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11.00	-	22	F
11.00	-	22	G

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11.5 - 20 G

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Lateral Force vs. Inflation Pressure, Load Steer Angle Aligning Moment vs. Inflation Pressure, Load, Steer Angle

B. F. Goodrich Intercity Mileage

12.00 - 20 G 12.00 - 20 H

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@ Rated Load on Dry Asphalt

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Vertical Load Inflation Pressure Aligning Torque @ 1,2,4,8,12 & 16° Slip Angle

Vertical Load Inflation Pressure Circumferential Stiffness Vertical Spring Rate Highway Tread .

TIRE NO.	MANUFACTURER	\$ 0F MARKET*	MODEL	CARCASS TYPE	TREAD TYPE
lagb	Goodyear	20%	Unistee1-2	Radial	Rib
2a§b	Goodyear		Himiler Special	Bias	Rib
3a f b	Goodyear		Custom Quiet Drive	Bias	Rib
4a6b	Goodyear		SuperHiMiler	Bias	Rib
Safb	Goodyear		Custom Hi-Miler	Bias	Rib
6a§b	Firestone	18%	Power Drive	Bias	Lug
7afb	Firestone		Transteel	Radial	Rib
8agb	Firestone	•	Long Hauler	Bias	Rib
9aƙb	Firestone		Super All Traction	Bias	Lug
10a&b	Kelly-Springfield	6.5%	Registered Armor-Trac	Bias	Rib
lla§b	Kelly-Springfield		Registered Drive Trac	Bias	Lue
lZa&b	General	6.1%	GQT	Bias	Rib
l3aGb	General		QĊL	Bias	Lug
14a&b	Michelin	6.0%	ΧŻΑ	Radial	Rib
lSaGb	Michelin		XZX	Radial	Rib
16afb	Uniroyal	5.2%	Fleetmaster Triple Tread	Bias	Rib
17afb	Uniroyal		Fleetmaster Superlug	Bias	Lug
18agb	B.F. Goodrich	5.0%	Extra Miler XL	Bias	Rib
19agb	B.F. Goodrich		Traction Express Custom	Bias	Lug
20a§b	Sears	4.6%	Plus Mileage Rib	Bias	Rib
21a6b	Sears		Silent Trac	Bias	Ţ.uo
22afb	Armstrong	4.5%	SD-200	Bias	Rib
24af,b	Dayton	2%	Thorobred Premium ESD	Bias	Rib
26aßb	Recap		Uniroyal Fleet Carrier	Bias	Rib

TABLE 1. TEST TIRES

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II-10

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*Tire Review Magazine

PLY RATING AND TIRE SIZE

The ply rating designates the load range for which a particular size tire is designed. Load limits for various sizes at specific inflation pressures up to the design pressure are tabulated according to empirical formulae. The ply rating is a measure of the strength of the tire carcass and does not necessarily indicate the actual number of plies.

The tire pairs listed in Table 1 were tested on design width precision rims at the indicated pressures and loads which are



Fig. 4 - Lateral spring rate K_y versus inflation pressure for tires shown in Figs. 2A-2C

near the design values specified for these tires used as singles and duals. The higher rated tire of each pair is generally used as a dual. The 20 in tires that were tested all have the tread pattern shown in Fig. 6B. The tread pattern of the 11.00-22 tires (Fig. 2A) is similar. Table 2 lists the measured mechanical properties and illustrates the differences which may be found in tires which are similar in all respects, except for ply rating.

The differences seen in Table 2 are slight and possibly influenced by tire nonuniformity and/or measurement precision. There is remarkably little change in the properties of the 11.00-22 tires, the largest set tested for differences due to ply rating. The slight increase in test pressure (see Table 1) may be responsible for the increases in vertical spring rate. It is of interest to note that the vertical spring rate measured for the 10.00-20 tire with the G rating was less than that obtained for the F load rating. However, the lateral force generating ability did increase with increased load rating as evidenced by the



Fig. 5 - Lateral force versus slip angle and vertical load on 10.00-20/G tire at rated pressure (100 psi) and at 50 psi



Fig. 6 - Measured mechanical properties of 10.00-20/F nylon tire in three tread patterns. Arib-type I; B-rib-type II; C-open tread

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Figure 3.9 The effects of inflation pressure on cornering stiffness: heavy truck tires

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-5-

Figure 3.17. The load sensitivity of F_X/F_Z values measured at 4% slip for heavy tires of radial and bias-ply construction (tires are identified by code numbers previously listed in Table 3-1).



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"Peak and slide" values of F_X/F_Z vs. load for individual truck tires—superimposed within the envelope of data taken on eight truck and bus tires at 20 mph (for code number identifications, see Table 3-1).



3.22. "Peak and slide" values of F_x/F_z vs. load for individual truck tires—superimposed within the envelope of data taken on eight truck and bus tires at 40 mph (for code number identifications, see Table 3-1). 55

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Figure 3.23. "Peak and slide" values of F_X/F_Z vs. load for individual truck tires—superimposed within the envelope of data taken on eight truck and bus tires at 55 mph (for code number identifications, see Table 3-1).

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Figure 3.25. Lateral force measurements of heavy truck and bus tires at 20 mph, 1.5 x rated load.

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GOODYEAR UNISTEEL R-1 10.00R20/G VEL = 21 MPH

Figure 3.26. Typical array of $(F_y/F_z \text{ vs. } \alpha)$ curves covering the load range from $0.5F_{zR}$ to 1.5 F_{zR} .




1.0 .

.8

.6

Figure 3.27. Envelope and specific examples of $(F_y/F_z vs. \alpha)$ measurements taken for 8 heavy truck and bus tires at 1.0 F and 20 mph.

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Figure 3.28. Envelope and specific examples of $(F_y/F_z \text{ vs. } \alpha)$ measurements taken for 8 heavy truck and bus tires at 1.0 F and 40 mph.

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Figure 3.29. Envelope and specific examples of $(F_y/F_z \text{ vs. } \alpha \text{ measure-ments}$ taken for 8 heavy truck and bus tires at 1.0 F_{zR} and 55 mph.

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UNIROY FLEETHASTER TRIPLE TREAD 10.00X20 G

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

•16	1616.3	3020.6	4202.1	5149.2	3123,5	4216.6	3187.7	3976.9
2 +16	2.0 -1614.3	6.4 -3836.9	1.4 -4201.3	6.8 *5155.6	-3077.1	-4661.1	-3187.4	-4189.2
	2.4 149	0.3 271	1.7 370	7.5 447				
-0	266.9 -146	259,3 -269	1985.8 -367	1515 ,5 - 446	376.0	2996.2	214.3	2733.9
Q .+	-1278.9 1	.2278.7 2	-3021.1	.3556,8 3	-2395,2 2	-3043.4 2	•2320,9 2	+2759,9 ž
71	010-4	1398.0	1788.4	2052.9	1476.5	1756.2	1417.8	1579.2
44	- B69. B	-1488.4	-1916.2	-2157.1	-1533.3	-1869.5	-1511.0	+1675 . 6
∧: ₹	458.1	749.1	962.6	1987.5	792.0	940.7	760.6	811.0
ru +	-503.8	-863.4	-1088.9	-1231.8	-890.1	.1054.3	.866.1	6°786-
ī	228.9	381.2	469.5	509.3	388.7	442.9	373.8	391.3
 ,	-294°7	-490,1	•605°8	- 6964.9 ·	=211° 0	-581.0	-461.2	•495 . 5
8	-41.6	-61,5	-77-	1.40-	-67.2	÷68.9	-42.6	-51.9
LOAD	2000.0	4000.0	6988.8	8988,8	4604,9	6666.0	4089.0	6888°
104	180.0	100.0	188.0	169.0	15.8	15.8	56,8	50.8

P ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND BTEER ANGLE (DEG.)

+16 =16	6.5 e19.8	66.7 - 68.8	144.1 -147.8	253.9 -252.4	59,2 -72,8	59,2 -72,8 168,5 -167,9	59.2 -72.8 168.5 -167.9 73.4 -92.2
-12	- 29.2	-102.9	-216.6	-362.1			•
21+	11.3	89 . 5	196.9	335,3		-	-
8	-46.3	-152,9	• 279.9	-430.8	-181.9	•181.9 •348.1	•181.9 •348.1 •213.3
8+	36.5	138.6	273.8	924,9	164.5	164.5 333.5	164.5 333.5 199.4
7 -	-58.6	-155,9	-268.4	=377.6	-188.9	-188.9 -314.2	•188,9 •314,2 •225,5
4	47.8	148.5	265.1	378.2	174.5	178.5 310.5	178.5 310,5 216,8
2	1.84-	-103.7	166.1	+228,6	-125,5	-125,5 -194,3	-125,5 -194,3 +147,5
4	36.4	196.2	1.77.8	247,2	138.9	138.9 202.1	138.9 202.1 152.0
	-26.3	-56,8	-87.7	-119.6	.15.0	-15.0 -104.6	• 75.0 • 104.6 • 81.3
1+	21.2	64.7	1.05.7	142.8	73.7	73.7	73.7 114.5 87.9
6	9	2.7	19.3	12.2	7.6	7.6 8.7	4 4 0 9 4 0 9 5 7 0
LOAD	2000.0	4008.0	6000°	8090°B	4864.8	488 7.8	4889 , 8 6828 , 8 4888 , 8
154	100.0	100.0	100.0	160.0	75.0	75.0 75.0	75.8 75.8 58.8

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•	• •	1454.5	1152.3	1225.3	1150.7	9191.6	4139.4	5021.S	1939.2			-4.5	•63.9	-119.2	-205.0	-66,2	-136.4	-73.1	.174.3	
	• I •	1722.5	3116.1	4272.0	5187.9	.1985	4039.1	3025,8	3912.5		+16	-1.2	67.4	156.9	197.6	49.2	109.6	36.9	143.3	
	21-	1596.4 -	2972.1 -	4854.7 -	4861.4 -	. •	•		•		-15	-26,2	-103.2	-205.8	-343.1					
DEG.)	-12	-1686.7	-2925,4	-4863,7	4823,6			-4		GLE (DEG	-12	9.4	77.8	198.1	299,8					· -
ANGLE	8	1371.0	2584.4	3468.8	4847.9	2606.6	3297.5	2533,2	2935.9	STEER AN		-46°5	-157.7	-306,8	-442.6	-185,2	-361,2	-213.5	-452.8	
ND STEER	•	÷1309.3	.2533.9	=3495,4	•4205•0	-2653.4	•3375,4	.2534.0	-3000.3	ONA .C.	•	20.4	105.2	233 ₄ 1,	401.8	156.2	332,6	161.0	416.5	
(LB.), A	4	865.4	1688.7	2232.1	2529,2	1752.1	2079.0	1750.2	1792.3	LOAD (LB	3	-51.9	-160.6	-309.3	-482.9	-238.7	-434.5	-287.3	-545.7	
), LOAD	4	-905.7	-1786.4	-2489.1	•2729,0	.1898.0	-2283.7	.1898.0	-2024.0	(184)	4	30.8	147.9	289.4		220.7	427.4	259.1	0.°615	
RE (PSI,	~ -	478.1	894.6	1147.4	1229.7	927.6	1017.2	996.4	855.3	PRESSURE	2 -	-34,3	-115.7	-208.5	• 3A2 . 4	•161.9	*267,6	-204.5	-314,6	
N PRESSU	2+	-571.6	-1157.2	-1514.4	-1651.2	•1126.6	-1328.4	-1167.5	+1145.4	FLATION	2 +	34.8	125.4	235,0	347.6	169.2	307.3	249.7	396.1	
INFLATIO		224.1	419.5	518.9	544.2	395.3	429.2	367.7	352.6	CATED IN	•	-21.7	• 2 3 ° 9	6 8 6 8	*147.5	-77.5	-130,5	-100.9	•152.7	-
DICATED	+	-372.6	-710.6	-902.4	-982.7	-719.2	-773.7	• 689.6	-667.8	AT INDI	-	24.8	87.7	156.1	225.7	43.8	66.1	54.8	80°1	
AT IN	8	-80.3	•169.9	.220.6	+217.2	-156.0	-199.0	-167.8	-168.1	FTLB.)	6	6 . 6	26.9	57.1	52.9	÷25°	-43.B	-36.9	-57.3	
ORCE (LB	LOAD	2007.0	4000.0	6989 , 8	8688	4004	6889.0	4808.8	6888°	HOMENT (LOAD	2000.0	4698.8	6660°	8004.8	4000,0	6000°	4000.0	6000°	
ATERAL F	184	100.0	100.0	100,0	180.8	15.0	75.0	50.0	20.0	LIGNING	184	109.0	100.0	100.8	. 160.0	75.0	15.0	50.0	50.0	
م	•	-			:		•			46					•			•		

8. F. ()RICH MILBAVER HDR 10.00R20 G

B. F. GC ICH MILESAVER HDB 10.00H20 G

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

919	1576.8	2050.5	3929.2	4802.7	2070.5	3876.7	2828.8	3689.1
÷16	•1579,6	•2825.8	.2903.8	-4822.4	-2852.5	-3879.9	-2823.5	-3689.2
21.	1494.9	2722,2	3752.6	4582.8		-		
+15	-1500.2	*2717.1	-3754.1	4.1424.4				
•	1241.5	2340.3	3222.4	3867.3	2425.6	3168,2	2436.7	2901.5
8+	-1272.4	•2379.6	• 3271.2	= 3943 ,5	-2438.7	•3208.3	-2439.9	-2978.6
4	762.5	1510.4	2030.4	2340.3	1621.3	1985.4	1661.3	1885.5
7	-632.7	-1641.7	+2239.9	*2599,9	-1742.5	=2193 . 8	•1803,5	
~	426.6	814.4	1048,2	1165.8	848°6	974.8	852,3	691.3
+5	-518.7	-1045.6	•1377.4	-1551-0	-1111.8	+1297.2	÷1156.9	-1184.1
•	197.3	370.1	472.5	507.0	377.2	421.7	363,5	349.7
1+	*297 ,6	-633,8	-831.8	- 897.7	- 949 - B	•772.3	-684.7	•668.0
6	· 63. 7	-154,8	-191.8	-215.5	-153.1	-188.9	-156.6	-167.0
LOAD	2000.0	4987.0	6080.8	8088°	4004°	6089.8	4030.0	6666 .6
P31	100.0	100.0	109.0	100.0	75,0	15.8	50,0	50.0

-VI ALIGNING MOHENT (PT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND BTEER ANGLE (DEG.)

•1•	.0.1	-38,2	-71.8	-135, +	-32.8	-186,5	- 48.7	-143.7
÷16	5.5	9.5	49.5	110.4	8.7	63.4	28.9	116.1
-12	-25.4	-75.8	-158.4	=255 , 6				
+12	9.1	45.8	122.5	223.5				
8	-35.1	-110.0	-225.7	-381.2	-144.4	-302.3	•165.1	-367,5
8	33.6	102.0	216,1	361.6	121.1	273.4	141.1	340.3
7	-49.7	-143,5	-270.5	-416.5	• 233, 3	-442.8	-192.5	-355,1
4	41.1	134.1	258,5	410.0	177.8	343.9	269.4	
N 1	= 35°5	1. 79-	•172.1	=277.0	-130.1	-221,5	-170.7	-268,6
~	32.2	107.1	198.7	302.8	149.9	266.2	195,0	336.9
	-19.6	-47.3	- 93,6.	-114.3	•67.8	105.0	-84.6	•128.1
	25.4	75.0	133.6	195,2	100.1	167.4	130.0	209,3
G	5 ° 1	20.3	35.1	55.6	22.3	37.8	28.6	39.8
LOAD	2080,0	4660,8	6000°B	6999,8	4888.8	6988.0	4000.0	6686.8
184	100.0	100.0	100.0	100.0	75.9	75.0	2 8 . 8	50.0

6000Y UNISTEEL R-1 10.00420 G

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

91 -	1937.0	3391.5	4499.6	5363.3	1.5125	4270.7	3122.4	3946.3
+1+	8 -1961.1	.2 -3317.4	.3 -4488.2	9 -5328.7	•3362,5	-4332,6	. • 3223,5	-4029.6
-12	1050	3188	4192	4896				•
+12	- 1048.8	-3217.2	.4247.5	-4948.5				•
0	1553,0	2729.6	3561,1	4826.9	2789.3	3365,4	2678.9	2962,2
0 +	-1608.7	-2787.8	.3639,8	-4042.7	-2841.9	-3374.8	-2679.6	*2915,2
7	1054.4	1825.1	2191.5	2275.1	1853.2	1975.9	1741.8	
4	-1131.0	-1897.6	-2270.9	*2326,8	•1862.6	-2012.2	•1777.4	-1626.1
۲ •	662.9	1053.9	1210.2	1211.4	1004.7	1010.7	916.2	882.2
2+	.686.3	-1074.9	÷1197,2	-1203.9	-1831.7	-1039.0	-911.2	-807.9
:	362,6	565.5	633.4	639.7	525.9	518.2	459.9	417.6
1+	-402.8	-535.8	-643.2	•635,8 [°]	-541.2	-520.6	-478.2	-425.8
8	•12.6	-15.4	4.7	11.3	•3.9	-4,5	6.6	-2.5
LoAD	2000.0	4999.6	6889.8	8.900.8	4969.0	6000.0	4888.0	6000°
184	109.0	188.8	166,6	100,0	15.8	15,0	58,8	50.0
		•		•				•••

() ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND BTEER ANGLE (DEG.)

• •	-17.4	-61.7	- 142 . 0	=260,9	-61,0	•153,1	•75.i	-203, 3
419 419	16.8	72.5	155.6	265.1	67,5	171.7	92.4	200.2
~		-116.6	-248.4	•422°				
+12	28.8	117.0	247,8	423.6				•
0	-43°9	•155,4	•326 • 5	•582.3	•212•6	-455,3	+231,4	•533,7
Q •	47.1	188.6	363.2	612.0	207.4	449,9	258,8	557,6
7	- 6 8 - B	-212.4	-401.9	-601.4	•268 .1	-488.4	-338.1	-611.7
4	66.6	219.1	397.6	596,8	265.2	488.5	327.9	594.6
2 =	-61.6	-162.6	-284.3	.388.6	197.1	-319,5	-256,2	380.0
+ 2	57.0	160.9	270.1	373.1	193.8	306.9	237.7	355.7
•	=36 _e 8	-103.9	-166.9	-224.1	-124.5	-184.9	-150.4	-211.5
1+	33.4		148.1	191.0	112.7	167.4 .	137.9	183.3
6	-1.4	• 1 •	- 6 . 7	-14.6	.9.8	-11.Y	-9.9	•15.6
LOAD	2808,0	4998.6	6000°	8000.8	4999.0	6090 . 0	4000.0	6888.6
184	100.0	160.8	100.0	100.0	15.0	75.0	50.0	50°0

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LATERAL FORCE (LB',) AT INDICATED INFLATION PRESSURE (PSI,), LOAD (LB,), AND STEER ANGLE (DEG,)

		-+		•••	~	4	4	4	8+		+12	-12	+16	91
2888,8 -12,6 -381,6 264,9 -539,2	-12.6 -301.6 264.9 -539.2	-301,6 264,9 -539,2	264.9 -539.2	~539,2		519.5	-937.2	984.9	-1452.6	1415.6	÷1721.4	1708.4	-1065.4	1858.
1000.0 -3.1 -549.4 528,3 -1004.2	-3.1 -549.4 52A,3 -1004.2	-549,4 52A,3 -1004,2	52A, 3 = 1004 . 2	-1004.2		994.0	-1783.5	1716.9	-2683,5	2637.8	-3852.5	3045.3	•3296.6	3241.
1888.8 4.3 -705.4 694.7 -1302.8	4.3 .705.4 694.7 .1302.8	-705.4 694.7 +1302.8	694.7 +1302.8	•1302.8		1299.6	-2376.4	2310.3	-3618.9	3586.5	-4166.3	4149.3	-4498.4	4445.
1888.8 12.4 -746.3 747.4 -1437.3	12.4 -746.5 747.4 -1437.3	-746,3 747,4 -1437.3	747.4 -1437.3	-1437.3		1453.2	-2703.6	2668.5	-4311.5	4262,5	÷5864,8	5835,9	• 5553 • 9	5514
1888.8 2.5 ~556.1 571.3 ~1969.4	2.5 ~556.1 \$71.3 ~1969.4	-556.1 571.3 -1969.4	571.3 +1069.4	•1069.4		1942.0	-1892.5	1886.2	•2799.0	2740.6			-3357.0	3311.
1808.8 17.2 =596.3 644.8 =1223.2	17.2 =596,3 644,8 =1223,2	=596,3 644,0 =1223,2	644.8 •1223.2	•1223.2		1255.7	-2297.8	2290.1	-3598.3	3564.8	-		-4435.6	4349.
1888.8 16 .9 -5 22.8 572.8 -1852.4	16.9 =5 22.0 572.8 =1052.4	•5 22,0 572,0 •1052,4	572.0 -1052.4	-1052.4		8.1991	-1939.4	1914.9	-2759.6	2723.6			-3279.8	3232
.008.6 33.8 e472.6 566.8 e1837.5	33.8 e472.6 566.8 e1837.5	«472.6 566.8 •1837.5	566.8 .1837.S	·1837.5		1120.9	-2085.3	2126.4	.3382,3	3326.9			-4236.4	4157.0

(S ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND STEER ANGLE (DEG.)

	• •	•11.•	-25.4	• 67.8	•164.0	-20°	-93,5	-37, 3	•127 <u>.</u> 7
	•1•	16.4	51.9	110,2	252.7	74.1	159.2	8.48	193.1
•	21-	-23.2	-76.7	•158, •	-272.6				•
	+12	29.2	95 <u>,</u> 1	1.05.3	335,6		P		
	€) ∎:	-46.9	-134.9	265.6	-435,5	-161.1	-311.9	-155,3	.368.8
	8 +	50,2	166.1	319.7.	516.3	200.4	380.1	214.9	437.1
÷	4	-58.1	-173.0	=317.6	-484.8	-222,4	.391,8	•257,5	-480.4
- 11 1	₽ +	53,5	177.2	331.1	503.3	226.0	107.1	255.6	501.8
-	~	-44.4	-128,5	-222.7	-320.4	-160,5	-270.4	-205.7	-348.1
	2	36.3	120.0	212.5	308.2	156.6	261.6	194.0	312,0
		-28,8	-89 . 6	-132,0 .	-186.7	•102,5.	-168.7	- 128,4	-194,4
	+	22,3	66.3	112.1	161.2	8350,5	83.9	99°6	140.0
	8	-3.7	-3 ₊ Ŷ	•8.6	-11.5	-7.4	-10.9	-10.3	-10.2
	LOAD	2000.0	4000.0	6998.0	6686.0	4900.0	6666° 6	6.8684	6 6 6 6 ° 6
	154	100,0	100.0	109.0	100.0	75.0	75.0	58.8	50.0

. . .

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. 1	LOAD	6			+5	2	4	4	8+	8	+12	-12	•1•	•1•
	2040.0	-15.1	-309 ¢	295.9	-576.4	547.3	-1023.4	972.1	-1626.9	1501.7	•1581-	1717.0	•1858.1	1667.5
100.0	4808.8	-5.8	-576.8	565.6	-1093.7	1981.1	-1952.7	1079.1	-2856.9	2765.5	-3175.8	3136.3	•3259,7	2934.1
100.0	6888.8	5.1	=696a3	705.8	-1380.2	1366.0	+2512.4	2449.2	-3715.9	3640.0	-4208.7	4152.6	-4330,2	3907.0
199.0	8000°	2.8	-759.3	. 736.7	•1588.6	1453.5	-2881.4	2712.3	.4218.5	4162.4	.5000.0	4944.8	-5178.8	4770.5
75.0	4000	-3.1	-617.4	613.5	-1197.6	1165.3	•2881.6	2091.7	.2881.8	2739.8			-3315,0	3207.4
75.8	6009.8		-704.4	661,8	•1359°8	1325.8	•2538.0	2443.7	-3605.7	3535,6			-4397,2	4206.3
58,0	4000.0	.4.3	-616.4	580.7	-1179.0	1156.5	-2073.0	1995.5	-2754.7	2713.6		•	.1258.2	3150,0
59.8	6888.6	.15.5	-684.8	550,2	-1194.4	1126.6	-2205,4	2089.4	- 3238 , 8	3188.5			-4170.8	4069.1
ALIGNING	NOMENT	(I INDI	CATED IN	FLATION	PRESSURE	: (P&I),	LOAD (LB	DNA .C.	STEER AN	IGLE (DEG			
164	LOAD	8	• •	-	N +	лі Т	+4	Ţ	8 +	6)	-12	-15	+16	= 1 @
100.0	2001.0	9.9	29.6	• 28,9	46.0	-50.6	69.1	- 70.9	65.9	- 64.1	34.4	*35,8	11.6	4.4
100.0	4000.0	-5.4	83,3	• 92 • 8	146.1	-151.5	219.5	-218.1	188.8	-183.1	110.6	-104.5	39.4	•23,1
100.0	6696.0	8.6.	135.7	.154.1	250.0	-267.0	383,9	•391.6	345.6	-349.4	218.2	-215.8	93.5	• 2 3 • 4
-160.0	8668.8	-11.6	187,5	-212,8-	361,5	-379.7	571.2	-589.8	554.6	-563.7		.375,3	168.1	-127.0
75,0	4000.0	-12.0	98.0	•114.5	179.0	-191.0	231.9	-244.1	192.6	-168.1		•	67.0	-49,9
15.0	6006°	-14.8	158,0	-186.7	396.9	-328,1	430.4	-453.7	373.6	-363,6			151.0	•138.é
58.0	4000.0	-14.1	121.6	-147.2	222.6	-243,9	268.1	+297.3.	223.8	-190.7			71.8	-63,2
50.0	6666.6	-17.6	185.2	-224.5	141.5	. 104 . O	500.8	-552 A	UEQ. T	8-11-			171.4	1 4 4

•,

MICHE RADIAL 10,00R20 G



B. F. GOODRICH MILESAVER RADIAL STEEL HDR 10.00R20/G VEL = 22 MPH

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-21-



-22-

B. F. GOODRICH MILESAVER RADIAL STEEL HDR 10.00R20/G
FZ = 6080 LB



23-





-24-

BFG MILESAVER RADIAL HDB 10.00R20/G VEL = 40 MPH



-25 -

BFG MILESAVER RADIAL HDB 10.00R20/G FZ = 5943 LB



BFG MILESAVER RADIAL HDB 10.00R20/G FZ = 5944 LB VEL = 40 MPH



-27.

GOODYEAR UNISTEEL R-1 10.00R20/G VEL = 21 MPH



-28

GOODYEAR UNISTEEL A-1 10.00R20/G FZ = 6243 LB



GOODYEAR UNISTEEL R-1 10.00R20/G FZ = 6255 LB VEL = 41 MPH

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1.2

-29

Measurements on each of eight tire specimens are provided in the following tabular and graphic forms, presenting, first, a summary of the peak and slide values of F_x/F_z at all load and velocity conditions. Next, each tire's run-by-run traction performance is represented in both tables and print-plots of F_x/F_z (labeled "MUX") versus longitudinal slip.

The following heavy tires are represented in this data set.

Tire Code	Manufacturer	Model	<u>Size</u>
H-1	Uniroyal	Triple Tread	10.00 x 20F
H-4	B.F. Goodrich	Milesaver Radial H.D.R.	10.00 R 20G
H-5	B.F. Goodrich	Milesaver Radial H.D.B.	10.00 R 20G
H-6	Goodyear	Unisteel R-1	10.00 R 20G
H-8	Firestone	Power Drive	10.00 x 20F
H-12	Firestone	Commercial Mileage	12.5 x 22.5G
H-18	Michelin	Radial XZA	11 R 20H
H-19	Michelin	Radial XZA	11 R 22.5H



.		** A-D FILE 198	N. FILE 101 10	TEST SAMPLE209	
•	AVERAGE OF FILE 198	FOR 6 RECORUS.	RFG MILESAVER RADIAL HDR	10.08-20/G	(DANA)
SLIP	MUX	TOPOUE	FX		-
8.08	9°96	5° 6	8.6		
50.9	R. 25	31571.0	1592.6		
6.34	R . 45	56716.5	2699.3		
99.46	R . 59	74881.6	3557.3		
0.46	3,70	87991.8	4161.4	. 	
0.10	0.77	97344.6	4566.4		
9.12	9.41	1 ************	4823.0		
0.14	9.84	108925.1	1981.1		
0.15	R. 86	112696.0	5A72.1		
4.18	3.87	115526.2	5115.6 TOAV #	62955.3 LUAD 1	. 5954.5 YEL . 40.0 MPH.
6.20	A. B.7	117592.6	5121.7	•	
6.25	R.A7	121764.0	SUR3.7 HUPEAK #	0.87 MULOCK	r 4.52 rafio = 1.66
6.34	9 ° 4 ¢	125467.8	5415.8		
¢.35	8°84	128775.6	4926.3		
67°4	3.83	131891.5	4822.5		·
0.45	P.A1	134948.8	4702.1		
6.56	A 7 B	137430.2	4570.1		•
£4,55	A.76	138425.8	1433.2		· · · · ·
2.62	т , 7 и	136937.4	4.29R.6		
8.65	9.72	132362.7	4166.2		
K. 7P	69° ti	125262.3	1 4 1 1 . C		
6.75	P.47	115449.2	3471.5		
18°91	P . h4	173384.6	5123.2		
A.85	4.61	96.493 , 6	5564 . B		
× 5 • ×	с. • С.Я	Awin1.7	3417.7		
30.05	55°	1.04.7	4 2 1 2 • E		
7 • 7 (*	۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲, ۲	6295A.S	5-272.5	٠	•

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		** A-D FILE 200	FILE 103	TEST SAMPLEZI	•
	AVERAGE OF FILE 200	FOR A RECORDS.	BFG MILESAVER RADIAL HUR	10.44-2116	7444)
SLIP	жин	TORQUE	FX		
6.69	9 ° 4 3	د م	(3 € (3		
8.02	8,15	17712.4	9 n5 e		
64	A.31	3.97.89.3	1886.1		
B. 46	0,45	56839.2	2730.0		
8.78	A.56	7:0440.6	.3371.1		
5.3	A, 64	R.219.3	3476.5		
0.12	¢.49	R7354.2	1146.2		
Q . 1 4	e.73	92744.8	4377.5		
0.16	0.76	97140.3	4538.9		
0.18	0.78	100782.5	4050.2 TOAV E	72916.7 LOAD #	ЫЙ21.2 VEL # 28,0 МРН.
6.20	A. 79	103719.2	4712.3		
P. 25	6 . 81	119915.0	4792.0 MUPEAK	■ 0.82 MULOCK ■ 0	.60 KATIO = 1.35
6.32	1.0.1	115634.3	1831 . W		
0.35	4 . 8 2	124894.6	4B2A.8		
0.47	9.41	125230.2	4896.6		
0 45	R.AU	123934.2	4752.6		•
Q.50	и . 79	128365.5	4095.2		
U.55	n.78	126422.5	4618.5	•	
9 • 6G	11.1	122756.8	4524.6		•
0.65	a.75	117548.4	4433.6		
9.72	9.72	118359.6	4266.3		-
A.75	a.7 a	182201.2	4131.6		•
9.80	61 6 B	94599.5	4910.3		
a. H5	2.66	88351.8	3894.F		
16 ° N	9.44	B254A . 3	STAR. B		•
80°8	7 • 62	77348.4	3682.4		
1.60	9 ° 60	72916.7	3580.0		•

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		## A-D FJLE 201	NEW FILE 104	TEST SAMPLE212	
• •	AVERAGE OF FILE 201	FOR 6 RECORDS.	BFG HILESAVER HADIAL HUR	10.89-2416	(DAVA)
SLIP	МUХ	TORAUE	F X		
8.99	9.96	5. 5	4.4		
9.42	9.22	27294.2	1336.2		
9.44	6.42	52779.7	2523.2		
ۍ ، و	A.56	74469.3	3339.7		•
0.09	P.65	83724.4	344R.6		
0.19	A.72	93443.9	4294 . W		
6.12	. 0.76	9481445	4554.1	•	
0.14	6.19	104942.7	4721.6		
U.16	P.81	14945.6	4822.5		
0,18	0 ° 8 2	112163.6	4875.6 TOAV .	60466.7 LOAD 1	: 5982.3 VEL = 40.0 MPH.
6.20	Ø . A 2	114657.2	4884.2		•
0.25	4 ° 8 S	119791.2	4841.1 MUPEAK	1 0.82 HULOCK	: 0.51 RATIO = 1.62
0.37	6.A1	124325.1	4769.2	•	
0.35	A . 8 %	128381.9	4678.8		
N . 41	R. 78	1 132143.7	4567.1		
0.45	fi., 7.6	135372.9	4.137.6		
6°26	31 ° 7 4	137349.9	4295.9		
Ø.55	0.72	137360.7	4149.7	•	· · · · · · · · · · · · · · · · · · ·
9.68	A.69	134195.5	41:(46.5		-
J. 65	9.67	127933.1	3654.8		
510	10°64	119549.9	3725.0		
v. 75	8°.62	128316.9	3544.3		•
U. Br	6°,59	95495°a	3399.6		
P.85	ر. × 57	84018°4	3273.B		
06*0	2° 55	74A48.4	3158.4		
50 ° .)	1 ¹ 53	6a985 . 7	3::46.3		
3 ° 13 (*	15.0	40404.7	2011.0		

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	· · ·	** A=D FILE 242	NEW - 7 105	TEST SAMPLEZIS	
) 	AVERAGE OF FILE 2	WZ FOR 5 RECORDS.	AFG MTLESAVER RADIAL HDF	R 10.08-24/G	(DAWA)
SLIP	ХЛН	TOROUE	FX		
9.69		а. Ю	2° 5		
3.42	6.12	19341.4	1492.0		
6.84	0, 34	53452.4	2709.5		
8,46	4.45	81928.9	4656.2		•
6.05	0.57	191813.5	596N.5		•
C. 19	0.64	116156.5	5740.0		
0.12	0.70	125768.3	61A7.3	•	
6.14	9.73	132341.2	6478.1		•
0.16	9.75	137017.0	6665.1		
0.18	9.77	144415.5	6771.1 TOAV =	91675.0 LOAD #	9145.9 VEL # 20.0 MPH.
0.20	0.77	142867.9	6813.3	•	
e. 25	. 9.78	147856.9	6622,2 MUPEAK	# 0,78 MULOCK #	P.53 RATIO = 1.48
6°30	0.78	152315.9	47A1.4		
0.35	Q • 77	156269.3	6704.7		
0.43	9.76	159019.6	65A5.4		
P. 45	tr L * W	159732.6	6451.7		-
0.50	4.73	158364.4	63A8.N	•	
0.55	0,71	154292.2	6147.7		•
4.68	0.69	148467 . 5	5966.7		
0.65	P.67	141472.6	5774.1		-
6.70	3 • 64	133124.3	5571.6		
0.75	9°45	123421.6	5303.2		
9 8 9	2.64	115344.1	5279.2		
¢,85	9 2 A	128358.6	5015.1		
5 6 3	ل • ځ د	F. 6991	N95.4		
50 0	2.52	9e352.h	2.5°5211		
1 . t. t	0°53	91675°U	4545.5		•

وموسوعات والمروان المراجعة والمراجع

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Methods FILE Ref Inclust Ref Inclust Ref Inclust Ref Inclust Inclust 11 10.0 0.0 0.0 0.0 0.0 0.0 0.0 11 10.0 1380.1 1380.1 1280.2 0.0 0.0 0.0 10 0.1 370.6 0.0 1380.1 1280.2 0.0			** A-D FILE 203	NEW FILE 100	TEST SAMPLE214	*	
(10 1000E P3 01 0,00 0,01 0,01 02 0,30 0,31 0,40 03 0,31 15301.2 0,40 03 0,31 13301.2 0,40 04 0,41 13904.1 1041.1 04 0,41 13904.2 1440.2 05 0,41 1041.1 1041.1 05 0,41 1041.1 1041.1 05 0,41 1041.1 1041.1 05 0,40 1041.1 1041.1 05 0,40 1041.1 1041.1 05 0,40 2302.4 1041.1 05 0,41 2302.4 2404.4 10 0,10 2104.5 2404.5 11 0,10 2104.5 2504.6 11 110.7 2504.6 1001.6 11 110.1 2504.6 2504.6 11 110.1 2504.6 2404.7	•	AVERAGE OF FILE 203	FOR 5 RECORDS.	BEG HILESAVER RADIAL HDR	14.08-2016	(DAWA)	
0 0.0 0.1 0.1 0.1 12 6.20 13241.7 694.3 1204.3 14 6.21 39244.1 1204.2 694.3 16 6.41 3795.0 1204.1 1041.1 18 6.41 3795.0 1940.1 1041.1 18 6.41 3795.0 3991.2 2319.4 18 6.41 0795.0 2319.4 2319.4 18 6.41 0795.0 2319.4 2319.4 19 6.41 0795.0 2319.4 2319.4 19 6.41 0795.0 2319.4 2319.4 19 6.41 0791.2 2319.4 2319.4 10 6.41 7332.5 2319.4 2319.4 11 8.41 2342.5 2319.4 2319.4 12 8.41 2319.4 2319.4 4410.6 13 8.41 2319.4 2319.4 4410.6 14 8.41 <	LIP	ХЛН	TORQUE	FX			
(1) (5,2) (59,3) (59,3) (2) 2850,1 1244,2 1641,1 (3) 2850,1 1641,1 1744,5 (4) 2841,2 2719,4 1641,1 (4) 640,1 2714,5 2719,4 (4) 641,2 2719,4 2714,5 (4) 6513,7 2514,6 2714,6 (4) 6513,7 2514,6 2714,6 (4) 6513,7 2514,6 2714,6 (4) 6513,7 2514,6 2714,6 (4) 6513,7 2514,2 2714,6 (4) 6514,1 2714,2 2714,2 (4) 6514,1 2714,2 2714,2 (4) 641,1 2714,2 2714,2 (4) 641,1 272,2 2714,2 (4) 161,1 272,2 271,2 (4) 161,1 272,2 274,2 (4) 161,1 274,2 274,2 (5) 170,1	12 °	0 • 00	5.3	6. N			
(6) (6,1) 2054.0 1200.2 (6) (6,1) 3906.4 1001.1 (18) 3906.4 1001.1 1906.4 (18) (1902.1) 2190.4 1001.1 (18) (1902.1) 2319.4 1904.1 (18) (19) 2304.2 2319.4 (18) (19) 232.8 2519.4 (18) (19) 2519.4 2519.4 (18) (19) 2519.4 2519.4 (19) (10) 2519.4 2519.4 (19) (10) 2519.4 2519.4 (19) (10) 2519.4 2601.4 (11) (10) 2519.4 2601.4 (11) (11) 2504.5 2704.5 (11) (11) 2704.5 2604.6 (11) (11) 2524.6 2604.6 (11) (11) 2524.6 2604.7 (11) (11) 2524.6 2402.1 (11)	. 42	6 - 20	15291.2	659.3			
(6) (6,1) (101.1) (10) (1705.0) (101.1) (11) (1705.0) (101.1) (12) (1705.0) (101.1) (12) (11,2) (210.0) (12) (11,2) (210.0) (13) (11,2) (201.2) (14) (101.1) (101.0) (15) (101.1) (101.1) (16) (11.1) (101.1) (17) (101.1) (101.1) (16) (110.1) (101.1) (17) (101.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (101.1) (11) (110.1) (110.1) (11) (110.1) (110.1) (11) (11	64	R.37	28549.3	1204.2			
10 0.41 0795.0 1910.1 11 2.40 2.61.2 219.4 12 2.47 0.60.9.4 2392.4 13 0.41 0.5147.3 2314.6 14 0.41 0.9332.4 2514.6 15 0.41 0.9332.4 2541.4 16 0.41 0.9332.4 2641.2 17 0.41 2641.6 274.7 18 0.43 76.4 2641.6 19 0.43 274.5 2641.4 19 0.43 274.5 2641.4 19 0.43 274.5 244.7 10 0.43 274.5 244.7 10 0.42 244.1 244.4 10 0.41.7 255.6 244.7 10 0.416.1 244.7 244.7 10 0.416.1 244.7 244.7 10 0.415.1 244.7 244.7 10 0.415.1 244.7	• 0.6	0,51	39264.0	1641.1			
5.401.2 2219.4 6.714 64669.8 2392.9 6.714 64669.8 2392.9 6.714 6933.0 2314.6 6.714 6933.0 2314.6 6.714 6933.0 201.4 6.714 6933.0 201.4 6.714 6933.0 201.4 75361.1 2001.2 1044 75361.1 2001.2 2001.4 75361.1 2001.2 2001.4 75361.1 2001.2 2001.4 75361.1 2001.2 2001.4 91451.2 2001.2 2001.4 9133.1 214.2 200.4 9133.1 214.2 200.4 9133.1 214.2 200.4 9133.2 200.4 210.4 2101.2 210.4 <td>82</td> <td>0.61</td> <td>47965.8</td> <td>19Rti.1</td> <td></td> <td></td> <td></td>	82	0.61	47965.8	19Rti.1			
12 9.7 la 0600.0.1 2302.0 13 0.7 la 05137.0 2314.0 14 0.7 la 05137.0 2314.0 16 0.4 l 05137.0 2314.0 16 0.4 la 05137.0 201.0 201.0 17 0.6 la 75308.1 2001.0 2005.7 100.0 1199.7 VL a angle Peril 17 0.6 la 75308.1 2001.0 2010.0 2199.7 VL a angle Peril 18 0.6 la 7530.2 2001.0 2005.0 1000.0 1199.7 VL a angle Peril 19 0.6 la 7530.2 2001.0 2005.0 2001.0 2000.0 1199.7 VL a angle Peril 19 0.6 la 0.011.1 2001.0 2199.2 2001.0 2199.2 2001.0 2199.2 10 0.7 la 1974.0 2392.2 2392.2 2392.2 2392.2 2392.2 10 0.7 la 1974.0 2392.2 2392.2 2392.2	.10	6.4.9	54911.2	2219.4			
(1) (-7) (-5) (-1) (-5) (-1) (1) (-0) 72h2.4 2601.4 70.4 • 39450.4 140.0 • 3199.7 VEL = 48.4 0 PPU (1) (-0) 72h2.4 2601.2 70.4 • 39450.4 140.0 • 3199.7 VEL = 48.4 0 PPU (2) 8.4 · 3 75146.1 2601.6 733.4 10.0 • 3199.7 VEL = 48.4 0 PPU (2) 8.4 · 3 75146.1 2601.6 734.5 PULOCK = 0.4 · 0.1 0 CK = 0.4 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.1 · 0.	.12	0.74	64669.A	2392.9			
(1) (9.11) (9332, 0 2601, 4 Толек, 7 201, 4 2010, 6 2199, 7 710, 6 2010, 6 2199, 7 711, 6 2010, 6 2199, 7 711, 6 2010, 6 2199, 7 711, 6 2010, 6 2199, 7 711, 6 2011, 6 <	.14	R. 78	65347 . ß	2514.6			• • • •
1.8 8.03 726.56.1 2060.2 TOAV 39457.4 LOAD 3149.7 VEL And De 27 8.44 75308.1 700.6 270.6 700.7 8410.6 840.6 840.6<	.16	0.41	69332.A	2601.4			•
20 8.44 753.85.1 2603.6 .23 8.65 91660.8 2736.7 MIPEAK = 6.66 AATIO = 1.44 .31 8.76 61591.6 2744.5 MIPEAK = 6.66 AATIO = 1.44 .33 8.76 617591.6 2744.5 MIPEAK = 6.66 AATIO = 1.44 .35 8.76 61731.3 2664.6 7722.5 2584.6 AATIO = 1.44 .46 9031.3 2584.6 7722.5 2584.6 7722.6 244.7 .59 6.78 19414.7 25584.6 244.2 2584.6 7410.7 244.7 .55 6.78 19414.7 2584.6 244.1 2584.6 244.10 .5 6.77 9986.1 244.2 244.2 244.7 244.1 244.1 244.10 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1 244.1	.18	0.03	72626.7	2660.2 TOAV	39450.0 LOAU =	3199.7	VEL = 40.8 PPH.
-25 8.05 91664.8 276.7 MIPEAK = 0.86 MULOCK = 0.40 ATI0 = 1.44 -30 8.06 67591.6 2744.5 2744.5 776.7 -35 6.05 9332.4 2744.5 2744.5 714.1 -31 8.05 9332.4 2744.5 266.6 714.1 -40 9031.3 266.6 2690.6 2690.6 2690.6 -51 19744.1 25590.6 2690.6 2690.6 2690.6 -51 19744.1 25590.6 2442.0 7410.6 2690.6 -51 19744.1 25590.6 2442.0 7410.6 744.7 -51 19744.1 2573.2 2442.0 244.7 744.7 -51 19745.1 244.7 244.7 244.7 -51 194.6 244.7 244.7 744.7 -51 194.7 244.7 244.7 744.7 -51 -51.4 244.7 744.7 744.7 -51 <	0Z.	9.84	75388.1	2693.6			•
J0 0.86 6791.6 2744.5 .15 7.85 9332.4 772.5 .48 90131.3 2664.6 .48 90131.3 2564.6 .48 90131.3 2564.6 .48 90131.3 2564.6 .48 90131.3 2564.6 .49 10714.1 2569.6 .51 8.82 104116.7 .55 0.72 10724.3 .55 0.72 10724.3 .51 1.520.4 .53 1.520.4 .55 1.520.4 .55 2.442.0 .57 1.744.3 .55 2.442.0 .55 2.442.0 .51 2.442.0 .51 2.442.0 .51 2.442.0 .52 2.442.0 .51 2.442.0 .51 2.442.0 .52 2.442.0 .51 2.442.0 .52 1.44.7 .51 2.44.7 .51 2.14.6 .51 2.14.7 .51 2.14.7 .51 2.14.7 .51 2.14.7 .51 2.14.7 <	• 25	& B5	B1664.B	2736.7 HIPEAK	. N. 86 MULOCK .	6.60 RAT	10 m 1.44
.35 6.85 93382.4 772.5 .48 99031.3 2669.6 .48 99031.3 2669.6 .59 8.84 184116.7 2599.6 .51 8.78 187740.3 2599.6 .53 8.78 187740.3 2552.6 .51 8.78 19780.3 2447.0 .55 8.78 19780.3 2447.0 .67 19780.3 2447.0 2573.6 .67 19780.3 2447.0 247.6 .79 0.472 2371.6 2371.6 .71 0.72 1415.6 2313.2 .71 0.72 996.6 2149.3 .67 01415.6 2149.3 .68 586.9 1001.8 .68 586.9 1001.8 .69 586.9 1001.8 .69 587.6 1001.8 .61 7.47 201.8 .61 2.47.3 1001.8 .61 2.47.3 1001.8 .61 2.47.3 1001.8 .61 2.47.3 1001.8 .61 2.44.3 1001.8 .61 2.44.3 101.4 .71 2.44.3	.30	P. A6	67591.6	2744.5			
40 0.84 09031.3 2664.6 45 184116.7 2599.6 50 8.84 187446.3 2599.6 55 8.78 187247.3 2542.0 56 8.78 197247.2 2472.0 57 9.766.1 242.0 63 1.70 247.0 65 6.72 9466.1 70 6.72 944.7 71 974.6 233.2 73 9.145.6 233.2 74 9415.6 233.2 75 91415.6 233.2 6 7.2 91415.4 70 9.72 149.4 71 9.72 149.5 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7 6 7.65 194.7	. 35	6°85	93382.4	2722.5			
.05 082 1/44116.1 2599.6 .50 864 187744.3 2526.6 .55 076 1.98289.8 2442.0 .63 070 1156.1 2442.0 .63 070 1156.1 2442.0 .63 072 3511.6 2513.2 .70 072 91415.6 2513.2 .71 0.1415.6 2149.3 .72 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 2149.3 .67 91415.6 1970.4 .7 1975.7 1970.4 .61 1975.4 1941.4	46	6 6 th	99031.3	2669 B			•
50 2. PM 10774.03 2522.6 .63 076 11°5.0.7.2 2447.0 .63 070 11°5.0.7.2 2371.6 .65 674 99466.1 2534.7 .65 672 91415.6 2334.7 .70 672 91415.6 2334.7 .73 974 91415.6 2334.7 .75 9.1415.6 2334.7 .75 91415.6 2334.7 .75 91415.6 2334.2 .75 91415.6 2334.2 .75 91415.6 2334.2 .75 91415.1 1791.8 .65 5687.9 1942.7 .65 5684.9 1942.7 .66 761 1942.7 .95 761 1942.7 .95 761 1942.7 .95 761 1942.7	5	R . R 2	164116.7	2599 ° 6	-		
55 6.76 198289.3 2442.0 63 1.5417.2 2371.6 65 6.74 99866.1 2374.7 71 6.72 99866.1 2374.7 77 6.72 91415.6 2314.7 78 9.1415.6 2314.7 79 6.72 91415.6 71 6.72 91415.6 75 9.72 91415.6 76 9.415.6 2149.3 66 9.67 98877.5 71 9.677.5 1401.8 91 9.677.5 1940.8 92 7.61 177.5 93 7.61 177.5	.50	8° 8 8	107744.3	2520.6			
.63 0.76 1°5407.2 2371.6 .70 0.72 99866.1 2354.7 .70 0.72 91415.6 235.2 .71 0.72 91415.6 233.2 .72 91415.6 233.2 .73 0.72 91415.6 .75 9.72 91415.6 .75 9.72 91415.6 .67 6.877.5 2149.3 .65 3.65 58586.9 .95 7.63 5671.2.5 .95 7.61 197.7 .95 7.61 197.7	. 55	A. 76	188289.8	2442.0			
.5 6.74 99866.1 2364.7 .7 0.72 9945.6 235.2 .7 0.72 91415.6 235.2 .7 9.72 91415.6 22149.3 .6 9.67 5887.5 2149.3 .6 8.65 58586.9 1991.8 .9 9.65 58586.9 1992.7 .9 2.63 5671.2.5 1942.7 .9 2.64 1942.7 1947.4 .9 2.64 1942.7 1947.4	63.	14°14	1:54:17.2	2571.0			
73 0.72 91415.6 2233.2 75 9.74 80737.9 2149.3 86 8.67 58877.5 2445.2 85 8.65 5887.9 1491.8 86 8.65 5887.9 1491.8 97 2.63 56712.5 1942.7 96 2.64 1942.7 1942.7 97 2.64 1942.7 1942.7	• 65	F. 74	99R66.1	2344.7			
.75 ?.72 MUT37.9 Z149.3 .47 P.67 DAR77.5 Z149.3 .47 D.67 DAR77.5 Z149.3 .65 SN586.9 1401.4 .65 SN586.9 1401.4 .67 S15 1942.7 .67 1942.7 1942.7 .65 1942.7 1942.7	.1.	5°,72	91415.6	2233.2			
df 0.67 64877.5 2152.2 .85 2.65 54586.9 1491.8 .91 2.65 1942.7 .95 2.61 1775.5 .95 2.61 1775.5 .95 2.61 1775.5	• 75	÷1°6	HU737.9	2144.5			
.85 3.65 58586.9 1401.8 .91 2.63 56712.5 1942.7 .95 2.641 44115.1 1172.5 .61 44115.1 1172.5	J6.	P.67	68877.5	5.46			
.91 2.63 517.2.5 1942.7 .95 2.61 44115.1 1171.5 .01 1.51 1935.4 1151.1	. e S	8,65	5R584 . 9	H • 1051		- -	
-95 r.s.1 44115,1 1171.5 .et f.s. 1935,.0 1451.4	16°	2.63	567: 2.5	1942.7			
• tit for the second seco	. 95	14.5	44115.1	1:11.5			
	- 12 C	(* م بل. ۱	N . 464 88	1 4: 51			

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** A-D FILE 204 FILE 204 FOR 5 RECORDS
TOROUE
23146.5
51944.4
71723.4
85842.7
9584A.7
192821.3
167874.0
111885.7
115116.6
117663.8
122842.9
127300.0
131259.8
134747.3
137775.7
139943.1
140058.1
136349.9
129685.1
121249.5
110637.4
9744R.a
845A1 . 2
74641.9
60391.1
ย°ทรีส6รั.

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		** A=D FILE 208	NEW FILE 100	TEST SAMPLEZIG AN
· 4	FRAGE OF FILE 208	FOR 5 RECORDS.	BFG MILESAVER RADIAL HOR	10.04-20/G (DAWA)
	них	TORQUE	FX	· · ·
	9 ° 6 °	5°.	8 • 8	
	0.27	50792.4	25A5.1	
	P . 46	84755.3	4176.9	
	9.59	197136.6	5278.B	
	0.68	122724.7	6437.9	
	t+14	132994.8	6509.9	
	P. 77	6.447521	6775.6	•
	6.79	143508.1	k9119.7	
	£*19	146417.5	6968.A	•
•	0 . A C	148356.5	4986.4 TOAV	85925.0 LOAD = 9121.8 VEL = 40.0 MPH'.
	88	149623.5	6953.6	
	0.78	151988.2	6839.3 MUPEAK #	# 0.80 MULOCK # 0.48 RATIO # 1.66
	9.77	154กษุจุต	6794.6	
	n , 75	155729.9	6558.7	
	0.73	157140.6	64119 . 3	
	n.72	158384.3	6255.2	
	0.70	159273.0	6095.3	•
	¢.68	159328.6	5929.7	
	0°66	158002.4	576M.5	
	9.54	154643.0	5587.4	· · · · · · · · · · · · · · · · · · ·
	4,62	144147.3	54.4 ° 2	
9	9 ° 5 9	138917.0	5216.7	•
	9.57	127496.7	5017.7	
	л , 55	115637.3	4423.4	
	6.52	14495.3	4634.4	44
	- را • ج	№ ⁶ 0510.56	4447.5	+ -
	r.	P5425.0	4265.4	-



· -		- -	** A=0 FTLE 209	NEW FILE 109	TEST SAMPLE21		
		AVERAGE OF FILE 209	FOR 5 RECORDS.	BFG MILESAVER RADIAL HOR	R 14.6R-20/G	(DANA)	
	SLIP	ХЛИ	TOROUE	XL			
	61 ° 13	0°410	6° 9	N • N			
	9 • 0 S	9.22	15148.7	662.0			
	0° 7 4	n.38	28969.9	1156.8			
	2.66	P.51	36513.6	1536.8			
	0 . UA	6 6 %	46483.5	1819.1			
	n. 1 a	r.67	53412.5	2422.6			
	4.12	P.72	59171.8	2146.9			
	E.14	P. 75	63789.1	2265.1			
	U.16	R.78	67789.6	2332.7			
	0.18	A.79	71259.2	2376.2 TOAV #	34580°B LOVD	= 3440.A	VEL = 55.0 HPH.
	N5.J	A. AU	74255.4	2396.2			
3	A. 25	19 8	84912.9	2405.0 HUPEAK	<pre># 0.81 HULOCK</pre>	# @.54 A	ATIC = 1.49
3	0.30	A. A L	B7145.N	239249			
0	h. 35	0.80	92814.5	2360.4		-	
	ü 1 ° d	N. 79	98224.9	2324.4			
	6°45	G. • 7 B	143463.4	2274.B			
	£ • 5 "	u, 76	134158.9	2215.5	•		-
	e.55	P. 74	111542.0	2147.7			
	N • 6 H	ú•72	111420.0	2074.4			•
	2°65	er 2 * 24	194117.6	2015.5			
	11.	89°J	190457.1	1957.3			
	A.75 "	ن • 4 4	R9369.1	1895.6			• •
	6.8 ° A	79° U	75244.8	4. ICHI		•	
	0.85	1×*U	hir579.2	1748.6			
	16°3	6 Y • 5	19669.	1692.13			•
	50.0		I. GUAND	1645.7			
	₹; č. • 8	ره <mark>۶ د</mark>	34560 %	1666.5			

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	•	** A-0 FILE 210	LEW FILE 119	TEST SAMPLE21A	£	
	AVERAGE OF FILE 210	FOR & RECORDS.	BFG MILESAVER RAUIAL HDR	14.04-20/6	(DANA)	
	ХUM	TOHOUE	F X			• •
	9	0 [•] 0	6.6			
	8.20	24586.1	1232.6			
	6.37	46693.9	22A5.6			•
	674	62164.9	3449.3			
	6.58	73264.2	3514.0			
	0 • 64	82851°8	3910.5			
	n. 72	94374.1	4364.0			
	A.77	163040.1	4661.3			
	6.49	140941.5	4426.4			
	13 B B	113149.6	4912.5 TAAV #	58788.3 LOAD	s blat.a vfl. s a	HON O.
	6.81	115983.3	4934.6			•
	G . A 1	121413.4	49PR.2 MUPEAK	a 0.81 MULUCA	E 4.48 KATIO E 1.	91
	R . R G	120156.2	4.843, W			
	0.79	134513.8	4745.9			
	0.77	134679.3	u624.8			
	P.74	138251.3	4484.7			
	6°,72	140374.2	4575.3	•	•	
	8.69	140419.6	4168.9			
	r. 67	136629.6	41.20.2			
	6 6 5	129561.2	3871.8	· ·		•
*	4.42	120141.7	3716.9		-	
,	61 a K cð	198742.7	3561.5			
	a.57	95516.2	34PA . 3		•	
	ت • ۲ 5	A3564.5	3266.1'			
	4.52	734:04.5	3142			
	2°5°	ላካበ: ቀ. ሀ	2996. 3			
	₩1/ [©] e.	527, 4.3	2465.7			



	•	** A-D FILE 711	ZH FILE 1131	TEST SAMPLE219 AN
	AVERAGE OF FILE 211	FOR 6 RECORNS.	BFG MILESAVER RADIAL HDR	10.48-23/G (DANA)
SLIP	XIIH	TORGUE	F	
68.6	8.9.8 1	53 ° 12	0.61	
6 • E 2	A.21	26889。4	1276.3	
7 8 ° 7	61 . 38	48481.4	2303.1	
R . 96	P.51	6419A.1	3446.1	
0.48	n. 61	75898.2	3584.3	
6.19	6.69	85759 . 5	4472.5	
C.12	P . 76	96711.4	4453.1	
(r a 1 d	R. 81	104R71.7	4735.9	
Ø.16	61 . A 4	114422.A	4688.0	
619	Să ° D	114343.4	4951.1 TOAV E	58914.7 LOAD = 4031.5 VFL = 55.8 MPH.
ù2°0	0 ° A 5	1:7036.7	4946.A	
e, 25	74.0	122047.7	4874.9 MUPEAK	# 0.85 MULOCK # 4.46 HATIO # 1.76
i€ ° 3	9 B R 2	126231.4	4778.7 ·	
6,35	G & B Ø	129492.8	4646.1	
6.42	G. 78	133343.1	4542.4	-
6° 4 5	G. 75	136778.2	4466.2	
6.53	A.73	139993.6	4258.9	
Ø.55	6.7W	142356.8	4113.2	•
59 ° 55	99•0	142404.9	396H . 3	
£•65	2 ° 4 2	154271.6	3 Ĥ 7 L • H	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
0.7r	4,63	1 36-410.2	H. T. T.	
0.75	5.61	119662.4	5564.2	
0.87	v.58	135571.0	3422.6	
6 N S	: . 55	9239.5	3274.2	
00°	2°2	74962.1	8,62,8	
• • 5 2	0.51	1.97.21.4	2.0000	
1 • 21	9 H C	54916.7	2463.7	

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AVFRAGE OF F	A# A=0 FILE 213 TIF 213 FOR A RECORDS.	N FILE 112 JA BFG MILFSAVER KADIA	11	EST SAMPLE2	21 00 (DA1.A)	ш.
ХЛМ	TOROTE TOROTE	X				•
02.0	0 • v	N • 13			-	•
0.27	34405.4	1659.1				
P.48	61969, b	295A.A			·	
29.62	78465 <u>*</u> 6	3796.2				
a. 72	94772.0	4354.1	•			
r.78	1-14466	4703.7				•
18.5	104462.7	4975.6				
6.93	189114.4	5476.7				· · ·
9.84	112197. 3	5058.8			. .	
9.84	114273.6	5456.4 TO	34 H 62	ARG. A LOA	D = 6484.	3 VEL = 40.0 M
19.84	1156:19.0	5034.8	•			
0.83	118389.3	4937.8 MU	JPEAK = 0	.84 MULOC	X # 6.58	RATIO # 1.69
9.91	120930.7	4821.1				
0.79	123267.3	1693.1				
а. 77	125364 6	4560.1		-		
0.75	127716.3	4421.9				-
9.72	128605.8	4274.3		•	•	
9 . 70	128907.5	4134.4				
9.68	127569.4	4642.9				
3.66	125794.6	3874.2				•
¢,63	117564.9	3747.6				
3.61	194210°B	3611.0				•
£.59	v*1337.v	3471.4				
9-50	87003 . 6	3317.5				
0.54	77894.9	3211.7				
9.52	69515.5	4* tout				
P.54	62000.0	2975.4			•	•

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Summary - B.F. Goodrich Milesaver Radial - 10 R x 20G

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Menden of File 131 File 2 RECORDs. REG PILESAVER RADIAL MOD Ingenezator (114) 24.00 -0.48 1.0901E F.X 10.001 10.0 24.00 -0.48 1.0901E F.X 10.001 10.0 24.00 -0.49 1.0302.0 1074.0 10.0 10.0 24.00 -0.40 1.0302.0 1074.0 1074.0 10.0 10.0 24.00 -0.40 0.6031.0 1074.0 1000.0 10.00 10.0 <th></th> <th></th> <th>** A-D FILE 151</th> <th>NEW FILE 36</th> <th>TEST SAMPLE103</th> <th></th>			** A-D FILE 151	NEW FILE 36	TEST SAMPLE103	
411 103 1030 r 2.00 0.430 0.43 0.43 2.01 0.430 3025.4 1974.0 2.02 0.430 3025.4 1974.0 2.01 0.430 3025.4 1974.0 2.01 0.430 3100.4 3100.4 2.01 0.431.0 3100.4 3100.4 2.01 0.431.0 3100.4 3100.4 2.01 0.431.0 3100.4 4941.4 2.01 0.431.0 3100.4 4941.4 2.02 0.431.0 0.591.4 4941.4 2.01 0.431.0 0.591.4 4941.4 2.02 0.431.0 0.591.4 4941.4 2.01 0.431.0 510.4 4941.4 0.11 0.11 521.4 494.4 0.11 11974.1 510.4 494.4 0.12 11974.1 510.4 494.4 0.12 11974.1 510.4 494.4 0.12 </th <th></th> <th>AVERAGE OF FILE 151</th> <th>FOR 2 RECORDS.</th> <th>BFG MILESAVER RADIAL '</th> <th>108 19.08-20/G</th> <th>(DAWA)</th>		AVERAGE OF FILE 151	FOR 2 RECORDS.	BFG MILESAVER RADIAL '	108 19.08-20/G	(DAWA)
0.10 0.10 0.1 0.12 0.301.4 3001.4 0.10 0.40 3001.4 0.10 0.40 3056.5 1994.6 0.10 0.40 3165.6 3001.4 0.10 0.400 3564.6 3001.4 0.10 0.401.9 0.501.4 3794.4 0.10 0.431.9 2204.4 2004.4 0.10 0.12 0.431.6 2004.4 0.10 0.12 0.431.6 2004.4 0.11 0.12 2004.4 2004.4 0.11 0.12 2004.4 2004.4 0.11 0.12 2004.4 2004.4 0.11 0.12 2004.4 2004.4 0.11 0.11 2004.4 2004.4 0.11 0.11 2004.4 2004.4 0.11 0.11 2004.4 2004.4 0.11 0.11 2004.4 2004.4 0.11 0.11 2004.4 2004.4 <td>SLIP</td> <td>MUX</td> <td>TORAUE</td> <td>X</td> <td></td> <td></td>	SLIP	MUX	TORAUE	X		
0.4.2 0.310 3325.4.5 1974.0 0.400 0.406.2.0 300.1.4 300.1.4 0.400 0.400 0.106.2.0 300.1.4 0.400 0.720 0.400.1 2.200.4 0.410 0.720 0.401.4 2.200.4 0.410 0.720 0.401.4 4650.4 0.10 0.720 0.401.4 4650.4 0.10 0.720 0.401.4 4650.4 0.10 0.720 0.401.4 4650.4 0.10 0.720 0.401.4 4650.4 0.11 0.720 0.401.4 4650.4 0.10 0.720 0.401.4 4650.4 0.11 0.401 571.4 400.6 0.11 0.401 571.4 400.6 0.11 0.401 571.4 400.6 0.12 0.125.4 0.101.5 513.5 0.12 0.126.4 0.105.7 513.5 0.12 0.126.7 0.101.5 513.5	9.99	86 • N	5° 5	0 • K		
0.00 0.0002.0 310,1.0 0.10 0.20 310,1.0 370,0.0 0.11 0.20 300,1.0 370,0.0 0.12 0.0031.0 0.050.0 300,1.0 220,0.0 0.12 0.0131,0 0.050.0 300,1.0 220,0.0 0.12 0.0131,0 0.050.0 4050,0.0 4050,0.0 0.12 0.0131,0 571,0.0 4050,0.0 571,0.0 0.13 0.10 1700,0.0 571,0.0 400,0.0 401,0.0 401,0.0 0.13 0.10 1700,0.0 521,0.0 401,0.0 453,0.0 401,0.0 0.10 0.1030,0.0 521,0.0 400,0.0 521,0.0 401,0.0 453,0.0 401,0.0 0.10 0.10 11040,0.1 521,0.0 400,0.0 401,0.0 453,0.0 401,0.0 453,0.0 0.10 0.10 11140,0.0 521,0.0 401,0.0 453,0.0 401,0.0 453,0.0 0.11 0.110 1101,0.0,0 403,0.0 </td <td>0.42</td> <td>0.30</td> <td>38256.5</td> <td>1974.6</td> <td></td> <td></td>	0.42	0.30	38256.5	1974.6		
0.16 75614.0 3766.4 0.16 0.6511.4 2304.4 0.18 0.6511.4 2304.4 0.18 0.6511.6 633.6 0.18 0.9017.9 0.653.6 0.18 0.9017.9 0.653.6 0.18 0.72 0.9017.9 0.653.6 0.12 0.9017.9 0.9017.9 0.9017.9 0.11 0.17 130.06.6 510.4 0.11 11.902.1 521.40 10.000 633.4 0.11 11.902.1 521.40 10.000 633.4.6 10.1 0.23 8.01 11.902.9 521.40 10.000 633.4.6 10.1 0.23 8.01 11.902.9 521.40 10.000 633.4.7 10.1 0.24 9.1 11.917.1 521.40 10.000 633.4.5 10.100 633.4.5 10.100 633.4.5 0.25 8.01 11.902.7.1 521.4.9 10.000 633.4.5 10.1 10.1	0.04	9•16	61802°A	3067.4		
0.4.0 0.6.0 0.6506 0.6506 0.12 0.40316 46506 46506 0.12 0.40316 46506 46506 0.12 0.40316 46506 46506 0.12 0.40316 45506 46506 0.12 0.40316 5716 46506 0.13 0.19 108926 5104 0.16 0.19 11870.1 5216 0.18 11870.1 5216 10.0V 7315 0.18 11871.1 5216 NUFEAK = 661 NU10CK = 655 Antio = 1406 0.18 0.19 111871.1 5716 10.0V 5736 0.18 0.18 0.113706 510.31 10.0V 5335 Antio = 1406 0.19 0.19 1110577 0.9115 10.0V 5106 5106 0.19 0.19 0.19 0.105 0.115 110.0K 5106 0.19 0.19	6.46	R.58	75814.8	3786.4		
0.12 94431.6 4650.6 0.12 0.79 99917.9 4978.4 0.13 0.79 13800.6 571.6 0.13 0.79 13800.7 571.6 0.13 0.79 13800.7 571.6 0.14 19972.9 571.6 7000.6 0.18 19972.9 516.0 7000.6 0.18 11971.1 521.40 FOAV.6 0.28 0.61 11971.1 521.40 0.29 0.61 11971.1 521.40 0.20 0.41 11971.1 521.40 0.28 0.41 11971.1 521.40 0.29 0.47 5103.4 9475.4 0.45 0.47 11247.5 4975.7 0.45 0.47 11176.4 4974.7 0.45 0.47 11176.4 4947.2 0.45 0.47 11176.4 4947.2 0.45 0.47 11176.4 4944.7 0.45 0.474.2	6.48	0.66	86621.4	4294 N		
R-12 G-16 9991.0 4996.0 8.16 8.17 1356.0.0 571.6 8.16 8.63 10692.6 516.6 8.16 8.63 10692.6 516.6 8.16 1.0982.6 516.6 516.6 8.16 1.10926.1 521.6 104.7 571.6 8.26 8.61 1.1097.1 521.4 104.6 81.1 8.27 8.61 1.1097.1 521.4 91.5 81.10 81.6 8.27 8.61 1.1097.1 521.4 51.3.5 81.10 81.6 8.29 8.71 1197.1 521.4 51.3.5 81.10 81.6 8.29 8.71 1197.1 521.4 91.2 91.2 8.20 8.71 1197.2 917.2 91.2 91.2 8.20 9.73 110.93.7 91.7 91.2 91.2 9.20 9.71 110.97.5 91.7 91.2 91.2 9.20	e.10	0,72	94431.6	4658.6		
8.19 13400.0 571.6 8.10 7.83 106992.6 510.4 8.10 10992.6 510.4 10992.6 510.4 8.10 10992.6 510.4 10992.6 510.4 8.10 10992.6 521.4 100.6 521.4 8.25 8.40 111971.1 521.4 MUCCK = 6.55 A170 = 1.49 8.25 8.41 11971.1 521.4 MUCCK = 6.55 A170 = 1.49 8.25 8.41 11971.1 521.4 MUCCK = 6.55 A170 = 1.49 8.75 8.71 11971.1 521.4 MUCCK = 6.55 A170 = 1.49 8.75 8.71 11971.1 521.4 MUCCK = 6.55 A170 = 1.49 8.75 8.71 11971.2 513.5 A170 = 1.49 8.75 8.71 1107.2 513.5 A170 = 1.49 8.75 8.71 110.07.2 611.5 51.4 8.45 8.77 101.67 61.5 61.40 8.75	0.12	ē.76	6-11666	4978 <u>,</u> 4		
8.18 10692.6 510.4 1325.8 Loto - 5530.6 VEL - 40.6 8.18 9.81 19922.9 5212.8 70.4 - 73125.6 Loto - 5530.6 VEL - 40.6 8.28 9.81 11971.1 5211.9 70.4 - 73125.6 Loto - 5530.6 VEL - 40.6 8.28 9.81 111971.1 5211.9 VUPEAK = 0.91 PULOCK = 9.55 An110 = 1.49 8.35 8.01 111971.1 5103.4 S103.5 NUPEAK = 0.91 PULOCK = 9.55 An110 = 1.49 8.35 8.37 8.133.4 5103.4 S103.5 S103.5 An110 = 1.49 8.35 8.37 111871.1 5103.4 S103.5 S103.5 An110 = 1.49 8.47 0.77 11405.7 4912.5 S103.5 S103.5 An110 = 1.49 8.47 0.15 111607.7 4912.5 4910.7 An10.5 An10.5 <td>2.14</td> <td>ß. 79</td> <td>1338(19,0</td> <td>5071.8</td> <td></td> <td></td>	2.14	ß. 79	1338(19,0	5071.8		
0.18 0.4 199029.0 5216.0 104N = 73155.6 L04D = 6594.6 VEL = 40.6 0.28 0.81 111971.1 5231.4 MUPEAK = 0.81 MULOCK = 6.55 Ar110 = 1.40 8.28 0.81 111971.1 5231.4 MUPEAK = 0.81 MULOCK = 6.55 Ar110 = 1.40 8.13 0.40 113384.6 5163.3 5163.4 MULOCK = 6.55 Ar110 = 1.40 8.13 0.45 113384.6 5163.3 5163.4 MULOCK = 6.55 Ar110 = 1.40 8.15 0.47 113384.6 5163.3 5163.4 MULOCK = 6.55 Ar110 = 1.40 8.15 0.47 114953.1 5163.4 4972.3 4972.3 4972.3 0.45 0.47 11246.4 4914.5 4946.1 <td>0.16</td> <td>2.83</td> <td>196992.6</td> <td>5164.4</td> <td></td> <td>•</td>	0.16	2.83	196992.6	5164.4		•
0.28 0.81 110028.1 5221.4 0.23 0.81 111071.1 5210.5 NUPEAK # 0.81 MULOCK # 0.55 8.110 = 1.40 0.35 0.78 111071.1 5210.5 5103.13 9.17 11071.6 5103.13 0.35 0.77 114953.3 5103.4 5103.4 9.10 110.000 * 1.40 0.45 0.77 110265.5 5035.5 5035.5 5035.5 8.110 * 1.40 0.45 0.75 110203.6 949.7 4911.5 491.5 5000.7 5000.7 0.45 0.72 11746.6 491.5 491.5 491.6 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.6 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7 5000.7	0.18	18.9	109829.9	5210.8 TOAV	# 73125.0 LOAD #	1 A534.8 VEL = 40.0
0.25 8.81 111871.1 5201.9 MUPEAK = 0.81 MLDCK = 0.55 R.110 = 1.40 8.37 0.48 113304.6 5163.3 5163.3 5163.3 20.00 <t< td=""><td>N.20</td><td>N.81</td><td>114420.1</td><td>5221.4</td><td></td><td></td></t<>	N.20	N.81	114420.1	5221.4		
8.38 6.68 11334a.6 5103.4 8.35 8.79 114951.3 5103.4 8.43 9.77 114951.3 5103.4 8.45 9.77 116245.5 5835.5 8.45 9.77 116245.5 5935.5 8.45 9.77 116693.9 4972.3 8.45 117168.7 4911.5 4972.3 8.45 117168.7 4911.5 4911.5 8.57 117175.9 4911.5 4949.7 8.65 8.71 117745.9 4949.7 8.65 8.71 117745.9 4946.1 8.67 117755.9 4394.7 4544.7 8.65 9.47 4544.7 4544.7 8.65 9.460.8 4544.7 4544.7 8.65 9.460.8 4544.7 4544.7 8.65 9.467.8 4544.7 4544.7 8.65 9.467.8 4544.7 4544.7 8.65 9.467.8 4544.7 4544.7	e.25	8.81	111871.1	5244.9 MUPEA	K # 0,81 MULOCK #	0.55 RATIO = 1.49
0.35 8.79 11495.3 5103.4 0.47 116245.5 5035.5 0.45 0.77 116245.5 5035.5 0.45 0.76 116037.9 5035.5 0.45 0.76 116037.9 5035.5 0.45 0.74 116037.9 4972.3 0.55 0.74 11746.6 4911.5 0.56 0.72 117725.9 4939.7 0.57 0.72 117725.9 4939.7 0.57 0.72 117725.9 4749.7 0.57 0.51 117755.0 4749.7 0.57 0.51 117755.1 4514.5 0.75 0.51 114455.7 4514.6 0.56 7.44 119457.2 4514.6 0.56 7.45 474.7 474.7 0.57 0.54 474.6 474.7 0.75 4.74.6 474.6 474.7 0.75 4.74.6 474.7 4.54.6 0.75 2.	6.33	6 ° 1	113384.6	5163.3	·	
0.47 9.77 116245.5 5035.5 0.45 0.76 11693.9 4972.3 0.55 0.74 117168.7 4972.3 0.55 0.74 117168.7 4972.3 0.55 0.72 117168.7 4914.5 0.55 0.72 11716.9 4614.5 0.67 0.72 11774.6 464.6 0.68 0.72 11774.6 4749.7 0.69 0.72 11774.6 4740.1 0.67 0.47 11740.1 4514.2 0.67 0.47 11445.7 4514.2 0.75 0.47 11445.2 474.6 0.75 0.47 11445.2 474.6 0.74 11445.2 474.6 474.6 0.75 0.47.2 474.6 474.6 1.47 11445.2 474.6 474.6 2.69 924.6 840.7 746.2 2.65 0.55 731.5 747.6 1.67 1.75 154.6 154.6	0.35	a.79	114953.3	5103.4		
8.45 8.76 11693a.0 4972.3 8.57 8.75 117166.7 4911.5 8.58 8.72 117166.7 4911.5 8.65 8.71 117725.9 4911.5 8.65 8.71 117725.9 4639.7 8.65 8.71 11775.9 4616.1 8.65 8.71 11775.9 4511.2 8.65 8.71 11775.7 4511.2 8.65 8.74 114459.5 4511.2 8.65 9.45 4511.2 4511.2 8.75 9.51.2 4511.2 4511.2 8.75 9.51.2 4511.2 4511.2 8.75 9.451.2 4511.2 4511.2 8.75 9.54.5 474.6 474.6 9.64.5 474.6 474.6 474.6 9.74.6 474.6 474.6 474.6 9.75 9.24.5 474.6 474.6 9.45 7.15 474.6 474.6 9.75 9.24.5 474.6 474.6 9.45 7.14.6 474.7 474.7	6.43	9.77	116245.5	5035.5		-
0.52 0.75 117160.7 4911.5 0.55 0.74 117400.6 4839.7 0.56 0.72 117725.9 4839.7 2.65 0.72 117725.9 4839.7 2.65 0.71 117745.6 4646.1 2.65 0.71 117745.6 4646.1 2.75 0.67 116075.7 4511.2 1.75 0.67 116075.7 4511.2 2.65 0.64 116075.7 4511.2 2.65 0.62 114659.2 454.6 2.65 0.62 119071.2 474.6 2.65 0.62 111565.2 474.6 2.69 2.400.8 5402.3 374.7 2.45 0.51 174.6 474.7 2.45 0.55 73125.4 374.7	0.45	a.16	116937.9	4972.3		
0.55 0.74 117449.8 4839.7 0.66 0.72 117725.9 4749.7 8.65 0.71 117725.9 4749.7 8.65 0.71 117725.9 4749.7 8.65 0.71 11745.6 46416.1 8.65 0.64 116975.7 4531.2 8.75 0.64 116975.7 4531.2 8.75 0.64 119473.2 4531.2 8.65 9.64 109473.2 474.6 8.65 9.64 1075.2 474.6 8.65 9.2460.8 8482.3 374.6 8.95 9.2460.8 8482.3 374.6 8.95 1.655 731.56.4 374.7	U. 52	M.75	117168.7	4911.5	•	
U.60 P.72 11725.9 4749.7 P.65 P.71 11745.6 4646.1 P.65 P.69 116935.7 4581.2 P.73 P.64 114693.7 4581.2 P.75 P.64 114693.5 4581.2 P.75 P.64 119075.7 4581.2 P.75 P.64 11947.5 454.7 P.65 P.64 11947.2 476.6 P.65 P.64 11947.2 476.6 P.65 P.640.8 8482.3 P.69 P.690.8 1462.3 P.65 P.701.2 177.5	U.55	0.74	117449.B	4839.7		•
8.65 8.71 11746.6 4646.1 6.72 9.69 116975.7 4511.2 10.75 9.61 116975.7 4511.2 10.75 9.51.2 4511.2 4511.2 10.75 9.54.7 451.2 451.2 10.75 9.54.7 451.2 451.2 10.75 1.41564.2 474.6 451.2 2.65 9.246.7 445.2 445.3 3.45 9.546.8 5482.3 571.2 3.45 4.55 731.25.6 3517.5	0.63	n.72	117725.9	1749.7		· · · · · · · · · · · · · · · · · · ·
0.70 9.69 116975.7 4531.2 0.75 9.67 11445.65 4531.2 0.67 11445.65 4534.7 4534.7 0.65 9.62 1175.2 4734.6 0.65 9.647.8 4734.6 0.65 9.2469.8 5482.3 0.95 9.540.8 5482.3 1.65 73125.6 3517.5	2.65	a.71	111785.6	4646.1		
N.75 0.47 114454.5 4534.7 c.63 0.44 119473.2 4736.6 2.65 0.62 141565.2 473.2 2.65 0.62 141565.2 475.2 2.66 92460.8 5882.3 3.45 2.55 73125.4 1.66 73125.4 3517.5	6.70	9.49	116925.7	4531.2		• •• ••
F.A ³ A. A4 179473.2 A. 234.4 P. B5 P. A2 171565.2 A. 43.2 P. B5 P. 59 92469.8 SMR2.3 P. 45 P. 59 92469.8 SMR2.3 P. 45 P. 59 92469.8 SMR2.3 P. 45 P. 59 73125.6 3517.5	0.75 *	0.47	114453.5	11594.7		
P. 65 P. 62 M 1565.2 M 1655.2 P. 90 P2460.8 SM2.3 P. 92 P245.8 ST12.5	6.63	2 * 4 5	5.57901	11236.6		•
R.90 V.59 92460.8 SHR2.3 0.45 2.500.8 5711.2 1.65 73125.6 3517.5	2.85	4.62	141565 . 2	4763.2		
3.45 2.57 8.2973.7 8.744.2 1.64 13.55 731.25.4 351.7.5	06°J	9.59	92467.8	54A2.3		
1.62 1355 73125.4 3517.5	5 5 °0	·1 • 5 7	しょうないっち	5711.2		
	1 - 61 er	1 ⁸ • 55	73125.4	3517.5		

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	ŗ	•	** A=D FILE 152	NEW FILE 77	TEST	SAMPLEIA3 AM	
1	•	AVERAGE OF FILE 152	FOR & RECORDS.	BFG MILESAVER RADIA	VL HDB 10.05	(DANA) (DANA)	
•	SLIP	них	TORQUE	FX			
	9. V.	0 ⁶ 4	5.5	2.2			•
·	0 ° č	9.19	24372.3	1247.1			•
•	0 . N 4	R. 36	48911.1	2369.7			
	6.66	67 %	66678.S	3179.5			•
	0,09	Ø . 58	8ka1a. 2	3775.3	•		
	C. 19	G.65	R9957.9	4213.4			× .
	¢.12	0.74	97343.5	4526.B			
	P. 14	A. 74	102989.5	4742.5		•	
	0.16	A.76	107441.4	48A9 . 9			
	0.18	P. 78	110954.0	4942.7 TO	14V = 65125.	8 LOAD # 6646.9	VEL = 40.0 HPH.
	6.20	A.78	113539.6	5421.8	·		
	0,25	£,79	118373.4	5039 . 9 MU	IPEAK # 9.79	MULOCK = 0.50	RATIO = 1.58
	0.30	6L°U	122462.4	5018.6			
	0.35	M . 78	126962 . 8	1961.6			
	81 ° 16	Ø.77	1-99394.1	4875.5			
	8,45	A. 75	132541.2	4744.1			
	4°23	G. 73	135166.4	4679.8	-		· · · ·
	a . 55	a.71	136437.7	9.54.54			- - -
	6.03	G. 69	134826.3	11 5.46.3			
	2.65	5 4 5 5	n.91181	4238.5		•	
	3.72	3°44	124275.2	45148.4			
	₽.75 [*]	3 . 62	11445.2	39 54 . 1			• ••
	6° 4 3	P.59	192704.5	\$772.2			•
	₽.AS	r.57	5.1441.2	3414.1			
	6° 43	5.54	B1 740.7	3445.6			ר <i>ב</i>
	ូ ច ្	: . 5.2	72243.4	3519.4			
	€; •, •		65125°A	1176.2			

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		** A-D FILE 153	1EM FILE 79-	TEST SAMPLEIBU	
	AVERAGE OF FILE 153	FOR & RECORUS.	BFG MILESAVER RAUIAL HUB	10,08-20/G	(DANA)
SLIP	мUX	TOROUE	FX		
5 59 60	3 • GB	5°5	S. 5		
63°3	9 B33	6. B			
6. • 69	A.97	120.7	7.2		
6.4.9	70.47	120.7	7.2		
6 . 9 ?	0.97	129.7	7.2		•
6.63	16.9	12".7	7.2		
5.5 ° 5	6.97	122.7	7.2		
6 - C -	Q.07	129.7	7.2		
8. ~ · · 63	10.9	120.7	7.2		
8. 8)	10.3	122.7	7.2 TOAV .	9.8 LOAD	# 0.0 VEL = 40.0 MPH
۲. ۶ ۲. ۳	19 ° G	129.7	7.2		
5 ° 5	26 ° 3	120.7	7.2 HUPEAK a	0.97 MULOCK	a p.ega Ratto a=9.00
,. 6 9	· 26° J	129.7	7.2	740	
8.24	6.97	127.7	7.2		
6.09	R.97	124.7	7.2		
20°2	6.97	120.7	7,2		
63°4	6.97	120.7	7.2		-
6.24	4°47	120.7	7.2		
8× ° 9	G. 97	129.7	7.2		
2 C • 2	V. 97	129.7	7,2		
6.62	16°2	127.7	7.2	•	
5 5	2.97	120.7	7.2		
5.50	79,47	12a.7	1.2		•
53.0	1.6 ° C	124.7	7.7		
6	5° • 07	122.7	2.1		
4. •	10.0	122.7	7.2		
.ງ ເ ^{. ອ} ປ	الاعنا 🕈 فا	0°0	C		-

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		** A-D FILE 154	JEW FILE 791	TEST 3AMPLE105 **
	AVERAGE OF FILE 1	54 FOR 5 RECORDS.	RFG MILESAVER RADIAL MDB	19.04-20/G (DANA)
31 1 b	ХЛН	TOROUE	F X	
ປ ປ ື ກ	6.00	а - а	() a ()	
0.22	0.13	14881.3	814.3	
0.34	Q.26	33311.9	1654.7	· · · ·
42 • H	e. 38	50205.0	2435.8	
0.68	9.48	64947.8	3886.0	
0.19	H + 5 b	74511.0	3575.2	
0.12	C.61	82526.3	3937.6	-
0.14	R.66	88942。8	4207.6	
2,16	6.49	93950.4	2°1480	
0.19	0.71	98055.7	4541.8 TOAV 8	74175.0 LOAD = 6567.9 VFL = 20.8
0.23	9.72	121265.7	4630.1	,
0,25	P. 74	177999 <u>,</u> A	4765.5 HUPEAK	# 0.76 MULOCK # 0.57 AATIO # 1.35
0°30	0.76	114174.67	4845 . 3	
ß. 35	A.76	119841.3	4874.4	
92.3	P. 76	124374.5	4852.4	
8°, 45	P. 75	126999.4	9 * HUA7	
4°53	P. 74	127617.2	4750.47	
4.55	C.73	125845.2	4674.7	•
r. 63	a.72	122724.3	4593.7	
8.65	9 - 7 8	117429.1	11 U R 5 . 4	
0,73 4	r . h 8	110.064.4	4541.2	
0 . 75	r. 66	9,494.6	4234.2	
6.8.3	0.64	94384 5	4121.5	
2•4S	ن • ډ ځ	Q. 45.7.8.9	8.79PD	
06°.1		828J1."	5 H 13 K ()	
۲. a G	9.5 ° 6	17979.5	57 a.m.a. &	
1.03	v.57	74175.0	3679.5	

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e ^r		** A=D FILE 155	htm FILE BAJ-	TEST SAMPLEIA		• •	
	AVERAGE OF FILE 1	ISS FOR 6 RECORDS.	BFG MILESAVER RAUIAL HDB	14.4R-24/G	(DANA)		
SLIP	MUX	TORDUE	F X				
8 - P &	P. B2	9 ° 8	P . P				
54.9	0.19	それなるの。こ	1243.6				
0, 94	A. 35	48335.A	2326.7				
6.45	G. 47	65R5A . 6	129.4				
() • ()	4.56	79209.2	37244.9				
6.19	f. 63	. 89425 . 7	4149.4				
a, 12	ŋ. 68	9722A,2	1454 ° b			•	
6.14	r.71	1.05170.1	4666.1				· •· ·
0.16	0.74	197813.6	4A15.0	-			
C. 18	A.75	111528.1	4912.6 TOAV .	68588.8 LUAD	A 6648.6	V1L = 40.9	Hdl
€ 2 • 5	8.76	114437.4	4961.7				
P.25	9.77	120445.8	1995.6 MUPEAK	а 0.77 MULDCK	. V.52 6	1110 # 1.49	
6.30	9.77	125793.2	49R6.1				
e.35	0.77	130591.6	4935.8				
64.8	£.76	135034.3	4852.5				
8.45	6°14	1390.92.4	и7ин.1				
0°50	A.12	2 • 9 4 6 1 7 1	11674.5	0	•	•	
R.55	A. 70	142294.5	4495.A				
39°3	9 . AR	146.308.5	и34 н 5				
8°•5	1.46	134741.0	4239.5				
1.70	r r 54	126249.7	9.141N	·			
11.75	5.42	115356.7	3954.5				
r. 8 a	11 4 61	103041.1	3411.7				,
2 8 C	r.5A	92215.5	3641.6				
10 .	°. 5 ó	13132.5	1.44.5				
S. S. S.	87 C • 13	2.5.4.1.67	1,41,41,4				
1.60	11.52	6415.40 ° V	3 5 4 2 • 5				

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		** A-D FILE 156	New FILE 01, John TEST SAMPLE187 44	
•	AVERAGE OF FILE 156	FOR S RECORDS.	BFG MILESAVER HADIAL HUB 10.08-20/G (DANA)	
SLIP	них	TORQUE	, XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
N . 00	ต• ยด	6.6	0. to	
6.62	G1.0	18217.9	1007.9	
9.84	9,26	50161.3	2527.1	
09.0	ڻ ۳ • ن	78389.1	3942. T	
U.C.B	0.51	100230-9	4965.2	
0.10	P.59	115743.5	5709.4	
0.12	Q. 64	126469.1	6198.1	
0.14	0.47	133760.9	6514.6	
2.16	A. 76	139423.0	6725.5	
0.18	0.71	142819.7	6857.7 TOAV # 98225.8 LOAD # 9925	.8 vfl = 20.0 MPH.
6.29	e.72	145346.6	6922 ,9	
0.25	P.73	15#34A.7	4987.3 NUPEAK = P.73 MULDCK = 1.52	84110 m 1. 41
8.30	Q.73	154831.9	6997.R	
0.35	P.73	158985.4	6948.5	
5.43	<u>0</u> ,72	162314.8	6.874°.4	•
0.4S	0.71	164077.9	6756.4	
0,50	64,69	164321.5	6624.6	
N.55	A 6 6 8	161591.1	64Rti • 2	•
09°.j	99°u	156531.4	6321.1	
0.65	C • 65	149869.2	6149.9	· ·
8.70 ª	4.63	141524.1	5.96: • 2	
11-75	الح • ي	132400.4	5749.7	
ଣ କ ଓ	۴ . 59	123941.1	5.1.87.5	
0.8S	4.57	116642.3	5411.1	
5 5 -	" • 55	1.5475.1	5234.2	- -
50 *13	۲. ی 9 .	1 @ 3 4 1 5 *	5 * Y 3 * 5	-
1 - (- :-	5.	94225 1	1.0+14 ⁴ - 15	

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		** A-0 FILE 157	EN FILE NE	ST SAMPLEIAR as
	AVERAGE OF FILE 157	FOR 4 RECORDS.	BFG MILFSAVER RADIAL HUB IN	.44-29/G (DANA)
SLIP	XUM	TORQUE	XL	-
6.20	38°9	8 * 6	ي• بر ي	
0.02	6.11	8555 I	368.1	
76.94	9.21	17182.1	724.8	
96.36	P. 32	253/16.6	1446.9	
9.48	L + 41	32504.7	1334.8	
5) 1 C	8°48	36747.9	1577.3	
4.12	P. 55	4310°5	1778.1	
C.14	0 • 60	51142.6	1968.2	
U. 16	Q.67	56337.4	2175.6	
0.19	A.72	62132.A	2351.4 TOAV = 410	93.8 LUAD # 3443.4 VEL # 40.8 MPH.
n. 2A	R.75	66526.7	2454.7	
0.25	0 B B C	75170.5	PORS MUPEAK # 0.	84 MULOCK & S.S. WATIO E 1.44
4.39	8°. 93	82544.6	2793.0	
4.35	A. 44	89114.B	2749 ° N	
64.9	4 B 4	95319.3	2747.5	
Q.45	6.82	1 26964 . 6	2747.6	
9.50	61 . R . 1	1.85113.1	2641.7	
0,55	а, 78	196517.9	2545 . b	
4 ° 6 A	Pa 75	1 34646 4	2401.6	
ù. 65	n. 73	120592.4	2.1445	-
6.79	6.71	92415°	2463.6	· · · · · · · · · · · · · · · · · · ·
0.75	۹ ۹ ۹	825 <i>34</i> 55 [–]	2270.4	
58°3	3.66	71734.5	2,444,4	
0.85	3.64	59666.7	2.4515	
9.9 A	61 ° 62	51864.3	2.177	
56°3	ړ. ۹ و. ا	15643.7	2 · · · · · · · · · · · · · · · · · · ·	
U	:، د ک ې	8°16017	1960.º 4	

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		A# A=D FILE 158	EW FILE 93	TEST SAMPLE189 **	•
	AVERAGE OF FILE	ISB FOR 5 RECORDS.	BFG MILESAVER RADIAL MDE	10.04-28/6 (DANA)	× .
SLIP	ХUM	TORQUE	F X		
0.69	6.00	5 8	8 • 8		
2.62	8.16	20669.4	1692.4		
6.94	9 a 3 4	46845。3	22A2.3	•	
8.96	C • 4 7	65A,73 , R	3147.5		•
9.48	R.57	79717.8	3795.2		-
9.10	P+64	94127.2	4233.8		
8.12	P. 69	98614.3	4543.3		•
6.14	A.72	144150.7	4756.7		
0.16	R. 75	108998.7	1991.3		
0.10	B.76	112545.8	4993.6 TOAV .	67275.A LOAD # 6611	.7 VEL # 40.8 M
0.20	R.77	115268.2	5241.8		
0°25	2.78	126964.0	507A, 3 HUPEAK	# 0,76 MULOCK # P.51	RATIO . 1.53
9.30	9.78	126124.8	5441.0		
0°35	0.77	130984.6	1.7997.1		
0 ° 7 0	n. 76	135634.7	4 6 9 4 ° 6		
8,45	Q . 74	139673.4	4777.1		
0,52	9.72	142345,0	464%.2		•••
0,55	0°10	5.19.2	45MF.2	•	-
2 e 6 a	A. A.B.	1397.44.3	4344 <u>,</u> 6		
4.45	A •66	133924.9	4228.2		
4.70	9.64	125239.5	1.141.7		
u.75 *	9.61	114351.1	3421° 3		• • • • •
K. 69	6°,59	121985.4	3761.2		
5 0 ° %	0.51	91118.4	3622.7		
90.0	6°55	B1945.A	3478.6		•
36°*1	4°53	73914.5	1.158		
3-5-5	9°51	A7275.A	5 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -		



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•		** A-() FILE 162	THE FILE 60	TEST SAMPLETON	
	AVERAGE NF FILE 167	FOR SRECCADS.	NFG MILESAVER RADIAL H	10°54453010	(1,4,1)
SI. IP	ХОМ	Токаце	XL		•
3.03	0 ° 30	3 ° 3	Q • X		•
C . 0 2	¢.16	31991.1	2.52.61		
6.61	2°•36	74873.6	35/11 3		
8.46	u*2()	97745 . 3	4N59 。 5		
G . D B	θ 5 °υ	115645.1	5723.5		-
9.10	5.644	127151.6	4234°2		
9.12	11 ° A 7	134167.5	h5a7.7		
9.14	P. 69	138631.8	564B.3		
61.0	G + 7 A	141651.2	6708.3		
4.18	A. 7W	143846.3	6722.2 TAAV	A3325.0 LUAD	: 9876.9 VEL = 40.8 HF
0.23	4 • 7 B	145182.5	67at.4		
0.25	4.69	1475A8.A	4615.2 MUPEA	K = 0,70 HULDCK	1 0.44 RATIO . 1.61
0,37	84.5	149577.5	4511.4		-
U. 35	1.67	151419,5	63A8.2		
64.6	4.46	153224.5	6251.2		
£ * 4 2	9 ° 6 4	154994.1	61N2.1	,	
0.53	P. 63	156543.7	5944.b	• .	
N.55	0.61	156917.7	5774.h		-
J. 62	a. 59	154914.8	5412.1		
H • 65	9.5A	154578.S	5446.13		•
ы . 7 а	И.56	144353.8	5274.6		• • • •
a. 75	7 (J • E	135141.7	54A7.3		
t, A.P.	°,52	123546.4	4 V V I • 4		
6.95	64.2	111412.5	46.94 . 6		
16 6 19	R. 47	141163°u	1.5221		
11.95	51. [•] 13	124L16	435M+2		
1 ° CU	17 T T	R3325.0	4147.5		-



		** A-D FILE 163	FILE BS	TEST SAMPLE191	•	
	AVERAGE OF FILE	163 FOR 6 RECORDS.	BFG MILESAVER RADIAL HOB	14-24/6	(DAWA)	\$ 1
SLIP	нUX	TORGUE	Xu			
6.60	0 ° U	C.* E	11 ° 11			
e . 92	0.20	13996.9	629.7			
9.0	P. 35	26758.5	1134°6			
8 . N	9° 18	37696.4	1552.5			
8.48	A.58	46563.7	1 A R. 2. 3	,		
6.10	99,66	5347A.A	2133.0			
0.12	0.71	59521.7	2313.9			
0.14	a.75	64549 . 4	2443.3			
U.16	a , 78	68777.7	25,55.8			
8.18	28.5	72447.9	2599.7 TUAV #	36854.2 LOAP	# 3213.7 VEL #	H 55.0 HPH
4.29	A.A1	75414.2	2635.7			
U • 25	2 ° ° 8	81741.8	2078.5 MUPEAK	# 0.83 MULOCK	E 4.56 HATIN .	1.54
0.34	P.83	87463.7	5604.9			
0.35	M. 83	92843.2	2691.4			
67 . 6	P. 83	98695.1	2461.6			
0.45	0.81	1:3373.4	26.24.1			
6.59	A. AV	196414.2	2557 . 0	-		
6.55	a.71	112371.1	24A3.6			•
61 - 61	n. 75	1130-15.4	なっている。			•
0.65	9°13	1.49578.2	2345.2			
0.70	° ن 1	102362.1	2241.7			
6.75	9.69	91026.9	220H 6			
n.e.	3° 40	78722.5	2119.4			
38°8	9.63	64531.1	L.educ			
5 ° 3	0.60	53441.5	1937.H			•
36°0	., 5A	A. 14144	1 // 5 / 2			
1.6	a . 56	30854.2	1145.7			· •

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· . 7		** A-D FILE 164	NE. FILF HAS	TEST SAMPLEIG		
	AVERAGE OF FILE 164	FOR 5 RECORDS.	SFG MILESAVER RADIAL HO	8 10°64-2070	(BAHA)	#•
3 1 I P	Xfie	TOROUE	XS			
9.89	9 B B	5°5	5 • 5			
0,02	3.10	21 RUA. 2	1.095.1			
8.94	4.30	41232.9	20,2 u . B			
8°.5	9.41	56182.2	2731.1			
8 ° ° 8	2.50	67611.6	3274.5			
61.9	0.57	78435 6	3749.3			
6.12	R. 65	91664.0	4341.5			
6.14	6,71	100916.5	469%.1			
0.16	A.75	11746.8.7	4949.5			
9.13	4.77	112422.1	5424.8 TOAV =	62875.0 LAAU		, HAH 0.07 =
0.20	e , 17	114971.3	5058 . 4			
P.25	n, 77	120583.2	5049.3 HUPEAK	# 0.77 MULOCK	# 0.49 RATIO #	1,59
0°30	9.77	125352.7	11992.3			•
U.35	n.76	129841.8	4896.2			
6.40	P.74	134966,3	4774.5			•
3.45	P.72	137771.6	4627.5			
r. 53	P. 69	134969.4	41167.7	-	,	
5°2	n. 67	139542.0	4365.5			
9.40	0 • 6 5	136572.4	4144.8			<i></i>
8°65	G. 62	129901.8	4.1002			
6.70	r, 69	120470.1	3443.61			
3,75	0.58	138941.1	3600.00		•	
1.8 81	G . 5 6	96.17P . K	3553 . N			
6.85	6°24	B46A6.6	1.57.5			•
6.4	9.52	76001.2	3519.9			
36°9	% ° 2 %	64673 . 1	5.1142			
1.05	67 ° N	62875 . n	3144.5			

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		** A=D FILE 165	NEW FILE BY	TEST SAMPLE193	•	k . v.	
•	AVERAGE OF FILE 165	FOR 6 RECORUS.	BEG MILESAVER RADIAL HDB	10.04-20/6	(DANA)		
SLIP	МUX	TORAUE	FX				
9.00	י ש•טט	6 ° 6	R. S				
G . F 2	9.21	28226.0	1391.4				*
5.94	9 a C	9.1812S	2673.8				
6.96	P.53	73649.3	3529 . 9				
64 ° 69	A.62	86785.1	4114.4			:	
0.17	9.69	96844.8	4504.7	•			
W.12	0.73	192761.5	4759.8				•
9.14	P. 75	107769.6	4916.2				
e.16	. 9.77	111555.7	5000.1				
U.18	P. 78	114494,9	5456.1 TOAV .	63291.7 LOAD	. 6666.1	VEL = 55.9	Нан
6.20	8.78	116614.8	5061.6				•
Ø.25	A.78	129634.3	5823.1 MUPEAK	. 0.78 MULOCK	# 8.48 RA	110 = 1.64	
0.30	9.77	124152.1	4957.1				
0.35	0.76	127315.0	4.06.0		'		
0 * 40	n.74	136256.4	4752.R				
0.45	A.72	132981.7	1646.2			•	
6 . 9	0.70	135533.2	4515.5				
£ • 52	Q.6H	137591.9	4374.3				
69.6	0.46	1 34479.9	42 80.01				
4.65	3.64	135749.6	7.0010				
4.75	a.62	134658.7 -	3953.2				
ß . 75	0 5 G	124779.6	3411.7	•			-
0.89	15°0	14876.9	3465.2			•	
7.65	ņ. 55	9437A.7	351A.7			· · ·	
9.9.9	\$°.57	1°47758	1 ° 7 N 2 2				
56 • 3	4.50	720.03.4	3.254.4 a			1 41	
1.90	64 tr 14	19591.7	312.40				

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		** A=0 FILE 167	W FILE BA	TEST SAMPLE!	
	AVERAGE OF FILE 161	7 FOR 6 RECORDS.	HEG MILESAVER RADIAL HOB	19.88-20/6	(DAMA)
۰	ХЛМ	TORQUE	XL		•
5	0.00	и•и	P. 6		
2	n.22	29403.7	1476.9		
17	0.41	56315.3	2742.7		
¢.	0°50	75165.5	3678.9		
80	A. 65	88787.1	4319.8		
e	A.72	94181.0	4722.7		•
~	9.76	1 44523.8	4973.4		
7	A.78	128917.2	5129.2		
, 9	9. A.	112099.2	5224.9		
80	0. AU	114456.7	5246.3 TQAV #	64833.3 LOA	0 # 6665.4 VEL # 40.0 MPH
Ľ.	P. A.	116181.6	5268.5		
5	3 • A U	119665.5	5207.6 HUPEAK	0.81 HULOCI	K # 0,48 RATIO # 1,68
5	P. 78	122482.2	5121.7		:
10	6) , 76	124769.1	5017.6		
6	A. 75	126555.2	4940.0		•
Ś	A.73	127844.0	4771.7		-
E	9.70	128860.6	4632.5	¢	
5	7 • 6B	129431.4	44R3.4		•
ĸ	A. 56	8.927751	4330.7		
5	P. 63	124639.6	4175.0		
E.	0.61	1 1 9 4 4 9 . 7	1114.5		
, S	65° 6	111167.6	3A54.5		• • • • • • • • • • • • • • • • • • • •
¢.	м , 56	10,1419.4	3697.1		
ŝ	0 5 5 4	89641 . 8	3553.0		••••
6	P. 52	1,299.14	3416.6		
r	े । • •	7,01257	1222.1		
ę	5 . A 8	AUP 77 7	i 1 5 c - 1)		

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		AN AND FILE 4	EST TEST		
	AVERAGE OF FILF	4 FOH 3 RECORDS.	GOONYEAR HNISTEEL H#1 10.0K+2	r/g (1,444)	
SLIP	XUII	TORAUE	X L	•	
0,69	9 . 80	63 • E.	S • S		
U. ??	0.34	41941.2	2074.1		
0.94	P.54	61354 S	3094.1		
0.96	A. h2	75869.7	3845.9		
B . 4B	n.71	A531A.2	4341.4	•	
0.19	e.11	94255 。 8	4664.4		
9.12	9.62	1 nuu 62. A	4945.1		
A. 14	9 ° Å 5	104297.3	5111.9		
0.16	9 9 9	1,079,67.7	5175.8		
0.15	9 B B 2	196719.6	5234.9 TOAV = 63700.	3 LOAD = Alais VEL = 47.8 MPH	
0.20	7.87	19741.3	5219.8	•	
0.25	6° 45	111221.5	5125.0 HUPEAK # 0.87	MULOCK = 0.52 RATIC = 1.68	
ß. 3a	P. A3	112164.1	5417.6		
'n, 35	A. A1	112886.2	, p.1.61		
8.43	3.79	115489.7	417A2.1		•
0.45	٩, ٦٦	114239.5	11662.9		
0.53	r. 15	114561.9	4546.1	•	
0.55	a.72	114997.7	4412.2	•	
6.69	R. 7 W	115166.4	4277.7		
8.05	84°0	114461.9	A1 3 4A . G		
61.9	a. 66	112342.5	4.4.4.2.2		
J. 75	1.64	107139.3	3871.4		
0.84	19°ú	99191.5	3736 ° U		
Ŀ. 85	υ* 2ð	9%144.6	3576.3		
10 ° 13	12.0	81142.9	3417.5		
×.95	3 ° 5 4	72348.3	3.297.6		
1.60	n , 52	637MA.3	3147.5		


																	•										-	- 8	4 –
	}, 1 ^{,7}											VEL = 20.0 MPH.	-	ATIO = 1.36				•	-		•	•		-		-	•		
	(DAMA)											3AD = 3026.4		0CK = 0,70 B															
TEST SAMPLE	19-3K-2015											1 43A12.5 LC		1 = N, 95 HULC					•										
FILF J	UDTEAR UNISTEEL H-1	FX	5° 5	693 <u>.</u> 4	274,6	717.5	8 * H L H	1259.8		648.3	777.1	PARS.4 TOAV	819.0	HUPEAN HUPEAN	457.6	829.2	792.3-	745.5	6A9.1	625.6	56(·•7	1.400.0		5.0.2	9.4CS	P.775			1.451
## A=D FTLF 5	S FOR 6 RECORDS. GO	TORAUF	6 ° 5	0.577.11	26259.6	35323.2	42074.9	46719.5	50568.1	55601.9	59494 . a	62156.2	63838.7 S	46828.3	69245 . 8	71235.3	73220.K	74714.8	76477.5	76567.4	75827.1	73649.3	74972.6	65467°4	6w425.7	559:4.1	51645.3	47536.A	13412.5
	AVERAGE OF FILE	MUX	9.90	9.21	r. 3A		U.65%	9.67	6 . 7 d	9 B 3	96 8	94	8.95	3 45	94	9,93	3.92	(1 6 " 1 4	8 Y S	7.80	7 6 ° 1	9.92	5 7 5	* r. 78	4.76	л, 75	a. 73	11.0	a.70
-		SLIP	6 ° 3 8	8.62	6 · · · 4	N.85	6.04	6°13	612	Ø, 1 a	2.16	0.18	B.2A	0.25	6.30	0.35	540	6.45	0.54	0.55	N. 6.7	0.65	A. 7 .	2.15	16 8 V	0.85	€ 6 • J	395	1.47
																									. •	; ·	-		•



		AAD FILE A	NE TLE 3,.	TEST SAMPLEIUM AA
	AVERAGE OF FILE	6 FOR 6 RECURDS.	GOONYEAP UNISTEEL R-1	10°EX-53/C (DA:A)
SI. [P	MIJX	3/Ìùau 1	FX	
ต. ถก	9.00	2°5	2°2	
9.92	サイ・ビ	£ * 1 # 06Z	1513.6	
6,04	27 * 5	522W3.6	2625.7	
0.76	P.57	69592 A	35A2.8	
8.28	P. 68	A3463.1	4175.8	
0.19	A.75	93105.6	4655.1	
0.12	9.A2	1 441 73.4	49A.N. ()	
0.14	n.86	195219.9	52n4 .3	
A.16	A.A.A	108754.5	5314.2	•
8°13	6°, 89	111147.5	5426.1 TOAV	= 77729.2 LUAD = 5214.2 VFL = 29.9 HPH.
0°50	F. A 9	112559.0	5427.2	
0.25	A.A9	114935.9	5419.3 MUPEA	K = 0.89 MULOCK = 0.63 PATIO = 1.41
0°31	8 ° 8	116834.9	5378.9	
0.35	0 . A 7	116429.4	5313.4	
6.43	P. A6	119794.1	5230.5	
0.45	n. A4	126969.3	5131.0	
6.59	0.A2	121519.3	5419.4	
8,55	A.A.	121968.8	4984.1	· ·
9.69	a.79	119447.2	4749.6	
9.65	a.77	115A24.8	4671.8	
6.70	4.75	110477.1	4549.3	
u. 75	а. 73	1 15416.1	4422.44	
0.89	R.71	1.179.9	A 3 A5 + 5	· · ·
£4,45	n. 69	93794.A	4192.4	
r 6 ° 3	9.67	AH267.1	40A6.5	
4° 95	a • 65	A2085.9	5972.2	
1.04	9.63	77729.2	3444.7	

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Matrix Matrix<		** A=D FTLE 7		TEST SAMPLE	
n.m n.p 0.13 41uaA.a 2059.5 0.13 41uaA.a 2059.5 0.13 7his.p 3065.5 0.11 9033.0 373.1 0.11 9035.0 375.1 0.11 9035.0 375.1 0.11 9035.0 371.0 0.12 9035.0 371.1 0.17 9605.1 370.2 0.18 11157.1 219.0 0.18 11154.2 5015.0 0.18 11154.2 5015.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.18 11154.2 5005.0 0.19 11154.2 2565.0 0.10 11154.2 2505.0 0.11 1207.0 1115.0 0.11 1207.1 0.11	XIM	TORAUF			
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P.54 70629.7 3243.5 2.51 62562.5 3406.5	a.56	79477.3	3,593.9		
A.51 62562.5 34196.5	r, 54	76629.7	3243.5		•
	[5 " e'	62562.5	31106.5		

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NERACE ME FILE FOR a decomb. COUNTER MA COUNTER MA 0.17 $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$			AA A-D FILE A	VEN FILE JAN S	TEGT GAMPL	E110 **	.
81.P 100 700.00 x 6.28 0.49 0.4 2.4 6.28 0.423 241.16 244.2 6.29 0.899.6 241.2 244.2 6.41 0.899.6 341.16 244.2 6.41 0.899.6 341.16 244.2 6.41 1.226.4 359.4 359.4 6.41 1.226.4 359.4 359.4 6.41 1.226.4 359.4 359.4 6.41 1.125.6 1.125.6 441.8 6.41 1.125.6 1.125.6 441.8 6.41 1.125.6 1.125.6 441.8 6.41 1.125.6 1.12.6 1.12.6 6.12 1.125.6 1.12.6 1.12.6 6.13 1.125.6 1.12.8 4.18.8 6.14 1.12.6 1.12.2 4.18.8 6.14 1.12.6 1.12.8 4.18.8 6.14 1.12.7 1.12.8 4.18.8 6.14<	.•	AVERAGE OF FILE	A FOR 4 RECORDS.	GODAYEAR UNISTEEL R-1	14.08-20/6	(DANA)	•
6.00 0.00 Π.0 0.0 0.12 400 μ 2114.3 2114.3 0.120 8.13 9122.4 2114.3 0.120 8.11 1922.4 21431.3 0.12 8.10 112504.5 5514.6 0.12 8.13 112504.5 5534.6 0.12 8.13 112504.7 5714.3 0.12 8.73 12504.6 5259.4 0.12 8.73 12504.7 5714.3 0.12 112504.7 5714.3 5554.5 0.12 112504.7 5714.3 5554.5 0.13 8.73 735.7 1000 • 9.57 8.710 • 1.43 0.14 112504.7 7354.7 1000 • 9.57 8.710 • 1.43 0.15 8.41 11475.7 7354.7 1000 • 9.57 8.710 • 1.43 0.15 8.41 11475.4 7354.7 114.4 1.44 0.14 11475.4 7354.7 114.6 1.44 1.44 0.15 <td>SLIP</td> <td>XIIH</td> <td>TORAUE</td> <td>F X</td> <td></td> <td>,</td> <td></td>	SLIP	XIIH	TORAUE	F X		,	
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0.12 8.74 13250.1 6710.4 0.18 13559.2 7451.9 7451.9 0.18 139559.2 7451.9 7451.9 0.18 1.39559.2 745.10 7554.0 0.18 1.4015.7 7564.9 7564.9 0.18 1.4015.7 7564.9 756.1 0.19 1.4015.7 7564.9 70.1 0.28 7.01 1395.7 736.7 70.1 0.21 1.4010.6 736.7 70.1 70.1 0.28 7.01 1376.0 736.7 70.1 0.29 0.19 1577.6 717.6 736.7 0.35 0.71 15307.6 736.7 70.10.1 9551.7 0.35 0.77 736.9 736.7 70.10.1 9551.4 0.36 0.71 15307.6 736.7 70.1 951.4 0.35 0.35 649.4 610.7 953.4 96.6 0.45 11976.6 736.6	0.10	Ø. 69	122646.0	4229.4			
6.18 13959.2 745.40 6.16 1.4415.7 72.84.40 72.84.40 6.16 1.4115.7 72.84.40 73.82.6 6.18 1.4115.7 73.82.6 70.41 6.28 8.41 140475.3 73.72.7 6.28 8.41 15077.6 7372.7 6.28 8.41 15077.6 7372.7 6.39 1714.6 7306.7 7306.8 6.37 8.777.6 7306.9 7306.9 6.37 8.777.6 7305.9 7306.7 6.37 8.777.6 7305.9 7306.9 6.37 8.777.6 7305.9 7306.9 6.37 8.777.6 7305.9 7306.9 6.37 8.777.6 7305.9 7305.7 6.37 8.377.7 7205.9 7305.7 6.37 8.375.7 7305.9 7305.9 6.37 8.375.7 7305.9 7305.9 6.37 8.375.7 7405.4 741.2	0.12	8.74	132581.7	67113.4			
0.10 144155.7 7244.6 0.11 177966.9 7352.6 TOAN = 185187.5 LOLD = 9353.9 VEL = 294 0.22 0.81 177966.9 7352.7 7372.7 MUDEAK = 8.41 MULOCK = 8.57 R110 = 1.43 6.28 8.41 1510415.0 7376.1 MUDEAK = 8.41 MULOCK = 8.57 R110 = 1.43 6.28 8.41 1510415.0 7326.1 <t< td=""><td>0.14</td><td>R.78</td><td>139559.2</td><td>7457.9</td><td></td><td></td><td></td></t<>	0.14	R.78	139559.2	7457.9			
0.18 0.81 14706.0 73A.2.6 744V = 185187.5 0.00 = 9553.9 VEL = 20.0 0.28 0.81 148075.3 7372.7 MUPEAK = 0.31 MULOCK = 0.57 8.710 = 1.43 6.28 8.81 151045.0 7326.7 MUPEAK = 0.31 MULOCK = 0.57 8.710 = 1.43 6.38 8.81 15177.6 7306.9 736.6 736.6 736.6 6.38 8.79 15347.6 736.6 736.6 736.6 8.71 8.710 = 1.43 6.45 8.77 15347.6 736.6 736.6 736.6 8.710 = 1.43 6.45 8.77 736.6 736.6 736.6 736.6 8.710 = 1.43 6.45 8.77 737.6 736.6 737.7 737.6 745.7 6.45 8.71 15347.6 746.3 746.3 745.6 747.1 745.6 6.56 9.77 15347.6 631.4 631.4 631.6 74.1 74.1 74.1 6.56 11.456.7	0.15	8 • 8 8	144155.7	7264.0			
6:28 R.91 14647.3 7372.7 6:38 8.81 15/415.6 7326.7 MUDEAK = 6.61 MULOCK = 6.57 8.110 = 1.43 6:38 8.48 15/415.6 7326.7 7326.7 MUDEAK = 6.61 MULOCK = 6.57 8.170 = 1.43 6:39 8.773.6 7131.6 7131.6 7131.6 7131.6 7131.6 6:40 6.77 153475.6 7131.6 7131.6 7131.6 7131.6 6:40 6.77 153461.9 6.69.5 6.63.3 8.171.7 8.15.7 6:57 6.72 153461.9 6.63.3 6.53.4 7.305.7 8.11.2 6:58 7.72 153661.9 6.53.4 7.312.7 8.11.2 8.11.2 6:59 6.75 6.53.4 7.31.2 6.54.8 6.11.3 8.11.2 6:59 7.31.1 5.51.4 5.51.4 5.51.4 5.51.4 6:69 6.65.8 6.56.8 6.51.4 5.51.4 6.51.4 6:99 9.52.4 <	0.18	18.8	147964.9	7342.6 T0AV	= 105187.5 L	0VD = 9353.9) VEL = 20.0 HPH
6.25 0.81 15/015.0 73.06.1 MUDEAK = 0.51 MULOCK = 0.57 RA110 = 1.43 6.36 0.88 15177.6 7246.6 7246.6 7246.6 7246.6 7246.6 7246.6 7246.6 7246.6 7246.6 7246.6 7246.6 7111.6 7111.6 7111.6 7111.6 7111.6 7111.6 7111.6 7111.6 7111.6 7111.6 7111.7 7111.6 7111.7	0.2G	A. A.	148475.3	7.572.7			•
6.30 8.80 15176.6 724.6 0.35 0.77 15277.6 7117.0 0.46 1577.6 7117.0 7117.0 0.45 0.77 153475.8 7117.0 0.45 0.77 153475.8 7117.0 0.45 1.53495.2 6850.3 6870.3 0.45 1.53495.2 6870.3 6870.3 0.57 1.53491.9 669.5 6870.3 0.57 1.53491.9 669.5 6870.3 0.57 1.53491.9 669.5 6371.7 0.60 0.72 1.90590.5 6311.3 0.77 0.46 1.90590.5 6313.4 0.78 0.450.8 6313.4 6470.4 0.79 0.450.1 5770.2 6470.4 0.79 1.19497.4 5470.4 6470.4 0.46 1.19497.4 5470.4 6470.4 0.47 5.410.4 5470.4 6470.4 0.46 1.19497.4 5404.4 5404.4 <td>P. 25</td> <td>R. B.</td> <td>154415.A</td> <td>7326.7 WUPEA</td> <td>K # 0.81 MUL</td> <td>.OCK = 0.57</td> <td>RATIO = 1.43</td>	P. 25	R. B.	154415.A	7326.7 WUPEA	K # 0.81 MUL	.OCK = 0.57	RATIO = 1.43
0.35 0.79 15277.6 7114.0 0.47 15445.8 7405.9 0.45 0.77 15445.8 0.45 0.72 153795.2 0.56 0.72 153461.9 0.57 0.72 15346.2 0.56 0.72 153461.9 0.57 0.72 153461.9 0.57 0.72 13460.4 0.57 0.72 13961.5 0.57 0.72 13964.5 0.57 0.72 13964.2 0.57 0.575 6371.7 0.57 0.545.4 6313.4 0.60 0.60 6313.4 0.78 13490.5 6313.4 0.45 13490.5 6313.4 0.45 13490.5 5776.2 0.51 12270.3 5776.2 0.51 10450.4 5776.5 0.57 105107.5 5776.5	N. 30	9 . 9	151776.6	7246.6			
0.40 1.71 153475.A 705.9 0.45 P.75 153461.9 6696.5 0.57 153461.9 6699.5 6.57 153461.9 6699.5 6.57 153461.9 6699.5 6.57 153461.9 6699.5 6.57 153461.2 6535.7 6.57 15346.1 6535.7 6.575 13497.6 6531.3 0.65 P.68 149596.6 6511.3 0.77 0.46 149596.6 6511.3 0.78 13497.8 6311.3 0.79 7.46 5411.3 0.48 128131.6 5779.2 0.48 11.437.7 5470.8 0.56 11.537.7 5470.6 0.57 11.517.5 5470.6	W. 35	A.79	152777.6	7131.0			-
0.45 0.75 153705.2 6856.3 0.55 0.72 15361.9 6690.5 0.55 0.72 15361.9 6690.5 0.55 0.72 152061.5 6575.7 0.55 0.72 13961.9 6690.5 0.5 0.72 13961.6 6575.7 0.5 0.79 149596.6 6371.7 0.75 0.46 1399.6 6211.3 0.75 0.45 6211.3 6714.4 0.75 1.37807.8 5913.4 6714.2 0.85 0.65 13707.8 5770.2 0.85 0.65 11645.4 54.04.8 0.95 0.55 11645.4 54.04.8 0.95 0.55 11673.5 5210.6	6,43	ن• 11	153475.A	7.805.9		-	
8.50 9.74 153461.9 6699.5 1.55 6.77 152964.5 6535.7 0.63 7.72 152964.5 6511.3 0.65 7.8 149546.8 6311.7 0.77 0.46 149596.2 6211.3 0.77 0.46 149596.6 6311.3 0.77 0.46 13997.6 5311.4 0.78 7.65 13397.8 5913.4 0.79 7.65 13397.8 5770.2 0.85 7.65 128131.6 5770.2 0.85 7.65 116456.8 5470.8 0.95 7.65 110456.4 5470.6 0.95 7.65 11073.7 5315.6	0.45	P.15	153795.2	6858 . 3			
0.55 0.72 152064.5 6515.7 0.65 0.79 149648.8 6371.7 0.65 0.46 149648.8 6371.7 0.65 0.46 149648.2 6371.7 0.72 0.46 149599.6 6311.3 0.77 0.46 13997.8 631.4 0.79 0.46 13997.8 5915.4 0.88 2.45 133897.8 5915.4 0.88 2.65 13897.8 5776.2 0.88 2.65 116459.4 5476.8 0.97 2.65 111.752.7 5345.6 0.95 0.56 111.752.7 5345.6	6.59	0°-70	153461.9	6699 . 5			
0.6a $P.AB$ $1496.4R.A$ 6371.7 0.55 $P.AB$ $14528R.2$ 6211.3 0.77 $n.Ab$ $113959.A$ 6211.3 0.77 $n.Ab$ $113959.A$ 6211.3 0.77 $n.Ab$ $113959.A$ 6211.3 0.75 2.65 $113097.A$ 53170.2 0.86 122742.3 5770.2 0.85 0.62 122742.3 0.85 0.66 11675.4 0.95 $0.11075.2$ 5345.6 0.95 $0.5107.6$ 5114.6	N . 55	57 ° N	152961.5	4535.7			
0.55 P.68 145288.2 hZ11.3 0.77 P.65 13959.6 hZ11.3 0.79 P.65 13369.6 hA56.2 1.75 P.65 13369.6 hA56.2 0.86 P.63 128131.6 5915.4 0.85 P.62 128131.6 5176.2 1.87 P.66 116456.4 566.4 0.95 P.66 116456.4 566.4 1.67 P.65 116456.4 5176.5 0.95 P.56 1165187.5 5315.6	0.69	11 ° 2	14964R.A	6371.7		• • • • • • • • • • • • • • • • • • •	•
0.72 0.66 139599.6 645.8 0.75 2.65 133897.8 5915.4 0.83 128131.6 5770.2 0.85 2.62 128131.6 5770.2 0.85 2.65 128131.6 5770.2 0.85 2.62 128131.6 5770.2 0.85 2.62 128131.6 5470.8 0.85 2.66 116450.4 5404.8 0.95 2.56 11073.7 5345.6 1.67 2.514.6 5214.6	0.65	P. 4 B	145288.2	6211.3			- -
1.75 7.65 1.33897.8 5915.4 10.89 8.63 1.24131.6 5770.2 10.85 8.62 1.24131.6 5770.2 12.85 1.22242.3 56.56.8 12.97 8.626.8 54.04.8 11.075 54.04.8 54.04.8 1.67 9.51 110/51.3.5	0.79	A. 66	1 39599. 6	6458.2			• •
0.89 P63 124131.6 5770.2 0.85 P.62 122242.3 5626.8 0.97 P.66 116450.4 5404.8 0.95 P.56 11173.7 5345.6 1.67 P.57 5219.6	W. 75	P. 65	133897.8	5413.4			
M.85 P.62 122242.3 5626.8 R.97 P.66 11645n.4 54n4.8 N.95 P.56 110732.7 53n5.6 N.95 P.57 53n5.6 1.67 P.57 5214.6	9.80	P. 63	124131.6	5770.2			••••••••••••••••••••••••••••••••••••••
R.9? R.6E 11645n_4 5404_8 N.95 P.56 110732_7 5345.6 1.6? P.5187_5 5214.6	10.85	P.62	122242.3	5676.H		•	
0.95 0.56 110732.7 5345.6 1.Pr 0.57 105187.5 5214.6	6,97	0.5E	116450.4	54.04 . 8			
1,00 0.57 105187,5 521W.6	й , 95	0 5 6	11.0752.7	53115.6			
	U J * 1	0°51	105187.5	521% 6			

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		** A=() FTLE 9	EN FILE	TEST SAMPL	LE111 ##	
	AVERAGE OF FILE	9 FOR 6 RECURDS.	GOUNYEAR UNISTEEL R-1	10.04-20/6	(DANA)	
SLIP	MUX	TOROUE	FX		•	- -
0.40	0 1 • 1	8°5	43 e 43			
0. CZ	9 ~ S	17931.8	8°998			
6.04	8.45	28525。6	1370.0			
0.P6	a. 59	37843.7	17A8.3			
. 0, 0A	9.69	113229.3	2987.7			
0,10	P.16	48515.6	2368.6			
0.12	A.A.3	54437.4	2524.5			
6.14	8 8 ° 6	58839.0	2657.8	·		
4.16	50° 5	61994.5	57775			
0. 1 A	10.91	64459.2	2754.6 TOAV	. 36333.3 (LOAD . 3479.1	νfι = α 0. β >
8 - 28	9.91	66344.7	2748.5			
0.25	a , 90	· 4955ª.4	2724.4 HUPEA	K # 0.91 HUI	OCK # 6.57	8117 = 1. 58
6.39	6 ° 4 3	72110.6	2699.5			
0.35	6°, A B	74311.0	2668.3			
0.40	A . A b	76407.6	2625.7			
6.45	78°U	78524.6	2573.3			
0.53	ت 8ح	A&545.6	2517.6	¢		
0.55	P. A 63	A2353.7	2460.5			
0.69	r. 18	83669 . 3	24PK.7			
4.65	4 ° ۲	83534.6	5342°3			
0° 16	5. 74	AU768.2	7204.9		·	
6.75	9°72	75124-6.3	7214.2			
58°3	69°ú	68047.3	2126.6			
a. as	0 9 ° U	593HR.a	242A.3			
n, 9n	2.43	51214.5	1924.4			
20.5	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	45000 A	1 A 19.9			
8 : A @	\$°\$1	36333.3	1764 e B			

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		** A-D FILE 10	NEW FILE Z	TEST SAMPLE		•
	AVERAGE OF FILE	IA FOR 6 RECORUS.	GRUNYEAR UNISTEFL R-1	10.68-24/6	([.4.4)	
SLTP	XIIM	TOROUF	F X			
6.30	66.69	5: ° 5	8° 19			
0,02	5°36	41269.4	0°293°0			
8.94	8.52	63RA9.1	3218.1			•
8.36	0.64	79347.1	3976.6			
4.08	G.73	98261.5	114A7.B			•
9.19	a. 78	97874.1	4A23.8			
8.12	Ø. 82	103153.8	5P43.5	·		
0.14	P. A4	10798.4	5170.4			•
0.16	A. RS	1 09 A 95 . A	5239.8			
U.19	9 . R Ó	111910.2	5273.1 TOAV	= 61520.8 LO	140 = 6208.	2 VEL # 40.6 MPH
0.20	A. Ao	113242.4	5271.7			•
6.25	G . A 5	115725.4	5212.0 MUPEA	K # 0,86 MULC	JCK # 4.58	RATIO = 1.72
0.30	Ø. F4	117869.5	5176.5		-	
U. 35	R. A3	119722.5	5823.6			
5.49	G. B.I	121419.1	H-LJ67			
6.45	91.19	122922.4	4776.3	¢		· · · · · · · · · · · · · · · · · · ·
0°53	3.76	124198.4	4632.4			
A.55	4.74	124911.3	4477.6	•	- 	-
F 9 • N	n . 71	124245.1	4317.8			
6.55	69°	121704.2	4159.9			-
0.10	9 .66	116384.8	4696.1			• •
И. 75	Q. 63	1 44445 . 4	3849.4			-
R. R.	1.4.8	9H2U4.7	36.81.9			
0.85	A. 58	R741.5.9	3513.6			· ·
0°-9	a , 55	77994.2	357.244			
6.95	21°53	69345 . 7	3,2463			•
1.00	a.52	6152A.R	3440.0			

Condia table a body

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| | | | | | | | | | | | VFL 8 40.0 MPH. | | .TIN = 1.74 |

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| (DANA) | • | | | | | | | | | | LOAD # 7735.6 | | UL OFH = P.40 9A |

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| EL R-1 10.08-20/5 | | | | | | | | | | | TOAV = 72839.3 | | NUPEAK B 0.63 M |

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 | | |
| GOONYEAR UNISTEE | FX | 8 8 | 1.7001 | 3528.8 | 4498.0 | 5177.4 | 564.0 B | 5956.4 | 6155.1 | 6240.8 | 6398.1 | 4397.1 | 4237.7 | 6133.8

 | 6KA3.8
 | 5854 . 5 | 5686.3 | 5503.2 | 5312.2 | 5118.1 | 1.3561
 | 1732.9 | 25,24 . M | 5.46.8
 | 4137.5 | 3941.7
 | 4.1018 | |
| 14 FOR 7 RECORUS. | TOROUE | G . 9 | 39850.9 | 705u4.3 | 96467.4 | 184842.1 | 1149.5.5 | 121629.9 | 126437.9 | 13%914.5 | 132712.7 | 134575.8 | 138267.9 | 141537.5

 |] 44489.7
 | 147159.0 | 149468.3 | 150621.7 | 149980.4 | 141417.9 | 141741.2
 | 133012.1 | 45460121 | 5.7179w1
 | 94617.2 | 39014.5
 | A.742.9 | |
| AVERAGE OF FILE | XII | 9 ° 9 0 | 9~50 | 0 a 45 | r.59 | A.68 | 0.74 | n. 79 | 0.82 | 8. A 3 | 0.43 | ۲. ۳ .
۲. | A.A2 | 8 ° 8 '

 | A.79
 | د• ۲۲ | a.75 | n. 73 | B . 7 W | | A. 65
 | P. 63 | 9 • 65 | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
 | 9.55 | r • 5 3
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| | SLIP | 6°.09 | 5.02 | 9.64 | 9.65 | 0.48 | 6.19 | 8.12 | 0.14 | P. 16 | 0.1A | 0.23 | 8.25 | A.30

 | 0.35
 | 0,40 | 6.45 | 6.5.0 | 0.55 | 6.69 | 6.65
 | ul : 2 | Ŀ. 75 | 6.A.
 | 2.85 | • 6 • •
 | P. 45 | |
| | AVENALE OF FILE 14 FOR 7 RECURDING BUILDEAN UNDEREART INDUSTER ATT INDUSTERVIN UNDUSTRATO | IP WUX MUX IN THE 14 TOR THE MELONON BUUNTEAN UNIGHER ALL INDUMERTOR THANKING | | | IP MUX TACKAGE MUX TACKAGE MUX IP MUX TARGUE FX MUS MUX IP MUX TARGUE FX MUS IP MuX TARGUE MUX MUX IP MuX TARGUE MUX | IP MUX TACKAGE INTERVISION MULTER INTERVISION IP MUX TARBUE FX IP MUX C C IP | .1P | .1P MUX TORAUE FX MUX TORAUE FX .0B 0.80 0.80 0.80 0.80 0.80 .02 0.80 0.90 1997.1 0.90 .03 90.667.0 1997.1 1997.1 .01 0.59 90.667.0 1997.1 .01 0.59 90.667.0 1997.1 .01 0.59 90.667.0 14498.0 .01 0.50 114465.1 5177.4 | .1P MUX TORDUF FX .10 0.00 0.01 0.0 .12 0.01 0.0 0.07.1 .12 0.05 39850.0 1907.1 .12 0.05 39850.0 1907.1 .12 0.05 39850.0 1907.1 .11 0.05 3558.8 .11 0.05 14498.0 .11 11486.5 564.0 .12 121520.9 556.4 | .1P mix Trice is for the manage of the mission of the manage of the mission of t | .1P MIIX TORGUE FX NUTLED IN TACUADS. NUTLED IN TACUADS. .00 0.00 7.0 0.0 0.0 0.0 0.0 .01 0.00 7.0 0.0 0.0 0.0 0.0 0.0 .02 0.00 0.00 1907.1 0.0 0.0 1907.1 .03 0.26 0.00 1907.1 0.0 0.0 0.0 .04 0.26 0.000.0 1907.1 0.0 0.0 0.0 .04 0.26 0.000.0 0.000.0 0.0 0.0 0.0 0.0 .0 0.26 0.000.0 0.000.0 0.0 0.0 0.0 0.0 .0 0.0 0.000.0 0.0 0.0 0.0 0.0 0.0 .0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 .0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 .0 0.0 0.0 0.0 0.0 0.0 0.0 0.0< | .1P MIX TORDUF FX | 10 1. | 10 11.X 1060UE F.X 1060UE F.X 10 0.1X 1060UE F.X 0.1 10 0.26 3965a.0 1907.1 1 11 0.26 3965a.0 1907.1 1 11 0.45 705ua.1 3558.0 1907.1 11 0.45 705ua.1 3558.0 1907.1 11 0.45 114465.5 5177.4 114465.5 11 0.714 114465.5 5177.4 114465.5 11 0.774 114465.5 5177.4 114465.5 12 0.77 114465.5 5177.4 114465.5 13 13414.5 5177.4 114465.5 114465.5 14 0.47 114465.5 5177.4 114465.5 15 0.43 1156.0 5177.4 114465.5 16 0.43 114465.5 540.6 114465.5 18 0.43 113414.5 6136.6 114465.5 19 0.43 113475.4 113475.6 114465.1 <td< td=""><td>11 <td< td=""><td>19 MUX TROUE FX MULTAR MELLAND MULTAR MELAND</td><td>Image: International and and and and and and and and and and</td><td>1 </td><td>Network of File File Number of File File Number of File File Number of File Number of File Number of File 112 1.28 39658.0 1997.1 3558.8 1997.1 1 112 1.28 39658.0 1997.1 3558.8 1 1 1 118 0.45 7056.0 1997.1 3558.8 1</td><td></td><td>NUMBER 1 TAGE 1 FX NUME 1 FX 0.8 0.80 10.0 1 1 1 0.8 0.80 1903.0 1903.1 1 1 1 0.8 0.80 1903.1 1 1 1 1 1 1.8 0.8 1 1 1 1 1 1 1 1.1 0.45 1 1 1 1 1 1 1 1 1.1 0.45 500.1 1</td><td>NUMBER IN TALL NUMBER IN TALL NUMER IN TALL</td><td>NUMERIA PLACE NUMERIA PLACE<</td><td>NUMBER NUMBER NUMER NUMER NUMER<td>11 <th11< th=""> 11 11 11<!--</td--><td>MULL TORUF MULL <t< td=""><td>Martine in the first interviewe interviewe</td><td>Matrix Table Matrix Matrix<!--</td--></td></t<></td></th11<></td></td></td<></td></td<> | 11 11 <td< td=""><td>19 MUX TROUE FX MULTAR MELLAND MULTAR MELAND</td><td>Image: International and and and and and and and and and and</td><td>1 </td><td>Network of File File Number of File File Number of File File Number of File Number of File Number of File 112 1.28 39658.0 1997.1 3558.8 1997.1 1 112 1.28 39658.0 1997.1 3558.8 1 1 1 118 0.45 7056.0 1997.1 3558.8 1</td><td></td><td>NUMBER 1 TAGE 1 FX NUME 1 FX 0.8 0.80 10.0 1 1 1 0.8 0.80 1903.0 1903.1 1 1 1 0.8 0.80 1903.1 1 1 1 1 1 1.8 0.8 1 1 1 1 1 1 1 1.1 0.45 1 1 1 1 1 1 1 1 1.1 0.45 500.1 1</td><td>NUMBER IN TALL NUMBER IN TALL NUMER IN TALL</td><td>NUMERIA PLACE NUMERIA PLACE<</td><td>NUMBER NUMBER NUMER NUMER NUMER<td>11 <th11< th=""> 11 11 11<!--</td--><td>MULL TORUF MULL <t< td=""><td>Martine in the first interviewe interviewe</td><td>Matrix Table Matrix Matrix<!--</td--></td></t<></td></th11<></td></td></td<> | 19 MUX TROUE FX MULTAR MELLAND MULTAR MELAND | Image: International and | 1 | Network of File File Number of File File Number of File File Number of File Number of File Number of File 112 1.28 39658.0 1997.1 3558.8 1997.1 1 112 1.28 39658.0 1997.1 3558.8 1 1 1 118 0.45 7056.0 1997.1 3558.8 1 | | NUMBER 1 TAGE 1 FX NUME 1 FX 0.8 0.80 10.0 1 1 1 0.8 0.80 1903.0 1903.1 1 1 1 0.8 0.80 1903.1 1 1 1 1 1 1.8 0.8 1 1 1 1 1 1 1 1.1 0.45 1 1 1 1 1 1 1 1 1.1 0.45 500.1 1 | NUMBER IN TALL NUMER IN TALL | NUMERIA PLACE NUMERIA PLACE< | NUMBER NUMER NUMER NUMER <td>11 <th11< th=""> 11 11 11<!--</td--><td>MULL TORUF MULL <t< td=""><td>Martine in the first interviewe interviewe</td><td>Matrix Table Matrix Matrix<!--</td--></td></t<></td></th11<></td> | 11 11 <th11< th=""> 11 11 11<!--</td--><td>MULL TORUF MULL <t< td=""><td>Martine in the first interviewe interviewe</td><td>Matrix Table Matrix Matrix<!--</td--></td></t<></td></th11<> | MULL TORUF MULL MULL <t< td=""><td>Martine in the first interviewe interviewe</td><td>Matrix Table Matrix Matrix<!--</td--></td></t<> | Martine in the first interviewe | Matrix Table Matrix Matrix </td |

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		** A=D FJLF 15	N FILE 9	TFST SAWPL	
	AVERAGE OF FILE	15 FOR 4 RECURDS.	GOONYEAR UNISTEEL R-1	10.04-2010	(DAYA)
SLIP	них	TORDUE	FX		
0,40	9°38	ម ទ	5.5		
6.92	U • 28	19947.3	BA9.6		
0.64	A.46	32875.3	1455.1		
0.04	a . 59	42878.4	1857.1		
6.68	A. 68	52627.3	2145.1		
0.10	A. 15	56645.6	2355.6		
6.12	0.4.0	61509.3	2597.6		•
0.14	A.A3	65493°a	2666.8		
2.16	A.AS	68929 . 5	7672.4		
0,18	3.86	72028.8	2707.5 TOAV #	= 36937.5 L	040 # 3169.3 VEL # 55.8 MPH.
N.20	A .	74708.3	2716.5		
0.25	9.96	80369.5	PTOB.2 MUPEAN	K = 0.86 MUL	OCK # 0.57 RATIO # 1.53
0.37	0.86	A5495.0	2697.8		
0.35	A.A5	9243.7	2652.9		· · · · · · · · · · · · · · · · · · ·
6.49	A.83	95113.1	2646.9		
R. 45	1.4.1	99A14.1	2550.1	÷	•
0.50	a. 7.9	194923.1	2477.5	•	• •
0.55	a.76	1,4564.2	2394.7		••
0.63	A . 74	106917.1	2312.9		
6 • 5 • • 5	a.71	1 24684.3	2235.9		
0°10	64 • 0	98215.3 11	2171.6		
w.75	7.4.4	A7846.7	4.5415		
5. A G	2.4.65	75267.7	2.57.4		
0.85	27 4 ° 6	51726.K	1941.3		
v.9a	A. 51	51718.2	1897.5		
6.95	6 S° 5	43415.9	1 836.3		
1.40	e.57	36937.5	1777.5		

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												¥															_	10	0
E115	(04.4)				•							040 = 6141.3 VEL = 48.6 MP	•	OCK = 0.51 RATIO = 1.67					· · · · · · · · · · · · · · · · · · ·						• •				
TFST SAMPL	14°04-23/6											62ª75.9 L		■ 0.85 MUL				•	•					-					
NEW FILF JA	GOODYEAR UNISTEEL R-1	E X	8°.5	1354.4	2694.5	3543.1	4197.7	11672.6	4878.7	5447.3	5144.5	5199.6 TOAV #	5214.4	5194.9 MUPEAK	5143.2	5458.0	4948.4	4B19.B	4674.8	4525 . N	4376.A	42,27.3	4956.6	3494.4	3714.8	3556.3	3474.5	3244.1	1 6 A D I
** A=D FILE 15	16 FAR 5 GECURUS.	TOROUE	5°5	27159.1	55a36.1	73461.5	R6679.3	1.95793.1	192426.1	107308.4	111042.8	114918.1	116231.9	124946.4	125324.1	129465.7	13331.1	1367MR.9	138451.9	138962.3	135653.0	124578.4	121009-4	114327.1	98157.5	86967.3	7754025	7.42894	
	AVERAGE NF FILE	Y	9°96	4.22	3.44	9°58	3.63	0.75	a. 79	58°n	4 ° 47	R. B5	A. A5	78°U.	78°8	A.A2	9.4.0	0.78	A.76	97 ° A	71	64°	a . 60	ē, 63	19.4	п. 58	0 . 56	P .53	ŭ
٣		SLIP	0.69	3.92	0.04	93.0	U. NR	4.19	9.12	0.14	B .16	U.18	6.20	6.25	4°34	P. 35	0.40	P. 45	0.59	e . 55	0.69	4.65	B. 70	0.75	4°°	U.55	6.90	56° ປ	ar ,
	· · · · · · · · · · · · · · · · · · ·	0	-		•			•		• •	8			3	8	6)	•		т Э		a	- 	•)	



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Ň	-	** A=0 FILE 17	NEW FILE JI	TEST SAMPL	E116 **	
:	AVERAGE OF FILE	17 FOR & RECORUS.	GOODYEAP UNISTEFL R-1	19.0R-20/G	(DANA)	
SLIP	них	TORQUE	FX			
8.09	3.60	0°0	6) • (J			
6.02	0.27	34479.8	1793.7			
3, 84	A.48	64171.9	2954.3			
0. US	7.61	77803.6	3746.7			
0.08	P. A.9	88445 ° 2	4254.1			•
0.10	A . 74	95998.5	4548.6			
0.12	P.17	194966.9	1717.7			-
e.14	0.79	104310.5	4895.4		·	
0.16	а. 79	146787.2	4835.3			
0.18	A. 19	108835.9	4829.6 TOAV	≈ 55729.2 L	.010 = 6202.0	VEL = 55.0
0.20	9.79	110487.7	1,99,1	•		
0.25	A.78	113882.4	4709.2 MUPEI	IK # 0.79 HUL	OCK # 0.44 R	ATIO = 1.79
0.30	a.76	116924.2	4612.5		•	
0.35	0°75	119799.6	4546.7			
0.49	A.73	122656.7	4393.N			
9.45	0.71	125545.1	4274.2	•		
A.5a	A.69	128334.2	4146.7			• • •
0.55	P.67	1 50409.9	1412.0			•
4.67	P. 64	134643.6	3476.6			•
0.65	G. + R	128180.7	3746.1		•••	
a. 70	39 8	121945.4	3624.4			
2.75	3°28	112315.7	74A5.7			
0.87	ي ء ج 5	94834.6	3332.6		• •	
Q.85	&* 52	A6146.3	3172.6			
40°	5°5°5	74975.5	6"0121			
0.95	5.47	44747 ° A	A. 107 HG			
1	7770	55729.2	2.7040			

•

こうしょう ション・キー・ライント しゅうしょう ふうやましょう かんがたい あたい いたち かままた ないたい いたい かんない ないたい ないない ないない ないない ないない ない

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Artende of Fill IA File Pair Controls Controls Controls Control Control <t< th=""><th></th><th>•</th><th>4# A-U FILE 18</th><th>JEN FILE 1,2</th><th>TEST SAMPLE117 44</th></t<>		•	4# A-U FILE 18	JEN FILE 1,2	TEST SAMPLE117 44
ILIP HIK Thould F.x 6.20 0.00 0.0 0.0 0.0 6.10 0.00 0.00 0.00 0.0 6.10 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 0.00 0.00 6.10 0.00 0.00 0.00 0.00 0.00 0.00 0.00 6.10 0.00		AVERAGE OF FILE	IN FOR 5 RECORDS.	GOODYEAR UNTSTEEL R-1	0.08-20/G (DANA)
0.00 0.00 0.0 0.00 0.10 0.050,1 2990,0 1770,0 0.10 0.4560,1 2990,0 1270,0 0.10 0.4560,1 2990,0 1270,0 0.10 0.4560,1 122,5 990,0 0.10 940,6 127,0 127,0 0.10 940,6 127,0 127,0 0.10 114,0 127,0 127,0 0.11 11,0 111,0 127,0 0.11 11,0 121,0 124,1 0.11 11,0 111,0 111,0 0.11 111,0 560,1 104,1 0.11 111,0 560,1 104,1 0.11 111,0 560,1 104,0 0.11 111,0 560,1 104,0 0.11 111,0 560,1 104,0 0.11 111,0 111,0 560,1 0.11 111,0 111,0 104,0 0.11 1110,1	SLIP	ХЛМ	TÀRAUE	×	•
Kill Kill Math ITR. Kill 0.5601 29506 29506 Kill 0.4501 29506 392.5 Kill 0.4301 29506 392.5 Kill 0.4301 29506 392.5 Kill 0.13 913.7 104.2 Kill 0.13 312.7 104.8 Kill 0.13 312.7 104.8 Kill 0.13 5101 2568 Kill 111106 5101 5101 Kill 111106 5101 104.1 Kill 111106 5101 5101 Kill 111106 5101 5101 Kill 111106 5101 5101 Kill 111107 5101 104.1 Kill 111117 5101 104.1 Kill 111117 5101 104.1 Kill 111117 5101 104.1 <tr< td=""><td>0°69</td><td>8° 48</td><td>G • B</td><td>8.8</td><td></td></tr<>	0°69	8° 48	G • B	8.8	
6.30 0.450.1 2950.6 6.10 733.1.6 397.2 6.10 733.1.6 397.2 6.10 733.1.6 397.2 6.11 0.13 397.2 6.12 9.835.3 317.2 6.11 0.13 397.2 6.12 9.835.3 317.2 6.13 9.835.3 317.3 6.14 11194.4 317.1 7.11 11194.5 507.1 6.13 11194.6 307.1 6.14 11194.6 307.1 6.15 11194.7 506.1 10.01 4.0.0 6.14 11194.6 507.1 10.1 4.0.0 6.15 11397.1 507.1 10.1 4.0.0 6.14 11397.1 507.1 10.1 4.0.0 4.1.0 6.15 2.3.1 10.1 10.0 4.0.0 4.0.0 6.15 2.3.1 10.1 4.0.0 4.0.0 4.0.0 6.	9.32		36094.9	1774.8	
0.00 0.4.01 703.1.4.0 102.2.5 0.110 009 90365.3 4375.7 0.110 015 90365.4 4375.7 0.111 015 90365.4 4376.4 0.112 015 90357.5 4770.4 0.112 016 194115.6 919.1 0.112 701 1111184.5 597.3 70.4 0.111 1.13 597.3 597.3 70.4 661 41.10 0.111 1134.7 586.4 111184.5 596.4 10.0 661 41.10 166 0.112 010 1134.7 586.4 10.0 664 41.10 166 0.111 1134.7 586.4 10.0 10.0 466 41.6 44.6	0.34	9°70	64544.1	295(1.8	
0.00 0.469 94136 6312.7 6312.7 0.112 0.75 9637.5 4720a 0.112 0.73 9637.5 4720a 0.112 7.70 19617.5 9914.7 0.113 7.01 111104.1 5401.7 0.113 7.01 1111104.1 5402.0 0.113 0.11 1111104.1 5402.0 0.114 1111104.1 5407.1 1044.8 0.11 11111111 1111104.1 5402.1 0.113 1111111 11111104.2 5402.1 0.114 111111 11111104.2 5407.1 0.114 1111111 11111111 11111111 0.114 1111111 1111111 1111111 0.111 111111 5407.1 1007.2 5407.1 0.114 1111111 111111 111111 111111 0.115 1111111 1111111 111111 111111 0.114 11111111 1111111 1111	0.06	9 . 6 ()	78341.6	3842.5	•
0.15 965/1.5 012.1 0.18 14415.6 0914.7 0.11 14415.6 0914.7 0.11 1104.4 544.7 0.11 11104.4 544.7 0.11 111104.4 544.7 0.11 111104.4 544.7 0.11 111104.4 544.7 0.11 111104.4 544.7 0.11 111104.4 544.7 0.11 11195.6 546.1 0.11 11195.6 596.1 0.11 11195.6 596.1 0.11 1195.6 596.1 0.11 1195.6 596.1 0.11 1195.6 596.1 0.11 1195.6 596.1 0.11 1195.6 596.1 0.11 1195.6 596.1 0.12 1275.1 997.6 0.12 1279.7 056.4 0.12 12795.1 107.7 0.12 1275.2 107.7	8.68	A.69	94385.8	4372.7	•
1.12 9.18 [941]5.6 6918.7 5418.7 5.11 7.00 [9692.3 5418.7 5418.7 5.11 111184.4 5582.6 5418.7 70.8 6286.9 VL 6286	0.10	Q.15	98507.5	4720.4	
1.11 P.40 19892.3 5614.7 100 62004.0 6204.7 1.11 1.11 547.1 547.1 104 - 60004.0 62000.0 <td>7.12</td> <td>u, 78</td> <td>104115.6</td> <td>1914.7</td> <td></td>	7.12	u, 78	104115.6	1914.7	
3.11 3.4.1 111100 56.2.6 3.11 8.4.1 113.021.3 59.7.7 10.10 • 6200.0 VL • 40.0 VL • 4	6.14	04.9	188792.3	5614.7	
Dall Dall <th< td=""><td>ð. 16</td><td>3.41</td><td>111104.4</td><td>SGA2.8</td><td>· · · · · · · · · · · · · · · · · · ·</td></th<>	ð. 16	3.41	111104.4	SGA2.8	· · · · · · · · · · · · · · · · · · ·
0.20 0.41 11515A.4 506A.1 HUDEAK = 0.61 MULDCK = 4.4A A110 = 1.49 0.25 0.81 118979.7 5087.1 4970.6 4971.2 4000.6 4010.6 4.40 4110 = 1.49 0.25 0.78 122796.6 4971.2 4071.2 4071.2 0.35 0.78 12796.6 4071.2 4071.2 0.46 12796.6 4071.2 4071.2 0.45 0.71 4071.2 4071.2 0.46 12792.6 4071.2 4071.2 0.45 0.71 12792.4 4071.7 0.55 0.49 13110.17 4071.7 0.55 0.49 13140.1 4107.7 0.55 0.49 1774.2 4107.7 0.55 0.49 1774.2 4107.7 0.51 0.454.4 4074.2 4107.7 0.55 0.46 1774.2 4107.7 0.55 0.45 357.4 4107.1 0.55 0.55 <td>0. 1 A</td> <td>0.51</td> <td>113421.3</td> <td>SATT.T TOAV #</td> <td>60400.0 LOAD . 6288.9 VFL . 40.0 MPH.</td>	0. 1 A	0.51	113421.3	SATT.T TOAV #	60400.0 LOAD . 6288.9 VFL . 40.0 MPH.
8.25 8.81 118079.7 500.1 WUEAK = 0.81 MULOCK = 4.94 R.110 = 1.49 8.36 9.79 122796.6 4970.2 4970.2 4970.6 4970.6 8.35 9.78 125756.9 4970.2 4970.2 4970.6 4970.6 8.35 9.78 127556.9 4970.6 4970.6 4970.6 8.48 7.76 127926.9 4976.3 4976.3 4976.3 8.45 6.71 12792.4 4576.3 4576.3 4576.3 8.55 0.76 13110.7 4576.3 4576.3 4576.3 8.45 7.46 13110.7 4576.3 4576.3 4576.3 8.55 7.46 12754.1 4577.3 4577.4 4577.4 8.75 7.46 1757.4 4577.4 4577.4 4577.4 8.75 7.47 3.57.9 4577.4 4577.4 4577.4 8.75 7.45 7.47.8 4577.4 4577.4 8.76 7.47.8		6.61	115156.4	506A.1	
8.39 8.79 122796.0 4920.6 8.40 2.76 12576.9 4987.2 8.40 2.76 12576.9 4867.2 8.41 2.76 12792.0 4877.2 8.45 8.71 12792.0 4877.2 8.45 8.71 12792.0 4877.2 8.45 8.71 13110.7 4305.4 8.45 8.71 13110.7 4305.4 8.45 9.45 4107.7 4305.4 8.45 7.60 1375.4 4305.4 8.45 7.64 3107.7 4305.4 8.45 7.64 3107.7 4305.4 8.45 7.64 3107.1 4305.4 8.45 7.64 3107.7 359.4 8.45 9.455.7 359.4 359.4 8.45 7.61.01.4 359.4 8.45 7.61.01.4 359.4 8.45 7.61.01.4 379.4 8.45 7.64 379.4 8.45 7.64 379.4 8.47 7.64 379.4 8.47 7.64 379.4 8.48 7.64 379.4 8.49 7.64 379.4 8.414.9 <td>ø. 25</td> <td>R.81</td> <td>118879.7</td> <td>Sear.1 MUPEAK</td> <td>: 0.81 MULOCK = 4.48 RATIO = 1.69</td>	ø. 25	R.81	118879.7	Sear.1 MUPEAK	: 0.81 MULOCK = 4.48 RATIO = 1.69
8.35 8.78 125759 4867.2 8.48 8.775 1270289 4678.3 8.45 8.775 1270289 45764 8.55 8.71 1311012 4595.4 8.55 8.71 13111012 4395.4 8.56 8.71 1311101.2 4395.4 8.57 9.55 9.46 1311101.2 8.58 8.71 1311101.2 4395.4 8.59 8.71 131111.2 4395.4 8.50 8.71 1317.1 4244.3 8.65 8.61 115225.1 4177.1 8.75 9.45 3.759 4.782 8.75 9.457.9 3599 3599 8.75 9.457.9 3599 3599 8.8 7.55 9.457.9 3599 8.8 7.55 9.457.9 3599 8.8 7.55 7.5118 31101 8.9 7.55 7.5118 31101 8.9 7.55 7.5118 31105 8.9 7.55 7.5118 31105 8.9 7.55 7.5118 31105 <td>9.30</td> <td>\$ ° 4</td> <td>122796.A</td> <td>4920.6</td> <td></td>	9.30	\$ ° 4	122796.A	4920.6	
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	•	H1 • e	6.00 m	2905.5	

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2.0 RESEARCH METHODOLOGY

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The methodologies employed in this study addressed the characterization of two diverse aspects of tire behavior. Measurements were conducted to describe both the noise and traction performance qualities of a sample of six truck tires, under conditions which were seen as relevant to the respective noise and traction interests arising from environmental and safety issues. With regard to noise generation, measurements were made according to an existing standard practice, recommended by the Society of Automotive Engineers. Traction measurements were conducted according to procedures developed at HSRI, since a standardized methodology has yet to be established.

2.1 Tire Sample

Six radial-ply heavy truck tires, identified below, were selected to conduct the noise and traction experiments. All tires were size 10.00 x 20/G, where the "G" designation indicates a Tire and Rim Association (T&RA) rated load of 6040 lbs at a cold inflation pressure of 105 psi. The test sample, as illustrated in Figures la and lb, contains three tires with "circumferential rib"-type tread patterns and three tires configured with tread patterns of either the "cross lug" or "aggressive rib" varieties.

Sample of Radial-Ply Tires

Firestone Transteel			
Goodyear Unisteel R-1		Rib	Tread
Michelin XZA			
Firestone Transteel Transt	action	Lua	Tread
Goodyear Unisteel L-1		Lug	ii cuu
Michelin XZZ	į į	Aggr	ressive

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Rib



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it should be noted, by the substantial degree of "mixing" which occurs among rib and lug data—quite in contrast with data taken on the similarly-limited sample of bias tires [2] which showed virtually no mixing and a 23% spread in average (F_x/F_z) peak values on wet concrete.

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Regarding "slide" traction values, the data taken on wet and dry concrete display virtually no significant rib/lug distinctions in the case of the radial truck tire. This observation again contrasts radials with bias-ply tires, the latter of which showed an average 16% lower slide traction performance of lug tires on wet concrete.

In summary of longitudinal traction measurements, radial-ply truck tires, as represented in this sample, are not seen to be significantly discriminated, according to tread type, by the gathered peak and slide traction values. As a note regarding the statistical quality of the longitudinal traction measurements, the data obtained in the three repeat runs for each tire and surface are shown in Table 2. The tabulated data show that relatively good repeatability was obtained, with a typical standard deviation of approximately .012 for either peak or slide traction coefficients on both surfaces.

3.4 Mobile Traction Results - Lateral

Tests were conducted on the lateral traction dynamometer to permit examination of the friction-limited lateral force behavior of the six-tire sample. Data resulting from these tests were reduced to the plotted format of Figures 8 through 11. These data indicate the basic sensitivity of the F_y/F_z versus α relationship to velocity and vertical load under the two subject surface conditions. As with longitudinal traction measurements, the tire exhibits a steeply rising (elastic) behavior followed by a friction-determined saturation. In the case of lateral traction, the angular slip range of interest is limited to about $\alpha = 20^\circ$, thereby eliminating any need

		t	ree (3) Repe	ated Run	ıs on Eacl	n Tire.					
				Dry		Std.		I	Wet		Std.	
		(Rel	oeat N 2	lumber) 3	Ave.	Dev.] × σ	(Rep	eat Nu 2	mber) 3	Ave.	Dev. Ι×α	
Firectone Trancteel	Peak	.82	.81	.84	.823	.012	.75	.73	.72	.733	.012	•
	Slide	.65	.65	.63	.643	600.	.58	.58	.57	.577	.005	
Eiwectone Trancteel	Peak	.85	.82	.81	.827	.017	.73	.72	.70	717.	.012	
Traction	Slide	.65	.63	.62	.633	.012	.58	.58	.57	.577	.005	
Goodvear Unisteel R-1	Peak	.83	.80	.84	.833	.017	.74	.75	.76	.750	.008	
	Slide	.61	.59	.62	.607	.012	.55	.55	.56	.553	.005	
Goodvear Inisteel I-]	Peak	. 78	.78	.81	.790	.014	.67	.61	.64	.640	.025	
	Slide	.62	.62	.62	.620	.000	.54	.52	.53	.530	.008	
Michelin X7A	Peak	.82	.82	.81	.817	.005	.68	.64	.67	.663	.017	
	Slide	.57	.59	.58	.580	.008	.56	.55	.56	.557	.005	
Michelin X77	Peak	.79	.73	.78	.767	.026	.74	.70	.69	.710	.022	
	Slide	.62	.59	.59	.600	.014	.60	.56	.56	.573	610.	

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Table 2. Peak and Slide Values of F_X/F_Z Obtained from three (3) Repeated Runs on Each Tire.

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NOISE-TRACTION STUDY, RADIAL TIRES

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Tire Test Code	Manufacturer	Model
ONA/B-13-C-Date	Firestone	Transteel
ONA/B-14-C-Date	Firestone	Transteel Traction
ONA/B-15-C-Date	Goodyear	Unisteel R-1
ONA/B-16-C-Date	Goodyear	Unisteel L-1
ONA/B-17-C-Date	Michelin	XZA
ONA/B-18-C-Date	Michelin	XZZ
ONA/B-19-D-Date	Firestone	Transteel
ONA/B-20-D-Date	Firestone	Transteel Traction
ONA/B-21-D-Date	Goodyear	Unisteel R-1
ONA/B-22-D-Date	Goodyear	Unisteel L-1
ONA/B-23-D-Date	Michelin	XZA
ONA/B-24-D-Date	Michelin	XZZ .

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ONA/B-13-C-B/23 DRY CONCRETE (DANA) FZ = 6019 LB

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FILLESTO E TRANSTER _

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FRESSONE TANSTER







FILED E TRANTER TRAIT.







GOODYEAR MULTEEL 2-1

-129-



GOOD YEAL WAISTEEL C-1



ONA/B-16-C-8/23 DRY CONCRETE (DANA) FZ = 5941 LB

STODYEAL WINTEED UN



ONA/B-16-C-8/23 DRY CONCRETE (DANA) VEL = 21 MPH



ONA/B-16-C-8/23 DRY CONCRETE (DANA) FZ = 5964 LB VEL = 14 MPH

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VEL = 18 MPH

MICHELLY XEA





FZ = 6184 LB

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VEL = 20 MPH





ONA/B-19-D-8/25 VET CONCRETE (DANA) FZ = 6003 LB

FILE TO LE TARTEL



ONA/B-19-D-8/25 WET CONCRETE (DANA) VEL = 20 MPH

FIG TO E TWO JEEL



FZ = 5973 LB VEL = 20 MPH

HET VE TANTEL

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ONA/B-20-D-8/25 WET CONCRETE (DANA) FZ = 6171 LB





VEL = 20 MPH

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FZ = 6137 LB VEL = 20 MPH

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ONA/B-21-D-8/25 WET CONCRETE (DANA) FZ = 6248 LB

HOODYEAR ANASTEEL 2414

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ONR/B-21-D-8/25 WET CONCRETE (DANA) VEL = 20 MPH

TOUDYEAL WHITEEL UNI



TODDYEAL CULTERED C-1





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VEL = 20 MPH



 ONA/B-22-D-8/30
 WET CONCRETE (DANA)

 FZ = 6053 LB
 VEL = 20 MPH



ONR/B-23-D-8/30 WET CONCRETE (DANA) FZ = 6022 LB

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VEL = 13 MPH

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ONA/B-24-D-8/30 WET CONCRETE (DANA) FZ = 5515 LB

MUHELL Vee



VEL = 20 MPH

NUHEL XEE
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FZ = 5494 LB VEL = 19 MPH

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Figure 9. Cornering stiffness, C_{α} , as influenced by vertical load, F_{Z} , for the radial ply tires.



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Figure 15. Peak and slide values versus speed for radial tires at rated load on wet concrete.







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Figure C-37. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G. Firestone Transteel Traction tires were tested on a dry Portland cement concrete surface. Tire load was 6304 pounds.

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Figure C-38. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Firestone Transteel Traction tires were tested on a dry Portland cement concrete surface. Nominal vehicle speed was 20 mph.



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Figure C-39. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Firestone Transteel Traction tires were tested on a dry Portland cement concrete surface.

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Figure C-40. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Firestone Transteel Traction tires were tested on a wet Portland cement concrete surface. Tire load was 6171 pounds.



Figure C-41. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Firestone Transteel Traction tires were tested on a wet Portland cement concrete surface. Nominal vehicle speed was 20 mph.

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Figure C-42. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Firestone Transteel Traction tires were tested on a wet Portland cement concrete surface.



Figure C-43. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Firestone Transteel tires were tested on a dry Portland cement concrete surface. Tire load was 6019 pounds.



Figure C-44. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Firestone Transteel tires were tested on a dry Portland cement concrete surface. Nominal vehicle speed was 20 mph.

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Figure C-45. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Firestone Transteel tires were tested on a dry Portland cement concrete surface.



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Figure C-46. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Firestone Transteel tires were tested on a wet Portland cement concrete surface. Tire load was 6003 pounds.

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Figure C-47. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Firestone Transteel tires were tested on a wet Portland cement concrete surface. Nominal vehicle speed was 20 mph.



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Figure C-48. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Firestone Transteel tires were tested on a wet Portland cement concrete surface.



Figure C-49. Normalized later force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Goodyear Unisteel R-1 tires were tested on a dry Portland cement concrete surface. Tire load was 6287 pounds.



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Figure C-50. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Goodyear Unisteel R-1 tires were tested on a dry Portland cement concrete surface. Nominal vehicle speed was 20 mph.

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Figure C-51. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Goodyear Unisteel R-1 tires were tested on a dry Portland cement concrete surface.



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Figure C-52. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Goodyear Unisteel R-1 tires were tested on a wet Portland cement concrete surface. Tire load was 6248 pounds.

1.00 HSRI MOBILE DYNAMOMETER Ø8-0CT-76 80 69 FY/FZ 20 FZ = 3229 LB FZ = 9153 LB FZ = 6169 LB 88 5.03 ALPHA (DEGREES) 20.00 25.00

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Figure C-53. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Goodyear Unisteel R-1 tires were tested on a wet Portland cement concrete surface. Nominal vehicle speed was 20 mph.



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Figure C-54. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Goodyear Unisteel R-1 tires were tested on a wet Portland cement concrete surface.



Figure C-55. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Goodyear Unisteel L-1 tires were tested on a dry Portland cement concrete surface. Tire load was 5941 pounds.



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Figure C-56. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Goodyear Unisteel L-1 tires were tested on a dry Portland cement concrete surface. Nominal vehicle speed was 20 mph.

) 60.00 HSRI MOBILE DYNAMOMETER 08-0CT-76 (X10² 48.00 36.00 F۲ 12.00 RUN = 1 RUN = 2 RUN = 3 0.00 5.00 Т 10.00 15.00 ALPHA (DEGREES) 0 29.00 25.00 30

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Figure C-57. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Goodyear Unisteel L-1 tires were tested on a dry Portland cement concrete surface.

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Figure C-58. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Goodyear Unisteel L-1 tires were tested on a wet Portland cement concrete surface. Tire load was 6130 pounds.



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Figure C-59. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Goodyear Unisteel L-1 tires were tested on a wet Portland cement concrete surface. Nominal vehicle speed was 20 mph.



Figure C-60. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Goodyear Unisteel L-1 tires were tested on a wet Portland cement concrete surface.

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Figure C-61. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a dry Portland cement concrete surface. Tire load was 5445 pounds.



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Figure C-62. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G. Michelin XZZ tires were tested on a dry Portland cement concrete surface. Nominal vehicle speed was 20 mph.



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Figure C-63. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a dry Portland cement concrete surface.

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Figure C-64. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a wet Portland cement concrete surface. Tire load was 6022 pounds.



Figure C-65. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a wet Portland cement concrete surface. Nominal vehicle speed was 20 mph.

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Figure C-66. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a wet Portland cement concrete surface.


Figure C-67.

. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a dry Portland cement concrete surface. Tire load was 6184 pounds.



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Figure C-68.

3. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a dry Portland cement concrete surface. Nominal vehicle speed was 20 mph.



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Figure C-69. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a dry Portland cement concrete surface.



Figure C-70. Normalized lateral force versus slip angle data at nominal vehicle speeds of 20, 40 and 55 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a wet Portland cement concrete surface. Tire load was 5515 pounds.

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Figure C-71. Normalized lateral force versus slip angle for nominal tire loads of 0.5, 1.0, and 1.5 times T&RA rated load. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a wet Portland cement concrete surface. Nominal vehicle speed was 20 mph.



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Figure C-72. Lateral force versus slip angle data for repeated tests at rated load and a vehicle speed of 20 mph. The radial, 10:00R20, load range G, Michelin XZZ tires were tested on a wet Portland cement concrete surface.

*U.S. GOVERNMENT PRINTING OFFICE: 1977-261-264:547

2. TEST TIRES

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The tire sample was chosen to be representative of the entire truck tire population, that is, representative in construction, brand and popularity. The number of tires of each brand selected for the test sample was based on the market penetration of the sales of that brand, and the relative number of tires of the three major types (bias ply, ribbed tread; bias ply, lug tread; and radial ply, ribbed tread) was based on the relative popularity of the types. Table 1 lists the test tires and identifies their type.

All of the tires were of the 10.00 x 20 size and they were mounted on the proper rim recommended by the Tire & Rim Association. They were inflated to the maximum pressure (85 psi for bias ply tires and 90 psi for radial ply tires) and loaded to a nominal 4,620 lbs.

Each tire was warmed-up by traveling about six miles at 50 miles per hour immediately before being tested. Each tire was also broken-in by six brake applications of one second lockup duration during the warm-up. The whole group of tires were tested in braking and then retested later in cornering as a group.

3. SURFACES

Two pavements very much like the Uniform Tire Quality Grading traction pads at San Angelo, Texas were used. The surfaces were located at the Transportation Research Center of Ohio. One surface was a hot mixed bituminous asphalt pavement with a nominal ASTM E274-70 skid number of 60. The other surface was a polished Portland cement concrete pavement with a nominal ASTM E274-70 skid number of 35.

TABLE 1. TEST TIRES

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TIRE		% OF	WADEL	CARCASS	TREAD
NU.	MANUFACIORER	MARKET	MUDEL	ТҮРЕ	ТҮРЕ
lagb	Goodyear	20%	Unistee1-2	Radia1	Rib
2a&b	Goodyear		Himiler Special	Bias	Rib
3a&b	Goodyear		Custom Quiet Drive	Bias	Rib
4a&b	Goodyear		SuperHiMiler	Bias	Rib
5a&b	Goodyear		Custom Hi-Miler	Bias	Rib
6a&b	Firestone	18%	Power Drive	Bias	Lug
7a&b	Firestone		Transteel	Radial	Rib
8a&b	Firestone		Long Hauler	Bias	Rib
9a&b	Firestone		Super All Traction	Bias	Lug
10a&b	Kelly-Springfield	6.5%	Registered Armor Trac	Bias	Rib
11a&b	Kelly-Springfield		Registered Drive Trac	Bias	Lug
12a&b	General	6.1%	GQT	Bias	Rib
13a&b	General		QCL	Bias	Lug
14a&b	Michelin	6.0%	XZA	Radial	Rib
15a&b	Michelin		XZZ	Radia1	Rib
16a&b	Uniroyal	5.2%	Fleetmaster Triple Tread	Bias	Rib
17a&b	Uniroyal		Fleetmaster Superlug	Bias	Lug
18a&b	B.F. Goodrich	5.0%	Extra Miler XL	Bias	Rib
19a&b	B.F. Goodrich		Traction Express Custom	Bias	Lug
20a&b	Sears	4.6%	Plus Mileage Rib	Bias	Rib
21a&b	Sears		Silent Trac	Bias	Lug
22a&b	Armstrong	4.5%	SD-200	Bias	Rib
24a&b	Dayton	28	Thorobred Premium ESD	Bias	Rib
26a&b	Reçan		Uniroyal Fleet Carrier	Bias	Rib

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TABLE 2

TRUCK TIRE TRACTION FORCE COEFFICIENTS ON CONCRETE CORRECTED FOR SURFACE WEAR

		T	Ļ	xs Sli	de		۲	xp PC	a)e		μ y	Peak Peak	lat (ra)
TIRE	TIRE	40	mph	55	mph	40	mph	55	mph	40	mph	55	mph
	1.0.	avg	S	avg	S	avg	S	avg	s	avg	s	avg	S
` \	2A	.245	.026	200	.010	. 362	.069	. 311	.054	. 381	.025	. 336	.000
T	2B	. 222	.031	.186	.019	.337	.021	.308	.016	. 376	.022	. 333	.019
	4A	.221	.018	.182	.012	. 325	.040	.290	.043	. 430	.028	. 385	.024
	4B	.211	.021	.187	.022	.308	.034	.261	.021	.404	.021	.369	.019
	5A	.264	.024	.211	.021	.347	.028	.303	.025	.371	.023	.325	.017
	5B	.247	.033	.208	.028	.343	.039	.304	.021	.392	.020	.343	.030
	8A	.222	.021	.186	.011	.324	.039	.282	.034	.362	.015	. 300	.022
B	8B	.232	.017	.194	.021	.332	.029	.272	.036	.352	.028	.301	.006
I	10A	.266	.011	.209	.012	.350	.029	. 305	.025	. 396	.018	.368	.015
A	10B	.266	.042	.224	.016	.362	.039	.317	.025	. 382	.022	.342	.021
S	12A	.201	.022	.161	.017	.276	.029	.232	.014	.397	.029	.386	.054
	12B	.218	.026	.173	.021	.292	.010	.245	.010	.404	.029	.375	.034
R	16A	.245	.037	.196	.017	.343	.038	.276	.030	. 382	.034	.350	.018
I	16B	.238	.024	.217	.018	.353	.043	.310	.040	.400	.025	.371	.012
В	18A	.250	.026	.200	.012	.347	.039	.272	.033	.381	.018	.342	.013
1	18B	.239	.025	.198	.016	.352	.045	.302	.030	.395	.024	.360	.020
	20A	.251	.021	.232	.012	.371	.028	.326	.022	.383	.024	.351	.020
	20B	.263	.021	.230	.015	.370	.043	. 326	.025	. 394	.019	.367	.029
	22A	.228	.013	.222	.027	.358	.029	.290	.041	. 393	.028	.342	.017
	22B	.253	.030	.221	.024	.354	.028	.292	.017	.382	.021	.305	.020
1	24A	.235	.022	.200	.024	.317	.028	.216	.024	. 347	.021	.304	.015
L	24B	.251	.032	.208	.021	.344	.023	.287	.011	.363	.019	.320	.016
	3A	.224	.033	.193	.032	.331	.030	.285	.019	.362	.015	.317	.026
T	3B	.231	.019	.204	.022	.330	.024	.295	.018	.363	.023	.299	.012
	6A	.229	.027	.203	.024	.301	.021	.285	.023	.365	.032	.316	.015
	6B	.204	.014	.185	.020	.293	.027	.266	.025	. 353	.024	. 329	.018
В	9A	.226	.012	.179	.024	.320	.036	.260	.044	.361	.022	.298	.023
I	9B	.233	.028	.196	.024	.322	.016	.297	.050	.371	.039	.328	.024
A	11A	.224	.026	.185	.026	.325	.028	.286	.039	.406	.026	.359	.027
S	11B	.214	.018	.202	.028	.335	.032	.291	.040	.415	.034	.374	.051
	13A	.176	.022	.127	.007	.224	.029	.176	.013	.318`	.023	.306	.085
L	13B	.167	.013	.138	.027	.224	.025	.216	.032	.316	.024	.274	.025
U	17A	.220	.026	.194	.018	.289	.029	.251	.013	.326	.040	.286	.021
G	17B	.245	.021	.195	.017	.328	.033	.291	.020	. 323	.056	.284	.018
	19A	.236	.018	.197	.024	.311	.026	.267	.020	.407	.045	.361	.021
	19B	.239	.012	.189	.022	.310	.029	.250	.018	.386	.035	. 323	.020
	21A	.248	.021	.211	.032	.345	.021	.309	.023	. 387	.013	.332	.024
Ŧ	21B	.238	.019	.208	.037	.315	.029	.282	.029	. 390	.013	.336	.029
	IA	.235	.015	.180	.012	.352	.037	.338	.055	.416	.026	. 392	.016
R	1B	.230	.032	.176	.022	.361	.035	.316	.033	.407	.022	.3/6	.012
A	7A 7-	.211	.023	.170	.015	.276	.041	.234	.043	. 391	.023	. 366	.024
D	/B	.212	.022	.167	.033	.290	.037	.240	.039	.361	.050	.314	.026
_	14A	.220	.014	.155	.010	.302	.039	.244	.026	. 395	.033	. 303	.009
R	148	.217	.017	.175	.010	.296	.037	.244	.019	.40/	.021	. 309	.030
I	15A 15B	.243	.019	.199	.023	. 329	.02/	.285	.027	.422	.041	. 37.0	030
<u></u>	262	.624	.031	.190	.010	. 311	.018	.202	.019	270	.030	- 410 260	.045
KE CIR	20A 26D	.104 171	.029 110	123	.013	•233 775	•024 ∩21	•174 916	030	222	.017	. 202	.015
CHE	2 U D	• - / -	• • • • •	• I J Z	• 0 4 4	. 4 3 3	.044	. 410	• • • • • •	•	• U T U	• • • • •	

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TABLE 3

TRUCK TIRE TRACTION FORCE COEFFICIENTS ON ASPHALT CORRECTED FOR SURFACE WEAR

TTPF	TTPF		μ _x	S			μ x	P			μ	מי	
TYPE	NO.	40	mph	55	mph	40	mph	55	mph	40	mph	55	mph
		avg	S	avg	S	avg	S	avg	s	avg	s	avg	s
Å	2A	.538	.026	.462	.024	.784	.023	.718	.036	.620	.023	.572	.033
Ť	2B	.481	.015	.417	.019	.745	.040	.684	.051	.651	.018	. 589	.021
	4A	.521	.024	.444	.033	.778	.032	.729	.030	.612	.018	.597	.023
	4 B	.506	.020	.462	.021	.738	.068	.770	.027	.620	.014	.586	.019
	5A	.612	.017	.461	.046	.779	.021	.682	.034	.666	.034	.620	.020
	5B	.507	.020	.487	.029	.769	.014	.692	.031	.631	.017	.611	.022
	8A	.474	.017	.421	.026	.674	.033	.604	.052	.613	.018	.554	.012
B	8B	.747	.040	.403	.026	.676	.025	.619	.034	.615	.021	.578	.030
I	10A	.500	.036	.465	.026	.745	.039	.684	.018	.655	.023	.624	.022
A	10B	.514	.015	.451	.047	.735	.022	.680	.048	.648	.018	.604	.031
S	12A	.552	.034	.445	.034	.784	.022	.726	.025	.657	.024	.611	.014
~	12B	.519	.026	.461	.034	.754	.026	.721	.042	.675	.008	.610	.031
R Ŧ	16A	.538	.026	.437	.021	.710	.054	.666	.036	.670	.020	.608	.018
' <i>1</i>	16B	.524	.022	.451	.042	.731	.027	.663	.012	.662	.019	.591	.015
B I	18A	.519	.030	.482	.036	.817	.055	.770	.020	.648	.027	.557	.018
	18B	.544	.044	.463	.037	.797	.047	.606	.040	.662	.032	.582	.014
	20A	.585	.008	.479	.017	.791	.012	.640	.021	.623	.016	.5/4	.008
	208	.5/6	.044	.453	.052	./42	.027	.633	.043	.604	.021	.548	.015
	22A 22P	.4/5	.032	.419	.014	.760	.031	.660	.03/	.5/3	.023	. 510	.013
	228	.4/1	.018	.411	.023	./28	.038	.042	.030	.055	.027	.009	.025
	24A 7/D	. 510	.015	.439	.0.31	•0/3 701	.030	.040 571	.030	.005	.010	611	004
+	24D 37	• 552 560	.010	.403 170	.020	-721 777	.031	.574	.017	.700	.025	581	.004
_ A	2P	556	.000	.4/3	.024	•/44 7/5	.031	.054	.024	681	.015	585	.012
	5D 64	461	025	416	.024	614	.020	587	.029	.642	.023	.633	.019
	6B	. 398	.082	. 405	.025	. 567	.046	.603	.029	.643	.021	. 599	.025
В	9A	.562	.022	. 437	.025	.697	.032	.657	.018	.688	.008	.663	.008
I	9B	.501	.059	.431	.008	.679	.031	.677	.021	.709	.014	.704	.008
A	11A	.471	.018	.403	.023	.610	.034	.590	.016	.710	.031	.649	.021
S	11B	.478	.016	.404	.018	.611	.027	. 586	.019	.678	.014	.635	.014
	13A	.458	.027	.402	.045	.642	.0.31	.611	.037			.587	.020
L	13B	.435	.025	.366	.023	.643	.043	.584	.022	.620	.019	.593	.012
U	17A	.423	.022	.401	.020	.555	.024	.581	.045	.622	.016	.557	.008
G	17B	.415	.016	: 396	.017	.535	.030	.590	.037	.579	.012	.538	.024
	19A	.540	.024	.443	.014	.720	.022	.641	.023	.636	.022	.518	.022
	19B	.483	.021	.431	.024	.670	.029	.622	.030	.660	.026	.582	.016
J	21A	.516	.025	.442	.012	.716	.020	.680	.017	.618	.013	.601	.010
T	21 B	.512	.016	.454	.029	.708	.056	.696	.012	.632	.021	.583	.022
•	la	.437	.031	. 387	.020	.730	.027	.681	.022	.604	.022	.582	.029
R	1B	.422	.022	. 393	.031	.722	.040	.657	.032	.585	.015	.573	.021
A	7A	.445	.026	. 393	.015	.694	.027	.631	.025	.613	.020	.563	.030
D	7B	.475	.020	.410	.027	.694	.031	.658	.024	.613	.010	.502	.020
n	14A	.473	.016	.419	.019	.713	.052	.679	.043	.640	.005	. 59/	.012
K T	14B	.474	.020	.410	.027	.646	.051	.604	.036	.661	.015	.613	.012
д Д	15A	.443	.020	.404	.019	.736	.014	.684	.053	.690	.013	.052	.029
	15B ·	.448	.023	. 390	.030	./4/	.014	./12	.031	./02 015	.052	.009 730	020
CID	26A 265	.505	.025	.424	.029	.847	.041	•/56	.024	.013	.024	./ JO	027
-MF	26B	.485	.018	.454	.026	.848	.032	.766	.03/	./80	.019	.070	.024

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NUMBER OF TIRES



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Histogram of the Test Sample Distribution for Peak Braking Force Coefficient $(\mu_{\rm Xp})$ at 55 MPH on Concrete and a Prediction of the Population Distribution

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Histogram of Test Sample Distribution for Locked Wheel Force Coefficient (μ_{XS}) at 55 MPH on Asphalt and a Prediction of the Population Distribution

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TABLE	4.	SAMPLE MEAN AND STANDARD DEVIATION
		FOR EACH TRACTION PROPERTY AT EACH
		SPEED AND SURFACE

Property Mean &	Aspha	lt	Concre	te
Standard Deviation	40 mph	55 mph	40 mph	55 mph
μ _{xs}	0.497	0.433	0.229	0.191
s	0.048	0.031	0.023	0.023
$\frac{1}{\mu}$ xn	0.716	0.660	0.320	0.276
S	0.065	0.053	0.037	0.036
μ _ν ν	0.652	0.602	0.381	0,339
S	0.048	0.045	0.027	0.034

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Comparison of Locked Wheel Braking Force Coefficient (μ_{xs}) for Truck Tire and Car Tire Populations on Concrete



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Fig. 29

Comparison of Locked Wheel Braking Force Coefficient (µ_{XS})for Truck Tire and Car Tire Populations on Asphalt

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Comparison of Peak Braking Force Coefficient $(\mu_{\mathbf{X}\mathbf{p}})$ for Truck Tire and Car Tire Populations on Asphalt



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TABLE 4.SAMPLE MEAN AND STANDARD DEVIATION
FOR EACH TRACTION PROPERTY AT EACH
SPEED AND SURFACE

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Property Mean &	Aspha	lt	Concre	te
Standard Deviation	40 mph	55 mph	40 mph	55 mph
μ _{xs}	0.497	0.433	0.229	0.191
S	0.048	0.031	0.023	0.023
μ _{xp}	0.716	0.660	0.320	0.276
ร์	0.065	0.053	0.037	0.036
μ _{vp}	0.652	0.602	0.381	0,339
S	0.048	0.045	0.027	0.034

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	ASPHALT		CONCRET	E
COMPARISON	40 mph	55 mph	40 mph	55 mph
μ. vs. μ xs xp	.563	.400	.876	.720
^v xs ^{vs.µ} yp	. 20	. 05	.005	.057
μ _{yp} vs.µ _{xp}	23	. 06	.405	. 285

TABLE 5. CORRELATION BETWEEN TRACTION PROPERTIES

Tire: Highway Tread 10-20/G (New) Rim: 20x7.50

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LATERAL SOURCE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Lateral 1	Force at	t Indica	ated Sl:	ip Angle	e (degs.)
(lbs.)	(psi)	1	2	4	8	12	16
	50	261	472	795	1099	1210	1304
1400	85	252	449	706	1027	1159	1342
	100	210	416	759	1120	1195	1152
	50	405	757	1323	1991	2291	2548
2800	85	444	771	1282	1945	2253	2613
	100	366	727	1356	2083	2294	2242
	50	451	859	1562	2510	3033	3459
4200	85	536	991	1708	2666	3171	3725
	100	479	958	1809	2859	3247	3275
	50	447	861	1630	2768	3471	4043
5430	85	589	1117	1966	3147	3833	4520
	100	552	1102	2068	3374	3932	4034
	50	427	833	1572	2848	3733	4447
6700	85	605	1171	2136	3533	4377	5197
	100	603	1182	2257	3747	4494	4710
	50	414	806	1507	2806	3825	4609
100	85	611	1193	2233	3813	4838	5785
	100	631	1244	2325	4000	4967	5353
	50	405	790	1433	2672	3803	4500
9200	85	611	1189	2217	3927		
	100	640	1258	2229	4083	5070	

ALIGNING TORQUE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Aligning	Torque	at Indi	cated	Slip Ang	le (degs.
Load (lbs.)	Pressure (psi)	l	_2	4	8	12	16
1400	50	21	36	41	18	3	2
	85	21	32	35	21	7	1
	100	17	29	40	30	8	0
2800	50	58	100	134	101	55	27
	85	56	89	104	82	45	25
	100	42	79	119	97	45	11
4200	50	92	166	246	2 23]45	93
	85	91	150	196	174	113	72
	100	72	137	2 1 7	203	112	49
430	50	124	223	350	350	258	183
	85	118	200	278	272	186	131
	100	97	188	302	313	191	88

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ALIGNING TORQUE vs SLIP ANGLE AND VERTICAL LOAD (Continued)

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Vertical	Inflation	Aligning	Torque	at Indi	cated S	Slip Ang	le (deg	s.
Load (lbs.)	Pressure (psi)	1	2	4	8	12	1 0	
	50	161	283	451	522	407	310	
6700	85	1 48	253	365	383	278	208	
	100	120	234	403	443	289	143	
	50	183	342	561	715	606	406	
8100	85	180	311	463	515	406	311	
	100	146	295	471	595	418	222	
	50	209	395	647	868	768		
920 0	85	205	353	537	L32			
-	100	168	3 35	594	727	468		

CIRCUMFERENTIAL STIFFNESS vs SLIP ANGLE AND NORMAL LOAD

Vertical	Inflation	Cs(lbs.)	Vertical
Load	Pressure		Spring Rate
(lbs.)	(psi)		(lbs./in.)
5430	50 85 100	50,000	2857 4363 5532

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LATERAL FORCE (LB',) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

184	LOAD	9	1+	.	+2	4 2	. 7+	4-	48	8) #	+12	-12	+16	•16
8.89	2000,0	•22.6	-331.4	298.9	-616.2	576.5	-1046.6	999,5	•1493 •8	1375.0	•1598.B	1572.7	•1713.1	1644.8
8.9	4400.0	•12.Ś	-576.4	550.5	-1101.0	1058.0	=1947 . 3	1878.1	-2710.1	2673.2	• 2919.5	2878.1	•3054.1	2958.6
0.00	6900.0	13.6	-652.9	642.6	•1284.1	1250.9	.2391.0	2314.7	-3453,5	3380,4	•3835.7	3787.6	-4020.5	3922 J
00.0	8099.8	19.7	-664.2	652,6	-1267.7	1281.6	-2480.4	2435,8	•3842,2	3777.5	-4499 . b	a473,4	-4798.5	4780.1
15,8	4000.0	• 1 •	-600.3	568.4	•1128.0	1071.4	-2012.6	1928.3	-2782.1	2666,3			-3179.0	3102.5
15.0	6000°0	14.7	-687.3	689.6	-1202.4	1200.7	•2280,8	2228.1	=3419°S	3280.9			-4145.2	4082.0
58.8	0.0004	3.0	544.9	541.3	•1025.9	1060.9	1924.0	1863.8	-2627.8	2591,0			•3131.0	2937.0
50.0	6000.0	15.9		562.1	-1007.7	1050.0	-1941.7	1921.7	.3083.8	2966.3	-		-4826.2	3955°2

•35.9 •60°3 -32.7 -145.3 -33,6 -111.5 - 6.3 -135.7 • - -99.9 27.9 136.7 73.5 130.7 29.3 41.9 0.7 •=• -26.6 -02.5 •167.B =309.4 21-166.1 297.5 76.7 20.1 +12 ***319.2** -366.4 -200.6 -429.8 -36.2 164.4 -538,7 -168.7 8 545,9 32549 47.5 169.2 178.6 438.9 376,7 192.1 **8** + -78.0 -686.4 514.1 . -518.3 -340.4 • 605.0 -257.0 -471.7 -283.2 7= 341.6 467.3 682.5 285.1 606.5 64.4 252.3 7+ •272•0 -58.8 -317.3 -442.5 -361,5 -427.5 -189.3 -214.8 Ŷ 315,9 436.8 271.3 187.0 410.5 54.0 212.9 350.5 ₽ + -180.2 . -236.8 -37.4 -113.3 -124.4 -202.4 -155,9 -242.5 7 104.6 37,4 229.6 121.1 145.3 204.6 174.5 187,8 ...+ -7.9 -4.5 -2,2 -2.2 -3.4 -6.3 -16.9 -1.1 0 2000.0 4000.0 6430.0 6000.0 4000.0 6636.0 4000.0 6000.0 LOAD 50.0 50.8 999.691 100.8 100.0 0°00| 75.9 75,8 1 S J

ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND STEER ANGLE (DEG.)

18

X ROUTE I 11.00R20 H UNIROYA -226-
MICHELL VOIAL 11.00R20 H

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND BTEER ANGLE (DEG.)

							1	•	2			
8.	1.1.	-321.9	276.9	-569.2	531.1	-988.6	936.2	1540.1	1479.5	-1768 <u>.</u> P	1691.0 .1911	8 1797.7
	6 . Ż	-581.8	589.4	-1683.8	1084.9	.1913.4	1833.8	•2889.0	2603,2	.3318.0	3238.8 -3533	8 3415.6
8.9	19.5	-743.3	798.7	-1455.7	1464.3	-2630.1	2542.0	•3951.P	3859.2	-4475,8	4368,0 -4715	A 4615,3
0 ° 40	20.5	-823,8	A75.8	-1688.9	1668.0	-3113°8	3016.6	.4692.0	4640.4	-5399.0	5293,0 -5668	0 5587.4
0 ° 0	7.2	-612.8	645.9	-1206.3	1181.3	-2040.6	1998.1	-2805.6	2603.7		-3458	2 3868,8
8.8	29.7	-734.1	784.4	-1478.7	1500.7		2632,0	*3723,4	3617.0		1958-	9 4146.8
0 0 ,0	10.3	-687.6	647.4	*1231.3	1226.9	-2062.3	2015.3	+2733,5	2622.7		-3195	1 3202.7
8.9	21.1	•672.6	708.1	-1394.7	1392.3	-2582.9	2511.0	-3449.4	3437.8		-4242	0 4291.2

ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (P31), LDAD (LB.), AND STEER ANGLE (DEG.)

20

-16		-40.3	-106.9	-185,9	•26,8	-122.1	-19.5	1°66=
÷16	0, 5	48.8	116.9	187.0	39.9	119.8	47.6	142.7
21.	-27.4	-94°6	-202.7	-343,6	-		-	
+12	12.3	1 44.8	227.1	364.0				
•	- 39,9	-147.5	-299,2	475.5	.121.8	-273,7	-133,3	-302.6
8	4 . 4	164.2	321,5	195.5	139.6	294.6	167.1	358.1
7-	-53.6	•170.8	•326.4	504.9	-186.0	•359,5	-206.6	1.010-
7+	54.8	175.6	331,8	510,8	184.7		198.5	394.0
2 -	-43.3	-131.6	-234.4	-350.6	-161,0	-289.3	-196.7	-348,7
N +	40.6	124.0	223,2	327,3	150.7	266.6	182.2	514.8
	-26.1	-80.1	= 1 39 . 8.	-202.3	-103.1	-176.8	•125,5	-212.3
	-23,8	71.2	123,5	178.2	81.4	136.5	96.1	155.1
G .	-3.6	8.8.	-13.0	-16.8	-11.0	-20.9	-17.4	- 38.9
1040	2000.0	4000.0	6000.0	0.9990	4888.8	6060.6	4040.0	6 8 8 8 8
184	100.0	100.0	100.0	100.0	15.0	75.0	50,0	50,0

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_		** A=D FILE 124	W FILE	64% TEST SAMPLE179	
•	AVERAGE OF FILE 124	FOR 5 RECORDS.	MICHELIN X	, 114-20 (DAVA)	
SLIP	ХЛМ	TORAUE	FX		
6.00	9° 88	0.3	0 • U		
59.8	9.19	29133.3	1384.4		
6° 64	0.37	56237.6	2629.3		•
. 6 . 56	67.0	4.01947	3489.1		•
K. 88	0.57	8874A.9	4673.8	•	
0.10	0.65	97423.3	4419.4		•
0.12	24.66	104141.3	46A4.3		
0.14	C . 6B	108947.4	4816.2		
0.16	Q.69	112541.2	4 R R 4 . 4		
0.13	6.78	115414.4	4914.2	TQAV = 63750,0 LOAD	= 7102.1 VEL = 40.0
8.23	A. 76	117461.4	49194		
0.25	9°70	121741.3	4860.3	MUPEAK # 0.70 MULOCK	# 0.44 RATIO # 1.58
0.30	A.69	125454.6	4793.1		•
0.55	3.68	128755.2	4713.4		
61.9	2.67	131016.5	4621.2		-
6.45	P. 66	134901.6	4512.0		
0.52	11.64	137929.4	43A9 ,9	•	
11 5 5	· P.62	140247.7	4263.4		
1. 63	0.51	141387.7	4136.7		
6.65	a, 59	136625.7	4019.3		
6.70	n. 57	129316.2	39.01.7	•	
0.75	n , 56	A.4 16411	3169.7		
1.83	<i>к</i> - 53	140246.5	3624.6		•
6.45	: . 51	935346	3441.9		
59 ° 13	67.4	R2413.4	338.6		
56°0	10.4	72207.3	3195.6		
1 . UN	2. 4 th	637511.3	3054.0		

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		** A-D FILE 125	Th FILE	65, ,,	TEST SAMPLE171 **	r' i
	AVERAGE OF FILE 1	25 FOR 1 RECORDS.	MTCHELIN X	1 1 H-20	(DAVA)	
SLIP	ХЛМ	TORAUE	FX			
8.99	0 ° 4	8 8	3 ° 6			
6.22	r.11	19901.7	432.4			
4.04	4.22	26165.A	875.3			
9·2•N	R.34	3.066.1	1319.8		•	•
6 • F 8	9-44	39924 . 9	1725.3			
6.10	0 - 53	46814.7	2458.2			• .
6.12	a . 59	53443.2	2349.1			
0.14	0,64	59251.7	2513.6	·		
6.16	P. 6B	64341.3	2454.8			
6.10	. 71	69362°9	2774.5	TOAV =	49875.0 LOAD # 39A2.0 VEL	
6.20	п.73	71723.2	2851.4			
6.25	P. 75	74475.6	2975 . 0	MUPEAK	# 0.60 MULDCK # 0.60 RATIO	= 1,54
r. 30	ن [•] 18	84751。2	342.7			
ť, 35	Ø. A 5	1.9179.1	1,22,18			
62.5	R - A B	96226.8	312A.6			
2.45	61.9	102301.5	3191.2			
1.59	A . 7 B	103031.5	3042.0		•	
6.55	6.77	17182A.7	3467.6		· · · · · · · · · · · · · · · · · · ·	
4.64	W . 75	97836.2	3.5495			
P. • 5	а. 73	0°10126	2470.9			
aL • 2	0.71	4.11948	8.1075			
n . 75	1.2.1	174626	714.1		•	
8.67	5 - 5 5	64A72.A	2654.1			
P.65	ن • 4 ف	626N9 . 9	5,546,5			
30°3	5 - 7 5	57414.4	2545.9			
e. 35	د ب • بن	د در در د	1.2515			
•	- 4 • •	110 F 75 .	رد م و م			

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		** 4-0 FILE 126	NEW FILF	44	IEST SAMPLE	E172		
	AVERAGE OF FILE 126	FOR 5 RECORDS.	MICHELIN X	114-20	(0440)			
SLIP	XIIF	TOKQUE	F X					
5.0	A. AD	5 ° c	8° 8					
6.92	6.10	22313.A	1119.6					
4. A4	a. 32	6°522111	2273.1					
N - E 6	P. 45	66941.9	3205.3					
6 • 1: B	0°55	82181.4	3974 B					
4.15	4. h.2	93140.6	4489.9					
0.12	3.65	131393.6	4754.0					
3.14	13 ° 4	107155.9	49A4 5	•				
8.16	P.72	111312.8	5137.0					
1 ° 1	t1 - 74	114607.6	5241.6	10AV = 71	7000.0 LI	0AD = 7214,	5 VFL = 20.0	Нан
J. 2.3	n. 74	117079.9	5298.0					
32 8	и . 75	122314.8	5352 A	MUPEAK # 1	4.76 MULO	0CK # 6,54	4ATIO = 1.40	
u•30	P. 76	127149.7	5543.3					
4.35	3,75	131891.8	5334.5					
311 * ដា	v.75	136174.5	5269.0					
6 u 5	0.74	1 59340 A	5181.5					
C.54	й . 72	116071°A	5085 .3					
9.55	2.71	139662。0	A.4441					
64.3	0 - 7 3	1 55406.1	1477.7					
4•65	3 6 6 B	124574.2	4759.0	•			•••	
a.7 a	6 6 6	121911.3	4615.9					
4.75	7 Y *	113164.6	1.1444 .					
4 ° Y	5 + 5	1.05026.5	4315.0					
5 d • J		97424.6	4175.6					
5 ° C	6 . 5 H	1,120,3	4439.6					
50°C	11 - 5 fs	A3242.4	6 • 1 + 6 3					
1 • C 1	2 2 2	0.00017	57A3.U					

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												. HQ1	•																
d ^{er}	.					•		•	-			VEL = 40.0		TIO = 1.72															
HPLE173 #4	(M M											LOAD = 7230.9		MULOCK # 0.45 PA									×						
el TEST SA	118-20 (DA											TQAV = 65354.2		MUPEAK = 0.77				,	-				•						
NEW FILE	MICHELIN X	X	6 • 3	1376.3	7.9425	3532.9	4250.5	4742.2	5061.0	5258.1	5374.1	5435.6	5443.5	5399.8	5304.2	5197.4	5073.8	4932.3	4717.0	4689.2	9.99.4	11278.8	4114.3	3941.8	149.1	1.99.4	3440.3	5246 . F	51 55 6
** A-D FILE 127	7 FOR 6 RECORDS.	TARGUE	۳. ۲	28642.9	54684 . 7	75481.0	9138A.7	192717.2	114659.6	116233.1	122389.4	123551.3	125977.2	132574.2	134604.1	134086.1	141202.1	144189.9	146897.5	1 4444.9	147926.1	1 a 3059 a	134755.2	123274.2	9 . 0 . 1 . 0	1911130	R3615.6	137.01.1	5,010,544
-	AVFRAGE OF FILE 12	XIIH	(3 U ° U	0 .1 8	£ * 35	6.19	9.59	0.67	P.71	4.74	P. 76	. 0.77	a.71	0.77	n.76	0° 74	12° u	2.70	4.68	5 7 5	7.63	LA.D	1°53	0.57		دی	611 ° L	° , 17	۰ <i>د</i> ز کا
		d1 15	J.3 • 17	6.62	0.84	4.85	6° C A	9.1.4	0.12	4.14	7.16	91.0	0 - 2 h	P.25	6.30	6.35	6.6	24 °	6.53	Ø.55	× • • 5	0° 65	7.4	9.15	े . इ.स. • स	P. F5	9• 9·	រ ប្រ ្	•
														4	45	76)												



TEST SAMPLE174 **	(DANA)											AV = 184541.7 LOAD = 18614.4 VFL =		PEAK # 0.72 MULOCM # 0.50 RATIO # 1														
IEW FILE 68	MJCHFLIN X 118-2	۲ ۲	ن• ق	1177.1	798.7	4541.8	5447.6	4247.4	4171.9	7107.7	7313.1	743%,7 76	7440.2	751:1.5 MI	74A4 . W	7421.9	7321.0	1.4017	7435.6	5854 . 5	6444° • 3	4514.3	6°0254	0.125.0	5924.7	5752.1	6,2 n,4,5	
** A=D FILE 12R	B FOR & RECORDS.	TORQUE	5° 5	22773.4	57445.5	ŖA974。Ģ	112843.3	129207.2	140246.6	147596.A	152533.2	156319.9	1587 <i>MP</i> . A	153785。1	166758.2	16943.8	172747.8	174Au5.9	175351.7	973453.9	164953.4	1,5353,7	154952.7	7.54501	135396.6	176818.7	11APA.7	
	AVERAGE OF FILE 121	XIIH	30 ° 0	0.11	r.26	9.46	N. 51	û. 59	A. 54	A. h7	69°0	0.71	0.71	۹.72	G.72	0.71	u.7U	69°u	9 ° 48	09.	465 €	2.63	1×*0	9 °5 0	1.5.7	53° U	2 ° °	
		SI 1P	5 B S	c	6.64	6.36	6. C A	61 ° J	6.12	n.14	6.16	0.18	0.23	7.25	6.32	и . 35	6.40	6.uS	(. • 5،	a, 55	9.64	2°+2	01.0	2.15	r. 8 . 1	9 . 85	1.6°.	

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TEST SAMPLETTS AN	LIN X 11H-20 (DANA)		S.	÷.	5	-	• 3		5.		C,	.8 TGAV = 39375,8 LOAD = 3641,8 VEL = 48.P	£	.1 MUPEAK # 0, AR MULOCK # 1,50 RATIO # 1,59		S.	°		5.	S.	5	- 7	.	• 3		2 •	ſ,		
** 4-0 FILE 124	FOR 4 RECORDS. MICHEL	TORQUE	(1°)	14163.1 596.0	27225.9 1125.0	39a12.3 1578.	48821°4 1944	56524.2 2221.1	62657 . 8 2429,	67967.1 P598.	72294.5 2712.	76117.2 2791.	79379.2 2H37.	R6458.4 2A92.	92934 5 2913.	96497 . 9	1044866 2678°	109673.4 2A34.	113929.9 2766.	116461.7 7691.	115457.4 2647.	111349.7	1143371.A 24414.	92336.4 P336.4	79279.1	56476.1 2134.	 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21 -	- 64748 C 64748	
	AVERAGE OF FILE 129	XUM	5 ° 5 6	G. 16	u•31	F . 13	9°54	0.A1	r.h7	0.72	۵• 75	G.77	и.78	0 . A ()	6 B A	1) H B	P. 79	R. 78	P. 76	2 • 7 4	٩.72	9.7%	r . k 7	59°J	P.62	9-5-9	5 . 5	ע ע ע	
		SLIP	88° 8	8.62	5° 84	3.44	6.08	2.10	9.12	0.14	M. 16	6.18	F. 20	e. 25	5. JA	Ũ. 35	8 - 28	£**0	U •50	% 55	2.69	N • 65	N.7C	£.15	5. HP		****	1.95	•

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Net R1E 13 Le F1E 30 Le F1E 30 <thle 30<="" f1e="" th=""> <thle 30<="" f1e="" th=""> <th< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>·_•</th><th></th><th></th><th>•</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>- :</th><th>24</th><th>l</th></th<></thle></thle>													·_•			•												- :	24	l
Network FILE CAL FILE Mat Test JuneLTIA Conva 610 101 108016 FX 110-26 Conva 640 6.60 108016 FX 110-26 Conva 640 6.60 108016 FX 110-26 Conva 640 9.40 108012 250-61 1115 Conva 640 9.40 108012 250-61 1155-6 Conva 640 0.416 1155-6 250-61 1155-6 250-61 640 0.416 1157-6 253-61 155-61 253-61 641 0.43 247-2 253-62 475-2 247-61 1244-6 641 0.41 1110-6 753-62 475-2 252-62 475-2 641 0.41 1110-6 155-62 247-6 1044-6 733-64 641 0.41 1110-64 1110-64 527-22 247-4 474-6 474-6	,	8 .											VEL = 40.0 MPI	•	RATIO = 1.68					••••		·			-					
••• A-D FILE 2.0 FILE 2.0 3L1P HUX 10000E FX 114-20 3L1P HUX 10000E FX 114-20 3L1P HUX 10000E FX 114-20 3L1P B.PU B.PU 25306.1 1175.6 114-20 2.0.2 P.16 Z5306.1 1175.6 2533.6 114-20 2.0.2 P.19 Z5306.1 1175.6 2533.6 104 2.0.10 D.19 Z5306.1 1175.6 2533.6 104 2.0.11 D.1000.2 S315.2 2494.9 104 104 2.11 U.11000.2 S153.6 5494.9 104 104 2.11 U.11000.2 S135.6 S147.4 S177.4 104 2.11 U.11000.2 S171.4 S177.4 S149.4 104 2.11 U.11000.2 S149.4 S149.4 104 104 2.11 U.11000.2 S115.4 <	TEST SAMPLEI76 AA	(DAWA)											V = 68083.3 LOAD = 7238.9		EAK # 0.77 MULOCK # 0.46	· · ·														
************************************	EN FILE 320	MICHELIN X 114-20	FX	0 • U	1175.6	2533.6	3552.3	8-2724	4752.7	5466.2	5272.2	5474.9	5479.4 TOA	5499.H	5477.4 MUP	5474°N	5335.6	5226.8	5096.9	4945 . 0	4777.7	4411.2	1.171.1	u290.5	4118.9	3435.6	3796.5	35.A6 . A	5-4-16 B	
AVENAGE OF FILE 1 SLIP P. CO P. CO	** A=U FILE 130	30 FCP & RECORDS.	TORAUE	8°8	25766.1	54449.7	76384.0	92315°3	193932.2	111044.2	117698.7	122158.4	125718.5	128464.3	133818.9	138277.7	142062.9	1 45497 . 1	148752.0	151563.3	152428.6	151398.2	146629.7	1 3h64P .	12716524	113297.9	941 14° 4	87400.6	<. 1004T	
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		AVERAGE OF FILE 13	XUM	6 ° 6 '	۲ ۰ ۱۵	£.35	3.49	£.59	2.66	2.71	Q.74	0.16	۰ ۵.77	A.77	12°1	ئ• 16	A.75	P. 74	0.72	ت• 2 ج	Q. A.A	G • 55	r.63	r. h l	\$\$°	95° u	1.53	15.5	€2.*2 ● 1	
		,	SLIP	មិំ មិ	5° °3	9 ° 6 4	8° ° 6	R. 9.	5°10	č1•3	01.4	0 .16	0.1A	5.2.4	e.25	5.33	fi. 35	37° d	8++B	05-50	û, 55	و. • به ن	ù . 65	0.70	P. 75	58°5	C . h 5	5 6 • 5	7 t • 1	

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4PLE177 +4												LOAD = 10931.8 VEL = 40.0 MPH.	•	MULOCK = 0.39 RATIO = 1.75								•		•					
L. TEST 3A	18-20 (DA							- -				TUAV = 85812.5		MUPEAK # 0.68															
EW FILE 7	MICHELIN X 1	FX	ن • خ	2377.3	1192.7	5 \$ 7 4 • 5	6145.9	6674.4	6949 . 8	1.174.1	7146.0	7162.7	7139.0	74:14.6	6867 . 9	6718.3	6573.N	4425 . 4	6268.5	6195.4	5906 .5	5/10.9	5514.6	5318.3	51.16.4	4672.8	1634.5	4 \$ 9 5 . 8	4] 46.9
** A=D FILE 134	34 FOR 4 RECORDS.	TORRUE	es • 2	54607.4	87214.1	111560.9	127580.4	137905.3	144696.1	149188.1	152349.2	154361.8	155333.9 -	157474.5	159249。R	164364.8	161844.1	161519.2	161970.5	162444.7	162173.6	160272.9	155993.2	1470140	1 3n:43.A	122390.0	149567.0	97845.8	A5A12 . 5
	AVERAGE OF FILE 13	+UX	3.5	ו22	s . 39	1.54	4: 5 8	F. 6 S	a.65	7.67	r • 68	6 6 8	e • 68	9°67	3•65	9•64	54 ° 5	ن• ۴ 1	ю . 59	85°	û•56	9-54	61 - 5 2	6 - 54	8 t/ " r	4 ° 7 ¢	n • 4 3	1 1 °	5 2 • 4
		SLIP	64 ° 11	4° 05	6°69	ð1 J	4. ° A	R.1A	6.12	A. 14	e.16	A.18	5.27	4.25	U.3A	0.35	67°3	و . د ج	×.52	5°°0	Ũ. 69	4.65	91 °C	v. 75	т Ц •	P. 85	16.3	50°5	

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		** A-D FILE 135	+ FILE	TP TEST SAMPLEITS AN
	AVERAGE OF FILE	135 FOR 5 RECORDS.	MICHELIN X	114-20 (DANA)
SLIP	X(IH	1 OR DIJE	F X	
6.99	0 P	2°2	9 ° N	
8.62	9.24	23271.6	946.6	
0,04	6 ° 7 ()	38428.0	1556.6	•
60.00	u.53	4412.8	2030.H	
0.29	A 63	58602.7	2442.5	•
R.1A	9 ° 741	66234 . R	2679.Å	
0.12	4° 16	72474.6	2872.4	· · ·
0.14	0.79	77411.1	3 EA 1 . 5	
e.16	A. A2	A1309.3	30A6.7	
0.1A	6.83	844H9 4	3139.6	. TGAV # 39800.0 LOAD # 3829.0 VEL # 55.
8.29	19 ° U	87451.8	3158.7	
3-25	7.84	92834.3	3145.1	MUPEAK # 0.64 MULOCK # 6.49 RATIO # 1.72
e. 30	A. A.S	98273.3	3498.5	
e. 35	P.B1	103349.4	3030.7	· · · · · · · · · · · · · · · · · · ·
67°8	6°10	147953.9	295582	•
6.45	n.77	112278.2	2881.6	
e.5a	G. 75	114349.5	2846.3	•
£3 • 3	0.73	124246.2	2122.7	
9 ° U	a - 70	122695.4	2633.A	· ·
¥.65	0 6 A	121763.7	8,412	
0.70	4 • 6 S	117622.3	2461.4	
P.75	2 Y Y	1 7 3 4 5	2341.5	
n∺•1	19.1	5.04 S	5292.0	
0.95	R.50	76479.6	5192.5	
16 ° 1	35°°	61658.1	:1 • MOME	
56.95	5، •	44154.7	1374.1	
3 • C· I •	5 g, • a	39AC:11	7.1.4	-

LOAD = 3829.0 VEL = 55.0 MPH.

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17 3AMPLE179 4+	(DAWA)	•	-									75,8 LOAD # 7382,8 VEL # 48,8 MPH'	•	'S MULOCK = 0.46 RATIO = 1.64						•	•					•	-		-
E 33 TES	118-20			•							•	TGAV = 6667		MUPEAK # 0.7				•									·		
Zer FILE	MICHELIN X	×	61 e 61	1657.5	2917.4	3759.9	4350.4	4747.6	5409.1	5182.8	5297.1	5376.1	5383.3	5343.6	5273.8	51A8.9	5092.7	49A2 . 9	4854.3	4710.1	4557.7	4405.7	1257.3	4,199 . 8	1933.3	3772.A	3619.4	3468.4	2 114 5
** A-D FTLE 136	FOR 5 RECORDS.	TORQUE	۲. ۲	35950.3	61657.3	79677.9	926.04.1	182149.7	1,9114.7	114160.1	117958.7	121030.1	123444.1	128444.9	132744.2	136359.9	139629.0	142554 . 0	145045.2	140675.4	146749.7	143377.0	1 55 7 53.7	124997 A	111948.1	9A 379.1	87290.4	77436.8	60875 S
	AVERAGE OF FILE 136	жUж	8.6D	0.22	946	A.51	G • 6 Ø	3.66	69.9	9.72	ن• 14	0.75	A . 75	e 75	مة 7 ط	Q.73	r. 71	P.73	R . 68	3.66	5.44	4.61	r. - 59	u, 57	P.55	N . 52	5.53	P 4 5	
-		SLIP	ଅ ଟ • ସ	6.42	0.04	0.66	83.0	6.10	0.12	4.14	0.16	0.15	6.27	6.25	0.3A	e. 35	0° 4 9	20.9	ie . 5 P	2+55	N•6A	e. 65	· 4° 4 :	A. 75	0 • B •	0.85	6°0	20°3	ده ۲ ۳

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												VEL = 55		ATIO = 1.6														
EST SAMPLEISO AA	(DANA)										•	225.0 LOAD = 7353.8		-79 HULOCK = 0,47 R														
11 af	118-20		,									T0AV = 712		MUPEAK # 0								•						
NEW FILE	MICHELIN X	F	ن ^ه ون	1449.5	2896.9	3874.2	4553.8	5M38.1	5313.7	5512.4	5623.8	\$P.62.4	562A.8	55a9 . 8	5307.8	52612	5125.3	47R6.9	4849.6	5.1174	9-5721	4432.6	1292.6	4147.4	39914 3	3428.1	367Å.9	
** A=D FILE 137	FOR 5 RECORDS.	TOROUE	2°5	31850.9	61253.1	A2128.4	96989.9	197637.4	115197.2	129384.2	123894。0	126481.2	128356.8	131587.6	134364.6	137114.5	139928.9	142719.2	145350.9	14776.1	144527.8	8.171441	1.511201	136963.7	124296.8	1 49045 . 6	15241.6	
	IVERAGE OF FILE 137	XUM	3° 90	9 . 24	ę. 39	P.53	0.63	2.49	P.74	e , 11	P. 78	u, 79	a.78	2.77	<i>е</i> , 75	P.73	u.71	9.69	4°67	4 ¢ ¢	3.64	5 4 5	9 . 63	7 .5 8	4 . 56	7.54	15°;	
	•	SLIP	0.40	6.42	9.24	0.36	6.68	e.13	2.12	0.1¢	2.16	Ø.1A	0.24	0,25	e.30	Ø.35	5.40	0,45	۶° 3 °	P.55	g.69	e. 55	3.70	4.75	5 8 ° 1	0.85	r.6 ° J	

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SAMPLE182 BA	(DAVA)	2	-									.0 LOAU # 7528.4 VEL # 40.0 MPN.		MULOCK # 0.45 RATIO = 1.68															
TEST	- 20											10AV # 68675	•	"UPEAK # 0.76				•	•				•						
15.	118-										•	-		L															
+ FILE	MICHELIN X	×L	ن • ب	1652.9	2964.7	3869.9	4516.5	4914.6	5222.2	53A4.4	5476.8	5513.0	5546.7	5446.9	5361.6	5253.8	5130.8	5090.2	4863.9	4721.4	4576.5	1433.6	4287.4	4130.7	395,4 . 6	3789.4	3627.4	3471.9	3425.5
** A=D F1LF 139	FOR 5 RECORDS.	TOROUE	5° 5	3#729 . 9	62446.A	41455.7	95230.2	1.505.1	1122/3.5	117436.2	121386.3	124145.9	126642.3	138663.9	133764 . A	136686.5	139263.2	141343.6	143448.5	143885.9	142942.8	139688.2	1331 15.4	123787.7	112147.8	£ "960mil	88852 . 4	7n31.A。4	68675 . U
	AVERAGE OF FILE 139	ХЛН	6.9U	n.22	8° 2%	4.52	4.61	U.67	a.71	P. 74	R. 75	0°,75	A . 76	A. 75	0.74	Q.72	P. 71	64°8	74.67	R. 65	7.63	n.61	r.59	12.9		0 5 S	6 11 0	1+ n7	9.45
		5L JP	6.23	6 . U Z	4 S . G	9 Z • 2	8.48	0.10	6.12	9.14	£.16	W. 1A	6.21	¥. 25	9.30	6.35	11.45	U. 45	4°54	8°55	N . 61	U. 65	9,70	4.75	6.84	45 45	20.5	£6°3	1.1.

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Fig. 2 - Measured mechanical properties of three different tires. A-11.00-22/G; B-12.00-20/G; C-15-22.5/H

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profile become very pronounced, especially in the sidewall area, and cause a reduction in spring rate. It should be noted that the maximum value of lateral spring rate occurs near the esign load for each tire tested.

The vertical load-deflection data are remarkably linear for a broad range of tire loads (Fig. 1). Fig. 1 suggests that it is reasonable to consider the tire as a linear vertical spring with spring rate, K₇, defined as the average slope of the loaddeflection plot.

INFLATION PRESSURE

Increasing inflation pressure reverses the deformation caused by vertical load. Although a decrease in contact length accompanies an increase in inflation pressure, the dominant effects of increased pressure are reduced curvature in the sidewall and a generally stiffened carcass structure. The net result is a lateral spring rate that increases with inflation pressure, as is demonstrated by Fig. 4; these data being obtained on the three tires shown in Figs. 2A-2C. As may be expected, the effect of increasing the pressure is more pronounced at the

higher loads which cause large distortions in the meridian profile.

The cornering stiffness, C_{α} , exhibits similar pressure sensitivity at higher vertical loads. Fig. 5 compares the lateral force versus slip angle and vertical load exhibited by a 10.00-20/G tire (Fig. 6B) at rated inflation pressure (100 psi) and at 50 psi. As can be anticipated from lateral spring rate behavior measured for these three different tires (Fig. 4), cornering stiffness increases with inflation pressure at higher loads.

The apparent similarity between K_v and C_{α} is due to the definition of K_v as the lateral stiffness of a standing tire measured at, effectively, a 0 deg slip angle while C_{α} is defined to measure the stiffness of the rolling tire in generating lateral force at very small slip angles. However, the contact region deformation associated with tire traction is considerably more complicated than the deformation associated with the measurement of K_v . As no rational basis exists for the correlation of these values, they are treated as independent mechanical properties.



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Fig. 3 - Variation of mechanical properties with tire load for tires shown in Figs. 2A-2C. A-camber stiffness versus tire load; B-cornering stiffness versus tire load; C-circumferential stiffness versus tire load; D-lateral spring rate versus tire load

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loads, the tire behaves (laterally) like a softening spring. The lateral spring rate is the slope through the origin of the lateral load-deflection curve.

TRACTION STIFFNESS $(C_{\alpha}, C_{\gamma}, C_s)$ - The following three properties are defined to characterize the mechanical behavior of a rolling tire operated at very small slip and camber angles and for very light application of braking or driving power.

Cornering Stiffness

$$C_{\alpha} = \frac{dF_{y}}{d\alpha} \bigg|_{\alpha = 0}$$
(1)

Camber Stiffness

$$C_{\gamma} = \frac{dF_{y}}{d\gamma} \bigg|_{\gamma = 0}$$
(2)

Circumferential Stiffness

$$C_{s} = \frac{dF_{x}}{ds} \bigg|_{s=0}$$
(3)

where:

 α = slip angle

 γ = camber angle

s = circumferential slip parameter



Fig. 1 - Vertical load versus change in low-speed rolling height of tires shown in Figs. 2A-2C

= 1 locked wheel

$$s \neq 0$$
 free rolling (light braking: $s < 0$ driving

 F_x = longitudinal traction force (depends primarily on s)

0.05)

 F_y = lateral traction force (depends on both α and γ)

Graphically, the traction stiffness is the slope taken through the origin of the traction force $(F_x \text{ or } F_y)$ versus a particular operating variable $(\alpha, \gamma, \text{ or s})$ curve. These stiffnesses measure the initial rise of traction force and have no direct relation to peak values. However, a tire with higher traction stiffness will usually develop higher peak traction force. The usefulness of these definitions depends on linear behavior for small values of the operating variables. Examination of the following truck tire data will show this linearity to be a reasonable assumption.

GENERAL BEHAVIOR

Figs. 2A-2C describe three truck tires chosen to exhibit a broad range of traction stiffness properties^{*}. The mechanical properties listed below each tire were measured at rated load and pressure. The carpet plots of lateral force versus slip angle and vertical load show the variation in lateral force obtained and indicate how the cornering stiffness, C_{α} , is related to slip angle and load. Although C_{α} measures only the initial rise of lateral force with slip angle for a particular tire load, the rise is similar at other tire loads. It appears that a tire showing higher cornering stiffness will develop more lateral force than a lower stiffness tire operated at the same slip angle and vertical load.

TIRE LOAD

The operating variable having the greatest influence on traction stiffness is tire load. The influence of tire load derives from the extreme deformation which a tire undergoes in the contact region. Specifically, the meridian and circumference profiles, intersecting at the center of contact, are substantially altered in dimension and curvature as tire load is increased. The camber, cornering, and circumferential stiffnesses, being indirectly influenced by lateral and longitudinal tire stiffness, are consequently dependent on structural geometry, and are seen to increase with test load for the tires diagrammed in Figs. 3A-3D.

Particularly affected by sidewall deformation is the lateral spring rate, K_y . Fig. 3D illustrates the variation of K_y with tire load for the three tires shown in Figs. 2A-2C. Increasing load on the tire from far below the design value results mainly in an increased contact length with some change in the meridian profile. The increased contact length causes an increase in lateral stiffness. At higher loads, the changes in tire

*The tires are representative of the 14 different truck tire sizes tested for this program.

PLY RATING AND TIRE SIZE

The ply rating designates the load range for which a particusize tire is designed. Load limits for various sizes at specific aflation pressures up to the design pressure are tabulated according to empirical formulae. The ply rating is a measure of the strength of the tire carcass and does not necessarily indicate the actual number of plies.

The tire pairs listed in Table 1 were tested on design width precision rims at the indicated pressures and loads which are



Fig. 4 - Lateral spring rate K_v versus inflation pressure for tires shown in Figs. 2A-2C

near the design values specified for these tires used as singles and duals. The higher rated tire of each pair is generally used as a dual. The 20 in tires that were tested all have the tread pattern shown in Fig. 6B. The tread pattern of the 11.00-22 tires (Fig. 2A) is similar. Table 2 lists the measured mechanical properties and illustrates the differences which may be found in tires which are similar in all respects, except for ply rating.

The differences seen in Table 2 are slight and possibly influenced by tire nonuniformity and/or measurement precision. There is remarkably little change in the properties of the 11.00-22 tires, the largest set tested for differences due to ply rating. The slight increase in test pressure (see Table 1) may be responsible for the increases in vertical spring rate. It is of interest to note that the vertical spring rate measured for the 10.00-20 tire with the G rating was less than that obtained for the F load rating. However, the lateral force generating ability did increase with increased load rating as evidenced by the







Fig. 6 - Measured mechanical properties of 10.00-20/F nylon tire in three tread patterns. Arib-type I; B-rib-type II; C-open tread

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measured increase in C_{α} and by the carpet plot comparison given in Fig. 7.

Fig. 7 represents the extreme in force variation found in this study of ply rating and tire size. More tests are needed to establish firmly the trends evident in Table 2.

TREAD PATTERN INFLUENCE

It is widely recognized that the tread pattern is a very important factor in wet traction performance. However, it also appears that pattern influence is noticeable in the data from low-speed dry-traction flat bed tests. Fig. 6 shows the three 10.00-20/F nylon tires, similar except for tread design, that were tested in this study. Listed beneath the tires are the five basic mechanical properties defined earlier. The values shown were measured at rated inflation pressure, 85 psi, and rated load, 5430 lb.

From an examination of the data, it appears that tread design has little influence on the tire spring rates K_y and K_z . The cornering stiffness, C_{α} , was affected very little although

the open tread did generate slightly higher lateral force at higher slip angles than the rib-type pattern (see comparison presented in Fig. 8). The camber stiffness, C_{γ} , was sub-

stantially changed by the tread pattern. In Fig. 9, it is seen that the open tread generated considerably less lateral force (or camber thrust) than the rib-type pattern.

The marked decrease in longitudinal stiffness, C_s (Fig. 6),

Ply Rating and Tire Size on Mechanical Properties									
Tire	Test	Test							
Size and Rating	Pressure, psi	Load, It							
9.00-20/E	80	4160							
9.00-20/F	85	4250							
10.00-20/F	. 85	5430							
10.00-20/G	85	5430							
11.00-22/F	85	6290							
11.00-22/G	90	6140							

is a result of increased tread compliance^{*}. It would be of considerable interest to compare the peak braking traction of the rib-type and open tread tires. Although the force measuring equipment employed in these tests was incapable of responding to a longitudinal slip much above $s = 0.04^{**}$, the higher initial slope (indicated by the measured C_s) of the F_x

*This is to be expected in the open pattern which has approximately twice the void area of the closed rib-type pattern. **Far below that required for peak braking force generation.



Fig. 7 - Comparison of lateral force versus slip angle and vertical load on 10.00-20 tires with ply ratings F and G $\,$





 Table 2 - Measured Mechanical Properties for Three Sets of Two Tires Which

 Differ Only in Ply Rating

Tire	9.0	0-20	10.0	0-20	11.00-22				
Rating	<u> </u>	F	F	<u> </u>	- F -	G			
C _s , lb/unit slip	41,000	41,000	42,000	50,000	47,000	51,000			
C, lb/deg	466.1	479.4	523.4	588.8	542.7	536.9			
C, lb/deg	59.6	64.4	69.0	74.6	63.3	62.8			
K _v , lb/in	1,673	1,889	1,618	1,482	2,116	1,909			
K _z , lb/in	3,824	4,122	4,700	4,363	5,578	5,850			



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Tire: Highway Tread 11-22/F Rim: 22x8.00

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LATERAL FORCE vs SLIP ANGLE AND VERTICAL LOAD

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Vertical	Inflation Pressure (psi)	Lateral H	Force at	t Indica	ated Sl:	ip Angle	e (degs.)
Load (lbs.)		1	2	4	8	12	1 6
2100	85	268	508	903	1428	2003	2269
4200	85	434	832	1535	2584	3456	4020
6290	85	543	1034	1916	3310	4474	5308
8200	85	571	1122	2091	3718	5073	6155
9900	85	573	1140	2162	3932	5351	6706

ALIGNING TORQUE vs SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Aligning	Torque	at Indi	cated	Slip Ang	le (degs.)
Load (lbs.)	Pressure (psi)	1	2	4	8	12	_16
2100	85	31	51	73	73	54	22
4200	85	76	133	205	230	204	131
6290	85	120	215	345	420	400	274
8200	85	156	290	478	607	613	448
9900	85	183	356	598	784	838	639

CIRCUMFERENTIAL STIFFNESS vs SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	Cs (lbs.)	Vertical Spring Rate (lbs./in.)
2100	85	21,000	
6290	85	47,000	557 ⁸
9800	85	48,000	

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LATERAL FORCE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation Pressure (psi)	tical Inflation Lateral Force a		Force at	: Indica	Indicated Slip Angle (
Load (lbs.)		1	2	4	8	12	16		
2100	90	265	497	973	1636	2017	1927		
4200	90	435	828	1550	2807	3510	3577		
6140	90	537	1036	1979	3517	4497	4669		
8200	90	587	1148	2189	4028	5245	5572		
10000	90	601	1183	2236	4163	56 33	6137		

ALIGNING TORQUE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	inflation Aligning Torque		at Indicated		Slip Ang	;le (degs.)
(1bs.)	(psi)	1	2	4	8	12	16
2100	90	28	46	77	75	46	-5
4200	90	72	124	210	243	183	80
6140	90	112	199	350	428	342	174
8200	90	152	280	509	646	551	271
10000	90	185	345	6 52	853	766	429

CIRCUMFERENTIAL STIFFNESS VS SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	C _s (lbs.)	Vertical Spring Rate (lbs./in.)
2100	90	23,000	
6140	90	51,000	5852
10000	90	60,000	

2.2 DATA MEASUREMENT AND PROCESSING PROCEDURES

2.2.1 TIRE PREPARATION. Truck tires were prepared for testing through the maintenance of certain practices intended to assure consistency of test conditions as well as representativeness of measured traction performance. All tires were mounted on their respective Tire & Rim Associationrecommended rims (disc wheels).

The inflation pressure of each tire was maintained at a representative "hot" inflation level which had been identified in prior testing as the equilibrium value which accompanies operation at 60 mph and rated load, following "cold" inflation to the T&RA-recommended value. The maintained "hot" inflation pressure values are shown for each sample in Table 4.

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Tire Sample	Size	Code	T&RA-Recommended "Cold" Inflation	Maintained "Hot" Inflation
Firestone Transport 1	10.00x20/F	FT10	85 psi	100 psi
Goodyear Super Hi Miler	10.00x20/F	GyS10	85	100
General Power Jet	10.00x20/F	GLJ10	85	100
Goodyear Super Hi Miler	11x22.5/F	GyS11	90	100
Firestone Transport 1	12.00x20/H	FT12	105	120
Uniroyal Unimaster Rib	15x22.5/H	UU15	100	115

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Each tire was "broken-in," on the test machine, for a distance of approximately 10 miles, and at a velocity of 40 mph, followed by the execution of six preliminary "lockup cycles" for purposes of removing any surface contaminants remaining from the tire molding process.

It has been rationalized that customary preparations employed in passenger car tire testing, such as utilization of a 100-mile free-rolling break-in practice, are most likely inappropriate for preparation of heavy truck tire samples, given that the slip energy experienced in a single lockup far exceeds the accumulated work history encountered during the free-rolling practice. Accordingly, the initial application of six lockup cycles was seen as a more satisfactory method for assuring that the sample experiences the necessary transition in tread surface conditions prior to data-taking. It would appear from data which are presented later that the tires examined in this sample did indeed exhibit a quite stable traction performance over the sequence of test runs, following the indicated break-in procedure. The <u>need</u> for such a breakin practice, however, has not been explored.

2.2.2 TRACTION MEASUREMENT PROCEDURE. The basic lockup cycle, which was applied six times in succession at each condition of velocity and vertical load, involved a controlledonset brake torque application followed by an automatic brake release, as diagrammed in Figure 10. By means of an appropriate throttling valve setting, the flow of air into the chambers of a dual-wedge drum brake was controlled to provide a gradual approach toward the peak force condition, thus increasing the quantity of data gathered in the vicinity of the peak longitudinal force. The locked-wheel condition is constrained to approximately 150 milliseconds duration to minimize the load variations that derive from "flat-spotting," as reported previously [1, 2]. Throughout the brake application sequence an attempt is made to maintain the

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The C_s parameter is characteristically influenced by vertical load because of the increasing length of the tire-road contact patch with increased load. In the data presented, the load range is sufficiently broad that the C_s versus F_z relationship is seen to stiffen markedly at the higher load level. As expected, however, C_s has been found to be unaffected by variations in velocity as was illustrated in the normalized data curves of Figure 14.

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11.00 - 2- 3 / = N 20 R 2- 5 24

The " μ -slip" data (such as shown in Figure 14) has been reduced further to yield numeric characterizations of F_x/F_z at the peak of the curve and at the 100% slip (or "slide") point. These peak and slide characterizations are utilized, in large measure, to illustrate the basic findings of the study.

Let us examine, first, the variation in performance measured for the six-tire sample at the BADC (asphalt) facility. Figure 16 summarizes the sample's traction sensitivity to normalized vertical load, i.e., F_Z/F_z (rated). recognizing that the tire sample included four "F"-rated tires (open symbols) and two "H"-rated tires (closed symbols) we note that the traction data produced by the tires having a common load-range rating are rather tightly grouped, especially with regard to peak values. It is surprising, however, that the size 15x22.5/H wide base single tire (code UU15) provides such a small increment in normalized traction when the load is reduced from the rated value (8460 1bs) to 0.4 of the rated value (3380 1bs). This performance suggests, for example, that the wide base single is less suitable for operation at lower loads than tires which are rated in the lower load range. As shown in Figure 17, with vertical load (non-normalized) plotted on the axis of abscissa, the wide base tire provides a reduced tractive performance (compared to $10.00 \times 20/F$'s) when the value of F₇ is below about 8000 lbs. Thus the notion that one can "tire-up" to resolve stopping performance deficiencies in heavy trucks may not be a universal axiom.





Figure 17. Load sensitivity (non-normalized abscissa) in the peak and slide traction of the six-tire sample (on BADC asphalt).

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Figure 18 illustrates the influence of velocity on the normalized traction behavior of the six-tire sample as measured on the asphalt track at the BADC facility. The data show a rather narrow band within the respective peak measurements and slide measurements across the tire sample. with consistent gross trends exhibited in all cases except, perhaps, in the case of the peak measurements describing the performance of the Goodyear 11x22.5/F (tubeless) tire (code GyS11). Data from this tire are seen to rise from a value of 0.85 to 0.92 over the 3- to 10-mph velocity increment while the same tire in a tube-type version (10.00x20/F, code GyS10) stays virtually constant at .93-.94. The data in Figure 18 again place the H-rated tires (codes FT12 and UU15) at the lower boundary of performance for these experiments in which each tire was operated at its rated load.

To characterize the repeatability of the data presented in Figures 16 through 18, the data obtained in the check runs are plotted, for each tire, in Figure 19. Data points are presented, left to right, in the order in which they were gathered. Below each group of peak and slide data presented in Figure 19 for each tire, the standard deviation of the measures is printed. In general, the indicated repeatabilities are of considerably higher quality than is observed, say, in peak readings gathered using ASTM skid trailers. In addition to the observed repeatability, it is gratifying to observe that the test process is causing no monotonic trend in peak/ slide characteristics as a function of work history. Thus we conclude that each tire sample was behaving in a stable fashion throughout the sequence of test runs.

These results, as obtained by testing a selected sample of tires on the asphalt surface at the BADC facility generally confirm the measurements reported earlier, except insofar as absolute values of traction are concerned. Also,





(on BADC asphalt).



Figure 19. Peak and slide traction measures deriving from repeat runs of each of the six tires tested on the asphalt track at BADC.

GOODYEAR SUPER HI MILER, 11 x 22.5/F, BADC ASPHALT

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		** A=0 FILE 222	NEW FILE 91	TEST SAMPLEAD1 ++
	AVERAGE OF FILE 222	FOR 6 RECORDS.	GOODYEAR SUPER HI-	HILER 11.0-22.5/F DRY ASPHALT (8.8.)
SLIP	MUX	TORQUE	FX	
0.30	8.88	9.9	8.8	
8.82	8,15	13577.8	889,4	
8,84	0,24	23875.2	1315.9	
8,94	0,33	33481.6	1899.5	
8,08	0,42	43761.9	2317.2	
0.10	0,50	53892.1	2749.6	
8,12	e.57	60786.6	3137.1	
8.14	8.64	66595,2	3456.0	
9.16	9.68	71306.4	3745.6	
0.18	9,72	75447.4	3984.1 1	'GAV = 88791.7 LOAD = 5585.2 VEL = 3.8 MPH.
0,20	9.75	78861.4	4859.4	
0.25	a.80	85376,2	4298.6	HUPEAK = 6,85 HULOCK = 8,82 RATIO = 1,84
8.30	4.63	90847.1	4465,4	
0,35	5.84	91895.7	4531,•	
8.48	0.85	92377,3	4545.6	
9.45	0,85	42428,4	4541.8	
0,50	0.85	92294,9	4531.4	
2.55	9,84	92898.2	4517.8	
8,68	7.84	91846.4	4582.7	
8.65	0,84	91583,2	4486.9	
8.7#	8.84	91318,2	4478,6	
Ø.75	P.83	91832.4	4454,2	
8.88	a.83	98752.1	4437.7	
9.85	0,83	98478.6	4421.1	
0.98	8.85	98185.3	4482.2	
8,95	0.82	89573.3	4378,4	
1.89	8,82	86791.7	4347.5	



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	AVERAGE OF FILE	** A=D FILE 223 223 FOR 5 RECORDS.	NEW FILE 42 GOODYEAR SUPER HI-MI	TEBT SAMPLEAR2 ++ LER 11.0-22.5/F DRY ASPHALT (8.6.)
8LIP	HUX	TOROUE	FX	
0.00	P.08	8,8	6. <i>8</i> *	
8,82	8,16	14354.4	857,5	·
8.94	8.25	259#5,7	1401.4	
8.84	8,35	36421.8	1988.9	
8,08	P.44	46356.1	2484,8	
8.18	4,52	55374,9	2829,3	
9.12	6,59	62784.4	3210,1	
0.14	8.66	69556,8	3536.3	
0.10	8.71	76251.1	3816.1	
P.18	8,76	81785.6	4861.9 1041	V = 75075,6 LOAD = 5498,9 VEL # 18,8 MPH_
8.24	P.81	45787.7	4298,7	
8,25	P.86	93142.8	4567,3 HUP	EAK = 8,92 MULOCK = 8,72 RATIO = 1,26
A.38	8,98	98978,9	4724.4	
8.35	8.41	183521,3	4791.3	
0.40	8,42	187199.9	4846,7	
0.45	n, 42	11#117.2	4798.4	
P. 58	0.91	111674.4	4758.1	
8.55	P. 9A	111396.9	4698.6	
A. 68	8,48	108337,2	4484.1	
8.45	9,86	104151.8	4583, V ³	
W.78	8,84	100156.5	4462,8	
8.75	9.82	96439,2	4362.2	
P. 88	8,88	92676.7	4283.6	
2.85	9.79	89348,5	4195.4	
8,98	8.77	85554. t	4844.7	
P. 95	8,74	88914.4	3897.2	
1.00	8.72	75875.9	1768.6	



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44 20037dHVS 15	NEN 11 6 32 1	** V-0 LIFE 534		
(.8.8) TJAH98A VR0 912.55-8.1	COODYEAR SUPER HI-HILER 1	554 kok 2 kCC402°	AVERAGE OF FILE	
	K.	309901	ХЛМ	alle
		. 8'0	96 ° 6	86.5
	9*816	17242.1	0110	50,02
	1742.2	1,912,4	0*25	¥8*8
	4,0725	B * 55677	tr 17 ° el	98*8
	2,7595	2.864.62	r5*0	86,0
	2284*1	9.79868	19'0	81.9
	2.9775	7.47887	12-0	C 1 - D

	C DIIV
	8*5599
	5*8250
	5.4144
4.	9*8890
	4*6#17
	6.4971
	442148
	4815*9
HUPEAK = 0.91 MULOCK = 0.66 RATIO = 1.37	6°5917
	2.8668
10¥A # 9852*8 FOYD = 2005'8 AEF = 58'8 HeH'	1.0124
	6"18EV
	2.7914
	2119.3
	2284*1
	S.7595
	4,0725
	1742.2
	9*816
	X.J
(,8,8) TJAH98A YRO 9,22,69,11 93JIH-IH	A39US AA3YOOOS

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TJAHARA VAR	/5'22-0'11 8311w-1	0007EAR SUPER	
8.152	8 * 52869	99*0	60°I
1.976	9.1489T	69 * 0	56.9
2919**	80524,3	57.0	86*0
240762	8*98896	54 .6	58*8
*****	182555*9	٩, ٢٢	
L°8129	4,974211	e7 . 6	\$1.0
4328*5	5*#55611	5v ° 0	61.6
8*22*8	151515*2		59*0
5*0250	128864.1	98*6	89*0
5*#19#	118455**	18.6	55°0
9*8890	6*205511	68.8	#5°8
4.9174	8*195211	86*8	S# *0
6" 7617	2.001011	16'0	87*8
6*1280	5*569483	16*#	55.0
4*219#	8*988781	16'0	65.6
6*5910	1,411801	85 * 6	6, 25
2 * 8992	6 * 86846	88 * 0	85.8
1.0120	6*51516	98'0	81 .6
6*1950	81224.8	8.62	91*8
5"281#	5*00019	77.8	v1*8



FZ = 5492,0 VEL = 20,0 HULOCK = 9,66 HUPEAK = 0,91 RATIO = 1,37 A=0 FILE 224 HWFILE 93 SAMPLE 483

		** A=0 FILE 225	NEW FILE 94	TEST SAMPLEARE ++
	AVERAGE OF FILE 225	FOR & RECORDS.	GOODYEAR SUPER HI-	ILER 11.8-22.5/F DRY ABPHALT (8.8.)
SLIP	MUX	TORQUE	FX	
0,88	8,#8	8.8	9 , b	
54.6	8,19	18671.9	1876.8	
8,84	8,34	34349,9	1864.8	
8.84	8,46	47126.0	2586.4	
8,98	8.54	58745,8	3863.6	
8.18	4,65	69436.1	3544,2	
8,12	. F.73	78282.4	3976,9	
8.14	8,78	05591.3	4297,2	
8.16	F. 62 .	41488.4	4517.5	
8.18	8,86	95858.5	4671.1 T	0AV = 62645.8 LOAD = 5521.3 VEL = 38.8 MPH.
8,28	8,87	48458.8	4746.8	
8,25	8.85	184882.7	4795.4 H	UPEAK # 8,89 HULQCK # 8,61 RATID # 1,46
P.38	8,84	188165,7	4788.8	
8,35	e.84	111132.*	4758.2	
8,48	8.88	113484.4	4491.6	
8,45	8,86	115232.3	4416.8	
8,58	4,45	117157.5	4526,3	
8,55	n.83	119351.2	4432.1	
8.68	8,81	121583.9	4329.1	
8.45	e,74	122641.5	4214,9	
8,78	e. 77	121#81.4	4191,5	
8.75	8,75	114259.4	3488,2	
e,8P	9,72	194583.2	3848,5	
8.85	P. 64	97746,7	37#3.4	
8,99	8.47	86512.1	3554.4	
8,95	8.64	74862.9	3482.5	
1.00	8,61	62645.4	3244.3	

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			I NEW ETLE OF	1547 44404 FARE 44
			NEH FILE 43	101 3A756003 **
	AVENAGE UP FILE 20		BY	TLER SIGNERADIE UNT ADEMAGE (4.84)
5616	704	TORQUE		
0,00	4.46	7.0	a.a	
8.82	8.18	19081.5	991.5	
8,84	0.33	34649.0	1797.8	
0.06	9,46	48191.6	2495,8	
0,88	0.57	68882.8	3968.8	
0,10	8.66	69942.3	3543.7	
0,12	8,73	77917.4	3915.1	
0,14	8.79	84587.7	4215.3	
8.16	P.83 -	98669,4	4444.1	
0,18	8.87	95593,2	4628.4 1	GAV = 63125.0 LOAD = 5501.1 VEL = 40.0 MPH.
0,28	4,88	98846.3	4689.7	
0.25	0.90	184442.5	4751.6 H	UPEAK = 0,90 MULOCK = 0.63 RATIO = 1.42
8,38	9,99	198688,3	4751.7	
8,35	8,89	111037.1	4789.6	
9,40	8,88	114411.5	4638.2	
8.45	P.87	116741.6	4552.1	
8.58	0,85	118849,3	4456.3	
0.55	0,83	121104.9	4346.1	
8.68	8,80	123565.9	4232.3	
8.65	0,78	125486.7	4123,3	
8.70	8.76	125416.6	4021.3	
9.75	9.74	122918.6	3923.4	
8.80	8.73	116239.8	3824.8	
9.85	8.79	193809.6	3716.3	
a. 94	8.64	98897.3	3688.7	
0,70	8.44	76484.1	3463.9	
0,73	U . UU	41138 A	770380 1141 A	
1.00	C.03	0316740	230340	



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		** A+0 FILE 227	NEW FILE 96	TEST SAMPLEAGE ++
	AVERAGE OF	FILE 227 FOR & RECORDS.	GOODYEAR SUPER HI-HILE	R 11.8-22,5/F DRY ABPHALT (3.8.)
SL	IP HUX	TORQUE	FX	
θ,	88 8,88	8,8	1,1 .	
8.	82 Ø,21	28477.8	1184.6	
9,	e4 Ø.35	36656,3	1926.4	
8.	86 R,47	58473,5	2592,5	
۴.	86 # , 57	62788,3	3154,7	
8.	18 8,44	72846,8	3624,2	
8,	12 #,74	81497,8	4058.6	
8.	14 0,85	89873,8	4386,3	
	16 8,84	95671.4	4531.2	
	18 8.87	100445.1	4644.3 TEAV	8 61362.5 LDAD = 5622.2 VEL + 55,8 MPH.
8,	28 8,89	188421.1	4776.6	
8,	25 8,98	111371.7	4838,3 HUPEA	K & 8,98 MULDER # 8,61 PATIO # 1,48
	30 6.84	117847.4	4819.3	
8,	35 8,89	121518.8	4771.4	
e,	.49 8,88	125032.5	4783.7	
8,	.45 8.86	120064.1	4621.2	
e,	.58 P.84	130455*4	4524.9	
9,	55 4,82	133031.4	6834 . •	
		136832.9	4361.4	
8,	.65 8,78	139779,5	4184.7	
	, 7 # 9.76	141684.5	4867.1	
8,	,75 8,74	137873.2	3455.3	
Ю,	.8P 6,71	120501.3	3843.8	•
8,	,85 8,49	112941.7	3721.9	
	,98 P,67	15484.1	3588,4	
8,	,95 9,64	78127.7	3431+3	
		A1562.5	3272.5	

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		** A=0 FILE 232	NEW FILE 98	TEST SAMPLEADS ++
	AVERAGE OF FILE 232	FOR 6 RECORDS.	GOODYEAR SUPER HI-	HILER 11.8-22.5/F DRY ASPHALT (8.8.)
SLIP	MUX	TORQUE	FX	
8.68	5,00	0.0	8.8 .	
8.82	9.25	9812.3	549,8	
0.84	0.39	16534,4	852.8	
8,96	0,51	22656.1	1116.6	
0,06	8.61	27857.7	1334,9	
8.19	2.71	32380.8	1539.2	
8,12	A.85	37458.0	1761.7	
9,14	0,98	41977.6	1948.8	
0.16	9,96	45587,2	2962.9	
0.18	1.90	48465.3	2137.6 1	GAV = 38687.5 LOAD = 2226.6 VEL = 48.8 MPH.
0,20	1.92	50687.0	2170.2	
0,25	1.03	54379.8	2195.9 H	UPEAK = 1.83 HULOCK = 8.76 RATIO = 1.35
9,39	1.03	57454.8	2186.4	
0,35	1,81	68622.9	2154.8	
8,48	1.80	63278,2	2113.2	
9.45	8,98	65735.3	2867.9	
0,50	8,96	68862.5	2824,5	
0,55	9,95	78395.7	1988.5	
0.60	9,93	72773.4	1938.3	
8,65	8,92	75397.5	1988.3	
0.70	a,98	77507.0	1864.6	
£.75	P.89	77481.4	1831.0	
0.88	4,87	73728.9	1796.1	
0.85	P.85	65191.4	1749.8	
8,99	P. 82	54373.7	1699.3	
0.95	0,79	42869.4	1647.9	
1,98	8,76	30667,5	1593.8	

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		** A=0 FILE 233	HEN FILE	TEST SAMPLEAGE ++
	AVERAGE OF FILE 2	33 FOR 5 MECOMDS.	GOODYEAR SUPER HI-FILER	11.8-22.5/F DRY ASPHALT (8.8.)
SLIP	MUX	TOPOUE	PX .	
8,88	e.se		1,1	
8,82	6,17	18 #34 .#	945.0	
8,84	4,32	34227,5	1769.3	
8.84	4,44	47357.8	2424.4	
3.08	4,55	59818,6	2993.3	
8.15	8.45	64545.5	3462.6	
0.12	8.73	77514.3	3478.7	
8.14	P.88	45822,4	4188.1	
8.16	8,85 -	41873+1	4427.7	
9.18	5.88	95298,#	4544.7 TQAV =	64388.8 LOAD = 5517.8 VEL = 48.8 #PH.
8,28	8,48	46477.3	4676.3	
0.25	8. •1	105004.2	4713,7 HUPEAK	= 8,91 MULOCK = 8,62 RATIO = 1,46
6,38	P.46	189943.6	4697.8	
8.35	9,98	113228,1	4652.9	
8,48	8,89	115457.2	4592.9	
8,45	*,87	117262.2	4528.4	
8.58	8,85	119184.1	4426.6	
8.55	P. 83	121331.1	4317.8	
8,45	9,81	123786.8	4198.7	
4.45	8,78	126182.3	4879.1	
8,78	8,76	126901.6	3963.1	
8.75	8,74	124834,6	3853.4	
8.89	4,72	116826.1	3748,4	
8.85	8.69	104718.5	3648.6	-
1,70	8.47	*1237.1	3531.4	
8,95	8,65	77712.7	3428.6	
1.80	8,62	64 38 8,8	3347.5	

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		** A=0 FILE 234	NEW FILE 199	, '	TEST SAMPLE	410 **		
	AVERAGE OF FILE	234 FOR 6 RECORDS,	GOODYEAR SUPER H	INTLER	11.0-22.5/F	DRY	ASPHALT	(8.8.)
SLI₽	HUX	TORQUE	FX					
9,00	0.00	9.8	8.8 *					
0,82	8.14	23159.9	1287.4					
8.04	P. 25	42844,7	2270,5					
P. 84	9.35	69726.8	3218.4					
0.68	0,45	77308.7	4834,1					
0.19	P. 53	91217.4	4717.5					
0.12	0,59	103033.9	5288,4					
9,14	8,65	113086.8	5755.0					
0.16	8,70	_ 12177,9	6136,9					
0.18	P.73	129139,1	6416.8	TQAV = 6	5479,2 LO	AD =	9173,7	VEL = 48.0 MPH.
0.20	8,75	133766.7	6574,8					
0.25	8,78	141198.9	6737.5	MUPEAK =	8.78 HULO	CK = 8	,53 R	ATIO = 1,46
0,30	2,78	147157.7	6777.1					
0,35	8,78	151985.7	6731.3					
8.49	9.77	155873.8	6639,5					
8.45	0.75	159166.7	4522,B					
0,50	8,74	161824.8	6393.3					
0.55	9,72	164896.5	6258.3					
8.48	0.71	166926.1	6119,2					
0,65	0.69	166776.7	5974.1					
0.70	A, 67	164964.7	5822.3					
0,75	P.65	157538.0	5648.7					
8.88	9.63	146962.3	5482.4					
8,85	8.61	132107.6	5282.4					
0.90	P.58	116418.9	5059,5					
9.95	0.55	100835.1	4826.8					
1.80	0.53	65479.2	4540.0					



		** A-0 FILE 221	NEW
	AVERAGE OF FILE 221	FOR 6 RECORDS.	GOODYEAN
SLIP	HUX	TORQUE	FX
8,88	8,00	8,8 .	
8.82	8,14	13653,7	854.7
P.84	8.24	24501.2	1598.4
9,94	8.48	42335.4	2188.7
8.85	0,49	52075.6	2647.2
8,18	P.58	62768,4	3166.7
.12	6,68	74257.4	3730,0
8,14	8.76	83474,1	4163.3
8,16	. 45	48399.8	4549,9
8.18	8,84	45384.6	4629.7
8.28	P. A7	48551.7	4698.7
8,25		1#3353.*	4741+8
8,38	8.84	184599.5	4728.7
8,35	8,87	189166.9	4672.9
8,48	P. 85	111505.4	4588.2
8,45	6,83	1136#2.4	4487,8
8,58	*.81	115547,3	4377,3
8.55	8,79	116992.9	4265.0
8,68	a. 77	118349,5	4156.1
8.45	P. 75	119647.8	4858,9
8,78	8,73	128251.1	3949,6
¥:75	P.71	117938.6	3851.1
8,84	#,64	111674.*	3742.9
0.85	P. 67	1#1341.4	3611,4
8,98	f. 64	68563.2	3447.4
8.95	R. 61	74945.2	3317.4
1,98	A., 50	68479.2	3168.8

NEW FILE 98 ' TEBT BAMPLE488 +-Year Super HI-Hiler 11,8-22,5/f DRV ABPHALT (8,8,)

TOAV # 48479.2 LOAD # 5562.6 VEL # 48.8 HPH.

MUPEAK = 0,86 MULOCK = 0,54 RATIO = 1,58

Check Run #1

SAMPLE ARR

Image: Super visual super visual intervision

Image: Super visual super visual

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		** A=0 FILE 228	NEW FILE 97	TEST SAMPLE407 ++
	AVERAGE OF FILE 2	28 FOR & RECORDS.	GOODYEAR SUPER HI-HILE	R 11.8-22.5/F DRY ASPHALT (8.8.)
SLIP	MUX	TORQUE	FX	
Ø, ØØ	a, 20	Ø.Ø .	8.8	
0,02	0.18	17989.5	998.7	·
0.94	0.33	34998.3	1015,3	
8,86	8,45	47611.6	2457,6	
0,08	0,56	58867.6	2991.7	
0.10	8.65	68921.5	3456.1	
0.12	0.73	77332.0	3865.0	
0.14	0,80	65116.5	4198.9	
0,16	0.85	91936.5	4433.8	
0.18	0.88	97178.0	4688.7 TQAV	= 42288.3 LOAD = 5491.5 VEL =
8,20	6.98	100513.8	4682.4	
e, 25	0.91	144837.2	4748.1 HUPEA	K = 0,91 HÚLOCK = 0,62 RATIO = -
0,30	P.91	112165.5	4741.2	
0,35	8.98	116612.3	4688,7	Check Ilun #3
8,48	8.88	120386.1	4612.1	
P.45	8,87	123634.4	4521.4	
0.50	9.85	126591.6	4425.7	
0.55	9.83	129149.4	4333.1	
0,68	0.41	131516.8	4237.9	
0.65	e.79	132488.0	4148,4	
0,78	8.77	138946.8	4848.6	
0.75	0.75	125509.4	3934,4	
0,80	0.73	116171.8	3814,1	
8,85	a.78	192985.6	3681.1	
0,98	8.67	89861.9	3549.9	
0,95	8,65	75398.0	3419,9	
1.89	8,62	62288.3	3291.2	

TOAV = 62288.3 LOAD = 5491.5 VEL = 48.8 MPH.

HUPEAK = 0,91 HULOCK = 0,62 RATIO = 1,47

Check Run # 3

TEST SAMPLE407 ++

NEW FILE 97



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		** A=0 FILE 235	NEW
	AVERAGE OF FI	LE 235 FOR & RECORDS.	GNODYEAP
SLIP	HUX	TORQUE	FX
0,0 7	×. A4	8.A	8.8
0.82	8,17	16479.2	972.6
8,84	P. 3P	32451.1	1719.5
8.86	P. 43	46585,8	2392.9
4.88	8,53	58484,3	2478.3
8.18	8.62	69198,1	3436.9
8.12	8,69	77243.F	3886.8
8.14	8.75	83915,#	4896,9
0.16	A.74	84446,5	4319.6
P.18	A, 63		4484,2
8,28	8.85	+8+32,7	4583.7
A.25	8.88	185786.9	4698,2
A.3A	6,84	111166.3	4742.5
0.35	4,84	115777.2	4733.9
0,4 P	P.88	119711.8	4673,4
0.45	8.86	123210.9	4623.1
4.50	P.84	126572.5	4527.4
0.55	*, A2	154439*5	4425,7
0.6P	P.88	133116.4	4322,3
0.65	9.7R	135235,4	4217,8
8.78	P. 76	134157.4	4115.7
0.75	A. 74	128879.4	4012,8
8,89	P.72	119884.4	3981.8
P.85	P.69	194198.8	3767,8
a, 98	9.67	41414,2	3616.2
P. 95	4,64	76921,9	3458.9
1.00	8.01	62916.7	3296,2

NEW FILE 191' TEST SAMPLED11 ++ Dyear Super HI-HTLER 11.8-22.52F DRY ASPHALT (8.8.) FX

TOAV = 62936.7 LOAD = 5625.8 VEL = 48.8 HPH.

f.....

HULDCK = 4.61 RATIO = 1.46 -----

Check Run # 5

CONDUCTOR SUPER MI-MILER 11.8-22.5/7 ΟΡΥ ΑΦΡΑLΤ (8.6.)



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E

(i)







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TABLE 3.1. FLAT-BED TEST TIRES

Tire No.	Manufacturer	Mode 1	Size
Heavy Truc	: k		
Tires			
H-1	Uniroyal	Triple Tread	10 x 20F
H-2	Uniroyal	Triple Tread	10 x 20G
		PARTIT MITTE	第18797年前
H-4	B.F. Goodrich	Milesaver Radial Steel H.D.R.	10 R 20 G
H-5	B.F. Goodrich	Milesaver Radial Steel H.D.B.	10 R 20 G
H-6	Goodyear	Unisteel R-1	10 R 20 G
H-7	Goodyear	Unisteel L-1	10 R 20 G
H-8	Firestone	Power Drive	10 x 20F
H-9	Uniroyal	Unimaster Rib	15 x 22.5H
H-10	Michelin	Radial	10 R 20 G
H-11	Uniroyal	Fleetmaster - Superlug	10 x 20F
Heavy Bus Tires			
H-12	Firestone	Hiway Mileage	12.5 x 22.5G
H-13	B.F. Goodrich	Intercity Mileage	12.5 x 22.5G
H-14	B.F. Goodrich	Intercity Mileage	11.5 x 20G
H-15	Uniroyal	Intercity	12.5 x 22.5G
H-16	Uniroyal	MaxRoute I	11.00 R 20H
H-17	Goodyear	Custom Cruiser	12.5 x 22.5G
H-18	Michelin	Radial XZA	11 R 20 H
		and the second second	語を運動と調道に
H-20	Michelin	Radial XZA	12 R 22.5H
Light Truc Tires	:k		• •
L-1	Firestone	Transport 500	8.00 x 16.5D
L-2	Goodyear	Custom HiMiler	8.75 x 16.5E
L-3	Goodyear	Rib [.] HiMiler	8.00 x 16.5D
L-4	Firestone	Transport 110	7.50 x 16.5C
L-5	Goodyear	Super Single HiMiler	10.00 x 16.5E
L-6	Firestone	Town & Country Truck	8.00 x 16.5D
L-7	Goodyear	Custom Flexsteel	8.00 R 16.5E
L-8	Goodrich	Milesaver Radial	8.00 R 16.5D
L-9	Goodyear	Glas Guard XG	8.00 x 16.5D
L-10	Goodyear	Glas Guard XG	8.75 x 16.5E
L-11	Firestone	Town & Country Truck	8.75 x 16.5E
L-12	Goodyear	Custom Flexsteel	8.75 R 16.5E
L-13	Michelin	Radial XCA	8.00 R 16.5E
L-14	Wards	Steel Belted Super Wide	9.50 x 16.5D
L-15	Michelin	Radial XCA	8.75 R 16.5D
L-16	General	Jumbo Power Jet	8.00 x 16.5D
L-17	General	Jumbo Power Jet	8.75 x 16.5E
L-18	Goodyear	Glas Guard	8.00 x 16.5D
L-19			
	Goodyear	Glas Guard	8.75 x 16.5E
L-20	Goodyear Goodyear	Glas Guard Rib HiMiler	8.75 x 16.5E 8.75 x 16.5E

12

•



Figure 3.9 The effects of inflation pressure on cornering stiffness: heavy truck tires


Figure 3.12 The effects of inflation pressure on cornering stiffness: heavy bus tires (cont.).



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Normalized Load F_z/F_{zR}

Figure 3.19. "Peak and slide" values of F_X/F_Z vs. load for individual bus tires—superimposed within the envelope of data taken on eight truck and bus tires at 40 mph (for code identifications, see Table 3-1).



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Figure 4.19. Load sensitivity of the cornering stiffness parameter for the three tires employed in intercity bus simulations.

77H2180

LATERAL FORCE (LO',) AT INDICATED INFLATION PRESSURE (PSI,), LOAD (LO,), AND BTEER ANGLE (DEG.)

-	184	LOAD	6		•	+ 2		4	3	•	-	+12	21-	+1+	:
:	100.0	2000.0	- 39. 5	-313,2	239.1	-513.0	475.8	- 861.3	030.0	-1264.5	1237.0	-1475.6	1513.5 -1	592.5	1600.
	140,9	4986 . 0	-63.1	-507.0	398.9	-881.7	806.4	-1529.7	1446.7	-2309.7	2266.9	-2700.3	2944.3 -3	879.2	3109.
	100,0	6908.0	- ¢ 8 , 8	-657,0	. 518.4	-1150.5	1046.4	-2007.9	1900.2	-3114.5	5073.9	-3844.8	3915.2 -4	384.4	4341.
•	100.0		- 00 - B	-752,3	594.1	•1325.5	1190.9	-2319.5	2189.6	•3733,6	3669.1	-4666.8	4744.2 -5	514.2	5355.
• •	75.8	4646.0	-61.3	-530.4	426.6	- 643.9	854.7	"1635.5	1574.0	-2500.3	2480.1			213,3	3236.
	15.0	6996.	-69.9	-634.7	491.9	•1135.3	1021.7	-2005.6	1890.1	-3200.3	3155.9		4	428.3	4410.
	50.9	4898.0	•62.5	-530.2	397.6	-912°5	630.6	-1631.2	1537.6	- 2432 . 3	2455.8		•	174.5	3166.
	50.6	6898°	-61.4	=559 . 2	390.2	-976.8	847.0	-1763.0	1691.0	.2903.0	2948.8		7	198.4	4159.

TLEETHASTER TRIPLETREAD 11, UNX22,5 F VORINU

(I)

-87,3

78.0

+212+

192.1

-487.9

423.1

-389.8

486.3

-242.9

272.9

159,5

21.8

4088.8 6888.9

50.0

50.0

99.3

168.8

233.8

201.7

-69.7

58.7

-177.0

162.8

-349.7 -282.9

163,9 331,8

-323.7

322.2

223.1

133.5

11. j 12. 3

-175.3

-190.5

185.9

-253.7

247.2

197.1 333.8

420,0

-387.1

392.2

265,3

-125.7

115.7

10.8 11.1

-75.8 -110.4 -82.5

81.7

75.8

. 198.4

•59.3

12.8

-68,5 146.9

56.7

-228,4

-14.8

+16 6.1

-107,9

17.3

-48.1 -133.2 -262.7 -413.6

36.8

-52.6

48.8 149.7 269.8

-42.2 = 107.4 = 176.6 = 176.6 = 132.9 = 132.9 = 132.2

42.6

-26.6

28.8 73.8

1.5 0.6

P31 100.0 100,0

100.0 100.0

LOAD

113.3

138.6 262.4 .

-156.9 -270.5

•16

-12

+12

8

8+

7 |

7+

N

N +

...

() ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND STEER ANGLE (DEG.)

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MICHE, RADIAL 11,00R22,5 H

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

-16	1753.8	3263,0	4295.8	5332.0	3270.4	4354.5	3178.4	4207.0
91+	-1002.8	-3467,8	-4598.0	-5361,8		-4518.6	-3279.1	• 4358° 2
-12	1661.8	3065.0	4179.8	5019.0				
+12	-1675.3	-3170.1	-4310.4	-5140,0				
8 -	1401.2	2667.6	3669.3	4406.3	2742.9	3634.9	2699.8	3372.4
8+	-1488.1	-2773.9	-3744,8	•4468,0	• 2822,2	-3722,8	•2773.9	-3467.6
4	872.0	1732.8	2358.1	2737.4	1902.7	2486.0	1985.1	2352.1
4	-963.2	-1797.2	-2423,2	-2796.1	•1975.9	•2552.7	-2054.3	-2470.3
2	493e3	980.8	1312.0	1485.4	1142.3	6*6171	1202.5	1303.3
2+	-511.8	-981.0	.1301.8	•1467.6	-1146.9	-1439.1	*1186.5	-1284.4
ī	250 °B	514.7	676.7	766.7	632.9	759.6	623.5	660.7
+	-298 <u>.</u> 2	-528.5	-677.3	-739.4	-589.5	-702.7	-608.9	-641.1
6	- 9 - 1	4.4	14.1	13.7	10.4	15.5	12.7	12.1
LOAD	2444.0	4040.0	6889.0	8828.8	4000.0	6989,8	4000.0	6088.8
104	6.99	66.90	8.00	9,99	15,0	15.0	50.0	50.0

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ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND BTEER ANGLE (DEG.)

188.8 2000.8 -3.1 -25.4 -25.9 40.6 -43.8 55.6 -50.4 59.9 -55.8 30. 188.8 -7.1 66.1 -75.4 124.3 -129.6 176.6 -165.1 195.4 -172.7 124. 108.8 4080.8 -7.1 164.4 -134.2 221.2 -229.6 336.1 -345.8 544.7 -341.6 262. 108.8 6080.8 -15.3 166.3 -193.4 524.8 -341.3 510.9 536.3 -519.8 393. 188.8 6080.8 -11.6 79.7 -96.3 151.0 -160.8 207.1 -210.4 175.4 -156.5 75.8 6080.8 -11.6 79.7 -96.3 151.0 -160.8 207.1 -210.4 175.4 -156.5 75.8 6080.8 -11.6 79.7 -96.1 510.9 536.3 -519.8 534.3 -519.4 -519.4 75.9 6000.8 -11.6 79.7 -96.6 204.1 -210.4 -156.5 -175.4 -156.5 -1	18d	LOAD	6)	*		+ 2	~	4 4	7	8 +	8.	+12	- 15	+16	- 1 -
100.0 470.0 -7.1 66.1 -75.4 124.3 -129.6 170.6 -105.1 195.4 -172.7 124. 100.0 6000.0 -10.1 116.4 -134.2 221.2 -229.6 336.1 -345.7 -541.6 262. 100.0 6000.0 -15.3 116.3 -193.4 524.0 -341.3 510.9 536.3 -519.6 393. 100.0 6000.0 -15.3 166.3 -193.4 324.0 -341.3 510.9 536.3 -519.6 393. 75.0 4000.0 -11.0 79.7 -90.3 151.0 -160.8 207.1 -210.4 175.4 -156.5 75.0 4000.0 -11.0 79.7 -90.3 151.0 -160.8 207.1 -210.4 175.4 -156.5 75.0 6000.0 -11.4 -173.2 268.6 -291.0 308.0 -4008.3 -171.9 -321.9 75.0 40000.0 -174.0 123.6 -133.6 -294.0 330.4 -213.5 247.6 -255.3 200.3 -173.7 </td <td>100.8</td> <td>2000.0</td> <td>• 3. 8</td> <td>-25.4</td> <td>•25•9</td> <td>49.8</td> <td>-43.0</td> <td>55.6</td> <td>+28.4</td> <td>59.9</td> <td>-55,0</td> <td>30.8</td> <td>-37.1</td> <td>20.5</td> <td>-13.3</td>	100.8	2000.0	• 3. 8	-25.4	•25•9	49.8	-43.0	55.6	+28.4	59.9	-55,0	30.8	-37.1	20.5	-13.3
100.0 6030.0 -10.1 116.4 -134.2 221.2 -229.6 336.1 -345.7 -549.6 246.2 100.0 0000.0 -15.3 166.3 -193.4 324.0 -341.3 510.9 536.3 536.3 -519.6 393. 150.0 0007.0 -15.3 166.3 -193.4 324.0 -341.3 510.9 536.3 536.3 -519.6 393. 75.0 40007.0 -11.0 79.7 -90.3 151.0 -160.8 207.1 -210.4 175.4 -158.5 75.0 60007.0 -19.5 134.7 -173.2 268.6 -291.9 368.0 -400.3 341.9 -321.9 50.0 40007.0 -175.2 268.6 -291.9 368.0 -400.3 341.9 -321.9 50.0 40007.0 -175.2 268.6 -213.5 247.6 -255.3 200.3 -173.7 50.0 40000.0 -27.9 160.2 -224.0 330.4 -374.2 475.7 -564.0 403.6 -401.2 50.0 -27	100.0	4986.0	-7.1	66.1	-75.4	124.3	-129.6	178.6	-185.1	195.4	-172.7	į24°3	-120,2	82.4	-64.1
188.8 8000.8 •15.3 166.3 •193.4 324.8 •341.3 510.9 •535.8 •510.8 536.3 •519.8 393. 75.8 4000.8 •11.0 79.7 •90.3 151.0 •160.8 207.1 •210.4 175.4 •158.5 75.8 4000.8 •11.0 79.7 •90.3 151.0 •160.8 207.1 •210.4 175.4 •158.5 75.0 6000.0 •19.5 134.7 •173.2 268.6 •291.9 388.0 •400.3 321.9 58.8 40000.8 •17.6 100.7 •133.6 199.0 •213.5 247.6 •255.3 200.3 •173.7 58.8 60008.8 •27.9 160.2 •224.8 330.4 •374.2 475.7 •504.0 403.6 •401.2	100.0	6636.0	1.91-	116,4	-134,2	221,2		336.1	-343,8	344.7	-341.6	262.0	-240.8	139.6	0.0
75.8 4000.8 -11.8 79.7 -90.3 151.0 -160.8 207.1 -210.4 175.4 -158.5 75.8 6000.0 -19.5 134.7 -173.2 268.6 -291.9 388.0 -400.3 541.9 -321.9 58.8 4000.8 -17.6 100.7 -133.6 198.0 -213.5 247.6 -255.3 200.3 -173.7 58.8 6008.8 -27.9 160.2 -224.8 330.4 -374.2 475.7 -504.8 403.6 -401.2	100,0	8489.6	-15,3	166.3	-193.4	324.0	-341,3	510.9	•533,8	536.3	-519.8	393.4	.=374,0	217.1	-212.5
75.0 6000.0 -19.5 134,7 -173,2 268.6 -291.9 388.0 -400.3 341,9 -321,9 50.0 4000.0 -17.6 100,7 -133.6 198.0 -213.5 247.6 -255.3 200.3 -173,7 50.0 6000.0 -27.9 160.2 -224.0 330.4 -374.2 475.7 -504.0 403.6 -401.2	15.0	4000.0	-11.8	19.7	•98.3	151.0	•160.8	207.1	-210.4	175.4	-158,5	•		62.4	-51.6
50.0 4000.0 -17.6 100.7 -133.6 198.0 -213.5 247.6 -255.3 200.3 -173.7 50.0 6000.0 -27.9 160.2 -224.0 330.4 -374.2 475.7 -504.0 403.6 -401.2	75.0	6989.0	-19.5	134.7	-173,2	268.6	-291.9	388,0	-400.3	341.9	-321,9			162.9	-143.7
50.0 6000.0 -27.9 160.2 -224.0 330.4 -374.2 475.7 -504.0 403.6 -401.2	50,9	4000.0	-17.6	100.7	•133.6	198.0	-213,5	247.6	• 255 • 3	200.3	-173.7			01.0	-71.8
	50,0	6999,0	-27.9	169.2	-224°0	330.4	*374°2	475.7	-504.0	403.6	-401.2		•	197.6	-103.1

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		** A-D FILE 174	EW FILF	PO TEST SA	MPLE196 44	
•	AVERAGE OF FILE 174	FOR 6 RECORDS.	MICHELIN X	11.0R-22.5/H	(DAMA)	
SLIP	нuх	TORQUE	×			
0.49	8 ° U U	8 8	A. A			
6.42	0.19	26469.6	1268.3			•
4 ° 64	P. 39	53085.5	2500.6		•	
P. 06	P.53	71993.3	3453.6			
6,08	P.63	8544A . 9	4198.9		• •	
U.10	0.74	5.7997.2	4537.3			
0.12	0°,75	171944.3	4821,3	·		
0.14	P. 78	196441.3	4993.3		• •	
0.16	0.79	109684.8	50A6.0			
2.18	9.80	112022.4	5127.3	TOAV = 64962.5	LOAD = 6640,9 VEL = 40,6	.HOH .
95.0	0.80	113527.0	5128.9			•
0°25 ,	0.79	116293.4	5.176.7	MUPEAK # 8.80	MULDCK = 0,48 RATIO = 1.67	
0.30	0.78	110394.8	4991.3		-	
0.35	B.77	120173.3	4888.7	-		•
6.40	R., 75	121622,6	4790.3			
6,45	a.73	122792.6	4472.2	c		
0°20	G.71	123022.3	4561.8			
Q.55	P. 70	124589.1	4442.0			
6.69	6 • 6 B	124588 . 5	4314.6			
¥• 65	0 ° 65	123154.1	6.0714			
6.70	r.\$3	19151.2	4043.8			
0.75	r.61	112267.8	39au • 5			
4.8.	6°5,9	٩ • ٢٤ ٤٤ ٢ ن ٩	1.9215			•
€4 ° i)	P. 56	91697.9	3610.9			
- E6 ° U	75 * 1	A1445.7	3454.7			
30°°;	₽ • •	72150 . J	\$292.4			
	دی ⁶ دا ۲	64147.5	2122.5			

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•		** A-0 FTLE 175	ALLE 900	TEST SAMPLE197 ##	
•	AVERAGE OF FILE 175	FOR 2 RECORDS.	HICHELIN X 11.08-22.51	(U (D A H A)	
aits	ХГін	TOROUE	X	:	
0° 60	9 6 6 9	5°2	6°4)		
8,92	P.15	11633.4	540+2		
8°24	6₹°s	22104.6	1029.8		•
0.46	0 * 39 ·	34598 . 5	1373.7		
6.58	0+47	37521.1	1652.4		
8.10	ē - 54	43915.5	1 H 7 7 . 9		
0.12	P.59	47454.1	2659.6		
e.14	A. 63	51126.3	2204.5		
0.16	. A.66	54289.0	2312.4	•	
Ľ. 1 A	0.68	57172.7	2395.9 TUAV .	43125.8 LOAD . 342	3.6 VFL = 20.0 MPH
6.20	P. 78	59817.2	2454.6		
6.25	3,73	66729.2	2557.7 HUPEAK	# 0,76 MULOCK # 0,61	RATIC = 1.25
6.30	e, 75	72401.2	2624。(1		
@•35	р.76	78025.5	2638.4		
6.40	n. 76	82593.6	2636.1		
6.45	R • 7 6	R5232.0	2622.0	-	
6 - 5 3	0.76	85192 . 9	2604.0		
6,55	ę.75	83964.9	2579.7		
6.63	8.74	AU426.6	2537.6		
8.65	P. 72	75644.4	2476.9		
9.70	P. 7 U	70471.5	2494.5		
7.5	4.68	63718.0	2335.2		
6 • d 0	9°47	58424.1	2279.4		
6 BS	59°8	1.585.1	2227.6		-
	°, 64	4998.4	2176.0		
6°3	3•62	46181.4	2135.44		
1.50	P.61	43125.0	2496.2		

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** A-D FILE 176 . FILE 9]

TEST SAMPLE198 **

AVERAGE OF FILE 176 FOR 6 RECORDS, MICHELIN X 11.08-22.5/H (DANA)

SLIP	них	TORQUE	FX
6.32	0.00	0 <u>,</u> 9	6 . A
6.42	2.12	14779.4	748,4
0.24	P.26	34365.4	1678.6
0.06	6.46	53051.2	2579,9
0.08	0.52	69296.1	3353.7
0.10	2.60	81335.1	3922.0
0.12	0.66	89875.5	4318.2
0.14	0.71	95890 , 8	4585.7
1.16	2,74	190429.6	4775.6
0.18	0.75	103919.2	4891.6
0,20	4.76	106546.1	4956.7
f.25	¢,78	112019.8	5011.5
0.50	0.78	117060.2	5426.6
0.35	P.78	121664.7	5001.1
0.42	Q.77	125439.7	4945.1
W.45	7.76	127822.9	4878.7
e. 50	a.75	128174.3	47R7.9
P.55	0.74	126074.6	4695.3
8.68	<u>e.</u> 72	121999.4	4586.0
6.05	0 . 7 v	116522.8	4453.8
2.7.	0.65	123069.2	4299.4
w.75	18.66	141457 37	4141.4
0.80	æ., 63	93604.5	3978.5
e.85	3.61	87657.9	3868.1
0.7.1	***	81162.8	3742.8
A.95		757#2.1	3022.0
1-11	2.50	71345 A	3547.5

*a*0 0

		. •		
				•
TQAV # 7139	5.8 LOAD .	6623.8	VEL = 20.0	РРН <mark>,</mark>

MUPEAK = 0.78 MULOCK # 0.56 RATIO # 1.39

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ERAGE OF FILE	** A-D FILE 177 177 FOR 6 RECORDS.	NEW FILE Michelin X 1	92, TEST SAMPLE199 2, 1.08-22.5/H (DALA	•
×	10PQUE	X		
Ok	8° 8	N • 3		
18	24617.3	1194.3		
37	51487.4	2421.9		
15	76184.8	3364.8		•
62	84733.5	4454.8		
69	95288.5	4534.4		-
.74	1.1291.9.5	1.863.9		
. 78	148361.1	5477.1		
. 80	112375.5	5204.1		
1.41	115399.22	5276.7	TOAV = 63437.5 LOAU	# A561.4 VEL # 49.8 MP
14.	117434.0	5247.6		
4 J	121522.9	5244.4	MUPEAK = 0.81 MULGCN	# 4.49 4ATIO # 1.68
3 - A 2	124569.8	5165.8		
. 19	127341.6	50.46 .7		-
2.77	129A39.9	4935.5		
а.75	132151.7	47A4.3		
1.72	134035.9	4627.0	-	• •
0°,71	1 34674.7	4454.5		• · ·
9.6A	2 5 7 6 9 . 2	ちゃねっられ		
a. 65	124124 5	4141.3		• •
1.63	123834.0	39A5.6		- - - - -
1.6.1	11124.3	3423.2		
• 5 A	7.04470	\$454 . 2		•
، ج 5	471h9.2	3562. H		
• ۲ ک	77Puh. 3	3354.4		
	1, * 4 Z 84, 4	5211.3		
• 49	65437.5	5.17.7		

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	•							•				ЧРН.			,									•					
	•											EL = 20,0	•	0 = 1.51								•	,a,	-					
												96.3 VI		I RATI	-	·					· 			•		•			
** 84231dm	(DANA)	•										LOAD # 98		MULOCK # 0.5															
TEST 31	22 . 5/H											AV # 96208.3		PEAK # 0.76			·	•											
¥.	11.08-											10		ЫM															
MEN FILE	MICHELIN X	E X	5.0	864.1	2550.9	4128.9	5248.1	6845 . 4	6563.R	6873.3	7065.3	7175.7	7216.9	7228.2	7155.7	7864-6	69/13,8	6798.7	6641.4	4474.7	6301.6	6120.3	5921.4	5713.1	5515.1	5324.5	5146.8	1969.5	1798.B
A-D FILE 178	OR & RECORDS.	TOROUE	2°2	16483.9	50527.6	ß2344 。 9	1.05727.1	121794.1	132221 \$ 5	38897.2	143318.2	46317.7	48129.3	151271.5	53746.7	55845.4	57673 . a	5нв91.7	59186.7	57345.7	53144.0	47567.4	4.454.4	1927.4	23239.5	15691.7	1.9637.5	82866.9	96268.3
•	F F1LE 178 F	×	5		¢	2	5	3 1	6	2	4	6	6	6	6 1	5	4 1	2	1	9	7	5 1	3	1	9	7	5 1	3	1
	AVERAGE O	μŲ	5 6	6 • J	6 ° 5	0.4	9.5	9 • 6	9 ° 8	2.1	9.7	0.7	0.7	A. 7	9 • 7	2°4	0.7	0.7	0.7	у ° б	~ ~ <u>~</u>	3 • 2 8	3.6	9 • E	5 • E	S • 6	9 • 2		9.5
		SLIP	A. 07	5.42	8.74	95°	0.08	e.19	ø.12	6.14	R.16	Ø.18	0.20	ߕ25	M.30	0.35	61,49	0.45	8,59	0°52	6.60	6.65	19.79	A.75	6 8 9	0.A5	16 . 9	2.95	5 % 1
								·																					

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V = 38
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		** A-D FILE 189	NEM FILE 951' TEST	SAMPLEZUZ **
	AVERAGE OF FILE 189	FOR 5 RECORUS.	MICHELIN X 11.08-22.5/H	(JANA)
SLIP	МUX	TORQUE	X L .	
0° (50	6 8 G	8°8	6° 8	
C . Q Z	A. 19	25638.5	1251.1	•
9.64	n.38	5229a.7	2513.5	•
6.34	A.52	71350.8	3422.1	
0.28	9.62	85269.7	4069.4	
0.17	0 ° 4 9	94950.4	4512.0	•
4.12	0.73	101755.4	4778.8	
6.14	P. 76	196705.3	4972.5	
. 6.16	· · · · ·	11×579.4	5470.5	
U.18	A. 79	113739.5	5114.2 TGAV = 62750	3.0 LOAD = 6626.0 VEL = 40.0 MPN.
0 . 29	0.79	116459.6	5109.6	
0.25	8.78	123242.4	5051.0 MUPEAK = 0.79) MULOCK # 0.48 RATIO # 1.65
0.30	9.77	123650.1	4975.2	· · · · · · · · · · · · · · · · · · ·
0.35	A.76	126546.3	8°7467	
6.4	۰ U°14	129176.2	4176.1	
2°45	P.72	131602.2	4646.6	
6.51	3.76	13417.6	4501.1	
2•55	V + 68	134121.0	4346.7	
53 19 19 19	3.65	132636.3	4195.7	
29°	7.63	127Au6.1	4.57.8	
5.70	1,4,1	124614.1	3925.7	
75	6°5°	119941.5	3793.3	
- 4 • M	6°57	11-01-246	34515	
2 a • v	n . 55	A7414.2	3514.9	
45 • 4	רר י	C*ryp[]	3,570.22	
۰. ۱۰	۰ ۱	64714.7	1 * 11 × 1	
1.19	ط ۳ ° ن	62758.0	1.H1.F	

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	AVERAGE OF FILE 184	FOR 5 RECORDS.	MICHELIN X	11.0R-22.5/H	(DANA)	
SLIP	ХЛН	TOROUE	X			
6 8 8	30°8	2°2	ũ.ũ.			
6.62	A. 18	34204.1	1776.5			
7 U * U	P.38	73477.1	3725.5			
0.36	a.51	98736.8	49A3.6			
8.98	R. 61	116354.1	5857.7		•	
0.19	0.67	128439.4	6443.1			
9.12	r.71	136244.2	4787.Z			
0.14	P.12	141.998.2	6965.4			
0.16	A. 73	143729.5	7:056.47		•	
0.18	H.73	145354.3	7075.4	T0AV = 83	5988,8 1040 = 9929.4 VFL = 48.8 MPH.	
6.29	A. 73	1 16424.7	7035.5			
0.25	a, 71	148386.3	6879.0	MUPEAK # V	1.73 MULOCK = 0.44 RATIO = 1.67	
P. 31	91.9	149860.9	6712.M			
Ŀ.35	A.68	156929.9	6542.3			
6.43	A. 56	151743.2	537V.B			
8.45	N, 65	152421.9	6193.2			
N.50	0.63	152927.1	6491.2			
P.55	n.61	152549.1	5,797.2			
6.60	2.59	15464.7	4592.0			
V. 65	0 5 6	2 * 5 2 4 4 1	534.8			
c1 • A	M. 55	14:1219.0	8.44.2	•		
2.15	7.53	13113005	5.42.5			
ره ۹ د	12°4	120483.7	445H . H			
0.45	611° i	114161.6	1671.5			
₽6 ° ₹	7.4.7	130766.6	4526.4			-
5 ° N	- Ф.П. Ф.И.	1	6 . 5.45 1			31.
•	17 FT = 1.	A39.07 .	らいない		8 -	8 -

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											55.0 HPH.	,	, 58									•	•				
									•		4 VEL = 5		RATIO = 1.								- - 		-		•		
(0440)	•										LOAU = 3444	-	LOCK # 0.54				,										
22.5/H							. •				AV # 38020.8		PEAK & 0.85 MU				•										
X 11.44-											10		ŊМ														
MICHELIN	F X	2 • 2	617.0	1164.7	.1592.7	1914.2	2141.3	2458.7	2455.2	2775.4	2843.6	2849.1	2882.1	2873.9	2850.0	2415.2	2745.4	2700.4	7623.1	2538.8	2457.9	2344.8	2,594,2	2215.5	2113.7	2:15.2	1916.3
FOH 6 RECORDS.	TORGUE	5° 5	14160.8	265A8 . 3	34398.7	41369。4	51451.8	59344 . R	65575 . 2	76159.1	73655.6	76366.2	91847.9	A6729.3	2.191.5	95719.2	99325. u	1.13448.7	107927.5	14745.1	107768.5	1.0999.1	93092.R	R1694_4	674E4.K	56143.1	46116.2
ILE 185																											
AVERAGE OF F	мUX	5 E E	3.18	0.34	G 1 1 6	A.56	193	a.72	и. 78	9.41	0.84	0.84	3 4 ° U	a. A5	8.95	78 ° 5	9 ° 8 2	3.85	A. 78	G.76	A.75	4.71	3.69	7.60	a, 63	1.4.	1,57
- -	SLIP	R. UA	20.4	0.04	6.76	8 B B	6.10	U.12	e.14	U.16	6.18	5.23	6.25	0.33	0.35	N . N	8.45	0.50	۲ ۰ 55	11.53	4.65	6.73	.1.75	54.5	0.45	P.6 * 8	, 95
	AVERAGE OF FILE 185 FOM 6 RECORDS. MICHELIN X 11.04-22.5/M (DAVA)	AVERAGE OF FILE 185 FOM 6 RECORDS, MICHELIN X 11.04-22.5/H (DAMA) SLIP MUX TONAUE FX	AVERAGE OF FILE 185 FOH & RECORDS, MICHELIN X 11.049-22.5/H (DA14) SLIP MUX TOHQUE FX 0.00 0.00 7.0 V.V	AVERAGE OF FILE 185 FOM & RECORDS. MICHELIN X 11.44-22.5/4 (DAVA) SLIP MUX TONDUE FX 0.03 0.03 1.010.4 M.4 0.02 0.18 1.4160.4 M17.0	AVERAGE OF FILE 185 FOM & RECORDS. MICHELIN X 11.44-22.5/4 (DA*A) SLIP MUX TOHQUE FX (DA*A) SLIP MUX TOHQUE FX (DA*A) SLIP MUX TOHQUE FX (DA*A) R.00 0.08 0.0 M.M (DA*A) R.01 0.08 0.0 M.M (DA*A) R.01 0.08 0.0 M.M (DA*A) R.01 0.01 0.0 M.M (DA*A) R.01 0.11 0.11 M.M (DA*A)	AVERAGE OF FILE 185 FON GRECORDS. MICHELIN X NUM-22.5/H (DA14) SLIP MUX TONDUE FX (DA14) (DA14) RUM A.0 MUX INM-22.5/H (DA14) RUM A.0 MUX NU (DA11) RUM A.0 MUX MUX (DA11) RUM A.0 MUX MUX (DA11) RUM A.0 MUX MUX (DA11) RUM RUM MUX MUX (DA114) RUM RUM MUX	AVERAGE OF FILE 185 FON & RECORDS. MICHELIN X X MM-22.5/H (DAMA) SLIP MUX TONPUE FX (DAMA) (DAMA) SLIP MUX TONPUE FX (DAMA) (DAMA) 0.00 0.00 0.01 0.0 N.0 N.0 0.01 0.03 0.01 0.0 N.0 N.0 0.02 0.18 14160.8 MIC.6 N.0 0.03 0.34 20508.3 1164.7 (DAMA) 0.34 0.349 35398.7 (1592.7 (DAMA) 0.10 0.50 44356.4 1916.2 (DAMA)	AVERAGE OF FILE 185 FON & MICHELIU X II.WP-22.5/H (DA'A) SLIP MUX TORPUE FX (DA'A) SLIP MUX TORPUE FX (DA'A) SLIP MUX TORPUE FX (DA'A) RUM 0.00 MUX TORPUE FX 0.01 0.01 MUX NO NO 0.02 0.18 14160.8 MUX NO 0.02 0.18 NO NO NO 0.034 0.34 NO NO NO 0.04 0.34 1160.7 1160.2 NO 0.05 0.55 4015.2 1150.2 NO NO 0.05 0.56 4015.2 1916.2 NO NO NO NO 0.10 0.56 0.151.8 2141.3 2141.3 2141.3	AVERAGE OF FILE 185 FON & RECORDS. MICHELIN X 11.04-22.5/H (DAVA) SLIP MUX TORAUE F.X (DAVA) (DAVA) SLIP MUX TORAUE F.X (DAVA) (DAVA) RUB MUX A.R (DAVA) (DAVA) (DAVA) RUB MUX MUX (DAVA) (DAVA) (DAVA) RUB MUX MUX (DAVA) (DAVA) (DAVA) <tr< td=""><td>AVERAGE OF FILE 185 FUN RECARDS. MICHELLIN X ILMP-22.5/H (DA.A.) SLIP HUX TOHAUE FX 100-22 100-20 100-20 R.10 Read A.R TOHAUE FX 100-20 100-20 R.10 Read A.R N.M N.M N.M 100-00 R.10 Read N.M N.M N.M N.M 10-00 R.20 Read 1140-7 N.M 116-7 116-7 116-7 Read Read ZetoRe.3 116-7 116-7 116-7 116-7 Read Read 245-07 116-7 159-2 191-2 191-2 Read Setad.8 ZetAB.7 21451.3 245-8.7 245-8.7 191-2 Read Read ZetAB.7 245-8.7 245-8.7 245-8.7</td><td>AVERAGE OF FILE 185 FON & RECORDS. MICHELIN X 11.00-22.5/M (DA.A) 8LIP MUX TORPUE FX 10.04-22.5/M (DA.A) 8LIP MUX TORPUE FX 10.04-22.5/M (DA.A) 0.00 0.08 7.0 0.0 M.M M.M M.M 0.01 0.03 7.0 10.16 M.M M.M M.M 0.02 0.19 11.66.7 M.M M.M M.M M.M 0.03 0.139.7 11.66.7 M.166.7 M.M M.M M.M 0.13 0.146 11.66.7 M.M M.M M.M M.M 0.16 0.405 1916.2 M.M M.M M.M M.M 0.12 0.15 21.05.1 21.01.3 21.05.2 21.05.2 M.M M.M 0.112 0.72 59.144.6 21.05.4 21.05.4 M.M M.M M.M 0.112 0.713 21.05.1 27.</td><td>AVERAGE OF FILE 195 FON & REGRONS. HICHELIN X II.WP-22.5/H (DA.4) 8.LP MUX TORPUE FX (DA.4) (DA.4) 8.LP MUX TORPUE FX (DA.4) (DA.4) 0.08 0.09 Tation W1 Y Y Y 0.012 0.18 11406.7 W1 Y Y Y 0.02 0.19 26508.3 11667.7 Y Y Y 0.03 0.19 2652.7 11667.7 Y Y Y Y 0.10 0.54 1916.2 1916.2 Y Y Y Y 0.10 0.72 0.135.4 1916.2 Z Z Y Y Y 0.12 0.72 59344.6 Z Z Z Y Y Y 0.12 0.73 Z Z Z Z Y Y Y 0.11 0.19 Z<td>AVERAGE OF FILE 195 FUN 6 RECORDS. HICHELIN I</td><td>AVERAGE OF FILE 185 FON 6 RECORDS. HICHELIN X II IDA 8.1P HUX TORPUE FX (D) 0.08 0.01 10 0.1 0.1 0.108 0.01 0.1 0.1 0.1 0.108 0.19 0.1 0.1 0.1 0.108 0.19 1160.1 1116.2 1116.2 0.108 0.19 1160.1 1116.2 1116.2 0.108 0.19 1160.2 11916.2 11916.2 0.109 0.56 04356.4 01916.2 11916.2 0.110 0.50 0434.6 01916.2 11916.2 0.110 0.50 0416.8 2145.3 11916.2 0.110 0.12 0.14.3 2156.2 11916.2 0.110 0.12 0.14.4 0.14.4 10.14.4 0.110 0.110 2156.2 2055.2 2055.2 0.110 0.11 0.14.4 0.14.4 10.14.4 </td></td></tr<> <td>AVENAGE OF FILE 195 FIN 6 REGRIDS. HICHELIN X 11.44*-22.5/H (D.1.1) 8L19 HUX 7.0 N.4 K 0.010 0.010 7.0 N.4 K 0.010 0.010 7.0 N.4 K 0.011 0.012 1.0 N.4 K 0.012 0.19 1.16 1.16 K 0.02 0.13 1.16 1.16 K 0.012 0.14 0.15 1.16 K 0.12 0.15 1.16 1.16 K K 0.11 0.436 1.16 1.16 K K K 0.112 0.12 0.16 2.16 2.16 2.16 K K K K K K K K K</td> <td>AVERAGE FILE IS FUL R (FLELIN TUMP-22.5/H (D.4.1) 8L1P HUX 1089UE HX 1089UE HX (D.4.1) 0.08 0.08 1016U HX 1010U HX (D.4.1) 0.08 0.08 1010U HX 1010U HX (D.4.1) 0.08 0.18 1116U HX 1010U HX (D.4.1) 0.09 0.18 1116U 111 1116U 1116U 1116U 1116U 1116U 0.012 0.134 1116U 1116U</td> <td>AVERAGE OF LIE HIE HIE<</td> <td>AVERAGE OF FILE 195 FICHELIU X ILMO-22.5/H (D.M. J.) 8L1P MUX 10070L FX (D.M. J.) 0.010 0,01 J.0 M.1 (D.M. J.) 0.010 0,01 J.0 M.1 M.1 0.010 0,01 J.0 M.1 M.1 0.02 0,12 M.1 M.1 M.1 0.02 2.05M0.3 1166.7 M.1 A.1 0.02 0.12 M.100.4 M.1 A.1 0.01 0.02 1166.7 M.1 A.1 0.01 10.6 1166.7 M.1 A.1 0.02 0.030.4 1166.7 M.1 A.1 0.01 0.02 2.040.1 1166.7 A.1 0.01 0.02 0.01.2 2.040.1 1166.7 0.01 0.01 0.01.2 2.040.1 1016.7 1016.4 0.01 0.01 0.01.2 2.045.1 1016.4 1016.4 <</td> <td>AVERAGE OF FILE 105 FICH LIP Y IIHP-22.5/H (D.1] 61.19 HUX 10RUUE FX (D.1] (D.1] 0.00 0,-01 1080.16 1.1.0 1.1.0 (D.1] 0.01 0,-01 1010.16 111.0 111.0 111.0 0.02 0,-13 1106.17 111.0 111.0 111.0 0.03 0,-13 1106.17 111.0 111.0 111.0 0.03 0,-13 1106.17 110.1 111.0 111.0 0.04 0,-12 0.13.0 110.1 111.0 111.0 111.0 0.10 0.10 210.1 210.1 210.1 111.0 <t< td=""><td>AVENAGE OF FILE 195 FOULE HIV ILIVE-22.5/H [D.1.1] 8.1P HUX 10801E FX [D.1.2] [D.1.2] 0.00 0.01 -0.0 0.10 [D.1.2] [D.1.2] 1.02 2.01B 1410.1 [D.1.2] [D.1.2] [D.1.2] 0.10 0.13 2.550.0 [D.1.2] [D.1.2] [D.1.2] 0.10 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.12 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.12 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.13 0.10 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.13 0.12 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.12 [D.1.2] [D.1.2]</td><td>VERMEF OF FILE IDA IDA IDA IDA 8.1P HX 10401E FX (144)1 X (144)1 0.08 0.18 10401E FX (144)1 (144)1 0.08 0.18 1146.2 0.17.0 (144)1 (144)1 0.08 0.19 25681.3 1146.7 (154)2 (144)2 0.19 25681.3 1164.7 (150)2 (144)2 (144)2 0.10 0.136.1 1194.2 (150)2 (144)2 (144)2 0.11 0.10 25681.2 1164.2 (145)2 (144)2 (144)2 0.112 0.122 2914.1 2151.1 2151.2 2151.2 (145)2</td><td>NEMAGE OF FILE 195 FUE 401005. METUELIO X ILI-40-22:5/M LOA 0.108 -108 -</td><td>AVEAUENT OF FILE 105 FOIN 6 RECOMDS, MICLELIA 101 IL MICLIA 101 IL MICLELIA 101 IL MICLIA 101 IL MICLELIA 101 IL</td><td>Avenance of File Isis File 6 Recents, 10 Here is 11, 40–22, 5/H (0.1.4) 6,00 0,00 7,0 9,0 6,00 0,00 1,0 1,0 6,00 0,10 1,0 1,0 6,00 0,10 1,0 1,0 6,00 0,10 110 1,0 6,00 0,10 110 1 6,00 0,10 110 1 6,10 0,10 110 1 6,10 0,10 10 1 6,10 0,10 10 1 6,11 0,10 1 1 6,10 0,10 1 1 6,11 0,10 1 1 6,11 0,10 1 1 6,11 0,10 1 1 6,11 0,10 0 1 6,11 0,10 0 0 6,11 0,10 0 0 1,11</td><td>AVENAGE OF FILE IS FIG. 6. ECONDS, ECC. 6. LIO J. J</td><td>NUMBER of FILE 195 FIN. 6 FECANDS. FECA</td><td>NUMBER of FILE 195 FILe 105 FILe 105</td></t<></td>	AVERAGE OF FILE 185 FUN RECARDS. MICHELLIN X ILMP-22.5/H (DA.A.) SLIP HUX TOHAUE FX 100-22 100-20 100-20 R.10 Read A.R TOHAUE FX 100-20 100-20 R.10 Read A.R N.M N.M N.M 100-00 R.10 Read N.M N.M N.M N.M 10-00 R.20 Read 1140-7 N.M 116-7 116-7 116-7 Read Read ZetoRe.3 116-7 116-7 116-7 116-7 Read Read 245-07 116-7 159-2 191-2 191-2 Read Setad.8 ZetAB.7 21451.3 245-8.7 245-8.7 191-2 Read Read ZetAB.7 245-8.7 245-8.7 245-8.7	AVERAGE OF FILE 185 FON & RECORDS. MICHELIN X 11.00-22.5/M (DA.A) 8LIP MUX TORPUE FX 10.04-22.5/M (DA.A) 8LIP MUX TORPUE FX 10.04-22.5/M (DA.A) 0.00 0.08 7.0 0.0 M.M M.M M.M 0.01 0.03 7.0 10.16 M.M M.M M.M 0.02 0.19 11.66.7 M.M M.M M.M M.M 0.03 0.139.7 11.66.7 M.166.7 M.M M.M M.M 0.13 0.146 11.66.7 M.M M.M M.M M.M 0.16 0.405 1916.2 M.M M.M M.M M.M 0.12 0.15 21.05.1 21.01.3 21.05.2 21.05.2 M.M M.M 0.112 0.72 59.144.6 21.05.4 21.05.4 M.M M.M M.M 0.112 0.713 21.05.1 27.	AVERAGE OF FILE 195 FON & REGRONS. HICHELIN X II.WP-22.5/H (DA.4) 8.LP MUX TORPUE FX (DA.4) (DA.4) 8.LP MUX TORPUE FX (DA.4) (DA.4) 0.08 0.09 Tation W1 Y Y Y 0.012 0.18 11406.7 W1 Y Y Y 0.02 0.19 26508.3 11667.7 Y Y Y 0.03 0.19 2652.7 11667.7 Y Y Y Y 0.10 0.54 1916.2 1916.2 Y Y Y Y 0.10 0.72 0.135.4 1916.2 Z Z Y Y Y 0.12 0.72 59344.6 Z Z Z Y Y Y 0.12 0.73 Z Z Z Z Y Y Y 0.11 0.19 Z <td>AVERAGE OF FILE 195 FUN 6 RECORDS. HICHELIN I</td> <td>AVERAGE OF FILE 185 FON 6 RECORDS. HICHELIN X II IDA 8.1P HUX TORPUE FX (D) 0.08 0.01 10 0.1 0.1 0.108 0.01 0.1 0.1 0.1 0.108 0.19 0.1 0.1 0.1 0.108 0.19 1160.1 1116.2 1116.2 0.108 0.19 1160.1 1116.2 1116.2 0.108 0.19 1160.2 11916.2 11916.2 0.109 0.56 04356.4 01916.2 11916.2 0.110 0.50 0434.6 01916.2 11916.2 0.110 0.50 0416.8 2145.3 11916.2 0.110 0.12 0.14.3 2156.2 11916.2 0.110 0.12 0.14.4 0.14.4 10.14.4 0.110 0.110 2156.2 2055.2 2055.2 0.110 0.11 0.14.4 0.14.4 10.14.4 </td>	AVERAGE OF FILE 195 FUN 6 RECORDS. HICHELIN I	AVERAGE OF FILE 185 FON 6 RECORDS. HICHELIN X II IDA 8.1P HUX TORPUE FX (D) 0.08 0.01 10 0.1 0.1 0.108 0.01 0.1 0.1 0.1 0.108 0.19 0.1 0.1 0.1 0.108 0.19 1160.1 1116.2 1116.2 0.108 0.19 1160.1 1116.2 1116.2 0.108 0.19 1160.2 11916.2 11916.2 0.109 0.56 04356.4 01916.2 11916.2 0.110 0.50 0434.6 01916.2 11916.2 0.110 0.50 0416.8 2145.3 11916.2 0.110 0.12 0.14.3 2156.2 11916.2 0.110 0.12 0.14.4 0.14.4 10.14.4 0.110 0.110 2156.2 2055.2 2055.2 0.110 0.11 0.14.4 0.14.4 10.14.4	AVENAGE OF FILE 195 FIN 6 REGRIDS. HICHELIN X 11.44*-22.5/H (D.1.1) 8L19 HUX 7.0 N.4 K 0.010 0.010 7.0 N.4 K 0.010 0.010 7.0 N.4 K 0.011 0.012 1.0 N.4 K 0.012 0.19 1.16 1.16 K 0.02 0.13 1.16 1.16 K 0.012 0.14 0.15 1.16 K 0.12 0.15 1.16 1.16 K K 0.11 0.436 1.16 1.16 K K K 0.112 0.12 0.16 2.16 2.16 2.16 K K K K K K K K K	AVERAGE FILE IS FUL R (FLELIN TUMP-22.5/H (D.4.1) 8L1P HUX 1089UE HX 1089UE HX (D.4.1) 0.08 0.08 1016U HX 1010U HX (D.4.1) 0.08 0.08 1010U HX 1010U HX (D.4.1) 0.08 0.18 1116U HX 1010U HX (D.4.1) 0.09 0.18 1116U 111 1116U 1116U 1116U 1116U 1116U 0.012 0.134 1116U 1116U	AVERAGE OF LIE HIE HIE<	AVERAGE OF FILE 195 FICHELIU X ILMO-22.5/H (D.M. J.) 8L1P MUX 10070L FX (D.M. J.) 0.010 0,01 J.0 M.1 (D.M. J.) 0.010 0,01 J.0 M.1 M.1 0.010 0,01 J.0 M.1 M.1 0.02 0,12 M.1 M.1 M.1 0.02 2.05M0.3 1166.7 M.1 A.1 0.02 0.12 M.100.4 M.1 A.1 0.01 0.02 1166.7 M.1 A.1 0.01 10.6 1166.7 M.1 A.1 0.02 0.030.4 1166.7 M.1 A.1 0.01 0.02 2.040.1 1166.7 A.1 0.01 0.02 0.01.2 2.040.1 1166.7 0.01 0.01 0.01.2 2.040.1 1016.7 1016.4 0.01 0.01 0.01.2 2.045.1 1016.4 1016.4 <	AVERAGE OF FILE 105 FICH LIP Y IIHP-22.5/H (D.1] 61.19 HUX 10RUUE FX (D.1] (D.1] 0.00 0,-01 1080.16 1.1.0 1.1.0 (D.1] 0.01 0,-01 1010.16 111.0 111.0 111.0 0.02 0,-13 1106.17 111.0 111.0 111.0 0.03 0,-13 1106.17 111.0 111.0 111.0 0.03 0,-13 1106.17 110.1 111.0 111.0 0.04 0,-12 0.13.0 110.1 111.0 111.0 111.0 0.10 0.10 210.1 210.1 210.1 111.0 <t< td=""><td>AVENAGE OF FILE 195 FOULE HIV ILIVE-22.5/H [D.1.1] 8.1P HUX 10801E FX [D.1.2] [D.1.2] 0.00 0.01 -0.0 0.10 [D.1.2] [D.1.2] 1.02 2.01B 1410.1 [D.1.2] [D.1.2] [D.1.2] 0.10 0.13 2.550.0 [D.1.2] [D.1.2] [D.1.2] 0.10 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.12 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.12 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.13 0.10 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.13 0.12 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.12 [D.1.2] [D.1.2]</td><td>VERMEF OF FILE IDA IDA IDA IDA 8.1P HX 10401E FX (144)1 X (144)1 0.08 0.18 10401E FX (144)1 (144)1 0.08 0.18 1146.2 0.17.0 (144)1 (144)1 0.08 0.19 25681.3 1146.7 (154)2 (144)2 0.19 25681.3 1164.7 (150)2 (144)2 (144)2 0.10 0.136.1 1194.2 (150)2 (144)2 (144)2 0.11 0.10 25681.2 1164.2 (145)2 (144)2 (144)2 0.112 0.122 2914.1 2151.1 2151.2 2151.2 (145)2</td><td>NEMAGE OF FILE 195 FUE 401005. METUELIO X ILI-40-22:5/M LOA 0.108 -108 -</td><td>AVEAUENT OF FILE 105 FOIN 6 RECOMDS, MICLELIA 101 IL MICLIA 101 IL MICLELIA 101 IL MICLIA 101 IL MICLELIA 101 IL</td><td>Avenance of File Isis File 6 Recents, 10 Here is 11, 40–22, 5/H (0.1.4) 6,00 0,00 7,0 9,0 6,00 0,00 1,0 1,0 6,00 0,10 1,0 1,0 6,00 0,10 1,0 1,0 6,00 0,10 110 1,0 6,00 0,10 110 1 6,00 0,10 110 1 6,10 0,10 110 1 6,10 0,10 10 1 6,10 0,10 10 1 6,11 0,10 1 1 6,10 0,10 1 1 6,11 0,10 1 1 6,11 0,10 1 1 6,11 0,10 1 1 6,11 0,10 0 1 6,11 0,10 0 0 6,11 0,10 0 0 1,11</td><td>AVENAGE OF FILE IS FIG. 6. ECONDS, ECC. 6. LIO J. J</td><td>NUMBER of FILE 195 FIN. 6 FECANDS. FECA</td><td>NUMBER of FILE 195 FILe 105 FILe 105</td></t<>	AVENAGE OF FILE 195 FOULE HIV ILIVE-22.5/H [D.1.1] 8.1P HUX 10801E FX [D.1.2] [D.1.2] 0.00 0.01 -0.0 0.10 [D.1.2] [D.1.2] 1.02 2.01B 1410.1 [D.1.2] [D.1.2] [D.1.2] 0.10 0.13 2.550.0 [D.1.2] [D.1.2] [D.1.2] 0.10 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.12 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.12 0.13 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.13 0.10 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.13 0.12 [D.1.2] [D.1.2] [D.1.2] [D.1.2] 0.11 0.12 [D.1.2] [D.1.2]	VERMEF OF FILE IDA IDA IDA IDA 8.1P HX 10401E FX (144)1 X (144)1 0.08 0.18 10401E FX (144)1 (144)1 0.08 0.18 1146.2 0.17.0 (144)1 (144)1 0.08 0.19 25681.3 1146.7 (154)2 (144)2 0.19 25681.3 1164.7 (150)2 (144)2 (144)2 0.10 0.136.1 1194.2 (150)2 (144)2 (144)2 0.11 0.10 25681.2 1164.2 (145)2 (144)2 (144)2 0.112 0.122 2914.1 2151.1 2151.2 2151.2 (145)2	NEMAGE OF FILE 195 FUE 401005. METUELIO X ILI-40-22:5/M LOA 0.108 -108 -	AVEAUENT OF FILE 105 FOIN 6 RECOMDS, MICLELIA 101 IL MICLIA 101 IL MICLELIA 101 IL MICLIA 101 IL MICLELIA 101 IL	Avenance of File Isis File 6 Recents, 10 Here is 11, 40–22, 5/H (0.1.4) 6,00 0,00 7,0 9,0 6,00 0,00 1,0 1,0 6,00 0,10 1,0 1,0 6,00 0,10 1,0 1,0 6,00 0,10 110 1,0 6,00 0,10 110 1 6,00 0,10 110 1 6,10 0,10 110 1 6,10 0,10 10 1 6,10 0,10 10 1 6,11 0,10 1 1 6,10 0,10 1 1 6,11 0,10 1 1 6,11 0,10 1 1 6,11 0,10 1 1 6,11 0,10 0 1 6,11 0,10 0 0 6,11 0,10 0 0 1,11	AVENAGE OF FILE IS FIG. 6. ECONDS, ECC. 6. LIO J. J	NUMBER of FILE 195 FIN. 6 FECANDS. FECA	NUMBER of FILE 195 FILe 105 FILe 105

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		** A-D FILE 186	· FILE 98,	· TEST S	AMPLEZUS **	-
	AVERAGE OF FILE 18	6 FOR 6 RECORUS.	HICHELIN X 11.6	R-22,5/H	(DANA)	
SLIP	XIIH	TORAUE	FX			
8°.0	0°93	6. 6	6 . 4			
8.42	6.23	27717.2	1340.3	•		
6.64	A. 3P	51678.5	2520.7			
2.76	0.52	74411.3	3433.1			
8.9.8	N.63	84491.5	4694.8			
01.9	G. 7.J	94533 . A	4546.6			
6.12	a. 75	101534.3	4844.2	•		
2.14	C.78	106589.3	5024.3			
P.16	₩8°.	114439.4	5125.5			•
U . 18	A. B1	113449.9	5177.7	T0AV = 63000.0	LOAD = 6641.8	VEL = 40.0 MPH.
0.20	0 81	115572.3	5184.6		•	•
2-5	14.4	119760.5	5148.2	MUPEAK = 0.81	MULOCK = 0.47 RA	.710 = 1.72
0°30	8 . 8	123467.5	5 JAK . 8			
U. 35	0.78	126924.6	4987.2	·		
2 - C	¢. 76	130241.9	4871.4			•
11.45	0.74	133389.4	4733.2			•
u.5A	a . 72	135835.3	4591.3	•		
0°52	6°49	136771.9	4476.7			
4.62	7.67	1.4419.7	4275.9			
8.65	¹³ 65	129804.3	4132.4			
0.79	4° 62	121947.1	39Au.1			
9.75	5 - 5 -	111742.4	3422,5			•
9.8C	۰ ۰ 57	19709	5057.4			
£8.8	P • 54	B.B.a.h.5 . 3	3505. B			
00°0	5.5	78564.7	3 3 6 1 . 2			
:: •) 、	, ,	7:173.3	5,414,5			
U., • #	0.47	630PC-0	3041.5			

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		44 A=D FILE 187	NCW FJLE	99, TEST 3	14MPLE 206 44		
• •	AVERAGE OF FI	LE 187 FOR 6 RECORDS.	MICHELIN X	; 11,08-22,5/H	(DAMA)	•	•
SLIP	. XUM	TORQUE	. FX		•		
8°, 40	86° 5	5 ° 5	0 ° V				
6.25	A.23	31223.7	1511.2				
6.94	8.42	57149.3	2786.6		•		·
8.36	9 5° 0	75742.2	3685,1				
69.08	и. 66	88998.Z	4376.6				
0.10	P. 72	9023A.3	4754 a				
0.12	Q.77	124637.9	5M12.4				
U.14	R. 79	109146°2	5161.A			•••	
0.16	5 5	112416.1	5240.6	•			
8 I 8	3.81	114914.7	5267.7	TGAV # 61937.	5 LOAD = 664	40.7 VEL = 55.	HOH 0
6.24	6. 81	116584.3	5247.8				•
P.25	0.79	119680.0	5154.4	MUPEAK . 0.81	MULOCK = 0.41	7 RATIO = 1.73	-
0°30	n_78	122456,3	51145.6				
0.35	A . 7 b	125172.9	1928.1				
0.43	0.74	127933.7	4804.4				
e. 45	a.72	130805.3	4675.8			* <u>.</u>	
6.50	G. 71	133643.0	4544.3				
£•55	64°1	136287.0	4 398 N				
4.63	, , , , , ,	137274.4	4253.7			- - -	
59°5	5.64	136236.0	4111.4				
N. 70	7°62	131564 . R	3970.9				
2.15	ن • 59	122411.8	3434,8			-	
4.69	12.	117626.7	3641.3		-		
Ø.45	1.55	1.176	3520.0				
ت ح ت	52.5	ਚ ਰਿਸ਼ਾਇ	341.3				
2.45	67° v	11955.0	9271.0				
5. ja • 1	A.47	5°28619	3+38.0				

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		** A-) FILF 189	TH FILE 100 TEST SAMPLE200 AN	
	AVERAGE OF FILE	189 FOH 7 RECORDS.	MICHELIN X 11.0R-22.5/H (DANA)	
SLIP	ХЛН	TORDUE	XL	
8 ° 0 8	0 • AK	5° 5	13. ht	
6.62	9.21	28397.4	1396. b	
6.44	" 3 6	6° i 1667	2456.7	
6.46	4.4.4	65AH2.2		
8 0 B	r.51	77714.2	3813.7	
6.19	A.63	87227.1	112911.1	
6.12	B . 70	97166.2	4665.6	
0.14	P • 74	144166.9	4942.5	
A.16	u ، ۲۵	104441 . 3	50A9.7	
6.18	77	111663.3	5154.9 TOAV = 66414.7 LOAD = 6841.7 VFL = 4	. N M M M
Q . 2 %	A.78	113527.9	5163.3	
P.25	4.77	1.17422.A	5114.9 HUPFAK = 0.78 MULUCK = 0.49 RATIO = 1.	57
0.30	V.76	119933.6	5453.0	
9,35	2.75	122396.2	4976.4	
6.43	0°-74	124512.7	4893.7	-
Q • 45	n. 72	124349.7	4.8.50°.0	
0.50	0.71	124at7°a	4693.7	
ن ، 55	3.69	129136.5	1574.6	
59°.	2.67	126857.4	44447.6	
۲. ۵5	N • 55	126517.3	431A.7	
11.7.	1.63	121779.5	n.191.	
0.75	r.61	114234.44	4559.7	
5 9 ° 5	1 ⁴ • 59	1 04 3 8 H . H	3916.6	
6.45	r.51	9.151.9	3745.A	
6.9.5	: • 5 a	84164.1	3612.2	
វិល •ឺ ហ៍	רי י	1 * 6 to 8 Z	5 · 전 5 전 1 · · · · · · · · · · · · · · · · · ·	
۲ ۰۰ ۲	かさ・.	46414.7	3 \$1 tu	

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Fig. 3: Load sensitivity in the peak and slide traction of a six-tire sample on dry asphalt. All tests run at 64 km/h.



 Velocity sensitivity of the peak and slide traction values for a sixtire sample on dry asphalt. All tires operated at their respective T & RA rated load.



Fig. 5: The differing influence of pavement surface on the velocity sensitivities of two tires.



Fig. 6: Typical load sensitivities in the side force response of a sample of 10.00 x 20 tires tested at 32 km/h on a dry concrete surface.

LATERAL FORCE vs. SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Lateral I	Force a	t Indica	ated S1	ip Angle	e (degs.)
(lbs.)	(psi)	1	2	4	8	12	16
1800	85	197	427	752	1250	1547	1605
3600	85	395	748	1352	2302	2876	3086
5430	85	504	973	1773	3065	3867	4317
7200	85	570	1102	2023	3591	4605	5310
8700	85	625	1159	2166	3883	5047	5930

ALIGNING TORQUE vs. SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Aligning	Torque	at Indi	.cated	Slip Angle	e (degs.)
(lbs.)	(psi)	1	2	4	8	12	16
1800	85	18	36	48	45	27	10
3600	85	59	101	146	157	125	74
5430	85	96	171	261	310	269	178
7200	85	130	235	374	481	442	315
8700	85	159	293	479	640	623	452

CIRCUMFERENTIAL STIFFNESS vs. SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	C _s (lbs.)	Vertical Spring Rate (lbs./in.)
1800	85	18,000	
5430	85	56,000	5700
8700	85	46,000	

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0. F. GOP AICH INTERCITY MILEAGE 11.58X20 G

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

•

• 1 •	1443.2	2863.5	4876.8	5150.2	2959.2	4118.0	3056,2	4185.8	
-12 +16	1414.4 -1474.2	2666.9 -2689.5	3775.2 -4120.8	4702.8 -5218.4	-2848,2	-4827.6	2982.5	1 4 7 7 4 7 ° 7	
-8 ÷12	59,1 +1343,1	38.4 -2616.7	95.1 -3752.5	58.4 <u>44688</u> .8	52.6	46.3	43° B	63.5	
8+	1-1202.2 11	3 -2277.1 22	7 -3133.8 30	5 • 3909.6 37	1 -2307.2 22	1 -3174.0 30	5 -2381.8 23	i -3165.5 30	
4	741.1	1442.6	1950.7	2276.	1577.1	1988.	1587.6	1945.	
7	- 514.0	-1533.9	-2076.7	-2437.5	•1666.3	-2139.1	-1721.2	-2112.4	
- 5	436.5	803.6	1967.6	1224.6	879.7	1094.6	920.5	1093.6	
+2	-491.1	-899.7	-1202.2	•1399 . 9	-1010.1	-1272.0	-1039.1	1247.7	
-	218.0	397.0	524.6	. 598.2	444.7	553.7	461.9	520.7	
+1	-303.2	-508.7	-666.4	•755 •2	-568.3	-713.6	-607.3	-715,0	
6	- ¢. 7	•52•3	-72.7	-83,8	-77.4	-87,3	-78.4	- 97.5	
LOAD	2000-0	4666.6	6868.8	8986.8	4000.0	6888.8	4869.0	6000.0	
104	109.0	100.0	100.0	109.0	75.0	75.0	50.0	58.8	

ALIGNING MOMENT (FT'-LB') AT INDICATED INFLATION PRESSURE (PSI), LDAD (LB'), AND STEER ANGLE (DEG.)

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-16	-1.8	•33.4	-97.3	-177.6	-24,9	- 6 8 . 8	•36.7	-117.1
+16	- 8 -	21.1	82.6	163.0	4.1	48.6	11.5	57,4
-12	-15.0	-81.6	•183,3	-321.1				
+12	4.4	59,0	153,0	271.1				
6	•33.6	-137.8	-263.3	•426.4	-121.4	-267.1	-137.0	-312.6
8 +	31.5	124.8	244.5	425.6	107.5	252.9	126.7	9,195
7	-53,3	•159.9	•287.5	• 428.1	•183.0	•333,6	-216.4	-392.6
 +4	47.5	160.0	292,5	431.8	173.5	527.9	203.6	379.6
~	-42,5	-114.5	• 195 . 9	275.8	-138.7	•231.9	-171.2	-271.5
2+	36.4	119.3	208.7	295.6	151.7	250.0	178.5	298.6
	-27.2	•65.4	•103.6	-144.7*	•80.0	-125.6	8.44	-148.2
	18.6	76.1	130.4	178.8	95,1	154.9	117.6	183,9
6	•2•1	8°2	14.6	22.1	14.8	21,1	19.8	26.9
LOAD	2000.0	4600.0	6 6 6 6 e e	8000.0	0000	6689.0	4 6 6 6 . 6	6690.0
184	100.0	169,0	100,0	160.0	15.0	75.0	50.0	50.0

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loads, the tire behaves (laterally) like a softening spring. The lateral spring rate is the slope through the origin of the lateral load-deflection curve.

IRACTION STIFFNESS $(C_{\alpha}, C_{\gamma}, C_s)$ - The following three properties are defined to characterize the mechanical behavior of a rolling tire operated at very small slip and camber angles and for very light application of braking or driving power.

Cornering Stiffness

$$C_{\alpha} = \frac{dF_{y}}{d\alpha} \bigg|_{\alpha = 0}$$
(1)

Camber Stiffness

$$C_{\gamma} = \frac{dF_{y}}{d\gamma} \bigg|_{\gamma = 0}$$

Circumferential Stiffness

$$C_{s} = \frac{dF_{x}}{ds} \bigg|_{s=0}$$
(3)

where:

 α = slip angle

 γ = camber angle

s = circumferential slip parameter



Fig. 1 - Vertical load versus change in low-speed rolling height of tires shown in Figs. 2A-2C

s = 0 free rolling (light braking: s < 0.05)

 $\left| < 0 \text{ driving} \right|$

- F_x = longitudinal traction force (depends primarily on s)
- F_y = lateral traction force (depends on both α and γ)

Graphically, the traction stiffness is the slope taken through the origin of the traction force $(F_x \text{ or } F_y)$ versus a particular operating variable $(\alpha, \gamma, \text{ or } s)$ curve. These stiffnesses measure the initial rise of traction force and have no direct relation to peak values. However, a tire with higher traction stiffness will usually develop higher peak traction force. The usefulness of these definitions depends on linear behavior for small values of the operating variables. Examination of the following truck tire data will show this linearity to be a reasonable assumption.

GENERAL BEHAVIOR

2)

Figs. 2A-2C describe three truck tires chosen to exhibit a broad range of traction stiffness properties^{*}. The mechanical properties listed below each tire were measured at rated load and pressure. The carpet plots of lateral force versus slip angle and vertical load show the variation in lateral force obtained and indicate how the cornering stiffness, C_{α} , is related to slip angle and load. Although C_{α} measures only the initial rise of lateral force with slip angle for a particular tire load, the rise is similar at other tire loads. It appears that a tire showing higher cornering stiffness will develop more lateral force than a lower stiffness tire operated at the same slip angle and vertical load.

TIRE LOAD

The operating variable having the greatest influence on traction stiffness is tire load. The influence of tire load derives from the extreme deformation which a tire undergoes in the contact region. Specifically, the meridian and circumference profiles, intersecting at the center of contact, are substantially altered in dimension and curvature as tire load is increased. The camber, cornering, and circumferential stiffnesses, being indirectly influenced by lateral and longitudinal tire stiffness, are consequently dependent on structural geometry, and are seen to increase with test load for the tires diagrammed in Figs. 3A-3D.

Particularly affected by sidewall deformation is the lateral spring rate, K_y . Fig. 3D illustrates the variation of K_y with tire load for the three tires shown in Figs. 2A-2C. Increasing load on the tire from far below the design value results mainly in an increased contact length with some change in the meridian profile. The increased contact length causes an increase in lateral stiffness. At higher loads, the changes in tire

^{*}The tires are representative of the 14 different truck tire sizes tested for this program.

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profile become very pronounced, especially in the sidewall area, and cause a reduction in spring rate. It should be noted 'hat the maximum value of lateral spring rate occurs near the .esign load for each tire tested.

The vertical load-deflection data are remarkably linear for a broad range of tire loads (Fig. 1). Fig. 1 suggests that it is reasonable to consider the tire as a linear vertical spring with spring rate, K_z , defined as the average slope of the load-deflection plot.

INFLATION PRESSURE

Increasing inflation pressure reverses the deformation caused by vertical load. Although a decrease in contact length accompanies an increase in inflation pressure, the dominant effects of increased pressure are reduced curvature in the sidewall and a generally stiffened carcass structure. The net result is a lateral spring rate that increases with inflation pressure, as is demonstrated by Fig. 4; these data being obtained on the three tires shown in Figs. 2A-2C. As may be expected, the effect of increasing the pressure is more pronounced at the higher loads which cause large distortions in the meridian profile.

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The cornering stiffness, C_{α} , exhibits similar pressure sensitivity at higher vertical loads. Fig. 5 compares the lateral force versus slip angle and vertical load exhibited by a 10.00-20/G tire (Fig. 6B) at rated inflation pressure (100 psi) and at 50 psi. As can be anticipated from lateral spring rate behavior measured for these three different tires (Fig. 4), cornering stiffness increases with inflation pressure at higher loads.

The apparent similarity between K_y and C_α is due to the definition of K_y as the lateral stiffness of a standing tire measured at, effectively, a 0 deg slip angle while C_α is defined to measure the stiffness of the rolling tire in generating lateral force at very small slip angles. However, the contact region deformation associated with tire traction is considerably more complicated than the deformation associated with the measurement of K_y . As no rational basis exists for the correlation of these values, they are treated as independent mechanical properties.



Fig. 3 - Variation of mechanical properties with tire load for tires shown in Figs. 2A-2C. A-camber stiffness versus tire load; B-cornering stiffness versus tire load; C-circumferential stiffness versus tire load; D-lateral spring rate versus tire load

PLY RATING AND TIRE SIZE

The ply rating designates the load range for which a particu-

size tire is designed. Load limits for various sizes at specific inflation pressures up to the design pressure are tabulated according to empirical formulae. The ply rating is a measure of the strength of the tire carcass and does not necessarily indicate the actual number of plies.

The tire pairs listed in Table 1 were tested on design width precision rims at the indicated pressures and loads which are



Fig. 4 - Lateral spring rate K_y versus inflation pressure for tires shown in Figs. 2A-2C

near the design values specified for these tires used as singles and duals. The higher rated tire of each pair is generally used as a dual. The 20 in tires that were tested all have the tread pattern shown in Fig. 6B. The tread pattern of the 11.00-22 tires (Fig. 2A) is similar. Table 2 lists the measured mechanical properties and illustrates the differences which may be found in tires which are similar in all respects, except for ply rating.

The differences seen in Table 2 are slight and possibly influenced by tire nonuniformity and/or measurement precision. There is remarkably little change in the properties of the 11.00-22 tires, the largest set tested for differences due to ply rating. The slight increase in test pressure (see Table 1) may be responsible for the increases in vertical spring rate. It is of interest to note that the vertical spring rate measured for the 10.00-20 tire with the G rating was less than that obtained for the F load rating. However, the lateral force generating ability did increase with increased load rating as evidenced by the



Fig. 5 - Lateral force versus slip angle and vertical load on 10.00-20/G tire at rated pressure (100 psi) and at 50 psi



Fig. 6 - Measured mechanical properties of 10.00-20/F nylon tire in three tread patterns. Arib-type I; B-rib-type II; C-open tread

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FIRESTONE TRANSPORT 110, 12 x 20/H, BADC ASPHALT

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(B)

		** A=0 FILE 197	NEW FILE 74	TEST SAMPLE351 ++
	AVERAGE OF FILE	197 FOR 5 RECORDS.	FIRESTONE TRANSPORT 1	/ 18 12.8-28/H DRY ASPHALT (3.8.)
SLIP	MUX	TORQUE	₹X.	
9.99	8.80	8.8	8,8	
9,92	8,87	11237.2	594.3	
8.84	A.10	24839,4	1254,3	
0,86	8.24	38869.9	1927,8	
8.98	8.32	51598,8	2526,4	
0.10	0,38	62238.1	3825,1	
8.12	0,43	78849,9	3432,8	
8.14	0,49	79885.9	3841.9	
0.10	8.54	88946.3	4293,5	
0.18	8.68	98778.9	4753.8 TQAV	- 132288.8 LOAD = 7979.2 VEL = 3.8 MPH.
4.20	0.56	107715.9	5154.9	
8,25	8,75	123794,7	5918,1 HUPE	AK = 8,69 HULOCK = 8,88 RATIO = 1,12
0.30	0.83	135876.7	6451,1	
e.35	8.87	143123.2	6744,5	
8.49	7,84	145587.9	b\$41,2	
8,45	a, 89	145957,2	6846 . 1	
0,50	0.89	145454.7	6889.6	
a.55	P.88	144534.8	6752,9	
9.68	9,87	143485.9	668 4 ,2	
0,65	9.80	142174.4	6614,5	
0,70	P.85	140891.1	6548.3	
0.75	0.84	139581,9	6464.8	
8.88	P.83	138259,9	6366,7	
0.85	P.82	136931,4	6312,3	
0.90	Ø.81	135526.3	6233,8	
0.95	2.80	133973,5	6151,3	
1.00	6,89	132200,0	6963.9	



		++ A+0 FILE 198	HEN FILE AP "	TEST SAMPLE352
	AVERAGE OF FILE 198	FOR 6 RECORDS.	FINESTONE TRANSPORT	110 12.8-28/H DRY ASPHALT (8.8.)
SLIP	₩UX	TOPQUE	FX	
4.9P	P. 88	6.5	P.8 .	
P.+2	4,44	11728.8	669.6	
	8,18	29336,1	1451.2	
8.86	¥,24	46317.4	2268.7	
w. #8	4,38	61297.9	3014.5	
P.1P	*, 46	74758.F	3640.7	
8.15	*,54	88173.7	4278.1	
v.14	P., 63	1#1478,5	4896,9	
r.16	P. 74	113377.2	5432.5	
H. 18	3,76	122321.P	5851.1 TQA	V = 146428,8 LOAD = 7974,1 VEL = 14,8 MPH
4.54	P.5H	128815.#	6138.7	
7.25	a, 86	139583.5	6555.3 HUP	EAK + 8,48 HULDER = 8,67 RATIO = 1,35
r.3P	P.89	147439,7	6774.5	
P. 35	2.98	153864,1	6858,1	
P, 48	2,48	157104.3	6841.8	
0.45	a, 98	168412.6	6789,8	
r.5a	P.89	16#713.1	6784.3	
v. 55	9.87	157877.1	6575.1	
8.68	P.85	152455+1	6416.6	
4.65	P.43	146797.8	6254.1	
H. 70	P.81	141337.4	6892.4 s	
P.75	P.,78	136847.8	5931.6	
F.8P	7,76	13#744.7	5771.1	
4.85	#.7#	125516+7	5610,9	
N. 98	9,72	119917.9	5446.6	
P. 95	A. 69	113544.5	5273,9	
1.85	9.67	184828.5	5088.7	



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		** A-D FILE 199	NEW FILE 61	TEST SAMPLE353 ++
	AVERAGE OF FILE	199 FOR 5 RECORDS.	FIRESTONE TRANSPORT	T 110 12.0-20/H DRY ASPHALT (8.8.)
SLIP	MUX	TORQUE	PX .	
8.88		A. D	8,8	
9.02	8.17	26778,2	1371.8	
8.84	0.29	45878,3	2264,5	v
0,06	A. 44	64262,1	3115,5	
0.38	P.50	80629,4	3892.4	
0.10	8,59	95020,7	4564.8	
0.12	9,66	107409,7	5114.7	
8.14	8,72	117485.6	5560,3	
0.16	8,76	126179.3	5986.1	
0.18	8.80	132878,6	6178.4 TG	GAV = 98773.8 LOAD = 7883.8 VEL = 28.8 MPH.
8,28	8,82	137498.7	6396,2	
0.25	8,84	144545.5	6446.2 HU	UPEAK = 0.85 MULOCK = 0.58 RATIO = 1.47
9.38	8,85	149215.5	6481.7	
0.35	0.45	152305,#	6449,4	
8.48	8.84	154675.6	6369.4	
P.45	0,82	156889,2	6254,8	
8,58	9,81	158887.8	6125.3	
0,55	e. 79	168725.6	5985.8	
8.68	0.77	161841.3	5840.5	
0.65	9,75	168935.4	5698,9	
0,70	9,73	156733.8	5541.0	
0.75	P.71	149664.8	5383.0	
8.88	P.68	134514.3	5196.8	
0.85	A. 66	127952.2	5896.8	
0,90	a. 63	116430,5	4815.4	
0.95	9,61	184172.1	4618.1	
1.99	P.58	98775,6	4411.5	



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		** A=D FTLE 243	NEW FILE #2	TEST SAMPLESSA an
	AVERAGE OF FILE 20	3 FOR A RECORDS.	FIRESTONE TRANSPORT	118 12.0-20/H DRY ASPHALT (S.R.)
SLIP	Heft B	TORQUE	Fx	
0.3 0	P.0P	9,8	8, P ·	
9. 45	P,14	23276.7	1145.9	
P. #4	P.25	44278,5	2215,2	
ø, 96	P., 34	64724,5	3868.4	
4. PA	P. 48	Av#66.5	3747.0	
P.18	0,57	43874,A	4448,3	
4.17	P. +5	146637.8	5826.7	
P.14	P.72	117843.2	5535.5	
0.16	P, 77	126168.4	5953.1	
¥.18	P. 41	133968.4	6261.7 TQA	V = 44883.3 LOAD = 8817.1 VFL = 30.0 +04.
r. 20	P. A3	139548.0	A391.4	
P.25	*,84	147599.4	6469.7 NUP	EAK # 0,84 MULGER # 0,53 RATIO \$ 1,58
A. 3P	P.84	152882.5	6484.1	
P.35	P, 42	154594.8	6344.7	
** . ##	P.A1	159565,3	6216.9	
4,45	A, 78	162914.2	6854.2	
P.50	P.76	104116.2	5891.1	
P. 55	P.74	165872,3	5721.6	
P.68	9,72	147951.2	5555.2	
4.65	a,70	166713.5	5391.0	
H.7P	9,68	143845.9	5232.4	
H.75	P.66	155547.5	5874.8	
H. AA	·R.64	143631.5	4482.4	
r.85	P. +1	129581.3	4714.8	
	P.59	114711.0	4514.7	
H.95	#,5e	99682.8	4319,3	
1.40	4 53	84881.3	A118 8	

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		** A-D FILE 200	NEW FILE 83 (TEST SAMPLESSS
	AVERAGE OF FILE	294 FOR 6 RECORDS.	FIRESTONE TRANSPORT 119	12.8-28/H ORY ASPHALT (8.8.)
SLIP	HUX	TORQUE	#X	
6.90	a, 90	Ø.A	9.9	
8.65	0.19	29867.8	1471.6	
9,84	0,30	49383.5	2378.1	
9.86	0,41	67724.8	3225.6	X
0.08	8.51	83858,4	3961.2	
8,18	8,68	97988.6	4642.1	
0,12	#,67	118911.0	5292.2	
0,14	0.73	121493.3	5648,8	
8.14	P.78	129784.6	5992.8	
0.18	8.81	135848.4	6228.6 TQAV =	83812.5 LOAD # 7928.8 VEL # 48.8 MPH.
0.29	8.43	140164.5	6325,9	
0,25	A.84	146753.8	6367.5 HUPEAK	< 8,84 MULOCK = 8,55 RATIO = 1,52
0.30	8.83	151562,2	6386,8	
0.35	Ø.82	155315.7	6185.5	
8,48	9,89	156451.2	6838.6	
0,45	0,78	141195,3	5881.4	
0.50	8.76	163264,0	5721.8	
0.55	8.74	164979.9	5557.4	
8.48	9,72	166263,3	5395,9	
0.65	0,78	166886.5	5241.2	
0.79	0.68	145752.3	5886.7	
0,75	9.66	148927,8	4932.6	
0.80	P.63	151237.5	4775.9	
0.85	P.61	136563,2	4617.7	
Ø.90	7,59	119596.6	4468,7	
8,95	a. 57	181998.9	4386.4	
1.09	P.55	83812,5	4156.2	



		** A-D FILE 245	NEN FILE 84'	TEST SAMPLESSS ++
	AVEHAGE OF FILE 285	FOR & PECORDS,	FIRESTONE TRANSPORT	118 12.8-28/M DRY ASPMALT (8.8.)
SLIP	41)X	TORQUE	FY	
8. NB	* . ## `	P. P	a.e.	•
4.85	4.17	29941.8	1361.4	
9,84	A, 3A	51355,7	2386.8	
8. B6	P.41	78582.6	3293.4	
P., AR	P.52	87711.4	4898.6	
H.1P	*. 60	182439.P	4736.8	
W.12	A. 67	114148.6	5256.5	
H.14	P.73	123446.0	5678,1	
8.16	A.77	13#723,2	5991.6	
H.18	P. 89	136422.4	6225.2 TO	AV = A5964.7 EBAD = 8041.2 VEL = 55.4 HPH.
#.2P	P.41	1 491 45.1	4318.7	
0.25	n.#1	146692.2	4296.2 MU	PEAK = 0.41 HULDCK = 0.54 RATIO = 1.51
F. 3P	P. RH	151196.4	6143.3	
A,35	P., 79	153843.3	6 058 .7	
4.49	P. 77	155#51.3	5911.7	
4.45	4,75	150158.2	5755.1	
4.50	۳.73	160858.7	5545.2	
4.55	a, 7#	163621.2	5434.5	
H.6P	P. 68	166258.7	5294,1	
9.65	P.67	168423.8	5148.5	
H.78	4,45	144757.5	584P.3 9	
۴.75	P. 63	169284.7	4926.2	
H. 8P	A. 62	164218.9	4816.8	
4.85	P. 6P	151333.6	4679.8	
4.44	P. 58	131418.7	#525+2	
a . 95	7,56	1#4441.5	4363.1	
1.00	P.54	45968.7	4190.0	

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		** A=D FILE 218	NEW FILE 66	1	TEST SAMPL	E358 ++	
	AVERAGE OF FILE	218 FOR 5 RECORDS.	FIRESTONE TRANSPOR	PT 118	12.8-20/H	DRY ASPHA	_T (8,8,)
SLIP	MUX	TORQUE	FX				
0,00		8,9	9,9 🔤				
9,92	A.58	13434.7	647,8				
8,94	0.35	23155,6	1111.0				
0,06	8.50	34302,3	1618,2				
8.98	9.64	44553.0	2844,5				
P.10	Ø.75	52623,1	2347,5				
8.12	P.A3	58877.4	2656.2				
0,14	P.88	64833,7	2022.1				
0.16	8.91	68389,2	2919.6				
0,18	я, 93	71725,2	2972.4	19AV =	41875,# L	0AD = 3259,	,7 VEL = 40,8 MPH,
0.20	M. 44	74052.3	2982.7				
0.25	8,94	78454,8	2957.7	UPEAK	= 9,94 HUL	OCX = 8.66	RATIO = 1,43
0.30	P.93	81946.9	2989.2				
0.35	0,92	84981.4	2841,4				
8,48	8.89	87876.5	2768,6				
8.45	A.84	98664,5	2675,9				
9.50	Ø.84	94812.9	2597.2				
0.55	Ø.81	97982.8	2524.2				
8.69	8,79	99844.8	2449,7				
8.65	0.77	162326.8	2386.4				
8.79	9.76	183639.4	2339,9				
9.75	0.75	191717.7	2297.7				
0.80	P.73	94581.8	2253,7				
0.85	Ø.71	83439.6	22#8.5				
0.90	9.78	69976.9	2144.3				
Ø.95	P.68	55831,5	2986.1				
1.00	8.66	41075,0	2025,9				



FZ = 3259.7 VEL = 49.0 MULOCK = 4.66 MUPEAK = 8.94 RATIO = 1.43 4=0 FILE 218 NWFILE 86 SAMPLE 358

		** A-0 FILE 211	NED FILE \$7	7887 SAMPLE359 **
	AVERAGE OF FILE 211	FOR 5 RECORDS.	FIRESTONE TRANSPOR	47 110 12.9-20/H DRY LSPHALT (5.8.)
SL IP	mi i X	TORQUE	FX	
6°6#	P. A4	e. e	¥	,
4.45	P.13	21466.5	1874.2	
¥.#8	P.25	48382.8	1956.3	
*	P.34	55254,7	2682.2	
H. PA	P, 43	6875#.4	3337.8	
°.1A	4,58	A#473.1	3874.8	
4.12	P. 56	98624,9	4323.9	
P.14	***55	181484.7	48#8.4	
8.16	A. 71	116875.4	5497.5	
e.1A	P,78	128974.6	5983.5 T	TOAV = 83875.8 LOAD = 7969.1 VEL = 48.8 MPH.
P.2P	P.88	135467.8	6158.1	
9.25	A. 45	140154.6	6245,1 H	MUPEAK = 8,82 MULDCH = 8,55 RATIO = 1,89
a, 34	P.82	153448.4	6229.1	
*.35	0.52	159198.4	4167.6	
8. #R	P.81	143457.5		
и, 45	R. 79	165868.1	5451.6	
a.5A	P.78	168875.7	5823,8	
H.55	P.,76	170108.0	5477.4	
8.6*	a, 74	171926.8	5528.8	
P. 65	+,72	172975.7	5342.9	ι,
£.7P	P. 64	171658.2	5293.3	
W. 75	9.67	166524.9	5844,8	
¥. AA	R.45	156186.9	4898.7	
P.85	P.63	14#277.1	4738.6	
P. 98	P. 60	122241.5	4569,5	
p. 95 -	P. 58	183464.7	4496.5	
1.20	P.55	A3875.8	4248.5	

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		** A+D FILE 212	NEN FILE 88	TEST SAMPLES68 **
	AVERAGE OF FILE 2	12 FOR 5 RECORDS.	FIRESTONE TRANSPORT 110	12.8-28/H DRY ASPHALT (8.8,)
SLIP	MUX	TORQUE	FX	
0.09	a, 98	#. 8	8.8	
0.02	8,17	36645.6	2188.1	
0.04	ø,27	65188.4	3517.4	
0.06	P,36	88930.4	4476.9	
8.88	8,44	110728.3	5728.1	
0.10	9,52	138458.8	6666.3	
0.12	9,58	148928.6	7484,8	
8.14	0,63	163982.2	6141.2	
9,16	8,67	173037.8	8654.6	
0.18	8,78	181594.1	8983.9 TOAY =	118558,8 LOAD = 13159.4 VEL = 48.8 HPH.
0.20	0,71	187285.4	9117.3	
0.25	0,72	195996.1	9159.3 HUPEAK	# #,72 HULOCK # 0,58 RATIO # 1,43
0,30	Ø.72	281941.1	9887.1	
0.35	Ø.71	286182.2	8946.6	
0.40	3,78	289484,3	8748.1	
0.45	8,69	212424.4	8549.3	
0.50	a,67	215072,0	8368,7	
0.55	8,66	217254.7	8152.7	
A.68	0.64	219819.8	7954.2	
8.45	P.62	219579.7	7771.6	
8.79	A. 61	217284.7	7547.1	
a.75	9,69	218324.7	7421.9	
9.80	a, 58	197365.1	7233,3	
0.85	9,56	179289.3	7826,9	
8.98	8.54	159488.3	6614,7	
8.95	a, 52	139291.8	6598,9	
1.04	Ø.58	118550.0	6378, P	



		A. A.D FILE 196	NE#
	AVERAGE OF FILE	196 FOR 6 RECORDS.	FIRESTO
51 IP	HER	TORQUE	FX
4.20	r. p()	P. A	1,9
es	a.21	33862.7	1714.8
0.94	*. 13	54437.1	2797.6
4.26	a, 44	724#6,7	3553.8
4.48	P., 54	A6116.8	4267.8
4.14	0,62	1#2333.5	4987.4
P.12	7,69	114265.0	5447.6
4.14	P. 75	123144.8	588 8 ,8
0.16	e. 79	131154.7	6296.8
8.14	~. ■1	137484.#	6428.1
P.20	°.A3	148983.2	6499,9
·· 25	a, #3	146294.1	6474,4
4.30	. 42	159631.7	4359,5
N.35	r.84	154828.3	4285.2
4.49	۶.75	156549.6	6641.2
4.45	u. 76	158252.#	5081.2
4.5P	9.74	159396,9	5725.2
P.55	e. 72	164252,3	5567.8
4.68	a, 70	168953.4	5418.6
P.65	9,68	161547.3	5268,7
A.78	P. 66	141489.4	5113.+
2.75	H. 64	159281.4	4969.2
4.8P	°.+2	151648.8	4829,9
¥.85	0.6A	130269.5	4691,1
8.00	P. 58	121255.8	4541,8
1.95	n, 56	1#3231.#	4386,4
1.00	4.54	A3845.A	4227.5

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E. FILE 78 TEST SAMPLESSE ++ TONE THANSPORT 118 12.8-28/H DRY ASPHALT (3.8.)

TOAV . 83895.8 LOAD & 8848.2 VEL . 47.8 HPH.

MUPEAK 2 9,83 MULOCK 2 8,54 RATIO # 1.54

Check Run # I



		AN AND FILE 286	NEW FILE 65
	AVERAGE OF FILE 2	186 FOR 6 RECORDS.	FIRESTONE TRANSPO
SLIP	MUX	TORQUE	FX.
0,90	8.88	0 , 0	0.D
8.82	0,15	26881.7	1237.0
8,94	4,20	48451.0	2234.5
0.76	P. 39	\$6594,2	3073.5
0.88	8,49	82933,5	3852.3
P.18	0,58	97394,7	4528.9
0,12	8.66	189998.6	5041.1
0.14	8.71	119756.4	5494.4
0,16	4,75	127433.9	5783.7
0.18	A. 78	133494.6	5968.5
0,20	8.79	137785.3	6845.0
0.25	a*96	144612,4	6875.8
0.30	P.80	149464.1	6932.6
A.35	8,79	153130.0	5937.3
ə.4Ø	0,77	156236.7	5618,2
6.45	a, 75	159847.#	5662.5
9.50	9.73	161373.9	5511.5
e.55	0.71	163334.6	5359.4
8.68	8.69	164824.6	5210.8
8,65	8.67	165513.2	5874.3
8.78	8.65	164921.0	4948.9
8,75	9,64	168686.3	4825.1
8.80	9,62	150788.8	4694.9
8,85	A.66	136789.2	4554.9
9,99	9,58	128554,1	4486,2
8,95	a,56	183499.9	4253.8
1.00	P.54	8525A. A	4847.5

TRAV = 85258.8 LOAD = 7959.2 VEL = 48.8 HPH.

HUPEAK # 8,84 HULOCK # 8,54 RATIO # 1.58

TEST SAMPLE357 **

12.8-29/H

DRY ASPHALT (8.8.)

TRANSPORT 118

Check Run #3



	++ +-0 FILE 213
AVERAGE OF	FILE 213 FOR & RECORDS.
MOX	TORQUE
a, 64	P. P.
9,21	31294.5
P, 32	51111.7
R.43	69972.3
9,52	6524A,H
P.64	99637,2

112924.4

123629.8

131423.1

137856.8

140971.4

146391.8

154166.7

158642.7

162223.3

165117.1

167837.4

178328,8

172461.1

173710.1

172814.4

148844.1

157117.4

141156.3

122837.1

193977.9

84708.3

4.67

A.73

P., 77

e.79

8.41

8,81

P.81

9.68

9.7A

#**.**77

n. 75

e.73

A. 71

P. 69

4.68

P. ..

A. 84

9.62

6.46

a, 5#

A.55

51. 1P

R. 88

H. 82

0,84

P. 86

4.08

H. 1P

8,12

2.14

P.16

0.18

N.20

A.25

P. 38

e.35

.....

d. 45

4.50

0.55

8.68

8.65

a.7a

P. 75

0.8P

0.85

6.00

4,95

1.00

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NEW FILE #4 TEST SAMPLE361 .. FIRESTONE TRANSPORT 118 12.4-20/4 DRY ASPHALT (5.8.)

F 3

2677.4

3531.8

4275.1

4934.9

5531.8

5987.7

6291.4

6486.9

4564.7

6561.4

6476.4

6353.3

6217.9

6879.2

5931.3

5779.1

5631.4

5491.4

5351.0

5215.7

5988.4

4948,2

4782.2

4617.8 4447.5

... 1743.2

> LOAD = 6346.1 VEL = 48.4 MPH. TGAV S 84788.3

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HULDCK # 8.55 RATIO # 1.47 4.81

Check Run # 5





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- 349 -



- 350 -



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- 352 -



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Fig. 3: Load sensitivity in the peak and slide traction of a six-tire sample on dry asphalt. All tests run at 64 km/h.



 Velocity sensitivity of the peak and slide traction values for a sixtire sample on dry asphelt. All tires operated at their respective T & RA rated load.



Fig. 5: The differing influence of pavement surface on the velocity sensitivities of two tires.



Fig. 6: Typical load sensitivities in the side force response of a sample of 10.00 x 20 tires tested at 32 km/h on a dry concrete surface.

A A BARANA MANANA M

Tire: Highway Tread 12-20/G Rim: 20x8.50

R -356-

LATERAL FORCE VS. SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation Pressure (psi)	Lateral Force at Indicated Slip Angle (degs.)					
(lbs.)		1	2	4	8	12	16
2100	80	391	741	1245	1746	2047	2189
4200	80	590	1144	2041	3063	3681	4002(?)
6140	80	701	1343	2438	3846	4763	5292
8200	80	721	1417	2671	4414	5675	6472
9900	80	729	1440	2672	4695	6195	7197

ALIGNING TORQUE vs. SLIP ANGLE AND VERTICAL LOAD

Vertical Load (1bs.)	Inflation Pressure (psi)	Aligning Torque at Indicated Slip Angle (degs					
		1	2	4	8	12	16
2100	80	48	82	104	76	42	16
4200	80	114	203	292	261	177	101
6140	80	170	309	471	467	338	204
8200	80	224	422	659	713	559	369
9900	80	27 2	512	795	9 30	770	528

CIRCUMFERENTIAL STIFFNESS vs. SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	C _s (lbs.)	Vertical Spring Rate (lbs./in.)		
2100	· 80	23,000			
6140	80	60,000	4800		
9 9 00	80	74,000			

TABLE 3.1. FLAT-BED TEST TIRES

<u>Tire No.</u> Heavy Truck Tires	<u>Manufacturer</u>	Model	<u>Size</u>
H-1	Uniroyal	Triple Tread	10 x 20F
H-2	Uniroyal	Triple Tread	10 x 20G
H-3	Untroyal	Triple Tread	11 x 22.5F
· H-4	B.F. Goodrich	Milesaver Radial Steel H.D.R.	10 R 20 G
H-5	B.F. Goodrich	Milesaver Radial Steel H.D.B.	10 R 20 G
H-6	Goodyear	Unisteel R-1	10 R 20 G
H-7	Goodyear	Unisteel L-1	10 R 20 G
H-8	Firestone	Power Drive	10 x 20F
H-9	Uniroyal	Unimaster Rib	15 x 22.5H
H-10	Michelin	Radial	10 R 20 G
H-11	Uniroyal -	Fleetmaster Superlug	10 x 20F
Heavy Bus Tires			
H-12	Firestone	Hiway Mileage	12.5 x 22.5G
H-13	B.F. Goodrich	Intercity Mileage	12.5 x 22.5G
H-14	B.F. Goodrich	Intercity Mileage	11.5 x 20G
H-15	Uniroyal	Intercity	12.5 x 22.5G
H-16	Uniroyal	MaxRoute I	11.00 R 20H
H-17	Goodyear	Custom Cruiser	12.5 x 22.5G
H-18	Michelin	Radial XZA	11 R 20 H
H-19	Michelin	Radial XZA	11 R 22.5 H
H-20	Michelin	Radial XZA	12 R 22.5H
Tires			
L-1	Firestone	Transport 500	8.00 x 16.5D
L-2	Goodyear	custom Himiler	8.75 x 16.5E
L-3	Goodyear	Rib' HiMiler	8.00 x 16.5D
L-4	Firestone	Transport 110	7.50 x 16.5C
L-5	Goodyear	Super Single HiMiler	10.00 x 16.5E
L-6	Firestone	Town & Country Truck	8.00 x 16.5D
L-7	Goodyear	Custom Flexsteel	8.00 R 16.5E
L-8	Goodrich	Milesaver Radial	8.00 R 16.5D
L-9	Goodyear	Glas Guard XG	8.00 x 16.5D
L-10	Goodyear	Glas Guard XG	8.75 x 16.5E
L-11	Firestone	Town & Country Truck	8.75 x 16.5E
L-12	Goodyear	Custom Flexsteel	8.75 R 16.5E
L-13	Michelin	Radial XCA	8.00 R 16.5E
L-14	Wards	Steel Belted . Super Wide	9.50 x 16.5D
L-15	Michelin	Radial XCA	8.75 R 16.5D
L-16	General	Jumbo Power Jet	8.00 x 16.5D
L-17	General	Jumbo Power Jet	8.75 x 16.5E
L-18	Goodyear	Glas Guard	8.00 x 16.5D
L-19	Goodyear	Glas Guard .	8.75 x 16.5E
L-20	Goodyear	Rib HiMiler	8.75 x 16.5E

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The data presented in these figures are remarkable in that they indicate that inflation pressure may have a profound effect, quantitatively and qualitatively, on the C_a behavior of these heavy tires. The heavy truck tires (H-1 through H-11) show an increase in C_a with inflation pressure when the tire is operated at the higher load (except for H-9, the wide base tire). At the lower load, behavior is mixed: C_a may rise, fall, or remain quite constant with inflation pressure. For the bus tires (H-12 through H-20) behavior is mixed at both loads. Despite this mix in behavior, it is universally true in this sample of heavy tires that at the higher inflation pressure, the increase of C_a with load tends to reduce sharply, and, in many cases, at lower inflation pressure, C_a may actually fall with increasing load.

Figure 3.13 is a similar plot for the two light truck tires tested at reduced inflation pressures. At all but one point, C_{α} is seen to increase with decreasing inflation pressure. For tire L-1, the load sensitivity of C_{α} is rather independent of inflation pressure, but for L-2, this sensitivity decreases with inflation pressure.

The broad significance of the inflation sensitivity measurements is that light and heavy tires follow no simple rule in their cornering stiffness response to inflation pressure. In marked contrast to the case of passenger car tires, one must be cautious in applying "rules of thumb" relating cornering stiffness dependence upon inflation to the achievement of desirable vehicle understeer quality.

3.2 Mobile Tire Test Findings

3.2.1 Longitudinal Traction - Mobile Measurements. Dry pavement measurements of longitudinal traction performance were conducted on a sample of eight heavy truck tires. These data indicate traction properties which confirm and complement those reported earlier [8, 9]. The data were reduced to so-called

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Figure 3.25. Lateral force measurements of heavy truck and bus tires at 20 mph, 1.5 x rated load.

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77 12 180



Figure 3.27. Envelope and specific examples of $(F_y/F_z \text{ vs. } \alpha)$ measurements taken for 8 heavy truck and bus tires at 1.0 F_{zR} and 20 mph.

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Figure 3.28. Envelope and specific examples of $(F_y/F_z \text{ vs. } \alpha)$ measurements taken for 8 heavy truck and bus tires at 1.0 F_{zR} and 40 mph.

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Figure 3.29. Envelope and specific examples of $(F_y/F_z vs. \alpha measure-ments taken for 8 heavy truck and bus tires at 1.0 F_zR and 55 mph.$

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Lateral Force at Indicated Slip Angle (degs.) Vertical Inflation Load Pressure (lbs.) (psi) 3614(?) 2090(?)3436(?)4299

LATERAL FORCE VS SLIP ANGLE AND VERTICAL LOAD

ALIGNING TORQUE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Aligning	Torque	at Ind	icated	Slip Angle	e (degs.)
Load (lbs.)	Pressure (psi)	1	2	4	8	12	16
2000	85	35	55	67	40	14	-1
4000	85	89	153	212	180	117	31
5920	85	136	241	362	366	275	151
8000	85	179	331	530	605	520(?)	327(?)
10000	85	220	421	6 88	858	817	559

CIRCUMFERENTIAL STIFFNESS vs SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	C _s (1bs.)	Vertical Spring Rate (lbs./in.)
2000	85	20,000	
5920	85	58,000	4534
10000	85	57,000	

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MICHELIN RADIAL 12 x 22.5 16 PLY

LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB), AND STEER ANGLE (DEG)

PSI	LOAD	0	+1	-1	+ 2	2	. + 4	- 4	+8	- 8	+12	-12	+16	-16
100.0	2000.0	-12.8	-312.1	284.0	-572.7	531.8	-988.6	941.	-1592.3	1454.	-1793	1711	-1850	1798
100.0	4000.0	5.8	-576.1	576.5	-1086.	1046.8	-1937.5	1862.	-2917.5	2808.	- 3323	3213	- 3 3 4 7	3306
100.0	6000.0	25.4	-749.1	776.8	-1461.6	1373.6	-2641.8	2571.	-3995.4	3889.	-4506	4329	-4565	4463
100.0	8000.0	23.9	-829,9	875.2	-1669.2	1658,	-3090.4	3036.	-4795.7	4721.	-5405	5217	- 5436	5396 ·
75.0	4000. 0	18.8	-665.2	685.0	-1249.8	1223.8	-2118.	2070.9	-2937.5	2827.2			-3360.8	3270.4
75.0	6000.0	29.8	-804.4	836.8	-1570.8	1564.9	-2780.5	2730.5	-3927.5	3844.6			-4517.4	4392.2
50.0	4000.0	22.4	-680.4	683.6	-1282.5	1314.6	-2183.1	2124.4	-2901.8	2797.1			- 3299.9	
50.0	6000.0	27.2	-713.1	726.7	-1413.1	1432.4	-2688.9	2604.1	-3702.1	3639.8			-4340.4	

ALIGNING MOMENT (FT-LB) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB), AND STEER ANGLE (DEG)

PSI	LOAD	0	+1	- 1	+ 2	- 2	+4	- 4	+ 8	- 8	+12	-12	+16	-16
100.0	2000.0	-3.85	21.9	- 31.9	39.2	-42.6	54.3	-57.4	51.5	-46.9	25.7	-21.5	3.4	. 2
100.0	4000.0	-7.06	73.7	-86.1	128.3	-132.6	185.1	-190.0	178.2	-163.9	99.7	-92.5	28.4	-14.1
100.0	6000.0	13.6	126.1	-154.7	234	-236.0	349.7	-364.2	341.6	-326.8	209.6	-187.8	56.3	-47.8
100.0	8000.0	-18.86	176.1	- 222.5	344.2	-370.9	504.9	-562.8	528.4	-515.7	326.9	-293.1	108.5	-112.2
75.0	4000.0	-12.1	84.7	-104.7	151.0	-166.6	205.5	-212.3	154.9	-146.1		:	35.4	-16.5
75.0	6000.0	-20.4	143.	-181.8	269.4	-308.3	389.4	-411.38	327.6	-313.5			114.1	-93.3
50.0	4000.0	-21.2	106.7	-144.1	197.1	-218.3	232.6	-249.7	189.6	-160.8			47.85	22.5
50.0	6000.0	-33.5	163.7	-237.5	331.6	-383.6	443.5	-506.1	375.4	-364.0			14.1	11.8

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MICHELIN XZA 12.00822.5/H VEL = 40 MPH

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MICHELIN XZA 12.00R22.5/H FZ = 6843 LB



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MICHELIN XZA 12.00R22.5/H FZ = 6829 LB VEL = 40 MPH INDLE J.I. FLAI-DEU IEJI IIKEJ

<u>Tire No.</u> Heavy Truck	Manufacturer	<u>Kode 1</u>	<u>Size</u>
Tires		• •	
H-1	Uniroyal	Triple Tread	10 x 20F
H-2	Uniroyal	Triple Tread	10 x 20G
H-3	Uniroyal	Triple Tread	11 x 22.5F
H-4	B.F. Goodrich	Milesaver Radial Steel H.D.R.	10 R 20 G
H-5	B.F. Goodrich	Milesaver Radial Steel H.D.B.	10 R 20 G
H-6	Goodyear	Unisteel R-1	10 R 20 G
H-7	Goodyear	Unisteel L-1	10 R 20 G
H-8	Firestone	Power Drive	10 x 20F
H-9	Uniroyal	Unimaster Rib	15 x 22.5H
H-10	Michelin	Radial	10 R 20 G
H-11	Uniroyal	Fleetmaster - Superlug	10 x 20F
Heavy Bus Tires			· · ·
H-12	Firestone	Hiway Mileage	12.5 x 22.5G
H-13	B.F. Goodrich	Intercity Mileage	12.5 x 22.5G
H-14	B.F. Goodrich	Intercity Mileage	11.5 x 20G
H-15	Uniroyal	Intercity	12.5 x 22.5G
H-16	Uniroyal	MaxRoute I	11.00 R 20H
H-17	Goodyear	Custom Cruiser	12.5 x 22.5G
H-18	Michelin	Radial XZA	11 R 20 H
H-19	Michelin	Radial XZA	11 R 22.5 H
H-20	Michelin	Radial XZA	12 R 22.5H
Light Truck Tires		•	. • •
L-1	Firestone	Transport 500	8.00 x 16.5D
L-2	Goodyear	Custom HiMiler	8.75 x 16.5E
L-3	Goodyear	Rib [.] Hi Miler	8.00 x 16.5D
L-4	Firestone	Transport 110	7.50 x 16.5C
L-5	Goodyear	Super Single HiMiler	10.00 x 16.5E
L-6	Firestone	Town & Country Truck	8.00 x 16.5D
L-7	Goodyear	Custom Flexsteel	8.00 R 16.5E
L-8	Goodrich	Milesaver Radial	8.00 R 16.5D
L-9	Goodyear	Glas Guard XG	8.00 x 16.5D
L-10	Goodyear	Glas Guard XG	8.75 x 16.5E
L-11	Firestone	Town & Country Truck	8.75 x 16.5E
L-12	Goodvear	Custom Flexsteel	8.75 R 16.5E
L-13	Michelin	Radial XCA	8.00 R 16.5E
L-14	Wards	Steel Belted . Super Wide	9.50 x 16.50
L-15	Hichelin	Radial XCA	8.75 R 16.5D
L-16	General	Jumbo Power Jet	8.00 x 16.5D
L-17	General	Jumbo Power Jet	8.75 x 16.5E
L-18	Goodyear	Glas Guard	8.00 x 16.50
L-19	Goodyear	Glas Guard	8.75 x 16.5E
L-20	Goodyear	Rib HiMiler	8.75 x 16.5E
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FIRESTI HIWAY MILEAGE 12.50X22.5 G

LATERAL FORCE (LB',) AT INDICATED INFLATION PRESSURE (PBI,), LOAD (LB'), AND STEER ANGLE (DEG.)

	***	42	€ 1	4 +	4	8 +	8	÷12	-12	+14	-16
233,8 •		534,5	478.5	-672.6	839.2	-1296.1	1277.4	-1491°	1516.0	-1562.4	1577.
401.7 -	ĭ	130.7	825.7	-1585 ,6	1488.4	-2397.1	2361.4	-2823.2	2839.0	-2044.6	3040.
539.3 m12	12	58.7	1107.0	*2162.2	2036.8	•3343.6	3296.6	-2944.5	3039.0	•4215*	4251.1
613.5 -150	150	13,2	1318.4	•2588.6	2420.8		4008.3	-4865.1	4856.1	•5229°	5288.
458.2 -104	104	6 a 4	916.5	•1750.0	1673.0	•2533,8	2943,2			-3119.5	3167.7
557.9 +1320	1320	a. 5	1152.7	-2265.9	2142.5	-3482.4	3397.2			-4329 ₆ 2	4355.8
454.1 -186	106	6.4	950, 8	-1828.6	1714.3	-2589.5	2629.0		•	=3176.9	3002.
524.2 -125	521	2.6	1899.1	-2223.6	2071.3	*3357.6	3397°S			-4327.7	4252.

A ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND STEER ANGLE (DEG.)

184	LOAD	5	•1•	•	+5	- 2	+4	4 -	+8	8	-12	-12	+16	91-
100.0	2000,0	9 * 8	25.3	• 22.7	39.1	-37,8	43.5	-47.8	28.0	-32,5	6 . 4	-10.6	-12,3	-1.4
108.8	4889.0	7.4	64.4	•55•3	102.0	-98 . 2	133.7	-137.1	189.7	-120.2	53.5	-67.4		-13.5
100.8	6000°	16.3	115.8	-92.7.	189.0	-173.5	256.4	-257.7	233,1	-236.9	124.0	-144.0	49.61	-49.2
109.0	898A.8	23.7	164.6	*125.7	269.3	+245*2	381.0	-382.9	382.2	-384,2	229.2	•259.1	118.4	•118.3
75.8	4963.8	6 • 9	19.8	• 6 8 • 8	126.8	-131,2	163.3	-186.5	102.6	-124.4			- 6. 6	-9,1
75.8	6988,0	16.5	140.2	-113,2	222.7	-211.0	301.8	-314,9	235,5	-257.2			46.5	-54.2
50.0	4080.0	10.1	188.2	-89.9	153.8	-149.9	195.6	-216.5	127.3	-147.3			1.0	•1.7
50.0	6 8 8 8 °	17.6	163.6	-135.6	269.2	-249.4	370.1	-384.6	287.1	-314.1			42.3	-62.2

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B. F. DRICH INTERCITY MILEAGE 12.50X22.5 0

LATERAL FORCE (LB',) AT INDICATED INFLATION PRESSURE (PBI,), LOAD (LB.), AND BTEER ANGLE (DEG.)

•1•	1483.6	2795.0	3944.0	4973.0	2906.0	4892.7	2912.2	3978.8
+16	-1465.1	• 2862 . S	-4079.5	-5004,2	-2936.5	•4059.3	-3046.6	-4157.2
-12	1330.4	2618.2	3600.5	4434.5				
+12	•1353.2	• 2598, 3	-3497.3	-4578.6				
0 1	1174.6	2224.6	2981.6	3466.4	2296.6	3017.2	2334.7	2956,4
8+	-1217.4	-2173.8	-3005.7	-3664.5	• \$ 3 5 4 • 1	•3105.9	.2361.6	.3887.5
4	800.3	1436.9	1060.9	2145.1	1555.9	1936.0	1560.6	1843,8
7+	- 647.8	1919.7	-1953.7	-2244.6	-1628.9	-2012.9	.1686.0	-1964.4
2	456.3	00000	1034.1	1161.6	861.4	1063.7	887.1	1058.5
5+	+531.4	-689.7	-1130.5	•1265.3	.956.3	.1177.0	-969.0	• 6 7 6 •
	238.8	496.0	517.0	587.8	445,6	544.9	448.4	517.5
1+	-288.0	-493 . 2	-610.7	-691.2	•523,1	•639.6	-550,5	-621.2
8	-31.8	-45.2	-37.6	-56,5	-42.6	-46.2	-48.6	-43.6
LOAD	2000.0	4404.0	6906 . 0	8004.0	4808.8	6988.0	4000.0	6000.0
1 1 S d	100.0	109.0	108.0	100.0	15.0	75.0	58.8	50.0

G ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PBI), LOAD (LB.), AND BTEER ANGLE (DEG.)

91.	8,2	- 37.2	-116.1	-211.1	-37.9	-121.7	-44.	-142.1
÷ 1 •	7 - 4 - 7	31.1	107.4	211.4	35.8	105.8	39.1	115.7
•1è	-14.8	-78.7	-198,2	-343.7				•
+12	7.1	65,8	151.6	. 329.5				
8	-33,5	-132.3	-267.6	-398.7	-128,9	=287 . 4	-146.8	•335°4
0+	27.7	111.4	249.2	436.1	123.0	274.4	149.5	335°3
8	•52°9	-161.5	-289.0	-418.0	-181.3	-321.6	-221.7	-389.9
7+	46.3	161.6	282.9	417.5	172.9	317.6	211.4	379.0
N 1	-45.5	•117.3		-267.6	-136.1	•214.0	-163.4	-247.6
2	43.8	121.8	203.7	283.4	136.4	227.2	167.7	271.7
	-30.7	-66.4	•108 • 6·	-145.7	*79 . 5	-123,2	-89 - 5	-135,3
1+	27.3	75.4	122,2	164.6	98.1	136.1	103.5	159.4
8	9°3	5.3	7.9	9.3	4 . 9	6 • 8	0°0	9.3
LOAD	2000.0	4000.0	6666.0	8084.0	4009,8	6989,0	4009,0	. 8 . 8 . 8 . 9
184	100.0	100.0	100.0	100.0	75,0	15.0	50.8	50,8
	. ·		•					

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		.0 = 26.7 	-	7	42	24	7+	7-	D +	2	•	21.	+16	•
			-384.2	248,5	-500.7	456.2	-845 <u>.</u> 5	824.4	•1318.6	1260.4	-1482.5	1459.5	-1599.3	1507.
991		C+10. at	-509.4	415.7	-887,3	806.5	-1548,4	1473,0	-2417.8	2345,1	-2015,1	2774,5	-2992.5	2912.
100	.0004 0.	.8 -66.4	+657,3	532.7	•1159.6	1076.1	-2053,6	1948.4	=3256 . 8	3154,8	-3865.0	3798.8	-4153,1	4056.
100	.0 8000	.8 -73.1	-743.8	511.1	•1330°7	1220.0	-2381.0	2253.6	.3848.0	3749.4	-4702.2	4606.7	-5112.3	4993.
75.		.8 -47.7	-514.6	426,5	-971.3	839.2	-1668.7	1574.4	-2542.2	2507,0			-3267.9	3196.
15	.0 6000	.0 -64.7	-613.1	509.0	-1201.8	1032.6	-2085,8	1980.4	•3325•3	3260.9			-4415.5	4299
58	.8 4000	.8 -62.6	-537.4	419.2	-978.5	845.1 .	-1690.4	1551.4	*2515*1	2490.2			-3316.5	3215.
50	.0 6900	.8 -68.8	•552.4	434.1	-1050.4	916.2	-1986.5	1708.6	-3146.2	3078.7			-4338.1	4241.
6	I LOA	60	*	•	45	5 =	4	4	8 +		÷12	-12	÷16	-16
100	.0 200	.0 9.5	26.0	-27.1	42.3	-46.1	50.3	-57.4	38.6	-41.9	13.5	-23,7	-1.1	• • •
100	9994 6.	.8 9.3	72.6	-64.9	115.8	+112.5	156,5	-164.1	142.5	-146.9	79.2	- 69. 3	26,5	= 32
188	.0 6030,	.8 17.8	129.0	-101.2	. 204.6	1.9	289,8	-294,4	201 n 6.	-238,1	169.1	-177.8	69.1	- 79
160	, 0 6 0 0 0 .	.0 21.3	176.6	-147.7	292.4	-258.7	439.8	•432.9	442,6	-449.3	298.1	-302,3	137.6	- 140
75,	.0004 0.	.0 8,7	109.6	-73.6	341.8	-163,2	231.7	-188.2	156.8	2.191-			-43.6	36.
15	. 9 6 9 8 9	.0 17.2	178.3	-115.9	249.5	-263.1	416.2	-333,1	320.9	-394,6	•		-196.3	112.
50	.0.4008	.0 16.4	88,4	-89°	175.3	-133.6	184.7	-243.6	173.0	-166.6			-41.7	37.
58.	. 4 4 6 8 0	.0 29.3	143.5	-132.0	000		227 4		2 2 2 M	* ***				

UNIROT- NTERCITY 12.58X22.5 G

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LATERAL FORCE (LB',) AT INDICATED INFLATION PRESSURE (PSI,), LOAD (LB,), AND STEER ANGLE (DEG.)

· ·	2+	•	••
4 -747	408.	5 .9 - 434 .2 408.	~234 。1 196.9 ~434.2 408.
8 -1413	151	1.3 -797.1 751.	-418.3 361.3 -797.1 751.
2 -1855	966.	1.7 -1032.4 966.	=548.8 474.7 =1832.4 966.
2 -2168	1096.	1.5 -1198.7 1096.	•624.6 559.5 -1198.7 1096.
8 -1586	737.	7.8 -844.2 737.	-491.6 410.8 -844.2 737.
5 -1927	980	1.1 -1067.8 960.	-578.3 491.1 -1067.8 989.
-1601	795.7	1.6 -856.2 795.7	#472.5 396.6 #856.2 795.1
-1881	978.	1.2 -1867.5 978.9	=549.4 486.2 =1867.5 978.5

ALIGNING MOMENT (FT.-LB.) AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB.), AND STEER ANGLE (DEG.)

19

-16	4 -39,8	6 -119.7	3 -150.0	3 •239.2	8 -108.8	3 -192.6	8 -107.5	6 -207.8
91+	14.	73.	143.	-242.	91.	178.	88.	179.
-12	-15.0	•119.8	-234,8	-374.4				
+15	30. B	125.4	241.3	363.0				
•2	-59.6	•169.9	-317.6	-487.9	-198.1	-373.6	-234.8	-439.1
9 +	48.2	170.1	315.9	492.8	190.0	364.2	228.5	443.6
7	-62.2	•162.9	• 283, 2	-410.8	-194.9	-332,8	-237.9	-406.0
7+	53,1	163.4	287.0	420.5	191.0	330.1	247.2	402.4
~	9-40-5	-110.0	►188.9	-248.9	•125,3	•199.9	•153 ,6	-243.3
2+	43.8	116.0	192.4	270.8	136.7	230.4	163.9	265.7
	-24,3	•58,6	-94°2'	-130.7	-74.8	-100,5	-83.3	-131.8
	26.1	68.1	109.1	150.2	86.2	126.6	95°2	149.4
9	-1.0	9 . 4	5°.	12.7	7.2	12.4	7.4	11.1
LOAD	288A . 0	4000.0	\$800 °	8 B B G • 8	4000.0	6604,0	4000.0	6988.6
164	100.0	100.0	100.0	100.0	15,0	75.0	50.0	50,0

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FIRESTONE COMMERCIAL MILEAGE 12.5X22.5/G VEL = 21 MPH

K.



FIRESTONE COMMERCIAL MILEAGE 12.5X22.5/G FZ = 6804 LB

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FIRESTONE COMMERCIAL MILEAGE 12.5X22.5/G FZ = 6812 LB VEL = 41 MPH

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•	•		A* A-D FILE 99	EW FILE 51	TEST SAMPL	.E157 **	
	AVERA	GE OF FILE 9	9 FOR 4 RECORUS.	FIRESTONE COMMERCIA	L MILEAGE 12.5-2	22.52G (DANA)	
SL	JP.	хон	TORQUE	××		, .	
5	. 410	5 G C	63 ° 63	N			
6	62	3.17	22454.8	1175.2			
5	64	0.30	41 P44 3	2057.0			
6	5.0	9.42	57533.5	2006.1			
	R R	e.51	79673.4	3425.8		-	
.2	19	f. 59	R] C(9 _ K	3915.2			
	12	9.64	88963 . 4	4245.7	·	•	
• 69		8×.N	95124.5	4539.3	•		
	14	a.71	99552。6	4696.7			
.3	1.9	۴.73	192377.6	4842.1 TO	AV = 72095.6 L	UAU # 6776.3 VIL # 40.8 MPH	÷
8	20	9.74	101259.3	4851.8			
9	25	Q.74	197760.5	4845.6 MU	PEAK = 0.74 MUL	.0CM # 8.52 44117 # 1.42	
6	39	n. 74	110601.9	4834.6			
G	35	A.73	112931.4	4773.3			
5	410	P.72	114782.3	4695.1			•
. • 6.5	45	9.71	116176.5	4614.8			
•	50	9.69	117268.5	4534.1	¢		
	55	0.68	118229.9	1452.7 .	×	•	
•	6.9	9.67	119077.3	4365.9			
• •	65	P. 65	N.875911	9-1724			
. • G	61	4.64	117774.5	4177.5			
9	75	9.62	11301.9.1	4.47.1		• • •	
63	87	(A 4 ° E	1.134.1	3953.1			
. • •	АS	r.58	98443.3	3827.6			
່ ນ	5	л . 56	A9537.a	4.1015	•		
e j	4 L		A:757.3	7574.5			
-	3.	3 • 5 ¢	72043.A	5446 . 1			

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		** A-D FTLF 140	ENFILE SP	TEST SAMPLEISA #4
	AVERAGE OF FILE	INN FOR & RECORDS.	FIRESTONE COMMERCI	AL MILEAGE 12.5-22.540 (DAMA)
SI. IP	MIIX	TOROUF	FX	
9.40	(1 K) • W	5 * 6	R . R	
A. 62	61 " 1	13794.2	6~77°	
Q. 6.4	0.31	23692 . A	1446.8	
0.16	ت <i>ا</i> ا	31934.5	1469.5	
8° . 2B	4.52	38947.7	1789.8	
9.18	84.68	6 * H 1077	2056.0	
0.12	R. h7	L • 61/061	2274.3	
0.14	£.73	53957.7	2439.4	
0.14	R.77	· 57187.6	2567.9	
0.18	. B.D.	59767.9	7662.7 7	0AV # 50750.0 LUAD # 3463.9 VEL # 2
8.23	9 • A 2	A1744.9	2718.5	
A.25		659.NP.5	. 27A6.2 H	UPEAK = 0.85 MULOCK = 0.70 RATIN = 1.
6. 33	9. A S	69594.1	2819.6	
0.35	A.A5	72902.A	2424.9	
0.49	r . r5	76017.9	2818.2	
5.45	9 . 94	78917.A	2795.A	
N.5A	9.44	81278.0	2765.3	
0.55	7 • A 2	A2271.7	2726.11	
5.69	0.A1	81696.4	2692.B	
0.65	0.79	79944.6	2635.4	
3.73	r. 78	767675	25¤1.9	
v. 75	ن• 16	721424	2534.5	
10°83	n. 75	67183 . 7	2.1014	
0.45	Pa. 74	62676.ª	2455.1	
6.93	0.73	5A444.7	7476.66	
0°,95	0.71	54388.0	2587.8	
1.43	a. 70	54750.0	° 2551.5	

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		AA A-D FILE 101	EW FILE 253	TEST SAMPLEIS9 ##	
	AVERAGE OF FILE 101	FOR & RECORUS.	FINESTONE COMMERCIAL	MILEAGE 12.5-22.546 (DANA)	
SLIP	ХЛМ	TORQUE	X T		
0,00	8° 810	5°5	5.0		
0.92	9.12	16379.2	875.5		
9°.44	9°22	29A20.0	1474.7		•
6,96	9.32	42449.8	2089.6		•
0.48.	8.40	53827.4	2645.8		
0.19	P. 47	63434.3	3145.3		•
0.12	n . 54	72398.3	3531.9		
61.0	9.42	A3515.3	4041.8		
2.15	£ \$ \$	92202.0	6 * 6 < 11 11		
0.18	P.72	98426.2	4689.1 TOA	/ # 85145,8 1.040 # 4684,3 VI	EL = 20.0 MPH
0-20	A.75	191360.1	4629.2	•	•••
0.25	6°77	107214.4	4991.2 HUP	EAK = 0,79 MULOCK = 0,63 RATI	0 - 1.26
6.37	6L°U	111534.5	5072.7		
0.35	0°79	114765.9	51-3.6		
5.40	0°19	117443.2	5098.4		v
6°, 45	e.78	121.284.0	5043.0	· ·	
P.50	A.77	122358.4	5:1-5.8		
N.55	P. 76	123867.8	4933.5	•	
6° 9	31°ú	123ah7.2	n849 .9		
61.65	а.73	121843.5	4743.9	•	• •
3.70	0.72	118426.1	1676.6	•	
0.75	3,70	وحرافهماا	11549.3		
6°9	64.9	1 a6647 . R	4593.1		
и . 85	e.48	10673A.F	1412.7		
11 . 9 .	9.46	1.555.	a \$PC • 1		
86°ð	5¥° J	ይባባናና ና	リアフカ。4		
E1. 1					

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.3*		** A-D FILE 142	FW FILE 54. IFST SAMPLE160 **
	AVERAGE OF FILE	122 FON & RECORDS.	FIRESTONE COMMERCIAL MILEAGE 12.5-22.54G (DANA)
SL	XIIH dI	TOPAUF	Χ.
	6 1 6.84	5 * E	S • 3
	62 a.17	21388.7	1110.6
	A4 0.36	4.929.6	2494.5
. • 8	26 7.42	56329.1	27A4.3
9.	7A 0.52	69917.A	3429.B
6.	16 "4"	R.1951.7	394H.2
5	12 2.66	89445 . 3	1313.4
. •	14 0.70	96275.7	4641.6
9	16 7.3	1911.41.4	4869.4
• 8	1A A.75	105272.6	5022.7 TUAV = 69708.3 10AD = 6553.7 VEL = 45.9 MPH.
• N	20 a.76	107953.4	50A3.4
	25 0.76	111979.2	5086.4 MUPEAK # 8.76 MULOCK # 6.53 4410 # 1.43
, e G	3a a.75	114962.4	5018.6
	35 A.74	117301.3	4911.7
	40 fr.72	119132.0	47n4.8
6	ن 12 ن	120564.1	4681.3
. 9	50° Co	121769.4	4569.e
	55 a. hH	122789.6	2.022
• •	6A 3.66	123345.A	1336 . 4
	65 A.S	122544.8	2.502.7
	7a 7. a.63	119057.1	4145.1
6.	75 "	1137.94 2	397A.7
. 5	8a a.hu	104953.4	3792.6
5	a5 a.50	94581.1	3646.2
ε.	6، 56	A5469.6	3553.2
. • 5	ğζ Λ. 55	77152.3	34174°C
°	มต ราย	497.18.3	3 3 4 5 . 10

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* ~ ~		** A-D FILE 103	LH FILE 55	1EST 94	HP1 € 160		1	
	AVERAGE OF FILE 103	FOR & RECORDS.	FIRFSTONE COMMERCIAL	HILEAGE 12.	5-22,5/0	(v	
SLIP	Х(ін	TORGUE	FX					
6.80	5 ° 6	č. • 5	(J ° (J					
6.22	A.16	21624.5	1078.6					
8°. 4 a	0.31	42834.3	2456.3					
4.86	A. 113	5901:4.7	2862.5					
G. C.R	P.52	72749.3	3541.9					
7.10	R. 60	83397.7	5,995.8					
0.12	3.66	91741.6	4369.5			• .		
0.14	A.71	67924.5	4645.4				•	
9.16	P.74	142636.4	4838.3			•••		
0.18	r.76	196219.0	. 4964.8 TOAV	= 73250.A	LOAD = /	1767.7 V	FL = 40°0 MPH	
4.20	8.77	108770.7	5422.5					
e.25	A.77	113064.6	SUS MUPE	AK # 8.77	HULOCK = 0	53 RATI	0 = 1.46	
0.37	А.77	116450.5	5A16.8					
0.35	P.76	0°200611	8°9467			•		
9.49	A. 75	121211.9	1.050					
6.45	۲۲	122963.4	4845.2				No.	
£.59	0.73	1 24569.2	4758.6	-			•	
0.55	11.0	126133.3	4653.4					
6.63	9.49	127272.6	4533.4					
11.65	0.47	126857.9	4476.7		•			
6.7.9	° • 55	124352.9	4277.6			 	•	
0.75	2.63	118757.6	4149.3					
6: • 90		7.51995	4618.7					
5° 62	7.59	1°63160	TAA6.S					
50°N	r.57	89R41.5	オプちん。S			- - -		
6.95	C. 55	811.04 a	362A.4				• •	
1.90	p.53	73250.3	\$5.42°5					

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		** A-D FILE 104	Ch FILE Shy TEST SAMPLEIDI MA	
	AVERAGE OF FILE 100	FOR & RECORDS.	FTRFSTONE COMMERCIAL MILEAGE 12.5-22.5/G (D	TANA)
SLIP	жUн	TOROUE		
6.33	8 C *	6. • 5.	8°. C	
8.02	A.13	26282.6	1370.9	
0,44	۵۹,۵۵	48798.1	2463.9	•
N. R.h	P.34	67981.6	3411.4	
0. CA	0.43	A5088.9	4248.0	•
P.10	A A C	1.149081	5472.2	
0.12	R.57	112849.8	5654 . 4	
2.14	, Ø.62	122965.9	6145.1	•
0.16	9.67	131187.2	6545.1	
N.19	0.70	137547.5	6853.3 TUAV # 120166.7 LOAD # 1023	34,7 VEL = 29,8 MPH.
8,23	P.72	141229.9	7014.4	•
8,25	2.74	147342.4	7201.7 HUPEAK = 0.75 HULOCK = 0.66	A RATIO . 1.25
6,30	P. 75	151560.3	7291.4	
U.35	P. 75	154318°a	7292.1	
0,413	n. 75	156245.5	7258.1	
0.45	0°75	157632.1	7189.6	
0.50	2.74	158749.5	7495.3	
P. 55	0.72	159314.2	6981.5	•
ų . 6 .9	0.71	1 . nour	6457.7	
4.65	· 76	150766.1	6721.¢	
6.70	9 ° 4 9	153337."	4592.7	
6.75	3.67	1 anu 1 2 . 6	6 IAt's 4	-
6.8.0	8 • 6 6	145023.3	A 535.H	
0.35	3 . 62	137340.6	A213.3	
F 6 • 4	" * \$	131643.7	6001.0	
50.0	۰۹ ° ۲۰	1,25,494 ° 0	5976 . R	
1 . 115	5 ° C 2	124164.7	5451.2 5	

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				·								ЧРН.	•															-
£.	•							•				VEL = 40,0		1710 = 1.41								• •••						
-	(DANA)											3550.7		SA RA														
34MPLE162 **	12.5-22.5/6											.7 LOAD =		MULOCK = 0					ø									
7 1651	RCIAL MILEAGE									•		T0AV = 42343,		HUPEAK = N.81	·				•				•					
NEW FILE 5	FIRESTONE COMME	FX	6 . .	629.3	1114.9	1545.7	1918.6	2215.0	2447.5	2618.1	2733.5	2472.0	2822.7	2427.5	2408.9	2745.8	27A].8	2623.4	2519.3	2454.5	2389.3	2 5 3 6 • 5	5.1055	い。ちょれてん	2141.8	2117.5	5.1204	
** A-D FILE 145	FOR A PECORDS.	TOROUE	с. С	13495_0	24757.8	34184.7	42958.4	1.17973.1	55433.9	59725.7	63343.6	6644R & B	68R36.5	13085.4	76599.9	79615.3	83047 . 9	96347.R	89513.7	92AA5.A	93231.1	91733.0	97697.7	a1 443.0	73112.3	63957.A	56364.5	
*	AVERAGE OF FILE 105	ХЛМ	6 - GU	9.18	n.32	778	P.55	5.644	A.70	51° i	P. 19	18.3	P. A1	7. A 1	а. С. В. Т. С. С. С	9.90	a. 79	a. 77	а. 7 и	a. 72	n. 7'n	· +9	8 Ý ° J	2.67	5 Y * 2	7.63	r. r]	
		SLIP	6.65	a, e2	0.04	0.36	2. 2. 2. 2.	0.17	0.12	n.1.4	0.16	0.15	0.2N	6.25	r.3n	0.35	6.45	6.45	6.52	6.55	9.60	8.65	. 10	N. 75	6.69	e. as	6 ° 6	36

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		44 A-D FILE 196	WEW FILE SAM TEST SAMPLE163 AN
	AVFRAGE OF FILE	LOG FOR 6 RECORUS.	FIRESTONE COMMERCIAL MILEAGE 12.5-22.5/G (DANA)
81 I D	жин	TORAUE	×
6.61	R . 70	0	S • S
G. 62	n. 16	21537.7	1482.5
6.64	6 4 ° 0	4047r.6	1967.0
0.06	a. 11	56R21.9	2766.4
0.0B	n. 51	76.374.9	3409.5
6.10	0.58	A1232.9	3945.4
0.12	r4"J	89292.1	4273.2
6.14	Ø, 60	7,17,29	457A.R
0.16	A.71	10,0454.6	4708.6
f.] A	a.73	104068.A	4834.4 TGAV = 69895.8 LOAD = 6724.2 VFL = 48.8 M
62.9	9 a 7 4	196564.7	4893.7
0.25	u • 75	110949.5	4949.6 NUPEAK # 0.75 MULOCK # 0.51 RATIN # 1.47
N. 3A	a. 75	114324.5	4AR2.1
6.35	0.74	117034.4	4818.5
6.49	4.72	1193144	4731.7
0.45	. 6.71	121372.7	1679.4
A.5A	9.49	123359.6	4515.2
ù.55	4.67	125103.5	/1 \$R.R.9
N. 6 A	7.65	125828.9	11258.5
0.65	3• £ 3	54457.5	4137.5
8.79	7.51	124725.A	
0.75	3 4 .2	113458.0	3496.4
6.83	V.58	104359.8	\$763.7
P. R5	A.56	9461.7.6	\$649.E
UG * 5	3 • 5 4	R5741.6	35ap.1
55°0	ን ም 1 3	71464.4	3 ri 8 to a S
1: .: • ¶	• 1	49A95.4	3.511 § a 3

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J.		** A=D FILE 110	- FILE 50 TEST SAMPLE164 ##	
•	AVERAGE OF FILE 1	IN FOR 3 RECORDS.	FIRESTONE COMMERCIAL MILEAGE 12.5-22.5/6 (DANA)	
SLIP	ЧЛX	TORAUE	×	
6.40		5 ° 5	S • S	
0,02	P.13	26453.9	1337.1	
4.04	9.25	5222A. a	2562.1	
9.24	P.36	7409A.6	3423.1	
6.08	0°45	92631.2	4534.5	
0.13	A.53	147946。R	52AR.7	
N. 12	r.59	n19792.a	5847.4	
6.14	0, hu	128758.7	62A9.6	
Q.1A	. 9.67	135189.7	A5H7.6	
6.1A	0 • 69	1 39641 .9	4779.6 TOAV # 97375.0 LOAD # 10210.6 VEL # 40.8 MPH	\ _*
0.20	0.76	142378.K	ABA1.8	
0,25	11° i	146786.0	6933.1 MUPEAK = 0.71 MULOCK = 0.49 RATIO = 1.47	
6°30	7.71	149123.9	6978.B	
0.35	a.71	151094.5	68A4.2	
64.9	a.70	152246.5	6.9.119.6	•
0.45	9.49	153093.2	A717.6	
8.53	84°N	154099.8	65n4.3	
u, 55	7.67	155266.9	6457.5	
9.62	4 • 6 5	156427.3	6292.3	
¢.65	м • 6.3	150594.2	5115.7	
	2 ° 5 1	7.541421	5933.U	
P. 75	0°50	148792.5	5745.9	
3.87	· 23°	139125.A	5517.A	
4.85	Ø. 55	128485.1	5 3 2 5 • H	
10 ° 1	· • 5 3	11645.2	5140°C	
1°,95	ነ ነ የ	1,474,55.1	2.949.5	
6, - I	57 T	97115.0		

438

402 -



AVERAGE OF FLLF 111 FOR A RECORDS. FLAF 1004 P MUX TORDUE FX P PUX TORDUE FX P P.10 P.0 P.0 P P.14 12752.6 4A4.1 P P.3452.4 1371.0 952.1 P P.3452.4 1371.0 952.1 P P.3433.2 1371.0 952.1 P P.3493.2 1371.0 952.1 P P.3493.2 1371.0 952.1 P P.3493.2 1371.0 952.1 P P.3493.2 1310.1 952.1 P P.3493.2 1311.1 249.1 P P.349.2 544.4 244.1 P P.444.1 244.4 244.4 P P.444.1 244.4 244.4 P P.444.1 244.4 244.4 P P.444.1 244.4 244.4 P P.444.4 <t< th=""><th>TEST SAMPLEIOS **</th></t<>	TEST SAMPLEIOS **
HUX TORAUE FX P. RU r. B 0.40 P. RU 12752.6 484.11 R. J1 12752.6 484.11 R. J1 12752.6 484.11 R. J1 12752.6 484.11 R. J1 24409.7 952.11 R. J2 54735.3 1991.40 R. J2 54735.3 1371.40 R. J2 54735.3 1371.40 R. J2 54735.3 1371.40 R. J2 5440.71 5473.1 P. AB 61446.3 1371.40 P. AB 61446.3 1371.40 P. AB 61446.3 1371.40 P. AB 61446.3 2493.6 P. AB 61446.3 2493.6 P. AB 71911.47 71931.4 P. AB 784.6 714.8 P. AB 134.7.4 7143.4 P. AB 134.7.4 714.7.8 P. AB 114.6.1 744.1 P. AB 74.6	FIRFSTONE COMMERCIAL MILEAGE 12.5-22.5/G (DANA)
0.0 0.0 0.0 1.14 12755.6 484.1 0.57 24499.7 952.1 0.57 24499.7 952.1 0.57 24499.7 952.1 0.57 5.475.3 1371.1 0.57 5.475.3 973.1 0.57 5.475.3 1371.3 0.57 5.475.3 1371.3 0.57 5.475.3 1990.8 0.57 5.475.3 1991.6 0.57 5.494.9 1371.3 0.57 5.494.9 1371.3 0.57 5.495.3 1991.6 0.57 6.1440.3 2.574.9 0.77 7.1911.6° 2.573.4 0.77 9.2405.5 2.655.4 0.77 9.2405.5 2.655.4 0.77 9.2405.5 2.656.4 0.77 9.2405.5 2.655.4 0.77 9.2405.5 2.655.4 0.77 9.2405.5 2.655.4 0.77 9.2405.4 2.655.4 0.77 9.2405.5 2.655.4 0.77 9.2405.5 2.655.4 0.77 9.2405.5 2.655.4 0.78 19.657.4 2.745.5 0.79 <td< th=""><th>׼</th></td<>	׼
1.1716. 1.2753.6 484.1 0.39 34629.7 952.1 0.39 34629.4 1371.4 0.39 3452.3 1990.8 0.57 5.439.4 1371.4 0.57 5.439.4 1371.4 0.57 5.435.3 1990.8 0.57 5.435.3 1990.8 0.57 5.435.3 1990.8 0.57 5.435.3 1990.8 0.57 5.435.3 1991.6 0.77 7191.6 749.6 0.77 7191.6 749.6 0.77 7191.6 7493.6 0.79 78418.7 7651.4 0.79 78418.4 7651.4 0.79 78418.4 7651.4 0.79 78418.4 7651.4 0.71 7947.5 7493.6 0.71 7847.4 744.6 0.71 7847.4 744.6 0.71 7847.4 744.6 0.71 7847.4 744.6 0.71 744.7 744.6 0.71 744.7 744.6 0.71 744.7 744.6 0.71 744.7 744.6 0.71 774.7 747.7	۲ ۰. ۵
0.27 24499.7 972.1 0.39 34429.4 1371.4 0.57 54735.3 1991.8 0.57 54735.4 1371.4 0.57 54735.4 1371.4 0.57 54735.4 1371.4 0.57 54735.4 1991.8 0.57 5473.4 1911.4 0.57 5449.4 2371.3 0.57 5449.4 1911.4 0.73 65449.4 2493.6 0.73 65449.4 2493.6 0.73 65449.4 2493.6 0.73 65449.4 2493.6 0.73 65449.4 2493.6 0.73 71911.4 2493.6 0.73 71913.4 2656.4 0.73 71913.4 2656.4 0.73 7945.2 7945.4 0.74 7945.4 7445.4 0.74 196173.4 7445.4 0.74 1964.7 744.5 0.74 1964.7 744.5 0.74 1964.7 744.6 0.74 1964.7 744.6 0.74 1964.7 744.6 0.74 744.7 744.6 0.744.7 774.7 744.6 <td>444.1</td>	444.1
0.39 34529.4 1371.6 0.49 43435.3 1718.6 0.49 5673.1 2204.9 0.57 5673.1 2493.6 0.57 5673.1 2493.6 0.73 61440.1 2371.3 0.73 61440.1 2371.3 0.73 61440.1 2371.3 0.73 61440.1 2371.3 0.73 61440.1 2373.6 0.73 61440.1 2373.6 0.73 61440.1 2645.4 0.73 63465.4 2656.4 0.73 63465.4 2656.4 0.73 71911.4 2656.4 0.74 71911.4 2656.4 0.73 7346.7 2656.4 0.74 7346.7 2656.4 0.74 7346.7 2656.4 0.74 7346.7 2652.3 0.74 7346.7 744.6 0.74 7345.4 744.6 0.74 735.4 744.6 0.74 735.4 744.6 0.74 746.7 744.6 0.740.1 746.7 744.6 0.740.1 744.7 744.6 0.740.1 744.7 744.7	952.1
0.49 43437.2 1714.0 0.57 5.4755.3 1991.8 0.57 5.4755.3 1991.8 0.57 5.4755.3 1991.8 0.57 5.4755.3 1991.8 0.57 5.4755.3 2933.6 0.57 65449.0 2493.6 0.73 65449.0 2493.6 0.73 65449.0 2493.6 0.73 65449.0 2533.6 0.77 71911.4° 2493.6 0.77 71911.4° 2456.0 0.77 71911.4° 2456.0 0.79 83465.2 2657.3 0.79 8183.9 2657.3 0.79 92469.1 2552.4 0.711 1954.7 2557.4 0.771 19477.4 2557.4 0.771 19477.4 2557.4 0.771 19477.4 2557.4 0.771 19477.4 257.7 0.75.6 19477.4 274.7 0.761 1954.7 2140.6 0.75.6 93.175.4 2140.6 0.75.6 93.175.4 2409.5 0.75.6 257.4 2409.5 0.75.6 2448.4 2409.6 0.75.6	1371.4
0.57 5.4735.3 1900.8 6.64 56429.1 7204.9 7.64 56429.1 7204.9 7.73 65449.0 714.3 6.73 65449.0 714.3 7.73 65449.0 714.3 7.73 65449.0 733.6 7.73 65449.0 733.6 7.73 71911.4 7455.2 7.79 71911.4 7455.2 7.79 73462.5 7651.0 7.79 73462.5 7651.0 7.79 73462.5 7661.0 7.71 73462.5 7661.0 7.73 19474.6 7652.3 7.74 19474.6 7652.3 7.75 19474.6 7652.4 7.75 19474.6 7662.3 7.75 19474.6 7662.3 7.75 19474.7 7643.4 7.75 19474.6 7643.4 7.75 19474.7 7643.4 7.74 19474.6 7643.4 7.75 19474.6 7643.4 7.75 19474.6 7643.4 7.75 7444.6 7643.4 7.76 7474.7 7494.5 7.76 7404.7 <td< td=""><td>1718.0</td></td<>	1718.0
6.64 56.63.1 7273.6 7.73 61446.3 7495.4 7.73 65449.4 7493.6 7.73 65449.4 7493.6 7.73 65449.4 74943.6 7.73 71911.4 7553.6 7.73 78976.2 7661.4 7.73 78976.2 7661.4 7.73 78976.2 7661.4 7.73 78946.4 7661.4 7.73 78946.4 7661.4 7.73 78946.4 7661.4 7.74 78946.4 7661.4 7.73 7846.4 7661.4 7.74 7846.4 7661.4 7.74 7846.4 7661.4 7.74 7846.4 7661.4 7.75 7846.4 7662.3 8.76 7846.4 7673.4 7.74 1954.4 7673.4 7.75 1954.4 7673.4 7.75 1954.4 7657.4 7.75 1954.4 7657.4 7.75 1954.5 7657.4 7.76 6353.5 7657.4 7.76 71654.4 7657.4 7.77 1954.5 7764.5 7.76 7164.5 777.5	1971. 8
7.71.3 6.1440.3 7.171.3 7.73 6.9440.0 7493.6 7.73 6.9440.0 7493.6 7.73 6.9440.0 7573.6 7.73 71911.4° 7493.6 7.73 71911.4° 7511.0 7.73 71911.4° 75171.8 7.73 71911.4° 75171.8 7.79 71911.4° 75171.8 7.79 71913.9 7652.3 8.78 8346.7.7 7652.3 8.78 8346.7.9 7652.3 8.78 9246.9.4 7652.3 8.78 134714.1 7652.3 8.78 13453.6 7147.8 8.773 13453.6 7457.8 8.767.3 13453.6 7457.8 8.767.3 13453.5 7457.8 8.767.3 13453.5 7457.8 8.767.3 13453.5 7457.8 8.767.4 7553.5 7457.8 8.767.4 7456.1 1975.5 8.767.4 7557.4 7557.4 8.767.5 7557.4 7557.4 8.767.5 7557.4 7557.4 8.767.5 757.4 757.4 8.767.5 757.4 7557.4 <	7294.9
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6.75 6896.2.4 7573.6 7.7 71911.4' 2611.6 7.7 71911.4' 2658.6 7.7 71911.4' 2658.6 7.7 78076.2 2658.6 7.7 78076.2 2658.6 7.7 78076.2 2658.6 7.7 78076.2 2658.6 7.7 78076.2 2658.6 8.77 92467.7 2652.3 8.77 92467.8 2652.1 8.77 92467.8 2652.1 8.77 92467.9 2652.1 8.77 196173.4 2652.3 8.77 19347.9 2749.6 8.77 19347.9 2749.6 8.741.9 1953.4 2749.6 8.741.6 19533.5 2449.6 8.741.6 19533.5 2449.6 8.741.6 19533.5 2449.6 8.741.6 5149.2 2449.6 8.741.6 5149.2 2449.6 8.741.6 5149.2 2449.6 8.741.6 5149.2 2449.6 8.741.6 5149.2 2449.6 8.741.7 5149.2 2449.6 8.741.7 5149.2 2449.6 8.741.7 </td <td>2493.6</td>	2493.6
% 71911.0° 7011.0° 2050.0 % 78076.2 76011.0 2050.0 % 78076.2 78076.2 2051.0 % 78163.0 7652.3 7652.3 % 78163.0 7652.3 7652.3 % 78163.0 7652.3 7652.3 % 77 92460.11.0 7652.3 % 77 92460.11.0 7652.3 % 77.10.11.0 76.73.0 7672.1 % 7.14.11.0 174.1.0 76.7.1 % 7.14.11.0 174.1.0 76.7.2 % 7.47.1.0 174.1.0 76.7.0 % 7.47.1.0 174.1.0 76.7.0 % 7.47.1.0 174.1.0 74.7.0 % 7.47.1.0 174.1.0 74.7.0 % 7.47.1.0 174.1.0 74.7.0 % 7.47.1.0 174.1.0 74.7.0 % 7.47.1.0 74.1.0 74.1.0 % 7.47.1.0 74.1.0 74.1.0 % 7.47.1.0 74.1.0 74.1.0 % 7.47.1.0 74.1.0 74.1.0 % 7.47.1.0 74.1.0 % 7.4	2573.6 TOAV & 39625.0 LOAD # 3494.0 VFL # 55.0 MPM.
7.78 78276.2 2656.0 8.779 8346.2.5 7661.0 8.779 8183.9 7652.3 9.779 8183.9 7652.3 9.779 92469.1 7652.3 9.77 92469.1 7652.4 9.77 92469.1 7652.4 9.77 92469.1 7652.4 9.77 95440.6 7652.4 9.77 9549.4 7652.4 9.77 134714.1 7652.4 9.77 134283.4 7445.6 9.77 134283.4 7445.6 9.77 185175.4 7445.6 9.793.6 191253.4 7499.2 9.793.7 191253.4 7499.2 9.793.7 191253.4 7499.2 9.793.6 191253.4 7499.2 9.793.7 191253.4 7499.2 9.793.7 9.793.4 7499.2 9.793.7 9.793.5 7499.2 9.754 9.793.5 7499.6 9.754 7.755 7499.6 9.754 7.755 7499.6 9.754 7.755 7499.6	2611.0
0.179 83462.5 7061.0 0.79 8183.9 7652.4 0.70 92469.1 7652.4 0.71 92469.1 7652.4 0.71 92469.1 7652.4 0.71 92469.1 7652.4 1.2625 1.36714.1 7652.4 1.2625 1.36714.1 767.9 1.2625 1.36714.1 767.9 1.2625 1.36714.1 767.9 1.2675 1.36714.1 767.9 1.2675 1.36714.1 767.9 1.2675 1.36714.1 767.9 1.2675 1.36714.1 767.9 2.1601 77.9 767.9 2.1601 77.9 767.9 3.4501 77.9 77.9 3.4501 77.9 77.9 3.4501 77.9 77.9 3.4601 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9 3.4701 77.9 77.9<	2650.0 HUPLAK E 0.79 MULOCK E 0.55 RATIN E 1.44
8.79 88183.9 7652.3 8.70 92469.1 7562.4 9.71 92469.1 7562.4 9.77 92469.1 7562.4 9.77 92469.1 7562.4 9.77 96669.1 7562.4 9.75 136710.1 7562.4 9.75 136710.1 7562.4 9.75 13470.1 7562.4 9.75 13470.1 7572.4 9.75 13470.14 7562.6 9.75 13470.14 7562.6 9.71 186173.4 7401.6 9.71 186173.4 7401.6 9.753.6 931701.4 72294.8 9.763 931701.5 7094.5 9.764 68533.5 7009.5 9.56 5766.4 1055.4 9.56 5766.4 1055.4	2661.0
A. 4745 T. 60459 T. 6 A. 74651 A. 74661 A. 74661 A. 74651 L. 61740 L. 61740	2652.3
1.2025 1.2024 8.77 2.73 1.2017101 2522 2.73 1.20173.4 2522 3.711 10173.4 2522 3.712 1.20474 2522 3.713 1.00173.4 2552 3.713 1.00173.4 2552 3.714 1.00173.4 2552 3.715 1.0153.4 2645 3.715 1.0153.4 2645 3.715 1.0153.4 2645 3.715 1.0153.4 2645 3.714 1.0153.4 2744 3.755 0.0533.5 2019.4 3.750 0.1051.5 2744	7572.4
8.75 1.91710.1 7.822.4 8.73 1.94710.1 1.922.4 5.73 1.9474.4 7.847.5 5.747 1.06173.4 7.847.5 8.577 1.9164.5 7.84.6 8.647 1.9173.4 7.847.5 8.647 1.9173.4 7.84.6 8.767 1.9173.4 7.84.6 8.647 1.9173.4 7.84.6 8.647 1.9173.4 7.84.6 8.647 1.91653.5 7.84.6 8.647 6.8533.5 7.87.8 8.648 1.9173.5 7.84.6 8.648 1.9173.5 7.84.6 8.648 1.9173.5 7.84.6 8.648 1.9173.5 7.84.6	25A5。1
0.213 134240.4 2445 3.713 186173.4 2445 3.713 186173.4 2457.2 3.713 185483.4 2747.2 3.747 191233.4 2445 3.747 191233.4 2444.2 3.443 191641.5 2449.4 3.443 191641.5 2444.5 3.443 191641.5 2444.5 3.45 81584.5 2452.8 3.45 68533.5 2452.8 3.45 1923.5 2452.8 3.45 1923.5 2452.8	252.4
3.71 106173.4 7.61.2 2.64 105483.6 2645.2 2.64 105483.6 2224.8 2.65 101253.6 2254.8 3.63 63533.6 249.5 2.64 63533.6 2472.8 2.64 63533.6 2472.8 2.64 576.8 1955.8 2.64 10533.6 1955.8	2445.6
9.505 9.543.0 9.524.8 9.573.0 9.5178.1 7224.8 9.544 9.544.1 9.544.1 9.544 8.544.1 9.544.5 9.54 8.544.1 9.544.5 9.54 8.544.1 9.544.1 9.54 8.544.1 1.954.5	2367.2
3.67 1.41253.0 2224.8 3.65 931705 2149.2 3.63 8160.6 2409.5 3.63 8160.6 2409.5 2.64 68533.5 2409.6 3.56 68533.5 2409.6 2.56 576.8 1955.8 3.56 11055.5 1075.8	×207.
3.45 931701 2149.2 3.63 81680.6 2409.5 7.67 68533.5 2422.8 7.65 68533.5 2422.8 7.56 41051.5 1055.8	2224 B
1 3.63 81680.6 2009.5 C.62 68533.5 2022.8 C.62 57608.1 1955.8 1.499.5 1.499.6	2149.2
с. к.с. 68533.5 2422.8 1 2.56 57648.1 1955.8 1 1951.5 1 1955.8	2409.5
N°6501 1°84925 N5°6 N	8 ° 2 < 5 <
, "topl 5"1501" 93",	1055. H
	1 401° ¢
4.55 39625 39625 1640 BEAD	l feit. • e

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		·				•						, ,	•											-		-	- 4	LC	2
	(DANA)					•				•	•	790.3 VEL # 40.0 MP	-	51 RATIO = 1.49		1									e - 20		-		
TEST 3AMPLE166 44	AGE 12.5-22.5/G							•				69812.5 LOAD = 6		0.76 WULDCK = 0.			•									-			
W FILE 64	FIRFSTONE COMMERCIAL MILEN	FX	и . А	1019.1	1887.5	2639.9	3255.4	3747.6	4141.4	1454.1	46A2.V	4845.5 TOAV # 6	4927.6	5003.4 MUPEAK #	5014.7	4975.4	8.200	1798.0	4675.4	4546 , 6	4423.7	4303.3	41 42.7	4056.2	3922.5	4,7A4,5	365H 。 5		u • [] <}
** A-D FILE 112	112 FOR 6 RECORDS.	TORDUE	5° 5	21406.5	6 * 7 7 4 3 7	56221.1	6952A.1	824H7_5	89118°S	9594A.6	1 ü 1 a du ° v	1 95929.3	1 a9232 a	115161.1	1 26493.2	124423.5	128434.2	132169.7	135259.3	136762.(1	135944.3	132505.9	120367.0	117450.55] มี6RU6。R	95A73.6	A6323.2	1 ::::::::::::::::::::::::::::::::::::	1/54°55
	AVERAGE OF FILE	XIIW	A. AR	:	ຍ ~. ບ	A • 4 6	67*1	3°27	A.63	0.67	. 12°4	9 ° 74	9.75	۵ °16	n. 76	n. 76	a. 75	0.73	3.71	¢ • 69	2442	9 ° 45	4.43	6.41	65°8	n.57	r. ss	•	5 ° 2 °
•	•	SLIP	59°.5	0. 82	9.44	8.96	9°. AB	8.19	6.12	0.14	0.16	0.18	0°50	6.25	0.30	0.35	17.8	0.45	0.57	0.55	i9 ° 5	0.65	H.7A	N. 75	6.33	M . B S	6 0 • 5		r 7 • 3



		** A-0 FILF 113	R FILF 63.	TEST SAMPLE167 **	
	AVERAGE OF FILF 113	FOR & RECURUS.	FTRESTONE COMMERCIAL MI	:LEAGF 12.5-22.5/G (DAI	
SI. 1P	XIW	TORDHE	FX	:	
6. AA	9 ° 0 9	5 5	6.8		
9.12	0.15	21773.0	1035.1		
6,64	95 °	12947.5	1947.6		
0.74	3 . 4 1	54277.9	2770.A		
0, 2 A	0.51	7341.A	3423.B		
0;10	9°20	e Indha	3931.3		
6.12	P.65	92AA9.6	4304.5		•
A.14	Q.69	1.12496	4569.8		
0.16	A. 72	194509.4	47n.B.5		
0.18	A.74	198485.2	4857.6 TQAV #	67270.A LUAD # 4801	.« VEL = 55.9 MPH.
0°50	P.75	111450.0	4691.5		
e. 25	R. 75	117893.5	AHR3.6 MUPEAK	<pre>c = 0,75 พปLOCK = 8,53</pre>	RATIO = 1.52
6,30	Q.75	121729.2	4635.2		
6.35	6.74	125689.8	1769.5		
6.40	2.73	129273.8	4671.1		•
N . 45	A.71	132755.1	4549.4		
0.50	P.69	136239.1	4454.2	-	ł
N. 55	G. 67	139289.6	1.327.1		
9.6C	5×*0	144542.6	1214.2		
6.65	r.63	1393:11.5	4076.3		
6.70	0.62	1 54469.8	1959.3		
Q.75	35.5	125621	3844.4		-
5 ° 8 °	r - 5 R	113137.A	5724.1		
2 ¥ 2	а , 5 6	9896 7 . 2	300M-5		
۲.0°.	5.4	R70.5	34A.3.7		-
35° 8	، پ 5 ک	7645122	547°•°		
) - 1:1.	€ 3 • €	N.01912	5 2 41		

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i.			** A-D FTLF 115	EN FILE 63	TEST SAMPLE169 **
		AVERAGE OF FILE 115	FOR & RECOPDS.	FIRESTONE COMMERCI	AL MILEAGE 17.5-22.5/G (DANA)
	SLIP	PTI J X	TORQUE	FX	· · · · · · · · · · · · · · · · · · ·
	e	** **	P. P	Ø • Ø	· · · · · ·
	0.02	0.17	23939.2	1147.6	
	si . 04	Ø.29	42113.6	2014.3	
	6.116	0.41	58499.8	2804.3	•
	8. aa	a.51	72783.4	3479.6	
·	11 11	a.59	A4352.A	41135.8	
	8.12	4.66	93851.1	4463.7	
	6.14	2.70	100975.3	4771.5	
i	P.16	2.73	196353.A	4983.7	•
	0.18	P.75	110329.A	5118.7 T	GAV = 74333.3 LOAD = 4898.4 VFL = 48.8 MPH
	#.2 0	2.76	112864.5	5171.3	· · · · · · · · · · · · · · · · · · ·
	a. 25	8.77	117337.4	5206.9	UPEAK # 0.77 MULOCH # 0.53 RATIO # 1.46
	10°30	•• 77	120983.0	5198.1	
4	e. 35	P.76	123954.9	5151.6	
4	8.42	0,75	126199.9	5478.9	
0	0.45	C.74	127842.4	4996.7	
	0.5P	0.72	129895.1	4873.7	
	4.55	9.7A	129952.4	4742.8	
	1.62	°.68	129885.2	4601.9	
	8.65	A.66	128139.3	4458.5	
	0.70	7.64	124142.6	4318.1	
	0.75	9.62	11743.3	4177.5	
	N.80	2.60	108572.9	4037.3	
	6.85	r • 24	96987.6	3947.7	
	1,63	°.56 -	90253.6	3783.7	
	હું પુદ્	ູ້	P2117.1	366 5. 6	
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Tire: Highway Tread 12.5-22.5/G Rim: 22.5x8.25

LATERAL FORCE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	La	ateral H	force at	t Indica	ated Sl:	ip Angl	e (degs.	,
Load (lbs.)	Pressure (psi)		1	2	4	8	12	16	-
1960	90	*	284	540	956	1344	1623	1770	
3925	90		470	911	1653	2469	3042	3352	
5890	90		593	1157	2117	3261	4121	4629	
7850	90		649	1261	2370	3844	4945	56 58	
9800	90		666	1310	2420	4234	5558	6569	

ALIGNING TORQUE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Aligning	Torque	at Indi	cated	Slip Ang	le (degs.)
Load (1bs.)	Pressure (psi)	1	2		8	12	16
1960	90	31	54	77	58	34	13
3925	90	78	140	211	188	130	68
5890	90	126	230	363	353	263	157
7850	90	171	318	530	540	430	270
9800	90	219	417	697	760	6 36	429

CIRCUMFERENTIAL STIFFNESS vs SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	C _s (1bs.)	Vertical Spring Rate (lbs./in.)
1960	90	21,000	` 1
5890	90	62,000	4785
9800	90	50,000	

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loads, the tire behaves (laterally) like a softening spring. The lateral spring rate is the slope through the origin of the lateral load-deflection curve.

RACTION STIFFNESS $(C_{\alpha}, C_{\gamma}, C_{s})$ - The following three properties are defined to characterize the mechanical behavior of a rolling tire operated at very small slip and camber angles and for very light application of braking or driving power.

Cornering Stiffness

$$C_{\alpha} = \frac{dF_{y}}{d\alpha} \bigg|_{\alpha = 0}$$
(1)

Camber Stiffness

$$C_{\gamma} = \frac{dF_{y}}{d\gamma} \bigg|_{\gamma = 0}$$
(2)

Circumferential Stiffness

$$C_{s} = \frac{dF_{x}}{ds} \bigg|_{s=0}$$
(3)

where:

 α = slip angle

 γ = camber angle

s = circumferential slip parameter



Fig. 1 - Vertical load versus change in low-speed rolling height of tires shown in Figs. 2A-2C

= 1 locked wheel

$$s \neq 0$$
 free rolling (light braking: $s < 0.05$)
< 0 driving

15-22.5

 F_x = longitudinal traction force (depends primarily on s)

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 F_v = lateral traction force (depends on both α and γ)

Graphically, the traction stiffness is the slope taken through the origin of the traction force $(F_x \text{ or } F_y)$ versus a particular operating variable $(\alpha, \gamma, \text{ or s})$ curve. These stiffnesses measure the initial rise of traction force and have no direct relation to peak values. However, a tire with higher traction stiffness will usually develop higher peak traction force. The usefulness of these definitions depends on linear behavior for small values of the operating variables. Examination of the following truck tire data will show this linearity to be a reasonable assumption.

GENERAL BEHAVIOR

Figs. 2A-2C describe three truck tires chosen to exhibit a broad range of traction stiffness properties^{*}. The mechanical properties listed below each tire were measured at rated load and pressure. The carpet plots of lateral force versus slip angle and vertical load show the variation in lateral force obtained and indicate how the cornering stiffness, C_{α} , is related to slip angle and load. Although C_{α} measures only the initial rise of lateral force with slip angle for a particular tire load, the rise is similar at other tire loads. It appears that a tire showing higher cornering stiffness will develop more lateral force than a lower stiffness tire operated at the same slip angle and vertical load.

TIRE LOAD

The operating variable having the greatest influence on traction stiffness is tire load. The influence of tire load derives from the extreme deformation which a tire undergoes in the contact region. Specifically, the meridian and circumference profiles, intersecting at the center of contact, are substantially altered in dimension and curvature as tire load is increased. The camber, cornering, and circumferential stiffnesses, being indirectly influenced by lateral and longitudinal tire stiffness, are consequently dependent on structural geometry, and are seen to increase with test load for the tires diagrammed in Figs. 3A-3D.

Particularly affected by sidewall deformation is the lateral spring rate, K_y . Fig. 3D illustrates the variation of K_y with tire load for the three tires shown in Figs. 2A-2C. Increasing load on the tire from far below the design value results mainly in an increased contact length with some change in the meridian profile. The increased contact length causes an increase in lateral stiffness. At higher loads, the changes in tire

^{*}The tires are representative of the 14 different truck tire sizes tested for this program.

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Fig. 2 - Measured mechanical properties of three different tires. A-11.00-22/G; B-12.00-20/G; C-15-22.5/H

profile become very pronounced, especially in the sidewall area, and cause a reduction in spring rate. It should be noted that the maximum value of lateral spring rate occurs near the esign load for each tire tested.

The vertical load-deflection data are remarkably linear for a broad range of tire loads (Fig. 1). Fig. 1 suggests that it is reasonable to consider the tire as a linear vertical spring with spring rate, K_z , defined as the average slope of the load-deflection plot.

INFLATION PRESSURE

Increasing inflation pressure reverses the deformation caused by vertical load. Although a decrease in contact length accompanies an increase in inflation pressure, the dominant effects of increased pressure are reduced curvature in the sidewall and a generally stiffened carcass structure. The net result is a lateral spring rate that increases with inflation pressure, as is demonstrated by Fig. 4; these data being obtained on the three tires shown in Figs. 2A-2C. As may be expected, the effect of increasing the pressure is more pronounced at the higher loads which cause large distortions in the meridian profile.

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The cornering stiffness, C_{α} , exhibits similar pressure sensitivity at higher vertical loads. Fig. 5 compares the lateral force versus slip angle and vertical load exhibited by a 10.00-20/G tire (Fig. 6B) at rated inflation pressure (100 psi) and at 50 psi. As can be anticipated from lateral spring rate behavior measured for these three different tires (Fig. 4), cornering stiffness increases with inflation pressure at higher loads.

The apparent similarity between K_y and C_{α} is due to the definition of K_y as the lateral stiffness of a standing tire measured at, effectively, a 0 deg slip angle while C_{α} is defined to measure the stiffness of the rolling tire in generating lateral force at very small slip angles. However, the contact region deformation associated with tire traction is considerably more complicated than the deformation associated with the measurement of K_y . As no rational basis exists for the correlation of these values, they are treated as independent mechanical properties.



Fig. 3 - Variation of mechanical properties with tire load for tires shown in Figs. 2A-2C. A-camber stiffness versus tire load; B-cornering stiffness versus tire load; C-circumferential stiffness versus tire load; D-lateral spring rate versus tire load

PLY RATING AND TIRE SIZE

The ply rating designates the load range for which a particusize tire is designed. Load limits for various sizes at specific inflation pressures up to the design pressure are tabulated according to empirical formulae. The ply rating is a measure of the strength of the tire carcass and does not necessarily

indicate the actual number of plies. The tire pairs listed in Table 1 were tested on design width precision rims at the indicated pressures and loads which are



Fig. 4 - Lateral spring rate K_y versus inflation pressure for tires shown in Figs. 2A-2C

near the design values specified for these tires used as singles and duals. The higher rated tire of each pair is generally used as a dual. The 20 in tires that were tested all have the tread pattern shown in Fig. 6B. The tread pattern of the 11.00-22 tires (Fig. 2A) is similar. Table 2 lists the measured mechanical properties and illustrates the differences which may be found in tires which are similar in all respects, except for ply rating.

The differences seen in Table 2 are slight and possibly influenced by tire nonuniformity and/or measurement precision. There is remarkably little change in the properties of the 11.00-22 tires, the largest set tested for differences due to ply rating. The slight increase in test pressure (see Table 1) may be responsible for the increases in vertical spring rate. It is of interest to note that the vertical spring rate measured for the 10.00-20 tire with the G rating was less than that obtained for the F load rating. However, the lateral force generating ability did increase with increased load rating as evidenced by the



Fig. 5 - Lateral force versus slip angle and vertical load on 10.00-20/G tire at rated pressure (100 psi) and at 50 psi

	(a) Rib-type I	(b) Rib-type II	(c) Open Tread	
cs	46000	42000	28000	lb/unit slin
٢.,	508.2	523.4	516.0	1b/dea
	56.7	69.0	39.9	1b/deq
κ	1477	1618	1291	lb/in
κ,	5032	4700	4500	lb/in

Fig. 6 - Measured mechanical properties of 10.00-20/F nylon tire in three tread patterns. Arib-type I; B-rib-type II; C-open tread

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UNIROYAL UNIMASTER, 15 × 22.5/H, BADC ASPHALT

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		** A=0 FILE 245	NFW FILE 193	TEST SAMPLE451 ++	
	AVERAGE OF FILE 245	FOR 7 RECORDS.	UNIROVAL UNIMASTE	R 15,4-22,5/H DRY ASPHALT (9,8,)	
51.IP	MUX	TORQUE	FX .		
0.40	4.44	A. A	R . 0		
0.42	0.Ph	8268.4	551.9		
0.04	9,12	18957.6	1014.4		
0.06	a, 19	31622.2	1652.1		
0.NA	P,28	47998,6	2419,5		
H. 10	0.37	+3494,2	3156.0		
9,12	a. 46	77721.9	3878,9		
0.14	°,54	91494.4	4532,1		
4.16	4.61	104869.4	5139.4		
a.18	7,68	114618.7	5649.6	TQAV = 134462.1 LOAD = 6514.0 VEL = 3.0	нры.
4.20	W.72	122276.1	6833.4		
P.25	9. A0	136899.5	6646.P	HUPEAK = 0.84 HULOCK = 0.74 RATIO = 1.12	
r, 3P	9.65	146116.2	7648.9		
M. 35	9,88	151254.1	7238.3		
5.46	P. 89	152429,5	7288.5		
P.45	9.4A	152934.9	7271.3		
9.50	P.88	151821.3	7224,1		
4.55	P. 87	149714,8	7162.2		
4.68	8.86	148263.4	7843.0		
8,65	P. 85	146739.9	7928.1		
6.70	a. A5	145180.2	6945.4		
a, 75	R. A4	143602.5	6869.8		
4,80	P. A3	142915.7	6793.8		
e., 85	9.42	140424,5	6717.5		
4.90	P.81	138715.t	6634.6		
R., 95	P. AA	136772,9	6554.5		
1.00	M. 79	134482.1	6462.9		

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		** A-0 FILE 244	NEW FILE 184	TEST SAMPLEASE ++	
	AVERAGE OF FILE 244	FOR 7 RECORDS.	UNIROVAL UNIMASTER	R 15.8-22.5/H DRY ABPHALT (8.8.)	
SLIP	HUX.	TORQUE	FX		
9,68	8,88	8,9	88		
e, ø2	a.16	26697.4	1374,3		
6.84	*,26	46278,7	2383.4		
e. P6	4,38	+545R. 8	3245.0		
A. 88	ə, 47	83164.4	4895,8		
P.1P	2,56	78444.4	4811.8		
×.12	P.64	112235.*	5485.2		
8.14	P.71	124788.8	6844.6		
0.16	8.77	135254,8	4537.8		
P.18	8.62	142952.1	4989.9	TGAV = 113668.7 LOAD = 8671.3 VEL = 18.8 MPH	•
ə.28	A.85	148451.8	7129.0		
8.25	8,89	157454.3	7482.4	MUPEAK a 8,41 MULOCK # 8,67 RATIO = 1,36	
0.3A	# . • 1	163921.8	7537.4		
8,35	8.91	168711.6	7572.7		
a,48	8.41	172532.#	7534.8		
P. 45	8,98	175547.7	7464.5		
8,59	4.89	175928.5	7346.6		
A.55	8.87	172488.3	7198.4		
4.68	#.85	166321.3	7823.8		
8.45	A.A3	100002.4	6845.9		
e.70	8.88	153968.1	6667.5		
8.75	A, 78	148891.5	6494,8		
P.84	8,76	142313.4	6319.0		
8.45	P.78	136584.8	6144,4		
P. 9P	*.72	134584.7	5944,3		
0,95	A.78	122843.4	5781.1		
1.88	8.47	113668,7	5585.4		



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		** A=D FILE 247	NEW FI
•	AVENAGE OF FILE	247 FOR 6 RECORDS.	UNIROVAL U
SLIP	MUX	TORQUE	Fx
v.00	3.00	n.0	0.0
9.42	4.17	28450.9	1495.3
V. 04	2.34	57365.9	2488.6
0.06	9,47	88497.5	4013.1
P.UA	9,58	99657.6	4925.4
0,10	9.67	115594,#	5677.9
0.12	a. 75	129816.8	6311.2
a.14	Ø. A1	139865.3	6757.8
V.10	8,85	147879.5	7068.6
4.14	4,47	.153293.9	7243.3
4.24	P. AR	156545.1	7327.2
0.25	7.8A	102112.2	7321.1
и,за	A.87	166614.2	7246.6
r. 15	P. 86	170335.3	7133.8
4.40	J.84	173459.4	6992.4
4.45	1.42	176021.2	6843.3
P.5P	a. A1	178304.1	6645.2
0.55	1,79	179932,5	+523,3
0.60	0.77	179891.3	6359.5
0,05	a. 75	175571.4	6198.5
W.7V	2,72	168236.7	6814.4
۲.75	9,74	154013.5	5819.2
(1 , A 17	9.67	145661.0	5608.1
2,95	*,45	132684.9	5349.4
4.90	0.42	119439.1	5167.3
4.75	3,59	196075.2	4938.3
1.00	7.56	92479,2	4698.7

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NEW FILE 185	TEST SA	MPLE453 ++	
ROYAL UNIMASTE	H15.8-22.5/H	DRY ASPHALT	(5.8,)
Fx			
0,0			
95,3			
88.6			
13.1			
25.4			
77.9			
11.2			
57.8			
68.6			
43.3	TQAV = 92479,2	LOAD = 6664.	\$ V€L = 28.0 HPw.
27.2			
21.1	MUPEAK = 0,88	HULOCK = 0,56	RATIO # 1.57
46.6			
33.8			
92.4			
43,3			
45.2			
53*3			
59.5			
98.5			
14.4			
19.2			
08.1			
19.4			



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		** A=0 FILE 24A	NEW FILE 146	TEST SAM	₩PLE#54 ++
	AVERAGE OF	FILE 244 FOR 6 RECORDS.	UNIROVAL UNINASTER	15,8-22,5/H	DRY ASPHALT (8.8.)
\$L	IP MUX	TORQUE	FX		
e,	80 8,08	4.8			
ť.	#2 *.2 3	48834,4	1991.7		
a,	e4 e,38	++2#2.1	3384,4		
8.	P6 6,58	\$8489,9	4356,4		
۵.	PB 9.61	187218.2	5249,4		
Ρ.	1P 0,78	123#34,7	5986.6		
Я.	12 4,78	135968.1	6578,3		
θ.	14 P.82	144735.9	6486.7		
۴.	16 4.85	151626.4	7237,4		
۶.	10 0,86	156468.3	7352.7 76	AV = 85875,#	LOAD = 8782.5 VEL # 38.8 HPH.
₽.	24 6,86	140335.7	7345.5		
а.	25 4,85	165585.1	7219.8 HL	IPEAK = 8,86 - 1	NULOCK = 8.52 RATIO = 1.66
Я.	38 8,83	169685.7	7062.8		/
я,	35 #,81	173#53.2	6891.6		
0.	48 8,79	175974.7	6788,5		
۴.	45 #.77	178564.4	6519.2		
0.	5# P.75	188631.1	6331,4		
P.	55 P.73	182613.4	6148.2		
Ю.	68 P. 71	183327.7	5968,2		
υ,	65 R.69	141585.4	5791.1		
₽.	79 #.67	175248.6	5417.5		
я,	.75 F.65	164459,7	5446.8		
Ρ.	8# P.62	150471.4	5261.7		
0.	85 9.68	134679.4	5864,5		
е.	9# P.58	118348.4	4862.4		
Я.	95 P.55	182845.6	4656.2		
1.	PA 8.52	85875.8	4443.7		

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		** A=D FILE 249	NEW FILE 107	I TEST SAMPLEASS ++
	AVERAGE OF FILE	249 FOR 6 RECORDS.	UNIROYAL UNIMASTE	R 15.8-22.5/H ORV A8PHALT (8.8.)
SLIP	MUX	TORQUE	FX	
0,09	9.00	a, 0	8.8	
0,02	e,27	46168,8	2367.3	
0.94	8.40	69611.8	3455.8	
0.06	P. 52	92764.3	4468.2	
0.08	9.61	107739,2	5279,8	
0.10	8,70	121913.8	5923,2	
0,12	8,76	132849,5	6486.8	
8.14	A.81	141755.3	6777.4	
0.16	8,85	148739.4	7979.8	
0,18	P.87	154294.6	7239,7	TOAV = 83854,2 LOAD = 8587.4 VEL = 48.8 HPH.
0,20	9,67	157293.9	7262.5	
0,25	9,85	161392.4	7154.9	MUPEAK = 8,87 MULOCK = 8,52 RATIO = 1,66
0.30	0.83	164698.7	6983,8	
0,35	Ø.A1	167568.7	6788.5	
0,40	Ø, 78	169885.6	6571.7	
Ø 45	P. 76	171577.1	6364,7	
8.50	8.74	172877.3	6167.1	
0.55	P.72	173935.7	5977.8	
8.69	P.69	174683.5	5794.2	
8.65	9.67	174993,5	5612.9	
8.78	8,65	173351,2	5431.6	
0.75	8,63	168425.2	5249,9	
0.89	8.61	157688,9	5861.7	
8.85	0.58	141431.6	4878.6	
8.98	Ø. 56	123058.8	4679.1	
0,95	0.54	183986.2	4488.1	
1.00	P.52	83854,2	4297,5	



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		** A+0 FILE 258	NEN FILE 198	TEST SA
	AVERAGE OF FILE 25	S FOR 5 RECORDS.	UNIROYAL UNIMASTER	15, 8-22, 5/H
8L1P	MUX	TORQUE	FX	
*,48	0,80	8,7	6,6	
8,82	6.21	35974.4	1788.9	
8,84	8,36	+4437,8	3146.5	
8,84	8,49	**584,4	4271.7	•
8,86	8,68	187968.7	5105.1	
8,18	6.64	124111.9	5405.3	
8.12	4.75	134219,3	6434,8	
8.14	4,80	145374,3	4425.1	
8, 16	8.84	152545.4	7122.0	
8.18	5.86	157444.4	7244.2	8AV = 88325,#
0,20	6.85	161478.4	7298.1	
8.25	4,83	168416.4	7881.7	UPEAK = 8,86
. 8,38	8,80	173103.4	4425.4	
/ 0.35	8,77	176657.3	4567.7	
8,48	4,75	179168.7	4331.4	
8,45	8,73	188673.8	6127.7	
8,58	#•71	182361,9	5735.0	
B. 55	8.64	184218.8	5734.2	
8.45	8,66	146371,7	5535.5	
8.45	8.64	188448.8	5343.4	
8,70	8.61	148938.1	5155.5	
8.75	6,51	185465.2	4973.4	
8,89	8,57	173938.1	4885,7	
P.85	4,55	153831.1	4637.8	
8,98	0,53	129788.9	4453.2	

8,58

8,48

105055.1

40325,8

: 8,45

1.80

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TRAV . 80325.8 LOAD # 8492.8 VEL & SS.# MPH. RATIO = 1.88 HUPEAK # 8.86 HULOCK # 8.48

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TEST SAMPLESSA ...

DRY ASPHALT (8.8.)

4268,8

4857.5

UNIROYAL UNIMASTER DRY ASPHALT (8.8.2 15.9-22.5/H 1,8 . M U X 1111111 • ٠ . 111 8,2 P.88 LONGITUDINAL BLIP 100.00 FZ = 8692,P RATID = 1.88 A=0 FILE 250 NHFILE 188 SAMPLE 456 VEL = 55.P MILOCK & 8.48 MUPEAK = 8.86

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		** A=0 FILE 255	NEW FILE 110		MPLE458 **	
	AVERAGE OF FILE 25	55 FOR 6 RECORDS.	UNIROYAL UNINASTE	R 15,9-22,5/H	DRY ASPHALT (8.8.)	
SLIP	HUX	TORQUE	FX .			
0,09	0,00	0,0	8.8		•	
0,02	0,23	16888,4	825,7			
9.04	8,39	30244,5	1399,4			
8.86	0,53	41385.0	1886.9			
8.28	8.64	50589,1	2269.1			
8,18	8,72	57551.9	2552.8			
0.12	8.78	62938,8	2741.1			
8,14	0.81	67662.6	2856,7			
9.16	2.84	. 71641.3	2919.3			
8,18	8,85	74875.7	2949.1	TDAV = 39778.8	LOAD = 3515,8 VEL = 4	8.8 MPH.
8.28	9,85	77338.7	2958,3			
8.25	8,85	82374,8	2921.1	HUPEAK # 8,85	HULOCK = 0.55 RATIO = 1.	55
9,30	8.84	86596,8	2873.7			
0.35	ø, 83	96184.9	2012.0			
8.4P	0,81	93251,2	2744,1			
0.45	9,80	96178.8	2688,2			
0,50	8,78	99178 ₈ 7	2628.3			
0,55	8,76	192430.3	2555.5			
0.69	8,74	145845.4	2485.6			
8,65	8,72	189374,5	2416.5			
8,78	8,78	111427.8	2348.7			
8.75	8,68	109281.9	2279,5			
8.80	8.55	101153.6	2218,9			
0,85	8.64	88986,3	2134.7			
0,98	P.61	72792.1	2051.6			
8.95	8,58	36646.0	1965.4			
1.88	0,55	39778.8	1875.8			



		** A-0 FILE 256	NEW FILE 111	TEST SI	MPLEASE
	AVERAGE OF FILE	256 FOR 5 RECORDS.	UNIROYAL UNINASTE	R 15.8-22.5/H	DRY ASPHALT (S.B.)
SLIP	•••• • X	TORQUE	FX		. · · · · · · · · · · · · · · · · · · ·
8,88	8,88	8, 4	6, P *		
	0,16	28647,8	1394.8		
8,84	8,24	50727.4	2419.1		
8,84	0,30	68481,4	3214.2		
4,88	8,44	43016.7	3432.4		
	8,54	45111,4	*584.1		
8.12	8,48	190392.3	5832,3		
8,14	P. 78	126782,4	5815.1		
8.14	#•17	148145,8	4343.2		
8,18	8.81	146668.6	4785.0	TBAV + 79325.8	LOAD = 8519.3 VEL + 48.8 HPH
4,20	4,42	153758,1	\$742.7		
8,25	8,01	162452.4	4758.3	MUPEAK = 8,82	MULOCK # 0.48 RATIO = 1.70
0,30	4,10	168777.8	4447. 9		
4.35	8,79	173527.4	6544.8		
8,49	8,77	177584.4	6399.2		
8,45	8,75	101103.3	4831.5		
0.50	8,73	184743.1	6 8 58,8		
\$,55	8,71	144235,7	5845.8		
9,68	2,45	198984,2	5673.6		
8.65	8,66	191409.5	5475.5 °		
8,78	8.44	187341.0	5277.9		
8.75	8,41	177172.3	5841.3		
9,80	A, 54	168498,2	4877.9		
8.85	4,56	148397,3	4665.4		
8,78	8,54	119461.7	4441.3		
8,95	8,51	78968.4	4284.8		
1.08	8.48	79325.0	3969.0		



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		** A=0 FILE 257	NEW FILE 112	TEST SAMPLEAGE **	
	AVERAGE OF FILE 257	FOR 5 RECORDS.	UNIROVAL UNIMASTE	R 15.8-22.5/H DRY ASPHALT (8.8.)	
SLIP	MUX	TORQUE	FX		
a.ga	0.00	e. a	8.8		
9.02	9,17	44221.1	2550,1		
8.84	9.27	72493.0	3987.4		
8.25	2,36	96769.6	5896.9		
4.68	P.43	117791.6	6131.2		
0.10	8,49	134619.4	6975.6		
0.12	A. 55	151758.3	7886.5		
0.14	9.63	176630.4	8949,9	•	
8.16	9.69	196858.0	9791.4		
0.18	9.71	2#7743.2	10221.2	TUAV = 117775.# LOAD = 14557.8 VEL :	140.8 MPH.
a.20	a,72	213414.9	18293.2		
4,25	9.72	221536.0	10206.8	MUPEAK = 0,72 MULOCK = 0,45 RATIO =	1,60
0.30	Ø.71	22713#.6	19848.4		
0.35	P.69	231228.9	9848.3		
0.40	A. 68	234429,9	9631.6		
8.45	8.67	237228.7	9485.4		
0.50	A. 65	240878.2	9166.7		
0.55	P.63	242859,5	4926.5		
0.60	P.62	244912.6	8683.4		
0.65	A.48	244319.2	8436.9		
8.70	a.58	238693,3	8188.4		
a.75	A. 56	227697.2	7937.6		
P.8P	A.54	211897.1	7679.5		
0.65	P. 52	187718.1	7399.8		
u, 90	a.50	163686.5	7882.5		
a , 95	a. 48	14#181.2	6749.5		
1.00	a, 45	117775.0	6399,8		



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		** A=0 FILE 244	NEW
	AVERAGE OF FILE 244	FOR & RECORDS.	UNIROVAL
SLIP	₩UX	TORDUE	FX
8.08	P. 80		8, 8
e.#2	4,23	30#33.3	1978.4
P. 74	P. 34.	57468.4	2482.5
8.P4	P. 84	75164.8	. 3718.8
8.8A	A. 52	89437.3	4386,4
8.18	# . 58	1#1226.4	4919.3
8.12	4.64	112773.8	5418.2
8,34	A. 72	127201.4	6845.2
P.16	8,78	137826.7	4502,4
P.15	#.81	144636.5	6757.2
8,24	8.85	148212.4	6888,3
A.25	4.81	153498,7	6737.1
e.30	P. 8P	156798.8	6617.6
A.35	8,78	150835.7	6474.9
P. 4P	e.,77	148893.2	4324,8
8,45	*, 75	141884.7	6169.6
4.5P	4.73	162482.4	6885.2
P.55	F.71	163998.8	5829.5
P.68	4.69	145743,3	5648.8
8.45	#.67	147516.8	5471.1
P.7P	9.45	168186.8	5347.5
a. 75	P. 63	145379.4	5161.6
P.88	R. 61	155559,9	5816.4
4,85	4,59	139411.7	4836.4
H. 44	P.56	120433.6	4614.3
B.95	4.53	180674.6	4369,4
1.00	e, 14	8#187.5	4847.5

NEW FILE 142 TEST SAMPLEASS ++ IROVAL UNIMASTER 15.8-22.5/4 DRY ASPHALT (8,8,) FX.

TOAV = 88187.5 LOAD = 8496.3 VEL = 48.9 HPM.

HUPEAK = 8,82 HULDEK = 8,89 PATED = 1,66

Check Run # 1



RATIO = 1.66 AND FILE 244 HWFILE 182 SAMPLE 450 ----------

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HEN FILE (89 , TEST SAMPLEAST ** UNIROYAL UNIMASTER 15.0-22.5/H DRV ASPHALT (8.8.)

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	AVERAGE OF	FILE 251 FO	R & RECORDS.	UNIROYA
SLIP	HUX		TORQUE	FX
0.00	A, 60		a,8	0.0
0.92	0.18	2	5231,3	1595.6
0.94	P.31	4	8966.6	2686.2
0.06	A.41	5	8,1521	3555.5
P. 88	P.59	6	1171.2	4388,7
#.1P	P. 58	6	6957.3	4983,8
B.12	9,64	6	5896,1	5342,4
0.14	P. 69	6	3789,3	57#6,6
8.16	8,76	9	8722,8	6296,7
0.18	9,81	. 15	7147.6	6653,7
e.2P	9,82	13	8825,2	6749,8
0.25	a. 62	15	3786.0	6739,B
0.30	P.81	16	3698,7	6645,6
a . 35	Ø.79	17	8534.6	6515.2
0.40	0.78	17	5784.2	6364.2
6,45	9.75	17	9999,4	P566°5
0.59	A.73	16:	3566.3	6826.8
e, 55	e.71	18	6415,8	5856,2
и, 6р	P,69	18	8555,2	5686.9
0,65	9.67	18	8573.4	5524,4
0,70	P.65	18	4876.4	5366.0
0.75	9.63	17	6581.0	5285.7
A, 8P	0.61	16	1137,3	5032.3
P.85	P.59	14	2375.0	4843.7
P.98	0.56	12	2515.4	4647.8
0.95	0,54	19	2602.7	4447.1
1.00	P.51	8;	2812.5	4240.0

** A-0 FILE 251

TGAV = 82812.5 LOAD = 8559.7 VEL = 48.0 MPH.

MUPEAK = 0.82 MULOCK = 0.51 RATIO = 1.62

Check Run #3



7-1

	×	4+ A+D FILE 261
	AVERAGE OF FILE 261	FOR 5 RECORDS.
8L1 P	HUX .	TOROUE
n, en	P. PA	A.8
P.82	9,19	38431.5
H. 84	A. 34	64954,9
8,84	R. 48	87797.9
W. 78	8,59	147892.5
8,18	R. 67	122467.6
9,12	P.73	135145.4
e.14	* .77	145084.2
P.16	P. 79	152178.4
8,18	e.81	157369.#
n*5u	P.81	100400.4
W. 25	P.88	168944,7
8,3P	8,79	174855.7
0.35	P. 78	179371.3
H. 4P	R.76	184128,9
8.45	4,74	186511.4
a.5A	P.72	192455.5
8.55	A. 7A	196487.5
8.64	P.68	199187.1
P.45	A. 67	148514.4
4.7A	P. 45	194813.4
8.75	P.63	182992.1
8.80	P.68	146492,5

9,85

8,97

0.95

1.08

a, 58

0,55

A. 52

P.58

146454.2

125384.1

1#5276.2

86825.8

NEW FILE 183 TEST SAMPLEASE ..

Fx 1,8 1675.9

4100.6 5884.6

6869.4 6798.3

4488.3 4553.9 4481.6 \$236,8 5843.8 5726.3 5567.4 5484.9 5234,6 5949,4

4848.2

4629.3

4483.4

4171.5

2998.7 5716.6 4217.7 4539,4 6743.0 6853.8 TOAV LOAD . 8438.8 84825,8

VEL & 48.8 HPH.

HULDER # 8.58 . RATIO # 1.63 NUPEAK = 0.81

Check Run #5





with regard to peak values. It is surprising, however, that the size $15 \times 22.5/H$ wide base single tire (code UU15) provides such a small increment in normalized traction when the load is reduced from the rated value (8460 lbs) to 0.4 of the rated value (3380 lbs). This performance suggests, for example, that the wide base single is less suitable for operation at lower loads than tires which are rated in the lower load range. As shown in Figure 13, with vertical load (non-normalized) plotted on the axis of abscissa, the wide base tire provides a reduced tractive performance (compared to 10.00 x 20/F's) when the value of F_{τ} is below about Thus the notion that one can "tire-up" to 8000 lbs. resolve stopping performance deficiencies in heavy trucks may not be a universal axiom.

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Figure 14 illustrates the influence of velocity on the normalized traction behavior of the six-tire sample as measured on the asphalt pavement. The data show a rather narrow band within the respective peak measurements and slide measurements across the tire sample, with consistent gross trends exhibited in all cases. The data in Figure 14 again place the H-rated tires (codes FT12 and UU15) at the lower boundary of performance for these experiments in which each tire was operated at its rated load.

To characterize the repeatability of the data presented in Figures 12 through 14, the data obtained from a set of five repeat runs which were interspersed within data runs for each tire are plotted in Figure 15. Each repeat run represents the average of six locking cycles conducted at 40 mph and the T & RA rated load on each tire. Data points are presented, left to right, in the order in which they were gathered. Below each










Figure 15. Peak and slide traction measures deriving from repeat runs of each of the six tires tested on the asphalt track at BADC.

group of peak and slide data presented in Figure 15 for each tire, the standard deviation of the measures is printed. In general, the indicated repeatabilities are of considerably higher quality than is observed, say, in peak readings gathered using ASTM skid trailers. In addition to the observed repeatability, it is most significant to note that the test process is causing no monotonic trend in peak/slide characteristics as a function of work history. Thus we have concluded that each tire sample was behaving in a stable fashion throughout the sequence of test runs.

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To demonstrate the influence of pavement surface characteristics on peak and slide traction, results have been summarized as load and velocity sensitivities for a baseline tire tested on four different test surfaces. Figure 16 illustrates the extent to which the four pavement selections altered the load sensitivities of this tire. While there appears to be a changing rank among the surfaces in terms of the peak and slide traction values, the two asphalt surfaces which were examined generally provided higher peak traction performances than did two concrete surfaces.

Figure 17 indicates the influence of the pavement differences on velocity sensitivity. Whereas previously reported measurements indicated a profound difference between peak traction performances on concrete and asphalt, these data show basically comparable trends among the two asphalt and two concrete surfaces.

To characterize the statistical repeatability of the data describing pavement influences, the "check run" values of peak and slide traction are plotted for each of two baseline tires in Figures 18 and 19. As before,

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- 436 -



- 437 -

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100.00 WET JENNITE LONG. SLIP -ŕ.

IDX

- 438 -

RATIO = 1.82

MUPEAK = 0,36

MULOCK = 0.29

VEL = 20.0

FZ = 13519.9

90,00



- 439 -

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100.001 RATIO = 2.01 LONG. SLIP . 89.9 IJX

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440 -

HUPEAK # 8.87 MULOCK - 0.43 VEL = 40.0 FZ = 6596.7



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TABLE 3.1. FLAT-BED TEST TIRES

<u>Tire No.</u> Heavy Truck Tires	Manufacturer	<u>Mode 1</u>	<u>Size</u>
и 1	llad may a l	Triple Tread	10 - 205
1+1 1-1	Uniroyal	Triple Tread	10 x 200
n=2	Uniroyal Uniroyal	Triple Tread	10 x 200
n-3 17 4	Uniroyal D.E. Coodrich	Hilossym Dadial	
n-4	B.F. GOOGFICH	Steel H.D.R.	10 K 20 G
H-5	B.F. Goodrich	Milesaver Radial Steel H.D.B.	10 R 20 G
H-6	Goodyear	Unisteel R-1	10 R 20 G
H-7	Goodyear	Unisteel L-1	10 R 20 G
H-8	Firestone	Power Drive	10 x 20F
H-9	Uniroyal	Unimaster Rib	15 x 22.5H
H-10	Michelin	Radial	10 R 20 G
H-11	Uniroyal	Fleetmaster - Superlug	10 x 20F
Heavy Bus Tires			•
H-12	Firestone	Hiway Mileage	12.5 x 22.5G
H-13	B.F. Goodrich	Intercity Mileage	12.5 x 22.5G
H-14	B.F. Goodrich	Intercity Mileage	11.5 x 20G
H-15	Uniroyal	Intercity	12.5 x 22.5G
H-16	Uniroyal	MaxRoute I	11.00 R 20H
H-17	Goodyear	Custom Cruiser	12.5 x 22.5G
H-18	Michelin	Radial XZA	1] R 20 H
H-19	Michelin	Radial XZA	11 R 22.5 H
H-20	Michelin	Radial XZA	12 R 22.5H
Light Truck Tires			
L-1	Firestone	Transport 500	8.00 x 16.5D
L-2	Goodyear	Custom HiMiler	8.75 x 16.5E
L-3	Goodyear	Rib HiMiler	8.00 x 16.5D
L-4	Firestone	Transport 110	7.50 x 16.5C
L-5	Goodyear	Super Single HiMiler	10.00 x 16.5E
L-6	Firestone	Town & Country Truck	8.00 x 16.50
L-7	Goodyear	Custom Flexsteel	8.00 R 16.5E
L-8	Goodrich	Milesaver Radial	8.00 R 16.5D
L-9	Goodyear	Glas Guard XG	8.00 x 16.5D
L-10	Goodyear	6las Guard XG	8.75 x 16.5E
L-11	Firestone	Town & Country Truck	8.75 x 16.5E
L-12	Goodyear	Custom Flexsteel	8.75 R 16.5E
L-13	Michelin	Radial XCA	8.00 R 16.5E
L-14	Wards	Steel Belted . Super Wide	9.50 x 16.5D
L-15	Michelin	Radial XCA	8.75 R 16.5D
L-16	General	Jumbo Power Jet	8.00 x 16.5D
L-17	General	Jumbo Power Jet	8.75 x 16.5E
L-18	Goodyear	Glas Guard	8.00 x 16.5D
L-19	Goodyear	Glas Guard ,	8.75 x 16.5E
L-20	Goodyear	Rib HiMiler	8.75 x 16.5E
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LATERAL FORCE (LB.) AT INDICATED INFLATION PRESSURE (PSI.), LOAD (LB.), AND STEER ANGLE (DEG.)

	LOAD	5			~	N 1	4	4	8+	- 60	21+	-12	91•	-16
120.0	2500.0	-45.1	-388,6	307.5	•642.6	589.8	-1968.3	1003.3	-1631.2	1541.7	-1910.2	1003.6		1997.
120.0	5000.0	-96.8	•735,2	588.9	·1253.7	1135.8	-2072.9	1961.5	-3185.3	3059.4	-3747.6	3602.0	-3774.3	3848.
120.0	7500.0	-136.6	•1865.4	825.1	-1803.0	1621.6	-3019.1	2869.3	•4622 . 4	4487.0	-5231.7	5209.7	-5462.5	\$520.
120.0	10004.0	-176.2	•1285.9	992.2	*2228,2	1995,3	-3886.7	3622.3	-5857.5	5747.1	• • • • 31 . 0	6685.1		.1994
96,96	504A.0	•1 P0.6	-786.8	633,2	-1379.7	1253.1	-2336.5	2246.4	-3568.2	3269.8			6*6707-	3927.
9.99	7500.0	-135.1	-1863.7	865.9	+1875.7	1707.5	-3254.5	3103.3	-4839.6	4707.3			-5724.0	5561.
6 ° 8	5000.0	-183.1	-899 ,1	724.0	•151 4	1439.3	-2648.3	2520.0	=3712ª4	3494.8			2.115 #	4182.
6 ° 9	1508.0	-124.2	•1123.5	9.44.9	•1975,B	1807.0	-3444,8	3260.1	-5008.2	4783.6			-5734.4	5670.

T ALIGNING MOMENT (FT'-LB') AT INDICATED INFLATION PRESSURE (PSI), LOAD (LB'), AND STEER ANGLE (DEG')

164	LOAD	6	+1		2+	د ۳	4	7	8+	40 8	+12	-12	+16	919
128.8	2500.0	0.0	25.7	-27.5	38,3	-41,6	43.6	-48.5	36.5	-34.6	20,5	-14.0	4.4	2.7
120.0	5000.0	11.1	78.6	-71.8	117.8	-114.7	140.1	-148.6	130.0	-124.9	65° 0	- 65,3	4.0	-18.7
129,0	7500.0	18.4	154.8	-127.8 .	232,0	-218.6	295.4	-305,8	267.0	•250,1	154.0	-149.6	46.5	•49.1
120.0	1000.0	30.1	228.7	-186.4	537.4	•329.5	476.3	-489.6	437.6	-423,6	236.9	-241.9	85.6	8.8
9.99	5000.0	11.2	102.0	-91.6	157.8	•158,3	217.4	•198.3	155.6	-158,0			10.6	-28.9
98.0	7500.0	25.6	181.1	-158.1	298.9	-277.2	402.0	-403.6	521.0	=337.2			50.4	• 69 • 8
6 8 9	5000.0	28,3	141.3	•123,5	224.3	-213.0	264.6	•276.1	1 42 . 1	-164.4			14.7	.29.1
60°	7500.0	31.1	250.6	.206.5	400,6	=378.6	527.1	•531.6	366.9	•369°,6			45.0	-69,2

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Fig. 3: Load sensitivity in the peak and slide traction of a six-tire sample on dry asphalt. All tests run at 64 km/h.









Fig. 6: Typical load sensitivities in the side force response of a sample of 10.00 x 20 tires tested at 32 km/h on a dry concrete surface.

4: Velocity sensitivity of the peak and slide traction values for a sixtire sample on dry asphalt. All tires operated at their respective T & RA rated load.

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LATERAL FORCE VS SLIP ANGLE AND VERTICAL LOAD

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Vertical	Inflation	Lateral 1	Force a	t Indic	ated Sl	ip Angl	e (degs.)
(lbs.)	(psi)	1	_2	4	8	12	16
2900	90	461	850	1402	2027	23 76	2772
5800	90	79C	1488	2531	3791	4479	5256
8640	90	1015	1915	3368	5190	6195	7301
10000	90	1041	2012	3583	5628	6860	8119(?)

ALIGNING TORQUE VS SLIP ANGLE AND VERTICAL LOAD

Vertical	Inflation	Aligning	Torque	at Ind:	icated	Slip Ang	gle (deg	gs.)
Load (lbs.)	Pressure (psi)	1	2	4	8	12	16	,
2900	90	44	71	86	63	29	10	
5800	90	124	208	276	223	131	78	
8640	90	214	375	515	449	273	161	
10000	90	251	449	632	571	347	215	

CIRCUMFERENTIAL STIFFNESS vs SLIP ANGLE AND NORMAL LOAD

Vertical Load (lbs.)	Inflation Pressure (psi)	C _s (lbs.)	Vertical Spring Rate (lbs./in.)
2900	90	47,000	
8640	90	85,000	5420
10000	90	76,000	