AEROSPACE

SAFETY

UNITED STATES AIR FORCE

NOVEMBER 1966

AEROSPACE SAFETY

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AFRP 62-1 VOLUME 22 NUMBER 11

FALLOUT

PHOTOGRAPHS

The Rex Riley poster on the back cover of the September issue of AEROSPACE SAFETY shows a pair of misplaced pliers as the cause of a major F-100 accident. Result: one fatality with a loss of over $600,000.

On page 19 of the August, 1965 issue of AEROSPACE MAINTENANCE SAFETY is a picture of this same aircraft. Cause of accident: a steel bolt was dropped in the fuel pump area, resulting in damage to the fuel system components leading to fuel starvation and a crash! The article points out that the pilot ejected, indicating no casualties. A loss of some seven hundred thousand dollars was reported.

Which article is correct?

A couple of Non-Maintenance Personnel

Both are correct. Here's why:

1. The price of the F-100 varies by model and other factors.

2. Because our picture file is so limited, we sometimes are forced to use a photograph of an appropriate type of aircraft even though it is not the one actually involved in the particular incident. This was the case detected by a couple of sharp-eyed readers. Incidentally, this is a good chance for us to make a plea for pix. Anyone who has any aircraft photos of any kind can do a favor by sending same to ye editor. Thanks.

CROSSWIND LANDING

Reference the article "Crosswind Landings," page 16 of the August issue. From a purely semantics standpoint, the next to the last sentence in the lead paragraph is not true. A crosswind at traffic pattern altitude would only manifest itself in drift, and as such would not kill anyone. Admittedly, if the aircraft had been on the ground, lack of correction for crosswind could have resulted in weathervaning, groundloop and all those other embarrassing things, the more violent of which could lead to fatality.

In the case outlined here, the crosswind didn't kill the pilot; but his rather gross lack of planning did — in conjunction, of course, with possible loss of face when he went around. Pilots don't earn the reputation as "the world's best" by downwind legs that are so close to the runway they require extremely tight turns onto final and even "airplane aimers" can usually recognize an impending stall. The rest of the article reads fine.

Lt Col J. A. Talbot
Chief of Safety
61 Mil Alft Wg (WS)
APO San Francisco 96553

Glad you approve.

Sorry

On page 25 of the October issue, in Missilanea, Major Herman F. Profit is mentioned as the name of the Project Test Officer. Our apology to the good Major. His name is PROBST.

SUPERVISION

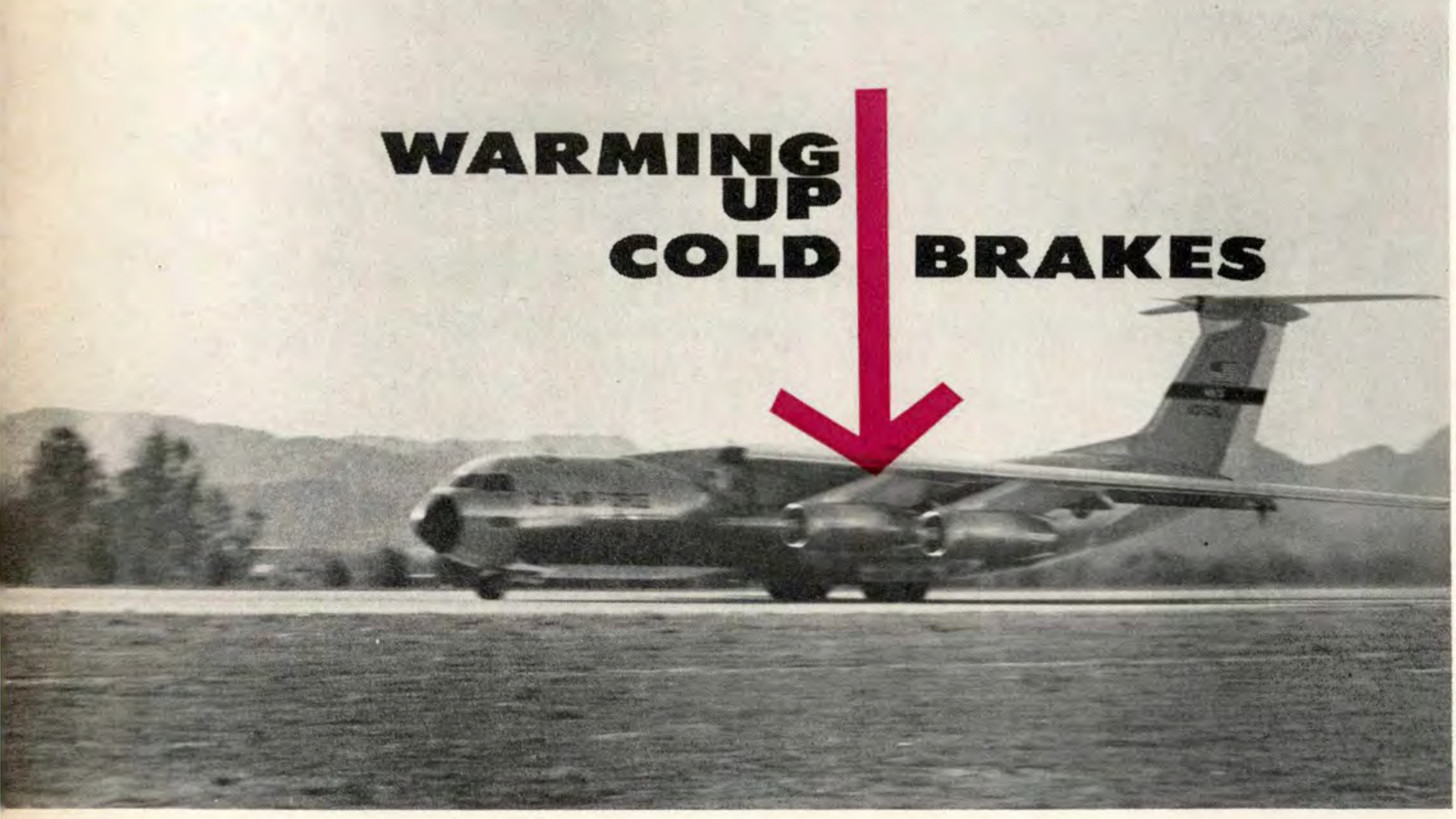
Lt Col Samuel R. Smith, Directorate of Aerospace Safety

High level management is concerned that adequate supervision is lacking throughout the Air Force. Although supervision is now found as a cause factor in many accidents or incidents, many more accident reports indicate the possibility but do not list it as a cause factor.

The SEA situation requires 100 per cent manning by our best pilots and maintenance personnel if we are to get the job done. This has, at many bases, placed the maintenance manning below desired levels, both in numbers and skills. At the same time, training requirements have been increased to provide pilot replacements in SEA. This all adds up to the need for more aggressive supervision than ever before if we are to maintain our excellent aircraft accident rate.

When an airman is directed or allowed to do a job for which he is not qualified, without proper equipment, or under conditions such that he cannot reasonably be expected to do an adequate job, supervision can easily be cited as a contributory cause factor.

Aircrew members are in an excellent position to assist their commanders and maintenance supervisors in correcting unsafe practices on the flight line. To be of the greatest assistance, they should know Chapter 8, AFM 127-101, Accident Prevention Handbook. During safety surveys conducted by the DIG/IS Flight Safety Division, findings of violations of procedures outlined in this chapter are numerous. Corrective action, before it is entered in an accident report, may save lives and an aircraft. ★



WARMING UP COLD BRAKES

By D. L. Herring, C-141 Senior Design Engineer
(Reprinted from AirLifters, Lockheed-Georgia Co., October 1966)

When brake pressure cannot be applied to a particular wheel in a main landing gear system on an airplane, you get what is called a "cold brake."

Derivation of the term is clear — after an airplane lands, if the brake is not warm, it is apparent that no friction has been generated in the brake, that it has not been braking.

Occurrence of cold brakes on the C-141 has been traced to a component of the airlifter's hydraulic system, a shuttle valve.

The eight multi-disc brakes on a C-141 can be supplied hydraulic pressure from either of two hydraulic systems. The two-system capability is provided with a single, common hydraulic line to each brake, running from a point inside the fuselage. Such a design makes for greater accessibility for maintenance.

A shuttle valve, at the junction of the Nr 2 normal and Nr 3 emergency brake system lines and a line to a brake, allows the two systems to be used independently. (See Figure 1.)

If the Nr 2 system is used, pressure in the Nr 2 line forces the spool in the shuttle valve to close the Nr 3 line; thus, fluid from the Nr 2 flows into the line to the brake. Conversely, if the Nr 3 system is employed, pressure in that line pushes the spool in the opposite direction to close the Nr 2 line.

In the Nr 2 normal brake system, upstream of each shuttle valve, there is a hydraulic fuse which operates in a manner similar to an electrical fuse in a residential wiring system. The C-141 fuse is a safety device, designed to close if hydraulic fluid starts to flow above a certain quantity at a certain minimum rate.

For example, if a C-141 brake line is broken or ruptured, allowing hydraulic fluid to escape, the fuse in that particular brake line closes, sealing the ruptured line. Thus, only a few cubic inches of fluid are lost, which does not affect the operation of the hydraulic system. The other seven brakes still function normally. Once a fuse is closed, it can be re-opened only by reverse flow, thereby providing a positive seal to close a broken line.

Field reports about cold brakes on the C-141 pointed out that no external leaks that could have caused a fuse to close had been found, and that a cold brake could be made to work again only after the fuse had been reset, or opened. Although the shuttle valves were believed to be leaking fluid between hydraulic systems Nr 2 and Nr 3, early functional tests at Lockheed-Georgia indicated that the valves would not malfunction or leak enough fluid to cause the fuse to close.

However, the Nr 2 and Nr 3 hydraulic systems also serve other functions besides the brakes, such as the spoiler actuators. So, shuttle valve spools could be subjected to varying return line back pressures from both systems simultaneously, during both inflight and ground operations (See Figure 1). It was believed that return line pressures could vary enough to cause the shuttle valve spool to hang up in the center position.

Additional bench tests at Lockheed, simulating various return line pressures on the shuttle valve, verified that the spool could be made to hang up in the center position, and that then the valve would leak at a rate sufficient to cause the fuse to close.

In such a situation, if the return line pressure was greater in brake system Nr 2 than that in Nr 3, fluid flowed from Nr 2 to Nr 3 in a quantity and at a sufficient rate to cause the fuse in that particular line to close. Consequently, since brake pressure could not be applied to that particular wheel, that wheel would have a cold brake.

If the pressure from brake system Nr 3 was greater than that of Nr 2, transfer of fluid from Nr 3 to Nr 2 could take place. If that happened, in sufficient quantity, system Nr 3 was lost. While Nr 2's braking power was not adversely affected, the fluid overflowed the Nr 2 reservoir.

To prevent recurrences of cold brakes on the C-141, a new shuttle valve has been incorporated. Regardless of the position of the spool in this new valve, it prevents transfer of fluid between systems.

The new valve was installed on aircraft Nr 64627 at Travis AFB, California, and on Nr 64647 at Tinker AFB, Oklahoma. Combined reports from Travis and Tinker show that to date (October) the two aircraft have compiled a total of more than a thousand landings with no cold brake problems.

All other C-141s are being retrofitted with the new shuttle valve, in accordance with TCTO 1C-141A-1026, to help stamp out "cold brakes." ★

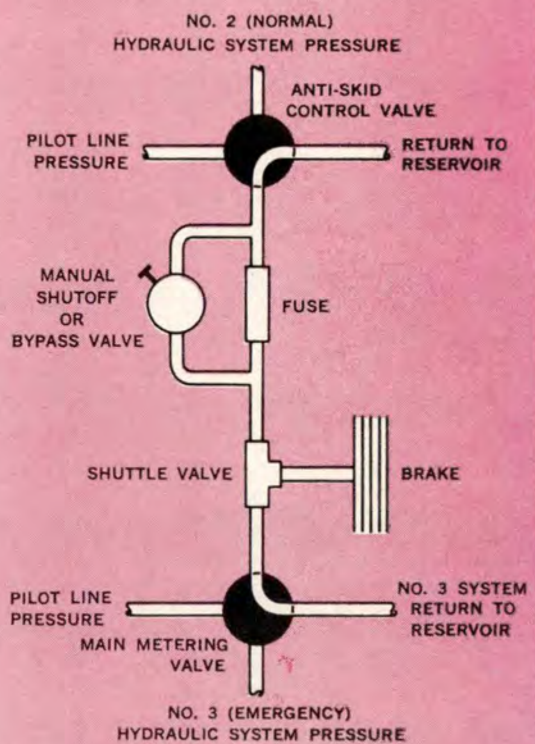


FIGURE 1. TYPICAL HYDRAULIC BRAKE SYSTEM
(VALVE POSITIONS SHOWN WITH NO BRAKES APPLIED)

Check... and double check

Robert B. Shanks, Directorate of Aerospace Safety

During a recent F-104 accident investigation, a hydraulic quick disconnect was found only partially engaged. Teardown revealed that the nipple end of this disconnect could be unscrewed by merely twisting the disconnect when it was assembled but not locked.

What happens is this: the socket can grip the nipple sufficiently to unscrew it when the nipple is rotated relative to the socket. When this occurs, the disconnect won't lock. In the F-104, however, it can be held in place sufficiently tight to prevent leakage on a return line, but in a pressure line, there is sufficient pressure to cause the disconnect to spray the oil out.

The return line is the one to watch out for. It is possible to assemble these disconnects so that they do not leak and yet will pass a small quantity of fluid so that normal stick movements can be made. But, if rapid stick movements are attempted, the stick will lock up, because of the nipple obstructing the free passage of fluid. In an emergency this could contribute to an accident. Don't overlook the quick disconnects. Be sure they are locked together and properly safetied.

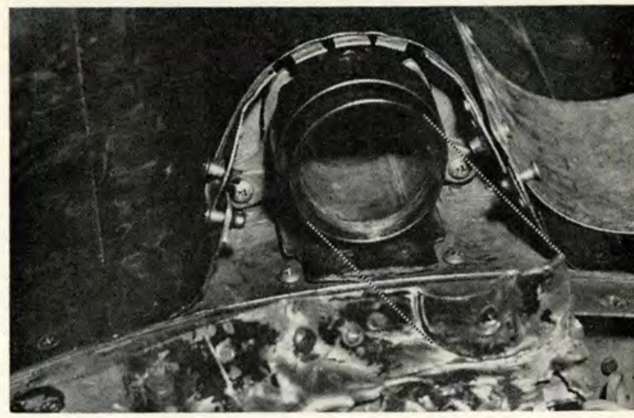
While we are talking about F-104 aircraft, let's not overlook the bleed air line. In the F-104, the bleed air line is two inches in diameter and runs along the top of the fuselage. Any time any maintenance is done in the fuel tank bay, it may be necessary to remove a section of this line. If the couplings are not properly torqued, during reassembly there is no way of telling this until some damage is done to the aircraft. If the coupling is left disconnected, the inspection covers will probably blow off on engine run up.

In one case, a coupling evidently began leaking without serious effects until after the aircraft had leveled off in flight. The pilot had noticed that the air conditioning wasn't working properly, then the stick began to shake, the APC light came on, the automatic pitch control indicator went all the way over to 5. This is what happens when the 501, or "C" phase, fuse in the 3 axis amplifier blows. Right after this a terrific over-pressure occurred in the cockpit. The nozzle position indicator was spinning and wisps of smoke flowed gently forward from behind the seat. Then suddenly the whole cockpit filled with smoke.

None of the instruments were visible except for a red glow from the fire warning light. The stick jerked and the aircraft nosed down. The pilot tried to level off, but the stick was locked and wouldn't budge. He saved himself by ejecting but we lost the F-104 which completely disintegrated on impact with the hard desert soil.

Quick disconnect not adequately engaged resulted in stick lockup during rapid control movement, although restricted flow of fluid permitted normal stick movement.

Coupling on left, in photo at right, on 2" dia. engine bleed air line still intact after crash of aircraft. Note severe distortion of stainless steel ducts still attached to coupling. The coupling to its right was found disconnected with no evidence of forcible separation and no thread damage. Photo below shows 2¼" dia. circular gouge and cut on fuselage upper skin which investigators matched to open end of the bleed air line on another aircraft.



If it hadn't been for the tell-tale scorching of zinc chromate paint, we might never have found the accident cause. However, there near the burned paint was an open coupling with undamaged threads. All of the other couplings had remained connected even though the air duct was mangled. Next we found a perfect imprint of the open end of the duct on a piece of aircraft skin that had been right under the coupling.

What had happened was that the coupling became separated in flight and had released hot air at about 500 degrees F. This air went down the space between the bleed air duct and the aircraft's skin until it reached an elbow where only a thin rubber boot separated it from the space over the top of the auxiliary fuel tank. Of course, with about 200 PSI pressure in the bleed air duct, the rubber boot wouldn't last long once the duct came open. Hot air blowing on top of the auxiliary fuel tank, where a harness connecting the yaw damper gyro to the 3 axis amplifier was routed, accounted for the flight control antics that were similar to the blown fuse in the 3 axis amplifier. A grounded or broken "C" phase wire in this harness would cause these symptoms. In fact, this was the only warning the pilot had other than poor performance of the air-conditioning package.

In the A and C model aircraft (single seat) the bleed air shutoff valve is next to the air-conditioning package in the electronic bay. In the B and D models (twin seats) there wasn't room for it there, so it was moved back into the engine bay next to the primary heat exchanger. Unfortunately, the accident aircraft was a "C" model so there was no possible chance for the pilot to shut off the air supply. Had it been a "B" or "D" model, then by going to ram air the pilot could have shut off the bleed air and possibly brought the aircraft home, provided the stick did not lock up.

Since there had been some maintenance done on this aircraft prior to the final flight, it is probable that the aircraft was run-up and ground tested and cleared for flight without critical inspection or access panels having been double checked. If the access panels over the quick disconnects had been double checked, the unsafetied condition of the disconnects might have been discovered and corrected. Similarly, if the access cover to the bleed air duct at station 335 over the auxiliary fuel tank had been removed, the burned zinc chromate might have been detected and the loose connection in the duct tightened before any serious damage was done.

There must be a lot of good ideas on how to check and double check after PE or other maintenance that will prevent loss of an aircraft because of maintenance error. If you have one, and it's not already in the T.O.s, send it in as a suggestion and get some recognition for yourself and your outfit. ★

FOR FUN, SPORT AND UTILITY, MOTORCYCLES ARE SETTING A FAST NEW PACE. UNFORTUNATELY AIR FORCE PERSONNEL ARE HAVING MANY ACCIDENTS. REMEMBER, IT TAKES ACTIVE DILIGENCE WHEN YOU HAVE ONLY . . .

TWO FOR THE ROAD

By BOB HARRISON

Airman Pete Petosky withdrew $300 from the credit union last week, leaving a balance of $6.71. Then he took the bus downtown. When he returned to base he was riding a shiny new motorcycle and had joined that vast group of two-wheel enthusiasts that has multiplied like Texas jackrabbits during the past few years.

When he went to have his bike registered for on-base operation, the airman discovered that getting the base permit wasn't a simple matter of filling out a form. First, the bike had to be thoroughly inspected and certified. Then there was a short orientation followed by a written test. If he could make 80 per cent or better, Airman Petosky would be awarded a base decal.

Why so much to-do over a mere motorcycle? The record is the answer. During the first six months of this year there were 257 accidents (reported) involving two-wheel vehicles operated by Air Force personnel. And, probably reflecting the growth in popularity of these machines, there were 33 fatalities during the first six months against an average of 26 per year for the past three years. Not only are these fatalities costly, but the number of man-days lost due to accidents has reached serious proportions (Figure 1).

Analysis of two-wheeler accidents over a three-year period reveals nothing particularly unusual. They occurred about when, where and to whom most of us would predict (Figures 2 and 3).

What got us interested in this subject was the figures turned out recently by the numbers shop. When we discovered the number of accidents that have been occurring, the deaths and that last year motorcycle accidents cost the Air Force 12,542 man-days, we decided to pass on a few of the facts and figures. We learned that motorcycle (the Air Force lists three types of two-wheel vehicles — motor scooters, motorbikes and motorcycles; for clarity, we're using the words motorcycles or two-wheelers in this article) sales in this country have grown astronomically during the past six to seven years. One manufacturer sold only 181 vehicles in the U.S. in 1959; last year Americans bought 275,000 from this company alone.

Apparently Air Force personnel have been acquiring the two-wheeled vehicles at a similar rate. By far the greatest number of these are in the popular $300 to $400 price bracket. A dealer told us that he sells a large number of machines to Air Force personnel and that most of the approximately 50cc, $300 types go to airmen and officers who use them as transportation to and from work. The bigger, faster, more expensive bikes are bought principally by single men who probably do not own an automobile.

Many of the smaller motorcycles serve a dual purpose — transportation and recreation. The trail bike has become popular during the past few years, and it is not at all unusual to see riders on trails in our national parks on two-wheeled steeds rather than on four-legged mounts.

To the uninitiated, the motorcycle looks dangerous and many motorists consider them a nuisance and a hazard on the highways. Much of this attitude has been engendered by irresponsible cyclists and the antics of motorcycle gangs that have sprung up around the country. For these the reputation they have acquired is well deserved. Unfortunately, there is a tendency to tar all two-wheel riders with the same brush. This has resulted in resentment toward cyclists which is manifested occasionally by motorists determined to give them no quarter on highways and freeways. Cyclists have been deliberately edged off the road,

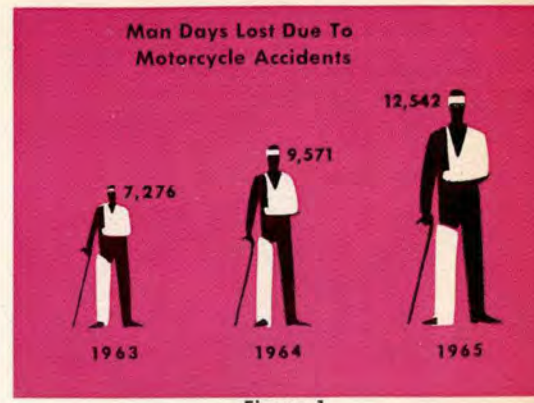
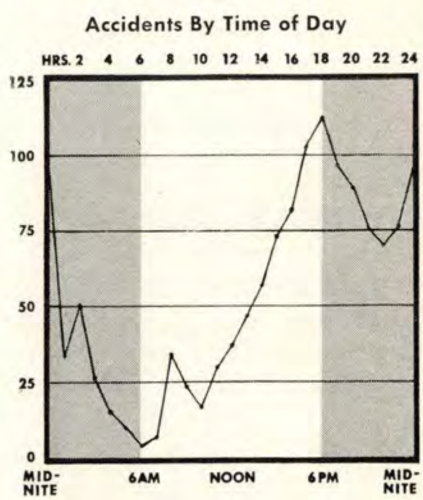
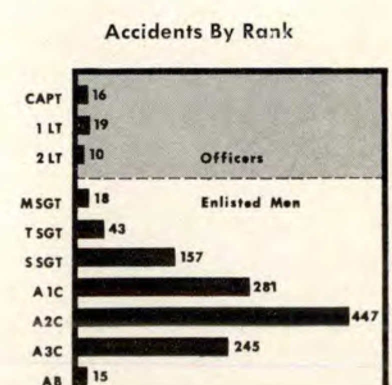


Figure 1

Figure 2





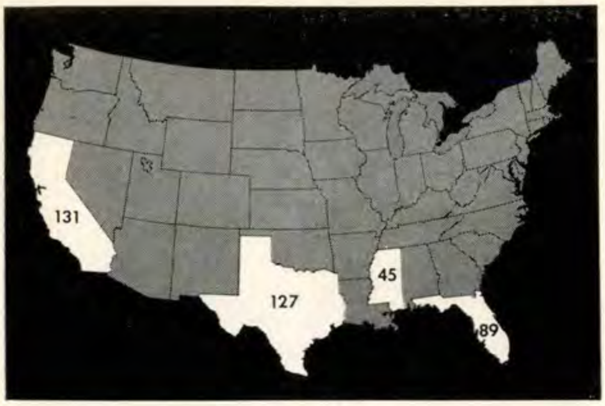
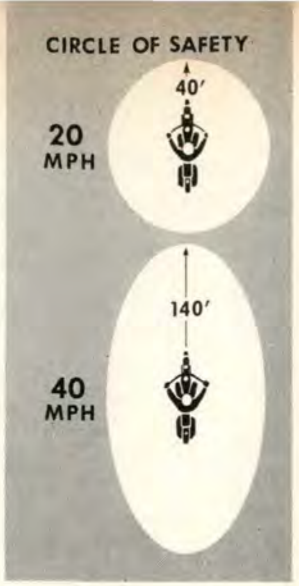


Figure 3

Figure 4

Circle of Safety—as speed increases, circle elongates to provide safety cushion around cyclist.



sometimes with catastrophic results.

How safe is it to ride these machines? Indications are that they are not inherently dangerous — in fact, they have some points in their favor — but that if an accident occurs, they are more dangerous than an automobile simply because they do not provide the protection that a car body affords. There is no question but what the cyclist must be a more careful driver than the average automobile driver. Loose dirt, water, oil and grease on the road surface, ruts and railroad tracks, which normally present no hazard to an automobile, can be dangerous to a bike rider.

Add these to all of the hazards that plague automobiles as well as cycles and it becomes apparent that the cyclist must be more alert, more careful and more considerate of other motorists than the average driver. For example, tailgating, particularly on freeways, frequently results in front-rear collisions. These are seldom fatal to people in automobiles, although they result in many injuries, expensive damage and often huge traffic jams. To the motorcycle rider, tailgating that results in an accident can easily be fatal.

Defensive driving, long preached by law enforcement agencies, the National Safety Council and the Air Force, is a *must* for the cyclist. Two airmen lost their lives in May in a headon collision with an automobile. The accident occurred at the crest of a small rise when the driver of the automobile drifted into their lane. The driver of the car, who was allegedly under the influence of alcohol, has since been charged with manslaughter.

For the cyclist, skill is essential. This doesn't mean that he has to possess any unusual abilities or skills, but many accidents occur to riders who are not familiar with the equipment or who have had little experience.

See and be seen is a cardinal rule for automobiles, aircraft, boats and any other vehicle and is particularly important to cyclists. Accidents and a far greater number of near-misses occur because automobile drivers fail to see small two-wheeled vehicles. A cardinal rule for cyclists is to stay out of automobile drivers' blind spots. Bright colored, easy-to-see jackets and reflector helmets are recommended, and some authorities suggest the motorcycle headlight be on at all times, day and night.

Safety equipment is essential. Recommended are gloves, boots or high-top shoes, glasses or goggles and, by all means, a safety helmet. Gloves should be long enough to prevent wind from entering the cuffs of the jacket. Glasses or goggles should be secure so that they won't blow off, shatterproof and ventilated so that they won't steam up to cut or distort vision. Many helmets are available, but get a good one. A satisfactory helmet can be purchased for about $20 to $25 — even less in the BX — although prices go up to the hundred dollar mark. But a word of caution: watch out for cheapies. AFR 127-5 makes the wearing of helmets on base mandatory. It also specifies acceptable colors and outlines general structural requirements.

PASSENGERS

The first rule here is don't carry any passengers until you are thoroughly familiar with your motorcycle and have enough experience to be a competent driver. Once you reach this stage, it is permissible to carry passengers but you must observe certain precautions: Be sure the passenger

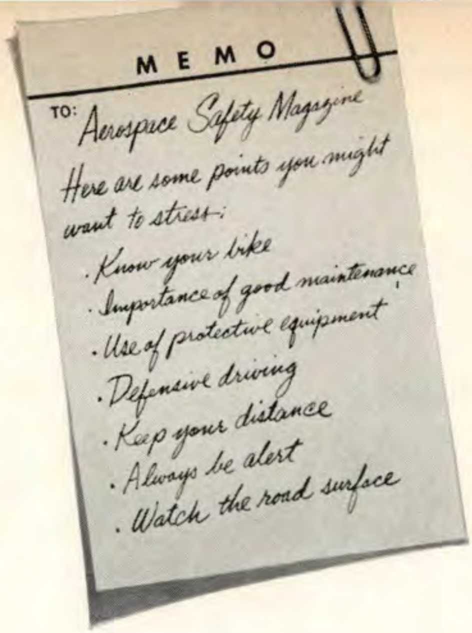
- Holds on to the handle or seat strap when the vehicle is in motion.
- Keeps his feet on the footrest at all times.
- Is briefed on leaning with the driver and against holding his body rigid. This makes the vehicle hard to balance.
- Avoids contact with the hot muffler.

A concept that applies not only to two-wheeled vehicles but to automobiles as well is the "Circle of Safety." This simply means that one should operate his vehicle in such a way that he keeps traffic situations far enough away to protect himself from them as they develop. In other words, keep a safe distance behind vehicles ahead, use the rear view mirror and look around to keep from being overtaken from behind either while moving or in case a sudden stop or maneuver is necessary. Keeping clear of hazards and obstacles on both sides completes the circle (Figure 4).

The motorcycle has become a significant factor in traffic nationwide and is being recognized as such. In the near future we can expect more attention to be given to these vehicles by both military and civil authorities. This is reflected in the Air Force by a study that is being made by the Ground Safety Division of the Directorate of Aerospace Safety which is expected to lead to a new safety policy and standards. A segment of the new USAF Traffic Safety Training program is devoted to this subject, and a new training film is scheduled to be made in the future.

Meanwhile, the bikes are growing in numbers as owners discover the joys of exploring the back country where automobiles are impractical or can't go at all, their economy of operation, the fun they can provide.

But the hazards are there, too. As one safety officer said: "There are those who have fallen and there are those who are going to." There will be falls and collisions with the resultant lumps and bruises, occasional broken bones, other injuries and deaths. Safety people will continue to develop accident prevention methods and techniques but the final responsibility rests with those who ride two-wheel vehicles. ★



Smart rider (above) watches road conditions. Rocks, sand, oil and water can cause a fall.

Well dressed cyclists, below, wear suitable helmet, gloves, in this case leather jackets. Bright colored, easy-to-see jacket is good, too, but leather helps protect rider in case of a fall. Boots or high top shoes are better than low cuts.

WRONG **RIGHT**

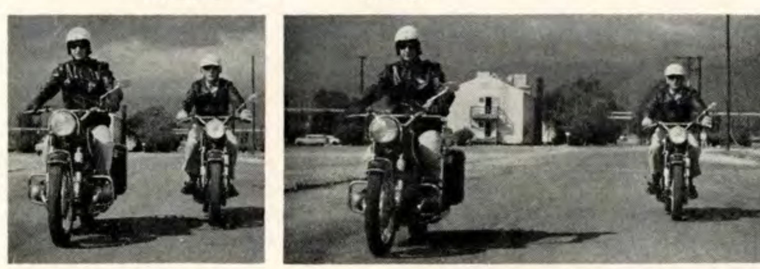


Photo at left shows riders close together, nearly abreast. This inhibits maneuverability. Better spacing fore and aft, laterally, shown at right.

Auto begins right turn. Cyclists are in driver's blind spot, too close and could be forced into obstructions or curb on a city street.

PHOTOS BY MSGT BOB PARKER

Would you believe...?

Maj Bruce D. Jones, Chief of Safety
4510 CCT Wg, Luke AFB, Arizona

WOULD YOU BELIEVE, the difference between an incident and an accident is the first two letters of the word, especially when it comes to abort procedures?

WOULD YOU BELIEVE, that you, the pilot, in many of the cases have some control over which two letters are placed at the beginning of this word? One of our pilots proved this last week when he successfully aborted an F-100 when a birdstrike stalled his engine at nose wheel liftoff. He made a perfect abort and stayed out of the barrier. The brakes were not even overheated.

WOULD YOU BELIEVE, we have pilots that still try to take off with improper trim? Makes for a thrilling abort or takeoff but proper procedures can avoid these seconds of sheer terror which are injected in the hours and hours of what some people have referred to as boredom.

WOULD YOU BELIEVE, my subject is aborts? An abort, for bold face procedures, means not taking off. But missions can be aborted anywhere at anytime and several different ones will be discussed.

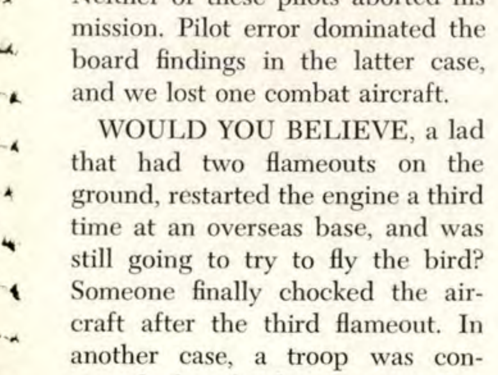
WOULD YOU BELIEVE, we still have pilots today who want to try a second takeoff after they have aborted their first one?

WOULD YOU BELIEVE, we also have pilots who consider the mission so important they take aircraft that are not in good condition? A T-33 recently launched with a bad radio; luckily his destination picked him up and he got in on guard channel. He didn't abort because his mission was too important: parts pickup. His radio problem — blower cooler was missing off the radio.

WOULD YOU BELIEVE, another pilot had such an important mission he took off without oxygen because he was going to remain below 10,000 feet? Fumes entered the cockpit and he attempted a Precautionary Landing Pattern. He missed the PLP and had to bail out. Neither of these pilots aborted his mission. Pilot error dominated the board findings in the latter case, and we lost one combat aircraft.

WOULD YOU BELIEVE, a lad that had two flameouts on the ground, restarted the engine a third time at an overseas base, and was still going to try to fly the bird? Someone finally chocked the aircraft after the third flameout. In another case, a troop was convinced after the first flameout that he wasn't going anywhere in his bird. He did attempt to assist in the trouble shooting to find out if there was a cockpit goof but made no attempt to go any further.

WOULD YOU BELIEVE, we had a number four lad who had his



mind made up to take off and despite his flight leader and element leader aborting, mobile control giving him abort instructions, he took off anyway? Luckily he didn't ding or kill his flight leader, but it was another one of those you wouldn't believe.

WOULD YOU BELIEVE, a pilot had an unsuccessful abort in an F-100 and received pilot error in the accident because his speed brakes were down? No tail hook barrier was available, and the old barrier couldn't stop him. Some people believe retarding the throttle back and pushing the speed brake switch forward is an awkward movement and could be forgotten in the few seconds an abort

requires. Visit mobile and notice the number of F-100s touching down with speed brakes out.

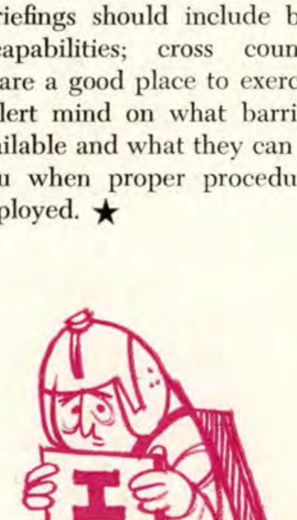
WOULD YOU BELIEVE, an F-105 just hooked the approach end of the barrier at a TAC base? He had been told the tail hook was down and smartly caught it on the fly while landing. Bent another combat aircraft.

Here's an interesting case. A captain was taking off and airspeed stopped increasing so he aborted. Stores weren't jettisoned and barrier was engaged at about 100-120 knots. The old barrier didn't hold and a major accident occurred. The pitot static system and the barrier took the blame, but WOULD YOU BELIEVE the pilot possibly could have saved this combat aircraft by proper abort procedures? Then another base had an attempted abort but the pilot never got it out of afterburner and back to idle. He hit the BAK-6 barrier at 200 KTS without jettisoning tanks or deploying the drag chute. He went through two barriers and covered 3078 feet more on the nose. Dirt finally snuffed out the engine and the pilot evacuated the wreckage safely. He thought he had engine failure, had idled the engine, and deployed the drag chute. Simulator tests later showed that it takes pilots 4-16 seconds to evaluate a take-off emergency and take action. Seventy-five per cent of the pilots had at least one step out of sequence. Twenty-five per cent did it right. In the real abort the pilot had six seconds to perform all functions correctly. Unfortunately he only accomplished one step, lowering the hook.

WOULD YOU BELIEVE, that 11 months later another pilot aborted at this same base, due to low accel check airspeed? He also failed to bring the throttle out of A/B. This particular base had learned its lesson well and mobile called him to get throttle to idle. He lost only 60 knots airspeed in 6500 feet of runway, so the seconds and runway under you go very fast.

In summary I HOPE YOU BELIEVE:

- No mission is important enough to take an aircraft with a known malfunction or problem.
- Knowledge of abort procedure is fine but simulator practice and perfect abort procedures are a part of our training requirements.
- Briefings should include barrier capabilities; cross country flights are a good place to exercise your alert mind on what barriers are available and what they can do for you when proper procedures are employed. ★



THE IPIS APPROACH

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

Q A pilot receives clearance for a specific published high altitude penetration and approach while inbound to the destination fix at an assigned altitude *higher* than the published initial penetration altitude. Does clearance for the penetration and approach constitute clearance to immediately begin descent to the initial penetration altitude? Can the penetration be initiated from an altitude higher than that published?

A The answer to the first part of the question is yes. A descent to the initial penetration altitude can be started immediately, unless otherwise directed by Air Traffic Control. (NOTE: If the initial penetration altitude is a flight level such as FL 180 or FL 190, make sure it is usable according to local altimeter setting, e.g., FL 180 is only usable with current altimeter setting 29.92 or higher.)

The answer to the second part of the question is also yes; however, a pilot should use judgment before commencing a penetration from an altitude higher than that published. The ability to comply with penetration airspace limitations (teardrop) or subsequent altitude restrictions (straight-in) should be considered by comparing altitude to be lost with distance, ground speed and rate of descent. When arriving at the initial approach fix at an altitude considerably higher than the initial penetration altitude, e.g., FL 260 with published altitude FL 200, descent to the initial penetration altitude should be performed in a holding pattern after receipt of appropriate ATC clearance.

Q Since AFM 51-37 defines a circling approach as a visual flight maneuver, when can I descend below published circling minimum altitude during a circling approach?

A One point must be thoroughly understood concerning circling approaches, i.e., a circling approach is a *visual* flight maneuver; it is used when the instrument approach is completed to align the aircraft with the landing runway. With this firmly in mind, descent below the minimum altitude guaranteeing obstruction clearance rests solely with pilot judgment. At the time the decision is made to commit yourself to the circling approach there should be no doubt that the aircraft can be maneuvered visually for a landing.

POINT TO PONDER

The old question of when to start a missed approach from a precision approach still seems to be around. AFM 51-37 states, "The missed approach must be performed when visual references are insufficient to land from a precision approach at the published minimum altitude." The debate centers around the altitude lost during the transition of the missed approach and the fact that there may be a momentary deviation below the prescribed minimum altitude. The factors of speed, weight, and vertical velocity, plus pilot reaction time, altimeter errors, and position relative to centerline and glidepath cannot be ignored. All of them must be considered by the pilot prior to, and during any precision approach in minimum weather conditions. Our position in this matter is simply this: The published minimum altitude is the pilot's *minimum decision height* for initiating a missed approach. It may be necessary in some aircraft to initiate the missed approach prior to the prescribed minimum to avoid contact with obstructions during the transition to a climb. Far better to see the runway on the missed approach than to realize too late that your aircraft can't pull up from a 100-foot PAR minimum without touching down. ★

COMPRESSIBILITY

CORRECTION

Maj Robert J. Vanden-Heuvel
Systems Engineering Group, ASTFF
Air Force Systems Command

Students at all test pilot schools are probably exposed to the theory of pitot static instruments. Included in this course is a "thing" called Compressibility Correction. Although this correction is something to be used for most preflight cruise planning (except those fortunate Mach Jockeys), I believe that very few pilots, except those exposed to the subject at test pilot schools, know why it exists. Definitions of "compressibility error" and "compressibility correction" in the publications used by pilots are vague and misleading. Therefore, I propose to explain the error and its correction in pilot language.

In a conventional airspeed indicator, air pressure from moving (dynamic) and air pressure from altitude (static) sources combine to cause a needle to point to a certain value of knots. To bring this about, we have an aero-mechanical gadget designed to follow an airspeed equation which includes these variables. This standard airspeed system was designed to read true airspeed at sea level on a standard day (CAS=TAS). Let's not get involved with instrument or position error. You all know what they are. At altitudes above sea level, you have to apply a computer correction to CAS to obtain TAS because the airspeed indicator thinks it is working on sea level static pressure and it is not. (This turns out to be a good deal anyway because the wings think the same thing and stall in agreement with the airspeed indicator.)

Pretty simple except for one hooker. To make this relatively simple airspeed indicator it was necessary to assume that it would be operating in air of constant density. (Like the ocean.) If air were of constant density, then the pressure would vary linearly from sea level to the "surface" of our atmosphere. But, as any schoolboy pilot knows, half our air lies below about 18,000 feet. With the rest spread out to anywhere from 50 miles and up, it is obvious that density is far from constant.

Does this mean that we should throw away our airspeed indicators and start over? No. It means that we have to apply a correction to our CAS when above standard sea level conditions to account for the error caused by air being compressible. Voila! *Compressibility Correction!* Not because the plane is compressing the air. Not because molecules are packed in the pitot tube. Not because of Mach effect. Simply a correction to the airspeed equation which the airspeed indicator, by design, is incapable of solving.

Refer to either an F Factor Chart or a Compressibility Correction Chart. Note that at sea level the error is zero regardless of speed. Also note that the error is greater at 200 K and 50,000 feet than it is at 600K and 5000 feet. This should make it clear. The error is the result of getting farther away from sea level density, not because of speed. At any given altitude, the error is greater at higher airspeeds only because of the way in which the "incorrect" pressure fits into the airspeed equation.

If you did not already know, you may by now have figured out that the correction charts are universal — that one chart applies to all airplanes using the conventional airspeed system.

Why don't Mach Jockeys care about Compressibility? Because it doesn't affect the Machmeter. But that is another story. ★

Rex Riley Cross Country Notes

LIFE PRESERVERS. The 6486th Operations Squadron P. E. Section at Hickam has had some problems in keeping track of life preservers issued on AF Form 261. TSgt V. T. Mathis, Assistant NCOIC of the P. E. Center, asked Rex to pass on the following, and he's glad to oblige.

"We have approximately 7000 life preservers which makes numbering impractical and unfeasible. We issue an average of 100 preservers per month to transient personnel, the great majority of which are turned in to a few bases in California. It is, therefore, quite likely that we would have 30-40 vests at one particular base. Unless the receiving organizations note on their shipping documents (DD Form 1149 or DD Form 1348-1) who turned item(s) in, the issuing organizations have no way of knowing to whom credit should be given upon receipt of the equipment. The 6468th Operations Squadron, Personal Equipment Section, adheres to the policy of typing on either form: *This Equipment Turned in By* .... We also ship transient equipment within 24 hours.

"Another policy that would aid the issuing organization in locating equipment, after a reasonable period of time, is to have the receiving organization write the document control number on the margin of the post-card portion of the AF Form 261 prior to mailing. This not only informs the issuing organization that the equipment has been received, but also it is being returned and the date shipped."

DURING DOWNLOADING of a C-141, part of the cargo loaded aboard a 25K loader struck the left tip of the left aileron inflicting a cut. The report had this to say about the driver of the vehicle: "SSgt .... has over eight years of government vehicle operations without any accidents, previous mishaps or traffic citations. He has over nine years active duty and is highly motivated to obtain quality work."

With this kind of a record and reputation, why would this man allow such a mishap to occur? This question is often asked after accidents, but the answer is sometimes difficult to come by. In this case there are some answers as to why the driver misjudged the height of the load and its proximity to the aircraft.

Congestion on the ramp was much greater than usual because traffic was being diverted from another base that had been closed by an accident. This resulted in many uncontrolled passenger busses in the vicinity and many passengers in front of the passenger holding facility. In addition, the 25K loader operators were said to be pressed to accomplish loading operations within the authorized ground time.

It is possible that the driver's night vision was affected when he drove in front of a parked fire truck that had its lights on. Apparently, the area lighting was poor. Lights were available but not requested; however, an officer stated that he doubted whether there were sufficient authorized persons even if the lights had been requested, due to saturated maintenance on that particular evening.

BY GEORGE, that was a close one! A pair of F-104s taxied to the maintenance inspection area for a final check just before getting in place for takeoff. Two of the ground crew inspected each aircraft. While one man was checking the nose gear well he felt a tug at a pocket and almost simultaneously, another ground crewman heard a noise and thought he saw a puff of smoke come out of the tail pipe. Then when the inspection was completed, the first man showed the tip pins to the pilot who then taxied into number one position for takeoff.

While this aircraft was waiting for Nr 2, the crewmen got to counting the pins and discovered one short. One of the men then ran to the waiting aircraft and notified the pilot of suspected FOD. The aircraft was taxied back to the line and, sure enough, there was extensive damage to the engine.

What happened was that pins from a previously inspected aircraft were in the ground crewman's pocket and one of them was ingested into the engine. Another minute or so and the pilot may have tried to take off with a sick engine.

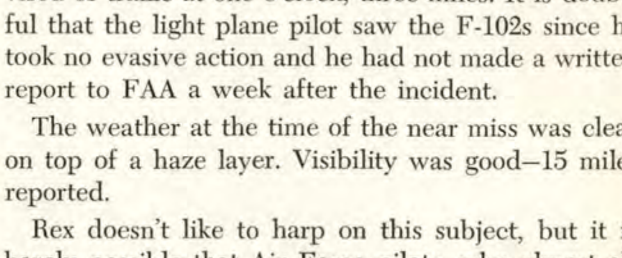
PROBABLY TOO FREQUENTLY we talk about accidents after the fact. When we discuss near misses between aircraft in flight, we're talking about accidents that didn't happen but conditions that could lead directly to a disaster.

Rex doesn't know of anything more frightening to a pilot than the thought of a midair collision. If you are lucky, you might get away with it; if you're not, even a parachute and an ejection seat won't save you. It is because of this terrible potential that we frequently mention near misses and publish accounts of some of those that occur.

The latest tale involves a pair of deuces that missed a twin engine light plane by only 50 to 100 feet. The interceptors were climbing out on a practice scramble and they passed the other aircraft between 7000 and 7500 feet. The leader of the flight of two never even saw the other aircraft, although approach control advised of traffic at one o'clock, three miles. It is doubtful that the light plane pilot saw the F-102s since he took no evasive action and he had not made a written report to FAA a week after the incident.

The weather at the time of the near miss was clear on top of a haze layer. Visibility was good—15 miles reported.

Rex doesn't like to harp on this subject, but it is barely possible that Air Force pilots, who almost always fly on IFR flight plans even in VFR weather, sometimes fail to remember that this is no guarantee against VFR traffic. And that means almost all light plane traffic. Further, Air Force pilots who have never flown light aircraft, or who seldom fly them, may not realize that there are a lot of civilian pilots to whom the hemispheric rule is something they learned in order to pass a test and have since forgotten. Therefore, you just might see a light plane flying VFR on a course of 90 degrees at 8000 or 8500 feet. And he might have his head buried deep in the cockpit while



he studies all those dials and knobs on that new radio he just bought.

Add one more item—it's a rare light bird that has a transponder (probably most light plane pilots don't even know what the word means) and many of these little birds don't paint worth a darn on primary radar.

What Rex is leading up to here is this: We have been diligent over the years in stressing IFR and instrument procedures. Air Force pilots, therefore, are so accustomed to grabbing onto the gages that it is easy to forget to keep an eye outside the cockpit. This is most acute in single engine aircraft with only one pilot, who doesn't have a friend in the other seat to keep a lookout.

THE IF FACTOR

A helicopter scramble is a rapid and exacting exercise. It requires a well-trained crew, operationally ready equipment and procedures that are refined to the point where no extraneous actions slow the event. The absence of any one of these requirements is almost sure to result in inability to carry out the mission expeditiously, the possibility that it will never get off the ground, or an accident.

An HH-43 crashed earlier this year because the cable from the aircraft to an auxiliary power unit (APU) was not unplugged. Analysis of the events leading up to the mishap revealed that the scramble formula was less than perfect and, in fact, created the distinct possibility that an accident could occur. The particulars of this accident are presented here because this kind of mishap could occur elsewhere and for essentially the same reasons.

The mission was to orbit while the pilot of an F-102 with primary hydraulic system failure made an emergency landing. The flight crew consisted of a pilot, a medic and two firefighters. The ground crew was one helicopter mechanic.

The chopper took off with the cable from the aircraft to the power unit still connected. Apparently they build connectors pretty well these days, because the cable remained plugged in at both ends. But the stress was too much for the cable and it parted eight feet from the APU and traveled up into the rotor blades. Of course this sliced the cable into small pieces, and in the process, the rotor blades began to disintegrate, throwing pieces all over the lot including some that struck a WB-47 parked 450 feet away and others that damaged an HU-16 400 feet in the opposite direction.

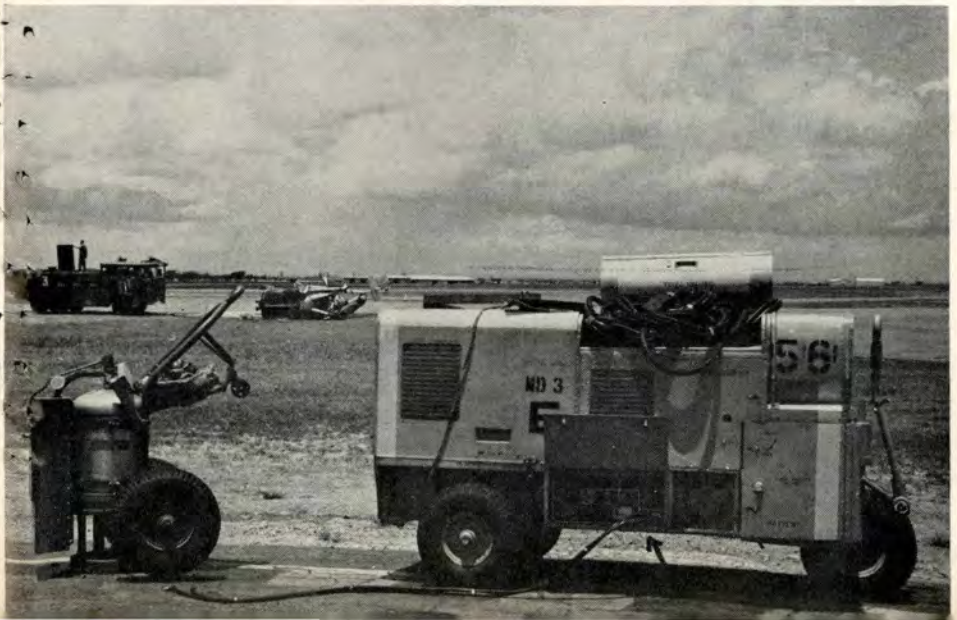
The chopper descended, crossed a drainage ditch and touched down on the left gear, which failed. The bird then rolled onto its left side, its rotor blades flailing the ground and rapidly breaking into small pieces. It stopped with 30 feet of the cable draped around the right main gear and the bottom of the aircraft.

The primary cause was obviously personnel factor: the helicopter mechanic failed to detach the auxiliary power cable from the aircraft.

Well, that takes care of that. Next time be more careful. If you are thinking something like this, whoa up a minute. Let's take a closer look. Was this mechanic careless? Or forgetful? Or not qualified?

The Board decided that the entire crew was current, properly trained and qualified in their du-

Usually, after an accident we can apply the "if" factor: If he hadn't done that, or if someone else had done this, or "if" on and on. Perhaps the accident is the price we pay for all of the "ifs" that weren't corrected before the accident.



ties. It was also determined that the events preceding the accident were normal: the crew was prepared and briefed, clearance was proper, weight and balance okay, takeoff and landing data accurate, weather checked and as forecast, and the chopper had been properly preflighted. Sounds like a pretty good operation.

But this unit had a few problems. For one thing, they had been unable to acquire an APU with the proper output limitation. The one they were using had an output of 1200 amps, whereas an 800-amp unit was specified. Consequently, the mechanic had to stand by the APU while the aircraft was being started so that he could monitor the power output to preclude damage to the helicopter.

The duties performed by the various crewmembers during a scramble were less than perfect in that written operating instructions contained one procedure, but for a couple of months the unit had followed two different procedures, depending upon whether one or two pilots were on alert.

When there were two pilots, the medical technician stood fire guard, pulled the chocks and disconnected the power cable. With only one pilot, the medic occupied the left cockpit seat and the helicopter mechanic performed these duties, in addition to the other things he had to do. Just two hours previously, a scramble occurred in which the medic was not present and the mechanic took care of all the duties. During the scramble in which the accident occurred, the medic was in the cockpit and the Board reasoned that the appearance of two men in the cockpit may have given the appearance of a two-pilot scramble and could have confused the mechanic.

A distraction occurred when the mechanic started from the APU toward the aircraft to disconnect the cable. En route he deviated to give

THE iFACTOR

the pilot the rotor engagement signal. When the blades began to turn he gave the "droop stops out" signal and hurried to the aircraft and strapped in.

Now what was he doing in the aircraft? Because a couple of fire suppression kits had been dropped in flight, the base had requested that the kits be located in a grassy area between the taxiway and runway to preclude flying with the FSK suspended over areas populated with people and aircraft. The procedure, therefore, was for the mechanic to get in the chopper at the alert pad, ride to the FSK where he got out and attached the kit to the chopper. Then he waited there until the aircraft returned to disconnect the kit.

As contributing causes of this accident, the board pointed to the two different scramble launch procedures and the troubles with the unit having to use the wrong APU. Also they found that the procedure for turning the generator power switch off prior to detaching the cable from the aircraft failed to give the pilot positive indication that the cable was disconnected.

As a result of this accident and the subsequent investigation, the unit took certain corrective actions:

- All crewmembers received proficiency checks.
- A single scramble procedure was written for inclusion in operating instructions after the procedure was tested.
- An MD-3M power unit modified to an amperage output of 800 amps was procured.

Usually after an accident we can apply the "if" factor: *If* he hadn't done that, or *if* someone else had done this, or *if* on and on. Perhaps the accident is the price we pay for all of the *ifs* that weren't corrected before the accident. A lesson implicit in this helicopter accident is that, while procedures may be adequate for the situation existing at the time they were written, time and change create the need for frequent review and correction where necessary. One test of the sharpness and capacity of supervision is that supervisors keep their procedures in tune with the times. ★

Missilanea

BOTTLED GAS FACTS. While a cylinder of hydrogen was being used to recharge an oxygen system on an aircraft, an explosion resulted killing four men and demolishing the aircraft.

In another accident, two civilians were killed while pressurizing a surplus steel container without benefit of a pressure regulator. Last spring, an airman was killed when he transferred high-pressure gas into a common tank. In a non-injury accident, a cylinder fell from a truck, breaking off the valve. The cylinder took off like a rocket, penetrating two building walls before it stopped.

From the above, one can gather that: compressed gases in cylinders can be dangerous—when used by personnel who are careless and uninformed. If you use bottled gas, make it your business to know the equipment and the hazards, then abide by the safety regulations.

Here are some precautions which should be observed when handling bottled gas cylinders:

• Always read the labels to identify the contents of compressed gas cylinders.

• Return cylinders with conflicting or illegal names of contents to suppliers.

• Never force connections that *do not fit together easily*. Do not improvise by using nonstandard adapters to join connections with different threads.

• Keep safety caps on cylinders that are not in service, especially when being moved.

• Do not lift a cylinder by its safety cap.

• Never use a gas cylinder as a roller or support.

• Do not pressurize low-pressure containers with high-pressure cylinders unless a pressure regulator is used and a pressure relief valve is installed between the low-pressure and high-pressure cylinder. The pressure relief valve should be installed on the low-pressure side of the regulator.

• Protect cylinders from temperature extremes (high and low).

Know all the facts about bottled gas cylinders before you handle them. If others had known the facts, the mishaps recounted above never would have happened.

Maj R. L. Mahynske
Directorate of Aerospace Safety

LGM-30 HAPPENINGS—"A chain is only as strong as its weakest link." A trite cliché, but irrevocably true. A safety program is only as effective as its least safety-conscious member. We design thorough and detailed programs to effect safe operating procedures. They look fine on paper but if we don't give them the widest possible coverage, their effectiveness decreases correspondingly. The staff officer contributes to a safe operation, but not nearly as much as the man with the wrench. Give that man your undivided interest and attention and observe the resulting elimination of accidents.

A case in point: A recent teardown report (TDR) of an arm-disarm switch returned from the field attributed galling and pin damage to improper safing pin removal procedures. Technical Order procedures were not adhered to. The safing pin should be fully seated until a definite stop is felt, then released prior to rotating the safing pin. An additional finding of the TDR was damage to the safing pin square drive, guide sleeve, and groove inside shaft housing caused by the use of improper tools.

This is one of those things that "could not possibly happen," *but it did happen!* Training, Quality Control Evaluation and Certification, and Supervisory checks all were ineffective in spreading the word. *The man with the wrench didn't get the word.*

In YOUR unit, how many men with wrenches *still* have not gotten the word? It's YOUR safety program, and if I were you, I'd find out.

Lt Col T. F. X. O'Connor
Directorate of Aerospace Safety

DOES YOUR OUTFIT HAVE A T-29/C-131 WHICH DOES NOT PERFORM QUITE LIKE THE DASH ONE SAYS IT SHOULD? THIS ARTICLE DISCUSSES ONE PARAMETER WHICH CAN CAUSE PERFORMANCE DEGRADATION OF CONVAIR 240, 340 AND 440 AIRCRAFT.

AN OUNCE OF PREVENTION

Captain T. G. Farrell, SAAMA Service Engineering, Kelly AFB, Texas

During the routine maintenance test hop of a C-131A, the crew observed abnormal stall behavior. The aircraft entered the prestall buffet region and stall about ten knots higher than predicted in the flight manual.

In this type of aircraft, any stall is preceded by a buffet because the air does not flow smoothly over the top surface of the wings as the angle of attack is increased. The buffet produces a moderate aircraft and control system shake, followed by a change in elevator control characteristics. Thus the buffet gives the pilot an effective prestall warning.

Since takeoff, best climb and landing speeds are usually a function of the normal stall, an increased stall speed could be dangerous. For instance, if an engine were lost on takeoff at a high gross weight, the takeoff speed, best climb speed and minimum safe single engine speed should be 1.2 times the normal power-off stall speed. Since the normal stall speed is a fixed quantity for a given gross weight, an abnormally high stall speed would make the takeoff, best climb and safe single engine speeds greater than expected. An abnormally high stall speed also reduces the pilot's margin of safety during normal landing approach because the minimum recommended approach speed depends on the normal stall speed. Clearly, a premature stall is undesirable in this aircraft.

SAAMA Service Engineering was asked to diagnose the problem of this C-131. The engineers first performed an inspection of the aircraft. When the wing leading edge wrap seals were found dented and loose, the cure for this flying Samaritan became obvious — fix the seals.

The leading edges of T-29 and C-131 aircraft are removable for ease of maintenance (see Figure 1, Index 12). In the secured position, the removable leading edge is made aerodynamically clean by the leading edge wrap seals (see Figure 2, Index 12). Even a slight misadjustment of a wrap seal can result in unstable airflow across the wing, resulting in premature buffet and stall.

These wrap seals are made in three parts: The strap which actually seals the leading edge, the turnbuckle assembly which may be adjusted to remove strap slack (Figure 1, Index 20) and the lever which is fastened to the lower, front spar cap. The lever arms were originally manufactured with round, countersunk holes (Figure 2, Index 6). The fastener is shown installed through a round hole. This design is fine if the seal requires no tightening, but the round holes prevent turnbuckle adjustment. This shortcoming was recognized by the manufacturer while the T-29s and C-131s were still in production, so the lever was re-designed to have slotted holes (see Figure 1, Index 18). Note that the fastener goes through a slotted hole in the lever. The production drawing shows that a number of T-29/C-131 aircraft left the factory with the obsolete and ineffective lever design. The only difference between the old design and the new is that (1) the round, countersunk holes in the lever are replaced by the slotted holes, and (2) the lever material thickness is increased from 0.040 to 0.064 for the wrap seals of the nacelle to fuselage leading edge.

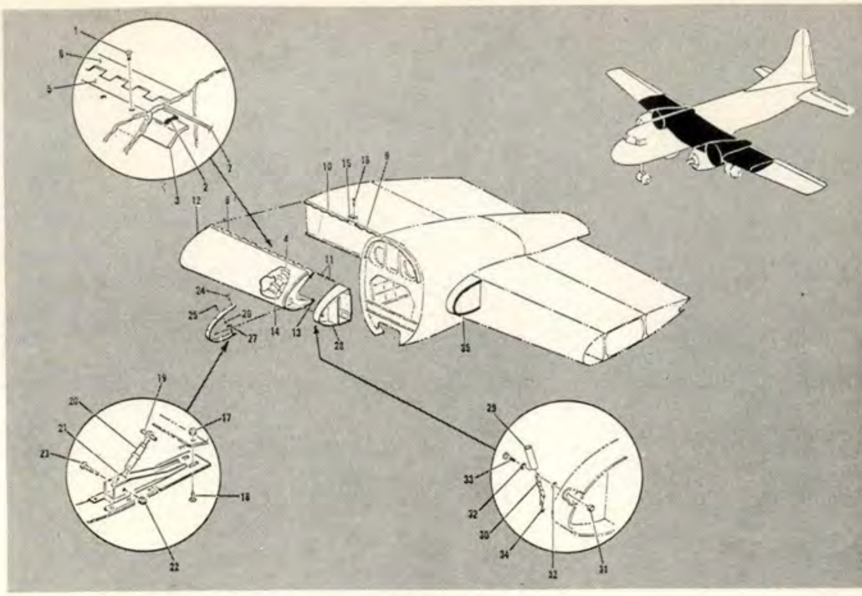
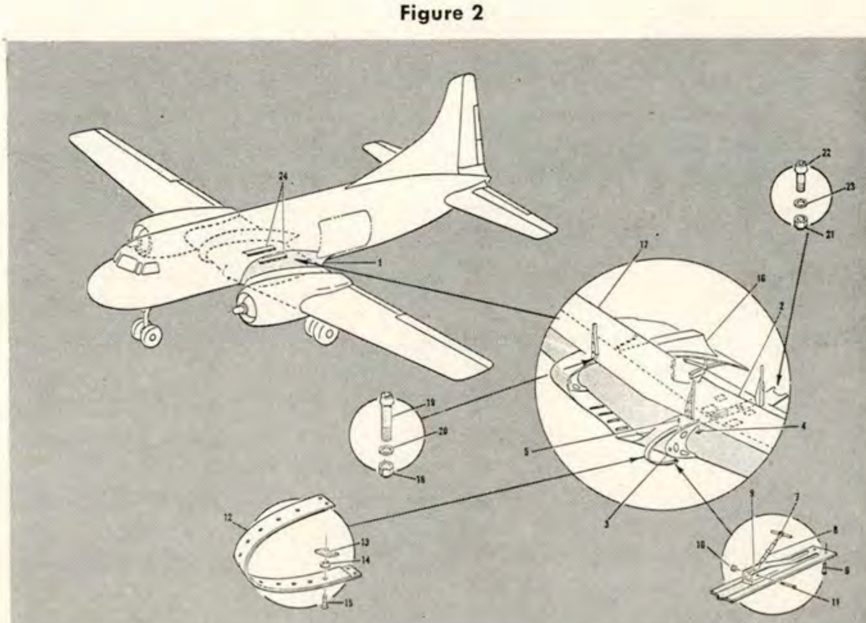


Figure 1

Evidently the old wrap seals should have been replaced by attrition over the years. However, this has not happened in all cases, although replacements are made as required during the normal IRAN cycle.

If you have T-29/C-131 wrap seal problems, carefully inspect the seals. The strap must possess a tight, clean fit around the Wing Leading Edge. If the lever arm holes are round rather than slotted, the turnbuckles are not working for you, and the ship's stalling speed may be higher than it should be. If the nacelle-to-fuselage leading edge wrap seals require replacement, make the new lever of 2024-T4 Clad, 0.040 thick with slotted holes. This will allow continual turnbuckle adjustment until the seals have to stay in place during flight. For further information, contact the T-29/C-131 System Support Manager (SSM). ★

Figure 2



BUILD IN SAFETY

Maj Carl H. Cathey, Jr, FSO, AF Contract Management Div, Los Angeles 90045

How often have you jumped into your bird and sailed into the blue, then wondered: Why did they put this switch in this position? Why did they build this thing this way? I don't know about you, but I've asked these questions many times. It seems that all the big talk about safety runs dry about the time a bird gets to the troops. We get the machine and we have to work out some procedure so that we can live with a poor design feature or overcome some ridiculous arrangement of switches.

It was great to see the article in the April issue of AEROSPACE SAFETY, "The Safety Concept," in which Major Bill Smith explained what is being done in the major air commands, primarily AFSC and AFLC, to keep the ball rolling in getting good ideas incorporated into aircraft design. When you've seen Murphy after Murphy kill your buddies, it gets to be tiring and makes you wonder if this trip is necessary.

Project 60 is a DOD program to have one government agency interface with the contractor in a plant that produces aerospace weapons systems. In the past, there have been cases in which every branch of the services had representatives at a plant buying the same product, but they were giving conflicting directions to the contractor. Now each plant under Air Force cognizance has only one government representative with which to interface: the Air Force Plant Representative Office (AFPRO).

Out of this same program came the newest division in the Air Force Systems Command. The Air Force Contract Management Division (AFCMD) was formed in January 1965 by combining the three regions which had previously managed Air Force contractor operations in the Eastern, Central and Western parts of the United States. The Air Force, through the Systems Command and the Contract Management Division, thus has "plant cognizance" for 21 of the largest aerospace plants, where $41 billion worth of contracts are being performed. These contracts represent nearly all the major Air Force aerospace systems – as well as many major systems for Army, Navy and NASA. Once assigned cognizance of a plant, the AFPRO services contracts of all government agencies doing business there.

"You men and the crews who work for you will accept for the Air Force all of the aircraft that will be in the Air Force inventory for the next 10 to 15 years." (McDonnell Aircraft Company is an exception; the Navy BuWeps has cognizance of F-4 procurement.) That was the kickoff sentence for a recent Operations Conference for AFCMD Flight Operations Officers. The true significance of that sentence indicates a tremendous responsibility on the troops who take the birds that the contractor has proven airworthy and then put them through the envelope of their performance. The jocks of AFCMD are the last link in this chain of design, test and production of aircraft for the Air Force. If we don't catch the mistakes or poor workmanship now, the troops in the using commands will have to live with the built-in hazards.

Who are some of the jocks accepting these birds for the using commands? Well, over at AFPRO Northrop (Norair), Palmdale, California, we have ex-Thunderbirder Major Clarence Langerud chasing through the blue with new F-5s and T-38s. TAC, MDAP and ATC pilots can bet they are getting a good bird after Clarence has zipped them up, around, and then low and fast. That inverted flight pressure recovery check is a natural for solo star Lang.

How about the trash carriers down at AFPRO Lockheed, Marietta, Georgia? Major Gene Jones is the leader of the pack; he still sees the Discoverer capsules drifting down so that he could snag them from the expectant Pacific. The troops there are chasing around in

MAJOR CLARENCE I. LANGERUD, a former member of the USAF flight demonstration team, the Thunderbirds, flew more than 200 air shows with the Thunderbirds during his two year tour as a member. He was the lead solo pilot during this assignment. Subsequently, in February 1966, he was assigned to the AFPRO Northrop, Palmdale, California, as Production Assistance Test Pilot for the T-38 and F-5.

MAJOR GENE W. JONES, Chief, Air Force Flight Test and Acceptance, supervises acceptance of C-130 and C-141 aircraft at Lockheed. A former operations officer in the Discoverer Project, he organized and directed aircrew activities of 90 officers and men of the first flying squadron designated to make mid-air recovery of satellite re-entry capsules. Major Jones flew the aircraft that made two of the first three Discoverer mid-air recoveries. This led to award of the MacKay Trophy, given each year for the most outstanding military, commercial, or private flight of the year. Major Jones was a featured speaker at the 57th Annual Dinner of the Explorers Club and was elected to active membership in the club for "outstanding contribution to knowledge and exploration of space."

MAJOR THOMAS WHEELER (left), a former F-105 pilot, is assigned to the AFPRO at General Dynamics, Fort Worth, where he is an Air Force acceptance pilot for the F-111. With 13½ years rated service, he has logged over 3500 hours of flying time, including over 3200 hours in jets.

MAJOR HENRY M. WEST (right), a former acceptance pilot at North American Aviation, Inc. at Palmdale, California, was the fifth military pilot to check out in F-111 (June 1965). He is presently responsible for flight acceptance of F-111 Category II test aircraft built at Fort Worth. Major West has 12½ years rated experience, total time over 3900 hours, including over 3600 hours jet time logged in F-86, F-100, F-102, F-106, F-111 and T-33 aircraft.

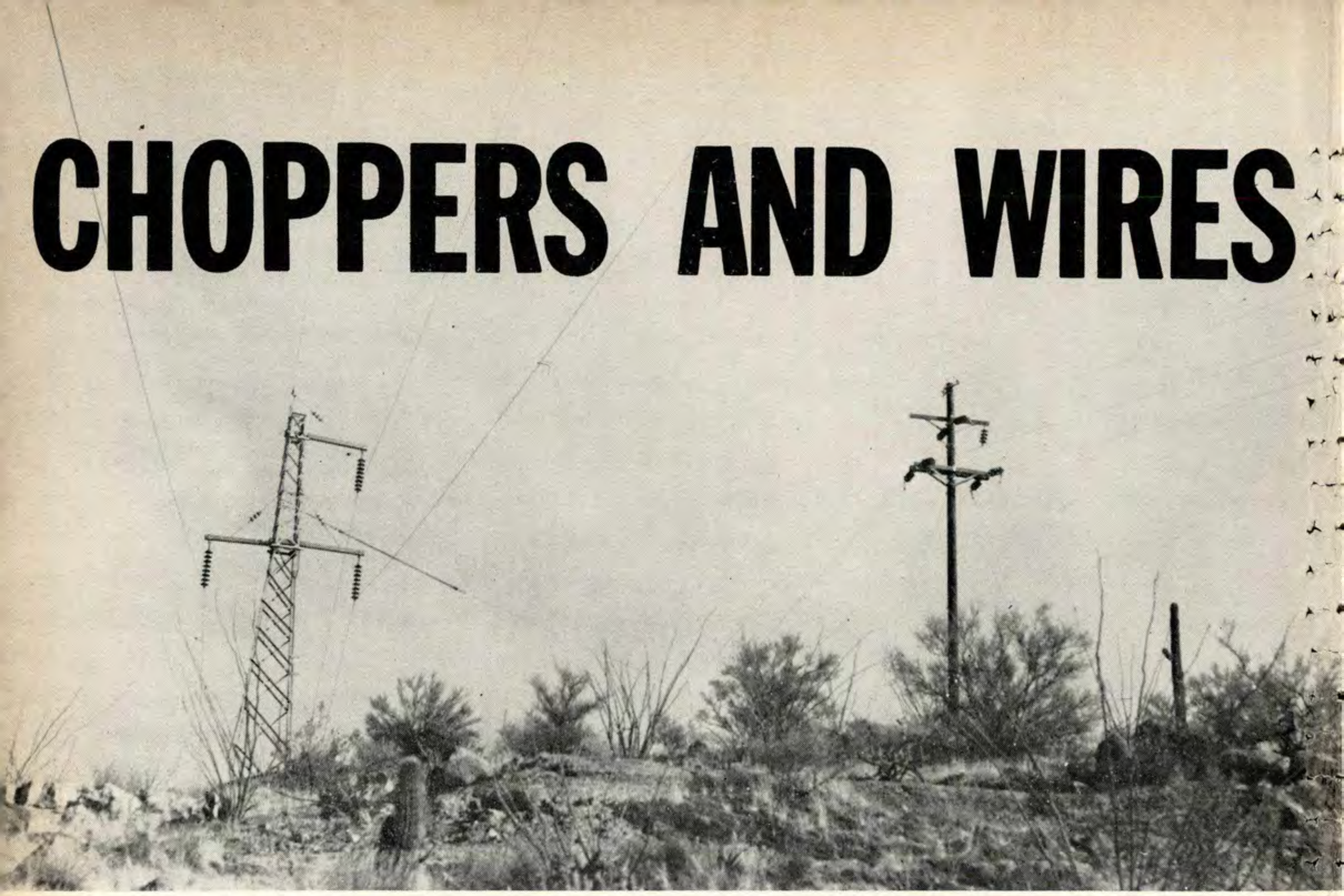
the Starlifter, C-141. It gets up and moves out like a '135 after the last off-load of JP to the fighter jocks. And what do they have coming next in the crowd-carrying types? The C-5, which is something to behold. That bird will not only analyze what the inflight emergency is, but it will also remember where the part is located that will fix the malfunction, then order the part; and then finally, it has been telling the jocks what to do to take care of the immediate problem. It sounds great if it works. The gal's voice reciting the emergency procedures might even be worth the trip.

Down in Texas we have Mr. Supersaber, Major Hank West, as the Chief of Flight Operations on the F-111 acceptance at AFPRO General Dynamics, Fort Worth. Hank looked over most of the Supersabers as they rolled out of North American's Los Angeles plant and wrung them out over the Mojave Desert. Now he has been given the job of using this procurement knowledge and fighter acceptance experience down in LBJ-Land with the all-purpose F-111.

There are many more stories, but this is only leading up to the reason that AFCMD is in the business of being the last stop in the long quality production of effective and safe aerospace weapons systems. USAF Military Specification for Safety, MIL-S-38130, provides the contractor a uniform guide with which to assess potential safety hazards in all systems and subsystems and analyze the situation to reduce such hazards.

After all is said and done, the job finally comes to the AFCMD Flight Acceptance Crews to prove each aircraft is operational. In keeping with the mission, to accept all the aircraft that will be used in the Air Force inventory for the next 10 to 15 years, AFCMD has chosen the motto, "Build in Safety" as the byline to continue to buy the best. ★

CHOPPERS AND WIRES



The helicopter was on a support mission carrying passengers and cargo between missile sites. At the second stop passengers and cargo were exchanged and the pilot took off. The aircraft had traveled only about 65 feet horizontally when it struck electrical wires about 35 feet off the ground.

No flight problems developed but the pilot decided on a precautionary landing and put the UH-1F down in a field straight ahead. There was some damage: wire marks on the underside of both blades, a small tear in the trailing edge. The rotor did not appear to be damaged.

This is just one of several accidents and incidents this year in which helicopters have struck obstacles, usually wires. Some crews were lucky — like the one above — in that there was no serious damage. Others bought the farm. For example, a JUH-1F struck power lines and crashed, killing the IP, the pilot and flight mechanic. Some of the factors involved were power lines concealed behind trees, wires that were weathered and blended into the terrain making them difficult to see, the flight path was into the sun and both pilots had their visors down.

Here is a complete account of an accident in which an HH-43 crashed during a flight for the purpose of indoctrinating a newly assigned flight surgeon.

The crash occurred about 22 miles from the base after an inflight collision with electrical power lines. First part of the mission was devoted to hoist work. After leaving the training area the aircraft headed for mountainous recreation areas for orientation of the flight surgeon.

With the pilot (an IP) flying from the left seat, a gradual descent was started and a left turn begun while the pilot was pointing out route landmarks. But the aircraft descended lower than the pilot intended, which placed it at the same altitude as the electric power lines. Both the pilot and copilot saw the wires at the same time — just a few feet in front of the aircraft and too late to avoid contact. The chopper struck the wires and pitched up sharply. The pilot was struck in the face by aircraft parts or the wires, which pushed his helmet back on his head and caused facial injuries.

Now over to the pilot: "The airplane was beating vertically and horizontally. The only thing I can say is, it was severe. Certainly there was a lot of noise and the aircraft could have been coming apart at that time. I couldn't say. I never saw the wires at all. I saw the sparks and that's all. After this the aircraft was controllable. However, it was very difficult to move the cyclic stick.

"I was able to fly the airplane and I still had power. I had control of the pitch stick and I was able to keep us off the side of the hill; we were going to hit the hill, there's no doubt about that, about 100 feet up. I naturally pulled in the pitch and it raised the nose somehow. When I did, I shoved in all the rudder I could get and turned, and the nose went down and I saw we were lined up with the bottom of the canyon. I can still remember that it made me feel good because I knew we were going to get to the bottom of the canyon and it wasn't going to roll down the hill. After that it was about 30 or 40 feet off the ground yet.

"After I had turned, the nose came up and I still had collective pitch. Although it was shaking it was somewhere near controllable. As I got the nose up I attempted to close the throttle but the locking pin won't allow you to from the copilot's seat. Many times you can stopcock the engine if you push the throttle and turn the linkage and it will close. I believe I closed it because I know I twisted it. I didn't care if I broke it. But anyway, I got the nose of the airplane up, got the forward airspeed stopped; it looked like I lowered the nose and it looked like it was coming down very gentle.

"I felt good about it. I didn't feel we were going to hit too hard. At the last minute I pulled in all the pitch there was and, as I did, the nose dropped and then we hit with the nose first.

"I realized after I got out of the aircraft that the console had broken off and it looked like it was on the cyclic stick and was probably pushing it around too."

Pilot factor was assessed because the pilot descended lower than he intended and flew into high voltage power lines. A contributing cause was inadequate supervision on the part of the operations officer/IP for permitting the flight to depart with inadequate planning and briefing. A second contributing cause was inadequately marked utility power lines.

Helicopter crashed as result of striking wires strung across canyon.

For the Army, with its many helicopters, wire strikes have become a very serious factor in aircraft accidents. In a report covering the period 1 July 1957 through December 1965, the Army had 321 reported wire strike mishaps (83 involved fixed wing aircraft) with 1965 reaching an all-time high. According to this report, there have been 32 fatalities, 94 injuries and a dollar loss of more than seven million dollars. The Army came to these conclusions relative to wire strike accidents:

They can be reduced by

• Continued emphasis on pilot education and air discipline.

• Thorough ground and air reconnaissance of flight paths.

• Pilots enroute maintaining an altitude in excess of 100 feet above the terrain, except when operational requirements dictate otherwise.

The number of wire strike mishaps and the serious potential demand an increased effort on the part of helicopter operators. Air Force regulations require that hazards to low level flying be depicted on appropriate maps. Before flying missions, pilots should thoroughly familiarize themselves with areas in which they will routinely operate. Autorotations should not be practiced except in designated areas. Maps should be kept up to date as to newly installed obstructions to flight (poles, wires, antennas). Pilots should maintain a safe altitude especially when conditions obstruct vision.

The above apply primarily to aircrews and operations personnel. But others, too, have responsibilities. Any time new facilities are constructed that might be a hazard to flight, operations should be notified at once so that maps and locally developed letdown plates can be modified and pilots briefed. ★

AERO BITS

F-4C PITCH PROBLEM—On takeoff roll, at 155 KCAS, the pilot had the stick full aft but all three gears stuck to the ground. The pilot then centered the stick and re-initiated rotation. The aircraft rotated rapidly and broke ground in an extremely nose-high pitch attitude. Recovery from this attitude was made without difficulty, fuel was burned down and the pilot made a precautionary landing. Throughout the flight pitch control was very sloppy, he said, and slow to respond.

Cause: Malfunction of the stabilator actuator due to internal failure. The actuator failed all checks and the viscous damper was leaking. After repairs the aircraft flew normally during an FCF.

IF YOU SEE a couple of pilots in wrinkled clothing and needing a shave, here's what happened:

Just after selecting afterburner during takeoff roll, the pilot of the F-101 heard an explosion. He shut down the engines and stopped the aircraft on the runway. It was quickly apparent what the problem was. The armament bay door had not been properly fastened, had come open and the pilot's clothes bag and shaving kit had fallen out and were ingested by the right engine. This, of course, meant an engine change.

The mishap occurred at night and when the pilot queried the ground crewman about the door, he checked it with a flashlight. Since the door appeared to be flush with the underside of the aircraft, he signalled that it was closed. Failure to make a positive check resulted in this costly incident.

AERO CLUB—While demonstrating a forced landing to a student, the instructor allowed the aircraft to get unusually low. When he applied power to the Tri-Pacer, the engine faltered and the IP decided to land. The only damage—other than to the instructor's pride—was to the alfalfa field where the landing took place; part of it had to be mowed to allow the aircraft to be flown out.

The trouble with the engine was apparently just loading due to prolonged idling and rapid application of power. This is very common but usually it happens at an altitude that gives the pilot a chance to bring up the power a little more slowly. This instructor was probably a little lax, and his example is not recommended, but there undoubtedly is a student who won't forget to clear his engine when he gets up alone.

DURING A RECENT T-33 defueling operation, the shutoff valve on the defueler failed to close. Investigation revealed that the inlet line to the defueler contained four bolts, seven spring clips for retaining safety chains on fuel caps, two washers and two gaskets. All parts were identified as being common to the T-33.

The aircraft was being defueled because of an internal failure of the fuselage tank boost pump. Pilots who had last flown the aircraft had experienced malfunction of the low level warning light. The fuselage tank of the aircraft had been repaired within the last five months. Therefore, it is reasonable to assume that this debris represented a collection which was acquired within a five-month period. Refueling personnel reported that strainers on the refueling vehicle are inspected every 90 days. Regardless of whether debris came from one aircraft or from several, fuselage tanks should be carefully inspected for the presence of foreign objects which could result in malfunction or damage to the fuel system.

Robert B. Shanks
Directorate of Aerospace Safety

EXPLOSIVES ACCIDENT PREVENTION. There are so many management tools available pertaining to explosives accident prevention that some technicians engaged in munitions activities probably think that "Safety" with regard to explosives within the Air Force is being stressed too greatly.

Since munitions functions compare favorably with other activities in the overall explosives accident prevention program, why is explosives safety emphasized so much in the munitions career field?

The obvious answer is that when you work with munitions, you are handling items which are designed to kill people. An accident involving munitions could very possibly result in fatalities, serious injury, loss of strategic materials and property, and could conceivably bring about a combat mission failure.

Compliance with a suitable organizational explosives accident prevention program is your life insurance. Aggressive support of such a program by all individuals concerned, from the Commander down to the lowest working level troops, will greatly contribute to successful accomplishment of the organizational mission and will result in reducing and finally eliminating explosives accidents. Explosives safety is considered even more important in combat areas because of the adverse effect which explosives accidents could have on the combat mission.

Irving Hendler
OOAMA, Hill AFB, Utah

ABOUT 15 MINUTES AFTER TAKEOFF the pilot of an F-102 was notified that he may have blown a tire on liftoff. After burning off excess fuel, the pilot made a successful approach end arrestment following Dash One procedures.

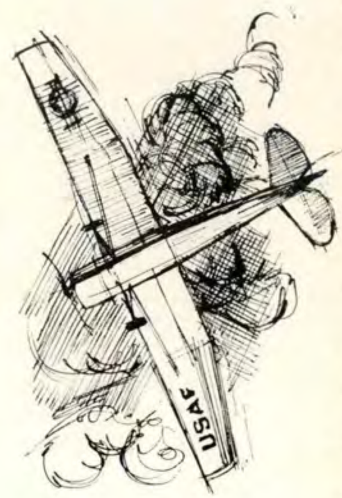
There was nothing very spectacular about this incident, a straight-in approach was made with touchdown 500 feet ahead of the BAK-9 barrier with drag chute out and nose down prior to engagement. But it does bring to mind a couple of items that pilots should bear in mind when using the hook for a brake: Shoulder harness should be locked, and the pilot should remove his hand from the throttle since the deceleration could, and did in this instance, cause throttle movement to 100 per cent.

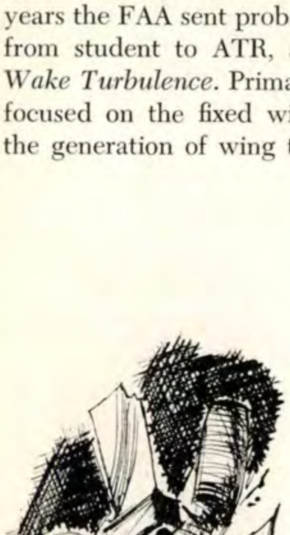
AERO BITS

DURING LANDING an O-1 was caught in severe turbulence caused by vortices produced by a helicopter also approaching for a landing. The result was a badly damaged airplane.

The subject of vortices in the wake of aircraft has received a great deal of attention during recent months. Early this years the FAA sent probably every pilot, from student to ATR, a booklet titled *Wake Turbulence*. Primary attention has focused on the fixed wing aircraft and the generation of wing tip vortices. But the helicopter also generates vortices and these trail along behind the chopper just as do those produced by fixed wing aircraft. This is well illustrated in a film, Wake Turbulence, produced by the FAA and available for the writing. We've seen the film and think it is very good. To procure a copy, write to

FAA Film Library
Aeronautical Center
P.O. Box 25082
Oklahoma City, Okla. 73125.





WOULD YOU BELIEVE IT? A sergeant and an airman who were sent to change the fuel control on an engine had some trouble removing the inlet temperature probe so the sergeant reached into the intake and began tapping the probe with a mallet. The probe still failed to come out so he went after a larger hammer. Meanwhile, the airman got the probe loose and informed the sergeant, who forgot he had left the mallet in the intake.

Of course, the inevitable happened. The sergeant got into the cockpit to check the engine with the airman standing outside on the ground cord. The engine was started and then flamed out. Another start. But the engine wouldn't go past idle. The airman checked the throttle linkage and the sergeant moved the throttle several times. The engine then began to accelerate, but at approximately 2.0 EPR there was a violent surge so the engine was shut down. The wooden handle of the mallet had been ingested but the head, badly chipped was ejected. Some of the chips, however, went through the engine along with the wooden handle causing damage to compressor and turbine wheel blades.

TAXIDENT—A U-10 was being taxied to the wash rack about 3500 feet away. Noticing that there were no aircraft on the parking ramp the crew chief doing the taxiing left the taxi lane to cut across the ramp directly to the wash rack. Suddenly there was a metallic sound and vibration. The crew chief stopped the aircraft, shut down the engine and investigated. What he found was a slightly damaged fire extinguisher and some bent prop blades—the price of someone's leaving the extinguisher parked on the ramp and deviation from the designated taxi area. ★

U. S. GOVERNMENT PRINTING OFFICE 1966 251-210/2

WELL DONE

CAPTAIN ZACK D. PRYSE

29 FIGHTER INTERCEPTOR SQUADRON, MALMSTROM AFB, MONTANA

On 22 August 1965, Captain Zack D. Pryse prepared for a flight from Malmstrom AFB, Montana, to Perrin AFB, Texas, in a T-33 aircraft. The start, taxi and takeoff of Runway 20 were normal, but as the aircraft passed over the end of the runway a severe vibration was felt. The engine RPM was decreasing rapidly and the airspeed began to decrease from 160 knots. Captain Pryse immediately energized the gangstart switch and informed the observer in the rear seat of the situation and the possibility of an ejection. The emergency fuel control caught and was holding at 94 per cent rpm with 150 knots airspeed. The tower was notified of the emergency and that an immediate landing would be attempted. After delaying momentarily to assure that the heavily traveled highway a few hundred yards off the end of the runway was clear, the tips were jettisoned in an open field, and a turn back to Runway 02 for a downwind landing was started. During the turn it became apparent that he would be very close to the end of the runway, so Captain Pryse elected to attempt a landing from an SFO low key position on Runway 20. The vibration increased steadily, and the oil pressure started to fluctuate. At low key, a shallow turn was made to final, the gear was lowered, and a successful landing was accomplished on Runway 20.

Failure of a turbine blade had started the chain of events. The failed blade had broken pieces off more than half of the remaining blades and damaged all the turbine stator blades. Holes were punched in the shroud ring, exhaust cone, and tail pipe. Even though the rpm was 94 per cent, the thrust was probably much less than normal. This engine had only two previous flights since complete overhaul.

By his outstanding ability to properly evaluate and cope with a serious inflight emergency, Captain Pryse saved an aircraft and avoided an incident which could have caused injury or property damage. ★

ENJOY THE GREAT OUTDOORS