FINAL REPORT NUMBER 201U-MGA-04-11

SAFETY PRE-STANDARD TESTING FOR FMVSS 201U
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection

FORD MOTOR COMPANY
1998 Ford F150 XLT
NHTSA No. PW0201

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: September 7-8, 2004
Report Date: September 9, 2004

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF PLANNING, EVALUATION AND BUDGET
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Accepted By: Marcia J. Darlet

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16. Abstract A pre-standard test series was conducted on the subject 1998 Ford F150 XLT, NHTSA No. PW0201, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U pre-standard compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on September 7-8, 2004.			
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact pre-standard test series was to measure the performance of the subject vehicle, a 1998 Ford F150 XLT, for FMVSS 201U, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on September 7-8, 2004 on a 1998 Ford F150 XLT, manufactured by Ford Motor Company.

All tests were conducted in accordance with the U. S. Department of Transportation, National Highway Traffic Safety Administration's Laboratory Test Procedure TP-201U-01 dated April 3, 1998 and the corresponding MGA Research Corporation's FMVSS 201U procedure number MGATP201U_FRAME#2 dated March 20, 2003.

All tests were conducted at MGA Research Corporation in Troy, Michigan and were performed by MGA engineers and technicians. The FMVSS 201U impactor test machine was used to conduct the testing. Target locations were determined by using a Coordinate Measurement Machine in conjunction with the MGA EZ-Target™ program and MGA procedure MGATP201U_Test Series dated March 20, 2003.

2.0 TEST DATA SUMMARY

The 1998 Ford F150 XLT was equipped with A and rear-pillars, a left side B-Pillar, a right-side door frame, an assist handle on the passenger A-pillar, coat hooks on both side rails, an adjustable seat belt anchorage on the driver B-pillar, a fixed seat belt anchorage on each rear-pillar, and a fixed seat belt anchorage on the passenger side rail for the passenger front seat.

Upon completion of targeting the test vehicle, ten (10) targets were chosen to be impacted based upon engineering judgment and discussion with the COTR. Targets were chosen which appeared most likely to give high HIC(d) values. The ten (10) targets chosen were:

AP1	RP2	RH	UR3
AP2	SR2A	UR1	
AP3	SR3-1	UR2	

TABLE 2-1

SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Ford F150 XLT

VEH. NHTSA NO.: PW0201 VIN: 1FTZX1764WN COLOR: Red

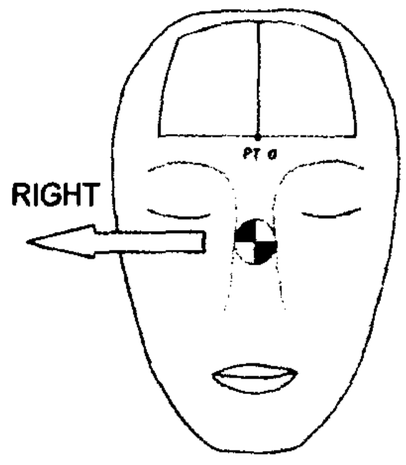
VEH. BUILD DATE: November, 1997 TEST DATES: September 7-8, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Right	110	31	23.7	1182	1345	20	2 Right
AP2	Left	201	38	23.5	1331	1543	23	3 Left
AP3	Right	158	38	23.6	436	357	17	6 Left
RP2	Left	270	0	23.5	670	668	17	0
SR2A	Left	270	35	23.5	1039	1157	15	3 Left
SR3-1	Left	270	24	23.9	679	679	52	12 Left
RH	Right	0	40	23.5	420	336	52	8 Left
UR1	Left	270	50	23.6	1211	1385	45	0
UR2	Left	270	50	23.4	686	688	32	10 Left
UR3	Left	270	50	23.7	962	1054	34	8 Left

Above and left/right refers to the position relative to reference pt. 0 where the target made contact with the Free Motion Headform. See the diagram below for details.



POST TEST COMMENTS:

The following description lists any post-test damage or other test observations for each target.

AP3 Right: Grab handle deformation.

RH Right: Broke rear window.

UR1 Left: Headliner deformation.

No damage was observed for any other targets.

REMARKS:

The targets listed were impacted in the following order:

Left: AP2, UR1, SR2A, UR2, SR3-1, UR3, RP2

Right: AP3, AP1, RH

The 150 mm rule was observed for targets horizontal to each other and the 200 mm rule was observed for vertical components.

RECORDED BY: David G. Gotwals DATE: September 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Ford F150 XLT

VEH. NHTSA NO.: PW0201 VIN: 1FTZX1764WN COLOR: Red

VEH. BUILD DATE: November, 1997 TEST DATES: September 7-8, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

INTERIOR TRIM INFORMATION: A and rear-pillars, a left side B-Pillar, a right-side door frame, an assist handle on the passenger A-pillar, coat hooks on both side rails, an adjustable seat belt anchorage on the driver B-pillar, a fixed seat belt anchorage on each rear-pillar, and a fixed seat belt anchorage on the passenger side rail for the passenger front seat.

SUNROOF INFORMATION:

Installed: ___Yes _X_ No

Operation: ___Electric _____Manual

ROLL-BAR INFORMATION:

Installed: _____Yes _X_ No

Padded: _____Yes _X_ No

Braces: _____Yes _X_ No

GENERAL INFORMATION:

Date Received: 9/2/04; Odometer Reading: 119,768 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Ford Motor Company

Date of Manufacture: November, 1997; VIN: 1FTZX1764WN

GVWR: 2721 kg; GAWR FRONT: 1474 kg

GAWR REAR: 1587 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 200 kpa REAR: 221 kpa

Recommended Tire Size: P255/70R16

Recommended Cold Tire Pressure:

FRONT: 200 kpa REAR: 221 kpa

Size of Tire on Test Vehicle: P255/75R16

Type of Spare Tire: P255/70R16; Space Saver: ___; Standard: X

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench _____; Bucket ___; Split Bench X

Number of Occupants: Front 3; Rear 3; TOTAL 6

VEHICLE CAPACITY WEIGHT (VCW) = N/A

No. of Occupants x 68 kg = 548 kg

Rated Cargo/Luggage Weight (RCLW) = 136.0 kg (201U limit)

WEIGHT OF TEST VEHICLE AS DELIVERED AT LABORATORY: (with maximum fluids)

Right Front =	613.0 kg	Right Rear =	443.0 kg
Left Front =	623.0 kg	Left Rear =	435.5 kg
TOTAL FRONT =	1236.0 kg	TOTAL REAR =	878.5 kg
% Total Weight =	58.5 %	% Total Weight =	41.5 %

TOTAL DELIVERED WEIGHT = 2114.5 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 2114.0 kg

Rated Cargo/Luggage Wt. = 136.0 kg

TARGET TEST WEIGHT 2250.0 kg

WEIGHT OF TEST VEHICLE:

Right Front =	611.5 kg	Right Rear =	504.5 kg
Left Front =	628.5 kg	Left Rear =	508.0 kg
TOTAL FRONT =	1240.0 kg	TOTAL REAR =	1012.5 kg
% Total Weight =	55.0 %	% Total Weight =	45.0 %

TOTAL TEST WEIGHT = 2252.5 kg

Weight of ballast secured in vehicle's cargo area = 136 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 880.0 mm; Left Front 880.0 mm;
Right Rear 915.0 mm; Left Rear 917.0 mm

Pitch Angle at Right Door Sill = 1.3 rear higher
Pitch Angle at Left Door Sill = 1.3 rear higher
Roll Angle at Front Bumper = 0.6 left higher
Roll Angle at Rear Bumper = 1.7 left higher

FULLY LOADED: Right Front 887.0 mm; Left Front 882.0 mm;
Right Rear 908.0 mm; Left Rear 907.0 mm

Pitch Angle at Right Door Sill = 1.0 rear higher
Pitch Angle at Left Door Sill = 1.0 rear higher
Roll Angle at Front Bumper = 0.5 left higher
Roll Angle at Rear Bumper = 1.7 left higher

AS TARGETED: Right Front 1072 mm; Left Front 1079 mm;
Right Rear 1096 mm; Left Rear 1097 mm

Pitch Angle at Right Door Sill = 1.3 rear higher
Pitch Angle at Left Door Sill = 1.3 rear higher
Roll Angle at Front Bumper = 0.6 left higher
Roll Angle at Rear Bumper = 1.7 left higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = 1.3 rear higher
Pitch Angle at Left Door Sill = 1.3 rear higher
Roll Angle at Front Bumper = 0.6 left higher
Roll Angle at Rear Bumper = 1.7 left higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill = 1.3 rear higher

Pitch Angle at Left Door Sill = 1.3 rear higher

Roll Angle at Front Bumper = 0.6 left higher

Roll Angle at Rear Bumper = 1.7 left higher

VEHICLE WHEELBASE = 4000 mm

REMARKS: The seat travel distance was measured to be 220 mm for the driver front seat and 220 mm for the passenger front seat.

RECORDED BY: David G. Gotwals DATE: September 2, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A PILLARS AND DOOR FRAMES

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Ford F150 XLT

VEH. NHTSA NO.: PW0201 VIN: 1FTZX1764WN COLOR: Red

VEH. BUILD DATE: November, 1997 TEST DATES: September 7-8, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

	HORIZONTAL ANGLE SPECIFIED RANGE	MINIMUM HORIZONTAL ANGLE	MAXIMUM HORIZONTAL ANGLE
A-PILLAR	L 195°-255°	L 201.0°	L 253.0°
	R 105°-165°	R 109.3°	R 158.9°
B-PILLAR	L 195°-345°	L 216.5°	L 296.5°
	R 15°-165°	R 64.9°	R 143.9°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: David G. Gotwals DATE: September 2, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Ford F150 XLT

VEH. NHTSA NO.: PW0201 VIN: 1FTZX1764WN COLOR: Red

VEH. BUILD DATE: November, 1997 TEST DATES: September 7-8, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

VERTICAL IMPACT ANGLE RANGES

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
FRONT HEADER	FH1	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
	FH2	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
SIDE RAIL	SR1	L 0°-50°	L 0°	L 36°
		R 0°-50°	R 0°	R 38°
	SR2A	L 0°-50°	L 0°	L 35°
		R 0°-50°	R 0°	R 36°
	SR2B	L 0°-50°	L 0°	L 35°
	SR3-1	L 0°-50°	L 0°	L 24°
		R* 0°-50°	R 0°	R 0°
A-PILLAR	AP1	L -5°-50°	L -5°	L 31°
		R -5°-50°	R -5°	R 31°
	AP2	L -5°-50°	L -5°	L 38°
		R -5°-50°	R -5°	R 16°
	AP3	L -5°-50°	L -5°	L 37°
		R -5°-50°	R -5°	R 38°
B-PILLAR	BP1	L -10°-50°	L -10°	L 13°
	BP2*	L 0°-50°	L 0°	L 7°
	BP3	L -10°-50°	L -10°	L 4°

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
	BP4	L -10°-50°	L -10°	L -10°
DOOR FRAME	DF1	R -10°-50°	R -10°-50°	R 11°
	DF3	R -10°-50°	R -10°-50°	R 3°
	DF4	R -10°-50°	R -10°-50°	R -10°
REAR PILLAR	RP1	L -10°-50°	L -10°	L 28°
		R -10°-50°	R -10°	R 29°
	RP2*	L 0°-50°	L 0°	L 0°
		R 0°-50°	R 0°	R 0°
REAR HEADER	RH	L 0°-50°	L -10°	L 36°
		R 0°-50°	R -10°	R 40°
UPPER ROOF 1		0°-50°	0°	50°
UPPER ROOF 2		0°-50°	0°	50°
UPPER ROOF 3		0°-50°	0°	50°
UPPER ROOF 4		0°-50°	0°	50°
UPPER ROOF 5		0°-50°	0°	50°
UPPER ROOF 6		0°-50°	0°	50°

As determined using the Procedures specified in S8.13.4.2. *Targets BP2, RP2, and SR3-1 (Right) are seat belt anchorage locations.

RECORDED BY: David G. Gotwals DATE: September 2, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Ford F150 XLT

VEH. NHTSA NO.: PW0201 VIN: 1FTZX1764WN COLOR: Red

VEH. BUILD DATE: November, 1997 TEST DATES: September 7-8, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	220 mm	220 mm
T°	Horizontal ∠ {CG-F1 (Left Seat) to (Right A-Pillar)}	107.0°	--
A1°	360° - T°	253.0°	--
W°	Horizontal ∠ {CG-2 (Left Seat) to (Left A-Pillar)}	201.0°	--
A2°	A2° = W°	201.0°	--
U°	Horizontal ∠ {CG-2 (Left Seat) to (Left B-Pillar)}	296.5°	--
B1°	B1° = U°	296.5°	--
V°	Horizontal ∠ {CG-R (Left Seat) to (Left B-Pillar)}	216.5°	--
B2°	B2° = V°	216.5°	--
W° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right A-Plillar}}	--	158.9°
A1° (right)	A1° (right) = W° (right)	--	158.9°
T ° (right)	Horizontal ∠ {CG-F1 (Right Seat) to (Left A-Pillar)}	--	250.7°
A2° (right)	360°-T° (right)	--	109.3°
V ° (right)	Horizontal ∠ {CG-R (Right Seat) to (Right B-Pillar)}	--	143.9°
B1° (right)	B1° (right) = V° (right)	--	143.9°
U ° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right B-Pillar)}	--	64.9°
B2° (right)	B2° (right) = U° (right)	--	64.9°
J	A-Pillar {(Plane 3) - (Plane 5)}	399.7 mm	390.9 mm
J/2	J ÷ 2	199.9 mm	195.5 mm
D1	Upper Roof {(Plane A) - (Plane B)}	1427.1 mm	
D1/2	D1 ÷ 2	713.6 mm	
D2	Upper Roof {(Plane C) - (Plane D)}	1323.3 mm	
D2/2	D2 ÷ 2	661.7 mm	
.35D1	.35 x D1	499.5 mm	

Measurement	Description	Left Side	Right Side
.35D2	.35 x D2	463.2 mm	
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	544.8 mm	--
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	272.4 mm	--
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	136.2 mm	--
D	R-Pillar (Point 7 - Point M)	680.0 mm	680.0 mm
D/2	D / 2	340.0 mm	340.0 mm
3 D/7	3 D / 7	291.4 mm	291.4 mm
DN	D / N	--	548.9 mm
DN/2	D N / 2	--	274.5 mm
DN/4	D N / 4	--	137.2 mm

As determined using the Procedures specified in S10.1-10.13.

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2161.7	-442.7	772.0	2161.7	442.7	772.0
Rear Row	2852.7	-442.7	772.0	2852.7	442.7	772.0

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2161.6	-442.8	771.6	2162.1	444.0	771.9
Rear Row	2852.4	-444.8	771.8	2853.0	442.0	772.0

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	2101.6	-442.8	1431.6	2102.1	444.0	1431.9
CGF2	2321.6	-442.8	1431.6	2322.1	444.0	1431.9
CGR	3012.4	-444.8	1431.8	3013.0	442.0	1432.0

REFERENCE FOR VEHICLE COORDINATE SYSTEM:

- Vehicle coordinate information for the SgrP's was not available so a world coordinate system was used.

RECORDED BY: David G. Gotwals DATE: September 2, 2004
APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Ford F150 XLT

VEH. NHTSA NO.: PW0201 VIN: 1FTZX1764WN COLOR: Red

VEH. BUILD DATE: November, 1997 TEST DATES: September 7-8, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

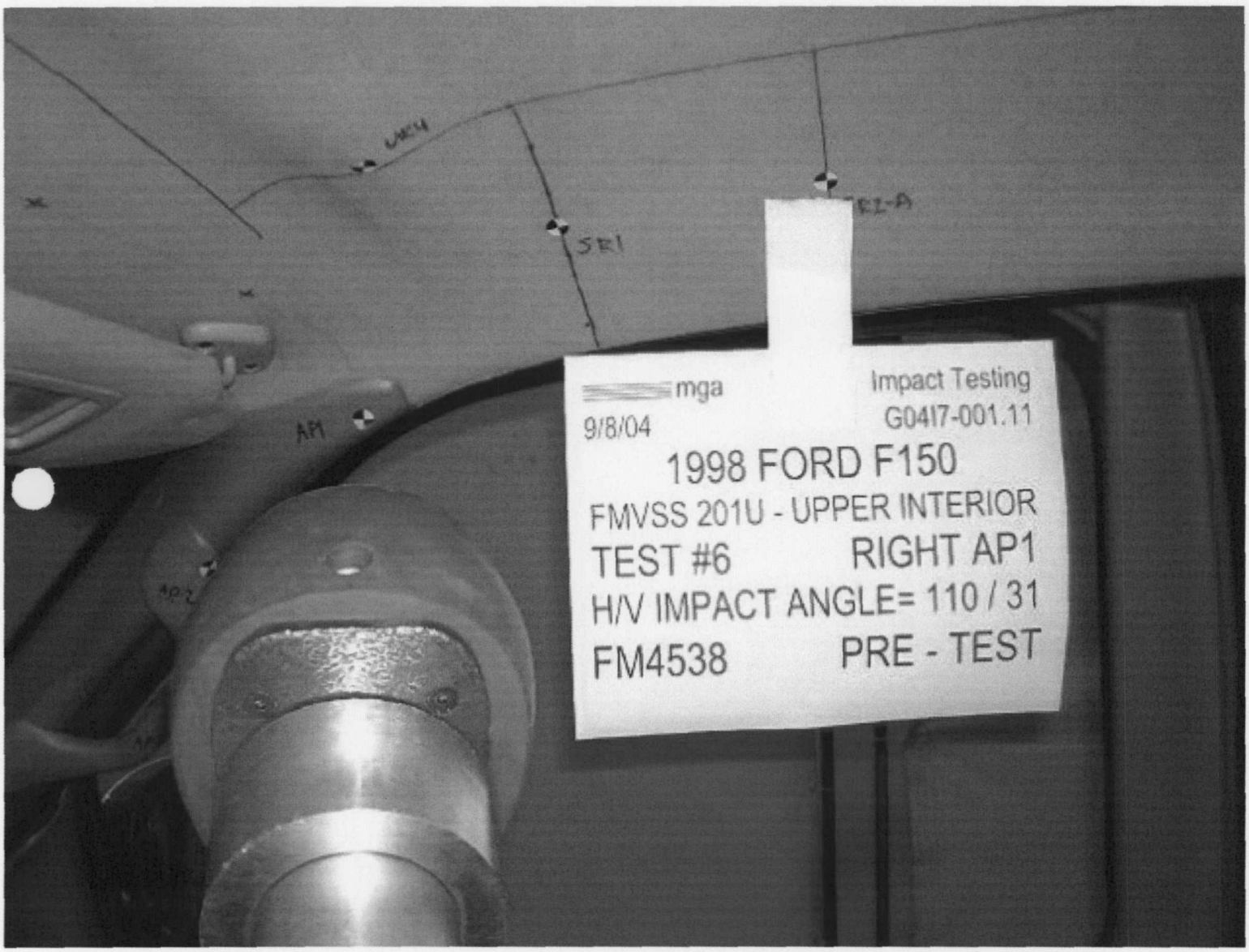
SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
A-Pillar Left Side								
AP1	1899.1	-615.2	1557.4	253	31	No	--	No
AP2	1777.1	-652.3	1470.4	201	38	No	--	Yes
AP3	1637.4	-694.4	1358.4	201	37	No	--	No
A-Pillar Right Side								
AP1	1897.3	621.5	1547.8	110	31	No	--	Yes
AP2	1779.0	648.6	1460.0	135	16	No	--	No
AP3	1733.4	684.5	1353.3	158	38	No	--	Yes
B-Pillar Left Side								
BP1	2500.2	-557.6	1674.0	270	13	No	--	No
BP2	2523.2	-682.0	1400.7	270	7	No	--	No
BP3	2452.1	-709.6	1402.1	270	4	No	--	No
BP4	2606.5	-815.3	1267.1	217	-10	No	--	No
Door Frame Right Side								
DF1	2533.4	552.2	1669.4	90	11	No	--	No
DF3	2447.5	728.4	1394.9	75	3	No	--	No
DF4	2602.0	812.1	1258.4	130	-10	No	--	No
Rear Pillar Left Side								
RP1	2991.6	-553.8	1645.1	315	28	No	--	No
RP2	3042.6	-668.7	1453.3	270	0	No	--	Yes
Rear Pillar Right Side								
RP1	2991.9	554.7	1637.1	45	29	No	--	No

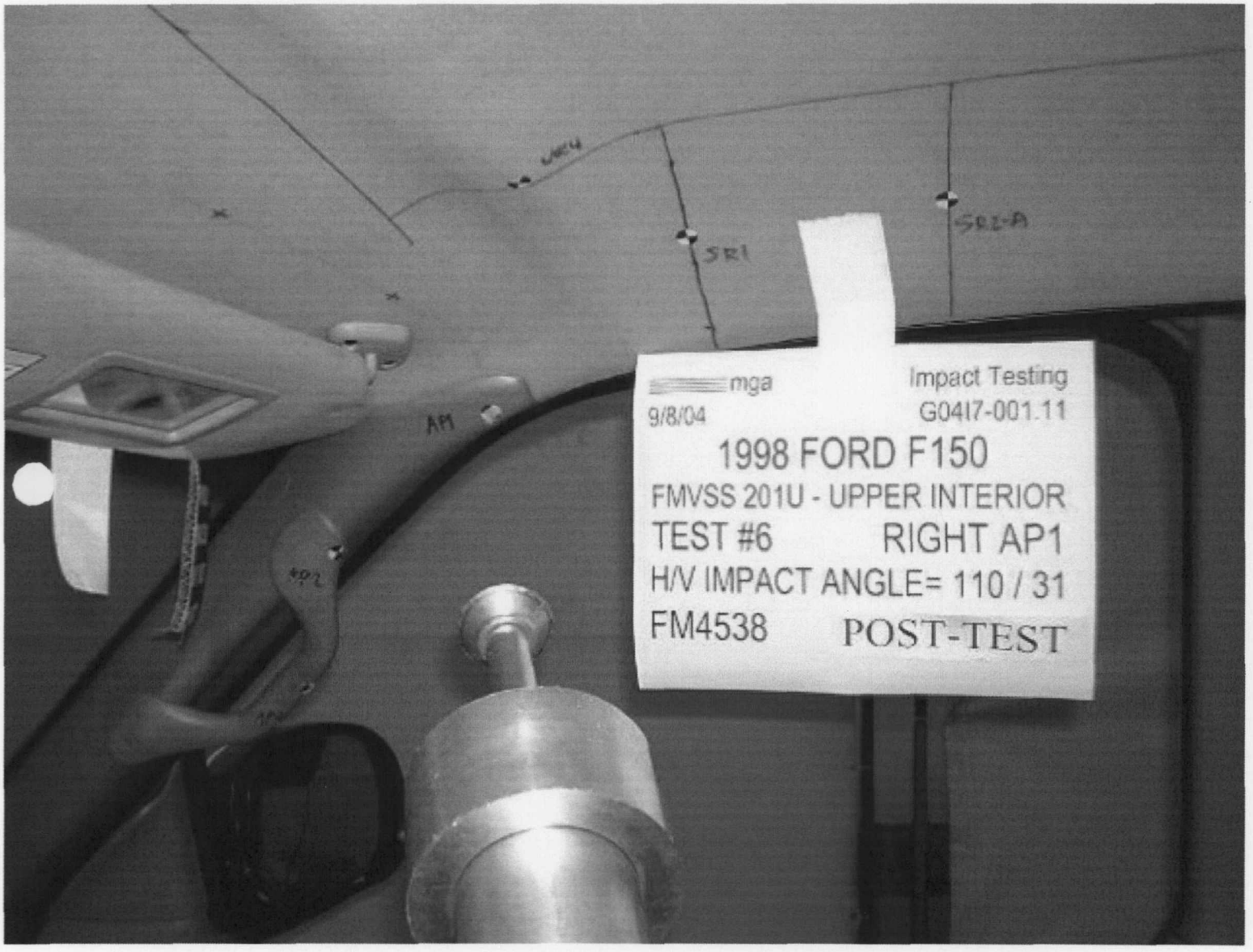
SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
RP2	3040.8	673.6	1445.7	90	0	No	--	No
Front Header Left Side								
FH1	1807.5	-518.4	1594.3	180	50	No	--	No
FH2	1777.0	-369.3	1604.9	180	50	No	--	No
Front Header Right Side								
FH1	1805.5	521.1	1587.2	180	50	No	--	No
FH2	1777.6	372.1	1599.2	180	50	No	--	No
Side Rail Left Side								
SR1	2048.7	-558.9	1651.0	270	36	No	--	No
SR2A	2199.1	-560.3	1661.6	270	35	No	--	Yes
SR2B	2200.4	-561.1	1661.3	270	35	No	--	No
SR3-1	2650.1	-580.4	1664.3	270	24	No	--	Yes
Side Rail Right Side								
SR1	2046.5	563.9	1643.6	90	38	No	--	No
SR2A	2197.4	561.9	1655.3	90	36	No	--	No
SR3-1	2621.0	569.3	1611.4	90	0	No	--	No
Rear Header Left Side								
RH	3013.6	-444.3	1656.6	0	36	No	--	No
Rear Header Right Side								
RH	2988.1	442.7	1655.4	0	40	No	--	Yes
Upper Roof Left Side								
UR1	1971.6	-459.0	1655.4	270	50	No	--	Yes
UR2	2499.3	-454.2	1694.3	270	50	No	--	Yes
UR3	2887.2	-458.0	1700.1	270	50	No	--	Yes
Upper Roof Right Side								
UR4	1973.5	456.0	1648.2	90	50	No	--	No
UR5	2535.1	456.0	1684.4	90	50	No	--	No
UR6	2885.5	453.7	1688.4	90	50	No	--	No

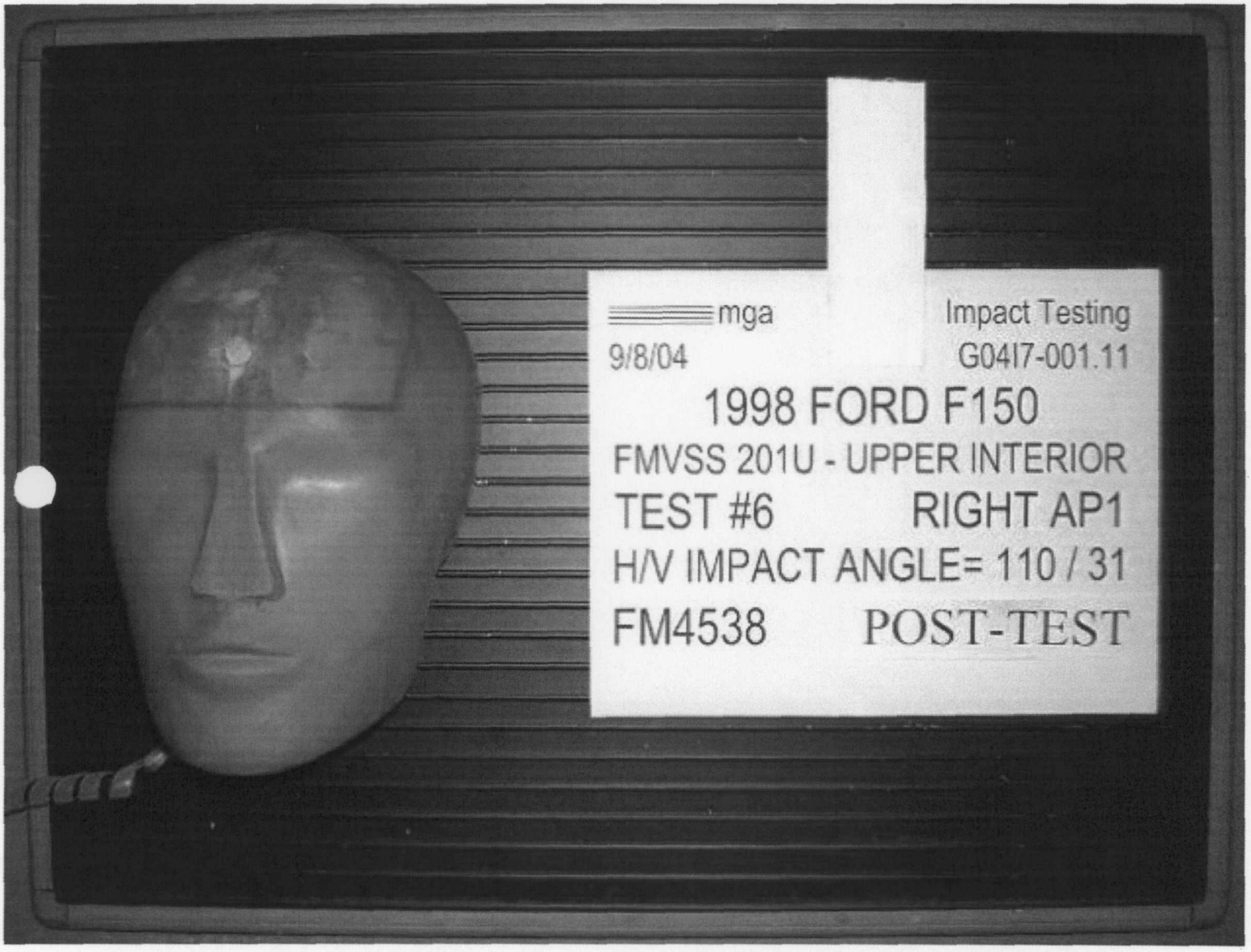
As determined using the Procedures specified in S10.1-10.13.

RECORDED BY: David G. Gotwals DATE: September 2, 2004

APPROVED BY: Helen A. Kaleto


UR4
SR1
AP1
mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #6
RIGHT AP1
H/V IMPACT ANGLE= 110 / 31
FM4538
PRE - TEST


SR1
SR2-A
AP1
mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #6
RIGHT AP1
H/V IMPACT ANGLE= 110 / 31
FM4538
POST-TEST


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #6
RIGHT AP1
H/V IMPACT ANGLE= 110 / 31
FM4538
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP1 Right

MGA Test Reference No.:FM4538

Approach Horizontal Angles:110°

Approach Vertical Angles:31°

Test Number:#6

Temperature:22C

Humidity:54%

Time of Test:9:45 AM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1182	1345	2.7	23.7	20	2 R

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.67	1.67
Y	6	J35916	100.2	1.54	1.54
Z	7	J35918	97.9	1.29	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: Helen A. Kaleto Date: 9-8-01

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD
Test # 6
FM4538
Additional Desc: N/A

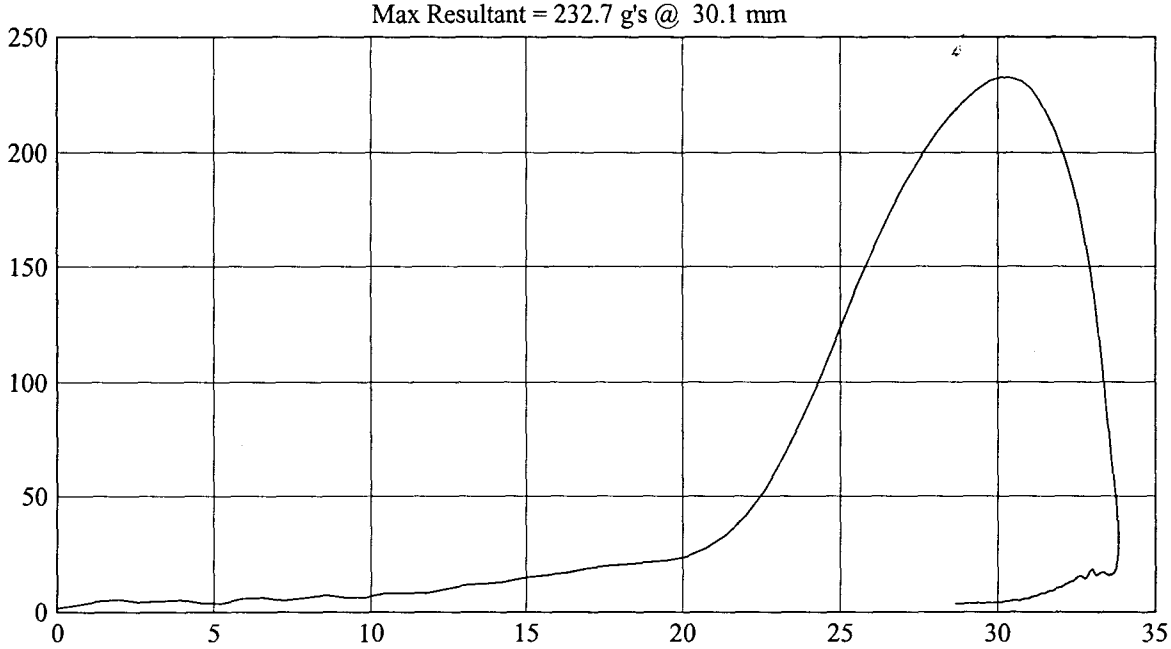
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 110/31

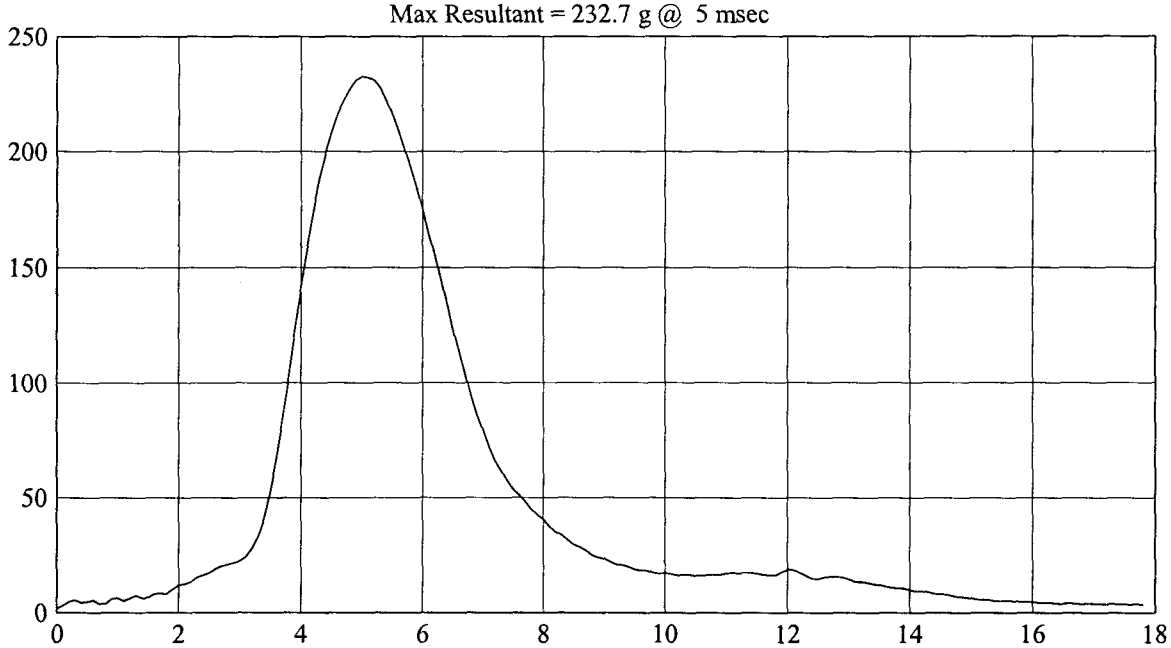
HIC(d) = 1182, HIC = 1345, Delta T = 2.7 msec

Max Resultant = 232.7 g's @ 30.1 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 232.7 g @ 5 msec

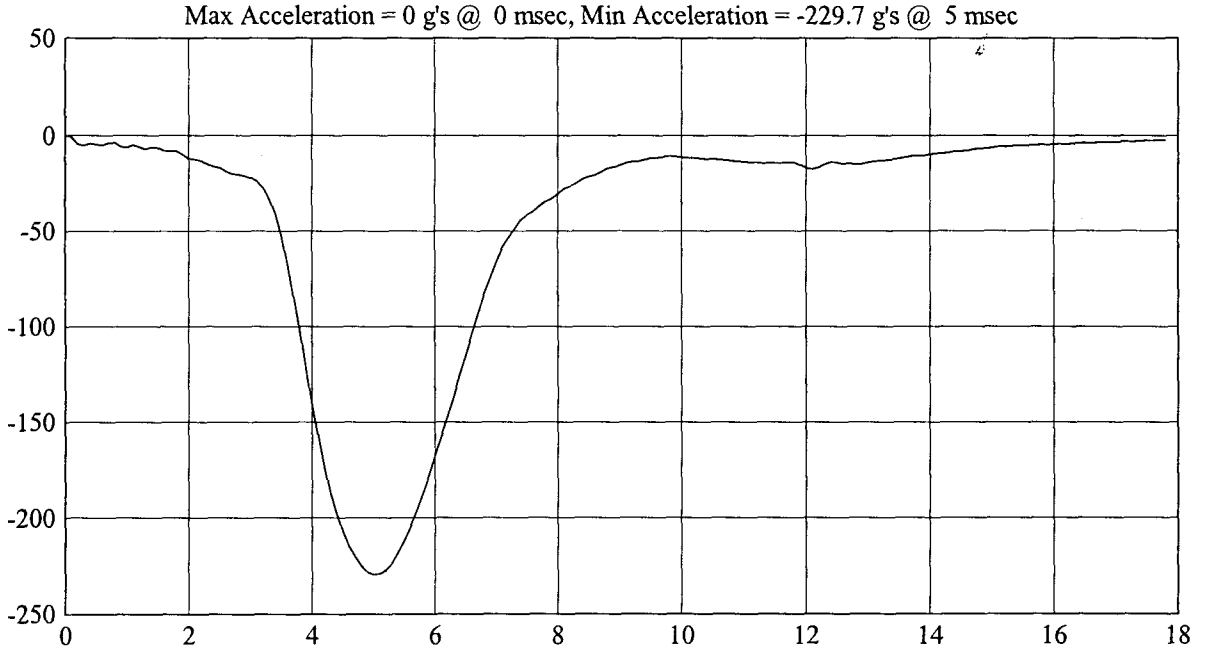


Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

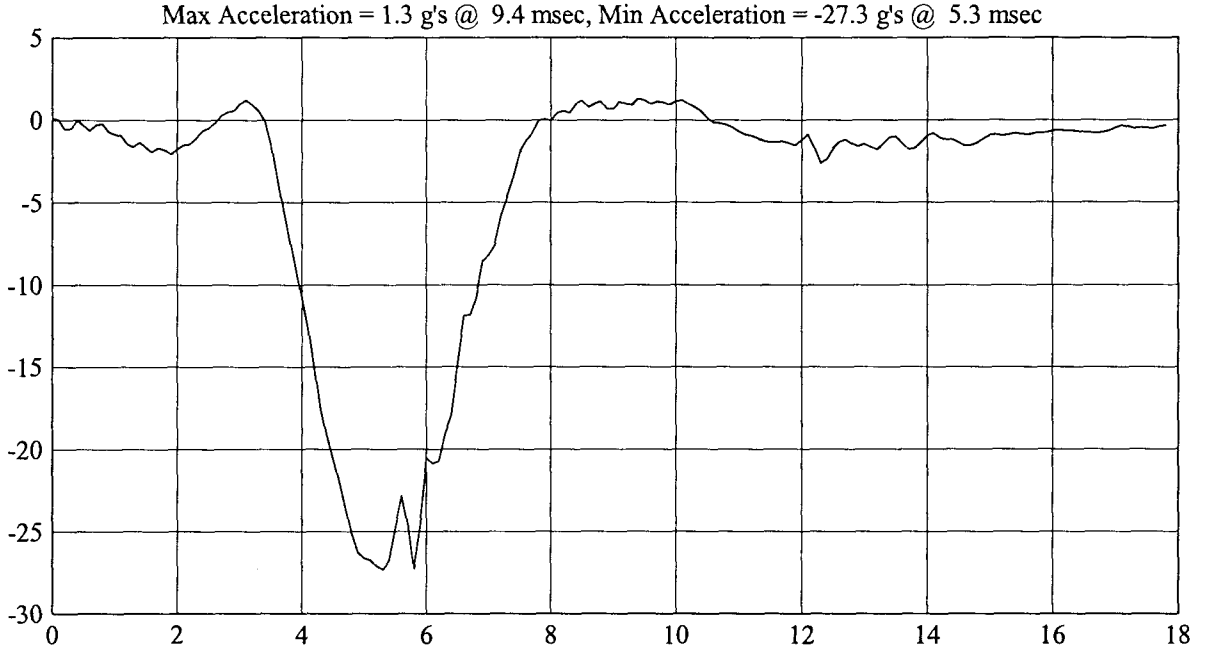
Customer: FORD | Vehicle Program : F150 | Model Year: 1998
Test # 6 | Target: AP1
FM4538 | Vehicle Side: Right
Additional Desc: N/A | Test Date: 9/8/04 | Horz/Vert Angle: 110/31
HIC(d) = 1182, HIC = 1345, Delta T = 2.7 msec

Max Acceleration = 0 g's @ 0 msec, Min Acceleration = -229.7 g's @ 5 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 1.3 g's @ 9.4 msec, Min Acceleration = -27.3 g's @ 5.3 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 6
FM4538
Additional Desc: N/A

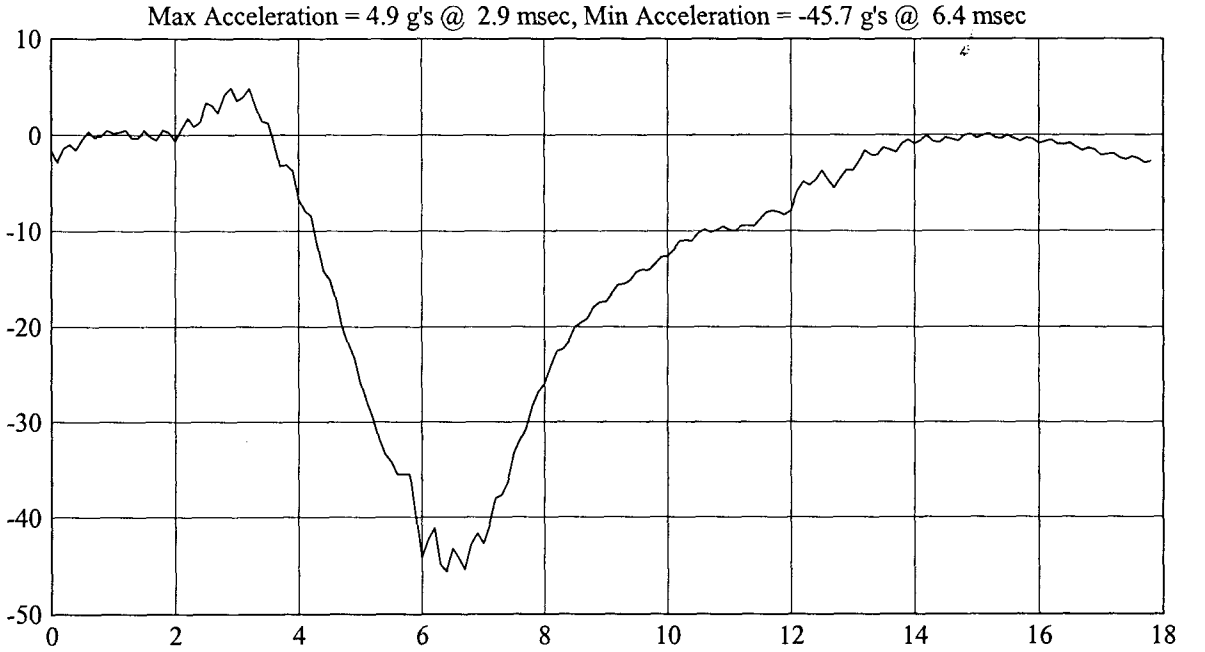
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 110/31

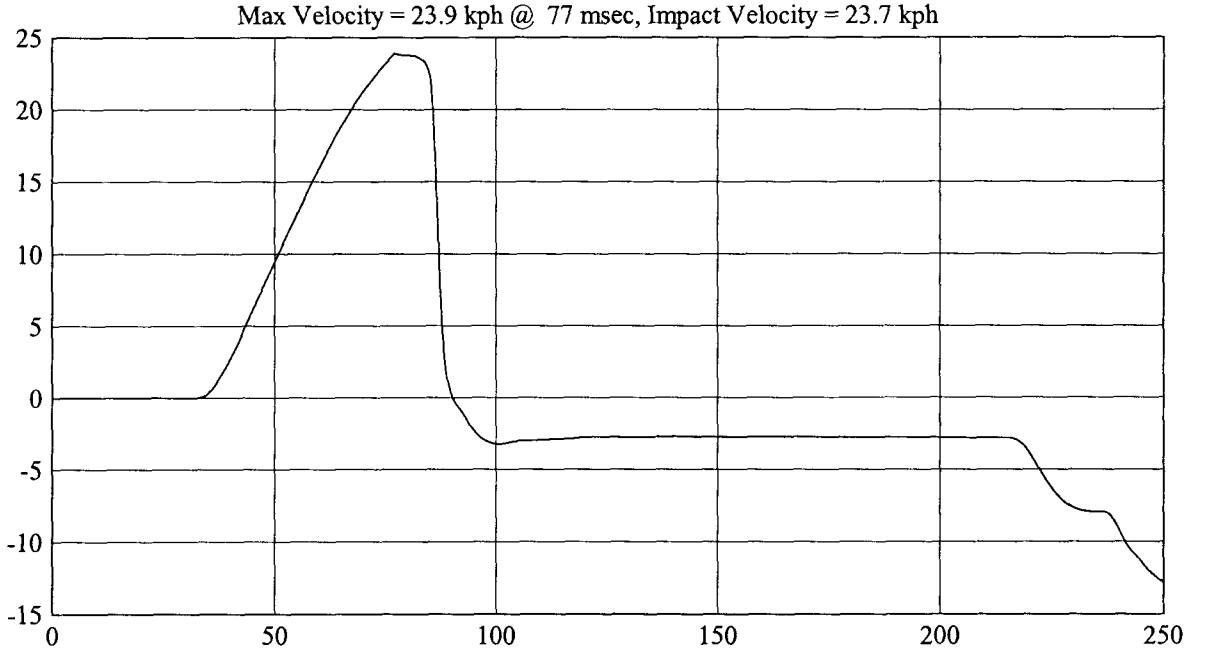
HIC(d) = 1182, HIC = 1345, Delta T = 2.7 msec

Max Acceleration = 4.9 g's @ 2.9 msec, Min Acceleration = -45.7 g's @ 6.4 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.9 kph @ 77 msec, Impact Velocity = 23.7 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 6
FM4538
Additional Desc: N/A

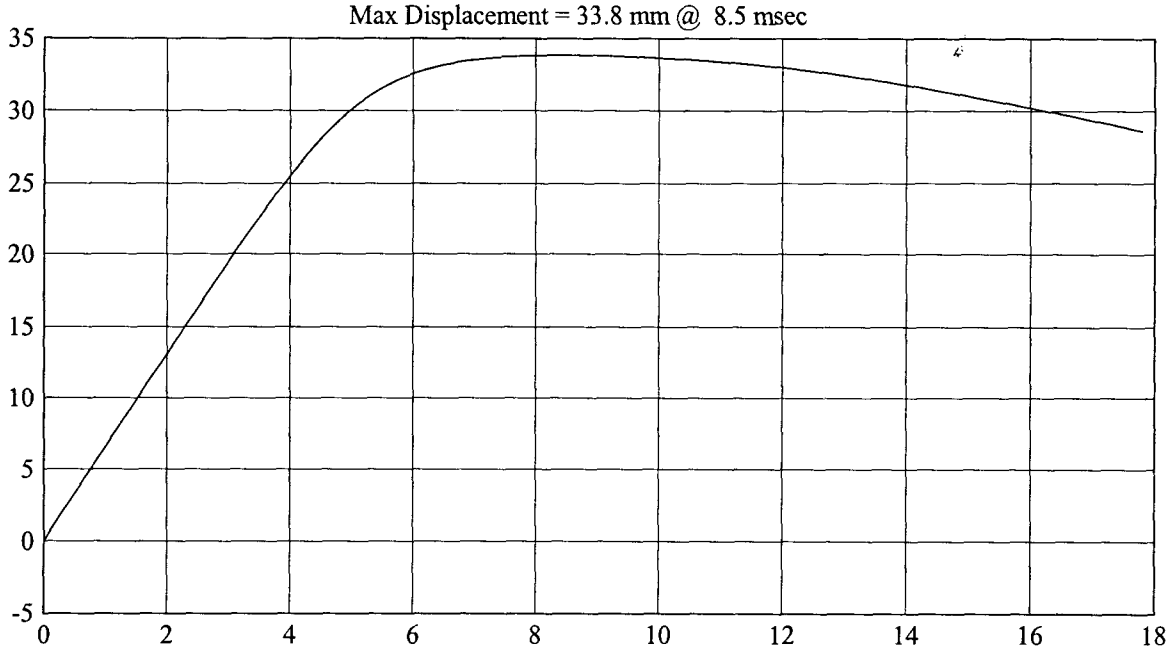
Vehicle Program : F150

Test Date: 9/8/04

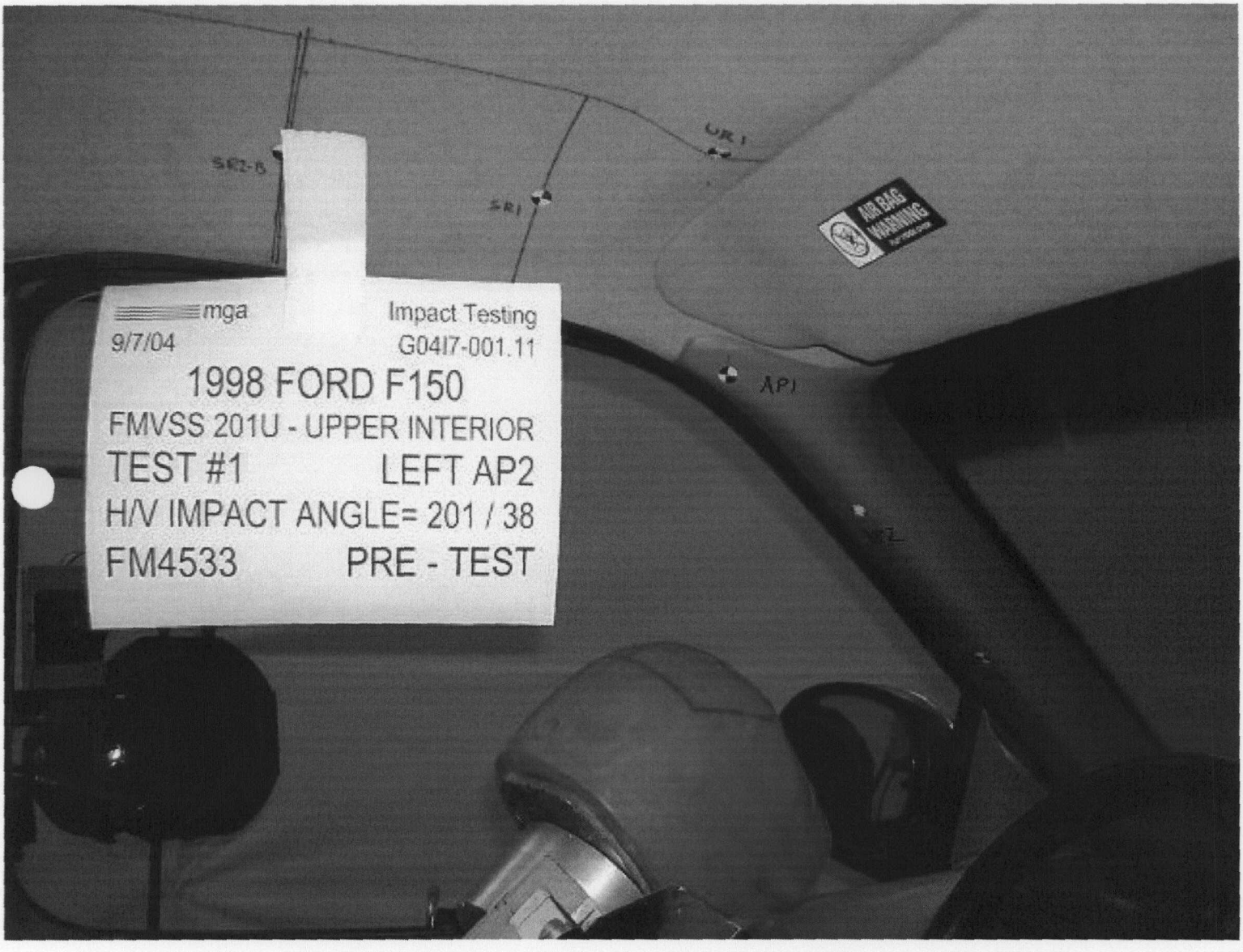
Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 110/31

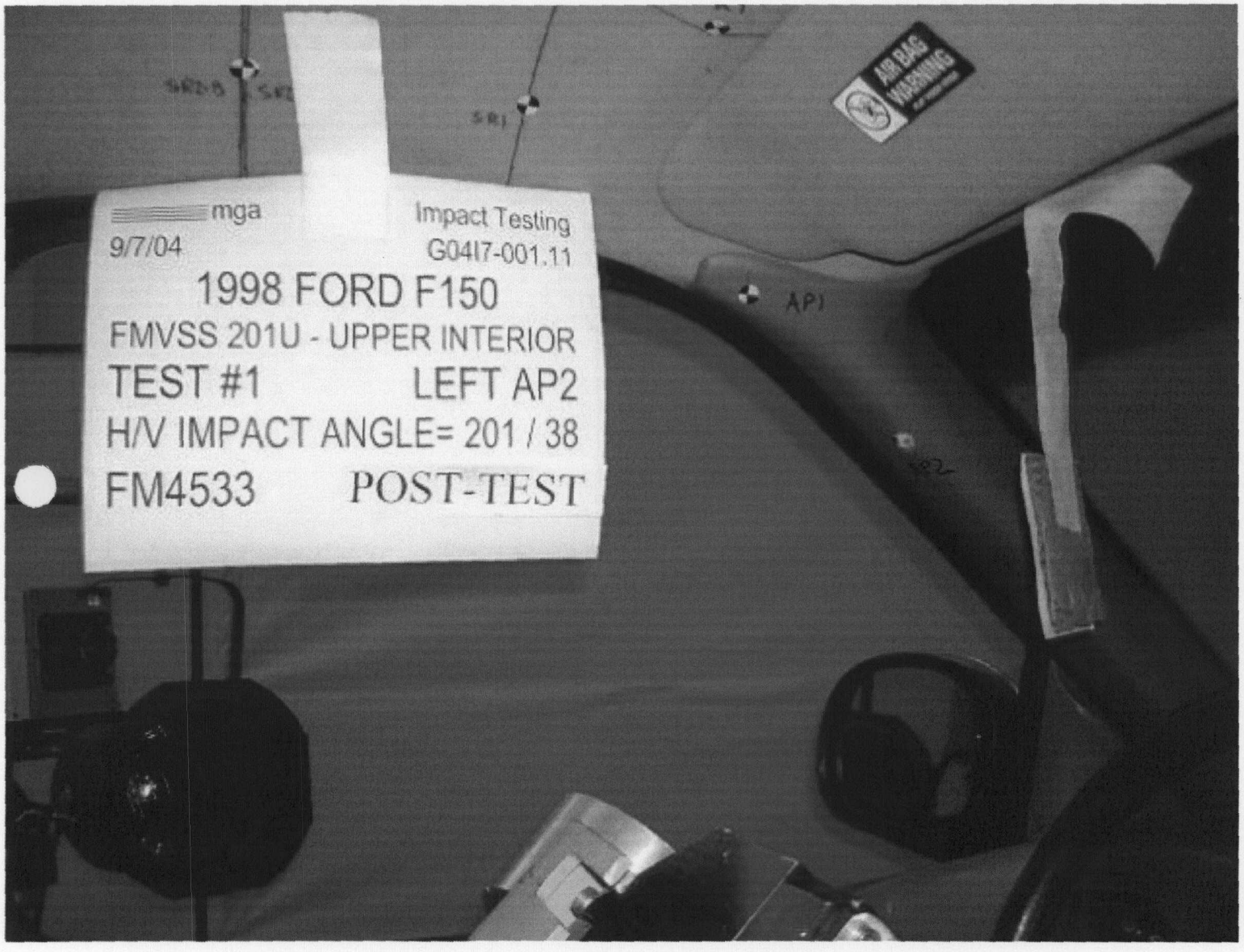
HIC(d) = 1182, HIC = 1345, Delta T = 2.7 msec

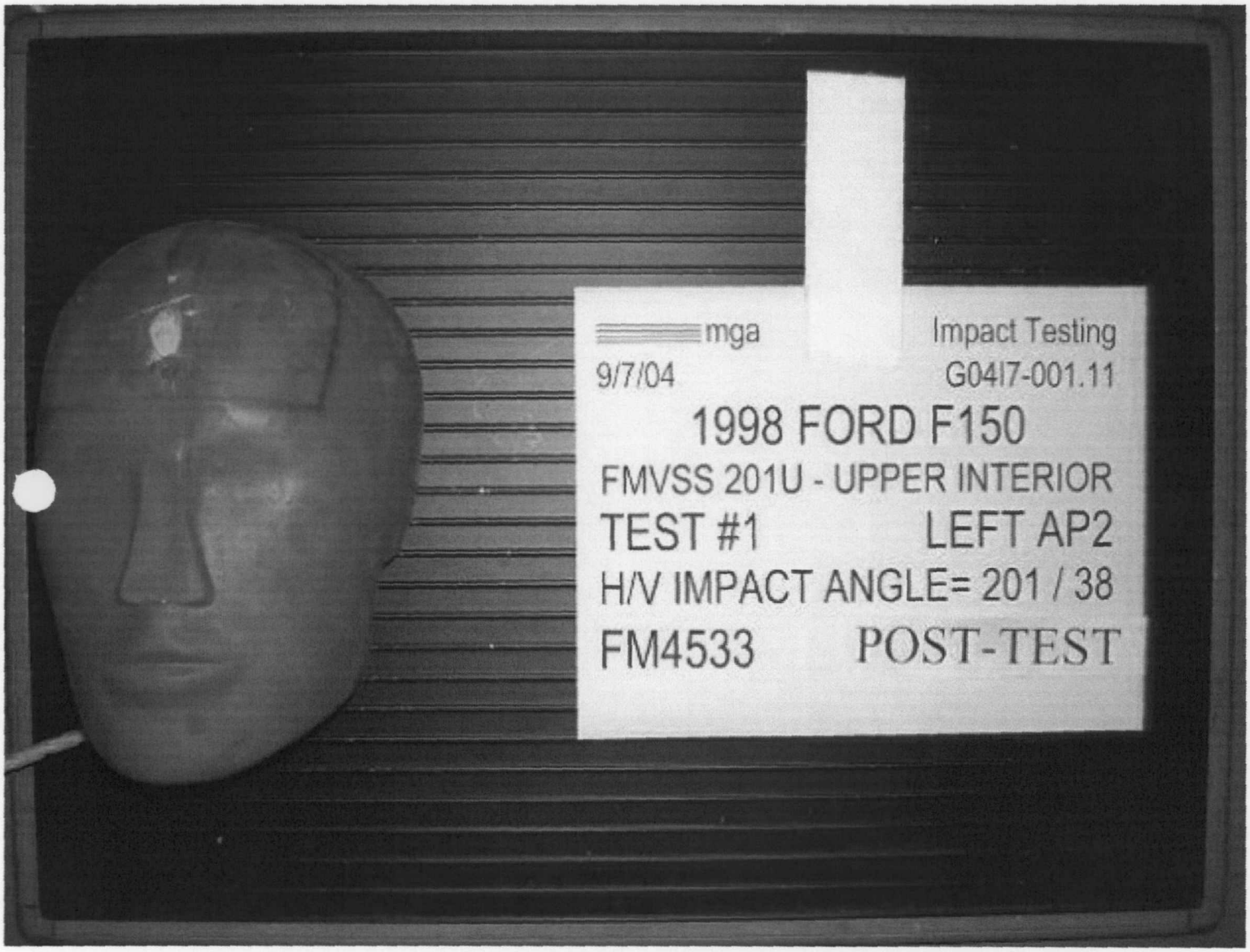
Max Displacement = 33.8 mm @ 8.5 msec



Displacement (mm) vs. Time (msec)


SR2-R
SR1
UR1
AIR BAG WARNING
AP1
mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #1
LEFT AP2
H/V IMPACT ANGLE= 201 / 38
FM4533
PRE - TEST


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #1
LEFT AP2
H/V IMPACT ANGLE= 201 / 38
FM4533
POST-TEST
AIR BAG WARNING
AP1


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #1
LEFT AP2
H/V IMPACT ANGLE= 201 / 38
FM4533
POST-TEST

MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP2 Left

MGA Test Reference No.:FM4533

Approach Horizontal Angles:201°

Approach Vertical Angles:38°

Test Number:#1

Temperature:22C

Humidity:62%

Time of Test: 12:00 PM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1331	1543	3.7	23.5	23	3 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: Helen Q. Kaleto Date: 9-7-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

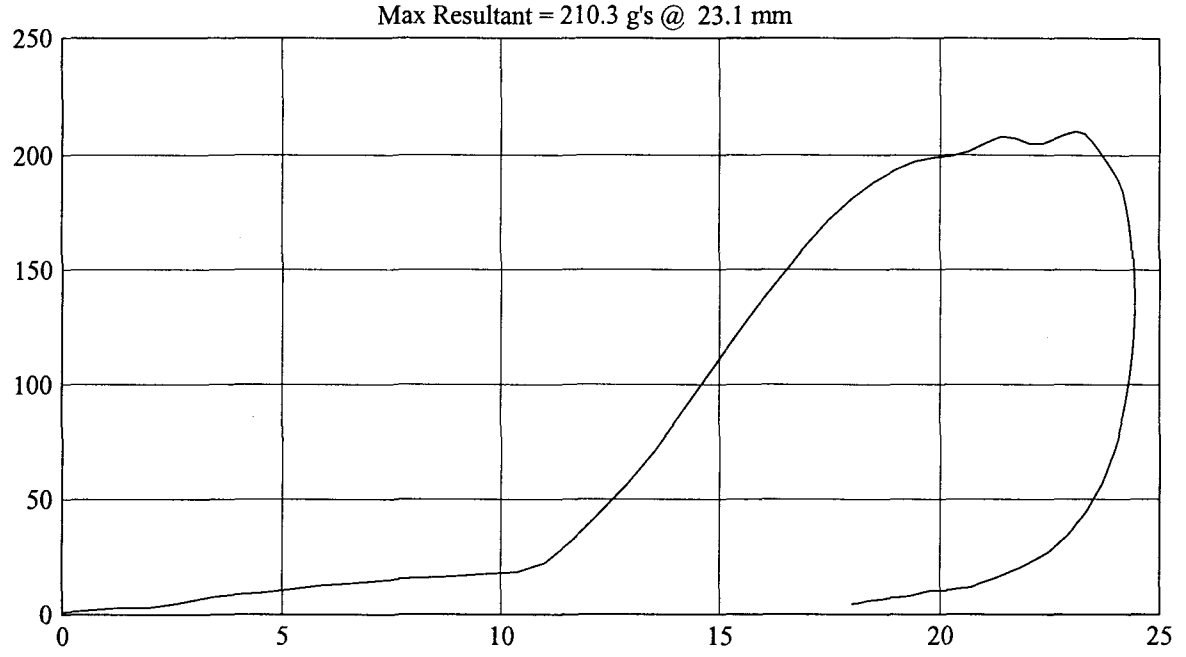
Customer: FORD
Test # 1
FM4533
Additional Desc: N/A

Vehicle Program : F150
Test Date: 9/7/04

Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/38

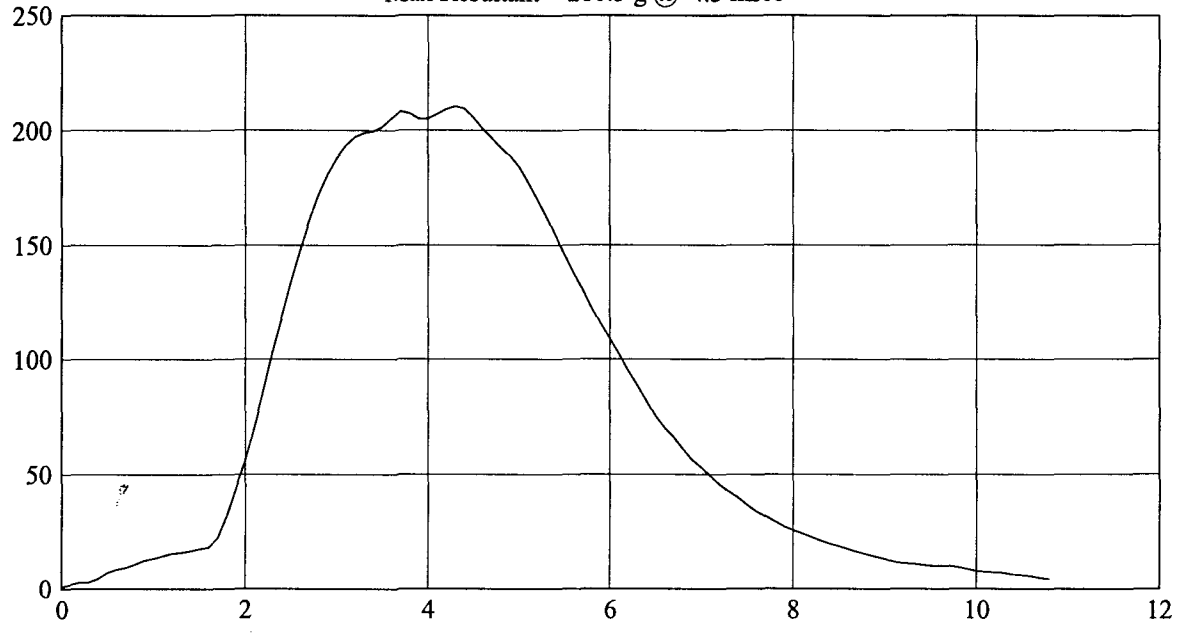
HIC(d) = 1331, HIC = 1543, Delta T = 3.7 msec

Max Resultant = 210.3 g's @ 23.1 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 210.3 g @ 4.3 msec

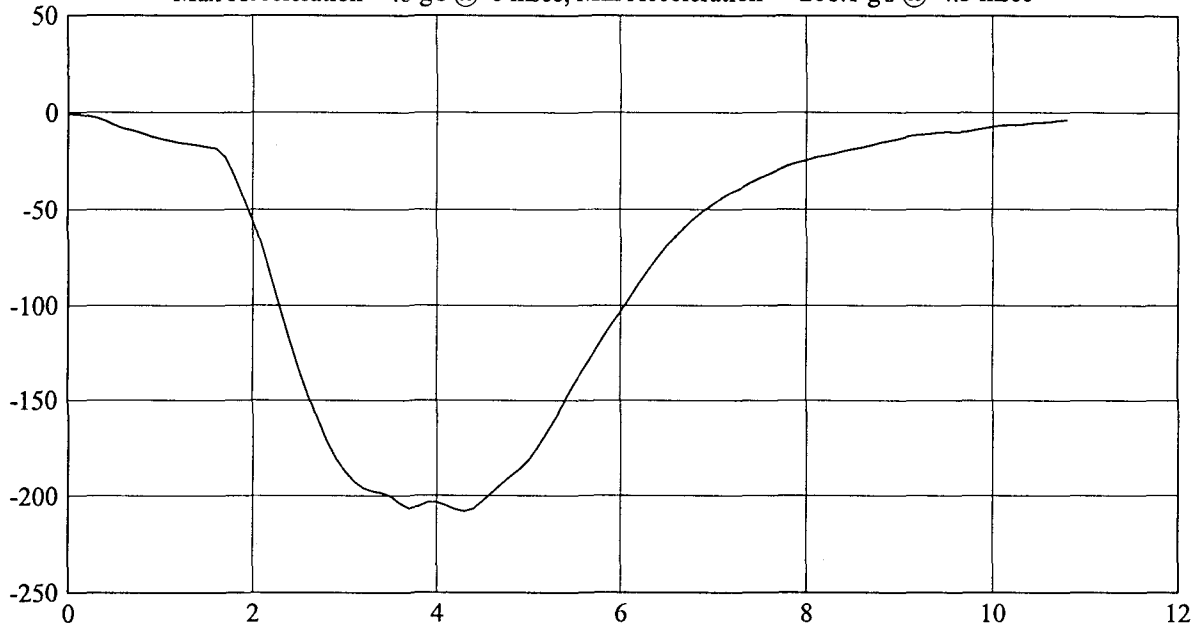


Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

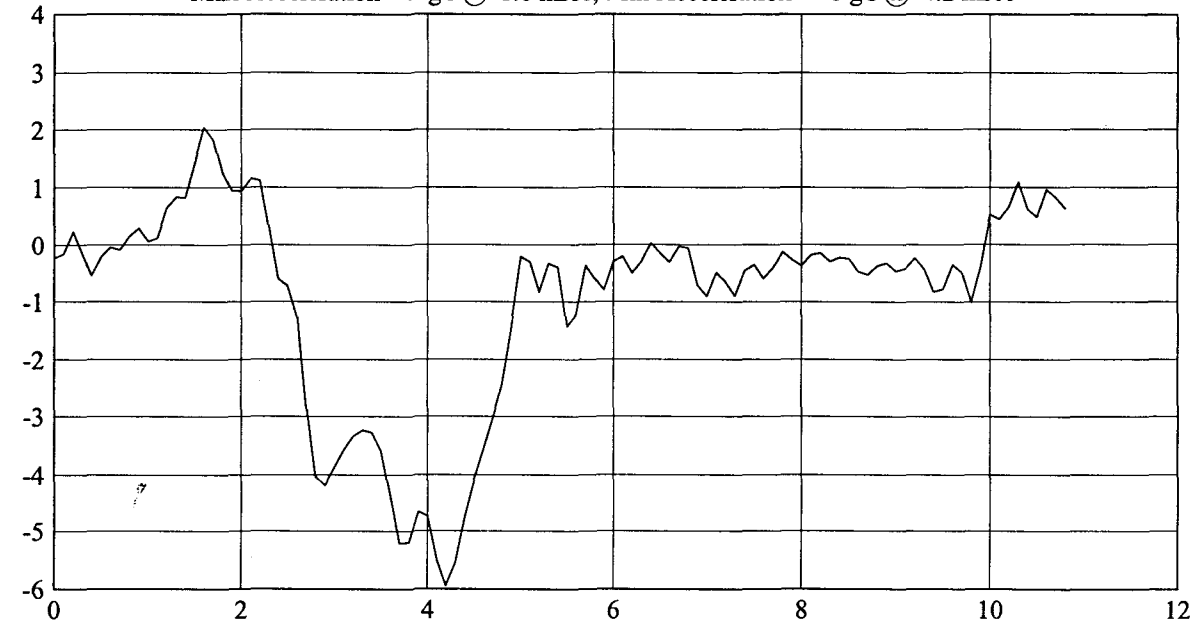
Customer: FORD | Vehicle Program : F150 | Model Year: 1998
Test # 1 | Target: AP2
FM4533 | Vehicle Side: Left
Additional Desc: N/A | Test Date: 9/7/04 | Horz/Vert Angle: 201/38
HIC(d) = 1331, HIC = 1543, Delta T = 3.7 msec

Max Acceleration =-.8 g's @ 0 msec, Min Acceleration = -208.1 g's @ 4.3 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 2 g's @ 1.6 msec, Min Acceleration = -6 g's @ 4.2 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 1
FM4533
Additional Desc: N/A

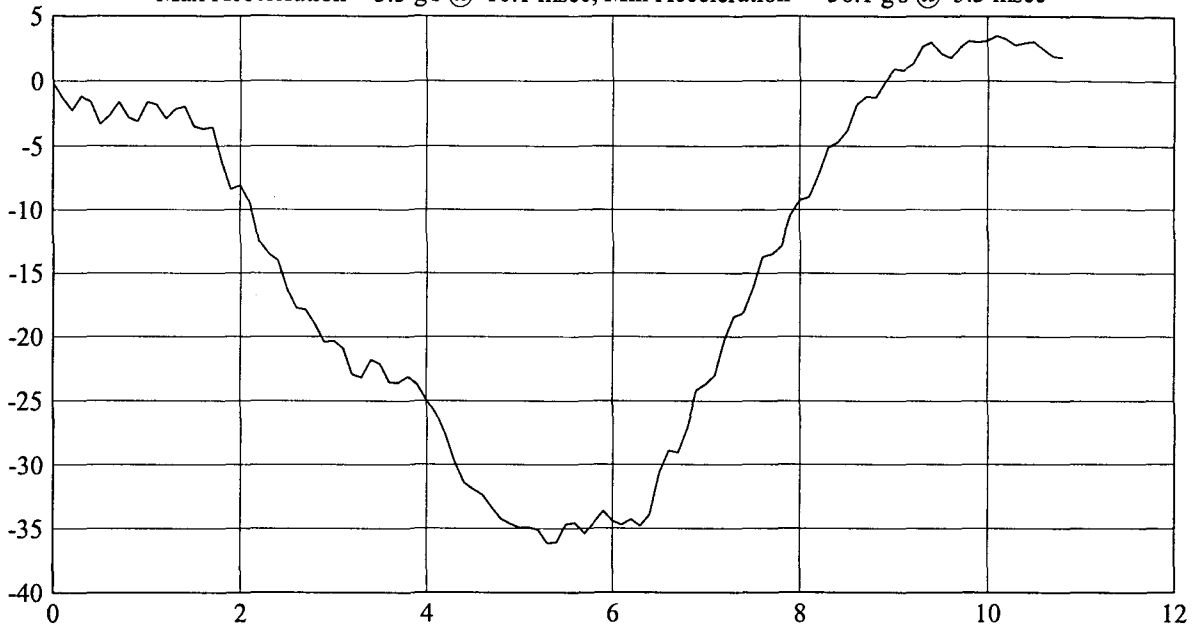
Vehicle Program : F150

Test Date: 9/7/04

Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/38

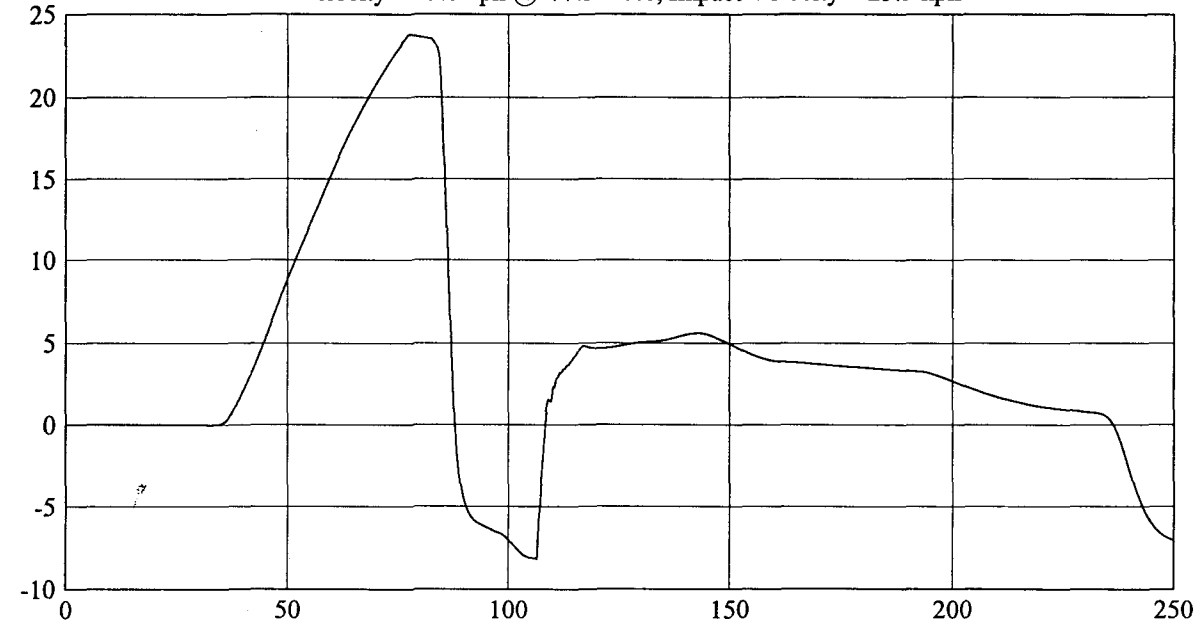
HIC(d) = 1331, HIC = 1543, Delta T = 3.7 msec

Max Acceleration = 3.5 g's @ 10.1 msec, Min Acceleration = -36.1 g's @ 5.3 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.8 kph @ 77.5 msec, Impact Velocity = 23.5 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

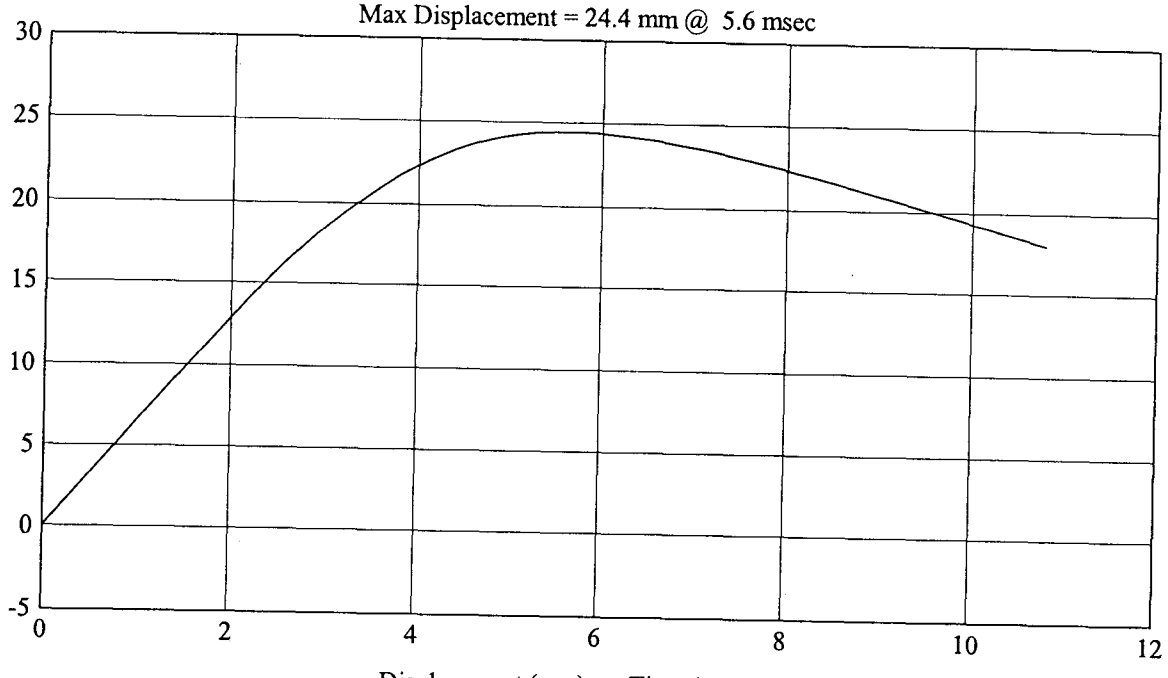
Customer: FORD
Test # 1
FM4533
Additional Desc: N/A

Vehicle Program : F150

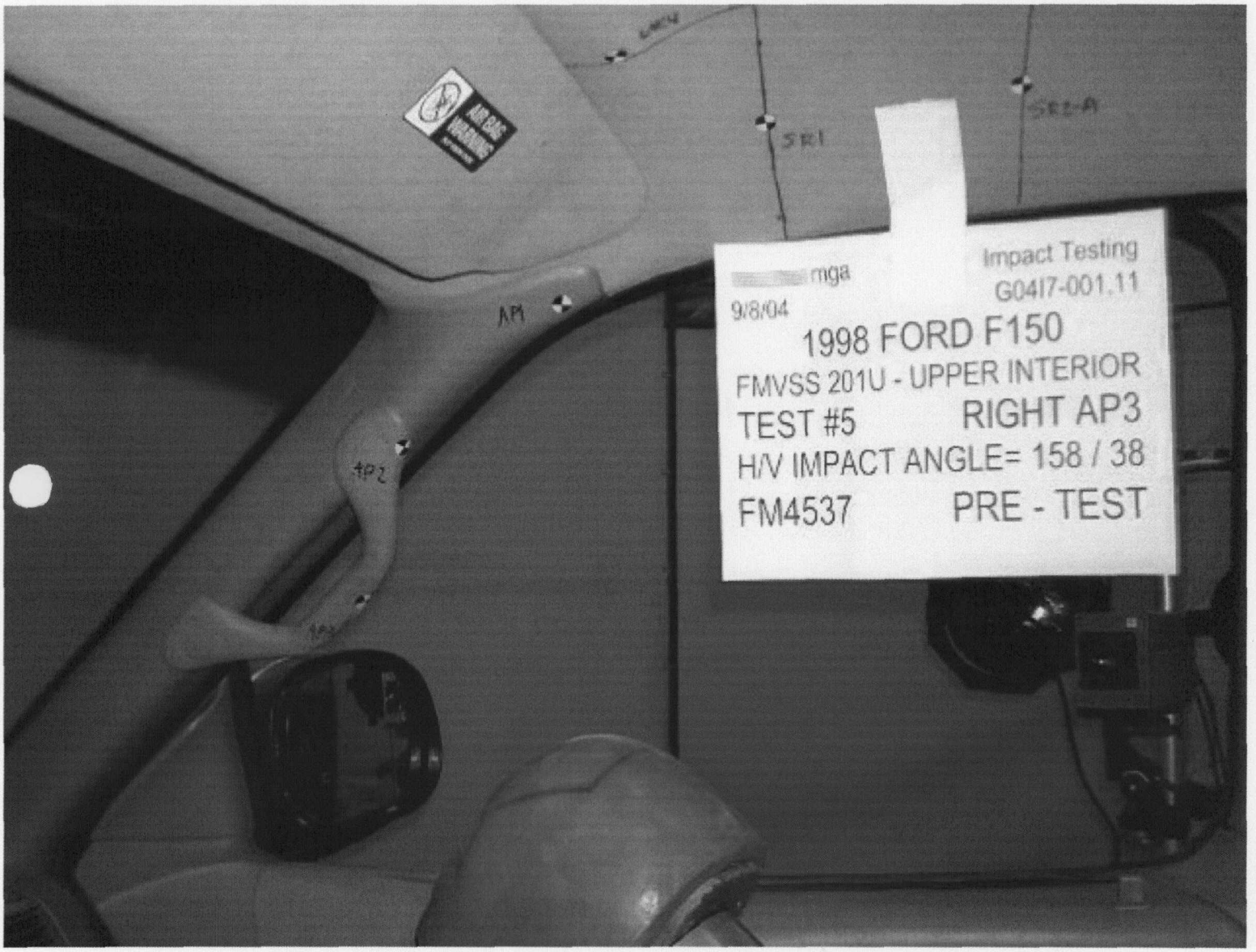
Test Date: 9/7/04
HIC(d) = 1331, HIC = 1543, Delta T = 3.7 msec

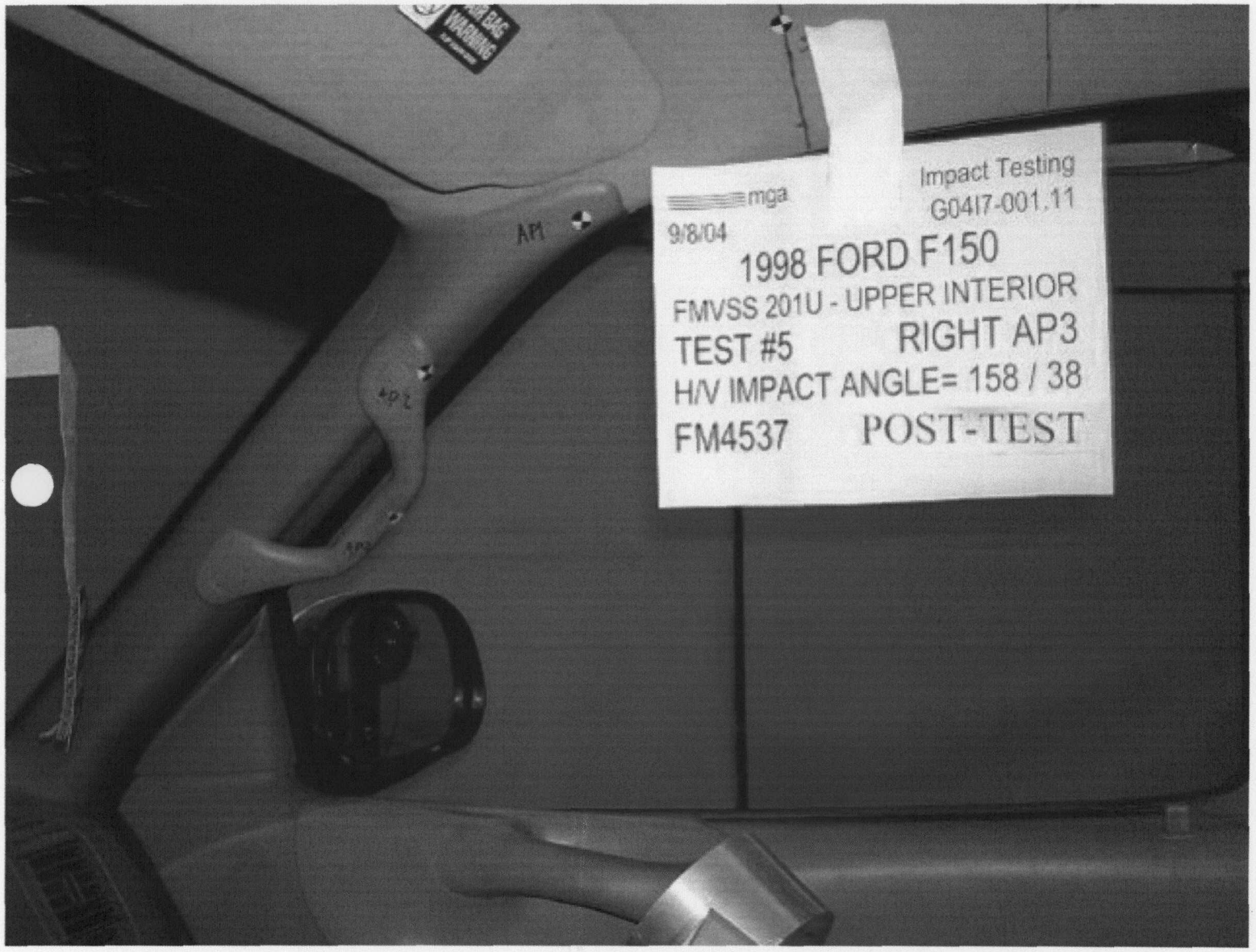
Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/38

Max Displacement = 24.4 mm @ 5.6 msec



Displacement (mm) vs. Time (msec)


SR1
SR2-A
AP1
AP2
mga
9/8/04
Impact Testing
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #5
RIGHT AP3
H/V IMPACT ANGLE= 158 / 38
FM4537
PRE - TEST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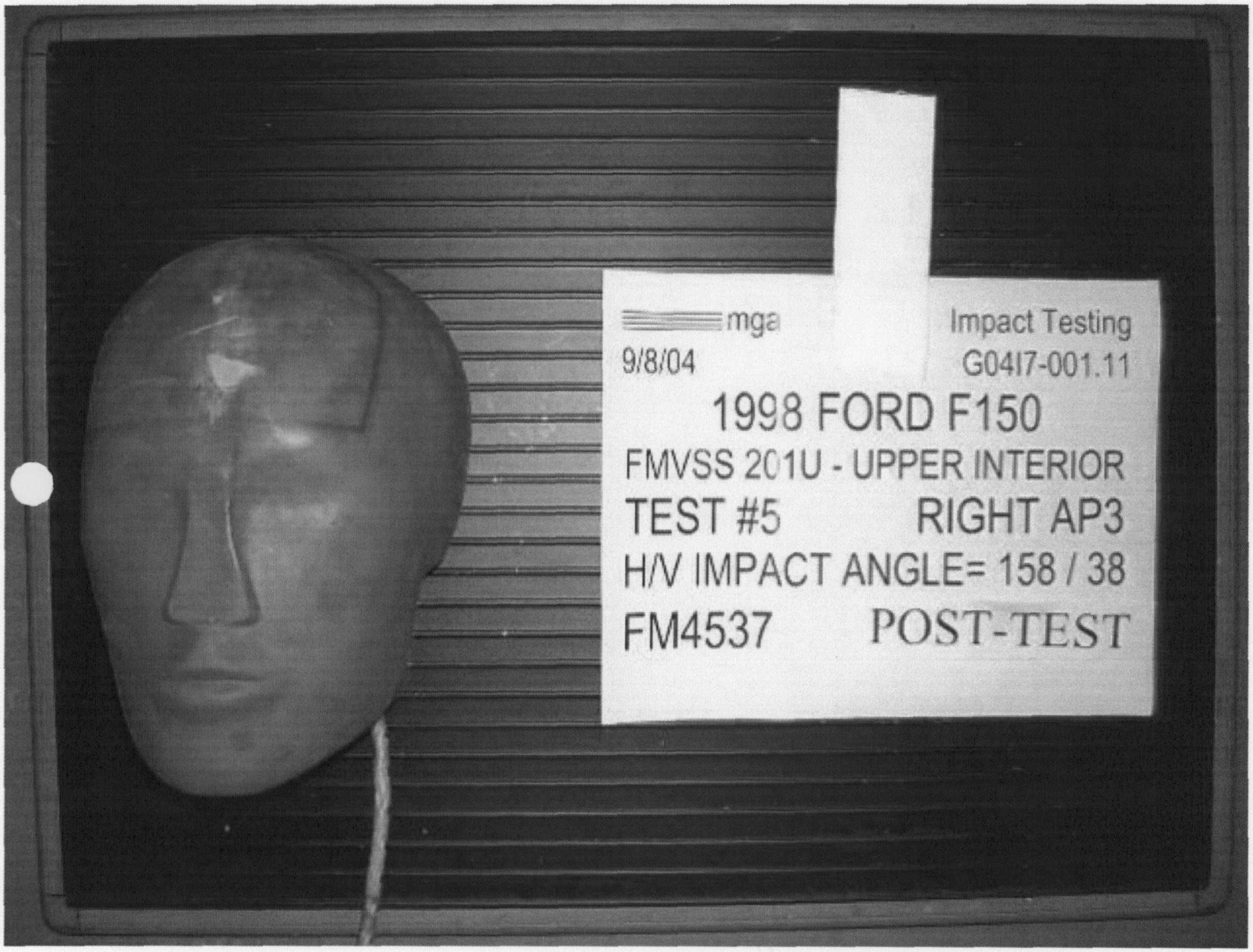
Impact Testing
G04I7-001.11
9/8/04
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #5
RIGHT AP3
H/V IMPACT ANGLE= 158 / 38
FM4537
POST-TEST
AP1
AP2
AP3


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #5
RIGHT AP3
H/V IMPACT ANGLE= 158 / 38
FM4537
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP3 Right

MGA Test Reference No.:FM4537

Approach Horizontal Angles:158°

Approach Vertical Angles:38°

Test Number:#5

Temperature:22C

Humidity:53%

Time of Test:9:00 AM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
436	357	9.2	23.6	17	6 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Grab handle deformation

Recorded By: _____ Approved By*: Helen A. Koleto Date: 9-8-04

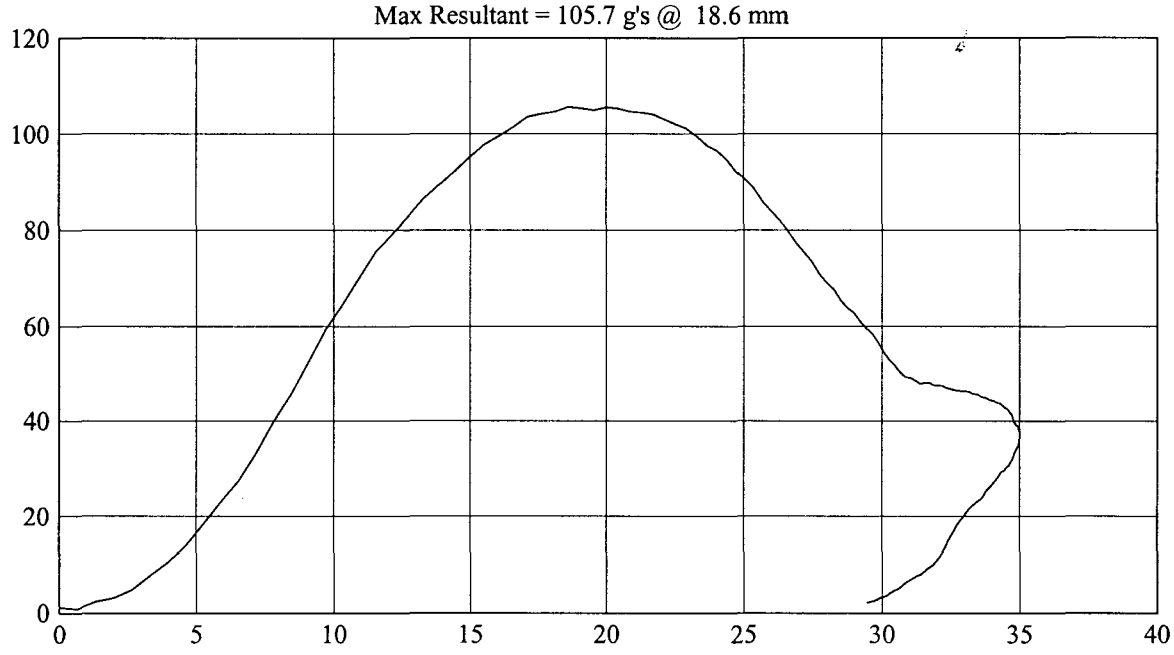
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 5		Target: AP3
FM4537		Vehicle Side: Right
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 158/38

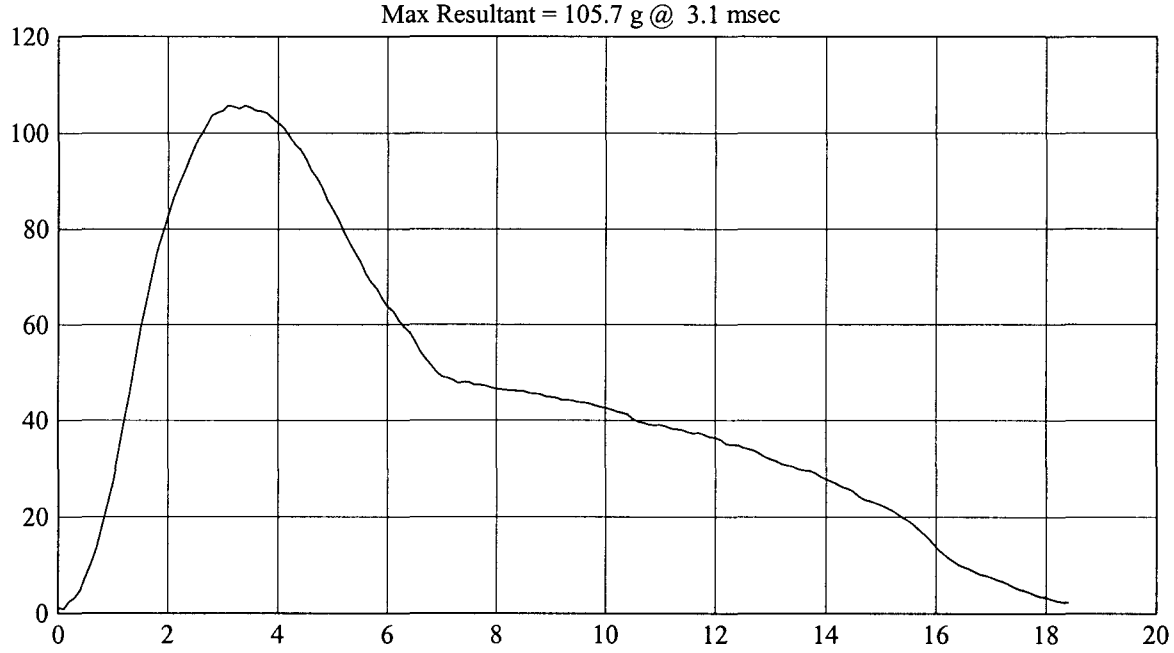
HIC(d) = 436, HIC = 357, Delta T = 9.2 msec

Max Resultant = 105.7 g's @ 18.6 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 105.7 g @ 3.1 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 5
FM4537
Additional Desc: N/A

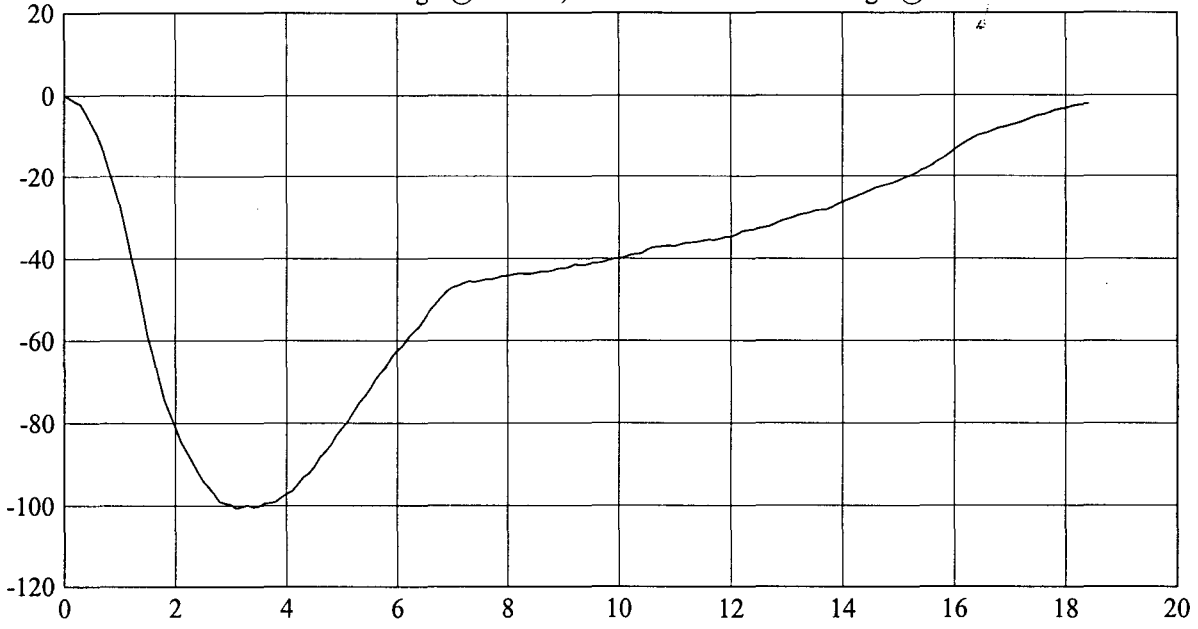
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 158/38

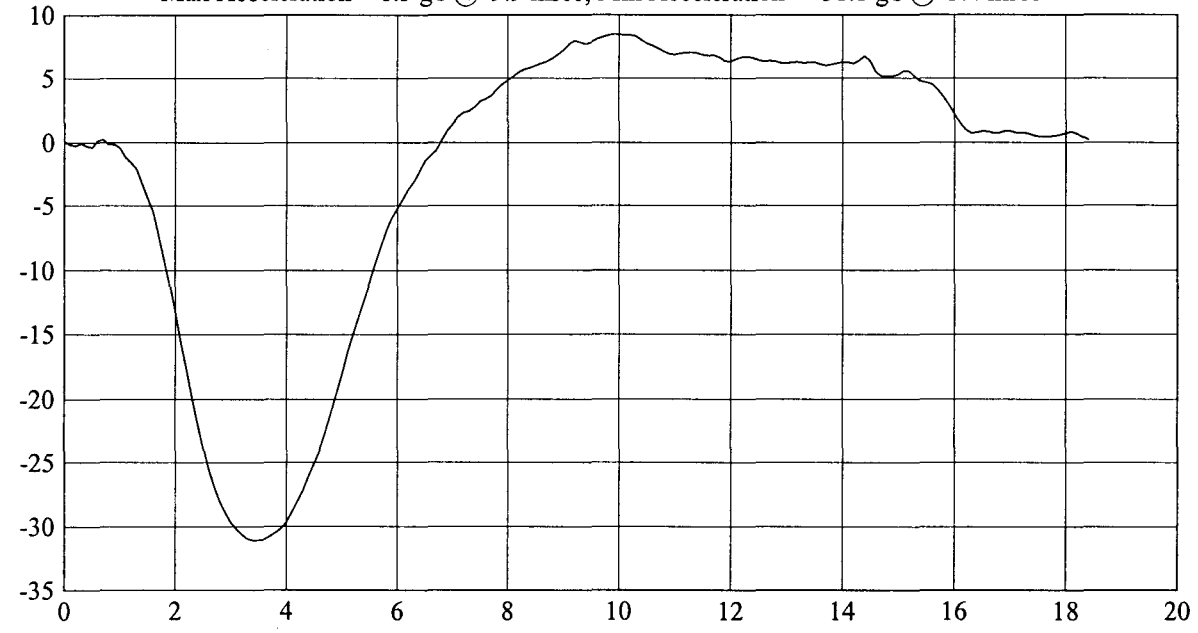
HIC(d) = 436, HIC = 357, Delta T = 9.2 msec

Max Acceleration = .1 g's @ 0 msec, Min Acceleration = -100.7 g's @ 3.1 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 8.5 g's @ 9.9 msec, Min Acceleration = -31.1 g's @ 3.4 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 5
FM4537
Additional Desc: N/A

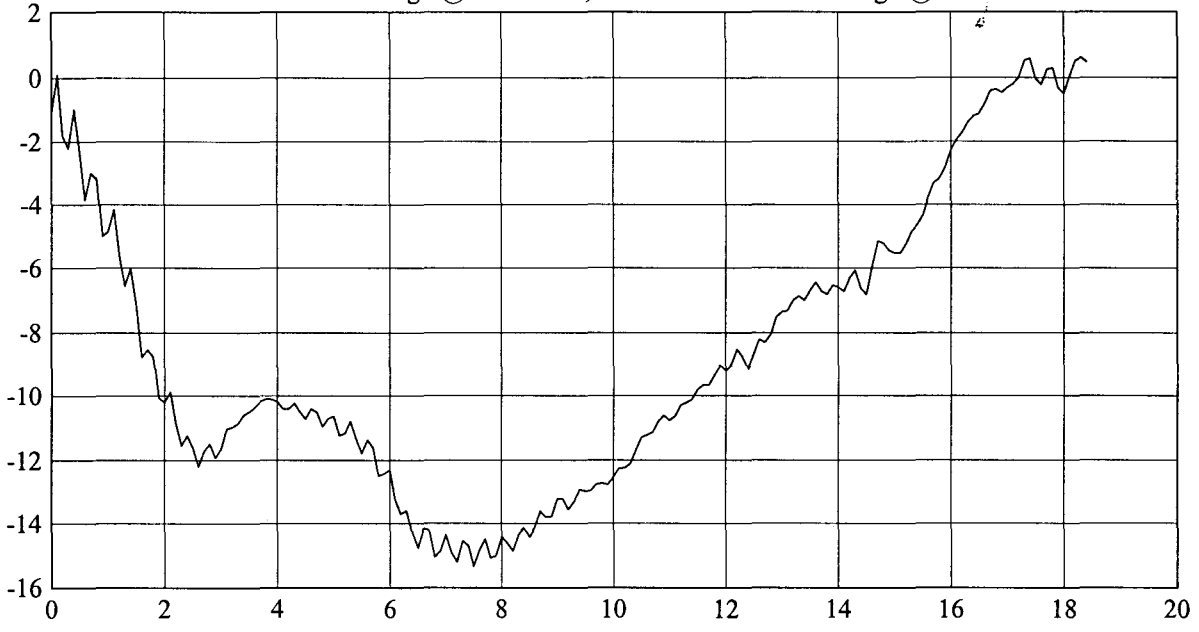
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 158/38

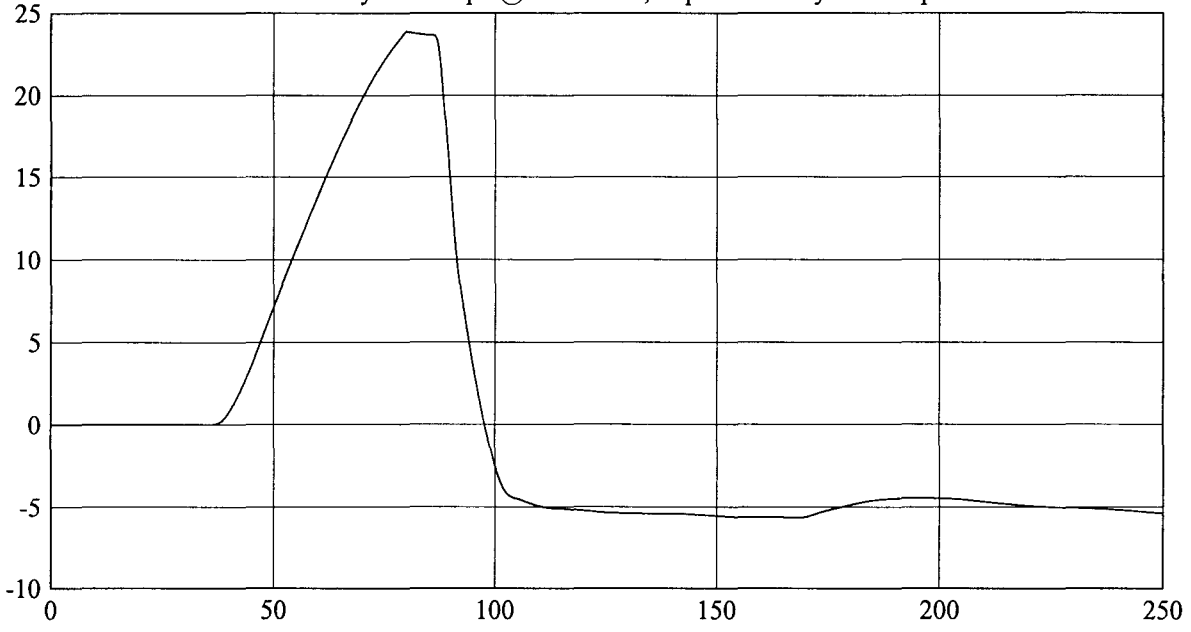
HIC(d) = 436, HIC = 357, Delta T = 9.2 msec

Max Acceleration = .6 g's @ 18.3 msec, Min Acceleration = -15.4 g's @ 7.5 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.9 kph @ 79.9 msec, Impact Velocity = 23.6 kph



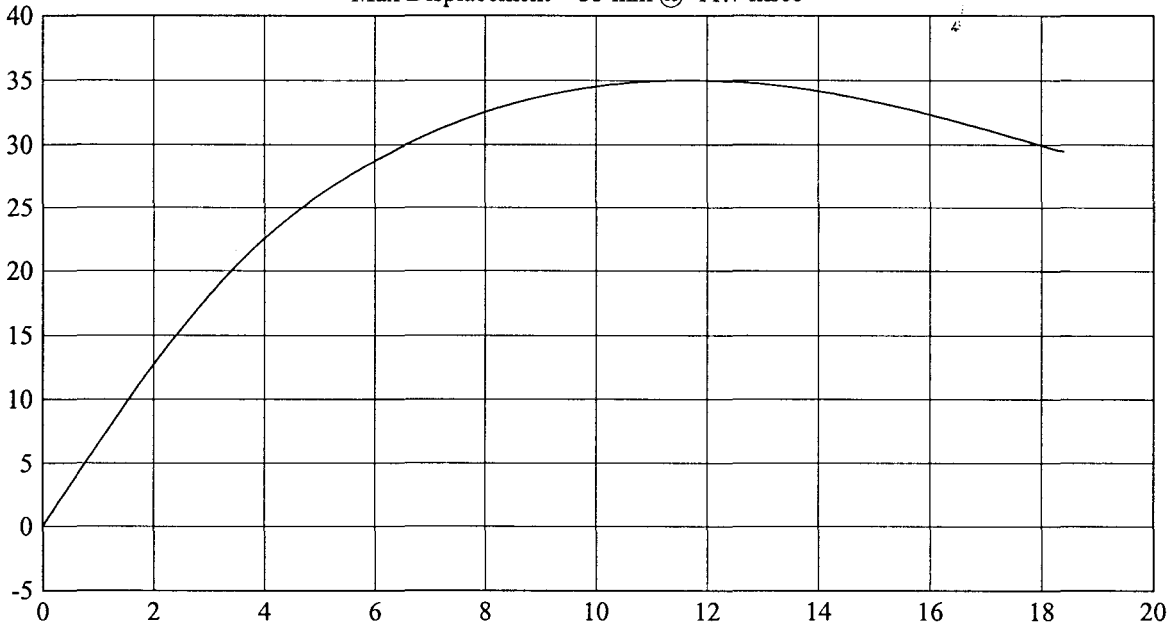
Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 5		Target: AP3
FM4537		Vehicle Side: Right
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 158/38

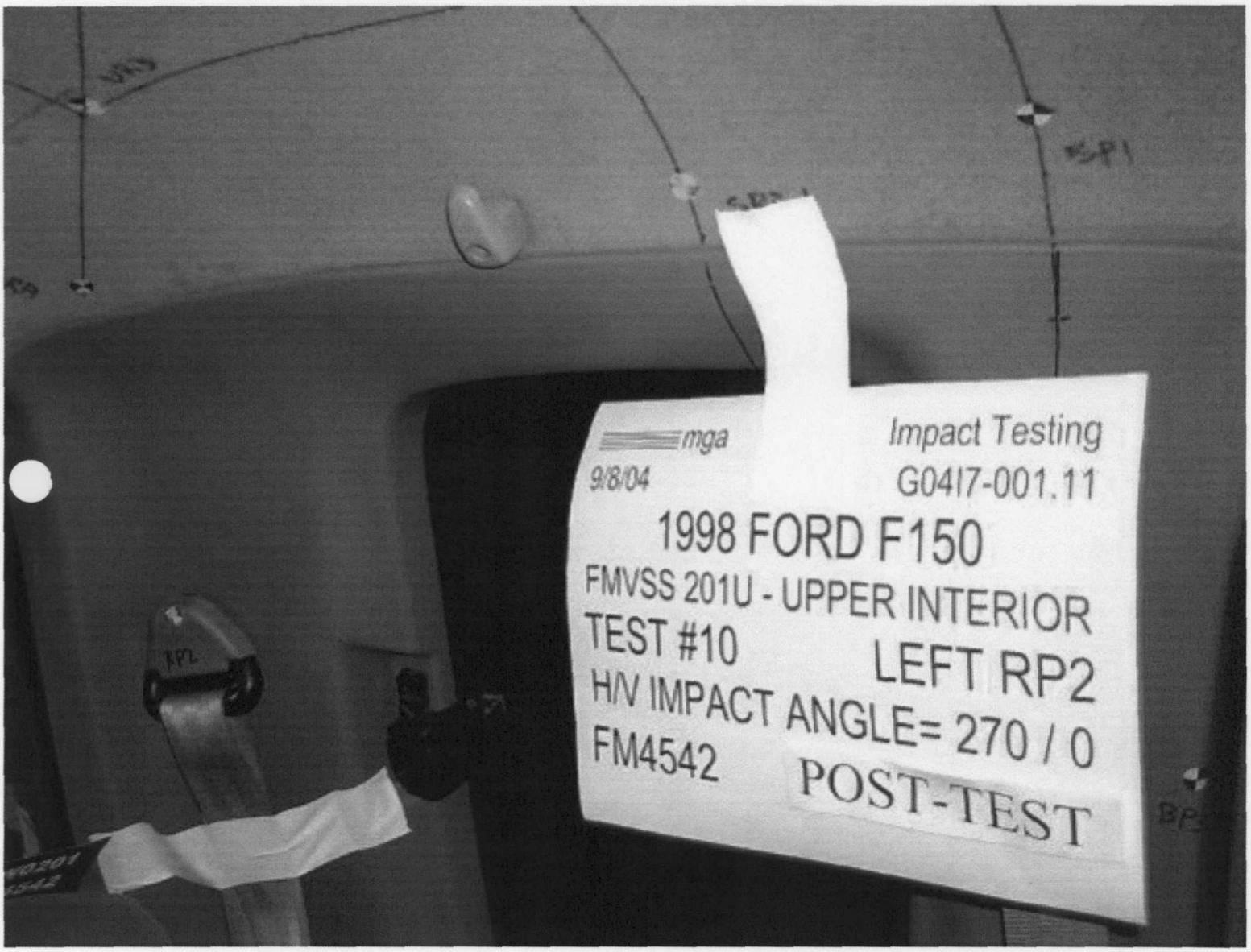
HIC(d) = 436, HIC = 357, Delta T = 9.2 msec

Max Displacement = 35 mm @ 11.7 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
G04I7-001.11
9/8/04
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #10
LEFT RP2
H/V IMPACT ANGLE= 270 / 0
FM4542
PRE - TEST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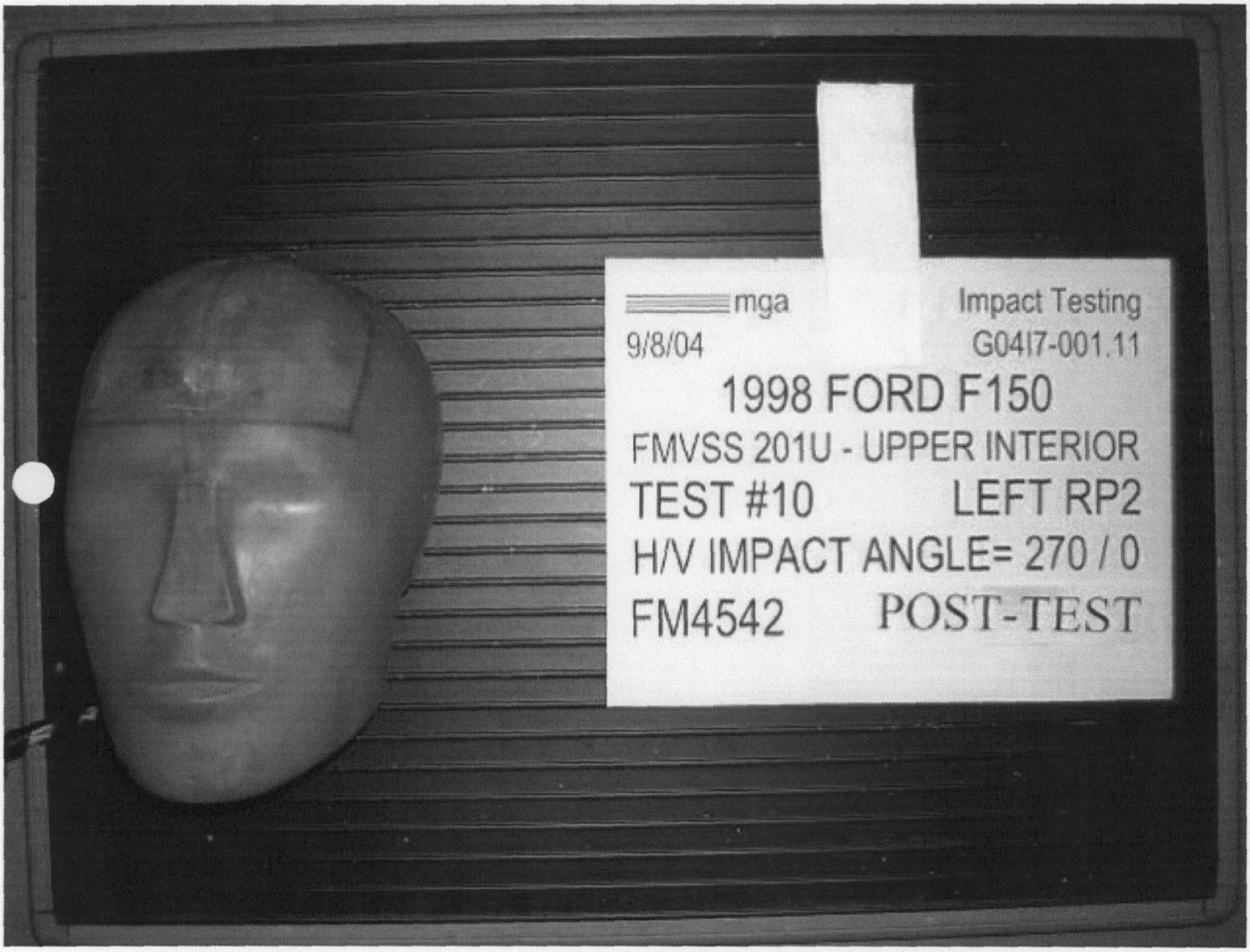
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #10
LEFT RP2
H/V IMPACT ANGLE= 270 / 0
FM4542
POST-TEST


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #10
LEFT RP2
H/V IMPACT ANGLE= 270 / 0
FM4542
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): RP2 Left

MGA Test Reference No.:FM4542

Approach Horizontal Angles:270°

Approach Vertical Angles:0°

Test Number:#10

Temperature:22C

Humidity:59%

Time of Test:2:45 PM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
670	668	6.6	23.5	17	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-108	1.67	1.67
Y	6	J36193	101.4	1.54	1.54
Z	7	J36353	96.8	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: Helen A. Kelsto Date: 4-8-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD
Test # 10
FM4542
Additional Desc: N/A

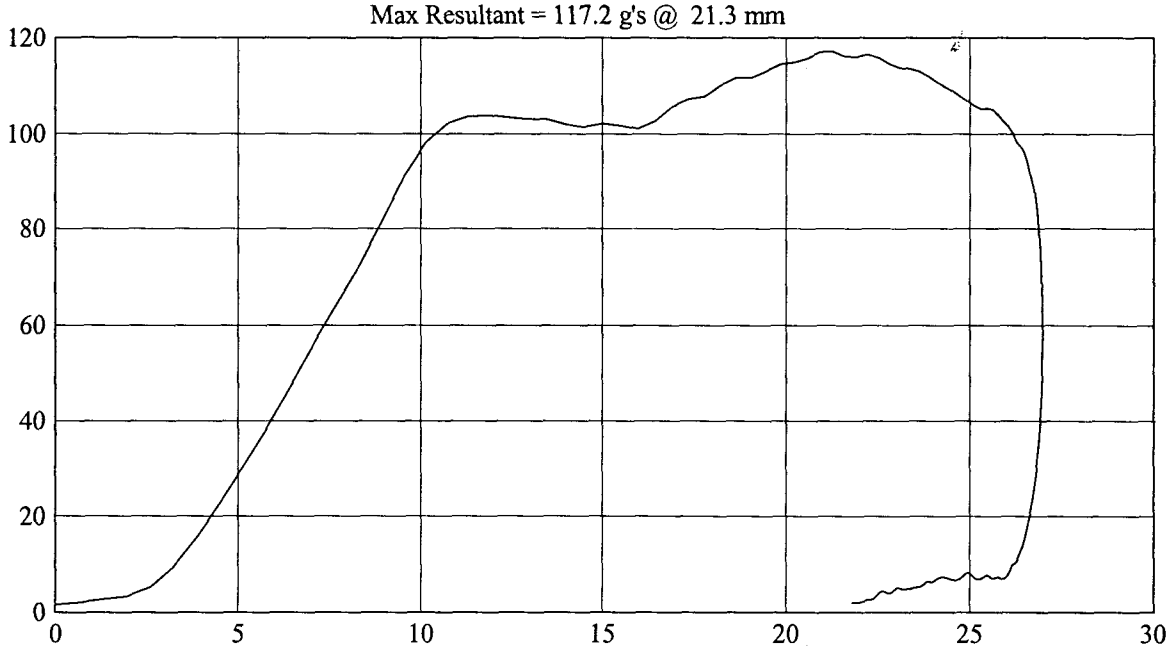
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: RP2
Vehicle Side: Left
Horz/Vert Angle: 270/0

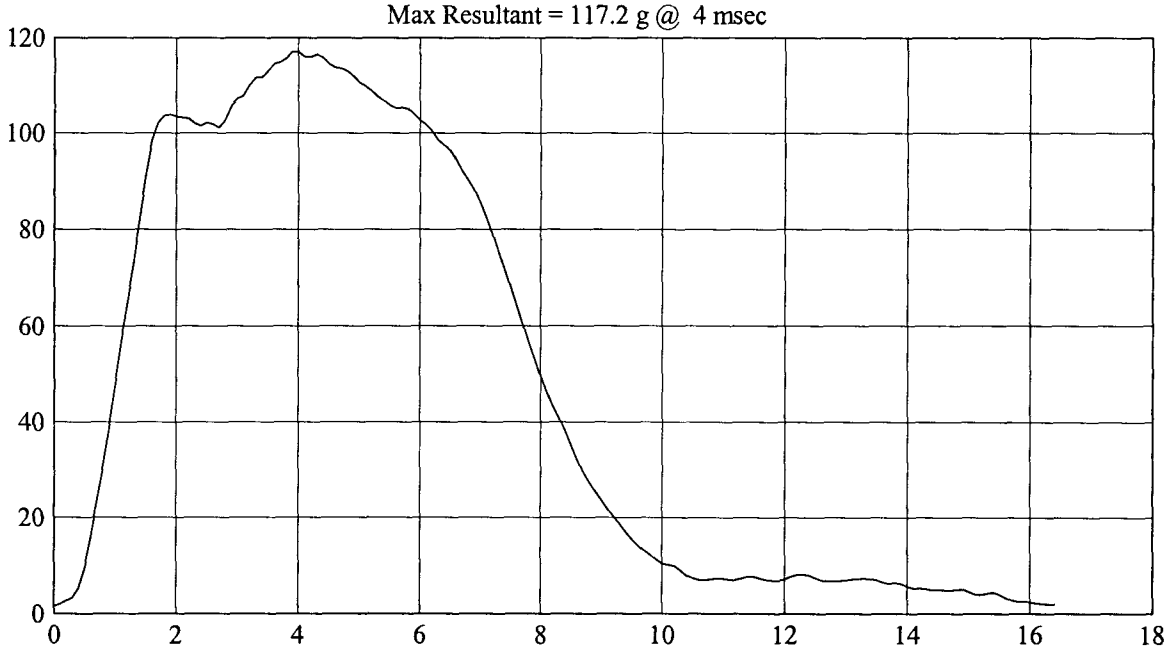
HIC(d) = 670, HIC = 668, Delta T = 6.6 msec

Max Resultant = 117.2 g's @ 21.3 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 117.2 g @ 4 msec

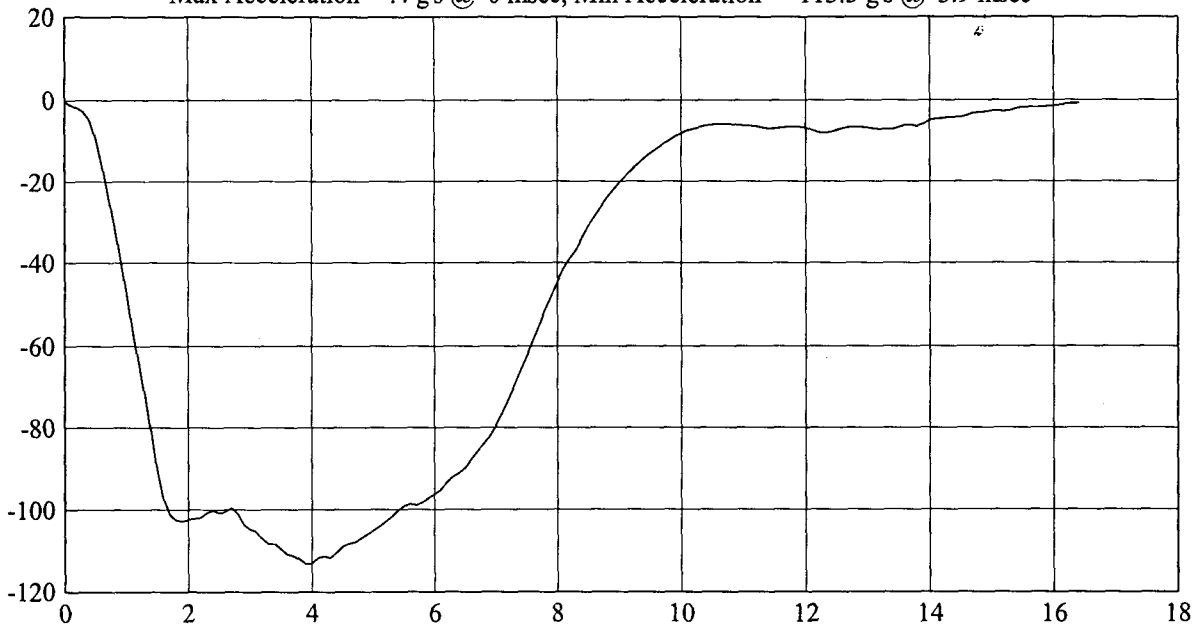


Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

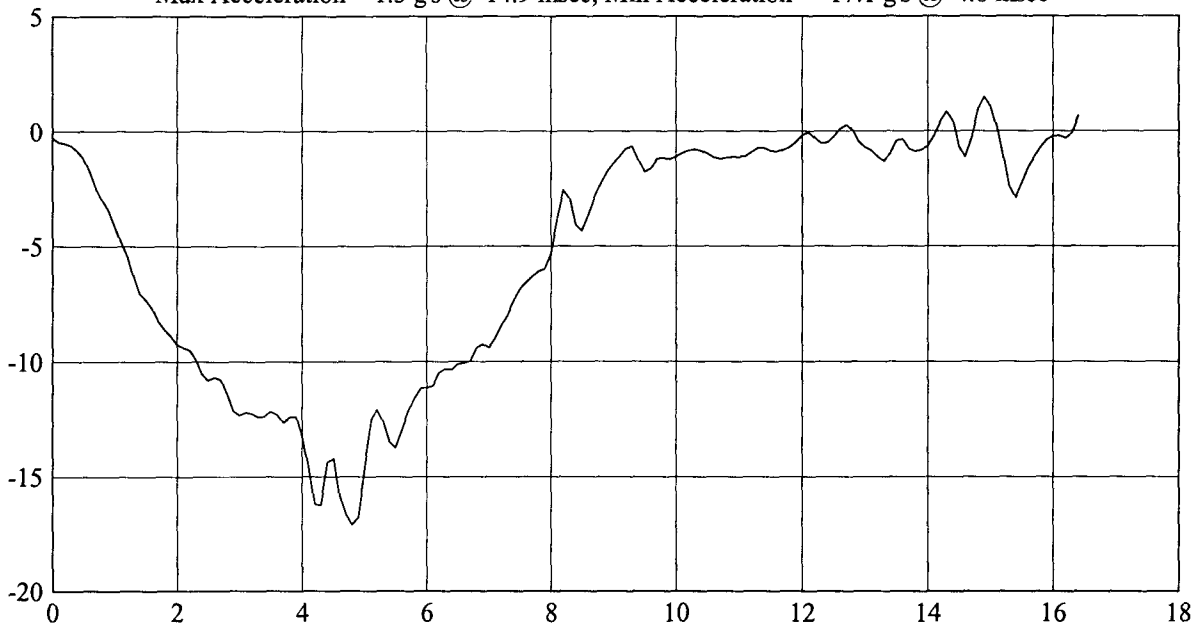
Customer: FORD | Vehicle Program : F150 | Model Year: 1998
Test # 10 | Target: RP2
FM4542 | Vehicle Side: Left
Additional Desc: N/A | Test Date: 9/8/04 | Horz/Vert Angle: 270/0
HIC(d) = 670, HIC = 668, Delta T = 6.6 msec

Max Acceleration =-.4 g's @ 0 msec, Min Acceleration = -113.3 g's @ 3.9 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 1.5 g's @ 14.9 msec, Min Acceleration = -17.1 g's @ 4.8 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 10
FM4542
Additional Desc: N/A

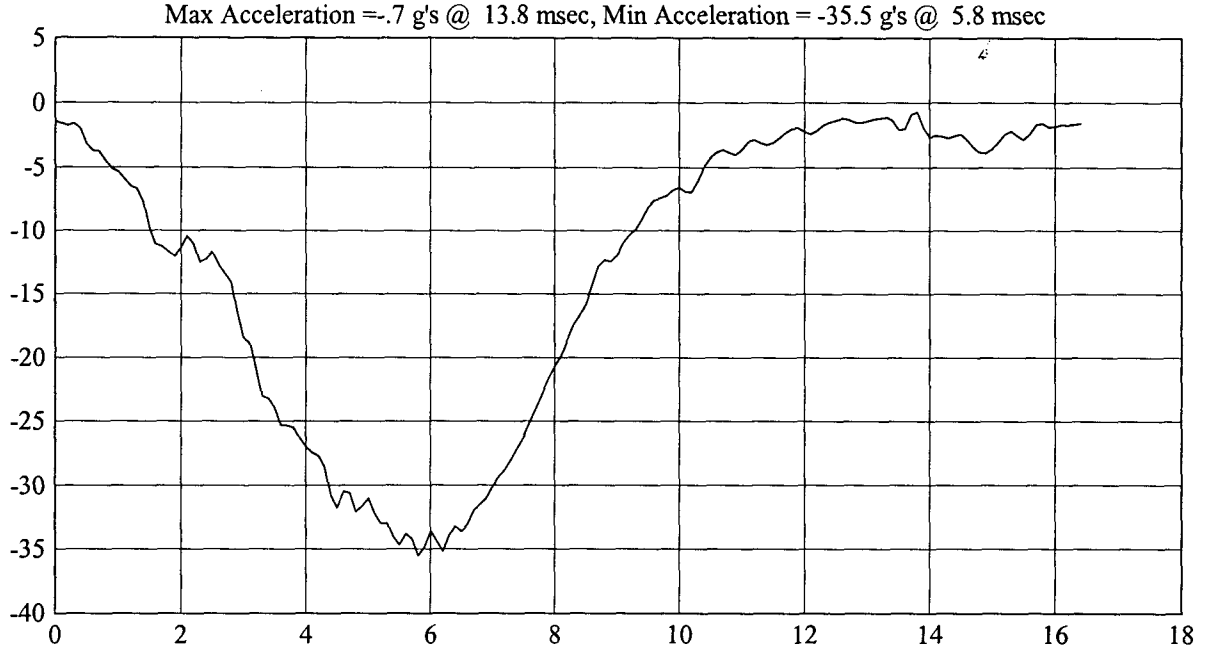
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: RP2
Vehicle Side: Left
Horz/Vert Angle: 270/0

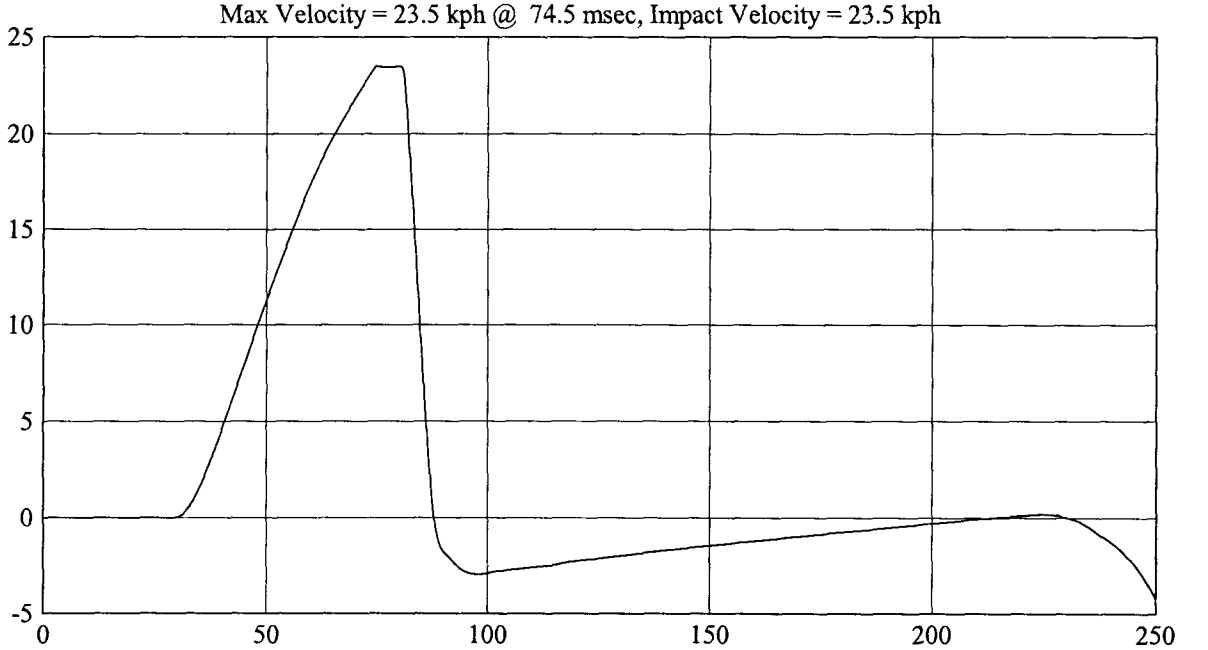
HIC(d) = 670, HIC = 668, Delta T = 6.6 msec

Max Acceleration =-.7 g's @ 13.8 msec, Min Acceleration = -35.5 g's @ 5.8 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.5 kph @ 74.5 msec, Impact Velocity = 23.5 kph



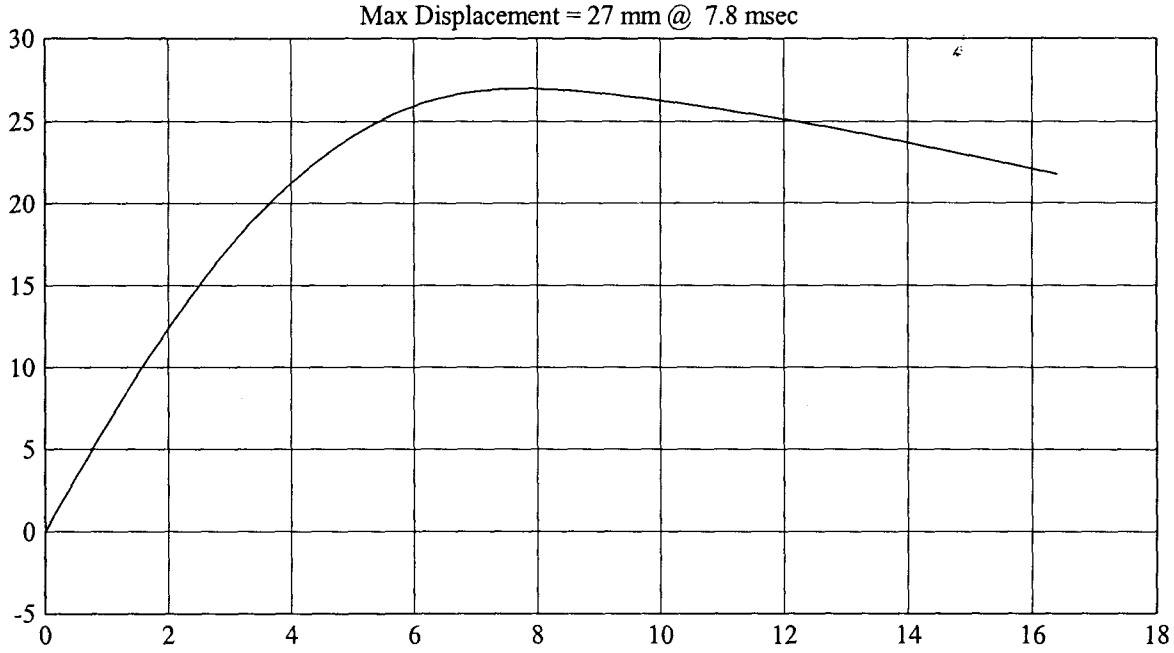
Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

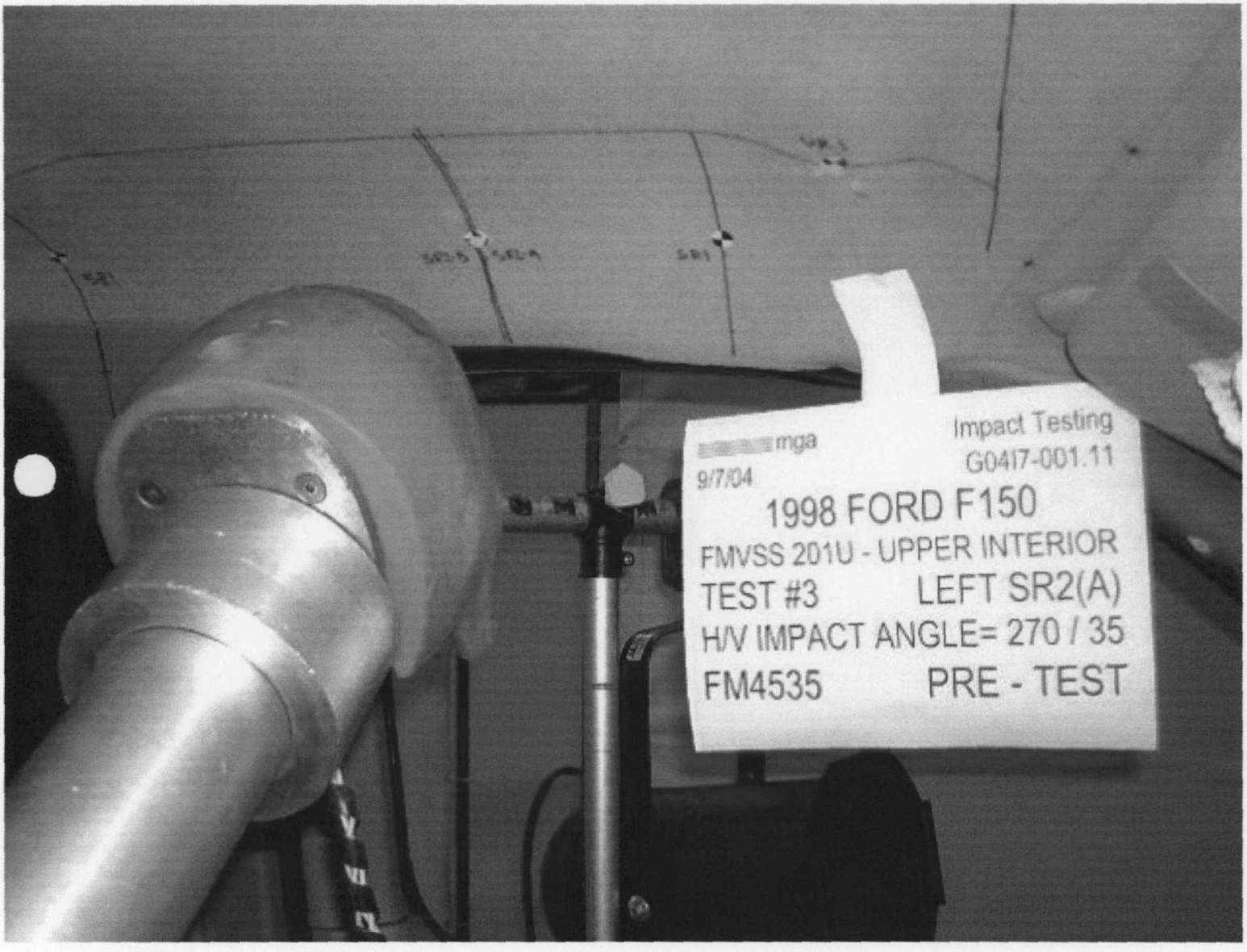
Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 10		Target: RP2
FM4542		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/0

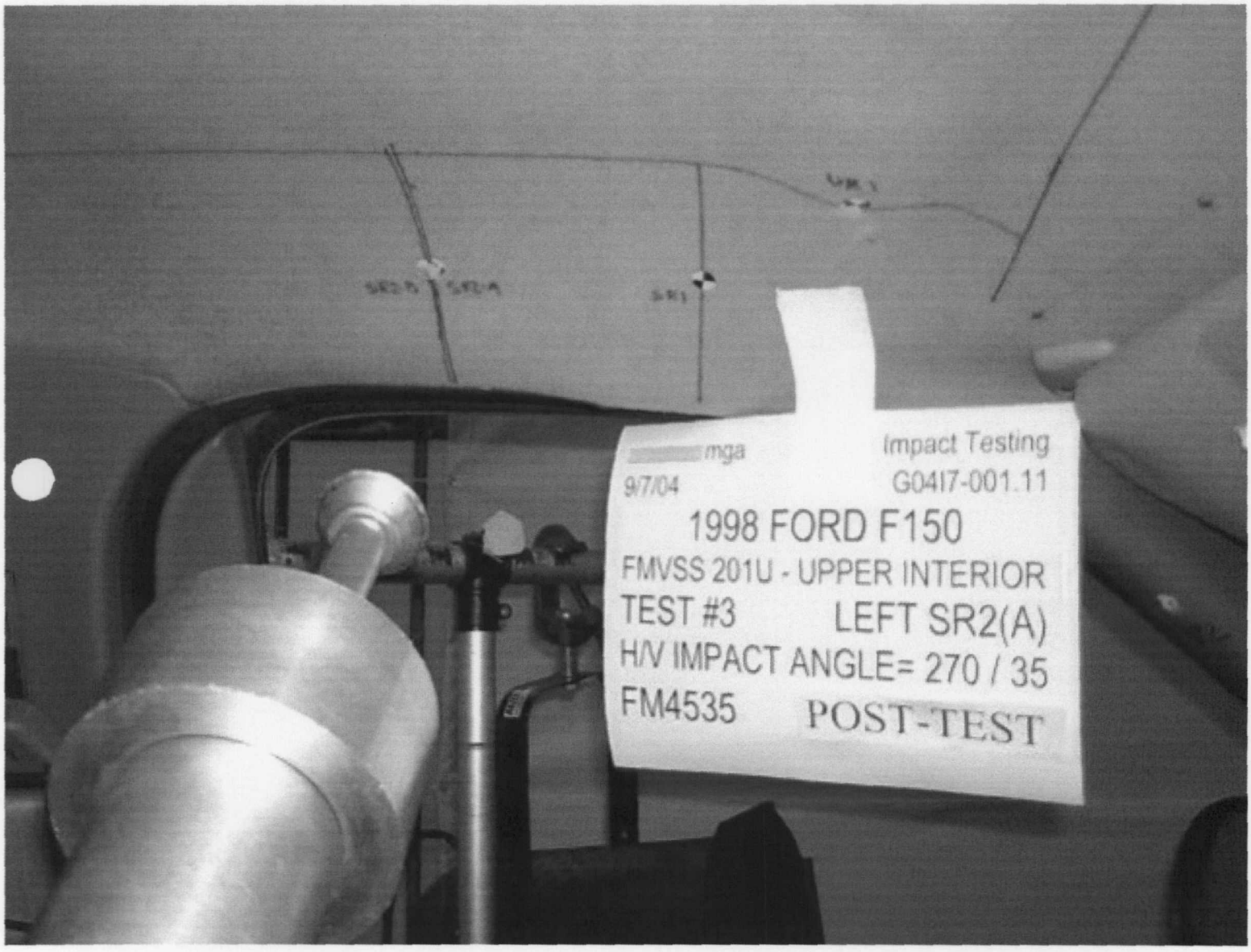
HIC(d) = 670, HIC = 668, Delta T = 6.6 msec

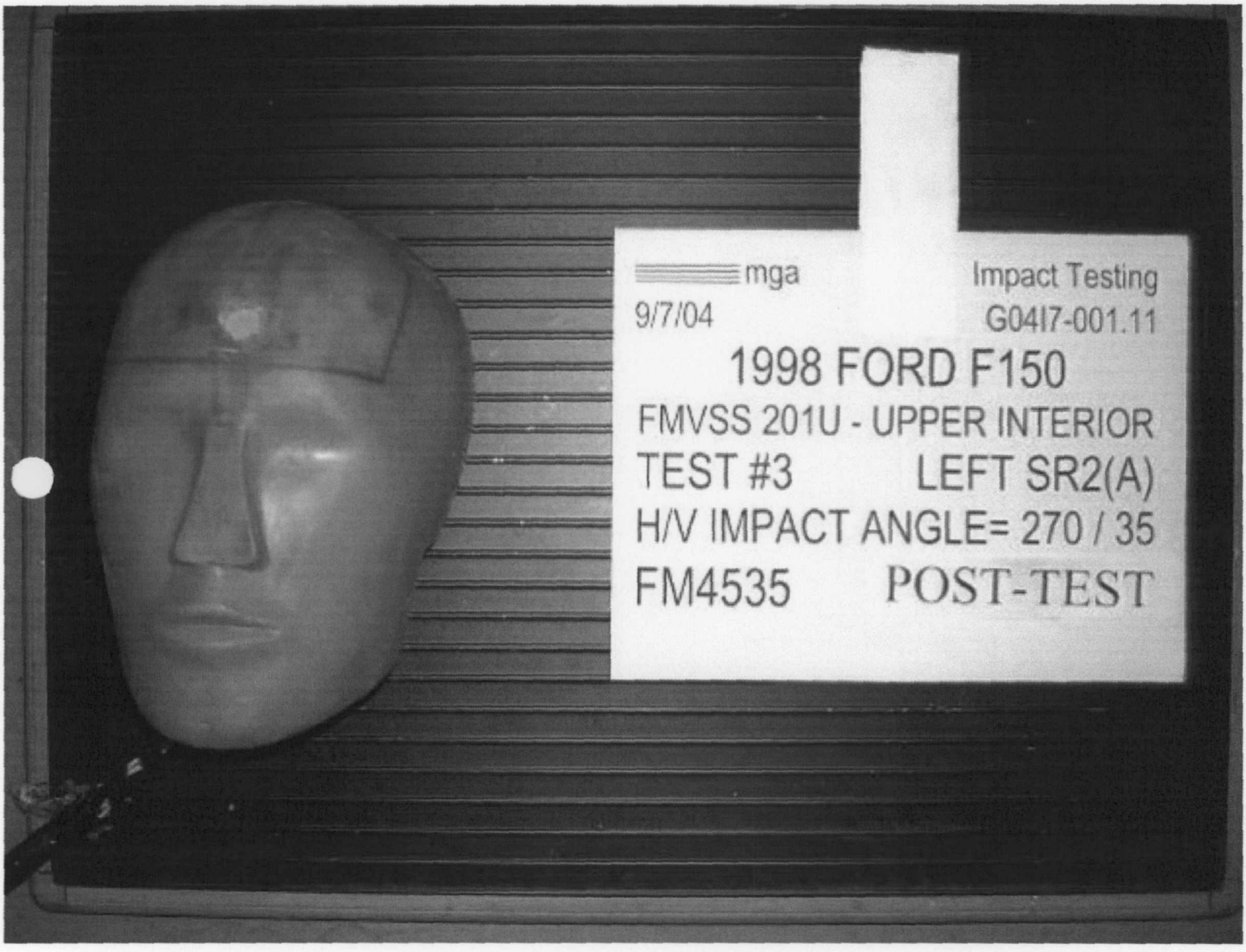
Max Displacement = 27 mm @ 7.8 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
9/7/04
G0417-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #3
LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 35
FM4535
PRE - TEST


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #3
LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 35
FM4535
POST-TEST


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #3
LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 35
FM4535
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR2(a) Left

MGA Test Reference No.:FM4535

Approach Horizontal Angles:270°

Approach Vertical Angles:35°

Test Number:#3

Temperature:22C

Humidity:55%

Time of Test:3:15 PM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1039	1157	4.6	23.5	15	3 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-108	1.67	1.67
Y	6	J36193	101.4	1.54	1.54
Z	7	J36353	96.8	1.58	1.60

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 9-7-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD
Test # 3
FM4535
Additional Desc: N/A

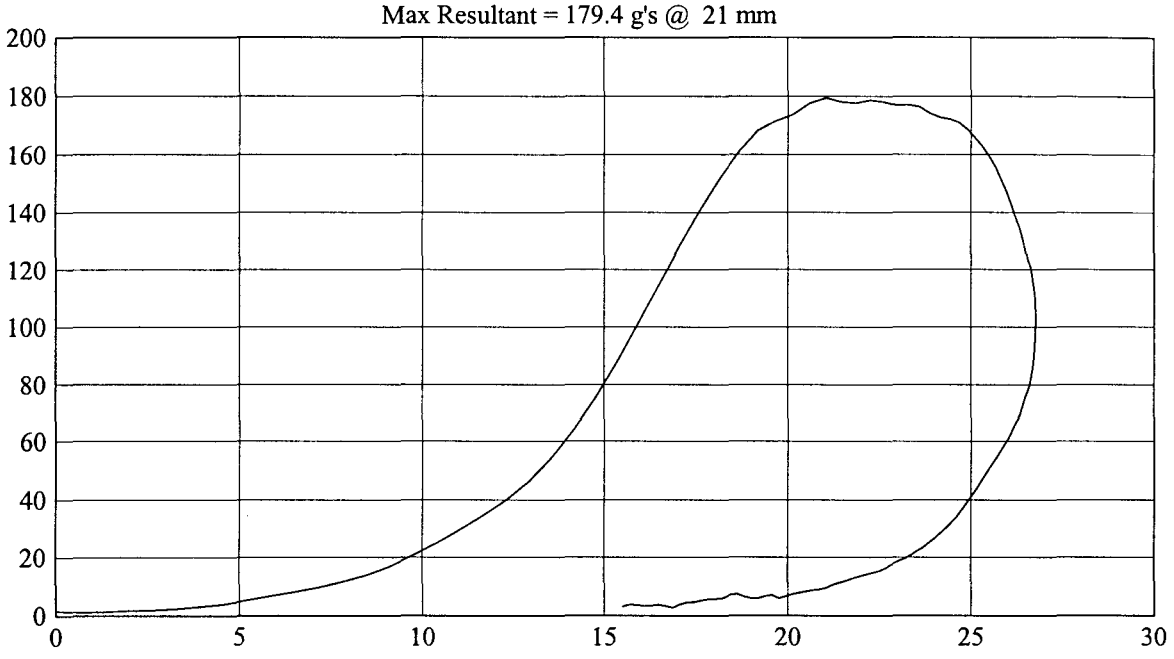
Vehicle Program : F150

Test Date: 9/7/04

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/35

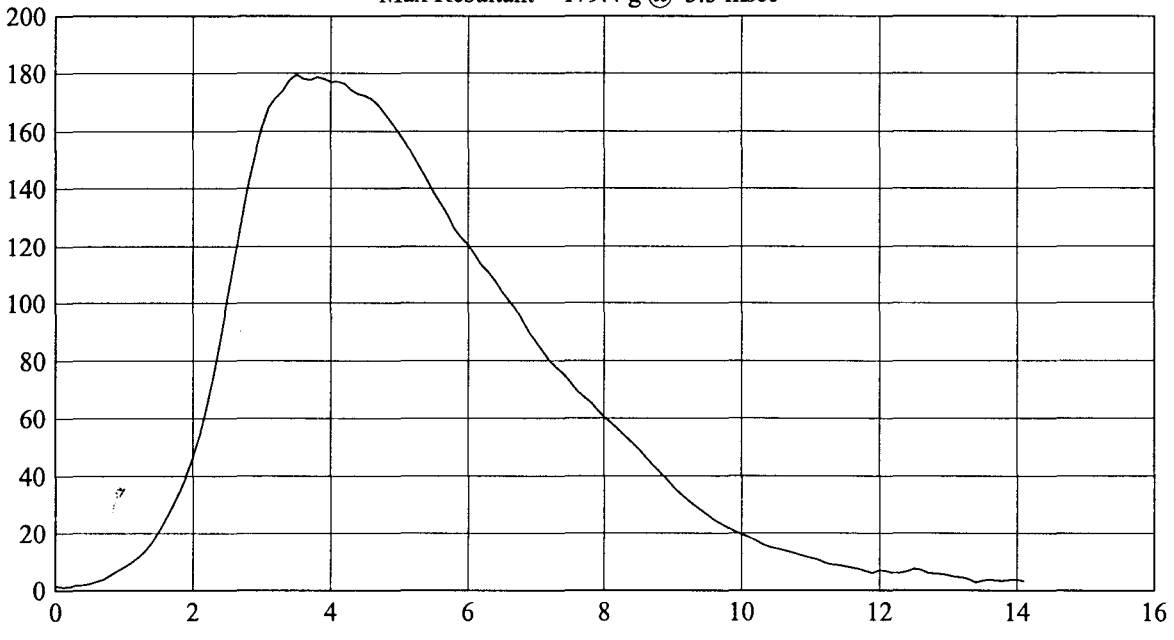
HIC(d) = 1039, HIC = 1157, Delta T = 4.6 msec

Max Resultant = 179.4 g's @ 21 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 179.4 g @ 3.5 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

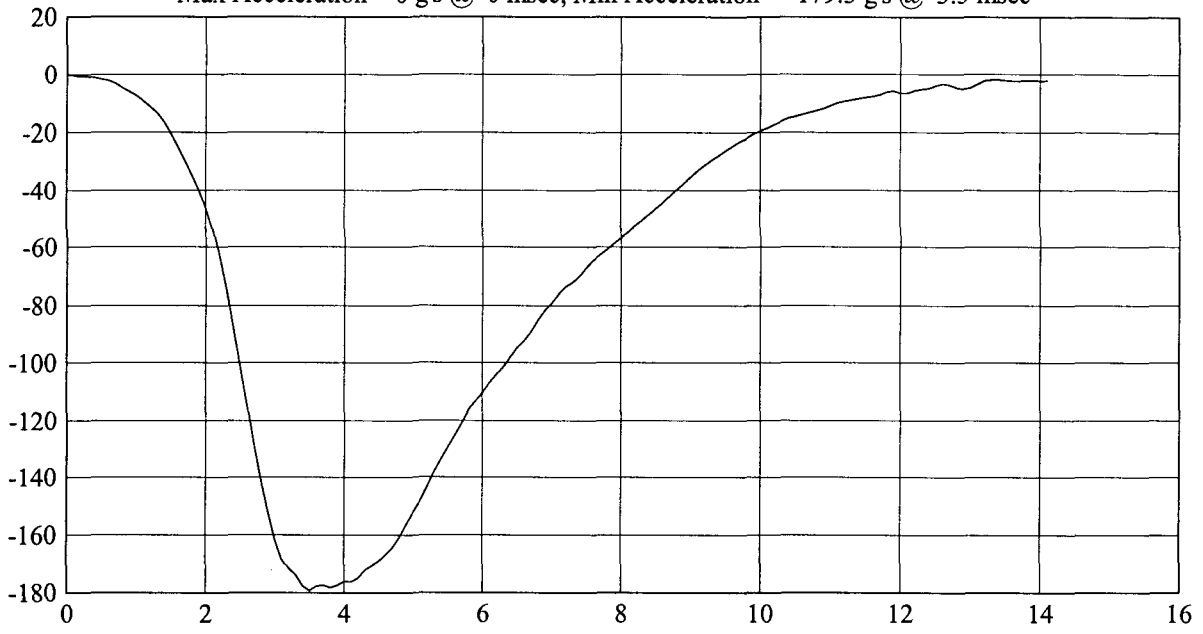
Customer: FORD
Test # 3
FM4535
Additional Desc: N/A

Vehicle Program : F150
Test Date: 9/7/04

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/35

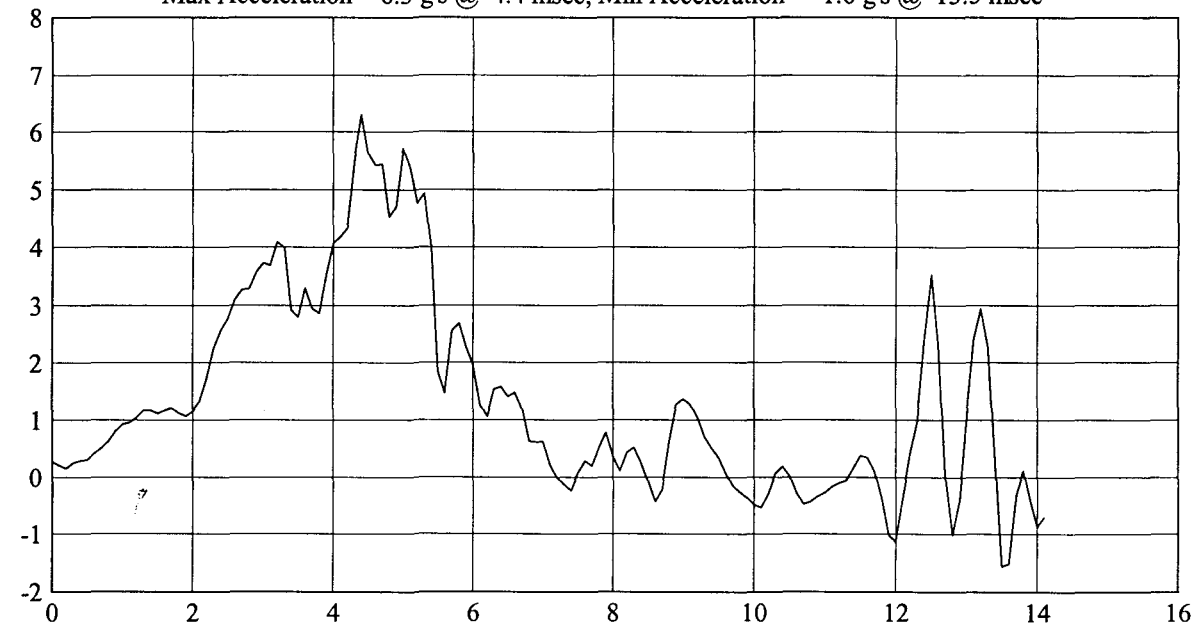
HIC(d) = 1039, HIC = 1157, Delta T = 4.6 msec

Max Acceleration = 0 g's @ 0 msec, Min Acceleration = -179.3 g's @ 3.5 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 6.3 g's @ 4.4 msec, Min Acceleration = -1.6 g's @ 13.5 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 3
FM4535
Additional Desc: N/A

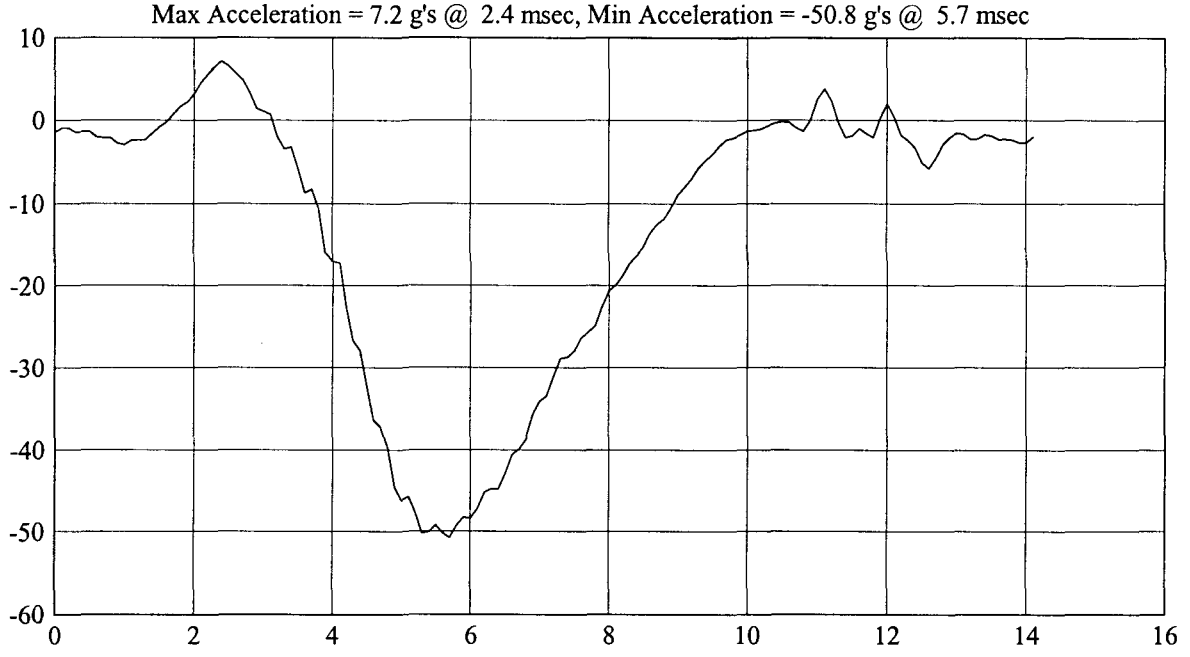
Vehicle Program : F150

Test Date: 9/7/04

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/35

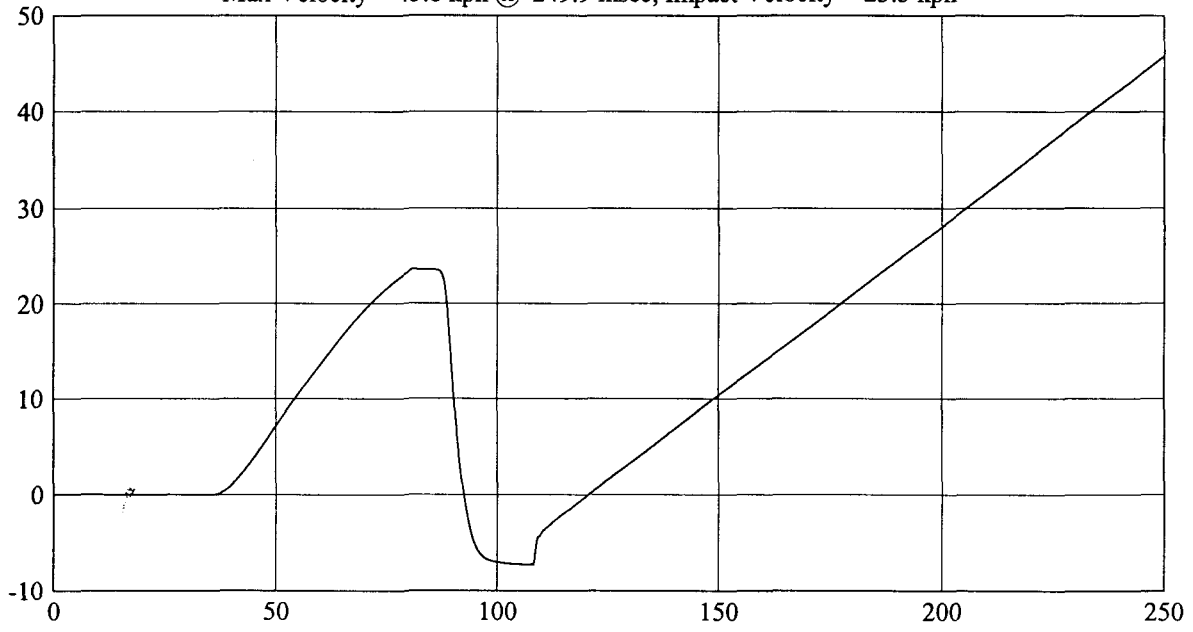
HIC(d) = 1039, HIC = 1157, Delta T = 4.6 msec

Max Acceleration = 7.2 g's @ 2.4 msec, Min Acceleration = -50.8 g's @ 5.7 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 45.8 kph @ 249.9 msec, Impact Velocity = 23.5 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 3
FM4535
Additional Desc: N/A

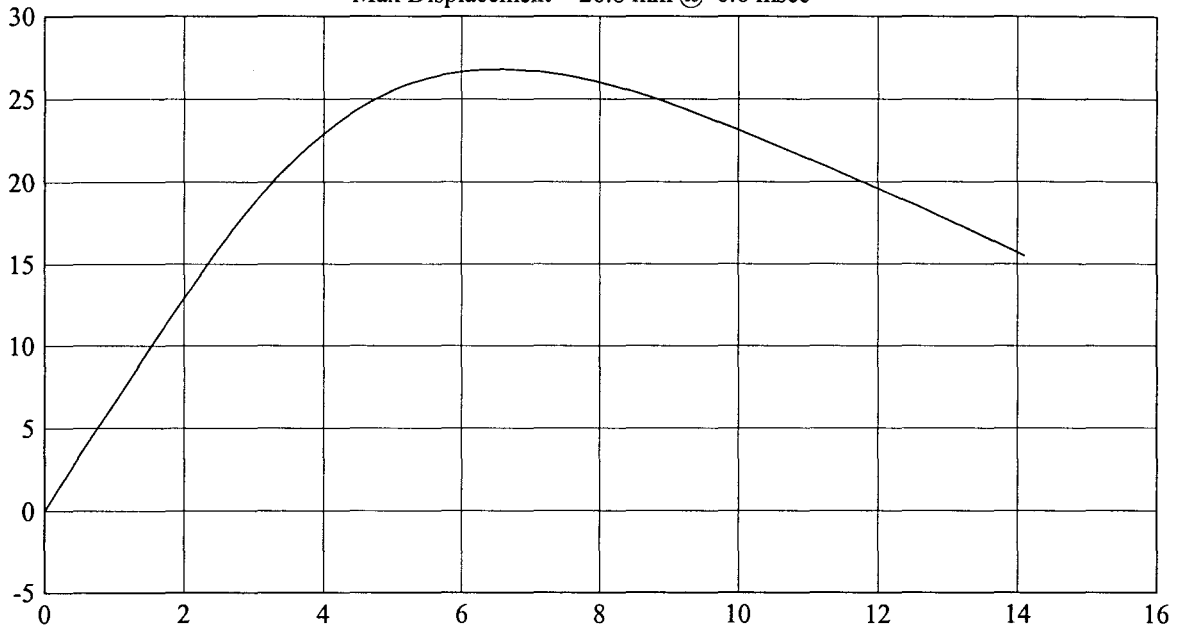
Vehicle Program : F150

Test Date: 9/7/04

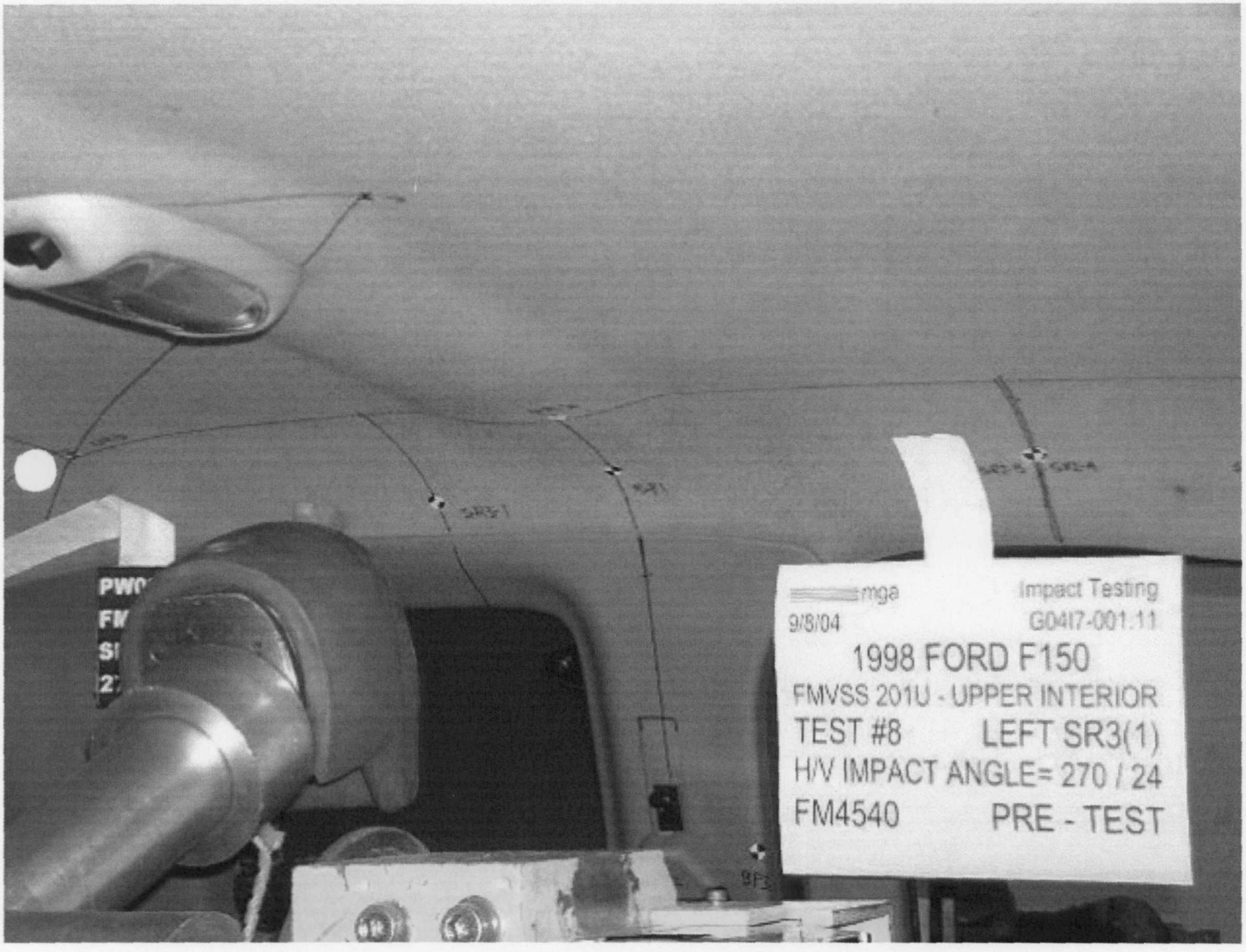
Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/35

HIC(d) = 1039, HIC = 1157, Delta T = 4.6 msec

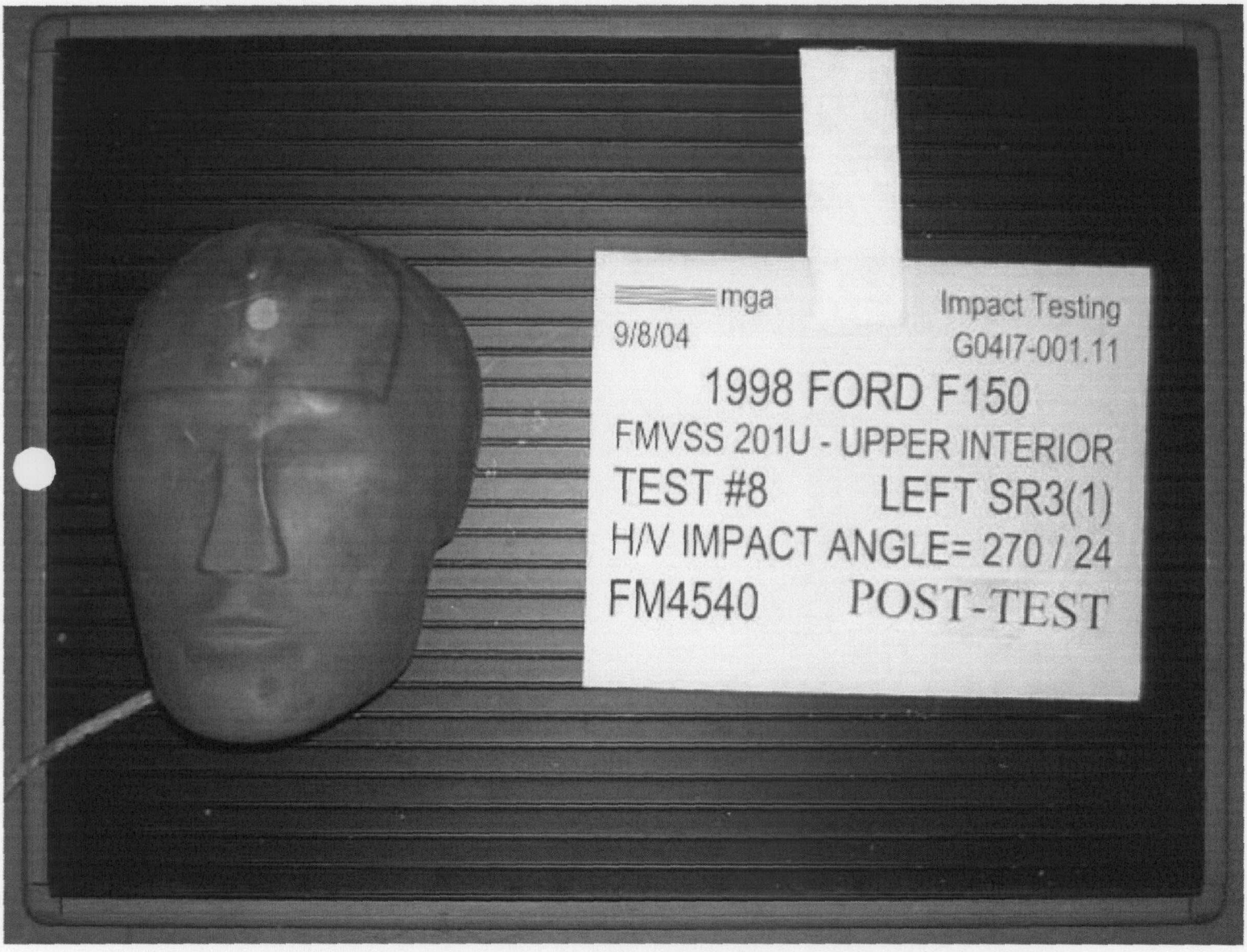
Max Displacement = 26.8 mm @ 6.6 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #8 LEFT SR3(1)
H/V IMPACT ANGLE= 270 / 24
FM4540 PRE - TEST


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #8
LEFT SR3(1)
H/V IMPACT ANGLE= 270 / 24
FM4540
POST-TEST
PW0201
FM4540


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #8
LEFT SR3(1)
H/V IMPACT ANGLE= 270 / 24
FM4540
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR3(1) Left

MGA Test Reference No.:FM4540

Approach Horizontal Angles:270°

Approach Vertical Angles:24°

Test Number:#8

Temperature:22C

Humidity:58%

Time of Test:1:15 PM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
679	679	5.6	23.9	52	12 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: Helen Q. Kaleto Date: 9-8-04

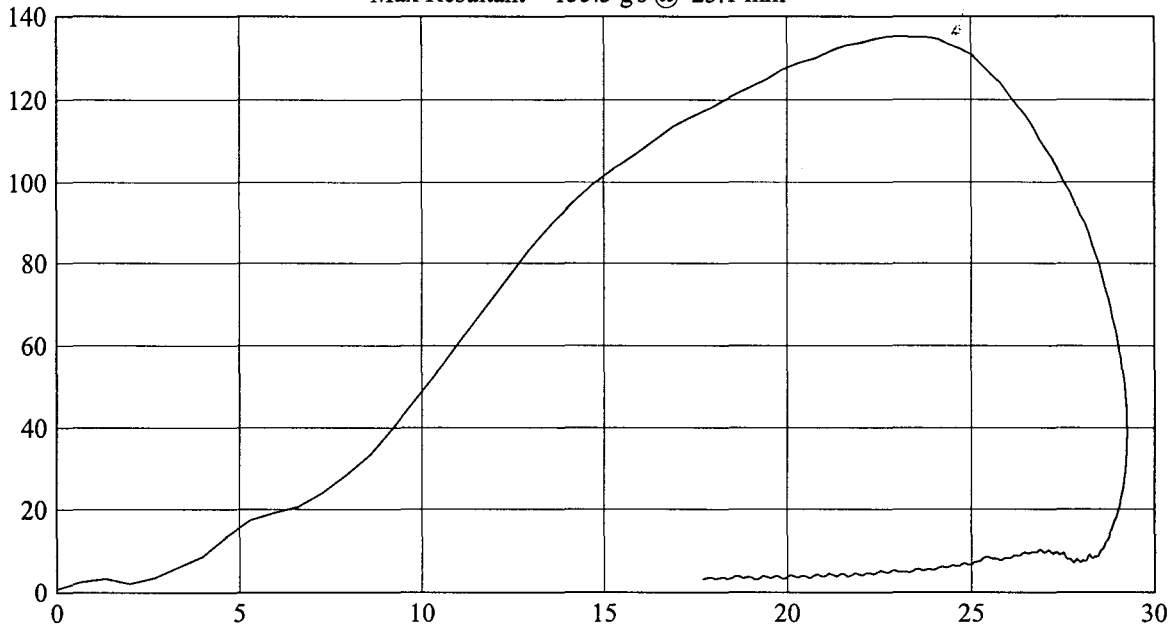
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 8		Target: SR3(1)
FM4540		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/24

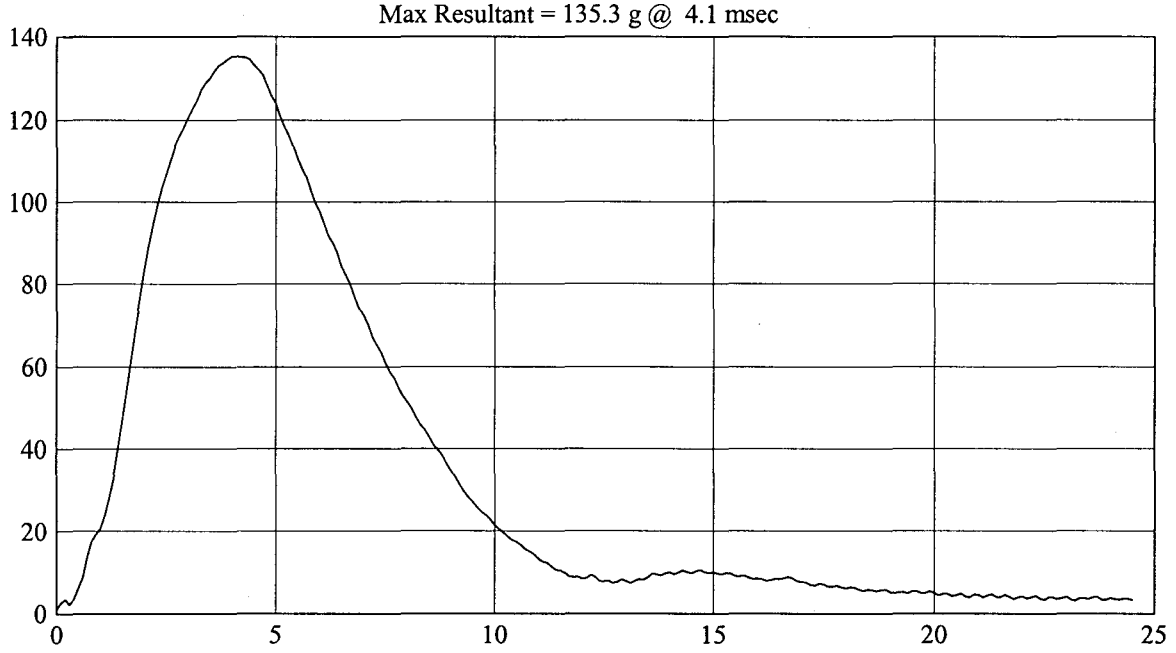
HIC(d) = 679, HIC = 679, Delta T = 5.6 msec

Max Resultant = 135.3 g's @ 23.1 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 135.3 g @ 4.1 msec



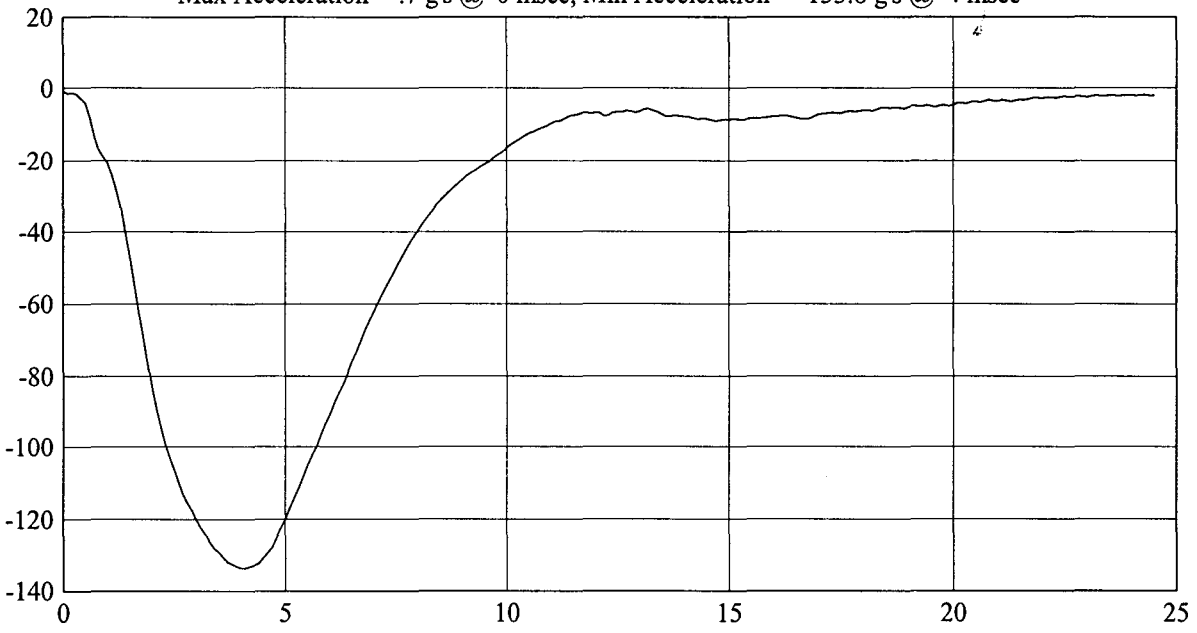
Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 8		Target: SR3(1)
FM4540		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/24

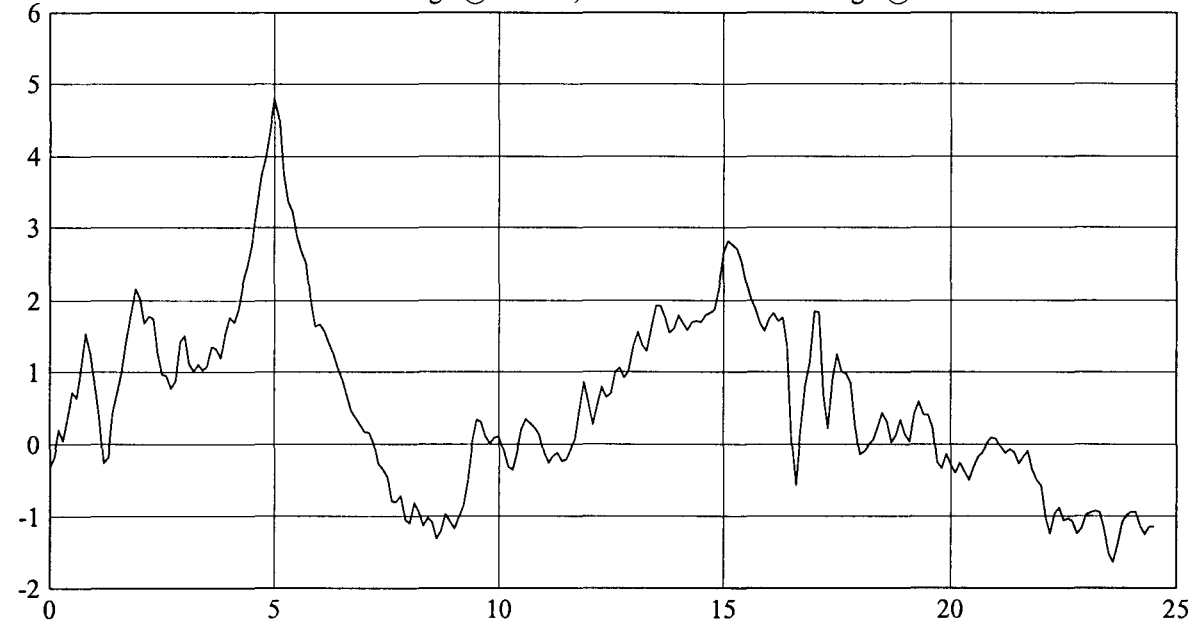
HIC(d) = 679, HIC = 679, Delta T = 5.6 msec

Max Acceleration =-.7 g's @ 0 msec, Min Acceleration = -133.8 g's @ 4 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 4.8 g's @ 5 msec, Min Acceleration = -1.6 g's @ 23.6 msec



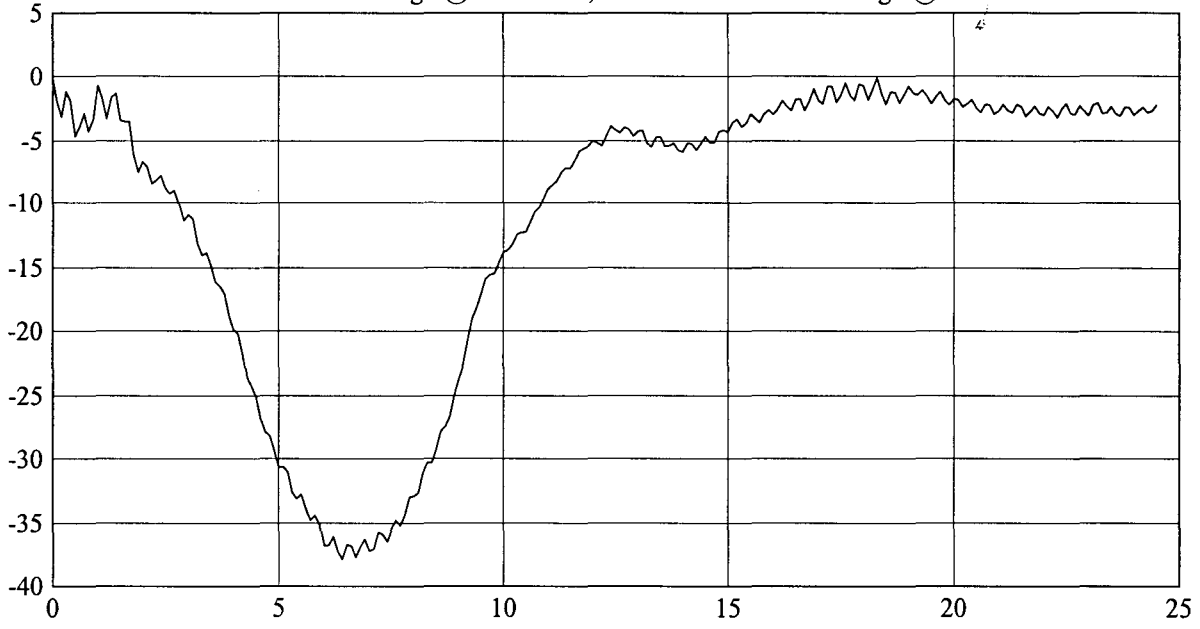
Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 8		Target: SR3(1)
FM4540		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/24

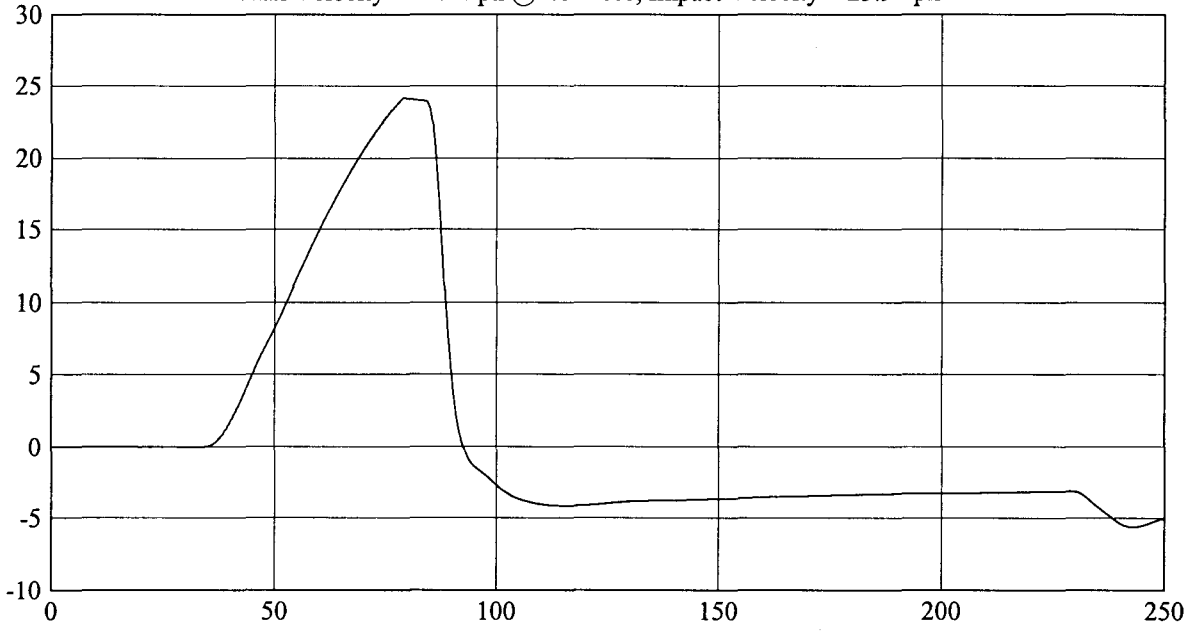
HIC(d) = 679, HIC = 679, Delta T = 5.6 msec

Max Acceleration =-.1 g's @ 18.3 msec, Min Acceleration = -37.9 g's @ 6.4 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 24.2 kph @ 79 msec, Impact Velocity = 23.9 kph



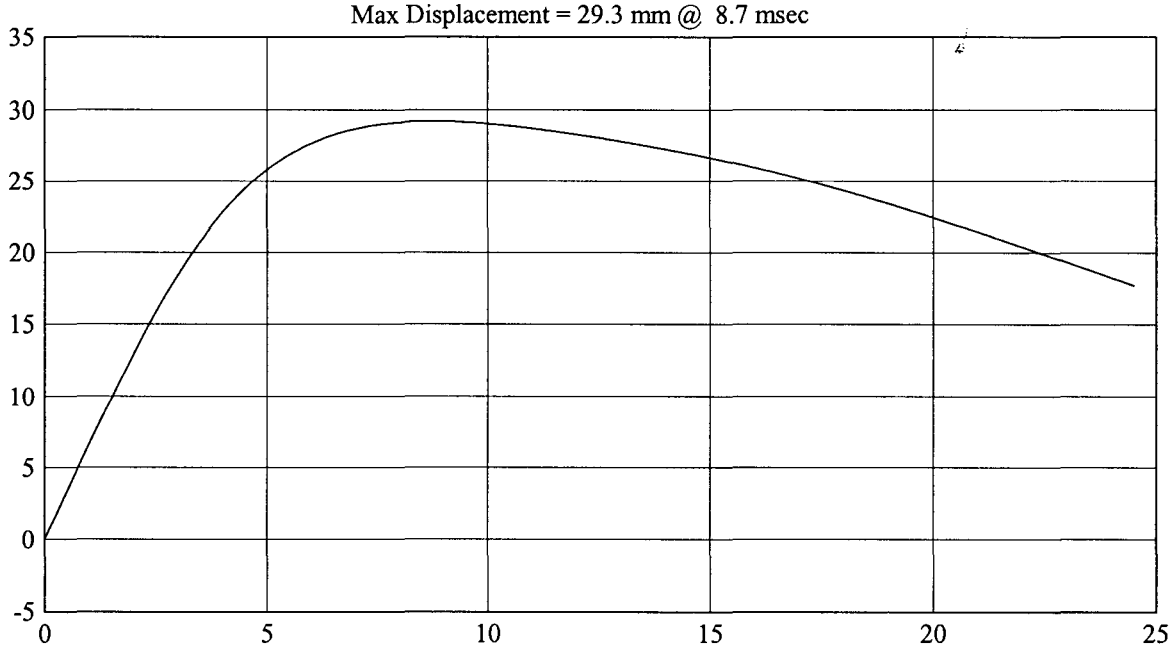
Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

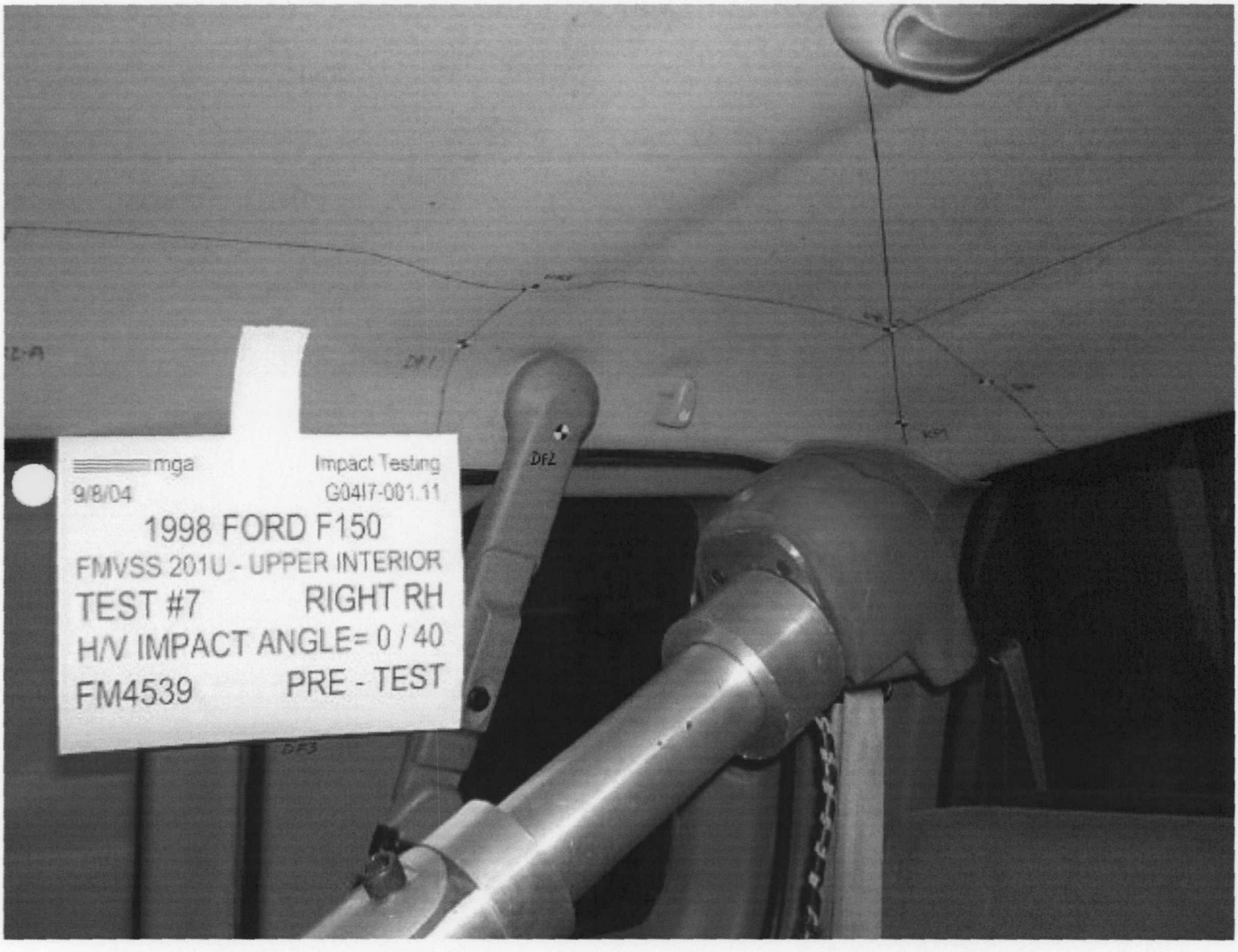
Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 8		Target: SR3(1)
FM4540		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/24

HIC(d) = 679, HIC = 679, Delta T = 5.6 msec

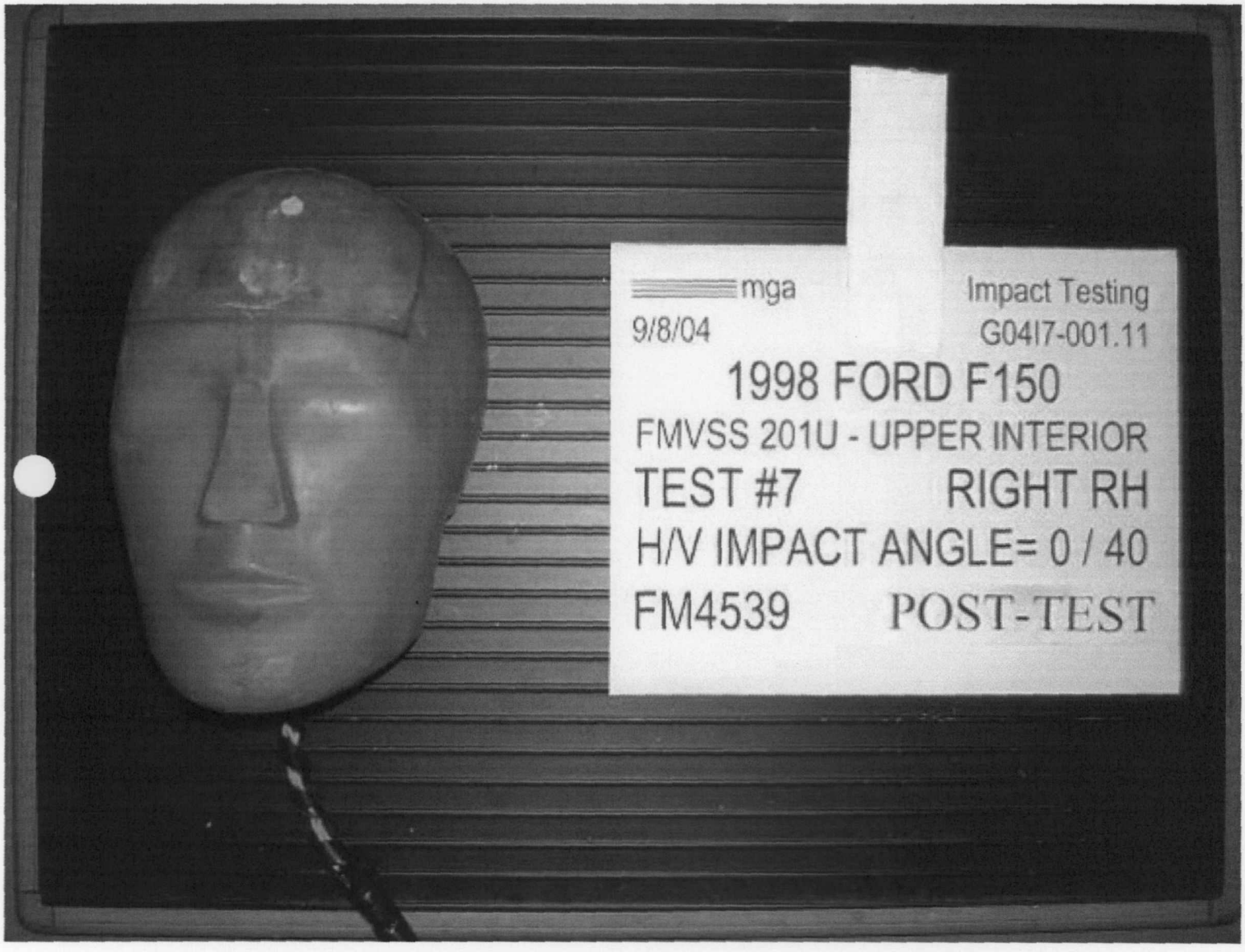
Max Displacement = 29.3 mm @ 8.7 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #7
RIGHT RH
H/V IMPACT ANGLE= 0 / 40
FM4539
PRE - TEST


mga
9/8/04
Impact Testing
G0417-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT RH
H/V IMPACT ANGLE= 0 / 40
FM4539 POST-TEST
DF1
DF2
DF3
0/40


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #7
RIGHT RH
H/V IMPACT ANGLE= 0 / 40
FM4539
POST-TEST

MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): RH Right

MGA Test Reference No.:FM4539

Approach Horizontal Angles:0°

Approach Vertical Angles:40°

Test Number:#7

Temperature:22C

Humidity:58%

Time of Test:10:30 AM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
420	336	8.3	23.5	52	8 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-108	1.68	1.67
Y	6	J36193	101.4	1.54	1.54
Z	7	J36353	96.8	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Broke rear window

Recorded By: _____ Approved By*: Helen A. Kaleto Date: 9-8-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD
Test # 7
FM4539
Additional Desc: N/A

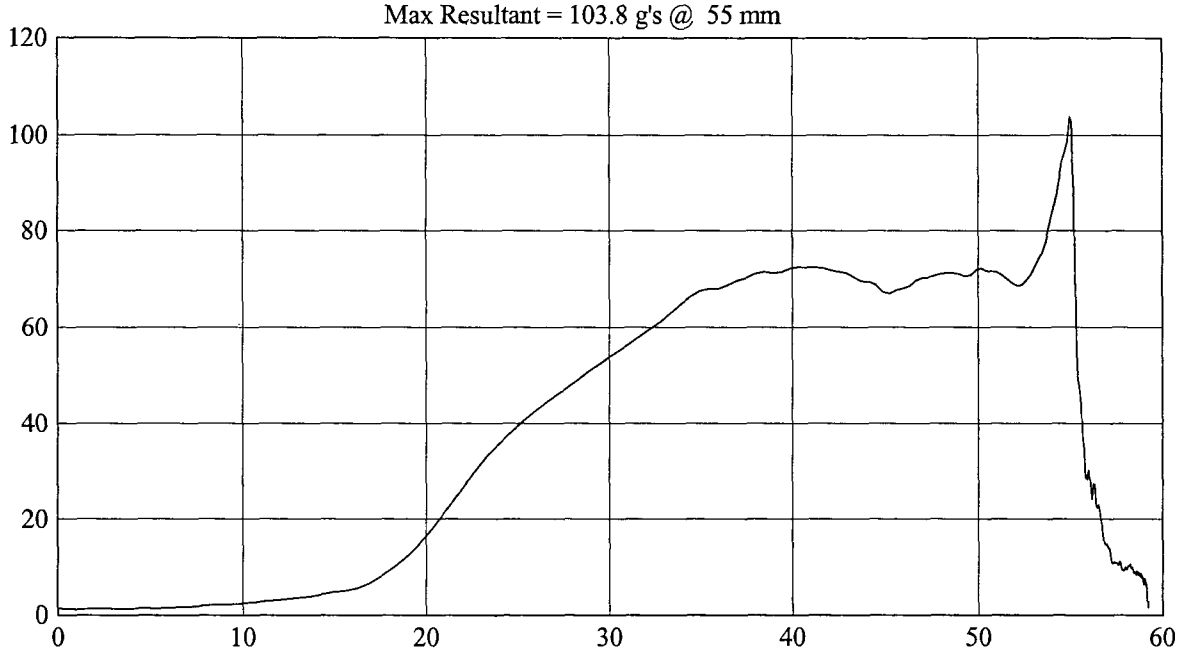
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/40

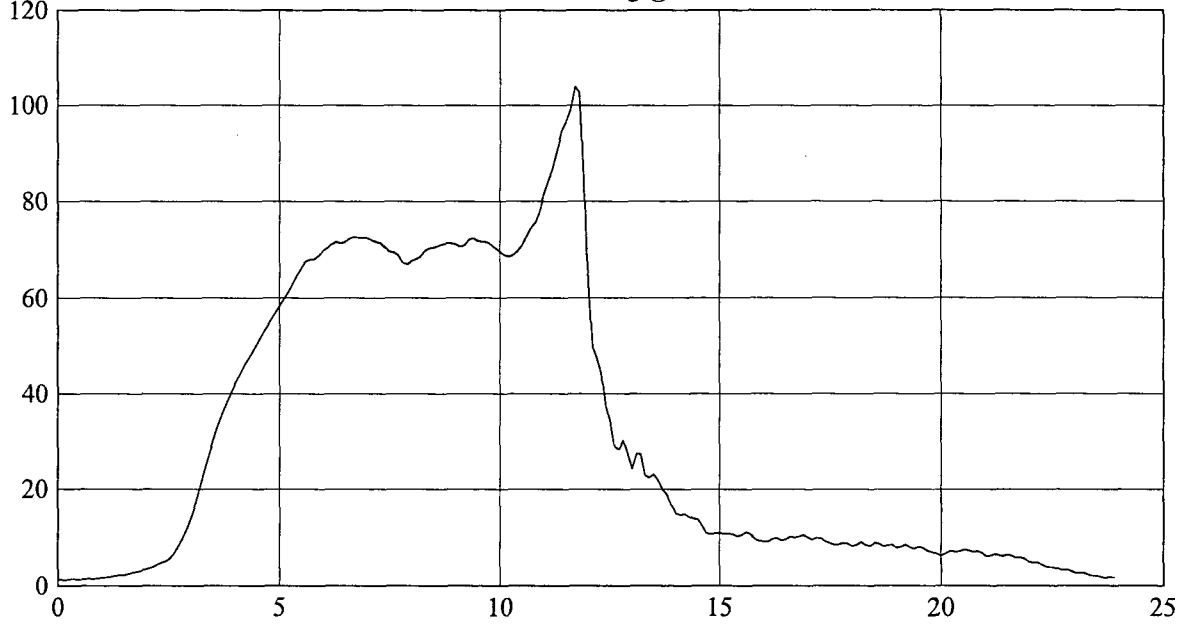
HIC(d) = 420, HIC = 336, Delta T = 8.3 msec

Max Resultant = 103.8 g's @ 55 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 103.8 g @ 11.7 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 7
FM4539
Additional Desc: N/A

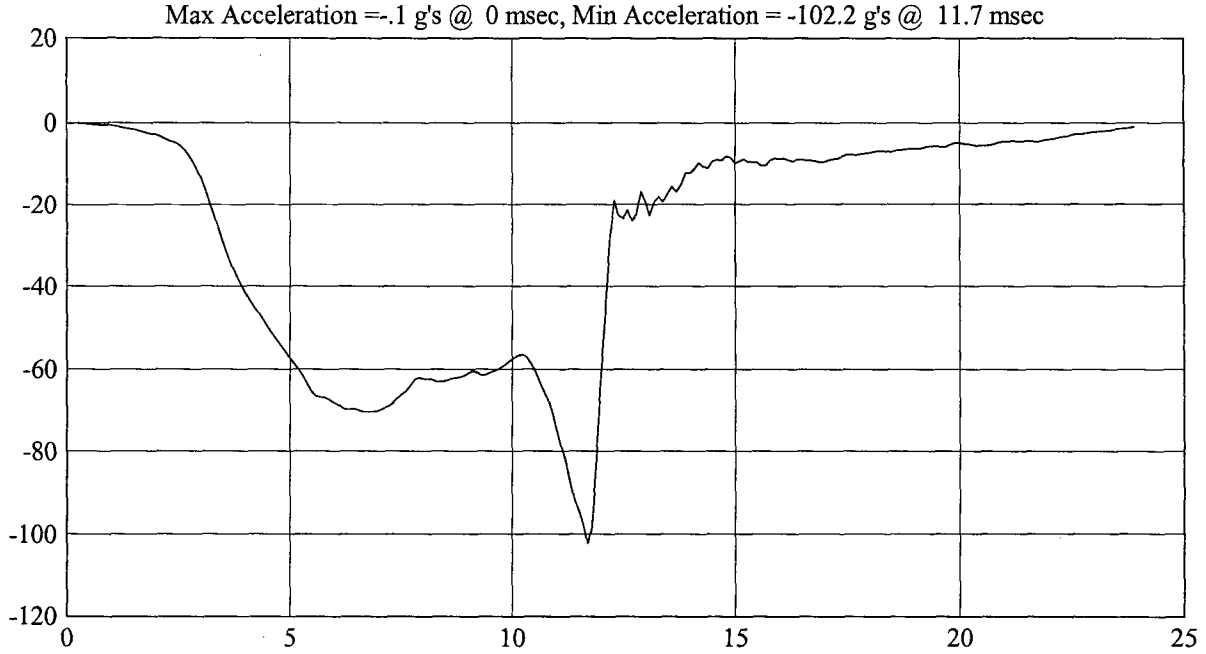
Vehicle Program : F150

Test Date: 9/8/04

Model Year: 1998
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/40

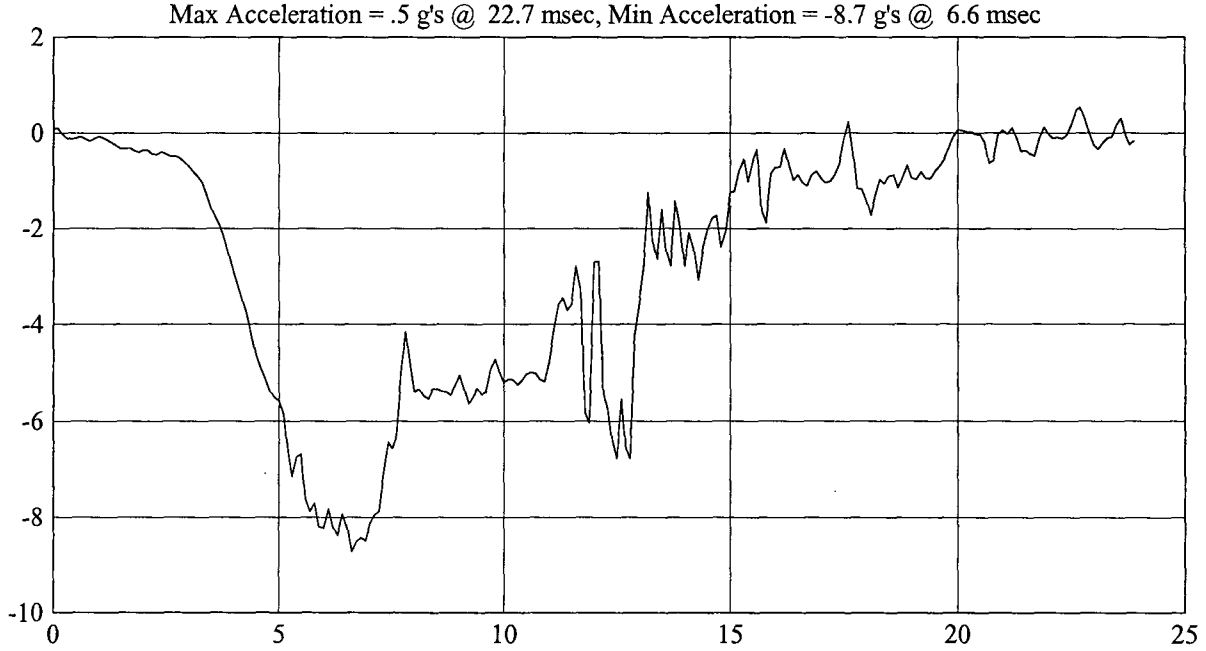
HIC(d) = 420, HIC = 336, Delta T = 8.3 msec

Max Acceleration =-.1 g's @ 0 msec, Min Acceleration = -102.2 g's @ 11.7 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = .5 g's @ 22.7 msec, Min Acceleration = -8.7 g's @ 6.6 msec

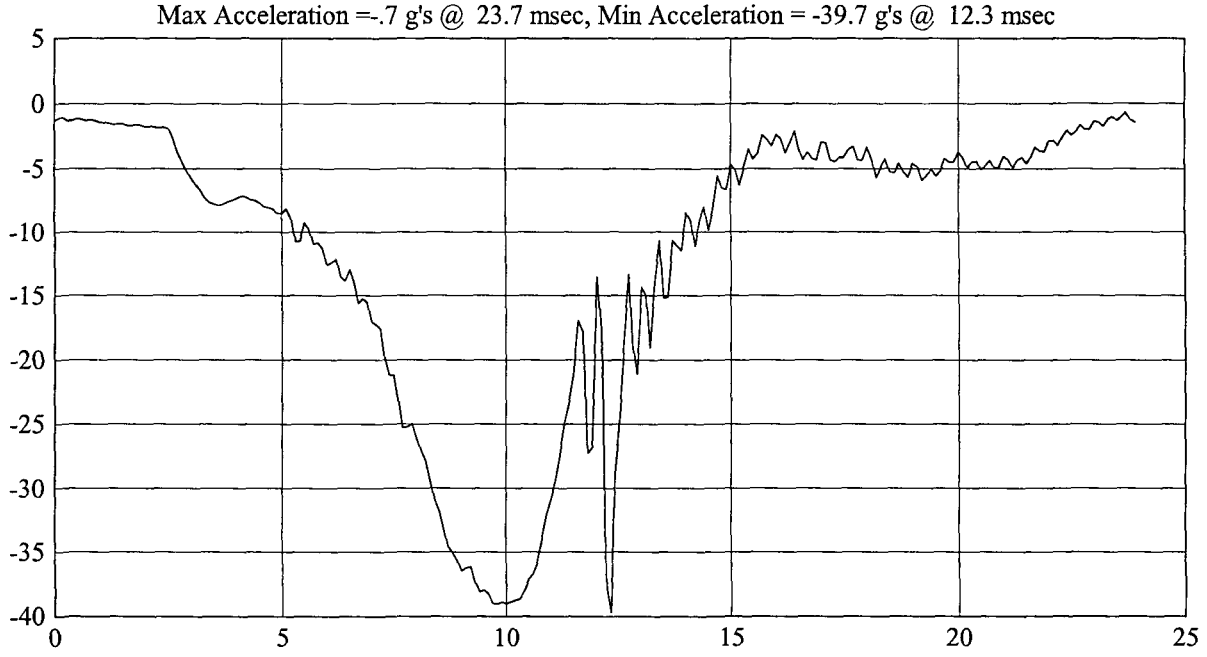


Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

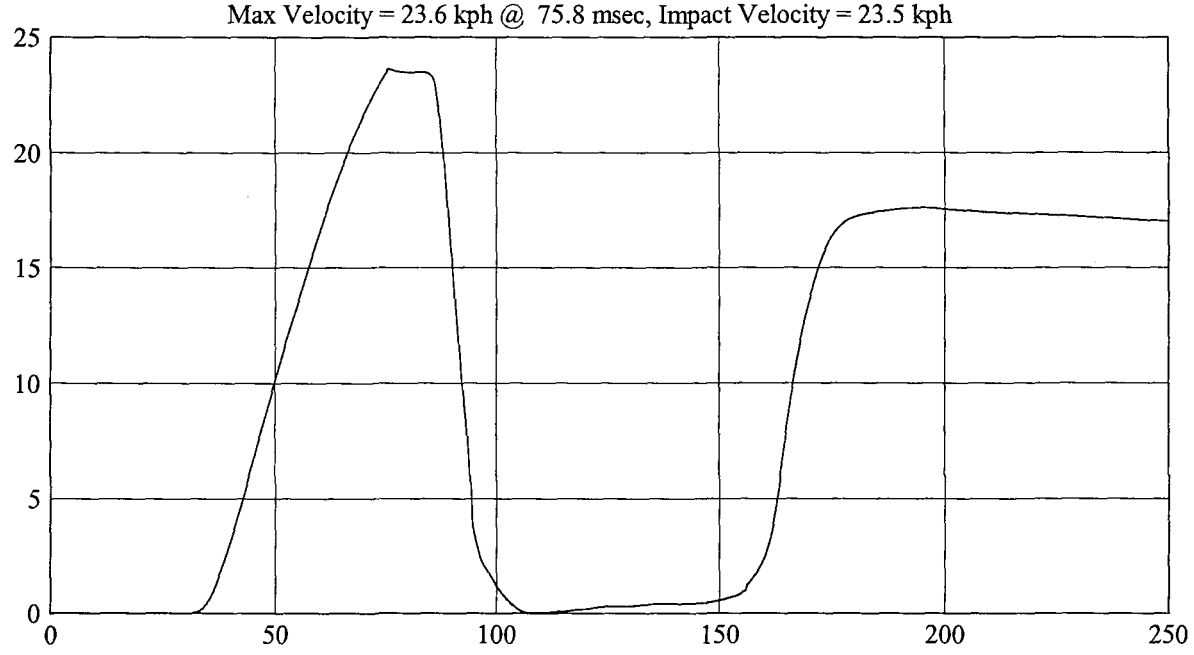
Customer: FORD | Vehicle Program : F150 | Model Year: 1998
Test # 7 | Target: RH
FM4539 | Vehicle Side: Right
Additional Desc: N/A | Test Date: 9/8/04 | Horz/Vert Angle: 0/40
HIC(d) = 420, HIC = 336, Delta T = 8.3 msec

Max Acceleration =-.7 g's @ 23.7 msec, Min Acceleration = -39.7 g's @ 12.3 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.6 kph @ 75.8 msec, Impact Velocity = 23.5 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 7
FM4539
Additional Desc: N/A

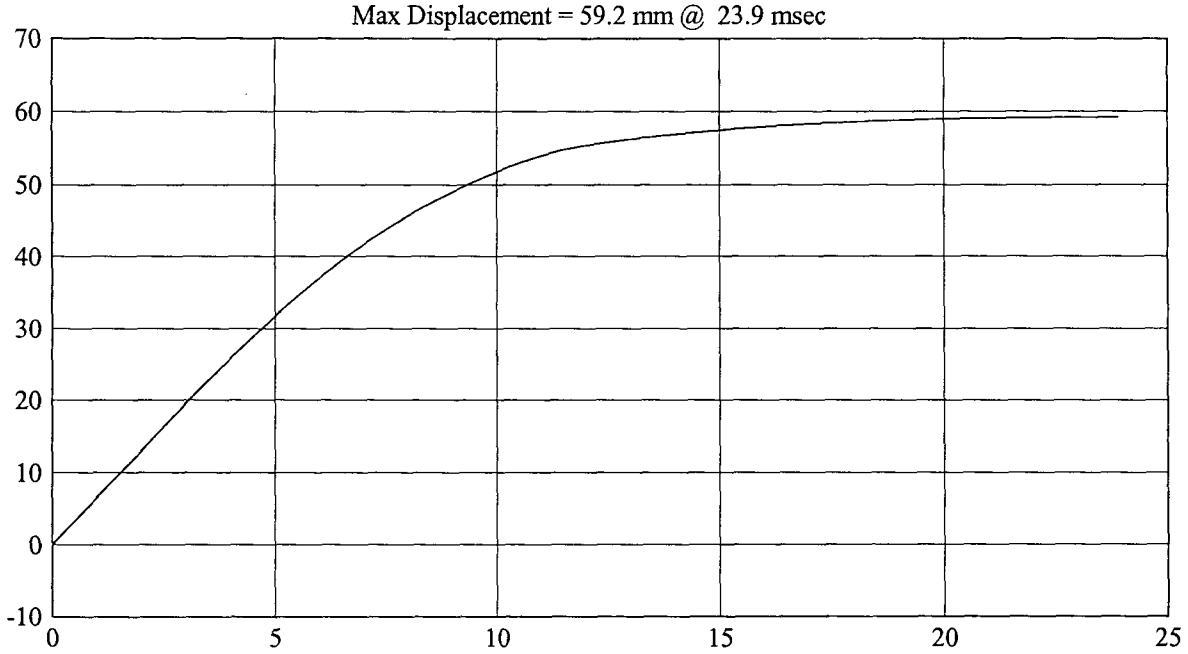
Vehicle Program : F150

Test Date: 9/8/04

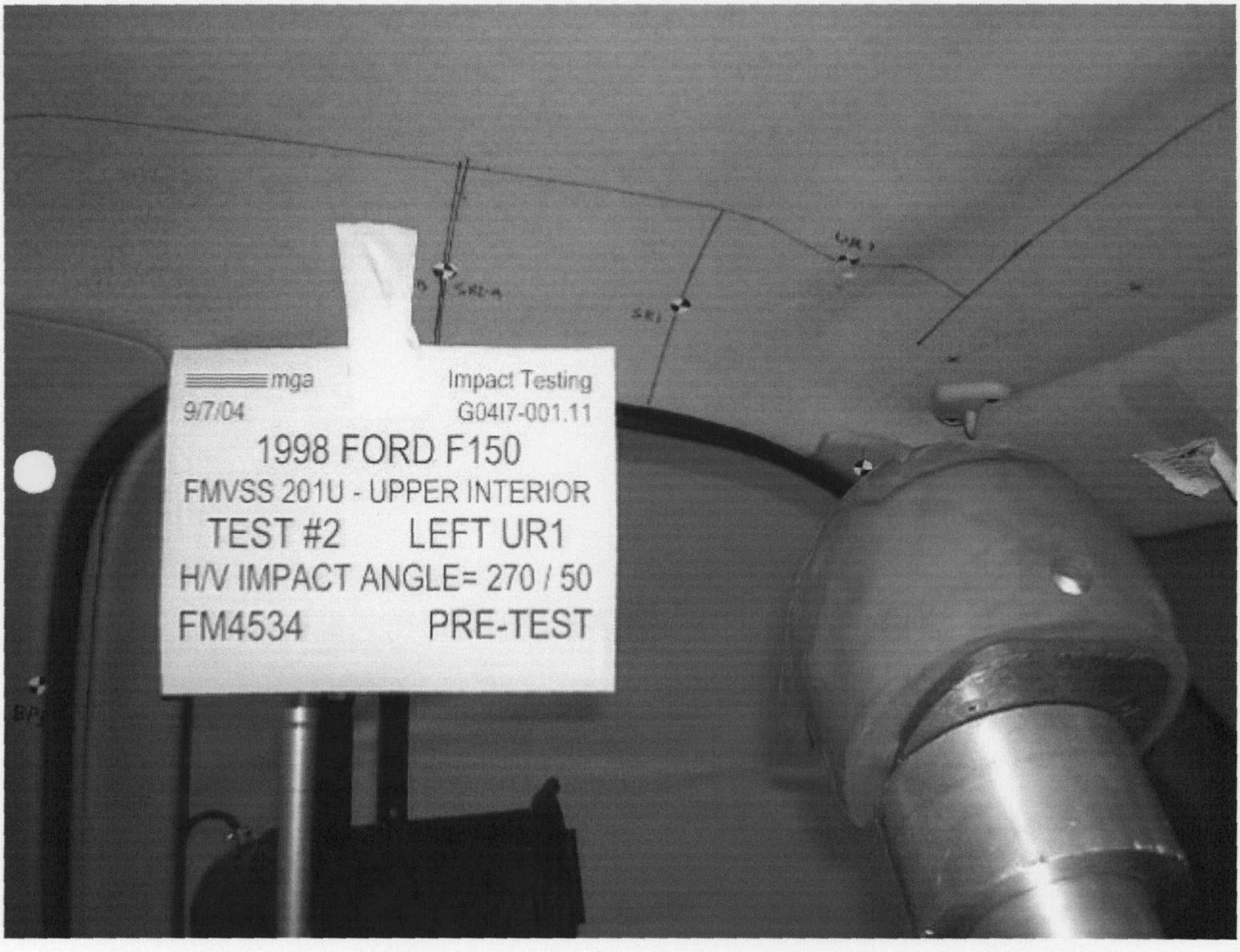
Model Year: 1998
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/40

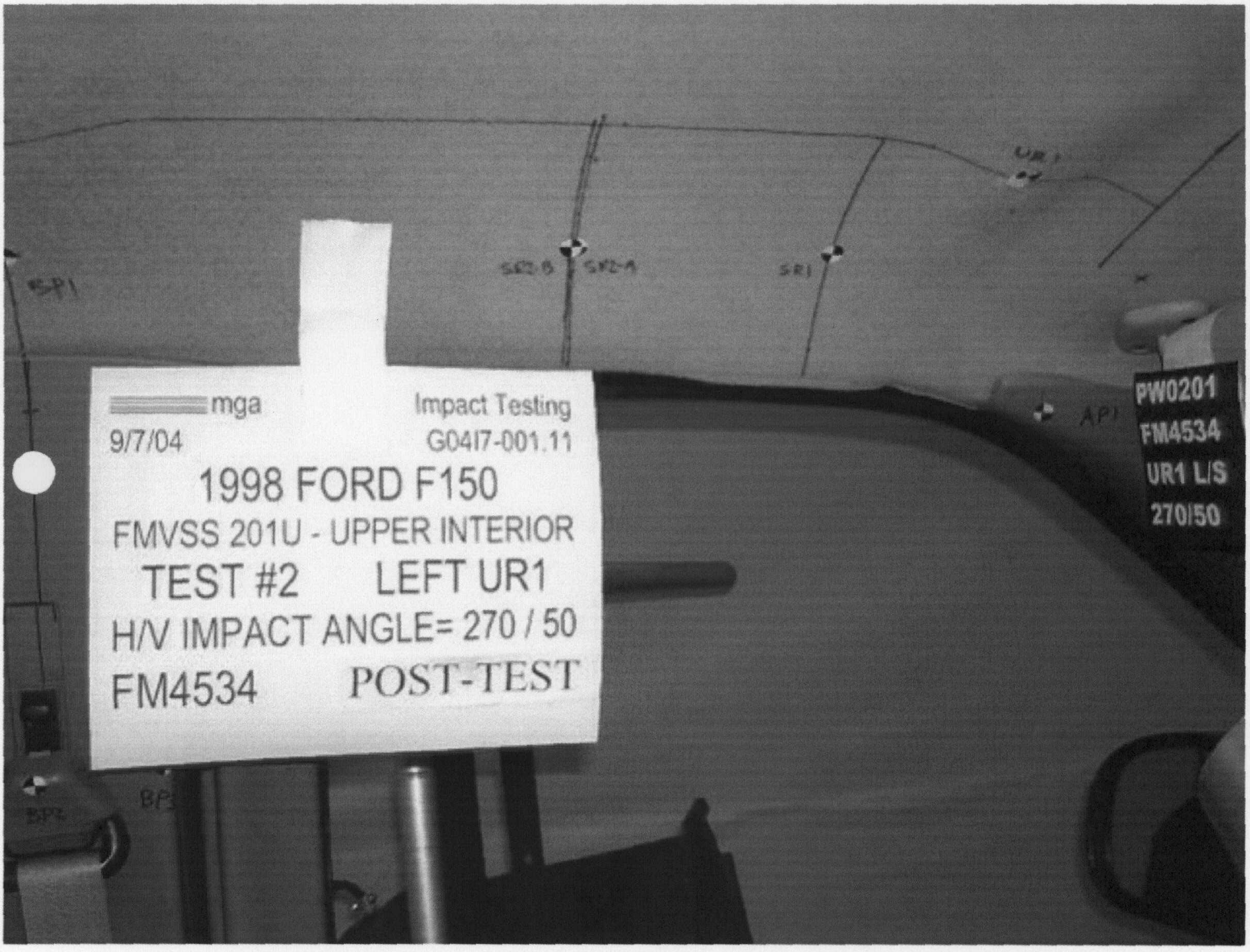
HIC(d) = 420, HIC = 336, Delta T = 8.3 msec

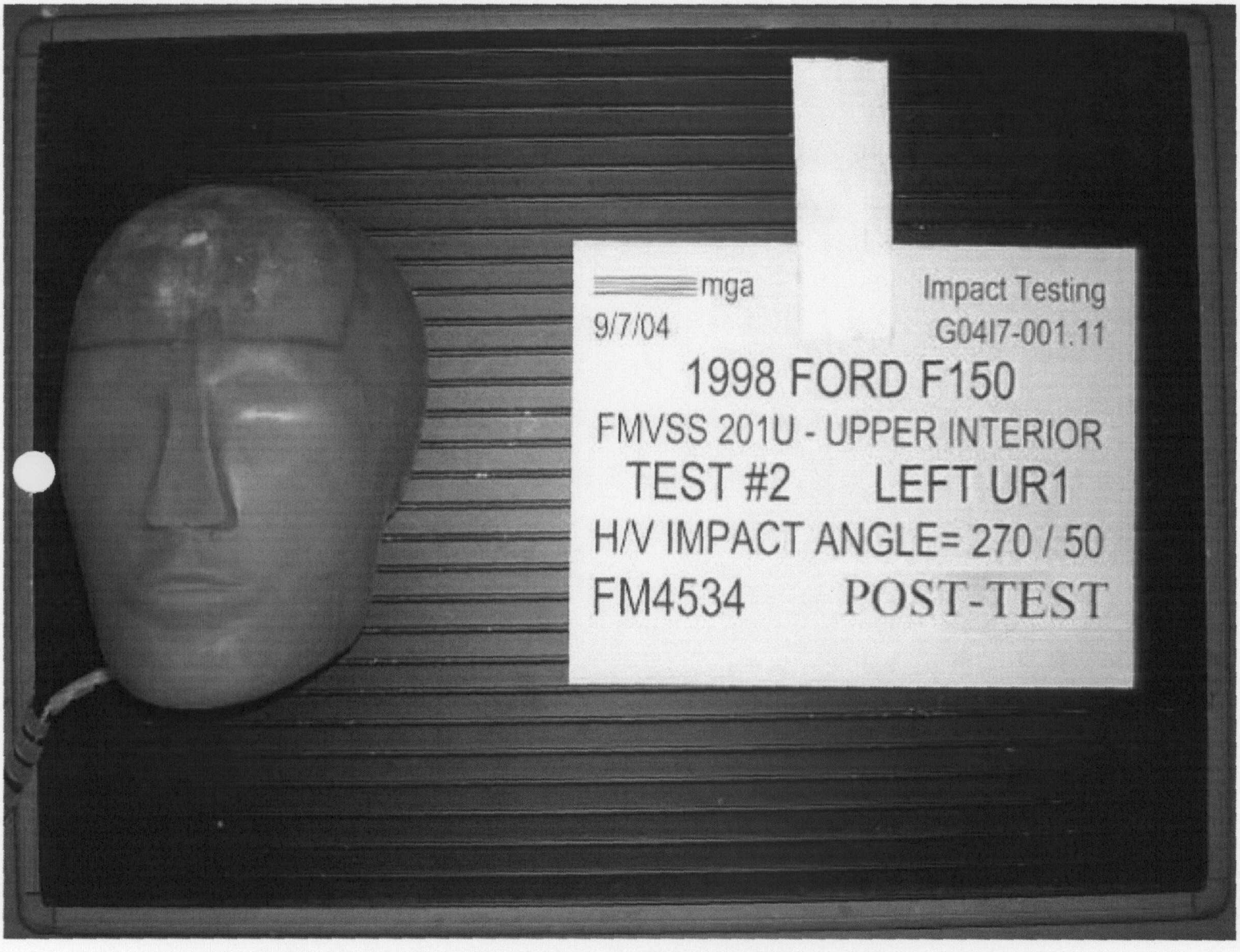
Max Displacement = 59.2 mm @ 23.9 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
FM4534 PRE-TEST


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
FM4534 POST-TEST
PW0201
FM4534
UR1 L/S
270/50


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
FM4534 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR1 Left

MGA Test Reference No.:FM4534

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Test Number:#2

Temperature:22C

Humidity:57%

Time of Test:2:15 PM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1211	1385	3.8	23.6	45	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.67	1.67
Y	6	J35916	100.2	1.54	1.54
Z	7	J35918	97.9	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Headliner deformation

Recorded By: _____ Approved By*: Helen A. Kaleto Date: 9-7-01

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD
Test # 2
FM4534
Additional Desc: N/A

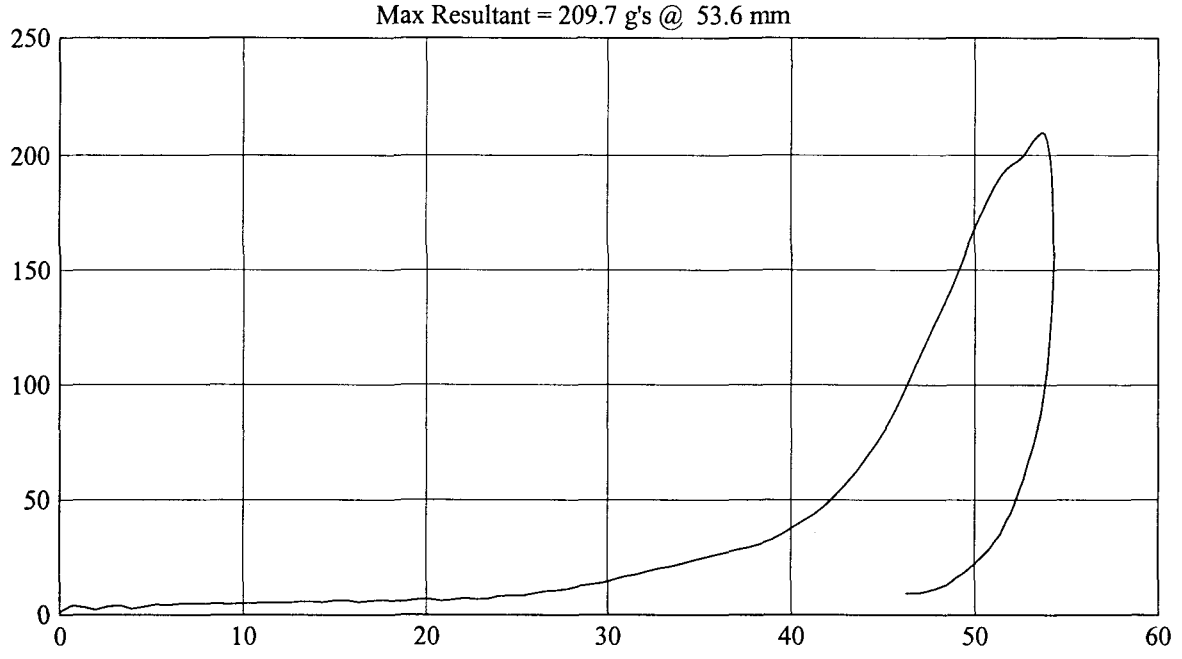
Vehicle Program : F150

Test Date: 9/7/04

Model Year: 1998
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

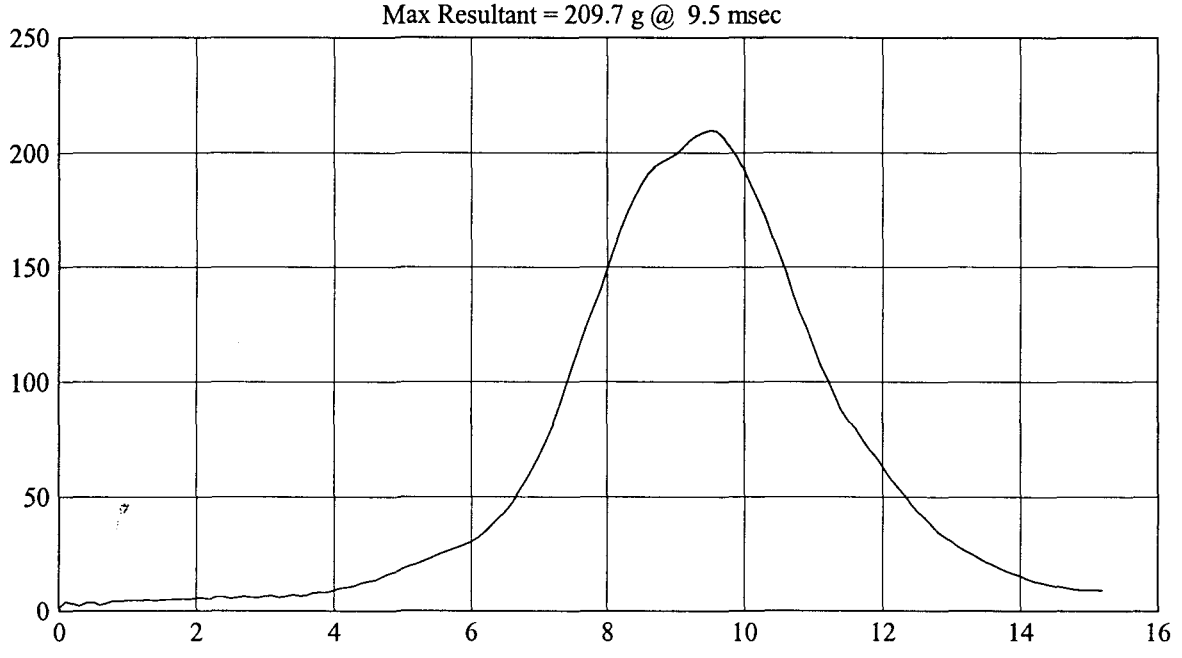
HIC(d) = 1211, HIC = 1385, Delta T = 3.8 msec

Max Resultant = 209.7 g's @ 53.6 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 209.7 g @ 9.5 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

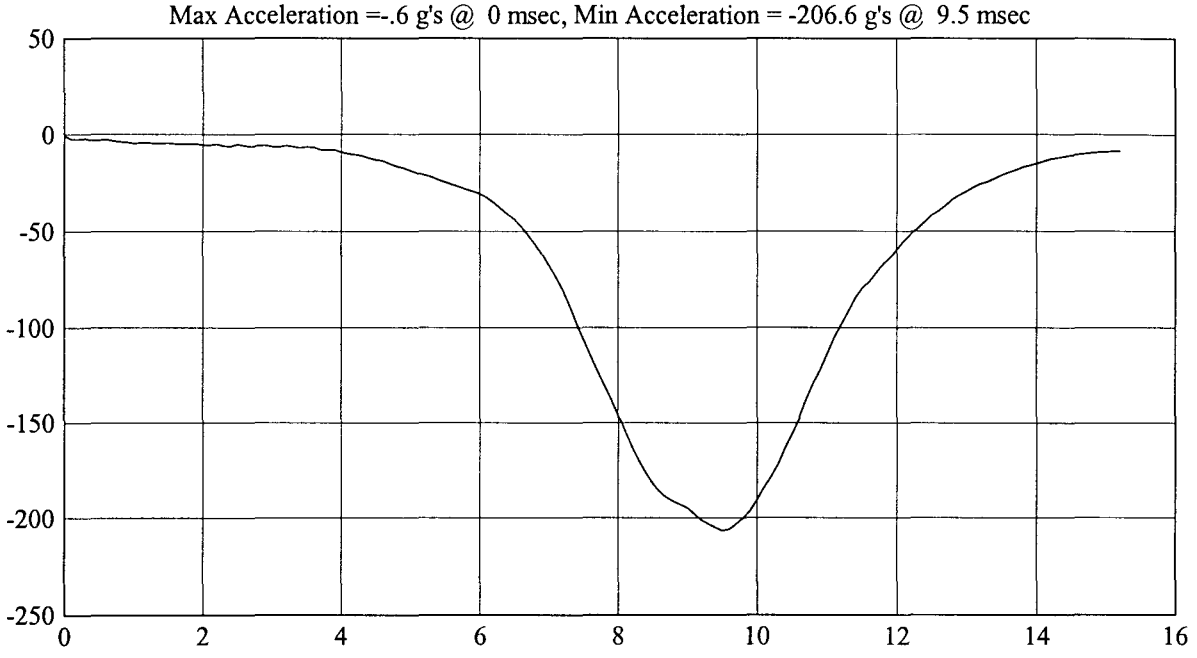
Customer: FORD
Test # 2
FM4534
Additional Desc: N/A

Vehicle Program : F150
Test Date: 9/7/04

Model Year: 1998
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

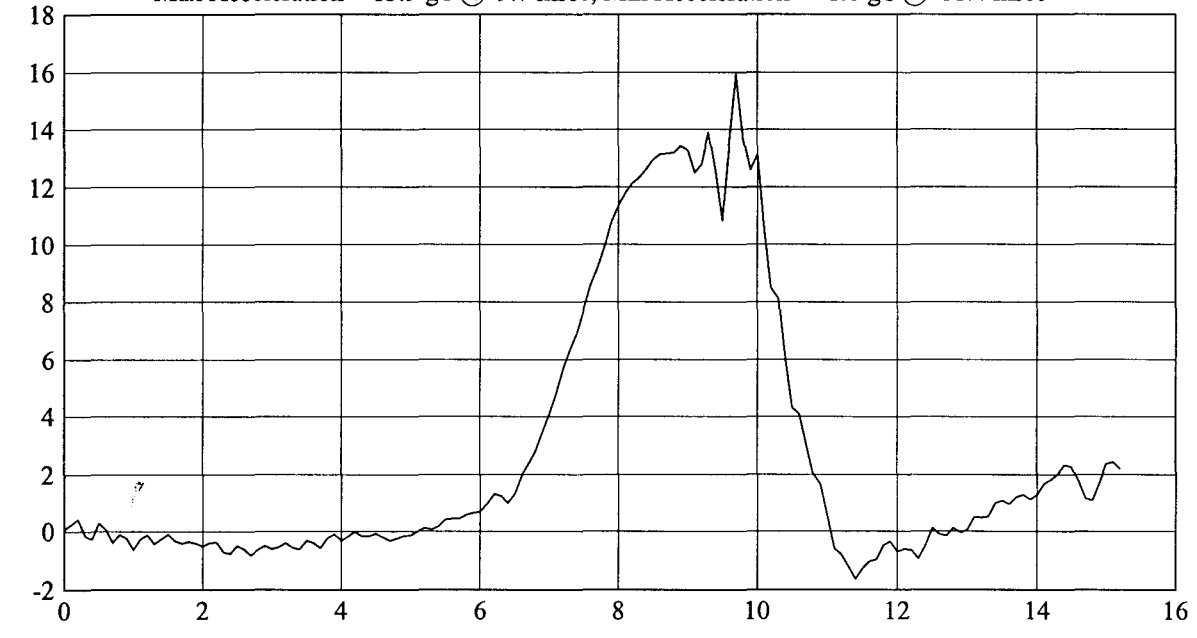
HIC(d) = 1211, HIC = 1385, Delta T = 3.8 msec

Max Acceleration =-.6 g's @ 0 msec, Min Acceleration = -206.6 g's @ 9.5 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 15.9 g's @ 9.7 msec, Min Acceleration = -1.6 g's @ 11.4 msec



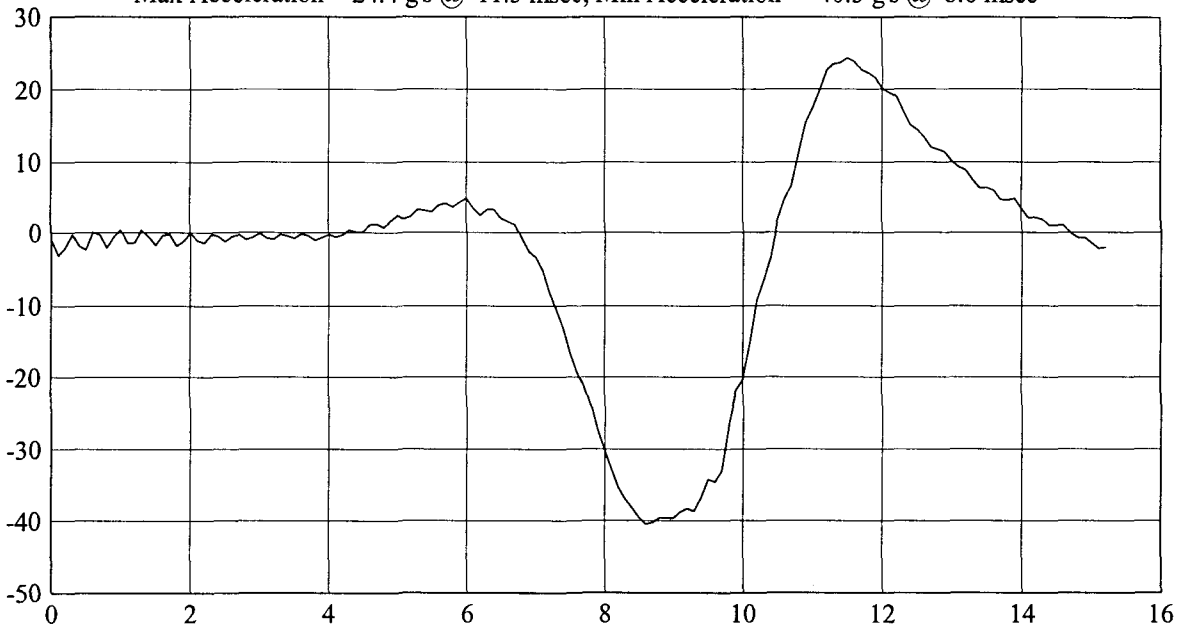
Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 2		Target: UR1
FM4534		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/7/04	Horz/Vert Angle: 270/50

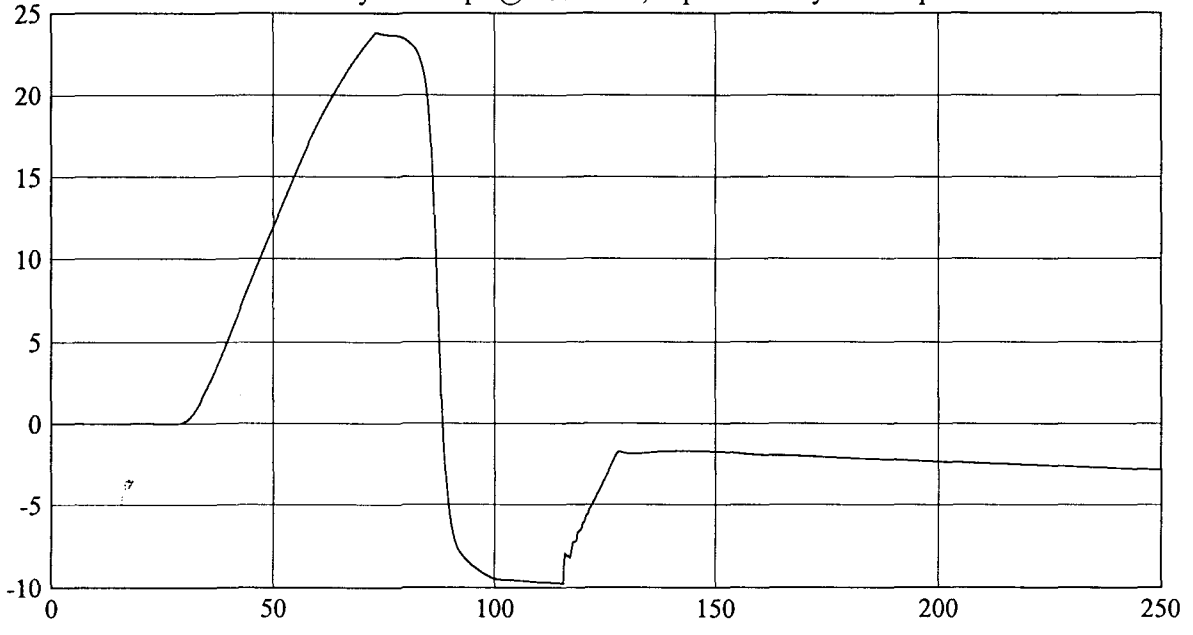
HIC(d) = 1211, HIC = 1385, Delta T = 3.8 msec

Max Acceleration = 24.4 g's @ 11.5 msec, Min Acceleration = -40.5 g's @ 8.6 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.8 kph @ 73.1 msec, Impact Velocity = 23.6 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 2
FM4534
Additional Desc: N/A

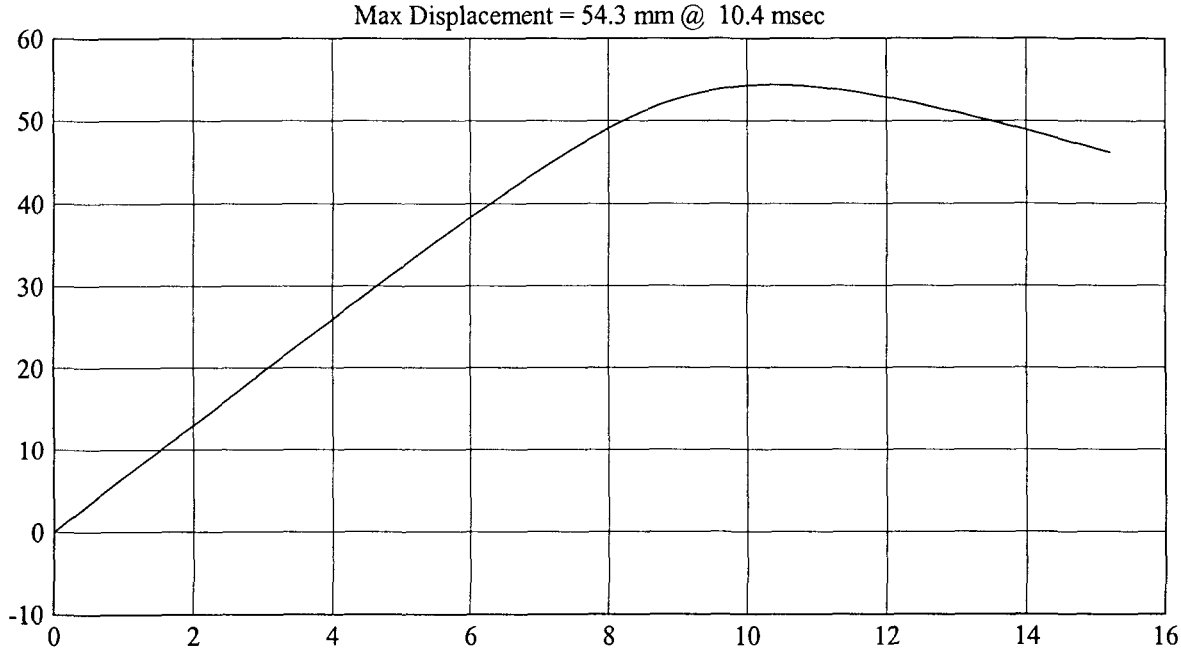
Vehicle Program : F150

Test Date: 9/7/04

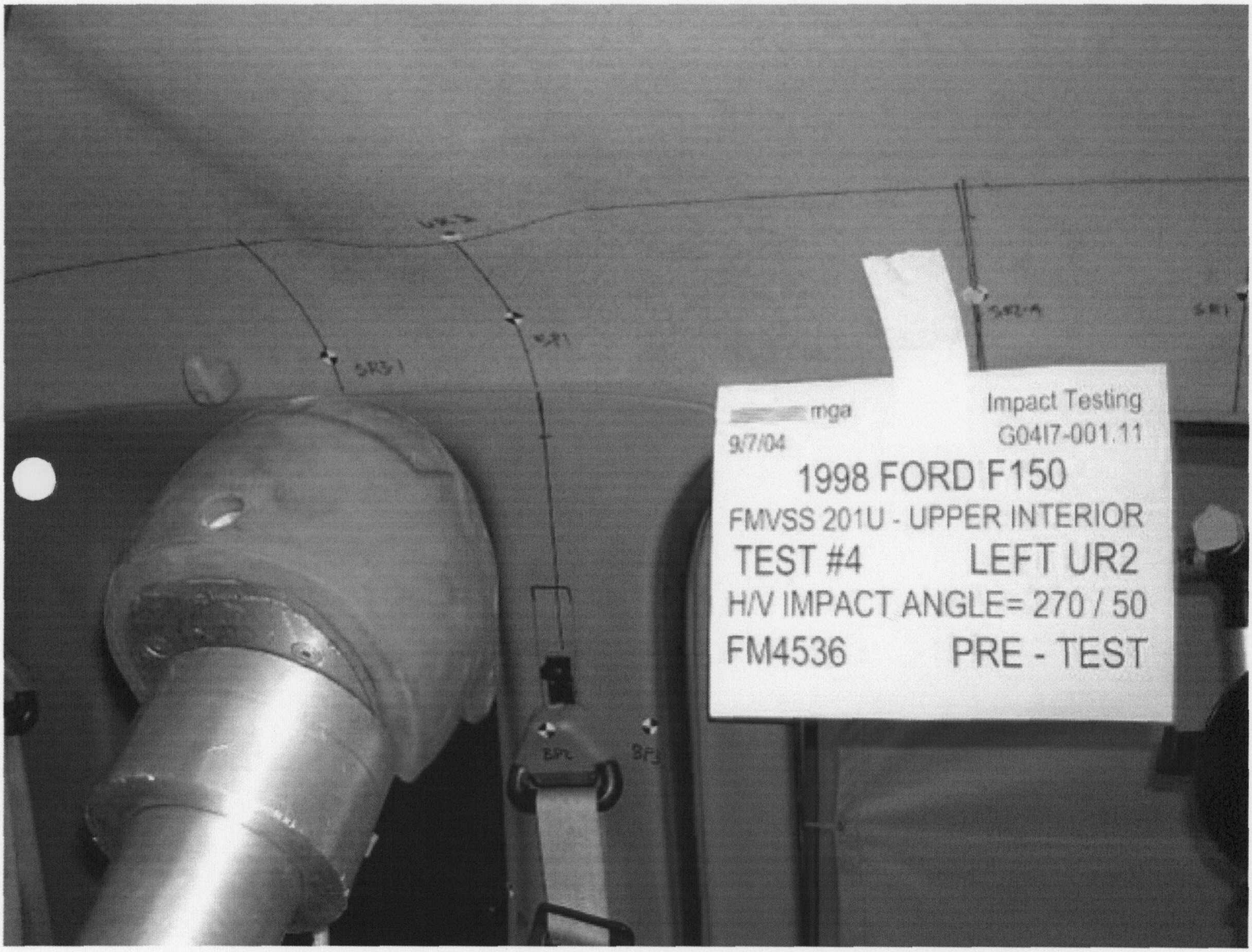
Model Year: 1998
Target: UR1
Vehicle Side: Left
Horz/Vert Angle: 270/50

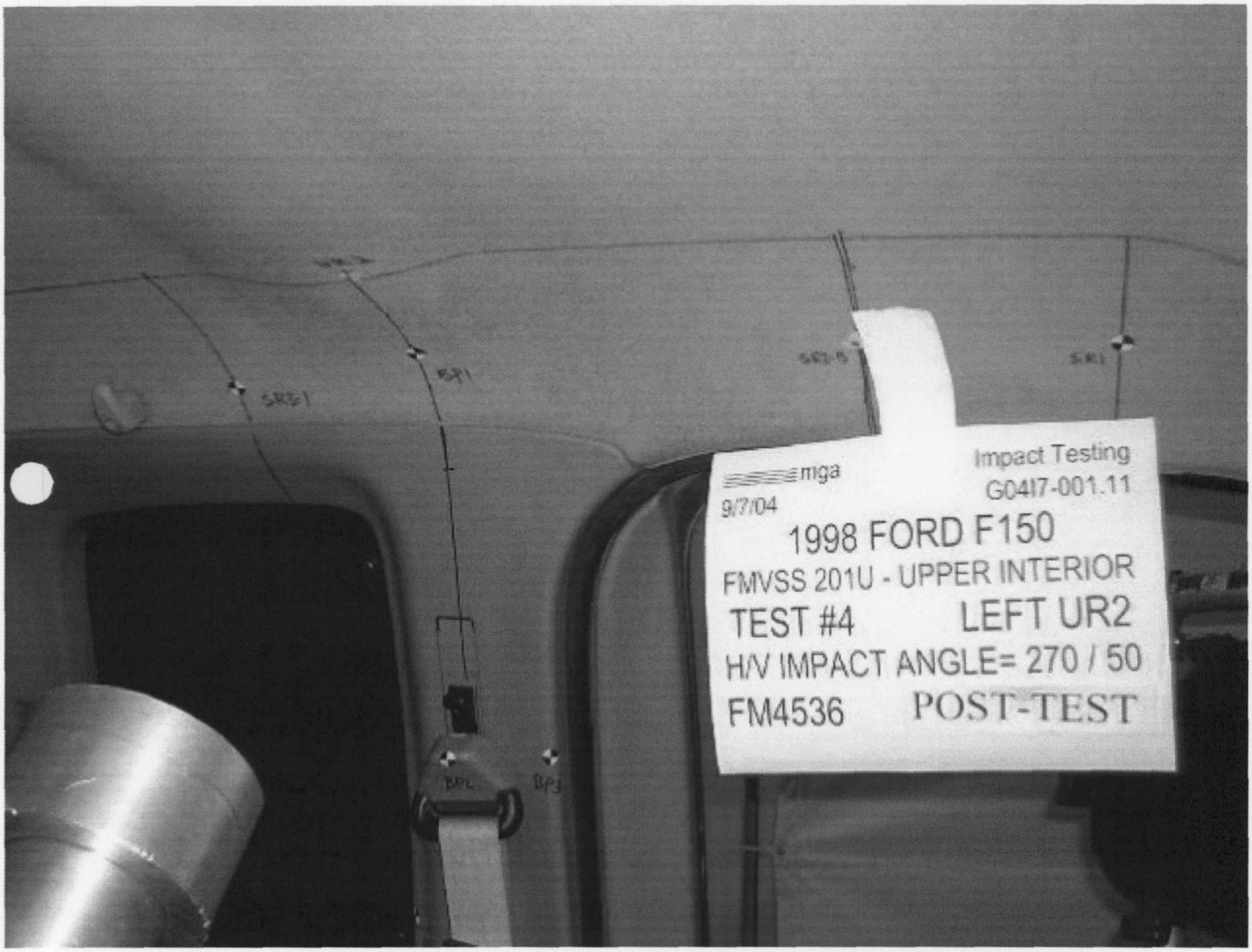
HIC(d) = 1211, HIC = 1385, Delta T = 3.8 msec

Max Displacement = 54.3 mm @ 10.4 msec



Displacement (mm) vs. Time (msec)


mga
9/7/04
Impact Testing
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #4
LEFT UR2
H/V IMPACT ANGLE= 270 / 50
FM4536
PRE - TEST



mga
9/7/04
Impact Testing
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #4
LEFT UR2
H/V IMPACT ANGLE= 270 / 50
FM4536
POST-TEST


mga
Impact Testing
9/7/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #4
LEFT UR2
H/V IMPACT ANGLE= 270 / 50
FM4536
POST-TEST

MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR2 Left

MGA Test Reference No.:FM4536

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Test Number:#4

Temperature:22C

Humidity:53%

Time of Test:4:30 PM

FMH Serial No:035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
686	688	8.9	23.4	32	10 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 9-7-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

Customer: FORD
Test # 4
FM4536
Additional Desc: N/A

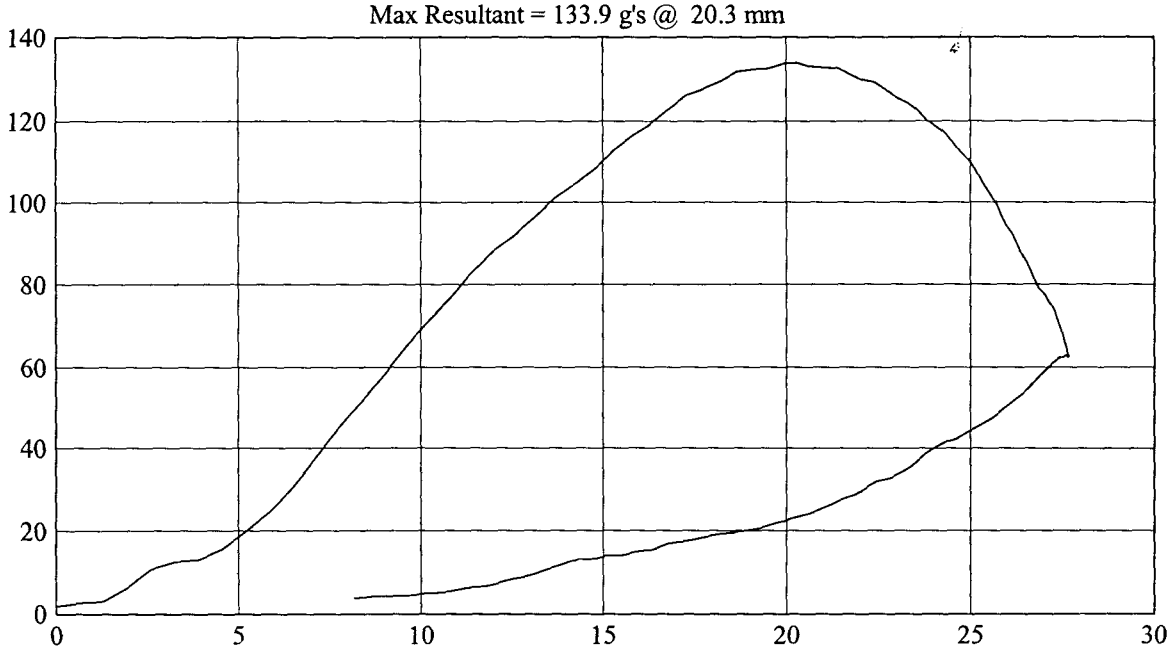
Vehicle Program : F150

Test Date: 9/7/04

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

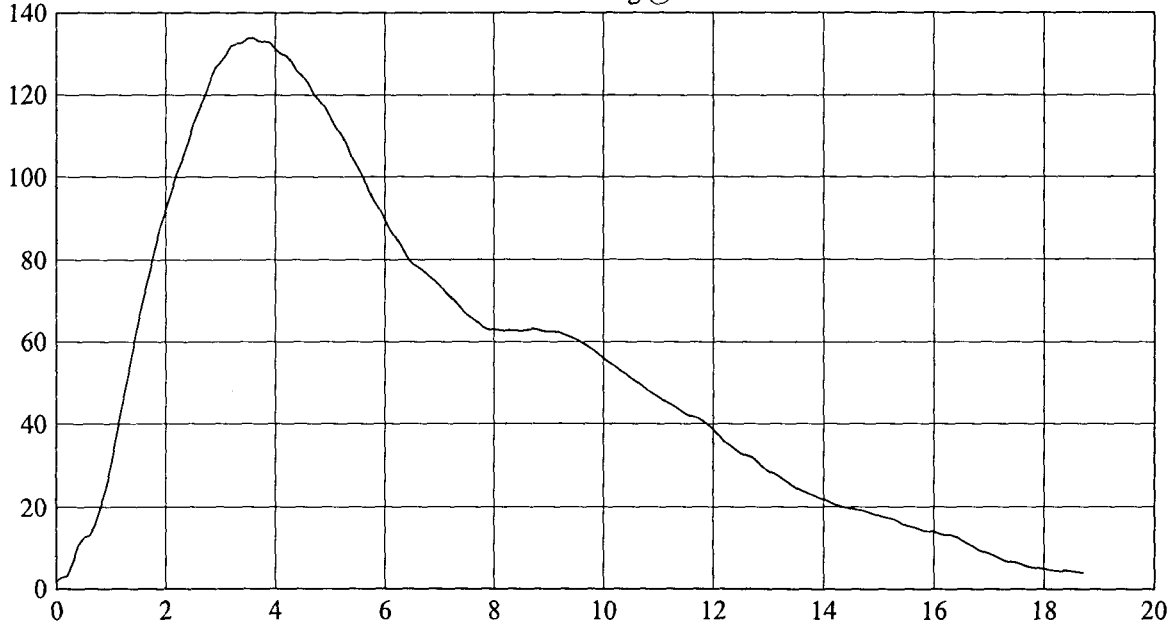
HIC(d) = 686, HIC = 688, Delta T = 8.9 msec

Max Resultant = 133.9 g's @ 20.3 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 133.9 g @ 3.6 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

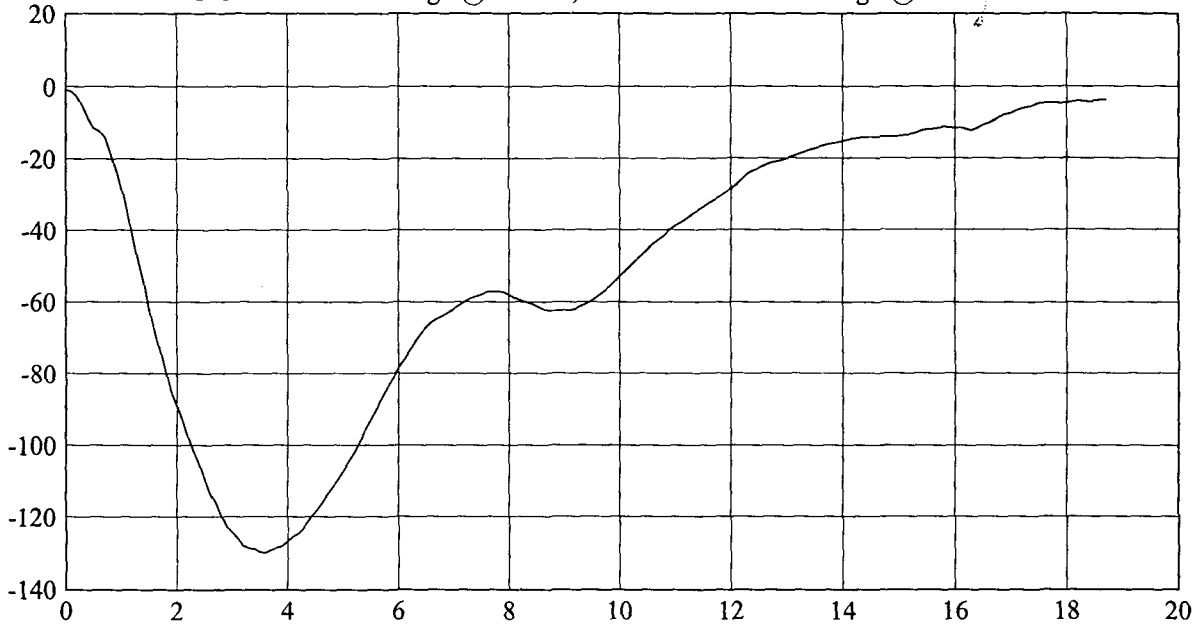
Customer: FORD
Test # 4
FM4536
Additional Desc: N/A

Vehicle Program : F150
Test Date: 9/7/04

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

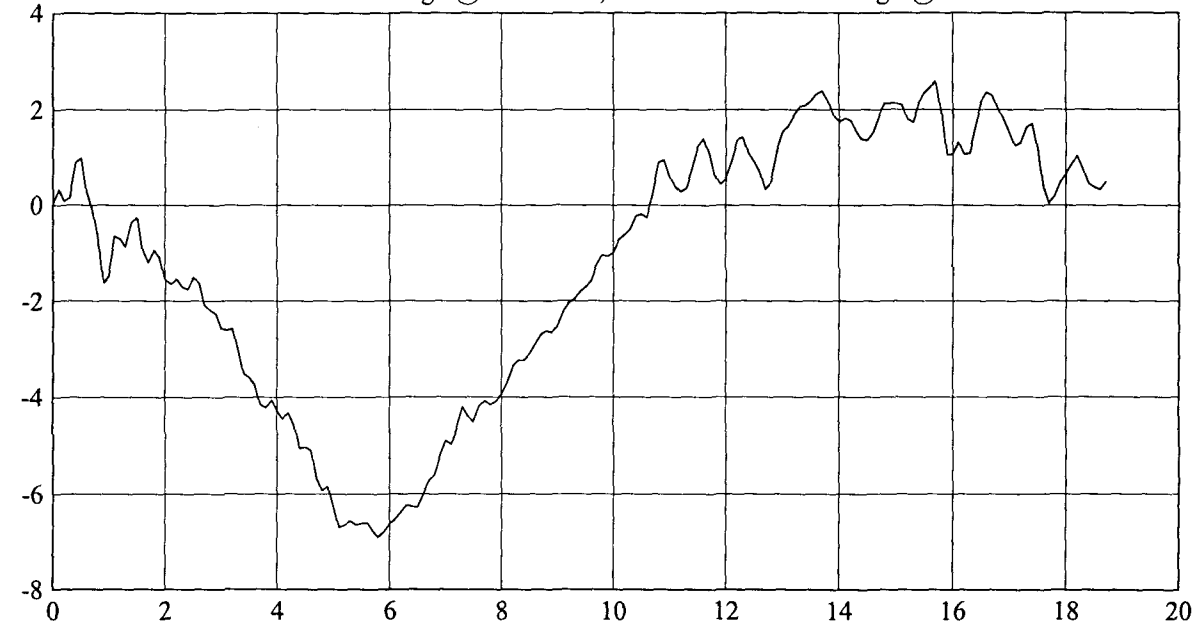
HIC(d) = 686, HIC = 688, Delta T = 8.9 msec

Max Acceleration =-.9 g's @ 0 msec, Min Acceleration = -130 g's @ 3.6 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 2.6 g's @ 15.7 msec, Min Acceleration = -6.9 g's @ 5.8 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 4
FM4536
Additional Desc: N/A

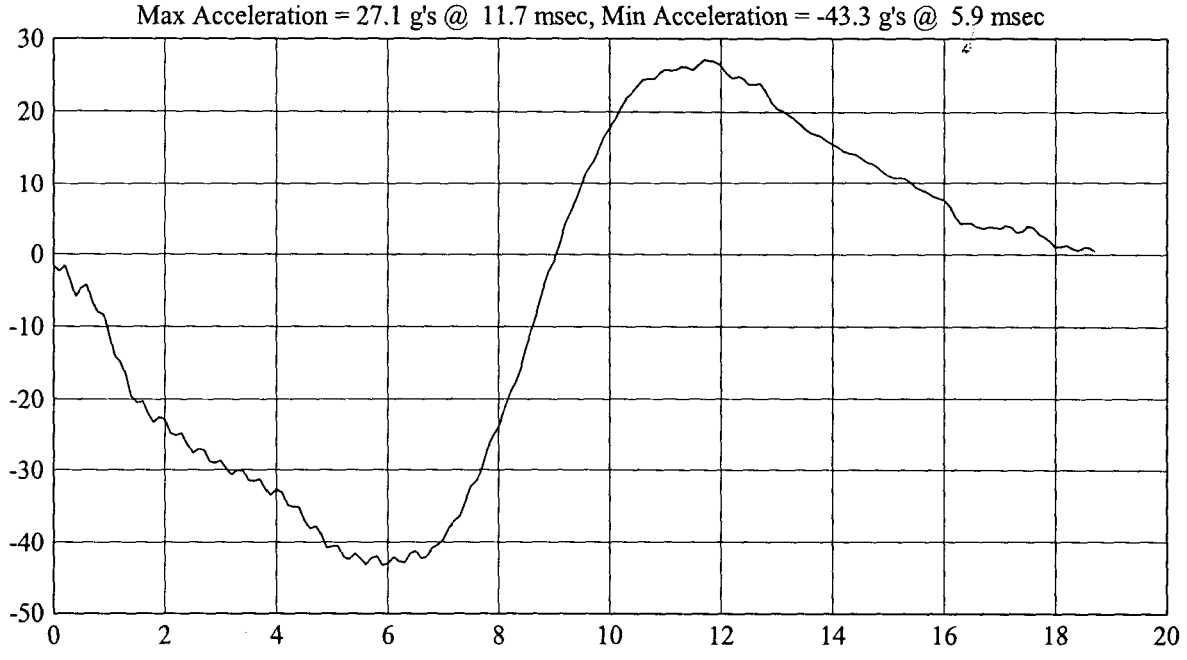
Vehicle Program : F150

Test Date: 9/7/04

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

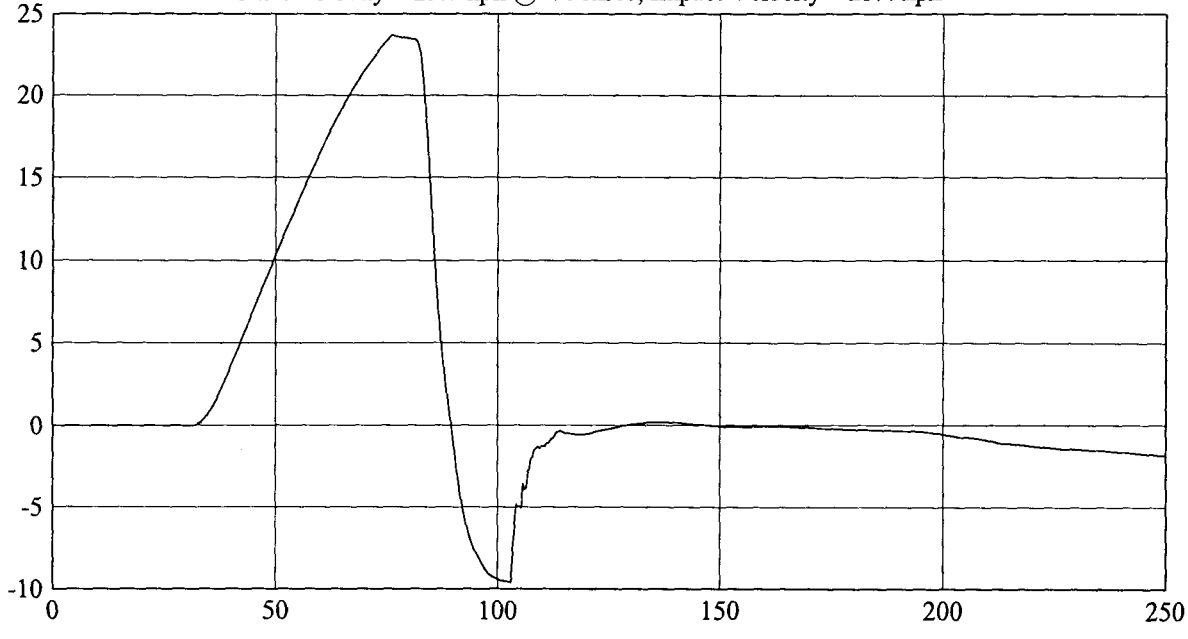
HIC(d) = 686, HIC = 688, Delta T = 8.9 msec

Max Acceleration = 27.1 g's @ 11.7 msec, Min Acceleration = -43.3 g's @ 5.9 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.7 kph @ 76 msec, Impact Velocity = 23.4 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD
Test # 4
FM4536
Additional Desc: N/A

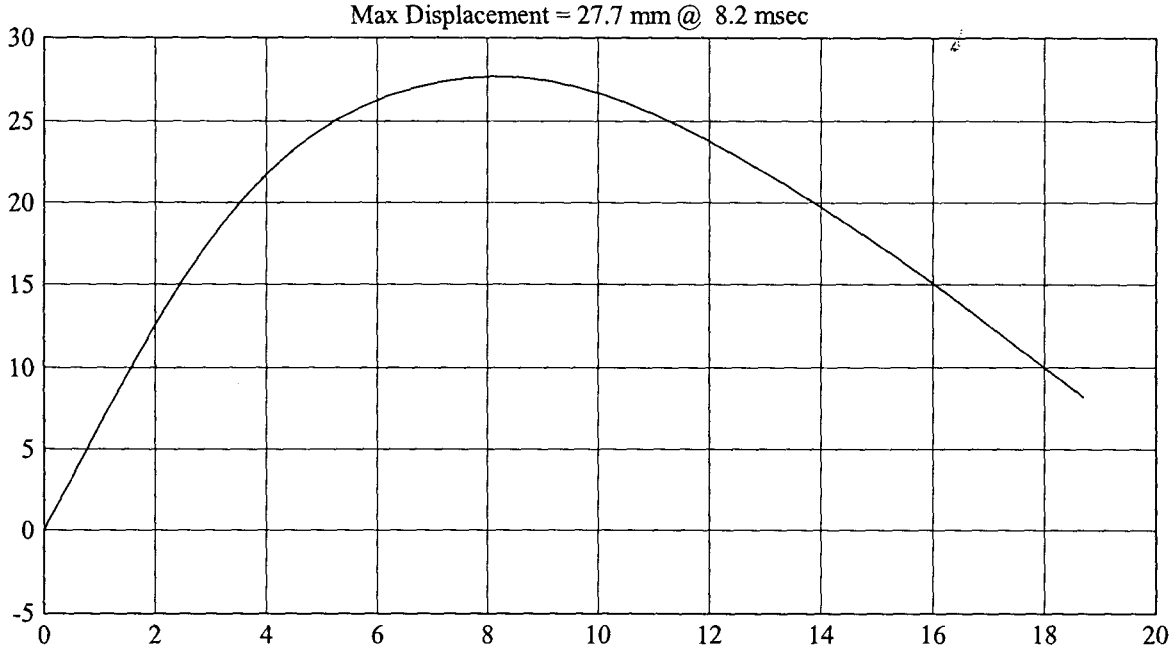
Vehicle Program : F150

Test Date: 9/7/04

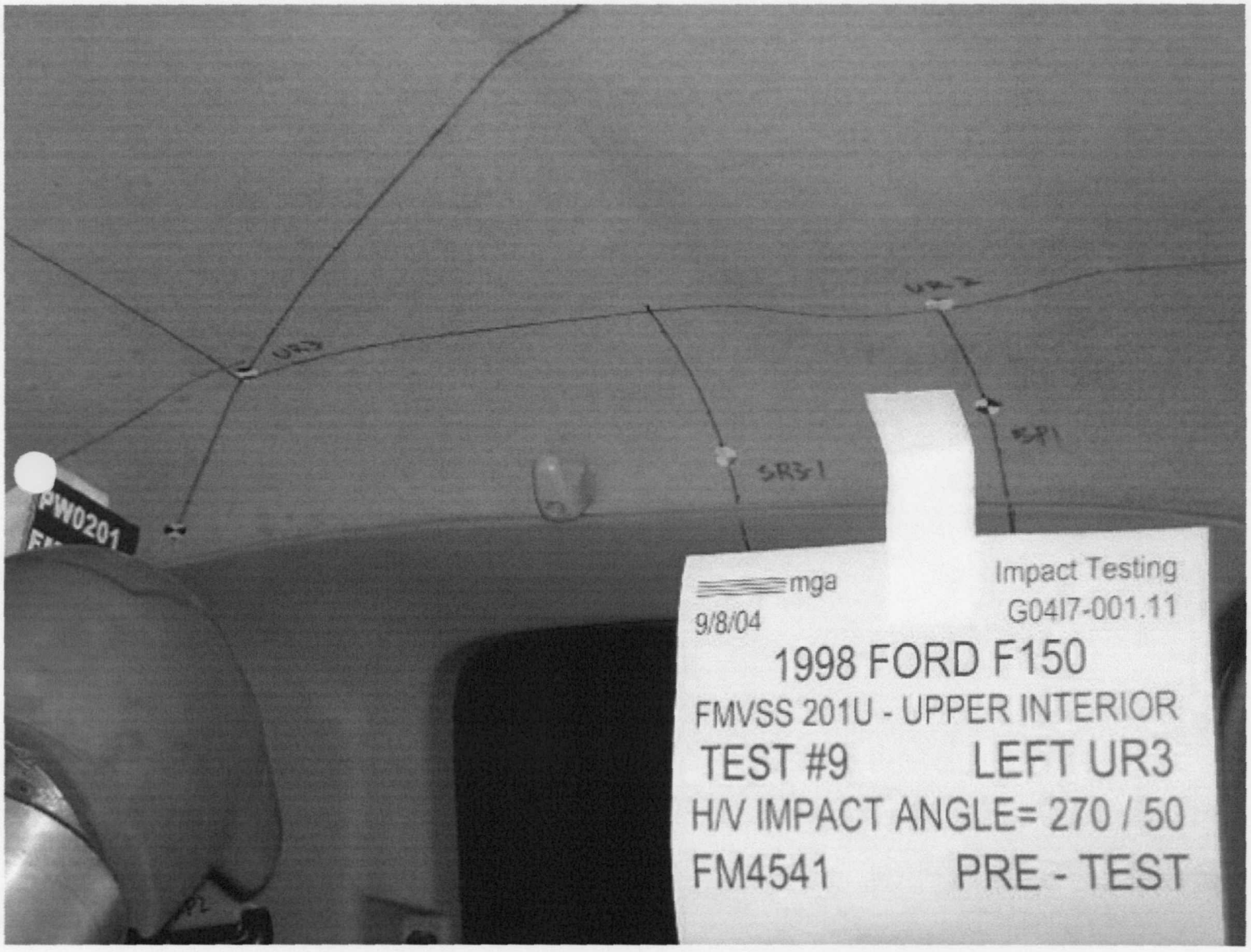
Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

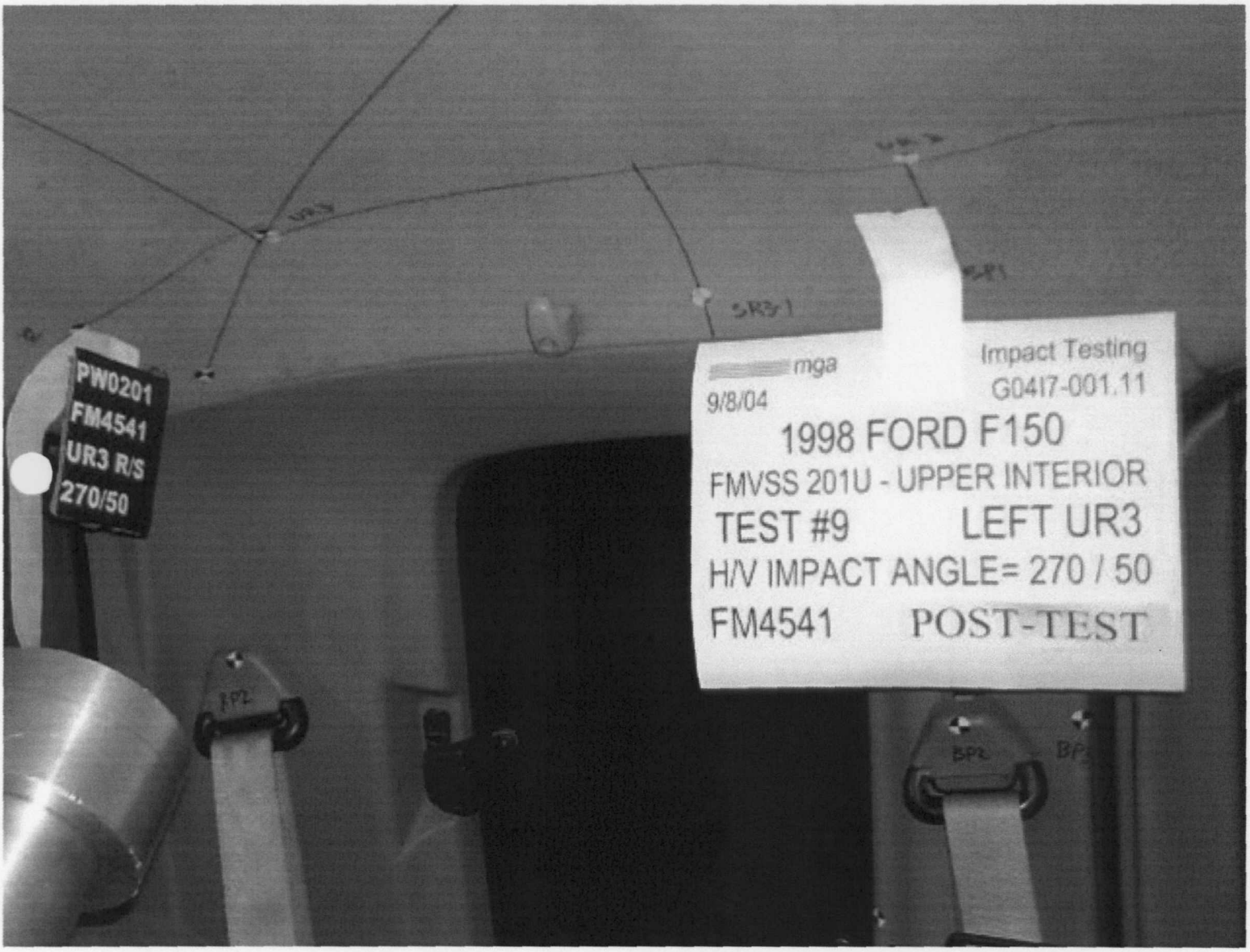
HIC(d) = 686, HIC = 688, Delta T = 8.9 msec

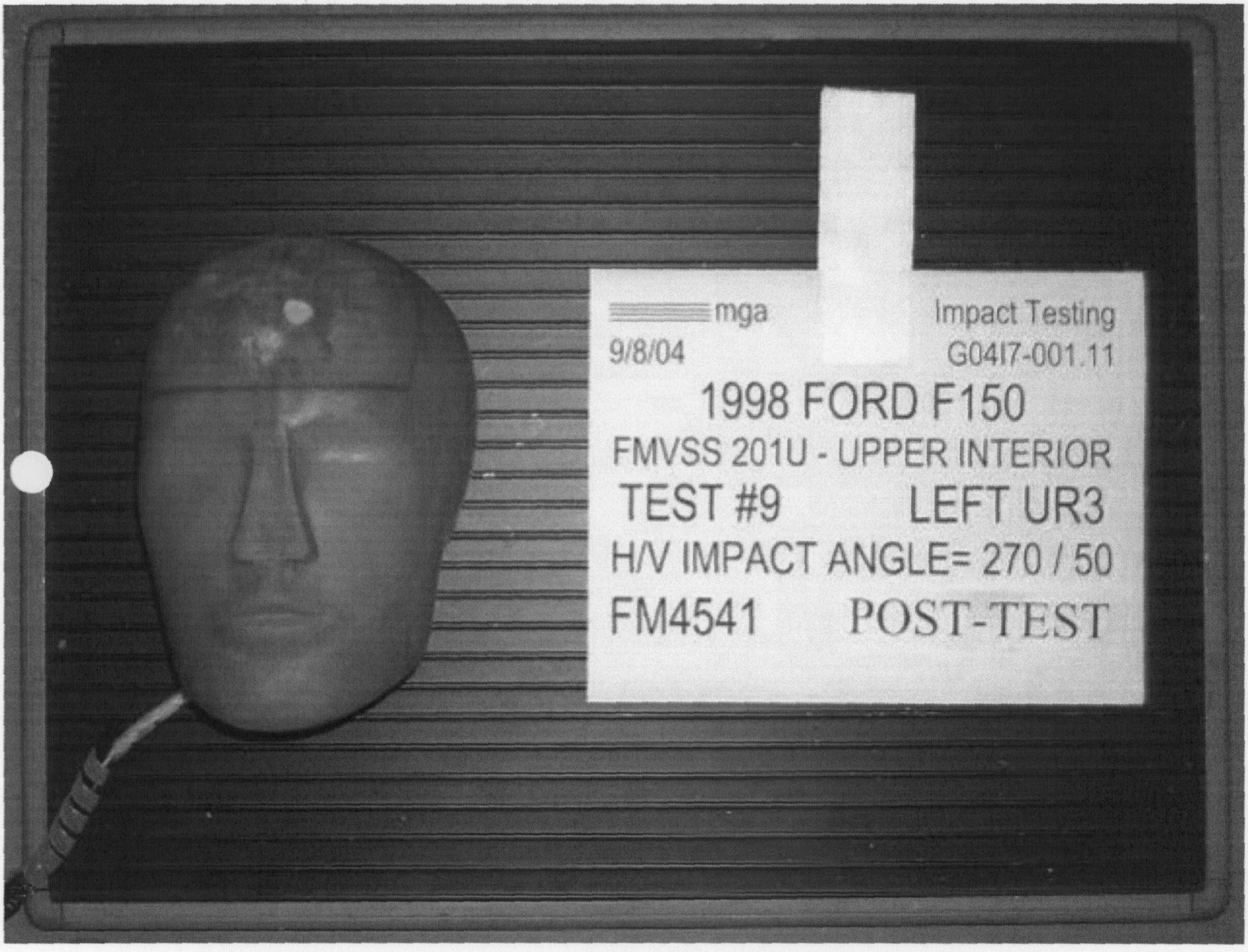
Max Displacement = 27.7 mm @ 8.2 msec



Displacement (mm) vs. Time (msec)


UR3
UR2
SR3 1
SP1
PW0201
mga
9/8/04
Impact Testing
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #9
LEFT UR3
H/V IMPACT ANGLE= 270 / 50
FM4541
PRE - TEST


PW0201
FM4541
UR3 R/S
270/50
mga
9/8/04
Impact Testing
G0417-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #9 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
FM4541 POST-TEST


mga
Impact Testing
9/8/04
G04I7-001.11
1998 FORD F150
FMVSS 201U - UPPER INTERIOR
TEST #9
LEFT UR3
H/V IMPACT ANGLE= 270 / 50
FM4541
POST-TEST

MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.11 VEHICLE YR/MAKE/MODEL:F150 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR3 Left

MGA Test Reference No.:FM4541

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Test Number:#9

Temperature:22C

Humidity:62%

Time of Test:1:45 PM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
962	1054	4.8	23.7	34	8 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.67	1.67
Y	6	J35916	100.2	1.54	1.54
Z	7	J35918	97.9	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: Helen A. Kaleta Date: 9-8-4

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.11

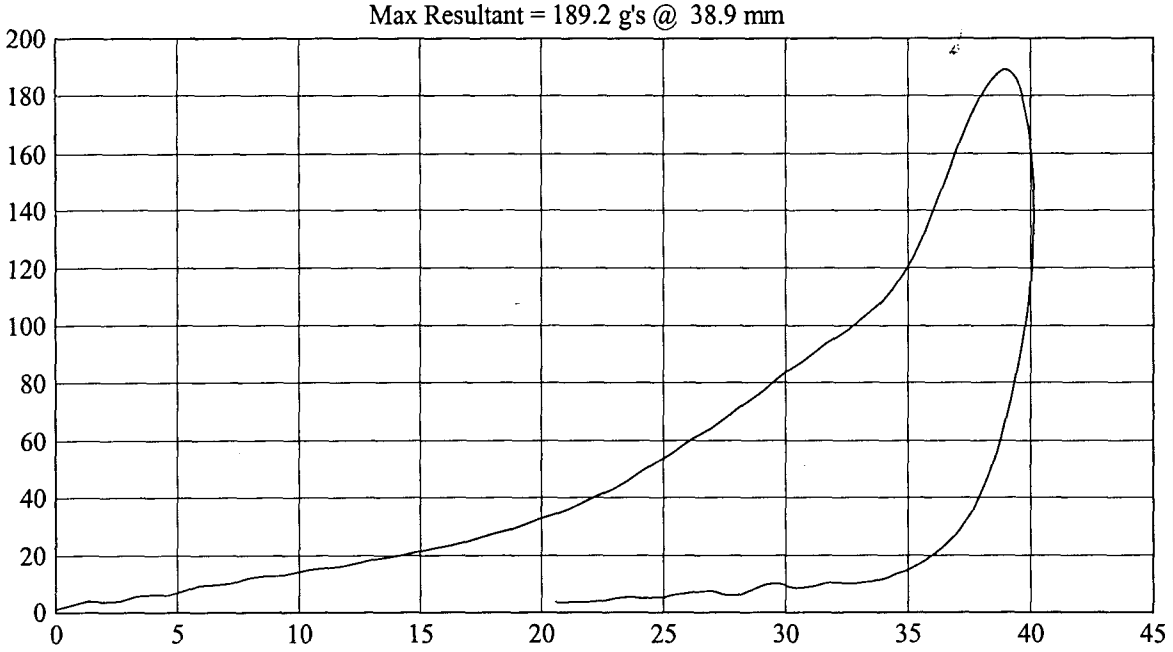
Customer: FORD
Test # 9
FM4541
Additional Desc: N/A

Vehicle Program : F150
Test Date: 9/8/04

Model Year: 1998
Target: UR3
Vehicle Side: Left
Horz/Vert Angle: 270/50

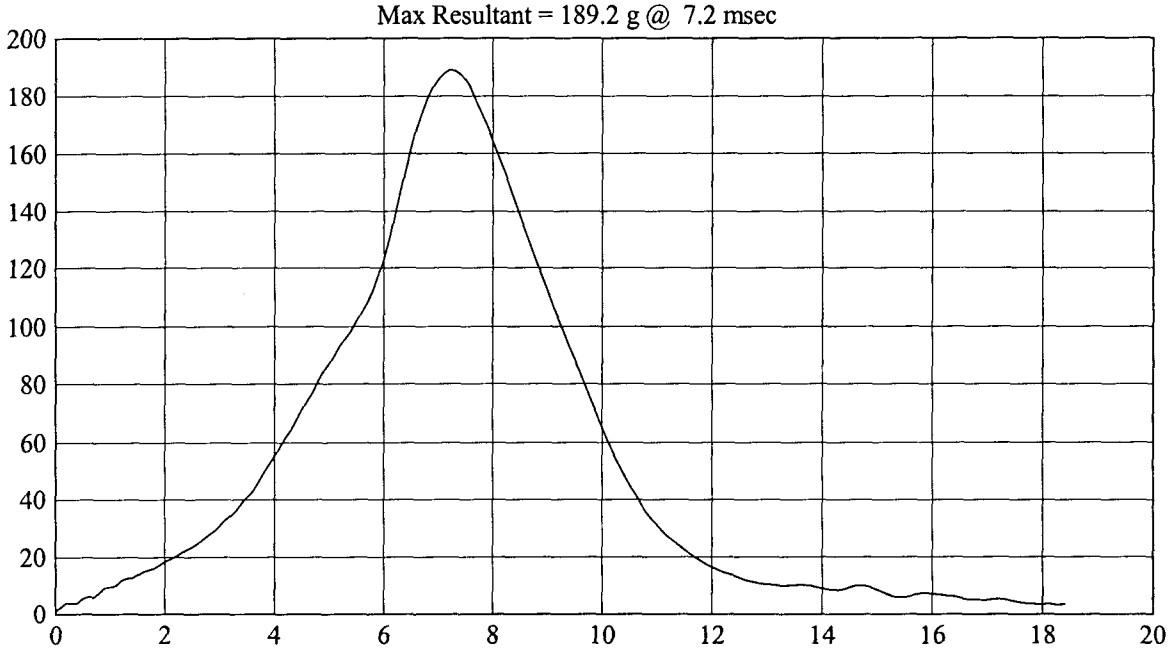
HIC(d) = 962, HIC = 1054, Delta T = 4.8 msec

Max Resultant = 189.2 g's @ 38.9 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 189.2 g @ 7.2 msec



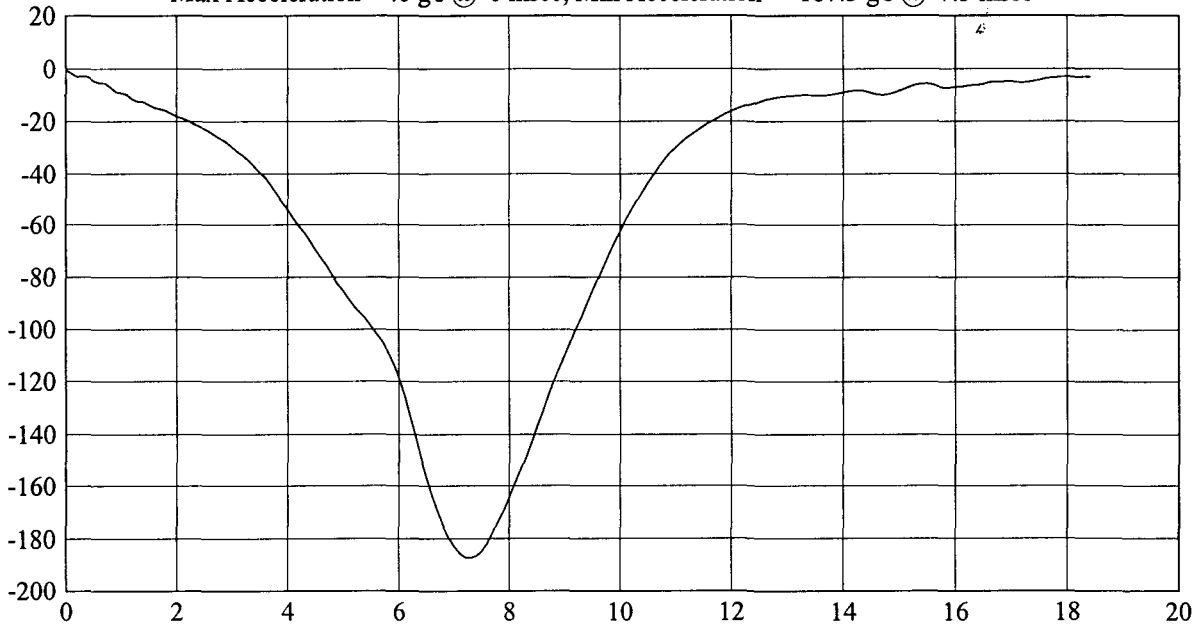
Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 9		Target: UR3
FM4541		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/50

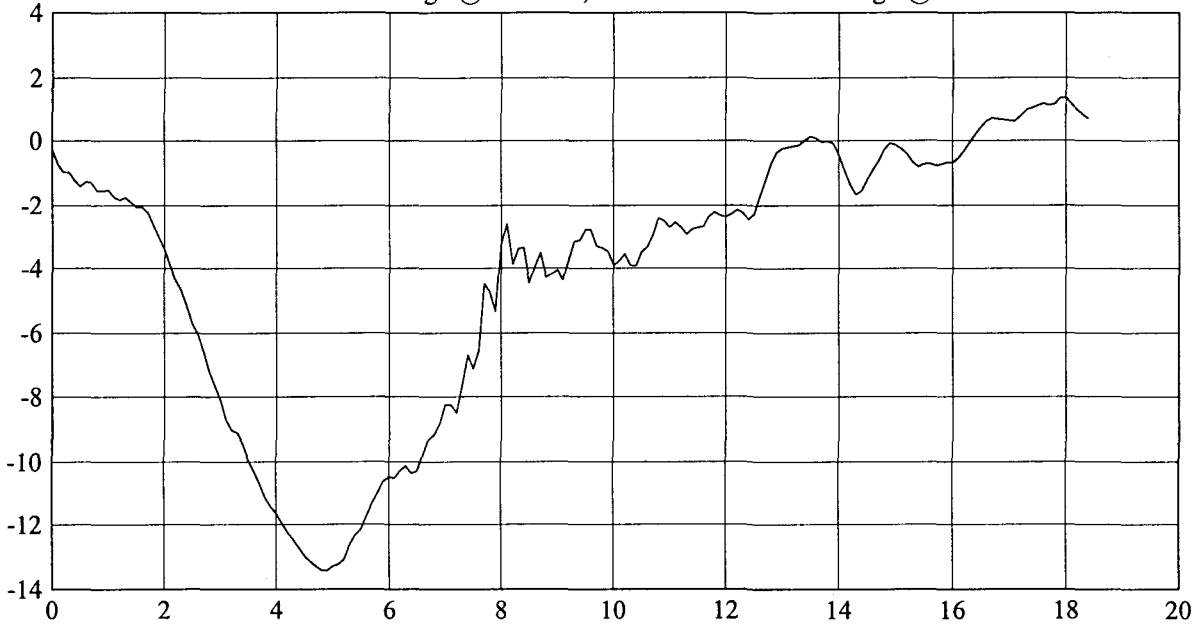
HIC(d) = 962, HIC = 1054, Delta T = 4.8 msec

Max Acceleration =-.6 g's @ 0 msec, Min Acceleration = -187.3 g's @ 7.3 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 1.4 g's @ 18 msec, Min Acceleration = -13.4 g's @ 4.9 msec

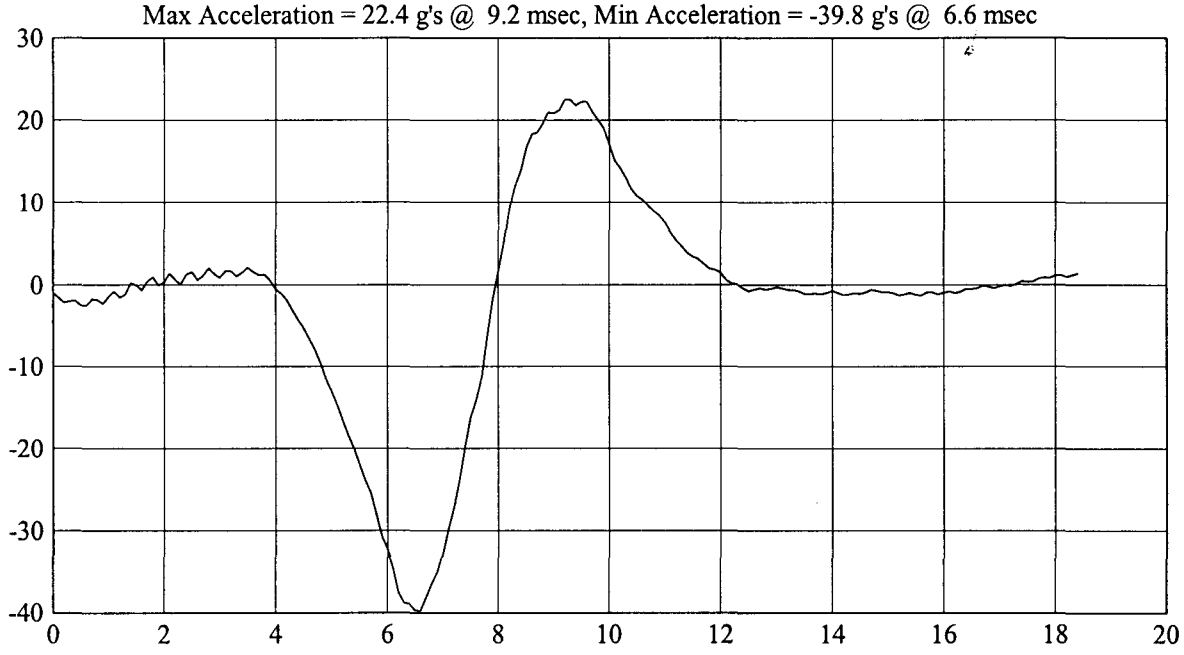


Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.11

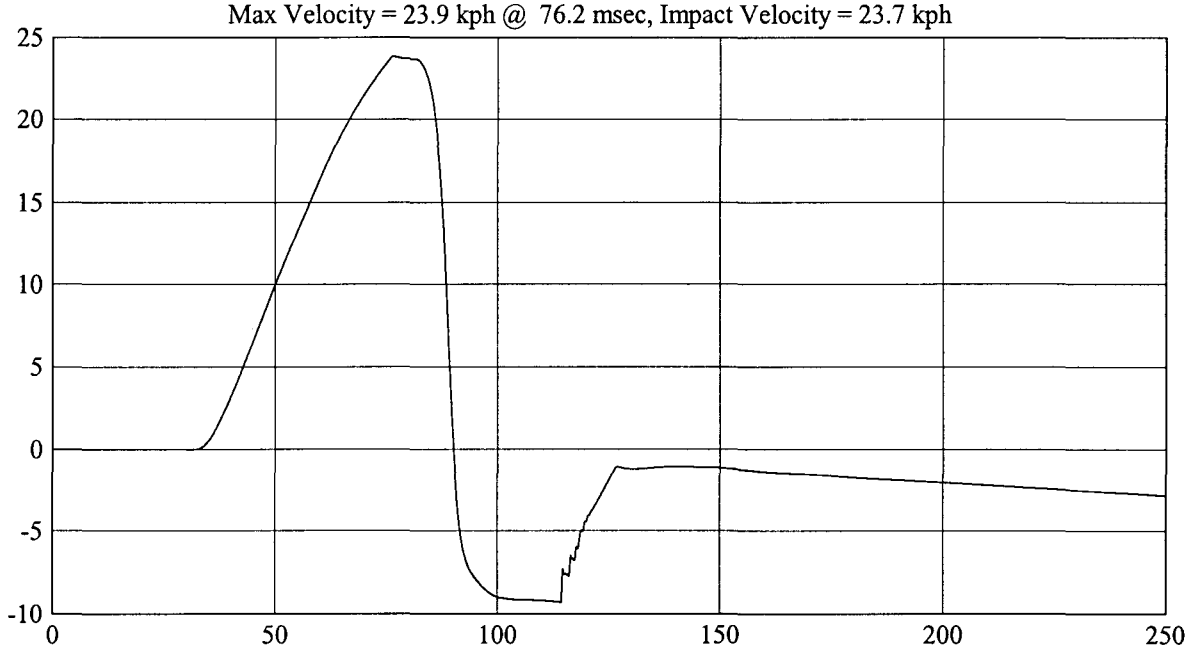
Customer: FORD | Vehicle Program : F150 | Model Year: 1998
Test # 9 | Target: UR3
FM4541 | Vehicle Side: Left
Additional Desc: N/A | Test Date: 9/8/04 | Horz/Vert Angle: 270/50
HIC(d) = 962, HIC = 1054, Delta T = 4.8 msec

Max Acceleration = 22.4 g's @ 9.2 msec, Min Acceleration = -39.8 g's @ 6.6 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 23.9 kph @ 76.2 msec, Impact Velocity = 23.7 kph



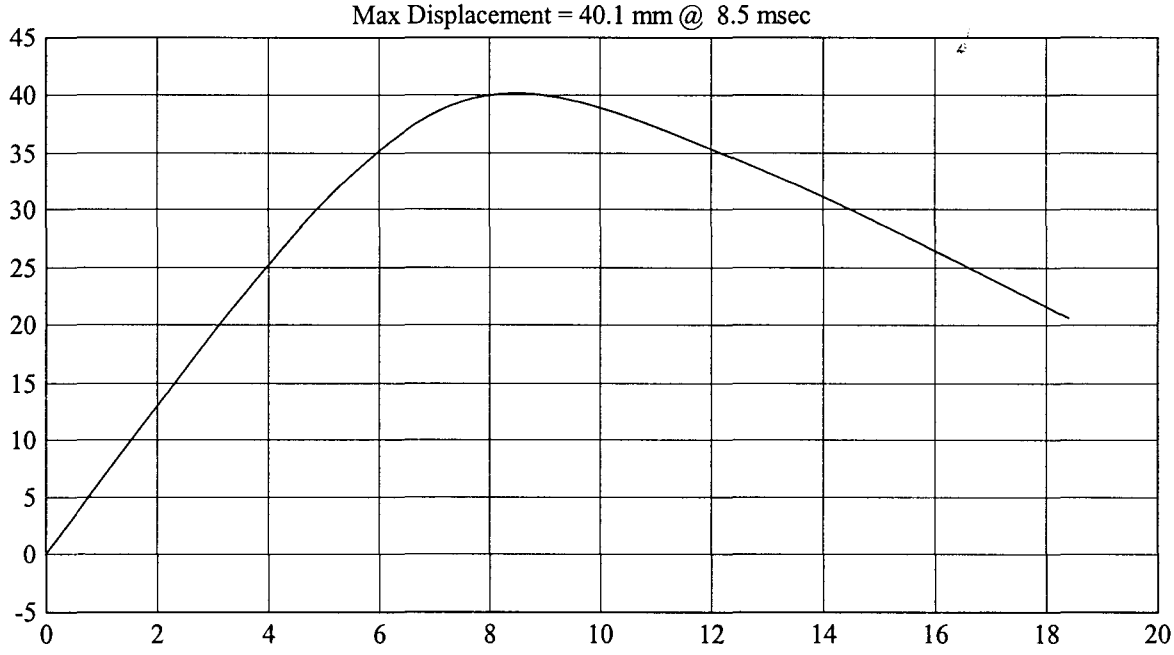
Velocity (kph) vs. Time (msec)

FMH
G04I7-001.11

Customer: FORD	Vehicle Program : F150	Model Year: 1998
Test # 9		Target: UR3
FM4541		Vehicle Side: Left
Additional Desc: N/A	Test Date: 9/8/04	Horz/Vert Angle: 270/50

HIC(d) = 962, HIC = 1054, Delta T = 4.8 msec

Max Displacement = 40.1 mm @ 8.5 msec



Displacement (mm) vs. Time (msec)

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the test series. Items marked with an asterisk are calibrated by an external lab. An additional summary table is given for the pre and post-test calibration data for the Free Motion Headforms. The temperature trace to confirm testing was conducted between 66°F and 78°F (19°C - 26°C) is included in Appendix A. Calibration information can be found in Appendix B.

TABLE 4-1 LIST OF ITEMS USED

ITEM	MANUFACTURER NAME	MODEL #	FUNCTION OF ITEM	ACCURACY	CAL. INTERNAL
Head Drop Tower (includes test frame and DAS)	MGA Research Corp.	MGA-100-DC	FMH Calibration	N/A	N/A
Accelerometers	Endevco	7264-2000	Acceleration Data	±0.5%	6 months
*Digital Inclinometer	Mitutoyo	PRO 360	Set Angle of FMH/Targeting	0.1°	Annual
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	035 036 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Kodak	RO1000	Record Event	N/A	N/A
*FARO™	Faro Technologies	S802059801273	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Protractor	 Stanley N/A Mitutoyo	 289 -- --	Measurement Targeting FMH setup Horizontal Measurement	 1 mm N/A 0.5°	Annual
*Vehicle Scale 9804-022/9805-175	Cardinal	8950F	Weighing Vehicle	± .5 kg	Annual
* Scale	Detecto	AP-20	Weigh FMH Head	± 0.01 lb	Annual
*Temperature Recorder	Dickson	TR-320	Record Temperature and Humidity	± 1°C ± 1% RH	Annual

TABLE 4-2 FMH CALIBRATION SUMMARY DATA SUMMARY TABLE

FMH Serial #		Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#35	10.02	22.0	64.0	230.6	1.3	Yes
Post	#35	10.02	22.0	63.0	237.4	9.7	Yes
Pre	#36	10.03	22.0	64.0	243.1	4.4	Yes
Post	#36	10.03	22.0	63.0	251.3	11.6	Yes
Pre	#38	9.99	22.0	64.0	243.3	12.3	Yes
Post	#38	9.99	22.0	63.0	242.8	14.7	Yes

RECORDED BY: David G. Gotwals DATE: September 8, 2004

APPROVED BY: Helen A. Kaleto

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 9-3-04	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.02
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	64
Peak Resultant Acceleration	225 G's to 275 G's	230.6
Peak Lateral Acceleration	15 G's Maximum	1.3
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35924	5-20-04	11-20-04
3	ENDEVCO	7264-2000	J35919	5-20-04	11-20-04
4	ENDEVCO	7264-2000	J21969	5-19-04	11-19-04

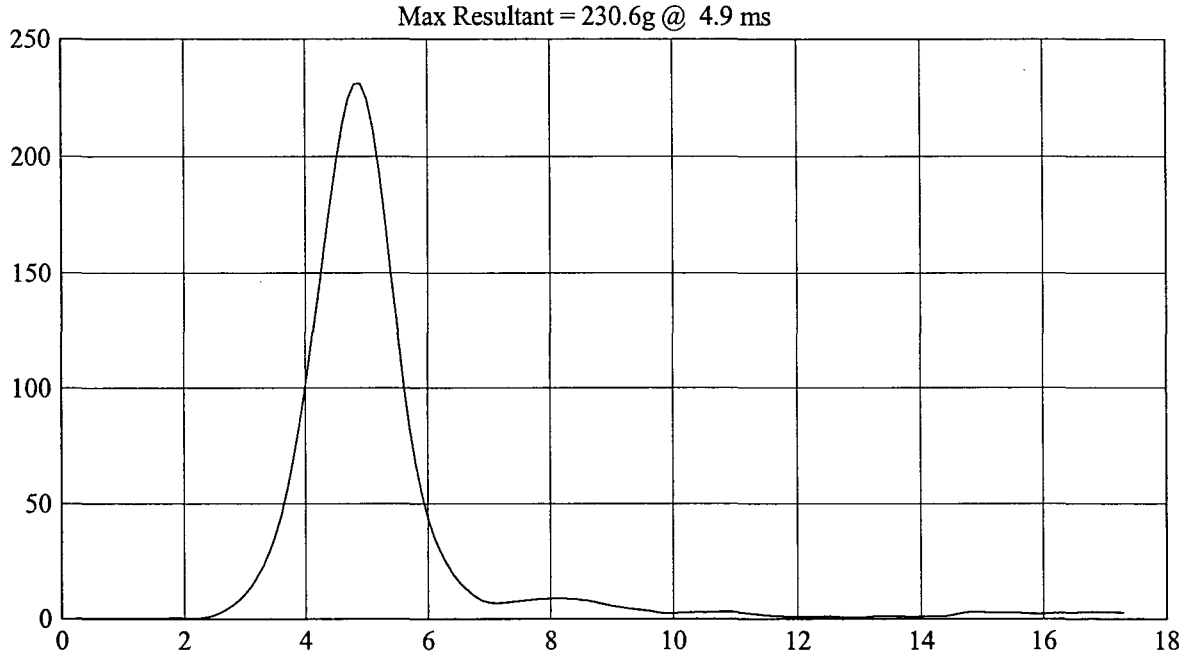
REMARKS:

RECORDED BY: _____ DATE: 9-3-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

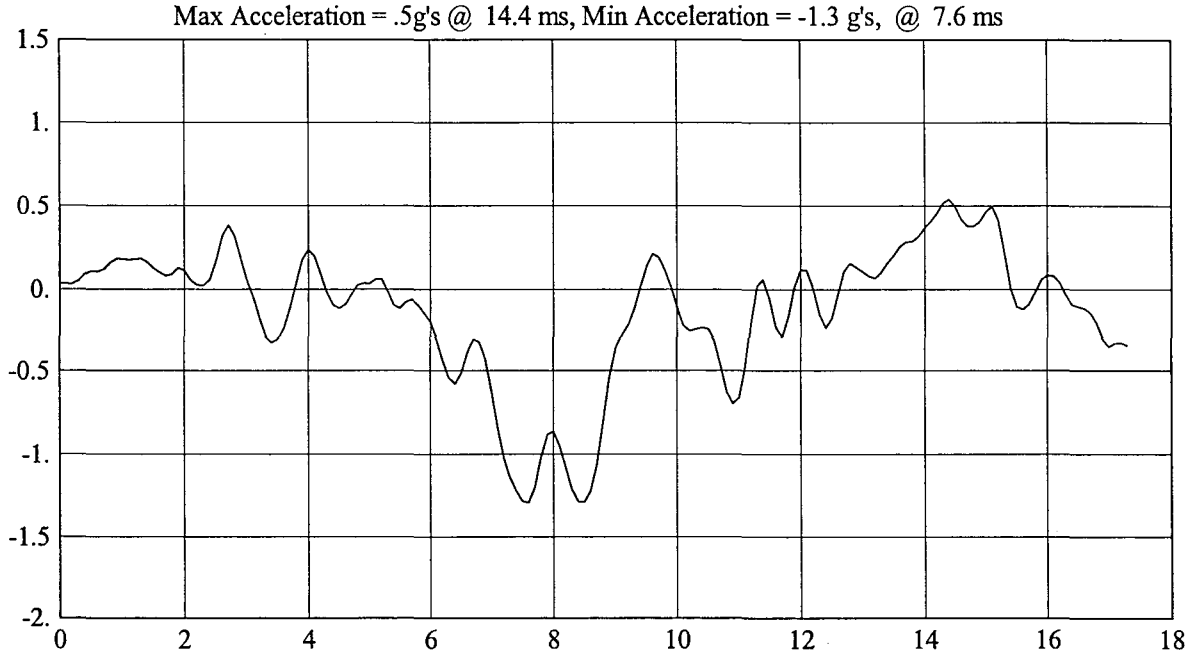
Test Number: H35261 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 35



Head Drop
(Preliminary Test Report)

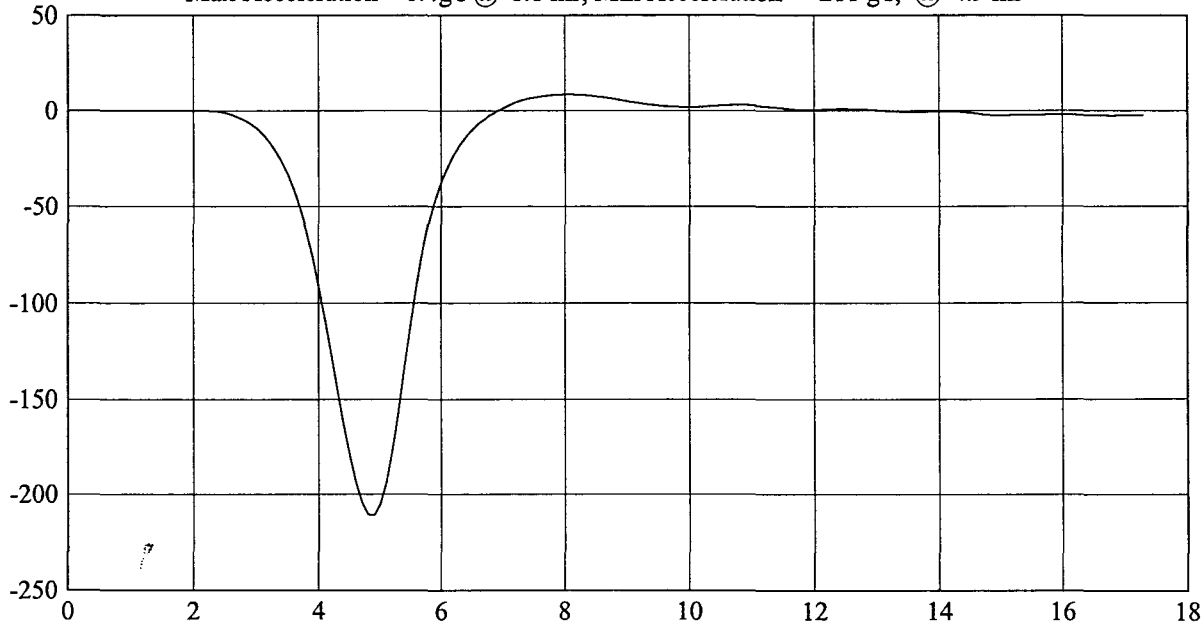
Test Number: H35261 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 35

Max Acceleration = .5g's @ 14.4 ms, Min Acceleration = -1.3 g's, @ 7.6 ms



Accel Y(g's) vs. Time (msec)

Max Acceleration = 8.4g's @ 8.1 ms, Min Acceleration = -211 g's, @ 4.9 ms

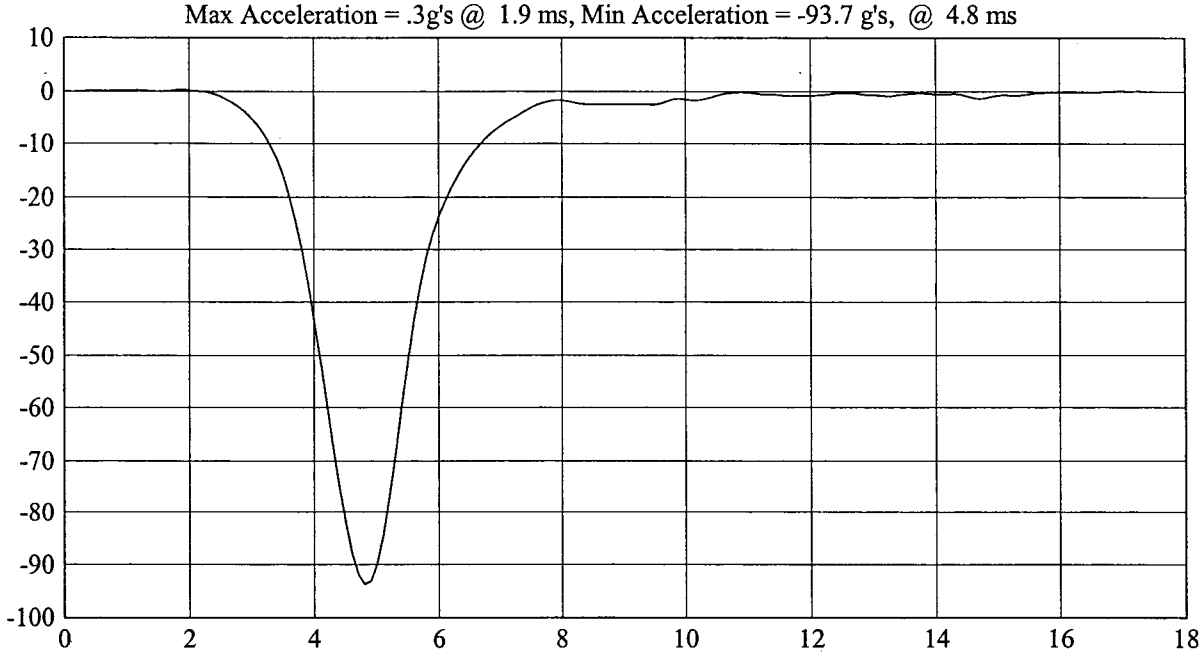


Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H35261 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 35

Max Acceleration = .3g's @ 1.9 ms, Min Acceleration = -93.7 g's, @ 4.8 ms



Accel Z(g's) vs. Time (msec)

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 35	CALIBRATION DATE: 9-8-04	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.02
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	63
Peak Resultant Acceleration	225 G's to 275 G's	237.4
Peak Lateral Acceleration	15 G's Maximum	9.7
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
	ENDEVCO	7264-2000	J35924	5-20-04	11-20-04
	ENDEVCO	7264-2000	J35919	5-20-04	11-20-04
	ENDEVCO	7264-2000	J21969	5-19-04	11-19-04

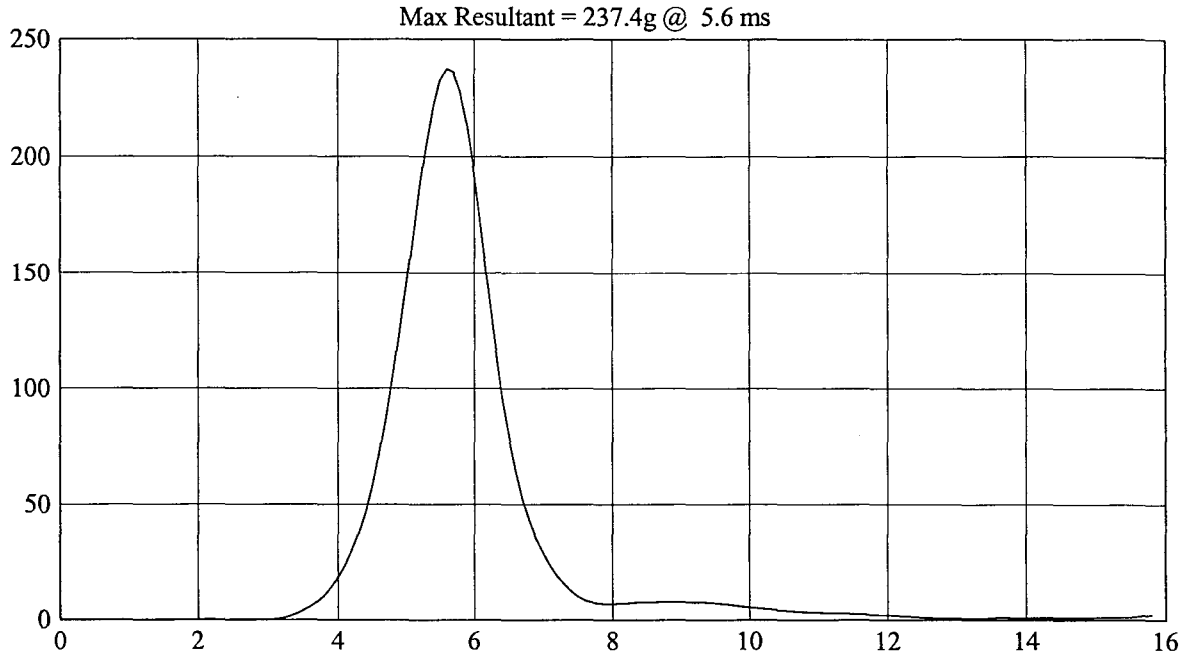
REMARKS:

RECORDED BY: _____ DATE: 9-8-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

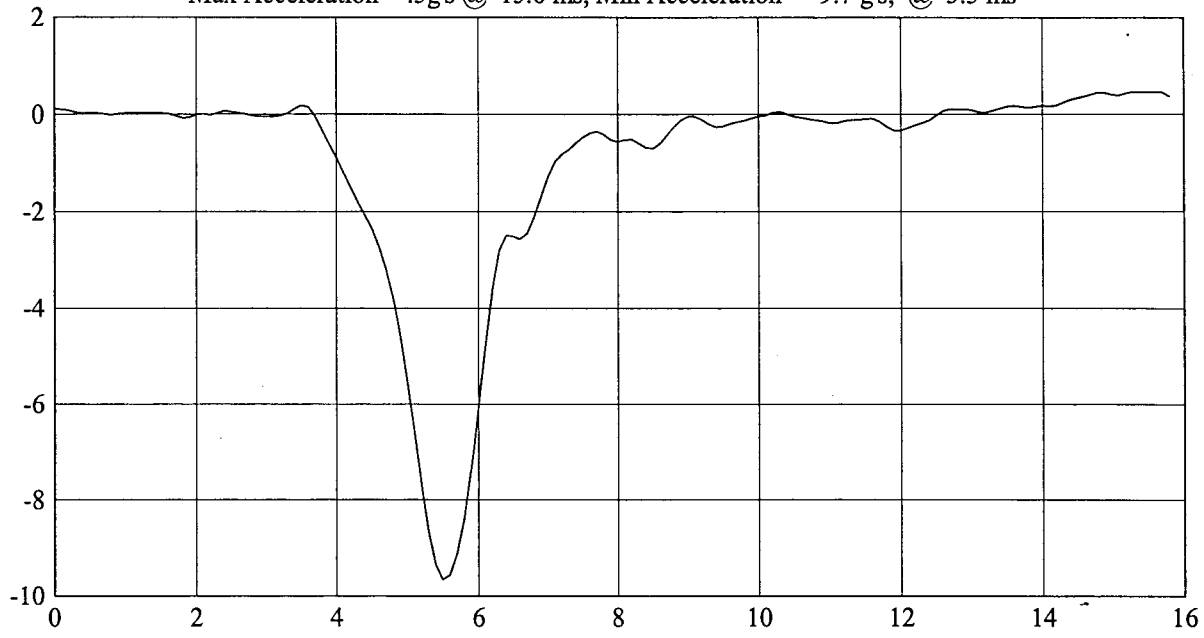
Test Number: H35262 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 35



Head Drop
(Preliminary Test Report)

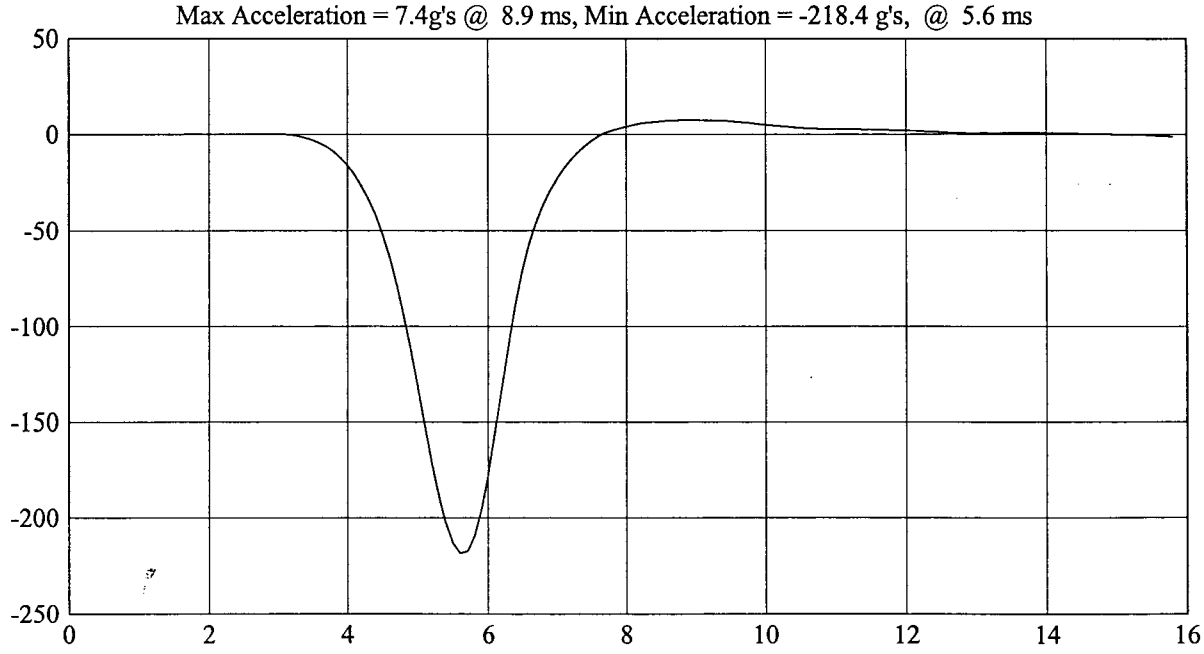
Test Number: H35262 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 35

Max Acceleration = .5g's @ 15.6 ms, Min Acceleration = -9.7 g's, @ 5.5 ms



Accel Y(g's) vs. Time (msec)

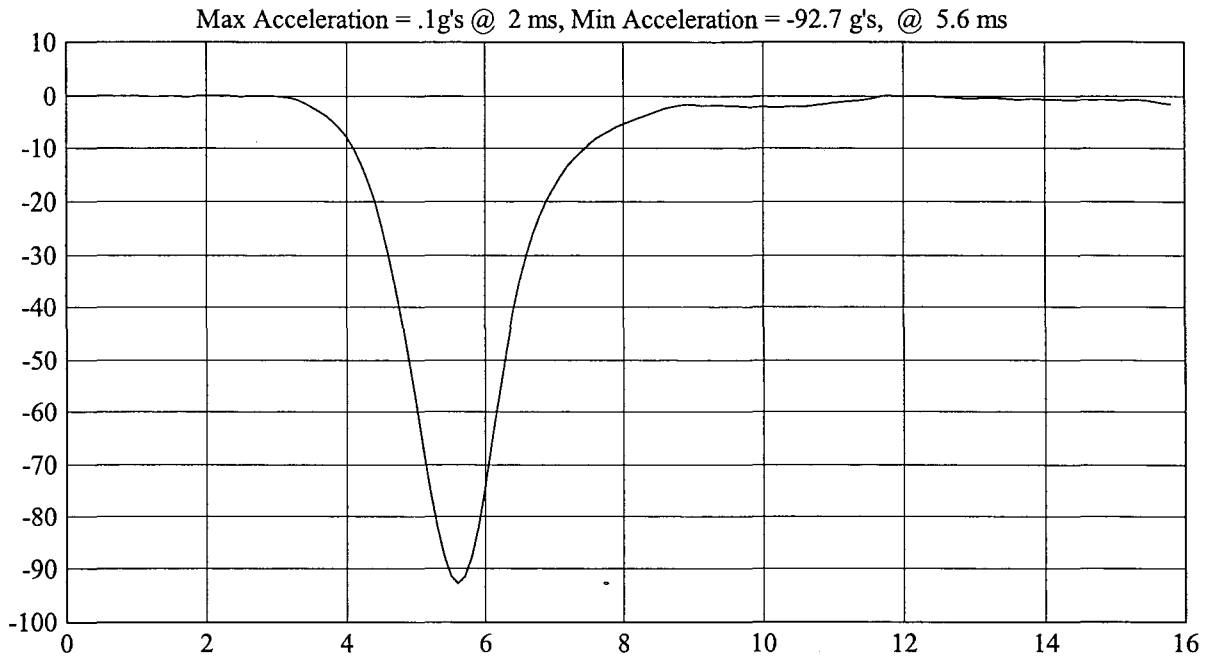
Max Acceleration = 7.4g's @ 8.9 ms, Min Acceleration = -218.4 g's, @ 5.6 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H35262 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 35



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 036	CALIBRATION DATE: 9-3-04	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.03
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	64
Peak Resultant Acceleration	225 G's to 275 G's	243.1
Peak Lateral Acceleration	15 G's Maximum	4.4
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35923	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J35916	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J35918	5-23-04	11-23-04

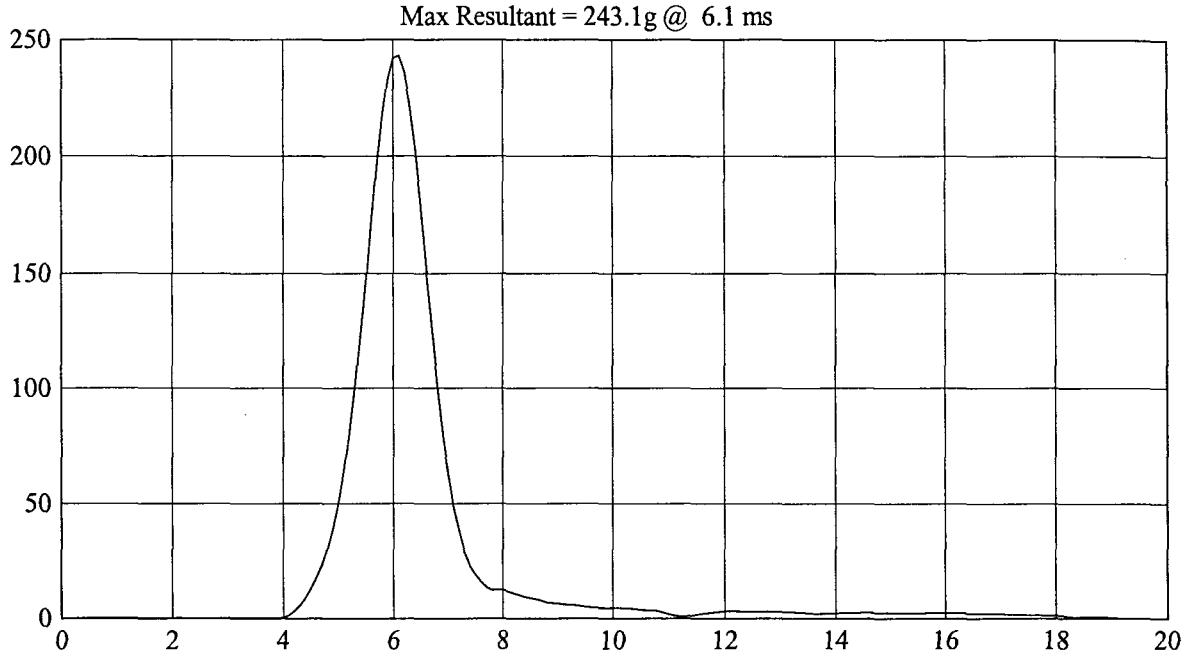
REMARKS:

RECORDED BY: _____ DATE: 9-3-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

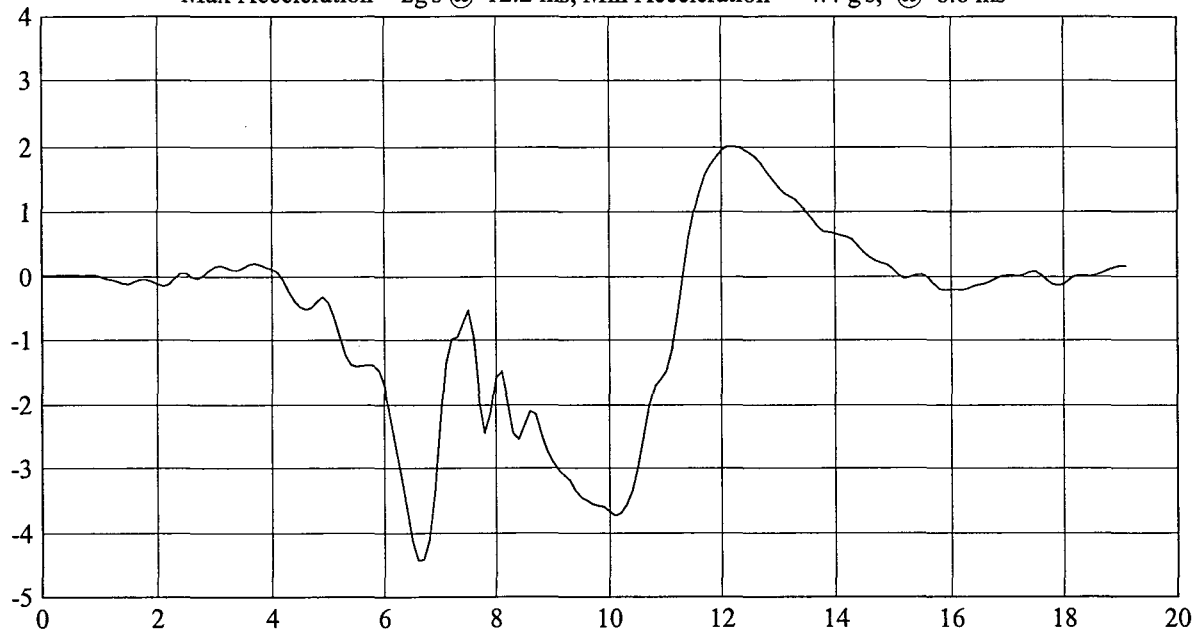
Test Number: H36260 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 36



Head Drop
(Preliminary Test Report)

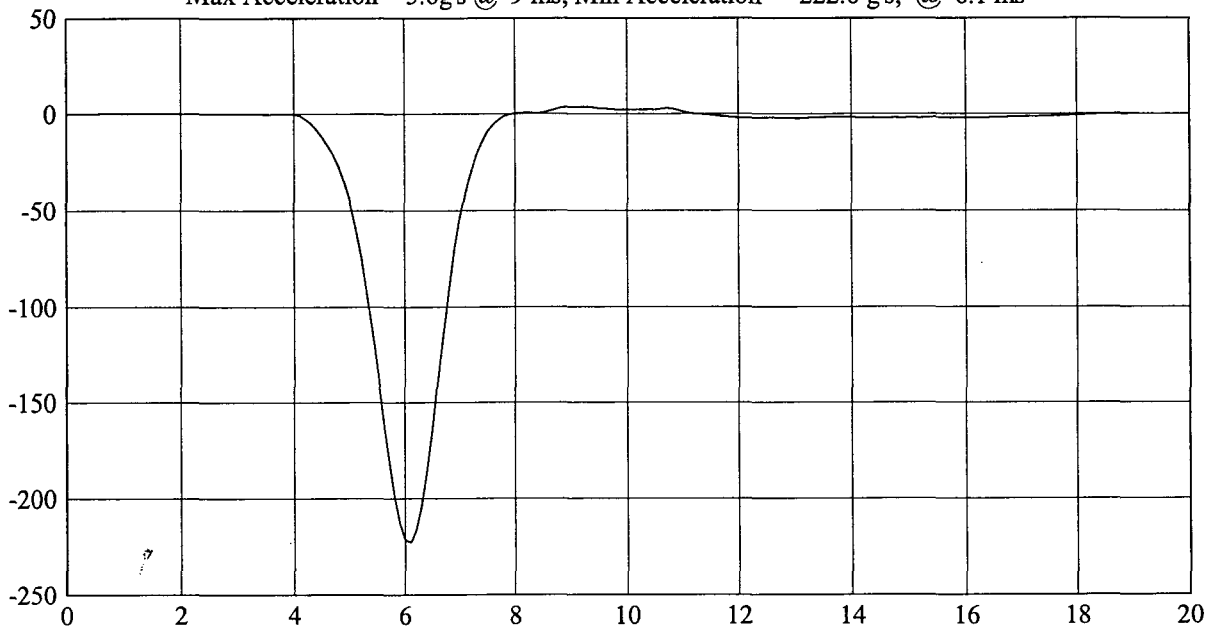
Test Number: H36260 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 36

Max Acceleration = 2g's @ 12.2 ms, Min Acceleration = -4.4 g's, @ 6.6 ms



Accel Y(g's) vs. Time (msec)

Max Acceleration = 3.6g's @ 9 ms, Min Acceleration = -222.6 g's, @ 6.1 ms

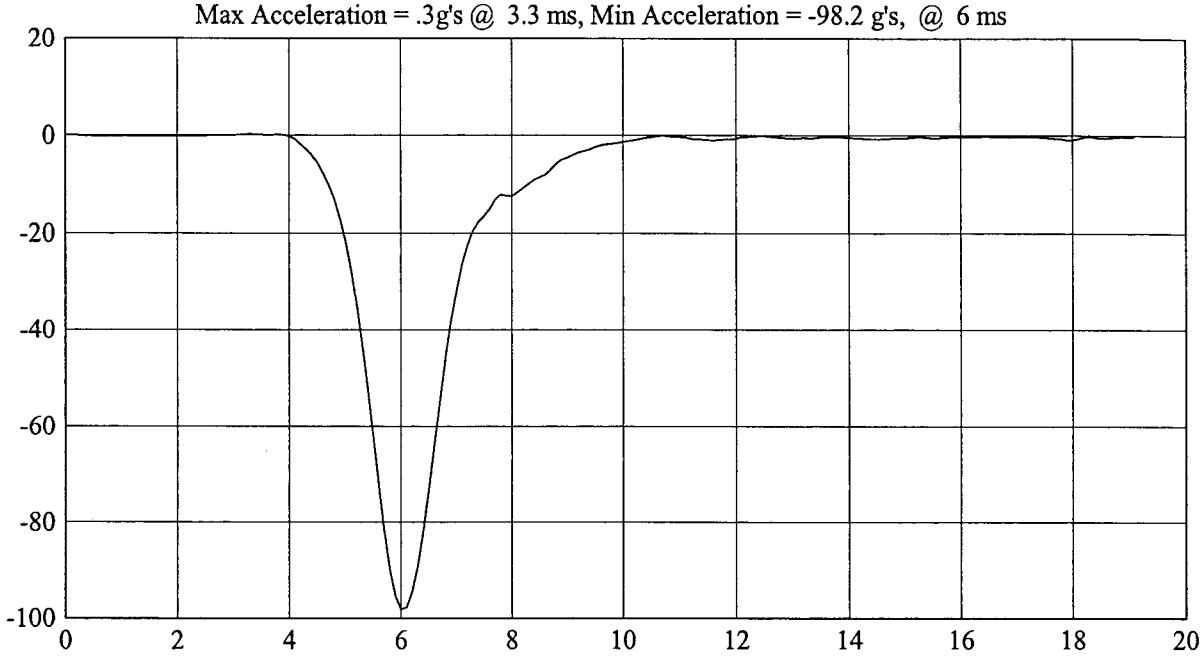


Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H36260 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 36

Max Acceleration = .3g's @ 3.3 ms, Min Acceleration = -98.2 g's, @ 6 ms



Accel Z(g's) vs. Time (msec)

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 036	CALIBRATION DATE: 9-8-04	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.03
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	63
Peak Resultant Acceleration	225 G's to 275 G's	251.3
Peak Lateral Acceleration	15 G's Maximum	11.6
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35923	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J35916	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J35918	5-23-04	11-23-04

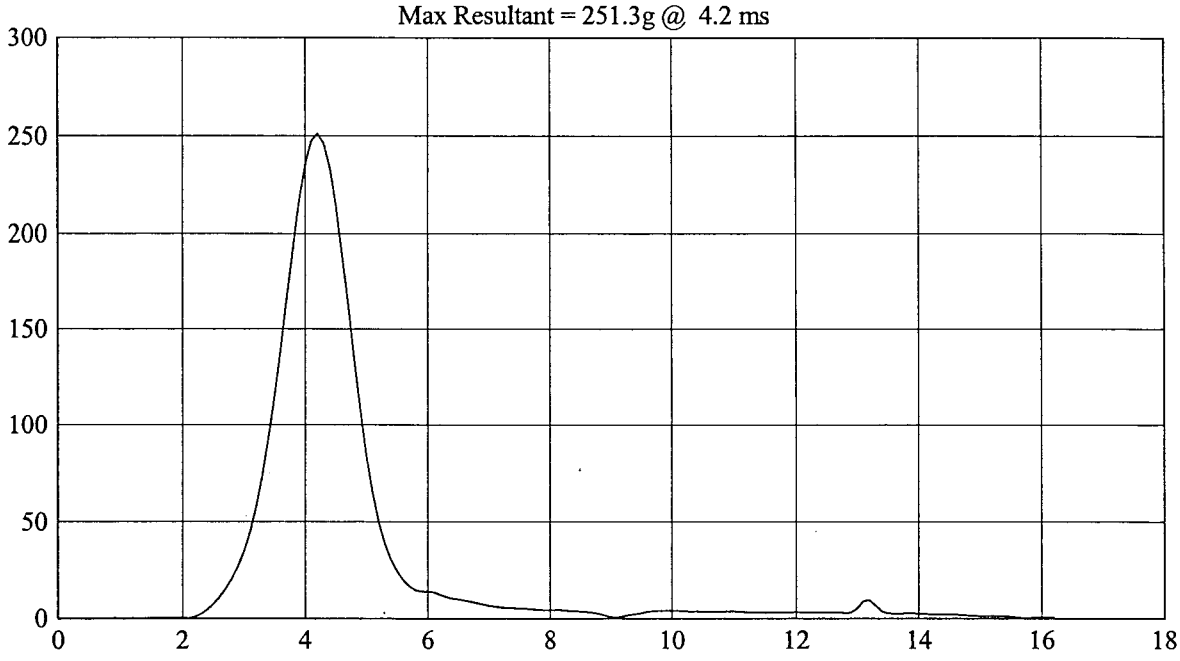
REMARKS:

RECORDED BY: _____ DATE: 9-8-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

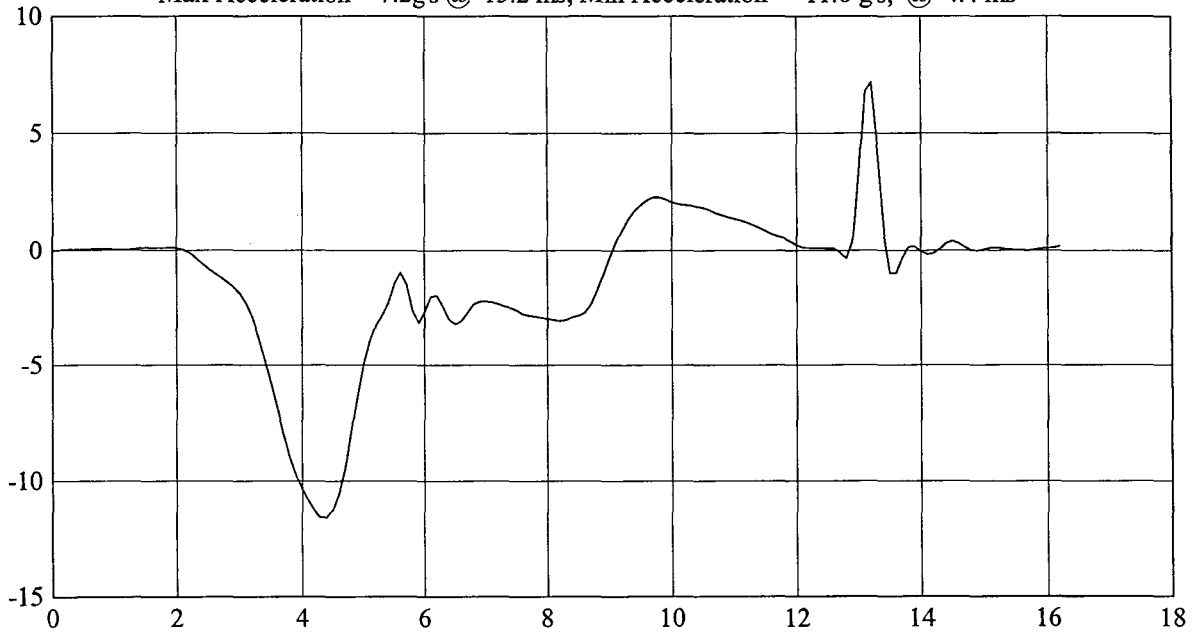
Test Number: H36261 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 36



Head Drop
(Preliminary Test Report)

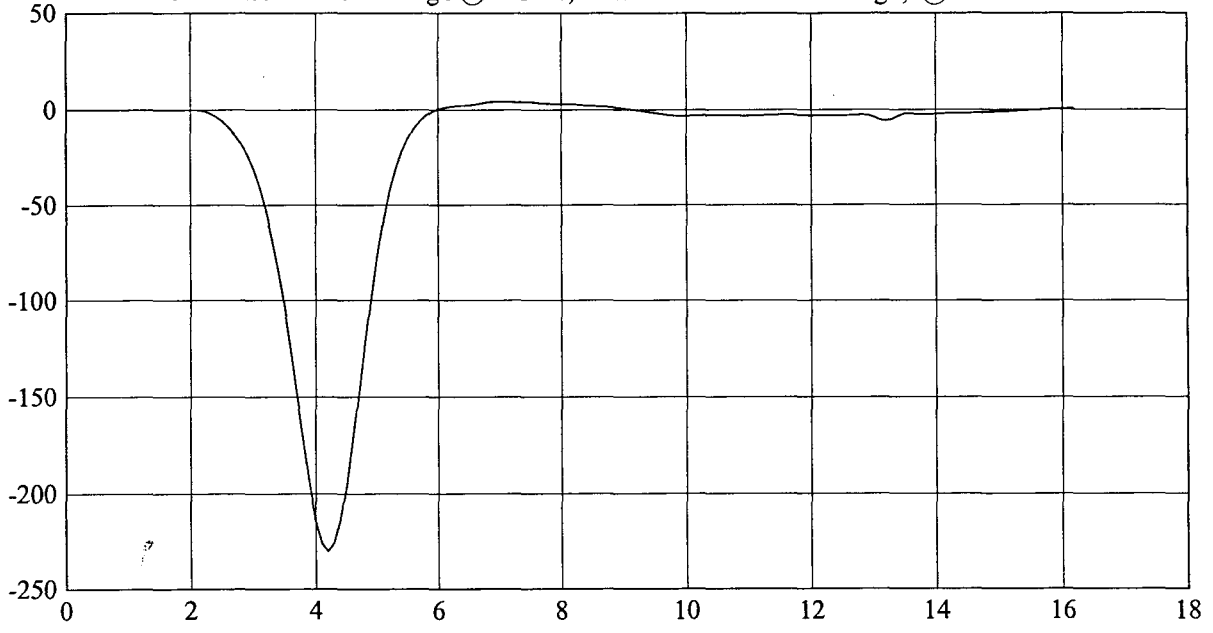
Test Number: H36261 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 36

Max Acceleration = 7.2g's @ 13.2 ms, Min Acceleration = -11.6 g's, @ 4.4 ms



Accel Y(g's) vs. Time (msec)

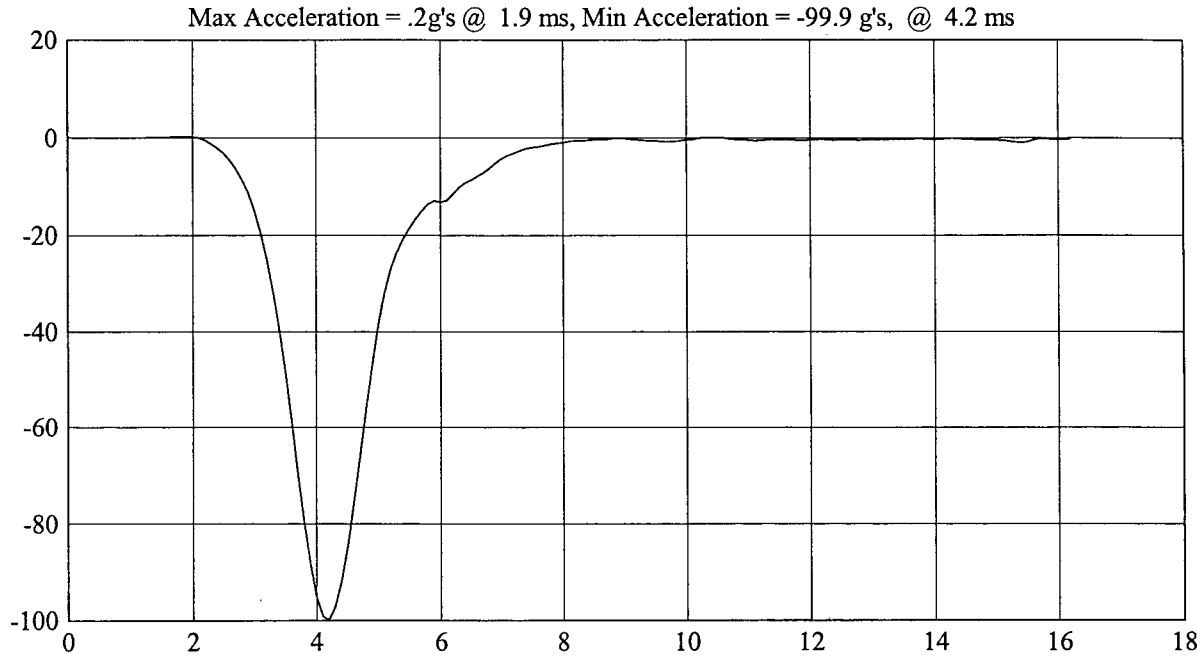
Max Acceleration = 4.1g's @ 7.1 ms, Min Acceleration = -230.3 g's, @ 4.2 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H36261 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 36



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 9.3-04	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.99
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	64
Peak Resultant Acceleration	225 G's to 275 G's	243.3
Peak Lateral Acceleration	15 G's Maximum	12.3
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J36197	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J36193	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J36353	5-23-04	11-23-04

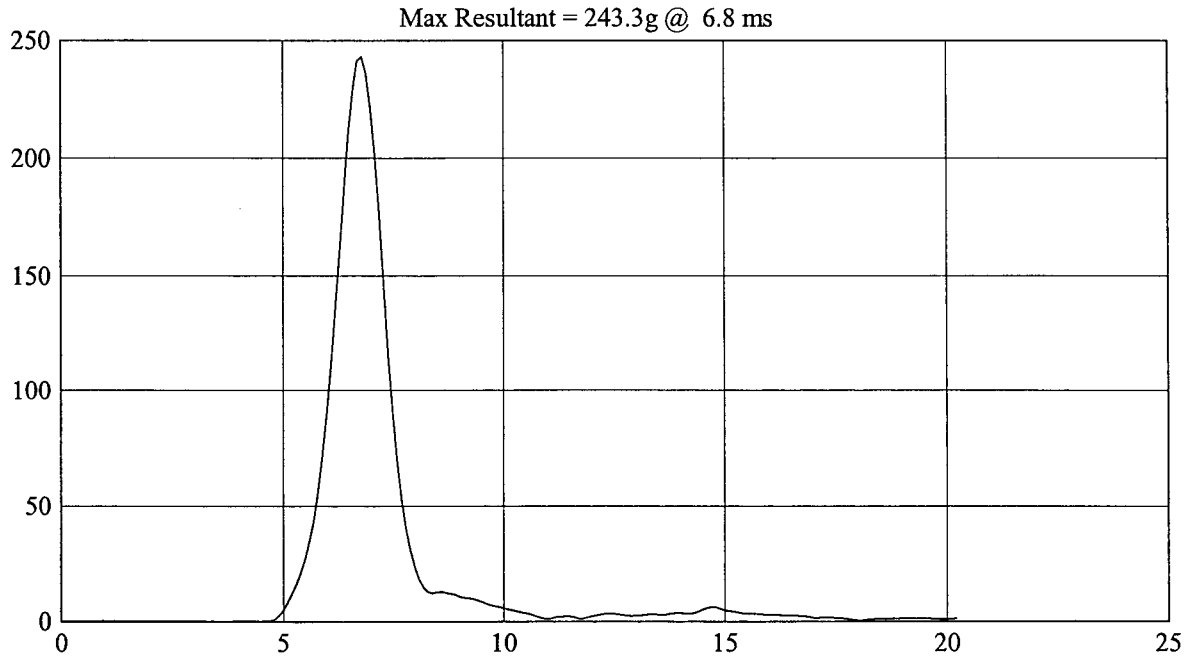
REMARKS:

RECORDED BY: _____ DATE: 9.3-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

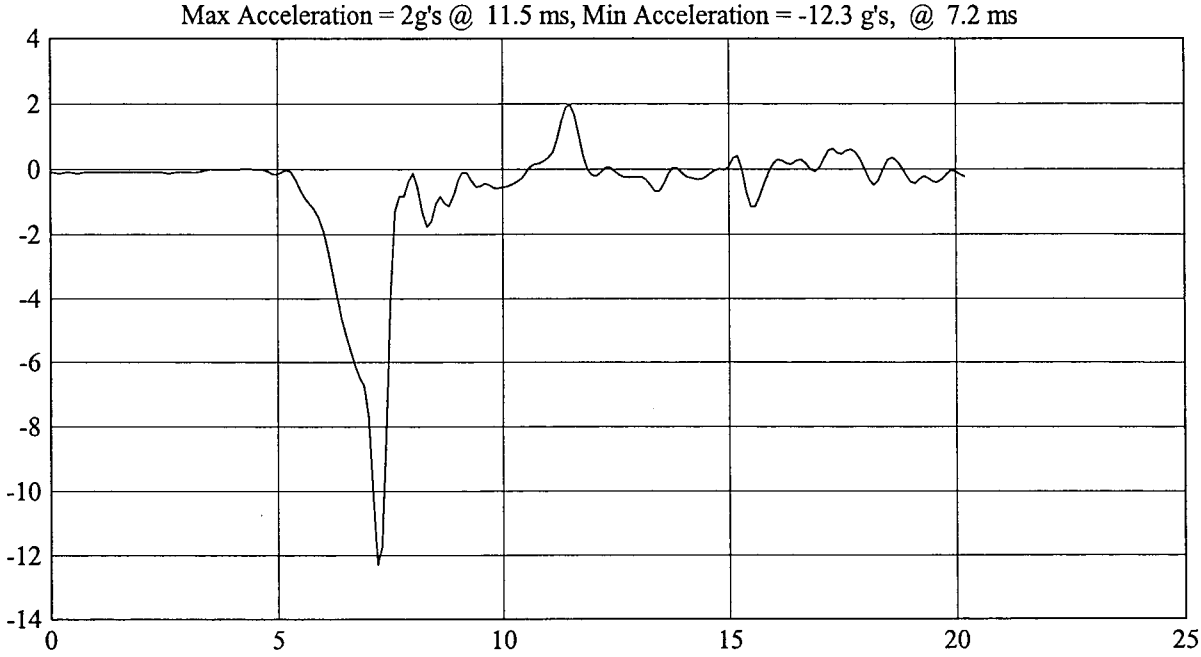
Test Number: H38246 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 38



Head Drop
(Preliminary Test Report)

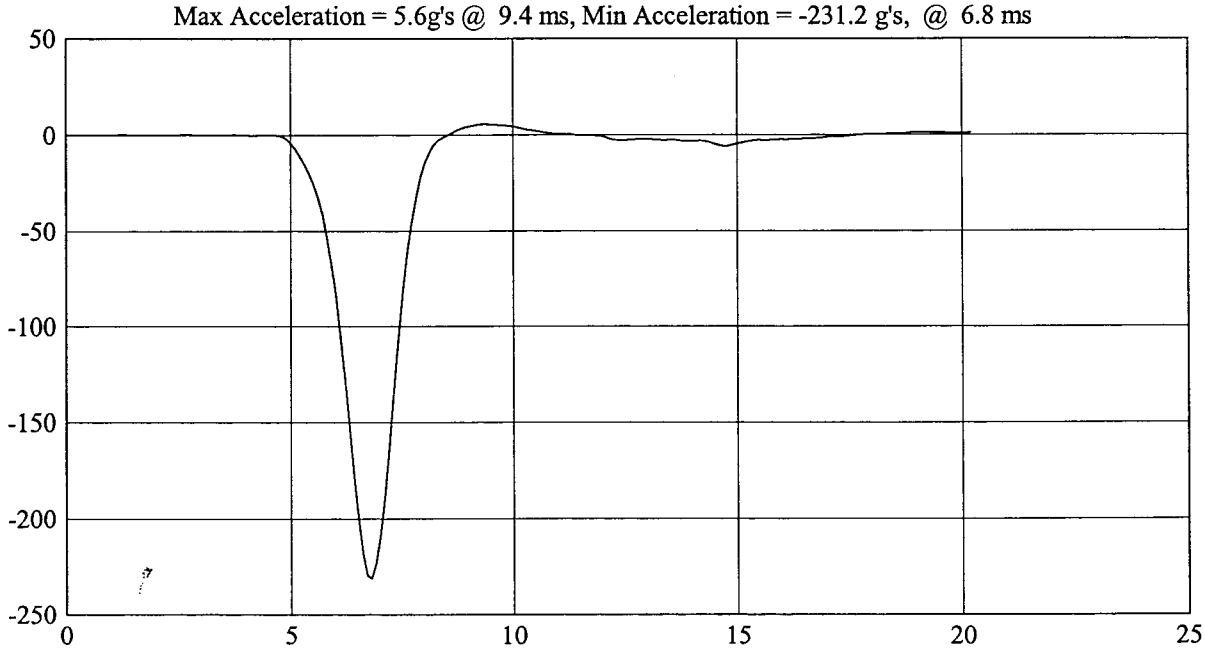
Test Number: H38246 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 38

Max Acceleration = 2g's @ 11.5 ms, Min Acceleration = -12.3 g's, @ 7.2 ms



Accel Y(g's) vs. Time (msec)

Max Acceleration = 5.6g's @ 9.4 ms, Min Acceleration = -231.2 g's, @ 6.8 ms

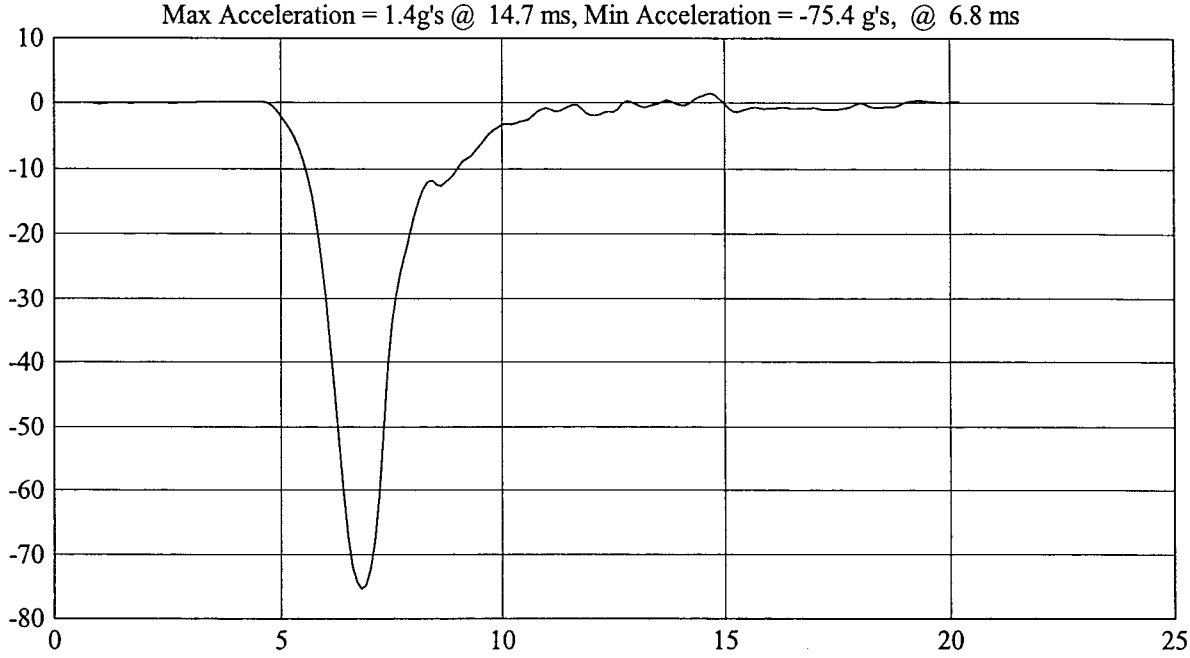


Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H38246 MGA Job Number: G04I7-001.11 Test Date: 9/3/04
Test Description: Pre - Test Calibration Head # : 38

Max Acceleration = 1.4g's @ 14.7 ms, Min Acceleration = -75.4 g's, @ 6.8 ms



Accel Z(g's) vs. Time (msec)

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 038 CALIBRATION DATE: 9-8-04		
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.99
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	63
Peak Resultant Acceleration	225 G's to 275 G's	242.8
Peak Lateral Acceleration	15 G's Maximum	14.7
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J36197	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J36193	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J36353	5-23-04	11-23-04

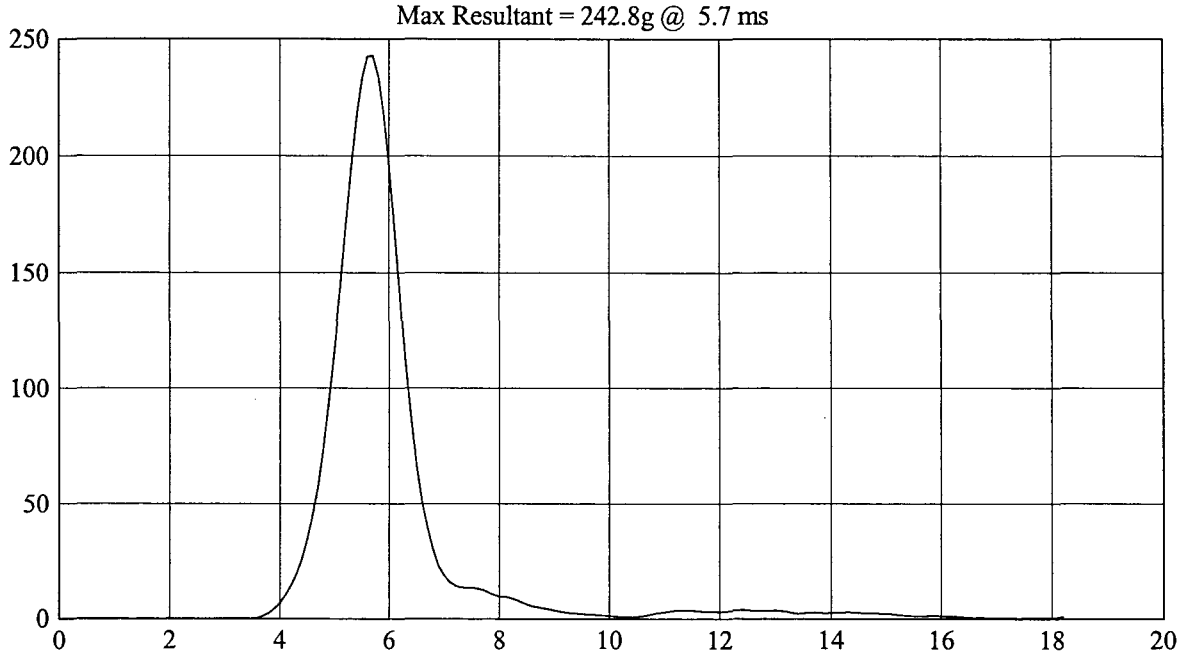
REMARKS:

RECORDED BY: _____ DATE: 9-8-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

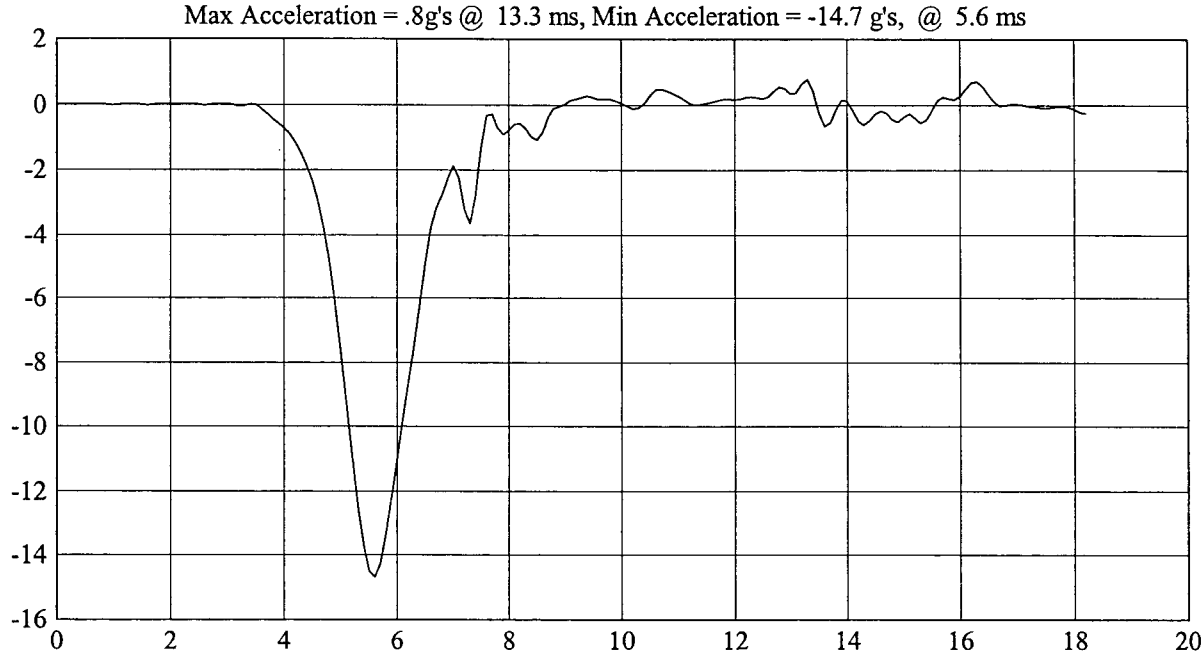
Test Number: H38247 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 38



Head Drop
(Preliminary Test Report)

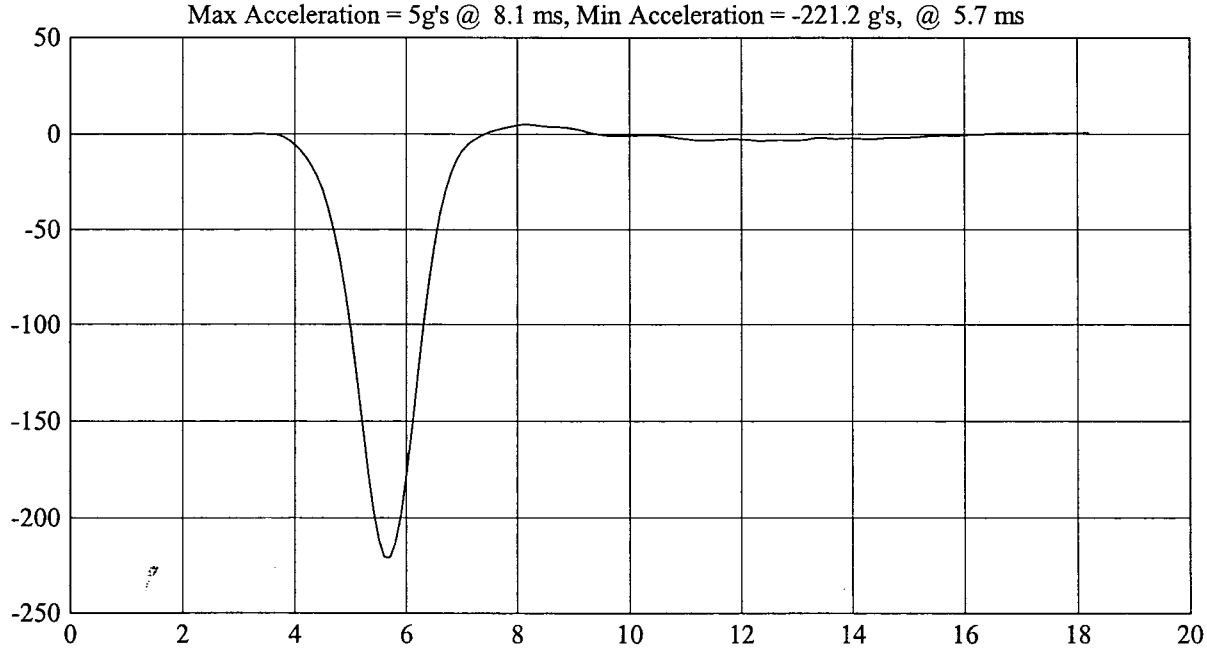
Test Number: H38247 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 38

Max Acceleration = .8g's @ 13.3 ms, Min Acceleration = -14.7 g's, @ 5.6 ms



Accel Y(g's) vs. Time (msec)

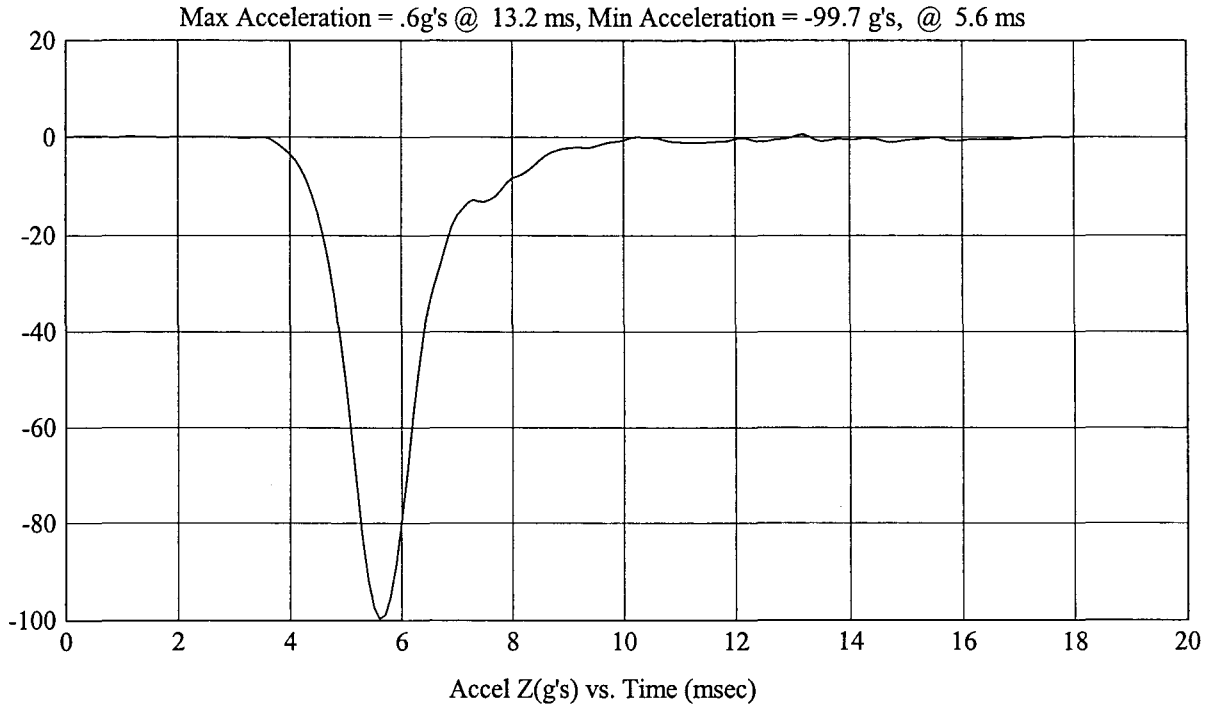
Max Acceleration = 5g's @ 8.1 ms, Min Acceleration = -221.2 g's, @ 5.7 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H38247 MGA Job Number: G04I7-001.11 Test Date: 9/8/04
Test Description: Post - Test Calibration Head # : 38

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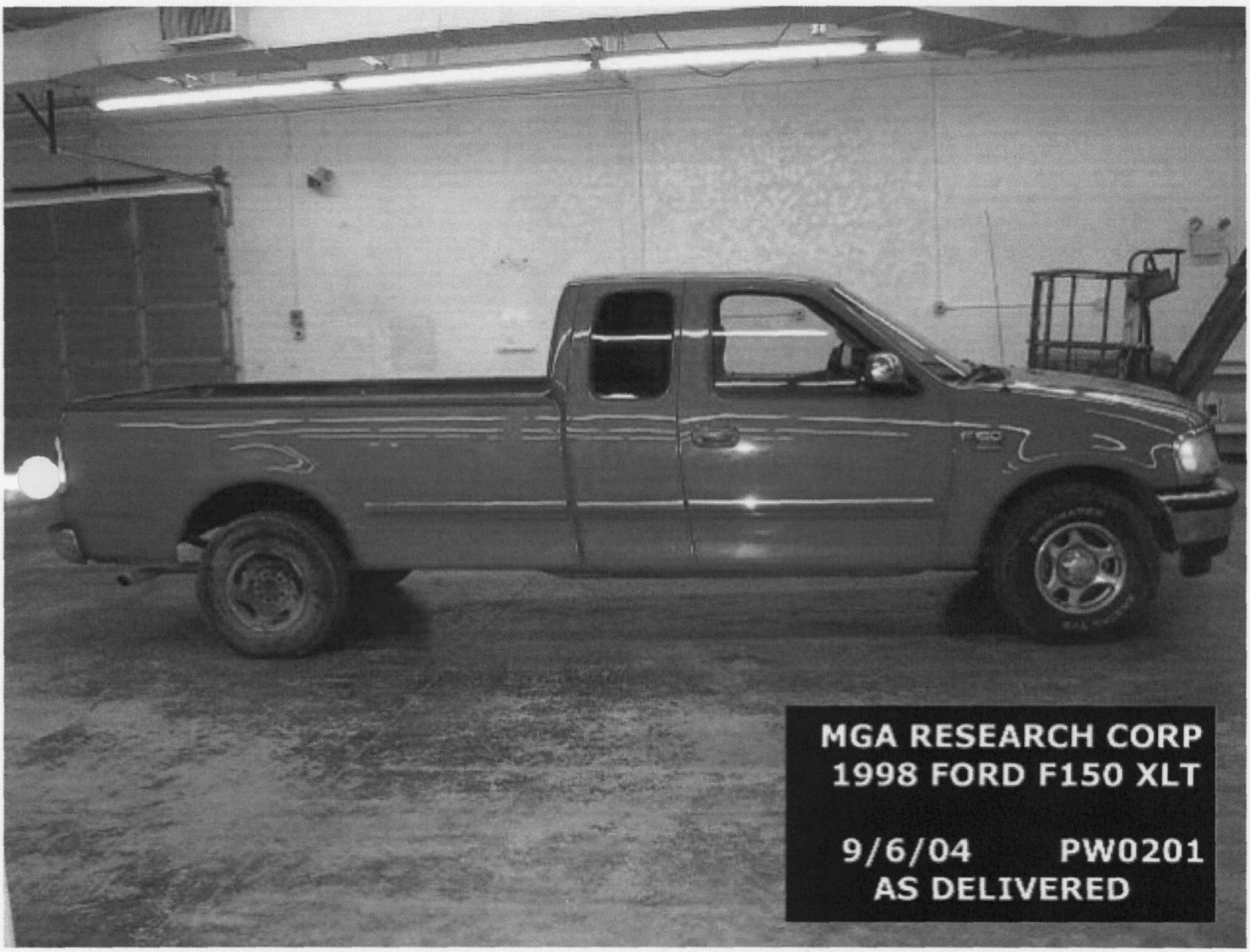
1998 FORD F150 XLT
9/6/04 PW0201
AS DELIVERED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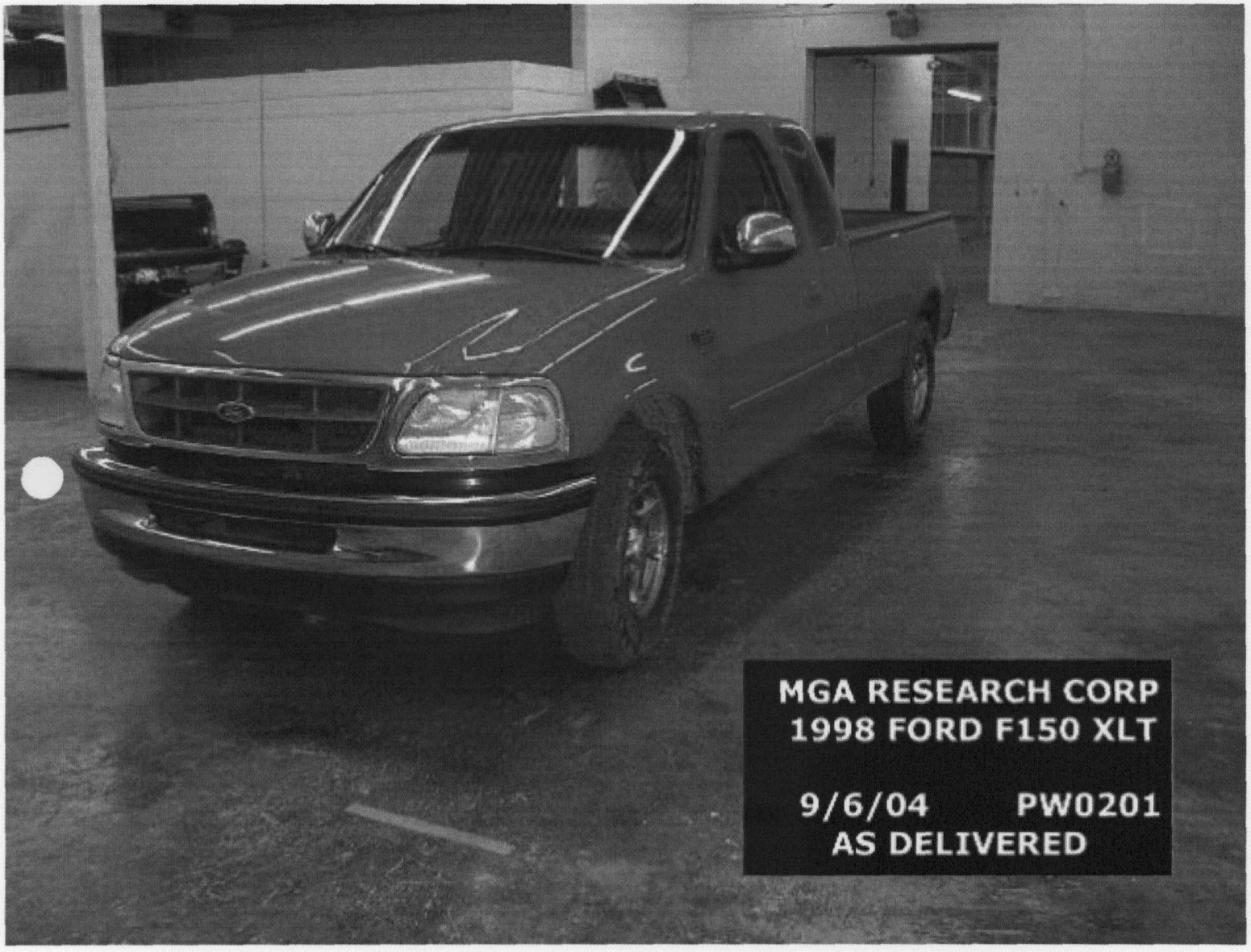
1998 FORD F150 XLT
9/6/04 PW0201
AS DELIVERED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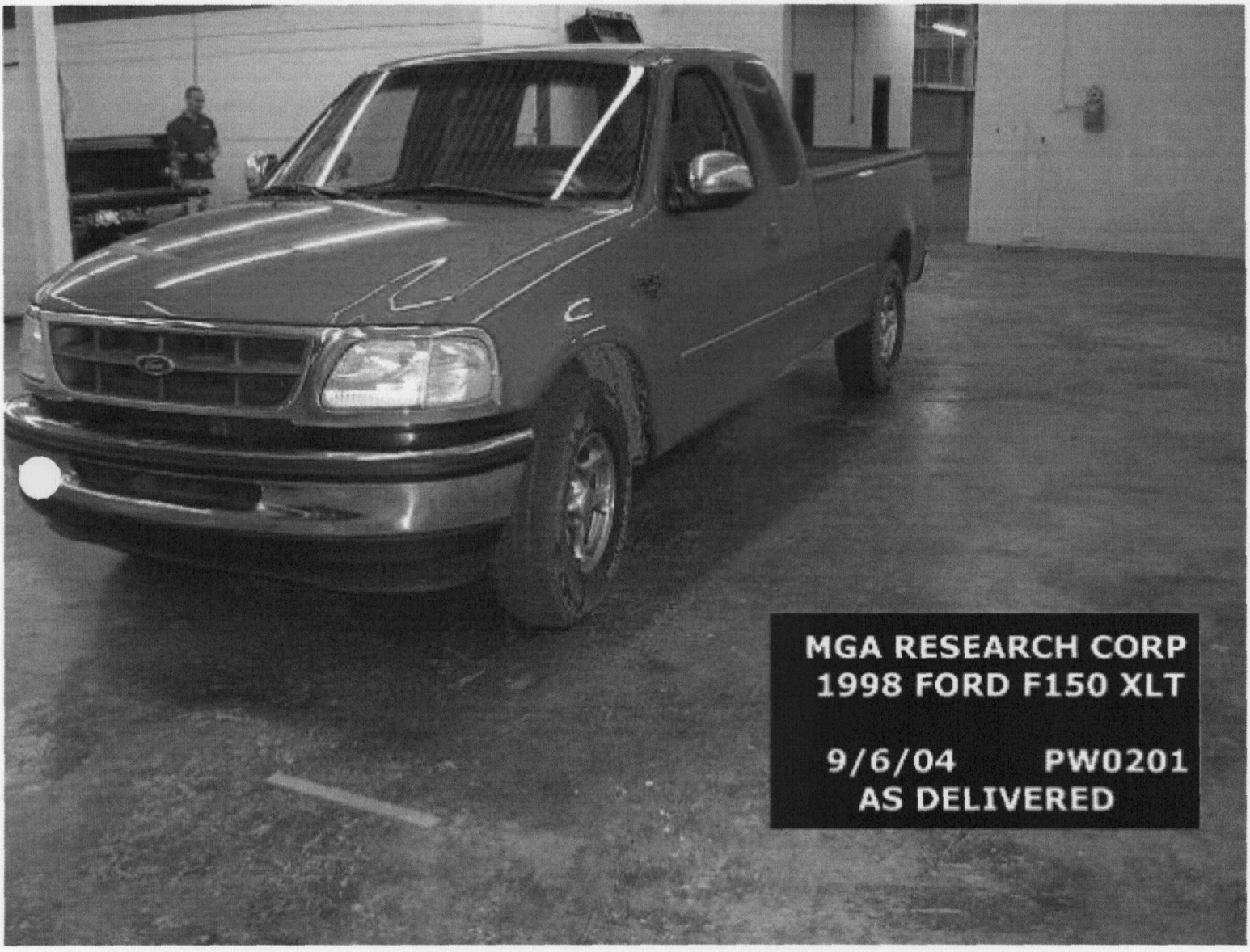
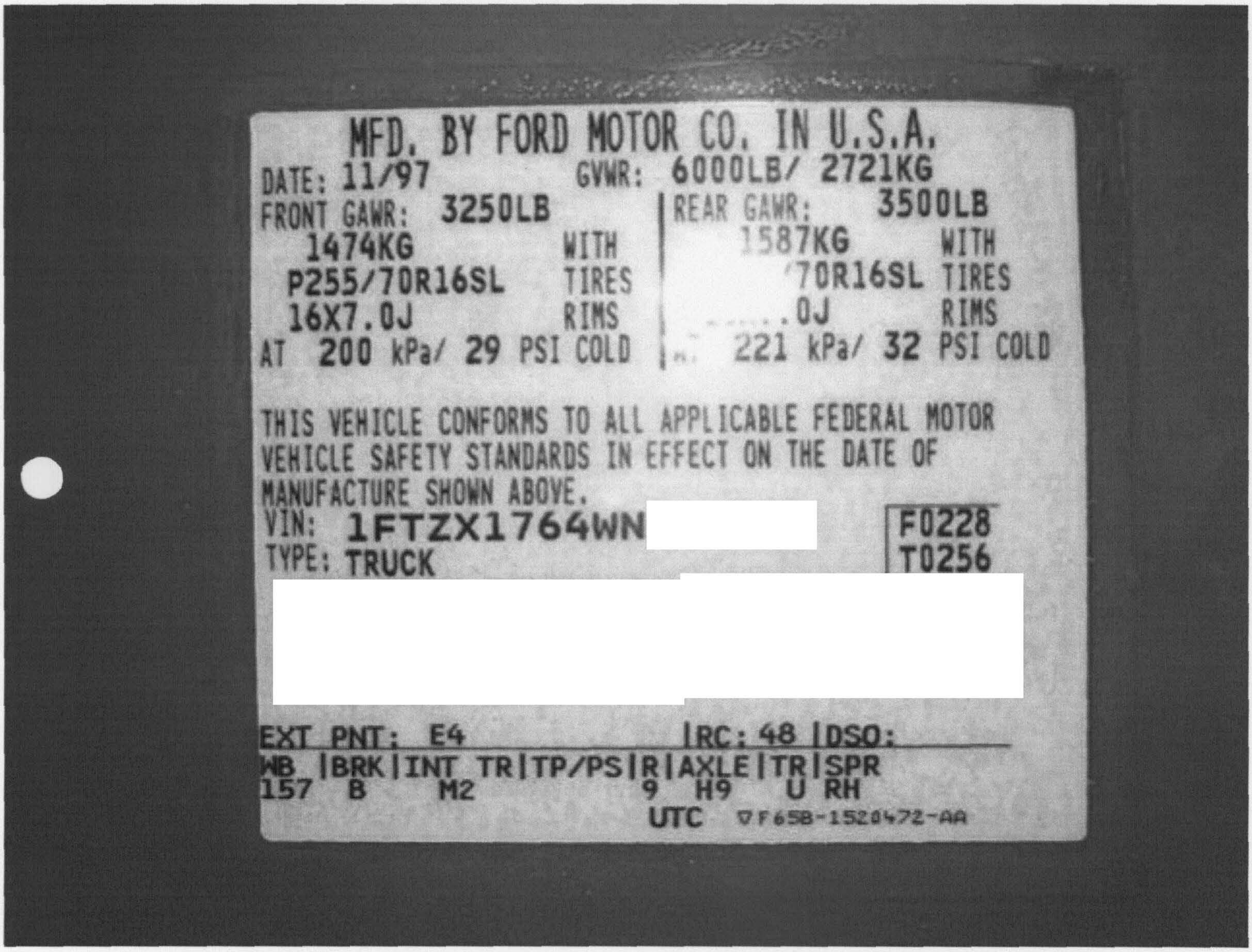
1998 FORD F150 XLT
9/6/04 PW0201
AS DELIVERED


MGA RESEARCH CORP
1998 FORD F150 XLT
9/6/04 PW0201
AS DELIVERED


MGA RESEARCH CORP
1998 FORD F150 XLT
9/6/04 PW0201
AS DELIVERED


MFD. BY FORD MOTOR CO. IN U.S.A.
DATE: 11/97
GVWR: 6000LB/ 2721KG
FRONT GAWR: 3250LB
1474KG
WITH
P255/70R16SL
TIRES
16X7.0J
RIMS
AT 200 kPa/ 29 PSI COLD
REAR GAWR: 3500LB
1587KG
WITH
70R16SL TIRES
.0J
RIMS
221 kPa/ 32 PSI COLD
THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
VIN: 1FTZX1764WN
TYPE: TRUCK
F0228
T0256
EXT PNT: E4
RC: 48 DSO:
WB BRK INT TR TP/PS R AXLE TR SPR
157 B M2 9 H9 U RH
UTC ▽F65B-1520472-AA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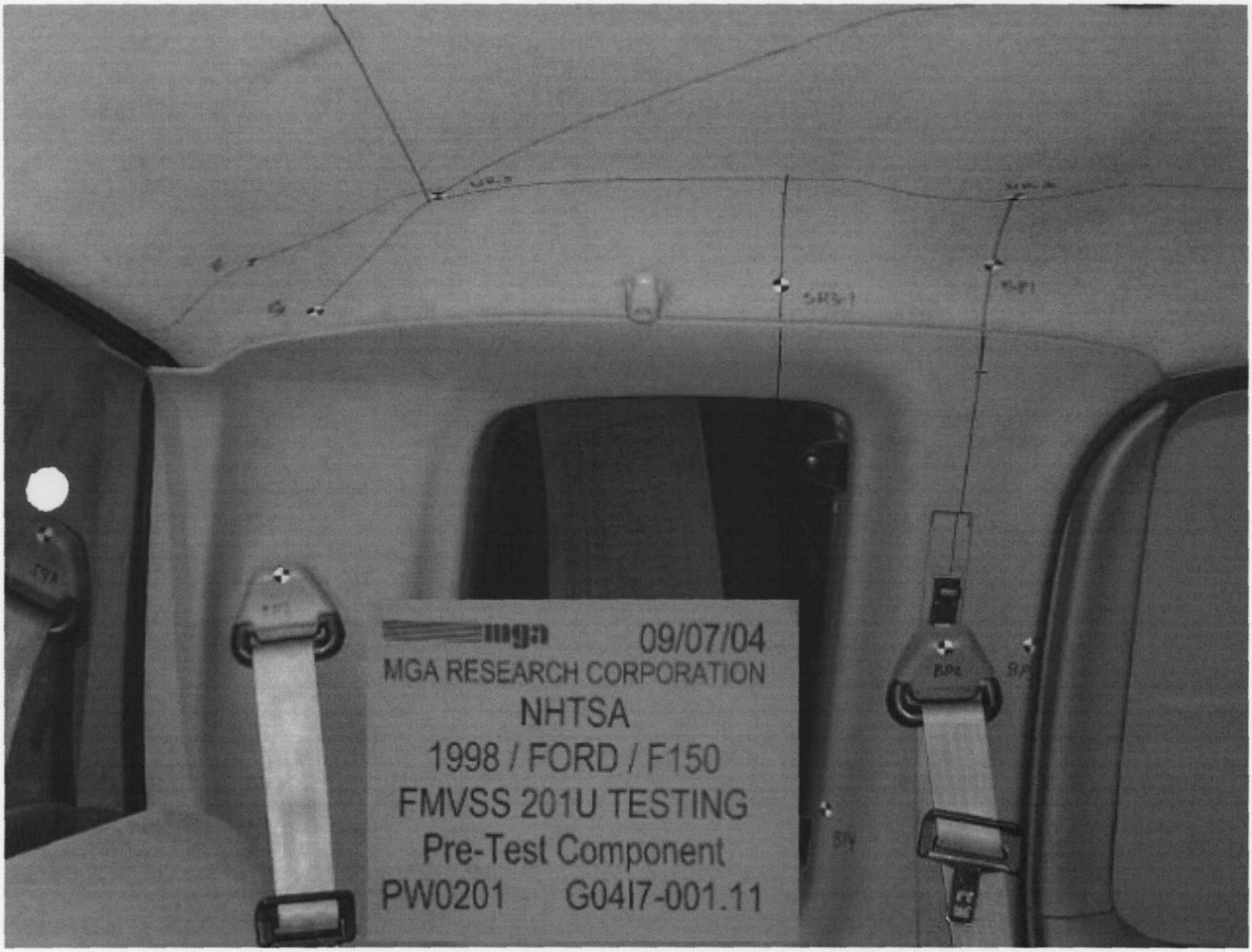
1998 / FORD / F150
FMVSS 201U TESTING
Pre-Test Component
PW0201 G04I7-001.11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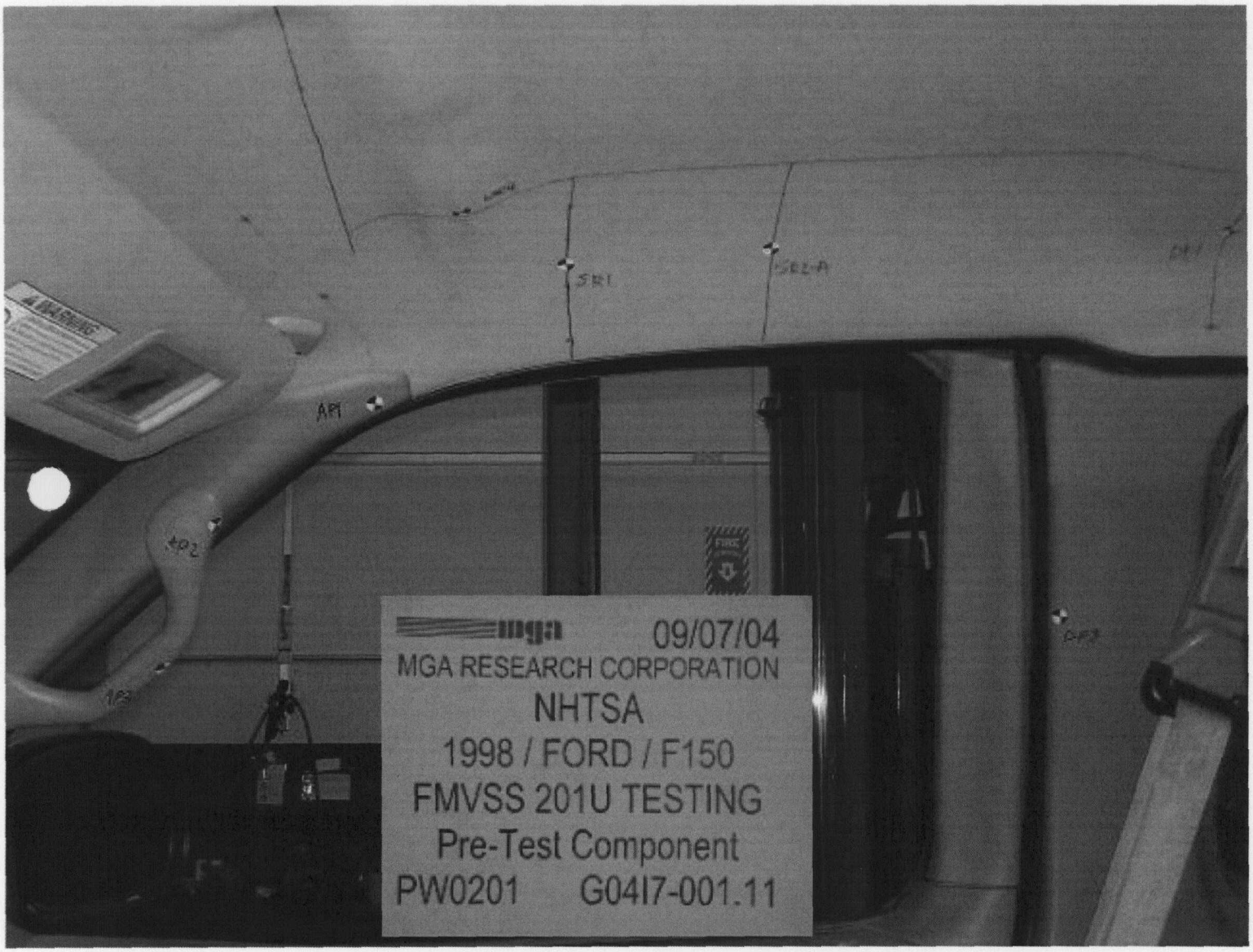
FMVSS 201U TESTING
Pre-Test Component
PW0201 G04I7-001.11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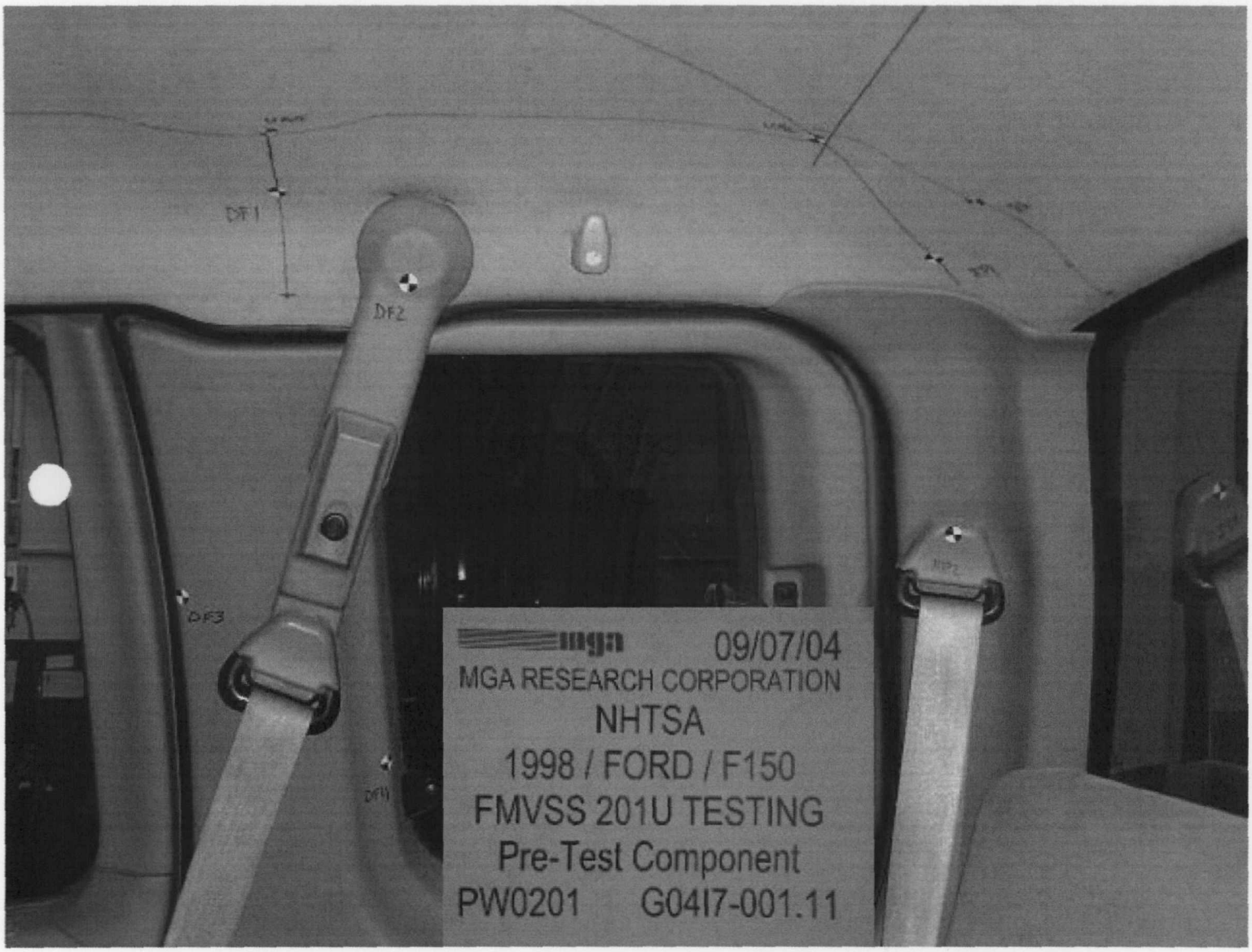
PW0201 G04I7-001.11


DF1
DF2
DF3
DF4
09/07/04
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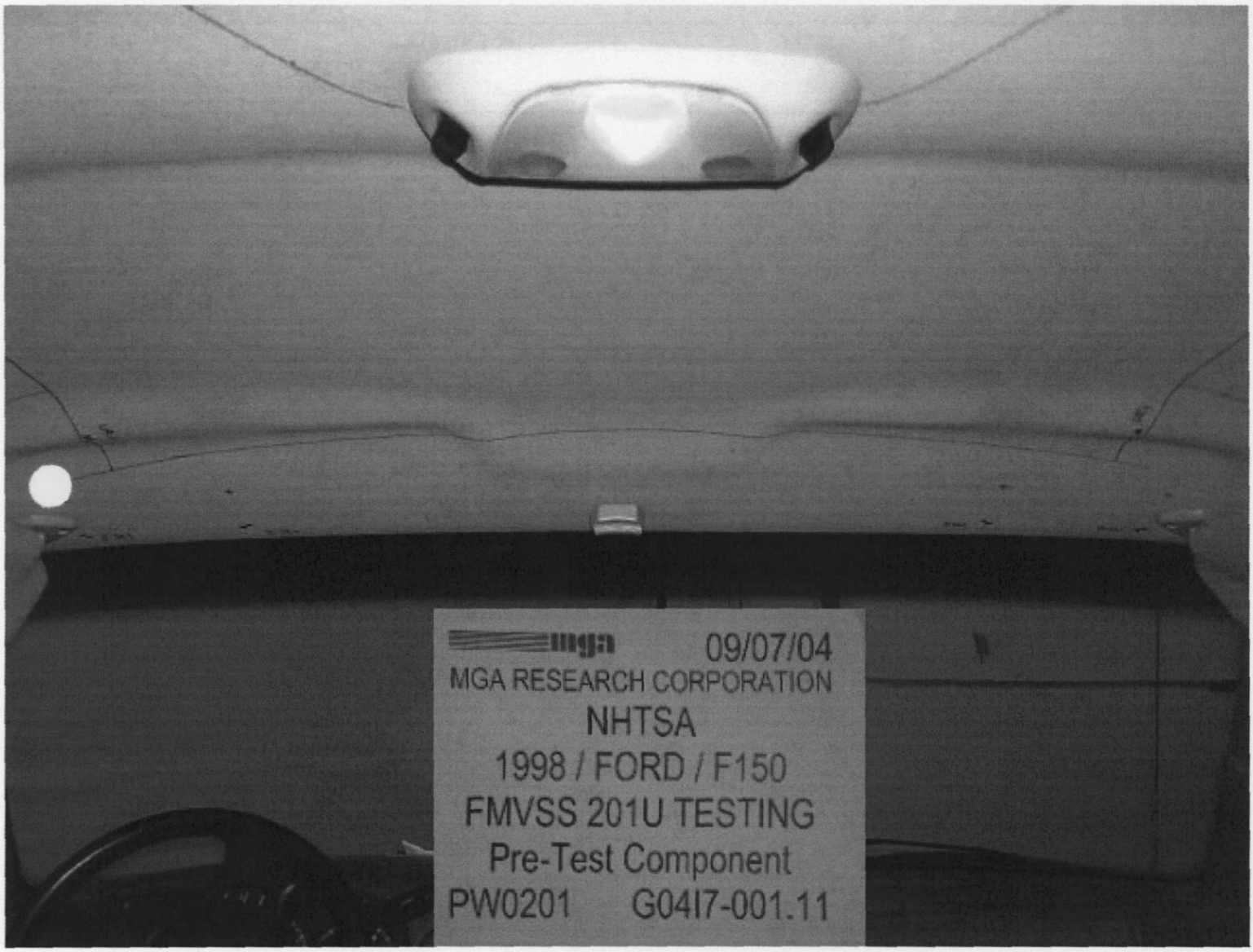
Pre-Test Component
PW0201 G04I7-001.11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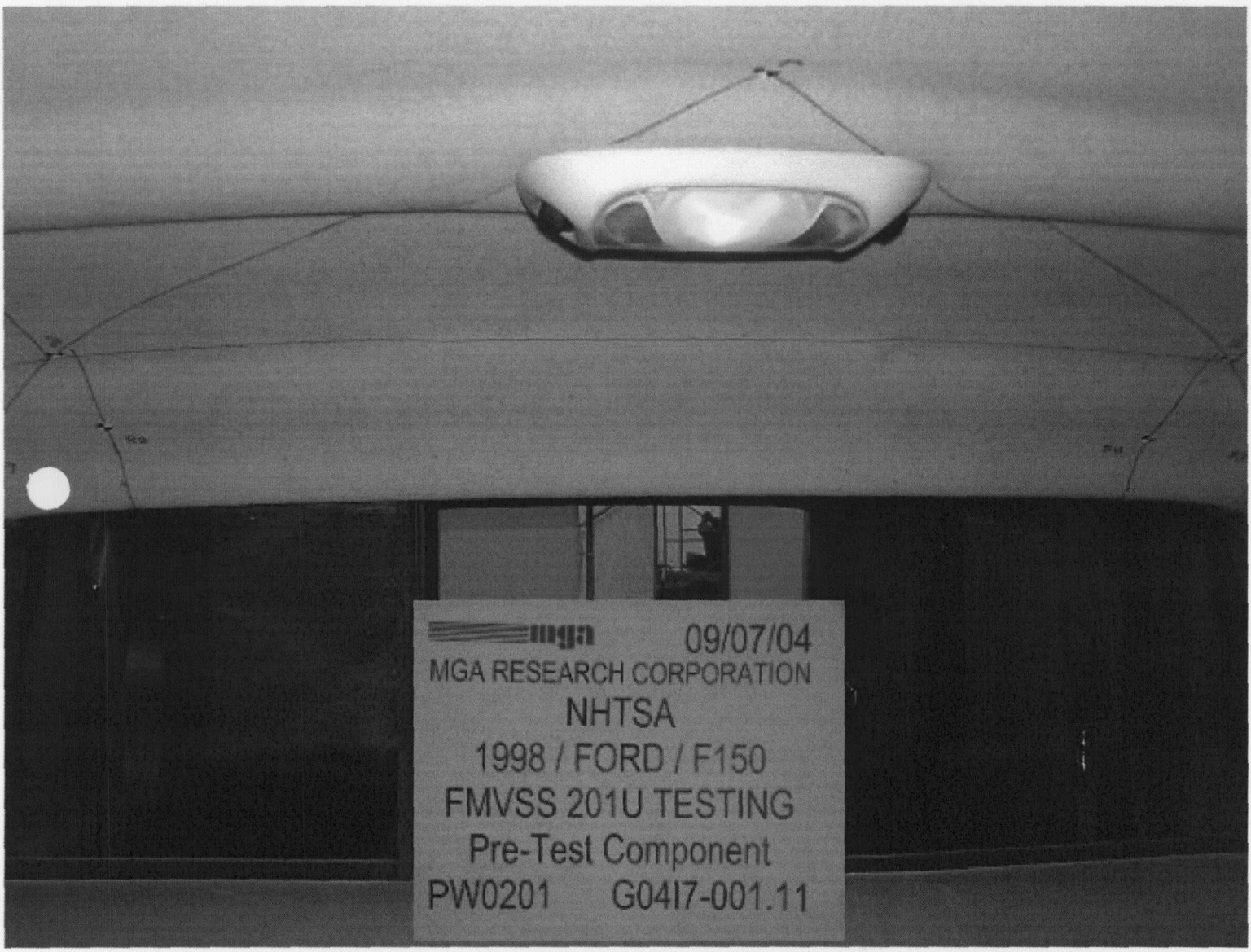
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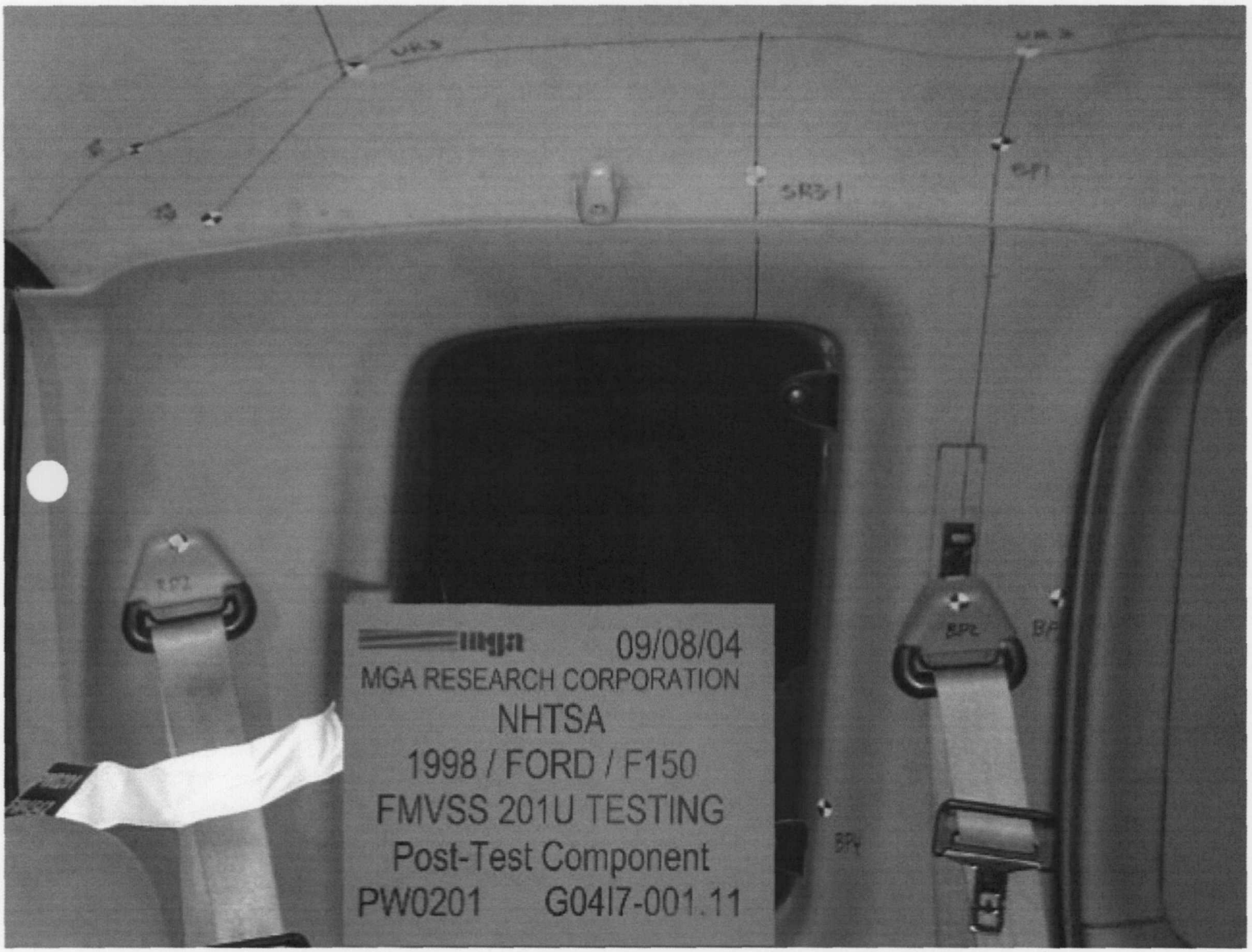
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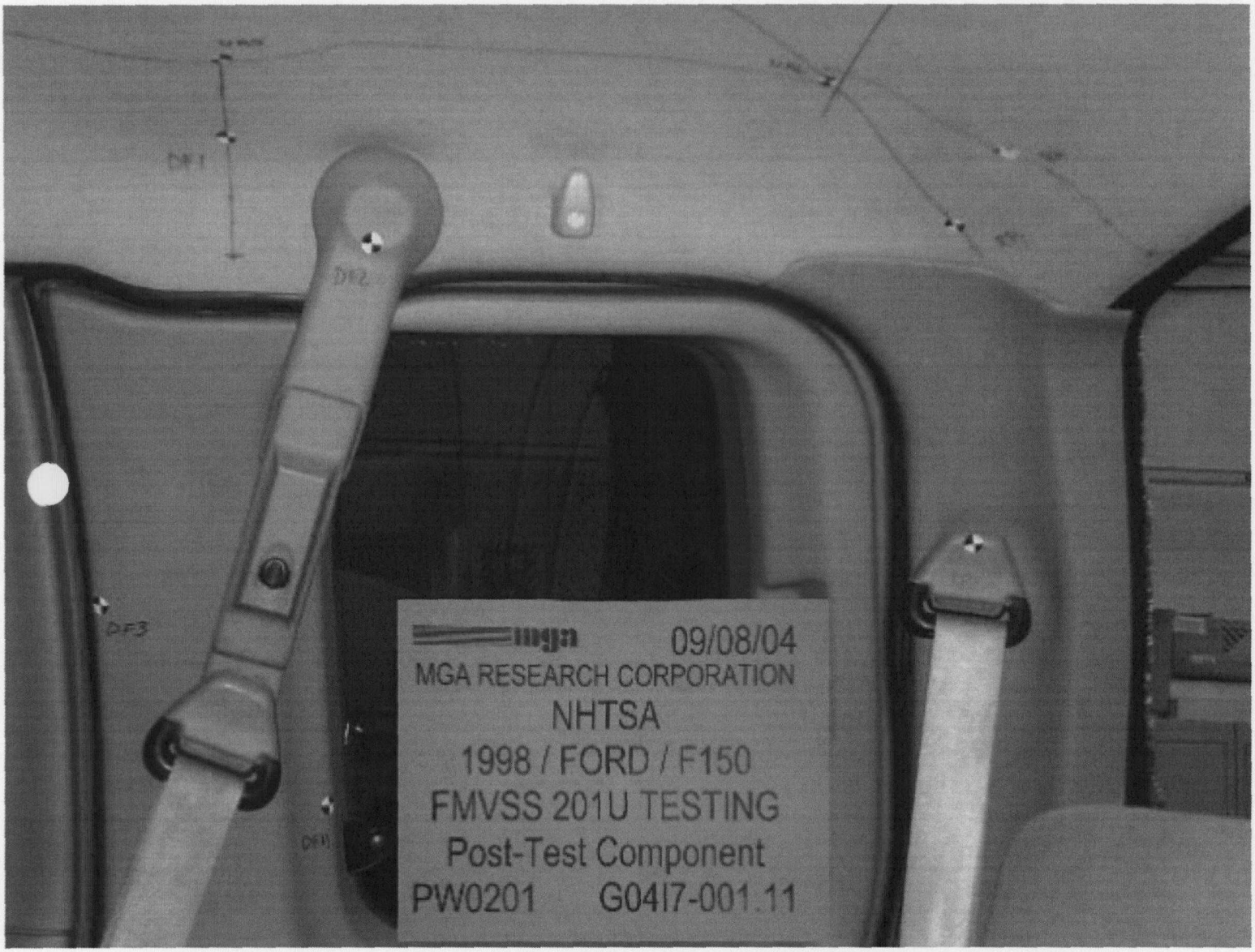
Post-Test Component
PW0201 G04I7-001.11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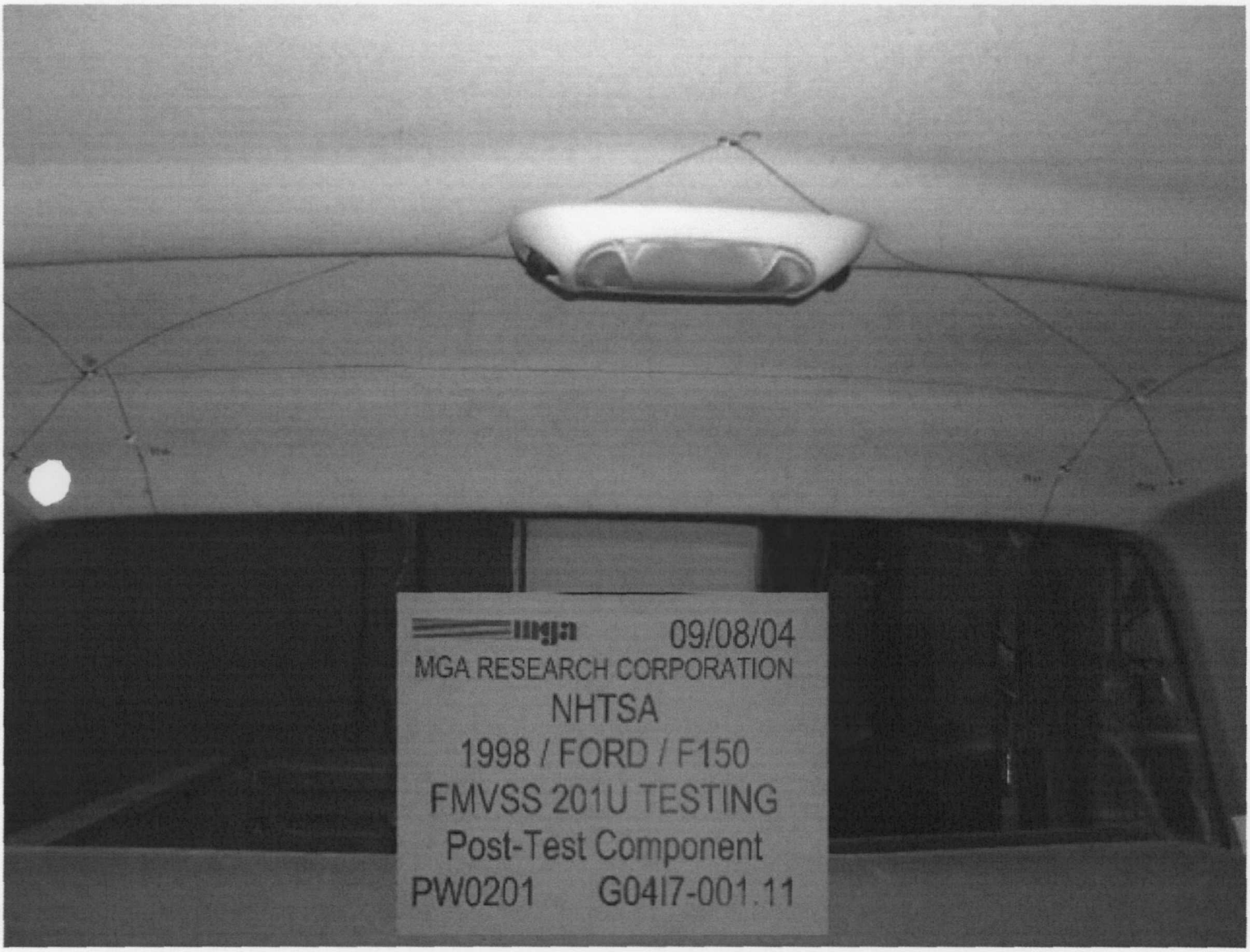
FMVSS 201U TESTING
Post-Test Component
PW0201 G04I7-001.11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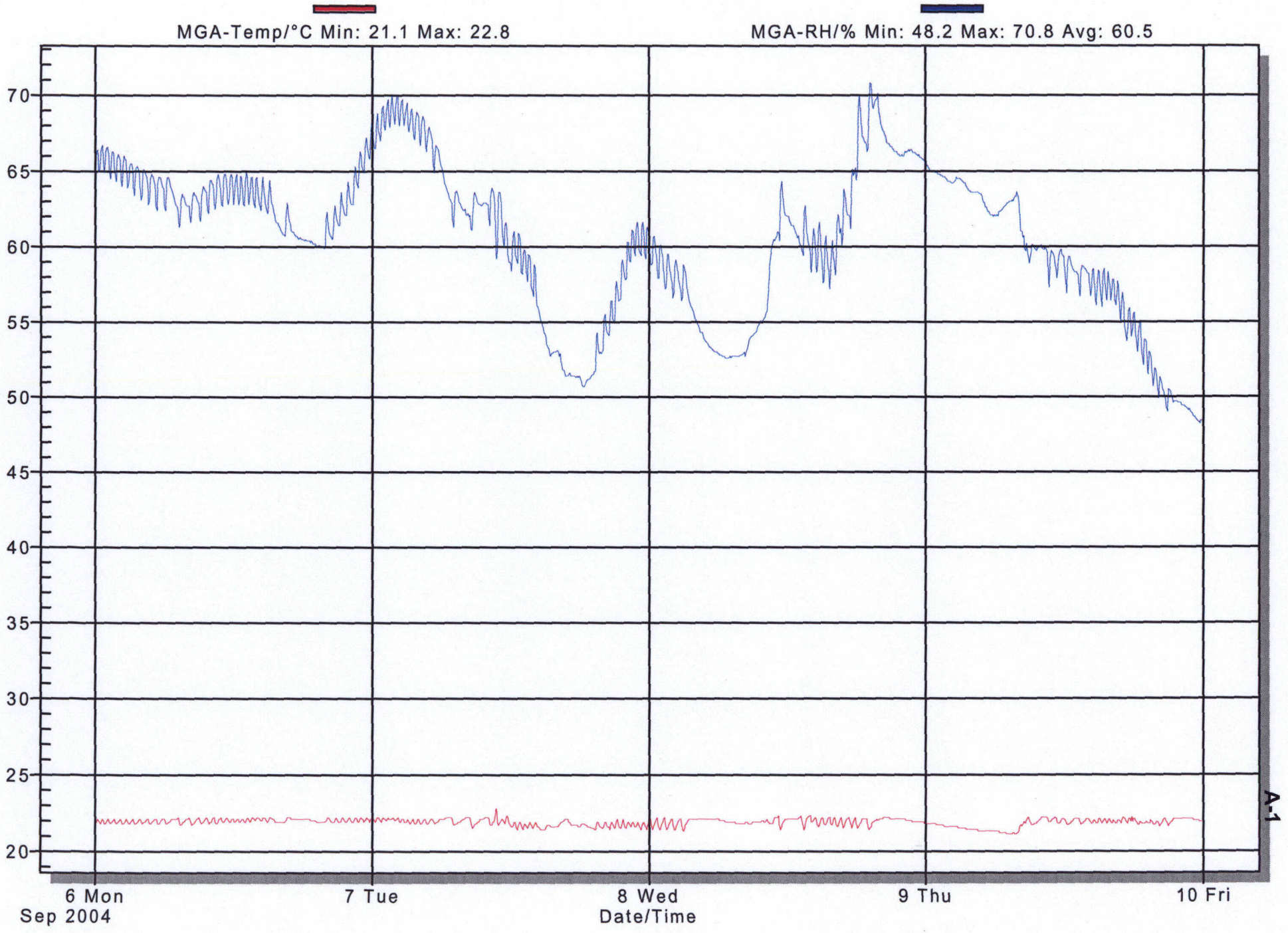
Post-Test Component
PW0201 G04I7-001.11

1998 FORD 150 PW0201

SEPTEMBER 6-10, 2004



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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35924	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/21/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0410

New DLR (100k , Units: G): 92.3

StdDeviation (%) 0.106

% Difference in DLR (New vs. Old): 0.506

Temperature (°F): 72

Humidity (%): 47

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35919	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/21/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0410

New DLR (100k , Units: G): 93.8

StdDeviation (%) 0.066

% Difference in DLR (New vs. Old): -0.27

Temperature (°F): 72

Humidity (%): 47

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J21969	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/19/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0409

New DLR (100k , Units: G): 88.5

StdDeviation (%) 0.194

% Difference in DLR (New vs. Old): -1.641

Temperature (°F): 73

Humidity (%): 43

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35923	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 100.8

StdDeviation (%) 0.782

% Difference in DLR (New vs. Old): -1.506

Temperature (°F): 74

Humidity (%): 50

Performed By: [signature]

Approved By: [signature]

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35916	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 100.2

StdDeviation (%) 0.215

% Difference in DLR (New vs. Old): 0.872

Temperature (°F): 74

Humidity (%): 50

Performed By: Jamie Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35918	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 97.9

StdDeviation (%) 0.929

% Difference in DLR (New vs. Old): -0.762

Temperature (°F): 74

Humidity (%): 50

Performed By: Kaitlin Campbell

Approved By: Helen A. Kaluto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J36197	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 108.0

StdDeviation (%) 0.915

% Difference in DLR (New vs. Old): 0.719

Temperature (°F): 74

Humidity (%): 50

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J36193	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 101.4

StdDeviation (%) 0.375

% Difference in DLR (New vs. Old): -3.509

Temperature (°F): 74

Humidity (%): 50

Performed By: Kaitlin Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J36353	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 96.8

StdDeviation (%) 0.376

% Difference in DLR (New vs. Old): -0.677

Temperature (°F): 74

Humidity (%): 50

Performed By: Travis Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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~Certificate of Calibration~

Model Number: 484B	**N.I.S.T. Project #: 6720012**
Serial Number: 2470	**Calibration Date: 05/11/2004**
Description: Signal Conditioner	**Recalibration Date:**
Test Procedure: AT-106-1	**Calibration Technician: Chris Vega CV. #36**
Temperature: 74° F	**Relative Humidity: 42%**

TESTS	BEFORE	AFTER
INPUT VOLTAGE (24 ± 0.1V)	24.02	24.02
ICP CURRENT (4 ± 0.6mA)	3.97	3.97
DC OFFSET A.C. MODE (volts)	-.001	-.001
GAIN (REF 1 VRMS, 1kHz)	1.0000	NOT ADJUSTABLE
DRIFT (DC MODE)	< 2mV/min.	NOT ADJUSTABLE
FREQUENCY RESPONSE 10 Vp-p, 1 kHz REFERENCE	FLAT TO 200kHz	NOT ADJUSTABLE

As Received: In tolerance

As Left: In tolerance

Special Notes: MGA Research

This document certifies that the equipment referenced above meets published specifications. The calibration procedure is in compliance with ISO 10012-1, and former MIL-STD-45662A and is traceable to NIST. *Measurement uncertainty (95% confidence level w/coverage factor of 2) for scale factors is +/- 0.2%.

~ Calibration Certificate ~

Per ISO 16063-21

Model Number: 301M09/484B (394M17 SYSTEM)

Serial Number: 862/2470

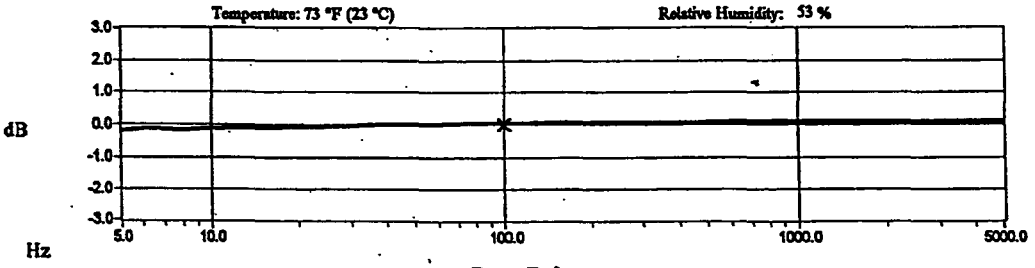
Description: ICP® Accelerometer Method: Back-to-Back Comparison Calibration

Manufacturer: PCB

Calibration Data

Sensitivity @ 100.0 Hz	**31.17**	**mV/g**	Output Bias	8.6	VDC
	(3.179	**mV/m/s²)**	Transverse Sensitivity	3.0	%

Sensitivity



Data Points

Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)
5.0	-2.5	REF. FREQ.	0.0	5000.0	1.1
10.0	-1.9	300.0	0.7		
15.0	-1.4	500.0	0.8		
30.0	-0.6	1000.0	1.0		
50.0	-0.2	3000.0	1.1		

Mounting Surface: Stainless Steel w/Silicone Grease Coupling Fastener: Stud Mount Vertical
Acceleration Level (pk): 10.0 g (98.1 m/s²)
*The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude; Acceleration Level (g) = 0.010 x (freq)². *The gravitational constant used for calculations by the calibration system is; 1 g = 9.8066 m/s².

Condition of Unit

As Found: In Tolerance, No Adjustment Necessary

As Left: In Tolerance

Notes

1. Calibration is NIST Traceable thru Project 822/267400 and PTB Traceable thru Project 1055.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%.

Technician: Chuck DiMaggio Date: 05/13/04

ACCREDITED
Cert No 1062.01

PCB PIEZOTRONICS
VIBRATION DIVISION
3425 Waldon Avenue • Depew, NY 14043
TEL: 888-684-0013 • FAX: 716-685-3886 • www.pcb.com

PAGE 1 of 1

Interim Certification Document

Part Description: **Silver** **Serial Number:** S08059801273

Single Point 2Sigma: S08-05 +/-.076mm (+/-.0030")

Linear Displacement 2 Sigma: S08-05 +/-.108mm (+/-.0042")

Certification Date: August 26, 2004

Measurement Standards, N.I.S.T., U.K.A.S. TRACEABILITY

Bal-Tec Invar Ball Bar Kit	Kit Number: 543	N.I.S.T. Cert No.:	LL0101/0310	Date:	08/18/04
		U.K.A.S. Cert No.:	LL0101/0310	Date:	08/18/04
"The Ball Bar Kit above has been calibrated against a laser interferometer traceable to NIST and UKAS standards (see test numbers above.)"					
Mitutoyo Corporation, 10mm Step Gauge, Code N0.: 515-744,	Serial Number: 410101	N.I.S.T. Control No.:	110107226	Date:	04/06/04
Measuring Range: 1.5m		U.K.A.S. Cert No.:	150674	Date:	02/25/04

Certification Results

A basic 4 quadrant certification included with all Faro Arms and compromised of: 2 vertical level single point repeatability test: in 4 quadrants with 5 repeats from 4 directions.	**PASSED**
Step gauge test in 4 quadrants 3 orientation per quadrant.	**PASSED**
3 Length, 3 position free ball bar test in 4 quadrants.	**PASSED**

This Instrument as received was within specification.

Ambient Temperature: 22°C +/- 3°C

Technician: Patrick Newell Date: 8/26/04

Patrick Newell 8/26/2004

The results of this certificate relate only to the items calibrated or tested.

Faro Technologies, Inc. 125 Technology Park Lake Mary, FL 32746
PH: (407)333-9911 1-800-736-2771 FAX:(407)333-8056

Revised: August 19, 2004

Certificate Number: 20040729Cal

Detroit Testing Laboratory, Inc.

ACCREDITED Certificate No. 38.05

7111 E. 11 Mile Road, Warren, MI 48092-2709 • (586) 754-9000 • FAX (586) 754-9045 • www.dtl-inc.com

Certificate of Calibration

Equipment Information

Customer:	MGA Research Corporation 446 Executive Drive Troy, MI 48083	**Model:**	AP 20
		Serial Number:	E33603-0213
		Manufacturer:	Detecto
		Description:	Scale
System ID:	MGA00081		
Customer Asset No.:			

Calibration Information

Calibration Date:	3/24/04	**Procedure Used:**	33K6-4-72-1/98
Calibration Due:	3/24/05	**Calibrated to:**	MFR SPEC
Calibration Interval:	12 Month		
Revd In Tol:[1]	Yes/Pass	**Temperature:**	24 °C
Returned In Tol:[1]	Yes/Pass	**Humidity:**	37 %RH
Performed On Site:	No		

Calibration Limitation:

The Uncertainty of the Measurements Pertaining to This Calibration are Estimated to be: (0.006 + 0.01% Ind) lb

[1] Pass/Fail or In/Out of Tolerance statements are opinions only of the person performing the calibration based on data from measurements at the time they were made, procedure utilized, professional experience, and the uncertainty associated with this calibration. It is ultimately up to the user of this equipment to determine if this item meets their specific requirements for accuracy for its intended application.

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer	Description:	Date Due:
09126	CT485B	61201050	OMEGA	Thermohumidigraph	5/12/04
07580	CLASS C	07580	TROEMNER	WEIGHT SET	9/11/04

Any calibration interval and due date of this device, if stated, is at the request of the customer. Due to the fact that many variables may effect drift of reported values over time there is no assurance implied that this item will maintain it's stated accuracy through the end of this interval.

This Calibration has been performed per requirements of ISO 17025-1999. Reported results are from standards with accuracies that are traceable to the International Systems of Units (SI), derived from physical constants, ratio measurements, national measurement standards, or compared to consensus standards. Measurement uncertainty is expressed at a confidence level of approximately 95% (coverage factor k=2).

Signature: Jerry Wells Date: 3-24-04 Technician	Approved: Paul Weiss Date: 3-24-04
Date Printed: 03/24/04 Printed By: Jerry Wells	Page: 1 of 2 QFC 1048-1 Rev 4/17/03

Detroit Testing Laboratory, Inc.

CALIBRATION DATA SHEET

Date: 3/24/04
DTL I.D: MGA00081
Cert. Number: 20040729Cal

Cal Point lb std	Reading As Found lb uut	Reading As Left lb uut	Deviation As Found lb	Deviation As Left lb	% of Allowed Dev as Found	% of Allowed Dev as Left
5.00	5.00	5.00	0.00	0.00	0.0	0.0
10.00	10.01	10.00	0.01	0.00	100.0	0.0
15.00	15.01	15.00	0.01	0.00	100.0	0.0
20.00	20.01	20.00	0.01	0.00	100.0	0.0

Tape Measure Calibration Certificate

Reference Steel Rule

Brand: GEE
S/N: C18033
Calibration Date: 11 24 03

Subject Tape Measure

Brand: Stanley
S/N: 289
Calibration Date: 1.7.4

Reference mm	Subject Tape Measure	Difference	Reference mm	Subject Tape Measure	Difference
0	0	0	450	450	0
25	25	0	475	475	0
50	50	0	500	500	0
75	75	0	525	525	0
100	100	0	550	550	0
125	125	0	575	575	0
150	150	0	600	600	0
175	175	0	625	625	0
200	200	0	650	650	0
225	225	0	675	675	0
250	250	0	700	700	0
275	275	0	725	725	0
300	300	0	750	750	0
325	325	0	775	775	0
350	350	0	800	800	0
375	375	0	825	825	0
400	400	0	850	850	0
425	425	0	875	875	0

If all differences are ± 1 mm, then the tape measure is acceptable.
Pass X Fail ____ Maximum Difference = 0

Date: 1.7.05 Performed By: RJ Mill

Certificate of Instrument Calibration and Testing

Calibration report shall not be reproduced, except in full, without written authorization from Dickson.

Customer Instrument

Dickson Model Number: TR320

Serial Number: 04018409

Calibration Technician: *Kitty McReynolds*

Calibration Date: 01/22/2004

Calibration Standards

ACCREDITED

General Eastern: Model # M3
Ser. # 6856808 / 2360502
Accuracy: ± .4% FS RH and ± .4 °F
Certified February, 2003 / August, 2003

Anseix Model # A1011 Ser. # T2513-9027
RTD Platinum Probe Ser. # 496013 Accuracy: ± .2 °F
Certified February, 2003

Cole Parmer: Model # PT1000/ 90111-00
Ser. # 10067869 / Ser. # 10148057 Accuracy: ± .4 °F
Certified June, 2003

The calibration standards are traceable through the National Institute of Standards and Technology.

Calibration Procedure P1130

The customer instrument was compared to the calibration standard. Drifts and faults were determined, and any necessary mechanical or electronic adjustments were taken. The Dickson calibration system conforms to the requirements of MIL-STD-45662A, ANSI/NCSL Z540, ISO/IEC guide 25, and ISO 17025 as appropriate. Recalibration of the customer instrument is recommended within 6 months after the unit is placed into service. Any number of factors may cause the calibration item to drift before the recommended interval has expired. A2LA Certificate Number - 1621.01

Environmental Conditions 72 °F 41 %RH

Calibration Standard Reading	Customer Instrument Reading	Unit Specification
Humidity (%RH)	Humidity (%RH)	Humidity
22.1	22.9	± 2% RH
55	56.1	± 2% RH
86.6	88.2	± 3% RH
Temperature °F	Temperature °F	Temperature
-7.6	-7.1	± 1.8 °F (±1.0 °C)
75.1	75	
111.5	111.4	

The TR320 has an ISO/IEC 17025 required NIST Technical note 1297, Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results, estimated measurement uncertainty at 95% CL (K=2) of ±0.7°F and ±1.1 %RH.

FOR YOUR NEXT CALIBRATION NO PHONE CALLS REQUIRED

Fill out and send this form along with your instrument to Dickson. Label the outside of the box with: "CCM"- that is your RA#. That's all there is to it!

1. Purchase Order #: ______
   Name: ______
   Phone: ______
   Model #: TR320
   Serial #: 04018409

2. ☐ 1-Point Deluxe NIST Calibration $149.00
   ☐ 3-Point Deluxe NIST Calibration $199.00
   ☐ 3-Point Ultima Deluxe A2LA NIST $299.00 (with incoming reading)
   ☐ N995 - User selectable NIST Temperature points $50.00 each (to be selected in addition to one of the above calibration options)
   ☐ N997- Next Day Service $50.00 (Not available for ULTIMA service)

3. Please return via:
   ☐ Ground Freight*
   ☐ 2nd Day Air*
   ☐ Next Day Air*
   *Charges added at factory

4. Ship To: ______

Bill To: ______

Charts/Pens!
(Order now and receive them with your calibrated unit)

	Order No.	Qty.	Price Ea.
☐ 6 Red Pens	P222	___	$36 pk.
☐ 3 Red/3 Blue Pens	P246	___	$36 pk.
☐ Charts* (60 per box)	C___	___	$24 box

*Please fill in the chart order number. For a listing of available charts go to www.dicksonweb.com, click on "product search" and select the product type, "Parts /Accessories."

Prices are subject to change.

Let Dickson remind you the next time your unit is due for calibration. Register for our FREE Calibration Club now at www.dicksonweb.com

Dickson Calibration Services

930 South Westwood Avenue Addison, Illinois 60101 630-543-3747 Fax 630-543-0498

NuWeigh, Inc.
10421 Enterprise Drive
Davisburg, MI 48350
248-922-1435 Fax 248-922-1465
ISO/IEC/17025 ACCREDITED

CALIBRATION / TEST REPORT

Page 1 of 1

SCR 4365

Customer: MGA Research	Date of service: 3-23-04	Location: C S	
Address: 446 Executive Dr	Last known test date: 3-28-03	Environmental conditions acceptable: ☒ Yes ☐ No	
City: Troy State: MI Zip: 48083	Frequency: ☒ Annual ☐ Semi Annual ☐ Quarterly ☐ Monthly ☐ Bi Monthly ☐ Other		

Indicator Mfg: Cardinal	Platform Mfg: Cardinal	Indicator Mfg:	Platform Mfg:
Model: 708	Model: 8950 F	Model:	Model:
Serial No: 9804-022	Serial No: 9805-175	Serial No:	Serial No:
Seal Applied? ☐ Yes ☒ No	Platform size: 28" x 28"	Seal Applied? ☐ Yes ☐ No	Platform size:
Customer Id: Shop	Cap. x Grads: 2000 x 1 lb	Customer Id:	Cap. x Grads:
Printer Mfg/model:	General device condition: ☒ Good ☐ Fair ☐ Poor	Printer Mfg/model:	General device condition: ☐ Good ☐ Fair ☐ Poor

Weight Applied	Reading as Found	Error as Found	Reading as Left	Error as Left	Weight Applied	Reading as Found	Error as Found	Reading as Left	Error as Left
0	0	0							
100 lb	100	0							
300 lb	300	0							
500 lb	500	0							
300 lb	300	0							
100 lb	100	0							
0	0	0							
X	X	X							
Load Section #1	100	0			Load Section #1				
Load Section #2	100	0			Load Section #2				
Load Section #3	100	0			Load Section #3				
Load Section #4	100	0			Load Section #4				

Scale meets HB44 tolerance: Yes X No
Standards used (serial nos.): 6-15
Estimated measurement uncertainty of applied load is .038 %
Traceable report nos: MI 10-01-6285

RECOMMENDATIONS/OPINIONS
No adjustments needed
Scale tested good.

Scale meets HB44 tolerance: Yes No
Standards used (serial nos.):
Estimated measurement uncertainty of applied load is %
Traceable report nos:

RECOMMENDATIONS/OPINIONS

Test procedure: NuWeigh Quality Manual and Procedures, Handbook 44

Mike Knight — TECHNICIAN
3-23-04 — DATE
George Baber — CUSTOMER

White - Customer Copy Canary - File Copy

Certificate Number: 20040204Cal

Detroit Testing Laboratory, Inc.

ACCREDITED Certificate No. 38.05

7111 E. 11 Mile Road, Warren, MI 48092-2709 • (586) 754-9000 • FAX (586) 754-9045 • www.dtl-inc.com

Certificate of Calibration

Equipment Information

Customer:	MGA Research Corporation 446 Executive Drive Troy, MI 48083	Model:	Pro 360
		Serial Number:	NONE
		Manufacturer:	Mitutoyo
		Description:	Protractor
System ID:	MGA00072		
Customer Asset No.:	MGA00072(012904)		

Calibration Information

Calibration Date:	1/28/04	Procedure Used:	33K6-4-1597-1/99
Calibration Due:	1/28/05	Calibrated to:	MFR SPEC
Calibration Interval:	12 Month		
Revd In Tol: [1]	Yes/Pass	Temperature:	20 °C
Returned In Tol: [1]	Yes/Pass	Humidity:	35 %RH
Performed On Site:	No		

Calibration Limitation:

The Uncertainty of the Measurements Pertaining to This Calibration are Estimated to be: Various

[1] Pass/Fail or In/Out of Tolerance statements are opinions only of the person performing the calibration based on data from measurements at the time they were made, procedure utilized, professional experience, and the uncertainty associated with this calibration. It is ultimately up to the user of this equipment to determine if this item meets their specific requirements for accuracy for its intended application.

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer	Description:	Date Due:
09098	CT485B	61201094	Omega	Thermohumidigraph	7/28/04
07748	2 X 2'	13928	TRU-STONE	Granite Surface Plate	2/19/04
10493	SP-66-S1	9902	Suburban Tool, Inc.	Sine Plate	2/17/06
09156	CHALLENGER 81 P 09156		AA JANSSON	Gage Blocks	3/5/04

Any calibration interval and due date of this device, if stated, is at the request of the customer. Due to the fact that many variables may effect drift of reported values over time there is no assurance implied that this item will maintain it's stated accuracy through the end of this interval.

This Calibration has been performed per requirements of ISO 17025-1999. Reported results are from standards with accuracies that are traceable to the International Systems of Units (SI), derived from physical constants, ratio measurements, national measurement standards, or compared to consensus standards. Measurement uncertainty is expressed at a confidence level of approximately 95% (coverage factor k=2).

Signature: Paul Wonsowicz	Date: 1-29-04	Approved: Robert West	Date: 1/30/04
Paul Wonsowicz	Technician		