REPORT NUMBER: NCAPCHILD-MGA-2004-001

NEW CAR ASSESSMENT PROGRAM
FRONTAL BARRIER IMPACT TEST

Evenflo Vanguard 5
Graco Treasured CarGo

NHTSA NUMBER: M40201

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

Test Date: October 16, 2003

Report Date: December 8, 2003

FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number DTNH22-01-D-12005.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: Shefalika Agarwal Date: 12/8/03
Shefalika Agarwal, Project Engineer

Reviewed by: David Winkelbauer Date: 12/8/03
David Winkelbauer, Facility Director

FINAL REPORT ACCEPTED BY:

_____
Manager, New Car Assessment Program

_____
Date of Acceptance

_____
COTR, NCAP Frontal Impact Program

_____
Date of Acceptance

Technical Report Documentation Page

1. Report No. NCAPCHILD-MGA-2004-001	*2. Government Accession No.*	*3. Recipient's Catalog No.*
4. Title and Subtitle Final Report of New Car Assessment Program Testing of Evenflo Vanguard 5 and Graco Treasured CarGo Child Restraint Systems NHTSA No.: M40201		*5. Report Date* December 8, 2003 *6. Performing Organization Code* MGA
7. Author(s) Shefalika Agarwal, Project Engineer		*8. Performing Organization Report No.* NCAPCHILD-MGA-2004-001
9. Performing Organization Name and Address MGA Research Corporation 5000 Warren Road Burlington, WI 53105		*10. Work Unit No.* *11. Contract or Grant No.* DTNH22-01-D-12005
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Rulemaking, Office of Crashworthiness Standards 400 Seventh Street, SW, Room 5311 Washington, D.C. 20590		*13. Type of Report and Period Covered* Final Report 10/16/03 to 12/8/03 *14. Sponsoring Agency Code* NVS-111

15. Supplementary Notes

16. Abstract

The subjects CRS Evenflo Vanguard 5 and Graco Treasured CarGo were tested in conjunction with a Frontal NCAP test in support of research in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the determination of CRS crashworthiness. This test was conducted at MGA Research Corporation in Burlington, Wisconsin on October 16, 2003, in conjunction with frontal NCAP.

Measurement Description	Units	Pos. 3 ATD	Pos. 4 ATD
Head Injury Criteria (HIC36)	N/A	472	1396
Head Injury Criteria (HIC15)	N/A	257	1021
Max. Thorax Accel. (3msec Clip)	G's	40	58

17. Key Words 56.3 km/h NCAP Frontal Barrier Impact Test New Car Assessment Program (NCAP) Evenflo Vanguard 5 NHTSA No: M40201		*18. Distribution Statement* Copies of this report are available from: National Highway Traffic Safety Admin., Technical Ref. Division, Room 5108 (NPO-230) 400 Seventh Street, S.W. Washington, D.C. 20590	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 108	22. Price

Form DOT F1700.7 (8-72)

TABLE OF CONTENTS

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

The purpose of this test was to obtain CRS performance data in a frontal impact NCAP condition.

This 56.5 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-01-D-12005.

SUMMARY

Both child dummies were instrumented with head, chest, and pelvic triaxial accelerometers. In addition, both dummies had six upper axial neck force and moment sensors.

The right rear (Position 3) child dummy (S/N 40) and left rear (Position 4) child dummy (S/N 186) were calibrated previous to this test. Child dummy certification information is found in Appendix C.

The right rear child dummy's HIC36 was 471.8; maximum chest deceleration over 3 msec was 40.3 g's. The left rear child dummy's HIC36 was 1396.0. The maximum chest deceleration over 3 msec was 57.6 g's. Position 3 was forward facing and used the vehicle LATCH and top tether for attachment. Position 4 was forward facing and was used as a booster seat.

SECTION 2
DATA SHEET NO. 1
CRASH TEST SUMMARY

TEST DUMMY INFORMATION

Description	Position 3 CRS	Position 4 CRS
Dummy Type / Serial No.	HIII 3 Year Old / 40	HIII 6 Year Old / 186
Number of Data Channels	22	22
Restraint System	Evenflo Vanguard 5 (Forward Facing)	Graco Treasured CarGo (Booster Forward Facing)

CAMERA COVERAGE

High Speed	16
Real Time	1
Total	17

POST TEST DOOR OPENING

Description	Front	Rear
Left Side Doors	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Right Side Doors	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Hatch/Other Door	None	None

POST TEST SEAT DATA

Location	Seat Movement (mm)	Seat Back Failure
P1 (Left Front)	0	None
P2 (Right Front)	0	None
P3 (Right Rear)	0	None
P4 (Left Rear)	0	None

VISIBLE DUMMY CONTACT POINTS

Description	Position 3 CRS (S/N 40)	Position 4 CRS (S/N 186)
Head Contact	Back of head to CRS	Back of head to CRS
Upper Torso Contact	None	Chin to Chest
Lower Torso Contact	None	Left knee to booster seat
Left Foot Contact	None	Back of Drivers seat
Right Foot Contact	None	Back of Drivers seat

SECTION 2… (continued)

DATA SHEET NO. 2
CRS PARAMETER DATA

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Booster Forward Facing) Graco Treasured CarGo
NHTSA No.	M40201

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1546.7
Weight of 2 P572E ATDs	kg	156.0
Rated Cargo/Luggage Weight (RCLW)	kg	90.7
Calculated Vehicle Target Weight (TVTW)	kg	1793.4

TEST VEHICLE WEIGHTS

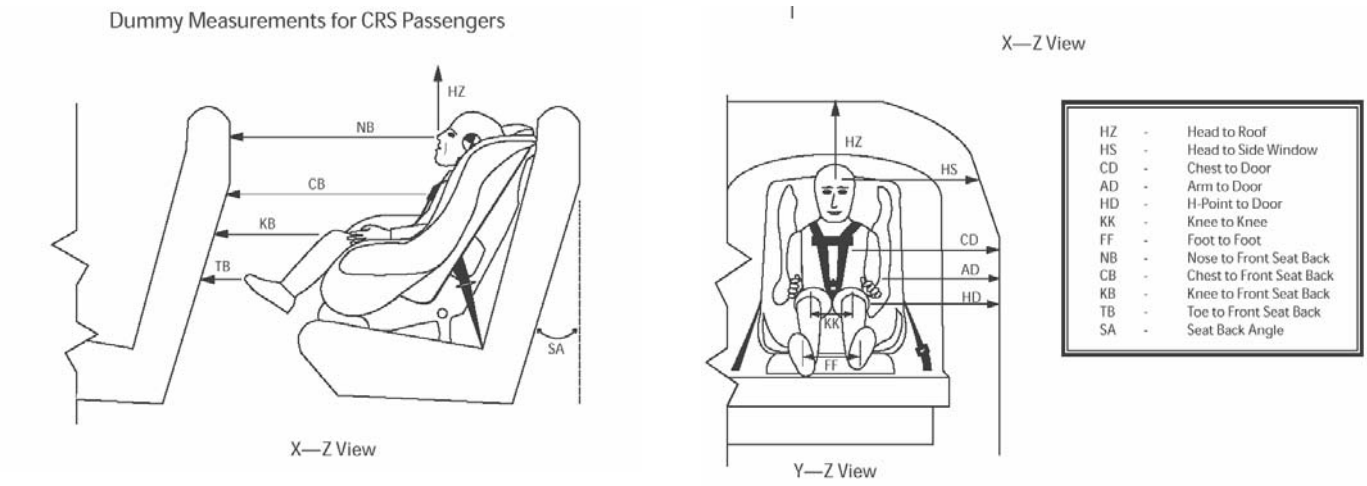
	Units	As Tested (ATW) (Axle)		
		Front	Rear	Total
Left	kg	533.4	351.1	
Right	kg	531.6	368.3	
Ratio	%	59.7	40.3	
Totals	kg	1065.0	719.4	1784.4

As tested weight of vehicle includes two 50th percentile ATDs, one 3 year old with CRS, one 6 year old with CRS, cargo, equipment and instrumentation.

SECTION 2… (continued)

DATA SHEET NO. 3
CHILD DUMMY POSITIONING IN VEHICLE

Child Restraint System (Position 3)	Evenflo Vanguard 5 (Forward Facing)
NHTSA No.	M40201



Measurement	Pre-Test (mm)	Post-Test (mm)
	P3 CRS (42)	P3 CRS (42)
SA (deg)	21.7	21.6
HS	464	452
CD	411	411
AD	269	262
HD	282	290
HZ	394	340
NB	650	692
CB	619	650
KK	156	188
FF	159	198
KB - LEFT	406	450
KB – RIGHT	407	451
TB - LEFT	116	163
TB - RIGHT	116	170

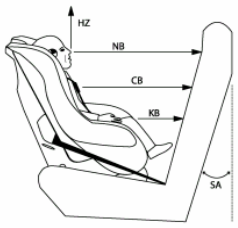
All dimensions in mm (unless noted)
P3 – Right Rear Passenger (Forward Facing)

SECTION 2… (continued)

DATA SHEET NO. 3
CHILD DUMMY POSITIONING IN VEHICLE

Child Restraint System (Position 4)	Graco Treasured CarGo (Booster Forward Facing)
NHTSA No.	M40201

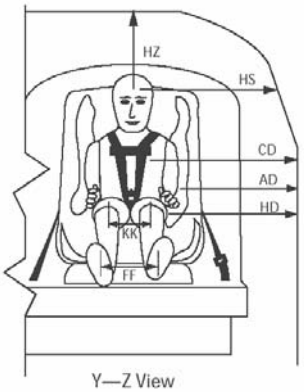
Dummy Measurements for Rear-facing CRS Passengers



X—Z View

HZ	-	Head to Roof
NB	-	Nose to Front of Back Seat
CB	-	Chest to Front of Back Seat
KB	-	Knee to Front of Back Seat
SA	-	Seat Back Angle

X—Z View



Y—Z View

HZ	-	Head to Roof
HS	-	Head to Side Window
CD	-	Chest to Door
AD	-	Arm to Door
HD	-	H-Point to Door
KK	-	Knee to Knee
FF	-	Foot to Foot
NB	-	Nose to Front Seat Back
CB	-	Chest to Front Seat Back
KB	-	Knee to Front Seat Back
TB	-	Toe to Front Seat Back
SA	-	Seat Back Angle

Measurement	Pre-Test (mm)	Post-Test (mm)
	P4 CRS (186)	P4 CRS (186)
SA (deg)	21.6	21.6
HS	418	351
CD	378	327
AD	239	143
HD	219	202
HZ	323	309
NB	679	702
CB	662	671
KK	140	149
FF	137	131
KB - LEFT	324	355
KB – RIGHT	326	387
TB - LEFT	115	141
TB - RIGHT	124	186

All dimensions in mm (unless noted)
P4 – Left Rear Passenger (Forward facing)

SECTION 2… (continued)

DATA SHEET NO. 4
CHILD DUMMY INJURY CRITERIA VALUES

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Booster Forward Facing) Graco Treasured CarGo
NHTSA No.	M40201

HEAD PEAK ACCELERATIONS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	0.5	25	-35.6	110	2.5	36	-33.3	81
Head CG	Y	G's	2.6	61	-16.9	110	5.1	95	-11.9	115
Head CG	Z	G's	45.3	88	-12.2	46	86.1	91	-6.8	57
Resultant	N/A	G's	50.4	86			89.8	91		

UPPER NECK PEAK FORCES AND MOMENTS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Neck Force	X	N	11	196	-624	85	10	37	-740	80
Neck Force	Y	N	46	67	-50	107	106	118	-54	105
Neck Force	Z	N	1717	86	-279	46	2800	93	-246	59
Resultant	N/A	N	1826	86			2868	93		
Neck Moment	X	N•m	3.8	73	-8.5	109	8.9	72	-6.7	94
Neck Moment	Y	N•m	10.3	61	-4.2	78	23.4	107	-39.6	73
Neck Moment	Z	N•m	1.7	131	-0.5	84	2.2	112	-1.5	100
Resultant	N/A	N•m	10.5	61			40.5	73		

CHEST PRIMARY PEAK ACCELERATIONS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.0	192	-31.2	80	3.1	166	-49.3	70
Chest CG	Y	G's	1.9	97	-3.7	81	11.5	93	-12.9	64
Chest CG	Z	G's	12.2	90	-28.2	62	18.3	99	-36.4	69
Resultant	N/A	G's	41.3	62			60.5	69		

CHEST PEAK DISPLACEMENTS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	mm			-16.3	119			-18.6	92

SECTION 2… (continued)

DATA SHEET NO. 4… (continued)
CHILD DUMMY INJURY CRITERIA VALUES

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Booster Forward Facing) Graco Treasured CarGo
NHTSA No.	M40201

TETHER FORCE

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Tether Force	N/A	N	2399	58	-103.6	157				

PELVIC PEAK ACCELERATIONS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Pelvis	X	G's	5.0	166	-32.3	79	9.6	123	-47.3	67
Pelvis	Y	G's	2.7	165	-6.8	58	9.9	121	-10.0	51
Pelvis	Z	G's	3.6	198	-28.2	57	10.8	101	-61.4	79
Resultant	N/A	G's	41.3	60			70.3	79		

HEAD PEAK REDUNDANT ACCELERATIONS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Head CG	X	G's	0.2	0	-36.0	110	0.4	39	-35.8	80
Head CG	Y	G's	1.9	66	-17.1	110	4.2	94	-12.4	115
Head CG	Z	G's	45.5	78	-10.3	47	89.0	92	-7.3	60
Resultant	N/A	G's	51.3	80			93.1	91		

CHEST PEAK REDUNDANT ACCELERATIONS

Location	Axis	Units	Position 3				Position 4			
			Max	Time	Min	Time	Max	Time	Min	Time
Chest CG	X	G's	3.5	190	-31.9	81	3.2	182	-49.8	71
Chest CG	Y	G's	2.7	84	-6.0	85	16.0	80	-14.5	64
Chest CG	Z	G's	13.0	90	-28.1	62	19.4	100	-37.2	69
Resultant	N/A	G's	41.9	62			61.2	69		

SECTION 2… (continued)

DATA SHEET NO. 4… (continued)
CHILD DUMMY INJURY CRITERIA VALUES

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Booster Forward Facing) Graco Treasured CarGo
NHTSA No.	M40201

HEAD INJURY CRITERIA (HIC36)

Location	HIC	T^1 (msec)	T^2 (msec)	Average Acceleration (G's)
Position 3 - Right	472	67.6	103.6	44.3
Position 4 – Left	1396	74.9	104.2	74.3

HIC is as defined in FMVSS 208. The maximum time interval from t1 to t2 is 36 milliseconds.

HEAD INJURY CRITERIA (HIC15)

Location	HIC	T^1 (msec)	T^2 (msec)	Average Acceleration (G's)
Position 3 - Right	257	75.5	90.5	49.3
Position 4 – Left	1021	82.4	97.4	85.7

HIC is as defined in FMVSS 208. The maximum time interval from t1 to t2 is 15 milliseconds.

CLIP SUMMARY

Location	CLIP	T^1 (msec)	T^2 (msec)
Position 3 - Right	40.3	60.4	63.4
Position 4 – Left	57.6	67.4	70.4

The maximum chest resultant acceleration is defined as the maximum acceleration, which exceeds 0.003 seconds in duration.

DATA SHEET NO. 5
CRS PERFORMANCE DATA

Child Restraint System (Position 3)	Evenflo Vanguard 5
Child Restraint System (Position 4)	(Booster Forward Facing) Graco Treasured CarGo
NHTSA No.	M40201

POSITION 3 CRS POST-TEST INSPECTION

Location	Damage	Remarks
Upper Tether Strap	None	
Upper Tether Buckle	None	
Upper Tether Hook	None	
Vehicle Upper Tether Anchor	None	
Lower Anchor Strap	None	
Lower Anchor Buckle	None	
Lower Anchor Hooks	None	
Vehicle Lower CRS Anchors	None	
Five Point Harness Connections	None	
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	

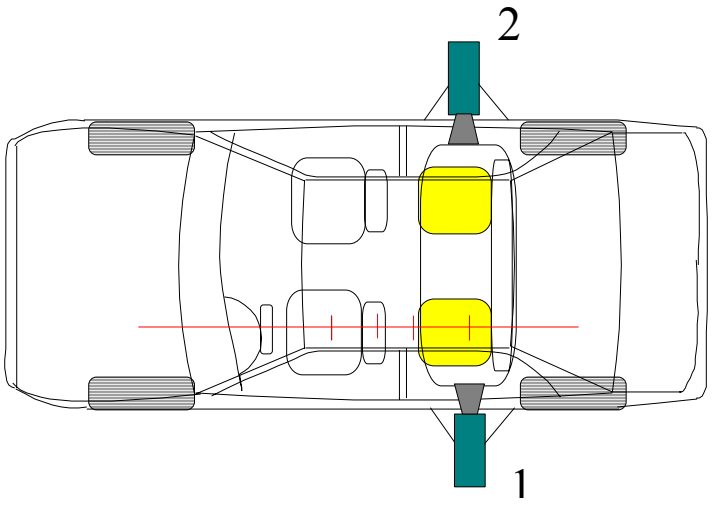
POSITION 4 CRS POST-TEST INSPECTION

Location	Damage	Remarks
Upper Tether Strap		Booster Seat
Upper Tether Buckle		
Upper Tether Hook		
Vehicle Upper Tether Anchor		
Lower Anchor Strap		
Lower Anchor Buckle		
Lower Anchor Hooks		
Vehicle Lower CRS Anchors		
Five Point Harness Connections		
Cracks on CRS	None	
Fabric Tears on CRS	None	
Vehicle Seat Structure	None	
Vehicle Seat Fabric Tears	None	
Child Dummy	None	

SECTION 2… (continued)

DATA SHEET NO. 6
CRS CAMERA DATA

Child Restraint System (Position 3)	Evenflo Vanguard 5 (Forward Facing)
Child Restraint System (Position 4)	(Booster Forward Facing) Graco Treasured CarGo
NHTSA No.	M40201



No.	Camera View	Location (mm) *			Angle (deg)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Left Side CRS Lateral View					13	505
2	Right Side CRS Lateral View					13	526

*COORDINATES:

+X = film plane rearward of barrier

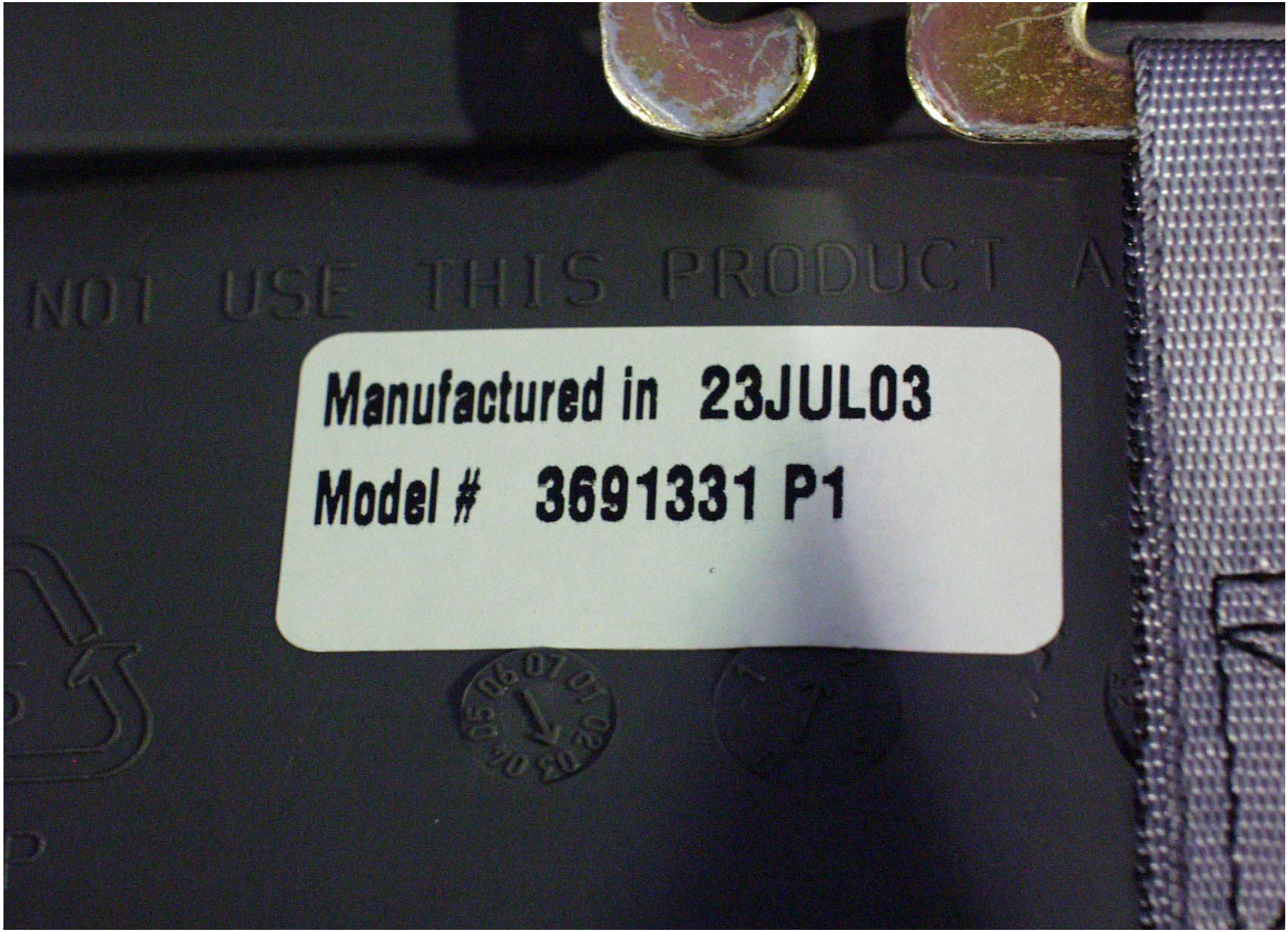
+Y = film plane to right of monorail centerline

+Z = film plane above ground level

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



A-1.

Close-up View of Position 3 CRS Label

Pre-Test Frontal View of Position 3 CRS

Post-Test Front View of Position 3 CRS

Pre-Test Rear View of Position 3 CRS

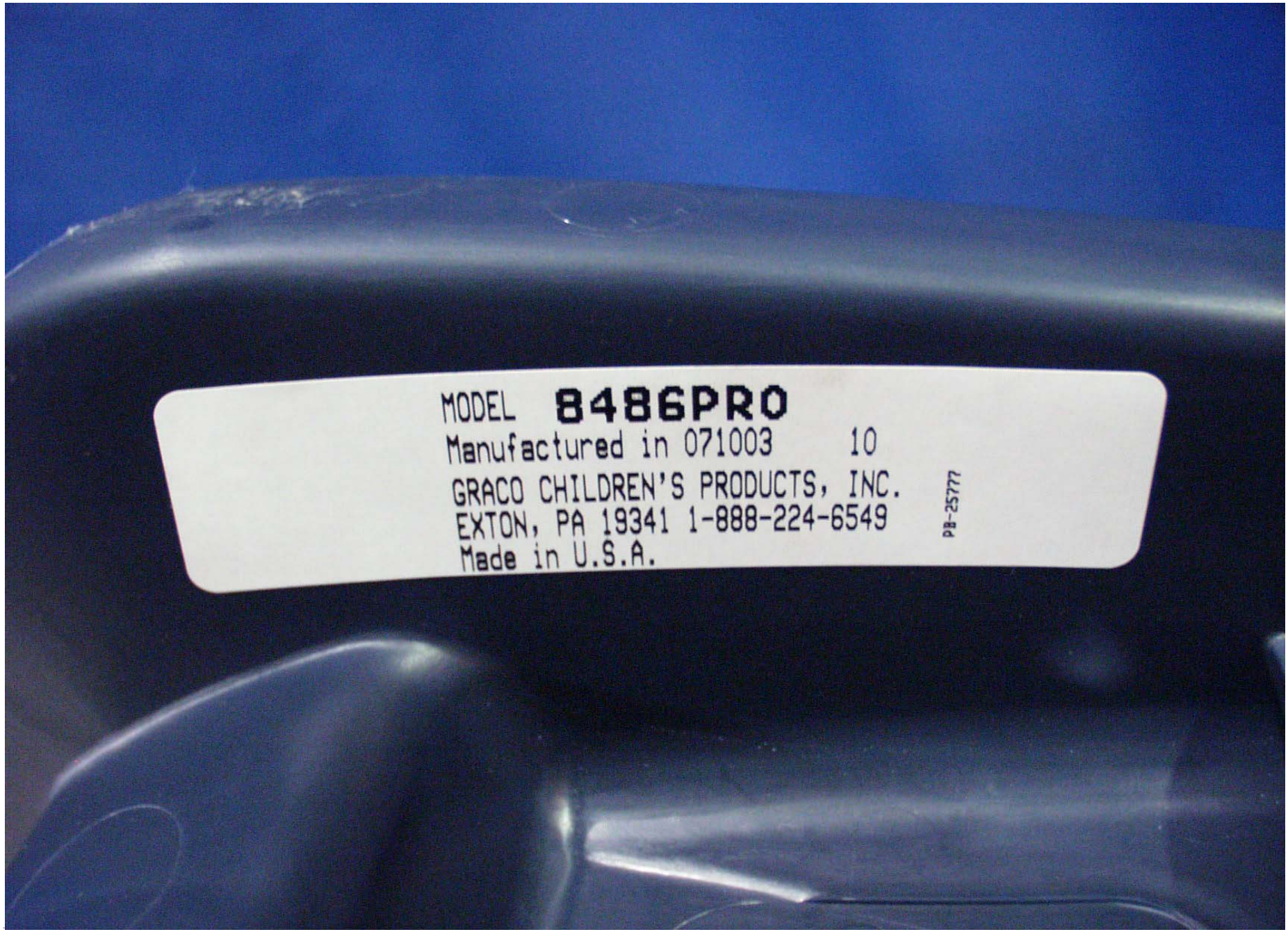
Post-Test Rear View of Position 3 CRS

Pre-Test Left Side View of Position 3 CRS

Post-Test Left Side View of Position 3 CRS

Pre-Test Right Side View of Position 3 CRS

Post-Test Right Side View of Position 3 CRS



Close-up View of Position 4 CRS Label

Pre-Test Frontal View of Position 4 CRS

Post-Test Front View of Position 4 CRS

Pre-Test Rear View of Position 4 CRS

Post-Test Rear View of Position 4 CRS

Pre-Test Left Side View of Position 4 CRS

Post-Test Left Side View of Position 4 CRS

Pre-Test Right Side View of Position 4 CRS

Post-Test Right Side View of Position 4 CRS

Pre-Test Position 3 Left Side View

Post-Test Position 3 Left Side View

Pre-Test Position 4 Left Side View

Post-Test Position 4 Left Side View

Pre-Test Position 3 Right Side View

Post-Test Position 3 Right Side View

Pre-Test Position 4 Right Side View

Post-Test Position 4 Right Side View

Pre-Test Position 3 Rear View

Pre-Test Position 4 Rear View

Post-Test Positions 3 and 4 Rear Views

Post-Test Position 3 View

Post-Test Position 4 View

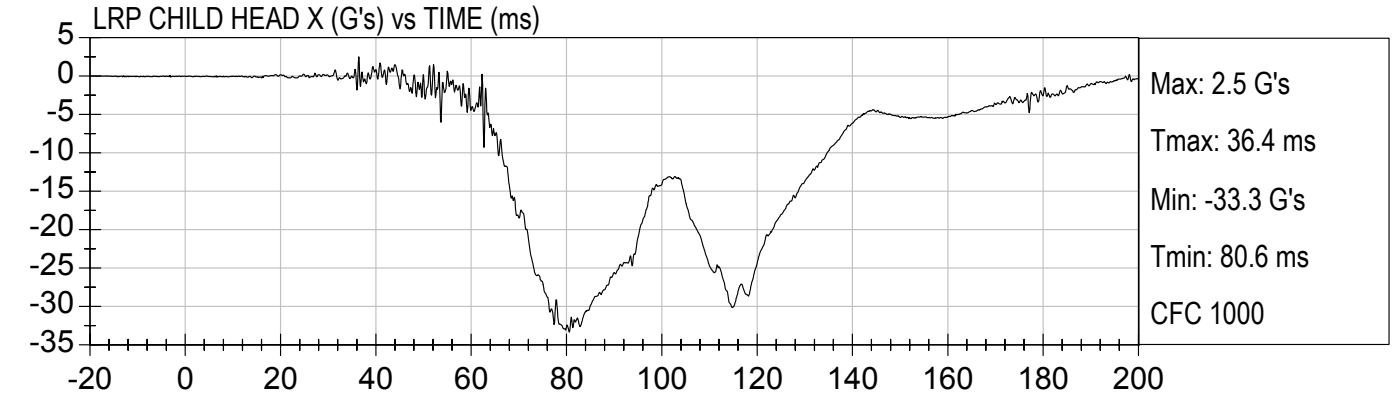
APPENDIX B

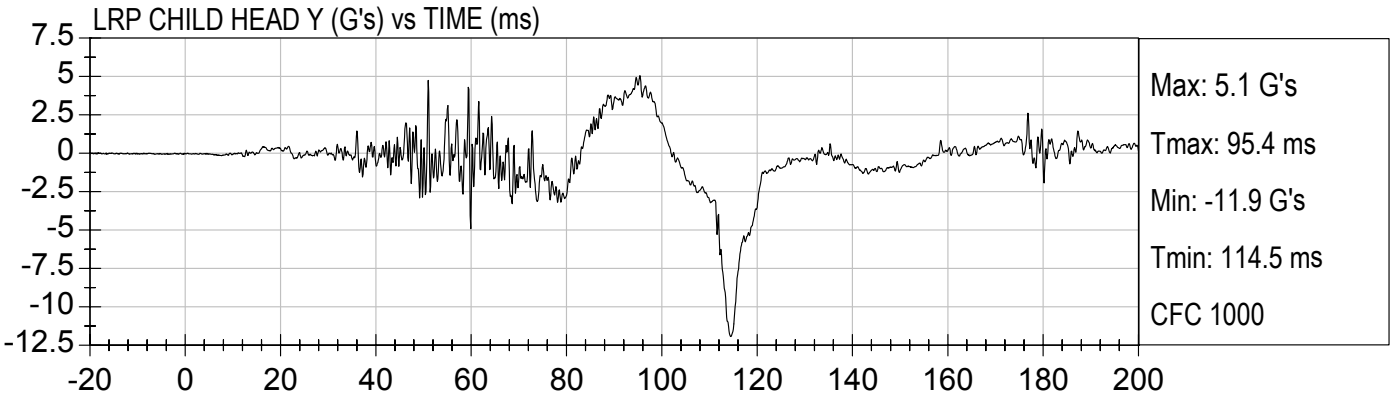
CHILD DUMMY RESPONSE DATA TRACES

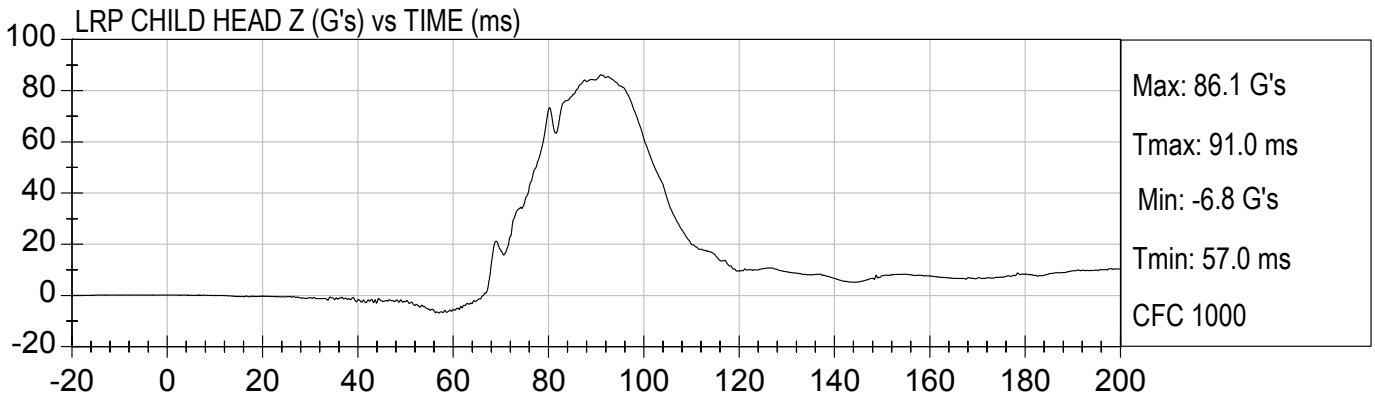
TABLE OF DATA PLOTS

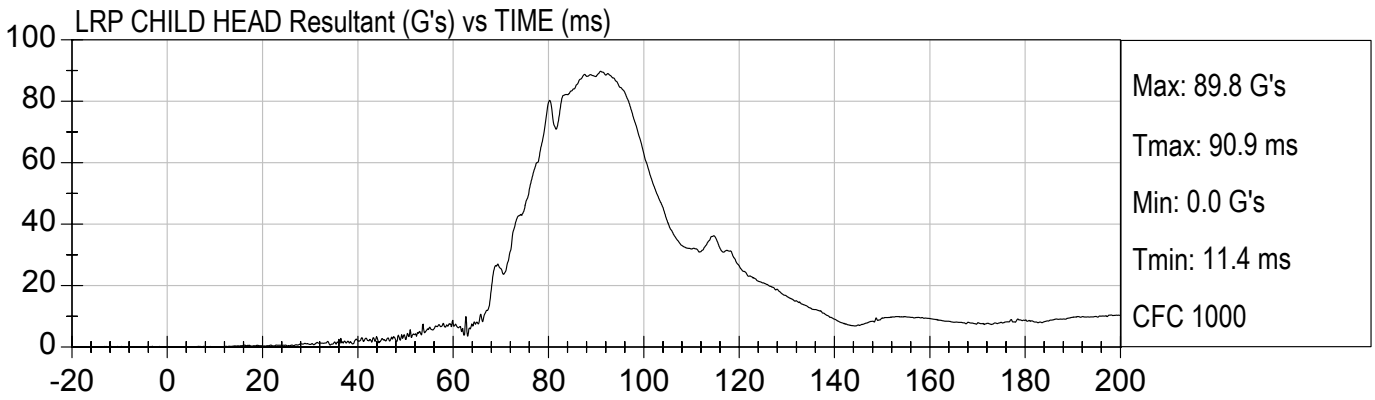
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



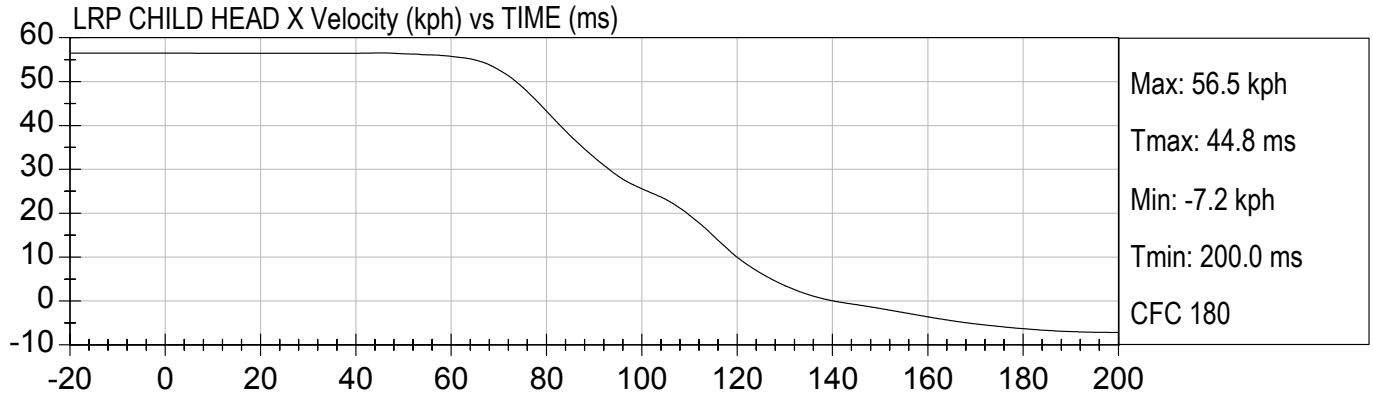


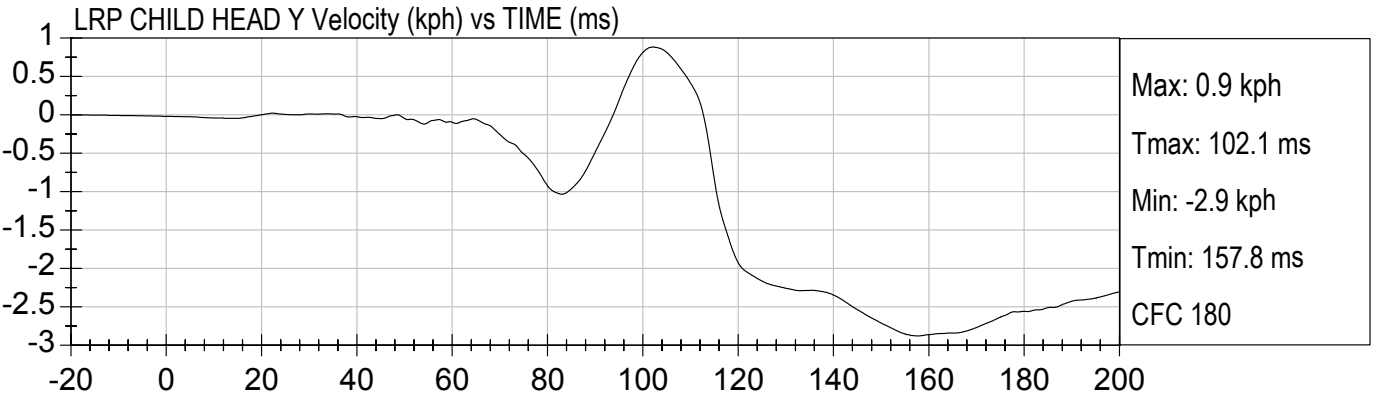


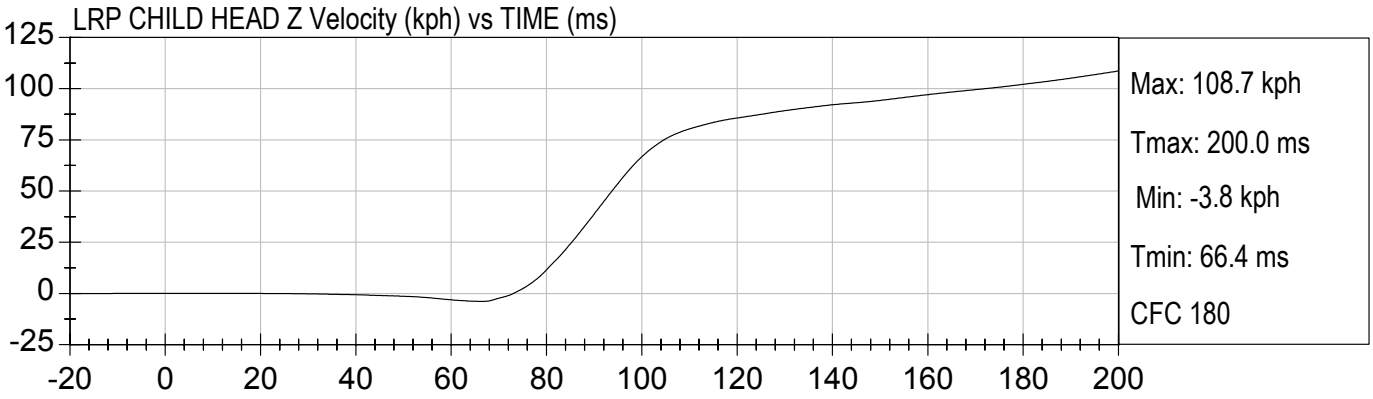


NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

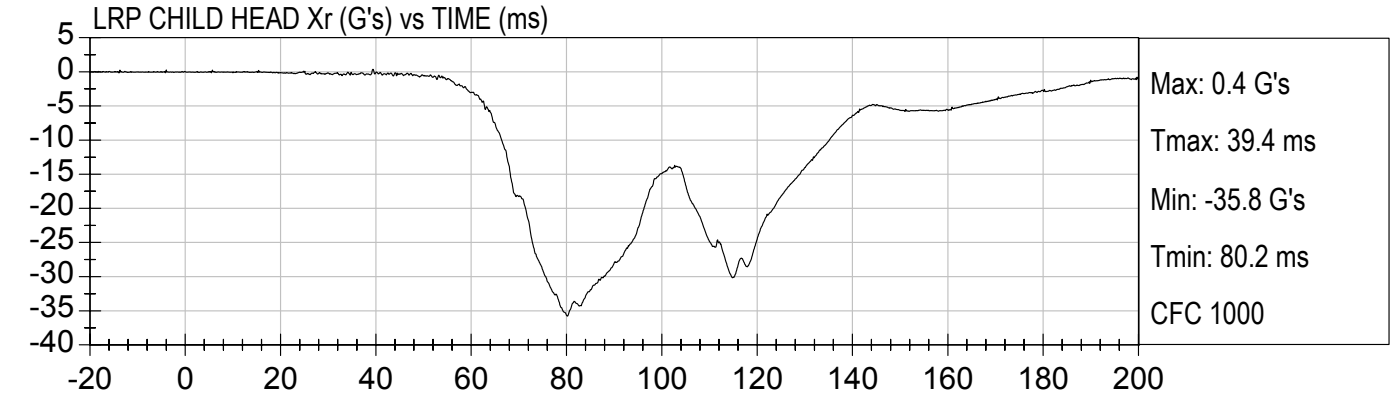


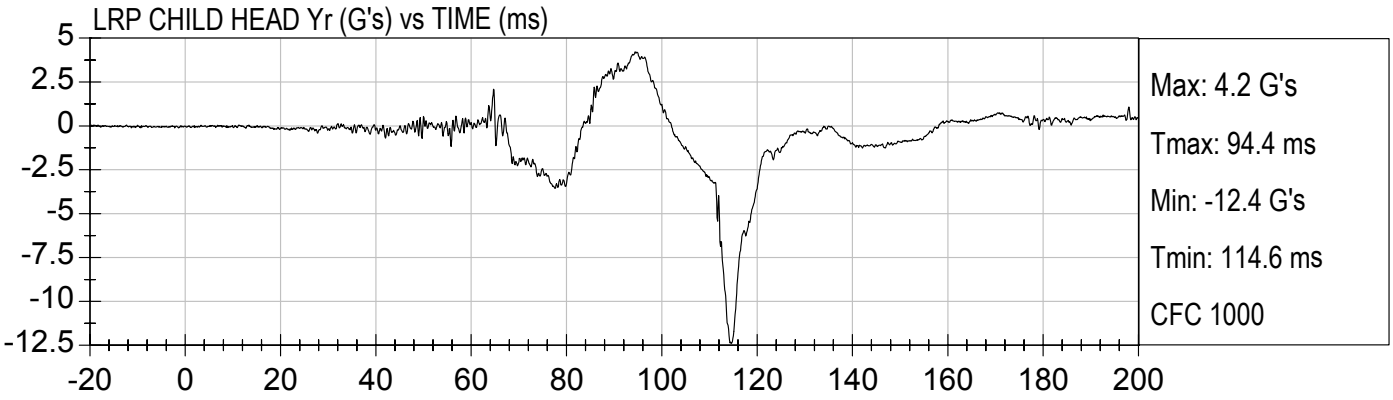


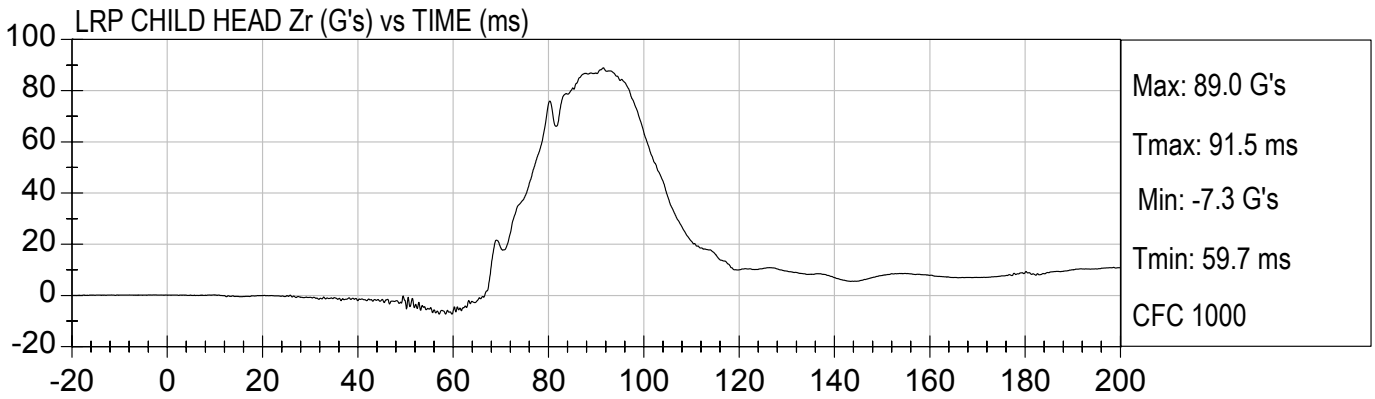


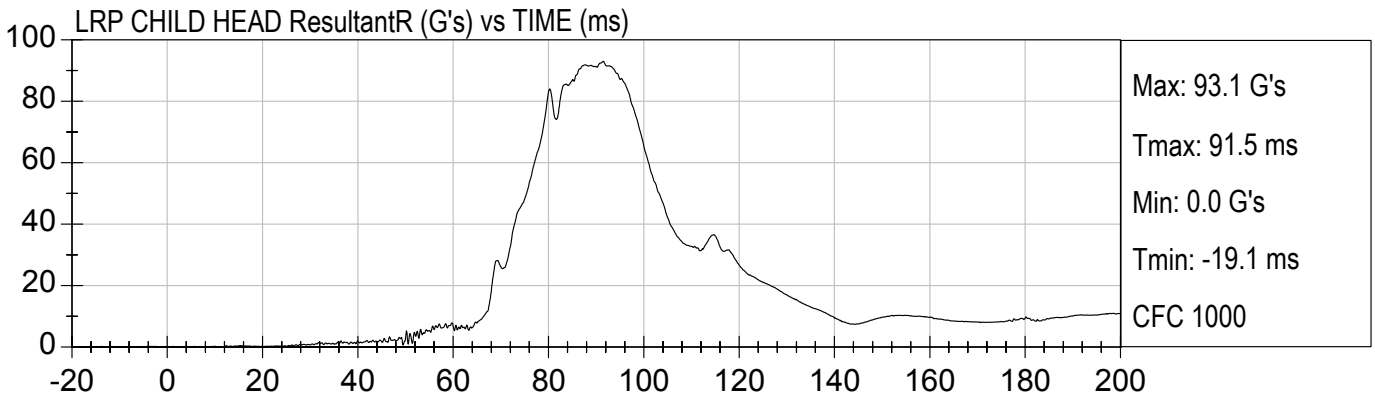
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

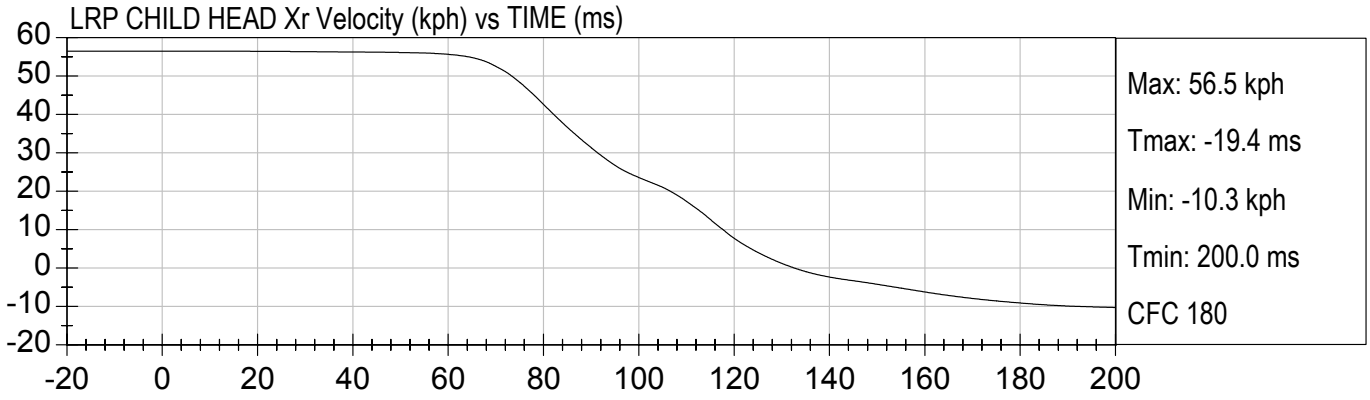
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

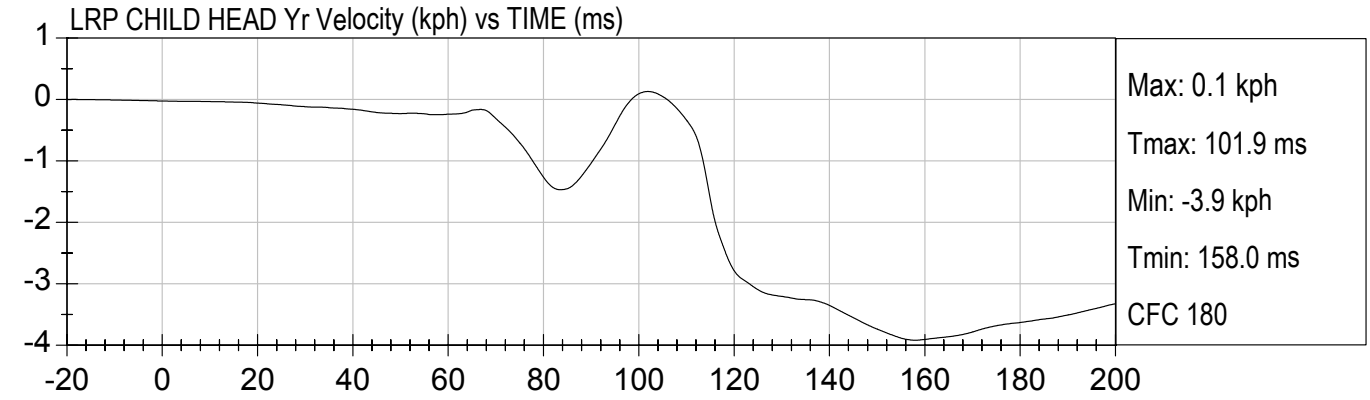


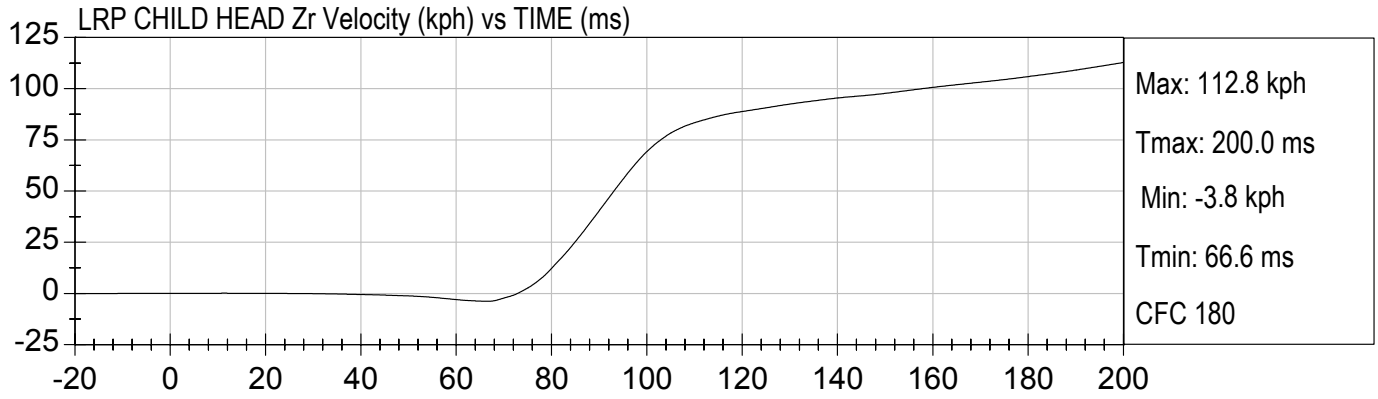






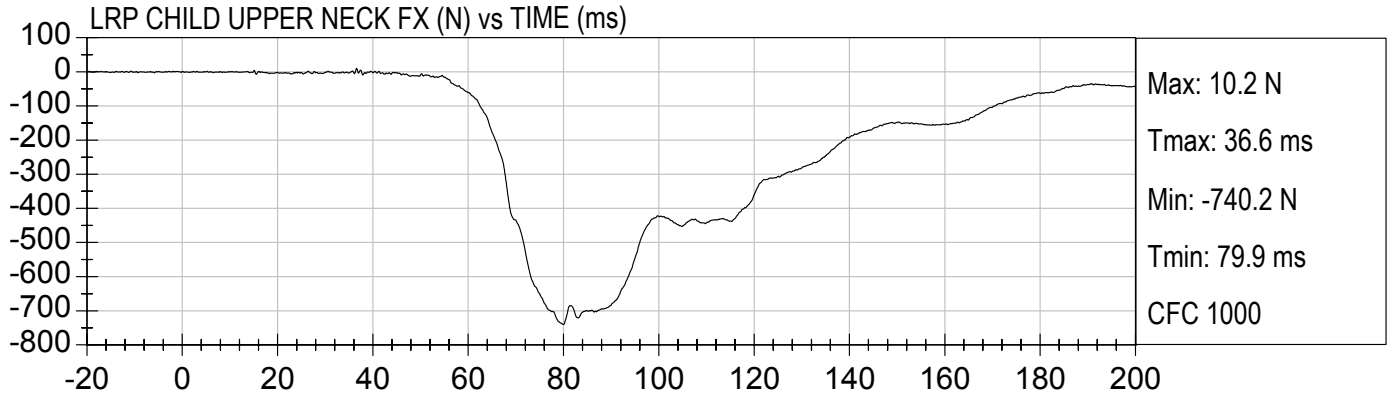

LRP CHILD HEAD Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 56.5 kph
Tmax: -19.4 ms
Min: -10.3 kph
Tmin: 200.0 ms
CFC 180

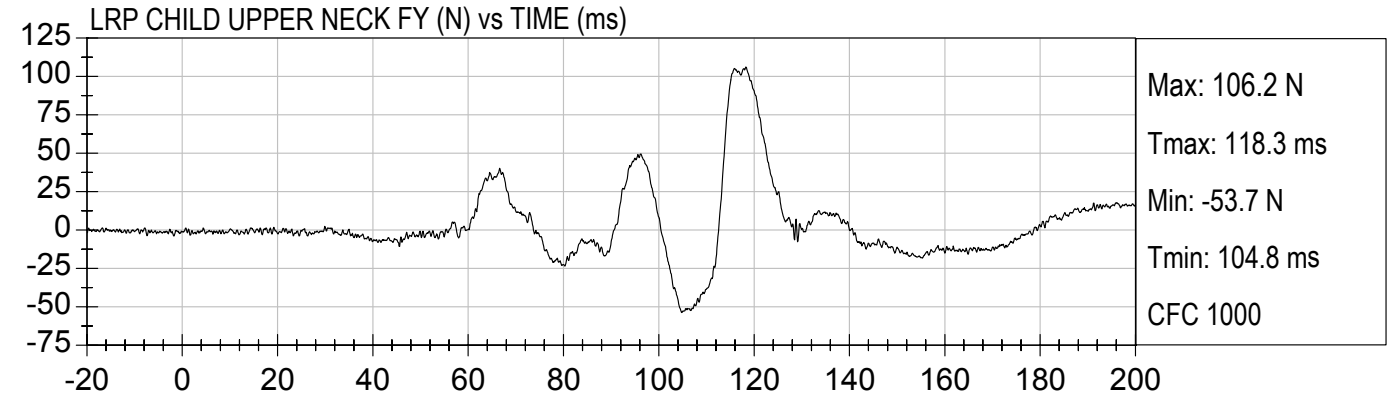

LRP CHILD HEAD Yr Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 0.1 kph
Tmax: 101.9 ms
Min: -3.9 kph
Tmin: 158.0 ms
CFC 180

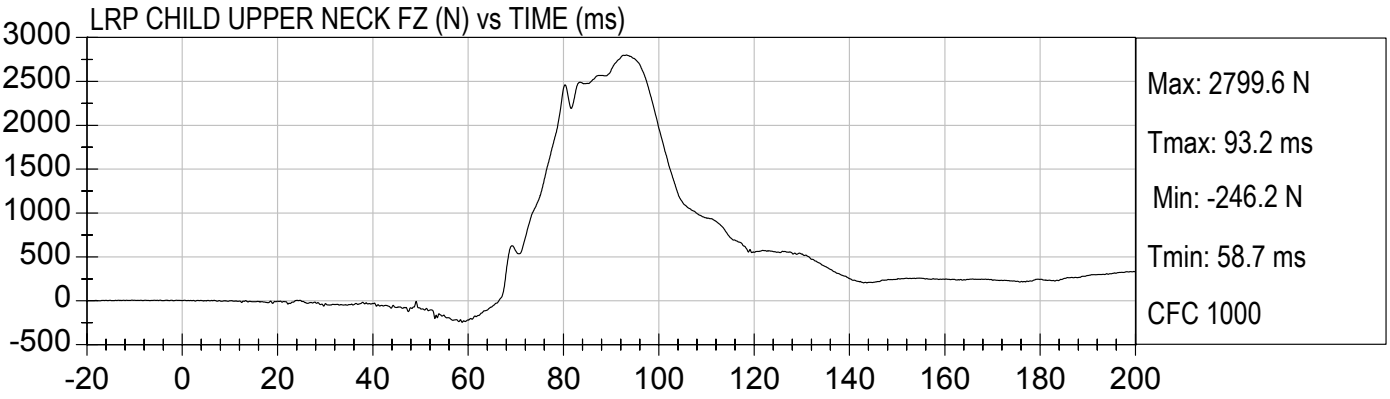

LRP CHILD HEAD Zr Velocity (kph) vs TIME (ms)
125
100
75
50
25
0
-25
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 112.8 kph
Tmax: 200.0 ms
Min: -3.8 kph
Tmin: 66.6 ms
CFC 180

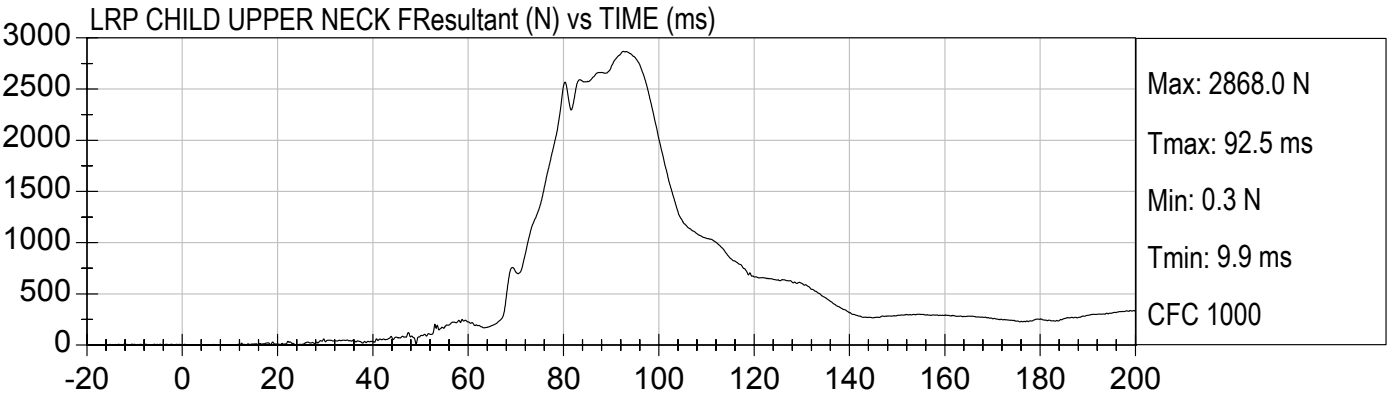
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



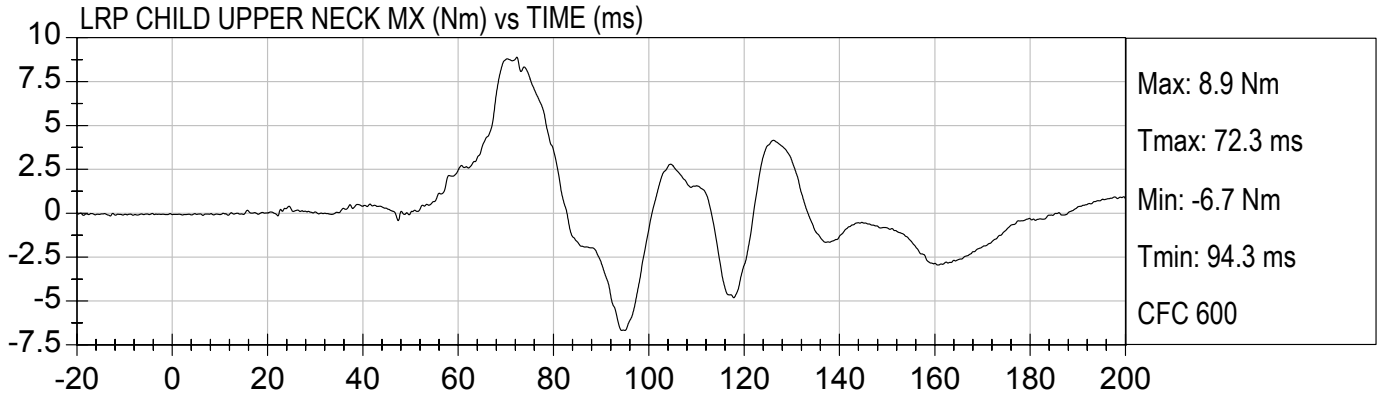


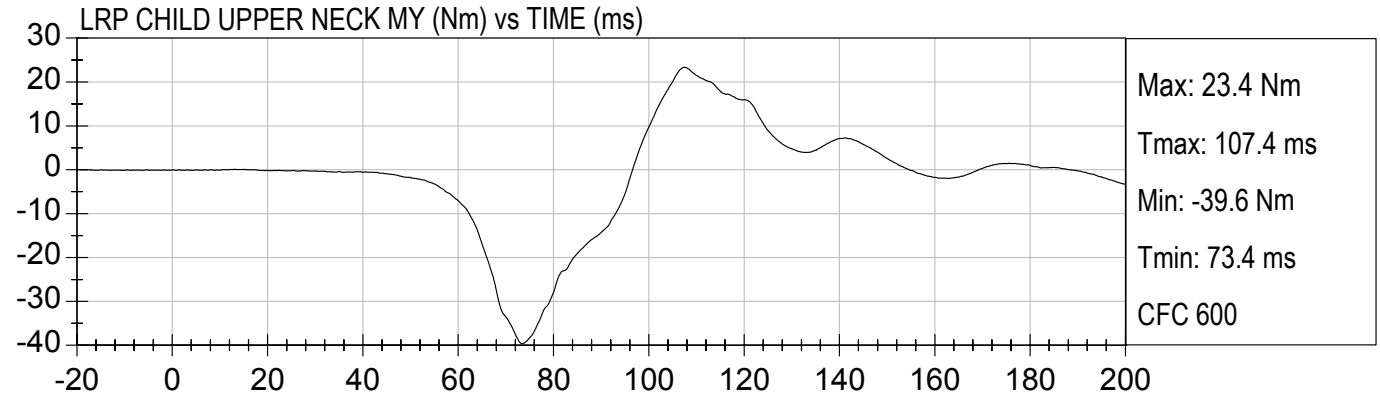


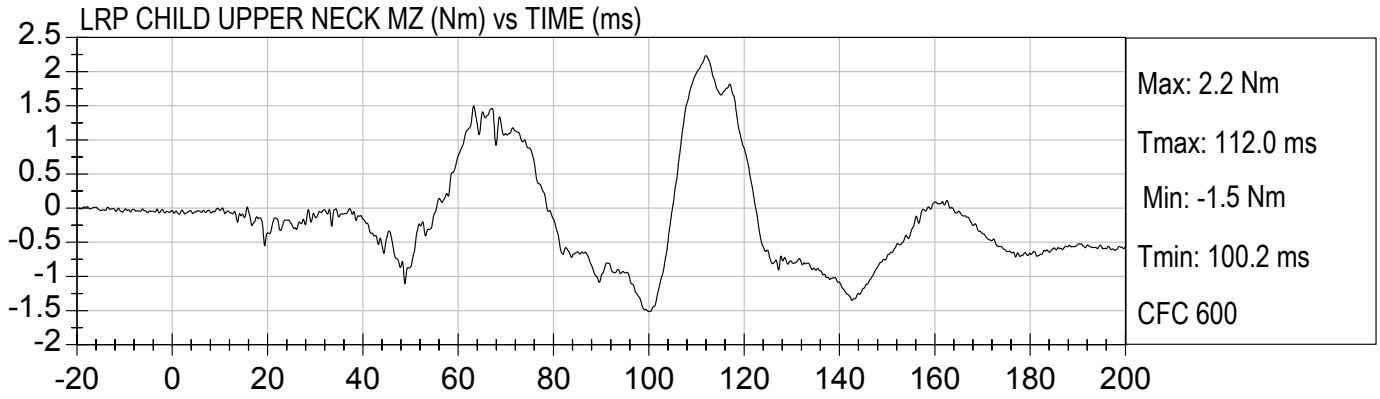


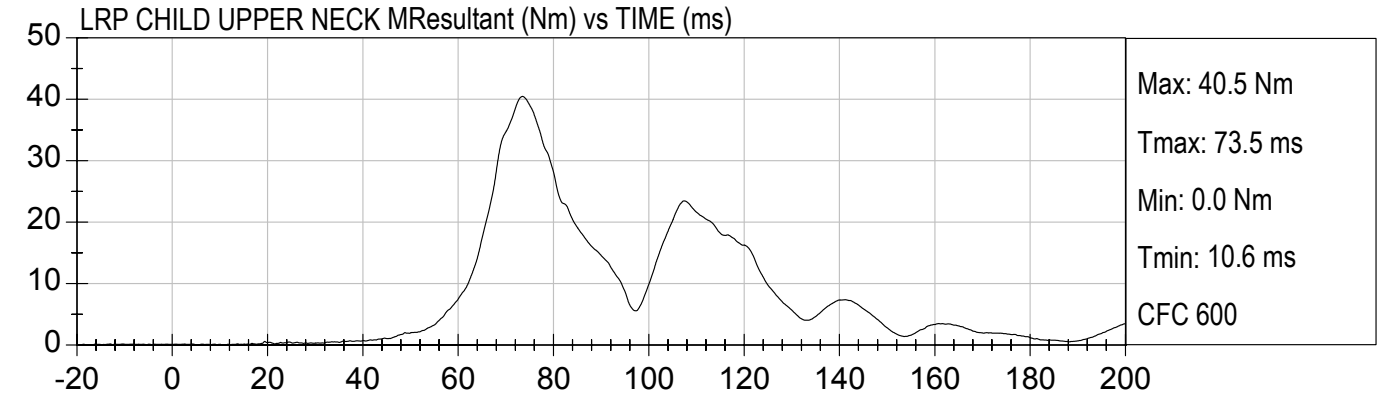
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



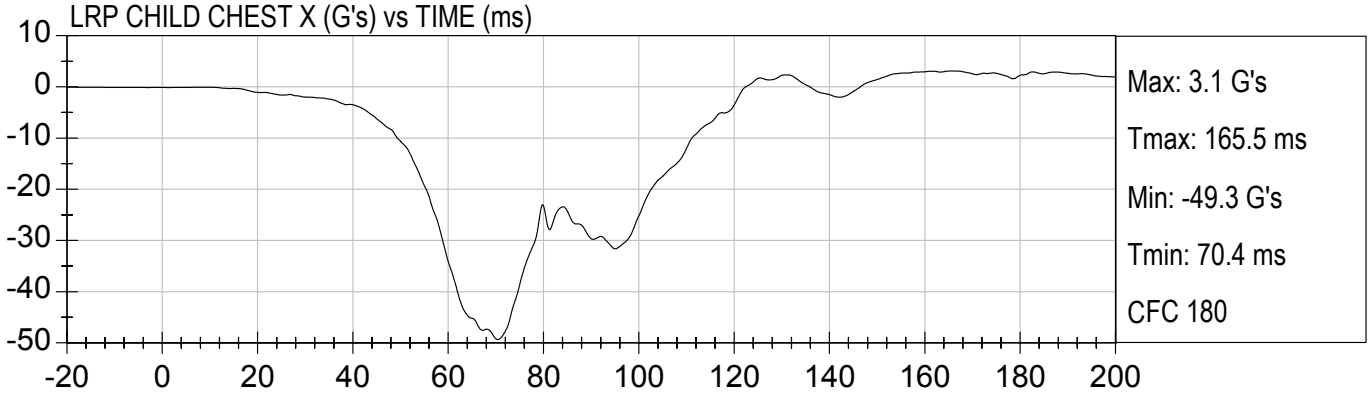


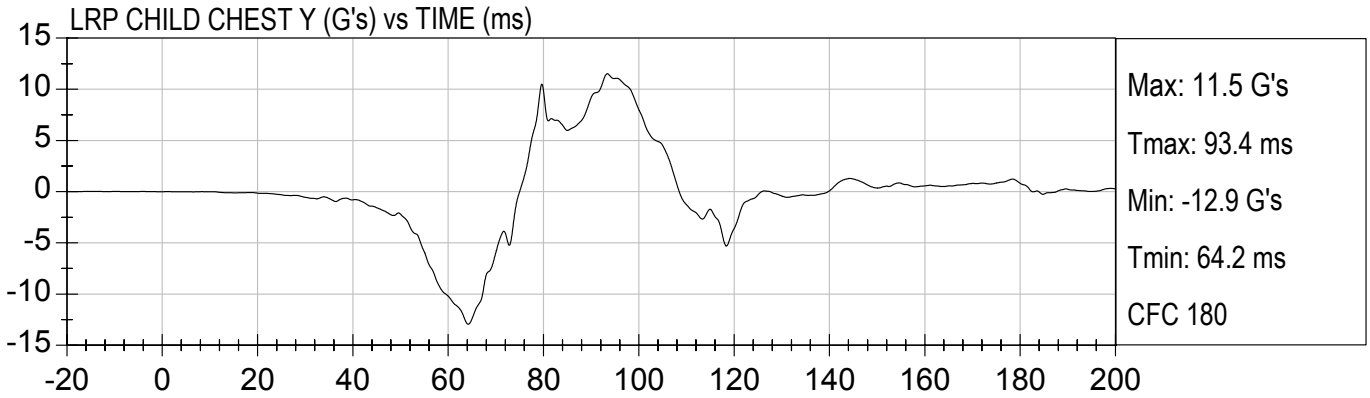


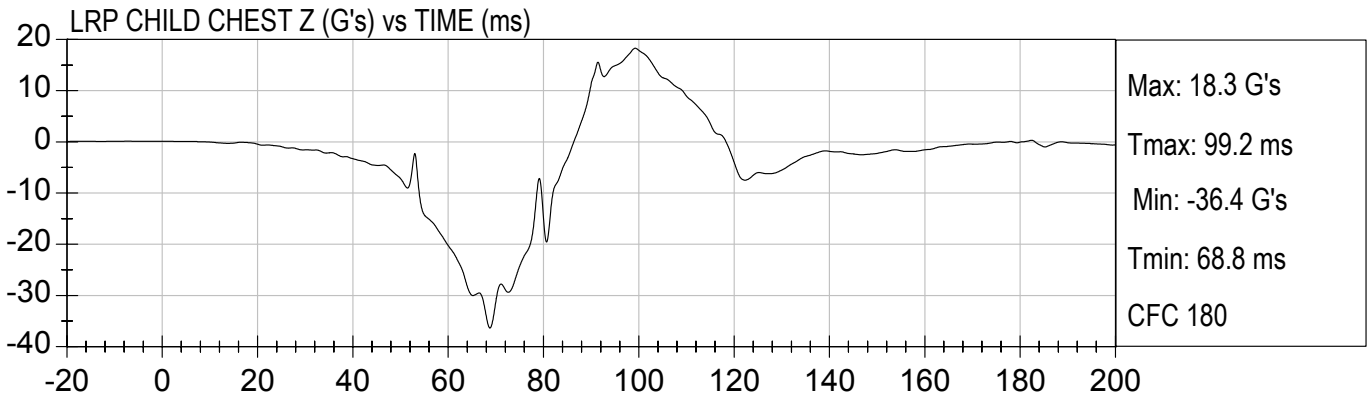


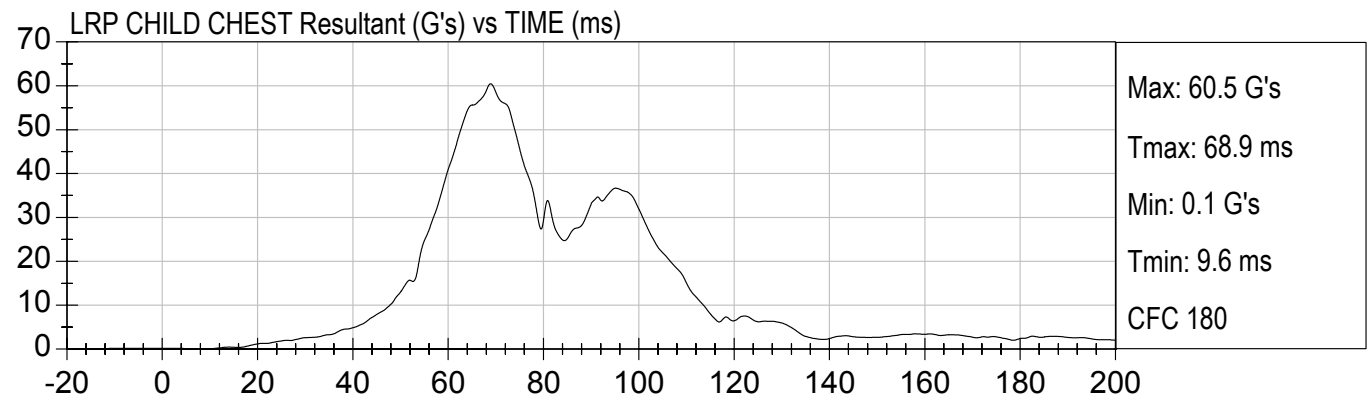
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



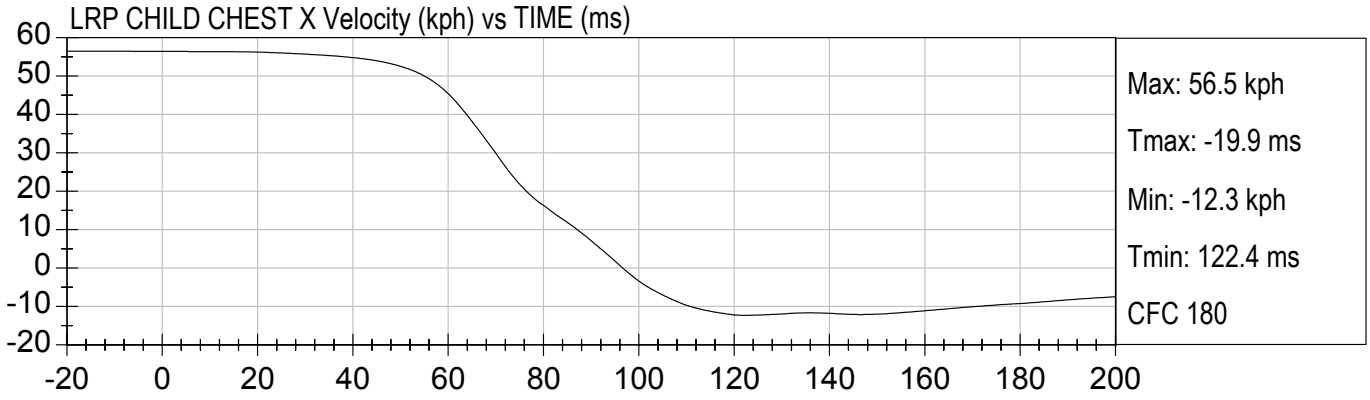


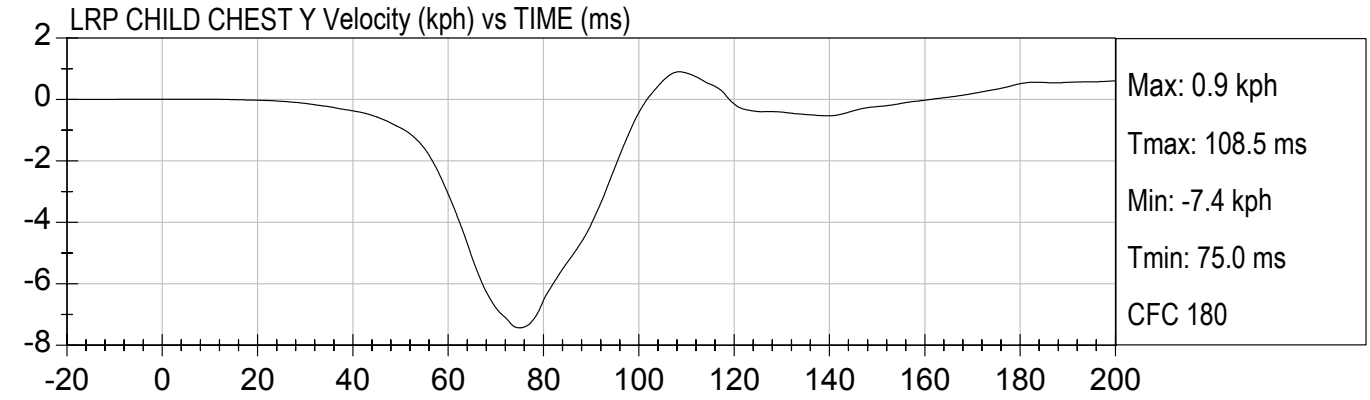


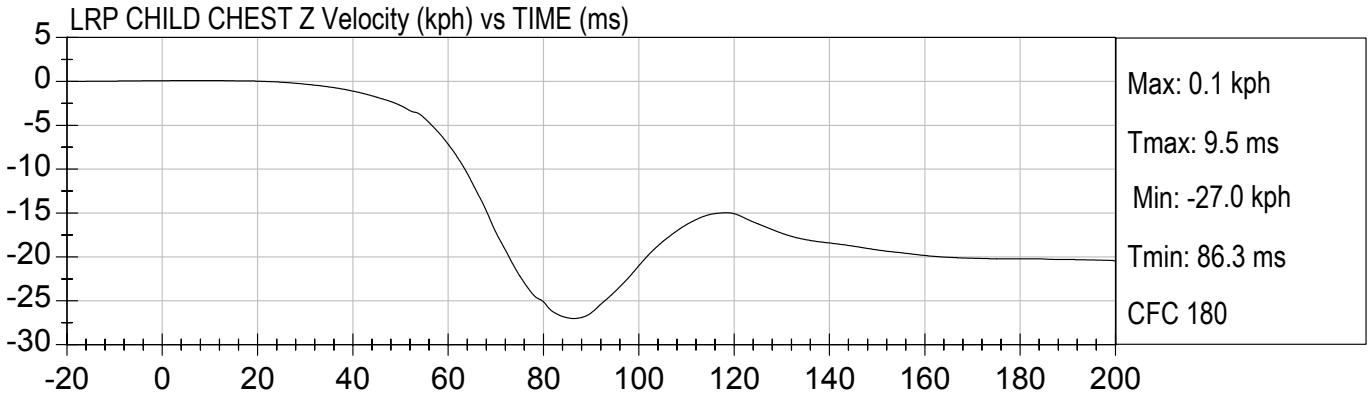


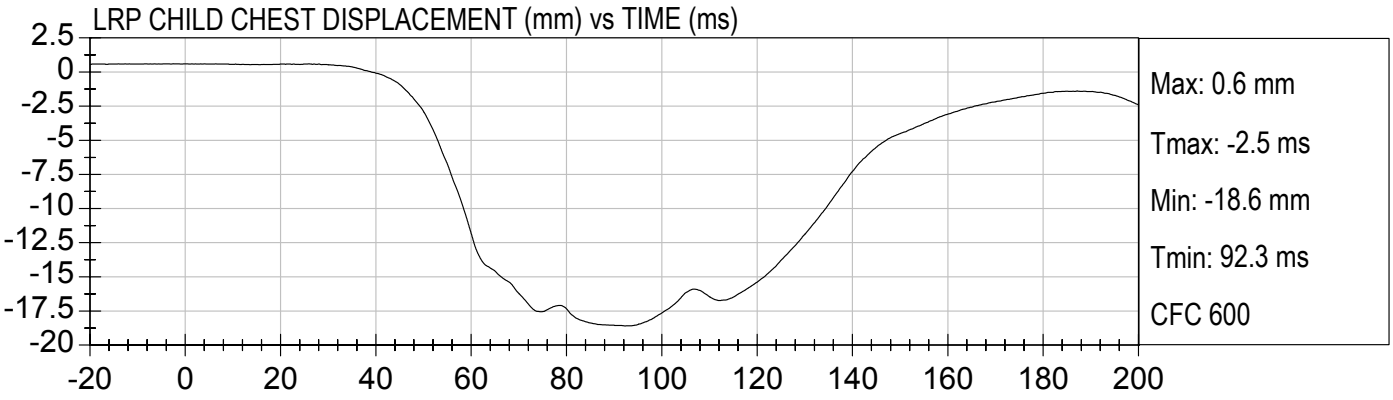
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



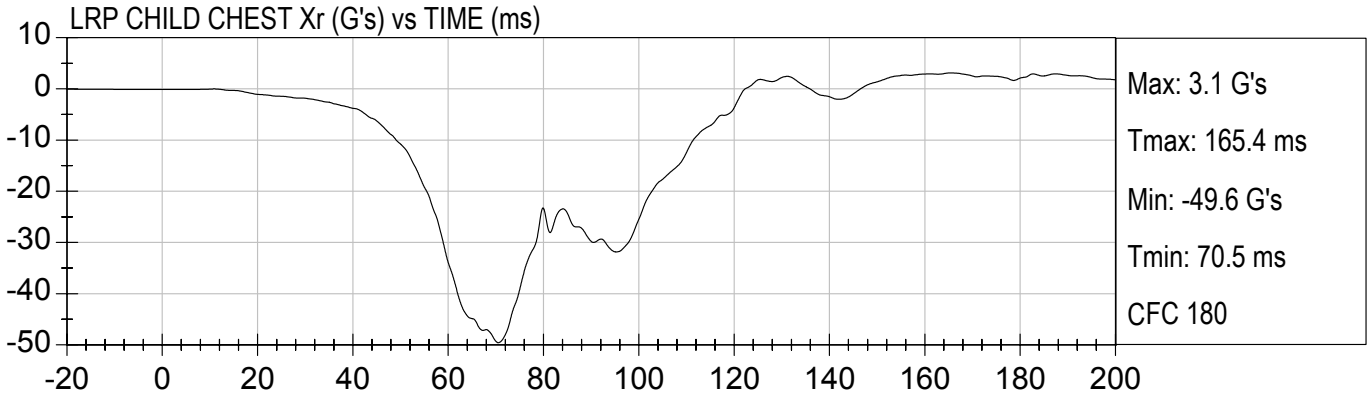


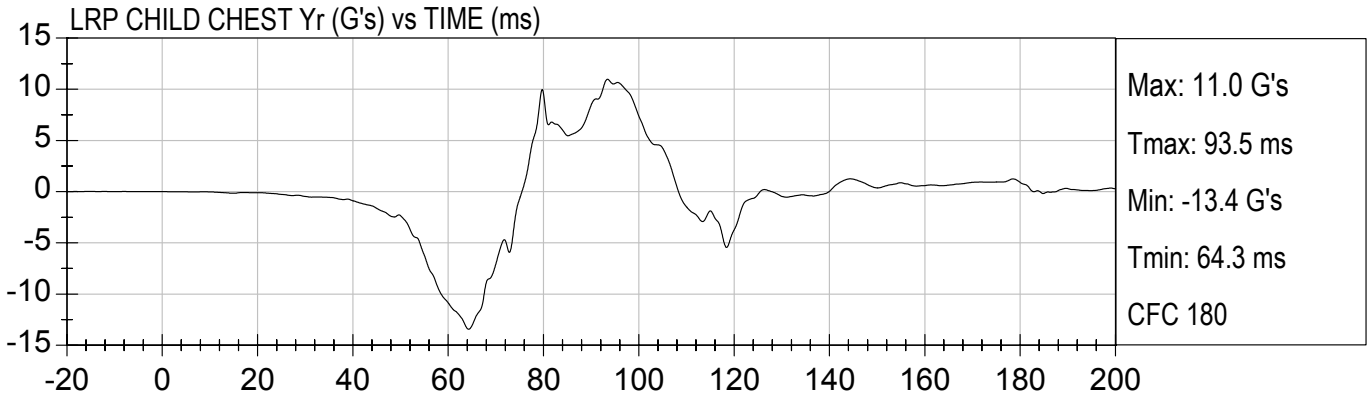


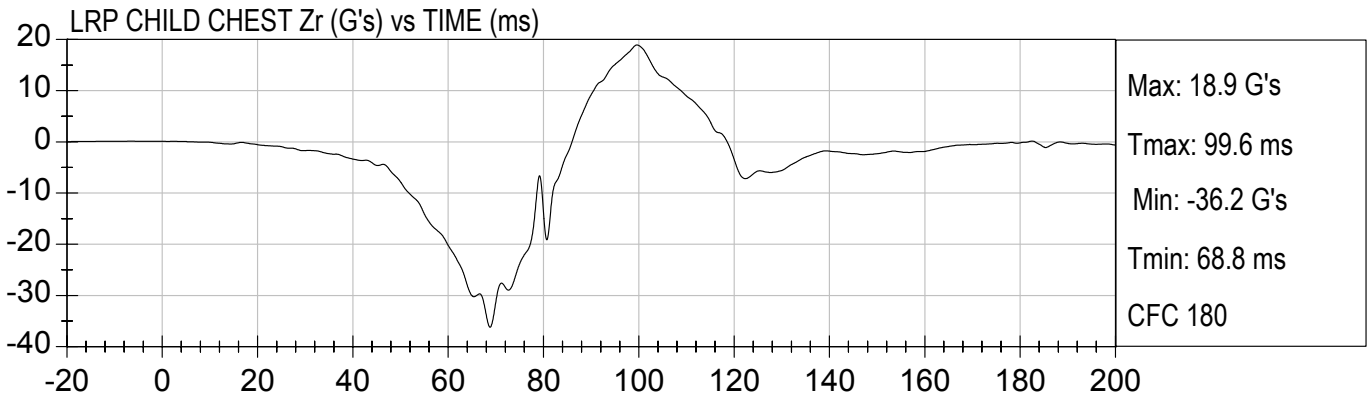


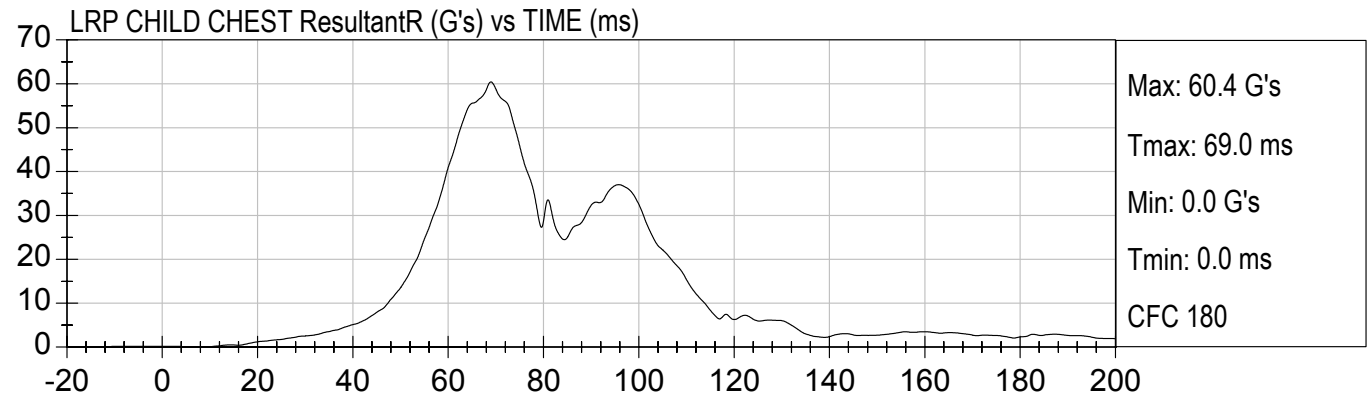
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

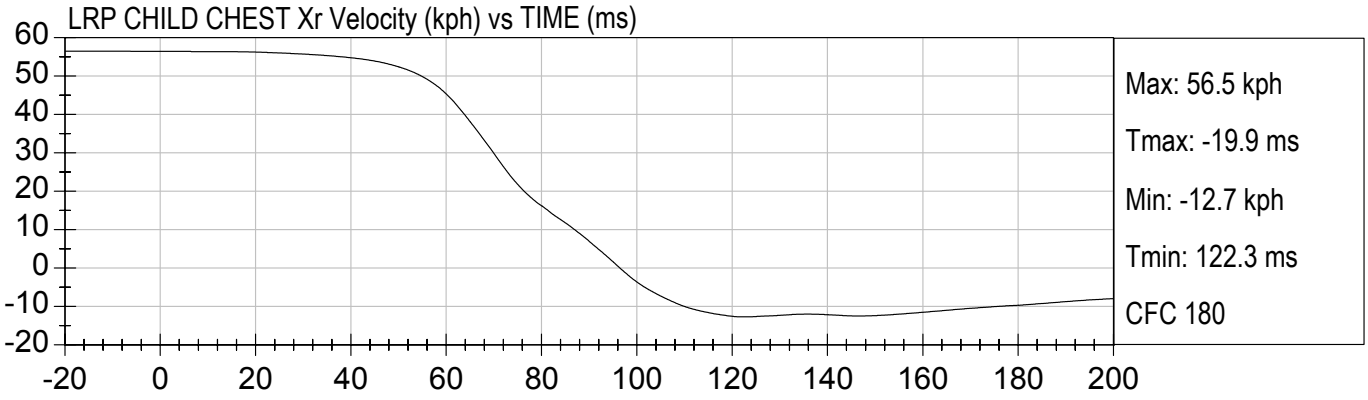
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

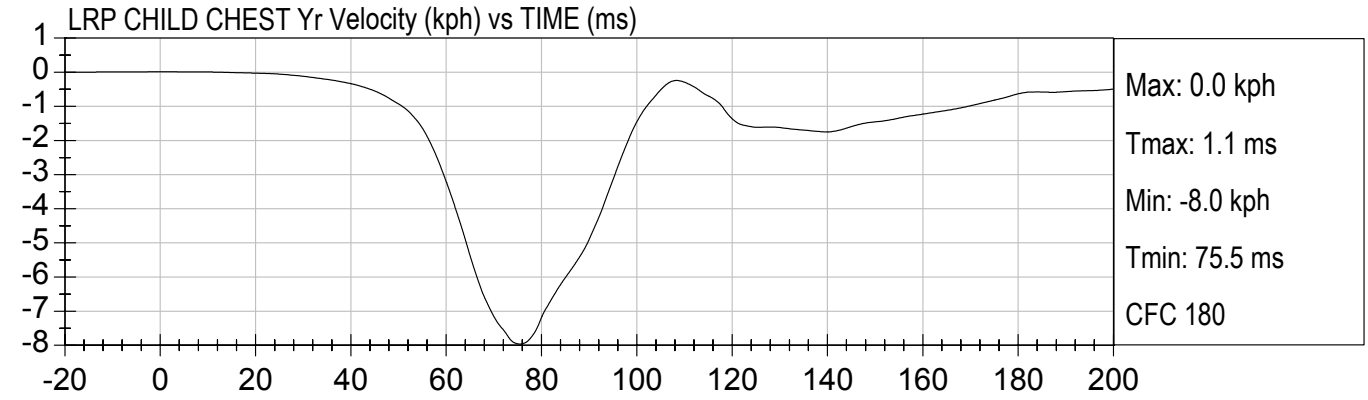


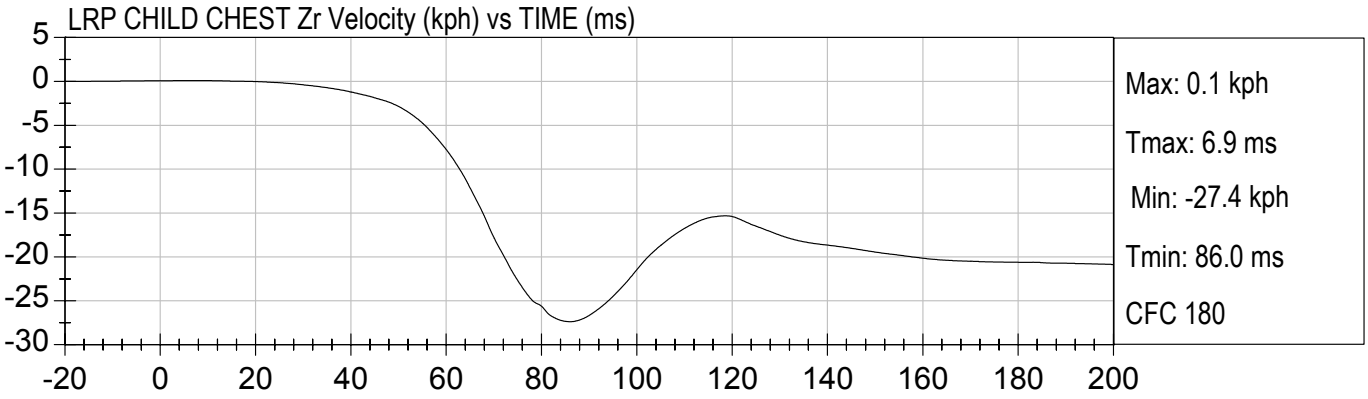






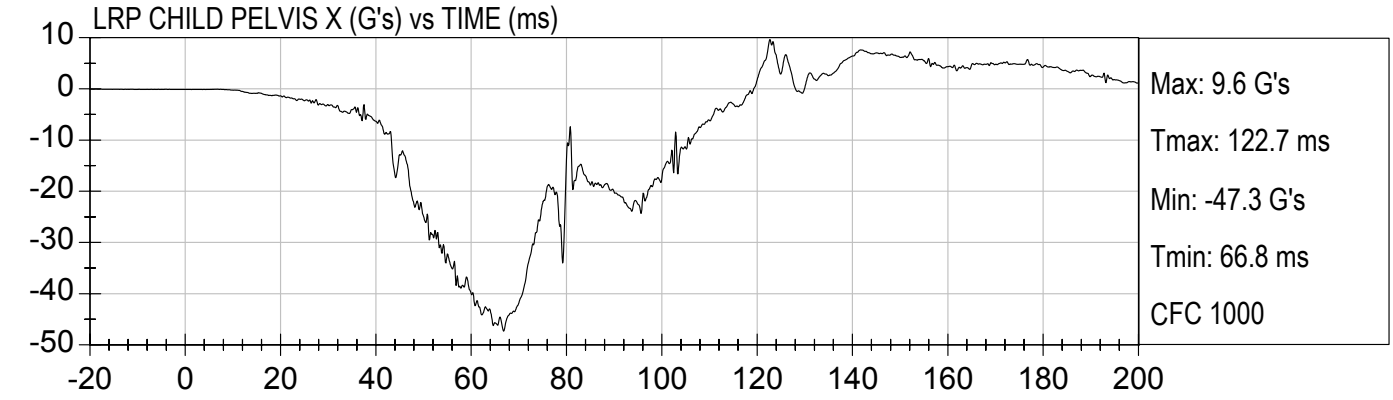

LRP CHILD CHEST Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 56.5 kph
Tmax: -19.9 ms
Min: -12.7 kph
Tmin: 122.3 ms
CFC 180

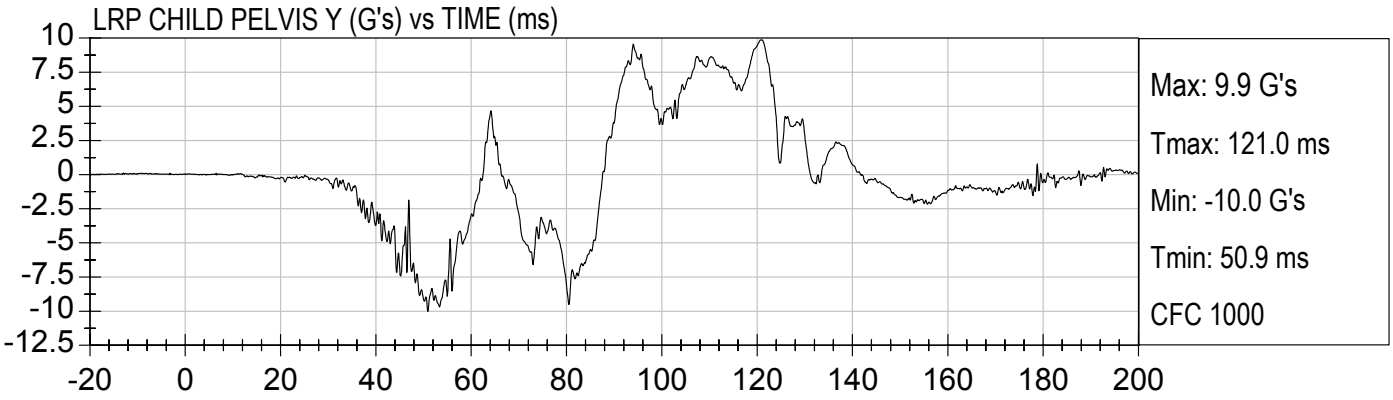

LRP CHILD CHEST Yr Velocity (kph) vs TIME (ms)
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 0.0 kph
Tmax: 1.1 ms
Min: -8.0 kph
Tmin: 75.5 ms
CFC 180

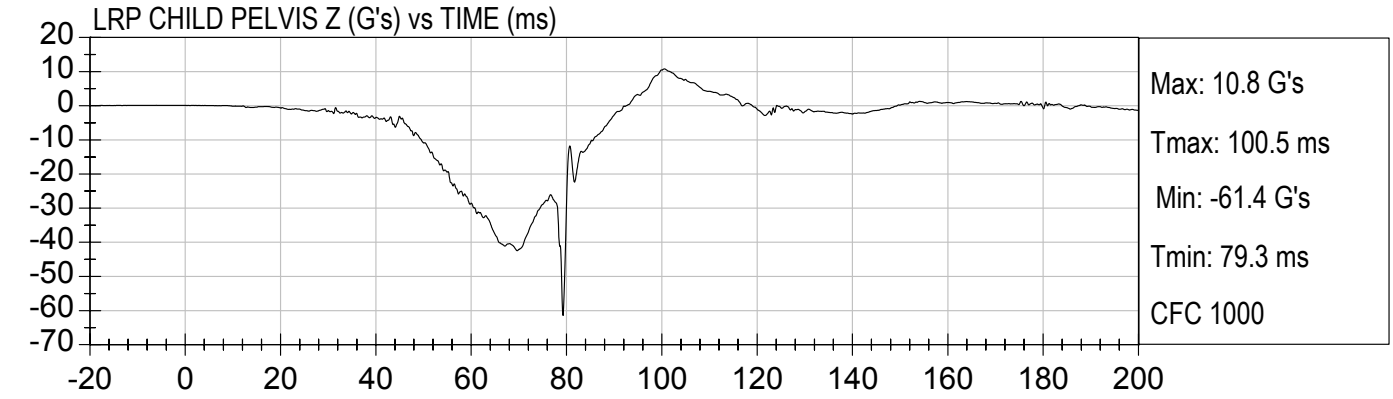

LRP CHILD CHEST Zr Velocity (kph) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 0.1 kph
Tmax: 6.9 ms
Min: -27.4 kph
Tmin: 86.0 ms
CFC 180

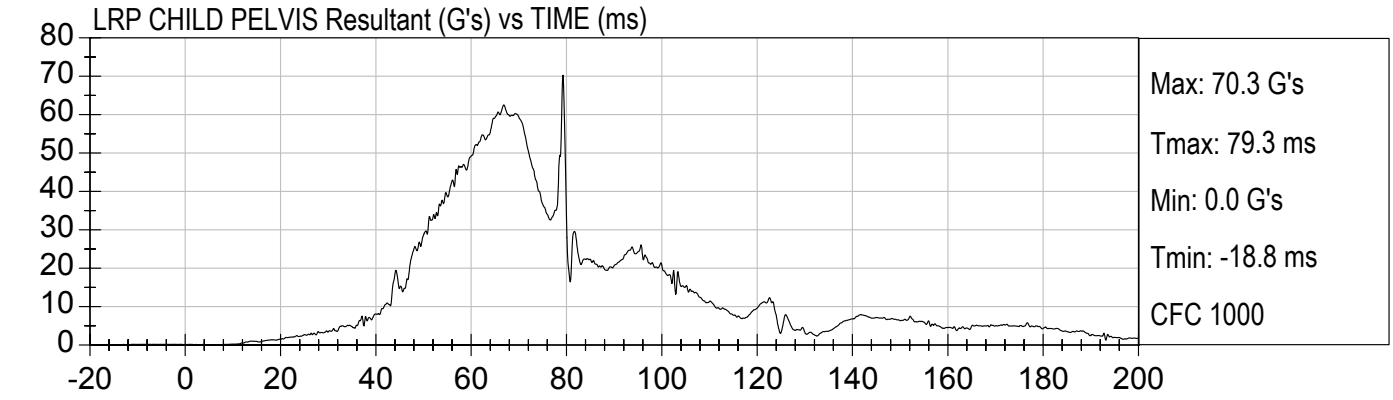
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

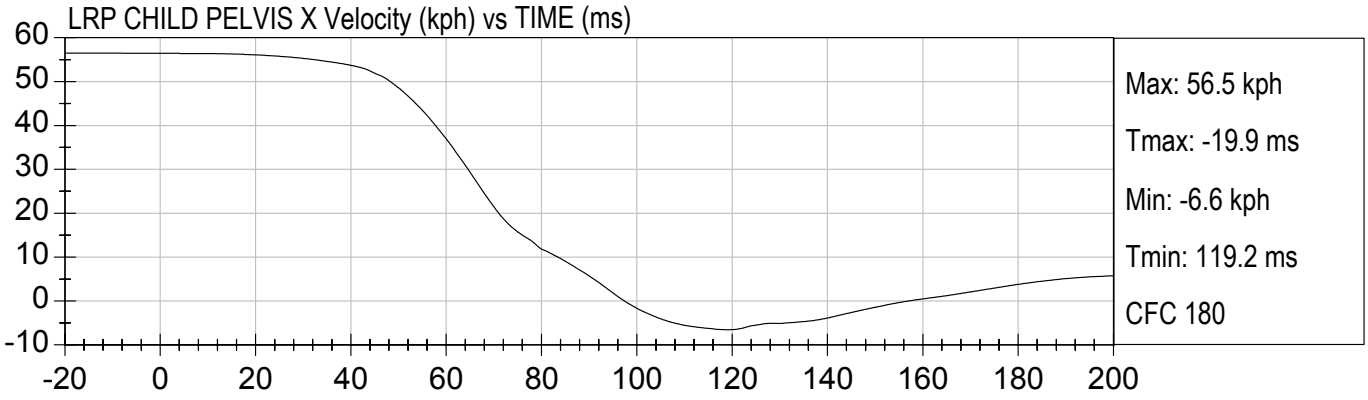
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

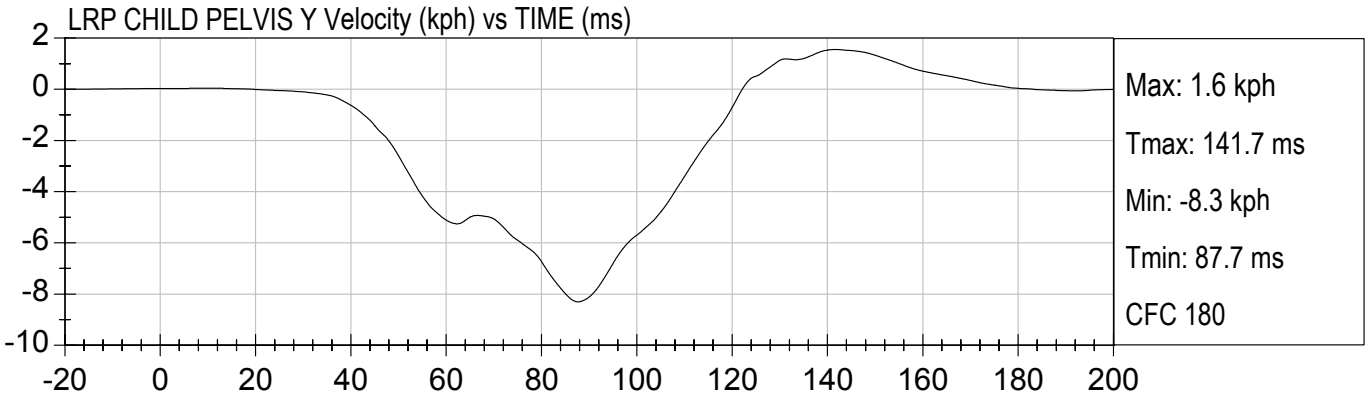


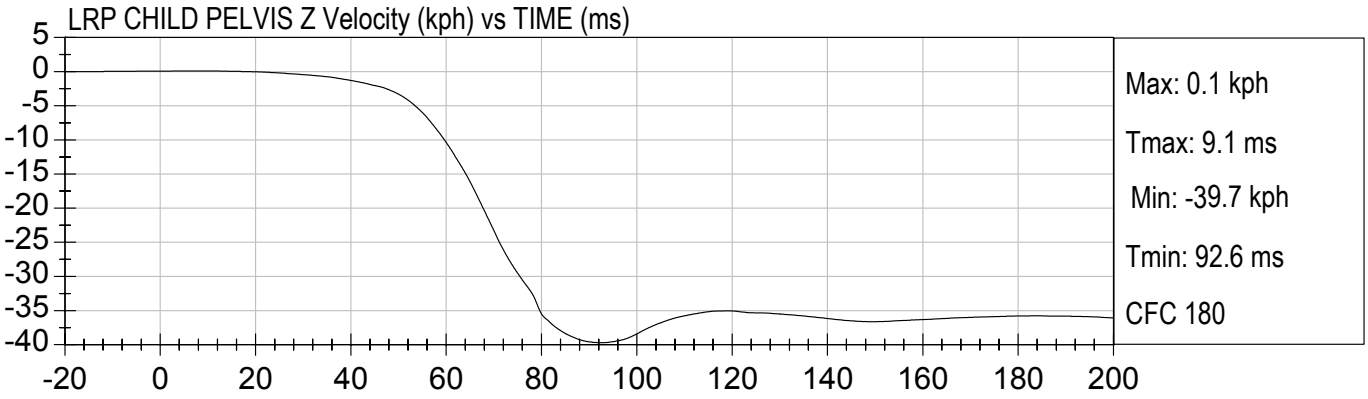






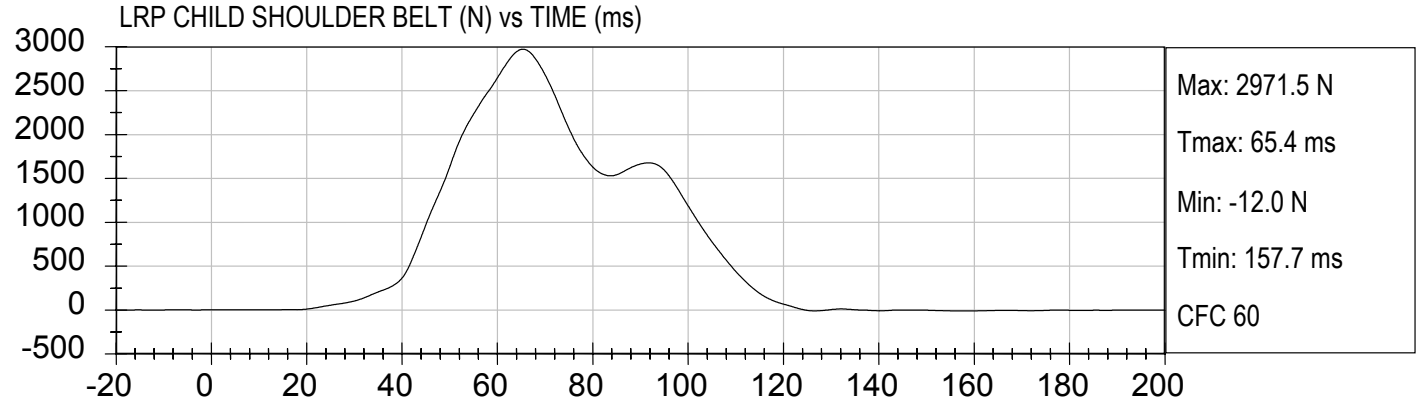

LRP CHILD PELVIS X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 56.5 kph
Tmax: -19.9 ms
Min: -6.6 kph
Tmin: 119.2 ms
CFC 180

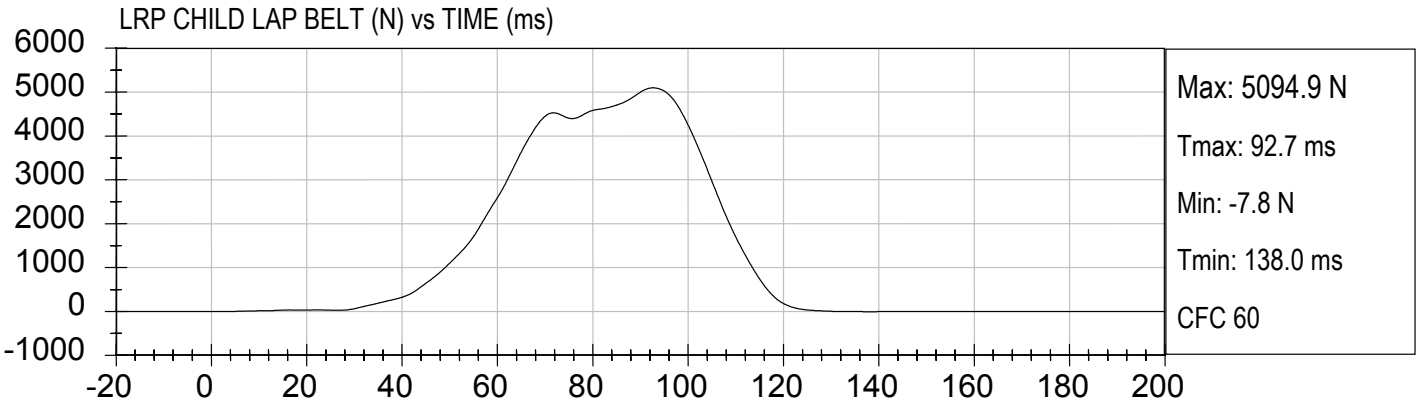

LRP CHILD PELVIS Y Velocity (kph) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 1.6 kph
Tmax: 141.7 ms
Min: -8.3 kph
Tmin: 87.7 ms
CFC 180


LRP CHILD PELVIS Z Velocity (kph) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 0.1 kph
Tmax: 9.1 ms
Min: -39.7 kph
Tmin: 92.6 ms
CFC 180

NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

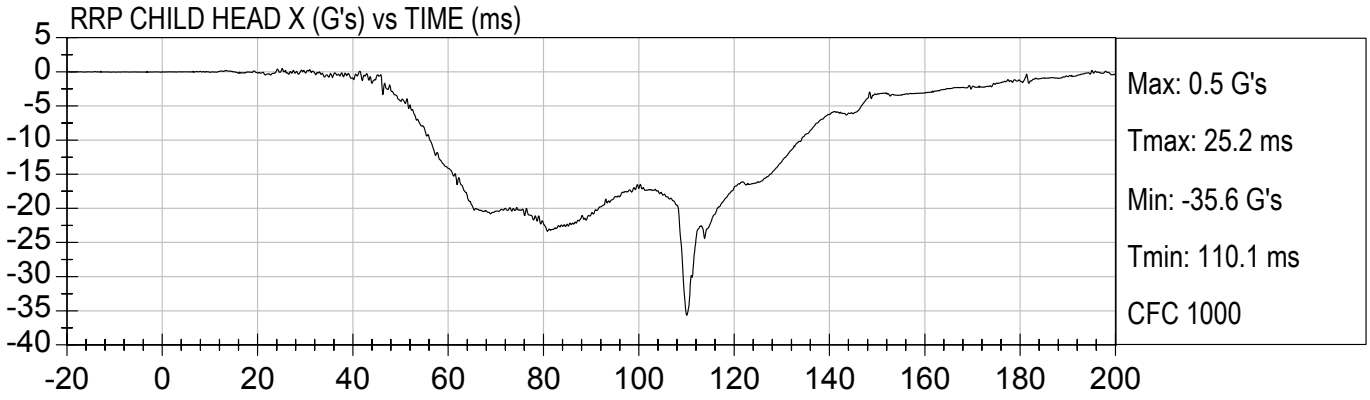
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

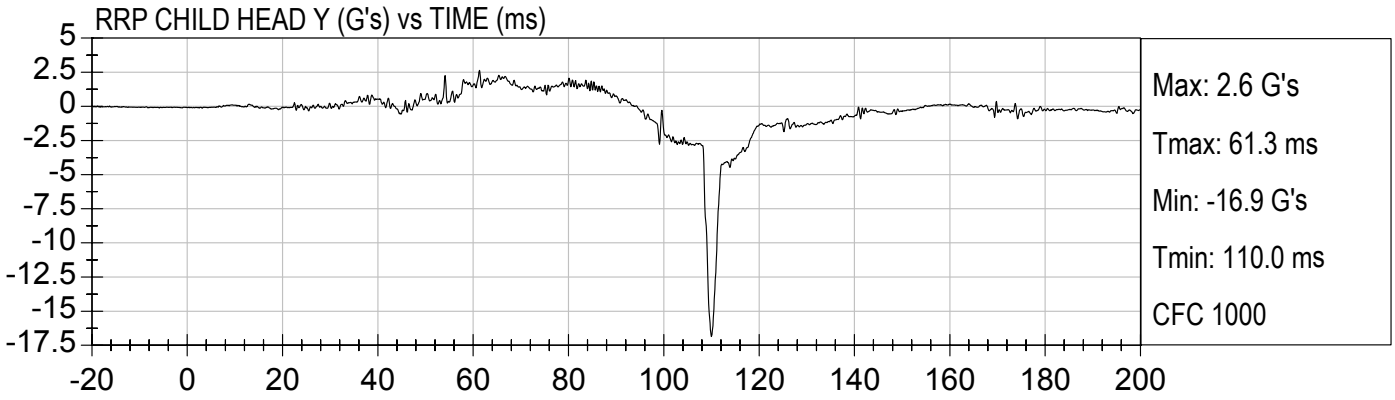


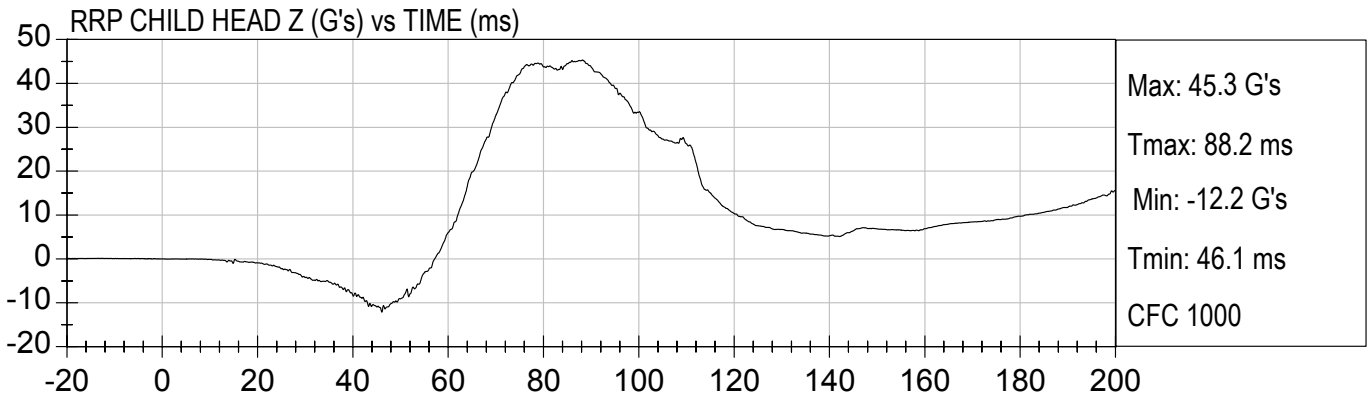


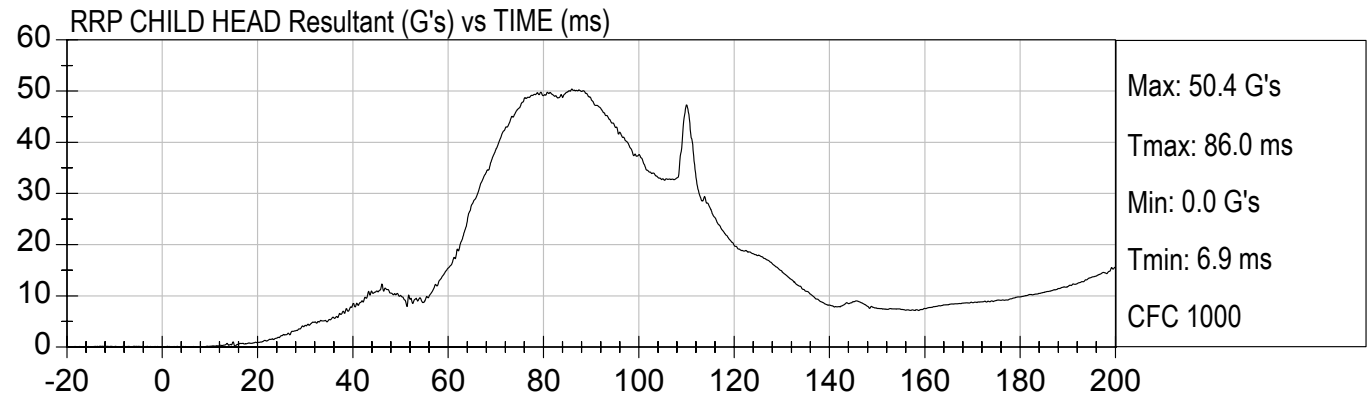
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

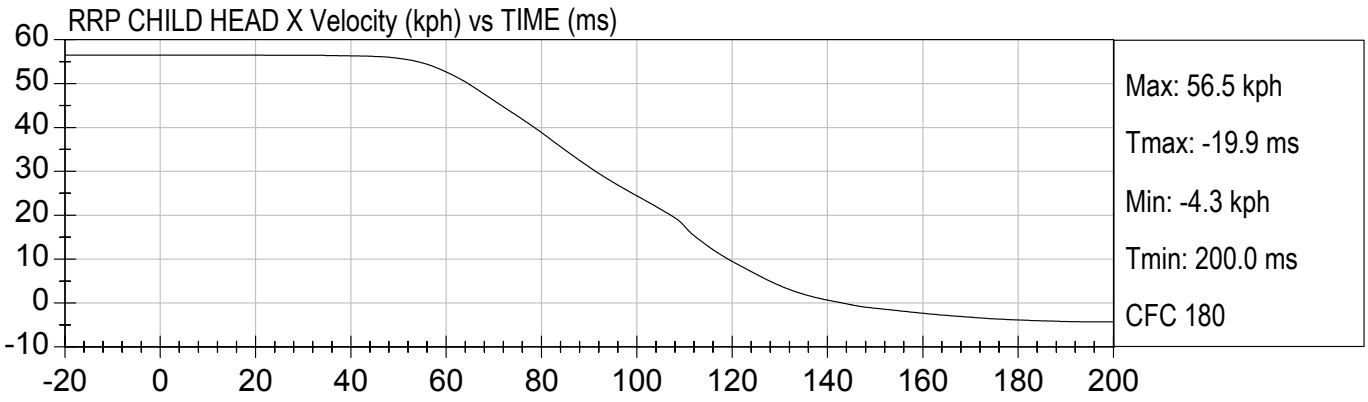
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

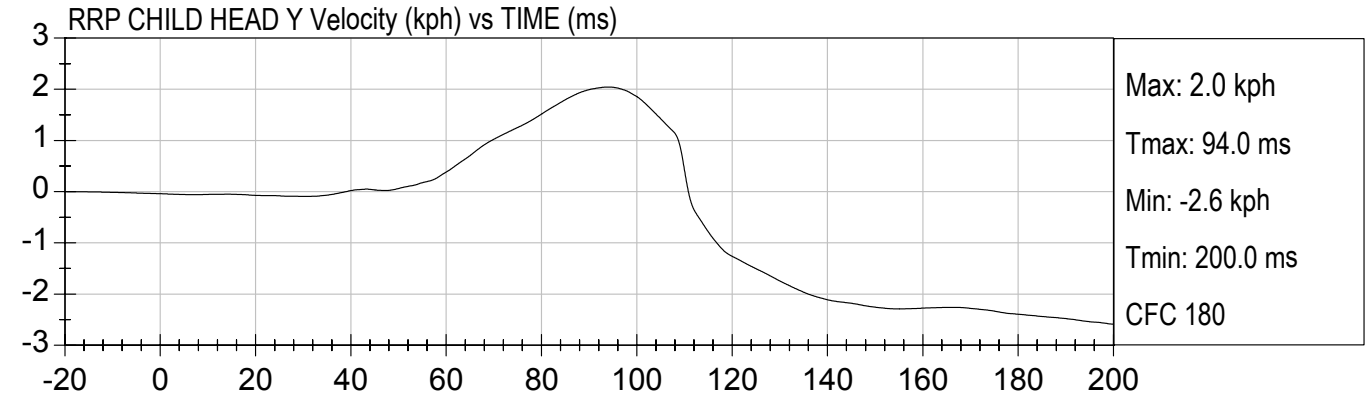


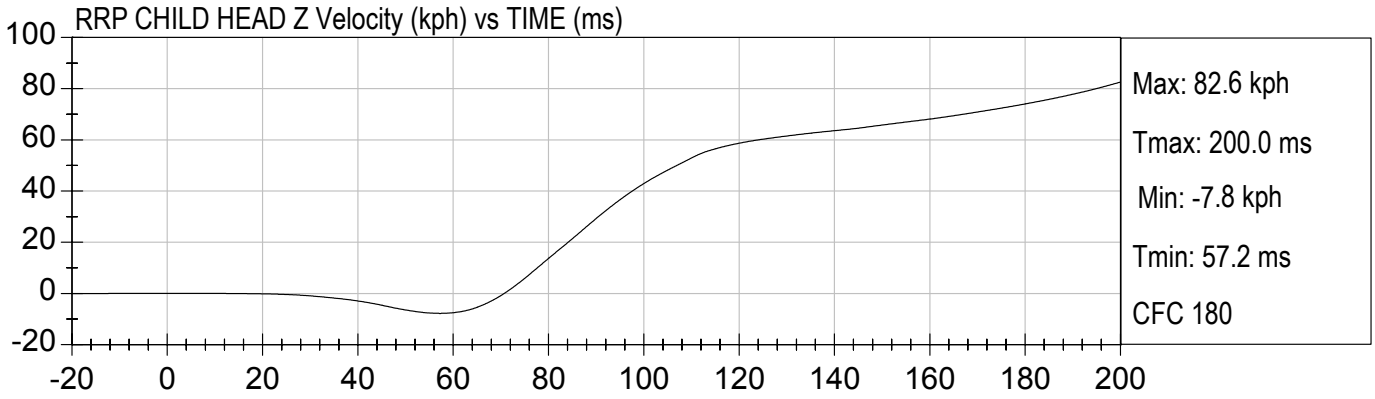






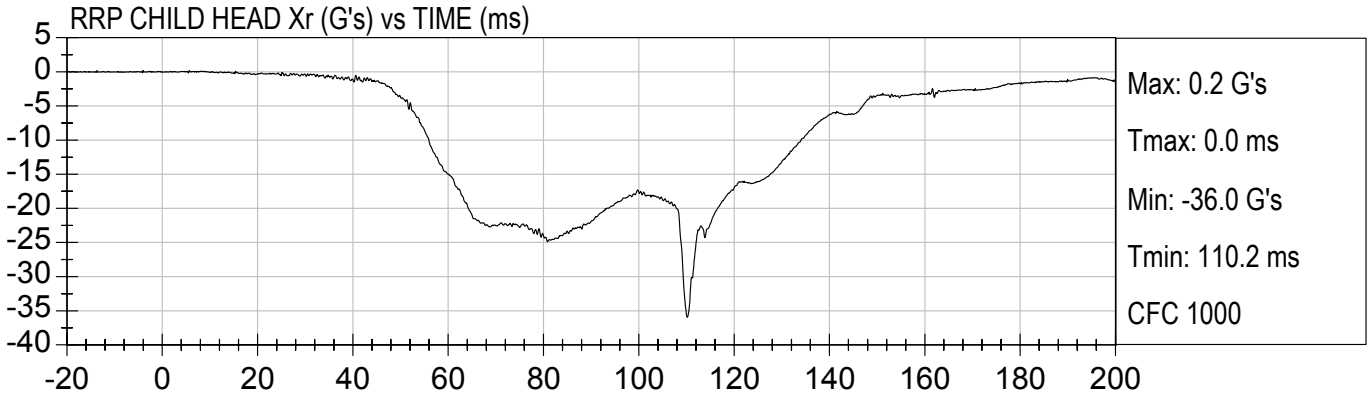

RRP CHILD HEAD X Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 56.5 kph
Tmax: -19.9 ms
Min: -4.3 kph
Tmin: 200.0 ms
CFC 180

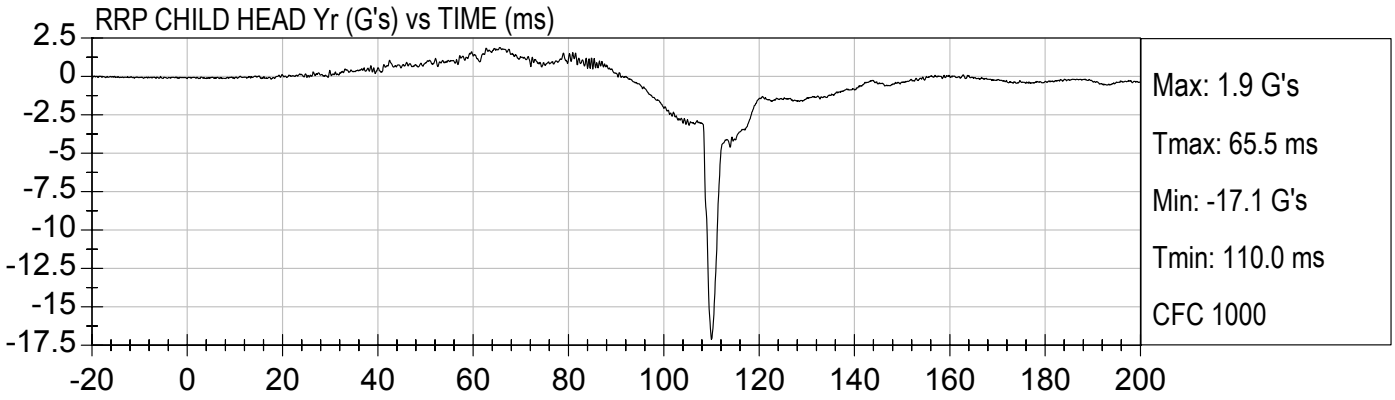

RRP CHILD HEAD Y Velocity (kph) vs TIME (ms)
3
2
1
0
-1
-2
-3
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 2.0 kph
Tmax: 94.0 ms
Min: -2.6 kph
Tmin: 200.0 ms
CFC 180

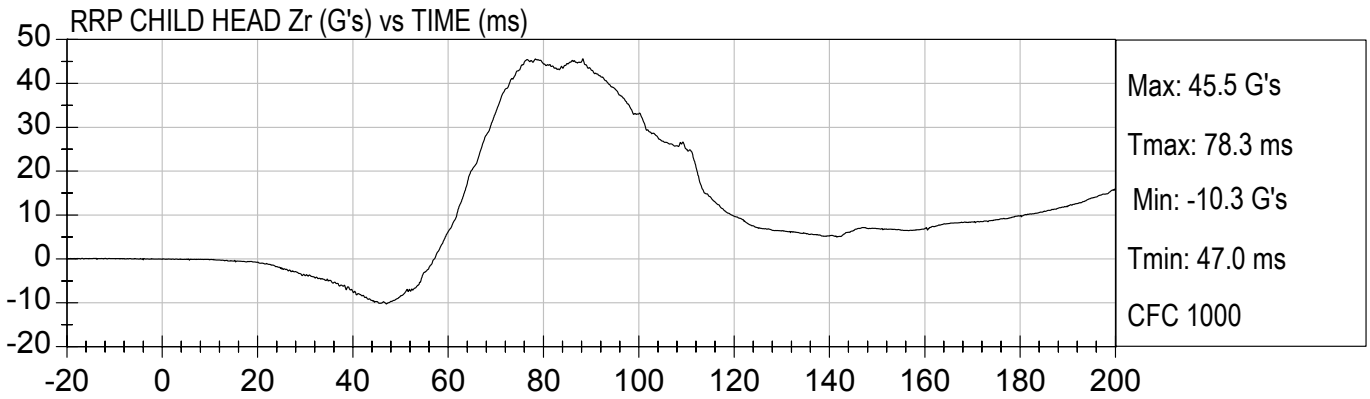

RRP CHILD HEAD Z Velocity (kph) vs TIME (ms)
100
80
60
40
20
0
-20
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 82.6 kph
Tmax: 200.0 ms
Min: -7.8 kph
Tmin: 57.2 ms
CFC 180

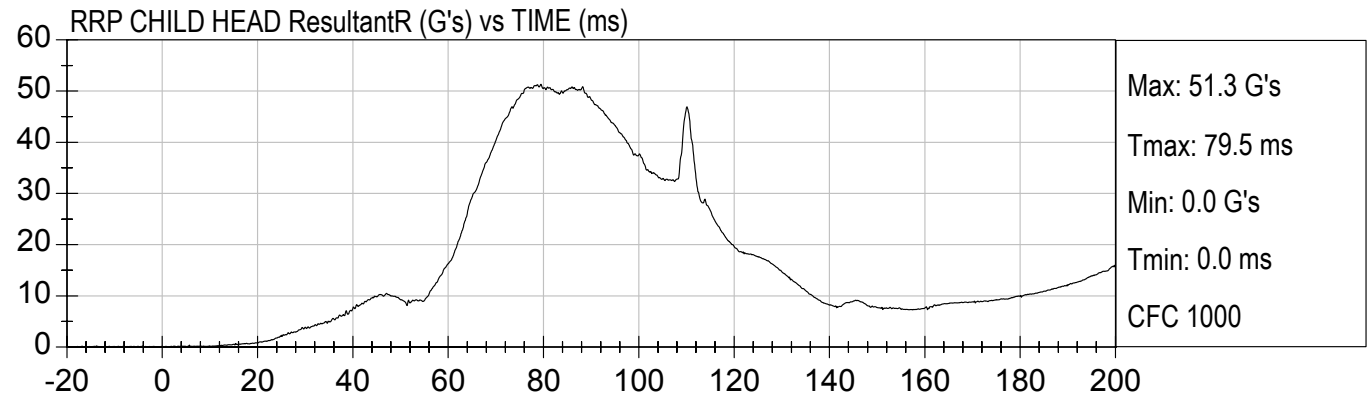
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

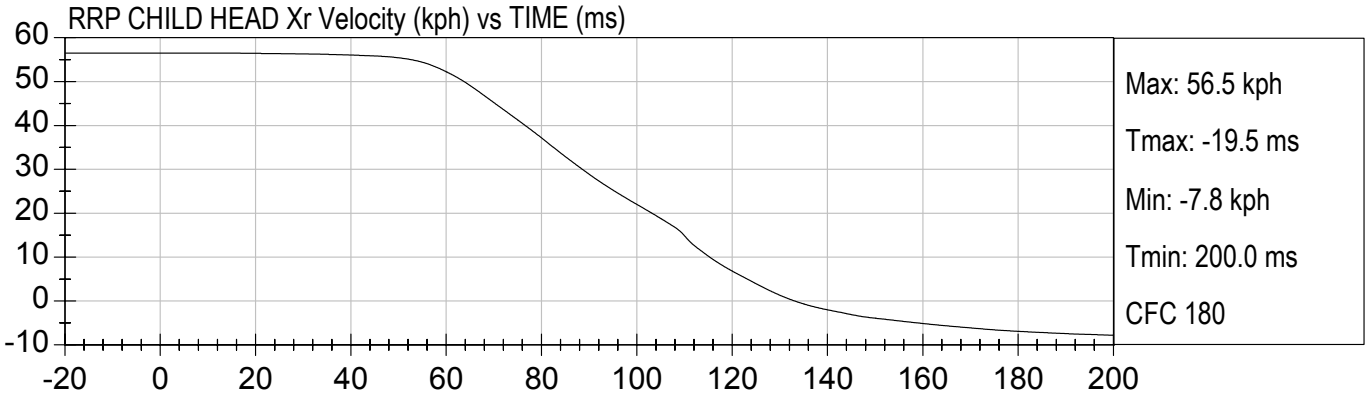
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

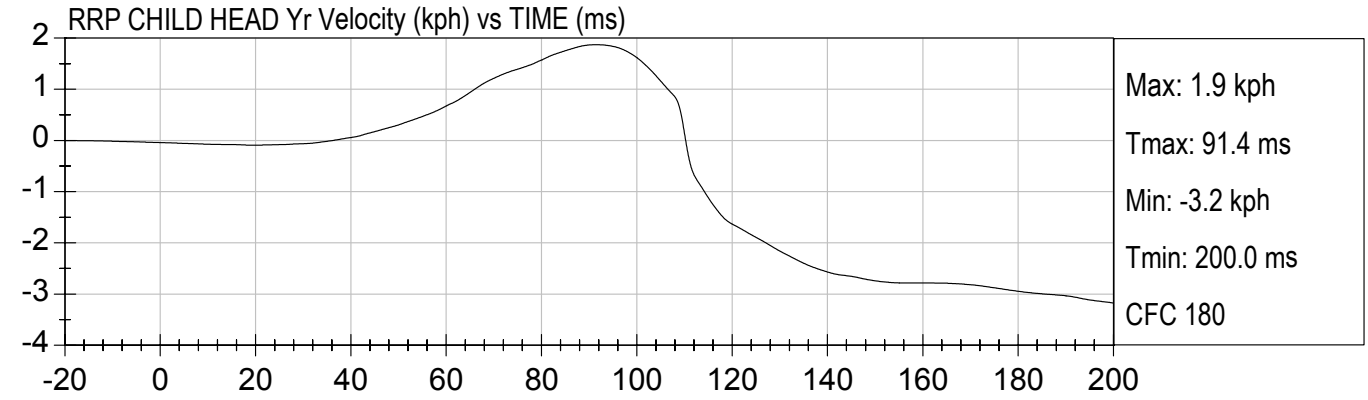


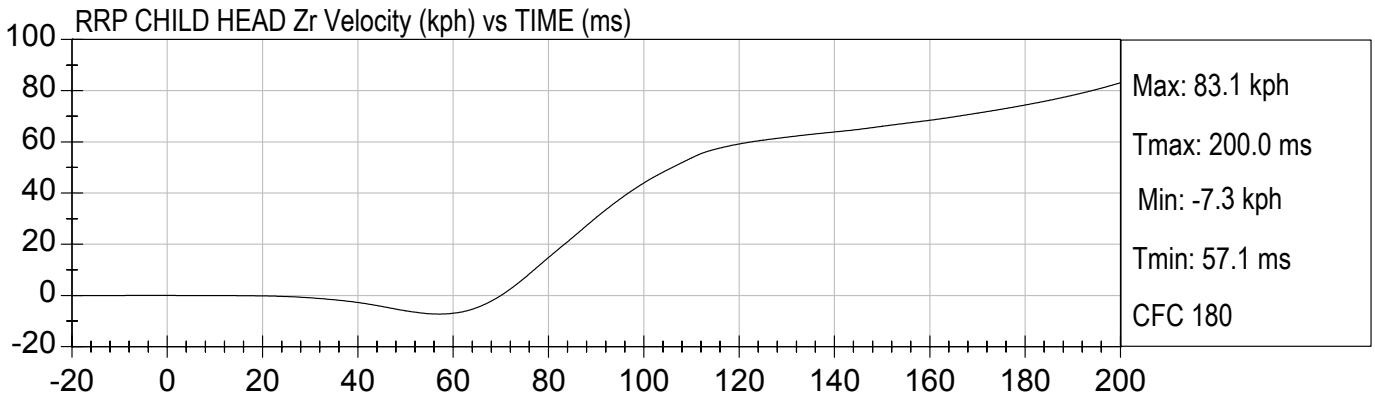






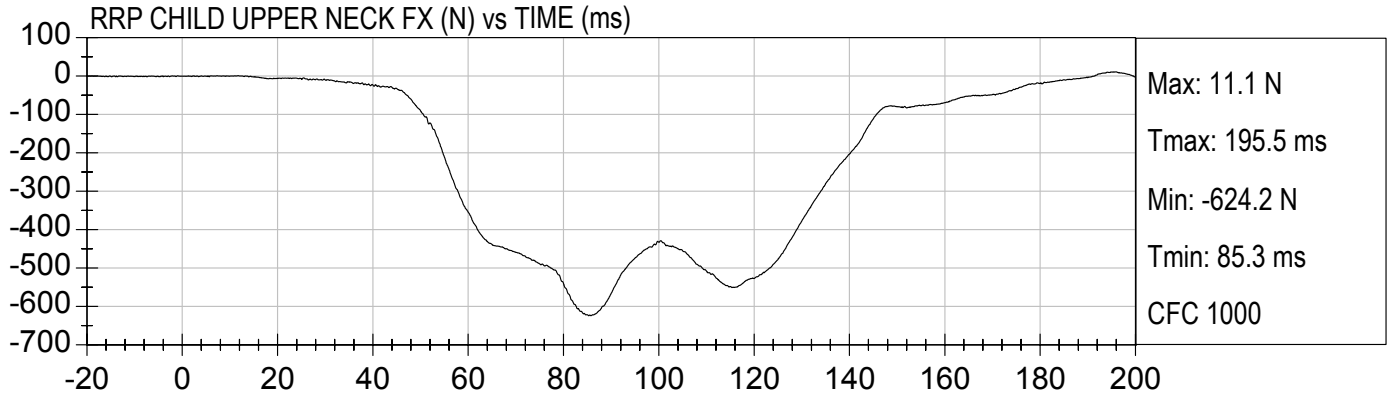

RRP CHILD HEAD Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 56.5 kph
Tmax: -19.5 ms
Min: -7.8 kph
Tmin: 200.0 ms
CFC 180

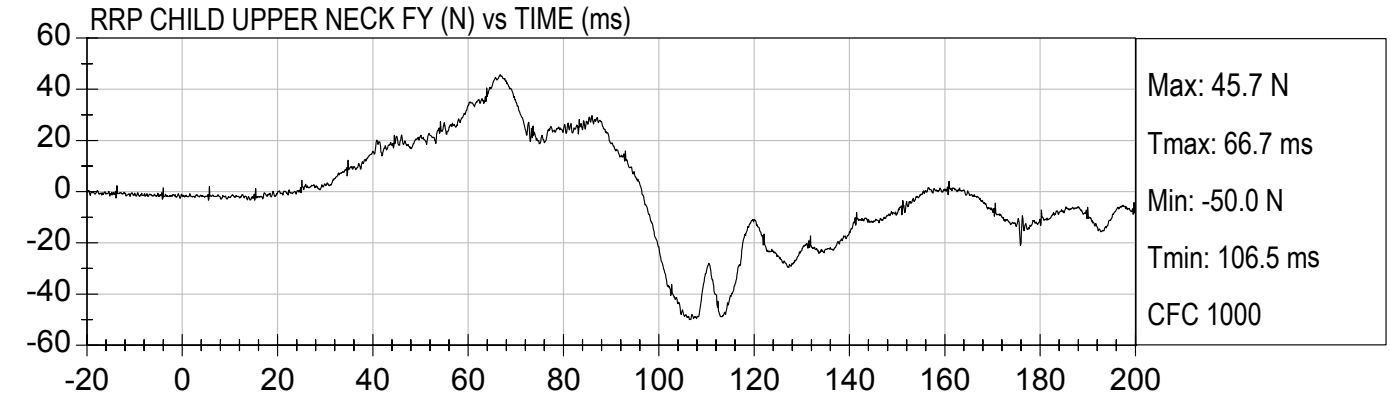

RRP CHILD HEAD Yr Velocity (kph) vs TIME (ms)
2
1
0
-1
-2
-3
-4
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 1.9 kph
Tmax: 91.4 ms
Min: -3.2 kph
Tmin: 200.0 ms
CFC 180

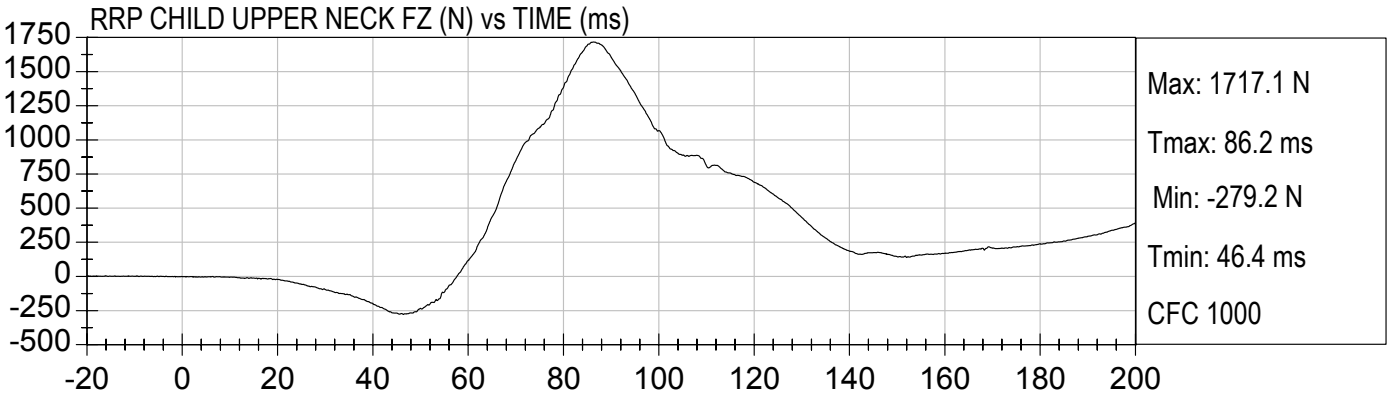

RRP CHILD HEAD Zr Velocity (kph) vs TIME (ms)
100
80
60
40
20
0
-20
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 83.1 kph
Tmax: 200.0 ms
Min: -7.3 kph
Tmin: 57.1 ms
CFC 180

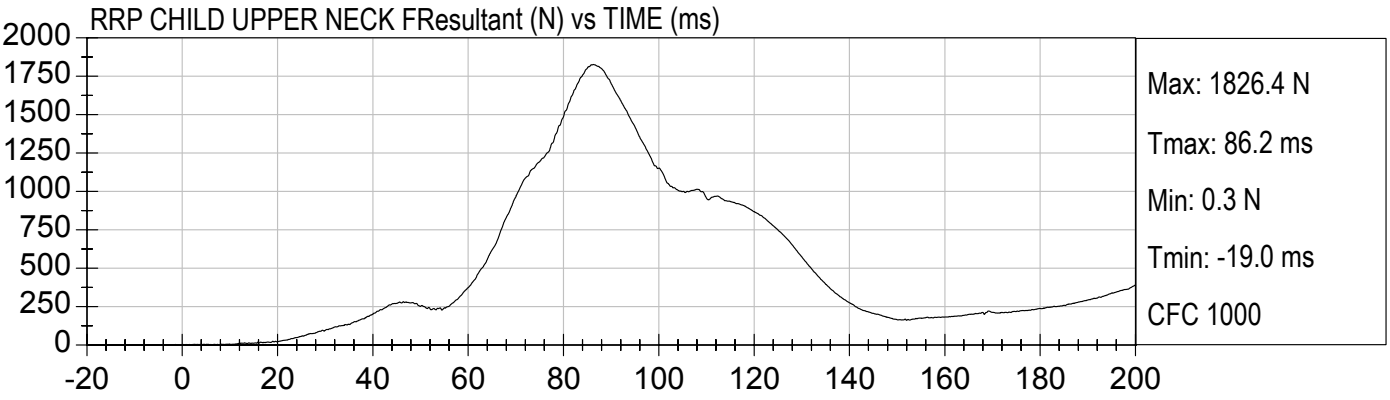
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



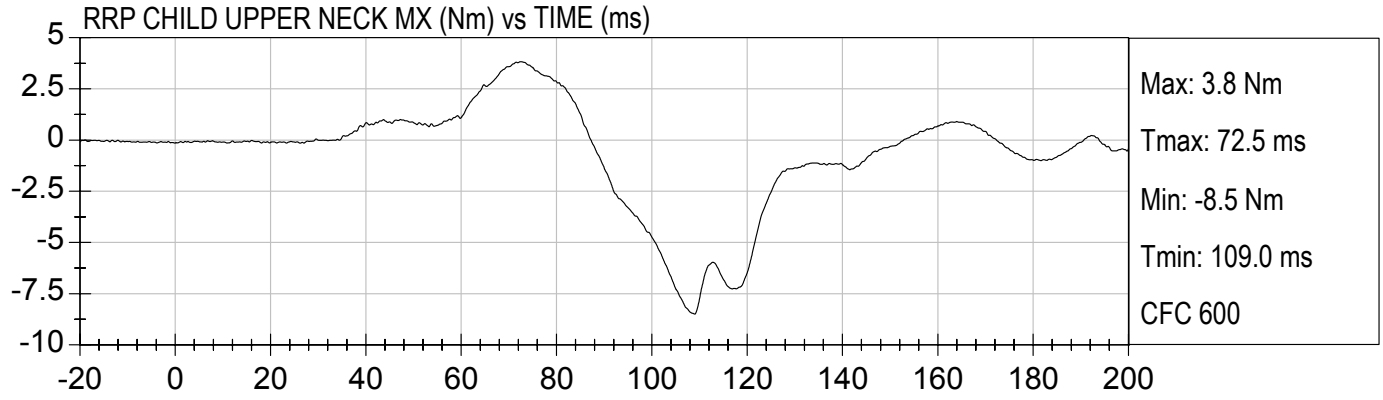


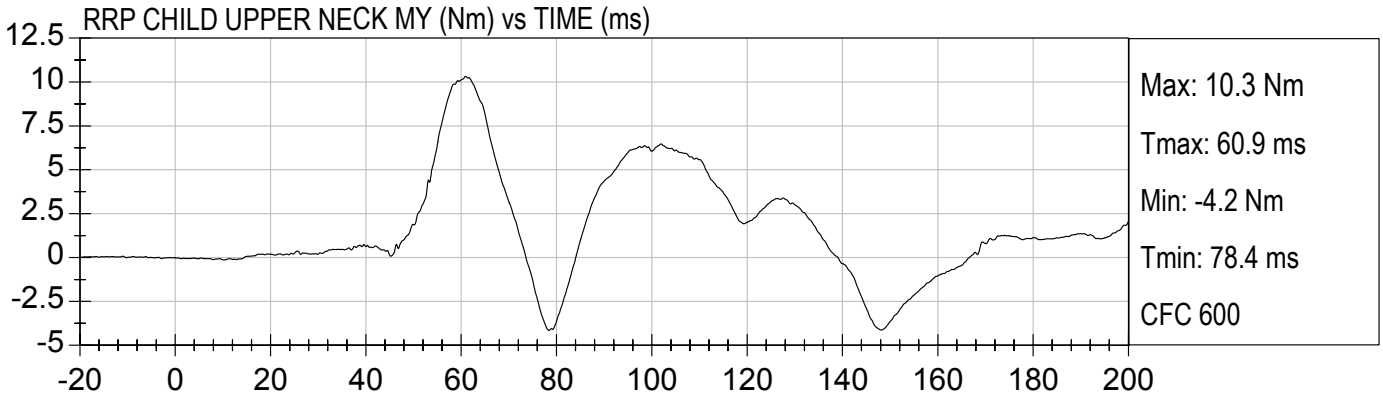


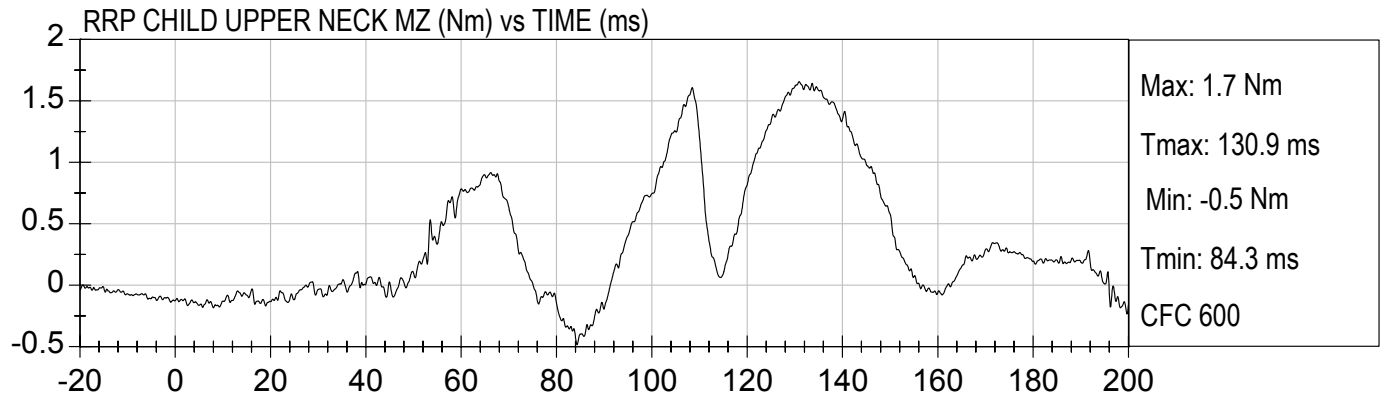


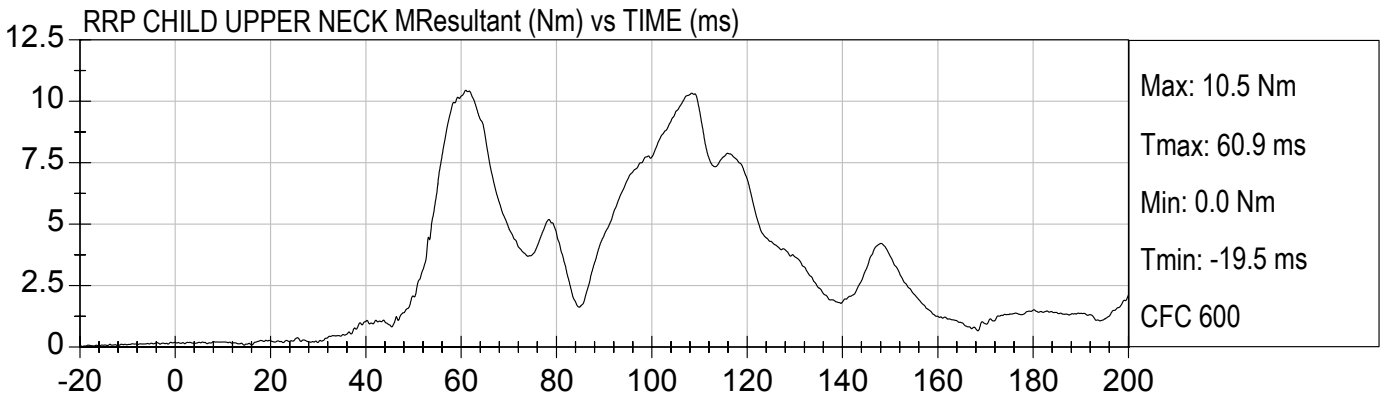
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



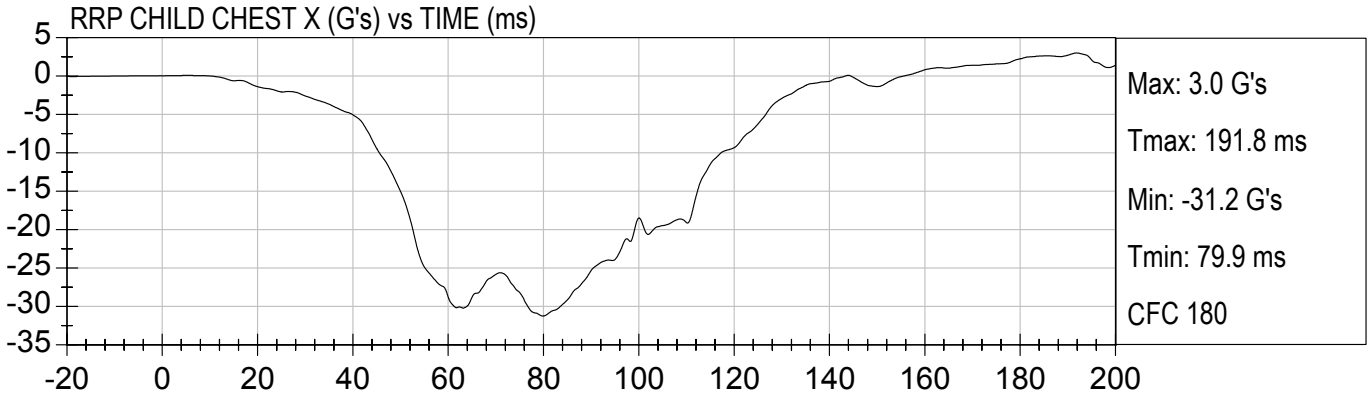


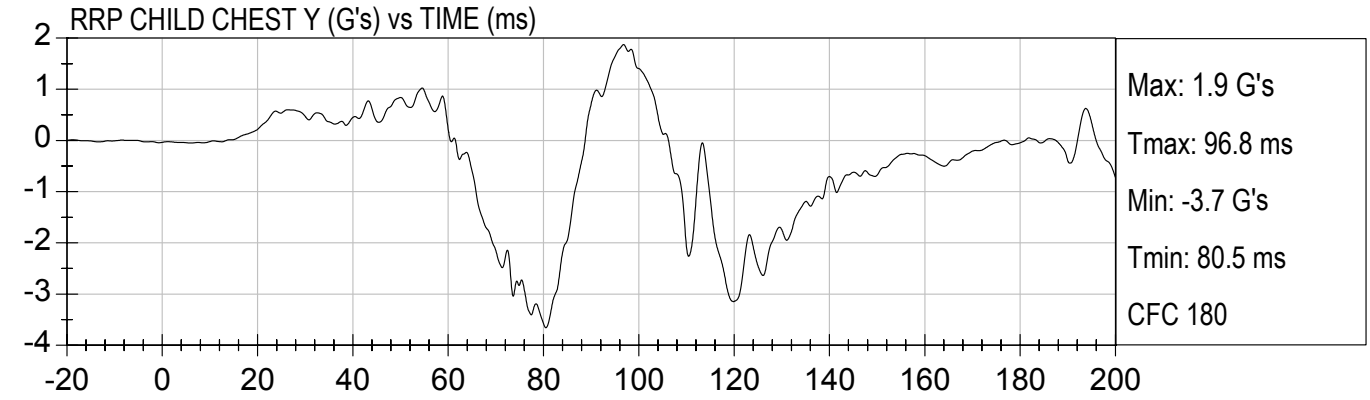


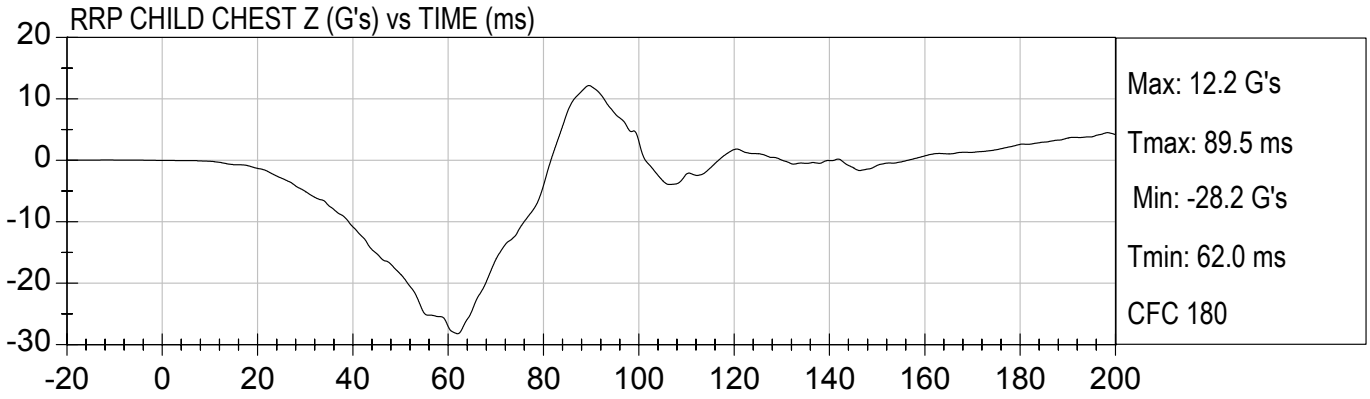


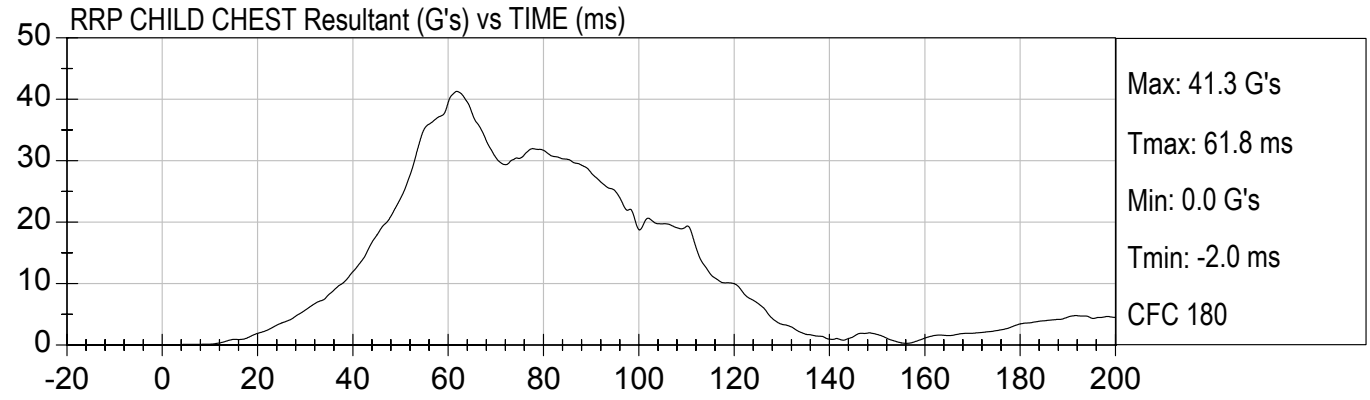
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



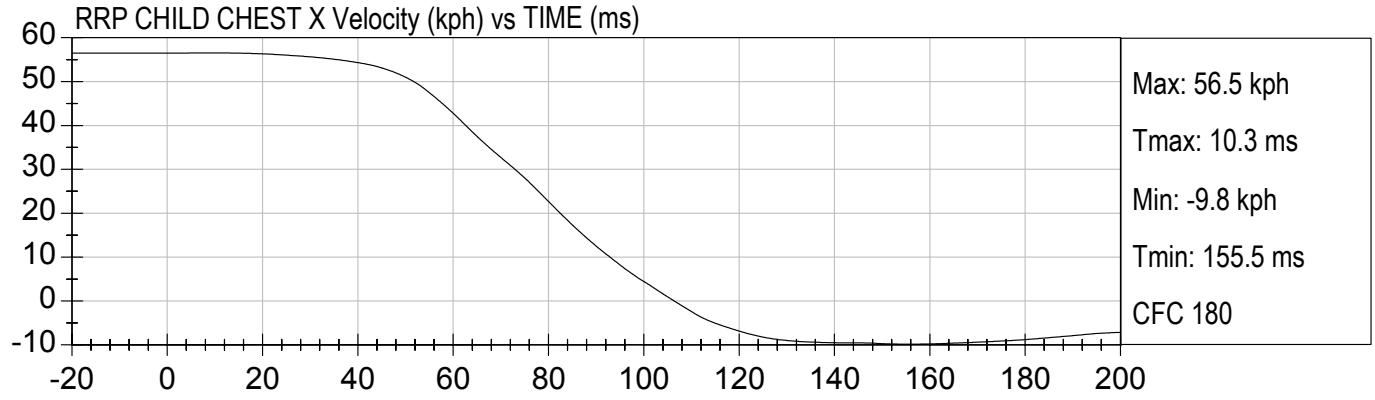


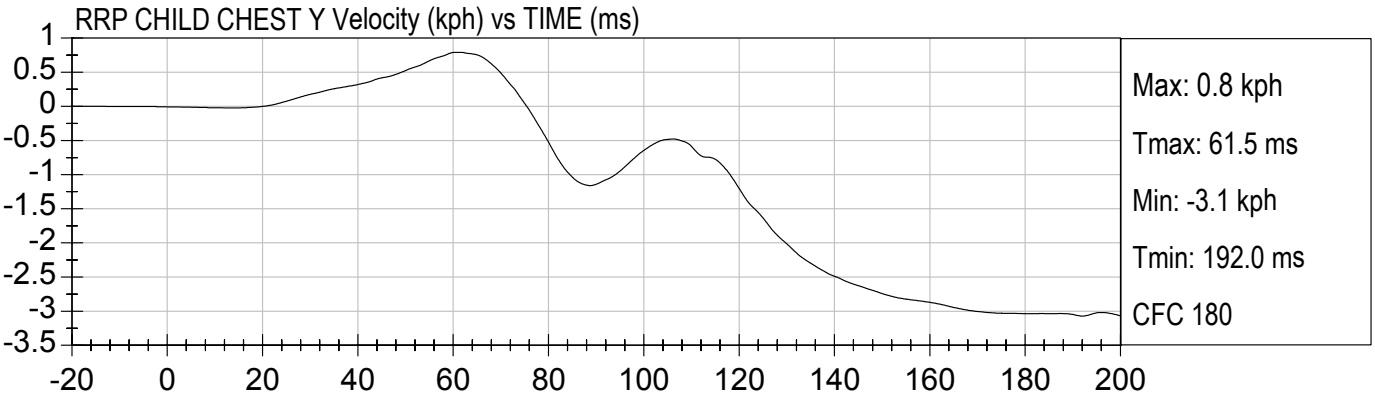


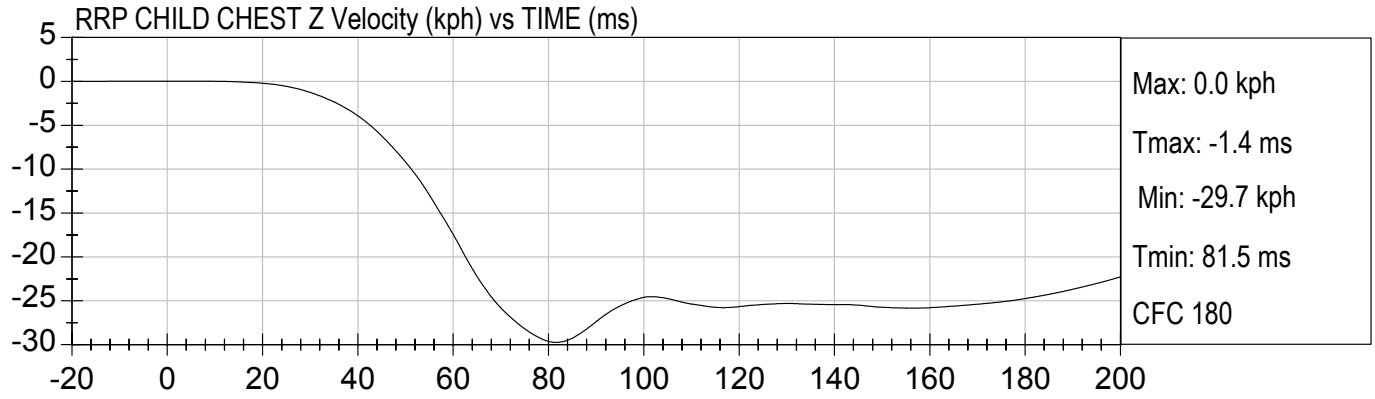


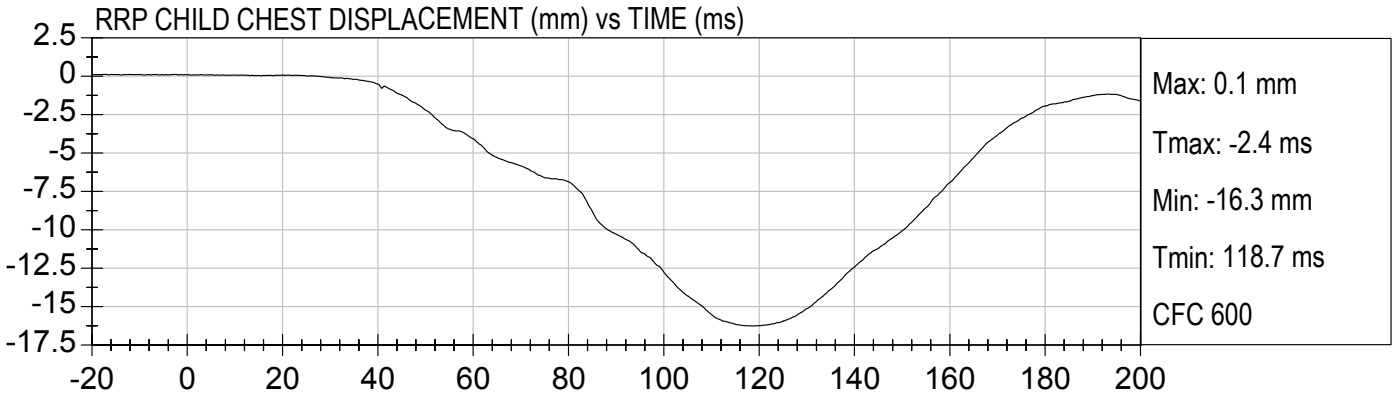
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

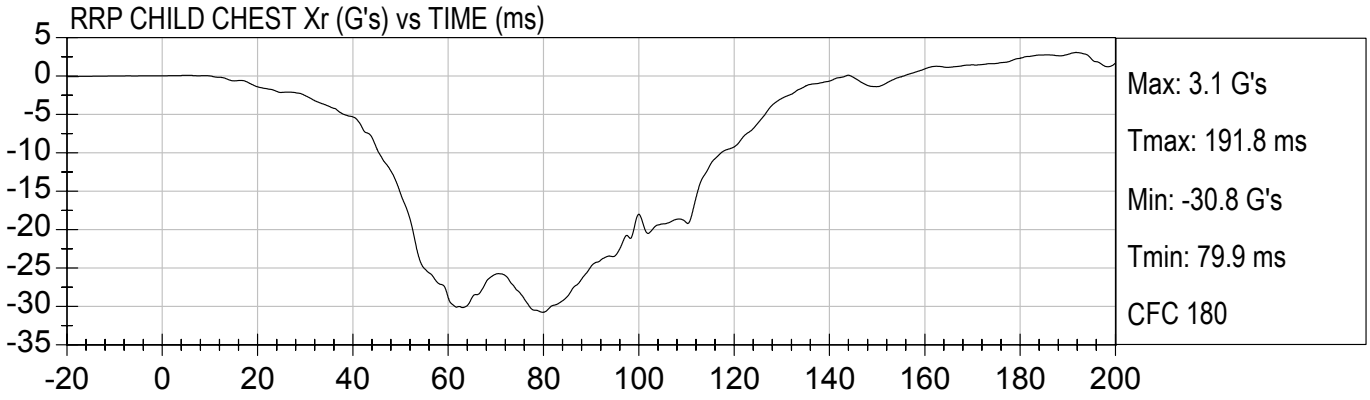
Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)

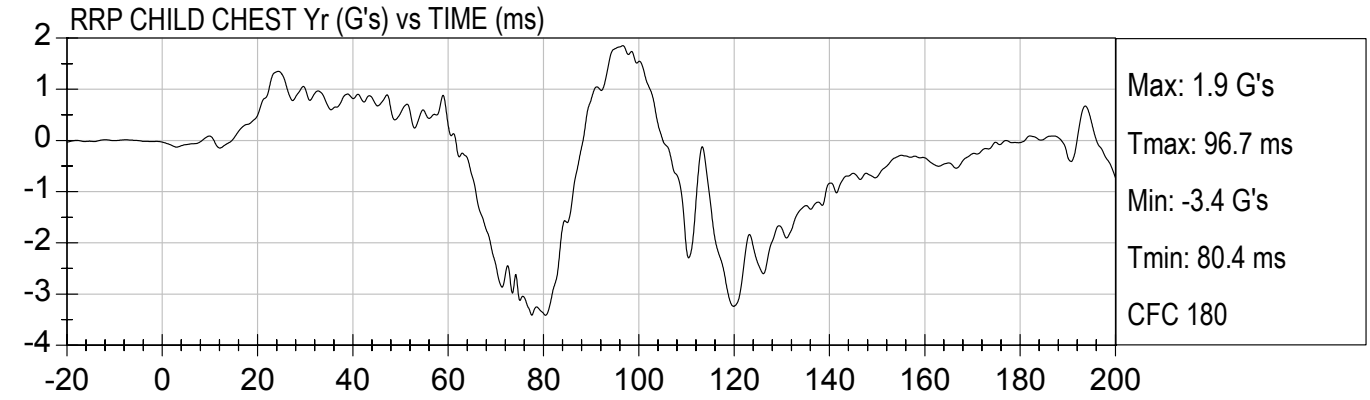


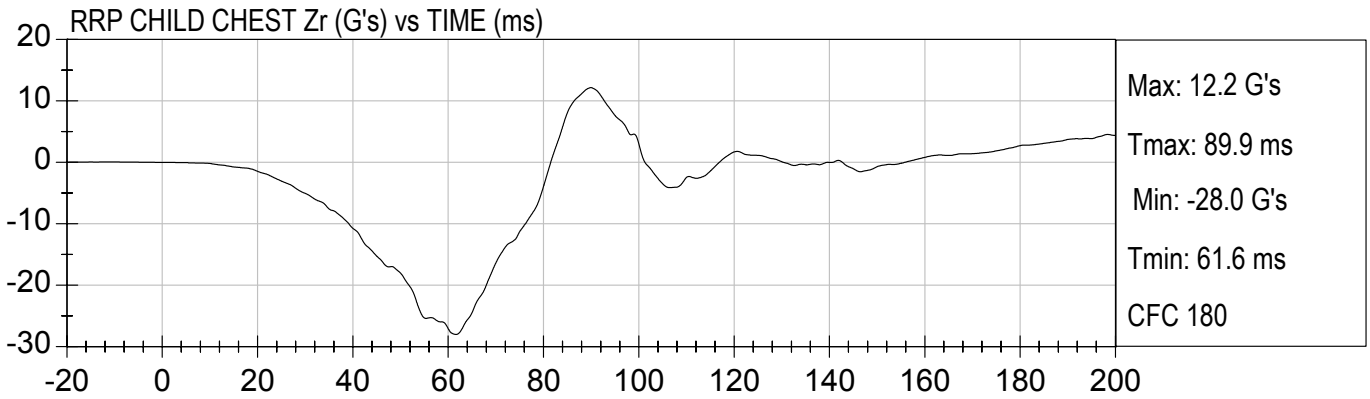


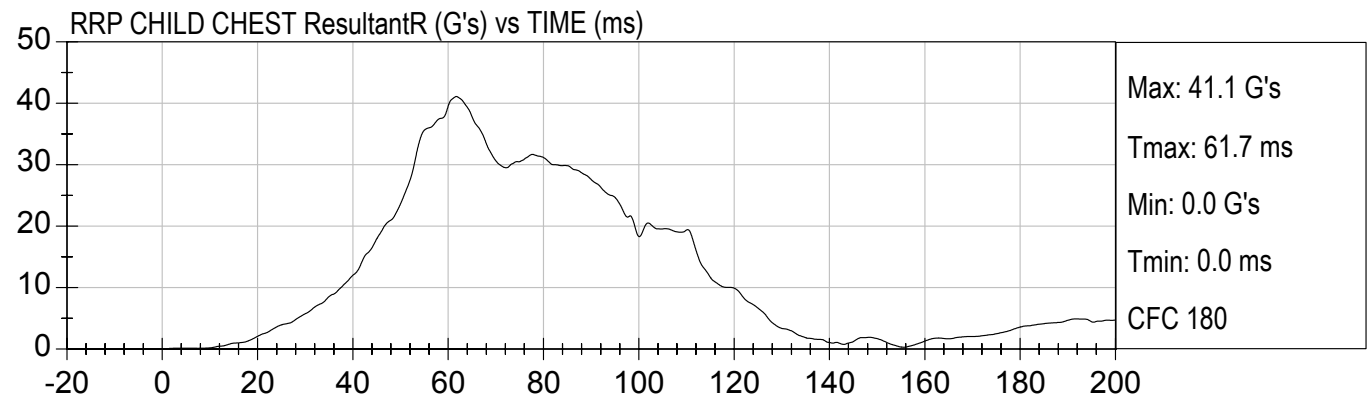


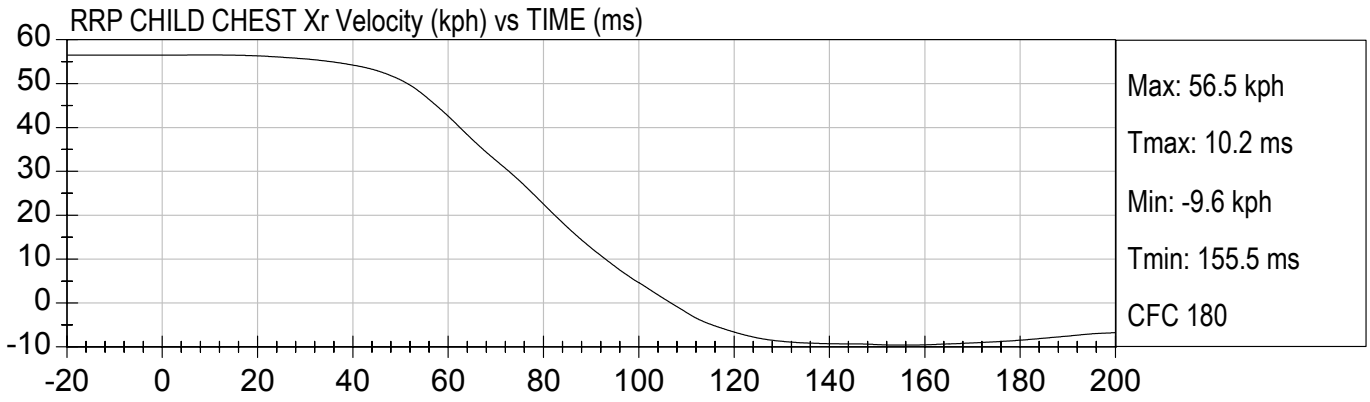


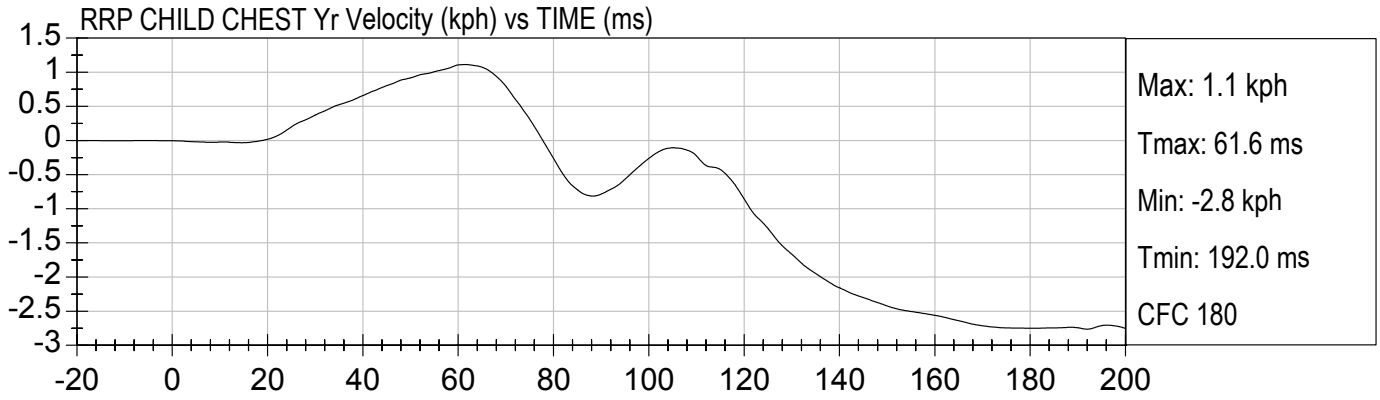

RRP CHILD CHEST Xr (G's) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-35
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 3.1 G's
Tmax: 191.8 ms
Min: -30.8 G's
Tmin: 79.9 ms
CFC 180

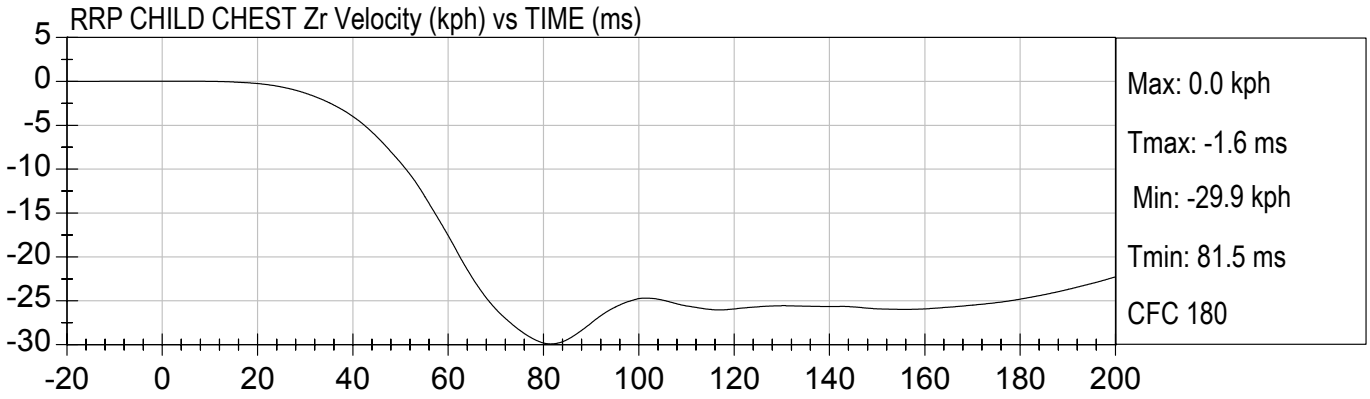

RRP CHILD CHEST Yr (G's) vs TIME (ms)
2
1
0
-1
-2
-3
-4
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 1.9 G's
Tmax: 96.7 ms
Min: -3.4 G's
Tmin: 80.4 ms
CFC 180


RRP CHILD CHEST Zr (G's) vs TIME (ms)
20
10
0
-10
-20
-30
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 12.2 G's
Tmax: 89.9 ms
Min: -28.0 G's
Tmin: 61.6 ms
CFC 180


RRP CHILD CHEST ResultantR (G's) vs TIME (ms)
50
40
30
20
10
0
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 41.1 G's
Tmax: 61.7 ms
Min: 0.0 G's
Tmin: 0.0 ms
CFC 180

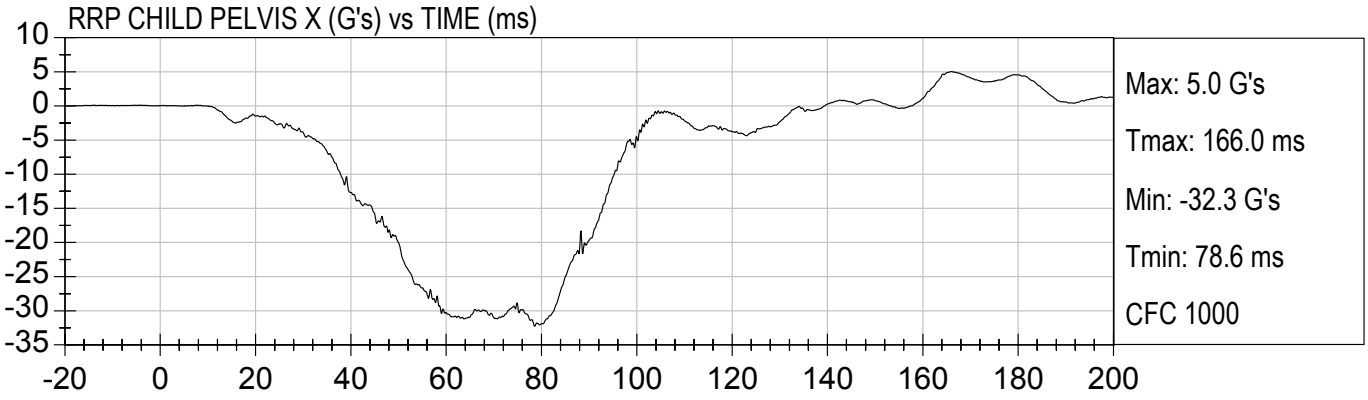

RRP CHILD CHEST Xr Velocity (kph) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 56.5 kph
Tmax: 10.2 ms
Min: -9.6 kph
Tmin: 155.5 ms
CFC 180

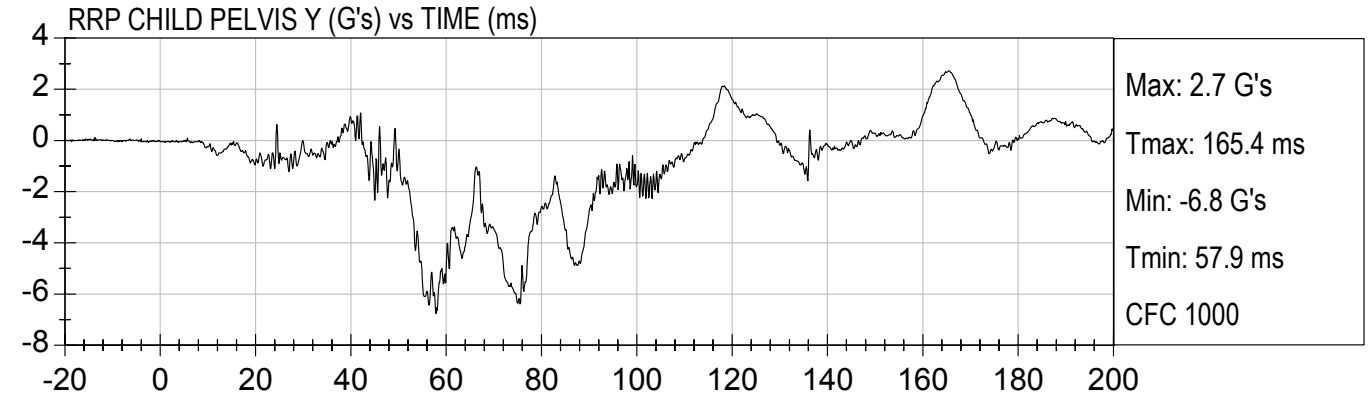

RRP CHILD CHEST Yr Velocity (kph) vs TIME (ms)
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 1.1 kph
Tmax: 61.6 ms
Min: -2.8 kph
Tmin: 192.0 ms
CFC 180

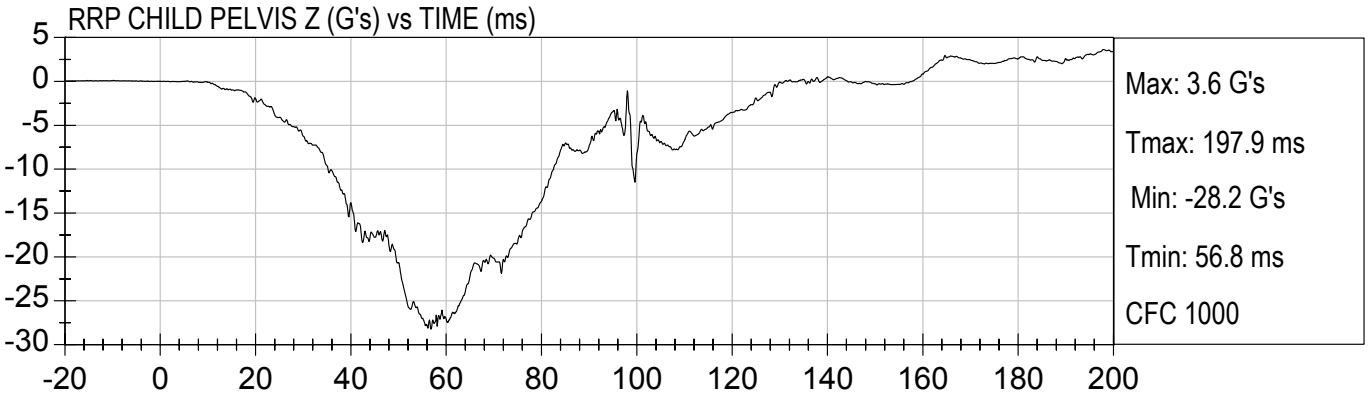

RRP CHILD CHEST Zr Velocity (kph) vs TIME (ms)
5
0
-5
-10
-15
-20
-25
-30
-20 0 20 40 60 80 100 120 140 160 180 200
Max: 0.0 kph
Tmax: -1.6 ms
Min: -29.9 kph
Tmin: 81.5 ms
CFC 180

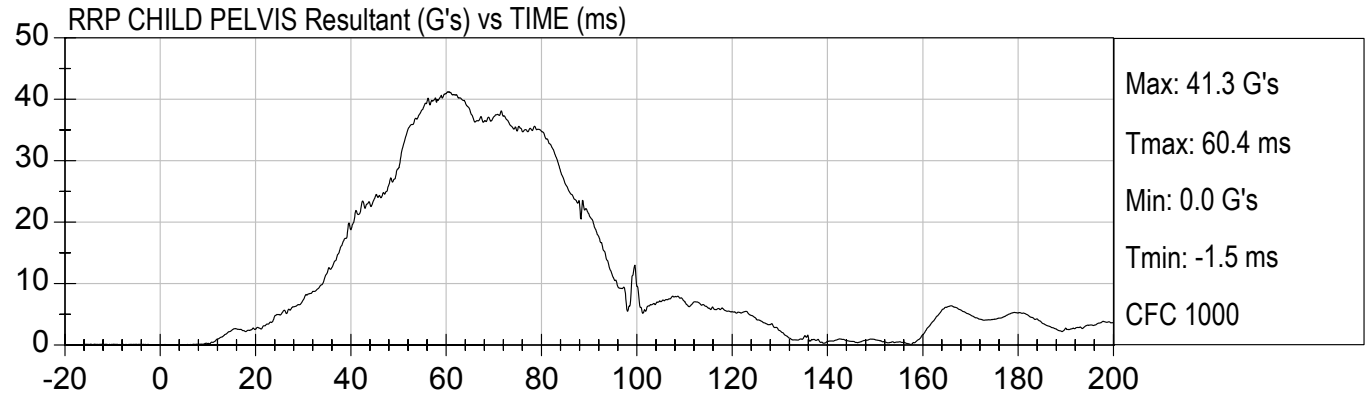
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)



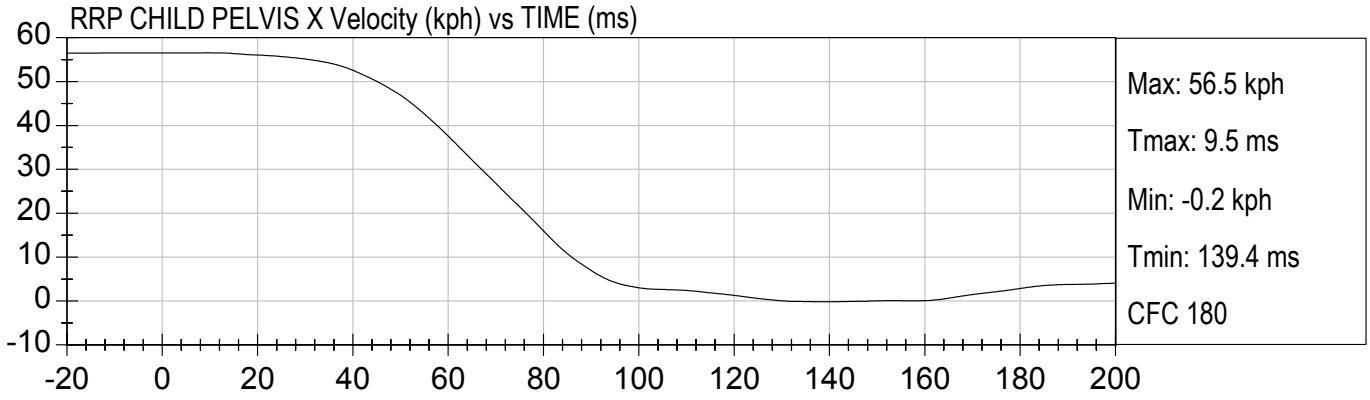


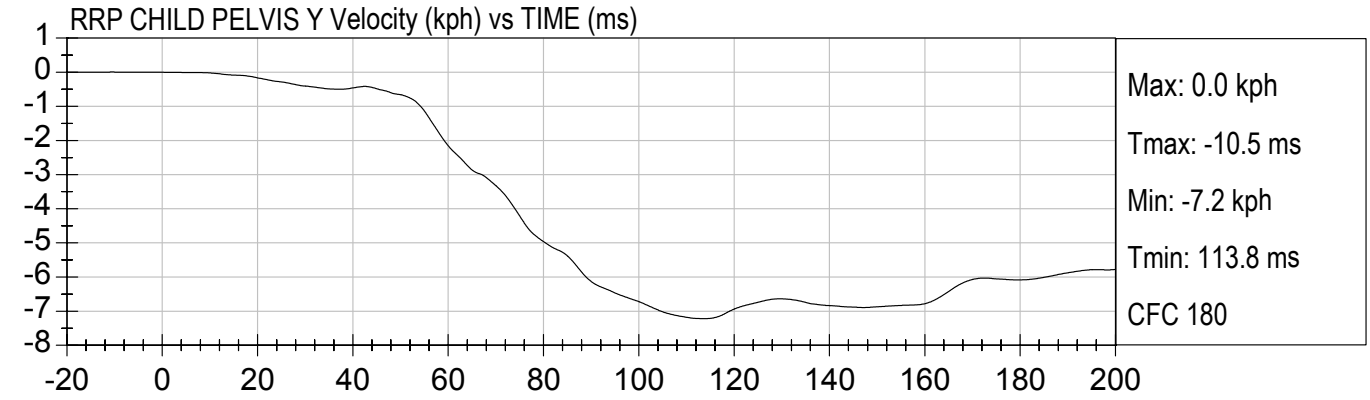


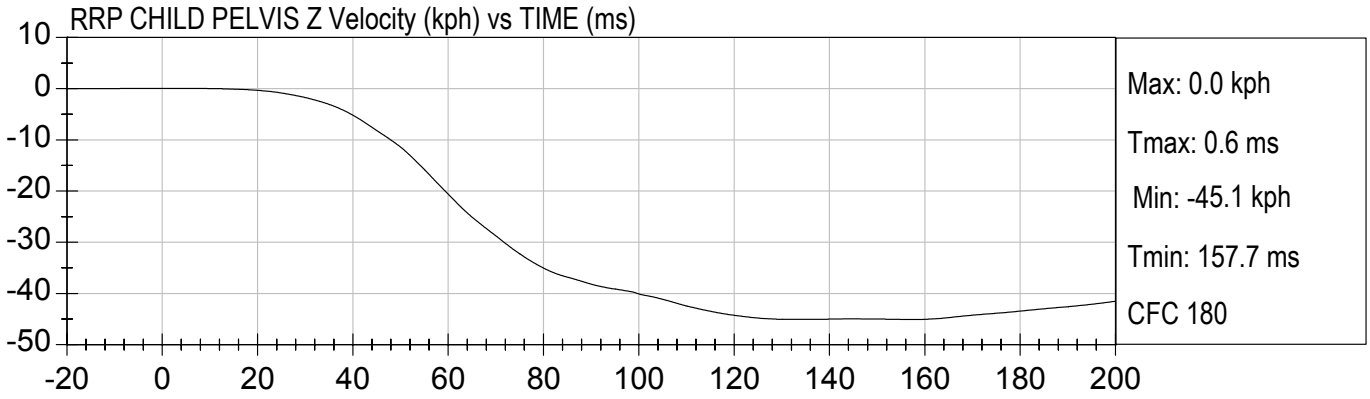


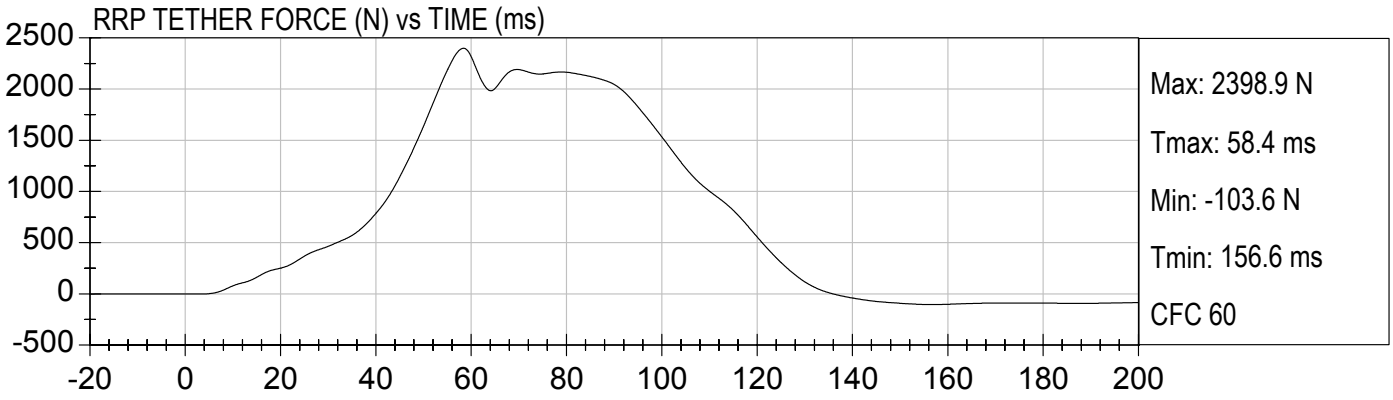
NCAP 35MPH FRONTAL
2004 FORD TAURUS (M40201)

Test Date: 10/16/03
Speed: 35.1 mph (56.5 km/h)









APPENDIX C

CHILD DUMMY CALIBRATION INFORMATION

Transportation Research Center Inc.

ATD Calibration Report

for

VRTC

HIII 3 Year Old Serial No. 040 Calibration No. 02

Transportation Research Center Inc.
P.O. Box B-67
10820 St. Rt. 347
East Liberty, OH 43319-0367

Transportation Research Center Inc.
572P HIII 3 Year Old Dummy
External Dimensions
Serial No. 040 Calibration No. 02

Test Parameter	Dimension	Specification	Results	Pass
Total Sitting Height	A	538.5 - 553.7 mm	550 mm	Yes
Shoulder Pivot Height	B	307.3 - 322.6 mm	315 mm	Yes
Hip Pivot Height	C	33.0 - 43.2 mm	40 mm	Yes
Hip Pivot from Backline	D	56.9 - 67.1 mm	60 mm	Yes
Shoulder Pivot from Backline	E	58.4 - 68.6 mm	64 mm	Yes
Thigh Clearance	F	81.0 - 91.2 mm	86 mm	Yes
Back of Elbow to Wrist Pivot	G	247.4 - 262.6 mm	251 mm	Yes
Head Back to Backline	H	48.3 - 58.4 mm	55 mm	Yes
Shoulder to Elbow Length	I	185.0 - 200.7 mm	196 mm	Yes
Elbow Rest Height	J	133.6 - 148.8 mm	139 mm	Yes
Buttock to Knee Length	K	287.3 - 302.5 mm	297 mm	Yes
Popliteal Height	L	221.0 - 236.2 mm	229 mm	Yes
Knee to Floor Height	M	241.6 - 256.8 mm	254 mm	Yes
Buttock Popliteal Height	N	217.9 - 233.2 mm	225 mm	Yes
Chest Depth without Jacket	O	134.6 - 149.9 mm	145 mm	Yes
Foot Length	P	137.7 - 147.8 mm	140 mm	Yes
Stature	Q	932.2 - 957.6 mm	950 mm	Yes
Buttock to Knee Pivot Length	R	251.5 - 261.6 mm	254 mm	Yes
Head Breadth	S	128.3 - 143.5 mm	138 mm	Yes
Head Depth	T	167.4 - 182.6 mm	178 mm	Yes
Hip Breadth	U	200.7 - 215.9 mm	204 mm	Yes
Shoulder Breadth	V	236.5 - 251.7 mm	239 mm	Yes
Foot Breadth	W	53.6 - 63.8 mm	57 mm	Yes
Head Circumference	X	500.4 - 515.6 mm	503 mm	Yes
Chest Circumference with Jacket	Y	527.1 - 552.5 mm	531 mm	Yes
Waist Circumference	Z	527.1 - 552.5 mm	540 mm	Yes
Reference Location for Chest Circumference	AA	248.9 - 259.1 mm	254 mm	Yes
Reference Location for Waist Circumference	BB	160.0 - 170.2 mm	165 mm	Yes

Technician

Approved

V. V. Walton

Transportation Research Center Inc.

572P Head Drop Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 1

Test Date 10/09/2003

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Peak Resultant Acceleration	250 - 280 g	262.1 g	Yes
Peak Lateral Acceleration	15 g Max	-4.5 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

Comments:

Technician

Approved

10.09.2003 09:57:28 607

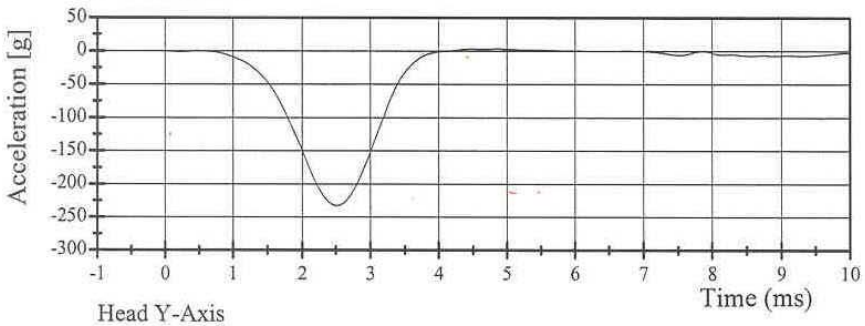
Transportation Research Center Inc.

572P Head Drop Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 1

Test Date 10/09/2003

Head X-Axis

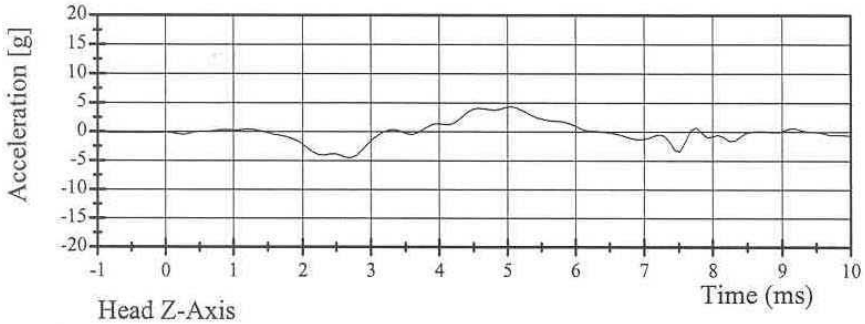


Filter Class: 1000

Max: 3.5 g at 4.9 ms

Min: -232.3 g at 2.5 ms

Head Y-Axis

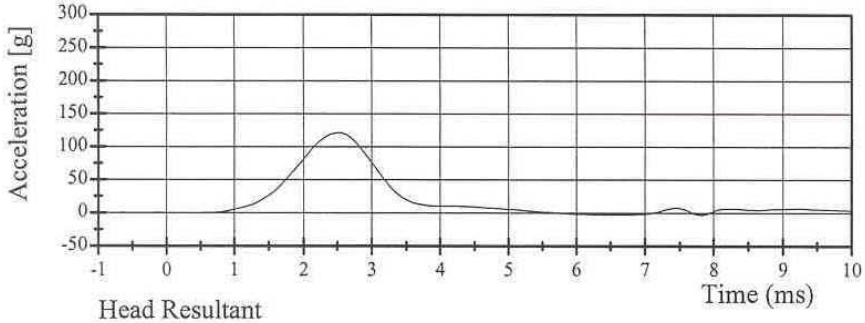


Filter Class: 1000

Max: 4.4 g at 5.0 ms

Min: -4.5 g at 2.7 ms

Head Z-Axis

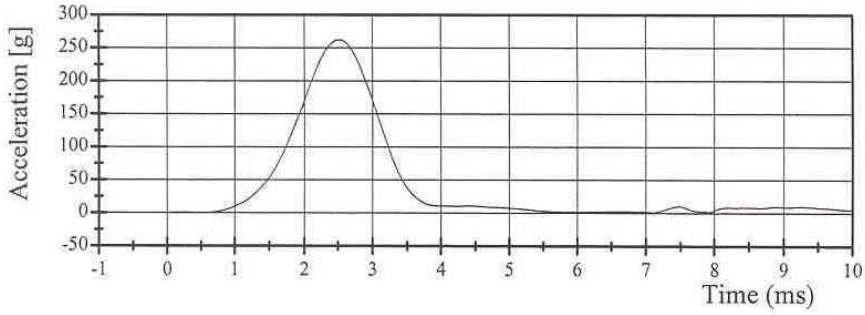


Filter Class: 1000

Max: 121.6 g at 2.6 ms

Min: -3.0 g at 7.8 ms

Head Resultant



Filter Class: 1000

Max: 262.1 g at 2.6 ms

Min: 0.0 g at 2.0 ms

10.09.2003 09:57:30 607

Transportation Research Center Inc.

572P Neck Flexion Test - 6 Channel Transducer

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 3

Test Date 10/09/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Impact Velocity	5.40 - 5.60 m/s	5.58 m/s	Yes
Integrated Pendulum Velocity			
10 ms	2.00 - 2.70 m/s	2.60 m/s	Yes
15 ms	3.00 - 4.00 m/s	3.71 m/s	Yes
20 ms	4.00 - 5.10 m/s	5.03 m/s	Yes
Peak D Plane Rotation	70 - 82 °	71.8 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	42.0 - 53.0 N·m	46.29 N·m	Yes
Positive Moment Decay Time To 10 N·m	60 - 80 ms	69.12 ms	Yes

Comments:

Technician

Approved

V. J. Walton

10.09.2003 08:57:58 637

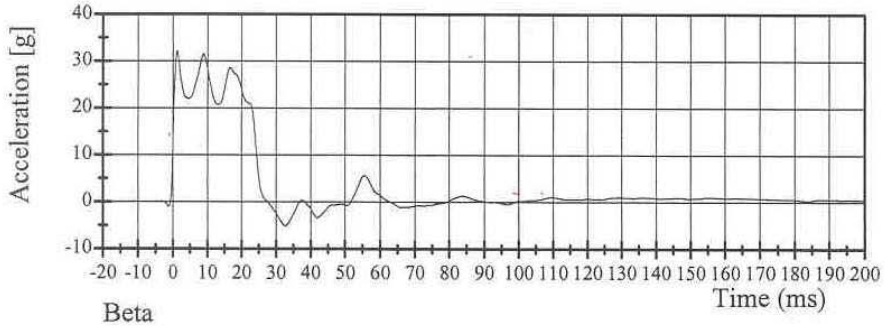
Transportation Research Center Inc.

572P Neck Flexion Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 3

Test Date 10/09/2003

Pendulum Deceleration

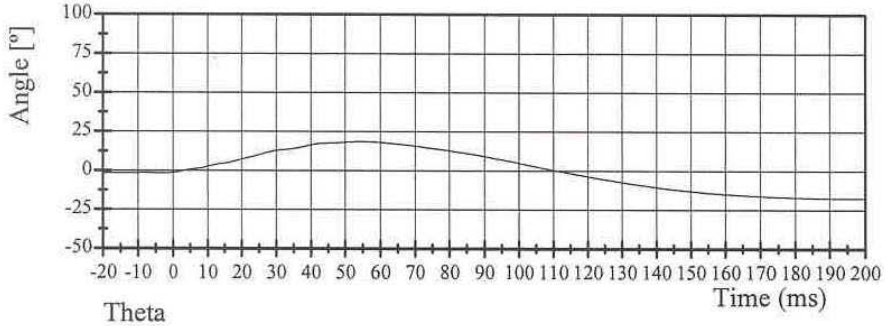


Filter Class: 180

Max: 32.1 g at 1.3 ms

Min: -5.1 g at 32.7 ms

Beta

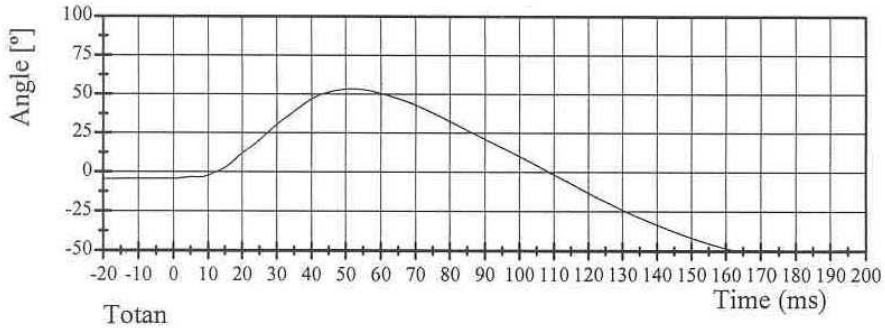


Filter Class: 60

Max: 18.5 ° at 55.1 ms

Min: -17.6 ° at 201.9 ms

Theta

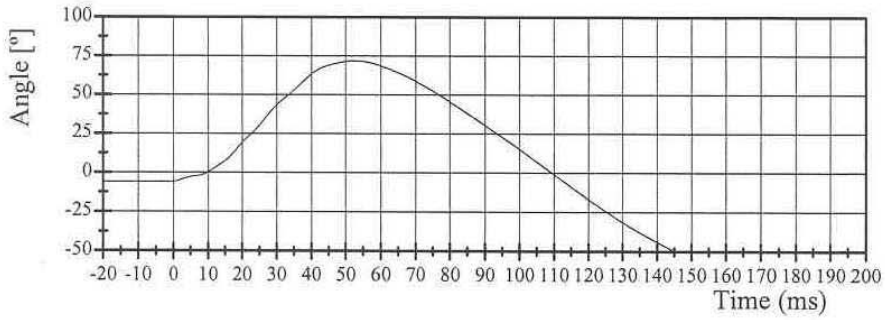


Filter Class: 60

Max: 53.4 ° at 51.7 ms

Min: -57.3 ° at 192.6 ms

Totan



Filter Class: 60

Max: 71.8 ° at 52.6 ms

Min: -74.9 ° at 192.9 ms

10.09.2003 08:57:59 637

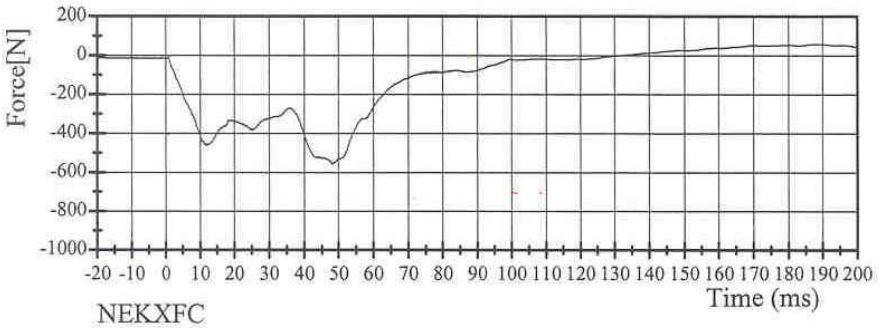
Transportation Research Center Inc.

572P Neck Flexion Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 3

Test Date 10/09/2003

NEKXF

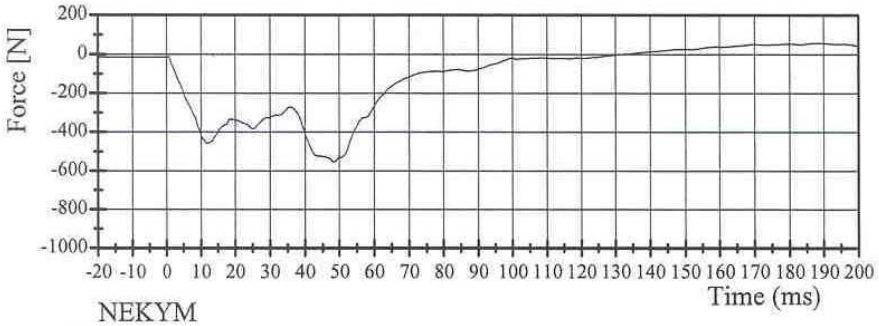


Filter Class: 1000

Max: 58.6 N at 187.5 ms

Min: -555.8 N at 48.1 ms

NEKXFC

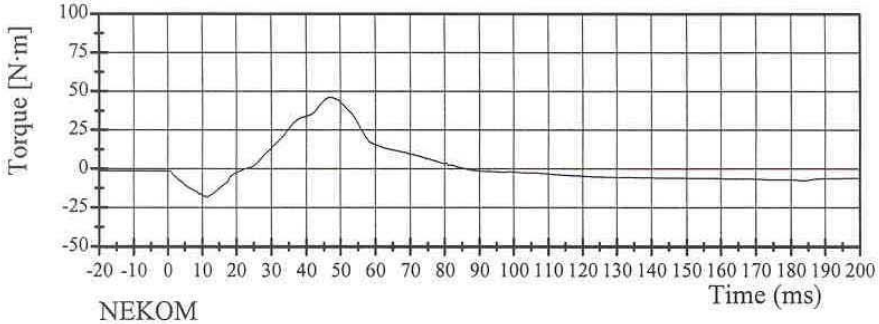


Filter Class: 600

Max: 58.5 N at 187.4 ms

Min: -554.6 N at 48.2 ms

NEKYM

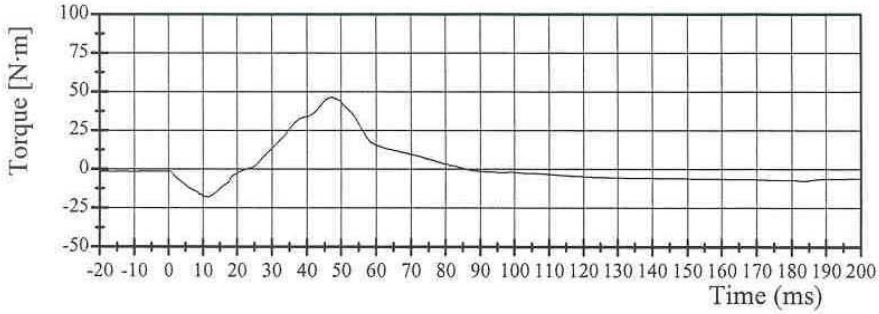


Filter Class: 600

Max: 46.3 N·m at 47.3 ms

Min: -18.0 N·m at 11.4 ms

NEKOM



Filter Class: 600

Max: 46.3 N·m at 47.3 ms

Min: -18.0 N·m at 11.4 ms

10.09.2003 08:58:00 637

Transportation Research Center Inc.

572P Neck Extension Test - 6 Channel Transducer

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 2

Test Date 10/09/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Impact Velocity	3.55 - 3.75 m/s	3.71 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.00 - 1.40 m/s	1.38 m/s	Yes
15 ms	1.90 - 2.50 m/s	2.44 m/s	Yes
20 ms	2.80 - 3.50 m/s	3.32 m/s	Yes
Peak D Plane Rotation	83 - 93 °	86.8 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	-53.3 - (-43.7) N·m	-46.33 N·m	Yes
Positive Moment Decay Time To -10 N·m	60 - 80 ms	66.16 ms	Yes

Comments:

Technician

Approved

10.09.2003 09:53:50 953

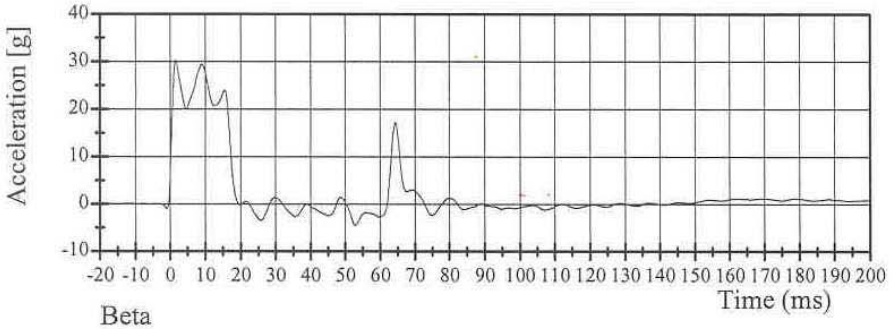
Transportation Research Center Inc.

572P Neck Extension Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 2

Test Date 10/09/2003

Pendulum Deceleration

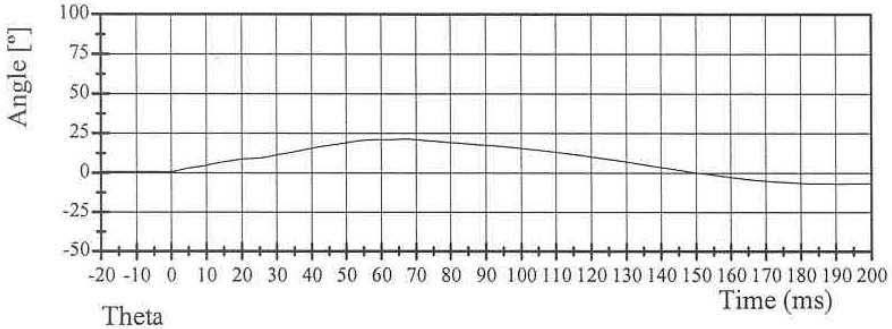


Filter Class: 180

Max: 30.2 g at 1.7 ms

Min: -4.5 g at 52.8 ms

Beta

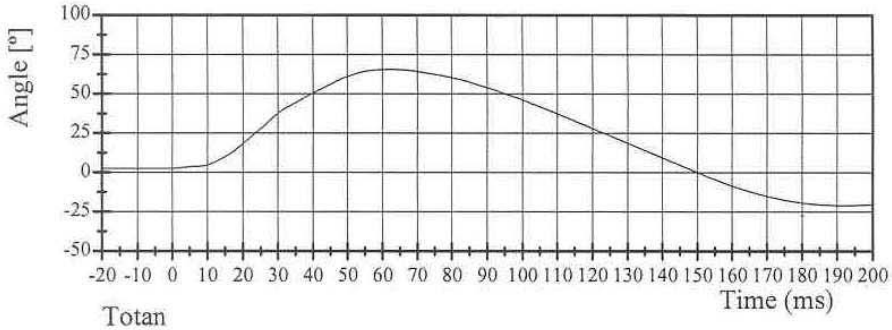


Filter Class: 60

Max: 21.4 ° at 67.0 ms

Min: -6.8 ° at 190.8 ms

Theta

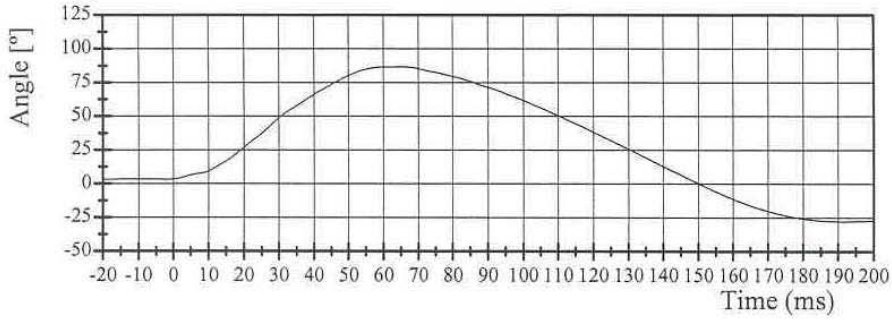


Filter Class: 60

Max: 65.5 ° at 62.4 ms

Min: -20.9 ° at 191.8 ms

Totan



Filter Class: 60

Max: 86.8 ° at 65.4 ms

Min: -27.8 ° at 191.6 ms

10.09.2003 09:53:51 953

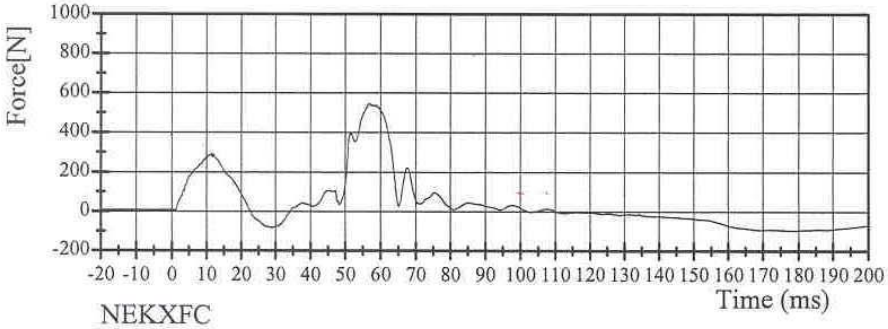
Transportation Research Center Inc.

572P Neck Extension Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 2

Test Date 10/09/2003

NEKXF

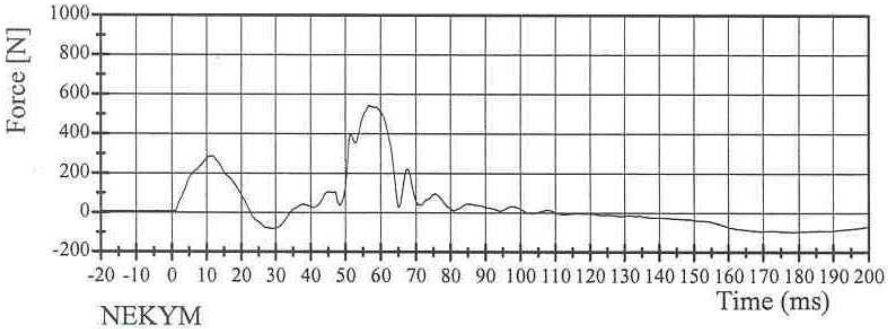


Filter Class: 1000

Max: 543.9 N at 56.9 ms

Min: -97.1 N at 175.3 ms

NEKXFC

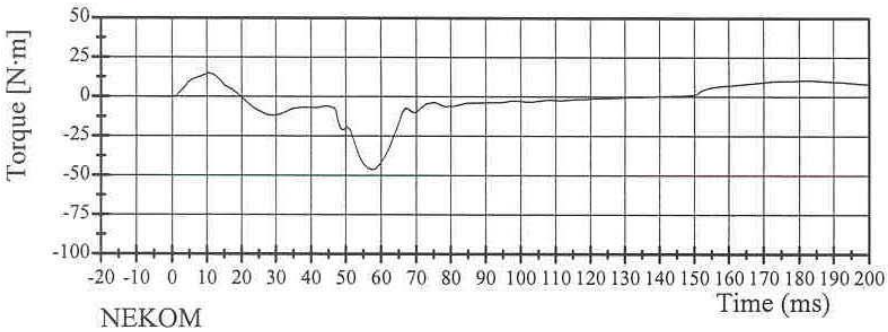


Filter Class: 600

Max: 543.2 N at 56.8 ms

Min: -96.2 N at 178.7 ms

NEKYM

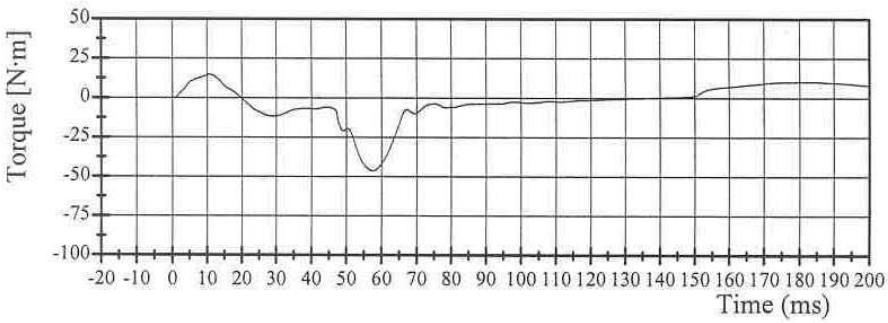


Filter Class: 600

Max: 15.1 N·m at 10.4 ms

Min: -46.3 N·m at 57.6 ms

NEKOM



Filter Class: 600

Max: 15.1 N·m at 10.4 ms

Min: -46.3 N·m at 57.6 ms

10.09.2003 09:53:52 953

Transportation Research Center Inc.

572P Thorax Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 3

Test Date 10/10/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
Pendulum Velocity	5.90 - 6.10 m/s	6.05 m/s	Yes
Maximum Chest Deflection	-38.0 - (-32.0) mm	-32.5 mm	Yes
Peak Impact Probe Force Within Compression Corridor	680 - 810 N	715 N	Yes
Internal Hysteresis	65 - 85 %	71 %	Yes
Maximum Force Between 12.5 mm & 32 mm Of Deflection	<= 910	778	Yes

Comments:

Technician

Approved

10.10.2003 09:47:24 998

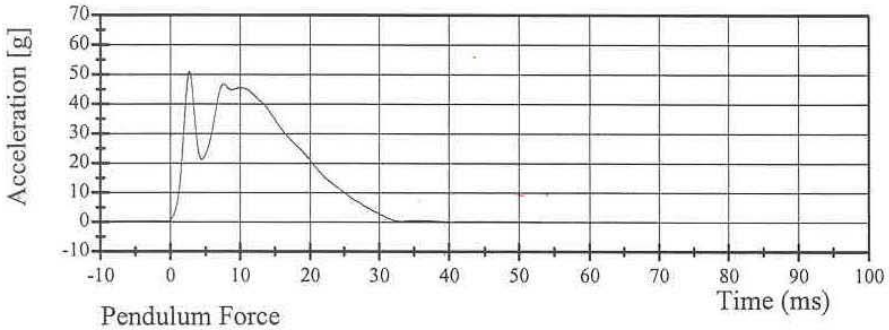
Transportation Research Center Inc.

572P Thorax Test

HIII 3 Year Old Serial No. 040 Calibration No. 02 - 3

Test Date 10/10/2003

Pendulum Deceleration

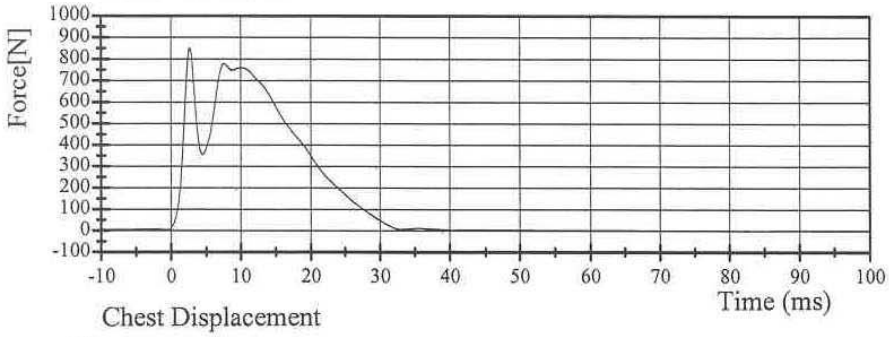


Filter Class: 180

Max: 51.0 g at 2.6 ms

Min: -0.4 g at 433.0 ms

Pendulum Force

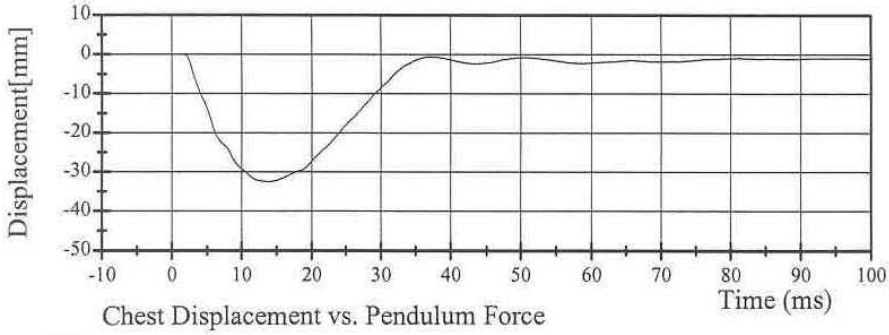


Filter Class: 180

Max: 850.3 N at 2.6 ms

Min: -7.0 N at 433.0 ms

Chest Displacement

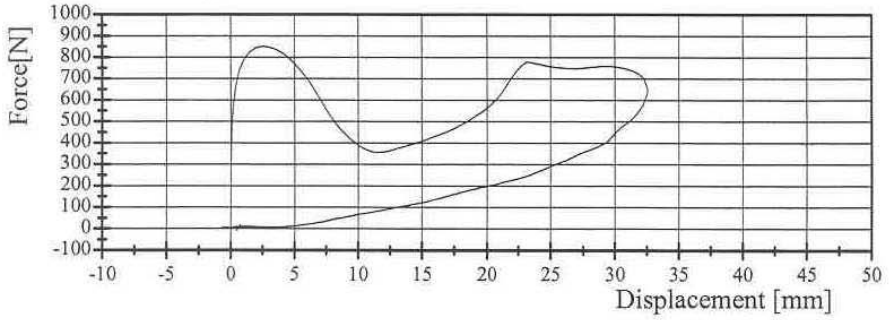


Filter Class: 600

Max: 0.7 mm at 725.3 ms

Min: -32.5 mm at 13.9 ms

Chest Displacement vs. Pendulum Force



10.10.2003 09:47:25 998

TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III THREE-YEAR-OLD

CAL DATE: 09-Oct-03

TRC, INC. TEST NO: 040C02TF1 572 P SN 040 TORSO FLEX CAL 02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9 – 25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 – 70 %	44 %
INITIAL ANGLE OF UNSUPPORRTED DUMMY	<= 15 DEG. REFERENCED TO VERTICAL	9.2 DEG.
MAXIMUM FORCE AT 45 DEG. DURING 10 SECOND PERIOD	130 – 180 N	152.6 N
RETURN ANGLE		14.8 °
DIFFERENCE BETWEEN RETURN ANGLE & INTIAL ANGLE	+/- 8 ° OF INTIAL ANGLE	5.6 °
RATE	0.5° - 1.5°/sec	1.0 °/sec

TEST MEETS SPECIFICATIONS

TECHNICIAN 

Transportation Research Center Inc.

ATD Calibration Report

for

VRTC

HIII 6 Year Old Serial No. 186
Calibration No. 01

Transportation Research Center Inc.
P.O. Box B-67
10820 St. Rt. 347
East Liberty, OH 43319-0367

Transportation Research Center Inc.
572N HIII 6 Year Old Dummy
External Dimensions
Serial No. 186 Calibration No. 01

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Total Sitting Height	622.3 - 647.7	638	Yes
B	Shoulder Pivot Height	348.0 - 363.2	355	Yes
C	Hip Pivot Height	63.5 - 73.7	68	Yes
D	Hip Pivot from Backline	88.9 - 99.1	95	Yes
E	Shoulder Pivot from Backline	53.3 - 63.5	58	Yes
F	Thigh Clearance	88.9 - 104.1	94	Yes
G	Back of Elbow to Wrist Pivot	182.9 - 198.1	188	Yes
H	Head Back to Backline	17.8 - 22.8	20	Yes
I	Shoulder to Elbow Length	215.9 - 231.1	220	Yes
J	Elbow Rest Height	157.4 - 177.8	161	Yes
K	Buttock to Knee Length	370.8 - 391.2	389	Yes
L	Popliteal Height	269.2 - 289.6	278	Yes
M	Knee to Floor Height	307.4 - 322.6	309	Yes
N	Buttock Popliteal Height	320.0 - 340.4	331	Yes
O	Chest Depth without Jacket	129.6 - 144.8	134	Yes
P	Foot Length	170.2 - 185.4	176	Yes
Q	Stature (Q=A-C-D+R+M)	1099.9 - 1181.1	1127	Yes
R	Buttock to Knee Pivot Length	342.9 - 363.2	343	Yes
S	Head Breadth	137.1 - 147.3	140	Yes
T	Head Depth	167.6 - 177.8	170	Yes
U	Hip Breadth	208.3 - 223.5	212	Yes
V	Shoulder Breadth	259.1 - 274.3	268	Yes
W	Foot Breadth	62.3 - 77.5	66	Yes
X	Head Circumference	510.5 - 530.9	521	Yes
Y	Chest Circumference with Jacket	596.9 - 622.3	606	Yes
Z	Waist Circumference	558.8 - 584.2	565	Yes
AA	Reference Location for Chest Circumferenc	325.1 - 335.3	330	Yes
BB	Reference Location for Waist Circumferenc	153.7 - 163.9	158	Yes

Technician

Approved

Revised 3/12/3003

Transportation Research Center Inc.

572N Head Drop Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	45 %	Yes
Peak Resultant Acceleration	245 - 300 g	247.3 g	Yes
Peak Lateral Acceleration	15 g Max	-2.7 g	Yes
Is Acceleration Curve Unimodal?	Yes	Yes	Yes

Comments:

Technician

Approved

10.09.2003 13:10:33 610

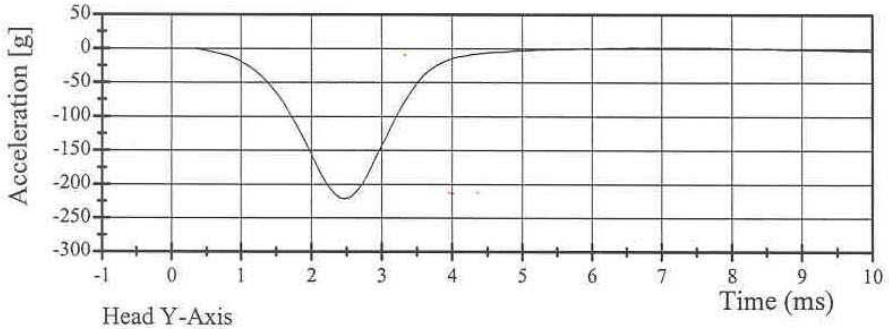
Transportation Research Center Inc.

572N Head Drop Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

Head X-Axis

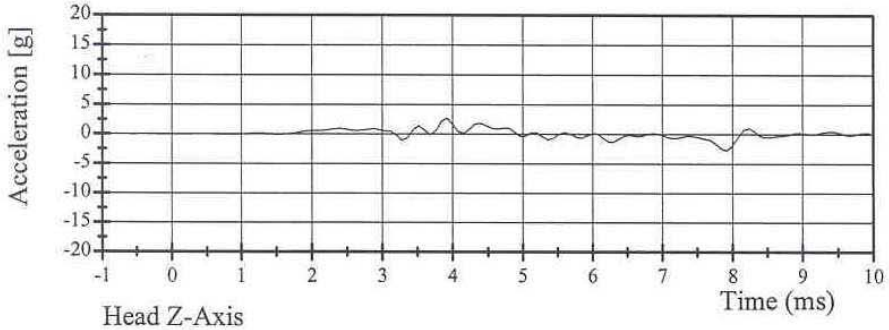


Filter Class: 1000

Max: 2.0 g at 7.2 ms

Min: -221.6 g at 2.5 ms

Head Y-Axis

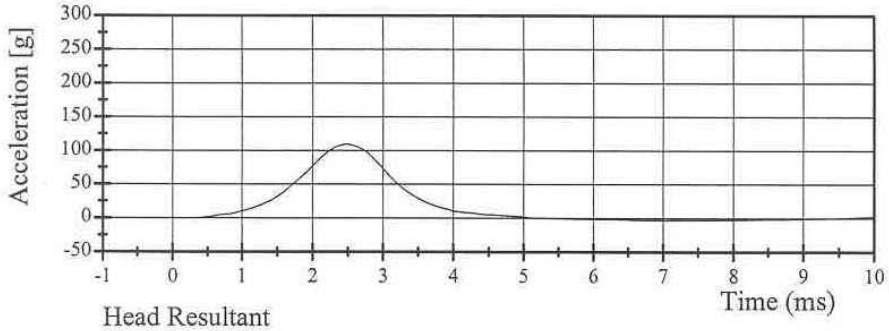


Filter Class: 1000

Max: 2.7 g at 3.9 ms

Min: -2.7 g at 7.9 ms

Head Z-Axis

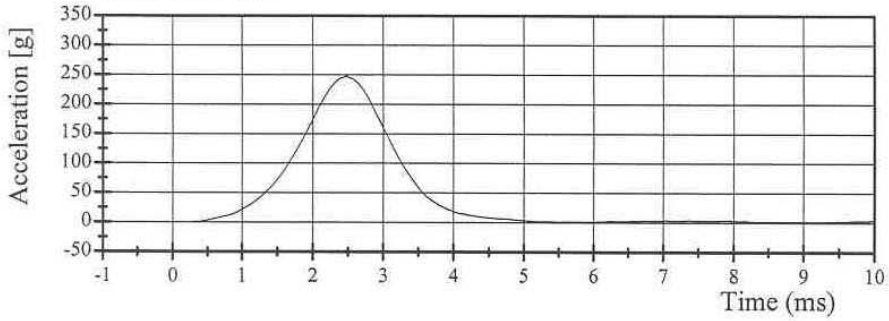


Filter Class: 1000

Max: 109.6 g at 2.5 ms

Min: -3.3 g at 7.0 ms

Head Resultant



Filter Class: 1000

Max: 247.3 g at 2.5 ms

Min: 0.0 g at 2.0 ms

10.09.2003 13:10:33 610

Transportation Research Center Inc.

572N Neck Flexion Test - 6 Channel Transducer

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	45 %	Yes
Impact Velocity	4.83 - 5.07 m/s	4.97 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.20 - 1.60 m/s	1.33 m/s	Yes
20 ms	2.40 - 3.40 m/s	2.61 m/s	Yes
30 ms	3.80 - 5.00 m/s	3.90 m/s	Yes
Peak D Plane Rotation	74 - 92 °	76.9 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	27.0 - 33.0 N·m	28.99 N·m	Yes
Positive Moment Decay Time To 5 N·m	103 - 123 ms	117.68 ms	Yes

Comments:

Technician

Approved

10.08.2003 11:26:05 700

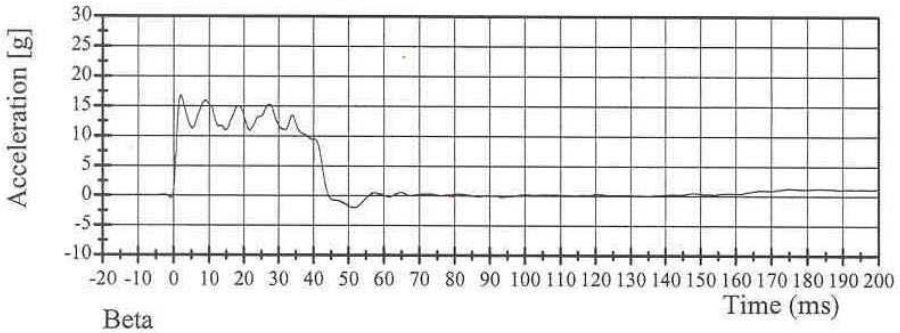
Transportation Research Center Inc.

572N Neck Flexion Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

Pendulum Deceleration

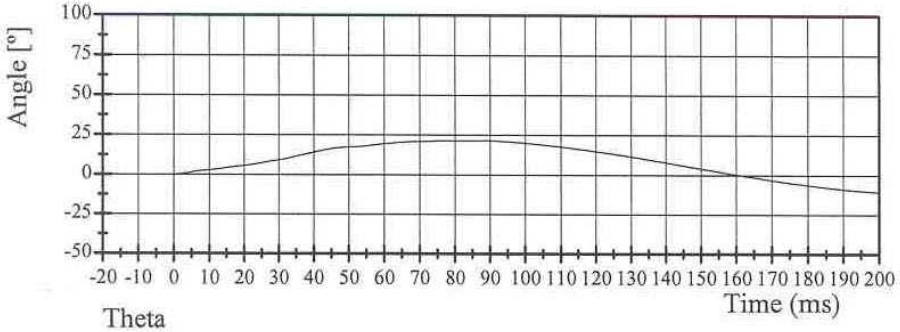


Filter Class: 180

Max: 16.8 g at 2.0 ms

Min: -2.0 g at 51.6 ms

Beta

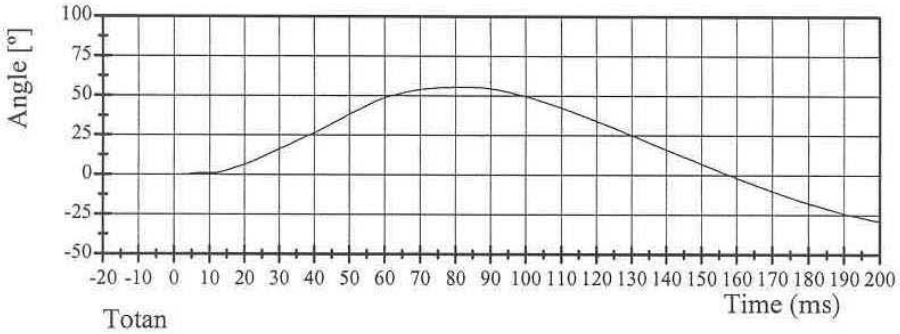


Filter Class: 60

Max: 21.6 ° at 89.2 ms

Min: -12.7 ° at 227.0 ms

Theta

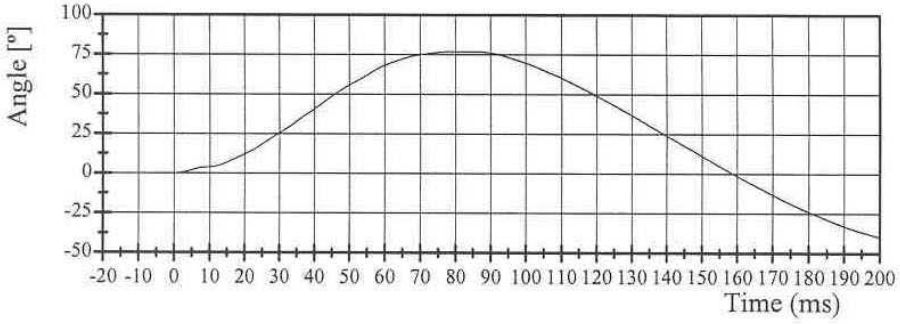


Filter Class: 60

Max: 55.5 ° at 83.4 ms

Min: -34.9 ° at 229.0 ms

Totan



Filter Class: 60

Max: 76.9 ° at 80.2 ms

Min: -47.6 ° at 228.7 ms

10.08.2003 11:26:06 700

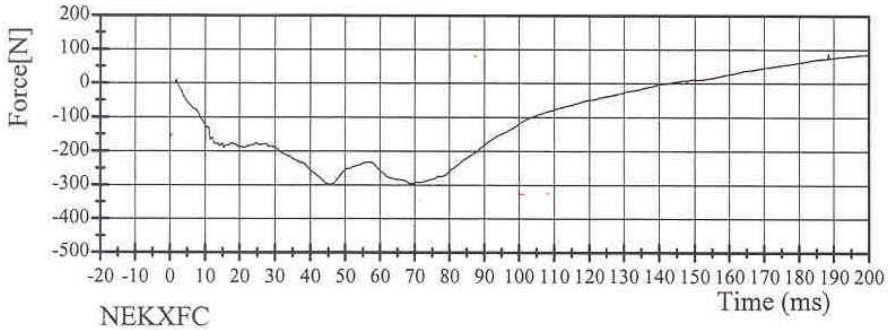
Transportation Research Center Inc.

572N Neck Flexion Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

NEKXF

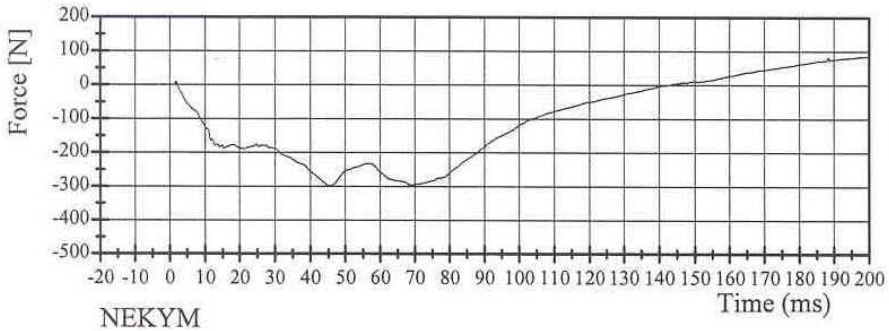


Filter Class: 1000

Max: 92.5 N at 217.1 ms

Min: -298.5 N at 45.6 ms

NEKXFC

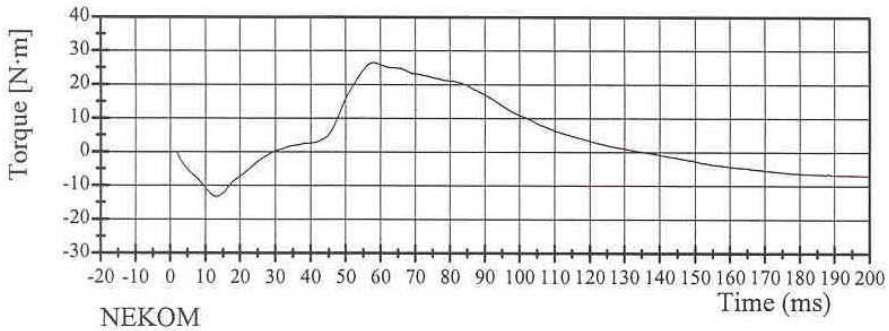


Filter Class: 600

Max: 92.1 N at 217.1 ms

Min: -298.3 N at 45.7 ms

NEKYM

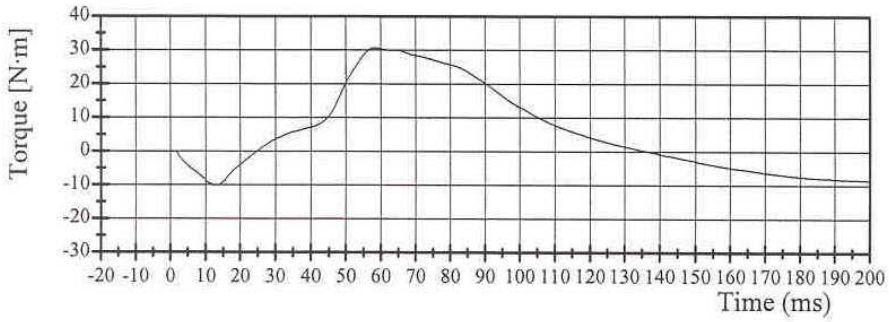


Filter Class: 600

Max: 26.5 N·m at 58.1 ms

Min: -13.2 N·m at 12.8 ms

NEKOM



Filter Class: 600

Max: 30.7 N·m at 58.3 ms

Min: -10.1 N·m at 12.8 ms

10.08.2003 11:26:07 700

Transportation Research Center Inc.

572N Neck Extension Test - 6 Channel Transducer

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Impact Velocity	4.18 - 4.42 m/s	4.33 m/s	Yes
Integrated Pendulum Velocity			
10 ms	1.00 - 1.40 m/s	1.27 m/s	Yes
20 ms	2.20 - 3.00 m/s	2.36 m/s	Yes
30 ms	3.20 - 4.20 m/s	3.48 m/s	Yes
Peak D Plane Rotation	85 - 103 °	96.1 °	Yes
Peak Moment About Occipital Condyles (During time interval rotation is within specified corridors)	-24.0 - (-19.0) N·m	-21.52 N·m	Yes
Negative Moment Decay Time To -5 N·m	123 - 147 ms	140.24 ms	Yes

Comments:

Technician

Approved

10.08.2003 12:12:29 823

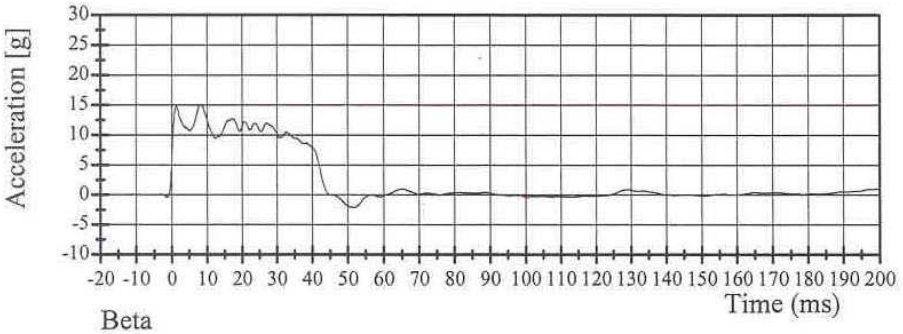
Transportation Research Center Inc.

572N Neck Extension Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

Pendulum Deceleration

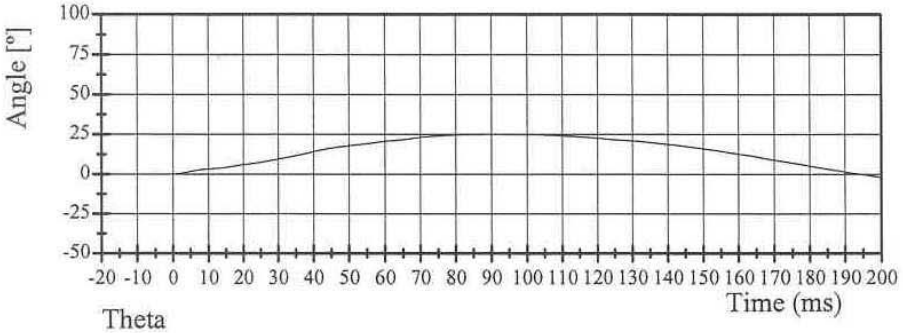


Filter Class: 180

Max: 15.0 g at 8.0 ms

Min: -2.1 g at 51.8 ms

Beta

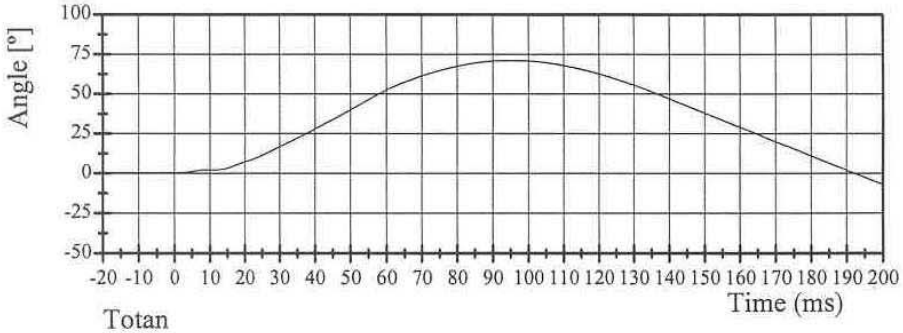


Filter Class: 60

Max: 25.0 ° at 90.9 ms

Min: -10.1 ° at 253.8 ms

Theta

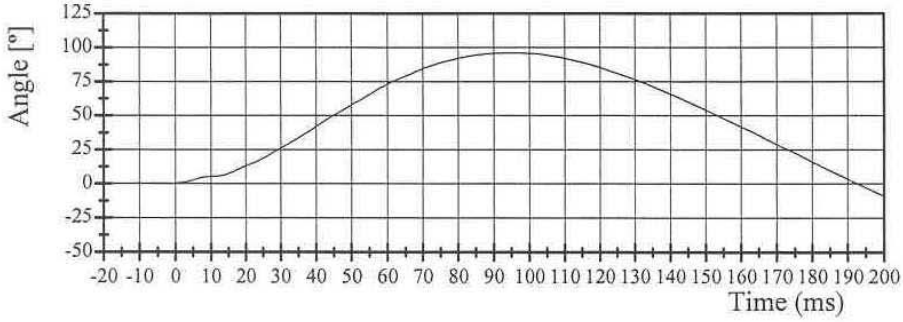


Filter Class: 60

Max: 71.1 ° at 95.4 ms

Min: -27.7 ° at 248.8 ms

Totan



Filter Class: 60

Max: 96.1 ° at 94.6 ms

Min: -37.8 ° at 251.9 ms

10.08.2003 12:12:30 823

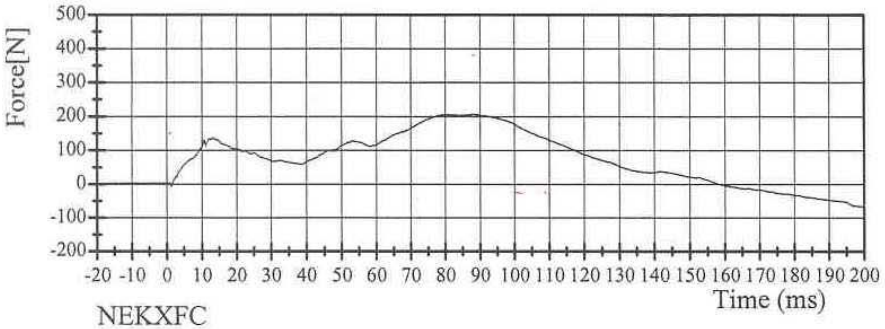
Transportation Research Center Inc.

572N Neck Extension Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 1

Test Date 10/08/2003

NEKXF

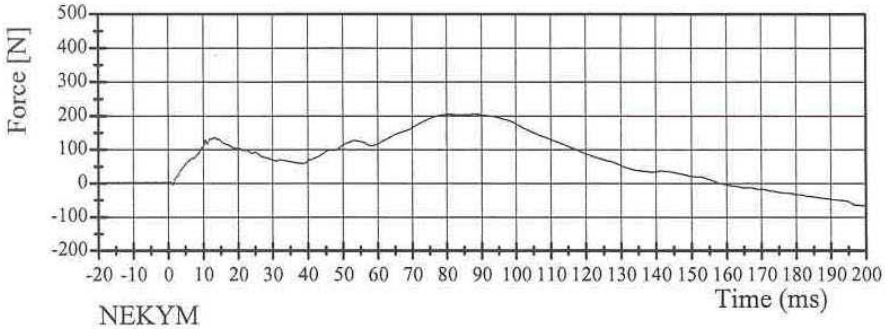


Filter Class: 1000

Max: 207.2 N at 87.9 ms

Min: -108.3 N at 232.2 ms

NEKXFC

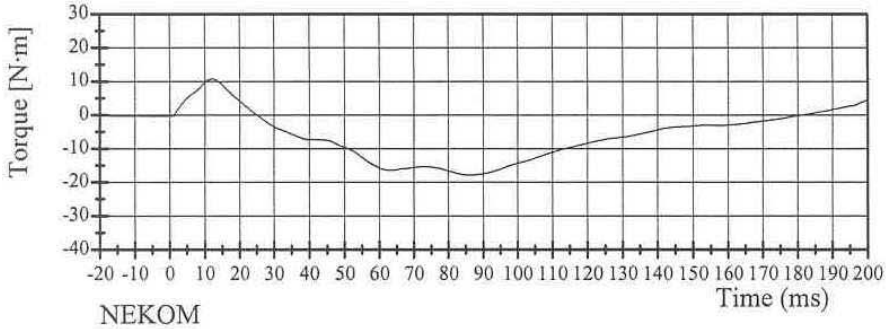


Filter Class: 600

Max: 207.1 N at 88.1 ms

Min: -107.9 N at 232.2 ms

NEKYM

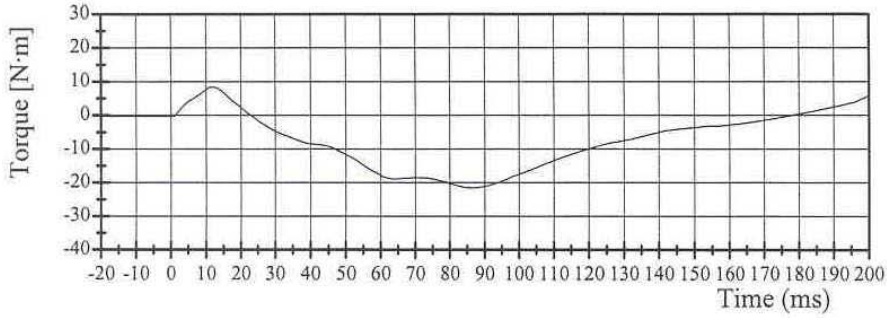


Filter Class: 600

Max: 10.8 N·m at 12.2 ms

Min: -17.9 N·m at 86.2 ms

NEKOM



Filter Class: 600

Max: 12.5 N·m at 235.9 ms

Min: -21.5 N·m at 86.2 ms

10.08.2003 12:12:31 823

Transportation Research Center Inc.

572N Thorax Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 3

Test Date 10/09/2003

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Pendulum Velocity	6.59 - 6.83 m/s	6.76 m/s	Yes
Maximum Chest Deflection	-46.0 - (-38.0) mm	-39.2 mm	Yes
Peak Impact Probe Force Within Compression Corridor	1150 - 1380 N	1225 N	Yes
Internal Hysteresis	65 - 85 %	79 %	Yes
Maximum Force Between 12.5 mm & 38 mm Of Deflection	<= 1500	1338	Yes

Comments:

Technician

Approved

10.09.2003 12:35:13 941

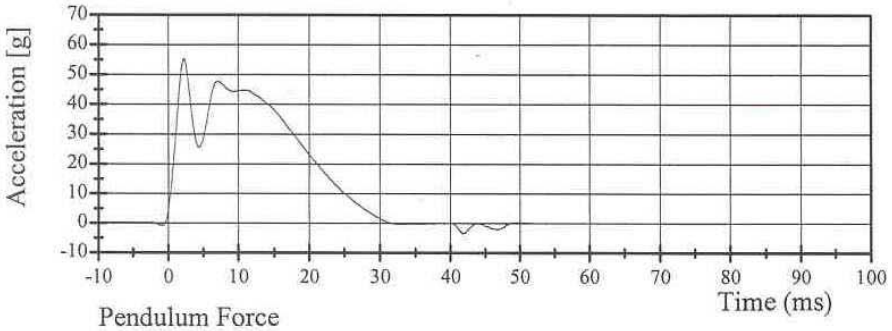
Transportation Research Center Inc.

572N Thorax Test

HIII 6 Year Old Serial No. 186 Calibration No. 01 - 3

Test Date 10/09/2003

Pendulum Deceleration

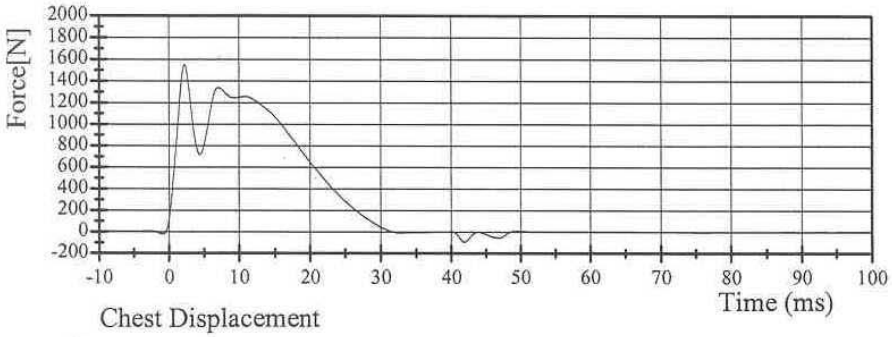


Filter Class: 180

Max: 55.3 g at 2.2 ms

Min: -3.4 g at 41.8 ms

Pendulum Force

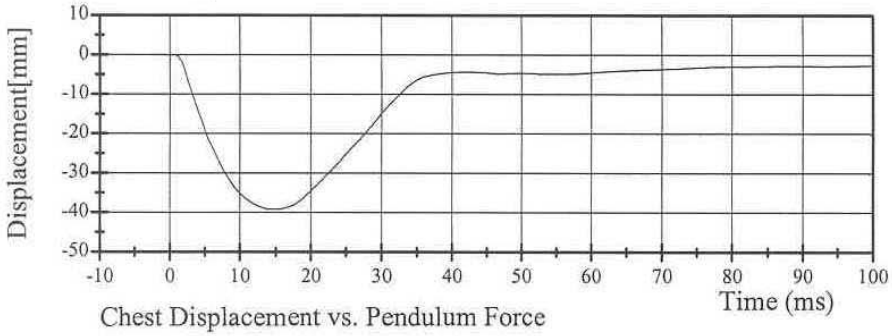


Filter Class: 180

Max: 1550.0 N at 2.2 ms

Min: -95.7 N at 41.8 ms

Chest Displacement

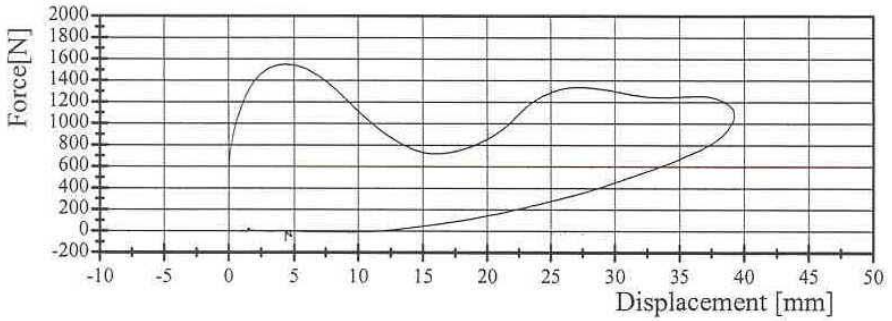


Filter Class: 600

Max: 0.0 mm at -51.3 ms

Min: -39.2 mm at 15.0 ms

Chest Displacement vs. Pendulum Force



10.09.2003 12:35:14 941

TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III SIX YEAR-OLD

CAL DATE: 09-Oct-03

TRC, INC. **TEST NO: 186C01TF1** **572N SN186 TORSO FLEX CAL 01**

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 – 22.2° C	21.7 ° C
RELATIVE HUMIDITY	10 – 70 %	43 %
INITIAL ANGLE OF UNSUPPORRTED DUMMY	<= 22° REFERENCED TO VERTICAL	14.5 °
MAXIMUM FORCE AT 45 DEG. DURING 10 SECOND PERIOD	147 - 200 N	185.3 N
RETURN ANGLE		20.6 °
DIFFERENCE BETWEEN RETURN ANGLE & INTIAL ANGLE	+/- 8 ° OF INTIAL ANGLE	6.1 °
RATE	0.5° - 1.5°/sec	1.0 °/sec

TEST MEETS SPECIFICATIONS

Comments:

TECHNICIAN 

APPENDIX D

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

INSTRUMENTS FOR RRP CHILD DUMMY S/N: 40

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AP1Y1	Endevco	8/7/03
Head Y	ACC81	Endevco	8/7/03
Head Z	AHY71	Endevco	8/7/03
Head X Redundant	P22190	Endevco	9/4/03
Head Y Redundant	P22180	Endevco	9/4/03
Head Z Redundant	P22805	Endevco	9/4/03
Upper Neck Load Cell	210	Denton	8/25/03
Chest X	J13649	Endevco	10/6/03
Chest Y	ANBP7	Endevco	9/4/03
Chest Z	J13422	Entran	10/6/03
Chest X Redundant	J13653	Endevco	10/6/03
Chest Y Redundant	AP1C6	Endevco	9/4/03
Chest Z Redundant	J13713	Endevco	10/6/03
Chest Deflection Gauge	040	Servo	10/14/03
Pelvis X	AMTG3	Endevco	8/6/03
Pelvis Y	AMTL6	Endevco	8/6/03
Pelvis Z	ALC37	Endevco	8/6/03
Tether Force	160	FTSS	9/18/03

INSTRUMENTS FOR LRP CHILD DUMMY S/N: 186

	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AJ412	Entran	8/6/03
Head Y	AKAH1	Entran	8/6/03
Head Z	J17709	Endevco	8/6/03
Head X Redundant	J20473	Endevco	8/6/03
Head Y Redundant	J18260	Endevco	8/6/03
Head Z Redundant	J20298	Endevco	8/6/03
Upper Neck Load Cell	1632	FTSS	8/12/03
Chest X	J12449	Endevco	8/7/03
Chest Y	J12462	Endevco	8/7/03
Chest Z	J12425	Endevco	8/7/03
Chest X Redundant	P27029	Endevco	5/20/03
Chest Y Redundant	P10148	Endevco	5/23/03
Chest Z Redundant	P23012	Endevco	9/4/03
Chest Deflection Gauge	186	Servo	10/14/03
Pelvis X	AC913	Endevco	8/7/03
Pelvis Y	J11630	Endevco	8/7/03
Pelvis Z	AGTT3	Entran	8/7/03
Lap Belt Load Cell	192	Denton	7/14/03
Shoulder Belt Load Cell	194	Denton	6/9/03