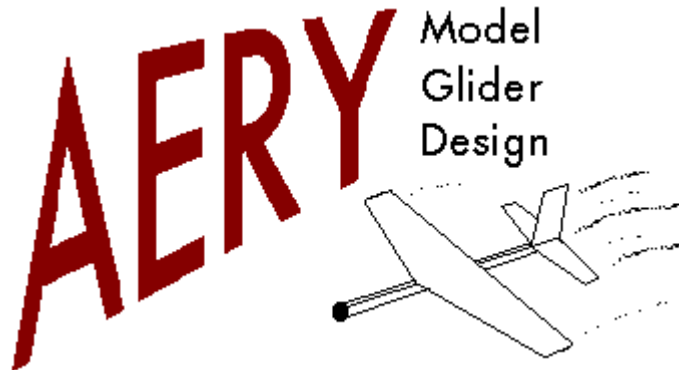# Development and Application
# of a Program for the
# Computer Aided Design
# of Simple Gliders

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Plan B Project Presentation

**AERY** Model Glider Design

# Outline of Presentation

→ Project Description

→ Background

→ Program Development

→ Program Testing

→ Results

→ Summary & Future Plans

# Project Description

- Interactive computer program, "Aery"

- Written in Visual Basic for PC's running Windows

- Intended for secondary and post-secondary levels

- Design and analysis of simple gliders

- Creates plans for glider construction

- Testing and use within Aviation Career Education (ACE) Academy sessions

- Freely distributed for use by individuals and educational institutions

# Background

➤ Spring of 1995, spoke with Mr. Gordon Hoff, Minnesota Department of Transportation, Office of Aeronautics

➤ Technical (engineering) session at ACE Academy

➤ Suggested airplane design using computers

➤ Develop program usable by the students

➤ Session would teach about aerospace engineering and the aircraft design process

➤ Original inspiration drawn from "Glider Design" for Macintosh computers, by Mr. Michael Kamprath and the Michigan Space Grant Consortium

➤ Secured permission to use the program for Plan B Project

# Program Development

✈ Aery written in Visual Basic 3.0 for Windows 3.1
(Windows 95 compatible)

✈ VSVBX custom control licensed from Videosoft
for "tab" interface and window resizing

✈ "Point and click" interface for adjustment of glider
parameters

✈ Continuously updated graphical display of glider
and glider components

✈ Save and load glider and data files

✈ Print dimensioned drawings of glider

✈ Glider analysis applies simple methods and
approximations

    ✈ center of gravity
    ✈ neutral point
    ✈ vertical tail & stabilizer volume coefficients
    ✈ stabilizer incidence angle

# Program Testing

➔ Comparison of output with expected results

➔ Construction of test gliders
 ➔ Insufficient directional stability
 ➔ Required lateral balancing

➔ Modification of program design criteria

➔ Center of gravity deviation dependent upon
 specified material properties

➔ Early version tested at ACE Academy
 August, 1995

➔ First version capable of printing plans tested at
 ACE Academy in June, 1996

➔ Resolved problems with printing of plans

➔ Tested full version of Aery at ACE Academy
 August, 1996

# Results

→ Aery may be successfully used to design flying model gliders.

→ Flight performance is acceptable given type of glider design.

→ Validity of analytical approach proven.

→ Glider construction methods developed.

→ Different styles of glider design explored.

→ Excellent student response.

→ Feedback on "bugs" and features invaluable.

→ Aery shown to be easy to use.

# Summary

✈  Aery allows the interactive design, analysis, and creation of plans for simple gliders.

✈  Aery was developed with the assistance of, and tested at, ACE Academy.

## Future Plans

✈  Free distribution through the World Wide Web

✈  Educator's lesson plan; glider construction guide

✈  Windows on-line help file

✈   Aery rewrite as Windows 95 specific, 32 bit application