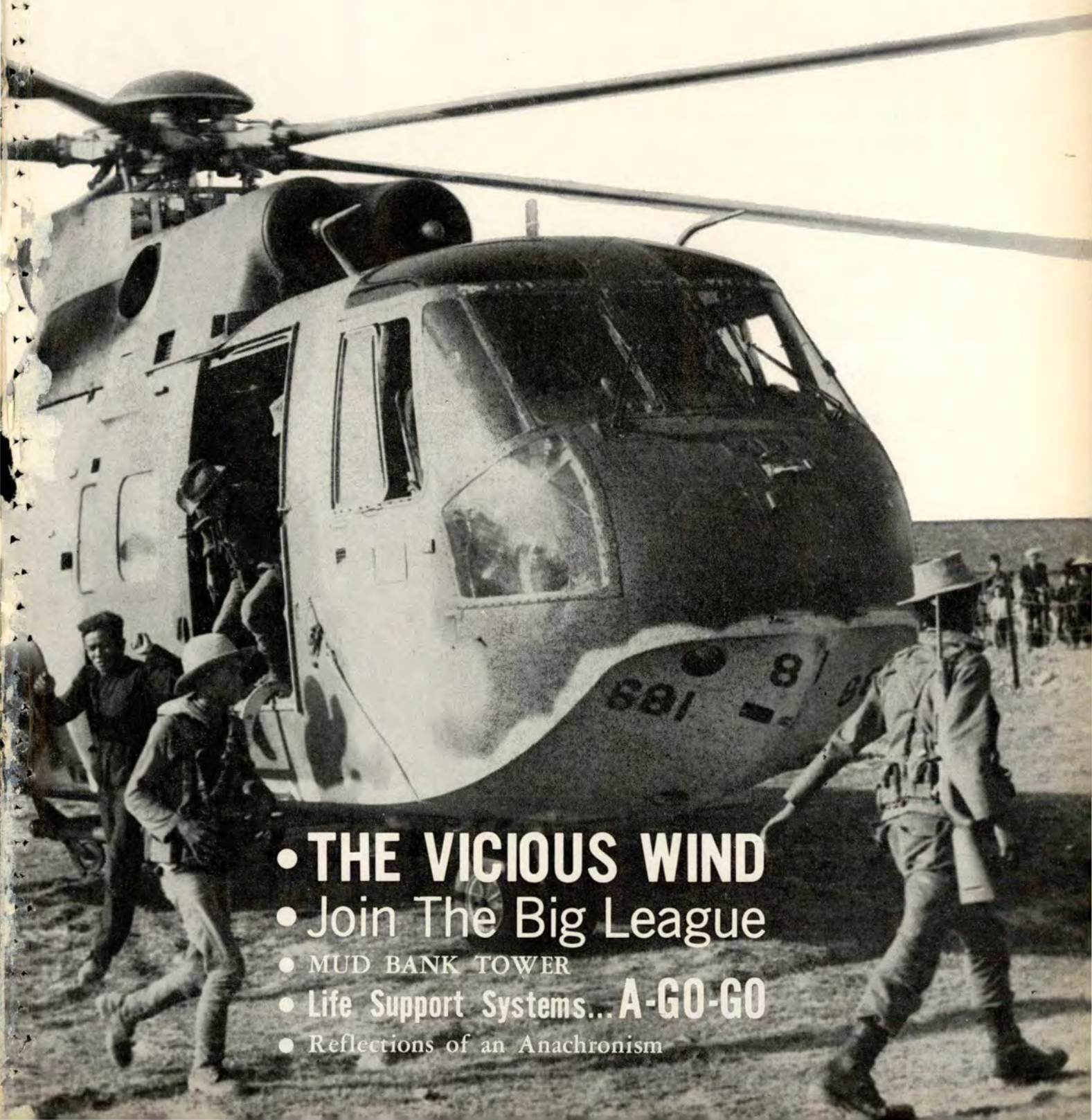
UNITED STATES AIR FORCE • APRIL 1967

Aerospace SAFETY

THE MAGAZINE DEVOTED TO YOUR INTERESTS IN FLIGHT



- THE VICIOUS WIND
- Join The Big League
- MUD BANK TOWER
- Life Support Systems... A-GO-GO
- Reflections of an Anachronism

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FEATURE ARTICLES

REGULAR FEATURES

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RENOWNED AIR FORCE ACCIDENT INVESTIGATOR DIES

Sydney D. Berman, technical adviser to the Director of Aerospace Safety, and one of the world's foremost aircraft accident investigators, died February 14 following a short illness. He was 62.

Mr Berman was twice awarded the Air Force Commendation for Meritorious Civilian Service, in 1958 and 1960, and the Air Force Exceptional Civilian Service Award in 1964. He was probably best known for his metal fatigue research into the causes of fatal accidents involving the B-47 and B-52 fleets. His findings resulted in modifications that extended the combat usefulness of both aircraft for many years.

In paying tribute to Mr Berman Brigadier General Frank K. Everest, Director of Aerospace Safety, said, "He made many outstanding contributions to the cause of safety all over the world . . . his death is a great loss to the Air Force and the entire aerospace industry."

FRONT COVER

Rapid delivery of troops is just one of the many capabilities of the Air Force's newest helicopters. The article beginning on page 14 describes some of the capabilities and needs of the future.

SELECTIVE SAFETY

If safety efforts could be depicted on a graph, the ideal line would be a straight bar across the top of the page. Unfortunately, however, if we made a graph of our safety efforts, the chart would look like a side view of the Rocky Mountains. Why?

By looking at our graph and then looking at the accident/incident reports, we can come up with a reasonable answer. As the graph line shoots straight to the top of a mountain peak, showing great safety efforts, we can find a mishap report dated about the same time our line was down in a valley. We can read the recommendations contained in the accident/incident reports and follow our graph line straight up the mountain. Everybody, from Hq USAF, major commands, directors of safety, unit safety "weinies," down to the working troops, gets real safety conscious. Many pairs of feet are going up and down to "stomp" out that particular fire. It could be a fire that will spread and become a critical blaze. But, we make it a "selective safety" item and act accordingly. *Then we sit back and wait!*

Sure as shootin' pretty soon our graph line starts downhill. It is a gently sloping line, but it is moving, and downhill. It is just a matter of time until another mishap report will be dated about the same time as the line reached the bottom of the vale. And then, "away we go" again. Another fire to be "stomped" out!

Another item of selective safety.

This graph of ours applies across-the-board. A rash of mishaps occur in a particular aircraft and the fire "stomping" starts. Up goes the line. A couple of missiles "poop" out during launch, and up and down go the feet! The motor vehicle accident rate increases and our safety effort line also starts to climb.

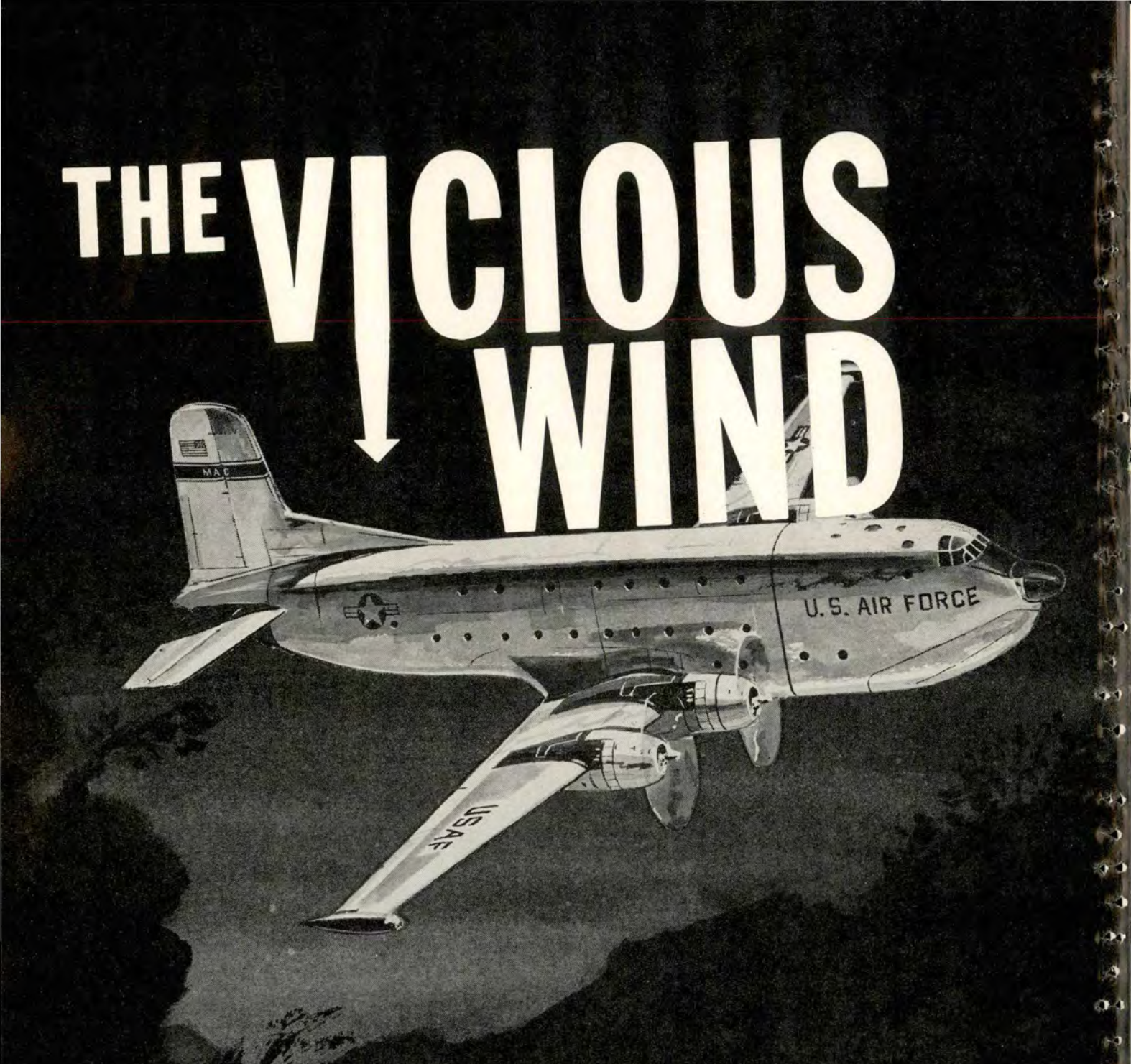
This SELECTIVE SAFETY method of accident prevention is as old as some of us so-called safety experts. It used to be known as "locking the barn after the horse was stolen." Running out and putting locks on the barn door hasn't as yet gotten the horse back. Nor has racing around, "stomping" on a fire ever prevented that fire from starting.

The only way we can put SELECTIVE SAFETY to work in the right way is to take our knowledge and our accumulated data and really get into the accident prevention business full bore. Running back of the power curve won't hack the program. But all is not grim. We have started! System safety is one big step. With system safety, we have applied SELECTIVE SAFETY at the beginning. We can make our line straighten out and go across the top of the graph by emphasizing our hazard analysis programs, by forecasting pitfalls rather than looking back at the hole, and by injecting a new safety shot in the arm of our troops to *prevent* rather than investigate.

SELECTIVE SAFETY must be applied to a system or a potential problem area *before* the mishap and not after the fire is started! Then, we will be doing our job as safety experts, for accident prevention and not accident investigation is our charter and our responsibility. ★

Lt Col Curtis N. Mozley
Directorate of Aerospace Safety

THE VICIOUS WIND



A FIRST-HAND ACCOUNT OF A GLOBE-MASTER CREW'S ENCOUNTER WITH A VICIOUS MOUNTAIN WAVE THAT ALMOST CAUSED A CATASTROPHE.

Capt Sherman R. McKinney
2663 Winding Lane, N.E.
Atlanta, Ga. 30319

Last December 13 was not a Friday but it was a day a MAC reserve crew will remember all their lives. They looked disaster in the eye, straight-armed it and survived five minutes of terrifying, adrenalin-pumping hell.

The Dobbins AFB crew was flying a scheduled MAC cargo mission in a C-124 from Athinai Airport, Greece, to Rhein Main, Germany.* They had experienced several difficulties with the aircraft on previous legs of the trip, the most notable being an auto-pilot which was unreliable at times, and an erratic pitot-static system; the airspeed had fluctuated from 150 knots to 210 knots without any pitch or power changes on the flight into Athinai. Minor corrections were performed by ground maintenance and these items were written off as corrected.

Normal pre-departure duties were performed by the crew without event. Flight planning, buffer zone, route and departure briefings were thorough; however, the weather briefing was not adequate. A weather forecaster was not on duty at Athinai, and the briefing was by telephone. Weather charts were not prepared and issued to the crew. A cold front was forecast to be located across our line of flight curving N. E. to S. W. through Brindisi, Italy. A weather warning area covering the western edge of Italy, the Mediterranean Sea and continental Europe which contained isolated thunderstorms, and high ground winds were also mentioned. After the engines were started and just prior to taxiing, Athinai Airlift Command Post advised us to switch radios to the pilot-to-forecaster channel. This was done and someone at the weather station advised us that there was a possibility of moderate turbulence and mountain wave effect within the local area up to 14,000 feet.

A normal takeoff was made at 2220Z. Manning the crew positions for this flight were Capt T. M. Shanahan, pilot; Capt S. R. McKinney, copilot; Lt Col J. A. Williams, navigator; TSgt J. Knight, panel engineer; SSgt. W. J. Green, scanner; and SSgt. S. J. Van Meter, loadmaster on duty. The aircraft was computed to be at the maximum gross weight of 185,000 pounds. ATC clearance was for the Charlie-Korinthos standard instrument departure to cross the Korinthos radio beacon (located 40 NM west of Athinai Airport) at or above a flight level of 8000 feet, and to climb and maintain a flight level of 10,000 feet. This departure route was flown, except the airborne clearance was amended to proceed direct to the Korinthos radio beacon from the Aiyin radio beacon. We crossed Korinthos at 2239Z at a flight level of 10,000 feet.

Exactly ten minutes later at 2249Z, the doors of Hell started to open. Our position was at latitude 38° 04′ North and longitude 20° 20′ East, over the northern part of the Greek Island of Peloponnosis. Cruising airspeed was 175 to 180 KIAS and the auto-pilot was engaged, including altitude hold. No turbulence or other adverse weather conditions had been encountered to this point. Sgt Knight called the decreasing airspeed to the attention of the pilots between 165 to 160 knots indicated. Capt Shanahan, who was reviewing the pilot's flight plan log at the moment, immediately took over the controls and disengaged the auto-pilot. The loose papers in his lap floated up and hung in mid-air at about eye level for a couple of seconds. Within this momentary period of time, the airspeed had decreased to approximately 135 knots. Capt Shanahan immediately lowered the nose and called for climb power which Sgt Knight had already begun to apply. The aircraft entered a cirrus or lenticular looking type cloud formation at this time and extreme turbulence began. Capt Shanahan directed Capt McKinney to assist him on the controls, which was necessary to keep the aircraft in an upright position.

METO power was asked for and applied immediately after climb power was set. With this power setting and an airspeed now of about 145 knots, with a two degree nose high attitude, the altimeter was unwinding rapidly and the vertical velocity indicator was showing a descent of approximately 2500 feet per minute. Max power was applied. During the fall, the right wing dropped some 25 degrees but was brought back to level. However, control was sluggish and it appeared that the ailerons were almost stalled. The descent finally slowed and was broken at an indicated altitude of about 8000 feet. The height of the tallest mountain peak in our general vicinity was 7796 feet.

Action in the cargo compartment was also quite spectacular. The cargo consisted of a telephone

Members of the crew were Capt T. M. Shanahan, the aircraft commander who was taking his initial A/C line check; Maj R. C. Silby, pilot flight examiner; Capt S. R. McKinney, first pilot; Lt Col O. K. Armstrong, second pilot; Capt C. D. Hawkins, navigator flight examiner; Lt Col J. A. Williams, navigator; Lt Col B. J. Antonio, navigator; Maj B. E. DeMars, navigator; TSgt J. Knight, instructor flight engineer; TSgt R. J. Logue, flight engineer; SSgt W. J. Green, flight engineer; TSgt J. E. Newberry, loadmaster flight examiner; SSgt S. J. Van Meter, load master; A1C T. H. Burks, loadmaster, and A3C R. K. O'Hara, loadmaster. All were members of the Reserve 918 Military Airlift Group, 700th MAS.

pole line truck full of miscellaneous equipment with a total combined weight of 23,230 pounds. (Space Control at Athinai has listed the weight as 22,500 pounds, so the aircraft took off 730 pounds overgrossed.) All at once, all of the tie down chains attached to the truck were straining in a quivering tension. A moment later, the chains were full of slack and actually laid down on the floor. Next, the chains on the left side were taut and straining while the right chains were still slack as the truck was trying to turn over sideways. This undoubtedly occurred when the right wing dropped during the rapid descent. When the chains laid down on the floor, the loadmasters attempted to get out of their seats in order to tighten up and attach additional chains to the truck, but were unable to do so because of the extreme positive G forces.

It will never be known by what height the airplane cleared the mountains since the altimeters were set at 29.92 Hg. and the local altimeter setting, especially in these erratic conditions, was not known. Also, no outside visual reference was possible, since in addition to being in the roll cloud most of the time, it was night and very, very dark.

Within seconds after the descent was broken, the aircraft began a very sharp rate of climb. An attitude was held which would normally be straight and level flight, and the power was reduced to METO and then to climb power. Under these conditions, the aircraft ascended back to a flight level of 10,000 feet, with the vertical velocity indicator showing a climb of 4000 feet per minute during a good part of this ascent.

Two other less spectacular mountain waves were encountered. The second occurred at 2254Z, just five minutes after the first one began. The aircraft and instruments reacted in the same manner, but only about 600 to 700 feet of altitude was lost this time. After again reaching cruise altitude of 10,000 feet following the first encounter, Capt Shanahan asked Capt McKinney to get a clearance to climb to 12,000 feet. Athens Control cleared us to do this, with instructions to "report leaving 10,000 and reaching 12,000." Capt McKinney acknowledged the clearance and reported leaving 10,000 feet at 2243Z, but alas, we encountered the second wave at this same time and left 10,000 feet on the way *down* instead of up. Several minutes passed before we were able to attain and report reaching 12,000 feet. The third wave encounter occurred at 2324Z over the smaller Greek Island of Kefallinia at a flight level of 12,000 feet. Only 300 to 400 feet of altitude was lost during this one.

In addition to the flight instruments indicating conditions which were completely backward to normal flight (whereas by adding po-

wer and lowering the nose the airspeed would still decrease and vice versa), two other phenomena were noted during these encounters. Just prior to and during each one, the radar would become blurred and would spoke in a saw-toothed pattern. After emerging from the wave effect, the radar would return to normal each time. Due to the uncertainty of the accuracy of the airspeed indicators because of the previous trouble, Sgt Knight, on the suggestion of TSgt R. J. Logue, set the propellers in the "fixed pitch" position during the latter wave encounters. He reasoned that with the propellers fixed, any change in airspeed would normally be reflected immediately by a corresponding increase or decrease in RPM. It didn't happen that way; even though the airspeed would start to decrease rapidly, the propeller RPM would remain constant.

During the first mountain wave encounter, all of the crew members sprang into action and performed exceptionally well. Sgt Knight was very alert at operating the panel and stayed well ahead of the anticipated engine power requirements with cool professionalism. Lt Col Williams determined and recorded the position of the aircraft during these hectic moments. Maj R. C. Silby came forward to the cockpit and emphasized "attitude, attitude" over the interphone, realizing that Capt Shanahan was doing all that could be done. Sgt Logue was in the crew compartment and immediately distributed life preservers and had everyone don one except the pilots, who were too busy.

Capt Shanahan did an outstanding job of controlling the aircraft and coordinating the crew during these grim encounters. In a very calm voice, without a trace of panic, he directed the engineer to set the necessary power, the help of the copilot, the position from the navigator, the personnel in the cargo compartment to strap in their seats. During all this time he was fighting the controls to maintain a proper aircraft attitude in violent turbulence and erratic conditions. Had this job been performed in any less professional manner there might have been a fatal crash in the mountains of Greece, cause unknown.

Three other factors, had they been any different, could have caused the same disastrous results. Before start-up at Athinai, Sgt Logue remarked to one of the loadmasters in regard to the truck, "that's the kind of load that can kill you because you can't get rid of it." The truck had been secured with the required number of chains, but after this statement, eight additional chains were added. This was probably what prevented the truck from tearing loose and breaking up the back of the airplane.

During climbout, the pilots anticipated that a flight level of 8000 feet could not be reached prior to the Korinthos radio beacon. Sgt Knight suggested a climb using METO power which was done, and therefore 10,000 feet was attained by the time we reached Korinthos. Had the aircraft been at any lower flight level when the mountain wave was encountered, there may not have been enough altitude left to recover.

Our position during the first encounter was four miles right of course. The location of the 7796-foot mountain was perpendicular to our line of flight at this position and six miles left of course. Had our position been farther to the left, it is likely that a stronger wave action over the taller peaks plus less clearance would have prevented a recovery.

The remainder of the trip, after the three mountain wave encounters, did not contain quite as many thrills of such harsh magnitude. A heavy load of rime ice built up on the aircraft as we flew along the western edge of Italy even though all anti-icing heaters were on. The ice finally dissipated later on when we got out of the clouds and into clear air. Some more mountain wave effects of lesser exuberance were encountered over the southern part of France near Marseilles. METO power was necessary to maintain altitude during these actions.

A sailor who was on emergency leave was carried as a passenger on this trip. He went to sleep shortly after takeoff and slept most of the way. He did partially wake up during the violent turbulence, but must not have thought it was too unusual. Upon landing at Rhein Main, one of the crew asked him how he liked the trip, to which he replied, "just fine except it was a little bit cold." He will never know how close he came to meeting his destiny that night. ★

Maj Frank J. Tomlinson, Directorate of Aerospace Safety

While the sun struggled to rise above the miasma of the surrounding swamps, a relic of past days of glory mused on the state of affairs in which he found himself. The venerable old Spad (A-1E to the jet set) had just been pumped up in preparation for the day's activities involving the training of attack pilots at Truhurt Field, and was not exactly elated over the prospect of three missions involving ACM, gunnery, acrobatics and landings at the ungentle hands of the fledgling Spad drivers.

It was not that the students didn't try to do what they were supposed to, but they were nearly all products of the jet age and totally unfamiliar with the intricacies of the compound recip engine, propellers, conventional gear and

the like which made flying an over-age prop job considerably different from the modern push button start, go handle equipped jet job.

Old 655 reflected back on the past three years since that fateful day when his basking in the sun at Litchfield was summarily terminated, and he found himself rehabbed and flown to this training base to turn out qualified pilots for the air commando troops who were using the A-1E in their activities. He had hoped that he would be transferred overseas, along with some of his other Spad padmates, but no such luck. Yet someone had to do the often mundane job of grooming the green beans and the ancient pelicans (the former fresh out of jet school and the latter plucked from the catacombs of Fort Fumble) for the showdown in SEA.

"Gee, a lot of things have happened to this ol' airframe in these past years." Not many people ever thought that there would be a crying need for the old Spad with its load carrying capability and ability to get and stay on target regardless of weather or terrain. When the chips were down and the weather in the weeds, the call went out to the old "gun fighter" to pull somebody's chestnuts out of the fire. "Too bad they don't have many of us left," sighed 655. "The old pros really love us.

"I guess that I have had nearly everything happen to me – ground looped because the student forgot about not having tricycle gears; dead stick landings because the ol' 3350 just gave out (at least the AMA people got this and the egress problem licked); near midairs because the driver forgot about the prop being out in front. At least I am still here, but many of my padmates have joined the rolls on the ramp upstairs, due to midair collisions with their buddies, the hills, and other assorted Airchines. I've had some close ones though, like the time the IP was showing the student what it was like on a low level recon job in RVN. He was cruising at a pretty low altitude along this canal and didn't see the power lines. We got back OK but I had some nasty dents and cuts in my wings. I wonder what ever happened to him?

"And then there was the time the IP was showing the student how to run up and nearly tipped me over on the prop. Or the time the crew chief forgot to fill up the old petrol tank, the student forgot to check it and things went to H--- in a hand basket real quick. Oh, well, they put me back together so I'm still around. I suppose some drivers will never learn about torque roll, carb heat, overboost, sump lights, rudders, and the many other little oddities we oldsters have. Maybe they think that I'll be replaced by one of these new squirt jobs pretty soon. Ha, that'll be the day!

"Just can't help thinking about my buddy, Ol' 007, flying all those SAR escorts and having all the fun chasing Charlie out of the elephant grass. He says that it is really a bash even though he spends a lot of time in the tin patch factory getting put back together. I can see myself, Sandy 13, escorting Jolly Green low over the triple tiered green undercast. We are coming back from a successful pick-up of a Thud driver who came out second best in a stand-off with Uncle Ho's boys up along the Red. High above there is a glint and my eagle-eyed old head, Rob Maroon, spies a MIG starting a high side pass. Resolute Rob sends our wingman and the Jolly Green toward home, pickles the Ho roasters and Willy Peter and breaks into the bogie. *Zap, Thwak, Plub!!* 'Curse you, Green Dragon, you will rue the day you punched holes in my flappers.' A wracking scissors, a quick over-the-top reverse and Rob walks the HE-- down the side of that 17. 'Ha ha, Green Dragon, you've been had by a Super Spad!!'

"Oof, who's that poking a cold dip stick into my innards? Guess I had best return to reality. At least this young tiger seems to know what he is doing. H-m-m-m, checking the brakes, oil, fuel, controls – this kid's good. Switch on, chocks away and let's gettum tiger – with care, though. Watch that truck, easy on the brakes, that's it, rudder, rudder – Whew, aloft again. Wonder what it will be like tomorrow and tomorrow and – tomorrow?" ★

THE ICING FACTOR FOR T-38/F-5 AIRCRAFT

Paul W. J. Schumacher and 2/Lt Donald A. Reilly, ASD, WP-AFB

Pilots of T-38 and F-5 aircraft must pay close attention to weather conditions that exist particularly at the bases of departure and arrival. Enroute weather, outside of the giant thunderstorm, can be avoided in nearly all cases either by going around it or by climbing over it. Icing conditions that are encountered while on the ground prior to departure are of the freezing rain type and any buildup of ice can be observed on structural parts of the aircraft — the windscreen being a good indicator. Climb characteristics of both the F-5 and T-38 are excellent and allow the aircraft to pass through icing layers rather quickly following takeoff. So what's left to cause trouble? PLENTY! Imagine this example:

AF Jet 762: Descend and maintain Flight Level 210.	Temperature is -16°C, dew point spread is 2°C. Five minutes later . . . .
AF Jet 762: Descend and maintain Flight Level 190.	Temperature is -12°C, dew point spread is 1.5°C. Nine minutes later . . . .
AF Jet 762: Descend and maintain 13000 MSL.	Temperature is -3°C, dew point spread is 1.8°C. Six minutes later . . . .
AF Jet 762: Descend and maintain 8000 MSL.	Temperature is 8°C, dew point spread is 2°C. Four minutes later . . . .

and so on.

ICING FACTOR

Holding in the traffic pattern plus the low approach and go-around maneuver all tend to aggravate the safety of flights of aircraft in icing conditions. The order of events most likely to occur on the T-38 and F-5 aircraft while holding in and descending through icing conditions, or while making a low approach or go-around following the holding maneuver, are:

- Severe fogging, frosting or icing of the windscreen critically affecting visibility.
- Icing on the engine inlet duct surface and engine inlet lip. Ingestion of pieces of this ice seriously affects engine performance and operation and consequently, flight safety of the aircraft.
- Icing on the airframe causing problems with aircraft control and response.

In six minutes of icing conditions, for example, engine icing would likely become a much more critical factor than visibility through the windshield. Fogging and frosting of the windshield apparently is not a problem on the aircraft, and the condition was never experienced during Air Force Category II All-Weather Tests. Operating the aircraft in IFR conditions under the observation of radar approach control minimizes the visibility problem. Airframe icing itself would not become a critical factor in six minutes of icing unless the rate of accretion was heavy.

Structural ice causes higher stall speeds, poor handling characteristics and poor visibility through unprotected windshields. However, engine failure can be expected to occur before structural ice becomes critical.

AN ICING MODEL

The geometric pattern and physical properties of ice formations depend upon four main variables: (1) Content of liquid water in the cloud, (2) Size of the water droplets, (3) Ambient temperature, and (4) Size of the collecting body or surface. However, a very good mathematical model of icing is illustrated in Figure 1 for a small probe exposed to an icing environment (assuming 100 per cent collection efficiency, holding some variables constant). For this model, it is assumed that none of the ice ever breaks off.

For example, weather data that describe the icing environment and the size of the frontal or cloud activity can be used to assess the thickness of ice that may be expected to accrete on a body that has a radius of curvature less than one-half inch.

These data, reorganized in Figures 2 and 3, show the ice one would expect to accumulate dur-

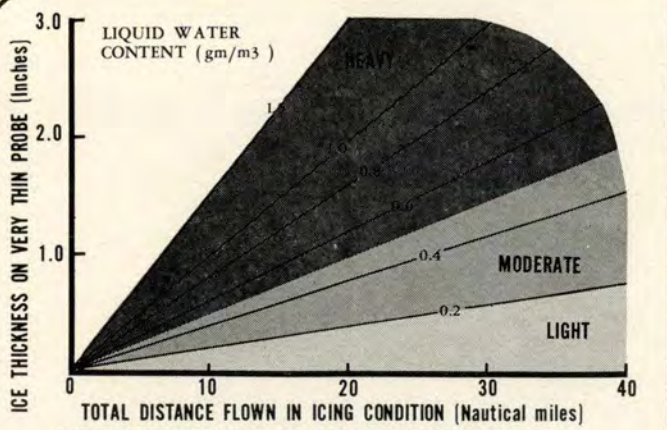
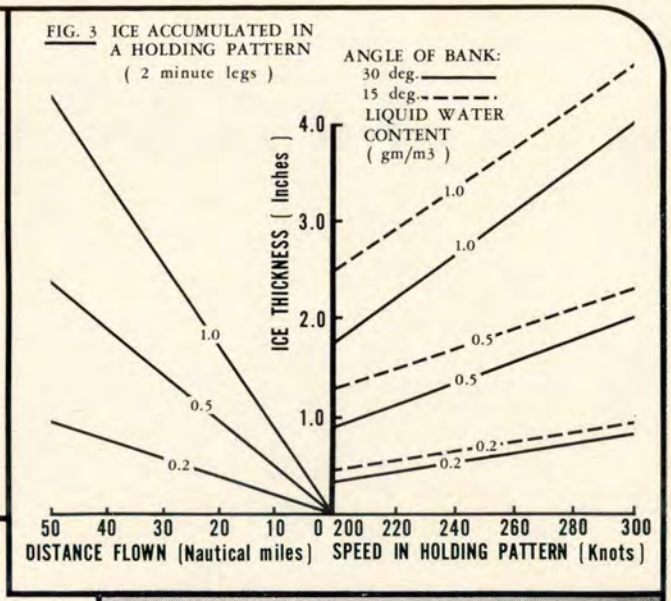


FIG.1 ICE ACCRETION ON A SMALL PROBE IN LIGHT, MODERATE AND SEVERE ICING CONDITIONS.



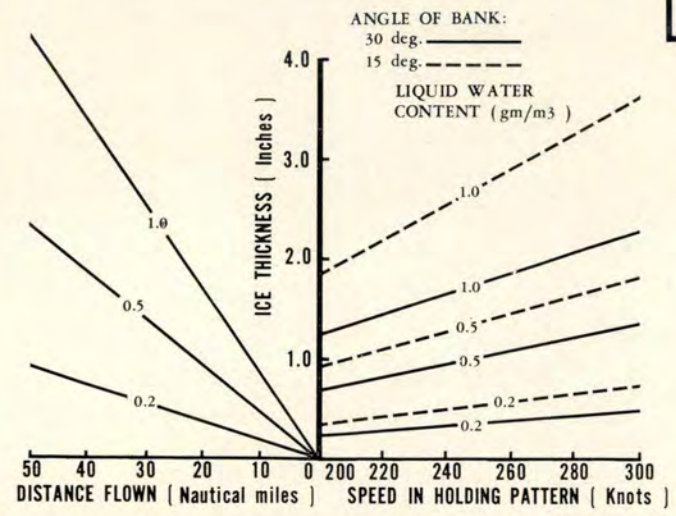
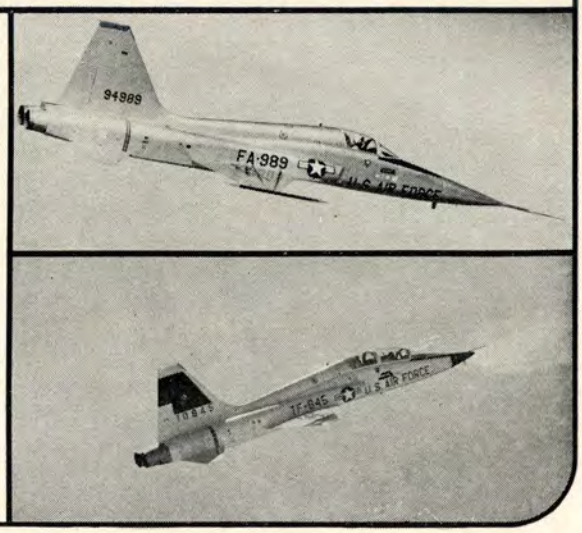


FIG. 2 ICE ACCUMULATED IN A HOLDING PATTERN (1 minute legs).



ing one circuit of a race track holding pattern having one- and two-minute legs, respectively. If the speed in the patterns and the angle of bank in the turns are known, both the ice thickness and the distance covered may be obtained for planning purposes from figures two and three.

ENGINE ICING

Engine icing is the most serious problem to pilots of T-38/F-5 aircraft. While the first visible signs of ice may not always be easily noted by a pilot, airspeed of the aircraft and power setting of the engine may to some degree affect any rate of ice accretion. A combination of high power settings and low airspeed in ice prolongs exposure to icing and increases the hazard. *Most of the time, however, safe survival is a simple struggle involving time and distance.*

Engine damage from ingested ice can occur during the icing encounter but is most likely to occur immediately after the aircraft departs the icing condition, particularly where the outside air temperature rises to above freezing, or where throttles are advanced to recover some lost RPM, airspeed, or to maneuver.

When icing exposure is minimized by avoiding the prolonged holding procedure, and by climbing and descending rapidly through icing clouds, the aircraft has the capability to penetrate regions of light icing with little danger of sustaining engine damage.

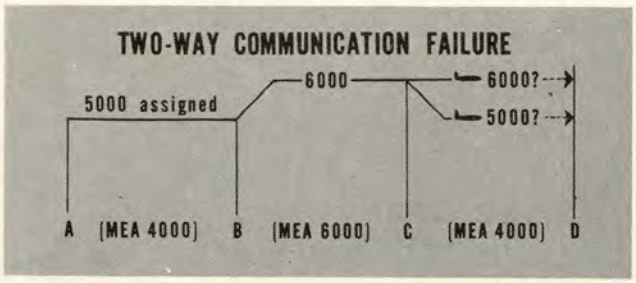
But the aircraft can survive only for a limited time (perhaps four minutes) while holding in any icing region, and cannot survive for any appreciable length of time in icing regions at low speeds and high power settings such as would be found in a GCA or instrument approach pattern.

The technique of reducing both airspeed and power for ingesting ice is believed to be instrumental in reducing engine damage. Consequently, advance throttles cautiously while flying in icing conditions or after departing an icing condition. ★

the I.P.I.S. approach

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

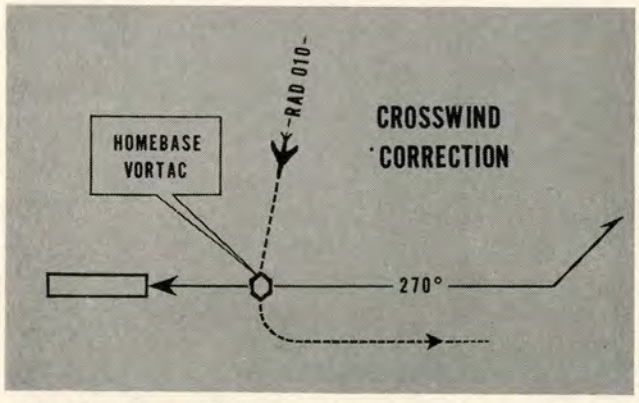
Q One of the procedures for two-way communications failure in IFR conditions is to *continue* the flight at the *higher* of the following altitudes—last assigned or minimum for IFR operations. Does this mean that the aircraft in the example below should *continue* from point C to point D at 6000, or should the aircraft descend to 5000 (last assigned) at point C?



A Descend to 5000 at point C. In the event of communications failure, enroute aircraft are required to maintain assigned altitudes unless the lowest established altitude for IFR operations (MEA) is higher. When the MEA no longer requires flight at the higher altitude, the aircraft should descend to the last assigned altitude.

TRICKS OF THE TRADE

Crosswind Correction



In the above depiction the aircraft is inbound to Homebase VORTAC on the 010 radial at 2000 feet MSL. Negligible wind drift correction is required to maintain course, however, a recent ground speed check confirmed the presence of a 25-knot tailwind. Approach control also reports a northerly surface wind of comparable velocity.

After station passage at Homebase VORTAC, the aircraft must turn outbound to *parallel* the approach course to execute a parallel procedure turn. Procedure turn altitude is 2000 feet MSL, and 150 KIAS will be maintained throughout procedure turn maneuvering. In order to *parallel* the approach course outbound under these conditions, what heading would you select?

The Wind Drift Correction Chart in AFM 51-37, page 11-9, reveals that a 10-degree drift correction will correct for a 90-degree crosswind component of 25 knots with a 150 KTAS. Closer interpretation of chart data discloses that a 10-degree drift correction is adequate correction for a crosswind component of 1/6 the TAS; 20-degree correction for a crosswind 2/6 the TAS; 30-degree correction for a crosswind 3/6 the TAS, etc. In the previously described situation, the crosswind (25 knots) is 1/6 the TAS (150 KIAS), requiring a 10-degree drift correction. Therefore, a heading of 080 degrees should approximate a track parallel to the approach course.

To estimate the required drift correction in any situation, all you need to remember is: 10-degree drift correction is required for a crosswind component equal to 1/6 the TAS, and as the crosswind component increases by 1/6 the TAS, the required drift correction increases by 10 degrees.

This knowledge of drift correction/TAS relationship can be very useful to the pilot, especially in those instances where course guidance is not available and maneuvering airspace is limited by terrain obstructions or airspace boundaries.

NOTE: Do you have a need for 35mm slides to brief AFM 60-16? If so, your Base Instrument School should have them. ★


IT'S BRAND NEW . . .
It's all about cars and motorcycles . . .
Volume one, number one---COMING SOON!
DRiVER
the automotive magazine of
the UNITED STATES AIR FORCE

LIFE SUPPORT SYSTEMS a-Gogo

NOW THERE'S A SPO FOR THE LIFE SUPPORT SYSTEM. THIS SHOULD END YEARS

The light is green for operating a centralized system of developing, procuring, distributing, and operating life support equipment throughout the Air Force. Given a little time to get into high gear, the system promises to squelch the grumbling of aircrews prevalent through the years about shortages and shabbiness of equipment.

The heart of the system is a Life Support System Program Office (SPO) in the Aeronautical Systems Division of AFSC, Wright-Patterson AFB. This SPO, unlike most, is a permanent office, organized to manage the development of new or improved equipment and techniques, and in conjunction with a Life Support System Support Manager (SSM) at the San Antonio Air Materiel Area of AFLC, to monitor the procurement, distribution, operation, and maintenance of the sub-systems and individual items of life support equipment Air Force-wide.

The major weaknesses of the total program from establishment of requirements to operations use has historically been *lack of control.* Many good people in many places have worked hard through the years to put reliable protective devices and techniques into the hands of the aircrews. Much credit is due these people. But their efforts have not been adequately coordinated, and progress has been piece meal. With no overall program, inadequate funding has been the rule. Gaps and duplication, improvisation to meet suddenly recognized needs, low priorities, stop-and-go production and distribution – all these and many more major headaches have characterized the personal, emergency and survival equipment field. When one takes a look at its complexity, with all the varying needs of the using commands, strong personal opinions of flyers, many Air Staff offices of varying degrees of responsibility and interest, and the enormous procurement-logistics responsibility of Systems and Logistics Commands keyed to *major* developments, one can only wonder how we have done as well as we have. A "machine" as complicated as this must have a blueprint, a fault analyzer, a fueling and lubricating system, and above all a control panel.

The Life Support System (412A) directed by Hq USAF in 1965 and now coming into full effectiveness should provide these missing ingredients to make a smooth functioning machine. The SPO serves as control panel of the system, and their responsibilities are many. They must work hand in glove with weapon system SPOs and SSMs. They must stay current with the available state-of-the-art in life support equipment throughout the world. They must stimulate industry and government technical development centers to main-

OF CONFUSION, AND PRODUCE BETTER EQUIPMENT.

Col Thomas A. Collins, USAF (MC), Life Sciences Div.

tain a capability, and to produce quality prototypes and production models quickly when called upon. They must stay abreast of Air Force technology and operational concepts and assure that the using commands are forsightedly establishing their requirements, both in nature and in quantity.

The SPO-SSM management system obviously cannot work in a vacuum. These controlling offices must tie in effectively with the people that control the broad policies and the money in the Pentagon on the one hand, and the using commands on the other. The importance of establishing an organizational-functional structure in life support, all the way up from base level to major command headquarters, cannot be emphasized enough. The life blood of the new system is still the procedures that have been in effect (but not always used effectively) for years. Command, operations and training safety offices, materiel and maintenance, and the aeromedical services must develop a team working concept so that requirements are recognized and acted upon. The Life Support System is nourished through receipt of the properly prepared Required Operational Capability (ROC), Operational Hazard Reports, Unsatisfactory Reports, Quality Control Deficiency Reports, and Accident and Incident Reports. Of the latter, the aeromedical services at base level will have their hands full with the newly revised Form 711g. The Flight Surgeons will require full support from all technical information sources to provide the necessary incident-accident data fully and accurately, but the payoff in terms of better equipment in the long haul will be big, "really" big.

The development of a management system is in itself no panacea. Almost any control framework will function effectively if people understand it, accept it, and fulfill their role in it. The Life Support System is no exception. We will still have those who will sound off constantly with why don't "they" do something about it. We will still have differences of opinion about the relationship between performance and safety, and the acceptable level of risk in different circumstances. Comfort versus reliable emergency function is a necessarily imposed trade-off which will continue to be with us. But with our overall organization with defined responsibilities and authority, and with the understanding and participation of all concerned, the outlook is excellent for real progress toward the life support Utopia – comfortable, functional protective equipment, fully reliable, and effective in a broad range of emergency situations. ★

Greater range and speed, advanced systems are enabling the modern helicopter to . . .

Join The Big League

Lt Col Robert E. Englebretson
Directorate of Aerospace Safety

Helicopters, long relegated to the back burner, so to speak, are rapidly coming to the forefront as vital Air Force systems capable of not only those missions peculiar to the chopper's VTOL capabilities but many new missions heretofore assumed by fixed wing aircraft. This is so because of the many design improvements made during the past few years and the performance features the newest helicopters boast. A number of these appear on the next page.

From this list it is obvious that the rotary wing birds today have an almost unlimited capability. Therefore, we must begin orienting our thinking more toward that of fixed wing operation rather than restricting it to the rather narrow role that the more limited machines of the past were capable of. In other words, the helicopter has grown up. No longer is the chopper confined to the immediate vicinity of the airpatch. No longer is it limited to short out and back local missions.

The capabilities of the present generation of helicopters, and those to come, have some important implications for all of those now operating these birds and those who someday will. One of these is the longer legs the helicopter has grown. These birds are capable of long range flights and have the navigational equipment and fuel to do so safely and efficiently. Some even have aerial refueling equipment. Then there is the unique ability to operate off land or water, from and into confined areas, and at higher altitudes than in the past.

Now that we have all the goodies listed here, and more, we had better give some thought as to how we are going to operate these air-

Transporting heavy loads is just one facet of helicopter's capability. Here, H-53 replaces old Army mule.

craft. For one thing, flight planning will have to be more inclusive and should be the same as that for fixed wing aircraft. This calls for IFR flight plans, careful weather analysis, and selection of alternate airfields. The days of filing VFR for flight in instrument weather are numbered. Obviously helicopter pilots are going to have to be as good instrument pilots as their fixed wing counterparts. Instrument approaches for peak proficiency will become the name of the game. Long accustomed to accepting risk and hazardous operating conditions, helicopter pilots must learn to demand the same support and consideration afforded their fixed wing brothers.

The HPPA (Helicopter Pilots Protective Association) must be expanded to include the base operations officer (for helicopter flight planning), the flight surgeon (for crew rest, personal equipment, first aid training), traffic control personnel (for understanding of helicopter capability and operation in instrument meteorological conditions). Finally there is the Commander, who authorizes the mission and supervises the flight operation.

Low altitude flight planning charts do not depict many of the hazards of low level flight, so we need to fly at minimum enroute altitude or higher. Some operations, of course, require low level flying. Therefore, proper maps will be needed to indicate TV towers, power lines, and other obstructions that can put a chopper out of business, as has happened so many times in the past.

Now for the first time the helicopter has great potential as an airlift system. We must train our transient alert people how to care for a helicopter, the dangers associated with helicopter ground operation, how and where to ap-

DESIGN IMPROVEMENTS

- Improved design and redundancy features.
- All weather capability/Doppler Navigation, and Communication Equipment.
- Long range capability/Automatic Flight Control System.
- Air to air refueling/center point refueling.
- 463L cargo features/two winches.
- Twin engine.
- Ability to operate off water and land.
- High altitude operation.
- Self contained auxiliary power which does not require a battery for starting.
- Increased cruising speeds. Up to 150K in CH-53A.

HH-3C rescue helicopter is armor plated, equipped with extensive communications gear and rescue equipment. Injured man on stretcher, left, is assured of rapid trip to medical facility.

Sophisticated cockpit of newest Air Force helicopter, H-53, is shown above. (Photos courtesy of Sikorsky Aircraft.)

Aircrew relaxes in helicopter after rescue in SEA. Choppers are doing a magnificent job in this and other roles.

proach these critters while the rotor is turning. Same with our forklift operators and air freight people. When you drop the cargo loading platform on the H-3 or H-53 to truck bed height, it is almost like looking into the aft cargo compartment of a C-130. Rollers of the H-53 flip up out of the floor same as on a C-141. It has two winches up forward and tie down equipment same as a fixed wing cargo aircraft. It seems awfully foolish to worry about short field landings in a fixed wing aircraft when we have a helicopter capable of hauling the big loads, landing on a dime and giving you 11 cents change.

One thing the helicopter planners haven't provided are crew bunks and latrine facilities. Guess they figured the helicopter pilot could use the litter stanchions or else set down along the way, catch a few winks, and proceed. How about those hot in-flight lunches? If we're going to have to burn up three or four tanks of petrol on each mission the least we deserve is a hot meal or a hot cup for heating up the soup.

For a while the Air Force though it could save money by putting the helicopter pilot through an abbreviated fixed wing, recip under-graduate pilot program. That thinking has changed and rightly so. The time has arrived when the helicopter pilot must be qualified in every aspect of fixed wing as well as helicopter flying. For today it may be a cargo mission hauling three pallets from point A to point B. While tomorrow it could be flying formation with two A-1Es going out on a rescue mission. In many of our mixed units the helicopters are compiling more flying time than the steady wing machine.

When it comes to composite flight plans the helicopter really has it made. Fly from point A to point B, make an approach to point B, then proceed at 700 feet to point C. The authorization for helicopters to fly VFR at 700 feet AGL has proven its value many times. Let's use it, but not exclusively.

It is time we recognize these unique machines for what they are: highly capable and versatile aircraft. Let's make the most of these qualities to enhance success of the Air Force mission. ★

Maj Gen Perry B. Griffith, USAF-Ret.

Retiring from the active list is like taking leave of the human race. Old habits have to be broken. Tolerance for the body politic is necessary unless you want to fight windmills; but, as the preacher and the scoutmaster say, as long as you keep active and keep your health, you won't blow your cool.

Nonetheless, you miss certain things if suddenly denied. I suppose to an aging cowboy, it would be his horse. To me, it was flying.

In 1965, I exchanged my flying suit for military oblivion, and my wife and I returned to a small California town near March and Norton Air Force Bases, to country we liked, among civilians we had learned to admire and respect.

We were lucky. We found two acres to work and expand. We are up to here in civic affairs. Our health is of the best. Then one day a light plane went by toward Palm Springs, and I came unglued. I wanted to fly again.

At first I thought of buying an airplane, but rejected

the idea. I looked at civilian flying clubs. None appealed to me.

Then there were the military Aero Clubs. I had helped to form up the Andrews Club but was not a very active member. And when I was Air Force Deputy IG for Safety these world-wide clubs had caused me untold grief. Just tolerated in some commands, the clubs might have gone out of existence had it not been for the personal and command leadership of General LeMay while in SAC, where, unlike many others, the clubs were run in a military manner.

Ridiculous accidents were commonplace. These, in turn, generated a constant rumble to close the clubs. It is easy, in life, to eliminate a problem (1) with a blunderbuss or (2) by exercising a little effort, guid-

ance, control and command interest. Hence, eliminating flying clubs is a poor substitute for operational and maintenance imagination and command guidance. I wondered if the common faults and discrepancies, as I remembered them, still existed.

After a physical examination, and upon finding my old commercial license, I joined the Norton Aero Club, checked out in an L-17 (Navion), took my wife for an indoctrination ride the following Sunday, immediately made plans to fly to the East Coast, visit other super-annuated warriors and our children. So, here, then are some observations and experiences on our junket.

Though it was commonplace in the old days for me to leap off after breakfast and have a late lunch in the Pentagon, this trip was like my first cross-country out of flying school. For one thing, my last eight years of service had been flown mostly in a T-33 with a terrified seeing-eye captain huddled miserably behind me and ready to haul me out of a deep hole if I dug myself into one. Fortunately, it never happened. Now I had to draw my own maps, fill out the forms myself, pull my own pre- and post-flight, get the weather. My new aide was the gal with whom I had committed marriage over a quarter century before; and five minutes after we took off, she was on page 10 of "The Four Horsemen of the Apocalypse" which she said she had forgotten to read in high school.

Our first stop was at a field near an Air Force base. This base's Aero Club was supposed to be located there. I circled and landed—no radio on the field. In the center was a Chic Sale, with a half dozen PT-9 crop dusters nosed in like shooting a stage at flying school. There were a couple of old civilian crates parked near a corrugated hangar so I taxied over and stopped. In the hangar, I found a fellow who said he would sell me some gas, thought that there was an Aero Club at the other end of the building, and, indeed, had recently seen an officer slowly driving by in a staff car. I found no one there.

At a joint usage base—our next stop—we fought our way past a half dozen jeeps with competing people frantically waving checkered flags. At base operations, no one knew if there was any 80 octane fuel available, but they would find out, and then hangared the bird for the night, as a blow was expected.

The following day the Aero Club president directed me to his pump, two or three miles away, gave me 30 gallons of petrol at a respectable price, and I used up a couple taxiing back.

When we landed at our next stop—another joint usage base—operations had a refueling truck from the civilian side standing by. My wife and I had a good lunch, and after signing my clearance, I stopped to look at the Rex Riley Award on the wall. There, big as life, was my signature at the bottom. A Master Sergeant came in and saw me admiring Old Dad's name. Taking me for a staff car driver, or lost, or something, as I stood there most unmilitarily, with longer hair and a moustache (my retirement fringe benefit), he pointed to my name and said, "He's the one who made the free falls on that job. Some kind of nut, I guess!" My day was made, and I bounced out whistling a bar from "Thanks for the Memories," while he shook his head and wondered who the hell I was. (Why should I tell him?)

At the next base, I was again confronted with the same reluctance to dispense 80 octane fuel, or ignorance of its existence—a phenomenon I had to cope with several times. Also, was there an Aero Club? Again, they did not know, but they would find out. Now, there is a list of Aero Clubs kept at some locations, but it is published infrequently, always out of date, and generally inaccurate. I had come to regard the list only as a rough guide.

Cutting through all the surrounding fog, I found that this base did, indeed, have a lively Aero Club a couple of rather inaccessible miles from Base Ops. I had carried some spare parts; and, in a leaky hangar, a very wet sergeant helped me change five plugs and promised to have the old ones cleaned to keep as spares. Later, the club maintenance officer, a captain, stated he had not cleaned them for fear of severe criticism, as the action would be of a quasi-official nature. So I threw the old plugs away. (Let the aircraft prang, but don't be criticized!)

Our next two hops were to Army fields, and our experiences were poles apart. At the first, a disconcertingly young PFC came out of the weeds, onto the parking ramp, figuratively carrying a welcome mat saying "Keep Out!" No, there was no 80 octane fuel. No, there was no Aero Club (although a Piper Cub was shooting landings).

In base operations, five or six soldiers disclaimed knowledge of 80 octane fuel or a flying club. Licked, I saw the phone on the Ops desk and felt that, out of courtesy, I should say hello to the commanding general (he had worked for me in a MAG, and we had been friends since we were cadets). He was away, but after the people standing around eavesdropped on my chat with his wife, instant knowledge suddenly infused the room. An adolescent lieutenant materialized from the woodwork. Yes, there was an 80 octane gas pump—right around the building. Yes, there was a flying club, and he volunteered to help my wife and me refuel our bird.

As we were taking off, the poor man's Jackie Cochrane, who had spent a lot of her girlhood at this post, shook her head and recalled it wasn't that way when they had the horses.

A completely different exercise took place at the next Army field. I made my usual controlled crash and was met by a "Follow Me" jeep. (Only at about half the airdromes where we landed were we met by a "Follow Me" jeep.) Quickly gassed, I paid my bill and asked the Army major in charge how many aviators he had. "Only two of us," he whispered and glanced furtively over his shoulder.

If you have a good thing, keep it a secret.

At the following stop Base Ops informed me the Aero Club was located at a civilian field 20 miles away. So I flew there to refuel. But I bought civilian 80 octane gas because the vendor informed me the Aero Club, several months previously, had moved further south 50 miles. Ah me!

After some fairly turbulent flying on the next leg, my wife asked me to land. The place was designated as having a club belonging to a nearby base. The Aero Club was locked tight as Philadelphia on a weekend. They had loaded their birds with catfish and all flown off to a picnic 200 miles away.

It was here we first heard of aerial green stamps. After I bought more civilian gas than I care to think of, all the way across the United States, this vendor *volunteered* to give us green stamps. He also cleaned our windscreen and emptied the cigarette trays—duties hitherto performed by the Swiss Family Griffith.

Our following turn around was the halfway point; and, as I had not been able to get any scoop on an Aero Club at the base, we landed at a civilian facility. It was the nadir of the whole trip. Service was wretched, sloppy, and in the take-it-or-leave-it manner associated with what you find when a dealer has a monopoly and his clients are rich amateurs. To a persnickety old pro like me that was incredible. I had to tie down the bird (but pay for the privilege). Half of their gassing help was elsewhere so we did it together. I bought some oil, drained the old oil and pulled a 25-hour inspection, not because I was nickel squeezing, but because I wanted it done right. I had to borrow some safety wire and, for lack of proper tools, asked a mechanic to safety the oil sump nut for me. This was his total effort – about five minutes' worth – labor charge: $1.60. I'm in the wrong business.

The service department head was insulted because I even asked him a question.

We had learned a lot by now. At any one commercial field you might taxi all over hell's half acre, park where you jolly well please and, if you scratch hard enough, find service. At another, you might have to fight your way through competitors, all striving for your business. In any event, prices and help are not cheap. One of the merits of a going Aero Club is services at a reasonable price, and if you have troubles you can't fix, some-

one else, who knows how, can fix them. However, if the club is not well run, you may as well skip it and seek help elsewhere.

One disturbing factor concerns responsibility and, particularly assistance. I found some clubs had been so badly mauled by Air Force auditors they were gun shy in the face of adversity. Rather than find out just how they could be helped, and in the absence of local command guidance, and in the presence of indifference, they were going some distance and paying outlandish prices for service and parts that might possibly exist through their own means, locally and legally. Loose operation and guidance from the base always augers such cases and can drive a worthwhile organization out of existence, particularly if there are no senior people in the club.

At the first turn-around on our way home, the service was 100 per cent. The Aero Club was only 150 meters from Base Ops and we were off 30 minutes after landing.

That night we stayed at a base where I got a mechanic moonlighting for the Aero Club to replace three exhaust gaskets. The bill was very modest, and as this was a club-to-club transaction, our Norton Club saved a lot of money.

All the poop sheets said the next base had a club. But when I called the tower 50 miles out, I was told to land at the municipal field, that the base club was located there in Hangar Three. Instead of letting my wife try to paint it on the runway, I smashed in for my landing, taxied to Hangar Three, and when we shut down was told that there was no Aero Club there. As usual, I dealt with a commercial vendor rather than chase two miles around the taxiway searching for the club's actual location.

An out-of-the-way Army post, another milestone in my wife's maiden stage, was our next stop. I must say, it was quite some place, right out of TV's Fort Apache and not much different from the Khyber Pass. But once we had sightseen, the business of 80 octane fuel came up. So, here we went again. None available. If the Army flies all their little birds with 115 octane fuel, their spark plug bill must be staggering.

I figured I could get over the range to an Air Force Base, but we were held up at the end of the runway because our destination refused our clearance. I reiterated this was an Aero Club craft, and eventually we were cleared and landed at destination after about a 30 minute flight (with the engine so leaned out it sounded like a $5.00 watch). I was close on fuel and, as usual, found that operations would have to sort out the 80 octane question.

In the morning, an old tanker marked "Diesel" rumbled to our aircraft. I was assured it had been cleaned out a few days before and had 80 octane in it for the local Aero Club. Three alert crewman and I tried to

milk fuel from it for several minutes without results. A major from operations came out to dig those crazy civilians, and a local tenant who had come down to see us off, asked him if this was a base problem.

"Oh, no," said the major. "The base hasn't anything to do with this."

So help me, the Air Force can't have changed *that* much since I answered muster.

Off we chugged to the municipal field 20 miles away for our fuel – engine leaned out until it was almost profane; all a bit of a nuisance and extra expense, and, not even any green stamps. I still had my puckering string drawn tight around the gas gage.

The rest of the trip home was routine. We circled our house, saw no one had stolen the swimming pool, and from 1500 feet could tell that the gardener had cavalierly created a hay crop out of a lawn. The next engine I would start would be on the lawn mower.

From the foregoing, these observations are offered. Like any non-appropriated fund club, aero clubs are, indeed, as much the base commander's responsibility as a golf club or officers' club. But there is the inherent source of trouble stowed away in an aero club that is absent from the others – risk to human life. In my study at home I have a maxim that reads, "While aviation in itself is not dangerous, it, like the sea, is terribly unforgiving of any carelessness, neglect or incapacity." And a puddle jumper, like a razor in the hands of a baby, can be as potentially devastating as a jet.

It would seem that *up-to-date* club listings, their locations, hours of operation, fuel availability, etc., could be included in present publications such as the IFR Supplement, VFR Supplement, the Safety Magazines, or the Airdrome Sketches in the U.S. Aero Clubs surely are operational in nature, and regardless of who oversees them in the Air Force, local operations personnel should be current and up to date on their activities and possibly responsible for them. They aren't fun clubs per se. They go further than service clubs, officers' clubs and the like. However, aero clubs are not for a privileged few. Anyone who is not blind, and who has the desire and will to do it, can learn to fly a light plane. These clubs are not like old Army polo clubs. They are for everyone who qualifies, with proper military credentials; but if not carefully run, they can be expensive. And any unnecessary obstacles to club members created through design or ignorance can be frustrating and discouraging, especially to inexperienced pilots. The result may be that potential aero club members will go elsewhere for airplane instruction. The record for the past couple of years of Air Force personnel killed in non-aero club private aircraft indicates aero clubs can be a good place for the commanders to invest some time and effort to insure their success.

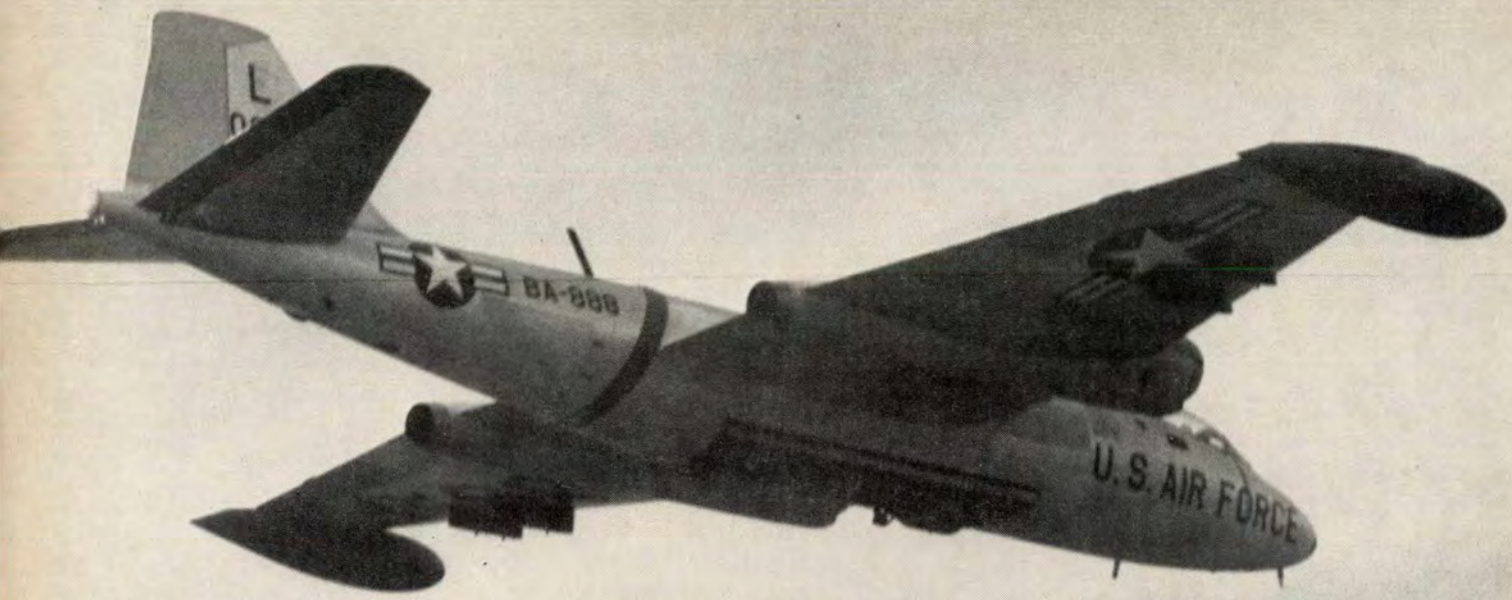
We witnessed clubs struggling against almost insuperable obstacles – located in wretched quarters, leaky hangars, muddy tie down ramps – literally existing from hand to mouth. On the other hand, there were some facilities that looked as good as a base operations. One thing all clubs had in common, at least those we saw, that were not locked up, was enthusiasm – the hangar flying verve that exists only in the fraternity of flying people. My wife and I bummed rides in everything from fancy limousines to flat-wheeled pick-up trucks, and she is just as eager as I am to get off on another trip – a real patsy!

A base commander would do well to become thoroughly acquainted with his club – even join it. Nor would it hurt to locate the facility within his peripheral vision rather than over the horizon. As for me, a congenital non-joiner, I am now an active participant in a very finely conceived, enthusiastically supported organization here at Norton.

They even tried to make me Club Safety Officer at a recent election, because my friends said I had written a lot of the regulations. Not so! I never read more regulations than I had to while in uniform, let alone wrote them. I respectfully declined.

Next time my wife and I plan to try Central America, Panama and the Antilles. And don't forget the green stamps. ★

The author, Major General Perry B. Griffith, USAF Retired, has a distinguished background in aviation, having served in a number of key positions during his Air Force career: squadron, group and wing commander in World War II, Commander of the 836 Air Division (TAC) from 1958 to 1960, three years as the Deputy Inspector General for Safety, and Deputy CINCNELM with headquarters in London. His last active duty assignment was as Commander of all MAGs and Missions in the Middle East and Africa, south of the Sahara. During the late 1950s he served as Deputy for Air and Chief of Staff for two task forces conducting nuclear tests at Eniwetok. General Griffith was an active pilot until his retirement, flying T-33s, B-57s, and T-39s.



The aging B-57 is still with us and may well be for many months to come. The pilots who fly it will do well to remember that no matter how old the airplane is, flying by the rules is still . . .

The ONLY Way To Fly

Maj Robert F. Keeley, Flight Safety Officer, Kansas ANG, Hutchinson AB, Kansas

In these days of high performance, supersonic aircraft and earth orbiting space craft, the aging B-57 is a comparatively safe, easy plane to fly. In fact, it is deceptively easy to fly and is extremely forgiving of most pilot errors. And this, in the opinion of many, has contributed to far too many accidents.

It is difficult to find another reason why numerous pilots – some with several thousand hours – have ignored or completely forgotten the basic do's and don'ts which are pointed out in the pilots' handbook. Yes, these rules are still being ignored, with fatal results in many cases, for the B-57, like an aging boxer with years of experience, still demands professional respect. There are two cardinal rules that must be emphasized more than all others, because accident records indicate that pilots have forgotten or ignored them more than the rest. Since these two rules are the result of the B-57's minimum single engine control speed, a complete understanding of this phase of flight is necessary to appreciate these rules.

The single engine minimum con-

trol speed of any aircraft is defined as the slowest speed at which the pilot can apply full power to the operating engine and still maintain directional control, without banking more than five degrees. On B-57s with a power rudder or rudder boost system operating normally, there is insufficient rudder available to continuously counteract the thrust of full power from the operating engine if the airspeed is below 135 knots. Thus, 135 knots is the minimum single engine control speed of all B-57s and one of the two cardinal rules is formulated.

NEVER GET SLOWER THAN 135 KNOTS WHEN OPERATING ON ONE ENGINE EXCEPT ON FINAL APPROACH WHEN THE LANDING IS ASSURED.

For the information of some of you older readers who recall and perhaps still wonder about a slower single engine control speed that used to apply to the B-57E model, it was raised to 135 knots to make it standard with the rest of the B-57 aircraft. It thereby eliminated a potential safety hazard to units flying all models.

The above cited rule should be followed even when practicing single engine operation; remember that thrust decreases with altitude. This means that the pilot can control the airplane at a considerably lower speed at 10,000 feet than he can at 1000 feet.

One other item concerning single engine practice. Do not shut down one engine while practicing. Such advice may seem completely unnecessary, even insulting, to most pilots, but several fatalities have already resulted from this. The safest technique is to retard both throttles to idle and slow the aircraft to about 145 knots. Then gradually add full power on one engine, holding heading without the benefit of trim and slow the airplane gradually until a minimum airspeed of 135 knots is reached. There is no need to get slower, even if you can hold the minimum single engine control speed without undue strain.

After you have a feel for flying in this condition, begin the practice routine again with the gear and flaps down. As the minimum single engine control speed of 135 knots is approached you will note that with full power on the operating engine, the airplane will not maintain altitude. From this fact comes the second of the two most important rules, violations of which have contributed to a number of major accidents.

NEVER ATTEMPT TO GO AROUND ON SINGLE ENGINE WITH GEAR AND FLAPS DOWN IF THE AIR SPEED IS BELOW 135 KNOTS AND ALTITUDE IS LESS THAN 500 FEET.

There are no exceptions to this rule. If on a single engine approach you get below the airspeed/altitude minimums, there is only one thing to do – LAND!!

Should you anticipate being short of the runway, gradually add as much power as you can hold and set the airplane down where you must. If you expect to land long, cut the power, increase the glide speed and land at the higher than normal touchdown speed on at least the first third of the runway. Once on the runway, lower the nose immediately and get on the brakes. Either of these predicaments can be avoided by following the single engine procedure given in the Dash One. This specifies keeping the flaps retracted until you are assured, as much as you can be, that your pattern is right.

If you are ever in the situation where a go-around is required, keep the nose down to hold speed and apply power smoothly so that directional control is maintained. Retract the flaps, then the landing gear. If your airspeed is too slow, or even marginal, it may be necessary for you to deliberately sacrifice some altitude during the go-around to gain safe single engine control speed. By doing this, you utilize the available thrust to gain airspeed rather than overcome drag.

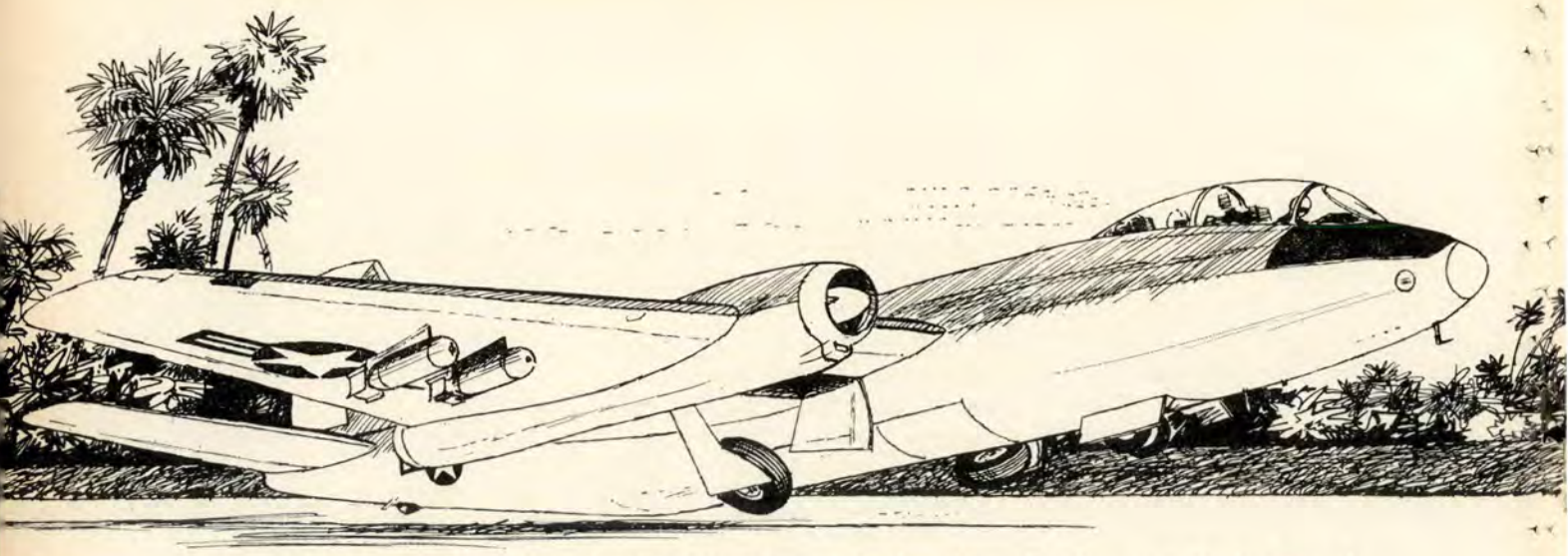
So far, the discussion of single engine operation has been on B-57s equipped with a power rudder. For aircraft without power rudder, the two cardinal rules still apply – except that 160 knots is the minimum single engine control speed figure.

The reason that the minimum single engine control speed with boost off is higher is that you do not receive full rudder tab deflection when rudder pedal is applied. Therefore, full rudder deflection is not available. Air flow around the vertical stabilizer resists the rudder movement and any extra rudder pedal pressure that you may exert is lost in the torque tube assembly as it tightens up.

Both during practice and under actual single engine conditions, care should be exercised when advancing the throttle of the operating engine. The J-65, like most jet engines, develops most of its thrust during acceleration in a rapid surge in the last few per cent of RPM. This surge of power creates a dynamic yawing condition that is difficult to control. If power is applied rapidly on a single engine at 135 knots, this dynamic yaw procedure produces a situation that can easily result in loss of control. Even at speeds slightly in excess of 135 knots this will result in a condition that requires the finest of piloting skill. Therefore, we come to another rule almost as important as the two previous ones, which many of you may not have seen stated in exactly the same manner.

WHEN ON SINGLE ENGINE, ALWAYS APPLY POWER SLOWLY, ESPECIALLY AT SPEEDS BELOW 200 KNOTS.

Regardless of how tight the situation may be, when you are on



Retract gear only after becoming definitely airborne and when airspeed is above normal takeoff speed.

single engine below 200 knots, use your good throttle with caution. Remember that holding a minimum control speed under stable conditions and being confronted with it under a dynamic operating condition can be two entirely different problems. While on the subject of landings, there is another caution that is so basic it is almost embarrassing to repeat. Always remember that when the wing flaps are extended, the airspeed will bleed off rapidly unless you work at controlling it. This item ties in with the aforementioned rules and certainly needs no further explanation.

Another important rule results from the effect of fuel consumption on center of gravity travel. When fully loaded, the CG of the B-57 is very near the aft allowable limit. Burning fuel from the Nr 1 fuselage tank moves the CG farther aft. Using fuel from the Nr 2 fuselage tank on tip tanks moves the CG farther forward and using fuel from the wing tanks has a negligible effect on CG travel except that it keeps the Nr 1 fuselage tank full; so remember the following rule:

NEVER ALLOW FUEL IN THE NR 1 TANK TO DECREASE ANY APPRECIABLE AMOUNT WHILE THE TIPS AND NR 2 TANK ARE FULL.

The low level warning light for the Nr 1 tank was incorporated to warn the pilot that the other tanks are not feeding, but it is a good practice to check the quantity gages to insure that Nr 2 is feeding properly. Failure to follow the fuel management procedure prescribed in the Dash One has contributed appreciably to the B-57 accident rate.

The handbook, incidentally, contains a detailed description of flight characteristics when the CG is beyond the aft limit, so there is no need to repeat the information here. A thorough knowledge of these characteristics is a must, however, for all B-57 pilots.

The next rule is more of a general flight safety rule, rather than one applicable only to the B-57, but it must be mentioned here because disregarding it has resulted in several major accidents.

INITIATE GEAR RETRACTION ONLY AFTER DEFINITELY AIRBORNE AND WHEN AIRSPEED IS SAFELY ABOVE NORMAL TAKEOFF SPEED.

In keeping with this rule, it is essential to compute the takeoff performance before every flight. Admittedly, the B-57 has excellent takeoff performance compared to most jet aircraft, but high gross weights, field elevations and temperatures extend takeoff distances and speeds considerably, and only the charts will tell you exactly how much. In addition, these charts provide the best speed for nose wheel lift off — ten knots below takeoff speed. This should be used for every takeoff because assuming a premature nose high altitude is a dangerous pilot technique. It makes directional control unnecessarily difficult and increases drag, which lengthens the takeoff roll considerably. Before leaving this subject, one other critical rule for takeoffs must be cited.

ALLOW THE AIRPLANE TO ACCELERATE TO MINIMUM SINGLE ENGINE CONTROL SPEED AS RAPIDLY AS POSSIBLE AFTER BECOMING AIRBORNE.

Such takeoffs, while not spectacular, demonstrate good, safe, smart pilot technique. Professionalism is the word currently being used to describe such procedures.

Takeoffs made immediately after full stop landings introduce another important rule which all B-57 pilots must remember.

WHEN MAKING FULL STOP LANDINGS, ALLOW TEN MINUTE BRAKE COOLING INTERVAL BETWEEN LANDINGS IF THE GEAR IS LEFT DOWN IN THE PATTERN: IF THE GEAR IS RETRACTED, MAKE LANDINGS AT LEAST 30 MINUTES APART.

Violation of this rule has added substantially to the accident rate because overheated brakes have caused wheel fires, both in flight and on the ground. When using brakes on landings with gross weight below 38,000 pounds, exercise care to prevent the tires from skidding. Braking capacity on landings above 40,000 pounds is noticeably less than at low gross weights. Keep this in mind when making heavyweight landings, particularly if the majority of previous landings have been at low gross weights.

Ascertaining the correct touchdown and over-the-fence speeds for each landing, emergency or otherwise, is something every B-57 pilot should do. But because maintaining exact speeds during the approach is not as critical with the B-57 as with many other more current airplanes, some B-57 pilots become lax. This type of pilot is failing to establish a habit pattern which can make dealing with emergency or unusual landings easier. (For example, landing with isometric tip tank loading or at high gross weights.) The importance of good habits in flying *any* airplane is well known, in fact this is the basis of all military flight training. What some B-57 pilots may not realize, however, is that habit is the only way a pilot can avoid violating a cardinal rule regarding speed limitations.

NEVER EXCEED THE MAXIMUM ALLOWABLE SPEED FOR THE AIRPLANE'S CONFIGURATION.

Only by developing the habit of closely monitoring the airspeed indicator can a pilot adhere to this rule when flying at high speeds at low altitudes. Up to 5000 feet, there is no buffet or unusual characteristics to warn the pilot that he is approaching the airspeed limit – 513 knots without tip tanks and 444 knots with tips. In the latter configuration, the pilot must be doubly cautious because the placard speed can easily be exceeded with the thrust available. Above 5000 feet in either configuration, buffet, tuck or wing drop will usually warn the pilot that he is approaching the limiting airspeed.

In some cases the limit can be slightly exceeded without undue danger, but this should not knowingly be done. With tip tanks installed, the placard speed is close to the structural limit. Exceeding this speed will damage the ailerons and possibly other parts of the airplane. In any case, make an entry in the 781 so that the airplane will be properly inspected before the next flight.

The limiting speed without tips, although usually accompanied by aerodynamic warning, is close to the area where a pitchup will develop. If this area is entered with any appreciable acceleration it will usually throw the airplane into a high speed stall. Needless to say, this area should be avoided. In fact, when flying near the limiting speed, be especially observant of the basic flight characteristics. If any of the aerodynamic warnings are present, don't increase airspeed even if the machmeter indicates that the limit speed has not yet been reached. If the landing light is extended or if an access door comes open, it will aggravate the control problems at speeds considerably less than maximum. Below 5000 feet, monitor the airspeed closely because, to repeat, no aerodynamic warning will occur. Adherence to this rule applies to many other of today's jet airplanes as well as the B-57. The same is true of the basic rule regarding aerobatics, but some pilots have violated it, either because of carelessness or ignorance.

WHEN DOING OVER-THE-TOP MANEUVERS, ENTER AT THE RECOMMENDED G-FORCE THEN HOLD CONTINUOUS BACK PRESSURE BUT NOT CONSTANT ACCELERATION—FROM START TO COMPLETION.

Failure to follow this rule usually results in a stall at or near the top which may be followed by a spin. The correct technique is to ease up slightly on the back pressure on reaching the vertical position or beyond so as to have an over-the-top acceleration about 1G less than initially established. If the stall warning should occur, immediately ease off the back pressure, using a rapid control motion only when a stall is fully developed.

The next rule has been violated several times, but fortunately not with as serious results as some of the previously stated rules. Nonetheless, a major accident could occur to the next pilot who breaks the following rule:

IF HYDRAULIC FAILURE IS KNOWN OR SUSPECTED, DO NOT DEPRESS THE BRAKE PEDAL UNTIL AFTER LANDING. THEN USE ONE STEADY APPLICATION UNTIL THE AIRCRAFT HAS COME TO THE COMPLETE STOP.

This rule is cited many times in the handbook as are all of the others discussed in this article. Others in the handbook have not been mentioned here because, although equally important, they have not contributed materially to the accident rate. This brings about the final rule, which, if followed, would almost make the others unnecessary.

KNOW YOUR FLIGHT HANDBOOK AND FLY THE AIRPLANE ACCORDINGLY.

To borrow a phrase from automobile traffic safety – The life you save may be your own. The B-57 is still a potent airplane and flying by the rules is still –

THE ONLY WAY TO FLY. ★

AERO Bits

THE START WAS NORMAL but when the pilot was ready to taxi he couldn't advance the throttle. He pulled the throttle back and inadvertently stop-cocked it. The power unit was brought back up to the aircraft and the engine restarted. Although the power unit was still connected, the pilot signaled for chock removal and turned his attention to the cockpit. He thought he saw the crew chief signal to taxi and released the brakes. The crew chief said he was giving the hold signal but that the pilot, because he had his head in the cockpit, was delayed in stopping. Several other personel around the aircraft signaled to the pilot to stop, but he didn't see them. When he did stop it was too late; the left wingtip struck a mirror on the power unit. Pilots must delay departure until they are certain that all taxi obstructions are removed and ground crewmen should never remove chocks until the aircraft is unquestionably clear for taxiing.

THERE BUT FOR the Grace of God— Recently an IP and student FAC were shooting touch-and-go landings in an O-1F. A normal landing was made but on the go the plane assumed an excessive angle of attack. The IP required all his strength and both hands to move the controls forward and lower the nose from the 25- to 30-degree pitch angle. After the aircraft was "under control," he discovered the student had also been pushing forward on the stick with all his might!

It took the combined efforts of both men to control the nose-up pitch tendency and land the aircraft. Post-flight examination revealed the horizontal stabilizer hinge had failed, allowing the elevator to drop and jam in the full-up position. As no unusual turbulence or landing force had been experienced, this defect must have been missed on preflight.

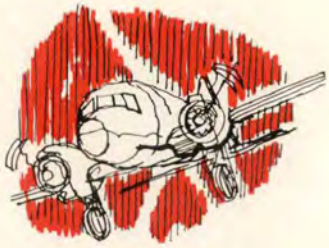
It is always mandatory preflight item to check hinges and control cables. Everyone does this, but how many times have you caught yourself doing the preflight automatically – your mind already busy with problems of flight? This is undoubtedly a strong probability in this case. This title could be changed to "There but for the Grace of God, *or a thorough preflight*, Goes a Major Accident."

Maj Victor J. Ferrari, Jr
Medical Officer, Life Sciences Div.

ANOTHER INCIDENT which re-emphasizes Dr. Ferrari's preflight message came across the editor's desk recently. A Gooney received considerable damage when it was struck by lightning. What has an Act of God got to do with preflight? Well, it's this way.

When the troops were repairing the

damaged wingtips they found that bonding was either non-existent or very badly corroded in certain sections of the aircraft – between the wings and ailerons and between the wings and fuselage. True, you can't easily check the wing to fuselage bonding but, on most machines, you can easily check presence of wing to aileron bonding. Do you know how many bonding straps are supposed to be in the hinge areas of the wings and empennage control surfaces of your aircraft? Ask the maintenance boys; they can tell you.



F-104 AND F-4 PILOTS take special note of this OHR which was recently submitted by Captain Gary R. Blake of Luke AFB. It serves as a double reminder of the importance of properly inserting your seat pins and leaving your parachute leg straps hooked up until you are out of the cockpit.

"After shutdown, prior to climbing out of the aircraft, I had released my parachute leg straps from the hooks. The left strap clamp fell down and around the ejection ring, and when I stood up caught onto the ejection ring, stopping my upward progress quite suddenly. The next half second was one of the longest I have suffered through as I carefully assured myself that my seat pin was properly inserted. I feel that the procedure of unlocking the leg straps prior to getting out of the aircraft is a definite and serious hazard, and a procedure that is practiced by many of the pilots in the wing, both students and instuctors. This item should be made a mandatory portion of each flight briefing and the Transition Phase briefing. Recommend that all F-104 units be advised of this situation."

THE O-1F AND THE A-1E COLLIDED in mid-air and the primary cause was pilot factor. The A-1 flight leader and O-1 student trainee didn't fulfill their mutual responsibilities. The O-1 pilot failed to keep the fighters in sight at all times and did not have the experience necessary for controlling fighters. The A-1 leader identified the wrong O-1 as his controller and was not certain of the number of controlling aircraft involved.

Accident Board recommendations are:

• The joint service close air support doctrine and procedures be amended to specify a clear cut policy on visual and radio contact requirements between FAC and strike aircraft engaged in ordnance delivery.

• Effective immediately all O-1 FAC trainees assigned have a minimum of 1000 hours total flying time, or 500 hours first pilot experience as a tactical fighter pilot is highly desirable.

• SAWC (Special Air Warfare Center) aircraft engaged in combat crew training be conspicuously marked with day fluorescent marking in accordance with T.O. 1-1-4.

• That all O-1 pilots wear protective headgear.

• That O-1 bailout training be further emphasized in the O-1 training course. ★

Fallout

LETTERS TO THE EDITOR

BOUQUETS AND BRICKBATS FOR TINA

Congratulations on your February back cover. It is certainly an "added attraction," and will surely increase the readership if it is continued as a regularly recurring feature.

Your plump, improbable "Tina" is a priceless eye-catcher, with her rather unconventionally paraphrased limericks and sage warnings. And the calendar is worth a dozen safety posters.

I've been retired from the Air Force for some 10 years now, but can still tell a good book when I see one. Keep up the good work.

Retired Fan

As a pilot and Air Force officer, I think the "Tina" feature on the back cover of the January issue is one of the silliest, most pointless ever placed in AEROSPACE SAFETY. It looks like someone just couldn't think of anything decent to put on the back cover. As a matter of fact, even the limerick has lousy meter.

DEX

CREWS FOR HERKY

While my roommate and I were reading the February issue of AEROSPACE SAFETY, we came across the article "Crews for Herky" which interested us because we are in the engine shop of the 36th TCS at Langley. The article was about the training of Herky crews in the 4442 CCTW at Sewart, and one of the pictures (pg 5) showed three airmen changing an engine on a C-130A. We are "E" model troops but we do know our safety. The most flagrant violation of safety is the position of two of the airmen. One of the first things we learned was never to stand under an engine. No one plans to drop engines, but it is possible, and the "safety-unconscious" airman who is under the engine wouldn't be able to talk about it.

Secondly, it appears that no safety chain was being used, which is another thing any 3-level at Langley knows you have to use.

Finally, and we may be mistaken, but it appears to us that the prop blade should not be perpendicular to the ground. After all, the T-56 engine stands can't raise an engine high enough to clear a prop in that position.

As far as we are concerned this was a pretty poor picture to put in a safety magazine as an example of "first class maintenance . . . required, if the wing is to meet training schedules." We keep our schedules but we don't sacrifice safety.

Imp & Butch
36th TCS, Langley AFB, Va.

In your article "Crews for Herky," in the February issue, the picture of the airmen removing the 130 engine (page 5), caught my eye. It would seem that the man guiding the propeller was in a very unsafe position. If the cable breaks, scratch one airman.

Isn't it standard safety procedure to use guide lines when removing an engine? This way, no one need stand under the engine and no one would be in the danger zone.

It was our procedure to do this when I was a machinist in the Coast Guard.

1/Lt Lloyd C. Mertens
4115 FTD
Duluth Int'l Airport, Minn.

We agree, this man appears to be in a dangerous position. Tag lines are recommended in AFM 127-101 when sling load is being moved. Also, AFM 127-101 requires safe loading capacities plus safety inspection of hoisting equipment. In this picture, engine lowering had been stopped to rotate prop away from hoist truck. Incidentally, the photo was not taken at Sewart.

SPATIAL ORIENTATION TRAINER

After reading the article entitled "Spatial Orientation Trainer" (January) for the fourth time, I was less oriented than when I began. With all due respect to the author of the article, Webster and I waded through "planetary yaw planes," "oculogravic illusion" and "illusory controlling orientation cues" without much success. By the way, is it really true that a loop is a maneuver of constant angular velocity?

Capt Jack W. Wimer
USAF Instrument Pilot Instructor School
Randolph AFB, Texas 78148

That depends.

THE BEST IN ATC

We, at Vance AFB, read your article "Schoolhouse of the Air Force" in the January issue of AEROSPACE SAFETY with great interest. It is regrettable that in your travels at ATC bases you did not visit the best operation in ATC. We are extremely proud of our flying safety record of 19 consecutive months and 144,499 hours without a minor or major accident.

Yours from the top of the Totem Pole,

Capt Archie B. Clark
Chief, Safety Div, 3575 PTW
Vance AFB, Oklahoma

Thanks, Archie, sorry we couldn't visit all the bases. Congratulations on your flying safety record. May it continue.

F O D

On page 14 of the December issue is a picture of Lt Col Rex Riley standing with his left hand on his hip while one pocket on the right leg of his flying suit remains unzippered. The pocket contains a potential FOD item of the type discussed in Aerobits on page 26 of the same issue. That FOD item should be mandatory reading for our safety-conscious world traveler.

Capt Galvin G. White
Hq ARRS (ARIIG) Orlando AFB, Fla 32813

Lt Col Riley had already read the FOD item in Aerobits when your letter arrived. In fairness to Rex I must add that he was actually in his office when he posed for the drawing and this was just before planning a flight. We are pretty sure he was properly zipped before entering the flightline area. Rex commented on your letter, saying "good to know our sharp-eyed readers are just as sharp-eyed about the FOD problem."

☆ U. S. GOVERNMENT PRINTING OFFICE 1967 251-215/7

WELL DONE

COLONEL HARRY B. COCHRAN

121 TACTICAL FIGHTER WING, LOCKBOURNE AFB, OHIO

Colonel Harry L. Cochran was flying an F-100 on a dart tow mission at 25,000 feet when his aircraft was struck by two 20mm projectiles from one of the firing aircraft. One projectile shattered the rear half of his canopy, traveled forward into the left side of the headrest, grazed the side of Colonel Cochran's helmet, tore off his visor, and shattered the left quarter windscreen. It also made the drag chute inoperative when it struck a cable pulley housing. The second projectile entered the right wing, severed gear position indicator wires, struck and ruptured hydraulic lines to the right brake, and went into the gear strut. Colonel Cochran was injured on the face and neck by flying plexiglass. After jettisoning his dart tow rig and external fuel tanks, he landed at the nearest field. Despite the windblast, loss of right wheel braking, a collapsed right main strut, and no drag chute, Colonel Cochran kept the aircraft on the runway. He lowered the tail hook and engaged the center of the barrier without further damage to the aircraft.

Colonel Cochran's calm reaction to this series of emergencies, while unsure of the extent of his own injuries, averted the possible loss of a valuable aircraft. For his outstanding airmanship, WELL DONE! ★

TiNA AND HER TIMELY TIPS

There was an aircrewman named Dave,
Who tried a dead engine to save.
So long he reflected,
Before he ejected,
That the outcome for Dave was quite grave.

TAKE REASONABLE REMEDIAL ACTION . . .
THEN GET OUT!

APRIL 1967

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Last Quarter—1st	New Moon—9th	First Quarter—17th	Full Moon—24th			**1** APRIL FOOL'S DAY
2 Charles Paine, inventor of all-glass plane, has hopes shattered in test flight. 1929	**3** Maj K. A. Boomer, armament expert, cited for doing bang-up job. 1953	**4** SAFETY IS NO ACCIDENT	**5** 1Lt "Tattoo" Smith named most decorated pilot in Vietnam. 1963	**6** Peary discovers North Pole. 1909	**7** Perry Como discovers barber pole. 1935	**8** WAFs allowed to wear lace undergarments as "fringe benefit." 1949
9 Capt W. X. Balloon weatherman, finds his rainy forecast was only fair. 1958	**10** TINA TIP: Is your safety accidental? PLAN TO LIVE.	**11** Pentagon safe won't open—initiates Fail-Safe incident. 1959	**12** Vietnam airlifters coin phrase - What's up . . . MAC? 1965	**13** Thomas Jefferson's Birthday. 1743	**14** 1st Reunion 384th Bomb Gp. New York Hilton.	**15** SAFETY— The first step to promotion.
16 Capt W. X. Balloon weatherman, finds his sunny forecast was all wet. 1962	**17**	**18** Be on your guard channel—only in EMERGENCIES.	**19** 1Lt E. Z. Breezy keeps cool-head during canopy jettison incident. 1956	**20**	**21** Sky diver, Rip Silk, breaks free-fall record— Creates big impact. 1965	**22** Start Daylight Savings time. Set clock one hour ahead.
23/30	**24** Pilots invoke Taft-Hartley Act against Bird Strikes. 1952	**25** PASSOVER	**26** Maj B. I. Finkley protests being passed over. 1960	**27** Ulysses S. Grant's Birthday. 1822	**28** Dr. A. P. See discovers miracle cure-all drug bearing his name. 1921	**29** Pegasus Day party