

**Car/Cab Inputs**

<b>Weight and Inertia</b>		<b>CG Height</b>		<b>Semitrailer/Pin Dimensions</b>	
Weight, $W_c$	Inertia, $J_c$	$H_c$	$L_{cp}$	$W_{cp}$	
4000 lb	2000 lb-ft-s <sup>2</sup>	1.76 ft	7 ft	2.42 ft	
<b>Widths</b>				<b># of Wheels</b>	
$W_1$	$W_2$	$W_3$	$W_4$	6 Wheels	
2.42 ft	2.42 ft	2.42 ft	2.42 ft		
<b>Lengths</b>					
$L_1$	$L_2$	$L_3$	$L_4$	$L_{cfa}$	$L_{cra}$
3 ft	3 ft	5.22 ft	5.22 ft	3 ft	2.8 ft
<b>Tire Lateral Coefficients (Steering)</b>					
$Ca_1$	$Ca_2$	$Ca_3$	$Ca_4$		
13000 lb/rad	13000 lb/rad	13000 lb/rad	13000 lb/rad		
<b>Tire Forward Coefficients (Braking)</b>					
$Cs_1$	$Cs_2$	$Cs_3$	$Cs_4$		
13000 lb	13000 lb	13000 lb	13000 lb		
<b>Car/Cab Long Accel</b>		<b>Tire Size</b>			
0 g		245 / 75 R 16			
<b>Wheel Brake Slip</b>				<b>Longitudinal BNP Constants</b>	
$S_1$	$S_2$	$S_3$	$S_4$	BNP-Cx	BNP-Ex
0	0	0	0	1.5	0.5
<b>Wheel Acceleration Traction Coefficients</b>				<b>Lateral BNP Constants</b>	
$T_1$	$T_2$	$T_3$	$T_4$	BNP-Cy	BNP-Ey
0	0	0	0	1.4	0.6
<b>Initial Conditions</b>					
$X_c$	$X_c - Vel$	$Y_c$	$Y_c - Vel$	$\theta_c$	$\theta_c - Vel$
0 ft	50 ft/s	5 ft	2 ft/s	0 deg	0 deg/s
<b>Aero Drag Coefficients and Wind Speeds</b>				<b>Front/Rear Aero Force Offset</b>	
$C_{dxAxc}$	$C_{dYAyc}$	$W_x$	$W_y$	$L_c$	
0 ft <sup>2</sup>	0 ft <sup>2</sup>	0 ft/s	0 ft/s	0 ft	

**Semitrailer Inputs**

<b>Weight And Inertia</b>		<b>CG Height</b>		<b>Semitrailer/Pin Dimensions</b>	
Weight, $W_t$	Inertia, $J_t$	$H_t$	$L_{tp}$	$W_{tp}$	
2000 lb	2000 lb-ft-s <sup>2</sup>	4 ft	5 ft	3 ft	
<b>Widths</b>					
$W_5$	$W_6$				
3 ft	3 ft				
<b>Lengths</b>					
$L_5$	$L_6$	$L_{st}$	$L_{tra}$		
5 ft	5 ft	9 ft	3 ft		
<b>Tire Lateral Coefficients (Steering)</b>					
$Ca_5$	$Ca_6$				
13000 lb/rad	13000 lb/rad				
<b>Tire Forward Coefficients (Braking)</b>					
$Cs_5$	$Cs_6$				
13000 lb	13000 lb				
<b>Tire Size</b>					
245 / 75 R 16					
<b>Wheel Brake Slip</b>		<b>Longitudinal BNP Constants</b>			
$S_5$	$S_6$	BNP-Cx	BNP-Ex		
0	0	1.5	0.5		
<b>Traction Coefficients</b>		<b>Lateral BNP Constants</b>			
$T_5$	$T_6$	BNP-Cy	BNP-Ey		
0	0	1.4	0.6		
<b>Initial Conditions</b>					
$\theta_t$	$\theta_t - Vel$				
0 deg	0 deg/s				
<b>Aero Drag Coefficients</b>		<b>Front/Rear Aero Force Offset</b>			
$C_{dtxAxt}$	$C_{dtyAyt}$	$L_t$			
0 ft <sup>2</sup>	0 ft <sup>2</sup>	0 ft			

**Roadway Parameters**

**Road Width**  
 Rw  ft

**Friction Coefficients**

<b>Road</b> $fR$ <input type="text" value="0.7"/>	<b>Shoulder</b> $fB$ <input type="text" value="0.7"/>
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**Program Run Parameters**

**Final Time**  
 s

**Print Interval**

**FPS**  
 ▲  
 ▼

**Integration Interval**  
 ▲  
   
 ▼ s

**Equalizing Hitch**  
 ▼

**Steering Parameters**

**Steering Mode**  
 ▲  
 ▼

**Lane Change**

**Begin Time**  
 s

**Duration**  
 s

**Steer Angle**  
 deg

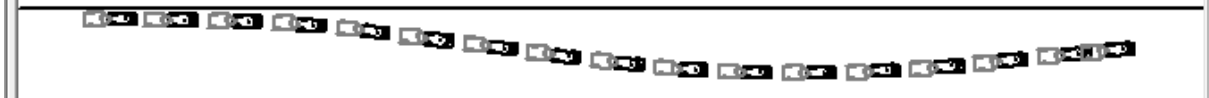
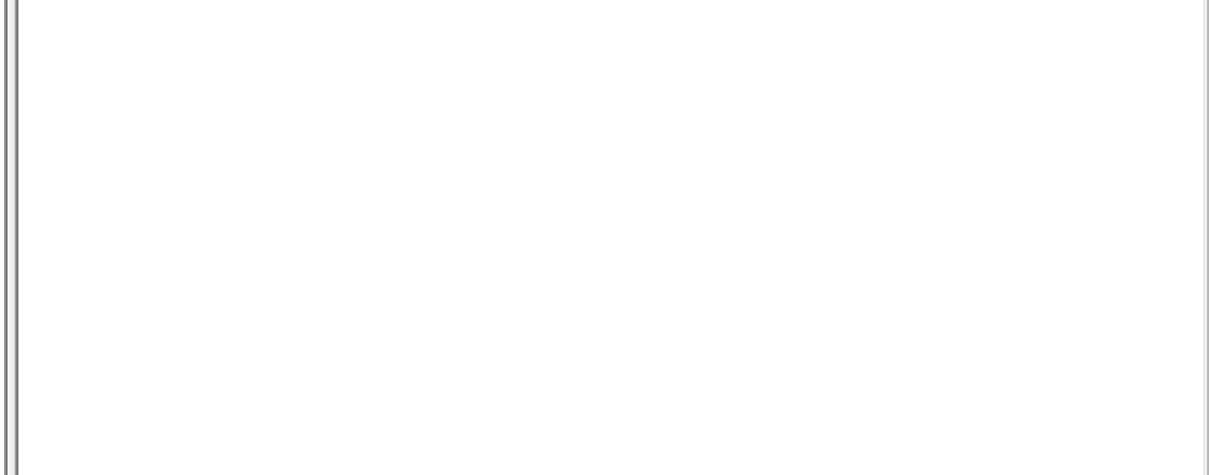
**Tabular Steering Data**

Time, s	$\delta$ , deg
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<input type="text" value="2"/>	<input type="text" value="0"/>
<input type="text" value="2.5"/>	<input type="text" value="0"/>
<input type="text" value="3"/>	<input type="text" value="0"/>
<input type="text" value="3.5"/>	<input type="text" value="0"/>
<input type="text" value="4"/>	<input type="text" value="0"/>
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<input type="text" value="5.5"/>	<input type="text" value="-0.5"/>
<input type="text" value="6"/>	<input type="text" value="-0.5"/>
<input type="text" value="6.5"/>	<input type="text" value="-0.5"/>
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<input type="text" value="7.5"/>	<input type="text" value="-0.5"/>
<input type="text" value="8"/>	<input type="text" value="0"/>
<input type="text" value="8.5"/>	<input type="text" value="0"/>
<input type="text" value="9"/>	<input type="text" value="0"/>
<input type="text" value="9.5"/>	<input type="text" value="0"/>
<input type="text" value="10"/>	<input type="text" value="0"/>

time (s)	Xc (ft)	Xc - vel (ft/s)	Yc (ft)	Yc - Vel (ft/s)	Long Accel	Lat Accel (ft/s <sup>2</sup> )	θc (deg)	θc-Vel (deg/s)	δ(deg)	Xt - Vel (ft/s)	Yt - Vel (ft/s)	θt (deg)	θt-Vel (deg/s)
0.000	0.00	50.00	5.00	2.00			0.00	0.00	0.00	50.00	2.00	0.00	0.00
0.050	2.50	50.00	5.09	1.65	0.01	-6.32	0.00	0.05	0.28	50.00	1.65	0.03	1.31
0.100	5.00	50.00	5.17	1.37	0.01	-5.09	0.01	0.14	0.30	50.00	1.36	0.12	2.21
0.150	7.50	50.00	5.23	1.14	0.01	-4.03	0.02	0.26	0.33	50.00	1.13	0.25	2.54
0.200	10.00	50.00	5.28	0.96	0.01	-3.14	0.03	0.39	0.35	50.00	0.95	0.37	2.35
0.250	12.50	50.00	5.32	0.82	0.01	-2.40	0.05	0.53	0.38	50.00	0.82	0.47	1.82
0.300	15.00	50.00	5.36	0.72	0.01	-1.78	0.08	0.69	0.40	50.00	0.71	0.55	1.15
0.350	17.50	50.00	5.40	0.64	0.00	-1.25	0.12	0.87	0.43	50.00	0.64	0.59	0.50
0.400	20.00	50.00	5.43	0.59	0.00	-0.80	0.17	1.07	0.45	50.00	0.59	0.60	-0.05
0.450	22.50	50.00	5.46	0.56	0.00	-0.40	0.23	1.29	0.48	50.00	0.56	0.59	-0.45
0.500	25.00	50.00	5.48	0.55	0.00	-0.03	0.30	1.53	0.50	50.00	0.55	0.56	-0.70
0.550	27.50	50.00	5.51	0.56	0.00	0.25	0.38	1.76	0.50	50.00	0.55	0.52	-0.78
0.600	30.00	50.00	5.54	0.57	-0.01	0.51	0.48	1.98	0.50	50.00	0.57	0.48	-0.74
0.650	32.50	50.00	5.57	0.61	-0.01	0.76	0.58	2.18	0.50	50.00	0.60	0.45	-0.58
0.700	35.00	50.00	5.60	0.65	-0.01	1.00	0.70	2.37	0.50	50.00	0.65	0.43	-0.34
0.750	37.50	50.00	5.63	0.71	-0.01	1.22	0.82	2.53	0.50	50.00	0.70	0.42	-0.04
0.800	40.00	50.00	5.67	0.77	-0.01	1.42	0.95	2.69	0.50	50.00	0.77	0.42	0.29
0.850	42.50	50.00	5.71	0.85	-0.01	1.61	1.09	2.82	0.50	50.00	0.84	0.44	0.63
0.900	45.00	49.99	5.76	0.93	-0.01	1.79	1.23	2.94	0.50	50.00	0.93	0.48	0.96
0.950	47.50	49.99	5.81	1.03	-0.01	1.95	1.38	3.05	0.50	49.99	1.02	0.54	1.29
1.000	50.00	49.99	5.86	1.13	-0.01	2.10	1.54	3.14	0.50	49.99	1.12	0.61	1.59
1.050	52.50	49.99	5.92	1.24	-0.01	2.34	1.70	3.25	0.55	49.99	1.23	0.70	1.86
1.100	55.00	49.98	5.98	1.36	-0.02	2.56	1.86	3.40	0.60	49.98	1.35	0.80	2.11
1.150	57.50	49.98	6.05	1.49	-0.02	2.76	2.04	3.58	0.65	49.98	1.48	0.91	2.32
1.200	60.00	49.97	6.13	1.64	-0.02	2.95	2.22	3.78	0.70	49.97	1.62	1.03	2.51
1.250	62.50	49.96	6.22	1.79	-0.02	3.14	2.41	4.00	0.75	49.96	1.78	1.16	2.69
1.300	64.99	49.95	6.31	1.95	-0.03	3.33	2.62	4.24	0.80	49.95	1.94	1.30	2.85
1.350	67.49	49.94	6.41	2.12	-0.03	3.53	2.84	4.50	0.85	49.94	2.11	1.45	3.01
1.400	69.99	49.93	6.52	2.30	-0.03	3.73	3.07	4.77	0.90	49.93	2.29	1.60	3.18
1.450	72.48	49.92	6.64	2.49	-0.04	3.94	3.32	5.05	0.95	49.92	2.48	1.76	3.34
1.500	74.98	49.91	6.77	2.70	-0.04	4.16	3.58	5.35	1.00	49.91	2.68	1.93	3.52
1.550	77.47	49.89	6.91	2.90	-0.04	4.06	3.85	5.58	0.90	49.89	2.88	2.12	3.72
1.600	79.97	49.88	7.06	3.10	-0.03	4.01	4.13	5.68	0.80	49.88	3.08	2.31	3.94

time (s)	Whl 1 - total force (%)	Whl 1 - friction limit (lb)	Whl 2 - total force (%)	Whl 2 - friction limit (lb)	Whl 3 - total force (%)	Whl 3 - friction limit (lb)	Whl 4 - total force (%)	Whl 4 - friction limit (lb)	Whl 5 - total force (%)	Whl 5 - friction limit (lb)	Whl 6 - total force (%)	Whl 6 - friction limit (lb)	-	Static N Forc
0.000	0.0	889.1	0.0	889.1	0.0	808.1	0.0	808.1	0.0	402.9	0.0	402.9		Non Equi
0.050	28.4	787.9	23.1	990.0	36.1	707.0	28.9	909.1	79.3	153.7	33.7	652.2		Full Equi
0.100	22.1	807.5	18.6	970.5	29.4	726.6	24.5	889.6	49.8	212.1	23.4	593.8		
0.150	16.9	824.4	14.7	953.6	23.8	743.5	20.5	872.7	24.4	272.1	13.8	533.7		
0.200	12.6	838.6	11.3	939.3	19.2	757.8	17.1	858.5	8.9	320.5	6.1	485.2		
0.250	9.2	850.5	8.4	927.5	15.4	769.7	14.1	846.7	1.1	353.1	0.9	452.5		
0.300	6.3	860.4	5.9	917.6	12.2	779.6	11.4	836.8	2.1	372.7	1.8	432.9		
0.350	4.0	868.8	3.8	909.2	9.5	788.0	9.1	828.4	2.9	383.4	2.7	422.2		
0.400	2.0	876.1	1.9	902.0	7.1	795.2	6.9	821.1	2.4	388.8	2.3	416.9		
0.450	0.2	882.5	0.2	895.6	5.0	801.5	4.9	814.6	1.3	391.4	1.3	414.3		
0.500	1.3	888.3	1.3	889.9	3.0	807.3	3.0	808.8	0.1	393.0	0.1	412.8		
0.550	2.3	892.8	2.3	885.4	1.2	811.7	1.2	804.3	0.9	394.8	0.9	411.0		
0.600	3.2	897.0	3.3	881.2	0.5	815.9	0.5	800.1	1.7	397.4	1.6	408.5		
0.650	4.1	901.0	4.2	877.3	2.0	819.8	2.1	796.1	2.0	400.8	2.0	405.0		
0.700	4.9	904.7	5.1	873.5	3.4	823.6	3.6	792.4	2.0	405.3	2.0	400.5		
0.750	5.7	908.2	5.9	870.0	4.8	827.1	5.0	788.9	1.6	410.6	1.7	395.1		
0.800	6.4	911.5	6.7	866.8	6.0	830.4	6.3	785.7	1.0	416.6	1.1	389.1		
0.850	7.0	914.5	7.4	863.7	7.1	833.4	7.5	782.7	0.2	422.9	0.3	382.7		
0.900	7.6	917.3	8.1	860.9	8.1	836.3	8.7	779.9	0.7	429.5	0.8	376.1		
0.950	8.2	919.9	8.7	858.4	8.9	838.8	9.7	777.4	1.6	436.0	1.9	369.5		
1.000	8.7	922.2	9.3	856.0	9.7	841.2	10.6	775.1	2.6	442.3	3.1	363.2		
1.050	9.8	926.0	10.6	852.3	10.4	845.0	11.5	771.3	3.5	448.1	4.3	357.3		
1.100	10.8	929.4	11.8	848.9	11.1	848.5	12.3	767.9	4.3	453.6	5.5	351.8		
1.150	11.7	932.6	12.9	845.7	11.7	851.7	13.1	764.7	5.1	458.8	6.6	346.5		
1.200	12.5	935.7	13.9	842.6	12.4	854.8	13.9	761.7	5.8	463.7	7.7	341.5		
1.250	13.3	938.8	14.9	839.6	13.0	857.8	14.7	758.6	6.4	468.5	8.7	336.7		
1.300	14.1	941.8	15.8	836.6	13.7	860.8	15.6	755.6	6.9	473.1	9.6	332.0		
1.350	14.9	945.0	16.8	833.5	14.4	864.0	16.6	752.5	7.4	477.8	10.5	327.3		
1.400	15.7	948.2	17.9	830.4	15.2	867.2	17.6	749.4	7.8	482.4	11.4	322.5		
1.450	16.5	951.5	18.9	827.1	16.1	870.5	18.7	746.1	8.2	487.1	12.2	317.7		
1.500	17.3	954.9	20.0	823.7	16.9	873.9	19.9	742.7	8.6	492.0	13.1	312.7		

VdynVB\_example.dat  
8/31/2012  
VdynVB - Brach Engineering



**Car/Cab Motion**

T (s)	Xc (ft)	Xc - Vel (ft/s)	Yc (ft)	Yc - Vel (ft/s)
0.000	0.0	50.0	5.0	2.0

$\theta_c$ (deg)	$\theta_c$ - Vel (deg/s)	Long Accel (ft/s <sup>2</sup> )	Lat Accel (ft/s <sup>2</sup> )	$\delta$ (deg)
0.0	0.0	0.0	0.0	0.0

**Semitrailer Motion**

Xt - Vel (ft/s)	Yt - Vel (ft/s)	$\theta_t$ (deg)	$\theta_t$ - Vel (deg/s)
50.0	2.0	0.0	0.0

Navigation controls: < << >> >

Display Options 1 | Display Options 2

- Trace Options**
- Car/Cab LF wheel
  - Car/Cab RF wheel
  - Car/Cab LR wheel
  - Car/Cab RR wheel
  - Car/Cab Trace
  - Car/Cab Rest Positic
  - Semitrailer CG
  - Semitrailer L wheel
  - Semitrailer R wheel
  - Semitrailer Trace
  - Semitrailer Rest Pos
  - Tick marks
  - Road Edge

**Trace Colors**

- Car/Cab
- Car/Cab CG
- Car/Cab LF Wheel
- Car/Cab RF Wheel
- Car/Cab LR Wheel
- Car/Cab RR Wheel
- Semitrailer
- Semitrailer CG
- Semitrailer L Wheel
- Semitrailer R Wheel

**Trace Density**

Car/Cab	Semitrailer
50% <input type="text"/>	50% <input type="text"/>
25% <input type="text"/>	25% <input type="text"/>
12.5% <input type="text"/>	12.5% <input type="text"/>
6.25% <input type="text"/>	6.25% <input type="text"/>

**Misc**

Zoom: 100  200

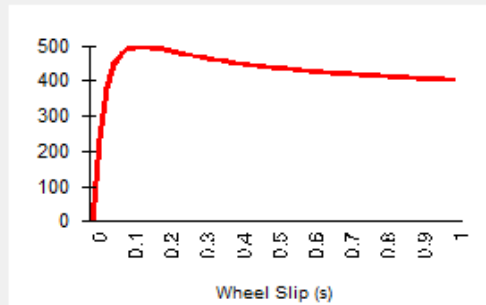
Tick Scale: 0  ft

FPS (actual): 0

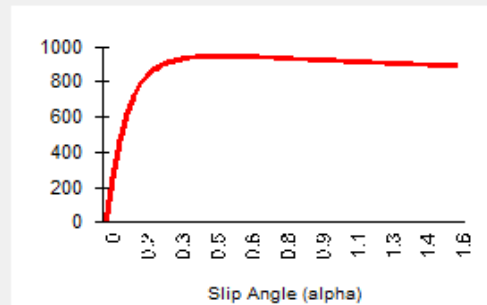
Longitudinal Car/Cab Tire Force, lb



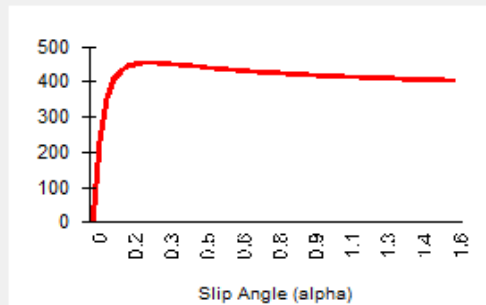
Longitudinal Semitrailer Tire Force, lb



Lateral Car/Cab Tire Force, lb



Lateral Semitrailer Tire Force, lb



Longitudinal BNP Constants

BNP-Cx     BNP-Ex

Lateral BNP Constants

BNP-Cy     BNP-Ey

Calculate Forces

Export Plots

Convert Plot Units

Transfer Constants to "Vehicle Inputs" sheet

Longitudinal BNP Constants

BNP-Cx     BNP-Ex

Lateral BNP Constants

BNP-Cy     BNP-Ey

Longitudinal Car/Cab Tire Force	Lateral Car/Cab Tire Force	Longitudinal Semitrailer Tire Force		
Slip s	Force lb	Slip Angle $\alpha$	Force lb	Slip s
0.00	0.00	0.00	0.00	0.00
0.02	253.49	0.03	251.72	0.02
0.04	472.79	0.06	461.71	0.04
0.06	641.88	0.09	615.29	0.06
0.08	762.98	0.13	720.29	0.08
0.10	846.46	0.16	790.68	0.10
0.12	903.08	0.19	838.14	0.12
0.14	941.24	0.22	870.64	0.14
0.16	966.80	0.25	893.26	0.16
0.18	983.70	0.28	909.19	0.18
0.20	994.60	0.31	920.49	0.20
0.22	1001.26	0.35	928.49	0.22
0.24	1004.88	0.38	934.10	0.24
0.26	1006.32	0.41	937.93	0.26
0.28	1006.16	0.44	940.43	0.28
0.30	1004.83	0.47	941.90	0.30
0.32	1002.64	0.50	942.60	0.32
0.34	999.83	0.53	942.68	0.34
0.36	996.55	0.57	942.28	0.36
0.38	992.95	0.60	941.52	0.38
0.40	989.12	0.63	940.45	0.40
0.42	985.14	0.66	939.16	0.42
0.44	981.05	0.69	937.69	0.44
0.46	976.92	0.72	936.08	0.46
0.48	972.77	0.75	934.36	0.48
0.50	968.62	0.79	932.56	0.50
0.52	964.51	0.82	930.70	0.52
0.54	960.43	0.85	928.80	0.54