U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: THE ULTRALIGHT VEHICLE
Date: 1/30/84
Initiated by: AFO-820
AC No: AC 103-7
Change:

1. PURPOSE. This advisory circular provides guidance to the operators of ultralights in the United States. It discusses the elements which make up the definition of ultralight vehicles for the purposes of operating under Federal Aviation Regulation (FAR) Part 103. It also discusses when an ultralight must be operated as an aircraft under the regulations applicable to certificated aircraft.

2. BACKGROUND.

a. The number of ultralight vehicles and participants in the various aspects of this sport has increased dramatically in recent years. All indications are that this growth will continue. The presence of these vehicles in the national airspace has become a factor to be considered in assuring the safety of all users of the airspace.

b. On October 4, 1982, a new regulation (Part 103) applicable to the operation of ultralight vehicles became effective. This regulation defines those vehicles which may be operated as "ultralight vehicles" and provides operating rules which parallel those applicable to certificated aircraft. The Federal Aviation Regulations regarding aircraft certification, pilot certification, and aircraft registration are not applicable to ultralight vehicles or their operators.

c. Ultralight vehicle operations may only be conducted as sport or recreational activity. The operators of these vehicles are responsible for assessing the risks involved and assuring their own personal safety. The rules in Part 103 are intended to assure the safety of those not involved in the sport, including persons and property on the surface and other users of the airspace. The ultralight community is encouraged to adopt good operating practices and programs in order to avoid more extensive regulation by the Federal Aviation Administration (FAA).

3. DEFINITIONS. For the purpose of this advisory circular, the following definitions apply:

a. Ultralight Vehicle. This term refers to ultralights meeting the applicability for operations under Part 103.

b. Recognized Technical Standards Committee. This term refers to a group of at least three persons technically qualified to determine whether a given ultralight meets the requirements for operations under Part 103, as follows:

(1) It is recognized by a national pilot representative organization,

(2) It is comprised of persons not directly associated with the manufacture and/or sale of the make of ultralight being inspected, and

(3) It conducts its review and documents the findings in accordance with the guidance provided in this circular.

4. WHAT DOES THIS MEAN FOR THE PERSON WHO WANTS TO FLY UNDER PART 103?

a. You are Responsible for Your Personal Safety. Certificated aircraft are designed, flight tested, manufactured, maintained, and operated under Federal regulations intended to provide an aircraft of consistent performance, controllability, structural integrity, and maintenance. An ultralight vehicle is not subject to Federal aircraft certification and maintenance standards. This means that the costs of purchasing and maintaining an ultralight vehicle may be considerably less than the purchase of a certificated aircraft. There is no assurance that a particular ultralight vehicle will have consistent performance, controllability, structural integrity, or maintenance. Your safety, and potentially that of others, depends on your adherence to good operation and maintenance practices. This includes proper preflight techniques, operation of the vehicle within the manufacturer's recommended flight envelope, operation only in safe weather conditions, and providing safety devices in anticipation of emergencies. Part 103 is based on the assumption that any individual who elects to fly an ultralight vehicle has assessed the dangers involved and assumes personal responsibility for his/her safety.

b. You are Limited to Single-Occupant Operations. Part 103 is based on the single-occupant concept; operation by an individual who has assumed all responsibility for his/her personal safety. Pilots of ultralight vehicles subject to Part 103 are not required to have training or previous experience prior to the operation of these vehicles. You should consider receiving adequate training prior to participation.

c. You are Limited to Recreation and Sport Purposes. Operations for any other purpose are not authorized under the applicability of Part 103.

d. You are Limited as Necessary for the Safety of Other Persons and Property. Part 103 consists of operating rules which were determined necessary for the safety of other users of the airspace and persons on the surface. These rules were developed in consideration of the capabilities of the vehicles and their pilots. It is your responsibility to know, understand and comply with these rules. Ignorance of the regulations pertaining to the activities you pursue is not an acceptable excuse for violating those regulations.

e. You are Responsible for the Future Direction the Federal Government Takes With Respect to Ultralight Vehicles. The actions of the ultralight community

will affect the direction Government takes in future regulations. The safety record of ultralight vehicles will be the foremost factor in determining the need for further regulations.

5. FAA CONTACT POINTS. The FAA will provide clarification of particular subject areas, information, and assistance pertaining to the operations of ultralight vehicles through the following contacts:

a. Flight Standards Field Offices. Flight Standards District Offices (FSDOs), General Aviation District Offices (GADOs), and Manufacturing and Inspection District Offices (MIDOs) are the FAA field offices where information and assistance are available regarding the operation of ultralight vehicles, acceptable methods of complying with Part 103 requirements, and compliance with other regulations should it become necessary to operate an ultralight as a certificated aircraft.

b. Air Traffic Control Facilities. FAA Air Traffic Control facilities are located throughout the United States and maintain jurisdiction over the use of the controlled airspace in their particular area. To obtain authorization to operate from or into the airspace designated in § 103.17, contact must be made with the controlling facilities.

c. Flight Service Stations. These facilities provide operational information to pilots, such as weather briefings, advisory information regarding the status of facilities, etc., and are the most accessible of the FAA points of contact. They can provide additional information regarding how to reach the other points of contacts mentioned here.

d. Airports District Offices. These offices inspect airports certificated under Part 139 of the FARs to determine whether an airport is safe for public use. Persons wanting to establish new airports or flight parks, or operate ultralight vehicles from Federally-funded airports, may contact these offices for assistance.

6.-9. RESERVED.

SECTION 1. WHAT IS AN ULTRALIGHT VEHICLE?

10. SCOPE AND CONTENTS. This section discusses the elements contained in § 103.1 which make up the definition of an "ultralight vehicle" and the proper way to assure that Part 103 applies.

11. APPLICABILITY OF PART 103.

a. Probably the single most critical determination which must be made is whether or not your vehicle and the operations you have planned are permitted under Part 103. The fact that you are operating a vehicle which is called or advertised as a "powered ultralight," "hang glider," or "hang balloon" is not an assurance that it can be operated as an ultralight vehicle under Part 103. There are a number of elements contained in § 103.1 which make up the definition of the "ultralight vehicle." If you fail to meet any one of the elements, you may not operate under Part 103. Any operations conducted without meeting all of the elements are subject to all aircraft certification, pilot certification, equipment requirements, and aircraft operating rules applicable to the particular operation.

b. The FAA realizes that it is possible to design an ultralight which, on paper, meets the requirements of § 103.1, but in reality does not. However, the designers, manufacturers of the kits, and builders are not responsible to the FAA for meeting those requirements. Operators of ultralights should bear in mind that they are responsible for meeting § 103.1 during each flight. The FAA will hold the operator of a given flight responsible if it is later determined that the ultralight did not meet the applicability for operations under Part 103. Be wary of any designs which are advertised as meeting the requirements for use as an ultralight vehicle, yet provide for performance or other design innovations which are not in concert with any element of § 103.1. The FAA may inspect any ultralight which appears, by design or performance, to not comply with § 103.1.

c. If the FAA Determines Your Ultralight Was Not Eligible for Operation as an Ultralight Vehicle. If your ultralight does not meet § 103.1, it must be operated in accordance with applicable aircraft regulations. You will be subject to enforcement action ($1000 civil penalty for each violation) for each operation of that aircraft.

12. ELEMENTS MAKING UP THE DEFINITION OF AN ULTRALIGHT VEHICLE.

a. Single Occupancy. An ultralight cannot be operated under Part 103 if there is more than one occupant or if it has provisions for more than one occupant.

b. Sport or Recreational Purposes Only. An ultralight cannot be operated under Part 103 if it is operated for purposes other than sport or recreation or if it is equipped for other uses.

c. No Airworthiness Certificate. An ultralight cannot be operated under Part 103 if it has been issued a current U.S. or foreign airworthiness certificate.

d. Unpowered Vehicles. An unpowered ultralight cannot be operated under Part 103 if it weighs 155 pounds or more. Balloons and gliders are unpowered vehicles.

e. Powered Vehicles. A powered ultralight cannot be operated under Part 103 when it has an empty weight of 254 pounds or more; has a fuel capacity exceeding 5 U.S. gallons; is capable of more than 55 knots airspeed at full power in level flight; and has a power-off stall speed which exceeds 24 knots.

13. SINGLE OCCUPANT.

a. The Rationale for Allowing Single-Occupant Operations Only. One aspect of the rationale for allowing ultralight vehicles to operate under special rules which do not require pilot and aircraft certification is the single-occupant limitation. The assumption is made that a person who elects to operate an uncertificated vehicle alone is aware of the risks involved. This assumption does not necessarily hold true for a passenger. Because the pilot qualifications for ultralight vehicle operations are not Federally controlled or monitored, the single-occupant requirement is a necessary component to the continuation of the policies and regulations which allow the operation of ultralight vehicles free from many of the restrictions imposed on the operation of certificated aircraft.

b. Guidelines Regarding Seating Arrangements Which Should be Considered when Purchasing or Operating an Ultralight Vehicle.

(1) Any provisions for more than one occupant automatically disqualify an ultralight for operations under Part 103.

(2) Some powered ultralights were originally manufactured with bench or "love" seats with only one seatbelt, but have been advertised as two-place in the ultralight periodicals. They are not eligible for operations under Part 103. While no maximum width standards for the size of a "single" seat have been established at this time, most manufacturers are providing seats which have a width of 18 to 22 inches. Any seat notably wider than 22 inches raises a question as to whether the ultralight is intended for single occupancy.

(3) An ultralight with provisions for more than one occupant can only be operated as a certificated aircraft, even when occupied by only one person. In addition to the previously stated aircraft certification and registration requirements, the pilot must hold a medical certificate and at least a student pilot certificate with the proper endorsements for solo operations. At least one occupant during two-occupant operations must hold at least a private pilot certificate.

c. Two-place Ultralight Operations under Part 103. The AOPA Air Safety Foundation, Experimental Aircraft Association, and the United States Hang Gliding Association have been granted exemptions from the applicable aircraft regulations to authorize use of two-place ultralights under Part 103 for limited training purposes and for certain hang glider operations. Except as authorized by exemption, no person may operate an ultralight under Part 103 with more than one occupant.

14. RECREATION AND SPORT PURPOSES ONLY (§ 103.1(b)).

a. The Rationale for Only Allowing Recreation and Sport Operations Under Part 103. In combination with the single-occupant requirement, the limitation to recreation and sport operations only is the basis for allowing ultralight vehicle operations under minimum regulations. The reason for allowing the operation of these vehicles without requiring aircraft and pilot certification is that this activity is a "sport" generally conducted away from concentrations of population and aircraft operations.

b. Determining Whether a Particular Operation is for Recreation and Sport Purposes. There are several considerations that are necessary in determining whether a given operation is conducted for recreation or sport purposes:

(1) Is the flight undertaken to accomplish some task, such as patrolling a fence line or advertising a product? If so, Part 103 is not applicable.

(2) Is the ultralight equipped with attachments or modifications for the accomplishment of some task, such as banner towing or agricultural spraying? If so, Part 103 does not apply.

(3) Is the pilot advertising his/her services to perform any task using an ultralight? If so, Part 103 does not apply.

(4) Is the pilot receiving any form of compensation for the performance of a task using an ultralight vehicle? If so, Part 103 does not apply.

c. Examples of Operations Which are Clearly Not for Sport or Recreational Purposes.

(1) Aerial Advertising. Part 103 does not apply to operations that include the towing of banners and the use of loudspeakers, programmed light chains, smoke writing, dropping leaflets, and advertising on wings; nor does it apply to the use of interchangeable parts with different business advertisements or flying specific patterns to achieve maximum public visibility.

(2) Aerial Application. Part 103 does not apply to operations that include using an ultralight to perform aerial application of any substance intended for plant nourishment, soil treatment, propagation of plant life or pest control. An ultralight with an experimental certificate as an amateur aircraft could be used to perform this function under specific, limited circumstances. Paragraph 35b provides more detail on this subject.

(3) Aerial Surveying and Patrolling. Patrolling powerlines, waterways, highways, suburbs, etc., does not come under Part 103. The conduct of these activities in an ultralight must be in compliance with applicable aircraft regulations as outlined in paragraph 34. Local, state, or Federal government entities may operate an ultralight as a "public aircraft." This is discussed in greater detail in paragraph 35a.

(4) Carrying parcels for hire.

d. Examples of Situations Involving Money or Some Other Form of Compensation Allowable Under the Recreation and Sport Limitation.

(1) Rental of Ultralight Vehicles. Renting an ultralight vehicle to another person is permissible.

(2) Receiving a Purse or Prize. Persons participating in sport or competitive events involving the use of ultralights are not prohibited from receiving money or some other form of compensation in recognition of their performance.

(3) Authoring Books About Ultralights. Persons are not prohibited from flying ultralights and then authoring books about their experiences, for which they ultimately receive compensation.

(4) Receiving Discount on Purchase of an Ultralight. There is no prohibition which would prevent you from taking advantage of any discount on the price of an ultralight a company might offer where its logo or name appears on a portion of the vehicle. You cannot, however, enter into any agreement which might specify the location, number, or pattern of flights contingent on the receipt of that discount. Any operation under such an agreement could not be conducted under Part 103.

(5) Participation in Airshows and Events. You may participate in airshows and other special events where persons are charged for viewing those events, so long as you receive no compensation for your participation. This does not hold true where you stand to benefit directly from the proceeds as the organizer or producer of the event.

15. AIRWORTHINESS CERTIFICATE (§ 103.1(c).

a. If your ultralight has been issued an airworthiness certificate, you cannot operate it as an ultralight vehicle under Part 103. An ultralight cannot be operated interchangeably as a certificated aircraft and an ultralight vehicle.

b. If you want to operate your ultralight under Part 103, you must turn in, to the issuing authority, any airworthiness certificates currently issued for the craft.

c. You may operate an ultralight as a certificated aircraft if you obtain the proper certification. If you do not already hold an airworthiness certificate, you should consult paragraph 31 for further guidance.

d. An ultralight is eligible for operation under Part 103, even where the same make and model is also being issued airworthiness certificates, so long as a all elements of the definition of an ultralight vehicle contained in § 103.1 are satisfied. As an example, assume that there is a model which would meet the definition of an ultralight vehicle being manufactured in Canada and is issued a Canadian airworthiness certificate. If you purchased one, you would have to turn in the airworthiness certificate to the Canadian authorities before operating it in the United States under Part 103.

16. UNPOWERED ULTRALIGHT VEHICLES.

a. Unpowered Ultralight Vehicles Eligible for Operation Under Part 103. All forms of gliders and free balloons weighing less than 155 pounds and meeting all other requirements of § 103.1 are eligible for operation under Part 103.

b. Unpowered ultralights eligible for operations under Part 103 are not required to be operated under that Part. In some cases, you can obtain certification of your glider or free balloon as an experimental aircraft.

c. Computing the Empty Weight of an Unpowered Ultralight Vehicle.

(1) Gliders. The fuselage, wings, structure, control surfaces, harnesses, and landing gear, etc., are included in this determination. Parachutes and all personal operating equipment and harnesses associated with their use are not included.

(2) Free Balloons. The envelope, lines, harnesses, gondola, burner, and fuel tank are included in this determination. Parachutes and all personal operating equipment and harnesses associated with their use are not included. The weight of the fuel, in the case of a hot-air balloon, or any logical amount of removable ballast, when intended for control of the buoyancy of a gas balloon, is not included in the weight specified in § 103.1(d).

d. Free Balloons are Considered "Unpowered." A balloon, for Part 103 eligibility, is considered an unpowered ultralight, regardless of whether it drops ballast to ascend or uses heated air. The burner on a hot-air balloon is used to raise the temperature of the air in the envelope allowing the balloon to rise. This can be compared to the glider's use of lifting air as a means of ascending. In both cases, no method of horizontal propulsion is employed and a loss of the lifting force will cause the vehicle to descend to the surface.

17. POWERED ULTRALIGHT VEHICLES.

a. "Powered" Ultralights Eligible For Operation Under Part 103. All ultralights with a means of horizontal propulsion which also meet the provisions of § 103.1 are eligible; this includes ultralight airships, helicopters, gyrocopters, and airplanes.

b. A powered ultralight eligible for operation under Part 103 is not required to be operated under that Part. You may elect to certificate and operate it as an experimental aircraft. The applicable procedures and regulations are explained in Advisory Circular 20-27C, Certification and Operation of Amateur-Built Aircraft.

18. POWERED VEHICLE WEIGHT.

a. Items Excluded From the Computation of the Empty Weight of a Powered Ultralight Vehicle.

(1) Safety Devices Which are Intended for Deployment in a Potentially Catastrophic Situation. Parachutes and some associated additional equipment

necessary for their operation meet this criteria. Other devices, such as seatbelts, roll cages, instruments, or wheel brakes, are considered part of the airframe and are included in the empty weight.

(i) Up to 24 pounds of weight associated with the parachute system may be excluded by the FAA without requiring a separate weighing of the system components.

(ii) No weight allowance will be given for any component of the parachute system if, when it was operated, the parachute was not carried and attached to the ultralight at the reinforced points/fittings provided.

(2) Floats Used For Landings On Water. Only the weight of the floats and any integral, external attachment points are excluded. All other items associated with attachment of the floats to the airframe are included in the vehicle's empty weight. Up to 30 pounds per float may be excluded by the FAA without requiring substantiation of the float's actual weight. This exclusion was allowed under the rationale that float-equipped ultralights would not usually be operated in the vicinity of airports and large concentrations of people and, thus, would be even less of a safety hazard than those which had conventional landing gear. While amphibious capability would appear to negate somewhat that rationale, some allowance for the "float" capability is made.

(i) Amphibious Floats. Up to 30 pounds per float may be excluded by the FAA. The weight of all attached items associated with the installation and operation of the landing gear is included in the calculation of the dry, empty weight specified in § 103.1(e)(1). Satisfactory evidence of the weight of those components must be available.

(ii) Amphibious Fuselage. Where the fuselage is intended to function as a float during water landings, up to 30 pounds (the average weight of a single float) is allowed by the FAA to be excluded from the empty weight where the ultralight is capable of repeated water takeoffs and landings. (Operators may be required to demonstrate the water operational capability of their vehicle in order to receive an allowance for the added weight.) Up to 10 pounds per outrigger float and pylon is also allowed by the FAA.

(iii) "Float" provisions not discussed here should be reviewed with FAA personnel at a Flight Standards field office.

b. Acceptable Methods for Determining the Weight of an Ultralight. The completely assembled ultralight should be taken to a draftless location and placed on:

(1) A Single Scale. A determination may be made on a calibrated scale which has sufficient weighing surface to accommodate the ultralight resting fully on that surface without any stabilizing assistance, or

(2) Two or More Scales. A determination may be made on two or more calibrated scales if they are located at all points where the ultralight contacts the surface when parked and it is resting fully on those scales without any stabilizing assistance. In this case, the sum of the scales will be used.

19. MAXIMUM FUEL CAPACITY OF A POWERED ULTRALIGHT VEHICLE. The maximum fuel capacity for a powered ultralight vehicle is 5 U.S. gallons. Any powered ultralight with fuel tank(s) exceeding this capacity is ineligible for operation as an ultralight vehicle.

a. Determination of Fuel Capacity. The total volume, including all available space for usable and unusable fuel in the fuel tank or tanks on the vehicle is the total fuel capacity. The fuel in the lines, pump, strainer, and carburetor is not considered in a calculation of total volume.

b. Use of an Artificial Means to Control Capacity.

(1) Tanks which have a permanent standpipe or venting arrangement to control capacity are permitted, but may be subject to demonstration of the capacity if there is any reason to doubt that the arrangement is effective.

(2) A temporary, detachable, or voluntarily-observed method for restricting fuel capacity, such as a "fill-to" line, is not acceptable.

20. MAXIMUM LEVEL FLIGHT SPEED OF A POWERED ULTRALIGHT VEHICLE. The maximum speed of an ultralight vehicle at full power in level flight cannot exceed 55 knots.

a. The 55 knots specified in § 103.1(e)(3) is a performance limitation, not a speed limit. It is not a speed limit that a pilot has to observe. The vehicle, as configured (exposed drag areas, engine power output, and propeller efficiency), cannot be capable of driving through the air in level flight at full power faster than 55 knots. It is also not a structural never-exceed speed (Vne). The vehicle may well be structurally capable of higher airspeeds.

b. The use of "voluntarily observed" or arbitrarily specified maximum airspeeds, such as a red line on the airspeed indicator, is not acceptable where the ultralight is capable of more than 55 knots in level flight.

c. Acceptable Methods of Determining the Maximum Level Flight Airspeed of an Ultralight.

(1) A calculation, using the information in Appendix 1, is an acceptable method for making this determination.

NOTE: The engine manufacturer's maximum horsepower rating will be used for all computations associated with maximum level flight speeds (unless the operator can provide documentation from the engine manufacturer that a method of derating an engine will result in a predictable reduction in horsepower).

(2) A series of three or more full-power level runs in both directions along a 1,000-foot course under specified conditions could be used by a recognized technical standards committee to make this determination. The average speed derived should be adjusted for atmospheric conditions other than sea level on a standard day.

NOTE: While these guidelines contain provisions allowing flight testing to establish eligibility for operations under Part 103, the FAA has provided charts in Appendixes 1 and 2 which encompass most normal aircraft design factors without requiring flight testing. Any flight testing to establish eligibility for operations under Part 103 is done at the risk of the participants.

(3) A calibrated radar gun may also be used. Again, a series of full-power level runs as described in subparagraph c(2) could be used by a recognized technical standards committee to make this determination.

d. Use of an Artificial Means to Limit the Maximum Level Flight Airspeed.

(1) An artificial means of restricting the total power output of an engine in order to lower the maximum level flight speed at full power would be acceptable if the method used to restrict the power available is one which cannot be modified, bypassed, or overridden in flight and the pilot or operator can provide the FAA, on request, satisfactory evidence that the vehicle meets the requirement of § 103.1(e)(3).

NOTE: Vehicles which require artificial restrictions to power or propeller arrangements may incur a substantial penalty in terms of takeoff, climb, and absolute performance. This factor should be considered when assessing the safety of ultralight vehicle operations, especially at high altitude locations.

(2) As a general guideline, a method is unacceptable if it can be modified, bypassed, or overridden in any way while sitting in the pilot seat so as to further increase the power. There may be some ultralights which could be operated as ultralight vehicles if such restrictions are employed to meet the requirements of § 103.1(e)(3). If you change or modify the restricting elements, your vehicle may be ineligible for use under Part 103.

(3) The use of voluntarily-observed restrictions, such as a lower power setting, instead of using all available power, is unacceptable.

e. Use of a Less Efficient Propeller/Shaft Arrangement. The use of a less efficient propeller/shaft arrangement to lower the maximum level flight speed at full power is acceptable, if the operator or pilot can provide the FAA, on request, satisfactory evidence that the vehicle meets the requirements of § 103.1(e)(3). If you change or modify that arrangement to increase the efficiency, your vehicle may be ineligible for use under Part 103.

f. Use of an Aerodynamic Restriction. The use of an aerodynamic restriction, such as a limiting device to pitch control travel on a canard arrangement, automatically deployed speed brakes, or a strut installed for drag purposes only, is acceptable, provided a recognized technical standards committee has evaluated the resulting maximum full-power level flight speeds at a pilot weight of 170 pounds and determined that the vehicle is not capable of maintaining level flight above 55 knots. (Again, modification of that arrangement may render the vehicle ineligible for use under Part 103.)

NOTE: Vehicles using aerodynamic restrictions to limit maximum speed may have undesirable flight characteristics when operated near the controllability limits.

21. MAXIMUM POWER-OFF STALL SPEED OF A POWERED ULTRALIGHT VEHICLE. The maximum power-off stall speed of an ultralight vehicle cannot exceed 24 knots (28 mph).

a. Acceptable Methods of Determining the Power-Off Stall Speed of an Ultralight Vehicle.

(1) A calculation, using the information provided in Appendix 2, is an acceptable method of providing satisfactory evidence that your vehicle meets this requirement.

NOTE: For the purpose of all stall speed calculations, the pilot's weight will be considered to be 170 pounds and the fuel tank(s) filled (6 lbs./gal.).

(2) This speed can also be determined by a recognized technical standards committee which can take the average speed from a series of power-off stalls using existing flight test procedures.

b. Use of High-Lift Devices to Lower Stall Speed to 24 Knots. Slots, slats, flaps, and any other devices which would lower the stall speed are acceptable. A determination of the resulting average stall speed by a technical standards committee is acceptable evidence of compliance.

22. DOCUMENTATION OF A TECHNICAL STANDARDS COMMITTEE'S FINDINGS. If an ultralight is found by a recognized technical standards committee to meet the requirements of § 103.1 with respect to the items specified in paragraphs 18 through 21, the committee should issue a document confirming its findings. (See Appendix 4 for an example of this documentation.)

23. CONTENTS OF THE DOCUMENT. To be acceptable, the document will contain, as a minimum, the:

a. Name and address of the person requesting the determination.

b. Type/model and general description of the ultralight, including any installed equipment.

c. Empty weight of the ultralight, showing the allowances given for parachutes, floats, and fuel, and how it was determined.

d. Fuel capacity and how it was determined.

e. Maximum speed at full power in level flight and how it was determined, including a description of any method incorporated to limit the power or thrust output or the ability of the vehicle to fly in level flight at more than 55 knots. (This description should allow an inspector reviewing the document to determine that the limiting devices are still operational.)

f. Maximum power-off stall speed and how it was determined, including a description of any lift devices used.

g. Typed or printed names of the committee members, their signatures, and the name of the organization which recognizes their committee.

24. CONTACTS WITH FAA INSPECTORS. Most ultralight operators will probably only encounter FAA field inspectors during accident, incident, or public complaint investigation. On initial contact, the inspector will usually ask for your pilot certificate and the aircraft airworthiness certificate. You should inform the inspector that you are operating your ultralight under Part 103 and provide evidence that it meets the applicability of § 103.1.

a. Failure to Provide Satisfactory Evidence. If you cannot provide this evidence, or if the evidence provided is not satisfactory, your ultralight will be considered an aircraft subject to all applicable aircraft regulations and you will be subject to all requirements applicable to the operator. It is your responsibility to prove that your ultralight and any operations you may have conducted meet the applicability for operation under Part 103. Until you do, the FAA will proceed with any enforcement investigation resulting from your inability to provide that proof.

b. "Satisfactory Evidence."

(1) The use of the graphs provided in Appendixes 1 and 2 will be acceptable for determination of the maximum level flight speed and power-off stall speed if your ultralight has no special limitations to maximum speed or power and no special high-lift devices.

(2) An FAA-certificated aircraft mechanic or repair station may also weigh your ultralight and provide a weight document similar to that provided for aircraft, listing the components and attachments of the ultralight when weighed. An FAA-certificated mechanic may also make the determinations in paragraphs 18 through 21 and issue the documentation outlined in paragraph 23, provided that the maximum speeds were determined through the use of the graphs provided in Appendixes 1 and 2.

(3) A recognized technical standards committee's findings documented as provided in paragraph 23 will usually be considered acceptable. A committee may issue their findings in relation to a given model of ultralight which are then included by the manufacturer in the sale of the ultralight. The subsequent operators of that model of ultralight may use those findings without having another inspection made, provided that there are no changes or modifications to the configuration, components, engine, or propeller arrangements of the basic model originally reviewed by the committee and any artificial means of restricting maximum airspeed is installed and operational.

c. FAA Ultralight Inspection Authority. The FAA has the legal authority to inspect any ultralight, whether it is operated as an aircraft under Part 91 or as an ultralight vehicle under Part 103. In the case of an ultralight operated under Part 103, this authority will usually be exercised only when an inspector has reason to doubt the validity of the evidence provided by the operator or that the ultralight still conforms to the findings contained in that evidence.

(1) Refusual to Allow the Inspection. Refusal to allow the inspector to inspect the ultralight would be a violation of the Federal Aviation Act of 1958, as amended, and the applicable FAR, and would result in enforcement action.

(2) Usual Content of the Inspection. The inspector may ask you to show compliance with § 103.1 by measuring the capacity of the fuel tank, weighing the vehicle, measuring the wing, stabilizing and control surface areas, and showing that any artificial means required to restrict the maximum airspeed are installed, operational, and cannot be bypassed. Further checks may be made in situations where the inspector has reason to doubt the effectiveness of any restriction to maximum airspeed.

25.-29. RESERVED.

SECTION 2. HOW TO CERTIFICATE AND OPERATE AN ULTRALIGHT AS AN AIRCRAFT

30. SCOPE AND CONTENTS. This section outlines the regulations which are applicable to the operation of ultralights as certificated aircraft and provides general information regarding how to comply with the regulations.

31. AIRCRAFT CERTIFICATION. A person who chooses to operate an ultralight as a certificated aircraft has two options for airworthiness certification of the vehicle, depending primarily on the configuration of the vehicle or kit when purchased, as follows:

a. Completely Assembled at the Factory, or Assembled by the Purchaser From a "Bolt-Together" Kit With Little or No Fabrication Operations. An ultralight in this category would be eligible for airworthiness certification only for the purpose of exhibition in the experimental classification. Application for an experimental certificate for exhibition may be made to the nearest Flight Standards field office.

b. Major Portion (Over 50%) Fabricated by the Builder/Purchaser, Either from Raw Materials to the Builder's Own Design or From a Partially Prefabricated Kit. A vehicle shown to meet the provisions of this category would be eligible for airworthiness certification as an amateur-built aircraft, in addition to eligibility for experimental exhibition. Detailed information pertaining to amateur-built aircraft requirements are in FAA Advisory Circular 20-27C, Certification and Operation of Amateur-Built Aircraft. Applications for such certification may be made to the nearest Flight Standards field office.

32. REGISTRATION. An ultralight that is to be certificated and operated as an aircraft is subject to the registration and marking requirements applicable to aircraft. The applicant should contact the nearest Flight Standards field office to obtain the required forms and information concerning the procedures to be followed. Advisory Circular 20-27C also contains information concerning registration and marking requirements as they apply to amateur-built aircraft.

33. PART 61 (CERTIFICATION: PILOTS AND FLIGHT INSTRUCTORS). Part 61 of the Federal Aviation Regulations contains the regulations which define the certificates and ratings which pilots must hold to function as a pilot of a certificated aircraft in the United States. It also outlines the minimum experience levels and standards to qualify for those certificates and ratings. The minimum levels of pilot currency for certain operations are also contained in Part 61.

34. PART 91 (GENERAL OPERATING AND FLIGHT RULES). Part 91 contains the general operating rules (Subpart A), flight rules (Subpart B), and maintenance rules (Subpart C) which are applicable to all certificated aircraft operations. Pilots of certificated ultralight aircraft must comply with Part 91. No certificated aircraft can be operated under Part 103. The flight rules of Subpart B are the minimum standards for flight operations except where the operating limitations of the particular aircraft establish more stringent standards. The majority of the rules contained in Subpart A and Subpart C will not apply to operations of certificated ultralight aircraft; however, a thorough review of these regulations

should be conducted to determine those applicable to a particular type of ultralight aircraft.

35. SPECIAL FLIGHT OPERATIONS. There are some special operations of ultralight aircraft that are allowed under present regulations.

a. "Public" Aircraft. An ultralight may be used exclusively in the service of a Federal, state, or local government without an airworthiness certificate. (The pilots do not have to hold pilot certificates.)

(1) The ultralight must be properly registered with the FAA and display appropriate registration markings, and

(2) All operations must be conducted in accordance with the applicable operating and flight rules of Part 91.

b. Aerial Agricultural Application. A farmer owning an amateur-built experimentally certificated aircraft may use that aircraft for aerial agricultural applications over his/her own property, provided that,

(1) The ultralight is certificated as an amateur-built aircraft and does not have any operating limitations prohibiting agricultural operations;

(2) The pilot holds at least a private pilot certificate and successfully completes a knowledge and skill test as specified in § 137.19(e); and

(3) The farmer holds at least a Private Agricultural Operator Certificate under Part 137 and all operations are conducted in accordance with that regulation.

36.-50. RESERVED.

Kenneth S. Hunt
Director of Flight Operations

APPENDIX 1. DETERMINING MAXIMUM LEVEL FLIGHT AIRSPEED OF ULTRALIGHTS.

The information contained in this appendix is intended to assist in a determination of an ultralight's capability to comply with Section 103.1(e)(3). The maximum speed of an ultralight as computed with this information may be accepted as a portion of the "satisfactory evidence" specified in Section 103.3(b). When using this information, no additional drag factors should be considered and no extra value should be given any of the factors provided. There is already a "cushion" built into the computation to account for the factors affecting the maximum speed capability of an ultralight. No drag-producing element should be counted under more than one drag factor category.

STEP ONE - Compute the total drag factor (See page 2 for further breakdown of the values assigned to each category.)

1. Pilot Drag Factor (Select one)..... _____

   *Not Enclosed
   - -prone..... 1.2
   - -supine..... 4.5
   - -seated upright..... 5.5

   *Partially Enclosed
   - -lower half of body enclosed..... 3.5
   - -only head exposed..... 2.5
   - -streamlined, head behind windshield.. 2.0

   *Totally Enclosed
   - -streamlined fuselage..... 1.5
   - -boxy fuselage..... 2.0

2. Wing Drag Factor (total square feet of upper surface = _____ x 0.01)..... _____

3. Stabilizing & Control Surface Drag Factor (total square feet of one side of each surface = _____ x 0.014)..... _____

4. Exposed Wire Drag Factor (total wires over 4 feet long and 45 to 90 degrees to airflow = ____ x 0.05)..... _____

5. Exposed Struts Drag Factor (total struts over 4 feet long and 45 to 90 degrees to airflow [excluding those associated with landing gear] = ____ x 0.4)..... _____

6. Landing Gear Drag Factor (includes associated struts)..... _____
   *Faired, fixed gear (number of wheels = ___ x 0.3)
   *Unfaired, fixed gear (number of wheels = ___ x 0.5)

7. Engine Drag Factor (select one)..... _____
   *completely exposed = 2.5
   *partially exposed = 1.5
   *some components exposed = 0.5

8. SUBTOTAL ABOVE DRAG FACTORS..... _____

9. SUBTOTAL OF DRAG FACTORS FROM PREVIOUS PAGE..... _____

10. Allowance for Induced and Interference Drag (multiply subtotal of drag factors _____ x .20)..... _____

11. COMPUTED TOTAL DRAG FACTORS (add items 9 and 10)..... _____

PROCEED TO CHART ON PAGE 3

CONSIDERATIONS IN ASSIGNMENT OF DRAG FACTOR VALUES:

1. Pilot drag factors. "Supine" is a sitting position with the legs extended forward, nearly in line with the lower part of the body. "Seated upright" is a sitting position where the lower legs extend downward. "Only head exposed" includes all semi or fully streamlined vehicles having a small windshield which does not deflect the airflow away from the pilot's face. "Streamlined, head behind windshield" includes those ultralights which, from a viewing position in front of the vehicle, the pilot's body is not exposed to the airflow. Where a two-place vehicle is being operated under an exemption, side-by-side seating doubles the factor for the fully-exposed groupings and the "lower half of body enclosed" category. No additional credit is given for the other categories under partially or fully exposed. Also, no additional credit is given to tandem arrangements.

2. Wing drag. This includes all horizontal flying surfaces, including canards (but excluding any other stabilizing or control surface). The total square feet of upper surface of the wing, as determined from a manufacturer's specification or through rough measurement (length x width) is used in this calculation.

3. Stabilizing and control surface drag. This includes horizontal and vertical stabilizers, rudders, elevators, and ailerons. The total square feet of exposed surfaces (one side only) is used in this calculation.

4. Exposed wire and strut drag. The number of wires or struts, not associated with the landing gear, which are OVER 4 FEET LONG with an angle of 45 TO 90 DEGREES TO THE AIRFLOW are counted and multiplied times the given values. Those wires and/or struts located behind the pilot/engine/wing (usually making up portions of the rear fuselage or empenage) are not counted. Wires or struts located parallel to and behind other wires or struts in the airflow are not counted if they do not flare uniformally away from any common attaching point, achieving a minimum separation of at least 8 inches.

5. "Fixed" landing gear drag. Regardless of size of wheels or length of struts, the values shown in the chart are applicable. "Faired" wheels are those which have one-third or more of the wheel surface covered in the front and on the sides.

6. Engine drag. Engines in front of the wing without fairing and those in back, which protrude noticeably into the airflow above or below the wing, are considered completely exposed. Those with streamlined fairings not located in the fuselage or behind a semistreamlined pilot cockpit are considered partially exposed. Faired engines positioned in the front or rear of a fully streamlined fuselage with components such as air filters and mufflers exposed are treated under "some components exposed." Faired or unfaired engines located in the turbulent area directly behind the pilot's body or the vehicle's fuselage are also considered under this grouping.

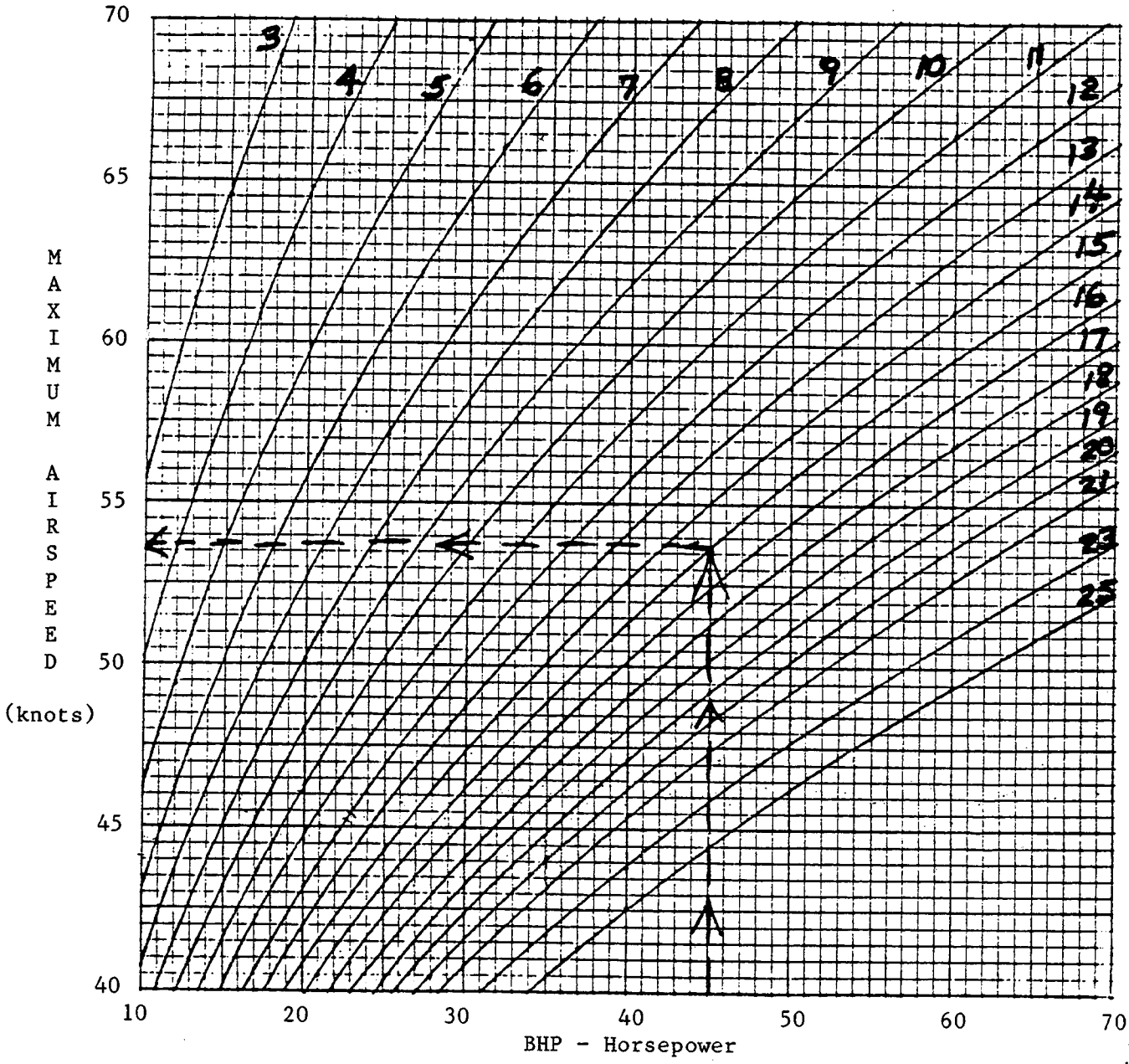
STEP TWO - Determine the maximum airspeed of the vehicle through the use of the chart below.

INSTRUCTIONS:

1. Enter the bottom of the chart at the engine manufacturer's maximum horsepower rating of the installed engine. (Example: 45 horsepower).

2. Proceed directly up the horsepower line until encountering the total drag factor curve computed for the ultralight (Example: 15).

3. Note horizontal line which also intersects at that point, proceed to the left along that line to the edge of the graph, read maximum airspeed (Example: 53.5).



APPENDIX 2. DETERMINING POWER-OFF STALL SPEED OF ULTRALIGHTS

The information contained in this appendix is intended to assist in a determination of an ultralight's ability to comply with Section 103.1(e)(2), a maximum power-off stall speed which does not exceed 24 knots. Computations made in accordance with the information provided may be accepted as satisfactory evidence of compliance. When using this information, no factors other than those provided here should be considered. (The values provided here are for relatively square, rectangular wings; they are not valid for noticeably swept or tapered wings.) Relevant considerations for this computation are:

1. Empty weight. The dry empty weight of the vehicle (excluding floats and/or parachutes), as established through some form of evidence satisfactory to the inspector, should be used.

2. Pilot weight. The pilot's weight will be assumed to be 170 pounds. In the event that an ultralight is being operated under exemption allowing two-occupant operations, the pilots' weight will be assumed to be 340 pounds.

3. Fuel weight. The weight of the fuel (6 pounds per gallon) is included and for the purpose of this computation will be assumed to be filled to capacity.

4. Wing area. The total wing area (square feet) should be determined. Ailerons and flaps may be included, but canards (which generally have a higher stall speed than the main wing) are excluded.

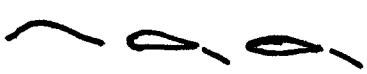
STEP ONE - Add the weight factors. Example:

Empty weight....	240 lbs.
Pilot weight....	170 lbs.
Fuel weight.....	30 lbs.
	440 lbs.

STEP TWO - Divide the total weight by the total wing area to obtain the wing loading of the vehicle.

Example: $\frac{\text{Weight}}{\text{Wing Area}} = \frac{440}{151} = 2.9$ (Wing Loading)

STEP THREE - Select, from the wing profiles provided below, the lift factor which applies to the ultralight in question.

Lift Factor	Wing Profile	Wing Description
1.4		Single/double surface with camber of less than 7 percent (see Appendix 3) and all symmetrical and semisymmetrical airfoils without flaps, regardless of camber.
1.6		Relatively flat-bottom, double surface wings with camber of 7 percent or more.
1.8		Single surface with camber of 7 percent or more or double surface with flaps extending up to 50 percent of the total wingspan.

2.0 Double surface with flaps extending more than 50 percent of total wingspan.

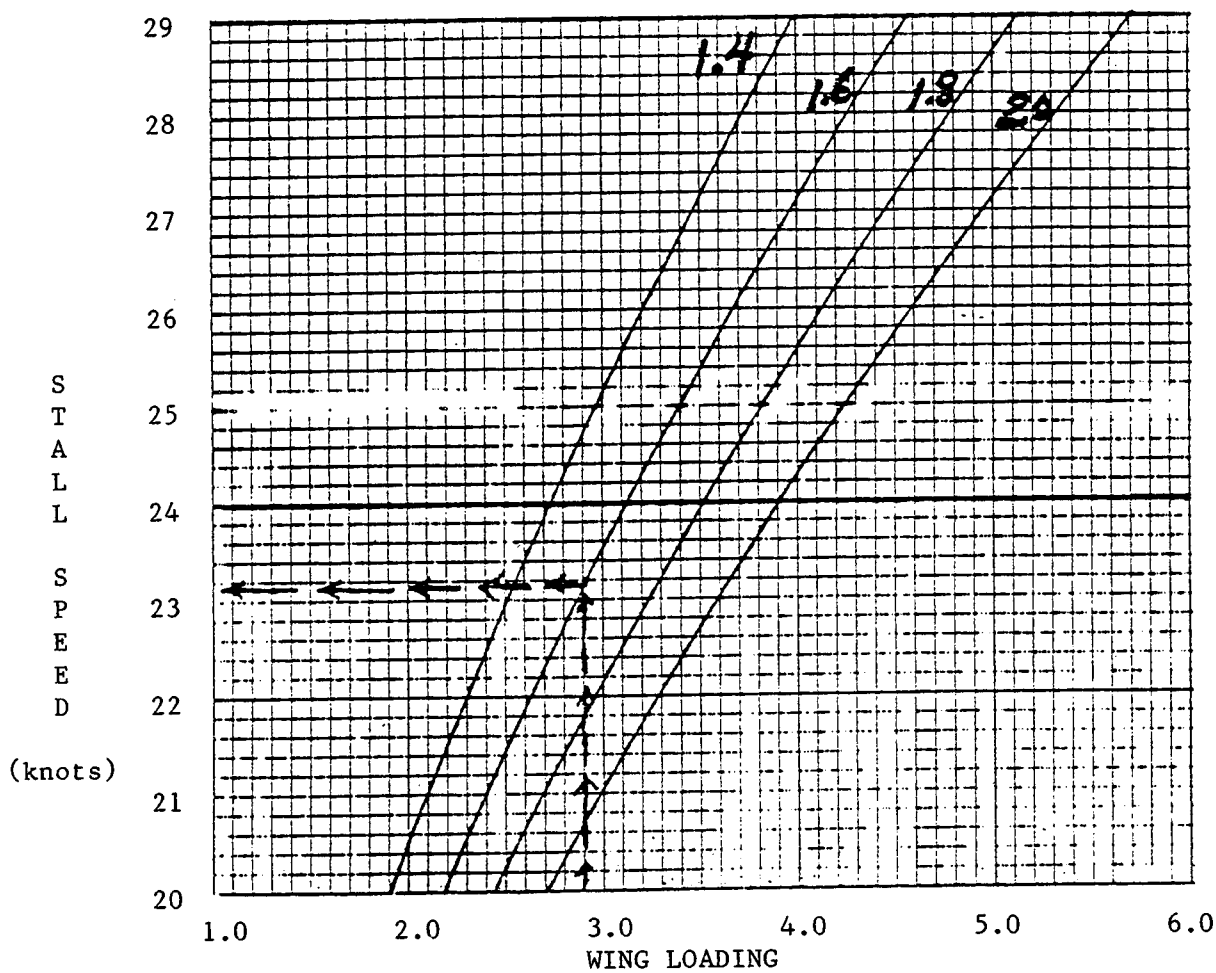
STEP FOUR - Determine the power-off stall speed of the ultralight through the use of the chart below.

INSTRUCTIONS:

1. Enter the bottom of the chart at the computed wing loading of the ultralight (Example: 2.9).

2. Proceed straight up the wing-loading line to the point where it intersects the applicable lift factor curve (Example: 1.6).

3. Note horizontal line which also intersects at that point, proceed to the left side of the chart via that line. Read power-off stall speed (Example: 23.2 knots).



NOTE: If your computed wing-loading point is lower than the applicable lift factor line at the base of the chart, the stall speed would be lower than provided on the chart.

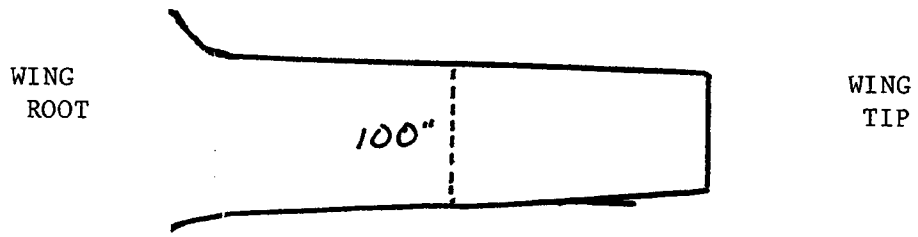
APPENDIX 3. DETERMINING UPPER SURFACE CAMBER OF A WING.

Relevant considerations for this computation are:

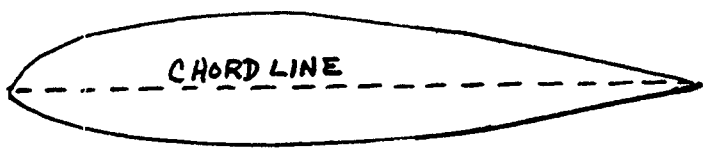
1. Chord or chord line-an imaginary straight line joining the extremities of the leading edge and the trailing edge. For the purpose of this computation, this imaginary line will be measured midway between the tip of the wing and the wing root.

2. Camber-the curvature of a wing. For the purpose of this computation, only the camber of the upper surface (above the chord line) of the wing is considered.

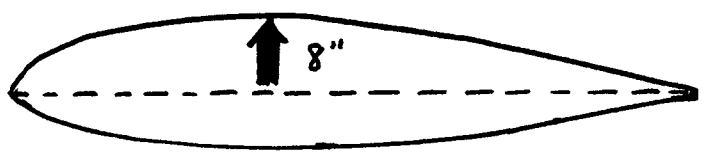
STEP ONE - Determine the mid-point of the wing and measure the mean chord line.



STEP TWO - At the mid-point of the wing, determine the chord line horizontal position on the airfoil profile (assuming straight line from the extreme forward point on the leading edge to the extreme rearward point of the trailing edge).



STEP THREE - Measure the distance from the chord line to the highest point of camber on the upper surface.



STEP FOUR - Divide the measurement obtained in step one into the measurement obtained in step three.

Example: Upper surface camber = 8 inches
Mean chord line length = 100 inches = 8% camber

APPENDIX 4. SAMPLE DOCUMENTATION OF TECHNICAL STANDARDS COMMITTEE FINDINGS

(INSTRUCTIONS: Complete all blanks; insert N/A in blanks not applicable to this particular review; check off other applicable items (✓) as provided.)

ISSUED TO: _____
ADDRESS: _____
_____

ULTRALIGHT MAKE/MODEL: _____
SERIAL NUMBER: _____
REGISTRATION NUMBER: _____

ENGINE MAKE/MODEL: _____
ENGINE MANUFACTURER'S RATED HORSEPOWER: _____

PROPELLER MAKE/MODEL: _____
PROPELLER DIAMETER: _____
PROPELLER PITCH: _____

FUEL CAPACITY: fuselage tank_____ wing tank_____ other_____ TOTAL: _____

GROSS EMPTY WEIGHT..... _____
-Exclusion for parachute system weight..... _____
( ) hand-deployed
( ) ballistically deployed
( ) installed and operational
( ) standard allowance weight given
( ) parachute system weighed separately
-Exclusion for floats..... _____
( ) weighed in landplane configuration only
( ) weighed in floatplane configuration only
( ) standard allowance for floats-only given
( ) standard allowance for amphib floats given
( ) standard allowance for amphib fuselage given
( ) standard allowance for outrigger floats given
( ) all floats weighed separately
FLOAT MAKE/MODEL: _____
-Fuel on board at weighing..... _____
TOTAL WEIGHT ALLOWANCES..... _____
NET EMPTY WEIGHT (minus weight allowances)..... _____

MAXIMUM FULL-POWER LEVEL FLIGHT SPEED (calculated by AC 103-7, Appendix 1). _____
( ) engine manufacturer maximum rated horsepower used
( ) derated horsepower of engine=_____, per engine manfacturer's specs
DEMONSTRATED MAXIMUM FULL-POWER LEVEL FLIGHT SPEED..... _____
( ) timed (average of a series of three level runs in both directions)
( ) radar gun (average series of level runs per timed instructions)
( ) speed adjusted to sea level conditions
( ) artificial restriction ( ) power ( ) propeller ( ) aerodynamic
DESCRIPTION OF RESTRICTION (should be included on the back of this form in sufficient written and graphic detail for an FAA inspector or other qualified person to ascertain that the restriction is in place and operational)

MAXIMUM POWER-OFF STALL SPEED (calculated by AC 103-7, Appendix 2)..... _____
operating weight used=_____ maximum coefficient of lift used=_____
DEMONSTRATED POWER-OFF STALL SPEED..... _____
( ) average of six or more stalls (in level flight, with an airspeed reduction of approximately one knot per second until stall occurs
( ) high lift devices installed ( ) flaps ( ) slots ( ) other

CONFIGURATION:

( ) provisions for one occupant only
  ( ) seat width 22 inches or less (inside measurement)
  ( ) single seatbelt/shoulder harness
  ( ) single controls located logically for a person sitting in the center of the seat

( ) no equipment is installed which could logically be construed as for a purpose other than sport/recreation of the operator, such as:
  ( ) towing hitches
  ( ) agricultural equipment
  ( ) advertisement on the wings

AIRWORTHINESS CERTIFICATION:

( ) no U.S. or foreign airworthiness certificate is currently issued to this particular ultralight unit

( ) this ultralight has not been registered with the U.S. federal government.

LIST OF INSTALLED INSTRUMENTS AND EQUIPMENT:

OTHER:

ISSUED BY:

( ) A & P Mechanic; Name_____ Certificate Number_____

( ) Technical Standards Committee: Names: _____

National pilot organization recognizing this committee:_____

DATE OF ISSUANCE OF THIS DOCUMENT:_____

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