U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of the Chief Counsel

800 Independence Ave., S.W.
Washington, D.C. 20591

September 4, 2012

Carol and Brian Carpenter
Rainbow Aviation Services
930 N Marguerite Ave.
Corning, California 96021

Dear Mr. and Ms. Carpenter:

This responds to your e-mail dated May 4, 2012, to Rebecca MacPherson, Assistant Chief Counsel for Regulations. In that e-mail you requested a determination regarding the use of batteries and electric motors in ultralight vehicles operated under the provisions of part 103 of Title 14, Code of Federal Regulations (14 CFR) and whether batteries used to provide power for electric motors should be included in the determination of the empty weight of an ultralight vehicle.

Section 103.1(e) specifies that an ultralight vehicle:

> If powered:
> (1) Weighs less than 254 pounds empty weight, excluding floats and safety devices which are intended for deployment in a potentially catastrophic situation;
> (2) Has a fuel capacity not exceeding 5 U.S. gallons;
> (3) Is not capable of more than 55 knots calibrated airspeed at full power in level flight; and
> (4) Has a power-off stall speed which does not exceed 24 knots calibrated airspeed.

Unlike light-sport aircraft, which are limited to a single reciprocating engine if powered,[1] the parameters for ultralight vehicles found in § 103.1 do not impose a similar restriction. Accordingly, an ultralight vehicle may be powered by an electric motor provided all of the other requirements of that section applicable to powered ultralight vehicles are met.

The FAA does not, however, concur with the assertion in your e-mail that the weight of batteries that provide power to the electric motor of an ultralight vehicle should not be included in a determination of that vehicle's empty weight.

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[1] See 14 CFR 1.1

In the FAA's *Aircraft Weight and Balance Handbook*, FAA-H-8083-1A, the FAA defines empty weight as:

> The weight of the airframe, engines, all permanently installed equipment, and unusable fuel. Depending upon the part of the federal regulations under which the aircraft was certificated, either the undrainable oil or full reservoir of oil is included.

Although batteries may indeed be used to provide power to an electric motor, the FAA does not agree that those batteries should be equated to usable fuel and excluded from an ultralight vehicle's empty weight. Unlike conventional aviation fuels which are depleted after serving as a source of an engine's power, these batteries remain installed in the vehicle during the flight and the weight of the batteries remains virtually the same after they are depleted. Including the weight of batteries that power an electric motor in an ultralight vehicle would permit an ultralight vehicle to carry an unlimited amount of batteries as a power source.

Although the FAA agrees that adequate fuel reserves must be available for safe flight, the FAA, in the Notice of Proposed Rulemaking in which the rules for the operation of ultralight vehicles were proposed, specifically expressed its concern about ensuring that a reasonable fuel limitation for ultralight vehicles be included in the rules. In that notice the agency stated that:

> The FAA is concerned that current or future developments could create a hazardous situation if a reasonable fuel capacity limitation is not specified . . . That maximum capacity would have the practical effect of limiting both the range the vehicle can operate under power and the hazard of fire posed by the ultralight vehicle. Those vehicles are being treated as sport vehicles under the proposal, and their operators are not required to be certificated nor must their operators demonstrate a pilot's knowledge of navigational technique or weather; thus extended range and endurance capability should be reasonably limited. " (46 FR 38475; July 27, 1981).

Permitting no restriction on the amount of batteries that may be carried aboard the aircraft as part of the vehicle's useful load would clearly contradict the original intent of the regulation. Accordingly, an ultralight vehicle may use batteries to power an electric motor; however the weight of those batteries must be included when determining the empty weight of the ultralight vehicle and that empty weight must not exceed 254 pounds.

This interpretation was prepared by Paul Greer, an attorney in the Regulations Division of the Office of the Chief Counsel, and was coordinated with the General Aviation and Commercial Division (AFS-800) of the Flight Standards Service and the Production and

Airworthiness Division (AIR-200) of the Aircraft Certification Service. If you have additional questions regarding this matter, please contact us at your convenience at (202) 267-3073.

Sincerely,

Rebecca B. MacPherson
Assistant Chief Counsel, Regulations Division (AGC-200)
Office of the Chief Counsel