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.

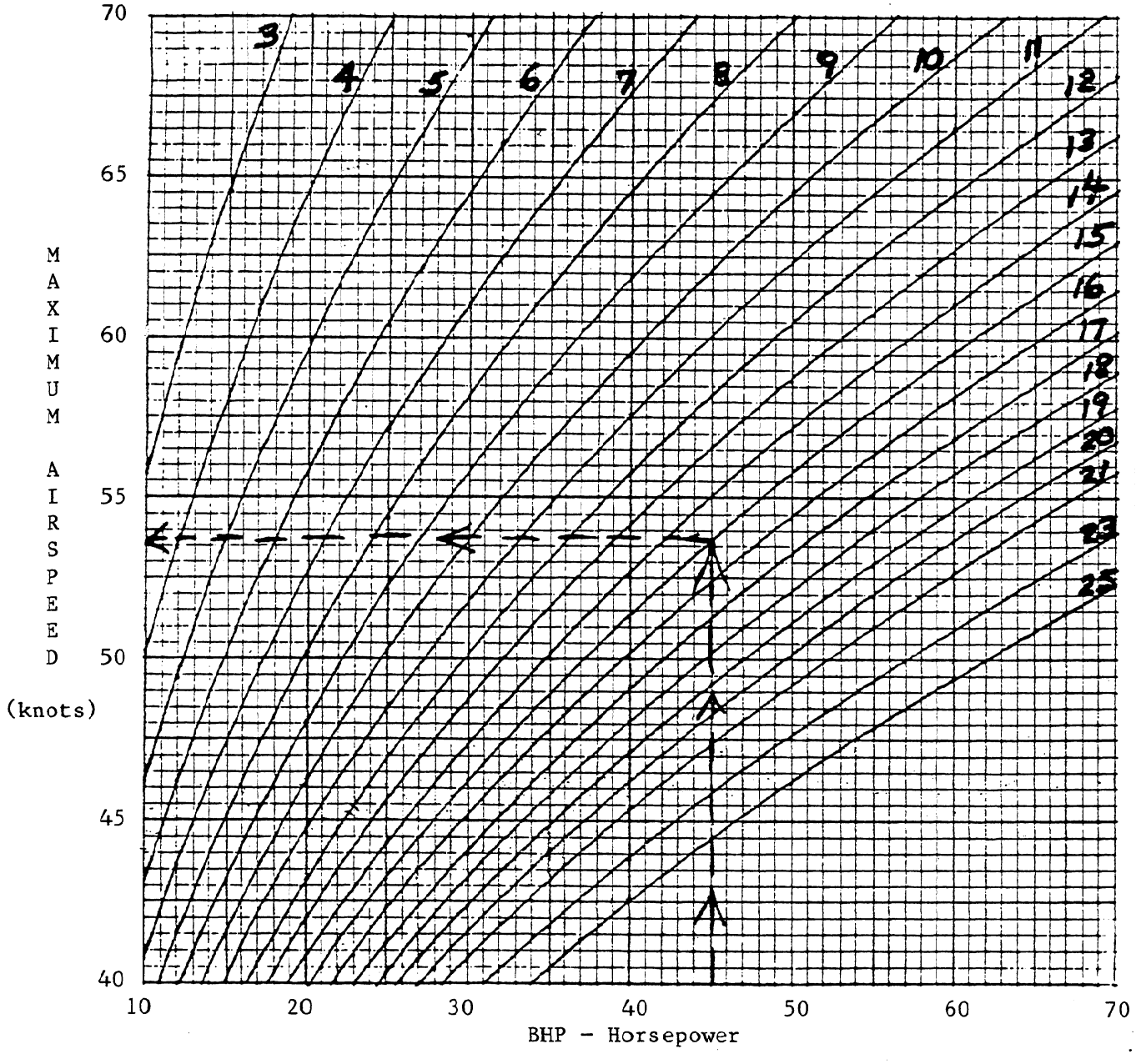
STEP TWO - Determine the maximum airspeed of the vehicle through the use of the chart below.

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.

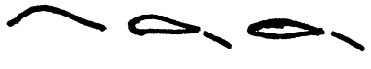
STEP ONE - Add the weight factors. Example:

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.

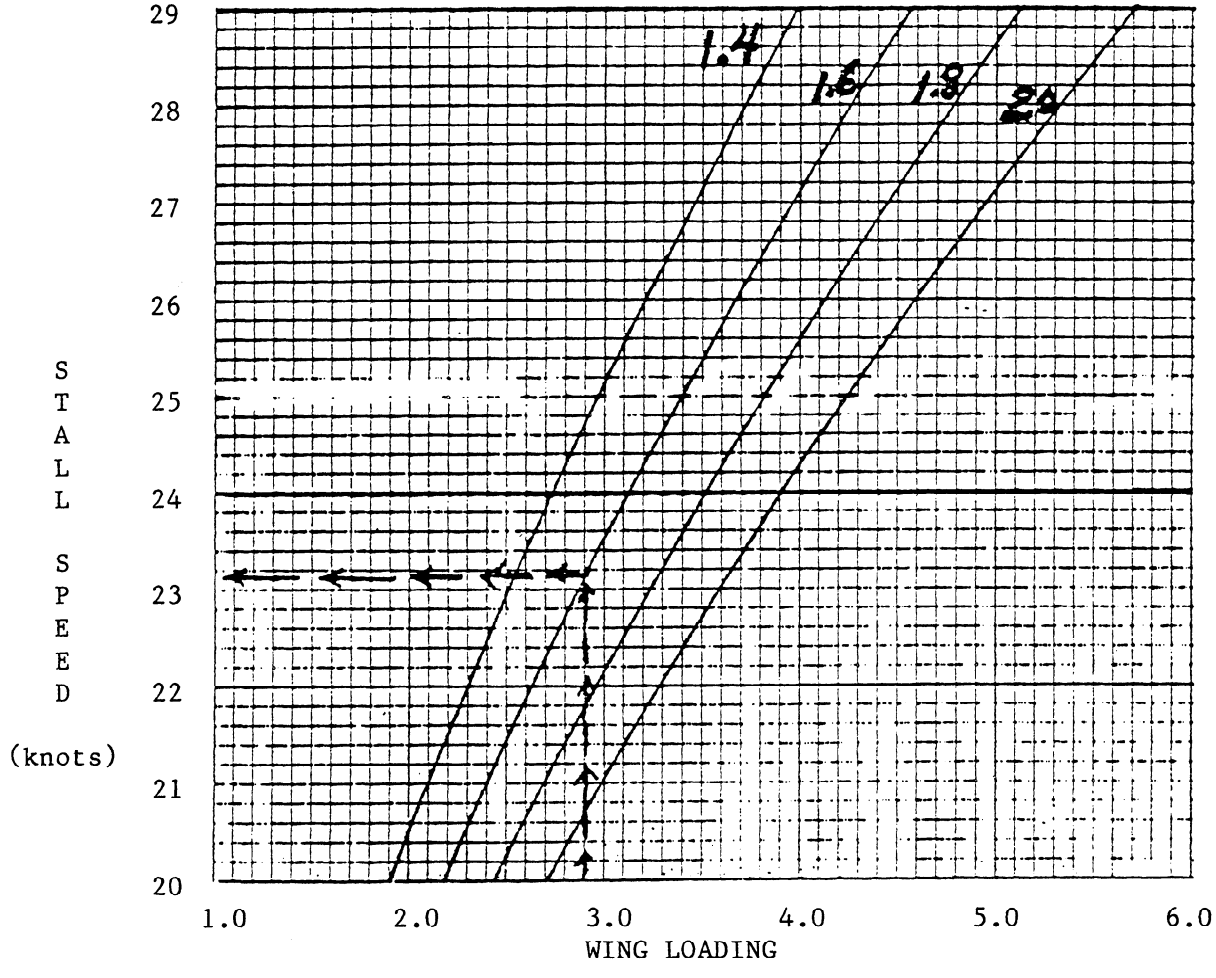
STEP FOUR - Determine the power-off stall speed of the ultralight through the use of the chart below.

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.

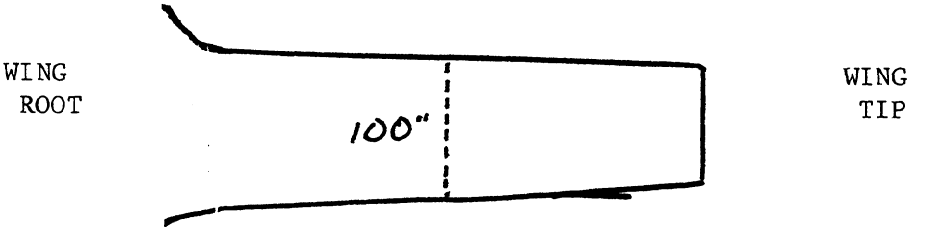
APPENDIX 3. DETERMINING UPPER SURFACE CAMBER OF A WING.

Relevant considerations for this computation are:

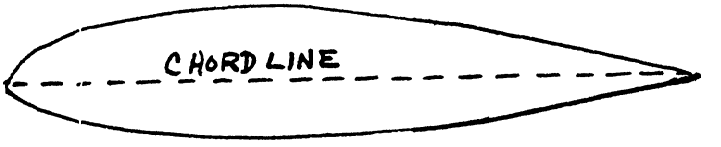
1. Chord or chord line-an imaginary straight line joining the extremities of the leading edge and the trailing edge. For the purpose of this computation, this imaginary line will be measured midway between the tip of the wing and the wing root.

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.

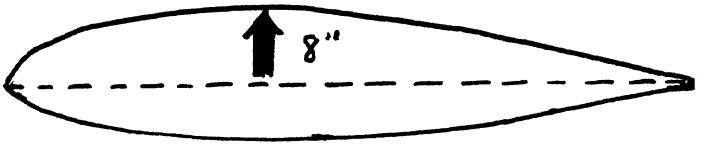
STEP ONE - Determine the mid-point of the wing and measure the mean chord line.



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 = $\frac{8 \text{ inches}}{100 \text{ inches}}$ = 8% camber
Mean chord line length

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

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

U.S. Department
of Transportation

**Federal Aviation
Administration**

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

Official Business
Penalty for Private Use $300

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