

**DATA SHEET NO. 7**

**VEHICLE ACCELEROMETER AND SQUIB SENSOR LOCATION AND DATA SUMMARY**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40402

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 8/12/04

**VEHICLE ACCELEROMETER PEAK DATA**

No.	Accelerometer Location	Peak Values				
		Units	Max	Time	Min	Time
1	Left Rear X	G's	2.3	126.8	-44.8	31.5
2	Right Rear X	G's	1.4	124.3	-39.7	32.2
3	Left Brake Caliper X	G's	65.9	56.7	-106.6	36.3
4	Right Brake Caliper X	G's	28.0	55.7	-83.5	41.4 <sup>1</sup>
5	Instrument Panel X	G's	40.6	72.1	-101.0	68.1
6	Engine Top X	G's	23.3	52.3	-89.1	37.0
7	Engine Bottom X	G's	29.6	54.5	-63.9	37.4
8	Toe Pan Accelerator X	G's	21.4	61.6	-61.8	47.0
9	Toe Pan Accelerator Z	G's	44.6	44.3	-64.1	55.5
10	Toe Pan Footrest X	G's	0.0	0.0	0.0	0.0 <sup>2</sup>
11	Toe Pan Footrest Z	G's	13.4	6.1	-19.8	84.8
12	Rear Deck Z	G's	29.9	15.7	-26.8	9.1
13	Rear Center Compartment X	G's	7.9	12.4	-45.6	6.5

1.) Channel failed at 115.0 msec.

2.) Channel failed, no data

**SQUIB FIRING TIME DATA**

Loc. No.	Contact Switch Location	Units	Peak Values			
			Max	Time	Min	Time
1	Driver Squib 1st Stage	On/Off	3.5	9.1	-1.4	11.7
2	Driver Squib 2nd Stage	On/Off	0.1	19.2	0.0	19.6
3	Driver Pretensioner	On/Off	3.6	9.1	-2.2	9.7
4	Passenger Squib 1st Stage	On/Off	3.0	9.1	-2.9	9.9
5	Passenger Squib 2nd Stage	On/Off	3.7	29.5	-2.8	30.3
6	Passenger Pretensioner	On/Off	5.3	10.0	-3.9	12.1

**DATA SHEET NO. 8**  
**VEHICLE ACCELEROMETER PRE AND POST TEST LOCATIONS**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40402

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 8/12/04

**VEHICLE ACCELEROMETER PRE AND POST TEST LOCATIONS**

No.	Accelerometer Location	Pre Test (mm)			Post Test (mm)			Difference (mm)		
		X	Y	Z	X	Y	Z	X	Y	Z
1	Left Rear X	2050	-705	320	2067	-710	340	17	5	20
2	Right Rear X	2050	705	320	2067	710	340	17	5	20
3	Left Brake Caliper X	4000	-710	250	3855	-710	210	-145	0	-40
4	Right Brake Caliper X	4000	710	250	3860	710	210	-140	0	-40
5	Instrument Panel X	3140	0	960	3190	0	960	50	0	0
6	Engine Top X	4035	35	810	3735	30	785	-300	-5	-25
7	Engine Bottom X	4120	-300	135	3810	-305	130	-310	5	-5
8	Toe Pan Accelerator X	3390	-240	245	3325	-160	195	-65	-80	-50
9	Toe Pan Accelerator Z	3390	-240	245	3325	-160	195	-65	-80	-50
10	Toe Pan Footrest X	3350	-650	245	3295	-635	185	-55	-15	-60
11	Toe Pan Footrest Z	3350	-650	245	3295	-635	185	-55	-15	-60
12	Rear Deck Z	255	-235	635	230	-235	770	-25	0	135
13	Rear Center Comp. X	2180	0	330	2190	0	385	10	0	55

Reference Planes: X=From Rear Surface of Vehicle, Y=Vehicle Centerline, Z=Ground Plane

**DATA SHEET NO. 9  
HYBRID III ATD INJURY CRITERIA AND SENSOR DATA**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40402

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 8/12/04

**HEAD PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	4.4	199.9	-73.3	77.5	3.5	199.7	-59.3	80.9
Head CG	Y	G's	14.3	84.8	-4.0	18.0	2.9	46.4	-28.9	101.1
Head CG	Z	G's	24.1	68.9	-12.4	91.8	38.2	82.3	-1.1	12.6
Head CG Resultant	N/A	G's	74.5	76.9			70.8	80.8		

**CHEST PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.3	134.3	-46.9	69.1	3.3	144.2	-42.4	74.0
Chest CG	Y	G's	12.5	71.5	-5.6	47.5	2.8	22.0	-12.0	88.1
Chest CG	Z	G's	10.1	42.2	-16.2	95.9	11.5	59.5	-9.0	104.1
Chest CG Resultant	N/A	G's	48.0	69.3			44.4	83.0		

**FEMUR PEAK FORCES**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	437.0	25.4	-4631.8	53.5	987.2	36.6	-6888.3	57.2
Right Femur	Z	Newtons	681.8	30.3	-3658.5	59.4	578.7	29.5	-5558.3	56.2

**KNEE PEAK DISPLACEMENTS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Knee	Z	MM	0.4	176.6	-12.8	54.2	0.8	31.5	-5.9	44.9
Right Knee	Z	MM	0.4	30.9	-11.5	53.2	0.0	0.0	0.0	0.0

1.) Channel failed, no data

**PRIMARY HEAD INJURY CRITERIA (HIC15)**

Location	Driver (95th)				Passenger (95th)			
	HIC	T <sup>1</sup>	T <sup>2</sup>	Avg G	HIC	T <sup>1</sup>	T <sup>2</sup>	Avg G
Head CG Primary	575.3	70.7	85.7	68.1	513.1	75.7	90.7	65.0

**PRIMARY CHEST CLIP (3MSEC)**

Location	Driver (95th)			Passenger (95th)		
	CLIP	T <sup>1</sup>	T <sup>2</sup>	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary	46.0	68.4	71.4	42.8	81.5	84.5

**DATA SHEET NO. 9...(CONTINUED)**

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

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**CHEST PEAK DISPLACEMENTS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest	X	MM	0.0	6.2	-32.5	92.7	0.0	3.1	-28.1	83.4

**UPPER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	536.3	89.9	-497.0	132.3	149.8	200.0	-479.2	122.3
Neck Force	Y	Newtons	0.0	0.0	0.0	0.0	184.9	88.5	-396.3	118.2
Neck Force	Z	Newtons	2087.7	69.0	-349.5	97.5	1906.1	80.4	-161.2	91.3
Neck Force Resultant	N/A	Newtons	2092.2	69.0			1922.6	80.4		
Neck Moment	X	Nm	16.4	112.6	-20.1	96.3	5.2	50.3	-27.4	114.2
Neck Moment	Y	Nm	65.7	124.2	-33.0	105.1	41.1	115.6	-45.8	66.9
Neck Moment	Z	Nm	13.3	133.8	-21.8	93.6	48.9	101.4	-17.1	146.1
Neck Moment Resultant	N/A	Nm	68.0	124.2			59.8	100.1		

1.) Channel failed, no data

**SEAT BELT SENSOR PEAK VALUES**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	7093.8	52.2	-2.6	2.9	8803.6	54.8	-4.2	2.2
Shoulder Belt Force	N/A	Newtons	4972.2	45.9	-46.4	137.9	5158.1	41.3	-35.7	200.0
Shoulder Belt Pullout	N/A	MM	310.2	95.8	-0.1	4.2	335.9	95.7	-0.1	3.3

**UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Upper Moment	X	Nm	67.6	36.0	-51.8	85.8	41.4	83.4	-43.2	42.1
Left Upper Moment	Y	Nm	280.4	53.7	-5.9	16.0	146.4	44.9	-78.4	63.0
Left Lower Force	X	Newtons	977.6	54.1	-45.5	8.6	1276.0	53.4	-469.8	71.7
Left Lower Force	Z	Newtons	827.7	31.8	-1813.1	41.2	1058.8	47.2	-3704.3	79.2
Left Lower Moment	X	Nm	14.7	54.8	-23.5	44.5	4.4	73.5	-46.0	40.0
Left Lower Moment	Y	Nm	65.3	86.2	-10.4	26.3	27.8	34.6	-88.0	53.5
Right Upper Moment	X	Nm	53.7	44.5	-40.5	88.0	14.1	71.9	-62.1	38.7
Right Upper Moment	Y	Nm	267.8	51.9	-15.9	81.7	291.6	40.5	-50.7	76.6
Right Lower Force	X	Newtons	505.3	63.2	-2646.7	39.1	471.8	77.3	-1741.4	38.5
Right Lower Force	Z	Newtons	610.2	55.2	-2481.3	82.4	812.8	37.5	-2609.9	83.1
Right Lower Moment	X	Nm	9.597	44.4	-12.956	87.9	2.324	92.1	-31.56	77.6
Right Lower Moment	Y	Nm	40.698	84.1	-11.241	31.5	110.05	81.6	-6.378	30.5

**DATA SHEET NO. 9...(CONTINUED)**

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**HEAD REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	4.4	200.0	-73.6	77.5	3.7	200.0	-59.3	81.0
Head CG	Y	G's	14.1	84.8	-4.0	18.0	2.5	46.5	-28.8	102.5
Head CG	Z	G's	24.7	68.7	-12.3	92.6	38.1	82.9	-1.0	13.0
Head CG Resultant	N/A	G's	74.9	76.9			70.7	82.8		

**CHEST REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Driver (95th)				Passenger (95th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	2.4	135.8	-46.7	69.1	3.4	143.9	-42.9	72.7
Chest CG	Y	G's	12.3	71.6	-5.4	47.5	3.0	46.3	-11.9	88.3
Chest CG	Z	G's	9.7	42.2	-15.9	95.8	11.5	59.5	-9.1	104.0
Chest CG Resultant	N/A	G's	47.7	69.3			43.9	82.7		

**REDUNDANT HEAD INJURY CRITERIA (HIC15)**

Location	Driver (95th)				Passenger (95th)			
	HIC	T <sup>1</sup>	T <sup>2</sup>	Avg G	HIC	T <sup>1</sup>	T <sup>2</sup>	Avg G
Head CG Redundant	584.3	70.3	85.3	68.5	511.0	75.6	90.6	64.9

**REDUNDANT CHEST CLIP (3MSEC)**

Location	Driver (95th)			Passenger (95th)		
	CLIP	T <sup>1</sup>	T <sup>2</sup>	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Redundant	45.7	68.4	71.4	42.2	81.4	84.4

**DATA SHEET NO. 9...(CONTINUED)**

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**HEAD PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Head CG	X	G's	0.8	30.6	-172.0	99.9
Head CG	Y	G's	6.4	106.9	-100.9	99.8
Head CG	Z	G's	83.9	81.9	-1.4	19.8
Head CG Resultant	N/A	G's	212.4	99.8		

**CHEST PRIMARY PEAK ACCELERATIONS**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Chest CG	X	G's	2.9	152.6	-48.9	64.1
Chest CG	Y	G's	3.3	73.8	-7.9	64.0
Chest CG	Z	G's	13.2	40.7	-5.6	111.5
Chest CG Resultant	N/A	G's	49.6	64.1		

**FEMUR PEAK FORCES**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Left Femur	Z	Newtons	1620.9	68.6	-805.2	35.3
Right Femur	Z	Newtons	2290.2	59.0	-1073.7	99.1

**KNEE PEAK DISPLACEMENTS**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Left Knee	Z	MM	0.0	0.0	0.0	0.0
Right Knee	Z	MM	0.7	74.0	-1.2	107.8

1.) Channel failed, no data

**PRIMARY HEAD INJURY CRITERIA (HIC15)**

Location	Center Rear Pass. (50th)			
	HIC	T <sup>1</sup>	T <sup>2</sup>	Avg G
Head CG Primary	1095.6	98.5	101.5	165.8

**PRIMARY CHEST CLIP (3MSEC)**

Location	Center Rear Pass. (50th)		
	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Primary	45.4	62.3	65.3

**DATA SHEET NO. 9...(CONTINUED)**

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**NINE ACCELEROMETER ARRAY HEAD PEAK ACCELERATIONS**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
NAAH CG	X	G's	0.9	19.0	-173.5	99.9
NAAH CG	Y	G's	6.5	106.9	-101.9	99.8
NAAH CG	Z	G's	83.2	82.2	-1.4	10.6
NAAH CG Resultant	N/A	G's	214.0	99.9		
NAAH X-ARM	Y	G's	12.5	102.4	-98.8	99.8
NAAH X-ARM	Z	G's	83.9	79.6	-9.9	99.2
NAAH Y-ARM	X	G's	2.4	11.2	-174.1	99.8
NAAH Y-ARM	Z	G's	121.7	99.7	-2.1	11.2
NAAH Z-ARM	X	G's	6.2	63.1	-278.2	99.3
NAAH Z-ARM	Y	G's	23.7	102.3	-185.7	99.7

**CHEST PEAK DISPLACEMENT**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Chest	X	MM	0.0	0.4	-33.5	86.6

**UPPER NECK PEAK FORCES AND MOMENTS**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Neck Force	X	Newtons	61.7	10.9	-1724.9	101.3
Neck Force	Y	Newtons	433.4	100.2	-80.4	47.0
Neck Force	Z	Newtons	3549.3	82.2	-674.5	100.3
Neck Force Resultant	N/A	Newtons	3776.8	82.2		
Neck Moment	X	Nm	33.4	103.5	-10.5	57.2
Neck Moment	Y	Nm	83.6	98.5	-59.7	63.0
Neck Moment	Z	Nm	5.3	83.7	-9.4	109.8
Neck Moment Resultant	N/A	Nm	84.4	98.4		

**SEAT BELT SENSOR PEAK VALUES**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	10040.9	58.1	-11.3	108.9
Shoulder Belt Force	N/A	Newtons	5678.9	83.6	-27.2	141.8
Shoulder Belt Pullout	N/A	MM	363.3	89.3	-0.1	10.6

**DATA SHEET NO. 9...(CONTINUED)**

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**CHEST REDUNDANT PEAK ACCELERATIONS**

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Chest CG	X	G's	2.8	152.2	-49.4	64.1
Chest CG	Y	G's	3.5	73.9	-7.9	63.9
Chest CG	Z	G's	12.9	40.8	-5.7	111.6
Chest CG Resultant	N/A	G's	50.1	64.1		

**REDUNDANT CHEST CLIP (3MSEC)**

Location	Center Rear Pass. (50th)		
	CLIP	T <sup>1</sup>	T <sup>2</sup>
Chest CG Redundant	45.7	62.4	65.4