



Steering Calculation

75 Motor Sailor Junk

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Doug Jackson

	One Speed				2:1 Geared Speed				146
			Metric				Metric		
Length Overall	74.0	ft.	22.5	m.	74.0	ft.	22.5	m.	
Length Waterline	65.0	ft.	19.8	m.	65.0	ft.	19.8	m.	
Displacement	89,600	lb.	40,727	kg.	89,600	lb.	40,727	kg.	
Rudder Area	24.0	sq.ft.	2.230	sq.m.	24.0	sq.ft.	2.230	sq.m.	
Rudder Balance	8.0	%	8.0	%	8.0	%	8.0	%	
Mean Rudder Chord	24.0	in.	61.0	cm.	24.0	in.	61.0	cm.	
Rudder Turning Arm	12.00	in.	30.5	cm.	12.00	in.	30.5	cm.	
Wheel Diameter	48.0	in.	1219	mm.	48.00	in.	1219	mm.	
Quadrant Radius	24.00	in.	610	mm.	24.00	in.	610	mm.	
Sprocket Diameter	2.43	in.	3-10 61.7	mm.	2.43	in.	3-10 61.7	mm.	
Rudder Post Dia.	4.00	in.	102	mm.	4.0	in.	102	mm.	
Rudder Travel	90	deg.	90	deg.	90	deg.	90	deg.	
Between Bearings	50.0	in.	1270	mm.	50.0	in.	1270	mm.	
Lwr Bearing to CA	50.0	in.	1270	mm.	50.0	in.	1270	mm.	
Cruising Speed (1.3)	10.5	kts	10.5	kts	10.5	kts	10.5	kts	
Surfing Speed (1.5)	12.1	kts	1.5 12.1	kts	12.1	kts	12.1	kts	
Force on Rudder (Surfing)	19,001	lbs	8,637	kg.	19,001	lbs	8,637	kg.	
Max Bending Moment	79,170	ft.lbs	10,969	m.kg.	79,170	ft.lbs	10,969	m.kg.	
Lower Bearing Load	38,002	lbs	17.0	Tons	38,002	lbs	17.0	Tons	
Upper Bearing Load	19,001	lbs	8.5	Tons	19,001	lbs	8.5	Tons	
Turning Moment (Cr)	2,636	ft.lbs	365	m.kg.	2,636	ft.lbs	365	m.kg.	
Turning Moment (S)	3,510	ft.lbs	486	m.kg.	3,510	ft.lbs	486	m.kg.	
Cable Tension (Cr)	1,318	lbs	599	kg.	1,318	lbs	599	kg.	
Cable Tension (S)	1,755	lbs	798	kg.	1,755	lbs	798	kg.	
Gear Ratio in Steerer	1		1		2		2		
Gear Ratio in Sprockets	1		1		1		1		
Mechanical Advantage	19.8		19.8		39.5		39.5		
Chain Travel	37.7	in.	95.8	cm.	37.7	in.	95.8	cm.	
Turns - H.O to H.O.	4.9		4.9		9.9		9.9		
Force on Wheel (Cruising)	67	lbs	30.3	kg.	33	lbs	15.2	kg.	
Force on Wheel (Surfing)	89	lbs	40	kg.	44	lbs	20	kg.	
Wheel Speed	8.25	in./degree	21.0	cm/deg	16.50	in./degree	41.9	cm/deg	
Equivalent Tiller Length	39	ft.	12.0	m.	79	ft.	24.1	m.	
Tiller Length % of LwL	61%		61%		122%		122%		
Summary	One Speed				2:1 Geared Speed				
Wheel Size	48	in.	1219	mm	48	in.	1219	mm	
Quadrant Size	24.00	in.	610	mm	24.00	in.	610	mm	
Turns HO-HO	4.9		4.9		9.9		9.9		
Turning Force	67	lbs	30	kg.	33	lbs	15	kg.	
Equivalent Tiller	39	ft.	12.0	m.	79	ft.	24.1	m.	

Due to the many variations of yacht design in areas of hull shape, engine horsepower, and sail configuration, final recommendations must be approved by your Naval Architect.