Glasair III

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Basic Geometry

Sref	87.6 ft^2
Swing	81.3 ft^2
Stail	15.54 ft^2
Swet	393.81 ft^2
b	23.3 ft
AR	6.20
_	0.75
_	0°

Weight Breakdown

TOGW	2400 lbs
W_{empty}	1625 lbs
W_{fuel}	438 lbs
$W_{payload}$	337 lbs
W_{fuel} /TOGW	0.1404
$W_{payload}$ /TOGW	0.1825

High Lift Devices

- Standard plain flaps or optional slotted flaps

	Plain Flap	Slotted Flap
Stall Speed	80 mph	73 mph
C_{Lmax}	1.80	2.16
Pitch Angle @ C_{Lmax}	20.4°	24.5°

*Using GW = 2400 pounds, sea level standard conditions.
*Pitch angle doesn't account for changes in lift curve slope with flap deflection.

Tail Scrape Angle

Control “Effectiveness”

- Flaps
  - $b_{flaps}/b = 0.475$
  - $S_{flaps}/S = 0.075$
- Elevators
  - Total Area = 4.85 sq ft
- Rudders
  - Area = 5.35 sq ft
- Ailerons
  - Total Area = 4.79 sq ft
  - Span = 3.3 ft
  - $b_{aileron}/b = 0.3342$
  - $S_{aileron}/S = 0.1094$

Airfoil

t/c = 12.5%

Propulsion System

Engine	Lycoming IO-540-K Series
Propeller	Hartzell 80” diameter (two-bladed)
Power	300 hp
P/W	0.125 hp/lb

Static Stability

- Neutral Point – 0.521c
- Assumed CG – 0.25c
- Static Margin – 27.1%

c – mean aerodynamic chord (3.76 ft)

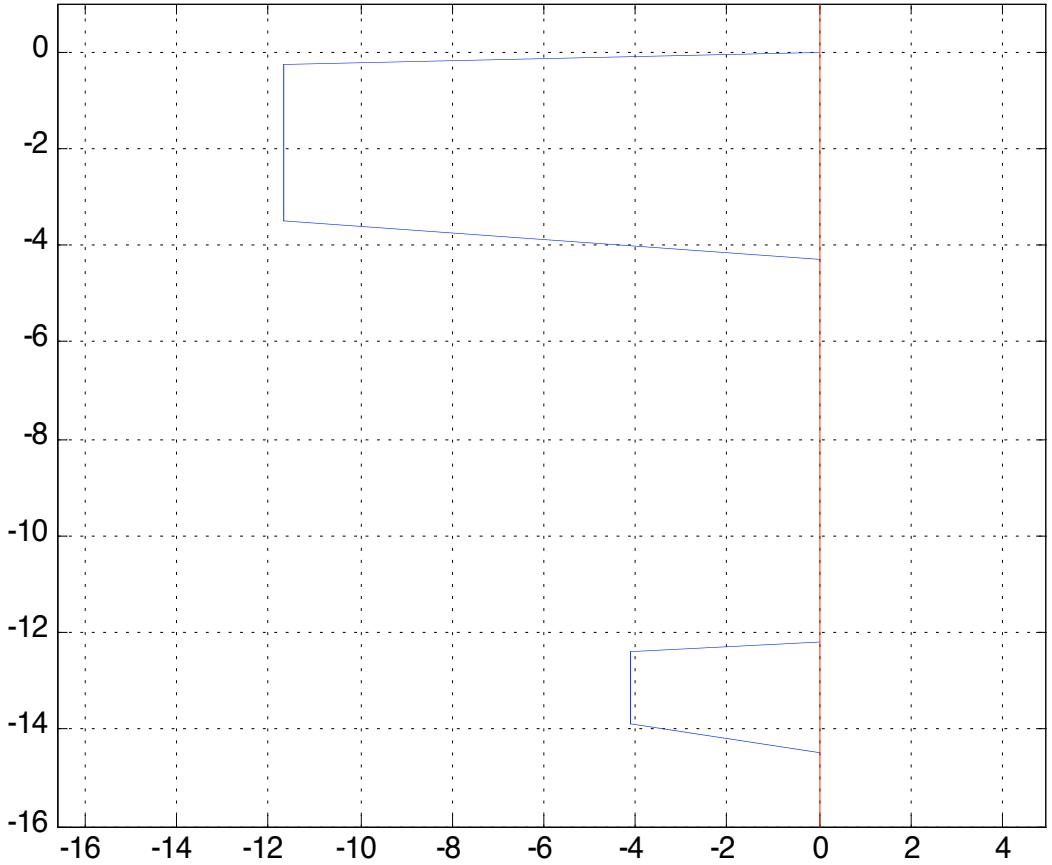
From: VLMpc

Load Split

- 92% of lift on wing for trimmed cruise

From: VLMpc

Planform Geometry



Friction Program

	Wetted Area (ft^2)	C_{do} M=0.1 alt=0	C_{do} M=0.15 alt=0	C_{do} M=0.35alt=8000
Wing	121.588	0.00680	0.00632	0.00565
Fuselage	232.66	0.00907	0.00851	0.00768
Horizontal Tail	31.078	0.00174	0.00161	0.00143
Vertical Tail	8.482	0.00048	0.00045	0.00040
	Total Cdo =	0.01809	0.01688	0.01515

Range Analysis

- Equations: $R = \frac{550\eta_p}{C_{bhp}} \frac{L}{D} \ln\left(\frac{W_i}{W_f}\right)$ $\quad \frac{L}{D} = \frac{1}{2}\sqrt{\frac{\pi A \mathrm{Re}}{C_{D0}}}$
- Inputs: W_i=2400 lbs, W_f=2000 lbs, C_{bhp}=0.42 lb/hp/hr, η_p,e=0.8, AR=6.2
- Results: $R = 1219\,mi \Rightarrow \frac{L}{D} = 10.0 \Rightarrow C_{D0} = 0.03873$ ← Glasair's posted range

  $C_{D0} = 0.01515 \Rightarrow \frac{L}{D} = 16.0 \Rightarrow R = 1949\,mi$

  $C_{D0} = 0.01809 \Rightarrow \frac{L}{D} = 14.7 \Rightarrow R = 1784\,mi$

  ← Our estimation
- Conclusion: There is a discrepancy between our analysis and Glasair's posted results

Basic Performance

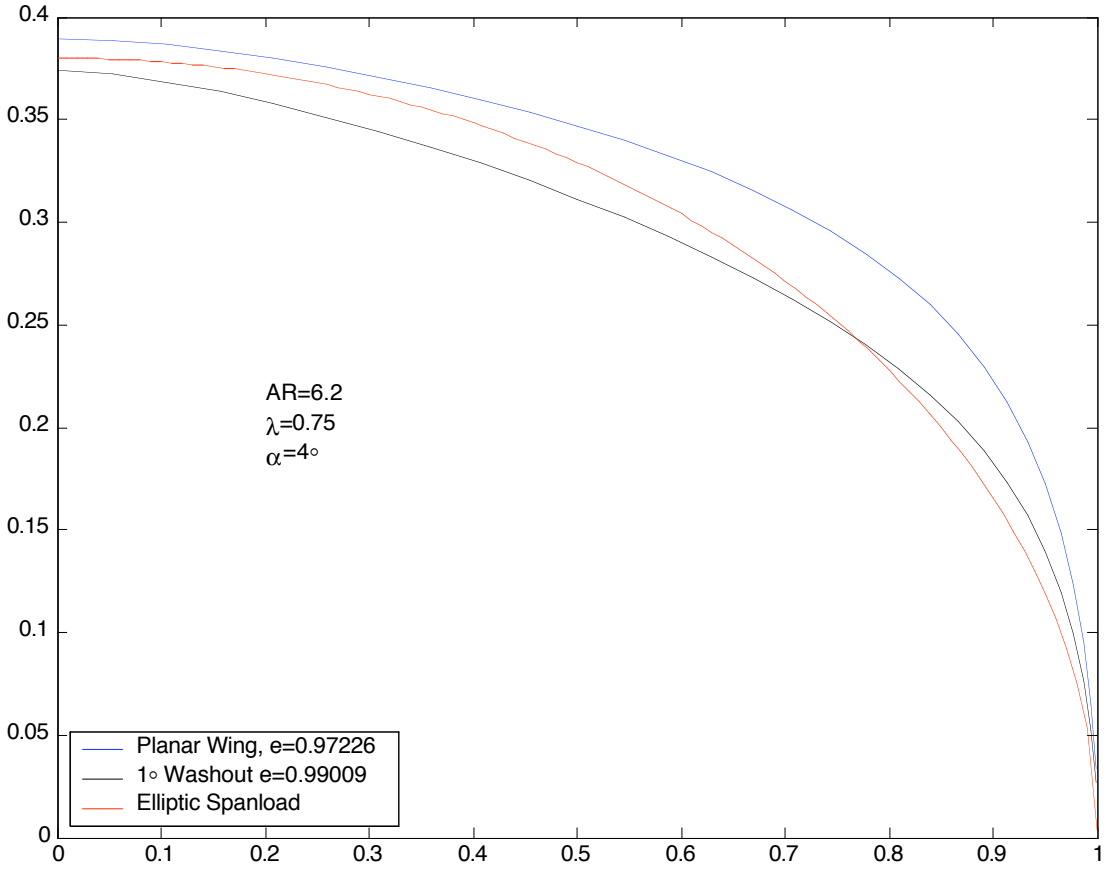
Top Speed (sea level)	300 mph
Top Speed (18000 ft)	327 mph (turbo)
Never Exceed Speed	335 mph
Solo Weight Rate of Climb	2990 ft/min
Gross Weight Rate of Climb	2140 ft/min
Roll Rate	140 °/sec
Ceiling (normally aspirated)	24000 ft
Ceiling (turbocharged)	30000+ ft

Cruise Conditions

Altitude	Speed	C_L
24000 ft	313 mph	0.254
17500 ft	290 mph	0.238
8000 ft	258 mph	0.222

* Assuming weight = 2400 pounds.

Spanload



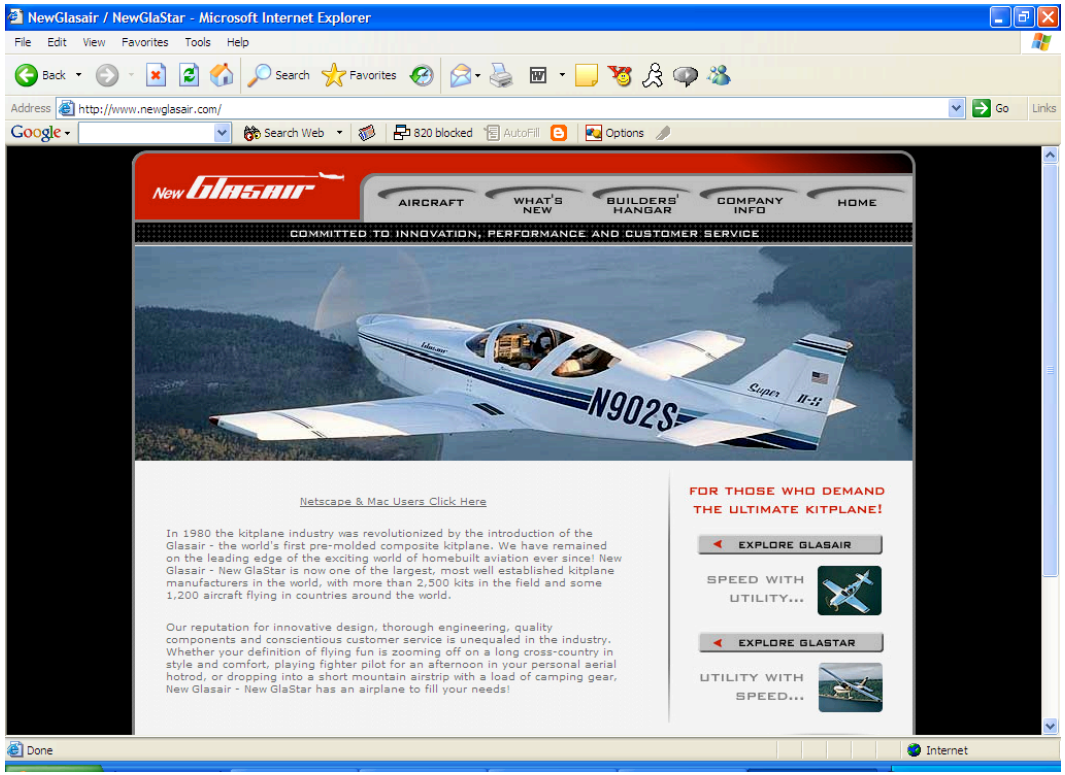
*Using Lifting Line Theory

Band-aids

Pricing Information

- Kit Prices
  - Total = $44,950
  - Fuselage = $11,450
  - Wing = $11,450
  - Landing Gear = $13,950
  - Final Assembly = $10,950
- Lycoming I0-540-K1H5 = $47,447

Reference



www.newglasair.com