Flying Safety

SEPTEMBER 1995

OLD-FASHIONED AIRMANSHIP

LT GEN RALPH E. EBERHART
Deputy Chief of Staff, Plans and Operations

■ As the Air Force prepares to move into the 21st Century, we cannot help but be excited about the challenges we face. Our rapidly changing world brings new technological discoveries each day. Development of the Global Positioning System (GPS) is opening new doors to us in navigation, and satellite-based communication is redefining traditional flight procedures. Similarly, improvements in avionics and weapons delivery systems have simplified complex missions and significantly increased our combat capability. New technology continues to make our aircraft safer and more reliable than ever. Still, we lose aircraft and pay enormous costs in lives and equipment. More than six times out of ten, the reason for the loss is us — the operators.

Even with all of the modern cockpit technology, all of the "old-fashioned" ways to crash airplanes are still with us. Poor systems knowledge, lack of flight and checklist discipline, spatial disorientation, poor situational awareness, loss of control — these problems existed in the early days of aviation. Yet, as we look at the mishap reports, we see they are still with us.

Perhaps "old-fashioned" problems can be solved with an "old-fashioned" remedy — good airmanship. We aren't born with airmanship; it's something we must learn. A sense of airmanship comes to life on that first day of flight school when we memorize three short phrases. These words of wisdom are a legacy handed down from those airmen who have gone before. No matter how sophisticated (or simple) an aircraft might be, these words can help our aircrews live to fly another day:

■ **Maintain aircraft control.** First and foremost, fly the aircraft — a vitally important step. If the aircraft is upside down, turn it right side up. If it is close to the ground, fly it to a safe altitude. Once the aircraft is under control, then, and only then, go on to the next step. If the aircraft is under control, generally, the problem is under control as well.

■ **Analyze the situation and take appropriate action.** Take a deep breath. If you feel you must take some action just wind the clock; the idea is to remain calm. Our training is the best in the world; rely on it. Take advantage of all available resources. When possible, use other available crewmembers, flight members, or squadron "ops" to help accurately assess the situation. Follow guidance provided in checklists and the Dash 1. There's help available and the system will move heaven and earth to get it. At the end of the day, however, don't forget it's *the call of the person flying the aircraft.*

■ **Land as soon as conditions permit.** Don't rush to land the aircraft unless it is absolutely necessary. As emergency and normal checklists are completed, analyze the options; factor in important things like fuel remaining, weather and the suitability of the runway or airfield. Pick the best place to land. Many times the first piece of concrete is the right place to land, sometimes it's not.

In this world of high-tech "bells and whistles," perhaps it behooves us to reflect on the old adage "the more things change, the more they stay the same." Technology is exciting, but it cannot replace basic airmanship. Flying safety is a result of sound airmanship and personal responsibility. Our aircrews must continually strive to maintain the high standard of basic flying skills required to ensure they master their machines. ■

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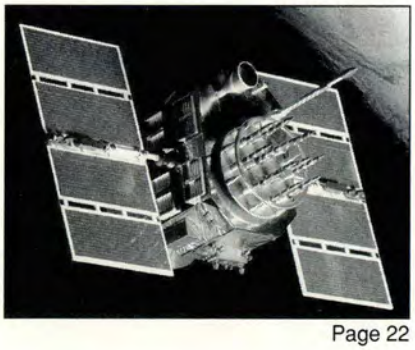

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CONTRIBUTIONS

Contributions are welcome as are comments and criticism. No payments can be made for manuscripts submitted for publication. Call the Editor at DSN 246-0936 or send correspondence to Editor, Flying Safety magazine, HQ AFSA/SESP, 9700 Ave G, S.E., Ste 282, Kirtland Air Force Base, New Mexico 87117-5670. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

MR. MARSEILLE

CHARLES L. LUNSFORD
Courtesy *Air & Space*
June/July 1994

Historical photos courtesy Mr. Paul Minert

Editor's note: Aviators sometimes fly through the same airspace so frequently they, and the controllers they talk to, learn to recognize each other by the little idiosyncrasies each develops over time. The way they communicate with each other forms a special relationship shared between two professionals. It's one of the little things which is unique to the flying profession.

Although Mr. Lunsford wrote his article about a time when voice communications weren't quite yet the standard, he points out some of the ups and downs such familiarity can have on effective communications. Trying to "show off" a little can definitely create problems, especially in foreign airspace. You might note his reference to the "Q" signals — the origin of the three types of altimeter setting (QNH, QFE, and QNE) references still used today. If anyone out there has had an experience similar to the one Mr. Lunsford shares with us below, we'd like to hear from you. Enjoy– The Ed.

■ Fresh out of Airborne Radio School, I arrived in France in July of 1956, assigned to the 12th Troop Carrier Squadron, 60th Troop Carrier Wing (Medium), based at Dreux Air Base in Normandy. The primary mission of the wing, equipped with shiny new C-119G aircraft, was combat cargo.

Except in England, European air traffic control was primitive. In North Africa and the Middle East, even radio navigation was mostly nonexistent, with only a few radio compass stations from the early 1930s. There were two Flight Information Regions (FIR) that had no voice high-frequency capability — Basra in Iraq and Marseille in France. A few others had limited voice, but because we couldn't count on it, we frequently worked those regions in Morse code.

High-frequency (HF) radio transmissions don't move along a line of sight but rather follow the curve of the earth and bounce off the stratosphere. They can be transmitted for very long distances, but every receiver on that frequency, however remote, can send or receive. It's a giant party line.

Visualize a situation in which, say, 20 aircraft are flying in the

FIRs of Rome, Athens, Cairo, Tunis, Lod (Israel), Casablanca, and Algiers, along with Ankara and Istanbul, the two stations in Turkey, all using the same frequency. If you know anything at all about citizens' band radio, the word "chaos" will come to mind.

But it wasn't chaotic because we adhered to a mostly outdated principle called radio discipline: Know what you have to say, say it, and GET OFF THE AIR!

My relationship with the FIR controller, Mr. Marseille, began on my initial training flight en route to Athens. I was flying with an experienced radio operator who was to expose me to the real world of airborne radio operation and check me out.

Approaching southern France, the Paris controller handed us off to Marseille, and I listened as the trainer made contact in Morse code.

Marseille's call sign was FNM. He answered on the fourth call. He was using an automatic telegraph key, known as a "bug," and transmitted faster than I could read. The trainer sent our position report and the estimated time of arrival over Marseille using the international system of "Q" signals, which meant it wasn't necessary for the communicating parties to speak the same language. For 3 years, I carried an inch-thick book of Q signals everywhere until it was in tatters.

Wow, I thought as I listened to the traffic. *This is real radio operating.* Then the trainer told me he wanted me to make the next transmission to Marseille. Although I acted in what I thought was a confident, devil-may-care manner as I changed seats with him, I knew I would blank out, forget the code, and end up as an Air Policeman, forced to wear one of those funny white hats.

My trainer told me to write out what I was supposed to send. Then I listened to Marseille work other aircraft and tried to make sense of it. I got a word or a Q signal here and there, but not enough to read his work on that bug. More thoughts of grounding: They would send me to the motor pool to do oil changes.

I needed a cigarette, but before I could light one, the trainer tapped my arm and pointed to the big radio compass needle which indicated we were passing Marseille. I was out of time. With the unlit cigarette dangling from my mouth, I hunched over the key.

I guess all those months of code school had some impact because I found my fingers tapping out what I wanted to send. Marseille replied, telling me to go ahead, and I even understood him. The signal for "Go ahead" is the single letter "K," which isn't a big deal, but at the time it seemed like great progress. I sent the position report, remembering to note the time for the log, and ended with "BT" (end transmission).

By God, I did it! I thought. I was so excited I forgot to listen to the reply and had to ask him to repeat it. He did, and still I couldn't read it. I was about to send another repeat request when the trainer pushed my hand away, sent "R" (roger, for "understand"), and then the letters "TU" (thank you). After a short pause, Marseille answered with two dits on his key — a radio operator's "you're welcome."

Not sure of what I should do next, I just sat there. The engineer, sitting on the floor because there was nowhere else for him to sit with an extra crewmember on the flight deck, lit my cigarette. He and the trainer had their poker faces on, but then the smiles came as they shook my hand and pounded me on the back. I grinned with relief.

I stayed in the radio chair and sent the next report over the FIR boundary, slower this time, and copied Marseille's reply without having to ask him to repeat. Following the trainer's example, I sent him a TU. After a long pause, Marseille replied with two dits. Much later, I found out that Mr. Marseille reserved those two dits for a select few. In my case, knowing I was a student, I'm sure he thought about it before deciding to throw me a morsel. I guess he thought I was barely smart enough to develop into a real radio operator.

"The engineer, sitting on the floor because there was nowhere else for him to sit with an extra crewmember on the flight deck, lit my cigarette. He and the trainer had their poker faces on, but then the smiles came as they shook my hand and pounded me on the back. I grinned with relief."

Several weeks later, I was a newly checked-out operator, new wings on my cap, flying through the Marseille FIR without a trainer. Mr. Marseille was on duty. At the end of my last position report, I sent him a TU, and after a short pause, he sent back two dits. As time went by and I became more proficient, he came to know my "fist," a radio operator's unique style, and I his. I could communicate on a level acceptable to him, and as my speed went up, I seldom had to ask him to repeat.

I began to wonder about him — who he was and how he got so good. I could hear him working other traffic, mostly civil air-

continued

MR. MARSEILLE

continued

"My last flight through Marseille was in the spring of 1959. I was flying alone on return from Tripoli. I knew it would be my last trip this way. I listened ahead, hoping Mr. Marseille would be on duty."

craft, and marveled at his speed. When he was on the air, he was in absolute command. He was a stickler for proper radio procedure and etiquette, and God help the operator who wasn't ready when he called. When he got angry, his speed would go up and up until nobody could read him. That, of course, made him even angrier, and he would just go off the air for about 20 minutes and wouldn't answer anybody.

He got mad at me a time or two, but mostly we got along. He recognized me when I flew through his domain. There was a quality of "welcome" in his reply to my callup that wasn't there for just anybody. He would occasionally ask me to relay to other aircraft he wasn't able to reach, and I flattered myself that he was asking me because I had become such a polished radio operator. More likely he knew our aircraft had the most powerful transmitter in the air.

After I had been flying about a year, I felt my skill and proficiency were at their peak. I was a Morse code whiz and could work Marseille like nobody's business. But I was hampered by the old manual Morse key that was screwed down to the radio desk.

What I needed, considering my fantastic proficiency level, was some way to improve my speed. Man, if I had a bug — an automatic telegraph key like Marseille's — I'd be right up there. I wrote to my father in Santa Fe, whose boss was a ham radio operator. They found me a bug, and it soon arrived.

The guys in radio maintenance were kind enough to make me an oscillator with a little speaker so I could practice with my new toy. A standard key is pressed down against a spring, and the length of time one holds it down determines whether the signal is a dot or a dash. One has to have good rhythm to make the hand do what the brain is thinking. An automatic key has a long rod with a weight that bounces against a spring, sending the dots very fast. Pressed the opposite way against a regular spring, it sends dashes. One doesn't pound up and down on a bug — one caresses it, from side to side. A really fast operator can get that weight bouncing so fast it chirps like a cricket — hence the name "bug."

I practiced diligently, and my speed began to climb. I was ready, I thought, for Mr. Marseille.

During preflight for a mission to Athens, I disconnected the leads from the standard key and hooked up my bug. When we reached the Paris-Marseille FIR boundary, I listened to Marseille for several minutes before Paris handed us off, took a deep breath, and blasted off with my new bug: "Marseille, this is Air Force 38145, over." He ignored me. A short time later, I called again. Could he read my fist on the bug? After another pause, he told me to go ahead.

I sent our position report as fast as I could make that bug go, probably about 45 words per minute, and ended with a BT (end transmission) and a K (go ahead). I could have been Artur Rubinstein ending a Chopin concerto, waiting for the applause.

The elation was fleeting. Marseille came blasting back on his bug at what must have been a hundred words a minute. I couldn't copy.

I asked him to repeat, along with the signal to send slower. He slowed to about 75 words a minute. I still didn't get it all. Once more I asked for a repeat and a slowdown. This time he replied very, very slowly, maybe 5 words a minute. Humiliated, I copied his acknowledgment and his instructions to report passing Marseille and to maintain altitude.

I was about to send my usual R (copied) and my usual TU

when he sent, in plain English, "Go back to the radio school, 38145. Marseille out."

I had violated the first rule of Morse/carrier wave transmission: Never send faster than you can receive because that is the speed at which the reply will come. Mr. Marseille had put me very securely in my place. We both knew who was the amateur and who was the professional.

Crushed, I disconnected my bug and used the standard key for the next call over Marseille. He answered in the normal way, slowing his speed to match mine. At the end I sent TU, and after what seemed like an overly long pause, he replied with dit-dit. He and I never referred to the incident again, but I think a kind of mutual respect came out of it. He knew it was me who had made a try at him. Who knows? Maybe he was flattered.

As a check operator, when I took a new student through Marseille FIR, I would make the first call and then turn it over to the student. I think Mr. Marseille, who made it quite clear he didn't suffer inept radio operators, was just a little easier on my students because he knew they were with me. But no dit-dits for them. On departing the FIR, I would take the key and send FNM TU and back would come my two dits. My last flight through Marseille was in the spring of 1959. I was flying alone on return from Tripoli. I knew it would be my last trip this way. I listened ahead, hoping Mr. Marseille would be on duty. But it was someone else.

Crossing the boundary, I opened my key and called Marseille. The operator replied with a go-ahead and I sent him our track, altitude, and estimated time of arrival over Marseille. There was a short pause. I was about to ask if he copied when I recognized Mr. Marseille's fist as he told me he copied and to report over the beacon. Happily, I sent him a TU and got my two dits.

I was elated. I listened as he scolded some other aircraft for being late on his call and missing his arrival time. Twice he asked me to relay. Did he do it to make me feel good?

Eventually, the time came for the last call leaving the Marseille FIR. I sent the report, and he acknowledged, ending with "Marseille out."

I knew it was a violation of radio procedure, but risking his wrath, I sent "M. [Monsieur] Marseille TU for working my flight. Leaving for USA 6/29, will miss you, go ahead." Normally, he would have given me hell for cluttering the air with unnecessary information, but he replied, "M. Air Force, good luck from M. Marseille." I sent "Goodbye TU." He replied with two evenly spaced dits, then in plain language: "Au revoir." ■

Photo by TSgt Perry J. Heimer

Mr. Chuck Lunsford, hometown Tererro, New Mexico, enlisted in the US Air Force in October 1955 as an airborne radio operator. He spent most of his 4 years in the service flying in the C-119 Boxcar, attached to the 12th Troop Carrier Squadron (Medium), 60th Troop Carrier Wing, France. Mr. Lunsford attained the rank of Airman Second Class "with lots of time in grade," in his words. He now resides in Albuquerque, New Mexico, and is writing a book about his experiences as an airborne radio operator.

Mr. Marsaille's Call Sign: F N M ...- / -. / --

HURRICANE HUNTERS:

ONE-OF-A-KIND PROFESSIONALS

Lt Col Jim Marcotte, 53 WRS/CC

■ On July 27, 1943, Maj Joe Duckworth flew a propeller-driven, single-engine North American AT-6 "Texan" trainer into the eye of a tropical storm. Duckworth flew into the eye of that storm twice that day, once with a navigator and again with a weather officer. These were generally considered to be the first airborne attempts to obtain data for use in plotting the position of a tropical cyclone as it approached land. Duckworth's pioneering efforts paved the way for further flights into tropical cyclones.

While tropical cyclones can be easily observed by satellites, their precise position, along with highly accurate data on surface pressures and wind fields can only be measured by reconnaissance aircraft. Today, the tropical cyclone reconnaissance mission is carried on by the Air Force Reserve's 53d Weather Reconnaissance Squadron (WRS).

The 53 WRS is a one-of-a-kind organization. It is the only unit in the world flying weather reconnaissance on a routine basis. The Hurricane Hunters' mission is to recruit, organize, and train assigned personnel to perform aerial surveillance of tropical storms and hurricanes in the Atlantic, Caribbean, Gulf of Mexico, and the Central Pacific. The unit also flies winter storm missions off both coasts of the United States.

> "The Ninth Air Force formal Stan/Eval visit, monitored by ACC, was conducted during an actual hurricane deployment. This unit was rated excellent, with several programs that will provide a benchmark for years to come."

The unit was originally activated in 1944 as the 30th Weather Reconnaissance Squadron at Gander, Newfoundland. Its original mission was to fly weather tracks between North America and Allied Western Europe. The Hurricane Hunters have had many designations and called many airfields home.

Hurricane Workhorse

Since 1944, when Admiral Halsey's fleet experienced two disastrous encounters with typhoons in the western Pacific, they have flown in many famous storms (e.g., Camille '69, Hugo '89, and Andrew '92) and have flown numerous aircraft types (e.g., B-17s, B-29s, B-50s, and WC-130s).

The workhorse of the Air Force weather reconnaissance fleet has been, and continues to be, the Lockheed WC-130 "Hercules," adapted for the weather reconnaissance role from a search-and-rescue version HC-130.

"Raging Bull" Riders

Weather crewmembers who have flown combat missions say their feelings before both missions were similar. There is a blend of excitement and apprehension. Adding to the tension is the knowledge that no two hurricanes are alike. Some are gentle, while others are like raging bulls. All crewmembers are highly

trained specialists. Preparations for flying into a hurricane must be thorough. Loose objects are secured, and crewmembers wear seat belts while penetrating the eye at 10,000 feet altitude.

In a well-developed storm, penetrating the eye wall can be a difficult challenge. Winds at flight level often exceed 100 miles per hour, and the wall cloud surrounding the center can be 10 to 15 miles thick. Rain often comes in torrents. Wind shears are strong and frequent, producing a roller-coaster ride. Inside the eye, the conditions are much different. Many times the ocean is visible, as well as a blue sky and sunshine from above. Often the wall cloud presents a stadium effect, like that experienced while standing in a large football stadium. The flight level winds fall to near zero, and the ride is smooth.

Coordinating Agencies

Collocated with the National Hurricane Center in Miami, Florida, is a small group of U.S. Air Force civilian personnel assigned to the 53 WRS. The supervisory meteorologist of the unit serves as Chief, Aerial Reconnaissance Coordinator, All Hurricanes, or CARCAH (as the unit has come to be known over the years). This unit has the functional responsibility to coordinate Department of Commerce requirements for hurricane data, task weather reconnaissance missions, and monitor all data transmitted from weather reconnaissance aircraft.

During the hurricane season, June 1 through November 30 each year, CARCAH is the central point of contact and the coordinating agency for all tropical cyclone reconnaissance flown in support of the National Hurricane Operations Plan. In this capacity, CARCAH issues a daily Tropical Cyclone Plan of the Day that specifies tropical and subtropical reconnaissance requirements for the next 24 and 48 hours for the Atlantic Ocean, the Caribbean Sea, the Gulf of Mexico, and the Central Pacific Ocean near Hawaii.

Executing this plan are the Hurricane Hunters of the USAF Reserve's 53d Weather Reconnaissance Squadron and the National Oceanic and Atmospheric Administration's (OAA) Aircraft Operations Center. OAA's Office of Aircraft Operations flies Lockheed P-3 "Orion" aircraft which operate from MacDill AFB in Tampa, Florida, and fly research missions.

Data gathered by the flight meteorologist aboard the reconnaissance aircraft is transmitted by satellite communications link directly to CARCAH's "Miami Monitor" station. It is checked for meteorological and coding accuracy and transmitted via weather circuits for worldwide use. With its aircraft satellite data link, CARCAH provides the hurricane centers in Florida and Hawaii with important information only moments after the observation. This service is especially valuable since time is a crucial element in the preparation of both warnings and forecasts.

During the winter storm season, November 1 through April 15, CARCAH tasks the 53 WRS for missions under the National Winter Storm Operations Plan. Data gathered from these flights are used by the National Meteorological Center in Washington and local Forecast Offices to prepare warnings and forecasts of severe winter weather that will affect the entire Eastern Seaboard as well as the Gulf Coastal Region.

Goals 2000

A projected capability of the aircraft will be the Global Positioning System (GPS). This will provide the following:

- More precise three-dimensional geographic positioning.
- More accurate geopotential heights at higher altitudes.
- The ability to provide weather observations over land.
- The ability to deploy GPS lightweight dropwindsondes over land.

The Hurricane Research Division of the National Oceanic and Atmospheric Administration is developing a step-frequency microwave radio-meter for the remote sensing of surface winds over the ocean.

The service life expectancy of the current aircraft will be exceeded before the year 2000. New aircraft may provide the capability of reaching the 200 millibar pressure surface (38,662 feet). ■

continued

HURRICANE HUNTERS HAD A BUSY 1994

MAJ DOUG LIPSCOMBE
53 WRS
Keesler AFB, Mississippi

■ The Hurricane Hunters of the Air Force Reserve provided critical and precise weather data to the National Hurricane Center (NHC) during the 1994 hurricane season. From missions east of the Lesser Antilles to those west of the Hawaiian Islands, the Hurricane Hunters tracked numerous storms of varying intensities throughout the tropical regions.

The hurricane season officially begins the first of June and runs through the end of November each year. The Hurricane Hunters flew 84 missions against 16 tropical cyclones in the Atlantic and Central Pacific areas. The flying season began in late June when the Hurricane Hunters were called upon to investigate an area of disturbed weather near the western tip of Cuba. This first tropical storm, Alberto, caused over $100 million in damage, took 29 lives, and caused record flooding in Georgia and Alabama. July became another record month, with two Category 5 (on the Saffir-Simpson scale) hurricanes in the Pacific, Emilia and Gilma. Emilia's central pressure of 938mb is now the measured record for a hurricane in the Central Pacific. A total of six storms, three being classified as Category 5, were flown in the Central Pacific, setting a new record for a single storm season. Fortunately, none of these storms made landfall in the islands.

USAF Photo

The Improved Weather Reconnaissance System (IWRS) provided enormous amounts of data, automatically measuring temperature, pressure, humidity, and winds every 30 seconds of flight. This amounted to a data point approximately every mile and a half. High-density, high-accuracy data continues to be crucial in NHC's forecasts.

The final hurricane missions for 1994 were in November as Hurricane Gordon moved circuitously through the Caribbean, Gulf of Mexico, and finally the Atlantic Ocean. Flooding and mud slides, due to heavy rains, caused deaths in Costa Rica, Jamaica, Cuba, the Dominican Republic, and Haiti (where estimates of the death toll range up to 2,000). There were seven fatalities in Florida. Flooding from torrential rains caused agricultural damages amounting to near $150 million. A total of 19 missions were flown against Gordon.

What's in store for 1995? Dr. Bill Gray, of Colorado State University, noted for the accuracy of his predictions, has called for an above-average year with 12 named storms. Eight of these should become hurricanes, and of those, three should become major hurricanes (Category 3 or higher on the Saffir-Simpson scale).

The Hurricane Hunters look forward to the 1995 season when our efforts will again be focused on assisting the National Hurricane Center in its vital role in the forecast and warning of tropical cyclones. ■

AIR COMBAT COMMAND FLIGHT SAFETY AWARD

It is my distinct pleasure to congratulate the men and women of the 403d Airlift Wing, Keesler Air Force Base, Mississippi, for earning the Air Combat Command Flight Safety Award for FY94. This award reflects the superior flight safety record they achieved by completing FY94 without a command-controlled Class A or B flight mishap. Just as important, it also speaks about unit pride, and about quality, and about what successes are possible when all working levels within a wing become part of a team committed to excellence. Please relay my appreciation to the 403d Airlift Wing TEAM for their accomplishments during the past year.

JOHN P. JUMPER
Lieutenant General, USAF
Commander, Ninth Air Force

A DATE WITH EMILIA

SMSGT ROBERT E. LEE
53 WRS
Keesler AFB, Mississippi

■ I write this as we begin descent into what may well be the most powerful hurricane ever to form in the Central Pacific Ocean. We've received no less than five admonitions to "be careful" and "fly safe" from both the National Hurricane Center in Coral Gables, Florida, and our fellow crewmembers at Hickam AFB, Hawaii, over our satellite communications network.

Our pilot has 33 hurricane penetrations, but hasn't flown a storm in 5 years. The flight engineer is working on his second hurricane season with just a few penetrations. The copilot is on his first hurricane ride. The navigator has 11, the weather officer has 48, and I, the dropsonde (weather instrument)[1] operator, have 72 penetrations. We have two crew chiefs aboard with a handful of penetrations between them.

We are over 120 miles out from the eye of the storm, so our inbound leg hasn't begun. But the crew is already discussing windspeed and positioning the aircraft for the run inbound[2]. Excitement and anxiety are the main emotions — not quite thick enough to cut with a knife, but still evident.

We're inbound now. Winds in excess of 30 knots, 100 miles from the eye wall. There's not much turbulence yet. We begin to leave the bright sunshine for the foreboding darkness of the storm. The sky and sea are lost as the first feeder band closes its grip around this frail craft. I feel very insignificant in the midst of nature's fury.

The crew is all business. Chatter over the interphone is cut to a minimum. We still haven't had much turbulence — thankfully.

The radar is attenuated by the sheer volume of rain we are encountering. We can't see more than 10 miles into the hurricane's depth. We've also found some turbulence, although nothing that hurts yet.

The excitement builds. We've got the eye wall on radar at 30 miles. Winds are over 60 knots on the surface. We're in light to moderate continuous turbulence. The aircraft instrument panel is getting difficult to keep in focus. My computer screen is just a blur. The roller-coaster ride has begun.

Things are beginning to happen rapidly. The wind speed is over 80 knots. Before I finished that sentence, the speed increased to over 90 knots. We're 20 miles from those ominous thunderstorms that make up the hurricane's eye wall.

Not much talk out of the "low time" fellows. Ten miles out and 106 knots — 5 miles of the roughest ride of our lives coming up. Winds are 120 knots, 10,000 feet — our cruise altitude — and increasing at an unbelievable rate. Now 130 knots...144 knots...152 knots and a rough ride...155 knots (almost 180 mph), and the aircraft begins to drop as we break through the eye wall.

We're in the middle of a "gigantic stadium." Wow! What an incredible sight! Giant white clouds wall around us with brilliant blue sky above!

I release a weather instrument into the eye — it failed. The aircraft has to maneuver around in the eye to get back into position for a second attempt. This one works as advertised! We're about to hit the eye wall outbound now. A peek under the wall reveals 30-foot seas and a totally foam-covered tempest.

The second instrument also fails — another temperature probe failure. I'll sure be glad when our new sondes (dropsondes) come on line to replace these with an expired shelf life.

The sea level pressure, extrapolated from our aircraft data, makes this the most powerful hurricane ever to form in the Central Pacific. However, the NHC says "no credit," because the reading wasn't verified by a sonde. We'll get it the next time we meet Ms. Emilia in an hour or so.

Sunshine greets us with a warm laugh as if to say, "Welcome back!" Little does it know we must venture back once more to kiss the face of death.

We begin our next inbound-leg heading from south to north. It's a much rougher ride in this quadrant of the storm. We're 52 knots windspeed, 30 miles from the eye wall. We said good-bye to the sunshine some time back. The crew is less wary this time, but still extremely attentive to the task at hand. This storm won't give you a second chance.

We're through the first eye wall and headed for the second eye wall. The winds are now 105 knots...120 knots...127 knots...150 knots. Back in the stadium!

Good sonde this time! The crew cheers. We've just verified the sea level pressure for the strongest Central Pacific hurricane in history.

Outbound to the north, and winds are almost 60 knots at 60 miles from center.

Our departure from the storm environment is welcomed by the crew. We will have been in the air more than 13 hours when we finally set this old bird on the ground. A little rest, and we'll be back to see Ms. Emilia again and again for as many times as it takes to escort her beyond the Hawaiian Islands.

It's a formidable challenge, but one the Air Force Reserve Hurricane Hunters are more than capable of meeting.■

Courtesy *The Honolulu Advertiser*, 24 July 1994

[1]This instrument measures barometric pressure, ambient air temperature, relative humidity, windspeed, and direction.

[2]The windspeed is critical as you approach a storm as you need to "crab" the aircraft in the direction of the wind.

MAIL CALL

Dear Editor

I have carried a copy of the enclosed around with me for, oh my goodness, nearly 30 years now. I carry it as a bit of inspiration from someone I respect and admire. It also helps me keep in mind why I do what I do!

It may be time for another generation of young maintenance people and pilots to read the words of one of our forefathers. The aircraft are much different today, the systems are more complex, the engines and weapons are more powerful. But the minds and aspirations of the men and women involved in aviation today are the same as when these words were written.

I don't know what the copyright issues for this article are. I'll let you sort that out.

Best regards

MICHAEL L. ROSS
Lockheed F-16 Tech Rep Office

A TRIBUTE TO MAINTENANCE MEN AND WOMEN

This article is reprinted from the former Strategic Air Command's Combat Crew.

Every generation of every nationality requires a hero. It finds one or makes one.

In earliest times, he was mythical. A little later, he was some great warrior or explorer. But some man has always been set apart from his fellows and accorded the adulation of the multitude...then along came the spectacular flights. At this juncture, America was searching its collective soul for a hero, and it seized upon these unsuspecting fliers. So the toga was handed about, falling in turn upon each succeeding ocean spanner or record breaker.

Strangely enough, with all the shouting that has been done, all the medals which have been struck, the right man in this flying business has yet to be picked.

Human flight was a comparatively new art. For thousands of years, man had longed to soar among the clouds. It was not unnatural then that some member of the flying fraternity should fill the national need for a hero.

For some reason, the pilot was selected. He it was whose will directed these new machines to flight, whose courage permitted performance of such feats of daring high above the earth.

So, selected he was. And each small boy decided not to be a policeman, fireman, or railroad engineer, but envisioned himself a flier when he grew to man's estate.

So we pulled a parade, waved flags, made medals, played the band, and greeted like a Viking arriving at Valhalla each new pilot who flew a little higher, or a little longer, or a little faster.

Why not? Your airman wore proudly the symbols of his profession. He was the striking figure in this new industry. Small wonder that the little lads foreswore old models and changed their boyhood dreams.

But we made a great mistake, as multitudes often do. The fellows who make airplanes fly, and make records fall, and who drive 10,000 airplanes 50 million miles a year were not the pilots. They were the mechanics.

Let me tell you about this fellow as I have come to know him...and see if you don't agree with me.

Most men work for reward. There are various forms of reward — the cheers and commendations of onlookers, money, plea-

sure, self-expression, self-satisfaction. The pilots get all of these in some degree.

What does the mechanic get...his hands are cut and black from contact with greasy engines. He can't keep "that skin you love to touch" and maintain an intimacy with an airplane powerplant. Don't ask me why or what kind of a man would elect such a role, such a life. Rather, tell me why there is a hermit, wizard, nurse, nun, or saint. I don't know! There is no accounting for occupational tastes, but every time I fly I thank fate for a good mechanic.

He's no dunce, either. To learn all he knows would give many a college professor an awful headache. He gets his invaluable training over a long period of years. The school of hard knocks is his. Truly, he learns to do by doing.

This modern airplane engine is no simple mechanism. It has more parts than has the human body — and more ailments. A divine providence has fashioned your own mechanism more smoothly, coordinated your organs better than man has built this engine. But the good engine mechanic knows every part, every symptom, every malfunction as well as any doctor knows the causes of and remedies for your aches and pains.

Some years ago, I was assigned a plane for flight. I started to climb in, and the mechanic said, "Lieutenant, I wouldn't take that ship up. The engine doesn't sound right to me."

I ran it up, and it delivered full power. It hit on both switches, accelerating promptly, and I couldn't detect any indication of trouble. I called for the engineering officer. He ran it up and marked it okay, but the mechanic still shook his head.

I took off and joined a practice formation and soon forgot the warning of my mechanic as we flew over San Diego Bay, past Point Loma.

Twenty minutes later, the engine quit cold without warning. I set her down in the sea. Being a land plane, she soon sank.

While swimming around, waiting for a rescue boat, I made one resolve that has remained with me through the years. When a good mechanic says an engine's bad, I don't fly that plane. He's the doctor.

These mechanics are versatile, too. Mine was on that rescue boat. He has never to this day said, "I told you so," but he couldn't rest until we had fished that plane off the ocean floor.

Then he displayed one of his rare "human weaknesses" by spending his Sunday holiday taking it apart to see what had failed. His expression never changed as he showed me the cause.

So, you see, the airplane mechanic is human. In fact, he has the instincts, training, and mental ability of a surgeon.

One of the characteristics we always like to associate with heroes is courage. Here your mechanic is not found wanting. He'll fly with any pilot, anytime, and that's something I won't do. It takes more courage to ride than to pilot the plane yourself. You always know what you are going to do. He never does...I have known some pilots to get cold feet. Yet, I have never known a mechanic to decline to fly.

The mechanic is reliable; he is trustworthy. He takes his work seriously; he knows that human life is at his mercy. He worries, too.

One of my best men who had cared for the special planes of high officials in Washington for some years once came to me and asked to be relieved from those duties and assigned to routine work. He said that the tremendous responsibility he carried was undermining his health.

I know another mechanic who spent his last dollar to buy a flashlight so he could better see to make his inspections in closed hangars on dark winter days.

Examine the rolls of the airmen dead and you'll find mechanics as well as pilots. Yet, their names are forgotten. Others got the adulation, the praise, the medals, and the commendations...but I say, "My hat's off to you mechanics. You may be ragged grease monkeys to some, but to me, you're the guardian angels of this flying business."

Capt Ira C. Eaker

This tribute to Air Force mechanics first appeared in print in April 1931. The author was Capt Ira C. Eaker, later Lt Gen Ira C. Eaker, Chief of Air Staff, USAF, who retired in 1947. A maintainer's responsibilities haven't changed from that of the airman mechanic of 64 years ago. Maintenance personnel...work the hardest and often receive the least recognition for the safe operation of an aircraft or any other mechanical marvel that is in the Air Force today.

TACO 41 to the Rescue

MAJ NINA GREELEY
150 FG
Kirtland AFB, New Mexico

■ About sunset on 28 February 1995, a VFR-qualified pilot, flying a single-engine Cessna, became disoriented and lost over the eastern New Mexico plains near Roswell. The pilot's urgent pleas for assistance were overheard by Albuquerque Center. However, they were unable to help because the pilot could not communicate his exact location. He was hopelessly lost — trapped above an overcast. Disaster seemed imminent. He needed someone to join on and lead him to a safe runway.

Luckily, Taco 41 was en route to the White Sands Missile Range for a training mission. After being contacted by Albuquerque Center, Col Tom Wittman, 150th Fighter Group commander, assisted by Maj Gen "Rusty" Gideon, piloted the F-16D to an area north of Roswell to search for the distressed pilot. After a sweep of the area, Col Wittman was able to find the unfortunate airman and relay his position and altitude to Roswell tower.

The task of leading the pilot to the runway at Roswell was difficult and hazardous. By this time, it was completely dark. Col Wittman had a hard time keeping the small airplane in sight. His task was further hampered by the fact that the pilot he was assisting was flying with a bad attitude indicator and compass.

Col Wittman was able to coordinate with Roswell tower and give the pilot dead-reckoning vectors to the ILS localizer at Roswell. The distressed airman still had to penetrate a cloud deck in order to land. Col Wittman was able to keep the airplane in sight and adjust his heading and glidepath during the approach until the pilot was clear of clouds and had visual contact with the runway.

After visual contact was made with the runway, the now relieved and grateful pilot made a successful landing at Roswell. Nice job Taco 41! ■

USAF photo by TSgt Perry J. Heimer

THERE I WAS

USAF Photo

■ It was just a normal Army exercise move — nothing special — we were taking the soldiers someplace where they could practice what they do best. Before the war in the Gulf, this is what we did when we weren't hauling trash around the Pacific. The loadmaster crew consisted of myself (a basic loadmaster with about 1,000 hours and over 2 years of flying), Fred (the primary loadmaster who'd been airlifting since Orville and Wilbur), and a student/instructor team. We seemed to be a pretty good team, having already logged four cargo-carrying sorties this trip.

The cargo consisted of Hummers and pallets, stuff we had moved a thousand times before. When we saw the load plan, we knew it would be a tight load, but that wouldn't be a problem. Before we started loading, we divided up the loading duties. I had the job of marshaling the vehicles in and positioning them in the right place according to the load plan. Once the airplane was knelt and the aft doors positioned, the primary loadmaster started sending the Hummers my way. I marshaled the vehicles in and stopped them where they needed to be. Because of the tight load, we had to park the Hummers bumper to bumper. The student/instructor team started the tiedown which had to be routed underneath the vehicles.

Once all the Hummers were on, we unknelt and reconfigured the aft doors to start loading the pallets. The student and his instructor went aft to get some training done on loading pallets, and I assumed the job of finishing the tiedown. We finished loading the pallets, tying down the Hummers, and the Weight and Balance form at about the same time. The primary called for the troops to come out, and I went to the troop compartment to sit with them for the takeoff. Both the primary and the student/instructor gave a cursory check of the tiedowns and headed to their assigned compartments.

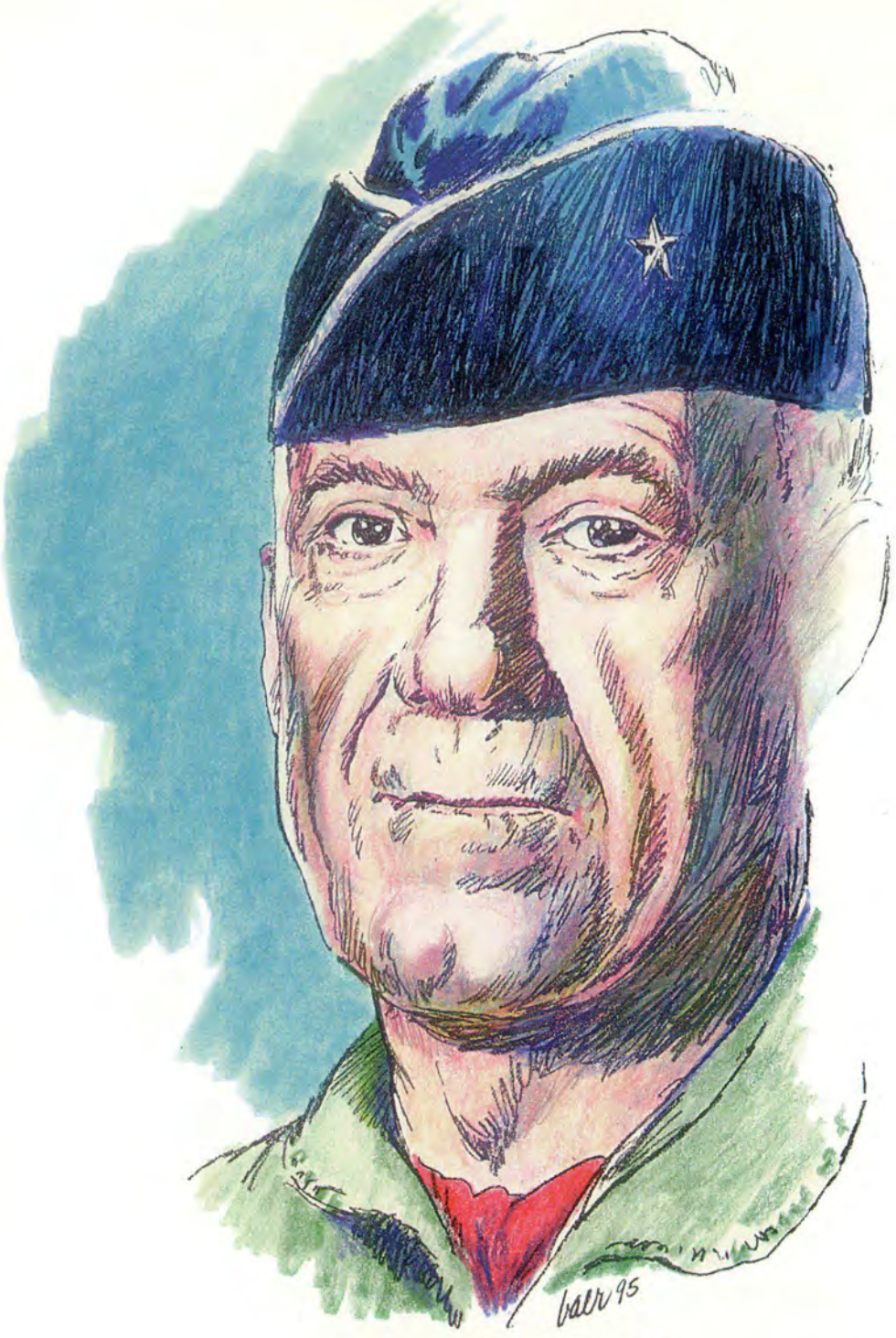
The takeoff was uneventful, and the primary load went down to the cargo compartment to do a cargo check. About 5 minutes later, he called the student/instructor team downstairs. A few minutes later, they came up to the troop compartment to relieve me. The primary wanted to show me something. I went downstairs and noticed that the last Hummer on the right was now butted up against the pallet behind it. I had left it about 2 feet forward of the pallet. The primary load showed me that the last Hummer didn't have an aft restraint on it! The forward restraint had been properly applied, but there wasn't anything stopping it from rolling into the back doors except the pallet behind it. We rearranged the tiedown and went upstairs.

Later that night, as we sat around with a few beers, we talked about what had happened. I completely missed the tiedown, and they had missed it on their walkarounds. We all agreed not to mention this to anybody, and the subject has never come up since then.

We didn't hurt anybody, and we didn't damage any equipment, but the possibility for catastrophe was there. I hate to think what a 7,500-pound Hummer would have done to our back doors had it completely broken loose on takeoff roll. We had a crew of 12 and 47 pax on board that day, and our error could have killed everyone.

I know I learned a valuable lesson that day, and it's one we hear so often we get sick of it. But it's still a lesson we all have to learn. **Complacency can kill.**

Don't learn that lesson the hard way. ■



BRIG GEN ORIN L. GODSEY

A REVISIT FROM THE CHIEF OF SAFETY

■ It is hard to believe that a year has already passed since I moved into the position of Chief of Safety. As I reflect back on the year, I first want to thank all of you for your support and hard work. You all can be proud of the improvements that have been made in the Air Force Safety arena. You have reduced the number of Class A mishaps from the previous year, thereby saving valuable resources. Even though we have had an outstanding year, we do not want to sit back and pat ourselves on the back, because there are areas that we can still improve.

As I dissect what has transpired so far in FY95 — 26 Class A mishaps and a rate of about 1.40 per hundred thousand flight hours — no particular trends jump out and grab you. This, so far, has been an unusual year. We have had mishaps in aircraft types that do not typically have mishaps; i.e., C-21, Cessna 210, C-130, T-37, and T-3. We have had a disturbing increase in the number of maintenance-related mishaps. Engines are still a problem, but, hopefully, this is getting better. We have also had mishaps involving "Murphy." Don't forget, if there is a way, it will happen. I believe that the bottom line still comes down to leadership. In my article last year, I emphasized a philosophy based upon **LEADERSHIP + DISCIPLINE + INDIVIDUAL INTEGRITY = ACCOUNTABILITY**. I believe that philosophy is still valid. In FY95, we revalidated that leadership, discipline, and individual integrity are the keys to "safe" flying.

An example of a maintenance-involved mishap is a recent F-15C accident. An analysis of the findings indicated that an incorrect flight control rod reinstallation was not caught by the inspecting technician. It was subsequently missed by the crew chief, the pilot, and the end-of-runway crew chiefs on the first sortie after a holiday weekend. **ACCOUNTABILITY.** This resulted in the death of a very experienced fighter pilot. The exact same improper maintenance was reported in a High Accident Potential (HAP) report in 1991, and the proper actions were not taken to preclude this from happening the second time. **LEADERSHIP.**

A C-21 took off with a known fuel malfunction. "Get-home-itis"? Possible. **DISCIPLINE.** It crashed following a divert with an incorrectly diagnosed fuel balance problem, killing eight people. The civilian LearJet community was aware of the possibility of this type of fuel malfunction, but our tech data did not include the appropriate emergency procedure. **LEADERSHIP.**

A mentally and physically fatigued F-16 pilot who received little sleep the night before his mishap experienced a G-induced loss of consciousness during fighter maneuvers. He crashed without attempting ejection and was killed. **INDIVIDUAL INTEGRITY.** Is taking yourself off the schedule all that big a deal? Does your squadron have a sincere "knock-it-off" policy in our high operational tempo (OPTEMPO) world of flying? **LEADERSHIP.**

The Chief of Staff, General Fogleman, has taken initiative in looking to the future by appointing an impartial Blue Ribbon Panel to investigate the entire Air Force safety process. Composed of a former Secretary of the Air Force and retired admirals and generals with safety backgrounds, the Blue Ribbon Panel personally made recommendations to General Fogleman in August. **LEADERSHIP.**

Air Force safety will significantly benefit from the Blue Ribbon Panel review. No matter how good a program is, it is always healthy to have outsiders look at how you operate. An excellent program can become an outstanding program. I look forward to taking action on every recommendation presented to General Fogleman. We, the Air Force, will prosper from their review as we enter the end of this decade and position ourselves for the next century.

On the ground safety side of the house, the past year brought mixed news. On-duty Class A mishaps have been very low since FY90, which marked the beginning of the post-cold war drawdown in military numbers. Our rate of mishaps has decreased steadily over the past 5 years. However, off-duty mishaps, which initially saw their rates decrease, have started creeping up. Privately owned motor vehicles (PMV) kill more off-duty people than any other category, with the favorite killers — speed and alcohol — usually involved. **DISCIPLINE.** In addition to off-duty PMV mishaps, "sports and recreation" mishaps are starting to become a problem, too. **LEADERSHIP.**

I want to emphasize three areas during the upcoming year.

■ We are losing too many outstanding Air Force individuals to foolish mistakes. Let's eliminate human factor-caused mishaps. **DISCIPLINE.**

■ The OPTEMPO of the Air Force is not going to get any better in FY96. Stress manifests itself in *more mishaps*. Commanders, individuals, and families must work together to ensure OPTEMPO-related mishaps do not occur. **ACCOUNTABILITY.**

■ I want to stop being *reactive* to the last accident and start being ***proactive*** in preventing the next.

If a tabletop is our regular flying operations, then how far are we from falling off the edge into another mishap? What must **YOU** do to personally push back the next mishap from the edge of the table? Can you look a friend in the eye and suggest he or she not fly? **INDIVIDUAL INTEGRITY.** Can you tell your aircraft commander that you just don't feel comfortable flying with a known maintenance malfunction? **DISCIPLINE.** Can you take the initiative to act on a HAP report even though it creates work for you, and your friends argue, "Heck, no one is going to make that mistake again..." **ACCOUNTABILITY.**

I need your continued support to protect the men and women of the Air Force. Are you willing to bet your life on other people's judgment? Take charge, take responsibility, and step up to the plate!

Fly Safe! ■

LAST FLIGHT INTO SHEMYA

Official USAF Photo

MAJ MARK SHEEDY
USSTRATCOM/J531

■ The island of Shemya, at the end of the Aleutian chain of Alaska, was officially turned over to contractors this summer after years of Cold War service. Shemya AFB was renamed Eareckson AFS 2 years ago. During its history as an active military installation, it had a major impact on the defense of our country.

I served as an instructor pilot for the 24th Reconnaissance Squadron, flying the RC-135 COBRA BALL/COBRA EYE missions off the "Rock" (our affectionate name for Shemya) from May 1991 until flying operations ceased in the summer of 1994. My last operational flight occurred in March 1994. What a flight it was! After that mission, I realized the incredible importance of crew coordination and cockpit resource management (CRM).

The mission started off, like most at Shemya, with the Klaxon™ sounding. Within 15 minutes, we had gotten to the aircraft, backed it out of the hangar, and launched off the Rock. The weather was very typical for Shemya — 200 feet overcast, with blowing fog and 25 knots of crosswind. Everything went fine for the first few hours.

While we were orbiting, we noticed the oil pressure on our No. 4 engine had increased out of operating limits. After having the navigator check the tech orders and reviewing our emergency procedures, we shut down our No. 4 engine and turned for home. At this point, the mission was over. Our major concern was safely returning our crew and aircraft to Shemya. The weather back at Shemya had not changed much, but the winds had died down.

Probably the greatest thing about flying the COBRA missions was the amount of authority given to the aircraft commander. We had the choice of either attempting a landing at Shemya or diverting to Eielson AFB or Elmendorf AFB. The senior leadership of the organization had decided long ago to let the aircraft commander make the call for reasons of safety. The crews were all experienced prior to joining the unit, with a 2,500-hour requirement for the instructor aircraft commanders. We chose to land back at Shemya.

Approaching the Rock, we all felt very comfortable. Even though the weather was still lousy, our biggest concern was the crosswind — it had died down to under 15 knots. After conferring with the detachment commander, we adjusted our gross weight, agreed upon a plan of action, and reviewed

the approach and landing procedures with the crew. Unfortunately, this was a common occurrence for my crew. It seemed that whenever an emergency occurred, it happened with me flying. In fact, out of four emergency engine-failure landings at Shemya for the COBRA program, I had three of them. Because of this, we were not too concerned that our aircraft radar was not working or that the TACAN was off the air.

We planned for a Microwave Landing System (MLS) approach to Runway 10. This approach had become very reliable over the years. It was my choice for a landing in poor weather. The PAR was available, but my experience with PAR controllers on the Rock had not been very good. Due to the large velocity winds in the pattern, drift corrections were very difficult for the controllers. Many times I had to go missed approach out of the PAR. We could not use the ILS because only Runway 28 had one. Today we had to land on Runway 10.

We received vectors to the final approach course, and the MLS was being received correctly by our aircraft instruments. The MLS acts just like an ILS on the flight instruments, so there is really nothing abnormal about flying an MLS. After receiving the course guidance, we proceeded with our checklists and prepared for the final approach fix (glideslope intercept). We made our final gross weight adjustment after our gear was down, and we proceeded down the glideslope. Everything seemed perfectly normal, but that normalcy almost killed us.

I had a very experienced crew and two of the best navigators in the Air Force. I was flying the approach as the copilot monitored the approach. Since the navigators' radar was out, they were backing up my flight instruments and looking outside into the soup around Shemya. On the approach to Runway 10, there are two smaller islands, prior to arriving at Shemya, that are on the final approach course. One has a hill on it that is the high terrain for the approach. The flight instruments were working, as far as we could tell, and we were all preparing for another landing at the Rock.

Suddenly, my navigator yelled that he could see approaching terrain below us through a break in the clouds. This was abnormal as we were still a couple miles out from Shemya, according to the MLS glideslope indicator. Because I knew the capabilities of my crew and trusted them totally, I pulled the aircraft up, applied maximum power, and initiated a go-around immediately. After getting some altitude below us, we requested a PAR pickup into Shemya. We were brought in at such an angle and so far below glideslope that we broke out on top of the approach lights at a 45-degree angle off the runway, requiring us to initiate another three-engine missed approach. At this point, our nerves had been substantially shot. We flew around the box, and after flying a second PAR, we successfully landed on Mother Earth.

We learned a number of valuable lessons that day. First, and most important, was that our cockpit resource management training had paid off — we were living proof. If my navigator had been doing just his job and monitoring his instruments, he would not have seen the ground. We would have impacted it prior to our arrival at Shemya. If he was "only a navigator," 21 people and one of only two COBRA BALL airplanes would have been gone forever.

My second lesson was that of complacency. I have had 12 engine failures in flight, plus many other types of malfunctions and emergencies. This is good from the standpoint of experience, but, as I found out that day, it can kill you if you think of it as just another landing. I could have asked for PAR monitoring from the onset of the approach, and they might have noticed our descent rate. I also could have calculated an actual descent rate instead of assuming the equipment was guaranteed to work because we had received a valid signal.


Official USAF Photo

I had a very experienced crew and two of the best navigators in the Air Force. I was flying the approach as the copilot monitored the approach. Since the navigators' radar was out, they were backing up my flight instruments and looking outside into the soup around Shemya.

Finally, I let my pride get into the picture. Instead of breaking off the approach and diverting, I insisted on landing at Shemya. Luckily for me, God was smiling on us that day, and we were able to successfully land back at Shemya.

It has been about a year since my last landing at Shemya. Upon my return from that deployment, I decided I needed a break from flying, and I now work at USSTRATCOM. After looking back at it and spending a lot of time thinking about what went wrong, I am just glad we practiced CRM and survived my last landing into Shemya. ■

F WASTE, and ABUSE D

Realistically, FOD is nothing more than a *managerial* waste of scarce Air Force dollars and resources which significantly impacts our "fly and fight" capability. Either you're on a management team, with solid processes and solutions to combat the potential for FOD mishaps, or you're part of the problems that breed FOD! The obvious question is: Which side are you on?

A Satirical Review: Part Two

CMSGT DON A. BENNETT
Technical Editor

■ In the August 1994 issue of *Flying Safety*, there is an article titled *"FOD Prevention Program: Manage It — Don't Damage It!"* Its thrust is **not** about how to build a strong, effective FOD prevention program because we already have well-established programs in place. Instead, the article is about how some aircraft maintenance leaders and supervisors are not effectively managing the programs we have.

FOD is FOD is FOD!

It doesn't matter whether it involves a nail-punctured tire on a piece of ground support equipment or a totally trashed jet engine, it's still foreign object damage (FOD), and it all costs us dearly in man-hours, resources, and money — ***big money*** — (approximately $9.5 million for FY94) every year! With reduced budgets and spare part reserves, we just can't afford the waste — not now — and certainly not in the future!

If you were to closely analyze recent FOD incidents throughout the Air Force, you would come up with some common denominators: personal or organizational complacency, personal or organizational lack of maintenance discipline, and ineffective aircraft maintenance supervision/management. Then, if you were to closely *and honestly* assess your own FOD prevention program, you might be shocked to find common denominators in your own backyard!

Don't be lulled into believing that just because your unit hasn't experienced any FOD mishaps for a long time that this article doesn't apply to you. Quite the opposite is true — this article was meant especially for you!

Units having already suffered through some costly and frequently embarrassing FOD mishaps may well be on the way to recovery. They've had their wakeup call and **should have** thoroughly researched, identified, and corrected any bro-

ken-down procedures, processes, or programs. Possibly the only difference between your unit and theirs is chance, timing, or plain old luck — meaning, **your FOD mishap just hasn't happened — yet!**

Here are a few FOD mishaps which point to weak organizational, flightline, or workshop environments. The units' supervision and management could have been more proactive and aggressive in FOD prevention — **"walking the talk"** as they say.

#1.

A fighter's engine sustained over $100,000 in damage when a roll of ground support heater ducting was sucked into the intake during prelaunch engine checks. The pilot had caught sight of the ducting heading towards the intake and immediately initiated an engine shutdown. At the same time, he alerted the crew chief, but it was too late. GULP! CRUNCH! CHEW!

*The mishap took place in a hardened shelter. The roll of ducting had been lying beside a shelter wall (along with the parked ground support heater) at the time of the FOD incident. The duct and heater were in the same location during a launch several days earlier. In fact, it was common organizational practice to store or park maintenance-related equipment along the shelters' inside walls — **a host of potential FOD***

mishaps just waiting to happen!

Depending on whether the jet engines are run at idle or to military power inside the shelters determines whether or not these parked or stored ***FOD potentials*** *are within the engine inlet danger zone (the aircraft's Dash One defines the danger zone as 15 feet at idle and 25 feet at military power). This jet had been run up to 85 percent at the time of the FOD mishap.*

In addition to the particulars contributing to this FOD incident, it was also determined ***there were numerous opportunities for additional FOD incidents outside the shelters!*** *It seems it was routine within the unit to also place loose items outside the shelters on and around the hardstands. Located in the middle of the hardstands were items such as communication cords and aircraft chocks, around which aircraft would taxi during block-ins. Also, on the outer edge of the hardstands, maintainers would place unsecured items like the aircraft forms and/or engine covers. These hardstand areas were small enough that most of the loose items were within 15 to 20 feet of the engine inlet! Kind of like asking their taxiing pilots to thread through a gauntlet of FOD obstacles, isn't it?*

■ Why were such common maintenance items and equipment stored unsecured in small, confined areas such as the shelter and on the hardstand?

■ Why weren't potential FOD items discovered and eliminated by the flightline and/or unit maintenance managers and leaders?

■ Who's really responsible for *any* FOD prevention program?

#2.

"Three times the c(harm)" on this last example. Three FOD'd engines, but only two engine runs? How could that possibly be?

This depot-level organization FOD'd an aircraft's engine during an ops check after extensive aircraft and engine repair work. Supposedly, all pre-engine run preparations and inspections were completed ***before*** *the engine run commenced. Well, that may be, but apparently they weren't accomplished thoroughly!*

Then, about a month later, this same outfit FODs out not one, but two engines during another ops check run! The engine run happened on night shift, but the FOD wasn't found until the day shift came on duty.

■ There are just too many questions and assumptions to even address this one. I'm convinced they definitely didn't learn anything from the earlier one.

Of course, there are many more costly FOD cases to use as examples, but there's no sense in overwhelming you with, for instance, the story about a qualified crew chief and pilot **both** performing their preflights and **neither** discovering the aircraft forms (not to mention the pilot *never* reviewed the forms) sitting in an engine inlet during the launch start. You probably wouldn't believe it anyway. Besides, I think you've gotten my message by now.

Okay, so why is it that most of you haven't experienced a FOD incident lately and don't plan to, even in the near future? It's because from your wing commander to the lowest level of supervision, **they make the FOD prevention program work successfully *for* them — not against them!** They have established an organizational culture where safe, quality maintenance, including FOD prevention, is everybody's business, every mission, every time, every day. All their lines of communication are open — up, down, and laterally — to FOD problems and solutions.

In these quality-oriented outfits, active risk management, sound decisions, and good judgment are the daily rule, **not the exception!** This is what the real Air Force is all about.

This article is about eliminating FOD mishaps throughout the Air Force. But an equally important message is this: An organization can't have a solid, effective FOD prevention program **without** effective leaders and supervisors. They are the very heart and soul of any outfit, and when they falter, you can bet there will be more costly and embarrassing incidents of **"FOD, Waste, and Abuse,"** not to mention serious mishaps involving the loss of our fellow airmen.

Getting back to my opening question: ***Which side are you on?*** ■

See next page for more abuse

FOD, Waste, and Abuse

part 2 continues

TAKING CHARGE OF YOUR FLIGHTLINE

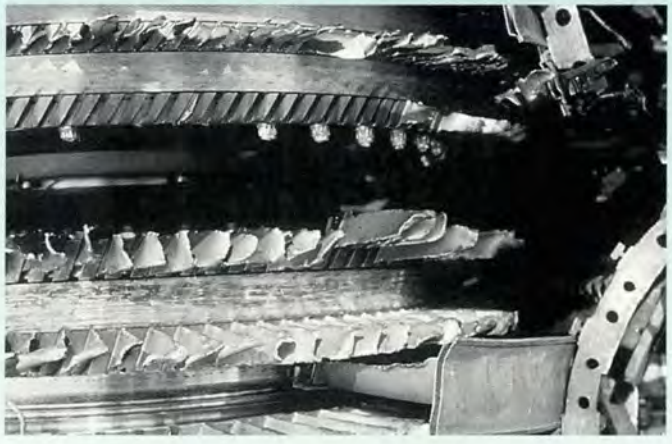
■ During my second tour of Desert Storm, on the first day of my watch as the provisional unit's maintenance superintendent, I had the occasion to witness that morning's flightline FOD walk. I told the Prod Super I wouldn't change anything — yet — of their normal routine with one exception. I requested a line of appointed supervisors follow behind the main body of FOD walkers. You know, a

quality assurance check of their already established FOD walk routine. So eight Tech and Master Sergeants were spread out and followed the main line of maintenance troops. Then I followed about 20 yards behind the line of supervisors to check their work. Well, it turned ugly real fast. Not 2 minutes after we started, everybody began jelling into cliques, and **my FOD walk** (my responsibility, my flightline, hence **my FOD walk!**) turned into a dispersed, moving "yap session." Within 10 minutes, the main body arrived at the other end of the ramp and was turning to go back to "the house." I yelled up to the line of supervisors and told them to hold everybody until I caught up with them. I had to, because by the time everybody **thought** they were finished, I had already filled up one of the kangaroo pockets of my BDUs and was starting the other!

As it turned out, I challenged the entire bunch (collectively!) to match the amount of FOD I had collected alone. No one, not even one supervisor, stepped forward to accept. They *all* knew they couldn't match, much less exceed, my personal collection of "boulders," cotter pins, washers, safety wire, sticks, gaskets, a half-inch socket, money (money? 36 cents!), etc.

The stage was set! The safety and quality standards the Air Force dictates, as well as our good common sense, were reestablished that morning. Everybody knew, from that moment on, what was important to the boss and what their boss expected from the corps of senior NCOs and flightline supervisors and managers. From then on, everything seemed to run more efficiently and effectively.

Soon checklists and tech data were taken out of the mothballs and used. The danger-tag and lost-tool programs were revitalized. Organizational tools, equipment, and back-shop hardware inventories were conducted and losses investigated (this action resulted in the cancellation of many back-ordered aircraft parts, support equipment, and special tools that were in great demand during the Gulf War). **Task supervisors soon started following up on subordinates' work, which was *actually* looked at and inspected *each time!***



Sure, there was a war going on, and the operations tempo was great. But as I had emphasized to everybody, we're defeating only *ourselves* — not the enemy — when a jet is damaged or destroyed because of our own FOD or other unsafe, nonquality maintenance. I stressed that every aircraft is a vital resource in combat, and on-time takeoffs are crucial. But I reminded them: What if you cut corners to get that critical resource off the ground and it *never* returns?!?

You, too, can take charge of *your* flightline again and reestablish the long-lost quality and safety standards. Sure, it will smart a little at first, but things will eventually return to some reasonable order. However, the most beneficial aspect will be the return of your maintenance's credibility and integrity. Your troops will respect

you for doing it, too. After all, they can be allowed to be careless and reckless in their duties and training opportunities for only so long before they, too, tire of disorganization, continual confusion, and constant mishaps! So my suggestion for starting is to **"put some discipline back into carrying out your own duties and responsibilities first."**

I promise you this: Whatever you gain in discipline and quality control of your flightline and/or back-shop maintenance has to be a ton better than the **"slow burning pit of fire"** you may be in now! Trust me. Do it now. "Walk the talk"! ■

ICE FOLLIES

RICH GREENWOOD
Safety Engineer with Pratt & Whitney
HQ Air Force Safety Agency

■ The weather forecast was not unusual for November in the midwest. An ice/snow storm was moving directly across our route of flight. My wife Beverly and I had flown our Cessna 182 from our home in Norman, Oklahoma, to Chicago to visit my family for Thanksgiving. Beverly was attending the University of Oklahoma at the time and had an important test Monday morning, so, of course, we were under a bit of pressure to get home Sunday night.

It quickly became apparent that a direct flight was out of the question. Severe icing was forecast in central and southern Missouri, northern Arkansas, and northeastern Oklahoma. It did, however, look like we would be able to go west from Chicago to Wichita, Kansas, and then directly south to Norman on the back side of the storm. With that in mind, we took off IFR from Chicago Midway to Wichita with a planned gas stop/weather check in Columbia, Missouri.

The flight was uneventful all the way to Wichita. A check with Flight Service showed the plan appeared to be working. There were no reports of any icing for the 150-mile flight home, with ceilings generally 1,000 to 1,500 overcast and 8 to 10 miles visibility. The only bad part was since the storm had recently moved through, the runway at our home airport had an inch of ice on it, as did most of the runways in the area. So we just planned to land at the international airport in Oklahoma City with long, wide runways. Off we went, single engine, single pilot, single radio, night IFR. This wasn't for sissies!

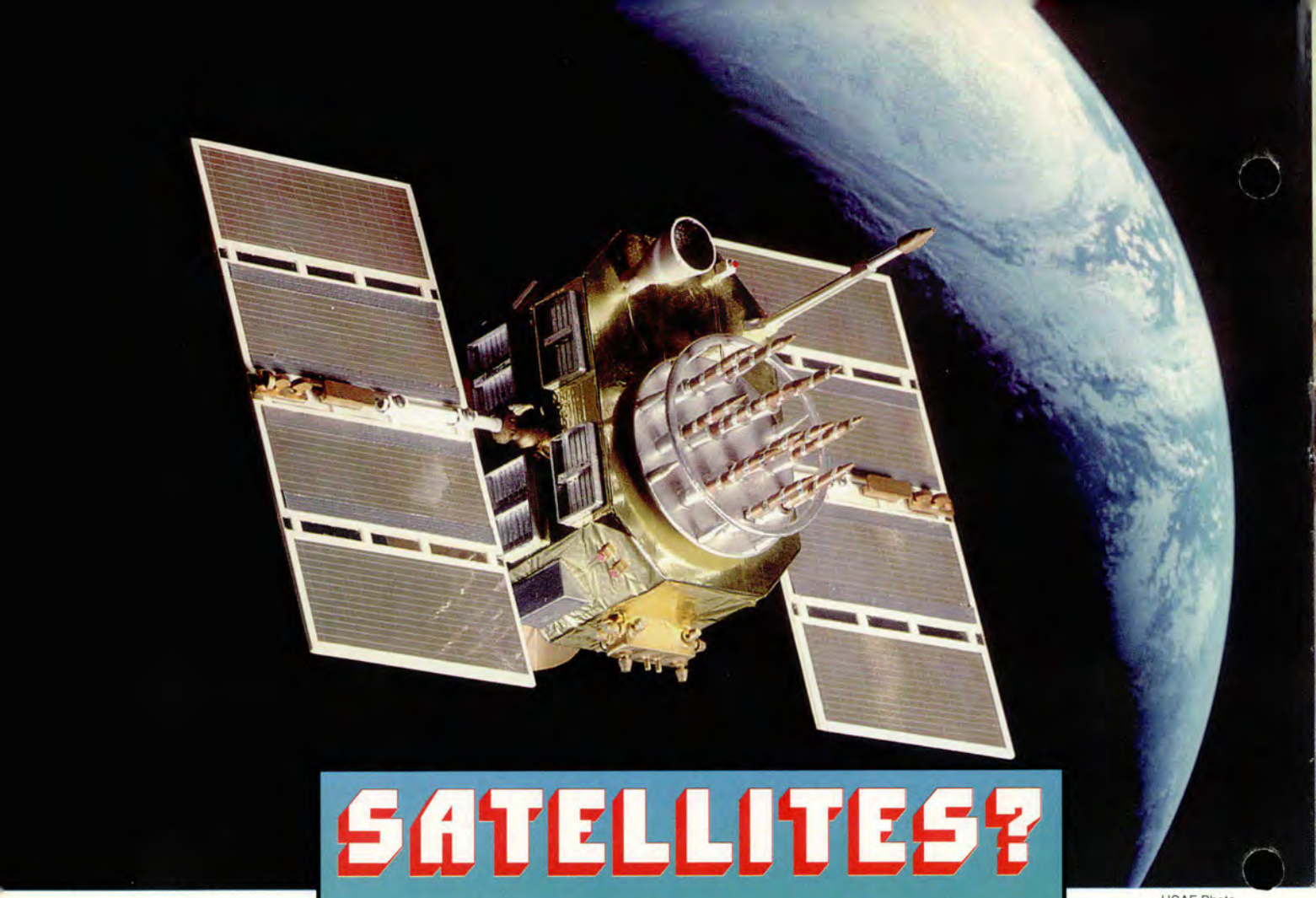
We were cruising along, fat, dumb, and happy at 4,000 feet in the clouds when I broke my scan for a minute and looked at the windshield. It had turned opaque. I'd never experienced this before and thought for a few seconds before it hit me as to what was happening. A quick look outside with the flashlight confirmed my fears. We were picking up ice at an alarming rate!

Then I noticed the airspeed deteriorating and had to add power to keep altitude. I called ATC and asked for a lower altitude, but they couldn't give me one due to terrain clearance. So I quickly canceled IFR and started a descent to get out of the clouds. It was hard to tell when we broke out VFR due to the ice on the windshield. Our 39-year-old Cessna defrosting system apparently wasn't designed for this extreme duty.

I could see out only the side windows and by now had full power in to maintain level flight at only 110 mph (normal is cruise — 140 mph). Fortunately, I was finally able to pick up Interstate 35 out my side window and could follow it the remaining 45 minutes to Oklahoma City at 1,000 feet AGL. Now all I had to do was land at night on an icy runway with an ice-loaded plane and no forward visibility!

Fortunately, my piloting skills had not eroded as much as my judgment on this night, and we made an uneventful landing. I didn't get really scared until I got out of the plane and had a good look at it. Ice 1/4- to 3/8-inch thick covered most everything. The most interesting part was the prop spinner. It looked like a porcupine that had a romantic interlude with an ice machine. Little icicles were sticking straight up all around it. It was very strange looking.

In retrospect, I should not have put as much faith in the lack of icing reports for my route of flight. Apparently, the lack of reports was because no one else was stupid enough to be out flying that night! Get-home-itis and fatigue (7 hours of single-pilot IFR) also played a part in the event as I felt pressured to get Beverly home. We both learned that night the old saying is true — "It's better to be on the ground wishing you were in the air than in the air wishing you were on the ground!" ■



USAF Photo

SATELLITES?

We don't need no stinking satellites!

LT COL JERRY ONEY
AFSPC

■ The USAF's Global Positioning System (GPS) has been around since 1978 when the first GPS satellite was launched. GPS was once thought of as a cosmic "Buck Rogers" system, but more and more, GPS is being thought of as the "next utility" (water, electricity, GPS!), and currently there are literally thousands of uses for it. More and more are being discovered every day around the world.

The basics of GPS are pretty simple — but worth knowing — especially because they can make a significant difference in your mission planning. Besides, if you're going to drop bombs, navigate, and eventually fly precision approaches with it, you should know how the thing works. No need to be like the unenlightened fellow who flatly stated to a Space Command captain recently, "We don't need no stinking satellites. I got this box (a GPS receiver) right here that tells me exactly where I am!" (Thanks for playing, Bud. We've got some nice parting gifts out back). Perhaps attitudes like this come about because once you're airborne, GPS and its associated avionics are pretty much a cockpit no-brainer.

The Basics

Okay, lets talk GPS basics and some numbers. Twenty-four (previously considered to be 21 plus 3 spares) GPS satellites make up the full operational constellation. They orbit at 10,900nm — way out there when compared to the space shuttle, which orbits at approximately 110nm to 400nm, depending on the mission.

Obviously, the navigation signals have a long way to travel before they get to your receiver. That's one of the reasons there are two levels of GPS navigation service — Standard Positioning Service (SPS) and Precise Positioning Service (PPS). SPS provides you with approximately 100 meters of horizontal accuracy and approximately 150 meters of vertical accuracy. PPS provides you with approximately 16 meters horizontal and approximately 29 meters of vertical accuracy.

The navigation signals are carried via two frequencies: L1 on 1575.42 MHz and L2 on 1227.60 MHz. When we say SPS, we are really talking about the Coarse Acquisition or "C/A" line of code, and when we discuss PPS, we mean the Precise or "P" line of code. Understanding this distinction is important, because L1 car-

ries both the C/A and P code, while L2 carries only the P code. The C/A code repeats every millisecond, while the P code repeats only once a week.

The C/A code is relatively easy for your receiver to pick up because of the high repetition rate — despite the fact the navigation signal volume is a lot less than the background noise of the earth. Once your receiver has locked on to the C/A code, the P code is much more easily picked up by your receiver, because it knows where to listen.

One more thing to add to the confusion. Whenever the P code is encrypted (which is almost always), it is then called the "Y" code. Only a military receiver loaded with the proper decryption keys can pick up the "Y" code. Therefore, the P code encryption lets only "the good guys" pick up the PPS signal and at the same time provides you with anti-spoofing capability — good stuff to have during a shooting war.

Lastly, not all GPS receiver sets can pick up both L1 and L2. Receivers that pick up L1 and L2 can do their own real-time ionospheric corrections. Receiver sets like the hand-held Precision Lightweight GPS Receiver (PLGR) and the vast majority of civilian GPS receivers can receive only L1 and must use a fixed internal model to correct for ionospheric distortion.

Using the System

The satellites are in six different orbital planes, with four satellites in each plane. By now, you might be thinking, "Who cares?" But this arrangement is what gives you the 24-hour, worldwide coverage — and it also means your satellite geometry and the satellites you are tracking can change rapidly as they come in or out of view over the horizon.

So how many of these satellites can you "lose" before your navigation accuracy starts to degrade? Should you even be concerned about it? The loss of three satellites (assuming none of the remaining 21 are down for maintenance) will start to degrade your navigation accuracy and create holes in your coverage. Since the satellites orbit twice a day, any hole(s) in coverage will change position as the satellite geometry changes. Any good rocket scientist will have figured out by now that satellite geometry has a lot to do with how accurate your GPS weapon/navigation is going to be at any given location, altitude, time of day, etc.

The ideal satellite geometry is to have one directly overhead, plus three satellites about 5 degrees above the horizon and 120 degrees apart. If your mission planning tells you that during your time on target (TOT) window the available satellites are all going to be directly overhead, you should probably get your TOT changed until the geometry is more favorable (unless some sort of GPS differential/augmented GPS is available). At least one airline now does this when the weather is IMC at airports where only nonprecision approach is available. If the satellite geometry is poor, they wait until it is more favorable before they fly the approach.

Terrain masking might also block the available satellites and the GPS signal. How fast your aircraft's receiver can acquire terrain-masked satellites once you have popped over a mountain, and which ones are used during your delivery, are factors you need to be aware of and plan for if you want the best possible delivery accuracy possible.

USAF Photo by A1C Sean Worrell

Keep in mind, despite their proven reliability, the GPS satellites are not simple appliances like the '62 toaster your mom still uses. Have a backup in case one of the satellites you expected to use during your delivery goes down for no-notice or scheduled maintenance. Your backup may simply be the understanding that the PDOP (Position Dilution of Precision) will go from very good to just strictly average if a satellite you had planned on using goes off the air. What's PDOP? Think of it like this: If you were to manually triangulate your position on the ground with three of four reference points, you would want them spread out, not all right in front of you. The same thing applies when you are using satellites for navigation. The point is you need to be aware of what's going on with the satellites and how it affects your mission.

The basics of using GPS are simple — but worth knowing. They can make a significant difference in your mission planning. The loss of just three satellites will start to degrade your navigation accuracy and create holes in your coverage.

Controlling GPS From the Ground

Now let's talk briefly about who actually "flies" the $10 billion GPS satellite constellation — the "Control Segment" of GPS. The

continued

USAF Photo by A1C Sean Worrell

continued

Obviously, the navigation signals have a long way to travel before they get to your receiver. That's one of the reasons there are two levels of GPS navigation service — Standard Positioning Service (SPS) and Precise Positioning Service (PPS).

2nd Space Operations Squadron (2SOPS) of the 50th Space Wing is responsible for the daily health and well-being of this combat utility. They are on duty 365 days a year, 24 hours a day, in the Master Control Station located at Falcon AFB, Colorado. They make contact with and "talk" to the 24 satellites about 60 to 80 times during a 24-hour period, depending on the constellation's current health. They also can turn Selective Availability (S/A — the C/A code error and the P code encryption) on or off and increase or decrease the amount of error introduced into the C/A code. (The exact upper and lower limits that the C/A code can be adjusted to are classified.) This fine-tuning is done via monitor stations and ground antennas at remote locations around the world. The crew consists of seven highly trained people, four of whom are enlisted. So if you think these satellites don't require any adult supervision on the ground to keep them flying and to maintain a good navigation signal, well . . . now you know the rest of the story.

The "Space Segment" of GPS is the 24 Block II satellites that are currently on orbit. The first of 11 Block I satellites was put in orbit back in 1978. These were R&D satellites that were supposed to have a mean mission duration of only 4.0 years. They just refuse to die, however, and the last one left on orbit is still going strong after 11+ years.

The first of the Block II satellites was launched in 1989. These satellites would eventually make up the operational constellation. The Block II satellites differ from their Block I older sisters by the solar arrays and by some of the additional sensors they have on board.*

Since satellites don't last indefinitely, you might be wondering what we do with the "dead" satellites. Once a satellite's navigation payload is declared nonfunctional, Air Force Space Command issues a launch call so that processing a replacement satellite can begin. To launch a replacement satellite costs about $100 million and takes about 60 days once the launch call is made. After a satellite's navigation payload is declared dead, the 2SOPS boosts the old satellite into a higher orbit, using its remaining fuel, and then turns it off.

USAF Photo by A1C Sean Worrell

Overcoming many of the obstacles posed by the ever-changing desert terrain, GPS has created a new horizon in the world of navigational technology.

In Conclusion . . .

If you do any civilian flying at all, or have seen any of the more recent rent-a-car commercials advertising rentals with on-board GPS, you know the GPS receiver market and civilian GPS applications are booming. New models and ideas are being introduced all the time. Our expertise regarding this system is just beginning. We are still using 8-track tape players as far as GPS uses, development, and features go, and we've got a long way to go before we get to the compact disc stage. Still, a good working knowledge of this system — with some of its present strengths and weaknesses — can be pretty useful. We all need to keep getting smarter about GPS, its uses, and ways to exploit it! ■

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* The GPS satellites really have two missions. The navigation mission is relatively well known, but the second, nuclear detonation detection for treaty monitoring purposes, is beyond the scope of this article.

GLOBAL POSITIONING SYSTEM AND NOTAMs

SSG(USA) WALT WALTHALL
US Army NOTAM Coordinator
TSGT AL JOHNSON
AFFSA/XON
Air Force NOTAM Coordinator

■ Since the early days of DESERT STORM, the latest and greatest navigation concept has been the Global Positioning System (GPS). Overcoming many of the obstacles posed by the ever-changing desert terrain, GPS has created a new horizon in the world of navigational technology.

Beginning with a basic hand-held GPS, it wasn't long before engineers began exploring GPS's application to other technologies, including aircraft navigation. GPS has the potential to become one of the most important innovations introduced to the military since Kevlar. But what is GPS, how does it work, and what impact will it have on air operations personnel?

For an indepth discussion on GPS basics, see Lt Col Oney's article on page 22.

NOTAMs

Military aircrews will soon have their aircraft equipped with GPS receivers for use during en route navigation and nonprecision approaches. With the "holes"* in GPS coverage, how are pilots going to know when the satellites are not available for their use?

The satellite constellation is monitored and controlled by the Air Force Space Command Master Control Station (MCS) at Falcon AFB, with the aid of five monitoring stations worldwide. The Air Force Flight Standards Agency established a fundamental GPS Notice-to-Airmen (NOTAM) requirement for DoD flight planning. This requirement was coordinated with the Federal Aviation Administration (FAA) and other services and is consistent with established DoD flying procedures and safety requirements.

Site-specific GPS satellite approach availability information is created by a computer modeling system called the GPS NOTAM Generator, located in the US NOTAM Office (USNOF) of the HQ FAA in Washington DC. Satellite position data is input into the GPS NOTAM generator via a GPS receiver located on the roof of the FAA building. The MCS sends scheduled and unscheduled satellite outage information to the USNOF for input into the generator.

This data is combined with the computer's airport database to build a computer simulation of the GPS navigation system. By looking 48 hours into the future, the computer is able to predict areas without enough GPS coverage to allow navigation/approaches. Any of these windows that exceed 20 minutes are forwarded to the military NOTAM system. The GPS NOTAM generator automatically transmits this information to the US NOTAM System (USNS) for distribution to military aviators 24 hours prior to the predicted start time.

This information is made available to pilots in the flight planning process through the use of the Customated Weather Distribution System/Continental Meteorological Distribution System NOTAM distribution equipment or the NOTAM summary at base operations. The following are two types of GPS NOTAMs a pilot may see:

!GPS PRN 12 OTS

This tells the aviator that GPS satellite is out of service. Unlike a land-based navigation aid (e.g., TACAN or VOR) which may affect a single airport, a single GPS satellite outage may affect hundreds of airports and routes.

The problem with the above NOTAM, however, is by itself it does not provide the aviator with enough information to plan an alternate approach at a given airport prior to arrival. Knowing this, the NOTAM generator creates a site-specific NOTAM in the following format:

KADW ANDREWS AFB
GPS ONLY NPA NOT AVBL
13 APR 1700 TIL 13 APR 1745

This tells the aviator there is not sufficient GPS signal integrity to fly a GPS-only nonprecision approach at Andrews AFB on 13 April from 1700 to 1745. This should give the pilot adequate notice of GPS outages for preflight planning.

Another advantage of the GPS NOTAM generator is the decreased workload for base operations personnel. The generator will cancel the NOTAMs if the signal strength returns, or the NOTAM will self-cancel once the time period is over. No work is required from the operator.

Remember, GPS is the future in navigation, but you must still monitor it and ensure you have the most up-to-date information on operating systems. Please forward any comments or suggestions concerning GPS NOTAMs or the NOTAM system in general to HQ FAA ATM-614 (AFFSA/XON), 800 Independence Avenue SW, Washington DC 20591, or call the NOTAMs office at DSN 851-3410, or commercial at 202-267-3410. ■

*See "Using The System," page 23.

DR. SHEILA E. WIDNALL
Secretary of the Air Force

GEN RONALD R. FOGLEMAN
Chief of Staff, USAF

BRIG GEN ORIN L. GODSEY
Chief of Safety, USAF

COL BERNARD B. BURKLUND, JR.
Commander, Air Force Safety Agency

MAJ JAMES H. GRIGSBY
Editor
DSN 246-0936

PEGGY E. HODGE
Managing Editor
DSN 246-0950

CMSGT DON A. BENNETT
Technical Editor
DSN 246-1984

DOROTHY SCHUL
Editorial Assistant
DSN 246-1983

DAVE RIDER
Electronic Design & Illustration
DSN 246-0932

DAVID C. BAER II
Illustrator
DSN 246-5655

TSGT PERRY J. HEIMER
Photojournalist
DSN 246-0986

Commercial Prefix (505) 846-
E-Mail--grigsbyj@smtps.saia.af.mil

DEPARTMENT OF THE AIR FORCE - THE CHIEF OF SAFETY, USAF
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Shot in the Foot — With What?

■ A maintainer was cleaning a piece of nonpowered support equipment with a high-pressure cleaning system. During the task, he lost his balance, almost fell, but didn't. However, in regaining his balance, the high-pressure cleaning system's water gun (or spray nozzle) accidentally went across one of his feet. The high-pressure water spray cut through his heavy-duty rubber boots — and into his foot! The individual had to spend over a week at home to recover from the resulting laceration.

TSgt Perry J. Heimer

Just a short reminder, folks. The low- and high-pressure ground support equipments' air, water, nitrogen, hydraulic, oxygen, lubrication, and others, will hurt you badly **if you're not careful!** These pressurized substances and elements can, and have, penetrated some clothing items (in this case, rubber boots) — and definitely **YOUR** skin! Great injury is especially likely when you **"shoot"** yourself, at close range, with these potentially lethal weapons! Following tech data, manufacturers' manuals, and safety directives, as well as good, common sense, will keep you out of harm's way.

Speaking of common sense, did you hear, a few years back, about the aircraft mechanic/trainer (a 5-level sergeant) who was demonstrating to his 3-level airman basic trainee just how harmless a low-pressure grease gun is to the human body? So adamant was he about his claim, the wise, old sergeant held the grease gun nozzle to the palm of his hand and pulled the trigger! **Y-e-e-o-o-w!!**

Well, there's no intrinsic value in repeating the **"choice"** words of extreme surprise and excitement that vaulted out of his shocked face. And there's no way to honestly and totally describe ***in all the pages of this year's magazines*** his utterly awesome animalistic behavior *after* the excruciating pain overcame the shock factor! Sort of like a combination of the Irish jig, a gymnast's floor routine, and a bull baboon's mating ritual — or something along those lines. To say the least, it was a bizarre act to witness, much less to experience!

So just keep the **business end** of those pressurized tools and equipment **down range** of your body, and ***please*** always be alert to where you're at and what you're doing, okay? It's called "situational awareness," something you can live with!

The "Stuck Throttle" Panel Mishap

The prelaunch checks and preflight inspection went well on a trainer jet that was going up for a functional check flight after an engine overhaul. Nothing out of the ordinary was noticed during a power engine run check just prior to takeoff. However, during the takeoff roll, the pilot sensed a little more muscle was needed while pushing the throttles up to military power.

SMSgt Bob Wickley

The pilot kept the throttles in military power until he reached the military operating area for the FCF work, whereupon he "attempted" to pull them both back to idle. He quickly discovered one of the throttles wasn't going to budge a bit — **it was stuck in military power!**

After some in-flight troubleshooting failed to free the stuck throttle, the pilot declared an in-flight emergency and returned to base. On short final, he pulled the mishap engine's fuel shutoff T-handle and safely landed under single-engine procedures.

After maintenance removed an engine access panel to investigate the cause for the jammed throttle, the problem disappeared — *it could be freely moved!* Looks like when the engine access panel was reinstalled after the engine's overhaul, it forced a neighboring panel to move slightly forward and up. This adjacent panel's movement, in turn, caused a corner of it to snag a cotter pin on the throttle clevis when the throttles were advanced to military power on the takeoff. This mishap just proves that even the simple task of installing aircraft access panels can set us back a bit in our quality maintenance and mishap prevention efforts.

Of course, a lion's share of the credit for safely recovering this jet rightly belongs to the pilot. A smaller portion goes to Lady Luck. But just imagine what could've happened if this mishap involved a single-engine aircraft?

Fact: "An ounce of attention will produce a ton of prevention!!"

Bladder Lacing FODs Fuel System?

A deployed KC-135 aircraft was several hours into an operational mission when all four engine fuel gauges fluctuated while using either of the air refueling pumps in the forward body fuel tank. After experimenting with different fuel panel burn configurations, the crew was able to stop the fluctuating gauges. Almost 8 hours later, the aircraft landed uneventfully.

USAF Photo

All of the engine fuel system filters were checked for contamination, but none was discovered. After further troubleshooting, maintenance decided to replace the engine pressure manifold. In removing the old manifold, maintenance found the next clue in the unfolding mystery.

A fibrous substance was attached to the spring of the pressure regulator. An alert fuel system specialist immediately suspected some fuel cell baffle lacing as the source **because of *another* past similar case.** All of the forward body tank's baffle lacing was in place, but not so with the aft body's No. 2 cell. It seems there was about 36 inches of baffle lacing cord missing. In addition, the aft body forward pump had fibrous material in it, **plus about 29 inches of the lacing cord, bonded to the pump's impeller shaft!**

Research revealed the last time the tank was entered was when it was replaced at depot almost a year earlier! **OUCH!!! That hurts!!!**

Closing up an access panel on *any* aircraft's system, or sub-systems, is more than just the final step in *any* repair or inspection actions. Because, if not performed properly and/or responsibly, there could be some very unsafe or incomplete maintenance **hidden *behind* the panel!** For this reason, the simple installation of *any* interior or exterior access panel is a very critical maintenance action, especially in the flight and ground mishap prevention business. **And, for the installing mechanic, it's an absolute integrity check — each and every time!!** ■

OPS topics

Anti-Ice System Trashes *Two* Windscreens

■ An F-15 pilot was preparing for departure from a base with an overcast, 2-miles visibility and light rain. The preflight and engine start were uneventful. Prior to starting the before-taxiing checklist, he cleared the windscreen of rainwater by turning on the windshield anti-ice system, but then turned the system off.

As he departed chocks, he turned the windshield anti-ice system on again — the rain had become more intense. Checklists, radio calls, and take-off preparations must have occupied his attention because he forgot to turn the anti-ice system off.

SrA Andrew N. Dunaway II

The first 10 minutes of the flight were in instrument meteorological conditions. After a half hour of flight, cruising at FL350, the pilot noticed something unusual at the bottom of the windscreen. While investigating this condition, he realized he had left the windshield anti-ice system on. The windshield "HOT" caution light had never come on. After landing, maintenance found extensive damage to the windscreen. Total costs were over $30,000.

The second F-15 was part of a real-world contingency operation. Weather was similar to the first case, and the pilot also used the anti-ice system to remove rainwater from the windscreen. He, too, forgot about the anti-ice system remaining on until he noticed damage about 3 hours out. Another $30,000 plus in repair costs!

The F-15 Dash One has many cautions about possible damage to windscreens when windshield anti-ice systems are left on too long during nonicing conditions. But it also allows the use of the windshield anti-ice system to **briefly** remove moisture during taxiing and landing approaches.

The windshield "HOT" caution light didn't come on because it's triggered by the excessive temperature of the anti-ice air — **not** windshield temperature. Depot has put together a modification package to solve this disparity, but the implementing funds haven't been received yet. When the money becomes available and the upgrades begin on the F-15 fleet, the modification will help remind task-saturated pilots when the windshield anti-ice system is still on.

The windshield "HOT" caution light will remain lit any time the windshield anti-ice switch is turned on. The light will blink when the anti-ice air temperature is excessively hot. The light's "steady/blink" feature will alert the pilot to the proper windshield anti-ice temperature condition.

Let's hope the funds and modifications are forthcoming *soon!* The F-15 is an extremely complicated flying machine, with equally complicated mission profiles. Task-saturated pilots don't need their missions blown for want of a simple nuisance light.

"Trapped *Gas* Mishap"

Several days before this physiological mishap, an AC-130 aircrew member had two separate meals during the same day, consisting of a combination of beef, chicken, fish, and rice. But he ate beans during *both* meals! Later that evening, he experienced gas, followed by stomach cramps the next day. He still had stomach pains the day of the mishap flight, but decided to tough it out and fly anyway.

After takeoff, and upon reaching 10,000 feet MSL, the gas-stricken aircrew member's condition worsened, and he had to lie down for a while. The pains lessened upon landing at an en route base. While there, he told the aircraft commander of his bout with excess gas, but still insisted on continuing with the mission.

An hour into the last leg, also at 10,000 feet MSL, the mishap aircrew member again had another episode with stomach pains. However, this time the pains were so severe he couldn't perform his in-flight duties. The mission was cut short, and an in-flight emergency was declared. Medical

*U.S. GOVERNMENT PRINTING OFFICE 1995-679-016/03018

personnel were requested to meet the aircraft upon landing. It was later determined the mishap aircrew member had a bad case of constipation! So, it's easy to realize just how distressed the aircrew member must have been when you combine excessive gas and suffering from constipation too!

Virtually all Air Force pilots and aircrew members should remember that "expanding glove" during their initial and recurring altitude chamber rides. Well, like the glove, your body will try to expand due to trapped gas!

This is an excellent illustration of ***what not to do to your body before you fly!*** And eating a mess of beans before the flight isn't a healthy way to prepare for a mission, either — especially for slow and low, unpressurized aircraft.

Don't forget the mishap individual had several opportunities to stand down and **not fly** that day, but decided to continue instead. Sometimes that "can-do, gung-ho" attitude can backfire and cause a reversal of the intended mission outcome.

This mishap sortie could have been an actual combat mission when the talents of the incapacitated aircrew member could have been paramount to the success of the mission.

TSgt Perry J. Heimer

If you're not fit to fly, then don't! And if your common sense or pride won't allow you to make that call, then at least explain your situation to the aircraft commander, and he or she will certainly make a risk-assessment decision for you!

Upside Down During Chute Deployment

What started out to be a normal static line exit from the back of an aircraft quickly turned critical for this mishap parajumper. He suffered a broken collarbone when the opening shock of his chute was absorbed by his shoulders vice his lower body. It didn't help any that he was upside down when it happened!

Upon his exit from the aircraft, there was no static line entanglement observed nor did he contact any part of the aircraft upon leaving it. However, immediately after his exit, he started a slight rotation, followed by a forward tumbling action. He wound up in a head-down position during the chute extraction, and his shoulders took the full force of the opening shock. Of course, the jumper was hurt, but at that moment the broken collar bone injury was probably the least of his immediate concerns. This is where the plot thickens.

Besides intense pain, the jumper was still upside down, *but with one of his feet tangled up in the suspension lines above him!* So there he was, upside down, hurt, and a leg tangled up. What to do? Well, a cool head, combined with excellent training, enabled this jumper to untangle himself, obtain a normal body position, perform the post-deployment checklist actions, and safely land. **Nice work, trooper!**

What started the forward tumbling action in the first place? It's not known for sure, but speculation is it was most likely self-induced due to body position during exit. It could also have been caused by aircraft wake turbulence, or a combination of both factors.

USAF Photo

The message here is simple — the factors leading up to this incident have and *will* continue to happen. We all live and work around potential danger just about every day, some of us more so than others. And how do we *all* avert injury or death on a daily basis? Self-confidence gained from real-world experiences and quality training coupled with uncompromising self-discipline — that's how! ■

A Message From the Chief of Staff

GEN RONALD R. FOGLEMAN

ON 11 AUG 95, THE FOLLOWING MESSAGE (CSAF/CC, 111600Z AUG 95) WAS SENT BY THE CHIEF OF STAFF OF THE AIR FORCE TO EVERY COMMANDER IN THE AIR FORCE:

UNCLAS ALMAJCOM-FOA
SUBJECT: THE ROLE OF LEADERSHIP IN SAFE OPERATIONS

1. SINCE AUGUST OF 1990, THE AIR FORCE HAS BEEN MAINTAINING AN EXTRAORDINARY LEVEL OF ACTIVITY. IT STARTED WITH DESERT SHIELD AND STORM, THEN CONTINUED WITH DESERT CALM, SOUTHERN WATCH, PROVIDE COMFORT, DENY FLIGHT, RESTORE HOPE, AND A HOST OF OTHER MAJOR CONTINGENCY OPERATIONS. AT THE SAME TIME, WE WERE ENGAGED IN A MASSIVE DOWNSIZING AND RESTRUCTURE OF THE FORCE WHICH RESULTED IN UNIT MOVES AND THE REQUIREMENT TO BRING UP NEW OR MODIFIED FACILITIES.

2. THE TROOPS HAVE PERFORMED IN A MAGNIFICENT MANNER, ANSWERING EVERY CHALLENGE WITH PROFESSIONALISM AND SKILL. OF COURSE, ALL OF OUR SUCCESSES HAVE COME AT A HIGH COST. WE'RE WORKING MUCH OF THE FORCE HARDER THAN WE HAVE IN A LONG TIME. PERSONNEL CUTBACKS HAVE REDUCED OUR NUMBERS, THE INVENTORY HAS SHRUNK, AND SPARES ARE SOMETIMES HARD TO COME BY. I KNOW THAT SOMETIMES THE PACE OF OPERATIONS SEEMS TO BE TOO FAST, OR JUST TOO RELENTLESS, FOR YOU TO STOP AND CATCH YOUR BREATH.

3. THE LEADERSHIP OF THE MAJOR COMMANDS, NUMBERED AIR FORCES, OR WINGS CANNOT BE IN EVERY WORK CENTER, COCKPIT, OR VEHICLE IN THE AIR FORCE. ALL OF US RELY ON GROUP, SQUADRON, AND FLIGHT COMMANDERS TO BE OUR EYES AND EARS, TO SEE THE FACES BEHIND THE NUMBERS. THE COMMANDERS IN THE FIELD, AT THE LOWEST ECHELONS, ARE THE ONES WITH THE TRUEST PICTURE OF THE STATE OF THE AIR FORCE. YOU SEE THINGS IN A WAY THE METRICS CAN'T ALWAYS REACH.

4. WHILE THE TURBULENCE ASSOCIATED WITH DOWNSIZING IS COMING TO AN END, DON'T EXPECT ANY BREAKS IN THE ACTION FOR THE FORESEEABLE FUTURE. BECAUSE OF THE INHERENT CAPABILITIES OF OUR AIR FORCE, I PREDICT A LONG-TERM CONTINUING NEED FOR OUR FORCES ON VIRTUALLY EVERY CONTINENT. THIS MEANS THAT EVERY ONE OF YOU HAS TO BE CONTINUOUSLY AWARE OF THE STATE OF YOUR ORGANIZATION, AND TO ACT ON THAT KNOWLEDGE AS NECESSARY. IF YOU PERCEIVE THAT YOUR UNIT'S OPERATIONAL TEMPO IS CREATING UNSAFE CONDITIONS, EITHER FOR YOUR PEOPLE OR YOUR EQUIPMENT, I EXPECT YOU TO STICK UP YOUR HAND AND SAY SO.

5. THE TOUGHEST CALL IN THE WORLD IS "KNOCK IT OFF," BUT IF YOU NEED TO MAKE IT, DON'T SHRINK FROM IT. YOU CAN COUNT ON MY SUPPORT. I GIVE YOU MY PERSONAL GUARANTEE THAT, IF YOUR PROFESSIONAL JUDGMENT LEADS YOU TO ASK FOR RELIEF FROM A TASKING, YOU'LL GET IT. I'D RATHER SPEND A BUSY NIGHT SHUFFLING PRIORITIES AND TASKINGS THAN GRIEVING THE LOSS OF A MEMBER OF THE TEAM.

6. THERE ARE TOOLS TO USE OUT THERE TO HELP YOU PREDICT TROUBLE, BUT ULTIMATELY IT'S YOUR KNOWLEDGE OF YOUR PEOPLE, YOUR WEAPON SYSTEMS, AND THE PRESSURES ON THEM THAT HELP US PREVENT IT. LISTEN TO YOUR SAFETY STAFFS, WORK WITH YOUR HEALTH PROFESSIONALS AND CHAPLAINS, BUT REMEMBER: YOU HAVE THE AUTHORITY AND RESPONSIBILITY TO MAKE THE "KNOCK IT OFF" CALL.

7. GENERAL FOGLEMAN SENDS.