HS 638005

REPORT NUMBER: 201-MGA-2005-006

SAFETY COMPLIANCE TESTING FOR FMVSS 201
RIGID POLE SIDE IMPACT TEST

KIA MOTOR CORPORATION
2005 KIA SPORTAGE
NHTSA NUMBER: C60504

PREPARED BY:
MGA RESEARCH CORPORATION
6000 WARREN ROAD
BURLINGTON, WI 53105

July 20, 2005

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW, ROOM 6111 (NVS-220)
WASHINGTON, D.C. 20590

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Date: October 26, 2005

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COTR, Side Impact

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Technical Report Documentation Page

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15. Supplementary Notes

16. Abstract

A rigid pole side impact test was conducted on a 2005 Kia Sportage in accordance with FMVSS 201, "Occupant Protection in Interior Impact", S6.2(b)(3) and the Office of Vehicle Safety Compliance Test Procedure No. TP-201P-02 "Rigid Pole Side Impact Test". The test was conducted at MGA Research Corporation in Burlington, Wisconsin on July 20, 2005.

The impact velocity of the vehicle was 28.3 kph, and the ambient temperature at the struck side (driver's) of the target vehicle at the time of impact was 21°C. The post-test maximum crush was 412 mm at level 3. The test vehicle's occupant performance is as follows:

	REQUIREMENT	DRIVER
HIC	≤ 1000	375.6

The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

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PURPOSE AND TEST PROCEDURE

1.1 PURPOSE

This rigid pole side impact test is conducted as part of the FY' 2005 test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-01-D-01033. The purpose of this test was to evaluate occupant protection in interior impact in a 2005 Kia Sportage manufactured by Kia Motor Corporation.

1.2 TEST PROCEDURE

The rigid pole side impact test was conducted in accordance with the current National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC), laboratory test procedure TP-201P-02, dated October 21, 2001 and the corresponding MGA Research Corporation Test Procedure MGA-NHTSA6. The procedures for receiving, inspection, testing, and reporting of test results are described in the test procedures and are not repeated in this report.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

SECTION 2
SUMMARY OF RIGID POLE SIDE IMPACT TEST

2.1 SUMMARY OF RIGID POLE SIDE IMPACT TEST

A rigid pole side impact test was performed on a 2005 Kia Sportage. The subject vehicle was towed into a rigid pole at a velocity of 28.3 km/h. The specified impact velocity range is from 27.2 to 28.8 km/h. The test vehicle was positioned 90° to the line of forward motion. The weight of the vehicle as tested was 1659.8 kg. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on July 20, 2005.

One (1) real-time motion picture camera and eleven (11) high-speed motion picture cameras were used to document the impact event. Camera locations and pertinent camera information are documented in the data sheets. Pre- and post-test photographs of the vehicle and SID/HIII can be found in Appendix A. One SID/HIII was placed in the left front outboard designated seating position according to instructions specified in the TP-201P-02 dated October 21, 2001. The SID/HIII was instrumented in the following locations:

- Head Center of Gravity (CG) tri-axial accelerometers (X, Y, and Z axis)
- Upper Neck 6 channel load cell (X, Y, Z force and moment)
- Left Upper Rib (LUR) uni-axial accelerometer (Y-axis primary and redundant)
- Left Lower Rib (LLR) uni-axial accelerometer (Y-axis primary and redundant)
- Lower Thoracic Spine (T12) uni-axial accelerometer (Y-axis primary and redundant)
- Pelvic (PEV) section uni-axial accelerometer (Y-axis primary and redundant)

The test vehicle was instrumented with twenty (20) structural accelerometers. All data channels were recorded with a fully self contained on-board DTS TDAS Pro. The data was digitally sampled at 10,000 samples per second and processed per Section 12.2 of the Test Procedure.

2.2 GENERAL COMMENTS

The test vehicle sustained a maximum static crush of 412 mm at level 3, at the vertical impact line. The driver SID/HIII, Serial No. 037, was calibrated just prior to this test. The SID/HIII's injury criteria are summarized as follows:

Measurements	Units	Driver
HIC		375.6
TTI*	G's	72.6
Pelvis*	G's	46.9
Neck Force X*	N	-262
Neck Force Y*	N	378
Neck Force Z*	N	824
Neck Moment X*	Nm	-76.8
Neck Moment Y*	Nm	-17.5
Neck Moment Z*	Nm	27.8

* Information Purposes Only

Test summaries and post-test observations are presented in Section 3. The vehicle, camera, and occupant measurements are presented in Section 4. Appendix A contains the still photograph prints. Appendix B contains the SID/HIII and vehicle data traces. Appendix C contains the SID/HIII's configuration and performance verification data. Appendix D contains the calibration information data.

TEST NOTES

The following channels were not used in test:
A Pillar Upper Y
B Pillar Upper Y
Left Roof Y
Right Roof Y

SECTION 3
SIDE IMPACT DUMMY (SID/HIII) AND VEHICLE TEST DATA

Test Vehicle: 2005 Kia Sportage NHTSA No. C60504
Test Program: FMVSS 201P Test Date: July 20, 2005

CONVERSION FACTORS USED IN THIS REPORT*

Quantity	Typical Application	English Units	Metric Unit	Multiply By
Mass	Vehicle Weight	lb	kg	0.4536
Linear Velocity	Impact Velocity	mile/h	km/h	1.609
Length or Distance	Measurements	in	mm	25.4
Volume	Fuel Systems	gal	liter	3.785
Volume	Small Fluids	oz	mL	29.573
Pressure	Tire Pressure	lbf/in^2	kPa	7.0
Volume	Liquid	gal	liter	3.785
Temperature	General Use	°F	°C	=(tf -32)/1.8
Force	Dynamic Forces	lbf	N	4.448
Moment	Torque	lbf/ft	Nm	1.355

*Based on the Recommended Practice in SAE J916, May 85

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005

TEST VEHICLE INFORMATION

Make	Kia
Model	Sportage
Body Style	MPV
NHTSA No.	C50504
VIN	KNDJF724257040736
Color	Green
Delivery Date	6/27/05
Odometer Reading (mile)	38
Dealer	Unknown/Transfer
Transmission	Automatic
Final Drive	Front
Number of Cylinders	4
Engine Displacement (L)	2.0
Engine Placement	Lateral

TEST VEHICLE OPTIONS

Front Airbag	Yes
Side Airbags	side & curtain
Power Windows	Yes
Power Steering	Yes
Power Door Locks	Yes
Tilt Wheel	Yes
Air Conditioning	Yes
Power Brakes	Yes
Disc Brakes, Front	Yes
Disc Brakes, Rear	Yes
Anti-lock Brakes	Yes
AM/FM/CD	Yes
Anti-theft System	Yes
Cruise Control	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Kia Motor Corporation
Date of Manufacture	12/04

GVWR (kg)	2050
GAWR Front (kg)	1170
GAWR Rear (kg)	1100

DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	303	303
Cold Pressure (kPa)	210	210
Recommended Tire Size	P215/65R16	P215/65R16
Tire Size on Vehicle	P215/65R16	P215/65R16
Tire Manufacturer	Kumho	Kumho

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Buckets	Split Bench		
Number Of Occupants	2	3		5
Capacity Wt. (VCW) (kg)				390.0
Cargo Wt. (RCLW) (kg)				50

DATA SHEET NO. 1... (continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW) (Axle)			As Tested (ATW) (Axle)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	457.2	316.6		491.7	361.1	
Right	kg	458.8	303.9		463.6	343.4	
Ratio	%	59.6	40.4		57.6	42.4	
Totals	kg	916.8	620.5	1536.3	955.3	704.5	1659.8

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1536.3
Weight of SID/HIII Side Impact Dummy	kg	80.7
Rated Cargo/Luggage Weight (RCLW)	kg	50
Calculated Vehicle Target Weight (TVTW)	kg	1667

TEST VEHICLE ATTITUDES

	Units	As Delivered	Fully Loaded	Ready For Test
Right Front	mm	780	776	892
Left Front	mm	777	768	884
Right Rear	mm	810	803	912
Left Rear	mm	805	785	906
Right Door Sill Angle	deg	0.2 ND	0.2 ND	0.2 ND
Left Door Sill Angle	deg	0.8 ND	0.5 ND	0.5 ND
Front Bumper Angle	deg	0.3 RD	0.1 RD	0.1 RD
Rear Bumper Angle	deg	0.6 RU	0.5 RU	0.5 RU

ND = NOSE DOWN, BD = BACK DOWN, LD = LEFT DOWN, RD = RIGHT DOWN, RU = RIGHT UP

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Test Vehicle Wheel Base	mm	2635
Total Vehicle Length at Left Side	mm	3882
Total Vehicle Length at Centerline	mm	4305
Total Vehicle Length at Right Side	mm	3885
Total Vehicle Width at B-Post	mm	1800
Weight of Ballast in Cargo Area	kg	4.5
Amount of Stoddard Solvent in Fuel Tank	liters	60.2

DATA SHEET NO. 1... (Continued)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

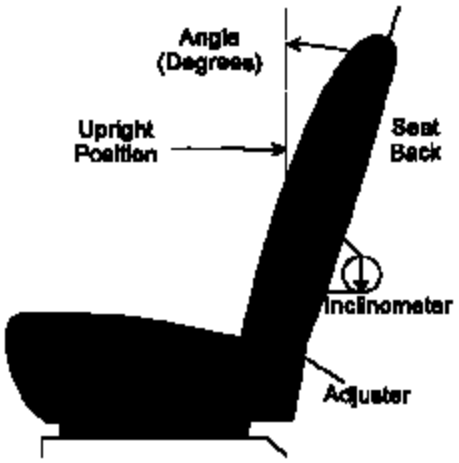
TEST VEHICLE VERTICAL IMPACT LINE DATA

Measurement Description	Units	Value
Target Impact Point Aft of Front Axle	mm	1338
Actual Impact Point Aft of Front Axle	mm	1334

NORMAL DESIGN RIDING POSITION

The driver's seat back is positioned to the manufacturer's designated angle. The procedure for the seat is as follows. The seat back is measured relative to the rocker sill.

Driver seat back angle: Initial – 15.6 deg. on headrest post
Final: 11.6 deg. on headrest post



FRONT SEAT ASSEMBLY

SEAT FORE/AFT POSITIONS

Manufacturer: Adjustable drivers seat position is 13th lock position from the fore 1st lock position.
Test:
Initial: the fore/aft was set to 13th position from the fore 1st lock position
Final: the fore/aft was set to 11th position from the fore 1st lock position

SEAT BELT UPPER ANCHORAGE

The test vehicle is equipped with adjustable "D" ring anchorage for the driver's seat position. The driver's "D" ring anchorage was placed in the highest position of the available positions.

DATA SHEET NO. 1... (continued)

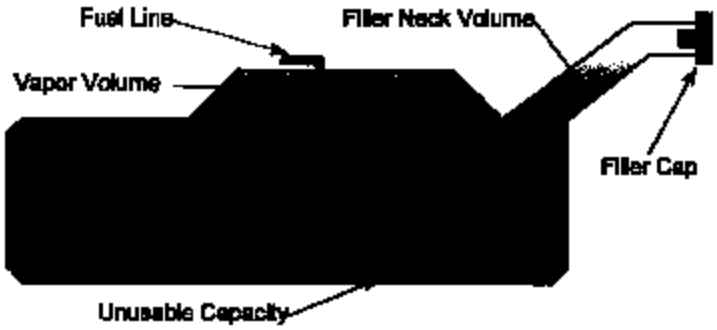
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

FUEL TANK CAPACITY DATA

The "Usable Capacity" of the standard equipment fuel tank is: 65.0 liters
The "Usable Capacity" of any optional equipment fuel tank is: N/A liters
92-94% of "Usable Capacity" for certification to FMVSS 301 requirements: 59.8 – 61.1 liters
Actual amount of Stoddard solvent added to vehicle for certification test 60.2 liters

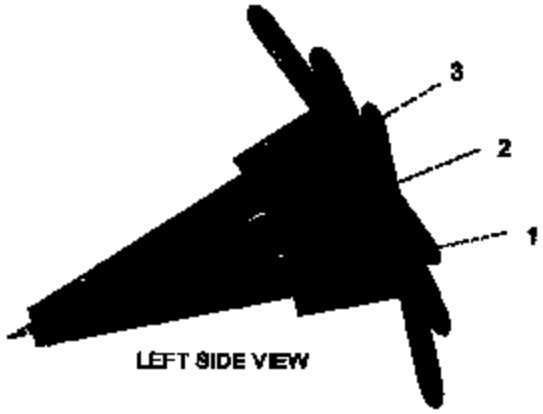
The vehicle is equipped with electric fuel pump and it operates when the vehicle is in ignition (start).



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes, when it is moved through its full range of motion. Manufacturer Info: Steering wheel can be located at midpoint. Steering wheel angle is 62° and the steering column angle is 28° from the horizontal line.



STEERING COLUMN ASSEMBLY

The steering column was placed in the mid-position for the test.

DATA SHEET NO. 2

TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	457.2	316.6		491.7	381.1	
Right	kg	458.6	303.9		463.6	343.4	
Weight Ratio	%	59.6	40.4		57.6	42.4	
Totals	kg	915.8	620.5	1536.3	955.3	704.5	1659.8

MAXIMUM EXTERIOR STATIC CRUSH

Level	Measured Parameter	Units	Maximum Crush	Above Ground
Level 1	Sill Top Height	mm	340	361
Level 2	Occupant H-Point	mm	404	715
Level 3	Mid Door	mm	412	776
Level 4	Window Sill	mm	365	1110
Level 5	Window Top	mm	184	1652
N/A	Maximum Penetration	mm	412	776

INSTRUMENTATION

SID/HIII Instrumentation	17
Vehicle Structure Accelerometers	20
Total	37

CAMERAS

Onboard Vehicle	3
Offboard Vehicle	8
Total	11

IMPACT POINT DATA

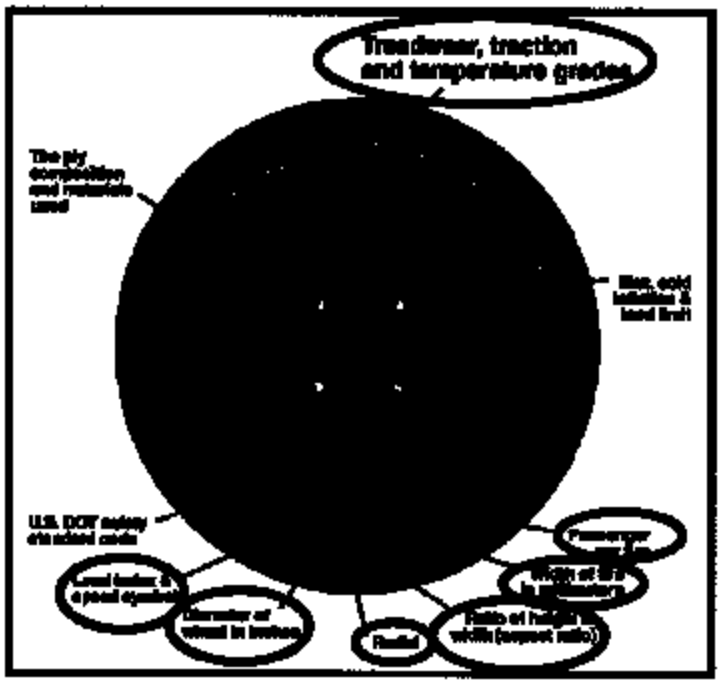
Measured Parameter	Units	Requirement	Value
Horizontal Offset	mm	+/- 38	4 forward

DATA SHEET NO. 3

TEST VEHICLE TIRE INFORMATION

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P
NHTSA No. C50504
Test Date: July 20, 2005

Vehicle Year	2005	Vehicle Make	Kia
VIN	KNDJF724257040736	Vehicle Model	Sportage



	Front	Rear
Tire Manufacturer	Kumho	Kumho
Tire Name	Ecsta HP4	Ecsta HP4
Tire Type	R	R
Tire Width (mm)	215	215
Ratio of Height to Width (aspect ratio)	65	65
Radial	Tubeless	Tubeless
Wheel Diameter	16	16
Load Index & Speed Symbol	96T	96T
Treadwear	Not noted on tire	Not noted on tire
Traction Grade	Not noted on tire	Not noted on tire
Temperature Grade	Not noted on tire	Not noted on tire

DATA SHEET NO. 4

POST TEST OBSERVATIONS

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Left Front Seating Position
Dummy Type / Serial No.	SID/HIII / 037
Head Contact	Airbag curtain, Side Airbag
Upper Torso Contact	Side Airbag
Lower Torso Contact	Door Panel
Left Knee Contact	Door Panel
Right Knee Contact	Left knee

POST TEST DOOR OPENING AND SEAT TRACK INFORMATION

Description	Front	Rear
Left Side Door Opening	Door remained closed and latched	Door remained closed and latched
Right Side Door Opening	Door remained closed and latched	Door remained closed and latched
Seat Movement	0	0
Seat Back Failure	None	None

POST TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No failures
Sill Separation	None
Windshield Damage	Cracked
Window Damage	Left side windows down for test
Other Notable Effects	None

AIRBAG DEPLOYMENT

	Driver
Front	No
Side	Yes
Curtain	Yes

ARMREST LOCATION AND SEAT CRUSH

	Driver
Front Armrest (from bottom of window)	193
Front Seat Back Crush	43
Front Seat Cushion Crush	75

SECTION 4
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 5

SID/HIII INJURY CRITERIA AND SENSOR DATA

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

THORAX AND PELVIS PEAK ACCELERATIONS (FIR 100 Filtered)

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Upper Rib (LUR)	Y	G's	77.1	44	-11.1	141
Upper Rib (LUR) (R)	Y	G's	75.0	44	-10.5	141
Lower Rib (LLR)	Y	G's	66.9	45	-12.1	93
Lower Rib (LLR) (R)	Y	G's	64.8	45	-12.4	93
Lower Spine (T_{12})	Y	G's	68.1	47	-14.3	84
Lower Spine (T_{12}) (R)	Y	G's	67.9	47	-14.4	84
Pelvis (PEV)	Y	G's	46.9	46	-8.6	82
Pelvis (PEV) (R)	Y	G's	47.0	46	-9.0	82

THORACIC TRAUMA INDEX (TTI) AND PELVIC ACCELERATION (FIR 100 Filtered)

Location	Driver			
	LUR	T_{12}	TTI(g)	PEV(g)
Rib, Spine, and Pelvis	77.1	68.1	72.6	46.9
Rib, Spine, and Pelvis (R)	75.0	67.9	71.5	47.0

UPPER NECK FORCES AND MOMENTS (SAE CLASS 1000/600 Filtered)

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Neck Force	X	N	191	194	-282	64
Neck Force	Y	N	378	55	-341	179
Neck Force	Z	N	824	50	-136	71
Neck Moment	X	Nm	13.3	115	-76.8	54
Neck Moment	Y	Nm	13.4	101	-17.5	197
Neck Moment	Z	Nm	27.8	71	-5.8	149

HEAD CG PEAK ACCELERATIONS (SAE CLASS 1000 Filtered)

Location	Axis	Units	Driver			
			Max	Time	Min	Time
Head CG	X	G's	4.9	205	-9.4	64
Head CG	Y	G's	63.0	60	-6.3	182
Head CG	Z	G's	4.0	87	-12.7	82
Head CG Resultant		G's	63.3	60		

HEAD INJURY CRITERIA (SAE CLASS 1000 Filtered)

Location	Driver			
	HIC	T1	T2	Avg G's
Head CG Resultant	376	50.4	71.6	50.0

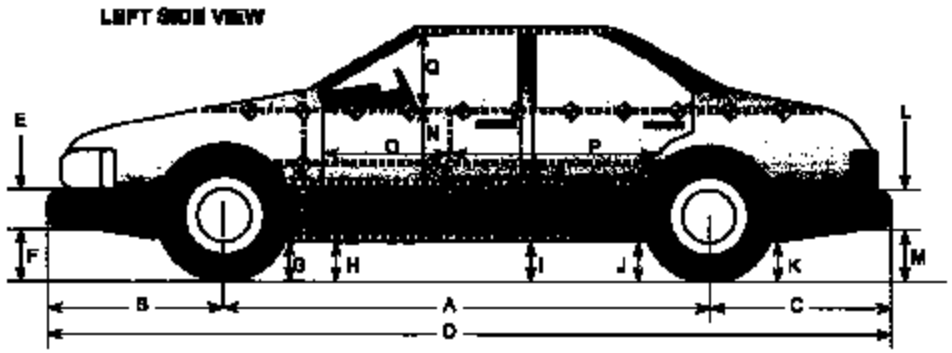
Positive Acceleration Polarities: Longitudinal (X) = + Forward
(Conforms to SAE J211) Lateral (Y) = + Right
Vertical (Z) = + Down

DATA SHEET NO. 6

VEHICLE PRE-TEST AND POST-TEST MEASUREMENTS

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50604
Test Date: July 20, 2005



All Measurements in mm

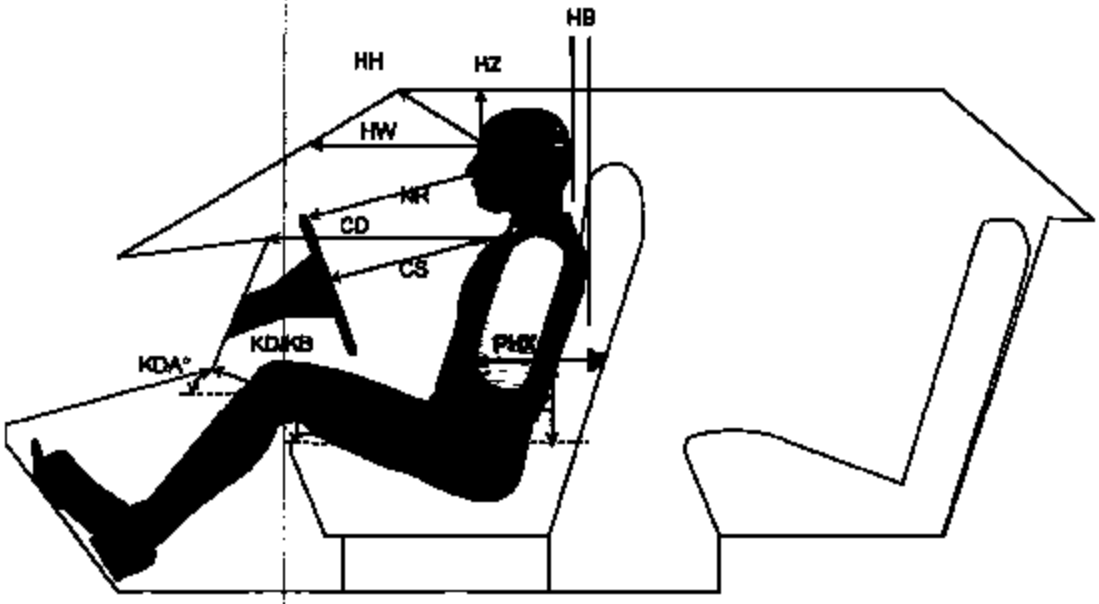
Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2635	2515	120
B	Front Axle to FSOV	840	804	36
C	Rear Axle to RSOV	830	905	-75
D	Total Length at Centerline	4305	4224	81
E	Front Bumper Thickness	140	140	0
F	Front Bumper Bottom to Ground	720	745	-25
G	Sill Height at Front Wheel Well	426	393	35
H	Sill Height at Front Door Leading Edge	419	390	29
I	Sill Height at "B" Pillar	420	425	-5
J1	Sill Height at Rear Wheel Well	405	418	-13
J2	Pinch Weld Height at Rear Wheel Well	405	415	-10
K	Sill Height Aft of Rear Wheel Well	450	445	5
L	Rear Bumper Thickness	100	100	0
M	Rear Bumper Bottom to Ground	640	621	19
N	Sill Height to Window Bottom Sill	742	746	-4
O	Front Door Leading Edge to Impact CL	924	824	100
P	Rear Door Trailing Edge to Impact CL	1065	914	151
Q	Front Window Opening	480	469	11
R	Right Side Length	3685	3700	-15
S	Left Side Length	3682	3554	128
T	Vehicle Width at "B" Post	1809	1527	282

DATA SHEET NO. 7

SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005



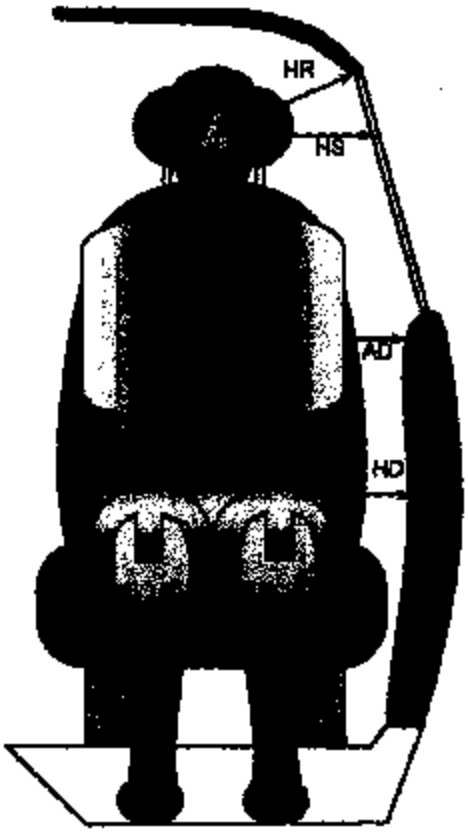
Driver Code	Measurement Description	Driver	
		Length(mm)	Angle(°)
HH	Head to Header	352	
HW	Head to Windshield	550	
HZ	Head to Roof	170	
NR	Nose to Rim	395	
CD	Chest to Dash	493	
CS	Chest to Steering Wheel	282	
KDL	Left Knee to Dash	121	28.6
KDR	Right Knee to Dash	135	27.2
PA	Pelvic Angle		23.7
PHX	H-Point to Striker (X-Axis)	215	
PHZ	H-Point to Striker (Z-Axis)	68	

DATA SHEET NO. 8

SID/HIII LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005



FRONT VIEW OF DUMMY

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	198
HS	Head to Side Window	mm	313
AD	Arm to Door	mm	116
HD	H-Point to Door	mm	203

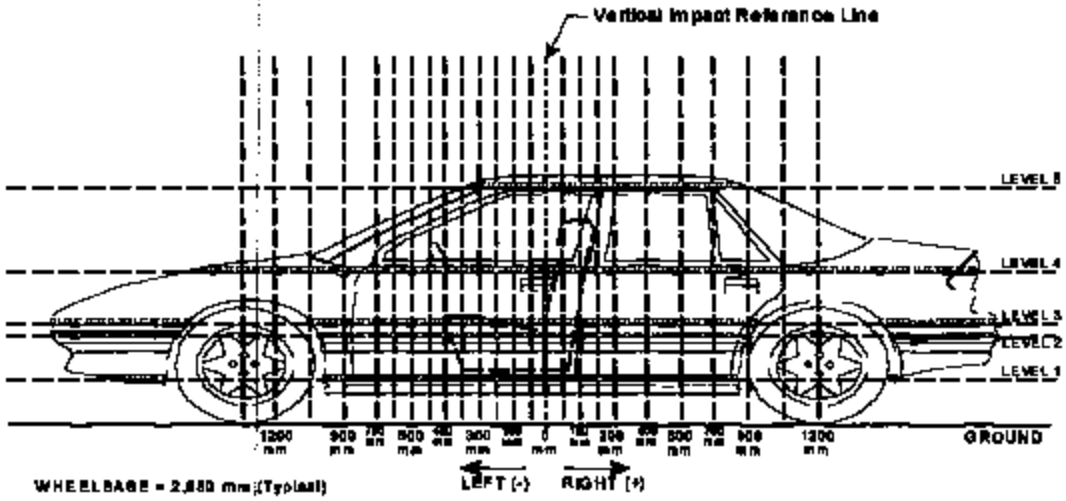
DATA SHEET NO. 9

VEHICLE SIDE MEASUREMENTS

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005

PRETEST AND POST TEST EXTERIOR PROFILE MEASUREMENTS



LEFT SIDE VIEW

Measurements are taken with vehicle in the as tested condition.
Measurements along the vertical 0 mm.

Level	Measurement Description	Units	Height Above Ground
5	Window	mm	1652
4	Window Sill	mm	1110
3	Mid Door	mm	776
2	Occupant H-Point	mm	715
1	Sill Top	mm	361

DATA SHEET NO. 10

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1725				286					276					-9	
-1575				278					277					-1	
-1425				271					269					-2	
-1275				268					267					-1	
-1125			189	265				196	267				7	2	
-975	269	197	193	257		272	209	197	266		3	12	4	9	
-900	270	203	203	258		268	208	206	261		-2	5	3	3	
-825	270	203	202	255		316	239	236	271		46	36	34	16	
-750	270	204	202	256		336	275	273	287		66	71	71	31	
-675	270	204	201	255		359	310	313	302		89	106	112	47	
-600	270	203	200	255		381	346	349	336		111	143	149	81	
-525	269	204	199	250		404	382	382	373		135	178	183	123	
-450	269	204	199	252		435	421	420	416		166	217	221	164	
-375	269	203	199	252	481	471	459	455	455	546	202	256	256	203	65
-300	269	205	199	252	465	518	507	500	504	566	249	302	301	252	101
-225	270	203	198	251	466	564	548	540	546	586	294	343	342	295	120
-150	269	202	197	251	465	605	584	582	592	615	336	382	385	341	150
-75	270	204	198	256	464	610	608	610	621	648	340	404	412	365	184
0	270	202	195	252	464	583	592	593	602	620	313	390	398	350	156
75	269	203	196	252	467	529	543	542	568	601	260	340	346	316	134
150	269	203	196	251	468	481	451	455	540	585	212	248	259	289	117
225	266	202	199	254	469	443	425	431	512	570	177	223	232	258	101
375	268	203	196	258	469	383	374	379	468	556	115	171	181	210	87
525	268	202	199	260	471	333	323	329	427	532	65	121	130	167	61
675	269	204	202	262	471	297	279	287	393	516	28	75	85	131	45
825		200	201	268	474		230	244	359	506		30	43	91	32
975			189	271	479			189	322	496			0	51	19
1125			186	273	484			197	289	502			9	16	18
1275			190	279	487			198	295	507			8	16	20
1425			184	285	492			196	295	506			12	10	14
1575			207	290				197	288				-10	-2	
1725			222	299				205	288				-17	-11	

Reference plane is parallel to test vehicle longitudinal centerline Units = mm

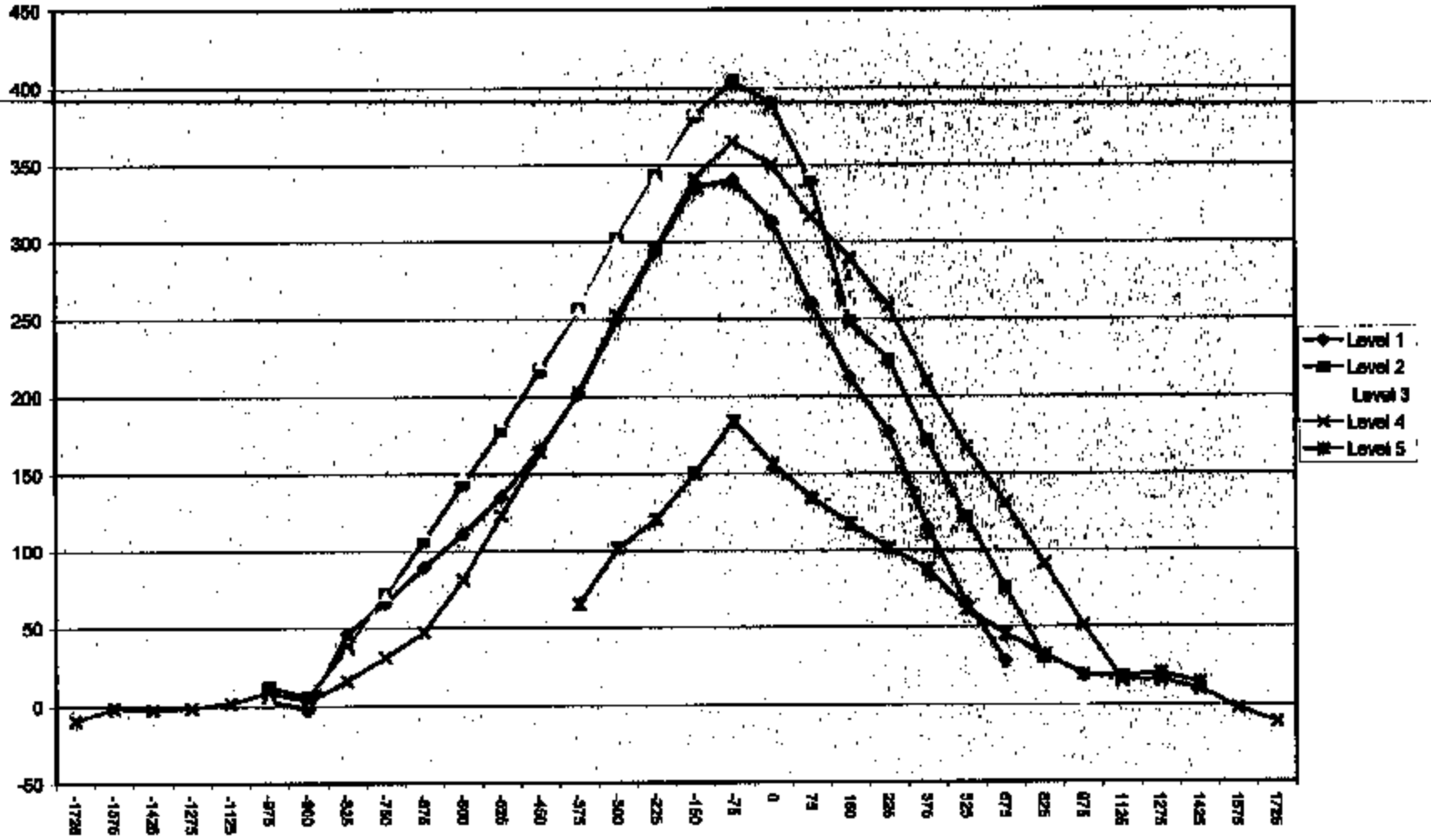
Given dimensions = Reference plane to car body

DATA SHEET NO. 10... (continued)

VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005

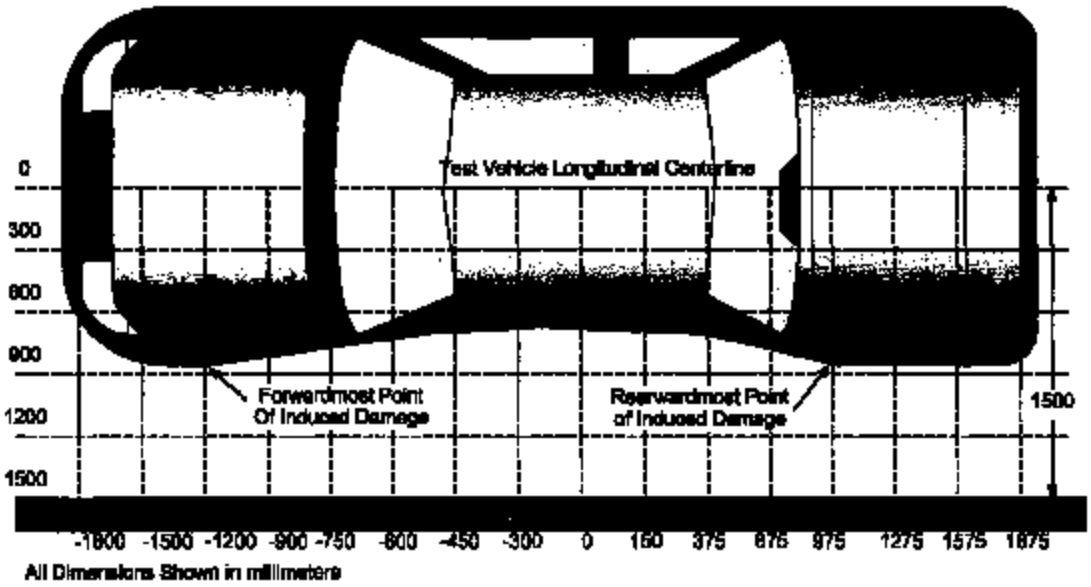


DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005



TOP VIEW

Damage Profile Distances

DPD	Distance from Impact Point in mm	Level	Pre-Test (mm)	Post-Test (mm)	Max Static Crush (mm)
1	1725 mm	3	222	205	-17
2	1080 mm	4	273	289	16
3	375 mm	4	258	468	210
4	-360 mm	3	199	455	256
5	-1052 mm	3	193	197	4
6	-1725 mm	4	285	276	-9

Reference plane is parallel to test vehicle longitudinal centerline

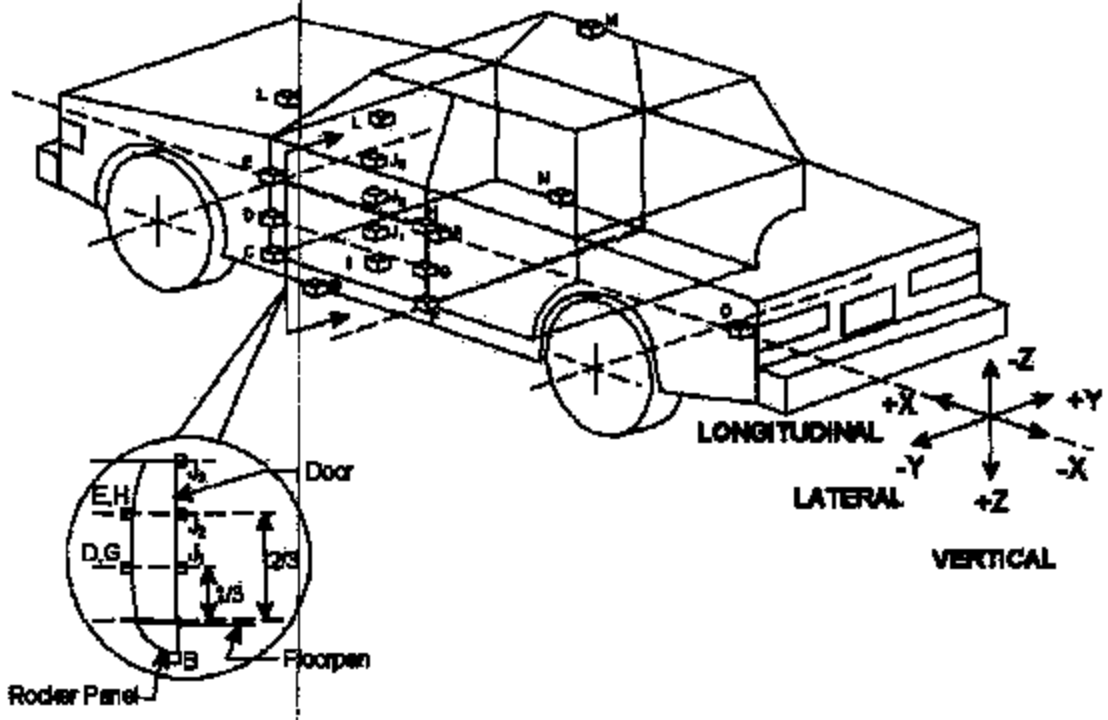
Given dimensions = Reference plane to car body

DATA SHEET NO. 12

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005



No.	Location
A	Vehicle CG
B	Left Floor Sill
C	A Pillar Sill
D	A Pillar Low
E	A Pillar Mid
G	B Pillar Sill
H	B Pillar Low
I	B Pillar Mid

No.	Location
L	Driver Seat
M1	Driver Door Rib
M2	Driver Door Pelvis
M3	Driver Door Knee
N	Engine
O	Firewall
Q	Right Floor Sill
R	Rear Deck

DATA SHEET NO. 12... (continued)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Peak Values (G's)				
		Axis	Max	Time	Min	Time
A	Vehicle CG	X	2.5	86	-2.5	37
		Y	10.6	65	-0.4	278
		Z	8.8	70	-12.7	45
		RES	14.3	45		
B	Left Floor	Y	27.4	21	-8.8	28
C	A Pillar Sill	Y	14.9	86	-6.7	90
D	A Pillar Low	Y	12.5	24	-4.3	19
E	A Pillar Mid	Y	12.5	15	-5.1	19
G	B Pillar Sill	Y	37.8	38	-9.8	29
H	B Pillar Low	Y	51.3	21	-7.7	29
I	B Pillar Mid	Y	52.7	20	-30.1	29
L	Driver Seat	Y	84.3	37	-45.8	33
M1	Driver Door Rib	Y	40.1	20	-24.5	32
M2	Driver Door Pelvis	Y	42.9	8	-32.6	26
M3	Driver Door Knee	Y	58.3	16	-56.9	11
N	Engine	X	5.7	105	-5.6	41
		Y	10.4	71	-0.6	229
O	Firewall	Y	10.0	68	-0.9	4
Q	Right Floor Sill	Y	15.1	99	-0.4	266
R	Rear Deck	X	2.3	24	-2.5	53
		Y	11.3	93	-1.2	207

Positive Acceleration Polarities: (Conforms to SAE J211)
Longitudinal (X) = + Forward
Lateral (Y) = + Right
Vertical (Z) = + Down

DATA SHEET NO. 12.. (continued)

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

VEHICLE ACCELEROMETER PEAK DATA AND PRE-TEST LOCATIONS

Loc. No.	Accelerometer Location	Measurements (mm)			
		Axis	Pre-Test	Post-Test	Difference
A	Vehicle CG	X	2267	2250	-37
		Y	0	56	56
		Z	432	387	45
B	Left Floor Sill	X	2578	2472	-106
		Y	698	549	-149
		Z	342	306	36
C	A Pillar Sill	X	2941	2828	-113
		Y	702	639	-63
		Z	340	313	27
D	A Pillar Low	X	2902	2751	-151
		Y	733	648	-85
		Z	602	577	25
E	A Pillar Mid	X	2915	2780	-135
		Y	768	734	-34
		Z	953	870	83
G	B Pillar Sill	X	1798	1773	-25
		Y	697	511	-186
		Z	647	353	294
H	B Pillar Low	X	1872	1762	-110
		Y	741	465	-276
		Z	613	607	6
I	B Pillar Mid	X	1874	1752	-122
		Y	748	391	-357
		Z	921	900	21
L	Driver Seat	X	2038	1892	-146
		Y	544	374	-170
		Z	586	425	141
M1	Driver Door Rib	X	2417	2342	-75
		Y	752	485	-267
		Z	1053	1040	13
M2	Driver Door Pelvis	X	2415	2331	-84
		Y	749	459	-290
		Z	896	881	15
M3	Driver Door Knee	X	2404	2316	-88
		Y	753	477	-276
		Z	579	564	15
N	Engine	X	3514	3425	-89
		Y	0	32	32
		Z	904	887	17
O	Firewall	X	3403	3305	-98
		Y	0	18	18
		Z	1056	1027	29
Q	Right Floor Sill	X	2118	2145	27
		Y	709	759	50
		Z	350	326	24
R	Rear Deck	X	575	605	30
		Y	0	2	2
		Z	540	537	3

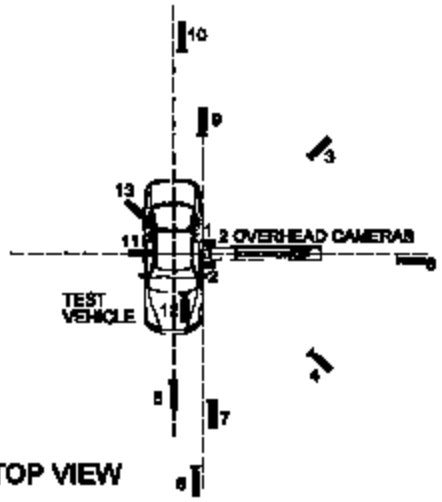
Reference Points
X – Rear of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 13

HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005



TOP VIEW

No.	Camera View	Location (mm)			Lens (mm)	Film Speed (fps)
		X	Y	Z		
1	Overhead Overall	515	-665	5725	14	1000
2	Overhead Close-Up	0	0	5050	19	1000
3	Left Side 45° Rearward Pole View	-2305	-2220	1460	24	1000
4	Right Side 45° Forward Pole View	-2250	3305	1455	24	1000
5	Real Time				13	24
6*	Left Side Rear Pole View					
7	Front Ground Level Vehicle/Pole Impact	135	6550	1515	24	1000
8	Front Ground Level Vehicle Roof Targets and Vehicle/Pole Impact	430	7625	1450	35	1000
9	Rear Ground Level Vehicle/Pole Impact	240	-7050	1485	24	1000
10	Rear Ground Level	740	-7850	1460	35	1000
11	Test Vehicle Onboard Driver Side View				8	500
12	Test Vehicle Onboard Driver Front View				12.5	500
13	Test Vehicle Onboard Driver ¾ Rear View				8	500

Reference Points X - + Forward of Impact
Y - + Right of Impact
Z - + Ground Plane Down

* Camera 6 was not used for this test.

DATA SHEET NO. 14

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Test Vehicle: 2005 Kia Sportage NHTSA No. C50504
Test Program: FMVSS 201P Test Date: July 20, 2005

Test Time: 9:53 AM Temperature at Time of Impact: 21°C

Stoddard Solvent Spillage Measurements

A. From impact until vehicle motion ceases: 0
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0
(Maximum allowable = 5 ounces)

C. For the following 25 minutes: 0
(Maximum allowable = 1 oz./minute)

D. Spillage Details: None

DATA SHEET NO. 15

FMVSS 301 STATIC ROLLOVER DATA SHEET

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005

0° to 90°

90° to 180°

180° to 270°

270° to 360°

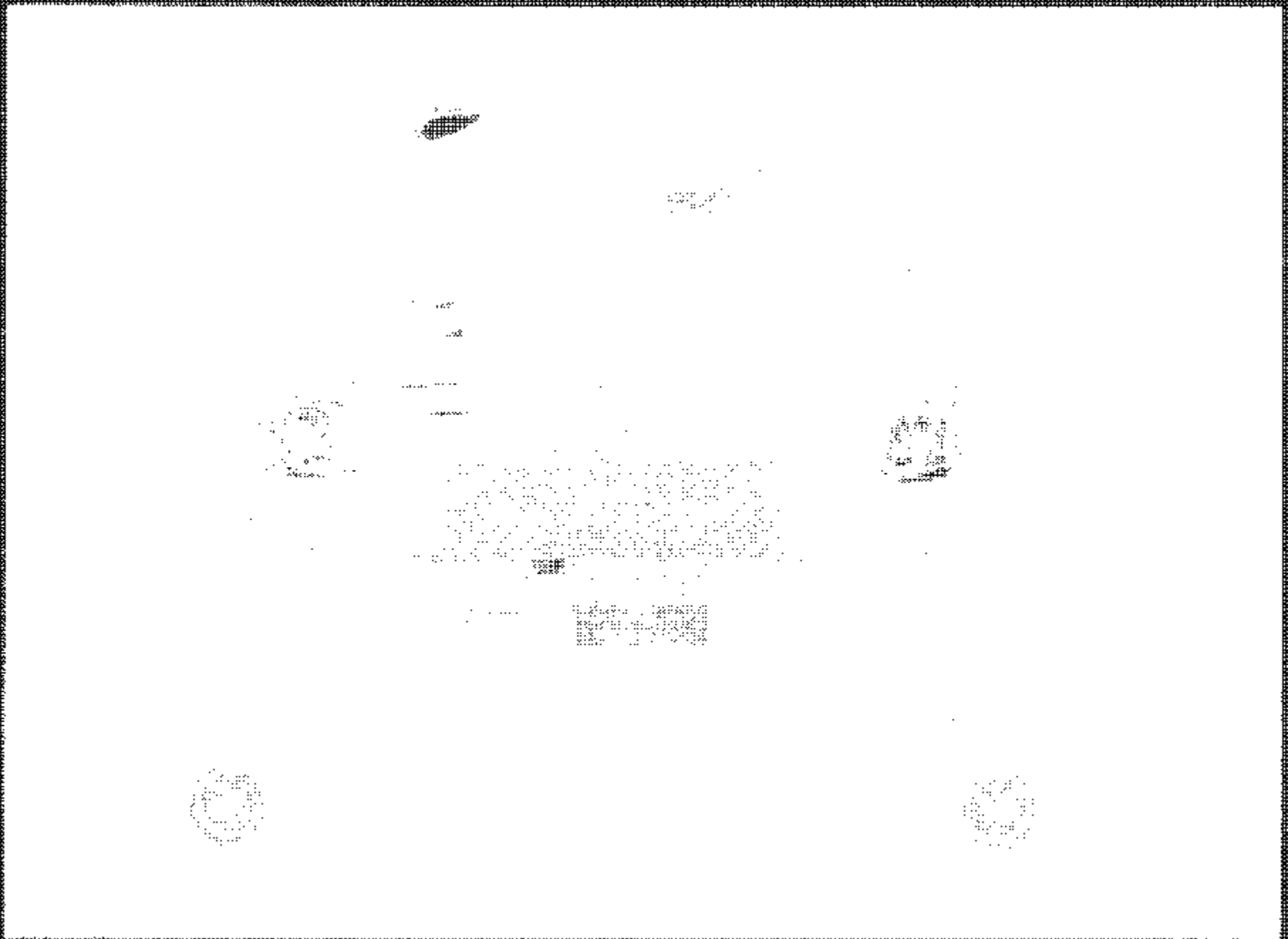
1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent Spillage locations: None

Rollover Test Phase	Rotation Time (sec.)	Hold Time (sec.)	Spillage (oz.)
0° to 90°	163	300	0
90° to 180°	155	300	0
180° to 270°	135	300	0
270° to 360°	164	300	0

APPENDIX A

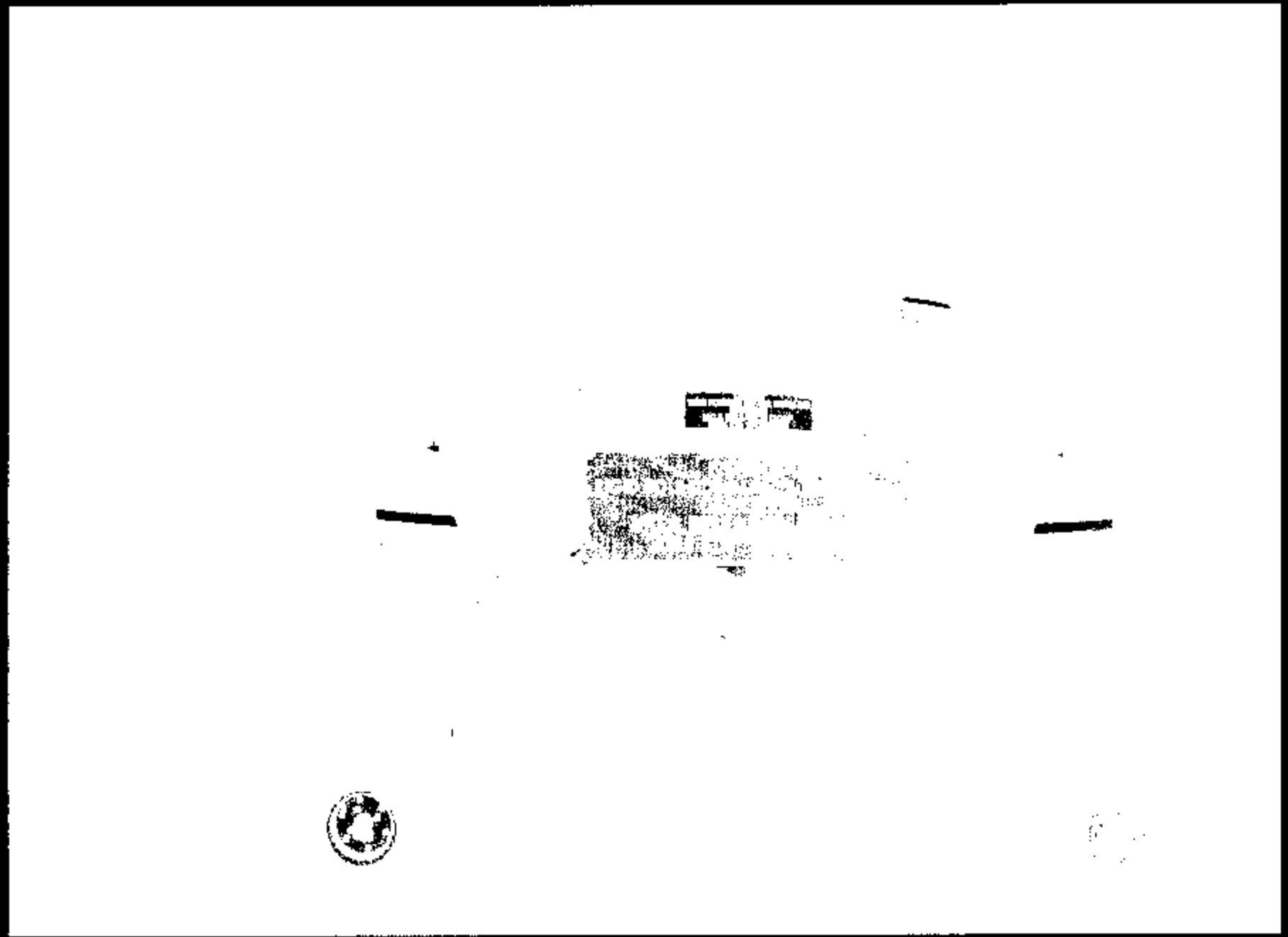
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS



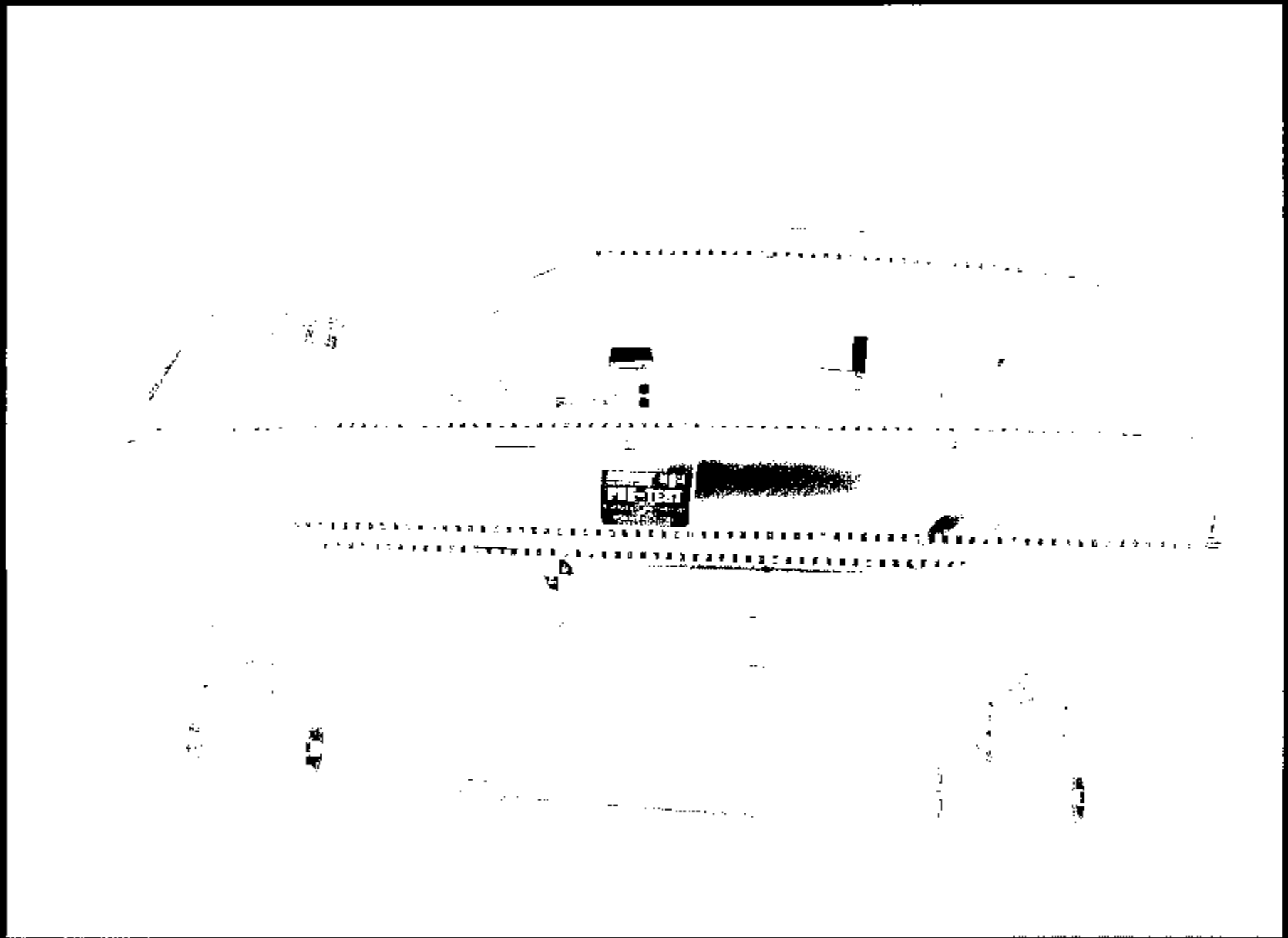
Pre-Test Front View of Test Vehicle

Post-Test Front View of Test Vehicle

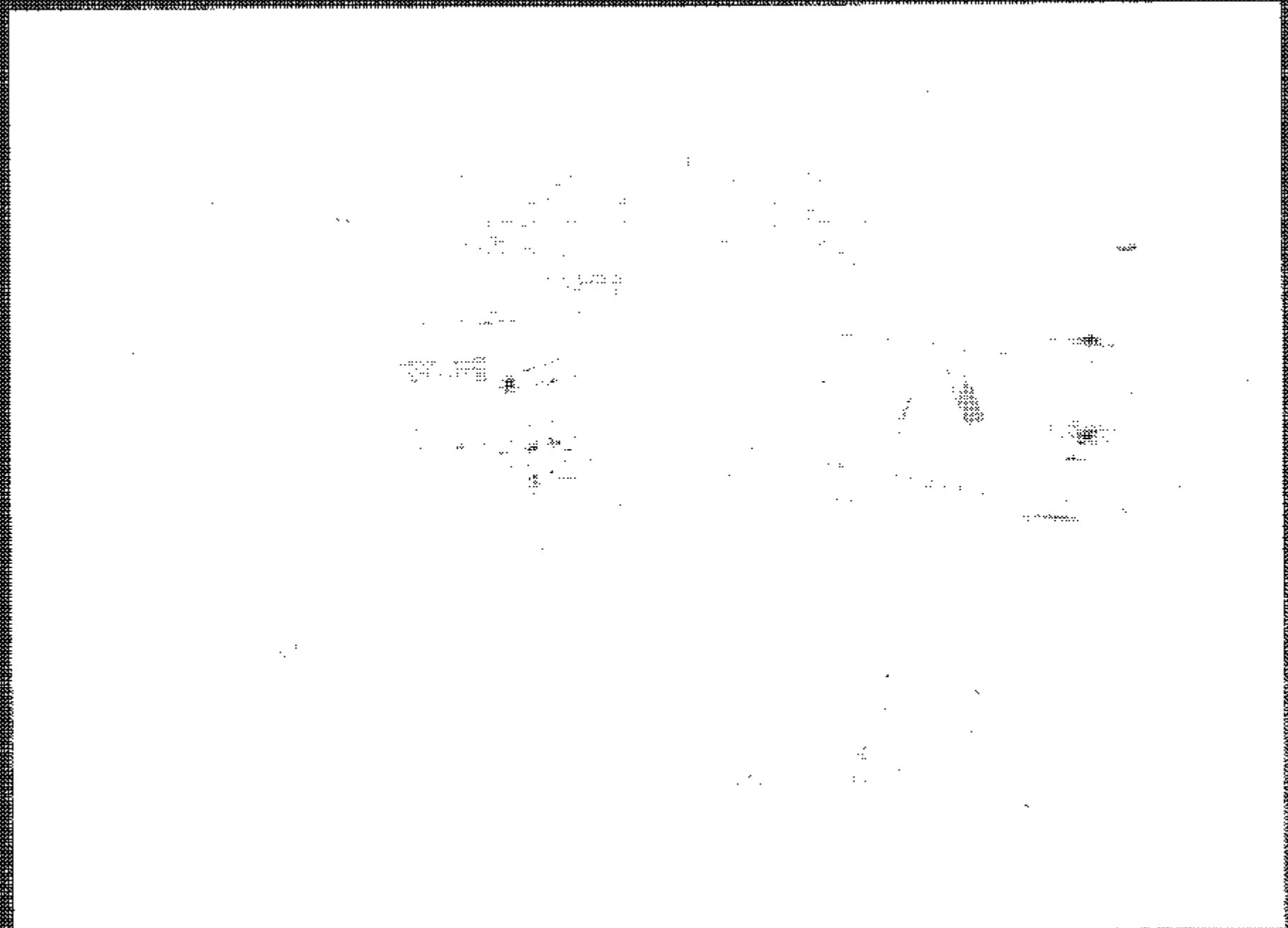


Pre-Test Rear View of Test Vehicle

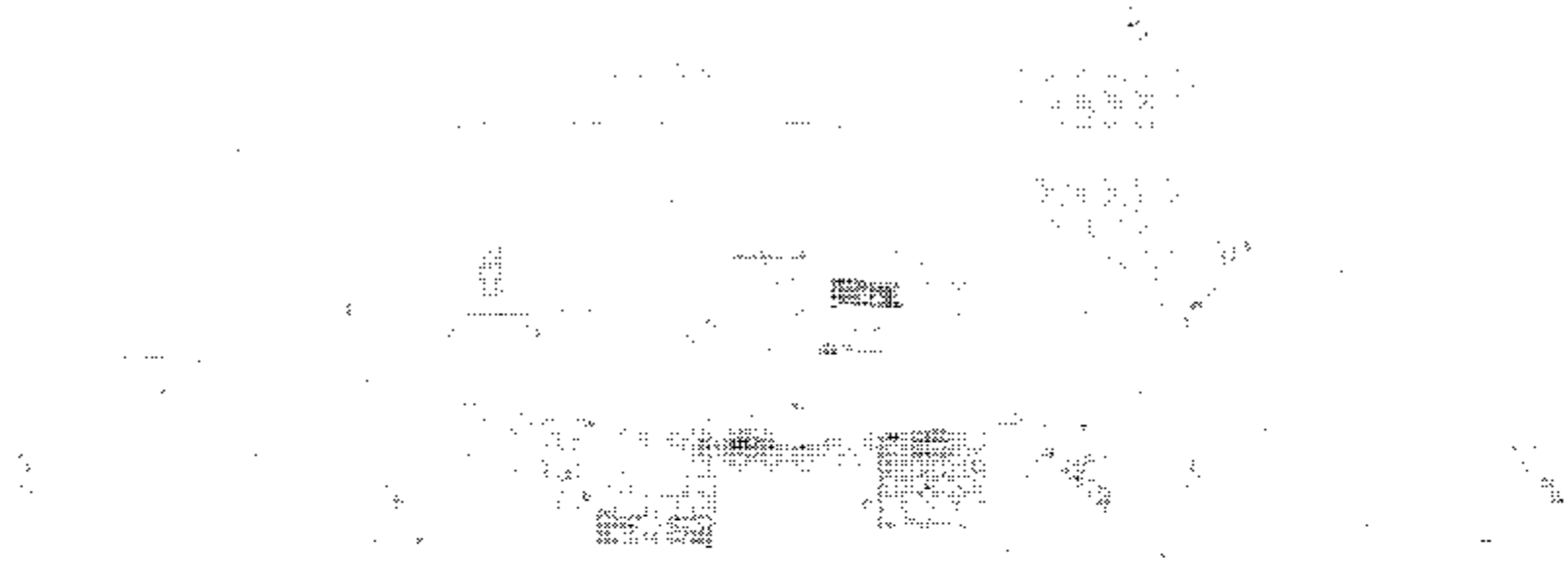
Post-Test Rear View of Test Vehicle



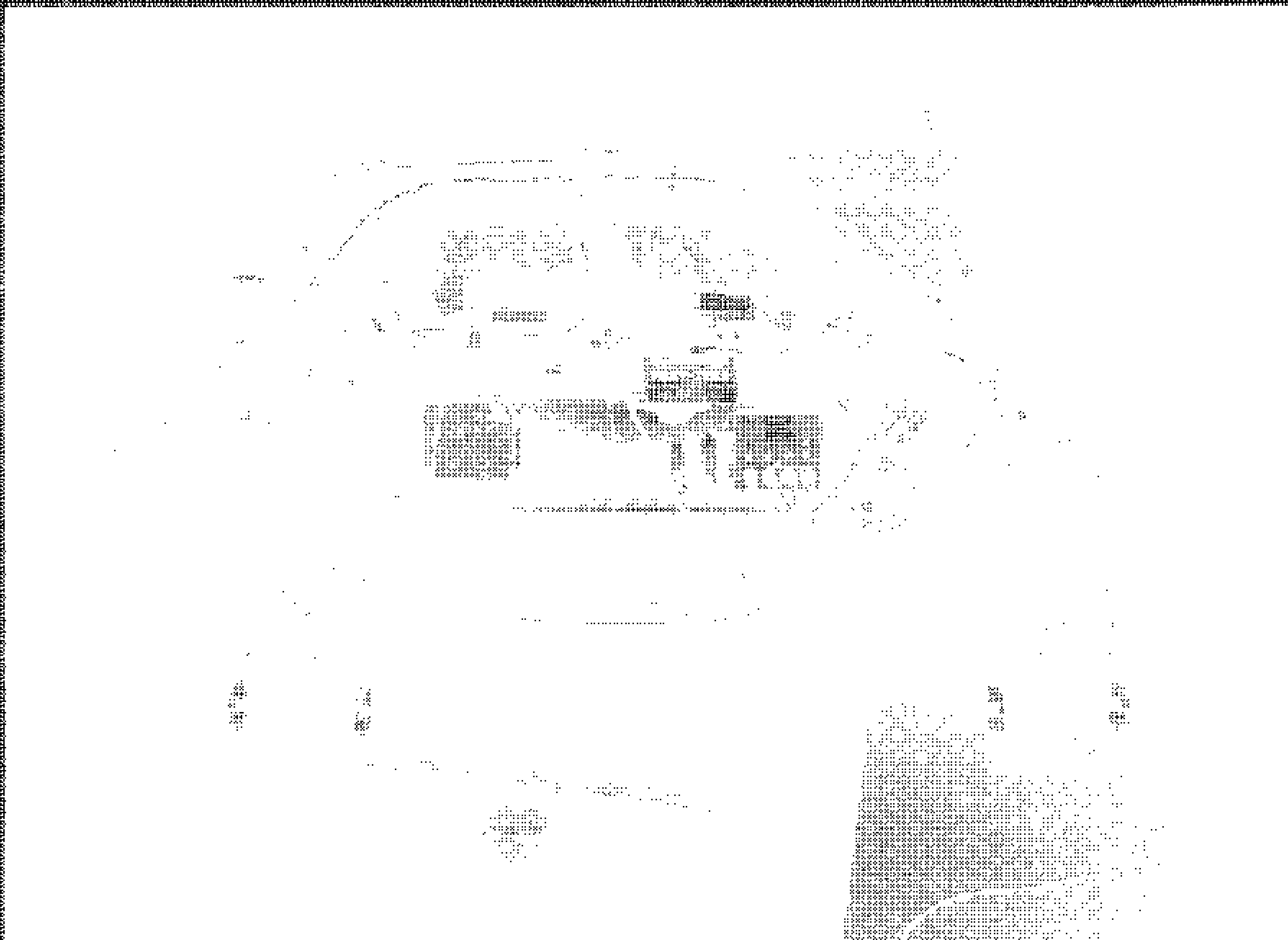
Pre-Test Left Side View of Test Vehicle



Post-Test Left Side View of Test Vehicle



Pre-Test, Right Side View of Test Vehicle



Post-Test Right Side View of Test Vehicle

Pre-Test Left Rear Interior View

Pod Test Unit Rear Three-Quarter View

Pre-Test Lot Front Three-Quarter View

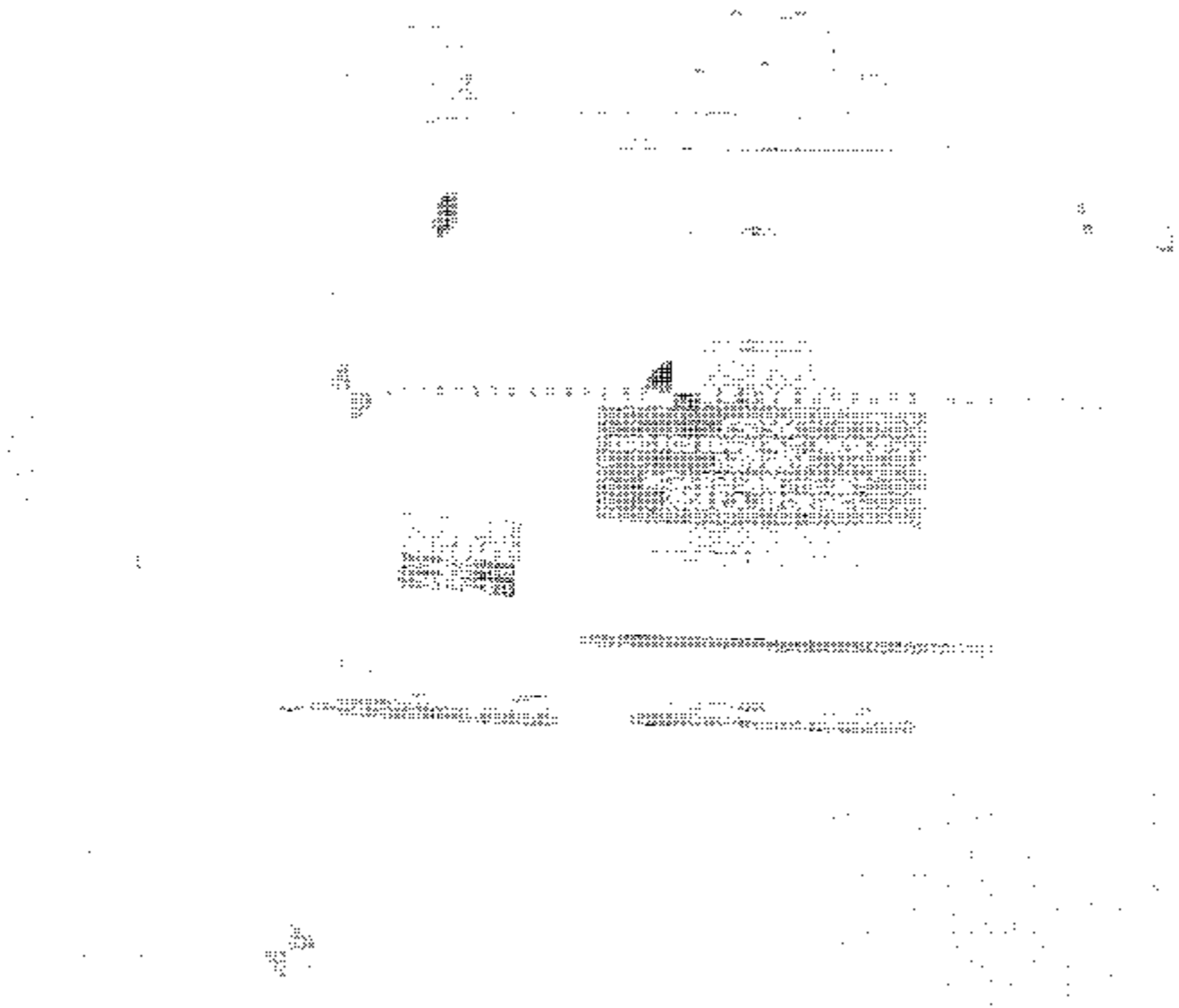
Post-Test Left Front Three-Quarter View

Pre-Test Right Rear Three-Quarter View

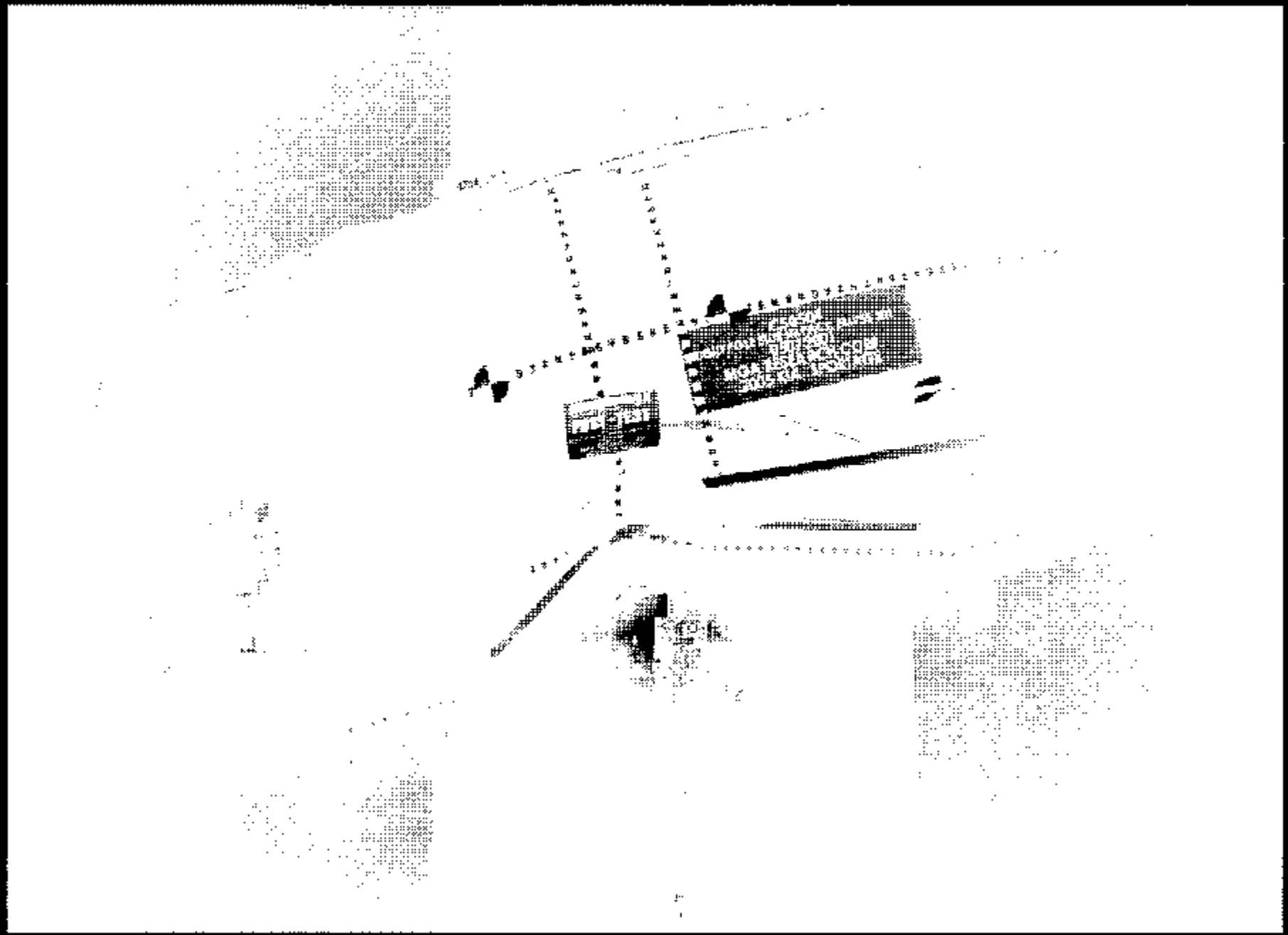
Post-Test Right Rear Three-Quarter View

Pre-Tear Right Rear Three-Quarter View

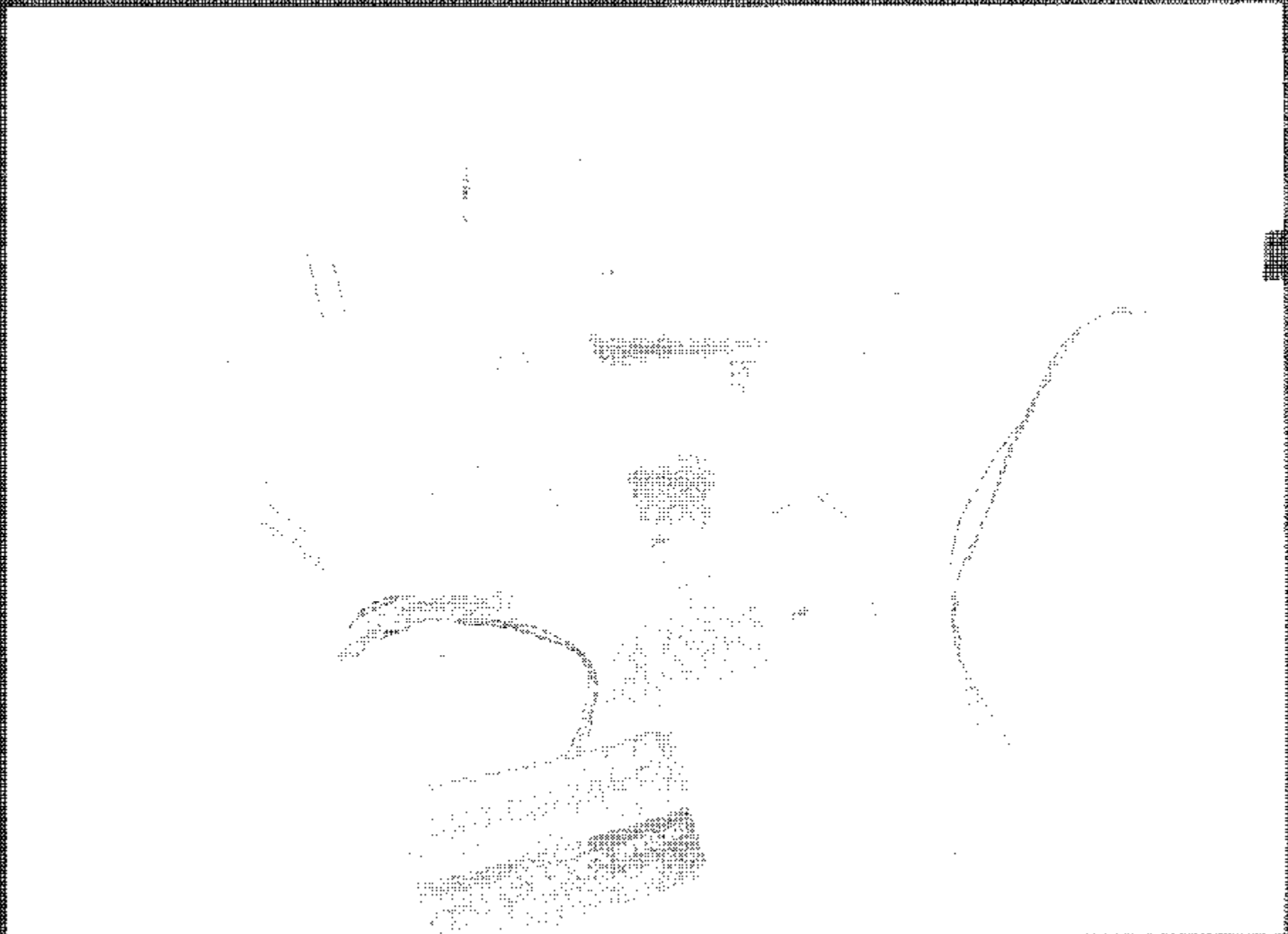
Post-Test Right Front Three-Quarter View



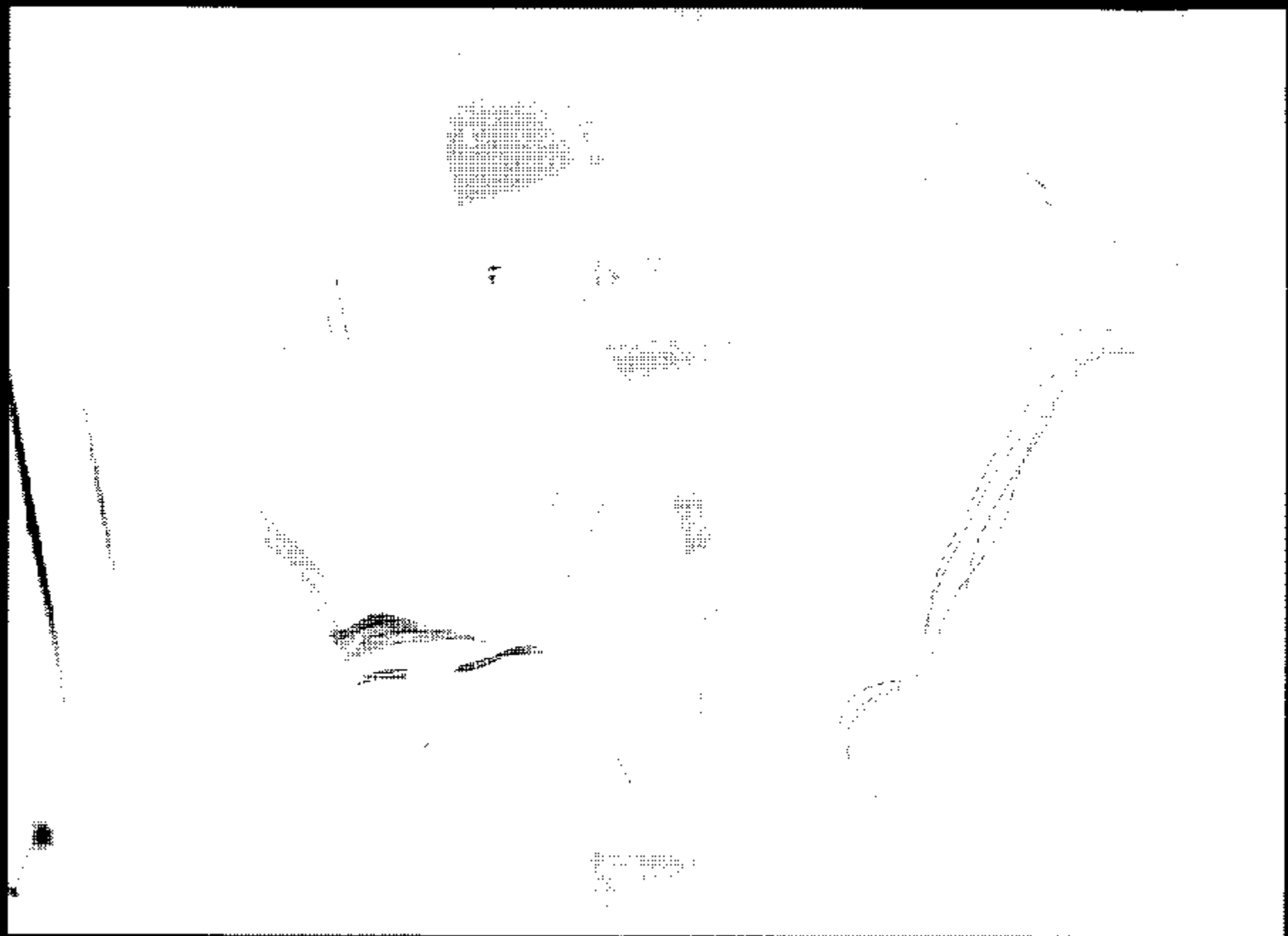
Pre-Test Overhead View of Test Vehicle



Post-Test Overhead View of Test Vehicle

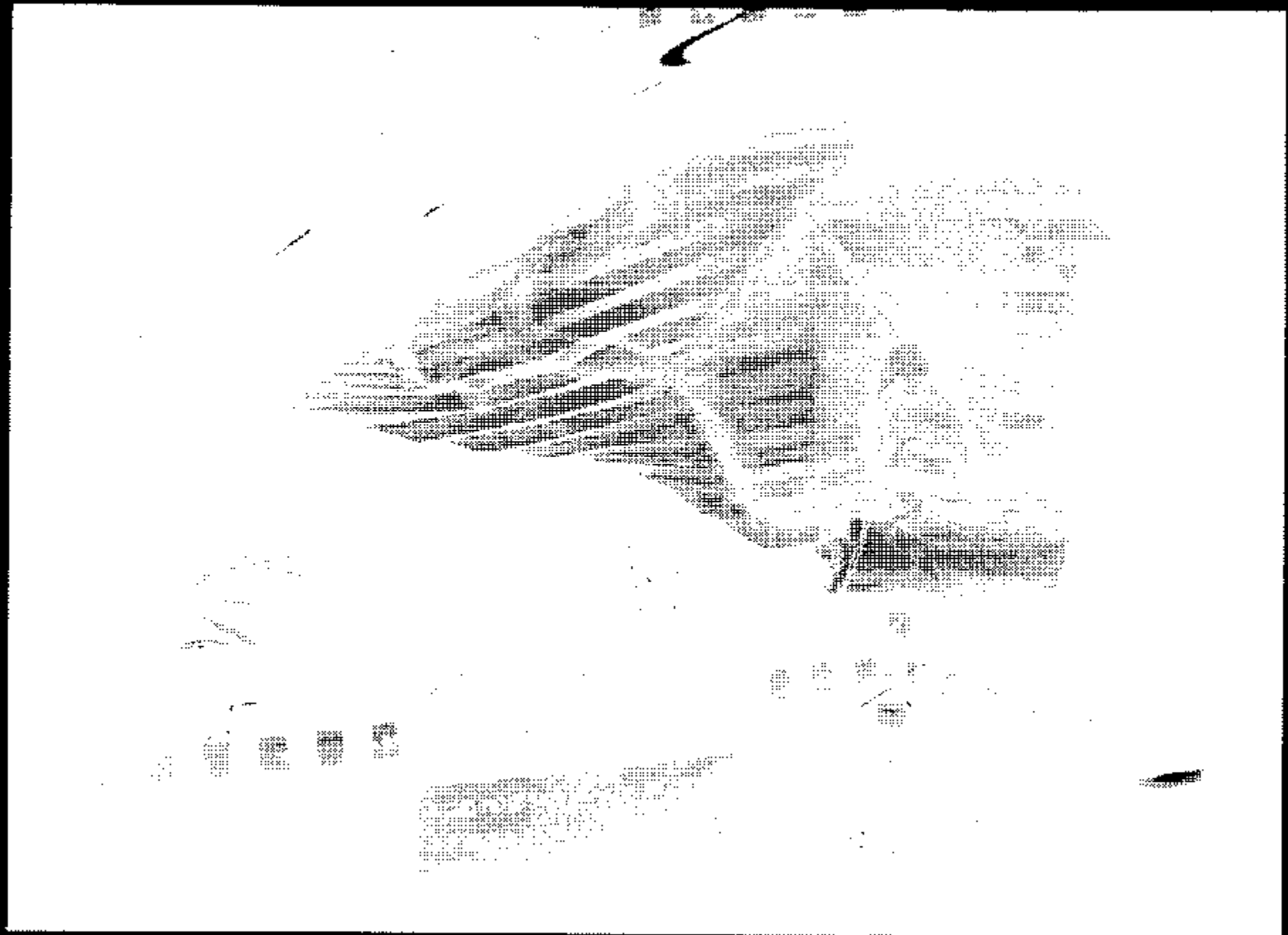


Pre-Test Driver Dummy Right Side View



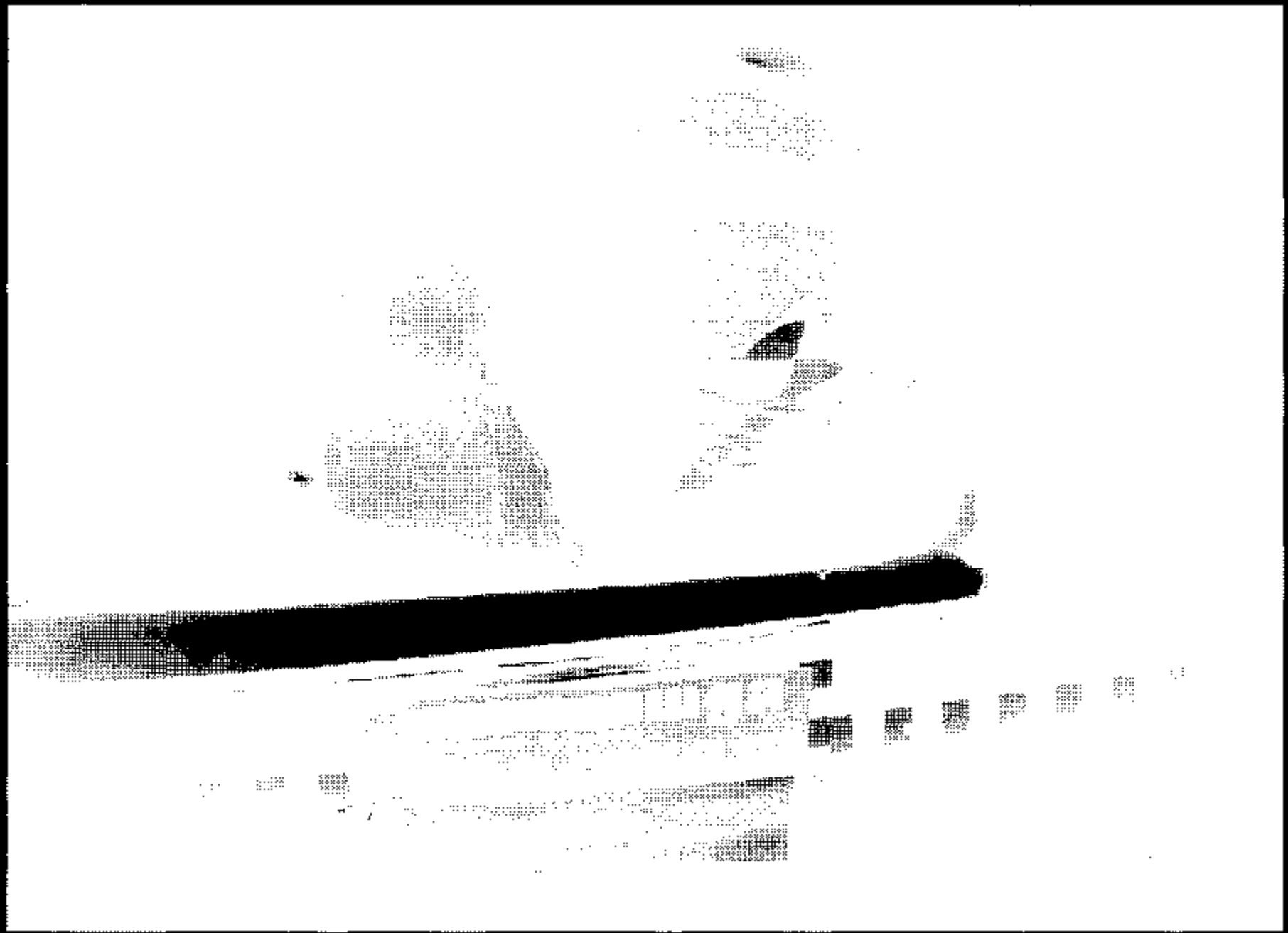
Post-Test Driver Dummy Right Side View

Pre-Test Driver Dummy Left Side View



Post-Test Driver Dummy Left Side View

Pre-Test Driver Dummy Left Side View (Door Open)

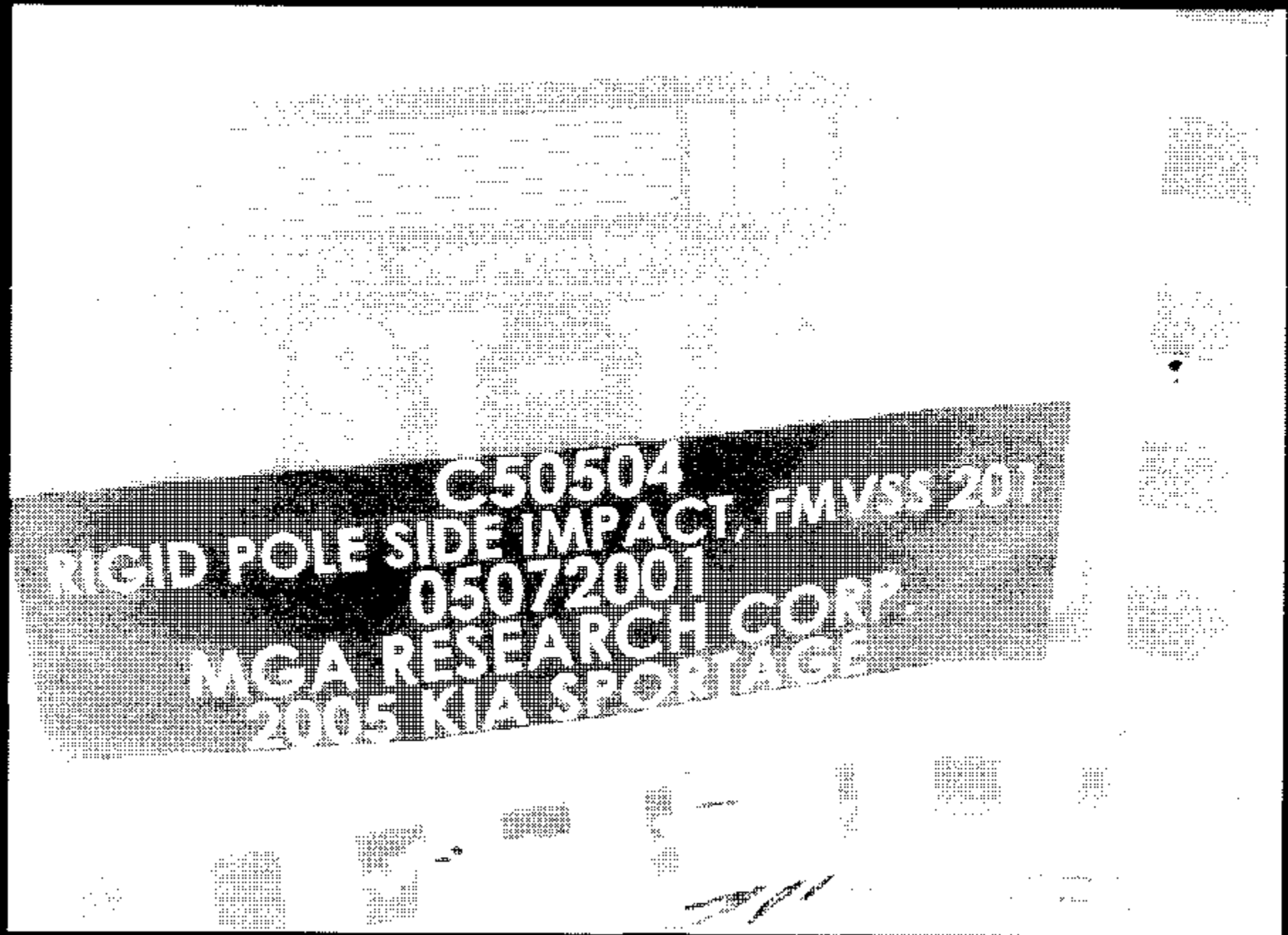


Pre-Test Driver Dummy Shoulder and Door Top View

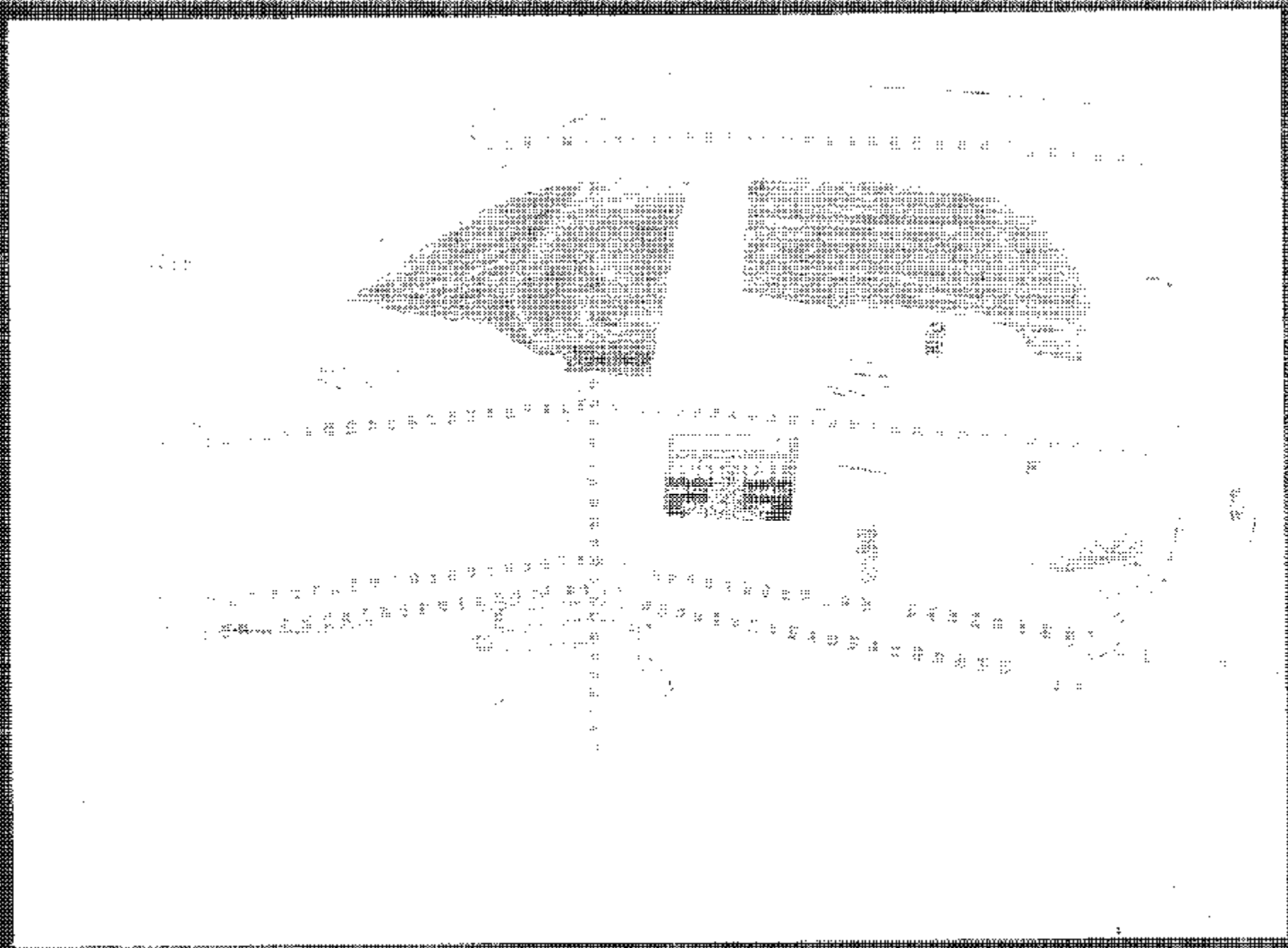
Post-Test Driver Dummy Head Contact

Post-Test Driver Dummy Thorax Contact

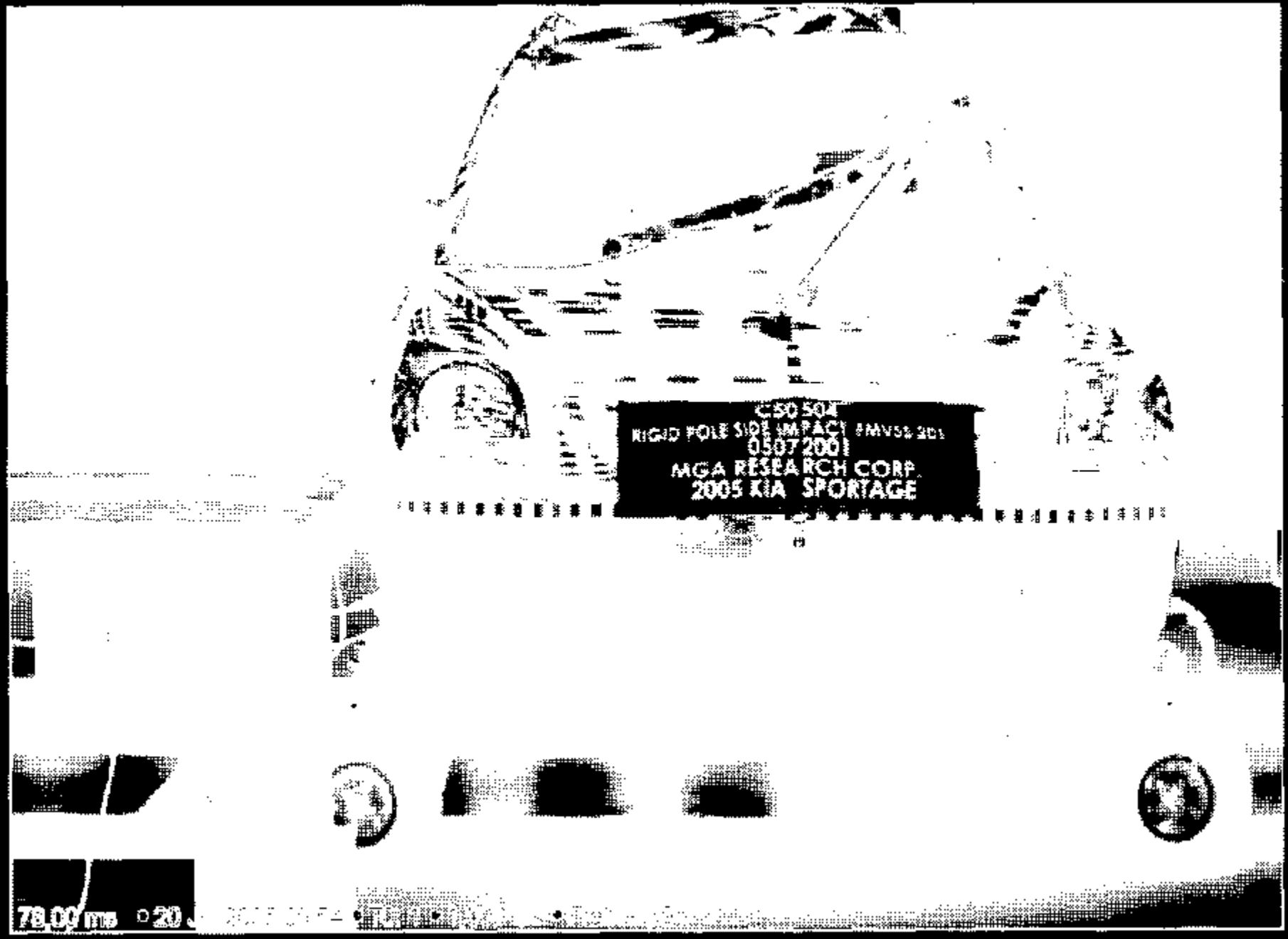
Post-Test Driver Dummy Gantest



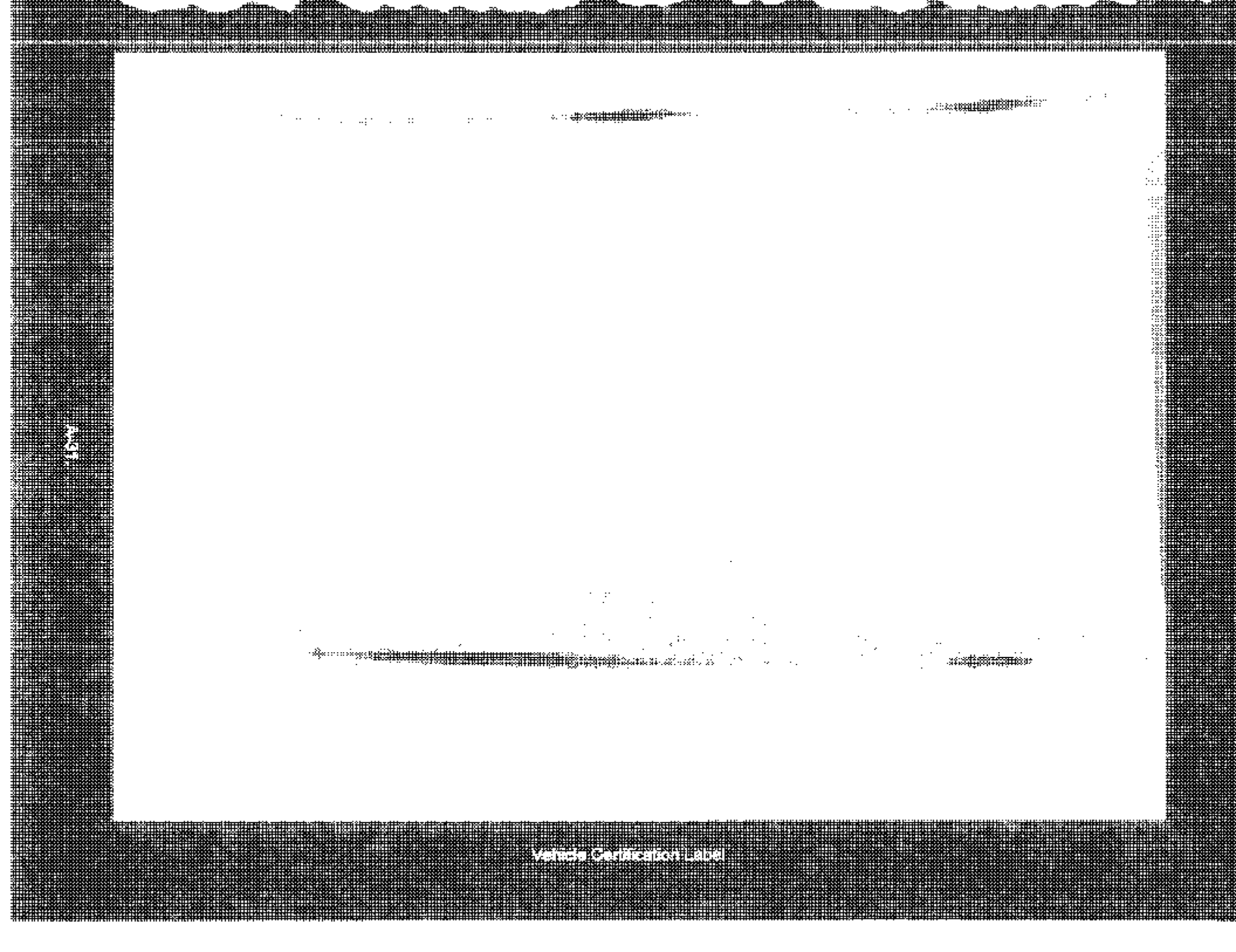
Post-Test Impact Point on Vehicle



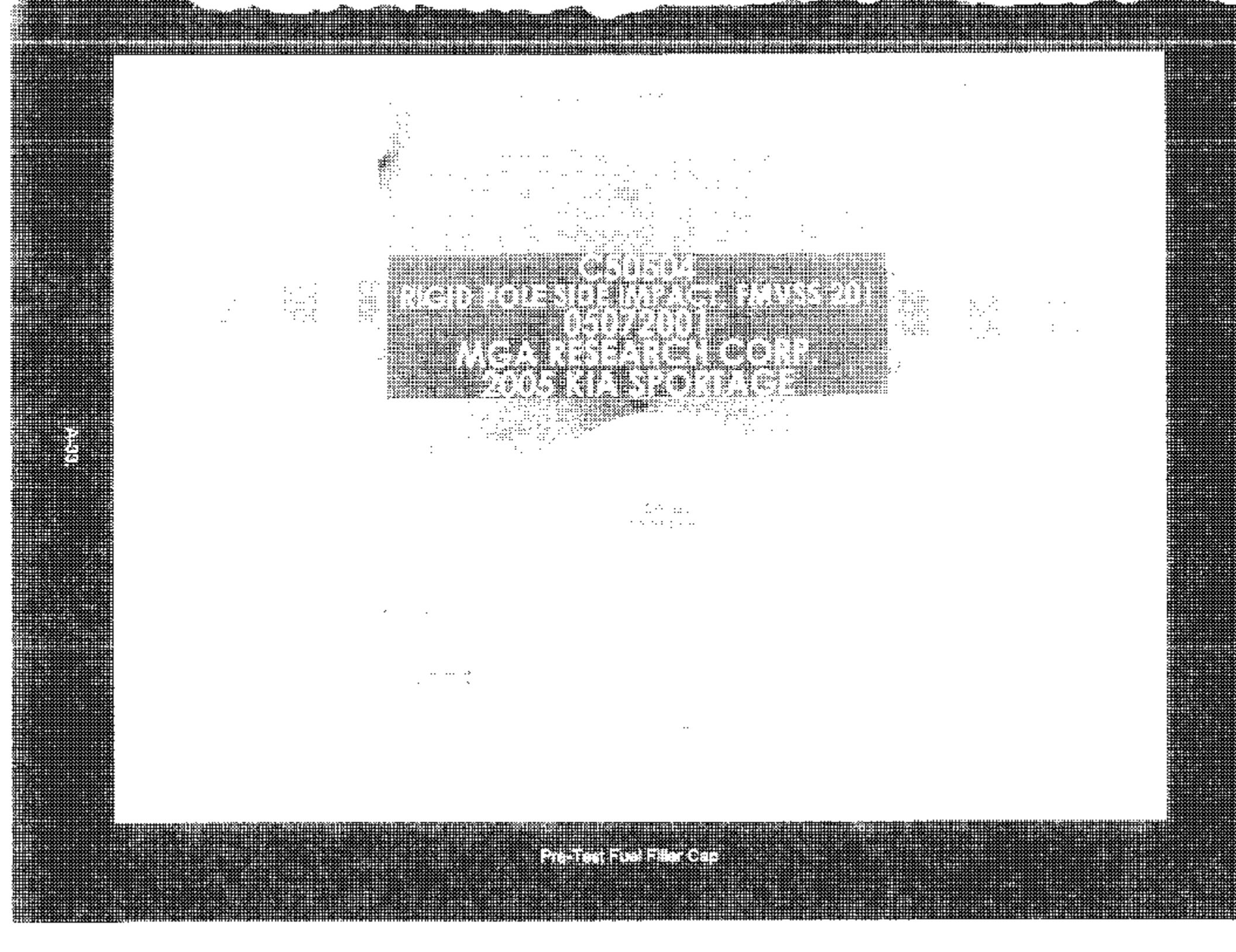
Post-Test Impact Zone Close-up View



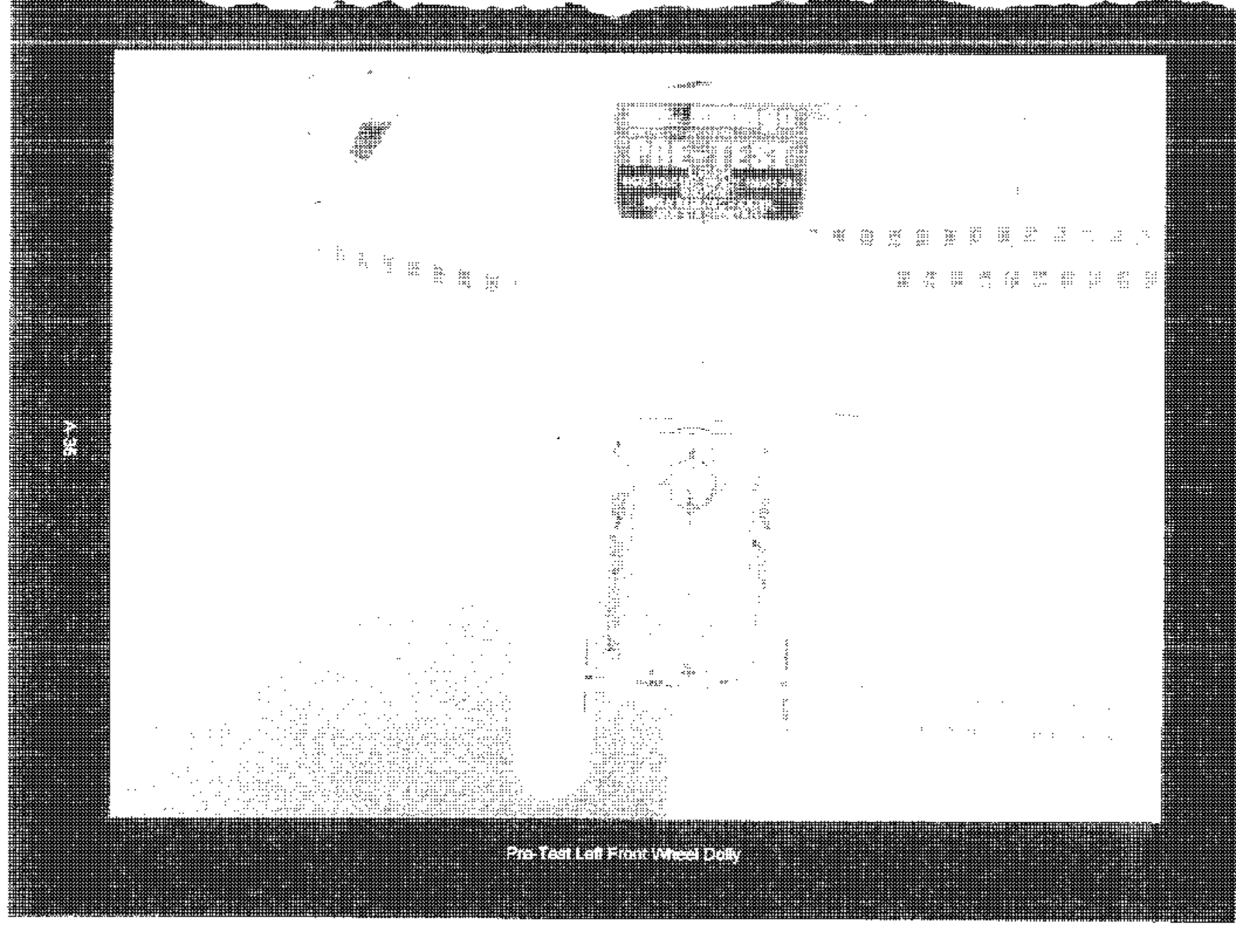
Vehicle Impact


Vehicle Certification Label

Tire Placard

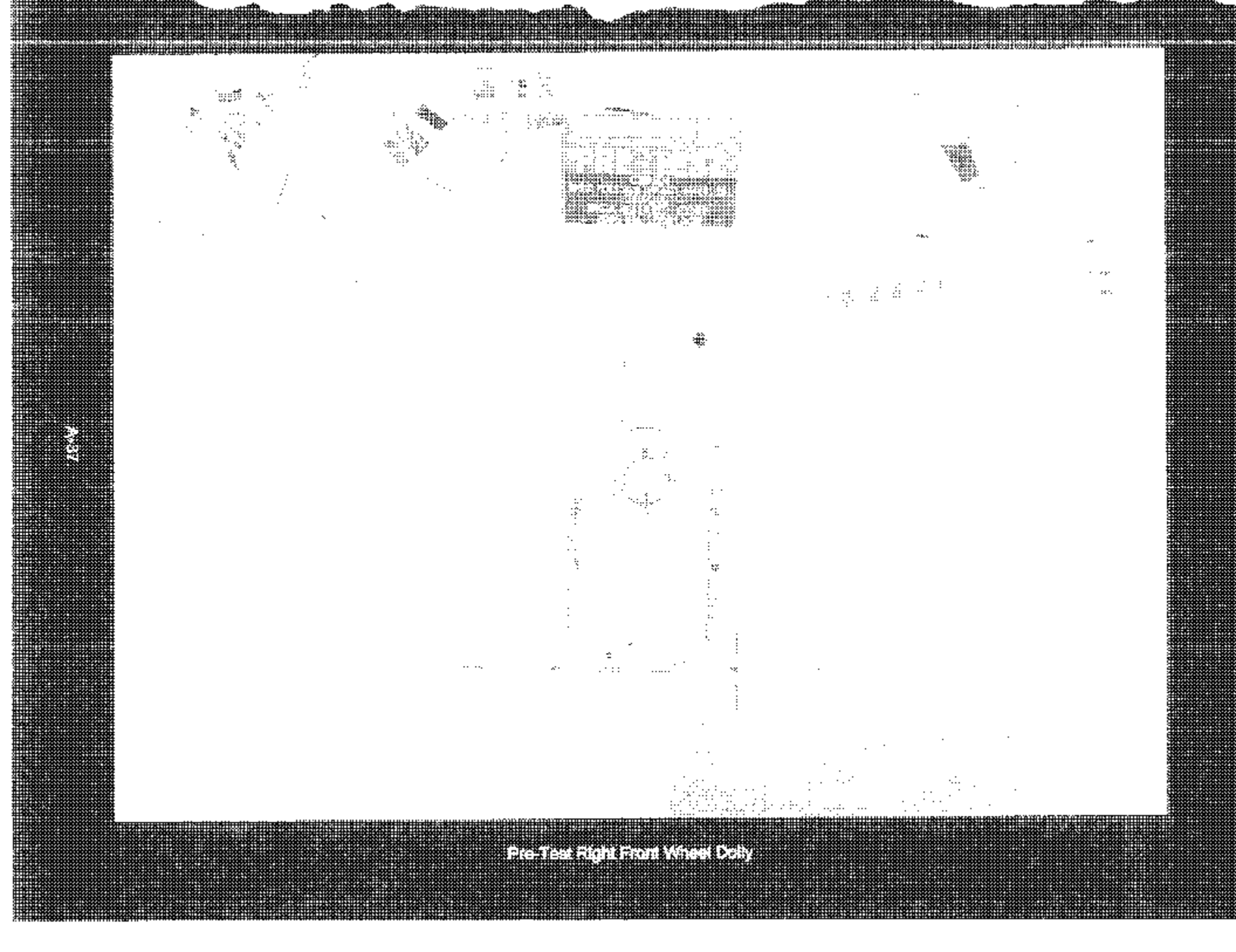

Pre-Test Fuel Filler Cap

Post-Test Fuel Filler Cap

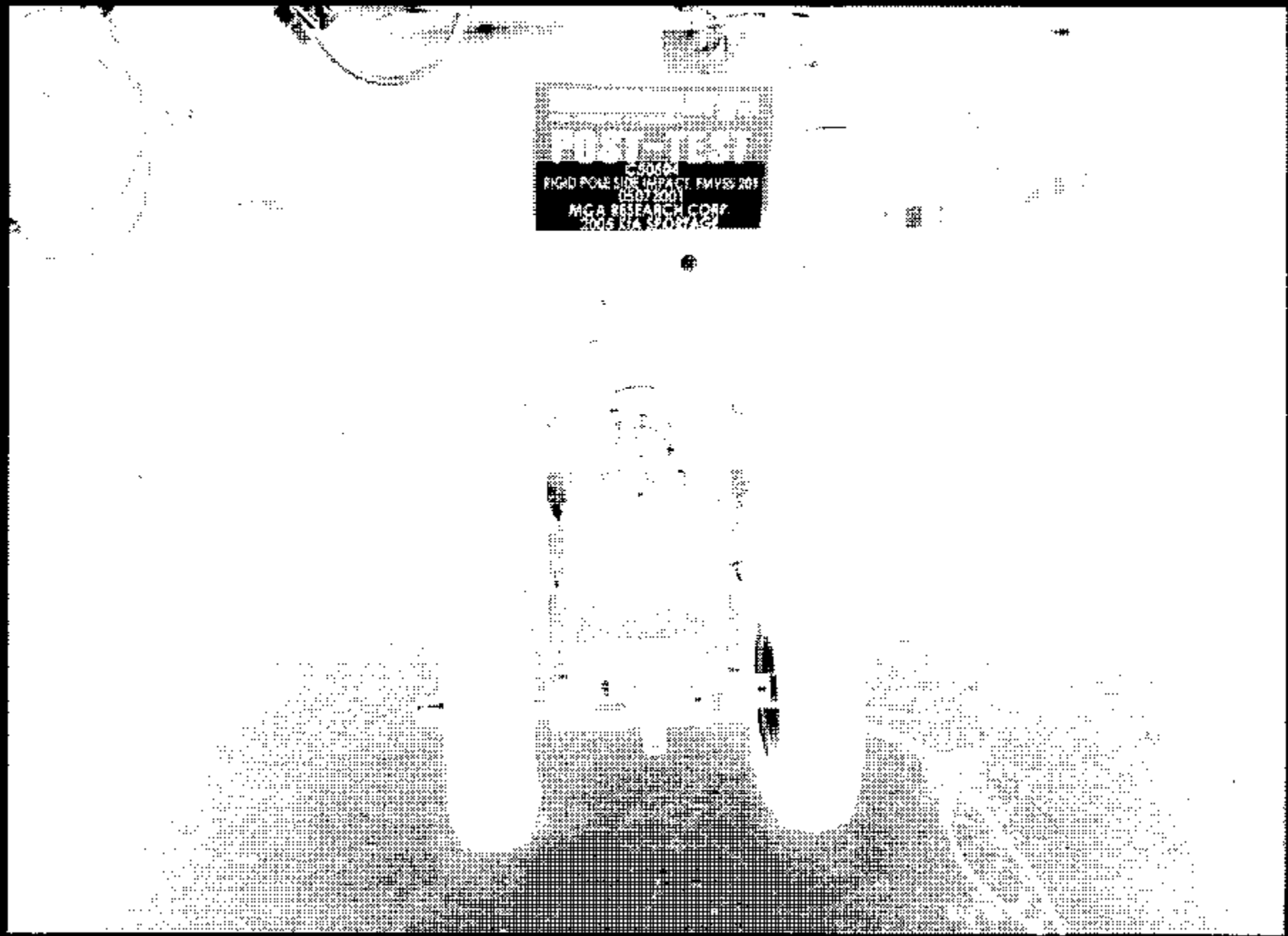


Pre-Test Left Front Wheel Dolly

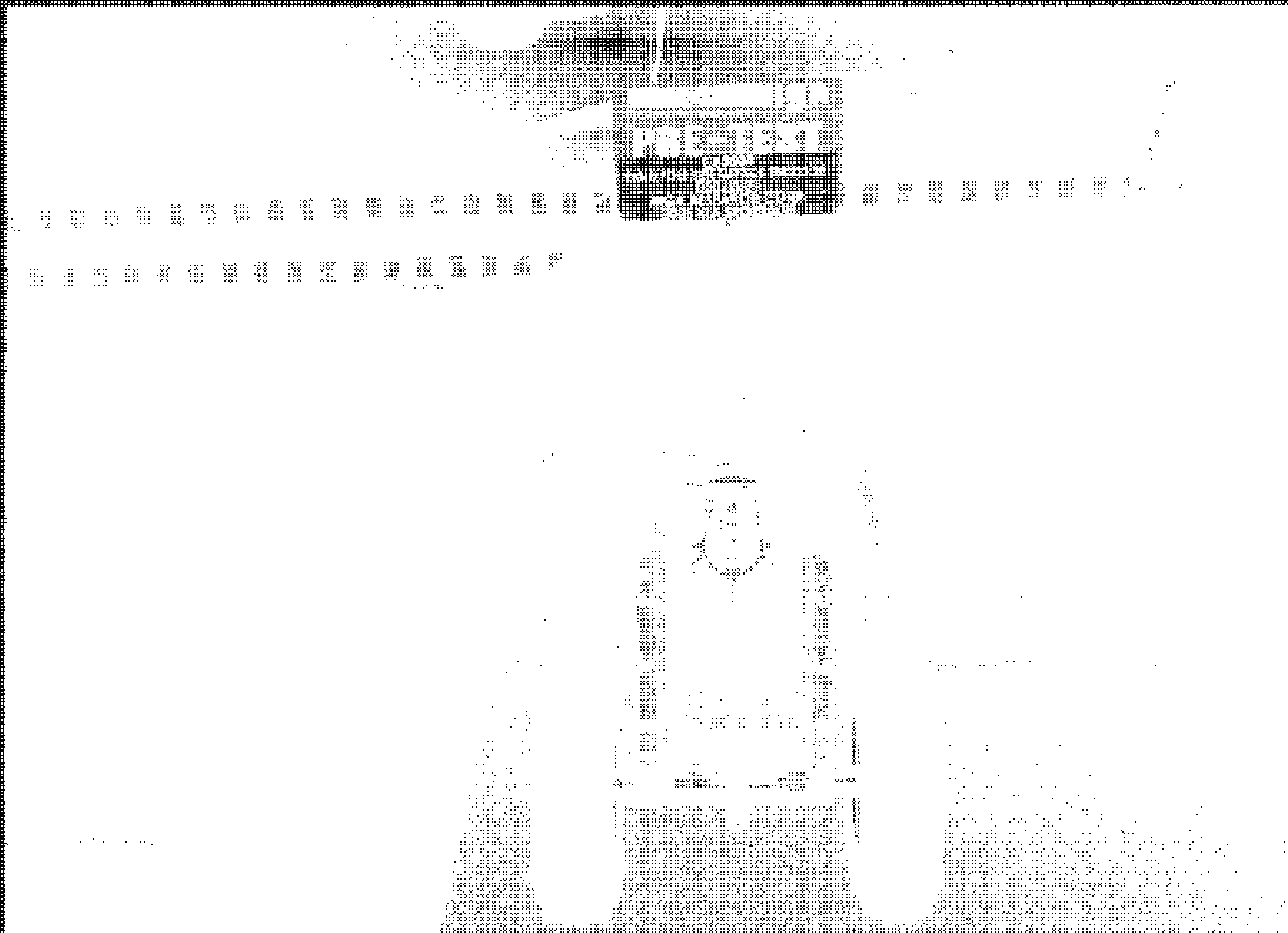
Post-Test Left Front Wheel Dolly



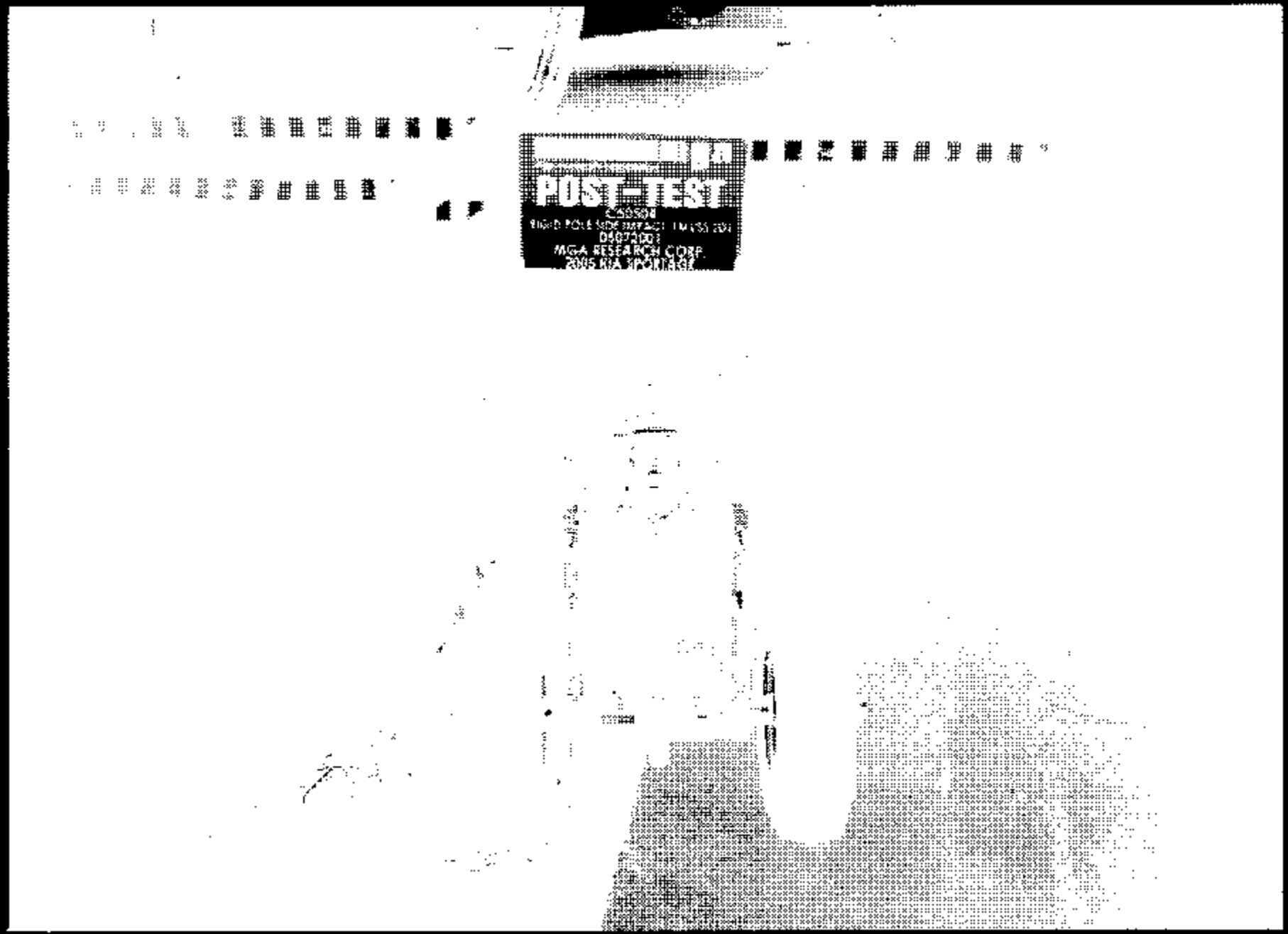
Pre-Test Right Front Wheel Dolly



Post-Test Right Front Wheel Dolly

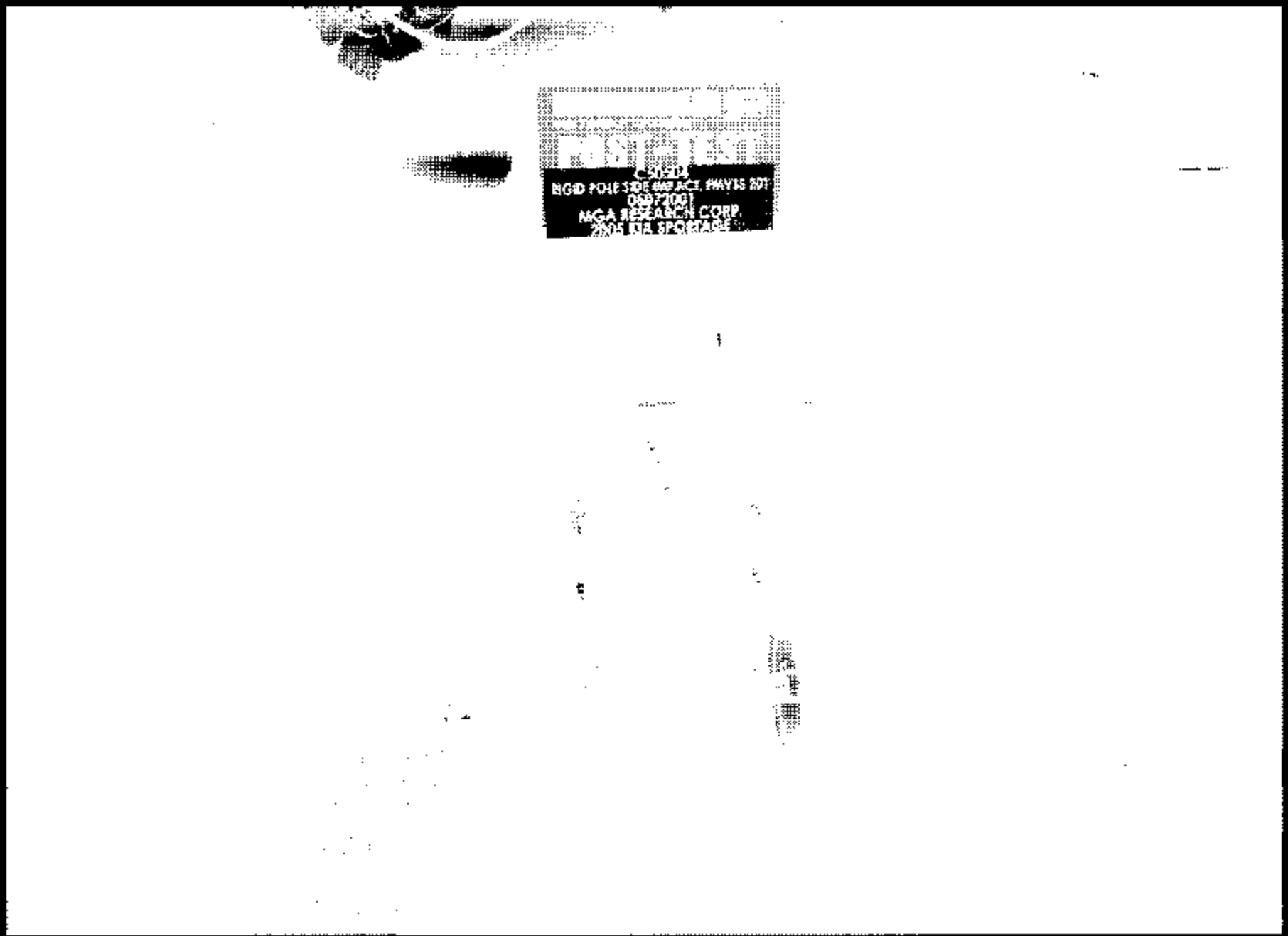


Pre-Test Left Rear Wheel Dolly

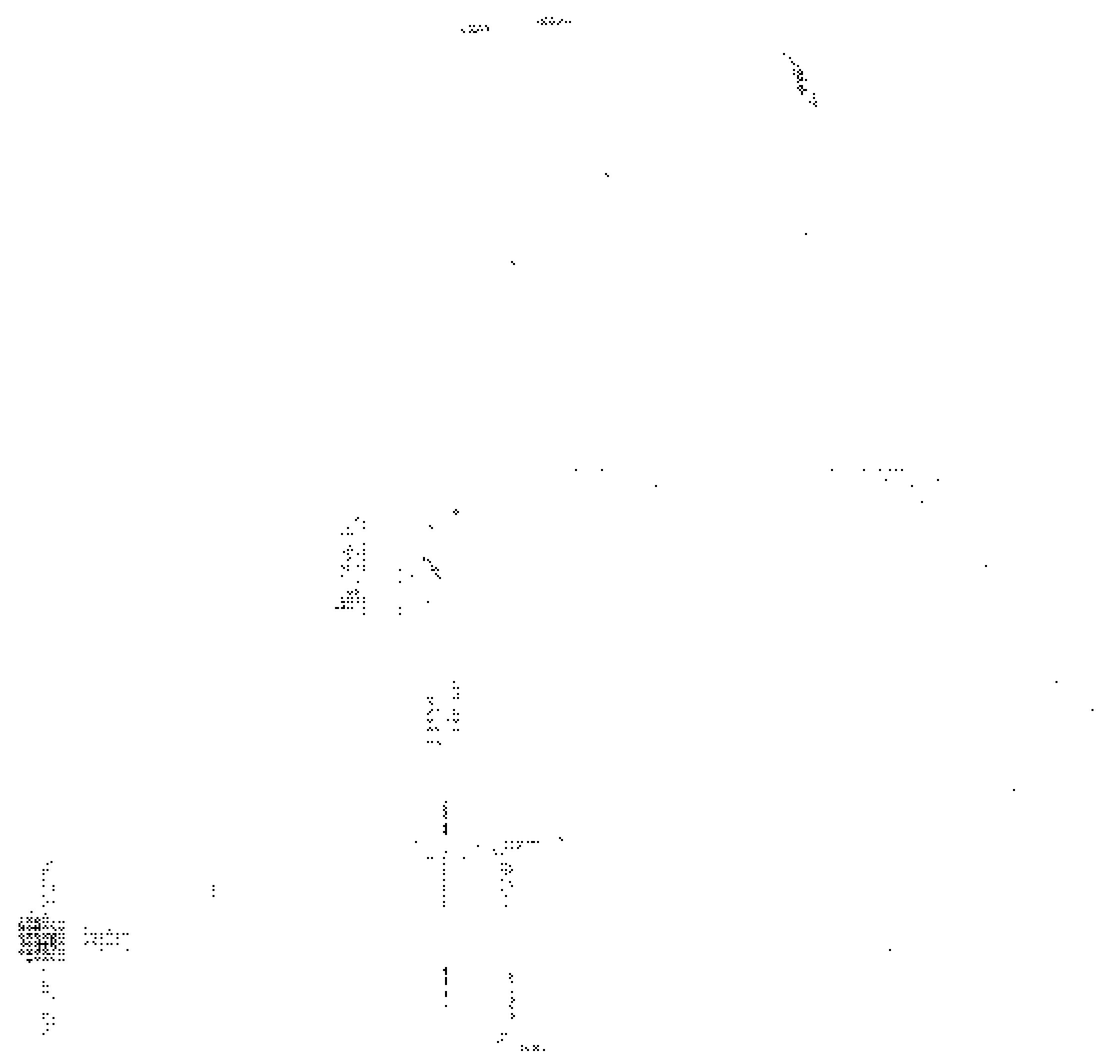


Post-Test Left Rear Wheel Dolly

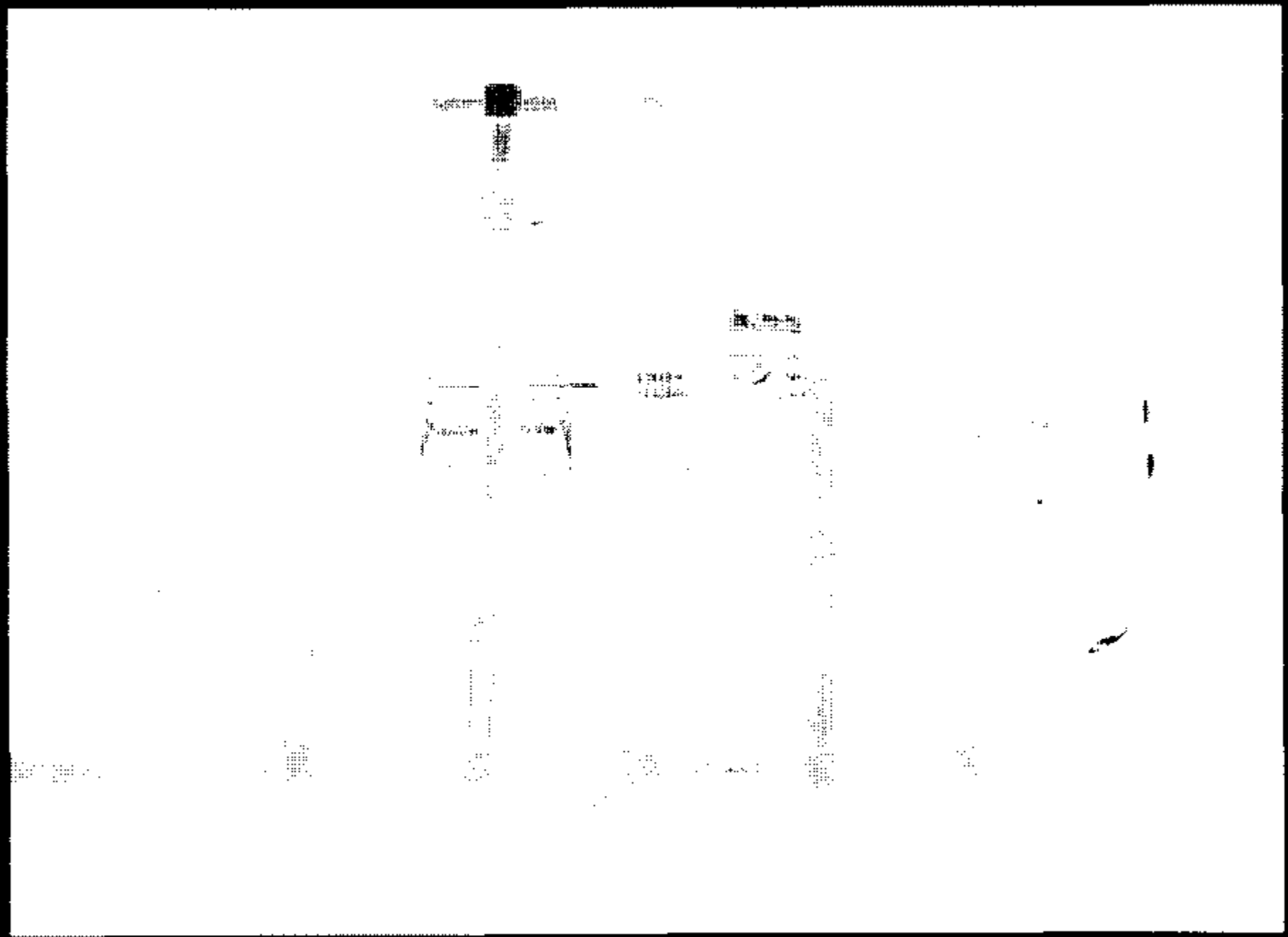
Pre-Test Right Rear Wheel Body



Post-Test Right Rear Wheel Dolly



Rollover 180 Degrees



Rollover 90 Degrees

Rollover 270 Degrees

Rollover 360 Degrees

APPENDIX B

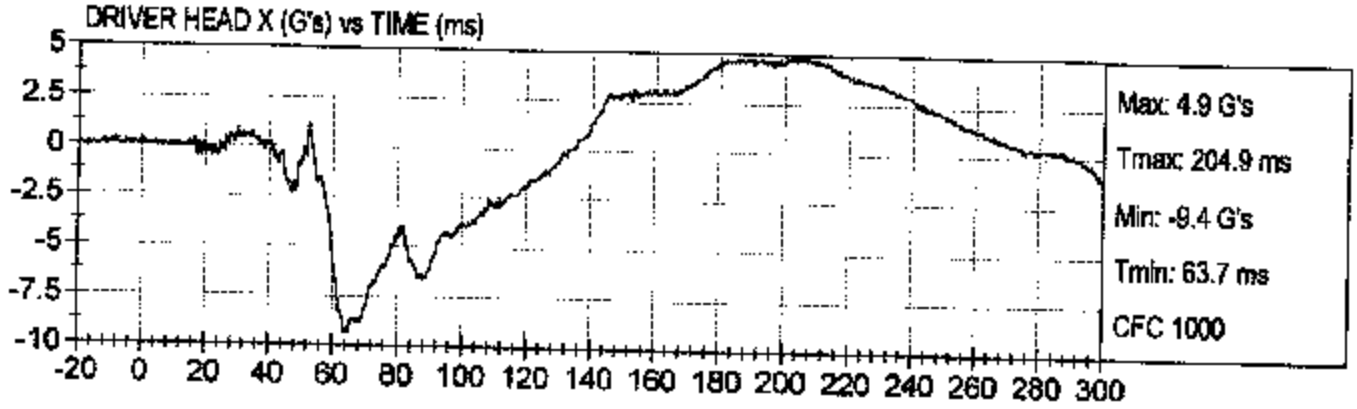
SID/HIII AND VEHICLE RESPONSE DATA

TABLE OF DATA PLOTS

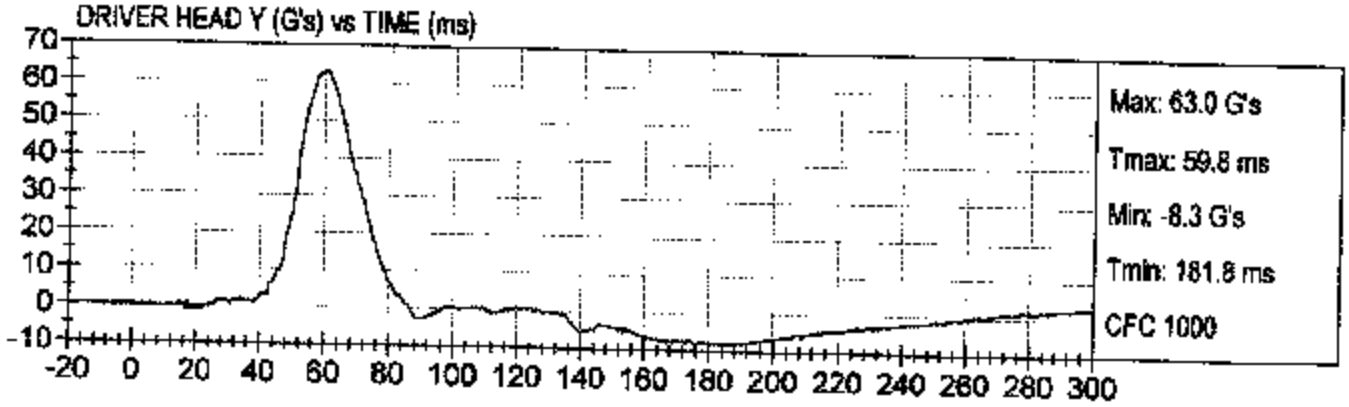
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

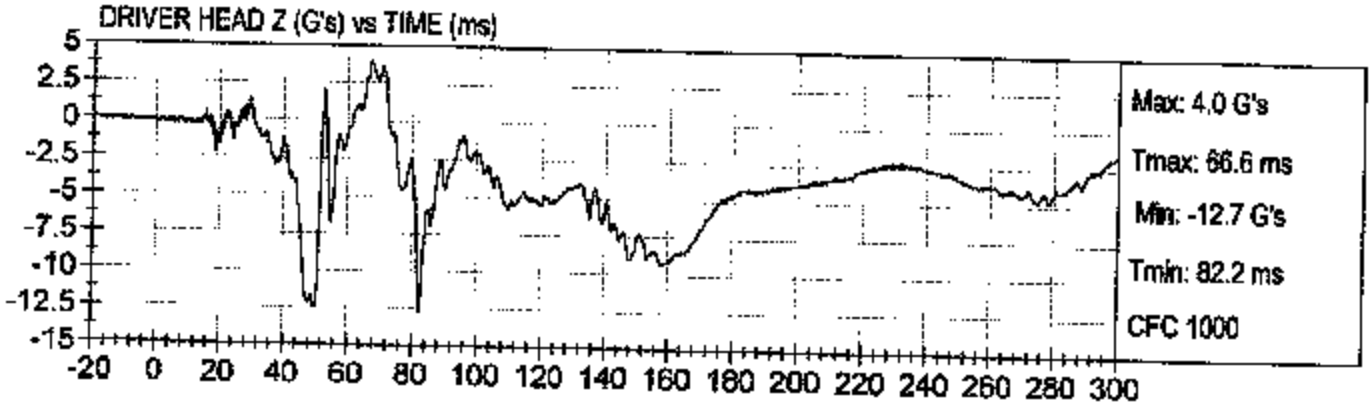
DRIVER HEAD X (G's) vs TIME (ms)



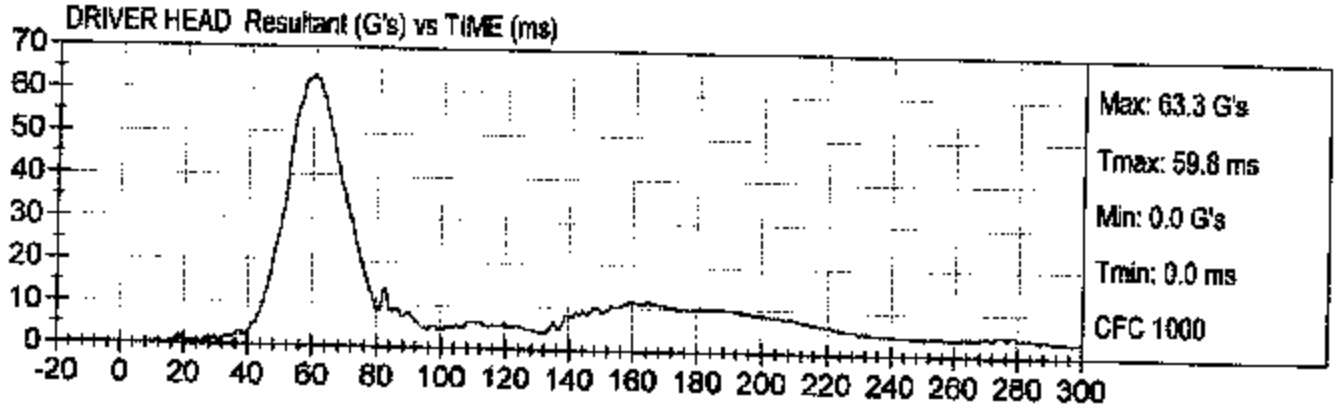
DRIVER HEAD Y (G's) vs TIME (ms)



DRIVER HEAD Z (G's) vs TIME (ms)

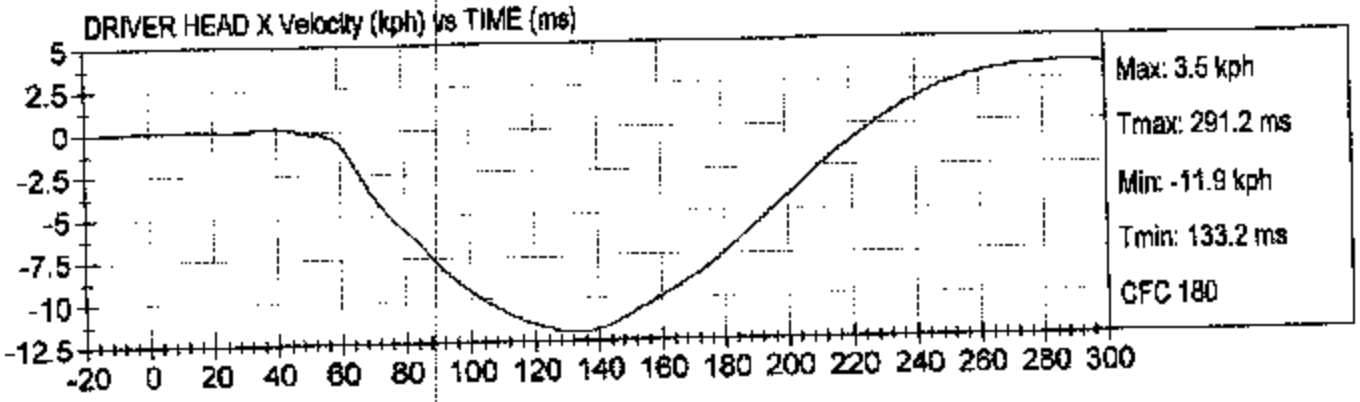


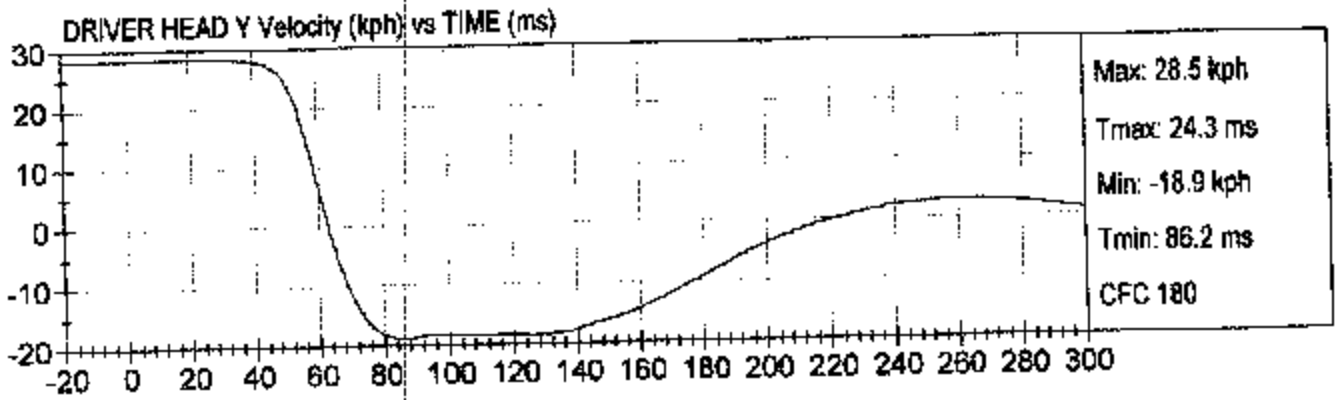
DRIVER HEAD Resultant (G's) vs TIME (ms)

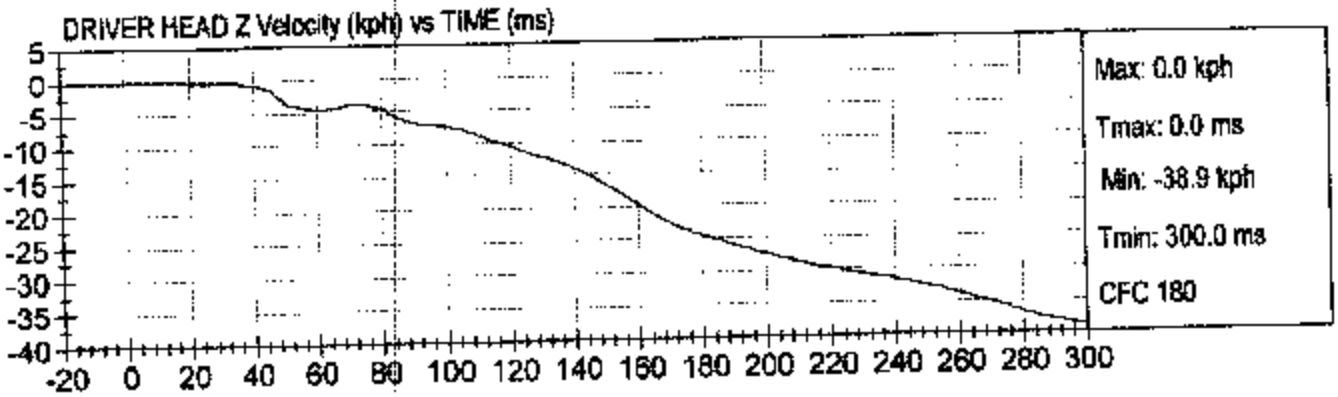


RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/06
Speed: 17.6 mph (28.3 km/h)



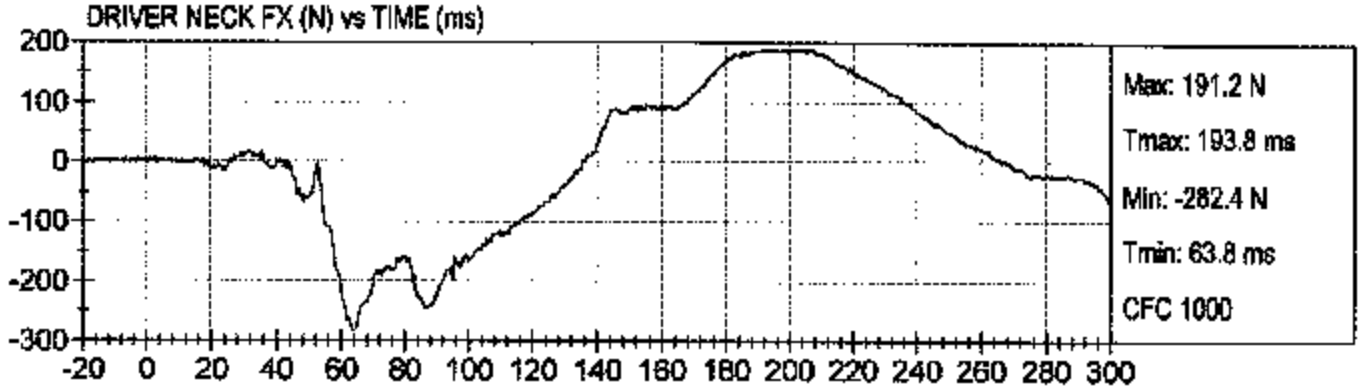




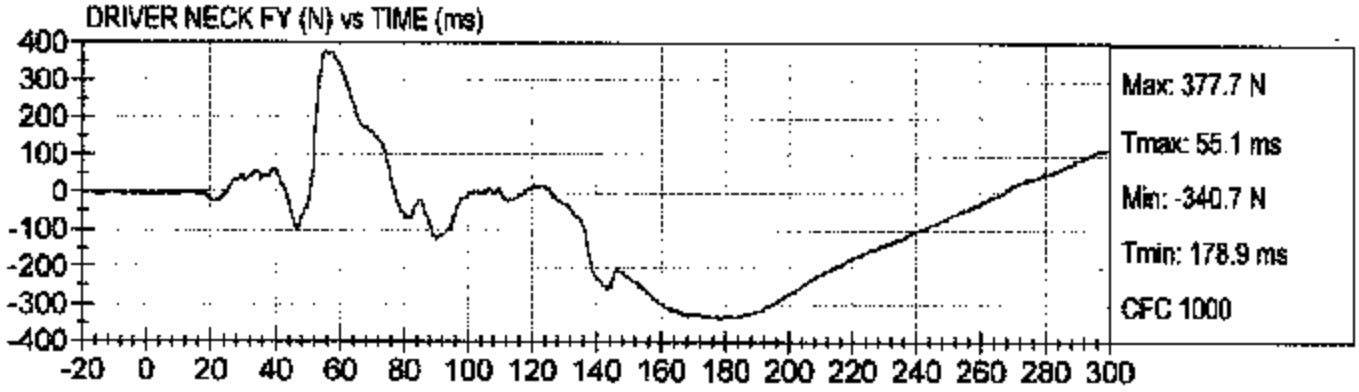
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

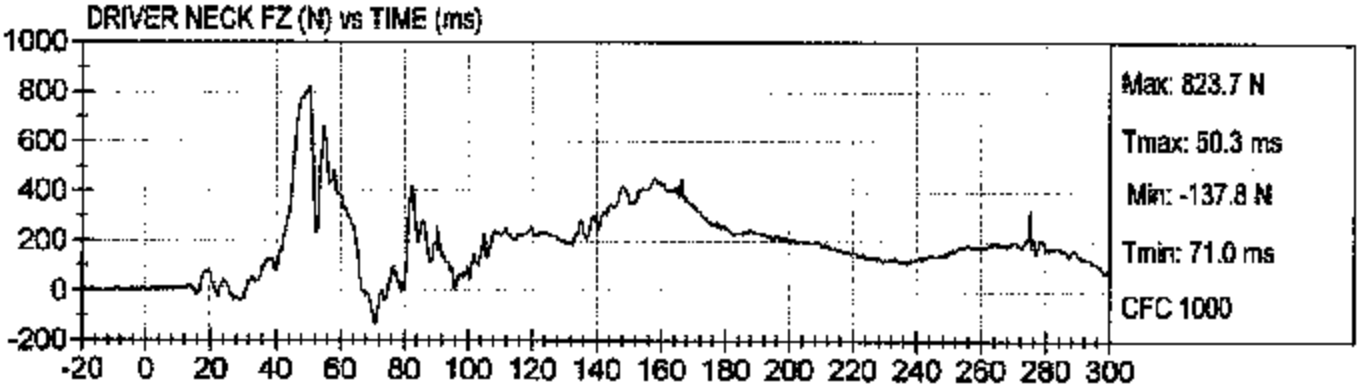
DRIVER NECK FX (N) vs TIME (ms)



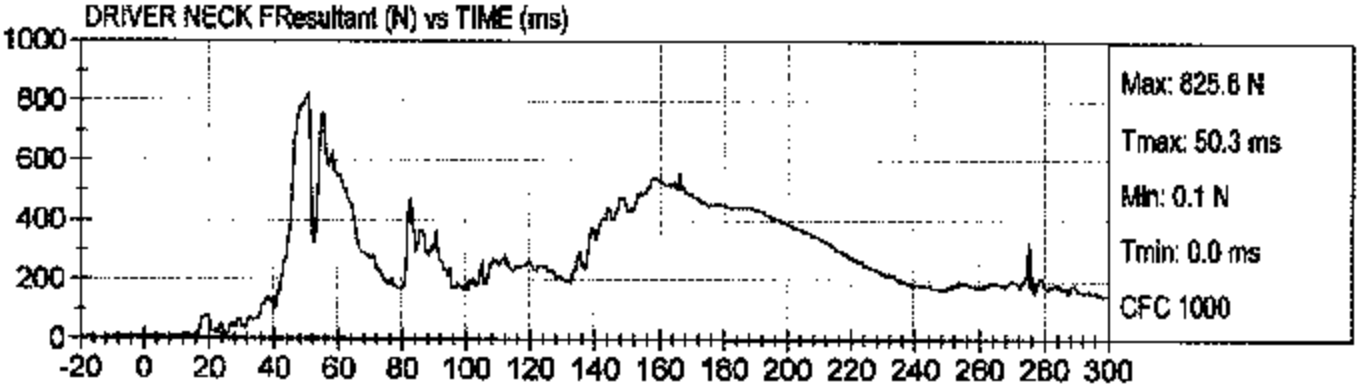
DRIVER NECK FY (N) vs TIME (ms)



DRIVER NECK FZ (N) vs TIME (ms)



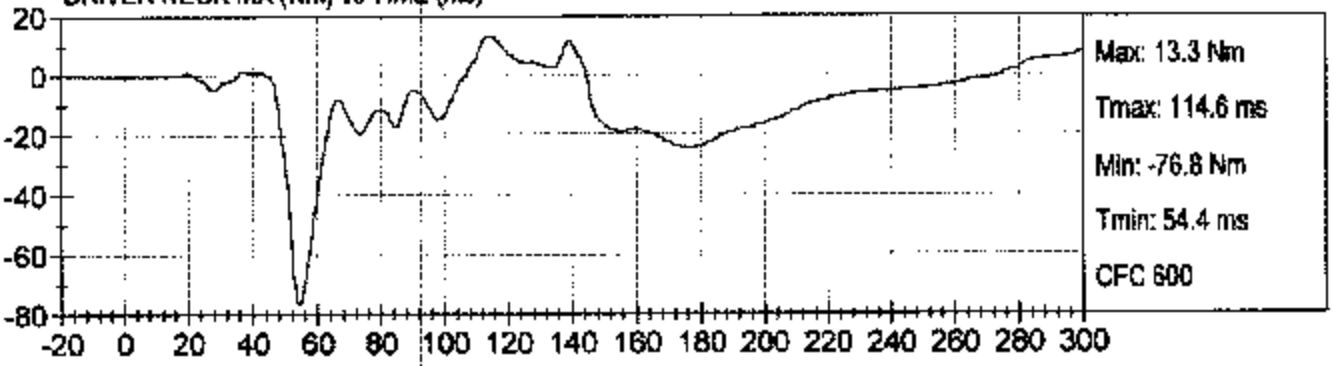
DRIVER NECK FResultant (N) vs TIME (ms)



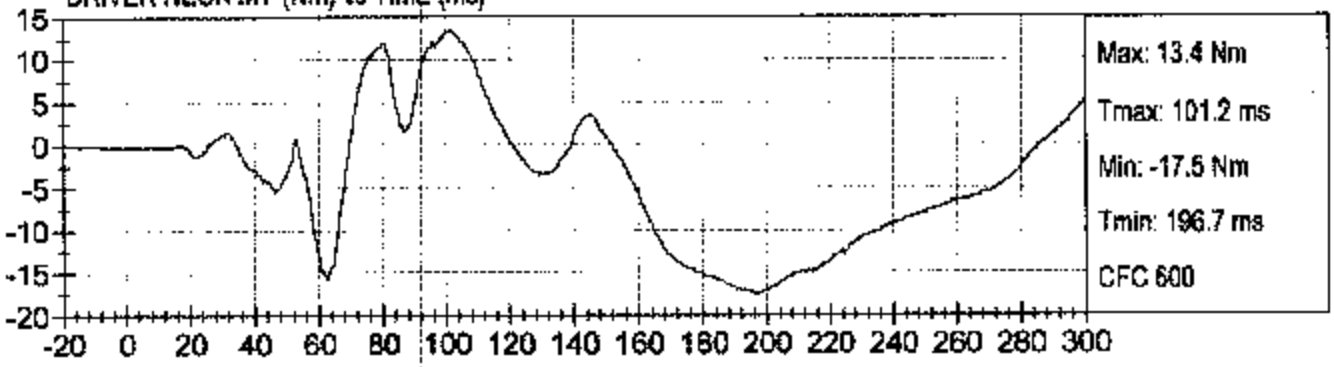
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

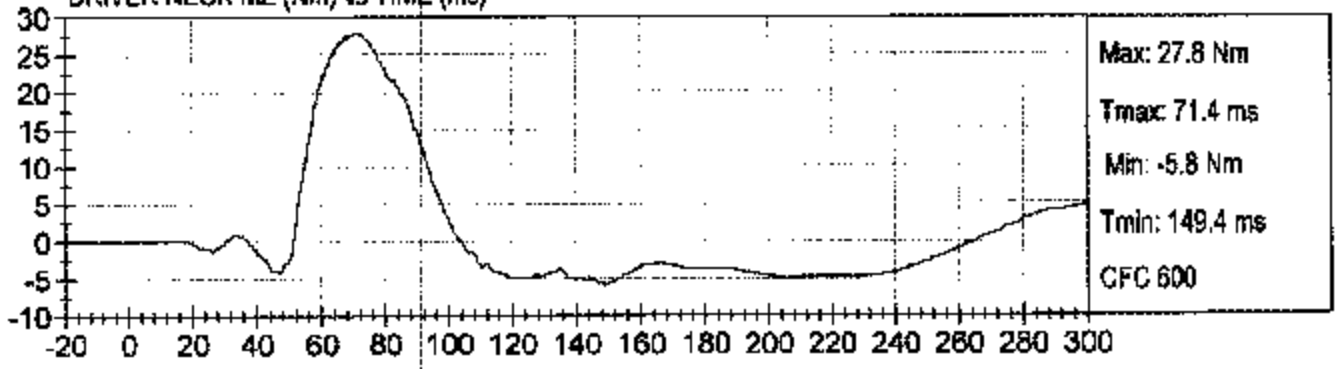
DRIVER NECK MX (Nm) vs TIME (ms)



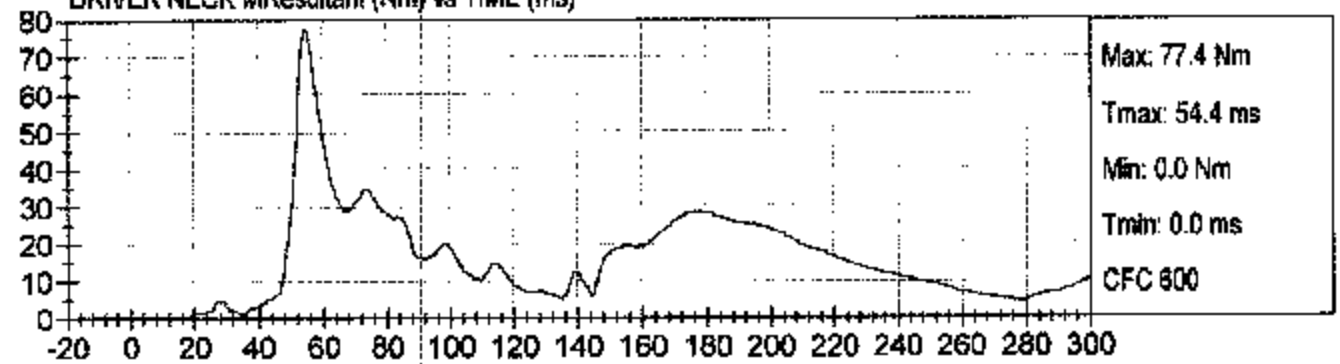
DRIVER NECK MY (Nm) vs TIME (ms)



DRIVER NECK MZ (Nm) vs TIME (ms)



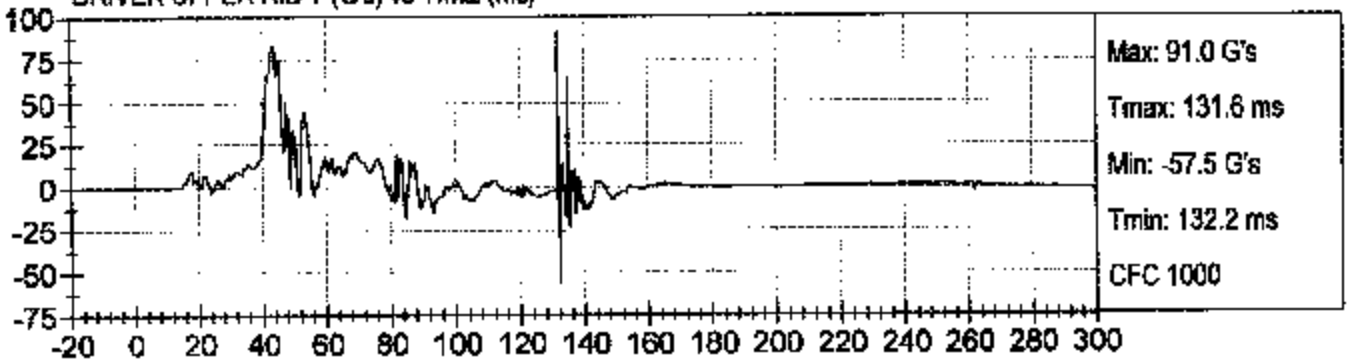
DRIVER NECK MResultant (Nm) vs TIME (ms)



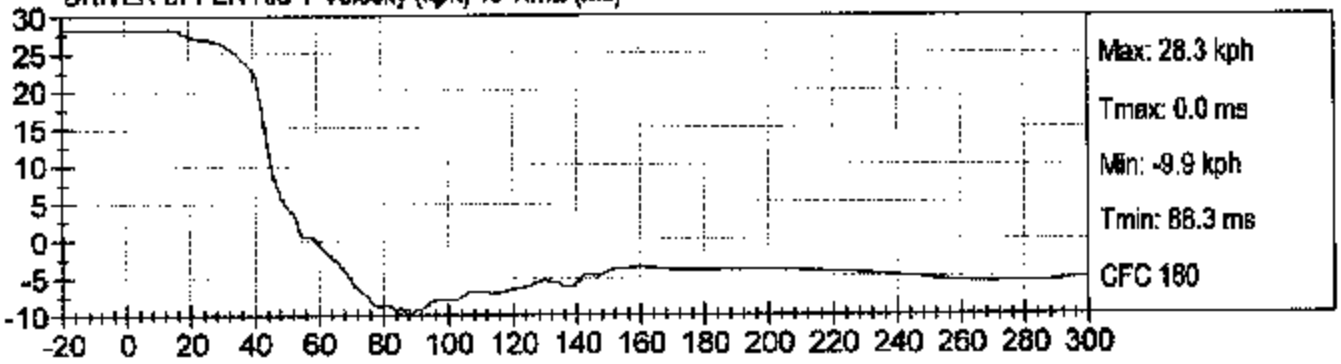
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

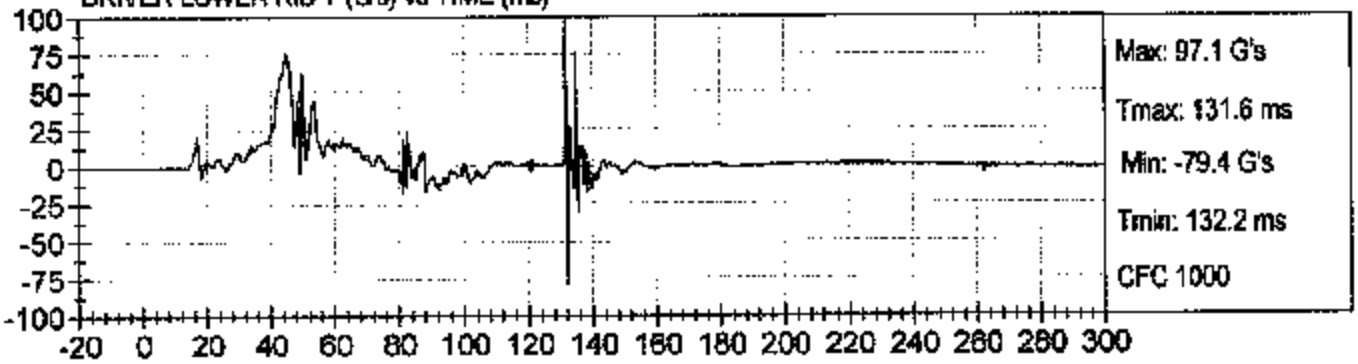
DRIVER UPPER RIB Y (G's) vs TIME (ms)



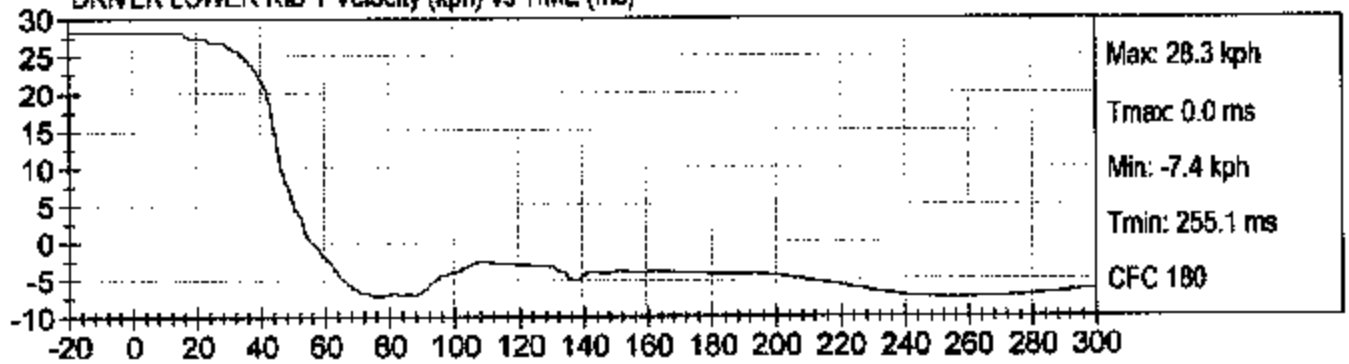
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Y (G's) vs TIME (ms)



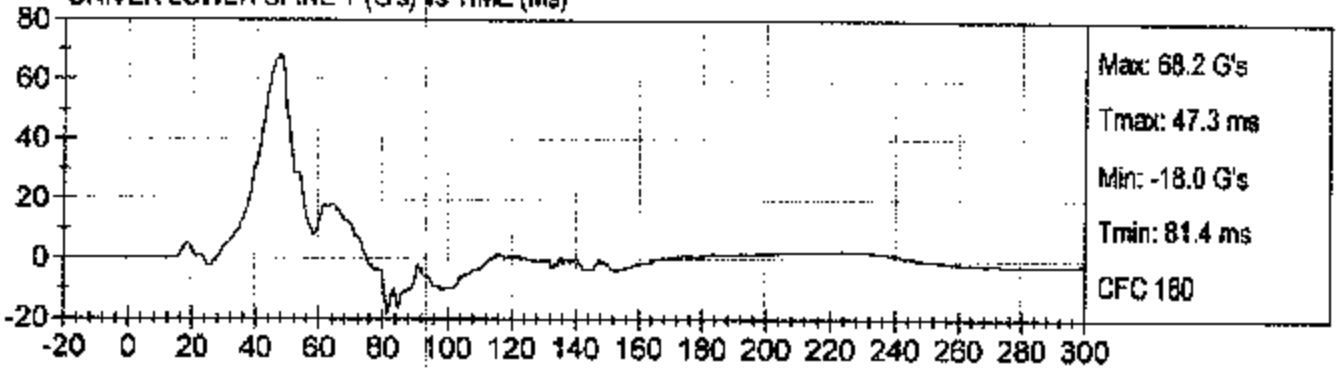
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



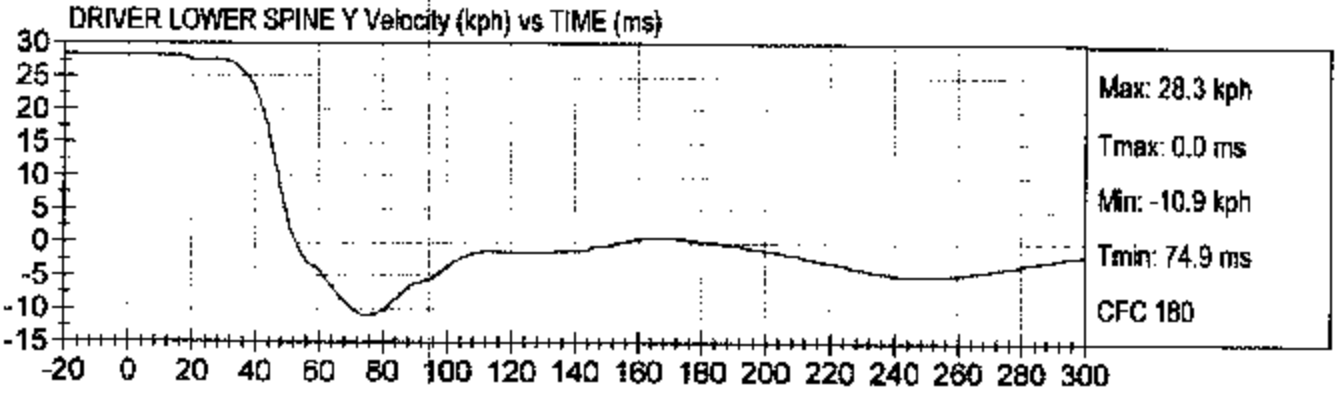
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

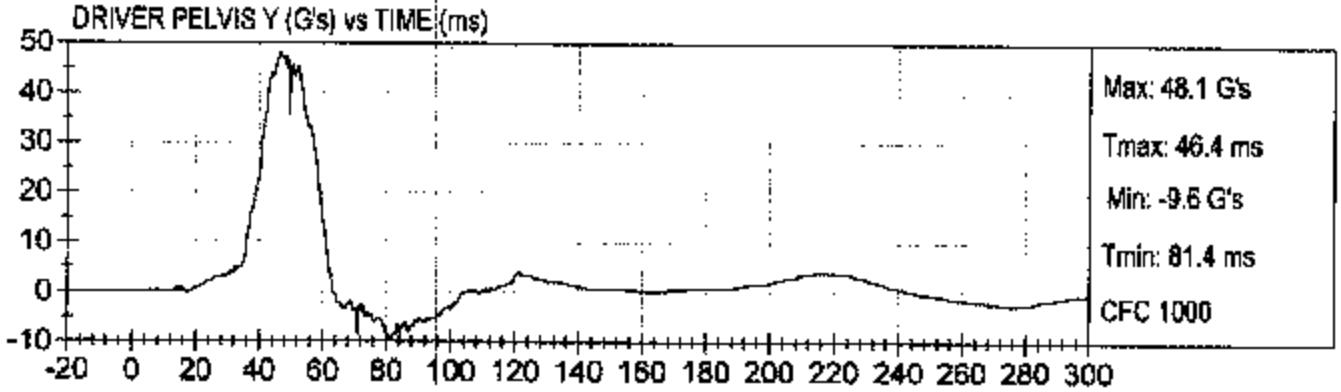
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



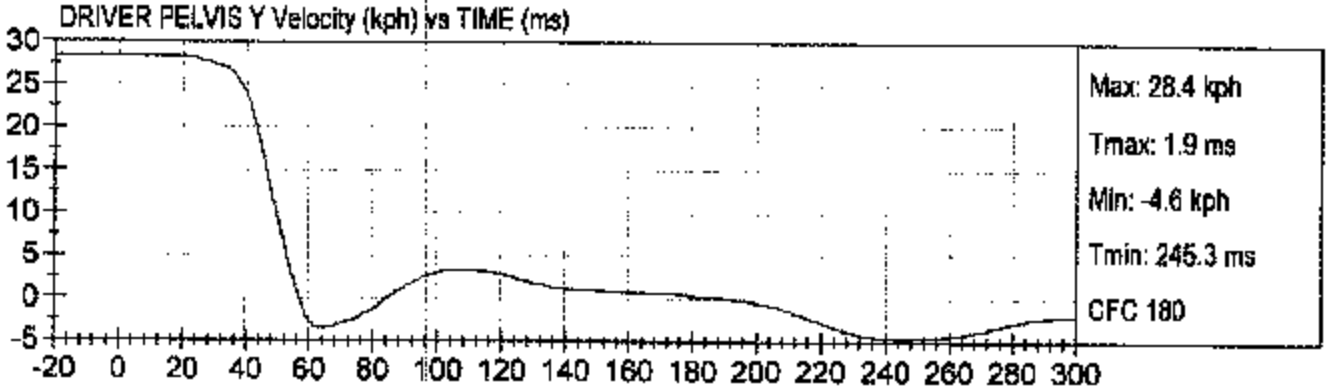
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



DRIVER PELVIS Y (G's) vs TIME (ms)



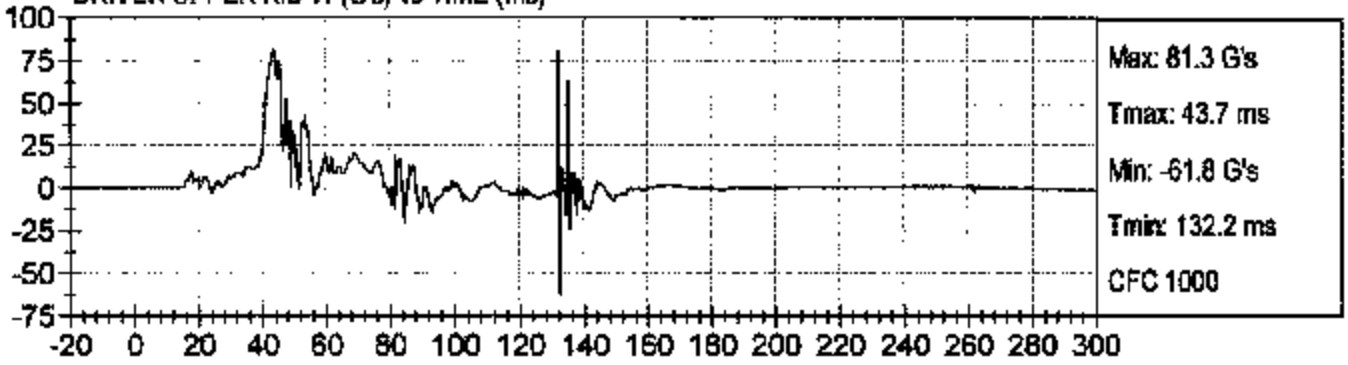
DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



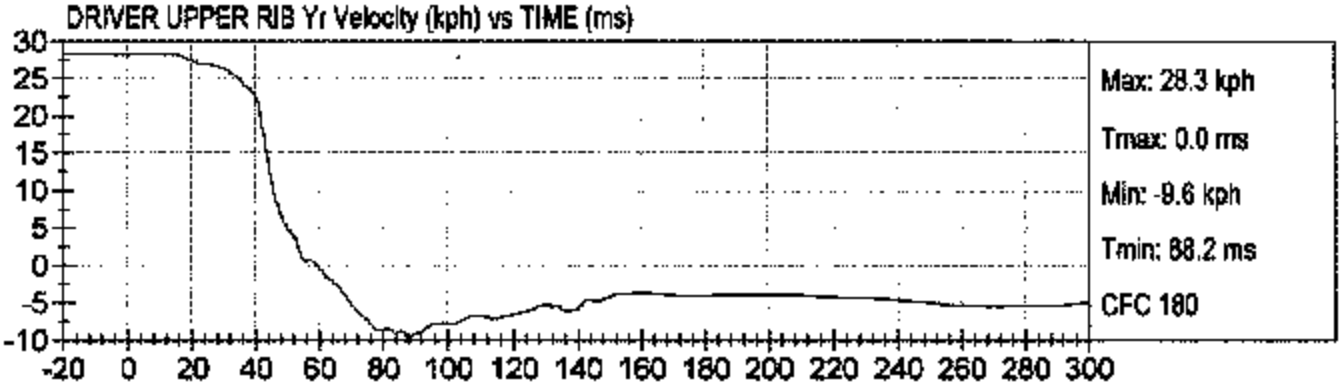
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

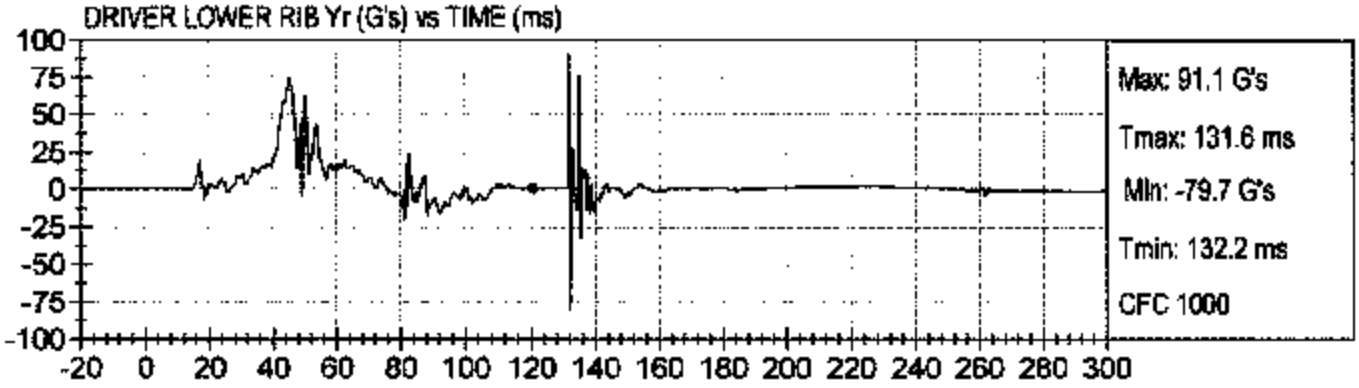
DRIVER UPPER RIB Yr (G's) vs TIME (ms)



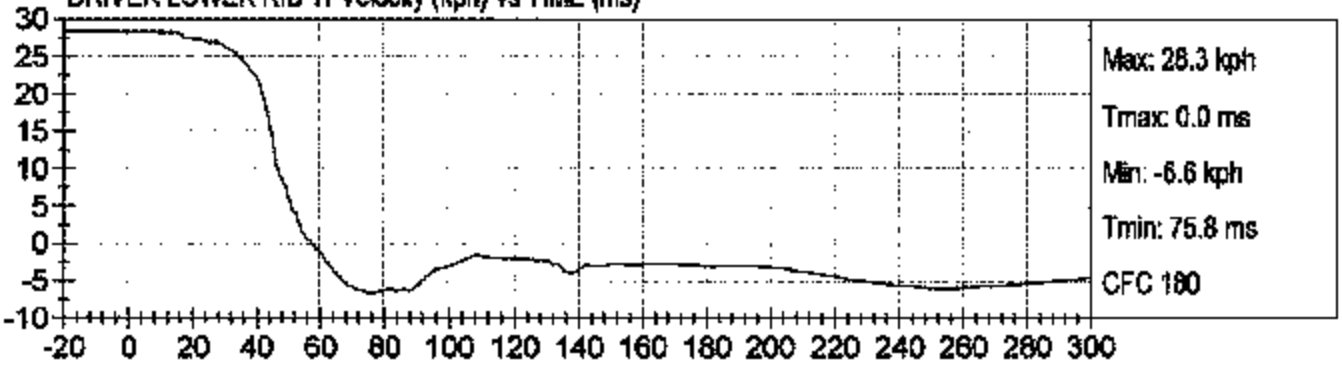
DRIVER UPPER RIB Yr Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Yr (G's) vs TIME (ms)



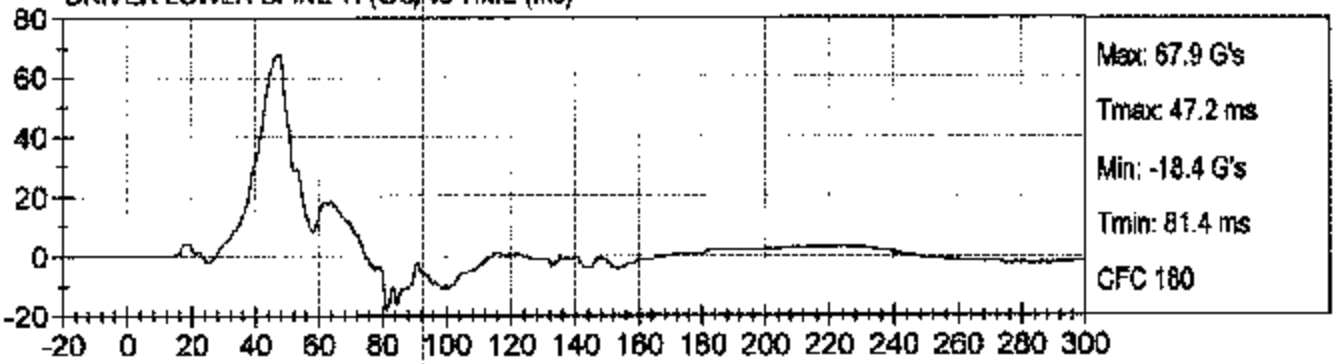
DRIVER LOWER RIB Yr Velocity (kph) vs TIME (ms)



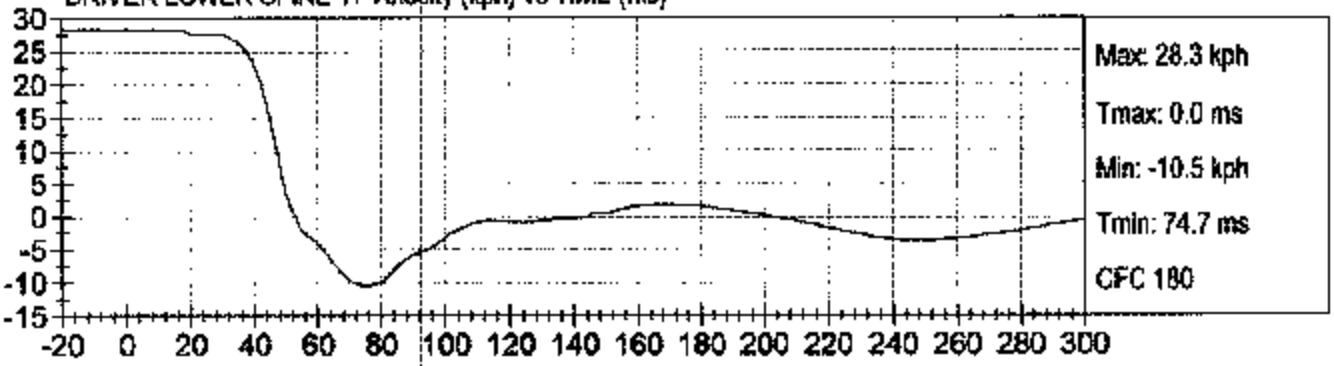
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

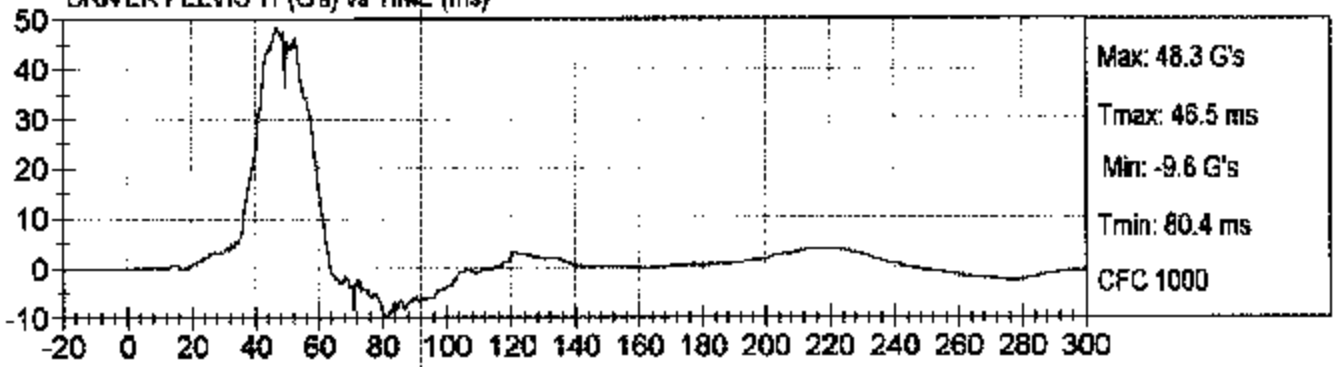
DRIVER LOWER SPINE Yr (G's) vs TIME (ms)



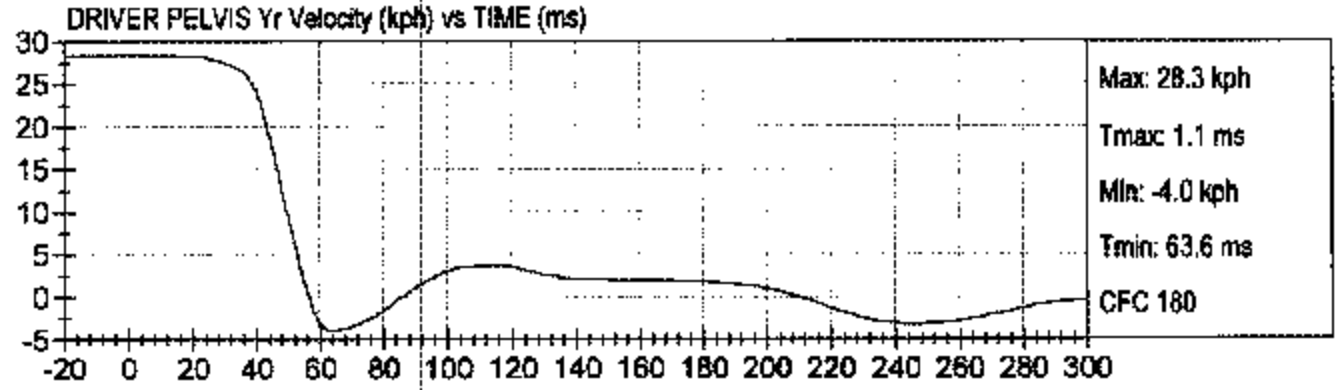
DRIVER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



DRIVER PELVIS Yr (G's) vs TIME (ms)



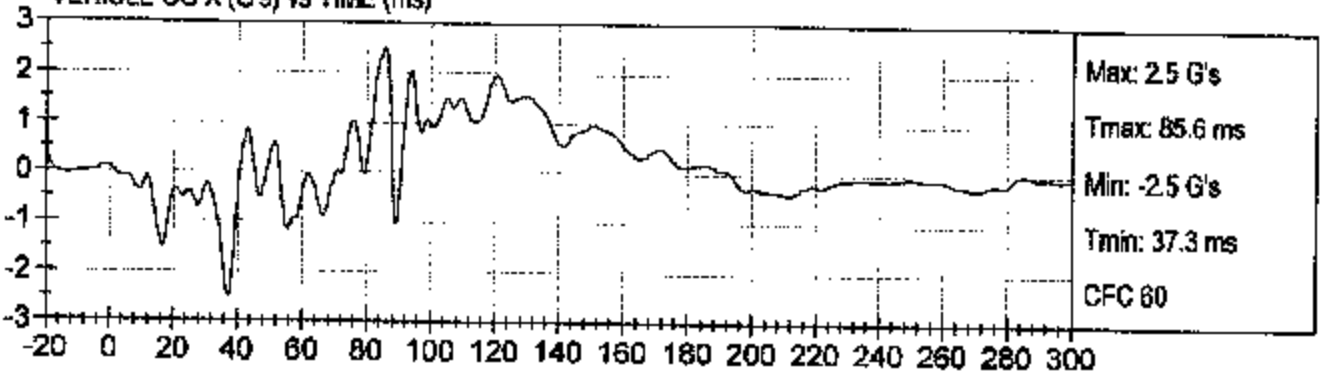
DRIVER PELVIS Yr Velocity (kph) vs TIME (ms)



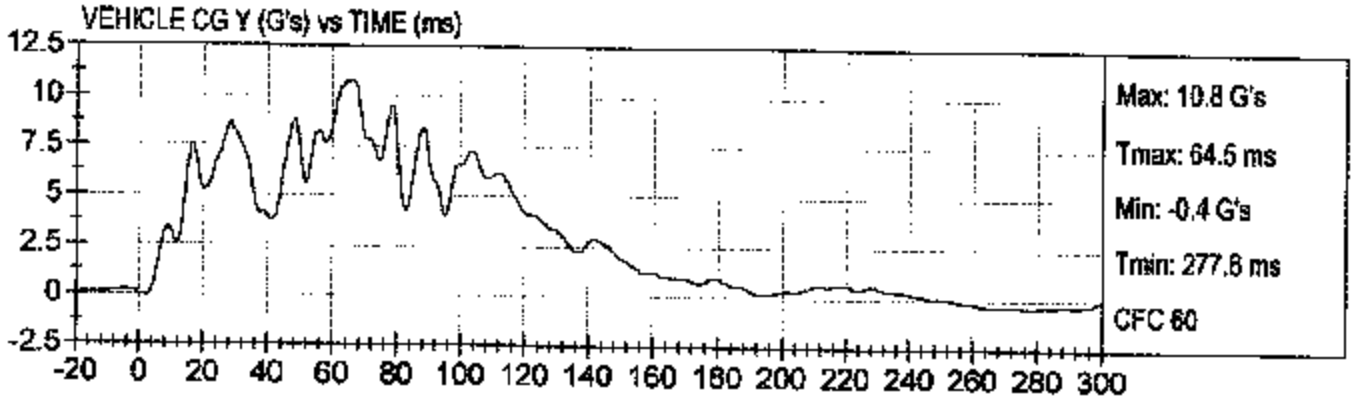
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

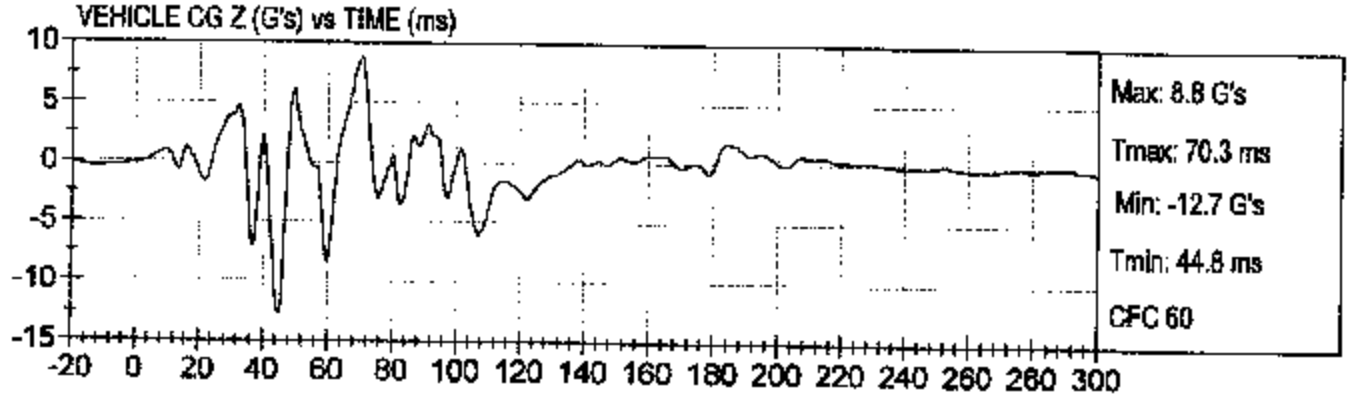
VEHICLE CG X (G's) vs TIME (ms)



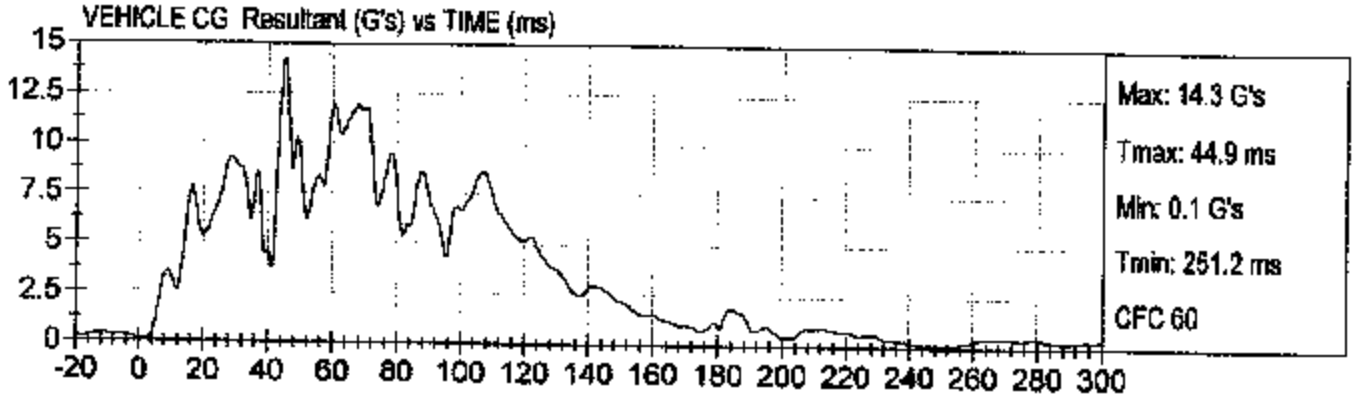
VEHICLE CG Y (G's) vs TIME (ms)



VEHICLE CG Z (G's) vs TIME (ms)

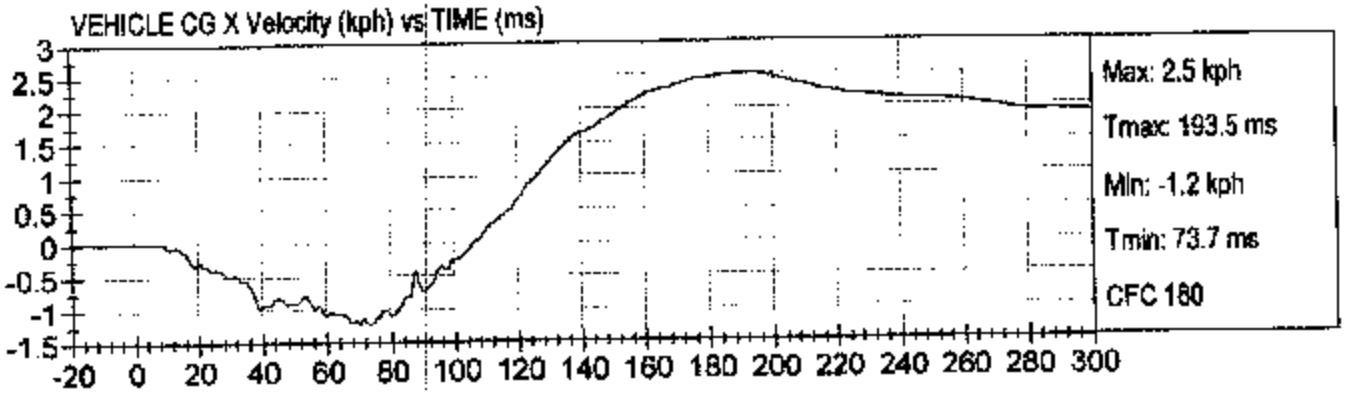


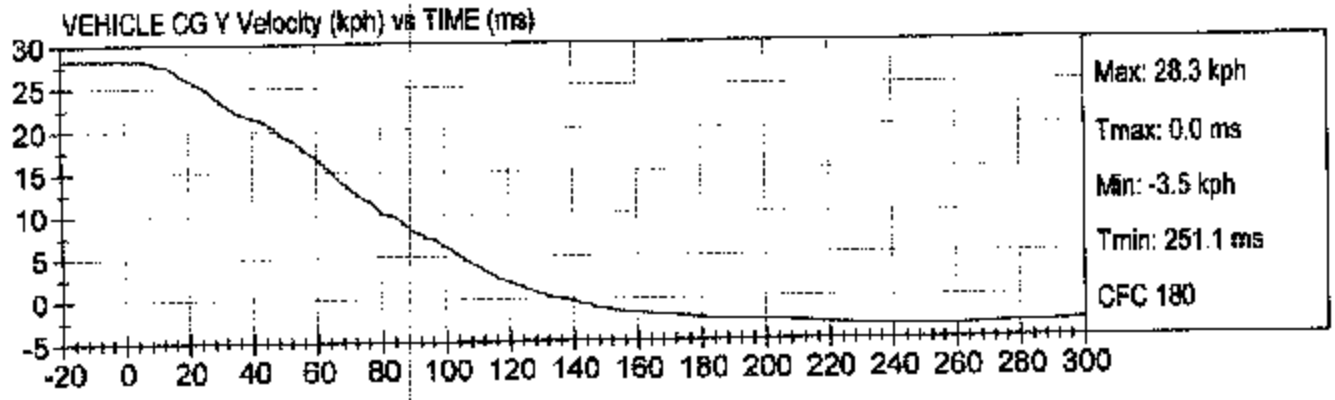
VEHICLE CG Resultant (G's) vs TIME (ms)

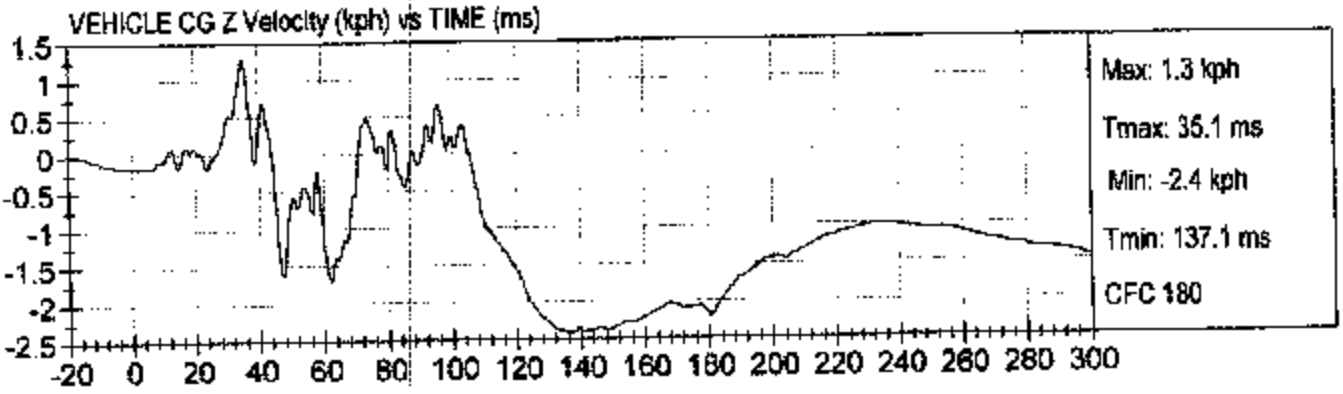


RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

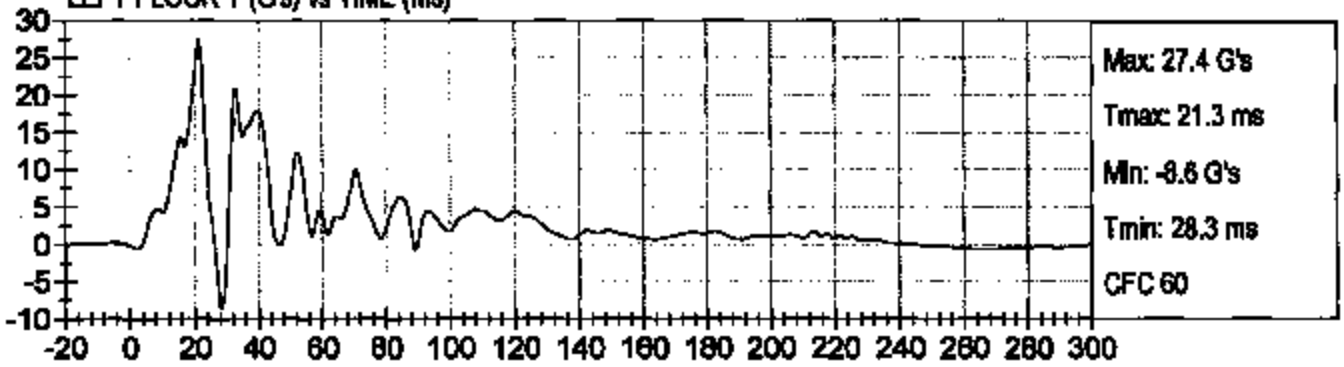
Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)



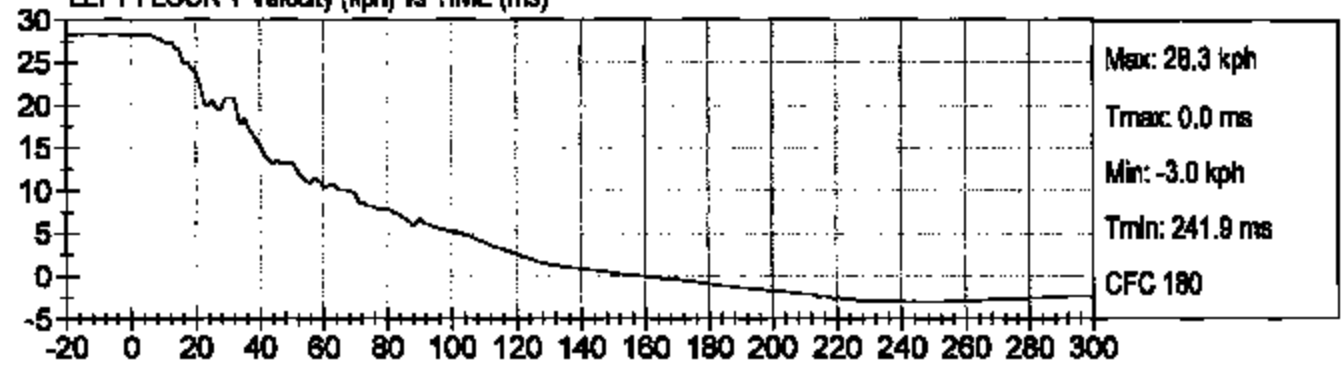




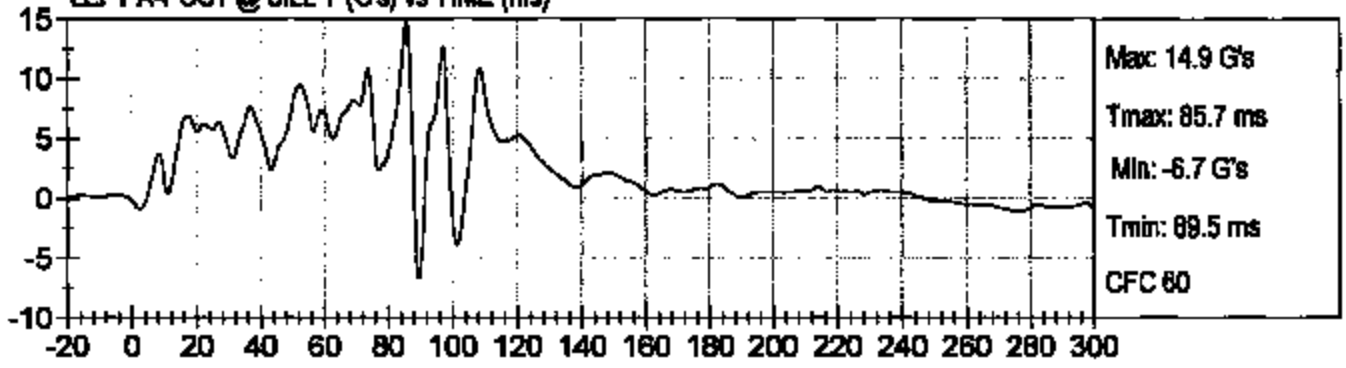
LEFT FLOOR Y (G's) vs TIME (ms)



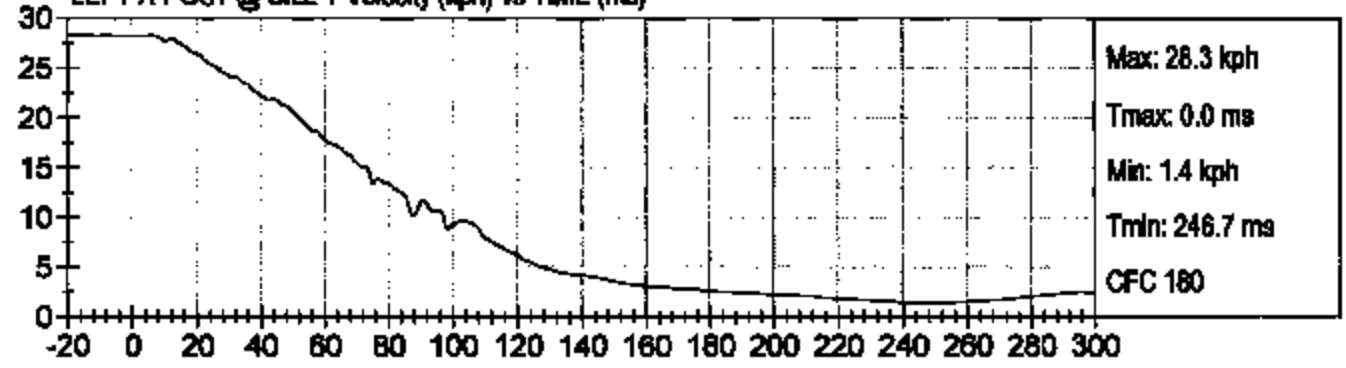
LEFT FLOOR Y Velocity (kph) vs TIME (ms)



LEFT A-POST @ SILL Y (G's) vs TIME (ms)



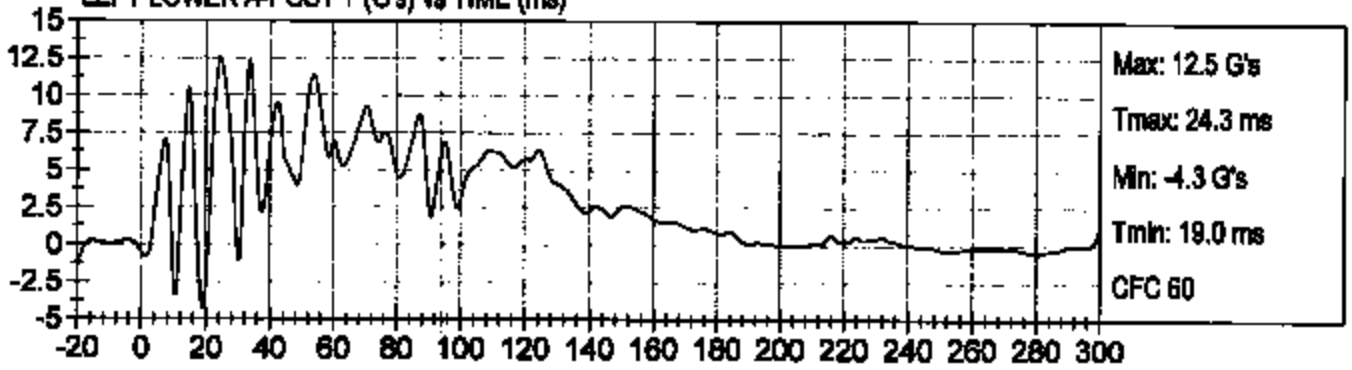
LEFT A-POST @ SILL Y Velocity (kph) vs TIME (ms)



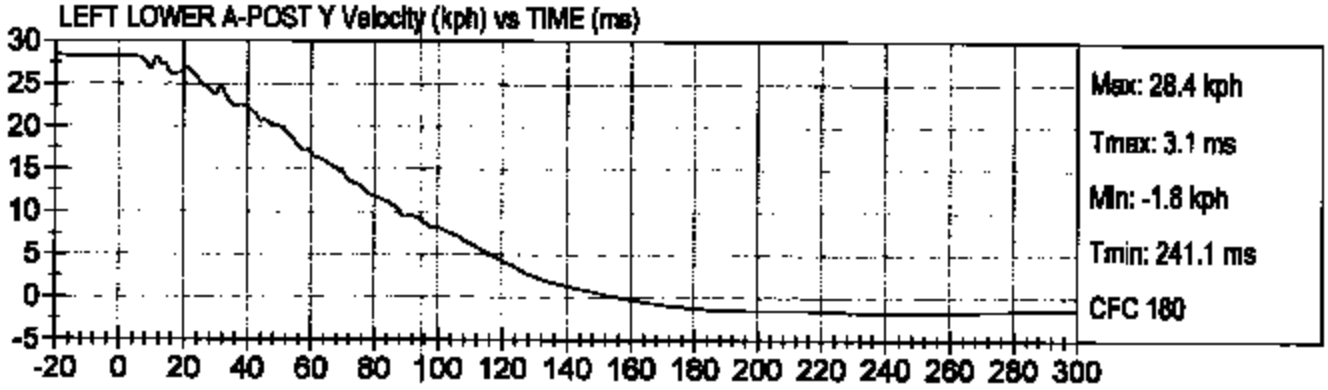
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

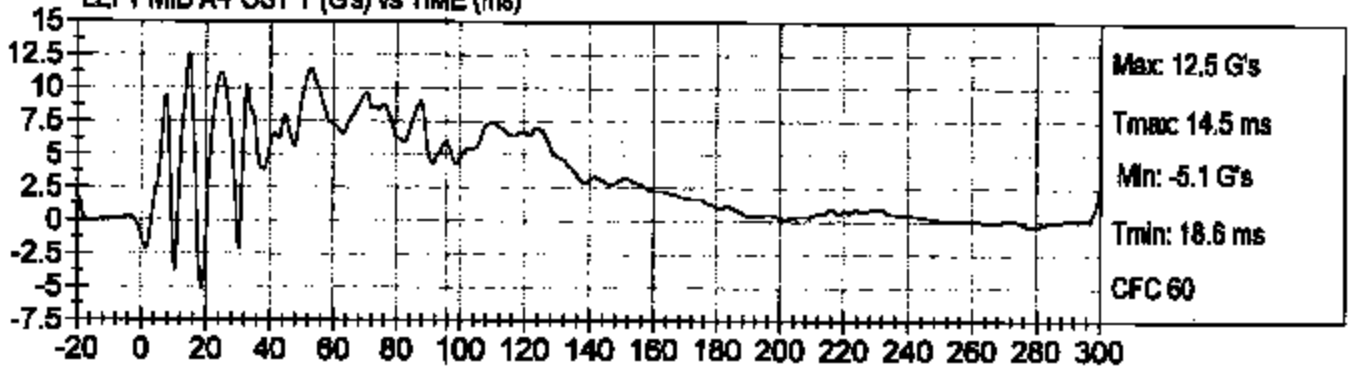
LEFT LOWER A-POST Y (G's) vs TIME (ms)



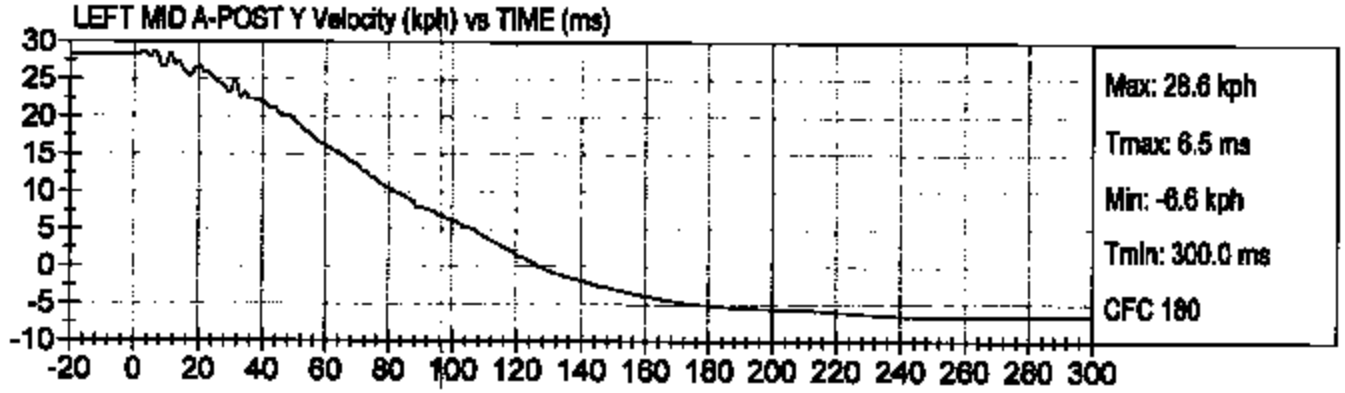
LEFT LOWER A-POST Y Velocity (kph) vs TIME (ms)



LEFT MID A-POST Y (G's) vs TIME (ms)



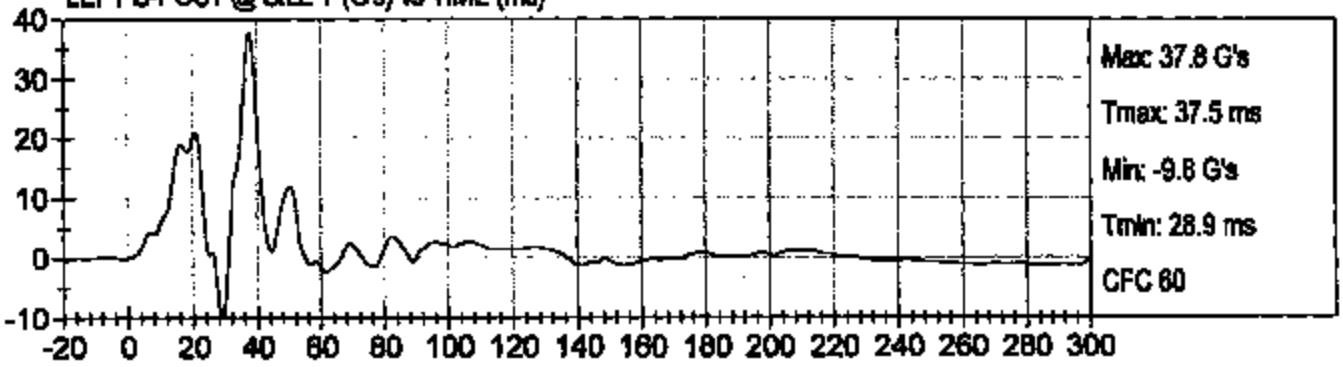
LEFT MID A-POST Y Velocity (kph) vs TIME (ms)



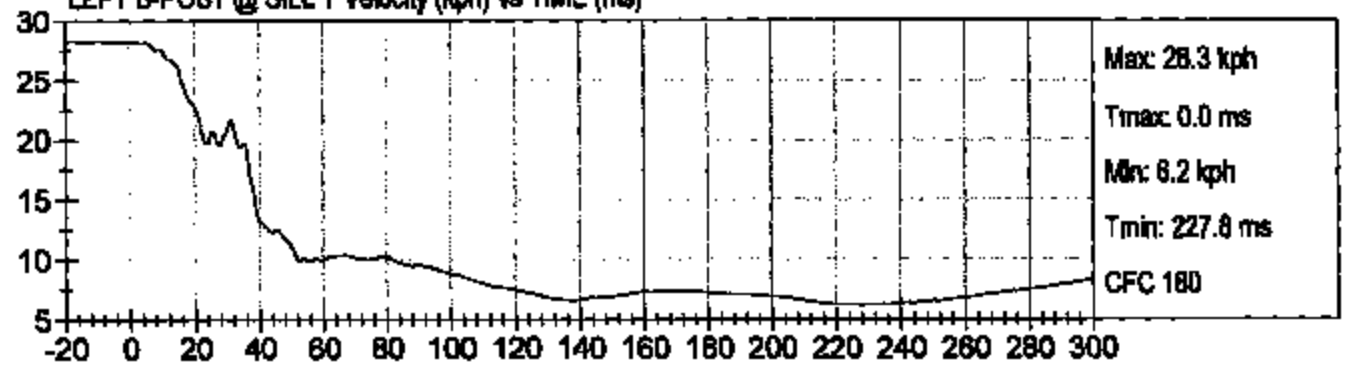
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

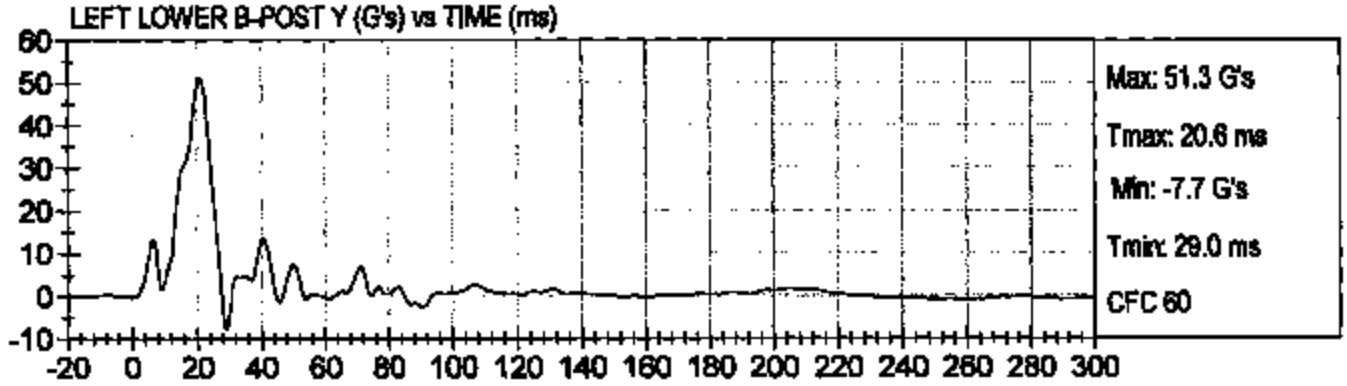
LEFT B-POST @ SILL Y (G's) vs TIME (ms)



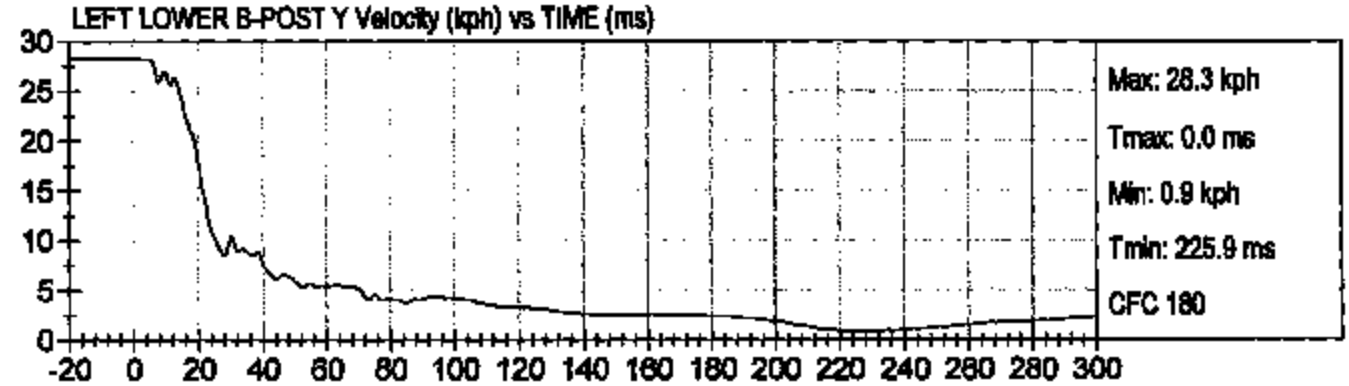
LEFT B-POST @ SILL Y Velocity (kph) vs TIME (ms)



LEFT LOWER B-POST Y (G's) vs TIME (ms)



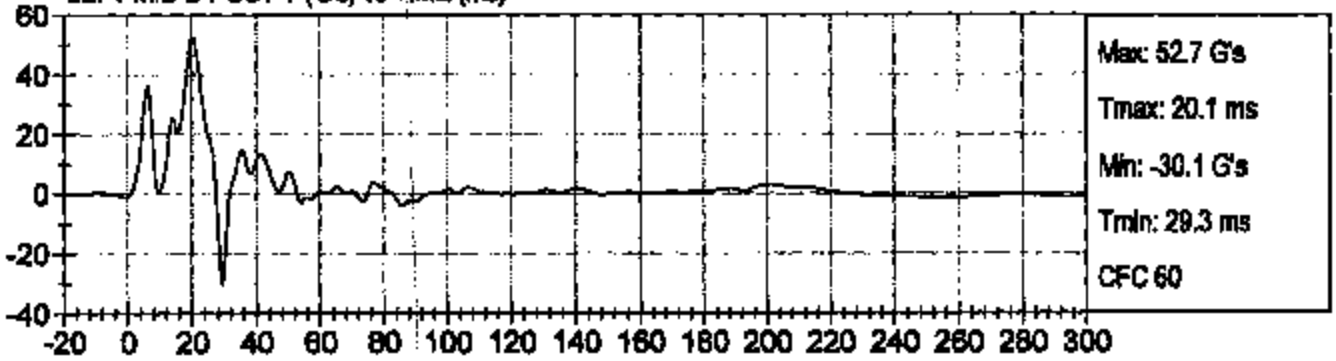
LEFT LOWER B-POST Y Velocity (kph) vs TIME (ms)



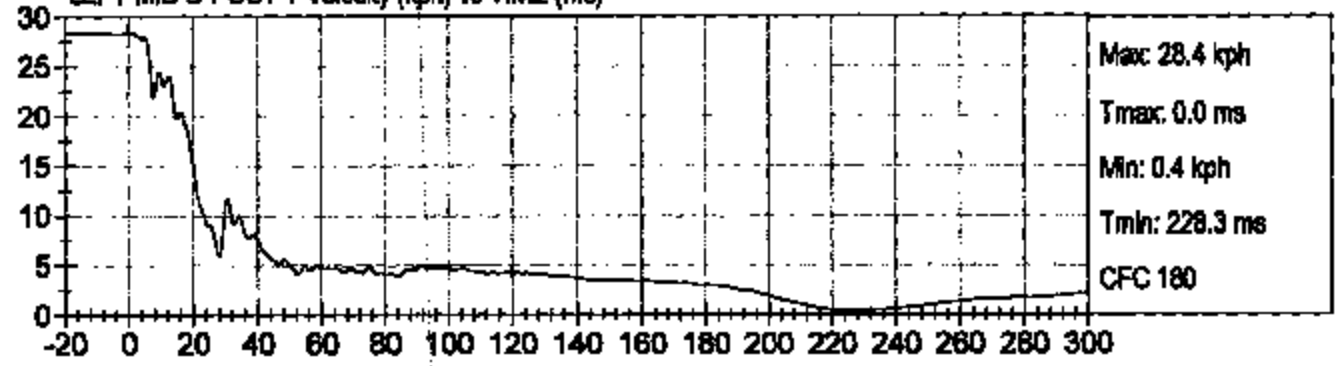
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

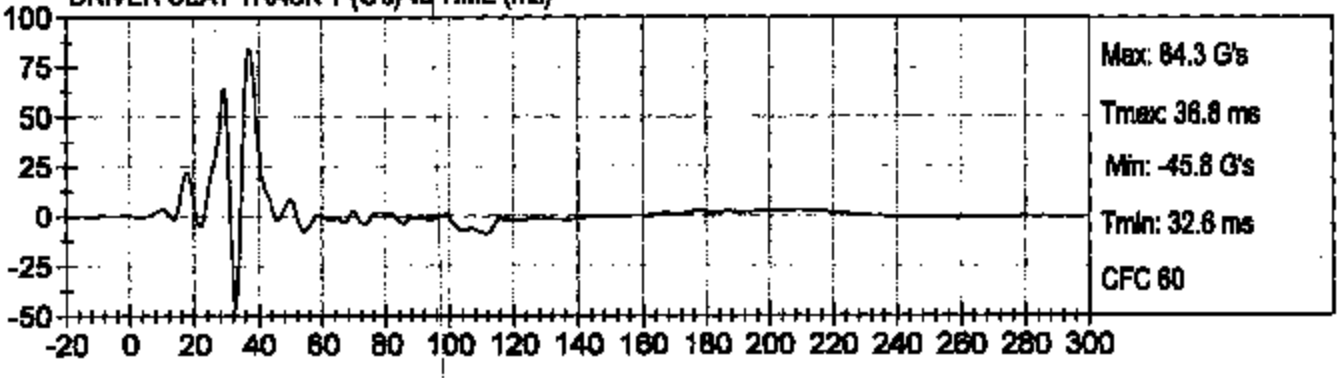
LEFT MID B-POST Y (G's) vs TIME (ms)



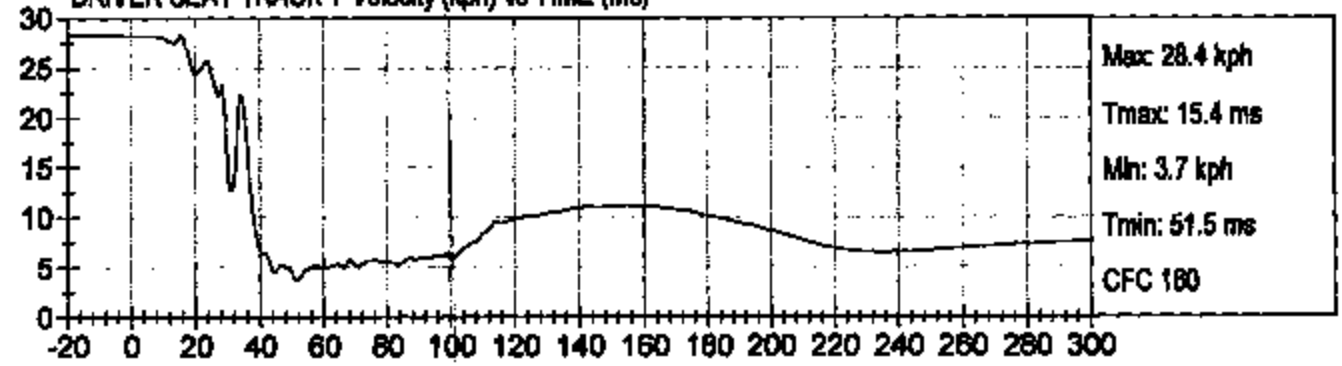
LEFT MID B-POST Y Velocity (kph) vs TIME (ms)



DRIVER SEAT TRACK Y (G's) vs TIME (ms)



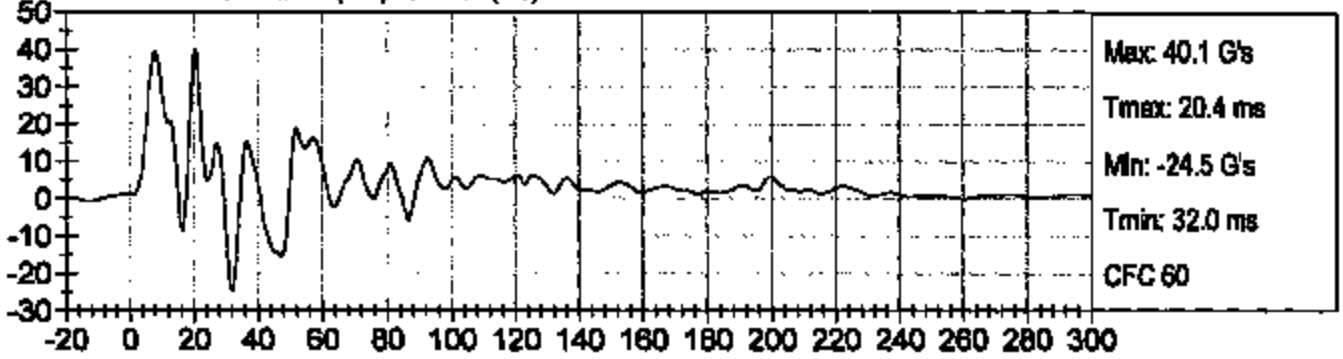
DRIVER SEAT TRACK Y Velocity (kph) vs TIME (ms)



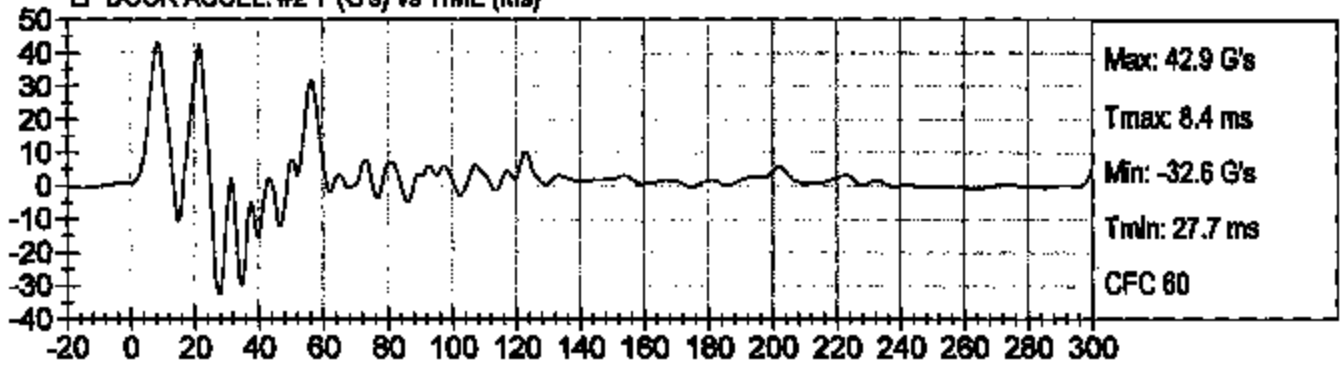
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

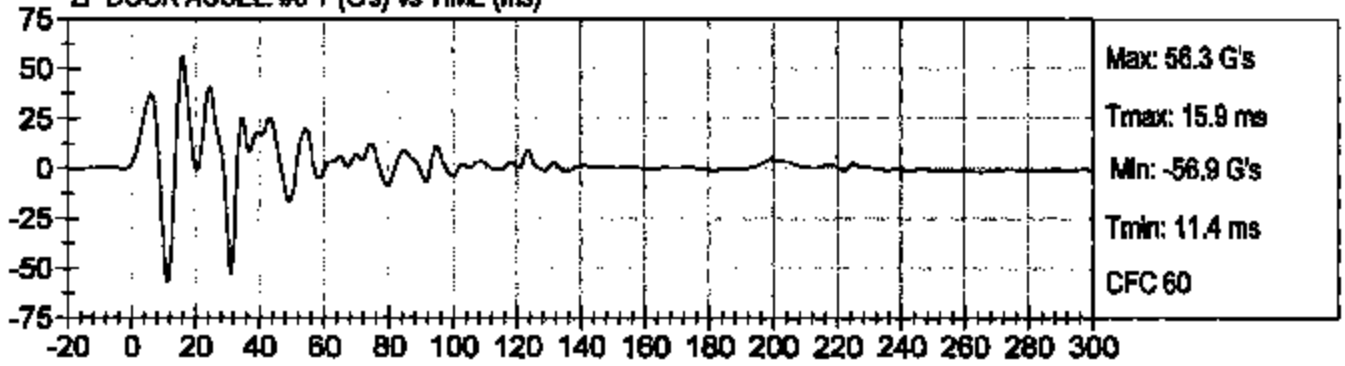
LF DOOR ACCEL. #1 Y (G's) vs TIME (ms)



LF DOOR ACCEL. #2 Y (G's) vs TIME (ms)



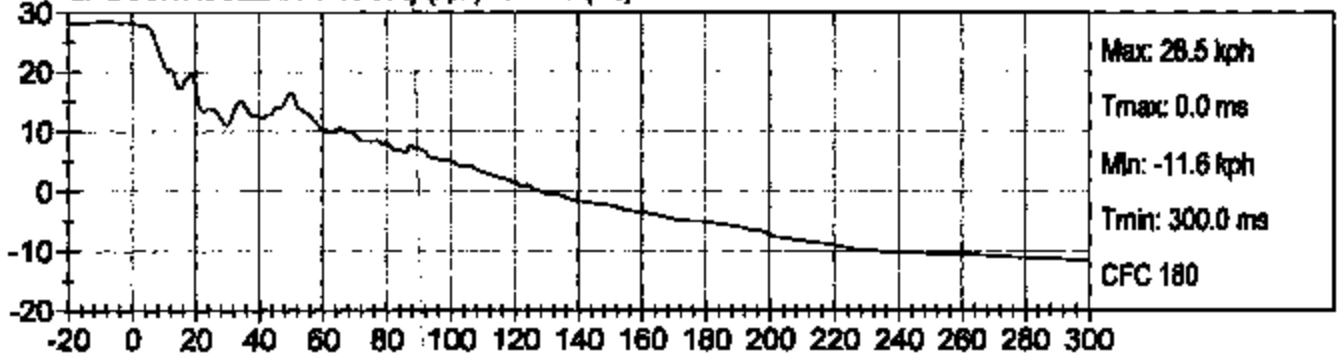
LF DOOR ACCEL. #3 Y (G's) vs TIME (ms)



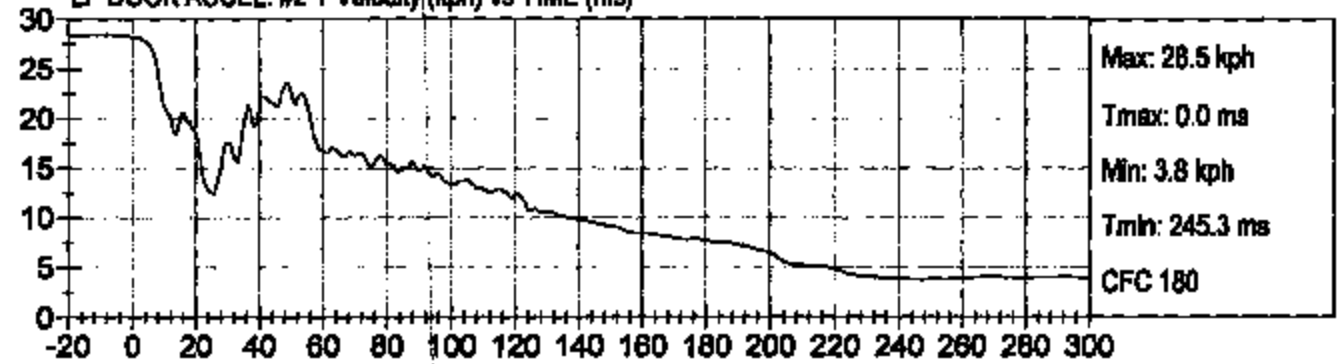
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

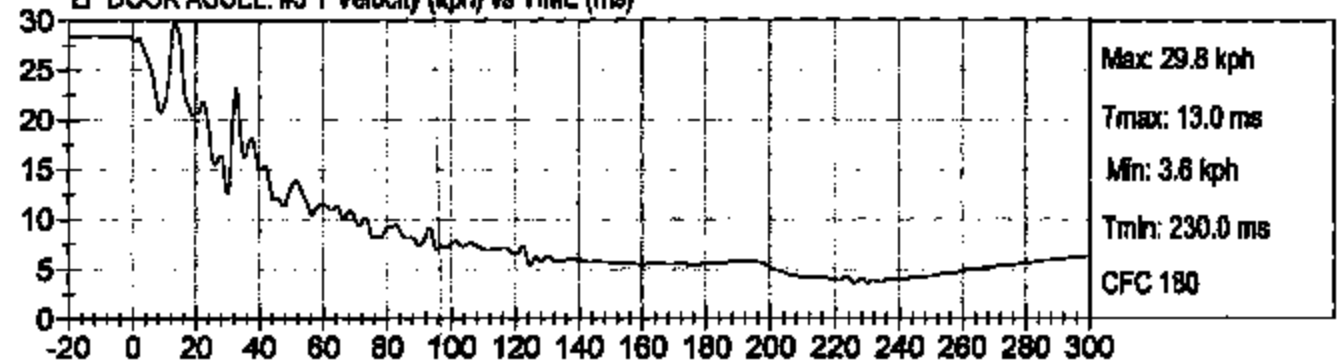
LF DOOR ACCEL. #1 Y Velocity (kph) vs TIME (ms)



LF DOOR ACCEL. #2 Y Velocity (kph) vs TIME (ms)



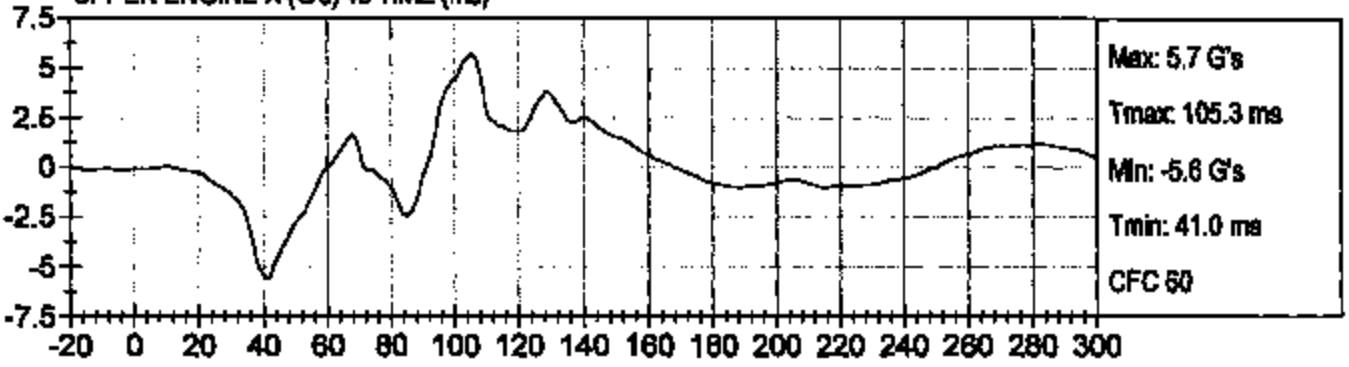
LF DOOR ACCEL. #3 Y Velocity (kph) vs TIME (ms)



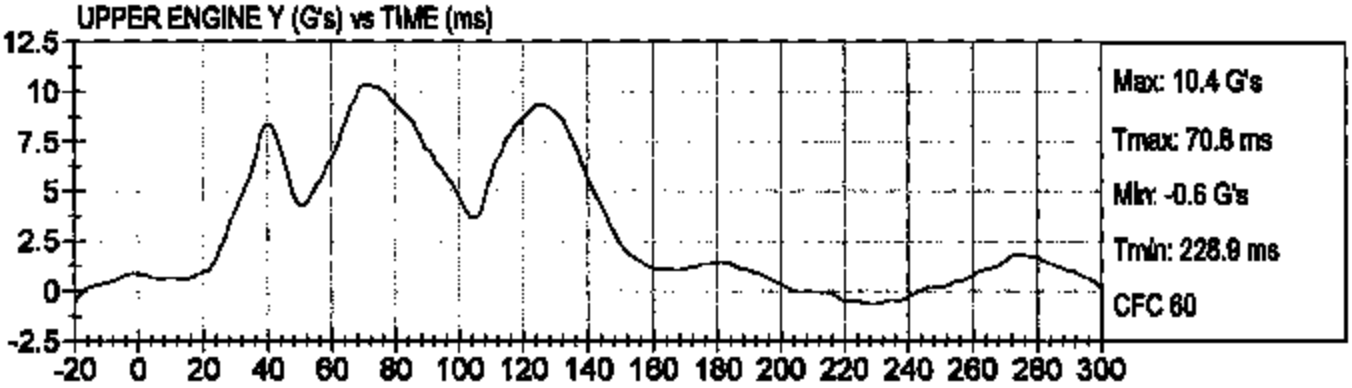
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

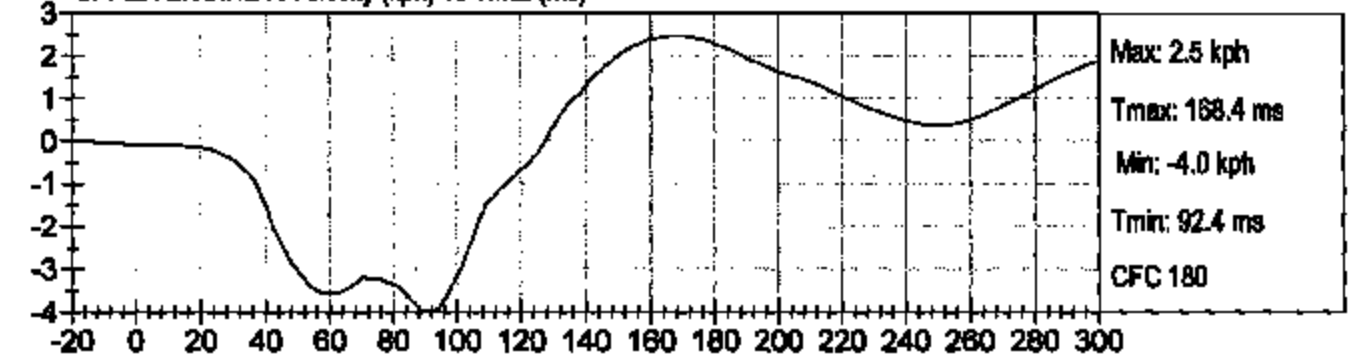
UPPER ENGINE X (G's) vs TIME (ms)



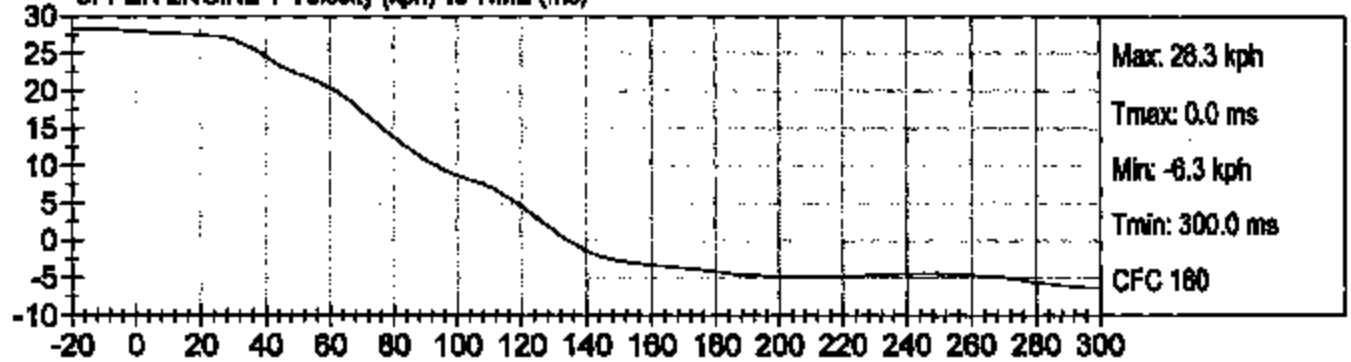
UPPER ENGINE Y (G's) vs TIME (ms)



UPPER ENGINE X Velocity (kph) vs TIME (ms)



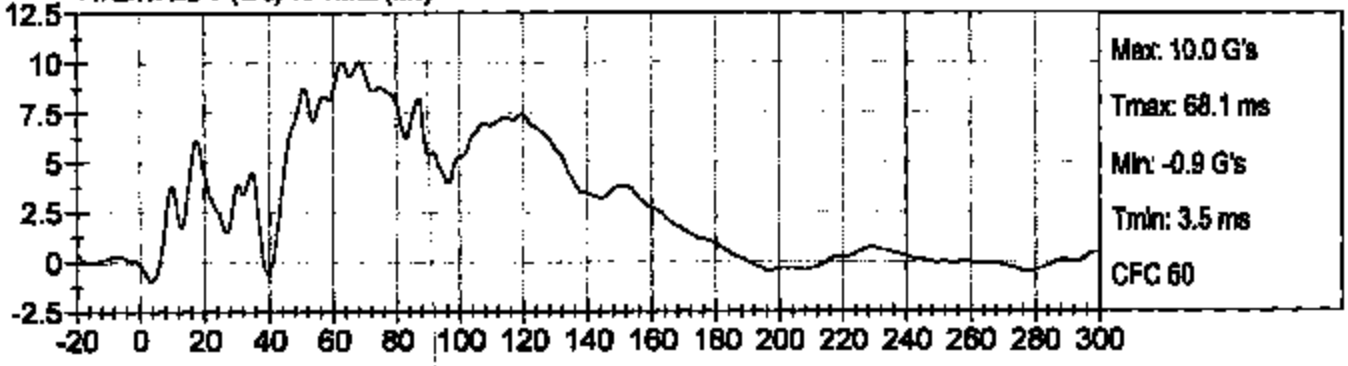
UPPER ENGINE Y Velocity (kph) vs TIME (ms)



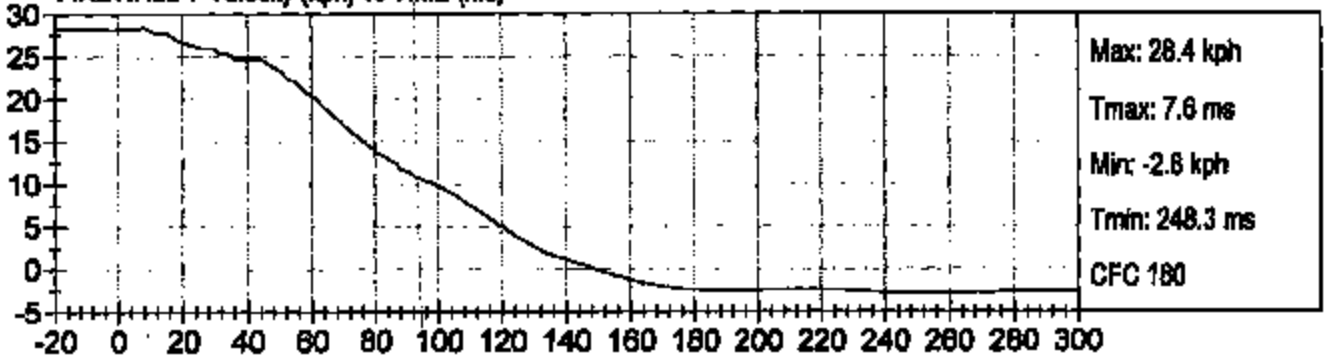
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

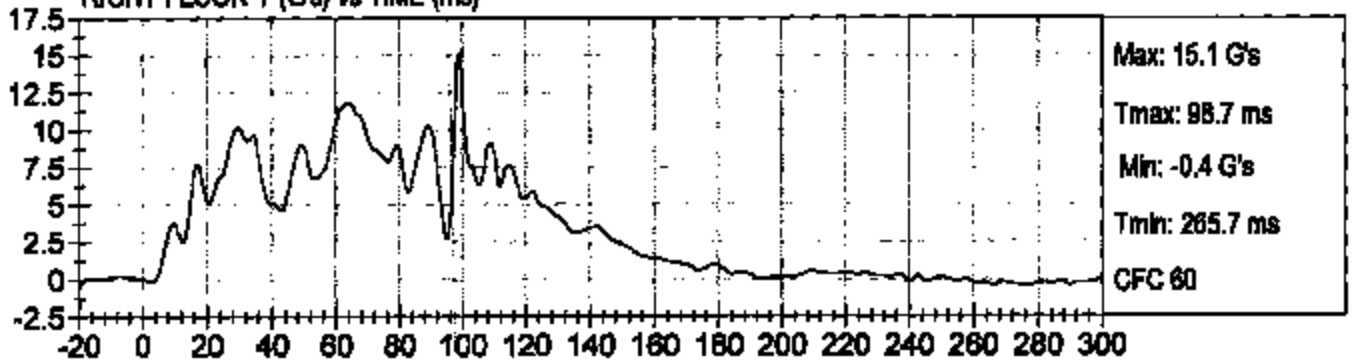
FIREWALL Y (G's) vs TIME (ms)



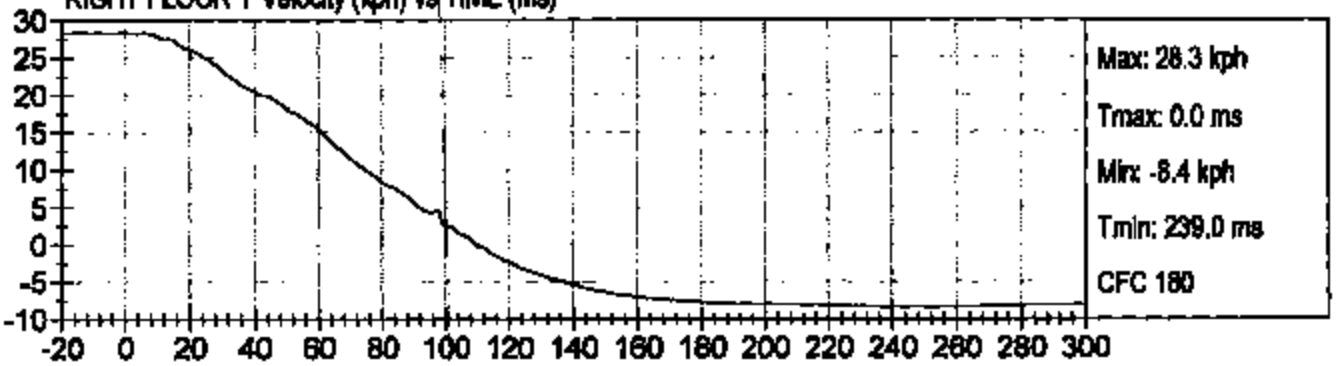
FIREWALL Y Velocity (kph) vs TIME (ms)



RIGHT FLOOR Y (G's) vs TIME (ms)



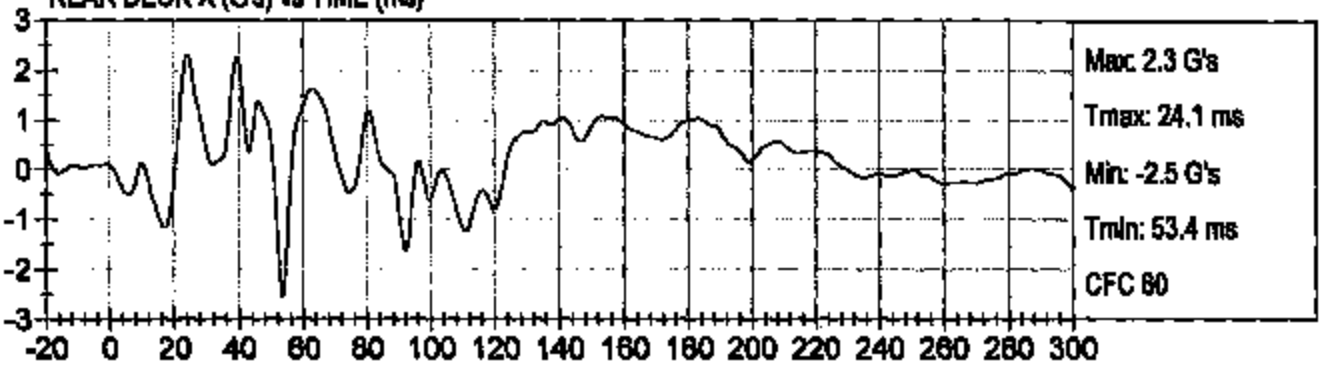
RIGHT FLOOR Y Velocity (kph) vs TIME (ms)



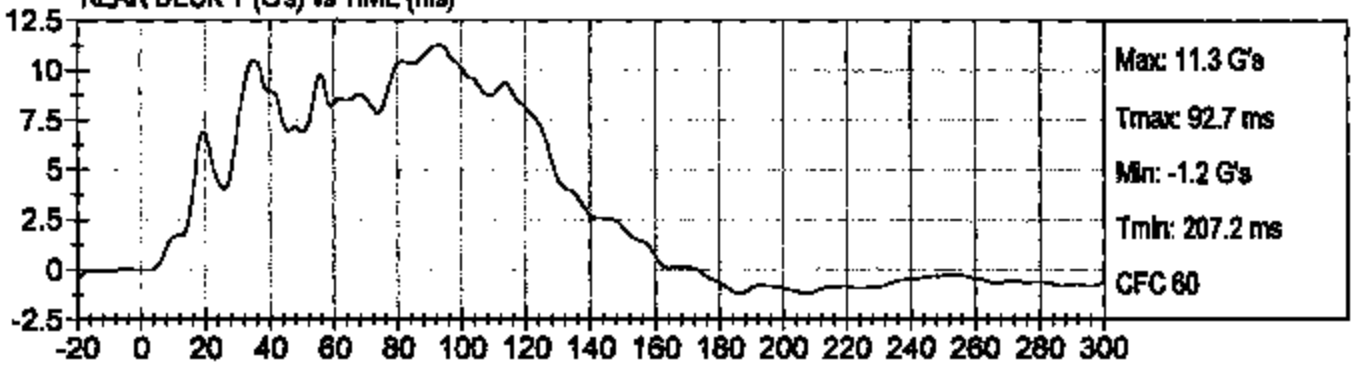
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

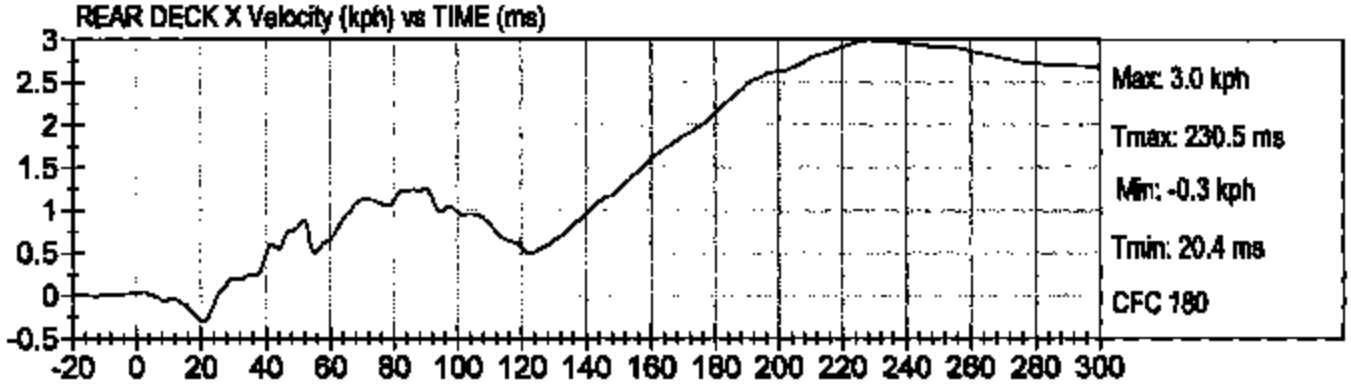
REAR DECK X (G's) vs TIME (ms)



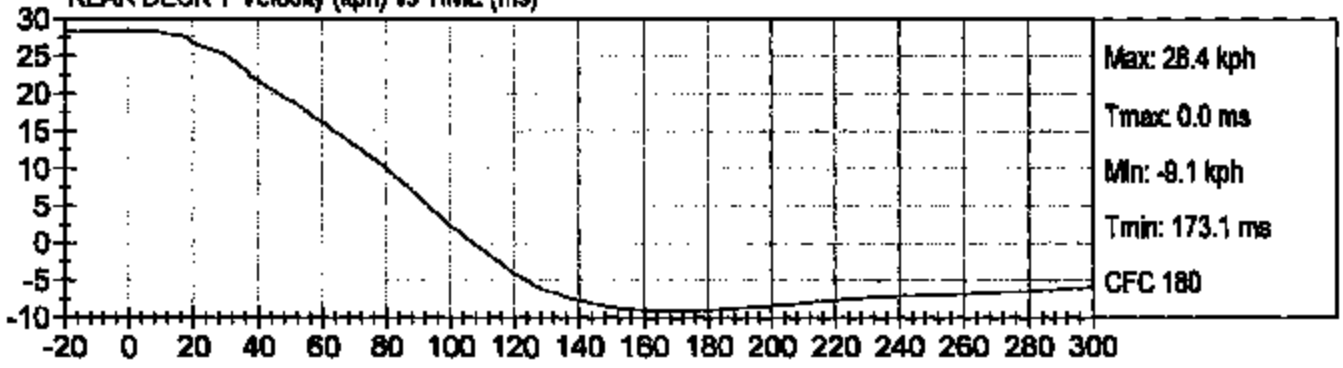
REAR DECK Y (G's) vs TIME (ms)



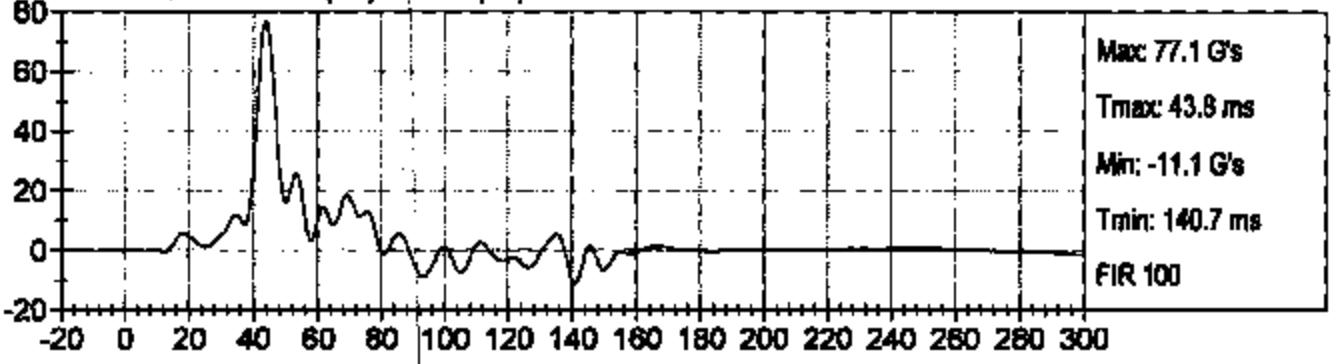
REAR DECK X Velocity (kph) vs TIME (ms)



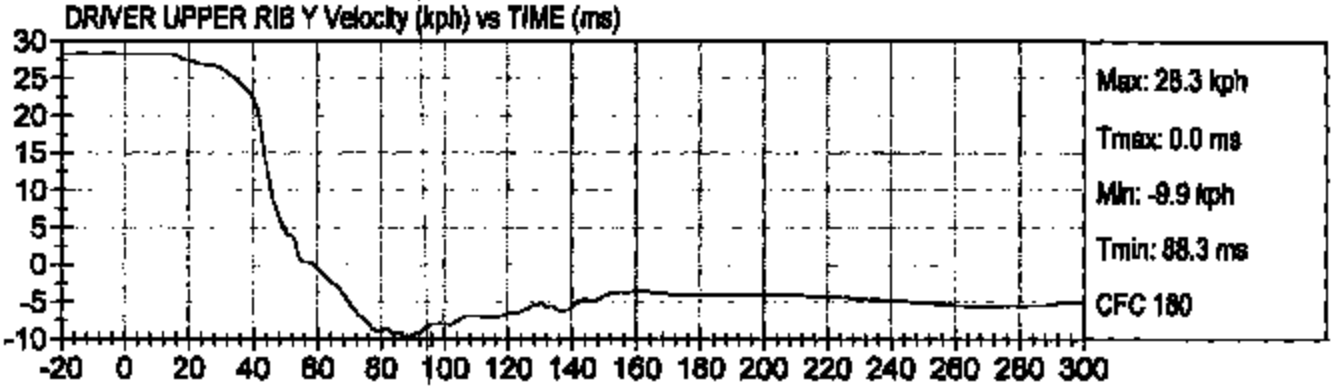
REAR DECK Y Velocity (kph) vs TIME (ms)



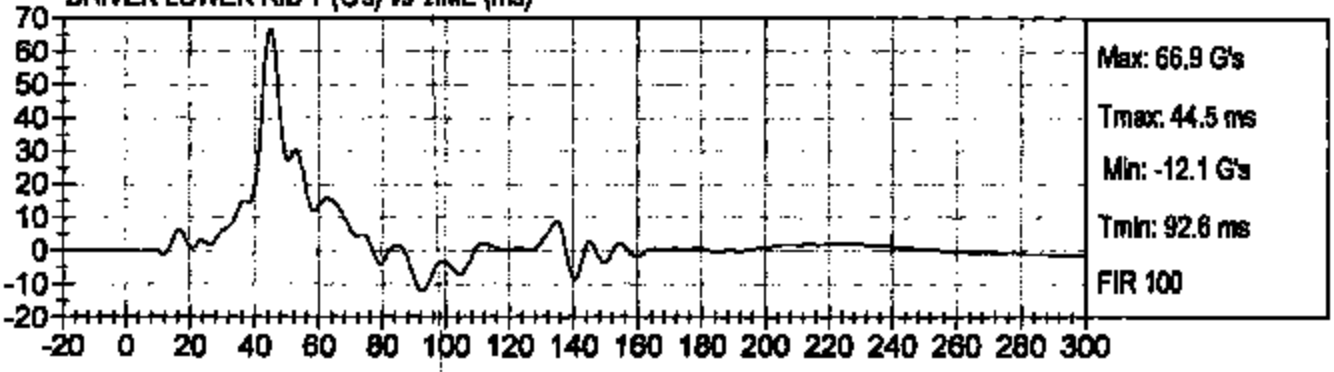
DRIVER UPPER RIB Y (G's) vs TIME (ms)



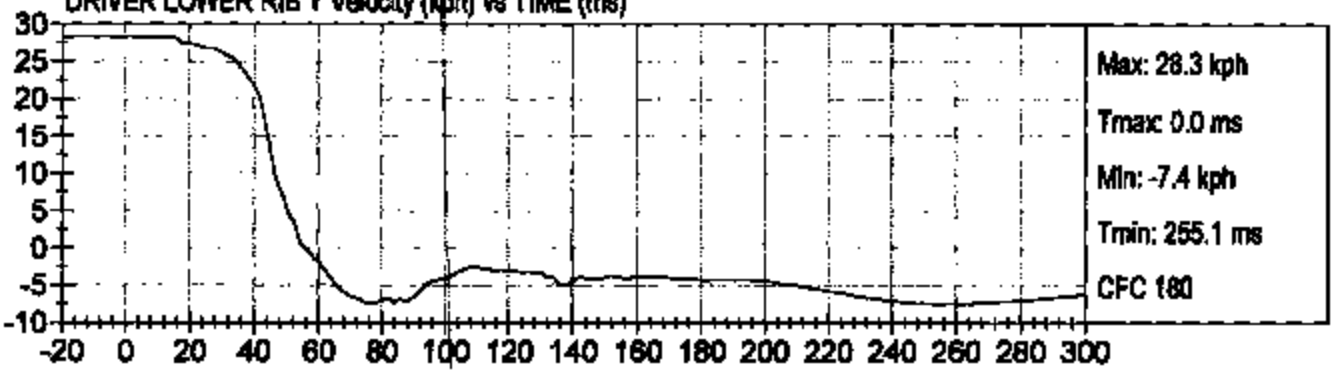
DRIVER UPPER RIB Y Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Y (G's) vs TIME (ms)



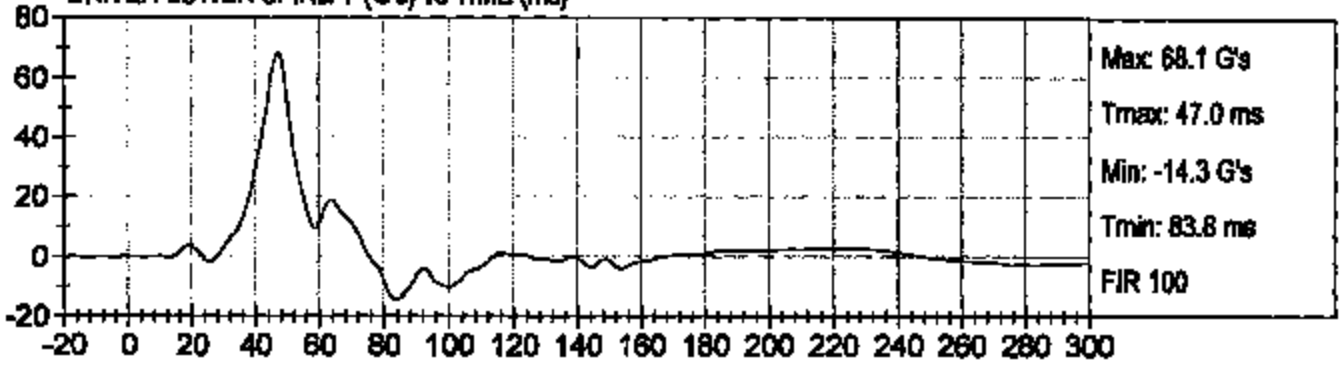
DRIVER LOWER RIB Y Velocity (kph) vs TIME (ms)



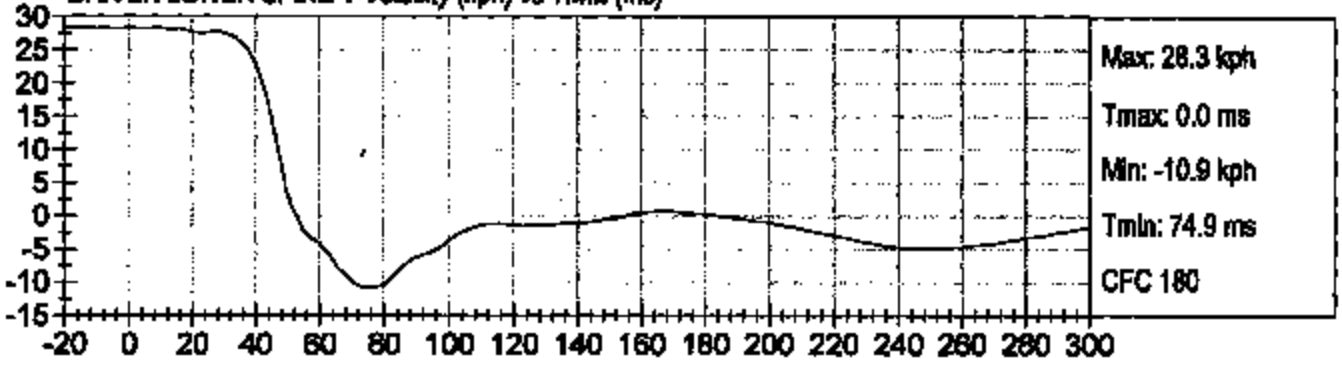
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

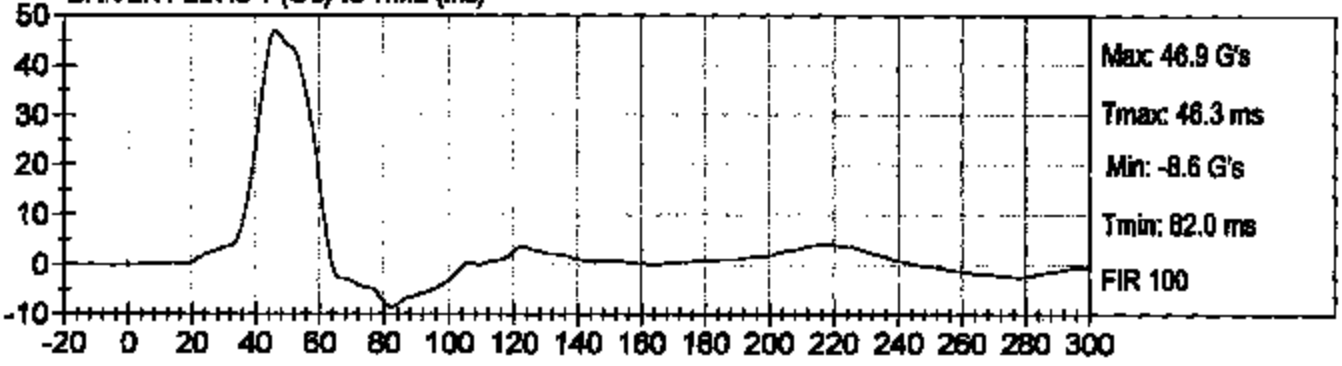
DRIVER LOWER SPINE Y (G's) vs TIME (ms)



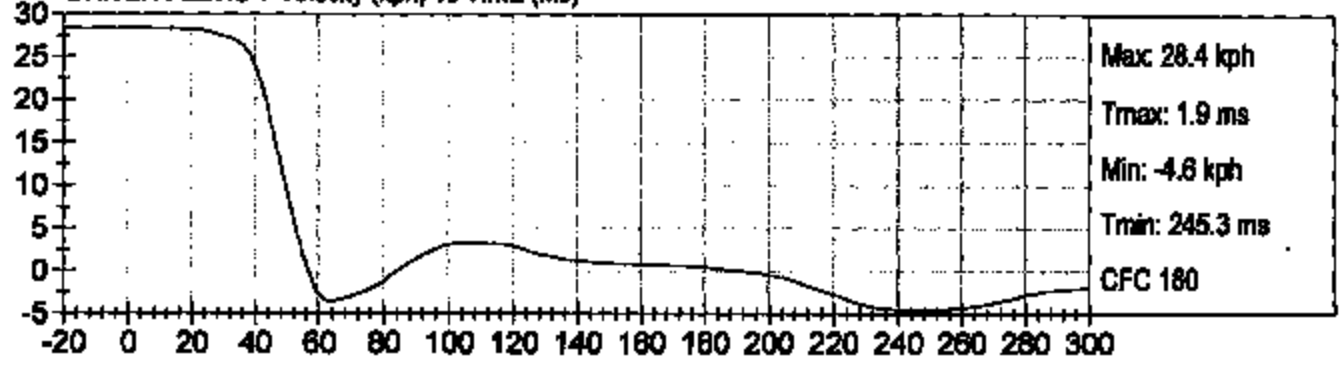
DRIVER LOWER SPINE Y Velocity (kph) vs TIME (ms)



DRIVER PELVIS Y (G's) vs TIME (ms)



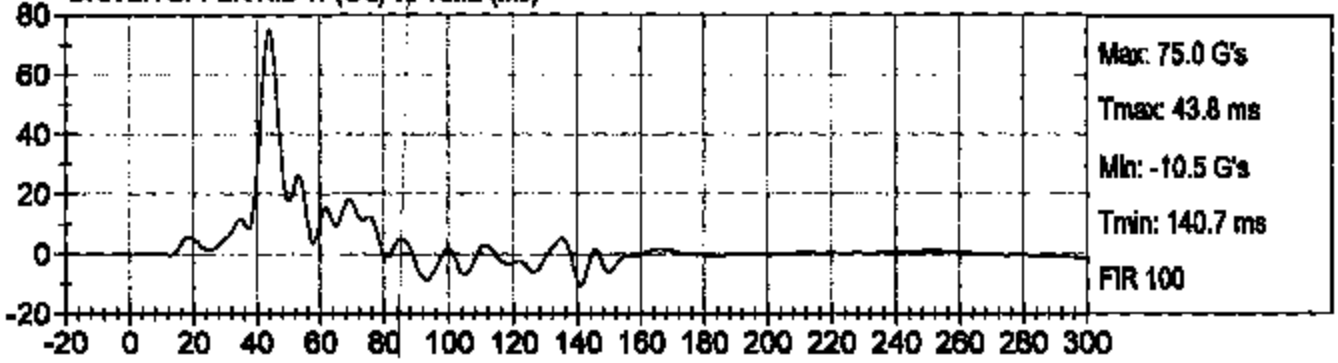
DRIVER PELVIS Y Velocity (kph) vs TIME (ms)



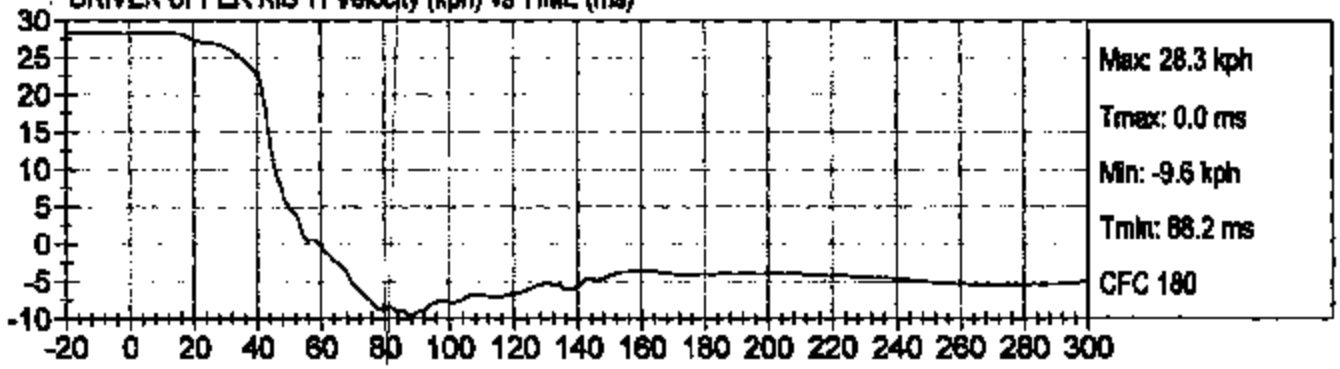
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

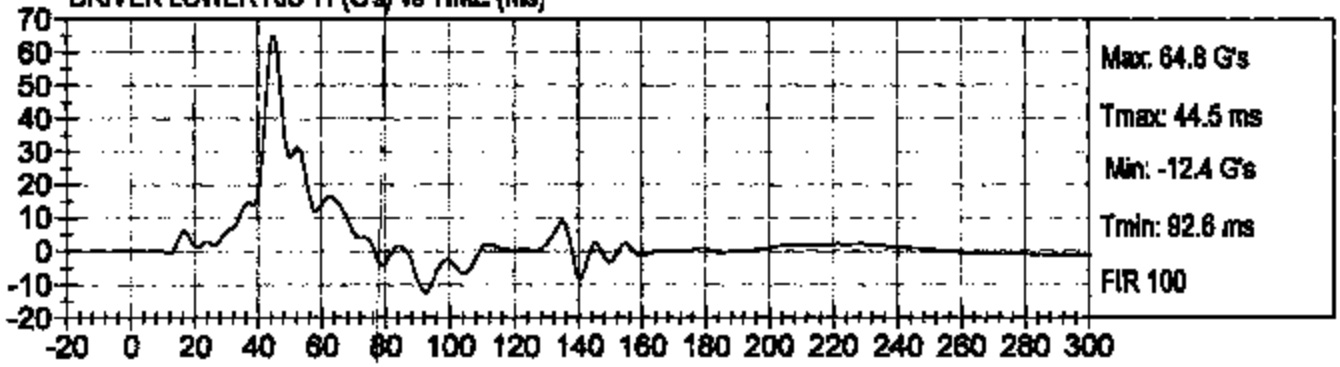
DRIVER UPPER RIB Yr (G's) vs TIME (ms)



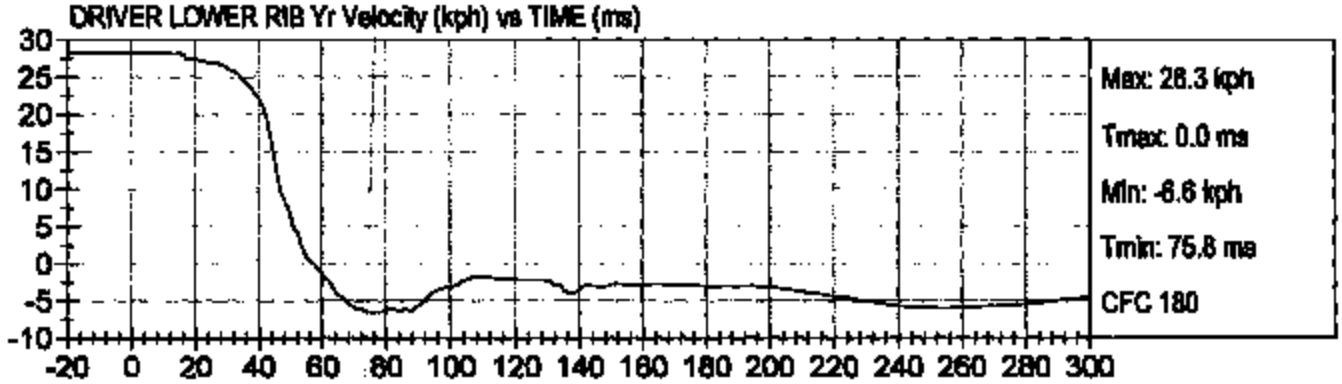
DRIVER UPPER RIB Yr Velocity (kph) vs TIME (ms)



DRIVER LOWER RIB Yr (G's) vs TIME (ms)



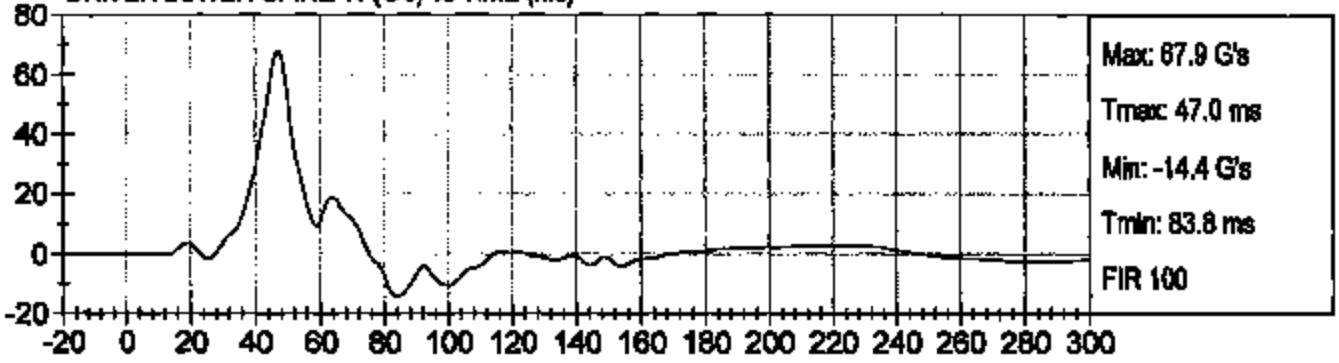
DRIVER LOWER RIB Yr Velocity (kph) vs TIME (ms)



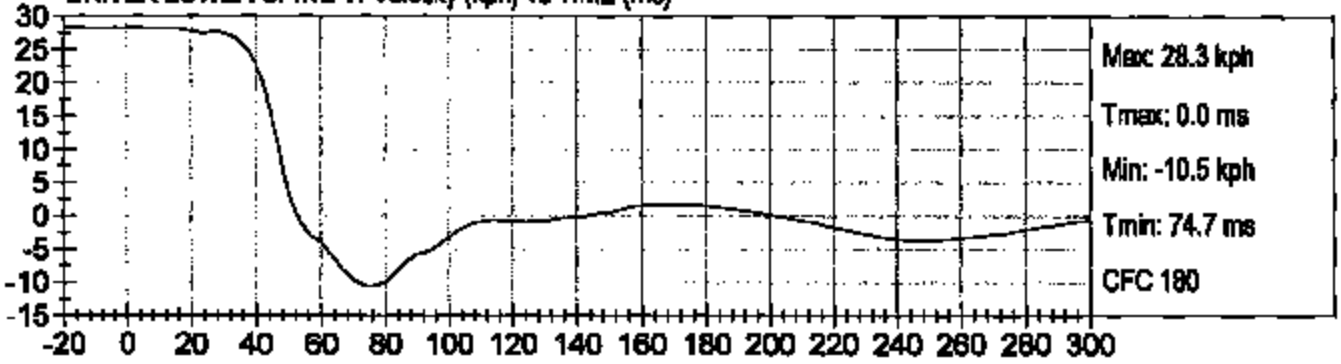
RIGID POLE SIDE IMPACT, FMVSS 201P
2005 KIA SPORTAGE (C50504)

Test Date: 07/20/05
Speed: 17.6 mph (28.3 km/h)

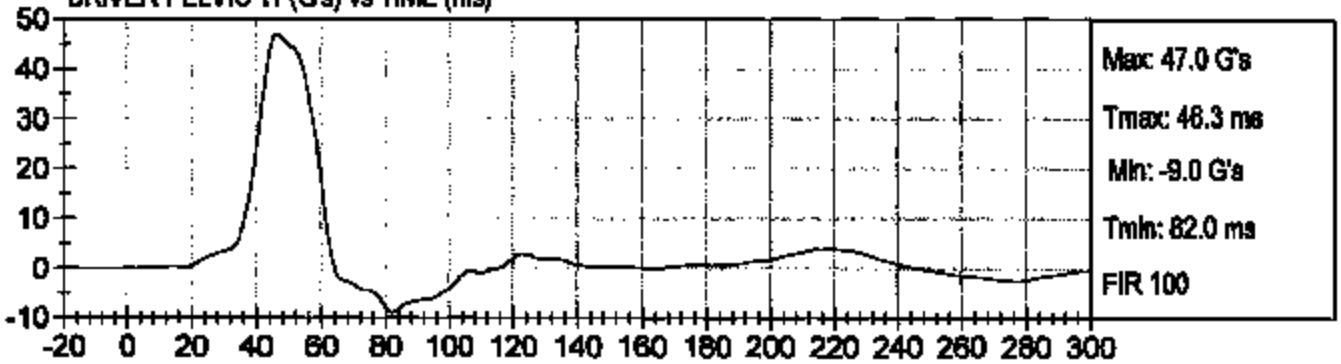
DRIVER LOWER SPINE Yr (G's) vs TIME (ms)



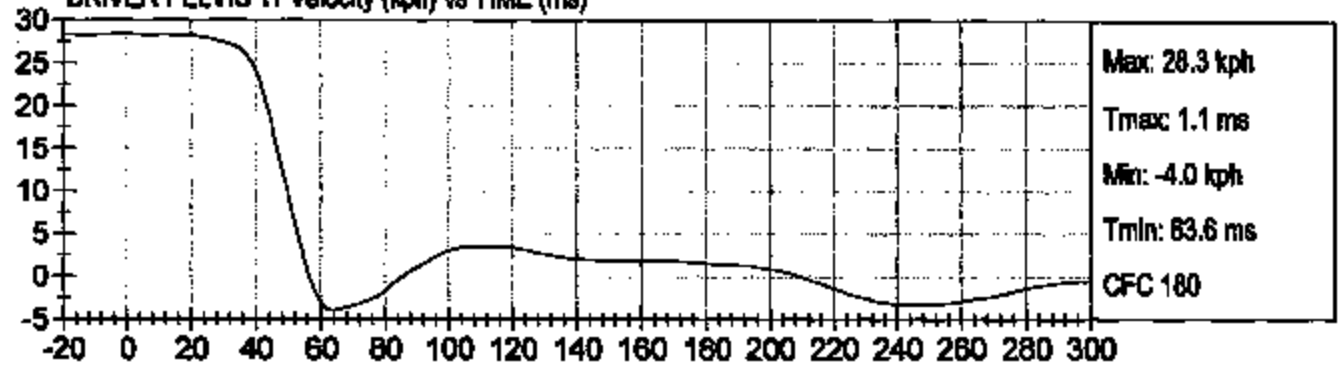
DRIVER LOWER SPINE Yr Velocity (kph) vs TIME (ms)



DRIVER PELVIS Yr (G's) vs TIME (ms)



DRIVER PELVIS Yr Velocity (kph) vs TIME (ms)



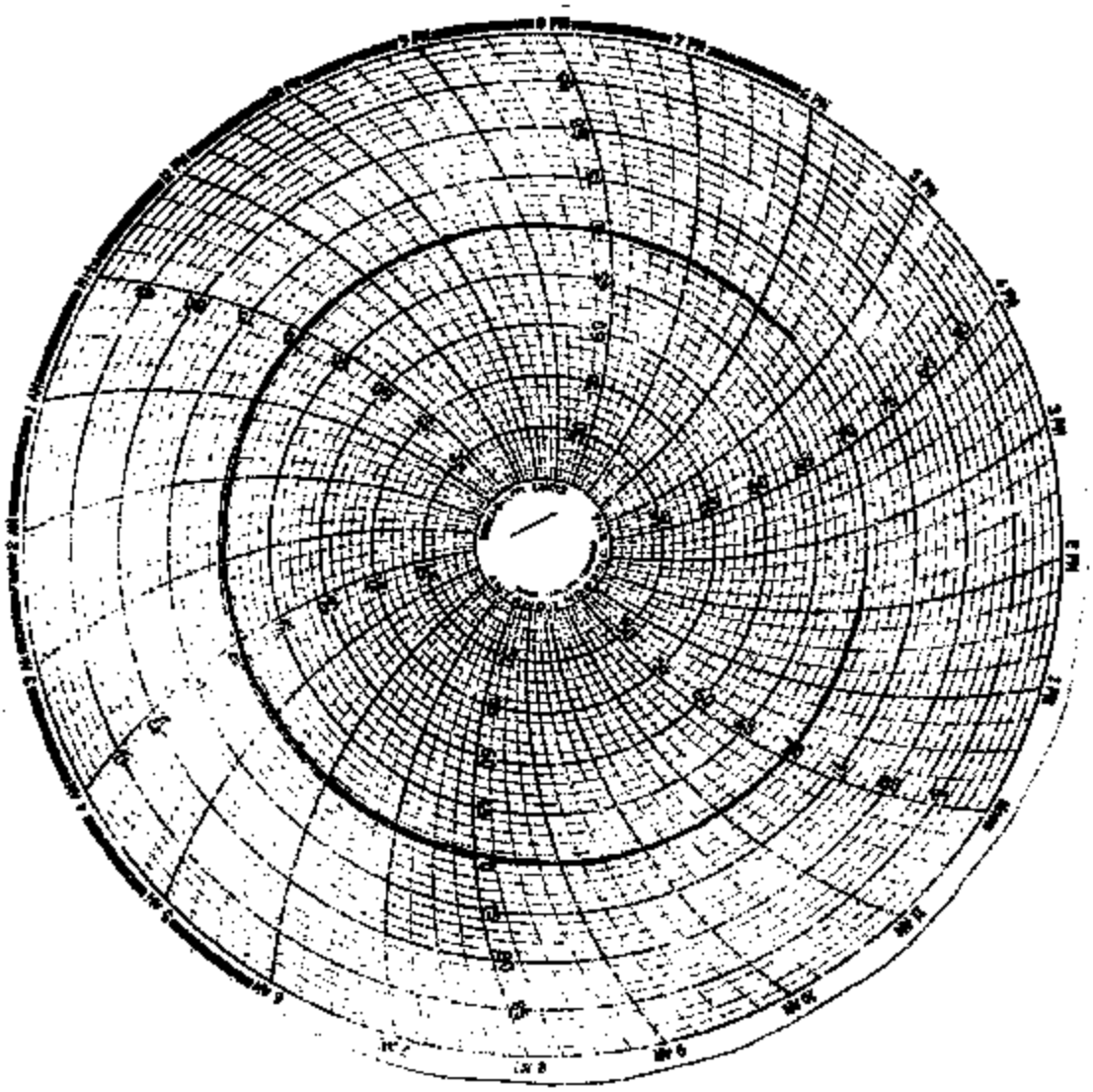
APPENDIX C

SID/HIII CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Vehicle and Dummy Temperature

Test Vehicle: 2005 Kia Sportage
Test Program: FMVSS 201P

NHTSA No. C50504
Test Date: July 20, 2005



CERTIFICATION DATA

Dummy Serial Number: 037

Calibration Test Results Summary

Dummy Serial Number: 037

Pre-Test Calibration

Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all Impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration (Lateral)

ATD Serial No: 037 **Test I.D:** D051881

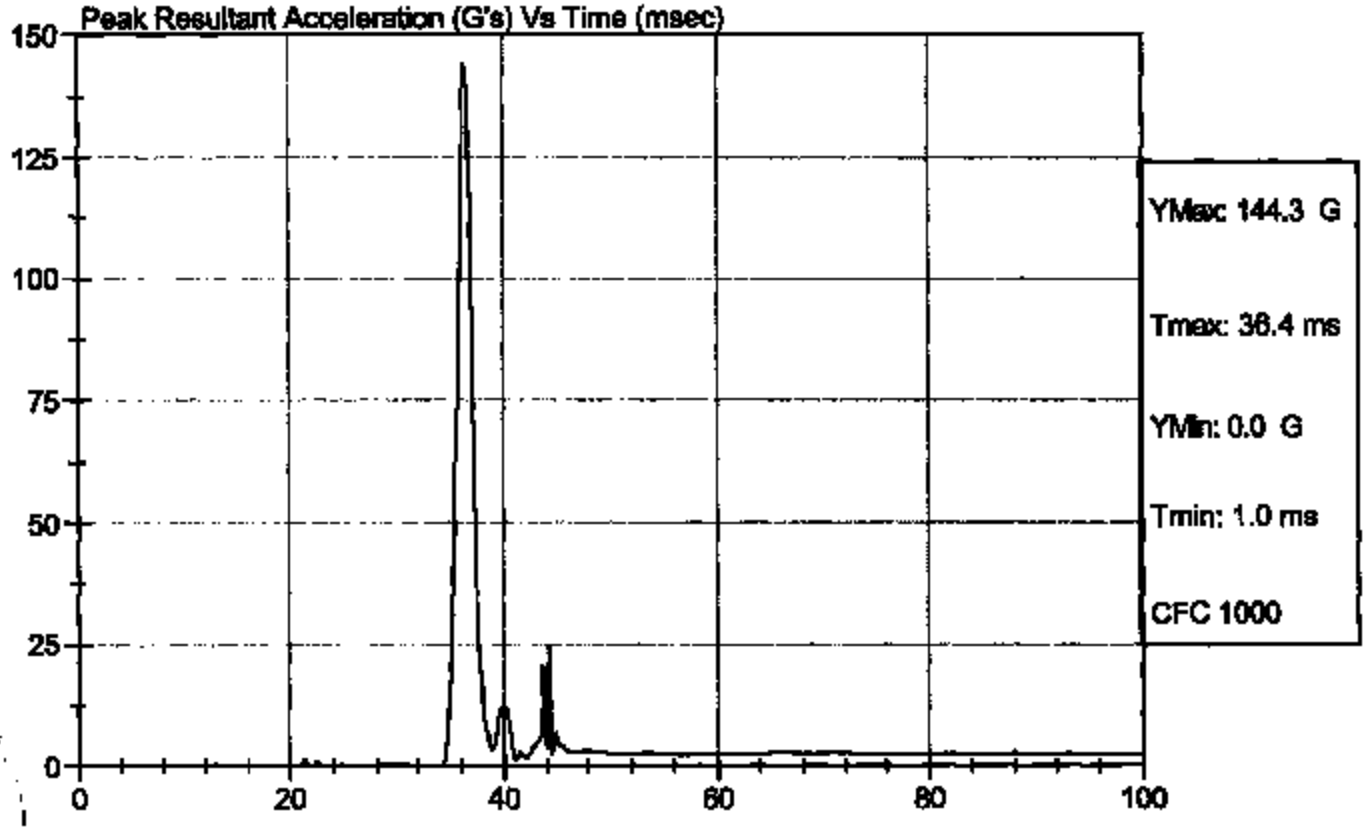
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	41	Pass
Peak Resultant Acceleration	G's	120 to 150	144	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-13	Pass
		Overall Test Results		Pass

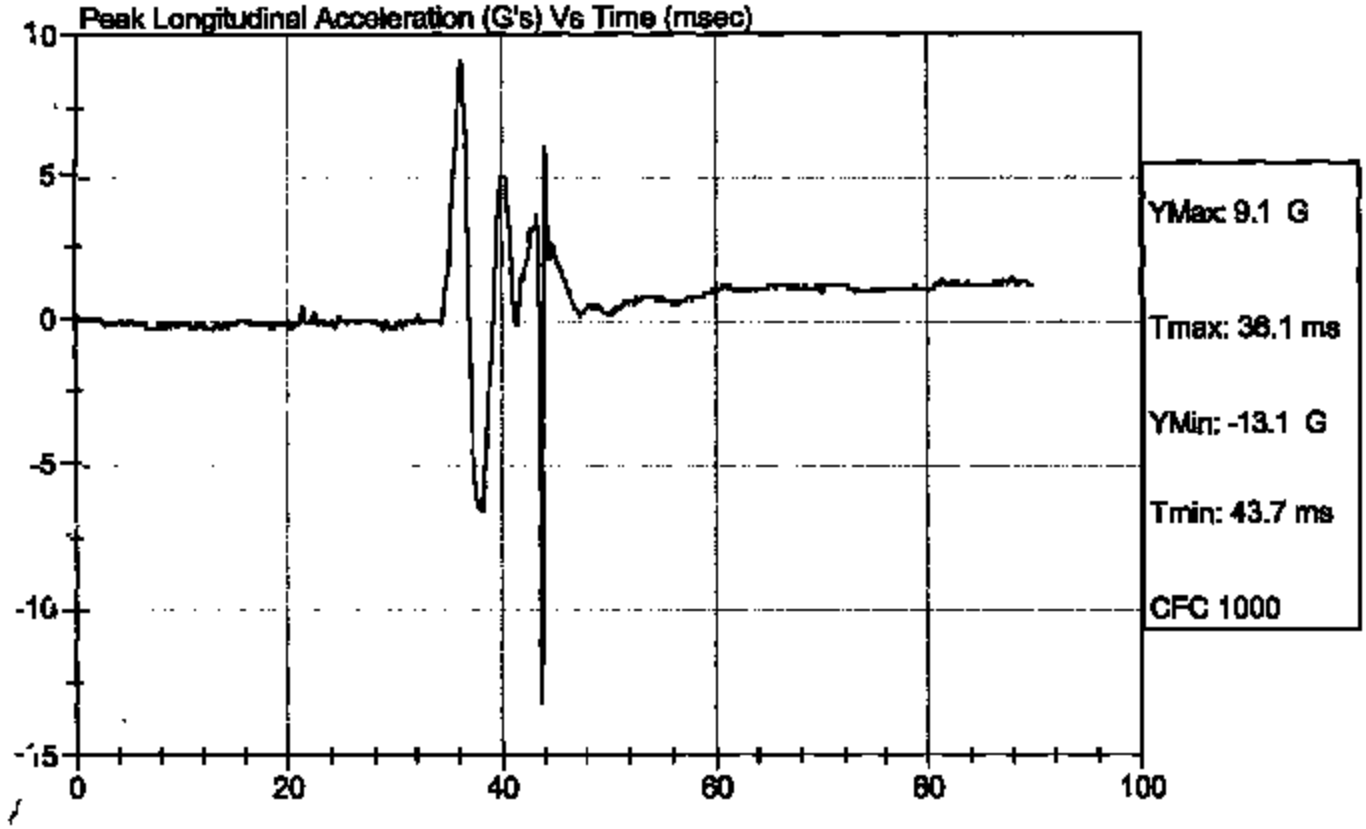
Laboratory Technician

07/06/2005
Test Date

Approved By

mga	Test Description: Head Drop	Test Date: 07/06/2005
	Component: D051881	Speed: 0 ft/s, 0.00 m/s





SID Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 037 **Test I.D:** D051882

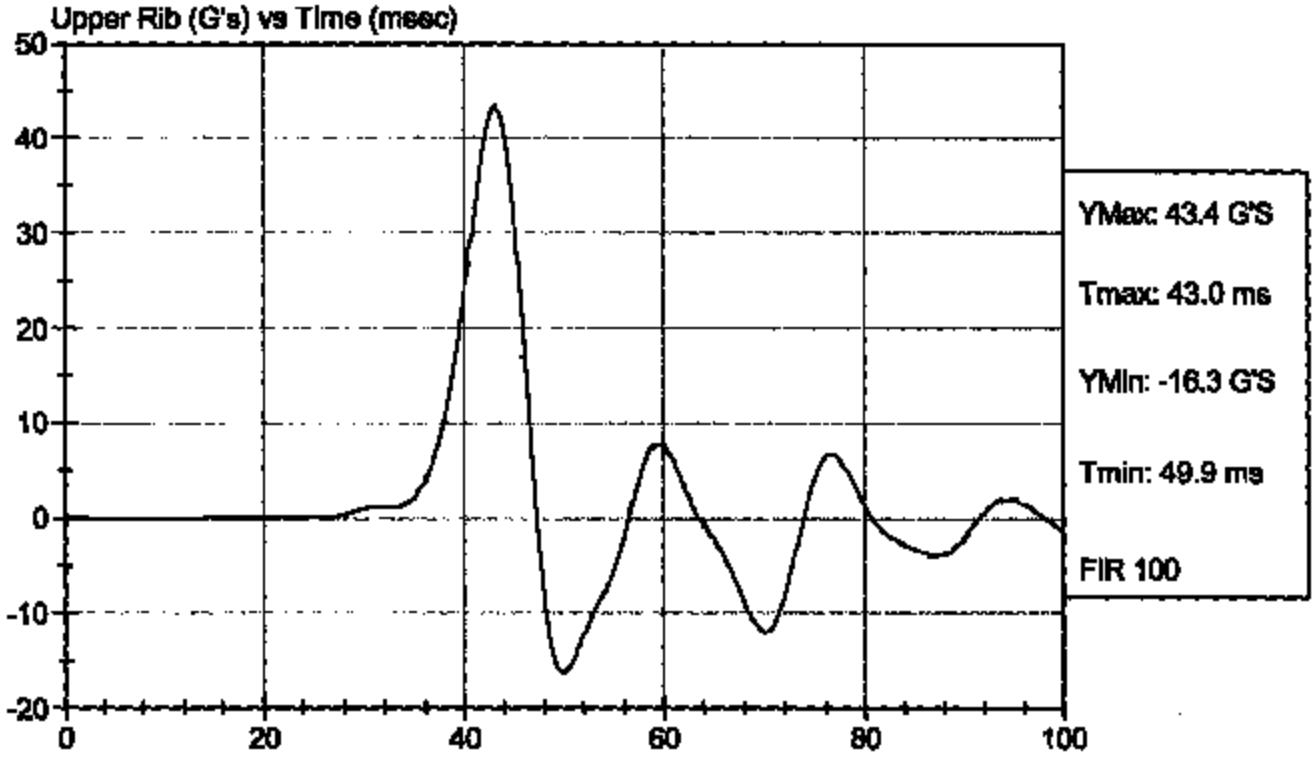
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	42	Pass
Probe Velocity	m/s	4.27 - 4.33	4.27	Pass
Upper Rib	G's	37 - 46	43	Pass
Lower Rib	G's	37 - 46	38	Pass
Lower Spine	G's	15 - 22	21	Pass
		Overall Test Results		Pass

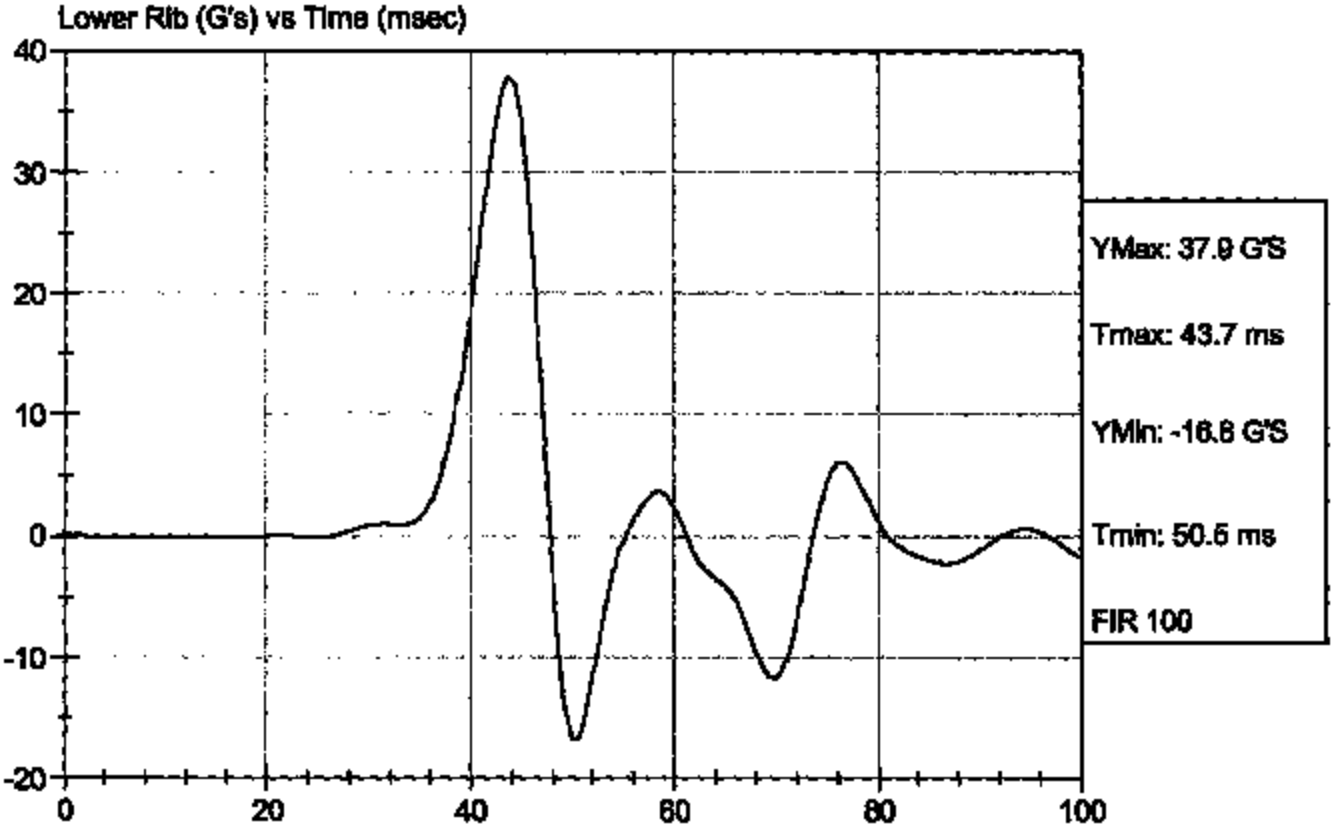
Laboratory Technician

07/07/2005
Test Date

Approved By

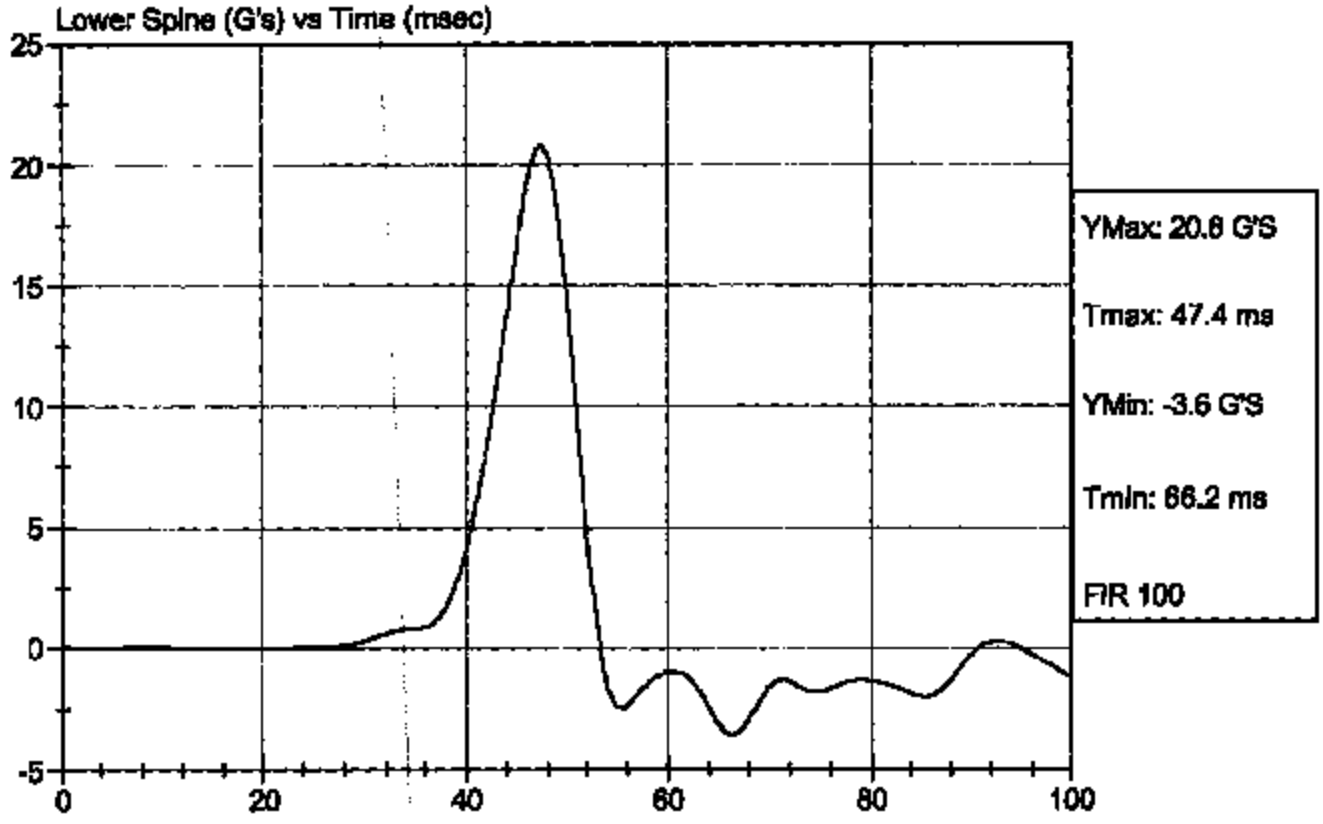
	Test Desc: Thorax Impact Component ID: D051882	Test Date: 07/07/2005 Speed: 14.01 ft/sec, 4.27 m/sec





Test Desc: Thorax Impact
Component ID: D051882

Test Date: 07/07/2005
Speed: 14.01 ft/sec, 4.27 m/sec



SID Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 037 **Test I.D:** D051883

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.4	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	4.27 - 4.33	4.28	Pass
Pelvis Acceleration	G's	40 - 60	42	Pass
		Overall Test Results		Pass

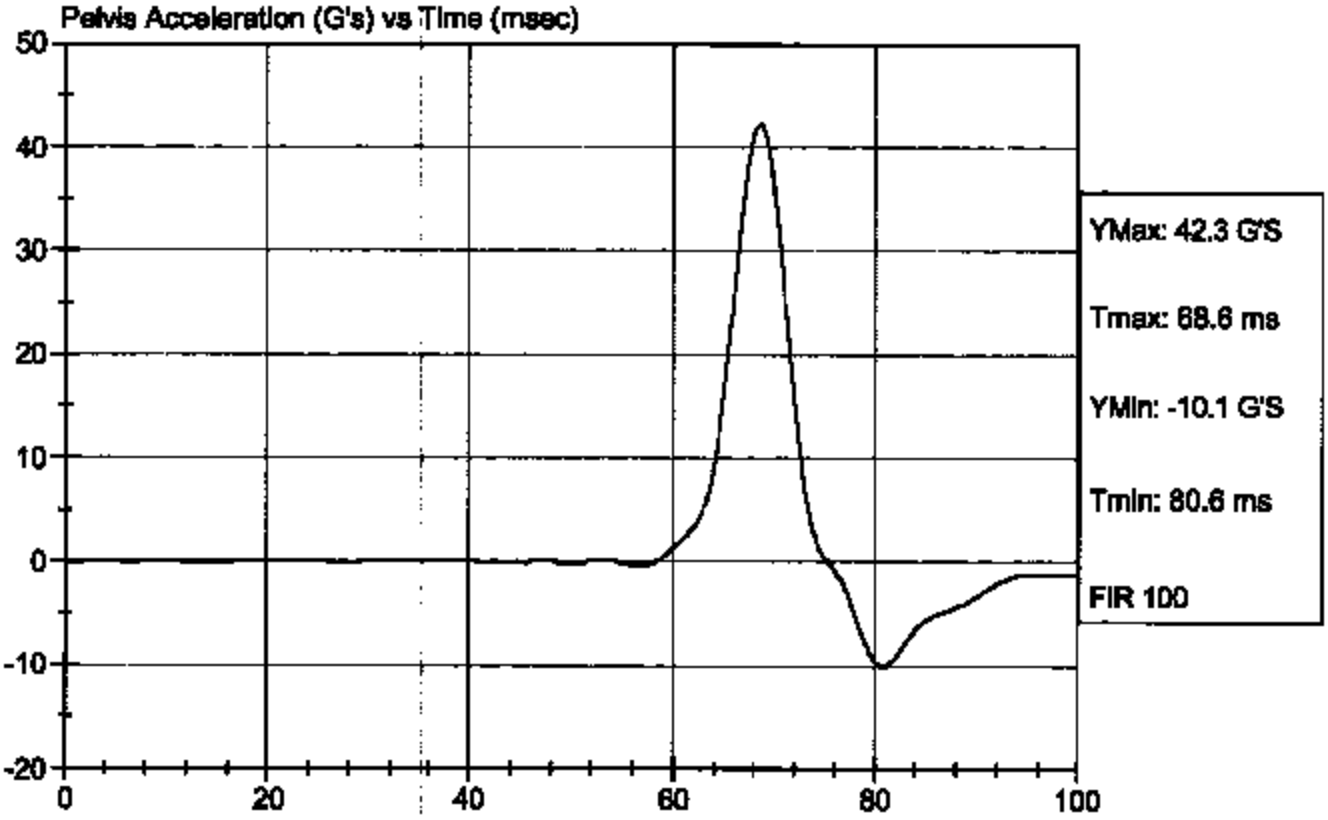
Joe Flores
Laboratory Technician

07/07/2005
Test Date

Jessica Hall
Approved By

Test Desc: Pelvis Impact
Component ID: D051883

Test Date: 07/07/2005
Speed: 14.05 ft/sec, 4.28 m/sec



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 037 **Test I.D:** D051884

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Force At 12.7 mm	N	104 -162	132	Pass
Force At 19 mm	N	163 - 222	190	Pass
Force At 25.4 mm	N	222 - 280	252	Pass
Force At 33 mm	N	325 - 391	344	Pass
		Overall Test Results		Pass

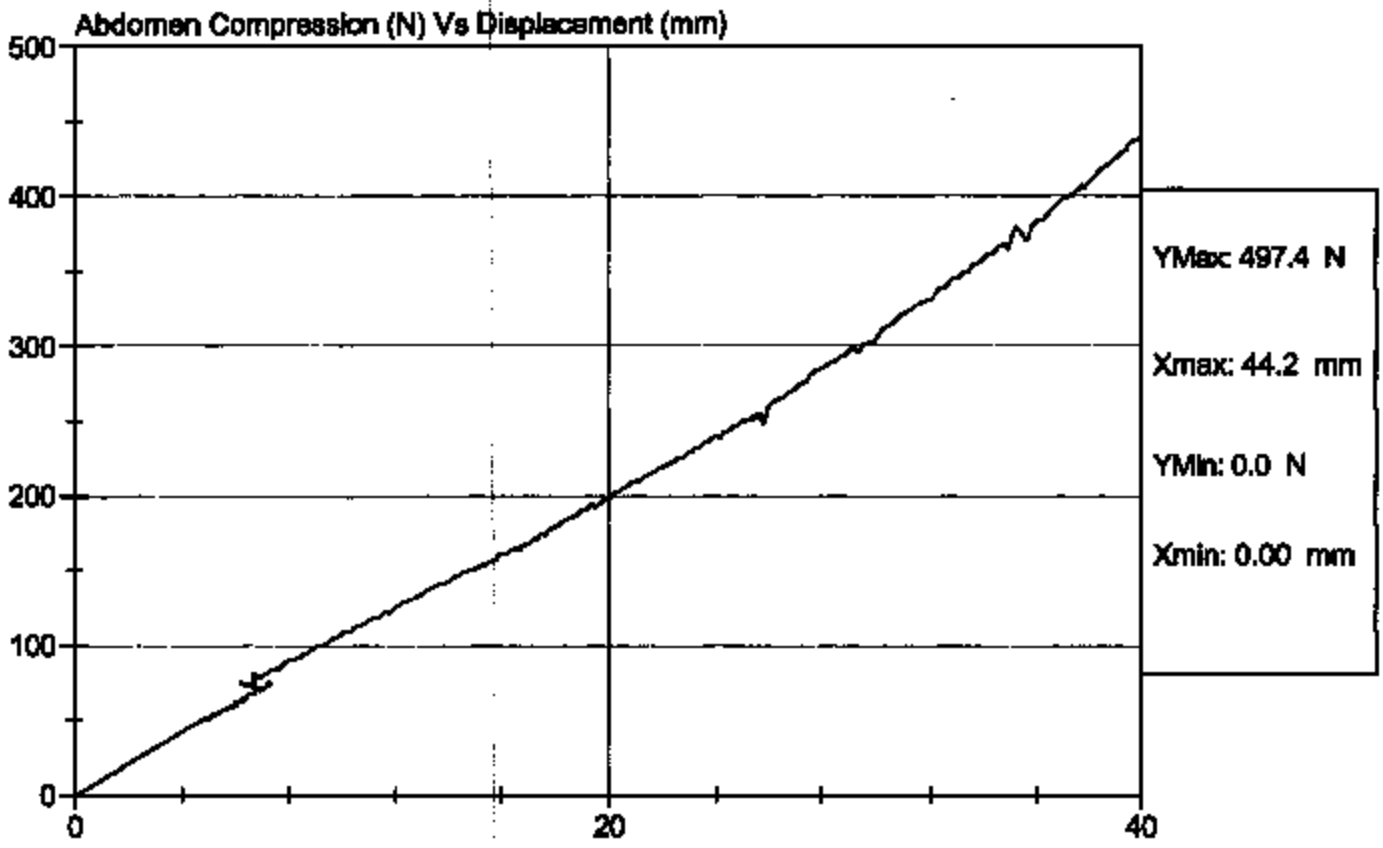
Laboratory Technician

07/07/2005
Test Date

Approved By

Test Description: Abdomen Compression Test Date: 07/07/2005

Component: D051884 Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No: 037 **Test I.D:** D051885

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Force At 0 deg	N	0 - 26.7	0.0	Pass
Force At 20 deg	N	97.9 - 161.2	101.5	Pass
Force At 30 deg	N	151.2 - 204.6	167.6	Pass
Force At 40 deg	N	204.6 - 258.0	223.5	Pass
Return Angle	Deg	12 Maximum	2	Pass
		Overall Test Results		Pass

Laboratory Technician

07/07/2005
Test Date

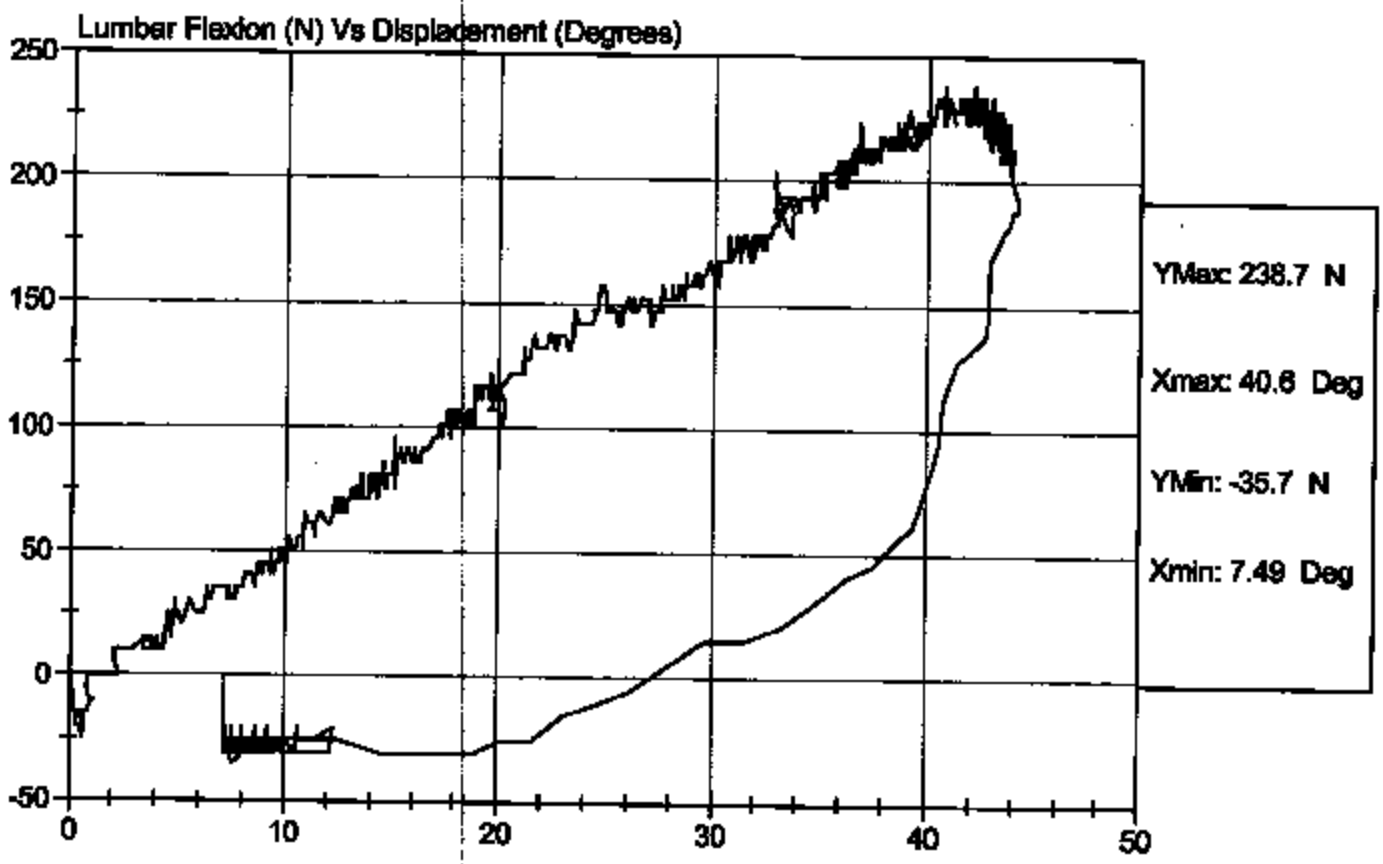
Approved By

Test Description: Lumbar Flexion

Test Date: 07/07/2005

Component: D051665

Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet

Side Impact Dummy (SID)

Neck Pendulum Test

ATD Serial No: 037 **Test I.D:** D051889

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity		%	10 to 70	43	Pass
Impact Velocity		m/s	6.89 to 7.13	6.94	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.18	Pass
	20 msec	m/s	4.12 to 5.10	4.36	Pass
	30 msec	m/s	5.73 to 7.01	6.20	Pass
	40 to 70 msec	m/s	6.27 to 7.64	7.10	Pass
Midsaggital Plane Max Rotation		deg	66 to 82	70	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	59	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	77	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	55	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	11	Pass

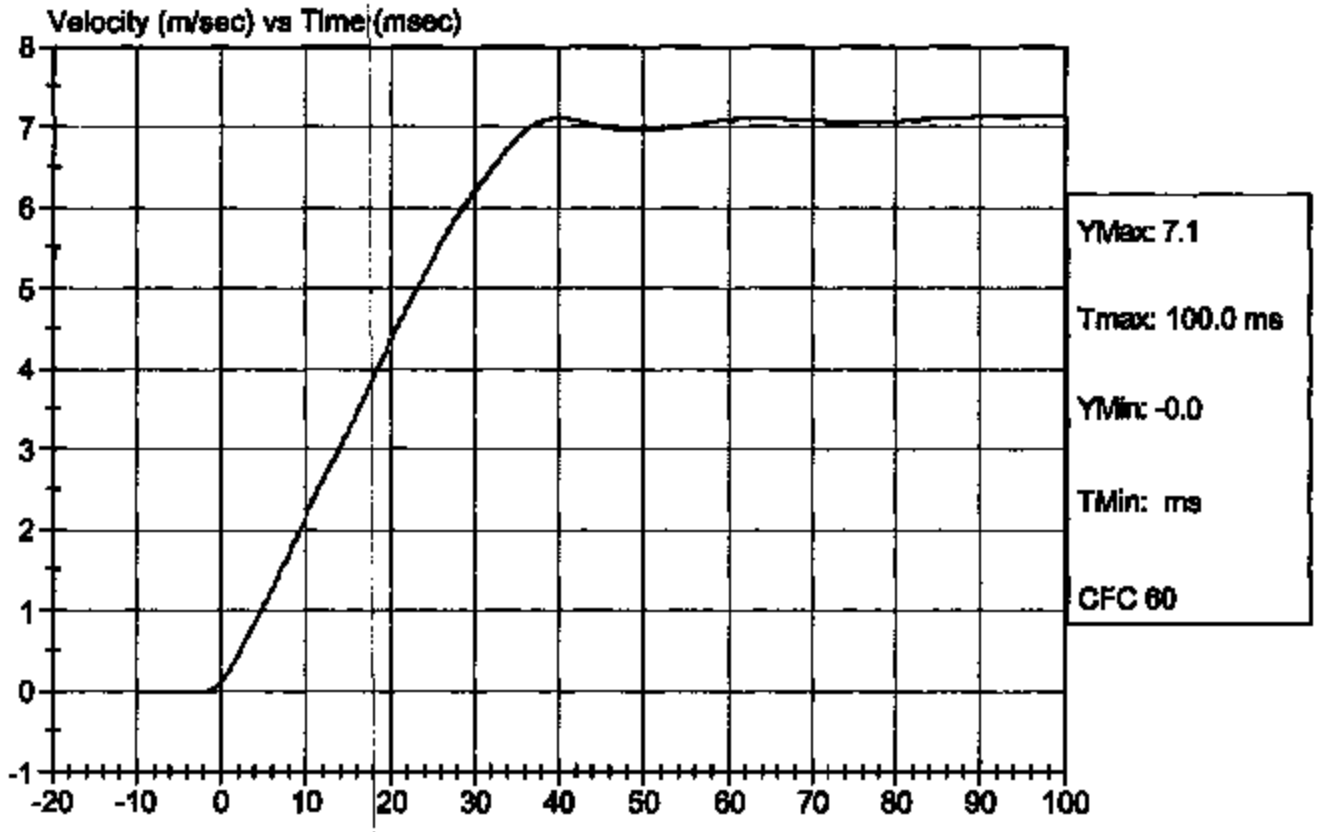
Laboratory Technician

07/07/2005
Test Date

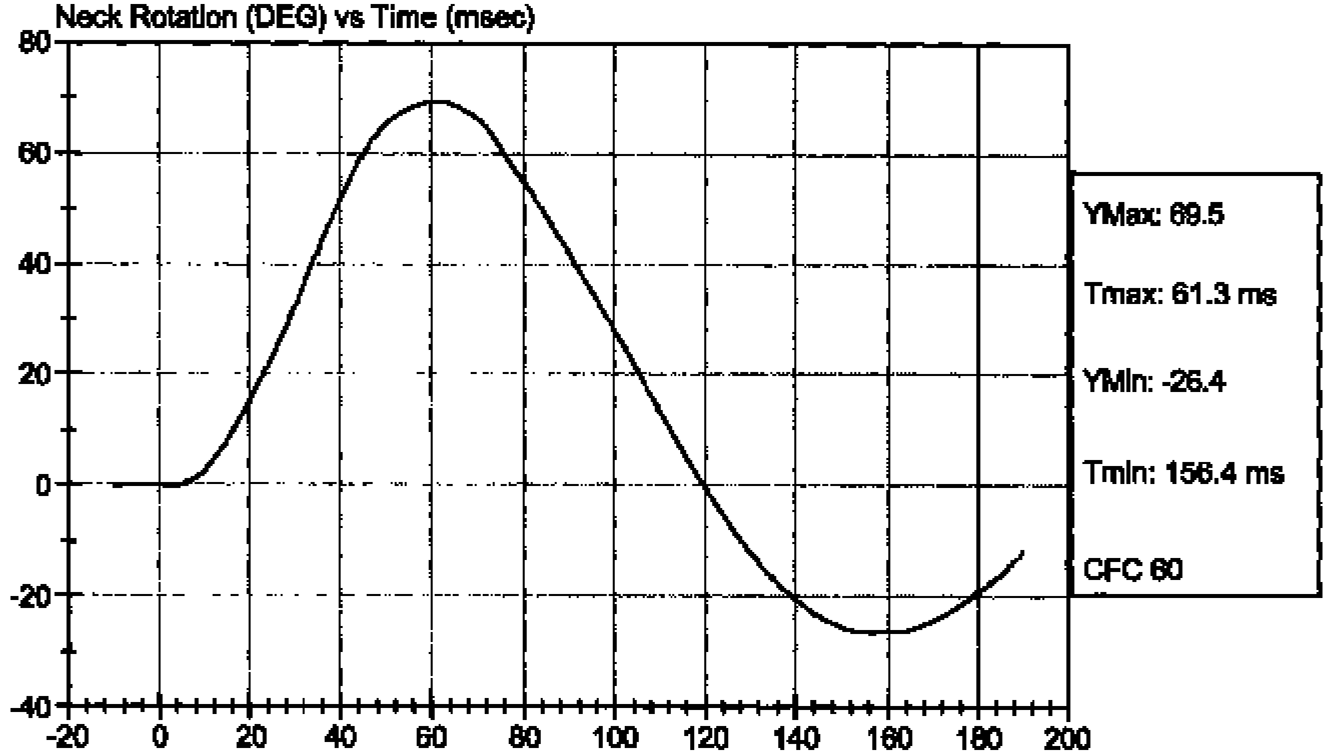
Approved By

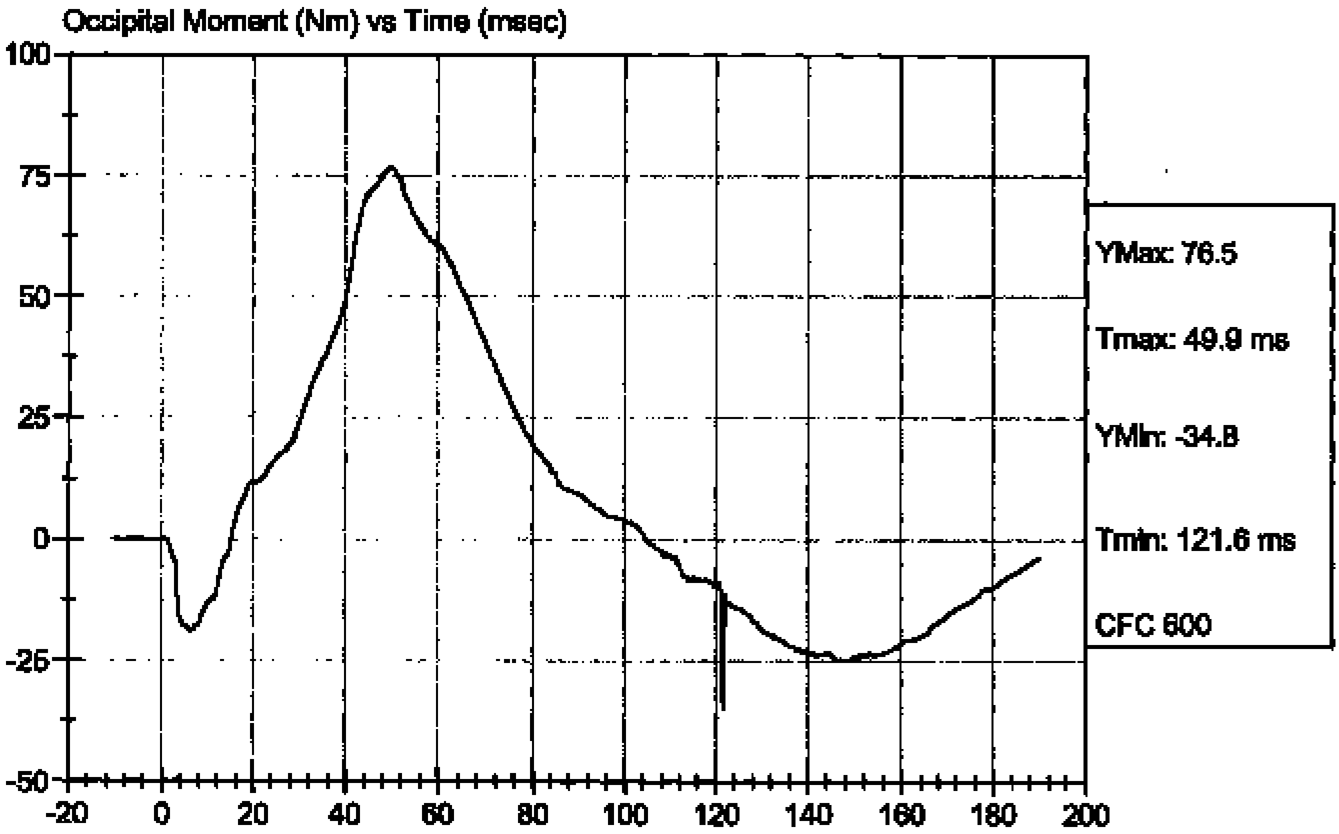
Test Desc: Neck Bending
Component ID: D051889

Test Date: 07/07/2005
Speed: 22.77 ft/sec, 6.94 m/sec



uga	Test Desc: Neck Bending Component ID: D051889	Test Date: 07/07/2005 Speed: 22.77 ft/sec, 6.94 m/sec





Calibration Test Results Summary

Dummy Serial Number: 037

Post-Test Calibration

Head Drop Test:	The head passed all drop test requirements.
Neck Pendulum Test:	The neck passed all pendulum test requirements.
Thorax Impact Test:	The thorax passed all impact test requirements.
Pelvic Impact Test:	The pelvis passed all impact test requirements.
Abdominal Compression Test:	The abdomen passed all compression test requirements.
Lumbar Flexion Test:	The lumbar passed all flexion test requirements.

SID Calibration Data Sheet

Side Impact Dummy

Head Drop Calibration (Lateral)

ATD Serial No: 037 **Test I.D:** D051991

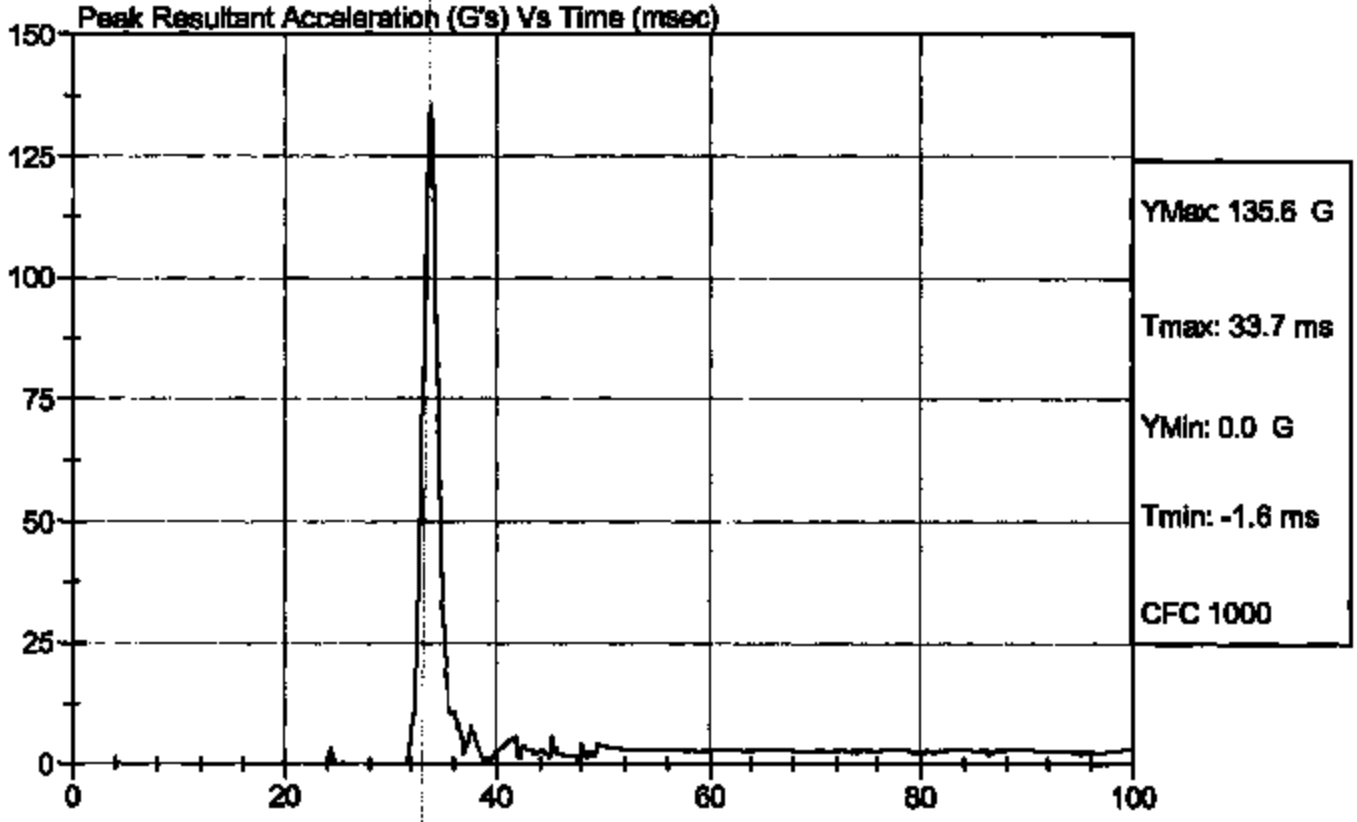
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	46	Pass
Peak Resultant Acceleration	G's	120 to 150	136	Pass
Is Resultant Curve Unimodal?	Yes/No	15% of peak	Yes	Pass
Peak Longitudnal Acceleration	G's	+/- 15	-8	Pass
		Overall Test Results		Pass

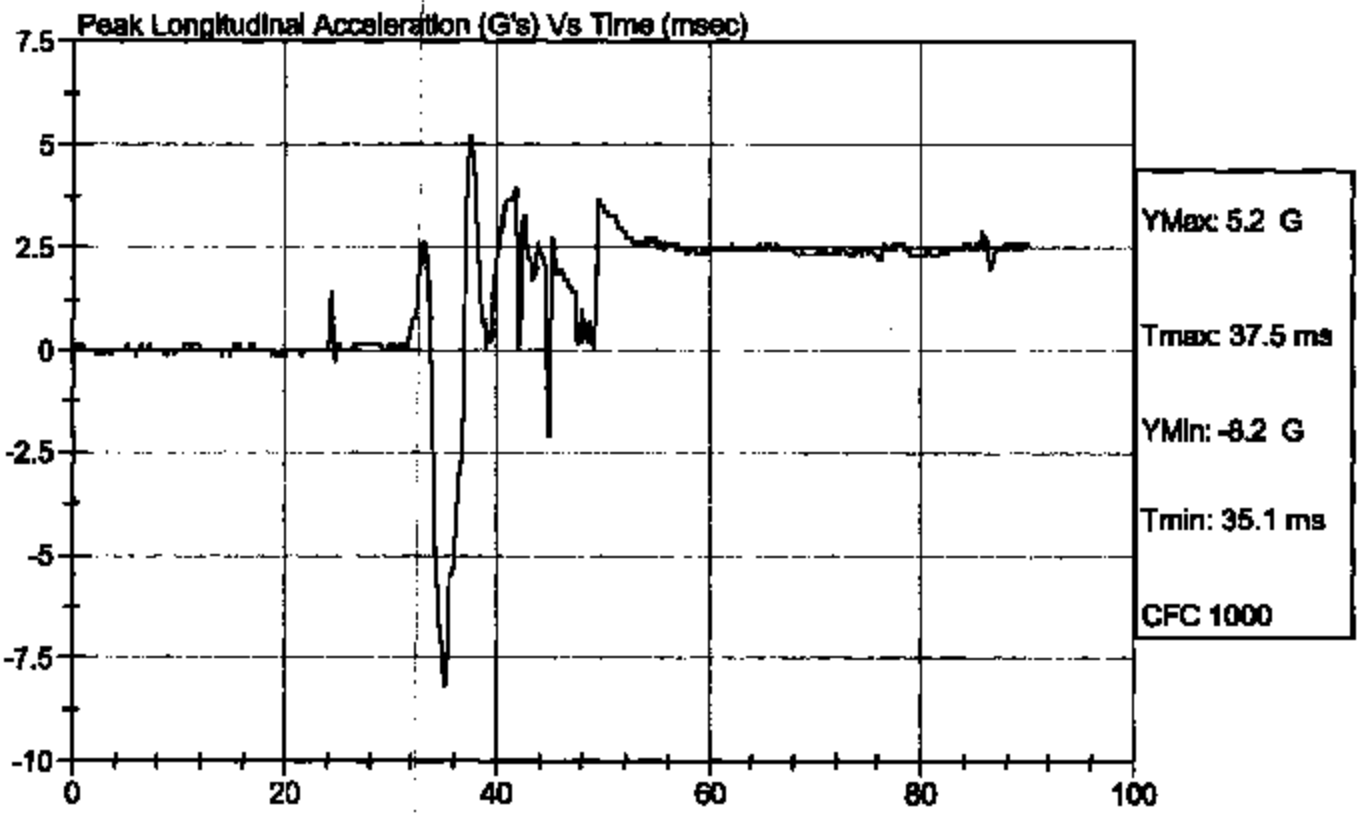
Laboratory Technician

07/20/2005
Test Date

Approved By

TRW	Test Description: Head Drop	Test Date: 07/20/2005
	Component: D051991	Speed: 0 ft/s, 0.00 m/s





SID Calibration Data Sheet

Side Impact Dummy

Thorax Impact Test

ATD Serial No: 037 **Test I.D:** D051992

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	21.5	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Upper Rib	G's	37 - 46	43	Pass
Lower Rib	G's	37 - 46	39	Pass
Lower Spine	G's	15 - 22	20	Pass
		Overall Test Results		Pass

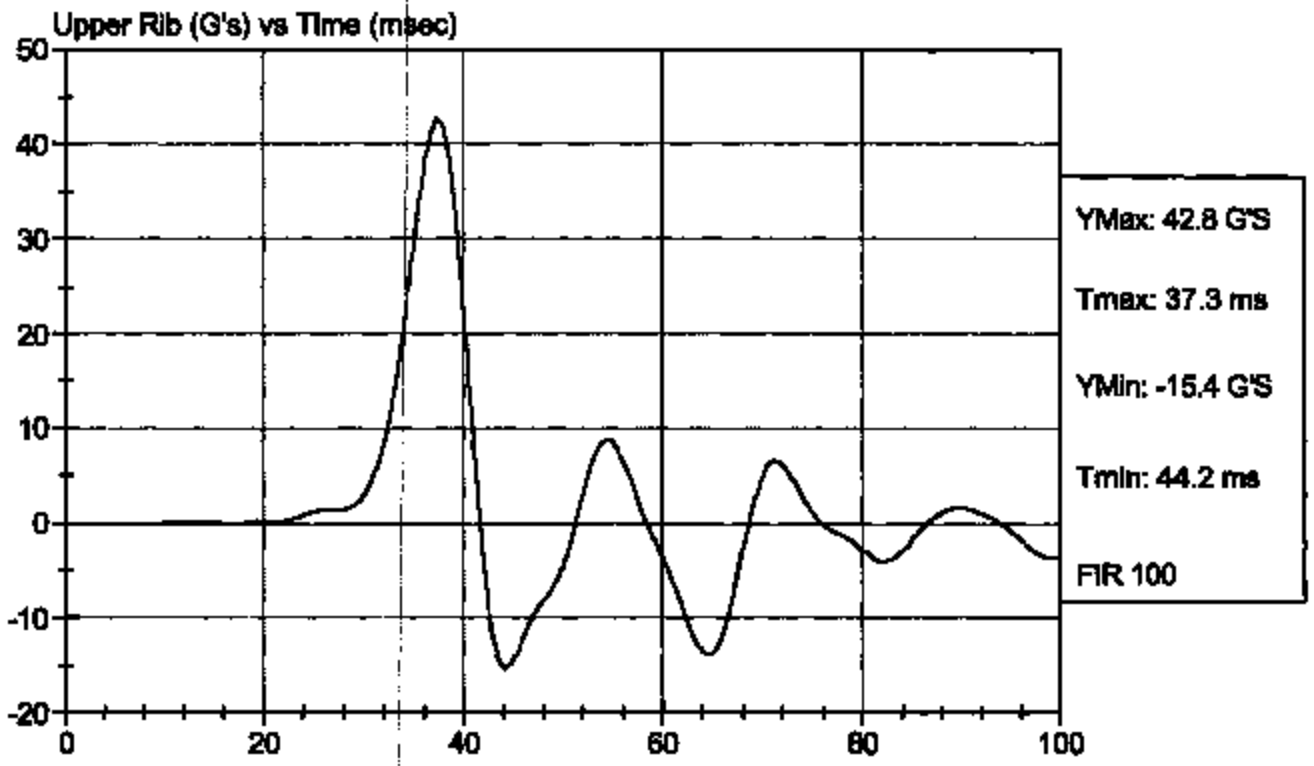
Laboratory Technician

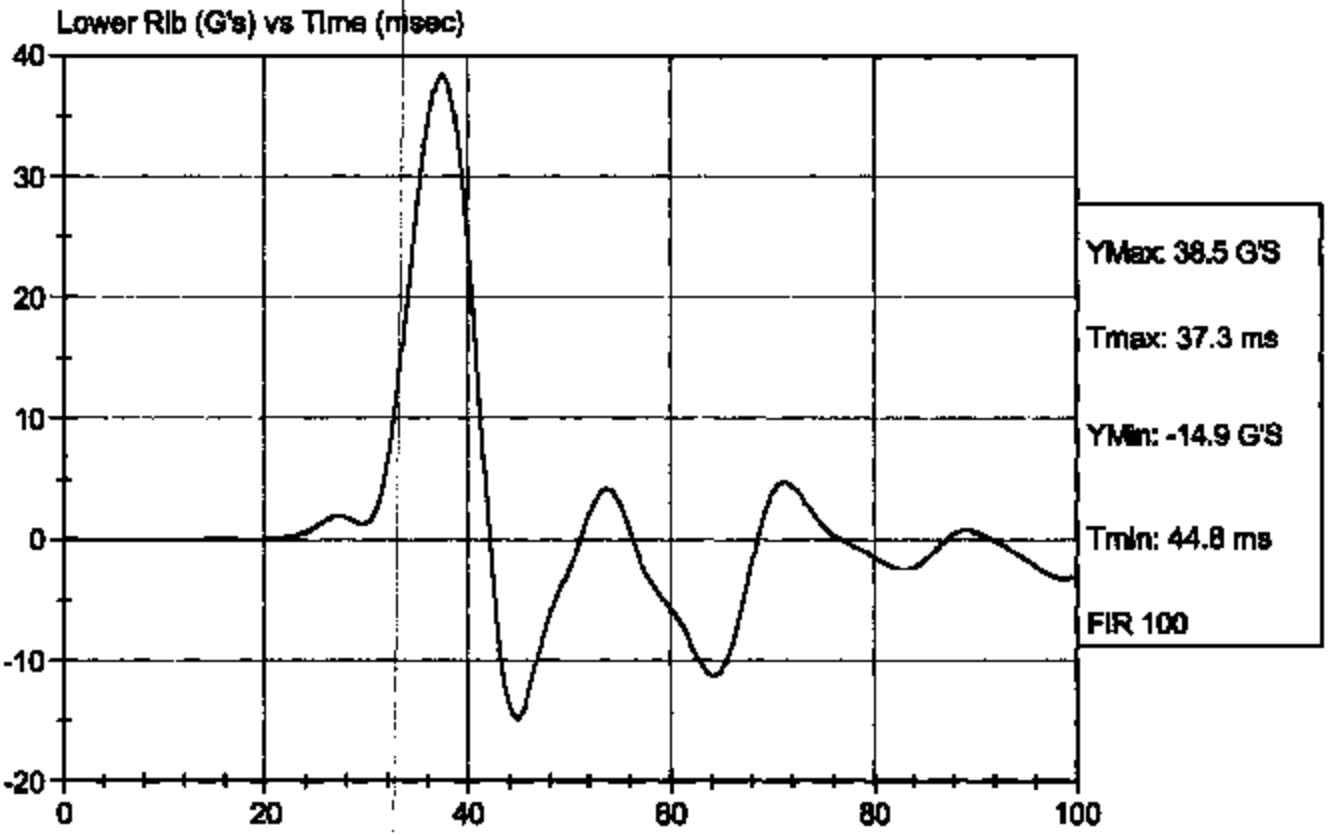
07/21/2005
Test Date

Approved By

Test Desc: Thorax Impact
Component ID: D051992

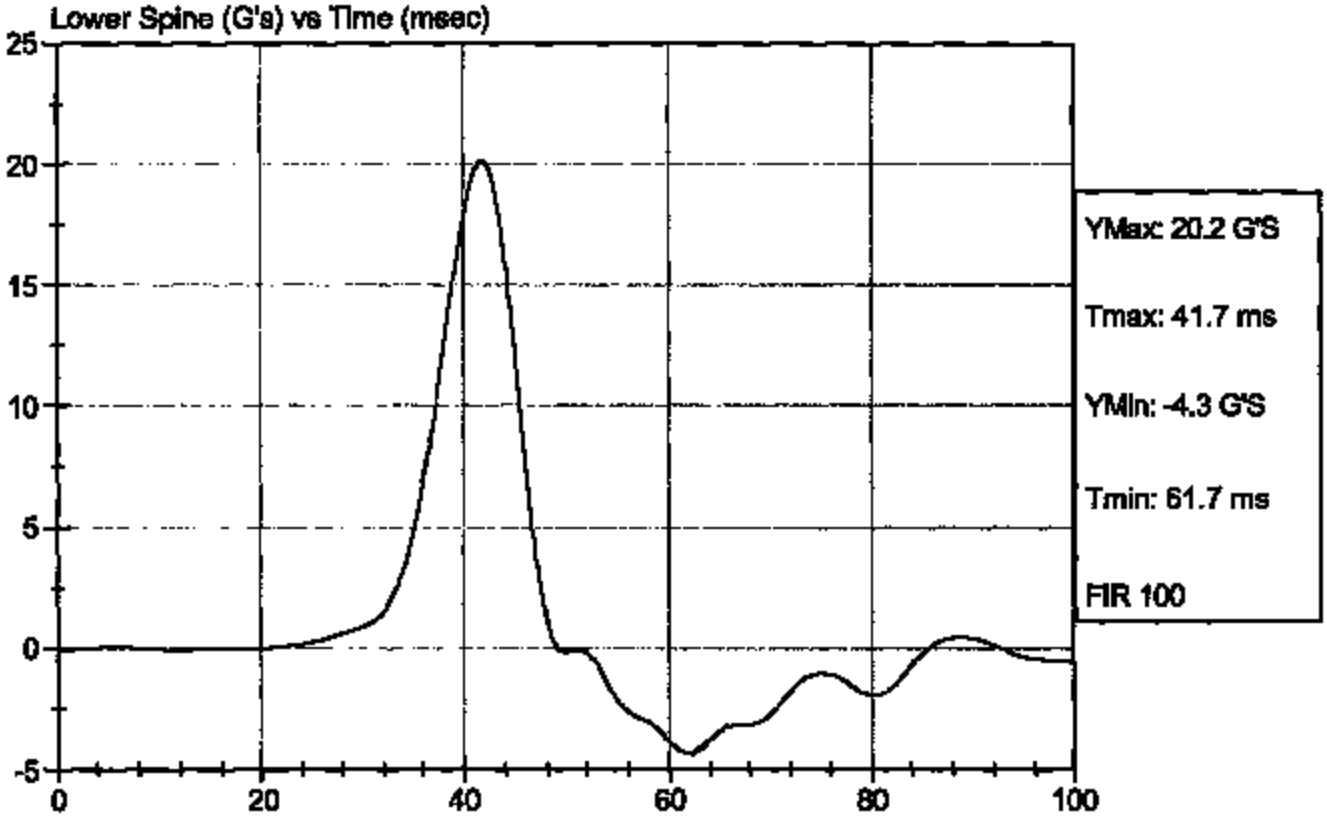
Test Date: 07/21/2005
Speed: 14.11 ft/sec, 4.30 m/sec





Test Desc: Thorax Impact
Component ID: D051992

Test Date: 07/21/2005
Speed: 14.11 ft/sec, 4.30 m/sec



SID Calibration Data Sheet

Side Impact Dummy

Pelvis Impact Test

ATD Serial No: 037 **Test I.D:** D051993

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	43	Pass
Probe Velocity	m/s	4.27 - 4.33	4.30	Pass
Pelvis Acceleration	G's	40 - 60	47	Pass
		Overall Test Results		Pass

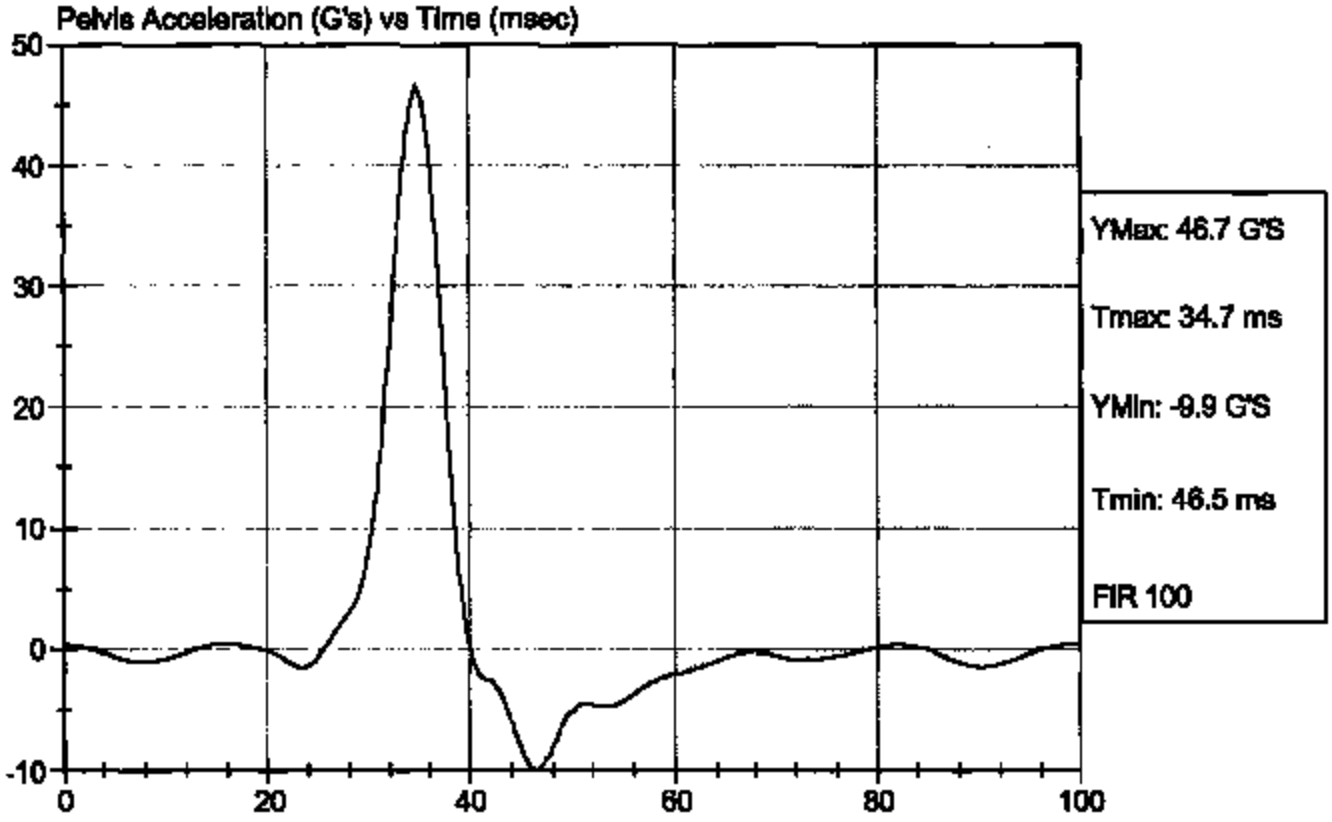
Jon Finch
Laboratory Technician

07/21/2005
Test Date

Jessica Hall
Approved By

Test Desc: Pelvis Impact
Component ID: D051983

Test Date: 07/21/2005
Speed: 14.1 ft/sec, 4.30 m/sec



SID Calibration Data Sheet

Side Impact Dummy

Abdominal Compression Calibration (Pre-Load = 10 lbs)

ATD Serial No: 037 **Test I.D:** D051994

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Force At 12.7 mm	N	104 -162	147	Pass
Force At 19 mm	N	163 - 222	205	Pass
Force At 25.4 mm	N	222 - 280	270	Pass
Force At 33 mm	N	325 - 391	374	Pass
		Overall Test Results		Pass

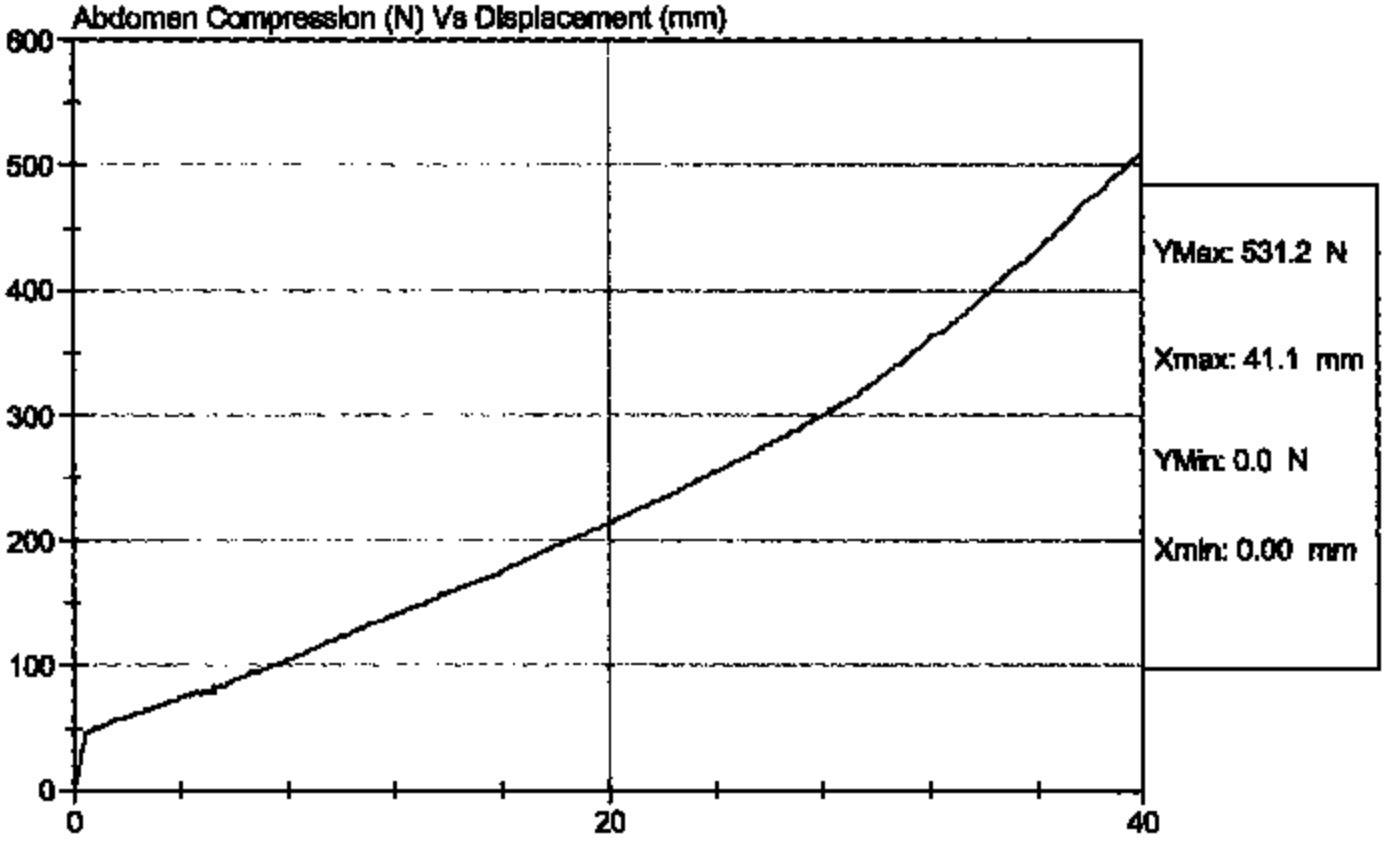
Laboratory Technician

07/21/2005
Test Date

Approved By

Test Description: Abdomen Compression Test Date: 07/21/2005

Component: D051994 Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet

Side Impact Dummy

Lumbar Flexion Calibration

ATD Serial No: 037 **Test I.D:** D051995

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.5	22.0	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Force At 0 deg	N	0 - 26.7	0.0	Pass
Force At 20 deg	N	97.9 - 151.2	126.3	Pass
Force At 30 deg	N	151.2 - 204.6	170.8	Pass
Force At 40 deg	N	204.6 - 258.0	209.7	Pass
Return Angle	Deg	12 Maximum	4	Pass
		Overall Test Results		Pass

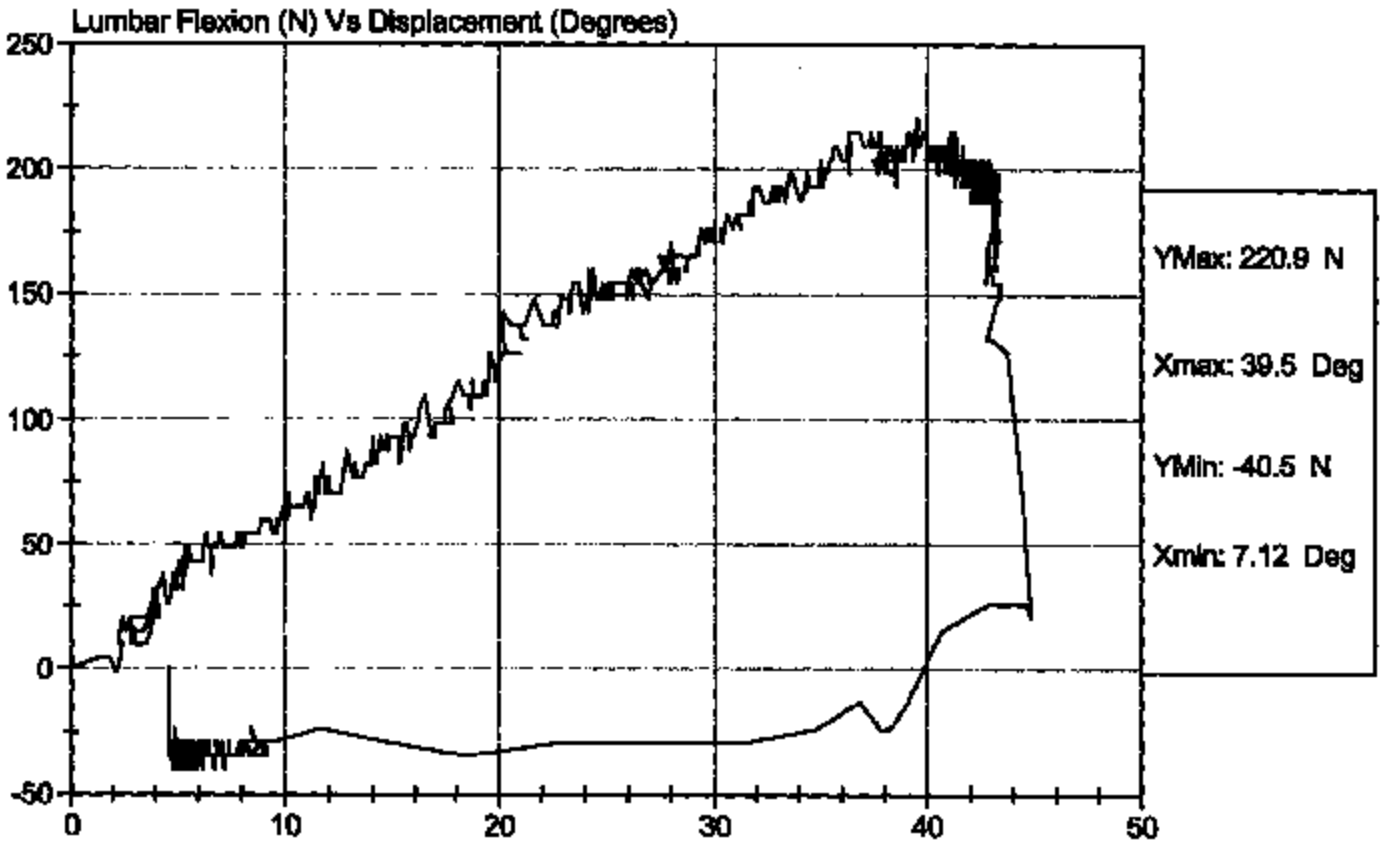
Laboratory Technician

07/21/2005
Test Date

Approved By

Test Description: Lumbar Flexion | Test Date: 07/21/2005

Component: D051995 | Speed: 0 ft/sec, 0 m/sec



SID Calibration Data Sheet

Side Impact Dummy (SID)

Neck Pendulum Test

ATD Serial No: 037 **Test I.D:** D051999

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	22.0	Pass
Laboratory Relative Humidity		%	10 to 70	46	Pass
Impact Velocity		m/s	6.89 to 7.13	7.10	Pass
Pendulum Deceleration	10 msec	m/s	1.96 to 2.55	2.47	Pass
	20 msec	m/s	4.12 to 5.10	4.81	Pass
	30 msec	m/s	5.73 to 7.01	6.77	Pass
	40 to 70 msec	m/s	6.27 to 7.64	7.22	Pass
Midsagittal Plane Max Rotation		deg	66 to 82	73	Pass
Head Rotation Peak to Zero - Decay Time		msec	58 to 67	58	Pass
Max. Mx at Occipital Condyles		Nm	73 to 88	79	Pass
Mx Peak To Zero - Decay Time		msec	49 to 64	56	Pass
Mx Peak to Max. Head Rotation		msec	2 to 16	11	Pass

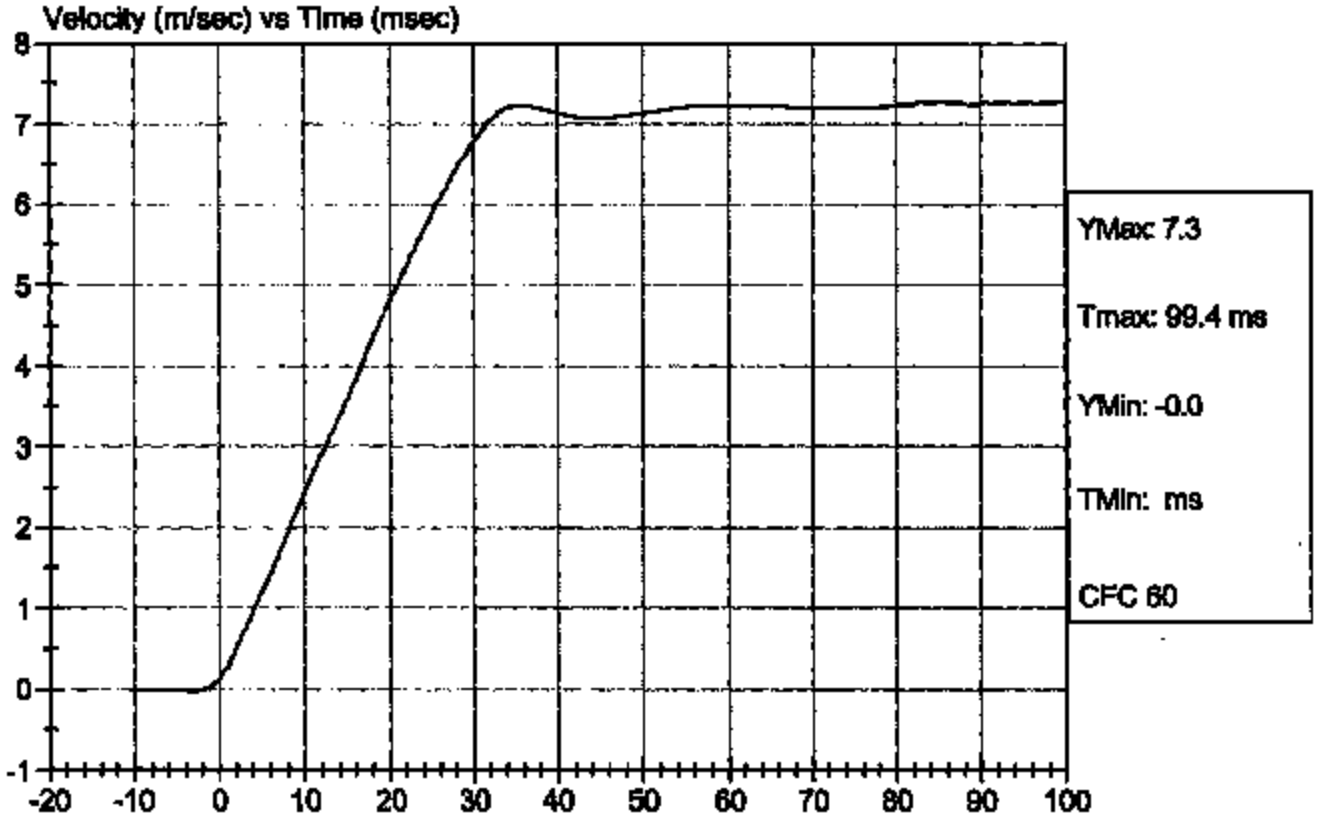
Laboratory Technician

07/21/2005
Test Date

Approved By

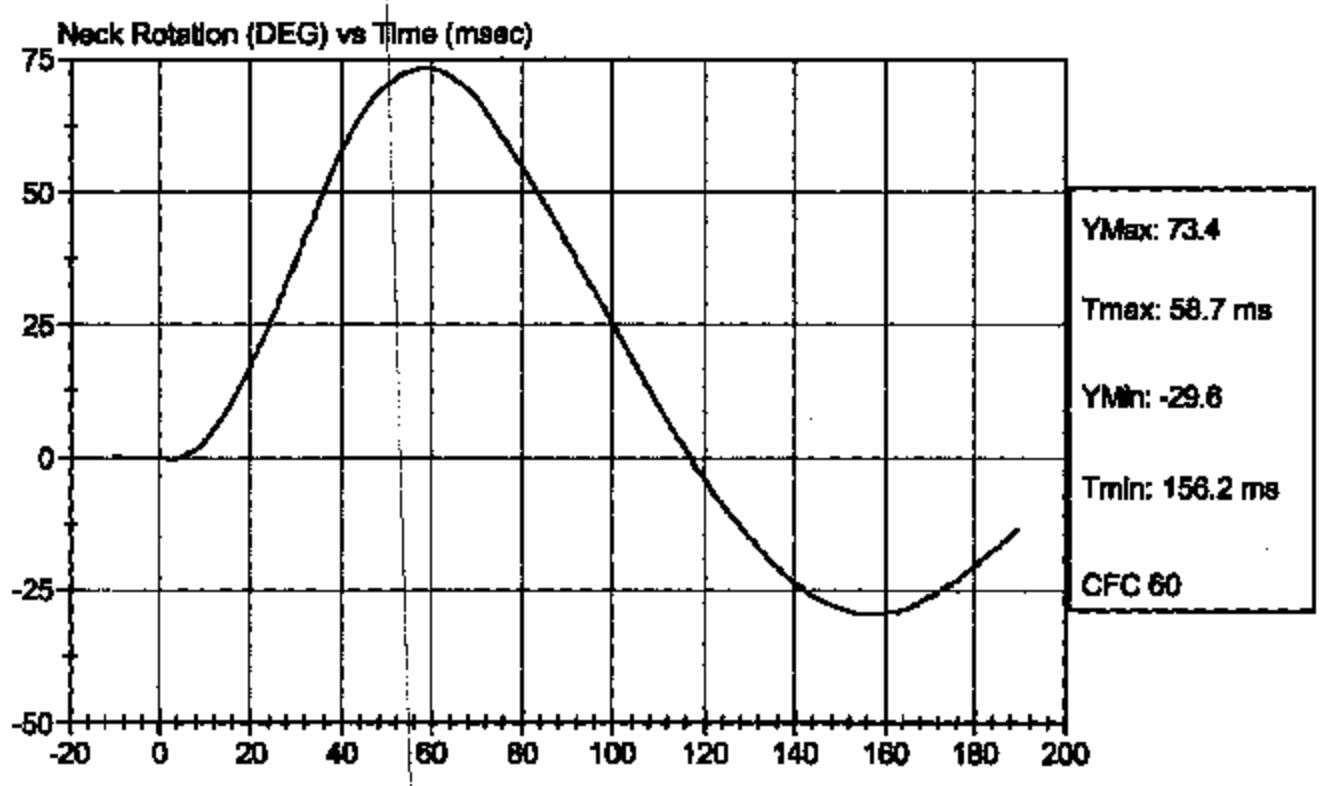
Test Desc: Neck Bending
Component ID: D051999

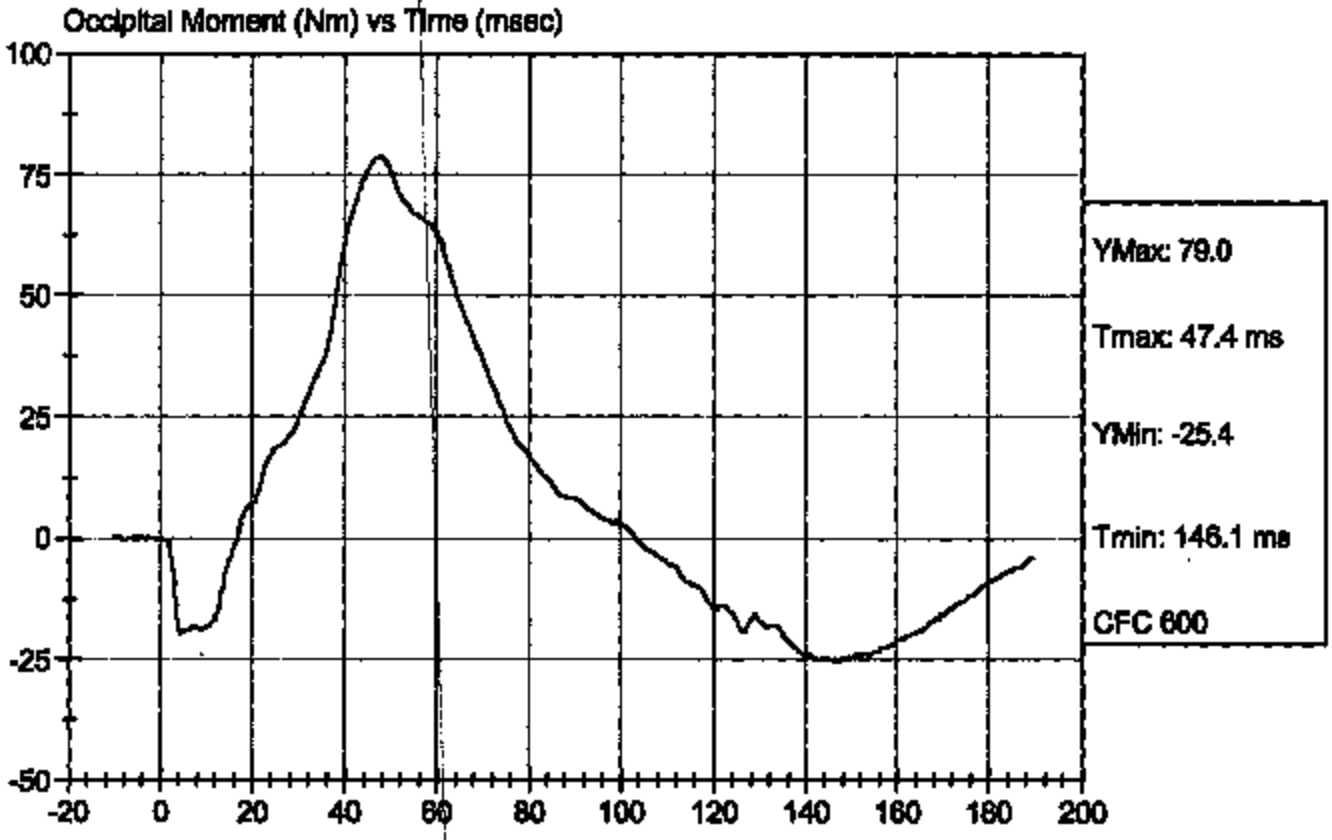
Test Date: 07/21/2005
Speed: 23.28 ft/sec, 7.10 m/sec



Test Desc: Neck Bending
Component ID: D051999

Test Date: 07/21/2005
Speed: 23.28 ft/sec, 7.10 m/sec





SID Calibration Data Sheet
Side Impact Dummy
Inspection Checklist

ATD Serial No: 037

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Laboratory Technician

07/20/2005
Test Date

Approved By

APPENDIX D

CALIBRATION INFORMATION DATA

SID Calibration Data Sheet
Side Impact Dummy
Inspection Checklist

ATD Serial No: 037

Test Part	Items Checked	Result
Skin	Visual inspection	Pass
Head	Visual, ballast, accelerometer mount	Pass
Neck	Visual	Pass
Spine Box	Visual, ballast, accelerometer mount	Pass
Rib Cage	Visual, measure	Pass
Sternum	Visual	Pass
Lumbar Spine	Visual	Pass
Abdomen	Visual	Pass
Pelvis	Visual, palpate, accelerometer mount	Pass
Upper Legs	Visual	Pass
Knees	Visual	Pass
Lower Legs	Visual, range of motion	Pass
Ankles	Visual, range of motion	Pass
Feet	Visual, range of motion	Pass
Joints	1 to 2 g range	Pass
Other		Pass

Laboratory Technician

07/20/2005
Test Date

Approved By

DUMMY AND VEHICLE CALIBRATION DATA

	INSTRUMENTS FOR DRIVER S/N 037		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head CG X	C10770	Endevco	3/17/05
Head CG Y	AH5E5	Endevco	3/17/05
Head CG Z	C12863	Endevco	3/21/05
Neck Load Cell	253	Denton	5/26/05
Upper Rib Y	G16-Z10	Entran	4/27/05
Lower Rib Y	G16-Z09	Entran	4/27/05
Lower Spine Y	F22-Z01	Entran	4/27/05
Pelvis Y	J14-J17	Entran	3/15/05
Upper Rib Redundant Y	F08-Z15	Entran	3/02/05
Lower Rib Redundant Y	F15-M11	Entran	3/02/05
Lower Spine Redundant Y	F09-N03	Entran	3/02/05
Pelvis Redundant Y	B26-J11	Entran	4/12/05

VEHICLE INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Vehicle CG X	C11-Z13	Entran	3/31/05
Vehicle CG Y	C09-Y09	Entran	3/31/05
Vehicle CG Z	B19-Z01	Entran	3/03/05
Left Floor Y	B16-Z03	Entran	3/03/05
Left A-Post @ Sill Y	C04-L14	Entran	3/24/05
Left Lower A-Post Y	B16-Z29	Entran	3/17/05
Left Mid A-Post Y	B28-Z15	Entran	3/17/05
Left B-Post @ Sill Y	C12-R25	Entran	4/28/05
Left Lower B-Post Y	C09-Y13	Entran	3/31/05
Left Mid B-Post Y	C21-G10	Entran	4/26/05
Driver Seat Track Y	E14-X01	Entran	6/28/05
LF Door Accel. #1 Y	C10-Z04	Entran	4/22/05
LF Door Accel. #2 Y	C08-L11	Entran	3/24/05
LF Door Accel. #3 Y	C08-L02	Entran	3/24/05
Upper Engine X	K03-J13	Entran	1/21/05
Upper Engine Y	L18-N15	Entran	3/09/05
Firewall Y	C15-L14	Entran	4/22/05
Right Floor Sill Y	C21-G12	Entran	4/28/05
Rear Deck X	C04-L10	Entran	3/24/05
Rear Deck Y	C06-L19	Entran	3/24/05