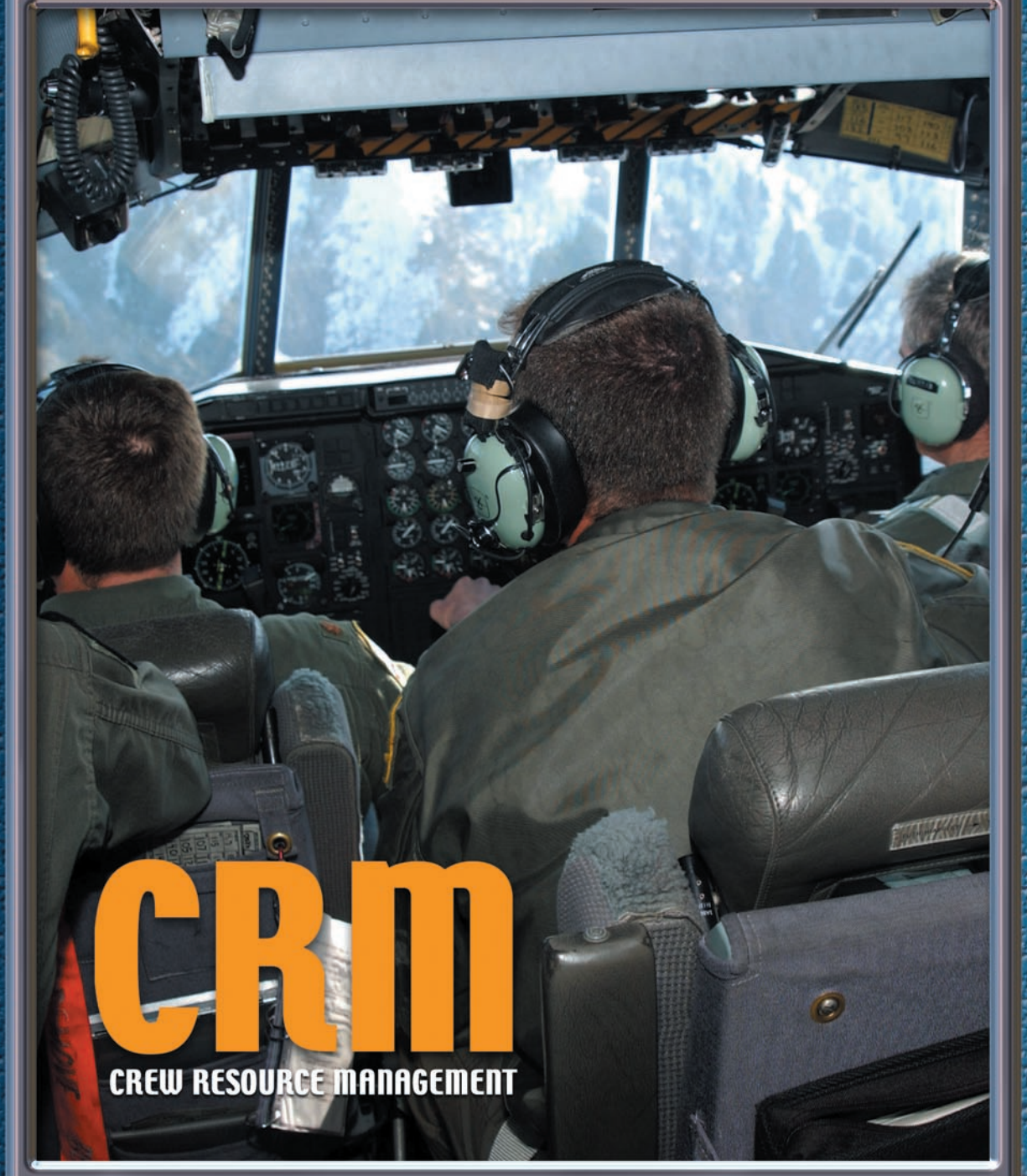
UNITED STATES AIR FORCE
FSM
FLYING SAFETY MAGAZINE
JUL 2005



CRM

CREW RESOURCE MANAGEMENT

FSM
FLYING SAFETY MAGAZINE

AIR FORCE RECURRING PUBLICATION 91-1

contents

Cover: USAF Photo by MSgt Kim Allain
Rear Cover: USAF Photo by SSgt Lee A. Osberry Jr.
Photo Illustration by Dan Harman

U.S. AIR FORCE

Flying Safety Magazine on line: http://afsafety.af.mil/magazine/htdocs/fsmfirst.htm

JULY 2005, VOL 61 NO 6 U.S. GOVERNMENT PRINTING OFFICE 2005-773-482-53088

MESSAGE FROM THE CHIEF of SAFETY

America's continuing battle against terrorism has necessitated many changes in how we do business in the Air Force, and at the Air Force Safety Center. One of these is that *Flying Safety* is adjusting its publishing schedule to bi-monthly. This change will enable us to expand our safety outreach using electronic media and the web.

If you've visited our Web site at http://afsafety.af.mil/, you've seen our archived editions of *Flying Safety*, *Road & Rec* and *Weapons Journal*, and our sets of downloadable flight and ground safety posters. Expect to see some exciting changes there in the upcoming months.

One thing we are planning is to make our site a repository for safety stories, which will be available for download. To make this effort a success, we still need your input. Your first-person experiences are a great tool for teaching Airmen to have an increased safety consciousness. If you have a good story, send it to *Flying Safety's* editor at jerry.rood@kirtland.af.mil.

In the meantime, you will continue to see *Flying Safety* every other month. Thanks for your interest, and thanks for keeping your Air Force the best and safest in the world. ✶✶

Maj Gen Lee McFann

DEPARTMENT OF THE AIR FORCE — THE CHIEF OF SAFETY, USAF

PURPOSE — ***Flying Safety*** is published monthly to promote aircraft mishap prevention. 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. The contents of this magazine are not directive and should not be construed as instructions, technical orders, or directives unless so stated. SUBSCRIPTIONS — For sale by the Superintendent of Documents, PO Box 371954, Pittsburgh PA 15250-7954. REPRINTS — Air Force organizations may reprint articles from *Flying Safety* without further authorization. Non-Air Force organizations must advise the Managing Editor of the intended use of the material prior to reprinting. Such action will ensure complete accuracy of material amended in light of most recent developments.

DISTRIBUTION — One copy for each three aircrew members and one copy for each six maintainers and aircrew support personnel.

POSTAL INFORMATION — ***Flying Safety*** (ISSN 00279-9308) is published monthly except combined Jan/Feb issue by HQ AFSC/SEMM, 9700 G Avenue, SE, Kirtland AFB NM 87117-5670. Periodicals postage paid at Albuquerque NM and additional mailing offices. **POSTMASTER:** Send address changes to ***Flying Safety***, 9700 G Avenue, SE, Kirtland AFB NM 87117-5670.

CONTRIBUTIONS — Contributions are welcome as are comments and criticism. The editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

Commercial Prefix (505) 846-XXXX

E-Mail — jerry.rood@kirtland.af.mil
Address Changes — patricia.rideout@kirtland.af.mil

24-hour fax: DSN 246-0931

HQ Air Force Safety Center web page: http://afsafety.af.mil/
***Flying Safety Magazine* on line: http://afsafety.af.mil/magazine/htdocs/fsmfirst.htm**

It's A Life Saver

CAPT JOSEPH F. OSBORNE
960 AACS/SE
Tinker AFB, OK

A little over 30 years ago, Eastern Airlines Flight 401 crashed in the Florida Everglades, killing 103 passengers. There are a multitude of reasons for this incident, but one is certainly a lack of proper Crew Resource Management (CRM). Amazingly, the crew was fixated on a burned-out light bulb which indicated whether the landing gear was down and locked. What they did not notice was a 200 FPM rate of descent.

That is tragic, but what does this matter to the single-seat F-16 driver or an AWACS crew? The short answer is CRM can save your life no matter what you fly. I was aboard an aircraft where the Eastern Airlines scenario began to play out…but we were *lucky* enough to recognize our fixation almost immediately through proper use of CRM. Once we saw our problem, we took corrective action before it ended in another tragedy. I will detail my crew's situation later, but ask yourself: Would you be as fortunate?

Pure and simple, no matter who you are, no matter what you fly, CRM is a vital part of operations in today's Air Force. You need to understand how to incorporate it into your daily flights. Now, I can bore you by quoting AFI 11-290, *Cockpit/Crew Resource Management Training Program*, and tell you the definition of CRM is "The effective use of all available resources—people, weapon systems, facilities, and equipment, and environment—by individuals or crews to safely and efficiently accomplish an assigned mission or task." But I won't do that to you. OK, so I did; but did you really know the full definition before now? CRM is not the most interesting of subjects, but it is something that, if you pay attention to it, could *save your life*!

For the single-seat folks out there reading this, who can you use to increase CRM? It is not as if you can look to your right and ask the copilot his or her opinion on a flight issue. Part of the definition of CRM includes the folks you speak with; it specifically says "facilities." If you have a problem on approach, talk with Approach Control! I am not saying every time you land you should have a session of 20 questions with Approach, but if you have a problem or there is some confusion, know that they are there to help you. Say it with me, *help you*. Yes, even a single-seat pilot such as you needs a little (just a little) help every now and then.

Another example would be if you were flying in a two-ship and you noticed you had a slight hydraulic malfunction. You begin to troubleshoot the problem yourself, but are out of ideas. Calling the other member of the two-ship formation would be a perfect use of CRM. Sure, they are not on your "crew," but they certainly might be able to help you through your problem.

USAF Photo by SSgt Bethann Caporaletti
Photo Illustration by Dan Harman

For you multi-place folks who are still with me, what can you do to help increase CRM? Well, for one, you could *listen*. If someone on your crew has an input, listen to them. It may not seem like a big deal, but if you shut down your fellow crewmembers, they may not be as likely to speak up with a great idea when it truly counts. Positive transfer of control of the aircraft and radios is another area of CRM which multi-place aircrews often overlook. I can tell you, on a flight lasting over 16 hours in duration, I have heard the pilots ask, "Who's flying the jet?" This type of incident is mainly brought about by fatigue, but that is *exactly* the scenario that CRM concepts are designed to resolve.

The Air Force, through AFI 11-290, defines its CRM program goals as, "Maximize operational effectiveness and combat capability" and "Preserve Air Force personnel and material resources." It is exceptionally easy to fall into a rut, especially on a long mission, and stop working at top performance levels. This is where you just cannot overstate the importance of CRM.

An example from my own experience: Early in my flying career, the crew I was with had a landing gear light which would not illuminate while we were in the pattern. After pulling out the indicator, the pilot, copilot, flight engineer and I (the navigator) briefly stopped paying attention to the job of flying the aircraft, and instead fixated on swapping out the light bulbs. All of us were momentarily concerned with finding a way to pull out the old bulb, which was stuck in the indicator—until the pilot recognized our problem. Almost immediately, the pilot realized we were not doing our primary duties, and told the copilot to continue to fix the bulb, the flight engineer to listen to the radios, and me to continue to keep an eye out for traffic as he flew the aircraft. This simple delegation of tasks helped us regain our situational awareness, replace the burned out bulb, and land without incident.

Crew Resource Management is a topic all flyers become intimately familiar with through required training. Most airframes also cover CRM as a part of their mission planning or briefing topics. But for some reason, some aircrew members do not take the CRM lessons to heart. Stop by your squadron's safety office and ask them to refresh you on the principles of CRM. Look at your squadron's copy of the Blue Four News and ask yourself how many of the mishaps could have been avoided, or at least minimized, through effective CRM use. The next time you fly, think about your actions, the scenarios you will be in, and if you could mitigate any potential problems by using CRM properly.

Be part of the solution, not part of the problem. Take CRM lessons to heart, and use them in your day-to-day flying operations.

The Good, The Bad and The Extremely Lucky

A Bird's Eye View of CRM

USAF Photos by SSgt Matthew Hannen and William M. Plate Jr.
Photo Illustration by Dan Harman

ANONYMOUS

Most aircrew members believe they have the crew resource management (CRM) tools necessary to fly their particular aircraft. However, the following experience happened to a crew with an aircraft commander (AC) with over 3500 hours, a copilot (CP) with 400 hours, a navigator (NAV) with 700 hours and an instructor flight engineer (IFE) with 3000 hours.

In the morning, the flight deck members attended a weather brief at base operations. The weather at the home base was above the required minimums for designating an alternate, and there was a forecast for showers in the vicinity. The AC had been instructed on a takeoff time and informed to fly direct from the divert base to the home station. During the before start checklist, the AC said he was tired and asked the CP to watch him because he was up late the night before, thinking about the squadron questioning his divert actions. The CP noticed the AC seemed tired and anxious because the AC chose to take things slowly and re-confirmed checklist steps more than normal.

During the climbout from the divert base, air traffic control (ATC) thought they were on an eastbound flight plan and vectored them accordingly. The crew was confused with ATC's vector and informed ATC that their intended flight plan was northbound. ATC then cleared the crew direct to a point to the north of their position. The CP heard the clearance as being cleared direct to a point, while the AC understood it as being cleared to intercept a jet route into that point. The AC took over the jet and turned to a heading that would intercept the jet route to the east of the point. The CP informed the AC of the difference in clearance interpretation. After all the confusion was over with, ATC cleared them direct to a point. The AC then made an enormous turn direct to the point.

About 120 miles from the home station, the crew performed the appropriate checklists items and approach briefing for recovery to the home station. The CP briefed an ILS instrument approach via radar vectors, and the crew confirmed all information was briefed correctly. Because the home station had low ceilings and rain showers in the area, the ILS was the most appropriate approach. They received continuous weather updates to review their options. The AC commented on being scrutinized on the previous day's decision and said, "I'm scared to make any decisions at the moment." The NAV joked, "Copy, the pilot's scared."

As the crew approached the final portion of their descent into their home station, the weather radar detected weather to the north of the field. At that moment, the AC began talk of flying a different approach. The CP told the AC he wasn't comfortable flying the suggested approach and would be more comfortable flying the briefed ILS. The suggested approach hadn't been flown by any crewmember on the aircraft, and no one on the crew except the AC was comfortable flying the circling approach, especially when a precision approach was available in less than perfect weather. The crew continued with vectors to the ILS, which brought them in from the southeast. The final approach course had them fly inbound from the north. On radar downwind and east of the field, the weather radar detected a small red dot about 9-10 miles north of the field. The AC became concerned with the weather north of the field. The NAV told the AC it looked like heavy showers. The CP suggested getting short vectors inside the weather because the final approach fix (FAF) was seven miles from the showers. The CP, with 400 hours, was inexperienced and had never been presented with this situation. The AC decided he would fly the VOR circling approach and told the CP to request it.

Air traffic control turned them on a vector towards final for the VOR approach. The AC began a quick brief for the VOR circling approach…no one, including the AC, was ready for it. Prior to rolling out on the given heading, the AC took the aircraft and said, "I'll do this approach!" The CP, angry with the AC, was still trying to catch up with the situation. Upon flying down to their minimum decision altitude (MDA), they broke out of the weather prior to their missed approach point. The weather over the approach end was below circling minimums, and they began to go in and out of the clouds. At this point the crew expected the AC to call and commence a missed approach. However, to the surprise of the crew, the AC began a descent to "duck under" the weather.

The CP had looked out the window prior to entering the weather and noticed excessive ground rush. The crew told the AC they couldn't see the runway. The CP had partial visual reference of the ground directly below, but couldn't see the landing environment. The CP suggested, "I think we should go missed approach." The AC continued to "duck under" the weather to acquire the runway. The CP then said the AC's name, followed by, "We're at 200 AGL and I can't see the runway." The AC continued the descent and asked the CP to dial up the ILS for course guidance. Finally, the CP told the AC to go missed approach. The AC then said, "All right, we're going to do the missed approach."

The crew started to climb and began to encounter difficulty in climbing. The NAV alerted the AC that they were in a descent and the airspeed was decreasing. "We need to climb and we're slow," the CP said. The stress levels were high on the flight deck. The instructor engineer instructed the student engineer to give the AC more power. ATC said, "We need you at 4000 feet to avoid the towers." Due to the quick approach brief, the crew didn't realize they were flying the missed approach incorrectly and were heading directly towards some towers.

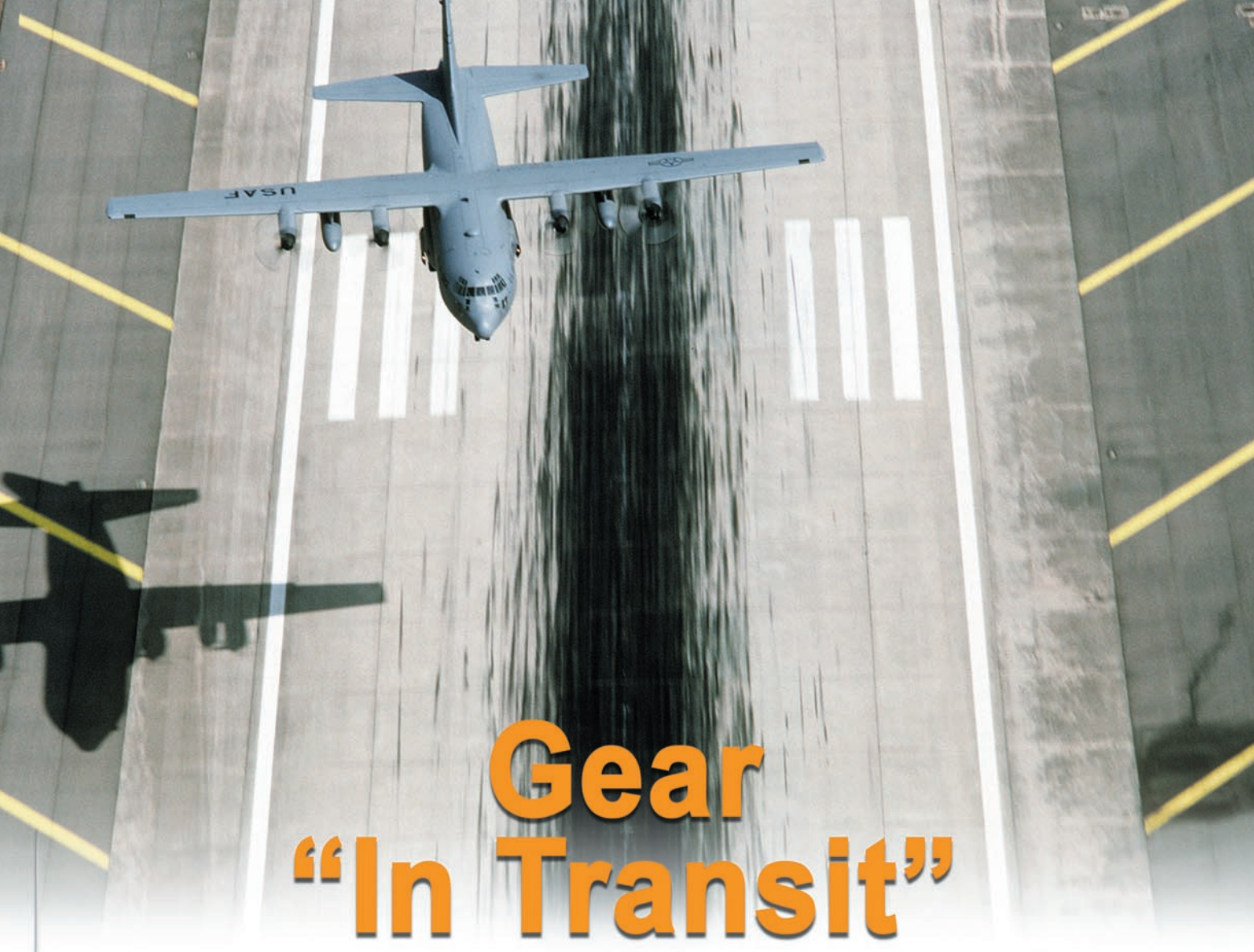
They finally achieved 4000 feet and discussed as a crew the problem that arose on the flight deck. They realized that they didn't have a thorough approach brief, coupled with a low-level wind shear. After all was said and done, the crew successfully landed the aircraft back at the home station. After landing, the crew was informed the VOR approach was considered a VMC training approach and circling was not permitted.

This is what the crew determined were CRM issues:

- First, the crew believed they should have stayed on the ground and taken the next day off because of the AC's sleep cycle. (The AC had broken crew rest. During his crew rest he was coordinating with higher supervision about his divert on the previous day…wondering what they thought of his decision. It worried him so much that he didn't get any sleep.)
- Second, there was only one option when flying back into the home station which the crew decided could have helped deal with the weather to the north. They could have gone into holding and waited for the weather to pass.
- Third, the crew realized they made a mistake not knowing that the VOR approach is a VMC-only approach for training, and that they were extremely lucky they didn't hit any towers.

How many times have you said or heard someone else say, "That would never happen to me!" How many of you would have said to go missed approach? How many of you sometimes have "get-home-it is?"

This is just one account of CRM. These situations occur daily…and many people just shrug it off as "The Standard." Don't be the one to fall into that group and quite possibly become a statistic.



Gear "In Transit"

CAPT WENDY B. RUFFNER
16 SOS/DOFB
Hurlburt Field, FL

USAF Photo

During the ninth hour of their crew duty day, the crew of Spectre 61 (AC-130H) took off from MacDill AFB, FL at about 1915L with 37,000 pounds of fuel and four maintainers on board for the return to Hurlburt Field. Shortly after raising the landing gear lever, MacDill tower told the crew, "One of your landing gear appears to still be down."

Cockpit indications were consistent with this statement, and in fact, the crew had already begun to analyze the malfunction. Thinking quickly, the copilot (CP) contacted Air Traffic Control and requested a climb to 7000 feet MSL and holding airspace over the Gulf of Mexico. The crew then continued to troubleshoot the malfunction. Although the handle had gone up and the Nose Landing Gear (NLG) and left Main Landing Gear (MLG) indicated up, the right MLG still indicated "in transit."

After consulting the flight manual, the flight engineer (FE) recommended that the crew attempt to obtain a "down and locked" condition on all three landing gear. The CP agreed, lowered the gear, and all three cockpit indicators showed "down and locked." The FE proceeded to the cargo compartment and confirmed the position of the gear by observing that the ball nuts were contacting the bumper stops on the right side in accordance with published procedures. Although holding just to the west of a useable runway, the crew wisely chose to proceed back to Hurlburt, with the landing gear down, to avoid the thunderstorms closing in on MacDill.

The crew had two Center Weather Advisories on hand which confirmed that MacDill and most of north and central Florida would be unacceptable for divert purposes. While still in the MacDill

area, the navigator and the electronic warfare officer (EWO) worked the command post frequency to relay critical information about the nature of the emergency and the intentions of the crew. The EWO requested that this information be relayed to the Hurlburt Command Post. The CP declared an emergency with ATC (Tampa Approach) and coordinated for the most direct routing back to Hurlburt Field. Once the risk of hazardous weather had been mitigated, the pilot and CP divided the numerous tasks still facing the crew before touchdown. The pilot remained at the controls through the remainder of the climb and engaged the autopilot once level, further reducing the crew's workload. Backed-up by the rest of the crewmembers on the flight deck, the pilot watched the airspeed indicator to prevent an overspeed of the landing gear, which might have further aggravated the damage.

The FE again returned to the cargo compartment to re-inspect the landing gear. The loadmaster (LM) elected to inspect the landing gear from the rear observation bubble for a better idea on the gear's condition. One of the maintenance troops on board (sensor maintenance) attempted to inspect the landing gear using the airplane's on-board infrared (IR) sensor. Unfortunately, the landing gear was outside the field of view of the IR sensor.

In the waning minutes of daylight that remained, the LM and FE inspections revealed the emergency was far more complicated than originally thought. The LM said the right main rear tire appeared to be hanging sideways, several feet below the right main front tire. The FE also observed this condition from the rear bubble. The crew then discussed the various options for landing, the systems, and the tools at their disposal. Although this emergency is not listed in the flight manual, the FE drew from his knowledge and experience. He also read information readily available to him with the publications he carried on board. Through critical thinking, the FE was able to make vital inputs to ensure the safest landing gear configuration. The CP recommended retracting and elevating the guns to preclude them from impacting the runway surface upon landing if the gear collapsed. The crew agreed and immediately retracted the guns inside for safety.

The pilot recalled a similar emergency at Dyess AFB, TX, where the crew had elected to leave the gear down and locked, dragging the flailing tire while the front right main tire held up the entire right side. This technique had worked quite well for that crew, resulting in minimal damage to the airplane. The EWO recommended holding over Hurlburt, requesting an airborne inspection from a Gunship or Talon with their visual sensors. This would clarify their condition with more fidelity. The crew decided that a gear-down landing would form the core of their plan and thus proceeded to handle the numerous administrative tasks required to recover the airplane.

Although the CP had been flying in the right seat to facilitate first pilot training for the Pilot, the CP decided that he, as the more experienced of the two pilots, should make the landing from the left seat. To achieve this, the crew coordinated and accomplished a double-seat swap. The EWO sat in the right seat watching the controls while both pilots swapped seats.

After the seat swap, the crew made good use of their en route time remaining (about 45 minutes) to continue planning for the approach and landing. Upon arrival, the navigator would assume airspace monitoring and ATC radio duties. The CP would fly the plane and back up the navigator on the radios while the pilot spoke with command post and the other aircraft. Once the other aircraft were in position, the EWO would take the command post frequency, leaving the pilot to focus on the airborne diagnosis of the problem. The FE, LM, and lead gunner (LG) would work in concert to prepare the cargo compartment, securing all loose articles and bags. Once established in holding over Hurlburt, the crew accomplished their assigned tasks as briefed.

Fortunately, Spooky 42 (AC-130U) was already airborne and volunteered to inspect Spectre 61. Spooky 42 maintained 9000 feet MSL and rejoined on the right. Using their IR sensor, Spooky 42 confirmed what the loadmaster and engineer had already observed; the position of the rear wheel was 90 degrees out of its normal plane of rotation. The wheel was uselessly floating sideways in the slipstream, attached to the aircraft by nothing more than the torque strut between the two wheels. With this external confirmation of the situation, the crew decided to immediately shift holding airspace further south over the Gulf of Mexico. This action safeguarded ground personnel at the base and civilians living near the base, in the event that the rear wheel departed the aircraft. It also provided the correct airspace for dumping fuel, should it be required.

Spooky 42 proceeded south with Spectre 61 for a closer inspection. This second inspection revealed that the rear wheel was indeed perpendicular to the front wheel (i.e., flat) and that the front wheel, having been twisted by the flailing rear wheel, had now been canted about 20 degrees towards the No. 4 engine. Spooky 42 relayed all the same information to Hurlburt Command Post and landed to provide the video of the inspection to the Wing Crisis Action Team. Spectre 61 continued to hold over the Gulf, preparing for the approach and landing. This inspection absolutely eliminated any possibility of raising the gear for a gear-up landing. The damaged right MLG was configured such

that a successful retraction was highly unlikely—although the left MLG and the NLG would come up, the right MLG would remain in some other unsafe condition, causing extensive damage to the left side of the airplane upon landing, including a No. 1 propeller strike and catastrophic damage to both engines. Therefore, the best option was to leave the gear down in the hope that the right front main wheel held and the right rear main wheel did not damage it.

Meanwhile, aft of Flight Station 245, the LM, FE, and LG were extremely busy preparing the aircraft for landing. All three worked to install the emergency landing gear tie-down fixtures, reinforcing the front struts for landing. The retraction of the No. 6 gun barrel is an extremely arduous two-man task that the LM and LG performed flawlessly in minimal time. The time they saved was later put to use preparing the four maintenance personnel for the landing. The LG and LM moved the passengers in the event of a post-touchdown crash, while still protecting them from the possibility of a propeller departure. The LM also recommended opening the right paratroop door in-flight to guarantee its later availability. Finally, after the FE returned to the flight deck, the LG and LM secured all loose objects to keep them from becoming projectiles after touchdown and advised the crew that the No. 6 gun was now obstructing the ramp and door area should the ramp need to be used as an exit.

Awaiting advice from Hurlburt Command Post, Spectre 61 continued to hold and solidified their plan of attack. The crew chose to dump fuel down to 10,000 pounds remaining, perform all the regular checklists (descent, before landing), configure for the approach (leaving the gear down) while maintaining 10,000 feet MSL, and perform a controllability check. They also chose to fly an ILS 36 to a full stop with the following deviations to account for the malfunction:

1. Emergency hydraulics should be turned on to preclude loss of nose wheel steering due to anticipated damage to the brake lines (utility system).
2. If the right MLG collapsed, the No. 4 propeller would strike the ground and possibly cause catastrophic damage to the No. 3 propeller and engine, wing and/or fuselage. To prevent this damage, the crew briefed that the CP would feather No. 4 if any settling took place after the landing.
3. The pilot would land on the left half of the runway, allowing maximum room for maneuver should any asymmetric drag, caused by the right main rear wheel, pull the aircraft to the right.

While waiting for assistance from Hurlburt Command Post, the crew consulted Spectre 62, which was holding short of Runway 36 for departure. Spectre 62 brainstormed the emergency, offering several "what-if" scenarios. Although the crew of Spectre 61 had considered all of these scenarios, the assistance was quite valuable because it validated Spectre 61's plan. Hurlburt Command Post came back on frequency after reviewing Spooky 42's inspection video and relayed these recommendations from Lockheed:

1. Land with 100 percent flaps for a flatter approach.
2. Keep the right wing up, in order to hold the right MLG upright, until 60 KIAS when the ailerons lose effectiveness.

The crew then executed their plan with the two command post suggestions. They dumped fuel till 10,000 pounds remaining and purged the dump manifold. The LG turned off the oxygen system in case of a post-landing fire, and the EWO removed the forward escape hatch. After performing controllability checks at 100 percent flaps, they turned on the emergency hydraulic pump and flew the ILS 36 approach.

The pilot took over the approach visually at about four miles and flew a smooth approach to an exceptionally soft landing. He then transitioned to nose wheel steering and transferred control of the yoke to the CP. The CP held the right wing up as long as possible. Once aileron authority began to degrade, the CP lowered the wing while the pilot maintained control with the nose wheel and selected reverse. As the right MLG contacted the runway, the LM saw a large flash and announced that there was a fire on the right side of the plane. The FE recommended the pilot come out of reverse at about 30 KIAS, at which time the pilot used the brakes to a complete stop. Once the aircraft was stopped, the pilot commanded an emergency ground egress of the crew and passengers. The CP turned on the alarm bell, notified the tower, feathered the engines, and pulled all the T-handles. During egress, the LM and LG assisted passengers and crew out of the right paratroop door. The LG also grabbed a fire bottle and, once clear of the aircraft area, performed a head count to account for all personnel.

The crew of Spectre 61 demonstrated superior airmanship and extraordinary cockpit resource management in this emergency. They took their time to analyze the malfunction and did an exemplary job of integrating multiple inputs—both internal and external—from a variety of sources. Every crewmember and passenger performed a critical role in saving the aircraft and minimizing the damage that was inevitable from this malfunction. They conceived and executed a superb plan, safeguarding a multi-million dollar national asset and, more importantly, the lives of 11 personnel.

Editor's Note: The crew won the Air Force Chief of Safety Aircrew of Distinction Award for their actions in this emergency.

USAF Photo by SSgt Ricky A. Bloom

"There We Wasn't..."

ANONYMOUS

It was one of those "trips of a lifetime," or at least special enough that everyone wanted to be on it. The trip would cover several time zones and have stops at outstanding locations, including four other countries. The mission would culminate in a multinational, low-altitude formation airdrop of paratroopers. There was no problem finding volunteers for this mission, even though it would entail some long days in a C-130. The crew was "augmented" with an extra pilot and consisted of three pilots, a navigator, a flight engineer, two loadmasters, two aircraft maintenance technicians, and a flight surgeon. If I haven't already convinced you the trip was better than "a good deal," let me repeat, "and a flight surgeon."

I'll always remember this incredible trip for many reasons; unfortunately, the reasons are not all good. Something went wrong, and although we didn't bend the airplane or injure anyone, I'm still bothered. The rest of this story is more or less how I remember it, twisted a bit in some places, and intentionally vague in others.

At the first stop, the aircraft proved it would not be trouble-free. Though it was not yet apparent, basically the same maintenance problem would persist for the rest of the mission. The actual problem is not pertinent. It was electrical in nature, would appear and disappear, and therefore, was difficult to troubleshoot. It affected our navigation systems, among others, but not as a "clean kill"—"The airplane is broke, we're done." That would have made things easy.

Instead, it was one of those problems that led to the "gray areas" in the books and required the use of judgment and experience on the part of the aircrew and maintainers. We diverted for maintenance. We got fixed. We flew. We broke again. That's how the mission went for the next 10 days or so. We coordinated for parts and specialists wherever we were, or we diverted. We limped along, considering the weather, back-up systems, etc., using what "book" guidance existed, and our best judgment.

As the aircraft commander, I put a lot of effort into sharing new information with the crew. With

USAF Photo by Jacob N. Bailey

10 crewmembers, that isn't always easy, especially when changes to aircraft status and the mission are occurring outside of the duty day. If we leaned forward, I believe we did so with the crew consensus that it was safe and sound to do so. We made our Time on Target for the formation airdrop. We diverted again for parts and specialists. We made it back across "the pond" and parked the aircraft for the night.

We were scheduled for two more stops and a final leg to home station. A crewmember approached me, alone, with his concerns. He was tired, as we all were, of dealing with a reoccurring aircraft problem, and he had a suggestion. He strongly recommended that we drop into our home station, which was along the way. There we could have our maintenance specialists look at the aircraft. If they couldn't find the cause of our intermittent problem, we could go to a spare aircraft and complete the mission. I listened to what he had to say and decided he was right.

Due to crew duty-day limits, the stop at home station would likely require us to spend the night at the last stop before home. This would add another day to what had already been a long mission. I informed the crew of the new plan to divert into home station for maintenance or to spare out.

I didn't share that one crewmember was very uncomfortable with taking this aircraft much farther. He had convinced me that this diversion was our best course of action, but I didn't want anyone who thought differently to give him a hard time. If anyone disagreed, I wanted him/her to take up his/her issues with me. I thought I had communicated openly with this crew throughout the mission, and I expected the same in return. I was mistaken. What unfolded surprised me, and it still troubles me.

Four crewmembers had big problems with the new plan. Instead of talking to me, the aircraft commander, they groused to each other, the crewmembers who supported the decision, and their section schedulers back home. Comments were made about getting off the mission at the first stop into home station, replacements or not. In less than an hour, a large crew that had worked rather well together for almost two weeks was now at odds. I called the squadron to coordinate our "divert" and found out that some of my crewmembers were planning on finishing with our mission then. I passed on to the schedulers that if they could find replacements for anyone that wanted off, that was fine. I said we would also finish our mission and do so with a complete crew.

It had seemed like being stuck overseas for an extra week would not have bothered anyone on the crew. Now that we were looking at one more night, at an Army airfield, some of "us" just had to get home. Most frustrating was that some crewmembers had gotten so angry without ever talking to me. In fairness to them (even if they had little for anyone else), they didn't understand why it was

no longer acceptable to press on. They must have also believed that I didn't have the authority as mission commander to make such a decision, especially without their consent. Those who thought we should divert squabbled with those who didn't.

About an hour into this mess, a senior enlisted crewmember I had always respected asked to talk to me. He had vocalized how much he didn't like the new plan, mostly to other crewmembers. He regretfully said his behavior had been unprofessional. (I still appreciate his apology and deeply respect his character and his professionalism.) I don't remember saying much more to the crew before we went into crew rest. Maybe tempers were too high, or maybe I was still trying to figure out how to handle it all. I'm pretty sure that I told the crew we would try to swap out crewmembers if we could, but we needed to finish our mission.

When we got to the airport the next morning, I had the entire crew assemble out by the aircraft nose. We stood in a circle, deliberately isolated away from any airport personnel, other transient aircrew, and certainly our passengers. To them, hopefully, it would have just looked like another crew brief. I've held plenty of crew briefings, but this one felt quite different, unlike any before for me, and thankfully none since. This crew was agitated and divided. I tried to choose my words carefully. I wanted us to fly to our home station, but we needed to function as a crew.

The following is what I remember discussing. I briefly explained how I saw our situation and that we still had a mission to finish. I explained that throughout our trip I had worked to keep the crew "in the loop," so they would understand my decisions. Although "consensus" is wonderful, at times an aircraft commander has the need, the responsibility, and the authority to make decisions without consulting all crewmembers. I stated that, in my opinion, some behavior had "bordered on insubordination." I also reminded some that while I was sharing the information I had, I often had to seek information that I should have been told right away. Despite some hard feelings, I wanted assurance that we were all professional enough to function as a crew before we continued.

I got feedback that we could fly, if not all happily, at least safely and professionally to home station. We did swap out crewmembers at home station. We took the paratroopers back to their base, spent the night, and returned home the following day, completing the mission.

I'm sure there are lots of ways I could have dealt with "challenges" on this mission. Some choices would have been better, some just different, and some worse. Go ahead and think about what you would have done differently, as the aircraft commander or as a crewmember. I had put a lot of effort into planning and accomplishing this mission with a safe, effective crew. The point of all this is to provoke some thought, especially about Crew Resource Management (CRM). Could better CRM have helped me avoid some of the challenges and conflict that we had? Possibly. Or has CRM training led some folks astray with misconceptions about the commander's responsibilities and authority? Has misunderstanding of CRM concepts contributed to poor "followership?"

I don't want to rehash CRM by the book. There's a good chance you've had CRM training. I believe our CRM training, for the most part, has improved the way our crews function. Personally, I don't remember word for word what's taught in annual CRM refresher training. I do think I understand the principles pretty well, I believe in them, and I try to use them effectively. The "essence" of CRM is pretty easy to understand. Communication? Good! Easy? Often not.

Although there are plenty of barriers to "good" communication, what really annoys me is when there's not even an attempt. I had crewmembers on this trip expecting me to make sound decisions while they failed to provide me information they knew I wanted or needed. Crewmembers' withholding of critical information continues to cause mishaps. The right info at the right time is required to make the right decision; otherwise, we're relying on luck. When you disagree, voice your disagreement, with respect. Give folks "the benefit of the doubt." Don't get angry with someone with whom you haven't even bothered to talk.

How difficult is this CRM stuff? It sounds more like "Everything I Really Needed to Know, I *Should* Have Learned in Kindergarten." Yet, we constantly see failure of both leaders and followers on these simple things.

I've heard complaints that CRM has eroded the commander's authority. I'm not sure about that, but let me share the following in closing. Misunderstood and misapplied CRM concepts are signs of less-than-optimal leadership or bad followership. Although crew consensus and agreement are great to have, it just isn't always going to be there. Often, in flying, there's not time to "take a vote." There's trouble when consensus becomes an expectation for every decision. Likewise, there's a problem when little attempt is made to include the crew in any decision and they're left to feel they have no input. Good followers trust their leaders; good leaders work to establish trust early and maintain it.

In the above story, crewmembers who had seen a lot of coordination in decision-making throughout the mission "blew up" when they felt left out of an important decision. I wish, instead, they would have had the trust and courtesy to talk to me before getting so spun up. That way, this "trip of a lifetime" would have been memorable for some more positive things.

How I Learned That

1LT AARON DRIPPS
963 AACS
Tinker AFB OK

The in-flight emergency started with a short PA announcement: "Crew, Copilot. We have fumes in the aircraft. Get on oxygen." The crewmembers aboard the E-3 AWACS were about to learn first-hand whether or not they were prepared to handle smoke and fumes in the aircraft.

This was only supposed to be a 4-5-hour night sortie in support of a Red Flag Exercise. Everyone was in high spirits, since this was nice and short in comparison to the normal training missions. The crew had flown this flight profile for the past week, and this sortie was shaping up to be another humdrum mission. This TDY was my first experience away from our home station, and I was getting a good feel for the duties required of me as a copilot.

After an uneventful takeoff and departure, the flight crew established the jet into the planned orbit and began powering up the Mission Radar Systems. With the workload diminishing for the flight deck, the Aircraft Commander (AC) transferred the flying duties to me, the trusty copilot, and headed to the back of the airplane for a bathroom break. A few minutes later, the AC noticed a distinctly bitter electrical smell from the aft portion of the cabin. He immediately conferred with the radar technician and then made an interphone call to the cockpit, informing the flight deck of the situation and directing us to make a PA announcement and get the crew on oxygen.

As we donned oxygen masks, I asked the engineer to run the smoke and fumes checklist. I fumbled to get my smoke goggles and gloves on and was surprised that the emergency happened without the AC on the flight deck. We never practice it that way! It was common courtesy to ensure all the flight deck members were ready to kick off the simulated Emergency Procedure (EP).

But this was no simulation. A few moments later, the AC arrived on the flight deck and hurried to get back into the seat and on oxygen. He backed up the engineer in the checklist while I flew the aircraft and listened to the radio. The radar technician reported fumes whenever he swapped out oxygen bottles. The situation didn't look good. With no clear sign of the fumes dissipating, we declared an emergency and requested holding airspace to dump fuel.

The crew removed power from the mission radar as the Mission Crew Commander (MCC) handed off

CRM Is Important

USAF Photo by MSgt Val Gempis

all command and control duties. This was no small task, considering the number of aircraft involved in a Large Force Exercise. During the fuel dump, the AC and MCC coordinated all the appropriate calls back to the base, and split up the duties effectively.

The fire crews were standing by on both ends of the runway, and our notification 15 minutes prior was more than enough time for them to prepare for our arrival. As we intercepted the final approach course, the AC took control of the aircraft and made an uneventful approach and landing.

Upon inspection of the aft lower lobe, Maintenance discovered one of the cooling fans had seized, and the wiring insulation had begun to burn. This was the source of our electrical fumes.

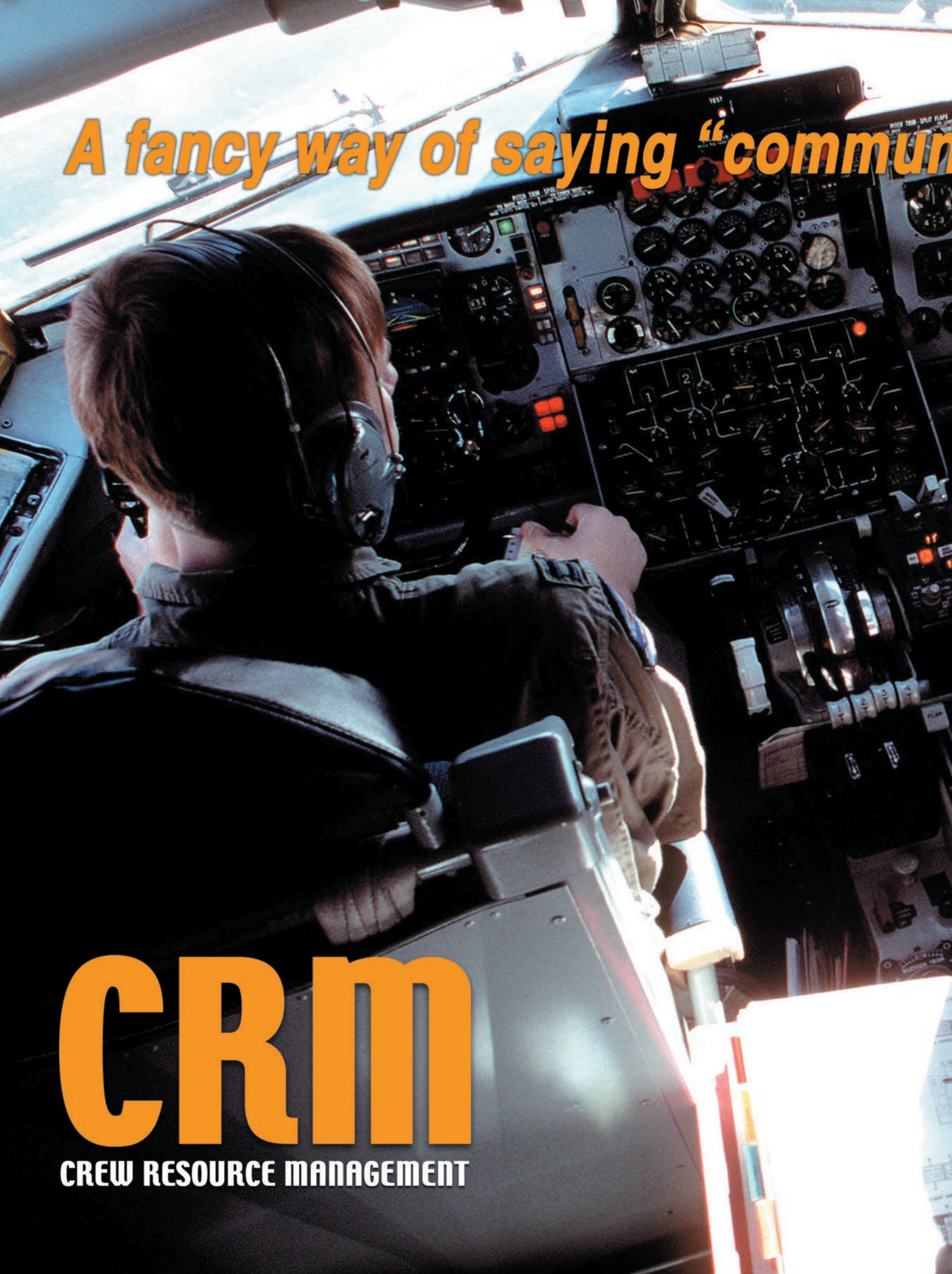
A rather benign malfunction on an aircraft is nothing to take lightly. I walked away from this emergency with valuable experience and a real life example of why we should always take our simulated emergencies seriously. I am thankful that this story has a safe and happy ending.

Looking back, I can remember how the Cockpit Resource Management (CRM) of the crew corrected some mistakes after the emergency that could have led us down the road to a deadly outcome. For example, in the excitement of the moment, I had tuned in the opposite direction course for the localizer. The AC also prevented the engineer from performing a step in the checklist out of order.

Using CRM was crucial to the success of the crew and backing each other up is the foundation for flying crew airplanes safely. Without good coordination, we could have caused problems with the aircraft under control or missed a step in the checklist. An inherent benefit of having more than one crewmember on board during an emergency is that duties can be delegated and the workload spread out.

Another resource lies in the experience that each crewmember brings to the crew. Using good CRM techniques will draw on these advantages and enable a crew to perform well during emergencies. Had we waited until smoke appeared in the aircraft, there could have been a more serious problem, like a physiological event. For a crew to successfully recover an aircraft in an emergency, everyone plays an important part.

The lessons learned from this emergency will remain in my memory for the rest of my flying career. I hope that your real life emergency story has a safe ending as well.


A fancy way of saying "commun
CRM
CREW RESOURCE MANAGEMENT


nication”

US Army Photo by Sgt. 1st Class Joe Belcher
USAF Photo by SrA James Harper
Photo Illustration by Dan Harman

Not Enough Crewmembers, Or Too Many Tasks?

CAPT RUSS COOK
459 AS
Yokota AB, Japan

Task saturation is an issue familiar to all aircrew, most likely experienced in a flyer's earliest days of training and revisited periodically, at the least opportune moments. Nearly everyone has a "There I Was" story about an incident where task saturation was a major factor in transforming what initially seemed to be a "low threat" situation almost instantaneously into an overwhelming series of events. Despite task saturation's causal effects, as well as its frequent appearance, crew training (simulation, continuation, etc.) very rarely addresses this meaningful issue.

In crew aircraft, we often handle task saturation through a delegation of tasks, usually addressed in the brief prior to the flight. A common briefing might contain something along these lines: "You handle the radios, I'll fly the aircraft, and the engineer will back up crew actions with appropriate checklists…"—or something similar. In our unit, during a formation sortie, we've taught aircrews that the other aircraft is an important and readily available CRM resource, ready and able to assist in times of emergency or other contingencies attracting the task-saturation beast. But how often do we use these concepts and see how they work under actual conditions? For me, an actual emergency was the first time I witnessed the interaction of CRM and its relation to task saturation on the flight deck.

I was a new copilot flying a UH-1N formation continuation training sortie. All training requirements had been accomplished, and the final leg of the mission consisted of a navigation route. Our ship was No. 2 in combat cruise, with the only requirement being to stay in position and clear of lead. This part of the navigation leg was in the mountains, and our spacing from lead allowed both crews to fly the aircraft aggressively, maneuvering at will. While making normal power changes, we noticed engine torque fluctuations in one of our two engines. Seconds later, during a climb over a ridge with an increased power pull, we noticed that the rotor rpm dropped out of the normal operating range, alerting us to a clear "problem."

CRM teaches you to know in advance what you have available in terms of aircraft, people, and the environment, so when the time comes to apply the MATR emergency response techniques, the crew can efficiently apply its resources in the order and at the rate best suited to expeditiously solve the problem at hand. In the mountains, at helicopter altitudes, out of radio range, an initial call home on the company frequency was not an option—not that it would have helped. Our unit is relatively small, and, not surprisingly, the majority of the squadron's experience was in the two aircraft. My pilot just happened to be the current chief of stan eval, while the pilots in the other aircraft were experienced instructors. Additionally, the other aircraft was manned by an instructor flight engineer. However, due to manning we had no FE on our aircraft—instead, we had one of our unit's fixed-wing pilots acting as a scanner. While there is nothing abnormal about this (the UH-1N is a single-pilot-capable aircraft, and a crew of two pilots with no FE is a common scenario), I certainly would have preferred a qualified flight engineer to help analyze the EP and work the checklists/Dash-1.

The pre-briefed formation part of this emergency

went smoothly. Flight "knock it off" calls were made, and as briefed we, as the "problem aircraft," took the lead and began to head home. Still, even as we headed home, it wasn't clear exactly what sort of engine malfunction we were dealing with—given the indications it still could have been a variety of problems. So, even as we headed home, we were still in the "analyzing phase" of the emergency. The pilot utilized an FCF procedure to identify the bad engine, which finally was able to tell us which engine of the two was acting up. Still, we were faced with a potential worst-case scenario of being single-engine.

Not surprisingly, as we approached the home field, leaving the concealment of the mountains, the radios exploded, as they often do during an emergency. We were within 10 miles of the base. The pilot made the emergency declaration call to tower, and then handed the radios over to me. At the same time, I was running checklists and backing up the pilot to make sure we didn't inadvertently put ourselves in a "less than single-engine" condition. We could not utilize the crew in the No. 2 aircraft for troubleshooting because of the difficulty of relating complex indications that we were receiving (later debrief on the ground would reveal that none of the crewmembers had seen a fuel control failure manifest as this one had). Additionally, our other crewmember was a fixed-wing Learjet pilot with no understanding of our systems—he was a great scanner, but not useful in this situation in terms of analyzing the engine indications. We told him to clear for traffic because we were predominantly "heads down," troubleshooting. This decision to use him as an active scanner would later be of enormous benefit.

Once tower inquiries into our emergency went beyond souls on board, we passed those radio calls off to our wingman. As soon as we passed off ATC responsibilities to wing, the company frequency began buzzing with requests regarding our single-engine emergency—which it wasn't, but second hand information often travels quickly in these situations. While Two was attempting to explain our situation, of which even they had limited understanding at the moment, to add insult to injury, host nation helicopter traffic became a factor. Our tower started chiming in with position reports as they tried to clear them out of the area—thereby adding confusion through radio chatter, especially given the host nation aircrew's lack of proficiency understanding and using ATC English.

At this point, the radios became a hindrance to our crew attempting to use CRM in the delegation of tasks. One pilot took tower freq and handled conflict traffic while the other talked to home station. About this time, my pilot was flying the aircraft with one engine in manual (this requires the pilot to constantly adjust the throttle while making collective inputs), while I monitored his performance and scanned for the conflicting traffic. Tower wisely sent the conflicting traffic out of the control zone so that they could focus on the emergency aircraft. Unfortunately for us, the local nation traffic didn't seem to understand that we were an emergency aircraft, that we were a formation, or even where we were—and to make matters worse, they requested to depart in the direction of our formation. Tower, possibly misinterpreting their broken English, and just wanting them out of the airspace, approved and advised them to "remain clear"—even though they were now clearing towards us.

At this point, too much was going on for my comfort. Although every crewmember in our formation of two had taken a different task, the culmination of all of these tasks still could be overwhelming. We finally told the company frequency to "stand by;" there was nothing they could learn at that point which would be of any benefit to us or them. Finally—this radio became silent. The advisory calls that were getting drowned out by company chatter were now becoming a concern. The aircraft that was told to "remain clear" was very slowly getting closer and closer to our position. We told our "scanner" to maintain visual with the aircraft while we in the front continued to concentrate on setting up for the approach, checklist cleanup, etc.

As the traffic got closer, we advised tower of the hazardous situation that was developing. Tower advised the traffic of our location and conflict, and the aircraft decided to demonstrate their concern for clearance by performing a hard bid to our tail, slightly high. The only problem was that we were lead of a two-ship, and he did not seem to realize that fact. The host nation aircraft managed to split our formation and, needless to say, upset the crewmembers of both aircraft. This was an additional factor we didn't need at the time.

Once finished with the excitement of a second wingman attempting to join our formation in a dissimilar, multi-national, and unapproved configuration, the flight managed to end uneventfully. Upon reflection, I couldn't figure out why everything seemed much harder than it should have been. Task prioritization was a consideration, as the pilot maintained focus on aviating and we doled out responsibilities to the different crews. We utilized our crewmembers as briefed, but we did too little initially to eliminate the tasks that were not important.

While task prioritization is often addressed in multi-crew aircraft, sometimes minimizing tasks should be a priority. Maybe we, as aircrew, should consider over-tasking crews with superfluous taskings during emergency training (in a controlled setting) and talk more about how this can adversely affect the situation. The general consensus can be that we have enough crewmembers to handle everything, but maybe we don't have to "handle everything."

Single-Ship CRM

USAF Photo by SSgt Lee O. Tucker

ANONYMOUS

We use special interest items (SIIs) to increase hazard awareness and decrease risk. One SII that is briefed on a regular basis is Crew Resource Management (CRM). I have questioned the utility of emphasizing the term "crew" to single-seat fighter pilots. *(Single-seaters usually refer to it as Cockpit Resource Management. Ed.)* At times, it is tough to put substance into briefing that SII.

Over years of instructing at the Flying Training Unit, I have briefed and heard CRM briefed with varying areas of emphasis. Interpretations of CRM for the F-16 include maintaining a composite crosscheck, monitoring flight members' position, situational awareness, and including ground control intercept (GCI) and AWACS controllers as additional wingmen. These examples illustrate there is no hard and fast definition of CRM in a single-seat, single-engine fighter.

One day I gained a more complete appreciation of single-seat CRM. The mission was offensive Basic Fighter Maneuvers (BFM) for a recent Undergraduate Pilot Training (UPT) graduate. We had completed mission planning the day before, including a thorough preview of how we would execute the profile and techniques for success. During the formal mission brief, I instructed in great detail what the student would see and how to maintain an offensive advantage and employ ordnance to kill the adversary. I would be flying the adversary role, simulating the capabilities of aircraft he could expect to meet in combat. I briefed the CRM skill of maintaining an effective crosscheck, with emphasis on monitoring and managing range and closure when gunning the adversary. I described visual and heads-up display (HUD) cues and how to adjust power and flight path to stabilize in the gun employment zone. A crosscheck breakdown or target fixation could lead to unrecognized closure, resulting in a training rule violation or a midair collision, in the worst case.

The emergency procedure of the mission was engine air start. In the briefed scenario, the pilot inadvertently shut off the engine. The student analyzed the situation and explained that he would maintain aircraft control, clear his flight path and initiate an air start. We discussed calling a "knock it off" with a quick explanation of the problem to Lead to relieve him of deconfliction responsibilities and better analyze the problem. We also covered what cockpit indications he would have of an inadvertent engine shutdown and the importance of concentrating on air start parameters over establishing a glide for a flameout landing outside glide range.

Start, taxi and takeoff were uneventful, as was departure, with the exception of minor course changes to avoid broken clouds between 5000 and 8000 feet MSL. We completed operations, fence and G-awareness checks before starting the planned offensive BFM sets for the student. On the first set, the student properly maneuvered to a position of advantage, but was late in adjusting power and flight path to maintain range for gun employment. I reinforced visual cues to determine range and rate of closure prior to the second set.

The student was skillful at reaching a position of advantage on the second attempt, and was making fairly timely corrections to maintain that position. I reversed my defensive turn to present another BFM problem, which the student wasn't able to counter without a large power reduction and maneuvering to a lag position with a fairly large heading crossing angle. I reversed a second time, increasing the rate of closure. The student countered with another bid to lag and power reduction, quickly followed by a radio transmission: "Knock it off; I've had a flameout."

My heart skipped a couple of beats, and the next few minutes taught me more about single-seat, single-engine CRM than I thought existed.

I immediately maneuvered to a chase position and directed the student to establish air start parameters. Realizing he had his hands full with a high-tech glider, I did not play twenty questions, but assisted in the big picture handling of the emergency by directing a turn to avoid high terrain and increase the time available to successfully restart the engine. Preparing for the worst, I mentally reviewed search and rescue procedures and monitored the student's altitude, ready to direct an ejection if the air start wasn't completed by 2000 feet AGL.

After what felt like an eternity (but in reality was less than a minute), the stricken F-16 started a climb, and telltale exhaust confirmed that the student had reestablished powered flight. Still in a chase position, I asked the student to confirm his flight parameters, engine indications and cockpit indications. Reasonably confident that the engine was running normally, I directed a turn toward the nearest acceptable runway. I remained in a chase position so the student could complete the remaining checklist items for air start.

Two important steps are to turn off the emergency power unit (EPU) and reset the electrical system to return generator power to the aircraft buses. Turning off the EPU did not return power to the buses, which caught the attention of both of us for a few seconds. When the student pushed the electric reset button, normal indication on cockpit displays returned. The student completed the remaining checklist items without incident.

When the student felt he had the situation back under control, he let me know he may have put the throttle to cutoff during the second BFM set. Having an idea what may have caused the flameout did not change our game plan, but gave us a better feeling that we wouldn't have a repeat flameout.

We were sharing the airspace with another flight of F-16s from our squadron. I let them know we were declaring an emergency and would fly near their position en route to the divert field. Once we had established altitude deconfliction between our flights, I switched my flight to the supervisor of flying (SOF) frequency. We told the SOF the student had inadvertently shut down the engine, accomplished a restart and would land the jet at the divert field. The SOF notified squadron operations and maintenance of our plan, while we switched to the working frequencies of airspace we were crossing en route to the divert field.

Once clear of the working area, we contacted tower at the divert field with our emergency and intentions. Tower was aware we were inbound and had cleared the pattern and approved our approach to either runway via the overhead or straight-in approach. The IP I had talked to earlier had notified not only the divert tower but each airspace we were crossing in the short time we were talking to the SOF, clearing a flight path and preparing ground response at the divert field sooner than we could have on our own.

The broken cloud deck we avoided on departure was also a factor to our recovery, so I took the lead to remain VMC and line up for a visual straight-in approach. Once below the clouds, I did not find the field visually until five-mile final, due to uneven lighting conditions. I pointed out the field and returned to chase the student through a straight-in to an uneventful full-stop landing. Since the student had not been to the divert field before, I coordinated with tower and switched to ground frequency to talk the student through taxi and shutdown at the divert field, while circling overhead. I then contacted the squadron operations officer to report the safe landing and discuss whether I should follow the student or return to home station. We decided I should recover to home station, based on a number of factors, including limited facilities at the divert field and increased demand on maintenance operational requirements. My recovery was uneventful.

As I mentioned earlier, in the short time between the flameout and successful recovery, my appreciation of CRM in the F-16 increased exponentially. While the student was wrestling with the air start procedures, I steered him away from high terrain and planned for possible scenarios. Once the engine started, the student and I worked together through checklist cleanup items and coordinated with the SOF for home station support, while the IP leading the other flight cleared all airspace in our flight path and prepared tower and ground personnel at the divert field to respond to our emergency landing. Following the safe landing, I coordinated with the operations officer to recover my jet to best support our training mission.

After the student returned to the home station by bus, we debriefed the mission. We concentrated on what happened, how it happened and what we could have done better. Safely back on the ground, we had time to review what we saw. The student noticed the engine light and saw the RPM below idle but increasing with the throttle above idle. Even with just a few hours experience in the jet, he used sound judgment to leave the throttle above idle and let the air start continue, instead of putting the throttle back in cutoff and starting over. This saved precious time and recovered the engine before terrain became a driving factor. Once the engine was restarted, we accomplished the engine air start checklist out of order. This caused momentary confusion in both cockpits and could have made safe recovery more difficult. We agreed if either of us had looked closer at the checklist we would have reset the electric system before turning off the EPU, and the displays would have recovered as we expected. With that exception, our coordination was effective and allowed us to recover the jet across busy airspace at a divert field with limited response capabilities.

CRM did not end there, however. We also discussed the incident with the squadron flight safety officer (FSO), who looked at the engine data from the student's jet. He discovered the throttle had been placed in cutoff twice during the second BFM set. The first time, the throttle was returned to mid-range before significant RPM decay. The second time, however, the engine was off long enough for the engine warning light to illuminate. He also took the time to conduct an extensive interview with the student. While they discussed the flight, the student made hand gestures while describing the events. The FSO noticed the student would curl his fingers as if he was cutting off the engine instead of the flat-handed slap to idle more common to F-16 pilots. The student mentioned to the FSO he had been an F-16 crew chief before attending pilot training. Asking more about his crew chief duties, the FSO determined the student had transferred his crew chief training to his pilot duties. As a crew chief, he always checked the throttle in cut off and battery off prior to completing any maintenance or switch changes. When confronted with the tactical problem of controlling his closure on the adversary aircraft, he unconsciously selected off with the throttle.

The student and I both learned a great deal on that sortie. I have added a couple of background questions before flying with a student for the first time to see if he has any past experiences, both negative and positive, that may affect the training we have planned for the next mission. Though closure is more manageable without thrust, avoiding terra firma is infinitely more difficult. I told the student the flat-hand slap to idle is an effective technique to overcome his negative skill transfer, and he spent a couple of hours in the simulator retraining his hands to do the pilot stuff instead of the crew chief stuff. He has since gone on to great success, mastering BFM, surface attack and air combat training without a single incident of unintentional engine shutdown.

USAF Photo by A1C Trina R. Flannagan

CAPT CHAD "SKID" GREER
34 FS
Hill AFB UT

It may be difficult for those in "Crew" aircraft to see how CRM is applicable in a single-seat fighter. In fact, in the F-16, we call "Crew Resource Management" training "Cockpit Resource Management," but the training is no less valuable. I experienced this first-hand on a recent, very brief, combat sortie in Iraq.

As a wingman in my first F-16 assignment, I have been flying the Viper operationally for about a year. This was my 18th sortie in theater and my flight lead this day was a relatively experienced IP—Major Lance "Shack" Yarborough. The flight was scheduled as a two-ship of Vipers tasked to execute Close Air Support and Armed Reconnaissance. It was a day sortie and the weather was clear. The briefing and ground ops were uneventful. Lead took the runway, lit the afterburner, and started his takeoff roll. I followed 30 seconds in trail, retracted my gear, accelerated to 420 knots, and began to zoom for a tactical departure. As I was passing 4000 MSL, I decreased my pitch angle in order to climb at 350 knots and started a turn to follow lead. Suddenly, I heard the voice warning system say, "Caution, Caution!"

It's not all that uncommon to hear the caution message shortly after takeoff for some minor problem with the aircraft. If the system says, "Warning, Warning," you immediately know you have a significant issue. I wasn't too concerned with the caution until I took a look at my Fault List Display and saw "ENG LUBE LOW" indicating my single engine had lost at least 60 percent of its oil. Immediately, I looked at my oil pressure to determine if I needed to jettison my external stores, which was 1500 pounds of bombs and two tanks containing over 4000 pounds of JP-8, and return for an immediate landing. The oil pressure was steady within limits, so, in accordance with the checklist, I elected to retain the stores and turn back toward the field while climbing to High Key. High Key is a position over the airfield that allows you to dead stick the aircraft to landing if the engine quits.

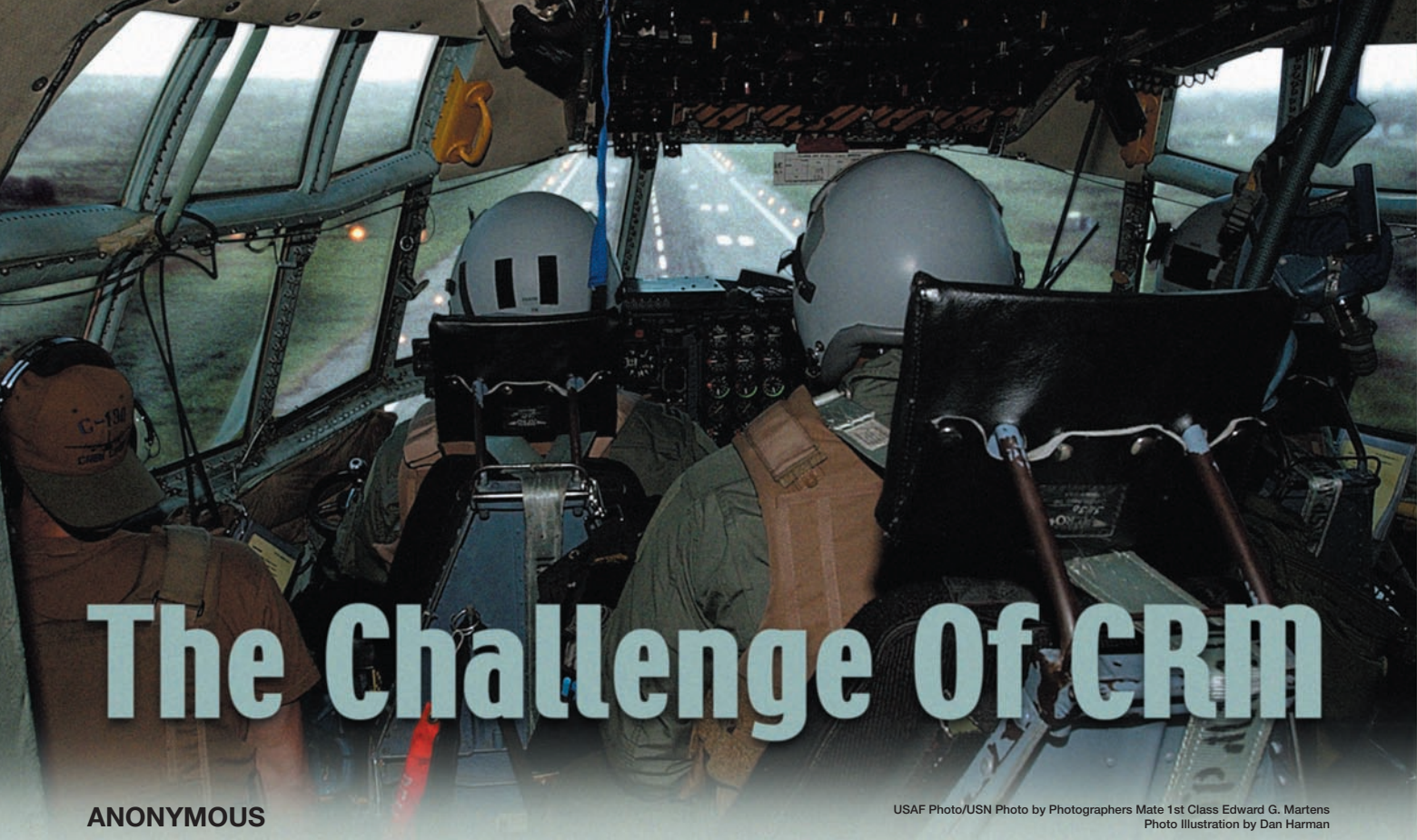
I informed my flight lead of the situation and that I was turning back to the field. That's all it took. Immediately, he told approach we were declaring an emergency and coordinated for the airspace to be cleared over the airfield. He then asked my position and altitude, and within a minute was flying a chase formation. Finally, he began reading applicable checklist steps as I cleared the fault to rule out the possibility of a false indication. When the fault returned, we knew this was the real deal.

At this point, it was critical that I jettison my external stores in case of engine seizure. I had to get the aircraft to an immediate landing weight and increase my gliding distance. Lead began coordinating with the Supervisor of Flying (SOF) for some place to jettison, since our primary jettison area was about 25 miles away. This location would have put us out of gliding distance to the airfield. While this coordination was taking place, I was watching my engine instruments like a hawk. I saw the oil pressure drop 10 psi and then fluctuate out of limits at a steady throttle setting. I pointed the aircraft at a relatively unpopulated area away from the field and told lead my oil pressure was dropping and I needed to get rid of my stores…NOW!

We proceeded six miles away from the field. Lead told all concerned parties what we were doing and then told me exactly when to hit the emergency jettison button once over the least populated area. After getting rid of the two external fuel tanks and the 1500 pounds of bombs, the aircraft felt light as a feather. The stores landed in a field and were later recovered by EOD. I lined up with the runway and was in great position to make a landing, even if the engine quit. Lead followed me, giving a few helpful words, but letting me concentrate on the approach. The landing was uneventful and I was able to shut down normally, clearing the runway 12 minutes after releasing brakes for a 0.2 duration combat sortie. I later found out that several internal bearing seals had failed and the engine had lost about 75 percent of its total oil capacity. Maintenance estimates the engine would have seized after only 10 more minutes of operation.

The bottom line is this was a pretty significant EP in the Viper. In the F-16, engine problems are always a large concern, but it was much easier to deal with than I would have expected. My comfort level was so high because I was able to focus entirely on flying the aircraft and monitoring its performance, thanks to my No. 1 cockpit resource.

That resource, not actually in my cockpit, was my flight lead.



The Challenge Of CRM

ANONYMOUS

USAF Photo/USN Photo by Photographers Mate 1st Class Edward G. Martens
Photo Illustration by Dan Harman

Crew Resource Management (CRM) has become an important concept in the aviation industry. CRM is a formalized process to solve problems and more effectively complete missions by ensuring crewmembers have inputs on mission decisions. No matter what type of aircraft you fly, we have all had a time in our careers where our crew resource management was less than stellar. Instructors need to teach students how to use CRM and aircraft commanders need to put it into practice. This story is a recap of an incident I had and the lessons I learned from it.

I had been mission qualified in the C-130 for two years when I participated in this event. My mission that day had been local tactical training in the month of September. I was surprised to see that my AC was one of our newest instructor pilots, who had just returned from instructor school a few months earlier. We were also scheduled as a basic crew, an added bonus because there wouldn't be any other pilots "stealing" my seat time. My AC was happy about that fact as well, since she was the mission commander that day and her ground job was Chief of Training at the OSS. This flight would give her an opportunity to accomplish a decent number of the semiannual requirements she had remaining (which were numerous). The rest of the crew was also quite experienced. Our navigator, flight engineer and loadmaster all had in excess of 2000 hours in the C-130. I was highly confident that this mission was going to be relatively easy, due to the ability of our crew.

We arrived at the squadron at 0400 for an 0800 takeoff. Preflight planning had gone along smoothly. The only problem we had anticipated was our forecast weather. Judging from what the weather shop and radar picture were telling us, it looked like we wouldn't be doing any VFR flying due to a front sitting over the base. Thunderstorms weren't anticipated, but the chance existed that they might pop up toward the end of our sortie. When the crews stepped to the aircraft, we all expected four hours of IMC formation training.

We did have one additional restriction to our flight plan. Over-flight wasn't much of an option due to Navy training that was going to be taking place at our airfield. Prior to deployments, the F-18, F-14 and E-2 crews would use our runway to accomplish landing practice in preparation for their carrier qualification rides. Since their training was necessary for an operational mission, it took priority in our traffic pattern. Non-participating aircraft could perform initial takeoffs and landings, but only the Navy planes were authorized multiple traffic patterns. This affected us because the drop zone we were using was located next to our runway. If the plan went smoothly, we should be in the chocks prior to the Navy getting to the airfield.

After the formal briefing, we accomplished the route study and headed for the flightline. We were supposed to lead the first route and then be second element lead on the next route. Check-in, engine start and taxi had all been performed without any problems until we were holding short and complet-

ing the navigation system's enhanced interrupted alignment. No. 3 called us to report they had a maintenance problem and would be returning to parking. This didn't really impact our plan too drastically, except it meant we would be in the lead position for the whole time until No. 3 was fixed and rejoined the formation. We took off as a two-ship, did the first route to a dry pass because of low ceilings, and then headed out on our recovery. During the recovery, No. 2 had a couple of minor maintenance problems and needed to full stop. Since it made no sense to fly single-ship, we decided to land as well and go back to the squadron to formulate a new plan.

After sitting in the squadron for about an hour we found out that No. 3 was cancelled for the day and No. 2 was supposed to be fixed and crew ready in 30 minutes. We continued to wait for 45 minutes, when maintenance finally called and said that No. 2 was actually hard broke and wouldn't fly today. My aircraft commander went to our DO and discussed her options. She had pro events remaining and the squadron wanted us to fly in order to help the flying hour program we were managing. Also, the end of the fiscal year was rapidly approaching. Our AC came back to the crew with a plan. We were going to leave our base and fly pro for about an hour at another base about 30 minutes away. Our pilot didn't ask for any input from the crew but on the bus back to the aircraft we all figured one hour of pro was manageable.

We flew up north, and the base was 1000 feet overcast with four miles of visibility—plenty of weather for touch-and-go operations. On half-mile final for our first approach, the IP, who was flying the aircraft, asked the flight engineer, "Eng, what's up with the No. 1 engine?" The engineer looked for a second, saw No. 1 had 3000 inch-pounds of torque more than the rest of the engines, and recommended we full stop. The pilot said, "We're going to make this a touch-and-go." I flew the next approach to see if it happened again and there was no problem. The crew guessed that the pilot had misaligned the throttle levers and didn't have time to troubleshoot the problem at 200 feet AGL.

On climbout from our second touch-and-go, Approach had to vector us to a holding pattern out of the way, since four F-16s were recovering and the weather was making their fuel an issue. We held for approximately 45 minutes, when I had finally had enough. I told the pilot, "I'm beat; let's get our clearance back home. We're pushing a 10-hour crew day, and we have almost nothing to show for it." The pilot's response was, "I don't want to leave yet. Let's get two more patterns and then go home. I don't get to fly much." Another 15 minutes of holding was followed by 30 minutes of pro training. At this point I was convinced that if something happened, my opinion meant nothing on this crew. For the remainder of our pro, I only responded with checklist items and numerous altitude and airspeed deviation calls. Finally, we got our clearance home and full stopped.

Our crew debrief happened on the bus. Both the engineer and loadmaster expressed their disappointment with the pilot's actions. This behavior relieved frustration, but didn't fix our problem. The crew's CRM had failed before we left the squadron for the second time. Our first issue was the pilot's hidden agenda. She was going to fly no matter what, because she didn't get to log many hours each month due to her office job.

The second issue we faced was perceived pressure from the leadership. We *assumed* we had to fly because it was September and the fiscal year flight hour program was coming to an end. After meeting with the DO, he made it very clear that he could sell back hours to the NAF and it wasn't a problem for the unit. That little tidbit of information should have been made very clear on 1 September when he had a DO call and only talked about making sure the 781s were accurate with flight time due to end-of-year management.

The crew's third breakdown happened on short final with the engine torque issue. Nobody (myself included) supported the FE's idea to full stop and check out the problem. The same thing happened when I brought up the RTB idea later in the sortie. A crewmember admitted to being less than 100 percent, and nobody had even suggested a plan to compensate for their decreased performance. If something had happened to the pilot, the only other person that could land that aircraft was working at less than a nominal level. Two days after the sortie, the DO had the entire crew sit down with one of the squadron's CRM facilitators to learn from this experience. We didn't have an actual mishap, but the potential for a bad situation getting worse existed at the tail end of that sortie, due to crew interaction problems.

What's the bottom line for this story? There are a few items to consider. Leaders need to be clear when they express their position on issues. Since we've cut back on training time due to OEF and OIF deployments, fiscal year flying hours are an issue in every C-130 unit. Aircraft commanders need to actively seek inputs from their crews. The AC is the only person that can make decisions for the entire crew, but you need the crew's input to make *good* choices.

Lastly, CRM isn't just the act of voicing your own opinion. If the crew feels that someone is being ignored, other personnel need to make sure that minority opinions are heard.

There were multiple errors in our CRM process that day. Thankfully, our squadron commander made CRM a priority in his unit. He used it as a learning experience to help the entire squadron. Teaching and using CRM are serious subjects. Good CRM is another effective tool for aircrews to use to complete their missions.

OPS TOPICS

Editor's Note: The following accounts are from actual mishaps. They have been screened to prevent the release of privileged information.

Here are a few High Accident Potential (HAP) events for your information. Thought this would be a nice change of pace and provide some info that you may use to help reduce your mishaps.

Unsafe Armor

The configuration of the C-130's navigator's (Nav's) seat armor is unsafe. The location of a section of the armor prohibits the Nav's seat from turning to directly face the control panel. Specifically, the navigator cannot rotate to face his/her instruments while strapped in. Neither the defensive systems, SCNS, nor radar can be effectively monitored while strapped in and facing forward with the present armor configuration. To face the instruments, the navigator must unstrap from the safety harness and sit sideways in the seat. In the before-landing checklist, the navigator is required to strap in facing forward for safety reasons. The situation is unsafe on approach to land, especially when the navigator is performing an ARA as they are required to do on all air-land NVG approaches, or in a combat zone where his attention is required on the defensive systems panel. In these situations, the navigator's attention must be on his/her instruments until the last moment prior to landing. With a properly swiveling seat, turning to face forward takes only seconds. With the present configuration, the navigator must turn and strap in before he can call the checklist complete and land safely. This is an unacceptable method for both safety and operational reasons. This problem affects all C-130H models Air Force wide. There is a quick way to modify the armor configuration and allow the seat to properly swivel. Completely remove the small plate of armor that is preventing the seat from moving. T.O. 1C-130H-2-00GE-00-1, *General Equipment Manual* (page 5-346, Change 8), already allows for the section of armor to be removed and modified: "all armor mat assemblies are common in configuration. Modification of mat assemblies may be accomplished during installation (if required)." This fix allows for safe operation while redesign of the armor is considered.

Extra Passenger

During a recent flight, the KC-135R IP noticed a tendency for the aircraft to roll right. With flaps from 30 to 50 degree setting, it required approximately 35 degrees of left yoke deflection to counter the aircraft

roll. Winds were calm and the landing was uneventful. After engine shutdown, maintenance personnel alerted the IP that they found a significant bird's nest wedged in the right outboard aileron balance bay. There was no evidence of the nest during the preflight inspection, nor did post-flight provide any visual cues that nesting was present. As the flaps move from 30 to 50 degrees, the outboard ailerons become "unlocked." This would appear to be the probable cause for the roll rate during flight. Coordination between maintenance and safety are being conducted to address possible prevention techniques. The "Dash 2A/2B" maintenance preflight inspections do not currently require inspection of balance bays prior to flight that is not affected by weather conditions of snow and ice on the ground prior to take-off. Watch out; Mother Nature's feathered friends love aircraft for nesting.

TCAS RA

The C-21 crew was on approach and received a "descend, descend" resolution advisory (RA) from the Traffic Collision Avoidance System (TCAS) at approximately 200-300 feet AGL. A commuter aircraft was departing and had just become airborne approximately one mile in front of the aircraft. The commuter aircraft's flight path was approximately perpendicular to the aircraft. The crew recognized the hazardous input from the TCAS and elected to maintain the descent rate appropriate for the GPS approach. This is in accordance with T.O. 1C-21A-1, "always comply with a TCAS RA unless the pilot considers it unsafe to do so."

Following the return to home base, maintenance performed extensive troubleshooting of the TCAS and associated systems. Based on information provided by the crew, the perceived conflict was correctly analyzed by the TCAS. However, due to the obvious hazards with low-altitude RAs, and especially low-altitude descend RAs, these functions are inhibited at low altitude. According to the Dash 1, all TCAS aural warnings and RAs are inhibited below 900 feet radio altitude on approach and up to 1100 feet radio altitude on departure. Increase descent RAs are inhibited below 1450 feet. The C-21A customized maintenance manual further states that descend RAs are inhibited below 1000 feet AGL during descent and 1200 feet AGL during climb. When RAs are inhibited, the TCAS will visually annunciate "TA only" on the IVSI. Although this was a valid conflict, the RA should have been inhibited since the aircraft was only at 200-300 feet radio altitude.

Testing the TCAS is limited to system self test while observing the fault warning annunciators on the face of the TCAS II processor. Repeated self-tests did not yield any faults or warnings. The crew does not recall whether "TA only" was annunciated on the IVSI. However, the crew is certain the radio altimeter read between 200-300 feet at the time of the mishap. The C-21 TCAS does not have an internal recording feature that saves TCAS event information. The C-21 TCAS receives inputs from the IFF/Mode S transponder, Ground Proximity Warning System (GPWS), low range radio altimeter, UNS-1B, and landing gear lever position. The IFF, GPWS, UNS-1B, and landing gear position indicators all were operating normally, so the fault did not appear to be caused by any of these components.

Suspicion next fell on the radio altimeter. The radio altimeter supplies inputs to the autopilot/flight director, GPWS and TCAS. No anomalies were noted in the autopilot/flight director. The GPWS has the ability to internally record faults and warnings with the integrated systems. Information from the last ten flights was downloaded and analyzed, and there were no GPWS faults recorded. A radio altimeter simulator was installed and the TCAS was exercised in TA/RA mode. All indications were normal. The "TA only" annunciation appeared on the IVSI at 962 feet radio altitude, well within operating limitations. It was noted that during ground testing, the radio altimeter indicator was fluctuating +/- 50 feet at altitudes between 900 and 1000 feet. This is not within normal parameters and a new radio altimeter indicator was installed. There were no other faults noted in the TCAS or associated systems and the airplane was released for flight.

The aircraft flew a local sortie and the crew reported erroneous TCAS RAs at low altitude, as well as inappropriate GPWS warnings and autopilot/flight director problems. At this time the radio altimeter receiver-transmitter was found to be faulty. It was replaced and the aircraft has flown several subsequent sorties without incident. An informal search of local aircraft maintenance history revealed several other TCAS anomalies on other C-21A aircraft, all traced to the radio altimeter. The number of radio altimeter failures does not appear excessive; however, they do occur periodically. There is no text in T.O. 1C-21A-1 that describes the effects on other systems of a failure of the radio altimeter. You need to look out for an intermittent fault in the radio altimeter receiver/transmitter that will feed erroneous inputs to the TCAS, causing it to remain in TA/RA mode below 900 feet AGL. TCAS can save your life and if you don't fully understand how it works, it could cost you your life.

Maintenance Matters

Editor's Note: The following accounts are from actual mishaps. They have been screened to prevent the release of privileged information.

Here are a few tidbits about towing and other ground operations that ended up in damaged aircraft. Routine tasks are adding up to a lot of extra work due to failure to follow tech data, and not using proper risk management or situational awareness.

Size Matters

The F-117 unit deployed to an AEF location with hardened aircraft shelters (HAS) designed for older and smaller aircraft (F-4, F-5, F16), with corresponding smaller specifications of HAS locations (closer together) and taxiway area into and out of the HAS area. The HAS entryway is shaped like an inverted "T," with close tolerances around the squadron aircraft's larger tail and wider wingtips leaving only inches of clearance. Power panels and circuit breaker boxes located on the sides of the interior of the HAS reduce wingtip clearance even further.

To put the squadron's larger aircraft into the smaller HAS, maintenance personnel have to ensure the tail of the aircraft will clear the smaller entryway, then angle the aircraft so that the wingtip will go around the circuit breaker boxes on one side of the HAS, then reverse the angle to allow the opposite wingtip to clear electrical power panels on the opposite side of the HAS. The "pushback" of the aircraft into the HAS is similar to a "zigzag" line, as opposed to normal, straight-line pushbacks. Doesn't this sound like a mishap waiting to happen?

On the day of the mishap, the maintenance personnel assigned to the pushback were accomplishing the tow during aircraft launch and recovery operations, and all were qualified 7-levels. All personnel had whistles except the driver. During the initial pushback attempt, the tail spotter blew his whistle to signal tail clearance was getting close. They stopped, and the tug driver pulled the aircraft back out to reposition the aircraft for another attempt. On the second attempt, the tail cleared the HAS opening, but then the wingtip was getting close to the side of the HAS. The right wing walker signaled that the wingtip was getting close and blew his whistle. The tail spotter also saw the wingtip getting close and blew his whistle in an attempt to overcome the jet noise from the launch and recovery operations. The tug driver stopped, but the aircraft rocked from momentum and the right wingtip struck the HAS. The pushback was stopped and maintenance supervision was notified.

Here we have an experienced crew trying to thread a needle out of operational necessity. We operate under higher risks all over the world and this "extra" risk is something we must manage and try to develop alternate methods to reduce the risk. How many times do you think this crew had completed this task with no problems before the mishap? The bottom line is we have to accomplish routine tasks with higher risk every day at deployed locations, but the key is how we accept and mitigate the risk to prevent mishaps. I encourage you to look at what you do and see if you can find a way to mitigate the risk instead of just accepting the higher risk.

No Bolt Or Nuts

The KC-135 aircraft was forward deployed in support of a tanker task force. Preflight, taxi and takeoff were normal. The aircrew stated that nothing unusual was felt during landing or taxi back, nor was the landing abnormal in any way. When the aircraft taxied into the chocks, ground personnel discovered severe damage to the No. 7 wheel assembly. Why did we have a damaged wheel assembly?

A hard landing or aircrew-induced errors were ruled out, as the damage was not consistent with abnormal flight parameters. Investigation centered instead on maintenance and maintenance procedures. Witness marks on the No. 7 skid detector cover from the wheel speed transducer arm showed the main wheel axle nut had backed off, allowing the outer wheel bearing to unseat from the race, which in turn allowed the entire wheel assembly to wobble around the axle and brake assembly. As a result, the outer wheel bearing, skid detector cover and entire outer wheel bearing race boss was destroyed. When assembled IAW tech data, the outer wheel bearing is held in place by the axle nut, which is torqued and then secured by *"two"* retaining bolts. In this case, there was no evidence of broken retaining bolts, elongated bolt holes or witness marks to indicate the retaining bolts were ever installed in the No. 7 wheel axle nut. Without these bolts installed, and over an unspecified amount of time, the No. 7 wheel axle nut was able to back off and contact the skid detector cover. With the axle nut loose, the outer wheel bearing was free to work itself out of the race, removing all support from the outer portion of the No. 7 wheel. When the tire was installed, maintenance personnel omitted a crucial step in the procedure. By the way, it could not be determined when or where maintenance was performed on the No. 7 wheel and tire assembly, as no record of such work was found in GO81 or the aircraft forms.

Was this mishap caused by lack of training, rushed work due to taskings, lack of supervision, or just plain bad maintenance practices? Most likely, all were part of the mishap, and all are things we can control. No sortie is worth destroying an airplane or injuring an aircrew or passenger. Make sure we take the time to do the job right—the first time. We can't afford the second time.

Re-Check What?

The tow supervisor (TS) was dispatched to the wash rack to tow the mishap KC-135E (MA). During the tow preparation, the TS noticed the horizontal stabilizer was set at 2.5 degrees nose- up, and so, he configured the aircraft for 2.5 degrees nose-down IAW tech data. This setting is optimal to ensure that the elevators will not contact the hangar when the aircraft is towed in and out. Before towing preparations were complete and the arrival of the tow team (TT), the TS left the hangar to recover another aircraft. How often do we have task interruption on today's flightlines? During the TS absence, hydraulic technicians (HT) were dispatched to the MA to replace a worn boom hoist cable. The HT set the elevator to *10 degrees* nose-up and installed a stabilizer trim safety lock to enable them access to the aft compartment to facilitate the boom hoist cable removal and replacement. After the HT completed the boom hoist cable change, the stabilizer trim lock was removed and the stabilizer trim was left at 10 degrees nose-up. What did the tech data say it had to be for towing? There was no reason for the HT to return the stabilizer trim back to its original setting. The TS returned to the hangar with a TT consisting of six personnel to prepare and tow the aircraft from the hangar to the parking spot. Upon arrival, the TT opened all hangar doors. The TS checked the forms to ensure no conditions existed that would restrict movement of the MA, and no discrepancies were found. The TS discussed with the tow team the tow path that would be used during the tow. The TS then performed a foreign object damage (FOD) inspection in the path that the wheels would travel.

The TS and crew prepared the aircraft, and everyone assumed their positions for the tow. The TS positioned himself on the pilots' side of the MA, enabling him to see all tow team personnel, and instructed the brake rider (BR) to release the brakes and ensure that proper brake pressure was achieved. Upon confirmation from the BR that the brakes were released, the TS made the announcement, "coming back," and motioned for the tow driver to push the MA backward. The MA moved approximately 10-15 feet, when a scraping sound was heard. The TS instructed the driver to stop and instructed the BR to set the brakes. The TS proceeded to the rear of the MA and identified the damage to the left and right elevators. The tail walker didn't notice that the stabs were going to hit. The operation was terminated and the scene secured until quality assurance and wing safety personnel could respond.

Another case of a routine task gone wrong. Too many times, we see reports where the task was interrupted, something else was done to the aircraft and the first crew comes back and something happens. Whenever your task is interrupted, go back and start at the beginning, to make sure someone else hasn't set you up for a mishap.

FY05 Flight Mishaps
(Oct 04-Jun 05)

26 Class A Mishaps
11 Fatalities
9 Aircraft Destroyed

FY04 Flight Mishaps
(Oct 03-Jun 04)

22 Class A Mishaps
13 Fatalities
10 Aircraft Destroyed

03 Oct		A C-5B sustained damage to 2 engines after multiple bird strikes.
04 Oct		Two F-15Cs collided in midair; both returned to base safely.
13 Oct	✶	An MQ-1L experienced damage from a hard landing.
18 Oct		An F-16 tire tread separated on takeoff; barrier engaged and gear collapsed.
20 Oct	✈	An HH-60G crashed during a rescue mission; 1 fatality and 5 injuries.
27 Oct		A KC-10 experienced a No. 3 engine failure in-flight.
24 Nov	✶	An MQ-1L crashed during an FCF.
30 Nov		A B-1B had an in-flight fire in the aft equipment bay.
09 Dec		An HH-60G experienced a hard landing.
14 Dec	✶	A B-1B nose gear collasped after landing.
20 Dec	✈	An F/A-22 crashed immediately after takeoff.
29 Dec	✈	An MC-130H impacted a hole in the runway on landing and was destroyed.
05 Jan		A C-17's right MLG strut failed on landing.
14 Jan	✶	A UAV lost its satellite link and crashed.
18 Jan	✈	A T-37B collided with a civilian aircraft; crew ejected safely, 1 civilian fatality.
22 Feb		An E-4B experienced a bird strike to the No. 2 engine.
10 Mar		A C-17 experienced a bird strike to the radome and No. 3 engine.
18 Mar	✈	An F-16D crashed short of the approach runway; pilot ejected safely.
25 Mar	✈	An F-15C crashed during a BFM mission; pilot ejected safely.

U.S. GOVERMENT PRINTING OFFICE 2005-773-482-53088

The "essence" of CRM is pretty easy to understand. Communication? Good! Easy? Often not.

see page 11