

# **The Likelihood of Human Casualty in Highway Crashes**

**Third Briefing: Contributions to a Workshop**

**Based on an Investigation Conducted for  
the FHWA/NHTSA Crash Analysis Center  
at George Washington University, Virginia**

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Washington, D.C.**

## "The Likelihood of Casualty in Highway Crashes"

Four topics are addressed and evaluated in this third briefing:

1. Control Total Counts in this Investigation. These are summarized in Table III.
2. Snapshots of Emergency Conditions and Services, Concerning Highway Crashes. These are summarized in Tables IV and V.
3. Expected Casualties from an 1,000 Car ACN Car Fleet. These are summarized in Tables VI and VII; and
4. Charts and Illustrations of Casualty Probabilities versus Delta V, for various specific combinations of Car Area of Damage and Car Occupant Age. These are illustrated in Figs 29 to 36 as follows:

MAIS 3+ for Restrained Drivers in Fig. 29;  
MAIS 3+ for Unrestrained Drivers in Fig. 30;  
MAIS 3+ for Restrained Frnt Passngrs in Fig. 31;  
MAIS 3+ for Unrestrained Frnt Passngrs in Fig. 32;

MAIS 2+ for Restrained Drivers in Fig. 33;  
MAIS 2+ for Unrestrained Drivers in Fig. 34;  
MAIS 2+ for Restrained Frnt Passngrs in Fig. 35;  
MAIS 2+ for Unrestrained Frnt Passngrs in Fig. 36;

Table III. Control Weighted Totals Averaged over the Seven Years of NASS/CDS 1988-1994

Towaway Cars per Year:	2,130,000
Towaway Crash Involved Car Occupants per Yr:	2,860,000
NASS/CDS 88-94 Sample Size (Occupant Counts):	60,627

Towaway Cars with	Count per Year
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No Fatality	2,109,235
At Least One Fatality	20,765
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Total	2,130,000

Occupants in Towaway Cars	Count per Year
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Survivors	2,836,478
Fatalities	23,522
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Total	<del>2,130,000</del>

Number of Fatalities in Car	Number of Cars per Year
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1	18,573
2	1,812
3	292
4	70
5	13
6	4
7	1
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All	20,765

Table IV. Distribution of Car Occupant Fatalities (about 23,522 per Year), According to Shown Attribute

Time to Death After Accident	Percent
1 Hour or Less	75.4
1 to 2 Hours	4.9
2 to 3 Hours	1.7
3 to 4 Hours	2.5
4 to 23 Hours	5.2
1 to 2 Days	2.6
3-10 Days	4.2
Over 10 Days	3.4
Total	100.0

Initial Med Facility	Percent
No Med Facil.	55.3
Trauma Center	25.2
Hospital	19.3
Clinic	0.1
Total	100.0

Days in Hospital Until Death	Percent
No Hospital	87.6
1 Night	3.4
2 Nights	1.4
3 Nights	0.3
4 to 10 Nights	4.1
11 to 30 Nights	3.2
Total	100.0

Table V. Distribution of Car Occupants, Towaway Crash Survivors, (2,840,000 per Year), According to Shown Attribute

Treatment	Percent
No Treatment	63.7
Hospitalized	5.4
Xported, No Hosp	25.2
Treatd, No Xport	0.6
Treated Later	5.2
Total	100.0

Initial Med Facility	Percent
No Med Facil.	64.2
Trauma Center	13.8
Hospital	17.0
Clinic	0.3
Phys. Office	0.0
Med Facil Later	4.8
Total	100.0

Days in Hospital	Percent
No Hospital	95.2
1 Night	1.2
2 Nights	0.8
3 Nights	0.5
4 to 10 Nights	1.6
11 to 30 Nights	0.6
Over 30 Nights	0.1
Total	100.0

Table VI. Distribution of Towaway Cars by Max Casualty Occuring in Car

There are currently about 122,000,000 cars in service on U.S. roads (Source: R.L.Polk); of these, about 2,130,000 per year are crash involved, and towed away (NASS/CDS 88-94 Avg).

Shown below is the Distribution of Towaway Cars according to Max Casualty in the Car:

- (a) For the entire Fleet on the Road; and
- (b) For an Hypothetical Fleet of 1,000 ACN Cars.

----- (a) -----

Max Casualty in Towaway Car	Cars per Year	Percent
None Injured	822,188	38.6
MAIS=1	764,890	35.9
MAIS=2	145,094	6.8
MAIS=3	48,803	2.3
MAIS=4	10,003	0.5
MAIS=5	6,415	0.3
MAIS=6	2,904	0.1
Unkn. Severity	93,296	4.4
Unkn. If Injrd.	235,972	11.1
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Total	2,130,000	100.0

----- (b) -----

Max Casualty in Towaway Car	Cars per Year	Percent
None Injured	6.74	38.6
MAIS=1	6.27	36.0
MAIS=2	1.19	6.8
MAIS=3	0.40	2.3
MAIS=4	0.08	0.5
MAIS=5	0.05	0.3
MAIS=6	0.02	0.1
Unkn. Severity	0.76	4.4
Unkn. If Injrd.	1.93	11.1
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Total	17.44	100.0

Table VII. Distribution of Towaway Cars by Max Treatment of Car Occupants

There are currently about 122,000,000 cars in service on U.S. roads (Source: R.L.Polk); of these, about 2,130,000 per year are crash involved, and towed away (NASS/CDS 88-94 Avg).

Shown below is the Distribution of Towaway Cars according to Max Treatment of Car Occupants  
(a) For the entire Fleet on the Road; and  
(b) For an Hypothetical Fleet of 1,000 ACN Cars.

----- (a) -----

Max Treatment of Car Occupants	Cars per Year	Percent
No Treatment	1,023,658	47.9
Killed	20,765	1.0
Hospitalized	128,067	6.0
Xported, No Hosp	509,119	23.8
Treatd, No Xport	12,999	0.6
Treated Later	135,726	6.4
Unknown	307,041	14.4
Total	2,130,000	100.0

----- (b) -----

Max Treatment of Car Occupants	Cars per Year	Percent
No Treatment	8.39	47.9
Killed	0.17	1.0
Hospitalized	1.05	6.0
Xported, No Hosp	4.17	23.8
Treatd, No Xport	0.11	0.6
Treated Later	1.11	6.3
Unknown	2.52	14.4
Total	17.44	100.0

Fig. 29. Probability of Fatality or  
MAIS 3+, versus Delta V, for Restrained  
Drivers of Shown Age, in Shown Impacts

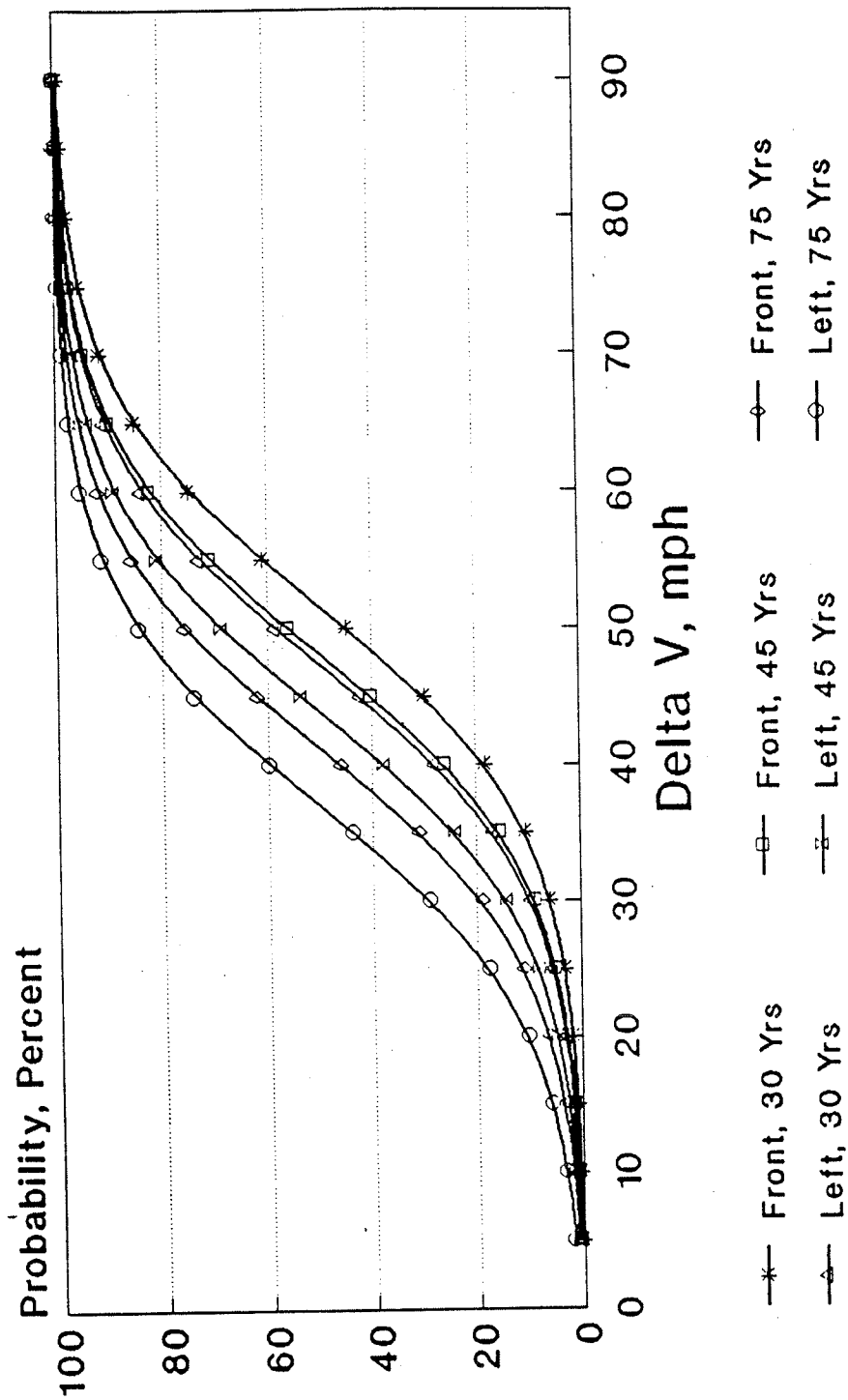




Fig. 30. Probability of Fatality or  
MAIS 3+, v. Delta V, for Unrestrained  
Drivers of Shown Age, in Shown Impacts

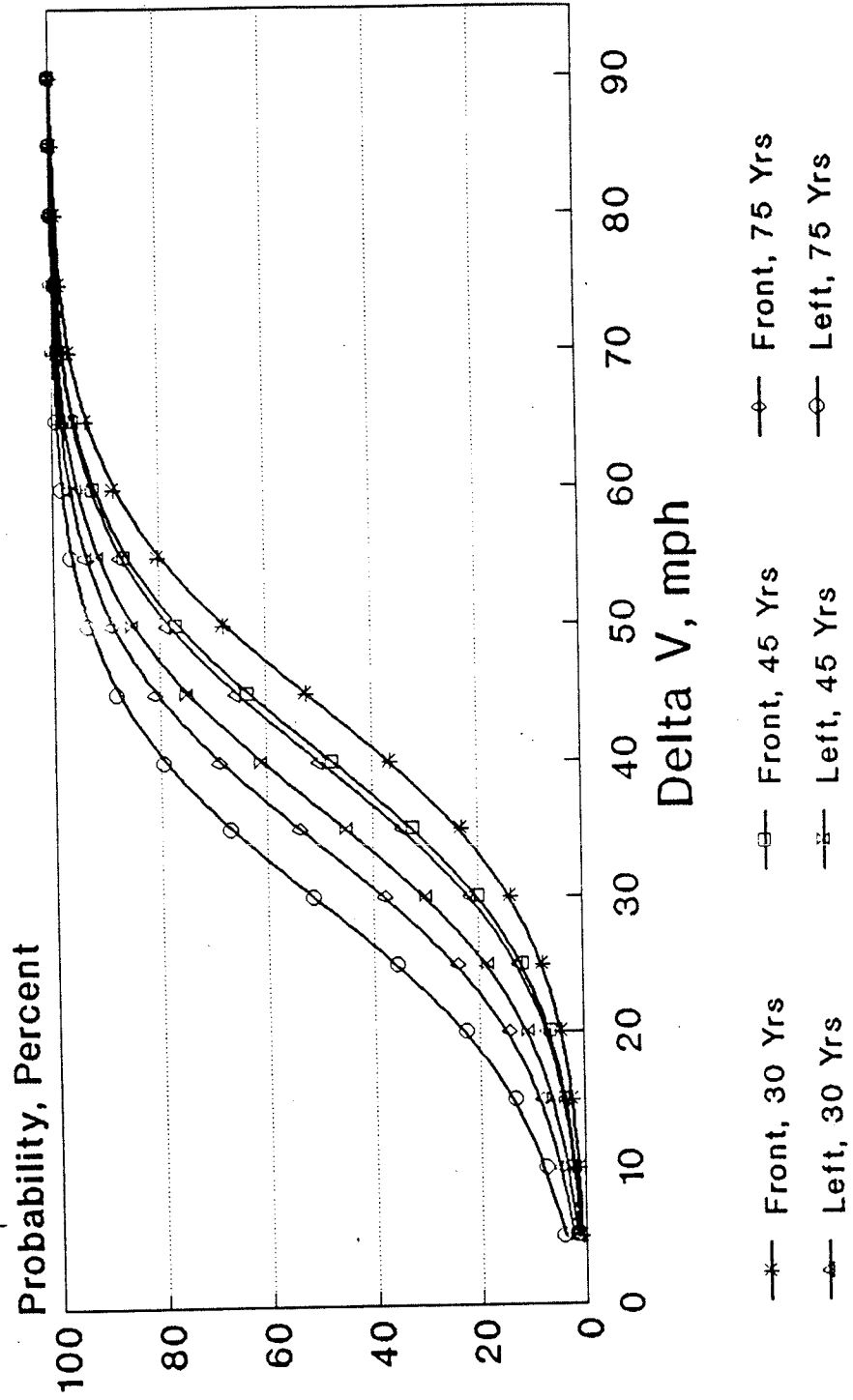


Fig. 31. Probability of Fatality or  
MAIS 3+, versus Delta V, for Restrained  
Frnt Pax of Shown Age, in Shown Impacts

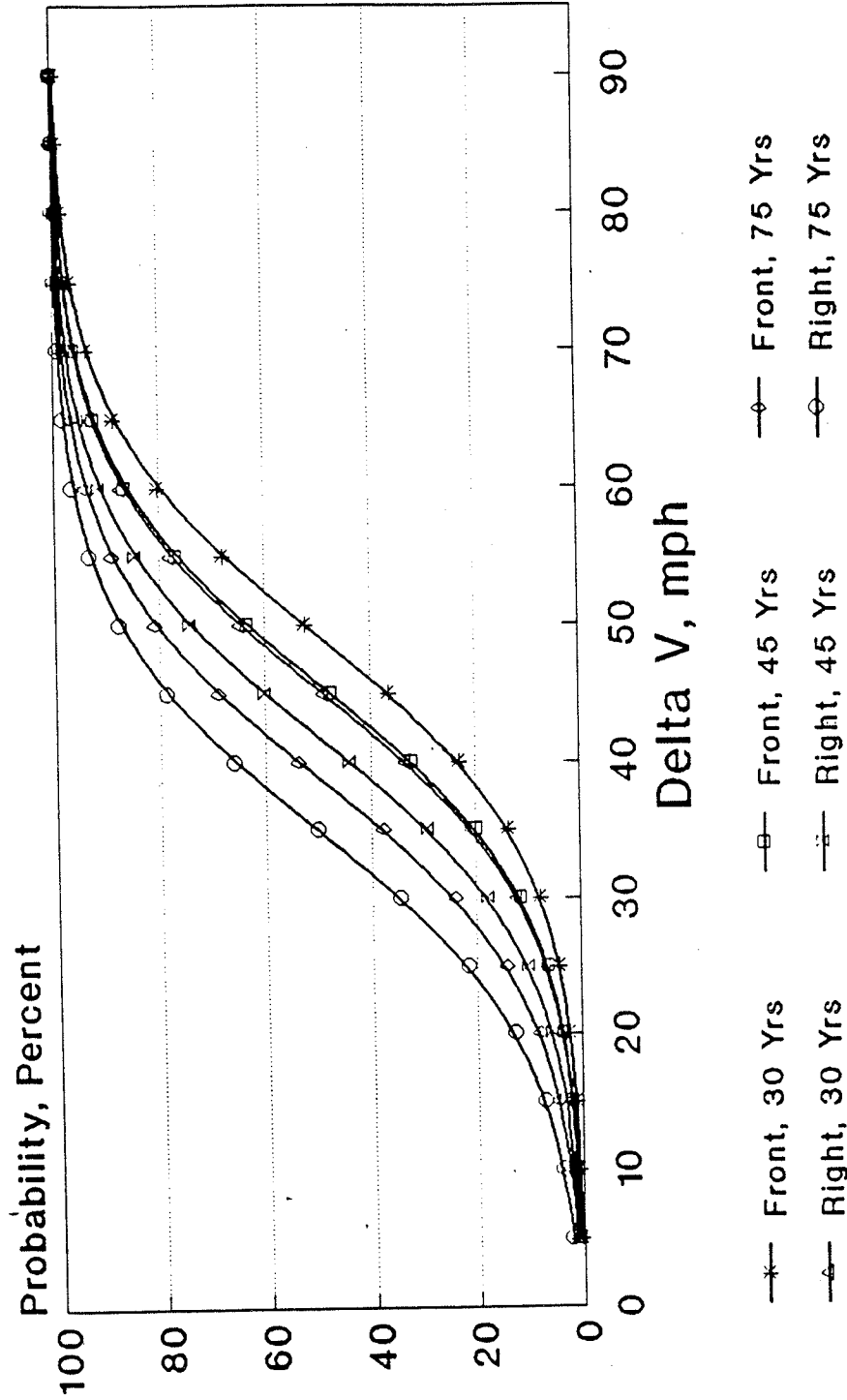


Fig. 32. Probability of Fatality or  
MAIS 3+, v. Delta V, for Unrestrained  
Frnt Pax of Shown Age, in Shown Impacts

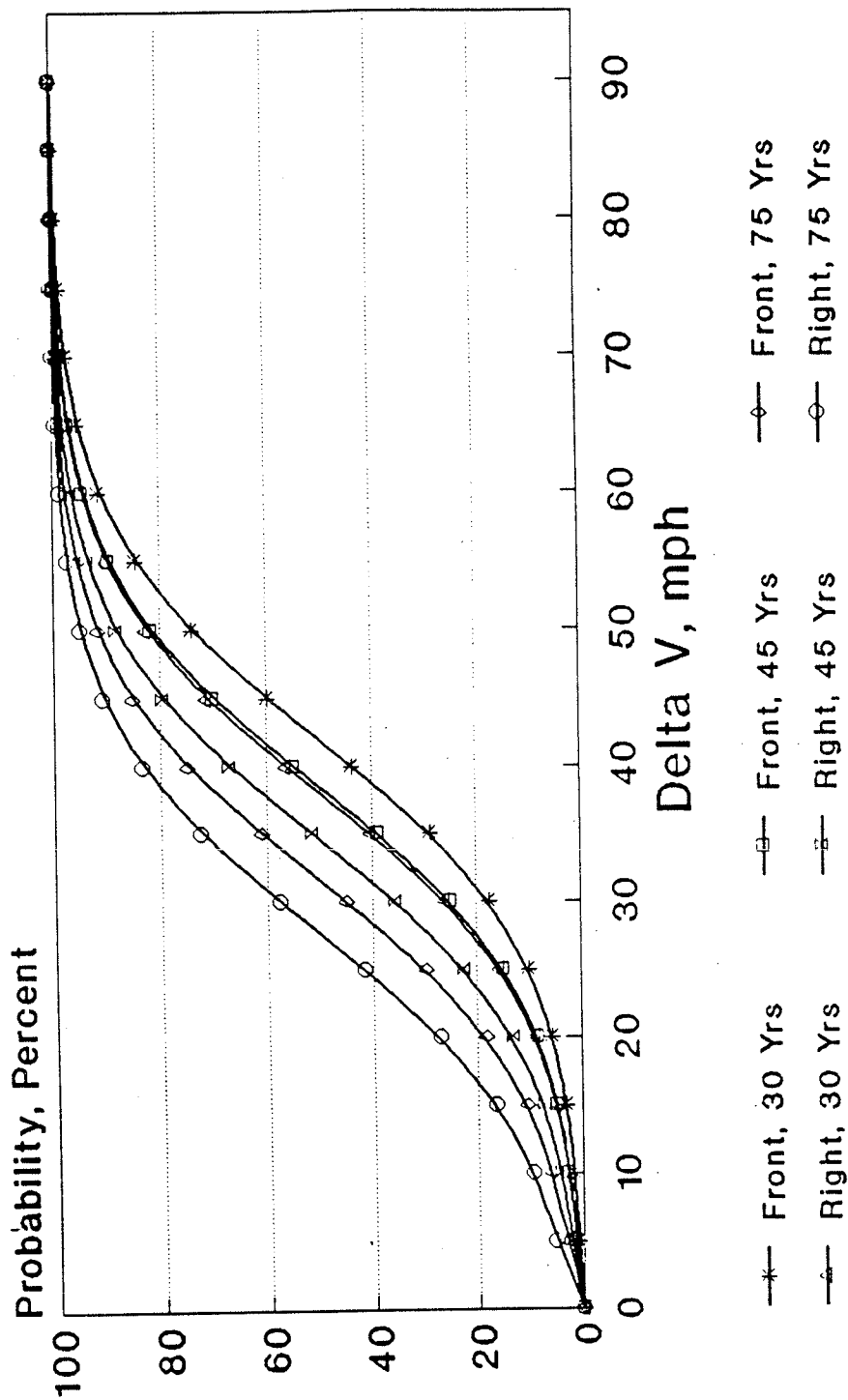


Fig. 33. Probability of Fatality or  
MAIS 2+, versus Delta V, for Restrained  
Drivers of Shown Age, in Shown Impacts

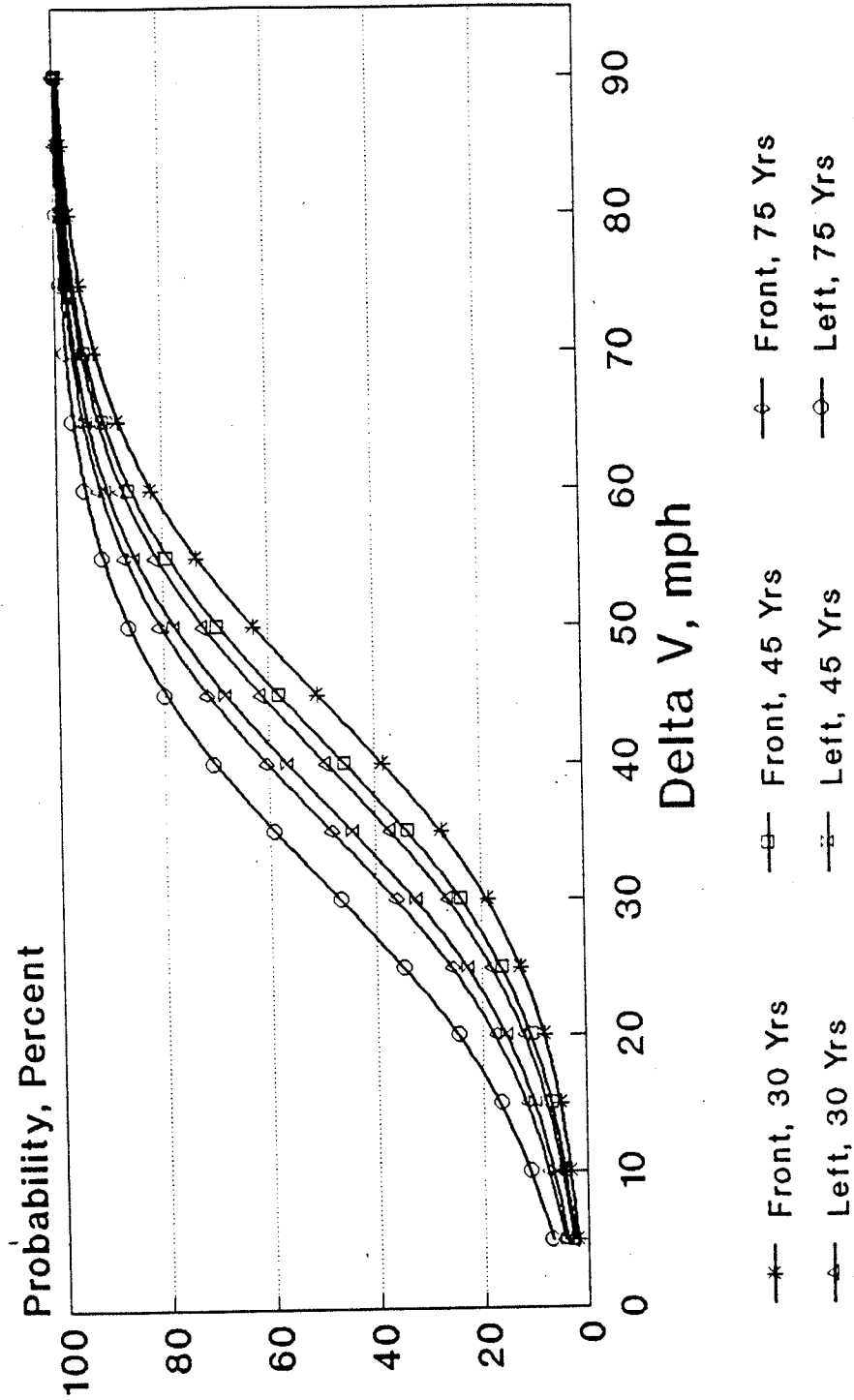


Fig. 34. Probability of Fatality or  
MAIS 2+, v. Delta V, for Unrestrained  
Drivers of Shown Age, in Shown Impacts

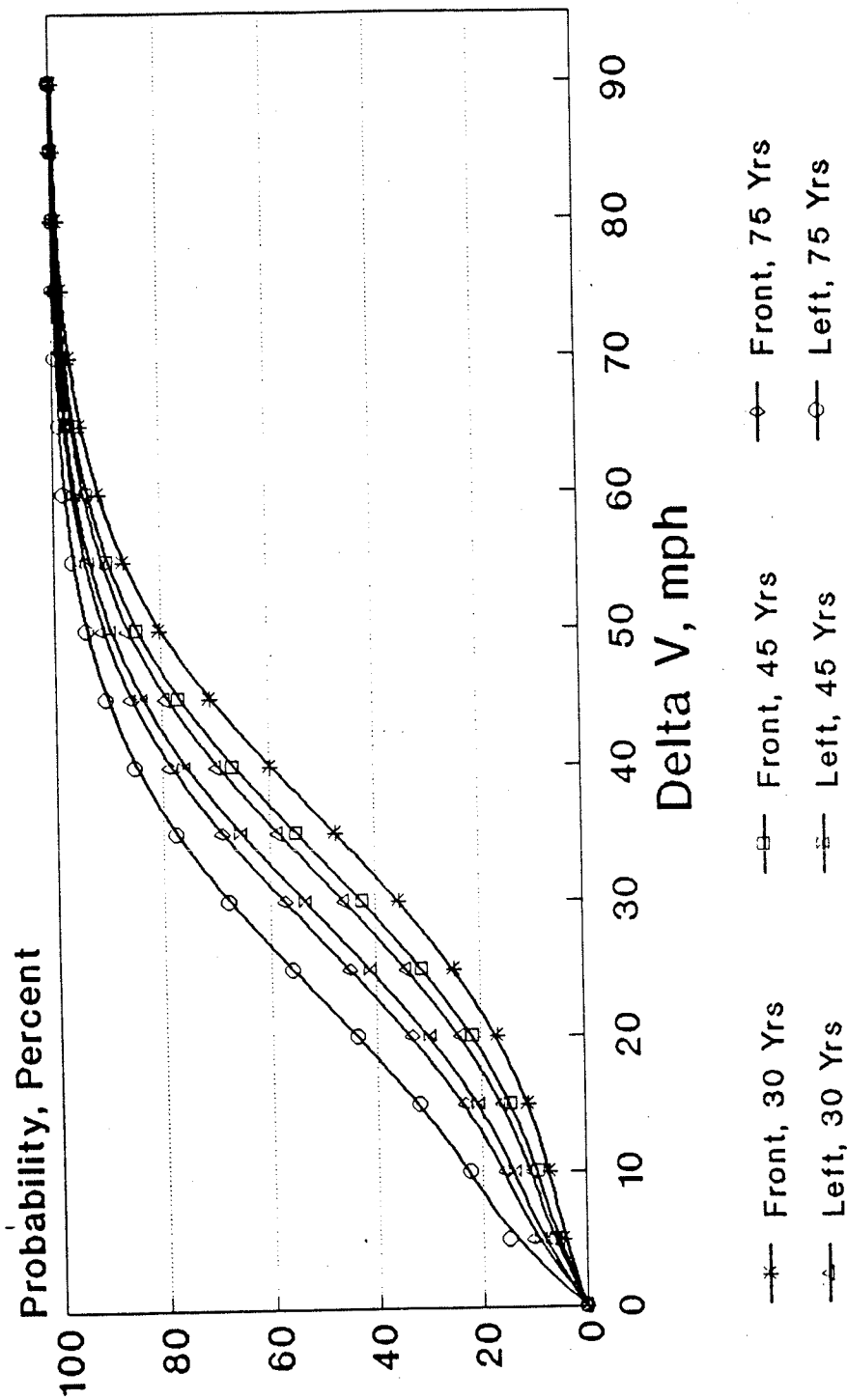


Fig. 35. Probability of Fatality or  
MAIS 2+, versus Delta V, for Restrained  
Frnt Pax of Shown Age, in Shown Impacts

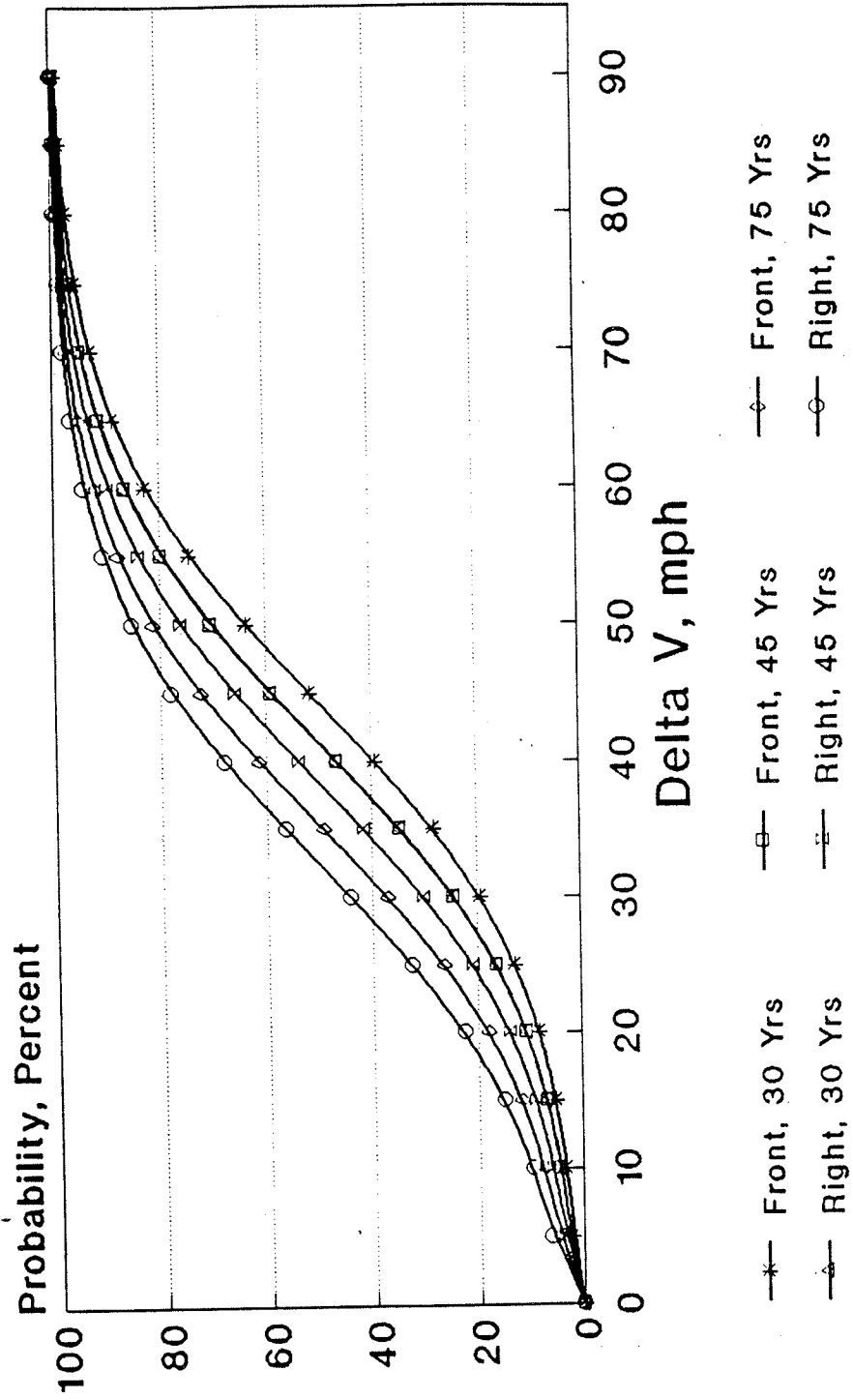


Fig. 36. Probability of Fatality or  
MAIS 2+, v. Delta V, for Unrestrained  
Frnt Pax of Shown Age, in Shown Impacts

