

DAMAGE DURING LANDING GEAR CHECKS

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Damage During Landing Gear Checks

“Great ideas need landing gear as well.” – Chester Douglas Jackson

There is an old saying about great ideas: “Great ideas need landing gear as well.” Those who have heard the saying may recall the wise teacher that bestowed this bit of wisdom. Most people do not realize the message’s intent right away. It isn't just a saying; this piece of intellectual advice (or at least an interpretation of it) applies to aircraft maintenance. We all have great ideas on how to accomplish things, regardless of how large or dynamic they may be. All too often, we overlook important details in our grand scheme of completing the task. The aircraft we work on often has some fine details that get overlooked during initial documentation. Over time, those who write our maintenance publications incorporate these fine details into our manuals as a new step or note of caution. This evolving process incorporates additional risk management and mitigation actions which are leveraged just by following the maintenance publication. Just as important as landing gear is to a pilot, these fine details help us complete maintenance tasks without injuring personnel or damaging aircraft.

While sanitizing an individual safety investigation report (SIR) for a mishap, we stumbled across similar instances during landing gear maintenance evolutions that made clear this is a topic worth discussing in a lesson learned format. Landing gear maintenance evolutions are extremely dynamic and require a significant amount of manpower. Each platform has their own fine details outlined in their maintenance and servicing publications. All of these fine details are important! Always read each step and any note of caution or warning associated with it. Below are a couple examples that illustrate the importance of fine details.

SCENARIO 1

A maintenance team was assigned to perform a jack and cycle of the landing gear on an MV-22 during an operational check. The guiding maintenance publication states in a caution to “ensure all areas around the landing gear are free from obstructions and verify tip doors are secured in the maintenance position. Failure to secure tip doors in maintenance position will cause tip doors to strike the ground and result in aircraft damage.” After the aircraft was successfully lifted, the collateral duty inspector (CDI) leading the maintenance evolution directed the maintenance team to “remove the gear pins.” Two of the maintainers removed the landing gear down-and-lock pins per the CDI’s instruction. The CDI did not physically check to ensure the landing gear down-and-lock pins were removed, but the tip doors’ pins were removed, and the tip doors were secured in the maintenance position. The CDI proceeded to cycle the landing gear which crushed the landing gear doors against the ground. The damaged doors were removed and turned in for repair.



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The technicians' procedural non-compliance and the CDI's failure to physically verify that the tip doors were secured resulted in four extra hours of work for the squadron technicians, added work for supply support personnel, numerous additional hours of work for I-level technicians, and a mission-capable aircraft being in an extended non-mission-capable status for an extended amount of time. This mishap was preventable if at least one of two layers of the maintenance team had performed their task like they were supposed to.

SCENARIO 2

Five maintainers were tasked with checking the installation and rigging of a landing gear door on an EA-18G. A maintenance team, comprised of a CDI, a starboard side and a port side safety observer, an A/M27T-15 hydraulic power test unit (T-15) operator and the cockpit operator, set out to complete the task. The applicable maintenance publication procedure directed the nose landing gear (NLG) right forward door connecting link be disconnected from the bell crank by removing the bolt, washers, bushing, nut and cotter pin and then restraining the door in the open position. The procedure later states to regulate external hydraulic pressure up to 3,000 psi with the warning "to prevent death or injury to personnel or damage to aircraft, make sure door and NLG right door rigid connecting link are restrained in fully open position and area surrounding NLG is clear of personnel and obstructions." The follow-on step is to set the landing gear control handle to the UP position and immediately reduce pressure on external hydraulic power source after NLG drag brace unlocks and starts to retract.

During the procedure, the CDI turned around to assist the T-15 operator, who was having difficulty regulating the pressure from the T-15. Once the pressure was adjusted, the landing gear began to move. Due to being distracted while assisting the T-15 operator, the CDI did not see the landing gear move. Once the CDI was facing the aircraft again, the CDI noticed the NLG right tire had damaged the landing gear door. After noticing the damage, the CDI directed securing the hydraulic and electrical power and the evolution stopped. The damage was repaired at the squadron level, but the possibility that more damage could have occurred or someone could have been injured became readily apparent to the team.

The cumulative cost of the two scenarios was over \$50,000. The last scenario didn't cover the extra maintenance hours to remove damaged components, repair and replace the defective components, the time taken away from other maintenance evolutions (or punching the clock and going home for the day), or the significant damage to stellar reputations as the best maintainers in the squadron.



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KEY TAKEAWAYS

The causal factors for both mishaps were nearly identical. The involved maintenance personnel didn't ensure the area around the aircraft was clear of obstructions or take note of the cautions in the maintenance task—in other words, they overlooked important details. The key takeaway from this lessons learned: pay attention to the fine details. Whether you're working on a helicopter or fixed-wing aircraft, before you cycle the landing gear, verify the area is clear and ensure each procedural task, notes, cautions and warnings are followed. If directors or safety observers can't confidently confirm the area is clear from where they are, don't assume it is safe, have them reposition to verify. Safety observers must view the area they are responsible for and signal that applicable areas are fully clear before taking action to cycle the gear.

Those simple acts of following procedures line-by-line and ensuring clear communication between directors and the entire safety team will improve the outcome of every landing gear maintenance evolution, therefore saving time and unnecessary expenditures (not to mention saving you from having to explain things to your supervisor).

There is another saying evolved from the story about the tortoise and the hare. The saying that rings true every time is "slow and steady wins the race" which has now morphed into "slow is fast, and fast is slow." The latter, more recent phrase, stated differently, means when you go a little slower and follow the procedures to a "T," no rework is required, the chance of an error is reduced and the task gets completed much faster. History shows if technicians do not follow the procedures, errors are more likely to occur, which worse case may injure a teammate or in the best case, damage equipment requiring additional maintenance and more time than it should have taken in the first place.