



NAVAL SAFETY COMMAND

SAFETY AWARENESS DISPATCH



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Amphibious Combat Vehicle Mishaps

In June 2018, the Marine Corps began procuring the Amphibious Combat Vehicle (ACV). The ACV is designed to transport personnel, equipment and supplies ashore from amphibious shipping; execute ship-to-shore and riverine operations; support breaching of barriers and obstacles; and provide embarked infantry with armor-protected firepower, extended communications and mobility on land and sea.



In July 2020, an Assault Amphibious Vehicle (AAV) sank off the coast of California, costing the lives of eight Marines and one Sailor. That tragic event led to the Marine Corps expediting the procurement and fielding of the ACV to replace the aging legacy AAV with a more modern and capable vehicle. The vast enterprise knowledge of Marines who have been operating the AAV for decades was expected to transfer directly to the ACV. However, since training on the new system began, there have been several mishaps on land and in the surf zone that show the knowledge transfer from the legacy platform to the ACV was inadequate to cover safe operating parameters. None of these mishaps caused a death or severe injury, which is a testament to the added safety designs of the new ACV and improved emphasis on egress training, but it is crucial to discuss recent mishaps to better understand the capabilities of the new ACVs.

- While conducting troop transfer procedures in the ocean, an ACV's fire suppression system was unintentionally engaged. The suppression system cut all power to the ACV's engine, which would not restart after multiple attempts. The disabled ACV was rigged for tow by another ACV in an effort to return to shore safely. While maneuvering through the surf zone, one of the tow ropes connecting the two vehicles snapped. Marines on board the towing vehicle disconnected the second tow rope, so they could safely make it to shore. This action left the disabled ACV in the surf zone, where it eventually rolled onto its side due to wave action. Water operations for the ACV ceased until a solution was found for stronger ropes that were more compatible with the vehicle's sea-tow quick release. —*A new vehicle requires new equipment. Using the same old stuff is a recipe for error.*
- While operating an ACV with hatches closed using the Driver Vision Enhancer (DVE), the driver misjudged the side of the road, causing the vehicle to tip onto its side into a six-foot ditch. The vehicle's camera, which provides the video feed to the DVE, is off-center to the starboard side of the vehicle, which causes an offset image to the driver. The offset image and lack of experience operating the newly fielded vehicle placed the driver in a disadvantaged position. The legacy AAV DVE was offset to the port side of the vehicle directly above the driver, while the ACV DVE is offset to the starboard side, requiring operators to be aware of the skewed view to position the vehicle on the road safely. —*We have to ensure we firmly grasp the nuanced differences between the old and new platforms.*
- An ACV unit conducting water operations experienced a rapid deterioration in weather conditions. This sudden change in wave size, littoral current, and visibility due to dense fog contributed to not one but two ACVs tipping in the surf zone. The V-shaped hull that gives the ACV its increased speed makes it somewhat more susceptible to littoral current, which can cause the vehicle to become parallel to the shore. If this occurs, wave action can impact the vehicle broadside faster than the driver can correct with vehicle steering. Enterprise knowledge of the effects of littoral currents on an AAV places operators and supervisors at a disadvantage when assessing how similar currents will affect the ACV (it's not the same). "The lack of knowledge in operating the ACV prevented the unit from conducting time critical risk management" and resulted in the unit "rushing into the surf zone to get to the safety of the beach rather than finding another safe landing location, which could have prevented this dual tipping." —*We don't know what we don't know, and when we recognize that, we must err on the side of caution in training.*

Amphibious Combat Vehicle Mishaps

- During an ACV licensing course, a vehicle tipped onto its side while conducting land driving. The driver was utilizing the vehicle's DVE with their hatch closed. While the driver was maneuvering the vehicle on the prescribed course, they approached a turn on the route and failed to reduce speed. The vehicle's excessive speed did not allow the student to sufficiently maneuver it to avoid the side of a hill, so it drove onto the hill, causing the vehicle to tip onto its side. Additionally, the DVE vehicle width indicators on the DVE screen, which present a visual aid for the driver to know where their vehicle is positioned on a road while driving with hatches closed, were found to be out of alignment. —*The increased speed capability of the ACV is a good thing, but not when you don't slow down for a turn. Leave the street racing in movies and treat the ACV like the tactical vehicle it is.*



- An ACV lost power and stalled near the surf zone while attempting to reach the shore. The crew tried to restart the engine when the vehicle drifted into the surf zone. A littoral current caused it to become parallel to the beach, where waves impacted it broadside, causing it to tip. After tipping onto its side, the crew evacuated the vehicle and it rolled inverted. The vehicle lost power due to fuel starvation in the engine. Before the event, maintenance personnel identified a fault with the vehicle's fuel system, prompting them to turn off one of the external fuel tanks and pump. By turning off the fuel pump, the vehicle only had the fuel available in the "day tank," which depleted and stalled the engine. The previous mishap showed that, even under power, an ACV broadside to a wave has the potential to tip. A vehicle with no power will be more vulnerable to becoming broadside to the waves. —*Ensuring the vehicle has enough fuel to get through the surf is vital. Hitting the gas pedal isn't always a bad thing, but it's useless if you forget to turn the gas on.*

Key Takeaways

Understanding the capabilities and limitations of a brand-new vehicle is vital to safe operations. It is essential to acknowledge that new vehicles will not function like the old ones and recognize those differences. Here are some considerations as we train on this new system:

1. **Take your time.** Understanding what your shiny new toy can and can't do is crucial to using it safely. It can also enable you to get everything you can out of it, maximizing its potential. But to do this, you must understand how all of its systems interact with each other. Experience cannot be surged, it must be developed over time through proper reps and sets.
2. **Resist the *wrong* norm.** How often have you heard, "This is how we've always done it"? Challenge the bad norm and resist the urge to work outside proper procedures. Think safety first. "Because we've always done it that way" is neither official Marine Corps policy nor common sense, which can be an increasingly uncommon virtue.
3. **Luck isn't a superpower.** Not one of the ACV mishaps has caused loss of life or serious bodily injury. Training and rehearsals allowed all Marines to go home. Ensure your units continue to prepare for incidents properly. Effective time-critical risk management and hazard mitigation will aid in preventing the next potentially catastrophic mishap from becoming a reality.

The minimum standard is a starting point... Not a goal!

And remember, "Let's be careful out there"