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PREVALENCE OF LED LIGHT SOURCES ON VEHICLES SOLD IN THE U.S.

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16. Abstract

This report provides information regarding the market-weighted prevalence of light-emitting diode (LED) light sources for exterior lighting on model year 2008 vehicles sold in the U.S. The main findings were as follows: (1) LEDs are employed to some degree for virtually all required exterior lighting functions on U.S. vehicles (high-beam headlighting is the exception, for which LEDs are expected to appear later in 2008), and (2) rear signaling and marking functions show the highest usage of these light sources. Supplemental information about headlamp bulb types, headlamp optics, and rear turn-signal color is also presented.

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Contents

Introduction

Light-emitting diodes (LEDs) have been used for center high-mounted stop lamps (CHMSLs) since the mid-1980's. In recent years, their use has accelerated, extending to other exterior lighting functions. By late in calendar year 2007 (model year 2008), LEDs were introduced for low-beam headlighting, and before the end of calendar year 2008 the use of LEDs for all required external lighting functions on U.S. vehicles, including high-beam headlighting, is expected to become a reality (Automotive Lighting, 2008; LEDs Magazine, 2007; Lexus, 2008).

The interest in transitioning to LEDs for external automotive lighting applications is due in part to the benefits that they provide over traditional incandescent light sources:

1) lower power consumption with higher efficiency (lumens/Watt) (Ackermann, 2005; Philips, 2006; Sylvania, 2007),
2) lower operating temperatures and no UV output (Philips, 2006; Sylvania, 2007),
3) greater durability and longer life, sometimes exceeding the life of the vehicle (Ackermann, 2005; Philips, 2006; Sylvania, 2007),
4) faster onset or "rise time," especially relevant for signaling applications (Sivak, Flannagan, Sato, Traube, Aoki, 1993; Philips, 2006; Sylvania, 2007),
5) ability to specify or tune the color output without using filters (Philips, 2006), and
6) smaller space requirements and generally greater overall design flexibility (Neumann, 2006; Philips, 2006; Sylvania, 2007).

In addition to the technical advantages that LEDs have over traditional incandescent sources, there is also evidence that consumers perceive LED-equipped lamps as more "exotic" in appearance and that they allow for greater on-road differentiation (Neumann, 2006). With designers, engineers, and consumers all demonstrating preferences for these light sources, it seems that future usage of LEDs on vehicles is likely to increase.

Currently, no comprehensive information exists regarding the overall installation frequency of these novel light sources in the U.S. automotive market. Consequently, this study was designed to assemble a database containing market-weighted information regarding the light sources used for all required external lighting functions for all model year 2008 vehicles currently sold in the U.S.

Approach

Sample

All available 2008 vehicle models currently offered for sale in the U.S. were included in this survey. The collected data were market-weighted by the respective 2007 sales figures for each individual vehicle (Automotive News, 2008). Of the 314 vehicles listed in the 2007 calendar year sales data, 248 were included in this survey (98.1% of all U.S. light-vehicle sales for 2007; see Appendix A for a complete list of vehicles included in the survey). The 66 excluded vehicles (comprising 1.9% of U.S. light-vehicle sales; see Appendix B for a complete list of excluded vehicles) were either no longer offered for sale as 2008 models or were unavailable for inspection. Two vehicle models first introduced for sale in 2008 were also excluded from this survey because there were no 2007 sales. The market-weighted percentages presented in this report are scaled to be percentages within the surveyed 98.1% of all vehicles sold.

Data collection

The data collection was conducted using several sources:

1) Internet
    a. Vehicle manufacturer web sites
    b. On-line bulb replacement catalog (Sylvania, 2008)
    c. Vehicle review web sites (Edmunds, 2008; MSN Autos, 2008)
2) Physical inspections performed at local dealerships.
3) Communication with lighting suppliers.

When more than one light source was offered for a specific lamp or lighting function on a vehicle, all available light sources for that function were documented. The weighting for that particular function's light sources was divided equally among each configuration for that vehicle. Only equipment offered as standard or factory-installed optional equipment was documented (i.e., no aftermarket options or equipment were included in this survey).

Light source survey

All available light sources were documented for each vehicle for the following external lighting functions:

- *Forward lighting*
    - Low-beam headlamp
    - High-beam headlamp
    - Fog lamp (if offered; not required equipment)
- *Front signaling and marking*
    - Parking (position) lamp
    - Front turn signal lamp
    - Front side marker lamp
- *Rear signaling and marking*
    - Stop lamp
    - Tail lamp
    - CHMSL
    - Rear turn signal lamp
    - Rear side marker lamp
- *Other rear lighting*
    - Backup (reverse) lamp
    - License plate lamp

Supplemental information

Several additional features were also documented for each vehicle:

- Low-beam optics
- High-beam optics
- Rear turn signal color

Results and Discussion

Forward lighting

The light sources for the surveyed low beams are summarized in Table 1, the high beams in Table 2, and the fog lamps in Table 3. Among the 248 vehicles surveyed, there were 337 unique low-beam headlamp variations offered, 289 variations for the high beam, and 253 variations for the fog lamp function (plus seven vehicles not offering fog lamps as factory-installed equipment). When a light source could not be identified (due to inability to physically inspect the vehicle and/or inability to access or inspect the specific function in question), we have listed the light source as "Unknown."

The prevalence of LED light sources for all three forward-lighting functions is very low. An LED light source is offered on one vehicle (0.1%) as optional equipment for the low-beam function and on three vehicles (0.3%) for the fog lamp. No vehicles currently offer LEDs for the high-beam function. (LED high beams are expected to be available on some vehicles later in 2008.) As LEDs have just recently become available for use in forward-lighting applications, low market penetration at this early stage is expected.

Table 1
Light sources used in the low-beam headlamps.
The row showing the prevalence of LEDs is highlighted;
the most frequently installed equipment is shown in bold.

Light sources		N	Market-weighted percentage[†]
Designation	Number of filaments		
D1S	n/a	53	5.8
D2R	n/a	8	1.7
D2S	n/a	41	4.4
D3R	n/a	1	0.4
D3S	n/a	2	0.2
D4R	n/a	2	0.8
D4S	n/a	7	2.2
H1	1	6	1.1
H11	**1**	**66**	**25.3**
H13	2	36	20.1
H6054	2	3	0.9
H7	1	45	6.0
HB2 (9003)	2	19	8.3
HB4 (9006)	1	33	18.4
HB5 (9007)	2	13	4.3
LED	n/a	1	0.1
Unknown	-	1	0.1
TOTAL		*337*	*100.0*

[†] Percentages may not add up to 100.0% due to rounding.

Table 2
Light sources used in the high-beam headlamps.
The most frequently installed equipment is shown in bold.

Light sources		N	Market-weighted percentage†
Designation	Number of filaments		
D1S	n/a	23	2.4
D2R	n/a	3	0.4
D2S	n/a	8	1.3
D3R	n/a	1	0.4
D3S	n/a	2	0.2
D4R	n/a	1	0.6
H1	1	12	3.2
H11	1	5	1.4
H13	2	36	20.1
H6054	2	3	0.9
H7	1	55	7.7
H9	1	19	5.9
HB2 (9003)	2	19	8.3
HB3 (9005)	**1**	**87**	**42.5**
HB5 (9007)	2	13	4.3
HIR1 (9011)	1	1	0.5
Unknown	-	1	0.1
TOTAL		*289*	*100.0*

† Percentages may not add up to 100.0% due to rounding.

Table 3
Light sources used in the fog lamps.
The row showing the prevalence of LEDs is highlighted;
the most frequently installed equipment is shown in bold.

Light source designation	N	Market-weighted percentage[†]
5202	9	9.1
880	3	0.6
881	3	1.4
893	1	0.4
898	1	0.4
899	1	0.4
9045	4	0.6
9055	1	0.3
9140	4	2.8
9145	41	20.0
H1	1	0.2
H11	**95**	**35.6**
H3	8	1.2
H7	5	0.3
H8	13	2.5
HB4 (9006)	32	14.0
LED	3	0.3
None offered	7	2.8
Unknown	28	7.2
TOTAL	*260*	*100.0*

[†] Percentages may not add up to 100.0% due to rounding.

Front signaling and marking

The light source types used for the front signaling and marking functions are summarized in Table 4.

Similar to the forward-lighting functions, usage of LED light sources for these functions is very low. The highest usage of LEDs for these functions is for the front turn signal (3 installations, 0.1%), followed by the parking lamp (2 installations, 0.1%), and the front side marker lamp (1 installation, <0.1%).

Table 4
Light source types used for front signaling and marking functions.
For each function, the row showing the prevalence of LEDs
is highlighted.

Function	Light source type	N	Market-weighted percentage[†]
Parking (position) lamp	Incandescent	245	99.9
	LED	2	0.1
	Unknown	1	0.1
	Subtotal	*248*	*100.0*
Front turn signal	Incandescent	244	99.8
	LED	3	0.1
	Unknown	1	0.1
	Subtotal	*248*	*100.0*
Front side marker	Incandescent	244	99.6
	LED	1	<0.1
	Unknown	3	0.4
	Subtotal	*248*	*100.0*

[†] Percentages may not add up to 100.0% due to rounding.

Rear signaling and marking

The light source types used for the rear signaling and marking functions are summarized in Table 5. For the 248 vehicles surveyed, there were 253 unique stop lamp variations, 254 tail lamp variations, 255 CHMSL variations, 249 rear turn signal lamp variations, and 251 rear side marker lamp variations.

LED light sources show their highest usage within this category. The most frequent usage of LEDs for all functions documented in this survey (not just rear signaling and marking) is for CHMSLs (166 installations, 51.2%), with LEDs in use slightly more often than traditional incandescent sources. Stop lamps show the second highest LED usage rate (55 installations, 11.1%), followed closely by tail lamps (56 installations, 9.7%). The two lowest usage rates within this category were in the rear side marker lamps (38 installations, 5.7%) and the rear turn signal lamps (16 installations, 2.6%).

Table 5
Light source types used for rear signaling and marking functions. For each function, the row showing the prevalence of LEDs is highlighted.

Function	Light source type	N	Market-weighted percentage
Stop lamp	Incandescent	196	88.7
	LED	55	11.1
	Unknown	2	0.3
	Subtotal	*253*	*100.0*
Tail lamp	Incandescent	197	90.2
	LED	56	9.7
	Unknown	1	0.1
	Subtotal	*254*	*100.0*
CHMSL	Incandescent	85	48.1
	LED	166	51.2
	Unknown	4	0.7
	Subtotal	*255*	*100.0*
Rear turn signal	Incandescent	232	97.3
	LED	16	2.6
	Unknown	1	0.1
	Subtotal	*249*	*100.0*
Rear side marker	Incandescent	210	94.0
	LED	38	5.7
	Unknown	3	0.3
	Subtotal	*251*	*100.0*

† Percentages may not add up to 100.0% due to rounding.

Other rear lighting

The light source types used for the backup lamp and license plate lamp functions are summarized in Table 6.

The prevalence of LED light sources in this category is second highest, with usage rates above the front signaling and marking functions (though still much lower than the rear signaling and marking category). LEDs are used in five installations for the backup lamp function, and five different installations for the license plate lamp function (0.8% and 0.6%, respectively).

Table 6
Light source types used for other rear lighting functions.
For each function, the row showing the prevalence of LEDs is highlighted.

Function	Light source type	N	Market-weighted percentage[†]
Backup (reverse) lamp	Incandescent	244	99.2
	LED	5	0.8
	Unknown	1	0.1
	Subtotal	*250*	*100.0*
License plate lamp	Incandescent	239	99.0
	LED	5	0.6
	Unknown	4	0.3
	Subtotal	*248*	*100.0*

[†] Percentages may not add up to 100.0% due to rounding.

Supplemental information

Headlamp optics and rear turn signal color were also documented for each vehicle. A summary of these features is shown in Table 7.

Table 7
Headlamp optics and rear turn signal color.

Function	Light source type	N	Market-weighted percentage[†]
Low-beam optics	Lens	3	0.9
	Projector	192	26.1
	Reflector	142	73.0
	Subtotal	*337*	*100.0*
High-beam optics	Lens	3	0.9
	Projector	49	6.0
	Reflector	237	93.1
	Subtotal	*289*	*100.0*
Rear turn signal color	Red	125	61.5
	Amber	124	38.5
	Subtotal	*249*	*100.0*

[†] Percentages may not add up to 100.0% due to rounding.

Conclusions

In terms of current overall market penetration, LEDs are used to varying degrees for all required exterior lighting functions on U.S. vehicles except for high-beam headlighting, for which they are expected soon. While LED usage for most functions, especially headlighting, is still in its early stages, usage for rear lighting functions is already substantial. LEDs are used for just over half of CHMSLs, and for about one out of ten stop lamps and tail lamps.

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Appendix A: Vehicles included in this survey. (The market share data is based on the information in Automotive News (2008).)

#	Model	Maker	Market share %
1	F series	Ford	4.28
2	Silverado	Chevrolet	3.83
3	Camry (incl. Solara)	Toyota	2.93
4	Accord	Honda	2.43
5	Corolla/Matrix	Toyota	2.30
6	Ram	Dodge	2.22
7	Civic	Honda	2.05
8	Impala	Chevrolet	1.93
9	Altima	Nissan	1.76
10	CR-V	Honda	1.36
11	Sierra	GMC	1.29
12	Cobalt	Chevrolet	1.24
13	Tundra	Toyota	1.22
14	Prius	Toyota	1.12
15	Caravan/Grand Caravan	Dodge	1.09
16	Tacoma	Toyota	1.07
17	Focus	Ford	1.07
18	Odyssey	Honda	1.07
19	RAV4	Toyota	1.07
20	Escape	Ford	1.03
21	G6	Pontiac	0.93
22	Fusion	Ford	0.93
23	Tahoe	Chevrolet	0.91
24	Sonata	Hyundai	0.90
25	3 series	BMW	0.88
26	Sienna	Toyota	0.86
27	Town & Country	Chrysler	0.86
28	Explorer	Ford	0.85
29	E-series van	Ford	0.85
30	Mustang	Ford	0.83
31	TrailBlazer	Chevrolet	0.83
32	Edge	Ford	0.81
33	Malibu	Chevrolet	0.79
34	Highlander	Toyota	0.79
35	Grand Cherokee	Jeep	0.75
36	300	Chrysler	0.75
37	Mazda3	Mazda	0.74
38	Charger	Dodge	0.74
39	Wrangler	Jeep	0.74
40	Pilot	Honda	0.73
41	Express/G van	Chevrolet	0.71
42	Sentra	Nissan	0.66
43	HHR	Chevrolet	0.65
44	RX 330/350/400h	Lexus	0.64
45	Caliber	Dodge	0.63
46	PT Cruiser	Chrysler	0.62
47	Jetta	VW	0.61
48	Sebring	Chrysler	0.58
49	Santa Fe	Hyundai	0.57
50	Liberty	Jeep	0.57

Appendix A (continued)

#	Model	Maker	Market share %
51	Expedition	Ford	0.56
52	Equinox	Chevrolet	0.55
53	4Runner	Toyota	0.54
54	Grand Prix	Pontiac	0.54
55	Elantra	Hyundai	0.53
56	Yaris	Toyota	0.52
57	Vue	Saturn	0.52
58	Avenger	Dodge	0.52
59	Suburban	Chevrolet	0.52
60	Lucerne	Buick	0.51
61	ES 330/350	Lexus	0.51
62	Versa	Nissan	0.49
63	Legacy (incl. Outback)	Subaru	0.49
64	Colorado	Chevrolet	0.47
65	Nitro	Dodge	0.46
66	Spectra	Kia	0.45
67	Avalon	Toyota	0.45
68	Acadia	GMC	0.45
69	Ranger	Ford	0.45
70	G	Infiniti	0.44
71	Uplander	Chevrolet	0.43
72	Aveo	Chevrolet	0.41
73	Titan	Nissan	0.41
74	Frontier	Nissan	0.40
75	tC	Scion	0.40
76	C class	Mercedes	0.39
77	Yukon	GMC	0.39
78	Pathfinder	Nissan	0.39
79	Commander	Jeep	0.39
80	Crown Victoria	Ford	0.38
81	Aura	Saturn	0.37
82	MDX	Acura	0.36
83	TL	Acura	0.36
84	Mazda6	Mazda	0.36
85	CTS	Cadillac	0.35
86	Fit	Honda	0.35
87	Avalanche	Chevrolet	0.34
88	FJ Cruiser	Toyota	0.34
89	IS 250/350	Lexus	0.34
90	5 series	BMW	0.34
91	Pacifica	Chrysler	0.33
92	Maxima	Nissan	0.33
93	DTS	Cadillac	0.32
94	Xterra	Nissan	0.32
95	Dakota	Dodge	0.31
96	Grand Marquis	Mercury	0.31
97	Sportage	Kia	0.31
98	E class	Mercedes	0.30
99	Envoy	GMC	0.30
100	LaCrosse	Buick	0.30
101	Impreza (incl. WRX)	Subaru	0.29

Appendix A (continued)

#	Model	Maker	Market share %
102	xB	Scion	0.28
103	Durango	Dodge	0.28
104	A4/S4	Audi	0.28
105	Yukon XL	GMC	0.28
106	Forester	Subaru	0.28
107	H3	Hummer	0.27
108	Ridgeline	Honda	0.26
109	Forenza/Reno	Suzuki	0.26
110	Cooper/Cooper S	Mini	0.26
111	CX-7	Mazda	0.26
112	Tucson	Hyundai	0.26
113	Optima	Kia	0.25
114	Sedona	Kia	0.25
115	Patriot	Jeep	0.25
116	Compass	Jeep	0.24
117	MKX	Lincoln	0.23
118	Milan	Mercury	0.23
119	Passat	VW	0.23
120	Vibe	Pontiac	0.23
121	Escalade	Cadillac	0.23
122	Sorento	Kia	0.22
123	Accent	Hyundai	0.22
124	LS 460/600h	Lexus	0.22
125	Element	Honda	0.22
126	X5	BMW	0.22
127	Mariner	Mercury	0.22
128	Outlook	Saturn	0.22
129	Zephyr/MKZ	Lincoln	0.21
130	M class	Mercedes	0.21
131	Corvette	Chevrolet	0.21
132	Rio	Kia	0.21
133	TSX	Acura	0.20
134	Taurus (new)	Ford	0.20
135	Torrent	Pontiac	0.20
136	E-series/Club Wagon	Ford	0.20
137	Armada	Nissan	0.20
138	Lancer	Mitsubishi	0.19
139	XC90	Volvo	0.19
140	New Beetle	VW	0.19
141	Magnum	Dodge	0.19
142	Enclave	Buick	0.18
143	Aspen	Chrysler	0.18
144	Quest	Nissan	0.18
145	X3	BMW	0.17
146	G5	Pontiac	0.17
147	Galant	Mitsubishi	0.16
148	GL class	Mercedes	0.16
149	S class	Mercedes	0.16
150	Rondo	Kia	0.16
151	Savana/G van	GMC	0.16
152	CX-9	Mazda	0.16

Appendix A (continued)

#	Model	Maker	Market share %
153	Rabbit	VW	0.16
154	Navigator	Lincoln	0.15
155	Mountaineer	Mercury	0.15
156	RDX	Acura	0.14
157	Outlander	Mitsubishi	0.14
158	Sequoia	Toyota	0.14
159	XL-7/XL7	Suzuki	0.14
160	GX 470	Lexus	0.14
161	9-3	Saab	0.14
162	SRX	Cadillac	0.14
163	XG350/Azera	Hyundai	0.14
164	M	Infiniti	0.14
165	GS 350	Lexus	0.13
166	70 series (incl. XC70)	Volvo	0.13
167	Canyon	GMC	0.13
168	STS	Cadillac	0.13
169	FX	Infiniti	0.13
170	Q7	Audi	0.13
171	Eclipse	Mitsubishi	0.12
172	Grand Vitara	Suzuki	0.12
173	350Z	Nissan	0.12
174	60 series	Volvo	0.11
175	Taurus X	Ford	0.11
176	40 series	Volvo	0.11
177	Rogue	Nissan	0.11
178	Entourage	Hyundai	0.11
179	Range Rover Sport	Land Rover	0.11
180	Tribeca	Subaru	0.10
181	Solstice	Pontiac	0.10
182	Aerio/SX4	Suzuki	0.10
183	Sprinter	Dodge	0.10
184	Golf/GTI/R32	VW	0.10
185	Escalade ESV	Cadillac	0.10
186	MX-5 Miata	Mazda	0.09
187	CLK class	Mercedes	0.09
188	7 series	BMW	0.09
189	Tiburon	Hyundai	0.09
190	Mazda5	Mazda	0.08
191	Tribute	Mazda	0.08
192	R class	Mercedes	0.08
193	Eos	VW	0.08
194	Veracruz	Hyundai	0.08
195	Cayenne	Porsche	0.08
196	911 Carrera/Carrera 4	Porsche	0.08
197	H2	Hummer	0.08
198	80 series	Volvo	0.08
199	Range Rover	Land Rover	0.08
200	QX56	Infiniti	0.08
201	A6/S6	Audi	0.07
202	Endeavor	Mitsubishi	0.07
203	Sky	Saturn	0.07

Appendix A (continued)

#	Model	Maker	Market share %
204	LR3	Land Rover	0.07
205	xD	Scion	0.07
206	Sable	Mercury	0.06
207	Z4	BMW	0.06
208	LR2	Land Rover	0.06
209	6 series	BMW	0.06
210	Touareg	VW	0.05
211	Crossfire	Chrysler	0.05
212	Mark LT	Lincoln	0.05
213	Escalade EXT	Cadillac	0.05
214	CLS class	Mercedes	0.05
215	SLK class	Mercedes	0.05
216	Eclipse Spyder	Mitsubishi	0.04
217	A3	Audi	0.04
218	RL	Acura	0.04
219	SL class	Mercedes	0.04
220	Cayman	Porsche	0.04
221	RX-8	Mazda	0.04
222	Amanti	Kia	0.03
223	9-7X	Saab	0.03
224	XK	Jaguar	0.03
225	XJ	Jaguar	0.03
226	9-5	Saab	0.03
227	TT	Audi	0.03
228	S2000	Honda	0.03
229	Pickup i-280/i-350	Isuzu	0.03
230	SC 430	Lexus	0.02
231	A8/S8	Audi	0.02
232	CL class	Mercedes	0.02
233	Boxster	Porsche	0.02
234	S-Type	Jaguar	0.02
235	Land Cruiser	Toyota	0.02
236	X-Type	Jaguar	0.02
237	Ascender	Isuzu	0.02
238	50 series	Volvo	0.02
239	B series	Mazda	0.02
240	LX 470	Lexus	0.02
241	30 series	Volvo	0.01
242	GS 430/450h	Lexus	0.01
243	XLR	Cadillac	0.01
244	G class	Mercedes	0.01
245	A5/S5	Audi	<0.01
246	Viper	Dodge	<0.01
247	EX	Infiniti	<0.01
248	R8	Audi	<0.01
		TOTAL	98.1

Appendix B: Vehicles excluded from this survey. (The market share data is based on the information in Automotive News (2008).)

#	Model	Maker	Market share %	Reason for exclusion
1	Murano	Nissan	0.47	Model not offered in 2008
2	Ion	Saturn	0.30	Model not offered in 2008
3	Five Hundred	Ford	0.22	Model not offered in 2008
4	Town Car	Lincoln	0.17	Model not offered in 2008
5	Freestyle	Ford	0.15	Model not offered in 2008
6	Monte Carlo	Chevrolet	0.10	Model not offered in 2008
7	Rendezvous	Buick	0.09	Model not offered in 2008
8	Montego	Mercury	0.07	Model not offered in 2008
9	xA	Scion	0.06	Model not offered in 2008
10	Raider	Mitsubishi	0.05	Model not offered in 2008
11	Terraza	Buick	0.03	Model not offered in 2008
12	Rainier	Buick	0.03	Model not offered in 2008
13	GTO	Pontiac	0.03	Model not offered in 2008
14	Bentley Continental GT	Bentley	0.02	Unavailable for inspection
15	Lotus (all models)	Lotus	0.02	Unavailable for inspection
16	Maserati (all models)	Maserati	0.02	Unavailable for inspection
17	Freestar	Ford	0.01	Model not offered in 2008
18	Ferrari (all models)	Ferrari	0.01	Unavailable for inspection
19	Stratus	Dodge	0.01	Model not offered in 2008
20	Relay	Saturn	0.01	Model not offered in 2008
21	Montana	Pontiac	0.01	Model not offered in 2008
22	Baja	Subaru	0.01	Model not offered in 2008
23	Aston Martin (all models)	Aston Martin	0.01	Unavailable for inspection
24	Lamborghini (all models)	Lamborghini	0.01	Unavailable for inspection
25	Monterey	Mercury	<0.01	Model not offered in 2008
26	Rolls-Royce (all models)	Rolls-Royce	<0.01	Unavailable for inspection
27	Montero	Mitsubishi	<0.01	Model not offered in 2008
28	Verona	Suzuki	<0.01	Model not offered in 2008
29	RSX	Acura	<0.01	Model not offered in 2008
30	SSR	Chevrolet	<0.01	Model not offered in 2008
31	GT	Ford	<0.01	Model not offered in 2008
32	Maybach (all models)	Maybach	<0.01	Unavailable for inspection
33	Bonneville	Pontiac	<0.01	Model not offered in 2008
34	H1	Hummer	<0.01	Model not offered in 2008
35	MPV	Mazda	<0.01	Model not offered in 2008
36	LeSabre	Buick	<0.01	Model not offered in 2008
37	9-2	Saab	<0.01	Model not offered in 2008
38	SLR class	Mercedes	<0.01	Model not offered in 2008
39	Grand Am	Pontiac	<0.01	Model not offered in 2008
40	DeVille	Cadillac	<0.01	Model not offered in 2008
41	Cavalier	Chevrolet	<0.01	Model not offered in 2008
42	Sunfire	Pontiac	<0.01	Model not offered in 2008
43	Park Avenue	Buick	<0.01	Model not offered in 2008
44	Astro	Chevrolet	<0.01	Model not offered in 2008
45	Venture	Chevrolet	<0.01	Model not offered in 2008
46	Aztek	Pontiac	<0.01	Model not offered in 2008
47	Q45	Infiniti	<0.01	Model not offered in 2008
48	Classic	Chevrolet	<0.01	Model not offered in 2008
49	Phaeton	VW	<0.01	Model not offered in 2008
50	Safari	GMC	<0.01	Model not offered in 2008

Appendix B (continued)

#	Model	Maker	Market share %	Reason for exclusion
51	FCX	Honda	<0.01	Model not offered in 2008
52	Axiom	Isuzu	<0.01	Model not offered in 2008
53	Blazer	Chevrolet	<0.01	Model not offered in 2008
54	Echo	Toyota	<0.01	Model not offered in 2008
55	Century	Buick	<0.01	Model not offered in 2008
56	Rodeo	Isuzu	<0.01	Model not offered in 2008
57	QX4	Infiniti	<0.01	Model not offered in 2008
58	911 Carrera GT	Porsche	<0.01	Unavailable for inspection
59	Insight	Honda	<0.01	Model not offered in 2008
60	L series	Saturn	<0.01	Model not offered in 2008
61	NSX	Acura	<0.01	Model not offered in 2008
62	Vitara	Suzuki	<0.01	Model not offered in 2008
63	Freelander	Land Rover	<0.01	Model not offered in 2008
64	I35	Infiniti	<0.01	Model not offered in 2008
65	G8	Pontiac	0.00	New model for 2008
66	Astra	Saturn	0.00	New model for 2008
		TOTAL	1.9	