

## MAYDAY, MAYDAY, MAYDAY!

“**O**

*n Saturday night January 5, 2002 at 9:30 the EMS helicopter experienced an engine failure. The following narrative provides the details of the flight, the crash, the rescue, and the insights into the post accident activities.*

*We were on a flight from Corpus Christi International Airport to Christus Spohn Hospital in Beeville Texas to transport a critically injured burn patient. The crew consisted of two senior Flight Paramedics – Randy and Mike, and Paul, a seasoned Vietnam-era helicopter pilot who was at the controls.*

*After loading the intubated and unconscious patient we took off from Beeville at 9:29 p.m. turning to a heading of 150 degrees to Corpus Christi. Three minutes into the flight at 1,200 feet AGL Paul called dispatch and gave the required position report. We had a 40 mph tailwind, so the 34 mile flight to Corpus Christi would take only 15 minutes. Two minutes later the engine noise ceased with a corresponding lurch and seemingly instant-*

*aneous abrupt drop from the sky. The engine had quit without any warning! Paul immediately put the bird into autorotation and began a sharp bank to the right to point us back into the wind. He then slowed the aircraft from the 105 knot cruise to 60 knots, and got off a quick call to Damien, one of our experienced dispatchers.*

*During the 7-8 second ride to the ground Randy asked Paul, "Are we going to hit hard?" The response was an immediate, "Oh yes!" Randy said he then looked outside and all he could see were trees everywhere!*

*Randy resumed bagging his patient and said a short prayer.*

*and all he saw was an endless expanse of trees. As an instructor he had shot hundreds of autorotations, many at night, but never with the engine out and into the trees! His experience told him to flare the bird to zero airspeed just above the trees, level the attitude, and as he settled into the trees to pull pitch and pray the trees weren't too tall. His prayers were answered. He fell through, chopping the tops of the trees like a giant lawn mower. Fortunately the aircraft free-fell only about eight feet and stopped very abruptly with a loud crashing sound. He immediately shut off the master fuel switch, rolled off the throttle and engaged the rotor-brake to stop the then-slowly-*



*Paul had turned on his landing light and search light*

*turning blades. No fire, thank God. We missed several large*

*dead trees by mere inches - one to the front and a couple on either side of the aircraft. If we had landed on top of any of those we would have punctured the fuel bladder and probably ended our journey as burnt toast.*

*We crashed in a desolate area, three miles from the nearest road. We were obviously shaken, but without any injury other than sore backs. The patient was still unconscious, and Mike continued to bag her while Randy took the 800MHz radio to an open field 50 yards to the east to establish a rescue-landing zone. The brush was so thick he lost sight of the aircraft after walking just ten feet. We later had to resort to yelling at each other so he could return to the downed aircraft.*

*Fortunately for all of us, five hunters had seen and heard our crash and found us in a few short minutes. They were great guys and were indispensable in extracting the patient. The first emergency person to arrive was a Bee County deputy sheriff. The deputy let Randy use his cell phone to call his family to let them know he was all right. Tears flowed on both sides and I understand there was even a teary-eyed deputy. Baptist Air Life and the Coast Guard were both launched, but the Coasties were recalled when Air Life reported they were ten minutes out. What a sight seeing fellow EMS personnel responding in a time of need. The flight crew and the patient were taken to Christus Spohn Memorial where the four of us were admitted. Many of the staff from the hospital greeted us. What a warm, wonderful*

*welcome following such a harrowing experience.*

*Several classes were provided at a recent HAI HeliExpo. As a result of those classes, our lead Communications Specialist – Stephanie – and Safety Officer – John – had placed a lot of emphasis on our Post Incident/Accident Plan. Their efforts paid off. Upon hearing of the initial call of engine failure the plan rolled into progress and four very lucky souls were plucked from the crash site without major injury.*

*All of us in the EMS helicopter business dread a crash. This incident could have had catastrophic results. Walking away unhurt from a night autorotation into the trees is rare. The entire team performed their assigned duties, support agencies responded correctly, and the story ends happily."*

Again, we must thank a reader for contributing an interesting story. What lessons can we take from this? Was it luck that allowed little damage and no injuries from a night autorotation into trees with

a 40 mph wind?

Murphy's Law is the one that says, "If something bad can happen – it will." Like the Law of Gravity, Murphy's Law seems to always be in effect. But it isn't. Sometime it is simply a matter of chance. If the chances are even between something good or something bad happening, half the time something good will happen – we will be lucky. Perhaps we feel that the bad things occur more often than the good things because we don't pay much attention to the times when something bad could have happened but it didn't. We tend to pay attention to and remember the bad things.

In this story they could have landed on a tree stump but they didn't - they were lucky.

Lee Trevino, the golf professional said "It's amazing how lucky you can be on the golf course when you regularly hit 400 balls on the practice range."

Like Lee Trevino on the golf course, you too can be lucky in your helicopter. You can make your own good luck. Practice does indeed "Make Perfect."

Every non-habitual or non-reflexive action we take is based on a four-step standard process.



We first obtain some data from our surroundings through any of our five senses – sight, smell, taste, feeling, and hearing. We then process the data of interest to turn it into information – or our own understanding of what it means. Third, based on our understanding, we make a decision. And last, we take the action we have decided on.

We use this process every time we take a cognitive action. Sometime this process can take a long time. Such as launching on a flight where the weather is marginal. Or accepting an aircraft for flight that has some technical problems. But quite often this process takes so very little time that it is unnoticeable. For instance, while in cruise at altitude during a day VFR flight, cyclic inputs to keep the desired attitude and heading are almost habitual. You can fly the helicopter with

such ease that you don't even notice that you are continuously using this four-step process to gather data, process it, decide on a cyclic input, and take the action. You have developed that skill to a level that it is automatic.

The best, and perhaps the only way to develop our skills to the levels that they are automatic is through practice and repetition. To be able to hit the spot in an autorotation, or to keep the ILS glide slope and localizer needles centered, or to manipulate a load on a long-line you have got to hone your skills. You simply must practice. The pilot in this story developed his skills long ago in handling a helicopter in autorotation during simulated engine failures.

There is another lesson that we might take out of this story. Prior planning can also improve your luck. Well before this engine failure occurred, this pilot thought

about it. He thought about what he would have to do when a real autorotation came along. He recognized that the chances of a real autorotation terminating on an airport runway were very remote. He also recognized that a real autorotation could happen at night. Consequently, even though he had never before practiced an autorotation to the trees, he knew that if he had to, he would zero out the ground speed and pull all of the collective as he settled into the tops of the trees. He had also made it a rule to set his landing light in a certain position before he took off so that he would not have to mess around with it if he needed it in a hurry.

You too can improve your luck – and perhaps save your life – by practice and prior planning.



## There I Was...



ere are some accounts sent to us by readers.

### Post Maintenance Check Flight

*"We had just completed an annual inspection on a 206L1. It was time to crank it up and see if everything worked OK. I got in and started it up. Ran it at flight idle for a while as the two mechanics who did the work looked for leaks. I rolled it up to 100% rotor rpm and let everything come up and stabilize – temperatures, pressures, etc. Another leak check. Everything looked OK. We must have been running for 5*

*to 10 minutes. Without shutting down, the two mechanics got onboard and we took off. After a few minutes I rolled into a descending tight right turn, and felt something dripping on me. Something from the overhead circuit-breaker panel. The mechanic in the left seat felt it. It was hot, and it was not water. It was transmission oil*

*I was very close to a private airstrip. I immediately entered a descent and made a landing. Just before I came to a hover we began to get some smoke in the cockpit.*

*I shut it down quickly and got everything to a stop and got out of the helicopter.*

*When we pushed the transmission deck inspection door open (the access door on the left side adjacent to the main transmission) oil poured down the left side of the aircraft.*

*I'm not sure how much of the transmission oil we lost – it seemed like a lot. Throughout the flight I never got any indications in the cockpit of a low transmission oil pressure or high temperature.*

*When we disassembled the transmission filter housing we found that the newly installed oil filter O-Ring (preformed packing) had been pinched and cut.*

*I was surprised that the*

*run-up and leak check prior to takeoff did not show a leak."*

## **Transmission Oil Pressure**

*"I was going from Tunja to Bogota in a Bell 212. This is north of Bogota. Only a 45 minute flight. The highest elevation on this route was near 9,000 feet. There was another company helicopter a Mil 17 that was flying the same route. They departed before me, climbed up on top of the cloud layer, and by radio, invited me to do the same. I considered it. It sounded neat. It would be an unusual experience. But I ultimately decided to stay beneath the cloud layer and in sight of the ground. Enroute, and while about 1,000 feet above the terrain, I saw the transmission pressure gage wiggle. At first I thought it was the gage itself. But a minute later the caution/warning lights came on and the pressure gage dropped to zero. I immediately began a descent and was on the ground in about a minute. Our inspection showed a return line had ruptured and I had lost all my transmission oil.*

*It then occurred to me that had I climbed up on top of the clouds I might have had a very nervous descent through the clouds in this mountainous terrain."*

## **River or Trees**

*"This was quite a few years ago. I was stationed at Ft. Benning, Georgia in what was then the 11th Air Assault Division. A UH-1B had come out of maintenance and needed a test flight. I started it up, and with the mechanics, did extensive checks on the ground*



*before I went flying.*

*On takeoff, and about 300 feet above the ground the engine went "Bang" and failed without any prior symptoms. I was faced with two choices – land in the Chattahoochee River or land in the trees. I had never been in a situation like this before. But I can recall that it was a conscious decision to choose going into the trees. I thought a river landing would result in the aircraft sinking before I could get out of it. I knew going into the trees was not going to be good; but I figured I could flare enough to stop my ground speed so that I would fall vertically through the trees. That's what I did, and it worked out just as I had hoped. The aircraft was wrecked pretty good, but I walked away from it."*

## **Weird Feelings**

*"I had dropped off my passenger and was flying from east Texas back to the Dallas*

*area. This was in a 206L. It was a beautiful night. Clear sky and excellent visibility. A bright full moon and lots of stars. I looked up through the rotor disk to look at the stars and moon. Almost immediate a weird feeling came over me. A feeling that is hard to describe. It wasn't exactly fear but it seemed to have something like that in it. I*

*felt tentative, unsure. Nausea was not an apt description; but I did feel unwell. This feeling was strong enough to make me consider making a precautionary landing. Somehow I decided that I should go on the instruments even though it was VFR. I did, and in a little while that weird feeling went away. I don't know for sure what it was. Perhaps it was a touch of flicker vertigo caused by looking at the moon through the rotors.*

*I had a similar feeling flying a CH-47 out of Ft. Sill at night. We were out away from the field, over terrain that had very few lights on the surface. I get that same queasy feeling that I experienced in the 206L. And even though this time I had a copilot, I got on the instruments until the feeling went away. I've never had any other experiences like this, but if I do, the first thing I'm going to do is get on the instruments."*

# YOUR ANSWERS. . . . .

*In our last issue we asked :  
"When you perform your  
preflight check, what  
items do you always  
check?"*



*Here are some of  
your answers.*

## **Human AD.**

*After reading your article  
Volume 14 Number 2 "Mast  
Nut" it really brought home  
the problem of " hoping some-  
one else checked it." I now find  
myself looking up at the mast  
nut on all starts even if I've  
run the helicopter all day.*



*I own my Enstrom 280C for  
years. No matter how rushed I  
felt or how many fuel stops I  
made, I at least checked the main  
rotor head, main rotor blades,  
and tail rotor assembly. I can  
land without an engine, but I  
can't land without blades, espe-  
cially main rotor blades*



*Oil level, drain fuel tank,  
main rotor blades, tail rotor  
blades, pitch links, leaks, fuel  
quantity, engine compartment,  
and fuselage.*



*I am a UH-60 maintenance  
test pilot in the Army so a lot of  
my flights are some form of post-  
maintenance verification flights.  
Because of this, I tend to look at  
aircraft more closely than during  
a normal preflight since there is  
a higher risk of an anomaly such  
as FOD, improper assembly and  
the chance that non-related com-*

*ponents may have been dis-  
turbed. Preflighting the main  
rotor hub assembly is critical to  
me, with a special look at the  
pitch change rod attaching hard-  
ware and main rotor blade pins.  
Other critical areas I always  
check are the tail rotor assembly,  
all of the tail rotor driveshafting  
and support bearings and flight  
control rods for security. The last  
thing I always check is security  
of all access panels to ensure they  
were all closed and secured after  
the preflight.*



*I generally make a habit of  
using the manufacturers check-  
list during my preflight check. I  
believe that all of the items on  
the list are important and the  
manufacturer believes these  
items need to be checked prior to  
each flight. I like to spend a little  
extra time going over tail rotor  
components, checking especially  
for any excessive play in the  
rotor blades connections. Next I  
like to take a little extra time  
checking the main rotor head  
assembly checking for signs of*

*fatigue or cracking especially on  
the underneath inside area of the  
rotor head. Yes, I fly Robinson R-  
2's. I always check the engine oil,  
sump fuel tanks, and make sure  
all antennas, strobe light lens,  
position light lens are secure so  
they will not come off in flight,  
because if they do, we all know  
where they will wind up. IN THE  
TAIL ROTOR.*



*The installation of cotter pins  
- especially those on the main &  
tail rotor components.*



*I have always promoted a full  
preflight check before the day's  
first flight. Then always check  
transmission oil level within 15  
minutes of shutdown. I advise  
our pilots to walk completely  
around the helicopter before each  
startup. Check tail rotor, tie-  
downs off, fuel cap on tight, doors  
closed, etc. I have always main-  
tained you can't do a good pre-  
flight without getting a little dirt*



*on your hands. Been flying helicopters for 48 years and still going strong*



*I am a commercial pilot in Europe and I make it easy for me every time I do the preflight: I just go by the checklist for preflight, checking every single line every time I check the aircraft to make sure I don't forget something, as I think people get lazy when they do the same thing over and over again*



*Fuel, fluid levels, Throttle movement, Mast Nut (now), and Pillows are out.*



*I check the log book to see if there are some discrepancies that could affect the next flight...weight and balance, life jacket for offshore, maps, flash light...*



*As we all know mechanical "things" (helicopters included) have personalities of their own, and as such have particular maintenance quirks that pertain to them only. I own a Rotorway "Exec 90" homebuilt that I constructed. The ship now has over 300 flight hours and is the only helicopter that I fly. Because of this my preflight inspection always consists of two things:*

*A standard preflight as required by the manufacturer and a second list of checks that is particular to my ship.*

*I believe that unique maintenance issues that surface on the ship you fly all the time should be constantly monitored for some time into the future to insure they do not re-occur.*



*Model 47D1 helicopters. Start left front. Look through cross tube for being straight. You should at least see 1/2 hole. Front leg for cracks at skid and cross tube. Hydraulic fluid level. Stand on front cross tube check control bolts...Check oil in engine. Drain both tank and filter sumps - if water drains, carburetor too. Look at intake manifold bolts for tightening. Check front short shaft for movement. Check cables from back cross tube to tail rotor box for frays. Check each bearing on the tailboom and their brackets for cracks. Universal joint for play. Check tail guard at gearbox for cracks. Tail rotor box for oil level. Tail rotor blades for cracks and nicks. Also pitch change links for wear. Check tail boom for cracks. Back right leg for cracks at skid and crossovers. Check shroud for being snapped. Stand on front cross tube hit stab bar with palm of hand to see if it rattles, if it does OK. See if fan belts are tight. Look up make sure Jesus Nut is in place. Look at the main rotor blades for dents*



*Everything that is on the checklist. There is no short cut when you or your passengers lives are at stake.*



*Good article in the last issue. Too bad the guys messed up. I was reminded of my own run in with a mast nut On May 25, 1995 I was scheduled to fly an L4 to the Indy 500 for demos in my region. The L4...had a loose "Jesus Nut" on my preflight inspection. Quite loose actually. I couldn't believe it was even a little loose. I had learned in the Army, "If there is only one thing you check on this ship (Huey), it had better be the Jesus Nut." I had the mechanics verify that I wasn't seeing things, and the ship was quickly pulled into the hangar and got a new mast nut, inspected, and test flown.... As I departed ... I was still a little apprehensive about flying a ship that had had a loose mast nut. ... The rest of my trip was uneventful*



# FLY WITHOUT A MAST NUT?

By Don Maguire Manager Model 206 Product Support Engineering

*In our previous issue Volume 14 Number 2, the feature article detailed a mishap in which a 206B was flown without a mast nut. We received several inquiries about this. Some disbelieved that it could happen. Please read on.*

"Perhaps the following will aid in convincing readers of the facts in the human error accident where the 206B mast nut was not installed. I have personally interviewed a maintainer who was working in the same hangar at the time of the accident, participated in the original investigation and reports the following.

- The main rotor had been installed approximately 1 week earlier with the recommended Corrosion Preventative Compound (CPC) Grade 1 applied to the hub-mast joint. When the hub assembly was originally installed, the mast nut was properly installed and re-torqued, ensuring a tight joint that squeezed out the excess CPC. Considering the warm summer weather at the time, the CPC may have cured slightly, adding some shear strength to the joint. The flap restraint and mast nut had been removed for corrosion removal and re-painting.

- The aircraft hovered for a few minutes and was flown briefly twice before the hub and blade assembly separated in flight. Total time in flight is estimated at 12 minutes.

- There was only one complete 206 in maintenance at the time, and only the one flap restraint and

mast nut was found in the investigation.

- The post crash investigation confirmed that no thread damage was observed on the mast where the nut should have been installed. This observation validates the conclusion that no hub retention nut was installed at the time of the crash.

Factors that contributed to the hub remaining in place may include the following:

- The rotor of the aircraft in



question was unusually smooth for a 206, with lower than normal vertical vibration acting on the splined hub-mast joint.

- The aircraft in question was uncharacteristically light for a 206B, with minimum equipment and furnishings for its intended utility mission role.

- During the brief flights prior to the accident, the aircraft was operated with a crew of two and minimum fuel.

I would also add the following personal experience regarding the shear strength of a CPC-coated mast-trunnion spline joint. Some years ago, while working as a maintainer, I was performing a

scheduled TT strap change, and was required to remove the hub assembly. I had performed the hub overhaul on this aircraft two years earlier and had, as recommended, applied CPC MIL-C-16173 Grade II to the hub and mast joint. After removing the mast nut, I was quite surprised to observe that with the lifting apparatus on the hub, the attempt to remove the hub assembly raised the entire aircraft from the floor, restrained only by the residual shear strength of the CPC on the splines. Ultimately, in order to remove the hub assembly, I re-installed the mast nut loosely, leaving approximately .200 inch gap between the nut and the hub, left the aircraft suspended from the hoist and allowing the weight to break the CPC adhesion. About 30 minutes later, we heard a light pop, and upon checking, found the joint had loosened enough to remove the hub and blade assembly.

As strange as it may be, the facts are clear, the mast nut and flap restraint were not installed, and the cured CPC coupled with drive friction and drag, kept the joint intact for about 12 minutes of flight. I would not wish to submit these circumstances to an intentional test, and highly recommend that all maintainers follow recommended maintenance procedures."

*Don Maguire Manager Model 206 Product Support Engineering*



