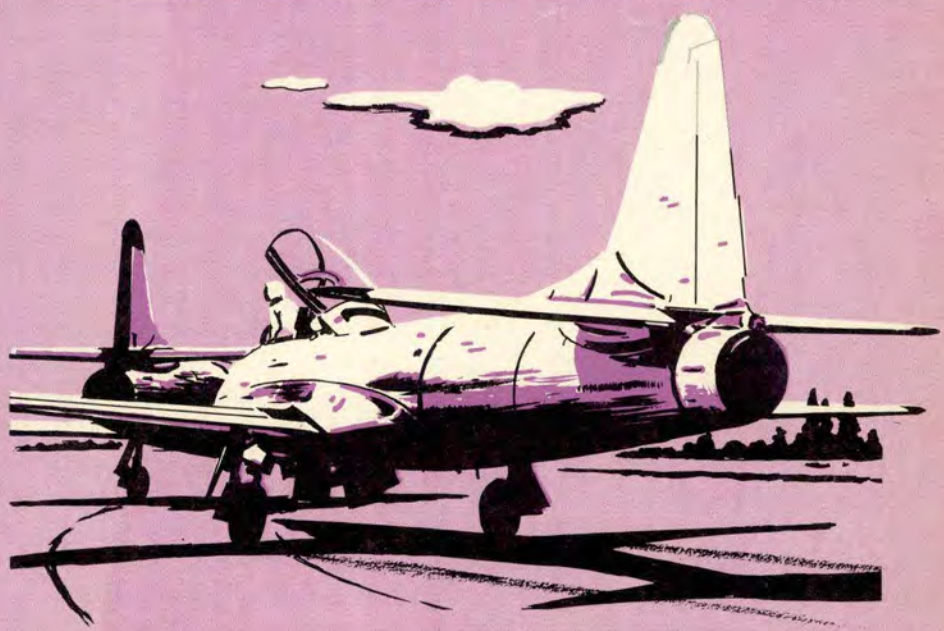
"Tower from 904. Don't have the other aircraft. What's his posit?"

Tower: "He's on short final. You're No. 1."

"And how did it go today?" Cindy asks as I pick a cold beer out of the six-pak.

"Very nice," I answer. "Do you think it's chilly enough to light the fire?"

I knew two pilots whose tragic exits I was able to predict. One was a clever man, with an enviable skill and a superb practical and theoretical knowledge of aerodynamics. The other was a wise guy.



I loved Casey, the first one, like a brother. He taught me much about flying, and he was, for me, St. Exupery and Jimmy Doolittle rolled into one. But he couldn't subtract. He didn't know when his units of safety were reduced to a dangerous minimum. His skill was his murderer.

He could roll at 200 feet and never scoop out. His aircraft was as his own body. This is a fine thing, but there are possibilities over which your skill has no control. Engine failure is one of these, and engine failure when inverted at 200 feet is a troublesome event. A parachute is useless, and your choice of pasture is severely limited, even if you complete your roll. Casey did not complete his. He scattered gas, guts, and gaskets over 500 feet of ripening corn.

I was such a mediocre pilot that I never had the courage to attempt such intrepid maneuvers. I mourned the death of Casey, but my grief didn't help him. He has been long gone, and I am here tonight, as I write, watching the scarlet leaves of the maple drift by my window in the moonlight. And yet his craftsmanship far exceeded mine.

Marvell said it 300 years ago:

"The grave's a fine and private place,
But none, I think, do there embrace."

But I love to stunt. You should see my triple sequence: the split-S, loop, and Immelman, coming right out on the original heading. I start it at 10,000 feet. I'm very proud of it.

The other pilot I shall call Grant. He was a likeable youth, but he lacked humility. He wore his cap on the side of his head, and made wrapped-up turns to a landing. He would argue areodynamics with pilots who had more hours of night flying than he had altogether. Can you imagine yourself advising Saint Ex on the best route to Dakar? Grant could have done it.

One day I said to him, after a particularly disheartening discussion (I think he was insisting that a plane in the air would weathercock): "Grant, it matters not to me whether I win the argument, but if you fly like you talk, you're gonna kill yourself."

He snorted, retilted his cap to a more rakish angle, and stalked off whistling, "Off we go, ta-ta-ta-tum-tum-tum-tum."

I had no car in those days, so Grant picked me up every morning to drive to work. One Monday morning, two weeks after my melancholy prediction, he failed to show, and I had to hitchhike. No bus.

The CO was on the phone when I loped in, an hour late. I was nervous and furious; we were flying a very tight schedule. I started blabbing when it was apparent that the CO was waiting for somebody at the other end.

"That damn Grant didn't pick me up this morning! It's not my fault!" I pounded on the desk.

The CO started talking on the phone, and being versatile like Caesar, wrote a note for me on the pad.

Grant was killed yesterday.

I had the psychic feeling of inevitability you sometimes get in a poker game when the card you draw is exactly what you expected. Of course, I said to myself. What else could it be?

He had his brother, a visiting cadet, in the rear seat when he pulled the wings off the trainer over Biscayne Bay. The only two boys in the family. What would his mother think, I wondered, and what could his father say?

I said before that Casey didn't know how to subtract. I referred to my formula for safety. According to my ingenious reckoning, safe flight is maintained only when you stay above a certain number of what I call safety units.

When you have trouble in an airplane, there are at best, a fairly large number of lifesaving alternatives. As far as I am concerned, there are more of them in the air than on the highway, where an oncoming car on your side of the road, passing on a curve, may reduce your alternatives to near zero. These units are your treasure, money in the bank, the buffers against chance, fate, bad weather, or even your own fallible judgment. . .

When the stories drift around to telling hairy tales of flight, don't feel put down just because your log book has a clean "Accident and Flight Rule Violation Record" page. Why, with a little imagination and the right superlatives, you can make a T-28 prop governor failure sound comparable to a double generator failure while IFR in a Phantom.

Best of all, feel within yourself the satisfaction of completing difficult and, quite often, dangerous flight missions in a cool, professional—and *safe* manner.

Now I am a private pilot only. I look forward to dancing the skies on "laughter-silvered wings," to winging to my destination in a safe, straight line, far above the twisting hazards of the increasingly expensive highways. There are no toll roads up there in the blue, no billboards, no speedtraps, no traffic lights. There is only the challenge to my imagination and to my common sense.

I must finish now. The ashes are glowing in the fireplace. Cindy has the coffee on, and I have marshmallows to toast. ★

(AIRFACTS Magazine)

FROM A CHIEF OF SAFETY

METRO van not chocked, not braked, engine running, unattended, pointed at and within ten feet of aircraft.

Speeding on flightline, around aircraft.

Driving between parked aircraft.

Powered AGE (internal combustion engines) positioned too close to aircraft.

Aircraft not chocked.

Night towing operation:
Rider on back of towing vehicle.
No wands in use.
No whistles.
Towing too fast.

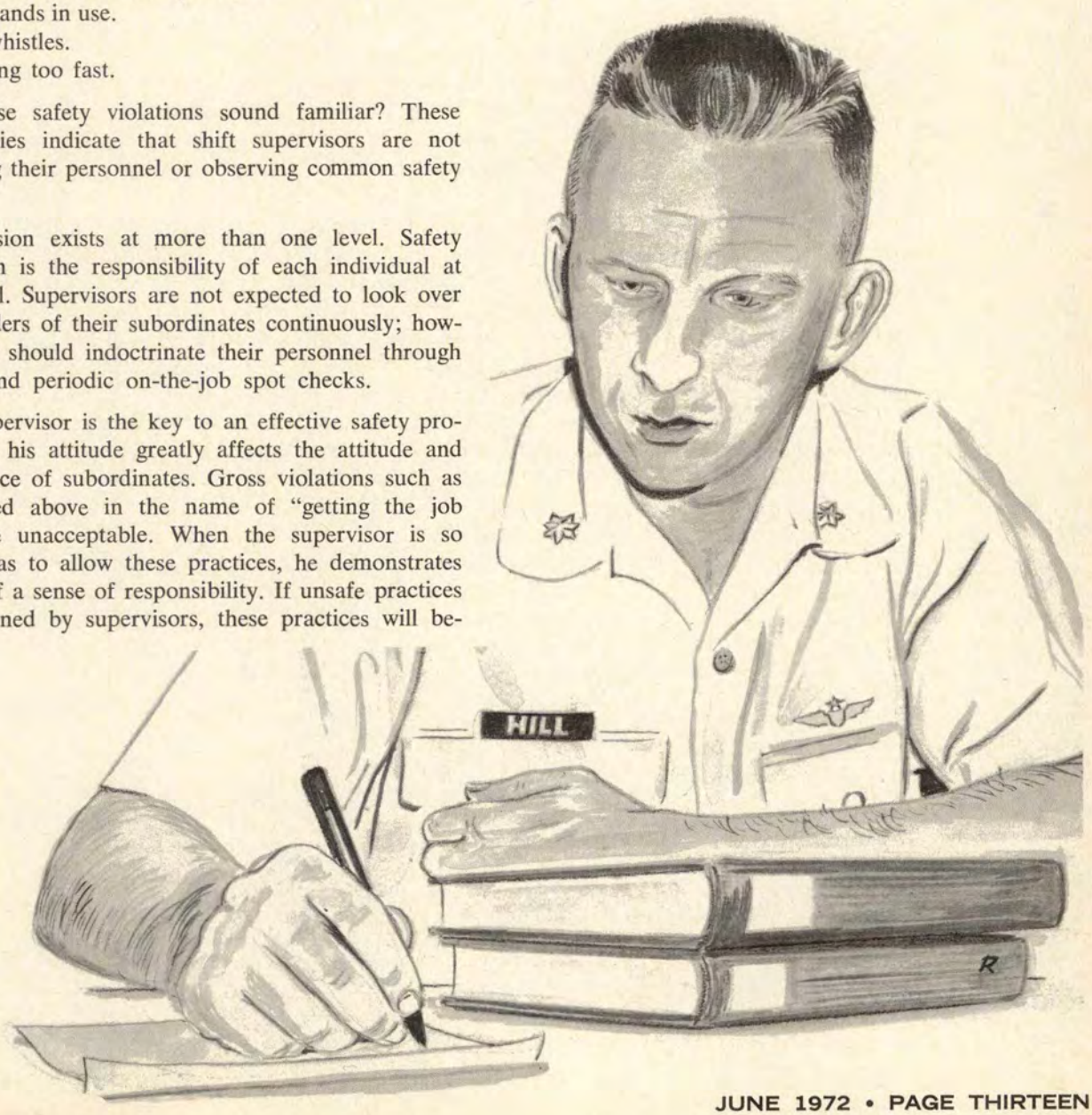
Do these safety violations sound familiar? These discrepancies indicate that shift supervisors are not controlling their personnel or observing common safety practices.

Supervision exists at more than one level. Safety supervision is the responsibility of each individual at every level. Supervisors are not expected to look over the shoulders of their subordinates continuously; however, they should indoctrinate their personnel through lectures and periodic on-the-job spot checks.

The supervisor is the key to an effective safety program and his attitude greatly affects the attitude and performance of subordinates. Gross violations such as those listed above in the name of "getting the job done" are unacceptable. When the supervisor is so negligent as to allow these practices, he demonstrates his lack of a sense of responsibility. If unsafe practices are condoned by supervisors, these practices will become the rule rather than the exception for the subordinates.

Supervisors must enforce good safety practices and must make a concerted effort to correct unsafe acts when they are observed. In the future, it will be the policy of my staff to annotate on the appropriate form any supervisory involvement in noted safety deficiencies. This practice is designed to educate supervisors in their responsibilities toward their personnel.

ED. NOTE: *Some findings from an active safety officer.* ★



RAMP ACCIDENTS

a pressure play

In the early days, if a mishap occurred during the ground movement or aircraft, it was seldom a big thing. The squadron airframe specialist spent a few hours with dope and linen, and the bird was as good as new.

Those days are gone forever!

The accident potential associated with ground movement of aircraft has increased tremendously. Some modern aircraft cost more, *per unit*, than the entire defense budget in olden days. Some modern aircraft contain enough fuel to have run an old-time squadron through an extended campaign. Many modern aircraft are frequently loaded with ordnance more volatile and destructive than our forebears dreamed of. And, with gross weights approaching the 400 ton mark, none of us can take ground movement for granted.

As a result, the movement of aircraft on the ground is covered by extensive and specific directives, which have been developed through years of experience. Because they are based on experience, they are sound, workable and so thorough that all we have to do to assure doing our job correctly is follow them.

In spite of this, deviations occur. We let the pressures of combat, quick turn-arounds or immediate launch lead us astray. When hard pressed for time, we use the pressure to justify shortcuts. We seem to feel that if we follow the directives, we waste valuable time.

We are wrong.

Consider the crew chief whose F-4 had just taxied in. The bird had to be turned around and backed into the revetment. The crew chief *knew* he didn't have enough help to do it safely, but since it was a quick turnaround, he went ahead and moved it. As the aircraft turned, the slab struck a power unit. *This aircraft missed several sorties because the crew chief deviated from established procedures to save a little time.*

Another case involved a B-52, which taxied in after a mission and was spotted in front of revetment one. The intention was to back it into revetment two. The B-52 in revetment one started its engines, preparing to launch, and the tow equipment hadn't arrived. The first bird had to be moved ASAP!

The pressure caused the crew to throw their judgment away. Every single man involved knew the correct procedures, but the strain of the moment won over.

Since the taxiway was sloped, they decided to free-roll the bomber backwards to clear revetment one. One man got on the brakes, the chocks were pulled, and the aircraft was allowed to roll back about ten feet before it was stopped. That wasn't enough, so brakes were released and the bird rolled back another ten feet—and was stopped. The launching B-52 still couldn't get out, so brakes were released a third time, the plane rolled back—but this time it didn't stop, because the accumulator pressure had been depleted!

As the airplane gained speed, one of the ground crewmen threw a chock in the path of the left forward truck. The chock didn't stop the airplane, but did deflect the front trucks, steering the airplane down a steeper incline and into a third B-52.

Estimated manhours to repair: 12,000.

Let's look at the pattern:

- Pressure is on.
- The ground crew takes a shortcut—even though they know better.
- The result is exactly the opposite of what they were trying to achieve.

Why is it that, while there is never enough time to do it right, there's plenty of time to pick up the pieces and start all over?

DO IT RIGHT THE FIRST TIME! ★

REX RILEY'S CROSS COUNTRY NOTES

876-2633 AUTOVON

Critical: Here is a rather critical item that all transient types should be familiar with. As you know, LOGAIR birds do a lot of hauling for Uncle Sam and much of it is in the Lockheed Electra. Just recently I found out that cranking this bird is a lot different from most airplanes. Here's a quote that will help explain two problem areas. One is associated with high pressure air, the other with a potential electrical shock.

"Let me tell you about the Lockheed Electra; it requires high-pressure air from an air start unit to start the Nr 4 engine. If certain valves in the system should stick, it could cause one or more of the engines to start without the pilot's knowledge or control—a most dangerous situation—so the air start unit should never be plugged in and turned on without a signal from the pilot. Unfortunately this happens all the time—alert personnel turn it on whenever they feel like it, not realizing the hazard.

"On each Electra there is a power receptacle on the right side of the nose which contains an amber light to indicate that the aircraft is receiving power from the ground unit; printed directly above it in large red letters is the warning:

DANGER: UNDER NO CIRCUMSTANCES MUST THE EXTERNAL POWER PLUG BE REMOVED WHILE THE AMBER LIGHT IS ILLUMINATED. FAILURE TO COMPLY COULD BE LETHAL.

"So when you pull the plug without a signal—scary."

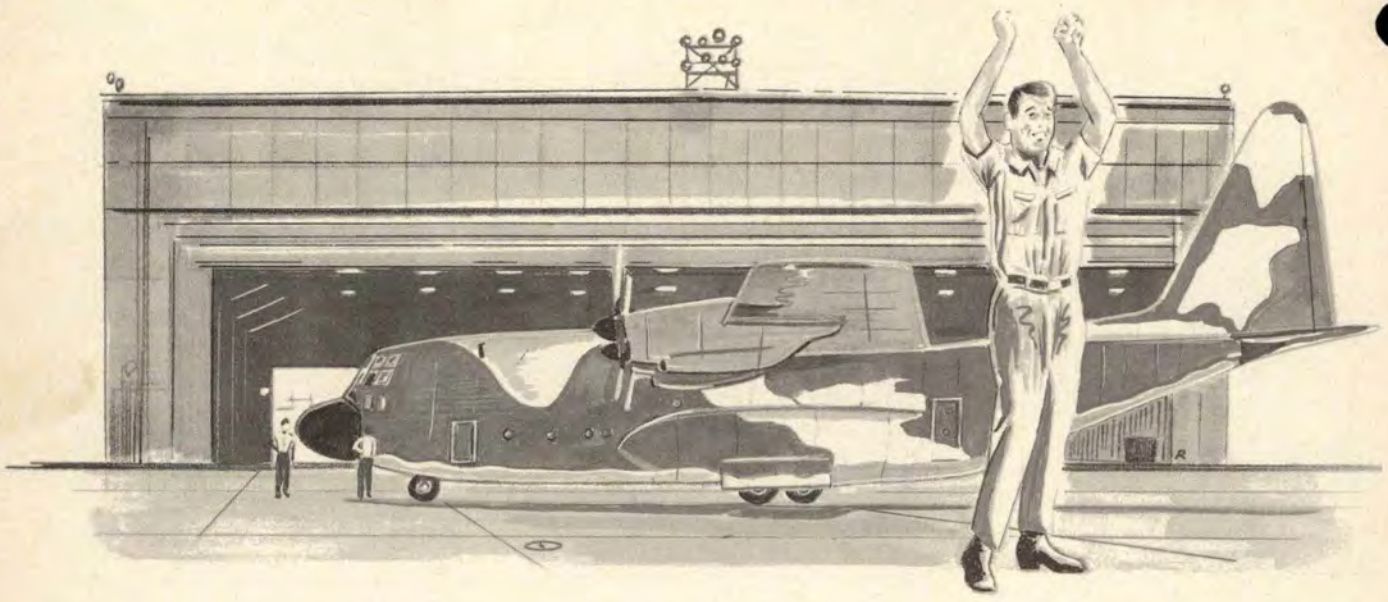
We have already wrapped an airhose around the prop and if everybody doesn't get this word, we're going to have somebody's hair parted with one of those paddles.

Surprises, or as the cool cats say "unplanned events" are something that we could well do without in the cockpit. Some of these surprises come in the form of unusual clearances. I'm well aware that some situations dictate complicated departures but when you have your handy-dandy SID right in front of you and you are directed to proceed to a fix that almost nobody has heard of, it tends to get your flight off to somewhat of a bad start. In some cases its very possible that a fighter could be given directions to a low altitude fix that isn't depicted on the charts he has. If that happens, at the very least he is going to have a delay and a cluttered frequency, while the tower has to go through the complete explanation of how to fly this new departure. There is usually a way around this type of thing. To insure that surprises such as these are kept to a minimum, the guy from Ops must get together with the people who are responsible for clearances and iron out the problem. It just may be that Center doesn't know a problem exists.

Patches: We recently forwarded a suggestion from one of our transient types who suggested that we design a patch to be worn by those transient sections that have been selected for the Rex award. We thought it was a good idea. If it is approved you should see it in the field before too long. ★

THE REX RILEY *Transient Services Award*

LORING AFB	Limestone, Me.
McCLELLAN AFB	Sacramento, Calif.
MAXWELL AFB	Montgomery, Ala.
HAMILTON AFB	Ignacio, Calif.
SCOTT AFB	Belleville, Ill.
RAMEY AFB	Puerto Rico
McCHORD AFB	Tacoma, Wash.
MYRTLE BEACH AFB	Myrtle Beach, S.C.
EGLIN AFB	Valparaiso, Fla.
FORBES AFB	Topeka, Kans.
MATHER AFB	Sacramento, Calif.
LAJES FIELD	Azores
SHEPPARD AFB	Wichita Falls, Tex.
MARCH AFB	Riverside, Calif.
GRISSOM AFB	Peru, Ind.
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, Col
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, Calif.
BARKSDALE AFB	Shreveport, La.
KIRTLAND AFB	Albuquerque, N.M.
BUCKLEY ANG BASE	Aurora, Colo.
RICHARDS-GEBAUR AFB	Grandview, Mo.
RAF MILDENHALL	U.K.



Many aircrew members and receiving organizations have been known to register anything from silent disappointment to utter disgust toward Air Force Logistics Command (AFLC), the Air Materiel Area (AMA) or the contracting facility when aircraft are picked up or received from Inspection and Repair as Necessary (IRAN). So, an education program for many Air Force people outside of AFLC (and maybe some within) may, at least, smooth relations.

Times have changed. Perhaps the term IRAN is long outdated and should no longer be used. Too many people still expect that IRANing an aircraft will, or should, result in everything being inspected and repaired so that a perfect, 100 percent operational bird is picked up or comes back. It would be nice, but "tain't so!" Popularizing or officializing a term such as IRAP, Inspection and Repair as *Programmed,* would probably be in the best interest of the system and everybody involved.

The following dissertation on the subject recently came to my attention. I think it should be publicized world-wide so everyone knows "the name of the game." The author is unknown, but he deserves credit for getting the words on paper.

The aircraft rolls to a stop, back from 10 weeks at a modification site. The folks bear down on the scene.

After the greeting, a barrage of comments, some inquisitive and some unprintable, rises from the group of wrench-benders. On the surface they all appear to be justified.

"We sent that aircraft to the depot to be refurbished, but it looks like it's aged a thousand hours," roars the boss of maintenance. "We've been had. Hardly anything has been restored to a new-like condition. They didn't even paint this crummy floor."

The fact that there were a few new modifications halfway simmers him down, then the crew chief reports 58 open discrepancies in the aircraft forms; new and quite detailed.

This really glues the chief to the ceiling. He feels the whole depot system is badly bent out of shape. The last few aircraft returned from the mod site looked worse to him than some of the war machines he had ferried to the pickling bases.

At this point, let us invite the cussed and the discussed to shake hands, regroup, and examine a few hard facts. Granted, we would all like to be the recipients of "new" aircraft out of the mod barns, BUT, even though the game is the same, the rules have changed.

Some of the changes have come from the Department of Defense; others from major command and depot system management. All of them have been prompted by the ever-present trend to squeeze from the defense dollar one dollar of defense.

Maintenance at a mod site, be it Air Force depot or contract facility, has been tailored to the installation of a maximum amount of mission-oriented hardware in a given amount of time. If not understood, the result of this concept can be earth-shattering. Here are the cold, hard facts:

There have always been two types of weapon systems input to a mod site. First is the bird in which neither the ferry crew nor the receiving inspectors report any critical

IRAN versus IRAP

GEORGE E. KAMMERER, SMAMA, McClellan AFB, California

problem areas. Discrepant items are minor, systems are serviceable.

The second type is the machine that may arrive with a variety of power plants burning, as well as churning, on final approach. The receiving inspection quickly determines that it has been carefully "prepared" for the depot maintenance cycle. Equipment racks are full of inoperative and/or obsolete black boxes. White elephant hardware has been modified to "fit" for the ferry flight. Big red tags are hanging from system switches, and the flight report reads like a Mil Spec requirement, or else it candidly goes like "one-time flight O.K."

In earlier times the IRAN program would receive both types and crank them out at the other end as serviceable all along the line. Not so today. The IRAN concept was simply too costly in time and funds when applied to massive, sophisticated weapon systems. It has been replaced by a concept of clearly defined modification programs. Lacking a handle, let's call it IRAP—Inspection and Repair as Programmed.

Common aspects of these programs are: (1) They have been initially programmed to accommodate a known work package; (2) Items over and above the work package will be corrected only when considered safety of flight items or are necessary for a one-time flight home; (3) "Gold Plating" on design of new systems has given way to a concept of systems "active value"; (4) Wherever and whenever possible, field maintenance will be kept in the field; (5) Greater emphasis on system serviceability, not necessarily "like new"; (6) Competition among the mod sites to do the best job in the least time and at the most economical price.

What does this mean to the user? What condition will a weapon system really be in when received from a mod site? Assume that an aircraft is turned into a depot for an engine and autopilot modification. The depot will examine and classify all recorded discrepancies. Those related to safety of flight, plus those associated with the modification work package (engine and autopilot in this case), will be worked on and checked for serviceability both in flight and on the ground.

All other discrepancies, except those affecting the minimum requirements for the one-time return flight, will *not* be corrected. Inoperative or obsolete black boxes will go back the same way they came in. Ditto for homemade hardware. Test flights will be made only to determine serviceability of the modified or newly installed systems. An O.K. flight will mean only those systems were air checked and found to be serviceable.

This is today's "minimum maintenance" concept, and a crystal-clear understanding of the whole picture is mandatory for all maintenance troops, supervisors, aircrews, and commanders. It should also be noted that for a base to get back the same tail number from a mod site "ain't necessarily so." The using command aircraft distribution officer may, and often does, redistribute his aircraft to meet his operational requirements.

IRAP has proved successful in saving a lot of our hard-earned tax dollars. It will be even more successful when all of us, airborne, or groundborne, functional or logistical, get behind it and push. ★

Ops topics

BUCKLE HUP!

Two passengers were seriously injured recently when the C-130 in which they were riding encountered clear air turbulence in an area of thunderstorm activity. One passenger was asleep when the pilot directed "fasten seat belts," and never got his fastened. The other passenger said he had his belt secured, but there was no sign of belt failure and, when asked to demonstrate the fastening of the belt, the passenger was confused about its operation.

Without trying to cast blame on anyone, perhaps there are some things we can do to improve passenger safety.

• The initial passenger briefing should include instruction on how to fasten the belts and advice to keep the belt fastened at all times, when seated, regardless of whether the "fasten seat belt" sign is on or off.

• Loadmasters should examine each passenger to make certain the belt is fastened once the light comes on, or at the pilot's command.

NOTE

(CHINA, BURMA, INDIA)
HUMP PILOTS ASSN.
27TH ANNUAL REUNION
RIVIERA HOTEL &
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PALM SPRINGS, CALIFORNIA
AUGUST 17, 18, 19, 20, 1972
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T-29 FUEL STARVATION

The T-29 pilot set up a long final, established a wing-down, no-crab configuration about three miles out, and drove in toward the runway. Crosswind component exceeded 20 knots from the right. Power was set at 2800 rpm with about 30 inches MAP on Nr 1 and 40-45 inches MAP on Nr 2. On short final, Nr 2 engine quit running from fuel starvation, even though there were 900 pounds of fuel in the right tank.

Thorough checks of the engine and the fuel system disclosed no defects, so the organization decided to perform some tests under controlled conditions at altitude. Two T-29 aircraft were used for the tests, and both flights confirmed that engine failure will occur during a wing-low, cross-control configuration with a fuel load of 900 pounds in low wing tanks!

On the first test, with 20 degrees of bank and a combination of differential power and top rudder to maintain heading, the low engine quit after approximately one minute. Fuel load was 900 pounds per wing.

On the second aircraft tested, four combinations of cross-control were used. With 25 degrees of bank the engine quit after one minute—with ADI either off or on. Fuel in the low wing at completion of the fourth combination was 825 pounds.

Changes are in the mill to get the word out to everyone concerned. In the meantime, T-29 and C-131 operators should be aware that an extended cross control condition may result in an inadvertent single engine approach.

(NOTE: Interim Safety Supplements for T-29 and C-131 aircraft were transmitted on 22 March, and provide important information concerning the fuel systems and crosswind landing techniques. Refer to SAAMA message Nr 221966ZMar72.)

DING!

The C-130 pulled out of its parking spot and taxied along the yellow line between the rows of parked C-130s. After it had taxied approximately 500 feet down the taxiway centerline, the left wing tip collided with the trailing edge of the tailcone of another C-130. The flight engineer informed the IP of the collision, and the IP stopped the aircraft and shut down all engines.

How could that happen? Let's take a look, but first let's get some numbers in mind. The parking area was designed for C-130s. Wingtip clearance between properly parked aircraft is 20 feet. C-130s taxiing between rows are provided wingtip clearance of 26 feet. With those figures in mind, we can now analyze the *process* of a taxi mishap.

C-130 Nr 1 arrived late in the afternoon and was parked by transient alert. TA didn't do too sterling a job, and the bird was parked 14 feet aft and 12 feet left of its proper spot.

C-130 Nr 2, which had previously been assigned the spot to the left of C-130 Nr 1, had been out flying. It got back after dark and taxied in to park. Since Nr 2 wasn't considered a transient (having arrived previously and assigned a parking spot), TA assistance wasn't provided. The airplane was parked using the flight engineer as marshaller and the loadmasters as wingwalkers.

Nr 2's pilot couldn't see the guideline or nosewheel spot because of light reflecting on the wet ramp, and he misaligned the aircraft five feet to the right of the guideline. The flight engineer stopped him when it became obvious that inadequate wingtip clearance was available between the two aircraft. The pilot called ALCE and advised that he was unable to taxi all the way into the parking spot. ALCE instructed him to shut down in place, and advised that they would check the aircraft later. Nr 2's position was 5 feet right and 26 feet aft of its parking spot.

The basic ingredients are all in the pot. That 26-foot clearance provided by the yellow taxi line is all used up.

Fourteen hours later, in broad daylight, C-130 Nr 3 pulled out of its parking spot and headed for its unplanned meeting with C-130 Nr 2.

The IP on Nr 3 bought the mishap, of course. But he had a lot of help.

That kind of help we don't need.

FLIP CHANGES

Some transponders are equipped with a Mode C automatic altitude reporting capability. This system converts aircraft altitude in one hundred foot increments to coded digital information which is transmitted together with Mode C framing pulses to the interrogating radar facility. Aircraft equipped with transponders that have altitude reporting capability will activate this Mode in areas under FAA jurisdiction, unless otherwise directed by ATC or unless equipment error has been reported to be in excess of 125 feet.

PREVENTABLE FOD

On postflight inspection, the F-4's left engine was found to have incurred foreign object damage. Investigation disclosed that the damage to the engine had been caused by a bolt from a DART tailcone assembly. Markings on the damaged engine matched up with the suspect bolt.

As it turned out, about 20 minutes before the incident aircraft took off, a tow aircraft had inadvertently dragged a DART on takeoff. But here's the kicker: The RSO saw the DART being dragged—but didn't bother to request a runway inspection.

Estimated manhours to repair—600. Estimated cost —$20,000.

BIRDPROOF?

A T-38 recently came away a poor first in an altercation with a Franklin's Gull. Max gross on the bird is one and a quarter pounds, but it knocked a five-by-seven inch triangle out of the birdproof windscreen.

An EUMR has been submitted on the windscreen.

Keep those visors down, folks!

TAIL ROTOR BLUES

Partial control failure is an emergency anytime. It's a pleasure to report on how analysis and careful planning, coupled with pilot skill, resolved one emergency.

The UH-1P had just leveled off. As climb power was reduced to cruise power, a left yaw developed, and the pilot discovered that the aircraft didn't respond to rotor pedal movement. The rotor pedals could be moved full travel in either direction without corresponding change in the aircraft direction. Any reduction in power aggravated the left yaw condition. For this reason, the pilot chose to make a left-hand pattern to landing. The landing site selected was into the wind on a grassy area.

After analyzing control response and severity of yaw at various power/airspeed combinations, the pilot decided to try a slide-on landing at a power setting/airspeed which would minimize the yaw.

He first tried a normal approach at 50 knots, but the yaw which developed when he reduced power to descend from normal pattern altitude was excessive. It didn't look right, so he took it around!

On the second approach, the pilot lost most of his altitude in the turn to final, and rolled out on a long, flat approach which required higher than normal power —and which minimized the left yaw. The power required for a 30 knot approach held the glide path and permitted straight flight.

The pilot maintained his power setting, held 30 knots airspeed, and flew the helicopter to the ground using a combination of brief forward cyclic control movements and short movements of the collective control. At touchdown, he firmly lowered the collective and the helicopter slid to a stop.

Landing slide, about 20 feet. No damage. No injuries. Nice job!

HAIRCUT-ARMY STYLE

The C-130 crew had loaded paratroopers and was starting engines. Nr 3 and Nr 4 engines had been started and were on speed.

Just as the loadmaster cleared Nr 2, one of the paratroopers jumped out of the forward entrance door and ran through the Nr 2 prop arc to the rear of the aircraft, where he re-entered through the paratroop door. The loadmaster yelled "Stop! Hold it!" and the pilot pulled the start button out and pulled the condition lever to ground stop before the prop started turning.

Only a couple of seconds separated this incident from a fatal accident. The paratrooper could just as easily have popped out a few seconds later, when the Nr 2 engine would have been on speed.

The unit involved has developed a procedure of positioning a crewmember so as to prevent anyone exiting the aircraft without clearance. Unit crews have been told to emphasize in their briefings that passengers must remain seated until cleared to exit the aircraft.

This problem has been with us for years and it seems that people would finally learn. But they don't! So it's up to units and crews to protect personnel like this paratrooper from themselves.

ETERNAL OPTIMIST AWARD-1972

The most promising candidate for ASM's Eternal Optimist Award thus far for 1972 is the Flying Safety Officer who, in his initial message concerning an aircraft which was ditched offshore, classed the damage as "minor . . . pending recovery of aircraft." ★

Dear Worried

Worried is an excellent word to describe your concern about the situation. It would appear that supervision is lacking in your unit. When a hazardous situation such as you have mentioned exists and the supervisors appear not to notice, something is dead wrong.

Riding a bicycle in the dark without lights and reflectors is a mighty dangerous act at any time, but to have this situation on a busy flightline is unthinkable. Bicycles are a definite advantage in any organization, but policies should be established to insure their safe operation, and these policies should be strictly enforced by all supervisors.

I talked with the OPR for AFM 127-101 about your letter. They were equally concerned about this unsafe condition. Also during recent Unit Effectiveness Inspections there have been several observations of the same unsafe operations.

Pending revision of Chapter 8-2P of AFM 127-101, a letter (SEOG, 8 Apr 72) was sent out to all commands requiring the use of headlights and reflectorized paint or tape on all bicycles, Air Force or privately owned, which are operated on the flightline. By the time you read this, the letter should already be in the hands of your safety officer, and corrective actions should have been taken.

One further word of advice to all my troops out there, a quick way to bring attention to a hazardous condition is to use AF Form 457 (USAF Hazard Report). AFM 127-6 tells you how.

Toots

D- , TOOTS

My question is in regard to the proper method of storing technical orders within a work center when more than one copy of the publication is required during daily operation. Is it permissible to store two copies of the same publication side by side in the shop file? Or is it necessary to establish an additional file for the extra copy?

In the unit I just left we had our standard publications (8¼ x 10¼) filed in a separate (extra copy) file in accordance with paragraph 6-24 of TO 00-5-1. Our work cards and 06 manuals were filed with all copies side by side in the same file (paragraph 6-37 and 6-53, TO 00-5-1).

What is the correct way to maintain the file?

TSgt Jay A. Peat
Kirtland AFB, New Mexico

Dear Jay

The correct way to maintain your file is to establish an extra copy file independent of your original file. TO 00-5-1, paragraphs 6-24 through 6-26, is your reference.

Remember that this extra copy file must be correctly maintained and is subject to the same inspection criteria as your original file; however, the extra copy file need not be kept in the standard binders.

Toots

Dear TOOTS

How do we properly ground a fuel bowser (or drainage drum) when draining fuel from our B-52Gs? The local Quality Control contends, citing TO 00-25-172, paragraph 4-26g(1) (g) (Caution), that a common ground must be used. Other references in the same TO, plus TO 1B-52G-2-2 and TO 00-25-212, indicate the fuel bowser be grounded to approved ground and to the aircraft. Nothing about the aircraft and bowser being grounded to the same (common) static ground.

Capt John J. Weber, Jr
Mather AFB, California

Dear John

My recommendation is that the fuel bowser be connected to the common ground. I understand from the officials here that under certain conditions, the B-52 uses two grounds, and under other conditions only one. In the case of two grounds, you could use either one as long as you maintain the common ground triangle.

Toots

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.

TECH TOPICS

Briefs for Maintenance Techs

34 QTS OF OIL

Thirty-four quarts of engine oil —that's what it took to service engines Nr 1 and 2 after 1.3 hours of flight on a KC-135.

The aircraft was 25 minutes into the flight when Nr 2 oil pressure started fluctuating, accompanied by a low oil pressure warning light. The engine was shut down and a three engine return to base accomplished.

During postflight inspection Nr 2 engine was serviced with 22 quarts of oil and Nr 1 with 12 quarts. Both engines were ops checked with no leaks found. Breather pressure was checked and found to be within limits (1.7 inches).

Prior to this flight, Nr 1 and 2 engine oil coolers were removed to correct minor write-ups. Apparently the engines were not reserviced following this maintenance.

COMMANDERS: *Proper aircraft forms management would have prevented this incident.*

FOD WEARS MANY FACES

Foreign objects come in all sizes and shapes and they turn up just about anywhere one could imagine. Here's one that showed up in an air conditioning duct in the form of a rubber seal. There's no telling how long this little object would have remained hidden had the temperature control unit not failed.

The B-57 was on GCA downwind when the navigator removed his oxygen mask to wipe his face and reported a strong, burning rubber smell. It was also discovered that the auto temp control unit had failed. The rubber seal had been dropped in the duct by an unknown person at an unknown time. The overheated duct melted the seal, producing the odor.

This should be a reminder to all maintenance personnel that FOD is not limited to engines and hard objects such as tools, nuts and bolts. A positive way to prevent such incidents would be to know what materials—tools, etc. —are on hand during the job. Know what were used and make sure that both what were used and unused are accounted for when the job is completed.

WHERE'S THE SUPERVISOR?

One evening not long ago, when an airman drove a Metro van on the flightline, he had four things going against him. He didn't have a government vehicle operator's permit, lacked training in flightline operations, exceeded the speed limit, and failed to allow adequate clearance between his van and a parked F-4. As a result, he totaled the Metro and caused $943 damage to the F-4. In addition to receiving a letter of reprimand, the airman will most likely be required to pay for the vehicle. The question: What kind of supervision set up this senseless accident?

(USAFE AIRSCOOP)

NEAR DISASTER

Deviation from procedures or, perhaps, lack of a clear understanding of the established procedures, coupled with one supervisor overlooking a critical item during inspection, led to an engine bay fire on takeoff roll. Only quick action by the aircrew saved this F-4 from major damage and possibly total destruction.

A test cell run was completed on an engine. The test cell supervisor, thinking the engine would be scheduled back through the shop for quality assurance inspection, failed to assure that all components disturbed during test cell operation were restored to their original condition.

Due to a shortage of engines this one was delivered directly to the aircraft from the test cell. An engine conditioning supervisor performed the pre-installation inspection, but failed to detect the unsafetied A/B primary core fuel line cap. The engine was installed, trim run completed, and the aircraft released for flight. Three sorties later, after approximately three to five seconds of afterburner operation during takeoff roll, the right fire light came on. An abort was initiated, but the fire light remained on so the engine was shut down. As the F-4 turned off the runway, the crew saw smoke coming from the right engine, so the left engine was shut down and the aircraft evacuated.

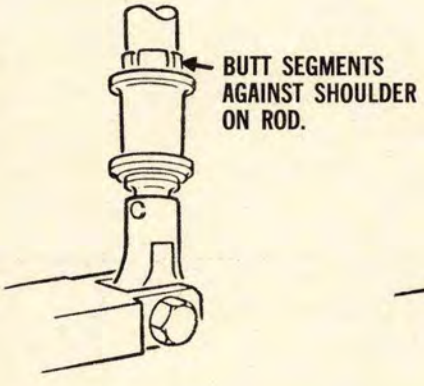
The unsafetied primary core fuel line cap that the engine conditioning supervisor did not detect vibrated off, allowing fuel to spray into the engine bay during A/B operation.

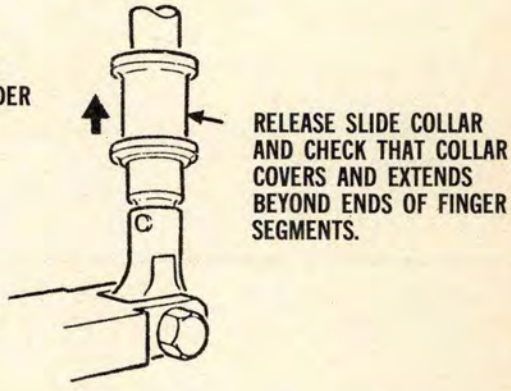
T-38 THROTTLE LINKAGE

During recovery from a traffic pattern stall at 17,000 feet, the right engine RPM remained at 95 percent regardless of throttle position. The aircraft returned to base and the engine was shut down at touchdown with the fuel shut-off switch.

Investigation found the throttle quick disconnect disconnected. This engine had been installed 27 hours prior and no further maintenance had been performed before this incident. Following a thorough inspection, the quick disconnect was found serviceable. Apparently it had not been completely locked during engine installation.

When connecting the throttle quick disconnect linkage, extreme caution should be exercised to make sure that the slide collar extends beyond the ends of finger segments.





WHO CLEARED THE RED CROSS?

RB-57, flight level 2500 feet, 140 knots, 40 degrees left bank. The pilot applied stabilizer trim but got no response. The wings were leveled, but the aircraft remained in a slight nose low attitude. The pilot could not pull the control column back with normal force. After using maximum force in addition to trim attempts, a loud snap was heard from the rear of the aircraft and normal control was possible. The aircraft was returned to base without further problems.

The lower left stabilizer actuator bushing was missing, which allowed the actuator to shift to the left and bind with the aircraft structure.

It could not be determined when this actuator was last installed. It is believed that the aircraft was delivered to the unit minus the bushing.

When the actuator was installed is beside the point. **Who cleared the red cross** is the critical question. Did the inspector just sign the "inspected by" block? Or did he check the installation but fail to notice the missing bushing? In either case the result was the same: a flight control deficiency that could have ended in disaster.

TECH TOPICS

TROUBLE-SHOT!

Sgt Doe was dispatched to troubleshoot the egress battery test lamp on an A-1H. After checking the aircraft forms, he proceeded to check the system and discovered that the hot wire from the jettison battery was broken and hanging by a few strands at the test switch terminal. Sgt Doe disconnected the wire from the switch and installed a new terminal end on the wire. At this time the left canopy thruster fired.

Cause: Failure to follow tech data. TO 1A-1H-2, paragraph 2-181, requires that the cannon plug connecting the two thrusters be disconnected. Failure to disconnect the cannon plug put Sgt Doe in a position of working on a hot system. When he accidentally touched the hot wire to the terminals of the switch, the circuit was completed and the system fired as designed.

Perhaps the maintenance man was trying to save time. Or was it just plain negligence? Following tech data during all maintenance will prove to be the best time saver.

FUEL CONTROL RIGGING

A T-37 right engine flamed out during spin recovery at 20,000 feet and airspeed at or below 50 knots. A successful airstart was obtained at 18,000 feet followed by a successful recovery at home base.

Cause: The right fuel control protractor pointer was found set on two degrees instead of the required 12-14 degrees. This low protractor setting caused the engine to flame out at altitude when the throttle was placed in the idle position.

This unit has initiated a training program to include a step-by-step procedure for correct throttle and fuel control rigging.

How is the training program in your unit? Could your maintenance personnel and safety be improved with this type program?

ENGINE CONTROL LINKAGE

We can't seem to get away from incidents involving disconnected engine control linkages. It appears that the technicians are dropping the ball after adjustments are made and the operational checks are complete. Frequently they either fail to retorque the connecting bolts or fail to install the cotter pin.

Here are a few examples:

- B-52—Nr 8 engine went to 70 percent during cruise. Throttle movement had no effect. The power control rod had not been safetied, allowing the linkage to disconnect in flight.
- RF-4C—At level-off when throttles were retarded, the right engine RPM remained at 100 percent. Neither front nor rear throttle had any effect on the RPM. The throttle crossover shaft was found disconnected from the torque booster clevis shaft. It was the fourth sortie since maintenance was performed in this area.
- Another B-52—One plus fifteen into the flight, Nr 8 engine flamed out; restart attempts were unsuccessful. The throttle linkage was found disconnected. The linkage jam nut had not been properly torqued during engine installation.

A thorough supervisory inspection prior to closing the engine door (cowling) would have prevented these incidents. Confidence in your troops that did the job is fine, but you supervisors also owe these troops support by insuring that the job was completed to the last detail. This is accomplished by performing a careful inspection before signing the forms.

UNDER PRESSURE

A KC-135 was launching during a no-notice ORI when a hangfire occurred on Nr 4 engine. The crew chief, who was on the ground headset, directed that a pneumatic cart be connected and the pilot was cleared for a second start attempt. The engine started but the starter was damaged from excessive energy from both sources (cartridged and pneumatic air).

The ORI commitment was completed but the starter had to be changed. This was one of those cases where maintenance allowed the pressure which goes along with increased operational commitments to lead them away from established procedures.

TO 1C-135(K)A-2-4, para 8-17 through 8-36. has several warning notes against engine start attempts following hangfire or misfire. It also warns against removing malfunctioned cartridges for a period of five minutes following these mishaps.

Also SACM 178-1, para 11-5, states that if a start cartridge malfunctions during engine start, maintenance will wait five minutes, then remove the cartridge before starting the engine with bleed/external air.

It was not reported as to what the pilot directed the ground crew to do after the hangfire, but he cannot be completely absolved. The flight manual also warns against handling hangfired cartridges until at least five minutes have elapsed.

Follow the TO, observe the warning notes. This is the only professional way.

A FEW THINGS MISSING

The following episode would have furnished rich material for the Keystone Cops—except it was not a bit funny.

An F-4 had been on alert for a short period when the word was received to increase the load. The load crew arrived at the aircraft to find the aircraft armed (all safety devices removed) for immediate launch. An aircraft crew chief was requested to install the safety pins.

The load team proceeded to prepare the weapons for upload. After about 10 minutes, when the aircraft crew chief had not shown up, the load crew decided to go ahead and started to dearm the aircraft by removing the jettison cartridges from the outboard MERs. The load crew stopped again briefly to await the aircraft crew chief; however, after a few minutes, they decided to go ahead without him. They started to load the two inboard MERs without completing the dearming. (Ed. Note: This crew was not using any type checklist.)

The outboard pylon cartridges and safety pins were installed, the inboard pylons were safety pinned but had no cartridges installed, the Aero 27 and two aft Aero 7A racks had cartridges installed but not safety pinned, no egress safety pins were installed. The armament placard read HOT and there was no entry made in the 781-A.

The Nr 2 man climbed in the cockpit to functionally check the system. The master arm switch was positioned to arm, the left inboard station was selected, and power was applied to the aircraft. The man then depressed the armament override button. He is unsure just what he did next, but the centerline tank and two AIM-7 missiles jettisoned to the ramp, and the outboard MAU-12 racks fired.

We could list a dozen deficiencies in this operation, but will mention only two: supervision and use of tech data. This crew lacked both.

PLANNED ACCIDENT

An apprentice aircraft maintenance technician failed his proficiency test as a tow team member, but training control never sent word of this failure to his unit. His supervisor violated a local MOI by not bothering to check the airman's training records and test results. These mistakes were the building blocks for an almost inevitable accident.

The young airman was acting as the brakeman in an F-4 being towed by a tug. The NCO who was acting as the tow team supervisor was not carrying out his duty as nose walker but was instead riding on the tug. When the driver made a sharp left turn, the rear of the tug skidded to the right and the tow bar broke at the shear point. The brakeman pulled the emergency brake handle but made no attempt to apply the brakes, and the aircraft struck the tug. The aircraft boarding ladder was broken, the nose of the left external tank was dented, and the G & C unit of an AIM-7 was damaged. Each man on the towing team contributed to this accident, but another person was responsible also—the man in training control who mishandled the paperwork. ★

(USAFE AIRSCOOP)

a case for fuel tank inerting

T. O. REED, ASD, Wright-Patterson AFB, Ohio

Nothing can disrupt a flight plan quicker than a fuel tank explosion. The vulnerability of fuel tanks to accidental ignition has been a nagging aeronautical safety problem ever since Wilbur and Orville poured their first gallon of octane at Kitty Hawk.

On the surface, the problem seems to be a paradox: How can you keep a highly combustible fuel from igniting and still have a highly combustible fuel?

The answer is a concept called "fuel tank inerting." It has allowed us to develop fuel tanks that are explosion-proof.

One of the most effective inerting methods found to date involves packing fuel tanks with open-pore polyurethane foam. The foam arrests flame propagation, whether it be from a bullet puncture, lightning or any other ignition source.

THERE IS AT LEAST ONE incident on record that proves the reliability of foam inerting: It happened on the ground during a thunderstorm at Pope AFB, South Carolina, in June 1970. There was a loud clap of thunder outside one of the hangars. Ground crewmen turned in time to see a puff of smoke swirl from a wing vent of a C-130E parked on the flightline. The plane had just been refueled.

A quick inspection revealed that a three-foot section of grounding cable near the single point refueling adapter was burned. There was no doubt that the aircraft had been struck by lightning in the vicinity of the Nr 3 main tank fuel filler cap.

Normally, there would have been an explosion and fire, and the C-130 would have gone to the highest bidder in the scrap metal market. But this was no normal situation. The fuel tanks of this particular aircraft were packed with foam inerting material.

Inspection revealed no evidence of damage to the aircraft structure or accessory systems, so the aircraft remained operational until several months later, when the Nr 3 main fuel tank was opened during IRAN. Not until then was the seriousness of the lightning strike and the effectiveness of the foam fully appreciated.

It was discovered that lightning had entered the tank in the filler cap area with such energy that the fuel filler foam guard (screen) was partly disintegrated and an area of foam approximately three feet in diameter burned. The foam zapped the lightning!

COMPARE THIS incident to an accident in 1970, when an ignition source near a JP-4 vapor-filled tank opened for repair resulted in a series of fuel tank explosions that destroyed a test aircraft. Or compare it to the commercial airline flight that was struck by lightning over Elkton, Maryland, in 1963. Most likely lightning entered the fuel tank through the vent system and caused a mid-air explosion, resulting in the loss of the aircraft and many lives.

It is highly probable that fuel tank inerting would have prevented these accidents.

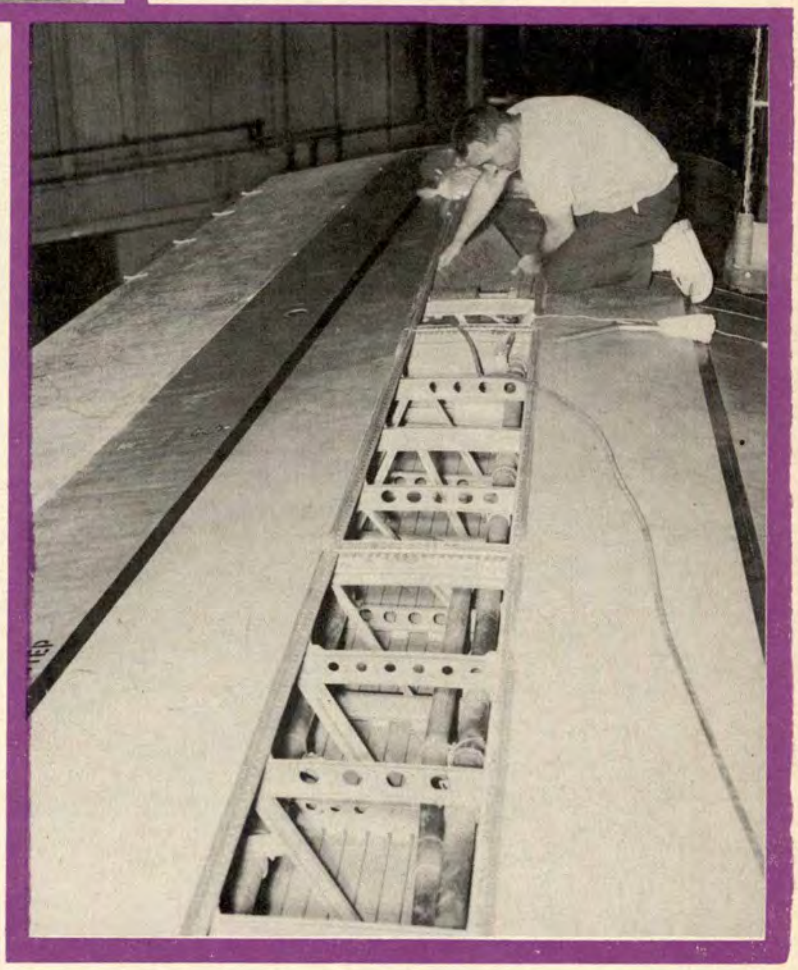
ANOTHER effective inerting method involves the use of nitrogen, which replaces air in the fuel tank. It requires the system to be recharged with nitrogen after each refueling. Experimental work also is being done with catalytic reactors and "sorbent bed" inerting techniques.

The technique of foam inerting was developed by ASD and the Aero Propulsion Laboratory at WPAFB in 1966 to protect aircraft from ground fire in the SEA environment. Installations have been completed in over 200 aircraft including C-130, AC-119, C-123,

Overview of burned foam in the area of the Nr 3 main tank filler cap and dual level control valves.

Side view of burned foam piece at fuel filler opening.

Typical foam installation into outboard fuel tank on C-130 aircraft.



C-47, F-105, A-7, OV-10, O-2, F-4, A-37 and others.

The principle by which the foam works relates to its small pore size (10 pores per inch) which acts as a flame arrestor and prevents flame propagation. The penalty incurred for this full time protection is quite nominal at four percent fuel loss, of which 2.5 percent is by displacement and 1.5 percent by retention of fuel. The net weight increase is about 0.06 lbs/gallon.

Efforts are under way to reduce this penalty through use of a lighter weight material (30 percent less than the present orange foam) and by voiding concepts (preplanned cut-outs in the foam) without sacrificing inerting characteristics.

As an example, voiding concepts have been proposed where up to 80 percent of the material can be removed from a fully packed configuration. However, these concepts will require a much finer pore size, such as 15 ppi, to prevent flame propagation between voids.

New materials currently being qualified include a nominal 15 ppi yellow foam for fully packed configurations, and a nominal 25 ppi red foam for voided systems. These materials are expected to be available for fuel tank use within the next few months under the present foam specification (MIL-B-83054).

It is conceivable that eventually the use of fuel tank inerting will be a standard requirement on all military and civilian aircraft for explosion and fire safety under all flight and ground maintenance conditions. ★

MAIL CALL

hazard reporting

Been reading your publication for about 25 years. Even way back when it was referred to as Flying Safety Magazine. I am sure you'll be pleased to know it took me 25 years to find something I don't quite agree with. Ain't no biggie but since I have been involved in processing Hazard Reports for some time, I do not understand a statement made in the February 1972 issue, "Management in Action—SHOW ME."

Well, I hope to show you. After 25 years in this bustling Air Force as an Air Traffic Controller my memory is not so good so I'll quote.

"HR (USAF HAZARD REPORT) Disinterest. Disinterest and poor administration degraded the HR program—only four HRs were submitted during the first four months of the year."

The article went on to say some good words about a successful HR program and who kills the program because of laziness, disinterest, or complacency. With all of those good strong words, I wonder how the most important point in the whole HR program was missed.

ARE WE JUST LOOKING FOR VOLUME?? DO WE JUST HAVE TO FILL A QUOTA?? OR are we looking for real hazards? Now, we old, broken-down, bleary-eyed controllers take this Hazard bit a mite serious. We are prone to get upset when a pilot (IN PURE VFR CONDITIONS) reports looking out of his cockpit, sees another airplane and acts as though his "solitude with God" has been violated—and we are at fault.

Again—VFR—SID DEPARTURE—DEVELOPED WITH IFR PROCEDURES IN MIND—TAKEOFF—Weather clear/15—max rate climb to one thousand—rack a tight VFR turn—get nose to nose with an F-104 on the break for downwind—again HR—ATC. Really??

I could go on for several pages citing supposedly HRs that are not HRs. But, once submitted, the whole gauntlet of the paper war must be traversed. Perhaps my command (AFCS) takes a little more interest in HRs concerning our service. After all, we who are in the towers see the whole airpatch, in the radars see tracks of flight within 40/60 miles; we are involved in some of the results of uncorrected hazardous situations—they are not pretty. So—we are concerned with HAZARDS, and safety of flight, and pilot comments, and air traffic control services, and proper NAVAID operation and user satisfaction. Otherside—we ain't interested in paperwork hazards that just satisfy numbers. With all due respect, Sir, I submit that four real hazards in four months, accomplishes a hellavah lot more than four real hazards hidden in the middle of a myriad. Since we are under MANAGEMENT, let us follow a basic principle, weed out the chaff, and spend our time on the real problems. Square filling is for squares. Limbo gets a lot of square fillers.

CMSgt EUEL J. CLOUD
Griffiss AFB, New York

Your point is well taken. However, in defense of the statement, four hazard reports in four months are not very many. You seem to be taking a narrow—but natural—view. Hazards are not confined to the air traffic situation; rather they are present in all areas, as evidenced by the incidents that occur daily. In our view, when a person detects what he considers to be a hazard he would be remiss not to report it. We doubt that very many people take the time and trouble to report hazards that do not seem real to them.

"Know Your Systems" Mar 72

In your March 1972 issue, you had an article entitled "Know Your Systems?" under Ops Topics.

The article was apparently about a C-130/A model since the hydraulic pressure (for brakes) came from Engine No. 2 and Engine No. 4. In this case, there is no aux pump to turn on since the "A-Model" uses an air turbine motor driven hydraulic pump for emergency pressure. The ATM is unusable while making a bleed air check.

The later models (C-130s) would not have utility pressure from No. 3 engine either, but, they have the aux pump and your procedure would apply.

Know Your Systems? I believe Murphy was present when the article was written.

Maj WALTER J. GODWIN
Andrews AFB, Maryland

Right you are! The author, project officer and a telephone call to an A-model unit all failed to detect the goof. As we said, Murphy is always *present. The emphasis should have been placed on procedures to prevent the aircraft from running into objects even with a brake malfunction. Designated run-up areas and proper use of chocks are alternatives worth considering.* ★

☆ U.S. GOVERNMENT PRINTING OFFICE 1972 789-129/10

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 PETER D. ROBINSON

Captain ANTHONY P. HART

432nd Tactical Reconnaissance Wing, APO San Francisco 96237

On 1 September 1971, Captain Robinson and Captain Hart flew as "Fast Forward Air Controllers" in and F-4D, on a combat mission in Southeast Asia. Their target was a well-defended enemy position, and weather conditions made it necessary for Captains Robinson and Hart to mark the target prior to each fighter pass, in order for the fighters to maintain visual contact.

On the third marking pass, Captain Robinson's aircraft was hit by ground fire, which severed the number two power control system, punctured the utility hydraulic system return line and severed the tail hook cable, allowing the tail hook to fall to the fully extended position.

Captain Robinson immediately climbed to a safe altitude and set course for the nearest recovery base. At this time, his only control over the aircraft came from the number one power control system, which operates the left aileron, left spoiler and horizontal stabilator, and from manual control of the rudder.

The return flight was marked by severe aircraft oscillations, which worsened as the airspeed was decreased to lower the gear with the emergency system. At speeds below 185 knots, control was extremely marginal. Captain Robinson completed his controllability check, fixing the minimum safe speed at 190 knots, and maneuvered the aircraft to a no-flap straight in approach. At 190 knots, almost full left aileron and left rudder deflection were needed to maintain wings level.

Oscillations intensified during the approach, but with Captain Hart assisting by holding in full left rudder, Captain Robinson brought the aircraft in and made a successful approach end barrier engagement.

The skill and resourcefulness displayed by Captain Robinson and Captain Hart, under extremely trying conditions, resulted in the successful recovery of a valuable aircraft. WELL DONE! ★

RADIO OUT- visual signals

DESCEND TO LOWER ALTITUDE: Hold hand at top of canopy, palm down, fingers extended and joined, move hand forward and down.

FUEL CHECK: Close fist with the thumb extended and perform drinking motion with thumb touching the oxygen mask.

FUEL REMAINING: Extend one finger for each 1000 lbs of fuel onboard. Extend finger(s) vertically for 1000-5000 lbs; horizontally for 6000-9000 lbs. After signaling 1000 lb increments, close fist and signal 100 lb increments in the same manner. To signal zero, form a circle with finger and thumb.

HEFOE SYSTEM: Clench fist and hold it at top of canopy, then hold up the required number of fingers to denote which system is involved (see a through e, following). The receiving pilot acknowledges the signal by repeating it. a. Hydraulic—one finger; b. Electrical—two fingers; c. Fuel—three fingers; d. Oxygen—four fingers; e. Engine—five fingers.

I MUST LAND ON YOUR WING: Pat shoulder, palm down; use right hand for left shoulder, and vice versa, to prevent confusion with other signals. Other pilot must give an OK signal; the basic signal indicates a jet approach speed of 130 knots. If higher approach speed is desired, raise one finger for each 10-knot increase.

LAND IMMEDIATELY: Close fist and hold it to the top of canopy, with thumb extended downward, then move arm up and down rapidly. (Do not confuse this signal with "GEAR DOWN" signal, which is not used at altitude.)

RADIO INOPERATIVE: Fly aircraft along the side of the landing runway, 1000 feet above the field elevation, rocking wings until it reaches end of the runway. Turn to downwind and check mobile control and/or tower for green light on base leg and final approach.

RECEIVER FAILURE: With palm of hand over ear position, move hand forward and backward.

TRANSMITTER FAILURE: With palm of hand toward and in front of the face, pilot moves hand up and down.