

DATA SHEET NO. 7

VEHICLE ACCELEROMETER AND SQUIB SENSOR LOCATION AND DATA SUMMARY

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

NHTSA No.: R40401

Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

VEHICLE ACCELEROMETER PEAK DATA

No.	Accelerometer Location	Peak Values				
		Units	Max	Time	Min	Time
1	Left Rear X	G's	0.9	91.1	-43.1	39.9
2	Right Rear X	G's	1.8	92.6	-46.0	26.0
3	Left Brake Caliper X	G's	21.4	59.7	-68.0	47.6
4	Right Brake Caliper X	G's	18.8	34.7	-62.3	25.4
5	Instrument Panel X	G's	23.7	71.7	-71.7	48.2
6	Engine Top X	G's	19.3	63.5	-53.0	45.1
7	Engine Bottom X	G's	0.0	0.0	0.0	0.0
8	Toe Pan Accelerator X	G's	3.6	12.6	-47.0	40.2
9	Toe Pan Accelerator Z	G's	18.4	41.3	-18.8	59.8
10	Toe Pan Footrest X	G's	2.3	13.0	-42.7	9.0
11	Toe Pan Footrest Z	G's	22.9	43.2	-17.4	66.6
12	Rear Deck Z	G's	17.1	16.9	-16.7	50.4
13	Rear Center Compartment X	G's	4.6	13.6	-44.1	26.8

1.) Channel failed at 63.4 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	3.6	20.4	-2.7	20.9
2	Driver Squib 2nd Stage	On/Off	0.1	10.2	0.0	13.1
3	Driver Pretensioner	On/Off	0.0	0.0	0.0	0.0
4	Passenger Squib 1st Stage	On/Off	3.6	10.2	-2.5	11.2
5	Passenger Squib 2nd Stage	On/Off	3.3	30.6	-2.8	32.2
6	Passenger Pretensioner	On/Off	0.0	0.0	0.0	0.0

1.) Seatbelts not used

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

Test Vehicle: 2004 Jeep Liberty 4-Door MPV

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Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

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	1625	-705	450	1590	-700	515	-35	-5	65
2	Right Rear X	1625	705	450	1590	700	515	-35	-5	65
3	Left Brake Caliper X	3305	-610	304	3360	-630	350	55	20	46
4	Right Brake Caliper X	3305	610	304	3360	630	347	55	20	43
5	Instrument Panel X	2720	0	1145	2740	0	1165	20	0	20
6	Engine Top X	3575	-60	940	3560	-55	990	-15	5	50
7	Engine Bottom X	3485	70	330	3500	80	420	15	10	90
8	Toe Pan Accelerator X	2820	-300	350	2815	-345	370	-5	45	20
9	Toe Pan Accelerator Z	2820	-300	350	2815	-345	370	-5	45	20
10	Toe Pan Footrest X	2744	-660	350	2745	-695	370	1	35	20
11	Toe Pan Footrest Z	2744	-660	350	2745	-695	370	1	35	20
12	Rear Deck Z	220	0	660	200	0	750	-20	0	90
13	Rear Center Comp. X	1675	0	520	1665	0	575	-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

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Test Program: 2004 FMVSS 208 Upgrade

Test Date: 9/9/04

HEAD PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	2.3	18.5	-59.6	71.4	18.4	89.7	-79.0	60.9
Head CG	Y	G's	32.2	62.5	-7.0	75.9	7.0	184.6	-50.0	58.7
Head CG	Z	G's	31.8	67.2	-13.6	87.3	29.5	146.6	-41.0	86.5
Head CG Resultant	N/A	G's	65.9	71.4			90.8	60.9		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	1.5	158.7	-54.9	75.9	4.3	199.4	-57.0	71.3
Chest CG	Y	G's	7.6	75.7	-1.8	69.0	4.0	124.5	-10.2	72.1
Chest CG	Z	G's	23.9	71.2	-5.8	45.6	37.2	74.2	-6.5	41.9
Chest CG Resultant	N/A	G's	58.4	75.6			68.4	74.3		

FEMUR PEAK FORCES

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Femur	Z	Newtons	200.7	158.3	-7662.0	53.2	483.7	102.7	-7646.7	46.9
Right Femur	Z	Newtons	155.6	199.3	-6578.2	62.3	247.5	159.5	-8065.1	50.7

PRIMARY HEAD INJURY CRITERIA (HIC36)

Location	Driver (50th)				Passenger (50th)			
	HIC	T ¹	T ²	Avg G	HIC	T ¹	T ²	Avg G
Head CG Primary	329.3	59.2	79.2	48.5	524.3	54.3	69.7	64.8

PRIMARY HEAD INJURY CRITERIA (HIC15)

Location	Driver (50th)				Passenger (50th)			
	HIC	T ¹	T ²	Avg G	HIC	T ¹	T ²	Avg G
Head CG Primary	306.7	60.5	75.5	52.9	523.2	54.4	69.4	65.5

PRIMARY CHEST CLIP (3MSEC)

Location	Driver (50th)			Passenger (50th)		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Primary	54.9	74.0	77.0	66.6	72.7	75.7

DATA SHEET NO. 9...(CONTINUED)

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UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	Newtons	1312.0	81.8	-378.8	152.2	2346.0	85.7	-522.8	175.0
Neck Force	Y	Newtons	26.9	50.0	-243.8	75.0	1434.8	87.3	-110.8	145.5
Neck Force	Z	Newtons	604.5	117.8	-1201.6	70.4	1342.5	68.0	-830.3	58.5
Neck Force Resultant	N/A	Newtons	1688.9	70.4			2739.0	86.0		
Neck Moment	X	Nm	24.4	78.4	-12.3	68.4	24.5	59.5	-62.4	71.0
Neck Moment	Y	Nm	51.7	69.7	-10.7	110.4	48.4	172.7	-34.9	87.4
Neck Moment	Z	Nm	8.5	90.5	-3.7	66.5	52.9	86.4	-4.9	69.8
Neck Moment Resultant	N/A	Nm	52.3	81.8			63.7	70.7		

NINE ACCELEROMETER ARRAY HEAD PEAK ACCELERATIONS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
NAAH CG	X	G's	1.6	18.5	-59.0	71.4	18.7	89.7	-78.1	60.9
NAAH CG	Y	G's	33.1	62.5	-6.9	76.4	7.2	184.4	-51.4	58.7
NAAH CG	Z	G's	31.7	67.2	-13.7	87.3	29.2	146.6	-41.5	86.2
NAAH CG Resultant	N/A	G's	65.3	71.5			90.3	60.9		
NAAH X-ARM	Y	G's	41.8	63.5	-9.2	80.0	15.9	86.9	-74.6	57.5
NAAH X-ARM	Z	G's	27.5	75.6	-13.6	61.0	38.7	67.0	-26.8	54.9
NAAH Y-ARM	X	G's	2.1	39.1	-66.1	70.4	33.6	89.0	-70.3	59.0
NAAH Y-ARM	Z	G's	36.4	67.4	-14.8	82.5	42.4	58.5	-50.4	86.5
NAAH Z-ARM	X	G's	7.9	83.8	-79.8	71.5	50.1	87.0	-135.0	60.8
NAAH Z-ARM	Y	G's	60.9	63.3	-18.3	69.1	22.0	79.3	-77.5	58.7

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest	X	MM	0.2	23.8	-41.6	80.9	0.5	52.6	-12.0	87.1

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 ¹
Shoulder Belt Force	N/A	Newtons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 ¹
Shoulder Belt Pullout	N/A	MM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 ¹

1.) Driver and passenger seatbelts were not used

DATA SHEET NO. 9...(CONTINUED)

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KNEE PEAK DISPLACEMENTS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Knee	Z	MM	0.0	0.0	0.0	0.0	0.3	105.5	-4.3	41.3
Right Knee	Z	MM	0.0	0.0	0.0	0.0	0.2	170.6	-12.0	39.4

1.) Driver channels failed, no data

UPPER AND LOWER TIBIA PEAK FORCES AND MOMENTS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Upper Force	X	Newtons	480.4	32.1	-1121.1	69.5	106.3	24.8	-1116.9	39.0
Left Upper Force	Z	Newtons	126.8	176.7	-1453.0	75.0	120.2	136.0	-4775.1	73.3
Left Upper Moment	X	Nm	43.0	63.1	-2.1	199.4	14.4	194.5	-75.3	74.0
Left Upper Moment	Y	Nm	161.7	36.8	-1.4	13.1	109.1	38.6	-20.8	53.6
Left Lower Force	X	Newtons	569.6	35.9	-86.3	48.7	631.7	71.2	-195.6	27.5
Left Lower Force	Y	Newtons	154.2	48.9	-243.3	63.2	662.9	74.6	-62.7	192.6
Left Lower Force	Z	Newtons	165.3	25.8	-2820.7	71.8	147.7	142.3	-5600.1	73.4
Left Lower Moment	X	Nm	78.2	75.7	-8.3	29.0	33.2	83.1	-31.0	36.5
Left Lower Moment	Y	Nm	53.9	70.7	-15.2	46.9	76.1	71.3	-40.2	31.6
Right Upper Force	X	Newtons	804.1	59.1	-1117.7	34.9	671.8	58.0	-1963.5	38.8
Right Upper Force	Z	Newtons	388.5	44.6	-1992.8	73.7	200.5	173.2	-3886.1	76.5
Right Upper Moment	X	Nm	22.6	62.2	-16.8	115.7	45.9	56.9	-120.2	76.4
Right Upper Moment	Y	Nm	177.6	35.3	-4.7	14.7	5.1	199.9	-224.2	38.3
Right Lower Force	X	Newtons	608.2	35.1	-73.3	29.2	957.2	37.7	-13.5	6.5
Right Lower Force	Y	Newtons	75.3	53.6	-106.0	31.5	248.1	57.7	-818.9	76.5
Right Lower Force	Z	Newtons	168.9	194.6	-3421.8	72.7	251.3	30.9	-5074.1	74.8
Right Lower Moment	X	Nm	21.8	71.6	-11.2	88.9	62.3	83.7	-6.3	39.4
Right Lower Moment	Y	Nm	44.7	71.7	-31.6	29.5	99.4	72.4	-1.4	15.2

TIBIA AND FOOT PEAK ACCELERATIONS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Tibia	X	G's	8.7	70.4	-77.1	48.4	17.6	70.6	-71.9	31.2
Left Tibia	Y	G's	19.1	64.6	-25.7	48.4	25.9	70.6	-16.9	57.4
Left Foot	X	G's	29.5	73.0	-102.2	36.0	30.6	69.1	-76.1	40.4
Left Foot	Y	G's	22.1	26.9	-36.0	75.6	29.2	27.5	-25.7	77.1
Left Foot	Z	G's	19.7	36.3	-57.3	47.9	53.0	23.7	-31.6	32.5
Right Tibia	X	G's	5.4	21.1	-74.4	29.1	19.0	50.2	-79.6	42.8
Right Tibia	Y	G's	14.3	35.3	-17.1	72.3	28.9	82.8	-84.4	42.9
Right Foot	X	G's	21.4	70.4	-120.8	36.4	24.8	75.0	-119.5	39.3
Right Foot	Y	G's	27.5	44.4	-22.5	71.4	31.8	44.5	-25.6	80.5
Right Foot	Z	G's	27.9	29.3	-65.8	34.4	41.2	44.8	-47.6	51.9

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ANKLE PEAK ROTATIONS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Left Ankle	X	Degrees	5.7	25.7	-36.5	197.6	37.8	83.2	-1.9	29.1
Left Ankle	Y	Degrees	18.8	74.5	-18.3	26.7	0.9	68.5	-30.1	32.4
Left Ankle	Z	Degrees	2.2	42.5	-8.3	69.0	12.4	128.5	4.7	0.4
Right Ankle	X	Degrees	2.4	8.6	-9.1	91.1	37.1	82.7	-4.4	194.5
Right Ankle	Y	Degrees	24.2	73.9	-17.5	34.2	9.2	77.1	-30.3	34.9
Right Ankle	Z	Degrees	0.0	0.0	0.0	0.0	3.7	38.4	-7.3	196.9

1.) Driver channel questionable data 2.) Driver channel failed, no data

CHEST REDUNDANT PEAK ACCELERATIONS

Location	Axis	Units	Driver (50th)				Passenger (50th)			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	1.5	160.0	-54.8	75.9	4.3	198.5	-57.6	71.1
Chest CG	Y	G's	7.8	75.7	-1.7	69.0	4.0	126.2	-9.8	71.9
Chest CG	Z	G's	24.0	71.2	-6.0	45.6	36.8	74.1	-6.1	38.7
Chest CG Resultant	N/A	G's	58.3	75.6			67.9	74.2		

REDUNDANT CHEST CLIP (3MSEC)

Location	Driver (50th)			Passenger (50th)		
	CLIP	T ¹	T ²	CLIP	T ¹	T ²
Chest CG Redundant	54.9	73.9	76.9	66.3	72.7	75.7

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	1.1	16.4	-50.8	106.7
Head CG	Y	G's	2.0	104.9	-3.5	66.0
Head CG	Z	G's	54.2	85.8	-0.6	11.5
Head CG Resultant	N/A	G's	63.5	88.5		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Chest CG	X	G's	1.5	153.1	-44.7	54.4
Chest CG	Y	G's	8.9	80.3	-3.1	74.3
Chest CG	Z	G's	10.9	79.8	-15.8	46.1
Chest CG Resultant	N/A	G's	45.8	54.4		

FEMUR PEAK FORCES

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Left Femur	Z	Newtons	1616.5	45.2	-1539.4	57.7
Right Femur	Z	Newtons	1787.0	46.3	-2388.6	58.5

PRIMARY HEAD INJURY CRITERIA (HIC36)

Location	Center Rear Pass. (50th)			
	HIC	T ¹	T ²	Avg G
Head CG Primary	851.9	74.0	110.0	56.2

PRIMARY HEAD INJURY CRITERIA (HIC15)

Location	Center Rear Pass. (50th)			
	HIC	T ¹	T ²	Avg G
Head CG Primary	419.6	79.3	94.3	60.0

PRIMARY CHEST CLIP (3MSEC)

Location	Center Rear Pass. (50th)		
	CLIP	T ¹	T ²
Chest CG Primary	41.2	49.3	52.3

CHEST PEAK DISPLACEMENT

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Chest	X	MM	0.0	8.0	-37.8	84.2

DATA SHEET NO. 9...(CONTINUED)

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UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Neck Force	X	Newtons	82.7	28.1	-1678.5	106.0
Neck Force	Y	Newtons	58.3	105.2	-74.9	55.2
Neck Force	Z	Newtons	2352.1	88.2	-52.9	6.2
Neck Force Resultant	N/A	Newtons	2658.4	89.9		
Neck Moment	X	Nm	3.9	97.4	-16.1	115.0
Neck Moment	Y	Nm	83.6	108.7	-63.2	62.6
Neck Moment	Z	Nm	9.1	112.2	-4.4	66.1
Neck Moment Resultant	N/A	Nm	84.8	108.7		

NINE ACCELEROMETER ARRAY HEAD PEAK ACCELERATIONS

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
NAAH CG	X	G's	5.0	14.7	-50.6	106.6
NAAH CG	Y	G's	1.9	105.3	-3.6	66.0
NAAH CG	Z	G's	54.7	85.8	-0.5	11.9
NAAH CG Resultant	N/A	G's	63.7	88.9		
NAAH X-ARM	Y	G's	3.8	93.7	-5.1	65.1
NAAH X-ARM	Z	G's	56.4	85.8	-1.7	15.0
NAAH Y-ARM	X	G's	0.8	26.7	-52.8	106.8
NAAH Y-ARM	Z	G's	57.0	75.8	-1.0	11.9
NAAH Z-ARM	X	G's	11.2	59.3	-78.4	106.1
NAAH Z-ARM	Y	G's	8.5	72.6	-7.9	97.7

KNEE PEAK DISPLACEMENTS

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Left Knee	Z	MM	1.0	96.6	-2.6	58.6
Right Knee	Z	MM	0.0	0.0	0.0	0.0

1.) Channel failed, no data

SEAT BELT SENSOR PEAK VALUES

Location	Axis	Units	Center Rear Pass. (50th)			
			Max	Time	Min	Time
Lap Belt Force	N/A	Newtons	8057.4	49.3	-52.8	135.9
Shoulder Belt Force	N/A	Newtons	5285.0	76.0	-29.5	160.9
Shoulder Belt Pullout	N/A	MM	304.5	86.8	0.0	3.5