Aerospace
SAFETY
UNITED STATES AIR FORCE • JULY 1971

UNITED STATES AIR FORCE

JULY 1971

Aerospace SAFETY

FOR AIRCREWS, MAINTENANCE & SUPPORT TECHNICIANS

SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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JULY 1971 AFRP 127-2 VOLUME 27 NUMBER 7

don't bust the trust

VERNET V. POUPITCH
Directorate of Aerospace Safety

Would you "bust" the trust that flight crews have in you? This article is prompted by the numerous flight control system disconnects on record and accidents that have resulted therefrom. The primary cause of those accidents has nearly always been the same—Maintenance personnel failed to properly connect the system and Inspection personnel failed to assure that the work was done properly.

When you in Maintenance sign off the Form 781, the pilot depends on your word and signature that the system is safe and operational. He seldom challenges you (although he can) to say, "Open that panel and I will check it out for myself."

How then does a breach occur? Let me paint a portrait of a typical aircraft accident involving a flight control disconnect:

The fighter was departing on a day mission. After engine start the crew chief extended one finger indicating readiness for the AFCS and PCS checks. The pilot ignored this PCS/AFCS check and gave the signal for the ground crew to remove the wheel chocks. Neither the crew chief nor the last chance inspector saw the pilot perform a functional check of the stabilator (the crew chief did notice an ailerons check).

The pilot appeared to be in a hurry to make his takeoff, which had been delayed due to weather. Nose wheel liftoff occurred at the proper location on the runway, but instead of maintaining normal takeoff attitude, the nose of the aircraft continued to rotate rapidly and smoothly. The aircraft left the runway in an extremely nose high attitude which continued to increase to about 70 to 80 degrees. At an altitude of about 100 feet the canopy left and several seconds later the radar intercept officer ejected. The pilot went about one second later. Too low . . . both fatal!

The aircraft crashed on the runway.

The *primary cause* was maintenance error in that the job inspector failed to detect the incomplete installation of . . .

Contributing causes:

1. The job supervisor did not observe or discover the omission of the cotter pin installation in the castellated nuts on the top and the bottom mounting bolts.

2. The person performing the work omitted the cotter pin installation on the top and bottom mounting bolts.

3. The flight line chief allowed the installation of an access panel Nr ____ *without assuring* job completion to include inspection of the work.

Possible contributing causes:

1. The pilot, in hurrying to make a scheduled takeoff time, did not perform a complete flight control system check, or having made the check and not receiving normal response from the systems involved, elected to accept aircraft for flight.

2. The breakdown in communication between the auto pilot shop, maintenance control, and the flight line chief allowed premature installation of the access panel.

3. Shortage of maintenance personnel induced increased overtime and a fatigue factor . . . etc., etc.

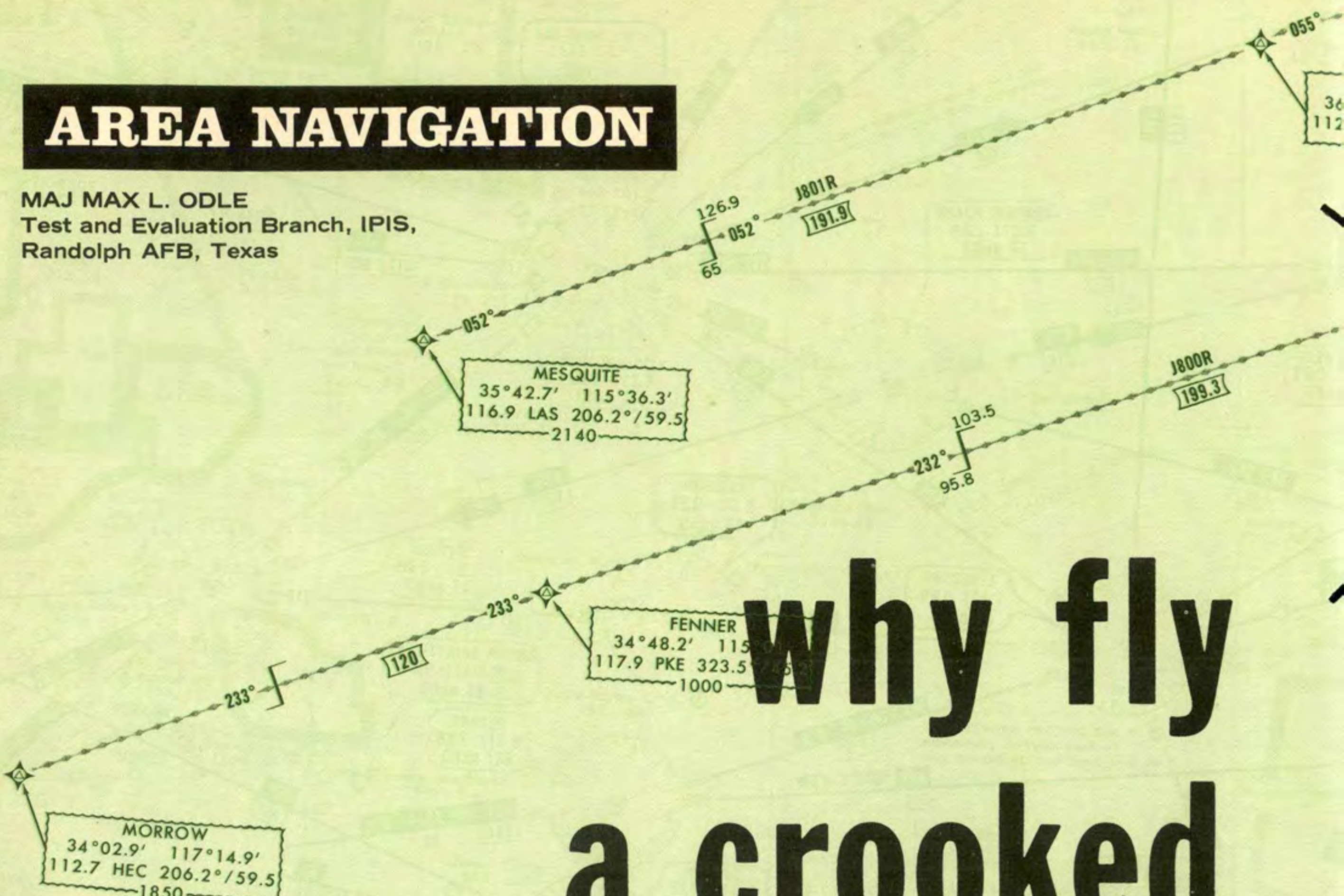
4. Overall maintenance supervision.

So the moral of this story is that the job must be right and let no Ops pressure force you to manslaughter!

When you sign off a performed task, you are betting that your valuable technical competence and reputation will assure the safety of your flight crews and multi-million dollar aircraft. Also, that with your intimate knowledge of the system, you have not only verified the proper performance of the particular task assigned but also verified the integrity of the system immediately upstream and downstream. Your signature is your oath—don't "bust" the trust! ★

AREA NAVIGATION

MAJ MAX L. ODLE
Test and Evaluation Branch, IPIS,
Randolph AFB, Texas

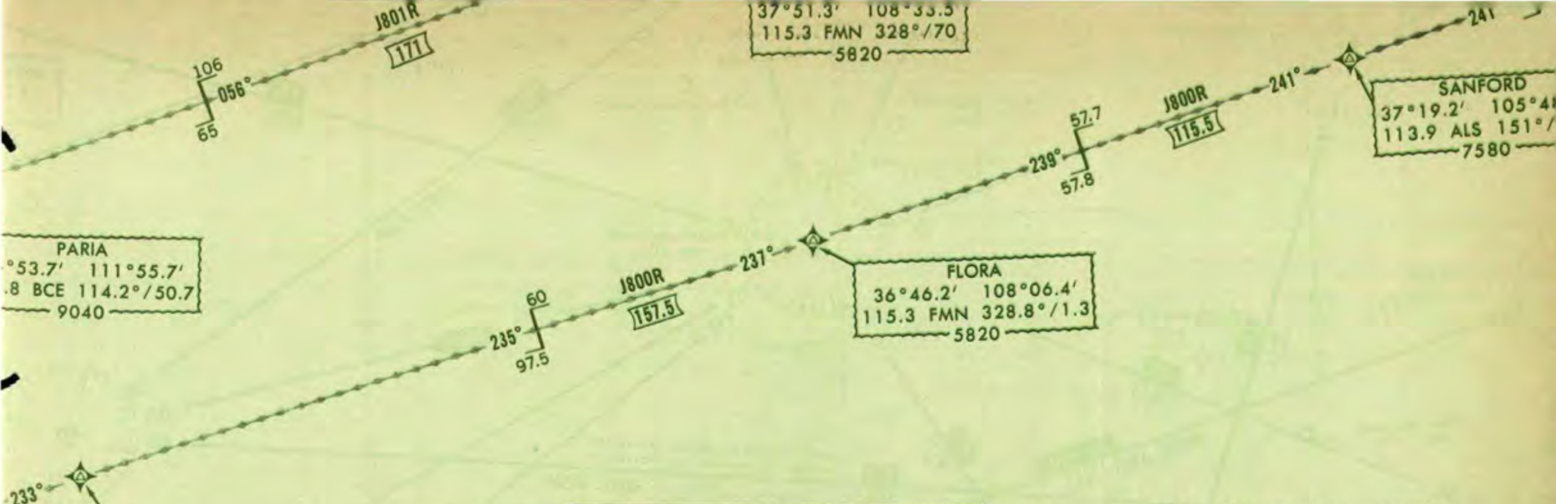


why fly a crooked path?

Many years ago the fledgling airlines and the Air Mail Service generated the first airway navigation system, a string of bonfires on hilltops. This primitive system was soon replaced by light beacons that stretched from one airport to the next. Laid out in nice straight lines, the beacons were relatively simple and easy to fly—if you could see them. But new generation aircraft came with longer ranges and we no longer wanted to go just down the road to the next city in VFR conditions. We needed to go across the country in any kind of weather. The nice simple straight lines of yesteryear became crooked paths as the airways wandered across the countryside from one airport to the next. Today we overfly these fields and the reason for crooked paths no longer exists.

Of course, we're all familiar with the VOR/DME/TACAN airways system that evolved from those light beacons. We're also very familiar with the many problems associated with the system: delayed departures; holding stacks for arrivals; more and more near misses, or worse yet, mid-air collisions because of enroute, arriving and departing aircraft all being crammed into the same airspace over a single navigation fix.

So what's new? *Area navigation* is the new system and it's called "RNAV." Maybe you've already seen the All Commands message concerning RNAV requirements or the Federal Aviation Administration announcement about the implementation of four transcontinental area navigation routes stretching from New York to Los Angeles and San Francisco. These routes became operational in April and the addition



Background for these pages is a section of a new area navigation edition of enroute high altitude chart. Chart is printed in green ink and RNAV routes are depicted in black. Charts are available for review — see Special Notices Section of Enroute IFR Supplement.

of many more RNAV routes is expected to be announced soon.

Still don't understand? Well, don't feel like the "Lone Ranger," because most folks in the airplane driving business don't either. It all started back in August 1969 when the FAA published Advisory Circular 90-45, Approval of Area Navigation Systems for Use in the US National Airspace System. AC 90-45 provided the guidelines for implementation of area navigation within the National Airspace System. In actuality RNAV is not new. When the present VOR/DME/TACAN airway system was designed, RNAV was considered as a possible follow-on navigation system.

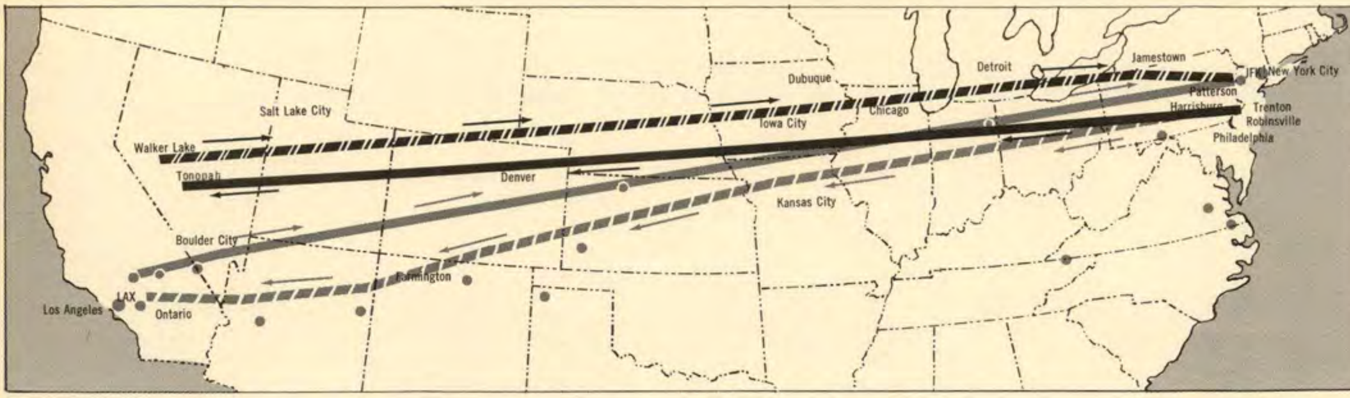
RNAV is nothing more than *a system that can use the present ground referenced navigation system and electronically fix a way point, or phantom station, at any desired point within the service volume area of the station.* You are then able to drive to that point just as if it were the real navigation fix. RNAV can also be flown with certain self-contained navigation systems, provided they have the required accuracies. With the proper control/display equipment in the cockpit, the bearing pointer points at the way point and you receive course guidance on any course you select to that point.

What good is all of this? With RNAV you have the capability to go direct (or almost so) from your departure point to destination and bypass the congested areas. The four new transcontinental routes are basically great circle routes and, therefore, the shortest distance between the East and West Coasts. So what's the difference between an RNAV route and the basic airway structure we have right now?

Besides being shorter than the present airway structure, RNAV has the potential to be a more precise navigation system. Thus, protected airspace for each aircraft can be reduced in size and the volume of traffic increased. With the high cost of flying time, even a small percentage reduction in operating time between two points can mean big dollar savings. Consider also that most air traffic volume forecasts predict three times as much IFR traffic in 1980 as there is today; hence the need for more usable airspace becomes readily apparent.

Let's take a look at departures and arrivals. When did you last depart a high density area and have to wait maybe five to ten minutes for departure clearance and, while waiting in the number one position, you were burning up your valuable JP-4? RNAV should help solve this problem because it permits multiple departure and arrival paths designated by pre-selected way points. "So what? I can always get a radar vectored departure and be on my way." Yes, but that departure controller can only *vector* six to eight aircraft safely. He can *monitor* the departures of several more. With reliable and precise navigation displays in the cockpit, the radar controller can resume his role of monitor rather than navigator. His workload is then reduced and he can handle the emergency or unusual situations that come up, much more easily and with a lot less sweat.

Basically the same procedures apply to arrivals. RNAV gives you the opportunity to choose from several approach way points and paths instead of just one VOR/DME or TACAN initial approach fix. An added safety feature of RNAV is that it virtually eliminates the need to fly circling approaches. A way point can be established on the approach end of almost any landing runway and a straight-in final approach flown to that point. The system also provides the capability for flying non-precision approaches to airfields or areas that do not have a landing navigation aid of their own. In this case, the field must be within the service volume area of the navigation aid and the line-of-sight signal not blocked by



J800R **J801R** **J802R** **J803R**

Area navigation routes begin and end at a VORTAC near (but not on) the terminal airport. With a few exceptions the routes are virtually straight lines, permitting the most direct flight possible.

obstructions.

With new approach computers just over the horizon, you will soon be given an approach time over the runway threshold which you will be able to meet within approximately ± 5 seconds. The arrival controller will assign you an RNAV arrival path based upon your present position, approach speed, vertical descent capability and other traffic approaching the same field. You will proceed along the assigned approach path from one point to the next without delays or vectors from the controller.

In fact, it will be just like an ILS from your cruising altitude to touchdown because RNAV will have three-dimensional guidance. In other words, you will have positive vertical flight path displays that will give you precise vertical guidance just like the glide path indicator and pitch steering bar guidance on flight director system ILSs.

Great! Sounds super! Well, not yet, because not all of us have the capability to fly this new stuff. A quick look at the inventory shows approximately 5000 Air Force aircraft that may have a "limited" capability to fly the RNAV way. These aircraft would include those that have inertial navigation systems, inertial with updating capability, Doppler radar, and LORAN systems.

Even if you have these systems, you still may not be able to fly RNAV because your system may not have the accuracies needed to fly within the RNAV structure. A recent ALMAJCOM message requested the Major Commands to determine their RNAV capabilities and establish criteria for using present equipment in the RNAV route structure. This could mean that your inertial system would be satisfactory if you could get a positive update every 30 minutes or one hour. It all depends on your system and the command's decision.

So you have a system and your command says, "Go to it." How do you file it? The best way is to use FLIP Planning Document II and enroute charts as you fill out your 175. The transponder/Navigation Aids codes are listed in FLIP II and the routes are depicted just like standard airways. The IFR Enroute Supplement is also carrying RNAV information in the Special Notices Section.

Will it work? You bet! But it will take some time and I'm certain a few trials and tribulations. Right now, even the Air Route Traffic Control Center controllers aren't certain what area navigation is and how it will be used. Talk to the controllers in one center sector and tell them you have RNAV capability and they'll clear you any way you want to go. But, on the handoff to the next sector, they may put you back on the standard VOR/DME/TACAN airways system. It will take some time to get it going, but more and more aircraft are getting an RNAV capability and will be able to take advantage of the RNAV system.

The FAA has already stated that it intends to give preferential treatment to those aircraft with an RNAV capability. The airlines have already tested several different RNAV systems and selected systems are in use today in the Northeast Corridor and other areas. ★

THE I.P.I.S. APPROACH

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

VISIBILITY MINIMUMS

Q After I have started my approach, the visibility is reported as less than that required for the approach. May I continue the approach, and, if I see the runway, land?

A First, continue to fly the published approach until you obtain a new or amended clearance. Your MAJCOM supplement to AFM 60-16 will indicate whether or not you may continue to the missed approach point. If you are permitted to continue the approach, you may land providing the conditions established in para 8-15b of AFM 60-16 are met. These conditions are:

"1. The aircraft is in a position from which a normal approach to the runway of intended landing can be made; and

"2. The approach threshold of the runway, or approach lights or other markings identifiable with the approach end of that runway, are clearly visible to the pilot."

If these conditions are not met, you must execute the missed approach.

CLEARANCES

Q When I receive the abbreviated clearance, "Cleared as filed," must I also receive an altitude?

A Yes. The controller is required by para 951, FAA Handbook 7110.8b, to issue an altitude as part of the abbreviated clearance. Do not accept an abbreviated clearance without an altitude assignment.

ILS

Q To what distance may I use ILS localizer and glide slope information?

A The localizer signal is usable to at least 18 miles within the sector 10 degrees either side of the centerline. If use of the localizer is required at a greater distance, it is flight checked at the required distance and altitude. The glide path signal is usable to at least 10 miles. *NOTE: These are flight check requirements established by AFM 55-8, Flight Inspection Manual, and represent changes from previous requirements of 25 miles for the localizer and 15 miles for the glide path.*

KEEP 'EM HIGH

FAA Order 7110.22 has changed considerably the manner in which IFR turbojet aircraft are handled during arrival and departure. The purpose of this order is to segregate IFR turbojet aircraft from other controlled and uncontrolled traffic. Accordingly, pilots can expect:

(1) Entry to the terminal area (normally 30 miles from the airport) at or above 10,000 feet MSL.

(2) A reduction from cruise speed to 250 knots at least ten miles from the outer fix (a radar fix in the terminal area).

(3) A descent from 20,000 feet MSL or higher at the outer fix not in excess of TERPs criteria (800 to 1000 feet per mile descent gradient).

(4) Arrival delays to be absorbed at the outer fix at or above 10,000 feet MSL in lieu of delaying vectors at low altitudes.

(5) Unrestricted climbs where possible during departure. If an altitude restriction is necessary, altitude assignments below 5000 feet AGL will be avoided.

POINT TO PONDER

Have you flown into Andrews AFB recently? How about Chicago or Atlanta? If so, you should already be familiar with Terminal Control Area (TCA) procedures. If you are not, check FLIP Section II, *Special Notices and Procedures*. The advantages of filing and flying IFR in these areas should be obvious. Also note that AFM 60-16 establishes a 200 knot indicated airspeed restriction in the airspace beneath the lateral limits of any Terminal Control Area.

NOTE

The March '71 Approach article stated that no Air Force aircraft has been certified by the FAA for area navigation. A recent message from Hq USAF gives the major commands authority to determine which of their assigned aircraft meet the criteria established in FAA Advisory Circular 90-45, "Approval of Area Navigation Systems for Use in the U. S. National Airspace System." No FAA certification will be necessary to authorize Air Force aircraft to use RNAV routes and procedures. (See article, page 2, for more on RNAV.) ★

EDITOR'S NOTE: The author, who recently retired from the Air Force Reserve, is an experienced "desert rat" who became interested in desert survival while assigned as a flight test engineer in the B-58 and F-111 programs at Edwards AFB. He has studied the problems of surviving in the desert from many angles, including the first-hand approach. An avid supporter of Air Force aircrews, he frequently shares his experience and knowledge through articles in Air Force publications.

COMPOUND FRACTURE

A downed airman can survive—even with a broken foot, a broken back, a near blind companion, on a 120° day in Death Valley, when no one is looking for him and equipped with only minimum gear. This I proved.

After reviewing the classroom theories of survival, and equipped with a theoretically complete survival kit, I set out to prove that a bailout into the isolated wasteland of Death Valley could be a pleasant camping experience. The first thing I learned was that a planned or simulated emergency could quickly develop into a very *real* and *deadly serious* emergency of the first order.

The survival kit I carried was packed in a 7¼" x 4" x 1½" aluminum box. When filled, it weighed two pounds. Inside the magic box was a .22 caliber pistol, a flare gun, a hunting knife, 25 rounds of .22 ball ammo, 25 rounds of .22 bird shot ammo, 6 flares, a mini signal mirror, 4 packs of beef jerky, 2 bars of high protein candy, a chocolate bar, paper sunglasses, pain pills, antiseptic ointment, sunburn cream, matches, fire starter, snake bite kit, water purifier, water bag, antibiotic ointment, boric acid, chapstick, gauze pads, band-aids, bouillon cubes and a small roll of thin sheet plastic. With that planning, which proved to be an unusual bit of common sense, I carried a two-quart canteen of fresh water. A companion who went along to photograph this great demonstration of man's conquest of the elements was equipped with the same survival gear and another two quarts of water.

The plan was to bail out of an aircraft approximately ten miles north of the northern national park boundary of Death Valley and then to walk the 50 miles to Stove Pipe Wells, using only the survival kit and that which the land provided. A target time of three days was allowed for the walk. The three days was not a positive figure for I planned to go to the surrounding mountain range if things got too tough in the desert.

A band of accomplices was rounded up and a detailed plan for the exercise was made. The photographer and I would bail out over the prescribed landing area at 9 a.m. on a hot August morning. A jeep would be in place near our landing area and would come to our aid if we encountered serious trouble after landing. The jump aircraft would fly over us for a final check of our situation and if all was well, both the jeep and the aircraft would leave us to our own devices. Three days later they would meet us at the wet bar at Stove Pipe Wells for a recovery celebration.

On the day of the jump all went as planned with a single exception—I made an extremely bad landing. Normally, my biggest problem with parachuting is that it takes so long for a 28-foot canopy to get my 125-pound frame to the ground that I suffer from hunger pains. This jump went that same way but I became fascinated with the magnificent view of the valley and drifted about 50 yards from the intended landing

GROVER C. TATE
Palmdale, Calif.

spot. The 50 yards made the difference between landing on level terrain or on big, jagged rocks, so I slipped the chute violently to miss the rocks.

The valley floor slopes from below sea level at the South end to plus 3000 feet at the point we had chosen for landing. The parachute descent rate was pretty rapid at the 3000 foot level and slipping the chute accelerated the rate. With all of these good things going for me, I arrived at touchdown with a chute about three-fourths inflated, a descent rate higher than any I had ever experienced, much rougher terrain than anticipated, and ill prepared for contact. I should say, *impact point* instead of touchdown point, because that is exactly what I did—impact. Rather than try for a picture-book landing, I did a survival roll as I hit the ground. The impact was such as one might experience when jumping from the barn roof and knocking his breath out. I knew that I had hit hard, but had no idea that I was hurt, so I field packed my chute, walked to where my jump companion landed, helped him with his chute, signaled the jeep crew that we were OK, and sat down to make plans for the desert trek. The jump aircraft flew over us and we waved to them that all was OK. Both jeep and aircraft departed to let the world know that we were off on the great adventure.

The day was already warm, 105° at 9:30 a.m., so we decided to head toward the Last Chance mountain range to the West and to make a camp in the foothills. We would construct a tent from the parachute canopies, make lunch, and try to sleep throughout the hottest part of the day. Each of us had a parachute canopy, canteen filled with water, and survival kit. Before starting for the mountains, we put on the paper sunglasses that were in the kits, coated our hands and faces with sunburn ointment, put chapstick on our lips and eyelids, and made Arabic type headpieces from parachute nylon. All seemed serene and as planned except that I had a faint tingle of pain in my right foot and a general feeling of being all shook up physically.

After a mile or so of walking, my right foot really started to hurt, so we stopped to take a look at it. The foot was swollen so badly that it was necessary to cut the boot off. The swelling increased after the boot was removed and the normal fish belly white color changed to black and blue. Rather than sweat this obviously revolting development, I believed that it would lend more reality to the exercise. We wrapped the foot in parachute nylon and made our way to a damp alkali puddle that we had previously spotted from the air. Using the damp mud for plaster, I cast the damaged foot and rewrapped with nylon. When I started to get up to continue the walk, a severe pain in my back erupted, taking away both breath and voice. The pain would subside and recur with alarming frequency. Regardless of body position there seemed to be no way to relieve the pain. Lying flat on my back seemed to minimize the pain and any motion antagonized it. With the foot and back aggravations we now had a real survival problem.

Time wasn't improving our situation so we made a command decision—I would stay where I was and my companion would go for help. With this plan another problem reared its ugly head. My companion was from New York City and knew very little about the desert. He had ten percent vision in one eye and forty percent in the other—when wearing corrective glasses. He had lost his glasses during bailout and without them was nearly blind. So, with our jeep and airplane crews thinking we were okay, there we were under a 120° sun, 23 miles from any inhabited area; one clown with a busted foot and a back that was highly suspect of being broken and a near-blind city-oriented lad as the only immediate link with salvation.

We cut strips from the parachute canopy and, using rocks for weights, outlined a distress signal on the desert floor. We hung part of a canopy over a greasewood bush as a makeshift shelter for me, cut strips from the canopy to use for trail blazing, and created some new ground rules for our survival.

My companion would walk to a road intersection at Grapevine, marking his progress with strips of nylon from the chute canopy. He would walk no more than two miles per hour, would rest at least once every hour, would drink as much water as he needed, and in no way would he compromise his safety. If he had not found help by dusk, he would make camp for the night and start out again the next morning. I would remain at our desert *casa* and would likewise do nothing to compromise my safety.

After my anticipated savior left, I took each of the items from the survival kit and tried to think of alternate uses for each piece of the equipment. I took a pain pill,

SURVIVAL KIT USED

planned a dinner menu, and practiced with the signal mirror. The mud cast on my foot had crumbled so I removed the nylon wrapping. A few minutes after the foot was exposed, large ants started crawling over it, so I coated it with antiseptic cream which alienated the ants completely. Next I cocked the flare gun so that it would be immediately available if someone or something came into view. I loaded the .22 with birdshot as a reception for any unfriendly snakes that might be sightseeing during the cool of the evening. Cocking the flare gun was a real challenge as my back protested in severe pain at any muscular demands. Like the good guys of the old West who bit on a bullet, I bit on a folded match box while I cocked the gun—perhaps a wad of parachute nylon would have been better biting material, but I didn't think of it at the moment.

For lunch I tried a chocolate bar but found it too dry to eat unless washed down with lots of water. Bouillon cubes I found distasteful and potent without water. The beef jerky was the best thing on the lunch menu, so I had a bit of that, a cup of water, and a portion of a jelly bar. For dinner I planned to heat water, make bouillon, melt some chocolate in water and have beef jerky for an appetizer. With the food and water at hand, I figured to live comfortably—albeit monotonously—for at least three days.

To stay occupied, I tried to name all of the heavyweight champions of the world in their order of reign, recited the incantations of the Prophet, imagined realistic shapes to the few clouds in the sky, discussed the state of the nation with Mr Nixon, thought of pleasures past and of those anticipated, made verbal truces with desert critters seen and unseen, looked for possible gold sources in the mountains beyond and wondered how our ancestors ever survived in this vast expanse of nothingness. Purposely, I avoided self recrimination.

Birds, lizards, ants and unidentified insects came by to inspect me and we all observed our reciprocal truce. It is strange how any form of life can be a welcome visitor in such a lonely situation—late evening visits from sidewinders excluded.

Time passes slowly but after about six hours I heard a yell and my help-seeking companion bounded into view. A tall Park Service ranger was with him. They carried me and my gear to a truck that was parked about a half mile away. The ranger drove for about 100 yards and the truck became stuck in the sand. Now we were four—the ranger, my companion, the truck and me.

A CB radio in the truck was line-of-sight and we couldn't arouse any one with it so we prepared for the night. I would be tied to a metal platform on the back of the truck to keep my back straight, and the others would sleep in the truck. As we went about preparing our beds, a light was spotted in the distance and we sent up a barrage of flares. The radio boomed to life and we learned that the light was from the car of another ranger who was out looking for his missing colleague. I was carried to the car and driven to the store at Stove Pipe Wells. We arrived there about 9:30 at night—some 12 hours after our initial leap into the valley.

After a series of intermediate hospital stops and a $400.00 ambulance bill, I wound up in a hospital near my home. Diagnosis was cracked vertebrae, compressed discs, and a cracked foot bone. Thirty-eight hours after the jump I was in a hometown hospital, anesthetized, cast in concrete, and on the road to repair.

So what did I learn from all of this that might be of value to others?

I learned (again) that you can survive under adverse conditions.

I learned the value, both real and psychological, of survival equipment.

I learned that a physical infirmity can make one stronger rather than weaker.

Perhaps the most important thing that I learned about survival is that the associated problems tend to compound one after the other. In this particular case there was the damaged foot, then the back problem, then the limited vision of my companion, then the truck stuck in the sand, and so on.

Like the instructors in the Air Force survival schools tell us—when you're planning for survival, anticipate the worst and plan for it.

That advice is right on. I learned that. ★

the urge

Hawk Two is rather surprised to see Lead disappear so quickly after rotation, but shrugs it off as the F-100 accelerates down the runway. Now, suddenly, with the increase in speed, he can make out only four runway lights, the fourth a hazy glow in the thickening fog. He increases back pressure as the airspeed says it's time to fly and the bird smoothly breaks ground. All outside references are gone and Hawk Two picks up his instrument cross-check with the confidence born of diligent practice, reaching for the gear handle, glancing down as he does so. Returning his gaze to the instrument panel, he is overwhelmed by the feeling that he is in a steep climb. He slams the stick forward . . . .

Impact occurred three seconds later, at 195 knots, 15 degrees nose low, 30 feet right of the runway edge. Hawk Two—man and plane—was dead.

Couldn't the pilot hack it? Obviously not. Was the accident preventable? You bet it was! Let's take a closer look.

By takeoff time the weather was actually below minimums, but Hawk Lead had promised the Ops Officer that these two birds would be available for the Monday morning mission and was determined to get home. Hawk Two was a junior birdman; assuming he had enough judgment to realize that he wasn't tiger enough to tackle the cruddy weather, it's likely he'd be reluctant to admit it.

It all adds up to *Get-home-itis,* a wide-spread malady which usually runs its course with no bad side effects, but which sometimes causes symptoms of severe fright or, all too frequently, a tragic disaster like the one above. The severity of the disease is random and unpredictable; its symptoms will show on a pilot one day and be mysteriously absent the next. Symptoms occur most frequently on cross-country proficiency flights, when the decision for Go or No-Go rests entirely with the pilot.

In a combat situation there is an obvious requirement to fly, sometimes despite extreme risk that has been carefully calculated and weighed against mission requirements. In the typical case of *Get-home-itis,* the need to press on exists only in the mind of the crew. Invariably, hindsight says the mission wasn't worth the loss. ★

EXPLOSIVES SAFETY

EXPLOSIVES SAFETY AWARDS

Outstanding units contributing to explosives safety will soon receive recognition through the establishment of a safety awards program. Permission has been received to add such a program to AFR 900-26 during FY 72. The first awards will be presented for achievements during calendar year 1971.

Fundamental to the success of this program will be discretion in the number of awards presented. Two eligibility categories have been established. Category I will be for units up to wing level actively engaged in explosives operations. A total of five awards will be presented in this category. Category II, containing three awards, will be for organizations contributing to explosives safety through their roles in research, design, test and evaluation, logistics or training.

As organizational and functional differences preclude designing a rating system that can be fairly applied across the board, each command will have the prerogative to choose one nominee in each category based on specific achievements in and contributions to explosives safety.

Still to be designed is a distinctive emblem to symbolize the explosives safety function. This emblem is to be used as the central theme of the plaques presented to the award-winning units.

It is only fitting that design for this symbolic emblem come from the field. To encourage individual and organization participation, a $10 cash prize will be awarded for the winning idea, suggested design, sketch or drawing. Each entry should include colors to be used and a narrative description of the symbolism employed.

Send all entries to the Directorate of Aerospace Safety (IGDSGE), Norton AFB, California 92409 by 1 Sep 1971. ★

"DON'T PUSH YOUR LUCK"

JOHN H. KAWKA, Directorate of Aerospace Safety

There have been too many unauthorized personnel fooling around with explosives and explosives components. Here are a couple of examples:

- An airman was trimming bushes when he found an item wrapped in waterproof material under the bushes. He opened the wrapper and noted the markings read "Simulator Booby Trap." Another individual then took a look at it and pulled the initiator cord. The item exploded in his hand, cutting and burning his hand and cheek.
- An airman standing guard at an aircraft removed three rounds of caliber .38 ammunition from his ammunition pouch. Out of boredom he tossed one round into the air and caught it with his right hand, which contained the two remaining rounds. One of the rounds exploded causing minor injury to the airman's right hand.

The airmen in both cases were very fortunate to survive with only minor injuries. We continue to receive TWXs stating in cold black and white that a guy lost his hands or arms when he pulled a pin or banged a shell with a screwdriver and hammer or pried out a primer.

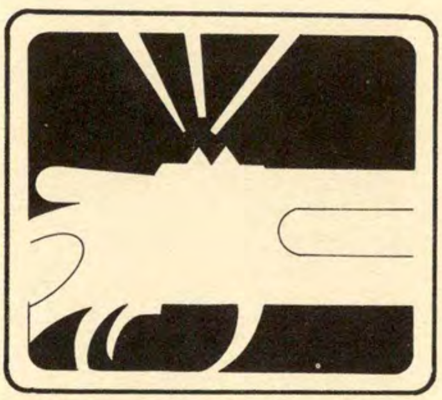
It's too bad that people have to go through something like that before they take warnings seriously. Curiosity has and may cost hands—eyes—lives. Don't push your luck—DON'T TOUCH! DON'T DISTURB! DON'T HORSE AROUND WITH EXPLOSIVES! ★

NUCLEAR SAFETY AID STATION

HALFWAY SAFETY BENDS BOMB

The rear window of the tow vehicle had fogged over due to cold, humid weather so the crew opened the back door of the tractor cab to obtain better visibility while backing a loaded clip-in assembly into a storage cube. Obviously, better visibility improved safety. Then an unfortunate series of events started. The tractor tires began to spin on snow covered pavement. The door latch came loose and the door began to swing closed. Finally, the tractor slipped sideways, the door struck the bomb nose and was forced into the bomb by the side movement of the tractor. Sometimes you can't make a dime—but if the clutch had been disengaged when the wheels started to spin, or if there had been a safety latch on the door, bet he could have made a nickel! It's rather embarrassing to report these preventable problems, but we realize hindsight is much better than foresight. Your reports make it possible for others to know the hazards and help improve foresight. ★

"CLICK"--LOCKED,



OR

"CLICK, CLICK"--LOCKED?

Following download, two nuclear weapons were placed in a storage structure and the structure was certified as being locked. The next morning, maintenance personnel observed that the padlock securing the door was not locked. Investigation revealed that the intruder alarm system on the door worked properly and that there had been no alarm, hence no entry, since the time the door was supposedly locked. The type padlock in use required two distinct "clicks" before being locked and the key could be removed after the first click. You can easily surmise what happened. After the first click, the key was removed and, visually, the padlock appeared fully locked. The visual security checks during the night, of course, did not reveal the unlocked condition. Needless to say, this type lock is being replaced at that location with one that must be fully locked before the key can be removed. This is an example of equipment being designed to allow mistakes rather than prevent them. The security procedures were also inadequate to compensate for the equipment design deficiency. In this case a mistake was made which jeopardized the security of two nuclear weapons before the deficiency was discovered, reported, and corrected. How about your equipment and security procedures? Here is a classic example of a deficiency that should be reported as required by AFR 127-4. ★

IT HAD TO BE THE ... eng

MAJ THOMAS E. BOYLE, 6486 Air Base Wing, APO San Francisco 96553

When I first heard about the accident, I knew it had to be the engine. The pilot was the chief instructor pilot for our Aero Club and had over 4000 hours in the Cessna 150. It was obvious that he couldn't have been lost since the weather was VFR. It was clearly engine failure.

I thought about the accident as we flew out to the scene in a helicopter. The Civil Air Patrol said it was in the bottom of a ravine and both occupants appeared to be dead. Perhaps they were trying to make it to the ranch airstrip just a few hundred yards away. If only that engine would have lasted a few more seconds . . .

Jim used to conduct the monthly safety meetings for the instructor pilots so we knew *he* wouldn't take any chances around those mountains. True, he had been involved in an accident with a student pilot 20 months before, but his abilities must have been recognized because he became chief instructor pilot two months after that mishap.

When we reached the aircraft, both bodies had already been removed by Coast Guard and FAA personnel. Wonder what caused that engine to quit? Maintenance had been rated outstanding in the last two safety surveys.

When I asked the ranch manager if he had seen the aircraft make an approach to the field, he replied, "Yes, but I saw only the approach to the strip. I didn't see the crash beyond the runway."

"What were the winds like yesterday?" I asked.

"Just like today," he replied. "Coming down the mountain rather than the usual northeast wind. It gets a little turbulent when the wind blows this way," he added.

Jim knew about turbulence near the lee side of these mountains. He had been flying around them for years. Landing at the ranch in the prevailing wind would usually be a piece of cake, but landing in this wind could be a little tricky.

The wreckage was located on the mountain side of the runway. Why would he let the student turn uphill after a low approach . . . or was it a touch-and-go? Nobody witnessed the latter part of the approach.

We used a sling and a Huey helicopter to get the engine out. Our on-site investigation revealed no flight control malfunction. We wanted to get that engine back to the Base to find out what went wrong.

On the trip home, I kept thinking about the 60′ tree approximately 50 feet behind the wreckage. It hadn't been touched by the airplane. He must have stalled or spun to miss that tree. Jim would have taken con-

ine

trol before it entered a spin. He wouldn't let the student go so far as to put both of their lives in jeopardy before he reacted. Didn't he have 4000 hours in that bird? Yet if the aircraft ran into turbulence when it flew over the gulch and if it went into a spin while the student was trying to turn towards the upsloping terrain, the aircraft would be below the edge of the gulch in one turn if the spin started less than 670 feet above the ground. Then it would be too late for even Jim to make a recovery.

We took the engine directly to the reciprocal shop. Since it was late, we decided to start the teardown first thing in the morning. On the way back to the office, my supervisor and I talked about Jim's previous accident. I dug out the old report and took it home to read.

"Cross country flight . . . several touch-and-go landings, and a full stop landing. Following this, the instructor requested the student to execute a maximum performance takeoff. While in this maneuver, the instructor administered a simulated engine failure and during the recovery, the aircraft struck the runway and sustained major damage.

". . . the student had a total of 29 hours at the time of the accident. . . . When the instructor pulled the throttle to idle at 150′ in the air, the student—a large burly marine—pushed the control wheel full forward. The instructor got on the controls when the student didn't recover quickly enough and the aircraft struck the ground with considerable force with both student and instructor on the controls.

". . . The aircraft's engine was performing satisfactorily and continued to run at idle power throughout the impact with the runway.

"CONCLUSION . . . the instructor required the student to attempt to perform a maneuver for which the student lacked the necessary skill or judgment." THE MANEUVER WAS PERFORMED VERY NEAR THE GROUND AT A HIGH ANGLE OF ATTACK AT AN AIRSPEED VERY NEAR THE STALLING SPEED . . .

". . . The instructor did not brief the student . . . .

". . . The instructor did not demonstrate the desired procedures to be followed . . . ."

The conclusion was obvious: Jim was overzealous in pushing his student into a maneuver for which he was ill prepared and not briefed or knowledgeable on the proper recovery procedure.

I went to sleep thinking about those 4000 hours, and an engine teardown, and the possibility that maybe it didn't have to be the engine after all. ★

OPS TOPICS

NEW NASA FILM

NASA has released a 16mm color motion picture showing the areas of research in aeronautics that will be pursued in the 1970s. Entitled "Space in the 70s—Aeronautics," the 28-minute film discusses the problems that improved technology can help solve and on which NASA's research will be concentrated. Included are short haul aircraft, improved safety, and development of the space shuttle.

Prints may be obtained on one-week loan by writing to NASA Headquarters (Attn: Code FAD), Washington DC 20546, stating when the print is needed, or by calling (202) 962-4397. Prints may also be purchased for noncommercial use from the National Audiovisual Center, National Archives and Records Service, Washington, DC 20409.

FOR OUR NEXT TRICK

Two pilots in an OV-10 took off from a base in SEA and requested a closed pattern, which tower promptly approved. Coming around, they made a gear-up pass down the runway about 50 feet AGL. Three-quarters of the way down the runway the airplane pulled up and started an aileron roll to the left. As the bird came through the inverted position the nose dropped, and as the roll was completed the aircraft caught a concertina wire barrier. . . .

All the spectators were suitably impressed.

TWO SWITCH HITTERS

• Take a small fleet of Century-series fighters. Modify a portion of that fleet so that switch "A" on the fuel control panel turns off the fuel feed instead of jettisoning the belly tank. Then put a pilot accustomed to this mod into an unmodified bird. Guess what's likely to happen during engine shutdown. Then guess who was blamed for it.

• After about 30 minutes of flight, the F-100 pilot began to experience symptoms of hypoxia. He went to "100 percent" oxygen, but could not breathe at all and immediately started a descent to below 10,000 feet. Symptoms were severe, but the pilot was sufficiently conscious to respond to commands given by his wingman, even though he was unable to locate and actuate his emergency oxygen bottle. Below 10,000 feet the pilot was experiencing "jerks" and "spasms," but managed finally to actuate his bailout bottle. Return to home base and landing were uneventful.

QC met the airplane and discovered that the oxygen "On-Off" switch was in the "off" position, probably turned off by the pilot when he went from "100 percent" to "Normal" climbing through 10,000 feet.

Primary cause was assessed as operator factor, even though the "On-Off" switch is supposed to be safety-wired "On." The broken wire was still there. Two points seem safe to make:

A. If the safety wire was broken before flight, someone's inspection procedures aren't adequate.

B. If it is possible to actuate a safety-wired switch *inadvertently*, it isn't really *safety*-wired.

LATE PUBS

You can't fly safe without current Flight Information Publications (FLIPs), but many bases have been experiencing delayed reception. If the delays occur off base, ACIC may be required to initiate tracer action. However, if the delays occur on base, a step-by-step check should be made of base transit procedures, beginning with the base transportation officer or postal officer, until the cause of the delay is found.

GOOD JOB

The T-38 IP and his student had been airborne for 30 minutes when the left fire warning light lit up and the number one engine RPM started unwinding. Directing the student to shut down number one, the IP headed the airplane for home. Although the fire warning light remained illuminated for the duration of the flight, there was no other evidence of a continuing fire; however, a controllability check disclosed limited pitch control, and an uncontrollable pitch-up tendency with more than 30 percent flaps.

The instructor concluded that enough control was available to make a safe landing with less than 30 percent flaps, and made a straight-in approach using 25 percent flaps and 170 knots. Immediately after nosewheel contact, the aircraft pitched up, becoming airborne in an excessively nose-high attitude. The instructor was unable to lower the nose, but succeeded in making a single-engine go-around. His next approach was a wide, loose pattern to a straight-in at 160 knots, no-flap, and this time the aircraft stayed on the ground.

Investigation showed that the engine combustion case had ruptured, and the hot gasses had severed the fire detect system and damaged the left horizontal stabilizer quadrant to the extent that the nose down cable separated from the quadrant. All nose-down pitch commands utilize this one control cable; loss of the cable negated stick, trim and flap/slab interconnect nose-down commands.

Here's one case where a bad situation came to a happy ending, thanks to the pilot's professional skill.

FLIP CHANGES

VFR Supplement: The publication of parenthesized Daylight Saving Time as well as Zulu Time originally planned for the Airdrome Directory Section of both the IFR and VFR Supplements will be included in the IFR Supplement only. Therefore, aircrews using the VFR Supplement are reminded to utilize the appropriate adjustments for Daylight Savings Time when converting the hours of operation of a Facility/Airdrome from Zulu to local time.

Reminder: Daylight Saving Time will be effective from 24 April to 31 October 1971 throughout the conterminous US except Arizona, Michigan and that part of Indiana which is in the Eastern time zone.

"CRUMP"

A private pilot in an aero club aircraft taxied up to the gas pump to fill the bird's tanks after his flight. After deplaning, and discovering that he wasn't quite close enough to the pump, he jumped into the right seat of the airplane (the only door is on the right side) and started the engine in order to taxi closer to the pump. He got a little closer than he bargained for; this particular airplane has brakes available only from the left seat. *(Crump!)*

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

HAIRY TALES

I'd been at Last Chance AB for five weeks, completing C-124 ground school, and was scheduled for an 0500 show for my first flight in "Old Shakey." The mission profile called for two hours of VFR pattern work, but as my IP and I headed for the airplane after a short briefing and a gulped-down cup of coffee, it quickly became obvious that Ma Nature wasn't going to cooperate: the morning was dark, cold and drizzly with ground fog. Weather had promised that the early morning sun would break up the ground fog, so, rather than pound the ramp, we decided to take off on time and fly GCAs until we could move into our planned VFR mission.

All went well until two or three minutes after takeoff. On GCA downwind I couldn't stay on my altitude or airspeed. A stranger would have thought the throttles were manual fuel pumps for the engines, the way I kept them moving. Radar advised us on downwind that a precision approach would not be available until 0800, when the operators came to work, but that they would be happy to give us a surveillance approach. I was having such a hard time maintaining level flight, I didn't even want to think about a glideslope, so I accepted the surveillance approach as a blessing.

I finally stumbled around the pattern to final approach and was told to start my descent. At eight miles from touchdown I was 100 feet high and I reduced power; at six miles I was 400 feet high and eased off some more power; at four miles I was 500 feet high and I again reduced power as the IP prodded me by saying, "The man said to get down, so let's get down!" In desperation I chopped more power. My final power setting seemed to make the IP uncomfortable, and shortly thereafter he commanded, "I HAVE IT—GO AROUND—MAX POWER!"

My first reaction was irritation with the IP for not letting me continue the approach, even if I was too high. Then I looked up from the panel and all I could see were trees and houses and a look of panic on my IP's face. The instruments still indicated that we were more than 1000 feet AGL, but we most certainly were not! After we regained our altitude and breath we tried troubleshooting our problem.

We obviously had some sort of trouble with our pitot-static system. The ground school had recommended the static drain valve in our lower compartment as an alternate static source, but when the valve was opened our instruments went wild. Airspeed dropped 40 knots, the altimeter went up 1000 feet and the VVI indicated a high rate of climb. All three instruments were fluctuating and the indications were so unbelievable that we closed the valve, returning them to their original readings.

We called the command post to advise them of our troubles and requested a chase plane, but none would be available for another hour. By this time the early morning sun was performing as promised and, as visibility improved, the IP chose to fly a wide visual pattern, using known power settings and aircraft attitude, flying the airplane right down to the runway and reducing power until we touched down. When we turned off the runway, our instruments told us that we were still 1500 feet in the air and doing 180 knots!

Maintenance quickly discovered our problem. Our airplane had been on the washrack the previous day, and the tape which had been placed over the static ports to prevent water from entering was still there.

(Good story, Hairy, but we wonder how you guys got through the takeoff, climb, and all the way around a GCA pattern without getting a clue.) ★

REX RILEY'S CROSS COUNTRY NOTES

Dear Rex

In 1965 I was a member of maintenance at ________. We worked our tails off and made what everyone considered an outstanding transient maintenance outfit. I note that the last time ________ was listed was (several months ago). What, pray tell, happened to have them pulled off? They sure have the facilities to be a top outfit. Just lack of interest?

Sincerely
Major ________

Rex gets quite a bit of fan mail and occasionally a letter that reads about like the one quoted above. We wish we had a good answer for the Major. One thing we do know is that a commander cannot simply take transient services for granted. As with every other activity on the patch, his personal attention will assure that it shapes up a little better.

To give some idea of what Rex looks for, here's a list of items covering arrival to departure:

Tower service, parking service and facilities, reception by TA, aircraft maintenance, availability of transportation.

BOQ, TAQ, messing facilities, flight planning facilities, weather service, clearance service.

Flight lunch service, preparation of aircraft and forms, TA personnel available for departure, taxi directions and taxiway markings, runway/taxiway condition, departure and climbout procedures.

Self inspection has inherent dangers but I think that as objective a look as possible at your own facilities will give you a very good idea of whether they meet the Rex Riley standards. Comparison with services at other bases by local crews when they visit elsewhere will help nail down the problem areas. This will insure that transient services at all USAF air bases are of top quality. And that is what the Rex Riley program is all about!

THE

REX RILEY
Transient Services Awar

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

a place for everything

SQDN LDR KEITH H. JOHNSON
474 FMS, Nellis AFB, Nevada

The following article is presented in hopes that it will stimulate thoughtful approaches toward dealing with a recognized problem area; views presented are those of the author, and do not represent an official USAF position. Interested USAF units who feel that the proposed procedures may be adaptable to their use can acquire further information on the CTK by writing to the editor.

On a typical USAF base there are roughly half a million tools used by about 2000 people. Most of these people work directly on the airplanes or engines. Any one of those half a million tools can be left in the wrong place. When it happens, and it has, the result can be disastrous. Since 1965 the sad story is:

- 15 aircraft destroyed—tools a cause or possible cause (tools found in wreckage).
- 12 deaths resulting from these crashes.
- 25 instances of controls jammed by tools.
- 25 instances of engine damage from tool ingestion.
- 9 cases of inflight fire or other miscellaneous damage or malfunction caused by tools.

Now, the interesting thing is that throughout this period 1965 through the present, the Air Force *has had* tool control systems. They vary from command to command, but the basic theme is this: Each man has a tool checklist; when he takes a tool out to work on an aircraft he notes it on the list; when the tool is returned to his toolbox he deletes the notation. It reminds me of King Canute standing on the beach and ordering the tide not to come in.

King Canute thought his authority was enough to override the gravitational effect of the moon—but, then Old Canute wasn't the world's greatest physicist. These days we *must* understand the physics of human variation if our procedures are to work. Given our present systems and considering the physics of human variation and workplace dynamics, what is the likelihood that a technician will ignore/forget the tool control procedures and not be detected? The answer is—very likely! And this answer leads inevitably to the next question: *If the present procedure is less than perfect, have you got a better system?*

Yes, I think I do have a better system. It's cheaper, it's easier, and —most important of all—*it works.* It has been tested on three continents, by four military air arms (the RAF, the RAAF, the Canadian Armed Forces and the US Navy). There's just one problem: changing a system requires effort and energy, so don't read any further UNLESS you are prepared to evaluate the system objectively and then *act on it* if you conclude that it has the advantages claimed.

The system is called the Composite Tool Kit (CTK) and it has three key features:

(1) Under CTK there are no individual tool boxes.

(2) Each kit is designed according to task location, and contains sufficient types and numbers of tools to support the people who will be using it.

(3) Affixed to each tool kit is a control board with appropriately numbered and colored disks. These disks are used to identify each person who draws tools from the CTK.

Let's look at a typical CTK in operation. Our sample CTK is for an aircraft Phase Dock and at any one time up to eight people may be using the kit. There may be more than one aircraft involved. Figure 1 illustrates the control board which is used with the kit.

• At the start of the shift, Airmen Smith and Jones write in their names against green/black disks #1 and #2, respectively. Green/black is the color assigned to aircraft #197, and both these airmen will be working on that aircraft.

• As they take tools from the kit, they put one of their numbered disks in place of each tool. (This shows *who* has *what* tool and *where* he has it.)

• At the end of the shift, or when work on the aircraft is finished, each man returns the tools he used to the kit and returns the disk from each tool space to the control board.

• At this time the Dock NCOIC checks the board. He has, incidentally, kept a fatherly eye on the kit throughout the day. If a tool is missing the NCOIC initiates a search, in the area and on the aircraft, until the tool is found and returned to the kit. He then *knows* that every tool that went to the aircraft is back where it belongs.

This description of its operation sounds too simple. Right now many of you are saying, "What if someone stole a tool—you won't find that one!" or, "What's to stop a man

NCOIC TOOL KIT: MSgt KEEN			
WORK SUPERVISOR		WORK SUPERVISOR	
S Sgt SOLD		T Sgt CONVINCE	
AIRCRAFT #197	SPECIALIST NAME	AIRCRAFT #065	SPECIALIST NAME
1	Smith	1	Kelly
2	JONES	2	
3		3	
4		4	
SPECIAL TOOLS - TOOL CRIB			
TAG	TOOL TYPE	TAG	TOOL TYPE
1	Tension Wrench	•	
•		•	

FIG 1. Typical control board for Composite Tool Kit

from using someone else's disk?" or, "The NCOIC will have to guard the kit!"

Be patient; these questions will be answered. But first let us return to the three key features and look at each more closely.

First, how do you get by without tool boxes? You get by very well! You ensure there is an adequate range of CTKs throughout the unit, each one designed for the shop, dock or flightline area it serves. Normally, no more than 300-400 tools are needed per kit; the precise number needed is determined by examining how many people doing what jobs will use the kit. The kit in photo A has 260 tools and is used by an engine dock crew of four men. It replaces four individual boxes, each of which had 200 tools. In six months of use there has never been a time when a man had to wait for a tool because those he needed were in use. (Incidentally, during the same period there were no losses from the kit.)

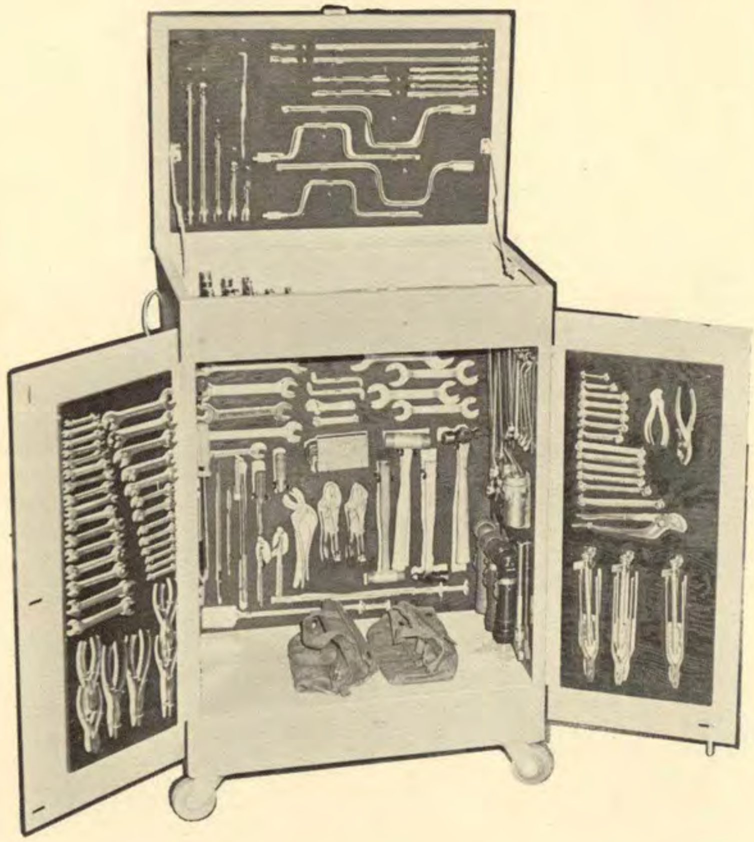


PHOTO A.
This four-man CTK of 260 tools replaced four tool boxes of 200 tools each.

Typically, you could expect to have the following distribution of CTKs: one CTK per eight small aircraft; one CTK per two to four larger aircraft; one CTK per four-engine aircraft, particularly when there's a parking location problem; one CTK per engine dock; one CTK per phase dock; one CTK per specialist shop (where equipment is maintained in shop); and one CTK per AGE dock. Additionally, CTKs would be needed to cover shops that split several ways on deployment.

Actual studies at a TAC base showed that an F-111 squadron, operating under the squadron maintenance concept, would need 40 CTKs replacing 300 individual tool boxes.

Secondly, the shadowing principle is in large measure responsible for the success of the CTK system, for it enables the kit to be inventoried, visually, at a glance. In fact, studies show you can visually inventory a shadowed CTK in about 20 seconds, versus 45 minutes needed for a conventional tool box. A bright yellow shadow on a black background seems to do the best job of providing the visual stimulus needed to show a tool is missing, but any contrasting color scheme (even black and white, as in photo B) will suffice. The pattern of tool layout is also a big help, both for detecting absent tools and for guiding a technician's eye straight to the tool he needs (a big improvement over the "lucky dip" system of a conventional tool box). The loss of a tool—that is, a shadow without a control disk—can be detected at a glance. Thus a supervisor who does nothing more than cast an eye periodically

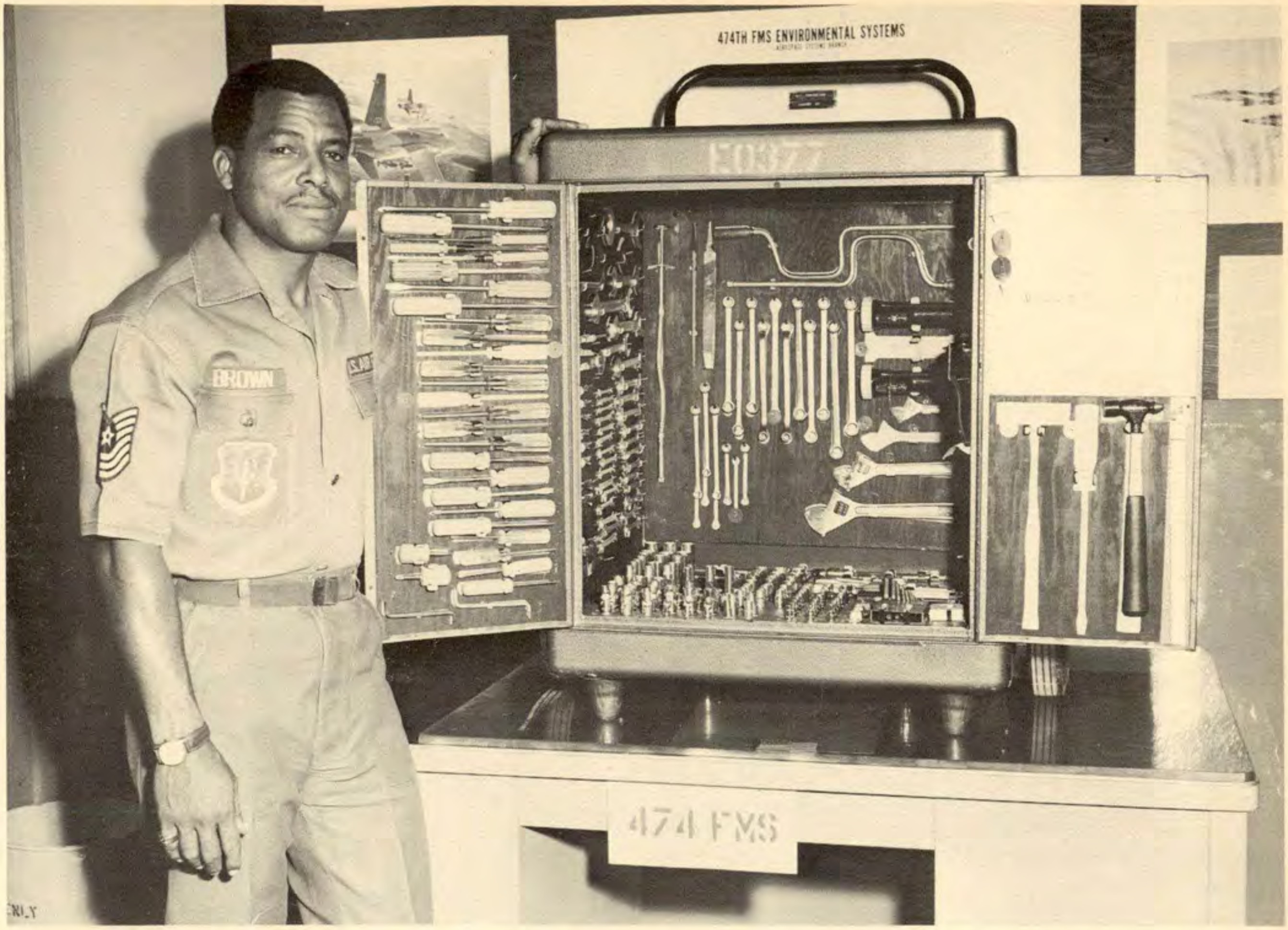


PHOTO B. Missing tools are easy to spot, even in black and white.

over the kit *knows* instantly if a loss or unauthorized use has occurred. Photo B shows a CTK with tools missing—and even in a photo the telltale effect of the shadow is obvious. The supervisor can therefore initiate action while the trail is hot. Whether a tool is stolen, lost or left on an aircraft, he is immediately alerted and can act accordingly. His people know what they are looking for, and so the search centers on the specific tool, not just FOD in general. If any of these people suspect that the tool was stolen—and they have an idea about who stole it—there is a tendency to arrange for the culprit to "find" the tool. This saves a lot of needless work and lost time on their part. In practice, everybody using the kit develops a protective attitude toward it.

The third feature we need to discuss is the control board, shown in photo B and illustrated in figure #1. This is an eight-man, two job board, the green/black disks assigned to one job, the green/white disks to the other. A good, workable approach might be to have 15 copies of each disk hung on the board; this would allow each man to draw up to 15 tools. It is rare to find that more than 15 disks are needed by any one technician.

If the same people use the CTK over a long period (say, three months), their names can be painted in against a particular number. If, however, the people using the kit change from day to day, then the name space should be left blank. Then, as each man goes to the kit for the first time, he inserts his name in wax pencil in the next vacant space. That number is then his for the duration of his work on that job, whether for a few hours or a few days.

The board can be designed to have space for as many individuals as the job is going to need. Up to ten, 15, or even 20 spaces for technicians (together with appropriately numbered disks) can be created just by varying the size of the board. This should, of course, be decided before the CTK is built, and the board made to suit the need.

Finally, it is necessary to control tools which come from the Tool Crib—outside the shop—and which would not be contained in a CTK. This is done with a very simple dual-control system: A control board in the Crib identifies which tools have been issued to what job and what technician; then, as the tool from the Crib is brought to the job, the technician puts a tag in the Special Tools section of the CTK control board and writes in the name of the tool (see Fig. #1).

The same principle applies to tools brought from specialist shops. Both the specialist shop control board and the CTK control board are used to show *who* has *what* tool and the job it is used on.

Those are the basics of the CTK system. Now for the facts on its use and history:

• The RAF has used this system since the early 1960s. Initially it was optional; it is now mandatory.

• The RAAF has used the system since about 1964. It is optional, but is used by all flying squadrons and some non-flying squadrons, e.g., ground telecommunication units.

• The CAF appear to be in the process of adopting it, if not already done so.

• The U. S. Navy has an active evaluation program, and the CTK system is in use at at least one Naval Air Station.

Detailed statistics are not available; however, reliable sources in the RAF state that the incidence of tools found in aircraft has decreased significantly. On those rare occasions when tools have been found, they have been traced to civilian contractors who worked on the aircraft concerned during IRAN or modification.

ECONOMIC COMPARISON: INDIVIDUAL TOOL KITS VS CTK FOR A TAC WING

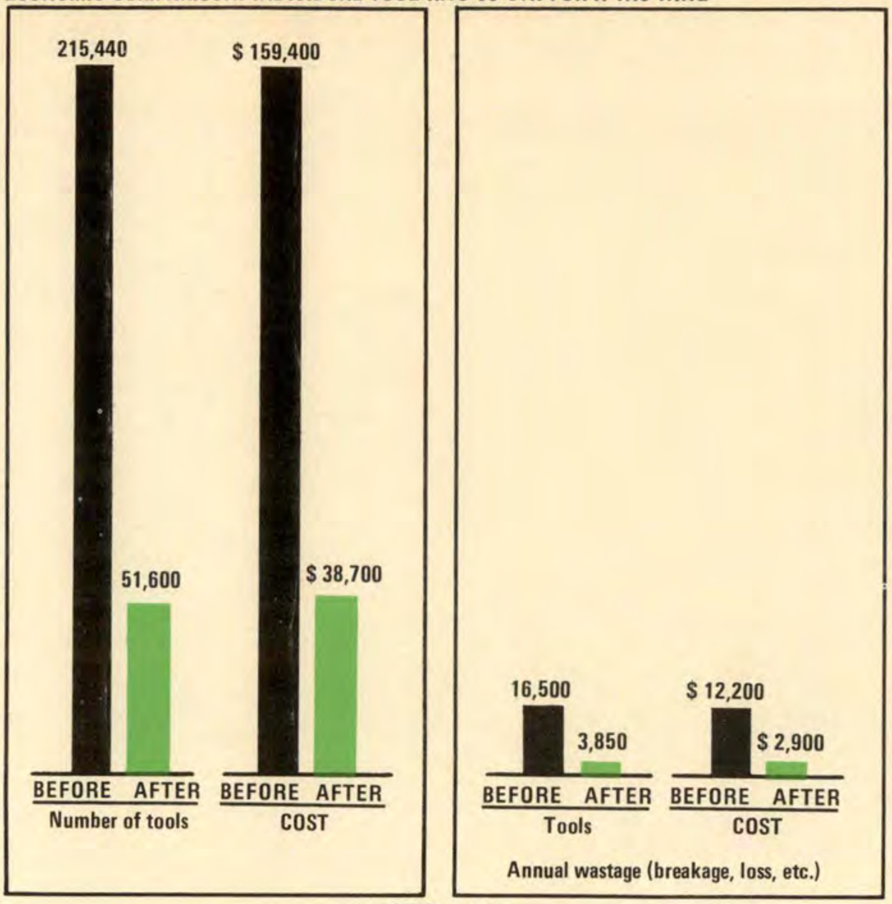


FIG. 2

So far I've stressed the safety aspects of the CTK. The CTK system also offers the opportunity to save a considerable chunk of money (see Fig. 2). Taking a typical TAC Fighter Wing as an example (and even allowing for extra CTKs to cover deployment), we can replace 1150 tool boxes with 170 CTKs. We thereby reduce our tool inventory from 215,440 tools to 51,600 tools, an inventory reduction in excess of $120,000. Annual wastage from breakage, loss etc., is similarly reduced, from 16,500 tools costing $12,200 to 3950 tools costing $2900 —an annual savings of $9300.

Depending on how you go about it, the cost of the conversion discussed here would vary from a low of about $6000 to a high of $23,800. The higher figure assumes that all items (boxes, clips, etc.) are purchased through GSA; the lower figure assumes local manufacture and individualization of each CTK container and local purchase of clips. If you're careful, it's possible to convert to the CTK system and still net a first-year savings of $3300 (from annual wastage), in addition to that whopping $120,000 inventory reduction!

And you MIGHT save an aircraft or two. Maybe even a pilot!

So there it is, once over lightly on the CTK system—a cheaper, easier, more efficient and safer way to do the job. I've dealt only with the basics, and any manager can extend these basics and add quite a few touches of his own. There are just two ground rules for CTK that must never be violated:

• SHOW—All tools must be shadowed onto their boards, one tool per shadow.

• KNOW—There must be a simple control system which allows supervisors to know who has what tool on which job—at all times.

Now it's up to you. ★

Tech topics

briefs for maintenance techs

MAINTENANCE CREDIBILITY GAP

Capt Rafael A. Goyco
Directorate of Aerospace Safety

I have just received the repair bill for my motorcycle. The total came to 300 percent more than the price initially quoted. Although the original problem was a high speed misfire requiring a tune up, a piston and bore job was also accomplished. This inspired remedy was performed prior to thoroughly checking the carburetor, which was eventually found to be the culprit after the piston job did "not quite" remedy the problem.

Although the possibility exists that I was "taken," an explanation less bruising to my ego is that poor troubleshooting techniques were used by these so-called **mechanics.** This expensive incident made me review some of my past experiences as an aircraft maintenance officer. Could this be the reason why we have the famous hangar queens? How many times have you as a maintenance man been plagued by recurrent discrepancies on your aircraft? How many answers like the following have you received on an EUMR submitted by your organization?

• Functional tests of the pressure switch revealed it to be within its correct limits.

• Thorough evaluation of exhibit pump failed to detect any condition which may have caused operational condition reported. It is probable system components other than the pump caused fuel feed problem.

• Since bench test did not confirm the complaint, it is concluded that exciter was serviceable when removed.

Qualified maintenance people and good troubleshooting performed with the help of the tech orders could have prevented the manhours, headaches, and transportation costs incurred by submitting UMRs on items that were not defective in the first place.

I can visualize the chagrinned look of the technicians when they see their bird come back from an aborted mission with the same writeup that they supposedly fixed the day before. Granted, our systems are extremely complex and getting more so, but good maintenance and use of technical orders will save our Air Force countless manhours and dollars by getting the job done right the first time; not changing a piston when only a tune up was called for.

* * *

ANOTHER EGRESS GOOF

A young airman was dispatched to an F-105 to perform an equipment change. When he arrived at the Thunderchief, both canopies were closed. Seeing the door labeled "Rescue" and thinking this was the way to open the canopy, he opened the door and pulled the rescue lanyard out the required six feet.

The system operated as designed. Both canopies jettisoned, fortunately with no injury to the young airman but the bird wasn't so lucky. It received extensive damage to both canopies and two dents to the fuselage. It appears that this accident was caused by personnel error—"not completely familiar with the egress system," but how about you managers and safety officers? Is your supervision at the operator level effective? Would you knowingly dispatch someone unqualified, unfamiliar and uncertified to the aircraft? It's too late to prevent this accident, but must there be a next one?

* * *

DISCONNECTIONITIS

Putting an end to all the little omissions and commissions that can cause aircraft accidents is somewhat like the three-legged cat trying to corral five mice. It ain't easy. **Connectors,** for example, continue to be the source of many headaches. Even a three-level ought to know that a **properly secured** connection means torquing, when applicable, or the installation of a safety device when one is required. Nevertheless, we still have those pesky connector problems because **someone didn't do the job right** and an inspector didn't **thoroughly inspect.** Items: When a T-29 pilot moved the mixture control **nothing happened** to the mixture. Firewall shutoff was used to shut down the engine . . . . Maintenance checked . . . . They found the **nut had backed off the control arm.** When the nut is **properly** secured and keyed **it won't come off.** Simple as that!

Or . . . throttle movement on an O-1 produced **no result** . . . . RPM remained at 1700. The throttle cable **wasn't properly secured** to the carburetor.

Another T-29 . . . Three minutes after takeoff . . . still climbing . . . RPM 2400, manifold pressure 38.2. Fuel flow dropped to 400 pph . . . engine torque to 55psi. The "B" nut on the fuel line at the fuel flow transmitter **was loose and leaking . . .**

C-130 . . . Crew lost directional control during the landing roll. Why? The torque arm (scissors) connecting bolt was **missing.** Why? The bolt and lock arm **weren't properly installed.**

Remedy? **Follow the TO.**

* * *

MORE CENTS THAN SENSE

The C-123 was on an aircraft commander upgrade mission. After two hours of flight, a simulated assault pattern using full flaps was accomplished. The pilot touched down and applied reverse thrust and normal braking.

After 1000 feet of ground roll, the crew heard the screeching of metal-to-metal contact and at 40 knots the anti-skid light illuminated. The aircraft came to a complete stop without further incident, and the loadmaster got out to check the aircraft. He found the right wheel cocked on the axle.

Further investigation revealed that the wheel retaining nut safety bolt was missing, allowing the wheel retaining nut to tighten to the point of bearing failure. The extreme heat from the overtorqued retaining nut melted the bearing rollers and fused the retaining nut to the axle.

The aircraft was returned to operational status in 48 hours, for a total cost of $2,866.56—a large price to pay for a small safety bolt.

* * *

IMPROPER ATTACHMENT

About 40 minutes after takeoff, the pilot felt an explosion that resembled a compressor stall, followed by an odor like gunsmoke. After returning to base the pilot depressurized the cockpit and unlocked the canopy, which immediately blew to the vertical position, remained for 5 to 10 seconds, then fell closed.

The canopy remover had fired without the assistance of other components used in the normal removal sequence. The canopy remover, canopy actuator and immediate area were too hot to touch. The hose to the canopy remover showed no indication of exposure to initiator gases.

Finally the cause became clear. The clamp and gasket attaching the hot air supply line to the equipment cooling package, which is located aft of the pilot's seat, was misaligned allowing a jet stream of 800°F air at approximately 175 psi to escape. A portion of the insulation around the hot air line had been burned and blown away. The female half of the cannon plug attached to the bypass valve assembly was found with the solder melted and the plug loose in its case.

The investigation revealed that the volume and extreme temperature of this air leak was sufficient to cook off the canopy remover.

The best material and the best design are wasted if the seals and clamps are not properly aligned during installation. Quality work in all maintenance procedures is the answer.

* * *

COULDN'T TAKE THE PRESSURE

The following three incidents were chalked up to materiel failure. Regardless of the cause factor, they were costly and dangerous. Close surveillance by maintenance might have prevented an incident or accident.

We are talking about tire failures on T-38 and T-39 aircraft.

- During landing roll a T-39 crew experienced what they thought was a blown tire, followed by hydraulic system failure. Investigation revealed that the entire tread on the right main gear had separated, making a hole and dents in the trailing edge of the wing inboard of the right flap, bending the right main gear actuating cylinder, and tearing hydraulic lines from the gear actuating cylinder and the gear uplock cylinder. Parts and labor ran $4,320.54.

• At liftoff the crew of a T-38 felt a slight bump and saw one of their main tire treads go rolling forward, An uneventful landing was completed on the tire body which did not deflate. Investigation revealed that the tread had struck the forward gear door link causing $100.00 worth of damage.

• After gear retraction the T-38 crew noted a red light in the gear handle. They reduced airspeed from 265 to 240 knots and recycled the gear, and the red light went out. Visual inspection by another aircraft indicated the T-38 was clean. After completion of the mission the tread was missing from the right main tire. The only damage this one caused was to the tire itself.

These incidents do indicate materiel failure as the cause factor. However, any one of the above incidents could have been caused by under inflation. An under inflated tire may go several missions without failing, then, after being inflated to the proper pressure, fail on the next takeoff.

The failure will almost certainly be listed as "materiel failure"—just as these examples were. Proper inflation will usually vary with gross weight and **must** be done in accordance with the Dash 2.

* * *

MISSILE MINUS WING

During a poststrike battle damage check, the wingman noted Lead's F-4 was damaged. As a precautionary measure, Lead made an approach end arrestment.

Postflight revealed that an AIM-7 missile wing had separated and struck the aircraft left wing and flap. The cause for the failure was traced to the munitions load crew who failed to lock the wing into the missile. All load crews at this base have since been briefed on the necessity for using the missile wing lock Go-No-Go gage when installing the wings.

* * *

A REASON FOR THE BOOK

During an FCF the pilot of an O-2B feathered the front prop but couldn't unfeather it. Maintenance found out why: the propeller accumulator was overserviced by about 100 percent—225 psi versus TO pressure of 100 to 125 psi. Could this be another case of failure to follow tech data? That book was written for a reason.

* * *

A MURPHY BOLT

Correct use of tech data is vital for us mechanics in maintaining modern high performance aircraft. The following incident indicates deviation from specific tech data during maintenance on a flight control system. Although, in this case, the aircraft landed safely, there could have been a disaster.

A T-38 was on GCA final approach. When round-out for landing was attempted, aft control stick movement was restricted to the neutral position and sufficient round-out could not be attained. Max power was selected for go-around, and the increased thrust raised the nose enough for a successful landing.

Investigation revealed a maximum fore and aft control stick movement and corresponding horizontal slab movement of two inches. When access panel 47 was removed, maintenance found that the forward bolt on the slab trim actuator had partially fallen out. This bolt, **installed from the bottom,** as depicted in Fig. 17, TO 1T-38A-4-3, was prevented from separating completely by the proximity of panel 47. The bolt had caught between reinforcement ribbing of the panel, restricting stick movement. The castellated nut had not been cotter keyed during actuator installation.

Inspection of work accomplished in areas that affect safety of flight is mandatory. Had such an inspection been properly performed, this incident could have been avoided.

* * *

INSPECTOR, OPEN THY EYES

Immediately after takeoff for an FCF the C-123 engineer noted a slight oil leak on the number two prop control; then the drain plug on the bottom of the control unit fell out, followed by all the oil. He immediately notified the pilot, but with all the oil gone, the prop could not be feathered. A successful landing was accomplished with Nr 2 prop windmilling at 2300 rpm. Investigation verified the missing plug; there was no indication that the plug had been safety wired.

Inspection of the forms revealed that the prop change prior to takeoff had been properly documented. The work was signed off by a qualified mechanic and inspected by a qualified inspector. This brings up the point that has been brought up many times before: if you put your name to the forms indicating you have inspected something, you better do just that —**inspect it.**

Aircraft Control

NYLON JACKETS

P. L. SMITH, ASD, Wright-Patterson AFB, Ohio

Modern jet aircraft impose increasingly severe operating conditions on control cables. Cable systems are more complex and are difficult to maintain with the wider temperature extremes, corrosive fumes of jet engine exhaust, and the various vibrations associated with high speed flight, not to mention the usual dirt, grit and other contaminants in the atmosphere and on the ground. Cable wear in control systems has been caused mostly by abrasion; however, cable damage due to flexing and misalignment is not uncommon at quadrants, pulleys and fairleads. In many cases, maintenance and inspection techniques are marginal to detect abrasive wear of cables early enough to prevent in-service cable failures.

Special emphasis should be placed on examining all cables where they come in contact with any surfaces (such as in Fig. 1). Inspect the cables for dark shiny spots that could range in length from one-half inch to several inches. (See Fig. 2). If you find any, the cable should be disconnected and flexed (as shown in Fig. 3) to determine the extent of damage. Experience has indicated that control cables can wear as shown in Fig. 3 in less than 100 flight hours.

Severe cable problems on several major aircraft systems led the Aeronautical Systems Division to conduct special cable tests, using bare cable and cables with 1/64″ and 1/32″ thick nylon jackets.

Flight test results were very conclusive: *nylon jacketed cables are far superior to bare cables under all conditions.* Non-control system vibrations transmitted to the cable through pulleys, fairleads, and cable guides were greatly reduced, since the nylon jacket acted as an absorbing cushion. Dirt and grime could not reach the protected cable. The lubricant applied during manufacturing was sealed in, providing a continuous low level of internal friction and wear. The insulating prop-

Cables Now Wear . . .

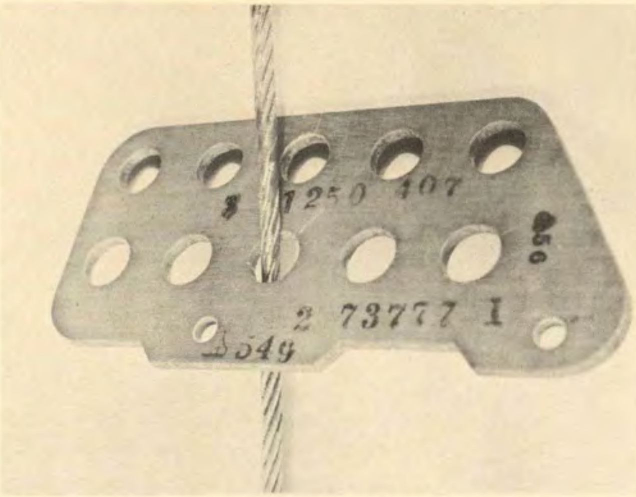


FIG. 1

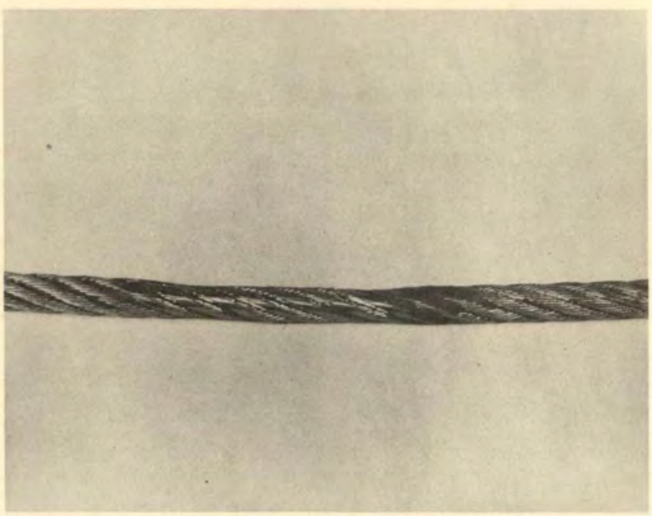


FIG. 2

FIG. 3

erties of the jacket appear to protect the cable from sudden temperature changes. Sulphur and other corrosive elements no longer contribute to cable corrosion and the detergents used in washing the aircraft have little effect on the internal cable lubrication.

To date, the tests verify that nylon jacketed cables can perform around molded phenolic aircraft control pulleys without splitting or peeling. Nylon jacketed cables can and have solved several application problems in current flying aircraft and ground-support equipment. However, flight tests on T-38 and C-141 aircraft are continuing to determine the maximum capability of these nylon jacketed cables.

Research on inspection criteria for nylon jacketed cables is continuing with both laboratory and service tests. Until such procedures are established, the cable should be inspected for any cracks, seams, lumps or changes in uniform thickness. The section of cable that comes in contact with a pulley should be carefully checked for reduced cable diameter, which could indicate nylon stretch and a broken cable.

Additional information can be obtained from ASD/ENFL, Wright-Patterson AFB, Ohio. ★

a new net

LT COL DAVID L. ELLIOTT
Directorate of Aerospace Safety

The MA-1A net type barrier, in use in the Air Force since 1952, has been only about 65 percent reliable, but many pilots are alive today because of it. The MA-1A barrier consists of a net attached to a cable lying on the ground. When an aircraft nose gear engages the net the cable is lifted to engage the main landing gear.

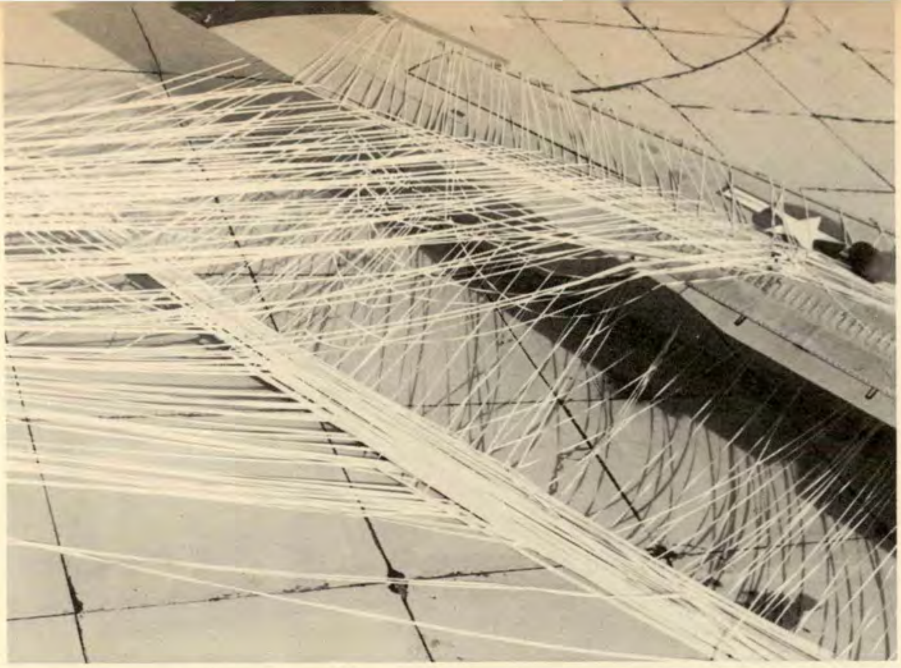
Later in the 1950s, the SAFE-BAR, another net engaging system, was developed in Europe. This barrier had an upper and lower cable with vertical nylon straps that would engage the wing of the aircraft. The successful engagement rate was much better than that of the MA-1A system; however, during high speed engagements, the upper cable could cause damage to the fuselage and on aircraft like the T-33, the upper cable could be pulled down through the canopy into the rear cockpit.

Either of these engaging devices could be connected to different arresting motors. For example, the MA-1A was originally connected to anchor chains; later it was also interconnected to a BAK-9 arresting system and feasibly could be connected to other type arrestors. Ditto for SAFE-BAR.

Advantages of the MA-1A over the other nets is its simplicity of operation and maintenance, and low profile in the erected position. It can be left up for almost all aircraft movements and operation of the system can be remoted to the tower. The remoted configuration is generally required on civilian/ANG or USAF joint-use bases. The SAFE-BAR had a higher profile because the upper cable had to be high enough to clear the cockpit during engagement. This higher profile made remoting the system an important consideration for installation.

For years the MA-1A and SAFE-BAR were the principal aircraft arresting barriers. They were for emergency-only, far-end arrestments. It is recognized that the success rates were not very shiny but enough aircraft were saved to make it very worthwhile.

During the late 50s and early 60s the Air Force configured all century series fighters with tailhooks.



The hook cable arresting system at the departure end for tailhook engagements became the objective. The high success rates the Air Force encountered with the tailhook was one reason that development of nets was limited from 1960 till the present. But a subtle problem developed that did not become evident until the mid 1960s when arresting system usage increased radically. This was the limitation of "added on" tailhooks to the century series fighters.

The evolutionary growth of systems to arrest heavier aircraft, and the development of tailhooks built just a few degrees stronger than existing arresting systems, resulted in an incompatibility problem when stronger arresting systems were developed. Unsuccessful engagements occurred as a result of broken tailhooks and arresting system failures. It then became apparent that retention of the MA-1A net was a necessity if we were to keep landing accidents to a minimum. Meanwhile, with development of the hook/cable, improvement of the net systems ceased. The thinking probably was that improvements in the net system would be at the expense of the hook/cable system. To a certain degree this may be true; there is only so much money.

Recently we have seen a great improvement in nets that could perhaps improve the reliability under emergency conditions to a point equal to the hook/cable systems. Last December, industry, under FAA sponsorship, conducted tests of a new type net. The net system was designed in France; the arresting motor was designed in the United States. The net and arrestor were married at Edwards AFB, and a B-52 weighing 305,000 pounds was successfully engaged and arrested on three separate occasions at speeds up to 115 knots, with no significant damage to the B-52. As an observer of one of the tests, my first reaction was, this system could have saved at least five B-52s or 135s in the past three years.

This particular net, which is enormous in size, and the arresting motor, also huge, operate on the principle of the BAK-13, i.e., rotary hydraulic. The tapes wrapped around the drums of these reels are 0.40 inch thick and 18 inches wide. Numerous steel bolts, one and one-half inches in diameter, are required to anchor this system to the foundation. The net is 36 feet high and is

Upper Photo—Test aircraft has just entered the net. Note rubber supporting tubes draped over wings. Lower Photo shows enormous size of tape attached to nylon webbing—0.40 inch thick by 18 inches wide.

supported in the center by four rubber tubes filled with air. (The tubes supported the net and did only superficial damage to the wings of the B-52—about like a bird strike on the leading edge of the wing.)

As the aircraft traveled through the net the vertical straps began engulfing the wings and were laced across the wings from tip to tip. They produced no side loads to cause damage to the pylon mounted engines. Most impressive is the way the net engulfs and laces itself around the leading edges of the wing. The upper and lower straps are made of nylon, not cable, as in the SAFE-BAR system. Thus, the brutal damage caused by cables being pulled into the fuselage does not occur with this net. From the photographs across these pages you can see the sequence of events as the engagement progresses and as the aircraft is brought to a stop. The particular net used in the test was designed for the Concorde supersonic transport, yet it successfully engaged and stopped the B-52. A newer net being designed for the B-52 and KC-135/707 type aircraft will be superior to this net in decreasing loads on wings of wider span and lower sweep angles than the Concorde's double delta. A net similar to this but on a much smaller scale has been used successfully in Europe to arrest fighters. It works on the same principle and has proven very reliable.

Perhaps the time is ripe for each commander to review his operational requirements and, if warranted, submit his required operational capabilities for a net type system for his individual needs. A quote from the 1969 arresting systems summary states, "The MA-1A system is still being maintained. A modernization program is needed to replace the current net with a more sophisticated system that is compatible with more aircraft types and not so dependent upon a rigid speed envelope or aircraft configuration. Two companies have designed net type systems that are superior to the MA-1A, and can be attached to any energy absorber from the anchor chain to the dual BAK-12. This opens the possibility of successfully arresting such aircraft as the T-39, C-9, B-57, B-66 and any aircraft where the speed/weight combination is compatible with an energy absorber. Installed as a backup system, this net could further reduce accidents when a hook-equipped aircraft fails to engage the primary system." ★

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

Dear Toots

I have a couple of questions on TO 00-20-5, para 1-36, page 1-5: Was the intent of this paragraph to allow a complete change of flight crew with engines running or to allow changes within the crew with the same pilot or copilot resuming the flight? After engines are shut down, must the same pilot resume the flight or merely remain in the area until another flight crew arrives at the aircraft?

We are not in the airline type of operation here and I am under the impression that any time the engines are shut down and another crew will take the aircraft, it must have a BPO inspection and a preflight by the flight crew.

Mr S.

Dear Mr S.

According to the OPR on TO 00-20-5, the intent of paragraph 1-36 was not to allow complete change of crew with the engines runnning. The paragraph was intended, rather, to suit the needs of units with a training commitment and allow a change of student with the IP remaining aboard, or the IP to deplane and let the student go solo. However, if an operational requirement for a complete crew change exists, there is nothing in the paragraph to prohibit it.

If the engines are shut down, a new basic postflight inspection is still not required of Maintenance if the same pilot or instructor pilot will remain in command of the aircraft on the next flight, provided that he stays in the immediate vicinity of the airplane while it is shut down.

Hope this answers your questions. Thanks for writing.

Toots

Dear Toots

There seems to be some confusion here in the control room about the intentions of AFM 65-110 on reporting aircraft undergoing periodic (we are in the periodic concept—400 hour interval.)

My question is, when do we close out the periodic status and carry the bird operationally ready? Do we report "periodic" or "unscheduled" during the post-dock portion of the periodic? After functional check flight do we report "unscheduled" or "periodic" while clearing the test pilot's write-ups?

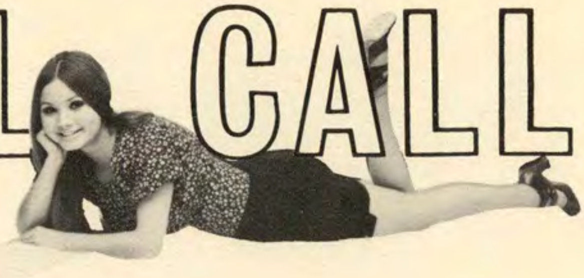
Concerned

Dear Concerned

I researched the explanation and terms portion of AFM 65-110. To answer your question, the aircraft is reported in periodic Code C through all portions of the pre-dock, in-dock and post-dock. At the time the aircraft becomes operationally ready for functional check flight the 359 card Code C (periodic) will be closed out and the aircraft will be reported operationally ready. Maintenance resulting from a functional check flight will be reported as unscheduled Code A.

Toots

MAIL CALL



Apologies to MrNewman

In the February issue on page 29 you stated that a movie starring Steve McQueen had the following line "What we have here is a failure to communicate."

Would you believe the line came from a Paul Newman movie? Regardless, it is a great and informative magazine.

SSgt Robert Carroll
24 SOWg
Howard AFB, CZ

What we had there was a communications failure!

* * *

"Time to go"

The February issue contains an excellent article on ejection entitled "Time To Go." This article is very precise and impressive and reflects a great deal of thought behind it. There is one major flaw, however. The cover picture for the article shows a GIB ejecting out of the back seat of an F/RF-4. All aspects of this ejection are correct with two exceptions. The GIB has his sleeves rolled up and is not wearing any gloves.

If you feel it appropriate, request that the errors in the referenced article be corrected and the proper manner of attire for flight be emphasized. Since your magazine is widely read and respected by most of the aircrews throughout the Air Force, a correction of these errors would be very helpful.

Capt David R. Shaw
432 Tac Recon Wg
APO San Francisco 96237

We can't emphasize this point enough! ! Gloves and Nomex flying suits are two items you can't afford to do without. Sorry about the oversight. Guess we were impressed with the artist's ability.

* * *

"I am an instructor"

Reference the item "I Am An Instructor" which appeared on page 32 of the April issue.

I realize the reason for the item was to emphasize the need for complete, clear instructions, and maybe even a checklist; however, I certainly hope that MSgt Lewis and everyone who reads the item can now see the greatest message here. It is the fact that the 1954 Ford was being driven with a critical safety hazard. It is not difficult to visualize a fatal PMV accident caused by loss of the headlights at a critical time.

We have too many cases on record where lack of time or money was given as the reason for not correcting known safety deficiencies. Safety is directly proportional to the priority it receives from every decision level. Each of us must give our personal safety top priority as there is no second decision level.

I think you publish a good magazine and look forward to it each month.

Lt Col Joseph P. Milton
Hq 3d Air Force

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UNITED STATES AIR FORCE WELL DONE AWARD

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

MAJOR
Daniel R. DuBoise

CAPTAIN
Hoyt D. Coupland

4780 Air Defense Wing, Perrin AFB, Texas

On 22 December 1970, Major DuBoise and Captain Coupland departed Ramstein, Germany, for Naples, Italy, in a TF-101. The flight progressed normally until the aircraft was approximately 10 minutes beyond Torino, Italy, where moderate to severe turbulence was encountered. Shortly Major DuBoise noticed a small area of delamination in the left windscreen had increased in size and a crack of about one inch extended from the delaminated area. The crack was examined and it was determined that the stress panel was not cracked. The windscreen was not opaque; the delamination was in limits and the crew decided to continue the mission. Both pilots agreed to lower their visors for the remainder of the flight.

Approximately five minutes later, while the aircraft was at FL370 approximately 25 miles from the Italian coast, the entire left windscreen imploded. Fragments tore away a large portion of Major DuBoise's visor and some went completely through the metal skin at the back of the cockpit.

The aircraft was momentarily out of control and by the time both pilots recovered it had descended approximately 5000 feet and was in a 120 degree bank, 15 degrees nose low. The extreme wind noise prevented the pilots from using the intercom and, although each could see blood on the other, they were unable to determine the extent of their injuries. Major DuBoise immediately turned the SIF to Emergency, called MAYDAY, turned back toward the coast and began to descend. Since airspeed in excess of 200 knots made windblast unbearable, a slow, cold descent was required. Despite the fact that they had not been able to communicate, Major DuBoise and Captain Coupland continued to function as a team. Major DuBoise flew the aircraft while Captain Coupland retuned the TACAN. Major DuBoise continued to transmit but was unable to comprehend transmissions of Rome Control. The only readable message received throughout the remainder of the flight was the frequency of Torino Tower. As the aircraft approached Torino, Captain Coupland attempted to read the letdown plate but that plate was torn from the book by the wind, so they could not determine the location of the Torino Airport from the TACAN. The flight continued to Torino at approximately 500 feet at an airspeed of 170 to 200 knots. By the time they reached the TACAN, Major DuBoise was nearly incapacitated from the cold and the windblast to his eyes through his broken visor. At the TACAN a random search for the airport was made with negative results. Through the use of hand signals, the pilots agreed to search for the runway until fuel diminished to 1000 pounds.

Soon Captain Coupland spotted an aircraft and followed it directly over the Torino airport. Visibility at the time was one and one-half miles. Captain Coupland made a circling approach and touched down gently 1000 feet down the runway, 40 minutes after the windscreen failure. The crew was immediately taken to the airport infirmary where glass was washed from their eyes, and facial lacerations were treated.

Excellent teamwork during this emergency saved a valuable aircraft. WELL DONE!

YOU LOSE!