TAC ATTACK

DECEMBER 1977

Flying the BALD EAGLE
...Pg 4

TAC ATTACK DECEMBER 1977 VOLUME 17 NUMBER 12

DEC

FOR EFFICIENT TACTICAL AIR POWER

FEATURES

DEPARTMENTS

TACRP 127-1

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"BALD" EAGLE

serious questions:

(1) What happens to the aft cockpit occupant in the event of an inadvertent canopy loss?

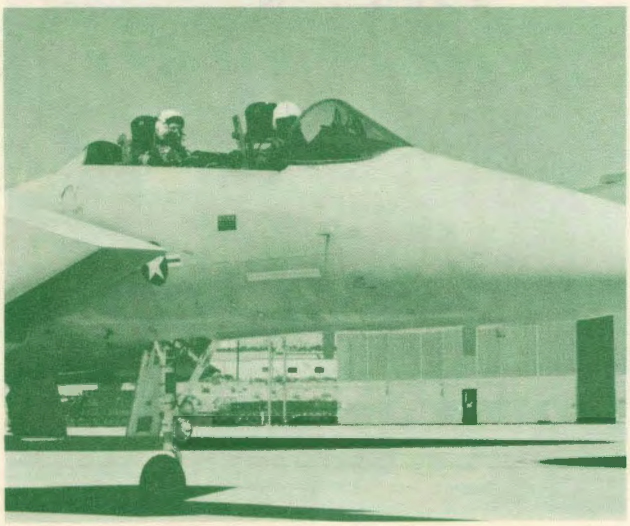
(2) What kind of protection should be provided to the GIB (guy in back)?

(3) What emergency procedures are required in the event of a canopy loss?

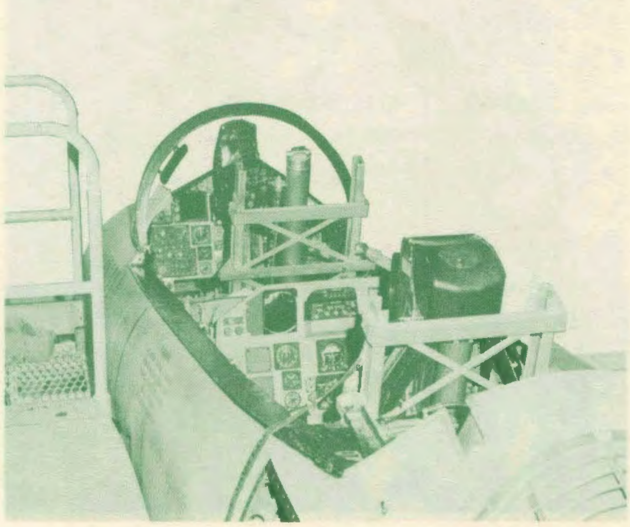
Everyone involved was of the opinion that the answers to these questions would result in lifesaving results for the GIBs of the Eagle. For those unfamiliar with the TF-15, it should be pointed out that there is NO protection for the backseater (Photo 1). If the canopy is lost, the GIB is left protuding in the wind stream and very vulnerable.

The testing at Edwards AFB was divided into four phases: (1) high speed taxi test with instrumented anthropometric dummy in aft cockpit, (2) flight test with dummy, (3) high speed taxi test with human subject in aft seat, and (4) flight test with human subject.

Prior to the first test, several planning meetings were held. First, the Configuration Control Board had to approve the Class II modification to the aircraft (TF-1, 71-0290). TF-1 was the first two-seat TF-15 produced and has been a mainstay in the F-15 DT&E test program. The



TF-15s sans canopy offers no protection to the GIB.



Modified cockpit of TF-15 S/N 71-0290.

flying the BALD EAGLE

Major Jerry Singleton is this month's Fleagle T-shirt winner

modification included: (1) canopy and canopy actuator removal, (2) modification of the ejection seat system to make it operable with the canopy off, (3) installation of a mirror system in place of the Vertical Situation Display in the rear cockpit (RCP) to allow use of a video camera to constantly monitor the RCP occupant (Photo 2), and (4) installation of a fixed mirror in the front cockpit (FCP) to permit observation of the RCP.

The second step was the review of the test by the Technical Review Board which consisted of the AFFTC and McDonnell-Douglas engineering experts (aerodynamics, stability and control, and human factors). The basic test plan, as conceived by the F-15 Joint Test Force (JTF), was approved with one important addition. It was decided that a thorough evaluation should include a supersonic point to evaluate shock wave effects. Therefore, an acceleration to 1.2 Mach at 20,000 feet was added to evaluate this phenomenon.

The final step was the convening of the AFFTC Safety Review Board (SRB). The SRB decided initially to approve only the dummy flight tests until the data from those flights was analyzed. After the dummy tests were completed, a second meeting resulted in the approval of the use of a live subject in the RCP.

For the first two tests, a 95th percentile anthropometric dummy (to represent the worst case) was obtained from the 6511th Test Squadron at El Centro NAS, CA (Photo 3). This squadron is a detachment of the AFFTC. In addition, Captain Ron Hill, the project engineer from the Human Factors Branch at Edwards AFB, obtained the use of the instrumented helmet used by the Flight Dynamics Laboratory of Wright Patterson AFB in the F-16 canopy-off testing in the lowspeed wind tunnel at NASA Ames, Moffett NAS, CA. This helmet had 15 high response transducers installed in the front, top, back, and sides to measure impact pressure from the airflow. The dummy, wearing this helmet, should give the data required to determine just how severe the environment would be in the RCP without a canopy (Photo 4). In addition, the dummy had a microphone installed in each ear to measure the sound response in decibels (db) in an attempt to determine how difficult it would be to have successful air-to-air and air-to-

Anthropometric dummy used during testing.

"Dummy" positioned in rear cockpit of TF-15 prior to first ground tests of canopy-off program. Helmet contained 15 sensors. An eye-mounted transducer was also used to measure impact pressures.

ground communications if the canopy was lost. Also, as project manager/pilot, I carried an audiometer in my flight suit leg pocket to measure FCP noise levels.

The dummy ground tests were completed on 26 May 77. Two ground runs to 150 KIAS were completed for an initial evaluation of the dummy instrumentation. All the data gave a green light for the actual flight test which was done on 27 May. The flight was photo-chased by an F-4 flown by the F-15 JTF director, Lt Col Ken Dyson. The flight was uneventful until the first acceleration was approximately one-half complete. An acceleration to 500 kts at 5,000 feet MSL was started, but at 280 KIAS the dummy lost the visor with two-thirds of the 15 installed transducers. While this was a setback (although not unexpected as the rear seat was full-up to obtain the worst case results), the dummy also had a transducer in his left eye, so the run was continued. At 458 KIAS, further problems occurred as the oxygen mask on the dummy suddenly came up over his eyes, and the chin strap was pushed up under his nose (Photo 5). Unfortunately, this caused the tests to be terminated as all effective impact instrumentation was now lost. As a result, the supersonic effects were not evaluated. It should be noted that throughout this acceleration, the FUF (fellow up front) was relatively unaffected. Voice communications were never in question and head/body buffet was negligible until above 350 KIAS. At this point, the seat was lowered full-down from my normal sitting position -- seat-up 3/4 -- and this reduced the slowly increasing head buffet to a very comfortable level. In short, if you lose a canopy while up front, NO SWEAT. Communications are normal and recovery is a piece of cake. If you slow to 250 KIAS or less, you will hardly know the canopy is gone. One word of warning - don't stick your arm or even your pinky near the slipstream. That's a quick way to ruin a happy ending to a real emergency. However, you can raise your arms to give HEFOE signals or tighten your oxygen mask, lower your visor, etc. Within the normal confines of where your canopy originally was, arm or body movements can be done with zero problems.

Dummy flight test results indicated two important items. The first was that the GIB would be subjected to unbearable sound levels. The db meter pegged at 130 db at 130 kts during takeoff for the flight test. However, we were

Problems occurred with dummy's equipment early in first test flight. The oxygen mask was forced upward over the eye transducer and the chin strap moved out of the proper position.

unsure as to how well the ear cups in the dummy's helmet were sealed with his head, and this caused us to question the data results. Secondly, the helmet instrumentation told us that the dummy never felt 0.80 psi impact pressure. AGARD data told us that 0.80 psi, which equates to 180 KIAS freestream velocity, would subject a human to eyelid flutter if his visor were up. To stay on the safe side, it had been decided by the SRB that the velocity that resulted in 0.80 psi would be the maximum to which we would subject a human (in case he lost his visor). While a GIB would survive this velocity in an inadvertent canopy loss , it was still a point where he could be severely injured if caught unprepared.

The "real" dummy, Dr. (Lt Col) Wayne Kendall of Wright Patterson's 6570th Aerospace Medical Research Lab, had volunteered (no kidding) earlier to be our guinea pig (Photo 6). Dr. Kendall also had been the pilot/flight surgeon who had participated in the F-16 canopy-off tests at NASA Ames. During the tests, he used all his own personal equipment to make the test as realistic as possible. The only instrumentation available was the video tape camera to show the effects of the windstream on him. A deadman's switch also was installed as a part of the Class II Mod to the aircraft. Dr. Kendall had to hold a button down on the switch to keep a warning light from illuminating in the FCP. If he let go, the light came on and the aircraft would be slowed down immediately. This was actually a backup in case cockpit communication was impossible due to high noise levels.

The human tests were started on 1 Jun 77, with the two taxi tests to 150 KIAS on the 15,000 foot Edwards runway. Communications and wind blast effects were acceptable. One run was done with the aft seat full-down, and one with it full-up. There was a significant difference in wind effect, confirming the obvious (?) fact that full-down was a better environment for the GIB. The flight test was completed on the next day, 2 Jun 77. Takeoff was made with the aft seat full-down and remained there most of the flight. Airspeed was held to 175 KIAS initially and the aircraft climbed to 5,000 feet MSL. Cockpit communications were possible with Dr. Kendall either sitting up or taking "protective measures" (bending forward as far as possible with shoulder harness unlocked). Accelerations were made in 20 kt increments for safety considerations. It was quickly discovered that 200 KIAS was the maximum speed that intelligible conversation could be successfully completed between cockpits even when taking protective measures. It was further determined that front seaters can understand back seaters up to 250 KIAS, but 200 KIAS is the maximum for converations going both ways. Remember, this was the aft seat full-down, an abnormal seat position during operational missions. The dead-man switch installation now paid off as it allowed us to safely continue the acceleration without intercom. The acceleration was terminated at 415 KIAS due to loss of air-ground communications in the FCP. There was so much noise from the mask flutter of the GIB that I could no longer understand transmissions from either the ground or the airborne chase. Although the deadman switch was never activated, Dr. Kendall admitted he was near his limit with the seat full-down and his bending forward under the glare shield as best he could.

Major Jerry Singletion, front cockpit, and Lieutenant Colonel Wayne Kendall, boarding ladder, just after the "live subject" portion of the canopy-off test program.

We learned several important facts during the test run. Dr. Kendall had to use one hand to hold onto his helmet (elbow pointed straight ahead, not sideways) above 300 KIAS. He felt sure he would have lost it above that airspeed. Also, the buffet and vibration made it impossible for him to see the instrument panel clearly. Flying the aircraft from the RCP was impossible above approximately 200 KIAS (hopefully one would never have to do that). Eye tearing with the visor down was severe above 350 KIAS, and it became difficult to breathe above 400 KIAS. Clearly this was not a comfortable environment! It was Dr. Kendall's opinion that with the rear seater caught sitting up, he would not be able to lean forward until the aircraft was slowed to below 300 KIAS.

Speed brake and angle of attack effects were also evaluated. The small preproduction speed brake was extended every 30 kts to determine if it had any adverse effects on the GIB. None were noted. It was thought that perhaps increased alpha would help protect the RCP. Angle of attack was increased to 21 units at 200, 250, and 300 KIAS but no beneficial or harmful effect was noted.

Seat position was also evaluated up to 250 KIAS. The rear seat was raised to approximately one-half up at 200 KIAS. The environment worsened considerably. Dr. Kendall was not willing to go above 250 KIAS with the seat in that position. Obviously, full-up would have lowered that airspeed even more. Most pilots fly the rear seat almost full-up for best visibility.

The flight ended after 50 minutes. Dr. Kendall was obviously exhausted from his ordeal. His only injury was a small abrasion on his right cheek that was caused by his oxygen mask strap flapping against the skin. An audoiogram was performed immediately after the test and no temporary hearing loss was found. The noise level in the RCP was not painful which confirmed our earlier doubts about the noise data we recorded during the dummy tests.

So, what did we learn? Most important was that some kind of protection should be provided for the GIB. A canopy lost during ACM at 350 KIAS or greater could have severe effects on the GIB. Most likely, the helmet would be lost and vision impossible. In the past, the GIB has always ejected under these circumstances due to severe disorientation. Hopefully, these test results will be publicized well enough so that this will not happen in the future. If you are in this situation, lower the seat and lean forward as far as possible. This will provide the best possible environment. If the helmet is not lost, hold onto it with one hand (elbow forward, not sideways) and pull forward with the other hand (grab the lower instrument panel above the rudder pedal wells). Communication between cockpits will not be possible until below 200 KIAS, so just sit tight. The front seater will be able to talk to the ground below 400 KIAS. FUFs should slow the aircraft using speed brake and moderate "g" (remember the GIB will be trying to lean forward) as quickly as possible. Once you get below 200 KIAS, no sweat -- you can even talk if the GIB has retained his helmet. If above 25,000 feet, you would also obviously want to descend as (1) it's cold, and (2) oxygen mask flutter will make a good face seal impossible. Oh yes, one other important fact -- even though our cockpits had been vacuumed with both seats removed, dirt and debris were a real problem for both pilots. Expect lots of junk in the eyes, even with the visors down. It was so bad on my first flight that I was constantly blinking and tearing.

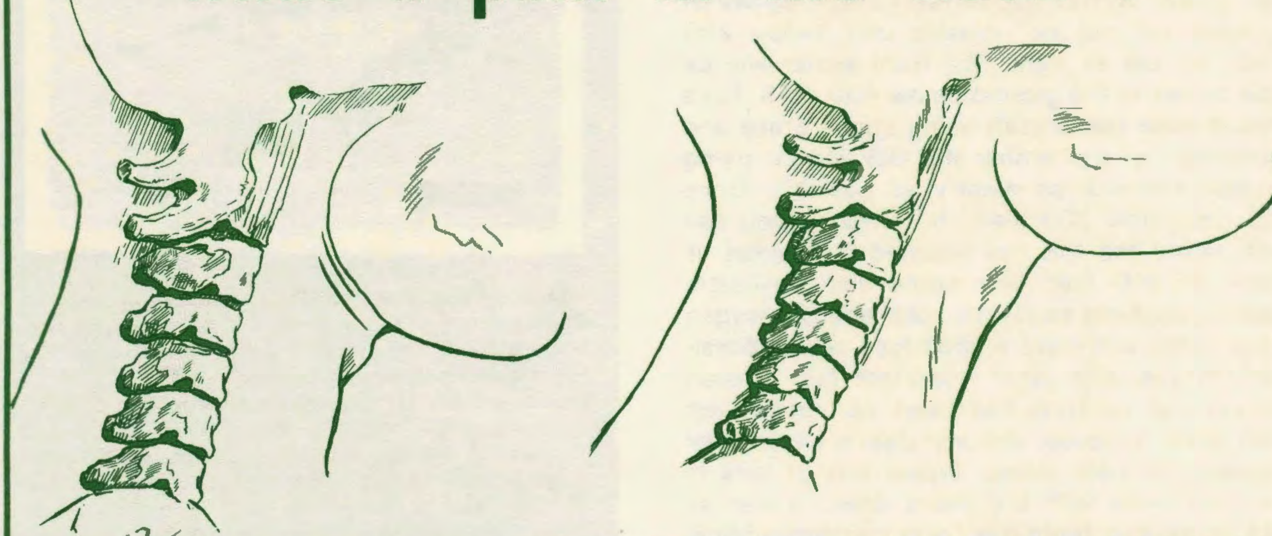
A final thought -- I hope no one ever has to make use of this information, but I know our friend "Murphy" is lurking nearby. As long as we fly, the opportunity for canopies to be lost exists. Remember, if a canopy loss is the only problem, the FUF is in a benign environment and can easily RTB safely. ➢

Major Ivan J. Singleton (M.S., University of Southern California) is the Deputy Director, F-15 Joint Test Force, Edwards Air Force Base, California. His service experience has included assignments as an F-101/F-102 pilot with ADCOM; an F-100 combat tour in SEA; an instructor at the USAF Test Pilot School; the Chief of Test and Evaluation, 1st Test Squadron, Clark AB, PI (Combat Safe); and as a test pilot (F-15, F-4) with the 6512th Test Squadron, Edwards AFB, CA. Major Singleton is a graduate of the USAF Aerospace Research Pilot School and a senior pilot with over 4,000 hours of flight time.

Four months after the completion of the test, this same Eagle accidentally became "bald" again. The crew had completed their test mission and were performing acrobatic maneuvers at 20,000 ft MSL, .9 Mach/450 KIAS, when the canopy departed during a 2 - 3 G turn. The GIB felt himself pushed back into the seat, head pushed back but not up. He did not lose his helmet, nor did he notice any tendency for it to depart. The GIB continued flying the aircraft, returned to an upright attitude, retarded the throttles, put out the speed brake, and started a descent before he turned control of the aircraft over to the FUF. Neither crewmember encountered any difficulty controlling the aircraft and suffered no ill effects from his experience. ED

PHYZ-BIZ

what a pain in the neck !



(LEFT) POSITION OF NECK WITH CHIN RETRACTED. NOTE CORRECT ALIGNMENT OF VERTEBRAE

(RIGHT) POSITION OF NECK WITH CHIN FORWARD. NOTE COMPRESSION OF VERTEBRAE

By Lt Col Virginia L. Floyd
Chief, Physical Therapy
Langley AFB, VA

If you are a TAC pilot, you probably already have been or may soon be, treated for neck pain. Neck strain is a malady affecting the TAC pilot with such increasing frequency that it must be suspected as being job-related. The conditions for provoking this medical problem prevail as you perform your flight requirements. These include the weight and pressure of your flight helmet worn for long periods, the confines of the cockpit limiting body motion, the higher-than-normal G-forces your body endures, as well as the mental stress and strain that you undergo while giving full and constant attention to your high-speed flight environment. Muscle tension in the neck and across the shoulders is a predictable occurrence under the above conditions and ultimately pain and muscle strain are the results.

Sport coaches would never send an athlete into competition requiring strenuous physical output without suitable warm-up exercises. Why should you be any different? You're asking your body, especially the neck and spine, to withstand more physical punishment than most athletes encounter in a game.

Warm up to the task ahead by taking a few minutes to perform some simple exercises which will lessen the chance of developing neck strain. Below is a program designed to give you:

1. **AN AWARENESS OF GOOD HEAD POSTURE**
2. **A SENSE OF MUSCLE TENSION**
3. **AN EXERCISE PROGRAM TO PROMOTE FULL MOBILITY OF YOUR CERVICAL SPINE**

GOOD HEAD POSTURE

First, check your head position. Is the head forward? Although it shouldn't be, it frequently is in people who wear a heavy piece of equipment on their head or who work over a desk. Extension of the neck in the forward head position causes a narrowing of the space between the vertrabra resulting in more neck tension and possible compression of nerves. Muscle fatigue and pain ensue.

For correct head posture, pull your chin down and in and move the head and neck as a unit back over the shoulders. The ears should be on a vertical line directly over the shoulders. Use a mirror or ask someone to check your head and shoulder position. Become aware of what your posture looks like and how the correct head posture compares to it. A second way to increase your awareness of correct head posture is by placing your hand on the bony prominence at the base of the neck. Now, extend the chin forward, retract it, and place it forward again. Compare how exaggerated the prominence is when the head is forward and how relatively flat it is when the chin is retracted.

SENSE OF MUSCLE TENSION

You can become aware of muscle tension by feeling the difference between tightness and relaxation. First, stand with your arms down at your sides. Make a fist and tighten all the muscles in the arms and shoulders. Now, shrug your shoulders upward toward the ears. Hold this tense position for about 10 seconds and then release the tightness very slowly, again comparing the difference between tension and relaxation.

MOBILIZATION EXERCISES

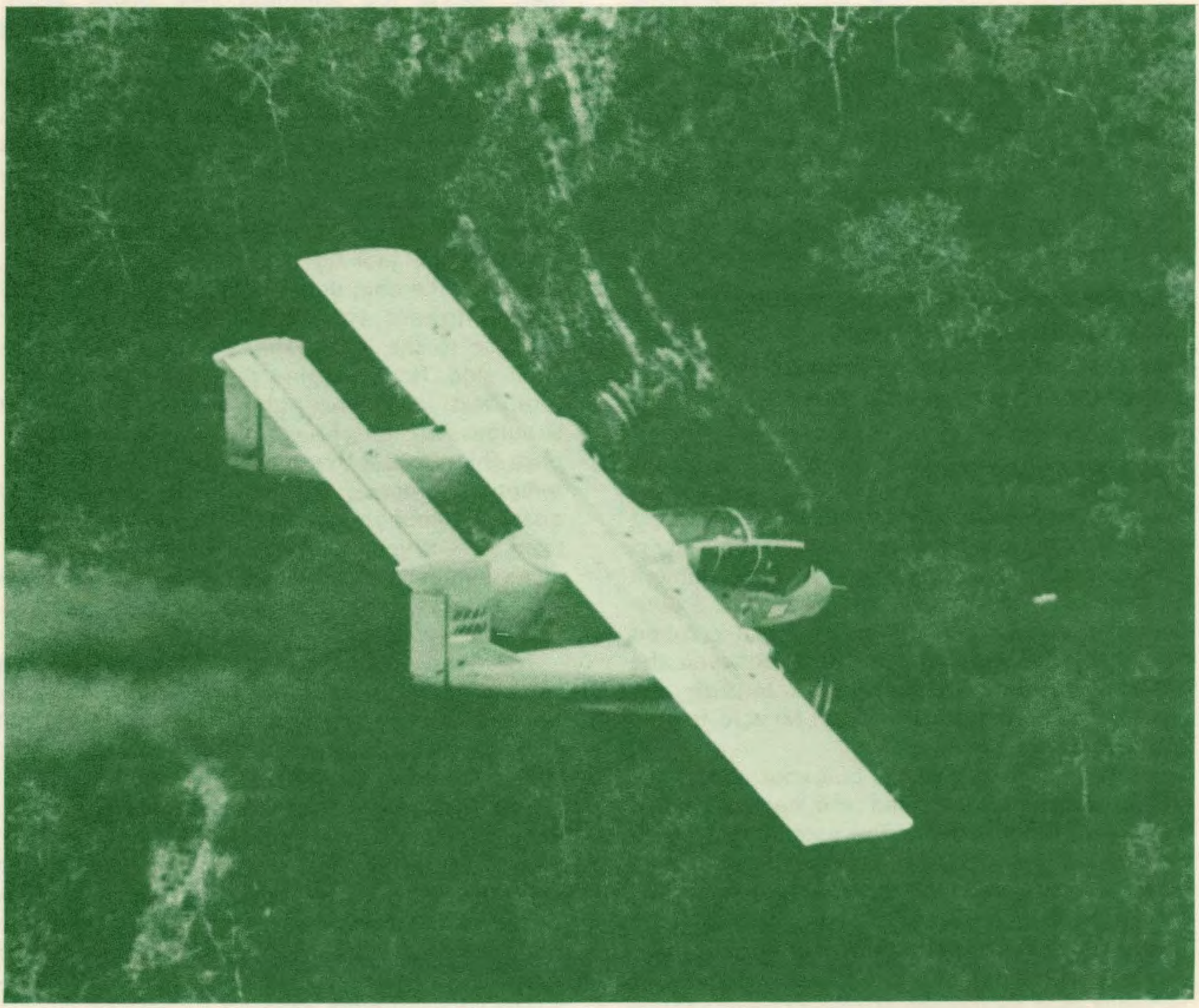
Now you are ready for the warm-up exercises which will help to promote full mobility of the cervical spine. Start by retracting the chin. Now, turn your head as far as possible to the right so that you are looking over your right shoulder. Next, pull the chin down (with the mouth closed) and in toward your chest. Repeat this same exercise to the left. Do these 5 to 10 times on each side. Now, assume the correct head posture. Next, lower your right ear toward your right shoulder. Do not shrug the shoulder to accomplish this. Repeat this on the left. You should attempt to complete as much range of motion as possible, feeling some stretch when doing these exercises. If you have any pain or your motion seems limited, it is best to do fewer repetitions frequently each day until complete pain-free motion is achieved.

To finish relaxing after the stretching exercises, close your eyes and think of your head as a heavy cannonball. Let your head fall forward and roll it slowly around several times, then reverse the direction.

One last point bears stressing. When driving your car, working at your desk, or flying your aircraft, you must guard against thrusting your chin forward for prolonged periods of time. A daily workout using these simple exercises and a conscientious effort to maintain correct head posture will give you the winning edge in preventing a pain in the neck. ➤

OPERATION SCO

A 9th AF TRAINING



reboard

FORUM

By Capt Gary S. Poole
21 TASS/DOW
Shaw AFB, SC

TRAINING ...WHAT IS IT AND HOW DO WE APPROACH IT? ...IS IT USEFUL? ...REALISTIC? ...SAFE? ... ARE WE TRAINING THE WAY WE EXPECT TO FIGHT?

The October '77 TIG BRIEF states that "... we must develop challenging, realistic scenarios that keep us oriented toward our reason for being ...." It also emphasizes in developing these scenarios that "the best idea on paper is still only an idea"; it is not a meaningful program until implemented at the working level.

Wait a minute! We have meaninful programs, don't we? Let's see ... BOLD EAGLE, SOLID SHIELD, JACK FROST, RED FLAG. Don't these programs offer us challenging tactical training? Let's take RED FLAG, for example, since it's the most tactically oriented. It's a great program, but we often seem to spend too much time preparing for our missions after we arrive at Nellis rather than having our "act together" before we leave home. Consequently, by the time we feel comfortable performing the tasked mission, our time runs out and the game is over.

In the interest of continuity, which is a significant part of any sound training program, I've often wished that RED FLAG could be devoted just to implementation of team tactics. A place where the FAC, the fighter, and the recce can come together to hone their skills as a team and to show how tight a unit we can, and do, become when employed together in a hostile environment. We need an opportunity to train the way we expect to fight at RED FLAG or in Europe or Korea, or in our local areas before we deploy to unfamiliar ranges with high stress tasking and active opposition.

We in 9 AF and the 507 TAIRCW, with our commanders' support, feel we have found a solid base on which to build a realistic training environment. A point to begin moving the TACS system, the DASC and TACC, the FAC, the fighters, and recce forces together -- to train together as a team in our local areas. We call it OPERATION SCOREBOARD.

SCOREBOARD is designed to allow our FAC, fighter, and recce communication channels to open, permitting us to identify problem areas that complicate our mission and to establish procedures to overcome them. Since this exchange of ideas takes place at the working level, we remove the reluctance of admitting our mistakes and risking embarrassment to that unit.

operation scoreboard

And, like other teams, we can now tackle these problems on the same playing field on a continuing basis.

The SCOREBOARD scenario requires high threat, close air support tactics for all the players. This scenario, mixed with varied intensities of communications jamming, is the focus of many RED FLAGS and has become the basis of our tactical targeting scenarios for Europe and Korea. This demanding environment presents the great difficulty in FAC, fighter, recce coordination and, of course, is one that warrants increased attention and practice.

Building the programs around our local area was really very easy. Using published FLIPlow-level routes that either transit or terminate in a local military operating area (MOA) gives us the vehicle to provide low-level ingress to the target area and maximizes the use of IFR and deconflicted routing. With fighter/recce assets fairly plentiful around Shaw (the 4 TFW at Seymour Johnson AFB, NC; the 354 TFW at Myrtle Beach AFB, SC; the 169 TFG at McEntire ANGB, SC; and the 363 TRW), we FACs in the 21 TASS began talking to each wing training, weapons, and scheduling shop. We solicited their participation and gained sortie commitments from which to build the frag. Selling the program proved easy. It sold itself, since we could provide not only the low-level MOA operation, but a comm jam and RHAW threat also. It must be emphasized here that all scheduling and coordination between wings was done so as to minimize other tasking during SCOREBOARD and allowed us to focus our attention and energies toward its success.

A rather general objective was stated for the exercise: that being, an overall look at the complexities of FAC to fighter/recce ingress coordination and target/weapons data adaptation in an environment of restricted communications. In order to support the objectives and provide realism, the 21 TASS began coordinating support assets. Through 9 AF we asked the 56 CSS at Avon Park, FL, to provide an MPS-19 RHAW threat simulator to be deployed in the vicinity of the target area. The RHAW not only provided the sought-after realism but filled valuable training squares in each wing. At the 21 TASS, we programmed comm jam tapes to be used by the airborne FAC via cassette recorder. We tasked our TACP to provide as many vehicles as possible to be used as tactical targets for operations in the MOA. Finally, we tasked our intel shop to formulate a high threat order of battle for day-one that could be transmitted to each participating wing's intel division and used by the fighter flight leads and recce crews in briefing tactics.

The tactics employed by the FACs were the ones most frequently seen in RED FLAG scenarios: the high FAC for initial target brief/communications relay, and the low FAC for final brief/clearance/target marking. The particulars of this tactic can now be found in the new TACM 3-1 (Close Air Support Volume). We held high FACs over the low-level routes outside the MOAs to coordinate fighter ingress with the low FACs and provide the comm jam threat. The low FACs held inside the MOA relaying the final attack brief and providing target/pop-up observation. Ground FACs were positioned in the MOAs to provide realistic target arrays for the ingressing fighter/recce aircraft and were linked to the high and low FACs via FM radio to coordinate smoke deployment. The ground FACs were also used in their conventional role of requesting close air support via the HF Air Request Net and monitoring for advisories from the DASC.

The DASC was employed conventionally as defined in TACR 55-46 while the TACC was used to monitor takeoff and landing times and pass this information down to the DASC and out to the target area and the TACPs.

Fighter tactics were centered around the low altitude pop-up maneuvers integral to RED FLAG operations and defined in TACM 3-1.

A typical mission would go something like this:

- The fighters would depart IFR to the low-level entry point, enter the low-level, and contact the high FAC. After contact, they would pass on their call sign, position, ordnance, and playtime.
- The high FAC would, in turn, pass on the target description and elevation, weather and altimeter setting, clearance to the designated IP, the low FAC's call sign and contact frequency.
- Jamming and RHAW indications are then initiated. The fighters establish contact with the low FAC who would tell them the IP, the run-in heading, the time to the pull-up point (PUP), target bearing from PUP, the type of target, and if friendlies are in the area, if they are a factor.
- The fighters would then depart the IP and initiate their pull-up. The low FAC would coordinate smoke deployment and move in to observe the attack. After the initial attack, the threat was downgraded, and a low threat scenario developed to maximize training.
- Recce tactics were basically the same as the fighters' until contact with the low FAC was established. At this time, the FAC would pass on the target description, georef coordinates, and clearance to depart the IP. This was the first occasion, other than RED FLAG, that FACs have talked to the recces. Consequently, this was our first attempt at establishing a positive FAC-to-recce briefing.

We composed debrief forms and dispersed them among all the players -- the fighters, the airborne FACS, ground FACS, and the recces -- with the intention of identifying ingress problems and comm jam difficulties, validating authentication and briefing items (both in quantity and necessity), measuring exposure times for each flight and target acquisition percentages. At the termination of our exercises, all data was recorded and an after-action report compiled to be sent to each participating wing.

Overall, our first SCOREBOARD was a resounding success with 131 sorties flown from 15 to 17 August 1977. We recognize RED FLAG as a necessity in our present day tactical training environment; but through operations like SCOREBOARD, we are able at the working level to better prepare ourselves for future engagements in environs like Nevada.

From SCOREBOARD, numerous discussion items surfaced during the planning execution, and debrief portions of the exercise. These included:

- The intrusion threat and how to combat it.
- The comm jam threat and possible solution. FAC capabilities.
- The use of the F-4 WRCS.
- Drawbacks to Georefs only in the A-7D weapons delivery system.
- A-10 tactics development and concepts of employment.
- The use of the Maverick (A) in a South Carolina ground environment.
- FAC to Recce brief.
- SCAR/CAS interface.
- The development of CAS/FAC tactics which eliminate FACs from dictating fighter groundtrack.

Future operations will call for the development of new objectives based on the data extracted from previous exercises. As FACs, we hope to realize the following additions to the operation:

SCOREBOARD continued on a quarterly basis; scheduled prior to a unit's deployment to RED FLAG.

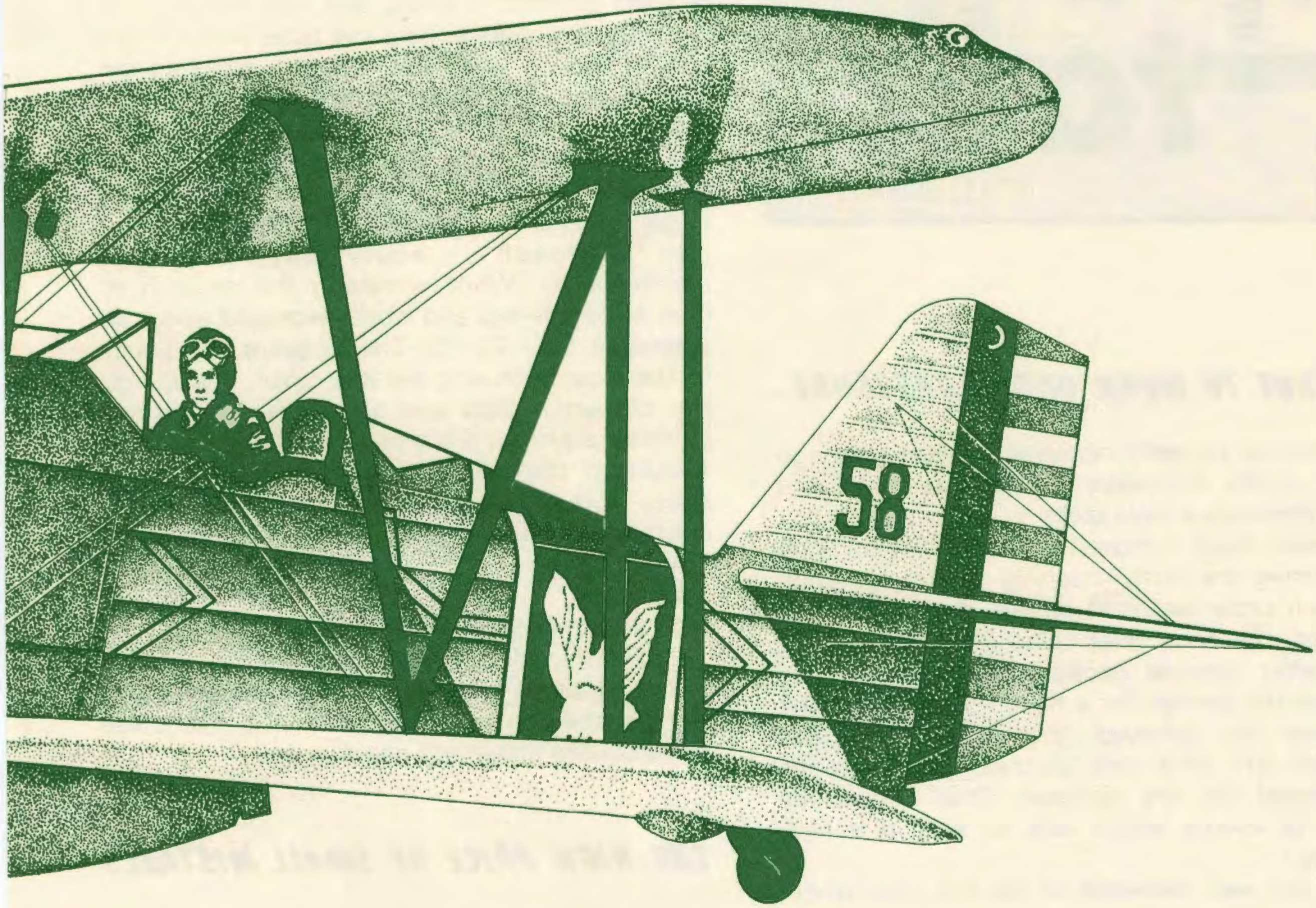
The formulation of a TACS Traveling Road Show to deploy with a TACS package to fighter units who are unable to use our MOA operation due to fuel requirements.

The employment of the Hornet diffused laser designator system for use with the A-10 and its Pave-Penny modification.

The inclusion of more sophisticated threat simulation equipment

The operation is safe; the cost is minimal, and we have no impact on the civilian air traffic. We use existing airspace, and we're talking to each other. The challenge is there, and we're preparing to meet it. Look for us together ... effective ... flexible ... and surviving.

CURTISS P-6E



James H Brown

chock talk

...incidents and incidentals

HOW NOT TO WORK UNDER PRESSURE...

A ground accident occurred a short time ago which vividly illustrates the dangers associated with seemingly simple tasks ....

A crew chief removed a C-131D main gear tire during the early morning hours. Although the tech order warns to deflate the tire prior to removal, the crew chief failed to deflate the tire even after removal because he was rushed to prepare the aircraft for a flight. Even though the TO was not followed, the AFTO 781A was signed off and the correct procedures referenced for tire removal. Thus began the chain of events which was to end in a near tragedy.

The tire was delivered to the tire shop where the shop supervisor was informed that "nothing had been done to the tire." The shop supervisor assumed that meant that an AFTO Form 350 (Reparable Item Processing Tag) had not been prepared and directed a sergeant and an airman first class to break down the tire and prepare the wheel for NDI. The tire was washed, and the men were preparing to break it down when the supervisor returned and began discussing an RF-4 problem with the sergeant. The supervisor's interruption may have broken the sergeant's habit pattern and he and the airman failed to note the still present valve core. They also failed to separate the tire bead from the wheel flange as required by the tech order. After the discussion concluded, the supervisor once again left. The airman first class, who was in the process of cross training and had no previous tire shop experience, held the bolts with a hinge handle wrench while the sergeant removed the nuts with an airwrench. After four or five bolts had been removed, the airwrench would no longer turn the nuts. (A clue, my dear Watson, that something was amiss). The men secured larger tools and continued ... (the bigger hammer approach -- equivalent to brogan maintenance). While removing the seventh of nine bolts, the tire and wheel exploded under an estimated 65 - 70 PSI. The sergeant was struck in the face fracturing his jaw, nose, and inflicting numerous cuts and abrasions. The airman suffered a broken left arm and knee injuries and a part of the wheel richocheted through the shop, through a wooden door, and struck another individual in the ankle causing minor injuries.

Causes?

1. Improper supervision.
2. Failure to follow tech data.
3. Lack of an effective training program.

I get the funny feeling that we'll see these same causes again and again and ....

THE HIGH PRICE OF SMALL MISTAKES

The total bill was $1,946.08 when an AIM-9E captive training missile was loaded on an F-4E without the required captive missile adapter. Without this adapter, the gas grain generator will function when switches are actuated to simulate a missile launch. Since the canards of the AIM-9 block the view of the umbilical cable, it's unlikely untrained personnel will see the captive adapter so it's doubly important for load crew personnel to insure this adapter is installed.

* * * * *

An F-100 flew a normal refueling mission, landed, refueled, and was buttoned up for the

with a maintenance slant.

evening. The aircraft was scheduled for gunnery the next day so the pylons were left on the aircraft. The aircraft was then taken off the gunnery schedule as it was needed for a cross-country flight, and a crew chief was dispatched to install drop tanks. Before installing the drop tanks, the crew chief performed the jettison system check. When he pressed the "emergency jettison button," both type III pylons jettisoned to the ramp and were damaged beyond economical repair. Maintenance control had failed to notify the flightline supervisors that the aircraft was "hot."

Cost? -- $6,204.40.

FOD

Several incidents early this year led to a new intake cover for F-4 aircraft. The old cover was secured to the aircraft with pip pins, several of which found their way into, and through, the engines at one time or another. A new form-fitting cover was procured and reached the field in summer '77. Somehow, the old type still remains around.

An F-4E returned from a mission with a fuel transfer malfunction necessitating a double engine run which was properly accomplished with the exception of the "after-run intake inspection" which was not accomplished, nor signed off, in anticipation of a second engine run for No. 5 fuel circuit breakers popping. Replacement of the circuit breakers was delayed while the aircraft received a scheduled lube and wash. The next day, the circuit breakers were replaced and an engine run was requested. A combination of more pressing maintenance and bad weather delayed the engine run until after a new shift reported for duty. The flight supervisor and engine-run man examined the aircraft forms and assumed the write-up of several days ago applied to the current engine run and did not make further entries required by local manuals. Since an engine-run screen was already installed, the engine-run man assumed the aircraft was ready. After receiving clearance from job control, the engine run was initiated. Idle operation was normal, but when the throttle was advanced to 80% RPM, sparks began coming out of the tailpipe. The engine run was terminated and inspection of the intake revealed an old intake cover lodged against the CSD dome. One metal pip pin was missing from the cover and was ingested by the engine. Damage occurred throughout the compressor and turbine sections. Failure to follow local procedures and technical data resulted in over $25,000 damage. Quite a high price for a small amount of carelessness.

AND FOD AGAIN...

Postflight inspection of an F-111D revealed FOD damage to the number-two engine. An exhaustive search revealed all possible panels and fasteners were properly secured. Depot analysis revealed the source to be an asphalt substance. Aircraft engines seldom pick up loose objects from the ground unless they are blown in, or perhaps thrown in, after having been picked up by a tire. All personnel have been urged to pick up loose stones, screws, etc. It would do well to add loose asphalt to the list.

TAC TIPS

...interest items, mishaps with morals, for the TAC aircrewman

A man must have a certain amount of intelligent ignorance to get anywhere.
Kettering

"NEAR-MISS"

A flight of three F-4s was descending to a low-level entry point when the leader lost his radio. Number two was off frequency attempting to recontact the leader when number three spotted a red and white Cessna 150 and called the flight to "take it down." Within seconds of the call, number two also spotted the light aircraft and initiated a rapid descent. The Cessna passed within 500 feet of the F-4s without taking any evasive action.

Investigation of the near-miss revealed two problems. First, because the F-4s' clearance did not define the specific low-level route entry and departure points or times, this information was not available to the Flight Service Station (FSS). They were then unable to pass it to civilian pilots in the area. The Flight Information Publication (FLIP) requires that pilots will file a flight plan for all VFR low altitude operations for transmittal to the tie-in FSS. The flight plan will include points and times of entry and exit. The other problem area was that the F-4s descent was over a well-known, light aircraft navigation route.

Review your low-level routes ... their entry and exit points. Know where the high hazard points are. Most importantly ... look around, especially in those areas where you're not expecting conflicting traffic and file and adhere to a flight plan.

RELIEF IS AS CLOSE AS ...

During the return portion of a recent joint service exercise mission at FL 330, an F-111 aircrew noted a loss in cabin pressure. The rate of loss started slowly but soon began to increase. The aircrews selected 100% oxygen on their regulators. Shortly thereafter, the navigator reported difficulty in breathing (restricted air flow). An immediate descent was initiated to 7,000 feet. Passing FL 220, the navigator reported increased difficulty in breathing and symptoms of hypoxia. Once level at 7,000 feet, the navigator recovered and an uneventful landing was made at a divert base.

In a similar case, an A-7D experienced cabin pressure fluctuations while climbing at FL 250. On level-off at FL 250, the cabin altitude also indicated 25,000 feet. The pilot then began to experience symptoms of hypoxia and selected 100% oxygen. He got no flow from the regulator and noticed a pressure of zero with a quantity of 8 liters. The pilot switched back to normal and, noting increasing symptoms of hypoxia, activated his emergency oxygen system and started an immediate descent. The hypoxia symptoms disappeared at 10,000 feet and an uneventful return to base was accomplished.

In both cases, the aircraft's pressurization and oxygen system malfunctioned -- with one predictable result -- hypoxia. In both instances, the aircrews reacted correctly. However, the A-7 pilot added something extra to his handling of the situation.

Early life support training may have introduced you to the "bailout bottle" and its use after ejection. The Dash One covers the emergency oxygen system used in your particular aircraft. Refer to it and examine the other possible uses of the system -- i.e., smoke and fumes, etc. Relief is as close as the green apple.

AW, IT WASN'T THAT CLOSE!!!

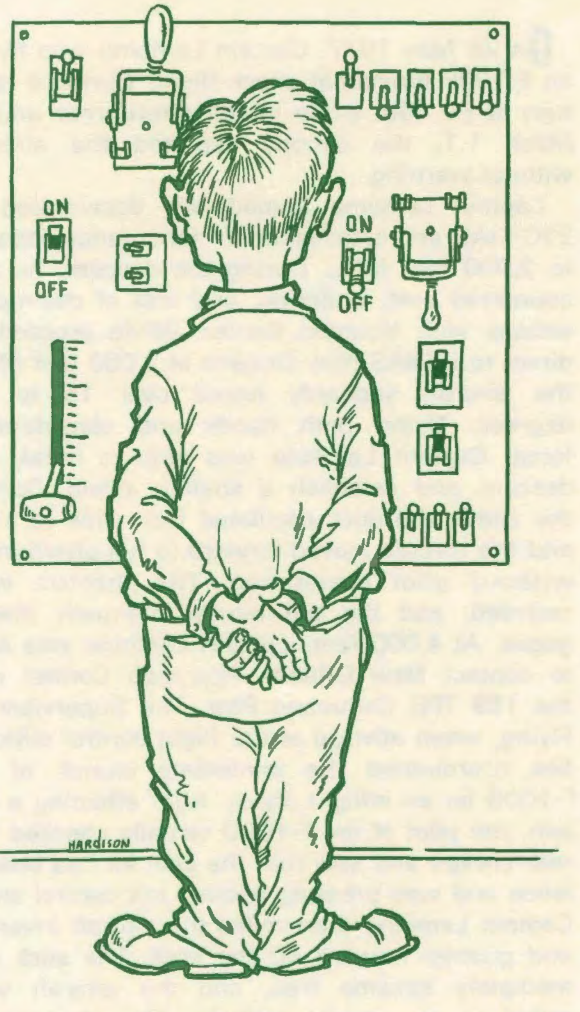
In many areas of the country, VFR low-level training routes and SAC Olive Branch routes intersect and conflicts are definitely possible. Several months ago, a HATR was submitted by a B-52 crew due to a near-miss with two ANG F-100s. Each aircraft was operating properly on its respective route, and the near-miss occurred where the routes intersect. The F-100s saw the Buff first but did not take evasive action, since it appeared they would pass without problems. The B-52 took evasive action after seeing the F-100s and estimated miss distances of 200 and 500 feet. Remember that the big fellows have restricted visibility and maneuverability. It would make a lot of sense to look twice for conflicting traffic at the points where it is most likely to be. The Buff co-pilot had the VFR low-level route and its intersection with the Olive Branch route marked on his chart and anticipated a conflict. For separation, AFR 60-16 emphasizes "well clear" and lists 500 feet as a guide. Let's avoid the tendency to be at 500 feet exactly -- that's not what the reg implies.

I WONDER WHAT THIS SWITCH DOES...?

When you were young, do you remember the fascination you had with airplanes and the people who flew them? At least a certain measure of this interest is shared by the general public and the members of the Air Force not directly associated with flying. When presented with a shiny fighter aircraft, the urge to touch and fiddle is almost insurmountable.

At a static display base a short time ago, the aircrew arrived at their aircraft at the opening of the show to find a small group of spectators already there. Due to the distraction caused by answering questions from the people, the crew had trouble accomplishing all steps of their static display checklist. Before the crew could disconnect the battery cable, one of the spectators removed the protective tape over a switch and activated it, firing an explosive bolt holding the tail hook. Fortunately, the arresting hook safety pin prevented the hook from falling completely.

The potential for a serious incident or accident is obvious. When you are charged with taking an aircraft on static display, arrive at the aircraft early, expect the worst, and prepare for it -- then it probably won't happen.



FOOD FOR THOUGHT

We should all bear one thing in mind when we talk about a troop who rode one in. He called upon the sum of all his knowledge and made a judgement. He believed in it so strongly that he knowingly bet his life on it. That he was mistaken in his judgement is a tragedy, not stupidity. Every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgement, so a little bit of all of us goes in with every troop we lose.

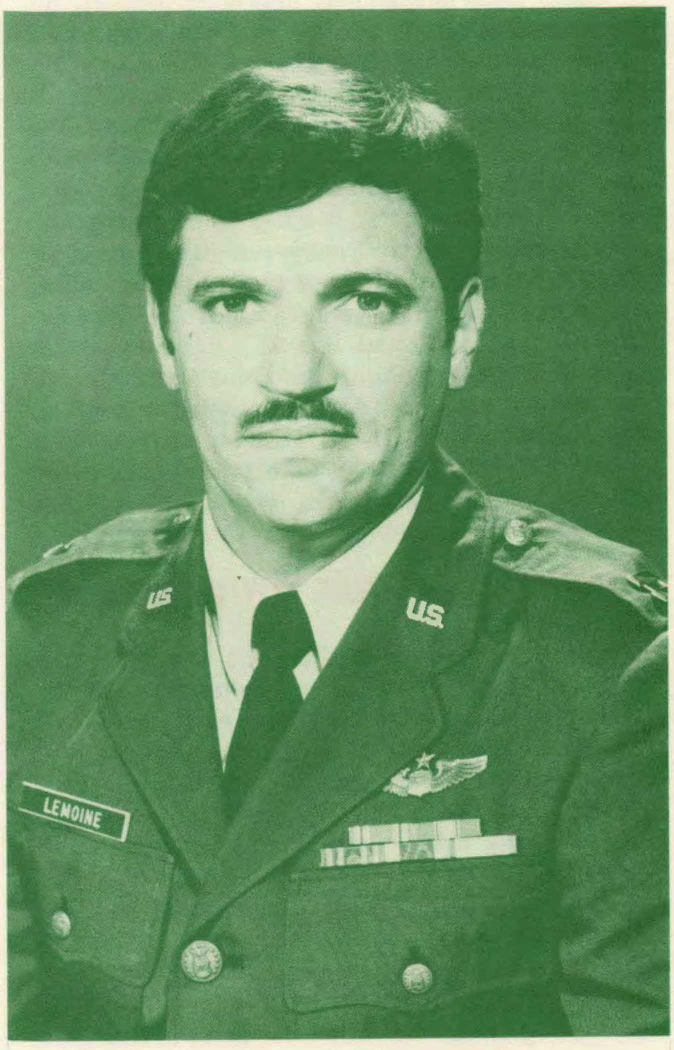
(Author Unknown)

Aircrew of Distinction

On 26 May 1977, Captain Lemoine was flying an F-100F functional check flight. During a right turn at FL 450, while in full afterburner and at Mach 1.1, the canopy departed the aircraft without warning.

Captain Lemoine immediately decelerated to 220 KIAS and established an emergency descent to 2,000 feet MSL. During the descent, he encountered cold, buffeting, and loss of communications with Houston Center. While proceeding direct to USNAS New Orleans at 2,000 feet MSL, the aircraft suddenly nosed over 15 to 20 degrees. Using both hands and considerable force, Captain Lemoine was able to break the descent and establish a shallow climb. During the climb, the stick oscillated from side to side, and the throttle moved forward to full afterburner without pilot assistance. The throttle was retarded, and the afterburner manually disengaged. At 4,000 feet, Captain Lemoine was able to contact New Orleans Approach Control and the 159 TFG Command Post. The Supervisor of Flying, when advised of the flight control difficulties, coordinated the immediate launch of an F-100D for an inflight check. After effecting a rejoin, the pilot of the F-100D visually checked the rear cockpit and saw that the seat kit had broken loose and was pressing against the control stick. Captain Lemoine then rolled the aircraft inverted and pushed forward on the stick. The stick immediately became free, and the aircraft was rolled to an upright attitude. The chase pilot made another visual check of the aircraft and observed the seat kit resting against the headset. After verifying this by the rearview mirror, Captain Lemoine pushed forward on the stick and observed the seat kit depart the aircraft. The emergency terminated with an uneventful landing at USNAS New Orleans.

Captain Lemoine's superior airmanship and cool reaction to an extremely stressful situation resulted in the saving of a valuable fighter aircraft and prevented possible injury to himself. Captain Lemoine's actions qualify him as the Tactical Air Command Aircrew of Distinction.



Capt Robert F. Lemoine
159 TFG (ANG)
USNAS New Orleans, LA

TAC SAFETY AWARDS

Ground Safety Award of the Quarter

1st Lt Ann E. Schmoyer

First Lieutenant Ann E. Schmoyer, 35th Supply Squadron, 35th Tactical Fighter Wing, George Air Force Base, California, has been selected to receive the Tactical Air Command Ground Safety Award of the Quarter for the third quarter 1977. Lieutenant Schmoyer will receive a desk set and letter of appreciation from the Vice Commander, Tactical Air Command.

Crew Chief Safety Award

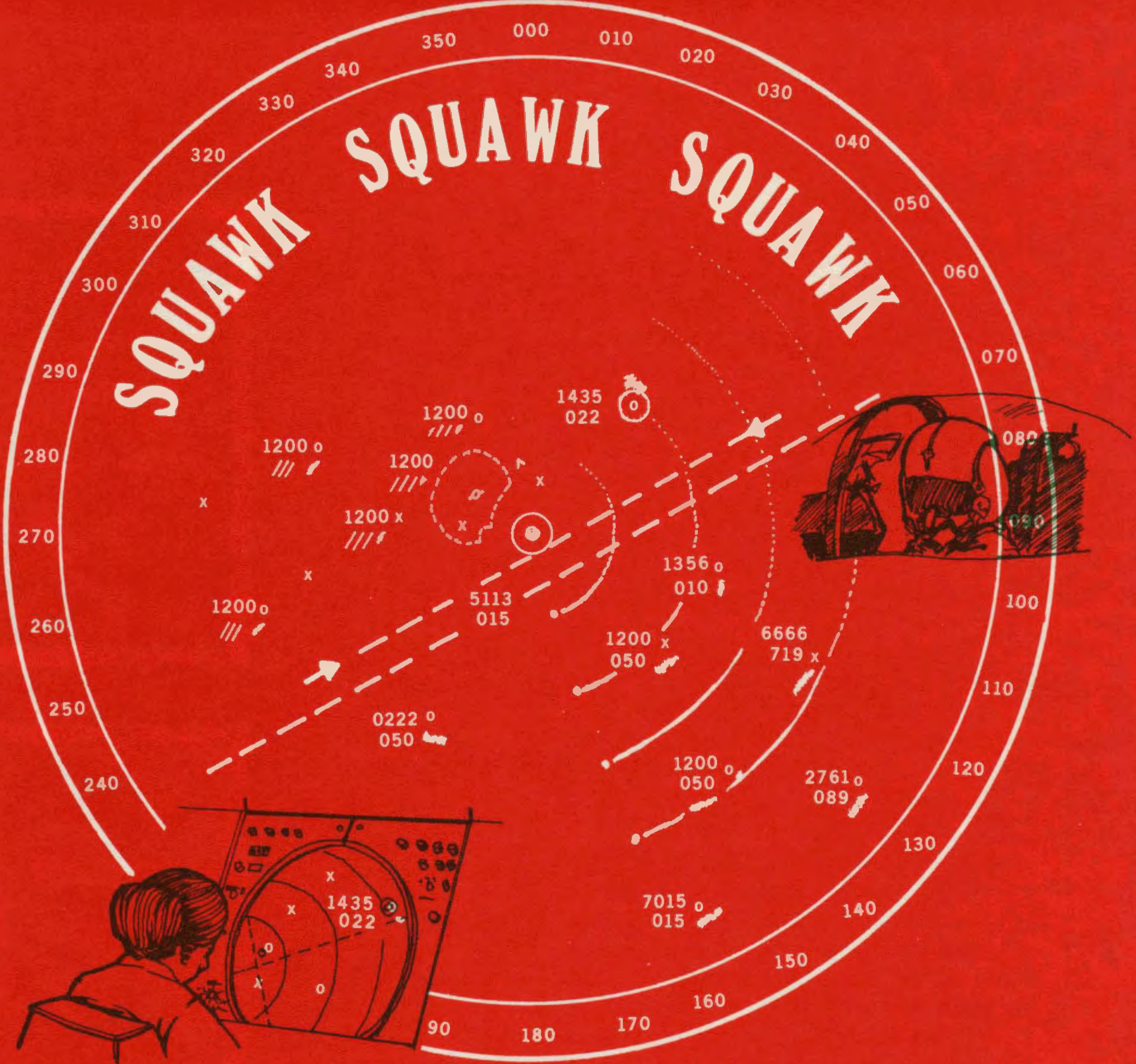
SSgt Michael J. Pullman

Staff Sergeant Michael J. Pullman, 1st Equipment Maintenance Squadron, 1st Tactical Fighter Wing, Langley Air Force Base, Virginia, has been selected to receive the Tactical Air Command Crew Chief Safety Award for this month. Sergeant Pullman will receive a desk set and letter of appreciation from the Vice Commander, Tactical Air Command.

Individual Safety Award

TSgt Leland G. Coon

Technical Sergeant Leland G. Coon, 4502d Consolidated Aircraft Maintenance Squadron, 602d Tactical Air Control Wing, Bergstrom Air Force Base, Texas, has been selected to receive the Tactical Air Command Individual Safety Award for this month. Sergeant Coon will receive a desk set and letter of appreciation from the Vice Commander, Tactical Air Command.



By MSgt Thomas W. Maynard
TAC Comm Area/Ops and Procedures
Langley AFB, VA

Webster tells us, "to squawk" is to utter a loud, harsh cry. We commonly refer to squawking as complaining or protesting in a loud voice. In the airplane business, we immediately think of the transponder when we hear the word "squawk." All pilots and air traffic controllers have heard or said the words, "SQUAWK VFR" or "SQUAWK ZERO FOUR ONE FOUR," but do we all understand what happens in an automated air traffic control environment when we flip the transponder on and dial in the appropriate code?

Other than the equipment needed to keep the airplane in the air, the transponder is rapidly becoming one of the most important pieces of equipment on the aircraft. Let's drop back to day-one for the transponder and see how it developed. Since Mode 3 is used for air traffic control, all comments pertaining to the transponder will be strictly related to Mode 3.

The primitive transponder can be compared to primitive man because both had a very limited capability for communicating. Primitive man could utter a few grunts and groans, and our infant transponder could just turn on and off. Therefore, we developed such phraseology as "A12345, SQUAWK STANDBY," "A12345, SQUAWK NORMAL," and "A12345, RADAR CONTACT."

Just as man's vocabulary increased, the transponder also developed 64 codes to go along with the on/off switch. As man could now say, "EAT, DRINK, RUN, FIGHT, etc," the transponder could tell us "climbing, descending, IFR, VFR, etc." When man wanted to talk, he could raise his hand or throw a rock, so the transponder developed an identification feature and an emergency switch. Air traffic controllers could not be outdone by man or transponder, so we also updated our phraseology with such items as "A12345, SQUAWK MODE 3, CODE 04, IDENT" and "A12345, RADAR CONTACT." In the same manner that man began multiplying and his vocabulary began growing, the transponder made some improvements to keep up with rapidly increasing aviation -- a capability for 4,096 codes was developed and, shortly thereafter, altitude readout information (Mode C) came along.

While the transponder was getting its Mode C, man was adapting a new invention, the computer, to aviation. He figured out that by using flight plan information, along with the radar information, and by assigning one of these 4,096 codes to that same aircraft, the computer could accurately track and predict the aircraft movement. Now the computer knows where the aircraft is supposed to go; the radar target shows that someone is on that route; and the discrete beacon code proves that it is one and the same. Additionally, the Mode C shows whether the aircraft is climbing to, descending to, or at the assigned altitude. Again, we had to change some phraseology: "A12345, SQUAWK FOUR ZERO THREE ONE!" and "A12345, RADAR CONTACT, VERIFY CLIMBING/DESCENDING TO/AT (assigned altitude)." Because everything was working out so well, man decided that he would expand the system to make the flying environment safer. He developed: conflict alert, low altitude alert, ground speed readout, track prediction, automatic departure time, and many more benefits.

It appears that we have done just about everything we can. That's the good news. Unfortunately, with all of the good must come some bad. Let's explore some of the bad situations.

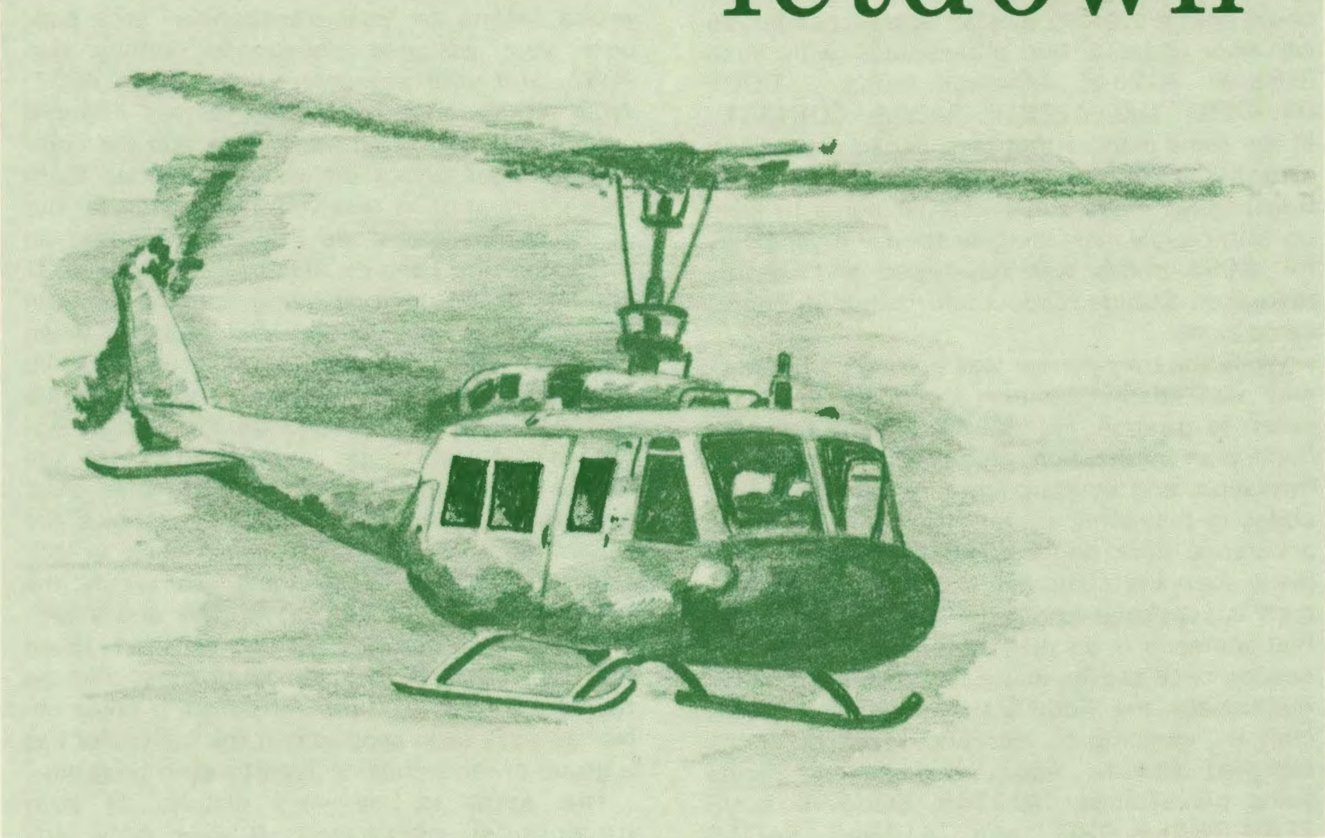
How many times have you called, "BLANK DEPARTURE, A12345, AIRBORNE." Departure Control asks you to check your squawk, and sure enough, the transponder is in the "Off" position. Now that's not too bad unless you're in an area which is automated. As soon as you turn your transponder on, the computer sees the squawk, automatically "departs" the aircraft at that time, and continuous flight plan information is then processed -- three or four minutes behind actual flight time. The computer will eventually catch up, and all the flight plan data will again be updated.

A much worse situation is an inadvertent wrong setting on your transponder. Let's suppose your assigned transponder setting was 4032, and your equipment was set on 4031. What great harm could this cause? Thought you'd never ask! What happens is that the computer assigns codes on availability when flight plan information is received. It's not too far out of line to envision Code 4032 assigned to an F-15 departing Langley AFB, VA, and Code 4031 assigned to a United jet going from Washington National to Miami. Guess what happens when the ARTS system at Norfolk picks up the F-15 squawking 4031? The computer thinks it's the United at Washington, and on the Norfolk Approach Control scope a data block for the United flight appears with no flight plan data; and the Washington Center scope shows the United flight as being a departure when, in fact, he's still awaiting passengers. To rectify the situation, the controllers at Norfolk and Washington have to get together and get the F-15 on the right code. The United flight must then be reentered into the computer before it takes off. Not an easy task; especially if the controller has a group of recoveries or departures in progress.

The point is, be very critical of your transponder operations. If you note any malfunctions, make sure maintenance checks it out. If it continues, call the local ATC people and see if it could be their equipment.

I think you can see that man, transponder, and computer have made tremendous progress in trying to create a safe air traffic environment; and I hope everyone has learned a little about the importance of the transponder in an automated air traffic control society. Maybe we can stop the controllers from squawking (Webster) when a transponder inadvertently gets set on the wrong code, or the pilot from squawking (common usage) when he has to make two or three code changes to get the computer on the right track; and let our little friend do the squawking for all of us.

autorotations can be a real letdown



By Capt John H. Schramm
20 SOS/1 SOW
Hurlburt Fld, FL

As a helicopter pilot, you're probably pretty certain that should something go wrong, there's always the helo's autorotational ability to get you safely back to terra firma; however, that lifesaving autorotation may also be the reason that your aircraft and crew were destroyed. The capricious nature of the autorotation is readily apparent when we look at the results of an Army study covering autorotation-related mishaps over a 2-1/2 year period. In this study, a mishap was defined as any incident or accident in which damage was sustained during, and caused by, the touchdown from an autorotation. During that period there were 1,195 mishaps, 709 during emergency autos and 486 during practice autos. These mishaps accounted for 82 fatalities, 606 injuries, and $82 million in damages and equipment losses.

In addition, when emergency autorotations were examined, a success ratio could be determined. This ratio is the number of successful autos, defined as those encountering no additional damage during the touchdown, for each auto in which additional damage was sustained. Figure 1 reflects the Army results compared to those of the other services over a comparable period.

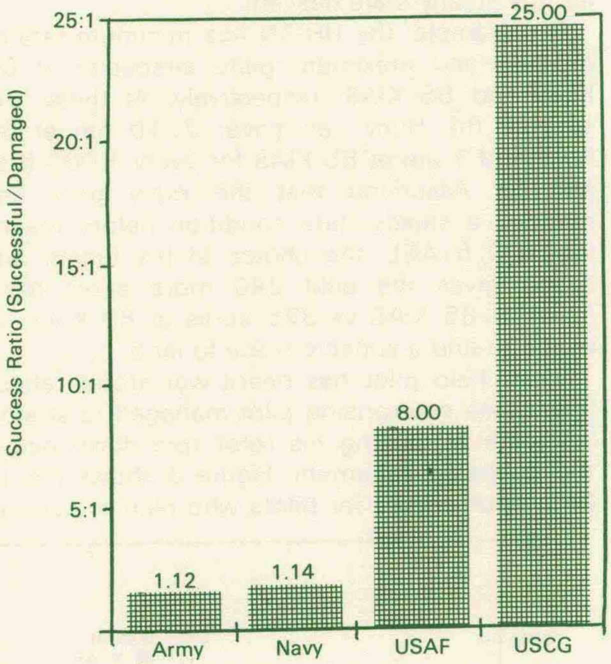


Figure 1

The difference in the USAF and USCG ratios reflects the use of higher altitudes and flight over terrain more hospitable to a successful landing. Additionally, the Army and Navy ratios include intensive student training. These ratios reflect the difficulty of performing an autorotation, especially at low altitudes and over poor terrain.

Perhaps a short comparison between the way a helicopter and a fixed-wing aircraft accomplish a power-off landing is in order. A fixed-wing pilot making a power-off approach has a two-step problem. First, he dissipates his altitude and then, once safely on the ground, he can lose his airspeed without regard to altitude control. In contrast, the helo pilot must dissipate both his altitude and airspeed simultaneously to reach an altitude and airspeed that allows the energy stored in the rotor system to be used to achieve a safe landing, at the same time he is trying to avoid fences, trees, rocks, and various species of horse, cow, and pig. It is no wonder that the Army discovered that 40% of all accidents during the study period involved autorotations.

Looking at the information, the autorotation becomes very important in the sequence of events leading to an accident. A well-executed auto can mean the difference between a short wait in some field until maintenance arrives or a crumpled wreck. The following is a short look at the autorotation. It is not meant to tell you how you should do an auto, but rather to review what is happening when you move the sticks in hopes that we can improve your success ratio.

To begin, an autorotation can be broken into three distinct phases: the entry, a steady-state descent, and the flare and touchdown. During the entry phase, a number of conditions must be corrected by the pilot. The aircraft yaws to the left as the torque is removed from the rotor system; simultaneously, the rpm begins to decay. The yaw caused by the loss of torque can generate pitching and rolling moments that must be corrected quickly if the pilot plans to maintain control of the helicopter. This is especially true during engine failure at high speeds.

The rate at which the rpm decays is directly proportional to the amount of torque applied to the system and is inversely proportional to the rotor system inertia. At high power settings, the rate of decay can be so rapid that it may take only a couple of seconds for the rpm to fall below the published minimum. To recover and prevent further decay, the pilot must rapidly lower the collective and apply aft cyclic to maintain rpm. In this respect, high gross weights, high density altitudes, OGE hover, and high airspeeds (near VNE) become very critical entry conditions because of the high power settings they require.

From the standpoint of initial rpm decay, a high inertia rotor system is desirable in that it resists that decay; however, its high inertia also tends to cause a lag in collective inputs making control of the rpm difficult. In addition, it is also slow to build rpm during the flare, although a high rpm may eventually be reached.

As far as the rotor is concerned, the following has happened. First, the pilot lowered the collective, reducing the lift from the rotor but reducing the amount of drag as well. This reduction in drag caused the lift-drag vector to move farther forward to a more vertical position. As the rotor began to autorotate, the lift-drag vector moved farther forward, past 90°, producing more lift and driving the rotor.

autorotations can be a real letdown

Now that you've managed to get the helo into an autorotation, you're in the second phase of the maneuver, the steady-state descent. This phase is characterized by zero torque and constant airspeed, rotor rpm, rate of descent, and heading. It generally takes 5 - 8 seconds to reach this condition. During this portion, airspeed, rpm, and aircraft attitude can greatly affect the performance of the helicopter.

Just like a fixed-wing, a helicopter has one speed for minimum rate of descent and one speed for maximum glide distance. Helicopter descent performance is a function of airspeed and is essentially unaffected by gross weight and density altitude. However, small changes in airspeed can result in large changes in the rate of descent (see Figure 2).

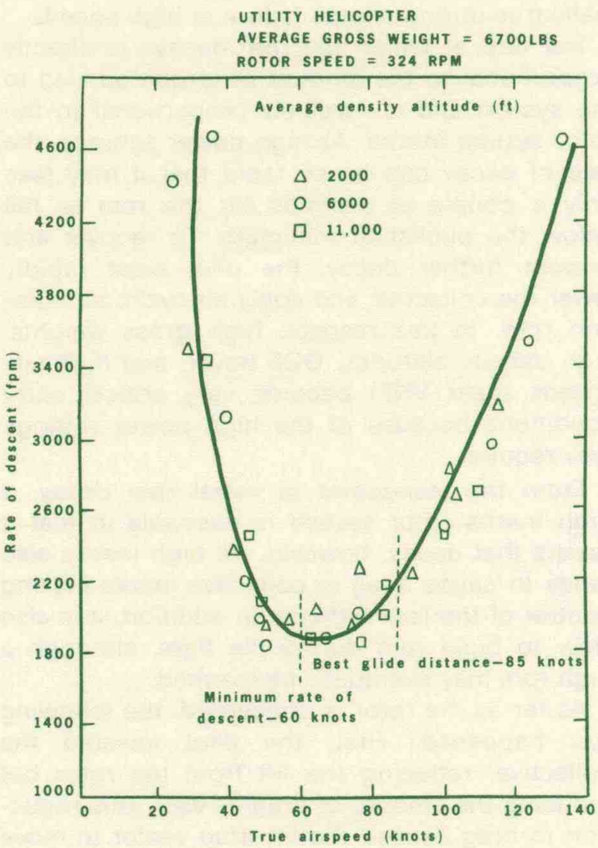


Figure 2. Autorotational rate of descent versus airspeed. (US Army data)

Most single-rotor helicopters achieve a descent angle of about 17° at minimum rate of descent airspeed and from 10° to 14° at maximum glide distance airspeed; the absolute minimum rate of descent generally falls between 1400 - 2200 fpm and best glide performance is roughly 1 mile for every 1,000 ft of altitude during the steady-state descent.

For example: the UH-1N has minimum rate of descent and maximum glide airspeeds of 60 KIAS and 85 KIAS, respectively. At these airspeeds, the Huey can cover 7/10 nm at 60 KIAS and 1 nm at 85 KIAS for every 1,000 ft of altitude. Assuming that the Huey pilot has reached a steady-state condition before reaching 500 ft AGL, the choice of the higher airspeed gives the pilot 340 more acres (666 acres at 85 KIAS vs 326 acres at 60 KIAS) in which to find a suitable place to land.

Every helo pilot has heard war stories about how some enterprising pilot managed to stretch his glide by pulling his rotor rpm down below the published minimum. Figure 3 shows this to be a poor choice for pilots who plan to survive.

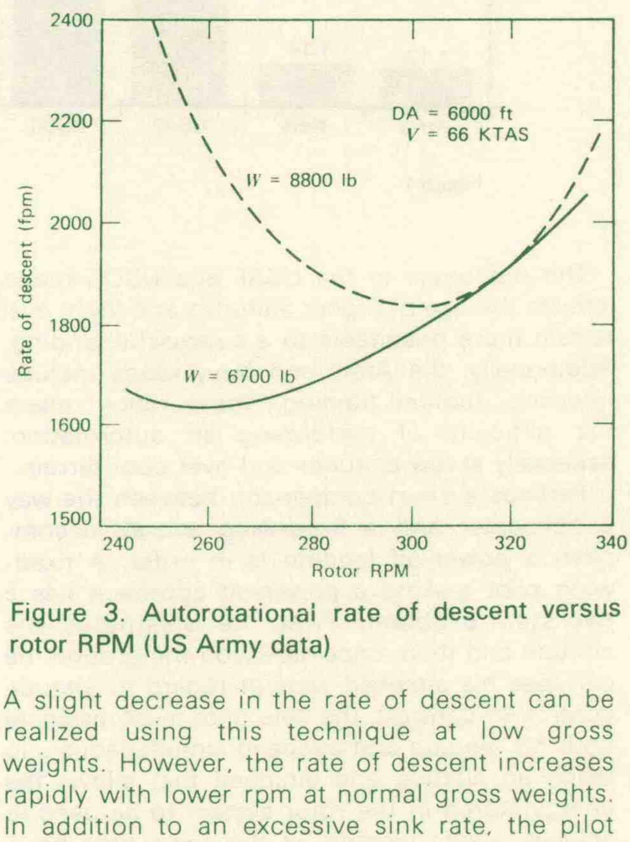


Figure 3. Autorotational rate of descent versus rotor RPM (US Army data)

A slight decrease in the rate of descent can be realized using this technique at low gross weights. However, the rate of descent increases rapidly with lower rpm at normal gross weights. In addition to an excessive sink rate, the pilot must also contend with the problem of regaining the lost rpm during the flare. Figure 3 also shows that if the rpm is allowed to increase above the recommended autorotational rpm, the rate of descent will also increase; therefore, control of the rotor rpm is critical to descent performance.

Another error that the pilot can make is to let the helo enter an unnoticed sideslip. Looking at Figure 4, the effect of sideslip on the rate of descent is readily apparent. Not only does sideslip increase the rate of descent, but as airspeed increases, the effect is more significant. By the way, the ball is not a linear indicator of sideslip.

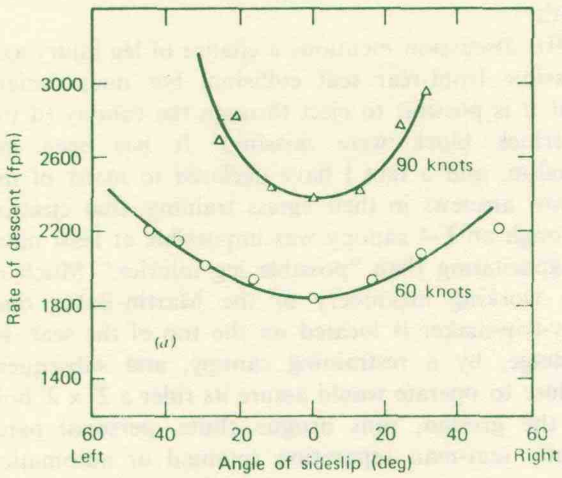


Figure 4. Autorotational rate of descent versus slidelsip angle (US Army data)

As airspeed changes, the displacement of the ball from center is not constant for a constant amount of sideslip (see Figure 5).

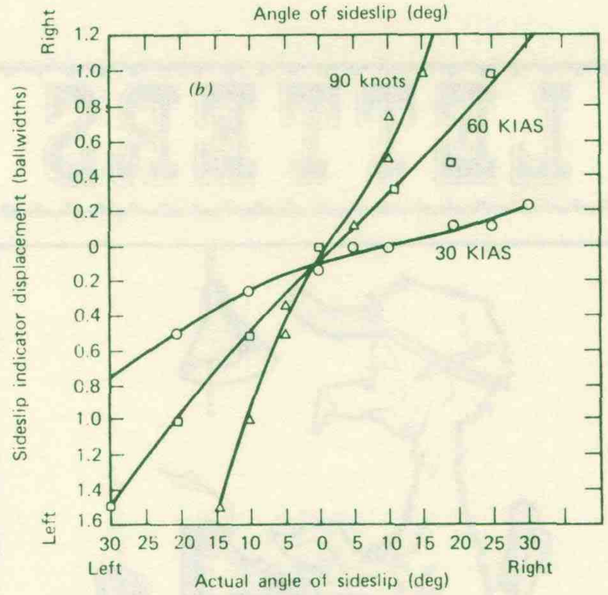


Figure 5. Ball displacement from centered versus sideslip angle (US Army data)

One final thing on the steady-state descent: rate of descent increases during turns; however, turns with angles of bank less than 20° have minimal effect on the rate of descent.

Now that you're approaching the ground (and at a rapid rate, I might add), it's time to think about slowing that airspeed and rate of descent to an acceptable level, usually near zero. The cyclic flare meets both requirements nicely. First, as the rotor is tilted aft, the lift vector is also tilted aft, changing from a driving force to a braking force, slowing the helicopter. Second, flaring the rotor effectively increases the angle of attack on all blades, regardless of cyclic pitch. This change in angle of attack causes an increase in the amount of lift and reduces the rate of descent. Third, the additional lift also increases the autorotational drive of the rotor, increasing the rpm unless positive collective is used to add drag on the rotor. In addition, the flare also causes the fuselage to pitch up, increasing the fuselage angle of attack and thereby the fuselage drag. The amount of drag can be significant, and therefore, the fuselage shape can greatly affect the flare performance of the helicopter.

At the conclusion of the flare, having reduced the airspeed and rate of descent to an acceptable level, the pilot must apply forward cyclic to bring the helo to a near-level attitude. From this point on, the rotor rpm is being sacrificed to generate lift nearly equal to the aircraft weight to control the rate of descent. Should the rpm decay below a point where adequate lift can be developed, the helo will begin to fall with disastrous results. At this point it becomes essential to emphasize that the helo must be in as near a level attitude as possible. No matter how severely it may strike the ground, the damage will be less if a level attitude is maintained. Additionally, as the collective is increased to cushion the landing, the friction caused by the additional load on the main transmission bearings will cause the fuselage to follow the rotor's direction of rotation, requiring additional right pedal to maintain heading.

Finally, while any autorotation should be done in accordance with the flight manual, which always recommends forward airspeed, a vertical auto is just as sound aerodynamically; however, the pilot must be willing to accept excessive rates of descent.

That does it. The autorotation can be a lifesaver or a life-taker. It all depends on how well the pilot understands and controls what's happening to his aircraft. ➤

LETTERS

Editor

Your "The Two Thousand Dollar Quarter" CHOCK TALK article on page 26 of Sep 77 TAC ATTACK referenced AFR 66-31 as requiring "bunny" suits when performing intake inspections. AFR 66-33, Prevention of Foreign Object Damage to Aircraft Missiles or Drones," is the regulation which requires "bunny" suits.

Capt Bruce C. Balbin
1 SOW/Quality Control
Hurlburt Fld, FL

Bruce

Oops, you caught us with our regs down. Thanks for bringing it to our attention.

By the way -- since you know a lot about maintenance, how 'bout an article.

ED

Editor

The July 1977 issue of TAC ATTACK contained the article titled, "F-4 Ejection -- With a Missing Interlock Block Interdictor Pin," by Maj William M. Douglass. It was an excellent account of "what if's" covering the F-4 sequence timed ejection. However, I believe his one paragraph discussion of "what if you eject through an F-4 canopy" falls short of the whole truth.

His discussion mentions a chance of leg injury and possible front-rear seat collision, but does declare that it is possible to eject through the canopy (if the interlock block were missing). It has been my opinion, and a fact I have declared to many of my fellow aircrews in their egress training, that ejection through an F-4 canopy was impossible at least more incapacitating than "possible leg injuries." Much of the working machinery of the Martin-Baker one-way-trip-maker is located on the top of the seat. Its damage, by a restraining canopy, and subsequent failure to operate would assure its rider a 2' x 2' hole in the ground, sans drogue chute, personal parachute, seat-man separation (manual or automatic), etc.

This might be an interesting question to pose to the Martin-Baker representative at San Antonio ALC.

Maj Davy M. Bass
4485 TS/Life Support Officer
Eglin AFB, FL

Davy

We had checked with the Martin-Baker representative prior to publication of the article. But just to make sure we understood what he said, we called him again. As we stated in the article, the seat will go thru the canopy and all the evidence from previous seat-thru-canopy ejections indicates that the seat top will withstand the impact. Most of these were inadvertent ejections during maintenance in hangars, and the seat components functioned normally.

We are not saying that the seat occupant will be uninjured. Injury to the ejectee will be dependent upon the breaking pattern of the canopy.

So, it is possible to eject thru the canopy -- not that we'd want to make it a habit. But it could be done as a last resort.

ED

TAC TALLY

	TAC			ANG			AFR		
	OCT	thru OCT		OCT	thru OCT		OCT	thru OCT	
		1977	1976		1977	1976		1977	1976
MAJOR ACFT. ACCIDENTS ►	1	24	30	0	9	8	0	1	2
AIRCREW FATALITIES ►	2	26	15	0	3	4	0	0	1
TOTAL EJECTIONS ►	0	21	24	0	9	5	0	1	1
SUCCESSFUL EJECTIONS ►	0	16	18	0	6	5	0	1	0

TAC'S TOP "5" thru OCTOBER

TAC FTR/RECCE	
class A mishap free months	
24	4 TFW
18	474 TFW
16	56 TFW
13	67 TRW
12	35 TFW

TAC GAINED FTR/RECCE		
class A mishap free months		
67	127 TFW	ANG
33	156 TFG	ANG
28	117 TRW	ANG
22	434 TFW	AFRES
22	162 TFTG	ANG

TAC/GAINED Other Units		
class A mishap free months		
123	182 TASG	ANG
103	135 TASG	ANG
95	507 TAIRCW	TAC
92	193 SOG	ANG
84	110 TASG	ANG

CLASS A MISHAP COMPARISON RATE 76/77

(BASED ON ACCIDENTS PER 100,000 HOURS FLYING TIME)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TAC	76	2.9	8.6	9.0	7.3	8.0	8.1	6.9	6.8	7.5	8.1	7.4	7.0
	77	0.0	5.3	5.8	5.4	5.1	5.0	5.6	5.1	5.9	5.5		
ANG	76	10.5	5.0	6.5	4.8	3.8	3.9	3.4	3.5	3.7	3.9	4.0	4.1
	77	0.0	3.1	1.9	5.7	4.4	5.4	5.4	5.4	5.3	4.8		
AFRES	76	0.0	0.0	11.3	8.1	6.1	5.0	4.2	7.2	6.4	5.7	5.3	7.3
	77	0.0	0.0	10.1	7.4	5.8	4.7	4.0	3.5	3.0	2.7		

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