SMITHERS TRANSPORTATION TEST CENTER

Federally approved tire test facility

ULTRASEAL TIRE SEALANT
LIGHT TRUCK TREADWEAR TEST

Prepared For:
ULTRASEAL INTERNATIONAL, INC.
1100 N. Wilcox Avenue
Los Angeles, CA 90038

By:
SMITHERS TRANSPORTATION TEST CENTER
P.O. Box 2038
Pecos, Texas 79772

Report Date:
April 27,1992

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I. INTRODUCTION AND BACKGROUND

On April 2, 1990, Smithers Scientific Services submitted a written test proposal to Ultraseal International to study the lasting performance capabilities of Ultraseal Tire Life Extender ("UTLE") and to learn the air retention benefits that Ultraseal provided, plus the increase in tire tread life and casing integrity for retreading. By taking periodic tread groove measurements of the tires containing Ultraseal Tire Life Extender and the control tires which did not, we would be able to assess the contribution, if any, that Ultraseal made in extending the tire's tread life.

A second test consideration was that upon completion of the mileage test, tires with and without "UTLE" should be dissected in our physical test laboratory to be measured for their rubber tensile and cord strength, elongation, and adhesion properties. This data would then be compared to new tire physicals to determine what influence the treadwear testing had on tires containing the "UTLE" and on tires not containing the "UTLE", thus determining the contribution Ultraseal lends in reducing tire degradation.

It was also suggested to Ultraseal International, Inc. that a study be made in preventing air loss from punctures in pneumatic light truck tires, at the same time Smithers was conducting the above evaluations which would be performed on a light truck that was pulling a tadem axle, dual wheel cargo trailer approximately 22 feet long at Smithers Transportation Test Center located near Pecos, Texas. Because this vehicle was not being utilized for any tire evaluations, it was suggested that Ultraseal consider a "piggyback" test on the vehicle to demonstrate all the above and the "permanent" puncture sealing properties of their product.

II. TEST INITIATION AND PROCEDURE

A prototype light truck pulling a gooseneck cargo trailer approximately 22 feet in length was selected to run the Ultraseal "UTLE" evaluation. A five-gallon plastic container, complete with pump and hose assembly, was shipped to our Pecos, Texas facility from Ultraseal International, Inc. in Los Angeles, California.

Eight LT215/85R16 Michelin XCHA tires which were all produced within a two week period from the same plant, were purchased to run on the trailer. At test start all eight tires were measured for their tread groove depths. The tires then ran a break-in period of 691 miles at the end of which 25 oz. of Ultraseal Tire Life Extender was added to the four front tires. The four rear tires

received no "UTLE" and were used as the control group. At 1,665 miles the treated tires were punctured by hammering a 16 penny nail into the approximate center of each tire's tread. The vehicle was then driven approximately a short distance to allow the "UTLE" to penetrate the puncture hole and stop the air loss. The inflation pressure was adjusted back to the test pressure of 65 psi. The facility project manager for tire testing was present to assure that the correct tires that were treated with the correct amount of "UTLE", were punctured in the correct spot on each tire and that each punctured tire was indeed sealed before continuation of the test. All of the four punctured tires did seal properly and testing resumed. During the next two days after being punctured the tires were closely monitored for air loss. When no air loss was detected, normal shift pressure checks resumed (at shift start, once during the shift, and at shift end).

At 13,111 miles into the test, the test vehicle concluded it's test and the tires were split into groups of four. Each group was composed of two test tires and two control tires. Since there were no available test units with size Lt215/85R16 tires to support a piggyback test, each group was applied to a commercial vehicle to finish the tests.

At approximately 29,000 miles both groups were taken off test due to losing tire #003 because of a wheel stud failure. Tires #001, #002, #007 and #008 were reapplied and were the only tires to complete the 40,000 mile objective because of vehicle availability.

At test completion (approximately 41,500 miles) the test tires were found to have maintained 65 psi for the entire test duration. The commercial drivers utilized were interviewed and have certified that they never needed to add air to any of the test tires containing Ultraseal Tire Life Extender.

III TREADWEAR DISCUSSION

The eight test tires were initially measured at test start at six locations in each of the four tread grooves. Thereafter, approximately each 5000 miles, all tires were measured in the exact same locations and the remaining tread rubber skid depths were recorded. (See tread data sheet in the Appendix)

After each measurement, the tires were rotated in forward X pattern to another axle position, thereby giving equal exposure of all tires on all positions.

A comparison of the linear regression analysis all groove values (mils/1000 miles shows that the tires containing "UTLE" wore at a slower rate than the control tires which had no "UTLE" applied. The three "UTLE" treated tires (tire #003 was lost due to a wheel stud failure) yielded an average slope of 7.1350 mils per 1000 miles. This data suggests approximately a 2% treadwear difference with the Ultraseal tires being the better. Knowing that radial passenger tires wear at different rates throughout their usable tread skid depths, we can make no judgement as to the actual contribution the Ultraseal product made in extending the tread life of these tires. Therefore, the only statement that may actually be made from this collected data is to conclude that Ultraseal Tire Life Extender can extend light truck tire tread life.

IV TEST RESULTS

Within the scope and limitations of the test program, the following assessments can be made:

1. Ultraseal Tire Life Extender appears to increase a tire's tread life based upon the average wear rate differences displayed between the tires containing the "TLE" and the tires not contain "TLE".

2. Ultraseal Tire Life Extender produces a "permanent" puncture seal, which under normal driving conditions, prevents air loss in punctured tires for the life of the tread (i.e. 40,000 miles).

V. RECOMMENDATIONS

1. The treadwear data in this test was hampered due to the fact that the original test vehicle prematurely concluded it's test and the tires had to be permuted to a commercial vehicle in order to complete the treadwear test. We strongly suggest that Ultraseal International Inc. consider a dedicated treadwear test which is designed exclusively as a tire wear test measuring the contribution of Ultraseal Tire Life Extender on a tire's wear rate over the life of the tire.

Because the potential for increased tread life (and tire life) is evidenced from this "permanent" sealing test in Texas, we believe that a test matrix can be outlined which utilizes known passenger vehicles and/or light trucks and known historical tire wear rates at our Pecos, Texas test facility.

2. Initiate actual field tests of Ultraseal Tire Life Extender in commercial truck fleets under strict record

keeping procedures and documentation. Primary test sites should be those of interstate carriers who are currently burdened with frequent flats or down-time due to tire punctures or road hazards.

3. Examine two of the worn control tires (#007 & #008) and two of the worn Ultraseal contained test tires (#001 & #002) in our Akron physical testing laboratory to determine what measurable physical differences are present. We would expect that the tubeless innerliner rubber, the radial casing ply cord adhesions are significantly less deteriorated than those of the control tires.

SMITHERS TRANSPORTATION TEST CENTER
PECOS, TEXAS

Client Name ULTRASEAL

TC Test No. 449-10-01 Date Received 4-11-90

ient Test No. PO2420 Date Issued 4-5-90

it No. 560 Date Applied 4-12-90

re Size LT215/85R16 Date Completed 2-9-92

m Size 6.0 x 16.0 Date Returned 4 -24-92

flation 65 PSI Load 2335

H Posted HWY/65 mph Track
ute PNY-38B
rpose Sealant/LT Tire Treadwear Test
oto N/A
lographs N/A
ration 40,000 miles or wear out
sposition D.E.W.

re No.

LFTO	44901	001	10		
LFTI	4401	002	11		
RFTI	44901	003	12		
RFTO	44901	004	13		
LRTO	44901	005	14		
LRTI	44901	006	15		
RRTI	44901	007	16		
RRTO	44901	008	17		
			18		

PARE TIRES

			2		
			4		

L INSTRUCTIONS Visual inspection each day. Rotate forward-X each 000 miles. Tred depth measurement each 4000 miles.

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
t No: 44901 Tire No: 001 Sec No:
re Mfgr: ULTRASEAL INTERNATIONAL
re Name: MICHELIN XCHA
rial No.: B7EB412X459
re Size: LT215/85R16
st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 65
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: TEST

Test Route: COMM
Test Vehicle:
Balance Weight: 3.8
Tire Wt: New: 35. Old:
Rotation Pattern: S TO S

te	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1 Mile .001	GRV 2 Mile .001	GRV 3 Mile .001	GRV 4 Mile .001	GRV 5 Mile .001	GRV 6 Mile .001	GRV AVE Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IH IO: IT:
-111			NEW	1387	386	392	380				386	163	130.441	8.93	115.251			
-191	560	LF	1331	15706	1378 658	378 698	376 356	366 402			374	485	165 130.411	8.88	115.501		194 -421	
	0	LR	1596	19975	1357 204	351 162	350 167	336 142			349	166	167 130.381	8.98	115.751		195 -531	
-301	560	RF	10	113111	1343 216	335 190	337 232	325 298			335	228	169 130.381	8.95	116.001		192 -631	
-191	M1	RD	10	117615	1301 108	291 102	293 103	290 128			294	109	168 130.281	8.95	117.001		185 -411	
-131	M1	RD	10	121425	1279 173	256 108	252 92	265 152			263	123	169 130.171	8.96	119.001		167 -181	
-111	M1	LD	10	129169	1200 97	174 95	186 116	213 149			193	111	167 130.021	8.95	123.501		167 -291	
-291	M1	LD	10	132603	1193 515	163 290	163 148	194 177			178	225	167 129.981	8.95	125.001		198 -631	
-111	M1	RD	10	137590	1182 440	132 161	139 215	170 206			156	222	169 129.921	8.95	130.501		177 -171	
-091	M1	LD	10	141483	1152 129	103 136	106 115	128 93			122	116	170 129.871	8.97	130.751		165 -271	

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 41483.

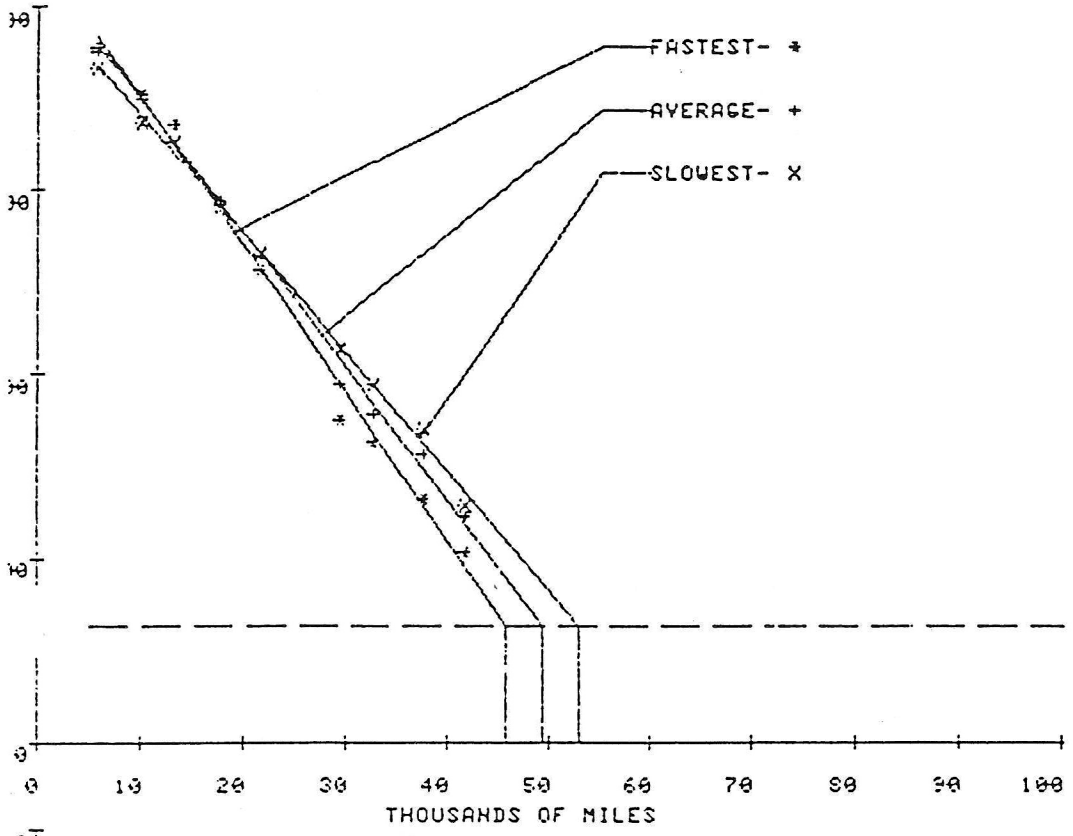
	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
ope In Mils/1000 Miles:	6.671	8.050	7.861	6.462			7.261
ntercept In Mils At Beginning Mileage:	381.8	383.1	381.9	367.1			378.5
efficient of Determination R**2	.9808	.9919	.9929	.9964			.9932
ojected Mileage To 62.5 Mil Wearbar	53562.	45533.	46344.	52836.			49222.

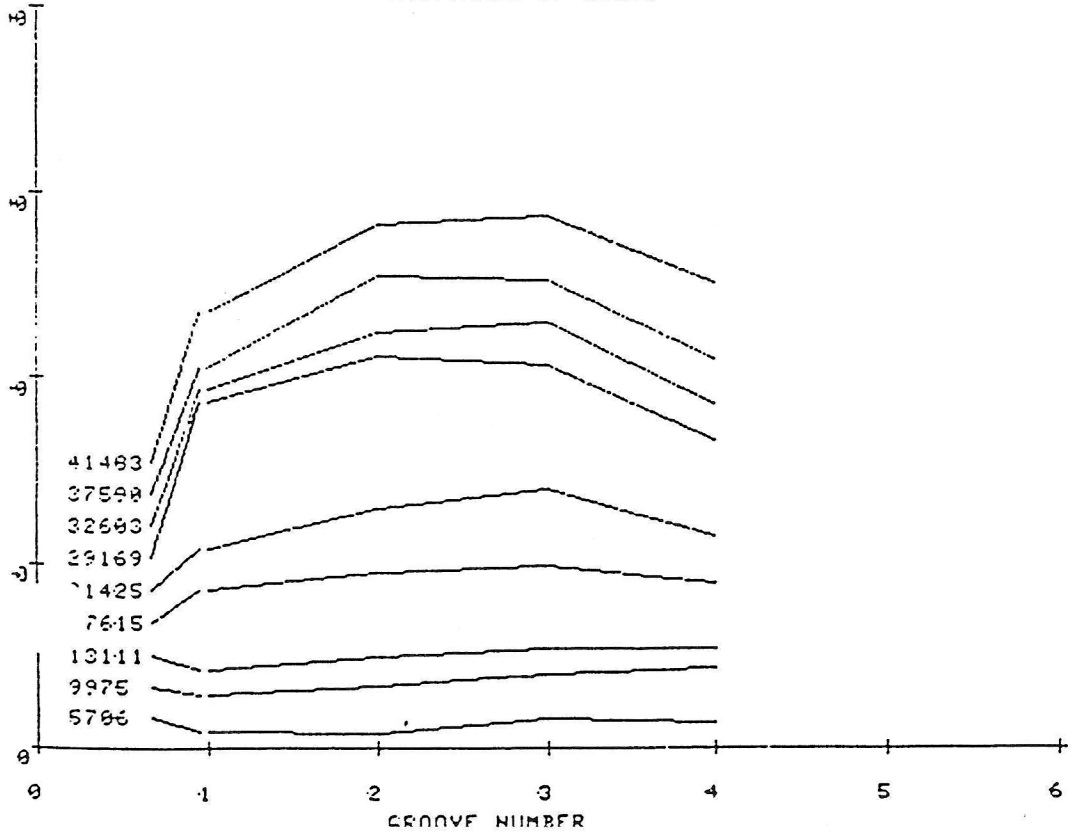
Comments:
0 TEST TIRE. THIS TIRE HAD A 691 MILE BREAK-IN AT THE END OF WHICH 25 OZ OF
0 TEST SEALANT WAS ADDED TO THE TIRE PER INSTRUCTION. THE TIRE WAS THEN
0 PUNCTURED WITH A 16 PENNY NAIL AT THE APPROXIMATE CENTER OF THE TREAD AT
0 1665 MILES, WAS VERIFIED SEALED AND CONTINUED TESTING.
9975 FAST WR GRV 4
13111 SL FEATHERY WR DOT SH; REMOVED DUE TO VEHICLE TEST COMPLETION;
13111 REAPPLIED TO COMMERCIAL VEHICLE 08/16/90.
21425 SL FEATHERY WR BOTH SHS

32603 SL FEATHERY WR BOTH SHS
37590 SL FEATHERY WR BOTH SHS
41483 SL FEATHERY WR BOTH SHS;FAST WR SRO

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

ent No: 4491001 Tire Name: MICHELIN XCHA
t No: 44901 Tire No: 001 Sec No: Serial No:B7EB412X459
e Mfgr: ULTRASEAL INTERNATIONAL Tire Size: LT215/85R16





SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
t No: 44901 Tire No: 002 Sec No:
re Mfgr: ULTRASEAL INTERNATIONAL
re Name: MICHELIN XCHA
rial No.: B7EB412X459
re Size: LT215/85R16
st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: TEST

Test Route: COMM
Test Vehicle:
Balance Weight: 4
Tire Wt: New: 35. Old:
Rotation Pattern: S TO S

ite)	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1 Mile .001	GRV 2 Mile .001	GRV 3 Mile .001	GRV 4 Mile .001	GRV 5 Mile .001	GRV 6 Mile .001	GRV AVE Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IH IO TF L
i-111			NEW	1392	389	394	396				393	164	130.451	8.92	115.251			
i-191	560	ILF	1331	15706	1376 372	381 698	377 335	384 482			380	436	165	130.421	8.88	115.501	194 -421	
	0	ILR	1596	19975	1346 141	354 159	353 182	362 192			354	166	168	130.381	8.98	115.751	195 -531	
i-301	560	IRF	10	113111	1343 818	350 784	349 648	360 ###			350	818	166	130.361	8.96	116.001	192 -631	
)-191	M1	IRD	10	117615	1302 111	300 89	302 95	316 103			305	99	169	130.281	9.00	117.001	185 -411	
?-131	M1	IRD	10	121425	1268 110	256 86	255 81	283 114			265	96	170	130.181	9.01	119.001	167 -181	
i-111	M1	ILD	10	129169	1194 104	186 110	184 110	217 118			195	110	168	130.031	9.02	123.501	167 -291	
)-291	M1	IRD	10	132603	1185 404	164 154	169 228	200 200			180	218	168	130.001	9.01	125.001	198 -631	
.-111	M1	ILD	10	137590	1168 293	135 176	135 146	167 150			152	177	169	129.911	9.00	130.501	177 -171	
?-091	M1	ILD	10	141483	1159 417	119 233	123 315	152 259			138	291	170	129.821	8.94	130.751	165 -271	

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 41483.

	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
ope In Mils/1000 Miles:	6.652	7.954	7.799	7.021			7.356
tercept In Mils At Beginning Mileage:	376.4	388.3	386.0	394.0			386.2
efficient of Determination R**2	.9730	.9859	.9835	.9892			.9845
ojected Mileage To 62.5 Mil Wearbar	52888.	46667.	47189.	52929.			49706.

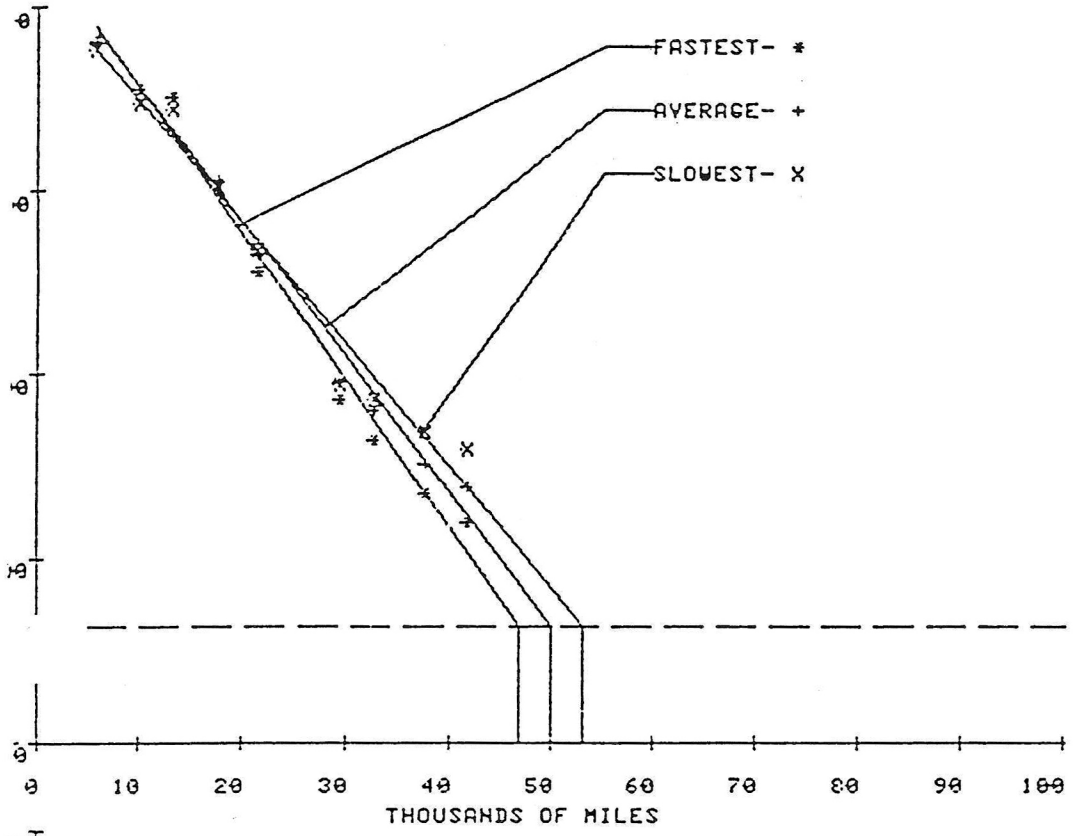
Comments:
0 TEST TIRE. THIS TIRE HAD A 691 MILE BREAK-IN AT THE END OF WHICH 25 OZ OF
0 TEST SEALANT WAS ADDED TO THE TIRE PER INSTRUCTION. THE TIRE WAS THEN
0 PUNCTURED WITH A 16 PENNY NAIL AT THE APPROXIMATE CENTER OF THE TREAD AT
0 1665 MILES, WAS VERIFIED SEALED AND CONTINUED TESTING.
9975 FAST WR GRV 1
13111 SL FAST WR GRV 1; REMOVED DUE TO VEHICLE TEST COMPLETION;
13111 REAPPLIED TO COMMERCIAL VEHICLE 08/16/90.
20160 SL FEATHERY WR BOTH SHS; FAST WR GRV 1; REMOVED FROM VEHICLE;

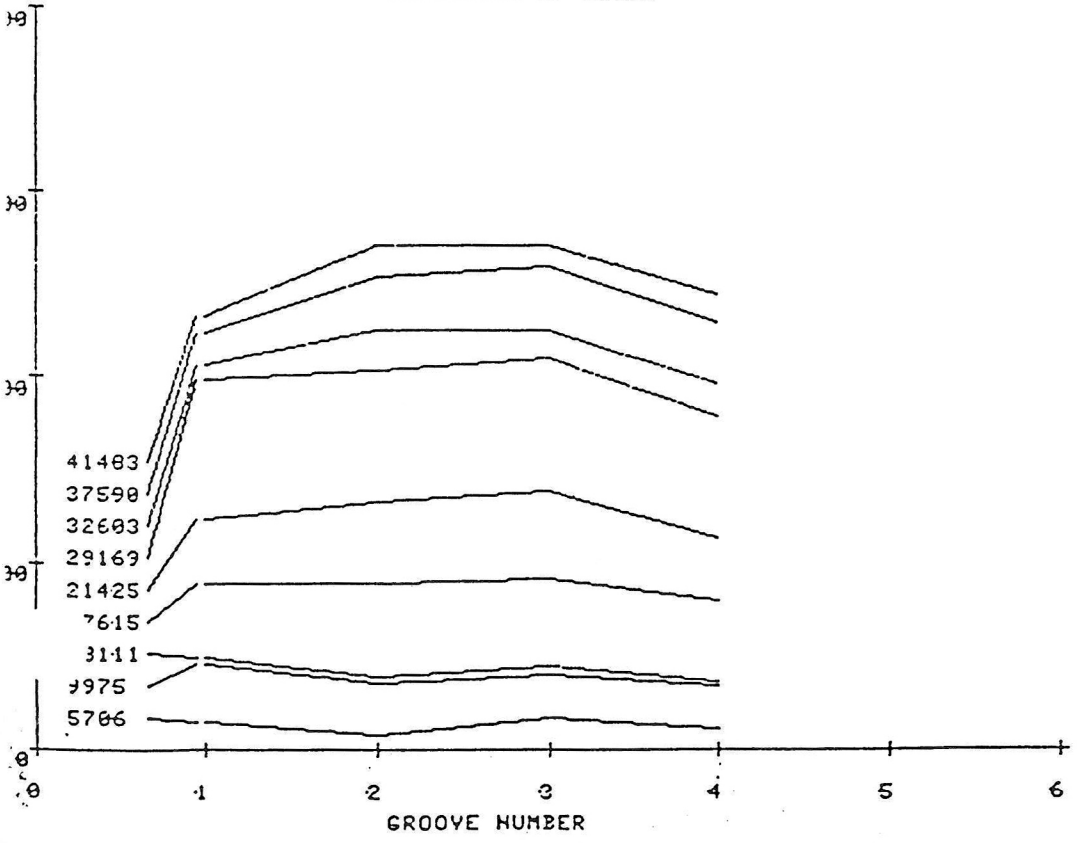
32603 SL FEATHERY WR BOTH SHS;FAST WR GRV 1
37590 SL FEATHERY WR BOTH SHS
41483 SL FEATHERY WR BOTH SHS

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

e... No: 4491001
t No: 44901 Tire No: 002 Sec No:
e Mfgr: ULTRASEAL INTERNATIONAL

Tire Name: MICHELIN XCHA
Serial No:B7EB412X459
Tire Size: LT215/85R16





SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ent No: 4491001
. No: 44901 Tire No: 003 Sec No:
e Mfgr: ULTRASEAL INTERNATIONAL
e Name: MICHELIN XCHA
ial No.: B7EB412X459
e Size: LT215/85R16
t No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: TEST

Test Route: PNY 3
Test Vehicle:
Balance Weight: 3
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

e	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1 Mile .001	GRV 2 Mile .001	GRV 3 Mile .001	GRV 4 Mile .001	GRV 5 Mile .001	GRV 6 Mile .001	GRV AVE Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IH IO IT L
-111			NEW	1388	388	390	392				389	165	130.44	8.90	115.25			
-191	560	RF	1331	15706	1373 389	373 380	373 335	379 427			374	380	164	130.41	8.84	115.50		194 -421
	J	RR	1596	19975	1319 79	328 94	333 106	346 130			332	99	167	130.32	8.98	115.75		195 -531
-141	560	LF	10	113111	1317 ###	320 437	326 470	338 376			325	519	169	130.33	9.00	116.00		192 -631
-031	835	LD	10	117615	1283 134	287 136	288 118	304 131			291	129	168	130.21	9.01	117.50		189 -411
-201	835	RD	10	121492	1243 95	245 91	248 96	253 76			247	89	165	130.12	8.90	117.75		179 -321

LINEAR REGRESSION ANALYSIS

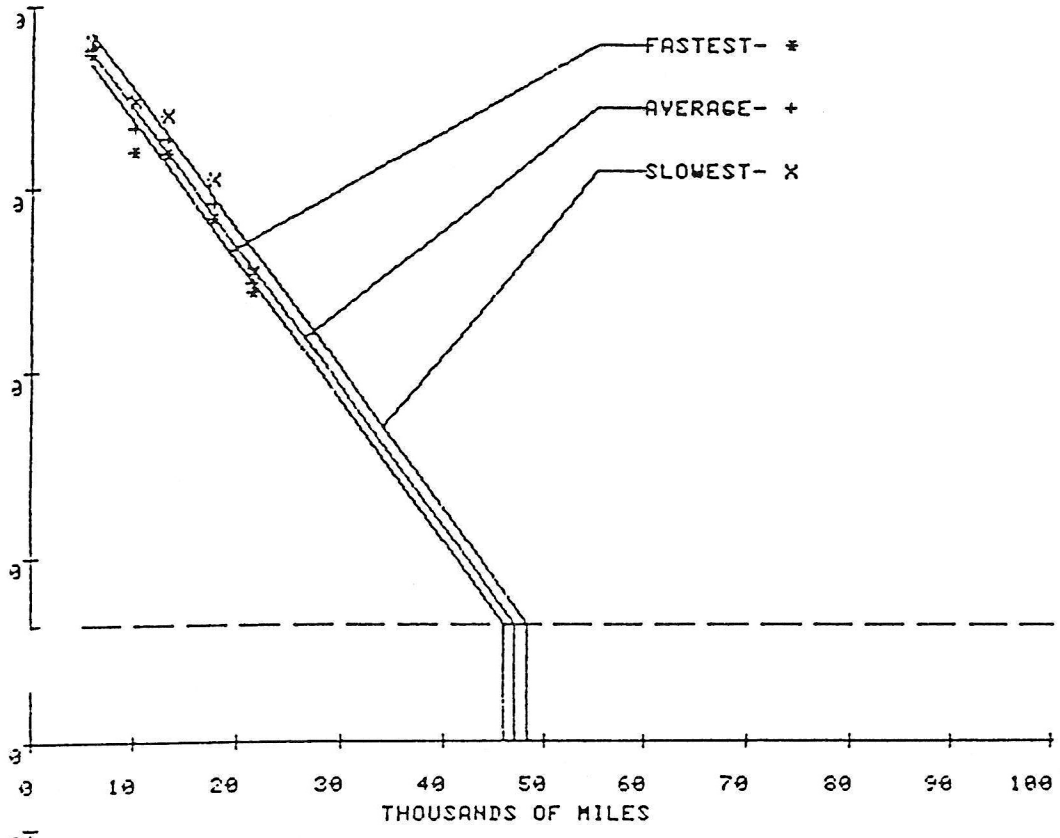
Beginning Mileage: 5706. Ending Mileage: 21492.

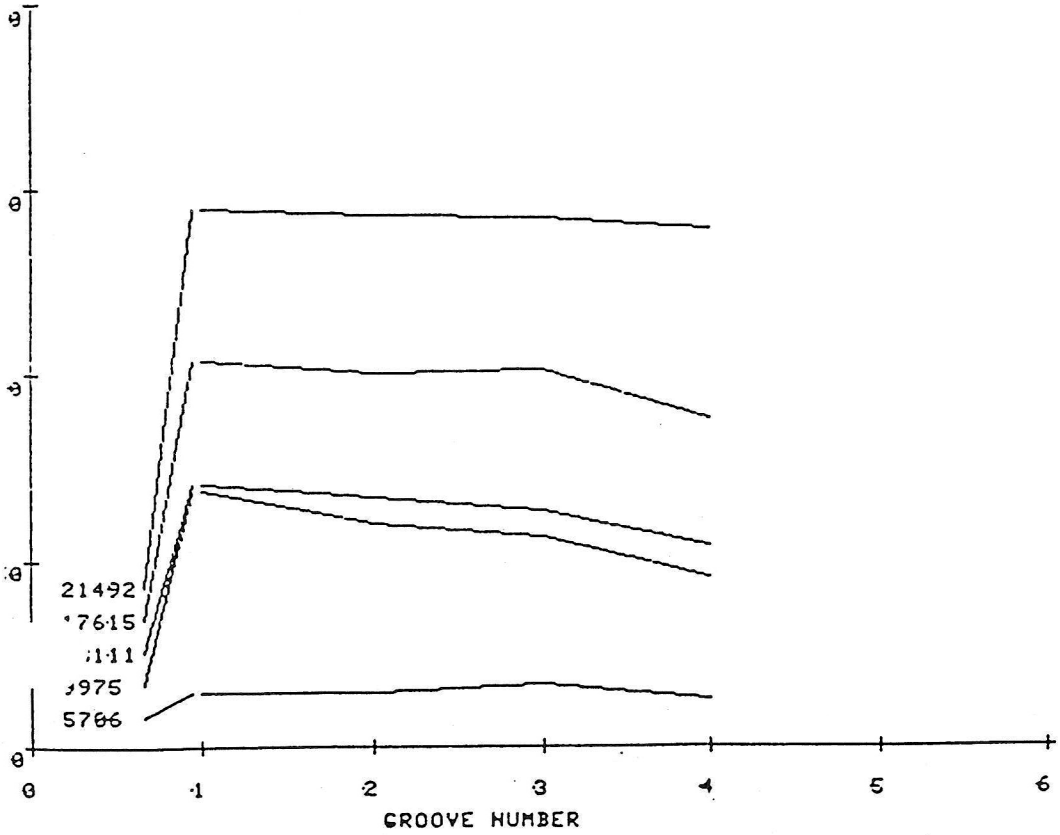
	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
ope In Mils/1000 Miles:	7.576	7.574	7.558	7.558			7.566
tercept In Mils At Beginning Mileage:	366.7	370.4	373.2	383.5			373.5
efficient of Determination R**2	.9587	.9738	.9770	.9576			.9714
ojected Mileage To 62.5 Mil Wearbar	45859.	46355.	46822.	48181.			46803.

Comments:
0 TEST TIRE. THIS TIRE HAD A 691 MILE BREAK-IN AT THE END OF WHICH 25 OZ OF
0 TEST SEALANT WAS ADDED TO THE TIRE PER INSTRUCTION. THE TIRE WAS THEN
0 PUNCTURED WITH A 16 PENNY NAIL AT THE APPROXIMATE CENTER OF THE TREAD AT
0 1665 MILES, WAS VERIFIED SEALED AND CONTINUED TESTING.
9975 FAST WR GRV 1
13111 FAST WR GRV 1; REMOVED DUE TO VEHICLE TEST COMPLETION;
13111 REAPPLIED TO COMMERCIAL VEHICLE 08/22/90.
17615 FAST WR GRV 1
21492 THIS TIRE EXPERIENCED A WHEEL STUD FAILURE; THE TIRE/WHEEL ASSEMBLY WAS
21492 EJECTED FROM THE VEHICLE AND COULD NOT BE RECOVERED.

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

No: 4491001 Tire Name: MICHELIN XCHA
No: 44901 Tire No: 003 Sec No: Serial No:B7EB412X459
Mfgr: ULTRASEAL INTERNATIONAL Tire Size: LT215/85R16





SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
t No: 44901 Tire No: 004 Sec No:
re Mfgr: ULTRASEAL INTERNATIONAL
re Name: MICHELIN XCHA
rial No.: B7EB412X459
re Size: LT215/85R16
st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: TEST

Test Route: PNY 3
Test Vehicle:
Balance Weight: 4.5
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

te	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1 Mile .001	GRV 2 Mile .001	GRV 3 Mile .001	GRV 4 Mile .001	GRV 5 Mile .001	GRV 6 Mile .001	GRV AVE Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/MIN	IH. IOI ITI L
-111			NEW	1389	392	390	393				391	162	30.96	8.94	15.25			
-191	560	RF	1331	15706	1377 462	377 368	373 342	376 332			376	370 164	30.40	8.86	15.50		194 -42	
	0	RR	1596	19975	1332 94	330 92	318 77	319 74			325	83 168	30.32	8.96	15.75		195 -53	
-301	560	LF	10	113111	1329 ###	323 392	316 ###	318 ###			321	855 167	30.30	8.98	16.00		192 -63	
-031	835	LD	10	117615	1287 106	284 115	283 136	288 150			285	124 169	30.20	8.98	17.50		189 -41	
-201	835	RD	10	121492	1249 102	245 101	247 106	252 109			248	104 165	30.12	9.00	17.75		179 -32	
-111	835	RD	10	129092	1220 266	206 194	208 199	225 281			215	229 168	30.02	8.93	22.50		167 -29	

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 29092.

	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
lope In Mils/1000 Miles:	6.816	7.295	6.830	6.211			6.788
ıtercept In Mils At Beginning Mileage:	370.2	370.5	362.3	361.3			366.0
oefficient of Determination R**2	.9702	.9846	.9733	.9525			.9734
-ojected Mileage To 62.5 Mil Wearbar	50841.	47927.	49598.	53811.			50425.

Comments:
0 TEST TIRE. THIS TIRE HAD A 691 MILE BREAK-IN AT THE END OF WHICH 25 OZ OF
0 TEST SEALANT WAS ADDED TO THE TIRE PER INSTRUCTION. THE TIRE WAS THEN
0 PUNCTURED WITH A 16 PENNY NAIL AT THE APPROXIMATE CENTER OF THE TREAD AT
0 1665 MILES, WAS VERIFIED SEALED AND CONTINUED TESTING.
13111 FAST WR GRV 4; FLAT SPOT MEAS PT 3; REMOVED DUE TO VEHICLE TEST
13111 COMPLETION; REAPPLIED TO COMMERCIAL VEHICLE 08/22/90.
17615 FAST WR GRV 4;FLAT SPOT MEA PT 3
29092 SL FEATHERY WR BOTH SHS; REMOVED FROM VEHICLE.

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
t No: 44901 Tire No: 004 Sec No:
re Mfgr: ULTRASEAL INTERNATIONAL
re Name: MICHELIN XCHA
rial No.: B7EB412X459
re Size: LT215/85R16
st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: TEST

Test Route: PNY 3
Test Vehicle:
Balance Weight: 4.5
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

te	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1 Mile .001	GRV 2 Mile .001	GRV 3 Mile .001	GRV 4 Mile .001	GRV 5 Mile .001	GRV 6 Mile .001	GRV AVE Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IH. IOI ITI L
-11			NEW	1389	392	390	393				391	162	30.96	8.94	15.25			
-191560		RF	1331	15706	1377 462	377 368	373 342	376 332			376	370164	30.40	8.86	15.50		194 -42	
0		RR	1596	19975	1332 94	330 92	318 77	319 74			325	83168	30.32	8.96	15.75		195 -53	
-301560		LF	10	13111	1329 ###	323 392	316 ###	318 ###			321	855167	30.30	8.98	16.00		192 -63	
-031835		LD	10	17615	1287 106	284 115	283 136	288 150			285	124169	30.20	8.98	17.50		189 -41	
-201835		RD	10	21492	1249 102	245 101	247 106	252 109			248	104165	30.12	9.00	17.75		179 -32	
-111835		RD	10	29092	1220 266	206 194	208 199	225 281			215	229168	30.02	8.93	22.50		167 -29	

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 29092.

	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
lope In Mils/1000 Miles:	6.816	7.295	6.830	6.211			6.788
ıtercept In Mils At Beginning Mileage:	370.2	370.5	362.3	361.3			366.0
oefficient of Determination R**2	.9702	.9846	.9733	.9525			.9734
-ojected Mileage To 62.5 Mil Wearbar	50841.	47927.	49598.	53811.			50425.

Comments:
0 TEST TIRE. THIS TIRE HAD A 691 MILE BREAK-IN AT THE END OF WHICH 25 OZ OF
0 TEST SEALANT WAS ADDED TO THE TIRE PER INSTRUCTION. THE TIRE WAS THEN
0 PUNCTURED WITH A 16 PENNY NAIL AT THE APPROXIMATE CENTER OF THE TREAD AT
0 1665 MILES, WAS VERIFIED SEALED AND CONTINUED TESTING.
13111 FAST WR GRV 4; FLAT SPOT MEAS PT 3; REMOVED DUE TO VEHICLE TEST
13111 COMPLETION; REAPPLIED TO COMMERCIAL VEHICLE 08/22/90.
17615 FAST WR GRV 4;FLAT SPOT MEA PT 3
29092 SL FEATHERY WR BOTH SHS; REMOVED FROM VEHICLE.

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ent No: 4491001
No: 44901 Tire No: 005 Sec No:
e Mfgr: ULTRASEAL INTERNATIONAL
e Name: MICHELIN XCHA
ial No.: B7EB412X449
e Size: LT215/85R16
t No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: CONTROL

Test Route: PNY 3
Test Vehicle:
Balance Weight: 3.8
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

e	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1	Mile .001	GRV 2	Mile .001	GRV 3	Mile .001	GRV 4	Mile .001	GRV 5	Mile .001	GRV 6	Mile .001	GRV AVE	Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IHI ION ITF L
-111			NEW	1391		392		395		392							393		163	30.43	8.90	15.25			
-191	560	LR	331	15706	1361	192	367	226	370	225	349	134					362	186	165	30.40	8.86	15.50		194	-42
	0	RF	596	19975	1343	237	345	195	347	185	334	281					342	218	166	30.37	8.97	15.75		195	-53
-301	560	RR	10	13111	1333	313	332	229	335	272	328	522					332	304	165	33.33	9.00	16.00		192	-43
-191	M1	LD	10	17615	1295	118	283	93	286	90	283	100					287	99	168	30.22	9.00	17.00		185	-41
-131	M1	LD	10	21425	1266	131	244	95	249	102	257	142					254	114	170	30.13	9.01	19.00		167	-18
-11	M1	RD	10	29169	1183	93	163	96	160	87	188	112					174	96	169	29.99	9.00	23.50		167	-29

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 29169.

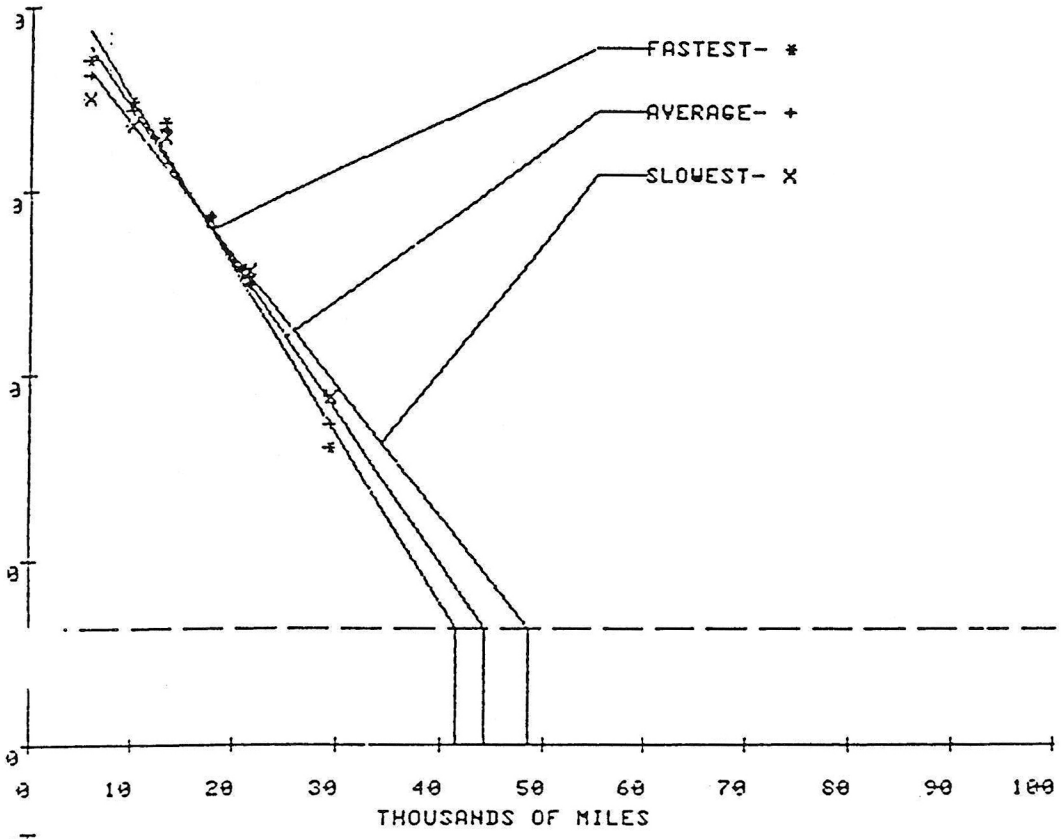
	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
ope In Mils/1000 Miles:	7.624	8.948	9.105	7.089			8.192
tercept In Mils At Beginning Mileage:	376.9	382.6	386.4	364.1			377.5
efficient of Determination R**2	.9632	.9784	.9740	.9663			.9720
ojected Mileage To 62.5 Mil Wearbar	46938.	41481.	41281.	48256.			44161.

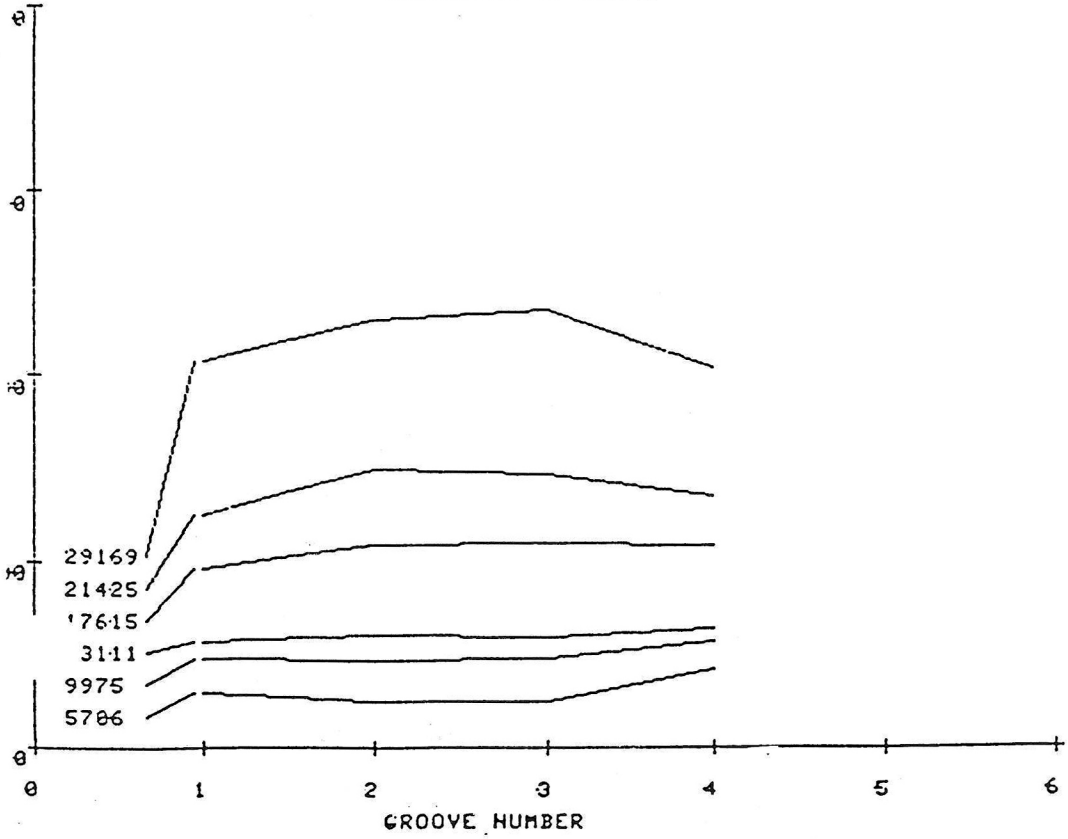
Comments: 0 CONTROL TIRE
13111 REMOVED DUE TO VEHICLE TEST COMPLETION; REAPPLIED TO COMMERCIAL VEHICLE
13111 08/16/90.
21425 SL FEATHERY WR BOTH SHS
29169 SL FEATHERY WR BOTH SHS; REMOVED FROM VEHICLE.

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

. . No: 4491001
: No: 44901 Tire No: 005 Sec No:
: Mfgr: ULTRASEAL INTERNATIONAL

Tire Name: MICHELIN XCHA
Serial No:B7EB412X449
Tire Size: LT215/85R16





SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
t No: 44901 Tire No: 006 Sec No:
re Mfgr: ULTRASEAL INTERNATIONAL
re Name: MICHELIN XCHA
:rial No.: B7EB412X459
re Size: LT215/85R16
:st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: CONTROL

Test Route: PNY 3
Test Vehicle:
Balance Weight: 4
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

ate	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1 Mile .001	GRV 2 Mile .001	GRV 3 Mile .001	GRV 4 Mile .001	GRV 5 Mile .001	GRV 6 Mile .001	GRV AVE Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/MIN	IHI ION ITF L
4-11			NEW	1389	387	392	394				391	163	30.431	8.90	15.25			
4-19	1560	LR	1331	15706	1352 152	368 302	371 271	371 249			365	227	164	30.401	8.89	15.50		194 -42
/	0	RF	1596	19975	1337 291	344 174	342 147	349 192			343	189	167	30.381	8.97	15.75		195 -53
4-30	1560	RR	10	113111	1331 570	334 308	333 342	335 232			333	327	167	30.321	9.00	16.00		192 -63
0-19	M1	LD	10	117615	1282 91	284 90	276 78	291 100			283	89	168	30.221	9.00	17.00		185 -41
2-13	M1	LD	10	121425	1252 125	240 86	235 95	264 143			248	108	169	30.121	9.00	19.00		167 -18
4-11	M1	RD	10	129169	1188 121	169 108	175 128	197 115			182	117	168	29.991	9.00	23.50		167 -29

LINEAR REGRESSION ANALYSIS

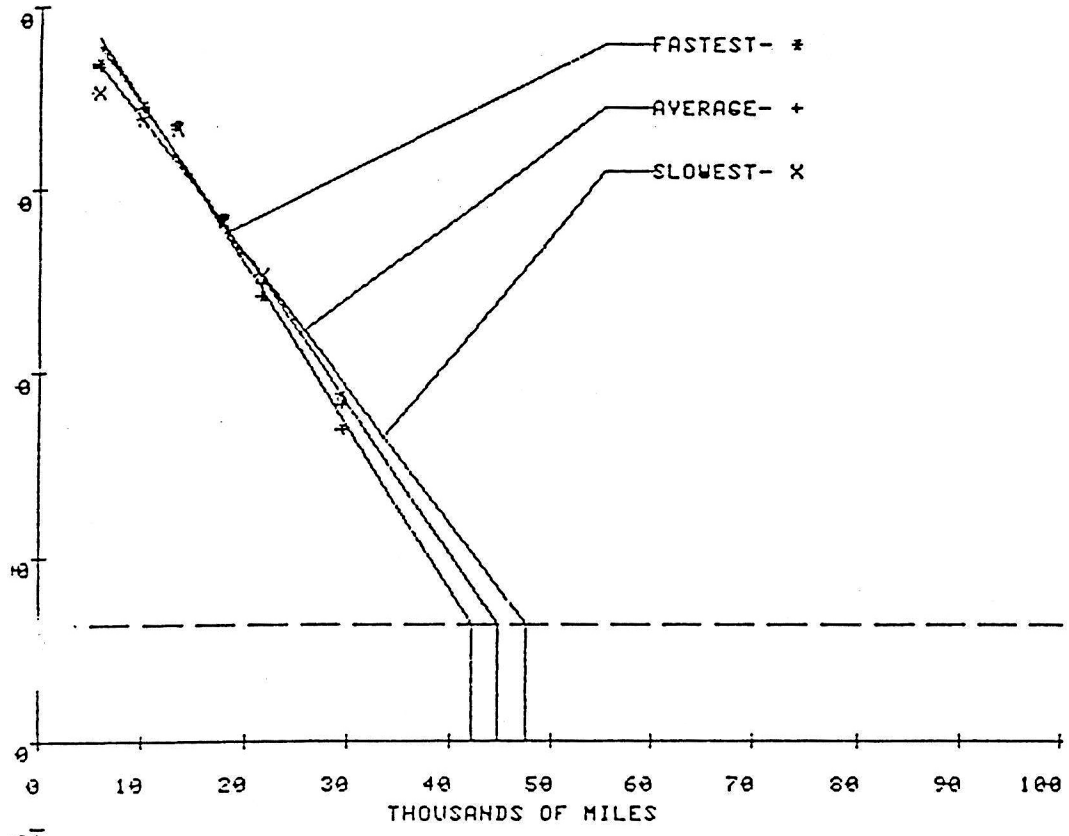
Beginning Mileage: 5706. Ending Mileage: 29169.

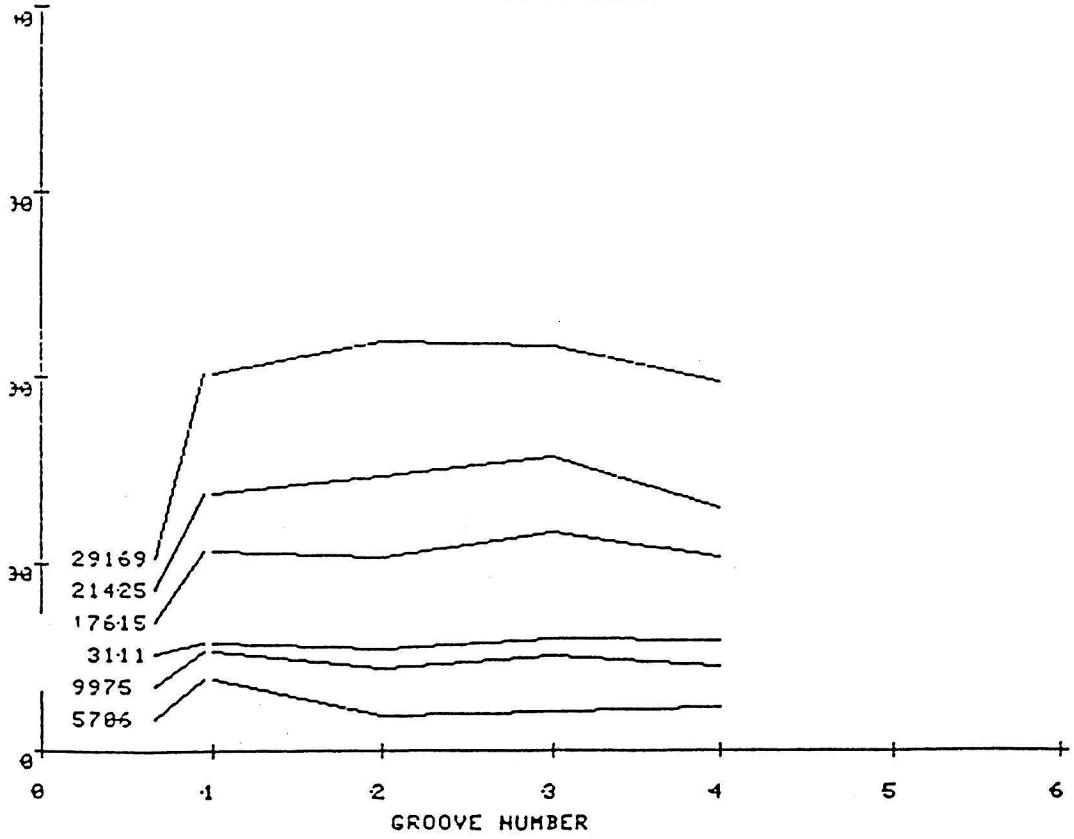
	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
lope In Mils/1000 Miles:	7.305	8.804	8.713	7.570			8.098
ntercept In Mils At Beginning Mileage:	366.7	381.9	379.8	380.4			377.2
oefficient of Determination R**2	.9671	.9795	.9840	.9878			.9819
rojected Mileage To 62.5 Mil Wearbar	47342.	41989.	42126.	47695.			44566.

Comments:
0 CONTROL TIRE
5706 FAST WR SRI
13111 REMOVED DUE TO VEHICLE TEST COMPLETION; REAPPLIED TO COMMERCIAL VEHICLE
13111 08/16/90.
21425 SL FEATHERY WR BOTH SHS
29169 SL FEATHERY WR BOTH SHS; REMOVED FROM VEHICLE.

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

Test No: 4491001 Tire Name: MICHELIN XCHA
Test No: 44901 Tire No: 006 Sec No: Serial No:B7EB412X459
Tire Mfgr: ULTRASEAL INTERNATIONAL Tire Size: LT215/85R16





SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
: No: 44901 Tire No: 007 Sec No:
-e Mfgr: ULTRASEAL INTERNATIONAL
-e Name: MICHELIN XCHA
-ial No.: B7EB412X449
-e Size: LT215/85R16
st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments: CONTROL

Test Route: PNY 3
Test Vehicle:
Balance Weight: 5
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

te	Car No.	SI TI NI	Wet Mle	Total Miles	GRV 1	Mile .001	GRV 2	Mile .001	GRV 3	Mile .001	GRV 4	Mile .001	GRV 5	Mile .001	GRV 6	Mile .001	GRV AVE	Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IH: IO: IT: L
-111			NEW	1386		385		392		385							387		165	130.43	8.92	15.25			
-191	560	IRR	1331	15706	1332	105	338	121	349	135	348	152					342	126	164	130.35	8.95	15.50		194	-421
	0	ILF	1596	19975	1308	174	322	256	332	248	327	204					322	215	167	130.33	8.97	15.75		195	-531
-301	560	ILR	10	113111	1306	###	315	495	329	855	318	342					317	606	166	130.30	8.99	16.00		192	-631
-031	835	IRD	10	117615	1277	152	273	104	288	110	278	112					279	117	168	130.21	9.00	17.50		189	-571
-201	835	ILD	10	121492	1243	113	231	94	238	77	229	78					235	88	165	130.16	8.98	17.75		179	-321
-111	835	ILD	10	129092	1207	215	206	299	205	232	209	389					207	269	168	130.04	9.03	22.50		167	-291
-291	M1	ILD	10	132526	1181	132	180	132	186	180	191	189					185	154	170	130.00	9.00	23.00		198	-631
-111	M1	IRD	10	137513	1166	328	163	302	153	147	172	260					164	235	169	129.94	8.97	25.25		177	-171
-091	M1	IRD	10	141406	1144	176	131	119	126	145	145	144					136	143	171	129.89	8.97	27.00		165	-271

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 41406.

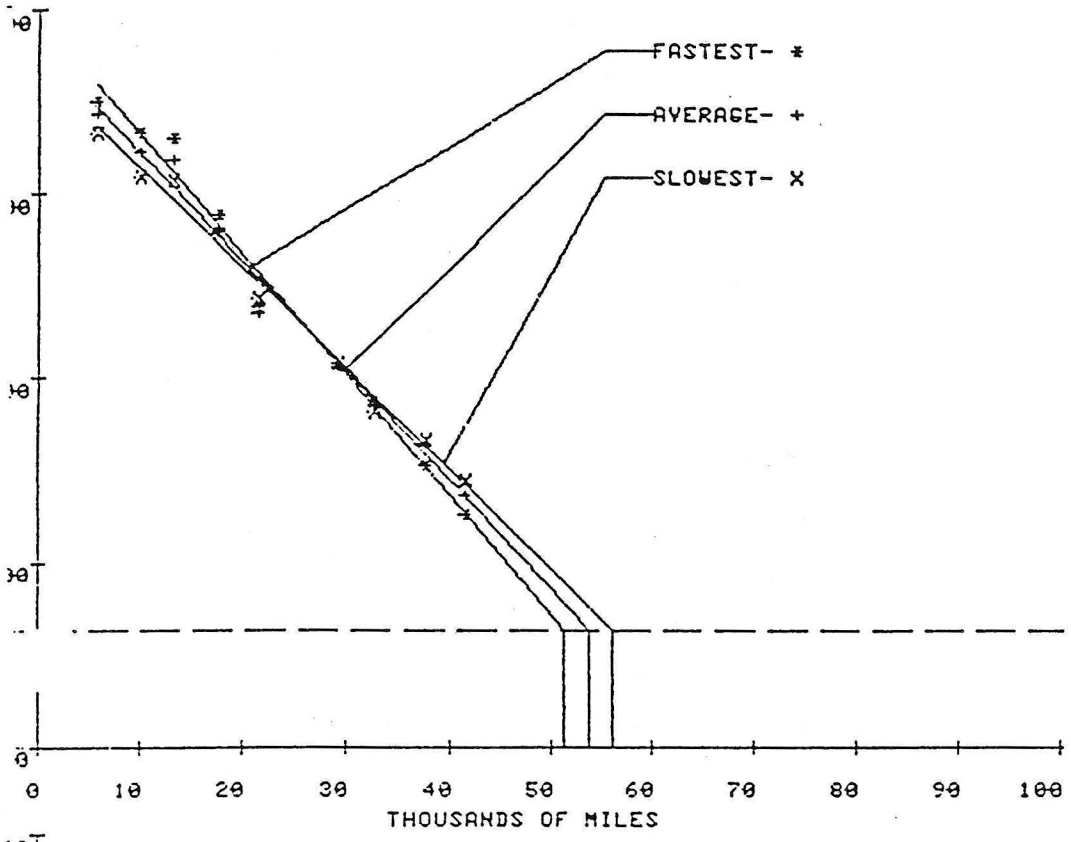
	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
ope In Mils/1000 Miles:	5.438	5.943	6.528	5.784			5.923
ıtercept In Mils At Beginning Mileage:	335.5	343.7	359.2	347.3			346.4
ıefficient of Determination R**2	.9913	.9840	.9857	.9759			.9868
·ojected Mileage To 62.5 Mil Wearbar	55901.	53027.	51156.	54947.			53640.

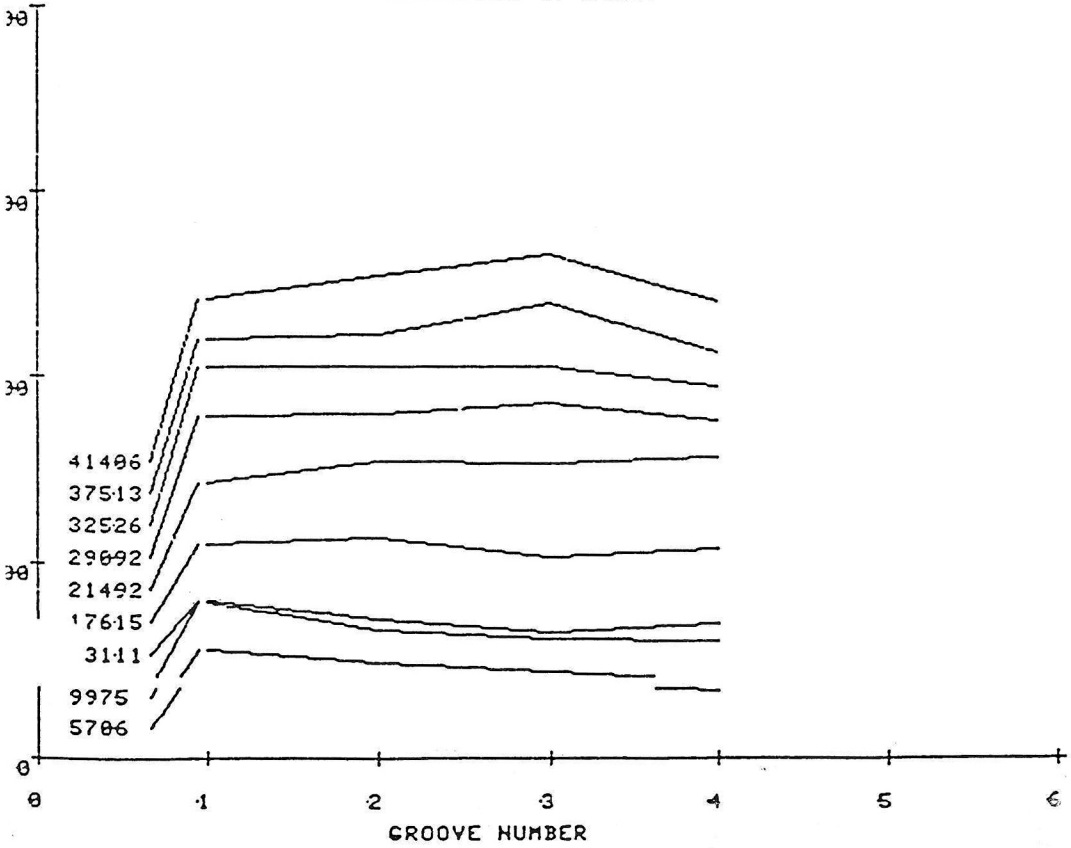
Comments:
0 CONTROL TIRE
13111 FAST WR GRV 1; REMOVED DUE TO VEHICLE TEST COMPLETION;
13111 REAPPLIED TO COMMERCIAL VEHICLE 08/22/90.
29092 SLA FEATHERY WR BOTH SHS; REMOVED FROM VEHICLE;
29092 REAPPLIED TO M1 07/06/91.
32526 SL FEATHERY WR BOTH SHS
37513 SL FEATHERY WR BOTH SHS &CENT
41406 SL FEATHERY WR BOTH SH &CENT

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

... No: 4491001
t No: 44901 Tire No: 007 Sec No:
e Mfgr: ULTRASEAL INTERNATIONAL

Tire Name: MICHELIN XCHA
Serial No:B7EB412X449
Tire Size: LT215/85R16





SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
TIRE WEAR TEST DATA SHEET

ient No: 4491001
t No: 44901 Tire No: 008 Sec No:
re Mfgr: ULTRASEAL INTERNATIONAL
re Name: MICHELIN XCHA
rial No.: B7EB412X449
re Size: LT215/85R16
st No: P02420

Construction: RADIAL
Tire Load(Lbs.): Fnt: 2335 Rear: 2335
Psi(Cold): Fnt: 65 Rear: 000
Rim Width (In.): 6.0
Rotation Miles: 2000
Cycle Miles: 4000
Comments:

Test Route: PNY 3
Test Vehicle:
Balance Weight: 4
Tire Wt: New: 35 Old:
Rotation Pattern: S TO S

te	Car No.	PI SI TI NI	Wet Mle	Total Miles	GRV 1	Mile .001	GRV 2	Mile .001	GRV 3	Mile .001	GRV 4	Mile .001	GRV 5	Mile .001	GRV 6	Mile .001	GRV AVE	Mile .001	DI UI RI OI	OUT DIA	SEC WID	TR RAD	SHD RAD	Ambt Temp MAX/ MIN	IH IO: IT:
-111			NEW	1386		385		385		389							386		162	30.421	8.90	15.25			
-191	560	IRR	1331	15706	1341	128	336	115	336	116	332	99					336	114	164	30.331	8.91	15.50		194	-421
	0	ILF	1596	19975	1320	200	321	281	316	213	314	246					318	231	166	30.301	9.00	15.75		195	-531
-301	560	ILR	10	113111	1315	696	315	588	309	482	311	###					313	648	168	30.291	9.00	16.00		192	-631
-031	835	IRD	10	117615	1276	113	278	120	272	119	270	108					274	115	168	30.181	9.04	17.50		189	-411
-201	835	ILD	10	121492	1232	88	238	96	243	135	246	161					240	113	169	30.111	9.04	17.75		179	-321
-111	835	ILD	10	129092	1197	215	196	183	194	156	213	231					200	192	169	30.041	9.05	22.50		167	-291
-291	M1	IRD	10	132526	1167	114	162	99	165	117	188	140					171	116	171	29.971	9.05	23.00		198	-631
-11	M1	ILD	10	137513	1154	378	142	247	128	134	142	106					141	170	170	29.881	9.02	25.25		177	-171
-09	M1	IRD	10	141406	1119	111	94	82	83	86	101	95					99	92	170	29.781	9.00	27.00		165	-271

LINEAR REGRESSION ANALYSIS

Beginning Mileage: 5706. Ending Mileage: 41406.

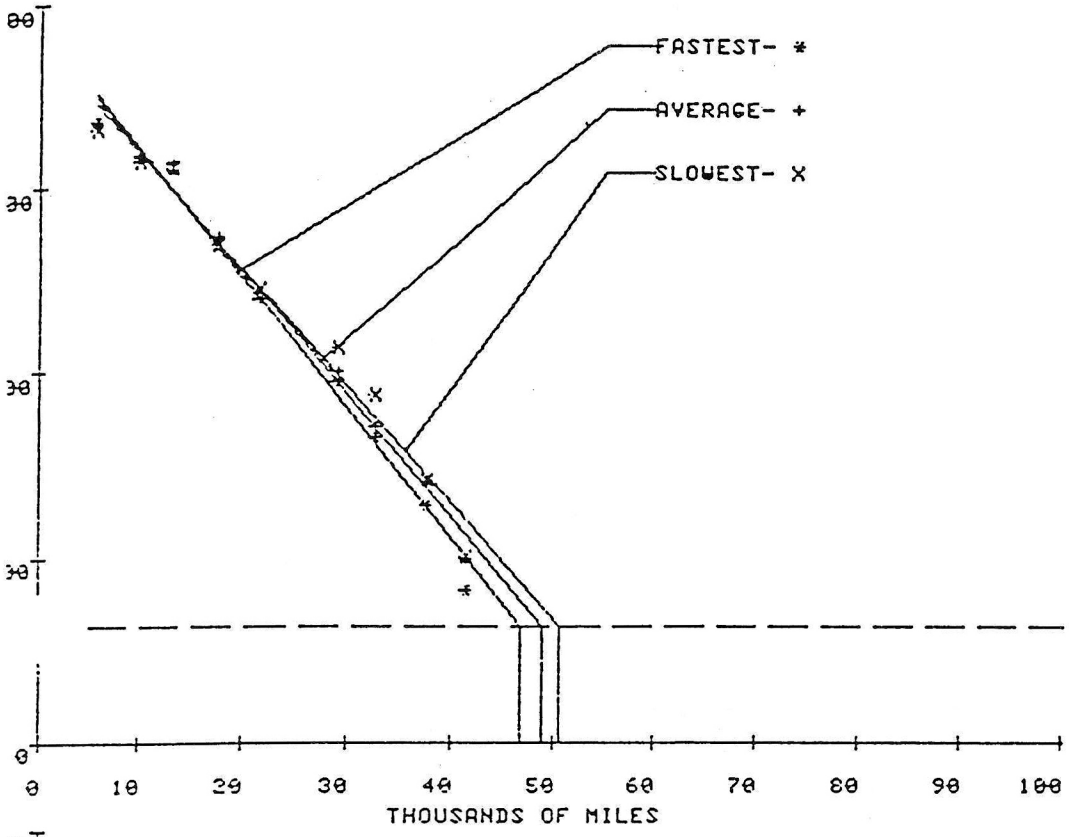
	GRV 1	GRV 2	GRV 3	GRV 4	GRV 5	GRV 6	GRV AVG (ALL GROOVES)
lope In Mils/1000 Miles:	6.400	6.878	7.052	6.320			6.663
ıtercept In Mils At Beginning Mileage:	347.4	351.3	350.4	345.4			348.6
oefficient of Determination R**2	.9872	.9863	.9885	.9786			.9897
ojected Mileage To 62.5 Mil Wearbar	50216.	47690.	46533.	50472.			48650.

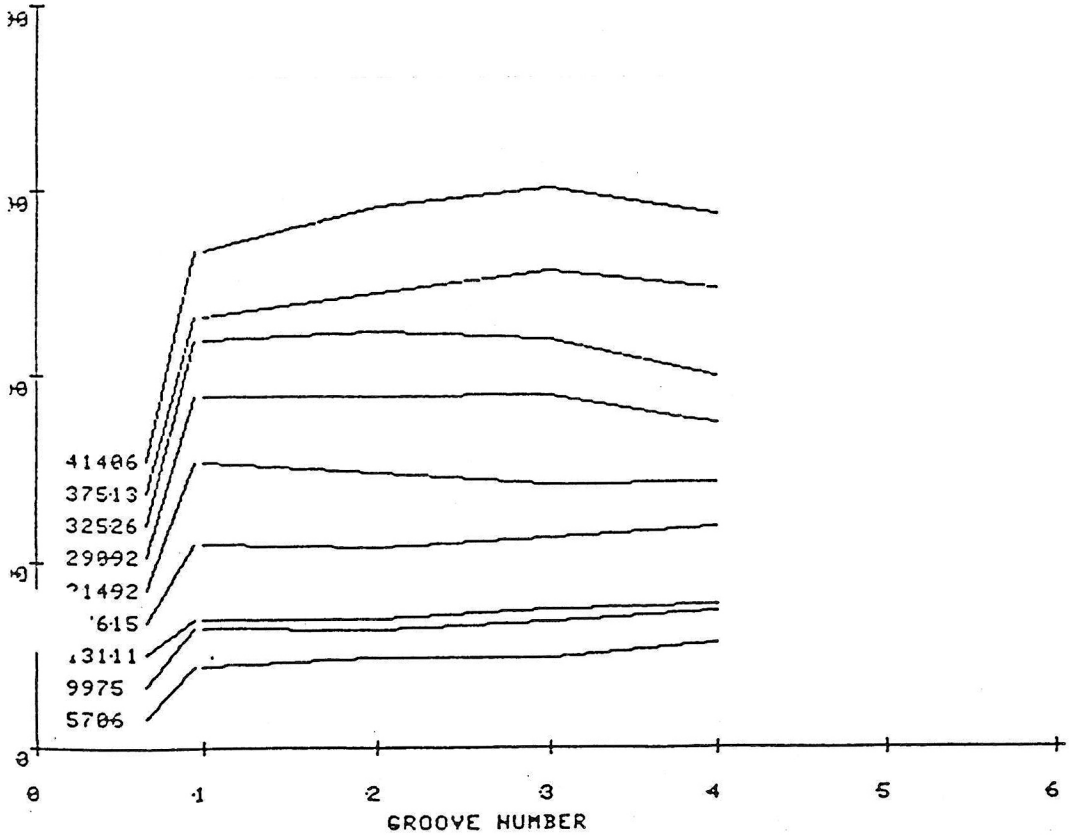
Comments:
0 CONTROL TIRE
13111 REMOVED DUE TO VEHICLE TEST COMPLETION; REAPPLIED TO COMMERCIAL VEHICLE
13111 08/22/90.
29092 SL FEATHERY WR BOTH SHS; REMOVED FROM VEHICLE;
29092 REAPPLIED TO M1 07/06/91.
32526 SL FEATHERY WR BOTH SHS;FAST WR GHRV 1
37513 SL FEATHERY WR BOTH SHS
41406 SL FEATHERY WR BOTH SHS

SMITHERS TIRE & AUTOMOTIVE TESTING OF TEXAS INC.
LINEAR REGRESSION AND WEAR PROFILE PLOTS

:ent No: 4491001
;t No: 44901 Tire No: 008 Sec No:
·e Mfgr: ULTRASEAL INTERNATIONAL

Tire Name: MICHELIN XCHA
Serial No:B7EB412X449
Tire Size: LT215/85R16

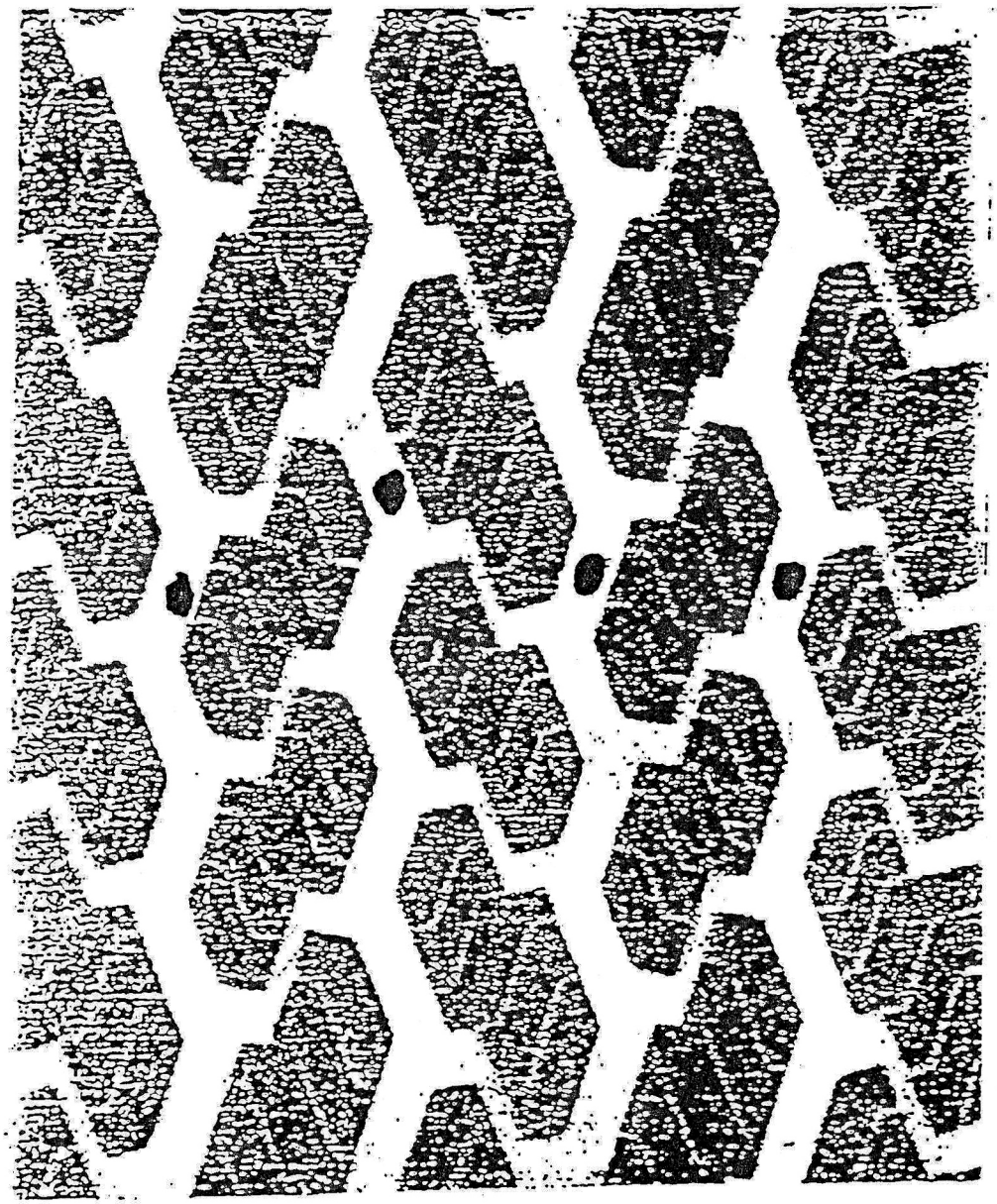




SMITHERS TRANSPORTATION TEST CENTER
PECOS, TEXAS

TIRE FOOTPRINT

TEST NO. 449-10-01	DATE April 16, 1990
TIRE NO. 1	MILES 1,000 miles
CLIENT NO.	TIRE SIZE LT215/85R16
TIRE NAME Michelin XCH4	LOAD 2,335 pounds
SERIAL NO. 05082414	INFLATION 65psi



MEASUREMENT LOCATIONS 4

SMITHERS SCIENTIFIC SERVICES, INC.
425 West Market Street
Akron, Ohio 44303

If you do not receive all the pages or have any other questions regarding transmission of this fax, please call (216) 762-7441.

DATE 5-26-92 PAGES TO FOLLOW 0

TO Liz & Ron Aguirre FROM Daniel (D.) Williams

COMPANY ULTRASEAL REF LT Tire test - post test

FAX # 213-465-9456 FAX # (216) 762-7447

Dear Liz & Ron -

The lab has completed our analysis with the exception of the air permeation measurements. These data are on their way to you by U.S. mail. Below are the highlights -

TEST TIRES MICHELIN XCHA LT 215/85R16

	NEW TIRE	WORN CONTROL(S)	WORN ULTRASEAL(S)
HARDNESS	55	54	54
TENSILE (PSI)	1680	1475	1450
ELONGATION (%)	780	710	685
TENSILE (lbs.)	47.5	46.3	46.9
ELONGATION (%)	33.6	29.3	30.8

Smithers Scientific Services, Inc.

425 W. MARKET STREET • AKRON, OHIO U.S.A. 44303
TWX NO. 810-431-2112 SMITHERS • FAX NO. 216/762-7447 • TELEPHONE 216/762-7441

May 21, 1992

R: Ultraseal International
1100 N. Wilcox Avenue
Los Angeles, CA 90038

ATTENTION: Liz Aguirre
P.O. #8372
Smithers Job #22900

The above mentioned firm submitted four (4) samples identified as Sample #1, Sample #2, Sample #7 and Sample #8.

PHYSICAL ANALYSIS:
Tensile, ASTM D412, D885
Elongation, ASTM D412, D885
Shore A Hardness, ASTM D412
Adhesion, ASTM D413, D429

PHYSICAL PROPERTIES: ASTM D412, D2240

	Ultimate		Shore A
Sample	Tensile	Elongation	Hardness
#1 Liner	1220	630	54
	1360	640	
	1440	730	
Median	1360	640	

	Ultimate		Shore A
Sample	Tensile	Elongation	Hardness
#2 Liner	1540	730	54
	1300	690	
	1550	730	
Median	1540	730	

	Ultimate		Shore A
Sample	Tensile	Elongation	Hardness
#7 Liner	1300	670	54
	1570	720	
	1480	710	
Median	1480	710	

·e
International
992
mithers Job #22900

PHYSICAL PROPERTIES: ASTM D412, D2240

Sample	Ultimate Tensile	Ultimate Elongation	Shore A Hardness
#8 Liner	1320	650	55
	1470	710	
	1510	730	
Median	1470	710	

CORD TENSILE, ELONGATION: ASTM D885

Sample	Tensile	Elongation
1 Ply 1	46.2 lbs.	31.1%
1 Ply 2	46.4	29.5
2 Ply 1	47.4 lbs.	31.4%
2 Ply 2	47.7	31.3
7 Ply 1	46.2 lbs.	30.1%
7 Ply 2	46.4	29.3
8 Ply 1	46.7 lbs.	29.1%
8 Ply 2	46.0	28.8

ADHESION: Sidewall to Ply, ASTM D413, D429

Sample		Adhesion Maximum	Adhesion Average
#1	a)	35.0 lbs.	30.0 lbs.
	b)	36.0	32.0
#2	a)	43.0 lbs.	35.0 lbs.
	b)	43.0	38.0

:
nternational
92
nithers Job #22900

ADHESION: Sidewall to Ply, ASTM D413, D429

Sample		Adhesion Maximum	Adhesion Average
#7	a)	46.0 lbs.	38.0 lbs.
	b)	44.0	37.0
#8	a)	45.0 lbs.	41.0 lbs.
	b)	47.0	40.0

Ross
nt Head, Physical Laboratory
Laboratories Division of
Scientific Services, Inc.
Laboratories No. 17370
27 31 March 1984
ogistic Agency

David L. Schwarz
Operations Manager, Akron Laboratories
Smithers Laboratories Division of
Smithers Scientific Services, Inc.
Qualified Laboratories No. 17370
QLL 27 31 March 1984
Defense Logistics Agency

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SMITHERS SCIENTIFIC SERVICES, INC.
425 West Market Street
Akron, Ohio 44303

Fax: 216-762-7447
Phone: 216-762-7441

TO Liz Aguirre PAGES TO FOLLOW 1

COMPANY UltraSeal FAX # 213-465-9456

FROM D. Williams DATE 6-15-92

SUBJECT Air permeation study of innerliner

Here are the preliminary results.
Samples 1 & 2 are UltraSeal tires
Samples 7 & 8 are controls.
All Michelin LT215/85R16

Low numbers are best on air transmission test.

UltraSeal tires are about 10% better yielding longer casing life!

Dave Williams

INNERLINER AIR PERMEATION STUDY 150°F

Sample	Gauge (inches)	Permeability*
1-1	0.057	2.01
1-2	0.062	1.77
2-1	0.059	1.81
2-2	0.061	1.46
7-1	0.062	2.00
7-2	0.061	1.99
8-1	0.061	2.08
8-2	0.060	2.19

* $(Ft^3 .001")/(Ft^2 PSI Day), \times 10^3$.

0328/SD