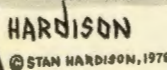


## TAC Attack

BACK

SEPTEMBER 1978



FLEAGLE, THIS ISSUE  
 IS FOR THE BIRDS.



TACTICAL AIR COMMAND

# TAC ATTACK

SEPTEMBER 1978 VOL 18 NO 9

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TACRP 127-1

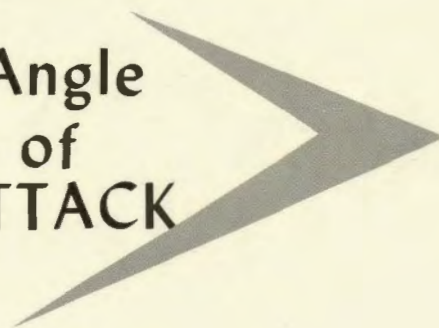
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## Angle of ATTACK



## BIRDSTRIKES

The problem of collisions between birds and aircraft has been with us since we began flying. The results of these collisions range from insignificant damage to loss of aircraft -- passengers -- and aircrews. We have made advances in preventing birdstrikes and in lessening the associated damage -- we need to do more.

The fall migration season is the most hazardous time of year for birdstrikes. Historical statistics indicate that 35 - 40% of all strikes occur in the Sep - Nov time period. Between now and the end of the year, TAC aircraft will be involved in 25 or more birdstrike incidents. The potential cost of these mishaps in men and materiel justifies our efforts in reducing this hazard.

This issue of TAC ATTACK is devoted to an examination of the hazard -- both the problems and solutions. An analysis of incidents from 1974 to 1977 involving tactical fighters and trainer aircraft helps explain when and where birdstrikes occur. Other articles are devoted to helping the aircrews and base environmental personnel understand the reason birds are a problem at the airdrome and methods of bird control. Finally, techniques for avoiding birds while airborne are included.

The material in this magazine will not prevent birdstrikes from happening. People, making use of the information and suggestions contained in the articles, are the key to the prevention process. That innocent looking duck, crow, or buzzard may be waiting for you on your next low-level. Read and heed!

**RICHARD K. ELY, Colonel, USAF**  
Chief of Safety



This issue of TAC ATTACK is devoted to the problem of birdstrikes. The 4-year analysis was done by the editor, and all the articles were written, rewritten, and edited by (guess who) the editor. Sources for most of the information are not identified by footnote since most of the data was available from more than one source, and I'm certain footnotes would only detract from the flow of information. References are listed on Page 29. Anyone with specific questions on the content of any article is encouraged to contact the Editor, Autovon 432-2937.

birdstrikes the problem

# BIRDSTRIKES THE PROBLEM

"bird/berd/n ME, fr. OE-bridd : Any of a class (Aves) of warm-blooded vertebrates distinguished by having the body more or less completely covered with feathers and the forelimbs modified as wings" -- Certain species appear to have an affinity for self-destruction against other airborne objects -- most notably aircraft.

There are currently about 8,300 species of birds in existence. These birds, and their ancestors, were the sole users of the air above the earth until man became involved in flight with kites, balloons, dirigibles, and airplanes. When the Wright brothers and others began experimenting with powered flight of heavier-than-air machines, the stage was set for head-on confrontation. Since that time, man and bird have had more conflicts than anyone cares to remember.

The first recorded downing of an aircraft by a bird occurred in California in 1912, when a seagull jammed the control cables of a Curtiss Flyer. The unfortunate pilot became the first birdstrike fatality. The conflict has continued until today with increasing frequency of collisions, costly damage to aircraft, and aircrew injuries. Several years ago, an F-111, on a low-level route, experienced a sudden implosion of the windscreen. Both crewmembers ducked

under the glare shield, but the turbulence, noise, and flying debris were so severe that control of the aircraft was impossible. The crew ejected successfully. The formidable foe which managed to shatter the windscreen and bring down the F-111 was later identified as the feared White-throated Swift -- whose average weight is ONE AND ONE-FOURTH OUNCES!

Inflation and sophistication have driven the price of our hardware up dramatically. One F-15 birdstrike last year resulted in over \$160,000 damage to an engine. It is obvious that serious efforts aimed at reducing the birdstrike hazard will produce a substantial savings in material alone. The prevention of only one fatality would more than justify our efforts.

In an attempt to gain a better understanding of the birdstrike hazard, especially for tactical fighter-type aircraft, I conducted an analysis of birdstrike incidents from Jan 1, 1974 to Dec 31, 1977, involving the A-7, A-10, A-37, O-2, F/RF-4, F-5, F-15, F-100, F-105, F/FB-111, T-37, and T-38 aircraft. The analysis did not yield any particularly surprising results, but it did serve to reinforce data gathered in previous studies; and it did serve as an up-to-date look at the problem involving these aircraft.

The analysis included all TAC and TAC-gained



# BIRDSTRIKES, THE PROBLEM

ANG and AFRES aircraft. Air Training Command aircraft were used because of their performance similarities to TAC aircraft and as a comparison also. Where significant differences between ATC and TAC aircraft occurred in the computations, they were listed separately for clarity. Several differences did exist which reflected divergent methods of aircraft operations.

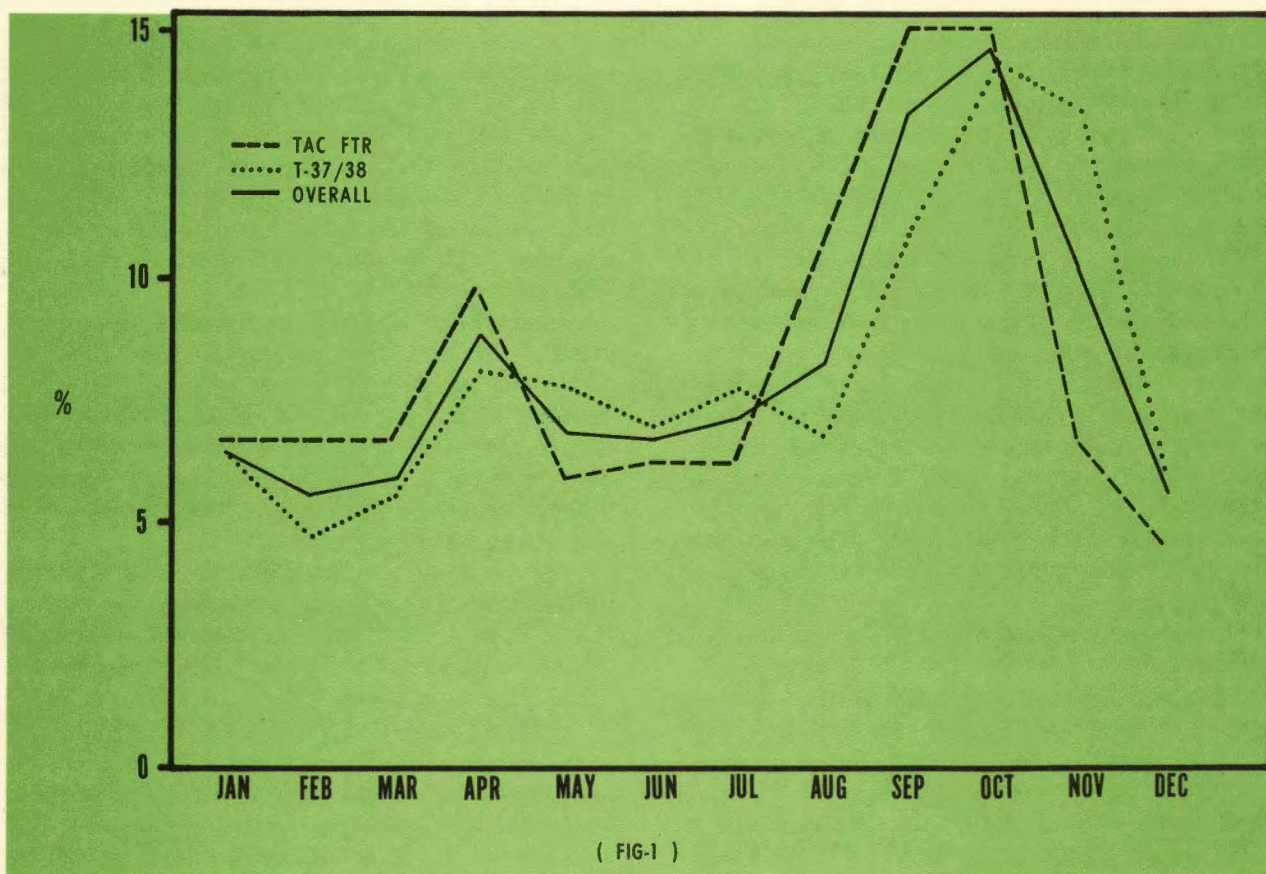
In the period from 1974 to 1977, a total of 593 birdstrike incidents were reported; 285 to TAC aircraft, and 308 to T-37 and T-38 aircraft. Damage from these incidents totalled more than \$5.3 million and included two destroyed aircraft and two aircrewmember fatalities.

The following charts and graphs provide a look at some of the variables in the analysis of these incidents. The first variable to be examined will be time of year.

As you can see from Figure 1, there are two peaks in the incidence of birdstrikes: one occur-

ring in April; with the major peak in the fall months -- Sep, Oct, and Nov. Overall, 38% of all birdstrikes occurred in these 3 months, the time period which corresponds to the major fall migration. In 1973, 36% of all USAF birdstrikes occurred during Sep - Nov. The figures for 1971 and 1970 are 40% and 38%, respectively -- the fall season thus being the most hazardous time of year. One of the reasons birdstrikes are more prevalent during the fall is that, in addition to the migration, many of the birds also winter in the Southern U.S. -- where many of the tactical air forces and training bases are located. The article on bird migration explains this subject in more detail.

A look at where birdstrikes occur by geographic location provides a less-than-startling realization that birdstrikes happen in proportion to the intensity of flying operations in each area. Ho hum ...





## BIRDSTRIKES - GEOGRAPHIC REGION (1974-1977)

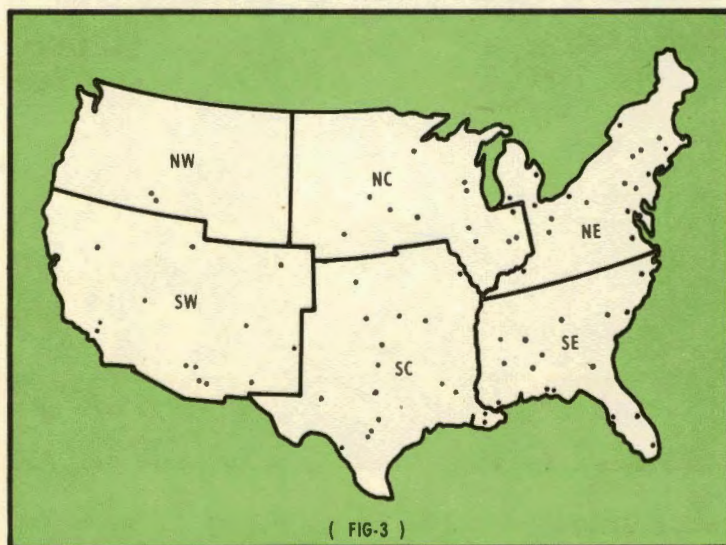
REGION	TAC FTR % / (#)	T-37/T-38 % / (#)	OVERALL % / (#)
NE	9.1% (26)	- - -	4.4% (26)
SE	33.3% (95)	27.6% (85)	30.3% (180)
NC	10.5% (30)	.3% (1)	5.2% (31)
SC	11.6% (33)	57.1% (176)	35.2% (209)
NW	8.8% (25)	.6% (2)	4.6% (27)
SW	26.7% (76)	14.3% (44)	20.2% (120)

( FIG-2 )

Figure 3 defines the geographic regions listed in Figure 2. The dots in Figure 3 indicate the location of a TAC-gained, or ATC flying unit now in being, or in being during the period of analysis. The data in Figure 2 do not necessarily reflect the incidence of birdstrikes in the vicinity of the air base. However, less than 2% occurred outside the operating area of each base. These incidents occurred during cross-country, deployments, etc.

The altitudes at which most birdstrikes occur reflect the incidence of birdstrikes at the air-drome and in the lower portions of the local

training area. Now for a few items of trivia guaranteed to win you a brew or a coke, whichever is your preference. What was the highest recorded birdstrike? Give up? Thought you would. Very few people remember that it happened over the West Coast of Africa when an airliner tangled with a "Griffon Vulture" at 37,000 ft MSL! Imagine flapping your wings hard enuf to get up there. In the U.S., the record high altitude strike involved a mallard duck at 21,000 ft MSL over Nevada in 1972. Yah, I figured ya' knew that one.



( FIG-3 )



# BIRDSTRIKES, THE PROBLEM

## BIRDSTRIKES - ALTITUDE (1974-1977)

ALTITUDE AGL	TAC FTR % / (#)	T-37/T-38 % / (#)	OVERALL % / (#)
0-500'	31.6% (90)	45.8% (141)	38.9% (231)
500-1000'	21.1% (60)	20.1% (62)	20.6% (122)
1001' AND UP	16.1% (46)	20.5% (63)	18.4% (109)
UNKNOWN	31.2% (89)	13.6% (42)	22.1% (131)

( FIG-4 )

Most of us appear to have had our close encounters of the bird kind a little lower. Figure 4 compares birdstrikes with altitude, while Figure 5 analyzes birdstrikes by phase of flight. These two charts are closely related in the information which they present. Incidentally, the altitude record during this period was an F-4 which hit a Pectoral Sandpiper (*Erolia melanotos*, to you intellectuals) at 12,000 ft! All other known strikes occurred at or below 5,000 ft AGL.

The above figures reflect the intensive traffic pattern work done in the trainer aircraft, while the TAC results are indicative of the low-altitude exposure during low-level routes and ordnance

delivery operations. Figures from previous years come fairly close to the data listed in Figures 4 and 5. The unknown figures do not allow complete analysis, but one could conclude that most of the unknown incidents would fall into the same distribution as the known incidents. Many of the unknown incidents occurred at night and to F-111 aircraft which engage in extensive low-level operations. The bottom line is -- when you're at low altitude -- watch out!

The time of day when birdstrikes occurred was difficult to determine since incident reports did not always identify the time of day other than to list "day," "night," etc. Seventy-seven percent

## BIRDSTRIKES - PHASE OF FLIGHT (1974-1977)

PHASE	TAC FTR % / (#)	T-37/T-38 % / (#)	OVERALL % / (#)
* START, TAXI TAKEOFF, GO-AROUND	6.6% (19)	26.6% (82)	17% (101)
LANDING APP, LANDING	15.1% (43)	36% (111)	26% (154)
LOW LEVEL	33.0% (94)	1.3% (4)	16.5% (98)
CLIMB/DESCENT	6.6% (19)	18.8% (58)	13.0% (77)
AIR TO GND WEAPONS DELIVERY	12.3% (35)		5.9% (35)
OTHER/UNKNOWN	26.3% (75)	17.2% (53)	21.6% (128)

\*Yes, several airplanes ate some birds while they were starting the engines and during taxi operations!

( FIG-5 )



took place during daylight hours, while nineteen percent occurred at night -- the remaining four percent happened during dawn or dusk. Figures on day and night flying hours were not available for comparison, so it's impossible to say if one period is safer than the other. During the migration season, most birds travel at night so it might be wise to curtail night activities during these periods -- especially in the vicinity of major bird flyways.

As I said in the beginning, very little "new" revelations would be forthcoming from this small study. You may even say, "I could have figured that out by myself," or "He's only stating the obvious." "True," says I. Now I've at least got

you thinking about birdstrikes -- remember you're getting into the worst season right now. And since you realize that, you may just look a little harder for that feathery creature who's got your number!

So, overall, what do we have? Figure 6 below details the incidence of birdstrikes by aircraft during the last 4 years. This rate is based upon flying hours because sorties were not available in all cases. Given your particular aircraft and figuring out your average sortie length should give you an idea of your chances of tangling with a bird. I guarantee the probability is going to be a lot higher if I haven't convinced you a problem exists for you and your aircraft. ➔

### BIRDSTRIKES - INCIDENCE PER 100,000 HRS BY TYPE AIRCRAFT (1974-1977)

TYPE ACFT	NO. INCIDENTS	FLYING HRS × 1000	* RATE PER 100,000 HRS
A-7	33	387	8.5
A-10	4	21	18.7
A-37	16	127.7	12.5
O-2	10	239.8	3.4
F/RF-4	102	1680.6	6.0
F-5	3	60.1	4.9
F-15	12	66.8	17.9
F-100	21	316.9	6.6
F-105	20	172.4	11.6
F/FB-111	64	371.4	17.2
T-37	100	1154.7	8.6
T-38	208	1135.6	14.4
OVERALL	593	6084.7	9.75

\*Rate would be more meaningful per # of sorties. Also rates computed for certain aircraft are meaningless due to the low number of incidents.

( FIG-6 )



# TAC

## **TAC TIPS**

Blessed are they who have nothing to say, and who cannot be persuaded to say it.

Lowell

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

#### *Hawk gets Dragonfly*

Two A-37s were flying a ground attack mission on a published low-level route when number two received a bird strike. The pilot saw what appeared to be a hawk just prior to impact and was unable to avoid it. The bird was performing its "last-ditch" falling maneuver, with wings folded, in an attempt to avoid the Dragonfly. Impacting the left front inverter door, the bird slid up the aircraft's nose and windscreen, and over the top of the canopy. The nose doors were dented and slight damage was sustained by the windscreen bulkhead.

If you are wearing a helmet that isn't equipped with a dual visor and you fly a lot of low-level missions, you might consider switching. That extra piece of plastic gives quite a bit of protection. If you have a dual visor, use both of them when flying day low-levels -- it may save you from getting the beak.

#### *Close call*

I was performing visual reconnaissance over a highly congested enemy area. We had just come out of a hard left turn and were beginning to jink to the right at approximately 1,000 feet and 400 knots when I felt a thump and heard a loud continuing howl. My immediate thought was that we had taken a hit because of known enemy activity in the area. I looked over my right shoulder and saw a hole in my canopy about 18 inches behind my head about a foot-and-a-half square. About that time I heard my backseater shout, "Let's get the hell out of here," which confirmed in my mind that we had, indeed, taken a hit. I then started climbing toward the nearest friendly base. While I was doing that, I looked over my left shoulder and could see blood and gore splattered on the aft side of the canopy. I began to shout at my backseater, asking him if he was OK. He couldn't hear me because of the noise. So, for about 15-20 seconds I was sure he was back there bleeding to death. After what seemed an eternity, I attained enough altitude to be safe from ground fire and slowed the aircraft to 250 knots; then my backseater was able to hear me and advised that he was all right. Not a scratch as far as he could tell. I asked him to look over the back of my seat, and he thought it looked OK. It was here he told me about the feathers. We flew the 150 miles at 250 knots and requested that egress personnel meet us when we landed. The landing was uneventful except for a split flap condition which corrected itself when only half flaps were used. In the dearming area, I handed the egress specialist the seat pins through the hole in the canopy made by the bird. My backseater exited the aircraft. After some discussion with the egress people, who by this time had replaced the interlock block knocked out by the bird, I gingerly opened the canopy. Nothing happened except that the canopy opened normally, so I unstrapped and stepped out. I could then see the actual size of the hole was more like four and one-half feet square. We had no real difficulty except for the noise and uncertainty right after the strike. But it was a very close thing, 18 inches either way ....



## For my next move...

The Photo Phantom was flying as number two on a two-ship, low-level training mission. While at 1,000 feet AGL and 480 knots, the pilot observed a bird at his 12 o'clock position. The jock lowered his head and made a 5 "G" pull-up in an effort to avoid the feathered foe. In less than one-half a second, the bird impacted the right quarter panel of the windscreen and entered the cockpit spraying the left quarter panel with remains, causing the center windscreen to shatter and become translucent, and striking the pilot in the right shoulder.

The pilot began a climb, informed lead, and declared an emergency. During the return to base, the pilot could only communicate with the WSO using the side tone of the UHF because of the high noise level. Fuel was reduced, and the pilot made a perfect landing while looking through the area of the broken right quarter panel.

Keep those visors down, and be alert for birds along your route of flight. If you see any large flocks of birds on low-level routes, on ranges, etc., give a call to the SOF so he can get the word to the other jocks who will be flying in the same area. It could save a buddy of yours from one of those "moments of stark terror."

## Splat!!!

For you nonbelievers who still don't pull your visors down when tooling around at low altitude, we'll quote one of the many birdstrike reports that daily drift through our basket: "On climb-out at 350 knots and 400 feet, a loud bang was heard and something hit the pilot in the face and arms. A hole approximately 6 inches in diameter was noted in the upper corner of the right windscreen side panel. Bird remains (species unknown) and plexiglass were scattered throughout the front cockpit. The pilot received minor scratches on his left wrist. Fortunately, his helmet visor was down and he suffered no damage to his face."

TAC ATTACK

## Recce subdues Buzzard

The flight of two recce types turned onto initial and ended up eyeball-to-eyeball with an equal number of buzzards. One brave buzzard objected violently to sharing his hunting grounds (and girl friend?) with the encroaching RFs, and attacked. He put on a pretty impressive show before being subdued by an obviously superior force.

The iron bird suffered a large leading edge dent, aggravated by a bulge on top of the wing. Also, slight damage to the leading edge ribs, skin torn on both ribs, and a broken forward leading edge upper stringer. It took about 96 hours to glue it back together. As for the feathered bird, don't know how long it will take his maintenance troops to put him back in fighting shape. But when he is ... with his experience, he'll really be mean the next time. Watch out for a slightly bowed buzzard who's trying to even up the score.





# AVOIDANCE OF BIRDS IN THE AIR



A great deal of time and effort have been expended in researching methods of bird control in and around airports. The most effective means will be discussed later in the article on that subject. But how do we avoid birds during the en route phase? Well, first, once you're through 5,000 ft, your chances of a birdstrike are small and above 10,000 ft, they're infinitesimal. But that doesn't mean you shouldn't be looking. We've been unable to perfect any other means of avoiding birds while airborne, so your eyes are the only thing you have going for you.

Research has been conducted in the use of lasers, strobe lights, microwaves, and radar to avoid birds. Attempts have been made to create a system to warn the pilot of the birds' presence or to make the birds avoid the aircraft. A discussion of the different approaches follows:

**LASERS** -- In an experiment, birds were subjected to laser energy of varying intensities. Although the birds reacted to the laser, the birds seldom resorted to flight as a means of escape. It was concluded the effective energy level which would make the birds resort to flight would also harm the birds. Energy of this intensity could also harm human beings. Because of the potentially harmful characteristics and high cost of such equipment, the laser approach does not appear feasible at this time.

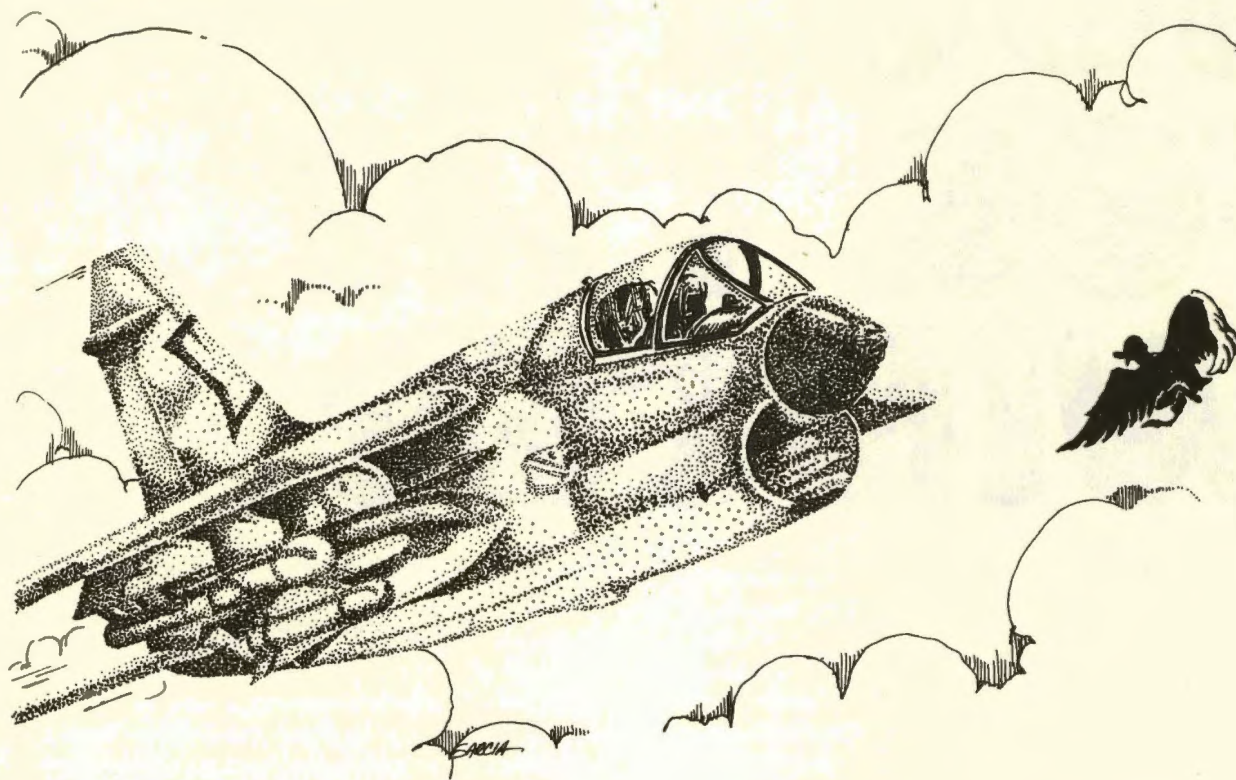
**STROBE LIGHTS** -- Experiments provided somewhat the same results as lasers except that strobe lights are harmless. The birds showed physiological reactions to the flashing lights, but little else. Very few birds attempted to leave the area. Birdstrike statistics reveal that strobe lights may be effective to some degree on small, slow-moving aircraft; but are probably useless on low, fast-moving jets. Strobe lights may also cause confusion to airborne birds. Scientists have theorized that the excessive number of birds which fly into high radio towers and smokestacks may be a result of the flashing lights installed on these structures.

**MICROWAVES** -- As with lasers, microwave research has concluded that birds can be disturbed by certain energy intensities. These same levels of energy are potentially harmful both to the birds and humans. Any effective equipment of this type will probably occur well into the future.



**RADAR** -- The most promising results of any of the systems tested to date have been from radar. Radar cannot aid us in controlling airborne birds, but it can track them and may be useful as a warning system. There has been an extensive amount of research on the capabilities of radar, especially in Canada. Present radar equipment is capable of painting, tracking, and





in some cases, even identifying flocks of birds. That's right, I said identifying. Radar returns give the target's relative size and speed. Characteristics of the return also give the size of the flock and type of bird. Different species of birds travel in dissimilar flocks. An individual familiar with the different returns could interpret the scope and determine the type of bird. Of course, this information isn't 100% accurate.

While birds show up on radar, their echoes are sometimes weak, variable in intensity, and their slow movement across the display makes it hard to follow them by eye. Time-lapse photography techniques have been quite useful in negating these shortcomings. When the time-lapse pictures are played back at normal speeds, they reveal a smooth flow of echoes across the scope. Use of radar and photographic techniques allow accurate flightpath analysis and possibly may lead to an advance bird warning system. No, this system is not in being yet; but the capability and need dictate that this system be developed in future years.

The best means of avoidance while you are airborne is still your eyeballs -- thoroughly clearing your intended flightpath. In other words, you ought to be looking for birds and other aircraft at the same time. If you do note a bird in your flightpath, your actions will be determined by how close the bird is to you. Since most birds will fold their wings and dive to avoid you, climbing is your best option if there's time. If you note a bird at the last minute, rolling the aircraft or trying to maneuver the aircraft so the bird hits a less vulnerable area of the plane may be worth a try. But don't count on last ditch maneuvers to get the aircraft out of the way in time. If you note a bird without time to maneuver and the point of collision appears to be the canopy -- duck -- or do whatever you can to get your head out of the way. This maneuver combined with your visor, which should always be worn in the down position, should save your eyes if the canopy shatters. With all our technology, a sharp lookout promises the best chance of success. ➤



# SOUTH FOR THE WINTER

For countless years, man has attempted, in vain, to counteract the whims and ravages of mother nature. Many of us continue to live and work in regions where, for several months of the year, the climate is just plain lousy. As the most advanced animal on earth, we continue to complain about the cold, rain, and snow while most of the "dumb" birds go south in the winter.

Few of nature's spectacles compare to the annual fall migration of birds in the North American continent. During this period, between 10 and 20 million waterfowl and countless other birds will be heading for their winter nesting grounds. Many birds spend the winter in areas of Mexico and Central or South America, while others have nesting areas in the U.S. There are several primary migration routes in the U.S. They are:

1. The Atlantic
2. Mississippi River Basin
3. Central
4. Pacific - Sierras

A map depicting these migration routes and winter nesting areas is on pages 16-17.

The most heavily traveled flyway in the U.S. is the Mississippi River. The concentration of birds and the low altitudes which they use create a great hazard to civil, commercial, and military aircraft. Weather Bureau radar (capable of measuring target altitude) at Havana, Illinois, spotted 40% of the duck traffic below 3,500 ft MSL. Only a few flocks were observed as high as 9,500 ft MSL. Pilot reports indicate that 75%

of the observed geese traffic was below 5,000 ft MSL.

It is estimated that some 3 million ducks and about 20 to 30 thousand geese pass within a 40-mile radius of St Louis during the fall migrating season. The periods of greatest hazard are between October 15 and November 30, and again between March 1 and April 10.

Kansas City and Omaha, both on the Missouri River, are overflowed in the spring and fall by an estimated one million ducks during the migrating seasons. In addition, some 200,000 geese pass through the same area in the fall; the number swelling to 400,000 on the return in the spring.

Major concentrations of migrating birds and waterfowl also occur in the vicinity of Minneapolis - St Paul, Chicago, Milwaukee, Detroit, and numerous other major metropolitan centers -- all with large airports. The greatest recorded loss of life from a birdstrike occurred in October 1960 at Boston's Logan Airport when an Electra turboprop flew through a flock of starlings on takeoff. The aircraft lost power on two engines, stalled, and crashed in Winthrop Bay, killing 62 persons.

Wintering areas in the United States accommodate a heavy concentration of birds. Those areas with the heaviest concentrations of birds correspond somewhat to the migratory flyways:

1. Atlantic -- Chesapeake Bay; Back Bay area in Virginia; and the Currituck Sound, Lake Mattamuseket, and North Carolina coast.



2. Mississippi -- the Mississippi valley and the southern Louisiana marshes along the Gulf of Mexico.

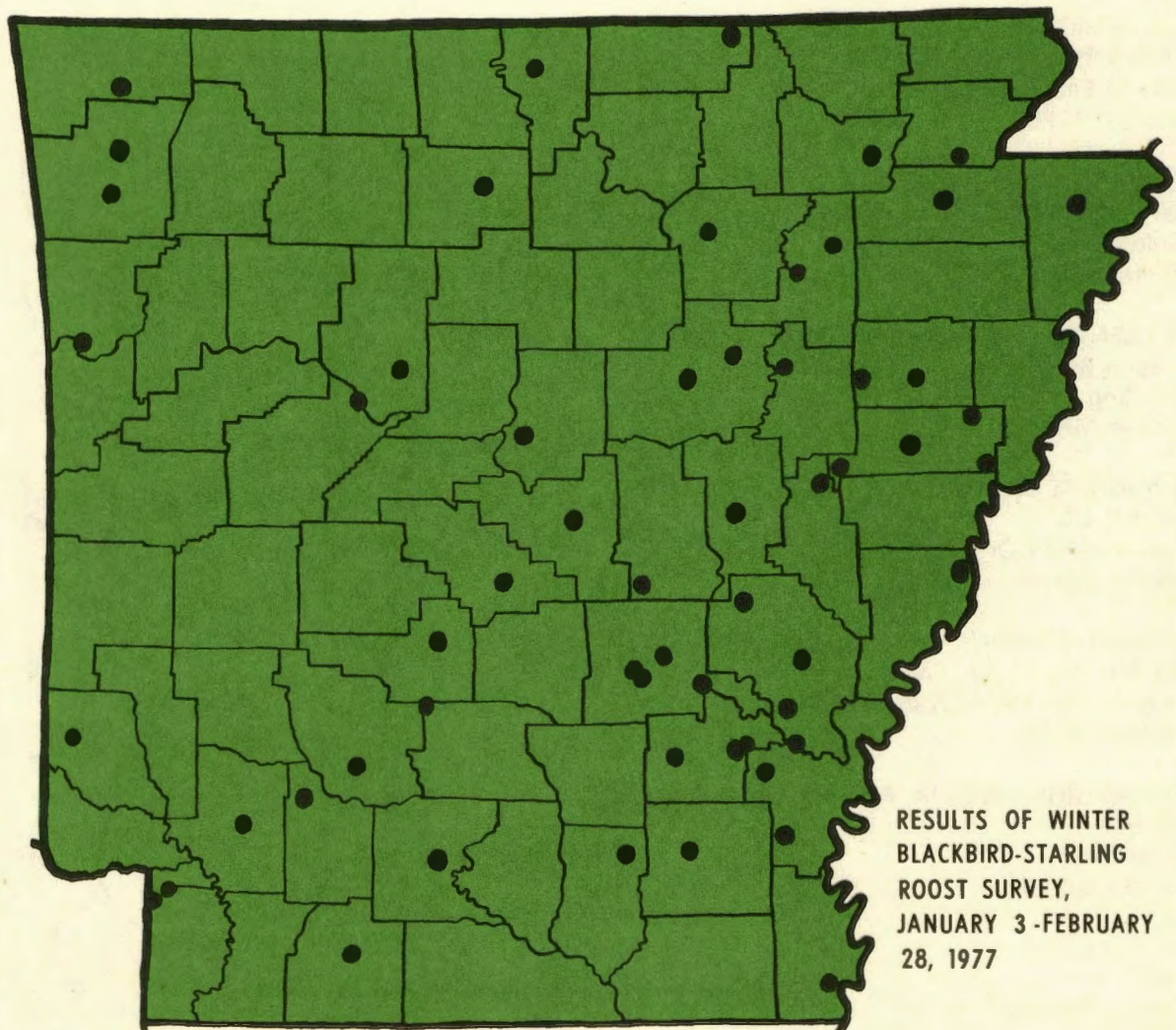
3. Central -- Along the Missouri River and gulf coast of Texas.

4. Pacific -- The area of Lake Tahoe and Sacramento valley area in California.

These wintering areas create a long-term hazard throughout the winter months. Two examples of the large concentrations occur in Louisiana and Arkansas -- areas which are typical of the entire Southeast. Information from the U.S. Department of Interior, Fish and Wildlife Service indicates that there were some 50 major

blackbird roosts in Louisiana involving an estimated 118,855,000 birds! Anyone who has lived in the Southeast has witnessed the endless ribbons of blackbirds coming to, or leaving, the roosting sites in late afternoons or early mornings.

Figure 1 is a map depicting major roosting sites for blackbirds and starlings in the state of Arkansas. The 58 roosts identified contained an estimated 78,280,000 birds. In addition to these birds, waterfowl concentrations were noted on practically all wetlands in the eastern one-third of the state. One item worth noting concerning winter roosting sites is their lack of





## south for the winter

stability. Different locations may be occupied each succeeding year. There is also constant movement of birds among roosts during a single winter.

The Fish and Wildlife Service of the U.S. Department of the Interior can be a valuable source of information on specific birds and their nesting or roosting habits in the areas around your base. Information gained from these agencies can be a great help in planning low-level training routes, etc., to avoid large concentrations of birds. Regional offices which should be contacted for assistance are:

### PACIFIC REGION -- CA, ID, NV, OR, WA, HI

1500 Plaza Bldg  
1500 North East Irving St  
Portland OR 97208

### SOUTHWEST REGION -- AZ, NM, OK, TX

Federal Bldg US PO & Court House  
500 Gold Ave SW  
Albuquerque NM 87103

### NORTH CENTRAL REGION -- IL, IN, MI, MN, OH,

WI, Federal Bldg  
Fort Snelling  
Twin Cities MN 55111

### SOUTHEAST REGION -- AL, FL, GA, KY, MS, NC, SC, TN, AR, LA

17 Executive Park Dr  
Atlanta GA 30329

### NORTHEAST REGION -- CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA, WVA

McCormack Post Office & Court House  
Boston MA 02109

### DENVER REGION -- CO, IA, KS, MO, MT, NE, ND, SD, UT, WY

10597 6th Ave  
Denver CO 80215

### ALASKA REGION

813 D St  
Anchorage AK 99501

It is fairly easy to see why the incidence of birdstrikes increased so dramatically during the seasonal migrating. Knowing where the birds are during these seasons and avoiding those areas whenever possible should help in reducing the hazard. One point: Although some areas are relatively free of birds, no area of our operations is safe from birds. If you don't believe that, talk to the crew who hit the bird at 37,000 ft or the F-4 crew that took a bird during an ACM mission at 12,000 ft. I, personally, have seen ducks at 15,000 ft over Moody AFB, GA, and also had a near-miss with a flock of ducks just north of George AFB, CA, at 11,000 ft. Believe me, they're out there -- so look out all the time; not just in the spring and fall. After all, you wouldn't want to bash Fleagle's brother! ➤





# USAF Annual Safety Awards

## COLOMBIAN TROPHY

The 35th Tactical Fighter Wing, George Air Force Base, California, was presented with the Colombian Trophy by General W. L. Creech. The 35 TFW was cited for not having a single aircraft accident during 1977 while flying more than 19,000 sorties and 26,000 hours in F-4 and F-105 aircraft.

The Colombian Trophy was established in 1935 by the Republic of Colombia to recognize the Air Corps General Headquarters having the lowest aircraft accident rate during the preceding year. No awards were presented between 1940 and 1961. In 1961, the trophy was reinstituted. Since that time, the trophy has been awarded annually, and the 35 TFW won the trophy in 1967 thus making it the only two-time winner of the award since it was reinstituted in 1961.



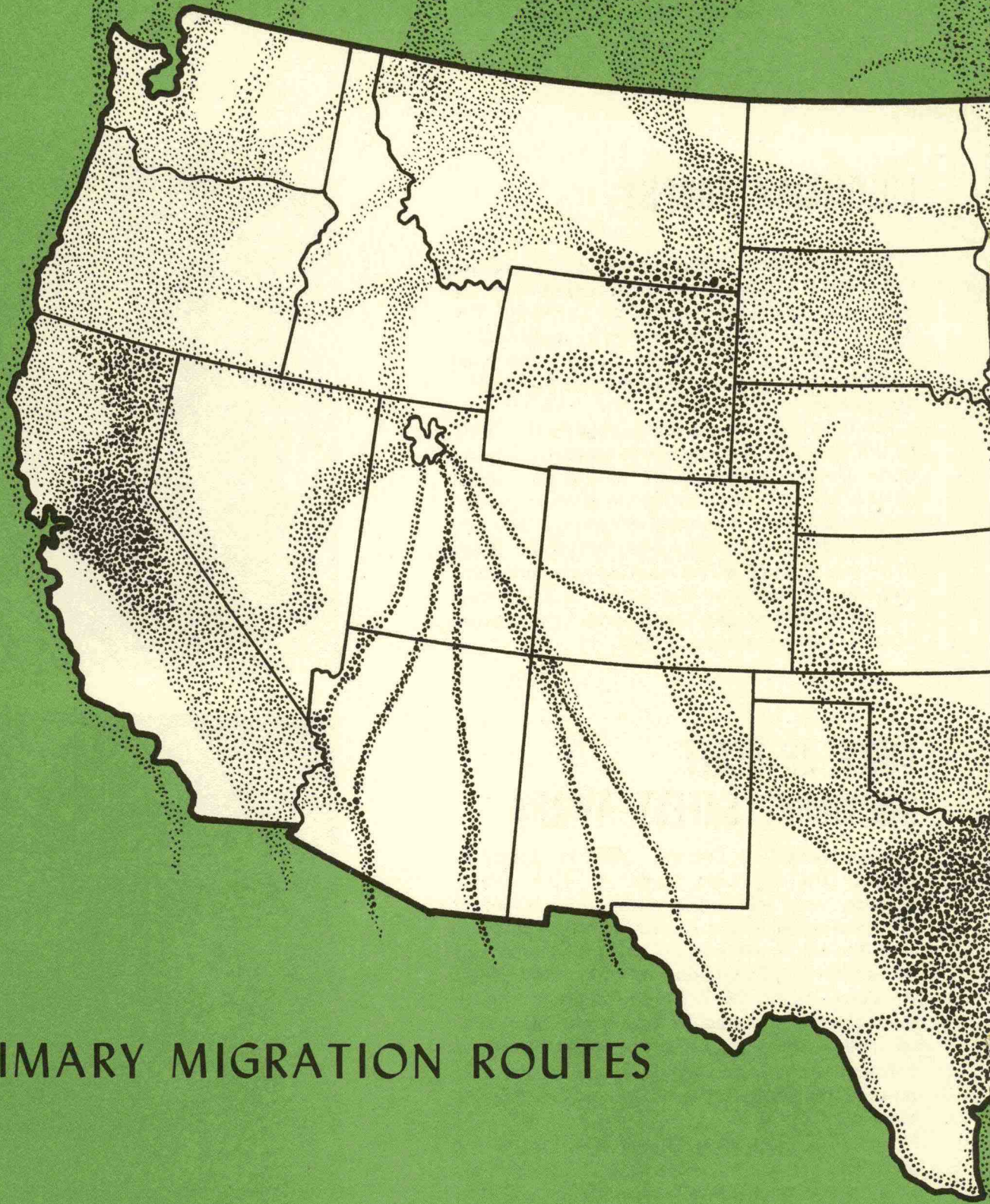
## CHIEF OF STAFF INDIVIDUAL SAFETY AWARD

Major Terrell J. Osborn, Chief of Safety at Tactical Training Luke, Luke Air Force Base, Arizona, was selected to receive the Chief of Staff Individual Safety Award for his outstanding contribution to the mishap prevention programs of Tactical Air Command and the United States Air Force during 1977. Major Osborn's efficient management resulted in significant reductions in mishaps. Improvement took place in substantially reducing military disabling injuries, on-duty injuries, fatal accidents, and explosive incidents.

The Chief of Staff Individual Safety Award is given to Air Force members or civilian employees who have made significant contributions to safety within the Air Force.

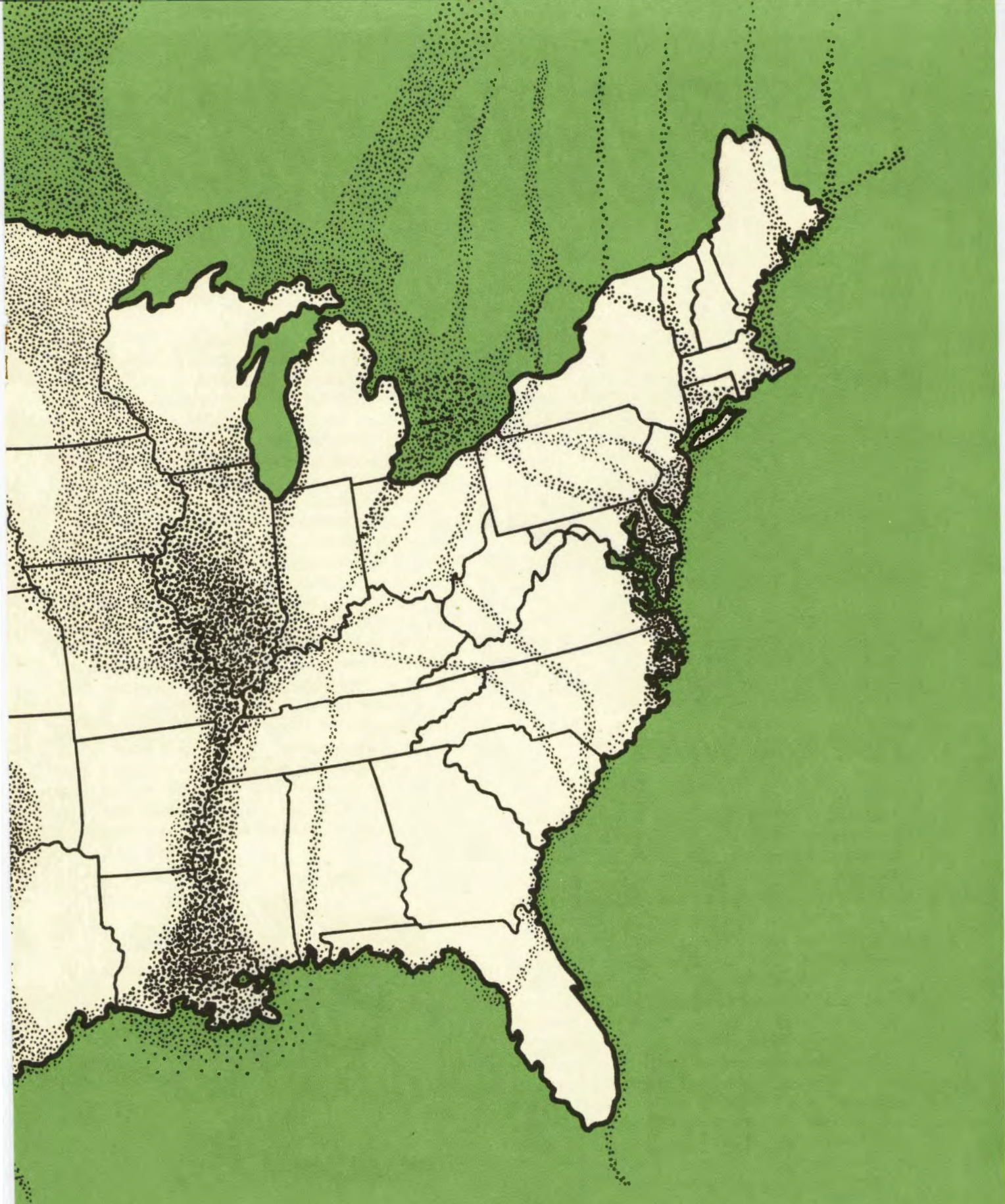






## PRIMARY MIGRATION ROUTES









# Birds and the

For tactical fighter aircraft, slightly more than 21% of all damaging birdstrike incidents in the 1974-77 time frame occurred during ground operations, takeoffs, go-arounds, landing approaches, and landings. Bird control in and around the airfield should be one area of emphasis. Before we can attempt to control the birds, we must determine why the birds are around the area in the first place.

As with all animal life, there are several basic, natural reasons which cause birds to frequent airport areas. Some of them are:

1. Food and Water
2. Safety and Shelter
3. Nesting Sites
4. Rest
5. Migration Routes

## Food and Water

Historically, airports and military bases have been constructed in outlying areas where land was cheap, plentiful, and available. This land may have been the natural habitat for some birds already. This same cheap real estate was also attractive to cities for garbage dumps and other disposal area. Urban growth added to the availability of food for scavengers; and birds, such as gulls, Starlings, crows, ravens, and House Sparrows were attracted to the area.

While garbage and other waste may have attracted some birds, natural food sources are equally important. Many airports have also been built close to the oceans, swamps, and inland water areas. These bodies of water provide food sources, such as small fish, tadpoles, frogs, insect larvae, and water plants. These areas are attractive to gulls, ducks, coots, and various marsh birds as well as other species.

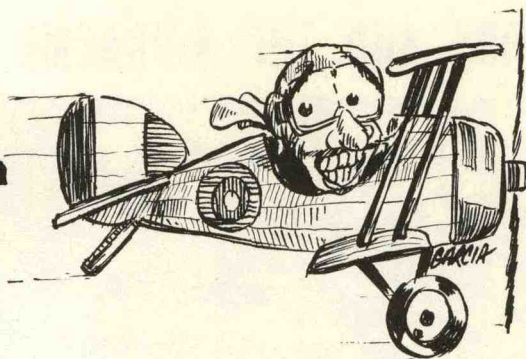
Any source of water -- ponds, depressions, drainage ditches, etc., will serve as an attraction to birds -- both for the water and the other food sources supported by the water.

Worms, insects, and even the smaller birds themselves may serve as food for our feathered friends. Worms are an attractive form of food, usually available at night or in the early morning and anytime heavy rain has forced them to the surface. The fertile, grass-covered areas around runways and taxiways provide an excellent environment for earthworms. Insects occur on every airport, not only on the ground and vegetation, but also in the airspace above airports to altitudes of 600 feet or more. Robins, Meadow larks, Bobolinks, and plovers normally feed on insects in low vegetation; while swallows and swifts prefer the airborne kind. Some gulls and terns also prefer flying insects as food. Predatory birds are attracted to an airport when small mammals, such as mice and rabbits, are numerous. They also have been known to take some small birds. Owls, vultures, and hawks are the kinds which are most involved as predators.





# Airdrome

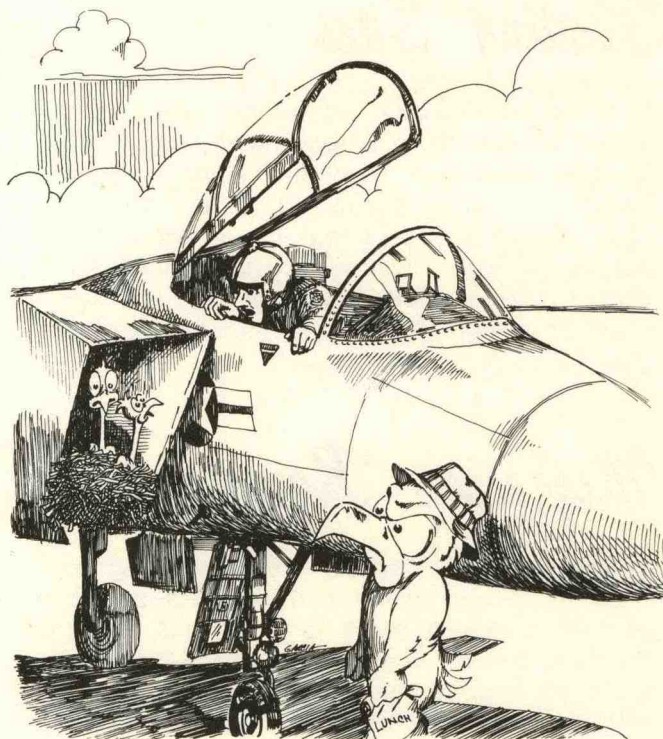


## Nesting Sites

Birds, such as Starlings, House Sparrows, and swallows, sometimes nest in or about buildings on an airport. Bank swallows have been known to establish a nesting colony in a sandbank, either a natural one or at excavation sites. Pheasants are attracted to nest in dense growth of weeds or grass, but have not been identified as a significant problem on airports. Other species of birds may also nest in trees, shrubs, or other vegetation on airports.

## Safety and Shelter

Safety and shelter can be considered together. Many birds appear to feel safe on the open runway where no marauder can stalk them unobserved. At coastal airports, gulls are prone to roosting on the runway or surrounding areas during storms at sea. Birds also seek shelter in hangars and the nooks of other buildings, while some find sufficient shelter by roosting in trees or shrubbery on the airport.





# BIRDS AND THE AIRDROME



## Resting Sites

Birds moving near an airport may find the airport surface to be a convenient place to relax. Most airports are free of Predators, ground traffic, and other things which disturb birds. They seem to adapt easily to aircraft and associated noise. However, since resting birds seem to attract even more birds, and the movement of a flock of birds is highly unpredictable -- a hazard usually results.

## Migration Routes

Some airports are on the major migration routes of various species of birds. The airports can provide a resting place for the birds, but the inherent conflict between the concentrated aircraft and large numbers of birds presents a significant problem. Migration is discussed completely in a separate article in this issue.



It's obvious that the birds are here to stay, and that the only effective means of controlling birds around the airport is to eliminate the attractions. This involves an analysis of the total environment around the airport. Once this analysis has been done, methods aimed at reducing the bird hazard can be undertaken. Some means of modifying the environment are covered in "Bird Control At Airports" on page 22. ➤





# AIRCREW of DISTINCTION



**Capt Edward B. Williston**  
363 TRW  
Shaw AFB, SC



**Capt John M. Nadolski**  
363 TRW  
Shaw AFB, SC

On 14 April 1978, Captain Williston was administering an instructor pilot upgrade check to Captain Nadolski. Captain Nadolski was flying in the rear cockpit of an RF-4C and had just completed a no-flap touch-and-go landing. As the aircraft broke ground, there was a muffled explosion followed by a fire light on the left engine. Tower and RSU controllers radioed to the crew that the aircraft was on fire.

Capt Williston assumed control of the aircraft and started a closed pattern while bringing the left engine to idle. The fire persisted forcing the crew to shut down the engine. As the aircraft rolled out on downwind, the fire light came back on, and the utility hydraulic pressure failed. The crew elected to set themselves up for a landing since they were so close to the field.

Minimum afterburner was required to maintain the 250 kts minimum airspeed required for the pattern. Both crewmembers were required to hold full right rudder and almost full right aileron to keep the wings level. Final approach was flown at 230 kts and planned touchdown was 191 kts.

After touchdown, both main gear tires blew. The crew kept the aircraft on the runway and engaged the departure-end cable at 120 kts. When the aircraft stopped, the crew safely egressed.

The skill exhibited by Captain Williston and Captain Nadolski and their timely and decisive actions prevented possible loss of life and resulted in the recovery of a valuable aircraft. Their achievement qualifies them as the TAC Aircrew of Distinction.



# bird control at the airport

**H**aving identified the reasons why birds frequent airports and surrounding areas, we can design some measures to control the bird population. Both natural and artificial means are available for controlling birds. We can modify the environment to reduce the attraction, or birds can be scared away. In nearly all cases, destruction of the birds is unsatisfactory both from an effective and ecological point of view. Scaring birds is also only a temporary measure with varying levels of effectiveness. Environmental management offers the best remedy to reduce bird hazards at the airport.

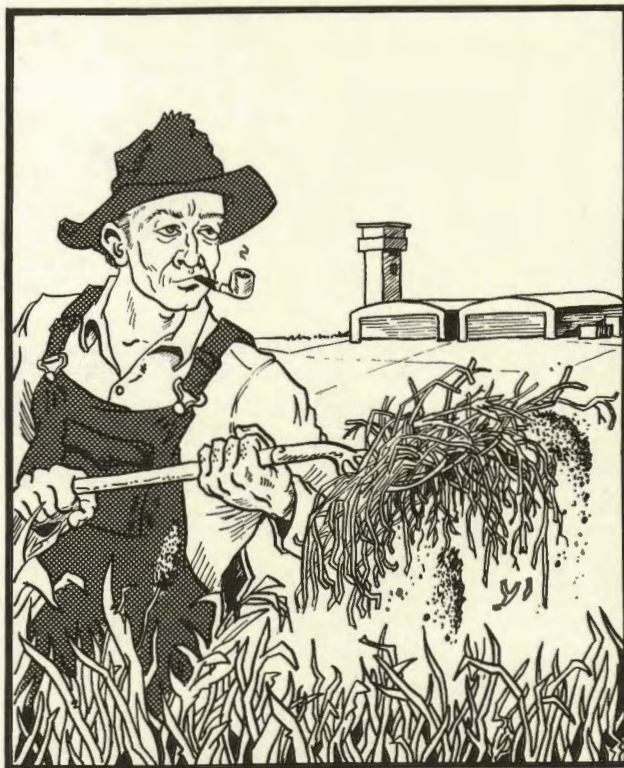
Measures taken to remove birds that don't include modifying the environment to reduce the attraction will only result in different birds taking the place of those which were scared away.

Management of the environment should attempt to eliminate the natural attractions for birds. As mentioned previously, these natural attractions include: food and water; safety and shelter; nesting; rest; and migratory routes. I will address some considerations in each subject area.

## FOOD AND WATER

Every effort must be made to eliminate natural sources of food. If the airport is next to or near farm land, this may be difficult unless the

farmers agree to plant crops which do not attract birds. Waste at nearby landfills must be disposed of in such a way that it does not attract birds. The FAA issued an order in 1974





which was designed to close or control sanitary disposal sites in the vicinity of federally-funded airports. This order was designed to reduce the hazard of scavenger types of birds.

Worms, insects, grubs, and other food sources may be harder to control. Insecticides are an effective control measure, but usually require frequent applications. At one time, it was thought desirable to keep the grass around runways cut short to discourage insects, etc. However, one base discovered that long grass, even though it offered shelter to potential food sources, discouraged gulls from landing. The gulls avoided the long grass and would congregate on runway or taxiways -- allowing the use of other dispersal measures.

Surface water, and the associated food sources, serve as another attraction for birds. Open pits and depressions should be filled in whenever possible. Drainage ditches should be cleared of vegetation regularly and graded so that water will run off as rapidly as possible. As yet, we don't have the power to move oceans and lakes -- but we're trying.

## SAFETY, SHELTER, NESTING AND REST

Trees, shrubs, and hedgerows provide protection and nesting sites. Many shrubs also provide seeds or berries that are most attractive to birds. Some varieties of trees and shrubs are acceptable, but a biologist should be consulted before any extensive planting is begun.

As previously mentioned, grass should be cut to a height sufficient to inconvenience the birds who would otherwise gather. In the case of gulls, 9 inches is the recommended height, while the height should be dropped to 7 inches for plovers or Starlings. If the grass is much shorter, worms and insects will be exposed. If it is longer, mice and other mammals will harbor there to attract birds of prey. Obviously, the grass cannot be kept at the optimum height because considerable time and expense are required. Your local base officials can determine the level of the birdstrike threat and preventive measures.

In addition to natural areas, birds are attracted to the outsides of buildings, under the eaves for nesting sites, and also frequent the large aircraft hangars. On many airports, annual surveys are used as a means of identifying the extent of nesting activities. The simple approach of using wire mesh screen to cover potential areas under



the eaves has been very effective. Aircraft hangars are more difficult to clear of birds.

Flashing lights, sirens, and other means have been used, with little success, in an attempt to clear the aircraft hangars. Approaches involving poisons and other measures which are potentially harmful to birds and humans are usually not acceptable in terms of ecological considerations.

## MIGRATORY BIRDS

If your modification of the airport environment has been successful in making the area unattractive to local birdlife, chances are that migratory birds will also feel the same way. However, if migratory birds do choose to land and rest, artificial means of scaring the birds must be employed including shotguns, cracker shells, and distress calls. A roving patrol may be needed during peak traffic periods to keep the birds moving. These measures should be fairly effective since the birds are itinerants and not adapted to the strange surroundings.

## ARTIFICIAL DETERRENTS

While management of the environment is the long-term answer to bird control, many artificial measures have been used to frighten birds away from airports; some unsuccessfully -- while others have worked quite well. Most of these methods can be used concurrently, and the air-



# bird control at the airport

port manager must be ready to switch methods as the birds adapt to the dispersal efforts. The methods I shall discuss are:

1. Falcons
2. Pyrotechnic Devices
3. Distress Calls
4. Narcotics and Poisons
5. Dead or Model Birds
6. Trapping and Removing

## FALCONS

Peregrine Falcons and other species of hawks are being used with some success in certain areas. Canada, England, Scotland, Holland, and Spain have used falcons and hawks. Their efforts suggested that, in some instances, this approach might be cost-effective. An attempt to use falcons in controlling the Prairie Chicken hazard at Whiteman AFB, MO, met with mixed success. The falcons would only fly when the weather and visibility were good (smart birds!). Only one of four different hawks, the Goshawk, proved to be effective.

Other problems with falcons also lessen the effectiveness of this approach. Falcons are only a temporary solution. Once falcons are removed, the other birds soon return. Only continuous daytime coverage can be effective. Additionally, trained birds and handlers are not available at your neighborhood Woolworths.

## PYROTECHNIC DEVICES

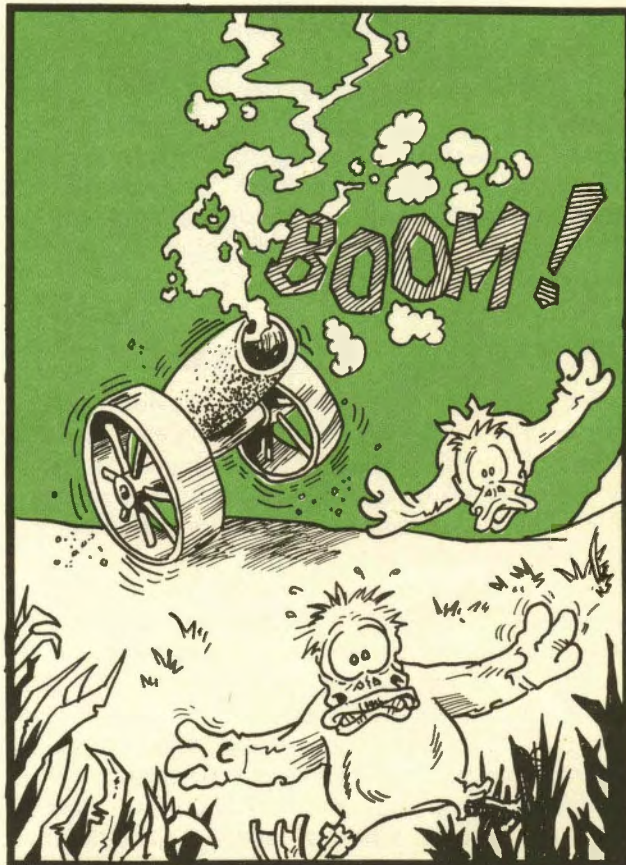
Big Boom technology has entered the war against birds. Various types of devices are used to scare the birds either with noise, smoke, or flashes of light. Firecrackers, rockets, flares, shotgun shells, and other devices have been used with varying degrees of success.

Firecrackers and rockets have had limited effectiveness. The noise from firecrackers results in only minor disturbance to most birds, and they usually only move a short distance away. Rockets which burst into flashes and make noise are somewhat more effective, but difficult to control -- presenting a greater hazard to people and airplanes than they do to birds.

Shotgun shells called shell crackers are moderately effective. These shells travel 100 yds or more before exploding with a sharp report and flash. More effective is a newer device. This

shell is called the M-74A1 Simulator Airburst from a flare pistol. The flash and report are much bigger than that from a shell cracker. At Langley AFB, these simulators have been quite effective when combined with distress calls which are discussed below.

Live ammunition and gas cannons have also been used with good results. However, the intent is not to destroy the birds, but rather to remove them so live ammunition is a last resort. Gas cannons create such a loud noise that more than birds are disturbed by the racket. All of these devices are of an explosive nature and require handling and storage by qualified personnel.



## DISTRESS CALLS

Many bases, including Langley AFB, have had excellent results utilizing portable sound equipment to broadcast bird distress calls. This equipment can be purchased in package units or separate components (amp, cassette player, and speakers) and is easily installed in the base ops vehicle.

When employed, the vehicle is placed upwind from the birds and short blasts of the distress call are used. This technique is useful on gulls,



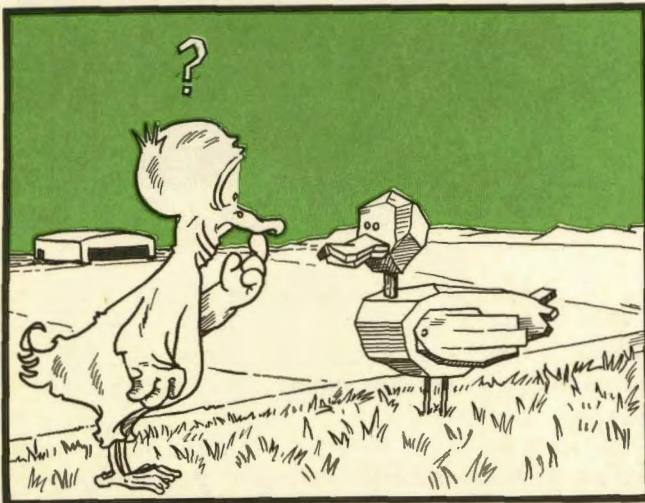
and to a lesser degree, on starlings. It is especially effective when combined with pyrotechnic devices and occasional birdshot. Overuse of the sound equipment can result in adaptation by the birds, so other negative reinforcements are a must. Consult with an ornithologist before selecting the type of distress calls. One west coast base mistakenly used an improvised tape which turned out to be a gull in heat -- and that just didn't work. I wonder why ...?

## NARCOTICS AND POISONS

Poisons are undesirable from a wildlife and ecological viewpoint and should only be used in extreme cases. Consultation is required with federal and state wildlife agencies before this remedy can be attempted.

## DEAD OR MODEL BIRDS

Using dead birds which have been preserved or "model" birds has been successful -- usually only on itinerant birds. Birds familiar with the airdrome usually ignore the "dead" birds after a short period of time. Experiments utilizing this concept are still in progress.



## TRAPPING AND REMOVING

Many birds, such as pigeons, owls, hawks, and crows, can be trapped more readily than they can be dispersed. The intent is to remove the birds once they are trapped, so only trapping methods which do not harm birds are used. It has been found that if the trapped birds are put in a sack and moved about 30 miles from the airport and released, they are not likely to return. This solution could obviously prove costly and time-consuming.

## TAC ATTACK



## CONCLUSION

Encouraging birds to move elsewhere is a lot more difficult than the problem appears on the surface. An effective program requires the cooperation of aircrews, base operations, civil engineers, and other personnel. Langley AFB has undertaken many environmental measures and has also initiated a warning program called the "Birdwatch." Tower personnel, aircrews, RSU, and other sources keep a lookout for birds and advise aircrews of bird conditions. "Green" denotes no hazardous activity; "Yellow" is a caution concerning birds in or near the pattern requiring increased vigilance; "Red" means takeoffs or landings are not recommended. Birdwatch info is broadcast over ATIS and is also included in all weather briefings. The program has had excellent results. The inconvenience of holding clear or switching runways has been quite minor when compared to potential savings.

The Air Force has expanded its own bird control efforts. The Bird-Aircraft Strike Hazard (BASH) team was established in 1975. An article in the June 1978 issue of AIRMAN covers their efforts and responsibilities. Their assistance can be obtained in combatting bird hazards. If you need help, write them at:

Autovon 970-2519/2587; AFCEC/DEVN, Tyndall AFB, FL 32403.

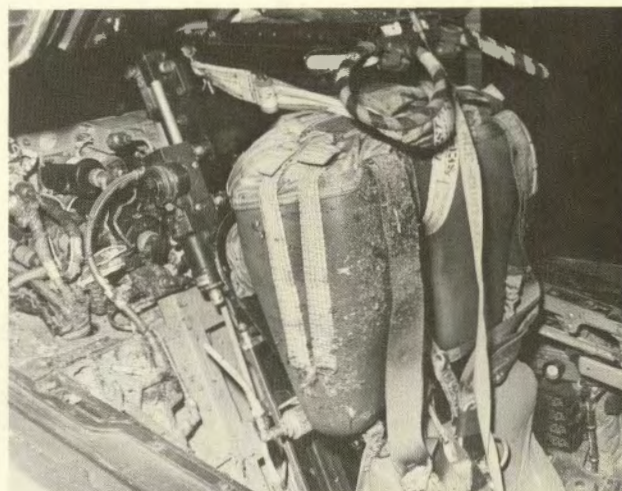


# TIPS

I'd be willing to wager a case of Colorado Kool-Aid (if I could get my hands on one) that you would fly your mission a lot differently if you knew for sure that you would have a birdstrike. However, incidents such as these are usually the farthest things from your mind as you stroke the burners (for those of you who have 'em) on your takeoff roll. I'm not going to bore you with any more war stories -- you can read about some past birdstrikes in the TAC Tips section -- suffice it to say that a 3-lb bird, hitting your windscreen at 420 kts, has about 23,000 lbs of kinetic energy to dissipate. If the impact angle is right, you're going to be wearing pieces of your windscreen when you get out of the cockpit. Here are some ideas on how to avoid or live through this type of incident:

1. If there are concentrations of birds on the runway or in the approach or departure corridors, don't take off or land until they move. I realize that operational requirements or fuel considerations may force you to take off or land anyway -- but if there's no real need -- why risk it? Some bases have set up programs where the base ops folks are equipped to disperse the birds. Let them do their job first.

2. When you're at low altitude, keep your airspeed down. Kinetic energy varies with the square of the velocity, so a strike at 250 kts is far less damaging than one at 500 kts. Operational, training, and aircraft requirements may prevent you from doing this -- but don't go fast just 'cause it's neat. Feathers in your teeth ain't cool.!



3. Plan low-level routes to avoid known concentrations of birds. Remember, roosting sites as well as migrating routes may shift seasonally, so consult the experts on these problems.

4. Reduce night flying during the migratory seasons. Most waterfowl fly at night during the migratory season, continuing until after daylight in search of suitable stopping areas. Realistic scheduling can reduce the strike hazard.

5. Report observed bird activity to the controlling agency, SOF, RSU, tower or ARTCC. Your report could keep other aircraft out of the same area and prevent a bash.

6. If birds are reported around the airport, fly a straight-in approach if you are able. Experiments have proven that birds can see and hear well, and they rely on these senses to warn of danger. Evidence also exists, however, that birds



# FOR THE OPERATOR

cannot predict an airplane's flightpath if it is not in a straight line. Turn early to avoid birds, if able. Last ditch maneuvers usually don't work.

7. Report all birdstrikes regardless of damage to the aircraft. This information is essential to continuing birdstrike studies and is a requirement of AFR 127-15.

8. Attempt to identify species involved, if possible. If local wildlife personnel cannot identify the remains, the Bird and Mammal Laboratories at the National Museum of Natural History may be able to help. Follow the procedures listed in AFR 127-15.

9. Become knowledgeable about the habits of birds in your area of operations. This type of information is essential to any control and avoidance efforts.

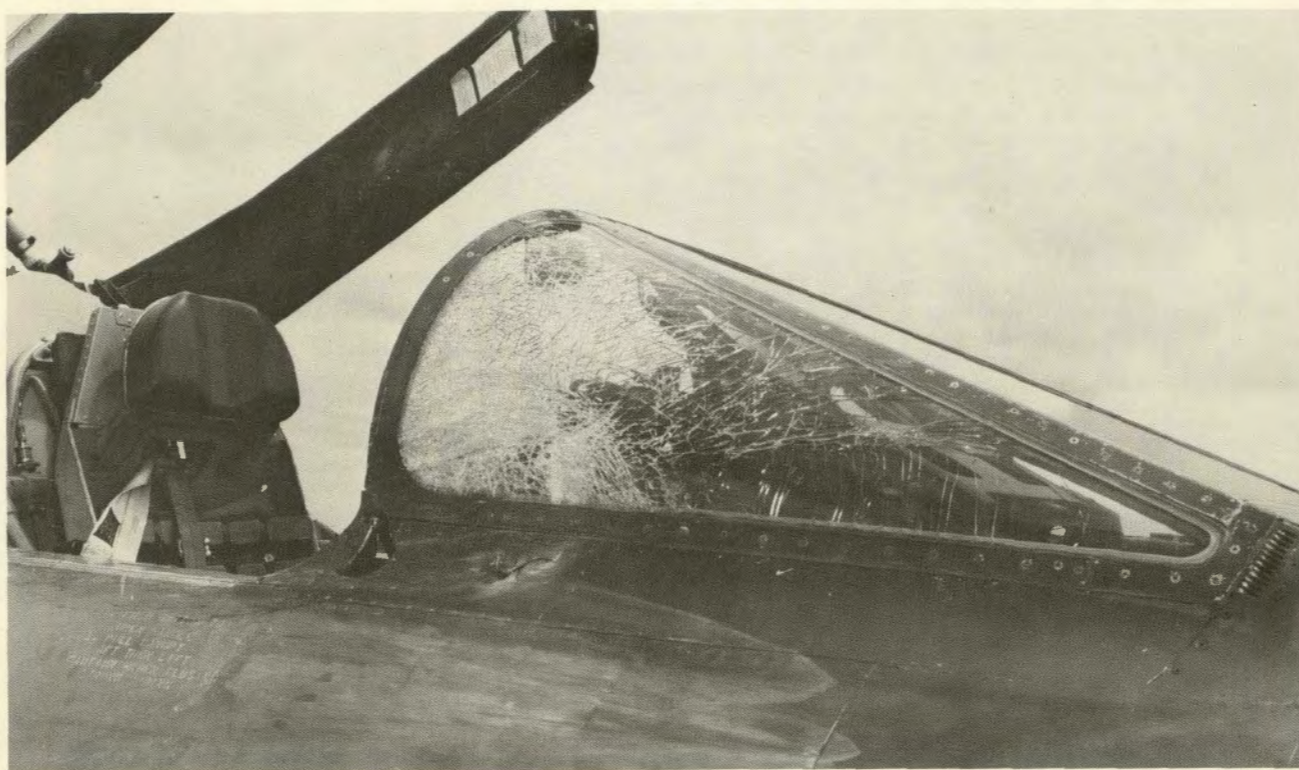
10. Always fly with your visor(s) down. The visor was designed to save your eyes. It's a proven fact that it works.

11. If you sustain a birdstrike, check instruments immediately. Bird/FOD damage to engines is a definite possibility. Land as soon as practicable -- your view from the cockpit, or even your wingman's may not allow you to accurately determine the level of damage.

12. Make the subject of birdstrikes a point for crew coordination. If you take one in the canopy, you may not be able to communicate. Clearly define who's going to do what, when, and how. This will save a lot of worry and confusion.

The bottom line is -- just use your common sense in approaching the problem. With a little preparation and by following these considerations, you should have a pretty good chance of avoiding the birds. As long as we fly in the same airspace, we're going to run into birds.

Preflight preparation and airborne alertness can make fowl encounters less disagreeable. ➤







# TAC SAFETY AWARDS

## Crew Chief Safety Award

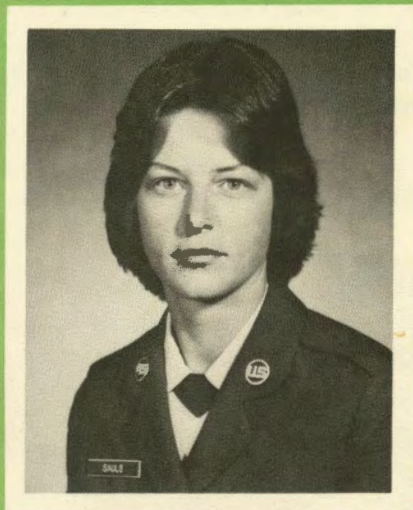
Technical Sergeant Walter D. Davis, 192d Tactical Fighter Group (ANG), Byrd IAP, Virginia, has been selected to receive the Tactical Air Command Crew Chief Safety Award for September 1978. Sergeant Davis will receive an engraved desk set and a letter of appreciation from the Vice Commander, Tactical Air Command.



TSgt Walter D. Davis

## Individual Safety Award

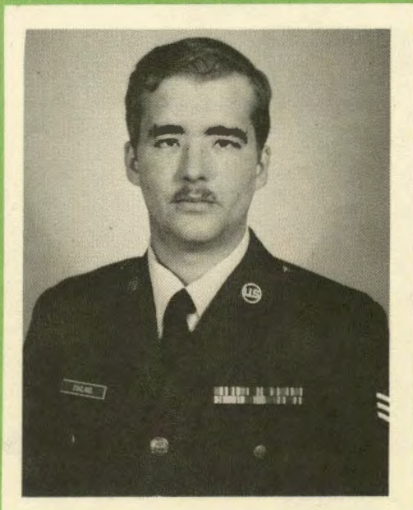
Airman First Class JoAnn Sauls, 35th Organizational Maintenance Squadron, 35th Tactical Fighter Wing, George Air Force Base, California, has been selected to receive the Tactical Air Command Individual Safety Award for September 1978. Airman Sauls will receive an engraved desk set and a letter of appreciation from the Vice Commander, Tactical Air Command.



A1C JoAnn Sauls

## Ground Safety Award of the Quarter

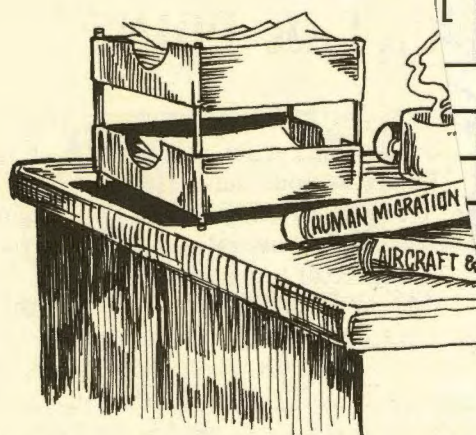
Sergeant Richard J. England, 9th Tactical Intelligence Squadron, 507th Tactical Air Control Wing, Shaw Air Force Base, South Carolina, has been selected to receive the Tactical Air Command Ground Safety Award of the Quarter for the second quarter 1978. Sergeant England will receive an engraved desk set and a letter of appreciation from the Vice Commander, Tactical Air Command.



Sgt Richard J. England



# REFEREN



TAC			ANG			AFR		
	thru	JUL		thru	JUL		thru	JUL
	1978	1977		1978	1977		1978	1977
	18	17	2	10	7	1	2	1
	13	8	2	7	3	0	0	0
	21	15	0	5	7	1	2	1
	17	12	0	4	4	1	2	1

## OP "5" thru JULY

AINED FTR/RECCE
mishap free months
TFG (ANG)

TAC/GAINED Other Units
class A mishap free months
132 182 TASC

AFR 127-15, The Birdstrike Hazard Reduction Program

### FAA PUBLICATIONS:

- FAA Order 5200.5 Guidance Concerning Sanitation at Airports.
- FAA Order 5200.6 Guidelines for the National Plan on Bird Hazards Detection and Control.
- FAA AC 150/5200-3A Bird Hazards to Aircraft
- FAA AC 150/5200-8 Use of Chemical Controls to Repel Flocks of Birds at Airports.
- FAA AC 150/5200-9 Bird Reactions and Scaring Devices

Airport Services Manual, Part 3 (ICAO, 1975)

USAF Safety Officers Study Kits -- March 1977, April 1978

USAF Birdstrike Summaries -- 1973, 1971, 1970, 1968, 1967, 1966

AFWL-TR-72-159 Physical Techniques for Controlling Birds to Reduce Aircraft Strike Hazards (Laser Light), Dec 1972

AFWL-TR-73-32 Gulls and USAF Aircraft Hazards, Apr 1973

AFWL-TR-73-175 Falconry as a Means of Reducing Bird-Aircraft Strike Hazards at Whiteman AFB, MO, Jan 1974

AFWL-DE-TN-73-026 Preliminary Evaluation of Bird-Aircraft Strike Hazard at Hill AFB, UT, Oct 1973

(Air Force Weapons Laboratory Series published at Kirtland AFB, NM)

### TAC ATTACK ARTICLES

- "Birdstrike and the Ejection Seat," Jan 1976
- "The Cost of Poultry," Sep 1973
- "Birdstrike Update," Feb 1972
- "The Feathered Missile," Oct 1971
- "Battling the Birdstrike Problem," Sep 1969

### TAC ATTACK



**ENERGY EQUALS ONE-HALF  
THE MASS TIMES THE VELOCITY  
SQUARED.**

**IN OTHER WORDS, A COUPLE  
OF POUNDS OF FEATHERS CAN  
TEAR HELL OUT OF AN AIRPLANE**

$$E = \frac{1}{2} MV^2$$

