Effects of Gross Weight Increase from 1370 to 1450 lbs.

Added weight increases stall speed. Indicated below, the increase of 80 lbs raises stall speed by one knot.

GW	Stall Speed	Nominal G	Negative G
1450	50	3.6	-1.8
1370	49	3.8	-1.9
1100	45	3.05	-2.35
0	0	0	0

The velocity vs G loading of the aircraft are affected also.

	1370 Lb GW		1450 Lb GW
V	N	V	N
160	3.8	160	3.6
150	3.8	150	3.6
140	3.8	140	3.6
130	3.8	130	3.6
120	3.8	120	3.6
100	3.8	100	3.6
95	3.8	96	3.6
84	3	87	3
69	2	71	2
49	1	50	1
25	0.3	28	0.3
10	0.05	11	0.05
0	0	0	0
10	-0.05	12	-0.05
25	-0.29	29	-0.3
50	-1	52	-1
70	-1.9	67	-1.8
100	-1.9	100	-1.8
120	-1.9	120	-1.8
130	-1.9	130	-1.8
140	-1.9	140	-1.8
150	-1.9	150	-1.8
160	-1.9	160	-1.8

Gust factor on G loading:

A strong 50 fps or 3000 fpm up/downdraft vertical gust (about 39 Knots) affects the G limit significantly, and is a consideration on the manuevering of the aircraft above the maneuvering speed (Va) of the aircraft and the max structural cruising speed (Vno) green arc or rough air limit should be adjusted.

A crude but effective method is to use the delta lift by the gust factor on the lift curve slope. Then calculate the equivalent airspeed decrease for that load and plot on the curve below:

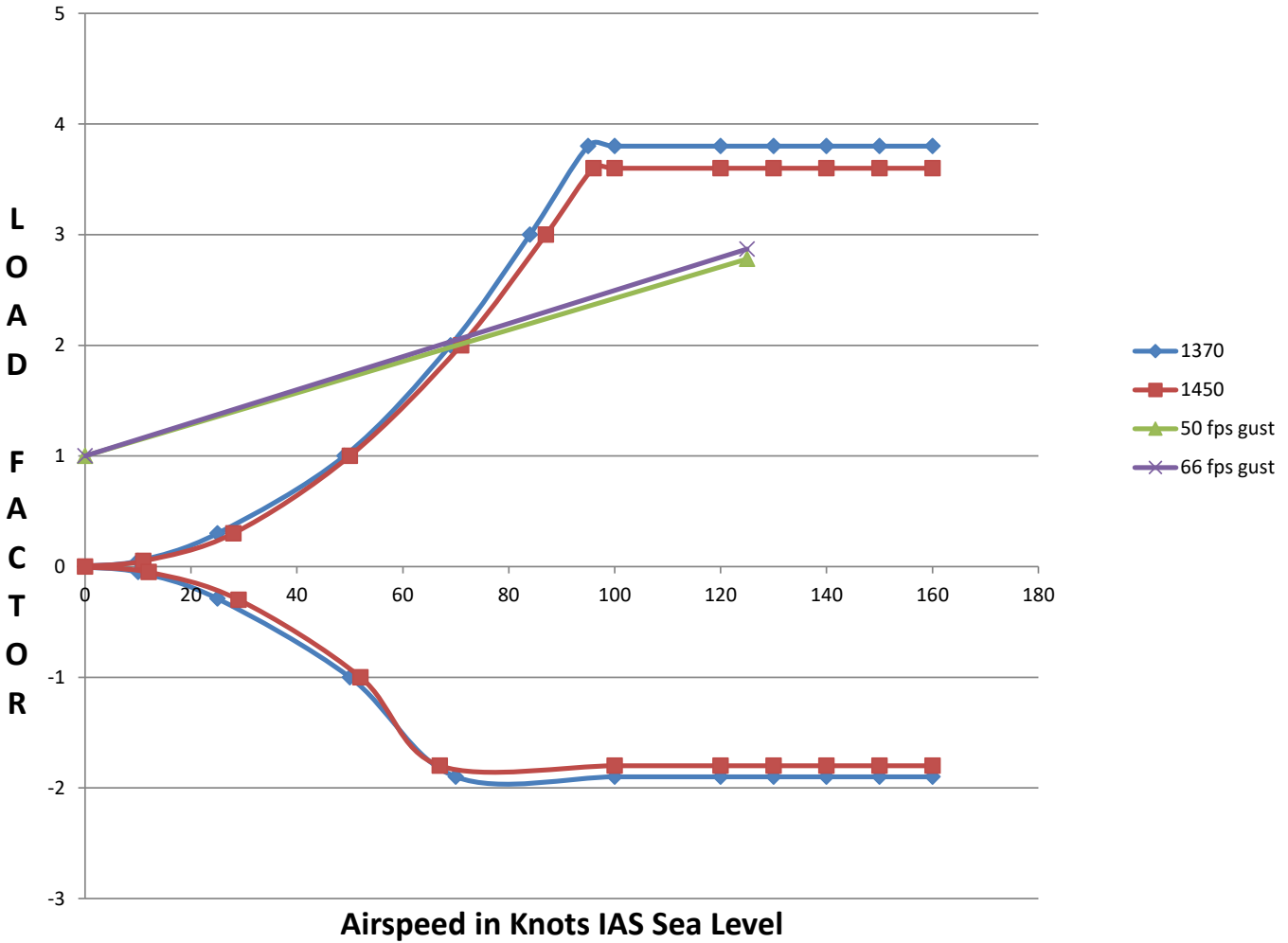n= 1+ (Kg Vgust V p S/2W)   Kg=.88u/5.3+u   u= 2m/p C a S where a is the centrifical acceleration

1370 Lbs. 50 fps	
A/S	Gust Factor
0	1
125	2.78

1450 Lbs. 66fps	
A/S	Gust Factor
0	1
125	2.87

Based on 100 sq ft wing area flaps up.
Cl of 1.67 clean wing

Europa XS/Classic V/N Diagram Calculated

LOAD FACTOR (y-axis)
Airspeed in Knots IAS Sea Level (x-axis)

Legend: 1370, 1450, 50 fps gust, 66 fps gust

Veas KTS	Ve fps	Vgust fps	Delta CL	Vd
50	84	50	stall	
75	126	50	stall	
100	168	50	16.6	
125	210	50	13	

u	Kg	n	
44.69	0.78	1.71	@ 1370 and 50 fps
44.69	0.78	1.87	@1450 and 66 fps