



TAC ATTACK

DECEMBER 1968

SAFE ARM TIME...Page 4

Safe Arm Time, Page 4

for efficient tactical air power

TAC ATTACK

DECEMBER 1968

Vol 8 No. 12

TACTICAL AIR COMMAND

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Published by the Chief of Safety

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TACRP 127-1

Articles, accident briefs, and associated material in this magazine are non-directive in nature. All suggestions and recommendations are intended to remain within the scope of existing directives. Information used to brief accidents and incidents does not identify the persons, places, or units involved and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. Names, dates, and places used in conjunction with accident stories are fictitious. Air Force units are encouraged to republish the material contained herein; however, contents are not for public release. Written permission must be obtained from HQ TAC before material may be republished by other than Department of Defense organizations.

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Distribution F, Controlled by OSP - TAC Publications Bulletin No. 22, dated 3 June 1966 Autovon 254-2937

Angle of ATTACK



the true cause

A TAC airman was killed this fall when the car he was driving went out of control, skidded 700 feet and flipped seven times. Investigators reported his car was traveling more than 120 miles per hour when it went out of control.

The apparent cause of this fatal accident was speed. But was it the real cause? Driving 120 miles per hour on the highway is too gross an example to merely say, "Excessive Speed," and close the case.

Why do people do things (For example: speeding) that cause accidents?

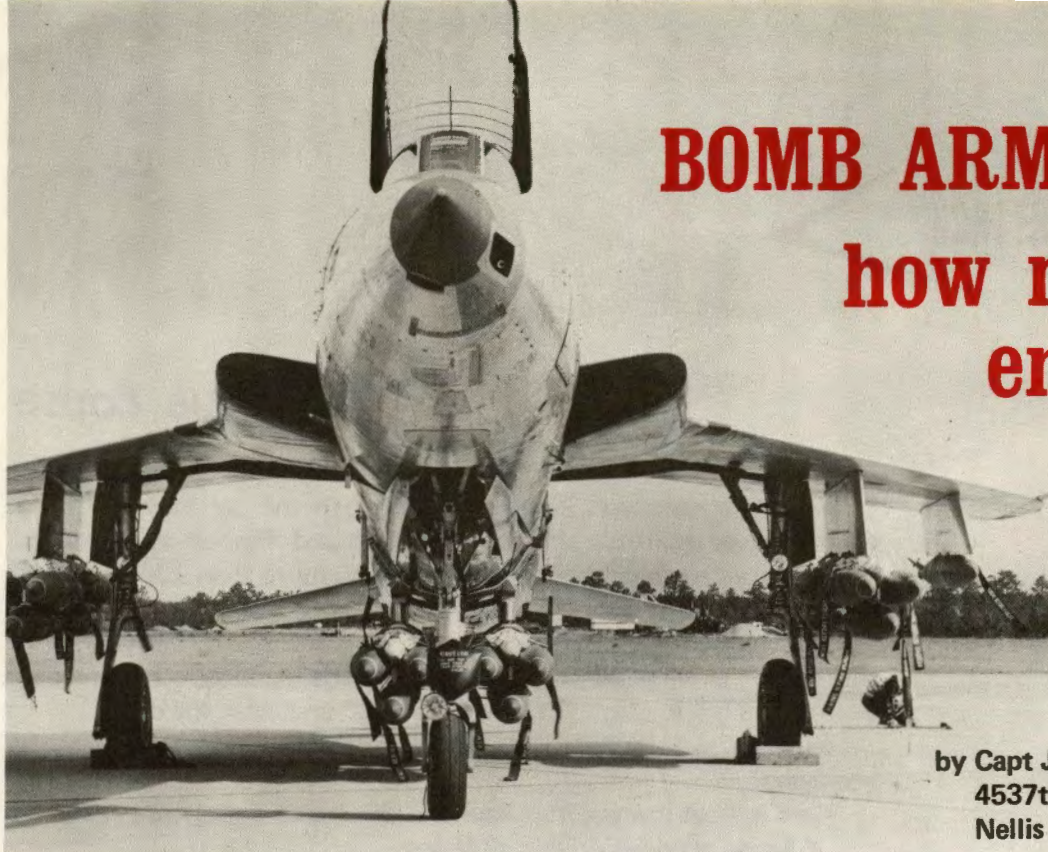
Here is what investigators found in this man's derogatory file:

- Three previous driving citations.
- An accident six months earlier – speeding a factor – that resulted in more than 100 days hospitalization.
- Not approved for reenlistment.
- An improper uniform citation.
- Drunk.
- Disrespect for Security Police.
- On control roster.

Now, the true cause – WHY this man was driving 120 miles per hour – becomes more apparent. Some individuals, apparently, have not developed the responsibility and self-restraint necessary to safely operate a motor vehicle. This is a flagrant example, but even brief lapses of responsibility can lead to accidents.

All of us who drive must be willing to accept responsibility every second we are behind the wheel. Those of us in supervisory positions have the additional obligation of protecting the lives of others. We must look beyond the obvious, determine the true causes, then seek to correct.

R. L. LILES, Colonel, USAF
Chief of Safety



BOMB ARM TIME...

how much is enough ?

by Capt John C. Morrissey
4537th Fighter Weapons Sq
Nellis AFB Nev

Captain Morrissey graduated from pilot training in Class 62-H at Laredo AFB and then attended basic and advanced gunnery school at Luke AFB. Duty with the 4440th Aircraft Delivery Group delivering F-105s from the Republic factory to Brookley AFB followed an F-105 checkout at Nellis. Captain Morrissey was then assigned to the 12th TFS in Okinawa in September of 1963. During his tour at Kadena, he was TDY to Da Nang and Korat on several occasions. He participated in the first F-105 strike in North Vietnam on 2 March 1965 and has flown as an F-105 pilot in SEA at least two months out of every year since 1965. He was assigned to the USAF Fighter Weapons School at Nellis AFB in April 1966. Now serving as an F-105 project test officer in the OT&E section of the 4537th Fighter Weapons Squadron, he was selected as the TAC pilot to fly the prototype Thunderstick II weapons system, and was one of two TAC pilots selected to evaluate the F-105 pilot recovery system.

At present Captain Morrissey is in SEA serving as Introductory Team Chief for the FMU-72/B Long Delay Fuze.

Is four seconds arm time a safe setting to use on an M117 bomb? Probably not. Safe arm time is defined as the minimum time that a bomb must be in the air before it becomes mechanically armed. Furthermore, it is assumed from a worst-case-safety standpoint that the bomb will detonate when mechanical arming occurs. This is an elusive subject because so many factors affect the safe arm time requirement.

I suppose it might seem unusual for a fighter pilot to be writing an article about fuzes, so perhaps a bit of background is in order. My interest in fuzes was kindled by a task assigned to me while I was a first balloon in a fighter squadron in the Far East. It seems that the object was to remove a steel coated door from the rear of the squadron immediately across the street. It went without saying, of course, that one of the primary objects of this exercise was to avoid detection.

Removing the door, heavy as it was, didn't worry me for I intended to pack the perimeter of the door with gunpowder and then seal it off with putty. The required escape distance (distance required to escape detection) was another matter entirely. Actually, this is how I first became

interested in a safe, reliable, long delay fuze. After several experiments, I finally settled on one of the oldest and most reliable time delay fuzes known to man -- the cigarette. Empirical data showed that a standard king size cigarette would consume 7 minutes and 30 seconds of burn time before reaching the filter. Adjustments to the safe escape distance could be made by attaching the primer cord closer to the lit end.

... Worked like a charm, because we were standing directly in front of the squadron in question, talking with their gunnery officer, when the door blew off the hinges precisely seven and one-half minutes after ignition (we had selected a non-delay function time).

During the past three years I have had the opportunity to work with conventional munition fuzing on a more scientific basis and become better acquainted with the problems associated with iron bomb fuzing. With this in mind, I would like to explore a common belief associated with our subject and discuss its validity with you, the fighter pilot.

The following items are the main factors affecting arm time selection:

1. The recovery maneuver used.
2. The type of bomb.
3. The air density.
4. Tolerances on fuze arming time.

The recovery maneuver is important to consider because most Dash 34 fragmentation envelope clearance tables are predicated on a 4G recovery attained 2.0 seconds after release. This is true for all conditions except the level release condition where no pull-up is initiated. The recovery maneuver, by the way, is figured from 2.0 seconds after the *last* bomb has been released.

Let's examine the case where we are rippling 8 bombs from an F-105. Time to ripple the bombs is 840 milliseconds (almost one second). During this interval the bombs that are being rippled are virtually flying with the delivery aircraft as no recovery maneuver has been initiated. It is after the last bomb has been released that we are allowed two seconds to attain the 4Gs required for recovery.

The type of bomb is an obvious factor to consider in selecting a suitable arm time and assuming factors 1, 3, and 4 remain constant. The

greater the fragmentation pattern the greater the arm time requirement.

Air density is a factor often overlooked in selecting proper safe arm time. This is extremely important when you consider that at 21,000 feet atmospheric density is approximately one-half the sea level value. Fragments of an exploded bomb react to this by not slowing down nearly as fast as they would at sea level. Consequently, more safe escape distance is required (ever dropped bombs straight and level on a sky spot mission from 20,000?).

As a rule of thumb, safe escape distance is inversely proportional to air density; i.e., escape distance at 21,000 feet is twice the sea level requirement.

Finally, let's consider fuze arming tolerances. We want four seconds of safe separation when we select it, but what are we actually getting? In an M-905 arming tolerance is ± 20 percent; the FMU-26B is ± 250 milliseconds, and the M-904E2 is ± 10 percent.

Putting all these variables into a typical F-105 eight bomb mission, let's drop M117 bombs in a 45 degree dive condition at 520 knots in ripple mode and select the minimum safe arm time. For our problem let's assume our recovery maneuver



BOMB ARM TIME

will be the standard 4Gs attained in two seconds.

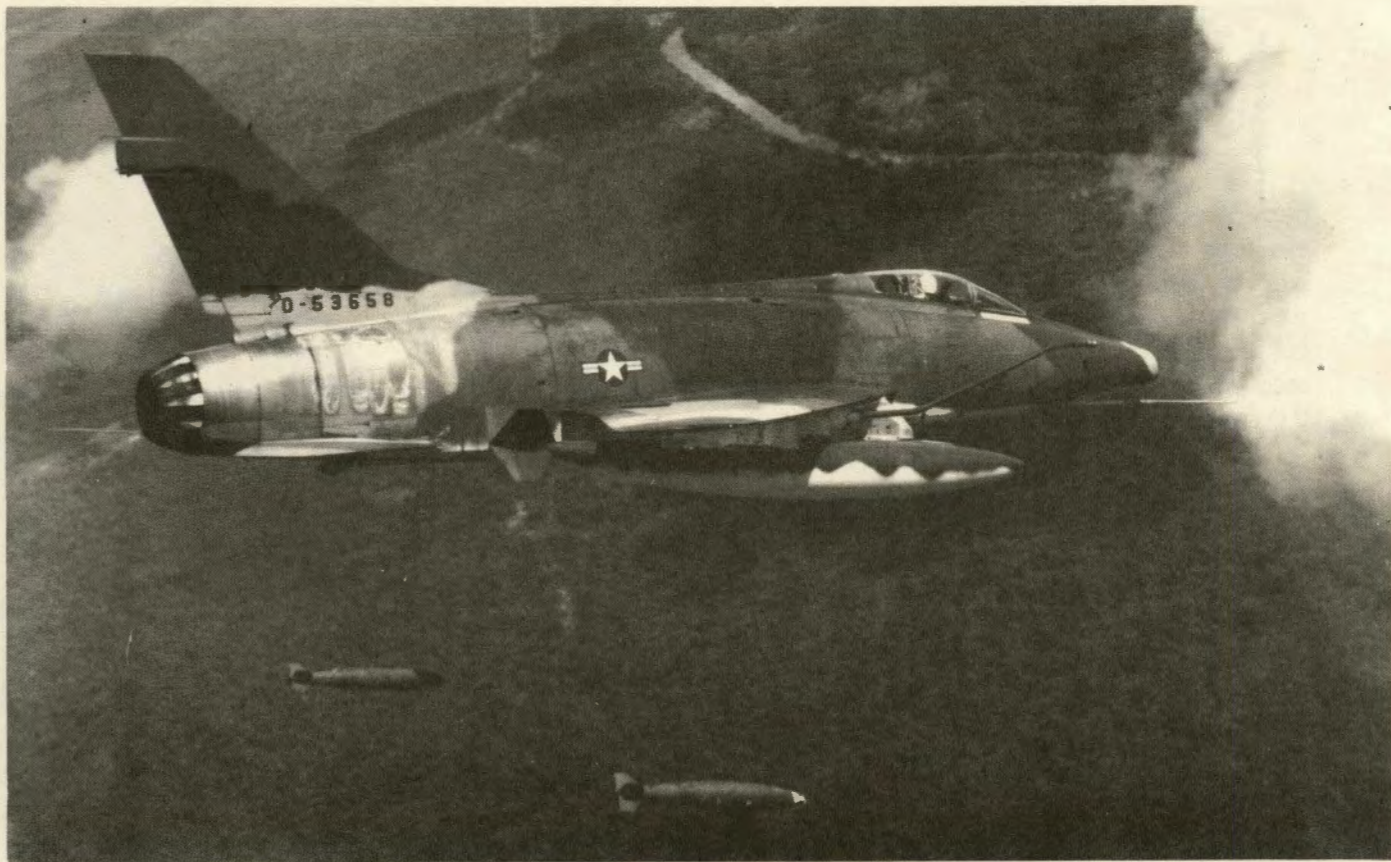
We now get into the areas of partial fact and extrapolated data. Your minimum fragmentation clearance altitudes are all based on sea level escape criteria. The fact that you are releasing 7 or 8 thousand feet MSL is not considered. This minimum altitude is valid only for a surface burst and is assumed to be valid for an air burst as there is no empirical data for air burst fragmentation clearance problems.

The F-105B -34-1-1 lists the minimum release time of flight for one M117 as 4.85 seconds. Now let's figure that we will be delayed from pulling up for at least 840 milliseconds more while the aircraft is releasing the remaining bombs. This puts us almost one second into the two allowed for attaining 4Gs. If we were using the M-904E2 fuze in the nose which has a ± 10 percent tolerance, we must consider the first bomb released fully armed at 3.6 seconds. Therefore, having determined that the minimum time from

release until the first bomb becomes armed is 5.7 seconds (minimum safe arm time for the first bomb released plus time required to complete the ripple) we can see that if the first fuze were to arm and detonate at 3.6 seconds we would be 2.1 seconds from the outer edge of the safe escape envelope. (Remember all those M117 bombs you dropped with 4 second arm time?)

Now let's take our aircraft up to 18,000 and ripple those 8 M117s with a straight and level fly through. What is the minimum arm time now? There is no such figure listed in the F-105-34; however, the F-4C-34 lists 9 seconds. The M-904E2 fuze would have to be set on 10 seconds to take care of the 10 percent tolerance. It works out, in fact, that considering the low end of the fuze arming tolerance, it is impossible to be outside the safe escape envelope with any iron bomb when using a 4 second arm time.

The general rule is that fuze safe arm time must be selected so that the minimum value





(desired value minus the tolerance) will be equal to or greater than the minimum safe arm time required. Conversely minimum drop altitude, considering your selected dive angle and true airspeed, is a function of selected arm time *plus* the tolerance. Drop it high enough to arm with the fuze set on the minimum safe arm time for your particular weapons delivery condition and type weapon. (Ever divert from a dive bomb mission to a sky spot mission without regard to the arm time set on the fuze?)

This information may come in handy, especially since we now know that approximately one FMU-26/B fuze detonates at the expiration of safe arm time for every seven hundred dropped.

How do we come up with these figures? It is true that not all the Dash 34 handbook values are listed in easy to read formats. However, most of the data can be extracted. For instance, we know the minimum altitude for a certain type weapon and delivery condition from the minimum fragmentation clearance table in the Dash 34. This altitude may then be used in the ballistic tables (same weapon and release conditions) to determine the minimum time of fall.

When using a ripple release, use the minimum release altitude of the last weapon and add the time required to ripple all weapons to the minimum arm time associated with the last bombs' altitude. This minimum time of fall is then set into the bomb fuze; e.g., a minimum time of 5.8 would require an 8 second arm time

on an M-904E2 as the minimum value for 6 seconds would be 5.4 seconds (.4 seconds short in a worst case condition). Finally check your Dash One to see if your ground clearance is adequate for dive recovery.

The above method for determining arm time is lengthy, but it is the only way to approach problems not considered in the Dash 34; e.g., determining the minimum arm time requirement for 5 MK-83s ripped from an F-105.

On the subject of fuzes, it might be worth while to note that several new fuzes are coming into the USAF inventory. They are the FMU series. All use internal arming wires mounted completely inside the fuze well of all currently manufactured M or MK series bombs.

The FMU-56/B and the FMU-57/B are proximity fuzes and their radomes extend forward of the bomb nose. The FMU-57/B is the low-altitude-iron-bomb-proximity fuze. The FMU-56/B is used to function the SUU-30B/B canister (CBU-24B/B and CBU-29B/B).

Information concerning these fuzes, their function, arm times, tolerances, and any warning notes will be covered in operational supplements to your Dash 34. Several of these fuzes have fixed arm times. Others have settings which could be hazardous; e.g., a two-second arm time in a FMU-26/B fuze.

At the Weapons Center we are attempting to thoroughly test these new fuzes and munitions before they reach the field. We are also attempting to make known TAC's requirements for forthcoming RAD's. In any event, when new munitions reach the field, you can be certain that someone at the Weapons Center has been through the "Graduation Exercise" first. ➤

AUTHOR'S NOTE:

The above discussion is based on the assumed validity and accuracy of the fragmentation clearance envelope in the F-105B-34-1-1 and TO F-4C-34-1-1S-19. As we learn more about conventional weapons and their effects, it is not only possible, but probable that more accurate fragmentation envelopes will be developed. If and when they do, the fundamentals of this article will still apply.



BARKING

by Lt Col Carl E. Pearson

Listen, recip types, that backfiring engine's trying to tell you something about survival...yours and the airplane's. It's not playful barking, like a happy, healthy pup's. You're toying with a sick, coughing canine. Ignore it and it'll soon disprove that old wives' tale about barking dogs never biting.

It happened to a dollar-nineteen pilot recently. About ten minutes after engine start, number two backfired intermittently at taxi throttle settings below 1100 rpm. Undaunted, he ran it at 1100 rpm and above, accepting the rough-running engine.

On runup his left engine power checked okay. And number two's left mag drop reduced from seven to five PSI of torque after ground defouling. Satisfied with his power plant output, he launched.

Accelerating on takeoff roll, his left engine increased torque smoothly to 165 psi. His right engine advanced slowly, sluggishly to a max of 163 psi at 58 inches MAP, holding until liftoff and gear up. Then it backfired twice... torque dropped to zero. He feathered the complaining engine, noting a 220 degree CHT and other instruments indicating normal. His altitude: 200 feet. Airspeed: 100 knots.

Complicating things, the left engine started backfiring, losing thrust with each cough. He eased back on his one good throttle, reaching 42 inches MAP before backfiring and torque loss

stopped. Now unable to hold his 200 feet at 100 knots, he turned back, lining up about 45 degrees off runway heading. His gear lowered and locked just before touchdown, the added drag stalling the slow-flying bird. Landing on turf about 30 degrees off runway heading, the Boxcar rolled across one runway, through a six-foot deep ditch, and stopped on the primary runway. Finally lined up with the runway, the bird had dirty feet. Fortunately, little else was damaged.

Maintenance investigators found the intake manifold feeding numbers one and two cylinders blown open at the base, cooling baffles on One, Two, and Three showed fire residue, plug leads on Two and the coil on Three were charred. The fire wall on number two nacelle buckled and shielding on prop conduits burned, but no metal particles turned up in engine oil screens. Engine time since major overhaul totaled only 324 hours.

Surprisingly, number two engine ground checked "within limits." This in spite of its failure to hold less than METO power without backfiring during a three minute flight... that somehow ended without tragedy.

Maybe it's inexperience, complacency, or lack of understanding on the pilot's part. Flight manuals offer specific guidance on handling backfiring engines during ground operation. They say take it back and find out why. They aren't too specific about what progressive destruction goes on inside a backfiring engine. Perhaps that's

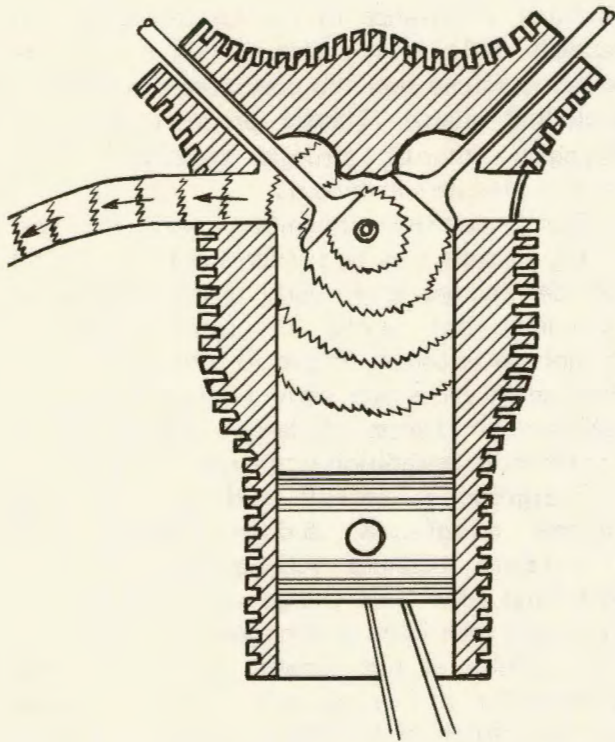
DOGS DO BITE !

Dogs do bite!

why he ignored it. The following may help.

WHAT'S BACKFIRING?

Not all the snap, crackle, pop a recip puts out is backfiring. That unwelcome noise can be backfiring, afterfiring, preignition, detonation, or a combination thereof, depending on where, when, and why the unwanted mini-blasts occur. They're all bad actors, but the loudest reports come from backfiring and afterfiring engines. Let's look at backfiring first.



Simply defined, backfiring's a too-lean mixture looking for more fuel and finding it when

the intake valve opens. This explosive "meeting" tears up intake manifolding, induction systems, power sections, supercharger sections, and carburetor components. And engine failure can occur after the first backfire or the next one. How many it takes is anybody's guess.

An extremely lean mixture won't burn, or burns so slowly that flame lingers in combustion chambers through completion of the exhaust stroke. When intake valves open, the still-burning mixture ignites the incoming fuel charge. The resulting explosion reaches back thru the open intake port to the carburetor deck, pounding induction system plumbing enroute.

Besides the angry noises, cockpit indications of backfiring include: wide torquemeter fluctuations, dropping to zero momentarily; increased manifold pressure; high carburetor air temperature; sudden stopping of cockpit "small talk."

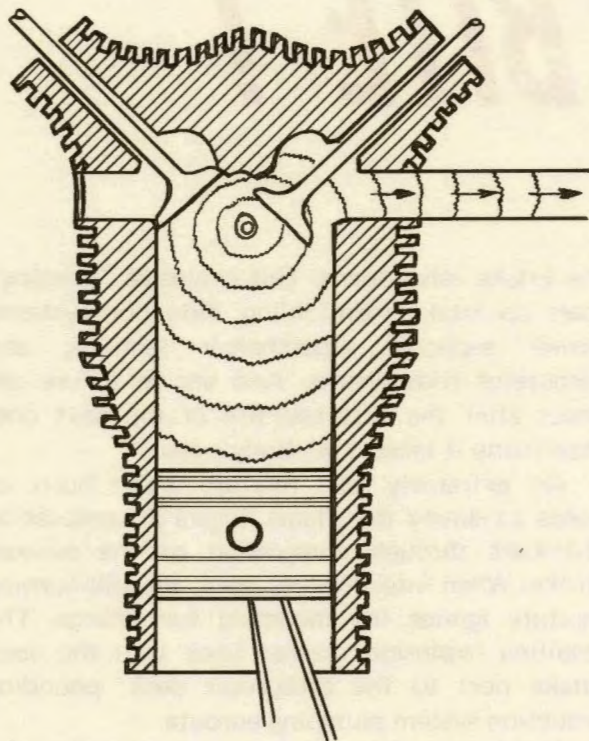
The engine conditioning manual for recip, AFM 52-9, recommends enriching fuel mixture and opening the throttle to reduce lean-mixture-induced backfiring. Fuel-air ratio enrichment prevents continued slow burning of the too-lean mixtures. Throttle opening draws the backfire out of the induction system into the engine expelling it thru the exhaust system... like pulling an engine-start induction system fire thru the engine with open throttle and continued starter cranking.

WHAT'S AFTERFIRING?

Afterfiring results from a reversal of backfiring's fuel mixture problem in combustion chambers. It's too rich for complete burning. As a result unburned fuel slugs enter hot exhaust

BARKING DOGS...

stacks or collector rings during the exhaust stroke and ignite explosively.



Recips with exhaust-driven turbosuperchargers suffer more often and more severely from afterfiring. Their collector rings and longer exhaust ducting retain larger quantities of unburned fuel — and then generate bigger bangs.

Dead jugs or cylinders firing intermittently cause afterfiring too. Their unburned fuel discharges into engine exhaust systems. The resulting torching and barking resembles a too-rich mixture afterfiring. If crews mistakenly lean mixtures on this wrong assumption they can precipitate a backfiring problem.

Afterfiring's destructive too. Besides blasting power section and cylinder components, it pounds exhaust plumbing, turbosupercharger nozzle boxes, and turbine wheels. Resulting gaps or cracks in the exhaust system now vent hot gases and flame within the engine nacelle.

Beyond the noise, cockpit indications of afterfiring are more limited. Too-rich mixtures indicated by high fuel flow, unusual torque increases during mixture leaning, weak-to-dead

cylinder firing patterns on ignition analyzers, excessive rpm increases during idle mixture checks, all point toward afterfiring possibilities. Unless an exhaust valve sticks open or is blown open, manifold pressure, torquemeter indications, and carb air temperature gauges won't provide afterfiring identification. Like backfiring, proper fuel mixture adjustment corrects afterfiring problems.

The lesser rattles of preignition and detonation are masked by prop and engine exhaust noises. Because they're hidden, they're potentially more dangerous and destructive. Instead of your ears you have to depend on your eyes and instrument interpretation . . . before engine failure occurs.

WHAT'S PREIGNITION?

Like the name suggests, cylinder fuel charges ignite before the timed spark jumps the spark plug gap. Hot carbon deposits, a burned valve, cracked piston, a "glow plug" in the form of a broken spark plug insulator trapped behind electrodes, crossed plug leads, all can fire fuel mixtures in advance of normal timing. If this happens early in the compression stroke, the piston is forced over top dead center against the exploding charge. There's probably no more damaging internal struggle developed in a recip . . . failure's imminent.

Don't confuse preignition with incorrect timing. Results may be similar, but in preignition cylinder charges ignite early due to overheated cylinders, hot spots, or cylinder defects. Preignition is usually traced to some cause other than spark plugs and early timing. High-power operation and excessively lean mixtures aggravate and promote preignition problems.

Preignition's cockpit indications include engine roughness, sudden cylinder head temperature increases, reduced power output, backfiring when fuel charge preignition catches the intake valve open or damaged.

If you're at high power, reducing throttle settings for a few seconds may break loose glowing carbon or lead deposits in the cylinder. Broken-off particles then discharge thru exhaust systems. Shock treatment such as water injection, carburetor deicing alcohol, and full-cold carb air

can provide the quick combustion chamber cooling needed to reduce cylinder head temperatures and pressures, stopping preignition.

WHAT'S DETONATION?

That "pinging" heard during detonation in an automobile engine can't be heard in a prop-driven recip. Heard or not, detonation is robbing power, overheating cylinders, setting the stage for preignition, and damaging the engine... destruction's ahead if continued.

Normal, even burning of cylinder fuel mixtures takes a fraction of a second, but it's slow motion compared to detonation. It's an almost instantaneous, piston-shattering explosion. Instead of the full power delivery of a normal flame front uniformly increasing gas pressure on cylinder heads, detonation's explosion delivers a quick, power-robbing blow. Extremely high cylinder pressures resulting from detonative firing can crack or burn pistons, break piston rings, create "hot spots," or blow off cylinder heads.

A detonating engine is firing on time. Its problems revolve around proper fuel-air ratios, high cylinder head temperature and compression, and fuel antiknock quality. Reduced power settings, improved mixture quality, lower carburetor air temperature, and cooler cylinder heads thru airspeed or cowl flap gap increase are recommended actions. And avoiding mixing J-P4 with av gas during fuel servicing helps, as many detonation-shocked crew members can testify.

Recip types should keep in mind that av gas fuel grades represent "without-detonation" performance ratings. The grade designation 115/145 means: an antiknock quality of 115 at lean mixture; an antiknock quality of 145 at rich mixture. In addition, a recip's power curve drops faster on the lean side of best power than it does on the rich side. And it's the too-lean mixtures that bring on backfiring, detonation, and preignition... the engine destroyers. So, being over-eager on fuel-saving leaning can actually be short-sighted engine destruction.

DAMAGE POTENTIAL

What's the possible engine damage result of

backfiring, afterfiring, preignition, and detonation? A former engine conditioning team chief jotted down a "few" recollections:

- Carburetor: Ruptured seals and diaphragm warped; broken and misaligned throttle valves.

- Induction system forward of carburetor: Cracks or holes in ducting; damaged carburetor screens, allowing stray parts to enter the impeller section; warped, broken, or seized carburetor heat doors.

- Impeller section: Blown-out seals and impeller seat allows engine oil to enter induction system; damaged impeller and drive train caused by sudden, intense pressures of backfiring.

- Cylinder and valves: Cracked cylinder head and skirt; cracked or broken piston; broken piston rings; complete cylinder separation; warped or broken valves and valve seats; damaged, broken, or warped rocker arms, valve springs, rocker arm bearings, push rods, tappet assembly, and cam mechanism.

- Connecting rods and drive train: Broken or bent rods; flattened or out-of-round rod bearings; damaged power section components and accessories caused by heavy "backloads."

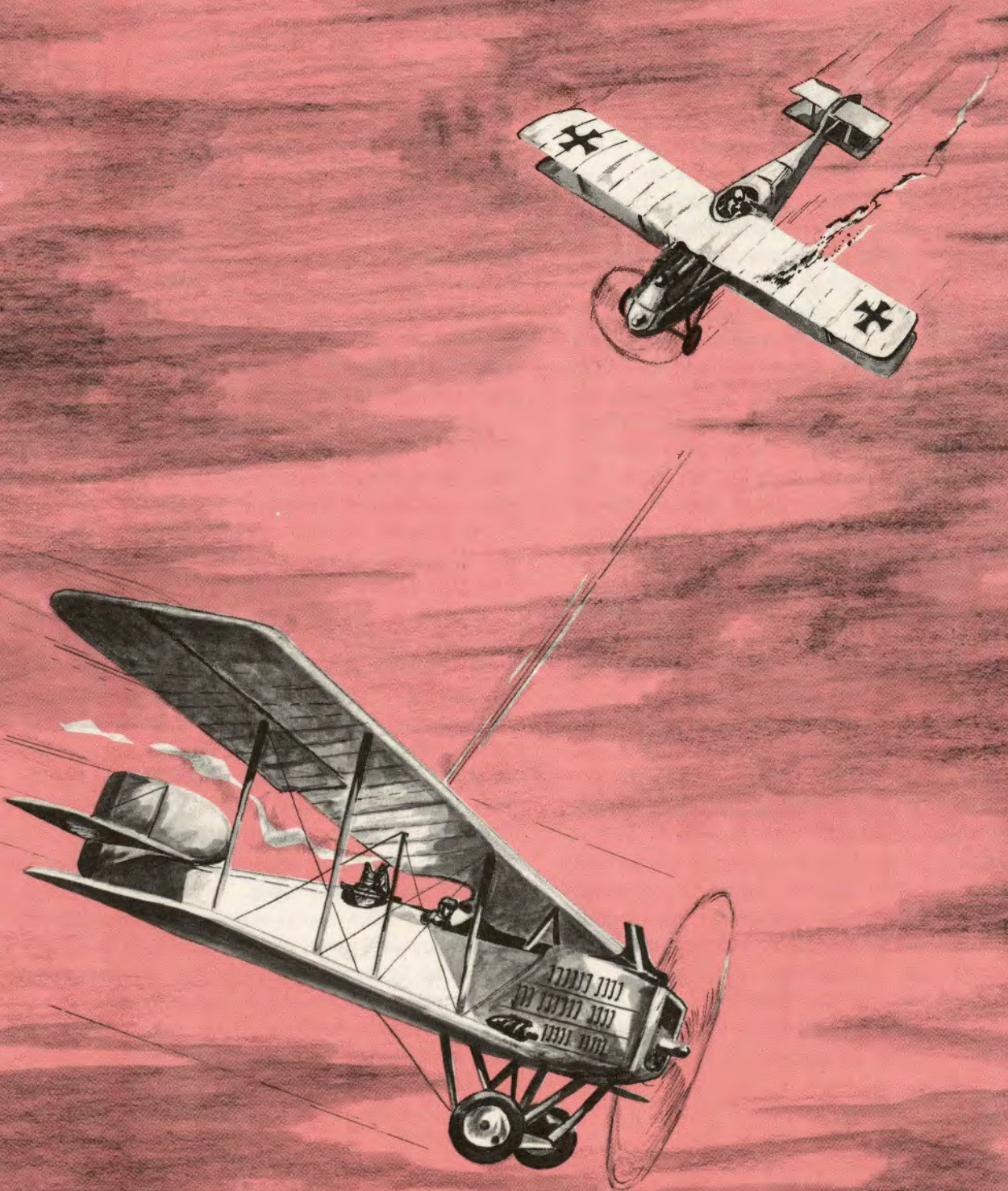
- Engine mounts and dynafocals: Warped and loosened engine mounts; damaged rubber inserts in dynafocal mounts.

It's a pretty impressive list... and not complete. However, it's long enough to generate some serious thought about pilots accepting "backfiring" engines. At least, while still uncommitted for takeoff and taxi-back is an option. Remember, a sound engine will operate satisfactorily without noisy interruptions. When they start barking it's time for that precision maintenance drill called engine conditioning.

That sick engine tried to alert you earlier in quieter, more subtle ways... like excessive mag and torque drop, rough running, below-predicted torque output, too-rich or too-lean mixtures, abnormal analyzer patterns, and over-two-inch manifold pressure spread between engines at balanced power settings. Now, like a forgotten mutt whining on the porch, it's desperate enough to bark. You'd better listen or lose a friend... and it could be on takeoff. ➤

Breguet 14-A2

Breguet 14-A2



Flight Leaders

by Lt Col Carl E. Pearson

Pug-nosed, slab-sided, the Breguet 14-A2 wasn't the fastest recon bird in 1917, but it was a rugged performer. And it typified the rapid advances made in aircraft design and power plants since the start of World War I. French-built, and designed by Louis Breguet, early pioneer in aeronautics, the Breguet 14 filled both a recon and long-range bomber mission for the French and Belgians. In the later stages of the war it served as a trainer for pilots of the fast-expanding American Air Service. Ahead of its contemporaries, it was one of the first airplanes in the world to employ wing flaps.

The Breguet 14's upright, big-bore-six Fiat delivered an impressive 285 hp at 1600 rpm. Italian-built, the Fiat power plant with its rhinoceros-like flame tube was the only "straight six" used by the Allied Air Forces in World War I.

With a wing span of 46 feet, the Breguet grossed out fully loaded at 3452 pounds. That's about 12.1 pounds per horsepower. It lifted a total load of 1159 pounds, a then-efficient 50 percent of its empty weight. At full throttle the two-bladed wooden prop pulled it along at 110 mph.

Fuel endurance with max power at sea level totaled three hours. Reduced cruise settings gave the Breguet unusually long "on station" times, ideal for recon operations and artillery spotting. Its climb to 6,500 feet consumed nine and one-half minutes and reaching 10,000 feet added six more minutes. Its calculated ceiling was 20,000 feet. It couldn't be called a homesick angel, but not bad for a big two-seater in its time.

The Breguet 14's performance was phenomenal improvement considering standards set by France to weed out inferior aircraft designs just prior to World War I. They demanded that a two-seater aircraft be capable of flying 186 miles with a payload of 660 pounds besides the crew, *and maintain 37 mph*

France recognized the airplane's potential as a war machine during military maneuvers in 1910. Like other nations, their thinking considered only a reconnaissance role. Development of tactical doctrine was slow. In a war of ground maneuver

and concern with "getting there fustest with the mostest" the flying machine permitted trained observers (not pilots) to locate roads and truck traffic, supply trains and railroads, bridges and river traffic, trench systems and fortifications, artillery sites, ammo dumps, and supply depots.

Wartime recon operations soon pinpointed the human failings of airborne observers and their severe limitations in communicating, and recalling intelligence gathered in flight.

With airborne radio transmission in its infancy, priority messages were handwritten and air dropped. Readability and reliability of content depended on the observer's ability, experience, and physical condition. Field commanders soon discovered that observers missed much of the available info and forgot vital details... sometimes they were too sick to recall at all.

The logical next step was use of cameras. At first, observers carried their own. Their success in recall and identification of strategic and tactical sites aided by crude photographs brought quick improvements. Small, family-portrait type cameras were replaced by hand-held, over-the-side cameras of increased quality. They were cumbersome and difficult to operate, but turned aerial reconnaissance into a military science conducted by professionals.

That's why enemy fighters like the pictured HANOVERANER, one of the toughest German two-seaters, moved in on the Breguet. Powered by a 260 hp Mercedes-Benz engine, the Hanoveraner featured a unique biplane elevator control and close-set staggered wings. A powerful, streamlined fighter with classic lines, the sight wasn't a happy one for the defending observer.

Depending on an observer's visual acuity and memory wasn't enough to fulfill the combat intelligence mission. Without a reminder, flying types - short of the rare mental giants - couldn't do their job without forgetting vital data. That's why checklists were born. So, use yours.

You wouldn't want to be called a rare mental giant, would you?



high-priced pliers

The number one engine compressor stalled when afterburner was selected. Maintenance troops stopped their trim check and towed the bird back to a hangar for engine removal and inspection. They found a pair of long-nose pliers lodged in the inlet guide vanes. The plier handles were long enough to reach the engine's first stage rotor blades.

A dollar's worth of forgotten pliers suddenly cost 6500 dollars in engine repair, not to mention total manhours and aircraft downtime. It's a poor trade and a sad example of how Forgotten Objects Damage combat capability.

all "foiled" up

A Supersabre nosed down on its first rocket pass. The pilot eased the pipper up on target and fired. But, rocket trails failed to appear! The range officer reported jettisoned stores; a type III pylon, an LAU-59 rocket launcher, and three 2.75 rockets.

Investigation eliminated improper switching. But they did find the problem . . . a small piece of aluminum foil in the dropped pylon, lodged between the wing Cannon connector and phenolic seating block.

How did this happen? Three personnel errors!

First, the Cannon connector was not seated to the phenolic block, leaving one-half inch of exposed connector pins. Second, maintenance personnel used unauthorized aluminum foil to protect the electrical connectors during storage. When the pylon was installed, a piece of foil fell inside and later worked its way to the connectors. And third, professional workmanship was

completely "foiled" when the munitions crew failed to properly inspect the connection.

If they had, they would have found the partially unseated connection, which would have prevented the electrical short, which would not have happened in the first place if connectors had been protected with authorized material instead of foil.

ejector outlet plug

The pilot of a T-39A arrived at his destination after a cross-country trip only to find the field temporarily closed because of an accident. It was then necessary to divert to an alternate field. During a sharp descent with about 600 pounds of fuel remaining, the left engine flamed out. Restart in level flight was accomplished without further incident.

During the subsequent investigation maintenance personnel discovered a plug (265-481020) missing from the left engine fuel boost pump. Inspection of the unit's two remaining T-39s revealed a plug missing from the right boost pump of one of the airplanes. Neither of the missing plugs could be found.

In both cases, with the plug missing, the transfer ejector (fluid-driven forward transfer pump) was inoperative. This plug is a conversion kit item installed on either the left or right side of the pump (depending on whether the pump is installed in the left or the right wing).

There are two possible explanations for the missing ejector outlet plugs: they were overlooked on a previous inspection; or, when the fuel boost pumps were changed the outlet plugs were turned in with the defective pumps and not retained for reinstallation on the new pumps.

with a maintenance slant.

With the plugless boost pumps and the airplane in a descent, fuel can be trapped in the forward part of the fuel cell. Engine flame-out can then occur even with 300 pounds of fuel remaining.

At the next opportunity, check configuration of the engine fuel boost pumps to determine that the ejector outlet plugs are installed correctly (right hand vs left hand). To verify installation of the outlet plug, the fuel boost pump access door may be removed to permit reaching through in order to feel the plug (cover plate).

From: OPERATIONAL SERVICE NEWS
North American Rockwell Corp.

double crossed

A ground crewman corrected a T-33 write-up by replacing the elevator trim tab motor. Later, investigation revealed that the bird was repaired, inspected, and released for flight . . . by the same individual.

The following day, the aircraft took off on a GCI mission. At 150 knots, the pilot raised the flaps, added some back stick and trimmed to relieve back pressure. But the trim seemed ineffective and the nose became heavier as speed increased. The pilot tried the emergency trim override switch with no effect. By then, both hands were needed to hold the stick back just to maintain level flight.

He declared an emergency, reduced power, and made a shallow, downwind turn toward a swamp to jettison tip tanks. After a wide base leg and shallow final approach, he landed without incident. On the ground, he saw the trim tabs in a full nose-down position.

Another trim actuator was installed and a check flight made. The test pilot had the same problem, but found that the trim was working backwards. The plane landed and the shop chief was directed to check the electrical wiring.

Crossed wires were found at pins 'E' and 'F' in the cannon plug at the aft section split line.

Apparently the error happened during IRAN, more than a year previous. And to make the trim work properly, they crossed the wires again at the actuator, the second "error."

Of course, when the original write-up was remedied, the mechanic wired the actuator correctly. This is where he trapped himself by signing off the inspection and the release for flight . . . without a crossed-wires check!

The plane was repaired, this time according to tech orders. And the mechanic and his supervisors . . . their procedures were corrected too.

small oversights

An F-4D returned from a combat mission with some unexpended ordnance. Because of a heavy gross weight and a wet runway, the aircraft commander decided on an approach end barrier engagement. His first attempt was good. He hooked the BAK-12 on centerline but for some reason, the hook cut the cable. He proceeded to his alternate, down loaded his weapons, and returned to home base.

With the runway still wet, the pilot again tried for the barrier . . . this time the M-21. He touched down properly, hooked the cable, but after about 100 feet of tape runout, this cable also failed. Committed to land, the pilot continued to the mid-field BAK-12. This time he stopped. Examination of this cable revealed it too was cut nearly in half.

The primary cause of this series of mishaps was blamed on the barrier crew. They failed to mount the barrier pendant cable the required one-and-a-half inches above the runway. Added to this was some maintenance error . . . failure to recognize the tail hook shoe was worn beyond limits. This gave the shoe front a very sharp wedge shape. The sharp edge dug into the strands, destroying cable integrity. This caused the arrestments to fail.

Two small oversights by two different groups of people almost caused one major aircraft accident.



LSD. What is it? Is it more harmful than alcohol? What's a trip like? What does it offer me? Much has been said and written about LSD during the last couple of years, and depending on the interest of the speaker or writer, these questions have been given many answers.

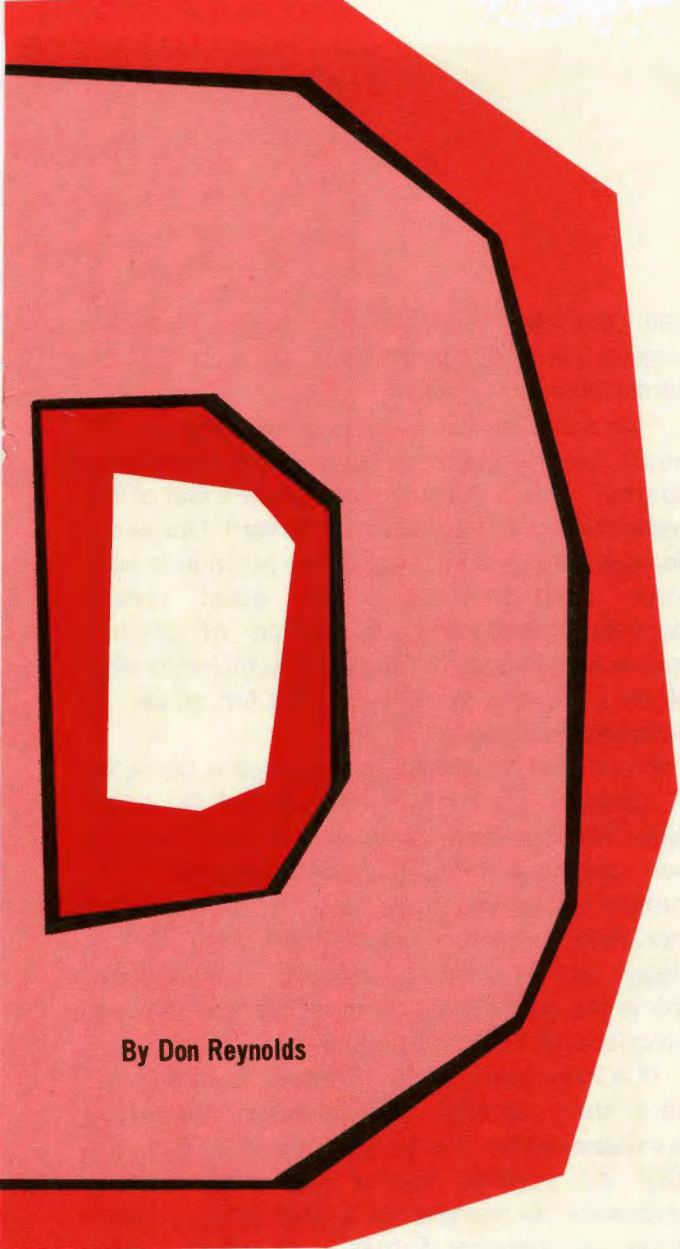
Answered by the Air Force in a Headquarters Letter earlier this year, they are also told in a specially prepared film, SFP 1826, titled "LSD." It describes LSD and its effects, and states a position: Any history of use of LSD is disqualifying for all flying duties, all air traffic control activities, and all duties under the Human Reliability Program. In short, the Surgeon General has declared that a person's one-time use

of LSD makes him a risk, and he cannot be considered reliable from that time on.

WHAT IS LSD?

Lysergic Acid Diethylamide is one of several compounds derived from fungus grown on wheat or rye. The various chemicals of these natural compounds have powerful effects on the body - from curing migraine headaches to causing an abortion.

The hallucinogenic effect of LSD was discovered accidentally by a Swiss scientist during a routine study of the compound. On a Friday afternoon, while resynthesizing the material he became "ill," feeling extremely uncomfortable, very anxious and nervous, and began to



By Don Reynolds

hallucinate. He called it a day and went home early. But over the weekend he was troubled. He concluded that he could have ingested some of the compound, but if he did, it had to have been a very small amount.

On Monday he decided to test the material . . . on himself. He selected a small dose of 250 micrograms, expecting that he could study his reaction to the minute portion. (Users can "take a trip" on as little as 100 micrograms, about the weight of 200 red blood cells -- there are about 330 million in one drop of blood.) The effects began in less than an hour and terrified him! He was essentially psychotic for the next 24 hours.

WHAT IS A TRIP?

Users take LSD several ways: in a tablet or pill, on a sugar cube, in a liquid, or by injection. But regardless of how the drug is taken, the reaction or latent period is about the same; from 30 minutes to an hour.

Tests were conducted by attaching a radio-active atom to an LSD molecule, tracking it through the body. Only minutes after LSD enters the body, it is absorbed from the intestinal tract and very rapidly cycles through the brain. Before any reaction appears, all trace of the drug has disappeared. This is extremely important to understand because it has led scientists to believe that the drug creates the cause but not the effect. What appears to happen is based on normal chemical reactions of the brain.

For instance: The brain is a storehouse, similar to an electronic computer memory bank, and there are certain chemical reactions which are possible but do not take place. These possible reactions are composed of memory bits in combinations which are not activated during normal consciousness. But LSD acts as a catalyst making the otherwise impossible reactions occur. Once the reaction is underway, it continues.

About 20 minutes after the drug is consumed, minor physical effects occur; faster heart beat, increased respiration, and possible feeling of anxiety. And that's all. But within another 20 minutes, the mental effects begin. There is a rapid and complete loss of contact with reality. The body image may disappear, merging with furniture or other objects. Sounds and sights are heard and seen when none exists. Ordinary objects change shape, size, and color -- usually brilliant colors. Sense of time vanishes. Seconds may seem like hours, or vice versa.

The environment immediately before taking the drug usually has a direct effect on what the user experiences -- from god-like associations to horrendous happenings. This period of insanity is referred to by illegal users of the drug as "expanded consciousness," a psychedelic journey into the yet to be known. Physicians studying effects of the drug report resulting

LSD

depersonalization is somewhat similar to schizophrenia.

Actions of a person "on a trip" vary. Some sit and stare for hours at a bright light or brightly colored objects. Some feel capable of omnipotent powers sometimes leading to disaster: falling from an eighth story window because he felt capable of flight; crushed by onrushing traffic when he believed he could stop all vehicles by simply stepping onto the highway with raised hand; and one woman drowned in San Francisco Bay when she demonstrated her belief that she could walk on water.

The peak of a "trip" occurs in about six hours, then gradually tapers off for a total trip of about 20 hours. The following 48 hours is a mental hangover, a period of depression. For the novice, this period may last for months.

IS LSD REALLY DANGEROUS?

Physically, the after-effects often appear nominal. But it is a known fact that LSD is destructive to chromosomes, or genes. This has been proven in laboratory tests, and the only similar reaction is caused by leukemia or exposure to a large dose of whole-body radiation. Whether the injury is permanent is not yet known, but until proven one way or the other, it must be assumed that an LSD user has become genetically different and possibly will produce abnormal children.

A study made at a New York hospital is revealing. During a 10-month period in 1965-1966, 25 persons were brought to the psychiatric receiving hospital because of LSD effects. Fourteen had taken the drug within a day of their admission. The others were suffering from LSD symptoms recurring from intake several weeks or months previous. Hospitalization came after four had attempted suicide, two had attempted homicide, one had smashed his parent's furniture, and the others experienced severe anxiety, confusion, and hallucinations.

The effect of LSD on the brain lasts longer

than "the trip." A lot longer! And this is why the Surgeon General has declared LSD users to be Human Reliability risks.

"No man who has taken even one dose of LSD should make a major decision for at least three months." This is the statement of the Chief of the Department of Medicine at Harvard University Medical School. The Air Force's position is even more cautious, and for good reason. Electroencephalograms, a method of plotting brain waves, shows that the brain is different after taking LSD, and remains changed for, as yet, an undetermined amount of time.

Proof that the brain has changed is borne by an unusual after-effect experienced by some users. Without warning, a person who has had even one dose of LSD, can be triggered into another full-blown "trip," months or even years later. And the sensory or emotional thing that can trigger the recurrence is equally unpredictable. This is one of the important differences between the effects of LSD and alcohol.

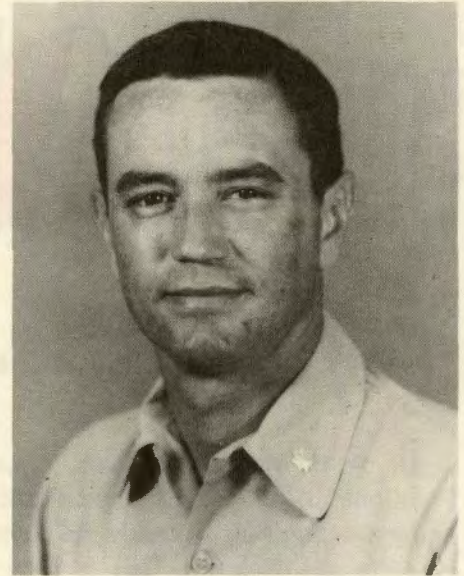
If a man does, while on leave, "booze it up" more than socially recommended, the effect terminates when the bottle goes dry. But with LSD, it's possible that a man might have a recurrence six months or a year later . . . while flying his supersonic fighter . . . or while working in highly sensitive positions.

LSD is an extremely powerful drug. And it may someday be proven a wonder drug. A resolution passed by the American Medical Association in 1966 still stands: "The AMA is unalterably opposed to any expansion of the use of psychedelic drugs beyond use by physicians. Even use by trained physicians should continue to be limited to carefully controlled experiments until incontrovertible data are available documenting LSD's efficacy and safety."

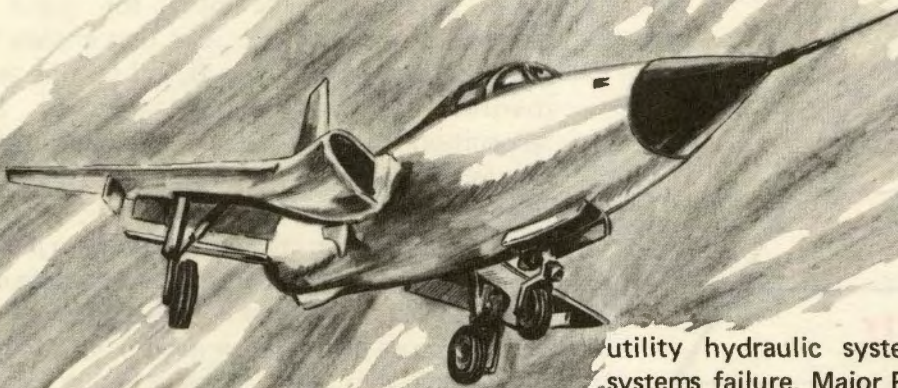
Indiscriminate use of LSD was described by Dr. Goddard, former chief of the Pure Food and Drug Administration, as "Russian roulette with a sugar cube." But as far as the Air Force is concerned, every chamber is loaded! ➤

TACTICAL AIR COMMAND

PILOT OF DISTINCTION



Maj. John E. Perkins



Major John E. Perkins of the 560th Tactical Fighter Squadron, McConnell Air Force Base, Kansas, has been selected as a Tactical Air Command Pilot of Distinction.

Major Perkins, a student in an F-105, was flying an ACM mission. The fuel inlet pressure and forward boost pump caution lights illuminated while in afterburner at low altitude and high indicated airspeed. He heard and felt a thump as he came out of afterburner and started to climb. Instantly, additional caution lights came on, including the main airline overheat light. Major Perkins turned off the main airline switch resulting in immediate loss of the generator and

utility hydraulic system. Because of multiple systems failure, Major Perkins decided to land the aircraft utilizing standby instruments and emergency systems.

Establishing a 25 mile final approach, he lowered the landing gear and increased approach airspeed to compensate for the failure of the trailing edge flap circuit. Major Perkins touched down 1,000 feet down the runway and brought the aircraft to a safe stop with 4,000 feet of runway remaining.

Investigation revealed that the main airline had broken in the bomb bay area and hot air bled directly onto wire bundles, hydraulic lines, fuel lines, the bomb bay fuel tank, and aileron pulley bracket, causing the multiple system failures.

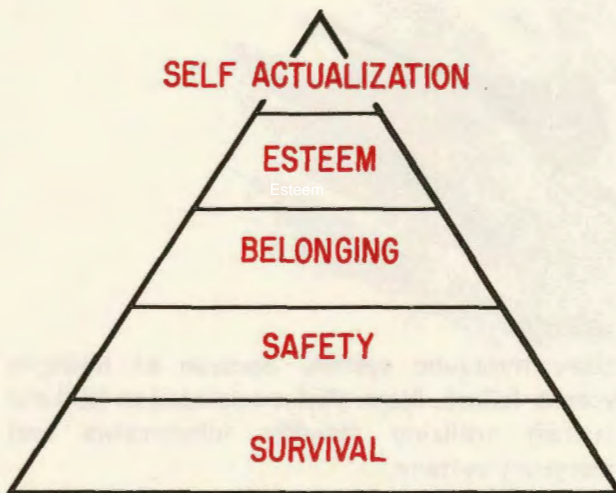
Major Perkins' professional knowledge and calm reactions during severe stress readily qualify him as a Tactical Air Command Pilot of Distinction.

HUMAN NEEDS

Human needs

by Major Emo Boado
40 TFS, Eglin AFB, Fla.

Dr. A. H. Maslow (he's very big in the Human Relations Field) has developed a useful vehicle for understanding human needs. He calls it "Maslow's Hierarchy of Needs." This is how the diagram looks:



Maslow's Hierarchy of Needs are arranged in ascending order. This means that as a lower need is satisfied, an individual progresses to the next level of need; i.e., survival to safety to belonging, etc.

Survival and safety needs are called "lower needs" and are fairly self-explanatory. Belonging, esteem, and self-actualization are called "higher needs" and require some explanation.

In order to understand these higher needs, let me put you in a familiar situation. You are an "FNG" (new guy) in a fighter squadron. Your first level of need at this point will be "belonging."

Assuming you have a loving wife, kids, or a

sweetheart, (this is one aspect of the belonging need) your behavior will be directed toward becoming one of the boys. As this need is satisfied the esteem need begins to appear.

This is an area of increasingly complex higher needs where it is more and more difficult to make exact distinctions. The belonging need shades into the esteem need and it is almost impossible to isolate one need from the other. The need to belong and to be identified with a group is just a short step from the need for status and recognition by the group. The first implies fairly passive acceptance of you by others, the second involves not only acceptance but active recognition of your talents and achievements. This is why you strive for Top Gun or some other significant feat.

Let me pause in this discussion for a moment, and comment on the fighter pilot's esteem needs. They are large. A fighter pilot is a different breed of cat because of this larger need. This is the thing that makes him want to be a fighter pilot. To understand him is to understand this need.

Even when men have satisfied their esteem needs, and consequently most of their other needs, they seem to feel the urge to move on to a higher level. When men are operating at this level, morale is high.

Here a man approaches the fullest possible integration of himself, in which all his talents, capacities, and potentialities are being put to use. An inner need to grow and develop and fully be himself is his all-powerful motivation; he is no longer dependent on the outer world of people and things for the satisfaction of his needs. In a sense, the need, behavior, and goal of his motivation are within himself.

Self-actualization should not be confused with outstanding achievement, which may exist on the level of esteem needs and does not necessarily

imply self-actualization if one has greater talent. Nor should self-actualization be equated with high intelligence or great ambition. It is just as attainable for the average person as for the outstanding leader. What a man can be, he must be, and this will vary from person to person. There will be few outward signs of self-actualization, except a certain serenity of mind and sense of accomplishment.

MORALE AND THE MISSION

When an organization can provide a means to satisfy these human needs, then morale is high. High morale and the mission have a direct relationship. When morale is high, the job gets done. General George C. Marshall puts it this way:

"Morale is a state of mind. It is steadfastness and courage and hope. It is confidence and zeal and loyalty. It is elan, esprit de corps, and determination. It is staying power, the spirit which endures to the end, the will to win. With it, all things are possible; without it everything else, planning, preparation, production, count for naught."

Unfortunately, the word morale often conjures up thoughts of the Red Cross or the Bob Hope Christmas Show. Certainly this is part of it, but it is much more, much deeper and much more significant. It is esprit de corps, discipline, and pride.

In good times, high morale may be marked by cheerfulness -- not by hilarity or exuberance of spirits necessarily, but by each man recognizing the necessity of the duty and performing it without hostility even though it is unpleasant.

In times of adversity, cheerfulness may not be found, yet morale can be excellent. It will be manifested in a determination to accept the situation which exists and get from it the best possible outcome.

The important ingredient is your *personal* desire to get the job done. It is not the *commander's* desire to get the job done. This is the key. Efficient work cannot come from men who are acting under protest and with no desire to do anything except to avoid punishment. Some commanders have mistakenly believed that

because they have the power to compel obedience, it is unnecessary to try to inspire willing cooperation.

When this happens motivation is directed at a "lower need." Consequently, low morale. Motivation directed at a "higher need" promotes high morale which in turn produces high performance.

Morale is intangible; it's an attitude; it is, as General Marshall puts it, "a state of mind." But it plays an all important role in mission success.

CONCLUSION

So far, I have said that people have certain human needs which they are constantly attempting to satisfy in one way or another. I have also said that morale of the organization is high when these needs are satisfied to an acceptable level. What does all this mean?

It means that we must understand people in order to work with them effectively. We must realize that an organization is more than regulations, office procedures, and restrictions. Organizations are people who can do anything when they are properly motivated. But who is responsible for this motivation?

The answer to this question is simple. The leader is responsible. But there is a side to the question which is not so simple. Who is the leader?

The answer: You are! No matter what position you hold in the organization, you can have a positive influence on people around you. When a man does a good job, you don't have to be the commander to tell him he did a good job. When a new man comes into the organization, you don't have to be the commander to make him feel welcome. These are positive influences we have on each other.

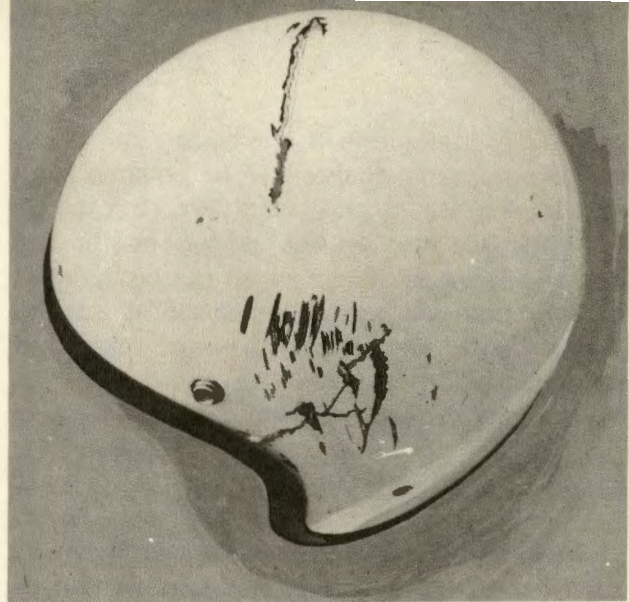
Morale is not only the commander's responsibility; it's everybody's responsibility. We are all leaders in one way or another.

I think the Air Force definition of leadership is an appropriate concluding remark:

"Leadership is the art of influencing and directing people in a way that will win their obedience, confidence, respect, and loyal cooperation in achieving a common objective." ➤

HELMET HINTS

This helmet saved the life of a TAC cyclist...twice during the same accident...when his head struck a steel sign post (top) before smashing to the pavement (side). Either blow would have crushed an improperly protected head. Will your helmet do the same?



"He was really motorscooting until he saw that car enter the intersection. Then he seemed to freeze. Looked like he knew he couldn't miss it. He slowed some, but still hit hard. He was thrown about 30 feet and his head hit the curb wall. I wish he'd worn a helmet. Yes, I'm certain that driver would've seen him if his headlight was on. It works that way with me. You're not really expecting motorcycles—you're conditioned to seeing other cars. That's why the headlight helps me," he concluded.

State Police and TAC's accident investigators throughout the country find similar witness testimony with the same tragic twist all too often. Head injuries are the major causes of two-wheeler accidental deaths. The driver would've survived the collision with car, culvert, curb, power pole, or roadbed if he'd worn a helmet. There'd be bruises, and lots of them, but he'd be alive. Medical examiners verify that.

Another sobering fact: nationwide in 1967, if you had any kind of two-wheeler spinout, your

chances of being killed were eight times greater than sitting thru an automobile bash. Deaths in two-wheeler accidents jumped 42.6 percent and the number of accidents 38.5 percent compared to 1966. In the same period automobile deaths increased 8.6 percent and accidents were up 4.7 percent.

In TAC, with only two percent of the total vehicle registrations, two-wheelers account for a staggering 26.5 percent of our accidents. You're just too vulnerable to injury sitting out in the open on your cycle saddle—and especially without protective gear. It's an unequal match when a motorcyclist takes on a driver enclosed in a steel cab. And it's small comfort to the cyclist knowing the other driver will be cited for failure to yield.

That's part of the background reasoning for states pressing forward with legislation on motorcycle headgear requirements and other operating regulations.

Nationally recognized standards of protective

To prevent injury AF cyclists must wear certain headgear and accessories while on CONUS bases. Can you pick

SAFE

UNSAFE

SAFE

UNSAFE

SAFE

UNSAFE



headgear for riders and occupants of vehicles in high-hazard environments are:

- USA Standards Institute (USASI) Z 90.1 - 1966.
- Motorcycle, Scooter and Allied Trades Association (MS & ATA)
- Snell Memorial Foundation
- American Motorcycle Association
- British Standards Institute

The majority of states adopted the helmet specifications established in the USASI 290.1 Standard or the MS & ATA standard.

TEST STANDARDS

Here's the protection you're buying in a helmet meeting the USASI 290.1 Standard. First of all, it's designed to protect your head and absorb shock under various combinations of temperature and humidity. It resists measured amounts of penetration and crushing. It has to stay on your head under specified impact loads.

CONSTRUCTION

The smooth external shell can't have projections greater than 1/8 inch except for a goggle fitting; and that no greater than 3/16 inch at the back of the helmet. Rivet heads can't have sharp edges or protrude more than 1/16 inch. Designs of optional helmet attachments cannot cause injury to the wearer.

MATERIALS

Materials used in the helmet must resist downgrading of the protection standards caused

by sun, rain, cold, dust, vibration, skin contact, perspiration, or even the greasy kid stuff used on hair. Any material that's known to cause irritation cannot come in contact with the skin. Only durable, high-quality materials can be used.

LABELING

Every helmet meeting USASI Z 90.1 standards that's offered for sale must be labeled as follows:

- For adequate protection this helmet must fit comfortably and closely, and provide a range of peripheral vision of about 120 degrees.
- This helmet may be partially destroyed or damaged by a severe blow and even though such damage may not be readily apparent, any helmet subjected to severe impact should be returned to the manufacturer for inspection or should be replaced.

SHOCK ABSORPTION

Shock absorption tests use a flat impactor of 19.6 square inches and a hemispherical impactor with a 1.9 inch radius. The helmet must absorb 50 foot-pounds of impact energy from the hemispherical impactor and 66 foot-pounds from the flat impactor without transferring a peak acceleration exceeding 100 Gs to the wearer. Each helmet tested must survive two identical impacts in not less than four locations.

PENETRATION TEST

The striker used on the helmet weighs six pounds and 10 ounces. Its point has a .197 radius with a 60 degree included angle. It's dropped one

the outfits that offer maximum protection, and meets other requirements of AFR 127-5? (Answers on next page.)

SAFE

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UNSAFE



HELMET HINTS

meter – 39.37 inches – in an attempt to penetrate the unpadded shell. Any vertical deflection of the shell is recorded electrically at impact. Maximum vertical deflection of the helmet shell is .394 of an inch. Any penetration of the striker point disqualifies the helmet.

RETAINING STRAP

Testing of the chin strap includes the attachment points as well as the strap itself. Three hundred pounds of weight or tension are applied to the strap and fasteners. Stretching beyond one inch or breaking loose from the attachment points isn't permitted.

WHY LEGISLATION?

Why motorcycle safety legislation and minimum test standards for your protective headgear? To save your life. It's as simple as that. The skyrocketing two-wheeler death and serious injury rate is a matter of nationwide and TAC concern.

If you've ignored helmet protection up til now, don't any longer. You're playing demolition derby in the wrong league. If you're wearing a helmet now, check its quality. If it's not up to approved test standards, it's time to change brands. After all, it's the only head you've got – it deserves the best. ➔

Which Helmets are Approved?

Safe and unsafe headgear pictured on previous page and described below were evaluated according to Air Force Regulation 127-5, which includes:

- *Helmet construction must meet minimum impact and penetration specifications (Z90.1 standard).*
- *Helmet color, when worn with uniform, must be white or international orange and free from decoration, except for an optional white, silver, or orange reflective one-inch band placed horizontally around the base, or vertical across the top, or both. Appropriate unit insignia or other identification may be displayed as authorized by Hq USAF.*
- *Helmet retention must include a chin strap or associated harness to hold helmet secure.*
- *Eye protection must include shatter-resistant face shield, glasses, or goggles of hardened lens.*

No. 1. Unsafe. Fails to meet Z90.1 standard, inner liner too soft. Bubble shield offers adequate eye protection but use limited to daytime only

because of tinted color. Decoration not authorized with uniform.

No. 2. Safe. Three-quarter style, meets Z90.1 standard, color and retention requirements. Chin strap cup offers added comfort, snap-on visor offers sun and rain protection. Glasses have shatterproof lens.

No. 3. Unsafe. Does not meet Z90.1 standard. Padding too skimpy, liner too soft, poor fit, no eye protection, and unauthorized color for use with uniform.

No. 4. Safe. Ladies helmet meets Z90.1 standard. Retention strap, color meet requirements except for decoration. Cushion contoured glasses are shatterproof.

No. 5. Unsafe. Ladies helmet does not meet Z90.1 standard, single shell construction and poor padding. Retention strap is unreliable, color and decoration not approved for uniform wear. Personal glasses without shatterproof lens is not approved.

No. 6. Safe. Meets Z90.1 standard and Air Force color. Glasses have shatterproof lens, and frames are designed to eliminate sharp corners and edges.

A 2nd Look at...



By Lt Col John M. Lowery

slush COATED RUNWAYS

An F-105 pilot told the accident board, "... final approach was normal with a touchdown point just past mobile control at 190 knots in the center of the runway... I delayed two seconds, then pulled the drag chute handle. But, the handle came out past the detent and the chute did not deploy... I applied brakes. The runway was wet from melting snow and ice with a wind from the left at 12 knots. As I applied brakes the aircraft hit some water and began to slide to the right (drift downwind). The slide could not be stopped with nosewheel steering or left brake. The aircraft left the runway at approximately 50 knots still sliding to the right."

The IP stated, "... because of the water on the runway I could feel the aircraft planing (hydroplaning)... I asked if he (the student) had the anti-skid on and told him he had better get on the brakes... I could still feel the "planing" because of patchy water (melting snow). About this time, I believe, the right tire blew. We were about 7000 to 7500 feet down the runway and passing thru 85 knots... I applied full left brake and rudder with no response. Shortly thereafter the aircraft left the runway and came to a stop."

The cause was determined to be operator error because the pilot failed to actuate anti-skid and appeared to have used improper braking procedure. In addition, he was blamed for inadvertently jettisoning his drag chute.

In light of more recent test information we know that a pilot is helpless when his tires begin

to hydroplane. This pilot had 12,000 feet of runway and even without the chute should have been able to stop by hooking the barrier. But the crosswind pushed him off.

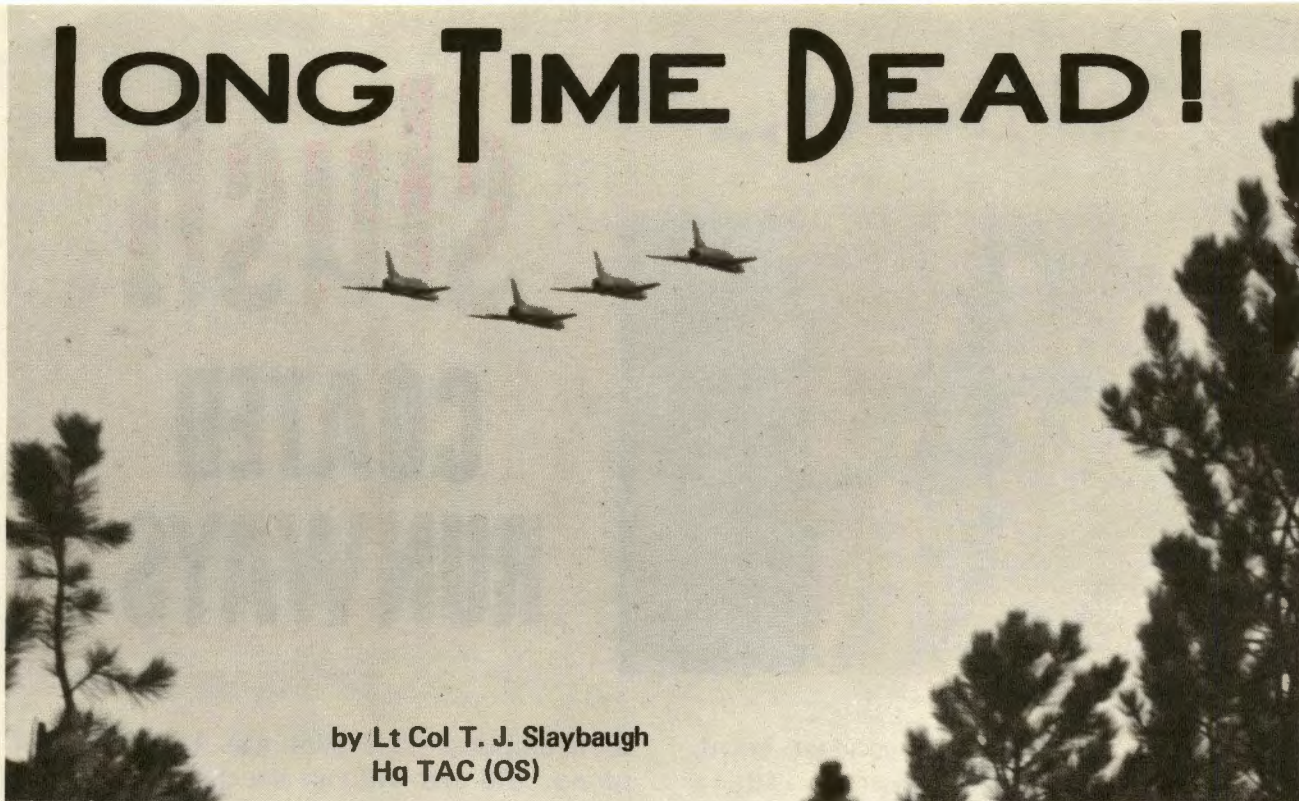
True, the F-105 anti-skid will prevent blowouts caused by hydroplaning tires running onto a relatively dry surface. The anti-skid system will also provide the most efficient braking from whatever traction is available.

The main point in this case is that with or without a drag chute the pilot, landing on a wet, slush-puddled runway, should have used the upwind side instead of the center. Had the drag chute deployed while his tire's hydroplaned, his downwind drift would have been accelerated... because the drag chute acts as a sail to catch and amplify the crosswind.

Possible corrective action - with the aircraft weathercocked into the wind, adding power (forward thrust) would have changed the resultant force (drift) vector. Power would not have helped him get stopped, but he would have been able to stay on the runway and snag the barrier.

During these winter months keep in mind that standing water is not necessarily required to encounter hydroplaning. And if the temperature is near freezing you may encounter the worst possible condition - slush. Combine these factors with a crosswind and you have all the ingredients for a major accident.

LONG TIME DEAD!



by Lt Col T. J. Slaybaugh
Hq TAC (OS)

Photo by A1C James R. Boca

Some of TAC's 1968 aircraft accidents point up the fact that there comes a time in a particular set of environmental conditions when a bird is destined to bash, no matter whose hands are stirring the cockpit accessories. The momentum induced by basic laws of gravity and aerodynamics overrides any mortal input, no matter how desperate.

Some examples:

On a heavyweight go-around from a simulated single engine approach, the IP permitted his student to let the airspeed decay below safe single engine speed. They soon reached a low point in time and space from which power and control reserves were insufficient to prevent the crash.

Both the pilot of the ailing aircraft and his element lead share in the next one: With both generators inoperative and the resultant loss of electrically powered systems, including radios, the pilot decided to go anyway. As the flight progressed systems operation continued to deteriorate until the aircraft became unflyable and ejection was the only way out.

Maybe, in the solitude of your conscience, some of the events in the next sequence will

awaken ghosts in your own flying past.

After landing at an enroute base, all AC power was lost when the right engine was shut down and the right generator went off the line. Both generator circuit breakers and the external power interlock circuit breaker had popped. Transient alert performed no maintenance that evening due to lack of T.O. data.

Next day, the pilot called his home base and discussed trouble-shooting procedures with his squadron maintenance officer. Engine run-up and trouble-shooting resulted in the same circuits being popped. Another call was made to the home station. The maintenance officer wasn't available.

The assistant ops officer directed the pilot not to fly the aircraft until the discrepancy was corrected. Meanwhile, the pilot and local maintenance specialists discussed the problem some more. Finally the home base maintenance officer called back. They agreed to another run-up check but the maintenance officer advised the pilot not to fly the aircraft unless it checked out.

After the engines started this time, only the left generator circuit breaker popped. When the

pilot was told of this he had the aircraft buttoned up and had obtained taxi clearance.

A quick-check crew was in position, but the pilot did not stop. On takeoff there was no left AB light, but no abort either. At the 2000 foot point, ground witnesses observed fire in the lower section of the left engine bay.

At the 5000-6000 foot point, immediately after lift-off, tower advised the pilot that he had a fire. The pilot continued his takeoff, shut down the burning engine, and asked for a heading to an unpopulated area. Then he swung around for a landing attempt. However, he didn't get a safe gear down indication.

As the pilot attempted a go-around the aircraft appeared to develop control problems, as evidenced by wallowing and wing rock. A rolling, descending left bank terminated in an inverted, nose low impact. And the pilot made no attempt to eject.

These aren't all, but they are representative of a type of accident that continues to recur.

There is a common denominator underlying these accidents: *the pilots contributed to the impending accident situations through their own acts.*

The control component known as 'pilot judgment' had to override a warning, or a series

of warnings, until the accident became inevitable. With each error of commission or omission the pilot took another step toward an inevitable accident. As the pattern progresses, there is evidence of temptation to take an ever bigger chance in an effort to try to rectify the sum total of mistakes made to that point.

Occasionally, the "override" pattern continues without apparent change, even after the accident becomes inevitable. At other times there is evidence of a pattern change – canopy separation or even partial chute deployment – but too late.

In sharp contrast, when onset of an accident situation is in no way pilot induced – materiel failure and combat damage being examples – there is less of a tendency to press on until survival is impossible.

As pointed out initially, in either case there are natural laws that make a crash inevitable once a certain point has been reached. From this point on, whether the pilot caused, contributed, or was in no way a factor – none of these have a bearing on the outcome.

Why not think about it right now? Establish a mental set ahead of time. Then, when you are tempted to buy a sick bird or stick with it too long, reason will prevail, not emotion. A bruised ego will heal, but you're a long time dead. ➤



TAC TIPS



“gusted” gooney

It wasn't reported or invited, but the thunderbomber moved in anyhow. Patient old gooney waited resignedly, gust locks in place, tied down to the ramp. Without a place to hide or a friendly hand willing to head her into the storm, she endured all 53 knots, broadside. Wind blasts blew ailerons and rudder over and out of gust locks and deflected control surfaces to, and beyond max travel.

When the winds went away investigators found both ailerons warped, the rudder twisted and its base structure cracked, a right wing former broken and some internal stringers damaged, and the control system needing inspection of all components. That's pretty rude treatment for an unglamorous, but still faithful bird.

Conscience stricken about possible lack of consideration for their uncomplaining beast of burden, the owners are working on newer, more effective control locks. Not content with just that and in deference to her years of service, they're finally arranging for early notice about severe weather threatening their gooney. Now grateful, gooney's looking forward to a quiet hangar during windstorms, or at worst, having winds work her over headon instead of broadside... and that's progress.

built-in booby trap

An O-2 student pilot was shooting night landings. Following takeoff from a touch-and-go, he switched the landing light "Off." He noticed that in the process he inadvertently hit some other switches. He turned up the cockpit's lights and attempted to reset each one.

His next landing was long, so he applied power to go around. Acceleration was unusually slow and it wasn't until the gear was retracted he

...interest items, mishaps with morals, for the TAC aircrewman.

noticed his rear engine had failed.

After a successful single engine landing they discovered the pilot's hand had accidentally kicked the auxiliary fuel pump switch to the high position, causing the engine to flood out when power was applied.

The cause was listed as pilot factor since he accidentally actuated the pump switch.

Looks to us like a good case of design deficiency in that the switches are ideally arranged to booby trap the pilot.

"It's awfully easy to assess pilot blame. It takes a mountain of paper work to change the darn thing." (H. W. Longfeather)

de-icing T-33 takeoffs

Mission insurance for T-33 flyers during winter months is noted in the Dash One. Don't forget that after takeoff from a wet snow or slush covered runway, you must operate landing gear and flaps through several cycles to prevent freezing. And another good idea, when taking off through puddles of water, wait at least 15-seconds after breaking ground before retracting gear. This allows time for the centering cam to position the nose gear for retracting and the delay lets the airstream remove excessive moisture, soon to be ice, from the wheel well areas and electrical indicator switches.

tacky trigger

An F-4D jock aligned his steed on target and pressed the trigger for a short burst. The SUU-16A burrrped... and burrrped... and burrrped! The trigger, released by the pilot after the short burst, stayed depressed. He reached to turn off the master arm switch but was blocked by his locked shoulder harness. While one hand

searched for the harness lock, the other kept the roaring cannon pointed in a harmless direction. He finally reached the switches. After safetying all armament switches, he manually extracted the trigger from its depressed position. On landing, investigation revealed that the trigger broke at the hole drilled for the trigger safety pin, causing it to jam. A UR was submitted and the stick grip replaced . . . and so were six over-used gun barrels.

automatic terminal information service

In the past, terminal controllers at civil airfields have been required to transmit routine non-control weather and airport information to every arriving and departing aircraft. As everyone knows this has caused serious radio frequency congestion at the busier airports.

After a test period ATIS, recorded broadcast of routine terminal information, proved so successful that FAA published Advisory Circular 90-22A (Oct 9, 1968) making it standard procedure for specified terminal areas. The recorded information—available on a special voice frequency TVOR, VOR, or VORTAC—gives the latest ceiling, visibility, wind, altimeter setting, instrument approach, and active runway.

When a pilot checks in, the terminal controller will assume that he has listened to the ATIS message and has all the routine information. Time checks and RVR will not be included in the recording. This will be provided in the usual manner. Also, when ceiling and visibility drop below the highest circling minimums for the airport, the ATIS message may contain the statement "Ceiling and visibility will be issued by Approach Control."

Recordings will be updated anytime there are changes in weather, type of instrument approach, active runway or any other previously broadcast information. As soon as the new recording is made the controller will make a one time

announcement on appropriate control frequencies.

The FAA urges all pilots to cooperate in order to relieve frequency congestion. A listing of airports using ATIS along with hours of operation and voice frequencies is available in the Airman's Information Manual. Otherwise, availability of the service and frequencies are indicated on Enroute Charts as part of the aerodrome data.

turbojet enroute descent

As a result of an article "Your Man at the Center" (TAC ATTACK, July 68) some question developed concerning the terms Enroute Descent and Enroute Penetration. Headquarters USAF advises that there is no such thing as an Enroute Penetration. True, you do hear pilots and the centers using "Enroute Penetration." This term appears to be a hold over from the old days.

A Turbojet Enroute Descent is a procedure for expediting military jet aircraft from enroute altitudes to final approach without execution of the published high altitude instrument approach procedure. The proper phraseology for requesting this procedure is to advise Air Traffic Control "Request Enroute Descent," in accordance with FLIP planning II-58, IV-B.

custom fitted helmets

For those of you who may need a custom fitted helmet in the near future, here's how you go about getting it.

First, check USAF Supply Manual 67-I, Vol 4, Part I. This manual tells you how to submit a request for a special helmet fitting. These requests all go to AFLC's Physiological Training Unit at Wright-Patterson AFB. Your flight surgeon supplies your head measurements and other appropriate details which must go along with the request. After your request is submitted the Physiological Training Unit decides whether you really need a special fitting and custom helmet liner.

MAINTENANCE MAN OF THE MONTH

Technical Sergeant Lyle V. Gillis of the USAF Tactical Fighter Weapons Center, Nellis Air Force Base, Nevada, has been selected to receive the TAC Maintenance Man Safety Award. Sergeant Gillis will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.



TSgt Gillis



Sgt Citty

CREW CHIEF OF THE MONTH

Sergeant William P. Citty, Jr. of the USAF Tactical Fighter Weapons Center, Nellis Air Force Base, Nevada, has been selected to receive the TAC Crew Chief Safety Award. Sergeant Citty will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.

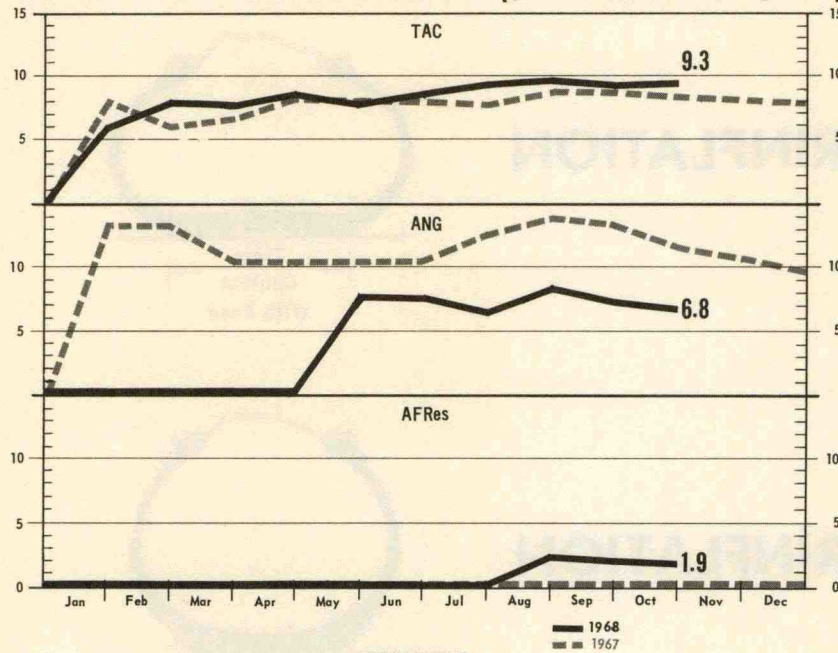


TAC TALLY

MAJOR AIRCRAFT ACCIDENT RATES AS OF

31 OCTOBER 1968*

MAJOR ACCIDENT RATE COMPARISON (per 100,000 flying hrs)



UNITS

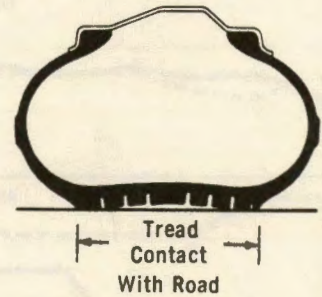
	THRU OCT			THRU OCT	
	1968	1967		1968	1967
9 AF	6.2	7.4	12 AF	10.2	9.3
4 TFW	9.4	6.0	23 TFW	27.5	10.2
15 TFW	9.5	23.0	123 TRW	7.1	12.6
33 TFW	7.8	8.8	27 TFW	8.5	11.4
113 TFW	20.0	13.4	140 TFW	5.8	18.2
4531 TFW	16.4	0	479 TFW	10.4	9.0
363 TRW	5.9	9.0	474 TFW	34.3	0
64 TAW	3.6	0	67 TRW	10.4	11.1
316 TAW	0	0	75 TRW	0	20.3
317 TAW	0	4.8	313 TAW	0	0
464 TAW	0	2.6	516 TAW	0	0
4442 CCTW	0	6.9	4453 CCTW	14.1	3.4
			4510 CCTW	6.6	9.6
SPECIAL UNITS					
1 SOW	6.6	5.9	4500 ABW	0	0
4410 CCTW	15.6	8.4	4440 ADG	0	0
4409 SUP SQ	0	0	4525 FWW	31.2	20.9
			4416 TSQ	46.9	0

AIRCRAFT	THRU OCT	
	1968	1967
TYPE	TAC	ANG-AFR
A-1	55.0 20.7	0 0
RB-66	0 0	0 0
F/RF-84	0 0	6.9 16.7
F-86	20.0 0	28.4 8.9
F-111	39.2 0	0 0
F-100	11.1 15.6	0 21.2
F/RF-101	13.7 32.5	0 20.3
F-5	16.4 17.8	0 0
F-105	29.2 14.0	0 0
F-104	10.2 5.0	86.4 0
F/RF-4	11.4 12.3	0 0
C-47	0 4.8	0 0
KC-97	0 0	0 0
C-119	0 0	1.9 0
C-123	14.7 0	0 0
C-130	0.7 0.5	0 0
T-29	0 0	0 0
T-33	2.3 5.0	9.8 0
T-39	0 0	0 0
C-7	0 25.2	0 0
O-1	7.9 12.3	0 0

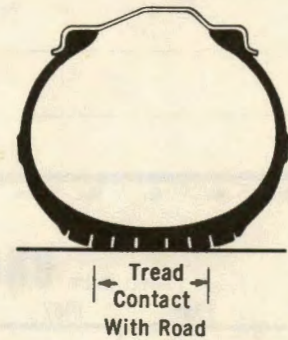
* ESTIMATED FLYING HOURS

INFLATION'S IMPORTANT

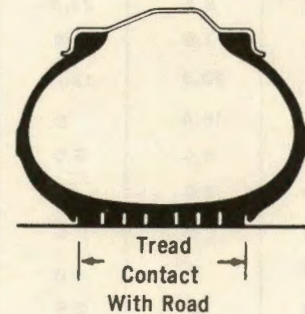
UNDERINFLATION



OVERINFLATION



PROPER INFLATION



**don't reduce tire pressure
on snow, slush, and ice.**