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Front and back cover photo by MSgt Perry Heimer, USAF

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FSM notams

COMMAND AND CONTROL

Courtesy ASRS *Callback* #244, Oct 99
NASA's Aviation Safety Reporting System

A delicate dilemma faced by instructors in operational training situations is deciding how far to let a student go. If an instructor is too conservative, the student may never learn the full range of skills needed. Too casual, and the student may be placed in situations beyond his or her ability to cope. An air carrier instructor explained to ASRS why being mentally prepared to take control from a student was not enough.

I have been a line check airman for my airline for twelve and one-half years. On this flight I was giving IOE (Initial Operating Experience) to a new hire with no previous jet experience. It was our first leg together, and his first leg since simulator training. We thoroughly briefed our visual approach to Runway 12, which is served by a VOR approach (no electronic glideslope). We discussed appropriate power settings for our flap 40 degree approach and landing. Approach was well flown from 1000 ft, at which point we were fully configured and on speed. Weather at the time was wind 090/8 kts, good visibility. We acquired the runway six miles out.

All indications were perfectly normal until 150 ft AGL, at which point our airspeed dropped 3-4 kts below target. I commanded "Add power." The First Officer added a small amount of power. I again commanded "Add power," at which point the First Officer added only a slight amount of power...(and) relaxed back pressure on the yoke, allowing the aircraft nose to drop. At this point I took control, adding a lot of power and attempting to flare the aircraft. Our full airplane (landing weight 137,500 pounds) hit hard on the main gear and bounced. I effected a recovery and continued the landing rollout. On arrival at gate, we inspected the aircraft and discovered that the tailskid was heavily damaged. An additional area of lower fuselage forward of the tailskid was also damaged.

I will make a point in the future of discussing some of the basic differences between jets and turboprops regarding landing technique for students whose background does not include jet aircraft experience. While I was mentally prepared to take control (as I always am during a new student's IOE), the unexpected relaxation of back pressure worsened the situation too quickly for me to avoid the outcome.

The reporter added that the geometry of the involved aircraft is sufficiently different from previous models (longer and more vulnerable to tail strikes) as to mandate trainee landing and takeoff experience in the simulator. ✈

Photo courtesy 55 CES, Offutt AFB

TAKE CONTROL OF YOUR BASH PROGRAM

MSGT MIKE JANCA
Offutt AFB NE

It is virtually impossible to prevent all birdstrikes, but there is much we can do to limit our risk ...

Less than one minute after takeoff, after climbing only 270 feet, the aircraft succumbed to severe damage caused by a brief but violent encounter with 35 Canada Geese during takeoff roll. With two severely damaged engines, and lacking the airspeed necessary to maintain level flight, the disabled aircraft plummeted to the ground, killing all 24 personnel on board.

Although the crash of the E-3 AWACS aircraft occurred nearly five years ago, lessons learned from this tragedy should forever keep us focused on the importance of a strong and effective BASH program. It should also continually remind us how dangerous a single encounter with birds can be. It is virtually impossible to prevent all birdstrikes, but there is much we can do to limit our risk and decrease the chances of a collision with birds.

With the benefit of hindsight, and five years of flight safety experience managing Offutt's BASH program, I'd like to share some of our challenges and what has worked for us and for our program.

The 55th Wing BASH Program

Successful BASH management is a full-time job. A key ingredient in the success of the 55th Wing's BASH program is our people and their commitment to making the flying environment a safer place. Our accomplishments are the result of a sustained total team effort from senior leadership on down.

At Offutt, we have adopted a "zero tolerance policy" for birds on our airfield. Our Bird Hazard Working Group (BHWG) has been the primary catalyst in keeping our program on track and focused on necessary projects and improvements.

Cultivating a strong network with your key personnel is important. If you're waiting until the next BHWG meeting to get issues resolved and work accomplished, you're wasting valuable time. Your productive work should go on behind the scenes and between meetings.

Program continuity is essential. Important projects can take many years and several commanders to accomplish. The typical flight safety office can experience frequent personnel changes which quickly erode your office's "corporate knowledge."

Maintain a solid BASH management book

with all of your program elements. Include pertinent correspondence and documentation, BASH statistics and trends analysis, related articles and publications, points of contact and, finally, detailed pictures of your problem areas. Pictures can have a huge impact and leave a lasting impression when getting your point across at meetings.

Take time to review and update your BASH plan. It is the heart of your program and should be an active, living document that contains not only your program requirements but also timely information on completed and upcoming projects. Anyone in your office should be able to pick up the program in your absence and continue right where you left off.

Since 1985, Offutt aircraft have experienced more than 500 birdstrikes resulting in over $4 million in damage. A closer look at our statistics shows that 65% of our birdstrikes and 95% of our birdstrike damage occur during our BASH Phase II (spring and fall migration).

Photo by MSgt Mike Janca

Local Challenges: Waterfowl, Wetlands and Weather

With this in mind, let's take a closer look at what we're up against. Offutt AFB is located in Eastern Nebraska, just off the Missouri River and in the path of the Central and Mississippi migratory flyways, both major thoroughfares for millions of waterfowl during spring and fall migration. Numerous area wildlife refuges provide excellent stopover points for migrating birds. Twenty-five miles north of the base is DeSoto National Wildlife Refuge, one of the largest stopover points for Snow Geese in North America, with as many as 600,000 geese on the refuge during fall migration.

Snow Geese, which fly in flocks of up to 1000 birds, are a serious threat to Offutt's flight operations. In 1987, migrating Snow Geese collided with an Offutt E-4B moments after takeoff, seriously damaging the aircraft and two of its engines. The aircraft landed safely with over $1.6 million in damage. Since then, we have experienced other significant birdstrikes with hawks, Canada Geese and Mallard ducks.

To better understand the magnitude of the migration and how it impacts our operations, we were host to an ACC-sponsored bird radar study. The study examined both local and migratory bird movements using modified marine radar. This unique capability provided us with critical information on bird direction, relative size, and altitude. The information was then used to issue real-time bird warnings through the Supervisor of Flying (SOF) to aircrews, enabling them to avoid some of the peak bird movements during migration. This was especially valuable during hours of darkness and reduced visibility when hazardous bird movements normally go undetected.

In an effort to learn more about the timing of the migration through our area, I visited a few of the local wildlife refuges to meet with their waterfowl specialists. Getting in touch with the right people enables us to track when the migration comes through, how long it stays and when it leaves our area.

Since weather is often a primary stimulus for migrating birds, unseasonably warm autumns and low bird counts from local refuges give us adequate warning to extend our BASH Phase II as necessary until the migratory movement has passed through. Keeping simple details on the bird migration, such as bird movement dates through area refuges, total bird counts and associated weather conditions, gives us some insight on what we can expect during future

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Photo by MSgt Mike Janca

In July 1993, we had five inches of rainfall in a 72-hour period, which flooded portions of the base and airfield for over 80 days.

bird migrations.

We can't change our location, but there are many initiatives we've taken to mitigate the birdstrike risk at Offutt. One of our first steps was to contact our local USDA Wildlife Services (WS) director and ask for assistance. For several months, personnel from WS came to the base to attend our meetings and look at our program. Their support was outstanding, and it didn't take long for us to realize they had the expertise we needed.

At a cost of $25,000 (a significant amount, but less than the price of an average reportable birdstrike), WS personnel conducted a yearlong wildlife study of Offutt. After the study was completed, they provided a report giving us detailed information on our problem areas and suggestions on how to begin correcting them. Additionally, they developed an extensive database, identifying all of the birds and wildlife hazards observed on and around the base.

With our work cut out for us, we moved ahead and hired a part-time wildlife biologist who works directly with flight safety and airfield management. His day-to-day involvement provides us the support and technical know-how needed to tackle the many challenges we face.

While migratory birds are often our biggest threat, local bird activity and conditions on and adjacent to Offutt also present a huge challenge. Poor airfield drainage and occasional flooding further complicate our BASH problems by driving up the insect population and attracting many small mammals and associated birds to the airfield. In July 1993, we had five inches of rainfall in a 72-hour period, which flooded portions of the base and airfield for over 80 days.

Habitat Modification

We knew habitat modification was our best line of defense against wildlife problems, so we set up a joint project involving Offutt, the city of Bellevue and the Natural Resources district. Completed at a cost of $1.6 million (the base's share in the project was about $500,000), the project improved the drainage channel from the city and the base out to the Missouri River, removing over 3000 trees from the drainage channel. In 1997, we experienced another significant rainfall event with five inches of rain in a 24-hour period. With the drainage improvement project complete, the water left the base in only four days.

Other BASH challenges at Offutt include agricultural fields surrounding the base, a pair of private lakes half a mile off the end of our runway, and a 113-acre base lake situated just off the airfield, all of which attract local and migratory bird activity. During the fall migration, it's often necessary to haze

Photo by MSgt Mike Janca

migrating waterfowl from our base lake. Groups of hundreds often stop off, taking a break from the migration. Pyrotechnics and a remote-control boat are used to keep the geese off the lake and out of the area. Brush and nesting areas adjacent to the lake have been removed to discourage resident geese from using the area. To keep the area clear in the future, we made it a part of our grounds maintenance contract.

On the airfield, we have over 29 acres of plush wetland between the runway and main taxiway. The wetland, created after a runway extension, has been in place for over thirty years. Initially thought to be a protected wetland, the area was allowed to grow and flourish for many years. Our birdstrike analysis shows that the area is directly responsible for many of our birdstrikes and most of our responses to the airfield for bird control.

The Army Corps of Engineers was brought in to take a look at the wetland. Through their analysis, the area was classified as a non-jurisdictional wetland, indicating we could modify it or remove it without restrictions. After a careful risk analysis, the area was classified as a RAC 1 safety hazard, meaning if we didn't do something to mitigate the risk it was possible we would lose an aircraft and crew.

In 1998, at a cost of $200,000, a clear zone drainage project was designed to eliminate the wetland and remove all the ponds and standing water on the airfield. The cost to complete the project was estimated at $4.5 million.

As an interim control measure, we looked at cutting down the wetland; however, that proved too costly and too difficult, given the limited results expected and the sheer size of the wetland. Instead, we applied an aquatic herbicide to the wetland in the spring and summer to effectively kill the growth. The project proved very effective and reduced a majority of the small mammal, swallow and blackbird populations, significantly reducing birdstrikes on the airfield.

On 20 Sep 99, $1.8 million was awarded to begin the infield drainage repair and wetland removal project. The project started 1 Nov 99, and will take about 210 days to complete. With a short delay expected due to winter, the project should be complete in late summer 2000.

The remainder of the clear zone drainage project, which includes two large ponds at the end of our runway, is currently awaiting funding. The ponds are part of the wetland drainage system that eventually empties into our base lake. The low-lying ponds are impossible to see from most of the airfield and were a favorite resting area for our resi-

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Completed at a cost of $1.6 million....the project improved the drainage channel from the city and the base out to the Missouri River…

USAF Photo by MSgt Perry Heimer

The relocation effort, along with a regular harassment program, has reduced our resident flock to less than 25.

dent and migrating Canada Geese.

As an interim control measure to exclude geese from using the ponds, a Kevlar® wire grid system was installed at a cost of approximately $28,000. The grid, which utilizes a 40-foot spacing for the wires and a containment fence, has been very effective in keeping geese and other large waterfowl from using the ponds. The project was completed in-house by our civil engineers.

Relocation and Harassment

Resident Canada Geese are a serious problem for airports in many metropolitan areas. The Omaha area has been no exception. At Offutt, we started out with over 200 geese which visited our airfield daily and resided at our base lake. These large birds, which are perceived as a minor annoyance by many, should be considered an extreme danger to flying operations in and around your airfield.

With the help of the state Game and Parks Commission, we removed many of the geese during the summer molt, a 28-day period once each year when the birds become flightless as they grow new flight feathers. The geese were relocated six hours away from the base in western Nebraska. While some of them did return, the overall effect was very successful in breaking up the flock. The relocation effort, along with a regular harassment program, has reduced our resident flock to less than 25. Through harassment and limited depredation, we have been successful in keeping the expansion of these birds in check in our area.

Our goal is to eventually eliminate the resident flock, and by doing so eliminate the danger of them decoying in migratory birds during our Phase II period. We have also had success in removing hawks from our airfield using pole traps, which are a nonlethal means of control.

Bird Watch Condition Codes

The effective use of Bird Watch Condition (BWC) codes also plays an important role in managing your BASH threat. At Offutt, we close our pattern during BWC Moderate and allow only initial takeoffs and landings if their routes avoid the hazardous bird


Photo by MSgt Mike Janca

activity. For BWC Severe, we shut down operations by prohibiting all takeoffs, landings and approaches. Airborne aircraft are directed to hold or divert until the hazardous bird activity is taken care of.

Involvement, Communication, Keys to Success

Of course, none of this will work without effective and timely communications between key personnel. Our SOF is the primary authority for issuing BWC changes. Since the SOF is mobile and on the airfield any time flight operations are underway, he is in the best position to keep a close eye on the airfield. Inputs from the tower, Airfield Management and Wing Safety play an important role in the SOF's BWC assessment.

Getting the word out through your safety meetings and educating your people on the BASH threat is important. We provide BASH training to all SOFs and also to our aircraft maintenance folks. Additionally, aircrew and maintenance personnel are directed to report all hazardous bird activity, whether on or above the airfield. Their support of the program has been outstanding. Birdstrikes, along with feather remains, are routinely submitted, providing important trends analysis information. Aircraft schedulers work hard to juggle mission and training requirements to avoid flying during the periods of peak bird activity (one hour before and after sunrise and sunset) during BASH Phase II.

Program Improvements

Reducing your BASH threat is no easy task, and of course there are no easy solutions. In today's climate of reduced funding and limited expenditures, you have to be prudent with your resources and prepared to fight for the changes you need to improve your program and make your flying operations safer.

Some suggestions:

• Take time to educate your senior leadership, especially after a change of command. Doing so will keep your important BASH issues a top priority while securing their invaluable support.

• Attend the Bird Strike Committee-USA conference, which is held every year (*see page 13—Editor*). Learn to network with key people from other bases and airports as you search for solutions to your problems. We can learn a lot from each other and save valuable time in the process.

• Get to know your airfield manager and your CE folks. Your BASH goals mirror many of their goals for the base. Here at Offutt, their support has truly made the difference and, because most of them aren't military, chances are they will be around long after you leave to keep some of your initiatives alive.

Finally, remember it's not enough to be aware of a problem. You must also assess the risk, make sure it's properly documented, and then take action. ✈

Aircraft schedulers work hard to juggle mission and training requirements to avoid flying during the periods of peak bird activity (one hour before and after sunrise and sunset) during BASH Phase II.

USAF Photo by MSgt Perry Heimer

1LT CURTIS BURNEY
HQ AFSC/SEFW

Work is beginning on developing BAMs to cover other parts of the world, such as Europe, the Middle East and Alaska.

The past year has truly been a busy time for the BASH Team. If things keep progressing as they have, Y2K and the years following promise to be exciting as well. New developments, approaches and techniques keep popping up everywhere. While many of these innovations show potential, we must continue to use good judgment and follow proven methods of wildlife management, habitat modification, bird avoidance and animal dispersal / removal.

To summarize the BASH Team's past year, I chose to address six topics that have generated the most interest from the field. Hopefully, this will answer many questions while stimulating more interest to generate even more inquiry.

Reporting Birdstrikes

The new online reporting system is active! The new form is piggybacking the Air Force's Safety Automated System (SAS) for Ground. The form decreases input time while increasing the validity of the data. To do this, we added more drop-down and pop-up lists that decrease time typing and standardize responses.

Going to an online form reduces many headaches that were created from the older reporting programs. No longer will you need special software to type in and report information. A computer with an Internet connection and a web browser are all that are required.

Data acquisition will also be streamlined and put on the web. No longer will you have to wait for strike information. A query system will be built online that will be able to retrieve most data requests.

Contact Lt Curt Burney (DSN 246-5673, email burneyc@kafb.saia.af.mil) for answers to your questions or to get you hooked up to this new and exciting system.

Bird Avoidance Model (BAM)/Avian Hazard Advisory System (AHAS)

The process of steering planes around birds is progressing at a steady rate. Work to improve the BAM has been started.

Developers are focusing on the acquisition of new data to enhance the existing archive. One source of new data is archived radar records from the network of NEXRAD radars currently being used for AHAS. Other sources include more localized surveys and population studies. The GIS (Geographic Information Systems) arrangement of the BAM allows developers to readily incorporate many of the different formats that are used to store datasets.

Work is beginning on developing BAMs to cover other parts of the world, such as Europe, the Middle East and Alaska. Creating a European BAM is a monumental task and will take much time and coordination.

Falconry

Falconry is an effective bird dispersal method that won't work when the predator birds are full, molting, really cold, really hot, or getting rained/snowed/sleeted on. I believe it's time for a pro/con breakout of falconry.

Pros

1. IT WORKS! It can be a very effective method of harassment. Deploying birds of prey almost always disperses birds immediately from the airfield and these birds are likely to remain away from the airfield for longer time periods. In addition, contractors will usually employ other wildlife control techniques besides falcons to cover periods when they cannot fly their birds.
2. NO HABITUATION. The evolutionary process has created a tool that provides natural harassment. Birds of prey inherently scare other birds.
3. PUBLIC RELATIONS. The "sport of kings" has always carried with it a romance, an allure, which has made its use an important PR tool for many airports.
4. BRINGING DEDICATED, KNOWLEDGEABLE INDIVIDUALS ONTO THE AIRFIELD. This is probably the most important advantage of having a bird control program with falcons incorporated. The folks who take care of these birds of prey are truly motivated about their job and excited about falconry. By bringing this tool to the airfield, you are also getting individuals who know about birds and their behavior.

Cons

1. COST! This is a relative argument and can be readily thrown out based on the following: In the United States, bird control programs that use falconry have consistently been extremely expensive. However, BASH programs in the UK have incorporated falconry at very low cost. The trick is not to focus on falconry when putting a bird control contract together. When developing a program, you must choose a contractor from the pool of bidders, weighing cost and their reputed effectiveness. Their job is to get the birds off the airfield. The tools they use to do that job are left up to them. Whether they want to go out to runway 17L ten times a day with pyrotechnics to scare off gulls, or maybe go only once by flying a falcon, is a decision they will have to make. Responsibility for assessing the bird control contractor's effectiveness lies with the safety office.

Bottom line: Contract out for a complete wildlife control program that uses more than just falconry. Let the bidders decide whether to use falcons or other tools and techniques to develop the most cost-effective approach to their job.
2. MANPOWER INTENSIVE. This argument is obviously tied to cost. Past experience has shown that an effective bird control program using falconry requires at least two full-time operators who are trained and dedicated.
3. A GAMBLE. Birds may fly away, get injured or killed, or become sick. It has been reported that loss from sickness and escape may be as high as 40%.
4. DAYLIGHT/WEATHER. Falconry is limited to periods of daylight and favorable weather.
5. SEVERAL BIRDS REQUIRED and PROCUREMENT OF RAPTORS. An operation must have several working birds since the raptors are useless after large feedings or while molting. Perhaps one of the most difficult problems with the use of falcons on airfields is their procurement. These birds are extremely hard to obtain and expensive.
6. SPECIES SPECIFIC. Some pest species only respond to certain types of raptors. This requires a diversified attack, more working birds, and experience in using raptors for harassment.
7. PROPER HOUSING. Birds must be properly cared for. Mews (bird pens) must be built very near the airfield for access. This will require the airfield to provide adequate space.

Pyrotechnics

This is the beginning of the fifth year for the BASH munitions authorization process.

continued on next page

Deploying birds of prey almost always disperses birds immediately from the airfield and these birds are likely to remain away from the airfield for longer time periods.

There is progress, albeit very, very slow progress. Confusion abounds over which munitions are approved for use and which are prohibited. At this writing, there is approval for two different 15mm launchers, 15mm bangers, 15mm screamers, 12 gauge bird scare cartridges, Olin/Winchester® brand steel shot waterfowl loads #2, 4, and 6, Federal #7 1/2 lead shot, and 00 buckshot loads. Additional pyrotechnics are under consideration for approval/authorization. The local purchase process for BASH munitions needs lots of improvement, along with the system for getting BASH munitions to overseas locations. These issues are being worked very hard.

Grass Height

The optimum airfield vegetative cover is a uniform, mono-typical stand of grass.... Maintain grass height between 7 to 14 inches and native vegetation as close to the 7-14 inch height as practical.

AFI 91-202, *The US Air Force Mishap Prevention Program*, is under revision, to include the grass height policy. The new policy will likely read as follows: "The optimum airfield vegetative cover is a uniform, mono-typical stand of grass. Installations located in arid climates where growing grass is difficult may develop natural vegetation on the airfield to limit attractiveness to wildlife. Maintain grass height between 7 to 14 inches and native vegetation as close to the 7-14 inch height as practical." This height discourages flocking species because reduced visibility disrupts inter-flock communication and flock integrity, and prevents predator detection.

USAF Photo by MSgt Perry J. Heimer

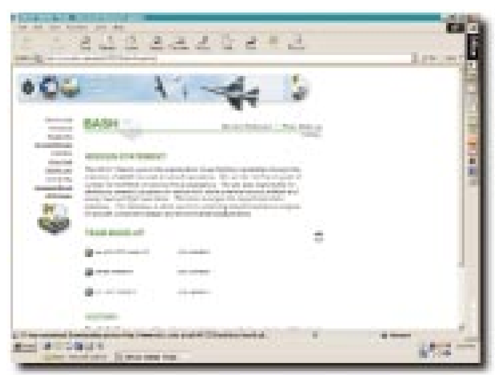
The BASH Team understands that situations arise where this approach may not be the most effective for the species of concern on your airfield. Plans may be developed to combat these contingencies. MAJCOM safety offices may request a grass height waiver from the BASH Team. When deciding whether a waiver is warranted, it is incredibly important that you acquire as much information as possible concerning the possible grass height problem. The gathering of detailed strike information and field observations is the minimum that should be done.

Birds are often drawn to the airfield environment due to available food. To determine a correlation between food gathering and the airfield grass habitat, necropsies of struck and/or depradated birds can be performed to ascertain the diet of problem species. Also, prey surveys can be conducted to determine food availability and its relationship to the grass height.

Concerning the mowing contract, please coordinate mowing with periods of low flight activity. Weekends are often great times for mowing. Also, it is advantageous to complete the mowing of the airfield in as short a period as possible. If mowing is done often, birds such as cattle egrets may develop a daily schedule and become a routine hazard on the airfield.

BASH Website

We here on the BASH Team are often very hard to get in touch with. Our phone lines are often busy and, to make matters worse, we are gone a lot. To alleviate these and other problems that sometimes happen, we have created the BASH information distribution animal! It is located at www-afsc.saia.af.mil/AFSC/Bash/home.html and can be referenced at any time. Check it out when you get the chance.



As you can see, the BASH plate is full and exciting. The wide spectrum of BASH concerns coupled with the developments in technology have truly kept us on our toes of late. We hope this enthusiasm continues. Please feel free to give us a call or shoot us an email with any concerns or questions. The BASH Team is here to serve you. ✈

Bird Strike Committee USA and Bird Strike Committee Canada

Announce the Second Annual Joint Meeting

August 8-10, 2000
Minneapolis-St. Paul International Airport, Minnesota

Theme: Practical Wildlife Control Techniques for Airports

PURPOSE

Every year, billions of dollars are wasted and lives are endangered worldwide when birds and other wildlife damage aircraft. To meet this ongoing challenge, the Bird Strike Committees of the United States and Canada present the second annual joint meeting, August 8-10 2000, at the MSP International Airport. MSP provides an ideal location to address wildlife issues because of major construction projects and close proximity to wildlife refuges.

WHO SHOULD ATTEND

This annual gathering is of particular interest to military and civilian personnel responsible for airfield operations, wildlife managers, land-use planners, FAA airport inspectors, university researchers, engineers, pilots, aviation industry representatives, and waste management operators. In short, anyone interested in reducing wildlife strike hazards to aircraft! For further information, contact one of the organizers listed below or visit the www.birdstrike.org web page.

PROGRAM

Presentations include papers, posters, wildlife control technique demonstrations, new technologies, land-use issues (landfills, wetlands), training, engineering standards, and habitat management. The meeting will also have hands-on demonstrations and activities during a field trip to MSP. A strike reduction training session rounds out the program.

EXHIBITS

The program will include vendor exhibits featuring the latest in bird and mammal damage control technologies. Companies interested in participating should contact Mr. Gene LeBoeuf at the address below.

REGISTRATION

Before June 16, 2000, $90. After June 16, $100.

HOTEL RESERVATIONS

Reservations must be made by June 16 to guarantee the special rate. Please call the Holiday Inn Select at (612) 854-9000. Room rates are $89/night for government employees and $109/night for all other persons. When making your reservation, be sure to mention you are attending the BSC-USA Meeting.

STEERING COMMITTEES

BSC-USA

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Vacant, Vice-Chair
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Kirk Gustad, USDA/APHIS, 2869 Via Verde Drive, Springfield, IL 62703 (217-241-6700)

BSC-Canada

Bruce McKinnon, Chair, Transport Canada, 330 Sparks Street, Place de Ville, Ottawa, ON K1A 0N8 (613-990-0515)

Minneapolis-St. Paul International Airport

John Ostrom, MSP International Airport, 4300 Glumack Drive, Suite 3000, St. Paul, MN 55111 (612-726-5780)

www.birdstrike.org

T. ADAM KELLY
ACC AHAS Project Manager

AHAS... evaluates in near-real-time, and forecasts for 24 hours ahead, the bird strike risk for 6,197 IR and VR low-level routes, ranges, military airfields and MOAs in the Eastern third of the US.

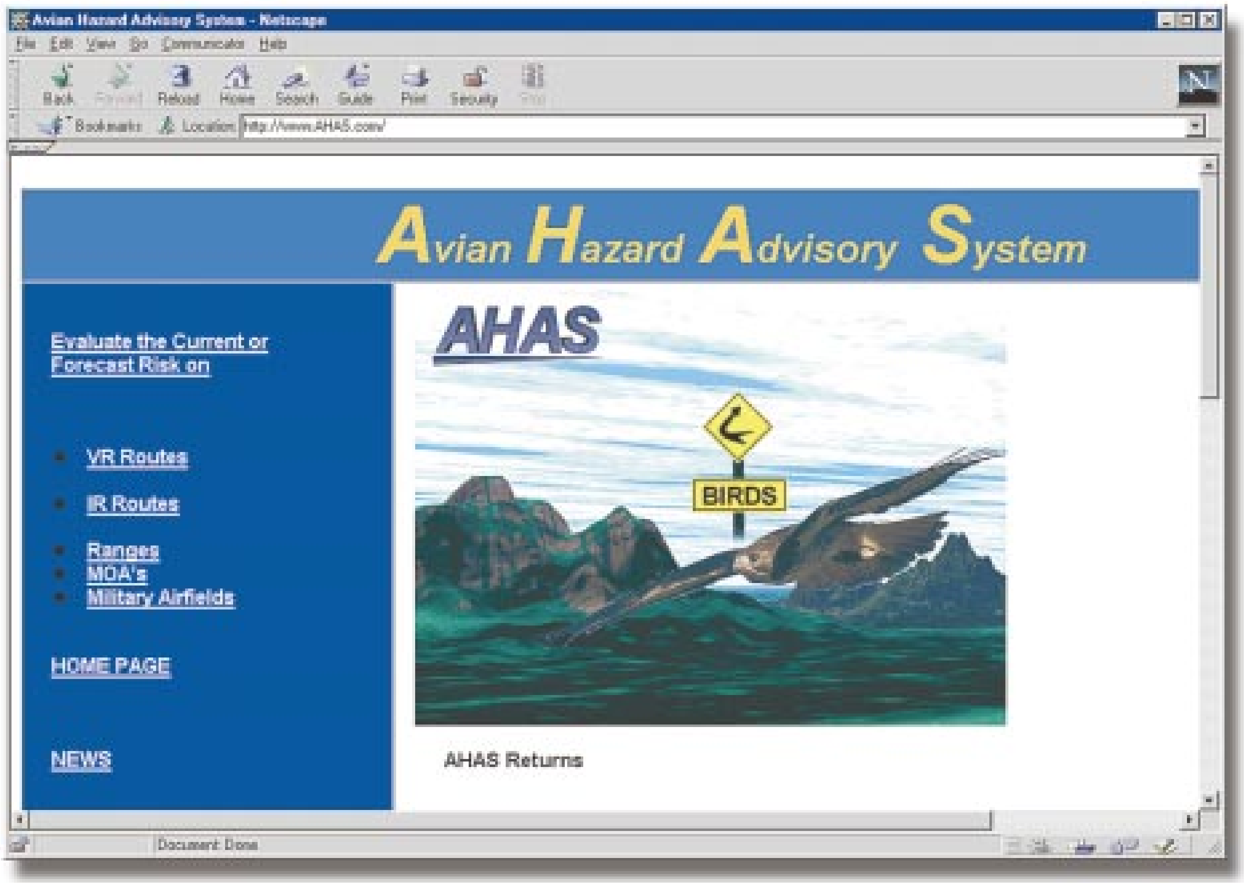
Last year, we reported how Air Combat Command had conducted a successful test of the Avian Hazard Advisory System (AHAS) in the fall of 1998 to monitor and predict potentially hazardous bird activity in selected regions of the US Atlantic Coast. (See *Flying Safety*, April 1999. Ed.) To the end user, not much appeared to happen with the AHAS during 1999. Our web page did not change much and no new data was posted. This was caused by problems with funding delays. Geo-Marine, Inc., kept one staff member developing the AHAS infrastructure and archiving data collected during the year.

Now, a much broader AHAS is in operation. It evaluates in near-real-time, and forecasts for 24 hours ahead, the birdstrike risk for 6,197 IR and VR low-level routes, ranges, military airfields and MOAs in the eastern third of the US. The data is being made available to pilots from two sources: directly from the AHAS web site (www.AHAS.com), and later in the year from the ACC natural resources web site(www.cevp.com/apps/bam/index.html).

Methods of Displaying Data

AHAS.com will continue to produce data in grid table form, while the ACC natural resources web site will generate the data as a graphic map display. Each method of displaying data has its advantages and disadvantages for showing areas of increased birdstrike risk to pilots. By making both formats available, users may access the data in the format that is most effective for their needs. If you want to look at the forecast birdstrike risk for the next 24 hours on a given low-level route, it's better to have the data in a table. In the table format, each hour is in one row and the risk for each segment of the route is in a column. A table can be printed for all frequently used routes and posted in the squadron mission planning room. While maps more effectively illustrate the spatial distribution of risk, printing 24 individual maps wouldn't be as useful. Tables are better than graphics for portraying risks over several time periods.

Seeing the current or forecast risk color-coded along a route overlaid on a flight planning map for a specified time is much more useful when considering the spatial aspects of mission planning, such as proximity of radio towers or other obstacles, and the general terrain. The ACC web site will



pull the information on risk from the on-line AHAS data base and then generate the map display.

AHAS and the BAM

The US Bird Avoidance Model (BAM) is the historical record of where and when birds are active. To the end-user, differences between the US BAM and AHAS are becoming increasingly transparent. If you access the AHAS web page to obtain the risk on a low-level route at any time period greater than 24 hours, you'll be looking at risk ratings from the US BAM.

AHAS is the *dynamic* data set of forecasts and near-real-time birdstrike request data. If you request the risk on a route within a 24 hour period from the web site, you'll be looking at AHAS forecast data. A request for the current birdstrike risk on a route will result in a risk evaluation based on near-real-time observations from the WSR 88-D Next-Generation Weather Radar (NEXRAD).

AHAS also uses US BAM data in interpreting radar returns from NEXRAD. The type of processing AHAS uses in processing NEXRAD radar returns can only separate weather from biological targets. US BAM data, which shows where and when large, hazardous birds are active, is used as a part of an expert system to evaluate the risk that the biological targets seen on the radar present to aircraft.

Much of the current funding for AHAS has been provided to collect data on the movement of birds in the lower 48 states to improve the existing US BAM. Radar data can be used to find new bird migration patterns. Man is constantly altering the landscape with development, changes in farm crops in response to market conditions and establishing new wetland areas and wildlife refuges. Monitoring bird activity in near-real-time provides a means to find these new "hot spot" areas and update the US BAM.

Improving Forecasts and Monitoring

The AHAS was designed from the beginning to learn from its mistakes and steadily

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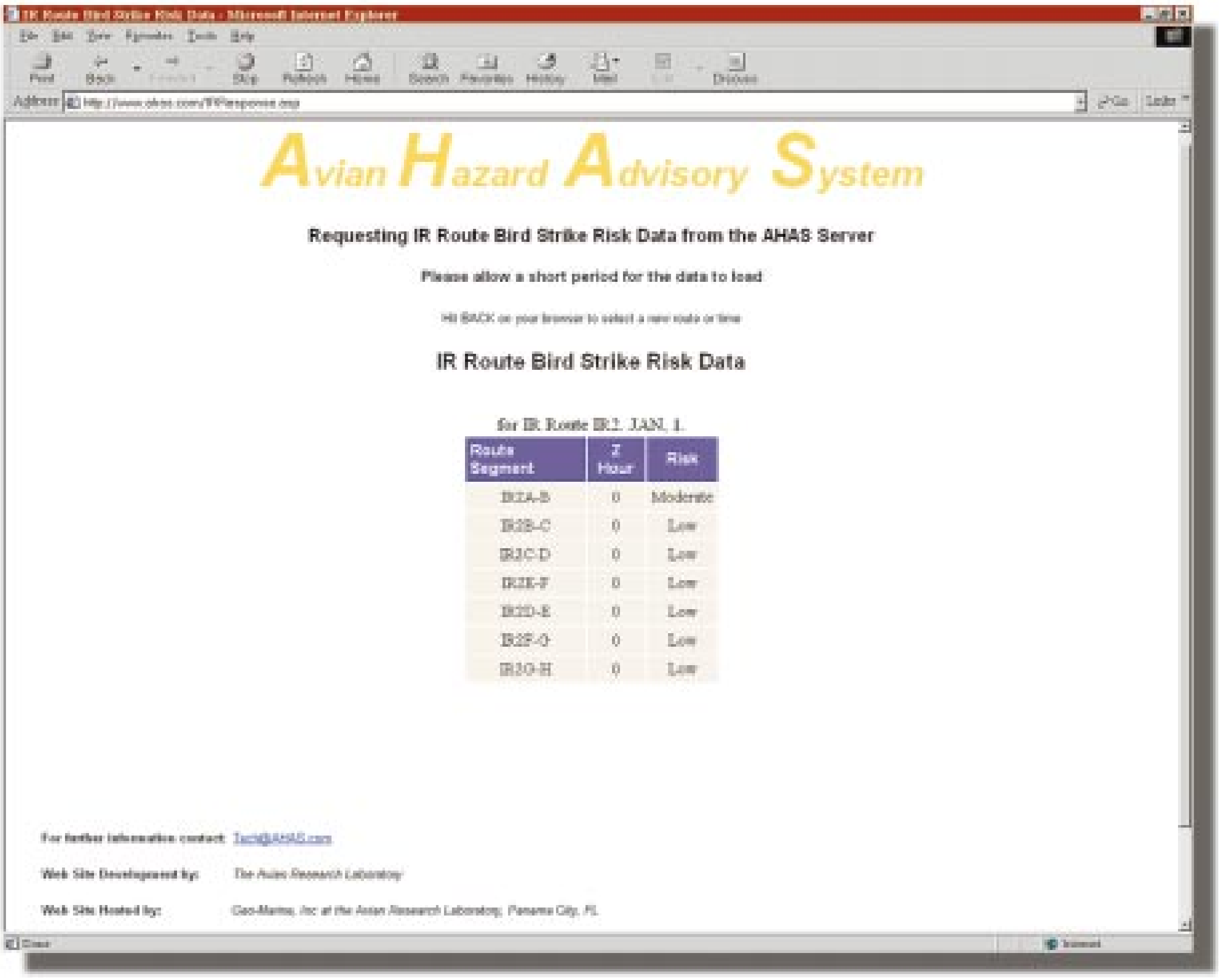


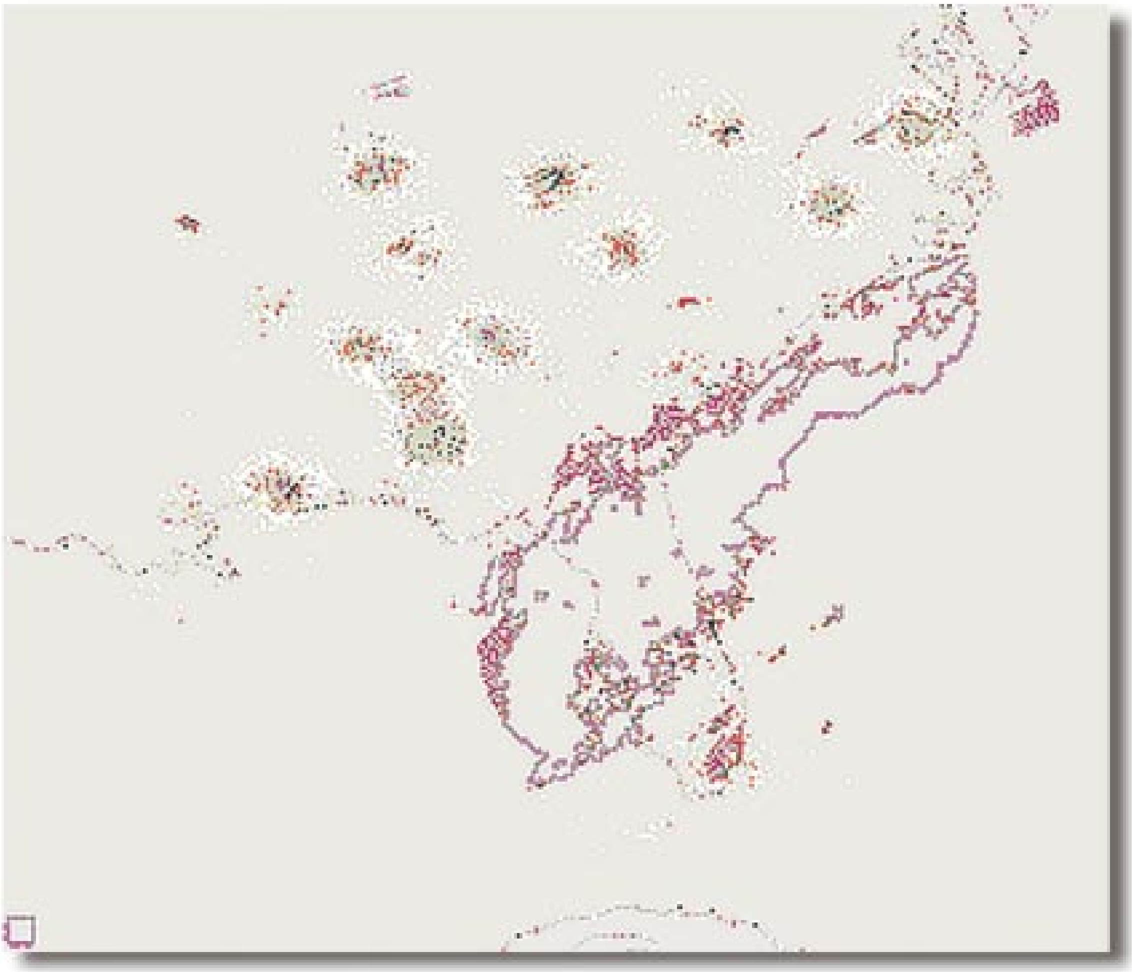
An archive of NEXRAD radar images has been collected in the past year, covering all types of radar targets.

improve itself by the use of sophisticated neural networks. When a bird migration occurs that wasn't predicted by the forecast system, the system can be retrained with the new set of weather conditions to learn how to predict this event. This is a much more powerful approach than using statistical models. Neural networks can, over time, find very subtle relationships between weather and bird behavior that are simply missed, or not considered significant, by other methods.

A similar approach is being used to improve the evaluation of radar data. An archive of NEXRAD radar images has been collected in the past year, covering all types of radar targets. They included large-scale weather fronts and small thunderstorms, bats, birds ranging in size from the smallest varieties to swans, ducks, and geese, and even to chaff discharged from military aircraft. In the coming months, neural networks will be trained to identify each of the identified target types. As the archive of target types grows, the neural networks will evolve, improving the quality of data used in both real-time monitoring and for the US BAM.

System Expansion

For pilots at bases outside the eastern third of the US, a progressive expansion from the East Coast is planned, and AHAS will be expanding to cover your areas in 2001. This progressive expansion has several advantages. Computers get consistently faster, doubling processor speed every 18 months. Therefore, we can do about a third more processing with each computer added to the system next year than we can now, for the same cost. It's also easier to fine-tune the system in small areas to achieve optimum performance than it is to try covering everywhere at once. The West Coast may be last to



receive AHAS coverage, but it will benefit greatly from the incremental improvements realized as the system is steadily expanded.

Fall 1999 Migration

During testing of the expanded AHAS system in the fall of 1999, before data was made available via the web, AHAS system operators noted that the fall migration, as in 1998, was going to be late. This information was sent out to aircrews via the USAF Bird/Wildlife Aircraft Strike Hazard (BASH) Team and HQ ACC Safety to ensure pilots didn't let down their guard before the worst of the fall migration was over for the year. When the weather finally turned cold in Canada, an advisory was issued five days in advance of a big movement of waterfowl across much of the lower 48 states. Fortunately, most of this hazardous bird migration occurred during the Thanksgiving holiday when low-level training was minimal.

AHAS continues to demonstrate that although we can't dodge all of the birds, we can stay away from the most intense bird activity, reduce bird strike risk and train more safely by just checking a web page before we fly! ✈

(About the author: Mr. Kelly has 18 years of experience in the BASH Program. He started his career as a falconer and bird control specialist with the USAF's 3rd Air Force BASH Program in the UK. After obtaining his master's degree with a thesis on Bird Avoidance Modeling, he moved to North Carolina and developed the Dare County BAM for HQ ACC. In 1999, he completed the Moody AFB BAM. He currently directs AHAS project development at the Avian Research Laboratory in Panama City, Florida.)

During testing of the expanded AHAS system in the fall of 1999… operators noted that the fall migration, as in 1998, was going to be late.

USAF Photo by MSgt Perry Heimer

BAMBI BE GONE!

CAPT JONATHAN R. VAN NOORD
314 AW/SE
Little Rock AFB AR

In 1930 there were less than 500 Whitetailed deer throughout Arkansas. Today they number over one million.

Two deer strikes in as many months. As might be expected, the spotlight instantly shifted to the Wing Safety Office and centered directly on flight safety. What were we going to do about it? Was there really any practical solution we could offer that would prevent another deer strike at Little Rock AFB?

It's common knowledge we have deer all over the base. After all, Arkansas prides itself as "The Natural State." Every fall, hunters take to the woods, staking out the spot they know will get them that 12-point trophy buck. Base operations personnel had observed deer during their airfield checks for years and it wasn't uncommon for the tower to spot a couple, high-tailing it across the runway. But did our deer "problem" really pose a hazard to our flying operations? And, if so, did the hazard translate into a significant risk that needed our attention?

Consulting the Arkansas Game and Fish Department, we discovered that the deer population in the local area, indeed the entire state, had gone from near-extinction to incredible numbers. In 1930 there were less than 500 Whitetailed deer throughout Arkansas. Today they number over one million. And the base's "herd" isn't doing too badly either—a population of around 400, plus those that move on and off the base's property. Not a bad comeback!

We then looked at historical data on Air Force aircraft strikes with deer and other wildlife. The C-130 fleet experienced eight deer strikes between 1977 and 1998, costing over $52,000. That didn't seem too bad, but three of those strikes occurred at Little Rock AFB. One was in 1993 and two in 1998, for a total cost of $23,000, not including loss of those aircraft during downtime. We also investigated strikes by other, smaller aircraft of the type that often transit our field. We found Class B and C reports on C-12, T-37, T-38, F-16 and C-21 aircraft. The strikes included Coyote, wild pig and deer, with damage ranging from none to as high as $482,513. Now it looked a little more serious.

Wing Flight Safety, in conjunction with base operations and civil engineering, conducted a thorough risk analysis. While historical data indicated a low probability of additional strikes, we realized our deer population was growing rapidly. We also agreed that one of our C-130s striking a deer posed little risk of injury to personnel and would result in only minor property damage and mission degradation. However, they did pose a significantly higher threat to the smaller aircraft and fast-moving fighters which routinely visit the base. Although we deemed mishap probability to be low, mishap severity could be significant to smaller aircraft. Our deer situation was a hazard to flying operations that needed mitigation.

Throughout the fall of 1998, the flight safety team researched measures to control deer on the airfield. We attempted a cost/value analysis over a 40-year period for every possible option. The most cost-effective measure was an 8-foot wildlife fence topped with barbed wire, claiming a respectable 95.6% efficiency. However, it soon became apparent we had a very determined variety of deer here in the area. With deer gracefully jumping their eight-foot fence, a local airport recently increased the height by four feet. After that, this same airport now had Whitetails entering their field *under* their 12-foot fence in drainage and low areas.

We considered numerous options and their expected efficiencies, including extra manpower, trained dogs, scare tactics, hunting, deer watch conditions alerting crews, scheduled depredation, altering flying operations, rerouting airfield drainage and associated deer watering locations, making feeding and watering locations away from the base, and of course doing nothing at all. The results of those studies are shown in the graph below.

We then factored in the costs of implementing and maintaining each solution. Costs ranged from almost nothing for initiating deer watch conditions and promoting hunting on base, to $284,000 for an eight-foot fence, to over $1 million for a new drainage system and hiring extra help.

Flight safety presented the analysis at our Bird Hazard Working Group (BHWG) meeting in February 1999. The group decided to implement new deer watch conditions in an attempt to standardize levels of "deer hazard" to formally advise crews of increased deer activity on the field. Our Supervisors of Flying conducted standardized, nightly deer counts on the airfield to collect data and better quantify the results of our efforts. We also decided to promote hunting through the base newspaper and to build hunting stands along the north side of the airfield with clear firing lanes. At $284,000, a wildlife fence, the most efficient solution, was deemed cost prohibitive.

Just three months later, I was attending the North America Bird Strike Committee '99 meeting in Vancouver, Canada. While gathering information on bird control, I also discussed our deer problem with several of the vendors at the convention. As fate would have it, my business card made its way to a company marketing a relatively

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Deer Control Measures
(Estimated Improvement, Percent)

USAF Photo

The fence is six feet high and 30,400 feet long, with nine alternating "cold" and "hot" lines.

new type of electric fencing for wildlife control. The president of the company contacted me, listened to our problem, and sent a sample of the fence material. Originally made for horse enclosures, it was also proving effective in Canada at preventing Moose and Elk from entering orchards or crossing roads. Until that time it had never been used around an airfield. Instead of the traditional heavy electric wire, this fence consisted of copper strands braided into a lighter nylon rope. Considering its success in Canada and its lower cost, we decided to explore further.

We were concerned that the proposed six-foot-high fence would not keep the deer out, but we learned it was the electric pulse and not the height that deterred the animals (they sense the electric current and are repelled). With an estimated five miles of fence line, controlling the vegetation near the fence was another concern. However, since the copper wire is a better conductor of electricity than grass and brush, vegetation has very little effect on the fence. Another benefit to this fence was the 25-year warranty. And after thoroughly researching airfield frangibility requirements, the 314 OSS Airfield Management Flight, in conjunction with 314 Civil Engineering, concluded we could bring the fence in closer to the runway, significantly reducing the length of fencing required. It seemed we could effectively enclose the portion of our airfield adjacent to wooded areas with an electric fence, guaranteed to be at least 90% effective, for under $60,000. With this new data, the wing commander approved the proposal at a special session of the BHWG in June 1999.

We quickly started detailing installation plans with civil engineering and coordinating with 314 Contracting Squadron to fulfill all competitive bidding requirements. Thorough research and competitive bidding failed to uncover any other fencing that would meet our requirements.

After working with a company representative for two hours, our six-man installation team was up and running. The fence is six feet high and 30,400 feet long, with nine alternating "cold" and "hot" lines. Lines at the bottom are spaced six inches apart to keep small animals such as raccoons, skunks and foxes out, while the upper lines are nine inches apart. The transformer produces a thousandth of a second pulse with an average of 7500 volts at 1.5 milliamps, below pain threshold figures established by OSHA. We kept the fence at least 20 feet from the tree line to give deer the option of running along the fence when being chased. The installation team had the fence operational in just six weeks at a cost of $58,700. But was it really going to be worth our time and effort?

Initial data indicates the answer is a resounding YES! Last summer, our airfield deer counts were averaging 19 per night with a high count of 41, with no deer-free nights. Since the fence went operational 24 Sep 99, our average count is down to one per night with a high count of five, and 80% of all nights are completely deer-free. (Note: The five deer were spotted near an open gate.) The improved count average equates to a 94.7% effectiveness, less than 1% off our original expectations of 95.6% for a traditional wildlife fence, at one-fifth the cost. Most deer spotted on the field these days can be traced back to an open gate. Those that jump the fence are running from hunters.

While the result of the fence is a success story in itself that we hope will benefit other USAF bases with similar wildlife problems, the real success story is the team effort that made it happen. Team Little Rock wasted no time in seizing an opportunity to significantly improve the safety of their flight operations. Nothing short of total teamwork and the Team Little Rock "Can Do" attitude could have carried a project of this magnitude from inception to operational status in just 18 short weeks. And, best of all, Little Rock AFB is now a safer place to fly. Come visit any time!

Since the fence went operational 24 Sep 99, our average count is down to one per night with a high count of five, and 80% of all nights are completely deer-free.


USAF Photo

Look OVER the Fence

CARL LAHSER
HQ AETC/CEVN
Randolph AFB TX

Almost 30 years ago, I ran a pest control shop at Homestead AFB. On the east side of the base was mangrove swamp, while the west side was occupied by fields where seeds were raised for Midwestern farmers. The mangroves were home for a large flock of cattle egrets that flew across the south end of the runway every morning and evening.

On many mornings I watched the Thuds of the 31st Tactical Fighter Wing and the Phantoms of the AFRES 482 TFW drive through flocks of egrets. I asked tower personnel why they didn't tell pilots to wait until the birds were out of the way. They told me it was not the tower's responsibility and, besides, those battle-hardened warriors wouldn't listen. Several of the pilots told me much the same thing and suggested if I wanted to do something useful I could get rid of those %$#$ birds.

We can keep the grass mowed and the wet spots drained on base but there isn't much we can legally do about our neighbors' land practices.

Times have changed. The Bird / Wildlife Aircraft Strike Hazard (BASH) program was organized in 1969 as a HQ USAF / CE function and I had my first BASH inspection in 1972. Air traffic controllers now control aircraft. They give warnings of bird activity and can even close the airfield if the bird hazard warrants. Pilots are aware of the damage bird can do to plane and pilot. Bird Hazard Working Groups and bird dispersal teams are an integral part of the flying safety program.

A new strategy in bird awareness is being employed at Sheppard AFB in Wichita Falls, Texas. The area around Sheppard is still rural enough so cattle grazing and wheat fields can be seen across the fence while driving the perimeter road. Tim Hunter, the base natural resources manager, sees this pastoral scene as a possible BASH threat. Tim says, "We can keep the grass mowed and the wet spots drained on base but there isn't much we can legally do about our neighbors' land practices. They didn't know that their farming practices could have an impact on our flying."

Tim explained, "Plowing and planting time attracts a lot of birds to the earthworms and other soil organisms. Birds also hit the freshly planted seed and other seed exposed by turning the soil. Harvest time attracts birds to ripened grain, and to mice and snakes injured during the harvest process. Young, green, winter wheat attracts feeding flocks of geese from their sleeping grounds on the Red River and local lakes."

Tim began touring the back roads around the base every couple of weeks to see what local landowners were doing. Tim said, "I know that plowing, planting, harvesting and moving cattle can attract birds. I use this information two ways. First, since I was raised around here I know many of the farmers and ranchers and can talk to them. I tell them about the BASH program. I might suggest they change to a crop or land use that does not attract so many birds and maybe save them money at the same time.

"The other side of the coin is to brief the flying community," Tim continued. "Through the Bird Hazard Working Group, I tell flight safety, pilots, the airfield manager and control tower personnel where the potential bird problems are off base. The pilots and tower personnel then know where to keep a special lookout for birds."

Don Pitts is the natural resources manager at Dyess AFB near Abilene, Texas. Don said, "Since vultures are among our most frequent and dangerous strikes, I make a weekly check around the outside perimeter for sick, dead or heavily pregnant livestock. I warn the rancher of any present or impending problems, and they appreciate it. I appreciate them doing their part to not attract vultures."

This proactive approach has not yet had specific measurable success but, like propane cannons and mowing, it is another tool for fine-tuning the BASH program. ✈

BIRDSTRIKE From The INSIDE

CAPTAIN E.W. (BUDDY) COUNTS

In 30 years of airline flying, I have encountered birdstrikes to the windscreen, wings, tail section and one engine ingestion that resulted in partial power loss. However, the most memorable birdstrike occurred at 35,000 feet during an international flight.

I was the captain on a Boeing 767ER flight from London's Gatwick International Airport (LGW) to Philadelphia, PA (PHL). Upon arrival at the jetway, the flight crew was met by two LGW security officers who informed me that a sparrow had just flown from the jetway into the cockpit interior. Unable to locate the stowaway, the officers had closed the cockpit entrance door, trapping the bird inside.

Knowing we were not allowed to carry live animals in the cockpit, I looked around in all the places I thought a bird might hide, but to no avail. The only thing to do was to call an exterminator to see if the bird could possibly be forced out. This didn't work either, so a mechanic was asked to help by removing several overhead circuit breaker panels. When this also failed, an entry was made in the aircraft log book of "a possible bird entry" and signed off by the mechanic. The company dispatcher was informed and the flight pushed back on time.

After takeoff and in cruise heading westbound, things were fine, and we all somewhat forgot we were carrying an unauthorized passenger. That is, until 30 minutes after coasting out over Ireland, when the speedbird decided enough was enough and flew out of hiding, where it commenced to flying circuits—inside the cockpit.

The first officer, international relief officer (IRO) and I made every effort to catch the speedbird in flight, but we were just not quick enough. Suddenly, the bird landed on the glareshield, chirped a few times, looked down at the cold North Atlantic, and took off flying again. This event was beginning to look like a re-enactment of Alfred Hitchcock's thriller, "*The Birds*."

The action was ended by a swift clipboard in hand and the sharp eye of the IRO (ex-Air Force pilot) as the speedbird made its last dive on the flight crew. Hearing all the commotion, the lead flight attendant, expecting to find bodies lying around, entered the cockpit. Luckily, the action was confined to the cockpit area, and none of the passengers would find a live bird in their soup.

This event was beginning to look like a re-enactment of Alfred Hitchcock's thriller, "The Birds."

Once the cockpit atmosphere had settled down to normal, I sent an electronic message to the company's dispatcher that the speedbird had died by flying headfirst into a clipboard. The only decision left was whether or not to declare the dead bird to the US Department of Agriculture after we arrived back in the United States. The declaration problem was solved when agriculture personnel didn't show up at the destination gate.

Flying air transport category can be exciting. The crew never knows what to expect when the cargo they are carrying either walks, swims, crawls or flies. We all must be prepared to expect the unexpected. ✈

(About the Author: Captain Counts begin his flight career as a private pilot, and held positions as an Instructor Pilot, aircraft sales manager, and charter pilot in the civilian community. He joined Piedmont Airlines (now US Airways) in 1969 and has flown the YS-11, most Boeing 737 variants, and the Boeing 727. He's currently a Line Captain on the Boeing 757 and 767, and has worked as Check Pilot, Instructor Pilot, Assistant Chief Pilot, and International Check Pilot within US Airways.)

BASH TOOL REVIEW:

The Air Rifle

GENE LEBOEUF
HQ AFSC/SEFW

> *Although air rifles are relatively safe…they can cause harm if handled in an unsafe manner. In addition, if air guns are used inside a hangar, you should always be alert to what may lie behind the intended target.*

Through the years, there have been many changes in the field of wildlife damage control. Most of the changes have been toward using kinder and gentler approaches in an effort to convince wildlife to move to a more desirable location. Some of us "old timers" refer to the use of these new techniques as the "spank and release" program.

Humor aside, it is always best to begin any control operations at the safest and simplest level, and work up. When your task is protecting lives and aircraft, success in a wildlife control program is not normally optional; you may have to elevate your level of control to whatever measure it takes to effectively deal with the problem species.

In the Nissan commercials, the advertisement claims, "Dogs like trucks." When talking about aviation we claim, "Birds like airfields, especially hangars." The relationship between dogs and trucks is much more enjoyable than birds and hangars, and because there are safety concerns, the hangar begs a solution. When birds infest an aircraft hangar, and your best efforts fail to keep them out and you don't have enough money to completely net the entire ceiling, you might have to consider other alternatives. Actually, netting the rafters is the best long-term solution, but because it's expensive it isn't often employed.

Having been a Wildlife Control Biologist for over 20 years and having been directly responsible for control operations, I have had to resort to using a variety of tools to effectively deal with wildlife problems. One of these tools is the air rifle.

I have used air rifles for many years and have found them to be relatively inexpensive to shoot and very effective in certain situations. I have also responded to questions about using air rifles often enough to sit down and respond to some "FAQs" or "frequently asked questions." There are two things one must remember: Safety is always first, and there are limitations to any program.

One must always respect gun safety when using any rifle or pistol, and air guns are no exception. If you remember the movie "A Christmas Story," you may recall the warning young Ralphie heard from literally everyone from his mom to Santa, "You could shoot your eye out!" Although air rifles are relatively safe and often considered a child's toy, they can cause harm if handled in an unsafe manner. In addition, if air guns are used inside a hangar, you should always be alert to what may lie behind the intended target. You may get rid of the pigeons, but hopefully not at the expense of those things we built hangars for in the first place!

There are many air rifles on the market and most will effectively deal with nuisance species (see sidebar). However, I have developed personal opinions as to the best choice of rifle to use. Although all air rifles use "air" to propel the ammunition, they develop the pressure in different ways. Some models require a single cocking or stroke, or a number of pumps, while others use CO2 cartridges to make them function. A multiple-pump gun can be handy because the shooter can literally choose the velocity, or power, based on the number of times the gun is pumped. The only problem with this type of gun is that each additional pump changes the point of impact, making it difficult to use with a mounted sighting scope. A CO2 gun is relatively accurate and can be used with a scope; however, you may find that they always seem to "run out of gas" at absolutely inopportune times, or you may encounter difficulty purchasing the cartridges.

For simplicity, availability and accuracy, my preferred choice for an air rifle is the single stroke, or "crack barrel" type. These are very popular and are sold by a number of manufacturers. As with all air guns, they can be purchased over the counter or ordered through sporting goods mail order catalogs. Prices for the different models range widely, so it's wise to shop.

Other considerations aside, probably the best reason for purchasing a single stroke rifle is because it may be fitted with a sighting scope. The single velocity means that once you sight in the scope, it will generally shoot in the same spot. The scope also gives the shooter a magnified view of the intended target and allows him/her to be more accurate. One word of caution about scopes must be noted here. All scopes are not the same and you absolutely must have a scope that is specially made for air rifles. Other scopes will be ruined if used with an air rifle. You can normally purchase these scopes from the same sources that sell air rifles.

If you have previously shopped for an air rifle, you probably have noticed they are sold by pellet size and speed. An air rifle is rated by the caliber, or diameter, of pellet shot by the gun, and by velocity, or the feet per second (fps), it pushes a pellet. What velocity and caliber is best? There are many opinions here, and I of course have mine. I currently own five air rifles and one air pistol. The rifles are of the multiple-stroke and single-stroke type and are of varying velocities and calibers. My favorite is a single-stroke, rated at a velocity of 600-700 fps, with at least a 4X scope that is solidly mounted and sighted in for 20 yards.

Caliber is simply the diameter of the pellet. Because the diameter relates to size and weight, they affect velocity. Let's clear up one thing while on this subject: We are talking about "pellets," NOT "BBs." Pellets are made of lead and are aerodynamically shaped. BBs are round, and usually copper-coated. Pellets are less likely to bounce back at the shooter if they strike a hard surface. BBs can bounce in any direction, including straight back—just remember what happened to Ralphie in "A Christmas Story"! Thus, DO NOT use BBs, even though they are approximately .177 caliber and will actually shoot in the same caliber pellet rifles.

Now, which is better, .177, .20 or .22 caliber pellet rifles? This choice will depend on what you intend to shoot. If you don't push a .177 caliber pellet faster than, say, 800 fps, it is a great tool for pigeons in hangars. You will find .177 caliber air rifles that will shoot over 1000 fps advertised in catalogs, but I find them to be less accurate. I believe the .177 caliber pellet is too light and becomes unstable at speeds above 800 fps. You won't normally see these high-speed guns at serious competitions, so that has to tell you something. However, if nuisance squirrels seem to be your problem, or a large bird such as a crow, I find that a .22 caliber gun is best. The .22 caliber pellet has greater mass and that relates to a greater impact. The larger pellet will generally do a better job on something larger than a pigeon. The only problems I run into using larger pellets are they are not as readily available for purchase.

Once you make your choice, all that is left is to practice, practice and practice! If you have any questions, contact me at DSN 246-5679, or e-mail me at leboeufe@kafb.saia.af.mil, and I'd be happy to provide more information. ✈

DO NOT use BBs, even though they are approximately .177 caliber and will actually shoot in the same caliber pellet rifles.

A Nuisance: "Introduced Species"

When dealing with a roosting flock of pigeons, starlings or sparrows, an air rifle is probably the least expensive control technique. These species are common nuisances in hangars and are not afforded any Federal legal status because they are non-native or "introduced species." But this does *not* mean there are no state or local restrictions. Before shooting *any* bird, it is wise to check for any applicable state or local laws that may prohibit shooting them. At all times be certain of the target species.

OPS TOPICS PRESENTS...

The "Blue" Edition

USAF Photo by SSgt Andrew N. Dunaway, II

"My *#%*#% Tailhook Is *Where*?!?!?"

The F-15 experienced a Utility A hydraulic failure while en route to training airspace. The pilot and his wingman initiated an immediate RTB and started running the emergency checklist.

In this circumstance, the Dash-1 directs an approach-end arrestment with a touchdown point 800 ft in front of the cable to maximize probability of a successful tailhook engagement. The Dash-1 also states the landing should be slightly off-centerline if centerline runway lighting is installed. Since the airfield was equipped with centerline lighting, the mishap pilot (MP) planned his approach and landing accordingly.

He executed touchdown at the desired point and at the desired speed, then lowered the nose of the Eagle, in anticipation of the arrestment. When it became apparent that his aircraft wasn't slowing, he initiated a go-around.

At about the same time the MP was starting his go-around, the SOF radioed the MP that it appeared as though his tailhook had fallen off on the runway. The MP's wingman joined up during the go-around and confirmed the tailhook was, indeed, no longer attached.

The MP's second landing resulted in a normal touchdown and, between aerobraking and the emergency braking system, he was able to stop his Eagle on the runway. Maintenance towed the aircraft back to parking, where it was later determined that events surrounding the aborted first landing had caused nearly $25,000 damage. Examination of the amputated tailhook and its components told the tale of what had happened.

Per Dash-1 guidance, the MP had purposely touched down slightly off-centerline so the tailhook wouldn't come in contact with the centerline lights. As it happens though, the home field's runway centerline lights were located as much as 20 inches to the right of the geographic centerline. Tailhook witness marks on the runway matched up with fresh damage to three of the lights. Simply stated, an improbable series of coincidences converged at just the right time and deprived the Eagle of its tailhook when it needed it most.

Since this event occurred, information on actual position of this runway's centerline lights has been distributed.

"Fuel In The *#%*#% Cabin?!?!?"

A little ditty from the HAP (High Accident Potential) files...

Among other things, the -130 mission called for some practice inflight refuelings (IFR). But because parts were on order for the aircraft's IFR system and the aircraft was incapable of taking on fuel via the inflight method, it was restricted to "dry" hook-ups only.

During the first dry hook-up with the tanker, residual fuel in the boom drained into the -130's IFR system and, because of the bad parts—surprise!—subsequently leaked into the cabin compartment. The crew declared an IFE and turned for home station, recovering without incident.

Moral of the story? It's a good bet that a tanker refueling boom contains at least a small amount of fuel anytime it's airborne. If you're the receiver, and your aircraft is similarly restricted to "dry" hook-ups because of mechanical problems, or parts on order for the IFR system, then make sure system condition is such that fuel will be unable to flow outside refueling system plumbing before attempting a "dry" hook-up…

USAF Photo by SSgt Andrew N. Dunaway, II

"*#%*#% Friendly Fire?!?!?"

And here's one more item from the HAP files...

The Warthog two-ship was assigned to fly CAS as part of a supporting arms training exercise (SATEX). They were to perform a 500 ft AGL level pass delivery, then egress the target area ASAP.

The SATEX attack plan included two phases: one in which artillery-delivered suppression of enemy air defenses (SEAD) bombardments would occur, and a phase in which the A-10s would do their CAS "thing" and deliver ordnance.

One of the most important facets of the plan called for the ground FAC to use timing to de-conflict artillery and aircraft, with artillery bombardments scheduled to occur at 18, 20, 23, and 25 minutes past the hour, and the A-10 attack set for 19 minutes past the hour.

Everything was peachy until run-in for the first low-altitude attack. The flight lead mishap pilot (MP) was on time, on heading, on target, and cleared hot to expend his BDU-33s. He dropped his bombs and was about to begin the briefed egress maneuver when...an artillery round impacted the target area.

On join-up, the MP's wingman reported that fluid was covering the underside of the MP's horizontal stab and a panel on the fuselage was cocked open. The cell declared an emergency. Even though the stricken Warthog was controllable, the MP set up for a left hydraulic system failure and planned for use of alternate landing gear extension and emergency wheel brakes. Landing at an alternate field was uneventful. Kudos to the MP and his wingman for their teamwork and cool handling of the emergency!

Since this near midair collision between an A-10 and an inbound artillery shell, you can take it to the bank that the sister service's Fire Support Coordination Center has tightened up procedures to prevent future conflicts.

Moral of this story? Know your emergency procedures and be prepared to use them. Especially when it's a "routine" mission.

"Fire Bottle?!?!? What *#%*#% Fire Bottle?!?!?"

What happens when a taxiing C-130 encounters a stationary fire bottle? The fire bottle loses, right? Not necessarily...

The C-130 mission was a routine one: A trip with three legs ending with an RON. The mishap crew (MC) made its first stop with a planned ground time of 1.5, but shortly after landing, sought and got approval for early departure that would cut the scheduled ground time in half.

The MC made ready for early departure, but had to await the arrival of pax and baggage. Once pax and cargo were loaded, the MC called Ground for clearance to start engines in preparation for departure. Ground granted clearance for engine start and reminded the MC that while early departure had been approved, early departure *approval* would expire in a little more than ten minutes. One can almost imagine a collective "Huh?!?! What?!? Ten minutes?!? It's time for the full court press! Gotta go, gotta go!" from the MC.

The MC finished preparations and commenced engine start. In an effort to assure the C-130 plenty of room for taxi to takeoff, Transient Alert (TA) disconnected the aircraft's power cart, hooked up and proceeded to tow it down the taxiway to the neighboring hardstand.

With six minutes elapsed since requesting engine start and all four engines turning, the MC had just seven minutes remaining before takeoff approval expired. TA was out of the area repositioning the power cart when the MC requested (and received) taxi clearance, so the C-130 began taxi without a marshaller.

TA was returning to marshal the C-130 from the hardstand when they noticed the aircraft already moving down the taxiway. TA also noticed the C-130 had hit the fire bottle that had been positioned a few feet in front of the aircraft, and saw that it was lodged just forward of the right main landing gear. The MC pushed the fire bottle nearly 500 feet before TA, via Ground, was able to notify the MC of the situation and halt the taxi. Need we say the C-130 didn't make its scheduled departure time?

Air Force cost for fire bottle damage was $715. C-130 damage? A shade over $100,000. Fire bottles "1," C-130 "0." Proving once again that haste *does* make waste… ✈

Maintenan

Maintenance Matters Presents...

A (NOT SO) SUBLIMINAL FOD PREVENTION MESSAGE

FOD'd Lancer

The B-1B suffered a birdstrike that caused extensive damage to the No. 2 engine inlet duct liner and RCS vane. The No. 2 engine came through the strike virtually unscathed, but it did have to be removed FOM for repairs to the inlet area.

Once the No. 2 engine inlet damage was fixed, the original engine was reinstalled. During the 90-odd days that the aircraft was out of commission, several parts were CANN'd. As a result, numerous systems required op check before the Lancer could be returned to MC status including a four-engine ground maintenance run.

During pre-run activities by the weekend duty crew, the maintainer crawling the intakes discovered birdstrike remains that had never been cleared from the No. 2 engine ram air inlet, so he removed them. Once satisfied that all engine intakes were properly inspected and everything was a "go" for the engine run and systems checks, the run crew proceeded. During the hour-long run, all four engines were checked at power settings ranging from idle to full AB. Some minor discrepancies were noted with a few of the aircraft's systems, but only the No. 4 engine had problems that required additional maintenance.

The crew worked the problems they'd found on the run until they'd been on duty for more than 12 hours and, since there was no night shift relief and they'd be on duty the next day anyway, cleaned up, turned in their tools and called it quits for the night.

Reporting for work the next morning, members of the weekend duty crew checked out their original tool boxes and picked up where they had left off the night before.

The same maintainer who had originally crawled the intakes crawled them again to conduct the post-run intake inspections required from the night before. That's when he discovered first stage fan blade damage to the No. 2 engine along with an assortment of soot-covered rubber and metal parts. The Lancer was impounded and the No. 2 engine removed for teardown and further evaluation.

Once one of the items was identified as a portion of a "D" cell battery, the focus of the investigation shifted to the type of flashlights used in squadron CTKs. Inspection of the CTK the maintainer doing the intake inspections used that weekend revealed a missing flashlight...

Cost? More than $128,000.

More lessons (re)learned:

- When putting in lots of extra hours, plan accordingly. Remember you're more prone to make errors when fatigued. Follow those checklists carefully and don't cut corners.
- As a minimum, inventory that toolbox when checking it out, when completing a job, and before turning it back in.

Another FOD'd Lancer

Three troops were performing a first stage fan balance on a B-1B engine. The procedure started out with a run to assess engine status and initial vibration parameters. Then, the centerbody ("nose cone") was removed to install some weights and another run was done to assess whether the weights made the fan vibes better or worse.

During the course of the day, this procedure—run to check vibes, shut down, remove centerbody and reposition weights, reinstall centerbody and run again—was repeated several times. Naturally, the crew took proper precautions and crawled intakes before and after each run.

While repositioning weights for the final time, a member of the crew, as he had done previously, used a standard torque wrench and socket with an extension to torque down the nut holding one of the balance weights in place. He removed the tools—*thinking* the socket was attached to the extension—closed everything back up and the crew did another engine run.

When he crawled the intake this time, it was immediately apparent that there were large nicks in several first stage fan blades. There was also a piece of metal lodged behind the first stage fan disk.

A toolbox inventory confirmed that a single socket—the same size as that used to torque the nut on a balance weight—was unaccounted for…

Cost? More than $105,000.

ce Matters

FOD'd Eagle

Three maintainers were tasked to do a ground maintenance run on an F-15 following an N2 sensor change. They arrived at the trim pad, completed the pre-run briefing and prepped the aircraft.

The crew removed engine covers, crawled intakes, made appropriate forms entries and proceeded with the maintenance run. The throttle man started No. 2 engine first. It started and idled normally. He then started No. 1 engine, and it too, started and idled as expected.

He moved the throttles forward to accelerate to 80 percent power in order to take up slack in the holdback, then returned the throttles to the idle position. Once satisfied that all indications were normal and the N2 sensor wasn't leaking, he accelerated to military to functionally check the N2 sensor. That's when the No. 1 engine coughed. He shut down both engines and joined his two coworkers on the ground to determine what had gone wrong.

They found red-painted, aluminum-type fragments aft of the No. 1 engine exhaust. (Uh-oh.) Intake inspection revealed severe damage to the fan section. (Oh, no.) They inventoried aircraft covers and came up one short for a secondary heat exchanger cover. (Ooooooh, boy.) Closer inspection of the No.1 engine revealed that the handle from the missing heat exchanger cover was laying against the compressor face. Cost of this mishap exceeded $1 million. (Not a typo.)

From reading the mishap report, it's obvious these troops were experienced, proficient and well-trusted. Did they allow the routine nature of the job to lull them into a false sense of security? We don't know. But we do know this: Following tech data step-by-step will prevent equipment damage and personnel injuries 99.995 percent of the time.

FOD'd Falcon

One of Murphy's lesser-known laws goes something like this: "An item misplaced will migrate to an area where it can cause the most harm." Here's proof.

The F-16's engine had been removed as part of an extensive work package. After reinstallation, and prior to one of the ground maintenance runs, an ECS technician found the 7th stage duct E-seal missing. So he got a new one from supply and installed it. All subsequent op checks were completed and the Falcon was readied for FCF.

The aircraft hadn't flown for nearly five months, but preflight, engine start, taxi, quick-check, a max AB takeoff and climb were all normal. The FCF pilot was putting the F-16 through its paces when the FCF suddenly stopped being normal.

While cruising at 30,000 ft, one of the FCF checklist items called for the throttle to be moved to various positions to verify engine responsiveness. During one check, when the pilot tried to move the throttle from idle to max, he discovered a "new" throttle stop and couldn't push the throttle far enough forward to accelerate the engine past 78 percent. Unable to maintain level flight, he declared an emergency and immediately set course for home, the nearest airfield. Fortunately, altitude and proximity to home station were with him, and the F-16 was able to make an uneventful approach and landing. The aircraft was impounded.

Once released to maintenance, it didn't take a crew chief long to duplicate the throttle problem. After several attempts to get the throttle to advance through its normal range, it suddenly did. And the sound of something metallic falling resonated clearly from the engine bay...

Now, Hindsight being 20/20 and all, here's what was (re)learned from this near-aircraft-destroying flight mishap:

- Just because a part is missing doesn't mean it should be replaced without first getting a satisfactory answer to the question, "What happened to the original part?"
- If unable to get a satisfactory answer to a "What happened to the original part?" question, then it could be that the part is still on the aircraft, but hidden from casual view.
- When a part is missing and it's uncertain what happened to it, better to be safe than sorry. Impound the aircraft for possible FO and search. Don't just presume it's no longer on board. ✈

USAF Class A Mishaps

FY00 Flight Mishaps (Oct 99 - Feb 00)	FY99 Flight Mishaps (Oct 98 - Feb 99)
8 Class A Mishaps	15 Class A Mishaps
4 Fatalities	7 Fatalities
5 Aircraft Destroyed	14 Aircraft Destroyed

3 Oct	♣	**While conducting a SAR mission, a UH-1N went down.**
17 Nov	♣	**Two F-16Cs flying a night vision goggle upgrade sortie collided during a VID intercept. One pilot ejected and was recovered uninjured. The other pilot returned safely to base.**
22 Nov		**An OA-10A departed the departure end of the runway. The pilot ejected successfully.**
6 Dec	✶	**An RQ-4A Global Hawk UAV was extensively damaged while taxiing after landing.**
10 Dec		**A C-130E touched down short of the active runway, then diverted to another airfield and belly-landed. Three personnel were fatally injured.**
15 Dec		**An HH-60G rolled over at an LZ following a hard landing.**
20 Jan	♣	**An A-10 crashed during RTB. The pilot was fatally injured.**
16 Feb	♣	**An F-16CG on a routine training mission experienced an engine malfunction. The pilot ejected.**
16 Feb	♣	**An F-16DG flying a night vision goggle upgrade sortie crashed. Both crewmembers ejected**

❑ A Class A mishap is defined as one where there is loss of life, injury resulting in permanent total disability, destruction of an AF aircraft, and/or property damage/loss exceeding $1 million dollars.
❑ These Class A mishap descriptions have been sanitized to protect privilege.
❑ Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
❑ "♣" denotes a destroyed aircraft.
❑ "✶" denotes a Class A mishap that is of the "non-rate producer" variety. Per AFI 91-204 criteria, only those mishaps categorized as "Flight Mishaps" are used in determining overall Flight Mishap Rates. Non-rate producers include the Class A "Flight-Related," "Flight-Unmanned Vehicle," and "Ground" mishaps that are shown here for information purposes.
❑ Flight, ground, and weapons safety statistics are updated daily and may be viewed at the following web address by ".gov" and ".mil" users: http://www-afsc.saia.af.mil/AFSC/RDBMS/Flight/stats/index.html
❑ Current as of 27 Feb 00. ✈

Got A Story?

We need your inputs! August's Flying Safety will be devoted to "Maintenance and Maintainers." If you have a good personal exerience story that would be of interest and benefit to other maintainers, send it to us at bakerm@kafb.saia.af.mil. Any photos you have to support the narrative would be great, and we promise to return them in good order.

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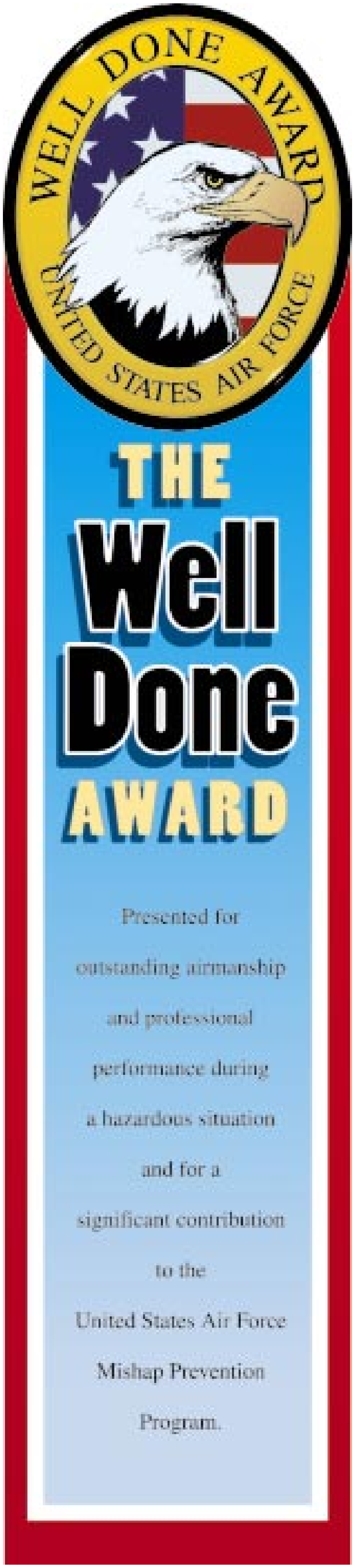

SRA
Jerry L. Shepherd

33d Maintenance Squadron
Eglin AFB, Florida

While deployed with the 58th Fighter Squadron and assigned to the 347th Air Expeditionary Wing, Shaikh Isa AB, Bahrain, SrA Jerry L. Shepherd prevented a catastrophic mishap involving an explosive-loaded aircraft.

On 10 January 1998, while performing duties as swing shift flightline driver, SrA Shepherd was dispatched to the flightline to transfer AGE equipment. After connecting the equipment to his bobtail, SrA Shepherd noticed what he thought was someone pushing an MC-7 air compressor across the aircraft parking ramp. Upon further observation, he realized the air compressor was moving under its own power unattended. He immediately jumped from the bobtail, ran 60 feet to the moving equipment, and applied the parking brake on the front of the unit. The forward momentum of the air compressor dragged him approximately 12 feet before coming to rest under the wing of an adjacent F-15, just inches from the aircraft fuselage.

Were it not for the alert actions of SrA Shepherd, the air compressor would have struck the centerline fuel tank and a live air-to-air missile, potentially starting an explosive chain reaction that could have destroyed every aircraft on the crowded parking ramp. SrA Shepherd's quick thinking and assertive actions prevented the destruction of valuable combat resources and loss of life.

Well Done! ✈

UNITED STATES AIR FORCE

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