

REPORT NUMBER: 5FEM-MGA-2001-022

35 MPH FRONTAL BARRIER IMPACT TEST

**Daimler Chrysler Corporation
2001 Dodge Grand Caravan
NHTSA NUMBER: M10317**

**PREPARED BY:
MGA RESEARCH CORPORATION
5000 WARREN ROAD
BURLINGTON, WI 53105**



April 4, 2001

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
400 SEVENTH STREET, SW, ROOM 5311
WASHINGTON, D.C. 20590**

35 MPH FRONTAL BARRIER IMPACT TEST

Vehicle: 2001 Dodge Grand Caravan

NHTSA No.: M10317

Test Date: April 4, 2001

Test Speed: 56.3 kph

Vehicle Test Weight:

Weight as Delivered: = 1929.7 kg

Weight as Tested: = 2122.8 kg

Injury Criteria:

ATD Position	HIC	Clip (g's)	Chest Disp (mm)	Left Femur (N)	Right Femur (N)
Driver	345	63	28	2677	2060
Passenger	430	57	20	3815	2417

**DATA SHEET NO. 8
HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2001/Dodge/Grand Caravan
Test Program: 35 mph Frontal Barrier Impact

NHTSA No.: M10317
Test Date: April 4, 2001

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	19.2	154	59.8	61	49.0	156	63.4	71
Head CG	Y	G's	4.0	55	3.6	155	37.0	157	22.7	84
Head CG	Z	G's	16.5	34	27.3	29	12.3	53	21.9	93
Head CG Resultant	N/A	G's	60.1	61			65.0	71		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	5.6	155	67.6	64	14.9	157	65.4	67
Chest CG	Y	G's	3.4	83	3.1	32	5.2	88	9.2	86
Chest CG	Z	G's	6.3	164	16.2	81	12.1	77	9.1	96
Chest CG Resultant	N/A	G's	67.9	64			65.5	67		

FEMUR PEAK FORCES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	1536	48	2678	65	319	43	3816	61
Right Femur	Z	Newtons	1686	53	2060	70	539	47	2417	61

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	3540	61			3065	60		
Shoulder Belt Force	N/A	Newtons	--	--			--	--		

HEAD INJURY CRITERIA (HIC₁₅)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Primary	345	55.6	54.5	69.5	430	60.7	65.9	80.9

CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	63.0	62.4	65.5	56.7	65.9	69.0

NECK INJURY CRITERIA

Location	Driver	Passenger
N _{te}	0.2	0.7
N _{tf}	1.7	0.3
N _{ce}	0.0	0.2
N _{ct}	0.4	0.0

DATA SHEET NO. 8...(continued)
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PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	3.6	92	57.7	62	5.7	107	70.0	61
Pelvis	Y	G's	7.0	88	12.1	53	9.4	62	5.8	51
Pelvis	Z	G's	5.7	165	32.2	77	5.6	162	22.9	62

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	236	23	2540	56	484	86	761	49
Neck Force	Y	Newtons	237	23	203	23	267	77	300	156
Neck Force	Z	Newtons	2172	61	779	167	1453	61	107	94
Neck Moment	X	N•m	13.0	64	3.8	23	6.8	161	17.5	138
Neck Moment	Y	N•m	150.5	56	0.3	1	15.9	155	52.8	52
Neck Moment	Z	N•m	7.0	22	3.8	23	19.5	97	3.7	150

FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Foot Aft	X	G's	230.3	51	26.2	75	263.6	50	20.4	71
Left Foot Aft	Z	G's	30.0	57	30.9	69	20.6	56	48.8	51
Left Foot Fore	Z	G's	99.8	70	186.8	53	138.9	47	104.5	55
Right Foot Aft	X	G's	360.3	52	141.5	74	209.6	49	13.1	67
Right Foot Aft	Z	G's	220.3	53	119.5	74	27.6	58	52.7	49
Right Foot Fore	Z	G's	469.9	52	343.5	48	118.1	48	68.3	57

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Lower Moment	X	N•m	9.7	73	47.7	54	14.4	48	5.2	53
Left Lower Moment	Y	N•m	44.0	71	137.0	53	5.9	46	120.9	50
Left Lower Force	Z	Newtons	1961	53	299	62	1947	52	203	105
Left Upper Moment	X	N•m	9.1	136	42.1	55	28.8	52	8.3	36
Left Upper Moment	Y	N•m	12.4	147	173.6	53	12.7	118	93.9	57
Left Upper Force	Z	Newtons	1309	53	316	58	1540	52	329	46
Right Lower Moment	X	N•m	56.8	57	30.0	93	40.7	52	3.1	37
Right Lower Moment	Y	N•m	401.5	57	135.0	75	4.9	113	156.7	51
Right Lower Force	Z	Newtons	3988	52	752	50	1356	50	136	63
Right Upper Moment	X	N•m	47.5	65	36.8	92	45.0	53	7.0	35
Right Upper Moment	Y	N•m	87.9	58	109.8	75	15.2	113	86.5	51
Right Upper Force	Z	Newtons	2927	52	459	50	1193	51	119	41

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CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			28.2	66			19.6	78

HEAD REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	18.8	153	59.2	62	48.2	156	63.8	73
Head CG	Y	G's	6.2	57	4.2	154	36.3	156	20.6	83
Head CG	Z	G's	16.1	34	26.3	29	12.3	53	21.9	93
Head CG Resultant	N/A	G's	59.7	62			64.9	73		

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver				Passenger			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	5.5	154	67.4	64	14.9	156	64.3	67
Chest CG	Y	G's	4.1	81	3.4	68	4.8	88	9.6	86
Chest CG	Z	G's	6.3	163	16.8	81	12.2	77	8.5	96
Chest CG Resultant	N/A	G's	67.7	64			64.5	67		

REDUNDANT HEAD INJURY CRITERIA (HIC)

Location	Driver				Passenger			
	HIC	Avg G's	T ¹	T ²	HIC	Avg G's	T ¹	T ²
Head CG Primary Redundant	337	55.0	54.5	69.5	412	59.6	65.5	80.5

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver			Passenger		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary Redundant	62.5	62.2	65.3	55.3	65.9	69.0

