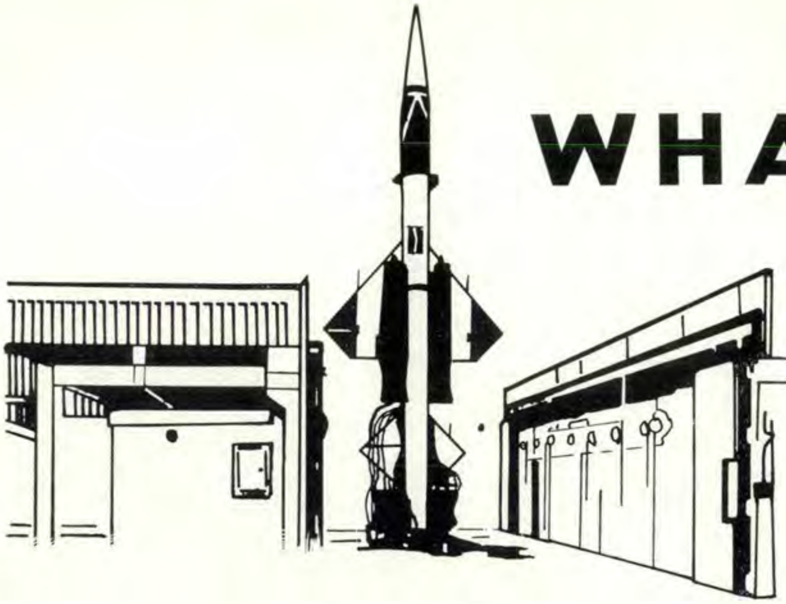
A E R O S P A C E

SAFETY

UNITED STATES AIR FORCE

April • 1962

See Page Two . . .



WHAT I SAW!

LIEUTENANT GENERAL
W. H. BLANCHARD,
THE INSPECTOR GENERAL,
USAF

I saw operating room technique in the mating of a nuclear warhead on air defense missile BOMARC. The strictness of the technique went something like this: one man reading the checklist, another airman picking up and passing the proper tool to a mechanic who performed the operation, the checklist man being sure that the function was properly executed—scalpel, suture, sponge! An operating room technique practiced daily by our nuclear Air Force technicians.

Five minutes later I saw a BOMARC erected; the shelter doors opened, the hydraulic lift raised the bird and disengaged. All went smoothly—fortunately!

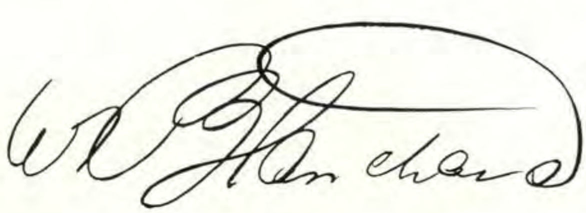
Fortunately—because the operator was playing a remote control box like an organ and he hit the right keys—NO CHECKLIST! Where had our operating room technique gone?

True, the remote control box is SUPPOSED to be so sequenced that the missile could not raise up through the closed shelter doors; however, missile people should know by now that circuits don't always operate as they are supposed to. As a result we damaged 49 missiles in 1961.

The above is not only what I *saw* but what I *predicted* to the local commander I would see. I was able to predict this correctly because it is my observation that, even though we have developed highly professional techniques in our nuclear and flying programs, our missileers haven't yet "got the message."

I envision a detailed formal briefing 24 hours ahead of time before anyone lays a hand on our Air Force missiles, at the conclusion of which the responsible supervisor should certify the qualification of the personnel assigned to perform a specific task. He should assure himself that people who are briefed actually "fly the mission" as an integral crew, that they have gone over their emergency procedures, i.e., how to back out or what to do when things don't go in accordance with the plan at any particular point. The supervisor should sign the clearance, as it were. This goes for both maintenance and operational crews. Then in a carefully preplanned, deliberate fashion, with checklists, emergency procedures and alternates, the operations should be conducted with operating room technique—a demonstration of the truly professional capacity which I know our missile folks possess.

I hope our missileers get this safety message. I am very interested that they do.



IN THIS ISSUE

FALLOUT

The Parrot

I found your article "Off The Record" very amusing. (February issue.)

Since I am one of those military types who call the radar beacon transponder a PARROT, I checked the FLIP Planning and found the word PARROT permissible when referring to the IFF MARK X SIF.

Possibly the non-military types should get with the latest correct phraseology.

Capt. Bruno F. Pitts
B-52 A/C, 72d B.S.
Mather AFB, California

• • •

Two Schools Of Thought

Ever since the new holding procedures came out we have been receiving letters to the editor from safety-minded writers who have had suggestions to offer on this particular gyration. So far, we are pleased to report, no one has been fighting the problem. Many of these letters have been accompanied by homemade computer adaptors and other assorted handy-dandy tools designed to figure out entry procedures with a few finger movements. Sample pattern entries have been worked out on these with the facilities people and all appear to do the job.

There is another school of thought, proponents of which contend that devices such as these should not be used. They point out that a mental picture approach to any such inflight problem is better. One argument used is that planning traffic pattern entry is normally done on this basis. Those who subscribe to this school declare that always having an accurate mental picture of the position of the airplane in relation to the fix, and a mental picture of the track that aircraft will make in performing the maneuver, is safer. One "for instance" cited is that the probability of inadvertently turning in to high terrain or over a restricted area is less under this system than when a mechanical system is ued.

There may be a third school— advocates of which combine the mental picture with the mechanical process. (No member of this school has yet written.)

This magazine is not going to subscribe to any one particular school. Since it is impossible to observe the mind at work, and judge only on the basis of results, the person who always performs the maneuver properly is acceptable from a safety standpoint—regardless of the mental or mechanical gyrations he has to perform.

This magazine does subscribe to ingenuity and initiative that provoke a safe, simple way of doing and to the desire to share safety knowledge with others, as evidenced by the suggestions on holding pattern entry procedures.

• • •

Breaking The Think Barrier

Reference your article "Breaking the Think Barrier" . . . I thought both Lt Bunn and Capt Lamb submitted excellent ideas and the feeling was shared by many of my fellow squadron pilots. In local bull sessions we have booted the problem around and suggested the following system be installed as a superior warning device to the horrified glances at rear view mirror and EPR gauge.

a. One each, reliable but inexpensive micro switch installed on the drag chute door or in the drag chute compartment.

b. Wiring to a warning light in the cockpit.

c. When the drag chute door opens, the micro switch causes the light to illuminate in the cockpit.

Concerning Capt Lamb's S_1—S_2 Timer, as you know, the F-100 line speed and refusal speeds are based on takeoff distance rather than time. Is there any chance of getting these charts converted to time-of-roll instead of distance so we too might benefit from use of a timer on takeoff roll?

Capt. James A. Neher
612th Tac Ftr Sq (TAC)
England AFB, La

Your suggestions have merit—up to the major command to certify the requirements for modifications. Suggest you submit proposals through command channels.

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• reflections

One of the things you soon learn in the safety business is that whoever first said, "It's an ill-wind that blows nobody good," knew exactly what he was talking about. We learn how to fly and service these fantastically complicated machines we have nowadays from attending training, reading manuals and testing. Then we really learn about them when we actually get them in our hands and try to make them go the way the engineers said they should.

We make mistakes and we learn better ways; we really begin to know what it was the experts tried to tell us in the first place. And we find out that there are a few things you can't be sure about despite what the slide rules, computers and wind tunnels say. We discover that no man has ever built a flying machine that was perfect the first time out. Take the T-Bird for instance; we're still learning about it and improving it, making it safer, even though it seems that it has been around since the beginning of time.

How do we do this? We have many ways: inspections, safety surveys, and, unfortunately, accidents contribute. We learn from those alert people who write up OHRs, EURs, and incident reports. Don't underestimate the value of these, especially the latter. Too often a major accident presents the first indication that a serious problem exists. Then we find out what we should have known a long time ago. The problem had been there right along but nobody reported it, maybe because it wasn't recognized as a potential hazard.

Periodically we reflect back and take a good look at where we've been and try to do better than just guess where we're going. Specialists in DIG/Safety looked back at 1961, then wrote up problems they had encountered. You undoubtedly had problems with the aircraft you fly or service, so we present these 1961 experiences for your profit.

• B-47

Engine icing is under careful study as the result of one major accident and 30 engine changes, 27 of them in one week. The actions taken include issuance of more definitive operational procedures, a project to investigate feasibility of wing/empennage anti-ice operation independent of engine nacelle anti-ice, and a study of the adequacy of the present configuration relative to mission requirements.

Discovery of *cracks in the wing attach fittings* resulted in inspection of 100 Red Barn and all Clear Sky aircraft. The consensus is that propagation of the cracks grows with age of the fittings, but that the fittings have adequate strength to carry calculated loads. All cracked fittings found were replaced prior to return of the aircraft to operational status, and data review is being conducted to determine the need for follow-on action.

J-47 Turbine Wheel overtemp and chunk failures continue to be a problem. OCAMA was requested to review wheel inspection procedures and was designated as the central data collection agency for all wheel defects found between 1 January and 27 July 1962. SAC wants high time wheels removed from inventory and an 11 point program has been established to determine means of correcting wheel deficiencies.

• B-66

Three accidents in seven months from undetermined cause factors have resulted in a complete engineering evaluation of the weapons system.

J-71 engine problems, primarily 8th stage and 2nd and 3rd stage blade failures due to corrosion accompanied by retainer strips breaking, resulted in a requirement for 100 per cent replacement of all compressor blades during overhaul as well as corrosion resistant painting of all compressors. Project "Quick Trip" was established to rebuild all J-71 engines in order to correct known problems.

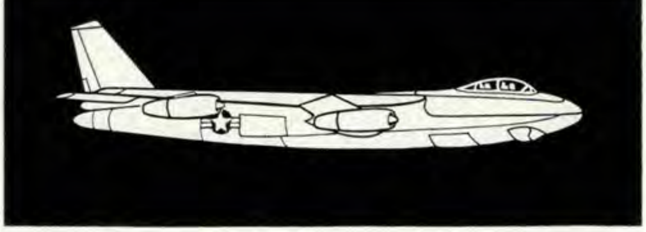
A Management Improvement Program resulted from *hot air duct leaks* that allow air to escape into the engine strut/wing area. An interim measure is an inspection procedure to detect signs of leakage as soon as it develops.

• B-58

Axle beam failures resulted in a gross weight restriction and TCTOs as an interim action pending completion of a study to determine the requirement for redesign.

• B-52

Pneumatic duct failures brought more stringent inspection, repair and replacement requirements, a new and improved duct, proposals to discard old replacement ducts and rehabilitation of all neoprene covered pneumatic ducts in the B through F models.



reflections •

Bulkhead 1655 cracks resulted in Engineering Change Proposals to rework the weld relief holes in bulkhead and where necessary, add bracing. A safety of flight supplement imposes restrictions on affected aircraft.

Landing gear shuttle valve problems existed. A stronger bolt did not provide the answer. A joint manufacturer-AMA study was undertaken to solve the problem.

High failure rates of *constant speed drives* continued. Installation of thermal disconnect shafts was discontinued due to an inadvertent disconnect problem. A CSD overheat light was installed to warn the flight crew of overheat and impending failure. An improved drive is undergoing service test.

Discovery of fatigue in wing structure areas has resulted in stipulation of inspection requirements for these areas.

Loss of cockpit lighting following failure of the No. 3 engine constant speed drive or alternator caused a request for an Engineering Change Proposal to provide emergency flight instrument and cockpit lighting in such cases.

• H-19 • H-21 • H-43

Pilot factor was determined to be the primary cause in 10 of 16 helicopter accidents in 1961. Weather was a contributing cause in seven of these. Capabilities of the aircraft, effect of weather on its performance, failure to observe existing weather or failure to use existing facilities to determine weather were common discrepancies.

Supervisory factor was a contributing cause or finding in 10 of the accidents last year. Air Training Command has prepared helicopter familiarization kits for indoctrination of personnel in helicopter operations.

Power interruptions and engine failures have been a problem in reciprocating engine powered helicopters. Improvements include shot peen cylinders for H-19 engines and an improved crankshaft sludge plug, master rod bearings and locking plates for H-21 engines.

• C-135

Marginal performance during heavyweight takeoffs has been evidenced in the form of: zero climb rates, lightening of control forces, over-rotation, loss of elevator feel and porpoising after takeoff. Frequency of these incidents has been reduced since takeoff speeds have been increased three knots. Flight tests by company test pilots have been completed. Further action will depend upon final findings of these tests.

Water contamination, particularly sea water, sustains the growth of fungus and micro-organisms. This results in fuel tank corrosion. In addition, fuel indicating probes become unreliable and, in some cases, inoperative from contamination. Corrective action includes application of a top coating in production aircraft, messages advising the field to closely monitor fuel supply and filter systems, vacuum blast of tanks during rework, and research to find a material or method to neutralize the fungus/micro-organism growth. In-service tests are geing conducted to develop a fuel tank top coating that has greater resistance to fungus/micro-organism action.

• C-133

Engine nose cone failures continued to occur, even after replacement with the modified case. Next step appears to be a Turbine Vibration Indicator which will give warning of impending failure in time to allow for engine shutdown before destruction.

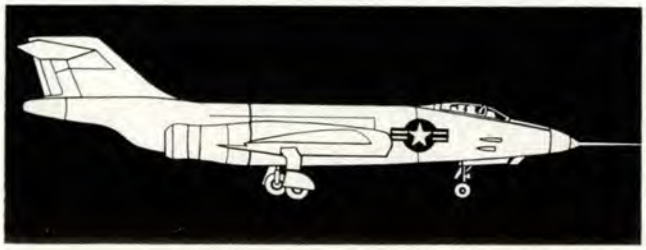
• C-124

Although C-124 aircraft accidents decreased from eight in 1958 to three in 1961, there are still some major problems: propeller shaft failures, propeller synchronizer failures and generator failures. Corrective action has been initiated on all three deficiencies. Educational film (FTA 574) is available on the propeller shaft failure problem and recommended for C-124 maintenance personnel.

• F-100

From 1 July 1955 to the end of December last year, 40 accidents and 23 incidents were attributed to *aft section fire and explosion.* Spraybar and pigtail failure accounted for most of these. Modification kits to relieve vibration are being installed. Initial distribution of these kits started in December and is scheduled for completion in June. Improved pigtails and spraybars have been designed and tested and are currently being installed.

Flight control system failure resulted in eight major accidents in 1961. Improved quick disconnects have been made available for the hydraulic flight control systems. Tests of runaround valves to relieve return line



• REFLECTIONS

blockage disclosed inadequate rudder control for cross-wind landings. A change in valve installation is being worked out.

Clamp failures in the heat and vent system resulted in all operators being directed to use heavier clamps. Conversion to stainless steel fittings is now provided for by TO.

Bearing failure caused eight accidents in 1961. A TO fix provides for installation of an improved front bearing support and heatshield.

• F-101

Overheat warning unit failures accounted for 30 incidents reported in 1961. New transistorized overheat control units have been service-tested and procured.

Nose-down stick forces caused 29 incidents, two of which resulted in major accidents. Erroneous TOs have been revised. New TOs have been published to increase the pilot's reliability to disengage the automatic flight control systems and pitch control systems.

Because of *tire failures* the prime AMA has provided more definitive guidance on tire pressures, pressure-temperature relationships and effects of load and operating conditions. Dimple tread tires are to be replaced by a newly designed rib tread tire.

The fire hazard from burn-through of combustion chambers has been traced to design deficiency of the *combustion starter* nozzle box. New combustion chambers, with improved nozzle box life expectancy, are scheduled to become available late in FY 62.

Improved pilot education on *pitch up recovery* procedures has resulted in a reduction in these incidents and successful recoveries. Pitch boundary indicators have been delivered and are expected to cut the number of inadvertant pitchups.

Hot air duct assembly failure has produced an engine fire hazard. Delivery of a new duct of heavier material is scheduled for May.

• F-104

Engine thrust loss resulted in project "Hardcore" to modernize, redesign and refit the engine. Engines are to be modified through a depot turn-around program. The goal is to have the first 75 engines modified by 30 June.

A new compressor blade is being developed to alleviate corrosion, thereby reducing the probability of *compressor stalls.*

In 1961, *nose gear shimmy* on landing and takeoff caused external stores release, blown nose gear tires and nose gear failures. Three TO modifications have been made to eliminate this problem.

• F-105

Cyclic testing of the airframe disclosed *failure of the aft wing attaching frame.* More rigid inspection requirements have been established and the contractor is conducting a testing program to determine the cause and fix.

Doubt as to the possibility of safe *through-the-canopy ejection* resulted in authorization of a test to resolve this question.

Installation of a standby *attitude indicator system* has been proposed as a result of numerous failures of the present system.

Tab lock failures of compressor blades occurred on two occasions, one resulting in a major accident. Modified tab locks were installed during the "Sun Dial" overhaul project. Engines which were not processed through "Sun Dial" are scheduled for 600 hours before tab lock modification.

Numerous incidents and one major accident resulted from *autopilot failures.* A TO has been issued requiring that all aircraft involved in uncontrolled oscillation incidents be impounded for investigation. System modifications are being made with completion date set for this month.

• F-106

Failures within constant speed drive system have resulted in *AC power failure,* loss of fuel boost pumps and resultant engine flameout. Installation of a hopper in No. 3 tank, a gage for this tank and an air turbine generator are slated for completion during 1962. TO modifications and test projects are also aimed at improved reliability.

Improved No. 3, 4 and 5 bearing seals have been installed in J-75 engines due to past *bearing seal failures.*

• F-102

A standpipe system is being incorporated to reserve oil for engine operation in the case of *constant speed drive failure.* As of the end of 1961, approximately one-third of the fleet had been modified.

Rupture of *speed brake hoses* is being corrected through installation of high pressure hose to replace medium pressure hose. Kits are expected to be available about June.

Unsnubbed launcher extensions have resulted in inflight loss of weapons system evaluator missiles and damage to GAR missiles and launcher rails during unsnubbed extensions. New selector valves, designed to overcome this problem, are being delivered.

Attitude indicator failures have necessitated development and testing of a standby instrument. Adaption of the new system to DC is underway with February 1963 the expected delivery date to tactical units.

Eleven accidents in 1961 were attributed to *landing gear failure*. Modification is to start this month at the rate of 35 aircraft per month.

• T-33

Turbine buckets. In the first six months of 1961, 53,310 buckets were removed as unserviceable. During the year 41 EURs were received at this headquarters and five major accidents were experienced from this cause. A new turbine bucket is under test at OCAMA, with tests to date indicating that this may be the answer.

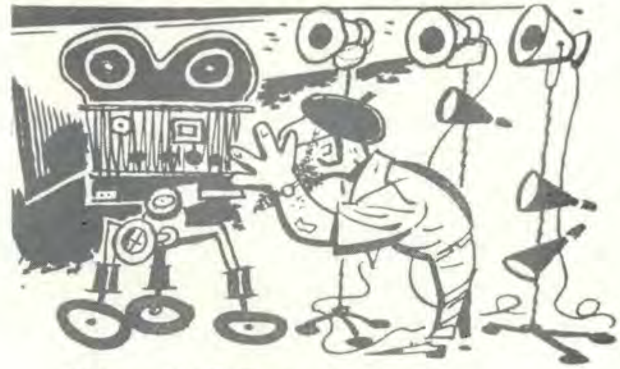
• T-39

Transitioning pilots with backgrounds in slower, reciprocating aircraft are proving a problem. Cognizance of this fact is stressed as a safety measure.

An aft *center of gravity shift* when the aircraft is flown nose-high is being watched for safety of flight implications. The CG change is caused by fuel flowing to outer extremities of the swept-back wings when tanks are not full.

FOD to compressor sections due to *ice ingestion* is particularly acute in aircraft equipped with small diameter turbojet engines. The aircraft is currently restricted from flight in known icing conditions. ★

• REFLECTIONS



Reel Messages

Here is a list of films available at the Air Force Film Library Center. Installations may order directly from the center, the address of which follows: Air Force Film Library Center, 8900 So. Broadway, St. Louis 25, Missouri.

• **FLIGHT SAFETY C-130.** FTA 491a. 11-min. B&W. Emergency situations during ground operations of C-130A aircraft, such as engine fire during start, taxi or shutdown, tailpipe fire (torching) during start, gas turbine compressor fire, DC power failure during first engine start, nacelle overheat, normal brake system failure.

• **FLIGHT SAFETY C-130.** FTA 49lb. 14-min. B&W. Inflight emergency procedures: engine fire or overheat, high turbine inlet temp, inflight door warning, elevator trim tab failure, engine driven hydraulic pump failure, engine driven AC generator failure.

• **FLIGHT SAFETY C-130.** FTA 491d. 12-min. B&W. Corrective procedures for emergencies during inflight operations: engine overheat or fire, prop malfunctions, engine driven hydraulic pump or AC generator failure and illumination of door warning lights.

• **FLIGHT SAFETY C-130.** FTA 491e. 12-min. B&W. Basic functions of Collins Integrated Flight System Instruments (IFS): approach horizon, course indicator and vertical gyro-monitor.

• **FLIGHT SAFETY C-130.** FTA 491f. 14½-min. B&W. A typical navigational maneuver demonstrating operation of Integrated Flight System (IFS). Shows how integration of navigational attitude instruments into two major units simplifies use of the system.

• **FLIGHT SAFETY C-130.** FTA 491g. 15½-min. B&W. Nuclear Weapons Handling Procedures (SECRET RESTRICTED DATA film).

• **EXTENDING JET HORIZONS.** SFP 1086. 27-min. Color. Traces development of KC-135 tanker and its ability to refuel aircraft at high speeds and altitudes.

• **AIR FORCE NEWS REVIEW.** Nr 66. AFNR-66. 14-min. B&W. Covers subjects as: Long Pass provides training exercise; airminded town has own F-102; reserves demonstrate readiness value; airmen make trek for tots; T-38 Talon joins ATC; ATC notches AF cage crown; and airmen launch Blue Scout.

• **FLIGHT SAFETY C-133A.** FTA 480c. 20-min. B&W. Preflight check, inspection of exterior, top-of-wings, and interior of cargo compartment of the C-133A.

• **MACE WEAPON SYSTEM SAFETY.** FTA 507a. 8-min. B&W. Covers safety practices to be followed in assembly and transport operations of the TM-76A in the Mace Weapon System. Shows trans-launcher and crane operation.

• **MACE WEAPON SYSTEM SAFETY.** FTA 507b. 10-min. B&W. Illustrates procedures for initial inspection and safe grounding of the TM-76A weapon system. Includes inspection of airframe, power receptacles, turbine buckets, radome, aft uplocks, stabilizers and testing equipment. Demonstrates how to ground the missile, launching pad and radar van to prevent buildup of static electricity.

• **MACE WEAPON SYSTEM SAFETY.** FTA 507c. 10-min. B&W. Outlines procedures for engaging the power takeoff, making the power pack check, and handling cables during testing operations on the TM-76A weapon system.

NON SUPPORT OF the PILOT

In fairness to the many support facilities that have PREVENTED accidents, and in deference to those who cry "UNFAIR" when they read this, we hasten to emphasize that there is no intent to castigate any service. THE ONLY POINT IN RUNNING AN ARTICLE OF THIS KIND IS THAT IT MAY CAUSE READERS TO EXAMINE THEIR OWN HOUSE AND MAKE SURE THEIR FACILITIES, TECHNIQUES AND PROCEDURES ARE IN ORDER. This magazine exists for only one purpose, accident prevention, and is obligated to present information of accident prevention value—even when, at times, such information is not pleasant. Often there are extenuating circumstances in accidents (there were in this case), but extenuating circumstances don't bring back destroyed aircraft and crews. If any of the cost of such accidents as this one is to be defrayed it will be through publicity of the factors causing the accident in the hope that others will not repeat the same mistakes.

• • •

Late one summer afternoon an F-106 began a penetration through thunderstorm cluttered skies at a midwestern base. Thirty-eight tension-packed minutes were to elapse before this aircraft was to destroy itself in a nose-low, vertical-bank crash into farmland.

This accident, like so many, should never have occurred. Primarily it stemmed from the fact that monitoring supervisors failed to divert the pilot to a suitable alternate when weather deteriorated below the minimums established for this type aircraft.

But the diversion wasn't directed, the pilot was never informed that weather was below minimums (and he didn't ask) and the F-106 cut low altitude paths through the storms in a vain effort to find the base. Finally, the tragedy that can result from failure to comply with directives was again illustrated, this time in a smoking hole in a farmer's field.

The fact that this was an F-106 had little bearing on the accident. Under the same circumstances it could have happened to almost any aircraft. Under similar circumstances it *has* happened to many aircraft.

Because such accidents have happened, and can happen again, directives such as those spelling out weather minimum criteria have been written.

But even though the penetration had been initiated, the seriousness of the situation should still be recognized and action taken. Yes, the situation was eventually recognized and action was taken—more of the same, NON SUPPORT OF THE PILOT.

Among the contributing factors was late coordination by the Sector as to the type of penetration to be used. This caused a delay of 10 to 11 minutes which, in turn, cost more fuel and allowed weather to deteriorate further. (The first four aircraft of the mission had cancelled IFR and penetrated VFR because of a large thunderstorm in the vicinity of the GCI-GCA gate.)

One other item before we get down into the thunderstorms with the F-106. Prior to penetration fuel gauge malfunctions had been experienced, but gages were again normal when penetration was started.

From over the TACAN the aircraft was given two vectors, the second a dog-leg to final. AC power failure then occurred and the pilot requested a no-gyro approach. The turn to final was slow; the pilot could not establish contact on final controller frequency (channel 17) and had to go back to channel 16. Contact was reestablished 38 seconds after he had rolled out of the turn. The aircraft never appeared on precision radar and was given a turn to crosswind leg for another attempt. Local weather was now indefinite, 500 obscured, visibility one mile in heavy thunderstorm. Due to poor internal coordination and lack of a simultaneous weather display system for GCA, the controller was unaware of the latest observation and could not pass it to the pilot.

After starting his turn for another pass, the pilot reported he could again make turns to headings. Now, however, he experienced complete fuel gauge failure.

On this second pass the pilot was given a surveillance approach with headings and initial descent instruction without subsequent range and altitude calls. The pilot was not advised of the type of approach. Radar lost contact at approximately 1½ miles due to heavy precipitation. The aircraft was advised of lost contact and continued approach as near minimums as was possible on standby instruments. The aircraft crossed the field 200 to 300 feet over the runway.

This is probably as good a point as any to interject just what failure of the AC system meant to this pilot. **All aircraft fuel boost pumps, airspeed-mach indicator, altitude-vertical velocity indicator, pitch and yaw dampers, and windshield anti-fog and anti-ice were inoperative.** Other systems are also lost, but are not pertinent to this accident. Loss of fuel boost pumps requires the pilot to maintain a nose-high attitude with a minimum of deceleration to prevent flame-out. Loss of vertical instruments degraded the aircraft's all-weather capability to a great extent. Standby altimeter and airspeed indicators are difficult to read. Interpretation is particularly difficult just prior to landing, as the runway must be brought into the pilot's instrument cross check. In addition, loss of the vertical speed indicator prevents accurate descent control on GCA final. Slow changeover from normal power to the emergency power package at a critical time on the first approach would account for the pilot's overshooting the turn to final.

During the second missed approach the pilot reported seeing the runway, but he was unable to keep it in sight. He asked radar to bring him around for a landing the opposite direction. He stated that indications were he was out of fuel, and he believed it. (Two previous writeups on the fuel gauge system on this aircraft were inadequately cleared.) The pilot was given clearance to land the direction requested and winds were passed to him. Twenty seconds later the pilot asked whether or not they were going to bring him in. This time, the pattern controller, identifying the aircraft 4½ miles from the base and not knowing of the pilot's request for a landing the opposite direction, directed the final controller to give the aircraft a right hand pattern toward an area of lighter precipitation.

The pilot reported to operations (same frequency) in the clear and low on fuel and considering attempting a landing on a road or in a field. It was determined only one low fuel light was on and the pilot was told to try another approach. Radar operators gave the aircraft a very tight, low fuel approach and were unable to place the aircraft in a position to land. The aircraft was descended to 177 feet above the terrain in turn to final. The pilot reported sighting some houses and trees, but not the base. He continued final approach heading for one minute and forty-five seconds at low altitude, then was directed to climb to 2500 feet. During this period the pilot requested a vector to land the opposite direction, but radar did not have contact.

After climb to 2500 feet conversation between the pilot and operations disclosed that the second low fuel warning light had come on. A second aircraft was now on the frequency and the pilot mistakenly answered a call to this second aircraft and took up a heading given the other aircraft. This took him still farther from the base. Finally the aircraft was identified 22 miles from the base. More conversation with operations ensued. Six minutes elapsed between the last missed approach and the next turn back toward the base, which followed a query by the pilot.

While the F-106 is returning toward the base, let's consider radar controller NON-SUPPORT listed in the report.

- The radar controller did not advise the aircraft that he was using circular polarization.
- The pilot was not advised of the type of approach being conducted.
- Rapidly deteriorating weather was not passed to the aircraft.
- Single channel capabilities were not provided.
- The aircraft was descended below minimum altitudes.
- After the second approach the pilot was not advised that radar service could not be provided due to heavy precipitation returns.
- Coordination between radar controllers was inadequate during critical phases of the approach.
- Unauthorized transmissions by other agencies on air traffic control frequencies possibly interfered with normal air traffic control.
- The weather radar operator was required to inform the operations officer of the development and movement of the thunderstorm area to a position over the base but failed to do so.

Here are some facilities considerations that contributed to NON SUPPORT of the pilot.

- Lack of adequate approach lights.
- Failure of telautograph facility for local weather dissemination.
- Lack of a hot line from the weather radar observer to unit operations.
- Lack of simultaneous weather dissemination to the radar unit and control tower.

Eight miles from the base the event foretold by the fuel warning lights occurred. The pilot's desperate, thirty-eight minute attempt to get into the below minimums, thunderstorm-swept base came to an end. The F-106 flamed out from fuel exhaustion. The pilot zoomed up and ejected.

Even then he almost didn't make it. The ejection seat became entangled in the pilot chute. Considerable oscillation occurred and once the main canopy collapsed, reopening just before the pilot reached the ground.

Rescue personnel experienced considerable difficulty in locating the crash scene. They went first to a fire caused by a lightning strike of a barn. Fortunately, the pilot was only dazed and managed to get up and reach a fence ahead of inquisitive pigs.

The destruction of a modern fighter in a farmer's field on that July afternoon is only one in a series of accidents that prove again that procedures ignored cause accidents. This one just happened to be a little more spectacular than some due to the pilot's ability to keep his aircraft flying until the last drop of JP-4, despite gross examples of NON SUPPORT by those directly charged with supporting him. ★

. . . or does it ? ? ?

It wasn't just a dark and dismal night. No, this was really a bad night. The skies were erupting in all quadrants and the time between lightning strikes was getting uncomfortably shorter. The "what am I doing up here" feeling was becoming stronger every minute.

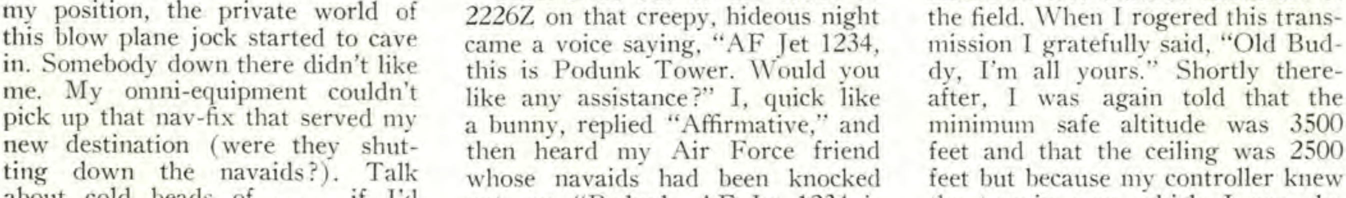
I had worked like the devil figuring that flight plan. Sure it was 1107 nautical miles to my destination, but I had some 40 knots of tailwind to help me and at 40,000 feet I'd be manufacturing fuel. This was just the type of flight to whet the old appetite of this famous T-Bird pilot. And besides, my destination was clear. With a setup like this, a hot jock just couldn't lose. Everything was okay until—but, I digress—Anyway, there I was some 106 miles short of my destination at 41,000, balancing that Tweety-Bird with caresses fit only for the tenderest sweet young thing. I had estimated the tops of the thunder bumpers to be some 10 grand above me, and I'd long since witnessed that minimum fuel number slide by.

Just as I had decided to get smart and change my destination to a big Air Force base within 20 miles of my position, the private world of this blow plane jock started to cave in. Somebody down there didn't like me. My omni-equipment couldn't pick up that nav-fix that served my new destination (were they shutting down the navaids?). Talk about cold beads of . . . if I'd had on one of those anti-submersion suits, I'd have drowned in my own sweat. "Call 'em," I said, and call 'em I did. That airman's voice sounded like a million dollars until after I'd requested immediate radar assistance and he said that his radar was out. I then requested an immediate DF steer and penetration.

He advised that his DF, TVOR, Homer and Low-Frequency Range had been knocked off the air by a severe electrical storm. Nobody had me except the Lord and He was preparing me for one of those "once in a lifetime experiences." I knew I was in deep trouble because when I decided to come up on 243.0 mc, I was already on it. How or when I switched to guard channel I'll never know.

Then from out of the ozone at 2226Z on that creepy, hideous night came a voice saying, "AF Jet 1234, this is Podunk Tower. Would you like any assistance?" I, quick like a bunny, replied "Affirmative," and then heard my Air Force friend whose navaids had been knocked out say, "Podunk, AF Jet 1234 is all yours to handle." My new-found friend told me to turn to 220 degrees magnetic and requested my fuel state. I replied, "Sixty-five gallons." He then wanted to know how many minutes 65 gallons was worth, and I told him 15 minutes. This boy was thinking, and that was good, because I had long since lost my ability to think. My actions were automatic, and if any actions were omitted, I'd soon find myself deeper in this dilemma.

When I reported steady on 220 degrees he turned me farther left to 200 degrees and told me that I was on a straight-in penetration to runway 20 at Podunk Airport. He then gave me all essential landing information, i.e., field elevation, altimeter setting, runway length and minimum safe altitude northeast of the field. When I rogered this transmission I gratefully said, "Old Buddy, I'm all yours." Shortly thereafter, I was again told that the minimum safe altitude was 3500 feet and that the ceiling was 2500 feet but because my controller knew the terrain over which I was descending, he was going to descend me to 2500 feet in an effort to break me out of clouds into VFR conditions. He also advised me that in the event my altitude was not low enough at station passage, he would reverse my penetration course for a straight-in approach to Runway 02. This controller was really with me. In fact, he was thinking ahead of me and doing some real valid planning. But I was stewing in a tall sweat. In the first place, I'd never heard of this airpatch, and in the second place, I was talking to an FAA man who was bringing me in on DF. I'd never heard of FAA



people working DF equipment. Of course, this man being my last hope sort of guaranteed him my undivided attention.

Finally, I couldn't stand the strain another second so I asked him, "How far out am I?" He answered that due to my low fuel state he didn't feel it practicable to make the 90 degree turn necessary to check the distance by formula. I ran this answer through the head bone in two milliseconds and concurred This joker and I had been to the same school; we both knew those time and distance formulas.

At 2234Z I thought that I was below the clouds at 2500 feet, but you guessed it—that neglected automatic action. After being coldsoaked at 41,000 and making a rapid descent, I was as blind as the old owl at high noon. As I was frantically starting my de-icing and de-fogging systems, I heard my controller sing out, "I have you in visual contact 1½ miles north-northeast, recommend that you land on Runway 02. I am raising the barrier for you." Fly boys, you can take it from me, sweeter words were never heard! I got a small hole cleared on the canopy and set her down on that strip with less than three minutes of fuel remaining.

A hair-raising story? Yes, but the facts are as follows:

1. This story is true; times and conditions are factual. Place and names are omitted. Source of information—FAA Flight Assist Report.

2. This T-33 was saved, and who knows—perhaps even the pilot's life was saved.

3. In a "stranger than fiction" setting, the FAA controller who performed this save was called upon, exactly two hours later, to repeat virtually the same perfomance with *another* USAF T-33. Again he accomplished an outstanding save and has been highly commended for his knowledge and practical use of DF procedures and in the manner in which he handled these emergencies.

Remember, regardless of how sophisticated the aviation business gets, common sense adequately applied to your flight planning will assure you a minimum of personalized hairy tales. ★

Maj John W. Cunnick, III, USAF
Federal Aviation Agency

BIRD TIPS

Few, if any, pilots have escaped the exasperation of speaking into a dead mike. One suffers a bit of discomfiture when seeking the destination he knows dern well is underneath all that billowy softness of white undercast, especially after he gets nothing but silence in reply to all that talk into his oxygen mask. On the other hand, if one has operational navigational equipment, he (and his machine) experiences only a minor inconvenience in most cases. One simply exercises patience, monitors the voice component of the nav apparatus, and if controller personnel show a reluctance to broadcast blindly into the ether, the approach maneuver is executed, commencing at the time listed in the appropriate section of the clearance sheet. Seems rather simple for the driver and his machine—but hesitate and reflect for a few moments on the the far reaching effect. The civil carriers and their passengers suffer, and one might add, not stoically, the inconvenience of waiting and diverting when air space must be vacated or made available to accommodate a machine which has suffered radio failure. The cost to the carrier which is diverted or delayed is a consideration easily calculated, but what about the hundreds of travelers? Indeed, it would be interesting if a meticulous accounting could be made of the dollar losses alone which were sustained by them. Of course this can not be done, but one thing is known: A LOT OF PEOPLE HAVE BEEN MAD!

Obviously the FAA was censured by irate carriers and passengers, resulting in a survey of the com-failure problem in 1959 and again in 1961. The data painted a dismal picture for USAF aircraft, and—of course, considering her mission—our old T-Bird held a commanding lead. The two surveys showed nearly identical failure rates with the Air Force contributing 79 per cent of the total failures. The T-Bird contributed 48 per cent of the total failures.

Headquarters USAF was apprised of the FAA survey and has since dictated policies and procedures which, if followed, will alleviate communication failures in USAF aircraft. An unclassified message concerning this subject was dispatched from Headquarters USAF on 7 February 1961, and is quoted in part: "Pilots of T-33 aircraft when reporting on AFTO Form 781A a discrepancy that involved loss while in flight of two-way UHF communications (complete, transmit or receive) will state also whether the flight was being conducted on a VFR or IFR flight plan at the time the difficulty was encountered. Note: the type of flight plan rather than weather conditions is to be indicated."

The Air Force has a strong desire to resolve this problem. To do so will take the combined effort of all personnel associated with this flying business—from the guy who makes the radio part to the pilot who uses it. ★

SEEING THE SHEAR

Starting his final approach at about 1500 feet, a pilot finds himself heading into a stiff wind. Because the wind provides a substantial part of the necessary airspeed, he throttles back his engines. Suddenly, a few hundred feet above the ground, the wind dies. Only a fast *increase* in power prevents the airplane from stalling and crashing.

Right?

Or is this right? Starting final into a stiff wind the pilot finds he has to carry extra power to bring his plane up to the runway. Suddenly, a few hundred feet from the ground, the head wind dies out. Only a fast *decrease* in power prevents the aircraft from overshooting.

Or how about this version? Starting final into a stiff wind the pilot finds he has to carry extra power to maintain a normal glide path toward the runway. Suddenly, a few hundred feet from the ground, the wind dies. Only a fast *increase* in power prevents the airplane from stalling and crashing.

If there is any doubt in your mind as to which of the three cases above is correct (or if there is no doubt, but you are wrong), read on. There are things you should know about wind shear.

• *NORMAL GLIDE PATH*

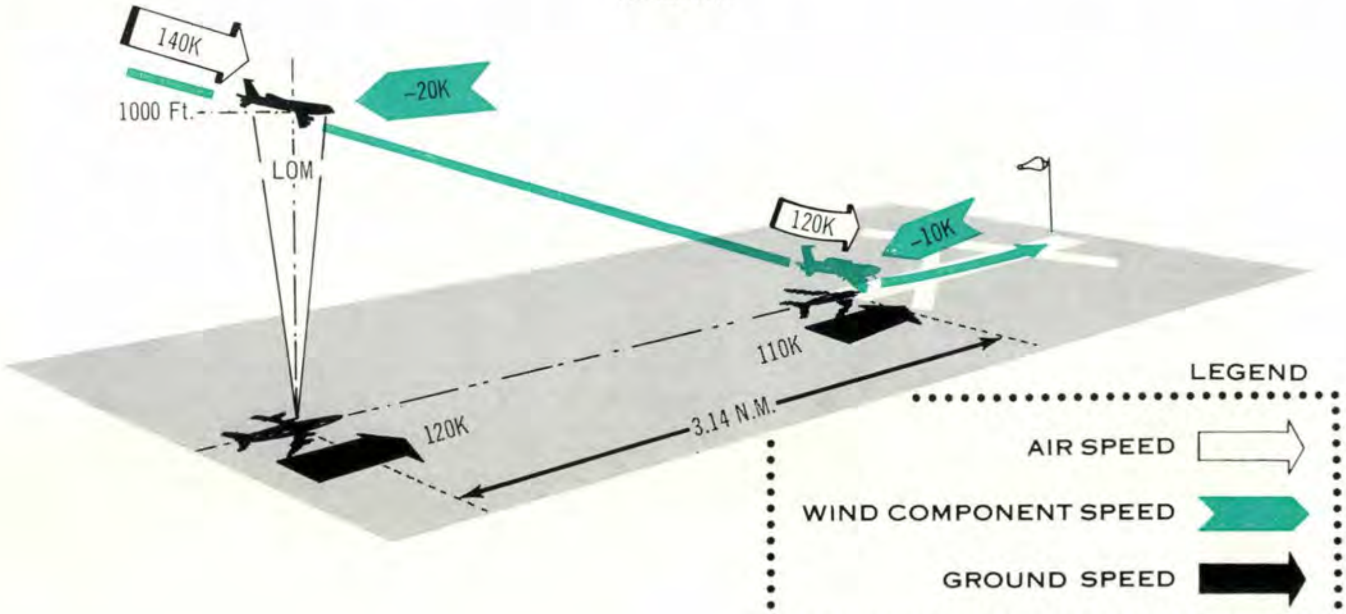
Figure 1 illustrates a normal glide path profile with a 3 degree glide path from the glide slope unit crossing the outer marker at 1000 feet. This gives a glide slope distance of 3.14 nautical miles from the outer marker to touchdown point. For our typical case we have chosen headwinds of 20 knots at 1000 feet and 10 knots on the surface. Speed selected is 140 knots over outer marker, tapering to 120 knots at touchdown. These conditions are considered as typical and will be used as standards for analyzing abnormal wind conditions in later examples.

From Figure 1 we can compute that the elapsed time from outer marker to touchdown in this case is 1.64 minutes, which results in an average ground speed of 115 knots and an average rate of descent of 610 feet per minute. Also, normal airspeed deceleration from outer marker to touchdown is 20 knots and the ground speed deceleration in this case is 10 knots. The change in ground speed becomes a very important consideration when analyzing abnormal wind shear conditions because it involves the problem of rapidly accelerating or decelerating an aircraft mass of up to 150 tons during the landing approach.

• *TAILWIND APPROACH*

In Figure 2 we consider an abnormal tailwind approach in which a 40-knot tailwind exists at the outer

FIGURE ONE



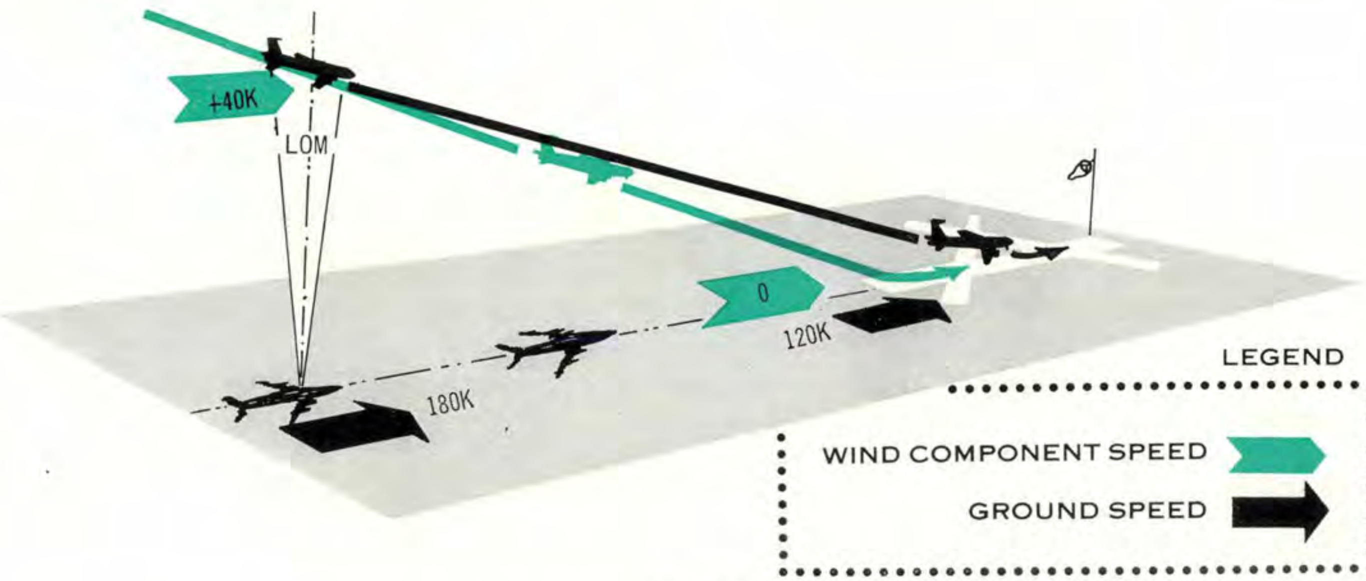


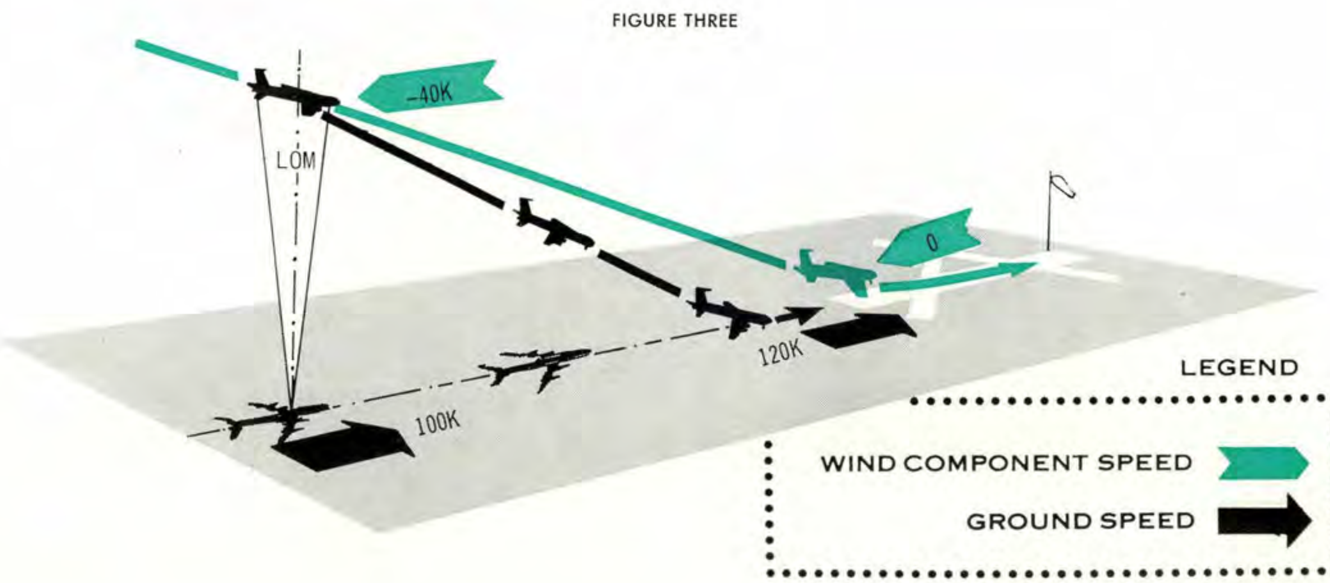
FIGURE TWO

marker with a zero surface wind. As can be computed in this case, the average ground speed from the outer marker to touchdown is 150 knots, which results in an elapsed time of 1.24 minutes and an average rate of descent of 800 feet per minute for a precisely executed approach. Comparing this example with Figure 1, we see that while the airspeed is decelerated 20 knots in both cases the ground speed in the latter case must be decelerated 60 knots in a faster time than the 20 knot deceleration in the normal approach of Figure 1. *This is the root of the problem, for whenever the wind environment changes faster than the aircraft mass can be accelerated or decelerated, the wind variations must be reflected by changes in airspeed.* In the tailwind situation depicted in Figure 2, should the pilot be unable to decelerate his aircraft in the faster time required he would find his airspeed had increased, very likely he would have gone above glide path in an effort to hold desired airspeed, and he would have to go around. (Assuming, of course, he wisely resists the temptation to land long.) One more point, the more gradual the shear the more likely the pilot is to be able to decelerate to remain on glide path and at desired indicated airspeed.

• *HEADWIND APPROACH*

In Figure 3 we take up the strong headwind-aloft condition. In this case we have a 40-knot headwind over the outer marker and a zero component on the ground. In this case we find that the average ground speed from outer marker to touchdown is 110 knots, which results in an elapsed time of 1.7 minutes and an average rate of descent of 580 feet per minute for a precisely executed approach. In comparing this situation with the normal profile approach depicted in Figure 1, we see that in the headwind shear approach the aircraft ground speed must be accelerated by 20 knots during the final approach instead of the normal 10 knot deceleration. Unless this acceleration is accomplished, the aircraft will sink below the glide slope and land short of the runway. Occasionally the shear will not be gradual, but

FIGURE THREE



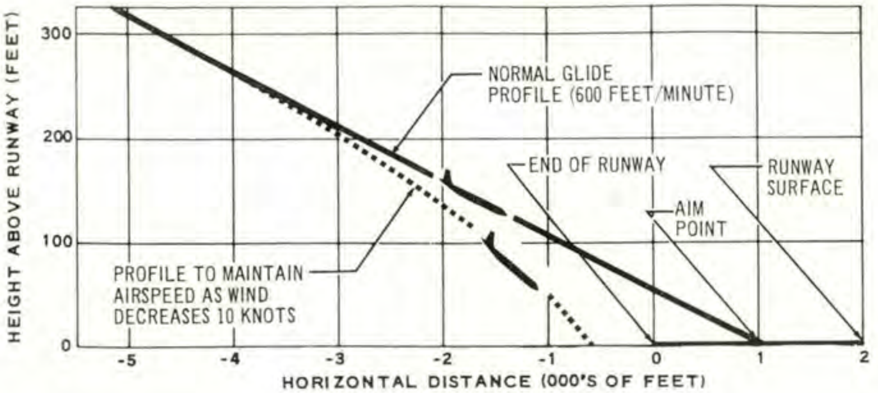


FIGURE FOUR

• SEEING • THE • SHEAR

will occur rapidly. If the speed falls below stall speed the aircraft will lose altitude until it crashes or flying speed is recovered. Time required for acceleration to flying speed may exceed that available. To illustrate, following are calculations for a particular aircraft. Conditions are: altitude 1000 millibars, power setting constant, air speed 100 knots, headwind 20 knots. When the aircraft is instantaneously placed in calm air the times to accelerate to the indicated ground speeds are:

80 knots — 0 seconds
86 knots — 39.9 seconds
90 knots — 77.5 seconds
96 knots — 175.5 seconds

This computation confirms tests run with a Constellation in stabilized flight at constant altitude near the stalling speed in which it was found that *nearly half a minute was required before any noticeable acceleration was observed following application of full power.*

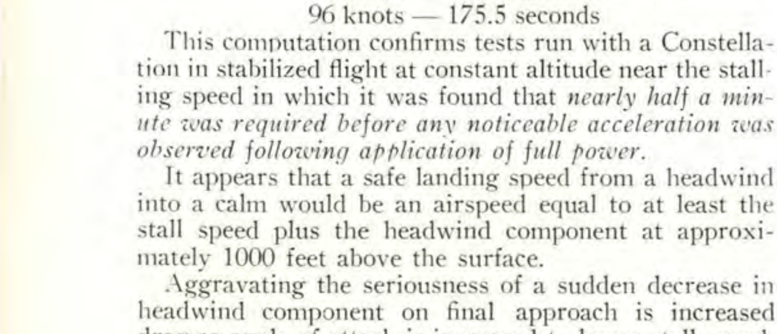
It appears that a safe landing speed from a headwind into a calm would be an airspeed equal to at least the stall speed plus the headwind component at approximately 1000 feet above the surface.

Aggravating the seriousness of a sudden decrease in headwind component on final approach is increased drag as angle of attack is increased to lower stall speed, with the possibility of entering the backside of the power curve (more power required to fly slower).

Pilots of propeller aircraft have a considerable advantage due to faster acceleration and a lowered power on stall speed due to increased airflow over the wings. Jet pilots must rely on increased airspeed alone.

The sudden loss of headwind component can also be disastrous on takeoff—takeoffs into thunderstorm shear areas have provided several examples of this.

FIGURE FIVE



• WIND SHEAR IN TURNS

The effect of encountering a wind shift during a turn deserves special mention because of the possibility in certain cases of its simultaneous occurrence with other conditions which could compound the hazard. Effects can be: a rapid drop in airspeed; a sudden increase in angle of bank caused by the side component of the new wind environment acting upon the wing dihedral, down drafts. An analysis of meterological conditions associated with squall lines had led to the conclusion that the simultaneous occurrence of the three hazards could normally be experienced in the Northern Hemisphere only in a left turn.

•GUSTY WINDS

When winds are gusty the airspeed will vary in an amount equal to the difference between the lull and the peak gusts. For this reason it is wise to carry an added airspeed allowance in a gusty wind condition to help prevent experiencing a dangerously low airspeed. This is particularly important during approaches and when circling due to relatively high drag of an aircraft with gear down, particularly when in a banked attitude. Operating procedures manuals spell out allowances to be made, usually on the order of half the value of the gustiness up to a specified figure.

• MECHANICAL SHEAR

Normal aircraft flight paths can be affected by wind flow changes near the surface due to buildings, cliffs, hills, seawalls and other features that alter wind patterns. Shear can be troublesome when a crosswind is sudenly blocked out and the pilot must make rapid corrections to land in the center of the runway. Downdrafts, particularly when encountered just short of the runway threshold, require immediate counteraction on the part of the pilot. Turbulence may or may not be associated with mechanical shear. Advance planning will minimize the surprise factor and promote more rapid and positive counteraction techniques.

• VERTICAL WIND GRADIENT

Due to reductions in wind speeds at lower levels due to surface friction, wind speed gradually increases from ground level up to the gradient level where surface friction is no longer effective. Another characteristic of wind gradient is the change in wind direction at low levels. In the free atmosphere the wind blows approximately parallel with the isobars, the lower pressure being to the left; but, in addition to reducing the wind speed, surface friction also causes the wind direction below the gradient level to flow somewhat across the isobars toward the lower pressure. As a result, the wind direction usually backs counter-clockwise from about 3000 feet to 300 feet, the magnitude averaging 20 to 40 degrees but reaching as much as 70 to 90 degrees in isolated cases. A rule which may help in areas where wind flow is not materially affected by terrain features and obstructions is: When the runway wind is from the right, and is nearly a crosswind or has a tailwind component, the gradient wind usually has a stronger tailwind component. An extreme situation of this type in a tight pressure gradient could constitute an abnormal tailwind-shear condition for aircraft using this runway. Similarly, the frictional shift of wind direction below the gradient level also increases the wind shear in a headwind approach. In this case, descent below the gradient level magnifies the decrease in headwind component, which tends to also decrease the airspeed unless ground speed is accelerated to correct for this factor.

• LOW ALTITUDE WIND GRADIENTS

Wind gradient effects normally benefit an airplane during takeoff, because as the plane climbs into increasing wind velocity the indicated airspeed increases faster than the airplane actually accelerates relative to the ground. Just the opposite occurs on landing. A high level headwind that decreases as the airplane approaches the ground causes a decrease in indicated airspeed that could, under certain conditions, allow the aircraft to touch down earlier than expected. As the airplane descends to the runway some bleed off in airspeed should be expected. During the last portion of the descent, a pilot should be prepared to add considerable thrust to accelerate the airplane in case the airspeed bleed off due to wind gradient is more than expected. Figure 4 shows what could happen were a pilot to hold the same airspeed as the wind falls off 10 knots below 300 feet. A rule of thumb to partially compensate for wind gradient is to add one half the headwind to the approach reference speed, allowing the airspeed to bleed off rather than attempt to hold the approach speed plus the one-half headwind and gust correction factor (maximum of 20 knots total).

• LOW LEVEL JET

The low level jet is a phenomenon most common over the flat terrain of the Great Plains that reaches a maximum during the middle of the night. In one reported case, at 1700 the wind at 900 feet was 28 mph, at 0300 the next morning it had increased to 67 mph and at the same time the wind speed 30 feet above the ground was 15 mph. Formation of this phenomenon is tied in with nocturnal inversions with wind above the inversion speeding up and giving birth to the jet. This condition, because of its magnitude and occurrence close to the surface, poses a low level shear hazard to aircraft.

Shear can also be expected from di-urnal cooling. The air close to the ground cools and settles, some fog may form, and about sunrise the upper air starts to move with the result that a low altitude shear—as much as 20 to 30 knots in 200 to 300 feet—results. This shear condition normally dissipates quite rapidly.

• CLUES

Figure 5 provides an indication of clues to wind shear that the pilot can pick up in the pattern. Assuming a calm, or near calm surface wind, if crabbing as depicted in A or B is necessary, lateral shear can be expected on final. If crabbing is required as depicted in C, a tailwind component is present at pattern altitude and overshoot problems, as discussed in the section on TAIL WIND APPROACH, should be anticipated. If crabbing is required as depicted in D, a headwind component is present and a short touchdown potential exists if the gradient is large enough and occurs rapidly during the final approach path.

Shear can be anticipated whenever there is an inversion. (Fig. 6). Shear is also a hazard potential with frontal passage and in and near thunderstorms. Severe down drafts associated with thunderstorms warrant delaying takeoff or landing when such storms are over or adjacent to the airfield. Shear should be anticipated when taking off or landing over cliffs, water, in hilly terrain and with large buildings or trees adjacent to the runway. Normally, the severity of such low altitude wind shear bears a direct relationship to the surface wind speed. Don't overlook the help you can obtain from the weather forecaster. Check with him before takeoff and, when you suspect shear, call him before making your final approach.

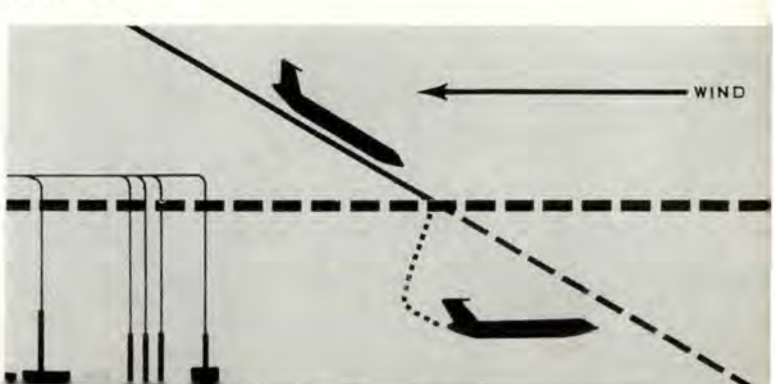
• ANSWERS

By now we trust you have figured out which of the three conditions posed in the beginning of this article is correct. Also, you may have done some projected thinking and figured out that converse situations could exist. Suppose you have calm air at pattern altitude, but a surface wind. For example, as you start to flare from your calm wind final approach you encounter a 15-knot headwind. Now you have 15 knots more speed to bleed off before reaching normal touchdown speed, and face a go-around or long landing situation. And if the surface wind you encounter is a tailwind . . . you've arrived, ready or not.

Apply wind shear hazard planning for the aircraft you fly. When you have strong surface headwinds reported aim a bit farther down the runway. Ground speed will be less and roll out distance will be shortened. If shear is probable a rather flat approach has been recommended by some in order to transition the shear area more slowly and allow more time for correction. If taking off into suspected shear accelerate as rapidly as conditions permit until safely above stall speed. ★

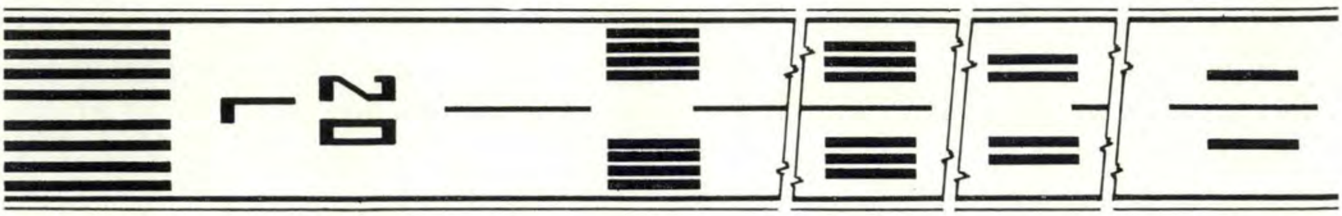
CREDITS: This article is an adaptation of a Trans World Airlines technical bulletin, with additional source material from Boeing and Air Force publications.

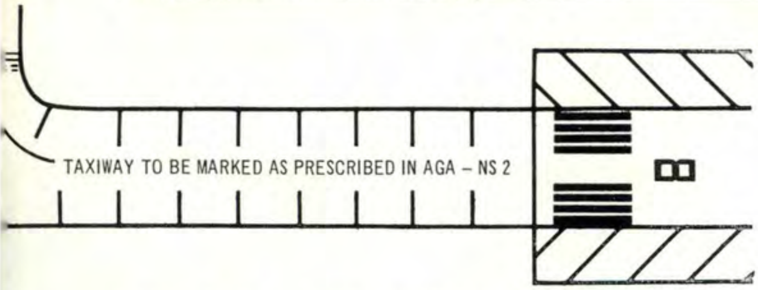
FIGURE SIX



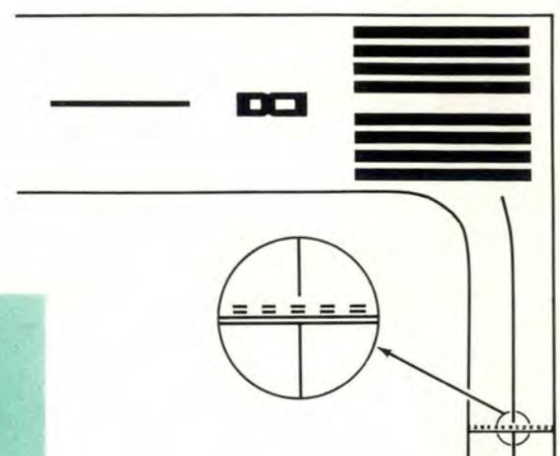
READ 'EM RIGHT...

Below, all weather runway includes basic runway markings plus threshold markings, landing zone markings (lines diminishing in number from four on each side of centerline to one) and side stripes.

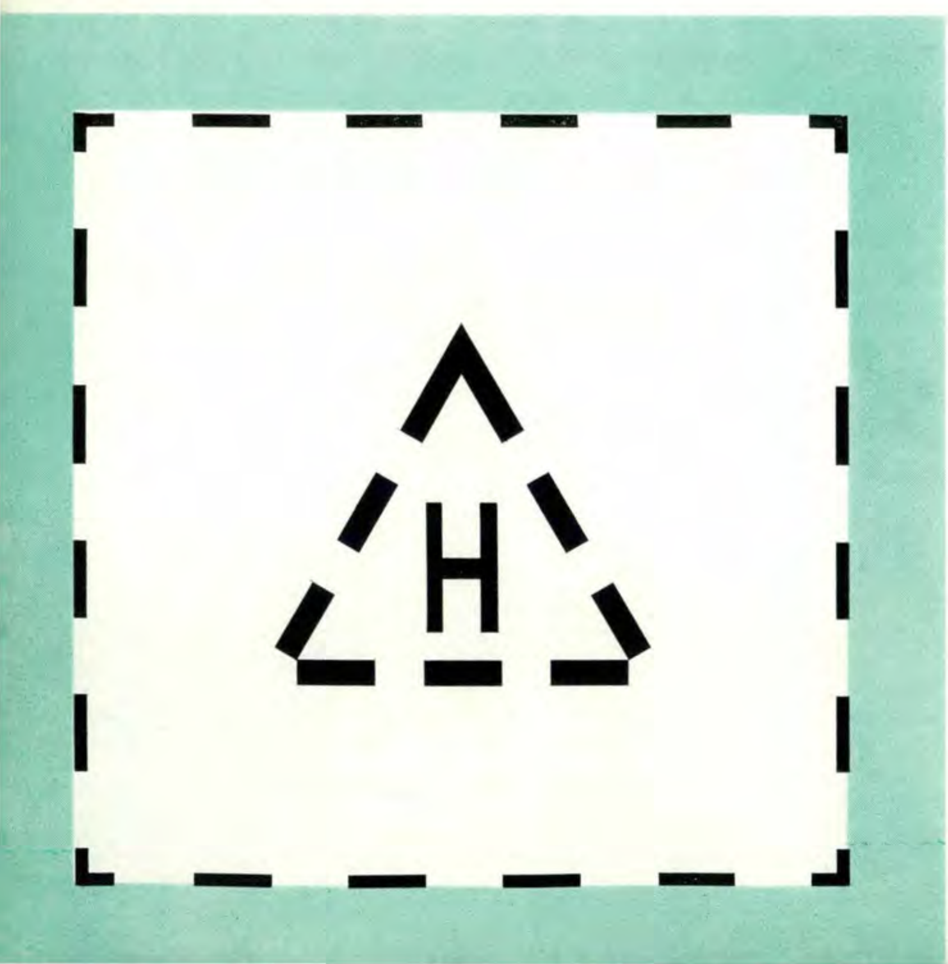




Taxiway leading onto and along displaced threshold. No landings or takeoffs permitted.



Taxiway leading on to instrument runway. Holding line is shown in detail in inset. Instrument runway markings differ from all weather runway markings by not having landing zone markers and edge stripes. Chevrons on overrun (item 7, right) indicate sterile area—no operations of any kind.



HELICOPTER LANDING AREA

The standard 32-foot triangular marker shall be placed in the approximate center of the touchdown area. The letter "H" shall be centered in the triangle as shown. The triangle shall always be oriented so that solid apex is pointed magnetic north.

Where necessary or desirable to confine the actual touchdown area of the helicopter landing area to a comparatively small area, such as those specially constructed on roof tops, or specific portions of landing areas, the touchdown area should be clearly defined by a solid or segmented border at least one-foot wide.

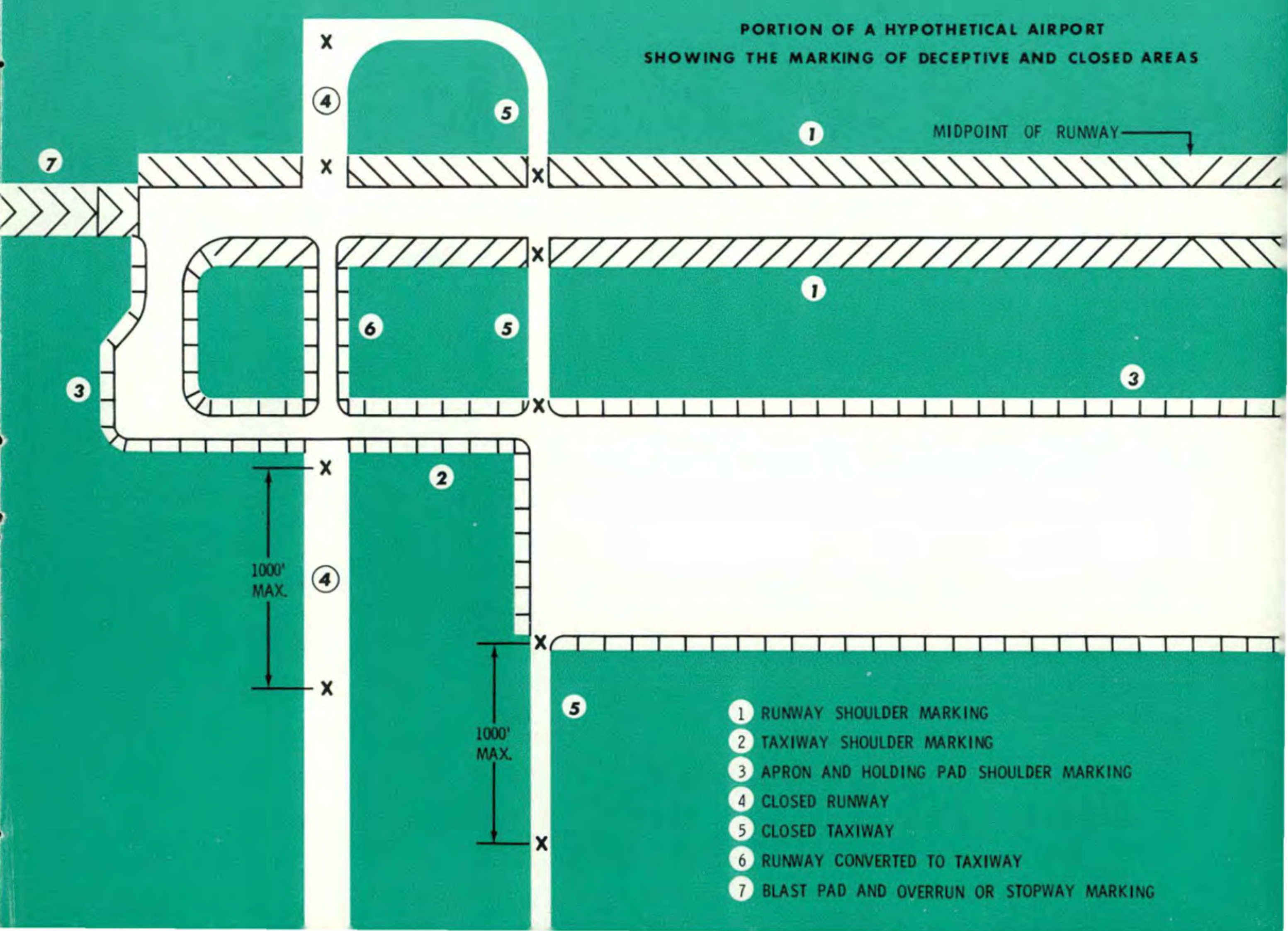
Basic runway showing numerical markings denoting magnetic direction, centerline, threshold marker (solid horizontal stripe) and displaced threshold (overrun). Arrows on overrun indicate taxiing and takeoff are permissible. Landings are prohibited in this area.

Seems some of the jocks are having trouble deciphering the lines, dashes, arrows and chevrons painted on our runways and taxiways. There really shoudn't be any confusion but there continue to be cases in which aircraft are landing on taxiways and closed or inactive runways.

The markings we now have are standardized and should be the same whether you are landing at a civil. Air Force or Navy field with the exception of those for displaced thresholds as explained in the accompanying drawings. Possibly you will find variations, but these should conform after the next painting. Standardization was brought about by the Air Coordinating Committee and the markings are published in FAA Technical Standard Orders N10b, N16b and N22a, and in AFR 91-17. The illustrations on these pages shouid clear up any misunderstandings as to these markings and help prevent such frowned upon events as landing on overrruns, operating on hazardous areas and the like.

As we said, Air Force pilots should know these markings. But just in case . . .

PORTION OF A HYPOTHETICAL AIRPORT
SHOWING THE MARKING OF DECEPTIVE AND CLOSED AREAS



Too often the aircraft accident prevention program is isolated from the training program or, at most, lip service is given the relationship that exists between the two. For example, one office of the operations complex contains the Safety Division, while across the hall, on another floor or even in another building may be an office for the Training Divison. Because of this physical separation of functions, a common tendency is to talk about the two—*Safety* and *Training*—out of different sides of the mouth. However, there can be no separation between the two.

A sound and practical training program is a mandatory prerequisite for any effective aircraft accident prevention program, and basic to an effective training program is the instructor. We believe within our command that the cornerstone upon which we can build our standardization—our safety program—is the instructor. The more attention we give this individual the more spectacular results we can expect to achieve.

Because of necessity, we cannot afford the luxury of waiting for the rare individual who is a natural born instructor. When he comes along, we're certainly pleased, but for the most part we must ascribe to the belief that good instructors are made, not born. Therefore, our attention is directed to two vital aspects of the instructor program: *selection* and *training*.

SELECTING AND TRAINING

SELECTION. We are all aware of a tendency which existed in the past and still exists to some degree today, to select instructors on the basis of total flying hours or some other criterion. This standard automatically gave ol' Joe added prestige by making him an instructor pilot, even though little effort was expended to analyze that "time" to see what ol' Joe really had done or was capable of doing. Now, we would normally expect some of the desired instructor qualities to progress together with this time criterion but time alone cannot be considered as a substitute for any specific quality.

Today the qualities desired in an instructor are well known and are emphasized in most publications concerning instructor education and training. One classification of these qualities, as put forth by President MacDonald of the Los Angeles City College, is as follows:

- Job knowledge.
- Knowledge of pedagogical techniques.
- Knowledge of people (human relations).
- Interest (desire to instruct).

Let's see how our command applies and uses these qualities in the selection of instructors in its aircrew instructor program.

JOB KNOWLEDGE. This factor requires the individual to be thoroughly familiar with the respective aircraft's system and equipment, normal and emergency operating procedures, the prohibited maneuvers, and aircraft performance under all allowable conditions of flight.

As indicated earlier, total hours flying time is an indicator of possible technical knowledge, but not a reliable one. Therefore we use additional measures. Individuals selected as IPs must be fully qualified and current in the specific model aircraft according to our transport operations manual. These requirements, I might add, are much more stringent than those required by the Air Force as a whole. In addition, the individual must maintain this currency in order to remain on Instructor Pilot status. This requirement insures that the prospective IP is up-to-date on the procedures used by the command.

It is not enough to demonstrate performance. We require the individual to demonstrate knowledge through written examination. Immediately prior to appointment as instructor, he is required to take and pass a written examination on these three phases:

- Aircraft systems and emergency procedures.
- Duties and responsibilities of his position.
- Simulated aircraft emergency training (MR 51-5).

These examinations stress more than factual type data. They try to get at understanding "Why," WHY must we establish certain limits, or WHY this procedure is done this way. We believe this "Why" is most important because understanding is what our new pilots must have in order to apply or adapt to the constant changing environment we find ourselves in.

The second factor, knowledge of pedagogical techniques, refers to "What does he know about the art of teaching others?" An instructor pilot is basically a teacher, therefore, he must qualify under recognized teacher standards. He must plan his training period for most effective use of time and be able to evaluate student performance, motivate, and so on. In addition to demonstrating this ability we also require a written examination covering understanding of these principles just as we required for job knowledge.

The third requirement—that of knowledge of people, or human relations if you prefer—involves more than knowing the student's name. It concerns knowing the needs of each student, being able to recognize mental states and the effect of these states, providing students with status by showing sincere desire to help, and if we want to include other personal qualities such as tact, patience and understanding, this is the place of application. Each commander is required to consider this factor in the selection of his instructors.

The last requirement—interest or desire to instruct is probably the most important one. Does the individual have the desire to instruct others? With this characteristic, we believe he will develop many of the other characteristics which might be lacking initially.

THE I. P.

Let's review briefly the selection procedure which we follow in appointing our instructors.

First, the individual must be fully qualified and current in his specific specialty. By meeting this requirement he will have a reasonable background of flying experience to have developed a desired standard of knowledge, judgment, and proficiency.

Second, he will satisfactorily complete written examinations on educational principles, job understanding, and so on.

Third, he will be recommended or approved by his commander on his ability to get along with others and he will indicate his desire to instruct.

To select instructors for the MATS Training Wing, a board representing MATS Headquarters personnel, standarization, training, and TTU personnel and standardization, meets annually at Command Headquarters, and selects pilots from the entire command to provide advanced instruction to MATS personnel. Local wings and units, although restricted in source, will use essentially this same procedure.

Once the selection process has been completed, we now begin our training phase. The following procedure is used in our training wing and while it may not be followed exactly in each unit, because of local facilities, it is the desired direction in which we are progressing.

The seven steps in our training phase are:

First, completion of the Instructor Pilot's seminar if not previously attended. This course, recently expanded, is our attempt to insure the second quality of an instructor—pedagogical knowledge, and to touch briefly on the basic aspects of the third quality—human relations. This IP seminar involves no flying other than the observation of a fully qualified instructor as he instructs a student, but brings out through discussion the areas of instruction to emphasize and those to avoid. We try to promote understanding and although we have no *school solutions,* we often have comments from those attending, such as, "I see now why I had so much *trouble* with *that* student." Or, "I'll know what to try the next time."

Second, completion of a formal ground school course on the specific aircraft if not completed within the previous six months period. The value of refresher training is obvious.

Third, completion of the flying phase of the regular pilot course. In this way the prospective IP becomes aware of the student side of the training program. This will provide an important feature of instructor behavior needed for successful instruction—that is empathy. At the conclusion of this phase he will be required to complete our MATS Form 4, Standardization Flight, to indicate current proficiency in all areas of flying his aircraft.

Fourth, he will receive right-seat training—training in demonstrating and in flying the aircraft from the position he will be in most of the time. This training also covers handling all emergencies from the right-seat position.

Fifth, upon satisfactory completion of the fourth step, the instructor-to-be will complete:

• At least two observational periods, watching a qualified instructor.

• At least two aircraft flight periods of actual student instruction.

• Two simulator periods of actual student instruction under the supervision of a flight examiner. Then he will satisfactorily complete our MATS Form 4 8M, instructor aircraft commander's standardization flight (in both the aircraft and the simulator) given by the Squadron Chief of Standardization.

Sixth, during all of this training he will be briefed on job course and training standards, near-miss and noise abatement policies and procedures, applicable regulations, SOPs and policies, student flight records, standarization forms, course curriculum, student critique forms and scheduling.

Seventh and last step. Finally, when all of this has been completed a squadron and wing aircrew certification and review board will make a decision as to whether the individual is ready for instructor duty or whether he needs additional training with the wing board making the final decision.

Upon completion of this program, our instructor pilot has been in training approximately 90 days. This training has covered all aspects of his duties as an IP and he has received the utmost in care and attention. Being a safe pilot demands 100 per cent awareness and can only be obtained if we start at the beginning—*with the instructor.* ★

Colonel Lloyd R. Humphreys, Commander 1707th ATW (MATS), Tinker AFB, Oklahoma

° ° °

HEADS UP—It has been a long time since the Air Force has lost a life from a person tangling with a spinning propeller. But we had one a while back that was too close for comfort. An Army officer nearly ended his career when he walked into a rotating prop and was struck in the head by the tip. A quick-thinking crew chief is credited with saving his life. It happened this way.

The engines of a T-29 were operating while the crew awaited the arrival of additional passengers. The weather was stinking —temperature 15°, blowing snow. The passengers approached from the left and went around behind the aircraft and forward toward the entrance door located on the right side between the wing and the cockpit. The crew chief had been stationed between the rotating prop and the loading stairs as a precautionary measure to guide passengers aboard. As the Army officer neared the turning prop from the rear it was evident that he would walk in to it. Another passenger yelled a warning which the Army officer apparently didn't hear. The prop tip struck his forehead but before further injury was incurred, the crew chief risked his own life by leaping forward and shoving the injured man away from the propeller.

The flight handbook requires that the passenger entrance door be closed prior to starting the right engine. Could this incident have been averted by a caution note in the handbook stating, "*Do not load passengers while the right engine is operating*?" Was it safe to station the crew chief near the loading door under these conditions? A dead engine is still the safest policy when loading passengers on this aircraft, regardless of a need to hurry. ★

Posed photo shows proximity of victim and crew chief to spinning propeller. Jagged tear in hat testifies to near tragedy.

MOVING MINIMA

Before you next approach the high station, preparatory to making an approach under minimum or near minimum weather conditions, it might be advantageous to know some of the reasons why weather will not be exactly as last reported. Knowledge of this kind won't help you hew to the centerline and glideslope any better, but it should provide strong inducement to never go below minimums, and to have missed approach procedures well in mind.

Did you know that:

Clouds, particularly low clouds, seldom have a smooth base. Tendrils, fragments and wisps usually hang down or move in patches under the main layer, particularly when winds are light.

Poor visibility is frequently found under low clouds —fog, smoke, drizzle, rain, snow and reduction in amount of sunlight due to the cloud curtain.

Height of the cloud bases is usually determined by a ceilometer of ceiling light. In either case, height is based upon the intensity of a reflected light beam directed vertically into the base of the cloud. The vertical penetration of the light beam will be variable, depending upon the density of the cloud. Further, determination of the reported base is also dependent on observer technique.

Time is an important factor. Rarely are weather conditions static. No matter how rapidly the ceilometer measures clouds in the approach zone, the values used in planning the letdown were derived from clouds that will have moved on before breakout on final.

Heights of cloud bases, up to 5000 feet, are rounded off to the nearest hundred. This simply means that cloud height measurements could be 45 feet off, from this procedure alone. For example, a ceiling measured as 155 feet is reported as 200. The observation made on this basis is that when the reported ceiling and the published minimum ceiling are the same a pilot not break out at the published minimum approximately 40 per cent of the time.

Allowable altimeter error is 75 feet. Correlate this with some of the above variances and another limitation leading to possible go-around is incorporated.

Radio altimeters, if accurately calibrated, are reliable only when approaching over flat terrain. Rising terrain, particularly cliffside type approaches, can be disastrous if this instrument is interpreted literally. Another hazard is introduced when approaching over ice and snow covered surfaces as the radio altimeter cannot be expected to give a true reading above such surfaces.

Precipitation has adverse effects. Scope clutter because of precip makes target identification more difficult. If polarization is used to minimize precip clutter, probability of flight through areas of greater turbulence exists.

Obstruction must be considered in any such treatise as this. When rain, snow, fog or dust totally cover the sky the observer uses the ceilometer in the same manner as when making cloud measurements. An example of such an observation would be W2X (indefinite ceiling, sky obscured, vertical visibility 200 feet).

One other point—the observer can devote his complete attention to his observation. He doesn't have to peer through a smeared windshield, listen to instructions on a radio, crosscheck instruments, manipulate controls, or work from a 100-knot plus platform as does the man who must look at these same weather conditions from a slant range viewpoint.

Next time, when you are planning an approach with weather reported at or near minimums, plan for a missed approach—and don't be surprised if you make one. ★

Based on an article from "Airscoop."

ALL HANDS, "STANDBY TO STANDBY." By now I'm sure that all you '106 drivers are thoroughly briefed and rebriefed on the flameout problem in the "Six" following AC power failure. Many fixes are in the mill to correct this problem; unfortunately, these improvements take time and we are forced to live with the situation for a while. In the interim, suppose you are faced with making a flameout landing in the F-106.

A study of actual flameout approaches and landings (excluding flight test patterns) made in the bird revealed an interesting but unfortunate trend. All F-106 (vertical instrument) flameout landings reported (made out of the flameout pattern) were short and generally hard. The culprit immediately suspected was the Handbook practice SFO pattern (power settings, etc.). As a result of the short landings and the flameout problem, Convair and the Air Force were asked to rerun the F-106 flameout pattern to include actual flameout landings on a pre-determined spot with a pace F-106 (instrumented) flying the wing, speed brakes out, to obtain Handbook data. This was done, and here's the story:

The Handbook procedures of 81 per cent N_2 with speed brakes out for SFOs give a more severe condition than an actual flameout! In fact, 85 per cent N_2 rpm more closely approximates actual flameout conditions. If the pilot uses the same technique as practiced in simulated flameouts, then he should land long—*not short*. So, let's go back and ask, "Why the short landing by operational pilots?"

First, it is suspected that practice SFOs were and are being flown by many pilots *using* the vertical tapes. This is extremely unrealistic training and has probably lulled many pilots into a "no apparent perspiration" approach. Airspeed control in the flameout pattern is critical.

Second, the use of standby airspeed and altitude indications is *mandatory* for all SFO approaches! Difficulty in reading these instruments was reported by all project pilots during the flameout tests. This is sustained by a wide scatter of airspeed points on all pilots. With the "pros" flying the peanut gages under ideal conditions and having problems, picture flying a flameout approach under less than ideal conditions on standby clocks when really, way down deep, you have not conscientiously practiced "no tape" SFOs.

Some organizations, on their own, carry masking tape along in order to practice "no tape" flying. This is good. When the chips are down, be it flameouts, weather GCAs, and so on, these lads will be in better shape to handle the situation.

Many things are being worked out to give you help. Some of these items are: relocation of the standby gages recalibration of the standby airspeed indicator to read out 80-400 kts rather than 80-800, addition of a standby attitude gyro, and CSD/electrical system improvements too numerous to itemize here. As I said before, these things take time. Meanwhile, take a look at your standby instrument training program; don't neglect the little gages. You'll probably need them on that bad dark day when nothing is going right.

Captain Martin O. Detlie, Defense Br., Fighter Div.

THE GOLD RING. Some of you tigers may not remember the wonderful excitement at the local county fairs trying to grab the gold ring. Well, it went something like this: a pole was placed strategically near the merry-go-round and hanging thereon were a number of gold rings. As the merry-go-round rotated, the riders of the up and down horses would reach out and try to grab one. This required considerable skill and dexterity to say nothing of long arms. The few that came home with these rings were needless to say, somewhat of local heroes. By this time, those of you who are still with me, are more than likely thinking that your dear old dad has flipped—and justly so. But hear me out, laddies, I am trying to make a message. This one involves two young stalwarts and a two seater '4. With all preflight procedures accomplished and ready to go, the start switches are activated, but no spark—starter ignition failed to fire. The pilots deplane, leaving their parachutes in the aircraft. Maintenance is performed and again they strap in; this time she fires up okay and they taxi out for takeoff.

On take off the pilot experiences severe nosewheel shimmy, but gets her airborne. The vibration has caused many circuit breakers to pop and the radio is lost. The pilots elect to return and land at home base. They make a fly-by, rocking the wings and enter a closed pattern with gear and flaps extended. On final as throttle is retarted slightly, the "motor" stalls and flames out. Both pilots eject, but one pilot still had the gold ring. You guessed it. When he hooked up his personal gear for the second time, he forgot to attach the gold ring on the parachute lanyard to the swivel link on the seat belt. As you all well know, this lanyard is attached to the parachute timer knob, also the zero lanyard is attached to the same knob. Therefore, the gold ring manually actuates (pulls) both the timer knob and D-ring (when zero lanyard is attached). Times and fads have changed. Believe me, nobody today wants to come home with the gold ring in the event ejection is necessary. The problem here is the interrupted sequence of events. This as we all know causes one to become impatient, irritated, and somewhat frustrated, and results in the desire to make up time lost. The pilot in this case may have neglected the gold ring, having hooked it up once. Forget the lost time, the good times lie ahead. Make like the old pro, "hook it up—live it up." Cheers!

BREAK TRAFFIC AND RE-ENTER . . . Sound familiar, Clyde? Well dig this one—the mission, local test hop for minor maintenance. Our intrepid birdman, being the conscientious type, tippytoes to the weather shop to make sure of his intended "local VFR." The briefing goes like this: 4000 scattered, 10,000 scattered, wind 250/7K, 12 miles visibility, no change for the next two hours—makes you feel good inside, doesn't it? Takeoff at 0814, everything in the green, and the old "79" making like the proverbial Cheshire Cat.

Our hero now concentrates on the gages and makes with the numbers on the knee pad. Meanwhile, back at the air patch (0900) the teller of tall tales, the man with the "blue skies up above" routine, goes to the window to get a poor pilot a forecast. Suffering succotash! What a sight befalls his steely blues. What manner of cloud is this approaching, so low, so thick, so you can't see through it, Jack? FOG—make with the "Ameche"—call 'em back, like rat now! Our pilot replies smartly, "Roger, I hear you dad," and commences the normal mach deuce letdown. With the field in sight he pulls the throttle from behind the instrument panel and calls "Three out on initial." Now laddies, hear this—guess what he heard in response? "Break traffic and re-enter, I have a big bird in the pattern with VIPs aboard."

At this point the fickle finger begins to write; in just four short minutes the air patch goes to zero zero. Our pilot tries the all weather Air Force bit and requests a GCA monitored ILS approach. From VFR at two grand he penetrates on final, but at GCA minimums he can't make visual contact with the runway, and is informed to make like a missed approach. By this time (0917) the pilot feels everything is going down but him—especially the JP-4! With no joy at home base—what else, divert to Base "X" fifty miles away. You guessed it—the old sand in the hour glass runs out along with the go juice; he splashed 10 miles short. The pilot, bless his heart, ejected ok, but the sight of that once so pretty "4" brings tears to the eyes of your dear old dad. I am not going to make with the post mortems on this one, but gather 'round the "old pro" and turn the hearing aids way up. Here is the message: If things ain't just right, like weather loud and clear and if you ain't holding an extra flask with juice for that thirsty motor, then let 'em know, and with all due respect, say: "Sorry, Tower, minimum fuel, extend the big bird and squeeze me in." When everyone understands the problem, the answer is usually simple. VIPs are human—that's how they got to be VIPs. Remember, the little "Slivers" are hard to come by if you don't "sprecken ze deutch," so try and save one for "old isch." I might untangle from this desk some day. Cheers—Martini Time. ★

Maj. Daniel D. Hagarty, Tactical Branch, Fighter Division.

HELP! We mean it. We want your help. Frequently during visits to Air Force bases, we come across local practices or gadgets and ideas that help prevent accidents and injuries. Often these are the product of a brainstorm on that base and the unit is the only one in the Air Force using the idea.

We think that sharing these ideas would benefit the entire Air Force. Through this sharing you might pick up items that you could use to good advantage. One of these—we caught it in a base newspaper—is an intercom which the crew chief plugs into a receptacle in the wheelwell of an F-100. Then the pilot and crew chief can communicate during final preflight much more effectively than with the old hand signals.

Here's where you come in. You can send these items to us for a new feature we're considering for this magazine. This feature will depend on the items you send us and we'll give you credit. Please be brief and send along any illustrations you think will help. This is not to supplant the suggestion program so don't send us untried ideas. Just those that are actually in use and have proved to be effective. You will be doing yourself and the entire Air Force a service. Let us hear from you soon.—Ed. ★

CROSS-COUNTRY NOTES FROM REX RILEY

On Rex's last swing through the country during which he landed primarily at fighter bases, the question almost invariably arose: whether to eject or try to dead stick a century series fighter. Always during the discussions came the question: what's the official stand of the safety people at Norton? This caused Rex to go back and pull out a TWX that was sent to a major command in November 1961. It's time for all good single engine fighter troops to read it and remember it—won't hurt the supervisors and accident board members to remember it either.

"Because of the critical nature of the maneuver, it is policy of Directorate, Flight Safety, that pilot factor not be charged as primary cause when aircraft accident involving century series aircraft occurs during attempted flameout landing. In the main, it is considered advisable to eject from century series aircraft when flameout occurs. However, variables of pilot proficiency, airfield suitability, aircraft configuration and flight condition will alter this as set procedure. Therefore, ultimately the decision to eject or land aircraft must remain with the pilot. The problem of precautionary landings out of flameout patterns is another matter. There are no valid data kept on number landings of this nature which are attempted. It is safe to assume, however, that they exceed by at least ten to one those attempted with engine or engines actually flamed out. In many instances these landings are occasioned by relatively minor problems such as malfunctioning instruments. Therefore, capability to safely accomplish a landing out of a flameout pattern is necessity if precautionary landings are to be made when such minor problems occur or when flameout seems imminent. In many current century series aircraft sink rates and aircraft controllability are such that even with an operating engine serious difficulties can be encountered which may result in an accident if the pilot involved does not possess a high level of proficiency. To achieve such proficiency it is necessary that simulated flameout patterns be practiced. Most critical part of flameout pattern is that portion below 1000 feet at which aircraft is rotated and rate of sink is decreased for landing. This point is and must remain a matter of pilot judgment, and can only be recognized by constant practice and training. For this reason SFO patterns must be a required part of every training program with particular emphasis on that part of pattern below 1000 feet. Further, because of high degree of proficiency required, the less experienced the pilot, the greater his requirement for such training."

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• HONG KONG BOUND? This won't mean a bloody thing to you unless you plan to drive an airplane into Hong Kong. If you contemplate such a fine trip, you might like to know that tiedown facilities will take only two military aircraft. If you are the third and a typhoon hits, it's more than likely you'll have to walk home.

P.S. Rex got this bit of intelligence right *after* typhoon Alice went blowing through.

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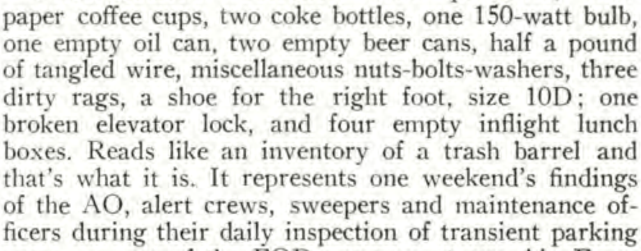

• TRANSIENT TRASH. One penknife, four paper coffee cups, two coke bottles, one 150-watt bulb, one empty oil can, two empty beer cans, half a pound of tangled wire, miscellaneous nuts-bolts-washers, three dirty rags, a shoe for the right foot, size 10D; one broken elevator lock, and four empty inflight lunch boxes. Reads like an inventory of a trash barrel and that's what it is. It represents one weekend's findings of the AO, alert crews, sweepers and maintenance officers during their daily inspection of transient parking areas, as part of the FOD program at one Air Force base. Last year this type of debris cost the USAF more than fifty million dollars in damages to jet engines, tires and aircraft surfaces. It's a problem of nearly every base and is compounded as a result of carelessness on the part of pilots, crewmembers and passengers.

It has been said before, but because it is such a common problem, Rex urges every member of the Air Force—civilian and military alike, transient and regularly assigned personnel—to add or include "policing" and "pick up" to their preflight. If ever a program needed the wholehearted participation of every one, it's the battle against foreign object damage.

Rex fully agrees with the Chairman of the FOD Committee, LtCol Dino Del Vecchio of Wright Patterson AFB, who took time to write about this problem. Hope on your next stop you make sure that "T.T." doesn't stand for "Transient Trash" which *you* may have left behind, but instead it means "Took Time to police and pick up."

• GOING, GOING, GONE. A B-47 copilot inadvertently raised his arm rests while attempting to free his jammed rotating ejection seat from a piece of cardboard that became lodged in the seat rollers. After much maneuvering he cleared the debris and completed rotation of his seat to normal position at which time the canopy departed the aircraft. An emergency descent from flight altitude was initiated but the aircraft was allowed to accelerate to well beyond the placard speed which resulted in loss of forward left wheelwell door. Upon departing, the aircraft door caused the forward gear to be cocked in approximately 65-degree position. When level off was accomplished from his desperation dive approximately two and one-half G's were pulled. The aircraft was then successfully landed with gear cocked without blowing either tire. All of this happened as the result of a piece of cardboard.

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• IT'S ENOUGH TO MAKE YOUR BLOOD BOIL. Recently we've lost two airplanes (one damaged, one destroyed) and a pilot, because some supervisory and/or support people sat on their big hind ends while the weather deteriorated to below minimums. In both accidents the pilots weren't given the weather info until it was too late for them to do anything but have a try at landing in below-minimum weather. By the time you read this the accident boards will have sorted out all the excuses, alibis and buck-passing but that won't bring back the pilot or return two airplanes to the inventory. And what's more, the same bloody thing could happen today or tomorrow because there are still some people sitting around worrying about everything else but doing their job. End of sermon, but still mad.

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• SAY IT AGAIN. So far this year we've had one T-33 major accident and three incidents when the engines flamed out during emergency fuel checks on test hops. So here's the word: you test pilots should make the emergency fuel checks under VFR conditions and within gliding distance of a high key. And all of you hear this: if for some reason, intentionally or inadvertently, you activate the emergency fuel system, leave it in the emergency position. Don't switch back to normal position. Get on home or to the closest suitable field as quickly as you can and land—still on the emergency system.

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• GOOD GUY. Rex heard a good one on UHF the last time out. We were stooging along nicely when a troop ahead called in over Gila Bend. He gave his position time and a flight level of 350. That struck Rex the wrong way cause we were going west, VFR on top, the same as this other joker and we were holding FL 360. About that time the Center came back with something like, "AF Jet 1234, please restate your altitude." There was a long pause and then AF Jet 1234 came back with, "Roge, Center, I'm at FL 350, climbing to 360." You could hear Center chuckle as he signed off, "Roger, 1234, good day."

Better Watch This.

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• HAZARDS. In the February issue there was a brief involving a century series fighter that struck a snow bank on touchdown, collapsed a gear, slid across a field, through a fence and stopped under a tree. From the report was reprinted the recommendation: "Snow removal be performed in accordance with AFR 90-6. More emphasis be placed on airfield conditions and all hazards be promptly NOTAM'd."

Now we have been reminded that such hazards as two and one-half foot snow banks no longer fall in the NOTAM category. "The letter from Central NOTAM Facility dated 15 November 1961, Subj: Revised NOTAM procedures, states in Atch 4, non-NOTAM material, par m, 'Local conditions which will influence safety, but will not affect, limit, or prohibit the arrival or departure of aircraft. This type of information should be relayed by the control tower.' "

Pilots, watch out! You still have to read the NOTAMS—there is a box on the Form 175 that has to be checked, but you may have to find out about hazards in some other way. **Good luck!**

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• IT'S A DANDY. Rex is always looking around for little gimmicks to make life a little easier on the ground and in the air. It's a locally devised "gizmo" to prevent JP-4 from running down your fingers, wrist, elbow, armpit, etc., when draining the fuel tanks on a preflight. Sure, we know some of the more fearless types don't bother with that nonsense or even use the anti-ice system on T-Birds but a lot of folks do. For the ones who would like to devise one of these dandies, here are the vital statistics: 5/8 in. stainless steel or aluminum tubing, 4 in. long, flared on one end (see picture) with 1/8 in. notches on the other. Simple? You bet; doesn't take but five minutes to make one either. ★

What Does It Say??

The following recommendation made in a recent accident report, is quoted verbatim: "That the Editor of Aerospace Safety, Norton AFB, Calif., reprint the articles 'Read It And Know,' Flying Safety, March 1954, and 'Don't Chance a Glance', Flying Safety, December 1954, in the Aerospace Safety Magazine at the earliest possible date."

Why? Both articles deal with reading altimeters—again a suspected culprit in an Air Force accident. Here's the finding, verbatim again, from the accident report:

PRIMARY CAUSE: The safety pilot allowed the aircraft to descend below the published minimum approach altitude.

Before we get into a recap of the requested articles, it would appear pertinent to bring out another aspect in relation to this particular accident—an aspect that may help explain how pilots are able to fly aircraft into the ground in VFR conditions. The last transmission received and acknowledged by the pilot was information from the tower giving the frequency of the Mobile Control Unit. The pilot acting as safety observer had begun to write this frequency on the letdown plate on his clipboard. The aircraft crashed as he started to write the third digit. His pencil and the letdown book were found on the floor of the front cockpit.

At certain settings the three-pointer altimeter is particularly susceptible to being read 1000 feet too high. This is most likely to occur when the sensitive pointer is approaching zero on the scale, as shown in the illustration. On the setting shown, 11 out of 97 pilots erroneously read the setting as 14,960 feet. Why are these 1000-foot errors made? In the first place the sensitive 100-foot pointer makes one revolution for every 1000-foot change in altitude. Therefore, if only the 1000-foot pointer is read carefully, the reading is likely to be off some multiple of 1000 feet.

The second source of error is also illustrated in the illustration. The 1000-foot pointer is pointing to the 4 on the scale, but to read the setting correctly, it must be read as 3 or 3000 feet. The error comes from reading the 1000-pointer to the nearest number, when it should be read to the next lower number.

From still other studies of the pilot's eye movements during instrument flying, it is known that pilots spend an average of about four-tenths of a second each time they check their altimeter. However, in another test with the type instrument in the illustration, average interpretation time was 7.1 seconds per reading.

The article, "Don't Chance a Glance," reiterates the points above and adds that at certain altitudes the 10,000-foot indicator is completely covered by the 1000-foot needle. Even with the needle not covered it is small and hard to see, especially at night. In summation, this article comes up with a reminder that is still pertinent in many aircraft we fly to day: until a new altimeter is developed, we have to live with the hard-to-see altimeter with the hide-and-seek 10,000-foot needle. ★

PISTON  PATTER

Investigation of a recent major accident reveals that some pilots are still not fully aware of the seriousness of overheated brakes. Also, it is doubtful if all pilots appreciate the fact that overheated brakes reach their peak temperatures five to fifteen minutes after a maximum braking operation.

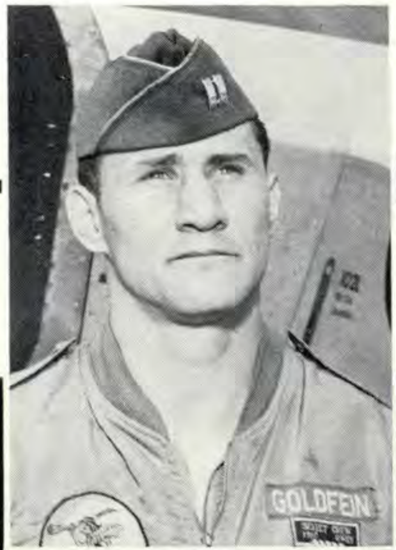
To clearly illustrate that overheated brakes will stop your forward progress in the air as well as on the ground, let's review the circumstances of a recent C-119 accident.

The aircraft was cleared for a routine thousand-mile flight and all was normal through preflight and engine start. The first sign of trouble occurred as the aircraft began to taxi from the parking area. On releasing the brakes and applying power, the right wheels would not revolve. The pilot added power until a 360-degree turn to the right resulted. After completion of the turn the aircraft continued to taxi to takeoff position. During the taxi out, personnel observed that the right outboard wheel was rolling approximately one-half turn and sliding a short distance on the ice and snow before turning again. The pilot was advised of this condition; however no one was observed to deplane and inspect the wheel. A normal engine runup was accomplished and the aircraft became airborne without further problems. Shortly after takeoff the loadmaster made an engine check and reported a fire in the right wheelwell. The right engine was feathered and fire emergency procedures were accomplished. The fire continued and became so intense that the right boom and horizontal stabilizer separated from the aircraft. It was at this point, approximately fifteen minutes after takeoff, that forward progress terminated due to fire from an overheated brake. Seven airmen lost their lives and one aircraft left the inventory as a result of this accident.

Safety of Flight Supplements 1C-119C-SF-1-3 and 1C-119G-SF-1-4 were issued to re-emphasize the potential hazards that exist when brakes are overheated.

It's a proven fact that heat built up after maximum braking action can destroy your aircraft by fire or explosions. Let's recognize this potential hazard and use our brakes for stopping the aircraft on the ground and not in the air. Remember, if you have brake troubles or overheated brakes, the time spent on the ground to cool and repair will be most profitable to you and your aircraft. ★

Lt Col Gordon D. McBain, Jr., Transport Branch, D/FS



WELL · DONE

Captain William M. Goldfein

18th Tac Recon Sq, 66th Tac Recon Wg, USAFE

Captain William M. Goldfein was leader of a flight of two RF-101s en route to Laon Air Base from Bitburg. Takeoff was at 1750 hours. Approximately 35 minutes out of Bitburg, his UHF radio began to channelize and became useless for the duration of the flight. Soon thereafter, the utility hydraulic system indicated a drop to 1400 psi and the pump failure light illuminated. From this point on, the control stick became increasingly difficult to move. Captain Goldfein used visual signals to advise the wingman of his difficulties and indicate his intent to land immediately. At this time and several times during the remainder of the flight, the RF-101 entered violent porpoise maneuvers and only through smooth use of the stabilator trim was Captain Goldfein able to return the aircraft to steady level flight. Flying with only stabilator trim and rudders, he arrived at Laon. To preclude any steep turns, he set up a long, straight-in approach to the active runway.

With hydraulic pressure remaining at 1400 psi, he dropped his gear normally but only the left main gear extended and locked. By using the emergency gear extension system, he was able to extend the remaining gear and received a safe indication on all three. Since he still had utility pressure, he elected to drop his flaps and after approximately two minutes of very slow operation, they indicated full down.

Captain Goldfein set up a very shallow final approach and began descent. Smoothly operating the trim button, he kept the aircraft controlled to a point one-half mile from the end of the runway—when the nose started a rapid downward movement. He applied more aft trim and smooth back pressure on the stick to break his rate of descent. This proved ineffective so he added full military power. This action resulted in the nose rising violently and the aircraft began shuddering—indicating a near pitchup condition. The aircraft rotated to a 60-degree nose-up attitude and the airspeed decreased rapidly.

Captain Goldfein actuated the afterburners, hoping to get enough altitude to recover the aircraft or to eject. At about 5500 feet—still in a nose-high attitude—he turned on the autopilot to regain control of the aircraft. The autopilot engaged and he effected very slow recovery to level flight, using nose-down trim. A slowly descending traffic pattern and approach was set up, using throttles, autopilot turn knob, and the trim wheel. Smoothly easing the aircraft toward the runway, he started a gradual flare out to break his rate of descent. The nose then started up rapidly and he rolled in nose-down trim and deployed the drag chute. The RF-101 contacted the runway near the proper touchdown point, bounced twice, then remained on the runway where he was able to maintain directional control with rudders only. The aircraft was braked to a safe stop.

Captain Goldfein's cool judgment and pilot skill, together with his thorough knowledge of the RF-101 aircraft and its systems enabled him to avert its almost inevitable loss. WELL DONE! ★

It Shouldn't

The C-47 has been around the Air Force so long that some pilots and maintenance men seem to think the old bird can take care of and fly itself. Incredible Gooney tales to the contrary, the C-47 is just an airplane, albeit a durable and honest one, and it must be maintained and flown like an airplane. It *can't* repair its own engines and pilots cannot take a nap and expect the airplane to get where they want to go on its own.

There has been evidence of this kind of thinking during the past few months with the result that 10 Goons were lost forever during 1961. During January of 1962, five more bit the dust—taking 12 men to eternity and injuring others. That makes 15 C-47s lost in 13 months, slightly more than one a month. The 10 major accidents in 1961 didn't produce an astronomical rate, in fact the rate was less than two, but remember that when one of these birds goes in, it usually takes several people with it. The lives lost column doesn't make for very light reading.

What happened? Why should so many old tried and true Goons be draping themselves over the landscape? The answer is not easy to come by, except that in almost every case there was human error involved. In other words, old as they are, the Goons are not just dropping out of the sky. Pilots are making fatal mistakes and maintenance men are contributing their share. Items:

Although the C-47 was fully instrumented and equipped with all the necessary navigational aids, the pilot elected to fly VFR contrary to the advice of the weather forecaster and the dispatcher. The clouds were hanging around the 4000-foot level in an area where mountain peaks reach up to 6000-feet. Thirty miles and 15 minutes from home plate the aircraft slammed into the side of a mountain at 3200 feet and was completely destroyed by the impact, fire and explosions. Three lives were lost.

The IP who had flown the last proficiency checks with both pilots testified that both of them were well qualified and thoroughly professional in their handling of the aircraft. No one yet has figured out the answer to this one.

★ ★ ★

Five lost their lives when a C-47 lost both engines and crashed. The aircraft was preparing to land in clear weather when the pilot reported the loss of one engine and low oil pressure on the other. The impact and resultant fire completely destroyed the aircraft..

Although the cause of the accident could not be absolutely pinned, the evidence pointed to engine failure due to low oil pressure. The investigation revealed that the engine oil inlet temperature indication in the cockpit did not reflect the actual temperature of the oil supply tank. The cockpit reading in a test was 65°C, after 20 minutes of ground operation, while the actual tank temperature was -6°C.

The lesson here is that tech order requirements for winter operation must be compiled with and special attention paid to oil dilution procedures. Even with dilution, an aircraft not equipped with oil diverter segregation valves will require preheating of the engine oil supply tank to insure that congealed oil will not loosen and block the inlet lines.

★ ★ ★

Another C-47 crashed when the crew became disoriented and attempted an approach to what they thought was home base. Actually the aircraft was about 25 miles east of the base and approaching some other lighted area the pilots took for their runway. Weather was marginal and the approach was made VFR. The finale came when the machine crashed into a mountainside killing three of the six men aboard. (AEROSPACE SAFETY, JAN. 1962.)

★ ★ ★

Then there was the one that just ran out of gas two miles from the runway and bellied into the ground. Actually there was enough fuel left for several more minutes of flying, only it was in a tank that wasn't being used. But this was only one item in a string of omissions and commissions as long as your arm. Fortunately there were no fatalities and only three minor injuries. Here are just some of the deficiencies in judgment involved in this fiasco. The pilot:

- Continued to fly into an area of marginal weather after being ad-

Happen to a Gooney Bird!

vised that his destination was below minimums.

• Continued an approach into known moderate to heavy icing conditions when the weather was below ILS minimums.

• Planned and attempted to fly the mission without a safe fuel reserve margin.

• Descended to a dangerously low altitude in order to get better visibility in violation of his en route clearance.

• Had a navigator aboard but didn't use his services.

• Ignored course, heading and drift in an attempt to fly the omnirange.

• Failed to exercise intelligent command and supervision over the copilot who operated the fuel selector, mixture and prop controls, anti-ice and navigation aids without consulting the pilot.

★ ★ ★

The Air Force lost another C-47 and a pilot when the aircraft crashed shortly after takeoff and burned. After breaking ground the aircraft settled back to the runway, got off again but settled back, finally became airborne in a nose-high mushing attitude, continued on for about one mile at approximately 200 feet, then flew into the ground in level attitude. One man was pinned in the wreckage and killed.

There are several suspected causes for this accident, no one of which yet has been definitely isolated as *the* cause.

Here's another. Shortly after becoming airborne the aircraft began a left bank which increased despite the use of full right aileron. Right rudder and reduction of power on the right engine failed to correct the left turn, although the bank decreased slightly. The aircraft crashed in a left wing down attitude approximately 45 degrees from the takeoff heading. The gear was sheared and the right prop lost on impact. There are two suspected causes: aileron control failure and left engine failure.

★ ★ ★

A taxiing accident resulted in damage to an aircraft and to private property. After landing, the aircraft was turned onto a taxiway along which it rolled for some 1500 feet. As it approached an intersection, the pilot unlocked the tailwheel and the aircraft started an immediate left turn. When the brakes failed to stop the turn, the pilot applied power to the left engine in an attempt to groundloop the aircraft so as to miss some vans parked alongside the taxiway. He didn't quite make it and the left wingtip struck and damaged two of the vans. A large section of the wing outer panel was torn off.

Although the accident was charged to pilot error, the pilot claimed that the failure of the right brake was responsible and that his action in applying left engine power prevented the aircraft from driving into the vans headon.

★ ★ ★

Another takeoff accident occurred when the pilot tried a maximum performance takeoff with a 15-knot tailwind, although the airport had 6500 feet of hard surfaced runway.

★ ★ ★

Strange as it may seem, another accident might have been a lucky thing for the crew. They attempted takeoff in a 40-50-degree cross wind of 29 knots with gusts to 42. The pilot lost control and chopped power on both engines. The aircraft ran off the runway and damaged both props. The lucky part was that if he had got airborne he would have flown into a mountainous area with severe turbulence, and mountain wave effect was forecast all along his route.

These examples should suffice. They point to the fact that pilots must know the procedures contained in the flight manual and fly accordingly. We stress the pilot factor because recent C-47 experience is that 75 per cent of the accidents were attributed to pilot factor. The other 25 per cent breaks out to 10 per cent maintenance, another 10 per cent undetermined and five per cent materiel.

As long as we fail to follow proper procedures, fly into mountains and throw common sense out the window we can expect the C-47 record to get worse. Let's put this trend into reverse. ★

MOVIES – USAF

"Movies are better than ever" was a theme Hollywood came out with a few years ago. We might revive it and add that *Air Force* movies are better than ever. The Air Force movie program is big business and much of it is aimed at helping you do your job better or helping save your life.

The old black and white training film employing amateur photographers and actors, with often as not childish scripts, is a thing of the past. The movies that are coming out now are of professional quality and are excellent tools for a number of purposes. Without detracting from the value of other type films let's concentrate on safety films and training films, which are indirectly safety films.

The ideas for such films are born in the minds of people who see problems and seek ways of eliminating the problems to provide more efficient and safer operations. Among these people is the Deputy Inspector General for Safety, who has an extensive program which supplements the Education and Training effort for safety. The film program for safety in 1962 consists of 39 titles covering training aspects of safety to film reporting on safety problems encountered throughout the Air Force. In addition to initiating requests for safety films, the DIG/S film people also monitor other Air Force films which may have safety implications. These safety implications are most generally found in weapon systems films—films about flying various aircraft or launching missiles, or the installation and handling of nuclear warheads in connection with missiles or aircraft. Major film efforts are put forth in the ground area since ground accidents continue to be the biggest killer in the Air Force. A fascinating series of movies is planned for production in 1963. The Deputy Inspector General for Safety is programming the film series on the built-in physical and psychological safety limits of man. To be called "Man and Safety," the series will deal with how men can best operate within these safety limits.

How do you go about getting a film? If it is a Safety film, approach AFIES, Deputy Inspector General for Safety, Norton AFB, California, and they will consider programming it for you. Or you can go to AFPTR, Headquarters USAF, with the request for programming, and AFIES will monitor the production for you. However, before requesting any film, you should explore AFP 95-2-1, the AF film directory prepared by APCS (Air Photographic and Charting Service) for film already in existence which may fulfill your needs. For a normal film request, go to AFR 95-14 which tells how to obtain films, and submit a request in accordance with its provisions. Assuming the idea is bought right up the line, the request, unless it's for a training film, will go from the Command to APCS, one of the links in the big MATS chain. Training film requests are forwarded to Headquarters, USAF, Attn: AFPTR.

When APCS receives the request it will assign it to one of its two major motion picture centers at Lookout Mountain AFS, California, and Orlando AFB, Florida. Then a writer-director team from the selected center will begin working with the command representative (CR) and technical adviser (TA) named in the request. (A new regulation and supplement to replace the present AFR 95-14 should be out by 1 July. These will clarify the duties and responsibilities of the CR and TA and present specific instructions for obtaining new films). It is the CR and TA who must provide the purpose of the film and the technical know-how to make it effective and accurate. They must work closely with the writer-director team to assure that the film meets the need for which it is being produced and that it is accurate in every way.

Once the film is produced—and that is an expensive process—it will be virtually useless sitting in a can on a shelf in a base film library. It must be used and used intelligently to meet the need for which it was produced. Film libraries should know the requirements of their base or unit and obtain movies, slides and other audio-visual materials appropriate to their mission and equipment. Supervisors, safety officers and others re-

SAFETY TOOL

sponsible for obtaining and using the films in their programs should use them not to entertain but to educate. You can tell a person something and you can show him. When you combine the two—showing and telling, as in a movie—you have a proven teaching process that produces results. Too often, however, movies designed for other purposes are used to entertain or to fill a gap an instructor or supervisor can't seem to fill in any other way. The film may not be a total loss, but it certainly is not being used to maximum effectiveness.

Making safety and training films is a painstaking process and the people involved have a variety of experiences. Some are enough to scare a man out of the business, others are humorous. Movies are made in all climates and a cameraman can freeze his posterior on one job and cook it on the next one. The men with the cameras go where the job demands. This might be on top of a tall tower or under water, on a boat or in an airplane, as close as he can get to a nuclear blast or in the quietness of a laboratory.

Major Robert MacKinnon, a producer-director at Lookout Mountain AFS, recalls his encounter with a shark while shooting footage in the water around Guam for a water safety movie. MacKinnon was swimming underwater with his camera, the shark cruising along near him on a parallel course. Suddenly the shark turned and set up a collision course with the photographer; MacKinnon tried to maneuver out of the way but, loaded with equipment, couldn't move fast enough. Instinct took over and he used the only weapon available—his camera. Like a matador he fended off the huge fish, which, on more sober reflection later, probably was only curious. Finally, when MacKinnon kicked one leg up, the predator dashed under it and out of sight. Later he discovered that he had had the camera running all the time and had some dramatic closeups of the business end of a shark.

The excellent quality of the movies now coming out is due to the wealth of experience and the facilities throughout APCS. As its production centers are approximately 500 people, half of them military, the rest civilians. In both categories, their total years of experience in the field amounts to an extraordinary number of centuries. For example, at Lookout there are seven film editors, who by themselves have more than 300 years in the industry. They, like many others in the photo command, were formerly employed by Hollywood's big movie studios.

The Lookout Mountain installation is a fabulous complex perched high in the Hollywood Hills. A World War II fighter control center, it was converted to a photo center in 1948. The Orlando installation also goes back to World War II when it was the center of the interceptor command school; its photographic career began late in 1952. Today they are fully equipped motion picture studios with writers, producers, directors, photographers, a number of other skilled technicians and all of the equipment and facilities necessary for movie making.

Lookout AFS is operated by the 1352d Photo Group, which is responsible for the area from the Mississippi River westward around the globe to India. Helping to cover this area are a squadron at Vandenberg AFB and detachments at Elmendorf, Alaska; Ent AFB, Colorado; Hickam AFB, Hawaii; Clark AFB, Philippines; and Yamata AS, Japan.

The other half of the world is the responsibility of the 1365th Photo Squadron at Orlando, and its detachments at Andrews AFB, Maryland, and Wiesbaden, Germany. It also gets help from its SAC documentation detachment at Offutt AFB, Nebraska; March AFB, California; Barksdale AFB, Louisiana, and Westover AFB, Massachusetts.

APCS photo teams roam the world from pole to pole and around the other way making movies for training, motivation, information, orientation and safety. Many of these are directly concerned with safety, others contain safety material as a by-product. Making the most of this excellent and effective tool can save Air Force lives and dollars. ★

"If one of my jocks ever wheels up a landing, he's had it!"

". . . And hereby do I tender my resignation!"

TWO POINTS OF VIEW

"But sir, I'm here on official business."

"Boy, I wish I was on the official business he is!"

"I feel fine, let's go home tonight and we'll sack in tomorrow."

"So, when they fell asleep at the weather briefing, I called the A.O."

*U.S. GOVERNMENT PRINTING OFFICE 611216