aerospace

SAFETY AUGUST 1977

Major General Ranald T. Adams, Jr. has departed his position as Commander of the Air Force Inspection and Safety Center (AFISC) to become the Director of the Inter-American Defense College at Fort McNair, Washington, D.C.

Major General Richard E. Merkling, the former Director of Aerospace Safety at AFISC has moved into the command position.

Brigadier General Garry A. Willard, Jr. has arrived from Korea to become the Director of Aerospace Safety. We wish all three much success in their new assignments.

AUGUST 1977

UNITED STATES AIR FORCE

aerospace SAFETY

THE MISSION - - - - - - SAFELY!

SPECIAL FEATURES

REGULAR FEATURES

NAME THAT PLANE

BOEING P-26

This new all metal low wing fighter was a major departure from the outdated designs previously in production. There were a total of 130 P-26's produced at a cost of $10,000 each.

Specifications

Length—23' 7¼"
Height—10' 4"
Span—27' 11⅝"
Gross wt—2935 lbs
Armament—two ea .30 cal or one .30 and one .50 cal
Power Plant—P & W, R 1340, 600 HP
Max Speed—234 mph
Cruise—205 mph
Range—570 NM
Service Ceiling—27,400 feet

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

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AUGUST 1977 AFRP 127-2 VOLUME 33 NUMBER 7

The Mission Safely

As I review the accomplishments of the last two and a half years, and turn the Safety Directorate over to General Willard, I believe each of you who contributed to safety during this period can be proud of your achievements. We have seen the Air Force reduce the number of flight mishaps and destroyed aircraft to the lowest level in our history. We have, as well, reduced the number of Air Force fatalities from all causes.

We have learned to predict mishap trends to a level of accuracy which is almost unbelievable and yet frequently discouraging. Discouraging because, after we have identified the causes, the numbers, the types of aircraft that are going to have mishaps, we seem unable to influence these trends to any great degree.

We have seen safety become a very active and dynamic force in the acquisition and development process, providing lessons learned, analyzing systems for inherent weaknesses and failure modes, then transferring the lessons learned from one aircraft and system to others. Here in the Directorate of Aerospace Safety we have simplified mishap reports and worked very hard to reduce the directed reporting workload which detracts so seriously from the safety officer's time available for prevention activities.

Obviously, this isn't the result of a single individual's efforts or of any small group. It has required the dedicated and imaginative efforts of many. The Directorate's Safety Action Teams, which were structured to assist program managers as well as operational commanders to achieve a better safety posture, have gained credibility to the point where they are now asked with some frequency by operating commands to assist in the search for solutions to problems.

Safety is now taking an active role in the modification, definition and certification process. This can only help the Air Force use its limited modification funds in a manner that will address the most severe, significant, and costly safety problems. The Air Force leads the way in implementing, in a workable, meaningful fashion, the Occupational Safety and Health Act of 1970. Program guidance has been in the field approximately 1 year, and some 53 General Industry Safety Standards are in preparation for publication and distribution to operating units. A revised AFR 127-4 is in the final stages of publication. Reporting processes called for in this new regulation are much simplified and every effort has been made to reduce the workload of field staffs.

While much has been accomplished in the last several years, we still have certain fundamental weaknesses to overcome. New generations of commanders, operations supervisors and middle managers sometimes overlook critical areas or repeat mistakes of the past. We find we must relearn old lessons.

As we demand ever higher performance levels from our weapon systems, sophistication and complexity increase. Engines today account for some 22% of all aircraft mishaps. Materials and machine processes are being taxed to the limit. Quality assurance becomes one of the most essential, but frequently overlooked, elements in the acquisition process. Development teams change so frequently that the decisions made today are someone else's problems tomorrow. The folks who design and build don't have to support and maintain, thus their emphasis or focus is on different elements of a weapon system.

All of this points to a very interesting and continuing challenge in the area of safety. In light of the ever increasing manpower and material costs and our vital need to maintain the most capable fighting force in the world, Safety will have an ever increasing role to play. But in perspective this contribution may have to be made with one-half or even, perhaps, a third as many people as today. We need to selectively and sternly eliminate those functions which are not high payoff items and do not contribute to the primary mission of protecting our combat capability and the men and women who are our Air Force.

To those of you who continue in this most essential career field I want to extend my best wishes for continued success and thank you for the outstanding support you have given me. ★

Richard E. Merkling

RICHARD E. MERKLING, Maj Gen, USAF
Commander
Air Force Inspection and Safety Center

From Whence We Came

70 YEARS AND STILL GOING STRONG

MSGT DAVE SYLVA, 63 MAW, Norton AFB, CA

We stand 'neath resounding rafters,
The walls around us are bare
They echo back our laughter
It seems that the dead are all there.

Stand to your glasses steady,
This world is a world full of lies
Here's a health to those dead
already
And hurrah for the next man
that dies.

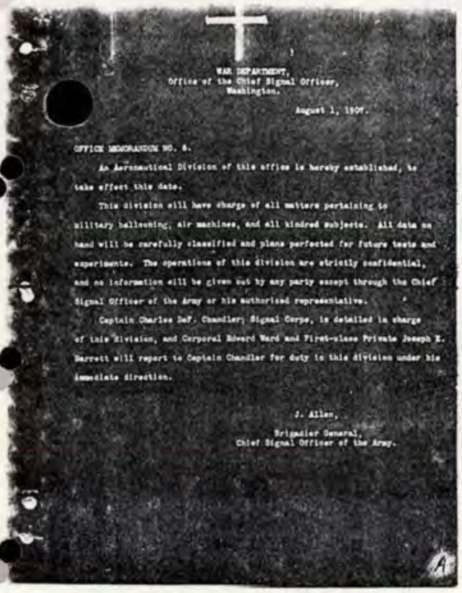
Seventy years ago, and just three and a half years after the Wrights' kite slipped the surly bonds, an innocuous memo from the Chief Signal Officer of the Army announced the establishment of "An Aeronautical Division."

The "Division" was staffed by three men; Captain Charles DeF. Chandler, Corporal Edward Ward and First Class Private Joseph E. Barrett. Shortly after his assignment, Barrett went over the hill and cut Air Force enlisted strength by 50 percent.

In 1904, just after Kittyhawk, the Wright brothers had offered their machine to the US Government, but some bureaucrat in Ordnance and Fortifications rejected the offer saying: "The War Department declines to lend financial support to the experimental development of devices for mechanical flight." The poor dude was probably licking wounds after the attacks the Army was suffering from the Congress and the newspapers for what they called "the assinine expenditure of government funds."

Nonetheless, nearly 5 months after the "Division" was established, the Signal Corps released specification bid No. 486. Exquisitely simple by today's standards the bid required: "The construction and delivery of a flying machine supported entirely by the dynamic reaction of the atmosphere and having no gas bag." It had to be "steered in all directions without difficulty and at all times under perfect control and equilibrium." It had to be able to carry "two men weighing 350 lbs together and enough fuel to fly 125 miles." It had to "fly for one hour and had to fly faster than 40 mph." The spec order listed as desirable that "the machine be capable of being assembled and put in operating condition in about one hour . . . that it be transportable by mule wagon" and that "the machine have some device to permit a safe descent in case of an accident to the propelling machinery."

The "Division" had no plane assigned for the first two years of its existence but some flight history was made during that time. The bicycle boys from Dayton brought out their 1905 model with a new, souped-up 30 hp engine installed. They began test hops at Ft. Meyer, VA, on September 3, 1908 with a one minute, 11 second flight. Two weeks later, Orville and his passenger, Lt Thomas E. Selfridge, were just beginning their fourth circling pass over the field when the starboard prop cracked lengthwise. The result was a wooden, non-variable pitch prop that was in low pitch. As the sick propeller started windmilling, the port motor, now out of sync, began to come apart. The shaft bent and the prop came loose cutting the guy wires that held the tail planes rigid.



WAR DEPARTMENT,
Office of the Chief Signal Officer,
Washington.

August 1, 1907.

OFFICE MEMORANDUM NO. 6.

An Aeronautical Division of this office is hereby established, to take effect this date.

This division will have charge of all matters pertaining to military ballooning, air machines, and all kindred subjects. All data on hand will be carefully classified and plans perfected for future tests and experiments. The operations of this division are strictly confidential, and no information will be given out by any party except through the Chief Signal Officer of the Army or his authorized representative.

Captain Charles DeF. Chandler, Signal Corps, is detailed in charge of this division, and Corporal Edward Ward and First-class Private Joseph E. Barrett will report to Captain Chandler for duty in this division under his immediate direction.

J. Allen,
Brigadier General,
Chief Signal Officer of the Army.

Memorandum No. 6 established an "Aeronautical Division" consisting of three men.

Orville Wright before the world's most modern flying machine.

Oft-published photo of Wright-Selfridge accident.

Those were the days—when aviation was young. Aircraft shown were typical of the day. Aircraft in upper photo was an early Curtiss.

The plane literally came unglued and fell to earth pinning both flyers. Orville was hurt but young Selfridge was dying. He whispered "Take this damn thing off my back" and passed out. Without regaining consciousness, Lt Selfridge became the first Army flyer to die in an aircraft accident.

The Wright Flyer was reassembled and continued its acceptance tests. On July 27, 1909, Orville and Lt Frank P. Lahm flew 5 miles from Ft. Myer to Alexandria, VA, averaging 42.583 mph. Six days later, the newspapers announced that "The Wright machine is now Aeroplane Number 1, Heavier Than Air Division, United States Aerial Fleet."

Two months later the Wrights taught Lahm and Lt Frederic E. Humphreys how to fly their machine. With three hours of dual time, they both soloed. Another young lieutenant named Benjamin Foulois got in on the training but didn't solo.

One month after soloing, Lahm and Humphreys were logging some time when they wrecked the bird. Without a machine and in accordance with the Army's "Manchu Law" these two men were relieved from their detached duty status and went back to their regular duties—Lahm to the cavalry and Humphreys to the Engineers. The operational "Division" was wiped out. The spirit wasn't dead though.

Lieutenant Foulois and some enlisted men packed up the kite and took it to Ft. Sam Houston, Texas, where the winds were more favorable and where there were fewer buildings to hit. Foulois stayed in touch with the Wrights by mail, and through a correspondence course learned how to land the thing. We were back in business and more interest was developing.

Up until 1911, we had one bird and one pilot. Congress had not appropriated one cent specifically for aviation. The Wright Flyer had been bought out of special experimental funds. The Signal Corps sidetracked installations maintenance funds for the aviation program. In fact, Ft. Sam had budgeted only $150 for gasoline and repairs.

In March, 1911, Congress voted $125,000 for Army Aeronautics. General Allen, still Chief of Signal immediately ordered five new planes at $5,000 apiece. The first two, another Wright B model and a Curtiss machine arrived the following month.

That same month, the Curtiss School and its students, Lts Beck, Walker and George E. M. Kelly, moved from North Island at San Diego to Fort Sam. One month later, Kelly was killed in a crash and the furious commanding general barred any further flying from *his* drill field.

Lieutenants Milling, Kirtland, and Henry "Hap" Arnold joined aviation that year. Arnold who had graduated from the Point in 1907 without ever having heard of the Wrights or of Kittyhawk would go on to become our first and only five star general.

The "Division" would become the Aviation Section, then the Air Service, the Air Corps, the Air Forces and forty years after its establishment would sever the bonds with the Army and become the United States Air Force. ★

THE MISSED APP

ROBERT E. BURGIN
Air Safety Investigator
National Transportation Safety Board

Although Air Force flying procedures and practices differ somewhat from those of the air carriers and general aviation, pilot fixation on landing is, nevertheless, a problem to all three. This paper, which discusses the missed approach and pilot landing expectancy, was presented before the 29th annual International Air Safety Seminar and Aviation Technical Exposition, Anaheim, California, in October, 1976.

The number of instrument approaches flown in the United States each year is approaching two million; few result in actual IFR missed approaches. Although the total number of approaches flown is compiled by the Federal Aviation Administration (FAA), it appears that no like comparison is being made regarding the numbers of missed approaches that occur. Because of this lack of information we are unable to determine the success rate of instrument approaches. The only statistics that deal in success rates are accident statistics where it is obvious that the approach was unsuccessful.

Pilot experience substantiates the fact that an actual IFR missed approach is an infrequent event. Pilots operating routinely in the air space system have difficulty recalling many past actual IFR missed approaches. Surprisingly, they often also have difficulty recalling the missed approach procedures for approaches that are so familiar that they have committed them to memory, not to mention the missed approach procedures for an approach that they have just successfully completed to a landing. That pilots are not attentive to the missed approach procedures is verified by my observations of crews

ROACH

while occupying the jump seat. I have rarely heard a discussion of the missed approach procedures; however, I almost always hear a discussion of the approach procedures when weather approaches minimums. While a silent review of the missed approach procedures by each of the crewmembers is sometimes observed, the approach procedures are almost always orally reviewed. Additionally, my observations are supported by the CVR tapes from accident aircraft.

In an 11 year period between 1965 and 1975, there were 48 aircraft accidents associated with the missed approach regime. Additionally, numerous landing accidents could have been prevented had the pilot elected to make a missed approach rather than to risk a poor approach or landing. What then is the cause of our lack of attentiveness to the missed approach? A possible reason may be that we are so oriented to operating in a total radar environment that we believe that the controller will take care of us should a missed approach be required. Another possibility is that the actual published missed approach procedure is rarely flown when a missed approach occurs, so why bother reviewing a procedure we will not fly. A third possibility is that the missed approach procedure is so uncomplicated that a review is not deemed necessary. A review of several approach procedures disclosed that in some cases the procedure for the missed approach is more complicated than the approach itself. Although each is a possible reason as to why we are not attentive to the missed approach, a review of the facts, conditions, and circumstances of landing and approach accidents indicates an underlying phenomenon that is prevalent in pilots, air traffic controllers, and the air traffic control structure. This phenomenon is called "landing expectancy." This paper deals with this phenomenon.

Landing Expectancy

Their decisions could be based on how they would like circumstances to be rather than what is reality.

Expectancy, or set, can be defined as an anticipatory belief or desire. Certainly the pilot anticipates that he will land and he has a desire to do so. Unfortunately his landing expectancy, which operates at a subconscious level, affects his decision-making processes to the point where a safe landing may not become a reality. The controller also has the belief and desire for landing, although for possibly different reasons. In essence, the individual has his own rationale supporting his expectancy; that is, his expectation provides the basis for his perception. This could mean that a pilot or controller can perceive situations to be different from actual circumstances. Thus their decisions could be based on how they would like circumstances to be rather than what is reality. The landing expectancy phenomenon is derived from experience, as are the meanings attached to any stimulus. This is what leads to accidents because we become influenced by this subconscious behavior instead of by the reality of the situation. For this reason, it is important that the users of the air space system be able to control these false motivating factors.

Pilot Landing Expectancy

"Well, I am sort of programmed for landing, I am oriented to landing."

The facts, conditions, and circumstances of several recent aircraft accidents illustrate that pilots, especially airline pilots, have an expectancy to land from every instrument approach. The fact that they almost always succeed reinforces their belief. Additionally, a pilot's competitive nature can also reinforce his belief; e.g., "Eastern 421 just missed but I can hack it." An example of pilot landing expectancy occurs when we execute a missed approach while at the same time attempting to review the missed approach procedures. An excellent example of the strength of the landing expectancy phenomenon can be found in the captain's testimony regarding the recent accident at St. Thomas. When asked why he did not go around or push the aircraft onto the runway when he recognized that the landing would be longer than normal, the captain replied, "Well, I am sort of programmed for landing, I am oriented to landing."

Because pilots are so strongly oriented to landing, there is a tendency to eliminate viable alternatives and opt for attempting a landing or try such feats as beating the weather to the field, continue unstabilized approaches or descend below decision height attempting to get the airplane on the ground. Thus they can end up in situations where they can't stop the aircraft on the runway remaining nor can they go around successfully; the result—an accident.

Controller Landing Expectancy

The expectancy phenomenon can be such a strong motivation force that controllers can fail to recognize that an airplane has landed or crashed as has been the case in several recent accidents.

In addition to pilots having a landing expectancy, air traffic controllers also have certain landing expectancies. They want to get the pilot out of the system. The strength of their expectancy depends on the type of pilot making the approach. Controllers are less likely to expect that a general aviation pilot will land out of an approach than they are to expect that an air carrier pilot will land. The controllers' expectancy is based on previous experience. Their expectancy is reinforced by the information pertaining to missed approaches contained in the FAA Air Control Manual 7110.65 which bases ATC procedures on the controller's judgment that weather conditions are such that approaches are likely to be missed. Thus, if the controller doesn't consider the weather bad enough, most likely he expects the pilot to land out of every approach. Should a pilot wish to demonstrate this controller expectancy, just make a missed approach at O'Hare when the weather is below VFR but substantially above minimums and no one else has made a missed approach. You will rapidly learn that cleared for an approach implies cleared for the approach to land; not cleared for the approach and missed approach. To further illustrate this phenomenon, the next time you are cleared for an approach, ask the controller what he would like you to do should you make a missed approach. You may be greeted with a period of silence. The expectancy phenomenon can be such a strong motivating force that controllers can fail to recognize that an airplane has landed or crashed as has been the case in several recent accidents.

Air Traffic Structure Landing Expectancy

Because a missed approach involves two controlling functions, each operating under different sets of assumptions, the sequencing of missed approach traffic back into the structure is often less than problem free.

Along with the controller and pilot landing expectancy, the ATC structure is oriented to the pilot landing out of an approach. A review of FAA's air control manual indicates that all spacing criteria are oriented either to takeoff or to landing. The manual contains little in the way of definitive information regarding the spacing and sequencing of aircraft on missed approaches. Substantiating the premise that the structure is oriented to landing is the practice of assigning arrival controllers to handle aircraft arrivals and departure controllers to handle departures. The missed approach falls somewhere in between; some of the procedure relates to arrival and some to departure. In this regard both controllers must become involved in the missed approach when it occurs and coordination between the two controlling functions is mandatory. Because a missed approach involves two controlling functions, each operating under different sets of assumptions, the sequencing of missed approach traffic back into the structure is often less than problem free.

An example of the type of problems that may occur is the missed approach procedures for the ILS to runway 28R at San Francisco. The missed approach fix is within 3 miles of the centerline of the Point Reyes One Standard Terminal Arrival route. Sequencing missed approach aircraft may require vectoring aircraft out of the arrival route, or the procedure may be completely prohibitive with regard to separation criteria. Another more serious consequence of the landing expectancy of the ATC structure could be the failure to identify conflicting procedures and implement corrective action. In one recent incident, separation procedures were developed and put into use that were unsafe, yet none of the parties involved in the procedure development recognized the unsafe condition, nor did anyone in the review cycle. It took a serious system error to identify the problem.

A LANDING EXPECTANCY INCIDENT

To illustrate how the landing expectancy phenomenon in the overall air traffic system can cause dangerous situations and lead to serious accidents, I will discuss a recent near midair collision incident that occurred this year. This incident involved elements of each of the three types of landing expectancy.

On April 1, 1976 a Hughes Airwest DC-9 and a Northwest Airlines DC-10 almost collided in instrument meteorological conditions over the Spokane International Airport, and came in close proximity to a DC-10 that had just departed the runway. The crew of the DC-9 estimated that the miss distance was about 20 feet. (Crosscheck Nov. '76)

Landing expectancy was exhibited in the following facts of the case:

The DC-9 captain did not follow established company approach procedures and continued an approach when it was apparent at the outer marker that he would have great difficulty in safely getting the aircraft on the ground from his position. Additionally, although not required to do so, he failed to contact the tower until inside the outer marker on short final.

The separation procedures used by Fairchild RAPCON and Spokane Tower did not provide positive separation between arriving and departing aircraft because too much reliance was placed on a non-mandatory report from the arriving pilot that his aircraft was over the final approach fix inbound to the airport.

The DC-9 captain thought that he was operating in a total radar environment. What he actually was operating with was a radar approach control and a VFR tower.

The Spokane Tower local controller, without knowing the exact position of the DC-9, based his clearance for the DC-10's takeoff on the fact that the DC-9 had not reported at the outer marker. Following the DC-9's report of "inside the marker," the local controller attempted to apply IFR separation criteria on the assumption that the DC-9 would be able to land from the approach.

When informed by the local tower controller of the DC-9's missed approach, the radar approach controller issued the published missed approach procedures and did not recognize the possible traffic conflict.

WHAT IS THE ANSWER?

Recognizing that the phenomenon exists, how do the participants in the ATC system counteract the landing expectancy on a conscious level?

First, for the pilot, there appears to be three things that he can do in this regard.

Become intimately familiar with the missed approach environment. This can be accomplished through situation training in the simulator where missed approach decisions can be practiced under varied conditions and during various parts of the approach profile. He has to learn what he can and can't do in this environment if he is to reduce uncertainty and place landing expectancy in its proper place.

Prepare for the missed approach as well as he does for the approach. This will help reduce much of the uncertainty of go or no go situations. The recent initiation by several air carriers of the sterile cockpit concept should assist in the crew being better prepared for the approach and missed approach because it will provide uninterrupted time for preparation of an approach.

Adhere to established procedures with regard to acceptable approach limits and have many of the decisions regarding missed approaches preplanned. That is, if he should exceed his pre-established limits, he will execute a missed approach. It is important that the other crewmembers adhere to this concept also.

The controller has two defensive actions at his disposal:

Adhere to established clearance criteria and be very cautious of minor deviations.

As the controller clears an aircraft for an approach, he should ask himself: What am I going to do should a missed approach become necessary?

Controlling air traffic structure landing expectancy can only be done through adequate knowledge by each of the participants in the system of how the system works and when potential problems may be expected. To things can be done in this regard:

Pilots and controllers should question procedures that appear in conflict with safe operating practices.

New missed approach procedures should be reviewed to make sure that they do not interfere with established arrival and departure procedures.

In summary, because of the relative infrequency of actual IFR missed approaches and because of the development of this landing expectancy phenomenon that results, three questions should be answered by all participants in the system prior to the initiation of any approach:

Am I, the pilot, as prepared to execute a missed approach as I am to fly the approach?

Am I, the controller, prepared should a missed approach occur?

Is the ATC system prepared to handle a missed approach should one occur?

In essence, I have discussed a behavioral phenomenon that can affect the success of an approach and landing. The prudent pilots and controllers, through adequate planning, are able to prevent landing expectancy from adversely affecting their decision making while on final approach, thus improving their own safety as well as the safety of the passengers—Courtesy **Crosscheck** Jan 77. ★

A LITTLE JOLT'LL DO YA!

LT COL M. W. ALLINDER, JR.
USMC
VMFA-122

Four crews of F-4 Phantoms were preparing for return to MCAS Homebase. The birds were being refueled by truck while one crew was filing the DD-175 for the return flight. During the refueling process, the afternoon sky began to darken with the "duty boomer" moving up from the southwest, obscuring the afternoon sun. The sky was hazy but clear to the north and east—just the normal, usual scattered midsummer afternoon thundershower, right? Ten minutes and six stricken Marines later, the ambulances would arrive to police up after this "usual" isolated thundershower.

The first indications of a storm were the heavy black curtains of rain that began to fall while the weather was 2 or 3 miles from the field. The display of lightning prompted one of the aircrews to secure refueling at once. As the fuel trucks drove away, it appeared that perhaps the storm would skirt the field to the north, and two crews plus their plane captain continued to inspect their birds in preparation for a start and go after the shower passed.

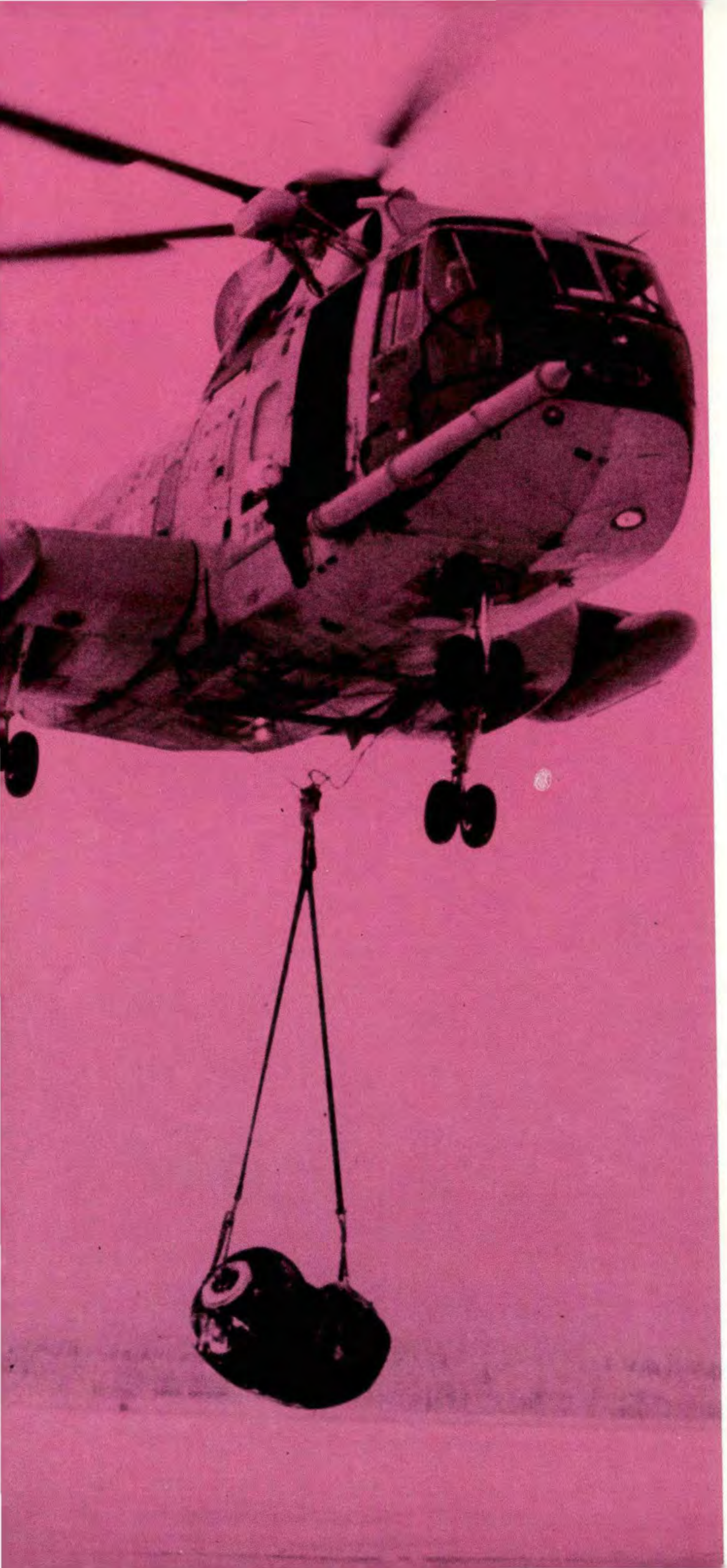
When light rain began to fall, most of the crews ducked under their clean Phantoms. A couple stretched out on the ground. Shortly, the intensity of the rain increased sharply, the wind picked up to about 20 knots, and the water began running under the planes. As a result, everyone had to rock on their haunches to stay dry while marvelling at the small hail that began to pellet the ground. The hail was being blown along by winds now gusting to 35 knots. Base ops was about 200 meters away, so no one wanted to make a dash for it and get wet(ter).

The crack of the lightning wasn't nearby at all; perhaps several hundred meters away. There was no flash, but simultaneously with the report, a lot of things happened. Under one Phantom, one airman was writhing on the ground; one plane captain was prostrate, unmoving and turning black in the face. One airman had his arm curled up in a peculiar contraction. Under a second F-4 one airman and two plane captains were knocked flat. Since no one was touching an aircraft, the lightning had apparently run along the ground, conducted by the rain on the mat, and shocked the Marines. Mouth-to-mouth resuscitation was immediately administered to the two downed Marines, along with sharp pounding on the chest of the immobilized plane captain whose heart had appeared to stop. The two more severely shocked were held by the hospital for 2 days of observation. The other four were examined and released, apparently no worse for wear. The birds were turned up later and had no discrepancies.

Lessons to be learned? None! We "know" that thunderstorms are cranky. We "know" to get in out of the rain, wind, and lightning. We "know" all these things already, don't we? You better believe six wide-eyed, deep breathing Marines know what to do when afternoon thundershowers approach!—Courtesy June 1977 **Approach** magazine. ★

NAME THAT PLANE

This was the first Air Corps attempt to modernize the fighter force to keep up with bomber developments. For answer see inside front cover.



BEWARE

While lifting a truck from an LZ at 60 feet above the ground and 29 kts, the CH-53 yawed and settled back toward the ground. . . .

The aircraft settled into its own disturbed air mass resulting in power settling. . . . (From a recent report.)

Fixed wing aircraft create a downwash as a by-product of lift. Helicopters also produce a downwash, known as induced flow. Although this induced flow is always present around the periphery of the rotor, under certain airflow conditions it can add to the already existing tip vortices causing these vortices to intensify. Coupled with a stall spreading outwards from the root end of the blade, induced flow can result in a sudden loss of lift and a subsequent loss of height. This is a condition known as "settling with power" or "vortex ring." It is somewhat like flying in one's own wake.

The purpose of this paper is not to publish any great new discovery about settling with power, I merely want to remind each helicopter pilot of its conditions, symptoms, development, recovery and most important its prevention.

The conditions in which vortex ring can develop are:

- A combination of low indicated airspeed (below 20 knots), and a high rate of descent (greater than 400 feet per minute).
- A downwind approach.
- Application of power when recovering from a low airspeed autorotation without first increasing airspeed.
- A misjudged and consequently fast approach which requires a flare to be maintained in the final stages

OF VORTEX RING

CAPTAIN JOHN G. TAYLOR III, USAF/RAF Exchange Program

of the descent.

The symptoms of the development of vortex ring are:

- Rudder and stick shake.
- Random yawing.
- Rapid increase in rate of descent.
- Cyclic stick less effective.
- Random rolling and pitching.

Note: Stick shake and random yawing can occur in turbulent conditions on steep approach; therefore, it is essential to cross-check airspeed and rate of descent to distinguish between turbulence and the onset of vortex ring.

We know when vortex ring is likely to occur and what it feels like; now we will look at its development. For hovering, and low rates of descent, the velocity of the induced flow through the disc exceeds the rate of descent itself, and an induced flow pattern similar to that shown in Figure 1 is obtained. In this state all flow through the rotor is downward (relative to the rotor). If collective pitch is reduced to begin a rate of descent sufficient for the rate of descent airflow to equal the rate of induced flow (see figure 2), the airflows at the root of the blades cancel each other, causing the angle of attack of the blades to increase in an attempt to maintain lift. At the tips of the blades the conflicting airflow outside and inside the disc will intensify the tip vortices, further increasing the induced flow.

If the collective pitch is lowered further, the rate of descent will again increase (figure 3); the process will be repeated, and eventually a condition will be reached where the root end of the

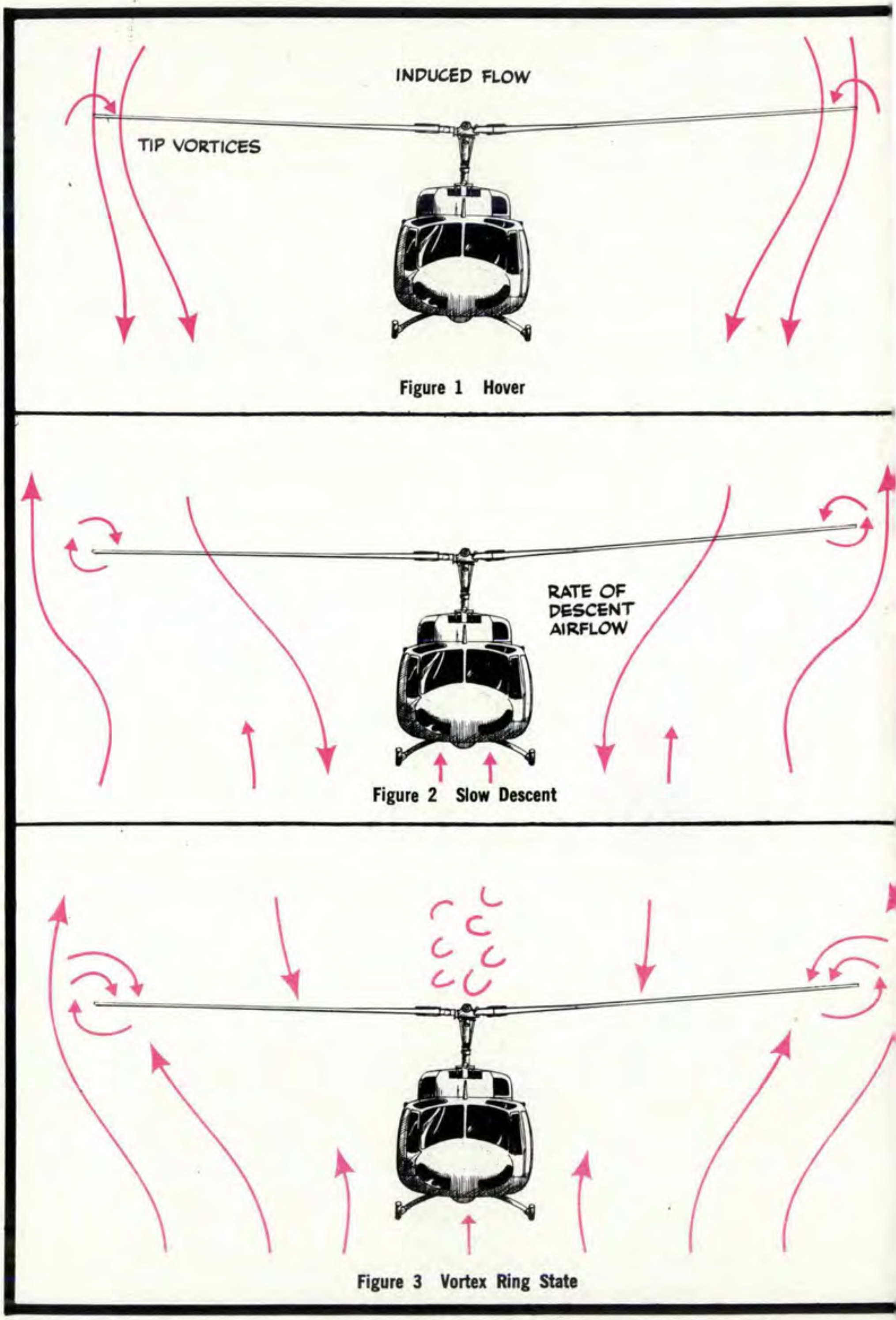


Figure 1 Hover

Figure 2 Slow Descent

Figure 3 Vortex Ring State

blade will reach its stalling angle of attack. At this stage, lift is decreased both at the tip of the blade, due to the vortices, and at the root of the blade, because of its stalled condition, leaving little area in between to produce the lift necessary to balance the weight. Any further increase in the rate of descent resulting from lowering the lever will further reduce the area of the blade that is effectively producing lift. Once a condition is reached where the lift becomes insufficient to balance the weight, then the rate of descent will rapidly increase, to as high as 6000 fpm[1] on some types of helicopter.

Wind tunnel experiments show that the vortices form and intensify in a most erratic manner, subjecting each blade inboard from the tip to large and sudden variations in angle of attack. Dissymmetry of lift occurs and the helicopter will pitch, roll and yaw to no set pattern, making control extremely difficult. In fully developed vortex ring, raising the collective pitch lever will only aggravate the condition by increasing angle of attack and, instead of slowing the rate of descent, will cause it to increase.

We've seen that raising the lever only aggravates the situation, how then do we recover? To recover from vortex ring it is necessary to change the airflow conditions which are causing it. To recover:

1. Change the disc attitude to achieve forward flight or bank the aircraft, so that the induced flow no longer opposes the rate of descent airflow, and then wait until the airspeed has increased to a safe figure (above 20 kts) before increasing power.

2. Enter autorotation, but it may be impossible to keep the rotor from overspeeding and a full recovery will require a considerable loss of height.

Since a helicopter pilot spends much of his flying time below 1000 feet and recoveries take altitude, we must really concentrate on prevention. Below are listed points which every helicopter pilot should know:

- It is in the low airspeed condition that vortex ring will occur. Ensure, if power is required to arrest any descent or sink, that it is applied before that low airspeed condition is reached (see Figure 4)[2].
- The most likely time for the indicated airspeed to be unexpectedly low is when turning downwind or making a downwind approach.
- Know where the wind is and monitor the airspeed indicator closely when maneuvering at low speed.
- Remember that the onset of vortex ring will be encountered earlier at high gross weights and high density altitudes, because the higher angles of attack required.

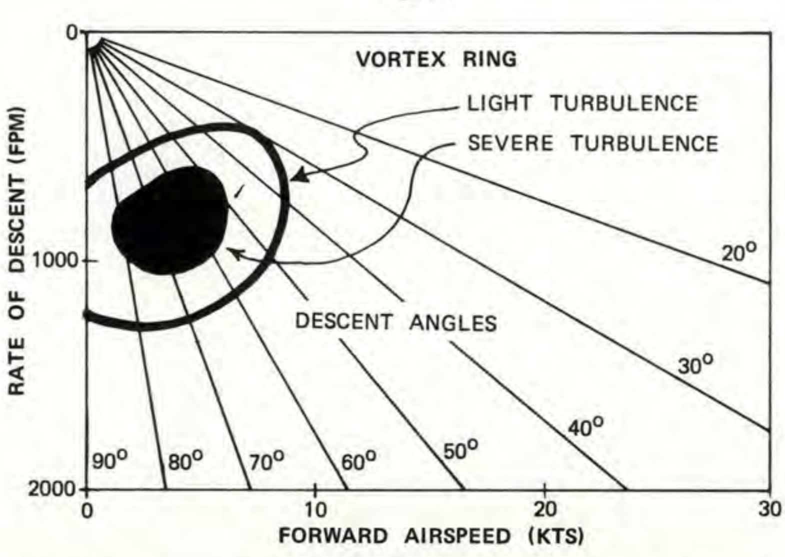
In the operational environment and with many other factors to think about, it is unlikely that all these points of aerodynamics will be foremost in our minds. For that reason it is useful to know of them and to consider them from time to time on the ground, so as to retain our instinct for "BEWARENESS" OF VORTEX RING.

[1]*Royal Air Force Air Publication 3456A*, Principles of Flight, *Part 2, Section 1, Chapter 5.*
[2]*Royal Air Force* Air Clues, *Volume 30, Number 9, September 1976.*

ABOUT THE AUTHOR

Captain Taylor is a graduate of Rutgers University. He was commissioned through Officers' Training School in December 1968 and attended Undergraduate Pilot Training at Craig Air Force Base. He then was assigned to EC-121Ds, and after a year of temporary duty was sent to Rotary Wing Conversion at Fort Rucker. After serving as Chief, Aircrew Standardization for the 40th Aerospace Rescue and Recovery Squadron at Nakhon Phanom Royal Thai Air Force Base, he joined the instructor staff at the Instrument Flight Center. He is presently assigned as a helicopter instructor pilot on exchange with the Royal Air Force at Royal Air Force Shawbury. ★

Figure 4



NOTE: Several interesting conclusions can be drawn from figure 4. First, the vortex ring state can be avoided by descending on flight paths shallower than about 30° (at any speed). Furthermore, for steeper approaches it can also be avoided at sufficiently slow or sufficiently fast speeds. In both cases the turbulent wake created by the vortex ring is not remaining in the vicinity of the rotor and causing problems. At very shallow descent angles, the wake is shed behind the helicopter. At steep angles, it is below the helicopter at slow rates of descent, and above the helicopter at high rates of descent.

XC AND TA

MAJOR JOHN E. RICHARDSON, Directorate of Aerospace Safety

Cross-country flying can be a refreshing change from the routine of local training missions, offering opportunities for a rewarding flying experience. However, a cross-country flight that is not carefully planned can become a frustrating, thoroughly unsatisfactory experience. A large part of this frustration comes about when the expected transient services are not available.

In the past decade we have become spoiled by the excellent service most transient alert people provide. We have come to expect exceptional service, far beyond what is required.

This kind of service was possible as long as manning was adequate, but now with cuts in personnel, everyone has to do more with fewer people. Although commanders are charged with providing transient services, this is an additional responsibility to be accomplished after the primary mission. No commander can be expected to jeopardize his mission merely to provide service to transients.

This doesn't mean that you can't get service. It merely means that some of the extra frills are gone. It means that we will have to take more responsibilities for our own aircraft when we go to a strange field.

One good way to avoid unpleasant surprises at a transient base is to plan ahead. Take a look at the IFR supplement. Look for the information on servicing and availability of transient services. Many bases now have limited transient services outside normal duty hours, and the base may advise transients to expect delays in refueling, etc., during certain periods. For those flying drag chute equipped aircraft, several bases, even with similar aircraft types, will not provide drag chute repack service on weekends or after duty hours.

Once you have checked the IFR supplement and the NOTAMS, you may have some question about services available. Do you want a quick turn? Or maybe you plan to arrive after normal duty hours. If so, call the transient alert supervisor at that base. He can tell you whether the base can handle your needs. It is rather embarrassing to discover after landing at Somewhere AFB that they don't have the proper equipment to service your aircraft. Another bit of planning can help make your trip more enjoyable. Very few TA facilities operate at full strength 24 hours a day. When TA is at minimum manning you should expect delays, so, whenever possible plan to arrive during normal operating hours.

A few comments on eating facilities. The days of elaborate flight line snack bars are numbered. Most places now are exclusively vending machine operations. This means that you will need change and you probably won't be able to get it at Base Ops.

I still fly cross-country regularly, and I find that with a little planning it is a most enjoyable experience. Just remember the responsibility for your aircraft is still yours as long as you are away from home base. Transient services personnel will do all they can to make your stay on their base enjoyable. But they do need your help. By the way, when you go to a base and find the service to be exceptional (good or bad), drop us a line at *Aerospace Safety* magazine. We need the information to help us schedule Rex Riley Transient Services visits. ★

THE INTERNATIONAL S

The metric system was conceived in the 16th century in an effort to solve the confusion resulting from the many different methods then used in determining weights and measures. In 1790 the French Academy of Sciences adopted the system, based on the metre as a unit of length and the gram as a unit of mass, as a practical measure to benefit industry and commerce, and as a system suitable for adoption by the entire world. This initial effort has evolved, as more and more units of measure became needed, and as more countries joined the organization, into an International Bureau of Weights and Measures, located near Paris. Also, a General Conference on Weights and Measures (CGPM) has been constituted to handle all international matters concerning the metric system. In 1960, with 36 countries participating, the CGPM gave the modern standard measurement system the title of the International System of Units, for which the abbreviation is "SI" in all languages.

If everyone had gotten together and adopted the same system in 1790 things would be a lot easier for us now. As more items were discovered that needed measuring they could have been incorporated into a standard system. But that did not happen so the "world" is attempting it now. It will be a long and, in some cases, expensive transition, but well worth the effort because the SI metric system is TEN TIMES easier to use than most of the other systems presently in use.

Situations that tend to confuse the SI usage will exist for some time to come. For instance, the *litre* is a special name widely used for the cubic decimetre. The reason the term litre was not preferred for the SI system is: an early definition of litre was that it equaled the volume occupied by the mass of one kilogram of pure water at its maximum density under normal atmospheric

CONVERTING FROM U.S. CUSTOMARY TO SI METRIC UNITS

MULTIPLY THE U.S. CUSTOMARY UNIT:	BY THE BELOW CONVERSION FACTOR	TO CONVERT TO THE BASIC SI METRIC UNIT: UNIT (SYMBOL)
LENGTH		
INCHES	0.0254	**METRE (m)** ABOUT 3.28 FEET
FEET	0.3048	
YARD	0.9144	
INTERNATIONAL NAUTICAL MILE (6076.115 FEET)	1852.0	
AREA		
SQUARE INCHES	0.000 645 16	**SQUARE METRE (m^2)** ONE SQUARE METRE EQUALS ABOUT 10.76 SQUARE FEET.
SQUARE FEET	0.092 903 04	
SQUARE YARDS	0.836 127 4	
SQUARE MILE (INTERNATIONAL NAUTICAL)	2 589 988.0	
VOLUME/CAPACITY		
FLUID OUNCES (US)	0.000 029 573 53	**CUBIC METRE (m^3)** ONE CUBIC METRE EQUALS ABOUT 264 U.S. GALLONS.
FLUID PINTS (US)	0.000 473 176 5	
FLUID QUARTS (US)	0.000 946 352 9	
FLUID GALLONS (US)	0.003 785 412	
MASS/WEIGHT		
OUNCE (AVOIRDUPOIS)	0.028 349 52	**KILOGRAM (kg)** ONE KILOGRAM EQUALS ABOUT 2.2 POUNDS (AVOIRDUPOIS). DO NOT BE CONFUSED BY THIS ONE! THE PREFIXES ARE ADDED TO THE WORD "GRAM" (g) TO FORM DESIRED MAGNITUDES OF THE GRAM. THE kg IS THE SIZE OF THE PROTOTYPE MODEL MAINTAINED IN PARIS.
POUND (AVOIRDUPOIS)	0.453 592 4	
SHORT TON (2000 POUNDS)	907.184 7	

THE DECIMAL EQUIVALE[NT] OF EACH PREFIX IS:

1 000 000 000 000 00
1 000 000 000 00
1 000 000 000 0
1 000 000 0
1 000 0
1 0
1

0.
0.0
0.000 0
0.000 000 0
0.000 000 000 0
0.000 000 000 000 0
0.000 000 000 000 000 0

CONVERTING FROM THE U.S. CUSTOMARY SYSTEM TO THE SI BASIC VALUES. Multiply the U.S. value by the appropriate conversion factor listed above. Example: .0254 times 6 inches equals .1524 metre.

CONVERTING FROM THE SI BASIC VALUES TO THE U.S. CUSTOMARY SYSTEM. Divide the basic SI value by the appropriate conversion factor. Example: .1524 metre divided by .3048 equals .5 feet.

CONVERTING WITHIN THE SI SYSTEM requires only a shift of the decimal point. However, you may have difficulty, at first, determining how far and in which direction to move the decimal. The information below will show you how easy it is.

DECIMAL DIRECTION: Down — Right, Up — Left. Converting down the prefix scale the decimal is always moved to the *right:* 1 kilometre converts to 1 000 metres. Converting up the prefix scale the decimal is always moved to the *left:* 10 000 metres convert to 10.000 kilometres.

NUMBER OF SPACES THE DECIMAL SHOULD BE MOVED. The "power value" of each prefix will tell you how many spaces the decimal should be moved. Locate "centi" in the above chart. The column to its left shows centi's power value to be 10^{-2}. For our purposes you should **DISREGARD THE 10 AND THE MINUS SIGN.** Thus, centi's power value is 2, micro's is 6, kilo's is 3, etc. (The basic unit, for our purposes, has no power value). The way these power values are used depend on which of the basic units we are working with.

CONVERTING PREFIXES WHEN WORKING WITH BASIC UNITS OF THE GRAM (g), OR METRE (m). *Converting from gram or metre to a prefix value,* you simply move the decimal the number of spaces indicated by the power value of the prefix you are going to. Example: Converting .1524 metre to centimetres (power of 2), you move the decimal 2 spaces to the right (going down the scale), so, .1524 metre becomes 15.24 centimetres, or, .1524 m = 15.24 cm.

Converting from a prefix value to the basic unit of gram or metre move the decimal the number of spaces indicated by the power of the prefix you are going from. Example: Converting 35.16 centimetres (power of 2) to metres, you move the decimal 2 spaces to the left (up the scale), so, 35.16 cm = .3516 m.

NOTE: Prefixes *deka thru exa* form the *upper half* of the scale. Prefixes *deci thru atto* form the *lower half* of the scale.

Converting from a prefix in one half of the scale directly to a prefix in the other half of the scale, add the power values of the prefixes you are working with, then move the decimal that many spaces left or right, depending on whether you are converting up or down the scale. Example: Converting 84 579 micrometres (power of 6) to kilometres (power of 3), you would move the decimal 9 spaces to the left (up the scale), so, 84 579 um = .000 084 479 km.

Converting from one prefix to another on the same half of the prefix scale. You must first find the difference between the powers of the prefixes to determine how far to move the decimal. Example: Converting 567 899 micrometres (power of 6) to centimetres (power of 2), you would move the decimal 4 spaces to the left (up the scale), so, 567 899 um = 56.789 9 cm.

Converting prefixes when working with basic unit of a **SQUARE METRE** *(m^2).* Multiply all of the power values by 2 and follow procedures for converting grams or metres. Example: Centi now has a power of 4 (and for our converting purposes, the basic unit still has no power value). To convert 6580 square centimetres to square metres, you move the decimal 4 spaces to the left (up the scale), so, 6580 cm^2 = .6580 m^2.

Converting prefixes when working with basic unit of a **CUBIC METRE** *(m^3).* Multiply all of the power values by 3 and follow procedures for converting grams or metres. Example: 6580 cm^3 = .006 580 m^3.

10

HE

pressure; however, it was later determined that the litre, so defined, was the equivalent of 1.000028 cubic decimetres. So, even though that definition has been withdrawn (the litre is now defined as the volume occupied by one cubic decimetre), using the term litre in precision measurements might conflict with measurements recorded under the old definition. Thus, *cubic decimetre* was adopted as the proper SI term, even though litre may still be used for the measurement of small amounts of liquids and gases. No prefix other than "milli" should be used with the name litre.

Similar confusion can result from the name *"hectare"* which is often used for an area equal to one square hectometre; it is simply another name for the same value. So if you are looking at the metric system for the first time, why not favor the internationally accepted system, the SI system?

The charts below compare the U.S. customary system with the SI system; this helps to get the initial relation of what term is large and what term is small. The charts then explain how the SI terms apply to each other, which is the most important because the sooner one is able to think in metrics, the easier it is.

We are, obviously, only scratching the surface. If you desire more complete information on the SI system the ASTM Standard Metric Practice, ANSI/ASTM E 380-76, IEEE STD 268-1976, which has been approved for use by agencies of the Department of Defense, may be ordered ($4.00) from:

American Society for Testing & Materials
1916 Race Street
Philadelphia, PA 19103
U.S.A.

"POWER VALUE," OR EXPONENTIAL EXPRESSION OF EACH PREFIX.

"PREFIX SCALE" TO KEEP FROM HAVING TO WRITE LONG DIGIT NUMBERS YOU CAN PUT ONE OF THESE PREFIXES IN FRONT OF THE BASIC UNIT'

	PREFIX	SYMBOL	PRONUNCIATION (USA) *
10^{18}	exa	E	EX' A (*A* AS IN *A*BOUT)
10^{15}	peta	P	PET' A (*E* AS IN P*E*T, *A* AS IN *A*BOUT)
= 10^{12}	tera	T	AS IN *TERR*ACE
= 10^{9}	giga	G	JIG' A (*I* AS IN J*I*G, *A* AS IN *A*BOUT)
= 10^{6}	mega	M	AS IN *MEGA*PHONE
= 10^{3}	kilo	k	KILL' OH
= 10^{2}	hecto	h	HECK' TOE
= 10^{1}	deka	da	DECK' A (*A* AS IN *A*BOUT)
asic unit of: metre, square metre, cubic metre, or gram)			
10^{-1}	deci	d	AS IN *DECI*MAL
= 10^{-2}	centi	c	AS IN *CENTI*PEDE
= 10^{-3}	milli	m	AS IN *MILI*TARY
= 10^{-6}	micro	μ	AS IN *MICRO*PHONE
= 10^{-9}	nano	n	NAN' OH (*AN* AS IN *ANT*)
= 10^{-12}	pico	p	PEEK' OH
= 10^{-15}	femto	f	FEM' TOE (*FEM* AS IN *FEM*ININE)
= 10^{-18}	atto	a	AS IN AN*ATO*MY

* The first syllable of every prefix is accented to assure that the prefix will retain its identity. Therefore, the preferred pronunciation of kilometre places the accent on the first syllable, not the second . . . kill' oh meter.

TEMPERATURE CONVERSION

(Degrees Celsius x 1.8) + 32 = Degrees Fahrenheit (°F)

(Degrees Fahrenheit − 32) ÷ 1.8 = Degrees Celsius (°C)

NOTE: The SI unit of temperature is the kelvin (K), however, the Celsius scale (formerly called centigrade) is also acceptable.

SIMPLIFIES PRICE COMPARISONS

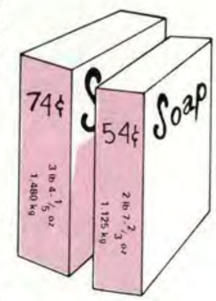
To compare unit price of 3-lb 4-1/5 oz Giant size at 74c with 2-lb 7-2/3 oz Large size at 54c convert weight to ounces and divide into selling price:

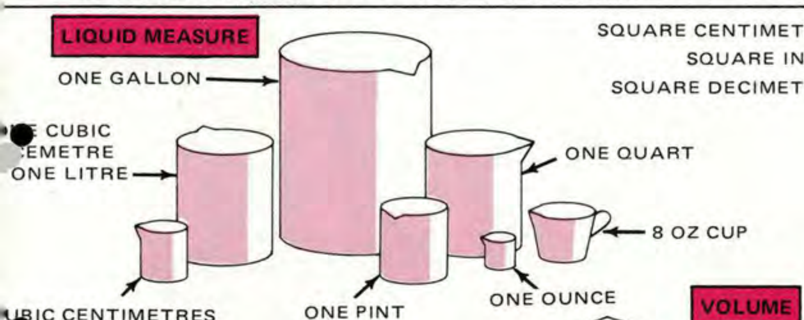
EXAMPLE:

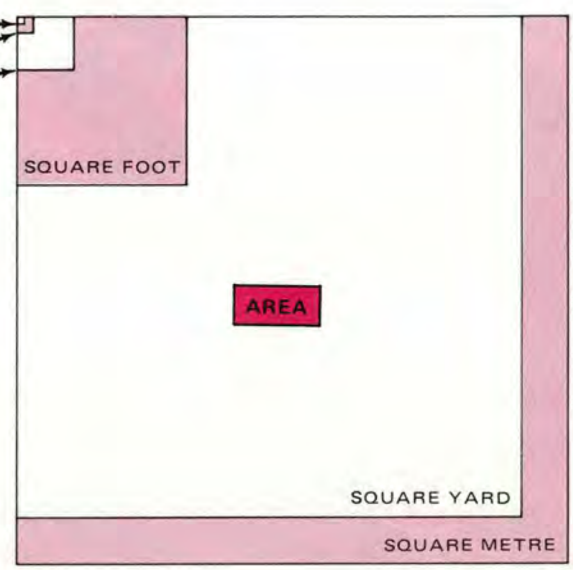
3-lb 4-1/5 oz = 52.20 oz
74c/52.20 oz = $.0142 per oz
2-lb 7-2/3 oz = 39.67 oz
54c/39.67 oz = $.0136 per oz

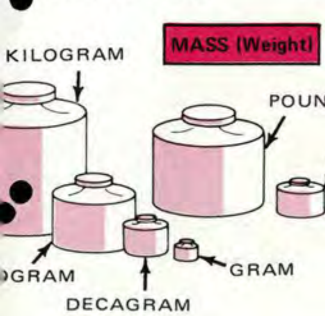
this indicates the smaller package is the better buy.

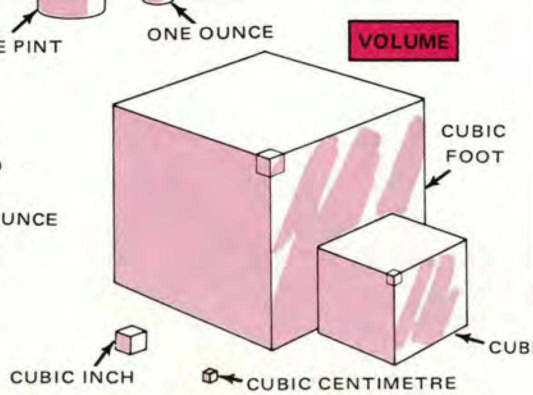
By using the metric system we eliminate conversions, thus: 74c/1.480 kg = 50c per kg and 54c/1.125 kg = 48c per kg.

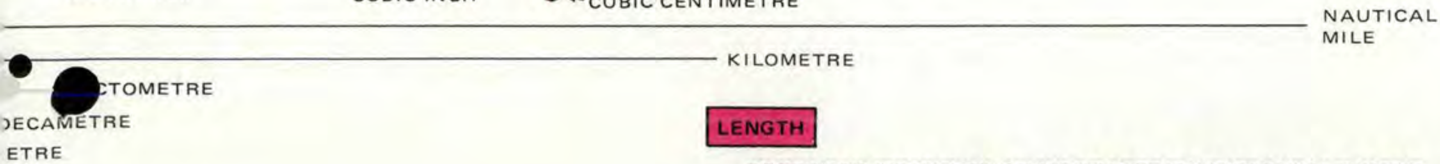












REPRINTED COURTESY OF NORTHROP F-5 TECHNICAL DIGEST

THERE IS A WAY

Annually the Air Force recognizes a given number of individuals, units and commands for outstanding performance. However, competition is keen and not all win major awards. To recognize all of those, AEROSPACE SAFETY is featuring one or more in each edition. In this way we can all share in recognizing their fine performance and, perhaps, learn some valuable lessons.

Nominated For The Koren Kolligian, Jr., Trophy

Captain Jeno M. Bean — Lt Col Frederick E. Tokash

500th Tactical Fighter Training Squadron — 58th Tactical Training Squadron

Luke Air Force Base, Arizona

On 2 September 1976, Captain Bean, instructor pilot, and Lieutenant Colonel Tokash, instructor weapon systems officer, were leading a flight of four F-4Cs on a student air-refueling/ground attack night mission when their F-4C experienced utility hydraulic failure. They declared an emergency and, with the number two aircraft as a chase, proceeded to Luke Air Force Base, Arizona, for recovery. When the landing gear would not extend with the normal system, they ran the emergency gear lowering checklist. The nose gear indicated down and locked, while the main gear remained up. This condition was confirmed by the chase aircraft. Colonel Tokash tried the emergency gear lowering procedures without results. The aircrew contacted the Supervisor of Flying and advised him of their situation. After considering all possible alternatives, they proceeded to the authorized jettison area to jettison their armament and SUU-25 flare dispenser with live flares, and requested foaming of the runway. They then proceeded to the fuel burn-out area to further reduce their gross weight and to apply positive and negative G forces to the aircraft in an attempt to allow the main gear to free fall to the down position. All attempts to get the main gear down were unsuccessful, so the aircrew was advised to prepare for a straight-in approach-end barrier engagement on the foamed runway. Upon being advised that the runway had been foamed, the aircrew attempted to lower flaps, in an attempt to slow final approach speed. When the flaps would not lower using normal procedure, the emergency flap lowering checklist was referred to and followed. At this time, the flaps indicated that the trailing portion was still up, and the leading edge in "transient." The emergency system was attempted from the rear cockpit with no further movement noted. The chase aircraft confirmed that the trailing edge flaps were up, but could not confirm the position of the leading edge flaps due to darkness. Even though the approach and landing were complicated by darkness, an inoperative landing light, and a split-flap condition, the aircrew executed a perfect landing on the nose gear and outboard external fuel tanks and made a successful barrier engagement. Because of a depleted pneumatic system, Captain Bean and Colonel Tokash had to manually open the canopies and hold them open as they egressed the aircraft. Jettisoning of the canopies was ruled out to preclude a possible fire due to the existence of fuel vapors from the ruptured external fuel tanks.

The professional skill, knowledge, and exceptional calmness exhibited by this aircrew under these extreme adverse conditions resulted in the safe recovery of a valuable Air Force aircraft. ★

NEWS FOR CREWS

Information and tips to help your career from the folks at Air Force Military Personnel Center, Randolph AFB, TX.

CAPTAIN THOMAS I. PARKS, AFMPC

DEPARTMENTAL/JOINT RATED ASSIGNMENTS

To those rated officers seeking responsible positions in high level policy drafting and decision making activities, MPC's Rated Departmental/Joint Career Management Section may have a challenging job for you. This office is charged with providing outstanding pilot and navigator manning support to those activities of critical importance to the Air Force and the Department of Defense. Departmental and Joint manning activities exist throughout the defense establishment including: Air Force positions above MAJCOM level as well as joint, combined, allied, and Secretary of Defense staff billets. Chapter 9 of AFR 36-20 (the officer assignment reg) provides a list of these activities which include among others the Air Staff, White House, JCS, Readiness Command, NATO, and the MAAG and Mil Groups.

The sensitive mission and far reaching impact of these activities warrant specialized manning consideration. Grade levels utilized by the various agencies include senior captain through lieutenant colonel (with full colonels' assignments, of course, being managed by the Colonels' Group at the Pentagon). Vacancies occur worldwide. Typically, these type positions become vacant due to an officer's completion of a controlled tour, promotion to colonel or reassignment to higher levels. Requirements exist for officers from all rated backgrounds. And to do our job we constantly seek generalists with strong operational and staff credentials, as well as rated officers possessing experience or education in specialized areas such as operations research, computers, and research and development. Strong writing and briefing skills are universally requested by using agencies.

Now we come to the specifics of how individual rated officers are identified to fill a Departmental/Joint requirement. First, all rated officers moving through the assignment cycle at AFMPC are screened for possible placement in this arena. Many officers are identified when they are on the move as a result of a DEROS, stabilized tour completion, or graduation from intermediate or senior service school. If a requirement exists which cannot be filled from among officers in the "available" cycle, computer supported searches are undertaken to identify an officer meeting the qualifications. After a careful review of the officer's entire record, the Departmental/Joint Career Management Team selects the individual for nomination and/or assignment against a specific requirement.

Many of the same factors influencing a normal assignment of a rated officer are considered in making a Departmental/Joint assignment. An individual's personal desires, rated expertise, and "gate" status all get considered. Volunteers are certainly preferred, and a Form 90 indication of a desire to perform duty in the Departmental/Joint arena could well result in the most challenging job of your career. However, overall duty performance is the key to progressing into these high-impact positions. Top performers create demands for themselves by building strong records as aircrew members starting at the flying unit level. Professional military education appropriate with grade may help. Advanced education, and some demonstration of ability to handle higher level duty could be influential. However, basic duty performance is still the most important criterion. As advocated by AFMPC resource managers, "Perform well in your present job," is sound advice for the serious, professional military officer.

Overall, Departmental/Joint positions offer a high-visibility, challenging environment, loaded with difficult yet rewarding opportunities. Awaiting those officers with a demonstrated superior performance capability are virtually unlimited personal and professional growth avenues of highest impact to the USAF and the nation. ★

ABOUT THE AUTHOR

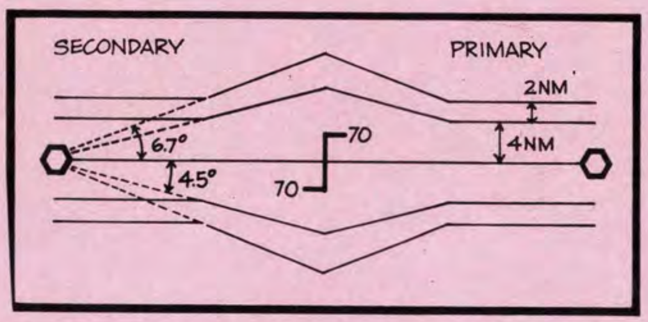
Captain Parks is assigned to AFMPC Rated Officer Assignments completing a one year ASTRA assignment. His flying background includes tours to SEA and RAF Woodbridge, England, in HC-130's. He is a graduate of Virginia Tech with a degree in Geology. Captain Parks' next assignment will be with the MAC staff at Scott AFB, Illinois.

AIRWAYS

Q: How wide is an airway?

A: An airway's primary protected airspace has a minimum width of 8 NM; 4 NM either side of centerline. This area begins to expand at a rate of 4.5 degrees either side of the primary width when the changeover point exceeds 51 NM from either facility as shown in Figure 1. In addition to this primary airspace, an additional 2 NM either side of the airway is provided for a secondary zone. This area expands at a 6.7-degree angle from the secondary width when the changeover point exceeds 51 NM. If the changeover point is other than halfway between the navigation facilities, it will be depicted on the enroute chart by ( ). Since the equipment can be up to 4.5 degrees in error and still be within tolerance, make every effort to remain as close to the centerline of the airway, as possible.

Figure 1



Q: How wide is a jet route?

A: Just as an airway, a jet route is formed by a straight line, whenever possible, between NAVAIDS, yet has no specified width. Since the primary reason an airway has a specified width is obstruction clearance and since the highest mountain in the United States, except Alaska, is 14,495 feet, a width specification is not necessary for jet routes. A few jet routes in Alaska do have a specified width due to their proximity to terrain in excess of 18,000 feet. Also, as with airways, pilots should attempt to remain as close to centerline as possible.

USE OF THE MILITARY AVIATION NOTICE (MAN)

Q: When should the bound, United States Low Altitude Instrument Approach Procedure (IAP) MAN be used?

A: When using a Low Altitude IAP booklet, first check the cover of the particular volume you intend to use for the effective date of the MAN. On the MAN itself, in addition to the effective date, there will be a "TO" date. For example, if the "TO" date is 19 November 1977, the MAN will be effective through midnight (local time), 18 November 1977.

Q: When the Low Altitude IAP MAN is in effect, how should it be used?

A: The MAN should be referred to before the IAP booklet. When using the MAN, it is imperative that you first refer to the Table of Contents for any changes to the aerodrome of intended use. The Table of Contents will identify approaches that have been added, deleted, or replaced, including effective dates if they are different from the MAN publication date. In other words, flipping through the MAN looking for approaches to a particular aerodrome is not assurance that an approach is still current. That information can only be found in the Table of Contents.

FILING TO INITIAL APPROACH FIXES

Q: Can I use the high altitude structure for the enroute phase and a low altitude IAP for the terminal phase of a flight plan? Conversely, can I use the low altitude structure for the enroute phase and a high altitude IAP for the terminal phase?

A: Yes. It is acceptable to list an Initial Approach Fix (IAF) at your destination in an altitude structure other than the one you've planned to use for the enroute phase of your flight. As you approach your destination, if you plan to fly a published approach, request any necessary altitude changes from the controlling agency. If a radio failure should occur during operation off published IFR routing enroute to the IAF, the applicable minimum safe/emergency safe altitude or last assigned altitude, whichever is highest, should be adhered to until established on a segment of the instrument approach procedure or published IFR routing. If lost communications occurs at an enroute altitude of 9,000 feet, for example, and the planned instrument approach begins at a minimum altitude of 15,000 feet as in the HI-TACAN/ILS RWY 35, Altus AFB, figure two, next page, the pilot should follow the procedures outlined in the IFR Supplement and remain at 9,000 feet. Since the minimum/emergency safe alti-

By the USAF Instrument Flight Center
Randolph AFB, Texas 78148

Figure 2

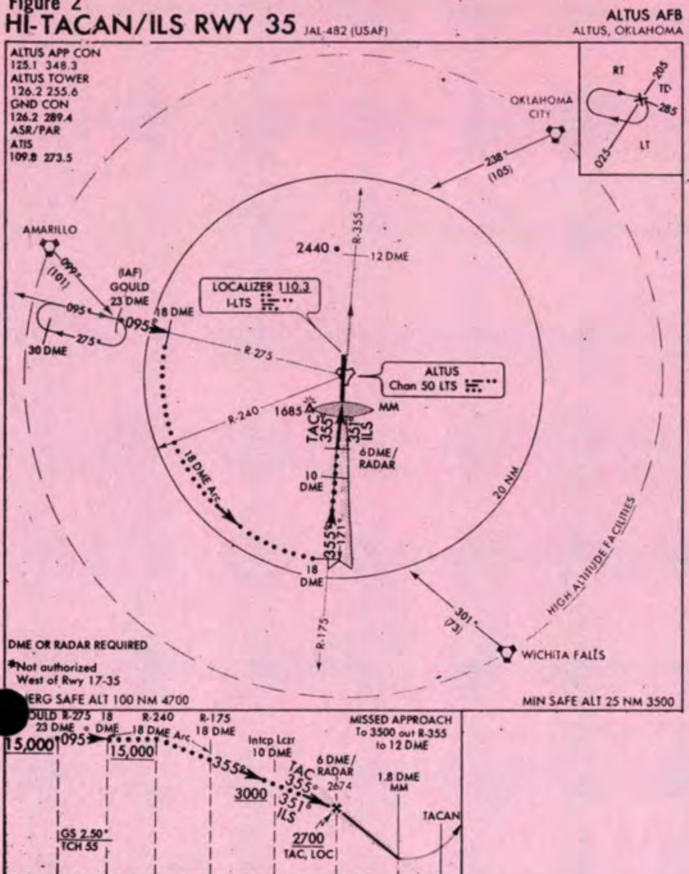
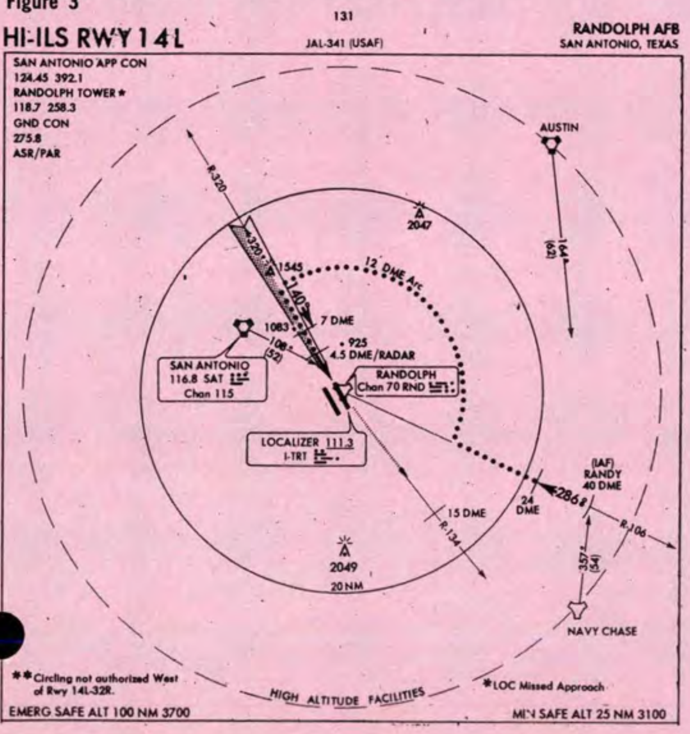


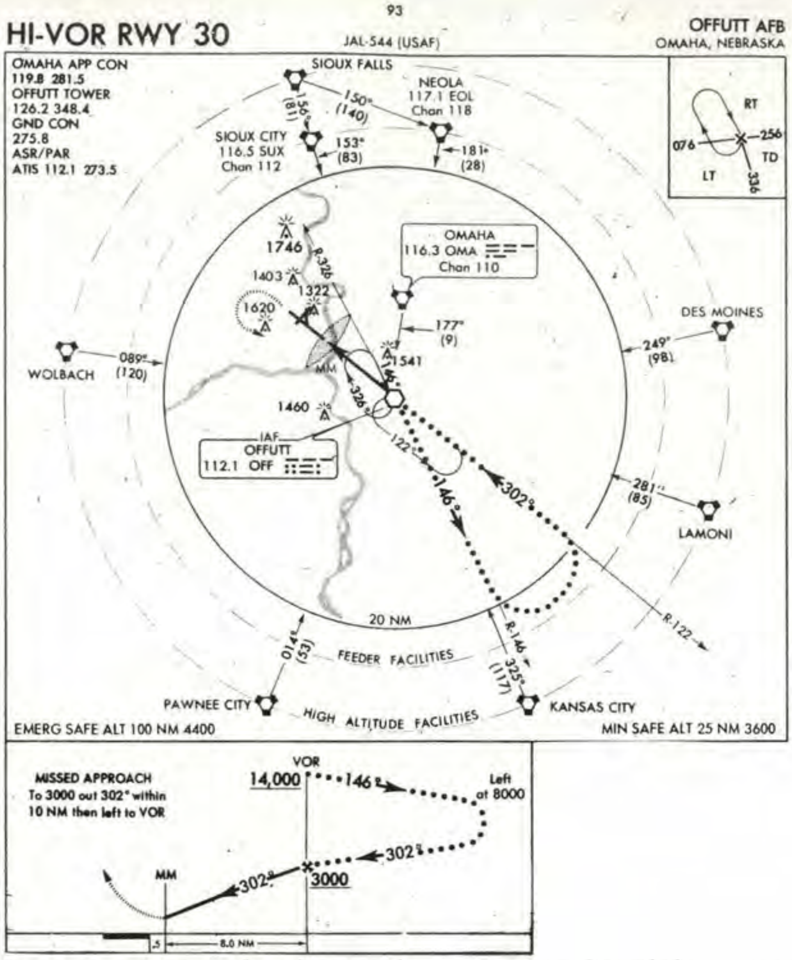
Figure 3



tude is not higher, he should execute the approach from that altitude.

No particular problem exists for the pilot operating in the jet route structure enroute to a low altitude IAF as long as the IAF is formed by an (H) class facility, or an (L), or (T) class facility which is published for high altitude use. An example of such a facility is the Randolph TACAN, figure 3. This NAVAID is an (L) class facility, yet is published in association with a high altitude approach procedure. In order to provide the optimum margin of safety, use the class of facility with the greatest normally anticipated interference-free service area, whenever possible. If unsure of the capabilities of the facility in use and no other options are available, the pilot should use his own good judgment as to whether or not he is receiving the NAVAID satisfactorily. In any case, radio out, at the ETA, or EAC if one has been received, the pilot is cleared to descend in a charted holding pattern or in a holding pattern on the side of the final approach course to the fix on which the procedure turn is prescribed, and execute the approach.

Another problem which may be encountered when you have filed from the low altitude enroute structure to a high altitude IAP is that of flying an IAP with a non-DME teardrop penetration. In this situation, you should perform a level fly-off from the IAP for 15 seconds for each 1,000 feet the aircraft is below the recommended/minimum altitude as shown at the IAF. For example, assume you are enroute to the Offutt VOR at an assigned altitude of 10,000 feet and



have requested and subsequently been cleared by ATC to fly the HI-VOR RWY 30 approach to Offutt AFB (as shown in Figure 4).

Upon arrival at the IAF you should perform the fly-off for one minute; e.g., minimum altitude (14,000 ft) minus assigned/actual altitude (10,-000 ft) equals (4,000 ft) altitude difference times 15 seconds/1000 ft equals one minute. This fly-off will assure you of enough distance inbound to descend to the FAF altitude prior to reaching the FAF.

If the weather permits, the best solution to lost communications problems is to maintain Visual Meteorological Conditions and land. Remember, if you plan to arrive at the IAF from a facility not shown on the approach chart, you should plan to keep your route of flight within the service volume area of the navigation facilities used. Also, be aware that, for Air Traffic Control purposes, at the ETA or EAC, you are cleared for any approach to that airfield of intended landing from any IAF and are not restricted to the IAF filed in the flight plan.

POINTS TO PONDER

MODE C

Have you ever been directed by ATC to "STOP MODE C SQUAWK?" If so, have you wondered why ATC wanted you to turn off your Mode C?

The reason you were instructed to "STOP MODE C SQUAWK" was probably because of a difference of more than 300 feet between the altitude you reported to ATC and the altitude which ATC displayed on their radar. How does the radar controller know at what altitude you are? Very simple. Your altitude encoder (Mode C) aboard the aircraft generates a signal from an internal altimeter permanently set to 29.92. This signal is transmitted in 100-foot increments. The ATC computer receives and then translates this signal into a numeric readout on the controller's radar scope.

Now, back to the 300-foot altitude difference. When the controller notes this difference, he normally assumes an airborne equipment malfunction. First, he will request that you verify your altimeter setting by stating, "SAY YOUR ALTIMETER SETTING." If the altimeter setting you read back is incorrect, he will issue the correct altimeter setting and request you confirm your altitude. If the 300-foot altitude discrepancy still exists, he will instruct you to turn MODE C off by stating, "STOP ALTITUDE SQUAWK, ALTITUDE DIFFERS (number of feet) FEET."

MINIMUM SAFE ALTITUDE WARNING (MSAW)

Recognizing a need to assist the air traffic controller in his efforts to detect aircraft that are within, or are approaching, unsafe proximity to terrain/obstructions, the FAA has developed and is implementing at all Automated Radar Terminal System (ARTS III) facilities, a new computer function called "Minimum Safe Altitude Warning (MSAW)." The MSAW function will generate an alert to the controller when a tracked, Mode C-equipped aircraft being processed by MSAW is at, or is predicted by the computer to go below, a predetermined minimum safe altitude. Controllers will evaluate each alert that is generated, and, when appropriate, will issue a radar safety advisory to the aircraft by stating, "Low Altitude Alert. Check your altitude immediately."

IFR aircraft with an operating altitude encoding transponder will automatically be processed by the MSAW function when it is operating. VFR aircraft with an operating altitude encoding transponder will will be provided MSAW processing upon pilot request. It is expected that all ARTS III terminal facilities will be equipped with the MSAW function by late 1977. ★

What Ever Happened To...
HANGAR FLYING?

CAN SOCRATES OFFER A NEW WAY TO SHARPEN FLIGHT CREWS?

MAJOR JOHN D. WOODRUFF
Directorate of Aerospace Safety

I'm sure most of you have participated in B.S. sessions around the squadron, discussing flying procedures and systems analysis. (You were hangar flying and didn't even know it.) Some of you may have even been involved in a formalized hangar flying program. I was a member of a tactical airlift squadron that had such a program. The problem was, it only functioned for copilots prior to unit rotations overseas and concentrated mainly on ICAO procedures. *So, I ask you, what ever happened to hangar flying?*

With smaller defense budgets, reduced flying time, crowded flight simulators, and the "Feet on the Ramp" program, why can't we make more efficient use of hangar flying instruction to ensure a more adequate understanding of our systems and procedures? Instructor pilots sometimes mistake memorization of procedures for learning, and that's an easy mistake to make with the limited time available and the heavy student load. If the student rattles off procedure, without hesitation, it is easy to assume he understands the procedure thoroughly. Of course, you have never made that mistake! Right? Right!

To increase our effectiveness

What Ever Happened To Hangar Flying?

continued

as instructors and support this ultimate goal of understanding, I propose you consider a formal hangar flying program in your squadron, and try the inquiry method of instruction. (That's a fancy name for the "What would you do if" . . . games you've been playing all along and didn't even know it.) It doesn't have to be an elaborate program with special facilities; just set aside a couple of hours one afternoon a week, plan a problem or two, get those copilots, AC upgrades, and less experienced pilots in there, and see what happens.

Historically, the concept of the inquiry method goes back to Socrates (no he didn't pull the chocks at Kitty Hawk!) and has been called the Socratic method, the inductive method, and the discovery method. It makes no difference what you call it, so we'll call it the inquiry method. Just to get our compasses straight, check any dictionary and you'll find the main difference between learning and memorization lies in the concept of comprehension. Comprehension is the key that unlocks the door to understanding.

To solve this problem of understanding with the inquiry method, the instructor's attitude is most important. His beliefs, feelings, and assumptions will determine the quality of instruction. Neil Postman and Charles Weingartner in their book, *Teaching As A Subversive Activity,* see the following attitudes as important for the inquiry instructor:

- He rarely tells students what he thinks they ought to know.
- His basic mode of discourse with students is questioning.
- Generally, he does not accept a single statement as an answer to a question.
- He encourages student-student interaction as opposed to student-teacher interaction.
- He rarely summarizes the positions taken by students on the learnings that occur.
- His lessons develop from the responses of the students.
- Generally, each lesson poses a problem for students.
- He measures his success in terms of behavioral changes.

These atitudes are important because they set the "atmosphere" of the learning environment.

METHODOLOGY

In addition, the employment of these attitudes is equally important. Here is an example of how the inquiry method can be used in a hangar flying program through a scenario developed about a C-130 "Herky Bird."

THE SITUATION

- Location: Just past the equal time point between the Eastern Coast of the US and the Azores.
- Altitude: 23 thousand feet.
- Crew: Basic crew of five.
- Cargo and passengers: 17 thousand pounds palletized and 10 passengers.
- Fuel load: 32 thousand pounds.
- Weather at destination (Azores): 300 broken, 2000 overcast, one mile visibility with rain showers, winds 270 degrees at 30 knots, altimeter 29.82.

The Problem ("Each of his lessons poses a problem"): A loud singing sound in the props.

Questions for the Students ("His basic mode of discourse with students is questioning").

- How immediate is the problem?
- How do you logically determine which prop it is?
- How do we use our basic procedures to solve the problem? (Explain each action you take.)
- How will you proceed if none of the corrective procedures solve the problem? (Explain why.)
- How will the loss of the engine affect other flight systems?
- How will the loss of the engine affect your maintaining altitude?
- How would the loss of the

engine affect the continuation of the flight all the way to landing at destination?

• How does your aircraft gross weight and fuel load fit into the problem?

• How do physiological factors affect this problem?

• How would the loss of a second engine affect the flight?

• How does the weather at destination affect your planning?

• How does the experience level of the crew affect your planning?

• How does your attitude and the way you handle yourself affect overall crew performance in this situation?

• And last but not least, how does the command and control system fit into your problem?

INSTRUCTIONAL TIPS

As a result of this scenario, notice how most of the possible actions to be considered were set up through a series of questions. Remember, these questions only set the stage for the problem. The instructor will surface additional questions as they develop from the responses of the students. As you can see, the responses of the students will allow the instructor to formulate additional questions and carry them to the depth required to the problem.

One technique is for the instructor to challenge student responses by redirecting one student's question to another student in a different form. The instructor should be sure the order of his questions leads the students through a logical sequence. Remember not to start the questions with the word "what," because it might evoke a single answer to the question. Single answers have a tendency to close the discussion. The instructor should ensure all his questions are formed to create a relationship between actions; that is, they force the students to think about procedures in terms of sequences and variables. Additionally, the instructor should ensure questions are "pluralizing" in that they ask for reasons and causes.

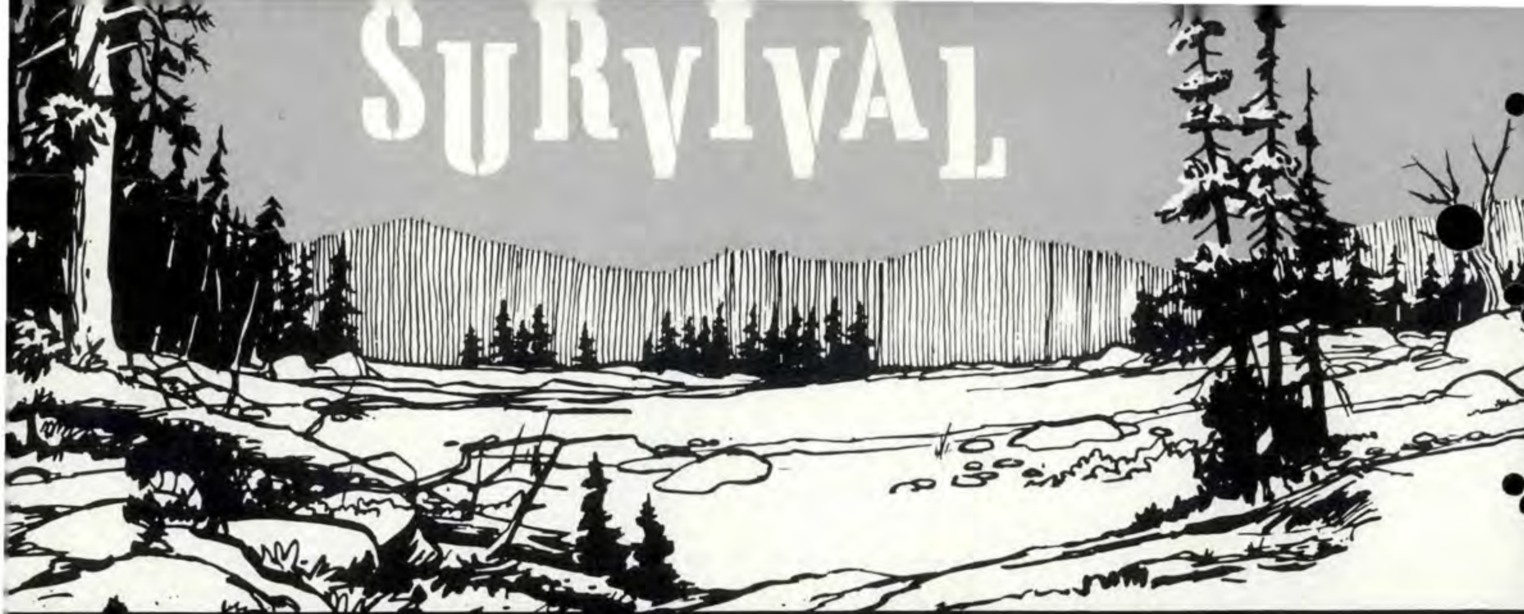
He should bring in other students with his questions from responses to develop crew coordination through student-student interaction and clarify standards by comparing other students' judgments. He should encourage students to modify their positions when new data demands a change due to new variables in the situation. Finally, the instructor should attempt to sharpen student's skills in classifying through establishing priorities.

THE "WHY" INVOLVED

As you can see, the inquiry method of instructing supports the all important goal of the instructor: *Understanding*. The instructor cannot be satisfied with the memorization or demonstration of a procedure. He has the ultimate responsibility of assuring that his students have a thorough understanding of the "why" involved. In some situations and with some systems, this "why" might prevent an accident and save numerous lives. The inquiry method will stave off tendencies toward memorization and will emphasize the learning of relationships among objects, systems, events, people, conditions, and feelings.

TRY IT; YOU MIGHT LIKE IT

A formal hangar flying program centered on the understanding of systems and procedures might just be the supplement to your training program that you've been looking for. Try it and see if your daily training efforts and checkrides improve. (Remember, "your success will be measured in terms of behavioral changes.") You instructor pilots can use it to emphasize those problem areas that show up on the monthly Stand/Eval trends. Safety officers can use it in a teaching interview at the next monthly flying safety meeting. Most importantly, don't sell hangar flying short as a part of your overall program of training and safety instruction. ★



Hide And Go Seek

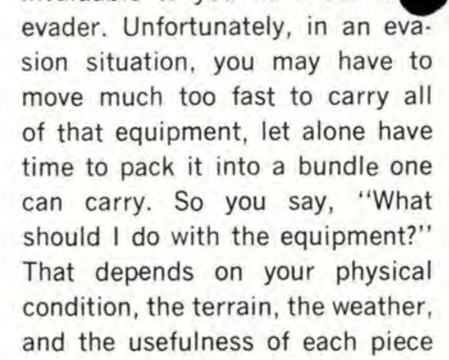
SGT HERBERT A. KUEKER
Operations and Requirements Branch
3636th Combat Crew Training Wing
Fairchild AFB, WA

Since the conclusion of hostilities in SEA, I'm sure the thought of what living in the Hanoi Hilton was like has crossed all of our minds. Most of us in the Air Force don't really have to worry about ever being captured —I sure don't. On the other hand, there are a lot of airplane drivers who don't relish the possibility of someday ejecting. I know that isn't a very nice thought, but it's a fact of air warfare. Airplanes get shot down, and crew members have to eject; sometimes smartly into enemy-held country.

That doesn't necessarily mean immediate capture and imprisonment. All of us, as military members, have a moral guide which we live by, part of which says "I will never surrender of my own free will." So, when your number tens smack the earth, you have that obligation to hightail it out of there. To successfully accomplish that mission, you're going to have to evade both the enemy soldier and the civilian population. Evasion techniques are quite simple, but applying them successfully can be a very difficult problem which requires patience, planning, and attention to detail.

In most cases, you will have a few moments to think and to get your act together as you come down in the parachute. This time can be used for a lot of things. It provides you with an excellent vantage point for observing enemy activity, active enemy installations, local population areas, roads, waterways, and the general scope of the terrain. **Use** this vantage point to your benefit by evaluating the situation and planning your direction of travel. This information could also come in handy if there is a need for you to act as a forward air controller and vector in air strikes.

Almost all crew members will feel like they have 100 pounds of equipment on their backs when they hit the ground. You really don't have that much, but what you do possess could prove to be invaluable to you as a surviv evader. Unfortunately, in an evasion situation, you may have to move much too fast to carry all of that equipment, let alone have time to pack it into a bundle one can carry. So you say, "What should I do with the equipment?" That depends on your physical condition, the terrain, the weather, and the usefulness of each piece



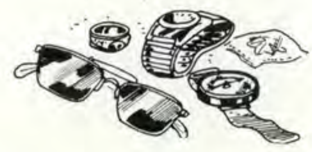
Before you move out, use the brown and green gores of the parachute canopy to bundle everything you're leaving throw it in some thick brush or u some leaves or rocks.

of equipment at the time. For example, if your leg is broken, you surely won't be able to carry bulky items like a full parachute and harness, or a life raft. If the enemy is hot on your tail, you might not want to take any of the equipment except the radio.

Should you come down in a cold area, you might decide you want to keep the green and brown gores of the parachute canopy for the construction of a shelter or sleeping bag. If the enemy is present, the white gores would provide good camouflage in a snow-covered environment.

Your next logical question would be, "What should I do with the excess equipment?" Bury it, cover it, burn it, eat it, or leave it! One thing you never want to do as an evader is to decide you are carrying too much and start leaving a trail of excess equipment through the woods. If you take it with you, it must **stay** with you. If you start chucking it out on the trail, you might just as well put out roadsigns as to which way you are going. So before you move out, use the brown and green gores of the canopy to bundle everything you are leaving and throw it in some thick brush, or under some leaves or rocks. Even if it only takes the enemy 10 minutes to find your discarded equipment, that's 10 minutes head start you have provided for yourself.

Obviously, in some areas of the world, a 6 foot 6 inch John Wayne-type looks a little out of place. So up pops your next problem: "How do I camouflage myself to look like a rice plant?" Well, you can't, but you surey can apply some basic camouflage techniques and blend in with the background. Sanitize your uniform by removing your rank, insignia, patches, etc. Also, be sure that your under-



Don't forget the watch, rings or eyeglasses; any shiny object can give you away.

wear is tucked in and not showing white. Tee shirts under an open collar are dead giveaways.

Don't forget the watch, rings, or eyeglasses; any shiny object can give you away. Next, darken your skin with mud, grease, ashes, or a camouflage stick so that the oils in your skin won't glisten in the sun or moonlight. Be sure to break up the body outline by using pieces of foliage indigenous to the area. Place it so it is sticking out of your pockets, trousers, boots, hat or wherever you can. Also, please remember to change it as you move from one type of foliage into another. A pine tree looks

Be sure to break up the body outline by using pieces of foliage indiginous to the area.

awfully funny sneaking across a wheat field!

Now that you have your equipment sorted and your body camouflaged, the next problem concerns travel. There are three things to remember about evasion travel: When to, how to, and where to.

In the pre-mission briefing you should have been given guidelines to follow if the necessity to travel on foot arises. If those guidelines aren't applicable, there are others to follow. Only travel if you have a place to go, because wandering around aimlessly in the boonies will be very tiring and unproductive. Besides, it generaly isn't smart to travel deeper into enemy territory.

You should also keep in mind that the rescue forces may direct you to travel to a more suitable pick up area. How to travel is a little more difficult. In mountainous areas with cover available, it is best to travel on or near the military crest of a hill. That is two-thirds to three-fourths of the way up the hillside. This gives you both an excellent vantage point and good concealment. Additional-

It is best to travel on or near the "military crest" of a hill. That is two-thirds to three-fourths of the way up the hillside.

ly, there are very few people or trails for you to encounter up there. Try to keep your travel posture as low and slow as possible, to make it more difficult for an enemy observer to spot you. You must remember to circumnavigate all trails, roadways, waterways, open areas, and populated areas.

The decision as to when to travel, at night or during daylight

Hide And Go Seek continued

The decision as to when to travel, at night or during daylight hours will be dictated by situation and terrain. Traveling at night is generally recommended—

hours, will be dictated by the situation and terrain. Traveling at night is generally recommended, but the environment may prohibit movement after dark. In that case, you'll have to travel in daylight, so pick the time of day with the least likelihood of contact with people. Careful observation will be your best insurance.

In an extended evasion environment, none of us can travel forever. You've got to stop and rest somewhere, at some time. The needs for a shelter or camp site are quite elementary. The primary one, naturally, is concealment. Remember that the enemy can see you not only from the ground, but from the air as well, so you must camouflage any shelter well from all angles. The word BLISS is a good key word when dealing with an evasion shelter or campsite. The B represents **blending** with the surrounding area. The L means **low silhouette.** The I, for **irregular** shape and contour, and the S for **small** in size and S for **secluded** area. Remember the BLISS formula; it could save your life.

One of the most dangerous acts you have to do in an evasion environment is to procure food and water. Water is an absolute necessity, but food really isn't for the first few days. So unless you feel

Remember that the enemy can see you not only from the ground, but from the air as well, so you must camoflage any shelter well from all angles.

your physical condition is deteriorated to the point where food is a necessity, don't try to E&E up into a farmer's yard and kill his prize cow. Stay concealed and capture small rodents, squirrels, fish, etc., that won't be missed.

Water is a necessity, but it, too, can be very dangerous to get. People frequent water holes, rivers, creeks, and lakes, so it's very easy to get captured there. If at all possible, get your water

Water is a necessity, but it, too, can be dangerous to get.

from swamps, intermittent drainages, water vines, trees, the dew on plants, or from rain water before trying to sneak up to the town well. If you should have to resort to a common water site, scope it out first and find out at what time of day you're least likely to encounter hostile forces.

These are by no means all of the known tricks for evasion. There are many military booklets on the subject that are well worth reading. What I have done is give you a few basic items which could help you be better prepared for evasion, and maybe keep you from making a simple blunder which could lead to your capture.

Questions or comments concerning the information contained in this article should be directed to 3636 CCTW/DOTO, Fairchild AFB WA 99011, or AUTOVON 352-5470. ★

OPS TOPICS

TRANSIENT SERVICES

Have you ever had difficulty with transient services on a base? Did you fill out a transient services questionnaire? This piece of paper is one of the best vehicles you have to get the attention of those people on base who can fix the problem. That is, they can fix it if you give them the information. When you make a complaint about some facility or service, give as much information as possible. Include dates, times, persons contacted, or frequencies. Anything that will help pinpoint the difficulty. Describe your problem as completely as possible. Finally, give a name and phone number so that the supervisor in charge can contact you for more information if necessary.

All too often we receive calls from people at bases complaining that they cannot correct a transient services problem which they cannot define. The pilot involved made a vague complaint and then left no name or phone number.

Most base commanders are concerned about the quality of their transient service. They will make every effort to resolve a problem if they have the necessary information. It is up to you, the aircrew, to give that information to the best of your ability. It's for your own benefit.

NOT RECOMMENDED

As long as there are tandem seats in aircraft, we apparently are doomed to repeat this old familiar scene:

Student returning to pattern in a T-38; stick travel to left restricted; aircraft controllable but only very slight roll could be made to left; straight-in landing made safely.

Postflight revealed rear seat survival kit/cushion had become dislodged and wedged between the seat, leg brace and stick. Sometimes this makes for a very interesting few moments. Not recommended.

ERRONEOUS ALTIMETER SETTING

A C-130 was making an approach to a base in Europe. RAPCON issued the weather observation and altimeter setting with initial radar contact. The aircrew questioned the altimeter setting of 30.31 and asked RAPCON for verification. The tower operator assumed that RAPCON had a garbled printing and read back the 30.31 teleautograph setting. Once again, the aircrew questioned the setting and RAPCON relayed the request through tower to the weather observer. However, it was not clear that it was the one inch difference from forecast being questioned. The reply once again came back 30.31. On the third query, the one inch change in the altimeter setting was caught and the weather observer corrected it on the teleautograph. What happened? The weather observer made the correct altimeter setting entry of 29.31 in all cases except the teleautographer, where he entered 30.31. This one inch change was not detected by personnel in the tower or at RAPCON. This incident highlights the obvious human error of controller misunderstanding, and incorrect recording by the weather observer. However, it specifically points out the necessity for an alert aircrew and good communications in a hazardous situation. IF IT DOESN'T SOUND CORRECT—QUESTION IT! ! !—Maj John D. Woodruff, Directorate of Aerospace Safety.

OPS TOPICS

CLEARED TO CROSS

After a C-141 landed at a civilian airport, the tower instructed "Taxi to end, cleared to cross Rwy 04L, contact ground." After taxiing off the active, the aircraft started across the other runway. The pilot of the C-141 saw a light aircraft (a Cherokee) on the runway but assumed that it was landing and would be well clear. After the C-141 was about halfway across the runway, the AC realized that the Cherokee was, in fact, on takeoff roll and stopped the C-141. The light plane barely cleared the cockpit of the C-141. The controller had expected that there would be sufficient clearance between the two aircraft but did not follow-up to assure separation.

CAP CADETS AT USAF ACADEMY

Two hundred sixty-eight former members of the Civil Air Patrol are now cadets in the four classes at the USAF Academy at Colorado Springs, Colorado.

The fourth class (Class of 1980) reported in June 1976 and was the first class admitting female students, six of which were former CAP members.

NEW NOTAM SYSTEM

Starting in August there will be a 90-day test of a new method of NOTAM transmission. Those bases participating in the test will no longer receive the present NOTAM summary or hourly updates. Instead, they will use the CONUS meteorological data system terminal (COMEDS) to request NOTAM information. (This is the same system used to request weather data for the 175-1.)

The system will provide current NOTAM information on request and provide the aircrew with a hand copy print-out of the NOTAMs they requested.

The system works like this: Airfields listed in the IFR Supplement will have an associated NOTAM automatic response to query (ARQ) code printed in parenthesis beside the ICAO identifier. When an aircrew wants NOTAMs for a base, they provide the COMEDS terminal operator with the ARS code for the base. The operator enters the code and within one to two minutes has a print-out for the aircrew.

IN A PICKLE

About 12 minutes after level off, an F-100 pilot accidentally hit the pickle button on the stick grip. At this point two drop tanks, a baggage pod and pylon all departed the aircraft. Then the pilot noticed that the master armament switch was in the "jettison all" position. It is not clear who left the switch in that position. The armament crew was sure they turned the switch to off. The pilot visually checked the switch but because the jettison position is 180 degrees opposite the OFF position the pilot didn't detect the error.

DON'T CAGE YOUR EYEBALLS

Even in this era of radar surveillance and mandatory IFR, the best protection is still visual separation when VMC. From a near miss report: "The sector controlling the Merlin did not advise the aircraft of the MOA activity prior to his entering the airspace, although the controller was aware the MOA was in use." The controller failed to provide the civilian aircraft with proper radar advisories. If the controller had done this the military aircraft would also have been advised of the existence of the VFR aircraft. This would have precluded the incident. (Controllers can make mistakes, too.) ★

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UNITED STATES AIR FORCE

Well Done Award

Presented for

outstanding airmanship

and professional

performance during

a hazardous situation

and for a

significant contribution

to the

United States Air Force

Accident Prevention

Program.

LIEUTENANT COLONEL

John T. Stadler*

113th Tactical Fighter Wing
Andrews Air Force Base, Washington, DC

On 17 January 1977 Colonel Stadler was number three in a flight of four F-105D's on a routine strike mission. The flight entered the range complex and split into two elements of two aircraft each. Colonel Stadler's element descended to 500' AGL and accelerated to 600 knots for a low level, high speed approach to the target area. Approximately 5 minutes into the low level portion of the mission, Colonel Stadler felt his aircraft suddenly decelerate and begin vibrating. He immediately zomed to a higher altitude and turned toward the base. During the zoom he discovered the EGT was slowly but steadily increasing. When he reached 10,000' MSL and leveled off, the aircraft continued to decelerate. He could not stabilize the altitude and airspeed even with the throttle set at full military. The engine EGT was increasing through 700° as the airspeed continued to decrease, and the vibrations became more severe. He began a gradual descent, jettisoned all external stores; however, these actions had little effect on the decreasing airspeed. At 250 knots the options to Colonel Stadler were extremely limited: immediate ejection, or the selection of afterburner on an already malfunctioning engine. He chose the latter. The afterburner lit normally, and the aircraft began accelerating. He set the throttle at 92 percent and the airspeed stabilized at 300 knots. Colonel Stadler declared an emergency and maneuvered the aircraft for a straight-in precautionary landing. Electing not to move the throttle until touchdown, he used pitch attitude, speed board, and S turns to lower his airpseed and drop the gear. After the aircraft made an uneventful landing, an investigation revealed that the engine had suffered extensive turbine damage. Colonel Stadler's rapid assessment and accurate diagnosis of a serious engine problem along with his superior airmanship resulted in the recovery of a valuable aircraft. WELL DONE! ★

*Colonel Stadler lost his life in an aircraft accident shortly after the incident related here.

The Stretched C-141