HONDA
The Power of Dreams

Honda presentation
to
NHTSA Office of Defect Investigation
(00-01M Odyssey coil spring)

April 20th 2006

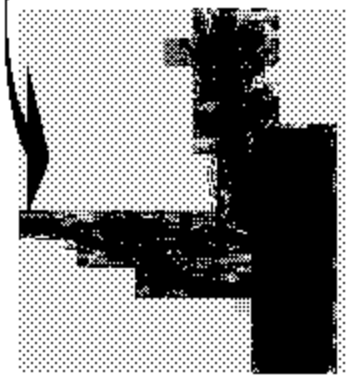
Agenda

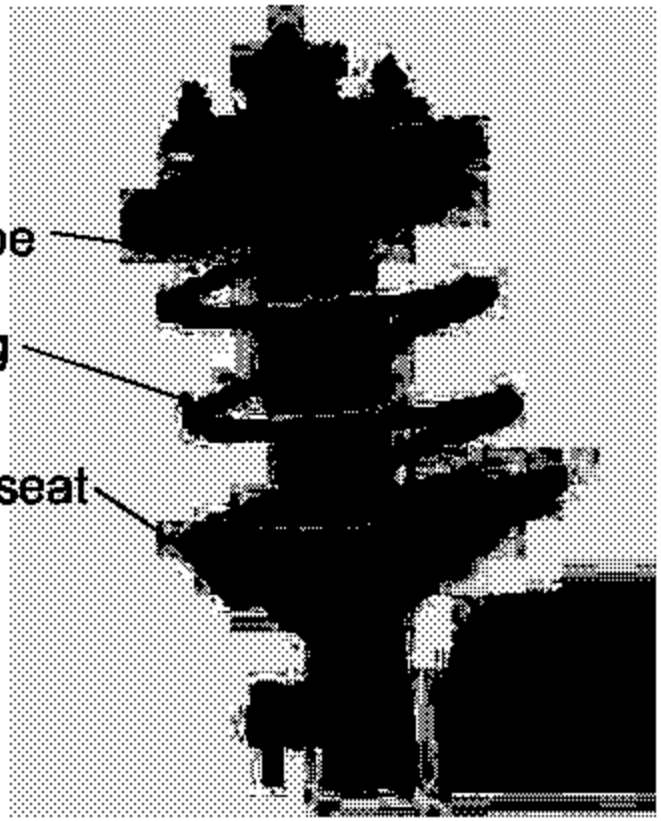
- Mechanism of spring fracture
- Tire Interference situation
- Warranty Analysis Overview
- Comparison to other manufacturers
- Conclusion

Mechanism of spring fracture

Structure of Front Strut Suspension

Honda Odyssey





Mechanism of spring fracture by corrosion at the silencer tube of upper spring

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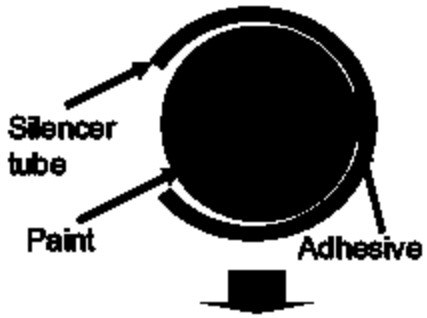


The silencer tube may be only partially bonded to the spring with adhesive, so there may be a gap or loose fit between the spring and the tube.

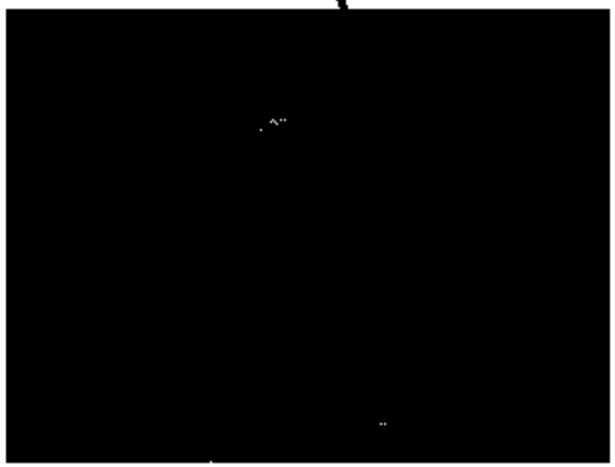
During use in salt belt regions, a mixture of salt and road dirt or sand can be trapped between the silencer tube and the spring.

Silencer tube reduces clearance between top spring coils and promotes paint stripping off by salt and road dirt when spring is compressed.

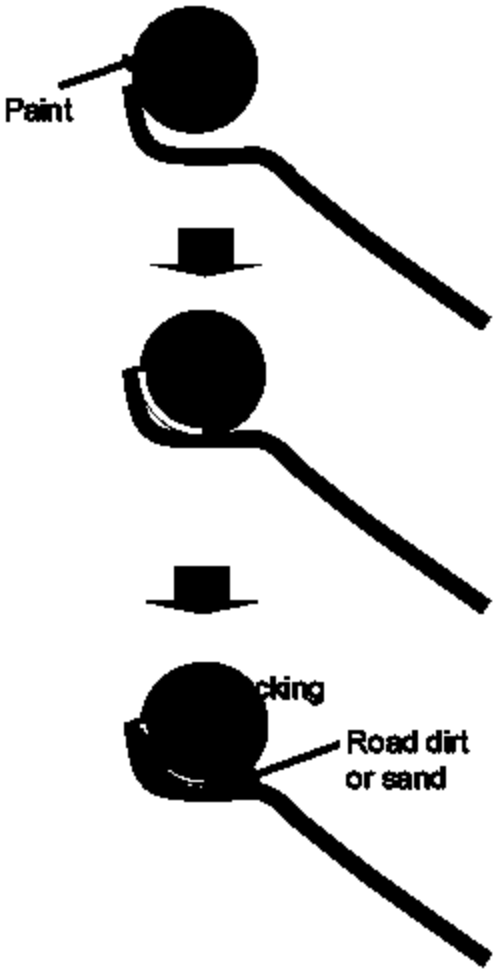
Trapped salt and water promotes rusting.

As rusting is increased, pits form in the spring surface.

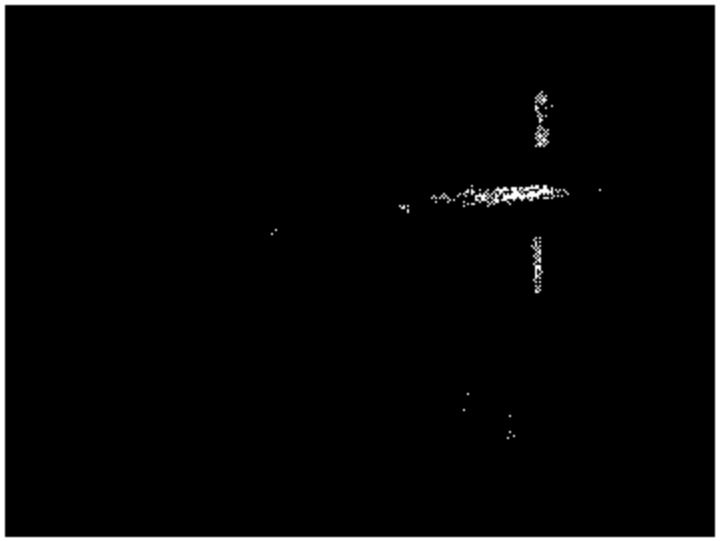
Stress concentration on the pitted surface causes the spring to become fatigued and cracked, and eventually fractures.



Mechanism of spring fracture by corrosion at the lower spring seat



As the spring moves, it rubs against part of the spring seat, and the paint is stripped off of that portion of the spring.



Road dirt or sand and (salt) water collects on the spring seat and promotes rusting of the spring, which eventually results in fracture.

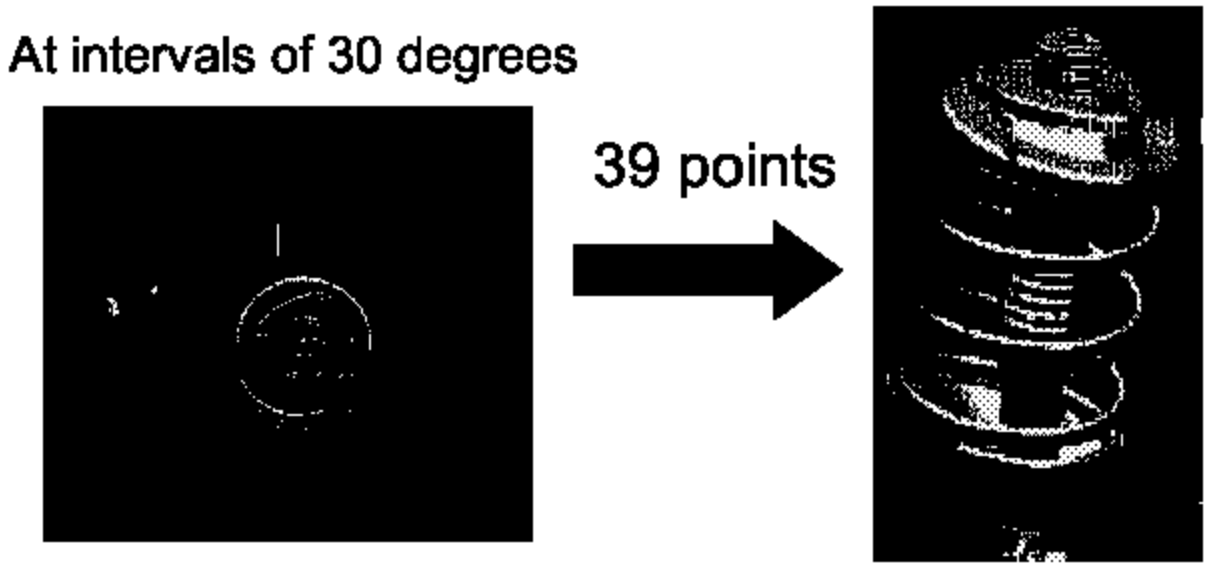
Tire Interference situation

ODYSSEY Front Spring Fracture Duplication Test

■ Test contents

Vehicle: ODYSSEY
The front spring was tested by breaking it at intervals of 30 degrees to establish whether such fracture would cause the alleged symptom of a punctured tire.
(Excluding the top and bottom end coils, the 2nd through 4th coils were broken at intervals of 30 degrees)

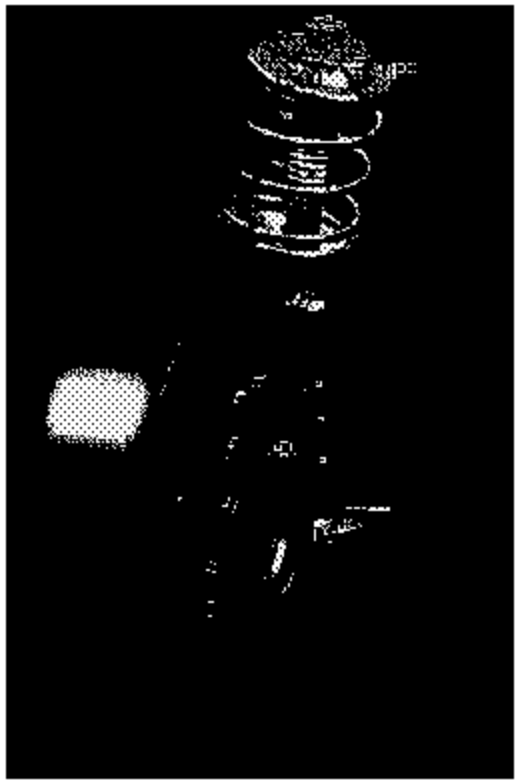
Behavior of broken spring:
The behavior of a broken spring at a given point would relate to a potential puncture in the involved tire. Both R and L springs were broken at intervals of 30 degrees, beginning with the 2nd coil from the bottom
At intervals of 30 degrees × 39 points (both R/L)



Broken location of spring, which resulted in puncture in tire

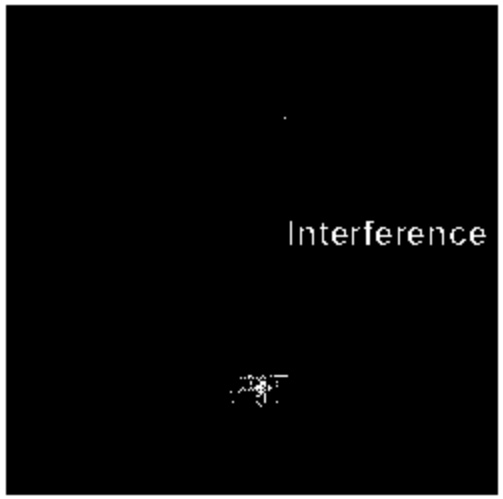
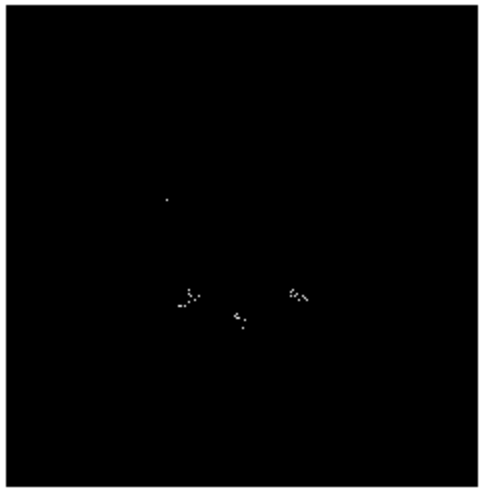
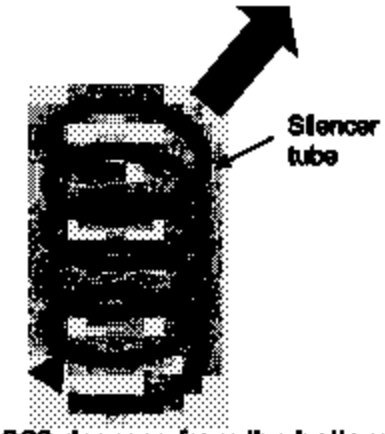
	NO.	Broken location	R side Puncture	L side Puncture
2nd coil from the bottom	1	360		
	2	390		
	3	420		
	4	450		
	5	480		
	6	510		
	7	540		
	8	570		
	9	600		
	10	630		
	11	660		
	12	690		
3rd coil from the bottom	13	720		
	14	750		
	15	780		
	16	810		
	17	840		
	18	870		
	19	900		
	20	930		
	21	960		
	22	990		
	23	1020		
	24	1050		

	NO.	Broken location	R side Puncture	L side Puncture
4th coil from the bottom	25	1080		
	26	1110		
	27	1140		
	28	1170		
	29	1200		
	30	1230		
	31	1260		
	32	1290		
	33	1320		
	34	1350		
	35	1380		
	36	1410		
5th coil from the bottom	37	1440		
	38	1470		
	39	1500		
1 or more turns from the top				



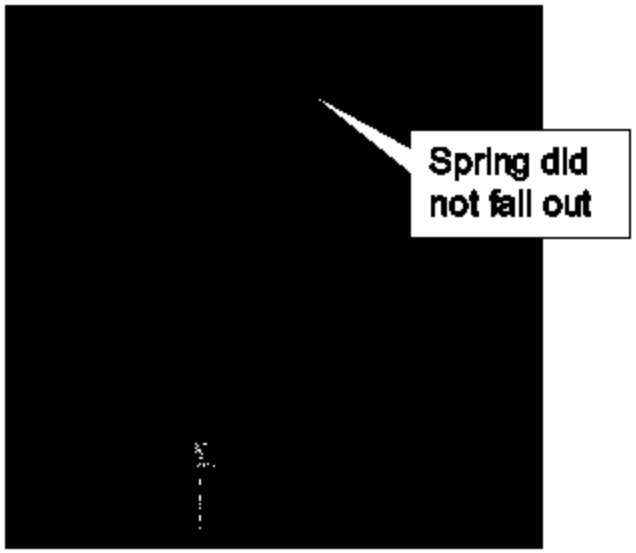
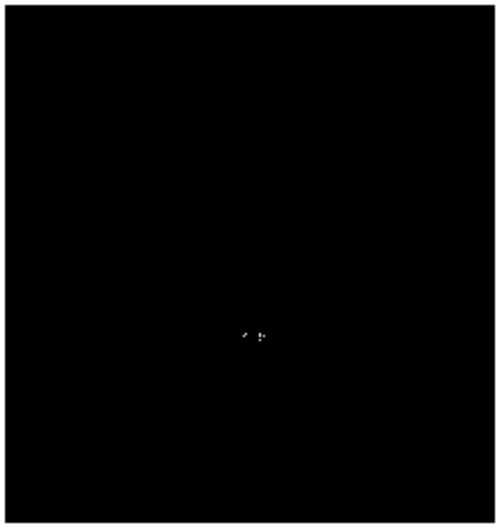
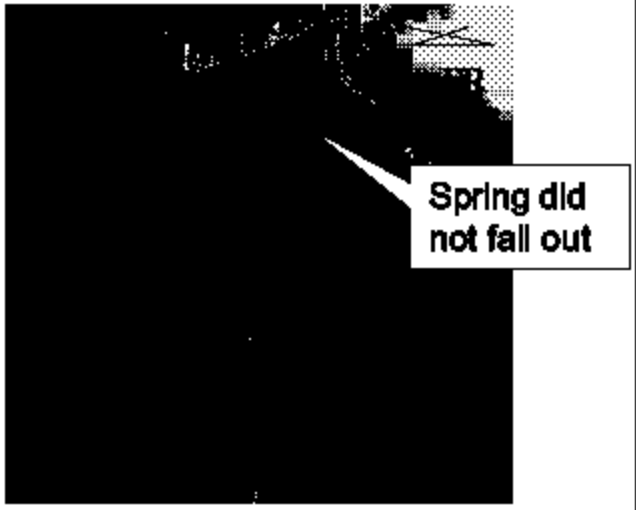
	Smoke and noise will occur and may have puncture
	Smoke and noise will occur and may have tire failure
	Smoke and noise will occur but no tire failure
	No contact with tire, noise occur

● Confirmation of the situation in which the spring was broken at 360 degrees from the bottom

	Condition after fracture	Condition of tire	Broken location (▼)
L side	Spring side face interfered with tire sidewall 	Interference did not result in failure during 100km driving at 60km/h 	 360 degrees from the bottom
R side	Spring did not interfere with tire 	No interference 	 360 degrees from the bottom

■	Puncture may occur
	Tire failure may occur
	No puncture
	No contact with tire

● Confirmation of the case in which the spring was broken at 1500 degrees from the bottom (at a point concealed in the silencer tube)

	Condition after fracture	Condition of tire	Broken location (▼)
L side	Spring did not interfere with tire 	No interference 	 1500 degrees from the bottom
R side	Spring did not interfere with tire 	No interference 	1500 degrees from the bottom 

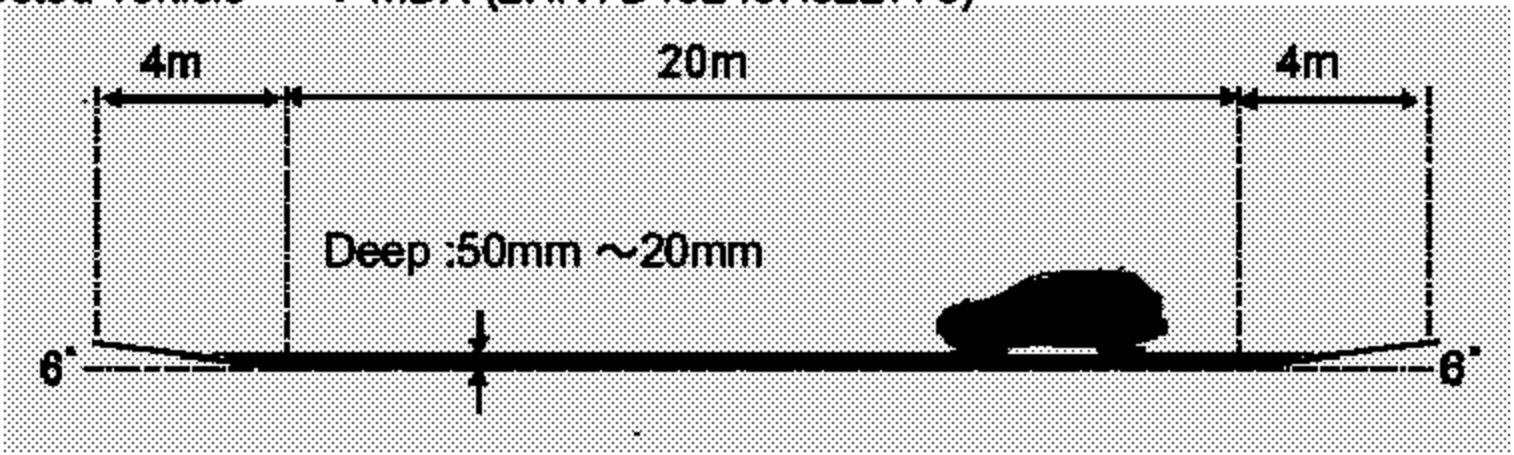
	Puncture may occur
	Tire failure may occur
	No puncture
	No contact with tire

Water splash test for front coil spring

Test method:

1 Apply the water detection reagent on the damper spring.
2 Confirm the water splash point by a road test through water.

Splash road test : 20Km/h(12.4mil/h) 2 times(40m)
Tested vehicle : MDX (2HNYD18245H522775)



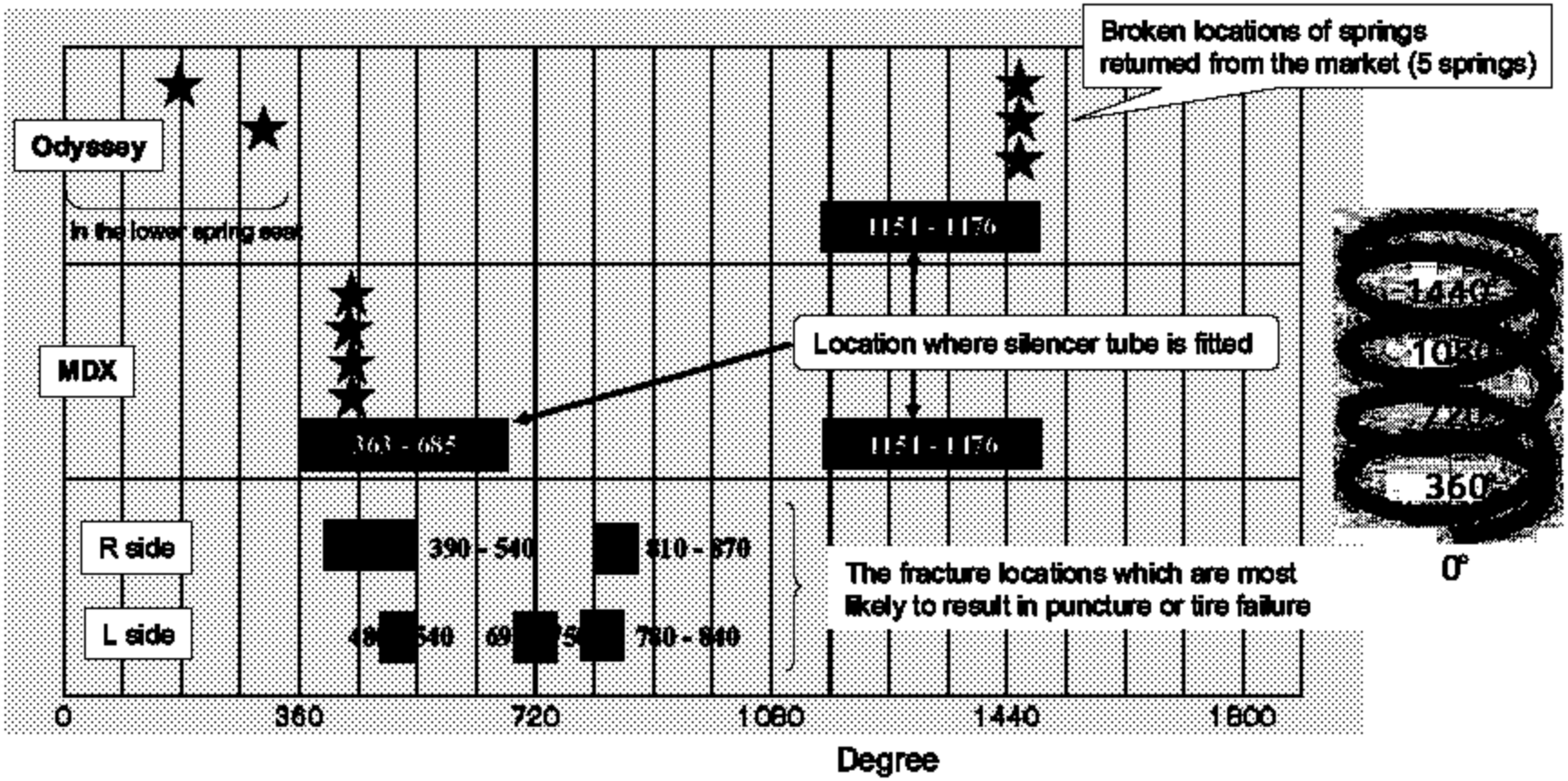
Odyssey front coil spring fracture rate is low, because Odyssey did not attach a silencer tube at lower part of spring.

MDX Main fracture point	MDX	ODYSSEY
		
Inside of a top silencer tube 	Fracture point (silencer tube attached after Jun/2001)	Fracture point
slight water 		
Inside of a lower silencer tube 	Main fracture point at lower silencer tube	**NO silencer tube**
much muddy water 		
The water situation after a splash test 		
Inside of a damper spring seat 	Fracture point	Fracture point

Fracture locations of springs returned from the market and fracture locations which are likely to result in puncture or failure

5 Odyssey springs were returned from the market. Most of the springs showed that the paint on the end coils was removed and that fracture occurred at a location where high stress is applied and road dirt or sand is apt to collect or at a location near the top of the spring where the silencer tube is fitted.

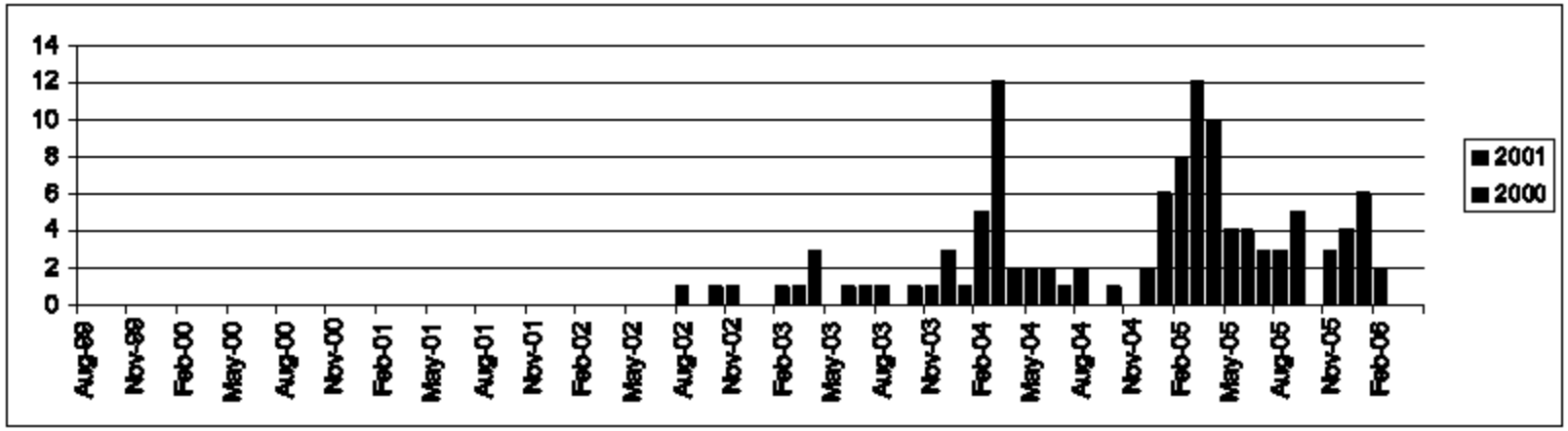
None of the 5 springs were broken at the location which could most likely result in tire failure.



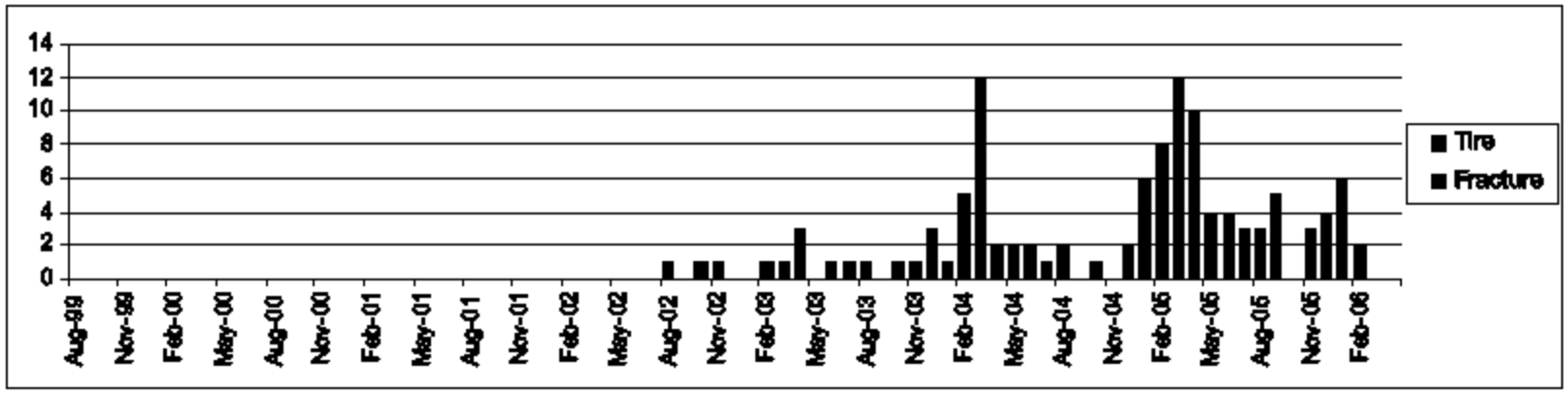
Warranty Analysis Overview

of Occurrences by Model Year and Result

by Model Year



by Fractured spring or Tire Interference



Locations where fracture occurred in the field (00-01M)

Analysis of fractured springs returned from the market confirm that fracture occurred in locations not likely to result in a tire puncture or failure. In fact, no puncture or failure was reported in these cases.

Locations where fracture occurred in the field (Parts checked by HCM)

Top of Spring

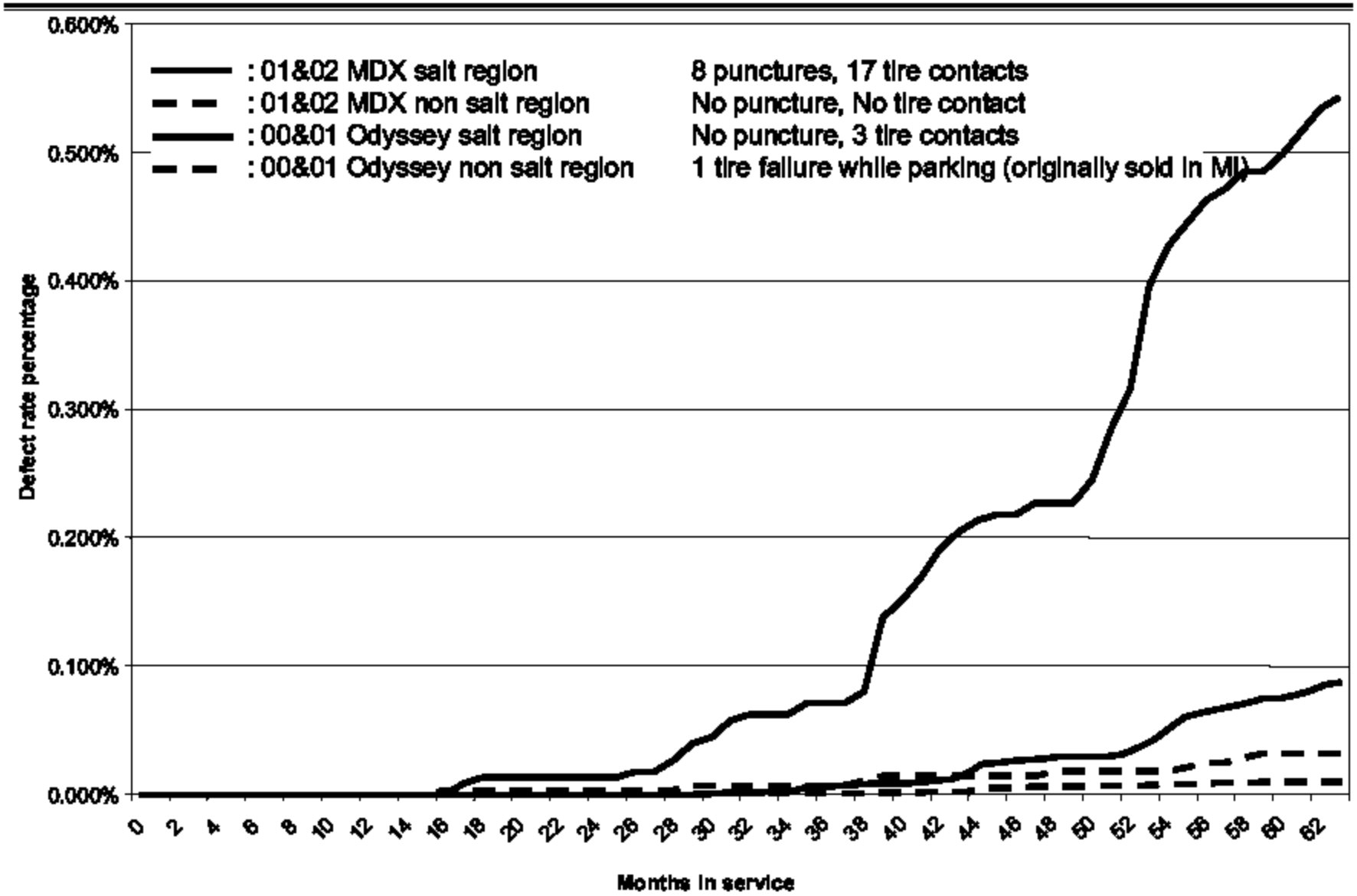
VIN	Broken Portion		Puncture or failure
2HKRL18511H528008	1460°	1.05 turn from Top	No
2HKRL18571H527221	1460°	1.05 turn from Top	No
2HKRL1853YH543619	1460°	1.05 turn from Top	No

Bottom of Spring

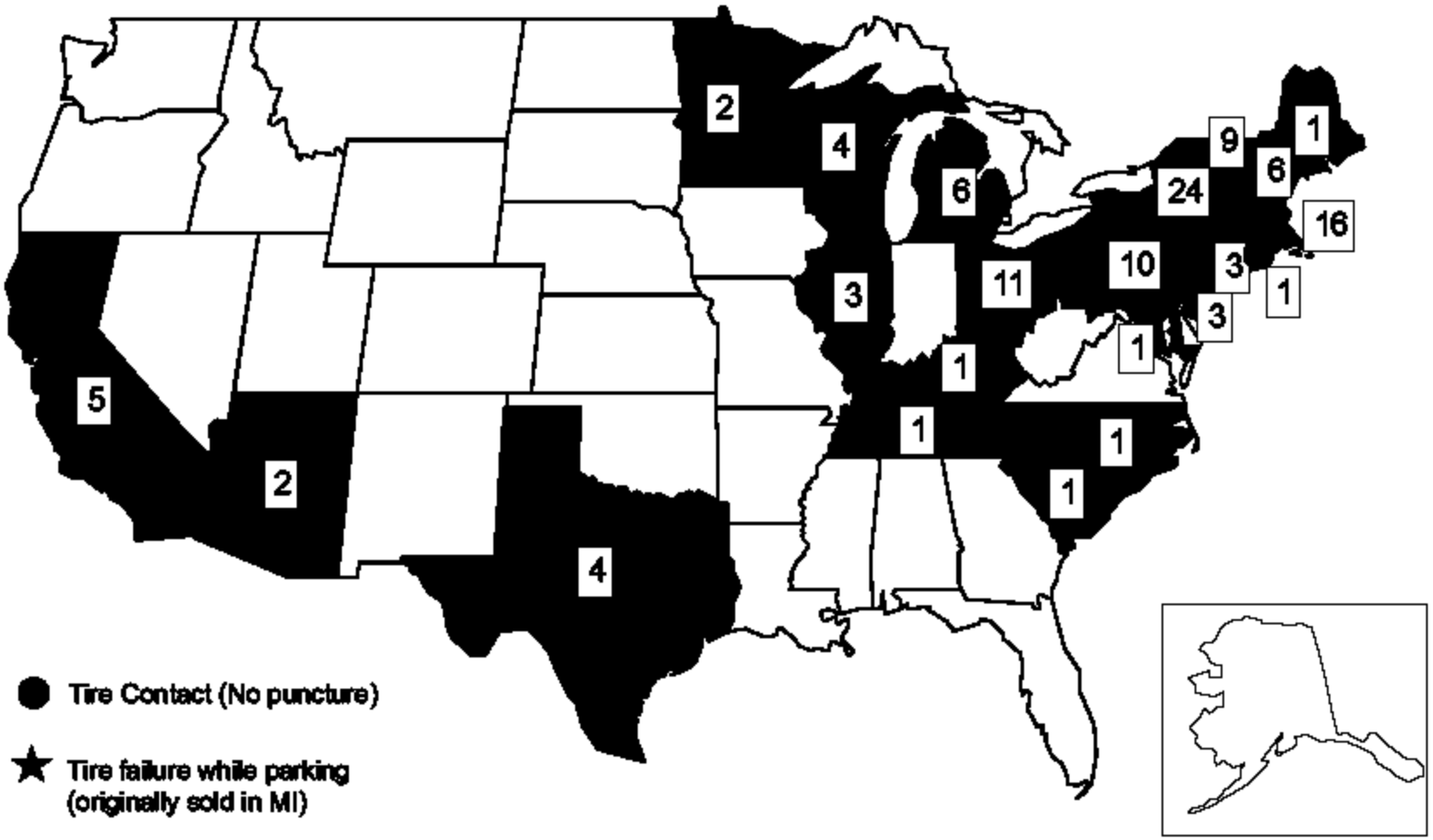
VIN	Broken Portion		Puncture or failure
2HKRL1851YH516855	310°	0.85 turn from Bottom	No
2HKRL18631H579938	180°	0.5 turn from Bottom	No

(Angle shown is the degrees from the bottom end of the spring)

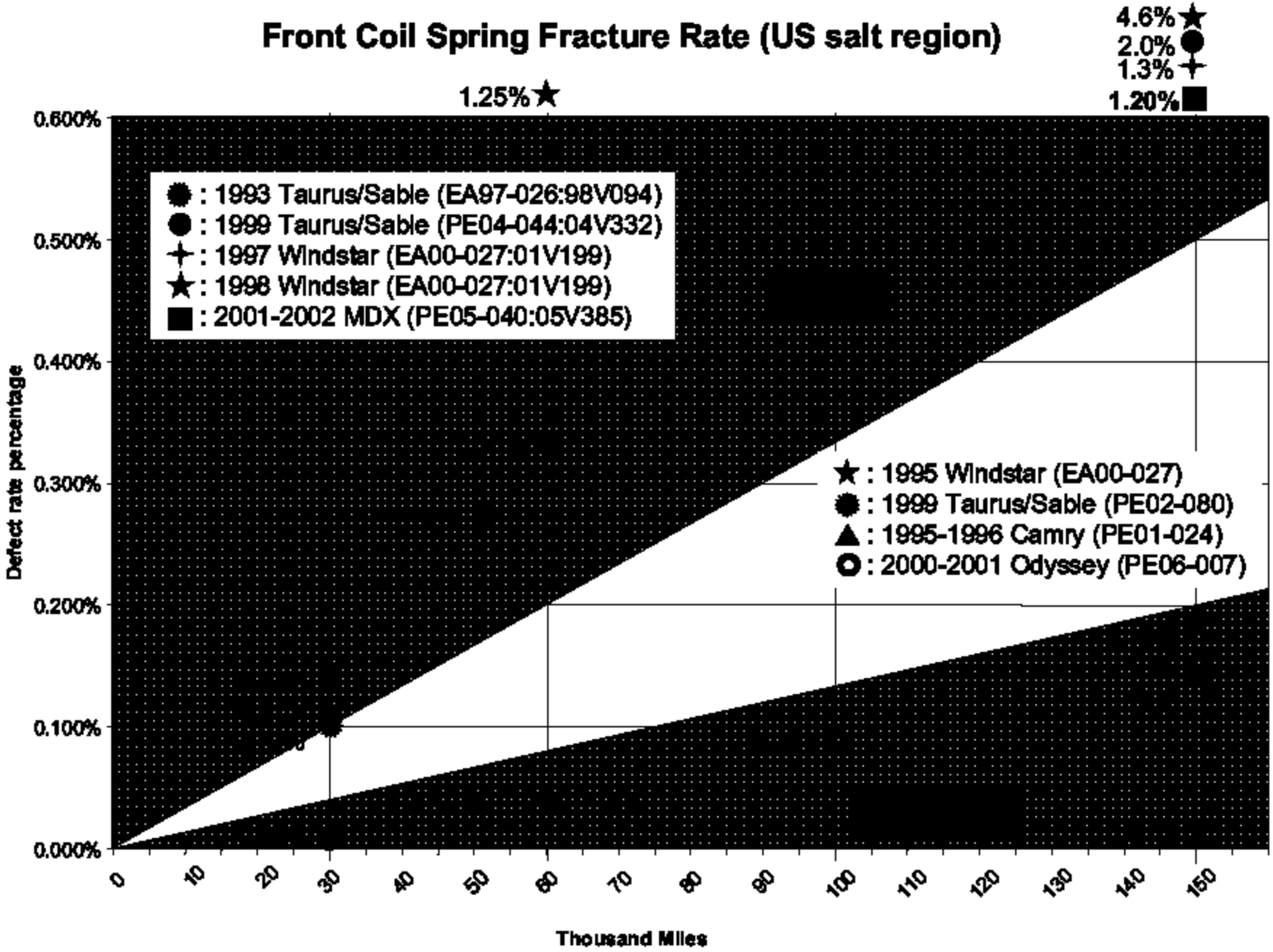
Warranty: Cumulative Coil Springs Fracture Rate by Months in Service



Warranty: Market Occurrence Data by States



Comparison to other manufacturers


Front Coil Spring Fracture Rate (US salt region)
4.6%
2.0%
1.3%
1.25%
1.20%
0.600%
0.500%
0.400%
0.300%
0.200%
0.100%
0.000%
Defect rate percentage
: 1993 Taurus/Sable (EA97-026:98V094)
: 1999 Taurus/Sable (PE04-044:04V332)
: 1997 Windstar (EA00-027:01V199)
: 1998 Windstar (EA00-027:01V199)
: 2001-2002 MDX (PE05-040:05V385)
: 1995 Windstar (EA00-027)
: 1999 Taurus/Sable (PE02-080)
: 1995-1996 Camry (PE01-024)
: 2000-2001 Odyssey (PE06-007)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Thousand Miles

Conclusion

Conclusion

1. Analysis of available data and our understanding of the causes and effects of broken coil springs in these vehicles suggests that the failure rate will remain quite low, even areas of heavy road salt usage.

2. Most of the failures that have occurred were either in the silencer tube (upper portion of the spring) or within the lower spring seat area, which cannot result in a tire puncture even if a broken spring contacts the tire.

3. Of the small number of failures that have occurred outside of the silencer tube or spring seat areas, the broken spring in these vehicles provided the drivers with clear warning signs, including smoke and noise, with no report of any subsequent tire failure.

4. We believe this problem does not merit a recall.

End