Fuselage Design

Flight Regime Data:

Cruise Mac	0.04
Cruise Alt. (	300
V (f/s)	44.12
ρ (lbm/f^3)	0.0758741
q (lbf/f^2)	2.2933098
μ (lbm/(f-s)	0.0000107
ν (cruise) (f	0.000141

Dimension Data:

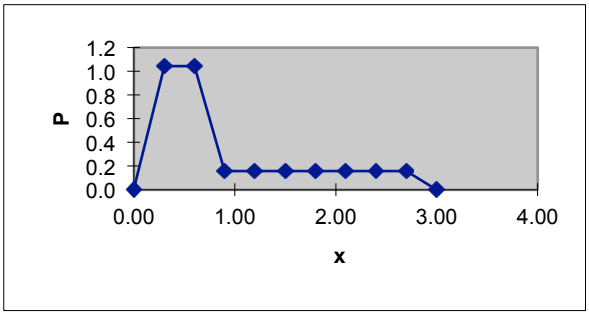
D-max (ft)	0.333
L/D	9
L (ft)	3.00
S (f^2)	6

Form Factors:

F	1.1048045
Q	1
*F*Q*	1.1048045

Viscous Drag Calculations: *Cone-Cylinder*

x/L	x (ft)	x-L/4 (ft)	D (ft)	P (ft)	Sw(ft^2)	Re_x	C_F	Drag (lbf)
0.00	0.00	-0.75	0	0.0				
0.10	0.30	-0.45	0.333	1.0	0.3	9.4E+04	4.34E-03	0
0.20	0.60	-0.15	0.333	1.0	0.3	1.9E+05	3.07E-03	0
0.30	0.90	0.15	0.05	0.2	0.0	2.8E+05	2.50E-03	0
0.40	1.20	0.45	0.05	0.2	0.0	3.8E+05	2.17E-03	0
0.50	1.50	0.75	0.05	0.2	0.0	4.7E+05	1.94E-03	0
0.60	1.80	-	0.05	0.2	0.0	5.6E+05	1.77E-03	0
0.70	2.10	-	0.05	0.2	0.0	6.6E+05	1.64E-03	0
0.80	2.40	-	0.05	0.2	0.0	7.5E+05	1.53E-03	0
0.90	2.70	-	0.05	0.2	0.0	8.4E+05	1.45E-03	0
1	3.00	-	0	0.0	0.0	9.4E+05	1.37E-03	0
Totals:					**1.0**			**0.00743**



Total Drag (lbf) **0.00743**

Equiv. CD 0.0005076

Tail Design

Main Wing Reference

b	5.5	ft
m.a.c.	0.8	ft
S	6	ft²
M	0.04	
Λ_{LE}	0	deg
t/c	0.12	
λ	1.00	

Air Properties

Cruise Alt. (	300	ft
V	44.12	f/s
ρ	0.0758741	lbm/f^3
q	2.2933098	lbf/f^2
μ	0.0000107	lbm/(f-s)
ν (cruise)	0.000141	f^2/s

Vertical Tail

Design Parameters

Cvt	*0.04*	
Lvt	*2.6*	ft
Λ_{LE}	*0*	deg
t/c	*0.09*	
λ	*0.80*	
Avt	*1.50*	

Airfoil Data

Name	*NACA 0009*	
Cl_{max}	*1.1*	
Cl_α	*0.111*	1/deg
a.c.	*0.25*	c
α_{0L}	*0*	deg
Cd	*0.01*	

Calculations

Svt	0.5451	ft²
b	0.904	ft
c_r	0.670	ft
c_t	0.536	ft
m.a.c.	0.605	ft
β	1.00	
$C_{L\alpha}$	**0.037**	1/deg

Sweep Angles

	x/c	$\Lambda_{x/c}$ (deg)
LE	0.00	0.0
1/4 chord	0.25	-4.2
(t/c)max	0.35	-5.9
TE	1.00	-16.5

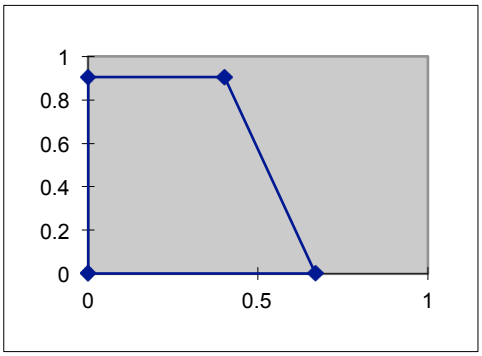
Viscous Drag

V_eff	44.1192	f/s
q_eff	2.2933098	lbf/f^2
M_eff	0.04	
Re_mac	189370.74	
sqrt(Re)	435.16748	
Cf	3.05E-03	
S_wet	1.1031717	ft²
F	0.9571781	
Q	1.05	
C_{D0}	**0.0062071**	

Total Drag	**0.008**	lbf

Spanwise View

x	y
0	0
0.7	0
0.4018841	0.9
0	0.9
0	0



Horizontal Tail

Design Parameters

Cht	0.50	
Lht	2.6	ft
Λ_{LE}	0	deg
t/c	0.09	
λ	1.00	
Aht	5.00	

Airfoil Data

Name	*NACA 64-004*	
Cl_{max}	*0.8*	
Cl_{α}	*0.111*	1/deg
a.c.	*0.258*	c
α_{0L}	*0*	deg
Cd	*0.004*	

Calculations

Sht	1	ft^2
b	2.2	ft
c_r	0.4	ft
c_t	0.4	ft
m.a.c.	0.4	ft
β	1.00	
$C_{L\alpha}$	**0.074**	1/deg
Total Drag	**0.016**	lbf

Sweep Angles

	x/c	$\Lambda_{x/c}$ (deg)
LE	0.00	0.0
1/4 chord	0.25	0.0
(t/c)max	0.35	0.0
TE	1.00	0.0

Viscous Drag

V_eff	44.1192	f/s
q_eff	2.2933098	lbf/f^2
M_eff	0.04	
Re_mac	138037.13	
sqrt(Re)	371.53349	
Cf	3.57E-03	
S_wet	1.9699495	ft^2
F	0.9586127	
Q	1.05	
C_{D0}	**0.0072812**	

Spanwise View

x	y
0	0
0.4	0
0.4412236	1.1
0	1.1
0	0