UNITED STATES ARMY

JANUARY 1973

AVIATION DIGEST

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Prisoner Of War

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ABOUT THE COVER

A penetrating study at the U. S. Army Aviation School analyzes Communist procedures for conditioning prisoners of war. See page 2.

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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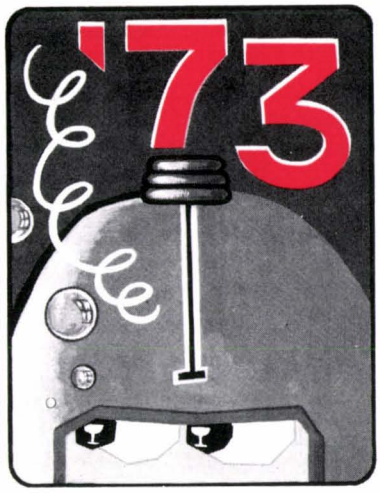
VIEWS FROM READERS



Sir:

There used to be a lot of group discussions on flying (more commonly known as "hangar flying") telling about experiences aviators encountered before, during and after flight. I am a great supporter of exchanging information of this type which could be a "boon" to preventing some aircraft incidents or accidents and maybe save a life. An experience which I'll never forget went like this.

I was flying a mission between Erlangen and Grafenwoehr, Germany, in [what was then] an L-19 aircraft [now designated 0-1]. The weather was clear at Erlangen with 2,000 feet broken. I encountered thunderstorm activity enroute with heavy turbulence; visibility was restricted by scud and heavy rain. I had just turned off the Autobahn (which I was using as a visual aid) and proceeded into a valley near Bayreuth (I transitioned to the "Iron Beam Railroad" navigation aid). Turbulence was severe, the gust spread relatively high. To place less strain on the aircraft and provide for better visibility, I throttled back to maintain an indicated air speed of approximately 80 mph. I tried to advance the throttle, but when it wouldn't move forward it shook me. I eased the throttle back a little bit more, but again when I tried to move it forward it wouldn't move. I was now flying with one notch of flaps (we didn't have electric flaps then) with the indicated air speed varying from 60 mph to 70 mph.

Looking off to my left I saw an airfield on top of a hill in the scud and turned gently toward it. The ensuing landing was uneventful; it had to be good as I would not have the power needed to go around.

After landing I opened the cowling on the carburetor side. I couldn't move the throttle forward but could move it back. A minute inspection of the throttle linkage revealed that the observer's earphones had "bounced" off the metal hook and the earphone harness had lodged between the mixture and throttle controls in the observer compartment. The culprit had been found, an unsatisfactory equipment report (UER) was submitted and corrective action was taken. The hook was replaced with a spring steel clip; no more problems. But should I have been flying in those weather conditions at all? You be the judge of that.

I think the above points out the benefits of "hangar flying." It could have happened to you. Let's not be too proud to talk about incidents of this nature. Knowledge gained could be a benefit to others.

A.B.C. Davis Jr.
11138 Glacier Drive
Creve Coeur, MO 63141

Sir:

I would like to get a few answers on some instrument procedures that have some members of my unit at odds with each other.

My first question has to do with a proper entry into holding by means of a teardrop entry. I first learned in 1965 that I should track outbound on a track of 30 degrees or less from the outbound course and track interception was not mandatory after 1 minute. TM 1-225, dated April 1965, and present FAA procedures verify this. However, later versions of TM 1-225 and DOD FLIP section II, have changed the word "track" to "course." Some interpret this new wording to mean "heading." I would like to know, is it mandatory to track outbound in the initial turn or just use a heading?

My other question has to do with instrument approaches that have holding patterns depicted in lieu of a procedure turn barb. Some approach charts like the Cairns ILS 6 approach has a holding pattern depicted and in the profile view it states descend in holding. The other type is like the Troy ILS 7 approach, it has 1 minute printed within the pattern. Everyone agrees that the type with 1 minute printed means you can never exceed 1 minute inbound. But, some say the other type like Cairns can be exceeded. For example, once cleared for the approach I could go outbound for any length of time so long as I do not exceed 10 nautical miles, and that my inbound time makes no difference. Others say any time a mandatory holding pattern is published in lieu of a 45 degree procedure turn, 1 minute inbound will not be exceeded. It makes no difference how it is printed the procedure is the same.

No matter what our research finds we always seem to disagree on the interpretation. As of now I have yet to get a clear cut answer as to which pro-

Continued on page 29

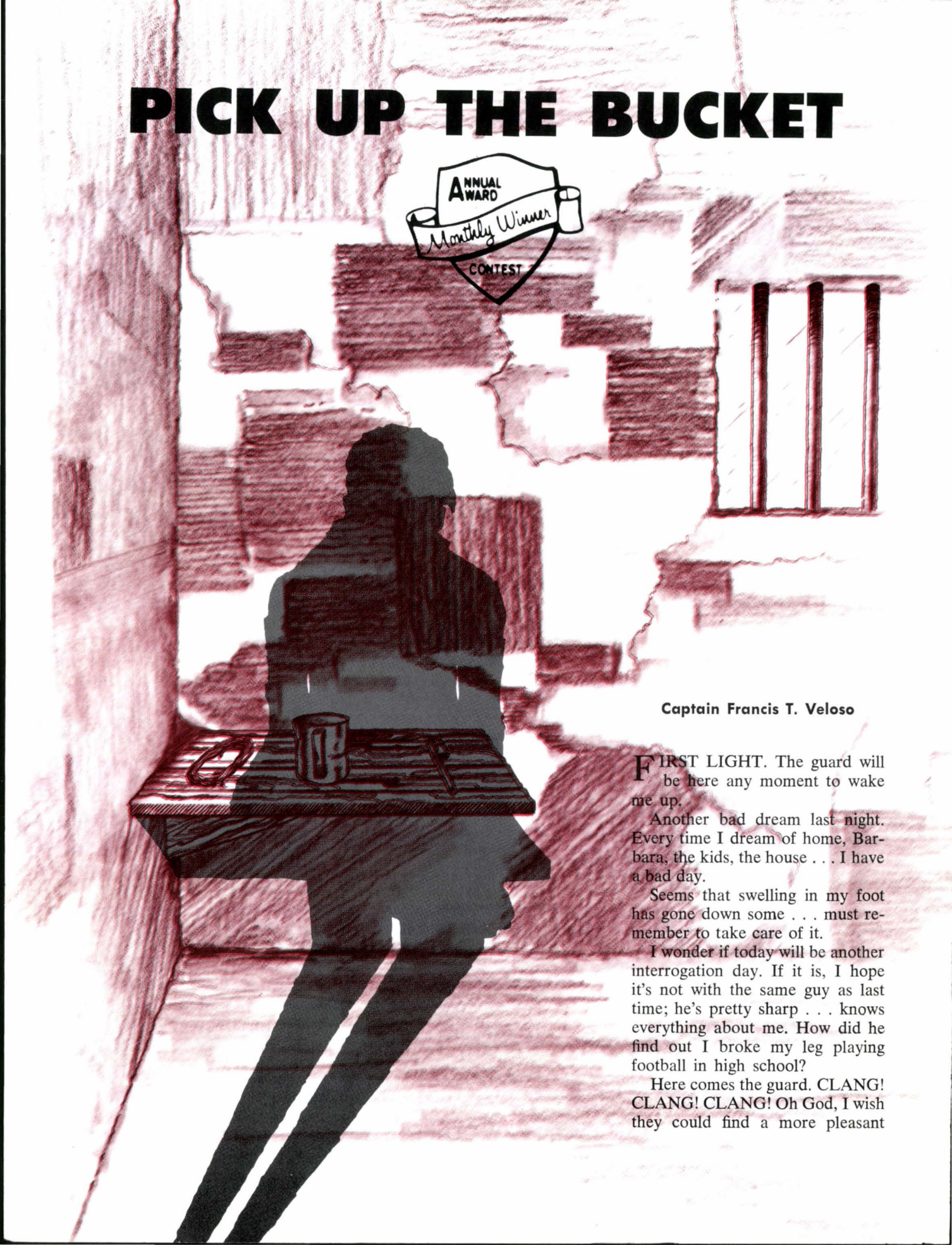
From the Director of Enlisted Personnel

A bit of confusion has resulted from this office's recent announcement (October 1972 DIGEST) concerning the obsolescence of certain aircraft maintenance MOSs. To set the record straight: Some Army aircraft are, indeed, being "retired from active duty" and transferred to the Reserve and National Guard. The following MOSs will no longer be needed in the active Army, though they will be retained in the Reserves and National Guard:

67B—O-1/U-6 Airplane Repairman
67C—U-1A Airplane Repairman
67M—OH-13/OH-23 Helicopter Repairman
67P—CH-34 Helicopter Repairman

However, MOS 67T (CH-37 Helicopter Repairman) is being dropped altogether from the enlisted MOS structure. Formal announcement and reclassification will be disseminated in a forthcoming change to AR 611-201.

PICK UP THE BUCKET



Captain Francis T. Veloso

FIRST LIGHT. The guard will be here any moment to wake me up.

Another bad dream last night. Every time I dream of home, Barbara, the kids, the house . . . I have a bad day.

Seems that swelling in my foot has gone down some . . . must remember to take care of it.

I wonder if today will be another interrogation day. If it is, I hope it's not with the same guy as last time; he's pretty sharp . . . knows everything about me. How did he find out I broke my leg playing football in high school?

Here comes the guard. CLANG! CLANG! CLANG! Oh God, I wish they could find a more pleasant

way to wake us up. That metal cup against the bars just doesn't cut it.

Pick up the bucket, stand at the door. When it opens, follow Bill to the latrine, stand outside, wait for him to finish. Poor Bill, doesn't look too good. Hang in there, Bill! I remember when they brought him in. Head bowed, tired, hungry, in pain from the leg wound, in a daze. I remember hearing him throw up after receiving his first meal. Hang in there, Bill!

Back to the cell. Sweep the dust with my hand into the dust corner. Rearrange for the millionth time my belongings. Toothbrush on the right side of the shelf, string on the left, metal cup in the middle.

Quick! Look through the bars to see where the guard is. Nowhere in sight. Good! Move the loose rock to check the calender. Still have small part of pencil and some paper left. Check off one more day . . . today is the first day of the rest of my life. Hang in there!

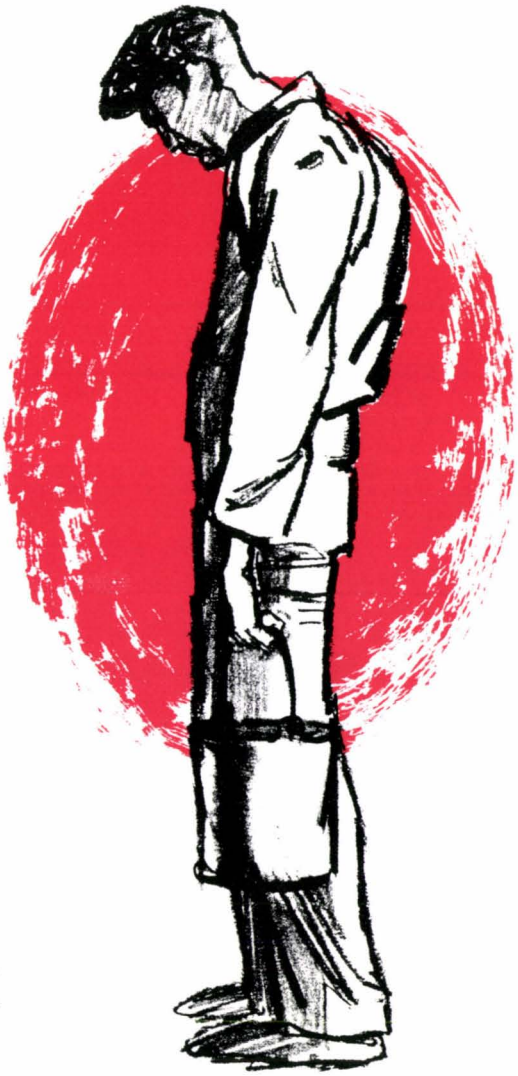
The POW question has gathered tremendous emotional momentum among the American people. The scenario above is typical of a number of books that explore the world of the POW. The better books serve to communicate the absolute despair and helplessness one encounters during internment in the hands of the Communists. They also serve to prove that resisting and surviving honorably is possible. This is the position taken by the Survival, Evasion, Resistance and Escape (SERE) Branch of the U. S. Army Aviation School's Department of General Subjects, Ft. Rucker, AL. After extensively researching the question, the SERE Branch has come to some interesting conclusions. These theories prove to be extremely important because they are being incorporated into training at the Aviation School.

A major objective will be to dispel the idea of *brainwashing*. The word brainwashing was adopted after the Korean War when many Americans were fearing the worst in terms of the conduct of our POWs. It very neatly explained a process that was thought of as highly technical, 100 percent foolproof and completely diabolical. Unfortunately, all of the fears and guilt was based on the very unfair assumption that the conduct of our men was anything but honorable.

The Korean War was the first time that Americans were exposed to the Communist policy of indoctrinating prisoners of war. Instead of concentrating on tactical information, which is what the Americans expected, the Communists were more interested in the man's background, where he came from, if he was married and what kinds of sports he enjoyed. The indoctrinators compiled profiles of the prisoners which allowed them to identify the type of background he had and his degree of suspectability.

In keeping with Communist philosophy, individuals with working class backgrounds were chosen to be at the top of the chain of command. They were charged with administrative responsibilities and were directly responsible to the political indoctrinator for everything their fellow prisoners did or failed to do. This usurping of the lawful authority that is supposed to exist in the POW environment is typical of the tactics used by the Communists in an attempt to undermine the faith of the POW in his fellow prisoners. Coupled with this type of thing was physical violence, sleep deprivation, prolonged periods of constraint, endless hours of interrogation and indoctrination, and a minimal diet that was atrociously lacking in nutritional value and the dreaded isolation. A thorough analysis at SERE Branch reveals eight important elements present in every Communist prison camp. In order to better understand the POW's predicament, these are briefly discussed below.

Since Korea, Communist "brainwashing" techniques have been generally accepted as being highly effective. Recently, studies being conducted at the United States Army Aviation School, Ft. Rucker, Alabama, have thrown new light on the matter



He Ain't Heavy . . .

Degradation is one of the most important factors used to try to undermine the POW's resistance. Through the use of force and trickery, the Communists degrade officers and senior enlisted men in front of lower ranking prisoners. They can and will in certain circumstances make a mockery of the prisoner's religion, his beliefs and hopes. Degradation is a gradual process that starts with simple things and becomes more and more difficult to avoid as the prisoner's ego is systematically weakened. The purpose of degradation is to slowly melt away the prisoner's precapture beliefs. It very effectively causes contradictory circumstances with which the prisoner has a hard time coping. He knows what his actions should be but is forced to do things in which he doesn't believe.

Enforced trivia is an instrument of degradation but has a purpose all its own. Enforced trivia introduces and reinforces the habit of compliance. The habit of compliance is the term we would prefer over brainwashing. It has a very interesting definition and will be discussed later in this article. Some examples of enforced trivia are: walking around with the head bowed, showing extreme politeness to a guard whose rank wouldn't normally warrant it, and elaborate and trite ceremonies that are performed for survival essential items. The daily latrine routine, the ceremony which is used for accepting food and water, are examples of enforced trivia and serve a definite purpose. The prisoner is forced to comply with these routines in order to survive. In a short period of time the effects manifest themselves when he voluntarily undertakes procedures in new areas to avoid having to be forced.

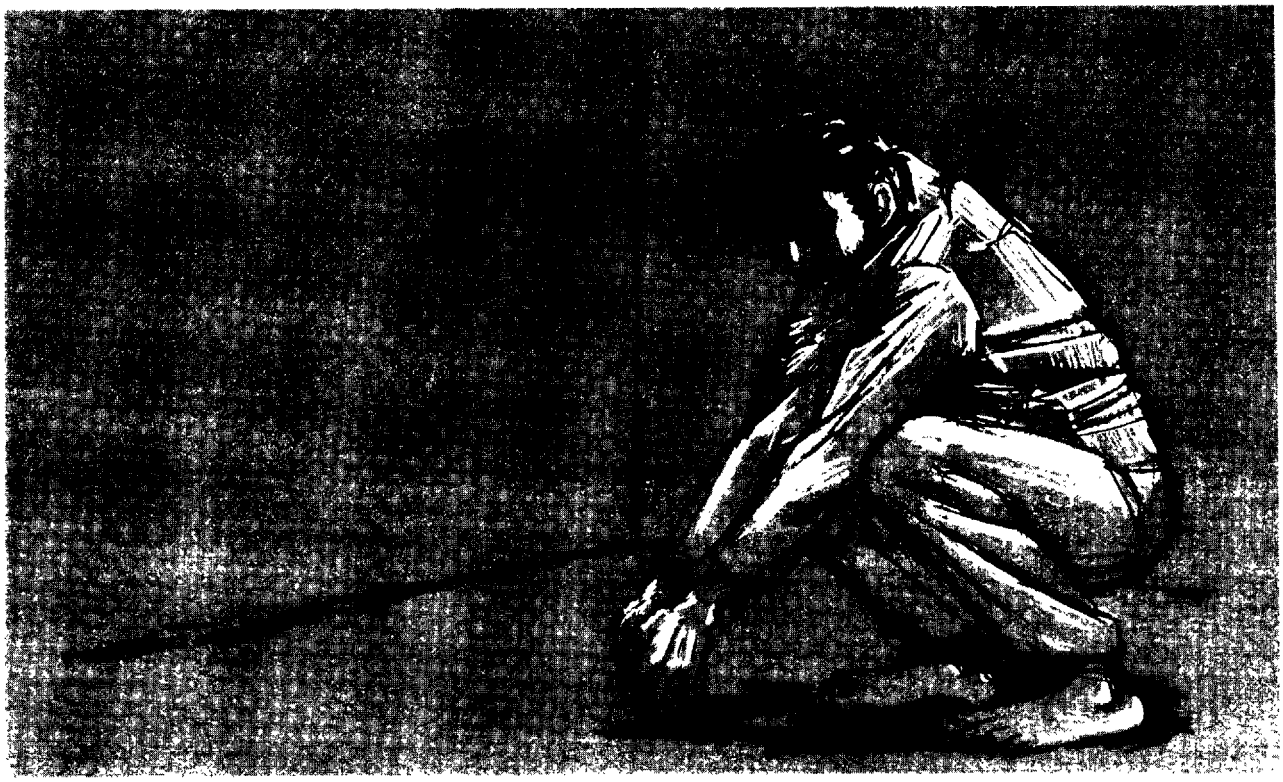
Fatigue is accomplished through many means. Sleep deprivation, prolonged periods of constraint, endless interrogation and indoctrination, and a poor diet. Fatigue is both physical and psychological. Not only is the prisoner physically exhausted but because of the wide range of emotions he feels (fear, anger, guilt, etc.) the POW becomes psychologically drained. Time and time again, the Communists will remind the POWs that they have the power of life and death over him.

Demonstrated omnipotence. The interrogators will try to appear that they are all-knowing. They will say that the information the POW is withholding is already common knowledge and further resistance is useless. Of course, if this were true, why would the interrogation continue?

Threats are used constantly. Strangely enough, though, the threat of death usually doesn't carry as much weight as the threat of nonrepatriation. Also, threatening the man directly usually isn't as effective as threatening one of his compatriots. Threats are an every day fact of life in the POW camp, but there must be a distinction between a viable threat and one which is made on the spur of the moment.

Unexpected rewards. Americans are by nature the type of people who believe in returning a kindness. From the time a child is old enough to understand it, he is compelled to live by the golden rule: *Do unto others as you would have them do unto you.* This fundamental desire to reciprocate favors makes the American prisoner of war a perfect target for *unexpected rewards.* In the midst of his trials, when the times seem impossible to survive, the prisoner will receive an unannounced, temporary reprieve. It may be in the form of mail, or extra food, or the medicine he needed. In every instance, however, when a prisoner receives something out of the ordinary, there is an underlying motive attached. Unexpected rewards serve to confuse the prisoner. It is difficult for him to part with the golden rule and the Communists know this.

Controlled perception and isolation go hand-in-hand. One is a product of the other. Of all the techniques used by the Communists, by far the most effective is isolation. Isolation comes in two degrees: partial and total. The total isolation would be the same as what we call solitary confinement. The prisoner is placed in a small, barren room. He has no contact with the outside and no external stimuli. Any activities he becomes involved in must be self-actuated. After a long period of solitary confinement, prisoners have been known to experience hallucinations. They begin to



display traits of the mentally disturbed. Resistance to this type of isolation is difficult but by no means impossible. The prisoner must practice mental gymnastics. A prisoner of the Hungarian Communists is known to have survived isolation by measuring the average length of her step and walking back and forth in her cell until she had "walked" around the world three times.

Partial isolation is not as dangerous as solitary confinement but it is very effective in two ways. First, it hinders the all important organization of the prisoners. Without organization, there is no discipline; without discipline, survival becomes very difficult. Second, it does not allow the prisoner the luxury of social support and therefore fosters introspection. A dangerous situation develops when a prisoner is constantly thinking about his own problems and has no one to turn to for reassurance. This inner turmoil is fairly easy to detect and when it happens the political indoctrinator will present himself as the prisoner's only "friend."

All of the eight methods discussed above interact to help induce the habit of compliance. What is the difference between brainwashing and this habit of compliance? The word brainwashing implies that a mystical technique has evolved through devious means that will completely eradicate the precapture beliefs of an individual and through some magical metamorphosis change him into a walking, talking puppet of the state. SERE Branch personnel prefer to use the term *habit of compliance* because it is more concrete, more comprehensive and it eliminates the fear of the other word which would prove detrimental to a POW. The habit of compliance is not owned solely by the Communists. It can be seen, in a much milder form, in any penal institution in the world. What this means to the individual soldier is that he no longer has to fear the ultimate weapon of psychological warfare—brainwashing—but now he can understand it. If he can understand this, he can combat it effectively.

SERE Branch is one of the first agencies within the Army to begin development of a realistic resistance training program incorporating the eight elements discussed above. Any questions or comments you may have are invited. New developments in survival, evasion, resistance and escape take form every day and it is difficult to disseminate this information Army-wide. Please address your correspondence to:

SERE Branch
Department of General Subjects
United States Army
Aviation School
Fort Rucker, Alabama 36360

Finally, I hope this article may have spurred your thinking about the POW question. As helpless as you may feel, something can be done. Remember, he's your brother.

Evolved Gas Dysbarism In Army Aviation Or Can You Bend An Army Air Crewman?

Aeromedic

Lieutenant Colonel Nicholas E. Barreca, M.D.

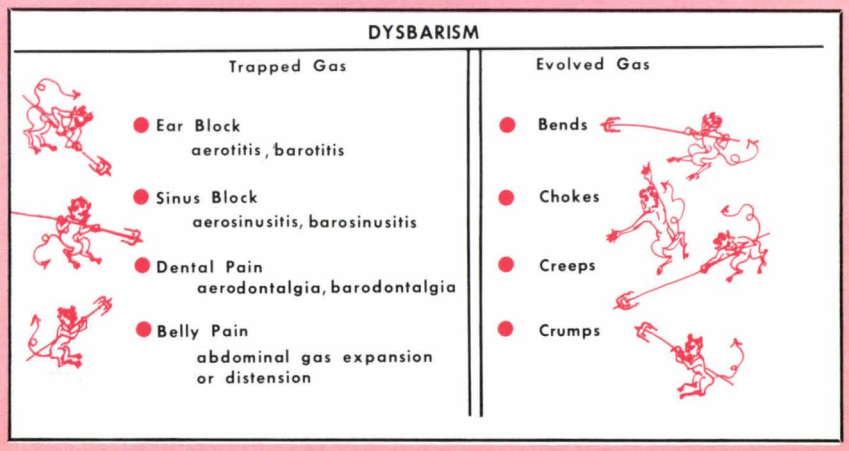
Provided by the Society of U. S. Army Flight Surgeons

This is the second in a series of three articles about the effects of changing barometric pressure on the human body

LAST MONTH we discussed dysbarism, generally defining it as the effects of changing barometric pressure on the human body. It was pointed out that dysbarism could be divided into two types—those due to trapped gases and others due to evolved gases (figure 1). The trapped gas dysbarisms are more commonly encountered in the Army aviation environment than those due to evolved gases.

This article centers on evolved gas dysbarisms. Just what are they? Basically they are a group of symptoms of differing types that occur when gases dissolved in the body tissues are suddenly permitted to come out of solution. These types of dysbarism have been known by several other names—decompres-

Figure 1



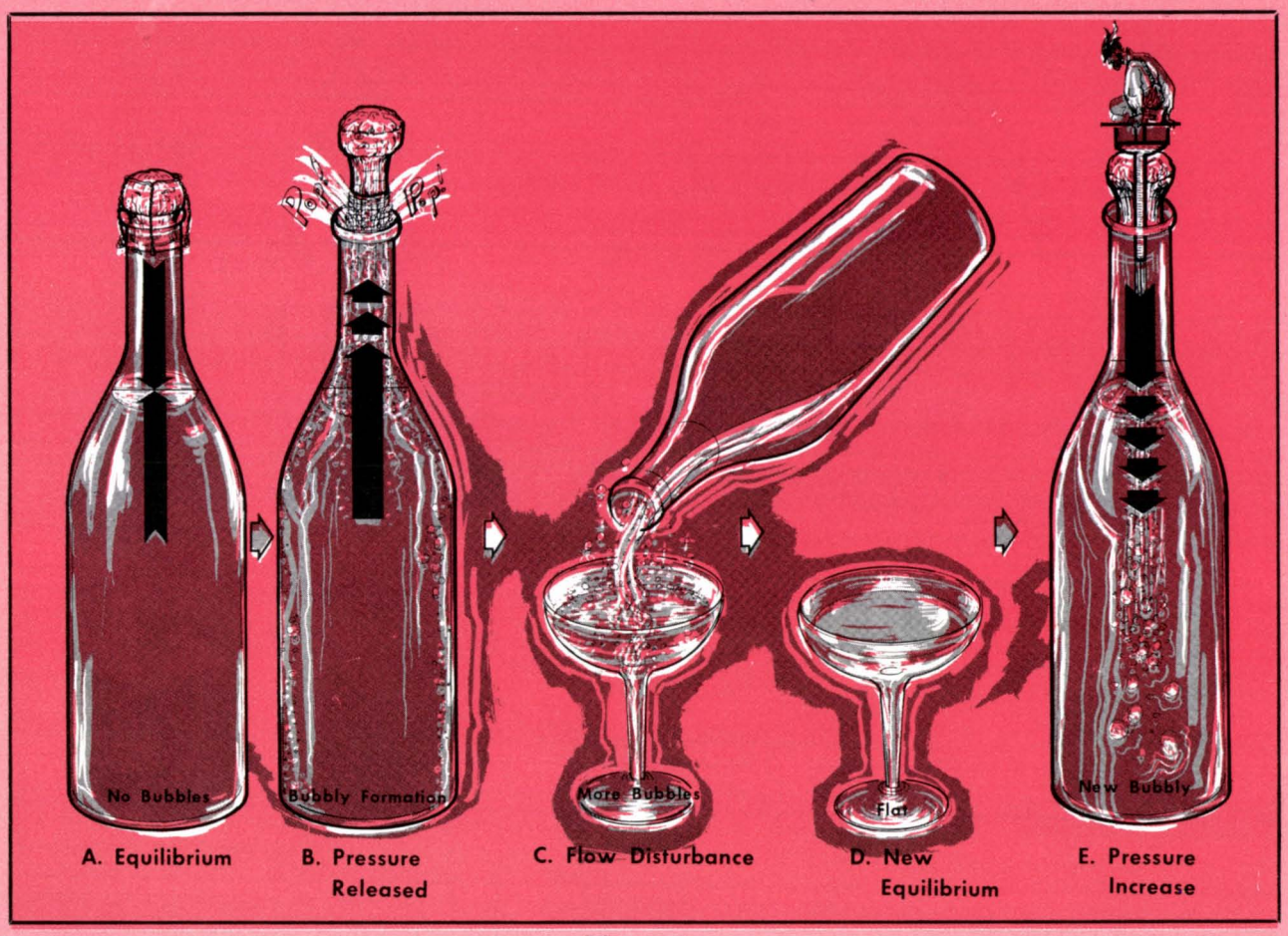


Figure 2

sion sickness and bends being the most common. Aeroembolism and altitude sickness are other terms which are not as appropriate or as specific as the term "evolved gas dysbarism."

The evolved gas dysbarisms are easily ignored since they are encountered infrequently. However, set up the right conditions and they will be incapacitating and sometimes life threatening. Do such conditions exist in the Army aviation environment? Are Army air crewmen ever really risking the development of what is commonly called decompression sickness? The answer to both of these questions is an emphatic "Yes!" There is a dual risk involved due to the nature of certain fixed wing mission requirements and by virtue of man's leisure participation in SCUBA (self-contained underwater breathing apparatus) diving. Actually, *both* rotary and fixed wing air crewmen are exposed to these risks at certain times. Let's examine a few specific examples.

A 22-year-old aviator was undergoing transition in the U-21A, an unpressurized fixed wing aircraft. Part of his training included an oxygen system and high altitude familiarization flight at 21,000 feet. This was started on a clear day, flying IFR. Upon passing through 14,000 feet the crew donned oxygen masks and started breathing diluted oxygen on their regulator's *normal* setting. At 21,000 feet, after about 30 minutes of oxygen breathing, the subject aviator began to experience some unusual sensations. He became lightheaded and confused and complained of a red veil and spots before his eyes. Another crewmember removed him from the controls and administered 100 percent oxygen by passenger mask. The aviator continued to feel ill and did not improve until the aborted mission returned to ground level. The affected aviator later stated that he was ill throughout the weekend. The remainder of the crew assumed that because of a poorly fitting oxygen mask the affected aviator had experienced hypoxia . . . or was it a form of evolved gas dysbarism known as the crumps?

In another instance a group of three air crewmen planned a weekend SCUBA diving expedition to a little known dive spot. They rented a civilian light observation helicopter because it would be

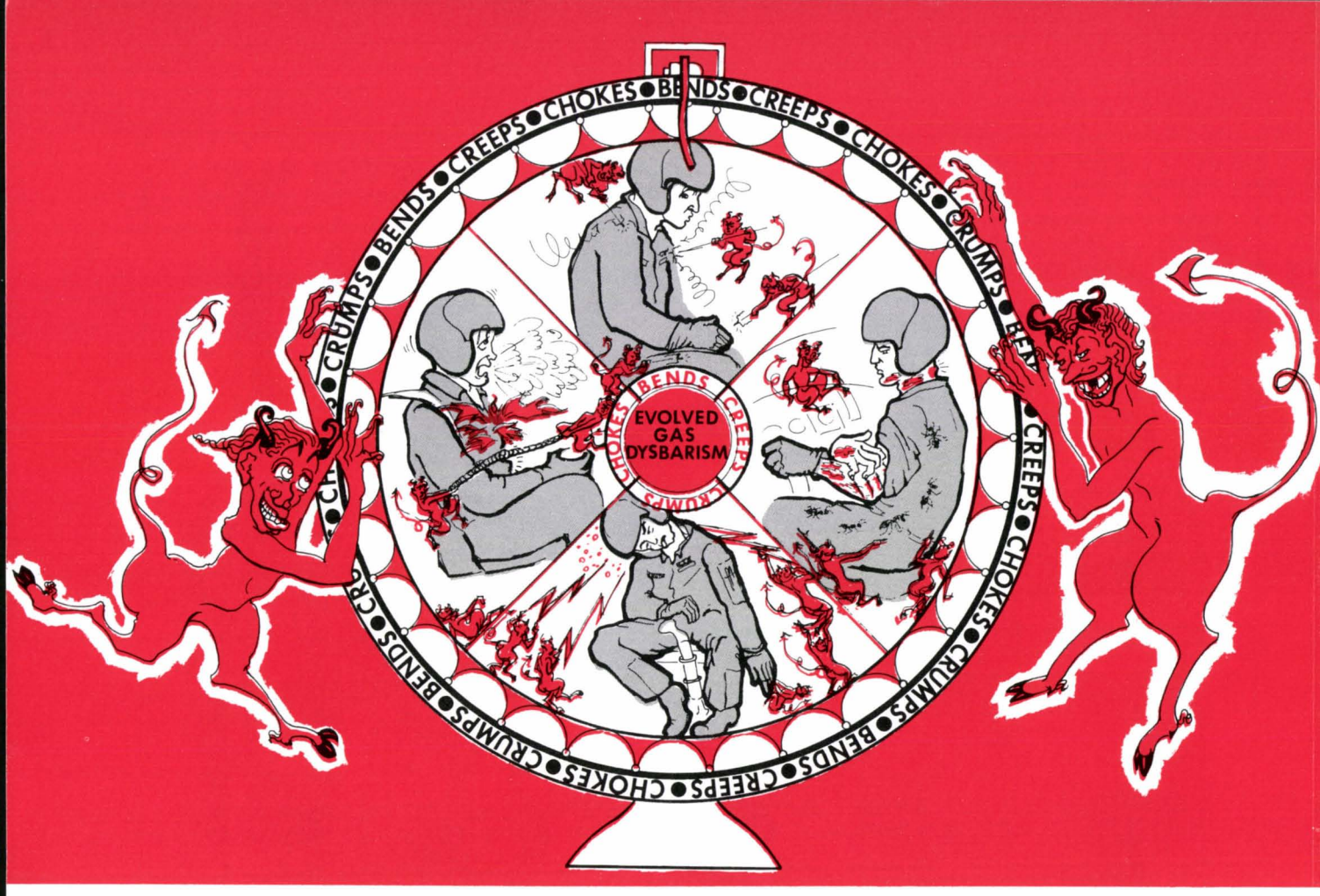


Figure 3

more versatile in locating the spot and landing at a nearby clearing. They arrived at midmorning on Saturday after reconning several springfed tributaries as potential dives. After two cave dives to 90 feet they "roughed it" in sleeping bags till morning. After a canned breakfast they pursued some shallow exploration of various other dive locations, refilled their tanks, refueled the aircraft and returned for a series of two midafternoon cave dives. At dusk, after spending 2 hours cleaning gear and breaking camp, they took off for the return trip home. Darkness fell rapidly as they climbed to 5,000 feet to provide a safe altitude. Within an hour all three were violently ill. The pilot and copilot had severe pain in the shoulders and knees, associated with varying degrees of limb numbness and weakness. The third member was unconscious after experiencing breathing difficulty with almost incessant coughing. Luckily they were within 15 minutes of a U. S. Navy experimental diving unit helipad. Were these cases of tomaine poisoning? No, these were undoubtedly due to the evolved gas dysbarisms.

Why is man subject to these problems when he goes to altitude or decompresses? To understand let's examine some basic physical principles relating to gases and liquids. The amount of gas that will dissolve in a solution and remain there is directly proportional to the pressure of the gas over the surface of the solution. This fact, known as Henry's Law, is the underlying basis of the evolved gas dysbarisms. Its implications are best understood if we examine our own experience with carbonated beverages. A bottle of champagne will suffice (figure 2).

Once bottled under pressure the gas in solution remains in equilibrium with the increased gas pressure above the liquid, enforced by the cork (figure 2A). Since the forces are balanced no gas can leave the solution, thus no bubbles form. This can be likened to the man at ground level whose tissue fluids are in equilibrium with the enforced gas pressure of the atmosphere.

Upon removing the cork there is an excited release of pressure and bubbles evolve from solution, frequently spilling over the top of the bottle and causing problems (figure 2B). Man has the same problem if the pressure around him is sufficiently reduced by unpressurized flight to high altitude. If one pours the champagne, more bub-

bles will come out of solution due to the agitation of the liquid (figure 2C). In like fashion, exercise can intensify the likelihood and degree of symptoms experienced by man.

Once a liquid previously under pressure is permitted to sit it becomes flat. It comes into equilibrium with the reduced pressure around it (figure 2D). Likewise, man under ideal conditions will equilibrate with his surrounding gas pressure if given sufficient time.

In order to restore things to their original state, gas must be forced into solution under renewed pressure (provided in figure 2E by the "little ole winemaker"). Thus, there is renewed potential for bubble formation. As man descends from high altitude in unpressurized aircraft, the increasing pressure forces greater amounts of gas into the solution of his body tissue fluids. If he dives under water the pressure increase is even more profound.

In man three primary gases are involved—oxygen, carbon dioxide and nitrogen. Oxygen and carbon dioxide are involved in body chemistry and readily diffuse out of the body. Nitrogen is not used in body processes. It's a sort of a filler. It takes time for the nitrogen gas to leave the body when pressures are reduced. If pressure is reduced rapidly and to a great enough extent, the nitrogen will come out of solution. Thus, *it is evolvement of nitrogen bubbles in the body tissues that causes the evolved gas dysbarisms.*

There are a number of factors that influence the likelihood that evolved gas dysbarism will occur. Several general factors are important to consider:

• *Altitude.* For those starting at ground level, it is found that 18,000 feet must be exceeded before evolved gas dysbarism will occur. Thus, the threshold for symptoms is considered to be 18,000 feet. Between 18,000 and 23,000 feet the incidence is negligible and seldom involves serious or disabling types. Between 23,000 and 30,000 feet the number of cases gradually increases. Above 30,000 feet the onset of evolved gas dysbarism becomes a likely prospect in unpressurized flight.

• *Rate of ascent.* This factor is important in diving but is seemingly unimportant in aviation. Rapid decompressions are perhaps an exception, but generally it is advantageous to achieve altitude rapidly so as to decrease time duration at altitude.

• *Duration of exposure.* The longer the time of exposure at a given altitude above threshold, the greater the likelihood that evolved gas dysbarism will occur in an individual.

• *Exercise.* At altitude exercise definitely increases the incidence of evolved gas dysbarism. Rubbing or repeated flexion of a symptomatic extremity will aggravate rather than alleviate the condition.

• *Repeated exposure.* Reexposure to high altitude within the same 48-hour period tends to increase the incidence.

• *Temperature.* Lowered temperature increases incidence perhaps due to decrease in blood circulation or shivering.

• *Time of day.* Incidence is highest in the morning, lowest in the late evening, perhaps due to the change in body metabolism.

• *Compressed air diving.* This leads to an increase in the amount of nitrogen dissolved in the body. Ascents to altitude while this residual nitrogen is present will result in the early onset of evolved gas dysbarism.

There also are a few personal factors that affect the incidence of evolved gas dysbarism:

• Age. The incidence increases with advancing age. Those in their mid-thirties are three times more susceptible than those in their early twenties. This may have something to do with the next factor.

• Obesity. Since nitrogen gas goes into solution in body tissues at different rates, certain tissues are more likely to be problems than others. Nitrogen is most soluble in fatty tissues. These tissues also give up nitrogen gas very slowly. In obesity then, the probability for evolvement of gas is increased. This has been borne out in several controlled studies—another good reason for being lean and mean.

• Recent injury. There is some evidence to indicate a higher incidence in joints or limbs that have sustained recent injury.

• State of health. Alcohol aftereffects and active infection appear to increase susceptibility.

Depending on factors not yet fully understood, four differing types of evolved gas dysbarism can occur—the bends, the chokes, the creeps and the crumps (figure 3). Each type consists of a distinctive group of symptoms and signs.

Bends: Being the most common form of evolved gas dysbarism, it is not surprising that this term has often been used loosely to mean all types of evolved gas dysbarism. Actually the term is specific for pain of a mild-to-severe degree, which is experienced at or around the body joints. It can be anywhere from mild dull aching to a gnawing or deep boring pain, sometimes referred to muscles or bones. The joints involved are the knees, shoulders, elbows, wrists, hands, fingers, ankles and hips in decreasing order of frequency. If severe, the pain will often become intolerable or incapacitating. The pain can appear gradually or abruptly at altitude and characteristically diminishes or disappears on descent to ground level or a lower altitude. It is sometimes unpredictable, becoming worse or better with time . . . even suddenly disappearing.

Chokes: This form of evolved gas dysbarism is less common than the bends, but is often more severe,

incapacitating and sometimes ominous. It results from the evolvement of nitrogen bubbles in the respiratory system giving rise to characteristic symptoms. Most prominent is a burning pain under the breast bone associated with paroxysmal, uncontrollable, nonproductive coughing and chest constriction or tightness with shortness of breath. This often is accompanied by a sense of apprehension and suffocation, sometimes terminating in collapse or unconsciousness. The chokes are sometimes preceded by the bends. Once recognized, descent and termination of the mission are imperative. Fatigue, weakness and soreness in the chest may persist for several hours after descent to ground level.

Creeps: This type of evolved gas dysbarism may occur alone or forewarn of a more serious type. It results from the pressure of bubbles on nerve endings and blood vessels in the skin. Due to a variety of sensations experienced, a number of descriptive terms have arisen to reflect these skin manifestations. The squiggles, inkles, niggles, creepies and crawlies undoubtedly reflect the tingling, prickling, burning, numbing and itching sensations that have been experienced. The skin may appear to develop a rash with irregular reddened areas or a mottling redness alternating with paleness. Sometimes a crinkling can be felt under the skin and less frequently an air blister or bleb will form. Most symptoms and signs disappear upon descent.

Crumps: This is a term invented for this article. It denotes the most serious type of evolved gas dysbarism which results from evolvement of bubbles in the nervous and circulatory control systems. Visual defects are common with flickering or shimmering of vision which may be associated with blind spots. Migraine-like headaches may be experienced. Most seriously, there can be diffuse loss of sensation, feeling and movement with partial or complete paralysis of an extremity or side of the body. Circulatory collapse or a shock-like state is another form of this serious evolved gas dysbarism. Usually this form of dysbarism occurs only with severe exposures, being most common above 30,000 feet in the unpressurized environment. Sometimes susceptible individuals will be affected at lower altitudes.

Prevention is the key to reducing the likelihood that evolved gas dysbarism will occur. Care to minimize or eliminate the general and personal risk factors that influence incidence is the first step. A most important rule to remember is the one pertaining to SCUBA diving. Compressed air diving and flying just do not mix safely. Even repeated skin diving to deep (50 to 70 feet) depths over a long duration can be risky. AR 40-8 specifically states that air crewmen will not fly or perform low pressure chamber runs within 12 hours following SCUBA diving, compressed air dives or high pressure runs. As our friendly dolphin says (figure 4): "SCUBA diving and flying are a *no-go* situation when they have proximity in time." Heed his advice and wait the full 12 hours between these activities.

When flying *unpressurized* aircraft a few general principles must be observed for prevention's sake. For flights above 23,000 feet a procedure known as denitrogenation must be undertaken. Denitrogenation is a process whereby one breathes 100 percent oxygen for a prescribed period of time in order to rid the body of nitrogen. Since nitrogen is the culprit in evolved gas dysbarism, reducing the body's burden of nitrogen will decrease its incidence. This preoxygenation or denitrogenation should be accomplished for 30 minutes prior to takeoff and continued up to altitude and for the duration of flight above 18,000 feet. For OV-1 and U-21 fixed wing aircraft this can be accomplished during aircraft runup and while awaiting the IFR clearance. Even with adequate denitrogenation flight above 30,000 feet should only be considered for emergency reasons and not for continuous or recurrent missions. Flight in unpressurized aircraft should be limited to 23,000 feet, unless the adequate denitrogenation procedures are used. The risk of evolved gas dysbarism is negligible between 18,000 and 23,000 feet. Remember, however, there is still a requirement for oxygen at and above 10,000 feet to prevent hypoxia.

Pressurized aircraft and pressure suits have been used commercially and by the other military services to prevent evolved gas dysbarism. They are expensive and carry a weight penalty with them, but are desirable and often essential for certain applications. In Army aviation missions that require long duration flights at high altitudes such a system would be desirable. Some aircraft have greater flying efficiency at higher altitudes, especially if they are to perform such missions as those of the U-21. These are best pressurized so that crews and passengers may be safely and comfortably accommodated.

The treatment of evolved gas dysbarism is basic and simple when it occurs in flight. It is *recompression*—the process of increasing barometric pressure. The first step after symptoms occur is immediate descent to an altitude below 18,000 feet (consistent with weather and terrain obstacles) at which time symptoms should disappear. If they do not disappear, prompt return to ground level is *imperative!* Upon landing, a flight surgeon's care must be sought and hospitalization may be required. If symptoms disappear at an altitude below 18,000 feet, the mission should still be curtailed or aborted *unless it is vital to national defense!* Again, the

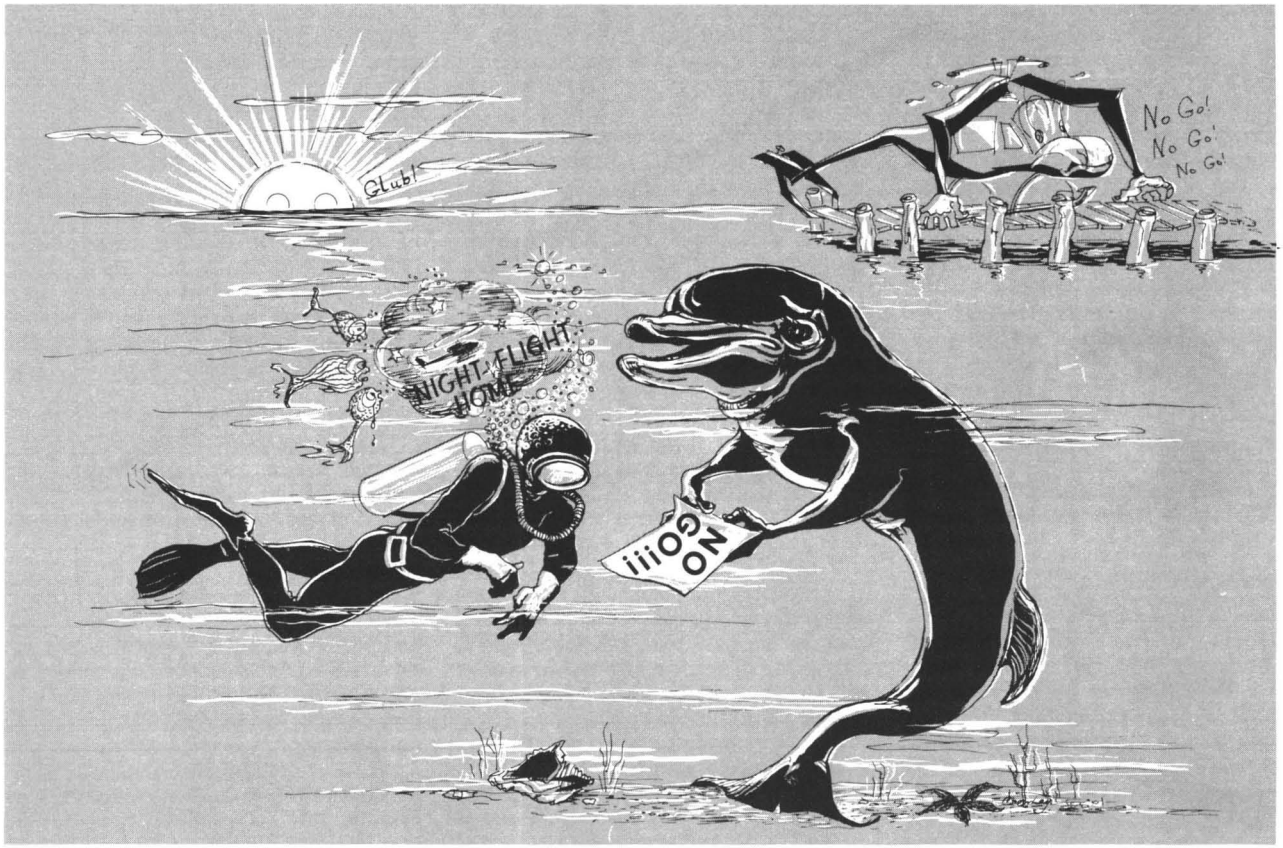


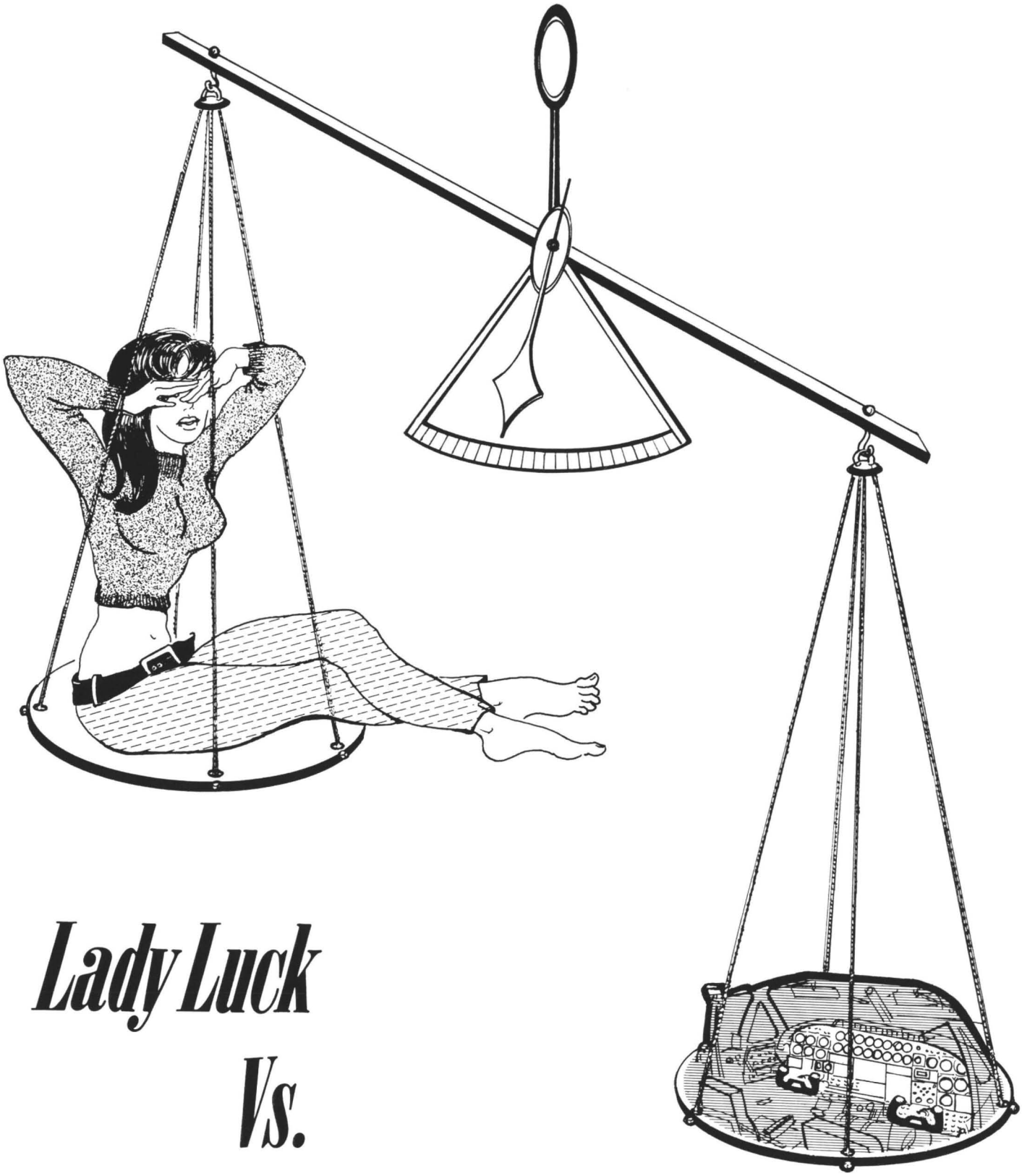
Figure 4

flight surgeon must be advised of the occurrence. There is a condition known as postdecompression collapse, which may occur after return to ground level and in a few cases up to 6 hours or longer after landing. This type of collapse is almost always preceded by some form of evolved gas dysbarism at altitude. Thus, it is wise to see the flight surgeon for observation after any episode of evolved gas dysbarism.

If symptoms persist after return to ground level, further recompression is indicated. This is accomplished in a hyperbaric or compression chamber. The U. S. Navy and U. S. Air Force each maintain operational treatment chambers for this purpose throughout the world. Army flight surgeons are knowledgeable of their use and have access to them.

The evolved gas dysbarisms, while seemingly a remote probability in Army aviation, are still worthy of every air crewman's knowledge and consideration. In point of fact several Army aircraft, both fixed and rotary wing, are capable of flight above 20,000 feet. The U-21A and OV-1 can reach as high as 28,000 feet and 40,000 feet respectively, depending on configuration. Only the U-21F has a pressurized cabin, yet Army aircraft are not prohibited from utilizing their altitude capabilities.

Potentially more distressing is the increased national and worldwide leisure interest in compressed air diving or SCUBA. Clubs and courses of instruction have organized all over the world and often are established at military bases. SCUBA equipment is within the financial reach of most people. Fortunately, most formally instructed SCUBA divers receive excellent instruction in the hazards associated with compressed air diving. Not infrequently though, some individuals undertake SCUBA experimentation on their own. This is not only foolhardy but also likely to result in all types of evolved gas dysbarism, including those associated with flying. Aviation commanders should ensure that all diving clubs on military installations come under scrutiny to ensure the receipt of sound medical advice and emphasis of those specific guidelines pertaining to flying personnel. Flight surgeons, being knowledgeable of evolved gas dysbarism, its prevention and treatment, should be prepared to advise and assist air crewmen to engage their environment safely.



Lady Luck Vs. IFR Competence

A lack of experience and self-confidence invites attempts to extend VFR flight when visual references no longer exist. The aviators, if around, tell us . . . "As luck would have it, the hole closed up" or "In this case 'Lady Luck' prevailed"

CW4 Paul J. Chauvin

THE FIRST PARAGRAPH of the message reads: "In order to achieve full utilization of Army aircraft capabilities and to meet requirements of midintensity warfare for dependable around-the-clock operations, Department of the Army has established the objective of a standard instrument qualification for every aviator. A follow-on training goal is to broaden his technical knowledge and to instill additional confidence in the equipment he operates."

Attainment of the standard instrument rating poses no significant problem as the Army continues to equip its tactical fleet with an IFR capability; however, the maintenance of instrument qualification has always proven to be a challenge directly proportional to the prevailing Army aviation environment at a given station.

I have conducted instrument flight examinations in various assignments during the past few years and observed that aviators have not fully demonstrated their capability to function under simulated or actual instrument flight conditions. Army and installation regulations not only place the responsibility for maintenance of instrument qualification upon the individual aviator, but also direct commanders to establish and conduct thorough and continuous training to assure a high degree of instrument flight proficiency. It has not always been possible to rely upon fulfillment of either of these areas of responsibility.

The aviation environment is naturally dependent upon combat activity, time, equipment and facilities. Today's flying programs are markedly affected by post-Vietnam budgetary requirements reflected in recent changes to regulations governing proficiency flying and instrument qualification. However, these same regulations allow aviation commanders to revitalize their combat readiness programs and achieve the stated goal for full instrument capability.

Army aviators have always wanted to be instrument rated either because they owe it to themselves and to the service or to enhance their opportunities for civil employment upon their release from active duty. It does not matter what type instrument rating an Army aviator possesses—call it standard or nonstandard, special or deluxe, tactical or mobile—it still represents an extension of VFR capability and increases his ability to serve Army aviation to the combat environment nor does it matter what type warfare the Army is preparing for or engaged in—cold war, midintensity of nuclear—the ability to transition between VFR and IFR flights is still required.

Prior to writing this article, I scanned all previous issues of the AVIATION DIGEST (beginning with February 1955) for information relative to the Army instrument program. The problems inherent to individual qualification remain the same. The rewards associated with well-developed training programs are reflected in such recent articles as: "Chinooks IFR (Cav Style)," July 1969 and "Instrument Training in the Americal Division," September 1970. I also found several well-written articles admonishing the aviator to thoroughly plan his flight. One such article worth reading over and over again is "IFR Apathy," March 1971.

Past issues of the AVIATION DIGEST, however, contain far too many examples of ill-preparedness for instrument flight. The theme never changes: "In this case 'lady luck' prevailed."

"As luck would have it, the hole closed up when we started through," the accident report stated. "Although the pilot and copilot had current rotary wing tactical instrument tickets, it is suspected they hesitated to climb out under instrument conditions due to lack of confidence and experience and extended the flight under visual flight conditions beyond their capability."

As far back as October 1955 the AVIATION DIGEST's "Gray Hair" feature began citing instances of below VFR/inadvertent IFR accidents. "Gray Hair" also wisely stated that there is no compromise between instrument flying and noninstrument flying. Attempts to mix the two conditions will lead inevitably to an accident. Therefore, an underlined *note of caution* is extended to those units which strive for the goal of proficiency in nap-of-the-earth VFR operations under decreased visibility and/or low ceiling conditions.

In the event you encounter instrument conditions during nap-of-the-earth operations, be wary of executing the proverbial 180 de-

gree turn. I like "Gray Hair's" attitude: ". . . This fallacy has killed hundreds of people . . . The 180 degree turn is only a safe escape when it is performed long before its absolute necessity is apparent . . . *The last escape route is up! Therefore, the first requirement for an aviator, before he pushes the weather at all, is instrument training and an instrument ticket . . .*" AVIATION DIGEST, April 1957.

During the conduct of about 170 instrument flight examinations in a 20 month period, I found examinees to be continually deficient in one or more of the following areas: use of DOD FLIP and flight planning, knowledge of instrument flight rules as promulgated by AR 95 series and FAR 91, terminal instrument approach procedures and basic attitude instrument flying. Ninety-five percent of these flight examinations were conducted in single-engine, fixed wing aircraft; the remainder in UH-ID helicopters. Minimum satisfactory performances were not necessarily a result of partial panel or knowledge of emergency procedures.

Consider the following situations:

• The examinee was in a holding pattern on the procedure turn side of a VOR final approach course. When cleared for approach, he tuned in the VOR of an airfield 9 miles away and proceeded to fly to it.

• The examinee took off, flew past his first fix to another 6 miles further away and then proceeded on course. The NDB (nondirectional beacon) identifications were similar.

• The examinee was cleared to 3,000 feet, and upon reaching 3,300 feet he leveled off and remained at that altitude for the first leg of flight.

• After crossing the final approach fix inbound, the examinee reduced to idle rpm and continued inbound at rates of descent varying between 1,200 to 1,700 feet per minute while not properly aligned with the final approach course.

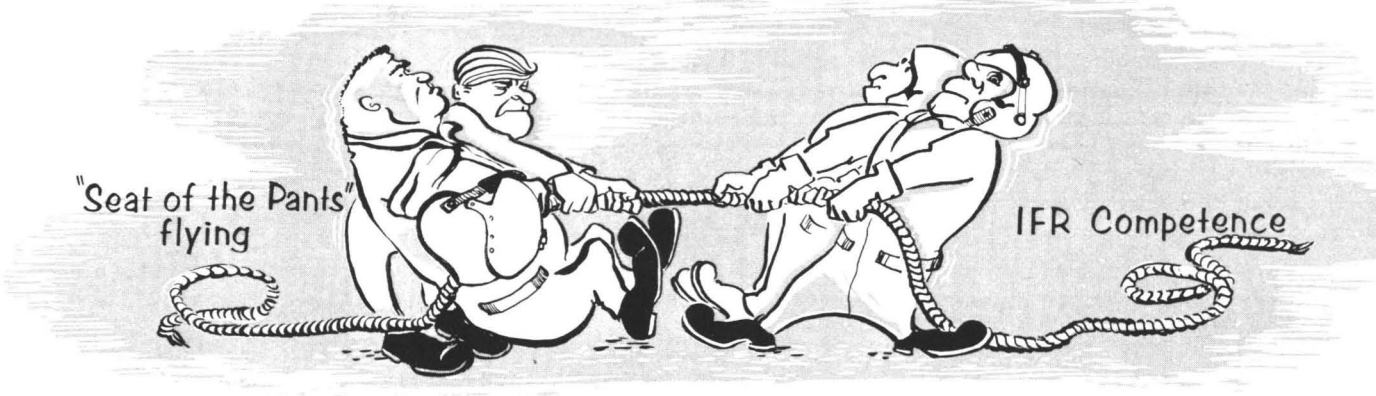
• The examinee crossed the NDB final approach fix outbound, and not being able to properly orient himself finally executed procedure turn at my request approximately 12 miles from the fix.

These are only a few of the violations of safety and good operating practice that I have confronted.

Upon completion of the 1971 annual written examinations, I conducted a personal survey of questions missed by about 150 aviators and noted the following areas of deficiency: terminal instrument approach procedures, enroute IFR planning and knowledge of the AR 95 series. This information further substantiated the low degree of instrument flight proficiency. Flight and/or academic instrument refresher training was immediately available to these aviators. Thus far my 1972 examinees are demonstrating lack of knowledge in these same aforementioned subject areas.

My duty assignment for 15 of the 20 months previously mentioned was that of a navigation academic instructor. You cannot imagine the numbers of rated aviators who were not aware of the more basic rules for visual flight or unable to orient themselves on a VFR aeronautical chart. AR 95-2, paragraph 3-1, sums it up: "The rules in this section and visual flight rules promulgated by the FAA will govern the operation of aircraft under visual flight conditions. See Chapter 4 for exceptions." (This same general paragraph applies to instrument flight rules.) Excluding exceptions, or combat, it is absolutely essential that you have a thorough understanding of these rules before you can adequately function as an instrument rated aviator in CONUS. If you happen to be stationed overseas, then AR 95-2 is supplemented by the International Civil Aviation Organization (ICAO) and/or host country flight regulations.

Instilling confidence in the equipment we operate may prove to be more of a primary goal than a follow-on training goal. Developments toward helicopter instrument flying were whimsically described in an early AVIATION DIGEST article: "Instrument flight conditions in a helicopter, due to oscillations and peculiar control forces, can quickly cause a well-developed form of hysteria among pilots not familiar with instrument flying . . . Military necessity will increasingly require the use of helicopters in all-weather and night operations . . . In the meantime heli-



copter instrument flying remains an emergency measure until further developments assure us of a sound basis for growth" (AVIATION DIGEST, June 1955, Captain Richard W. Kohlbrand). Tests were first conducted in UH-19s and H-25s, a far cry from today's UH-1D and CH-47 series. We cannot equip the entire Army with U-21Fs or helicopters comparable to those used by the Presidential Flight Detachment. Even though we improve the IFR capability of the tactical fleet, there will still be a vast number of aviators regarding helicopter instrument flying as "a well-developed form of hysteria" no matter how much training they receive.

What will be your unit's plan for continuing aviation education in support of the objective for 100 percent instrument qualification? My own experience would prompt me to return to basics and act in strict accordance with prescribed regulations and procedures.

There is certainly no shortage of literature and training aids to supplement a training program. I have seen the need for a strong academic environment, not only for initial qualification and requalification but also for refresher training in general.

The Army should be careful not to rely solely on programed instruction. Nothing can effectively replace the instructor/student direct relationship. Installation standardization boards could develop "miniwrits" in conjunction with ground school refresher training on at least a quarterly basis, patterned after the annual written examination but geared to the scope and concept of operation at your present duty station. I employed such a refresher program for aviators in my unit as they came within 90 days of instrument requalification. The syllabus included a discussion of airspace segments—Army and Federal Aviation Regulations (FARs)—of general, visual and instrument flight rules, air traffic control procedures, weather flight planning and an IFR flight planning practical exercise emphasizing preparation of the flight plan, enroute communications and navigation procedures, and terminal navigation. No special publications are necessary; you may use the current annual written examination reference data booklet to develop the IFR situation.

Were it possible to expand the annual written examination, I would include questions concerning the purpose and use of airspace segments, FAR 91 and add supplements appropriate to your overseas area of assignment to test your knowledge of ICAO and foreign rules of flight. Is it necessary that the examination be limited to 50 questions? Why not 55, or 62 questions, or whatever number is needed to adequately cover all aspects of visual and instrument flight?

Whether you are initially qualifying or renewing your present rating, a return to basic attitude instrument flying would be beneficial. Most of us experience little or no difficulty flying the aircraft in which we are most proficient. However, the division of attention invited by cross-checking instruments may result in sloppy flight characteristics. Far too many aviators concentrate on executing approaches to minimums at the expense of more basic things. We can sharpen our basic instrument airmanship by practicing the proficiency maneuvers outlined in chapter 6 of TM 1-215, or any other basic maneuvers we can devise. Where possible, these maneuvers could be practiced under actual instrument conditions. Many of our installations are situated so that we could make use of controlled airspace off airways and outside the terminal environment. Letters of agreement could be drawn to permit this type activity. Radar surveillance would be desirable and our own GCA units could provide this service.

All aviators should be exposed to as much actual instrument flying as possible in order to instill the desired confidence in their equipment.

It is reasonable to state that instrument flight is simply a series of connected basic flight maneuvers. Most of your flights will terminate with an instrument approach from on top and you will normally break out above published landing minima. Tracking the VOR (VHF omnidirectional range) airway requires no great skill; however, your basic instrument airmanship will determine how well you execute radar vectors or orient yourself for a procedure turn and final course alignment while operating in clouds.

I call your attention to TM 1-225, appendix C, IFR flight planning. The checklist items presented in this appendix provide general guidance for the individual aviator. Until your proficiency and judgment matures, a checklist such as this will enable you to effectively control the variable factors affecting each IFR assigned mission. The application of rules set forth in AR 95-2 should become automatic. Above all, learn to relax. One of the easiest and most satisfying missions you accomplish during the year should be the successful completion of your annual instrument flight examination.

You will eventually view instrument flying as Lieutenant Colonel Frank G. Forrest did in the May 1955 AVIATION DIGEST: ". . . The joy and excitement of flight on top of an overcast in itself is worth the work of becoming instrument qualified. This fascinating experience is further heightened when the pilot executes a well-performed letdown and landing at his destination. . . ."

A Mad Coffee Party

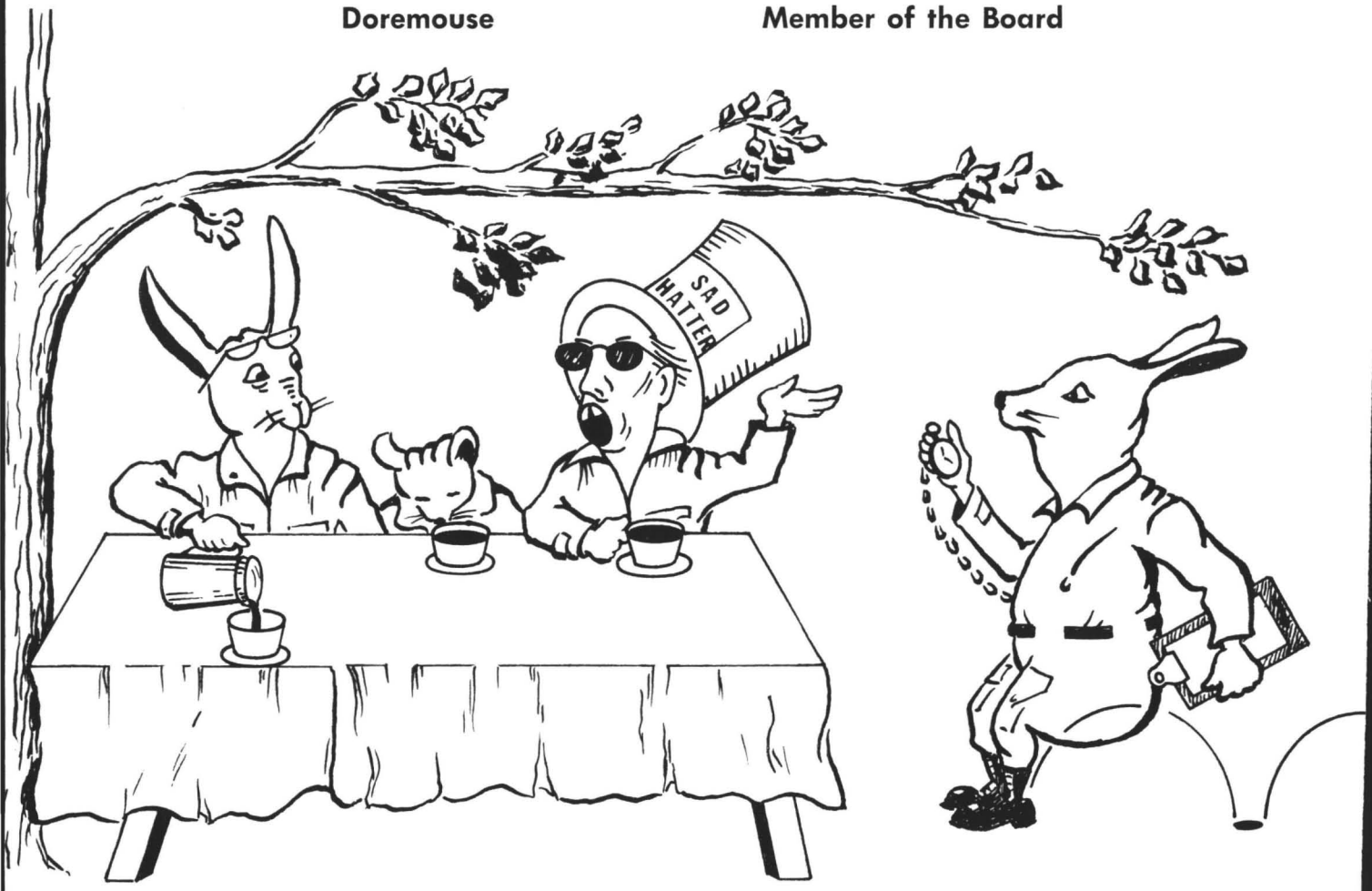
Or

How Not To Run A Standardization Meeting

Captain Thomas P. Petullo

DRAMATIS PERSONAE

Jack Rabbit	Chairman of the Board
Sad Hatter	Member of the Board
Harry Hare	Member of the Board
Doremouse	Member of the Board



"The time has come," the Walrus said,
"To talk of many things:
Of shoes—and ships—and sealing wax—
Of cabbages—and kings—
And why the sea is boiling hot—
And whether pigs have wings."

Through the Looking-Glass . . . Lewis Carroll

THE SCENE OPENS in an administration building where a small figure is scampering down a large dark corridor.

Jack Rabbit (looking at his watch): I'm late.

Outside of the building there is a table set out under a tree and as the clock strikes 13 Jack Rabbit rushes out of the building, scurries across the fog-blanketed lawn and takes his place at the head of a long table. A huge brown coffee pot is centered on the table and the three board members are nestled beside it—Sad Hatter and Harry Hare drinking coffee; Doremouse sandwiched between them dozing.

Jack Rabbit (out of breath): Sorry I'm late, gentlemen. The monthly standardization meeting will come to order.

Harry Hare (pouring): Have some coffee.

Jack Rabbit: Thank you. The first item on the agenda pertains to the use of the new aircraft checklist. The apportionment of the instructor pilot/student pilot duties has been questioned—specifically whether the instructor or the student should drain the fuel from the aircraft. As you know, with the exception of fuel draining, the procedure has been for the student to call out the item and the instructor to perform the check. However, with renewed emphasis being placed on strict adherence to the call and response method—do we want the student to call out the fuel check and have the instructor perform it, as in all the other checks, or do we want the student to call out and perform the fuel check while the instructor continues with the preflight?

Harry Hare (priggishly): Well, I for one think the student should drain the fuel from the aircraft. He always has in the past.

Sad Hatter: I think it's more important to look at *how* to drain the aircraft rather than worry about *who* is to do the draining.

Harry Hare (smugly): Well, *that* seems to be fairly obvious. The drainer will use his left hand to hold the petcock and his right hand to hold the bottle.

Sad Hatter: Aha! Not so. It's all contingent upon which side of the aircraft you're on. If on the left you would use your left hand to hold the petcock, but on the right you'd use your right.

Harry Hare (petulantly): In that case you'll have to define left and right . . . left seated in the aircraft looking out or outside the aircraft looking in?

Jack Rabbit: Before we go into that, shouldn't we take into consideration whether the drainer is left- or right-handed?

Sad Hatter (warming to the spirit of things): Not only that, but what about the wind direction? Surely a left or right crosswind would have a direct bearing on the draining procedure.

The fog on the lawn has been slowly rising and is now at table edge level.

Jack Rabbit: And then of course since we're striving for 100 percent standardization, which hand the reader holds the checklist in is also important.

Harry Hare: He should hold it in his left hand.

Sad Hatter: I think he should hold it in his right.

Harry Hare: Left!

Sad Hatter: Right!

Loud refrain.

Harry Hare: Left!

Sad Hatter: Right!

Doremouse (singing in his sleep): Marching along together . . . .

Jack Rabbit: Gentlemen! Gentlemen! Let's put it to a vote. All those in favor of the student draining the aircraft say aye.

Harry Hare: Aye.

Sad Hatter: Aye.

Doremouse (yawning): Aye.

Jack Rabbit: Those in favor of using the left hand for the petcock on the pilot's side of the aircraft and the right hand on the opposite side say aye.

Sad Hatter: Aye.

Doremouse: Aye.

Harry Hare (whimsically): Bottle grips!

Jack Rabbit (puzzled): Say again.

Harry Hare: Bottle grips. What about bottle grips? I mean it seems to me that people hold the fuel bottle differently. On the flight line you see everything from a petite two-fingered hold at the crown to a death clutch about the midriff. This is certainly a prime area for standardization. I'd like to propose for consideration four alternatives: (a) gripping the bottle at the crown with the thumb and index finger; (b) grasping the bottle's midriff with the entire hand; (c) placing the bottle flat in the palm; or (d) setting the bottle on the ground—hands off so to speak.

Sad Hatter (sharply): That fourth proposal is absurd. Your flexibility would be eliminated. A gust of wind would displace the fuel stream's trajectory. You know what fuel does to asphalt. As for your first idea, the bottle could easily slip with the same

result. In fact b and c also leave much to be desired. The fuel could easily spill over the drainer's hands, thus creating a safety hazard. Need I say more?

Harry Hare: Please don't. You've said enough. Your objections are totally invalid. They . . .

Jack Rabbit (shouting): Gentlemen! Gentlemen!

Doremouse (starting): I think I have the perfect solution. In fact it's so simple, so pure in form, so exquisitely wrought with geometric precision that it's rather frightening.

Harry Hare: Get on with it.

Doremouse: Well, simply stated, let's stop draining the fuel from the aircraft.

A moment of silence.

ALL (in unison): By George, I think he's got it! I really think he's got it!

Jack Rabbit: Let's vote. All those in favor of discontinuing the fuel draining procedure say aye.

Harry Hare: Aye.

Sad Hatter: Aye.

Doremouse (heavy lidded): Aye.

Jack Rabbit: Done!

Musketeer-like, they drain their cups and refill them as the Doremouse dozes off.

By now fog has completely enveloped the meeting; the members being able to see each other only with the greatest of difficulty.

Jack Rabbit: The next point to consider is the proper radio call to make when leaving a holding position. I have discussed the problem with Doldrums. I don't mind telling you it took some talking but I finally got them to reverse their previous position. A full position report will be required.

Sad Hatter: Are we going to have to change that call again?

Jack Rabbit: Tut, tut. No problem. Flexibility —that's the key. Let's just ensure that this is read into the minutes properly. The last change was entered as an amendment and the change previous to that as an abridgment, so let's make this one a modification.

Sad Hatter: No, you're wrong. The last change was an abridgment.

Harry Hare: No, the abridgment was the one before that. The last change was an amendment.

Sad Hatter: Abridgment.

Harry Hare: Amendment.

Jack Rabbit: Order!

Sad Hatter: Abridgment!

Harry Hare: Amendment!

Jack Rabbit (heatedly): Order! Order!

Doremouse (starting): One chili dog with a side order of slaw—hold the fries.

Jack Rabbit (oblivious): Gentlemen, gentlemen, I have copies of the minutes here. Brushing the fog from a stack of previous meetings' minutes he begins to read: On 2 June the proposal for a change was read into the minutes as an amendment; on 9 June we abridged the amendment; on 16 June we adjusted the amendment to the abridgment and on 23 June we altered the adjustment to the amended abridgment. Gentlemen, for simplicity's sake and to avoid confusion I think modification would be apropos. Don't you?

Sad Hatter: Aye.

Harry Hare (nudging the sleeping Doremouse): Aye.

Doremouse (vacantly): Aye.

Jack Rabbit: Done! Let's read this into the minutes then as a modification to the altered adjustment to the amended abridgment.

Once again the coffee cups are drained in unison.

Jack Rabbit: If there are no further proposals, I recommend we adjourn and have another cup of coffee.

Sad Hatter: Before we adjourn I have one item to put forward. An IP collared me just before we started this meeting and asked me to propose that we displace rather than mask the attitude indicator during simulated instrument training.

Groans.

Harry Hare (wearily): Not that again.

Sad Hatter (sheepishly): Well, the IP feels that the first time the instrument malfunctions in actual IFR conditions the unfamiliar sight picture of the unmasked attitude indicator will increase the chances of vertigo.

Harry Hare (exasperated): We know. We know. We've been over this so many times it's becoming ridiculous. It's just as effective if we mask the attitude indicator. The aviator has other instruments he can read. Besides, those cardboard cutouts we use to mask the attitude indicator take a long time to make. We have a stack of those things stockpiled. What are we supposed to do—use them for tea coasters? Once they're used up we may consider your proposal but for now let's forget it.

Jack Rabbit: Good idea. All those in favor of passing on this and taking it under advisement . . .

Harry Hare (nudging the Doremouse): Pass.

Sad Hatter (reluctantly): Pass.

Doremouse (rubbing his eyes): Three trump.

Jack Rabbit: Meeting adjourned. Whose turn to pour?

★ ★ ★ ★ ★

The foregoing fable was not meant to imply that all standardization meetings are conducted in this ludicrous fashion. However, if you have attended meetings regularly, I'm sure there were times when you felt as if you were Alice wandering through Wonderland where things seemed to get "curiouser and curiouser." This tale contained some of the inherent weaknesses of meetings in general and standardization meetings in particular. If these shortcomings assumed an uncomfortable familiarity for you, it may be time to review your procedures for conducting such meetings.

There is a thin line between standardization and pedantry and all too often it becomes indistinguishable in a morass of nitpicking irrelevancies. Meetings have a tendency to assume a separate existence with the members becoming caricatures: One digressor digressing; two disputants disputing; three doodlers doodling; four dozers dozing . . . and a partridge in a pear tree. Objectivity at these meetings is often lost until, divorced from reality, the content of the meetings resembles a ridiculous recipe: To three cups of trivia add two tablespoons of complacency and a dash of nonsense.

Although the standardization meeting is a much abused tool, it also is much needed. There are many distinct advantages of standardization meetings. Several individuals engaged in problem-solving allow a broader base of information; the discussion of problems stimulates the flow of ideas; combined judgment leads to objective solutions; and continuity of policy can be achieved while differences are reconciled and personnel developed professionally.

To achieve the full benefit of these advantages, however, certain responsibilities are incumbent upon the members. Prior preparation is essential. Never go to a meeting unprepared anymore than you would fly an aircraft without first having preflighted it. Members should be regular and punctual in attendance. They also should actively and intelligently participate in the proceedings. Token drones as well as narrow minds are out. The standardization meeting should be conducted in a professional manner with problems being defined and discussed *before* solutions are reached.

The technical nature of the aviation profession not only requires, but also demands, a high degree of standardization. The standardization meeting is not a panacea—it is a tool which, effectively used, enables the meetings to escape radio-TV star Fred Allen's trenchant definition of a conference: "A meeting of a group of men who singly can do nothing but who collectively agree that nothing can be done."

Maintenance

Bearing Down

Care of Bearings: Requirements for proper care of bearings are outlined as follows:

1. General precautionary measures to be observed in handling bearings are listed below:

a. Do not allow aircraft cleaning compounds to enter and contaminate bearings. When it is impossible to protect bearings from such contamination, they shall be cleaned, dried and relubricated.

b. Solvents and solvent-soaked cleaning cloths shall not be allowed to contact dry film lubricants.

c. Protect bearings from blowing sand, dirt and water vapor.

d. Cover bearings when drilling or grinding nearby.

e. Cover all exposed bearings with barrier material, military specification MIL-B-121, when applying preservative compound to the aircraft.

2. Bearings will be cleaned as follows:

CAUTION: Do not spin bearings during cleaning or drying process. Lubricate bearings immediately after drying.

a. Wash bearings with kerosene, Federal specification VV-K-211, or drycleaning solvent, Federal specification P-D-680.

b. Dry bearings with dry, filtered air passed over rolling elements. When dry, filtered air is not available, bearings will be drained by laying flat on a wire rack or a clean, lint-free cloth.

3. Lubricate bearings exposed to heat of more than 160 degrees F. (71 degrees C.), or when specified by applicable inspection requirements manual, with grease as specified in the applicable aircraft maintenance manual. Use low or high pressure grease gun as follows:

a. Open-type AN or ball bearings with metal shields can usually be lubricated using an approved tool with the grease gun. Disassemble sufficient parts to permit access for lubrication. Allow grease to flow until clean.

b. Remove split retaining rings and sealing washers. Lubricate control rod end bearings using an approved tool. Reassemble sealing washers and snap rings taking care not to damage them. Examine bearings after reassembly by rotating them to be sure that they will operate properly.

c. Purge needle bearings completely of old grease while lubricating. When possible, rotate needle bearings 360 degrees during lubrication as needles will prevent lubrication from reaching all parts of bearing.

d. Most of present concavex-type roller bearings will be given only one shot or pump or grease from grease gun unless inside diameter is notched. When this is true, bearing shall be completely purged of old grease. NOTE: Wipe excess lubricants and any foreign matter from exterior surfaces of bearings and lubrication fittings. Apply a thin film of grease to exterior surfaces of bearing.

4. Store replacement bearings as follows:

a. Store in a cool, dry, clean area.

b. Use oldest bearings first to eliminate relubrication. NOTE: Bearing manufacturers mark their standard series with only the basic bearing part numbers. To prevent confusion and misuse of bearings, complete bearing identification will be marked on all bearing packages. This information shall include complete nomenclature, manufacturer's part number and where bearing is used.

c. Store in original containers until issued for use or relubrication.

d. Wrap and identify relubricated bearings before returning to storage. Use barrier material, military specification MIL-B-121, if the original container is not avail-

Matters...

able. Reference: TM 55-1500-204-25/1, page 3-18.

Attention UH-1 Preflighters! While you are on top of the UH-1 (all models except UH-1C) checking the rotor head, put a finger on those pillow blocks and blade grip reservoirs. Check those small pressure relief valves located on each reservoir. Some Murphy type crewchiefs would rather remove the relief valves to add oil rather than cut and resafety the filler plugs. This will cause the threads on the relief valves to become worn and possibly loosen. Check these valves and make sure they are tight. Reference: TM 55-1520-210-34, page 8-12, figure 8-7, item 12 and 24.

Experience Tip: A well maintained aircraft is a clean aircraft, but a clean aircraft is not necessarily a well maintained aircraft. Think about it, then take the necessary action.

Remember Those UH-1 Oil Filters! Remember that the removal, disassembly, inspection, cleaning, reassembly and reinstallation of the oil filter for the T53 engine is no longer printed in The Organizational Maintenance Manual. This, however, does not relieve maintenance personnel from inspecting and cleaning the oil filter. Failure to do so could be expensive to the Army.

Manuals In Error? Some of the latest technical publications for the UH-1 aircraft contain numerous errors. All maintenance supervisors are encouraged to maintain a strict and constant surveillance over their inexperienced mechanics so that these errors do not hamper or endanger maintenance procedures. The inexperienced mechanic cannot fully maintain certain aircraft systems (especially the power plant) with the directions as outlined in some technical publications.

Sunshine In The U-21A: Position the sunvisors on the U-21A with both hands. Since there is no support around them, a one-handed operation could break them.

U-8F Seat: When removing the pilot's seat from the U-8F, lower the seat to its lowest position and place the left armrest down before removing the seat from the mounting tracks. If the seat is not lowered from the mounting tracks or if the left armrest is up, it will strike the fuel selector panel and may damage some components on the panel.

Attention CH-54B Pilots: When the signal adapter is inoperative or the "AN/ASH-19 CONT" circuit breaker is deactivated the following caution lights will be inoperative: #1 eng N_1, #1 eng T_5, #1 fuel flow, #1 eng torque, #1 eng flameout, #2 eng N_1, #2 eng T_5, #2 fuel flow, #2 eng torque, #2 eng flameout, rotor droop, main trans torque and hook not open. This warning is found in the operator's manual for the CH-54B. However, did you know that in addition to losing 13 caution lights, the isolation valve will not open. With this valve closed you *cannot* operate the following: engine start, wheel brakes, load levelers, APP accumulator recharge or the hoist.

Therefore, if you are tired of hearing the voice warning—*override the message—do not* pull the AN/ASH-19 circuit breaker!

Draining The OH-58 Transmission Oil: If the transmission deck gets messy with oil when draining the gearbox, suggest your unit order a special ground servicing drain unit. Its FSN is 1730-252-6097. Insert this unit into the transmission chip detector plug housing and attach a 2 foot length of any ⅜ inch hose to it. Drop the end over the side to drain the oil. After the clean dirty work is done, dunk the fittings in solvent and save the unit for another day.

Modification Work Orders

unapplied changes that are becoming a monster

Our aircraft cannot continue to serve us effectively in the near future if we neglect application of the MWOs needed today. Regulations provide for assistance from the MWO sponsoring agency when time or capabilities preclude accomplishing modifications with existing resources

Captain D. P. Vasey
Chief, Configuration Management Division
U. S. Army Aviation Systems Command

IT SEEMS THAT two maintenance officers met at a conference one day.

"What's this I hear about you?" demanded one. "You say you don't believe in modification work orders [MWOs]?"

The reply was instant and indignant, "That's a lie. I never said I didn't believe in MWOs. All I said was that my aircraft are flying all right without them!"

When it comes to considering the meaning of MWOs for our aircraft, equipment operators are much like the maintenance officer; they are quite willing to delay MWO application and operate their equipment to satisfy immediate mission requirements, but they really don't consider the significant impact that failure to apply MWOs within the designated time frames will have on their long-range mission effectiveness, cost and/or safety. To preclude mission restrictions, increased costs or obsolescence, it is essential that application time frames be met without exception.

Due to the versatility of our modern aircraft and their varied mission requirements (configurations), Army aviation is at any moment of its life cycle the product of a continuous process of change. The face of that change is an important one—and it comes in the form of an MWO.

Over the past decade it would be accurate to say that more than 1,000 MWOs have been approved for implementation. There currently are about 350 MWOs in the system which have been developed and approved to keep equipment as modern as possible, and the Army continues to develop product improvements, based on equipment improvement recommendations, which when approved will result in still additional MWOs. The life cycle of an MWO is reflected in figure 1.

It appears that many equipment operators do not recognize the concept of MWOs at all, and they are creating a tremendous manhour

backlog. It is their refusal to apply MWO changes "that is becoming a monster." All MWOs are normally preceded by engineering change proposals which are evaluated as to whether they influence safety-of-flight, cost effectiveness or mission requirements.

During the first 9 months of 1972 only 106,037 manhours of the 2,072,323 manhour backlog were accomplished; as of 1 September 1972 the total MWO manhour backlog, for all levels of maintenance, was 1,966,359 (see figure 2). One of the principal reasons for backlog reduction has been modification update programs —grouping MWO applications in the interest of expendiency and economy. Provisions have always existed in regulations for major commanders to request MWO application assistance from the sponsoring agency where time or capabilities have been exceeded, but they have not been used properly. Notifications to encourage MWO applications have appeared in the EQUIPMENT IMPROVEMENT REPORT AND MAINTENANCE DIGEST and PS MAGAZINE; however, they have not been productive and continue to fall on deaf ears. If an MWO is not applied within 1 year, it is considered delinquent (normal MWOs only).

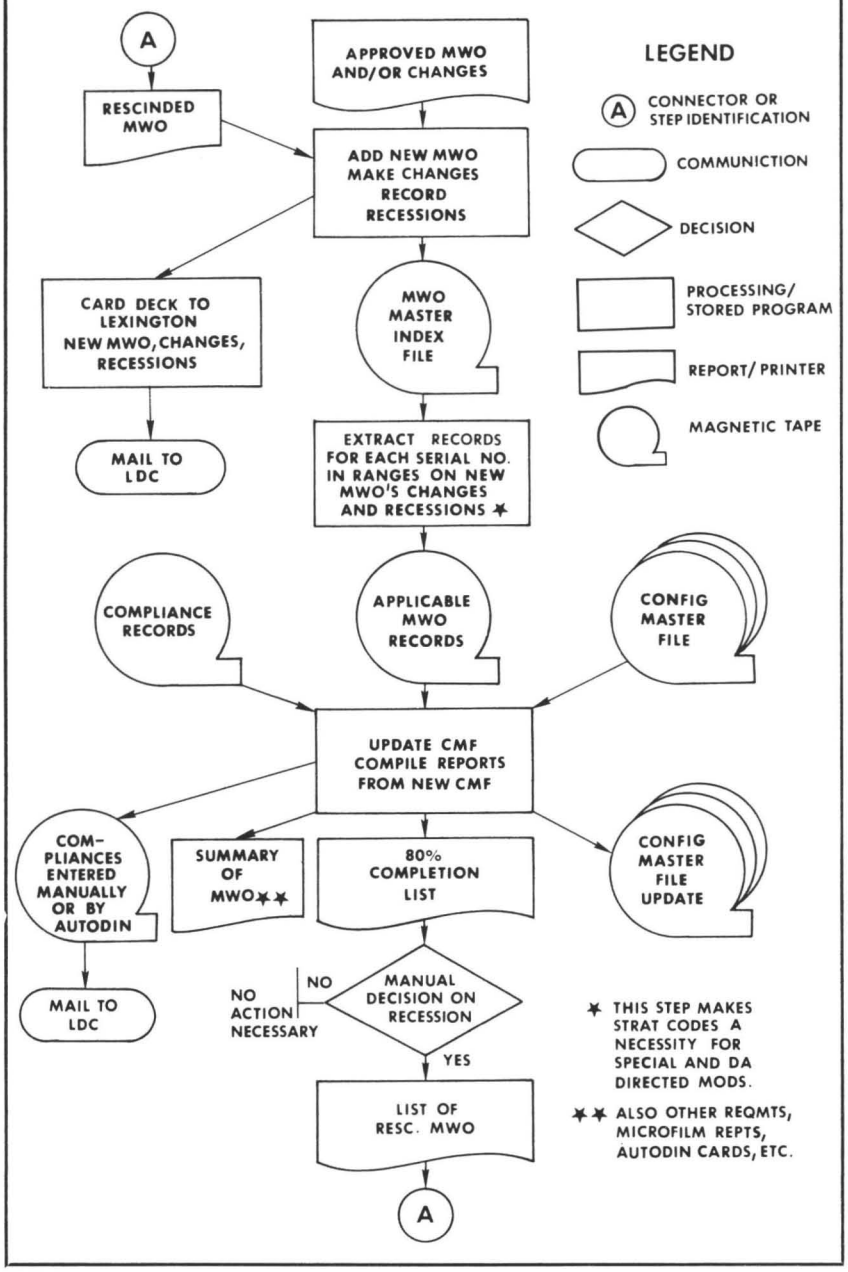
Based on the results of a total MWO audit of all mission-design-series aircraft, the Army initiated modification update programs in 1971 to reduce what investigative agencies considered an "intolerable workload upon major Army commanders." Although modification update programs at Ft. Benning and Hunter-Stewart, GA, and in Alaska, Korea and Germany have reduced the MWO backlog by about 400,000 manhours since 1971, these efforts do not provide the required stimulus to eradicate all of the Army's manhour backlog "monster."

For some reason equipment operators accept the myth that their aircraft are flying all right without the application of MWOs. With this low-energy emphasis, MWO programs will never encounter any program excitement, especially when compounded by equipment operators who continue to ignore the governing regulatory requirements. Due to the lack of overall MWO application planning and low-energy emphasis, critical aviation assets continue to deteriorate into a junkyard fleet.

Why is this? In the search for answers we have heard sharp criticism of the change approval process for its refusal to consider the

Figure 1

LIFE CYCLE OF MWO



missions assigned to the field. There were complaints that program funding was a problem; however, we were amazed that the same units who were quick to point out sponsor shortcomings received aircraft without performing acceptance inspections or asking about uninstalled MWO kits upon transfer.

In general, it appears that equipment operators do not have confidence in the universality of MWO programs. One losing unit actually removed MWOs prior to aircraft transfer because it felt its new aircraft would not have the MWOs applied. The range of comment on aircraft modification control was varied and correct in most instances, but it must not remain infinite. The critical point equipment operators should all recognize is that they must deliberately follow regulatory requirements and begin aggressive MWO application programs that include timely recording and reporting.

Inadequate control of MWOs within the Army has been a continuing problem. There is an old saying up in the hill country . . . the easiest way to get a job done right is to give it to a lazy man. But first you have got to give him time to study the situation before he can come up with a quick and easy way to do it.

AR 750-1, *Army Materiel Maintenance Concepts and Policies,* 1 May 1972, is not up in hill country and the personnel identified in paragraph 3-16, chapter 3, must be everything except lazy! To unboggle your mind, the U. S. Army Aviation Systems Command (AVSCOM) St. Louis, MO, has designated the Configuration Management Division "to be responsible for the application of modifications to materiel under their control." In an effort to identify the actual manhour backlog, AVSCOM initiated a two-phased audit of all MWOs in early 1971. All applicable MWOs were surveyed to quickly find significant problems. The AVSCOM sought verification through both messages and letters to equipment operators.

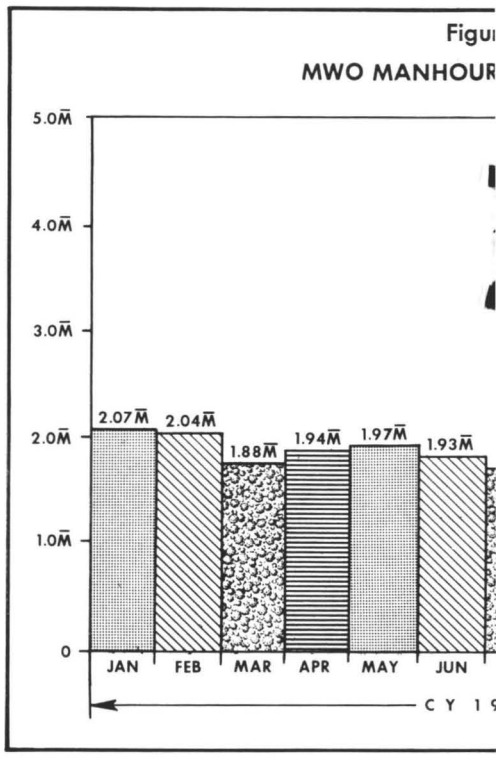
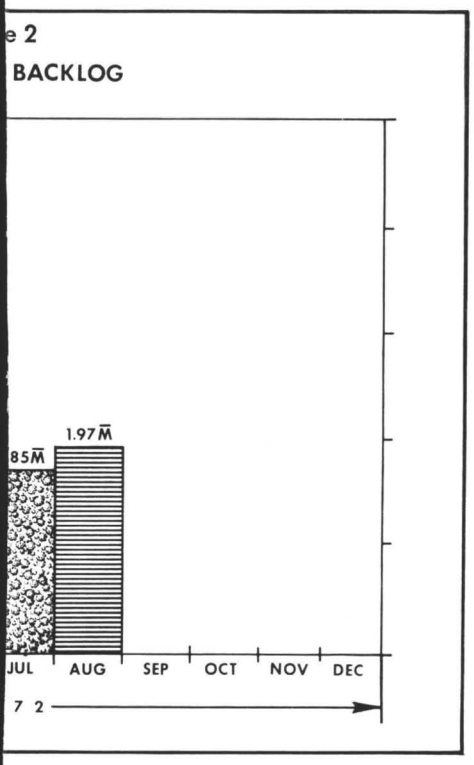


Figure 3

Strat Code	*Description*
1	DEPOT MODIFICATION—either published or unpubished—50 MWOs that can only be applied by a depot category of maintenance.
2	SPECIAL MODIFICATION—MWOs that are installed at the discretion of the theater or local commander to meet certain theater, mission, geographic, climatic, etc., requirements or MWOs whose application is dependent upon installation of specific part/component system or the existence of a specific condition/failure.
3	DA CONTROLLED MODIFICATION—MWOs in which the MWO kit availability or allocation is determined by DA. Kit procurement may be programed and funded by DA over a period of years.
4	MODIFICATION WAIVED—MWOs whose application to the fleet of a specific MDS, or whose application to a specific aircraft/equipment within the required time frame set forth in the MWO have been waived by DA for cogent reasons.
5	MODIFICATIONS APPLICABLE TO BAILED/LOANED/TEST AIRCRAFT—MWOs that will not be applied during the bailed/loaned agreement or test period, because the modification would have a deterimental effect on the purpose of the agreement or test.
6	COMPONENT MODIFICATION—MWOs written against a specific component rather than an aircraft.
7	FIELD APPLICATION MODIFICATION—MWOs that are applicable to all aircraft serial numbers set forth in MWO and are to be applied in the field. Simply stated there are no restrictions to field application.
8	REMAINING UNAPPLIED MODIFICATIONS APPLICABLE TO AIRCRAFT IN EXTENDED STORAGE—MWOs not applied prior to storage. Application would require extensive deprocessing and reprocessing in order to apply modification and return aircraft to storage, making application within time compliance period uneconomical. Application is therefore deferred until aircraft is removed from storage.
9	REMAINING UNAPPLIED MODIFICATIONS APPLICABLE TO SERVICEABLE/UNSERVICEABLE COMPONENTS—MWOs that have been applied to serviceable components but are included because on-hand serviceables are only modified to meet the item managers requirements objectives (RO).



"She flies O.K. without 'em!"

It was a detailed look into the problem in considerable depth. As a result of this survey 9 coded variables which influence MWO programs were identified (figure 3).

As of 1 September 1972 the total Army backlog by stratification code was as outlined in figure 4.

Coordination between the national maintenance point (NMP) and designated Army configuration control officers is essential for an aggressive MWO program. We have found that two elements must exist: First, configuration control officers must have access to planning data available to the NMP; second, the NMP must be able to provide Army area summary data for MWO program status, on a frequent basis, to ensure that adequate emphasis is being exerted at all command levels. The problem to date has been one of working out—and enforcing—a common approach to MWO application.

During 1972 it was necessary to request numerous physical inspections to verify the recorded status of many aircraft. Assignment of equipment specialists to each system has allowed AVSCOM to update recordings based on unit responses, and has also allowed it to appropriately manage MWO applications. During fourth quarter 1971 a new procedure was introduced: direct communication with the equipment operators. These additional focal points created a more responsive relationship—one which acted in a push-pull fashion—and opened a communication channel between the records keeper and the equipment operator. This approach was necessary due to the impersonal management control of The Army Maintenance Management System (TM 38-750). In a word TM 38-750 does not provide adequate feedback to the equipment operator. It's the best we've got, however, and will get the job done if properly used.

In most cases MWOs must be applied within 1 year of the publication date unless a waiver has been specifically approved by the Department of the Army.

Coming to grips with the MWO "monster" is a major problem we must all help solve. What can we do to change MWO program emphasis and get the most from our equipment? Upon receipt of an MWO, determine the number of kits necessary to complete retrofit of unit equipment; second, apply the MWO within the established time frame or request application assistance through channels; third, control and safeguard MWO kits; and fourth, report applications in accordance with TM 38-750 and command directives in a timely manner.

Figure 4

1 DEPOT MODIFICATION—459,251
2 SPECIAL MODIFICATION—19,214
3 DA CONTROLLED MODIFICATION—528,967
4 MODIFICATION WAIVED—265,639
5 MODIFICATIONS APPLICABLE TO BAILED/LOANED/TEST AIRCRAFT—30,012
6 COMPONENT MODIFICATION—None developed*
7 FIELD APPLICATION MODIFICATION—212,733
8 REMAINING UNAPPLIED MODIFICATIONS APPLICABLE TO AIRCRAFT IN EXTENDED STORAGE—450,543
9 REMAINING UNAPPLIED MODIFICATIONS APPLICABLE TO SERVICEABLE/UNSERVICEABLE COMPONENTS—None developed*
*pending consolidation into one code number

★ ★ ★ ★

Captain McKelvy's article is a well thought out expression on a very difficult issue facing Army aviation today. In this period when the armed services of the United States are emerging from one of the longest wars in our history, there is a strong trend to reduce expenditures and cut back our forces. To this end, the Congress in the past several years has placed increased restrictions upon the services in the field of flight pay and proficiency flying.

The Congressional restrictions have been accompanied by language directing the Department of Defense to establish uniform policy which inhibit combat readiness training as we have known it in the past. Relative to the Army, the restrictions prohibit proficiency flying by aviators performing duties not directly aviation related. In the case of prefix 6, or aviation related assignments, the list has been sliced and a new prefix X created to describe those positions which should be filled by an aviator but do not require the participation in regular and frequent aerial flight. Further, by law, no individual attending courses of instruction at either civil or military schools for a period of 90 days or more may fly as a crewmember, with the exception of the very few whose schooling involves aeronautical research and related fields.

Because the Army is in the readiness business, it is interested in keeping the individual proficiency of its members at the highest reasonable level. In furtherance of this goal, the Army was able to convince the Defense Department that aviators with less than 1,500 flying hours should continue proficiency flying until they reach that point. This will result in bringing our people at least to the senior aviator level in terms of total flying time. The Army also has segregated its prefix 6 community into those who should continue to fly and those who require aviation expertise but need not be fully current in the cockpit. In the long run, the Army would like to see all of its aviators with a high level of current proficiency.

Captain McKelvy's recommendation that all excused aviators take the annual written examination and undergo some monthly synthetic trainer program is well taken. The new Army Regulation 95-1, soon to arrive in the field, includes a requirement that all aviators on flying status take the written examination annually as a means of keeping them current and stimulating continuing interest in the aviation program. The requirement for synthetic training is beyond our capability at the present time; however, the Army is in the process of procuring new flight simulators which will make an expanded training program possible in the next several years. Individuals who are thoroughly dedicated to aviation may undertake a voluntary synthetic training program where facilities are locally available. Just as in any other endeavor, the efforts of an aviator to improve his qualifications will be reflected in official records and should gain him a degree of recognition not accorded his less energetic contemporaries.

Aviators throughout the Army should reflect carefully on Captain McKelvy's article because he makes a compelling case for readiness which is our first order of business.

Brigadier General William J. Maddox, Jr.
Director of Army Aviation
Department of the Army

★ ★ ★ ★

THE HIGH PRICE OF EXPERIENCE

Captain William R. McKelvy Jr.

IN THE PAST few months severe flying restrictions have been placed on high time Army aviators as a result of Public Law 92-204 passed earlier this year by the Congress. Very simply stated, commissioned officers with over 1,500 flying hours are now prohibited from flying unless they are assigned to a position which requires flying. The real savings derived from this austere policy are difficult to pinpoint, particularly because of the as yet unanswered questions concerning the eventual cost of requalifying pilots later. However, the immediate savings can be calculated and are of course tremendous. In the Military Dis-

trict of Washington alone almost 60 percent of the attached or assigned commissioned aviators have been grounded.

What does this mean for the officer who volunteered for flight school, not for the money but rather for the pleasure of flying or for the satisfaction of doing a technical task well? Clearly it is this category of aviator, with high flight time combined with personal and professional motivation, who makes up the quality and experience backbone of the Army flight program. Is there hope then under the new system that this vital element of the Army aviation program will not become quickly disillusioned and lose motivation to excel at flying? And furthermore, can the Army afford this degradation of trained assets?

In broaching the last question first, it should be remembered that Army aviation is a people-critical, not equipment-critical, endeavor. Therefore, we can ill afford a currency policy that undermines the very motivation and ability of our best and most experienced aviators. The cost of initial training and of the years of flying that go into the production of a 1,500 hour commissioned aviator are simply too high just to put him in cold storage. It would be the same thing as buying a $200,000 piece of equipment and then allowing it to rust by storing it in salt water. Good principles of management would indicate that if the cost of running the equipment cannot be afforded then it should be deposed of, sold or carefully preserved until the day when it is needed and can be afforded once again.

Therefore, let us make demands of the high-experience aviator, even if he is grounded because of fiscal policy, so that he can continue to be challenged, receive recognition for his achievements and, most importantly, avoid an erosion of his experience. I would propose as a minimum that grounded aviators be required to take the annual written examination and undergo some monthly synthetic training program, provided that synthetic trainers are locally available. The AVIATION DIGEST should be made available to each grounded Army aviator by the flight operations responsible for maintaining his flight records. And finally, there should be a revitalization of the flight simulator instructor training program to help them make their instruction more realistic for the equipment they already have. Again, the solution lies partially in what equipment is available, but largely in what we can do with what we already have. Indeed, the Army cannot afford to waste its most precious resource: experienced people.

But what of the first question, that of the grounded high-time commissioned aviator. What can he do today under the present policies to continue to enjoy the satisfaction of technical competency? In point of fact, there are many things that he can do.

The most important is to undertake a voluntary currency program of monthly synthetic training and annual written testing as mentioned earlier. One could even go one step further by offering to help the local flight simulator department upgrade its instructors by working with them toward more realistic and demanding ways of using their trainers.

For those who would decry the inadequacies of flight simulators, I would refer them to the results of recent experiments at the U. S. Army Aviation School, Ft. Rucker, AL. When creatively employed, 1 hour of flight simulator time was found to equal 1 and ⅔ hours of actual aircraft flight time in preparing for an initial standard instrument checkride.

In any case, the question of the value of flight simulator training will become somewhat a moot point as the new policy went into effect on 31 December 1972 requiring all aviators who are on active flying status to upgrade his instrument qualifications to at least standard ticket level by renewal time. One cannot possibly expect in 90 days to go from a stagnant to a standard ticket unless he is current on procedures and regulations and the simulator will be a must in obtaining the standard rating.

There also are many less obvious but equally efficacious things that can become a part of a grounded aviator's personal currency program. One can read the monthly military and civilian aviation publications. He can join a local military or civilian flying club and pursue the Federal Aviation Administration commercial or certified flight instructor. There also are many correspondence courses and programed texts available in aviation subjects such as maintenance, safety, aviation command and staff, and instrument flight procedures which would all contribute to the aviator's knowledge and motivation by keeping him at least mentally current.

Clearly then, there is a great deal that a grounded aviator can do not only to maintain his currency, but also to branch out into previously unfamiliar subjects. Because of all the expensive equipment that surrounds us, we forget all too easily that Army aviation is indeed a people-critical activity. And as such, we can never afford to consciously allow a policy to degrade the ability or motivation of the very people who have the greatest amount of experience. Let those of us who are grounded set our own standards until such a time as the present policies are modified to be more challenging and rewarding for ourselves and the Service.

CPT McKelvy prepared this article as part of the effective writing program of the Engineer Officers Advanced Course

INSTRUMENT CORNER

Q. May an aviator descend to the procedure turn altitude when within the 10 mile ring depicted on an instrument approach plate?

A. When cleared for an approach, an aviator may descend to the lowest appropriate minimum altitude. This may be the MEA, MOCA, sector altitude, transition altitude or procedure turn altitude. In the case of radar vectors, it may be low station altitude.

The only significance of the 10 mile ring is to portray items within to scale. In the procedure below, if an aviator were cleared for an approach when he was northeast of the station and he tried to descend to the procedure turn altitude (3,000 feet) at 10 miles, he could run into an obstruction about 49 feet from its top. In this instance he should descend no lower than 4,100 feet (sector altitude) until passing the VORTAC. A thorough search should be made of the approach plate and enroute chart to determine the lowest appropriate altitude. FAA Advisory Circular 90-1A, page 17, dated April 68; FAA Terminal Instrument Procedures, paragraph 234, dated February 70.

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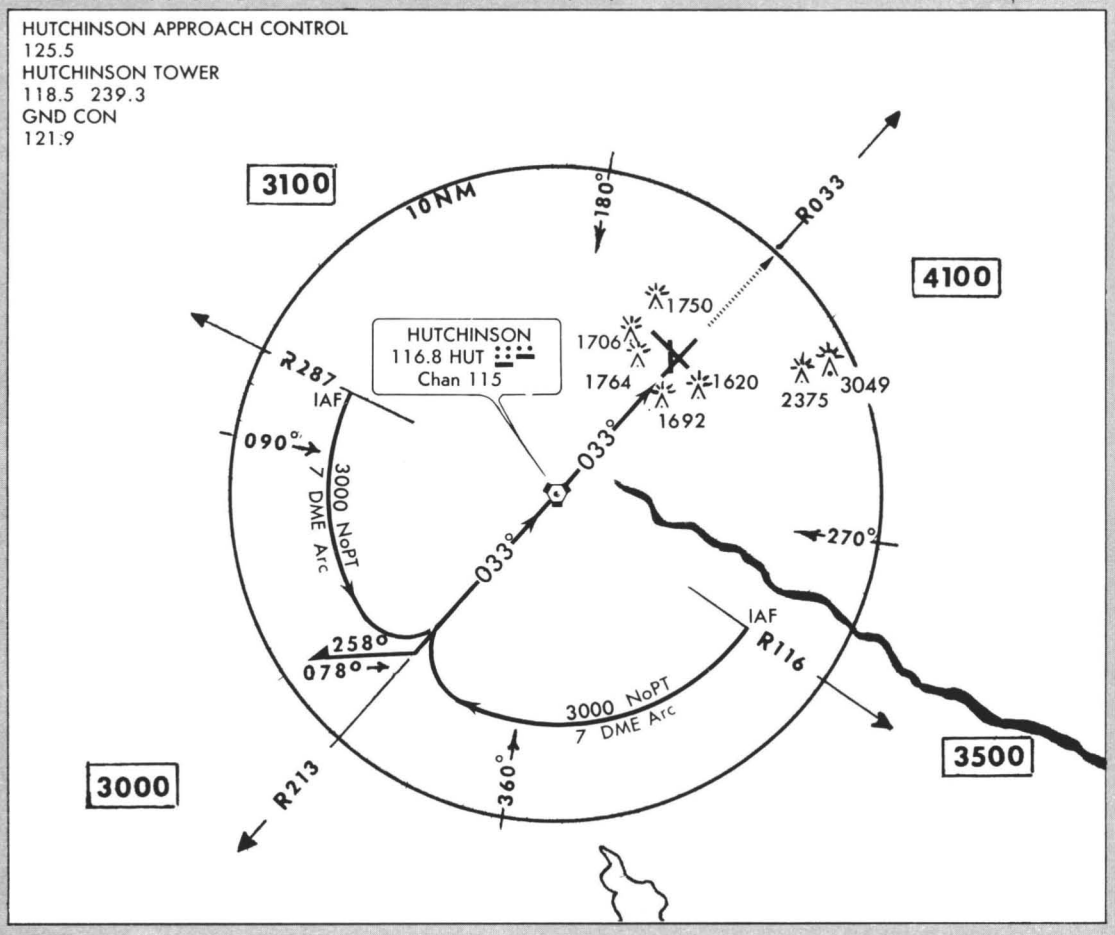


Continued from page 1

cedure is the correct procedure the Army wants us to follow. Your answer and references will be greatly appreciated.

CPT Jeffrey Roy
6 North Nancy Drive
Daleville, AL 36322

• The Department of Standards and Instructor Training at the U. S. Army Aviation School, Ft. Rucker, AL, has provided the following in response to your questions:

A question was prepared based on your first question concerning teardrop entry to holding. It appeared in the December 1972 "Instrument Corner."

Concerning your second question pertaining to descent in a holding pattern during an instrument approach, the September 1972 "Instrument Corner" discussed a similar question.

Sir:

Reference Captain F. Kevin Shea's article on "cannibalization," particularly the drawing on page 3 of your November 1972 issue of the U. S. ARMY AVIATION DIGEST. His article is fine but the drawing of a black figure with an Afro hairdo reflects directly on blacks as being cannibals. I am sure that black ancestors aren't the only cannibalistic race that exists.

I am also sure that in view of the increased emphasis that the armed services has placed on improving race relations, a cartoon of different sort could have been used without reflecting on any race.

SSG Walter Murry
190-A Norman Heck Court
Ft. Sheridan, IL 60037

• The cartoon of the cannibal was certainly not intended to reflect on any race. But, apologies to anyone who may have been offended by the drawing are in order—and most sincerely extended.

Sir:

I read the article "280 Feet Too Low" [DIGEST, July 1972] with great interest. It was extremely interesting to follow the logic of the board for, although the tragic accident leaves us saddened, it offers lessons to us all. In reviewing the many points addressed by the board, I find a question in my own mind which, while it cannot apparently be answered, might provide food for thought for others. It is through such "after-the-fact" questioning that we also learn.

I recall the copilot's interview where he states (quoted for DIGEST article): "I reached down and wheeled in the tower frequency and, as I recall, made two attempts to call the tower. However, they did not answer, so I wheeled back in the approach control frequency and requested an alternate frequency. They came back with an alternate frequency and I can't remember what it was, but they said, 'Attempt to contact the tower on such and such a frequency, be advised the tower has cleared you to land.' They gave all the sequence right on through, as they had before our approach began—the ceiling, visibility, wind direction and velocity. As I jotted all this down, I flipped on the intercom and asked, 'Did you monitor that?' and the pilot said, 'Roger, got it.' As I was looking at my chart where I had written the information, I glanced at my altimeter. I glanced across the board and rechecked the gear. I rechecked gear down and went across to his VOR and his altimeter and, at that time, we were leveling at 1,500 feet. He had 26 inches of power, 2600 rpm and his deviation needle was centered. The heading indication for the VOR was maybe 1 or 2 degrees, I think, to the right. As I started down to change the frequency for the tower, I recall getting it in and seeing the pilot's right hand come down, as if he were trimming . . . I don't know whether he made an adjustment or not, but then the hand went right back to the throttles and, after that, the only thing I recall is looking up and going in the trees. I screeched, 'Pull up, pull up.' "

Now, all this consumed time while low level on final approach under IFR conditions. Could the following possibly have occurred? The flight was, as stated, a currency ride for the copilot as well as a service mission. Did the pilot become momentarily concerned over the failure of the copilot to immediately change to the second frequency for the tower as given by approach control? Remember, the copilot "jotted all this down" referring to the complete sequence of ceiling, visibility and wind; spoke to the pilot about the data; looked at the chart where he had written data; glanced at his altimeter; rechecked gear; checked pilot's VOR, altimeter and heading indicator—yet had not changed to the new frequency yet. If the pilot did become concerned over this because of his position on final and the tension of the approach, could he himself have been reaching, not to trim, but to make the frequency change? If this is possible, then consider the position of the VHF control head. The board points out "to operate the radio, the copilot must reach, bend slightly toward the floor and glance down." This is also true of the *pilot* trying to operate; therefore, if you were piloting a U-8F, which according to findings was overgrossed and with marginal power settings established (26"/2600) to maintain 120 knots and altitude with gear extended and had only moments before established these settings and altitude, what is the normal body reaction in trying to tune the radio? With your left hand on the wheel and bending your body to the front right to glance at the radio, the body would naturally tend to ease the left arm forward, thus doing one of two things. First, possibly releasing back pressure you might be applying to the control column to maintain altitude in the "marginal" power/air speed envelope. Second, to force the left arm forward beyond neutral on the column. In either case, the end result would be the same: an unintentional dive of the aircraft. This, coupled with the possible altimeter errors discussed, could easily explain why 280 feet low.

I know that such momentary impatience does occur because I have done such acts and had them done to me. If this could have been the case, then does it not teach us a lesson to be sure we understand the duties of our crew and their limitations? Through such understanding can we not teach ourselves self control of impulses to usurp duties? Would it not be prudent and more professional to realize our duty as pilot is to control the machine and to maybe verbally remind the copilot of his need to tune a radio? Believe me, the intent is not to criticize or to point any finger because I am just a reader of this article as everyone else. But by looking into my own shortcomings and placing myself in that left seat, I hope to learn by someone else's tragic mistake whatever it might have been and, therefore, merely suggest another possible cause if I had been the pilot.

LTC Donald R. Jordan
Deputy Brigade Commander
HQ, Aircraft Maintenance Brigade
U. S. Army Garrison
Hunter Army Airfield, GA 31409

• Your letter was referred to the U. S. Army Agency for Aviation Safety (USAAAVS) where the article in question was prepared. USAAAVS agrees that your point is well taken and there is a lesson to be learned from what you suggest as a possible cause factor. Even though the investigation board recorded no testimony to indicate this is what happened, the possibility does exist. Board members are required to base their findings on substantiated facts. This possibility could not be listed as the established cause factor without being substantiated.

BACKSIDE OF THE POWER CURVE

From FLIGHT SAFETY FACTS AND ANALYSIS, July 1972

A REVIEW OF helicopter accidents over the past year indicates a requirement for pilots to study the power-required curve and refresh their memories on this subject taught in basic flight schools. Now is the time to get with it so that power settling accidents can be eliminated. Anyone who is not extremely familiar with or does not fully understand the "region of reverse command," is an accident waiting to happen and a little burning of the midnight oil may save assets!

Over the years, almost all pilots have become conversant with the term "backside of the power curve," or "the region of reverse command." While widely publicized and read, these particular terms normally are associated with jet and other fixed wing aircraft. Even though the chopper pilot is supposed to be a different breed of cattle altogether, he nevertheless is faced with the same problem of the "backside of the power curve" as the rest of his cohorts.

In order to fully understand the power-required curve for helicopters, which differs only slightly from a fixed wing aircraft, the first items to consider are the various parts that make up the total power required (figure 1).

Figure 1 shows the three components to be: parasite power, induced power and rotor profile power. Parasite power is the power required to overcome the parasite drag of the fuselage, rotor hubs and landing gear. Parasite drag is more commonly known as "barn door" drag. Parasite power is zero while hovering and increases to a maximum at maximum speed. Induced power is the power required to accelerate the air downward to create the rotor lift. Since the weight of the helicopter is constant for any particular flight segment, no change of lift is required. However, as the aircraft moves through the air, more air moves past the rotor blades to produce lift. Thus, forward flight requires less energy to be expended to force air over the rotor blades, and the induced power diminishes as the forward speed increases. Rotor profile power is the power required to turn the rotor through the air. Since the rotor speed is substantially constant in all phases of flight, the influence of forward speed is not of great importance. The combined effects of parasite power, induced power and rotor profile power are shown in figure 2.

Figure 2 is the power-required curve for a helicopter with power-required plotted vs. air speed. The curve has been divided by a vertical line drawn through the minimum power-required point. Stability is labeled to the right of this line, and instability to the left. Assume straight and level flight with a certain power setting and a certain air speed (point A on the curve). If a gust of wind were to be encountered that causes the helicopter to increase air speed to point A 1, it is evident that a higher power would be required to maintain this air speed, or there is a deficiency of power. If this higher power were not applied and the attitude or nose position was not changed, the aircraft would slow to the original air speed. The tendency for the helicopter to return to the original air speed is determined primarily by the longitudinal stability of the aircraft. Although aware of the relatively poor stability characteristics of rotary wing craft, a certain amount of

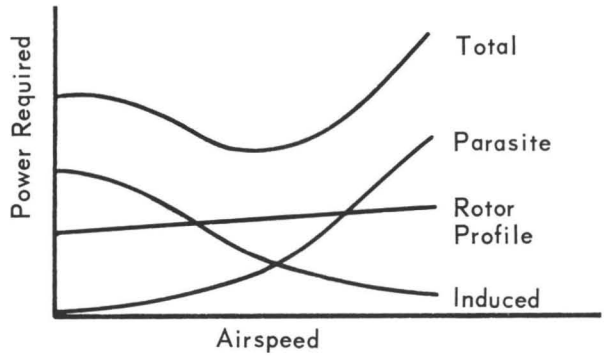


FIGURE 1

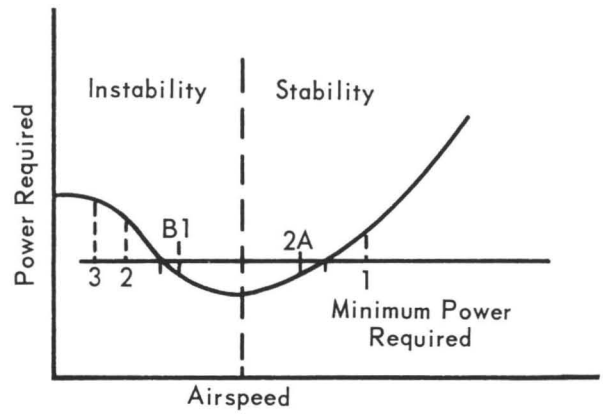


FIGURE 2

stability does, in fact, exist. If a gust of wind causes the helicopter to slow to point A 2 on the curve, less power would be required to maintain this air speed, or an excess of power exists. However, if no power or attitude changes were made, the aircraft would accelerate to the original air speed. Consequently, above the minimum power-required point on the curve, a condition of stability exists. This is the region of normal command, since the helicopter has a tendency to return to its original speed if some outside force causes it to deviate from this speed.

Now consider point B on the curve, with a certain power setting and a certain air speed. If a gust of wind causes the helicopter to speed up to point B 1 on the curve, less power is required to maintain this air speed, or an excess of power exists. If no power or attitude changes are made, the helicopter will continue to accelerate or climb. To return to the original air speed, a reduction in power or an attitude change is required. If this gust of wind causes the helicopter to slow to point B 2, more power is required to maintain this air speed, or a deficiency of power exists. If no power or attitude changes are made, the aircraft will continue to slow down due to this deficiency of power.

Compare this condition with the one previously discussed in the region of normal command, point A 2, where a loss of speed occurred. We see that the reverse is true and it takes more power to go slower. We are now in the region of reverse command, a region all chopper pilots have been in at one time or another, but perhaps now we have a logical explanation for the conditions that occur.

A familiar and frequently encountered term is "power settling" which occurs in the region of reverse command. Power settling occurs when the induced velocity along the blade span is reduced by the air flowing up through the rotor blades. This airflow up through the rotor blades is caused by the rate of descent, and effectively decreases the induced velocity along the blade. At the outer portion of the rotor blade, where the induced velocity is the greatest, the rate of descent is less than the induced velocity and the resultant flow is downward. At the center of the blade, where the induced velocity is quite small, the rate of descent is greater than the induced velocity, and the resultant flow is upward. The combination of this airflow through the rotor blades results in a net airflow mass of zero and a net thrust of zero. In this case, the helicopter is in a free fall, and high rates of descent are common. If sufficient altitude were available for this maneuver, this free fall condition would be of short duration since it causes a greater upward flow of air on the rotor blades until all the air is flowing upward. In this condition, the helicopter is in autorotation and lower rates of descent will result.

Now assume an approach to a landing with a reduced power setting and at an air speed below the minimum power required point on the curve (point B, figure 2). As we keep coming back on the cyclic stick to decrease the forward speed in the approach, the rate of descent will increase unless additional power is added. The addition of power will slow the rate of descent, but if this rate of descent has been allowed to reach a high value, the power required to stop the rate of descent may exceed the power available.

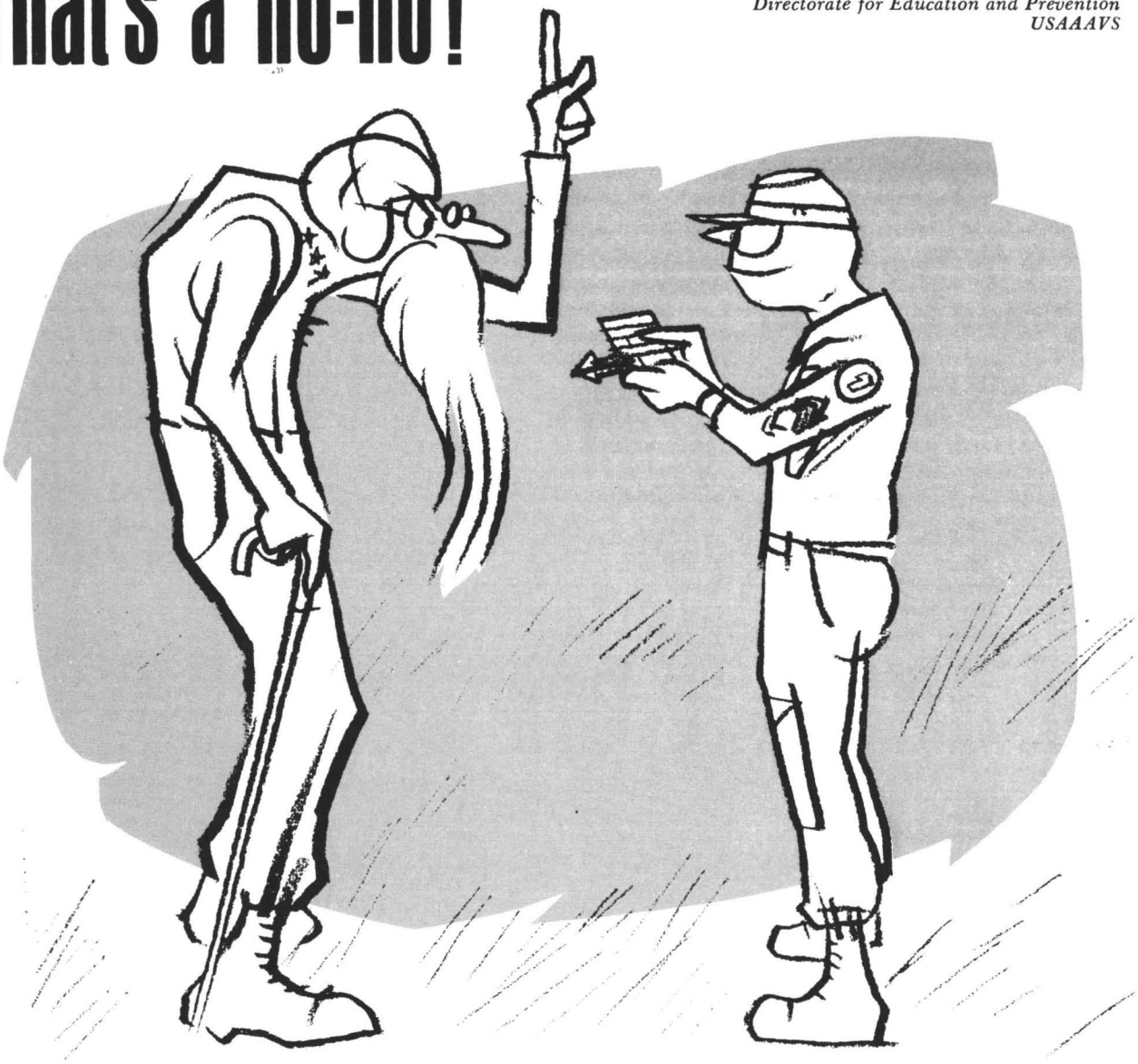
In this particular case, the one way to recover would be to push the nose over and gain air speed to a point where the power required is equal to or less than the power available. The urge to pull the nose up and stretch the glide is all too powerful, but it will never work. If sufficient power or altitude is not available, we become another item in aircraft accident statistics.

Contrary to popular opinion, recovery can also be effected if sufficient altitude is available, by reducing the throttle, decreasing collective pitch and entering autorotation. As soon as a normal autorotation is established with proper air speed and rotor rpm, a power recovery can be effected. An autorotation recovery from power settling will result in a great loss of altitude. Consequently, the procedure of diving to regain air speed is the preferred method.

Most helicopter flying is done at low speed, and chopper pilots are confronted with the region of reverse command more frequently than the fixed wingers. High power settings are required in the region of low-speed flight due to the high induced power and the additional factor of rotor profile power (figure 1). In all maneuvers of low-speed flight, hovering and approaches where the power required may exceed the power available, a sacrifice in altitude will be required to regain air speed and to prevent power settling. Plain old brute strength on the controls will never correct an error in judgment, but a thorough understanding of the power required curve will help in all circumstances.

That's a no-no!

Arnold R. Lambert
Directorate for Education and Prevention
USAAAVS



Army aviation is an area where self-discipline can definitely determine longevity

WHEN A TINY tot reaches the age where he decides his mode of travel needs improvement, he advances from the crawling stage to the walking stage. During the transition, he learns to use the furniture to pull himself up and by holding on, he discovers a whole new environment. His new environment, just a few inches higher, contains all kinds of strange objects. His curious mind tells him to investigate each one and the most common is an ashtray on a coffee table.

During this same period, a child starts to understand what is being said to him, if only by the tone of voice. He reaches for the ashtray and for the first time he hears, "No-No!" This sound becomes a familiar one and his response can get him praise and perhaps a cookie or a slap on the hand. This is his introduction to discipline and this training continues throughout his life.

Discipline is training in obedience to a given set of rules. Discipline is also punishment for disobedience. Therefore, discipline can be before-the-fact or after-the-fact. Discipline before-the-fact, in actuality,

is self-discipline; once you learn the rules, it's up to you whether or not you break them. (Read this again and remember it.)

We are reminded of the no-no's throughout our lives and obedience or disobedience can often determine our longevity. For the purpose of this article, we can dismiss after-the-fact discipline completely and concentrate on the importance of self-discipline or preventive discipline in Army aviation. Army aviation is an area where self-discipline can definitely determine longevity.

The main ingredient for a successful aviation accident prevention program is self-discipline from the commander right down the chain of command. We've all known for a long time that the commander must set the example for all personnel.

The commander needs safety-minded subordinates to whom he can assign individual safety responsibilities within each functional area of the unit.

The "rules" that produce a good safety record are available and known. They need to be followed and following them is a sign of self-discipline. The existence of discipline before-the-fact can be noted in many ways:

Operations

The operations officer must ensure that appropriate regulations are on file, understood by all, and are current, and that SOPs are also current, applicable and in effect. All personnel must be notified of known local hazards as soon as practicable and up-to-date obstacle maps must be prominently displayed and verified for change as frequently as needed. The operations officer must ensure that only essential missions, with qualified instrument-rated aviators, are assigned in marginal weather and that flight plans are filed and followed. Mission briefings must always include safety reminders and current, accurate weather information must be available. The operations officer must assign tough missions based on aviator capabilities and not in the old duty roster method.

Flight Procedures

The aircraft commander (AC) must ensure that thorough call-out preflights are performed by the checklist, crew and passengers are briefed, and survival equipment and fire extinguishers are available. He must be knowledgeable of fuel consumption and weight and balance, and be able to diagnose in-flight emergencies and initiate proper emergency procedures. The AC must know and adhere to local parking and taxiing procedures, local departure routes, firing ranges, impact areas, etc. He must know his capability and use good judgment in accepting nonessential missions in marginal weather.

POL

The POL officer must ensure that grounding cables are available and used, and that fire extinguishers are available, properly serviced and strategically located. Explosion-proof lights must be used, hoses and nozzles must be free of leaks and dispensing facilities and vehicles must be properly marked. The POL officer must ensure that precautions are taken to prevent contamination of fuel, "NO SMOKING" signs are prominently displayed and accurate records are maintained. He must also conduct timely and informative instruction for POL personnel and ensure adequate training and guidance.

Maintenance

The maintenance officer must ensure that current maintenance manuals in sufficient quantities are available and used, that test equipment is available and calibrated regularly and that qualified technical inspectors are available when needed. Complete, accurate and up-to-date records must be maintained, work areas must be clear of FOD and MWOs must be incorporated in the overall maintenance scheduling.

A positive rule for supervisors in all functional areas is to make certain new school-trained personnel work with experienced personnel for practical experience before allowing them to work alone.

These are just a few of the many rules required for a successful accident prevention program. A full-time effort by all aviation personnel is necessary if safe mission accomplishment is to be attained.

Many accident reports have listed "lack of discipline" as a cause factor and "lack of supervision" is often listed as a contributing cause factor. Discipline in a unit can be of the highest degree, but it's obvious that each man cannot be supervised 100 percent of the time.

A mechanic working alone may be in too much of a hurry to finish a job, leave a wrench in the tail boom and set the stage for a potential accident. A pilot flying alone may cast better judgment to the wind in favor of a desire to demonstrate his flying skill. He too sets the stage for a potential accident. Both of these acts are evidence of lack of self-discipline. An article, "Demonstrations of Flying Skill?" in the December 1972 AVIATION DIGEST, contains brief reports of several accidents where lack of self-discipline was apparent.

No matter what area of aviation you are in, don't ever drop your guard and set the stage for an accident. That's a no-no.

COMPLACENCY & THE EAGLE

Major Roy P. Hooks
Directorate for Education and Prevention, USAAAVS

ALMOST IMMEDIATELY, I knew I had entered the wrong valley. I wanted to turn around but for some reason did not. It seems as though I was trying to convince myself that this valley also led to my destination. Suddenly it was too late. The ridge lines were in the clouds and the valley had become too narrow for me to turn around. I fought back the gripping fear as I slowed the air speed to provide more reaction time in the event I was confronted with an obstacle. In good Scorpio fashion, I won the battle with panic and began to plot my course of action.

Because I was born under the sun sign of Scorpio, I am supposed to be able to imitate the glorious soaring path of my symbolic eagle who rises above earthly limitations, and uses his strength wisely and justly. As an aviator, I was particularly fond of my zodiacal association with an eagle, so why did I find myself in that situation? Complacency!

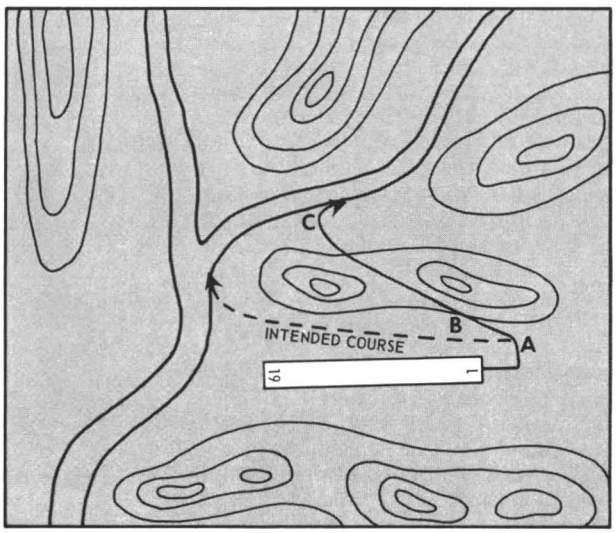
This word and the condition it describes were not new to me. I had read several excellent articles about complacency. As a commander, I frequently discussed its symptoms and hazards with my subordinates. I was always alert for the first indication of this "dread plague" among my personnel. The problem was that I did not look for the symptoms in myself. I had forgotten, "Physician, heal thyself."

The events leading to this occurrence actually began months before. While serving as executive officer of an aviation battalion, I was designated to assume command of a newly organized air cavalry troop at a time yet to be determined. In case this seems unorthodox, let me briefly explain the situation.

One of the two U. S. Army divisions in the host country was designated for deactivation. Its aviation battalion assets were to be integrated into the residual division to provide assets for the air cavalry troop, and I was to be executive officer of the battalion until time for transfer of assets.

For nearly 3 months, I was involved in formulating plans for the lateral transfer of personnel and equipment among these three units, and the relocation of the air cavalry troop and my parent battalion. As my battalion commander spent a good deal of time in meetings concerning the impending reorganization, I had to assume greater responsibility for administration of the battalion. During this period, my eagerness to assume command of the air cavalry troop mounted. I had been associated with organizing and training an air cavalry troop before, so I was aware of the tremendous amount of work that had to be done. Much of it could best be done before the major influx of personnel and equipment.

No, I was not overworked. But I was busy, and spent much time flying for coordination and liaison purposes. Being thoroughly familiar with the area, I began to devote less and less time to flight planning. Was I procrastinating? Of course I was! But isn't that



a big part of complacency—not doing what you know is right, and then justifying your actions to maintain self-satisfaction?

I finally assumed command of the air cavalry troop and the work pace continued. In addition to the normal requirements of command positions, there were many liaison and coordination meetings related

to the reorganization process; a new TOE had to be developed; SOPs had to be revised, and in many cases, developed; serious problems arose in the areas of personnel and equipment, mainly because I had no authorization for the necessary increase. These problems were amplified when basic unit training began. Time was a scarce commodity, and I economized by devoting less and less time to flight planning.

Weather conditions on the day of the incident included morning fog, haze and low ceilings. But the flight was important. My maintenance technician, who was new in the country, and I were to meet with the division aviation officer to discuss maintenance problems associated with the transfer of an aircraft. I did not have to plan the flight because our destination was in the local area. I didn't have to have a map folded and accessible because I knew the route. I did not need to brief my copilot as it was only about a 20-minute flight.

We completed our preflight and departed on runway 19. Figure on page 34 shows the terrain in the immediate vicinity of the airfield. As we turned crosswind, the tower asked me to measure the base of the clouds. I acknowledged the request at point A and continued to climb, but failed to complete a turn to my normal departure route. At point B, I began to get into the base of the clouds at 900 feet and began a descent. At this time my flight following agency asked me to provide a couple of transponder test signals. I began tuning the transponder immediately, since I would soon be masked by the hills and unable to provide the requested signals.

At point C, I completed the transponder test, and for the first time since turning crosswind, took a good look to verify my position. But things worked out fine, I thought, because underneath me was the stream I would follow. As I paralleled the stream, I settled back to point out some of the terrain features to my new maintenance technician. But something was wrong. These were not the right terrain features. I quickly checked my compass. I was heading southeast instead of my intended course of northeast. Fortunately, we were able to maintain VFR. We landed at the first suitable site, got out the map, verified our position and then proceeded to our destination without further incident.

The dictionary defines "complacency" as contentment, or self-satisfaction, and I had been content with making sketchy flight plans and satisfied with my performance. But all at once, I was neither content nor satisfied. Actually, I think a very fine line divides complacency and unprofessionalism. As I said before, we all know when we are not doing what we should. The solution is to inoculate ourselves against this plague. If it can catch an eagle, it can catch you.

GOOD IDEA

ON A RECENT visit to an Army airfield, we were impressed by a locally produced poster display in the operations building, an idea worth passing on to aviation safety and operations officers.

While these posters do not mention aviation safety or address specific safety problems, they are designed to display excerpts from Army regulations and directives pertaining to airfield alternates, hooded flights, classifications of airfields, etc. They furnish need-to-know information and answer frequent and recurring questions. Shown are only a couple of examples. Other ideas can be developed from data contained in ARs, flight handbooks, FMs, and DA and locally implemented directives to provide valuable on-the-spot information.

To be effective, displays need not be elaborate. These posters were prepared and printed using local facilities. They are revised bimonthly and are relatively inexpensive. In areas of operation where printing facilities are not available, attractive poster displays carrying a lot of impact can be prepared by local draftsmen or may be hand-lettered on poster board with felt markers.

Nomex Underwear

For several months now I've been hearing rumors that the Army purchased a Nomex underwear of sorts but never distributed it. As safety officer of my unit, I've been pushing the proper use of flight gear and most of our flight crews have responded very favorably. Several of them have told me they would wear such underwear if it were available. Is it? And if so, how?—ASO

Your rumor was indeed a rumor. Nomex underwear is not a standard item of issue although it was tested as a possible addition to the Army inventory. The U.S. Army Aeromedical Research Laboratory at Ft. Rucker, AL, has demonstrated that the standard ankle-length underwear (50 percent wool, 50 percent cotton) is as flame-retardant as the Nomex underwear when worn under the Nomex flight suit. As a result, men's ankle-length drawers, 50 percent cotton and 50 percent wool knit (FSN 8415-904-5119 through -5124) have been designated for air crewmember use and are available through normal supply channels.

Nomex Gloves

Is there an approved method of cleaning Nomex gloves? The gloves our crewchiefs and gunners wear are continuously getting soaked with JP-4 during refueling operations which causes the Nomex to rot very quickly.—ASO

Wash the gloves by hand or in a washer using warm water and detergent but no bleach of any kind. After hand washing, squeeze out excess water (do not wring or twist) and then lay gloves flat on a towel. Roll the towel to cover the gloves, making sure they don't touch each other. For machine washing, use either home or commercial type washers and dryers since washing in water as hot as 140° F. and tumble drying in temperatures up to 180° F. will not damage or shrink the gloves.

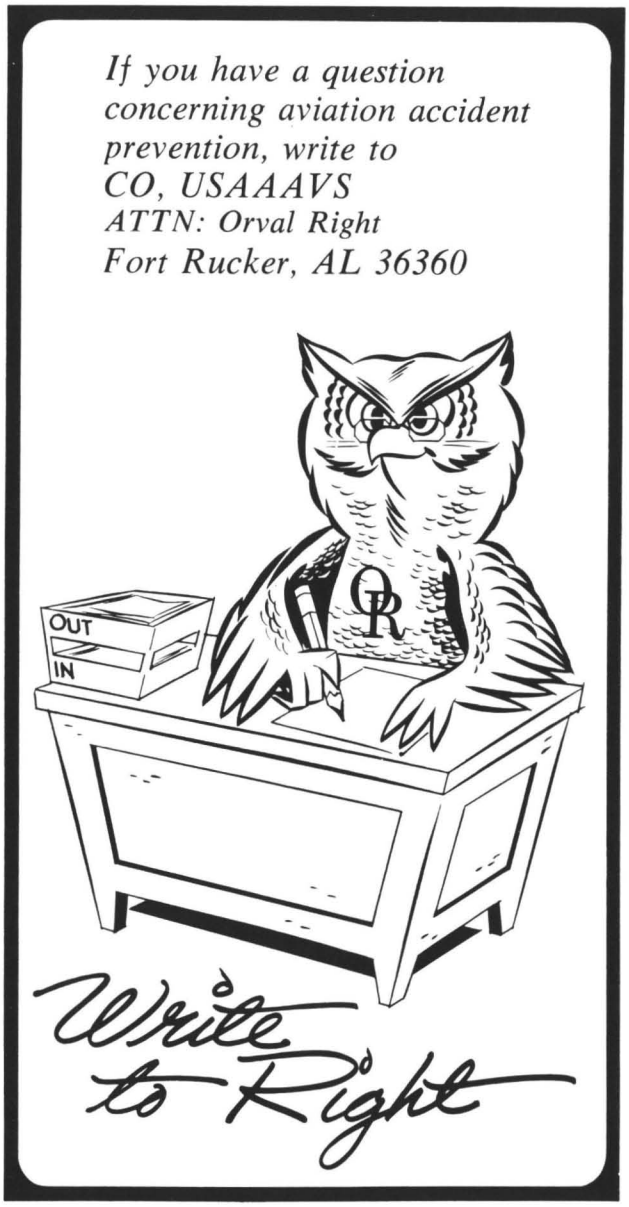
Sunglasses

Can I exchange my sunglasses for new ones with the new shatterproof lenses?—Aviator

A representative of the USA Support Center in Philadelphia tells us that an exchange policy has not been developed at the time of this writing. (Call our ASOC in a few weeks for the answer. The number is AUTOVON 558-6510/4714, commercial AC 205, 255-6510/4714.)

DA Form 285

Are DA Form 285's required to be filled out for aircraft mishaps?—ASO



Yes, regardless of cause, consequence or location if the mishap is classified as an accident or an incident. According to AR 385-40, August 1972, the commander of a unit, installation or activity having experienced an Army accident will investigate the accident, determine the causes and prepare DA Form 285. The G-1 rather than the ASO is responsible for preparing and submitting this form. AR 385-40 also requires that indorsements forwarding "Technical Report of U.S. Army Aircraft Accident," DA Form 2397 series, include a statement verifying that a DA Form 285-2 has been completed and processed in accordance with procedures contained in AR 385-41.

Civilian Survival Gear

Do you have any information about where a civilian aviator can procure protective clothing and rescue-survival gear?—Civilian

You may be able to obtain the information you are seeking from *Trade-a-Plane,* a national publication devoted to the sale of aircraft and related items. You might also try Survival and Flight Equipment Association National Office, Suite 207, 7252 Remmet Avenue, Canoga Park, California 91303; and Aviation Components, Inc., Benton Harbor, Michigan 49022.

Pressing Nomex

I am interested in whether pressing the Nomex uniform with a hot iron has any effect on the flame resistance of the material. Here in Korea many of the houseboys are accustomed to neatly pressing the Nomex uniform with a military crease. Does this practice tend to destroy the flame resistance of the uniform?—ASO

The people at Natick Laboratories tell me that ironing or steam pressing will not degrade the fire-resistant properties of the Nomex flight suit. There are certain precautions, however, that should be taken. Do not use any kind of bleaching compound when washing the suit. Do not use starch because starch will make the suit less fire resistant; a thorough rinsing to rid the suit of any starch will restore its fire-resistant capabilities. Although sharp creases make an attractive uniform, remember that the flight suit must be worn loosely on the body with sleeves rolled down and trouser cuffs fastened snugly over the boots if you want to achieve maximum thermal protection.

OH-58 Dash 10

I recently requisitioned a dash 10 and a dash 10CL for the OH-58 and was told that neither was available. Can you tell me why?—Aviator

Both the operator's manual (dash 10) and the dash 10 checklist are being completely revised. At the time of this writing, they are at the printer and will be distributed through pinpoint in the late fall.

Flying Clubs

Who is responsible for safety in U.S. Army-sponsored flying clubs?—Civilian aviator

According to AR 230-11, 21 July 1972, the commander of the installation where the flying club is located is responsible to ensure that the flying club complies with all applicable aviation regulations and that it conducts its operations in a manner commensurate with the safety standards required for U.S. Army aviation operations.

UH-1H Safety

I have two questions dealing with safety in a UH-1H. First, why is the copilot's shoulder harness lock in the UH-1H located on the copilot's right where it is impossible for him to operate without taking his hand off the cyclic stick? Second, why is the fire extinguisher in the UH-1H cockpit located between the seat and the door where the pilot cannot get it out of its brackets without opening the cockpit door?—Aviator

The answer to both questions has its beginning with the installation of the armored seats in the UH-1H. After these seats were installed, the copilot's harness lock in its original location on the left side interfered with movement of the collective, and the fire extinguisher would no longer fit under the seat. One solution to the lock problem, but not necessarily the whole answer, is for the copilot to turn the aircraft controls over to the pilot before he locks or unlocks his harness or else rely on the G-lock. The fire extinguisher was relocated on the right side of the pilot where it is accessible to the crewchief. In instances where the UH-1H is flown frequently without a crewchief, some activities have moved the fire extinguisher immediately aft of the map case where the pilot or copilot can reach it in flight.

Fuel Samples

How large a fuel sample should I take on preflight?—Crewchief

According to TM 10-1101, the size of the sample drawn can vary from one-half pint to one pint, depending upon the condition of the fuel. Remember that preflight sampling is the only way to ensure that the fuel on board does not contain water or other visible contamination. Use a clean, dry glass or clear-plastic container for the sample and look at it carefully for contamination. If water, sediment, suspended matter or any other contamination is visible, draw an additional quantity for verification. If contamination is still evident after you have drawn a quart or more, consult your supervisor for further instructions. Also, establish a safe place to dispose of your fuel samples and indicate the disposal procedures in your SOP for compliance by newly assigned aviators.

Arnold R. Lambert
Directorate for Education and Prevention
USAAAVS

TURN DOWN THAT NOISE!

HOW MANY times have you returned from a shopping trip, a movie or some other outing and found your house pulsating with sound? If you have teenagers, it has probably been often. With three of these not-so-rare individuals at my house, there is a constant disagreement as to how various sounds should be described. What they call music, I call noise. It's noise to me primarily because of the high volume at which it is always played.

I thought it was a shrewd move when I convinced them we should consult an impartial party to settle this music-or-noise matter. I selected Mr. Webster because they were unaware of my prior research on the subject. I opened the book to the word "noise," and quoted aloud the definition I felt would give me the best advantage: "any loud, discordant or disagreeable sound or sounds. . . ." My smirk slowly faded away when my 16-year-old daughter commented matter-of-factly, "Our music may be discordant or disagreeable to you, but to us, it's beautiful." Before I could muster a rebuttal, one of my son's friends pulled into the driveway and braked to a halt. His car had chrome pipes and no mufflers. My second chance to try to prove my point had to wait until I could calm my birddog that liked to nap on the driveway.

When the noise of car and dog finally subsided, I asked all four teenagers to describe the sound made by this classic little '55. One said it was neat, another said it was cool, the third used a word that was dirty when I was a boy and my 16-year-old daughter said nothing. I shouldn't have asked her opinion, but I did. I got it again: "Well, Dad, it may be discordant or disagreeable to you. . . ." Being democratic, I pulled rank and the subject was dropped. The stalemate still exists. So does the noise.

In recent years, man has been made more aware of his environment and the pollutants being heaped into it. One of these pollutants is noise. Granted, some noises are desirable—when they are controlled. We welcome the noise a fire alarm makes when it informs us of the hazard in time to escape, and we use the noise of an alarm clock to awaken us every morning. Similarly, we welcome the sound of a barking dog

when it warns us of a prowler. But if we had to listen to these all day, we would soon become prime candidates for the psychiatrist's couch.

Fortunately, most problems caused by noise are minor in nature, but some can be formidable.

It has been a theory for some time that prolonged exposure to the music or noise teenagers like (at high volume) will cause permanent damage to hearing. A recent news article stated that a band was hired for a school function in California and was restricted to 92 decibels or no pay. There must be something to the theory.

Consider noise emissions from aircraft, especially helicopters. Although helicopter noise is not considered as serious a problem as that of jets, it is a problem nevertheless.

For example, the helicopter's agility makes it a valuable military vehicle, but its effectiveness could be greatly increased if its noise could be reduced to a level where the helicopter could not be heard unless it could be seen. At present, the helicopter, under certain circumstances, announces its arrival to the enemy long before he can see it.

Helicopter noise also presents a safety hazard to passengers and flight crews. Several accidents have happened because the noise prevented adequate communications between individuals or groups. In one such instance, the intercom malfunctioned and the crewchief was unable to clear the AC who was hovering the aircraft into a tight LZ. The tail rotor struck a small tree, and the AC lost control of the aircraft. The accident report did not list aircraft noise as a cause factor, but without the high level of noise, the AC might have heard the crewchief's warning.

In another instance, a passenger approaching an operating helicopter was decapitated by the main rotor blades. He could not hear the warnings being shouted at him by the pilot who could not shut down the aircraft in time to prevent the accident. Numerous mechanics and other ground personnel have been either killed or injured because they could not hear similar warnings shouted at them.

Although noise is not accumulative, some of its harmful effects are. Depending on the type of noise and such variables as loudness and duration of exposure to it, damage to nerves affecting the hearing can occur. This type of damage is irreversible and the more prolonged the exposure to the noise, the greater the degree of nerve damage. Aviators have been permanently removed from flight status because of hearing loss from this cause.

The "Forum" in the September 1972 AVIATION DIGEST contains a letter from a disenchanted ex-aviator. The subject of the letter is "hearing loss" and is an example of another problem crewmen have with helicopter noises.

Although we cannot eliminate all the undesirable noise associated with rotary wing aircraft, we can make an honest attempt to reduce it to a safe level, and both military and civilian agencies have been actively working to do just that. As a result, much valuable information has been gained. It has been deemed possible, for example, to reduce helicopter noise by at least 5 decibels, and perhaps, even 10. But to do this will entail drastic and costly changes in design, and these will be some time in coming. Meanwhile, there are several things we can do.

We can ensure that all air and ground crews are kept aware of the serious threat posed directly and indirectly by helicopter noise.

We can insist that ground personnel receive thorough instructions in safe practices to be followed when working in the vicinity of operating aircraft, and we can provide ample supervision to ensure that these practices are followed.

We can make certain that ground personnel know and use proper hand signals that will not be misinterpreted when communicating with air crews by visual means.

We can ensure that all passengers receive a thorough briefing before flight, to include proper procedures to be followed in embarking and disembarking from operating aircraft as well as those to be used in the event of an emergency.

We can require air and ground crews to have and use protective devices available to prevent hearing loss, and see that these personnel are tested at frequent intervals for early detection of any possible hearing impairment.

These recommendations are not new, but they are effective in reducing the hazards posed by helicopter noise—if conscientiously followed. For more detailed information on how to protect your hearing, and for a report on the progress being made in reducing helicopter noise levels, the following articles are recommended: "Say Again All After 'ATC Clears,'" and "The Quiet One." Both appeared in the February 1972 issue of the AVIATION DIGEST.

With perseverance, the helicopter noise problem can be solved in the foreseeable future. Hopefully, before my teenagers are old enough to yell at their teenagers, "Turn down that noise!"

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

Does your unit rely on luck or prior planning? The following article, produced by a USC ASO student, may be revealing

HOW LUCKY CAN YOU GET!

IMAGINE YOURSELF as the commander of a small aviation unit located in a very primitive and mountainous area. It is mid-January with temperatures ranging from 0° F. to —30° F. At dusk, you receive a call from the Federal Aviation Agency that one of your aircraft has gone down in an extremely remote area, about 100 miles north of your airfield. The pilot did not have time to elaborate on his situation, so no other information is available.

Because of the rugged terrain, ensuing darkness and heavy snow within a 500-mile radius, search aircraft from your unit or other services cannot be dispatched. It is possible that weather conditions could even prohibit search efforts the next day.

Knowing the crewmembers will have to spend one night and possibly two without help, your head begins to swim with questions. Can they make it? Are any of them injured? Are they up to date on first-aid techniques? Are they wearing the proper clothing? Do they have the proper survival equipment? Did the aircraft burn, leaving them only their personally-attached survival equipment? If they have the equipment, do they know how to use it? Have they attended a survival school that teaches techniques for the particular area? You can't answer these questions, so you begin to contact people who possibly can.

You question the safety officer as to whether first-aid refresher courses are given periodically to all air crews and whether they are briefed on survival techniques for the surrounding area. He reminds you of your comment that most safety meetings are a waste of valuable time and that you never mentioned that survival techniques should be covered in the meetings. Embarrassed, you know he's right. You can't reply.

You then ask your supply officer whether the crew has the proper clothing. "Sir," he replies, "if you recall, I mentioned several times that our arctic flight clothing is in bad shape and every crewmember is short some items, but you told me to delay ordering new clothing until our next fiscal year budget is approved." Again you say nothing, nor do you inquire about survival equipment, because you remember his asking about this also—and you recall your answer.

Finally, you ask your administrative officer if the downed crewmembers have been to survival school. He informs you of your decision to postpone such training because personnel were critically needed for mission accomplishment. As a commander, you have "blown" it.

But now comes the hard part, that of telling your commander you do not know the crewmen's chances for survival and, worst of all, telling their families.

Does this description fit you? Think about it and about what you, as a commander, can do to prevent similar situations from occurring. Also keep in mind that accident prevention is the key to safe operation, and that *all* resources must be protected for a unit to accomplish its mission.

Oh yes, the snow stopped and the crew was found resting comfortably in an old cabin complete with food and a stove for warmth. How lucky can you get!

■ ■ ■

Dear Pearl:

Is there anything in writing that states that passengers in U. S. Army aircraft must fly with their shirt sleeves rolled down? I know good safety practices should be followed, and this is one of them. However, I cannot find anything in any AR on this subject.

Pharon R. Enochs
CW2, USA

Dear Mr. Enochs:

There is no AR which specifically directs that passengers on Army aircraft must have their shirt sleeves rolled down. In paragraph 4m, appendix X, "Army Aircraft Passenger Briefing," *Sample Aviation Accident Prevention Program, 1971,* prepared by

USAAAVS, it is suggested for passengers that shirt sleeves will be rolled down during the entire flight, and that gloves should be worn, if available.

Command responsibility for aviation safety is presented in paragraph 1-14(6), AR 95-1, and chapter 3, AR 95-5. Among other things, these regulations direct commanders to continuously review the aviation safety effort to ensure that:

• There is an effective system for exposing hazards.

• The safety council periodically reviews such hazards.

• Appropriate action is being taken to eliminate these hazards.

Therefore, if any hazard is to be eliminated, it must first be identified (i.e., passengers riding in Army aircraft with sleeves rolled down). Then directives should be published prohibiting hazardous operations and practices.

Pearl

A BETTER MOUSETRAP?

HAVE YOU ever wondered how the airlines keep enough planes available to meet their schedules? Do they have a lot of spare ships on hand, is their maintenance that good, or have they built a better mousetrap?

Captain Marvin J. Katcher of the U. S. Navy had enough curiosity to search out the answers. He visited the maintenance shops of several major U. S. airlines to find out what was going on, and when he got home, he wrote it all down. The next paragraphs briefly summarize a few of the high points of his excellent report.

Gene Berta
Directorate for Education and Prevention
USAAAVS

The old saying about fools and watchmakers tinkering with watches may apply to aircraft. But with aircraft the fault may not lie altogether with the skill of the repairman but at least partially with the bare fact that the aircraft was tinkered with. You don't agree? Well, the airlines seem to, according to Captain Katcher. Since nothing succeeds like success and admittedly the airlines meet their schedules, let's at least read about it.

In the first place, airlines recognize that the inherent design of aircraft determines the reliability and maintainability of individual components, subcomponents, systems and subsystems. A maintenance program, no matter how good, cannot yield a reliability higher than that designed into the item, but—and this is important—inappropriate or inadequate maintenance can degrade its reliability.

Second, if you examine an item properly, it will tell you how much, how often and what kind of maintenance it needs. You never need to replace any item having a constant failure rate before it fails because a new one is no better than one that has been used but is still serviceable. Only when the item's failure rate increases with age does replacement reduce the risk of failure. A related axiom concerns "infant mortality" units, those units whose failure rates decrease with age. You do not disturb an infant-mortality unit for preventive maintenance purposes if it is performing well or normally.

We recognize the first two concepts as nothing new to maintenance, but the third concept may force many of us to redirect our thinking, or else to reject the concept out of hand. The airline maintenance people believe that preventive maintenance often may be anything but preventive. Both by virtue of infant mortality and occasional human error during the maintenance, preventive maintenance on components with a constant failure rate wastes useful component life and manhours, and often leads to mishaps.

Right now you are probably thinking, "It's a lead-pipe cinch I don't want to fly in a ship where there's no preventive maintenance on critical items." You don't have to. Read on.

From these three maintenance concepts have evolved somewhat naturally three maintenance processes known as "Hard Time," "On Condition" and "Condition Monitoring." "Hard Time" and "On Condition" processes—both preventive in nature—include those units and parts that involve safety of flight or contain any hidden functions. Any item affecting safety of flight or having a hidden function *cannot* be "Condition Monitoring." Feel better?

Properly applied, the "Hard Time" process employs some positive means to determine the point in time at which the item begins to wear out as a result of age—when its performance first falls below acceptable standards. The age-reliability curve takes a decided upturn, and enough of the family of items have survived to this point in time to warrant taking a positive maintenance action. The importance of "Hard Time" lies in the fact that maintenance personnel can identify, in advance, a definite time in the

life of an item without specifically inspecting the item and can establish a positive preventive maintenance action before the item fails.

For many years, "On Condition" was considered the only alternative process to "Hard Time" maintenance and was used for everything not covered by the first process. According to Captain Katcher, the airlines apply "On Condition" to those items having two characteristics: a constant failure rate without the distinctive upturn of the "Hard Time" component age-reliability curve, and a location and design that permit regular physical tests and measurements to determine performance and the degree of deterioration present. If preventive maintenance is needed, it is performed. Otherwise, the item is allowed to continue to age in service until time for its next scheduled inspection.

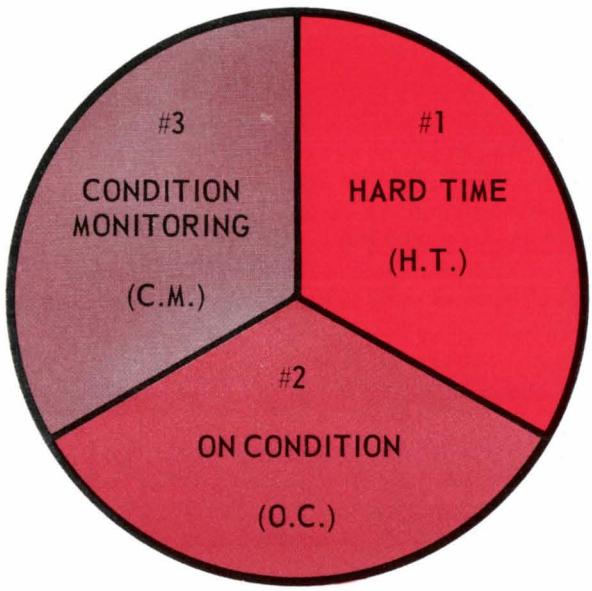


FIGURE 1 – Equal in Importance

The distinction the airlines make between the "Hard Time" and "On Condition" processes is that the "Hard Time" item has a predetermined life beyond which its failure rate rises sharply, thus establishing a point for maintenance action, while the "On Condition" item has no such point but depends upon a positive means for determining deterioration, thus making maintenance actions dependent *on the condition* of the item when examined.

Captain Katcher observes that the third primary maintenance process employed by the airlines, although the latest to evolve, is the most rewarding when properly utilized. Known as "Condition Monitoring," it is not preventive maintenance, and it is based on the fly-to-failure concept.

As noted earlier, many items are unresponsive to preventive maintenance as a means to ensure their continued reliability, and their malfunction does not always affect safety. Further, a maintenance action after failure may not be as costly as an action before failure, especially in view of unpredictable failures, maintenance errors and infant mortality rates. In short, you cannot predict failure, you do not gain economically by pre-failure maintenance, you do not improve safety or reliability by pre-failure maintenance and therefore you have no basis for action before failure.

In general, "Condition Monitoring" requires the collecting, recording and analysis of detailed maintenance and reliability information. Although this process may range from a simple, manual system to one that is costly and computer-oriented, it must provide a positive data base from which engineering action, maintenance service change action and other actions may be recommended to avoid degradation of reliability.

For the faint hearted, let us reiterate: If either safety of flight or a hidden function is involved in the performance of an item then it cannot go into the category of a "Condition Monitoring" item.

To arrive at this decision, as well as to categorize all components and systems into one of the three primary maintenance processes, the industry has developed guidelines and published them in two major documents—first, *MSG-1* for 747 airplanes and then

for older fleets the *Airline/Manufacturer Maintenance Program Planning Document—MSG-2,* March 25, 1970. Available from Air Transport Association of America, 1000 Connecticut Avenue, N.W., Washington, D. C. 20036, the *MSG-2*, together with FAA doctrine and guidelines, forms the basis for the airlines and manufacturers to establish jointly a maintenance program for an aircraft. While the *MSG-2* encompasses the maintenance program for the entire airplane, it contains decision logic diagrams which are used in the examination of individual components, subcomponents, systems and subsystems so that a maintenance category can be properly assigned. Captain Katcher noted at the time of his report that FAA was still adjusting its regulatory documents to cover full "Condition Monitoring."

As could be expected, airlines differ in applying the three maintenance processes, but despite these differences, Captain Katcher estimates that the "Condition Monitoring" process is applied to 75 percent of aircraft individual components/systems, "Hard Time" to 5 percent and "On Condition" to the remaining 20 percent.

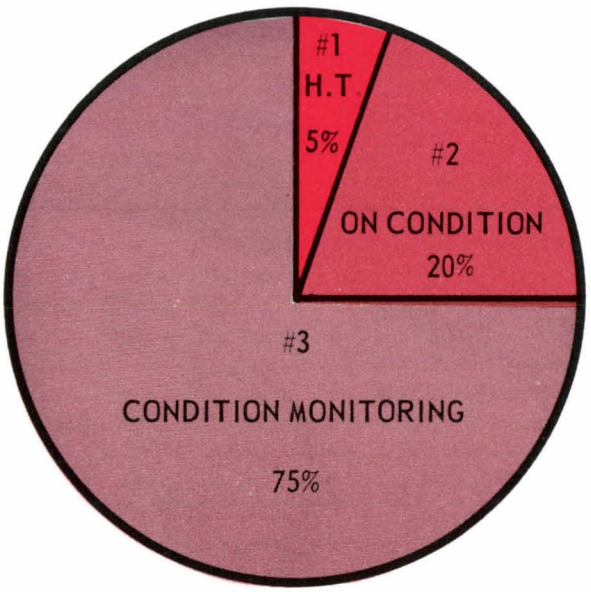


FIGURE 2 – Unequal in Application

Let's use your automobile as an example. If because of carbon buildup after 11,000 miles, your spark plugs no longer gave proper ignition, you might decide to remove, discard and replace them every 10,000 miles and they would be a "Hard Time" item. But if you removed them every 5,000 miles, checked clearance with a gap tool, decided they were okay and reinstalled them with intent to check them again in 5,000 miles, they would be "On Condition." The same applies to tires that you inspect for wear, baldness, gouges, etc., either periodically or before major trips. On the other hand, you never check your water pump either as service or as preventive maintenance unless your water temperature light/gauge or clouds of steam indicate trouble; the water pump is a "Condition Monitoring" fly-to-failure item as well as your springs, door hinges, steering wheel shaft, seat slide and at least 75 percent of the entire car. Points, plugs, condenser, oil filter, air filter and very little else are "Hard Time" items, making up about 5 percent of the car. That leaves about 20 percent of "On Condition" items in your car—tires, brake linings, fan belts, shock absorbers, wheel bearings and the like.

If our analogy holds, and we believe it does, the airlines maintenance concepts are nothing more nor less than an organized extension of common sense based on data and experience. Aircraft components and systems, if properly examined, will tell us what maintenance should be performed and when. A large percentage can be "flown to failure" without impairing reliability, decreasing safety of flight, or adversely affecting maintenance costs, whereas preventive maintenance can cause more problems than it cures.

Perhaps those of us involved with Army aircraft maintenance should reexamine our own areas of responsibility, and unless we are completely satisfied with what is being done, we should explore the potential of these ideas. As Captain Katcher's findings indicate, the airlines may have built a better mousetrap.

A pro-style offense and a hard-nose defense . . .

Game Plan for Winners

I ALWAYS look forward to New Year's Day. It is a time for many things—to recuperate from the activities of the night before, to make (or break) resolutions and, happily, a time to relax and watch the bowl games. And when the games are over, it is a time for coaches to evaluate the plays they have used —and plan changes for the following season.

Consequently, New Year's Day was an appropriate time for me to visit some of the top "coaches" of Army aviation teams and see what kind of plays they are planning for enhancing aviation accident prevention during the coming year. I was impressed. Listen to the offense:

". . . Commanders at all levels must take appropriate action to ensure that standing operating procedures are current and that they adequately meet local training and operational requirements."

"I recognize that realistic testing is desired. Aviation training and operation in support of testing must be accomplished within safety parameters that will provide the greatest amount of protection against injury, loss of life, and loss of equipment, and at the same time, let us prepare for future combat operations."

"A transitional period from a near-zero capability to a capability of full aviation support requires close and continuous examination on the part of commanders at all levels. . . . Of particular interest is the emphasis being placed on airmobility training. This type training involves split-second timing on the part

of both aviation and nonaviation personnel. . . . I expect each exercise to be deliberate, virtually by the numbers, until a greater depth of experience is obtained. In short, I expect safety to be placed above total performance.

"Individual aircraft missions must be closely supervised. . . . Ground commanders have been known to require an aircraft crew to accomplish missions exceeding normal safety limits despite crew reluctance. Likewise, flight crews have at times become exceedingly mission motivated, or have attempted missions beyond their capabilities, and in doing so, have ignored sound safety practices.

"In evaluating your aviation capability . . . establish a plan for maximum utilization consistent with crew qualification and training. Establish training programs where maximum benefit can be obtained from each hour flown. It is anticipated that as a result of training accomplished . . . airmobile operations and other specialized exercises will increase. . . ."

". . . I have dispatched a letter to each of the . . . commanders pointing out the essentiality of placing safety above total performance until all assigned personnel are completely familiar with and have participated in airmobile operations. Aircraft accident prevention surveys include aviation units on a regular schedule. . . . The systematic visits have done much to instill a desire for professional excellence in . . . aviation personnel."

As unpalatable as the truth may be, we must admit that occasionally we find ourselves playing defense. Army aviation coaches also gave me a few defensive plays.

"I desire that commanders at all levels take appropriate action to ensure that violations of flight and/or maintenance directives, breach of air discipline, or personal traits which indicate a poor mental attitude are dealt with promptly, to include disciplinary action when deemed appropriate."

"I recognize that the effective control has now been implemented and that the accident referred to . . . did not occur in the unit granted special waiver authorized for low-level flight. . . . However, failure to maintain positive control of aircraft operation in a low-level environment will result in the revocation of waiver authorization. The control measures include the marking of wires in designated contour flying areas in accordance with appropriate regulations and, where practicable, the wires around the perimeter of such areas."

"The SOPs and regulations pertaining to aviation will be reviewed and updated to ensure that sufficient guidance is included to conduct safe flight operations in your command. Command action will be taken to ensure that proper administrative procedures are being followed by all aviators in recording aircraft discrepancies on the DA Form 2408-13. A reply by indorsement will be made to this headquarters . . . of corrective action taken to eliminate these deficiencies."

"Failure to comply with the appropriate regulations and directives concerning the appointment of instructor pilots has not only lowered the standard of high quality instructor pilots desired in this command, but is also considered to be a direct cause factor in this accident. The lack of proper supervision in this area is unacceptable and must be corrected. Procedures will be established to ensure that all aviators performing duties as instructor pilots . . . are properly qualified and designated in accordance with appropriate regulations and directives and that procedures are established which will preclude recurrence of this type of supervisory shortcoming."

Any time you begin to doubt the importance of SOPs, training, surveys, crew assignment, recording of discrepancies, mental attitude, adherence to regulations, supervision, command emphasis, etc., read the above quotations again and rethink your accident prevention game plan.

If every aviation commander will put forth as much effort in 1973 to prevent aircraft accidents as the New York Jets Football Team does to prevent accidents to Joe Namath's knees, then the Army aviation New Year will be a winning year indeed!

USAASO Sez

The U. S. Army Aeronautical Services Office discusses

Safe Sensible Slope—Sans Sorrow: ASR final approach fixes (FAF) are generally established between 3 to 5 miles from the landing area on the final approach course. If the ASR minimum vector altitude is unusually high due to obstructions or air traffic considerations, the FAF may be at greater distances. It's bad news to descend rapidly to the MDA on long final and drag to the landing area. Lost an engine lately, in timber, when nearly home? It's also bad news to descend too slow on a short final and take a missed into icing or heavy weather. Really bad news if you're dipped deep into your alternate fuel due to unforeseen holding or head winds. For an extended period of time Army, Navy and Federal Aviation Administration controllers have provided recommended altitudes each mile on ASR final if requested by the pilot. U. S. Air Force radar controllers did not do so. Recently USAF has agreed to provide this identical service when requested.

USAASO calls this good news and recommends that pilots request this service especially when long or short finals are to be flown. To do so you help yourself—help sharpen the controller—and help others, too. Don't get home to a cold chow if you get home at all. The admin types will also love you. They respond to noise complaints that may have been unnecessary. Community, home and home base relations at the higher plane. Let's hear it for and to the ASR controller. "You" have the "Say So" in this!

ATC Chiefs: That old saying about the squeaking wheel getting the grease has been proven true again. Numerous complaints have been received at USAASO about the number of publications required in ATC facilities. To make matters worse, the IG has written up some facilities for not having the publications listed in appendices B, C and D of DA PAM 95-15. And to put the frosting on the cake, we find some publications are required in the facilities for one reason only—they're used as reference for pro-pay questions.

To correct some of these discrepancies, USAASO has initiated the following actions:

- The aircraft emergency operating instructions (the dash 10) will no longer be required in the control tower. This is being deleted in the current revision to TM 95-200.

- We have requested the IG to delete the following from the IG ATC Circular: "Are the following references available as requested by paragraph 320, TM 95-200—publications listed in appropriate appendix of DA PAM 95-15."

- We have coordinated with the ATC school at Ft. Rucker, AL, to have all references to the AIM deleted from ATC pro-pay tests. Since the AIM never served any operational requirement in ATC facilities, it may now be removed from all ATC facilities.

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Paul Harvey
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Flying Gets Less Joyful Every Year

THE ILL-FATED charter flight of Representative Hale Boggs and Nicholas Begich is still being investigated.

But I can tell you now that this will result in more regulation, more regimentation, less fun-flying for everyone.

Ask any licensed pilot, "Do you fly?"; he'll say yes and let it go at that. He knows that's not an adequate answer, but the whole truth is too complicated for casual conversation.

If he is licensed to fly he is rated to fly only specific types of aircraft.

I have an active license to fly. Further, I am rated to fly single and multiengined aircraft, land or seaplanes. That sounds like everything. Most certainly it is not.

I am not jet rated. I do not maintain a current instrument ticket. I would be almost helpless at the controls of most airliners. Indeed, if I were to fly any airplane other than the specific light twin I have been flying, it would require reschooling, a so-called checkout, perhaps requiring several hours of additional instruction.

Each airplane may be that different from any other.

I said that to prepare you for this:

The pilot who crashed that vintage jet into an ice-cream parlor in Sacramento, California, last September, in which 22 were killed, is said by his own instructor to have lacked proper preparation for flying that type plane.

Instructor Joe Patrick says pilot Richard Bingham needed more instruction and more practice before soloing that Sabre Jet.

He had flown that F-86 for 7½ hours, more than enough to satisfy Federal Aviation Administration requirements but not enough to satisfy his instructor.

With more experience he might not have pulled up that quickly with that fuel load from that short a runway.

I know after any crash it is easy to stick pins in the pilot. But more often than not, they ask for it.

The plane which went down in Alaska on October 16 had a veteran bush pilot at the controls, Don Jonz. He had 10,000 hours stick time.

But Jonz' license had been revoked 6 years ago for overloading and other violations, then reissued 4 years ago.

Perhaps significantly in the October issue of FLYING magazine that pilot wrote these words: "Flying in Alaska's icy weather is like playing poker with the devil. It's fun—but don't play unless you can cheat."

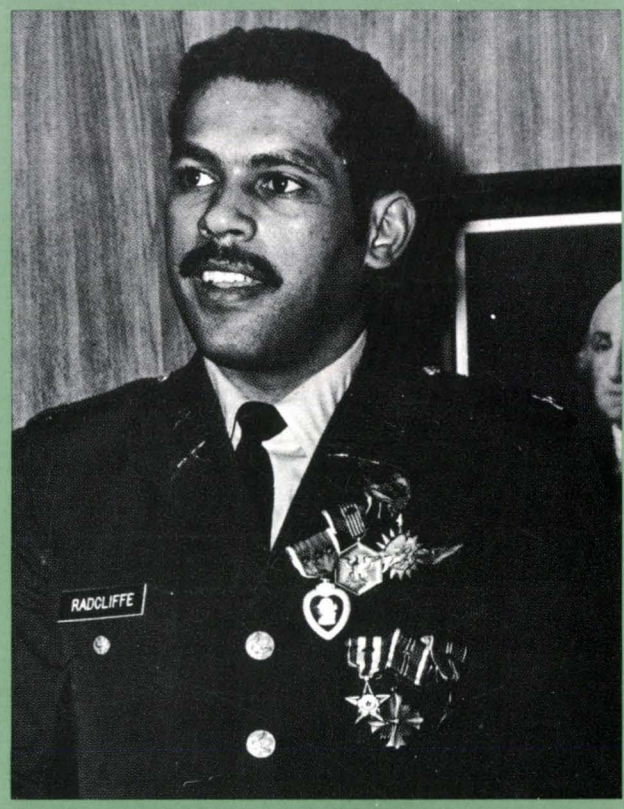
This mention today is not intended to heap coals of fire on two unfortunate airplane drivers but rather to explain why—in a more and more crowded sky—there will be less and less decisionmaking left to the discretion of airmen.

I don't like the tighter harness either. I learned to fly by the seat of my pants, not by a book. Flying is more regimented and less fun every year.

But it is safer every year.

. . . For A Job

Well Done



Captain Ronald Radcliffe, right, smiles immediately after ceremonies in which he was awarded decorations for his gallant actions in the Republic of Vietnam

Story by HM1 William J. Hammett, USN
Photograph by HM2 Michael A. Wittmus, USN

Official U. S. Navy Photograph

ARMY AVIATION'S Captain Ronald A. Radcliffe is one of the most decorated soldiers to emerge from the conflict in the Republic of Vietnam with 34 awards and decorations. Most of the citations were presented to the Army aviator in ceremonies held last month in the Board Room of the Naval Hospital, Great Lakes, IL. CPT Radcliffe has been recuperating from wounds he received in Vietnam since last June.

Major General Jack J. Wagstaff, Fifth U. S. Army Deputy Commanding General, Reserve Forces, Northern Area, Fort Sheridan, IL, made the presentations. During the ceremonies members of CPT Radcliffe's family and patients from his ward proudly watched.

CPT Radcliffe was born 13 February 1944 in Chicago. He attended Chicago Hirsch High School prior to enlisting in the Army in February 1961. He served as an enlisted man until 1968 when he was commissioned a second lieutenant through the Infantry Officer Candidate School at Ft. Benning, GA. Shortly after being commissioned he was selected for flight school and received his wings in June 1969. He has served three tours in Vietnam, the last with F Troop (Air), 4th U. S. Cavalry. He also has two tours of duty in Germany.

In addition to being named the 1971-1972 Army Aviator of the Year by the Army Aviation Association of America, the following decorations have been awarded to CPT Radcliffe:

- Two Silver Stars for Gallantry in the Republic of Vietnam, 2 February to 28 April 1972;
- Four Distinguished Flying Crosses for Heroism on 11 March, 9 April, 1 May and 23 May 1972;
- One Air Medal (with V Device) for Heroism on 29 April 1972;
- One Air Medal (37th through the 58th), a total of 21 citations for Meritorious Achievement while participating in aerial flights from 10 October 1971 to 21 May 1972;
- One Bronze Star Medal (1st Oak Leaf Cluster) for Meritorious Service on 8 December 1971;
- Three Purple Heart Medals for injuries sustained on 11 March, 1 May and 23 May 1972.

CPT Radcliffe is the holder of previous awards which include the Vietnam Service Medal; National Defense Service Medal; Good Conduct Medal; Republic of Vietnam Service Medal; Air Medal (1st through the 36th Award); Bronze Star Medal; Distinguished Flying Cross (with one Oak Leaf Cluster) and the Army Commendation Medal. He is pending further Vietnamese awards. CPT Radcliffe plans to continue his Army career when he is released from the hospital.