



MIDWEST ACCIDENT
RECONSTRUCTION SERVICES

wheelbase, ft.	9.33	weight, lbf.	4250	FAL	2252.5
circle radius, ft.	60	wt. dist.	53/47	RAL	1997.5
		% on front	53		
		% on rear	47		

SAMPLE VEHICLE DATA FOR CALCULATIONS

Ackermann										
speed, ft/sec	speed, mph	lateral accel, g's	steer angle, radians	W/Cf	W/Cr	bracket term	delta, radians	delta, degrees		
5.00	3.41	0.01	0.16	-5.93	-5.26	0.01	0.16	9.43		
10.00	6.82	0.05	0.16	-5.93	-5.26	0.04	0.19	10.99		
15.00	10.23	0.12	0.16	-5.93	-5.26	0.08	0.24	13.60		
20.00	13.64	0.21	0.16	-5.93	-5.26	0.15	0.30	17.25		
25.00	17.05	0.32	0.16	-5.93	-5.26	0.23	0.38	21.94	both tires with normal pressure Cf -190 Cr -190	
30.00	20.45	0.47	0.16	-5.93	-5.26	0.33	0.48	27.67		
35.00	23.86	0.63	0.16	-5.93	-5.26	0.45	0.60	34.44		
40.00	27.27	0.83	0.16	-5.93	-5.26	0.58	0.74	42.25		
45.00	30.68	1.05	0.16	-5.93	-5.26	0.74	0.89	51.11		
50.00	34.09	1.29	0.16	-5.93	-5.26	0.91	1.06	61.01		
understeer gradient= 0.70										
Ackermann										
speed, ft/sec	speed, mph	lateral accel, g's	steer angle, radians	W/Cf	W/Cr	bracket term	delta, radians	delta, degrees		
5.00	3.41	0.01	0.16	-6.77	-5.26	0.02	0.18	10.09		
10.00	6.82	0.05	0.16	-6.77	-5.26	0.08	0.24	13.62		
15.00	10.23	0.12	0.16	-6.77	-5.26	0.19	0.34	19.52		
20.00	13.64	0.21	0.16	-6.77	-5.26	0.33	0.48	27.77	one front tire with 75% stiffness Cf -190 Cr -190	
25.00	17.05	0.32	0.16	-6.77	-5.26	0.51	0.67	38.37		
30.00	20.45	0.47	0.16	-6.77	-5.26	0.74	0.90	51.33		
35.00	23.86	0.63	0.16	-6.77	-5.26	1.01	1.16	66.65		
40.00	27.27	0.83	0.16	-6.77	-5.26	1.32	1.47	84.33		
45.00	30.68	1.05	0.16	-6.77	-5.26	1.67	1.82	104.37		
50.00	34.09	1.29	0.16	-6.77	-5.26	2.06	2.21	126.76		
understeer gradient= 1.59										
Ackermann										
speed, ft/sec	speed, mph	lateral accel, g's	steer angle, radians	W/Cf	W/Cr	bracket term	delta, radians	delta, degrees		
5.00	3.41	0.01	0.16	-7.90	-5.26	0.04	0.19	10.97		
10.00	6.82	0.05	0.16	-7.90	-5.26	0.14	0.30	17.13		
15.00	10.23	0.12	0.16	-7.90	-5.26	0.32	0.48	27.41		
20.00	13.64	0.21	0.16	-7.90	-5.26	0.57	0.73	41.79	one front tire with 50% stiffness Cf -190 Cr -190	
25.00	17.05	0.32	0.16	-7.90	-5.26	0.90	1.05	60.29		
30.00	20.45	0.47	0.16	-7.90	-5.26	1.29	1.45	82.89		
35.00	23.86	0.63	0.16	-7.90	-5.26	1.76	1.91	109.61		
40.00	27.27	0.83	0.16	-7.90	-5.26	2.30	2.45	140.43		
45.00	30.68	1.05	0.16	-7.90	-5.26	2.91	3.06	175.37		
50.00	34.09	1.29	0.16	-7.90	-5.26	3.59	3.74	214.42		
understeer gradient= 2.77										

SAMPLE CALCULATIONS OF UNDERSTEER GRADIENT FOR DIFFERENT FRONT AND REAR TIRE STIFFNESSES

Ackermann										
speed, ft/sec	speed, mph	lateral accel, g's	steer angle, radians	W/Cf	W/Cr	bracket term	delta, radians	delta, degrees		
5.00	3.41	0.01	0.16	-5.93	-6.01	0.00	0.15	8.85		
10.00	6.82	0.05	0.16	-5.93	-6.01	0.00	0.15	8.66		
15.00	10.23	0.12	0.16	-5.93	-6.01	-0.01	0.15	8.35		
20.00	13.64	0.21	0.16	-5.93	-6.01	-0.02	0.14	7.92	one rear tire with 75% stiffness Cf -190 Cr -190	
25.00	17.05	0.32	0.16	-5.93	-6.01	-0.03	0.13	7.36		
30.00	20.45	0.47	0.16	-5.93	-6.01	-0.04	0.12	6.68		
35.00	23.86	0.63	0.16	-5.93	-6.01	-0.05	0.10	5.87		
40.00	27.27	0.83	0.16	-5.93	-6.01	-0.07	0.09	4.94		
45.00	30.68	1.05	0.16	-5.93	-6.01	-0.09	0.07	3.89		
50.00	34.09	1.29	0.16	-5.93	-6.01	-0.11	0.05	2.71		
understeer gradient= -0.08										
Ackermann										
speed, ft/sec	speed, mph	lateral accel, g's	steer angle, radians	W/Cf	W/Cr	bracket term	delta, radians	delta, degrees		
5.00	3.41	0.01	0.16	-5.93	-7.01	-0.01	0.14	8.07		
10.00	6.82	0.05	0.16	-5.93	-7.01	-0.06	0.10	5.55		
15.00	10.23	0.12	0.16	-5.93	-7.01	-0.13	0.02	1.36		
20.00	13.64	0.21	0.16	-5.93	-7.01	-0.23	-0.08	-4.52	one rear tire with 50% stiffness Cf -190 Cr -190	
25.00	17.05	0.32	0.16	-5.93	-7.01	-0.37	-0.21	-12.07		
30.00	20.45	0.47	0.16	-5.93	-7.01	-0.53	-0.37	-21.31		
35.00	23.86	0.63	0.16	-5.93	-7.01	-0.72	-0.56	-32.22		
40.00	27.27	0.83	0.16	-5.93	-7.01	-0.94	-0.78	-44.81		
45.00	30.68	1.05	0.16	-5.93	-7.01	-1.19	-1.03	-59.08		
50.00	34.09	1.29	0.16	-5.93	-7.01	-1.46	-1.31	-75.03		
understeer gradient= -1.13										