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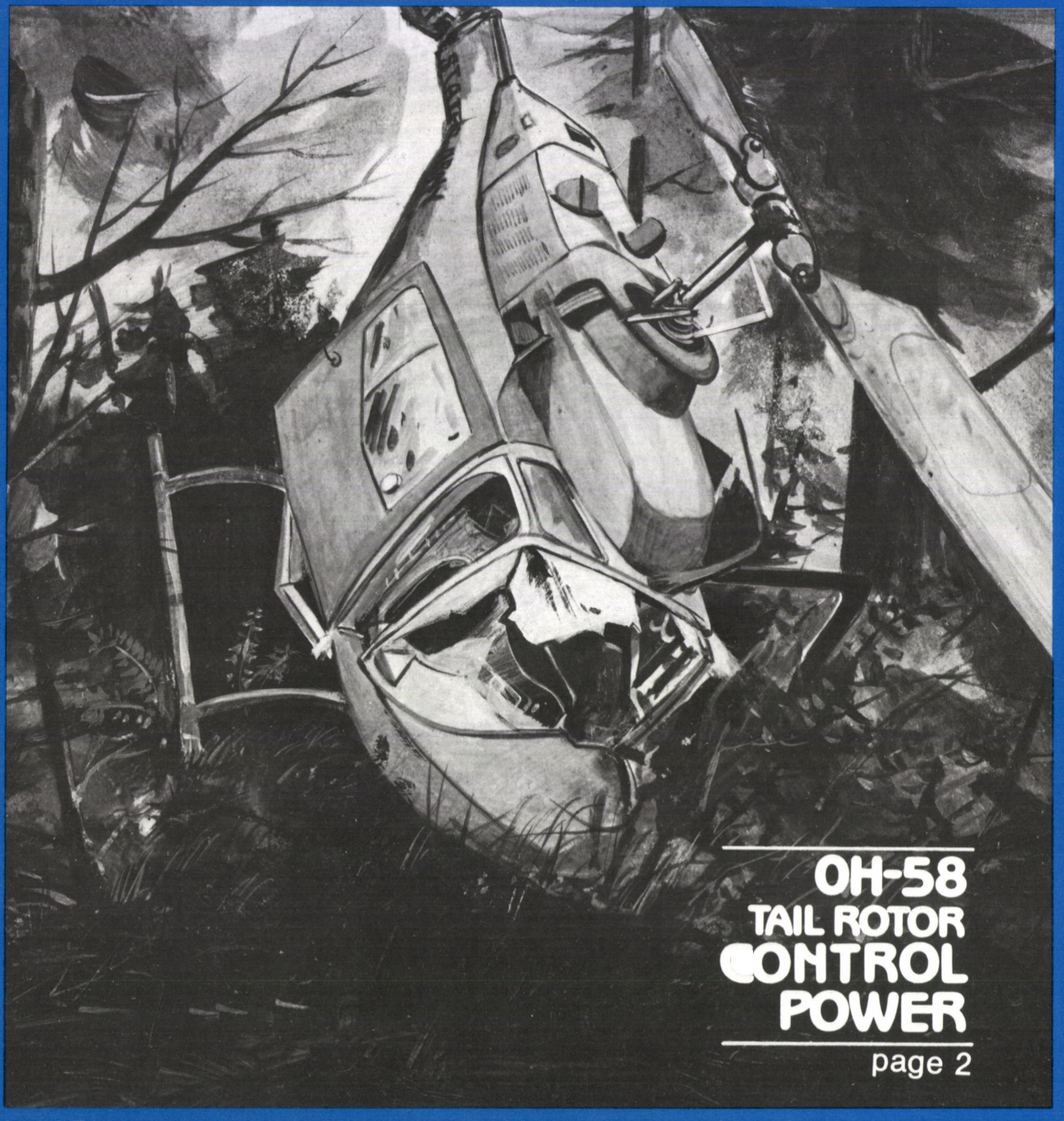

OH-58 TAIL ROTOR CONTROL POWER

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MARCH 1983 • VOLUME 29 • NUMBER 3

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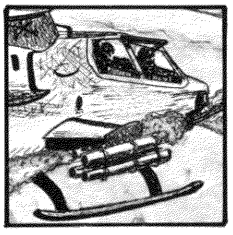

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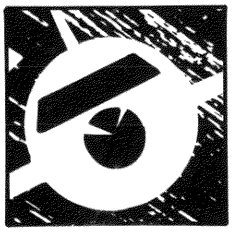

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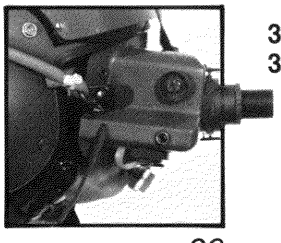

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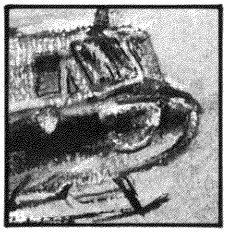

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Honorable John O. Marsh Jr.
Secretary of the Army

Richard K. Tierney
Editor

The mission of the *U.S. Army Aviation Digest (USPS 415-350)* is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

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Articles, photos, and items of interest on Army Aviation are invited. Direct communication is authorized to Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Fort Rucker, AL 36362. Manuscripts returned upon request.

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Aircraft accidents have been striking out this year. Because you have been pitching in, we have been able to break the aviation accident hitting streak. As of 21 March, 1983, we sustained 7 Class A accidents and 7 fatalities, compared with 24 accidents and 15 fatalities for the same period last year.

YOU AND YOU AND YOU can take the credit for that remarkable, lifesaving improvement. You determined to be ACCIDENT FREE IN '83 and you've worked hard at it. Of course, you have saved your own life in the process, which is a pretty good return on your investment.

Our work isn't finished yet; we have six innings (months) to go. However, there are some excellent articles in this *Digest* that will help you be an even wiser and safer crewmember.

Mr. Charles C. Cioffi and Lieutenant Colonel Donald E. S. Merritt have put a lot of needed information in "OH-58 Tail Rotor Control Power." They've written a detailed minicourse on how to cope with the less than optimum effectiveness of the OH-58 tail rotor. We must be aware of the potential of tail rotor control problems and adopt procedures which will minimize the possibility of losing tail rotor control.

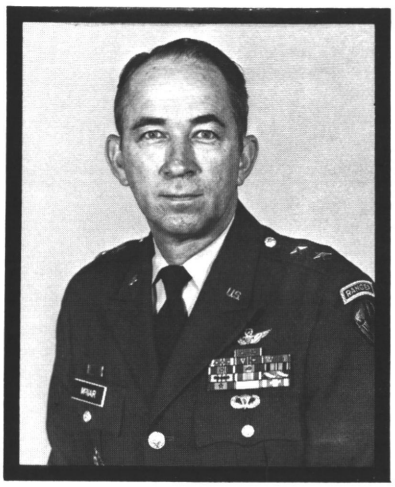
Another place constant awareness is required (I can't think of any place in our business where it isn't!) is Chief Warrant Officer, CW3, Ernest D. Kingsley's topic in "The Last Alert." It reads like good fiction until you reach the sentence, "But the nuclear, biological, chemical (NBC) officer...was issuing stuff I had never made any plans for (and had only worn twice before, if the truth were ever known)." Then you realize that Mr. Kingsley is trying to step on your toes with some hard truths in this article.

An outstanding example of the smartness I referred to above has been described by Major Vincent P. Jones in "Night Vision Goggles Counterbalance System." The system was devised, assembled and tested at Ft. Rucker. It provides a "significant improvement over the homemade remedies"—such as taping flashlights or other objects to the helmet—that have been used in an effort to offset the impossible-to-live-with weight distribution of the AN/PVS-5 NVG.

So far, the articles I've highlighted have dealt with positive decisions Army Aviation personnel have made. The other side of the coin is treated by Captain Thomas Richard Biang in "Pilot Error, a Decision." What causes us to make decisional errors? Can they be prevented? Captain Biang presents some fascinating insight on how the human mind works in this area.

Decisional errors are not a problem for the people who serve in the U.S. Army Aviation Detachment, Japan, at least not those that lead to aircraft accidents. That unit has been accident-free for 14 years! Chief Warrant Officer, CW2, Roy G. Wise notes that fact as well as others in "No Relics of the Past," a report on the Army Aviation mission in Japan.

As is readily apparent, there is much good reading in this issue of your magazine. So don't make an error—decide to read all of it.



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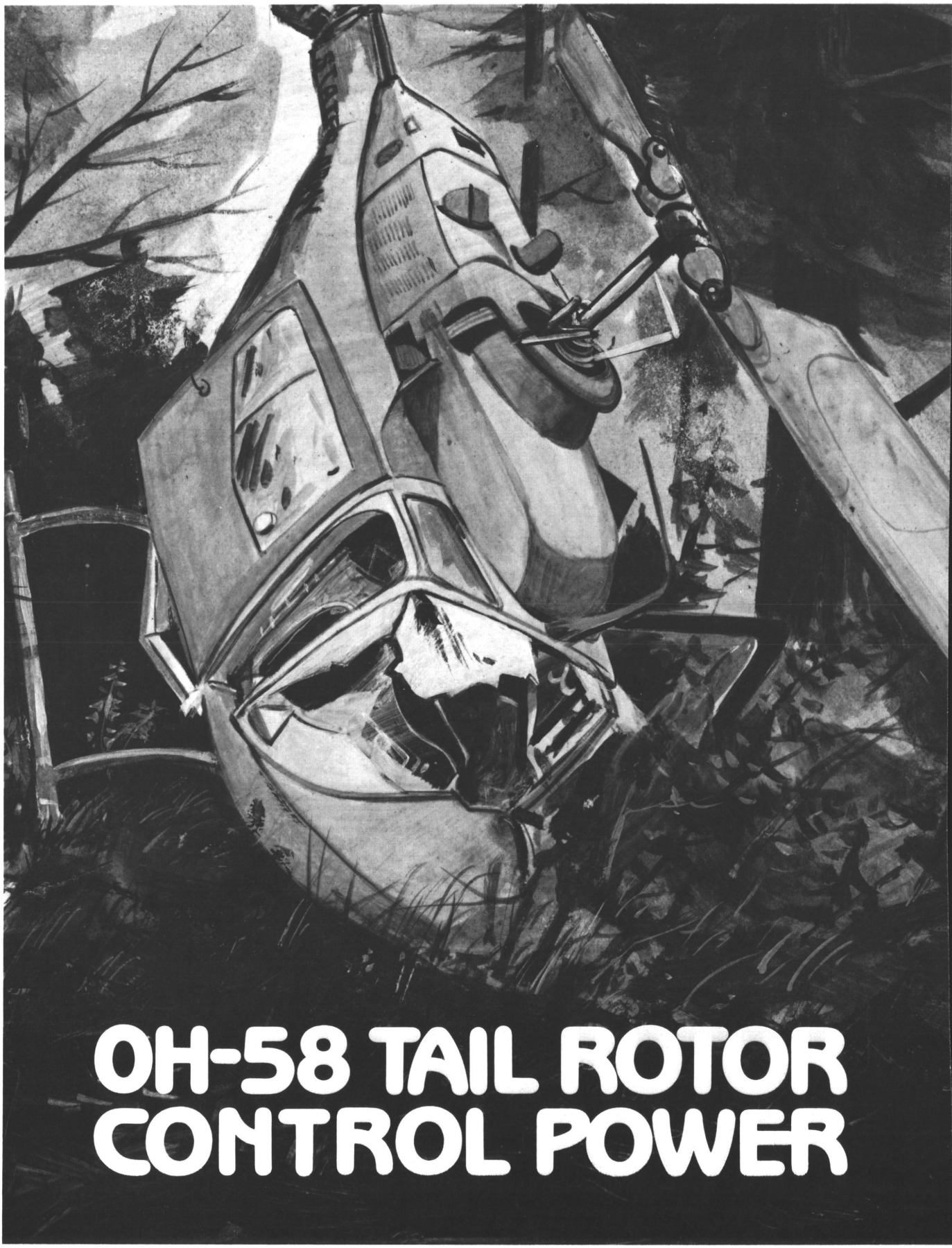

OH-58 TAIL ROTOR CONTROL POWER

illustration by Bill Totty

THE FOLLOWING Preliminary Report of Aircraft Mishaps (PRAMs) illustrate a well known but poorly understood problem with the tail rotor system on the OH-58 family of helicopters. The problem normally is referred to as **loss of tail rotor control authority.**

PRAM number 1 stated: *The aircraft was observed in a spin approximately 50 feet above the trees before it crashed.*

PRAM number 2 reported: *The aircraft departed a field site from which it had picked up passengers and was circling the field site when it appeared to fall.*

Both of the above were major accidents, but their common tie lies in their almost classic portrayal of the loss of tail rotor control authority phenomenon. How does that track? You can't tell that from the PRAMs you say! Well, let's look at each of these accidents a little closer.

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PRAM #1

The OH-58C was assigned a mission which required flight at low level, going from point to point. The estimated gross weight was 3,000 pounds; pressure altitude: plus 1,390 feet; free air temperature: plus 30 degrees centigrade; wind: estimated from the southeast at 20 knots. Upon approaching the start point, the aircraft was slowed to less than 50 knots awaiting clearance to continue. The pilot initiated a right hand turn for entry into holding while still slowing. The holding turn was continued after completion of the first 360-degree turn at which time the tail seemed to weathervane into the wind and the aircraft made an almost 180-degree spin in the air around the mast. The pilot pushed in left pedal, added a little forward cyclic and added a small amount of power trying to gain a little forward airspeed. This seemed to aggravate the situation and the aircraft began a fast rate of spin to the right. Left pedal didn't seem to do anything. By this time, the aircraft had experienced 8 to 10 360-degree turns and was about 75 feet above the trees. With no place for a forced landing and not enough control over the aircraft to get to any landing area, the pilot made the decision to hold the collective pitch in place. The main rotor system began to bleed off and cyclic control was lost as the aircraft entered the trees.

PRAM #2

An OH-58A pilot, on a day visual flight rules training mission, was assigned to participate in a site survey which required low-level flight. After takeoff, at about 100 feet above ground level, he began a right turn while reducing airspeed below effective translational lift. The right turn placed the aircraft in a 16 to 25 knot tailwind condition. Because of the low forward airspeed, the right turn, a high gross weight of 2,961 pounds, and the tail wind, the aircraft began to settle. To check the descent, the pilot increased his demand for power, exceeding the power available. Main rotor revolutions per minute (rpm) bled off and the aircraft continued to descend. The tail rotor became ineffective because of the power demand. The aircraft began to spin, completing two turns before hitting the ground.

The purpose of this article is to provide OH-58 pilots with information on the phenomenon known as loss of tail rotor control authority while addressing the limitations of the tail rotor system.

The subject of the OH-58 tail rotor and its effectiveness or lack thereof is a frequent discussion topic of Army OH-58 pilots. Several articles have been published explaining the tail rotor problem.*

Recently, a blue ribbon panel was chartered by U.S. Army Troop Support and Aviation Materiel Readiness Command, St. Louis, MO, to investigate the cause and possible courses for correction of the OH-58/T63 engine droop or power loss problem.

In reviewing power droop incident data and discussing these problems, it became evident that some of these problems may have been due in part to the OH-58 tail rotor, or more importantly, the degree of tail rotor control power. Further, some of the cases mentioned were not power loss problems, but more in the area of inadequate tail rotor directional control for the situation the OH-58 was in at that point in time.

The OH-58 is not a pure military helicopter; it was procured as an off-the-shelf Federal Aviation Administration certified helicopter and introduced into the Army's inventory with certain Army military equipment and some changes from its commercial counterpart, but the OH-58A basically was the same as its commercial version.

Most military helicopters are procured and tested to Military Specification MIL-H-8501A, "General Requirements for Helicopter Flying and Ground Handling Qualities." Had the OH-58A been required to meet a full MIL-H-8501A, it would not have the tail rotor configuration it has today; in addition, the OH-58C would not only require a different tail rotor, but possibly some form of a stability augmentation control system.

The reason for this Military Specification requirement is an attempt to provide the user with a flight envelope which will cover the basic spectrum where military helicopters will be used; requirements over and above the basic spectrum are added in the contract specifications for a particular helicopter.

If you refer to the flight manual for the OH-58A or OH-58C, you will note a section on hovering limitations in chapter 5, entitled, "Operating Limits and Restrictions." There are two "Directional Control Margin" charts in the manuals and these define the areas where safe operation can be conducted. (NOTE: These charts are not to be used for out-of-ground-effect flight but only for in-ground-effect hover.) They depict the area where safe operation will exist with a 10 percent pedal control margin. This margin is needed in order to provide a safety factor to account for many variables such as a marginal engine, a sudden wind change, slight out-of-rig condition, etc. Whenever operating in the "Yellow" area, the safety margin is not available and problems could exist with regard to directional control.

As an OH-58 pilot, you should be familiar with TB55-1520-228-20-29, a technical bulletin which was issued after OH-58s were found with significant loss of left pedal blade angle due to improper rigging. You should be aware that even with proper rigging, the OH-58 cannot meet the control requirements of MIL-H-8501A. Therefore, any misrigging will correspondingly degrade the system and therefore the charts in chapter 5 of the flight manual will not reflect your actual OH-58 capabilities.

The tail rotor of a conventional helicopter with a single rotor generally consumes 8 to 15 percent of the engine power under hovering conditions and somewhat less (3 to 7 percent) under forward flight conditions. The tail rotor thrust for normal no-wind hover can be estimated as follows:

$$\text{tail rotor thrust} = \frac{\text{main rotor torque}}{\text{length from center line of main rotor to center line of tail rotor}}$$

Another point which needs clarification is the term "tail rotor stall" and how it may be used to describe certain occurrences in the OH-58. If you refer to a classical airfoil characteristics chart (figure 1), you will note that as the angle of attack is increased, the coefficient of lift also will increase (more tail rotor thrust in this case is achieved by increasing the tail rotor blade angle). This relationship is maintained until at some point there is no increase in lift for an increase in angle of attack. Ultimately, the

*FlightFax, Volume 6, No. 46, dated 13 September 1978, subject: "OH-58A Tail Rotor Stall."

U.S. Army Aviation Digest, September 1977, "How to Crash by the Book."

U.S. Army Aviation Digest, November 1978, "OH-58 Tail Rotor Stall."

U.S. Army Aviation Digest, June 1980, "Tail Rotor Breakaway."

U.S. Army Safety Center message, 241925Z October 1978, subject: "Inadequate Tail Rotor Thrust in OH-58A Aircraft."

U.S. Army Aviation Digest, December 1982, "OH-58 Power Droop."

Copies of *Digest* articles are available upon request. Write Editor, *U.S. Army Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362.

curve slopes downward and thus less lift is experienced, and finally no more lift is produced since the airfoil has experienced (the classical term) "stall."

The given lift produced for a given blade angle, described above, is with respect to the relative wind. It is presumed that the wind is directed normal to the airfoil. If the wind's direction changes, then the perceived blade angle of attack also will change. Through this mechanism, we would then experience blade stall at a tail rotor blade angle other than would normally be expected.

In order for a helicopter to hover, the main rotor thrust (lift) must equal the weight of the helicopter; if the thrust is greater than the weight you will climb, if thrust is less than the weight you will descend. The thrust of a rotor blade in simple terms is:

$$\text{rotor thrust} = \text{thrust coefficient} \times \text{air density} \times \text{rotor disc area} \times \text{blade angular velocity}$$

From the above formula, it can be seen that for a given situation at a specific point in time, the only way to increase thrust would be to change the thrust coefficient or the blade speed, since all other factors would be constant.

Since the OH-58 (or any turbine helicopter) generally operates at a fixed blade speed, you must look further to determine how to increase thrust. Thrust coefficient is a term with dimensions; this term varies directly with the blade angle of attack. Therefore, to increase thrust (where blade speed is essentially constant), you increase blade angle of attack. However, for a given situation, if you only increase blade angle of attack, you must also increase power to the rotor if you want additional lift. If you could manually increase only the OH-58 blade angle and hold all other factors constant, the rotor would slow down. Thus, if you want to get an increase in lift you increase blade angle while increasing engine power. Conversely, if you only increase blade angle and hold engine power constant—the rotor speed decreases. If rotor speed thus droops—obviously, lift decreases and the aircraft descends.

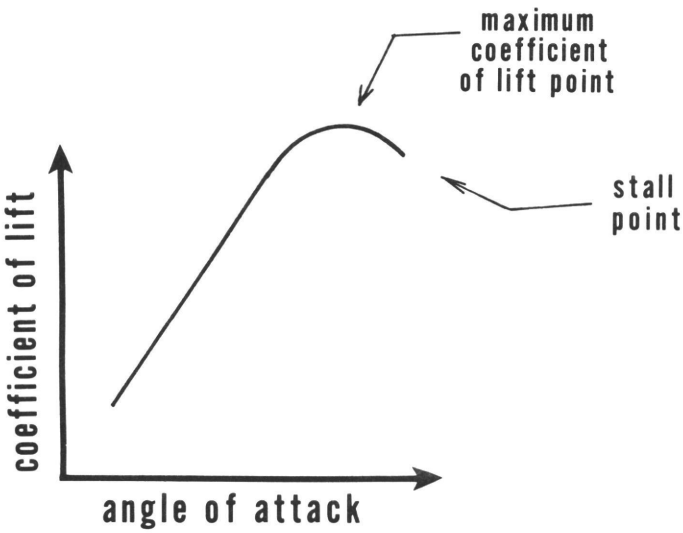
In the OH-58 as you increase blade collective pitch (blade angle), the engine power is increased automatically through the flight controls systems. Let's assume your T63 engine is "peaked-out" at maximum power, then if you increase blade angle, the blade speed slows down and the aircraft eventually descends if all other factors are held constant. Since a helicopter—or rotary wing vehicle—"hangs" by its main rotor as opposed to a fixed wing, which indirectly uses power to move the wings through the air to create the lift required to sustain flight, the helicopter's flight characteristics by their very nature become much more directly related to the powerplant and the powerplant operating characteristics.

The thrust of the tail rotor varies directly with the tail rotor speed (see "Tail Rotor Breakaway," page 40, June 1980 *Aviation Digest*). The normal OH-58A operating range is 101 to 103 percent; the maximum design thrust for the tail rotor is produced at 103 percent engine speed.

Whenever the OH-58A is in an increased engine power demand condition, the main rotor speed may decrease below 330 rpm before the engine governor acts to increase the main rotor speed.

The main rotor is driven by the engine through the main transmission from a driveshaft at the front of the engine, the tail rotor is also driven by a power takeoff point on the engine through the tail rotor shaft and tail rotor gearbox. Therefore, if the main rotor speed droops,

FIGURE 1: Classical simple airfoil curve



then the tail rotor speed must also be drooping (speed decreasing).

The available thrust of the OH-58A tail rotor (and/or its ability to counteract the main rotor torque effect) is at its maximum when the main rotor is at 103 percent (see figure 2). Note as the main rotor speed is decreased, the maximum thrust which the OH-58A tail rotor could produce is also decreased (if all other factors are held fixed).

Recalling the rotor thrust formula, note with a decreasing speed (blade angular velocity) and a fixed thrust coefficient, you obtain less rotor thrust at decreasing speeds.

The purpose of figure 2 is to show, for example, if for some reason you let the main rotor speed droop 3 percent or to approximately 100 percent N_R, the tail rotor's ability to counteract the main rotor's torque has decreased by 9 percent (actually a fraction over 9 percent). What this tells you is that when you let the main rotor droop 3 percent, you need 9 percent more tail rotor torque to maintain the same fixed condition!

In order to provide the pilot with an indication of a low main rotor rpm condition, an audio and visual warning is given whenever the OH-58A main rotor speed decreases to 335 ± 5 rpms or 95 percent engine speed.

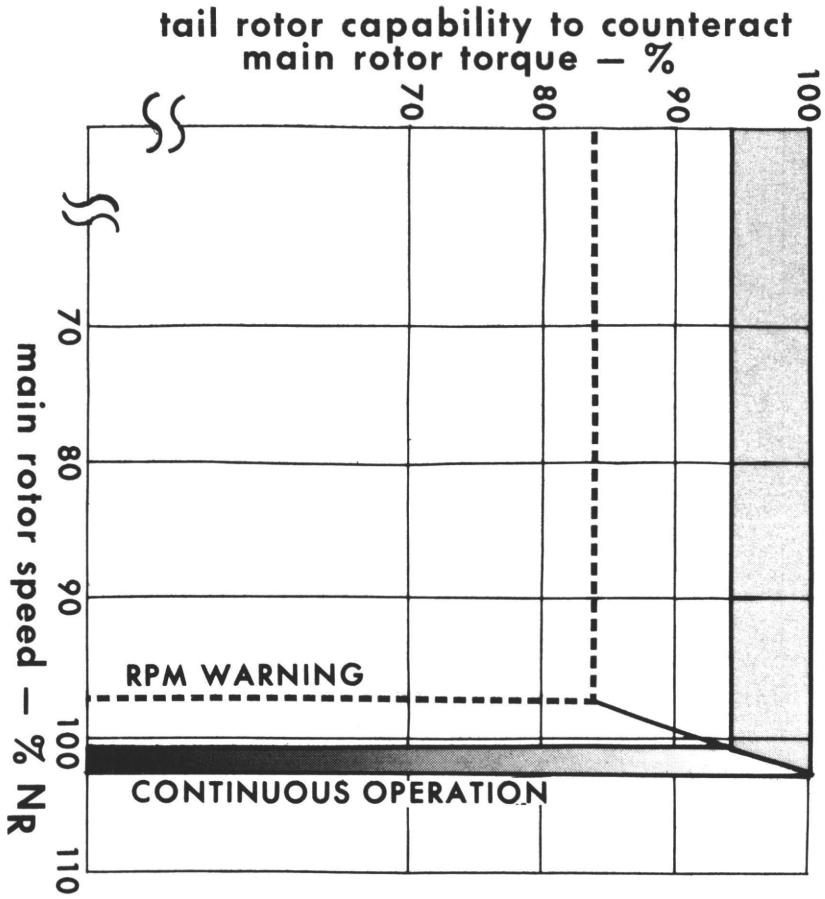
Therefore, it is conceivable that if the pilot was not "heads-up," he could have a 6 percent reduction in main rotor speed before he attempted to take corrective action. Note also that with this 6 percent reduction in main rotor speed, you would need an 18 percent increase in tail rotor capability.

The point is that a 6 percent reduction in main rotor speed would bring the speed down from its normal value of 103 percent N_R, to about 97 percent N_R, which would not trigger the low rotor rpm warning. Thus if you were not monitoring the instruments, you would not know the speed had decreased. What now becomes critical is that at this condition, if you had everything "maxed-out" (gross weight, outside air temperature (OAT), wind speed, altitude, etc.), you may *not* be able to get this required 18 percent more tail rotor thrust (actually about 19 percent).

Another point of interest is the requirement to maintain a 10 percent pedal margin. Full pedal travel is 6.86 inches, thus you should have .68 inches travel left, or about 11/16 of an inch. In the real world, the pedal is nearly bottomed, thus the OH-58 operators should start to mentally alert themselves whenever they have any flight condition where they do not have much pedal travel left. To verify this and its real world impact, recall the directional control charts in the flight manual and then consider again figure 2 of this article. If you are hovering and you have the pedals already bottomed or nearly so—you are asking for trouble.

The OH-58 has negligible directional damping at hover. (For further explanation of directional dam-

FIGURE 2: OH-58A rotor speed effect on tail rotor capability



ping, see AMC Pamphlet AMCP 706-201, para 6-3.) To explain what this means, let's suppose you were in a condition in which you needed to input more tail rotor control. First, you perceive this condition, so you add tail rotor pedal to correct it. Because the OH-58 has negligible damping, a rotational rate build-up results.

Since it is not dampened, the normal point when you perceive the need to neutralize is actually while you are in fact accelerating—and what results is not neutralizing but adding an opposite input to decrease the acceleration. Thus, you get into the high pilot workload regime which is common to the OH-58.

The directional control response rate thus will increase steadily with time because the OH-58 has a lack of yaw rate damping. What should happen, if the helicopter fully met MIL-H-8501A standards, is that the yaw rate should reach a maximum value quickly, dependent only upon the magnitude of control displacement and not upon duration of the input. Actually, if the control input is continued, the rate builds up and thus it would be easy to overcontrol.

In view of this, what should be done during hover is to input a control movement and then neutralize it *before* you normally perceive it should be neutralized, since the rate is building up!

The above condition in the OH-58 occurs mainly during hover. The rates and accelerations will decrease significantly as density altitude is increased. During hover with the OH-58, there should be no problem with the pitch and roll axes, but yaw may be a problem. Because of the above factor, it is more difficult to maintain a precise heading. The control inputs required to compensate for heading disturbances could result in moderate pilot induced oscillations.

To compound this problem, the OH-58 has a relatively high pedal force (10 to 15 pounds) which is out of proportion to the force in the lateral and longitudinal control system (0.5 pounds). This does not mean that the OH-58 is uncontrollable, but what does result is it is difficult for low-time pilots to maintain a precise heading during hover. This also could lead to overcontrolling and thus cause pilot induced oscillations.

The helicopter stability and control requirements specified by MIL-H-8501A and its corresponding damping requirements are difficult to achieve by the damping inherently available from the rotor. If full MIL-H-8501A compliance is required, then the OH-58 will need some form of a stability augmentation system.

The OH-58 operator must be consistently aware of the engine power margin as it relates to aircraft hover performance. The OH-58C with the T63-A-720 engine does have a greater degree of hot day hover performance than the OH-58A has with the T63-A-700 engine.

One of the findings of the blue ribbon panel was that the OH-58 has no throttle openstop. Once the throttle twist grip is moved (rotated) to full open there is no mechanical stop (or detent) to hold it there. The throttle twist grip is held in any given position by its built-in system friction. The throttle twist grip is 2 inches in diameter. A movement at the circumference of the grip of 0.6 inches is required to move the engine throttle from flight idle to maximum. This is about 34 degrees of rotation. Throttle rotation is about linear with engine N_1 changes, thus very small movements away from the full open position could result in large power reductions especially if the OH-58 is at a point demanding maximum power output. A movement of 1/32 of an inch from the full open point could reduce maximum N_1 by 2 percent. At sea level standard day conditions, this could result in a potential power loss of 30 horsepower!

An engine performance check was recently distributed to OH-58 users as Safety of Flight Maintenance Mandatory Message No. OH-58-82-01, "Maintenance Procedures and Engine Performance Check for OH-58 Aircraft." The message gives a method for checking the proper T63 engine performance in the OH-58.

It is important to make sure your engine has the correct power output especially since you now are aware of the figure 2 graph.

A training videotape (TVT46-2) was prepared by the National Guard Bureau entitled, "How Not to Crash by the Book." It has been made into a training film for viewing by Army aviators. This tape can be obtained through the audiovisual office that services your area. All OH-58 operators and maintenance personnel should view it.

The tape covers the performance planning card (PPC) which is DA Form 4887-R (1 July 80). Proper use and understanding of the purpose and the intent of the PPC can never be overemphasized. This would be especially true in the case of the OH-58A or any other helicopter which is engine-power limited, at increasing OAT values. Review of this article will make you aware of the tail rotor limitations and other factors which could lead to a safer flight. When performing nap-of-the-earth operations, use of the PPC and proper compliance with the flight manuals could give you that extra margin of safety.

The following is a hypothetical situation in an OH-58A; it does not represent any actual incident. It lists some flight situations which you may experience, describes the causes and shows what action should have been taken:

1

The pilot starts a right pedal turn and does not use counter-pressure on the left pedal to control the rate of turn.

The OH-58 has negligible directional damping; recall the preceding narrative description and remember you will have a rate build-up. When control pressure is applied, if it is not neutralized, the input will result in acceleration!

Recall also the "Tail Rotor Stall" and the "Tail Rotor Breakaway" articles (see bibliography at end of article) as well as the directional control margin limits in the flight manual. Your OH-58 must be operated in an envelope only where you have safe limits; anytime you are in the 10 percent control margin you are asking for problems.

2

After a rate turn has developed, he or she applies left pedal which causes a power demand resulting in a momentary decrease in N_2 and subsequent decrease in main rotor lift and tail rotor effectiveness. This causes a slight descent of the OH-58.

Application of tail rotor pedal means increasing its blade angle which would produce more thrust. However, to produce more thrust requires more horsepower; this is sensed by the engine. If the engine is at or near maximum output, what is perceived is a momentary decrease in N_2 since if more horsepower is demanded instantaneously it subsequently causes a loss in main rotor torque/rpm. If N_2 does not immediately increase and depending on the existing power loading, the OH-58 may descend slightly.

One other point to consider is if too much tail rotor pedal were added, the required reaction would be opposite pedal to neutralize the effect. These pedal reversals obviously take power and depending on the magnitude can also result in a corresponding N_2 droop. The larger the pedal reversal, the larger the power required and the larger the droop!

In design considerations for helicopters, pedal reversal conditions, especially full pedal reversals, are considered an important design point since power required and loads will be substantial!

3

The pilot increases pitch to stop the descent which causes further increase in left pedal. This causes a power demand which results in a momentary decrease in N_2 and subsequent decrease in main rotor lift and tail rotor effectiveness.

The natural reaction to correct the descent is to call for more collective pitch which should stop the descent. Raising the collective results in the main rotor blades having an increased blade angle which should have the resulting effect of more lift. However, more lift can be only produced if more horsepower is provided; recall the earlier discussed lift formula. You should also be aware that the collective is mechanically linked in the flight controls through the linear actuator to the N_2 governor; thus raising the collective should cause the governor to have a setting which should result in more power output.

As you are no doubt aware by now the engine power does not increase immediately as power is called for; there is a built-in time lag. Thus as you "beep-in" a demand for power or raise the collective the resultant power output is not instantaneous.

For information, the T63 engine response characteristics are such that once the power droops there is a delay of about 3 to 5

seconds before it recovers to full power output. Obviously the lower you go on the power curve, the longer it takes to get the power back up. Also, as you are aware, there reaches a point on rotor rpm where the OH-58 will not sustain flight; thus the low rotor rpm warning system was furnished to make you react in time to take appropriate corrective action.

One other consideration must be taken into account and that is your power margin. Obviously if all other given factors remain the same, the OH-58C has a greater engine power available margin than the OH-58A. In considering the T63 power recovery response you must also consider where you are in relation to the power required versus power available curve. If you are at the upper limits of this curve, it is obvious that the engine will not be able to respond as indicated in the preceeding paragraph—pulling collective to ask for more power at or close to the upper end of the curve will not result in any additional power output!

The "beep" switch on the collective will cause a change in the length of the linear actuator and thus is used to make minor power adjustments. Thus, if you were already "beeped" to maximum you have no place to go with the beep switch.

Also, remember the twist grip, it also controls engine power; remember too that a small amount of twist grip backoff can greatly affect power output!

4

Depending upon how fast the engine power increases, there could be another slight descent of the OH-58 or rate of turn. If the pilot overreacts and pulls in more pitch, step 3 may be repeated.

Once the engine power increases, more torque is available for the required amount of tail rotor control, but you must recall two factors now. The first factor is that you can't "split" the power between the main rotor and the tail rotor. Although you are asking for more main rotor thrust to stop the descent—and tail rotor power to counteract the helicopter rotation—the added main rotor thrust now requires an even greater amount of tail rotor thrust to counteract the increased main rotor torque.

Recall the graph shown in figure 2. It shows that the maximum tail rotor thrust for the OH-58A is at the prime main rotor speed of 354 rpm or 103 percent engine speed. As the main rotor speed decreases, then total tail rotor thrust decreases; thus, for the OH-58A you can't get your full tail rotor thrust capability below 103 percent engine speed or 354 rpm main rotor speed.

Since you are now descending it indicates your power is decreasing as is, most likely, your main rotor speed—thus it is also most probable you will NOT have full tail rotor thrust capability!

5

By this time the pilot may have run out of left pedal, and he will be at a high power setting.

You have run out of pedal, caused by one or more of the following:

a. Less than full tail rotor thrust capability on the OH-58A at less than 103 percent rpm.

b. You may have entered the initial flight condition with less than a 10 percent margin.

c. The additional main rotor torque requires additional tail rotor thrust to offset the condition—over and above what was required initially!

6

The higher power setting will thus generate a higher main rotor mast torque and lower rpm.

Because of the "flywheel" effect, the main rotor rpm cannot instantaneously increase; it must overcome many factors including the mass inertia of the system.

7

The rate of turn begins to increase and the pilot now may try to overcontrol the OH-58 with the cyclic stick.

The higher mast torque correspondingly requires an additional amount of tail rotor thrust; see also paragraph 5 above for other factors. In addition, you can also have tail rotor stall.

8

The spin cannot be controlled anymore.

Refer to the flight manual to see how to recover; obviously, the best approach would be to lower the power to decrease the main rotor torque and to straighten the OH-58 out and get into a forward flight mode. However, if flying in a confined area this may not be practicable.

In summary, some of the points you should be aware of are:

- Make sure your engine has adequate power available (refer to Message OH-58-82-01).
- Be aware of the tail rotor capabilities as a function of main rotor speed (figure 2).
- Stall can occur in the tail rotor blade airfoil; know what it is and why it will occur.
- Make sure you will have the 10 percent control margin available. Don't get into a position where your margin is less.
- Be aware of the OH-58's directional control hover damping characteristics and how the OH-58 reacts.
- When the main rotor speed comes down from its normal flight rating, be aware of what your directional control capabilities are.
- Assure your tail rotor has been properly rigged.
- Be thoroughly familiar with the flight manual, especially the hover charts and directional control charts. When operating at maximum conditions be aware of what is happening to your power reserve margins.
- Be sensitive to wind conditions and wind direction and how they affect tail rotor performance.
- Whenever you are flying the OH-58 and you are getting close to the tail rotor pedal travel limit—stay alert.

In closing, we'll cite a hypothetical example and you draw your own conclusions: First, let's say your people didn't comply with TB 55-1520-228-20-19, thus you probably don't have full tail rotor control power available.

Second, presume it's a hot day and you are nearly "grossed-out," the place where you intend to land is not sea level—it will have some nice density altitude to it.

Then suppose your engine was close to time between overhaul and you never had an engine performance check—or at least one had not been done recently (Message OH-58-82-01). Let's also suppose you didn't notice it, but by leaving your hand on the twist grip you rolled back the throttle only slightly—say 1/32 of an inch. Let's say you did mission preplanning, but now as you come into the hover mode you suddenly encounter heavy winds.

"All of a sudden" as you start your descent preparatory to getting in the pattern, you hit tail winds: the OH-58 starts to settle, so you call for more power; then the aircraft starts to spin to the right; you honk in full left pedal, still grabbing the collective for more power; the rotor speed drops off; the aircraft still spins; then the "horn" sounds.

What do you write on the PRAM as the cause?...faulty fuel control....excessive power droop....loss of tail rotor control authority....tail rotor improperly rigged....or all of the above?

AVIATION PERSONNEL NOTES

OER Appeals

An officer who has unsuccessfully appealed an OER should request a copy of his or her microfiche to see if the appellate correspondence appears on the "Performance" fiche. Recent selection boards have recommended that the individual officer should request that his appeal be removed from the "P" fiche and placed on the "Restricted" fiche. Unsuccessful appeals only clutter the officer's fiche and may present an overall negative connotation. To obtain a copy of your official file write to DA, MILPERCEN, ATTN: DAPC-MSR-S, 200 Stovall St., Alexandria, VA 22332. Your military personnel office (MILPO) can help you with the necessary details.

Use Your Local MILPO

In order to provide you better service, you must be able to reach us on the phone. Our phones are tied up while we answer routine questions that could be handled through your local MILPO.

MILPOs were designed, and are equipped, to handle the "nitty-gritty" of all personnel actions normally found at the installation level. Give them the opportunity to work for you.

Let's go one step further—talk to your commander, as he can answer most of your questions. We are also ready to answer all questions you might have for your upcoming officer calls. Use of your MILPO and unit officer calls are great ways to reduce individual calls to Branch.

Officer Record Brief

The Officer Record Brief (ORB) offers a great "snapshot" of an officer's file. Together with your official photo and microfiche, it gives a selection board the essential elements for selection or nonselection. You are responsible for keeping your ORB current, keeping it free from cluttering duty titles and making sure all other entries are accurate and current. This is no small task, as anyone who has ever tried to make changes will tell you. Stay on top of your ORB! We will help you any way we can, *but* it remains your responsibility. Talk to your MILPO! Allow 30 to 60 days for the changes to "take."

Congratulations New Test Pilots

CPT (P) Edward J. Tavares, CPT Eric L. Mitchell and CPT Alan D. Sodergren graduated 10 December from the United States Naval Test Pilot School at Patuxent River, MD.

CPT Tavares is a student at Air Force Staff College while CPTs Mitchell and Sodergren have begun utilization tours at U.S. Army Engineering Flight Activity at Edwards AFB, CA, and U.S. Army Aviation Developmental Test Activity at Ft. Rucker, AL.

Congratulations 0-6 Command Designees!

More congratulations to 0-6 command designees! MILPERCEN released the 0-6 command list in January. The following aviators have been selected for command:

COL Robert S. Frix
COL Everett O. Greenwood
COL Charles P. Harmon
COL Edward K. Lawson
LTC (P) Barry J. Sottak
LTC (P) Jack L. Turecek

MONTHLY WRITING AWARD

the Last Alert

CW3 Ernest D. Kingsley
Headquarters and Headquarters Troop
3/4 Cavalry
Fort Lewis, WA

IT WAS A HECTIC morning late in the spring when the last alert was called. It was especially inconvenient too, being held at 0230 and all, without an inkling of forewarning. The first thought was to grumble that the Old Man had thought it necessary that we do this one more time, but that soon turned into a prayer. This was the real thing, and the frenzy of activity in the company was proof enough that these troops were about to become engaged in a struggle for their very lives. It was a crisp, clear morning, rare for Germany, and everyone raced to their tasks carrying mountains of alert gear to the appropriate location, addressing the last-minute crises which always seem to appear and giving that little extra to make it all go.

The first stop was to pick up weapons and protective masks. They were letting us take whatever we could carry in the way of personal ammunition and C-rations, which I thought was just dandy. But the nuclear, biological, chemical (NBC) officer (for crying out loud) was issuing stuff I had never made any plans for (and had only worn twice before, if the truth were ever known). Masks, OK. But now came new NBC uniforms, hoods (some of which had a big blue "X" on them, and I was afraid to think what *that* might mean), boots and gloves. I had to leave some of my personal goodies behind just to carry the NBC equipment, though I wasn't sure just how smart that was. I knew I would miss those extra rations at the next meal.

There were a great many unanswered questions adding to the tension of the moment. Was this really a war-footing alert? Would the families make it out with the NEO (Noncombatants Evacuation Order) program? Would the forward arming and refueling point (FARP) be able to keep up with us? How about the supply of ammunition? Would the commander be successful in coordinating a viable and realistic mission in which we could be effectively employed, or would we be thrown into the breach and wasted in an unfavorable conflict? There was not enough information to make even a good wager over these questions.

Our platoon leader's pre-mission brief was short and to the point. We were headed to the assembly area we all knew so well, and we were to fly there in full mission oriented protection posture (MOPP) 4 NBC gear. Was he kidding? It had been 3 months since anyone had worn that dang mask in flight, and only a few of us had done that with any real intentional learning spirit. Heck, it was still *dark* outside. We'd have lots of time at the assembly area.

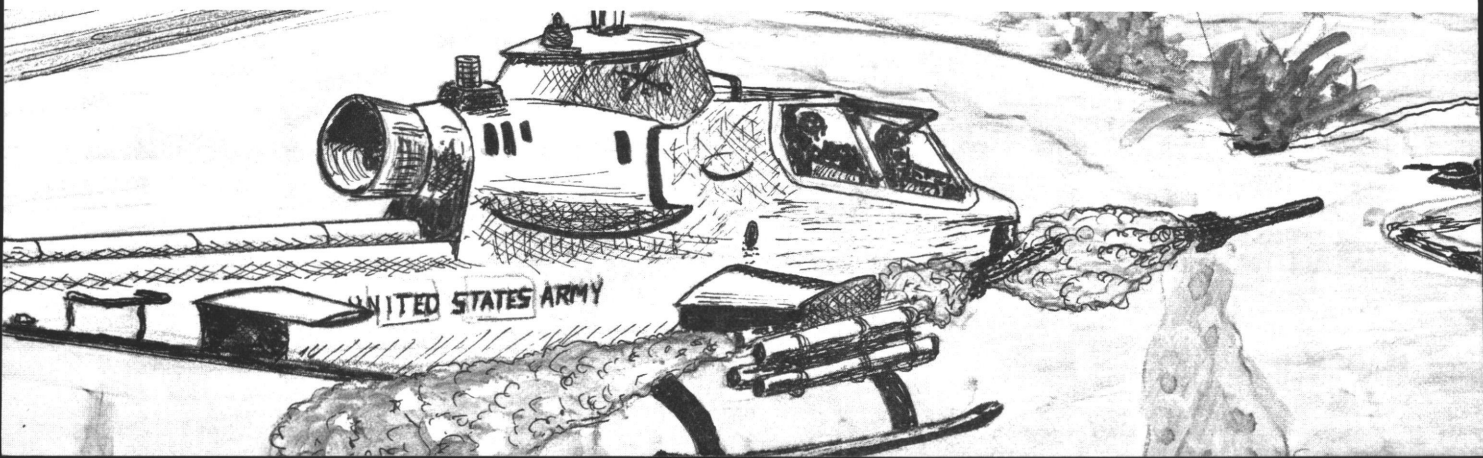
"No matter," said the NBC officer, feigning conviction. "We must wear the mask after crank." Almost as an afterthought he added, "Put your hood on the mask before you don it, unless you have one of those *new* hoods."

"So, what's a *new* hood?" I thought. I was thinking that an *old hood* was some kind of Fonzy with a beard, and NBC defense was something practiced only by the opposition, or by our ground troops, but *not me. I* am an aviator.

First platoon was in and out of the FARP in record time, with five Cobras. The platoon leader, Captain T, looked sort of silly flying his OH-58 Kiowa around in full MOPP 4; he was the subject of several intraplatoon comments, but I informed my back seat that I was going to play the game and wear my gear. He wasn't impressed.

"Oh no, not another one. We'll have time to put it on in the assembly area, if we have to. Only a fool would fly with that stuff on unless he had to."

I didn't say much, but several of the other guys must have felt the same way, because I began to see masks in each aircraft. Anyway, the



platoon formed up on lead at around 0545 and departed northeast. Captain T, in 005, had been there 20 minutes when we arrived onstation and had received a mission change. We circled the area and followed him out, this time north, northeast. We all received a short brief on FM (frequency modulated) "green," consisting of coordinates of a new FARP, coordinates for the new armored unit to be supported with frequencies and call signs and the developing situation. Then we all settled down to 1½ hours of radio silence.

The radio silence hung over the flight like a tomb. There were so many uncertainties now. We were probably not going to see our integral support again for some time, and aside from the FARP location ahead, we had little idea who might provide the beans and bullets for us. We were not going to be familiar with this area, and we were currently working off 1/250 maps, as our 1/50s ran out soon after we had started out.

It was 0715 hours when we arrived at the evacuated FARP location. The terrain looked busy with track and wheel marks, clearly showing heavy use and hasty departure. There was a burned out 49 Charlie (a small fuel truck) and several impact holes in the area, a GP (general purpose) small tent which was collapsed and partially burned and, on a tall mound of dirt beside a shell hole, someone had planted a tiny American flag. A soldier in full MOPP gear wallowed out to 005 to brief Captain T. on the current situation. We were all up FM secure to hear the new FARP coordinate and a last order to get into full MOPP. The last remark wasn't necessary. Even Tom, my back seat, was in his mask.

"The rest of it (gloves, hood, boots) is in the ammo bay, out of the way," he said. I said nothing, and he remained at the controls. Fuel was critical now, and time was awasting.

Captain T. led us into the new FARP with 078 already 5 minutes into his 10 percent light. The refuel was a lot faster than it seemed, and Captain T. received another brief during the wait. We departed to the east and in less than 5 minutes started an approach to an open area for a thorough update within the platoon.

We were short final when Tom told me to take the controls, because his vision was blurry. He pulled off his helmet and mask. I watched him in my rearview mirror as he rubbed his eyes and massaged his temples. He put on his sunglasses, replaced his helmet and told me that he had a terrible headache, that it must be nerves. I didn't key on the problem until he threw up. When we landed, I notified Captain T. that I needed help, and we pulled Tom out of the back seat. He was now gasping for breath, pale, jerking and I was sure he had the flu. I gave him his atropine as per the handy-dandy instructions, and a funny thing happened. Now he had two sore legs on top of his nerve agent symptoms, and he was mad about it.

Captain T. wandered around the flight, and found three more men with similar symptoms. Our mission now was too critical to turn back, so Captain T. decided to leave his pilot to shuffle the stricken men back to the FARP in the 58, and he paired up the balance of the crews in AH-1 Cobras. His 58 pilot was also Cobra qualified, so at mission completion he and the remaining healthy, unaffected pilot would meet us at the forward assembly area in a Cobra—bringing our strength to four attack aircraft.

We completed our mission and flew another that afternoon. We did a lot of damage, estimating 3 ZSUs (ZSU-23-4 mobile antiaircraft system) destroyed, 11 tanks (62s, 64s, 72s, 80s) disabled or destroyed and 10 BMPs (Russian infantry combat vehicles) destroyed. In the afternoon mission, we lost two aircraft to an ambush by a ZSU in the visual acquisition mode, but recovered one crew unharmed. We were unable to recover the 58 and the Cobra abandoned earlier.

Tom didn't make it, and one of the other guys died that night of nerve agent poisoning; two more of the crewmen who had flown throughout the day came down with nerve agent poisoning symptoms that night, and had to be sent to the rear. Our platoon was ready to fight the next day with two fully manned Cobras. Charlie Company made it with three Cobras; Bravo Company with two. All of the platoons had opted to trade their 58s for Cobras, leaving us without an air-air capability, except for the Cobra cannon.

It is interesting to note that the above situation is conservative in its estimate, and that the firepower of the second day could have been increased by 100 percent adherence to proper NBC defense procedures the previous day. Just what this effect could mean by the third and fourth days is impossible to judge; suffice it to say that without aviators, there can be no aviation. Even with perfect application of our NBC equipment we expect casualties.

The last item of interest is this—the situation above described a *successful* day. We may realistically do much more effective work against the enemy if we are truly prepared to fly and fight every minute in our NBC gear. It will buy lives and assets on the battlefield.

Illustration by Craig Randall

Crosswinds and Differential Power

Mr. Wilburn A. James
Directorate of Evaluation/Standardization
U.S. Army Aviation Center
Fort Rucker, AL

THE USE differential power is addressed in several fixed wing operator's manuals. Although its use is recommended for normal and crosswind takeoffs and crosswind landings, it is not further defined or explained. Aircrew training manuals make no mention of it, nor does Field Manual 1-50, "Fixed Wing Flight." What is meant by "differential power"? When and how does the aviator use it?

Simply stated, differential power is the unbalanced use or application of power in relation to the longitudinal axis of multiengine airplanes.

Apart from the obvious use of differential power when encountering certain emergency procedures, it may be used to augment directional control during takeoffs, crosswind landings and taxiing.

Takeoffs

When performing a normal takeoff, use of differntial power at the beginning of the takeoff roll can assist in directional control. The aviator must be aware, however, that the use of unbalanced power or the application of less than takeoff power during the takeoff roll will result in extension of the normal takeoff distances.

When performing a crosswind takeoff, after applying controls to counter the effects of the crosswind, leading with upwind power at the beginning of the takeoff roll will assist in maintaining directional control. As stated in the preceding paragraph, this technique will result in the extension of the takeoff distance. Under light wind conditions, the inherent directional stability of the tricyle gear configuration tends to keep the airplane straight on its roll while the nosewheel is on the ground and the tendency to weathercock is minimal. However, in strong, gusty wind conditions, or known bumpy runways, it is advisable to build up to the proper flying speed before liftoff. Otherwise, the airplane may settle back to the runway as it starts to drift, resulting in heavy side loads on the landing gear.

After the airplane is positively airborne, establish a crab with rudder to continue down the centerline. It is advisable when establishing the crab angle not to drop a wing because this reduces the lift. Once the crab is established, continue as in a normal takeoff.

The retraction of the landing gear and flaps after takeoff must not be initiated until the airplane is positively airborne and climbing.

Landings

Normal landings with no crosswind should be consistently good landings. They are the result of a combination of good judgment, good technique and good timing. Because there are a number of things to do on landing, use of the checklist and cockpit procedures should be so regulated that the aviator is free to concentrate on flying the airplane.

Crosswind landings present a greater challenge to the aviator. The combination of good judgment, good technique and good timing is required to an even greater degree. The object is to bring the airplane onto the runway with zero drift. Drift can place a heavy

side load on the gear and can result in damage to tires and in an extreme case to possible gear failure.

The usual method of countering the effects of a crosswind during landing is to use a combination of slip and crab. This is accomplished by crabbing and dropping the upwind wing to fly a track with the runway centerline. (Because of the possibility of side loads, it is imperative that proper runway alignment be achieved at the instant of touchdown.) This method is appropriate for most crosswind conditions.

Another method is to crab into the wind when first established on final approach. This gives the aviator a feel for the strength of the crosswind and with experience he will learn to anticipate the amount of slip and crab that will be required for alignment on short final, roundout and touchdown.

In all crosswind landings, especially when strong or gusty wind conditions are encountered, differential power can assist in maintaining runway alignment and provide a greater margin of safety. This technique requires the aviator to establish a slip by lowering the upwind wing and applying opposite rudder for runway alignment. Power is applied to the upwind engine which causes the nose to yaw toward the high wing, thus relieving some of the opposite rudder pressure. The result is that the rudder is given greater authority if needed to counter gusty conditions on short final, roundout or touchdown. As power is reduced in the landing sequence, the reduction is equal on all engines. In this way, the power differential remains constant throughout the landing process.

There are instances where the techniques discussed will be inappropriate, such as aircraft configured with special electronic equipment and antennas. A simple crab may be the only option available to the aviator in countering a crosswind. In no instance will any of the discussion be interpreted as authority to disregard crosswind limitations as stated in aircraft operators' manuals.

Taxiing

The use of differential power can also assist in directional control when the situation calls for prolonged taxiing in crosswind conditions. Under ordinary crosswind conditions, use of nosewheel steering if available and the intermittent application of upwind power will be sufficient to keep the airplane lined up with the taxiway while using a minimum of brakes. In a severe crosswind it will probably be necessary to carry constant power on the upwind side to counteract the crosswind. This tends to increase taxiing speed and will probably require more frequent use of brakes. If so, apply the brakes intermittently to prevent overheating.

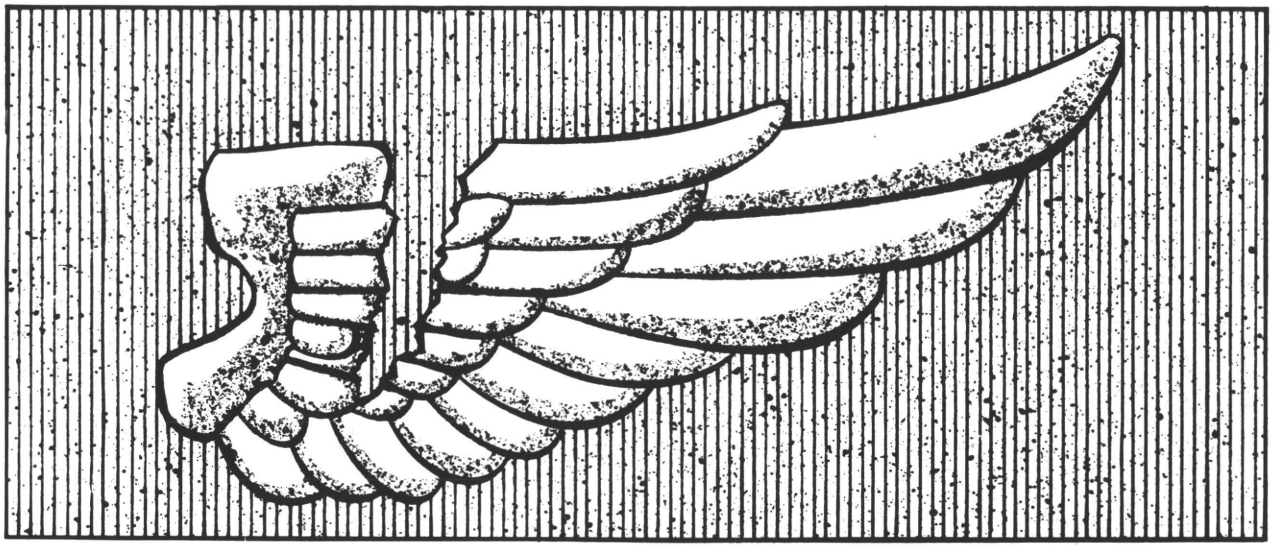
It is not the intent of this article to present the use of differential power as the panacea for all the problems aviators might encounter during crosswind operations. Rather, it is offered as one of the many techniques that professional aviators will have at their disposal under certain operating conditions.

The following Hotline numbers can be called on official business after duty hours. They will be updated and reprinted here periodically for your convenience. If your agency has a Hotline it would like included, please send it to *Aviation Digest*, P.O. Drawer P, Ft. Rucker, AL 36362.

	AUTOVON	Commercial
Aviation		
Ft. Rucker, AL	**558-6487**	**205-255-6487**
Engineer		
Ft. Belvoir, VA	**354-3646**	**703-664-3646**
Field Artillery		
Ft. Sill, OK—ARTEP	**639-2064**	**405-351-5004**
Redleg	**639-4020**	**405-351-4020**
Infantry		
Ft. Benning, GA—ARTEP	**835-4759**	**404-545-4759**
Intelligence		
Ft. Huachuca, AZ—Training	**879-3609**	**602-538-3609**
Maintenance and Supply		
Tobyhanna Army Depot, PA	**795-7900**	**717-894-7900**
Missiles and Munitions		
Redstone Arsenal, AL	**746-6627**	**205-876-6627**
Ordnance (Help Line)		
Aberdeen Proving Gnd, MD	**283-4357**	**301-278-4357**
Quartermaster		
Ft. Lee, VA	**687-3767**	**804-734-3767**
Signal		
Ft. Gordon, GA	**780-7777**	**404-791-7777**
Transportation		
Ft. Eustis, VA	**927-3571**	**804-878-3571**
Turbine Engines		
Corpus Christi Army Depot, TX	**861-2651**	**521-939-2651**

Broken Wings-not broken bodies

U.S. ARMY SAFETY CENTER



The C-12A WITH 5 passengers aboard was 30 minutes into its flight from Ramstein Air Base to Northolt, England. The aircraft was at 16,000 feet and climbing when the left engine exploded and caught fire. The aircraft yawed, pressurization was being lost, warning lights were flashing, flight instrument off flags were actuated, and engine instruments were fluctuating. The pilots successfully extinguished the fire, but when an attempt was made to contact Frankfurt radar, they found the number one VHF radio, UHF radio, and transponder, along with all other instruments and equipment associated with the number one avionics bus, were inoperable. Frankfurt radar had lost contact with the aircraft when the transponder failed. The pilot knew he would have to descend into the overcast where icing would be likely. He accelerated to recommended minimum airspeed which would provide the least ice accumulation, but he could not maintain altitude.

Although number two VHF radio was weak, Frankfurt radar responded and cleared descent to 6,000 feet. The aircraft was turned over to Ramstein ground control approach which had difficulty maintaining positive identification without the transponder but gave further clearance to 2,600 feet. Accumulating ice could be shed from the wings, but the heat for the pilot's windshield had been lost when the left isolation current limiter failed.

With power from only one engine and moderate accumulation of ice, the pilot had difficulty maintaining altitude and sufficient airspeed to prevent a stall. Clearance to descend to the minimum vectoring altitude of 2,400 feet enabled him to maintain airspeed and altitude. The emergency, however, wasn't over. Ice on the pilot's windshield severely restricted his vision as the copilot strained to find the runway approach lights through fog. The copilot was inexperienced in landing or operating the aircraft's controls from the right seat and was unable to take over and complete the landing. The pilot, using only visual cues from his side window and the partly obstructed copilot's window, landed the

aircraft without further incident. Result: eight lives and a valuable aircraft saved. The pilot received the Broken Wing Aviation Safety Award.

In June of 1967, the Commandant's Broken Wing Aviation Safety Award was established at the Army Aviation School at Fort Rucker to recognize aviators who demonstrate exceptional, professional knowledge, judgment and skill in recovering from in-flight emergencies. Nominations were submitted to a safety award committee chaired by the Aviation Center Safety Director. The committee included the directors of the Department of Rotary Wing Training and Advanced Fixed Wing Training, and the Chief, Maintenance Division, Office of the Deputy Chief of Staff for Logistics.

The first five awards were presented by the Commandant of the Aviation School, Major General Delk M. Oden, in February of 1968. Two additional awards were sent to Vietnam and Korea for presentation in the field. As a result of publicity about the award, questions were received on how it could be used in other geographic areas. The U.S. Army Board for Aviation Accident Research (USABAAR), now the U.S. Army Safety Center, was tasked by the Director of Army Aviation, Office of the Deputy Chief of Staff for Operations, Headquarters, Department of the Army, to study implementation, and the award was made Army-wide in September of 1968 when it was included in AR 385-10.

Army Regulation 672-74 currently governs the Army Accident Prevention Awards Program, including the Broken Wing Aviation Safety Award. The purpose of the award is described in Section IV, which also gives the circumstances for which it is given. The regulation specifies information which must be included in nominations. U.S. Army military aircrews (officer and enlisted), Department of the Army civilians and contract personnel are eligible to receive the Broken Wing, which consists of a gold lapel pin and a certificate.(A change to the regulation, currently being processed, will provide for inclusion of a Certificate of Achievement in the personnel records of the individual concerned.) The aircraft involved must be Army-owned, or leased by the Army, at the time of the mishap.

The Broken Wing Aviation Safety Award Program is monitored by the Deputy Chief of Staff for Personnel, Headquarters, Department of the Army. Nominations are sent to the Commander, U.S. Army Safety Center (USASC), who chairs a committee of at least five aviator representatives from USASC, the U.S. Army Aviation Center, and other aviation agencies located at Fort Rucker. The committee meets monthly to review nominations and select persons who will receive the award.

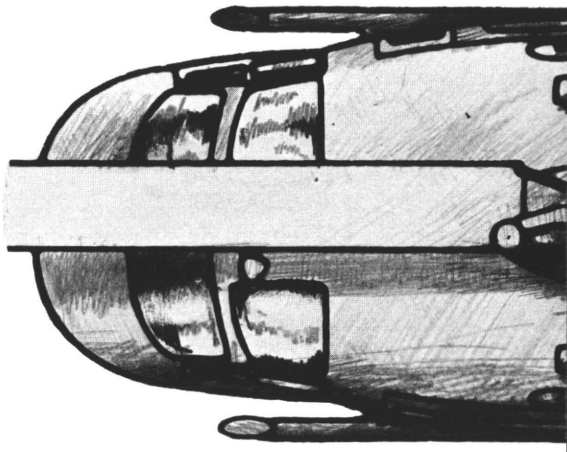
Normally only one person is awarded the Broken Wing for a single in-flight emergency, but if more than one crewmember contributes materially to the recovery, both may receive awards.

In 1982, for the first time, the Broken Wing was awarded to a nonaviator crewmember. A CH-47B helicopter was engaged in external load operations. During approach, the student pilot detected and identified a normal engine beep trim system failure (high side) on one of the engines. When he increased thrust, in an attempt to slow the rate of descent, decay of rotor rpm resulted and further increased the sink rate. The instructor pilot was attempting to control rotor rpm with emergency engine trim and was unable to reach the cargo release switch on the cyclic control. The flight engineer, a staff sergeant, made a quick assessment of the emergency and released the load, preventing the aircraft from going down in trees at the end of the confined area.

Since September of 1968, when the program was implemented Army-wide, 1,380 nominations for the Broken Wing have been processed and more than 700 crewmembers have received the award. Countless dollars in equipment, cargo, and training funds have been saved, but these are insignificant when compared to the lives which could have been lost. While the award recognizes flying skill during an emergency, the pilot must first of all have the necessary knowledge which is gained from good training and experience, and then be able to make sound judgments. The aviator must be able to weigh possible damage to the aircraft against possible injury to crew and passengers. For example, should the pilot attempt to stretch an autorotative glide over an obstacle to a clear area where little or no damage to the aircraft would result, or attempt to continue on to an area where the likelihood of damage to the aircraft is greater but risk to the occupants is less? Once this decision has been made, the skill of the aviator in flying techniques can make the difference in recovering from the emergency.

Unfortunately, not all deserving crewmembers are nominated for a Broken Wing. Any person who is aware of performance by an aviator, or crewmember, which they believe warrants this award may submit a nomination to the Commander, U.S. Army Safety Center, ATTN: Chairperson, Broken Wing Safety Award Program, Fort Rucker, Alabama 36362.

PILOT ERROR
A DECISION



Captain Thomas Richard Biang

Captain Biang was student management officer, Hanchey Division, Department of Flight Training, U.S. Army Aviation Center, Fort Rucker, AL, when he wrote this article

A UH-1 MAINTENANCE test pilot is progressing normally, completing the in-flight checks required during an end-of-phase test flight. Up to this point the flight is uneventful. The wind is calm, not a cloud in the sky. The aircraft is responding normally, weight and power requirements apparently well within limits. As the pilot attempts to make an out-of-ground effect power check, the aircraft begins to turn. The pilot responds with the correct control input, but the aircraft continues to rotate. Hastily the pilot interprets the situation as an in-flight tail rotor failure and decides to retard the throttle and autorotate from a hover height of 35 to 40 feet. A hard landing results and major damage is incurred.

Had the pilot recognized what was happening he could have recovered by reducing collective pitch until he was safely on the ground or until he had descended to a safe, autorotational altitude. The ensuing investigation concluded that the "pilot misinterpreted an in-flight failure (interpreted insufficient tail rotor thrust as tail rotor failure) because of INADEQUATE WRITTEN PROCEDURES FOR OPERATION IN NORMAL MAN-MACHINE-ENVIRONMENTAL CONDITIONS."

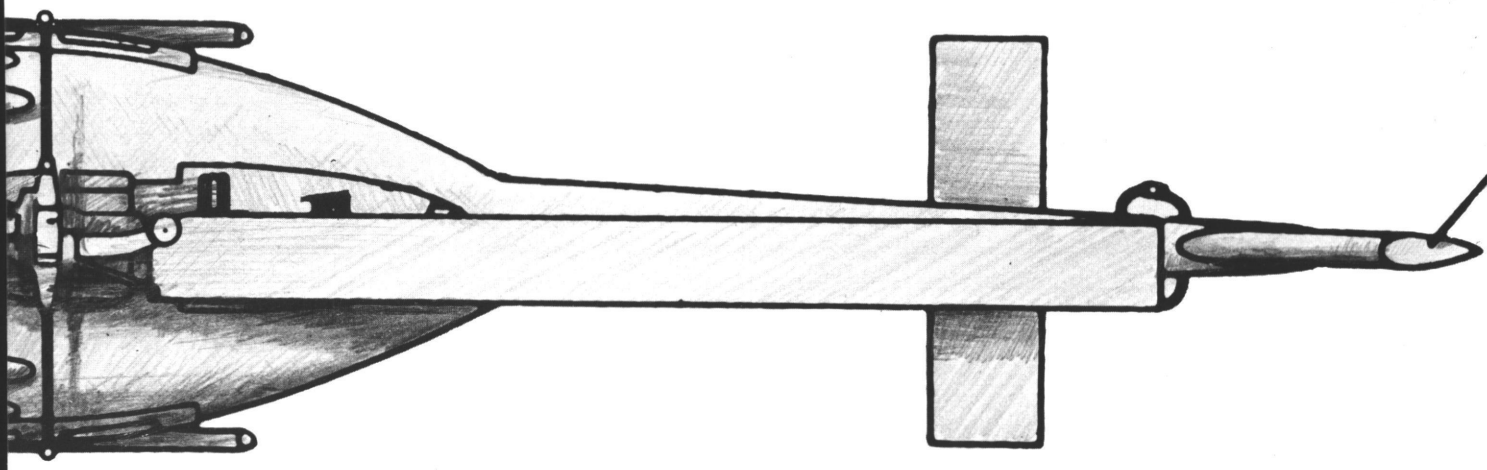
Is that it? Is the absence of a written procedure the cause for the pilot to decide to retard the throttle, or is there more?

Pilot error is involved as a factor in about 60 percent of air carrier, 88 percent of general aviation and 80 percent of Army Aviation fatal or nonfatal accidents. The cause, pilot error, was analyzed by the Office of Aviation Medicine, Federal Aviation Administration, and divided into three behavioral categories: procedure, perceptual-motor and decisional errors. The analysis showed that more than 50 percent of the fatal pilot-error related accidents were directly attributed to decisional errors.

The study of human error as a natural condition of life is the job of Dr. Donald Norman, a theoretical psychologist at the University of California at San Diego. Writing for *Psychology Today* (April 1980), Dr. Norman views the human mind as an exceedingly complex computer with an information-processing system and it produces human errors as slips. The mind can slip when stray information throws off the human information processing system.

Of the different types of slips described by Dr. Norman, the one that fits aviation best is description. Given a choice of solutions, sometimes we describe the wrong situation to ourselves (this may explain the action of the UH-1 Huey maintenance test pilot).

For example, we tend to use previous experiences as much as possible in finding a solution, processing only enough new information to figure out where it fits in the mind's "banks" of previous experience. That is done partly by forming a description of the situation, a description that characterizes things at a high level of abstraction.



Tail rotor failure and loss of tail rotor thrust share a common high-level description: The loss of antitorque control sets us up to expect failure so we don't process the word "thrust"; the meaning is in the mind but the information is *too* abstract to describe the situation.

Most psychologists believe that the success of abstract information processing depends largely on how familiar we are with a specific action. The more familiar we are, the more subconsciously we relate to previous experiences; conversely, the less habitual we are, the more conscious intervention is required to complete a task. Consider the following near-accident, extracted from *Analysis of FY 79 Army Aircraft Accidents* (April 1980): An OH-58A instructor pilot on a training flight to transition a rated pilot into a new category aircraft improperly monitored student performance. During practice of a standard autorotation, the IP allowed the pilot to apply cushioning pitch too high and obtain an excessive nose-high attitude. The aircraft landed hard on the heels of the skids, forcefully rocked fore and aft, and sustained spike knock.

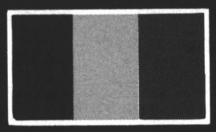
That instructor had completed the IP course at Ft. Rucker, AL, 4 months before and had accumulated only 12 hours of IP time. Without the repertoire of experience neatly sequenced in the subconscious, the conscious mind was obviously absorbed in the information processing mechanisms and not free to deal beyond the abstract picture.

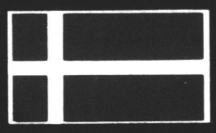
However, the human mind has the amazing ability to prevent the vast majority of simple human errors through a conscious monitoring system. Errors are caught in two ways: in the various ways we monitor our behavior, consciously comparing our actions to the intended outcome, or when errors cause something to happen that immediately attracts our attention. In aviation, the most dangerous errors committed by pilots are those which do not result in some obvious reminder and are, therefore, the ones most often overlooked.

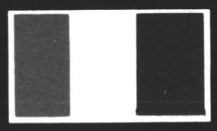
Pilot errors resulting from in-flight emergencies are affected primarily by stress. Psychologists learned long ago that some stress will actually improve the level of performance while high anxiety or an intense emotional response can impair performance. Conditions of stress are affected by the individual's physiological and emotional response, but equally important is the person's attitude. The successful outcome of a high-stress situation hinges on a positive attitude toward such conditions. Pilots who show signs of timidity or apprehension in critical situations which require straightforward, quick decision thinking often cannot deal successfully with such situations. Conditions of stress (physiological and emotional) and attitude, together with the habit patterns already developed (through previous experience and knowledge), are the ingredients that make up the "big picture" and will determine the pilot's performance.

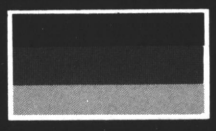
Training for the purpose of strengthening habit patterns does not seem to be the answer for dealing with pilot error. It would be a mistake to rely on habit memorization to comply with emergency procedures, at the expense of common sense. Simply, Army Aviation personnel must place emphasis on conscious monitoring of habit patterns and must constantly strive for excellence through application of sincerity and professionalism. Such efforts can only lead to a decline of *pilot error, a decision.*

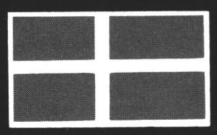
RSI Report

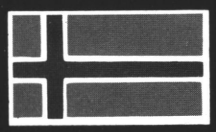


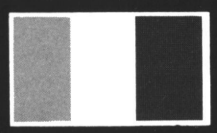












AVIATION UNITS that routinely transport cargo as part of their tactical mission should be aware that the U.S. Army has ratified a NATO (North Atlantic Treaty Organization) standardization agreement (STANAG 3468, The Rules, Operating Responsibilities and Procedures for the Transport of Cargo by Helicopter) that dictates the procedures for transport of cargo. As a signatory to this agreement it is incumbent upon Army Aviation units to abide by the terms of the STANAG. Units are encouraged to use this document as a guide for the development of their standing operating procedures.

Units which are subject to this agreement are encouraged to validate the content of the STANAG. If it is determined that there are terms of the agreement which should be considered for changes, a standard DA Form 2028 should be submitted.

STANAG 3468—The Rules, Operating Responsibilities and Procedures for the Transport of Cargo by Helicopter

1. Aim. The aim of this agreement is to establish general rules, operating responsibilities and procedures to govern the transport of loads by helicopter.

2. Agreement. Participating nations agree that the following rules and operating criteria will apply when cargo is carried by helicopter.

3. Planning And Preparation, Supported Unit. The supported unit is responsible for the coordination of air transport activities by establishing liaison with the helicopter unit and other agencies. In particular it is responsible for:

a. Establishing priority for transport of cargo.

b. Provision of trained personnel, materiel or handling equipment which may be required to accomplish cargo preparation, rigging, hookup, release and derigging as appropriate. This should include all equipment required to contain or rig an external load to enable it to be attached to the helicopter hook, e.g., vehicles, containers, pallets, slings, strops, shackles, clevises, padding.

c. Preparation of internal cargo by aircraft loads, to include shoring if required.

d. Preparation of external cargo by aircraft loads. Such loads should be prepared and rigged so as to minimize oscillation while suspended from the aircraft during flight. Loads must not exceed allowable cargo weight established by the helicopter unit.

e. Preparation of dangerous cargo in accordance with the terms of current international or national regulations.

f. Provision of information regarding internal and external cargo on weight, center of gravity, density loading, dimensions, axle weights of vehicles, descriptions and quantities of all cargo to the helicopter unit. Whenever possible the weight and density loading shall be marked on the complete cargo and each individual element to be loaded. Where the weight or density of a load/element is not known, the supported unit is responsible for notifying the helicopter pilot or crewmember and is to advise on the assessed weight/density.

g. Provision of any static electricity discharging devices or protective clothing and equipment that may be required during external cargo transport operations.

h. Selection and preparation of the pickup and release sites with technical advice provided by the helicopter unit when required.

NOTE: Some of the information detailed above will be passed to the helicopter unit in the originating NARAT (NATO Air Transport Request) in the form specified in STANAG 3093.

4. *Planning and Preparation, Helicopter Unit.* The helicopter unit is responsible for the following:

a. Liaison with the supported unit to coordinate planning, to include information and advice on:

(1) Aircraft availability.
(2) Allowable cargo load.
(3) Special loading instructions such as the selection of internal or external load carriage.
(4) Selection and preparation of pickup and release sites.
(5) Safety and security instructions.
(6) Procedures to ensure the maximum recovery of all rigging equipment.
(7) Procedures to ensure that internal/external cargo is properly secured or rigged.

b. Supplying the following special equipment which is not available to the supported unit.

(1) Internal Loads
- Lashings
- Tiedowns.
- Equipment organic to the helicopter unit, required exclusively for helicopter transport operations.

Transport of Loads by Helicopters

(2) External Loads

- All equipment connected to the helicopter including the hook installation which engages the load.
- Any other equipment organic to the helicopter unit required exclusively for helicopter transport operations.

c. Supplying technical supervision to the supported unit during loading, tiedown and offloading of cargo.

5. *Loading, Supported Unit.*

a. The supported unit will normally undertake the loading and restraining of internal cargo under the supervision of a crewmember of the helicopter.

b. Loading is to be accomplished by one of two methods:

(1) Distributed loading—loading by compartments of the helicopter.

(2) Concentrated loading—loading of large item placing the center of gravity (CG) of the item at a particular station number of the helicopter. Items to be considered for concentrated loading are trucks, large boxes, missiles, etc. The CG of such items must be known and is the responsibility of the supported unit.

c. The supported unit is responsible for presenting loads to be carried externally, in a safe condition for flight, rigged in accordance with their national procedure, and for correctly attaching the load to the helicopter hook. Large or very heavy loads shall be rigged and presented with the intended helicopter hook position as close to the load's CG as possible.

d. CAUTION. The CG markings of trucks loaded with equipment must not be mistaken for the CG of both the truck and its cargo.

6. *Loading, Helicopter Unit.* The final responsibility for the acceptance of a load, including the distribution and restraint of the internal cargo, rests with the helicopter pilot in command.

7. *Unloading, Supported Unit.* The supported unit is normally responsible for the following actions:

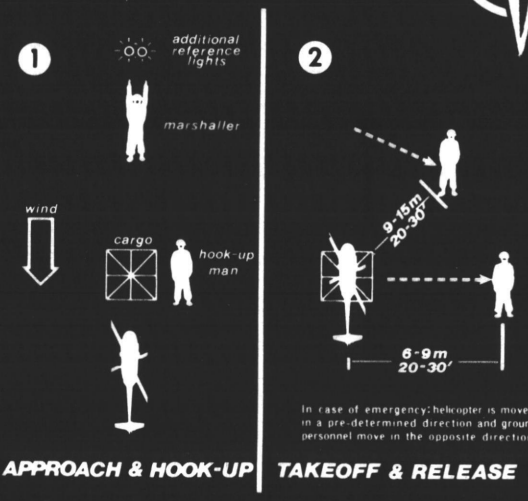
a. Unloading cargo carried internally.

b. The recovery of slings, nets, etc.

8. *Unloading, Helicopter Unit.*

a. The helicopter unit may assist in the recovery of slings, nets, etc., by arranging for backloading in helicopters returning empty to the supported unit.

b. The final responsibility for the safe unloading or release of cargo rests with the helicopter pilot in command.



9. *Marshalling, Supported Unit.* The responsibilities of the supported unit are as follows:

a. Provision of specially trained personnel to marshall helicopters to their landing points for the pickup and release of external loads. These personnel are to be equipped with distinctly colored clothing such as fluorescent international orange or yellow wherever practical.

b. The use of marshalling signals as set out in STANAG 3117.

c. The positioning of marshallers and hookup personnel as shown in the figure.

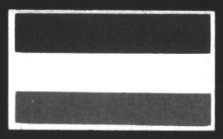
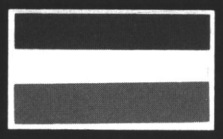
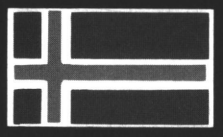
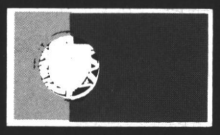
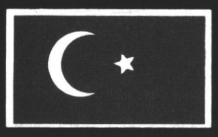
d. The restriction of personnel in the danger area around the helicopter, to those directly involved in the marshalling, loading, hook-up or release of cargo.

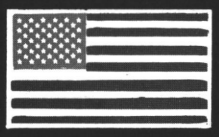
e. When conducting hookups at night, ground personnel must be equipped with a night lighting device. The intensity of this light will vary, depending on the means of vision, e.g., unaided or night vision devices, the aircrew uses.

f. To aid the pilot in hookup of loads at night, additional reference lighting may be requested by the helicopter unit.

10. *Marshalling, Helicopter Unit.* The helicopter unit may issue special instructions on hook-up procedures if these are necessary.

If this article has generated any questions or requirements please contact Mr. Rush Wicker by writing: Commander, U.S. Army Aviation Center, ATTN: ATZQ-D-CC, Ft. Rucker, AL 36362.



U.S. ARMY AVIATION STANDARDIZATION

"Training Voids"

GROUND COMMANDERS are becoming more aware of the firepower, mobility and depth that aviation can provide when fully integrated into the ground tactical plan. Whether employed as part of a company team, or at division level as part of an economy of force element, aviation assets give ground commanders a significant increase in their ability to put steel downrange.

The September-October issue of *Infantry* magazine had several articles concerning the integration of aviation in the combined arms. Major General Robert L. Wetzel, commandant of the United States Army Infantry School, ends his opening remarks in that issue by saying, "Practice Combined Arms!" This advice to practice combined arms is essential if aviators are going to be able to find, fix and destroy the enemy as far forward as possible. Army aircraft can't act as single elements alone on the battlefield, like lone eagles hunting their prey. They must be employed as an effective fighting force operating within the overall scheme of maneuver.

"Practice" is synonymous with training. A very significant portion of an aviator's training comes through the evaluation process, or what most aviators call "checkrides." The checkride process traditionally has determined the aviator's ability to fly the airplane and not necessarily how to employ it. Because aviators must train the same way they are expected to fight, they must understand their role in the combined arms element. With this understanding, aviators can provide knowledgeable advice to ground commanders on employment of their limited aviation assets.

Preparing aviators to assume full roles in the combined arms team takes a lot of training, substantially more training time than their nonaviator counterparts. Currently, most aviators' training time is spent on aircraft specific duties. In the aviators' development process, the tactical employment of aviation units, and their interface with other units, is not taught with enough depth. This has created training voids which exist in both aviators' and ground commanders' formal training programs. Recently the various branch schools have adopted 19 shared tasks common to aviation. These will be taught as part of their branch officer advanced courses. This is a step in the right direction and will be of tremendous value in advancing ground commanders' knowledge of the employment of aviation.

The 1982 Army Aviation Systems Program Review identified several areas that aviators need to stress to continue filling these voids. Specifically, areas impacting on the doctrinal employment of aviation assets as members of the combined arms must be emphasized. However, it was observed during AASPR-82 that this area is not sufficiently covered in the basic and advanced officer courses provided by the carrier branch schools, or during flight school. This helps exlain why most aviators can "fly it" but not "fight it."

The solution to this problem is made more difficult by the differences in the training aviators receive *before* and *after* attending flight school. While combined arms tactics are taught in the carrier branch schools, the same emphasis is not placed on certain subject areas by all of these schools. One officer advanced course may stress land navigation while another only requires the successful completion of a land navigation pre-test. Greater emphasis will be placed in varying degrees on the different weapons systems employed by the individual branch advanced schools. Aviators now are being drawn from all the carrier branches and therefore have different backgrounds. It is not unusual to have officers from Armor, Infantry and the Combat Engineers all assigned to the same attack helicopter company. Each officer has received a different training in the concept and employment of combined arms based on the carrier branch school's emphasis in training. Couple this training difference with the training void which is created when only aircraft peculiar tasks

GLOSSARY

ACP	air control point
ARTEP	Army Training and Evaluation Program
AASPR	Army Aviation Systems Program Review
DES	Directorate of Evaluation and Standardization
FARES	forward area refueling equipment system
LZ	landing zone
OPFOR	opposing force
PZ	pickup zone
RP	release point
SP	start point

are taught at Ft. Rucker, AL, and aviators are (in many cases) ill prepared to fight as full-fledged members of the combined arms team.

In an effort to determine the depth and impact of the training voids problem, several changes are being studied.

One such effort is a change in the philosophy and manner in which aviators are being evaluated. Previously, emphasis has been on aircraft maneuvers—how well can aviators fly a traffic pattern or perform an autorotation. Without a doubt these are important elements of aviators' overall requirements. But specific aircraft duties are only part of the needed body of knowledge aviators must possess to accomplish their missions.

The change in philosophy for evaluation will include mission tasks not normally associated with flight maneuvers. The Directorate of Evaluation and Standardization is identifying tasks that individuals must perform as members of a collective effort so that the overall mission can be accomplished. Evaluations for commissioned aviators will include tactical tasks and specific aircraft tasks needed to complete a mission. This is in contrast to the conventional contact checkride normally associated with a DES evaluation.

The manner of evaluation for aviators being studied is to provide a scenario (from an appropriate ARTEP) at the beginning of the evaluation, then follow the individual aviator through the mission sequence to mission accomplishment.

Examples of some of the tasks being considered are: Select flight routes, provide for ease of navigation, avoid known or suspected OPFOR positions. Select, in concert with the ground commander's tactical plan, PZs and LZs. Designate SPs, RPs and ACPs as part of an air movement plan. Select command post, trains, FARES and aircraft laagers (protected areas). Select movement routes, holding areas, attack and fire positions (attack/aeroscout). Coordinate fire support. Plan for unit displacement (offense).

The purpose of expanding the evaluations to include these mission tasks is to add realism to the evaluation process. We must evaluate our ability to employ our forces.

Aviation's acceptance as a full-fledged member of the combined arms team places a heavy burden on all of us. We must train, equip and organize to take maximum advantage of the impact aviation has on the battlefield.

Initiatives in training, reorganization under "Division 86" and a change in the thrust for evaluations and joint training exercises will add to the ability of aviation to not only be "Above the Best" but also, "Among the Best."

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362; or call us at AUTOVON 558-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hot Line, AUTOVON 558-6487 or 205-255-6487 and leave a message

CONNECTION ACTAAT

Aviation Center Training Analysis and Assistance Team

DA Form 4507-R

ISSUE: Maneuvers listed on the back of the DA Form 4507-R, Standardization Flight Evaluaton/Training Gradeslip, should be changed to reflect the task lists in the aircrew training manual (ATM).

COMMENT: DA Form 4507-1-R is being reviewed to make it as accurate as possible for all Army aircraft.

Some of the listed tasks on the 4507-1-R will not correspond directly with the ATM for any particular aircraft.

Unless we want to burden ourselves with a gradeslip for each aircraft, the present format with minor changes should be satisfactory.

Adequate blank lines are available for tasks not listed. DA Form 4507-2-R (comment slip) can be used for any overflow or additonal tasks.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Debbie Bacle photo by Tom Greene

Cuffs And Waist Bands—CWU-36/P And CWU-45/P Flight Jackets

Dear PEARL, can you provide us with the NSNs for CWU-36/P and CWU-45/P flight jacket cuffs and waistbands?

The cuffs and waistbands fit all sizes of these jackets and NSNs are: Cuffs: NSN 8315-01-028-3627;Waistbands: NSN 8315-01-028-4896. However, the flight jacket has not been adopted for Army use at this time. We hope this information proves to be of value, and we thank you for writing PEARL. If further information is required, our point of contact is Mr. Tommy Vaughn, AUTOVON 693-3307/2492.

Flight Clothing Repair

Dear PEARL, I recently had something happen to me that shocked me. I was given a "hand-me-down" flight suit CWU-27/P. What shocked me was the condition of the suit. The patch that was sewn on the suit certainly was not in accordance with any sewing procedures, and the appearance was terrible. Aren't we supposed to present a neat military appearance? Why should I have to wear a hand-me-down when I am new to the Army? Why shouldn't I be issued a new flight suit, or at least a serviceable one?

In answer to your questions, the procedures for general repair to clothing and textiles are covered in FM 10-267, and also in Technical Manual (TM) 10-8400-201-23, "General Repair Procedures for Clothing and Individual Equipment." I have reviewed these two documents and they are very specific on how clothing can be repaired. Chapter 7, TM 10-8400 201-23 covers maintenance of the Army Aviation crewmember's uniform. You should have been given an initial issue of clothing in accordance with CTA 50-900 when you entered the Army, and specialized clothing when you entered the flying program or aircraft maintenance program. In any case, I will quote paragraph 7-7 of referenced TM which covers workmanship. "All work shall be accomplished by personnel skilled in the trade applicable to their duties in the repair of subject item. Darning shall be neatly accomplished and patches shall be of proper size and firmly stitched to the garments."

Stitching and reseaming shall be secure and loose ends shall be turned and removed. Buttons, buckles and belt loops shall be securely and properly attached to function as they were intended. *The finished items shall be complete and well repaired, thoroughly cleaned and rinsed and free from all defects which may affect serviceability or general appearance.* By the way, I happened to see the flight suit you were talking about. It was at the recent SAFE (Survival and Flight Equipment) Conference in early December 1982. Members of other services also saw it and said under no circumstances would they have issued such a garment to be used. Your quality assurance people should be notified of this problem.

Why Wear Nomex?

(reprinted from PEARL's September 1969)

From a flight surgeon's statement in an accident report: "All three occupants were seen to exit the aircraft with clothing afire, but under their own power, by the pilot of the second ship. After remaining in the air for several minutes making emergency calls, the pilot of the second ship landed. He stated that at the time none of the downed crew had their flight helmets on. However, he noted that none of them had burns in the areas covered by the helmet. The pilot of the downed aircraft remarked to the pilot of the second ship, 'If only I had worn my Nomex.'

"Both the pilot and crewchief succumbed as a result of severe burns. The severity of the burns sustained was directly attributable to the failure of all three crewmembers to wear Nomex protective clothing. Had the suits been worn, these needless deaths could have been avoided."

Firewater and Flying *(from June 1969 USARV Aviation Pamphlet by Major Anthony A. Bezreh, MC)*

Pete climbed out of the sack slowly, very slowly. When his upper torso reached the vertical position, he grabbed his head with both hands to make sure that it wouldn't fall off. There was a sort of dried out feeling in his innards; his eyeballs looked like a Rand-McNally road map; and his mouth felt like the bottom of a birdcage. Pete mustered up enough determination to make it to his feet and carefully navigated his way out of the hooch. "Guess I really hung me one on," he muttered to himself. "No matter how I look at it, this is going to be one miserable day."

Poor Pete! What a condition to fly in. Of course, he's flown in this condition before and, so far, he is still alive to make the same mistake again. And, if he gets away with it this time, he'll probably get away with it the next time...probably, that is.

Pete is the willing victim of a delightful beverage called ETHYL ALCOHOL, which comes in a variety of forms to please every taste. Obviously, Pete is suffering from the aftermath of his overindulgence the evening before, affectionately known as the HANGOVER. Unfortunately, Pete thinks that his hangover is just a sort of reprisal for all the good spirits he shared last night, a necessary evil, but nothing serious, you know. That is, it couldn't affect his performance in the cockpit...or could it? Maybe it would be worthwhile to look at some of the facts. You know, no matter what subject it is you want to talk about, there's always some joker who will look at it scientifically; and until we find some way to eliminate these people, we probably will have to listen to them.

If you drink 2 ounces of WHISKEY or two bottles of beer, you will get a blood alcohol level of 0.05 percent and you are legally not under the influence. If you drink 6 to 7 ounces of WHISKEY or six to seven bottles of BEER, you will have a blood alcohol of 0.15 percent or above, which is considered as primafacie evidence (whatever that means) that you are legally DRUNK, that is that your behavior is significantly influenced by alcohol. Blood alcohol levels from 0.05 to 0.15 percent are considered as relevant to prosecution, especially if you ACT LOOPED. If you have a blood alcohol level increasing from 0.15 to 0.50 percent, you will pass through stages characterized as DIZZY and DELIRIOUS, DAZED and DEJECTED, DEAD DRUNK and finally just plain DEAD.

Now, if you take an average Army aviator like Pete and give him a normal highball to drink every half hour for 4 hours, at the end of his 4 hours and eight drinks he will have a blood alcohol level of about 0.22 percent. That puts him in the dizzy and delirious category. Then let's suppose Pete has finally had enough and decides to hit the sack and sleep it off. If he sleeps for 8 hours (and who does these days), he will wake up with a blood alcohol of 0.15 percent, and, if he jumps into an aircraft within the next 2 hours, he is now boring holes through the blue with the glorious blood alcohol level of only 0.13 percent, a full 0.08 percent above the level at which he is legally safe and sane. Pete has more than just a hangover. Good old Pete is still drunk! In fact, it won't be until about 24 hours after the start of his last night's spree that Pete will be down to the 0.05 percent level and by that time he is starting the same thing all over again. Pretty discouraging, isn't it?

Add to this the fact that it really doesn't take much booze to cause a significant amount of motor, sensory and mental impairment. For example, let's look at motor impairment. A moderate drinker suffers a 20 percent impairment of his steadiness in standing at a blood alcohol level of 0.02 percent, 60 percent impairment at 0.05 percent and 120 percent impairment at only 0.10 percent.

As for mental impairment, memory, judgment and reasoning are affected. For example, an experiment was done on telegraph operators receiving coded messages. Those who drank only two bottles of beer were 22 percent less efficient than before; their efficiency dropped to 72 percent after two bottles more.

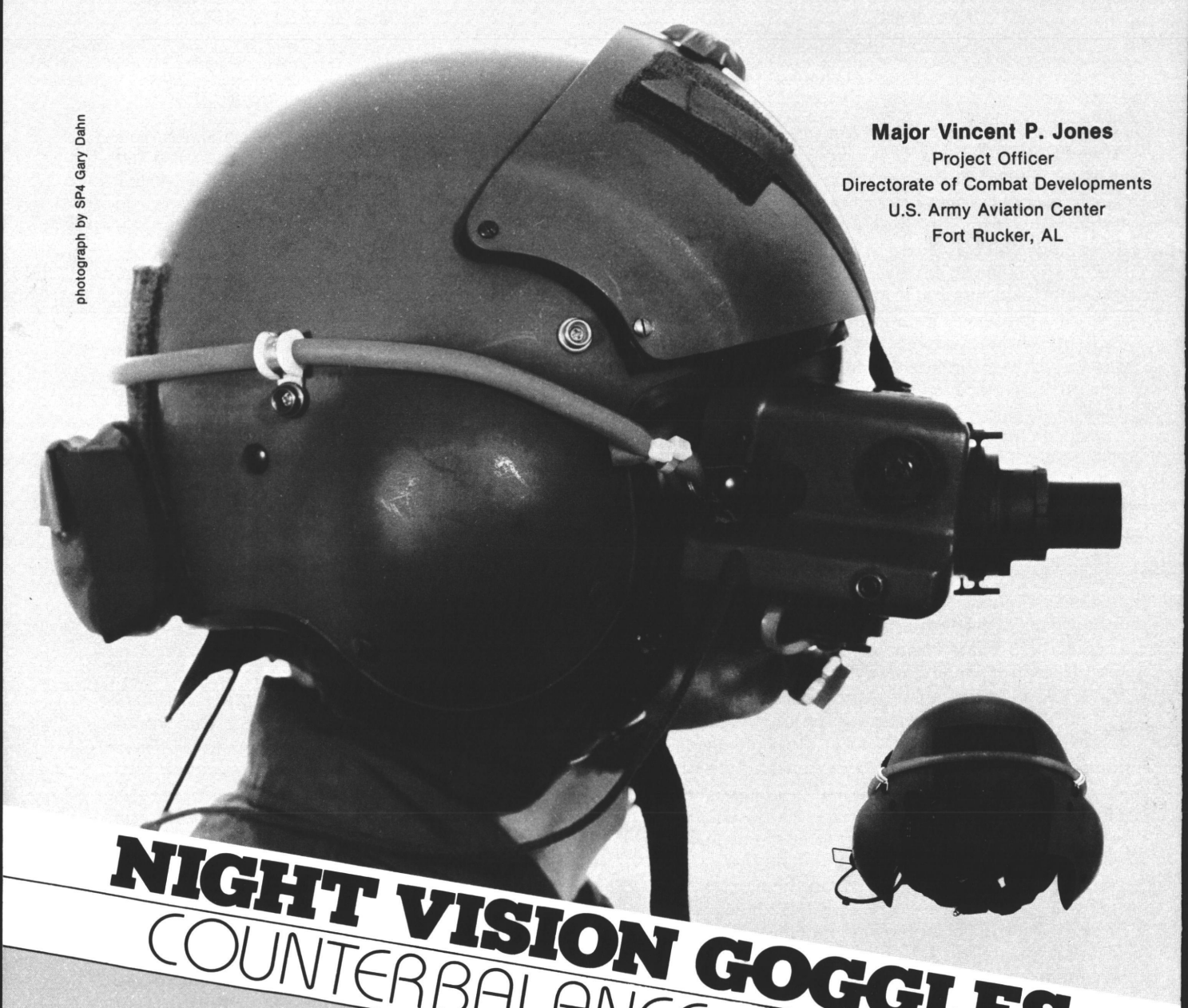
With respect to sensory impairment, alcohol causes a constriction of the visual fields and, for example, would impair a pilot in watching for planes in the periphery of his field of view. Night vision and vision at low levels of illumination are impaired by alcohol, and even the sense of touch is decreased.

Of course, when Pete is flying his chopper, hopefully at least, he is using all three—motor, sensory and mental functions. Pete can figure that three or four beers will knock his overall performance by abut 35 percent, when his blood alcohol level reaches its peak of 0.05 percent.

As a rule of thumb, you can count on your body getting rid of about 1 ounce of whiskey per hour. But remember that the metabolism of alcohol is handled by the body at a fixed rate and there is very little you can do to speed it up. All of the ice cold showers, walks around the block and black coffee in the world won't help your body get rid of that alcohol any faster.

Do you have a PEARL'S photo to nominate for publication in the *Aviation Digest?* Send it to Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Ft. Rucker, AL 36362

If you have a question about personal equipment or rescue/survival gear, write PEARL, DARCOM, ATTN: DRCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120 or call AUTOVON 693-3307 or Commercial 314-263-3307



photograph by SP4 Gary Dahn

Major Vincent P. Jones
Project Officer
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

NIGHT VISION GOGGLES COUNTERBALANCE SYSTEM

The U.S. Army Materiel Development and Readiness Command has approved the AN/PVS-5 counterbalance system described in this article. All required hardware needed for the modification is available locally to units.

FLIGHT USING night vision goggles (NVG) is a reality! The AN/PVS-5 night vision goggles provide the aviator with the tool necessary to fly at nap-of-the-earth (NOE) altitudes at night. We must realize, however, that the AN/PVS-5s were designed for the ground vehicle driver and adapted for aviation use. Visual acuity, weight and other design considerations were not as critical at road march speeds as they are in a helicopter; thus, several problems arise when applying this ground system to aviation use. In this article, we review some deficiencies and solutions developed at the U.S. Army Aviaton Center, Ft. Rucker, AL.

Most of the deficiencies from the AN/PVS-5 system are caused by weight distribution. The goggles themselves are heavy (32 ounces) and all the weight is on the front of the face, causing strain and fatigue on the neck and shoulder muscles. The weight is also concentrated on the cheekbone which causes pain or discomfort. The current mounting system and goggles weight allow shifting of the optical tube alignment which can greatly degrade image quality.

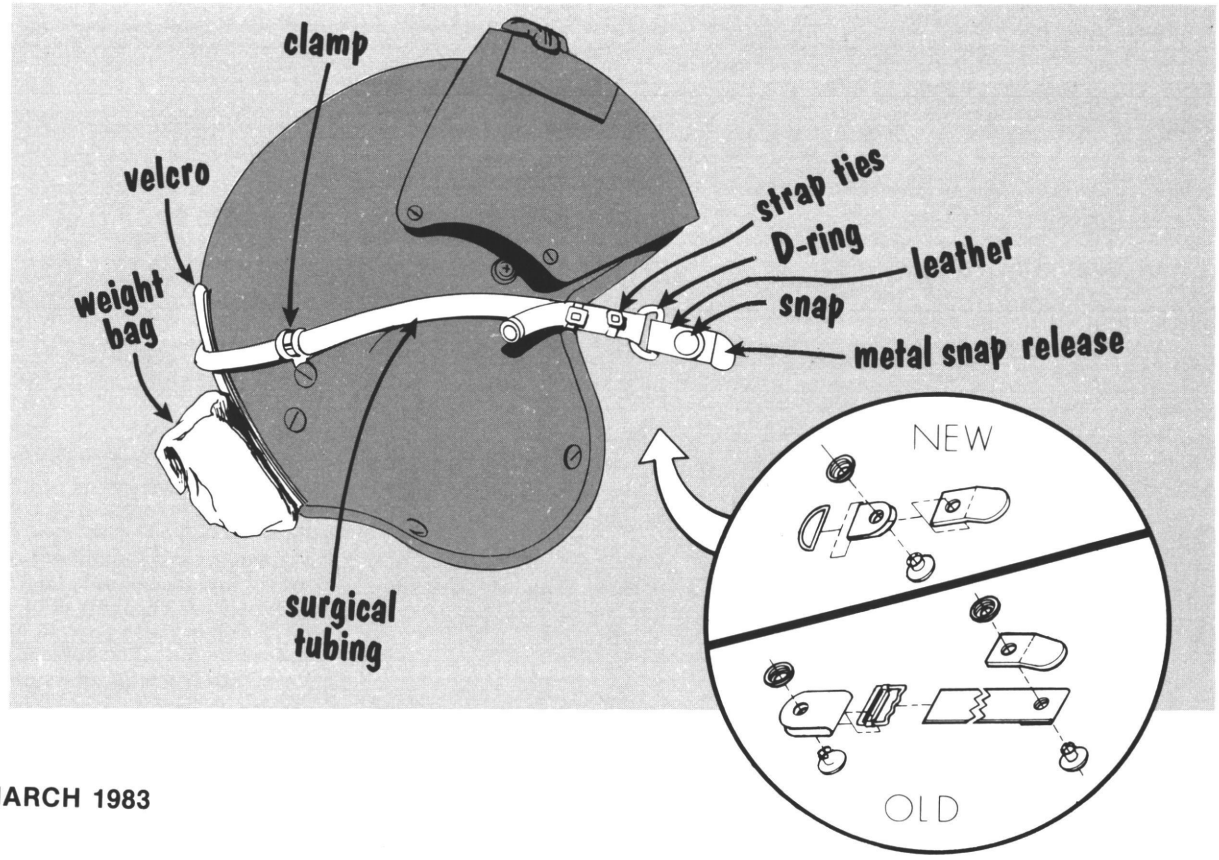
Several ingenious, though possibly hazardous, systems to "counter" these problems have been devised by individual aviators. Examples of these creative systems include taping flashlights, pennies, fishing weights or other objects to the rear of the SPH-4 helmet as a counterweight or attaching suspenders from the roof of the aircraft to the goggles to relieve the downward pressure. None of these are approved alterations. In an attempt to solve these problems and provide a standardized solution, research into a "counterbalance" system was conducted at Ft.Rucker.

Various counterbalance systems were evaluated to determine the one that would meet the requirements for weight distribution, center of gravity and focal alignment. One system appeared to best solve these problems and was test flown by NVG instructor pilots during normal training. They all felt that the system provided a significant improvement over the homemade remedies they had been using. The system adds a rubber tubing strap to hold the AN/PVS-5 firmly to the face to evenly distribute the pressure from the face mask and a counterweight bag to improve the helmet center of gravity and reduce helmet rotation. The counterweight system is designed so that each aviator can add sufficient weight, if needed, for individual comfort and alignment. This weight should not exceed 22 ounces.

The commander of the Aviation Center has authorized the counterbalance system for use at Ft. Rucker. The alteration kit is assembled at the Aviation Center. The following items make up the kit (figure 1):

a. Weight bag, locally produced from Nomex fabric, cloth, high temperature resistant, nylon twill, shade OG 106, NSN 8305-00-935-

FIGURE 1: Alteration Kit



6443, requisitioned by the yard. The measurements of the bag are 3.5 by 3.5 by 1 inches. The closing flap is secured by Velcro and is 1.5 by 3.5 inches. Velcro fastener tape, loop pile, 2 by 3 inches, NSN 8315-00-450-9837, is sewn on the rear of the weight bag for attachment of the bag to the SPH-4 helmet.

b. Velcro fastener tape, nylon pile, 2 by 5 inches, NSN 8315-00-926-4930, two strips glued vertically at the center rear of SPH-4 helmet. (This tape is longer than required to accommodate a future modification to the AN/PVS-5. A dual battery pack will be attached in this location.)

c. Surgical tubing, NSN 4720-00-141-9080, 24 inches per helmet. Tubing is secured to curved end of D-ring.

d. Clamp, two each, NSN 5340-00-533-3513, attached using existing screws on side of SPH-4. Helmets have both screws or socket snaps at this location; the clamp can be used with either.

e. Nylon strap ties, NSN 5975-00-074-2072, four each, for securing overlapped surgical tubing to D-ring.

f. D-ring, NSN 5365-00-260-1412, two each, for connecting surgical tubing to snap release.

g. Socket snap, NSN 5325-00-276-4946, two each, used with cap, NSN 5325-00-276-9724 two each.

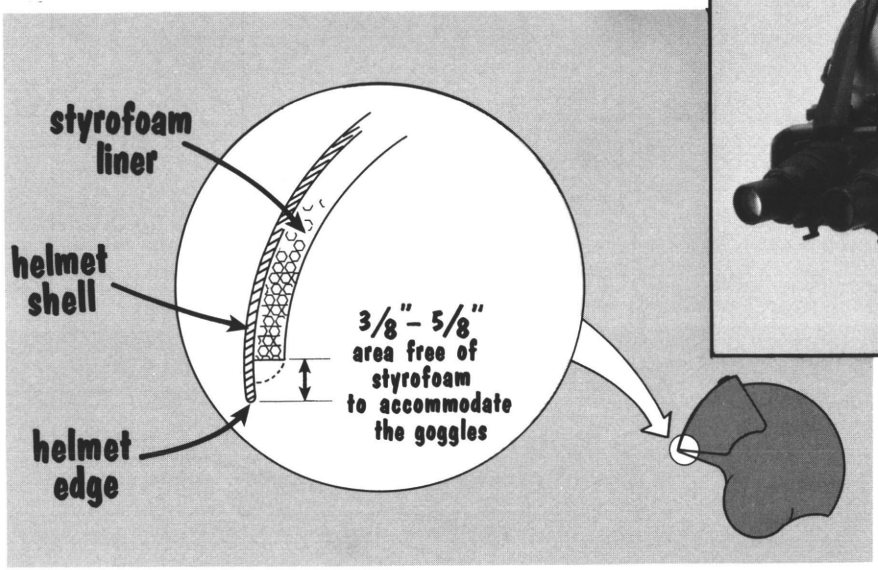
h. Leather strap and metal snap release, two each, are components from strap assembly, NSN 5855-00-125-0762. These components are used with socket snap and cap (g above) to form snap attachment (insert, figure 1).

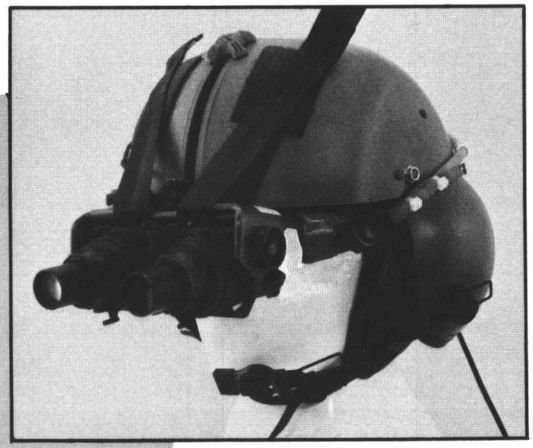
i. Weights, NSN 2530-00-272-7518 or 2530-00-241-7190, .5 ounce, for a maximum of 22 ounces per aviator.

The proper mounting of the counterbalance system is shown in the photograph on page 26. **It may be necessary,** on some helmets, to remove a small portion of the styrofoam liner in order for the NVG to fit properly under the helmet shell. **A minimum of 3/8 inch distance from the edge of the helmet shell to the styrofoam liner is required.** The maximum distance required to accommodate the NVG is 5/8 inch (see figure 2). **This does not mean removal of 3/8 to 5/8 inches of styrofoam. Rather it means that an area free of styrofoam is created, measured from the edge of the helmet to the styrofoam.** The crash attenuation properties of the SPH-4 helmet **could be degraded if this measurement is made incorrectly.**

The importance of night NOE flight is well established. Providing the aviation community with the best tools to do the job at night is being aggressively pursued. The introduction of the counterbalance system is another effort to safely and economically improve our aviation capabilities.

FIGURE 2: Styrofoam Liner





The modified face plate is being evaluated by the Materiel Development and Readiness Command and the Training and Doctrine Command for worldwide use to improve the operational capabilities of the AN/PVS-5 night vision goggles. This proposed modification is compatible with the counterbalance system

REPORTING FINAL

Late News From Army Aviation Activities

HEADLINERS

St. Louis, MO—As reported in the October 1982 *Aviation Digest,* the Fixed Wing Readiness Project Office (RPO), U.S. Army Troop Support and Aviation Materiel Readiness Command, is acquiring aircraft seized for controlled substance violations for the Active Army, Army Reserve and Army National Guard. RPO engineering flight crewmembers inspect, acquire and deliver these aircraft to units needing fixed wing assets. All requests for confiscated aircraft must be sent through appropriate MACOM or NGB to the RPO. If readers know of any confiscations, they are asked to contact the RPO with the tail number, location and other pertinent information. Points of contact are LTC Don R. Watson, Mr. Harlyn H. Hubbs and Mr. Jerry A. Brown, AUTOVON 693-2898, commercial (314) 263-2898.

Frankfort, KY—The first Army National Guard unit to receive a UH-60 Black Hawk helicopter is the 1155th Transportation Aircraft Maintenance Company, commanded by Major Robert L. Stephens.

Mission of the 1155th is to train maintenance people to support various Army aircraft, the newest of which is the UH-60. The unit will also now provide flight crew training in the Black Hawk.

New Cumberland, PA—Projected savings at New Cumberland Army Depot from the use of a new portable, high speed metal plating process is $5 million for FY 1983. When implemented throughout the Army, it is estimated the savings will exceed $100 million annually.

Currently, the plating process is being used on CH-47 Chinook helicopter components but will work as well on all other Army aircraft. It is a high current density, electrochemical method employing hand-held plating tools and direct electrical current to deposit metal coatings which form an excellent bond with base metals. Basically, it is used to build up, repair, resize and restore metal surfaces and replace coatings for mechanical, electrical or corrosion resistance properties.

Ft. Rucker, AL—The Aviation Center has announced that FM 1-300, "Flight Operations and Airfield Management" is scheduled to be released to the field this month and will supersede FM 1-55, "Flight Operations."

The purpose of this manual is to be a one-source document that focuses on all aspects of flight operations and airfield management. It incorporates under one cover information previously available from several sources.

While this manual also contains guidelines for commanders and aviators, it is primarily intended for use by school-trained operations personnel. It will serve as a ready reference in the practical application of principles learned in school. The manual outlines the organization and services of flight operations and explains personnel qualifications, duties and responsibilities. Detailed guidelines are given on the use of various forms, records, reports and publications. Chapter 7 covers, in detail, the maintenance of DA Form 759. In addition, this manual contains sections on airfield services, petroleum, oil and lubricants (POL) services, firefighting and rescue, and also a chapter on unit operations and responsibilities.

photo by MSG Phillip H. Jones

A Self Portrait. A bragging point for Troop D, 101st Cavalry, South Carolina Army National Guard, Columbia, SC, is its family team of helicopter pilots. They are CW4 G. Thomas Self, center, and his sons, 2LTs Michael W. Self, left, and G. Thomas Self, Jr. CW4 Self has more than 33 years' flying experience, 3 with the Air Force and 30 with the SCANG. His sons received their Army aviator wings at Ft. Rucker, AL, in 1982, Michael in June and Thomas in December

10,000 Safe Hours. Major General Charles W. Bagnal, left, commanding general, 101st Airborne Division (Air Assault) and Ft. Campbell, KY, presents Chief Warrant Officer, CW3, Max B. Kelley, B Troop, 2d Squadron, 17th Cavalry, with an award for flying 10,000 hours incident and accident free. CW3 Kelley is a UH-60 Black Hawk instructor pilot

AWARDS

Ft. Campbell, KY—CW3 Max B. Kelley has received a citation for flying 10,000 hours in rotary wing aircraft without an accident or incident.

Ft. Hood, TX—The 16th Air Traffic Control Battalion's aviation section has completed 2 years of accident-free flying, logging more than 1,500 hours in rotary and fixed wing aircraft.

Receiving special recognition for their contributions to the unit's record were CW4 David E. Nees, section leader and standardization instructor pilot, and SSG Sammy Vega, the section NCOIC.

Ft. Bragg, NC—An Aviation Mishap Prevention Award of Honor for 2 years of accident-free flying has been presented to the 517th Transportation Company (AVIM), 1st Corps Support Command. It was accepted by CW4 Dennis Fry, the unit's aviation safety officer for that period. Unit commander is MAJ (P) Julian Sullivan.

The 517th's primary mission is to provide intermediate level maintenance for aircraft, armament avionics and peculiar aircraft items of ground support equipment as well as aircraft parts.

Ft. Rucker, AL—U.S. Army Aviation Center Certificates of Achievement recognizing a total of 3,000 accident-free flight hours were awarded recently to aviators from Cairns Division, Department of Flight Training.

Recipients were CPT Rollie J. Edwards and CW3 Larry K. Rutland, 1,000 hours each, and CPT Freddie J. Mills and CW3 Richard E. Martine, 500 hours each.

UNIT REPORTS

Ft. Hood, TX—The 2/68th Air Traffic Control Company (Forward), supported by the 1/68th ATC Company (FWD) of the 16th ATC Battalion (Corps), 7th Signal Command, used two field sites for a recent 5-day FTX—Strip 12 for the tower team and Anderson Mountain for the flight coordination center.

That center was tasked to flight follow aircraft up to 1,400 feet in the Ft. Hood military restricted area. The controllers also provided en route instrument flight rules air traffic control, advisories, and weather and air warning information to pilots in that area.

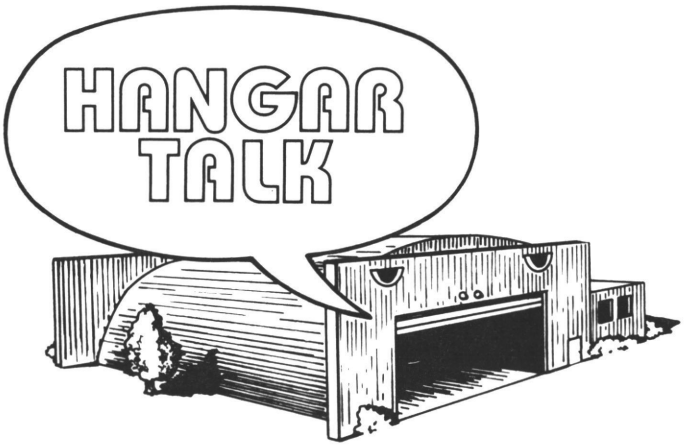
Action was taken to resolve a potential conflict between Air Force C-130s operating at Strip 12 and Army helicopters under the control of the flight coordination center (FCC).

Operating the FCC in the restricted area was extremely vital. When any firing point went "hot," pilots were notified immediately. The facility also implemented hand-offs with Hood Flight Following located at Hood Army Airfield.

HQ, 5th Signal Command, APO NY—Unique training problems call for unique solutions, and the 59th Air Traffic Control Battalion's new tactical certification program is just such a solution.

"We have ways to measure some areas of training," explained CPT James Hassinger, leader of the 1st Platoon, 240th ATC Company. "We have the SQT for soldier skills and fixed base controller ratings, but we had no way to measure tactical readiness. Now we can measure all three areas and determine when we have a competent soldier, fixed base specialist and tactical specialist. It is an excellent management tool to quantify readiness."

Regardless of MOS, certain requirements for certification must be met by all 59th members. The battalion commander prescribes specific training tasks from soldiers' job books that must be performed each month, and 50 percent of module I of the job book must be completed before the tactical certification can be earned.



"Hangar Talk" is a quiz containing questions based on publications applicable to Army Aviation. The answers are at the bottom of the page. If you did not do well, perhaps you should get out the publication and look it over.

FM 1-51
Rotary Wing Flight

CW2 (P) Gary R. Weiland
Directorate of Training Developments
U.S. Army Aviation Center
Fort Rucker, AL

1. Moist air is heavier than dry air.
a. True b. False

2. The tail rotor of a single main-rotor helicopter is more aerodynamically efficient at a hover than in forward flight.
a. True b. False

3. Attitude change about an aircraft's _____axis is called pitch.
a. Lateral
b. Vertical
c. Longitudinal
d. Cyclic

4. When conducting multihelicopter operations in a high threat environment, and contact is possible, the _____ method of movement should be employed.
a. Traveling overwatch
b. Bounding overwatch
c. Traveling

5. What is the safest way to cross a wire obstacle?
a. Overfly at the midpoint between the supporting poles
b. Underfly at the midpoint between the supporting poles
c. Overfly at or near a supporting pole
d. Underfly at or near a supporting pole

6. Dark-adaption for optimum night visual acuity approaches its maximum level in about _____ minutes under minimal lighting conditions.
a. 10 to 15
b. 20 to 30
c. 30 to 45

7. The optimum time for conducting night flight during a full moon is:
a. Just after sunset
b. Prior to midnight
c. Shortly after midnight
d. Just before sunrise

8. The best tactical lighting configuration for approaches initiated from terrain flight altitudes is the tactical "T."
a. True b. False

9. The thinner air of higher altitudes causes the airspeed indicator to read low.
a. True b. False

10. Mast bumping is likely to result when low-G maneuvers are performed in helicopters with semirigid rotor systems.
a. True b. False

ANSWERS

1. b; page 1-4
2. b; page 2-37
3. a; page 3-2
4. a; page 5-11
5. c; page 5-26
6. c; page 6-5
7. c; page 6-29
8. b; page 6-50
9. a; page 10-7
10. a; page 10-8

THREAT

Major Raymond R. Benson
Centralized Aviation Readiness Team
Fort George G. Meade, MD

Soviet high performance aircraft which pose a threat to our helicopters can generally be divided into two categories by mission: 1) ground attack and 2) armed reconnaissance. Current Soviet doctrine dictates that primary targets for ground attack aircraft are enemy nuclear weapons, command and control centers, and reserve forces. These targets are preplanned with only a limited number of resources allocated for immediate air attack missions. Aircraft on armed reconnaissance missions have primary targets of nuclear weapons delivery systems and counterattack forces.

Tactically, ground attack aircraft will generally approach their target area at an altitude of 50 to 100 meters (m) above ground level (AGL). The pilots are not allowed to deviate from their predetermined flight plan without ground control approval. While this positive control allows for "safe" corridors, it does not give the aircrew much flexibility. Therefore, they are of little threat to friendly helicopters unless they are in the designated target area.

Of more concern then, are the ground attack aircraft on armed reconnaissance missions. These aircraft may operate alone or in small formations and may have authority to attack without first gaining ground control approval. Since they are searching for targets, their altitude is higher, between 275 m and 1,500 m. However, when a target is spotted they descend, approaching the target at about 60 m AGL. They then climb to an altitude of several hundred meters to attack. This type of aerial reconnaissance is considered an integral part of Soviet operations and is considered especially important in a fluid situation such as a meeting engagement where the enemy disposition is not precisely known.

Although not primary targets, it is likely that helicopters would be attacked by Soviet high performance aircraft on ground attack missions if they are in the designated target area, and as targets of opportunity by Soviet aircraft on armed reconnaissance missions.

Threat Section
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

HIGH PERFORMANCE THREAT

IMAGINE, IF YOU will, that you are 30 minutes into a combat aerial resupply mission when suddenly you hear your crewchief's voice on the intercom: "Sir, there are two enemy fighters rolling in on us from 8 o'clock high." As the aircraft commander of your helicopter, what actions would you take?

If you are not sure, you may have never experienced such an encounter. Although helicopters are not normally a prime target for enemy fighters, helicopters are indeed vulnerable to attack by enemy high performance aircraft. Cognizant of this fact, Company C, 28th Aviation Battalion of the Virginia Army National Guard, recently participated in joint tactical training in which A-7s from the 192d Tactical Fighter Group served as aggressor aircraft. Helicopter crews from Company C were systematically exposed to an actual A-7 threat in a controlled setting which provided a unique opportunity to practice and refine evasive techniques.

High performance threat concerning helicopters is addressed in Field Manual 1-101. Generally, the tactics and doctrine outlined in these manuals proved to be valid, although several factors not addressed were also found to be significant during the conduct of the threat training. This article will examine high performance threat as it applies to helicopters and will focus on the following.

- Factors affecting the ability of high performance aircraft to acquire helicopters.
- Tactics which can be employed by helicopters to reduce the risk of detection.
- Evasive tactics which helicopters can employ once the threat aircraft has committed itself to an attack.
- Tactics used by fighter aircraft to attack helicopters.

Factors Affecting the Ability of Fighter Aircraft to Visually Acquire Helicopters

Because of their inherent design, most fighter aircraft have severe cockpit visual limitations. The restrictions to forward visibility are especially acute (figure 1). The speed of the fighter and its altitude also impact on the acquisition process. The greater the airspeed, the less probability that the fighter aircraft will be able to visually acquire operational helicopters. The optimum acquisition altitude for the threat aircraft is variable and depends on a variety of factors

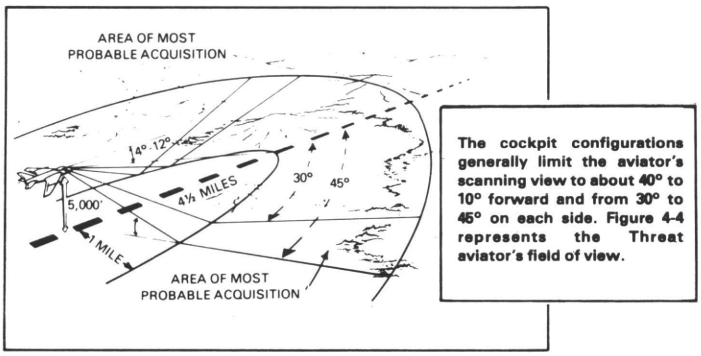


FIGURE 1: Threat high performance aircraft visibility

which include fighter speed, terrain, weather and the relative position of the helicopter. The altitude of the helicopter is extremely important, with helicopters in the nap-of-the-earth (NOE) mode being the most difficult to visually detect. Helicopters flying above NOE altitudes can become easy targets when silhouetted against the sky.

Multicolored terrain, with heavy foliage and elevation variation, offers the best concealment to helicopters. Conversely, flat, open terrain with a single contrasting color background greatly accentuates the helicopter's profile.

Atmospheric conditions are another key element in the acquisition process. Weather can affect both acquisition and the ability of the fighter to maneuver and initiate an attack. Low ceilings and reduced visibility can totally neutralize the high performance threat, depending on the severity of the conditions. Bright sunlight, on the other hand, creates reflections on the rotor blades and Plexiglas surfaces which significantly highlight the helicopter and increase its vulnerability.

Finally, multiple helicopters in formation are considerably easier to visually acquire than individual aircraft. Operations in a high performance threat environment dictate that helicopters remain dispersed whenever practicable.

Helicopter Tactics to Reduce the Possibility of Detection

Just as NOE provides maximum protection against ground based antiaircraft weapons, it is also the best defense against threat aircraft. Helicopters must stay as low as possible in an NOE condition while making maximum use of available terrain. It is also imperative that the helicopter crew be alert and vigilant to see the enemy threat first. The advantage of seeing the threat first cannot be overstated, since it provides the helicopter crew with the opportunity to maneuver or mask its aircraft in such a way as to greatly reduce the risk of detection.

EVASIVE MANEUVERS AFTER ENGAGEMENT BY INFRARED OR RADAR-GUIDED MISSILES: Once engaged by an air-to-air missile, survivability will depend on the evasive maneuvers and actions taken during the next few critical seconds. Without regard to aircraft survivability equipment (ASE), the first thing to do is get to NOE flight level as quickly as possible (if not already NOE). Ground clutter or a sharp turning maneuver (90 degrees or more to missile flight) may cause the missile to break-lock.

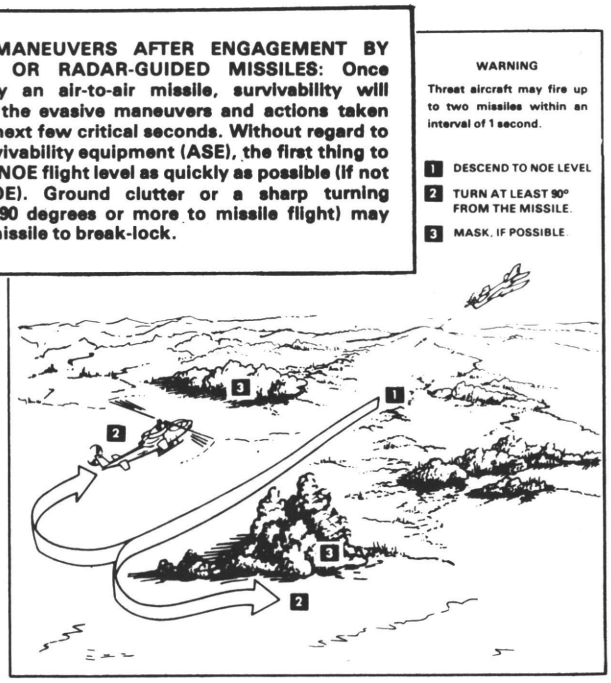


FIGURE 2: Evasive maneuver against missile, strafing, rocket, bombing attack

Helicopter Tactics to be Employed After the Helicopter Has Been Sighted and the Threat Initiates Attack

Generally, anytime helicopter crewmembers observe a threat fighter making an abrupt and deliberate turn in their direction, they must assume that they have been sighted by the threat. When this happens, the helicopter crew should attempt to keep the threat in sight while maneuvering to the threat's blind side. Depending on the terrain, it is possible that the helicopter may be able to evade an attack by dashing to a new location and masking once the threat passes overhead and is outbound preparing to attack.

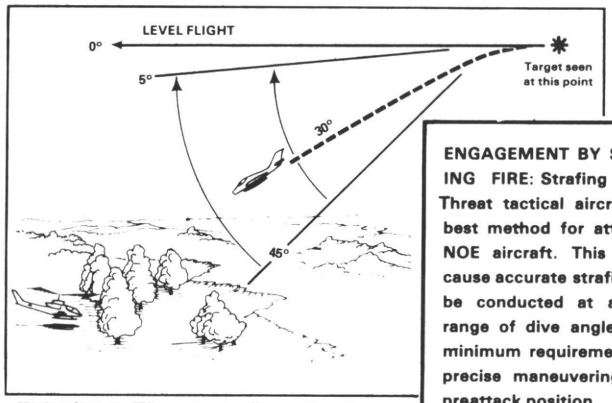
If the terrain or time available preclude the possibility of masking prior to the start of an attack, the helicopter should swiftly fly directly toward the threat. This will force the fighter aircraft to steepen the dive angle of attack. Before the threat can effectively open fire, the helicopter should turn sharply to the right or left which will further restrict the threat's ability to maneuver and keep the helicopter within engagement parameters.

Once the fighter has begun to recover from its dive, the helicopter should again attempt to maneuver and mask at a new location. By masking at a new position, the helicopter may avoid being rediscovered. Normally, the longer a helicopter is able to evade the attacker, the higher the probability that the fighter will be forced to break off the attack.

Threat Modes of Attack

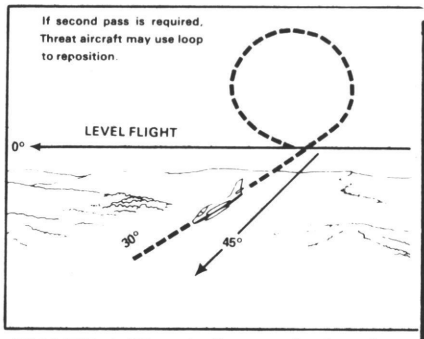
High performance threat aircraft normally can employ several modes of attack, including strafing, rocket firing, bombing and guided air-to-air missiles (AAMs). Strafing attacks would probably be used most frequently because they are less restrictive than other attack modes. Both rocket firing and bombing offer less flexibility in a helicopter attack because they both require a relatively steep dive angle.

Threat aircraft can launch a variety of both infrared and radar guided AAMs. These munitions may pose the greatest potential threat to helicopters and require special evasive tactics which differ from those previously discussed. In this mode of attack, survivability is determined by evasive maneuvers taken within a few critical seconds following the missile launch. As soon as the helicopter crew has an indication that it has been engaged by an AAM, the crew should immediately descend to NOE and turn at least 90 degrees from the inbound track of the missile. A combination of a sharp turn and ground clutter can possibly break the missile's lock and allow the helicopter to escape safely. Following the attack, the helicopter crew should attempt to maneuver and mask in order to elude any succeeding threat attacks.



ENGAGEMENT BY STRAFING FIRE: Strafing offers Threat tactical aircraft the best method for attacking NOE aircraft. This is because accurate strafing can be conducted at a wide range of dive angles with minimum requirements for precise maneuvering to a preattack position.

FIGURE 3: Threat strafing attack



ENGAGEMENT BY MISSILES, ROCKETS, AND BOMBS: Engagement of NOE aircraft by missiles and rockets will be much the same as by strafing fire (from a 10-degree to a 30-degree dive angle). Accuracy for engagement by bombs requires a steeper dive angle (30° to 45°). At low altitudes, the fighter is at a disadvantage. Due to high speeds and visibility limitations, target acquisition at a sufficient distance to initiate and attack is critical.

FIGURE 4: Threat dive angle, bomb engagement

EVASIVE MANEUVERS: Due to high speeds and flight characteristics, Threat high performance aircraft, once committed on an attack angle, are not able to maneuver quickly and still keep the target within engagement parameters. Therefore, an effective evasive maneuver is to let the attacking Threat aircraft commit himself to the dive angle while you fly head-on to the attacking aircraft, causing him to increase the dive angle; then execute a sharp turn left or right. At the same time, try to keep the attacking aircraft in sight and stay in his blind area by maneuver. Once in his blind area, blend into the terrain, mask, and stay still.

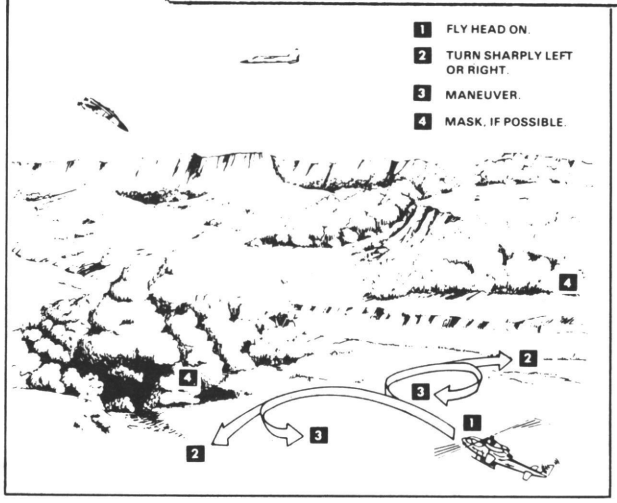


FIGURE 5: Engagement by air-to-air missile

in order to elude any succeeding threat attacks.

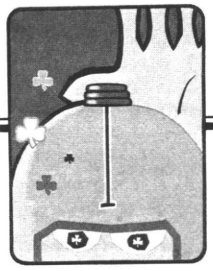
In reviewing the results of the high performance threat training conducted by the Virginia Army National Guard, it is apparent that properly trained helicopter crews can function effectively in a high performance threat environment. Experienced helicopter crews can often successfully avoid detection; and if they are detected, can frequently neutralize the threat's engagement attempts.

The speed and turning radius of fighter aircraft limit their ability to maintain visual contact with the helicopter. Actual engagements revealed that the A-7 pilots were forced to make high G (gravity) turns in order to remain within the vicinity of the helicopter. Weather also had a critical effect on the ability of the threat to acquire and engage helicopters. Low ceilings effectively restricted the threat's ability to maneuver and to establish dive angles required to deliver certain types of munitions.

Doctrinally, threat fighter aircraft will operate in pairs. This will improve the threat's ability to maintain visual contact with the helicopters during the conduct of attack; however, it does have the disadvantage of requiring increased coordination and pilot workload between threat aircraft. In cloudy conditions, threat aircraft operating in pairs must exercise considerable caution in order to maintain safe separation between each other.

In summary, the results of this threat training indicate that properly trained helicopter crews can often survive an encounter with a high performance threat. Additionally, the concept of integrating high performance threat into an aviation training program has other positive benefits. There is no doubt that this training is exciting and can greatly stimulate crew motivation and interest. It also significantly improves the cohesion of the total crew by reinforcing the importance of the crewchief and door gunner as an integral part of the team. A coordinated effort by the entire crew is essential to maintain visual contact with the threat in order to survive in a high performance threat environment.

VIEWS FROM READERS



Editor:

If possible I would very much appreciate a copy of all the National Guard and Reserve units you have on record, especially any civilian shops, i.e., flight facilities.

Thank you very much.

Dayton W. Mosher
Orlando, FL

Editor:

I have received several inquiries about January's Hangar Talk question 1 on hazardous duty incentive pay. The question and answer pointed out that only nonrated officers and enlisted members on valid orders to perform crewmember or noncrewmember flying duty are entitled to hazardous duty incentive pay (AR 600-105, para 1-3m). Rated officers then ask, "If I'm not entitled to hazardous duty incentive pay, what is flight pay?" The answer to this question is found in AR 600-105, paragraph 1-3e, which explains that the Aviation Career Incentive Act of 1974 converted military flight pay from a hazardous duty to a career incentive pay system. The "flight pay" that rated officers receive is actually Aviation Career Incentive Pay.

I hope this explanation eliminates any confusion the question has caused.

CW2(P) Gary R. Weiland
Directorate of Training Developments
U.S. Army Aviation Center
Ft. Rucker, AL

Editor:

I recently enjoyed an issue of your *Digest* which had been left in the pilot's briefing room at the BOI general aviation terminal.

I want to share with you, and all of my late brother's U.S. Army Aviation friends, if you wish to publish it, this parody of High Flight.

David, (CWO David P. Moeller), served several years in Schwabisch Gmund after finishing Ft. Rucker in 1974.

When he returned from Germany, he had this verse hand scrawled on an old brown paper, but the words were slightly different. Especially the last line, which originally read "...put out my hand and *searched for FOD.*"

Dave was subsequently employed in Iran; and, at the time of his death in a Bell 47, at Pilot Personnel International as an instructor and chief of maintenance. That was January 30, 1980, at Albany, OR.

Perhaps someone who remembers Dave can shed light on the origins of this verse, whether Dave wrote it, or copied it.

The part of this that is so poignant to me is that change in the last line. Dave penciled in that change within 2 weeks of the time he went in. It was in his tool box.

(I'm an ex-USAF pilot; part of the fraternity. This all hit me pretty hard. I know you understand.)

Let me know what you think.

Larry Moeller
3088 W. 15th #4
Eugene, OR 97402

Low Flight

A Helicopter Pilot's Version of "High Flight"

Oh, I have barely slipped
The muddy clutch of earth
And thrashed the skies with
Dusty, untracked rotor blades.
Sunway I've climbed, and
Joined the tumbling mirth
Of flies and bees, and
Sunsplit crowds of trees,
And done a hundred things
You have not dreamed...
Wheeled, and soared, and
Swung through rocks
And bushes and things,
High in the sunlit silence.
At three feet, hovering there
I've been chased by crows and
Sparrows and flies, and flung
My groaning craft along the
Freeway skies. Up, up the
Long, delirious, burning blue
I've almost topped 500 feet AGL,
Where never a self-respecting
Lark nor eagle flew.
And while with silent lifting
Mind I've trod the low, smoggy
Ambience of space, put out my
Hand, and said, Farewell To Thee.

Editor:

I would like to know how I might obtain a copy of the June 1982 issue of the *Digest*. I own and fly a 1943 L-4. I rebuilt and restored it myself. I have just learned that it was built under War Contract #W535AC30126 Aug 1942. My aircraft serial #10163 was given Army (Fin) number 43-1202. This info was kindly supplied by a new friend, Mr. Joe Caprio of Piper Aviation. Mr. Caprio also told me of the feature in the *Digest,* hence my request.

I would also like to know if you might have any suggestions as to who I might contact (government department) that might be able to supply me with any of the past history of this L-4 while it was owned by the Army or, if it is available, how to obtain same.

To get back to your Grasshopper article. You might also like to know that COL Mike J. Strok, USA Ret., one of the original Grasshopper pilots and a close and dear friend, is now rebuilding and restoring an L-4 aircraft. Mike still flies, owns a Super Cub and cherishes his original "L" wings!

I am sure that when Mike gets his Grasshopper in the air he will most likely be one of, if not the only, original liaison pilots still flying an "L-4."

Thank you very much for any assistance you might be able to give.

Charles J. Striebig
East Moriches, NY

Editor:

Reference laser hazard article on page 15 of the October 1982 edition of *Aviation Digest.* The following discrepancies should be corrected:

- Chapter 19 of the revised AR 385-63 will address laser operations.
- Point of contact at TRADOC for AR 385-63 is Mr. Paul Pennington, range safety specialist.
- Guidance in USAREUR can be obtained from Mr. Warren Leary in Heidelberg (AEAGA-B) and Mr. Bob Braun, safety manager, at Grafenwoehr.

E. C. Teichmann
TRADOC Safety Director

Editor:

I've enjoyed reading your Army Aviation in Latin America series over the past several months.

I've enclosed the December 1982 issue of *TMF (The MAC Flyer)* which has an article along the same lines appearing on page 4. It's entitled "South American Sorties: A Starlifter Sojourn." In the January 1983 issue of *TMF,* we'll have an article about "Volant Oak 82," the Central and South American C-130 resupply mission. In this later article, we'll mention the 193d Brigade based in Panama and show photos of the "Jumping Ambassadors," U.S. Southcom's command parachute team.

Here's hoping both our magazines can help both the Army and the Air Force to become "Accident Free in '83."

CPT Gale E. Clouse Jr.
Associate Editor, *The MAC Flyer*
Scott AFB, IL

Editor:

The criteria for award of the Senior and Master Army Aviator Badge, as currently published in AR 600-105, 1 May 1981, has created many heated debates in the aviation community during the past year. The major issue which causes problems among senior and/or master aviators is the removal of the hourly requirement and the addition of the timeframe as the substitute. The following hypothetical case points this out. An Army aviator with *less* than 1,500 prior to 1 May 1981 became eligible for the Senior Aviator Badge after 1 May 1981 based solely on having more than 72 months of Total Operational Flying Duty Credit (TOFDC). Less than 18 months later, this aviator completed 15 years of rated aviation service and 108 months of TOFDC; accordingly, he became eligible for designation as Master Army Aviator. His total flight time increased less than 100 hours from his rating of aviator through senior aviator to master aviator.

Everyone associated with Army Aviation recognizes the need for flexibility in the award of a higher level aeronautical rating; however, to hinge such a prestigious award on longevity only, is doing a great disservice to those who serve actively in a flying assignment for the full 15 years and accumulate in excess of 3,000 hours. Consider, if you will, the following criteria as a palatable solution for all on this very controversial subject:

SENIOR ARMY AVIATOR
At least 7 years of rated aviation service and 1,500 hours flying time.

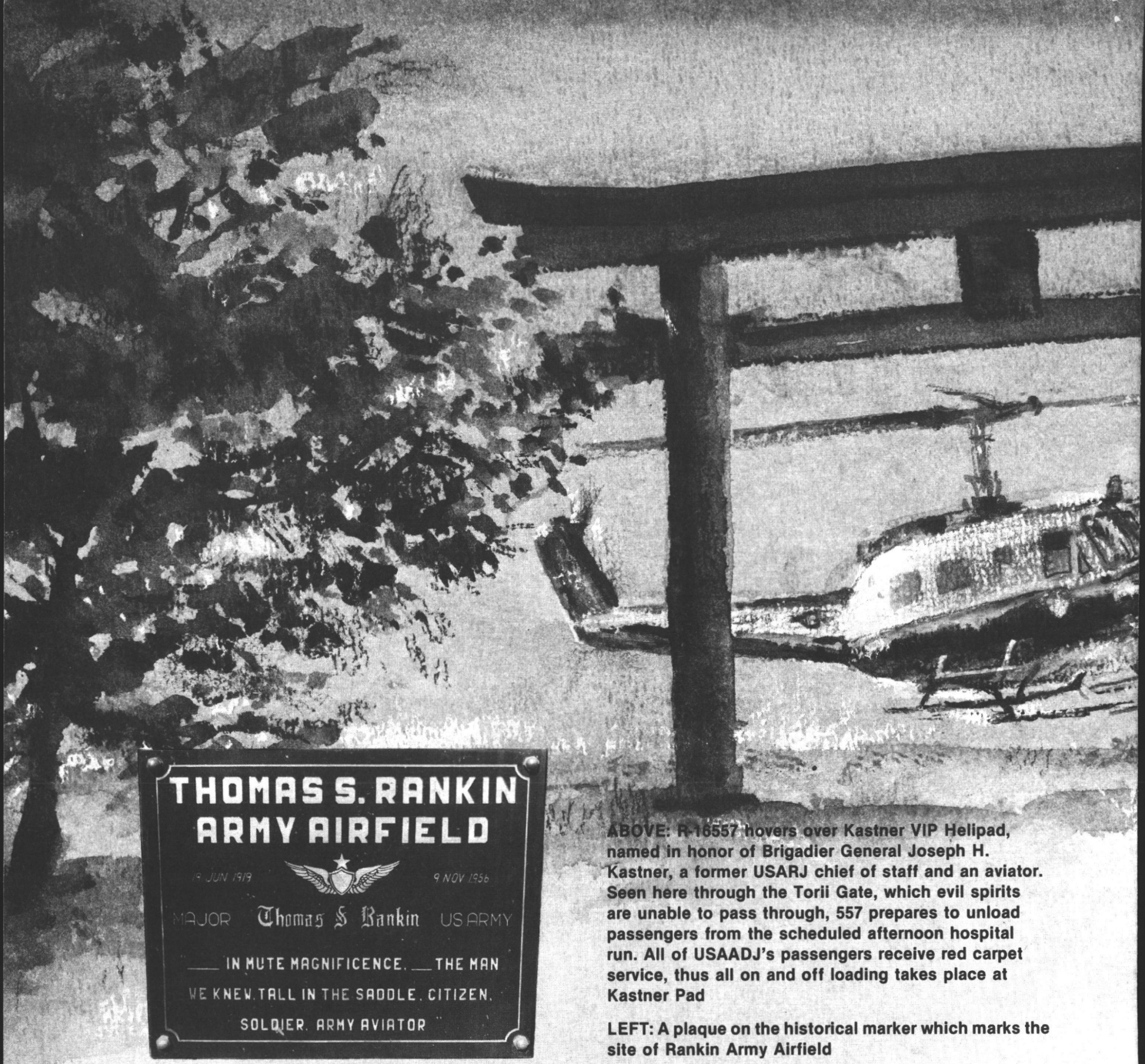
MASTER ARMY AVIATOR
At least 12 years rated service and 1,000 hours flying time as Senior Aviator.

I further recommend that *Aviation Digest* publish a questionnaire/survey in a forthcoming issue in an attempt to measure the concerns of all aviators.

MAJ Steven A. Strawder
IND ARNG

- **MILPERCEN hosted a conference in January to review 2028s and comments from personnel in the field. The resulting proposed AR 600-105 is being staffed at MACOMs; anticipated publication date is next month.**

Articles from the *Aviation Digest* requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, *U.S. Army Aviation Digest,* P.O. Drawer P, Ft. Rucker, AL 36362

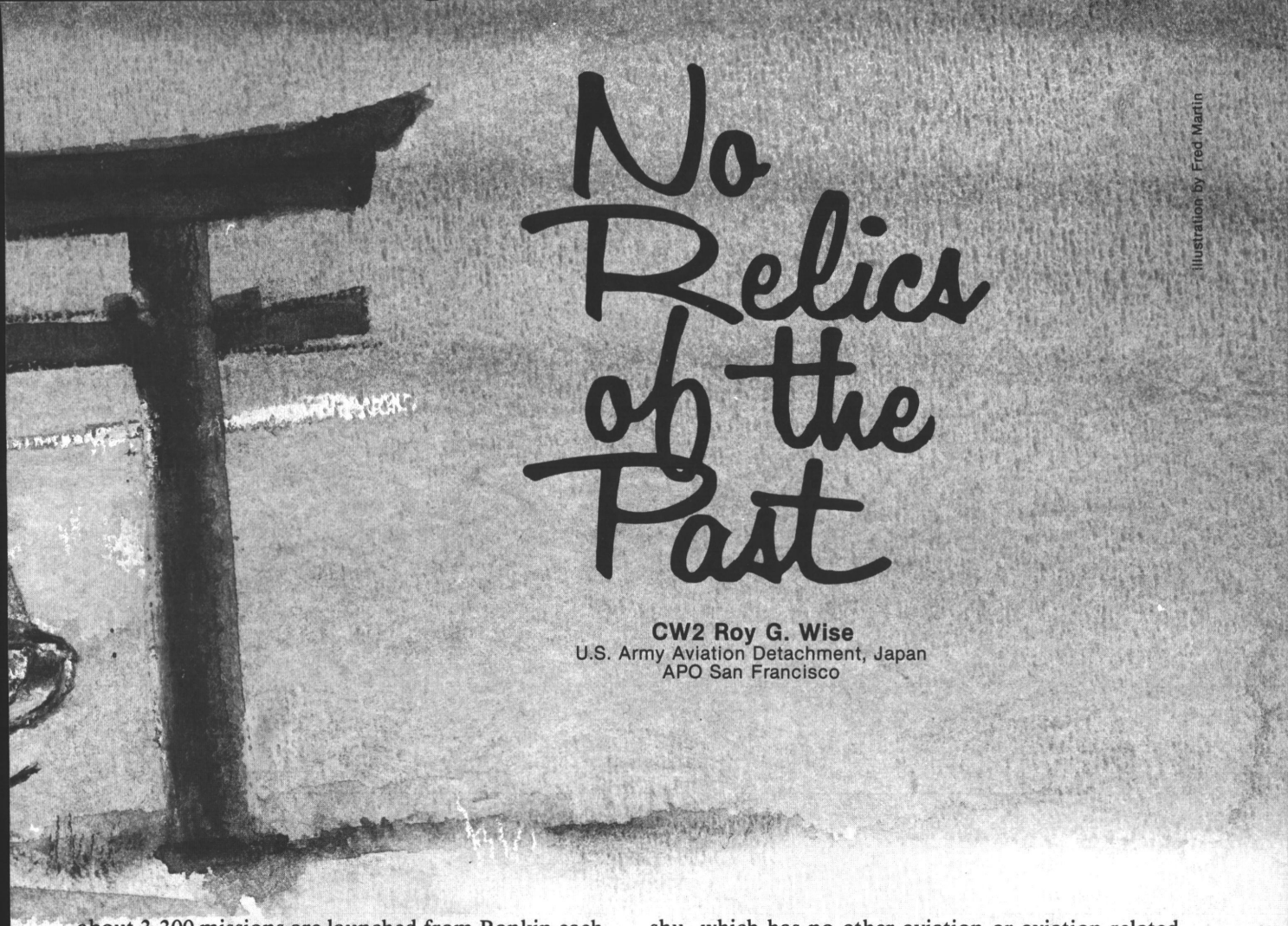


ABOVE: R-16557 hovers over Kastner VIP Helipad, named in honor of Brigadier General Joseph H. Kastner, a former USARJ chief of staff and an aviator. Seen here through the Torii Gate, which evil spirits are unable to pass through, 557 prepares to unload passengers from the scheduled afternoon hospital run. All of USAADJ's passengers receive red carpet service, thus all on and off loading takes place at Kastner Pad

LEFT: A plaque on the historical marker which marks the site of Rankin Army Airfield

CAMP ZAMA is the home of United States Army, Japan, (USARJ)/IX Corps. Scattered about its picturesque grounds are some 28 historical markers, one of which has special significance to the more than 16,000 American men, women and children who live and work in and around Tokyo. This marker, dedicated in 1956 in memory of Major Thomas S. Rankin, marks the site of Rankin Army Airfield (RAAF).

Rankin, located 35 miles southwest of Tokyo and centrally positioned on an 18,000-square-mile densely populated area known as the Kanto Plain, provides USARJ/IX Corps' aircraft with weather advisories, air traffic control services, and houses, services and maintains all of USARJ/IX Corps' aviation assets. Each year about 15,000 passengers, servicemen, Department of Defense civilians and their dependents, receive routine administrative and medical transportation. Additionally, about 300 urgent medevac calls, from installations throughout the Kanto Plain, are responded to, and about 900 dignitaries receive Rankin's famous "Red Carpet" service. All together



No Relics of the Past

CW2 Roy G. Wise
U.S. Army Aviation Detachment, Japan
APO San Francisco

Illustration by Fred Martin

about 3,300 missions are launched from Rankin each year requiring about 2,900 flying hours. This does not include the recently acquired C-12 for which historical flight data is not yet available.

But airfields do not respond to calls for help no matter how urgent nor do they transport dignitaries no matter what their stature. Aviation units do, and Rankin has one of the finest. Rankin is home to 6 UH-1Hs, 3 OH-58As, 1 C-12, 15 officers, 40 noncommissioned officers and enlisted members, 1 U.S. civilian and 4 Japanese nationals, collectively known as the U.S. Army Aviation Detachment, Japan (USAADJ). It's fixed wing asset operates out Atsugi Naval Air Facility located about 5 nautical miles away. USAADJ, like most military units, went through a long and sometimes difficult evolutionary process prior to attaining the compact, highly efficient structure it has today. During the Vietnam years, two distinct units performed the medevac and administrative missions. The post-Vietnam drawdown forced these two units to consolidate their missions and reduce their assets, becoming the single entity which now exists.

Today, a tenant unit of U.S. Army Garrison, Honshu, which has no other aviation or aviation related units, USAADJ finds itself totally responsible for the administration, supply and operational functions of a full aviation battalion. USAADJ performs not only its own scheduled and unscheduled unit maintenance, but also has its own allied shops to perform intermediate maintenance, making it a virtually autonomous entity.

In our constantly changing Armed Forces the only constant is change itself; so it is with USAADJ. Japan's geographical position and its phenomenal economic growth have continually elevated its importance as a world power. In 1978, Japan and the United States signed agreements committing their respective Armed Forces to developing bilateral defense plans and training. This innovative move toward stronger mutual defense substantially increased interaction between Japanese and American military staffs and dramatically boosted demand for aviation support. This demand increased throughout fiscal year (FY) 1982 and, by all indications in first quarter FY 1983, growth continues.

Bounded on one side by the necessary realities of

photo by SP4 Craig Newton

photo by SSG Gary A. Skidmore

INSET ABOVE: A few of the more than 15,000 passengers who receive service from USAADJ. USAADJ is unique in that it provides regularly scheduled flight to dependents with medical appointments

ABOVE: Although Japan has a temperate climate, it does occasionally get cold. The aircraft for the next day's missions were hangared to ensure timely departures

operational constraints and the need to conserve resources, and pushed from the other side by the increasing demand for mission support, the men and women of USAADJ, about one-third of whom are the sole representatives of their occupational specialities in Japan, strive to maximize their efficiency, successfully keep the fleet aloft and accomplish their ever-growing mission. However, the effort expended by these men and women, the progressive management of their senior leaders, the involved leadership of their middle managers, while impressive, are not the measure of the unit's success. Results are the proper measure of success—and USAADJ's historical record of mission accomplishment coupled with its 14-year accident-free safety record stands in mute testimony to USAADJ's excellence.

Rankin Army Airfield is an important part of Camp Zama's history, but USAADJ, while honoring its link with the past, does not dwell on history; for any organization that focuses on its past accomplishments is destined to fail to meet the challenges of the future. The men and women of USAADJ take great pride in their ability to meet and exceed the demands of continuous change, striving to influence the future rather than becoming relics of the past.

BELOW: A U.S. Army Aviation Detachment, Japan helicopter transporting passengers to Camp Fuji, a combined United States/Japanese training area at the base of Mount Fuji

U.S. Army Communications Command
ATC ACTION LINE

CONFUSED ABOUT CONTROL ZONES?

Mr. Kenneth S. Arnold
U.S. Army Air Traffic Control Activity
Aeronautical Services Office
Cameron Station, Alexandria, VA

ACCORDING TO THE Federal Aviation Administration, the frequency of questions about control zones indicates a relatively high degree of misunderstanding concerning these mysterious, confusing and misconceived rascals. The key to these unique creatures is locked in two worlds—"controlled airspace."

By definition, a control zone is controlled airspace which extends upward from the surface and terminates at the base of the continental control area. Control zones that do not underlie the continental control area have no upper limit. A control zone may include one or more airfields and is normally a circular area within a radius of 5 statute miles along with any extensions needed to include instrument approach and departure paths.

In general, the FAA Handbook of Procedures for Handling Airspace Matters states that control zones shall be designated where an FAA control tower is in operation; may be designated when a non-FAA control tower is in operation; shall be designated to accommodate prescribed instrument approach procedures; and, shall be designated to accommodate special instrument approach procedures, if justified, and in the public interest. It also says that there must be a communications capability to the runway surface of the primary airport and weather observations, and reporting at the primary airport before a control zone can be designated.

Here's where the fog settles in. What if the weather observer gets sick and goes home, or communications are temporarily lost? Should the control zone be cancelled or suspended by NOTAM? NO! The control zone still exists! If this surprises you, you are not alone. Many oldtimers have tripped over that one.

There are two key points to remember. First, control zones are established by law. This means that unless we change the law, or have a provision in the law to modify it, the control zone (controlled airspace) remains a control zone. Second, we must remember that the purpose of the control zone is to establish controlled airspace, not to establish weather reporting or communications.

OK, but since the policy is to have weather reporting and communications to establish a control zone, shouldn't something be done? Yes! A NOTAM should be issued that weather reporting or communications are temporarily unavailable. The control zone *is not cancelled!* It should be remembered, however, that when these two establishment factors are consistently unavailable, rulemaking action should be initiated to revoke or modify the control zone.

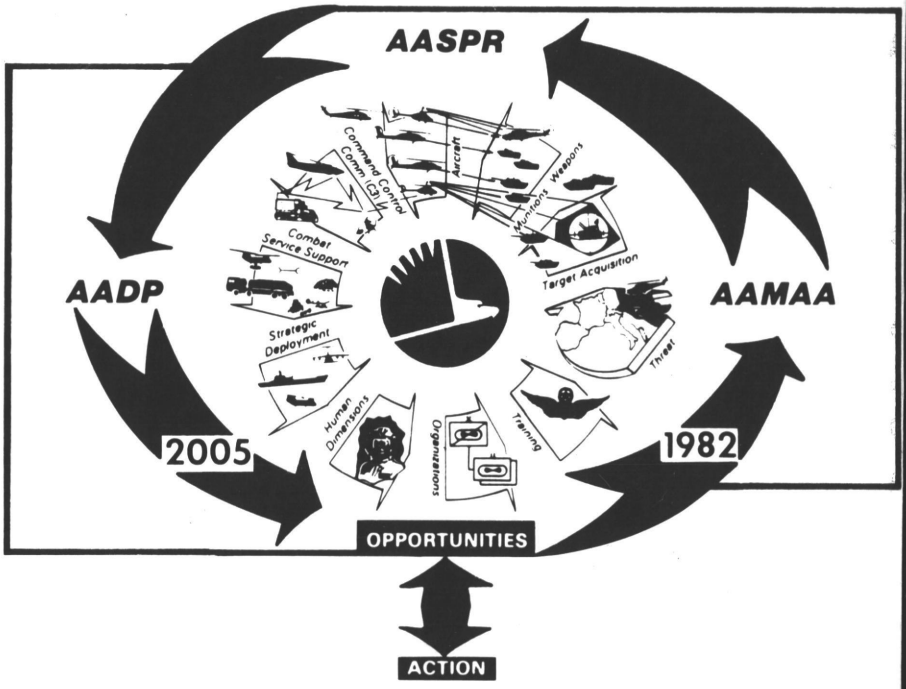
Another misconception is the use of NOTAMs to change the hours of part-time control zones. The FAA Handbook of Procedures for Handling Airspace Matters has a provision which allows for changes in control zone hours by NOTAM, when minor variations in time are anticipated. This provision allows the control zone hours to conform to seasonal trends in air traffic such as military summer training; however, it may be used only when the official description of the control zone specifically indicates that a NOTAM can be used, and only after coordination with, and approval from the appropriate FAA Regional Office. If all these provisions are met, a single NOTAM can be used to extend the hours for this particular timeframe. This should not be misconstrued to routinely extend or shorten control zone hours on a frequent basis.

Any questions? If so, call your friendly DARR (AR 95-50). Don't be afraid to ask dumb questions; they are easier to handle than stupid mistakes.

Readers are encouraged to address matters concerning air traffic control to:
Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22314

ARMY AVIATION DEVELOPMENT PLAN (AADP)

Major D. I. Smith
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL



THE MISSION AREA analysis process for Army Aviation has been culminated with the recent publication of the Army Aviation Development Plan (AADP).

That plan converts the general findings from the Army Aviation Mission Area Analysis (AAMAA) and guidance from the Army Aviation Systems Program Review (AASPR) into specific activities (figure 1). (See 1982 issues of *Aviation Digest* for additional information, AAMAA in April and AASPR in June, July, September and October.)

Completed in January 1982, the AAMAA identified Army Aviation deficiencies across the broad spectrum of combat, combat support and combat service support operations in the performance of close combat; fire support; air defense; combat support, engineer and mine warfare; intelligence and electronic warfare; command and control;communications; and combat service support missions. Recommended corrective actions were based on opportunities presented by changes in doctrine, organization, training and materiel.

Results of the AAMAA served as the keystone for the AASPR held in March 1982. That review served as a forum for senior military leadership on aviation's deficiencies and corrective actions. Participants included four 4-star and 47 other general officers, 70 field grade officers representing the Army, Navy, Marines and Air Force and members of the senior executive service.

The development plan describes the specific programs necessary to implement solutions from the AAMAA and guidance from the AASPR. It provides a blueprint for accomplishments in the functional areas of concepts and doctrine, organization and force structure, training and materiel developments. It also establishes a link between the analytical base and the planning, programing and budgeting system.

There are six chapters in the AADP: 1. Introduction; 2. Concepts and Doctrine; 3. Organization and Force Structure; 4. Training; 5. Materiel; 6. Summary. Each core chapter (2 to 5) has a series of strategy summary sheets and implementation pages which explain each deficiency and outline detailed milestones. Agencies responsible for implementation of the various corrective action programs are also identified in the implementation pages.

Chapter 6 lists the recommended priorities established for accomplishment of the corrective actions in each of the functional areas and summarizes these actions in terms of correction in the near, mid or far timeframe. It also presents a recommendation for problem resolution of proponent responsibilities for Army Aviation.

Preparation of the AADP included input and participation by subject matter experts at the U.S. Army Aviation Center in the areas of training and doctrine, training developments and combat developments. Additionally, input was provided by the various proponents for aviation matters, the materiel development community and aviation systems managers.

The development plan is scheduled to be updated annually, and the AAMAA is to be updated every 3 years.

Publication of the AADP as Army Aviation's first detailed master plan is a vital link in the continuing process to advance aviation as an integral member of the combined arms team. We're building to win and we're doing it right!

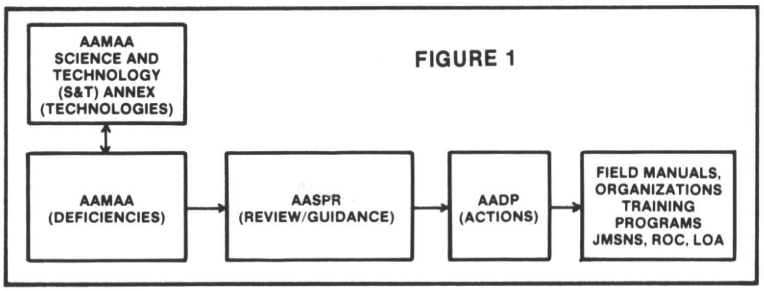


FIGURE 1