UNITED STATES AIR FORCE • OCTOBER 1970

Aerospace SAFETY

UNITED STATES AIR FORCE

Aerospace SAFETY

FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

SUBSCRIPTION—AEROSPACE SAFETY is available on subscription for $3.50 per year domestic; $4.50 foreign; 30c per copy, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony and conclusions of aircraft accidents printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in accident stories are fictitious. No payment can be made for manuscripts submitted for publication in the Aerospace Safety Magazine. Contributions are welcome as are comments and criticism. Address all correspondence to the Editor, Aerospace Safety Magazine, Deputy Inspector General for Inspection and Safety, USAF, Norton Air Force Base, California 92409. The Editor reserves the right to make any editorial change in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from AEROSPACE SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will insure complete accuracy of material, amended in light of most recent developments. The contents of this magazine are informative and should not be construed as regulations, technical orders or directives unless so stated.

OCTOBER 1970 AFRP 127-2 VOLUME 26 NUMBER 10

Maj Jerry Gentry
and Mr Bert Rutan
AFFTC, Edwards AFB, CA

UNLOAD FOR CONTROL

You F-4 jocks may be wondering just why the "Out-of-Control" procedures were radically modified by a recent Safety Supplement (1F-4C-1SS-113 and 1F-4-(R)C-1SS-84). This article will explain the reasons for the change and hopefully bridge the gap between the current procedures and the new sections III and VI of the F-4 Flight Manual to be published soon.

A stall/spin prevention program was recently flown at Edwards AFB. The basic objectives of the program were to determine the out-of-control characteristics of the F-4 at representative external store loadings and center of gravity (CG) positions. All previous deep stall and spin tests had been accomplished without external stores and at mid- to forward CGs. The specific areas we investigated were stall/departure warning, departure susceptibility and prevention, spin susceptibility and prevention, and spin recovery techniques.

Our test aircraft was an F-4E modified for spin testing. In addition to the standard test instrumentation, the aircraft was equipped with a 33 foot diameter anti-spin parachute which could be mortar deployed 110 feet behind the aircraft. This chute was to give us a recovery capability if we entered a flat spin.

Programs such as this run more than the average risk, so in addition to a modified aircraft we had certain ground rules to follow during the tests. Probably the most interesting and important was that the aircraft would never be intentionally spun. Pro-spin controls would not be applied and held for several turns as in previous tests. All stalls would be entered from conditions that could be experienced in operational use.

Before pressing on with the results of the program, let's clarify

some terms that will be used frequently throughout the discussion.

Wing Rock: Uncommanded roll-yaw motions, viewed primarily as roll oscillations. These oscillations may vary in intensity from small perturbations that degrade precision tracking to objectionably large roll-yaw motions.

Nose Slice: Uncommanded roll-yaw motions viewed primarily as an excursion in yaw. At high AOA, the yaw motions may oscillate, but can diverge, resulting in a departure from controlled flight.

Departure: The first aircraft motions immediately following complete loss of control by the pilot. For the F-4, departure is primarily characterized by a rapid nose slice or yaw.

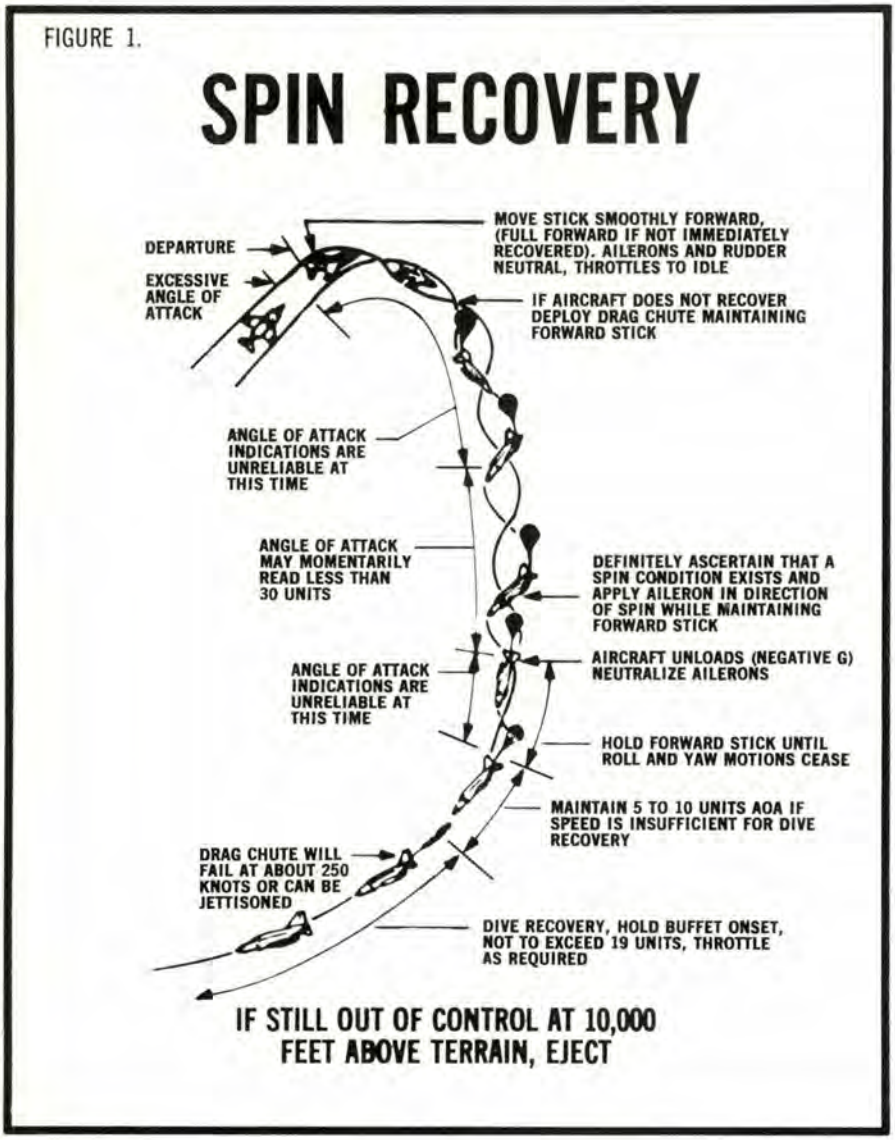
Post-Stall Gyrations: Uncontrollable motions about one or more aircraft axes following a departure. This is usually a rapid roll after an initial yaw divergence and is referred to as a *rolling departure.* However, following departures at very low air speeds (high pitch attitudes), post-stall gyrations may be characterized by random motions about all axes.

Spin: A sustained yaw rotation at AOAs above stall (above 30 units for an erect spin, less than zero units for an inverted spin).

Recovery Rolls: Uncommanded rolling motions below stall AOA that may occur during the initial phase of recovery from a rolling departure or spin. Recovery rolls seldom progress past two rolls.

A wide variety of external store loadings were tested. Stability Indexes up to 180 and asymmetric configurations up to one full 370 gallon external tank were evaluated. The aircraft was departed from controlled flight 233 times, resulting in 132 rolling departures and 101 spins. A discussion of the significant tests is given below.

FIGURE 1.



HIGH AOA MANEUVERING
(Above 15 units AOA)

Approximately 19-20 units AOA is optimum for maximum performance maneuvering. Generally light to moderate buffet and a mild nose rise tendency are evident at these AOAs. Aileron inputs alone do not provide satisfactory roll control and result in adverse yaw and inadvertent AOA increases. The rudder provides reasonably good roll performance up to 20 units. At higher AOAs, rudder roll performance decreases, roll hesitations are experienced, and inadvertent AOA increases result.

LOSS-OF-CONTROL WARNING AT LOW SPEED
(Below 0.8 Mach)

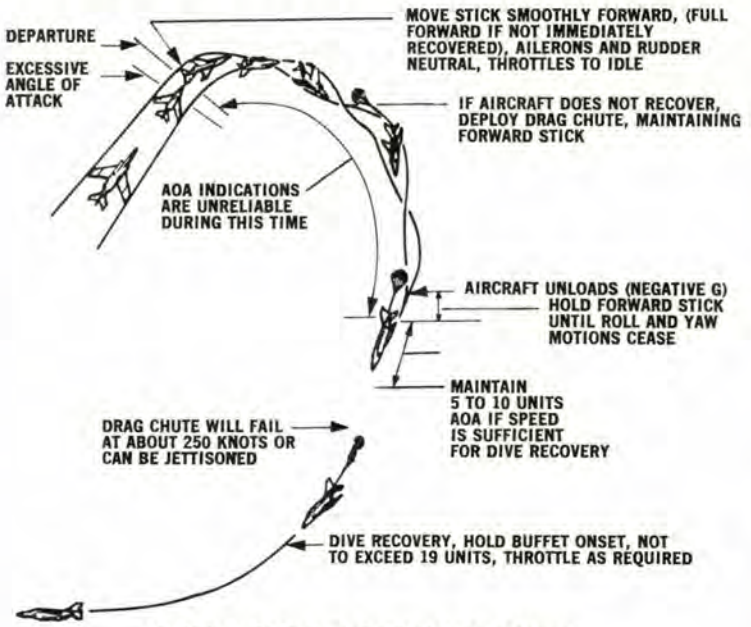
The clean aircraft generally has good low speed warning. Low frequency wing rock occurs near 24-25 units AOA and normally increases in amplitude as AOA is increased. Wing rock is not always a reliable warning since it can cease entirely as AOA increases, and departure can occur without being preceded by wing rock. Buffet intensity may not increase as AOA is increased above 15 units and is seldom considered heavy buffet at departure. The clean airplane generally will not depart below 28 units AOA even with aileron inputs. Aileron inputs at high AOAs often drive AOA even higher and this *will* result in a departure with any store loading.

As external stores are added, loss-of-control warning decreases. Buffet levels are about the same; however, wing rock is less prevalent and is reduced in intensity. Nose slice is a consistent warning, but may occur so close to departure that loss of control may not be prevented. If the aircraft has an asymmetric store loading, loss of control warning is further reduced and becomes essentially non-existent with large asymmetries such as one full 370 gallon tank. Wing rock is seldom experienced and departure will immediately follow the first indication of nose slice.

In all configurations, natural stall warning is negated during abrupt maneuvering, and the rudder pedal shaker is generally masked by aircraft and/or store buffet. Easing the stick forward will always reduce AOA if it is accomplished prior to departure.

FIGURE 2.

OUT-OF-CONTROL RECOVERY



IF STILL OUT OF CONTROL AT 10,000 FEET ABOVE TERRAIN, EJECT

LOSS-OF-CONTROL WARNING AT HIGH SPEED (Above 0.8 Mach)

At these speeds departure will occur at a lower AOA and the AOA interval between warning and departure is less than at lower speeds. Natural stall warning during smooth and moderately abrupt maneuvering is better than at low speeds and consists of light to moderate buffet followed by high frequency wing rock. When maneuvering at high Gs from supersonic to subsonic speeds, the F-4 will "dig in" or pitch-up rapidly and it is relatively easy to "over G" or lose control. Abrupt maneuvering at high AOAs will negate natural warning and probably result in a departure.

OUT-OF-CONTROL CHARACTERISTICS

Rolling Departures, the most prevalent out-of-control event, are distinguishable from spins by their brevity and/or by their lack of a sustained yawing motion. Rolling is the most noticeable uncontrolled motion. If a forward stick recovery is initiated at the first indication of an out-of-control situation, most rolling departures will be limited to only one roll; we never saw more than three rolls even with a delayed recovery. The stick should be moved all the way forward if the rolls continue. There is no reason to "jam" the stick forward—the best technique is to obtain full forward stick travel (if required) within two seconds. Deploying the drag chute with the stick forward will effect a more rapid recovery. There is little chance of deploying the drag chute at too high a speed. Airspeed bleeds off very fast following a departure and will be well under chute limit speed by the time the chute is deployed.

Many factors determine whether the post-stall event will be a rolling departure or a spin. The store loading, CG position, entry attitude, airspeed and AOA rate are the predominant variables. The clean aircraft with a forward CG at low speeds heavily favors a rolling departure. Spin susceptibility following a departure increases at more aft CGs, high speeds and with nose low entries. As external stores are symmetrically added, the F-4 becomes somewhat more spin resistant; however, the loss-of-control warning decreases, and the aircraft will depart at a lower AOA.

A spin is almost inevitable following a departure with a moderate to high asymmetrical loading; however, immediate forward stick at initial nose slice may limit the out-of-control event to a rolling departure. In every case, the aircraft will depart in the direction away from the heavy wing.

Spins generally occur immediately after departure. A rolling departure will not enter a spin if forward stick is maintained until the oscillations cease. Recovery from all spins, except the flat spin mode, can be effected by placing the stick full forward (with neutral ailerons and

rudder) or by a combination of full forward stick and either the drag chute or full aileron in the spin direction. Using forward stick for recovery almost completely eliminates the possibility of a spin reversal (changing spin direction) and the timing involved in detecting recovery is not critical.

The best way to determine if you are in a spin is an excessive and continuous yaw rate. The nose will sweep around the horizon or across the terrain, and yaw will be more noticeable than roll. The turn needle will also be pegged in the direction of the spin. Roll rates can be quite high in spins, but if so, are generally oscillatory, i.e., the roll will hesitate once or twice per spin turn.

Stall entries at high pitch attitudes (40 to 90 degrees) and low speeds (less than 100 knots) are very spin resistant if the controls are neutralized. The nose of the aircraft will fall through the horizon, "flop around," and eventually recover in a nose low attitude. Abrupt stalls in the clean aircraft at transonic speeds will generally result in spins especially at aft CGs. The F-4 with inboard pylons installed is more spin resistant and will recover from spins more quickly than the basic clean airplane. The F-4 with a high symmetrical Stability Index is comparatively spin resistant; most departures result in a rolling departure of two rolls or less.

The spin characteristics vary considerably with different aircraft store loadings; however, the recovery procedures remain the same. The clean aircraft usually spins comparatively steep (pitch attitude averages 45 degrees nose down). The spin may or may not be oscillatory. If it is oscillatory, the spin will appear to "hesitate" in roll and yaw. These hesitations should not be mistaken for impending recovery. Forward stick and the drag chute will unload the aircraft and effect spin recovery. Aileron applied in the direction of the spin will effect a more rapid recovery and could be required if the drag chute should malfunction.

Spins with symmetrical external stores can be recovered with forward stick only. The drag chute and the aileron are less effective as these configurations spin at higher AOAs (less nose down pitch attitude).

Spins with asymmetric loadings are very oscillatory. Full forward stick will effect recovery; however, the spin may continue for six or seven turns. The aileron and drag chute are ineffective for recovery; however, the drag chute will always be effective in reducing residual oscillation after the aircraft unloads.

Aerodynamic recovery of a flat spin in the F-4 is impossible. The probability of a flat spin entry is low and can be further minimized by prompt application of forward stick at departure. The flat mode develops shortly after departure and it is highly unlikely that a spin will progress into the flat mode if proper recovery controls are applied. The

PREVIOUS AND RECOMMENDED OUT-OF-CONTROL AND SPIN RECOVERY PROCEDURES

PREVIOUS PROCEDURES

OUT-OF-CONTROL

1. STICK—5-10 UNITS AOA
2. AILERONS/RUDDER—NEUTRAL
3. IF UNABLE TO OBTAIN 5-10 UNITS AOA RELEASE CONTROLS AND DEPLOY DRAG CHUTE

UPRIGHT SPIN

1. STICK—FULL AFT
2. RUDDER—FULL OPPOSITE TURN NEEDLE
3. AILERONS—FULL WITH TURN NEEDLE
4. YAW STOPPED—AILERONS AND RUDDER RAPIDLY NEUTRAL, AOA 5-10 UNITS
5. IF STILL OUT OF CONTROL BY 10,000 FEET AGL—EJECT

INVERTED SPIN

1. STICK—NEUTRAL
2. RUDDER—FULL OPPOSITE TURN NEEDLE
3. AILERONS—NEUTRAL
4. YAW STOPPED—RUDDER NEUTRAL, AOA 5-10 UNITS

RECOMMENDED PROCEDURES

OUT-OF-CONTROL

1. STICK FORWARD
2. AILERONS/RUDDER NEUTRAL
3. IF NOT RECOVERED MAINTAIN FULL FORWARD STICK AND DEPLOY DRAG CHUTE
4. THROTTLES—IDLE (UNLESS AT LOW ALTITUDE)

UPRIGHT SPIN

1. STICK—MAINTAIN FULL FORWARD
2. AILERON—FULL WITH SPIN (TURN NEEDLE)
3. AIRCRAFT UNLOADED—AILERONS NEUTRAL
4. IF OUT OF CONTROL AT 10,000 FEET AGL—EJECT

INVERTED SPIN

FOLLOW OUT OF CONTROL PROCEDURES

flat spin can be readily identified. It is quite smooth; the yaw rate is very high with no hesitations; there are few, if any, oscillations; the pitch attitude will be about 10 degrees nose low; and the pilot will be forced slightly forward in the seat.

Recognition of an inverted spin is almost as difficult as it is to enter one. The Out-of-Control procedure will effect a rapid recovery.

One of the more interesting findings of this program was that the F-4 will depart and spin without any aileron or rudder inputs. This is due to directional instability above 25 units AOA. Aileron inputs may determine the departure direction (left departure with right aileron); but the susceptibility to depart is not significantly increased by aileron inputs if AOA does not increase. If AOA is not monitored and controlled closely, an aileron input will increase AOA; this *will* cause a departure if AOA is excessive. Control surface mis-rigging, Stab Aug malfunctions and out-of-trim conditions have no significant effect on departure/spin susceptibility.

The external stores should be retained if a spin is entered. Jettisoning stores is not required for spin recovery and will only increase the risk of damage due to probable aircraft-store collision.

The production AOA indications are unreliable from departure until recovery due to errors induced by sideslip and roll and yaw rates. The AOA indicator will generally be pegged at 30 units during upright spins but may momentarily indicate much less due to the errors mentioned above. No attempt to fly AOA should be made until the aircraft is unloaded and all roll and yaw motions cease.

As forward stick or forward stick and aileron start to recover the aircraft, the magnitude of the oscillations will increase. The most violent oscillations and most uncomfortable portion of the spin will generally occur as the aircraft unloads (zero to negative G) during recovery. This unloading using forward stick is the best means of reducing these oscillations and is a positive indication that recovery is imminent. Forward stick should be maintained until all roll and yaw oscillations cease. As the aircraft recovers and starts accelerating, it may enter a series of *recovery rolls.* AOA will normally indicate 10-20 units, speed will be increasing, and the rolls will cease within two or three rolls with full forward stick.

Once these oscillations have stopped, normal throttle and control use will be effective for regaining the desired flight attitude. Do not exceed onset buffet or 19 units AOA maximum if at low altitude during the dive recovery. It is normally not necessary to jettison the drag chute since it will fail and streamline behind the aircraft as speed builds up.

If the engines are at high power settings, a flameout of one or both engines is probable at or just after departure. At initial indication of loss-of-control, the throttles should be retarded to idle if altitude conditions permit. This will normally prevent engine stalls or flamouts, and retain hydraulic and electrical power during the post-stall-gyration or spin. Should a flameout occur, a relight can be obtained with the throttles at idle even during a spin.

Jerry Gentry and Burt Rutan are now making the rounds of all F-4 units to explain and discuss their findings from the stall/spin program.

Make a point of catching their presentation; this is your opportunity to clear up any questions you have about Phantom handling characteristics.

SUMMARY

A comparison of the previous and recommended Out-of-Control and Spin Recovery procedures is shown on page 4. The emphasis now is on "unloading" the aircraft rather than obtaining "5-10 units." This, of course, is because of the AOA indicator errors mentioned above and because unloading will insure a positive recovery. The Upright Spin procedure is merely an extension of the Out-of-Control procedure. In all probability, the Out-of-Control procedures will recover the aircraft from most spins. The new procedures are pictorially presented in Figures 1 and 2.

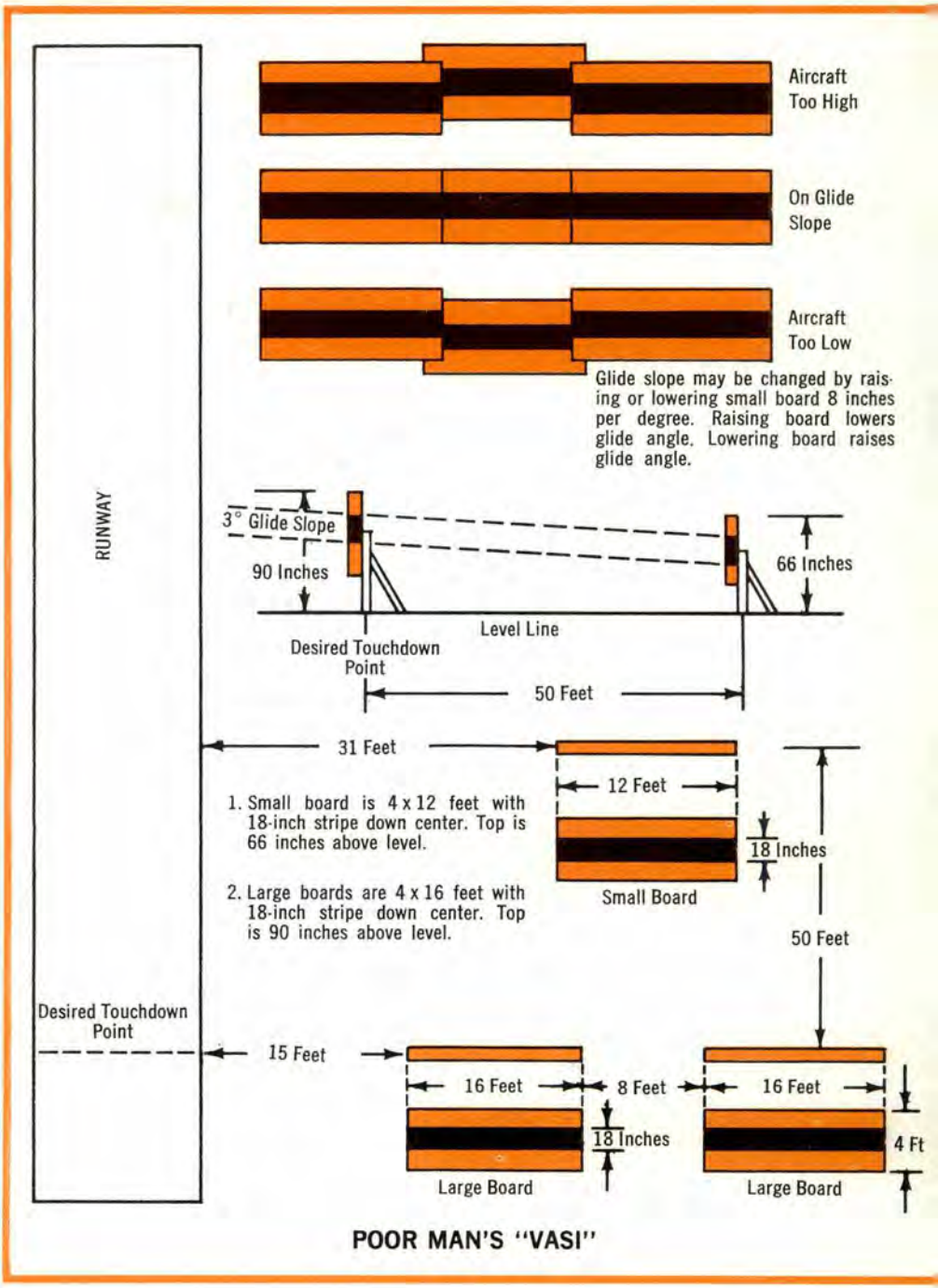
Many F-4s have been destroyed and good pilots killed due to loss-of-control at low altitudes. The only way to prevent this is to avoid excessive AOAs and we all know that this is easier said than done. A pilot who is aware of and heeds all the warnings available has the best chance of avoiding loss-of-control and safely flying the F-4 to maximum performance. ★

a poor man's VASI approach to a JUNGLE AIRCRAFT CARRIER LANDING

Early this year *Aerospace Safety* carried two articles that have generated quite a bit of mail. These were "Landing Short," February, and "Perspective" in March. Both mentioned a visual landing aid known as the Poor Man's VASI. We didn't anticipate the number of requests we have received for more information about this device or we would have published the details. But since so many have asked, we called on Col Robert Erbe of this headquarters to do this article with drawings and info about the device he installed in Vietnam. Also, for those who desire a copy, we have available a few repros of plans for a similar aid used by the Navy. Just send us a note requesting the POMOLA blueprints.

In this day of two- and even three-mile runways, sophisticated electronic guidance and lighting aids, not to mention continuous communications, some of us find ourselves landing under much more

Col Robert F. Erbe
Directorate of Aerospace Safety



POOR MAN'S "VASI"

primitive circumstances. Like short dirt runways, no lights, no communications, no glideslope. In other words, nothing except the pilot's eyeballs, judgment and skill. Sometimes these are not enough.

The reproduction of a page from the Tactical Aerodrome Directory for South Vietnam illustrates what we mean by an austere airfield. The photograph of the approach to this field gives a better idea of what the pilot sees on final approach.

At Gia Nghia pilots face an unusual set of circumstances. The field is simply a 2000 foot long strip that was built by carving off the top of a hill. There are steep drop offs at each end of the runway with severe downdrafts and strong wind shear. These, plus false illusions induced by the topography and a steep assault approach, present the pilot with a difficult situation. Add poor pilot technique and we have the situation that existed during two landing short accidents—a heavy airplane, behind the power curve, below runway elevation just short of touchdown. IMPACT Angle 80°!

To give our pilots some sort of visual landing aid we borrowed an old device from the Navy known as the Poor Man's VASI. We built it at Phan Rang out of used plywood and installed it at Gia Nghia in March of 1968. If Charlie hasn't carted it away, C-123s, C-7s, O-1s and O-2s may still be using it as an excellent glideslope visual aid. We thought it was just as good as a lighted VASI at one-half to one mile out.

Flying this VASI with proper power control and glideslope flying techniques will always place the aircraft in the slot for a normal flare and landing. A side advantage for forward bases is that the two front panels mark the touchdown point.

Securing large pieces of plywood in forward areas is another problem that you will have to deal with yourself. ★

the numbers game

You just can't get away from it! Everybody lives by the numbers. The clock goes off in the A.M. because we set the alarm on a number. "Gimme a couple of eggs" is the next step. Maybe the ol' buggy needs some gas on the way to work and we make change with numbers. If you think numbers aren't important, try forgetting your anniversary or your wife's birthday.

Whether we like it or not, the mathematicians have got us. But even though we "live by the numbers," they are sometimes elusive little digits that slip insidiously through our fingers. Remember the new guy you met at the bar who was so friendly? "Say, why don't you follow me home and meet my gang—and if you get lost, it's 3742 Elm." Naturally you lose him at the first stop light. No sweat—all you have to do is navigate to 7432 Elm—or was it 3274? After a short 10 seconds of playing the numbers game, you're not even sure you remember the name of the street. Some kind of tree or bush—so we end up with some grouch at 4732 Maple Street telling you, No, he hasn't the foggiest idea where Charlie Brown lives. Fortunately, telephones are fairly available these days, and you get Charlie to reconfirm his address as - - - - (assuming he was one of those who gave you his last name and not his seven digit phone number.) By the way, without looking back, what was Charlie's address?

HOW ABOUT THAT DATE with your wife or sweetie—"See you at _____," and if she's been ready for an hour, Buddy, you're wrong. Or even worse, the boss says, "Wheels in the well at _____." Again it doesn't matter who was misunderstood. He's right and you lose again!

Some of us who fly airplanes for a living are blessed with a super memory for numbers and, maybe equally important, names. However, some of us are real lucky the airplane manufacturer was clever

0267145

enough to stamp the bird's tail number on the instrument panel. If you have never pressed the mike button only to release it and frantically search for the stenciled tail number *somewhere* on the panel—you haven't been around too long. On a tactical mission did you ever sit tight while airborne and hope somebody would use your tactical call sign so your mental computer could get back on the track and remind you what your flight call sign was?

MAYBE YOU THINK we're a bit far out with some of these examples but we don't think so. Yours truly has to admit he has drawn at least one of these little mental blanks from time to time.

So far no real harm has been done. Maybe some embarrassed pilot but not much else. But let's complicate this numbers game a bit. How about a real life story.

"Roger AF 61200, I have radar contact. 200 turn left to 240, descend to 4500, squawk 3-2100, (slight pause), weather at Podunk measured 3200 broken, estimated 4800 overcast, viz seven miles, smoke and haze. Wind 200 at 10, altimeter 29.96. Squawk 2200 until passing 240, then 2100. Contact Podunk approach control 289.4 UHF or 125.45 UHF backup, passing 7000 feet."

So far in this short space of maybe one minute you, as a pilot, must be able to accurately sort out in excess of 50 semi-related digits. How many times have you heard this and mentally tried to note the more important bits of information and leave the others for later clarification? Obviously, one of the dangers lies in transposing one or more sets of numbers.

Using the example, how about a descent to 2100 feet on a heading of 320 degrees? Not too critical unless there are some granite buildups in this direction. How about something even less complicated? A pilot had been informed by approach control that the active runway was 02, yet after breaking out at 2500', he insisted on making a panic approach to 20 to beat a rapidly moving thunderstorm. Since the thunderstorm was small and located over the center of the runway with the landing zone clear, the pilot had no way of knowing another aircraft was landing in the proper direction. Since few runway centerlines are designed to permit two-way traffic, the two aircraft met at about midfield. The result was disastrous. The pilot said, "Roger, I understand," but in his anxiety to get his bird on the ground, the transposition of 02 for 20 just would not register on his mental computer.

THESE ARE JUST A FEW of the problems that confront a pilot in the age of congested air traffic. The only way to stay out of this box is to request the approach controller or tower operator to repeat the instructions. Sure, the R/T clutters the air now, but the repeat to confirm an altitude or heading doesn't take nearly as long as it does to pick up a bunch of broken bones and busted aluminum.

We all know why this string of instructions occurs: The area is filled with pilots who have but one thought in mind—*let's land*. The controller staring into his scope is just as anxious to oblige. However, let's be careful, fellows, and make sure the instructions you "roger" are correct or it may be your "number that's up." ★

what is your ALTITUDE?

FIGURE 2
COUNTER POINTER (CP)

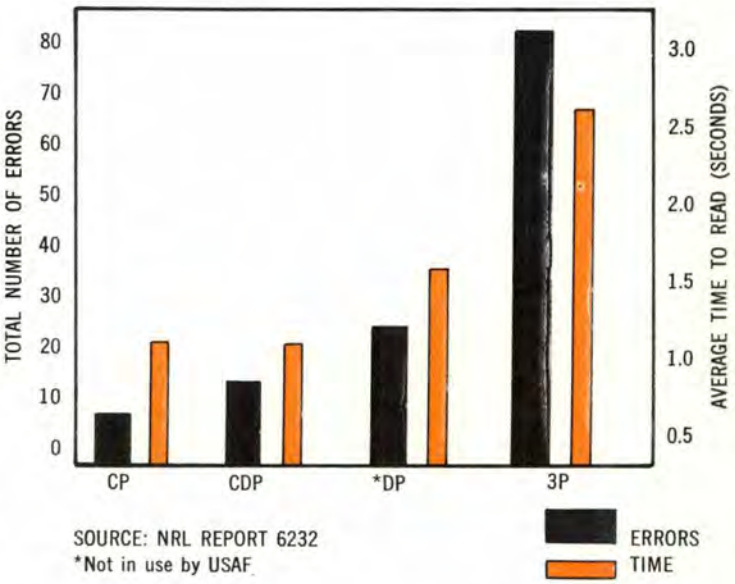
FIGURE 3
COUNTER-DRUM-POINTER (CDP)

FIGURE 1
THREE POINTER (3P)

FIGURE 4
ALTITUDE VERTICAL VELOCITY INDICATOR (AVVI)

HOW MANY TIMES have *you* misread your altimeter? Never? Only once? What would have happened if the situation had been slightly different—the weather worse, or perhaps the terrain slightly higher? Try reading the four altimeters on this page and check your answers with those at the end of the article.

THE US NAVY conducted several studies in 1964 and 1965 on misreading of the counter-pointer (CP), counter-drum-pointer (CDP), drum-pointer (DP), and three-pointer (3P) altimeters. Their findings on 1080 trial readings of each altimeter by 18 pilots are depicted on the chart below:



AS YOU CAN SEE, the three-pointer was misread the most; also, it took nearly three times as long to read.

Unfortunately, a recent accident points out the need to reemphasize the proper methods of reading the altimeter. The Air Force presently uses the four types of altimeters shown in Figures 1-4, of which the three-pointer (Fig 1) is the most commonly used. Two variations of the three-pointer (Figures 5 and 6) are shown below:

FIGURE 5

FIGURE 6

THE THREE-POINTER on the right (Fig 6) was designed with the white stripe to make the 10,000′ pointer more noticeable. Both have the low altitude warning symbol which warns the pilot when he is below 16,000′. This symbol as shown in Figures 7-10 is fully in view at 0′, ¾ at 4,000′, ½ at 8,000′, and ¼ at 12,000′.

WHAT IS YOUR

ALTITUDE

CONTINUED

FIGURE 7 (0')

FIGURE 8 (4,000')

FIGURE 9 (8,000')

FIGURE 10 (12,000')

FIGURE 11

1 READ THE 10,000' POINTER

2 READ THE 1,000' POINTER

3 READ THE 100' POINTER

THE MAIN PROBLEM with the three-pointer is the possibility of misreading the altitude by 10,000'. The "1-2-3 Method" will prevent this error. Check the low altitude warning symbol to determine if you are above or below 16,000'; then, proceed as at left.

NO SHORT CUTS ARE ALLOWED. Form the habit of reading the altimeter each and every time, using the "1-2-3 Method." A second problem is that some three-pointer altimeters can be set 10,000 feet in error by rotating the barometric scale. Mechanical stops have been installed on later altimeters to prevent this error. During the instrument cockpit check, always ensure that the 10,000' pointer reads approximately field elevation.

The counter-pointer altimeter (Fig 2) and the counter-drum-pointer altimeter (Fig 3) reduce the probability of misreading. However, they can be misread by 1,000' as the 1,000' counter changes. (This occurs when the 100' pointer is between the 900' and 1,000' position.)

ANS:

Figure 1	12,120′
Figure 2	2,960′
Figure 3	7,960′
Figure 4	40,000′

FIGURE 12

FIGURE 13

TO PRECLUDE misreading the counter-pointer and counter-drum-pointer altimeters read the counters first, then the 100′ pointer. For example, in Fig 12 the counters show an altitude between 14,000′ and 15,000′; the 100′ pointer further defines the altitude as 14,960′. In fig 13 the counters show an altitude between 12,000′ and 13,000′; the 100′ drum and pointer further defines the altitude as 12,960′.

Altitude Vertical Velocity Indicators (AVVI) (Figures 14 and 15) are the least likely altimeters to be misread. At present there are no known problems of misreading these altimeters.

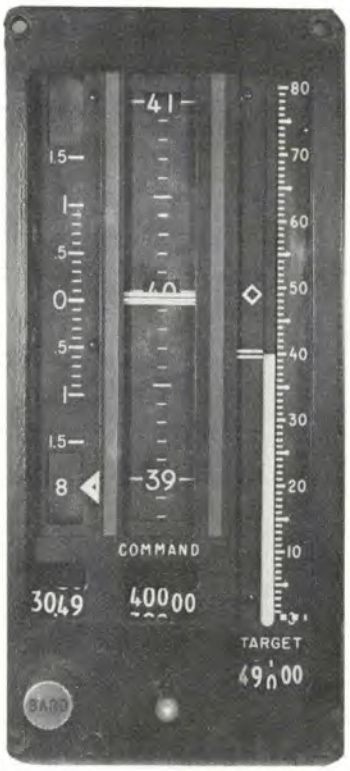


FIGURE 14

FIGURE 15

REMEMBER—regardless of which altimeter you use, one of the best methods to avoid misreading the altimeter is a conscientious effort to increase your instrument proficiency. In other words—GET AS MUCH INSTRUMENT TRAINING AS POSSIBLE! ! ★

PLEASE NO SECRETS IN SERVICING

CMSGT LLOYD THOMPSON

Several years ago during the Korean conflict, I was a C-54 crew chief. One day we were preparing my pride and joy for an air evac mission and were running late. I will never forget what happened because we accepted unauthorized assistance as a means to expedite things and make the scheduled departure time.

We parked the bird in front of Base Ops and called for fuel and oil. While we were waiting the navigator proceeded with his preflight and found something wrong with one of the black boxes. A radio man was dispatched to check the Nav's problem; however, when he arrived, we were in the process of servicing fuel. Since there was no power on the aircraft, this energetic radio man offered to service the engie oil while he waited. We welcomed his assistance and everything went well *until* . . . .

Servicing completed, I attempted to put power back on the aircraft, but the APU wouldn't start. In trying to determine why it wouldn't start, I found the spark plug covered with oil and the carburetor, fuel pump and fuel line were full of oil. Since the fuel for the APU comes out of Nr 3 main fuel tank, I opened the Nr 3 sump drain and a solid stream of oil came out of the sump!

I'm sure you can guess what had happened. The radio man, in his eagerness to help, had serviced approximately 30 gallons of oil into the Nr 3 main fuel tank. Discovering his own mistake, he decided to say nothing about it.

We drained and flushed the tank and lines and everything was okay. When I think of what could have happened: for instance, had he put the oil in a tank other than the one the APU fuel came from—well, I'm just thankful no one was hurt!

Of course, this sort of thing could never happen in today's modern Air Force, or could it? How about mechs putting engine oil into the hydraulic reservoir. You say it can't be? But it has happened. On the J71 engine, there is a separate integral hydraulic system on each engine for operating the exhaust nozzle actuators. On several occasions engine oil has been discovered in the hydraulic reservoir.

It's not possible to mention servicing problems without touching on the big problem that has been with us since the advent of jet fuels. The problem, of course, is putting jet fuel in an avgas tank. To do this, as the saying goes, is how they make angels.

The new AFM 127-101, para 8-3, provides more stringent rules for personnel handling aircraft fuels. For example, the individual requesting fuel from POL should indicate the type of fuel and the type of aircraft it's for. Also, the man servicing the aircraft must check to see that the truck actually does contain the type of fuel needed for the aircraft being serviced.

Check the manual and follow your TOs and checklists. Above all, if you do make a mistake, don't keep it to yourself. ★

REX RILEY'S CROSS COUNTRY NOTES

The other night another traveler and I were having dinner in the Club at a midwest air base. When the other fellow found out that I was that guy *Riley* from Aerospace Safety, he began filling me in on all his pet gripes about transient services.

"Ya know, Rex," he said, "there are a lot of similarities in any kind of travel. For one thing, no matter what your mode of travel, the thing is that you are going someplace. And you probably are in a bit of a hurry, at least part of the time. Finally, the major irritant to a traveler, as well as the source of his greatest joy and satisfaction, is people. Strangers you've never seen before can make or break your trip.

"I've often wondered," he continued, "why a person will run a third class restaurant . . . or a filthy, sloppy garage. And have you noticed that a friendly smile and a few encouraging words on the part of the proprietor will make a small town motel as satisfactory as one of those brand new palaces with color tv, two king-sized beds, room service and an Olympic-rated pool?

"Now I mention these things because I just got back from a three-week cross country with my family. So it is all fresh in my mind. Now you are in the business of rating transient services at Air Force bases. Don't you run into the same things?"

The guy was right. Travel is the process of going someplace, whether in an airplane, a car or a canoe. And the traveler requires certain services, whether he's spending the night in North Dakota, having his car (or airplane) fixed in Texas, or eating in California. Travel is exhilarating but it is also tiring and the people providing the service ought to realize this.

Awhile back I ran a little experiment. It wasn't very scientific but I think I found out a few things. During a trip that required stops at several bases, including three RONs, I tried being friendly and jovial at one place, then sour and irritable at the next. The results were just what you'd expect with one exception.

At one of our better known bases we taxiied in and parked where the man spotted us—which happened to be just about in front of Ops. This was my turn to be grumpy, but there wasn't much I could say about where we were parked. Then before I could open my mouth about fuel, the TA informed me that the truck was on its way and we would be serviced immediately.

This was rather frustrating. Here I was trying to be mean and all I got was first-class service with a smile. So I decided to take it out on the dispatchers. The frown I wore into Ops was calculated to scare the bravest man alive. I didn't say a word for a minute—just stared around the place as though I were inspecting a disaster area.

How the guy did it, I don't know. But the dispatch managed a smile and "Good evening, sir; welcome to _____ Air Base. Anything we can do for you?"

"Uh, yeah . . . gotta pencil?" I managed to get out, surprised by his reaction to my obvious meanness. Well, he got me a pencil, wheels to the Q, and a map showing the location of the BX, base theater, O club, as well as a card listing all the pertinent base phone numbers.

To make a long story a bit shorter, the whole works was like that. Hard as I tried, I just couldn't work up a mad. In fact, when we took off I was feeling pretty darn good about that base and the Air Force as a whole. Tomorrow, I'll be dropping in at your base. How do you suppose I'll feel when I leave? ★

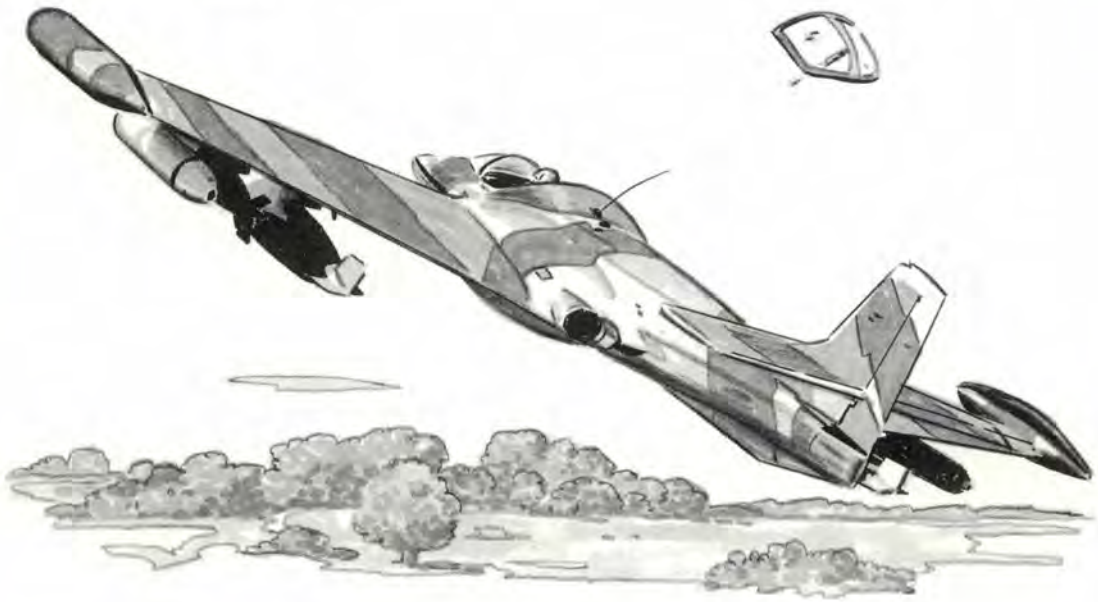
REX RILEY
Transient Services Award

KIRTLAND AFB
ALBUQUERQUE, N.M.

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

Tech topics

BRIEFS FOR MAINTENANCE TECHS



DOWN TIME

Have you ever been driving on a black night on a dark road and suddenly have your lights go out! Wow! The experience is terrifying.

With that thought in mind, read what happened to an A-37 pilot. While pulling up from a strafing pass, his seat went *kerpow,* all the way to the bottom. After recovering from the surprise, the pilot installed the pins and readjusted the seat. On the second pass the seat bottomed abruptly in exactly the same place as on the first pass, only this time the canopy blew off at the same time. The pilot declared an emergency and made an uneventful straight-in approach and landing. Investigation revealed the vertical arm adjust lock was not properly locked due to the seat adjustment cable being improperly adjusted. This caused the seat to bottom out under G loads.

Can you imagine what might have happened had the seat bottomed during a critical phase of landing? So how about you maintenance types making sure that seat locking mechanisms are in proper working order to prevent the pilot's lights from going out during critical phases of operation. ★

KNOW YOUR SUBS

The '101 pilot on a training flight had leveled off and increased airspeed to 540 knots. Approximately three minutes later the right engine flamed out. Air-starts were attempted in both the normal and emergency systems without success so a single engine landing was made.

Investigation revealed that a substitute seal had been installed in a fuel line during the last inspection. The seal was too small, allowing line separation. Two seals had been issued from base supply under the same part number and apparently one of these seals was of a different thickness than the other.

A word to the wise for all maintenance personnel. Investigate all substitute items and make sure, to the best of your ability, that the item really is a substitute. ★

ye old battery

THE PRIMARY PURPOSE of the aircraft battery, as everyone knows, is to supply emergency power in the event other power sources become inoperative during flight.

Two recent incidents indicate a need to highlight some do's and don'ts pertaining to battery maintenance.

The old standby lead acid battery requires more attention from the crew chief than do the silver zinc and nickel cadmium batteries. The water level of a lead acid battery is checked and serviced when necessary, by the crew chief. **NOTE: if you are in a cold climate be sure the battery receives a sufficient charge directly after servicing so the water will mix with the electrolyte to prevent the water from freezing.**

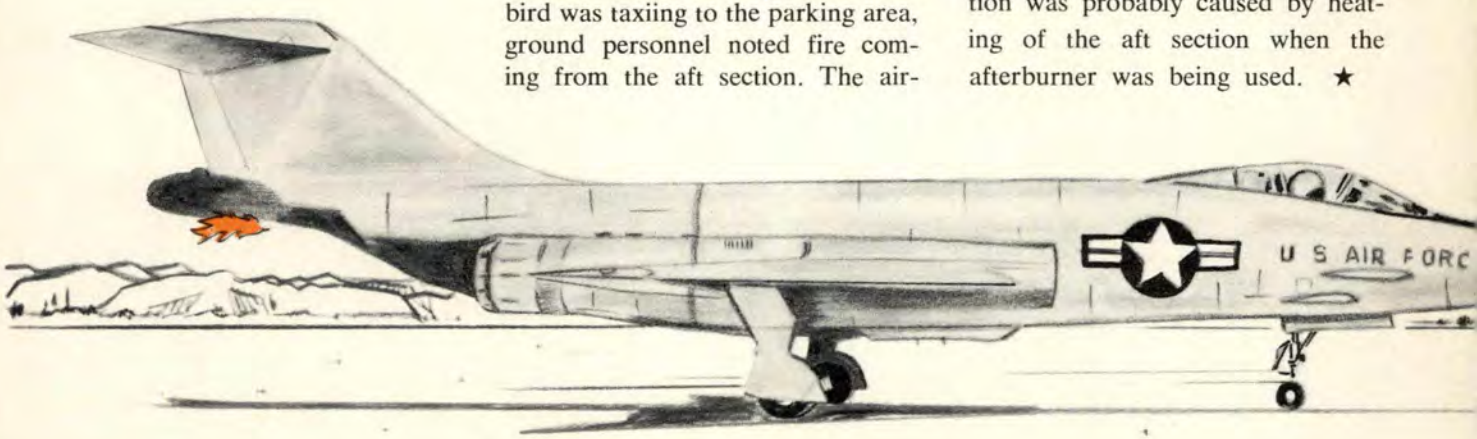
The crew chief must also take specific gravity readings. Here again temperature is important, so be sure you make temp corrections. The temp correction hydrometer has a thermometer which reads the temperature of the electrolyte and shows the correction to be made for various temperatures.

With the exception of water service and hydrometer checks, line maintenance of silver zinc and nicad batteries is about the same. Cleanliness and security of all parts in the battery compartment, along with proper service of the sump jar, is a must.

Remember the battery's primary purpose is for emergency power, so use it only as directed for ground operation. This also applies to flight crews: do not perform the before-engine-start checklist with battery power. For further information on battery maintenance, refer to 8D2 series TOs. ★

FIRE

Due to weather, the '101 pilot decided to land early so he went into afterburner to burn off 2000 lbs of fuel to lighten the aircraft. Everything went as planned until after touchdown when the drag chute failed to deploy. While the bird was taxiing to the parking area, ground personnel noted fire coming from the aft section. The aircraft was spotted and the fire extinguished. This little episode was caused by a loose "B" nut on a fuel vent line which allowed fuel to saturate the heat blanket around the drag chute compartment. Ignition was probably caused by heating of the aft section when the afterburner was being used. ★



Tech topics

CONTINUED

F-100 SOAP SAMPLING

Teardown of an F-100 engine that had been involved in an accident revealed that a glass SOAP sample bottle was in the engine oil tank at the time of the accident. From past experience we know that the standard SOAP sample bottle can lodge in the oil stand pipe and prohibit oil from reaching the engine. Consequently, special attention has been directed toward F-100 SOAP sampling procedures. TO 42B-1-9 gives a WARNING not to handle sample bottles, bottle caps, or tube caps directly over oil tank fillers.

Particular emphasis should be placed on retrieving foreign objects accidentally dropped in oil tanks or any other location on aircraft. Commanders should review their spectrometric oil analysis program to insure that (1) all affected personnel have received SOAP training and have seen the Air Force training film TF 6090, (2) units have written standing operating procedures, and (3) necessary equipment is available. ★

Maj Edward E. Cameron
Directorate of Aerospace Safety

SMOKING C-141

A call over the crash net indicated that smoke was coming from the left wing of a C-141. The maintenance officer, first to arrive on the scene, found everything under control. The stage was set for this little fiasco by the inadvertent actuation of the outboard wing deice switch while maintenance was being performed on the pilot's windshield. After about 20 minutes of APU operation, the loadmaster noted what appeared to be smoke coming from the left wing leading edge. Maintenance investigation revealed no heat damage to the wing.

The windshield maintenance had been performed after the flight crew preflight. However, we wonder what happened to the wing anti-ice valve open light. The apparent smoke was determined to be vapor caused when rain hit the hot leading edge of the wing. ★

TOOL TIP

We came across the idea below in General Electric's JET SERVICE NEWS, and we think it's great! "TRY PUTTING A BAND OR TWO OF REFLECTIVE TAPE, THE KIND USED ON AUTOMOBILE BUMPERS AND BICYCLE FENDERS, ON YOUR HAND TOOLS. THEN SHINE A FLASHLIGHT INTO THOSE DARK PLACES WHERE YOU MAY HAVE DROPPED OR PUT A TOOL." ★

KC-135 WRONG COWLING

During cartridge start of Nr 4 engine an explosion caused extensive damage to the cowling assembly. The explosion was the result of an unmodified Nr 3 engine left side panel being installed on the Nr 4 engine. Exhaust gases from the expended starter cartridge were trapped within the cowling. The explosion damaged the cowling beyond repair. This very expensive mistake caused by someone installing the wrong cowling on the wrong engine cost more than $12,000. ★

This is **not** the time to wonder if the cowling is on the right engine or not.

are you prepared to

hit the gro

When you think of an ejection seat, you think about ejection—getting out of a moving airplane in a hurry. Trouble is, there's more to it than that—more than just pulling the handle and floating gently to the ground, away from your no-longer airworthy air machine. Emergency ground egress can be a lot more complex. It can require many more steps—and a better understanding of the system. And it can be just as important to you.

A CRASH LANDING, an aborted takeoff that went sour, or gear collapse after you hydroplane off the side of the runway, and—Fire!! Suddenly you're in a tremendous hurry to get out and away. But the straps, braces, restraints and cords that held you secure and unhurt during the sudden stop are now working contrary to your most urgent desires.

The thought of ground-level ejection flashes momentarily through your mind. You dismiss it. The thing for you now is a fast exit over the side, get two feet on the ground and run!

It's the fast part that gets you. Freeing yourself of all the equipment that is holding you in the cockpit is not the simple one-motion act that ejection is. AT LEAST FORTY AIRCREW MEMBERS, FACED WITH EMERGENCY GROUND EGRESS SITUATIONS DURING 1968 AND 1969, EXPERIENCED DIFFICULTY — AND DELAY. Not all of them made it.

Much of that difficulty and delay came about because the people involved weren't familiar with the correct procedure for emergency ground egress. In case after case, we find that:

- Pilot activated wrong handle.

(emergency gear handle instead of canopy jettison)

(survival kit release instead of secondary escape handle)

- Pilot couldn't locate correct handle.
- Pilot didn't complete all steps of egress procedure.

(got out of parachute harness but left oxygen hose attached to the harness)

(started to stand up and was held back by leg restraints, chute risers, shoulder harness or radio cord).

Separation from the seat survival kit is a very frequent delay-causing problem. In many airplanes, a single handle deploys the kit once you are suspended beneath the chute. You use the same handle to separate from the heavy and cumbersome kit for emergency ground escape. Trouble comes when you start up out of the seat before you actuate this handle. In delaying until your weight is off the kit, you de-

Plunger (arrow) is key to separation from survival kit. If it's extended when you pull secondary escape handle, you remain attached to raft (right).

und running

John D. Shacklock, Maj, USAF (Ret)

ploy it instead of separating from it. Then you find yourself stopped cold at the end of a nylon cord right after you get your feet on the ground. More than once the crewmember caught at the end of the raft suspension cord has not been freed until the cord burned through!

A breakout of the forty ground egress difficulty cases by type aircraft is a real eye-opener. Sixty-five per cent of them were in the F-4 and A-1! The Phantom accounted for 17 (42.5%) and the Skyraider nine (22.5%). All other aircraft types combined added up to only 14 cases of difficulty (35% of the total). The reason for this distribution is obvious when you look at the systems. The egress systems in the F-4 and A-1 are unique. They're different, and probably more complex, than the rest of our systems. They both have good records of performing their primary function —emergency airborne escape from a disabled aircraft. But because of their complexity, and difference from the systems we were initially trained on, we've had trouble getting out of them in a hurry on the ground.

With both the Martin-Baker ejection system in the F-4 and the Yankee extraction system in the A-1, you wear an integrated torso harness into the airplane. The parachute and survival kit stay with the bird. You are held in the seat by a conventional lap belt and shoulder harness in most aircraft. With these two systems you attach your torso harness at several points to straps on the seat. A secondary escape handle severs these straps for manual bailout, releases you from the seat and leaves the parachute and kit attached to your harness. These can be significantly bulky, troublesome and delay-causing during the hurry of emergency ground escape. Therefore, in both aircraft, you must take additional actions before you can come out of the cockpit the way you entered it—light, unencumbered, with only your helmet and harness attached to you.

And it's in these additional actions that we run into trouble. When you're getting out of the cockpit under normal conditions, you just unfasten the Koch fittings attaching your harness to the straps. But because these are sometimes difficult to operate with gloves on, and to speed up your egress, the systems are designed with a survival kit release handle. Then, in addition, in the F-4 it's recommended that you reach up and release the parachute risers from your harness. Omit a step, or get them out of sequence, and you find yourself tangled up in the equipment. And your rapid escape from the cockpit is further delayed.

If you decide to shorten the procedure and muscle your way out of the cockpit with parachute and survival kit hanging from your harness, you're in for trouble. In the F-4 you must grasp something ahead of you—like the canopy bow —and pull yourself up to break away from the seat even without the weight of the parachute and kit. Try to carry them out of the cockpit with you for the first time, and you find you're carrying a lot more weight. It surprises you—and slows you down.

In the A-1E and G models it is

Parachute and survival kit attached, pilot has difficulty climbing out of A-1E/G seat.

virtually impossible for a large man to get out of the cockpit in a hurry with the rigid parachute frame on his back and the bulky kit hanging under him. It's a gymnastic feat that even most small pilots have great difficulty with.

The major problem in the "all other" category aircraft has occurred when pilots decided to unstrap from their parachutes before

hit the ground running

Many of us don't pay enough attention to getting out of the bird in a hurry WITHOUT using the ejection (or extraction) system.

going over the side. In more than one-third of the cases in which they experienced difficulty and delay, the pilots found themselves hauled back down into the seat by the oxygen hose because they hadn't disconnected it from the parachute harness. The quick-disconnect on the CRU-type connector is on the bottom—it separates from the aircraft supply hose, not from the harness.

The A-1H and J models (perhaps alone among all fighters) are equipped with a two-buckle lap belt. The buckles are really Koch fittings, and not readily adapted to rapid unfastening. You must unfasten both fittings (or your torso harness) because the center portion of the lap belt is threaded through the harness leg straps.

Habit is strong and unpredictable; several A-1H pilots have found themselves struggling to get out of the cockpit after unfastening only one side of the lap belt. One hapless pilot, after aborting takeoff, running off the end, collapsing the gear and bursting into flames, did this. But he got out of the cockpit —and found himself hanging head down beside the fuselage. Completely helpless and already seriously burned, he survived only because several people were able to reach his position and free him in a very short time.

Photo from rescue helicopter shows pilot suspended over the side of A-1H by lap belt.

This was an experienced pilot on his third combat tour. But he was relatively inexperienced in the A-1H. He had attempted to release his restraints by using the secondary escape handle, but couldn't get it to work and decided to unstrap and get out. Apparently he reverted to earlier training in other fighters, unfastened one lap belt fitting and went over the side.

There is only one sure-fire way to overcome this very natural tendency to revert to earlier, well-learned habits or training when you are in a situation of extreme stress. That is to erase the earlier training by abundant and continuing new training in the new habits or disciplines.

Serious attention to the recurring seat simulator training your unit schedules is a must. But it's not enough. You should rehearse your ground emergency escape procedures practically every time you enter the cockpit. Take a few seconds either before or after each flight. Sit in the cockpit, give yourself the command, "Go!", and move your hands through the motions of the escape procedure. Make sure you have it all in the correct sequence. Make sure you can get your hands into the correct positions. Mentally review any areas or steps in the procedure which have proven to be stumbling blocks to others in their escape attempts.

Your training must make the sequence of motions in emergency ground egress an automatic response. Then continuation training must keep it automatic as long as you fly the equipment.

CONSIDER EJECTION

IN SOME CASES, ground level ejection or extraction might have been the best way out of the airplane—fastest, cleanest, safest. Or ejection before the airplane came to a final stop might have been the answer. But there are far too many variables to allow us to set down any hard and fast rules on this one.

If you're riding a seat with zero-zero capability, it's up to you. Think about it, evaluate the history and experience—the success rate, if one has been established—of that particular seat, and make your own rules. Decide for yourself what situations, or what types of situations, will warrant serious consideration of ground-level ejection. Don't arbitrarily dismiss it, and don't attempt it frivolously.

Even under optimum conditions, ground level ejection is an extremely high-risk adventure. Timing and sequencing are down to fractions of seconds. Rocket ignition, seat separation, parachute inflation must occur with no delay.

But consider it.

Someday it may be your only route to survival.

A-1 AIRCRAFT

SURVIVAL KIT RELEASE HANDLE—Pull out. (This will leave the kit in the airplane, freeing the pilot for easier exit).

This handle must be pulled with crewmember's weight on the seat or the survival kit will remain attached to the torso harness.

SECONDARY ESCAPE HANDLE—SQUEEZE AND PULL UP.

This handle must be moved through its full 110-degree arc of travel. Pull force required is 80 pounds. In right seat of A-1E/G there may not be sufficient room to place your hand around the handle. Learn to initially grasp it backhand. In A-1H/J, should handle fail to release you from lap belt and shoulder harness restraints after you insure full 110-degree rotation, you will have to manually unfasten *4* Koch fittings (2 on risers at your shoulders, 2 on lap belt). *A single-fitting lap belt is undergoing test now, but it won't be in the field for several months.*

PERSONAL EQUIPMENT LEADS—DISCONNECT.

Communication cords, oxygen hose.

CONTINUED

A-1E/G—AUXILIARY CANOPY REMOVAL HANDLE—PULL DOWN.

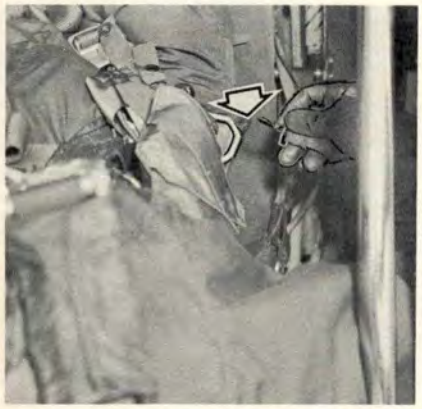
A-1H/J—CANOPY JETTISON SWITCH — JETTISON.

Practice this one in H/J models. It's very difficult to reach. Decide how you'll break plastic guard over switch.

ABANDON AIRPLANE

—but before you go:

A-1E/G—if you decided to rid yourself of the weight and bulk of your parachute by releasing the two upper Koch fittings, BE SURE to pull up the button on your D-ring bracket and disengage it from your harness.



A-1H/J—if you snapped your pararaft lanyard to the right side of your harness when you strapped in, BE SURE you unsnap it.

F-4 AIRCRAFT

LOWER EJECTION HANDLE GUARD-UP.

SHOULDER HARNESS—RELEASE.

Leave the parachute in the bird, it can catch on something on your way out.

SURVIVAL KIT RELEASE HANDLE—ROTATE AFT.

Inside handle first, then—

EMERGENCY HARNESS RELEASE HANDLE—LOCK UP.

If you allow the handle to return to the down position, it may re-lock your leg restraints. This has happened too often!

CANOPY—OPEN.

Try the normal canopy open switch first to avoid possibility of inadvertent ejection.

Then the manual canopy unlock handle, but remember you must hold the canopy open—there's no air pressure to hold it up.

Next go to emergency jettison handle on the left.

Finally, if you must, bust out with your canopy breaker tool. Start at a forward corner of the canopy and KEEP HITTING IT IN THE SAME PLACE!! Don't bang away at random all over the place.

With the canopy open (or removed), grasp the windshield bow and pull yourself up. You must use sufficient force to release the sticker clips (arrow) from the seat.

ABANDON AIRPLANE.

Should you find that you are still attached to the survival kit by the raft lanyard, you don't have to wait for it to burn through—or for someone to cut you loose. Just punch the survival kit quick release where it attaches to your harness at your left hip. ★

The information contained in this directory is the latest available. If there are any inaccuracies please forward corrections for your club listing to Aerospace Safety for publication.

Here's the way to read the directory: Base name, hours of operation, fuel (octane), all have oil available, and phone number. Clubs located on base are printed in black, and those located off base are in color with the name of the airport. Happy Landings!

STATE, CLUB & FLYING LOCATION	SERVICE AVAILABLE	PHONE NO.
ALABAMA		
Maxwell-Gunter AFB (AU) Gunter AFB AL 36114	0800-Sunset Gas 80/100 / Oil	279-5141
ALASKA		
Eielson AFB (AAC) Eielson AFB AK	0800-1700 Gas 80 / Oil	377-1223
Elmendorf AFB (AAC) Elmendorf AFB AK	24 Hours Gas 80 / Oil	752-4167
ARKANSAS		
Blytheville AFB (SAC) Blytheville AFB AR 72315	0800-1700 Gas 80/100 / Oil	763-9305
Little Rock AFB (TAC) Little Rock AFB AR 72076	0730-Sunset Gas 80/87 / Oil	988-1234
ARIZONA		
Davis-Monthan AFB (SAC) Davis-Monthan AFB AZ 85707	0800-1700 Gas 80 / Oil	327-7632
Luke AFB (TAC) Phoenix-Litchfield Muni Aprt Phoenix AZ	0800-1700 Gas 80 / Oil	935-4891
CALIFORNIA		
Beale AFB (SAC) Beale AFB CA	0800-1900 Gas 80 / Oil	788-1972
Castle AFB (SAC) Merced Municipal Aprt	0800-Sunset Gas 80/100 / Oil	722-3638
Det 1 AFSCF (AFSC) NAS Moffett Field CA 94035	0900-1500 Gas 80 / Oil	739-4510 Ext 2584
Edwards AFB (AFSC) Edwards AFB CA 93523	0730-1700 Gas 80 / Oil	277-2474
Hamilton AFB (ADC) Hamilton AFB CA 94934	0800-2000 Gas 80 / Oil	838-4447
Los Angeles AFS (AFSC) Los Angeles Intl Airport Los Angeles CA	24 Hours Gas 80 / Oil	643-1882
March AFB (SAC) March AFB CA 92508	0800-1800 Gas 80 / Oil	655-2455
McClellan AFB (AFLC) Sacto-Exec Airport Sacramento CA 95822	0800-Sunset Gas 80 / Oil	428-2812
Norton AFB (MAC) Norton AFB CA 92409	0800-1700 Gas 80/100 / Oil	876-2545
Travis AFB (MAC) Tolinas Air Strip Travis AFB CA 94535	0800-Dark Gas 80 / Oil	(707) 437-3470 (707) 438-3237
Vandenberg AFB (SAC) Vandenberg AFB CA	0900-1800 Gas 80 / Oil	734-5328
COLORADO		
Ent AFB (ADC) Peterson Field Colorado Springs CO	24 Hours Gas 115/145 / Oil	635-8911 Ext 4310
Lowry AFB (ATC) Buckley Field Denver CO	0730-1630 Gas 80 / Oil	553-3660 Ext 508
USAF Academy (USAFA) USAF Academy Air Field Colorado Springs CO 80840	0800-1700 Gas 80/100 / Oil	472-4423
FLORIDA		
Eglin AFB (AFSC) Eglin AFB FL	0730-1630 Gas 80 / Oil	882-5948
MacDill AFB (TAC) MacDill AFB FL 33608	0800-1700 Gas 80/87 / Oil	830-3391
Patrick AFB (AFSC) Patrick AFB FL	0800-1700 Gas 80 / Oil	494-4356
Tyndall AFB (ADC) Tyndall AFB FL 32401	0800-1600 Gas 80 / Oil	283-2636
GEORGIA		
Moody AFB (ATC) Valdosta Municipal Airport Valdosta GA 31601	Daylight Gas 80/100 / Oil	244-1527
Robins AFB (AFLC) Robins AFB GA 31093	0800-1700 Gas 80 / Oil	922-2634
HAWAII		
Hickam-Wheeler AFB (PACAF) Wheeler AFB HI 96515	0730-1900 Gas 80/87 / Oil	656-161

STATE, CLUB & FLYING LOCATION	SERVICE AVAILABLE	PHONE NO.
ILLINOIS		
Chanute AFB (ATC) Chanute AFB IL	0730-1930 Gas 80/100 / Oil	(217) 893-3111 Ext 3384
Scott AFB (MAC) Scott AFB IL	0930-1730 Daily 0800-1700 Weekends Gas 80/100 / Oil	256-4394
INDIANA		
Grissom AFB (SAC) Grissom AFB IN	0800-1700 Gas 80/100 / Oil	689-7258
KANSAS		
Forbes AFB (TAC) Forbes AFB KS 66620	0800-1700 Gas 80 / Oil	865-4517
McConnell AFB (TAC) McConnell AFB KS 67221	Daylight Gas 80 / Oil	685-1151 Ext 5180
LOUISIANA		
Barksdale AFB (SAC) Barksdale AFB LA	0800-1630 Gas 80 / Oil	423-8871
England AFB (TAC) England AFB LA	24 Hours Gas 80 / Oil	(318) 448-5609
MAINE		
Loring AFB (SAC) Loring AFB ME	0730-1630 Gas 80 / Oil	3207
MARYLAND		
Andrews-Bolling AFB (HQ COMD) Hyde Airport Clinton MD 20735	0800-Sunset Gas 80 / Oil	297-9229 297-4618
MASSACHUSETTS		
L. G. Hanscom Field (AFSC) L. G. Hanscom Field MA 01730	24 Hours Gas 80 / Oil	861-5731
Otis AFB (ADC) Otis AFB MA 02542	Daylight Gas 80 / Oil	(617) 563-2215
Westover AFB (SAC) Westover AFB MA 01022	24 Hours Gas 80 / Oil	593-3183
MISSISSIPPI		
Keesler AFB (ATC) Keesler AFB MS	1000-1800 Gas 80 / Oil	3849
MISSOURI		
Whiteman AFB (SAC) Whiteman AFB MO 65301	0800-Sunset Gas 80/100 / Oil	563-3311
NEBRASKA		
Offutt AFB (SAC) Offutt AFB NB	24 Hours Gas 80/100 / Oil	292-1517
NEW JERSEY		
McGuire AFB (MAC) McGuire AFB NJ	0800-1700 Gas 80 / Oil	3113
NEW MEXICO		
Hollomon AFB (AFSC) Midway Airport NM 88310	Daylight Gas 80 / Oil	(505) 437-0490
Kirtland AFB (AFSC) Kirtland AFB NM 87117	Prior Request Gas 80 / Oil	(505) 247-1711 Ext 3486
NEW YORK		
Griffiss AFB (AFLC) Griffiss AFB NY 13440	0800-1800 Gas 80/100 / Oil	(315) 330-3435
NORTH CAROLINA		
Seymour-Johnson AFB (TAC) Seymour-Johnson AFB NC	0730-1730 Gas 80 / Oil	736-1864
OHIO		
Wright-Patterson AFB (AFLC) Wright Field OH	0730-1630 Gas 80/100 / Oil	255-3847
OKLAHOMA		
Tinker AFB (AFLC) Tinker AFB OK	0930-1630 (Except Sun & holidays) Gas 100 / Oil	732-7321 Ext 2467

STATE, CLUB & FLYING LOCATION	SERVICE AVAILABLE	PHONE NO.
Vance AFB (ATC) Vance AFB OK	0700-Sunset Gas 80 / Oil	237-2121 Ext 7223
SOUTH CAROLINA		
Charleston AFB (MAC) Charleston AFB SC 29404	0800-1700 Gas 80 / Oil	747-4111 Ext 3614
Shaw AFB (TAC) Shaw AFB SC	0800-Sunset Gas 80/100 / Oil	436-6123 436-6389
SOUTH DAKOTA		
Ellsworth AFB (SAC) Ellsworth AFB SD	0700-Sunset Gas 100 / Oil	923-1955
TENNESSEE		
Arnold AFS (AFSC) Arnold AFS TN	Daylight Gas 80/100 / Oil	455-2611
TEXAS		
Bergstrom AFB (TAC) Bergstrom AFB TX 78743	0730-Sunset Gas 80 / Oil	385-3586 Ext 2301
Kelly AFB (AFLC) International Airport San Antonio TX 78216	24 Hours Gas 80/100 / Oil	824-2313 Ext 64
Perrin AFB (ADC) Perrin AFB TX 75090	0800-1800 Gas 80 / Oil	2504
Randolph AFB (ATC) Randolph AFB TX 78148	0830-1900 Gas 80 / Oil	(512) 652-4364
Sheppard AFB (ATC) Sheppard AFB TX 76311	0800-1700 Gas 80 / Oil	2160
Webb AFB (ATC) Webb AFB TX 79720	1630-Sunset Daily 0800-Sunset Weekends Gas 80 / Oil	(915)263-1344
UTAH		
Hill AFB (AFLC) Hill AFB UT	0900-1800 Gas 80 / Oil	3566
VIRGINIA		
Langley AFB (TAC) Langley AFB VA	0800-Sunset Gas 80/100 / Oil	764-2743
WASHINGTON		
Fairchild AFB (SAC) Fairchild AFB WA 99011	0800-Sunset Gas 80 / Oil	244-9292
CANAL ZONE		
Albrook AFB (USAFSO) Albrook AFB Canal Zone	24 Hours Gas 80 / Oil	86-7210
PUERTO RICO		
Ramey AFB (SAC) Ramey AFB PR	0730-2200 Gas 100 / Oil	22251 7287
EUROPEAN AREA		
Bentwaters/Woodbridge (USAFE) RAF Bentwaters England	Daylight Gas 91/96 / Oil	2557
Bitburg Air Base (USAFE) Bitburg AB, Germany	Daylight Gas 80 / Oil	7410
RAF Lakenheath (USAFE) RAF Lakenheath England	Daylight Gas 80 / Oil	2106
RAF Wethersfield (USAFE) RAF Wethersfield England	24 Hours Gas 100 / Oil	2478
Sembach Air Base (USAFE) Sembach AB, Germany	0800-Sunset Gas 80/87 / Oil	06302-7-7630
Torrejon Air Base (USAFE) Torrejon AB, Spain	0800-1700 Gas 115/145 / Oil	6517
PACIFIC AREA		
Clark Air Base (PACAF) Clark AB, Philippines	0600-1800 Gas 80/100 / Oil	23214 24460
Kadena Air Base (PACAF) Yontan Airfield, Okinawa	Daylight Gas 115/145 Oil	24296 24460
Misawa Air Base (PACAF) Misawa AB, Japan	24 Hours Gas 115/145 / Oil	3881 ★

EXPLOSIVES SAFETY

for munitions, weapons, and egress techs

BOMB CARE

After the BDU-33A/B practice bombs were downloaded from an F-4, the bombs were stored nose down in racks on a handling trailer. Normally a simple and safe operation, it was not to be so this time.

The BDU-33A/B carries a signal in its tail which functions through impact inertia. (The signal falls on a fixed firing pin upon impact.) In this case the bomb received some rough handling so that the signal fired when the bomb was placed in the rack. One of the crew had his hand over the signal when it went off, rather than in a safe location on the bomb, and he was injured. Supervisors must continue to stress the elementary principles of explosives safety, and men who work with explosives must take a professional approach to the job at hand.

TOWING TROUBLE

Two airmen towing a pair of M-5 trailers loaded with bombs and rockets to the flight line violated an all important rule of towing safety—"*Make sure the hitch is properly secured.*" The tractor driver, after hooking up the first of two trailers to the tractor, maneuvered the tractor and trailer into a position where the second airman was able to hook up the Nr 2 trailer. The second airman later said he couldn't find the pin for the pintle hook, but he did hook up the safety chains. He neglected to tell the driver that he couldn't find the pin for the pintle hook. Enroute to the flight line, the second trailer broke loose from the first trailer as they passed over a ridge in the road. The pintle hook on the first trailer opened, allowing the Nr 2 trailer to swing loose and break the safety chains. Negligence on the part of the airman who hooked up the second trailer was the prime cause of this incident.

On the other hand, proper supervisory inspection of the M-5 trailers would have detected the missing safety pin before the trailer was put into use. Take a good look at your towing vehicles and trailer hitches to see that they are in compliance with TO 36-1-44 dated 18 Jun 69.

Supervisors, be sure all your personnel know why it's important to put the safety pin in the pintle hook. ★

Toots

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

Dear Toots

During a recent flightline visit, I was observing a C-141 refueling operation. From my vantage point some 50 feet from the refueling operation, I was unable to tell which member of the refueling team had possession of the checklist. So I put the question to my escort, a SMSgt. He then informed me that the C-141 Dash 2 states the refueling supervisor will be someone other than the cockpit panel monitor. However, the C-141 refuel checklist states the refueling supervisor will be the man in the cockpit. This would indicate an error in either the checklist or the Dash 2. I asked my escort if an AFTO 22 had been submitted. He said he thought so, but he wasn't sure. How many times have you been confronted with a similar situation?

Observer-at-large

Dear O-A-L

I receive letters all the time from personnel requesting clarification of tech data. To help the technical writers clarify and/or correct the TOs, any time you find something that is not right, submit an AFTO 22, or if you're from the ops side, the form number is 847. Instructions for submitting the forms are in TO 00-5-1. Next time you hear someone cussing out the stupid people who write the tech orders, remind him that tech writers are human and humans sometimes make mistakes. Also, a TO may be correct when published, but over a period of time become outdated.

If you know of a TO deficiency but do nothing about it, you then become a part of the reason the deficiency was not corrected.

Toots

Dear Toots

We have recently been up in the air about an underwater problem. The members of our club, Aqua Falcons Skin & SCUBA Diving Club of Clark Air Base, have had a heated argument over the suitability of the military type flotation device, known as the LPU, to sports SCUBA diving. One school argues that the LPU is good enough for Air Force PJs so it's good enough for sports SCUBA divers. The other school argues that the LPU was not designed for constant use in the water and that because two inflators must be actuated instead of only one as in the conventional vest, that it is half as safe. The vest type will float an unconscious person head out of the water when inflated and there is argument whether or not the LPU will do the same. A diver's vest must be designed for use at depths as great as 250 feet. It must have a mechanical and oral inflator. It must float an unconscious person head out of the water. Do you know of any reason why the LPU unit should not be used by sports divers? Is it any better than the conventional vest type?

TSgt Charles Cardin
Box 1012
APO San Francisco 96274

Dear Sgt Cardin

I checked with one of our flight surgeons who has had some experience in this area. His advice is against using the LPU for SCUBA diving. The basic design is for flotation, not buoyancy control. It is bulky and might lead to entanglements and/or entrapment. Its bulk and underarm location could easily interfere with emergency jettison of tanks and weight belts.

Toots

Ops topics

LACK OF CONTROL

This one's hard to believe! Crew of a two-place tandem airplane was preparing for a cross-country. In the process of jamming his clothes into every nook and cranny he could find in the airplane, the front-seater decided to place his fancy civilian shoes under his seat. But the seat was all the way down. So he waited until after engine start, raised the seat and smartly slid his shoes under it—he thought.

On the way to the runway the two pilots wobbled the stick around the cockpit, but failed to perform a complete "wipe-out" check with it. And—when they got ready to rotate the bird for takeoff, they found the stick wouldn't come back as far as it should.

The aborted takeoff included locked brakes, blown main gear tires and a trip into the mud off the side of the runway.

They found a shoe wedged between the stick well barrier and the lower portion of the control stick.

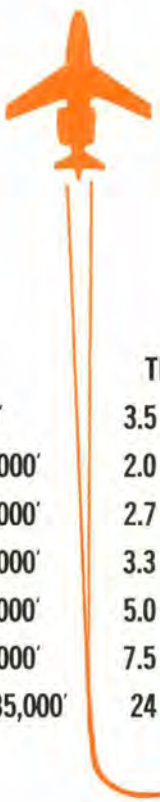
The unit reporting this adventure concluded their report by saying: "We seriously considered prohibiting storage of any personal item under the seat; however, it is our judgment that because of the very limited space available for clothing this would not be feasible or desirable."

Seems like anything would be more desirable than taking a chance on losing control of the airplane—even wearing your size 12 L'il Abner boots to the ball while you're off on a weekend nav prof trip. ★

T-39 THRUST RESTRICTION

The reduction in time-limits for use of military thrust from 30 mins to 5 mins imposed by TO 1T 39A-1S-31, has led to occasional questioning by FAA controllers regarding rates of climb.

The Directorate of Aerospace Safety has forwarded to the FAA Liaison Office the following figures with a request that all controllers be advised of the reduced rates of climb. (Data is based on standard day, maximum weight aircraft.)



	TIME	RATE OF CLIMB
S.L. to 10,000′	3.5 mins	2900′/min
10,000′ to 15,000′	2.0 mins	2400′/min
15,000′ to 20,000′	2.7 mins	1850′/min
20,000′ to 25,000′	3.3 mins	1500′/min
25,000′ to 30,000′	5.0 mins	1000′/min
30,000′ to 35,000′	7.5 mins	660′/min
Total Time to 35,000′	24 mins	@ average 1450′/min

It would behoove each FSO to pass this information to his local Air Traffic Control Board so "everyone gets the word." It could help allay some of the existing confusion over why we're now taking so long to get to altitude. ★

Maj Edwin L. Marsh
Directorate of Aerospace Safety

DON'T-EJECT LIGHT

In a recent F-4 incident, the front canopy came off the airplane shortly after takeoff. The aircraft was just about to enter a 500-foot overcast, and the aircraft commander made a quick decision, pushed over and stayed visual below the murk.

Wind noise in the cockpit made communication between the two pilots impossible. With the bird nosing toward the ground in an increasing bank, the rear-seater couldn't tell if his buddy up front still had control of the situation. The GIB ejected; the A/C brought the bird home with BOTH canopies missing.

We don't fault the rear-seater for ejecting even though he had not seen the "eject" light. As far as he knew, he had no way of communicating with the front seat, and the ground was coming up at an alarming rate.

Although the unit to which this crew and aircraft were assigned apparently didn't employ it, there is another means of communicating between cockpits in this situation. Many two-place fighter and interceptor outfits have briefed variations of the system over the years.

All you need is a light that can be switched back and forth between the cockpits—such as the TACAN or command radio control indicator light. In a situation where interphone is lost or unusable, and there is a question of abandoning the aircraft, the front-seater can flash this light in the other cockpit to indicate that he has the situation under control and there is no need to eject (a "don't eject" light). If the back-seater hasn't received such a signal, but is wondering about it, he can interrogate the front cockpit by flashing the light. If he receives a flashing light in response, all is well. If he receives no response after a reasonable length of time or sees an "eject" light (this will depend upon the circumstances), he's cleared to go.

Of course, this system must be briefed and understood in advance. It should be standardized among all crews in the outfit, and specifically briefed, or at least referred to during each pre-mission briefing. Since these navaid or radio control lights are often on a side panel under your elbow in the cockpit, the pilot in front should think to look specifically for the light when he's lost intercom with the other cockpit. Better, he should signal his all's-well to the rear seat as soon as possible after the canopy unexpectedly departs—or in other similar situations. ★

FLIP CHANGES

Terminal Control Area (TCA) procedures were expanded, effective 20 Aug 1970, to include the Chicago and Washington DC areas as well as Atlanta. See Special Notices, FLIP Planning Section II, N&S America.

In the interest of economy, production cycles for many FLIP products, world-wide, have been or will be expanded, i.e., U.S. Terminal High Altitude Procedures are now published every 56 days vice every 28 days. Users are requested to check expiration dates closely and to care for the publications wisely in order to make them last throughout the expanded periods. ★

ROLLING TAKEOFFS

BAK-type arresting gear cables are very efficient at catching airplanes. For most of us that's a good deal—and we're happy about it. But not so for the T-39 types; they're not too happy about all that efficiency because the cables frequently catch, bend and disfigure landing gear doors on the Tiny 'Liner.

Recent case in point: A not-too-experienced T-39 pilot attempted a rolling takeoff over a BAK-9 cable. He thought he'd held the speed sufficiently low until he'd crossed the cable, but apparently he wasn't slow enough. After he was airborne, he couldn't get the gear to indicate up and locked. After the bird landed, both main gear door leading edges were discovered bent. And the right uplock roller was found adjacent to the cable on the runway.

Lesson: Forego the rolling takeoffs in T-39s when there's a cable on the runway. *Taxi* across it, then take off! ★

Ops topics

CONTINUED

THANKS, TOWER!

It was one of those little, barely adequate fields in Southeast Asia that C-130s frequently use. Parking and ramp space were at a premium, and when the big birds landed they immediately back-taxied up the runway to the aerial port ramp. This arrangement worked well as long as traffic wasn't too heavy.

But then one day when a C-130 landed, he was instructed by the tower to clear the runway onto the small civilian ramp. A C-47 had landed behind the C-130 and would have to clear the runway before the C-130 could taxi back on the runway to the aerial port ramp.

To give you an idea of how small this civilian ramp was, the C-130 pilot had to taxi with his left wingtip up against a fence in order to keep his right wing from overlapping the runway. To add to his concern, the ramp was covered with numerous large rocks (3 to 4 inches in diameter) which were used to fill holes in the ramp surface. While he diverted his attention momentarily from his wingtip to the ramp surface, the wing brushed against a lamp pole and then contacted the corner of a building. He brought the bird to a stop, reversed and extracted the wing from the building.

According to the rules, the pilot was at fault—he picked up the primary cause. Contributing was the airbase in that the maneuvering area is extremely limited for C-130 aircraft.

But what about the control tower? A little judicious spacing of landing traffic could have averted the whole flap. ★

ASKING FOR TROUBLE

It was to be a simulated right-engine-out landing on a first pilot upgrade check in a T-29. At touchdown the IP put the left engine in reverse. As the bird drifted alarmingly toward the left side of the runway, the IP took control and applied full right rudder and then right brake. He observed no reaction to either. Even with full right turn on nose wheel steering, the airplane continued to slide. It went off the left side of the runway. When the IP finally put the left propeller in forward range, the airplane straightened out and paralleled the runway until it ground to a stop.

Damage was limited to a couple of runway lights and some bent and chipped propeller blades.

The report named hydroplaning and weathervaning as the cause of the incident because it was raining and there was a 16-knot wind blowing across the runway. It didn't criticize the IP's judgment. The unit decided to "brief all pilots on dangers involved in practicing a single-engine reverse on a wet runway with a crosswind."

The key word here, of course, is "practicing." You may have to do your single-engine thing on a slick runway with an adverse wind some day, but there's no point in practicing under conditions that bad. You don't set the wing afire before practicing engine fire procedures do you? ★

TEMP CONVERSION

Ever get a temp that you wanted to convert quickly from Centigrade to Fahrenheit and you didn't have a computer handy and couldn't remember the formula? Here's an easy way we picked up from Air Canada's *Grapevine*. They credit Navigating Officer L. Vanden Driesen and Second Officer B. J. Caldwell for it.

°C, double it, subtract 10%, add 32.

Ex. 1: 10°C = 10 X 2 = 20
Subtract 10% −2
18
Add 32
Answer 50°F

Ex. 2: Watch the sign!
−40°C = −40X2 = −80°C
Subtract 10% = −(−8°)C
−72
Add 32
Answer −40°F

TECH DATA PACE

Lt Col Robert E. Walker, Directorate of Aerospace Safety

The Air Force is experiencing an alarming rash of mishaps which can be attributed to deficiencies in the use of technical data. Too many reports of investigation, board proceedings, inspections and evaluations include these familiar words: "Improper tech data was used . . . ," "Tech data was available but not used . . . ," "I used it but I missed that step . . . ," "I thought that he did it so I checked it off . . . ," "The TO's wrong so I did it the way I thought was right . . . ," etc. On it goes—the endless list of glaring, infamous details which when put together ultimately made an incident or accident inevitable.

In many instances briefings which cover mishap details serve as a part of the corrective or remedial action. Although this approach does have merit for illustrating what can and does happen, there are some basics which may assist in reversing the untenable trend toward poor use of technical data.

A review of mishaps provides some guidelines for preventing future incidents and accidents related to technical data. There are four areas which include a significant majority of the mishaps caused by erroneous use of tech data. These are:

PACE

Preparation. Many instances cite circumstances where technicians, mechanics, or aircrew members fail to have the proper tech data to perform all the necessary tasks. This varies from wrong tech data to no tech data at all. A few additional minutes of proper preparation to permit confirmation of the tasks to be performed and the availability of current tech data can save time, money, damage and embarrassment.

Attention. Too many reports relate details which, in the final analysis, could only occur because the individual was not paying attention to what he was doing. Lack of attention is the primary cause for:

- Missing steps or notes
- Performing steps out of sequence
- Not utilizing additional references
- Using the wrong tech order
- Not confirming tech order page currency

Correction. Synonymous with the previous observation is the case for correcting known tech data deficiencies. Errors are discovered or changes and improvements become necessary. Yet, individuals delay in generating change action to have a correction formally accomplished. Details and instructions for submitting corrective actions are outlined in Section VIII of TO 00-5-1. If need develops for a new tech order in the system, a letter should be submitted to the applicable Tech Order System Branch identifying the requirement.

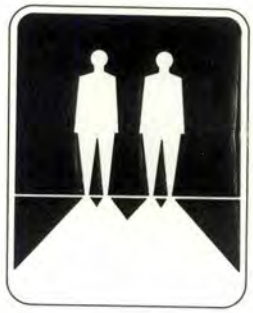
Education. Keeping the concepts of proper application and use of tech data foremost in the thoughts of the users is the most important aspect of all. Formal programs of both education and emphasis are currently in operation. But new ones can and should be developed. It's time for a revitalized approach to the tech data dilemma. An improved approach through more subtle means cannot be overlooked. Slogans, posters, informal discussions —all have their place in developing a tech data PACE program.

Now is the time to review your unit's tech data PACE program. How does it stack up? Spend some time evaluating the efforts expended in your unit for reducing mishaps through faulty or erroneous application of tech data caused by a lack of:

Preparation
Attention
Correction
Education.

Get in stride—keep PACE with tech data! ★

NUCLEAR SAFETY AID STATION



LOST HIS COOL

At an operational missile complex, a technician accidentally tripped a circuit breaker to the OFF position, which removed all readiness power from the complex. The technician immediately realized what he had done and took action to restore readiness power. Upon restoration of power, all of the water sprays in the silo activated and the Missile Combat Crew Commander's attempts to deactivate the sprays were unsuccessful. He then dispatched a technician into the silo, *alone,* to ascertain the extent of the problem. The silo is a NO-LONE ZONE and whenever a war reserve reentry system is mated to the missile, lone access is strictly prohibited.

This case illustrates a flagrant violation of the Two-Man Concept. The Two-Man Concept is a very important element of the Air Force nuclear safety program and is designed to prevent individuals from committing incorrect or unauthorized procedures which could result in a catastrophe. As it turned out, we had a happy ending, but it could have gone the other way. In an emergency, don't panic and by all means follow emergency procedures **to the letter.**

BACKWARDS

While performing Dash One-A maintenance, a technician inadvertently reversed a bracket on a warhead component. He immediately realized the bracket was on backwards. When an attempt was made to remove the bracket, he found it had seized to the component and was unable to remove it. The component was returned to the depot with the bracket attached. Embarrassing? Yes!

WR OR TR-MURPHY'S LAW AGAIN

What would you answer to a quiz question asking, "Are training quality components authorized for use on war reserve nuclear weapons?" Your answer would be an unqualified "No." Common sense would dictate this answer as well as the definition of a training quality item in TO-11N-4-1. Recently, an initial inspection of a WR weapon revealed that both suspension lugs were metal stamped "TR" above the part number. In addition, the bottoms of the lugs were marked "TR" in one-half inch characters (maybe Braille would help). Do not be a victim of "Murphy's Law"—keep your eyes open.

PINTLE HOOK BENDS BOMB

A loaded MHU-20/C clip-in had been transported from storage to the Maintenance Bay on an MHU-19/E for demating. During demating, the team chief noted a dent in the fuze section of one weapon. The unit was rejected and an investigation conducted. The towing operation had been accomplished with a farm tractor equipped with more than one pintle hook. It was determined that the hook on the left side of the tractor had contacted the bomb during a left turn. Neither the driver nor the team chief had observed the incident. Safety consciousness and motivation seem to be lacking in a situation like this one. The possibility of such an incident should have been apparent to the people involved and additional care should have been taken. "Should have" sounds like a Monday morning quarterback, but the need for constant safety vigilance is definitely illustrated.

NUCLEAR SAFETY AID STATION

CONTINUED

LEFT IS RIGHT AND RIGHT IS LEFT

While drilling secondary drain holes, a missile maintenance team inadvertently drilled into the missile lower umbilical cable. Procedures for this drain modification required that a hole be drilled through the launch tube liner at approximately 165 degrees as measured on the collimator bench. This is in the vicinity of the lower umbilical cable. At the time of the drilling, one team member was observing the operation from the work cage inside the launch tube and another team member was outside the launch tube doing the drilling. The third team member was in the upper equipment room observing the operation from the diving board area. The two men on level two were using two small pipes as a reference point for measurement. These two pipes are about four inches apart and lie between the launch tube heating duct on the right and the lower umbilical on the left as viewed from inside the launch tube. The maintenance man in the work cage estimated that a distance of about 12 inches, measuring left from the small pipe on his left across the lower umbilical, would put the hole approximately four inches to the left of the umbilical. He then told the maintenance man who was to do the drilling to drill the hole 12 inches from the left pipe. The man on the outside of the lines measured approximately 12 inches from the pipe on his left instead of the pipe on the left of the man inside the tube. Whoops—there goes another umbilical!

Confused? So were they!

BUDDIES

During a routine Guidance and Control (G&C) recycle, operations proceeded smoothly until step G, paragraph 4-5, TO 21M-LGM30A-2-10. While the crew was attempting to remove the access cover to the first ignition safe and arm device, three fastening bolts seized. The crew then proceeded to remove the reentry vehicle, penetration aids, and the G&C unit without pinning the first stage. Quality control inspectors arrived on the scene and discovered the discrepancy. The team was relieved and another team was dispatched to remove the access plate, intall the safing pin, and complete the G&C recycle.

This is an object lesson in negligence on the one hand and proper follow-through by the inspectors on the other. Attention to detail and nuclear safety are good buddies.

FOLLOW THE CHECKLIST

Over 1300 gallons of diesel fuel were spilled onto the equipment area in a missile silo during the refilling of a diesel fuel service tank. It appears that the technicians started the diesel fuel service pump and then left the silo area, in violation of technical order procedures, and proceeded to the Launch Control Center. Approximately four hours later, an alarm sounded in the control center and the technicians were dispatched into the silo to investigate. The diesel fuel had overflowed from the service tank onto the equipment area. Damage, fortunately, was limited to flex-ducting in the launch duct air conditioning system. This incident would not have occurred if the personnel involved had complied with the procedures in the applicable SAC Civil Engineering Manual. How many times have you heard—"Follow the checklist"?

FOR WANT OF A COTTER PIN

While downloading a B28 from an F-104, the rear lug hung up momentarily in the rack hooks—then released. The rear of the weapon abruptly dropped some three inches, breaking the pulse plug break pin. A detailed inspection of the MJ-1 table assembly cradle revealed that a cotter pin was missing from the lateral cylinder assembly. The absence of this pin led to the loss of the cylinder bracket locking pin and resulted in about one inch free play of the table assembly. Apparently, this free play allowed the aft lug of the weapon to bind in the rack hooks. For want of a cotter pin. . . .

DANGER — TRAPS on the FLIGHTLINE

Back in the pre-jet days one of the first things new flightline mechs learned was to beware of propellers. Most caught on quickly, but a few didn't and they either bear the scars or now rest beneath a marker engraved "Here Lies. . . ."

Perhaps some of us thought the jet would solve this problem. It didn't, for two reasons:

We still are not an all-jet air force, and

Jet engines can and do suck in or blast unwary people with sometimes fatal results.

So we not only have to teach the young airman respect for the whirling blades of a propeller but to give jet engine intakes and exhausts equal respect.

Unfortunately the problem is not that simple. Unless one is a fool, he will immediately recognize the danger in approaching too close to a propeller. Even when the engine is not running, one must use caution and be absolutely sure that someone in the cockpit is not about to fire the thing up.

In case you're thinking all this is obvious and why all the fuss, here's why:

IN THE PAST 10 YEARS 17 PEOPLE HAVE BEEN KILLED BY AIR FORCE AIRCRAFT PROPELLERS!

It would be logical to assume that the numbers have diminished over the years. Not so. 1968 was one of our worst years with four killed. That equalled 1960 (see the table on page 39.) And we have had some serious injuries this year.

A review of these unfortunate accidents does not indicate a clear pattern. Some occurred when men working in proximity to the aircraft apparently became distracted, or were so engrossed in what they were doing that they failed to notice the turning prop blades. Several involved non-flightline personnel who for some reason got into the path of moving aircraft or ran into propellers.

Mishaps involving jet engines are more numerous but generally not as drastic. These usually occur when mechanics working on the aircraft, such as trimming an engine, are sucked into the intake. Such incidents are seldom fatal but they frequently result in serious injuries. For example, one airman lost all the fingers on one hand and another lost an arm.

There have been several incidents in which airmen have tried to prevent foreign objects from entering the intake of a running jet engine only to be sucked in themselves. Their intent was laudable but not very smart. We can almost always fix a damaged engine but a man is something else.

Of course, both ends of a jet engine are dangerous. An airman was killed when he was cartwheeled nearly 100 feet by jet blast behind a fighter.

Another hazard around aircraft: people get caught in flaps and powered doors such as wheel well and bomb bay doors, sometimes with fatal results.

Now if you're looking for some words of wisdom—a sure-fire way to prevent these unfortunate mishaps, sorry. The learning process in this case does not lend itself to demonstration. About all we can do is tell you it can be very dangerous. Caution is up to you!

On second thought, though, there are a few things we could suggest.

If you are a supervisor, make sure your people are aware of the various traps they can get into around aircraft — props, intakes, flaps, doors, blast.

As an individual you can make sure that you know about these things and don't let your mind wander when you are in their vicinity.

Be aware that noise is a factor in most ramp accidents. It's surprising just how much we use our ears to alert us to approaching danger. But, if the noise level is high in the general area, this ability is seriously degraded to the point we have to rely almost entirely on sight. This tends to explain why whirling propellers, especially at night, are just not seen until too late.

Good organization and the systematic use of checklists will prevent most of those nasty little surprises, such as a flap being retracted when you're working in the well.

Finally, the flightline is a good place for the buddy system. Help look out for the other guy. You might even save his life. ★

BEWARE OF

WE LOST

1969	1	1964	0
1968	4	1963	2
1967	1	1962 HELICOPTER	1
1966	0	1961	1
1965	3	1960	4

ELECTRICAL HAZARD INFO

I was stationed in the USA last year (Comm. Course, Class 680410, Keesler AFB, Mississippi) and I know how important safety is to prevent electrical hazards. Now I'm stationed in Los Cerrillos Chilean AFB, Electronics Dept. Will you please send me some Safety Signs?

By means of your magazine, I would like to express my thanks to my classmates and instructors, wherever they are, for making my stay in your wonderful country such a happy one.

Capt Edgardo Yanez
Grupo de Aviacion No. 7
Base Aerea Los Cerrillos
Santiago de CHILE

Unfortunately, we do not have any posters on electrical or electronic hazards in our files. We are sending you a pamphlet, "Electric Shock"; the April 1969 issue of Aerospace Safety magazine which contains an article on electricity ("A Shocker," page 24); and the July 1969 issue containing "Do It Yourself Electrician" (page 20). I hope these are useful.

We are pleased that you enjoyed your stay and training in the United States, and are glad to pass on your message to your friends.

RADIO OUT PROCEDURES

The back cover of the May issue instructs pilots to SQUAWK Code 7600 if their radio is out, but neglected to advise them that the procedure only applies to IFR flight plan aircraft and that FAA does not interrogate Code 7600 continuously. Code 7600 is normally interrogated and monitored only when an IFR aircraft is suspected to have experienced radio failure.

The DOD (IFR) Enroute Supplement, page 425, establishes the procedure for aircraft on an IFR flight plan. However, paragraph 4, page 1-75, Airman's Information Manual, does not restrict use of the procedure to IFR aircraft. FAA was requested to consider revision of the AIM instructions to preclude misunderstandings and complaints by pilots on VFR flight plans who may expect a service that will not be provided.

Recommend the next issue of the magazine clarify the use of Code 7600 as being for IFR flight plan aircraft only.

Lt Col Doris D. Williams
Director, NAVAIDs Operations
Oklahoma City, Okla.

Thanks for the clarification. Jocks, take note.

RIGHT UNIT, WRONG PLACE

I can't spell Mabuhay, the greeting of the Philippines, so I'll have to say "Aloha." I've got one whole week behind me as a Clark AB resident, working in the 13th AF safety office. One of the first irate letters from readers that showed up in the "In" basket came from a member of the 355th Tactical Fighter Wing at Takhli. The page of your July issue identifies the "356th Tactical Fighter Squadron" at Takhli as recipient of a USAF Flight Safety Award. But there is no 356th at Takhli. He wants to know if the unit cited should be the 355th at Takhli—if so, "send us our prize."

Lt Col Carl Pearson
Clark AB, P.I.

You're right, there was a goof. Not ours this time, as we printed it just as we received it, but nevertheless the list of Flight Safety Awards for 1969 should have read "356th Tactical Fighter Squadron, Misawa AB." Better luck to the 355th next year.

☆ U.S. GOVERNMENT PRINTING OFFICE 1970 431-457/2

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.

MSGT JAMES A. ELLIS

TSGT JAMES A. HICKS

TSGT WILLIAM B. LANE

1 Special Operations Wing, Hurlburt Field, Florida

On 25 March 1970, Sergeants Ellis, Hicks and Lane discovered a critical defect in the Yankee Egress system of the T-28D and A-1H type aircraft which could have caused the system to fail if it were utilized during an emergency. While following up an EUMR on the T-28D primary extraction control handle, Sergeant Ellis from Quality Control examined an ejection system from a crash-landed A-1H that was in the Egress Shop. He noticed that the pulley stud was sheared and lying on the floor under the seat. He notified Sergeants Hicks and Lane of the Egress Shop who discovered that the pulley link lever had fallen loose. The pulley cover was pulled and after careful study, they determined that this failure was not caused by the aircraft accident. Realizing the seriousness of the failure and that pilot extraction would have been impossible, they informed their Materiel Officer who, in turn, notified the appropriate agencies.

SMAMA immediately grounded all T-28Ds and A-1Hs for a one-time inspection. This inspection was accomplished and three A-1Hs and seven T-28Ds were found with the same defect. Research revealed that the mechanical firing assembly required a 40-pound force to actuate the initiator; however, the pulley stud was shearing under an 18 to 20-pound force. Close coordination between two AMAs and Sergeants Hicks and Lane resulted in immediate replacement of the old aluminum studs with new steel ones and inclusion of these studs in the periodic seat inspection criteria. Within three days, Sergeant Hicks and Lane reinstalled the new studs in all the organization's T-28Ds and A-1Hs.

The outstanding achievement of Sergeants Hicks, Lane and Ellis is a significant contribution to the safety and well-being of all aircrews. WELL DONE! ★


the ONLY aerospace Vehicle
NOT LIKELY TO BE INVOLVED IN A MIDAIR!
CARELESSNESS CAN BE COSTLY!