

Unitas Flying Club

Training Operations

Doing the 'Dead-Cut-Check' on the magnetos:

“One of my favourite questions to ask of a student or pilot when going flying is why they do a dead-cut check. I have found that most times the person concerned has very little idea of what they are checking for and why.” – the author.

The dead cut check is performed after start and before shut down for two very different reasons. After starting the engine, you not only want to check for dead cut, but you also want to ensure that you have a smooth-running engine on each magneto. In other words, you do not want to merely whip the key to the off position and back to both again without having a clue as to what you are checking for, and why. The idea is to select each magneto alternately, pausing briefly on the *left* and the *right* magnetos to ensure that each is functioning properly, then all the way to the off position and then back to the *both* position. In other words, at this stage you are not checking the mag-drop limits, but rather that each of the magnetos isn't causing any rough or uneven running of the engine. This check merely prevents you from taxiing all the way to the holding point only then to discover that there is a major problem with a magneto. The dead cut check after start is to ensure that the bendix on the starter motor disengages fully. Some years ago the author personally experienced the consequences of not doing a dead cut check after start when he hurriedly set off in a C210 to beat an approaching storm. On the climb out the pilot noticed an unusually high reading on the ammeter but it subsided after a few minutes. What had in fact happened was that the bendix didn't disengage after start and the engine was now spinning the starter motor flat out. It turned the inside of the starter motor to iron filings in short order. Luckily there was no fire!

The dead cut check just before shutting down is for an entirely different reason. An aircraft ignition system works opposite to a motor vehicle in that when you switch off the key, the wires are connected (earthed). In a motor vehicle, when you turn off the ignition, the wires get disconnected. The reason it is set up this way in an aircraft is so that, should a wire come loose for some reason, the engine will continue running. In a motor vehicle, it doesn't really matter so they opt for the easy option of merely killing the circuit should a wire come adrift. Therefore, just before shutting down an aircraft engine, a dead-cut check is done in order ensure that when the key is in the off position, the electrical circuit is dead. (If there were a loose wire the engine would continue running). The key is then returned to the both position and the engine is shut down by leaning the mixture completely. This starves the engine of fuel and still further reduces the likelihood of the engine bursting into life when the propeller is handled. The ignition key is then switched off and the key removed. You can then be reasonably certain that the propeller area is safe and that the engine will not roar back to life should you now move the propeller in order to attach a tow bar to the nose wheel.

If ever you do a dead cut check and the engine continues running, shut down the engine by pulling the mixture control to idle cut-off, and stand guard at the propeller until someone can bring a large sign to hang on it saying something like "live prop, do not touch". Remember that magnetos have an "impulse coupling" which means that even a tiny movement of the propeller can produce a fully charged spark at the spark plugs, if the propeller is in just the right position. This is why it is relatively easy to hand-swing an aircraft engine to life by merely flicking the propeller. **It is in fact good practise to always treat a propeller as potentially live.**

Doing a dead cut check at low idle reduces the possibility of backfiring. When the ignition is switched off, even briefly, unburned fuel continues to be sucked into the cylinders and will ignite as soon as the ignition is switched on again whereas, at lower RPM, there will be slightly less unburned fuel being sucked into the cylinders. Also, when performing the check, keep the ignition in the off position only very briefly before switching back to both again.

In an aircraft, you should never do something just for the sake of doing it, or because your instructor said so. Rather question exactly why the action needs to be done and fully understand the implications of neglecting the action altogether.