flying SAFETY

JANUARY 1987

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A New Year's Message From The Director —

SAFETY AND READINESS

■ The New Year is a time for celebration and reflection. It is a good time for assessing what is important, what we have accomplished, and where we are going in the year ahead. As the proud new Director of Aerospace Safety, I have examined our safety story and find it is, indeed, a successful one.

Over the past several years, the Air Force has set new records in reducing the Class A aircraft mishap rate. An increase in operational flying hours, newer and safer aircraft in the inventory, realistic training, increase in the availability of spare parts, the contributions of system safety, and continued excellent maintenance have all played a role in this success. And I certainly give credit to the Air Force Safety Program and all of the individuals at MAJCOM and unit levels who push flying safety everyday — including, of course, the world's best flyers.

Aircraft mishaps cost the Air Force over half a billion dollars a year. We can't afford that! New weapon systems coming on line are very expensive. Every loss is more than we can afford, and the human loss is intolerable. High performance aircraft and sophisticated systems tax our crews and basic human capabilities to a high degree, and we need to do everything we can to help flyers perform effectively — which means safely.

I am concerned about mishaps caused by human error, which does account for the majority of our mishaps. To me, this means that most mishaps are preventable. We're looking especially hard at these mishaps attributed to human factors.

We're working on a program to specifically address the human factor problem. We must learn from our mistakes. In my opinion, we're on our way in attacking this major cause of aircraft mishaps. The program is called AMP — Aircraft Mishap Prevention — and is a computerized management system to compile and analyze human factors in aircraft mishaps.

Safety is not just an entity in itself but is important primarily in how much it improves readiness. Readiness involves a lot of things — training, standardization, attitude, equipment, maintenance, and certainly, *safety*! I can't overemphasize the role safety plays in maintaining readiness. By preserving and protecting our aircrews and aircraft, we support readiness. Without flying safety, we're not ready to train, fly, or fight.

A primary challenge in the year ahead is to continue to emphasize safety at every level throughout the Air Force. One of our jobs here at the Air Force Inspection and Safety Center is to support commanders, directors, and chiefs of safety in an effort to make safety interesting. Safety must be a driving part of the equation for success in any operation or organization. It is important we make safety interesting, appealing, and a part of *everything* we do.

All of us working our mission together can make the New Year superb and safe. We in the Directorate of Aerospace Safety wish you a safe 1987! ■

Donald A Rigg

DONALD A. RIGG
Brigadier General, USAF
Director of Aerospace Safety

UNITED STATES AIR FORCE **flying** SAFETY MAGAZINE

AIR FORCE RECURRING PUBLICATION 127-2 | JANUARY 1987 | VOLUME 43, NUMBER 1

AFRP 127-2
Entered as a publication at the Second-Class rate (USPS No. 586-410) at San Bernardino Postal Service, 1331 South E Street, San Bernardino, CA 92403 and additional entries.

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE INSPECTOR GENERAL, USAF

SUBSCRIPTION — FLYING SAFETY is published monthly to promote aircraft mishap prevention. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. Use of funds for printing the publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in mishap stories are fictitious. No payments can be made for manuscripts submitted for publication in the FLYING SAFETY Magazine. Contributions are welcome as are comments and criticism. Address all correspondence and, Postmaster: send address changes to Editor, FLYING SAFETY magazine, Air Force Inspection and Safety Center, Norton Air Force Base, California 92409-7001. The Editor reserves the right to make any editorial change in manuscripts which he believes will improve the material without altering the intended meaning. Air Force organizations may reprint articles from FLYING SAFETY without further authorization. Prior to reprinting by non-Air Force organizations, it is requested that the Editor be queried, advising the intended use of material. Such action will ensure complete accuracy of material amended in light of most recent developments. The contents of this magazine are non-directive and should not be construed as regulations, technical orders or directives unless so stated. Distribution: 1 copy for every 12 aircrew, aircrew support, and maintenance personnel.

SARSAT And You

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■ The use of satellites to monitor and locate distress transmissions has been the subject of discussions and studies for many years. Quick location and recovery time critically improve a victim's survival chances after a mishap. Studies show that only 20 percent of injured crash victims will survive if not located within 24 hours. Only 50 percent of uninjured crash victims will survive if not located within 72 hours. There are some 350 ship losses worldwide each year and from 1,200 to 1,400 light aircraft crashes within the United States each year. The ability to monitor and pinpoint aircraft and vessel distress beacons would greatly improve the chances of reaching and saving mishap victims.

While NASA Goddard Space Flight Center was conducting these studies in the 70s, the Canadian Department of Communication (DOC) was conducting their own studies for the Canadian Department of National Defense. Both studies led to the same results, so NASA and the DOC joined forces in 1976.

This project was expanded in December 1977 when the French Centre National D'Etudes Spatiales (CNES) joined the effort by providing the satellite onboard processor for the test. At this time, the project was designated Search and Rescue Satellite (SARSAT). Discussion among the SARSAT partners with the Soviet Union led to the formation of a four-nation program called COSPASS*/SARSAT. Two other nations, Norway and Great Britain, have recently joined the system by completing ground receiving stations.

The COSPASS/SARSAT System

How does the COSPASS/SARSAT system work? Currently, there are four COSPASS/SARSAT satellites, three Soviet and one US. These satellites monitor the emergency frequencies: 121.5 megahertz (MHz) is the civilian emergency frequency, 243.0 MHz is the military frequency, and 406.025 MHz is the newly agreed upon international distress frequency.

These satellites work in two different ways. First, the satellite will act as a repeater and relay emergency signals to a local user terminal (LUT) if the LUT is within range. Second, if the LUT is not within range of the satellite, the emergency signal must be stored aboard the satellite until the LUT is in range. This ensures coverage for all distress craft in the northern hemisphere regardless of whether there is an LUT in the region.

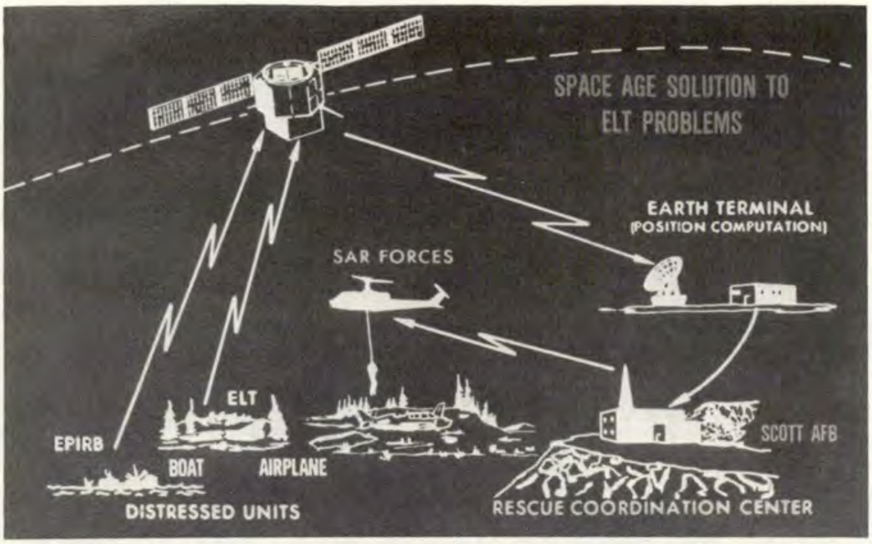
At the present time with 4 satellites in orbit, coverage is provided approximately every 90 minutes to 3 hours depending on the location. There are 10 LUTs with plans to complete 2 more within the United States. These sites are located at Kodiak, Alaska; Point Reyes, California; Scott AFB, Illinois; Ottawa, Canada; Toulouse, France; Archangelsk, Soviet Union; Moscow, Soviet Union; Vladivostok, Soviet Union; one in Norway; and one in Great Britain.

The US satellites work on 121.5, 243.0, and 406.025 MHz. The Soviets' satellites work only on 121.5 and 406.025 MHz. Existing beacon signals permit position fixing to within 10 to 20 km for 121.5 or 243.0, and with the 406.025 frequency, position can be pinpointed to within 2 to 5 km. The US mission control center at Scott AFB, Illinois, is the national focal point for US involvement. They reported the COSPASS/SARSAT system was responsible for 510 rescues in the United States in 1985.

* The Soviet's Search and Rescue Satellite System.

The following examples show SARSAT in action. A Cessna 172 with three people on board crashed in a heavily forested area while on a VFR flight in British Columbia, Canada. The crash site was located in a valley which was surrounded by 6,000-foot mountains. The survivors carried their locator beacon to the top of a nearby hill to extend its range. Search aircraft failed to locate the crash site visually or even pick up the emergency beacon. Information from a COSPASS satellite pinpointed the crash site which the rescue forces then located visually. The site was over 50 km north of the intended flight route, and rescue personnel estimated it would have taken an additional 3 or 4 days to locate the survivors without the satellite information.

In another incident, the ketch, Blue Jean, ran aground in the eastern Bahamas, far away from flight and shipping lanes. The 5-man crew activated their emergency locator beacon at 0400 on the 7th of November. At 0900, the satellite flew overhead, and by 1050, the rescue people at Scott AFB, Illinois, had determined rescue coordinates. These coordinates were passed to a search crew located in Miami, Florida. By 1500, the Blue Jean crew was picked up within 14 miles of the SARSAT estimate.



The satellite system's ability to quickly and precisely locate a beacon signal greatly reduces rescue time. The result is a dramatically improved survival rate.

Problems Encountered

SARSAT mission control center people at Scott AFB are now processing an average of 27 incidents daily, compared with 7 in the presatellite days. Since the false alarm rate of 97 to 98 percent still has not decreased, the greater monitoring capability has meant many more false alarm incidents have to be processed by search and rescue people than ever before as they seek to discover the actual emergencies.

Another difficulty that surfaced during a recent NASA-sponsored workshop on this problem was improper use of both the 121.5 and 243.0 MHz distress frequencies by pilots. Recordings made of both the civilian and military bands revealed numerous nonemergency conversations. Surprisingly, military pilots were the worst offenders, cluttering up the 243.0 frequency 25 percent of the time.

This interference may not seem like a serious problem, but it is. A pilot may think he is just talking with another nearby pilot, but the enhanced sensitivity of the satellite, even at more than 600 miles overhead in space, means the satellite is also hearing his voice transmissions on that frequency.

Since the aircraft transmitter is much more powerful and has fewer obstructions than the very weak electronic locator transmitter (ELT) signal emitting at 75 one-thousandths of a watt, the voice transmission effectively drowns out the ELT signal. To prevent this problem, downed aircrews should leave their ELTs activated in a nonhostile environment, so satellites in polar orbits can receive and process the emergency signal.

Another problem has been survivors on the ground trying to conserve battery life in beacons and radios. They may transmit for 2 to 5 minutes at regular intervals during the day. Due to not transmitting during times when the satellites were in position to receive signals, there were delays in rescue forces pinpointing locations. The suggested practice in a noncombat situation is to turn your beacon on for approximately 90 minutes, periodically listening to your transceiver to find out if anyone may be trying to contact you. The minimum battery life for beacons is 6 hours.

The SARSAT is for you! Know how it works and do your part to help it work at peak efficiency. ■


One problem the Rescue Coordination Center faces is a 97 to 98 percent false alarm rate. We can help reduce that rate by using our equipment properly.

THERE I WAS

■ It was a dark night with low scattered clouds, and a warm, gentle breeze was blowing from the south. Preparation for the mission and briefings had gone smoothly. Our F-4 was called in ready, so we left the squadron and started preflight. The ramp was poorly illuminated, but we were able to complete engine start and taxi without incident.

Quick check gave us a thumbs up, and tower indicated delays should not be expected. During takeoff roll, we felt the familiar thump of the BAK-12 at 100 knots. Gear up. Flaps up. Check the altimeter jump to indicate flap motion. The altimeter was unwinding instead of increasing. That was the end of our planned mission.

About then, the pilot was going to the gauges and was coming to the same realization. The altitude was going below sea level, the vertical velocity was definitely not doing what we were, climbing into a very dark sky. The indicated airspeed was OK for a Piper Cub, but was nowhere near our 300+ knots. A check with ATC verified our altitude at 600 feet MSL.

We switched over to mission frequency and started to sort things out. The RPM, AOA, attitude indicator, radar altimeter, ILS, and INS seemed to be working properly. The pitot-static system appeared to be the only thing affected.

But it was like an old friend gone amuck. One minute everything cross-checked OK. The next, altitude was dropping and airspeed going to zero as we flew along straight and level.

We switched back to ATC, declared an emergency, and explained the nature of the emergency. A bit later, the ATC controller firmly requested we maintain our assigned altitude. The ILS glide slope was acquired. Gear and flaps were put down and AOA was flown to touchdown.

Taxi-back and shutdown were anti-climactic after the adventure we had just finished. I checked the pitot port to make sure the cover was off and the inlet clear. We had a great time in debrief writing up the altitude and airspeed variations we had seen.

We did not immediately notice the crew chief when he walked in. However, when he opened his fist, everyone was looking at him. He held out a few pieces of black electrical tape each a few inches long. It seems on a black night, black tape on a black radome can easily be missed — even if the tape is covering the static port.

We learned later the plane had just come from the washrack, and some of the sealing tape had been missed. I still wonder how the story would have ended if the weather had been worse, the airplane had experienced a real problem, or if the indicated airspeed had gone above flap blow-up speed on final. ■

THERE ARE THOSE WHO HAVE . . .

MAJOR RONALD L. CARR
6514th Test Squadron
Hill AFB, UT

■ There I was . . . in the flare waiting for the feel and sound of the wheels touching the runway. But it wasn't there. It should have been, but it wasn't. I asked myself, "What's wrong?" and in the time it takes to say "What's wrong," I traveled the final 14 inches to the ground and found out. I watched the front prop completely tear itself up. The ugly scraping sound of metal against concrete filled my ears as we skidded to a halt. Fortunately, I had been blessed with one of my smoother landings, and we all egressed without incident or injury.

Anger was my first feeling. How could I do such a dumb thing as land gear up? I have never been so angry at myself before or since. On top of the anger was a great feeling of relief no one had been hurt. After realizing that came "What's going to happen to me and my flying career now?" I've never experienced three entirely separate emotions all tumbling and mixing together, one on top of the other. But, I'm not writing this to tell you the confusion of emotions one can experience after a mishap.

What I want to do is provide you with the causes of this incident. For just how does a command pilot with over 3,500 hours total time and 6 years of experience in type, an IP, and the senior flight examiner land an aircraft, in this case an 0-2, gear up? I'll be attempting to do this using a human factors approach. I believe I'm qualified to do this, for at the time of the mishap, I was a physiological training officer and trained in recognizing human factor stresses. So, I will be addressing the causes from the standpoint of the physical, physiological, psychological, and psychosocial stresses.

First, I'll cover the stress factors prior to the mishap. My wife and I had been trying to work out a problem our son had been having for several months. It appeared our son, while in class, would simply stop in the middle of doing something, have a blank stare, then pick up where he left off. We thought, at first, it might be a learning disability and had him tested. Results were negative, but it was suggested he be checked for a brain tumor.

That was done, and the results were still pending early in November on the date of the mishap. I also learned the night before the mishap that our son had had another "blank stare" episode. So I carried the knowledge, of both the latest episode and pending test results, with me to mission brief. The results of the brain tumor tests were completely negative.

The next stressor involved something which was started 2 years earlier. My wife and I had borrowed money to start a pre-school with the idea that my wife's salary would pay off the loan. Well, the pre-school opened, but my wife didn't get a salary due to other problems. So, now the loan had to be repaid from my salary, and that caused extreme penny-pinching.

There was no fun or date money left. It all went for basic living expenses and loan repayment. So, we didn't get any nights out, and our vacations were spent at home. Added to this, the final loan payment was due at the end of November. With some other added expenses, I didn't know if we could make it. The payment was made on time, but the sweat was still there on the day of the mission.

A third stressor involved social-religious problems. Since the first part of October, our church had been without a governing organization. A friend and I attempted to reconcile differences between the two

continued

church groups engaged in the struggle over reorganization plans. My friend and I had spent many long evenings working on a compromise plan, plus meeting with the two groups and discussing compromises. This task was difficult and at times very frustrating, and included many heated confrontations. The final version of the reorganization plan was turned in 3 November.

In addition to the reorganization business, I was also involved in reconciling two individuals who had a severe difference of opinion. This involved three long meetings on three separate evenings, all occurring in the month of October. I felt a great deal of frustration, especially after spending considerable time in the reconciliation process, where neither party would even attempt to reconcile their differences.

The next stressor involved my job. As Chief of the Physiological Support Division, I had my regular duties as division chief, plus trying to solve some major manpower shortages. We had only two fully qualified physiological training officers (PTO). Our third PTO was still in training and was posing additional problems. That meant I had to increase my classroom teaching to help make up the shortfall.

During the August through October time frame, I seemed to have dealt with a large number of items requiring short suspense dates. This created additional stress and, most definitely, irritation.

The next stressor was most probably the result of all of the above. Due to the number of evening meetings I had committed myself to, I wasn't able to get a full night's sleep. During the month of October, I averaged about 5 hours of sleep a night.

One thing I should have taken as a warning was nodding to sleep while driving the 30 miles to work. But, I didn't. The long waking hours, coupled with the lack of sleep, produced a good case of fatigue.

Another stressor involved memory. I could go from one room, wanting to do or get something in another, then upon reaching it forget what I wanted. So, fatigue was degrading my short-term memory. I felt tired and had no endurance.

I use running as a source of not only keeping in physical condition, but also as a tension and stress reliever. But, with all the commitments I had, I felt I didn't have time to exercise, and besides, I felt too tired to exercise. So, I didn't.

Those are the pre-mission stress factors I had acting on me. As for the mission stress factors, well, there aren't any that are uncommon.

This mission was a photo chase of a C-141 testing a parachute deployment system for cargo drops. I hadn't flown a chase mission for some time, but felt fully capable of doing it. I will admit, I did have some apprehension about flying chase, but only because of the time span since my last chase mission.

All the flights I had in October had been in the right seat. So I was faced with transitioning from the right to left seat. This transition meant switching hands — what the

"The final payment was due on our loan, and I didn't know if I could make it." — Dollar figures can cause much stress when our plans don't work out the way we would like them to.

right hand did while in the right seat, the left hand now does in the left seat and vice versa.

On the day of the mission, I checked in at the squadron, and the squadron commander stopped me and asked me to look over the new 0-2 training program. I asked to copy it, which I did, then proceeded to the mission briefing. The first part of the brief was on C-141 procedures and running checklists. I looked over the 0-2 training program at this time since the discussion didn't pertain to my part of the mission. I did this to keep awake. Second warning ignored.

I rejoined the discussion when chase procedures were addressed. After the mission briefing, the C-141 aircraft commander and I briefed in detail our parts of the mission. I then went through the usual motions of getting ready to fly, waited on the photographers to get their equipment, and then we all left to go to the aircraft.

The preflight was normal, and I briefed the photographers on 0-2 emergency procedures. We finished a bit early, so we discussed camera angles and positions. Strapping in, engine start, taxi, and pre-takeoff checklists all went as planned. I took off first and went directly to a prearranged orbit point.

While in orbit, I began to look for the C-141 at my 4 to 6 o'clock position. I finally located him and began a joinup. As I turned to join on him, he turned onto the base leg of our dry run. I found myself well back of the C-141 after rolling out on base leg. I was able to get a rather high overtake speed (high for the 0-2 anyway) just as the C-141 started his turn onto final. Upon rollout on final, I found myself again outside and behind the C-141 and trying to catch up. I achieved proper photo chase position at the end of the dry run.

I was having difficulty, initially, maintaining proper position. This was caused by my inability to detect minor changes quickly and then having to make large throttle changes to correct for those ever growing position changes. I also had to use idle several times to increase drag and slow the 0-2 into position.

Those throttle changes toward the idle side made the landing gear warning horn sound, and each time it did, I'd punch it off. I very quickly established a brand-new habit pattern of when the horn sounds, punch it off. When the horn is on, it interferes with communications inside and outside the cockpit. We were now making our turn onto final for the hot run. With the turn completed, I was still trying to catch up. At the one minute to drop call, I was finally in position and held proper position fairly well to the end of the run. At run's end, a right, 90° turn was started, followed by another right, 90° turn. I checked with the aircraft commander of the C-141, and he said they were done and cleared me to break off and return to base.

About 4 miles southeast of the base, I started a descent to pattern altitude. I called tower for landing instructions and was told about shuttle approaches to Lakebed Runway 17. They requested I make a left, 360° turn. At the completion of my turn, I started another 360° turn to lose more altitude and rolled out on a heading to the northwest to intercept a VFR final. I called tower for landing clearance. Tower told me I'd be No. 2 after the C-141. The C-141 was several miles east of the VORTAC, and that put him more than seven miles from the runway. (I estimated he was 10 to 12 miles out.) I told tower I could be on the ground by the time the C-141 got to the VORTAC, so tower cleared me to continue and told me to watch for two T-38s on downwind.

I started the before-landing checklist, then looked for the T-38s. I returned to finishing the checklist,

continued

Even though they are sometimes necessary, heated confrontations are frustrating and do much to increase our stress level.

There Are Those Who Have... continued

but I distracted myself again by trying to find the T-38s. I completed all items on the before-landing checklist except one — gear down.

I had now located the shuttle approach aircraft. They were just north of Runway 22, and the first T-38 on downwind had started his base turn. I was now concentrating on getting the proper spacing behind the second T-38, who had started his base turn. The shuttle approach aircraft had completed their approach and posed no problem.

I reduced power, bringing the throttles to near idle to slow down. This activated the gear warning horn. I immediately reached up and punched it off, just as I had done throughout the flight. I slowed to 80 KIAS and put down full flaps. I then added some power, but not enough to reset the gear warning horn. I achieved my spacing on the T-38 ahead of me and continued the approach.

I usually do a gear check of my own at 300 feet and 1/2 to 1/4 mile out. Again, I distracted myself by checking to see where the T-38 was and missed my final gear check. By the way, I did make the standard gear check call. I then concentrated on landing the aircraft and didn't know anything was wrong until I was in the flare.

A review of the mission stress factors show:

- I had to cope with a fastpaced mission when fatigued. I thought I could do it, but the fatigue factor slowed me down and proved I couldn't.
- I initially had problems with the transition from right seat to left seat; a small stress, but it added to the stress I already had. Also, the transition from using my left hand to operate the gear handle to that of my right hand was another small stress factor.
- The apprehension about chase flying and the inability to spot small position changes, which led to . . .
- Large throttle changes, which caused the landing gear warning horn to come on and me to quickly establish a new habit pattern of punching it off.
- I allowed myself to be distracted at two critical points where I would normally either get the gear down or check it down.

Now, let me put all this in a human factor perspective by showing you specifically the physical, physiological, psychological, and psychosocial stresses that were acting on me.

The physical stresses I imposed on myself were decreasing my physical condition and stamina by not exercising. I would also include here the elimination of the one stress remover I had — physical exercise.

The major physiological stress was fatigue, produced by long working hours and lack of sleep. This, in turn, produced short-term memory loss, muscle tenseness, and a tired feeling all the time.

The psychological stressors were perhaps the largest group affecting me. My attention span was shortened. I had some apprehension about the lack of proficiency in flying chase. Distraction was a major item and was the straw that did break the camel's back. Couple fa-

Another pre-mission stressor involved my son who had been tested for a learning disability. The results were negative, but our doctor suggested he be tested for a possible brain tumor. The doctor's findings were still pending on the date of the mishap.

tigue with decreased attention span, and distraction can become a much bigger problem than one first realizes. Habituation and inattention can be lumped together.

The new habit I formed (in about five minutes) of punching off the landing gear warning horn set me up to be inattentive to what the horn was designed to do. I also channelized my attention in trying to find the various aircraft in the pattern and, through short-term memory loss, forgot to recheck things — such as where the gear was positioned.

The psychosocial stressors were not uncommon. I believe most anyone can experience similar ones. Two differences might be the short time interval in which I experienced them and how I handled them. A factor you might look out for.

Concern about a child, family finances, church problems, or job-related problems by themselves won't usually be greater than we can cope or deal with. It's when several begin to pile up together and we get the feeling of being overwhelmed that serious problems arise. These can often go unrecognized or our egos rationalize that we can cope when really we can't.

Now you can see no single thing caused this mishap. There were many contributing factors, and through it all, I thought I could cope with and handle the pressures I either placed on myself or were placed on me. At the beginning of this article, I said I was trained to recognize human factor stressors, so why didn't I see this one coming?

First, I failed miserably in seeing these stressors myself. Second, as I said before, throughout this entire time, I felt I could deal with, cope with, or handle the stress. So, I didn't see this one coming because I didn't recognize the warning signs I was trained to see (or perhaps I didn't want to own up to them), and I let my ego and pride direct my actions instead of some good old-fashioned common sense.

Now I'm wiser. I know I have specific limits, and I know what they are. I know the symptoms my body gives out to tell me to back off because of stress. Some of the changes I've made in dealing with stress are:

- I get adequate rest before doing anything important.
- I take time off and don't think about work all the time.
- I don't take my work home with me.
- I try to work smarter and more efficiently.
- I never go to bed angry.
- I strive to eat a well-balanced diet.
- I take the time to exercise on a regular basis.
- If I have a problem, I admit it and work to eliminate it — especially if it involves stress problems.
- I'm more realistic and honest in setting goals and my motives for doing them.
- I've learned to say *no*. I try very hard not to do or take on more than I can handle.

Perfect I'm not, as you can see. But, I do know more about myself and, especially, my specific limitations. How about you? Have you looked at yourself and your limitations? Is your body trying to warn you about stress? Only you know. I hope you'll take the time to identify your stressors and how they stress you, and then develop some coping techniques.

You can successfully deal with the stress we all encounter at some time. The immediate solution may be to remove yourself from the flying schedule. Then, concentrate on resolving the stress so you can be at 100 percent capability when flying. ■

Pre-mission stress factors compounded rapidly. The mental stress, lack of sleep, and lack of exercise produced a good case of fatigue. I failed to heed the warning signs.

THE MISHAP THOUGHT PROCESS

MAJOR JAMES D. PRICE
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Selfridge ANG Base, MI

■ In 1972, I had just returned from Vietnam and was visiting my parents in Utah. At this particular time, the county was all "abuzz" because of a recent aircraft crash. A pilot and passengers, having spent the weekend in Wendover, Nevada (on the state lines of Utah and Nevada), were returning to Salt Lake City one Sunday evening.

The weather wasn't what the pilot was hoping for that day, but, since he needed to be home for work on Monday morning, he took a chance. The exact weather conditions at the time of the crash are known only to Mother Nature, but, we do know that somehow he entered IFR conditions on an intended VFR flight and struck a mountain on the west side of the Great Salt Lake.

But for the grace of the afterburner and sheer luck, there go I. The only difference between the mishap pilot and me is luck. We, who survive, have been allowed to learn from our mistakes.

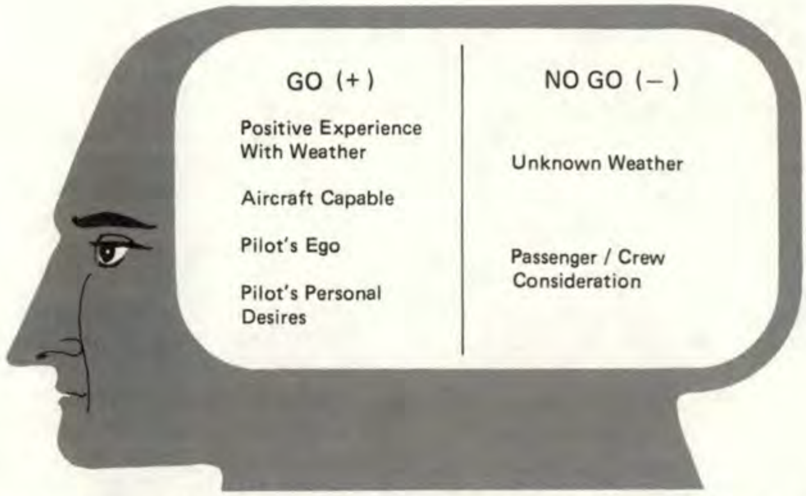
This fellow was in good company. He wasn't the first to err. For instance, a USAF test pilot tried, unsuccessfully, to top a thunderstorm in a T-38 on the way to a temporary assignment. A C-130 flight examiner plunged his crew and passengers into the Pacific Ocean. He had tried to crawl VFR beneath a very low ceiling in a valiant effort to deliver "the goods."

Lots of good men and women feel they *must* get home or they *must* complete the mission. As we monday-morning quarterback, it's quite easy to say, "Boy, that was sure shortsighted!" But when we do that, we lose the lessons that can be learned from those shortsighted attitudes. We deny the possibility it could happen to us and forget it may have already happened, except we were just luckier.

Could it be inexperience is the cause of mishaps? Not really. The test pilot and the flight examiner were very experienced, skilled, and respected. *Aviation Safety* recently completed a study on mishaps wherein they compared 237 mishaps in the 1982-1983 year group where the pilots had 10,000 hours +, and 3,359 mishaps in the 1979 through 1983 year group involving pilots of all experience levels.

The high timers averaged 15,265 hours compared to 1,100 for the normal group. The high timers had more than 1,100 hours in type, compared to 262 for the normal group. Of the high timers, 84 percent had air transport pilot (ATP) and 44 percent had commercial licenses. Most of these high timers were flying single-engine aircraft.

When comparing the groups, the high timers percentage is higher than the normal groups in all categories but landing, takeoff, weather-related, and taxiing mishaps. Both sides were tied in the "Improper IFR" category.



To reach a decision, the pilot compares the positive factors with the negative. In this case, the decision to go wins — 4 to 2.

So, a bulging log book is not a guarantee of safety, whether you're a military or civilian pilot. Experienced pilots are still stalling, landing short, and pushing the weather and themselves beyond the limits. Mere experience is no substitute for safety consciousness.

Mishap Percentage Comparison By Category And Pilot Experience

Normal Pilot Population Versus High Timers*

MISHAP CATEGORY	NORMAL POP. %	HIGH TIMERS%
Collisions	1.8	7.2
Fuel Management	9.6	10.5
Engine Failure	13.4	15.6
Landing Gear	6.8	11.8
Improper IFR	2.1	2.1
Landing Mishaps	30.6	18.6
Stall Mishaps	6.7	8.0
Takeoff Mishaps	7.0	3.0
Taxiing Mishaps	0.6	0.0
Weather Related	8.5	8.0
(VFR into IFR)	8.5	8.0
(Spatial Disorientation)	2.1	0.8
All Other	13.0	15.2

* High Timers are those with *10,000+* hrs
Adapted from *Aviation Safety*, September 1, 1986

The pilot who encountered cumulonimbus in Utah, the USAF test pilot who tried to top a thunderstorm in a T-38, and the Herky pilot who tried to hack the mission all had something in common. All three encountered unexpected weather. They all, (we would hope) weighed the possibilities, carried on the debate between the proverbial devil and angel, then made a decision based on what they saw, what they had experienced, and what they wanted to accomplish.

First, let's hypothesize the reasoning a pilot might go through in six general subareas.

The weather was different than briefed. It was either higher, wider, or lower than the pilot expected. This would cause the weather briefer to lose credibility. Many pilots would curse the weatherman, as if he controlled the weather (not Mother Nature), because the weatherman is a tangible object while not many pilots have actually talked to Mother Nature. Since the weather briefing no longer is believable, the weather situation beyond is certainly anyone's guess. Going into the unknown is not a very comfortable experience, so this would cause the rational pilot (with no other factors to consider) to turn around or go to an alternate.

They may have had experience with similar weather conditions. Isn't that how we have learned since we were children? Touching a stove and getting burned is a negative experience, and we learn that lesson quite rapidly. However, a positive experience, wherein you are victorious over the thunderstorm or low ceiling, may have canceled out the uncomfortable feelings about the uncertain weather beyond. Now the pilot is "sitting on the fence" and could either continue or turn around. If the pilot was unsuccessful with similar weather, then that would reinforce the tendency to turn around. But, they pressed on, indicating prior success with a similar experience, or no negative experiences.

Now the pilot would consider the capabilities of the aircraft. If his prior experience with similar weather conditions was with the same aircraft, then the confidence level would be high. Another positive thought is registered in the brain. If this aircraft was fairly new to him, then it would be another feeling of uncertainty, and a negative thought would cause him to wonder. We know they continued, so we assume they felt comfortable in their aircraft.

Let's say the pilots had no reason to doubt their own flying capabilities, and they had a healthy attitude about themselves. They would tend to have confidence in their ability to safely leap the obstacle. This would put a "good" thought in the plus column. continued

The solo pilot doesn't have the benefit of inputs from other crewmembers. But, the pilot of a larger aircraft who doesn't listen to other members of the crew might as well be solo.

THE MISHAP THOUGHT PROCESS continued

The next area is a tough one because it sometimes overshadows all other reasoning. It is a drive and desire so strong it has caused reasonable men and women to do some very unreasonable things: Gung-ho-itis, mission hacking, or get-home-itis. Those terms are troublemakers because they distort the thought process.

There is good reason to believe each of these pilots had a personal desire to get from point A to point B *today* — not tomorrow! When we put that factor into the brain, often times the most awesome obstacles seem like childs' play. Let's give the pilots the benefit of the doubt and just assign the "personal desire" a single "positive thought" and not several, so as to cloud all the negative reasoning heretofore accomplished.

Lastly (and I say lastly because many pilots put this thought last in the equation), the next factor considers the other members of the crew, the passengers, and the people on the ground. They not only have a great desire to live, but when the crew and passengers boarded the aircraft, they assumed the pilot would be safe. Let's give these pilots credit for feeling responsible for those lives — a "no go" thought goes in the negative side of the brain.

Add it all up, and the pilot reasons it is safe to continue. The positive side wins, four to two. Even without adding additional weight to the personal desires of the pilot, or overshadowing all other reason, it is extremely easy to talk one's self into pressing on.

Unfortunately, the implicit trust the crew and passengers put in the pilot should have overshadowed the personal desires, successful experience, and ego.

While flying for the state of Utah, I was in the lobby of the Aeronautics Office waiting for the remainder of my passengers to arrive. Out of the blue, a lady came up to me and studied my face. I asked her if there was something I could do, and she said, "I just wanted to know what kind of person is holding my life today." I was offended at first. What?! Question *my* ability? Then I realized her question went deeper than my flying skills. She wanted a blood oath from me that protecting her life would be priority No. 1; that my personal desires would not enter into the thought process equation.

I still see her eyes in the faces of crewmembers and passengers and wonder about pilots whose decisions caused a mishap. Had they felt more empathy for the rights of the passengers, crew, and people on the ground, would there still have been a mishap?

Signing for the aircraft on the flight plan involves a sacred trust because of the lives involved. The crew trusts the pilot, and when he or she lets personal desires overshadow this trust, that is when mishaps happen. Call it selfish, call it ego, call it what you will. I call it Russian Roulette because, when one presses on in the cloud of uncertainty, he or she may not live to regret it.

To twist a quote by Clint Eastwood's Dirty Harry Callahan, "Do you feel lucky, PILOT?!" ■

Who's the biggest risk? Is it the young second lieutenant who is building his experience level and pilot skills, or the old pro with cuffs rolled up and a confident smile as he climbs into the familiar cockpit? A recent study of this question offered some answers that may surprise you.

Center To Get New "N-Ray" Technology

MICHELLE TOWE-JOYCE
McClellan AFB, CA

■ The Sacramento Air Logistics Center's (ALC) Nondestructive Inspection Branch has always considered itself a leader in bringing new, state-of-the-art technology to aircraft maintenance inspection problems.

For example, this Air Force Logistics Command's Center was the first Department of Defense facility to use automated bond testing and real-time (moving) X-ray for nondestructive inspection.

Now, it will be the first facility in the Air Force to use a neutron radiography system to detect aircraft corrosion in its earliest stages — when it's too small to be picked up by ultra-sonar or X-rays.

The "N-ray" produces images in much the same way X-rays do; but the new process is much more sensitive to hydrogen, a large component of water and the corrosion it produces. Because of this sensitivity, N-rays can detect moisture and corrosion in minute amounts — in fact, no known method can match neutron radiography for its ability to detect low-level corrosion. X-rays, on the other hand, are sensitive to corrosion only when it is well advanced and can't detect small amounts of moisture.

The detection of corrosion in aluminum and composite-material aircraft structures is just as important to aircraft as early detection of cancer is to the human body. Detecting and monitoring low-level corrosion, combined with precise repair technology, will extend an aircraft's useful life span, reduce the risk of crashes, reduce repair costs, and add fundamentally to our knowledge of corrosion control for both military and civilian aircraft.

The new system, expected to be operational in early 1989, will be powered by a small, 250-kilowatt nuclear reactor called TRIGA. The acronym means it is used for teaching, research, and producing isotopes. Similar reactors have been used in hospitals, universities, and industrial sites around the country for more than 20 years.

One big advantage of the N-ray system is that it can inspect aircraft components through a two-part system without having to take the aircraft apart. The new inspection capability will be housed in bays large enough to accommodate F-111s intact. It will also house the world's largest robotic gantry — 90 feet square.

During the first part of the inspection — called the maneuverable N-ray system — robotic devices will pull a radioactive isotope-powered N-ray device around the aircraft, making a preliminary inspection of all panels for trouble spots. This part of the inspection can be done without having to disassemble the aircraft. Also, depending on the location and extent of corrosion, repairs themselves can sometimes be made without tearing down the aircraft.

However, not every aircraft component will need to go to the second stage — called the stationary neutron radiography system. Only those panels showing potential problem areas will be pulled off for closer examination by a more sensitive N-ray device powered by the reactor.

This advanced technology to identify defects without major disassembly and part preparation is expected to save an estimated \$3.8 million per year in the aircraft repair cycles and the supply inventory. The savings will pay for the \$8 million project within 3 years.

Neutron radiography at Sacramento ALC is expected to make it the Air Force leader in this new technology. Not only is it an important new means of making aircraft safe to fly and cheaper to maintain, but its state-of-the-art technology also gives the Center a competitive edge to support such current workloads as the F-111 and the A-10. ■

HYPOTHERMIA

Killer Of The Unprepared

It was a very cold December evening. The weather dispatcher reported visibility one-half mile in ice fog, wind calm, temperature −50 degrees Fahrenheit. The cargo compartment of the tanker was unheated because the auxiliary power unit wasn't operating. For 2 hours, the heavily clad pilots, navigator, and boom operator struggled to keep warm in cockpit temperatures nearly as cold as outside. As the last of four spare aircraft providing air refueling support for an airborne reconnaissance mission, the crew did not expect to launch. Then the unexpected occurred . . . the crew completed their final checks, advanced power, and released brakes. The aircraft departed. A few minutes later, the crew reported having a problem raising the gear. Thirty seconds passed . . . radio and radar contact were lost . . . and a huge fireball lit up the sky.

PEGGY E. HODGE
Assistant Editor

■ What happened? Investigators concluded the extreme cold was one of the major factors. The extended delay in these temperatures reduced crew effectiveness to an undetermined, but significant, degree. The temperatures contributed to the crew's delayed judgment, distraction, and lack of coordination. Also suspected was the subtle, but deadly *hypothermia* — a killer of the unprepared.

This mishap may have been prevented through awareness and good judgment. We need to understand what hypothermia is, its effects, and what we can do for prevention.

What Is Hypothermia?

Hypothermia is the lowering of the body's inner core temperature. The body maintains thermal equilibrium by regulating the production and loss of heat. This heat loss occurs through the mechanics of radiation, conduction, evaporation, convection, and respiration.

Radiation is the leading cause of

Hypothermia is a subtle killer. The cold can steal your body's warmth so slowly that symptoms aren't visible until your condition has already reached the danger zone.

heat loss through an uncovered or unprotected head. Heat loss is so rapid from an unprotected head that, at 40 degrees Fahrenheit, it may represent 50 percent of the body's total heat loss and up to 75 percent of the total body heat loss when the temperature is 5 degrees Fahrenheit. Covering the head will conserve body heat and energy.

Conduction is primarily an issue when the skin transfers heat through contact with surfaces. Sweaty or wet clothing touching flesh can extract heat at an alarming rate.

Evaporation losses occur through sweating; however, this process should be assisted by wearing loose fitting fabrics that "breathe" but still retain body heat. Clothing *must* ventilate or breathe. If not, ice may form on the inside of clothing.

Convection of warm air away from the body surface is a leading method of heat loss. This is heat exchange between an object and the currents of gas or liquid which flow past it, causing it to gain or lose heat, according to whether it is colder or hotter than its immediate surroundings.

Relative movement of air over the body, either because of an increased windspeed or movement of the body through the air, is therefore very significant. The so-called windchill effect is very important in the low temperature situation, since it aggravates heat loss from the body and therefore increases the possibility of hypothermia.

Windchill is a product of temperature *and* wind velocity. Although the temperature may not be particularly low, it is important to remember the danger of windchill. Even short journeys out of doors should not be made without taking full precautions. Be prepared for the unexpected. For example, don't trust your car heater to always work . . . cars break.

This good rule of thumb can usually be followed: For each mile per hour of wind, subtract one degree of temperature. For example, a −20 degrees Fahrenheit reading and a 20 mile per hour wind will give you a temperature reading of −40 degrees Fahrenheit. Note the windchill effects in the table. continued

WINDCHILL EFFECTS

Dry Bulb Temp °C	Little Danger Up To These Wind Speeds	Dry Bulb Temp °C	INCREASING DANGER At These Wind Speeds	Dry Bulb Temp °C	GREAT DANGER Above These Wind Speeds	Dry Bulb Temp °C
−10	20	−10	20 − 45	−10	see previous column	−10
−15	10	−15	10 − 45	−15		−15
−20	5	−20	5 − 45	−20		−20
−25	5	−25	5 − 30	−25	30	−25
−30	0	−30	0 − 20	−30	20	−30
−35	see next column	−35	0 − 10	−35	10	−35
−40		−40	0 − 10	−40	10	−40
−45		−45	0 − 5	−45	5	−45
−50		−50	0 − 5	−50	5	−50
Dry Bulb Temp °C	Little Danger Up To These Wind Speeds	Dry Bulb Temp °C	INCREASING DANGER At These Wind Speeds	Dry Bulb Temp °C	GREAT DANGER Above These Wind Speeds	Dry Bulb Temp °C

NOTE: All wind speeds in knots
Based on maximum wind speed of 45 knots (22 m/s or 50 mph)

FORECAST DESCRIPTION OF WINDS:

5 knots = Light Breeze
10 knots = Moderate Breeze
20 knots = Fresh Breeze
30 knots = Moderate Gale
45 knots = Fresh Gale

HYPOTHERMIA continued

Respiration — inhalation of cool air and exhalation of warm air — accounts for a significant amount of heat loss. Naturally, we cannot stop breathing, but we can place a piece of material across our face and mouth to prewarm the air we breathe.

Effects of Hypothermia

Any time a person is exposed to cold weather conditions (sometimes even cool, wet weather for a long period), one may suffer some degree of hypothermia. Signs of hypothermia may include muscular weakness, stiffness of limbs, fatigue, an overpowering drowsiness, and sight growing dim. Eventually, one may begin staggering, falling, and become unconscious. The respiration and pulse may become almost undetectable. Obviously, you will want to prevent hypothermia in the early stages.

It is important to remember that if cockpit conditions become excessively cold, hypothermia may impair performance in unexpected ways.

Modern day aircraft can be exposed to great temperature changes during a single sortie, even if the point of departure is located in a temperate climate. Within minutes of taking off from an airfield whose ground temperature may be more than 113 degrees Fahrenheit, an aircraft can be flying at an altitude where the outside air temperature is −70 degrees Fahrenheit and over mountains where the temperature on the ground is below freezing. Aircrews must plan carefully if they expect any kind of temperature variance, but must also bear in mind survival of the unexpected.

If the wide range of temperature variables becomes excessive to the point of discomfort, it can interfere with efficient crew performance. Extreme temperature swings can have a detrimental effect on a person's ability to perform. It is difficult to relate this performance loss to the particular temperature level; but if the temperature deviates significantly from a "comfort zone," a decrement in skilled performance is far more likely.

When temperatures are excessively cold, and especially if windchill is a factor, a crewmember's performance may be adversely affected during pre-flight procedures. Cold temperatures and windchill add to the stress of pre-flight operations. A crewmember will tend to "rush" through the checklist because of the cold! Remember to consider the human element during pre-flight. Don't abbreviate the pre-flight inspection because of the cold. Aircraft pre-flight inspections demand even more vigilance in cold weather.

Treatment

We need to be able to recognize and treat the symptoms of hypothermia. We need to prevent further body heat loss and increase the existing level of heat.

- The best treatment is *rapid* warming. The victim has suffered a loss of the body heat reserve, and warmth must be restored immediately. *Rewarm the body as quickly as possible.*
- A good treatment is taking a hot bath and drinking hot fluids.
- Use body heat to warm up a person if you are stranded.
- Obtain shelter from wind and rain.
- Remove wet clothing and replace with dry clothing.
- Insulate the victim from cold or dampness.
- Add heat by any method available, but avoid overheating which may burn tissue that is perhaps already compromised.
- Always, if medical aid is near, get it from qualified people.

Be familiar with the unseen risks as well as the outright symptoms of hypothermia and probable sources of heat loss. Remember, hypothermia can subtly become a cold weather killer. Know your safety measures and use them properly. ■

Cold weather also may adversely affect our performance. The cold can create additional hazards for us even when attempting to complete routine operations such as loading and unloading our aircraft.

FSO's CORNER

Managing The Additional Duty FSO

CAPTAIN DALE T. PIERCE
919th Special Operations Group
Eglin AFB Aux Field 3, Florida

■ A wing FSO recently asked me about management of additional duty (AD) and squadron-assigned FSOs. Between the lines, it sounded like ADFSO involvement was a major shortfall. He asked me how I manage the squadron flight safety people in my unit. In retrospect, my answer could have been more complete. Here's what I should have told him.

I use situational leadership to manage all assigned and AD people. You can read about it in various recent texts.* Beyond management styles are techniques for accomplishing specific objectives. For example, training through involvement, productivity programs, and the theory of chunks. I'll briefly discuss these three in the following paragraphs.

Training can and should foster involvement. Like ADFSOs at most other wings, ours receive an orientation on the pertinent safety and operations regulations. Then, based on their availability, they participate in mishap investigations, make presentations at flight safety meetings, and manage safety projects.

In addition to being helpful, I find their participation rewarding and informative. I've seen some of their suggestions and recommendations affect policy Air Force wide. To keep morale high, the ADFSOs and I work together to see to it they succeed. I might fail to provide sufficient guidance to ensure error-free performance, but *they* are never credited with my shortfalls.

Productivity programs don't need to be complex to work well. Encouragement and use of existing reward systems can go a long way toward making a program work. If a problem is discovered or someone has a program idea, I work with my ADFSOs to develop an approach to solving the problem or implementing the idea; help work the approach; assist, as required, with the politics; and then provide rewards for a job well done. Here's an example.

Productivity programs don't need to be complex to work well. Encouragement and use of existing reward systems can go a long way toward making a program work.

While participating in the wing FOD prevention program, one of my ADFSOs became concerned about aircrew generated FOD. Several approaches were considered, and finally a FOD display case (the FOD Box) was selected. A location for the FOD Box was chosen. I coordinated use of the location with the Director of Operations, and the ADFSO built the FOD Box in his home workshop, brought it to the squadron, and placed it in the desired location. Working the displays for the FOD Box is his safety project and is dutifully performed (I believe because he developed and implemented the idea).

The rewards were provided in three ways: First, he was praised for his efforts in front of the Director of Operations; second, the base newspaper carried an article about the FOD Box, which brought him peer recognition; and third, the *Air Force Safety Journal* (July 1986) carried an article about the FOD Box, which shared his idea as a valuable contribution to the Air Force Safety Program. Other reward systems are equally effective. Timely inputs for OERs and paperwork submitted for decorations are always appreciated.

Productivity programs can consist of encouraging new ideas, ensuring success, and rewarding a job well done. (Notice, I made no mention of either failure or punishment.)

A word on the theory of chunks is in order when discussing "management" of ADFSOs. The theory comes into play when individual initiative and creativity don't get all the squares filled. The idea is to assign tasks in doable pieces, proportionate with availability and experience. It's similar to the method for successfully eating an elephant. That is, take one bite at a time. It goes a long way toward ensuring successful completion of assigned tasks.

Leading ADFSOs can be more difficult than directing assigned people. But then, leading those with no obligation to follow has always been more challenging and rewarding.

The FSO's Corner needs your ideas. What are you doing in your program that would help other FSOs if they knew about it? Call me (Dale Pierce) at AUTOVON 872-8537 between 0800 and 1600 Central time, or send your name, AUTOVON number, and program idea to 919 SOG/SEF, Eglin AFB Aux Fld 3, Florida 32542-6005. ■

* For a recent text on situational leadership, see *Leadership and the One Minute Manager* by K. Blanchard, published by William Morrow and Company, Inc., New York, 1985.

QUALITY, Eglin Style

MAJOR DAVID J. BOYLES
Commander, 3246 MMS
Eglin AFB, FL

■ Quality assurance (QA) is a deputy chief of maintenance (DCM) staff function removed from the mainstream of maintenance production. Because of this fact, it is difficult at times to directly relate QA functions to a goal. It is very important to stand back and see the big picture to determine how quality assurance fits into that scheme. Only by judging your value to the DCM organization can you begin to measure success or failure.

We're proud of the success our quality assurance organization has enjoyed. There are several prime ingredients to that success which are worth recounting. To begin, a good QA organization needs the solid backing of the DCM. Surprisingly, most of that responsibility falls on QA shoulders rather than the DCM: A manager will only rob the workforce to support the staff if the staff has something worthwhile to offer. The key to solid backing is to make your boss an "offer he or she can't refuse" — then deliver.

Secondly, QA is a service organization. The producers are the squadrons that generate sorties and keep aircraft and equipment in commission. Since QA doesn't produce anything, we'd better understand the role of a service organization and how to provide quality service. Put another way, QA exists because of the squadrons it supports; the reverse is *not* true.

Third, a good QA organization is constantly evolving, always adapting to change for improved management. Since we have so much ground to cover in maintenance, there should be no excuse for a QA outfit to fall into a rut. And another argument: If we see ourselves as a catalyst for change in the maintenance complex, then we must be just as willing to lead the way with change for the better.

A fourth ingredient of a good QA organization is the quality of staff work. If we've done our homework well and documented our findings thoroughly, things are bound to change for the better — our reason for being.

Lastly, QA must be realistic in our approach, without sacrificing standards. We, on the staff, need to snap back to reality and remember it rains on the flightline, two-stripers do complete maintenance actions, and the pressure to produce does generate shortcuts. The real world is not always by the book and must be reckoned with.

In the 3246th Test Wing, we've developed a model of QA activities, shown in the figure to understand better the sum total of what we're tasked to accomplish.

The first apparent observation is that all QA responsibilities directly support the Quality Maintenance Theory. That theory is the centroid of all QA tasks. Six major programs encompass all QA activities. These programs are not equally weighted, however. For instance, the evaluation program represents at least 50 percent of QA efforts and involves the primary duty of two-thirds of our 33 personnel.

On the other hand, self-inspection (and management assistance visit) is an additional duty for three NCOs, with augmentation. Interface and DCM assignment are self-explanatory. You're probably acquainted with most of the technical services QA provides. Class II (temporary) modification and local checklist/technical data programs represent a significant workload because of our R&D mission. Along similar lines, weight and balance is a heavy workload because we're in the business of armament and configuration testing (7 types of aircraft, 17 separate Mission Design and Series (MDS)). We maintain more than 3,000 DD Form 365s (Form F) for our 60 aircraft.

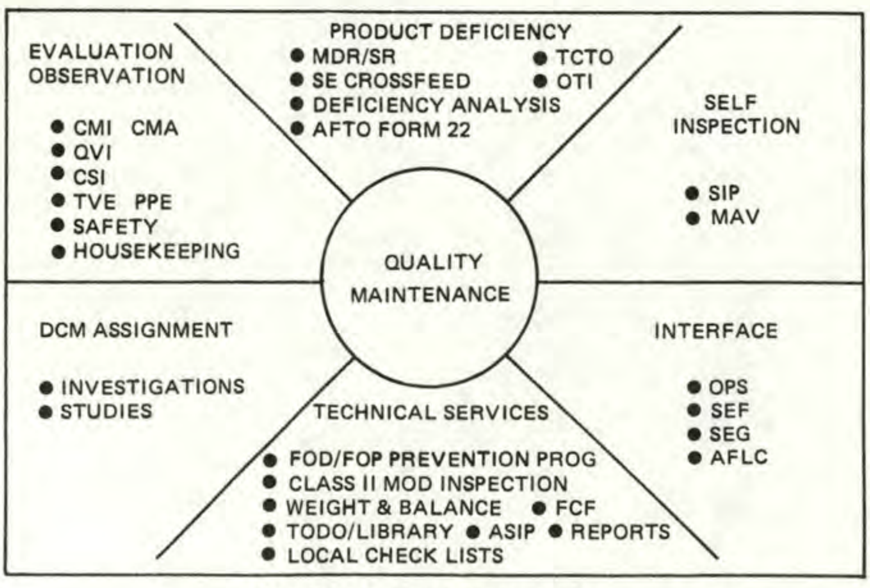
If evaluation is the heart of our QA program, then product deficiency is the brain. Our analysts work a two-way street, feeding systems project offices (SPOs) and system managers with deficiency information and translating data to the inspectors so they can adjust and fine-tune the evaluation game plan. We have a program we call FOCUS in which the individual inspector receives real-time data which enables him/her to investigate and determine if a negative trend supports a change in where and how an inspector looks. Two programs we work especially hard are safety cross-feed and one-time inspection (OTI).

We receive a tremendous flow of mishap messages (F-4, F-16, F-15, F-111, A-10, T-38, UH-1N) which we comb for logistics lessons learned, and then apply to our fleet and organization to improve the quality of maintenance. One method we may employ is the OTI to verify condition or status of our equipment, but a note of caution. OTIs are expensive and time-consuming; we put each recommendation for an OTI through rigorous screening to ensure the payoff potential is there.

Here are some additional ideas we've adopted to improve QA which might prove useful to you.

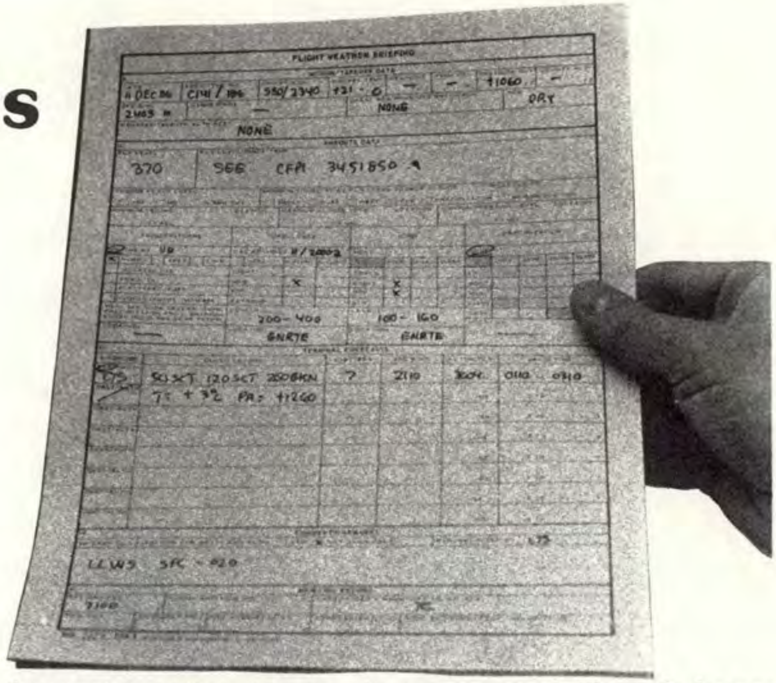
- Change your inspectors: We keep an inspector for 2 years and return him/her to the squadron. New people are selected from the squadrons using best qualified criteria. Introduce new ideas. Avoid deadhead practices.
- Institutionalize: Write a program OI for everything you do. Keep those that are successful. Don't rely on word-of-mouth.
- Advertise: QA is a service organization. Advertise your service, otherwise, nobody buys. Material deficiency reporting/service reporting (MDR/SR) is a prime example.
- Showcase: QA is the showcase in maintenance where examples are set. Make sure your example is a good one by personnel selection, personal appearance, and staff work.
- Work smarter, not harder: Always look for innovation that will permit you to accomplish more. Automate where possible. Creative task management is the key.
- Controversy: Don't shy away from it; at the same time, don't unnecessarily fall on your sword.
- Inspection: Allow yourself to be inspected, and use the report to improve. If you aren't inspected, you'll lose credibility, to say nothing of the lumps you'll take during the next MEI.

There you are — a few ideas on how we've chosen to organize our QA program. Maybe they will help you. In the meantime, you may have an innovative QA program we can borrow to further improve. If so, write to: 3246 TESTW/MAQ, Eglin AFB, FL 32542-5000. ■



Quality Assurance Program

All Dash Ones Are *Not* Created Equal



CAPTAIN ROBERT R. SINGLETON
55th Aerospace Rescue and Recovery Squadron
Eglin AFB, FL

■ The C-130's crew had received a written weather brief at an overseas location which forecast arrival weather at destination as 1,000 scattered, 2,000 overcast, 7 miles visibility — intermittent to 4 miles and light rain. Actual arrival conditions were 300 broken; visibility 1/2 to 3/4 mile; light to moderate rain, drizzle, and fog; light to moderate turbulence, surface to five thousand. The aircraft crashed and all aboard perished. The investigation determined the weather folks at departure base had done the best they could given the information available to them. With that in mind, this article is in no way an indictment of that, or any weather shop.

What struck me most about this incident was the fact that a crew, like any crew you or I have been on, took off believing weather to be one way, planned on weather being that way, and found actual weather to be *very different*. All of us, including weather folks, joke — at one time or another — about the reliability of weather forecasts. While the weather, and weather forecasting, admittedly provide good material for jokes, they can kill you.

The foremost question in my mind when I had finished reading the report was this: Given the weather people are outstanding, their product, my 175-1,* is only as reliable as the inputs available to them. What are those inputs? What are their limits? And lastly, what can aircrews do to help both themselves and the weather people serving them?

My hope in this article is to share what I've learned so aircrew members can better evaluate the reliability of our weather forecasts, and safely plan accordingly.

Early in my research, I was advised my questions could constitute the desired learning objectives for a 6-month course in forecasting and meteorology. Given that caveat, my words are admittedly not comprehensive and could drive a full-fledged meteorologist crazy; but for our purposes, they should suffice.

Observations and Forecasts

Your forecaster may choose to work with any of three types of observations in compiling your Dash-1. An aviation weather report (AWR), or its equivalent, is issued by stations hourly and on a special basis as required. Through the use of computer terminals, teletype, or telephone, the forecaster will either call your destination directly or tap into the data bank stored at Carswell AFB, Texas — the input/output terminal for the Air Force Global Weather Center (AFGWC) at Offutt AFB, Nebraska, and the Automated Weather Network (AWN). Together, the AFGWC and AWN receive observations from US and foreign, military and civil fields.

Your forecaster may use two other forms of observation; the familiar pilot report (PIREP) and the hourly or special radar report (RAREP). RAREPs provide information on precipitation patterns, area coverage, height, intensity, and movement.

While observation report information on what is happening right now may provide a good starting point, you are concerned with the forecast for your arrival time. Your forecaster can again choose to tap into the AFGWC or AWN via the Carswell data bank for a Terminal Aerodrome Forecast (TAF) or equivalent; or he may elect to contact your destination directly for the same. Like the AWRs and RAREPs, the TAFs are generated hourly and special as required. As with the AWRs, the Carswell data bank contains TAFs for US and foreign, civil and military fields.

* The standard Air Force weather briefing sheet which forecasts departure, en route, and destination and alternate base weather.

How much credence do you give to your 175-1? Some are much more credible than others. You should know and understand the sources.

Limitations

Observation and forecast coverage varies widely from field to field and is by no means complete. Some fields have no weather reporting services, while others run a part-time operation. Where fields lack reporting services, your forecaster may draw upon an AFGWC estimate of conditions present and forecast, or he or she may draw upon an AWR or TAF generated by a field in the vicinity of your destination under a cooperative weather watch program.

All observations and forecasts, regardless of type or origin, may fall prey to a number of factors. Transmissions may be garbled, delayed, degraded, or improperly encoded and decoded. Equipment used at some stations may be obsolete, improperly placed, calibrated, or otherwise misused resulting in inaccurate reports. There is the question, too, of who is taking or making the observation or forecast — a tower controller, a station manager or owner, a company representative, or a qualified weather observer or forecaster.

In the absence of destination station observations and/or forecasts, your forecaster may draw upon observations and forecasts from stations surrounding your destination. The extent to which surrounding stations can adequately reflect present or future conditions at destination depends to a great extent upon topography. All of us have stories to tell of two fields separated by no more than a few miles, one well within limits, the other well out of limits, be it for winds/RCR, ceiling, visibility, turbulence, or hazards.

Your forecaster may, as the situation warrants, reference three other sources as well. Satellite photos may or may not be available at your point of departure. If available, the interpretation of satellite photos constitutes a full course of instruction in its own right; as such, there is the matter of the training and experience of the individual interpreting your satellite shot. As to what the satellite can tell you concerning low altitude conditions at destination (ceiling, visibility, precipitation), the most consistent response I have received is such information is a function of the magnitude of the buildup — the greater the buildup, the greater the difficulty in determining the low altitude conditions via satellite photo interpretation.

Air Force Manual 51-12, Weather for Aircrews, contains comprehensive descriptions on the array of charts available to the forecaster. For the purposes of our discussion, not all stations have equipment required to receive the charts. If received, the charts may vary in recency due to lag time in transmission, reception, and posting.

As with satellite photo interpretation, the last source your forecaster may reference is climatology. This is another full course of instruction. Suffice to say, it requires training, experience, and time — it is a last resort.

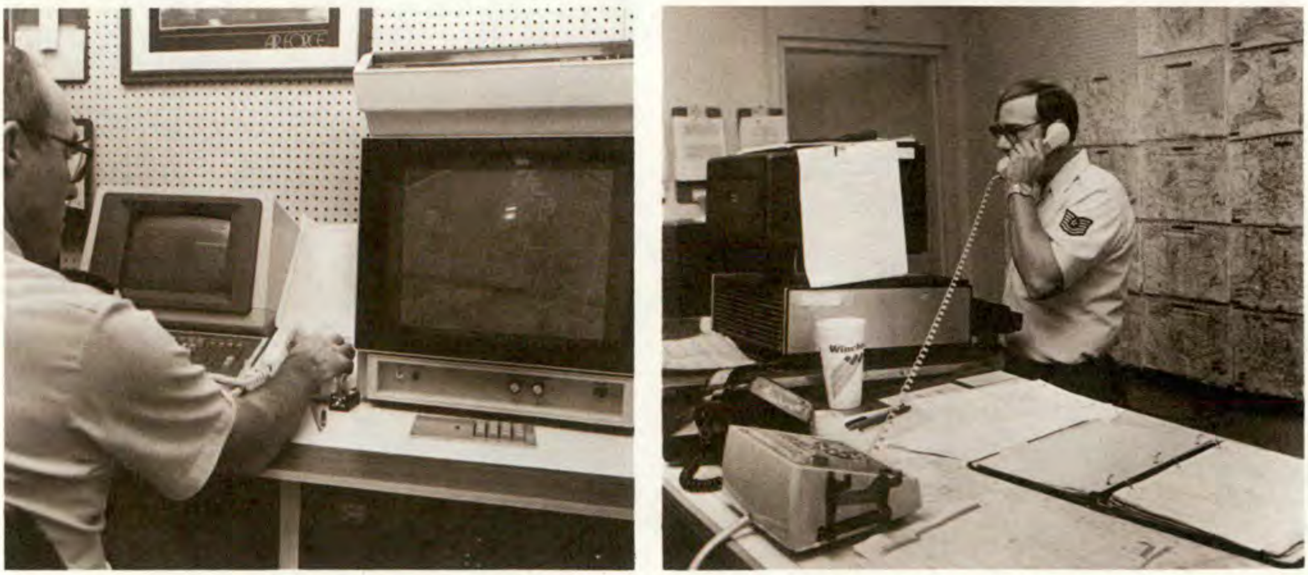
Each of the sources referenced by your forecaster has one common denominator: He or she is *your* forecaster. This role is one of synthesis and interpretation. This individual draws on experience and training to transform raw data into a complete 175-1 for you and me, the aircrew — critical players.

Aircrew Involvement

With the discussion to this point, what can we do to help ourselves and lessen the likelihood of surprise weather at destination?

First, and foremost, know your inputs. What are they? How com-

continued



Your forecaster has many sources of information. For example, he can tap into the data bank at Carswell AFB or call your destination on the telephone. It's important for you to know what these sources are and how reliable they are.

plete are they? How recent are they? Consider the limitations discussed to this point. Do not accept the Dash-1 at face value; have a "feel" for it.

The C-130 mishap which led to this article took off for a field with a complete Dash-1, however: (1) There were no weather services in the immediate vicinity of the destination field; (2) no observations or forecasts from the destination field were used; (3) the nearest official weather observation was 45 nm from destination airfield; (4) bearing in mind the discussion of surrounding fields and topography, the destination field was on the coast, and all fields within 45 nm were either much farther inland or tucked into the mountainous terrain prevalent in the area; (5) observations and forecasts for the entire area were sparse; (6) there were no radar weather reports in country; and (7) forecasters had to rely on satellite photo interpretation (with the limitation discussed earlier).

The investigation determined the 175-1 was the best possible, given the data available. Was the crew aware of the degree to which data was *not* available? Was the 175-1 accepted as we are accustomed to accepting them? Did the crew have a real "feel" for the strength of their Dash-1?

On a recent trip to the Caribbean, I departed from a field with a weather brief for Eglin AFB, Florida. Having already started the research for this article, I knew the questions to ask. My forecaster had been in the business since the 1940s, and had been trained by the US Army. He had no Eglin observations or forecasts. He had no charts. He *did* have a satellite shot which was 4 hours old. Our estimated time en route was 10 hours. His brief was based on the old satellite shot and observations from fields surrounding Eglin, most of which were 20 to 40 miles farther inland. Topography was a definite player — sea fog at time of arrival would differ greatly between Eglin and those surrounding fields.

Know your inputs. *Ask*.

Once airborne, continue to help yourself. Use your Pilot to Metro Service (PMSV). AFM 51-12, Vol II, directs the "PMSV will be used to the maximum to update forecasts and obtain latest weather observations." It goes on to point out "Worldwide PMSV facility locations, frequencies, and instructions are published in the appropriate en route supplement." Whether you have HF, UHF, VHF, FM, or any combination thereof; once airborne, and throughout the flight, keep up to date on the weather. This is all the more critical should the inputs to your Dash-1 be few, marginal, or otherwise suspect — as was the case with the mishap C-130. That C-130 arrived at destination, got surprised by the weather, and did not have enough fuel to divert to the filed alternate.

Lastly, help the weather folks help us. Give them time to prepare the brief, call early, and be specific with requests. A point much emphasized by the weather folks with whom I worked on this article was the PIREP. Put simply, *they want them*. AFR 60-16, General Flight Rules, states "Pilots are urged to make weather reports of all weather elements whenever possible. Report hazardous weather immediately." Do so.

Predicting the weather is a tough job. The professionals in weather shops around the world do the best they can with the inputs they have available. *Know* those inputs. *Ask*. Make your *own judgement* on the 175-1. Help the weather folks help us. Give them adequate and specific notice of your request. Give PIREPs. Once airborne, keep yourself up to date. Have a safe flight, and *arrive alive*. ■

At some departure points, your weather briefing may come by closed circuit television. Well planned questions will ensure you know what you're getting into.

Safety Warrior

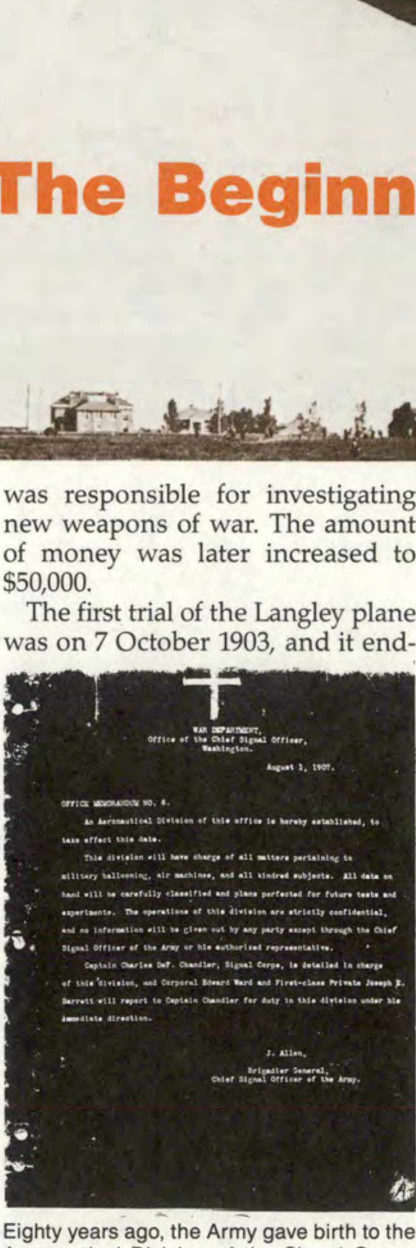
In The Beginning

LT COL JIMMIE D. MARTIN

■ In September of this year, the US Air Force will celebrate its 40th anniversary. In honor of this great event, "Safety Warrior" will feature a series of articles tracing the history of the Air Force. Of course, to do this we have to go back much farther than the official birth of the Air Force in 1947. I chose not to begin with balloons and gliders because of limited time and space for this series. So, we will begin with the first aircraft purchased by the US Army.

For many years, Samuel P. Langley, Secretary of the Smithsonian Institution, claimed to have invented the first aircraft capable of powered flight. After he had successfully built and flown several steam powered models, he began work on a full-sized aircraft. In 1898, the US War Department's Board of Ordnance and Fortifications recommended he receive $25,000 to continue his experiments. This board was responsible for investigating new weapons of war. The amount of money was later increased to $50,000.

The first trial of the Langley plane was on 7 October 1903, and it ended in failure when the front guy post caught on the launcher and caused the craft to crash 50 feet from the launcher. The second trial also failed when the rear wings and rudder were broken before the craft cleared the launcher. The Board of Ordnance and Fortifications refused to invest any more money in the project, and it was abandoned.



WAR DEPARTMENT,
Office of the Chief Signal Officer,
Washington.

August 1, 1907.

OFFICE MEMORANDUM NO. 6.

An Aeronautical Division of this office is hereby established, to take effect this date.

This division will have charge of all matters pertaining to military ballooning, air machines, and all kindred subjects. All data on hand will be carefully classified and plans perfected for future tests and experiments. The operations of this division are strictly confidential, and no information will be given out by any party except through the Chief Signal Officer of the Army or his authorized representative.

Captain Charles DeF. Chandler, Signal Corps, is detailed in charge of this division, and Corporal Edward Ward and First-class Private Joseph E. Barrett will report to Captain Chandler for duty in this division under his immediate direction.

J. Allen,
Brigadier General,
Chief Signal Officer of the Army.

Eighty years ago, the Army gave birth to the Aeronautical Division of the Signal Corps. Forty years later its descendant, the Air Force, was born.

The Langley machine was placed in the Smithsonian and labeled, "the first heavier-than-air machine capable of flight." Glenn Curtiss flew the Langley machine in 1914, but he made several structural changes before flying it. Since the plane never flew in its original form, the Smithsonian was finally forced to remove the label in 1914.

Meanwhile, without fanfare or monetary support, two bicycle builders in Dayton, Ohio, continued their experiments. The Wright brothers, Orville and Wilbur, had been interested in the possibility of flying for many years. They began with kites, progressed to gliders,

continued

Safety Warrior

In The Beginning

continued

On 17 December 1903, the Wright Brothers finally accomplished what had eluded so many others — powered flight in a heavier-than-air machine.

and finally reached powered flight.

On 17 December 1903, Orville Wright became the first man to fly in a power-driven, heavier-than-air machine. Throughout the next year, the Wright brothers continued to improve their aircraft and their own flying skills. They received very little public recognition for their feat. In fact, most members of the press and the public didn't believe the brothers had actually succeeded in flying.

Late in 1904, the Wright brothers were approached by representatives from Great Britain and asked to name a price for their aircraft. But, the brothers preferred to give first priority to the US government. So, on 18 January 1905, they wrote a letter to Congressman R.M. Nevin of the Dayton district telling him what they had accomplished and offering their invention to the United States.

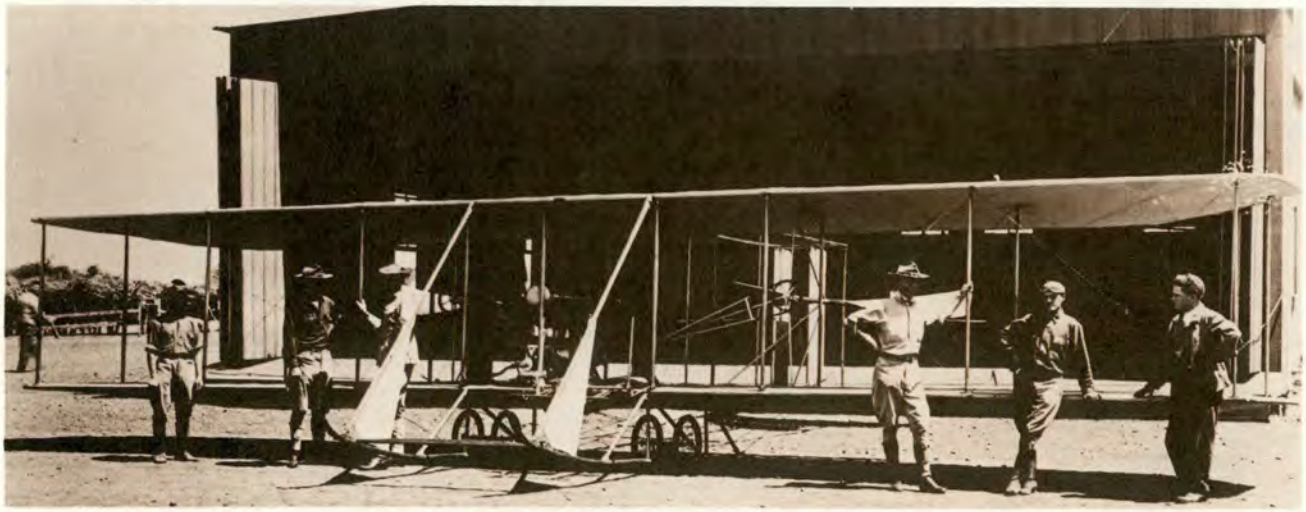
Congressman Nevin passed the Wright's offer on to the War Department and the Ordnance and Fortifications Board. The President of the board, Major General G.L. Gillespie, sent the congressman a form letter stating " . . . the Board has found it necessary to decline to make allotments for the experimental development of devices for mechanical flight. . . ."

They obviously didn't believe the Wright brothers' claim. No doubt, the board members were influenced by the loss of $50,000 in the unsuccessful Langley trials. The Army was still being criticized by Congress and the press for this "waste of money."

In October 1905, the Wright brothers wrote to the Secretary of War and repeated their offer. Once again they received basically the same reply from the Board of Ordnance and Fortifications. The Wrights then wrote to the Board and said they didn't want any money and asked the Board to specify the performance requirements they would require for a flying machine.

The Board considered the Wright's offer and their response was " . . . the Board does not care to formulate any requirements for the performance of a flying machine or to take any further action on the subject until a machine is produced which by actual operation is shown to be able to produce horizontal flight and to carry an operator." Ah, bureaucrats, where would we be without them?

The Wrights gave up the effort to sell their aircraft to the Army and began negotiations with the British and French government representatives who had come to see the aircraft for themselves. The invention was finally brought to the attention of President Theodore Roosevelt early in 1907 by members of the Aero Club of America. The President ordered William H. Taft, Secretary of War, to investigate, and the



The Wright Model B included changes such as wheels, a rear-mounted elevator, and improved flight controls.

Wrights were contacted in May of 1907.

It was on 1 August 1907, that the forerunner of the Air Force came into being. Brigadier General James Allen, Chief of the Signal Corps, issued a memo establishing an Aeronautical Division. The memo stated in part, "This division will have charge of all matters pertaining to military ballooning, air machines, and all kindred subjects." The division consisted of three men — Captain Charles Chandler, Corporal Edward Ward, and First Class Private Joseph Barrett. Apparently Private Barrett was not an aviation enthusiast because he deserted soon after his assignment to the division.

Although the division was primarily involved in balloons and dirigibles, on 23 December 1907, General Allen issued Specification No. 486 of a heavier-than-air flying machine and asked for bids. The specifications were pretty simple by today's standards, but many people considered them totally unreasonable because they thought no one had even built an aircraft that could fly. The requirements were:

- Must be able to be assembled in about one hour and capable of quick disassembly for transporting in Army wagons.
- Capable of taking off in any country and landing undamaged in any field without requiring a specially prepared spot.
- Carry 2 persons of combined weight of 350 pounds with sufficient fuel for a flight of 125 miles and should have a speed of 40 miles an hour.
- Have a simple and transportable starting device and be capable of a safe descent in case of an accident to the propelling machinery.
- Sufficiently simple to permit an intelligent man to become proficient in its use in a reasonable length of time.

The price quoted would include instruction of two men.

In spite of predictions there would be no bidders, there were three successful bidders. However, only the Wright brothers succeeded in actually producing a flyable aircraft. On 20 August 1908, Orville Wright delivered the first Army aircraft at Fort Myer, Virginia. Wilbur Wright was abroad at this time giving demonstrations, so Orville performed all the trial flights.

Lt T.D. Milling, Orville Wright, and Lt Henry H. Arnold at College Park. Milling and Arnold are wearing the latest in flight clothing while Orville is wearing his traditional "flight suit."

The first flight of the new Army aircraft was on 3 September, and less than a thousand people were on hand to see it. But the following day many thousands showed up, and the newspapers and general public finally accepted the fact that powered flight was a reality.

The final flight in the trials resulted in the first Army aviation mishap. Lieutenant Thomas E. Selfridge was flying as a passenger with Orville Wright. After they had been airborne about 3 or 4 minutes, the aircraft suddenly nosed over and crashed at a steep angle. Lieutenant Selfridge was fatally injured and died several hours later. Orville was seriously injured and hospitalized for 7 weeks.

The Army ordered an investigation to learn the cause of the mishap. The investigation consisted of observing the remains of the crashed aircraft and taking witness statements. The board found a new, longer propeller contacted a rudder guy wire and eventually caused the wire to come out of its socket. This allowed the rudder to fold sideways and caused the loss of control.

On 27 June 1909, Wilbur and Orville resumed the acceptance trials with an improved version of their aircraft. The improvements included structural changes to ensure the propellers could not hit any guy wires. This time the trials were completed successfully, and the Wrights were awarded a \$5,000 bonus for achieving an average speed of 42½ miles per hour on the final trial. Signal Corps Airplane No. 1 was formally accepted on 2 August 1909.

Our modern military aircraft such as the B-1, C-5, F-15, and KC-10 have all developed from this first, simple flying machine delivered to the Army. In the same way, our modern, sophisticated mishap investigation procedures evolved from this first, simple investigation. Of course, the purpose of the investigation is to prevent the same type of mishap from happening again. Just as the Wright brothers used the results of the investigation to modify their aircraft, our mishap prevention efforts over the years have resulted in a steady decrease in the number of aircraft mishaps. ■

* Most of the material for this article came from *The United States Army Air Arm 1861 to 1917*, by Juliette Hennessy, Office of Air Force History.

tech topics

BLAST OFF!

■ After washing the T-37, the worker called for his supervisor who inspected the job, signed it off as accepted, and then departed the area. Now the worker was left without assistance to declutch the aircraft canopy, a procedure to ensure moisture would not cause the mechanism to malfunction.

Working alone, he stood outside the Tweet holding the canopy with his right hand and activated the declutch handle with his left hand. After reaching inside the aircraft and removing the initiator safety pin, he reached for the door that contained the declutch handle.

Inadvertently, the worker opened the panel door containing the canopy jettison handle (both panels are located side-by-side on the T-37 aircraft exterior) and pulled the lever that engages the initiator handle, jettisoning the canopy. Fortunately, the worker wasn't injured, and the canopy landed on the ramp 8 feet from the tail of the aircraft.

Investigation revealed the worker had not declutched a canopy since his initial "new guy" training during the T-37 crew chief FTD course one year prior. Granted, both access panels are yellow and located side-by-side but they have different markings.

Not only did the repair costs exceed $3,000, but the Air Force was deprived of the training capability of a T-37 aircraft for the time required to accomplish the repairs. This was certainly the hard way to learn where the correct access panel was located.

Such mishaps serve to remind us of the need to stop sometimes and ask for assistance. Regardless of how anxious we may be to do something simple like declutch a canopy, the time saved by taking the task for granted will certainly not compensate for the additional time spent in replacing an aircraft canopy and its explosives.

JOB CONSCIOUSNESS — THE LONG & SHORT OF IT

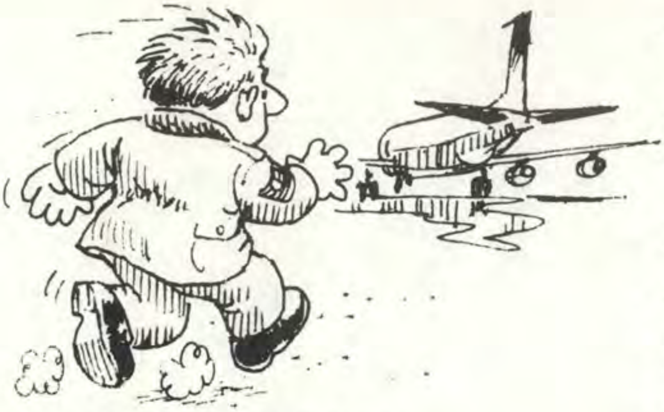
A routine F-15 basic postflight (BPO) inspection revealed impact damage to seven first-stage fan blades on the right engine. A borescope inspection uncovered further damage to the engine core module.

After the preliminary investigation indicated FOD by a threaded object, inspection of the Eagle revealed one screw was missing from panel 4R. That panel, along with four others surrounding the aircraft's windscreen, had been removed and reinstalled during a recent windscreen change.

A screw that is too long is obvious because the screwhead is not flush with the panel. However, a screw that is too short may seat and be properly torqued but it will not have a sufficient grip due to the reduced threading. An incorrect depth will allow screws to loosen due to airframe vibration. Seldom does the person who removed a panel install the same panel. It's usually someone working another shift. When you remove aircraft panels, are screw bags available to contain the screws for each panel? Are screws that require machinist removal or those that became unserviceable during removal either documented or immediately replaced with serviceable ones? Are the screw bags at the site labeled with panel number and number of screws? It sure helps if you're the person installing the panels!

Sometimes, when installing panels, we fail to consider the consequences of incorrect screw lengths. Job consciousness (self-discipline) is a necessary ingredient to good workmanship and safety. Think about it the next time you remove or install access panels.

tech topics



EXPECTING THE UNEXPECTED

Quick action, exhaustive investigating, and thorough reporting by the safety office at Plattsburgh AFB, NY, identified a potentially hazardous situation involving KC-135 ground refueling operations. The following paragraphs provide a brief synopsis of their superior efforts.

After the pit cart operator had transferred approximately 325 gallons of fuel to a KC-135 aircraft, the nozzle collar of the MH2B hose cart separated from the aircraft.

The pit cart operator quickly stopped the fuel flow, limiting the resultant fuel spill to only 5 gallons. Prior incidents similar to this have included one or more of the metal collar ears breaking off. However, this particular incident was the first time two metal ears were completely broken off and a third partly broken, causing the hose to completely separate from the aircraft.

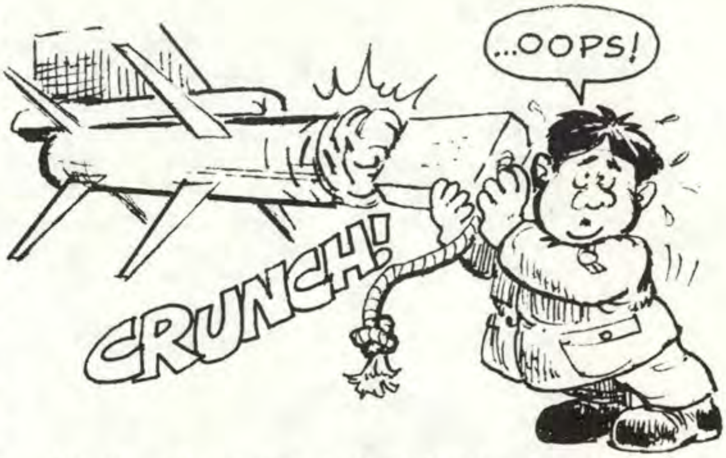
The nozzle collar is made of aluminum with steel inserts on the mating surface of each ear to reduce wear. It appears that the breaks are occurring in the area of the steel insert where aluminum thickness is dramatically reduced.

Investigation by the unit involved in this incident turned up an interesting finding. The breaks occurred on J.C. Carter D-1 nozzles, part number 6902, that had been repaired using nozzle collars of another manufacturer. The J.C. Carter collars have a raised five-digit casting number in the nozzle collar casting. The defective collars can be identified by a raised rectangle casted in the nozzle in the same location as the five-digit casting number on the J.C. Carter nozzles.

Since the failure of a pit cart nozzle during refueling presents a very real potential for loss of an aircraft and people, nozzle collars with the raised rectangle instead of the five-digit casting number should be removed from service until the defective collars are replaced with the proper J.C. Carter collars. Units are requested to take emergency local purchase action to obtain the proper J.C. Carter collars.

STUCK MISSILES

After the load crew was dispatched to download a captive AIM 9P missile from the F-16, they encountered difficulty in getting the missile to slide aft. The load crew chief discovered the missile launcher snubbers were not releasing and determined additional pressure was necessary to inch the missile aft. The No. 2 man then grabbed an aircraft chock and used it to apply constant pressure on the radome cover on the front of the missile. It worked! The additional pressure caused the launcher snubbers to release, but when the load crew chief removed the missile cover, he found the missile radome and seeker head damaged to the tune of $3,400.



Here's another incident. An AIM 9P umbilical was torn from the missile during a recent downloading operation. During unload of the missile from Station 1 of an F-16, the load crew experienced excessive resistance which they chose to ignore. By forcing the missile, the umbilical roll pin contacted the missile launcher rail, damaging the guidance unit with attached motor and five female pins.

Both of these mishaps could have been prevented if the load crews had halted their operations when undue resistance was encountered and obtained assistance from the armament systems shop personnel. Sometimes, an extra pair of eyes can assess the situation and provide the technical assistance to get those stuck missiles off their aircraft launchers.

These are only two examples of stuck missiles and the mishap potential involved. They are mentioned here to show it can happen to the best of us. The moral is simple. Armanent systems personnel are assigned for a reason, so use them. Don't depend on undue force to get the job done. Our missiles are far too expensive for anyone to use aircraft chocks for additional pressure. ■

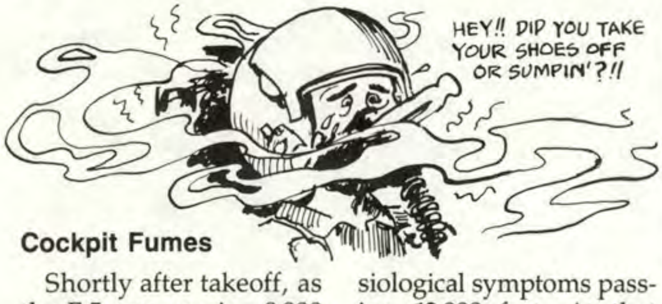
OPS TOPICS

Falling Seats

■ During takeoff roll in a C-130, two troop seat center support beams came loose and fell on the loadmaster. He was struck on the leg and head and required emergency room treatment for a scalp laceration.

Each troop seat beam has two attachment studs which are anchored in a hole by a wedjit assembly. Maintenance found the wedjit assembly shutters were bent. This allowed the support beams to vibrate out of their mounting brackets and fall. Similar problems with the troop seat center support beams and storage brackets have occurred before.

Be aware of this recurring problem, and check those brackets carefully before flying. You could prevent a serious injury.



Cockpit Fumes

Shortly after takeoff, as the F-5 was passing 8,000 feet MSL, the instructor pilot (IP) in the rear cockpit detected noxious fumes in his cockpit. The fumes stung his eyes and caused them to tear. They also made breathing difficult. The IP selected 100 percent oxygen which alleviated the breathing problem.

The climb continued until the front cockpit pilot experienced the same noxious fumes and physiological symptoms passing 13,000 feet. At that time, the IP assumed control of the aircraft, directed the other pilot to select 100 percent oxygen, and began an emergency descent. At 7,500 feet, they dumped cabin pressure and continued to an uneventful landing.

The cause of the fumes is still being investigated, but there is an important lesson here for all crewmembers. When the IP first encountered the fumes, he selected 100 percent oxygen, but didn't terminate the mission. It wasn't until 5,000 feet later when the other pilot developed the same symptoms that the IP finally decided to call it quits. Physiological problems are not something you try to "tough out." Terminate the mission and you'll be around to fly it another day.

Alert Controller

A C-141 had been cleared for a VOR approach and was about 4 miles from the VOR station at 5,000 feet when the GCA controller issued a traffic warning, "11 o'clock, 2 to 3 miles westbound, altitude unknown." The controller then looked at the PAR scope to pinpoint the altitude of the VFR traffic. By the time the target appeared on the PAR scope, it was 12 o'clock to the C-141, same altitude, one mile.

The controller issued a traffic alert to the C-141 with instructions to climb immediately. The pilot of the C-141 started an abrupt climb while asking the controller to repeat the instructions. The controller repeated, "Traffic alert, climb at least 300 feet immediately." Just after the alert was repeated, the flight engineer saw a glider pass just below the C-141. The glider had been co-altitude and on a collision course. The C-141 crew said a midair was highly likely if the controller had not detected the traffic and issued the alert.

This is a good example of doing the job correctly. The controller didn't just tell the C-141 about the traffic and leave it alone. The controller used all available equipment to more clearly define the threat and then gave positive instructions to prevent a possible disaster.

When given the climb instructions, the pilot of the C-141 started an immediate climb while asking for clarification. If the pilot had delayed the climb until the second transmission, it probably would have been too late to avoid the midair.

Good heads-up action by all involved in this incident. ■

☆U.S. GOVERNMENT PRINTING OFFICE: 1987 — 779-045/40005

UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

CAPTAIN
Philip A. Oppenheimer

FIRST LIEUTENANT
Paul A. Madsen

24th Composite Wing

■ On 30 January 1986, Captain Oppenheimer and Lieutenant Madsen were No. 2 on a close-air support training mission in an OA-37B. Five minutes after takeoff, while maneuvering at 500 feet in tactical formation, their aircraft struck a 4 to 6 pound turkey vulture on the leading edge of their right wing.

Captain Oppenheimer started an immediate climb while transmitting "knock-it-off." As the aircraft climbed, he noticed moderate buffet due to heavy leading edge wing damage and the large carcass which had remained on the wing interrupting airflow over the aileron. Any movement of the carcass caused a change of airflow over the aileron resulting in changing flying qualities.

After reaching 7,000 feet MSL, Captain Oppenheimer began to dump fuel while he and Lieutenant Madsen reviewed the controllability check procedures. The flight leader checked for other visible damage, found none, and initiated coordination with the SOF. Captain Oppenheimer began the controllability check and found his minimum controllable airspeed was 190 knots with severe buffet and an uncommanded right roll.

A climb to 17,000 feet MSL was immediately initiated since uncontrolled ejection became a very real possibility. At 17,000 feet, Captain Oppenheimer tried, unsuccessfully, to free the carcass by applying both positive and negative G and by accelerating the aircraft.

As the airspeed passed 220 knots, the pilots experienced severe airframe buffet and an uncommanded right roll. The fuel line from the right pylon wing tank had been crushed preventing fuel transfer and causing an imbalance of over 1,200 pounds which was unknown to the pilots since pylon fuel cannot be monitored. Captain Oppenheimer held full left stick and rudder to maintain aircraft control.

Landing under these conditions was impossible. Lieutenant Madsen reviewed emergency procedures and coordinated intended actions with the chase ship and the SOF. In coordination with the chase IP, SOF, and DO, Captain Oppenheimer decided to selectively jettison stores to increase aircraft control and found the new minimum control speed was 110 knots, but moderate aircraft buffet still existed. The crew selected a 130-knot final approach speed and executed a flawless straight-in approach and landing. Postflight inspection revealed part of the bird had hit and cracked the right aileron which accounted for the severe in-flight vibration.

The outstanding airmanship and professional flying skill of Captain Oppenheimer and Lieutenant Madsen enabled them to save a valuable aircraft. WELL DONE! ■

HYPOTHERMIA
CAN STOP YOU

C O L D