A Revolutionary Vehicle for the Future

by Colonel Larry Harman

While many technological advances occur in an evolutionary manner, occasionally a revolutionary technology appears on the horizon that creates startling new conditions and profound changes. Such is the case with the privately developed Moller Skycar, which is named after its inventor. With his permission, I would like to discuss the military potential of this vehicle. The ruggedized Moller Skycar variant the military is evaluating is called the light aerial multipurpose vehicle, or LAMV (pronounced "lamvee").

The LAMV is a vertical take-off and landing aircraft that can fly in a quick, quiet, and agile manner. It is a new type of vehicle that combines the speed of an airplane and the vertical take-off capability of a helicopter with some characteristics of a ground vehicle, but without the limitations of any of those existing modes of transportation.

The LAMV is not operated like traditional fixed- or rotary-wing aircraft. It has only two hand-operated controls, which the operator uses to direct the redundant computer control system to carry out desired flight maneuvers. The left-hand control twists to select the desired operating altitude and moves fore and aft to select the rate of climb. The right-hand control twists to select the vehicle's direction and moves side-to-side to provide transverse (cross-wise) movement during the hover and early-transition-to-flight phases of operation; it also moves fore and aft to control speed and braking. Simply put, the LAMV is user friendly.

The LAMV of the future will be 18 feet long, 10 feet wide, and 6 feet high and weigh 2,200 pounds. It will hold four passengers and a payload of 875 pounds (including fuel). The vehicle will have a maximum rate of climb of 6,400 feet per minute and an operational ceiling of 30,000 feet. It will attain a top speed of 390 miles per hour at an altitude of 6,000 feet and a cruising speed of 350 miles per hour at 25,000 feet, and it will have a maximum range of 900 miles at 80 passenger miles per gallon. The LAMV also will be quiet enough to function as an acoustic "stealth" plane at 500 feet. It will have a vertical take-off and landing capability and emergency air-

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frame parachutes, and it will be capable of using different fuels.

Safety, of course, is most important. The LAMV design incorporates a number of safety features. For starters, the LAMV has multiple engines. Unlike any light helicopter or airplane, the LAMV has multiple engine nacelles, each with two computer-controlled Rotapower engines. These engines operate independently and allow for a vertical controlled landing should either fail.

The LAMV features redundant, independent computer systems for flight management, stability, and control. Two airframe parachutes can be deployed in the event of the vehicle's catastrophic failure. With these parachutes, the operator, the soldiers it carries, and the LAMV itself can be recovered safely. The Wankel-type rotary engines are very reliable because of their simplicity. The three moving parts in a two-rotor Rotapower engine are approximately seven percent of the number of parts in a four-cylinder piston engine. Each nacelle fully encloses the engines and fans, greatly reducing the possibility of injury to soldiers who might be near the vehicle in the event of an engine fire or explosion. Multiple systems check fuel for quality and quantity and provide appropriate warnings. The LAMV can land on virtually any solid surface.

The LAMV is aerodynamically stable. In the unlikely event that sufficient power is not available to land vertically, the LAMV's stability and good glide slope allow the operator to maneuver to a safe area before using the airframe parachutes. Since computers control the LAMV's flight during hover and transition, the only operator input is to control speed and direction. Undesirable movements caused by wind gusts are prevented automatically.

The potential economic advantages of the LAMV are worth mentioning. Its fuel-efficient engines and ability to operate on various fuels will lower fuel costs. The LAMV uses one-fourth of the fuel per passenger mile used by the tilt-rotor V—22 Osprey or high performance helicopters. The LAMV's acquisition cost also will be a significant factor in its favor. The LAMV's purchase price per passenger seat is projected to be approximately eight percent of that for the 30-passenger Osprey.

The LAMV's potential military uses will be numerous. They include aerial medical evacuation, aerial reconnaissance, command and control, search and rescue, insertion of special operations forces, air assault operations, airborne operations, forcible-entry operations, military police mobility and maneuver support, communications retransmission, battlefield distribution for unit resupply, transport of individual and crew replacements, weapons platform, noncombatant evacuation operations, battlefield contractor transport, and battle damage assessment.

Consider the LAMV's use in contingency operations. An adversary observing a LAMV would have great difficulty in determining the type of force approaching and that force's destination and intention. If the adversary did realize our intentions, the senior enemy commander would not have time to react. Imagine a forcible entry and early entry force package based in the continental United States that self-deployed overseas in LAMV's. With short halts along the way at seaborne resupply vessels or land-based refueling sites, the force package would reach its objective within hours. This concept would reduce dramatically the Army's dependence on the U.S. Transportation Command for strategic airlift and on the geographical commander in chief for intratheater airlift support. The overall speed of force closure would improve greatly. This would enhance the senior commander's ability to conduct multiple, simultaneous operations in his battlespace with an accelerated operational tempo that precludes the adversary from achieving his goals. Dependence on air and sea ports of debarkation would be reduced.

LAMV will benefit the Army's battlefield distribution concept tremendously because it will be able to move commodities rapidly when and where they are needed across a widely dispersed battlespace. Both air and ground main supply routes (MSR's) would exist throughout the battlespace. The MSR's in the air would change as missions and situations dictate. Eventually, small, multicommodity shipping containers could be designed for transport by either LAMV's or an even more futuristic medium or heavy aerial mobility vehicle. Consider a new type of transportation unit equipped with LAMV's for aerial distribution; many types of land mines used to block convoy movements today would become less of a concern for logisticians and engineers since they could use MSR's in the sky. Or consider moving contractors around the battlespace in LAMV's to perform their tasks. Basically, the LAMV concept promotes a smaller, more agile, and more effective sustainment presence within a supported battlespace.

Consider the LAMV working in unison with the Army's Future Combat System (FCS). The LAMV could become an integral component of the overall concept for employing the FCS . The operator of the LAMV actually could be a member of the FCS crew or unit. In this role, the LAMV would provide multiple benefits—reconnaissance, resupply, medical evacuation, and maintenance support. Perhaps the LAMV itself could become a future combat weapon system platform. Perhaps this innovative technology could force major changes in joint and Army doctrine, training, leader development, organizations, materiel, and soldier programs.

Of course, the LAMV brings with it some obvious challenges. Its limited payload will be a negative factor. Its use will complicate Army airspace command and control. How the LAMV will be used in conjunction with forces under the joint force air component commander will have to be determined. Of course, LAMV support issues also require resolution. For example, operator selection and training, leader training, employment doctrine, LAMV basis-of-issue plans, and LAMV life-cycle management all require the Army's attention.

However, once the LAMV technology matures, its military possibilities are startling. We in the Army combat service support "futures" arena are encouraged by the developments so far and hope that the LAMV will be ready for Army fielding around 2010. The LAMV can become a reality in our Army and possibly in the other armed services as well. Without any doubt, this technological innovation will succeed internationally in the private, commercial, and military sectors. I hope that the U.S. Army will be the first army in the world to embrace and exploit this technology. But sooner rather than later, this aerial vehicle technology will affect all of our lives. It is just over the horizon.

ALOG

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☐ **The privately developed Moller Skycar will be the base model for the military's LAMV.**