

Human Performance in Maintenance

A CASE STUDY

"Too Many Cooks!"

Bell 206

The official cause of this accident states "The improperly secured cannon plug of the N1 tachometer generator became disconnected" But lets look deeper at what the real cause factors are. There was no intent not to secure the cannon plug and the AME, in good faith, felt sure in his mind that he had secured it.

So what happened? Look carefully at all the circumstances, figure out the links in the chain that added up to an error and look carefully at the safety nets that were not in place or could have been in place to prevent the accident.

*We must learn from the mistakes of others,
as we'll never live long enough to make them all ourselves*

Copies of this case study may be made to support this video

**The following case study is part of the video "Too Many Cooks" produced and distributed by
System Safety Services**

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Too Many Cooks (Continued)

Synopsis

The pilot and four passengers, who were all senior company employees and experienced helicopter pilots, departed Coldwater Airstrip for Johnson River. About four minutes after the takeoff, while in normal cruise at 2,000 ft. above sea level (asl), the engine-out audio warning horn sounded. The pilot made a perfect autorotational landing into the ocean. All aboard escaped uninjured and the helicopter was recovered from the water by a heli-logging Super Puma, before it sank.

Inspection of the helicopter and engine after the accident found no cause for the engine to have failed but the cannon plug to the N1 tach-generator was found disconnected and undamaged.

The Night Before

The helicopter had undergone a 100 hour inspection the previous day during which time the N1 tach generator had been replaced. The engineer who had done the work felt sure that he had installed and tightened the cannon plug but he was at a loss to explain how it could have come off only one day after he had installed it.

A careful review of the circumstances at the time the work was done revealed that the AME was the only person working on the aircraft. He was at the end of the inspection when he replaced the tach gen. He was running late and he had an important social engagement that evening. The telephone rang as he was finishing up and he rushed to answer it. It was part of his job to answer the telephone when no one else was around, as it could be a customer looking for a helicopter to charter. The phone call was from his wife who wanted to know why he wasn't home getting ready for their dinner date. After a rather one sided discussion, he promised that he would be home shortly and returned to finish up the 100 hourly. It had been a very long two days getting the machine in shape but it was going to be ready to work the next morning.

The AME completed the paperwork the next day due to his haste to get home and forgot to inform the pilot that he had changed the N1 tach generator.

Company Policy

The company had a policy that the cannon plug, which had provisions for lockwiring, did not have to be lockwired because a tightened cannon plug never comes loose.

Too Many Cooks (continued)

The Pilots

The pilot flying the accident helicopter was the lowest time pilot in the aircraft. When the engine-out warning system activated, he immediately lowered the collective and initiated an autorotation as he had been taught many times before on check rides. On check rides he would also automatically roll off the throttle in order to simulate an engine failure.

He was told to head for the nearest shoreline (which he was). He was told to radio a MAYDAY which he did. At the same time he was being asked where the life jackets were and to call for another helicopter on another frequency. The chief pilot, with over 10,000 hours flying experience, asked the pilot if he was sure that the engine had failed. The pilot pulled up on the collective again and noting the rotor rpm starting to decay, relowered the collective. He was asked to try an in-flight relight but the N1 wouldn't come off zero. The pilot made a gentle autorotational landing in the water but found it difficult to get the blades to stop when he rolled the machine on the water.

The Manufacturer's Safety Net

Bell had issued a Technical Bulletin (#206-82-71) which states that "*failure of the engine N1 tachometer generator causes the engine out audio warning horn to signal an erroneous engine failure, which has occasionally confused the pilot, causing an improper control response. In several recent cases, the N1 tach generator failed and the engine-out warning horn activated. The pilot hearing the horn, surmised he had an engine failure and elected to go with emergency landing procedures. The aircraft autorotated into undesirable terrain.*" The Technical Bulletin goes on to suggest that the fix for the problem is to deactivate the warning horn and placard the instrument panel, with a decal they will provide, that informs the pilot that the engine out warning horn is deactivated.

The Results

This bulletin had been carried out to two months earlier on an aircraft belonging to a different company. This company, within a week of the warning horn deactivation, lost a pilot and aircraft when the engine failed as the pilot was lighting controlled fires by drip torching. With his head out the window, the pilot did not realize the engine had failed until it was too late. The helicopter came down in the fire he had just lit. He died 16 hours later of his burns.

The Super Puma which rescued the survivors and saved the helicopter from a watery grave, crashed less than a month later, killing both pilots when the "barbecue plate" which holds the transmission failed from cracks which maintenance had failed to detect before the "plate" failed catastrophically.