

**Appendixes to:**  
**Federal Test Procedure Review Project:**  
**Preliminary Technical Report**

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Office of Air & Radiation  
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**DISCLAIMER:** Although the information described in this preliminary technical report has been funded in part by the United States Environmental Protection Agency under contracts to Radian Corporation and to Sierra Research, Inc., it has not been subjected to the Agency's peer and administrative review processes. It is being released for information purposes only and could be used in potential regulation development.

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Appendix A.

Chase Car Method Bias Analysis: Supplementary Tables

Table A-1. Comparison of chase car route characteristics for Baltimore

Trip type	Number of trips			Average Trip length (miles)		
	Master data set	Select ed	Driven	Master data set	Select ed	Driven
Home-based nonwork trips	2,507,325	124	93	7.8	7.6	7.2
Home-based work trips	1,789,950	89	62	11.1	10.6	9.8
Non-home based trips	1,117,031	55	42	7.9	7.0	7.4
Intrazonal trips	638,688	32	20	NA	NA	2.1

Table A-2. Comparison of chase car route characteristics for Spokane

Travel Period	Number of Trips			Average Trip length (miles)		
	Master data set	Selected	Driven	Master data set	Selected	Driven
<b>Interzonal</b>						
AM Peak	103,996	20	18	7.6	7.9	7.1
PM Peak	139,273	26	23	6.5	6.8	5.2
Off Peak	1,228,423	231	186	6.3	6.5	6.4
<b>Intrazonal</b>						
AM Peak	5,017	1	2	NA	NA	NA
PM Peak	9,608	2	2	NA	NA	NA
Off Peak	112,441	20	18	NA	NA	NA

Note: The local planning agencies in Baltimore and Spokane did not have estimates of intrazonal trip lengths.

Table A-3. Target Vehicle Characteristics for Baltimore and Spokane

Vehicle Characteristic	Baltimore		Spokane	
	Number	Percent	Number	Percent
<b>Vehicle Type</b>				
Luxury, sedan	559	72	552	63
Pick-up, van, utility	167	21	307	35
Sports	37	5	12	1
Not determined	18	2	9	1
<b>Vehicle Age</b>				
Pre-1979	32	4	125	14
1980-1989	464	59	527	60
1990 +	248	32	213	24
Not determined	37	5	15	2
<b>Continent of Origin</b>				
Asia	179	23	203	23
Europe	53	7	46	5
Domestic	495	64	612	70
Not determined	43	6	19	2
<b>Manufacturer</b>				
GMC	226	29	319	36
Ford	181	23	173	20
Chrysler	75	10	117	13
Nissan	34	4	40	5
Toyota	50	6	68	8
Honda	52	7	43	5
Mazda	15	2	24	3
Not determined	148	19	96	11

Appendix B  
 Baltimore 3-Parameter Vehicle Characteristics

Test Site	Sample Number	Vehicle ID	Number	Make	Model	Year	Transmiss
1	Rossville	B002	1FTCR10A1MUC48371	ford	ranger	1991	Automatic
2	Rossville	B010	7V1AX885XJ1793960	volvo	240dl	1987	Automatic
3	Rossville	B016	1G1FP21S3KL104669	chevrolet	camaro	1989	Automatic
4	Rossville	B017	YS3AL75L8M7006092	saab	900	1991	Manual
5	Rossville	B019	1G1FP21S1JL193186	chevrolet	camaro	1988	Automatic
6	Rossville	B037	2P4FH413XJR662190	plymouth	voyager	1988	Automatic
7	Rossville	B039	1P3BK46D2KC469869	plymouth	reliantk	1989	Automatic
8	Rossville	B042	1G6AD6983D9266654	cadillac	sedandeville	1983	Automatic
9	Rossville	B050	1GCEG25HXC7125742	chevrolet	c20van	1982	Automatic
10	Rossville	B052	1HGCB7661MA049561	honda	accord	1991	Automatic
11	Rossville	B058	1G2AB2705E7332521	pontiac	2000	1984	Automatic
12	Rossville	B059	1G1JF11W2K7180967	chevrolet	cAvelierz24	1989	Automatic
13	Rossville	B062	1FAPP14J2MW269094	Ford	Escort	1991	Manual
14	Rossville	B066	1YVGD31B5M5138706	MAZDA	mx-6	1991	Manual
15	Rossville	B072	1FTCR10A10UK81004	ford	ranger	1989	Manual
16	Rossville	B081	1G1JC1113KJ171405	chevrolet	cavalier	1989	Automatic
17	Rossville	B084	1G2AB2707E7250564	PONTIAC	SUNBIRD	1984	Automatic
18	Rossville	B086	1FAPP36X9KK201666	ford	tempo	1989	Automatic
19	Rossville	B088	1GDC14Z8KZ211565	chevrolet	silverado	1989	Automatic
20	Rossville	B098	1GTBS14R2GS533452	gmc	s15	1986	Automatic
21	Rossville	B105	JT4RN50R7G0173173	toyota	pickup	1987	Manual
22	Rossville	B123	TE725009680	toyota	corollawagon	1980	Manual
23	Rossville	B124	1B3BP48D5KN589752	dodge	shadow	1989	Automatic
24	Rossville	B130	1FABP44E2KF117098	ford	mustanglx	1989	Automatic
25	Rossville	B139	1G4AL1937FG463396	buick	century	1989	Automatic
26	Rossville	B143	JT2RA44C6B0001018	toyota	celica	1985	Automatic
27	Rossville	B150	1B3YA44K6JG448546	dodge	daytona	1981	Manual
28	Rossville	B153	1GNCT18Z3K0152538	chevrolet	blazer	1988	Automatic
29	Rossville	B156	1GFC24H1KE115676	chevrolet	silverado2500	1989	Automatic
30	Rossville	B163	JHMCA5386JC052224	honda	accordlxi	1989	Automatic
31	Rossville	B164	1B3BD31D6FG241191	CHRYSLER	ARIESK	1988	Manual
32	Rossville	B169	1G4XB69R0FW454358	buick	skylark	1984	Automatic
33	Rossville	B178	JH4DA3458KS013350	accura	integra	1985	Automatic
34	Rossville	B184	1G4AH51R1HT438622	buick	century	1989	Automatic
35	Rossville	B190	JT2EL43B2M0027569	toyota	tercel	1987	Automatic
36	Rossville	B191	1GDC14H3ME100424	chevrolet	1500	1991	Automatic
37	Rossville	B193	1GDC14Z6KE135013	chevrolet	scotsdale1500	1991	Automatic
38	Rossville	B195	JHMB47431GC066566	honda	accord	1989	Automatic
39	Rossville	B206	2MEBM75F1KX665883	MERCURY	GRANDMARQUIS	1986	Automatic
40	Rossville	B208	JM1FC3312G0121078	MAZDA	RX-7	1989	Automatic

41	Rossville	B210	JF1AC42B2KC210379	subaru	d1	Luxury/Sedan/Station Wagon	1989	Automatic
42	Rossville	B233	JN1GB21SXKU537381	NISSAN	SENTRA	Luxury/Sedan/Station Wagon	1989	Automatic
43	Rossville	B236	1W19J9B567918	CHEVROLET	MALIBU	Luxury/Sedan/Station Wagon	1979	Automatic
44	Rossville	B243	YV1AX8852H1723847	VOLVO	240DL	Luxury/Sedan/Station Wagon	1987	Manual
45	Rossville	B247	2B4FK5131JR676116	DODGE	CARAVAN	Pickup/Van/Utility	1988	Automatic
46	Rossville	B255	1C3BC59KXHF330954	CHRYSLER	TOWNANDCOUNTRY	Luxury/Sedan/Station Wagon	1988	Automatic
47	Exeter	B268	1G1AW35K5CR225618	chevrolet	Malibu_Classic	Luxury/Sedan/Station Wagon	1982	Automatic
48	Exeter	B269	1B7HD14T7HS461522	dodge	ram	Pickup/Van/Utility	1987	Automatic
49	Exeter	B273	1FTCR11T1JUE26260	ford	Ranger	Pickup/Van/Utility	1988	Automatic
50	Exeter	B275	JT2AL31G7E0225492	TOYOTA	TERCEL	Luxury/Sedan/Station Wagon	1984	Manual
51	Exeter	B286	CRN1498264964	CHEVROLET	LUV	Pickup/Van/Utility	1979	Manual
52	Exeter	B287	1237J9B412061	CHEVROLET	MONTECARLO	Luxury/Sedan/Station Wagon	1979	Automatic
53	Exeter	B297	1MEBP9237GH654018	MERCURY	COUGAR	Luxury/Sedan/Station Wagon	1986	Automatic
54	Exeter	B314	1G3CX69B9G4332506	OLDSMOBILE	98	Luxury/Sedan/Station Wagon	1988	Automatic
55	Exeter	B315	1FTEX15H2GKA94158	FORD	F150	Pickup/Van/Utility	1986	Automatic
56	Exeter	B317	8G87H169118	FORD	THUNDERBIRD	Luxury/Sedan/Station Wagon	1978	Automatic
57	Exeter	B319	1FABP259XHW11G408	FORD	ESCORT	Luxury/Sedan/Station Wagon	1987	Automatic
58	Exeter	B325	JT4RN50R7H0325017	TOYOTA	PICKUP	Pickup/Van/Utility	1987	Manual
59	Exeter	B329	1G1GZ11G2HP118178	CHEVROLET	MONTECARLO	Sports Car/High Performance	1987	Automatic
60	Exeter	B337	JT2MX62EX80014430	toyota	crossida	Luxury/Sedan/Station Wagon	1981	Automatic
61	Exeter	B338	1G6AD478XC9150406	CADILLAC	COUPDEVILLE	Luxury/Sedan/Station Wagon	1982	Automatic
62	Exeter	B344	1Y1SK5167LZ072182	GEO	PRIZM	Luxury/Sedan/Station Wagon	1990	Automatic
63	Exeter	B351	1G4AJ47A8EH477206	buick	rega	Luxury/Sedan/Station Wagon	1984	Automatic
64	Exeter	B361	JT2AE92W6J3076220	TOYATA	COROLLAWAGON	Luxury/Sedan/Station Wagon	1988	Automatic
65	Exeter	B365	JT2AE83E4G3279918	TOYOTA	CAROLLA	Luxury/Sedan/Station Wagon	1986	Manual
66	Exeter	B367	1G2JB6903G7538623	PONTIAC	SUNBIRD	Luxury/Sedan/Station Wagon	1986	Automatic
67	Exeter	B368	KMHLF31J3JU420717	HYUNDAI	EXCEL	Luxury/Sedan/Station Wagon	1988	Automatic
68	Exeter	B369	JE2AE72SXD2040392	TOYOTA	CAROLLA	Luxury/Sedan/Station Wagon	1983	Manual
69	Exeter	B371	1N6ND0650EC332168	nissan	pickup	Pickup/Van/Utility	1984	Automatic
70	Exeter	B375	2G1AW35X3G1114186	chevrolet	celebritygl	Luxury/Sedan/Station Wagon	1986	Automatic
71	Exeter	B376	JN1HB1155CU006220	NISSAN	SENTRA	Luxury/Sedan/Station Wagon	1982	Manual
72	Exeter	B381	1G3H73735G1874913	OLDSMOBILE	88	Luxury/Sedan/Station Wagon	1986	Automatic
73	Exeter	B386	JE2AE82E1G3308647	TOYOTA	COROLLA	Luxury/Sedan/Station Wagon	1986	Automatic
74	Exeter	B389	JT2TE72W2C5109018	TOYOTA	COROLLA	Luxury/Sedan/Station Wagon	1982	Automatic
75	Exeter	B395	JN1PB1254FU631495	NISSAN	SENTRA	Luxury/Sedan/Station Wagon	1985	Manual
76	Exeter	B406	1G2NE27L1FC748917	PONTIAC	GRANDAM	Luxury/Sedan/Station Wagon	1985	Automatic
77	Exeter	B410	JM2UF1135J0369027	MAZDA	b2000	Pickup/Van/Utility	1988	Manual
78	Exeter	B413	4J47AAG110524	BUICK	REGAL	Luxury/Sedan/Station Wagon	1980	Automatic
79	Exeter	B419	4J47WAG128222	BUICK	REGAL	Luxury/Sedan/Station Wagon	1980	Automatic
80	Exeter	B420	1AB08C3DY262608	Chevrolet	Chevette	Luxury/Sedan/Station Wagon	1983	Automatic
81	Exeter	B436	4P3CS34TXME109053	PLYMOUTH	LASER	Luxury/Sedan/Station Wagon	1991	Manual
82	Exeter	B438	JT2EL31G0H0069950	TOYOTA	TERCEL	Luxury/Sedan/Station Wagon	1987	Manual
83	Exeter	B441	1G1AB08C5EA125860	CHEVROLET	CHEVET	Luxury/Sedan/Station Wagon	1984	Automatic
84	Exeter	B445	JT4YR29G5V5007140	TOYOTA	VAN	Pickup/Van/Utility	1986	Manual
85	Exeter	B447	1G4AM69A7CH145805	BUICK	REGAL	Luxury/Sedan/Station Wagon	1982	Automatic

86	Exeter	B451	1P3BP36K4HF153374	PLYMOUTH	RELIANTK	Luxury/Sedan/Station Wagon	1987	Automatic
87	Exeter	B452	1GMCU06D2LT200405	PONTIAC	TRANSPORT	Pickup/Van/Utility	1990	Automatic
88	Exeter	B460	1FABP46F6D4168830	FORD	THUNDERBIRD	Luxury/Sedan/Station Wagon	1983	Automatic
89	Exeter	B466	JT2AE72EXD2098772	TOYOTA	COROLLA	Luxury/Sedan/Station Wagon	1983	Automatic
90	Exeter	B467	1HGBA743XGA063308	HONDA	ACCORD	Luxury/Sedan/Station Wagon	1986	Automatic
91	Exeter	B468	JT2EL31D5H0075958	toyota	tercel	Luxury/Sedan/Station Wagon	1987	Manual
92	Exeter	B472	1P3BM18C6ED304919	PLYMOUTH	HORIZON	Luxury/Sedan/Station Wagon	1984	Manual
93	Exeter	B482	1C3CJ51E3HG185086	CHRYSLER	LEBARON	Luxury/Sedan/Station Wagon	1987	Automatic



Table C-1

SUMMARY STATISTICS  
 ALL DRIVING & VEHICLE MOVING  
 Baltimore 3-Parameter Vehicles

	Speed (mph)	
	All Driving	Vehicle Moving
Mean	24.50	31.06
St Dev	20.52	18.17
Max	94.46	94.46
Min	0.00	0.02
Count	3,365,504	2,654,614

	Accel (mph/sec)	
	All Driving	Vehicle Moving
Mean	0.00	0.03
St Dev	1.50	1.67
Max	15.19	15.19
Min	-19.49	-19.49
Count	3,360,550	2,654,298

	Power (mph <sup>2</sup> /sec)	
	All Driving	Vehicle Moving
Mean	46.02	46.02
St Dev	42.96	42.96
Max	557.69	557.69
Min	0.00	0.00
Count	1,407,908	1,407,908

Table C-2

DISTRIBUTION OF SPEED  
 All Driving and Vehicle Moving  
 Baltimore 3-Parameter Vehicles

Speed (mph)	All Driving		Vehicle Moving			
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 0	710,890	-0.0%	21.1%	0	0.0%	0.0%
0 - 5	207,698	6.2%	27.3%	207,698	7.8%	7.8%
5 - 10	181,442	5.4%	32.7%	181,442	6.8%	14.7%
10 - 15	201,708	6.0%	38.7%	201,708	7.6%	22.3%
15 - 20	209,420	6.2%	44.9%	209,420	7.9%	30.1%
20 - 25	231,917	6.9%	51.8%	231,917	8.7%	38.9%
25 - 30	280,040	8.3%	60.1%	280,040	10.5%	49.4%
30 - 35	308,521	9.2%	69.3%	308,521	11.6%	61.1%
35 - 40	253,681	7.5%	76.8%	253,681	9.6%	70.6%
40 - 45	173,105	5.1%	82.0%	173,105	6.5%	77.1%
45 - 50	125,294	3.7%	85.7%	125,294	4.7%	81.9%
50 - 55	121,004	3.6%	89.3%	121,004	4.6%	86.4%
55 - 60	147,398	4.4%	93.7%	147,398	5.6%	92.0%
60 - 65	125,917	3.7%	97.4%	125,917	4.7%	96.7%
65 - 70	66,826	2.0%	99.4%	66,826	2.5%	99.2%
70 - 75	17,485	0.5%	99.9%	17,485	0.7%	99.9%
75 - 80	2,803	0.1%	100.0%	2,803	0.1%	100.0%
80 - 85	253	0.0%	100.0%	253	0.0%	100.0%
85 - 90	91	0.0%	100.0%	91	0.0%	100.0%
90 - 95	11	0.0%	100.0%	11	0.0%	100.0%
Total	3,365,504	100.0%		2,654,614	100.0%	

Table C-3

DISTRIBUTION OF ACCELERATIONS  
 All Driving and Vehicle Moving  
 Baltimore 3-Parameter Vehicles

Accel (mph/s)	All Driving			Vehicle Moving			
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	
-20 to -19	1	0.0%	0.0%	1	0.0%	0.0%	
-19 to -18	0	0.0%	0.0%	0	0.0%	0.0%	
-18 to -17	0	0.0%	0.0%	0	0.0%	0.0%	
-17 to -16	0	0.0%	0.0%	0	0.0%	0.0%	
-16 to -15	0	0.0%	0.0%	0	0.0%	0.0%	
-15 to -14	3	0.0%	0.0%	3	0.0%	0.0%	
-14 to -13	2	0.0%	0.0%	2	0.0%	0.0%	
-13 to -12	11	0.0%	0.0%	11	0.0%	0.0%	
-12 to -11	34	0.0%	0.0%	30	0.0%	0.0%	
-11 to -10	44	0.0%	0.0%	42	0.0%	0.0%	
-10 to -9	149	0.0%	0.0%	145	0.0%	0.0%	
-9 to -8	545	0.0%	0.0%	533	0.0%	0.0%	
-8 to -7	1,801	0.1%	0.1%	1,753	0.1%	0.1%	
-7 to -6	5,756	0.2%	0.2%	5,611	0.2%	0.3%	
-6 to -5	17,199	0.5%	0.8%	16,704	0.6%	0.9%	
-5 to -4	41,575	1.2%	2.0%	40,176	1.5%	2.4%	
-4 to -3	76,005	2.3%	4.3%	72,353	2.7%	5.2%	
-3 to -2	120,151	3.6%	7.8%	112,253	4.2%	9.4%	
-2 to -1	219,036	6.5%	14.4%	205,116	7.7%	17.1%	
-1 to 0	767,792	22.8%	37.2%	758,565	28.6%	45.7%	
0	702,538	20.9%	58.1%	33,092	1.2%	47.0%	
0 to 1	899,795	26.8%	84.9%	899,795	33.9%	80.9%	
1 to 2	267,355	8.0%	92.8%	267,355	10.1%	90.9%	
2 to 3	133,587	4.0%	96.8%	133,587	5.0%	96.0%	
3 to 4	62,415	1.9%	98.7%	62,415	2.4%	98.3%	
4 to 5	27,375	0.8%	99.5%	27,375	1.0%	99.3%	
5 to 6	10,639	0.3%	99.8%	10,639	0.4%	99.7%	
6 to 7	3,712	0.1%	99.9%	3,712	0.1%	99.9%	
7 to 8	1,649	0.0%	100.0%	1,649	0.1%	99.9%	
8 to 9	776	0.0%	100.0%	776	0.0%	100.0%	
9 to 10	325	0.0%	100.0%	325	0.0%	100.0%	
10 to 11	187	0.0%	100.0%	187	0.0%	100.0%	
11 to 12	62	0.0%	100.0%	62	0.0%	100.0%	
12 to 13	20	0.0%	100.0%	20	0.0%	100.0%	
13 to 14	8	0.0%	100.0%	8	0.0%	100.0%	
14 to 15	2	0.0%	100.0%	2	0.0%	100.0%	
15 to 16	1	0.0%	100.0%	1	0.0%	100.0%	
Total	3,360,550	100.0%		2,654,298	100.0%		

Table C-4

DISTRIBUTION OF POWER  
 All Driving  
 Baltimore 3-Parameter Vehicles

Power (mph <sup>2</sup> /s)	All Driving		Cumulative
	Count	Percent	Percent
0 - 20	477,725	33.9%	33.9%
20 - 40	308,000	21.9%	55.8%
40 - 60	215,625	15.3%	71.1%
60 - 80	149,080	10.6%	81.7%
80 - 100	100,442	7.1%	88.8%
100 - 120	64,170	4.6%	93.4%
120 - 140	38,864	2.8%	96.2%
140 - 160	22,726	1.6%	97.8%
160 - 180	13,099	0.9%	98.7%
180 - 200	7,386	0.5%	99.2%
200 - 220	4,306	0.3%	99.5%
220 - 240	2,566	0.2%	99.7%
240 - 260	1,565	0.1%	99.8%
260 - 280	1,023	0.1%	99.9%
280 - 300	582	0.0%	99.9%
300 - 320	302	0.0%	100.0%
320 - 340	187	0.0%	100.0%
340 - 360	103	0.0%	100.0%
360 - 380	72	0.0%	100.0%
380 - 400	42	0.0%	100.0%
400 - 420	20	0.0%	100.0%
420 - 440	8	0.0%	100.0%
440 - 460	7	0.0%	100.0%
460 - 480	7	0.0%	100.0%
480 - 500	0	0.0%	100.0%
500 - 520	0	0.0%	100.0%
520 - 540	0	0.0%	100.0%
540 - 560	1	0.0%	100.0%
Total	1,407,908	100.0%	



Table C-6

SUMMARY STATISTICS  
 BY VEHICLE TYPE  
 Baltimore 3-Parameter Vehicles

	Speed (mph)		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	24.07	25.59	24.61
St Dev	20.58	20.19	21.33
Max	94.46	83.72	72.20
Min	0.00	0.00	0.00
Count	2,324,449	903,688	137,367

	Accel (mph/sec)		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	0.00	0.00	0.00
St Dev	1.52	1.44	1.48
Max	15.19	13.11	11.75
Min	-19.49	-11.88	-11.84
Count	2,320,940	902,442	137,168

	Power (mph <sup>2</sup> /sec)		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	46.02	45.63	48.58
St Dev	42.38	43.51	48.80
Max	557.69	457.01	407.04
Min	0.00	0.00	0.00
Count	966,213	386,314	55,381

Table C-7

## DISTRIBUTION OF SPEED

By Vehicle Type

Baltimore 3-Parameter Vehicles

Speed (mph)	Luxury/Sedan/Station Wagon		Pickup/Van/Utility		Sports Car/High Performance	
	Count	Percent	Count	Percent	Count	Percent
0 - 0	509,282	21.9%	168,764	18.7%	32,844	23.9%
0 - 5	145,405	6.3%	53,660	5.9%	8,633	6.3%
5 - 10	126,874	5.5%	47,585	5.3%	6,983	5.1%
10 - 15	139,811	6.0%	54,386	6.0%	7,511	5.5%
15 - 20	146,497	6.3%	55,278	6.1%	7,645	5.6%
20 - 25	158,302	6.8%	65,268	7.2%	8,347	6.1%
25 - 30	194,792	8.4%	75,649	8.4%	9,599	7.0%
30 - 35	215,640	9.3%	83,646	9.3%	9,235	6.7%
35 - 40	172,105	7.4%	72,586	8.0%	8,990	6.5%
40 - 45	113,136	4.9%	51,896	5.7%	8,073	5.9%
45 - 50	77,083	3.3%	41,531	4.6%	6,680	4.9%
50 - 55	77,799	3.3%	37,512	4.2%	5,693	4.1%
55 - 60	95,575	4.1%	43,002	4.8%	8,821	6.4%
60 - 65	82,830	3.6%	36,343	4.0%	6,744	4.9%
65 - 70	51,381	2.2%	13,933	1.5%	1,512	1.1%
70 - 75	15,048	0.6%	2,380	0.3%	57	0.0%
75 - 80	2,541	0.1%	262	0.0%	0	0.0%
80 - 85	246	0.0%	7	0.0%	0	0.0%
85 - 90	91	0.0%	0	0.0%	0	0.0%
90 - 95	11	0.0%	0	0.0%	0	0.0%
Total	2,324,449	100.0%	903,688	100.0%	137,367	100.0%

Table C-8

## DISTRIBUTION OF ACCELERATIONS

By Vehicle Type

Baltimore 3-Parameter Vehicles

Accel (mph/s)	Luxury/Sedan/Station Wagon			Pickup/Van/Utility			Sports Car/High Performance		
	Cumulative			Cumulative			Cumulative		
	Count	Percent	Percent	Count	Percent	Percent	Count	Percent	Percent
-20 to -19	1	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-19 to -18	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-18 to -17	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-17 to -16	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-16 to -15	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-15 to -14	3	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-14 to -13	2	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-13 to -12	11	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-12 to -11	25	0.0%	0.0%	8	0.0%	0.0%	1	0.0%	0.0%
-11 to -10	37	0.0%	0.0%	5	0.0%	0.0%	2	0.0%	0.0%
-10 to -9	121	0.0%	0.0%	26	0.0%	0.0%	2	0.0%	0.0%
-9 to -8	410	0.0%	0.0%	110	0.0%	0.0%	25	0.0%	0.0%
-8 to -7	1,361	0.1%	0.1%	356	0.1%	0.1%	84	0.1%	0.1%
-7 to -6	4,324	0.2%	0.3%	1,154	0.3%	0.2%	278	0.2%	0.3%
-6 to -5	12,671	0.5%	0.8%	3,828	0.8%	0.6%	700	0.5%	0.8%
-5 to -4	29,641	1.3%	2.1%	10,226	2.1%	1.7%	1,708	1.2%	2.0%
-4 to -3	53,672	2.3%	4.4%	19,526	4.4%	3.9%	2,807	2.0%	4.1%
-3 to -2	83,651	3.6%	8.0%	32,208	8.0%	7.5%	4,292	3.1%	7.2%
-2 to -1	150,477	6.5%	14.5%	60,135	14.5%	14.1%	8,424	6.1%	13.4%
-1 to 0	516,758	22.3%	36.8%	219,964	36.8%	38.5%	31,070	22.7%	36.0%
0	501,562	21.6%	58.4%	168,582	58.4%	57.2%	32,394	23.6%	59.6%
0 to 1	613,053	26.4%	84.8%	250,606	84.8%	85.0%	36,136	26.3%	86.0%
1 to 2	182,595	7.9%	92.7%	74,447	92.7%	93.2%	10,313	7.5%	93.5%
2 to 3	93,270	4.0%	96.7%	35,745	96.7%	97.2%	4,572	3.3%	96.8%
3 to 4	44,517	1.9%	98.6%	15,575	98.6%	98.9%	2,323	1.7%	98.5%
4 to 5	19,825	0.9%	99.4%	6,371	99.4%	99.6%	1,179	0.9%	99.4%
5 to 6	7,868	0.3%	99.8%	2,222	99.8%	99.9%	549	0.4%	99.8%
6 to 7	2,755	0.1%	99.9%	792	99.9%	99.9%	165	0.1%	99.9%
7 to 8	1,238	0.1%	100.0%	333	100.0%	100.0%	78	0.1%	100.0%



8 to 9	616	0.0%	100.0%	122	0.0%	100.0%	38	0.0%	100.0%
9 to 10	250	0.0%	100.0%	60	0.0%	100.0%	15	0.0%	100.0%
10 to 11	150	0.0%	100.0%	29	0.0%	100.0%	8	0.0%	100.0%
11 to 12	51	0.0%	100.0%	6	0.0%	100.0%	5	0.0%	100.0%
12 to 13	15	0.0%	100.0%	5	0.0%	100.0%	0	0.0%	100.0%
13 to 14	7	0.0%	100.0%	1	0.0%	100.0%	0	0.0%	100.0%
14 to 15	2	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
15 to 16	1	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
Total	2,320,940	100.0%		902,442	100.0%		137,168	100.0%	

Table C-9

DISTRIBUTION OF POWER

By Vehicle Type

Baltimore 3-Parameter Vehicles

Power (mph <sup>2</sup> /s)	Luxury/Sedan/Station Wagon			Pickup/Van/Utility			Sports Car/High Performance		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 20	325,441	33.7%	33.7%	133,476	34.6%	34.6%	18,808	34.0%	34.0%
20 - 40	210,973	21.8%	55.5%	85,127	22.0%	56.6%	11,900	21.5%	55.4%
40 - 60	148,490	15.4%	70.9%	58,750	15.2%	71.8%	8,385	15.1%	70.6%
60 - 80	102,696	10.6%	81.5%	40,694	10.5%	82.3%	5,690	10.3%	80.9%
80 - 100	70,399	7.3%	88.8%	26,448	6.8%	89.2%	3,595	6.5%	87.4%
100 - 120	45,411	4.7%	93.5%	16,455	4.3%	93.4%	2,304	4.2%	91.5%
120 - 140	27,320	2.8%	96.3%	9,979	2.6%	96.0%	1,565	2.8%	94.3%
140 - 160	15,739	1.6%	98.0%	6,033	1.6%	97.6%	954	1.7%	96.1%
160 - 180	8,750	0.9%	98.9%	3,681	1.0%	98.5%	668	1.2%	97.3%
180 - 200	4,728	0.5%	99.4%	2,193	0.6%	99.1%	465	0.8%	98.1%
200 - 220	2,578	0.3%	99.6%	1,362	0.4%	99.5%	366	0.7%	98.8%
220 - 240	1,569	0.2%	99.8%	760	0.2%	99.6%	237	0.4%	99.2%
240 - 260	895	0.1%	99.9%	485	0.1%	99.8%	185	0.3%	99.5%
260 - 280	592	0.1%	99.9%	326	0.1%	99.9%	105	0.2%	99.7%
280 - 300	282	0.0%	100.0%	204	0.1%	99.9%	96	0.2%	99.9%
300 - 320	146	0.0%	100.0%	131	0.0%	99.9%	25	0.0%	99.9%
320 - 340	72	0.0%	100.0%	96	0.0%	100.0%	19	0.0%	100.0%
340 - 360	39	0.0%	100.0%	56	0.0%	100.0%	8	0.0%	100.0%
360 - 380	43	0.0%	100.0%	27	0.0%	100.0%	2	0.0%	100.0%
380 - 400	24	0.0%	100.0%	15	0.0%	100.0%	3	0.0%	100.0%
400 - 420	9	0.0%	100.0%	10	0.0%	100.0%	1	0.0%	100.0%
420 - 440	5	0.0%	100.0%	3	0.0%	100.0%	0	0.0%	100.0%
440 - 460	4	0.0%	100.0%	3	0.0%	100.0%	0	0.0%	100.0%
460 - 480	7	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
480 - 500	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
500 - 520	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
520 - 540	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
540 - 560	1	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%

Total	966,213	100.0%	386,314	100.0%	55,381	100.0%
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Table C-10

SUMMARY STATISTICS BY VEHICLE AGE  
 Baltimore 3-Parameter Vehicles

	Speed (mph)	
	MY 75-82	MY 83-92
Mean	21.15	25.10
St Dev	19.20	20.69
Max	81.15	94.46
Min	0.00	0.00
Count	513,342	2,852,162

	Accel (mph/sec)	
	MY 75-82	MY 83-92
Mean	0.00	0.00
St Dev	1.53	1.49
Max	15.19	14.88
Min	-19.49	-14.70
Count	512,438	2,848,112

	Power (mph <sup>2</sup> /sec)	
	MY 75-82	MY 83-92
Mean	45.22	46.15
St Dev	42.08	43.11
Max	379.87	557.69
Min	0.00	0.00
Count	207,215	1,200,693

Table C-11

DISTRIBUTION OF SPEED  
By Vehicle Age  
Baltimore 3-Parameter Vehicles

Speed (mph)	Model Year 75 - 82			Model Year 83 - 92		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 0	124,485	24.2%	24.2%	586,405	20.6%	20.6%
0 - 5	37,962	7.4%	31.6%	169,736	6.0%	26.5%
5 - 10	31,840	6.2%	37.8%	149,602	5.2%	31.8%
10 - 15	33,343	6.5%	44.3%	168,365	5.9%	37.7%
15 - 20	34,553	6.7%	51.1%	174,867	6.1%	43.8%
20 - 25	38,127	7.4%	58.5%	193,790	6.8%	50.6%
25 - 30	43,822	8.5%	67.0%	236,218	8.3%	58.9%
30 - 35	45,369	8.8%	75.9%	263,152	9.2%	68.1%
35 - 40	36,979	7.2%	83.1%	216,702	7.6%	75.7%
40 - 45	21,391	4.2%	87.2%	151,714	5.3%	81.0%
45 - 50	14,900	2.9%	90.1%	110,394	3.9%	84.9%
50 - 55	12,931	2.5%	92.7%	108,073	3.8%	88.7%
55 - 60	15,795	3.1%	95.7%	131,603	4.6%	93.3%
60 - 65	15,861	3.1%	98.8%	110,056	3.9%	97.1%
65 - 70	5,384	1.0%	99.9%	61,442	2.2%	99.3%
70 - 75	580	0.1%	100.0%	16,905	0.6%	99.9%
75 - 80	18	0.0%	100.0%	2,785	0.1%	100.0%
80 - 85	2	0.0%	100.0%	251	0.0%	100.0%
85 - 90	0	0.0%	100.0%	91	0.0%	100.0%
90 - 95	0	0.0%	100.0%	11	0.0%	100.0%
Total	513,342	100.0%		2,852,162	100.0%	

Table C-12

DISTRIBUTION OF ACCELERATIONS  
By Vehicle Age  
Baltimore 3-Parameter Vehicles

Accel (mph/s)	Model Year 75 - 82			Model Year 83 - 92		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
-20 to -19	1	0.0%	0.0%	0	0.0%	0.0%
-19 to -18	0	0.0%	0.0%	0	0.0%	0.0%
-18 to -17	0	0.0%	0.0%	0	0.0%	0.0%
-17 to -16	0	0.0%	0.0%	0	0.0%	0.0%
-16 to -15	0	0.0%	0.0%	0	0.0%	0.0%
-15 to -14	0	0.0%	0.0%	3	0.0%	0.0%
-14 to -13	1	0.0%	0.0%	1	0.0%	0.0%
-13 to -12	1	0.0%	0.0%	10	0.0%	0.0%
-12 to -11	5	0.0%	0.0%	29	0.0%	0.0%
-11 to -10	7	0.0%	0.0%	37	0.0%	0.0%
-10 to -9	15	0.0%	0.0%	134	0.0%	0.0%
-9 to -8	61	0.0%	0.0%	484	0.0%	0.0%
-8 to -7	222	0.0%	0.1%	1,579	0.1%	0.1%
-7 to -6	825	0.2%	0.2%	4,931	0.2%	0.3%
-6 to -5	2,719	0.5%	0.8%	14,480	0.5%	0.8%
-5 to -4	6,762	1.3%	2.1%	34,813	1.2%	2.0%
-4 to -3	12,546	2.4%	4.5%	63,459	2.2%	4.2%
-3 to -2	19,837	3.9%	8.4%	100,314	3.5%	7.7%
-2 to -1	34,278	6.7%	15.1%	184,758	6.5%	14.2%
-1 to 0	105,514	20.6%	35.7%	662,278	23.3%	37.5%
0	122,429	23.9%	59.6%	580,109	20.4%	57.8%
0 to 1	125,325	24.5%	84.0%	774,470	27.2%	85.0%
1 to 2	42,420	8.3%	92.3%	224,935	7.9%	92.9%
2 to 3	21,687	4.2%	96.5%	111,900	3.9%	96.9%
3 to 4	10,651	2.1%	98.6%	51,764	1.8%	98.7%
4 to 5	4,677	0.9%	99.5%	22,698	0.8%	99.5%
5 to 6	1,602	0.3%	99.8%	9,037	0.3%	99.8%
6 to 7	532	0.1%	99.9%	3,180	0.1%	99.9%
7 to 8	184	0.0%	100.0%	1,465	0.1%	100.0%
8 to 9	89	0.0%	100.0%	687	0.0%	100.0%
9 to 10	22	0.0%	100.0%	303	0.0%	100.0%
10 to 11	19	0.0%	100.0%	168	0.0%	100.0%
11 to 12	4	0.0%	100.0%	58	0.0%	100.0%
12 to 13	2	0.0%	100.0%	18	0.0%	100.0%
13 to 14	0	0.0%	100.0%	8	0.0%	100.0%
14 to 15	0	0.0%	100.0%	2	0.0%	100.0%
15 to 16	1	0.0%	100.0%	0	0.0%	100.0%
Total	512,438	100.0%		2,848,112	100.0%	

Table C-13

DISTRIBUTION OF POWER  
By Vehicle Age  
Baltimore 3-Parameter Vehicles

Power (mph <sup>2</sup> /s)	Model Year 75 - 82			Model Year 83 - 92		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 20	72,234	34.9%	34.9%	405,491	33.8%	33.8%
20 - 40	44,243	21.4%	56.2%	263,757	22.0%	55.7%
40 - 60	31,423	15.2%	71.4%	184,202	15.3%	71.1%
60 - 80	21,785	10.5%	81.9%	127,295	10.6%	81.7%
80 - 100	14,979	7.2%	89.1%	85,463	7.1%	88.8%
100 - 120	9,427	4.5%	93.7%	54,743	4.6%	93.4%
120 - 140	5,694	2.7%	96.4%	33,170	2.8%	96.1%
140 - 160	3,255	1.6%	98.0%	19,471	1.6%	97.7%
160 - 180	1,846	0.9%	98.9%	11,253	0.9%	98.7%
180 - 200	1,059	0.5%	99.4%	6,327	0.5%	99.2%
200 - 220	566	0.3%	99.7%	3,740	0.3%	99.5%
220 - 240	319	0.2%	99.8%	2,247	0.2%	99.7%
240 - 260	190	0.1%	99.9%	1,375	0.1%	99.8%
260 - 280	119	0.1%	100.0%	904	0.1%	99.9%
280 - 300	52	0.0%	100.0%	530	0.0%	99.9%
300 - 320	14	0.0%	100.0%	288	0.0%	100.0%
320 - 340	7	0.0%	100.0%	180	0.0%	100.0%
340 - 360	1	0.0%	100.0%	102	0.0%	100.0%
360 - 380	2	0.0%	100.0%	70	0.0%	100.0%
380 - 400	0	0.0%	100.0%	42	0.0%	100.0%
400 - 420	0	0.0%	100.0%	20	0.0%	100.0%
420 - 440	0	0.0%	100.0%	8	0.0%	100.0%
440 - 460	0	0.0%	100.0%	7	0.0%	100.0%
460 - 480	0	0.0%	100.0%	7	0.0%	100.0%
480 - 500	0	0.0%	100.0%	0	0.0%	100.0%
500 - 520	0	0.0%	100.0%	0	0.0%	100.0%
520 - 540	0	0.0%	100.0%	0	0.0%	100.0%
540 - 560	0	0.0%	100.0%	1	0.0%	100.0%
Total	207,215	100.0%		1,200,693	100.0%	

Table C-14

SUMMARY STATISTICS

BY TIME OF DAY

Baltimore 3-Parameter Data

	Speed (mph)				
	1-6 AM	6-9 AM	9AM-4PM	4-7 PM	7PM-1AM
Mean	24.80	25.42	24.59	22.98	25.43
St Dev	20.15	21.44	20.77	19.44	20.26
Max	72.36	83.72	94.46	80.61	89.43
Min	0.00	0.00	0.00	0.00	0.00
Count	84,906	538,780	1,488,941	746,958	505,919

	Accel (mph/sec)				
	1-6 AM	6-9 AM	9AM-4PM	4-7 PM	7PM-1AM
Mean	0.00	0.00	0.00	0.00	0.00
St Dev	1.53	1.45	1.51	1.51	1.47
Max	13.78	12.89	15.19	13.96	13.92
Min	-14.70	-19.49	-12.64	-11.88	-13.31
Count	84,796	538,163	1,486,519	745,870	505,202

	Power (mph <sup>2</sup> /sec)				
	1-6 AM	6-9 AM	9AM-4PM	4-7 PM	7PM-1AM
Mean	47.24	47.65	45.89	46.15	44.30
St Dev	45.26	43.50	42.79	42.91	42.52
Max	469.68	448.12	557.69	426.85	479.82
Min	0.00	0.00	0.00	0.00	0.00
Count	35,328	221,077	629,305	309,734	212,464



Table C-15

## DISTRIBUTION OF SPEED

By Time of Day

Baltimore 3-Parameter Vehicles

Speed (mph)	1-6 AM			6-9 AM			9AM-4PM			4-7 PM			7PM-1AM		
	Count	Percent	Cumulative	Count	Percent	Cumulative	Count	Percent	Cumulative	Count	Percent	Cumulative	Count	Percent	Cumulative
0 - 0	19,708	23.2%	23.2%	123,210	22.9%	22.9%	306,192	20.6%	20.6%	160,851	21.5%	21.5%	100,929	19.9%	19.9%
0 - 5	3,727	4.4%	27.6%	27,882	5.2%	28.0%	96,627	6.5%	27.1%	50,314	6.7%	28.3%	29,148	5.8%	25.7%
5 - 10	3,635	4.3%	31.9%	23,614	4.4%	32.4%	86,922	5.8%	32.9%	42,249	5.7%	33.9%	25,022	4.9%	30.7%
10 - 15	4,290	5.1%	36.9%	28,675	5.3%	37.7%	93,016	6.2%	39.1%	46,933	6.3%	40.2%	28,794	5.7%	36.3%
15 - 20	4,847	5.7%	42.6%	31,856	5.9%	43.7%	93,790	6.3%	45.4%	48,462	6.5%	46.7%	30,465	6.0%	42.4%
20 - 25	5,358	6.3%	49.0%	36,204	6.7%	50.4%	101,245	6.8%	52.2%	54,630	7.3%	54.0%	34,480	6.8%	49.2%
25 - 30	6,681	7.9%	56.8%	45,431	8.4%	58.8%	119,989	8.1%	60.3%	66,356	8.9%	62.9%	41,583	8.2%	57.4%
30 - 35	9,345	11.0%	67.8%	46,115	8.6%	67.4%	134,652	9.0%	69.3%	71,952	9.6%	72.5%	46,457	9.2%	66.6%
35 - 40	7,764	9.1%	77.0%	37,199	6.9%	74.3%	110,290	7.4%	76.7%	57,225	7.7%	80.2%	41,203	8.1%	74.7%
40 - 45	4,618	5.4%	82.4%	29,265	5.4%	79.7%	73,465	4.9%	81.7%	37,864	5.1%	85.3%	27,893	5.5%	80.2%
45 - 50	3,521	4.1%	86.6%	20,850	3.9%	83.6%	51,284	3.4%	85.1%	27,817	3.7%	89.0%	21,822	4.3%	84.6%
50 - 55	3,189	3.8%	90.3%	18,851	3.5%	87.1%	51,007	3.4%	88.6%	23,394	3.1%	92.1%	24,563	4.9%	89.4%
55 - 60	3,618	4.3%	94.6%	22,605	4.2%	91.3%	67,233	4.5%	93.1%	25,703	3.4%	95.6%	28,239	5.6%	95.0%
60 - 65	3,341	3.9%	98.5%	25,537	4.7%	96.0%	55,624	3.7%	96.8%	21,864	2.9%	98.5%	19,551	3.9%	98.9%
65 - 70	1,194	1.4%	99.9%	17,491	3.2%	99.3%	33,664	2.3%	99.1%	9,919	1.3%	99.8%	4,558	0.9%	99.8%
70 - 75	70	0.1%	100.0%	3,617	0.7%	99.9%	11,643	0.8%	99.8%	1,307	0.2%	100.0%	848	0.2%	99.9%
75 - 80	0	0.0%	100.0%	371	0.1%	100.0%	2,076	0.1%	100.0%	115	0.0%	100.0%	241	0.0%	100.0%
80 - 85	0	0.0%	100.0%	7	0.0%	100.0%	158	0.0%	100.0%	3	0.0%	100.0%	85	0.0%	100.0%
85 - 90	0	0.0%	100.0%	0	0.0%	100.0%	53	0.0%	100.0%	0	0.0%	100.0%	38	0.0%	100.0%
90 - 95	0	0.0%	100.0%	0	0.0%	100.0%	11	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
Total	84,906	100.0%		538,780	100.0%		1,488,941	100.0%		746,958	100.0%		505,919	100.0%	

Table C-16

DISTRIBUTION OF ACCELERATIONS  
By Time of Day  
Baltimore 3-Parameter Vehicles

Accel (mph/s)	1-6 AM			6-9 AM			9AM-4PM			4-7 PM			7PM-1AM		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
-20 to -19	0	0.0%	0.0%	1	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-19 to -18	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%
-18 to -17	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%
-17 to -16	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%
-16 to -15	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%
-15 to -14	2	0.0%	0.0%	1	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%
-14 to -13	1	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	0	0.0%	0.0%	1	0.0%	0.0%
-13 to -12	6	0.0%	0.0%	0	0.0%	0.0%	2	0.0%	0.0%	0	0.0%	0.0%	3	0.0%	0.0%
-12 to -11	5	0.0%	0.0%	7	0.0%	0.0%	13	0.0%	0.0%	7	0.0%	0.0%	2	0.0%	0.0%
-11 to -10	5	0.0%	0.0%	8	0.0%	0.0%	18	0.0%	0.0%	3	0.0%	0.0%	10	0.0%	0.0%
-10 to -9	16	0.0%	0.0%	14	0.0%	0.0%	70	0.0%	0.0%	24	0.0%	0.0%	25	0.0%	0.0%
-9 to -8	34	0.0%	0.1%	73	0.0%	0.0%	251	0.0%	0.0%	92	0.0%	0.0%	95	0.0%	0.0%
-8 to -7	92	0.1%	0.2%	244	0.0%	0.1%	849	0.1%	0.1%	358	0.0%	0.1%	258	0.1%	0.1%
-7 to -6	184	0.2%	0.4%	902	0.2%	0.2%	2,614	0.2%	0.3%	1,214	0.2%	0.2%	842	0.2%	0.2%
-6 to -5	515	0.6%	1.0%	2,745	0.5%	0.7%	7,860	0.5%	0.8%	3,654	0.5%	0.7%	2,425	0.5%	0.7%
-5 to -4	1,152	1.4%	2.4%	6,353	1.2%	1.9%	18,900	1.3%	2.1%	9,166	1.2%	1.9%	6,004	1.2%	1.9%
-4 to -3	1,875	2.2%	4.6%	11,532	4.1%	4.1%	34,213	2.3%	4.4%	17,305	2.3%	4.3%	11,080	2.2%	4.1%
-3 to -2	2,789	3.3%	7.9%	17,815	3.3%	7.4%	54,194	3.6%	8.0%	28,057	3.8%	8.0%	17,296	3.4%	7.5%
-2 to -1	4,580	5.4%	13.3%	33,390	6.2%	13.6%	97,880	6.6%	14.6%	52,234	7.0%	15.0%	30,952	6.1%	13.7%
-1 to 0	18,514	21.8%	35.1%	121,277	22.5%	36.1%	339,237	22.8%	37.4%	166,236	22.3%	37.3%	122,528	24.3%	37.9%
0	19,698	23.2%	58.3%	122,724	22.8%	58.9%	301,113	20.3%	57.7%	157,786	21.2%	58.5%	101,217	20.0%	57.9%
0 to 1	22,902	27.0%	85.3%	143,179	26.6%	85.5%	400,987	27.0%	84.6%	192,673	25.8%	84.3%	140,054	27.7%	85.7%
1 to 2	6,542	7.7%	93.1%	41,955	7.8%	93.3%	119,962	8.1%	92.7%	61,944	8.3%	92.6%	36,952	7.3%	93.0%
2 to 3	3,222	3.8%	96.9%	20,385	3.8%	97.1%	60,144	4.0%	96.8%	30,461	4.1%	96.7%	19,375	3.8%	96.8%
3 to 4	1,485	1.8%	98.6%	9,209	1.7%	98.8%	28,070	1.9%	98.6%	14,233	1.9%	98.6%	9,418	1.9%	98.7%
4 to 5	716	0.8%	99.5%	3,941	0.7%	99.6%	12,191	0.8%	99.5%	6,445	0.9%	99.5%	4,082	0.8%	99.5%
5 to 6	292	0.3%	99.8%	1,445	0.3%	99.8%	4,798	0.3%	99.8%	2,490	0.3%	99.8%	1,614	0.3%	99.8%
6 to 7	88	0.1%	99.9%	509	0.1%	99.9%	1,711	0.1%	99.9%	871	0.1%	99.9%	533	0.1%	99.9%
7 to 8	41	0.0%	100.0%	254	0.0%	100.0%	780	0.1%	100.0%	340	0.0%	100.0%	234	0.0%	100.0%
8 to 9	25	0.0%	100.0%	118	0.0%	100.0%	377	0.0%	100.0%	149	0.0%	100.0%	107	0.0%	100.0%
9 to 10	6	0.0%	100.0%	53	0.0%	100.0%	151	0.0%	100.0%	61	0.0%	100.0%	54	0.0%	100.0%
10 to 11	2	0.0%	100.0%	21	0.0%	100.0%	91	0.0%	100.0%	47	0.0%	100.0%	26	0.0%	100.0%
11 to 12	2	0.0%	100.0%	5	0.0%	100.0%	30	0.0%	100.0%	15	0.0%	100.0%	10	0.0%	100.0%
12 to 13	3	0.0%	100.0%	3	0.0%	100.0%	8	0.0%	100.0%	2	0.0%	100.0%	4	0.0%	100.0%
13 to 14	2	0.0%	100.0%	0	0.0%	100.0%	2	0.0%	100.0%	3	0.0%	100.0%	1	0.0%	100.0%
14 to 15	0	0.0%	100.0%	0	0.0%	100.0%	2	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
15 to 16	0	0.0%	100.0%	0	0.0%	100.0%	1	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
Total	84,796	100.0%	100.0%	538,163	100.0%	100.0%	1,486,519	100.0%	100.0%	745,870	100.0%	100.0%	505,202	100.0%	100.0%

Table C-17

DISTRIBUTION OF POWER  
By Time of Day  
Baltimore 3-Parameter Vehicles

Power (mph <sup>2</sup> /s)	1-6 AM			6-9 AM			9AM-4PM			4-7 PM			7PM-1AM		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 20	11,836	33.5%	33.5%	70,364	31.8%	31.8%	214,434	34.1%	34.1%	104,811	33.8%	33.8%	76,280	35.9%	35.9%
20 - 40	7,701	21.8%	55.3%	49,311	22.3%	54.1%	137,141	21.8%	55.9%	66,535	21.5%	55.3%	47,312	22.3%	58.2%
40 - 60	5,276	14.9%	70.2%	34,795	15.7%	69.9%	96,308	15.3%	71.2%	47,688	15.4%	70.7%	31,558	14.9%	73.0%
60 - 80	3,718	10.5%	80.8%	24,400	11.0%	80.9%	66,446	10.6%	81.7%	33,697	10.9%	81.6%	20,819	9.8%	82.8%
80 - 100	2,731	7.7%	88.5%	16,249	7.3%	88.3%	44,986	7.1%	88.9%	22,368	7.2%	88.8%	14,108	6.6%	89.5%
100 - 120	1,815	5.1%	93.6%	10,478	4.7%	93.0%	28,242	4.5%	93.4%	14,543	4.7%	93.5%	9,092	4.3%	93.7%
120 - 140	906	2.6%	96.2%	6,402	2.9%	95.9%	17,516	2.8%	96.1%	8,515	2.7%	96.3%	5,525	2.6%	96.3%
140 - 160	527	1.5%	97.7%	3,778	1.7%	97.6%	10,333	1.6%	97.8%	4,843	1.6%	97.8%	3,245	1.5%	97.9%
160 - 180	244	0.7%	98.4%	2,179	1.0%	98.6%	6,001	1.0%	98.7%	2,833	0.9%	98.7%	1,842	0.9%	98.7%
180 - 200	143	0.4%	98.8%	1,260	0.6%	99.2%	3,364	0.5%	99.3%	1,571	0.5%	99.2%	1,048	0.5%	99.2%
200 - 220	117	0.3%	99.1%	754	0.3%	99.5%	1,900	0.3%	99.6%	882	0.3%	99.5%	653	0.3%	99.5%
220 - 240	88	0.2%	99.4%	424	0.2%	99.7%	1,094	0.2%	99.8%	563	0.2%	99.7%	397	0.2%	99.7%
240 - 260	63	0.2%	99.5%	248	0.1%	99.8%	656	0.1%	99.9%	356	0.1%	99.8%	242	0.1%	99.8%
260 - 280	58	0.2%	99.7%	191	0.1%	99.9%	404	0.1%	99.9%	217	0.1%	99.9%	153	0.1%	99.9%
280 - 300	43	0.1%	99.8%	90	0.0%	99.9%	245	0.0%	100.0%	119	0.0%	99.9%	85	0.0%	100.0%
300 - 320	19	0.1%	99.9%	56	0.0%	100.0%	111	0.0%	100.0%	78	0.0%	100.0%	38	0.0%	100.0%
320 - 340	14	0.0%	99.9%	38	0.0%	100.0%	51	0.0%	100.0%	63	0.0%	100.0%	21	0.0%	100.0%
340 - 360	9	0.0%	99.9%	29	0.0%	100.0%	27	0.0%	100.0%	24	0.0%	100.0%	14	0.0%	100.0%
360 - 380	6	0.0%	100.0%	14	0.0%	100.0%	19	0.0%	100.0%	14	0.0%	100.0%	19	0.0%	100.0%
380 - 400	6	0.0%	100.0%	10	0.0%	100.0%	12	0.0%	100.0%	9	0.0%	100.0%	5	0.0%	100.0%
400 - 420	2	0.0%	100.0%	5	0.0%	100.0%	6	0.0%	100.0%	4	0.0%	100.0%	3	0.0%	100.0%
420 - 440	1	0.0%	100.0%	1	0.0%	100.0%	4	0.0%	100.0%	1	0.0%	100.0%	1	0.0%	100.0%
440 - 460	3	0.0%	100.0%	1	0.0%	100.0%	2	0.0%	100.0%	0	0.0%	100.0%	1	0.0%	100.0%
460 - 480	2	0.0%	100.0%	0	0.0%	100.0%	2	0.0%	100.0%	0	0.0%	100.0%	3	0.0%	100.0%
480 - 500	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
500 - 520	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
520 - 540	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
540 - 560	0	0.0%	100.0%	0	0.0%	100.0%	1	0.0%	100.0%	0	0.0%	100.0%	0	0.0%	100.0%
Total	35,328	100.0%		221,077	100.0%		629,305	100.0%		309,734	100.0%		212,464	100.0%	

Table C-18

SUMMARY STATISTICS  
 BY TIME OF WEEK  
 Baltimore 3-Parameter Vehicles

	Speed (mph)	
	Weekday	Weekend
Mean	23.92	26.35
St Dev	20.24	21.29
Max	94.46	83.14
Min	0.00	0.00
Count	2,559,047	806,457

	Accel (mph/sec)	
	Weekday	Weekend
Mean	0.00	0.00
St Dev	1.51	1.47
Max	15.19	14.88
Min	-19.49	-12.82
Count	2,555,267	805,283

	Power (mph <sup>2</sup> /sec)	
	Weekday	Weekend
Mean	46.57	44.30
St Dev	43.40	41.54
Max	557.69	457.01
Min	0.00	0.00
Count	1,064,896	343,012

Table C-19

DISTRIBUTION OF SPEED  
By Time of Week  
Baltimore 3-Parameter Vehicles

Speed (mph)	Weekday			Weekend		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 0	552,407	21.6%	21.6%	158,483	19.7%	19.7%
0 - 5	159,416	6.2%	27.8%	48,282	6.0%	25.6%
5 - 10	139,732	5.5%	33.3%	41,710	5.2%	30.8%
10 - 15	156,539	6.1%	39.4%	45,169	5.6%	36.4%
15 - 20	162,361	6.3%	45.7%	47,059	5.8%	42.2%
20 - 25	179,891	7.0%	52.8%	52,026	6.5%	48.7%
25 - 30	218,756	8.5%	61.3%	61,284	7.6%	56.3%
30 - 35	238,220	9.3%	70.6%	70,301	8.7%	65.0%
35 - 40	193,424	7.6%	78.2%	60,257	7.5%	72.5%
40 - 45	128,989	5.0%	83.2%	44,116	5.5%	78.0%
45 - 50	90,224	3.5%	86.7%	35,070	4.3%	82.3%
50 - 55	87,667	3.4%	90.2%	33,337	4.1%	86.4%
55 - 60	101,185	4.0%	94.1%	46,213	5.7%	92.2%
60 - 65	86,200	3.4%	97.5%	39,717	4.9%	97.1%
65 - 70	49,736	1.9%	99.4%	17,090	2.1%	99.2%
70 - 75	12,457	0.5%	99.9%	5,028	0.6%	99.8%
75 - 80	1,572	0.1%	100.0%	1,231	0.2%	100.0%
80 - 85	169	0.0%	100.0%	84	0.0%	100.0%
85 - 90	91	0.0%	100.0%	0	0.0%	100.0%
90 - 95	11	0.0%	100.0%	0	0.0%	100.0%
Total	2,559,047	100.0%		806,457	100.0%	

Table C-20

DISTRIBUTION OF ACCELERATIONS  
By Time of Week  
Baltimore 3-Parameter Vehicles

Accel (mph/s)	Weekday			Weekend		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
-20 to -19	1	0.0%	0.0%	0	0.0%	0.0%
-19 to -18	0	0.0%	0.0%	0	0.0%	0.0%
-18 to -17	0	0.0%	0.0%	0	0.0%	0.0%
-17 to -16	0	0.0%	0.0%	0	0.0%	0.0%
-16 to -15	0	0.0%	0.0%	0	0.0%	0.0%
-15 to -14	3	0.0%	0.0%	0	0.0%	0.0%
-14 to -13	2	0.0%	0.0%	0	0.0%	0.0%
-13 to -12	6	0.0%	0.0%	5	0.0%	0.0%
-12 to -11	27	0.0%	0.0%	7	0.0%	0.0%
-11 to -10	32	0.0%	0.0%	12	0.0%	0.0%
-10 to -9	110	0.0%	0.0%	39	0.0%	0.0%
-9 to -8	401	0.0%	0.0%	144	0.0%	0.0%
-8 to -7	1355	0.1%	0.1%	446	0.1%	0.1%
-7 to -6	4352	0.2%	0.2%	1,404	0.2%	0.3%
-6 to -5	13146	0.5%	0.8%	4,053	0.5%	0.8%
-5 to -4	31670	1.2%	2.0%	9,905	1.2%	2.0%
-4 to -3	58583	2.3%	4.3%	17,422	2.2%	4.2%
-3 to -2	93303	3.7%	7.9%	26,848	3.3%	7.5%
-2 to -1	170202	6.7%	14.6%	48,834	6.1%	13.6%
-1 to 0	572896	22.4%	37.0%	194,896	24.2%	37.8%
0	544282	21.3%	58.3%	158,256	19.7%	57.4%
0 to 1	672150	26.3%	84.6%	227,645	28.3%	85.7%
1 to 2	207292	8.1%	92.7%	60,063	7.5%	93.1%
2 to 3	103228	4.0%	96.8%	30,359	3.8%	96.9%
3 to 4	47953	1.9%	98.7%	14,462	1.8%	98.7%
4 to 5	20929	0.8%	99.5%	6,446	0.8%	99.5%
5 to 6	8088	0.3%	99.8%	2,551	0.3%	99.8%
6 to 7	2890	0.1%	99.9%	822	0.1%	99.9%
7 to 8	1292	0.1%	100.0%	357	0.0%	100.0%
8 to 9	586	0.0%	100.0%	190	0.0%	100.0%
9 to 10	259	0.0%	100.0%	66	0.0%	100.0%
10 to 11	153	0.0%	100.0%	34	0.0%	100.0%
11 to 12	51	0.0%	100.0%	11	0.0%	100.0%
12 to 13	17	0.0%	100.0%	3	0.0%	100.0%
13 to 14	6	0.0%	100.0%	2	0.0%	100.0%
14 to 15	1	0.0%	100.0%	1	0.0%	100.0%
15 to 16	1	0.0%	100.0%	0	0.0%	100.0%
Total	2,555,267	100.0%		805,283	100.0%	

Table C-21

DISTRIBUTION OF POWER  
By Time of Week  
Baltimore 3-Parameter Vehicles

Power (mph <sup>2</sup> /s)	Weekday			Weekend		
	Count	Percent	Cumulative Percent	Count	Percent	Cumulative Percent
0 - 20	356,443	33.5%	33.5%	121,282	35.4%	35.4%
20 - 40	231,895	21.8%	55.2%	76,105	22.2%	57.5%
40 - 60	164,114	15.4%	70.7%	51,511	15.0%	72.6%
60 - 80	114,158	10.7%	81.4%	34,922	10.2%	82.7%
80 - 100	76,923	7.2%	88.6%	23,519	6.9%	89.6%
100 - 120	49,005	4.6%	93.2%	15,165	4.4%	94.0%
120 - 140	29,897	2.8%	96.0%	8,967	2.6%	96.6%
140 - 160	17,704	1.7%	97.7%	5,022	1.5%	98.1%
160 - 180	10,236	1.0%	98.6%	2,863	0.8%	98.9%
180 - 200	5,827	0.5%	99.2%	1,559	0.5%	99.4%
200 - 220	3,461	0.3%	99.5%	845	0.2%	99.6%
220 - 240	2,006	0.2%	99.7%	560	0.2%	99.8%
240 - 260	1,281	0.1%	99.8%	284	0.1%	99.9%
260 - 280	827	0.1%	99.9%	196	0.1%	99.9%
280 - 300	477	0.0%	99.9%	105	0.0%	100.0%
300 - 320	250	0.0%	100.0%	52	0.0%	100.0%
320 - 340	161	0.0%	100.0%	26	0.0%	100.0%
340 - 360	95	0.0%	100.0%	8	0.0%	100.0%
360 - 380	61	0.0%	100.0%	11	0.0%	100.0%
380 - 400	37	0.0%	100.0%	5	0.0%	100.0%
400 - 420	17	0.0%	100.0%	3	0.0%	100.0%
420 - 440	8	0.0%	100.0%	0	0.0%	100.0%
440 - 460	5	0.0%	100.0%	2	0.0%	100.0%
460 - 480	7	0.0%	100.0%	0	0.0%	100.0%
480 - 500	0	0.0%	100.0%	0	0.0%	100.0%
500 - 520	0	0.0%	100.0%	0	0.0%	100.0%
520 - 540	0	0.0%	100.0%	0	0.0%	100.0%
540 - 560	1	0.0%	100.0%	0	0.0%	100.0%
Total	1,064,896	100.0%		343,012	100.0%	

Table C-22

SUMMARY VEHICLE STATISTICS  
ALL BALTIMORE  
Baltimore 3-Parameter Vehicles

	Minutes/Day
Mean	75.15
St Dev	33.78
Max	228.05
Min	17.76
Count	24.50

	Miles/Day
Mean	30.56
St Dev	18.85
Max	105.68
Min	4.77
Count	93.00

	Trips/Day
Mean	6.25
St Dev	2.83
Max	19.91
Min	2.01
Count	93.00

	Stops/Hour
Mean	35.23
St Dev	9.70
Max	70.99
Min	12.97
Count	93.00

Note: Means and standard deviations weighted:  
for per day measures, by number of days  
vehicle was instrumented; for per hour  
measures by number of hours of operation.



Table C-23

SUMMARY VEHICLE STATISTICS  
 BY VEHICLE AGE  
 Baltimore 3-Parameter Vehicles

	Minutes/Day	
	MY 75-82	MY 83-92
Mean	73.08	75.53
St Dev	31.31	34.21
Max	132.72	228.05
Min	27.94	17.76
Count	15.00	78.00

	Miles/Day	
	MY 75-82	MY 83-92
Mean	25.78	31.45
St Dev	15.53	19.27
Max	56.57	105.68
Min	8.72	4.77
Count	15.00	78.00

	Trips/Day	
	MY 75-82	MY 83-92
Mean	6.98	6.11
St Dev	3.12	2.75
Max	13.49	19.91
Min	2.91	2.01
Count	15.00	78.00

	Stops/Hour	
	MY 75-82	MY 83-92
Mean	40.12	34.35
St Dev	8.05	9.71
Max	52.24	70.99
Min	28.49	12.97
Count	15.00	78.00

Note: Means and standard deviations weighted:  
 for per day measures, by number of days  
 vehicle was instrumented; for per hour  
 measures by number of hours of operation.

Table C-24

SUMMARY VEHICLE STATISTICS  
 BY VEHICLE TYPE  
 Baltimore 3-Parameter Vehicles

	Minutes/Day		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	71.21	89.15	68.25
St Dev	29.90	43.46	9.10
Max	173.32	228.05	82.92
Min	17.76	32.93	57.68
Count	68.00	21.00	4.00

	Miles/Day		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	28.47	37.78	28.01
St Dev	17.89	21.19	10.80
Max	105.68	82.70	39.88
Min	4.77	11.66	13.09
Count	68.00	21.00	4.00

	Trips/Day		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	6.04	7.10	5.37
St Dev	2.60	3.51	1.17
Max	15.54	19.91	6.79
Min	2.01	3.51	4.23
Count	68.00	21.00	4.00

	Stops/Hour		
	Luxury/Sedan Station Wagon	Pickup/Van/ Utility	Sports Car/ High Performance
Mean	36.30	32.97	31.89
St Dev	9.89	9.09	6.50
Max	70.99	51.70	38.24
Min	15.30	12.97	21.72
Count	68.00	21.00	4.00

Note: Means and standard deviations weighted: for per day measures, by number of days vehicle was instrumented; for per hour measures by number of hours of operation.

Table C-25

SUMMARY VEHICLE STATISTICS  
 BY TIME OF WEEK  
 Baltimore 3-Parameter Vehicles

	Minutes/Day	
	Weekday	Weekend
Mean	80.14	62.86
St Dev	37.37	45.31
Max	254.45	166.57
Min	11.72	0.00
Count	93.00	91.00

	Miles/Day	
	Weekday	Weekend
Mean	31.90	27.29
St Dev	20.78	24.96
Max	104.76	108.15
Min	2.37	0.00
Count	93.00	91.00

	Trips/Day	
	Weekday	Weekend
Mean	6.69	5.10
St Dev	3.12	3.38
Max	23.20	13.53
Min	1.48	0.00
Count	93.00	91.00

	Stops/Hour	
	Weekday	Weekend
Mean	35.69	33.72
St Dev	10.18	12.09
Max	81.10	100.93
Min	12.76	0.00
Count	93.00	91.00

Note: Means and standard deviations weighted:  
 for per day measures, by number of days  
 vehicle was instrumented; for per hour  
 measures by number of hours of operation.

Appendix D. Baltimore Soak Periods

Table D-1

Soak Time Classes  
3-Parameter Trips

----- SITE=Baltimore -----

Soak Time (minutes)

Time	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0-2	259	5.6	259	5.6
2-4	442	9.5	701	15.1
4-6	263	5.7	964	20.8
6-8	236	5.1	1200	25.9
8-10	148	3.2	1348	29.1
10-20	531	11.5	1879	40.6
20-30	282	6.1	2161	46.7
30-40	210	4.5	2371	51.2
40-50	157	3.4	2528	54.6
50-60	123	2.7	2651	57.2
60-70	96	2.1	2747	59.3
70-80	86	1.9	2833	61.2
80-90	72	1.6	2905	62.7
90-100	76	1.6	2981	64.4
100-200	433	9.3	3414	73.7
200-300	196	4.2	3610	77.9
300-400	106	2.3	3716	80.2
400-500	112	2.4	3828	82.6
500-600	169	3.6	3997	86.3
600-700	98	2.1	4095	88.4
700-800	118	2.5	4213	91.0
800-900	107	2.3	4320	93.3
900-1000	88	1.9	4408	95.2
>1000	224	4.8	4632	100.0

Frequency Missing = 49

Appendix E. Trip Start Driving Behavior

Table E-1

Time to 140° Coolant Temperature  
 (< # of seconds)

TIMECL			Cumulative	
	Frequency	Percent	Frequency	Percent
10	1321	56.6	1321	56.6
20	10	0.4	1331	57.1
30	15	0.6	1346	57.7
40	30	1.3	1376	59.0
50	34	1.5	1410	60.5
60	36	1.6	1446	62.0
70	41	1.8	1487	63.8
80	29	1.2	1516	65.0
90	42	1.8	1558	66.8
100	39	1.7	1597	68.5
110	38	1.6	1635	70.1
120	44	1.9	1679	72.0
130	39	1.7	1718	73.7
140	35	1.5	1753	75.2
150	34	1.5	1787	76.6
160	28	1.2	1815	77.8
170	34	1.5	1849	79.3
180	33	1.4	1882	80.7
190	46	2.0	1928	82.7
200	37	1.6	1965	84.3
210	45	1.9	2010	86.2
220	38	1.6	2048	87.8
230	37	1.6	2085	89.4
240	39	1.7	2124	91.1
250	40	1.7	2164	92.8
260	22	0.9	2186	93.7
270	26	1.1	2212	94.9
280	21	0.9	2233	95.8
290	23	1.0	2256	96.7
300	9	0.4	2265	97.1
310	7	0.3	2272	97.4
320	10	0.4	2282	97.9
330	7	0.3	2289	98.2
340	4	0.2	2293	98.3
350	6	0.3	2299	98.6
360	4	0.2	2303	98.8
370	3	0.1	2306	98.9
380	1	0.0	2307	98.9
390	1	0.0	2308	99.0
410	1	0.0	2309	99.0
420	1	0.0	2310	99.1

430	3	0.1	2313	99.2
460	1	0.0	2314	99.2
490	1	0.0	2315	99.3
610	1	0.0	2316	99.3
690	1	0.0	2317	99.3
710	1	0.0	2318	99.4
800	3	0.1	2321	99.5
810	2	0.1	2323	99.6
990	1	0.0	2324	99.7
1030	1	0.0	2325	99.7
1080	1	0.0	2326	99.7
1180	1	0.0	2327	99.8
1230	1	0.0	2328	99.8
1390	1	0.0	2329	99.9
1470	1	0.0	2330	99.9
1620	1	0.0	2331	100.0
1740	1	0.0	2332	100.0

Table E-2

Time to 140° Coolant Temperature  
 (< # of seconds)

----- TRIPCAT=Cold Start -----

TIMECL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
10	18	5.6	18	5.6
40	1	0.3	19	5.9
50	1	0.3	20	6.3
60	1	0.3	21	6.6
70	2	0.6	23	7.2
80	2	0.6	25	7.8
90	1	0.3	26	8.1
110	3	0.9	29	9.1
130	2	0.6	31	9.7
140	3	0.9	34	10.6
150	5	1.6	39	12.2
160	3	0.9	42	13.1
170	6	1.9	48	15.0
180	5	1.6	53	16.6
190	16	5.0	69	21.6
200	15	4.7	84	26.3
210	20	6.3	104	32.5
220	20	6.3	124	38.8
230	19	5.9	143	44.7
240	23	7.2	166	51.9
250	31	9.7	197	61.6
260	17	5.3	214	66.9
270	21	6.6	235	73.4
280	16	5.0	251	78.4
290	17	5.3	268	83.8
300	8	2.5	276	86.3
310	7	2.2	283	88.4
320	9	2.8	292	91.3
330	6	1.9	298	93.1
340	3	0.9	301	94.1
350	4	1.3	305	95.3
360	1	0.3	306	95.6
370	2	0.6	308	96.3
390	1	0.3	309	96.6
430	1	0.3	310	96.9
490	1	0.3	311	97.2
610	1	0.3	312	97.5
690	1	0.3	313	97.8
800	1	0.3	314	98.1
810	1	0.3	315	98.4
990	1	0.3	316	98.8

1030	1	0.3	317	99.1
1230	1	0.3	318	99.4
1470	1	0.3	319	99.7
1740	1	0.3	320	100.0



Table E-3

Time to 140° Coolant Temperature  
 (< # of seconds)

----- TRIPCAT=Warm Start -----

TIMECL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
10	162	20.7	162	20.7
20	4	0.5	166	21.2
30	9	1.1	175	22.3
40	23	2.9	198	25.3
50	25	3.2	223	28.5
60	23	2.9	246	31.4
70	35	4.5	281	35.9
80	21	2.7	302	38.6
90	37	4.7	339	43.3
100	34	4.3	373	47.6
110	35	4.5	408	52.1
120	43	5.5	451	57.6
130	31	4.0	482	61.6
140	29	3.7	511	65.3
150	26	3.3	537	68.6
160	23	2.9	560	71.5
170	28	3.6	588	75.1
180	26	3.3	614	78.4
190	29	3.7	643	82.1
200	21	2.7	664	84.8
210	25	3.2	689	88.0
220	17	2.2	706	90.2
230	18	2.3	724	92.5
240	16	2.0	740	94.5
250	8	1.0	748	95.5
260	5	0.6	753	96.2
270	5	0.6	758	96.8
280	5	0.6	763	97.4
290	5	0.6	768	98.1
300	1	0.1	769	98.2
320	1	0.1	770	98.3
330	1	0.1	771	98.5
340	1	0.1	772	98.6
350	2	0.3	774	98.9
360	3	0.4	777	99.2
370	1	0.1	778	99.4
380	1	0.1	779	99.5
420	1	0.1	780	99.6
430	1	0.1	781	99.7
810	1	0.1	782	99.9
1620	1	0.1	783	100.0

Table E-4

Time to 140° Coolant Temperature  
 (< # of seconds)

----- TRIPCAT=Hot Start -----

TIMECL	Frequency	Percent	Cumulative Frequency	Cumulative Percent
10	1141	92.8	1141	92.8
20	6	0.5	1147	93.3
30	6	0.5	1153	93.8
40	6	0.5	1159	94.3
50	8	0.7	1167	95.0
60	12	1.0	1179	95.9
70	4	0.3	1183	96.3
80	6	0.5	1189	96.7
90	4	0.3	1193	97.1
100	5	0.4	1198	97.5
120	1	0.1	1199	97.6
130	6	0.5	1205	98.0
140	3	0.2	1208	98.3
150	3	0.2	1211	98.5
160	2	0.2	1213	98.7
180	2	0.2	1215	98.9
190	1	0.1	1216	98.9
200	1	0.1	1217	99.0
220	1	0.1	1218	99.1
250	1	0.1	1219	99.2
290	1	0.1	1220	99.3
410	1	0.1	1221	99.3
430	1	0.1	1222	99.4
460	1	0.1	1223	99.5
710	1	0.1	1224	99.6
800	2	0.2	1225	99.8
1080	1	0.1	1227	99.8
1180	1	0.1	1228	99.9
1390	1	0.1	1229	100.0

Table E-5

Initial Idle (Minutes) Classes during Trip  
 3p Atlanta Entire Trip Statistics

----- TRIPCAT=Warm Start -----

OBS	LOWER	UPPER	COUNT	PERCENT	CUM	DECUM
31	0.040	0.050	317	30.6576	30.66	69.34
32	0.050	0.063	.	0.0000	30.66	69.34
33	0.063	0.080	59	5.7060	36.37	63.63
34	0.080	0.100	107	10.3482	46.72	53.28
35	0.100	0.126	48	4.6422	51.36	48.64
36	0.126	0.159	77	7.4468	58.81	41.19
37	0.159	0.200	93	8.9942	67.80	32.20
38	0.200	0.252	55	5.3191	73.12	26.88
39	0.252	0.318	64	6.1896	79.31	20.69
40	0.318	0.400	52	5.0290	84.34	15.66
41	0.400	0.504	39	3.7718	88.11	11.89
42	0.504	0.634	25	2.4178	90.53	9.47
43	0.634	0.798	23	2.2244	92.75	7.25
44	0.798	1.005	19	1.8375	94.59	5.41
45	1.005	1.265	15	1.4507	96.04	3.96
46	1.265	1.592	16	1.5474	97.59	2.41
47	1.592	2.005	9	0.8704	98.46	1.54
48	2.005	2.524	5	0.4836	98.94	1.06
49	2.524	3.177	.	0.0000	98.94	1.06
50	3.177	4.000	4	0.3868	99.33	0.67
51	4.000	5.036	3	0.2901	99.62	0.38
52	5.036	6.340	1	0.0967	99.72	0.28
53	6.340	7.981	1	0.0967	99.82	0.18
54	7.981	10.048	1	0.0967	99.92	0.08
55	10.048	12.649	.	0.0000	99.92	0.08
56	12.649	15.924	.	0.0000	99.92	0.08
57	15.924	20.047	.	0.0000	99.92	0.08
58	20.047	25.238	1	0.0967	100.02	-0.02
59	25.238	31.773	.	0.0000	100.02	-0.02
60	31.773	40.000	.	0.0000	100.02	-0.02

Table E-6

Initial Idle (Minutes) Classes during Trip  
 3p Atlanta Entire Trip Statistics

----- TRIPCAT=Hot Start -----

OBS	LOWER	UPPER	COUNT	PERCENT	CUM	DECUM
61	0.040	0.050	891	41.0978	41.10	58.90
62	0.050	0.063	.	0.0000	41.10	58.90
63	0.063	0.080	153	7.0572	48.16	51.84
64	0.080	0.100	245	11.3007	59.46	40.54
65	0.100	0.126	108	4.9815	64.44	35.56
66	0.126	0.159	155	7.1494	71.59	28.41
67	0.159	0.200	151	6.9649	78.55	21.45
68	0.200	0.252	117	5.3967	83.95	16.05
69	0.252	0.318	66	3.0443	86.99	13.01
70	0.318	0.400	73	3.3672	90.36	9.64
71	0.400	0.504	52	2.3985	92.76	7.24
72	0.504	0.634	43	1.9834	94.74	5.26
73	0.634	0.798	27	1.2454	95.99	4.01
74	0.798	1.005	22	1.0148	97.00	3.00
75	1.005	1.265	18	0.8303	97.83	2.17
76	1.265	1.592	14	0.6458	98.48	1.52
77	1.592	2.005	10	0.4613	98.94	1.06
78	2.005	2.524	8	0.3690	99.31	0.69
79	2.524	3.177	2	0.0923	99.40	0.60
80	3.177	4.000	5	0.2306	99.63	0.37
81	4.000	5.036	2	0.0923	99.72	0.28
82	5.036	6.340	2	0.0923	99.81	0.19
83	6.340	7.981	.	0.0000	99.81	0.19
84	7.981	10.048	2	0.0923	99.90	0.10
85	10.048	12.649	.	0.0000	99.90	0.10
86	12.649	15.924	.	0.0000	99.90	0.10
87	15.924	20.047	1	0.0461	99.95	0.05
88	20.047	25.238	1	0.0461	100.00	0.00
89	25.238	31.773	.	0.0000	100.00	0.00
90	31.773	40.000	.	0.0000	100.00	0.00

Table E-7

Initial Idle (Minutes) Classes during Trip  
 3p Atlanta Entire Trip Statistics

----- TRIPCAT=Cold Start -----

OBS	LOWER	UPPER	COUNT	PERCENT	CUM	DECUM
1	0.040	0.050	419	20.4092	20.41	79.59
2	0.050	0.063	.	0.0000	20.41	79.59
3	0.063	0.080	83	4.0429	24.45	75.55
4	0.080	0.100	130	6.3322	30.78	69.22
5	0.100	0.126	69	3.3609	34.14	65.86
6	0.126	0.159	126	6.1374	40.28	59.72
7	0.159	0.200	144	7.0141	47.29	52.71
8	0.200	0.252	126	6.1374	53.43	46.57
9	0.252	0.318	105	5.1145	58.54	41.46
10	0.318	0.400	104	5.0658	63.61	36.39
11	0.400	0.504	84	4.0916	67.70	32.30
12	0.504	0.634	92	4.4812	72.18	27.82
13	0.634	0.798	80	3.8967	76.08	23.92
14	0.798	1.005	66	3.2148	79.29	20.71
15	1.005	1.265	67	3.2635	82.55	17.45
16	1.265	1.592	55	2.6790	85.23	14.77
17	1.592	2.005	46	2.2406	87.47	12.53
18	2.005	2.524	54	2.6303	90.10	9.90
19	2.524	3.177	36	1.7535	91.85	8.15
20	3.177	4.000	30	1.4613	93.31	6.69
21	4.000	5.036	22	1.0716	94.38	5.62
22	5.036	6.340	27	1.3151	95.70	4.30
23	6.340	7.981	30	1.4613	97.16	2.84
24	7.981	10.048	23	1.1203	98.28	1.72
25	10.048	12.649	17	0.8281	99.11	0.89
26	12.649	15.924	11	0.5358	99.65	0.35
27	15.924	20.047	6	0.2923	99.94	0.06
28	20.047	25.238	1	0.0487	99.99	0.01
29	25.238	31.773	.	0.0000	99.99	0.01
30	31.773	40.000	.	0.0000	99.99	0.01

Table E-8

Initial Idle (Minutes) Classes during Trip  
 3p Spokane & Baltimore Entire Trip Statistics

----- TRIPCAT=Warm Start -----

OBS	LOWER	UPPER	COUNT	PERCENT	CUM	DECUM
31	0.040	0.050	604	25.3143	25.31	74.69
32	0.050	0.063	.	0.0000	25.31	74.69
33	0.063	0.080	141	5.9095	31.22	68.78
34	0.080	0.100	259	10.8550	42.07	57.93
35	0.100	0.126	100	4.1911	46.26	53.74
36	0.126	0.159	182	7.6278	53.89	46.11
37	0.159	0.200	225	9.4300	63.32	36.68
38	0.200	0.252	142	5.9514	69.27	30.73
39	0.252	0.318	125	5.2389	74.51	25.49
40	0.318	0.400	100	4.1911	78.70	21.30
41	0.400	0.504	89	3.7301	82.43	17.57
42	0.504	0.634	92	3.8558	86.29	13.71
43	0.634	0.798	72	3.0176	89.31	10.69
44	0.798	1.005	56	2.3470	91.66	8.34
45	1.005	1.265	36	1.5088	93.17	6.83
46	1.265	1.592	32	1.3412	94.51	5.49
47	1.592	2.005	28	1.1735	95.68	4.32
48	2.005	2.524	18	0.7544	96.43	3.57
49	2.524	3.177	17	0.7125	97.14	2.86
50	3.177	4.000	16	0.6706	97.81	2.19
51	4.000	5.036	20	0.8382	98.65	1.35
52	5.036	6.340	11	0.4610	99.11	0.89
53	6.340	7.981	11	0.4610	99.57	0.43
54	7.981	10.048	1	0.0419	99.61	0.39
55	10.048	12.649	1	0.0419	99.65	0.35
56	12.649	15.924	5	0.2096	99.86	0.14
57	15.924	20.047	2	0.0838	99.94	0.06
58	20.047	25.238	.	0.0000	99.94	0.06
59	25.238	31.773	.	0.0000	99.94	0.06
60	31.773	40.000	1	0.0419	99.98	0.02

Table E-9

Initial Idle (Minutes) Classes during Trip  
 3p Spokane & Baltimore Entire Trip Statistics

----- TRIPCAT=Hot Start -----

OBS	LOWER	UPPER	COUNT	PERCENT	CUM	DECUM
61	0.040	0.050	1680	36.2225	36.22	63.78
62	0.050	0.063	.	0.0000	36.22	63.78
63	0.063	0.080	346	7.4601	43.68	56.32
64	0.080	0.100	556	11.9879	55.67	44.33
65	0.100	0.126	200	4.3122	59.98	40.02
66	0.126	0.159	334	7.2014	67.18	32.82
67	0.159	0.200	364	7.8482	75.03	24.97
68	0.200	0.252	250	5.3903	80.42	19.58
69	0.252	0.318	207	4.4631	84.88	15.12
70	0.318	0.400	155	3.3420	88.22	11.78
71	0.400	0.504	136	2.9323	91.15	8.85
72	0.504	0.634	94	2.0267	93.18	6.82
73	0.634	0.798	65	1.4015	94.58	5.42
74	0.798	1.005	71	1.5308	96.11	3.89
75	1.005	1.265	44	0.9487	97.06	2.94
76	1.265	1.592	39	0.8409	97.90	2.10
77	1.592	2.005	19	0.4097	98.31	1.69
78	2.005	2.524	23	0.4959	98.81	1.19
79	2.524	3.177	12	0.2587	99.07	0.93
80	3.177	4.000	12	0.2587	99.33	0.67
81	4.000	5.036	12	0.2587	99.59	0.41
82	5.036	6.340	2	0.0431	99.63	0.37
83	6.340	7.981	5	0.1078	99.74	0.26
84	7.981	10.048	5	0.1078	99.85	0.15
85	10.048	12.649	5	0.1078	99.96	0.04
86	12.649	15.924	2	0.0431	100.00	0.00
87	15.924	20.047	.	0.0000	100.00	0.00
88	20.047	25.238	.	0.0000	100.00	0.00
89	25.238	31.773	.	0.0000	100.00	0.00
90	31.773	40.000	.	0.0000	100.00	0.00

Table E-10

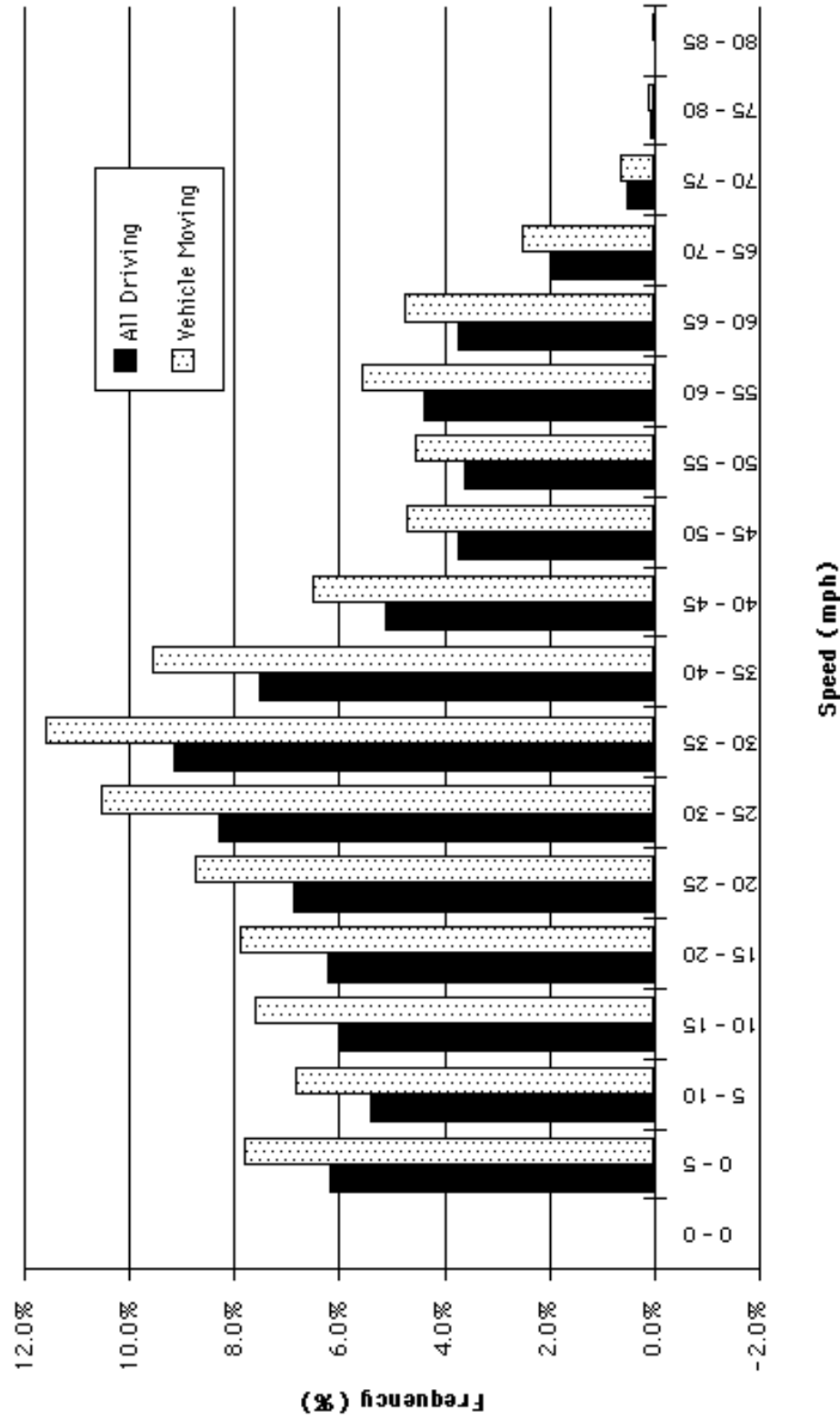
Initial Idle (Minutes) Classes during Trip  
 3p Spokane & Baltimore Entire Trip Statistics

----- TRIPCAT=Cold Start -----

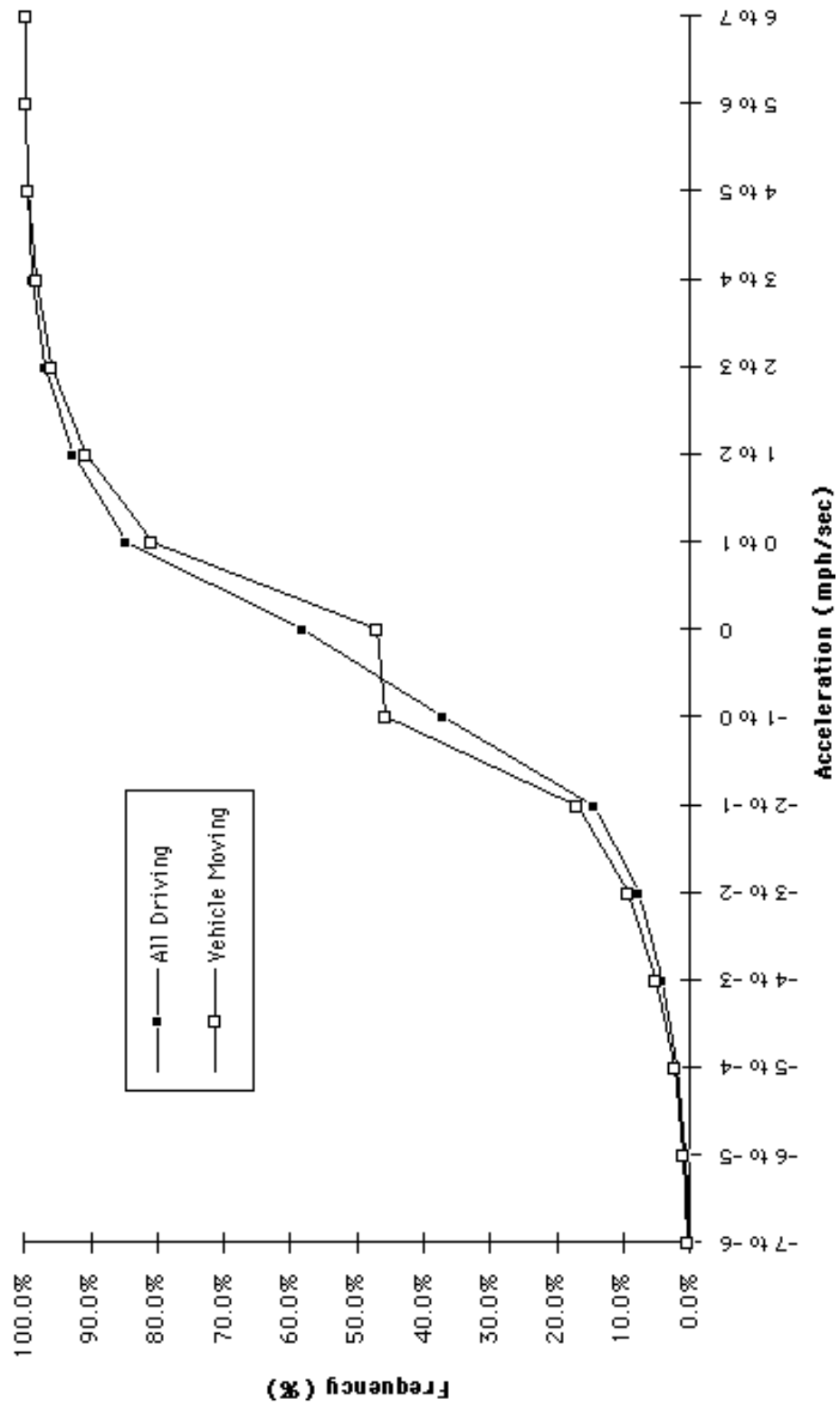
OBS	LOWER	UPPER	COUNT	PERCENT	CUM	DECUM
1	0.040	0.050	169	22.3545	22.35	77.65
2	0.050	0.063	.	0.0000	22.35	77.65
3	0.063	0.080	51	6.7460	29.10	70.90
4	0.080	0.100	71	9.3915	38.49	61.51
5	0.100	0.126	34	4.4974	42.99	57.01
6	0.126	0.159	60	7.9365	50.93	49.07
7	0.159	0.200	61	8.0688	59.00	41.00
8	0.200	0.252	36	4.7619	63.76	36.24
9	0.252	0.318	51	6.7460	70.51	29.49
10	0.318	0.400	38	5.0265	75.54	24.46
11	0.400	0.504	36	4.7619	80.30	19.70
12	0.504	0.634	34	4.4974	84.80	15.20
13	0.634	0.798	24	3.1746	87.97	12.03
14	0.798	1.005	27	3.5714	91.54	8.46
15	1.005	1.265	12	1.5873	93.13	6.87
16	1.265	1.592	9	1.1905	94.32	5.68
17	1.592	2.005	9	1.1905	95.51	4.49
18	2.005	2.524	8	1.0582	96.57	3.43
19	2.524	3.177	5	0.6614	97.23	2.77
20	3.177	4.000	2	0.2646	97.49	2.51
21	4.000	5.036	8	1.0582	98.55	1.45
22	5.036	6.340	4	0.5291	99.08	0.92
23	6.340	7.981	4	0.5291	99.61	0.39
24	7.981	10.048	1	0.1323	99.74	0.26
25	10.048	12.649	2	0.2646	100.00	0.00
26	12.649	15.924	.	0.0000	100.00	0.00
27	15.924	20.047	.	0.0000	100.00	0.00
28	20.047	25.238	.	0.0000	100.00	0.00
29	25.238	31.773	.	0.0000	100.00	0.00
30	31.773	40.000	.	0.0000	100.00	0.00



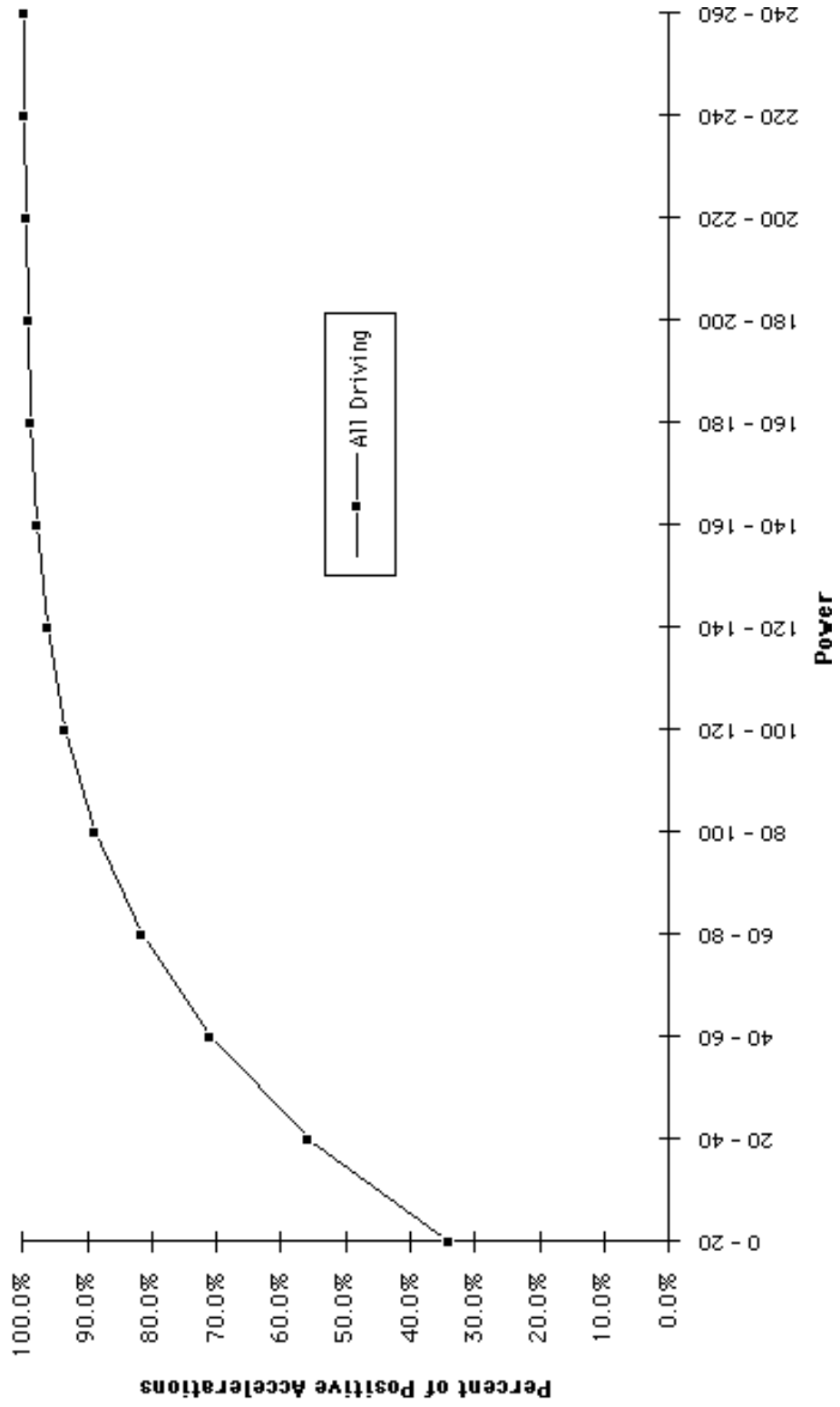
**Figure C-1**  
**Distribution of Speed: All Driving and Vehicle Moving**  
**Baltimore 3-Parameter Vehicles**



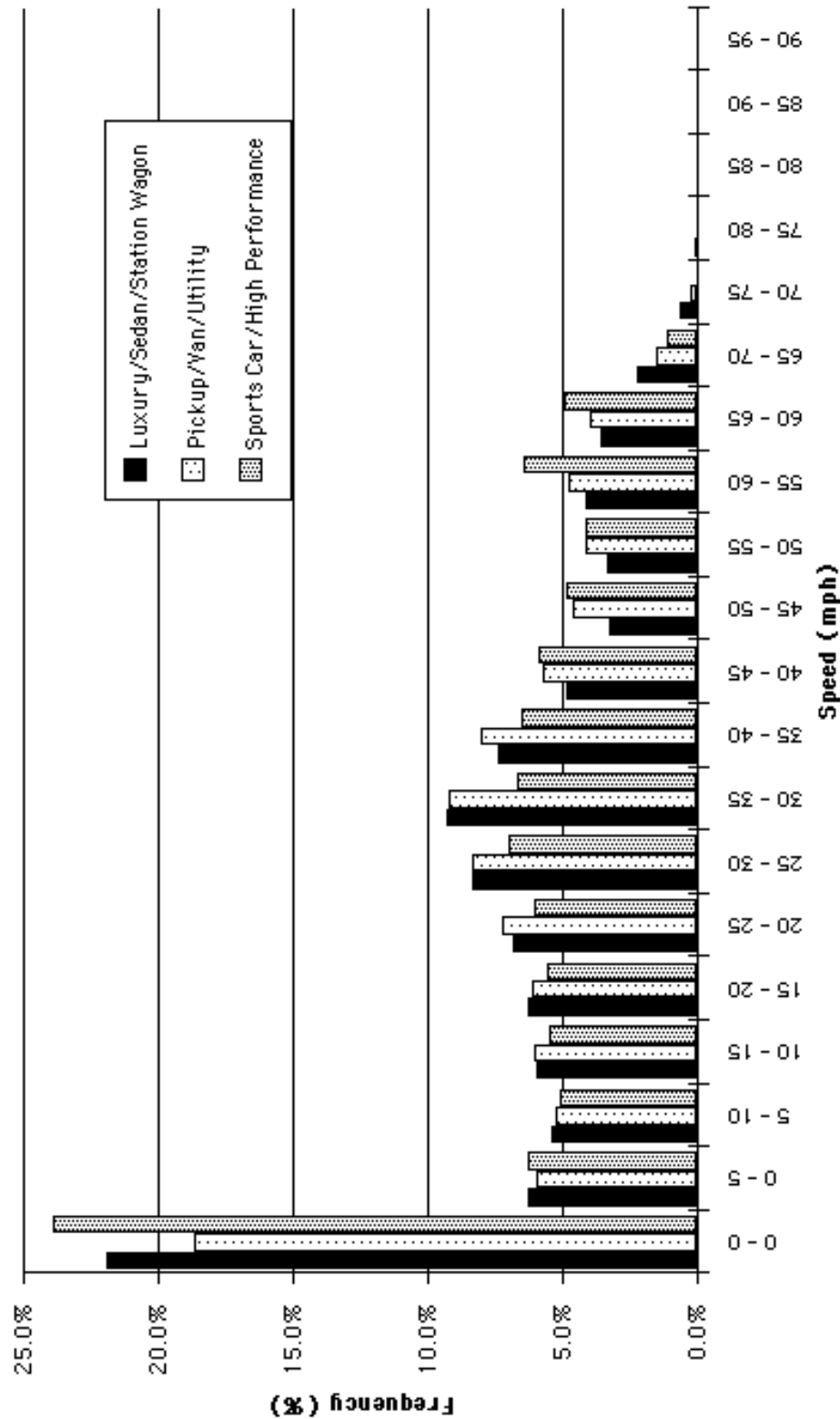
**Figure C-2**  
**Cumulative Distribution of Acceleration: All Driving and Vehicle Moving**  
**Baltimore 3-Parameter Vehicles**



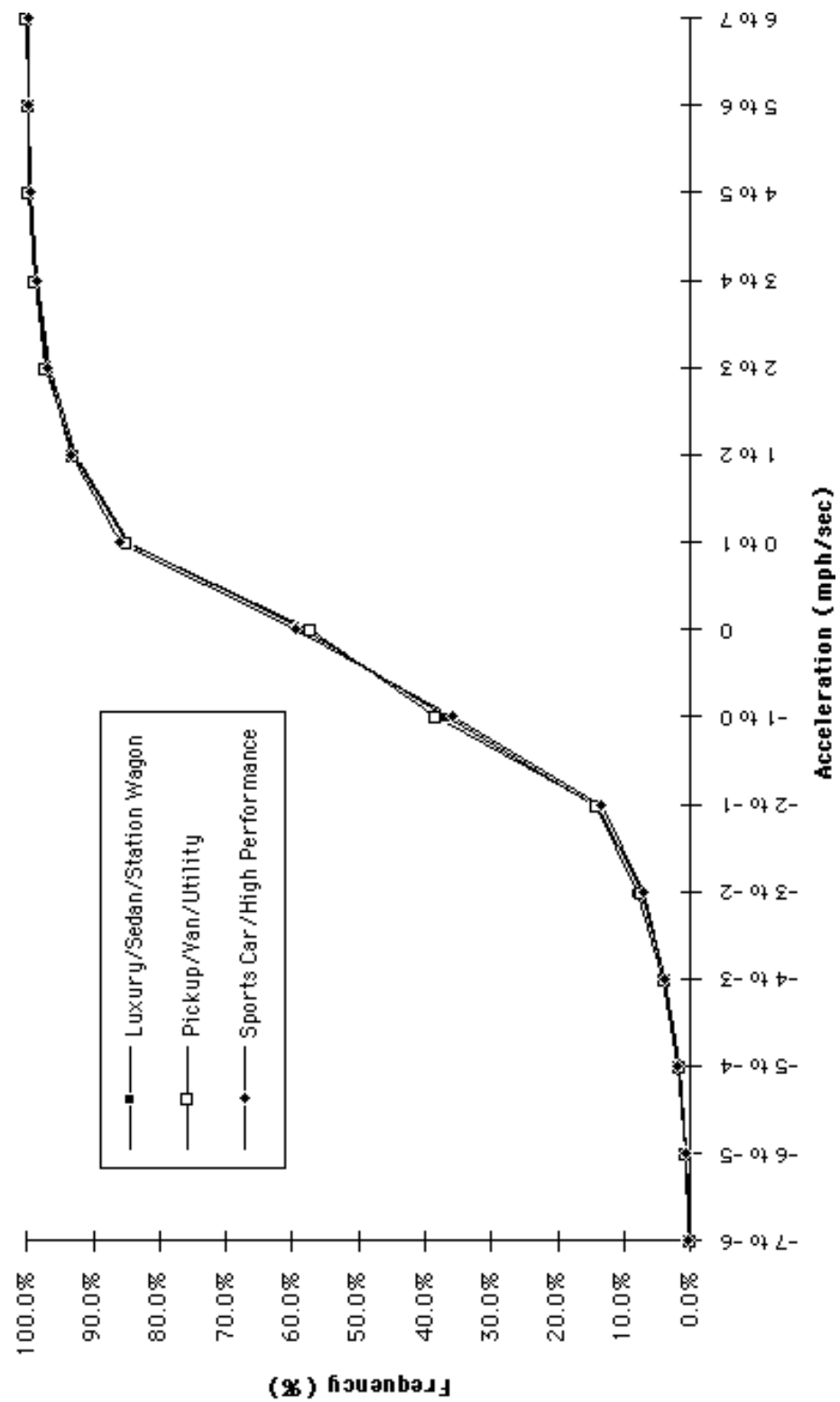
**Figure C-3**  
**Cumulative Distribution of Power: All Driving**  
**Baltimore 3-Parameter Vehicles**



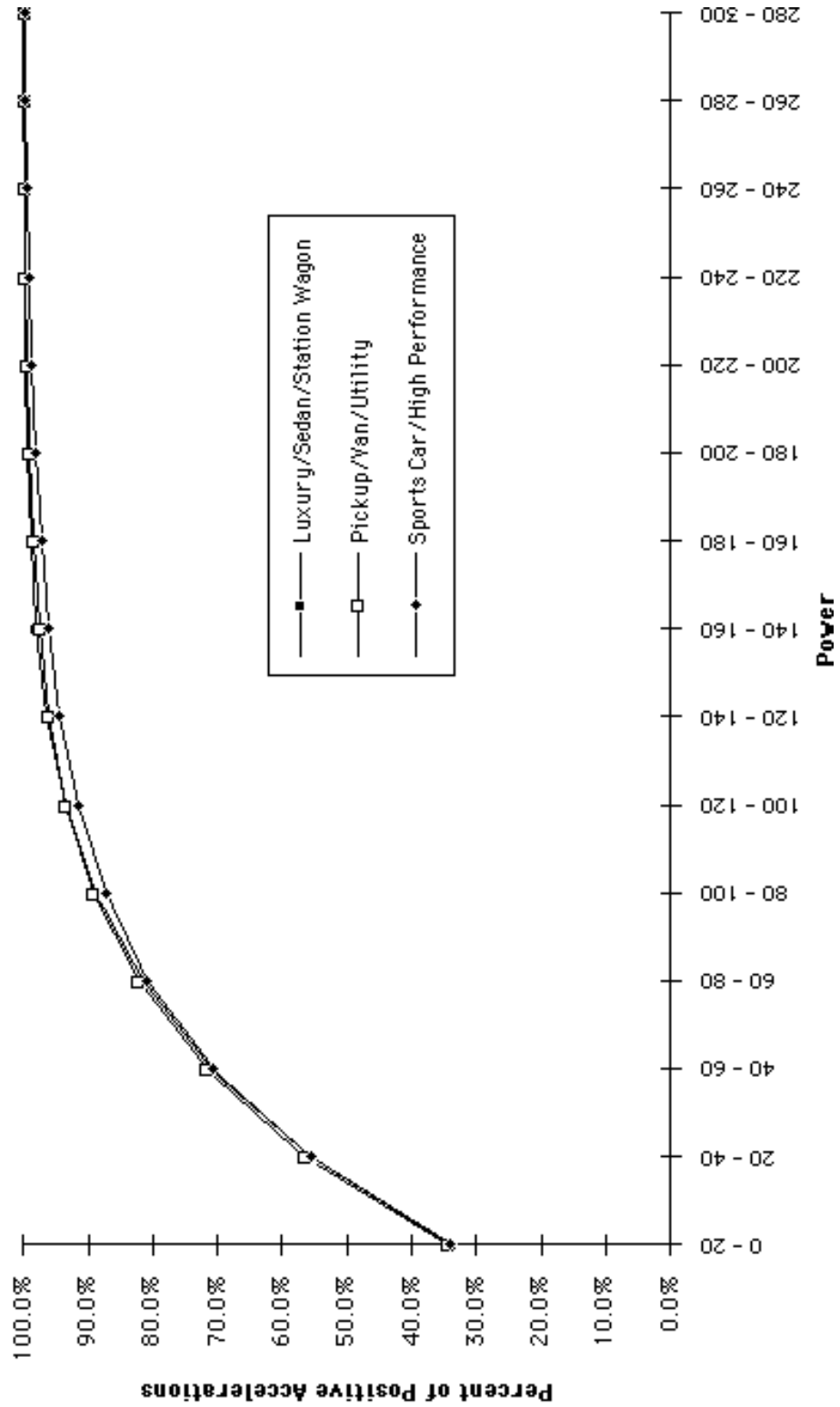
**Figure C-4**  
**Distribution of Speed: By Vehicle Type**  
**Baltimore 3-Parameter Vehicles**



**Figure C-5**  
**Cumulative Distribution of Acceleration: By Vehicle Type**  
**Baltimore 3-Parameter Vehicles**



**Figure C-6**  
**Cumulative Distribution of Power: By Vehicle Type**  
**Baltimore 3-Parameter Vehicles**



**Figure C-7**  
**Distribution of Speed: By Vehicle Age**  
**Baltimore 3-Parameter Vehicles**

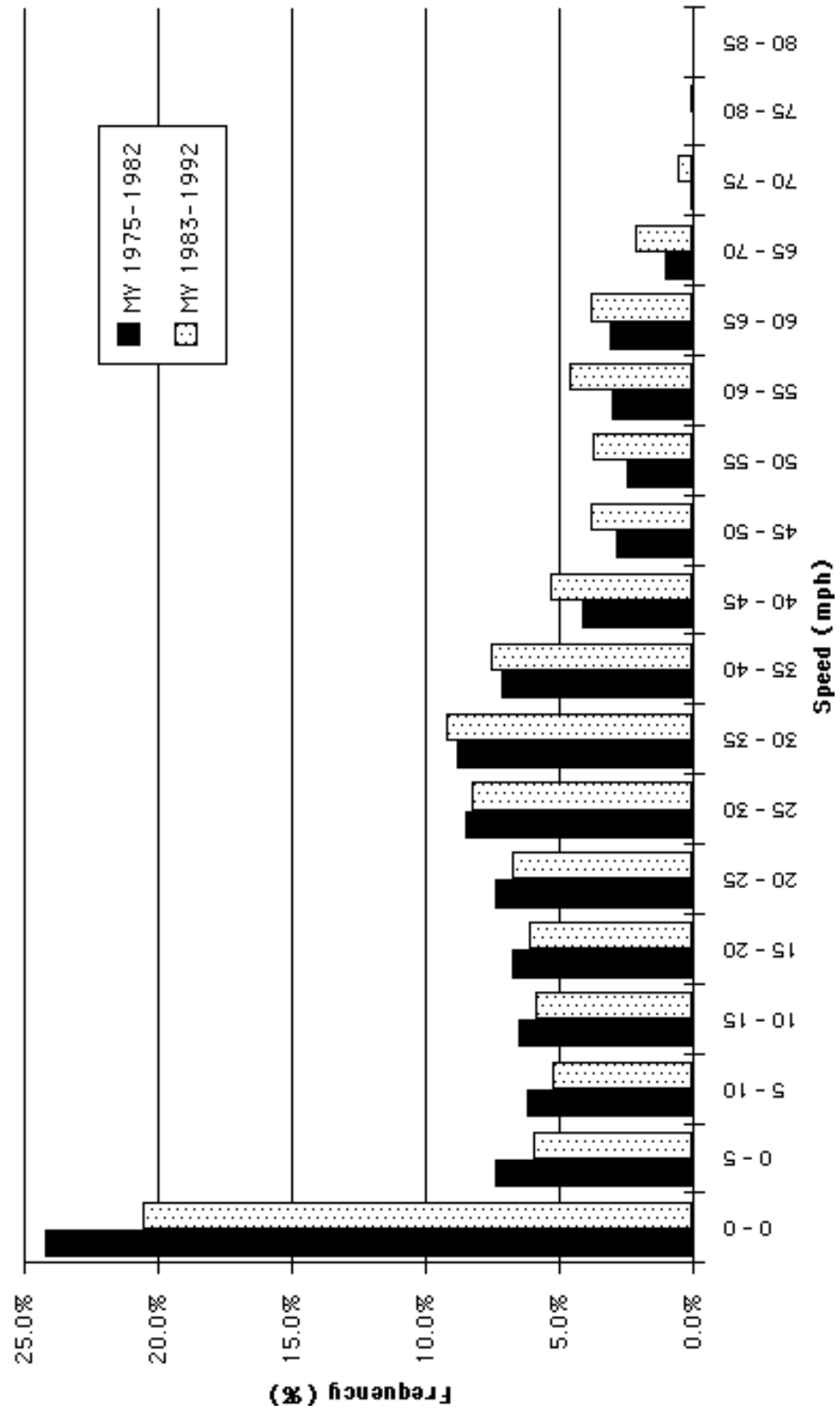
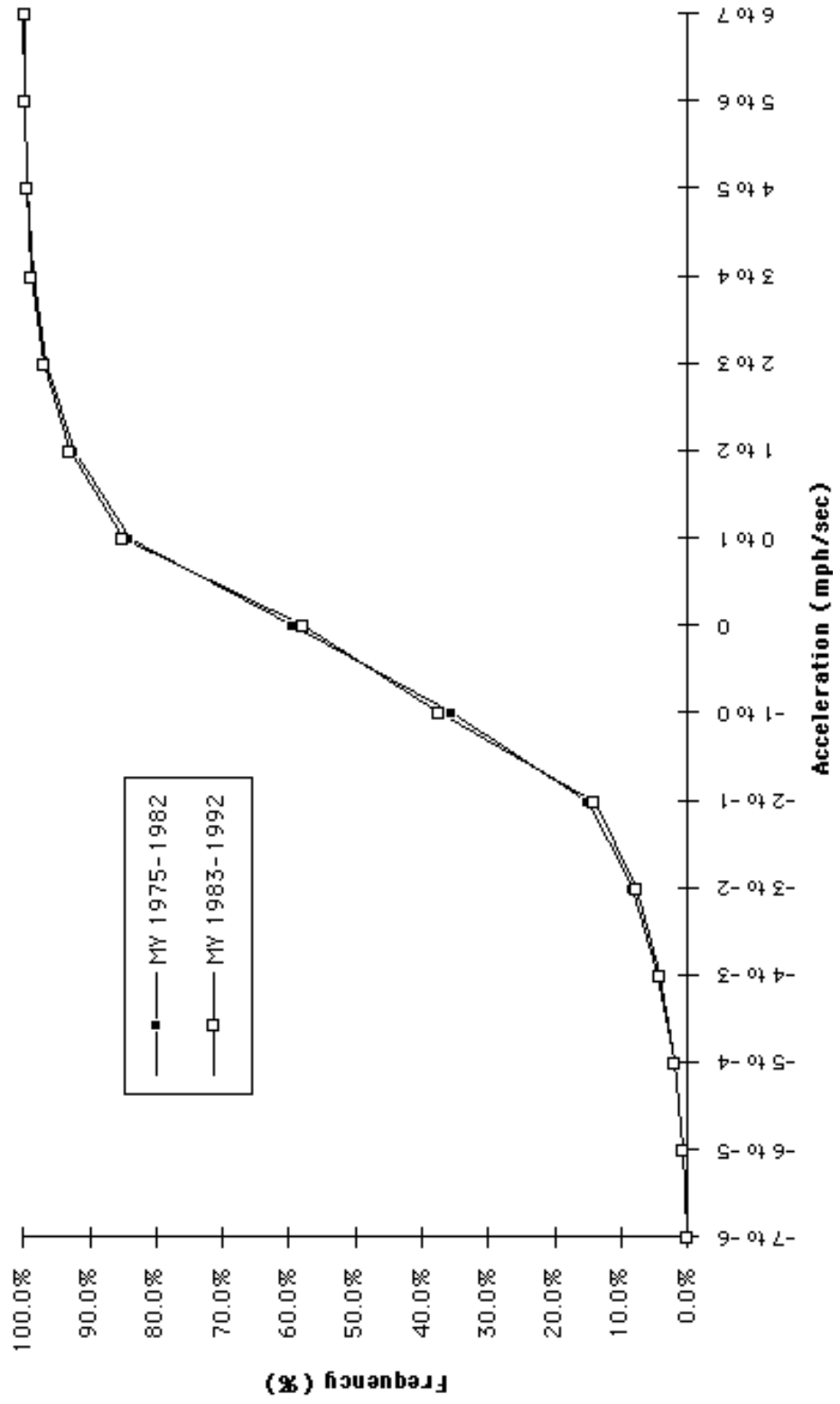
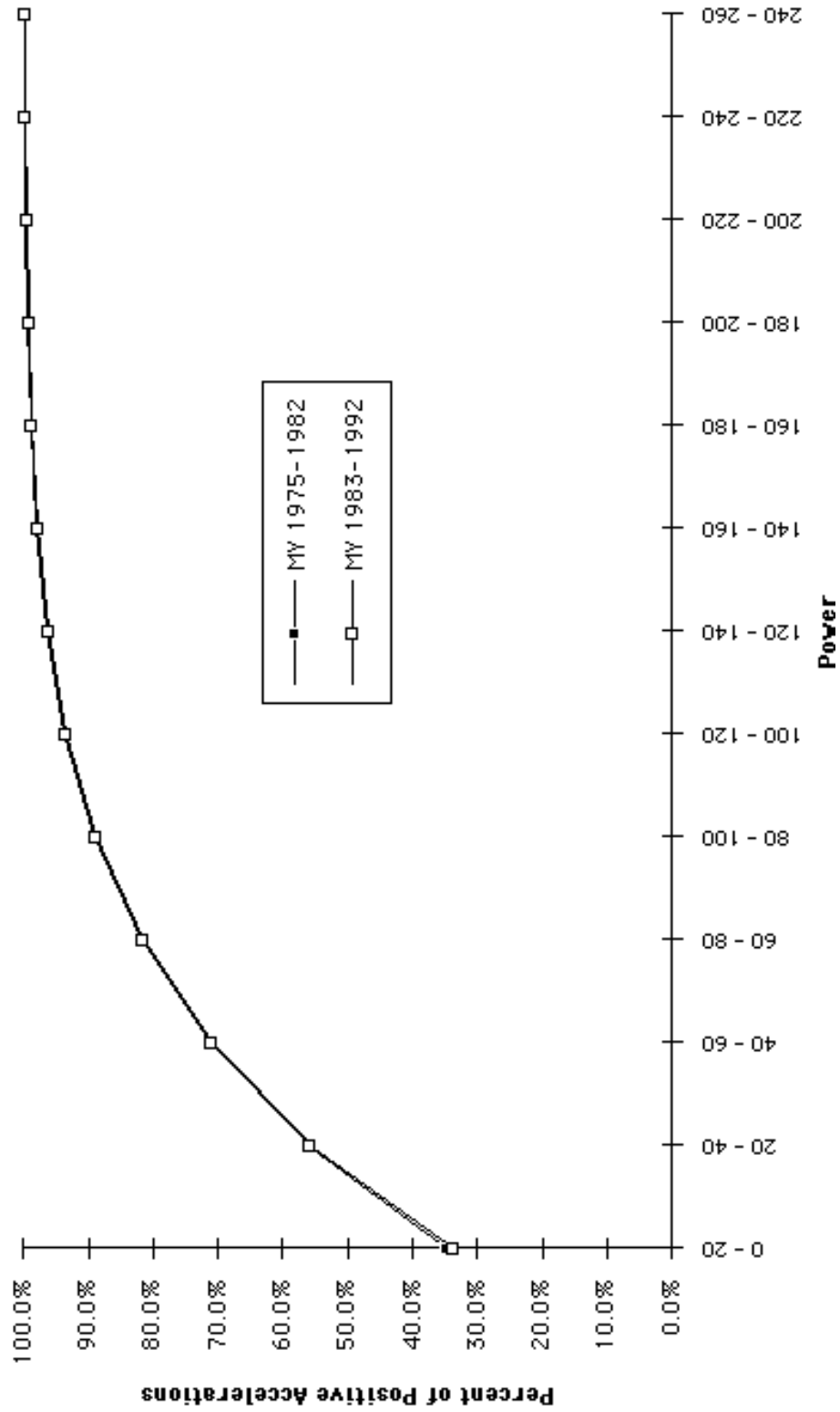


Figure C-8  
 Cumulative Distribution of Acceleration: By Vehicle Age  
 Baltimore 3-Parameter Vehicles

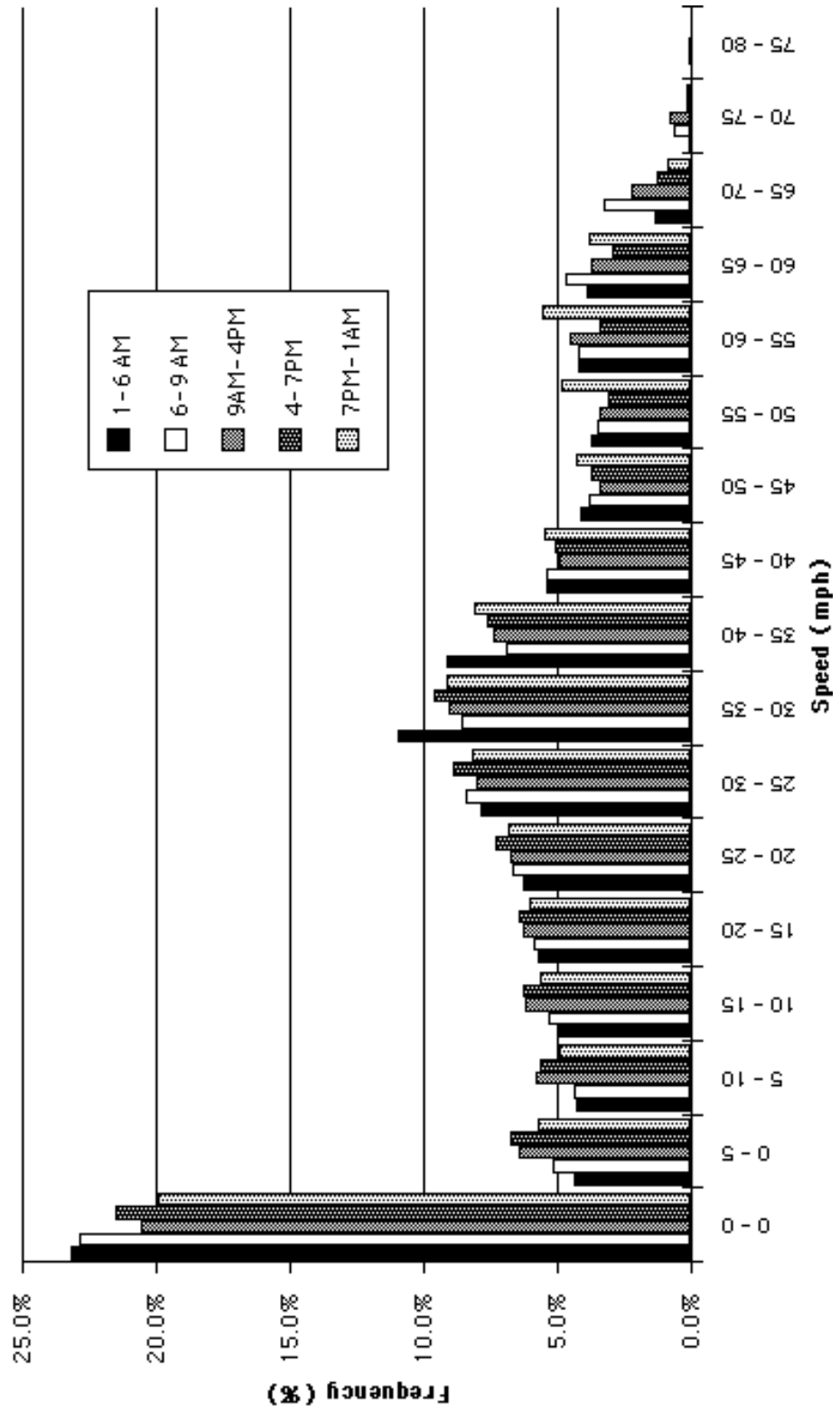




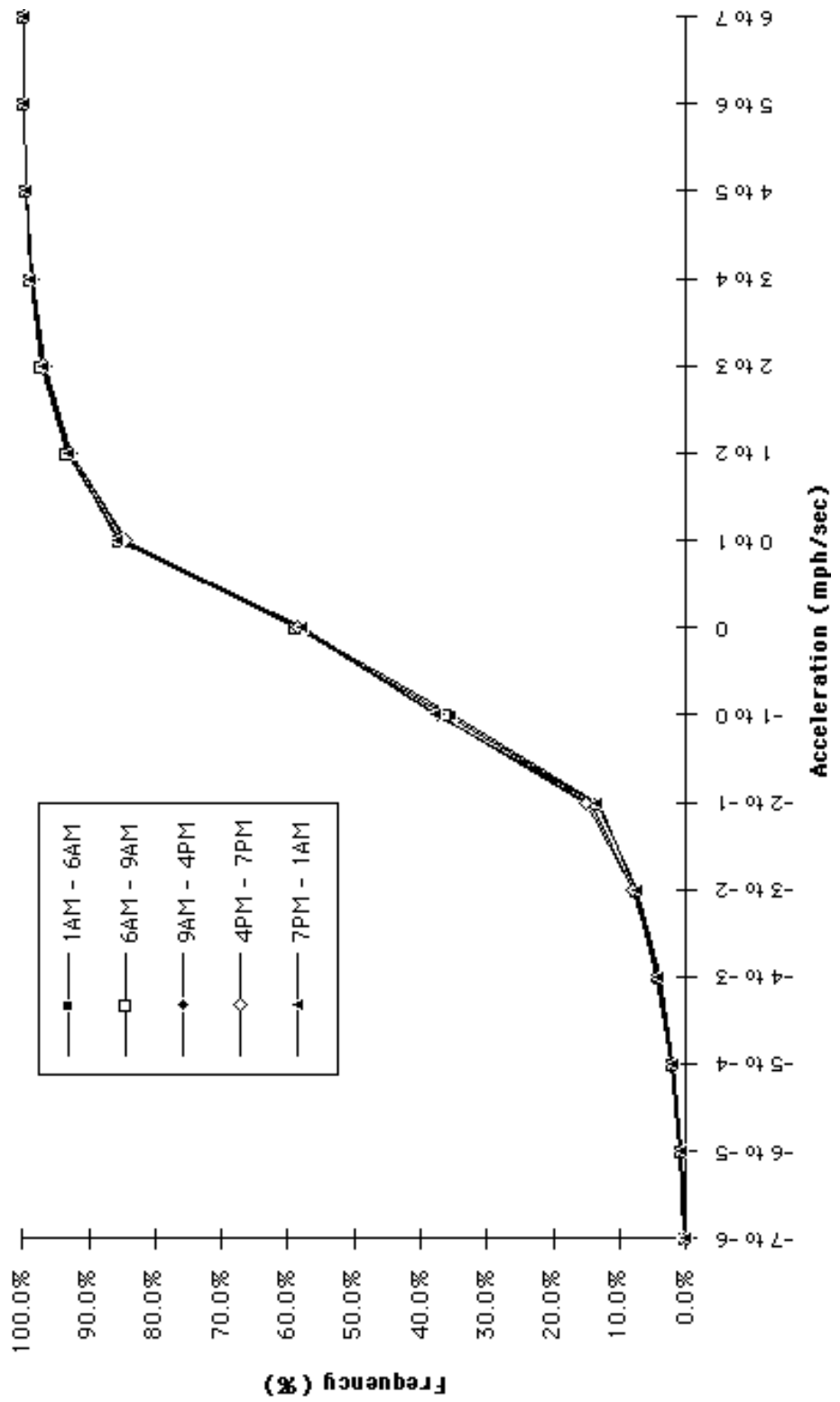
**Figure C-9**  
**Cumulative Distribution of Power: By Vehicle Age**  
**Baltimore 3-Parameter Vehicles**



**Figure C-10**  
**Distribution of Speed: By Time of Day**  
**Baltimore 3-Parameter Vehicles**



**Figure C-11**  
**Cumulative Distribution of Acceleration: By Time of Day**  
**Baltimore 3-Parameter Vehicles**



**Figure C-12**  
**Cumulative Distribution of Power: By Time of Day**  
**Baltimore 3-Parameter Vehicles**

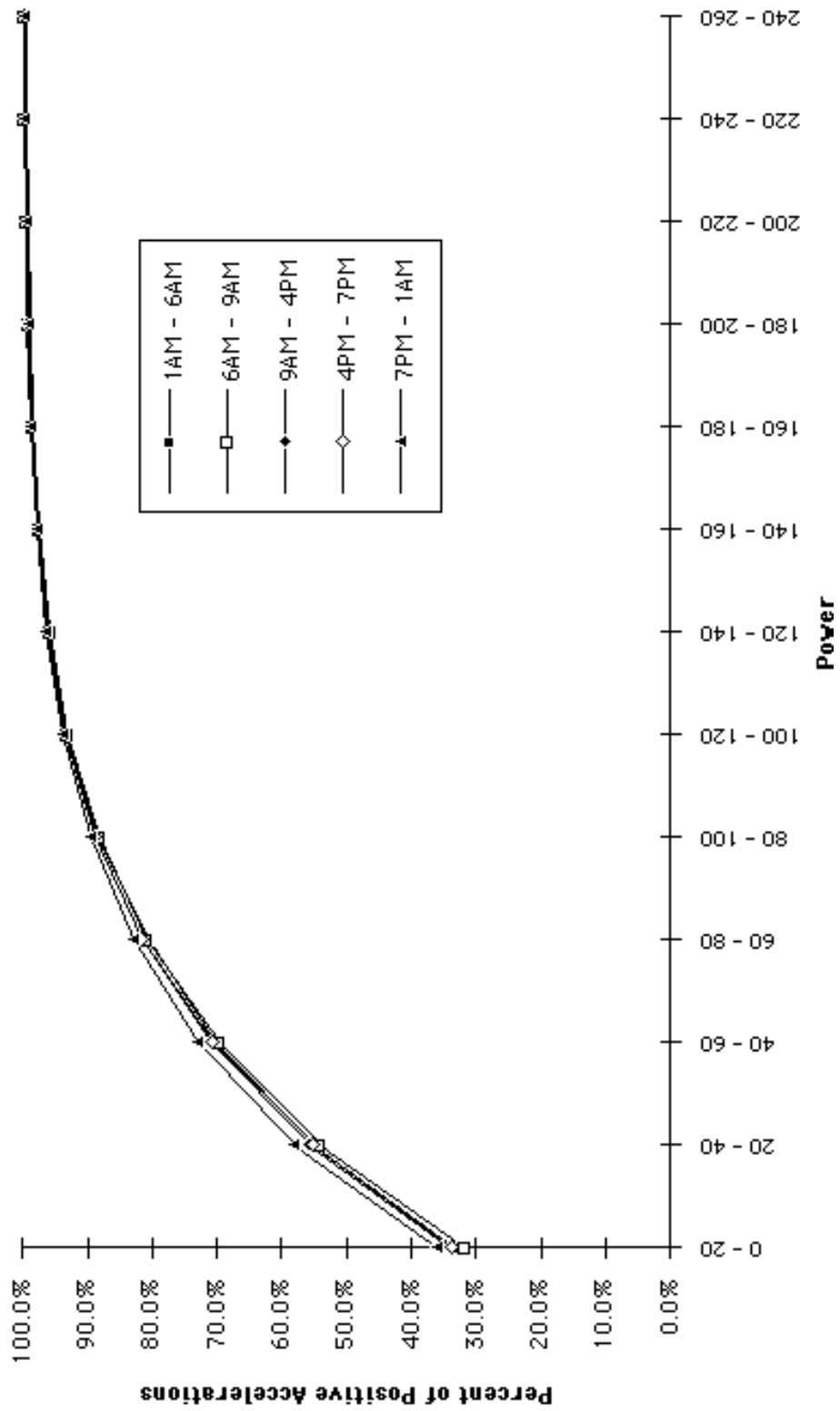
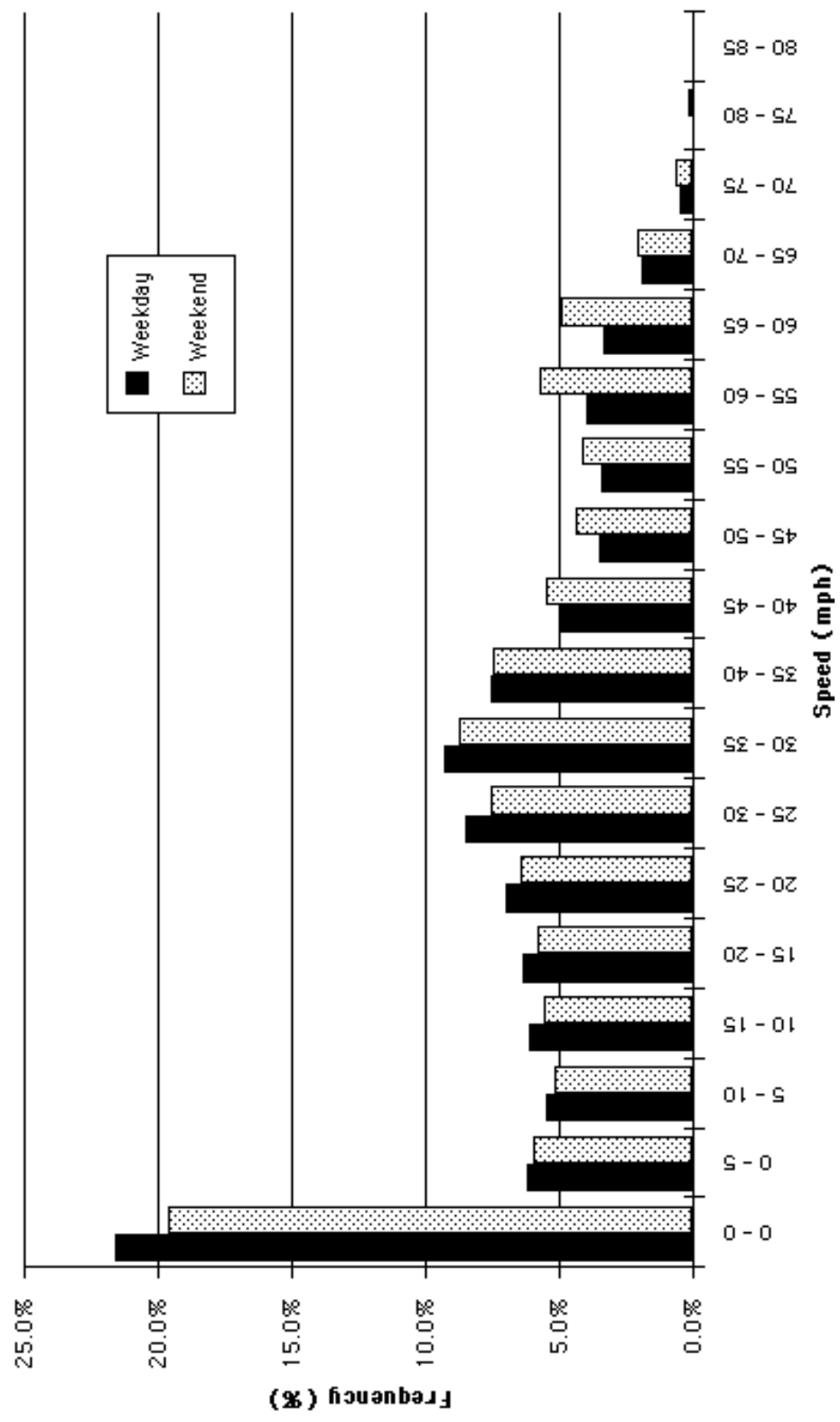
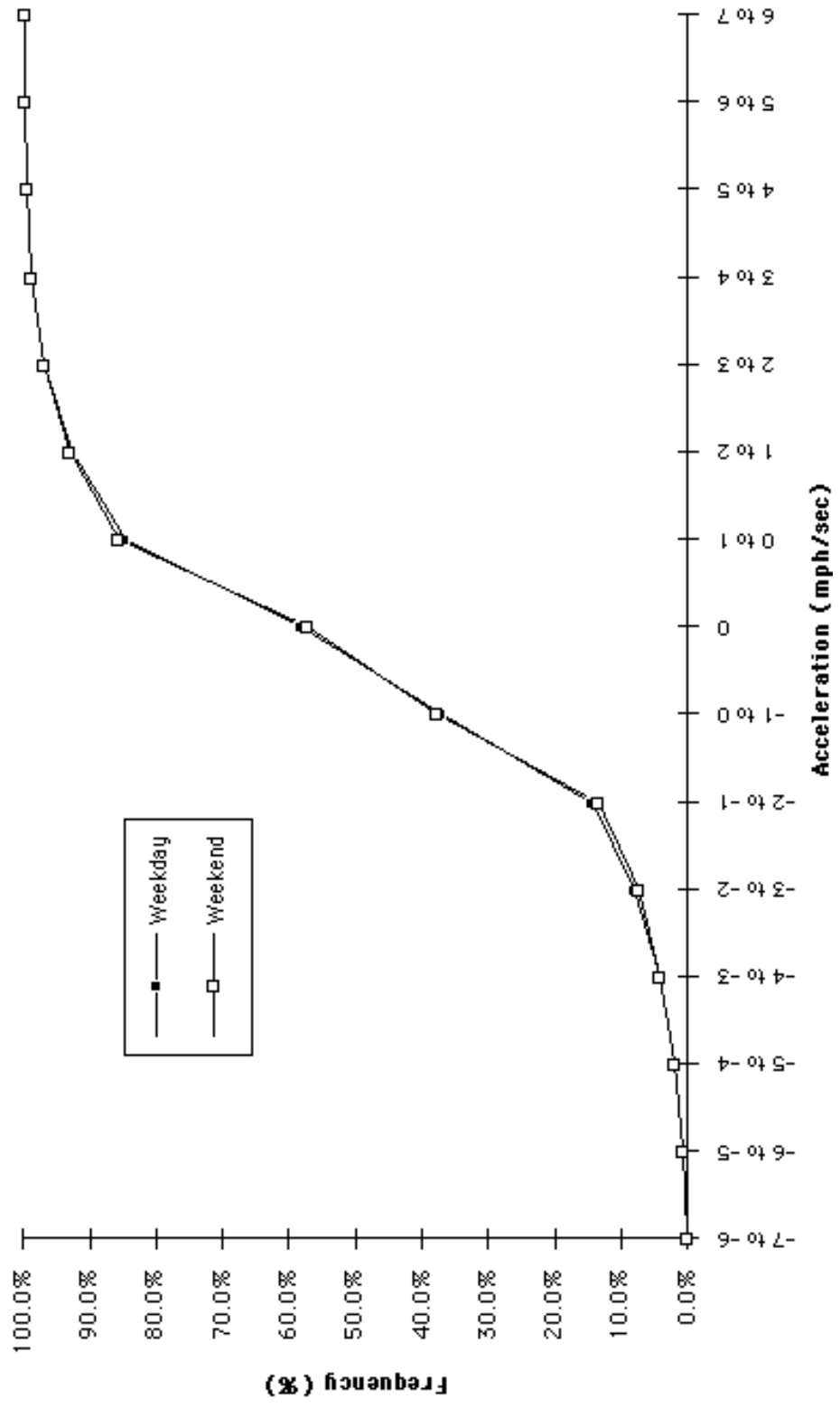


Figure C-13  
 Distribution of Speed: By Time of Week  
 Baltimore 3-Parameter Data



**Figure C-14**  
**Cumulative Distribution of Acceleration: By Time of Week**  
**Baltimore 3-Parameter Vehicles**



**Figure C-15**  
**Cumulative Distribution of Power: By Time of Week**  
**Baltimore 3-Parameter Vehicles**

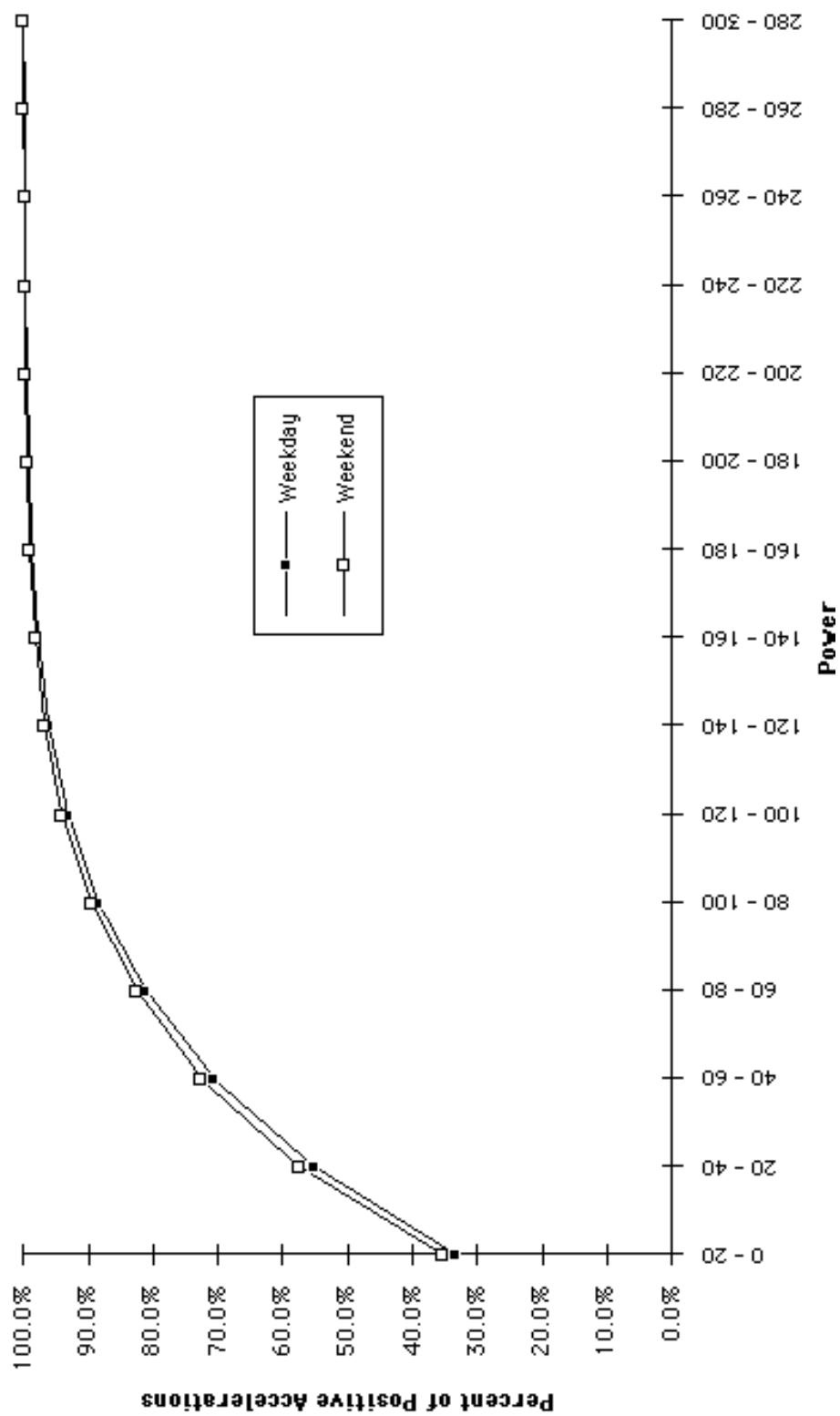


Figure E-1.  
Phase 1 – Speed Distribution by Start Type

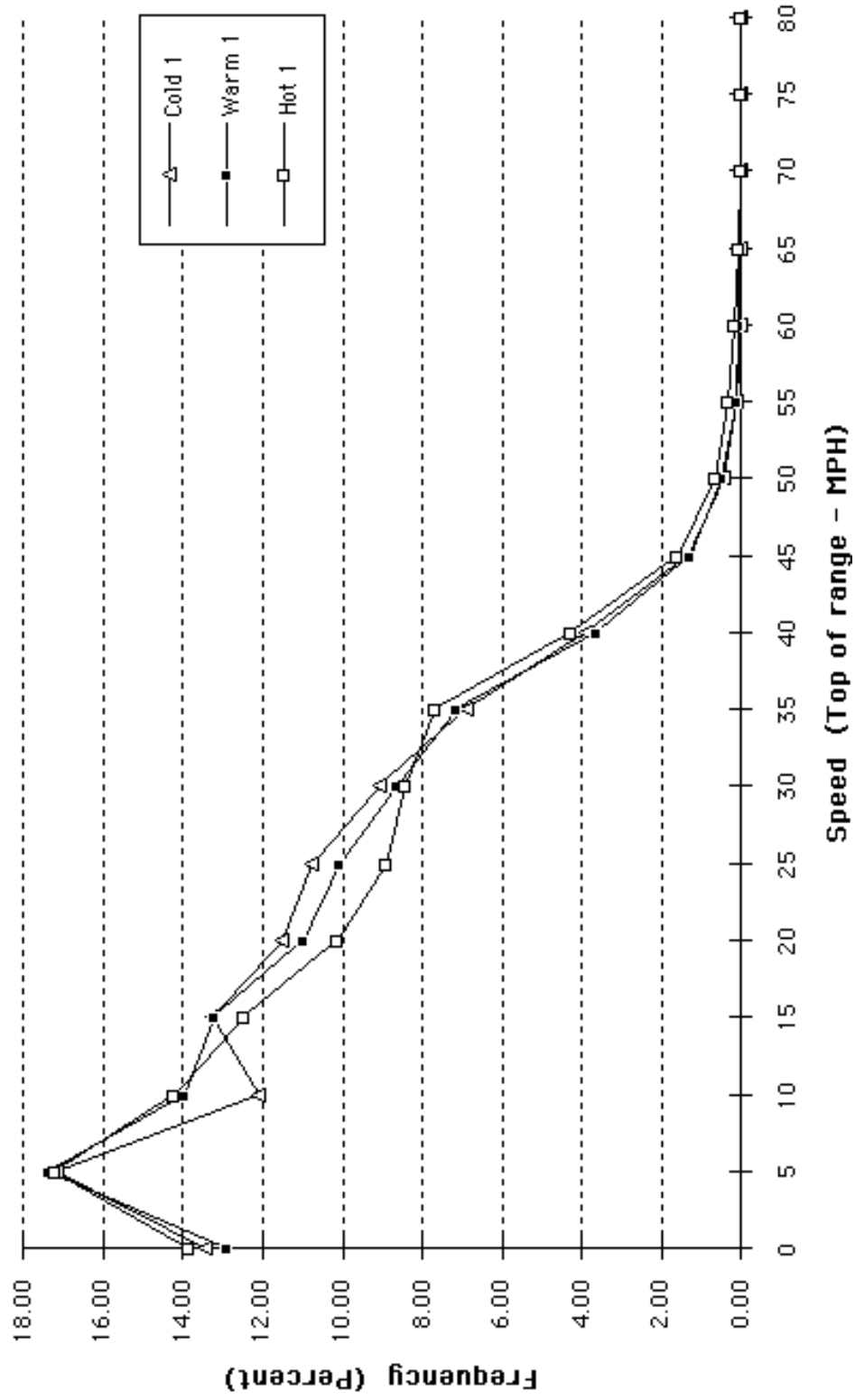




Figure E-2.  
Phase 2 – Speed Distribution by Start Type

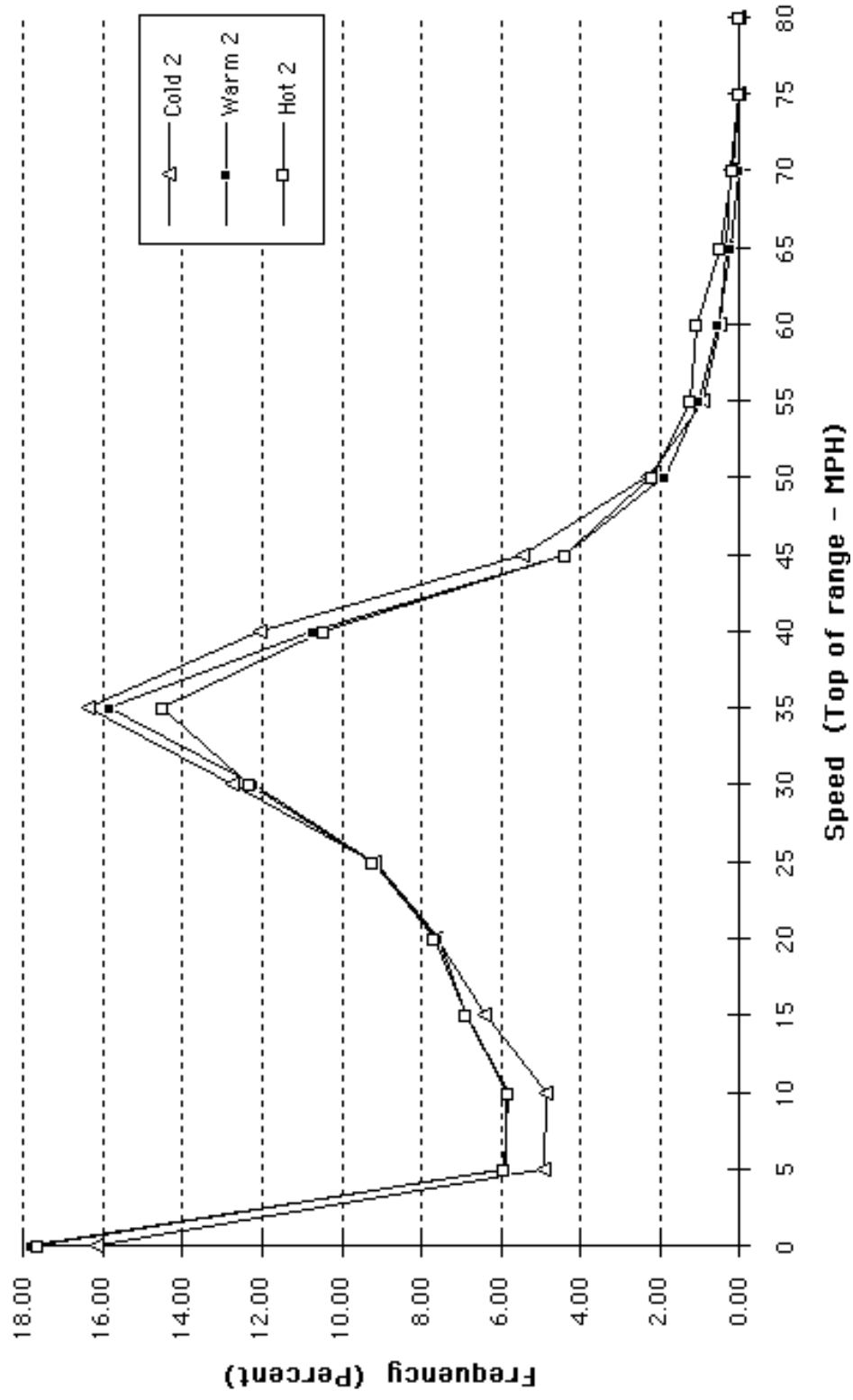


Figure E-3.  
Phase 3 – Speed Distribution by Start Type

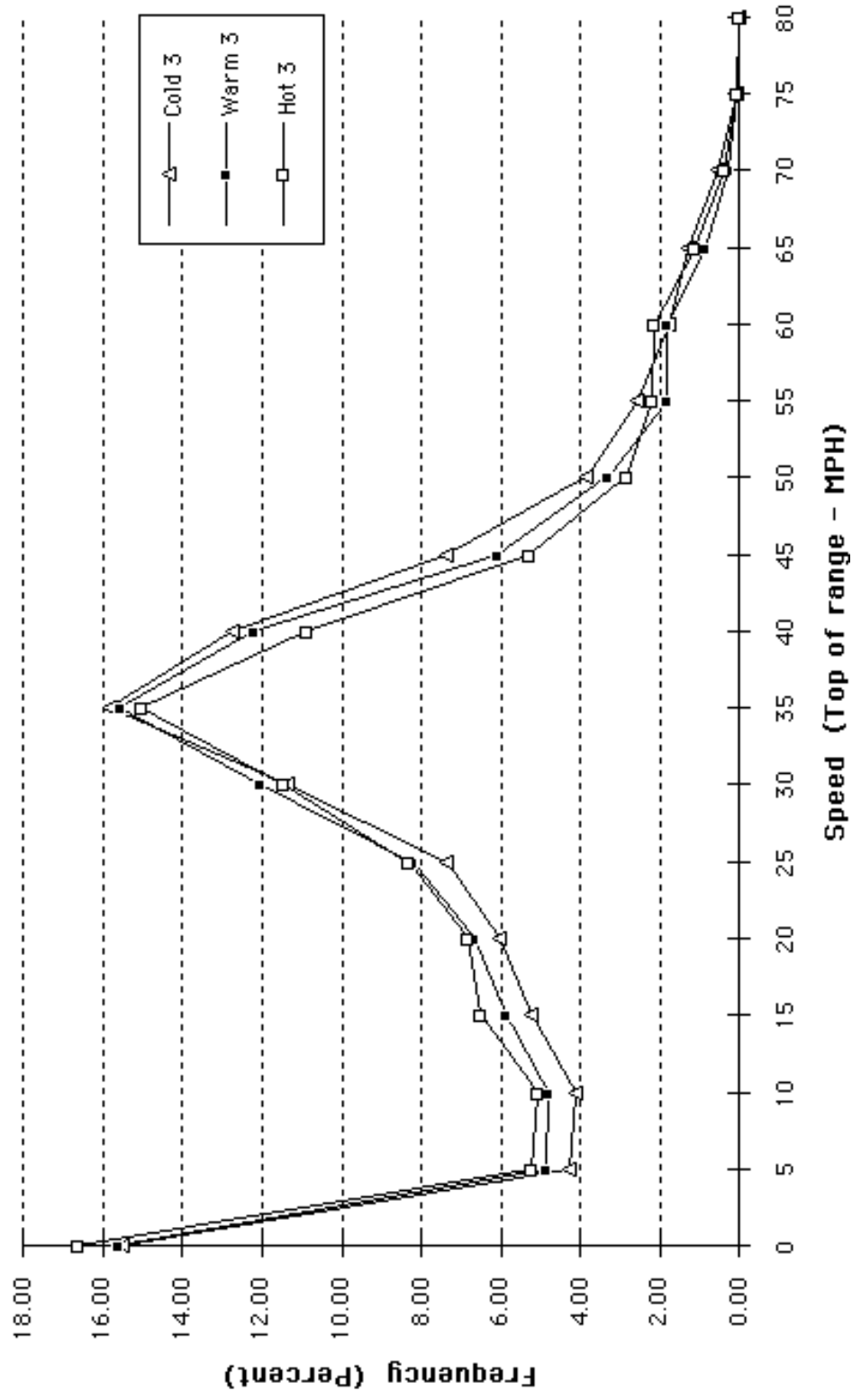


Figure E-4.  
Phase 1 - Cumulative Power Distribution by Start Type

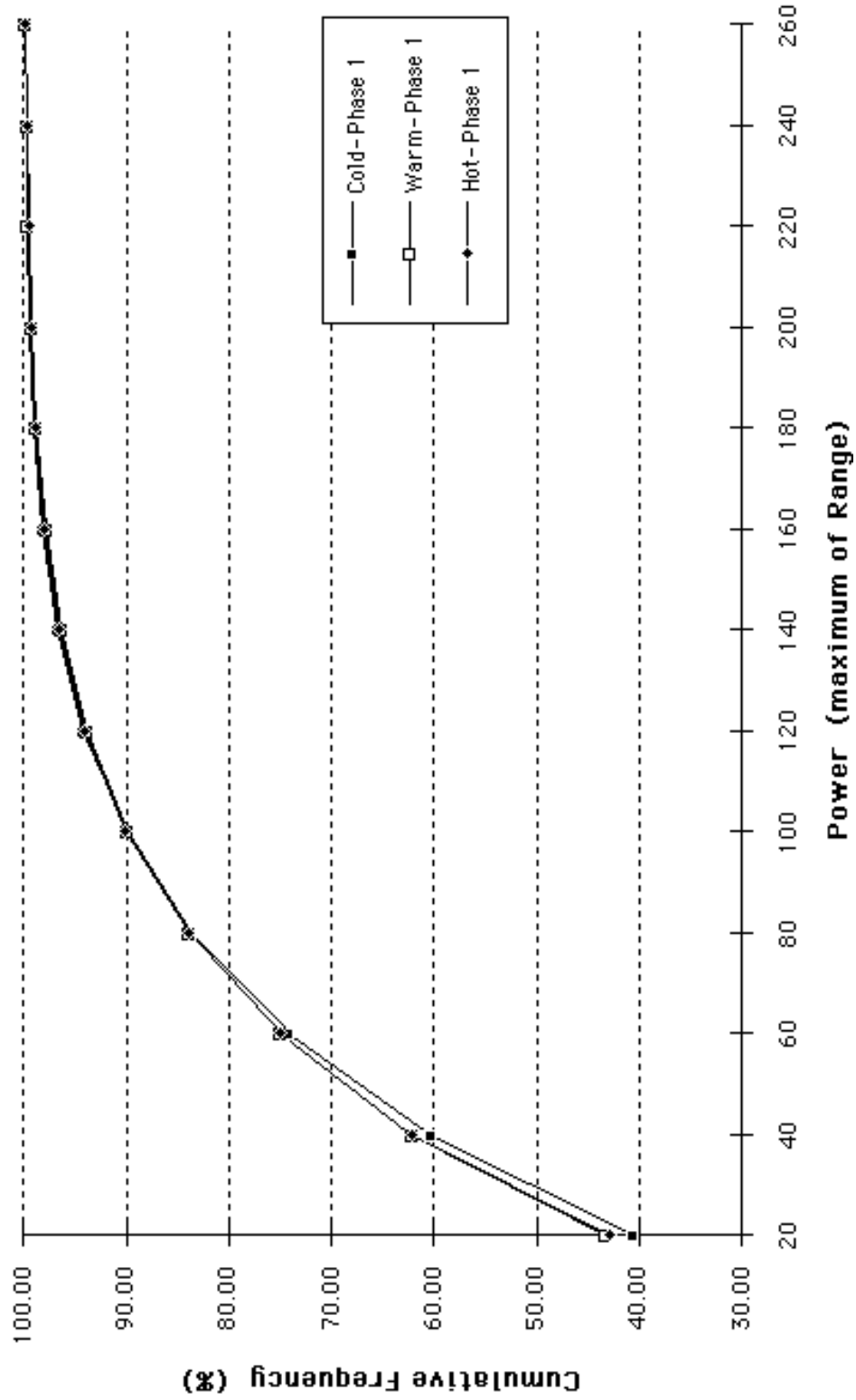


Figure E-5.  
Phase 2 - Cumulative Power Distribution by Start Type

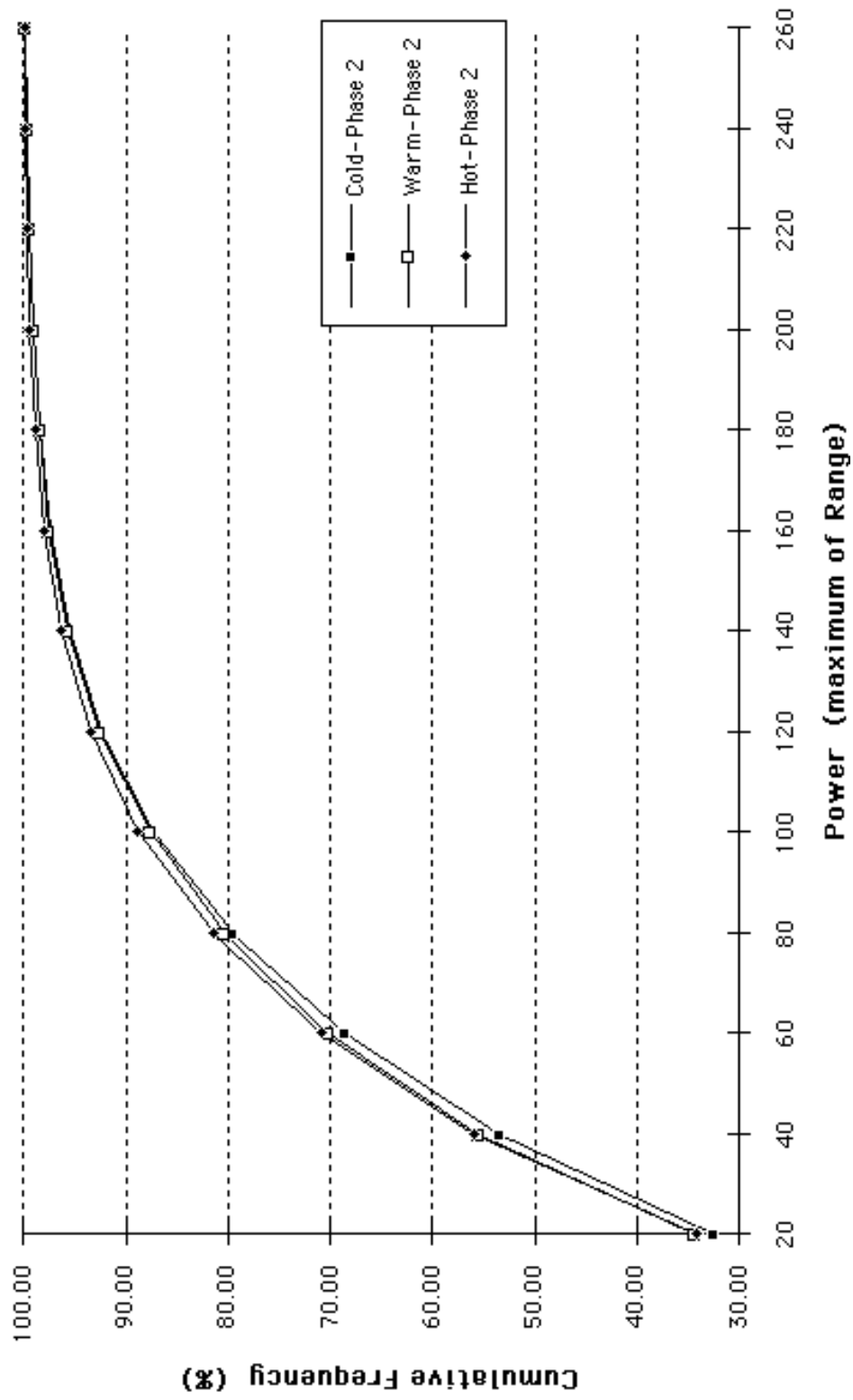


Figure E-6.  
Phase 3 - Cumulative Power Distribution by Start Type

