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Attention To Detail: Why We Preach It

Darin Ninness

(I've given a class on this at encampments and other leadership activities. Its usually an attention-grabber)

You've heard the phrase a million times: "Gig line.. brass on brass.. collar insignia. Geez, cadet, do you pay attention to detail?"

And you've thought "What is this 'pay attention to detail' thing? I can barely pay for my lunch!"

As CAP cadets, you're seldom faced with a "life or death" situation. Thankfully, nobody's squadron drill pad is situated at the edge of a cliff. We have the luxury of practicing "attention to detail" in a more benign setting, in a place where we can "get it right," without the cost of failure being death or serious injury.

We start with small, simple things: uniforms and insignia, quiz bowls, drill team, nightly D&C training, color guards, alert rosters, etc. Things where the consequences of not paying attention to detail are limited and non-threatening. If you blow it and forget your CAP ID card, nobody's going to fall over dead.

Later, we progress into more complicated and important tasks that demand better and better skills in this area: powered and glider flight academies, mission communications, ground team, mission observer. Places where a lack of attention to detail could potentially be hazardous to either yourself or others. Hopefully, by this point, we've filtered out the people who just don't "get it" long enough for them to "get it" (before it gets them!).

Eventually, we do things like go off to college (where attention to detail can be the difference between a good and a bad grade) or the military, and in particular military aviation, where attention to detail can very likely mean the difference between living and dying.

So while its not important YET, it could well be some day soon. So pay attention....

November of 1988, Camp Humphreys, Pyongtaek, South Korea. I was a 22 year-old E-4 and a newly-signed off CH-47 flight engineer. I had just received my "FE ride" a couple weeks beforehand and I was really on top of the world.

Unfortunately, I had also just decided to leave the active duty military and join a Chinook unit near my home in Michigan. I was "short" and getting "shorter" by the minute...



November in Korea is a crisp time. Frost on the grass, your breath in the air, maybe even snow. November was also the time that our unit, A Co, 2/501st Aviation Regiment (formerly the 213th Aviation Company), also known as "The Blackcats," would deploy to the field for our annual evaluation known as an "ARTEP." We were tossed out of our racks at 0430 to shouts of "Alert! Alert! Everybody up! Alert!" (*to this day, I don't know why they did that. We knew when we were going to the field. Why wake us up at 0430? Our stuff had been packed for days!*) only to head down to the flightline for a quick roll call & accountability, then sit in the chocks until noon waiting for the heavy fall coastal fog to burn off.



SP4 Ninness and CH-47C
67-18500, "The Spirit of Texas"

Our aircraft for the field exercise was a bird familiar to me: CH-47C, tail #68-15822, "*Tasmanian Devil*". 822 was the first bird I'd crewed as a newbie crewchief, and it was one of my favorites. After 822, I had been assigned to the oldest CH-47C in the Army's fleet at that time: 67-18500, "*The Spirit of Texas*." But 500 was down for its 200-hour "phase" inspection, and was sitting on the washrack with most of the forward transmission ripped out of her. As much as I would have preferred to take my own aircraft to the field, 500 was out of commission for the duration.

The mission for the day was to deploy part of the unit's field equipment in the form of two strapped-together CONNEX containers to a forward operating location as part of the ARTEP. After dropping off the CONNEXs in a riverbed northeast of Osan Air Base, we would proceed as part of a multi-ship flight northeast into the mountains of the Tactical Zone east of the capitol city of Seoul, where we would support a ROK Army engineer bridging unit. We'd be flying pontoon bridge sections for training. The ROKA engineers needed training in rigging, positioning, signalling, hooking up, unhooking and deploying the bridge, and we needed practice in flying external "sling" loads, and in particular big, seriously non-aerodynamic things like bridge sections.

We flew into the mountains to a valley where we met the engineer unit and spent the better part of the afternoon hooking up bridge sections, flying them a couple miles, and then dropping them off. The engineers are crackerjack hookup guys, not at all timid like their artillery counterparts at the school in Kwangju, so the hookups and drop offs were smooth and without a major hitch.

We finished our flying about 1530, flew to a laager site in a valley and shut down. As some thick evening clouds rolled in, our infantry support squad dug into a perimeter around our helicopters. Then the bad news: Crummy weather was preventing the battalion's Huey from getting hot chow to us. As proof that soldiers will find food wherever they can, several of us decided that MREs were no way to start a field exercise and hitched a ride into the nearby town for dinner "on the economy."

Laagering with a Chinook is a lot like going on a camping trip with your family, minus the continual "Are we there yet?" questions from the backseat. The morning found all four crewmembers cocooned in our sleeping bags on the webbed seats against the morning chill.

I could feel the cold air at the top of my sleeping bag. I had wormed my way down in the bag and was curled into a little ball in the center. I sat up, still in my bag, and looked around. The pilots were peeking out of their sleeping bags, as well. I looked down at the other sleeping bag, that of Rocko Brall, the guy I was crewing with that day.



SP4 Rocko Brall tests the temperature outside his sleeping bag

"Rocko, you alive in there?" Rocko just stuck his arm out of his sleeping bag to indicate he was coherent. I snapped a picture.

"You guys want some heat?" I asked. What a silly question. OF COURSE!

Still cocooned in my mummy bag, I hopped up to the cockpit like a 3 year old in a sack race. "Hearing protection!" I reminded as the auxiliary power unit screamed to life. It didn't take long for the 100,000 BTU jet fuel-fired heater to take the chill out of the air. Our crew climbed out of our sleeping bags and began preparing ourselves for the day's missions.



A CH-47 in the laager site

Rocko looked outside the window. "Hey, look! It snowed last night!!"

Sure enough, we'd received a dusting of down during the night. Our helicopters were covered about an a half-inch of light accumulation.

Following a quick breakfast, we divvied up the day's "daily" inspection of the aircraft. Rocko would take the "top" of the aircraft, those things accessible via work platforms and panels on the top of the fuselage. That included the main rotors, the combining transmission and the main synchronizing driveshafts. I drew the "inside," inspecting those things accessible throughout the cockpit, main cabin and ramp area.

Let me digress for a minute and explain the CH-47 a little better so you understand where I'm coming from.

The CH-47C Chinook was a twin-engined, tandem-rotored cargo helicopter. Capable of lifting 18,000 lbs, it could cruise at 150 kts comfortably, delivering up to 33 combat-equipped troops or other cargo out to a maximum unrefueled range of 250 miles. The crew consists of a crew chief, a flight engineer, and two pilots. (The newer CH-47D and now CH-47F have even greater

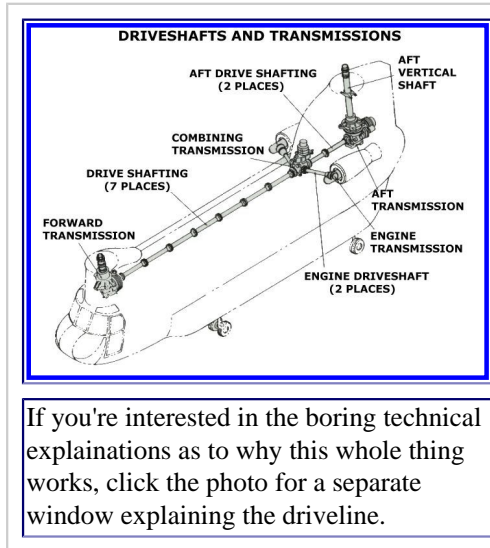


capabilities).

A Dutch CH-47D shows off the rotor configuration.

In the tandem configuration, each three-bladed rotor system (one forward and one aft) is synchronized or "phased" and inter-meshes with the other. The blades, each 30 feet long and weighing about 600 lbs each, overlap by over 20 of those 30 feet.

Because of this tandem configuration, the Chinook, and its Navy/Marine little brother, the CH-46 Sea Knight, are the only two aircraft in the inventory that can potentially have a mid-air collision with themselves.



If you're interested in the boring technical explanations as to why this whole thing works, click the photo for a separate window explaining the driveline.

So back to our snow-covered "Winnabago with rotor blades."

I'm deep into the daily inspection checklist on the inside, yakking with the pilots while I checked the aft transmission area.

"Darin!" Rocko shouted from the top of the aircraft.

"Huh?" I yelled back (*Yeah, real conversationalists we were*)

"You'd better come up here!" Rocko shouted back.

Rocko was a practical joker of the first order. It wouldn't be beyond him to say "Ha! Made you climb all the way up here!" But there was a different "no fooling around" note to his voice this time. I scrambled for the cabin door and the kick-steps up the side of the aircraft.

As I climbed up top, I noticed that Rocko had the "tunnel covers" over the forward synchronizing driveshafts open and he was standing at the base of the aft pylon, near the combining transmission. Walking aft, I looked down at the yellow zinc chromate-coated driveshafts neatly aligned down the spine of the aircraft.

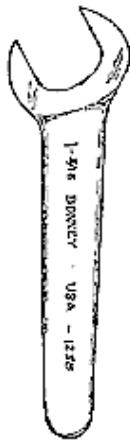
Then I noticed it: about a 3/4" wide silver stripe painted around the circumference of the #7 synchronizing drive shaft about 4 or 5 inches from the the forward end.

I thought "Gee, I crewed this aircraft for almost a year. I don't remember there being any silver paint on the driveshafts..."

As I got closer, I realized that a) that's not silver paint, that's raw unpainted aluminium; and b) there is a "bonney" wrench laying next to the driveshaft with its handle perfectly inline with the 3/4" stripe.



Preflighting the "top" of 74-22276



The realization of what I was looking at hit me like a rotor blade at operating RPM. My knees got weak and I felt nauseous. I had to kneel on the non-slip to to keep from falling off the top of the aircraft.

Most of the next thirty seconds of what I said is completely unprintable here.

An examination of the damage told us most of the story: An 1 1/4" bonney wrench with a flat tapered handle had found its way under the driveshaft in flight. The handle of the wrench wore against the shaft spinning at nearly 7,000 RPM, cutting a groove in the thin-wall aluminum driveshaft nearly .025 deep.

When the aircraft banked to the right, the wrench would slide to the right under the driveshaft, the thicker part of the handle causing it to wedge in tighter. But the driveshaft, spinning at 7,000 rpm clockwise, would catch the handle and spit it out, shooting the open end of the wrench against some non-structural sheetmetal located to the left of the driveshafts. The sheetmetal and the transmission oil cooler lines running along with it were pretty badly dinged up, but not punctured.

If the wrench had wedged under the shaft and gotten stuck there very long, say just a few short seconds, things would have been over with very quickly. A bit more wear on that driveshaft, say, about the thickness of thin cardboard, and we'd be wearing wings and playing harps. I was angry and sick with the idea that all of us could have been killed by carelessly mislaid tool.

Worst thing is, it could have occurred during any phase of flight: at cruise with or without a load on the hook, or while we where hovering, trying to get our external loads hooked up. Loss of a sync shaft and de-phasing of the rotor systems while hooking up a slingload would have been a heck of a wreck but probably not fatal for the crew. But the slingload hookup men would have been crushed by a 20,000 lb helicopter crashing down on their heads, not to mention the nearby spectators and flying debris. Occurring at cruise flight over the rough, mountainous terrain, it would have taken the accident investigation team a lot of time to find the root cause of that accident. Boom. "Mrs Ninness, the Department of the Army regrets to inform you..."

How did that wrench get there? Well, that brings us back to the subject of our article.

Several days beforehand, a young PFC, the new-to-the-aircraft crewchief who had just come over from maintenance, had gone out to the aircraft to do some work on the combining transmission and the lubrication cooler lines in that area. Since the lube lines to the C-box are large diameter lines, and an inexperienced crewmember can never remember exactly what size they are, he probably brought 3 or 4 large "bonney" wrenches with him (1 1/2", 1 1/4", etc) to preclude multiple trips back to the hangar and the unit's maintenance tool room. He completed his work and wrote up the maintenance. The technical inspector examined his work and signed it off in the logbook. The crewchief returned the tools to the tool room. Neither he nor the tool-room trolls noticed that he didn't return with as many wrenches as he signed out.

"But sir!" you shout from the back of the room, "What kind of preflight did you do if you didn't spot a big honkin' wrench under the driveshaft?"

Well, let me tell you a little bit about that, too.

Aircraft 822 had served as a "backup" aircraft for the missions a few days prior to our field exercise. As such, it had a "daily" inspection performed on it each day by the enlisted crewmembers, and a preflight by the pilots who would potentially have to take the backup aircraft.

When we were assigned to "*Tasmanian Devil*" for the field exercise, it had been dailied and pre-flighted by 3 separate crews. Since the aircraft had been heavily looked over, Rocko and I performed a more-curosry-than-normal daily inspection (commonly called a "look at the big pieces" inspection) and then accompanied the pilots around while they performed their preflight. In all, there were **16** sets of eyes that looked over 822 in a 3 or 4 day span, and nobody saw it a 1 1/4" bonney wrench in the C-box/driveshaft area. One pilot was so thourough that he always used a small inspection mirror to look in the small space under each driveshaft during preflights. Still, nobody saw a thing out of the ordinary. Nothing.

A later examination of the aircraft in the hangar determined that the wrench had probably found its way under the combining transmission, and in flight managed to migrate forward in the driveshaft area. That it wedged itself in the way that it did is nothing short of a miracle.

The moral of this story is clear, however: Attention to detail, or more importantly, a lack of it, can kill you.

In our case, it started with the mechanic and tool room clerk who failed to properly account for the tools. It was furthered by the crews, who became complacent in their inspection routines since other crews had already dailied and preflighted several times.

Ultimately, attention to detail skills are learned through continuous training and reinforcement. In Civil Air Patrol, you have opportunities to train and reinforce with your cadets on nearly a daily basis. Accountability for items, information and eventually individual cadets should teach you the basics, but good reinforcement habits are key to ensure that you've mastered the skills to move from the low-consequence, relatively benign environment and on to more critical and potentially hazardous situations that require a much higher degree of skill and ability.

Oddly enough, the strange story of 822 doesn't end right here.

After replacing the shaft in the field, we flew the aircraft home for repairs to the sheetmetal and replacement of the dented lube lines. We landed and taxied to the maintenance pad outside "The Cathouse," the A Co. hangar. Two or three crewmembers came out to help us tug the aircraft into the hangar so that the maintenance folks could go to work.

While the other guys hooked 822's right-aft wheel up to the tug, I hopped in the cockpit to

release the parking brakes. The tug took up the slack, the left-aft landing gear wheel didn't swivel around like it was expected to, and the cast magnesium trailing link in the left-aft landing gear exploded, collapsing the left aft gear and causing the helicopter to tilt crazily to the left.

There is a **reason** the manual tells you to manually swivel the left-aft wheel with the tow bar in the direction of travel before attaching to the right-aft wheel for towing, and this is it. The aft gear trailing links (the so-called "dogbone") can't handle the torsional stress brought on by attempting to pull 20,000 lbs of helicopter against a tire that's 90 degrees against the direction of travel. The crew got in a hurry trying to get the aircraft inside, failed to follow the approved procedure for towing the aircraft (again, **attention to detail!**) and paid the price.



A rather forlorn 822



SP4 Ninness and a damaged 822

That was the end to a very long and trying day in my Army career. Thankfully, it wasn't the last day of my Army career.

At the time of this incident, Maj Ninness was SP4 Ninness, US Army, and wrapping up a 30-month assignment on the Korean peninsula. He eventually went on to serve another seven years in the Michigan Army National Guard as a helicopter mechanic and crew chief. During his 10 year Army Aviation career, Maj Ninness crewed or worked on every type of Army helicopter with the exception of the UH-60 Blackhawk. This incident was the precursor to his current policy of "I don't fly on nothin' unless look at it first," which makes commercial air travel difficult.

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