HS 637580

FINAL REPORT NUMBER 201U-MGA-04-04

SAFETY COMPLIANCE TESTING FOR FMVSS 201U
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection

FORD MOTOR COMPANY
2004 FREESTAR SE MINIVAN
NHTSA No. C40206

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: March 30-31, 2004
Report Date: April 5, 2004

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
400 SEVENTH STREET, SW
ROOM 6111 (NVS-220)
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Approval Date: December 14, 2004

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: _____

Acceptance Date: January 19, 2005

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 201U-MGA-04-04	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 201U Compliance Testing of a 2004 Ford Freestar SE Minivan, NHTSA No. C40206		5. Report Date April 5, 2004	
		6. Performing Organization Code MGA	
7. Author(s) Helen A. Kaleto, Project Manager David G. Gotwals, Project Engineer		8. Performing Organization Report No. 201U-MGA-04-04	
9. Performing Organization Name and Address MGA Research Corporation 446 Executive Drive Troy, Michigan 48083		10. Work Unit No.	
		11. Contract or Grant No. DTNH22-99-C-11005	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh Street, SW Room 6111 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report	
		14. Sponsoring Agency Code NVS-220	
15. Supplementary Notes			
16. Abstract A compliance test was conducted on the subject 2004 Ford Freestar SE Minivan, NHTSA No. C40206, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U compliance. The test was conducted at MGA Research Corporation in Troy, Michigan on March 30-31, 2004. Test failures identified were as follows: NONE The data recorded seems to indicate that the 2004 Ford Freestar SE Minivan tested appears to comply with the requirements for FMVSS 201U which were set forth by the National Highway Traffic Safety Administration.			
17. Key Words Compliance Testing Safety Engineering FMVSS 201U 2004 Ford Freestar SE Minivan		18. Distribution Statement Copies of this report are available from: NHTSA Technical Reference Division, Mail Code: NPO-230 400 Seventh Street, SW Washington, D.C. 20590 Telephone No. (202) 366-4946	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 113	22. Price N/A

Form DOT F 1700.7 (8-69)

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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact compliance test was to determine whether the subject vehicle, a 2004 Ford Freestar SE Minivan, meets the performance requirements of FMVSS 201U, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on March 30-31, 2004 on a 2004 Ford Freestar SE Minivan, 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 COMPLIANCE TEST DATA SUMMARY

The 2004 Ford Freestar SE Minivan was equipped with A, B, C, and rear-pillars, a grab handle located on the side rail above each front door, an adjustable seat belt anchorage on each B and C-pillar, a fixed seat belt anchorage on each rear-pillar, an upper roof console on the front center and center roof, and a rear upper roof seat belt anchorage.

Upon completion of targeting the test vehicle, ten (10) targets were chosen to be impacted based upon engineering judgment and certification test data provided by Ford Motors Company. Targets were chosen which appeared most likely to give high HIC(d) values. The ten (10) targets chosen were:

AP2	RP2	UR1*	UR4
BP2	SR3-1	UR2	
OP2	RH	UR3	

The 2004 Ford Freestar SE Minivan tested appears to comply with the performance criteria for FMVSS 201U. The HIC(d) measured using the Part 572L (Free Motion Headform) was below 1000 for each tested component.

Note: * The data that was collected for Target UR1 was deemed invalid upon the post-test headform calibration drop. The z-axis accelerometer was incorrectly oriented inside the Free Motion Headform. This FMH was not used in any other testing and is not included in this report.

TABLE 2-1

SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Ford Freestar SE Minivan

VEH. NHTSA NO.: C40206 VIN: 2FMDA51684BA06331 COLOR: Green

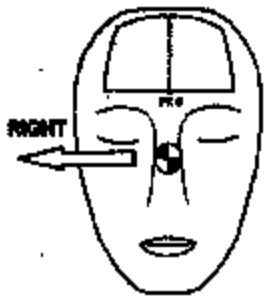
VEH. BUILD DATE: September, 2003 TEST DATES: March 30-31, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Scott Kreiger

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP2	Right	180	44	23.7	810	853	8	7 Left
BP2	Right	90	7	23.8	627	610	13	10 Left
OP2	Right	90	0	23.3	549	508	22	5 Right
RP2	Right	15	34	23.9	835	886	11	7 Left
SR3-1	Right	90	50	18.7	347	239	23	2 Left
RH	Right	0	29	23.5	397	305	22	30 Left
UR1	Right	90	47	Data Invalid				
UR2	Right	90	37	23.8	378	281	42	13 Left
UR3	Right	90	38	23.9	480	416	40	18 Left
UR4	Right	90	27	23.8	423	340	45	5 Right

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.

UR1 Right: Data collected determined to be invalid upon post-test headform calibration.

No damage was observed for any other targets.

REMARKS:

The targets listed were impacted in the following order:

Right: AP2, BP2, UR1, SR3-1, UR3, OP2, UR4, RP2, RH, UR2

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

Target SR3-1 was located within the side airbag zone, so the impact velocity was reduced to 19 kph. Per S6.2(b) (2) of FMVSS 201.

RECORDED BY: David G. Gotwals DATE: March 31, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Ford Freestar SE Minivan

VEH. NHTSA NO.: C40206 VIN: 2FMDA51684BA08331 COLOR: Green

VEH. BUILD DATE: September, 2003 TEST DATES: March 30-31, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Scott Kreiger

INTERIOR TRIM INFORMATION: A, B, C, and rear-pillars, a grab handle located on the side rail above each front door, an adjustable seat belt anchorage on each B and C-pillar, a fixed seat belt anchorage on each rear-pillar, an upper roof console on the front center and center roof, and a rear upper roof seat belt anchorage.

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: 1/11/04; Odometer Reading: 72 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Ford Motor Company

Date of Manufacture: September, 2003; VIN: 2FMDA51684BA08331

GVWR: 2567 kg; GAWR FRONT: 1322 kg;

GAWR REAR: 1251 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 240 kpa REAR: 240 kpa

Recommended Tire Size: P225/60R16

Recommended Cold Tire Pressure:

FRONT: 240 kpa REAR: 240 kpa

Size of Tire on Test Vehicle: P225/60R16

Type of Spare Tire: P225/60R16; Space Saver: ____; Standard X

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ____; Bucket X ; Split Bench ____

Number of Occupants: Front 2 ; Rear 5 ; TOTAL 7

VEHICLE CAPACITY WEIGHT (VCW) = 544 kg

No. of Occupants x 68 kg = 476 kg

Rated Cargo/Luggage Weight (RCLW) = 68 kg (difference)

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

Right Front =	566.0 kg	Right Rear =	400.0 kg
Left Front =	574.0 kg	Left Rear =	423.0 kg
TOTAL FRONT =	1140.0 kg	TOTAL REAR =	823.0 kg
% Total Weight =	58.1 %	% Total Weight =	41.9 %

TOTAL DELIVERED WEIGHT = 1963.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1963.0 kg

Rated Cargo/Luggage Weight = 68.0 kg

Target Test Weight = 2031.0 kg

WEIGHT OF TEST VEHICLE:

Right Front =	565.0 kg	Right Rear =	434.0 kg
Left Front =	573.0 kg	Left Rear =	456.0 kg
TOTAL FRONT =	1138.0 kg	TOTAL REAR =	890.0 kg
% Total Weight =	56.1 %	% Total Weight =	43.9 %

TOTAL TEST WEIGHT = 2028.0 kg

Weight of ballast secured in vehicle's cargo area = 65.0 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 748.0 mm; Left Front 749.0 mm;
Right Rear 770.0 mm; Left Rear 764.0 mm;

Pitch Angle at Right Door Sill = 1.0 Rear higher
Pitch Angle at Left Door Sill = 0.9 Rear higher
Roll Angle at Front Bumper = 0.1 Right-side higher
Roll Angle at Rear Bumper = 0.1 Right-side higher

FULLY LOADED: Right Front 757.0 mm; Left Front 762.0 mm;
Right Rear 755.0 mm; Left Rear 753.0 mm;

Pitch Angle at Right Door Sill = 0.8 Rear higher
Pitch Angle at Left Door Sill = 0.4 Rear higher
Roll Angle at Front Bumper = 0.0 Right-side higher
Roll Angle at Rear Bumper = 0.2 Right-side higher

AS TARGETED:

Pitch Angle at Right Door Sill = 0.6 Rear higher
Pitch Angle at Left Door Sill = 0.7 Rear higher
Roll Angle at Front Bumper = 0.0
Roll Angle at Rear Bumper = 0.1 Right-side higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = 0.6 Rear higher
Pitch Angle at Left Door Sill = 0.7 Rear higher
Roll Angle at Front Bumper = 0.0
Roll Angle at Rear Bumper = 0.1 Right-side higher

VEHICLE WHEELBASE = 3082 mm

REMARKS: The seat travel distance was measured to be 180 mm for the driver front seat and 180 mm for the passenger front seat.

RECORDED BY: David G. Gotwals DATE: March 25, 2004

APPROVED BY: Helen A. Kaiata

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Ford Freestar SE Minivan

VEH. NHTSA NO.: C40206 VIN: 2FMDA51684BA08331 COLOR: Green

VEH. BUILD DATE: September, 2003 TEST DATES: March 30-31, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Scott Kreiger

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 200.4°	L 246.8°
	R 105°-165°	R 110.6°	R 160.2°
B-PILLAR	L 195°-345°	L 208.5°	L 292.4°
	R 15°-165°	R 67.0°	R 151.3°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: David G. Gotwals DATE: March 25, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Ford Freestar SE Minivan

VEH. NHTSA NO.: C40206 VIN: 2FMDA51684BA08331 COLOR: Green

VEH. BUILD DATE: September, 2003 TEST DATES: March 30-31, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Scott Kreiger

VERTICAL IMPACT ANGLE RANGES

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
FRONT HEADER	FH1	R 0°-50°	R 0°	R 50°
	FH2	R 0°-50°	R 0°	R 50°
SIDE RAIL	SR1	R 0°-50°	R 0°	R 23°
	SR2A	R 0°-50°	R 0°	R 30°
	SR2B	R 0°-50°	R 0°	R 45°
	SR3-1	R 0°-50°	R 0°	R 50°
	SR3-2	R 0°-50°	R 0°	R 50°
A-PILLAR	AP1	R -5°-50°	R -5°	R 32°
	AP2	R -5°-50°	R -5°	R 46°
	AP3	R -5°-50°	R -5°	R 44°
B-PILLAR	BP1	R -10°-50°	R -10°	R 7°
	BP2*	R 0°-50°	R 0°	R 7°
	BP3	R -10°-50°	R -10°	R 4°
	BP4	R -10°-50°	R -10°	R -5°
OTHER PILLAR	OP1*	R 0°-50°	R 0°	R 7°
	OP2	R -10°-50°	R -10°	R 0°
REAR PILLAR	RP1	R -10°-50°	R -10°	R 47°
	RP2*	R 0°-50°	R 0°	R 34°

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
SLIDING DOOR	SD	R -10°-50°	R -10°	R 24°
REAR HEADER	RH	R 0°-50°	R 0°	R 29°
UPPER ROOF 1		0°-50	0°	47°
UPPER ROOF 2		0°-50	0°	37°
UPPER ROOF 3		0°-50	0°	38°
UPPER ROOF 4		0°-50	0°	27°
UPPER ROOF 4		0°-50	0°	26°

As determined using the Procedures specified in S6.13.4.2. *Targets BP2, OP1, and RP2 are seat belt anchorage locations.

RECORDED BY: David G. Gotwals DATE: March 25, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Ford Freestar SE Minivan

VEH. NHTSA NO.: C40206 VIN: 2FMDA51684BA08331 COLOR: Green

VEH. BUILD DATE: September, 2003 TEST DATES: March 30-31, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Scott Kreiger

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	180.0 mm	180.0 mm
T°	Horizontal < (CG-F1 (Left Seat) to (Right A-Pillar))	111.2°	--
A1°	360° - T°	248.8°	--
W°	Horizontal < (CG-2 (Left Seat) to (Left A-Pillar))	200.4°	--
A2°	A2° = W°	200.4°	--
U°	Horizontal < (CG-2 (Left Seat) to (Left B-Pillar))	292.4°	--
B1°	B1° = U°	292.4°	--
V°	Horizontal < (CG-R (Left Seat) to (Left B-Pillar))	206.5°	--
B2°	B2° = V°	206.6°	--
W° (right)	Horizontal < (CG-F2 (Right Seat) to (Right A-Pillar))	--	160.2°
A1° (right)	A1° (right) = W° (right)	--	160.2°
T° (right)	Horizontal < (CG-F1 (Right Seat) to (Left A-Pillar))	--	249.4°
A2° (right)	360°-T° (right)	--	110.6°
V° (right)	Horizontal < (CG-R (Right Seat) to (Right B-Pillar))	--	151.3°
B1° (right)	B1° (right) = V° (right)	--	151.3°
U° (right)	Horizontal < (CG-F2 (Right Seat) to (Right B-Pillar))	--	67.0°
B2° (right)	B2° (right) = U° (right)	--	67.0°
J	A-Pillar ((Plane 3) - (Plane 5))	--	348.1 mm
J/2	J ÷ 2	--	174.1 mm
D1	Upper Roof ((Plane A) - (Plane B))	2640.0 mm	
D1/2	D1 ÷ 2	1320.0 mm	
D2	Upper Roof ((Plane C) - (Plane D))	1271.0 mm	
D2/2	D2 ÷ 2	635.5 mm	
.35D1	.35 x D1	924.0 mm	
.35D2	.35 x D2	444.9 mm	

Measurement	Description	Left Side	Right Side
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	--	490.3 mm
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	--	245.2 mm
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	--	122.6 mm
Q	C-Pillar (Plane 13 – Plane 14)	--	494.8 mm
Q/2	Q / 2	--	247.4 mm
D	R-Pillar	--	1070.0 mm
D/2	D / 2	--	535.0 mm
MM	Sliding Door (widest opening)	--	1014.6 mm
MM / 2	MM / 2	--	507.3 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 Row	2981.0	-425.0	1152.0	2981.0	425.0	1152.0
2nd Row	3839.0	-280.0	1124.0	3839.0	280.0	1124.0
3rd Row	4650.0	-412.0	1168.0	4650.0	412.0	1168.0

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front Row	2981.5	-424.9	1151.5	2981.0	424.8	1151.6
2nd Row	3840.0	-279.9	1123.0	3839.6	279.9	1123.1
3rd Row	4651.6	-411.7	1166.6	4651.1	411.9	1166.7

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	Z
CGF1	2961.5	-424.9	1811.5	2961.0	424.8	1811.6
CGF2	3141.5	-424.9	1811.5	3141.0	424.8	1811.6
CGR-2nd	4000.0	-279.9	1783.0	3999.6	279.9	1783.1
CGR-3rd	4811.6	-411.7	1826.6	4811.1	411.9	1826.7

REFERENCE FOR VEHICLE COORDINATE SYSTEM:

Front door striker bolt (x, y, z) = (3158.0, -831.0, 1166.0);

Driver seat front outboard anchorage (x, y, z) = (2722.0, -592.0, 779.0)

Passenger seat front outboard anchorage (x, y, z) = (2728.0, 805.0, 779.0)

REMARKS:

RECORDED BY: David G. Gotwals DATE: March 25, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Ford Freestar SE Minivan

VEH. NHTSA NO.: C40206 VIN: 2FMDA51684BA08331 COLOR: Green

VEH. BUILD DATE: September, 2003 TEST DATES: March 30-31, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Scott Kreiger

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 Right Side								
AP1	2729.1	597.6	1921.5	–	–	Yes	–	–
REL	2725.3	597.7	1907.5	135	32	–	1	No
AP2	2609.1	621.7	1834.1	160	44	No	–	Yes
AP3	2453.7	658.2	1747.5	160	44	No	–	No
B-Pillar Right Side								
BP1	3296.2	454.7	1969.8	85	7	No	–	No
BP2	3270.7	633.0	1744.0	90	7	No	–	Yes
BP3	3219.1	676.5	1725.1	90	4	No	–	No
BP4	3314.8	736.8	1603.7	–	–	Yes	–	–
REL	3297.4	705.0	1646.9	95	-5	–	2	No
Other Pillar Left Side								
OPR	4432.5	479.9	1966.2	–	–	–	–	No
OP1	4403.9	632.8	1705.9	90	7	No	–	No
OP2	4438.3	663.0	1719.5	–	–	Yes	–	–
REL	4485.1	662.7	1719.7	90	0	–	2	Yes
Rear Pillar Right Side								
RP1	4956.0	549.0	1894.5	15	47	No	–	No
RP2	5087.6	630.0	1767.6	15	34	No	–	Yes
Front Header Right Side								
FH1	2652.3	490.4	1950.5	180	50	No	–	No

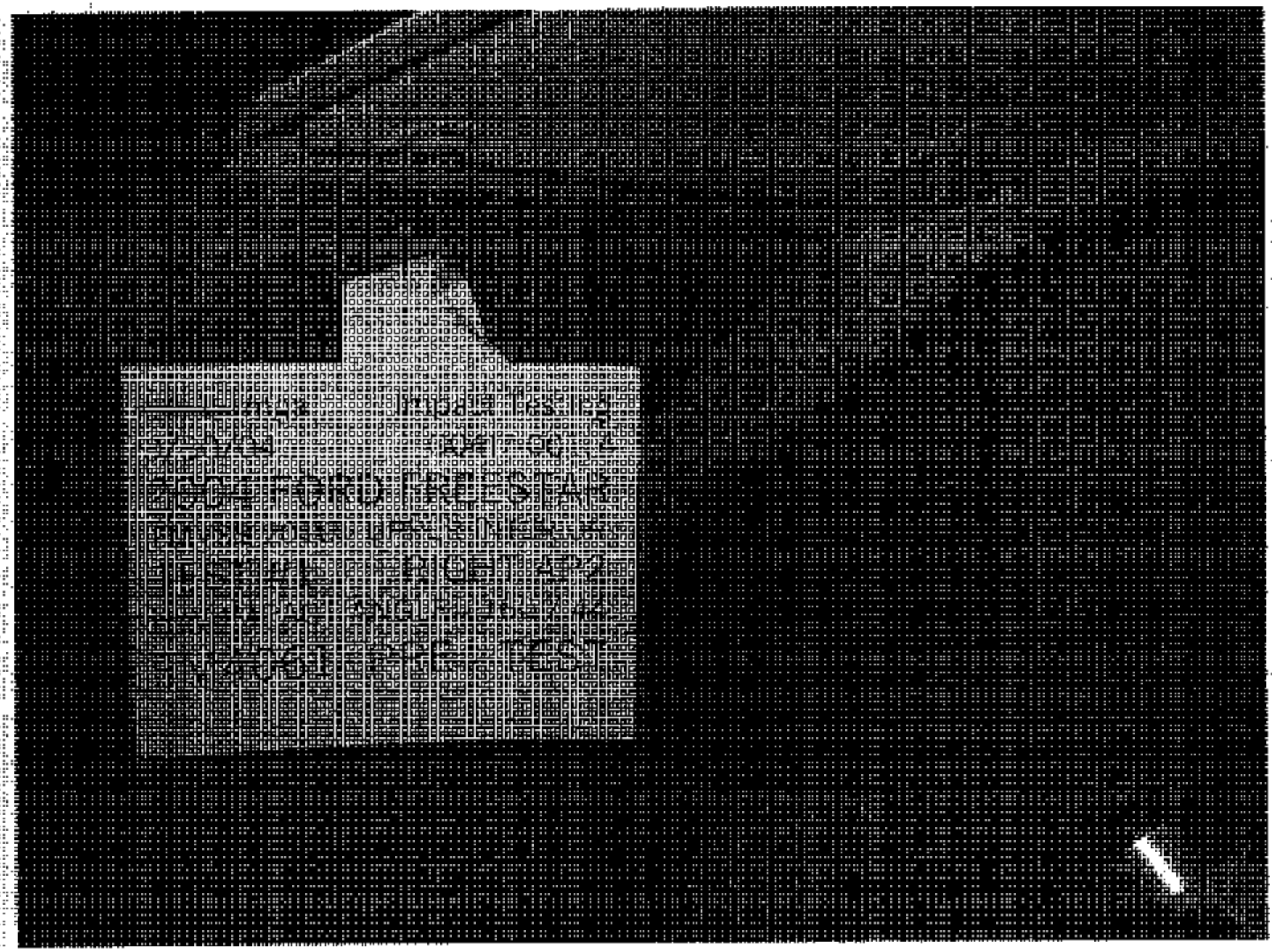
SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
FH2	2626.2	342.6	1960.8	180	50	No	--	No
Side Rail Left Side								
SR1	2879.5	537.2	1974.5	--	--	Yes	--	--
REL	2879.4	552.3	1955.8	90	23	--	1	No
SR2A	3028.5	530.4	1984.4	--	--	Yes	--	--
REL	3028.0	544.2	1964.3	90	30	--	1	No
SR2B	2995.9	530.7	1984.2	--	--	Yes	--	--
REL	3002.0	551.0	1957.5	90	45	--	2	No
SR3-1	3446.5	498.6	1936.8	90	50	No	--	Yes
SR3-2	4581.9	541.5	1927.0	90	50	No	--	No
Rear Header Right Side								
RH	4932.4	412.8	1918.6	0	29	No	--	Yes
Sliding Door Right Side								
SD	3830.8	506.2	1957.3	90	24	No	--	No
Upper Roof Right Side								
UR1	2995.6	434.3	2016.9	90	47	No	--	Yes
UR2	3327.0	342.0	2036.2	90	37	No	--	Yes
UR3	4147.1	439.5	2000.9	90	38	No	--	Yes
UR4	4437.6	441.7	1990.5	90	27	No	--	Yes
UR5	4782.4	443.6	1985.3	90	26	No	--	No

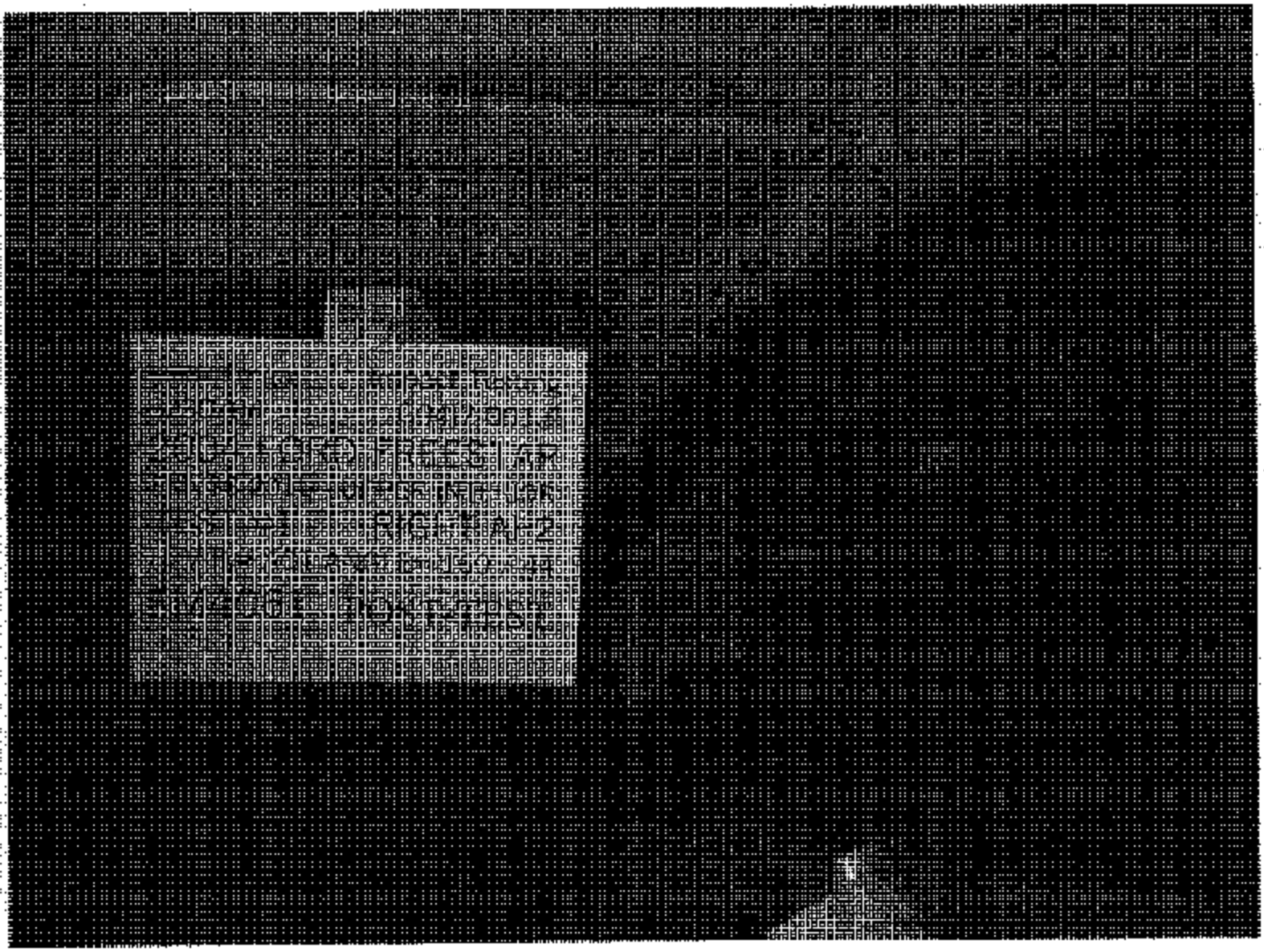
As determined using the Procedures specified in S10.1-10.13.

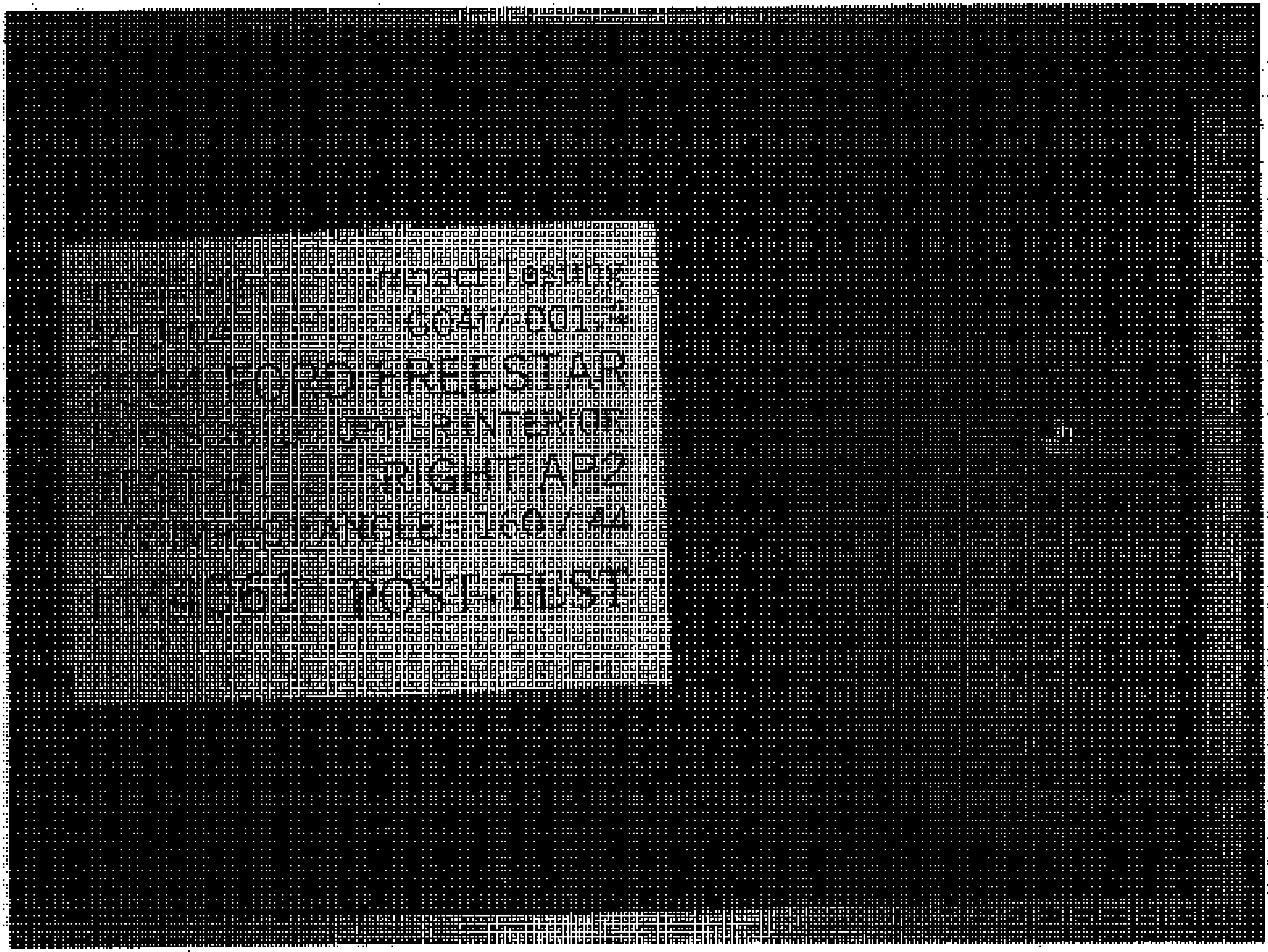
REMARKS:

RECORDED BY: David G. Gotwals DATE: March 25, 2004

APPROVED BY: Helen A. Kaleto






FORD FREESTAR
RIGHT AP2

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: 60477-001.3 VEHICLE YR/MAKE/MODEL: 2004/Ford/Freestar

GENERAL TEST PARAMETERS:

Test Number: 1

Target (Vehicle Side): left/right AP2

Temperature: 23 °F/(C)

MGA Test Reference No.: FM4061

Humidity: 52 %

Approach Angles: Horizontal 160 °

Time of Test: 12:10 am/pm

Vertical 44 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
810	853	43	23.7	8	7

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-91.8	1.20	1.20
Y	6	J35919	93.5	1.23	1.23
Z	7	J31051	93.5	1.51	1.51

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

No Visible Damage

Recorded By: [signature] Approved By*: Heena A. Kakaiya Date: 3/20/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.4

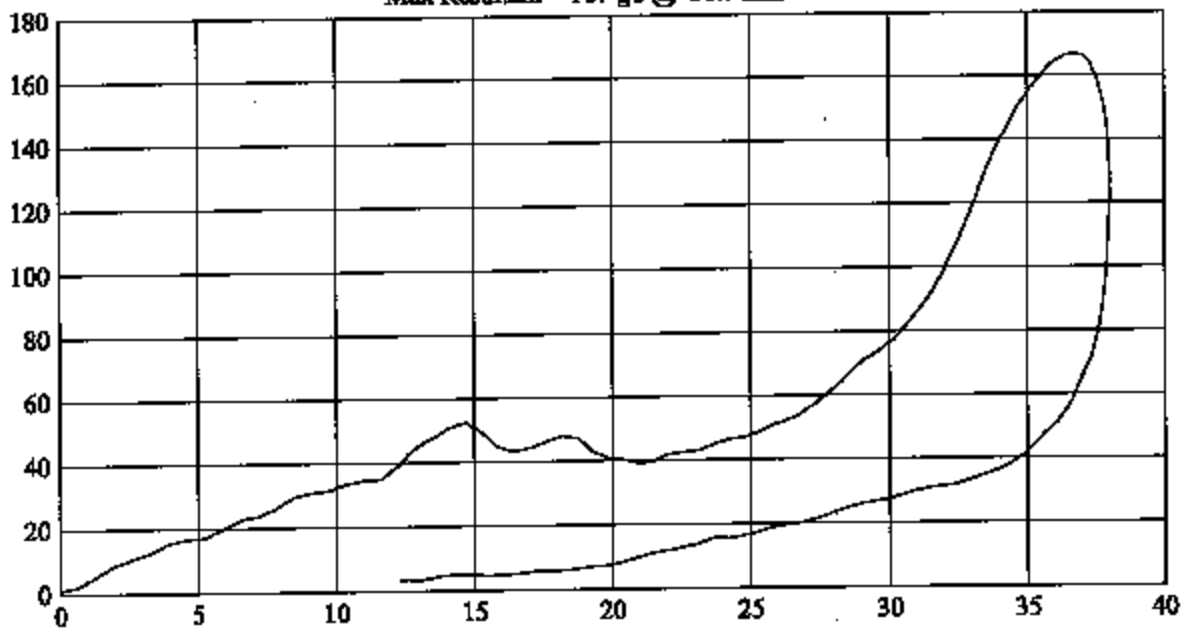
Customer: FORD
Test # 1
FM4061
Additional Desc: N/A

Vehicle Program : FREESTAR

Model Year: 2004
Target: AP2
Vehicle Side: Right
Horz/Vert Angle: 160/44

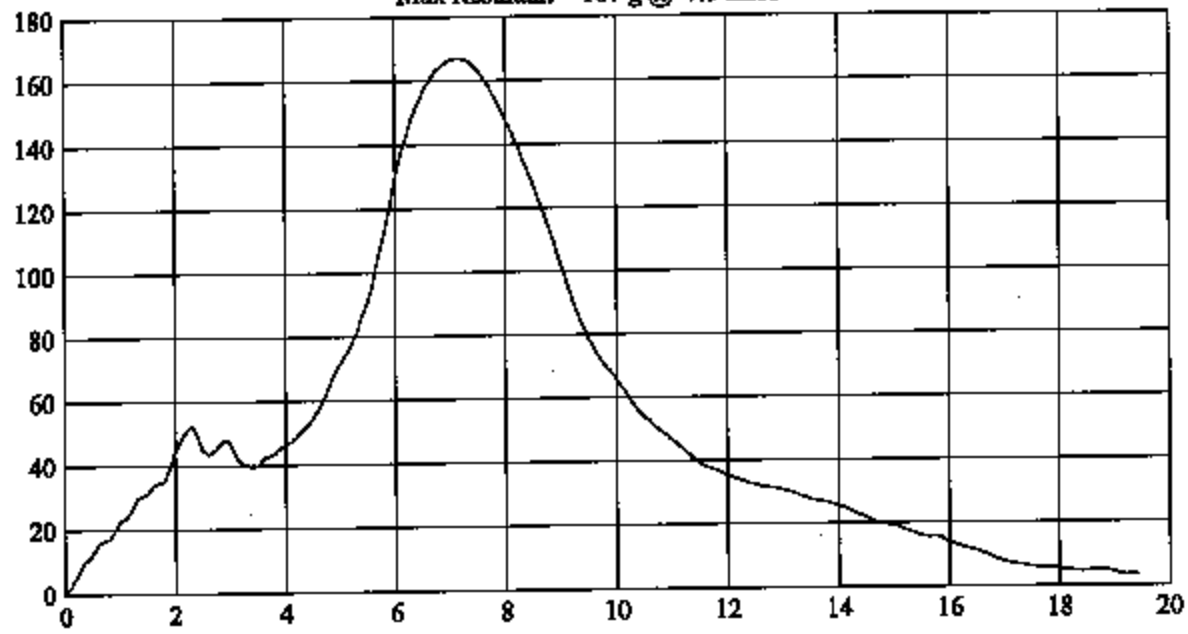
HIC(d) = 810, HIC = 853, Delta T = 4.3 msec

Max Resultant = 167 g's @ 36.7 mm



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

Max Resultant = 167 g @ 7.1 msec



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

FMH
G04I7-001.4

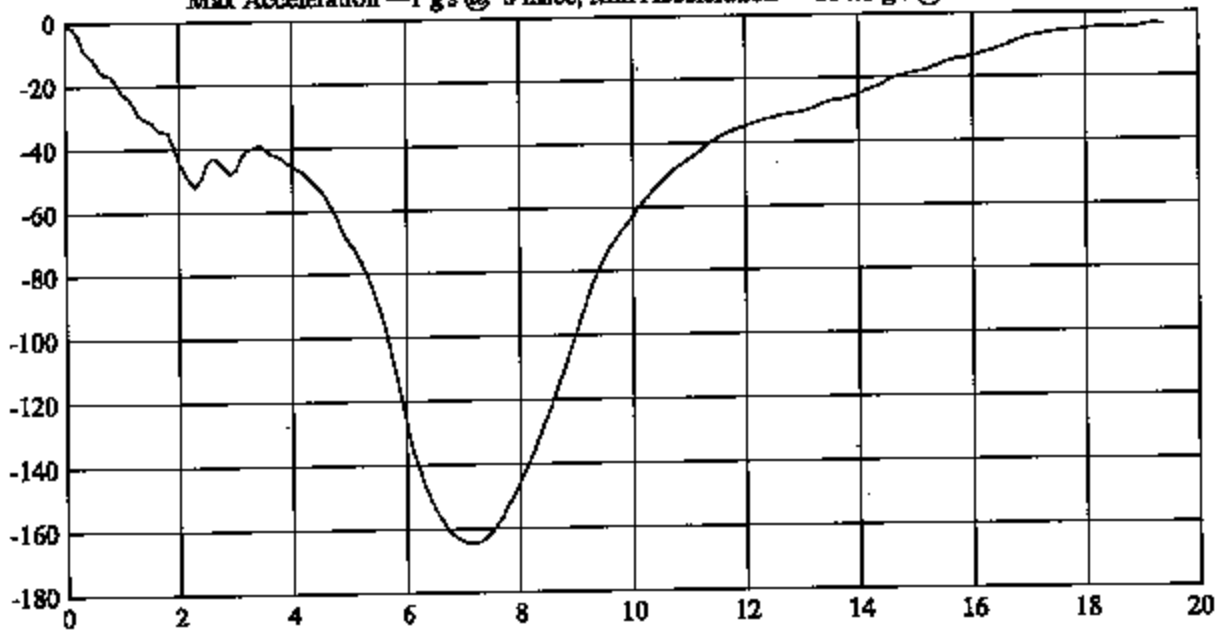
Customer: FORD
Test # 1
FM4061
Additional Desc: N/A

Vehicle Program : FREESTAR

Model Year: 2004
Target: AP2
Vehicle Side: Right
Horz/Vert Angle: 160/44

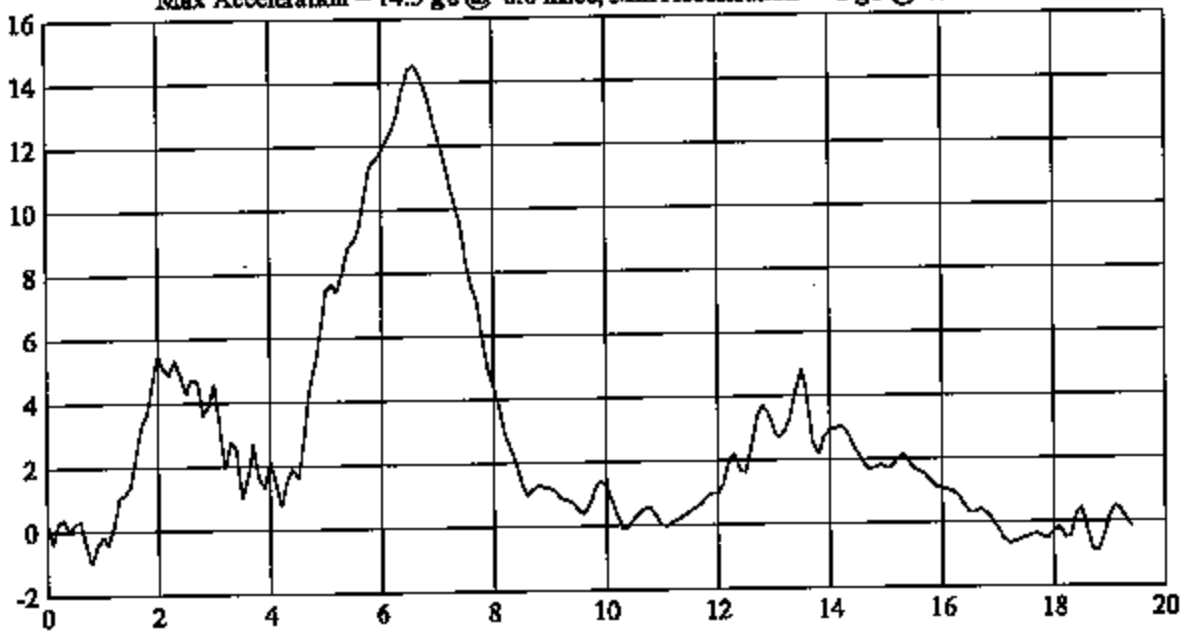
HIC(d) = 810, HIC = 853, Delta T = 4.3 msec

Max Acceleration = -1 g's @ 0 msec, Min Acceleration = -164.6 g's @ 7.1 msec



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

Max Acceleration = 14.5 g's @ 6.6 msec, Min Acceleration = -1 g's @ .8 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 1
FM4061
Additional Desc: N/A

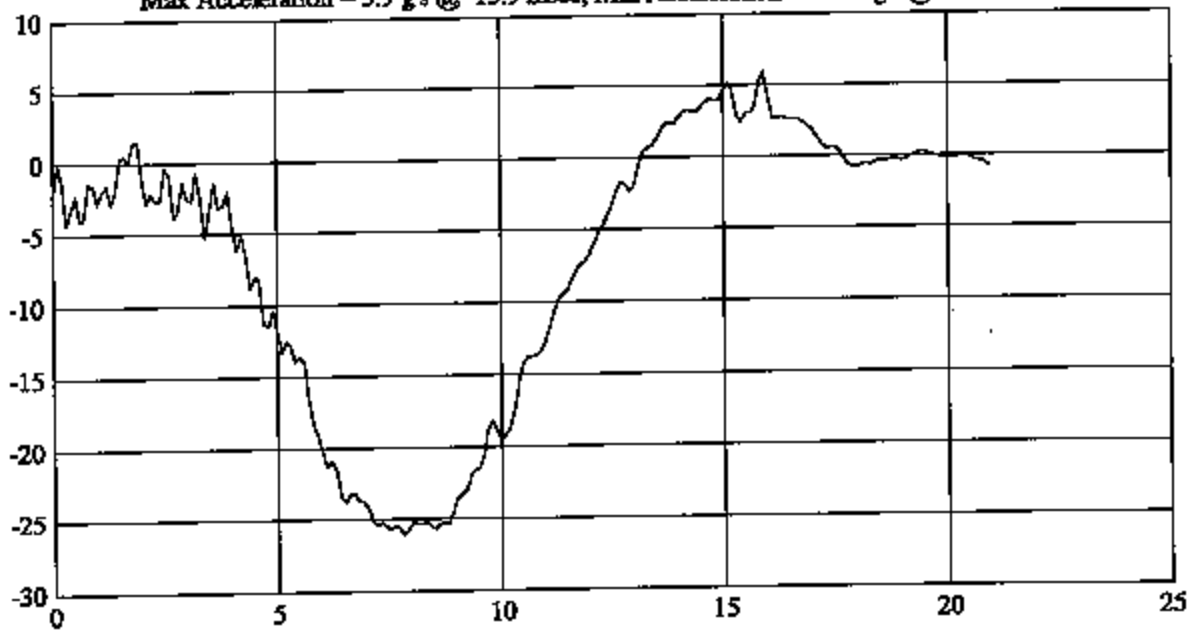
Vehicle Program : FREESTAR

Test Date: 3/30/04

Model Year: 2004
Target: AP2
Vehicle Side: Right
Horz/Vert Angle: 160/44

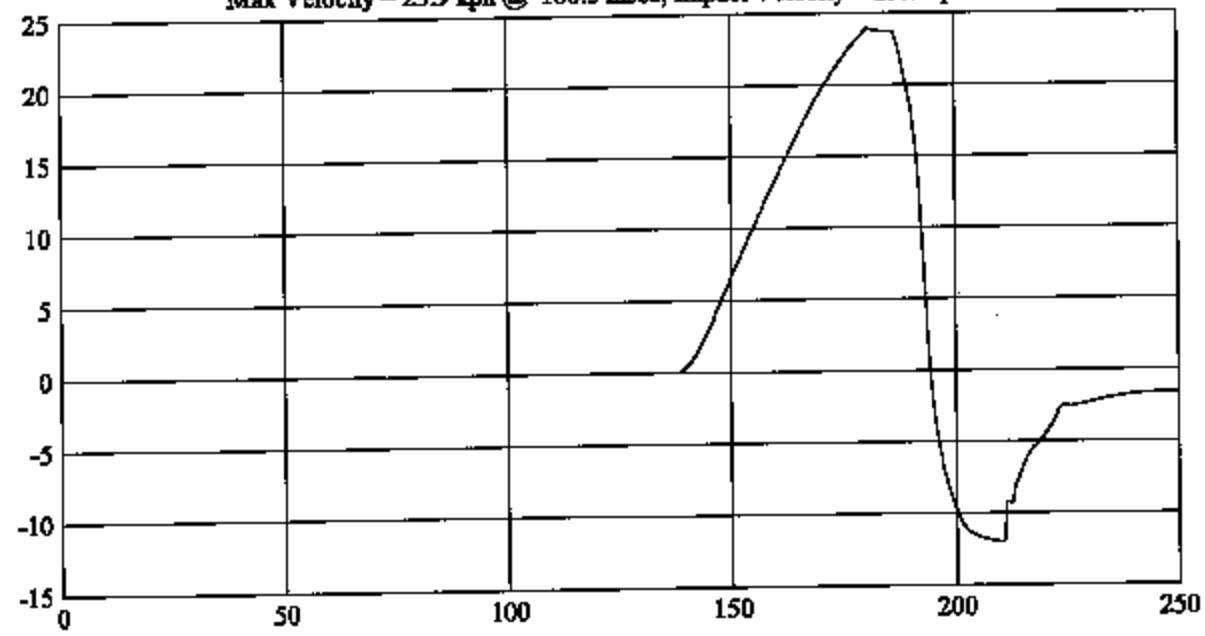
HIC(d) = 810, HIC = 853, Delta T = 4.3 msec

Max Acceleration = 5.9 g's @ 15.9 msec, Min Acceleration = -26.1 g's @ 7.8 msec



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

Max Velocity = 23.9 kph @ 180.5 msec, Impact Velocity = 23.7 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

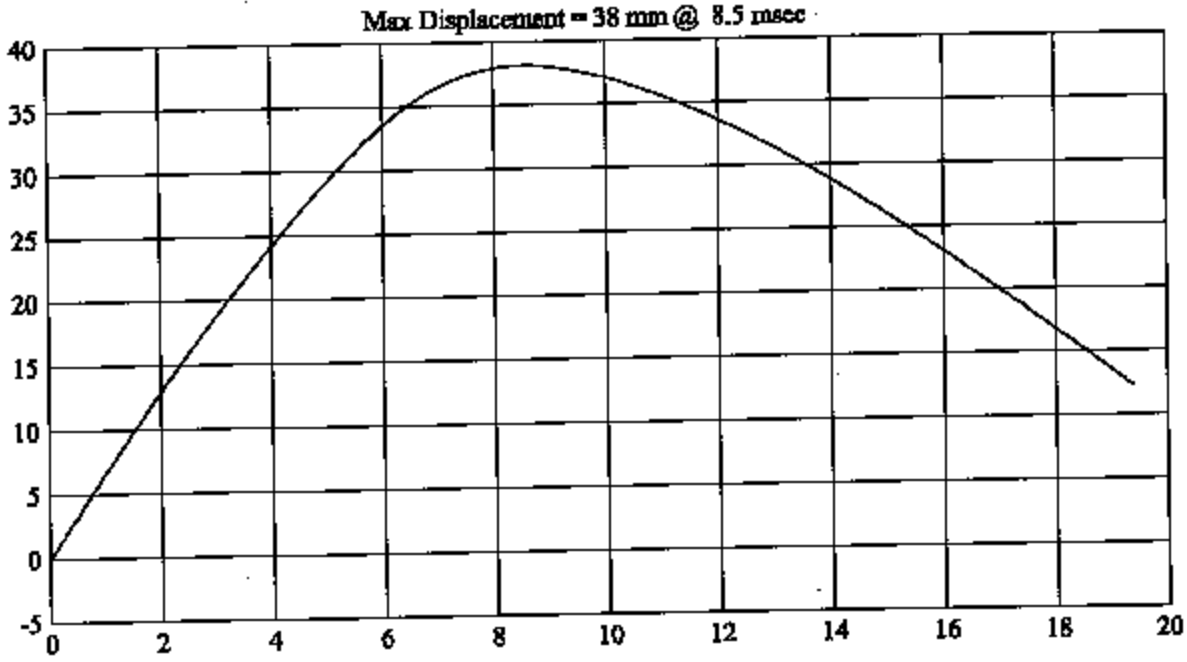
Customer: FORD
Test # 1
FM4061
Additional Desc: N/A

Vehicle Program : FREESTAR

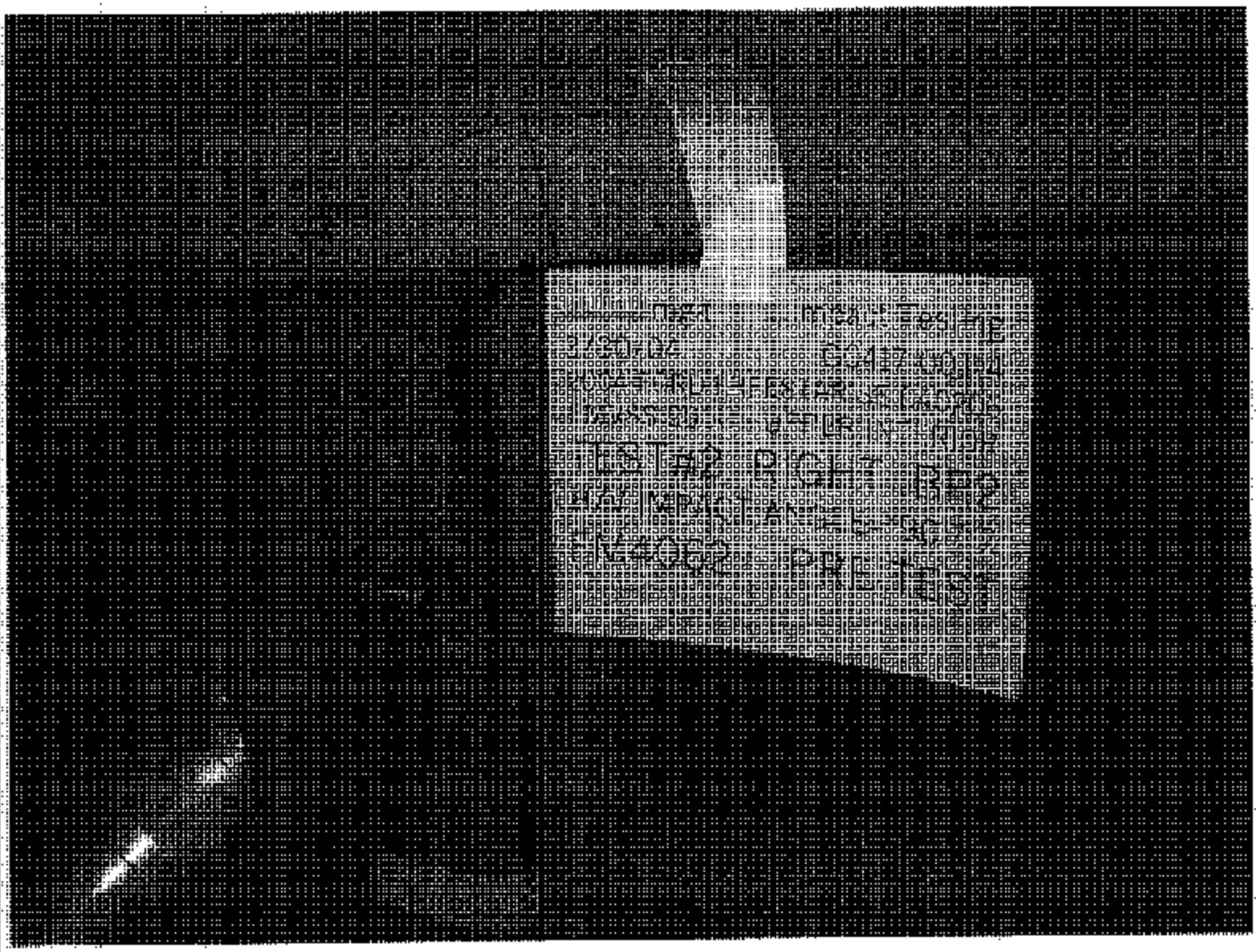
Model Year: 2004
Target: AP2
Vehicle Side: Right
Horz/Vert Angle: 160/44

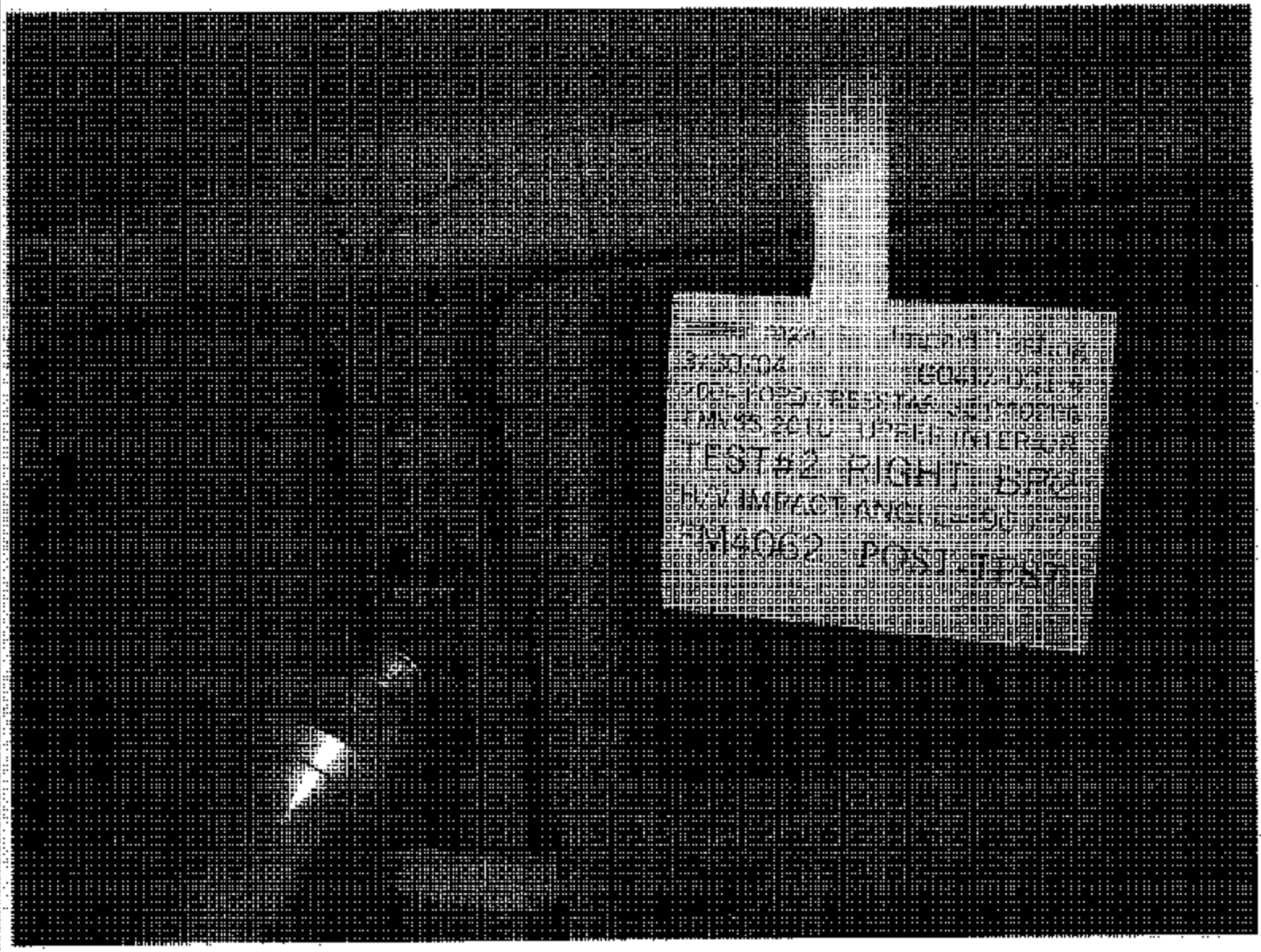
HIC(d) = 810, HIC = 853, Delta T = 4.3 msec

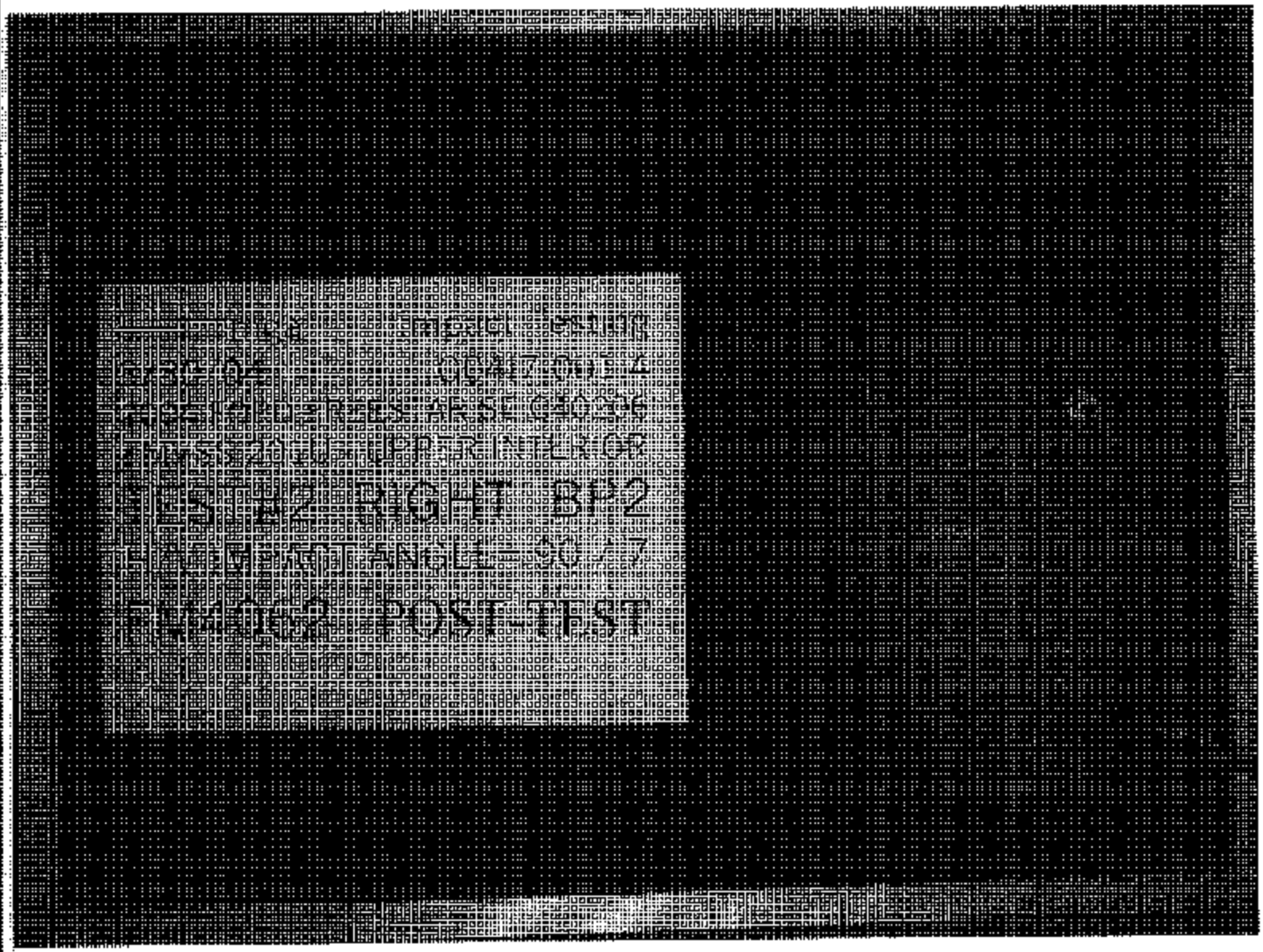
Max Displacement = 38 mm @ 8.5 msec



Displacement (mm) vs. Time (msec)




TEST #2 RIGHT SIDE
IMPACT
T1062 POST TEST



SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: CH0306 VEHICLE YR/MAKE/MODEL: 2004 FORD FREESTAR SE

GENERAL TEST PARAMETERS:

Test Number: 2

Target (Vehicle Side): left/right BPZ

Temperature: 23 °F/°C

MGA Test Reference No.: FM4062

Humidity: 52 %

Approach Angles: Horizontal 90 °

Time of Test: 1:30 am/pm

Vertical 7 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
627	610	6.0	23.8	13	10

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	JJ3593	-99.2	1.20	1.20
Y	6	JJ3616	99.6	1.25	1.25
Z	7	JJ3610	99.1	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): NO VISIBLE DAMAGE

Recorded By: [signature] Approved By*: Helen A. Yates Date: 3/30/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.4

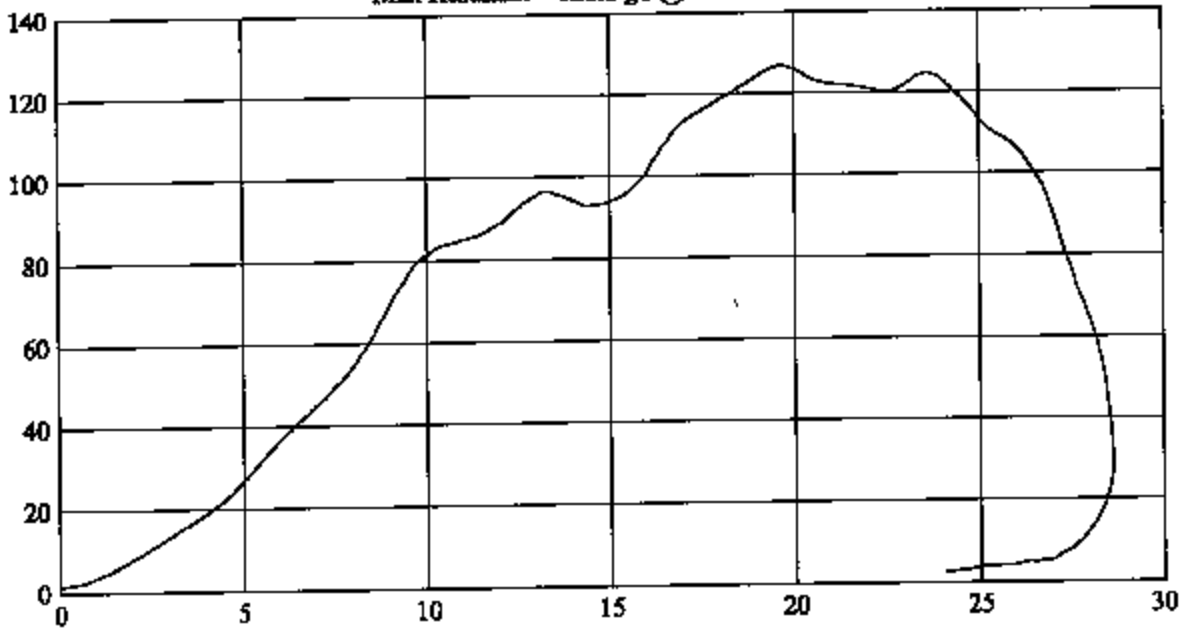
Customer: FORD
Test # 2
FM4062
Additional Desc: N/A

Vehicle Program : FREESTAR

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/7

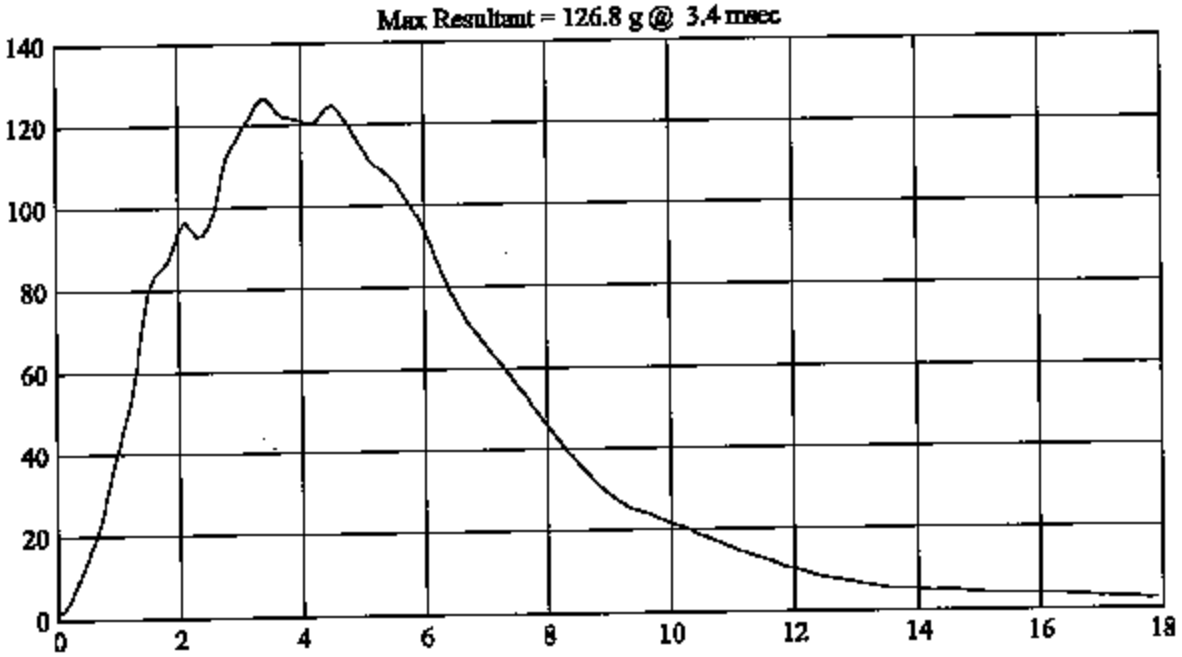
HIC(d) = 627, HIC = 610, Delta T = 6 msec

Max Resultant = 126.8 g's @ 19.7 mm



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

Max Resultant = 126.8 g @ 3.4 msec



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

FMH
G04I7-001.4

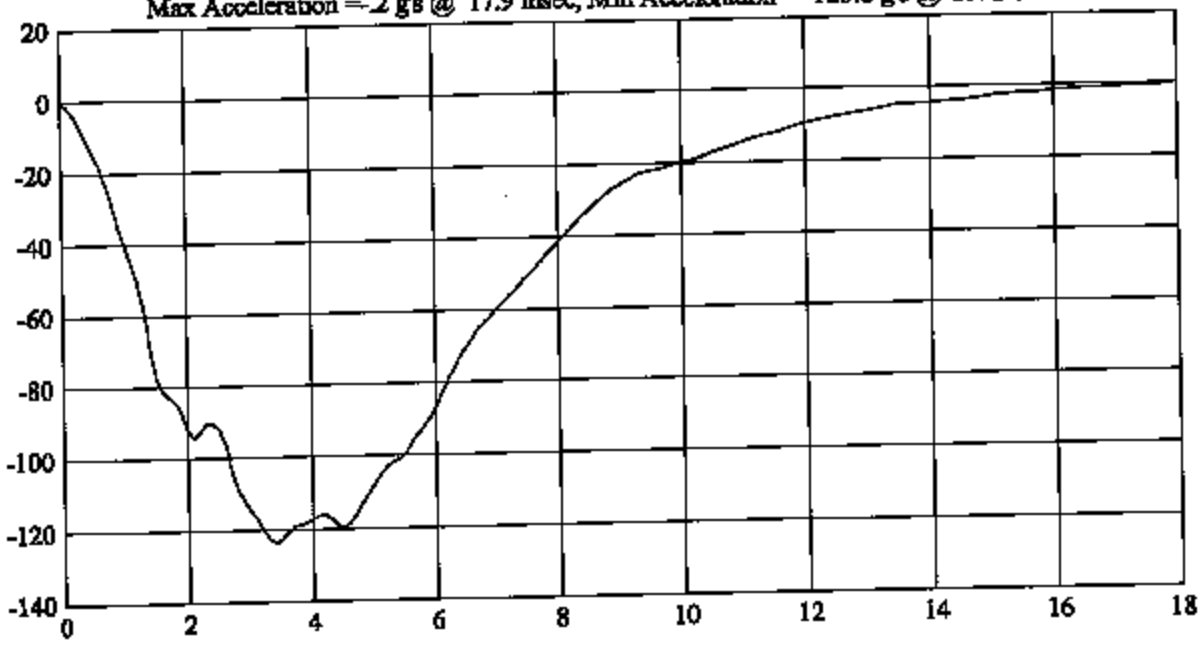
Customer: FORD
Test # 2
FM4062
Additional Desc: N/A

Vehicle Program : FREESTAR

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/7

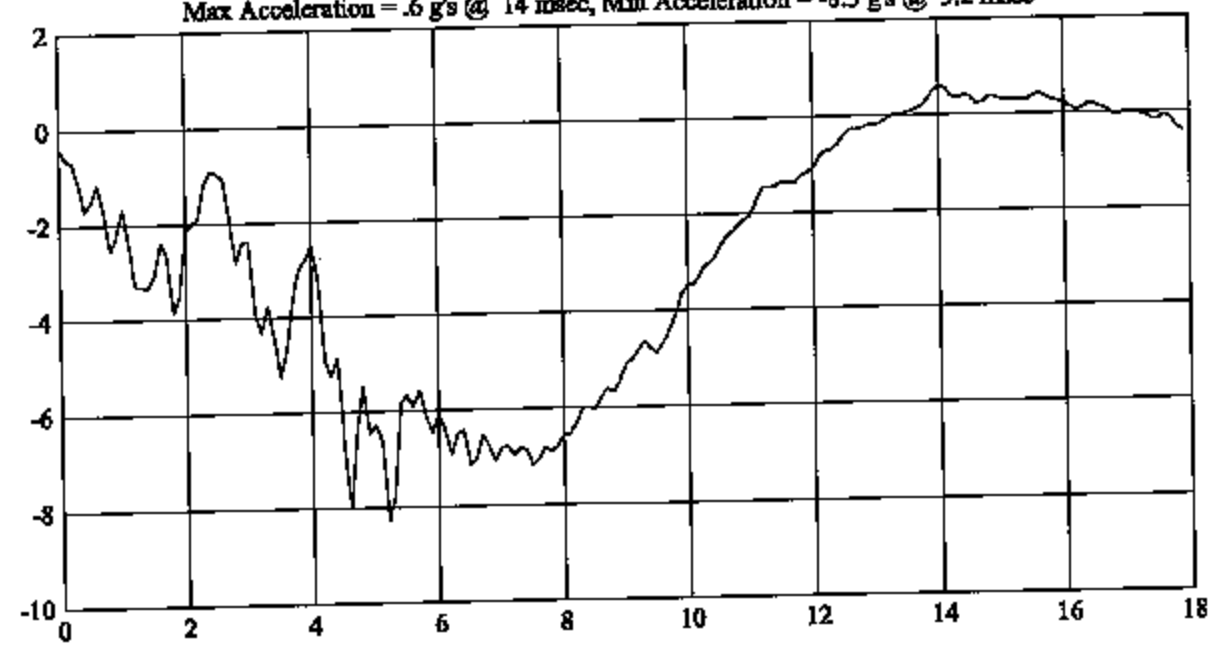
HIC(d) = 627, HIC = 610, Delta T = 6 msec

Max Acceleration = .2 g's @ 17.9 msec, Min Acceleration = -123.8 g's @ 3.4 msec



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

Max Acceleration = .6 g's @ 14 msec, Min Acceleration = -8.3 g's @ 5.2 msec



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

FMH
G04I7-001.4

Custmmer: FORD
Test # 2
FM4062
Additional Desc: N/A

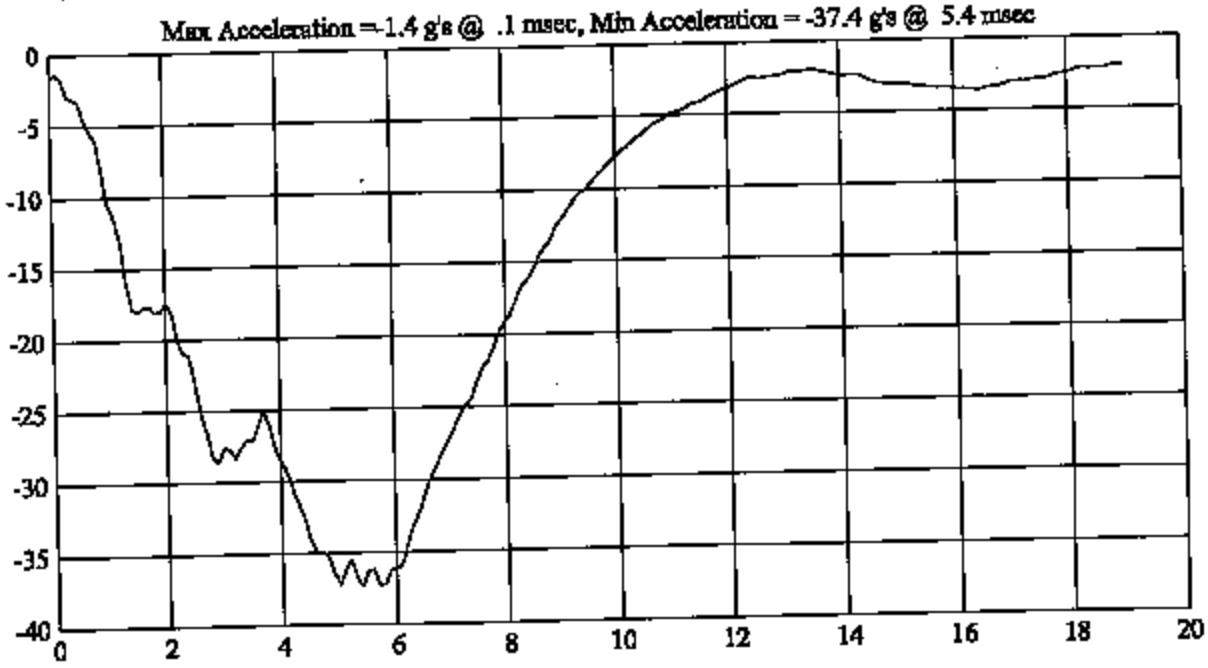
Vehicle Program : FREESTAR

Test Date: 3/30/04

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/7

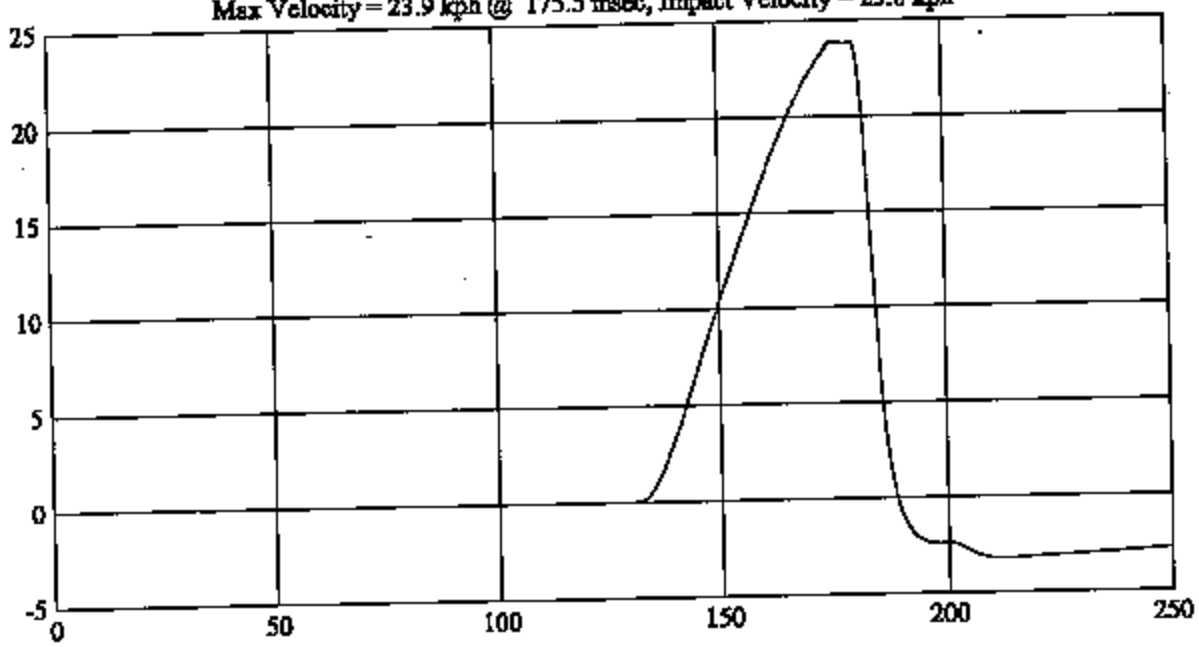
HIC(d) = 627, HIC = 610, Delta T = 6 msec

Max Acceleration = 1.4 g's @ .1 msec, Min Acceleration = -37.4 g's @ 5.4 msec



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

Max Velocity = 23.9 kph @ 175.5 msec, Impact Velocity = 23.8 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

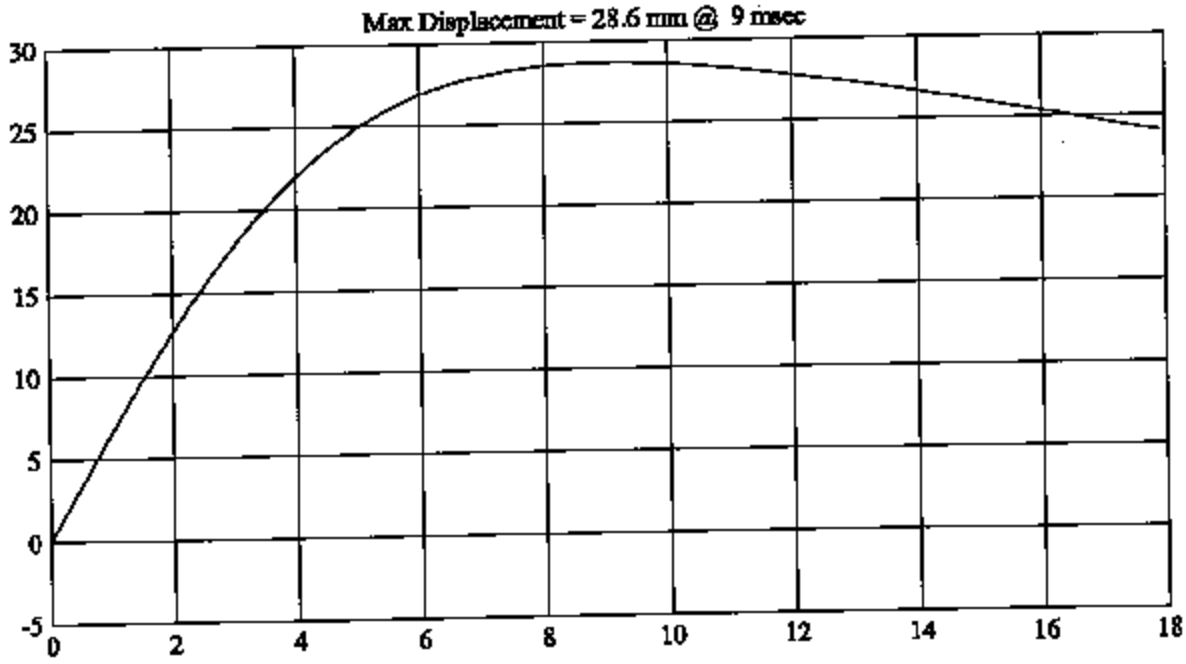
Customer: FORD
Test # 2
FM4062
Additional Desc: N/A

Vehicle Program : FREESTAR

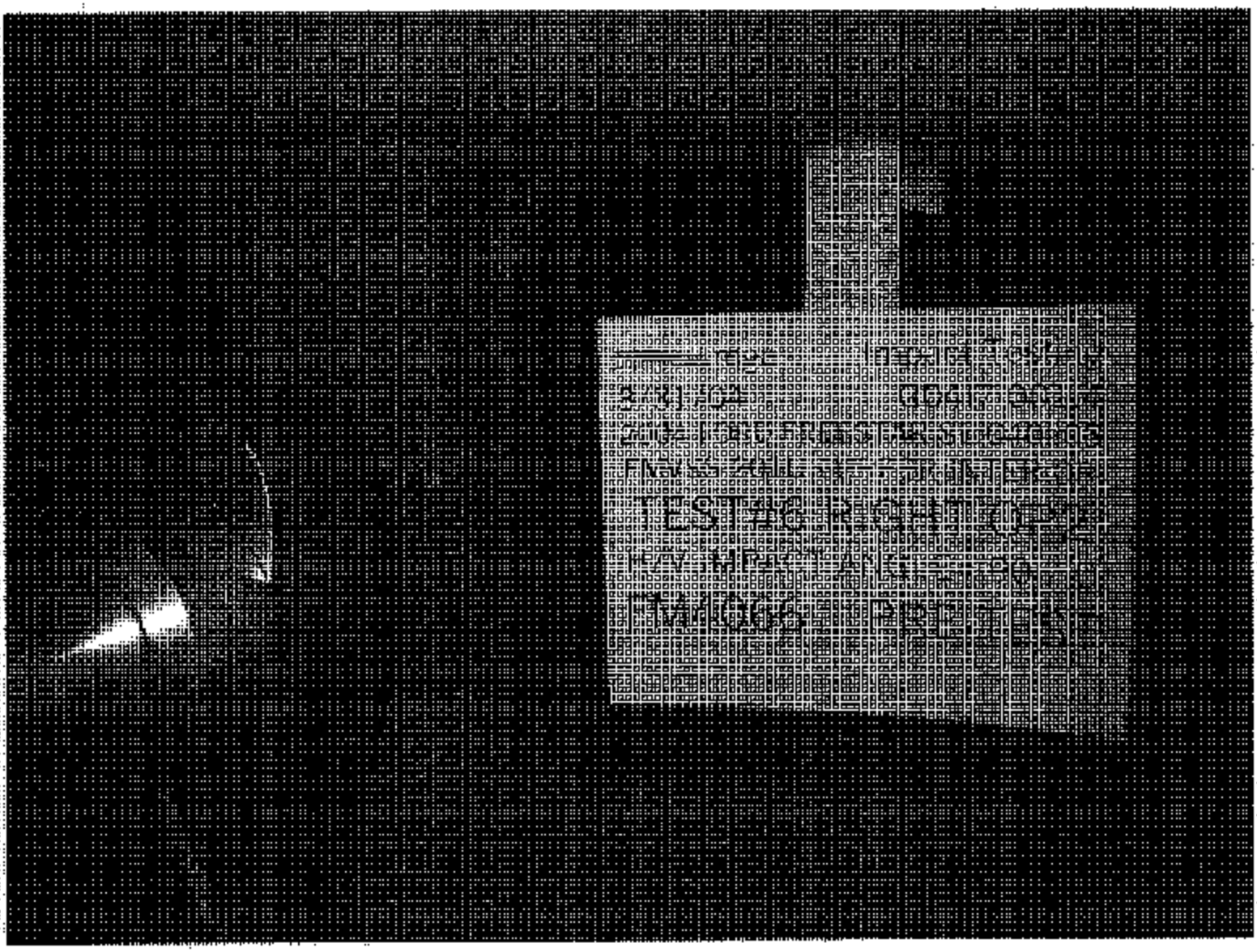
Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/7

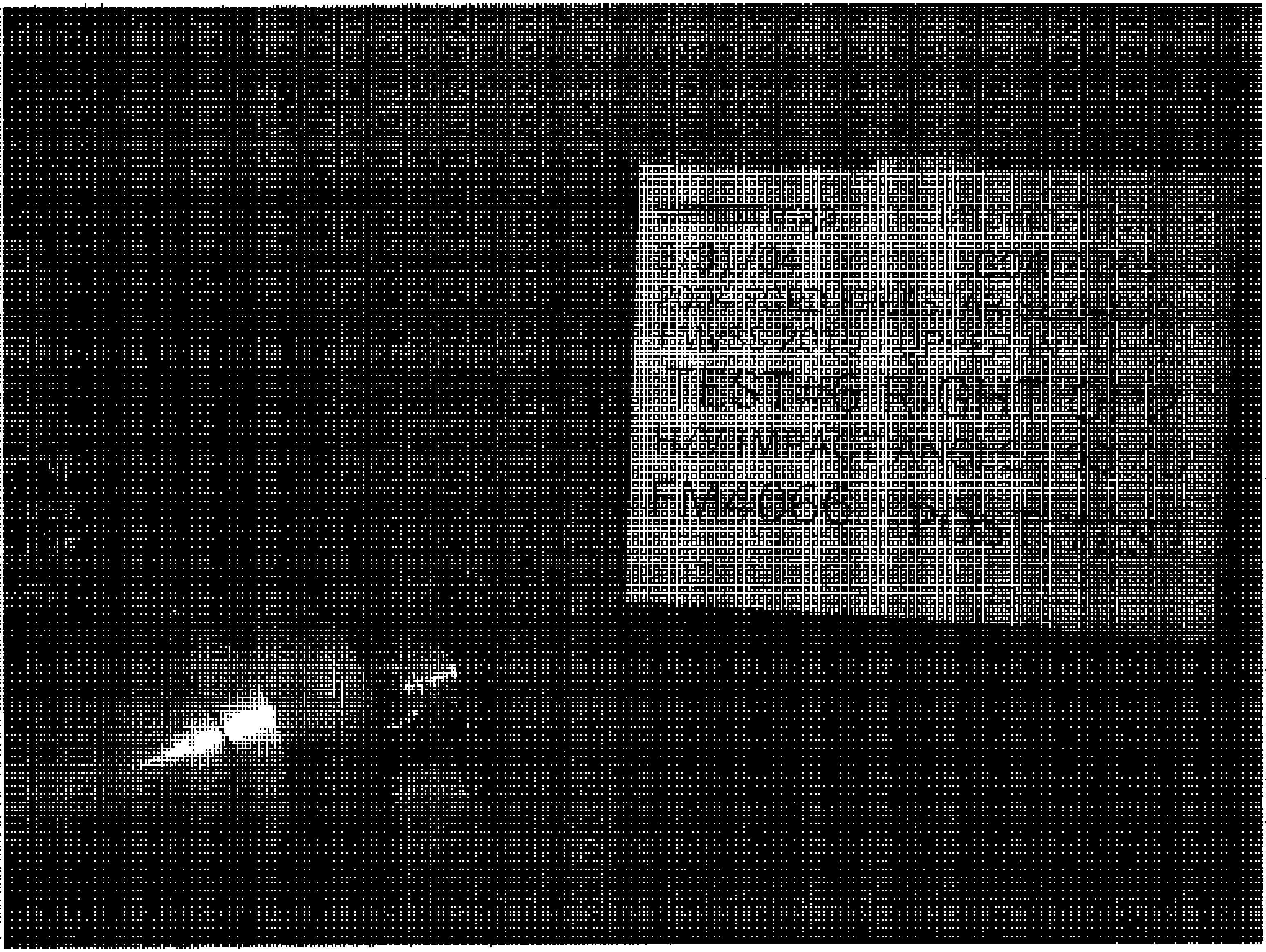
HIC(d) = 627, HIC = 610, Delta T = 6 msec

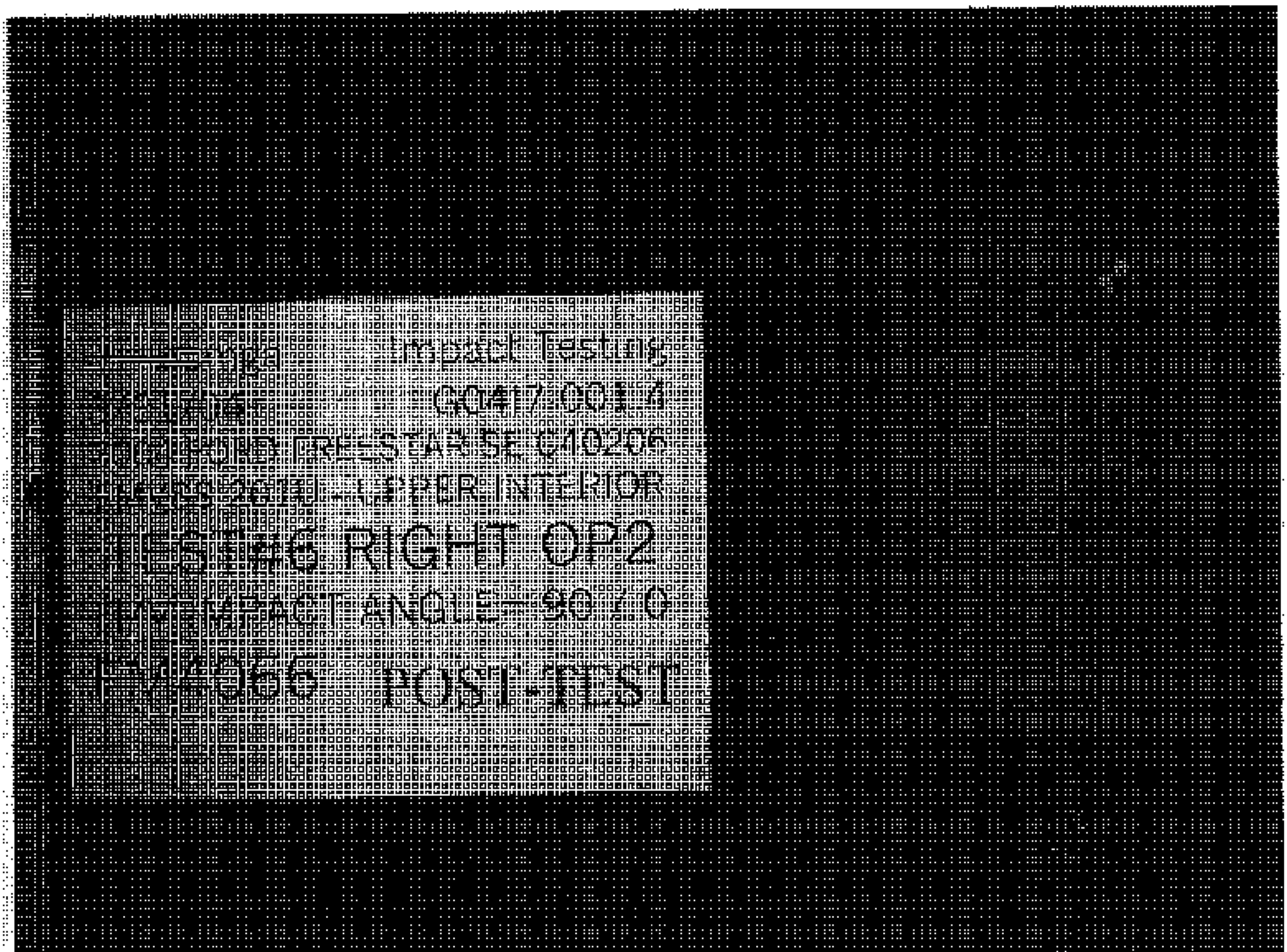
Max Displacement = 28.6 mm @ 9 msec



Displacement (mm) vs. Time (msec)






Impact Testing
UPPER INTERIOR
RIGHT OP2
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40206 VEHICLE YR/MAKE/MODEL: 2004 Ford Freestar SE

GENERAL TEST PARAMETERS:

Test Number: 6

Target (Vehicle Side): left/right OPZ

Temperature: 23 °F/(C)

MGA Test Reference No.: FM4066

Humidity: 35 %

Approach Angles: Horizontal 90 °

Time of Test: 10:00 am/pm

Vertical 0 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
549	508	9.2	23.3	22	5

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	JJ5923	-99.2	1.20	1.20
Y	6	JJ5916	99.6	1.23	1.23
Z	7	JJ5918	99.1	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): No Visible Damage

Recorded By: [signature] Approved By*: Helen A. Kaletz Date: 3/31/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.4

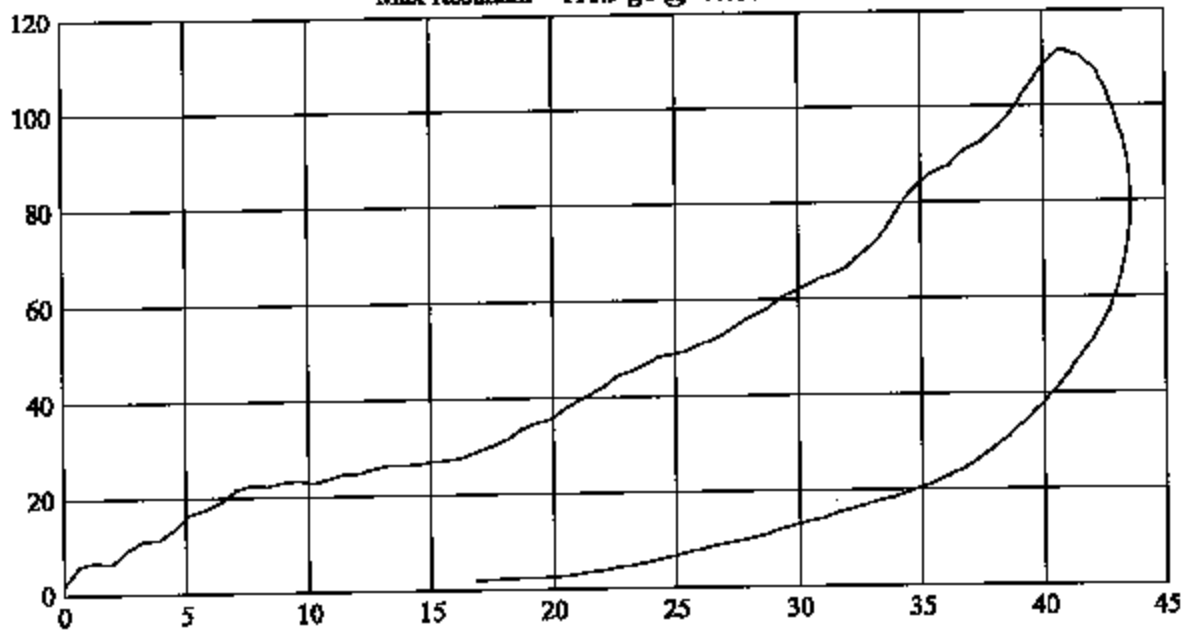
Customer: FORD
Test # 6
FM4066
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/0

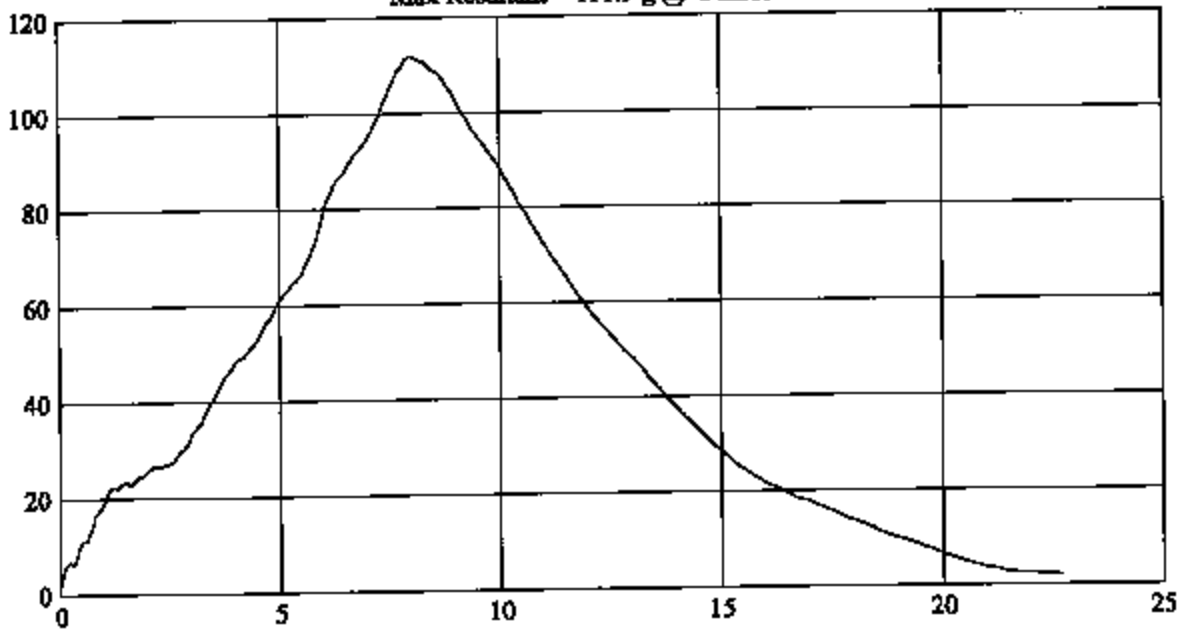
HIC(d) = 549, HIC = 508, Delta T = 9.2 msec

Max Resultant = 111.9 g's @ 40.8 mm



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

Max Resultant = 111.9 g @ 8 msec



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

FMH
G04I7-001.4

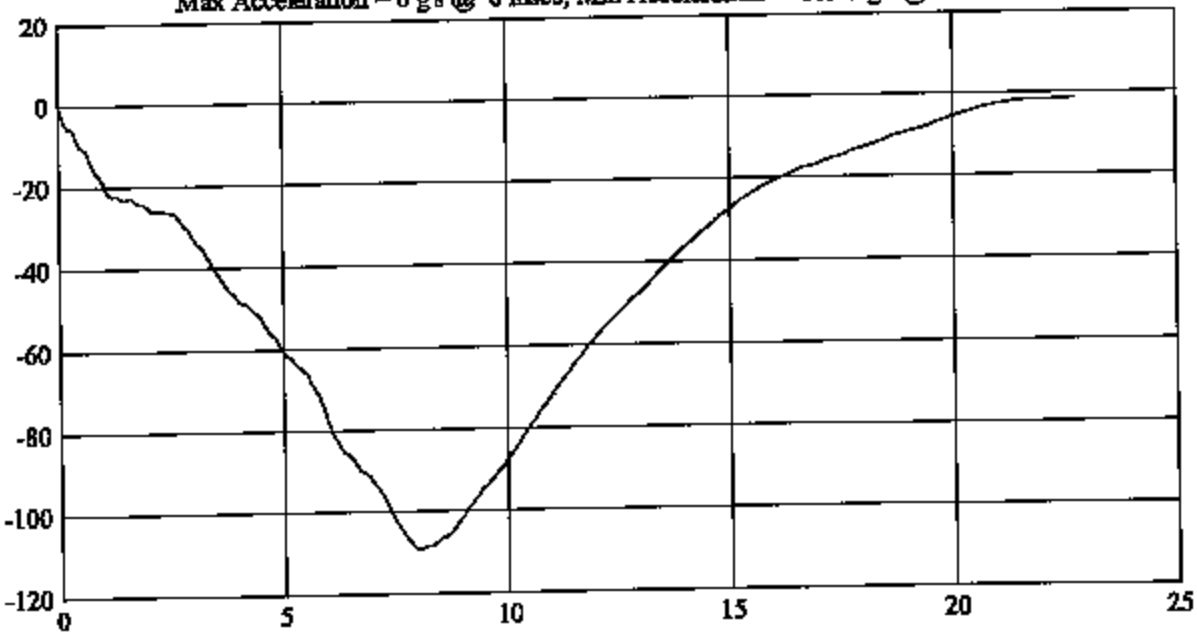
Customer: FORD
Test # 6
FM4066
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/0

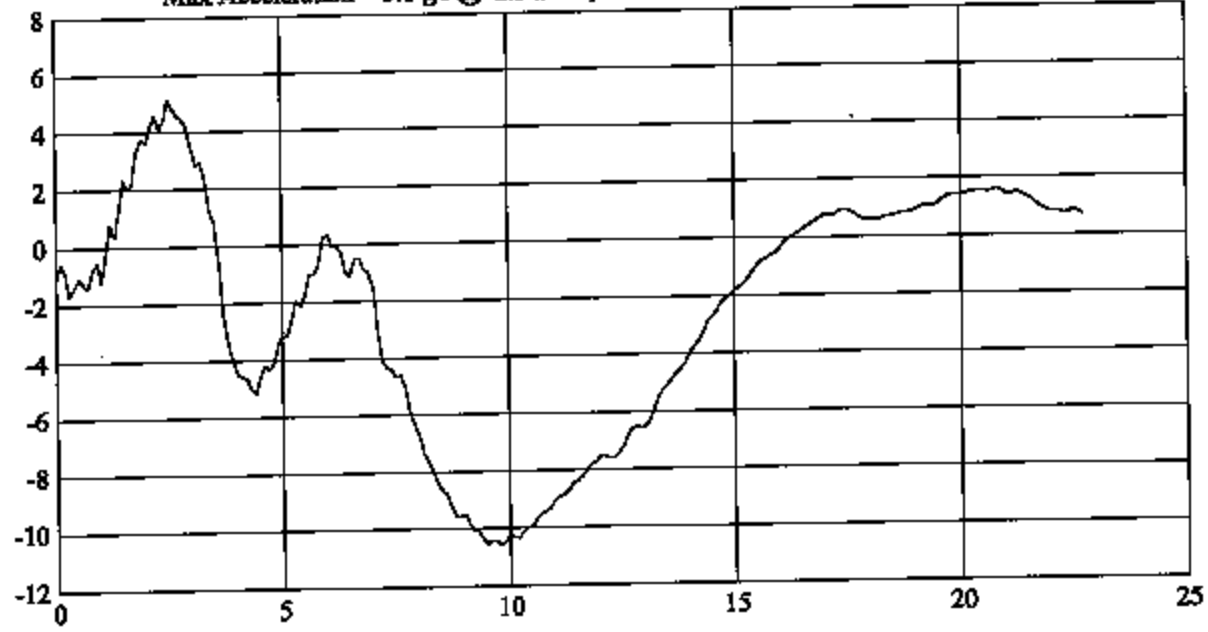
HIC(d) = 549, HIC = 508, Delta T = 9.2 msec

Max Acceleration = 0 g's @ 0 msec, Min Acceleration = -109.3 g's @ 8 msec



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

Max Acceleration = 5.1 g's @ 2.5 msec, Min Acceleration = -10.6 g's @ 9.8 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 6
FM4066
Additional Desc: N/A

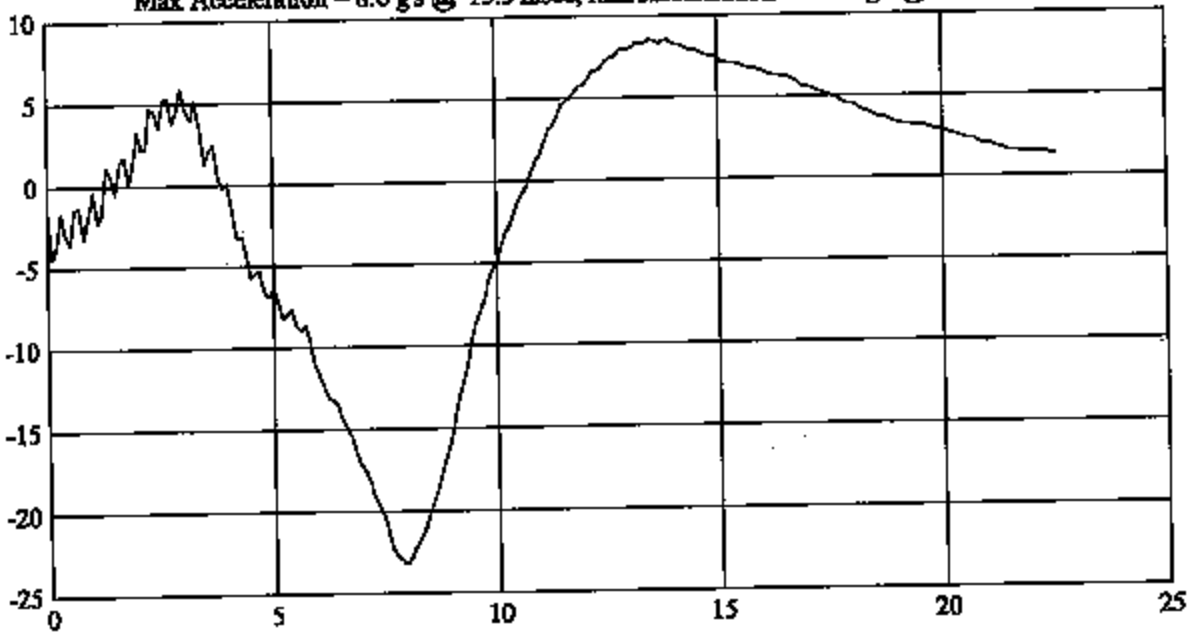
Vehicle Program : FREESTAR SE

Test Date: 3/31/04

Model Year: 2004
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/0

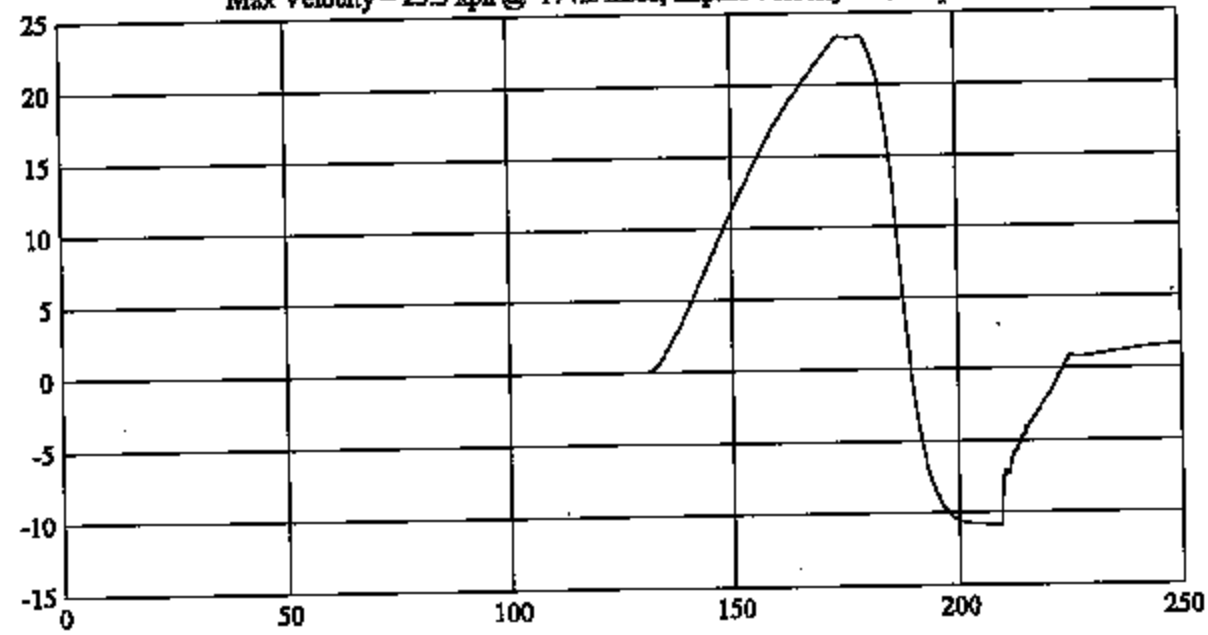
HIC(d) = 549, HIC = 508, Delta T = 9.2 msec

Max Acceleration = 8.6 g's @ 13.5 msec, Min Acceleration = -23.3 g's @ 7.9 msec



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

Max Velocity = 23.3 kph @ 174.2 msec, Impact Velocity = 23.3 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

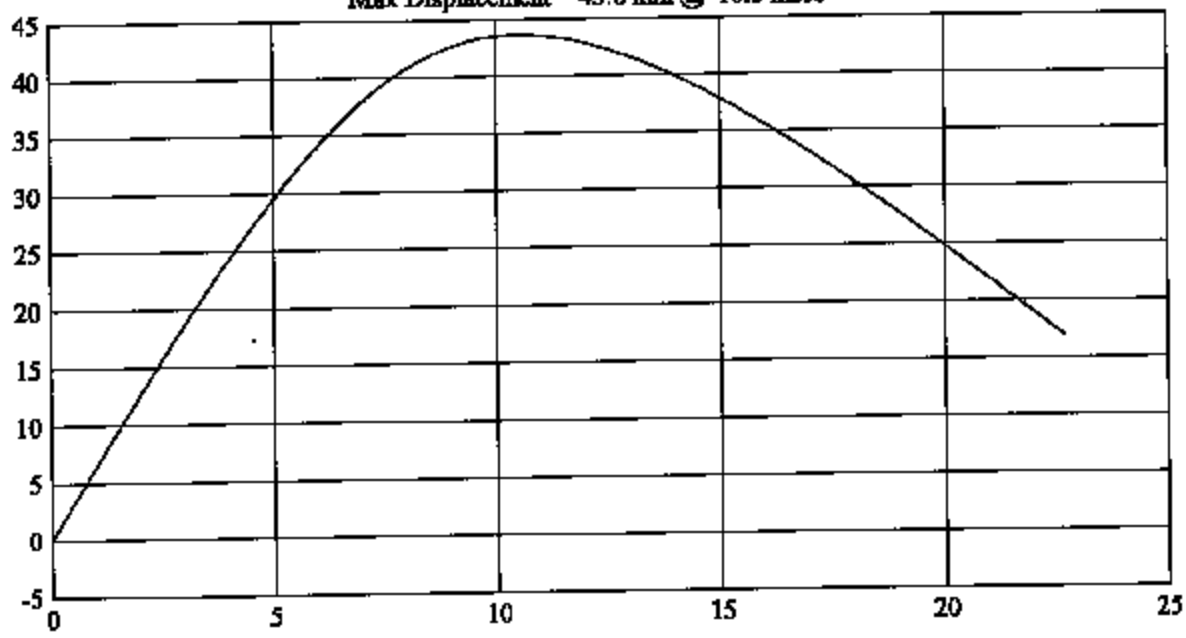
Customer: FORD
Test # 6
FM4066
Additional Desc: N/A

Vehicle Program : FREESTAR SE

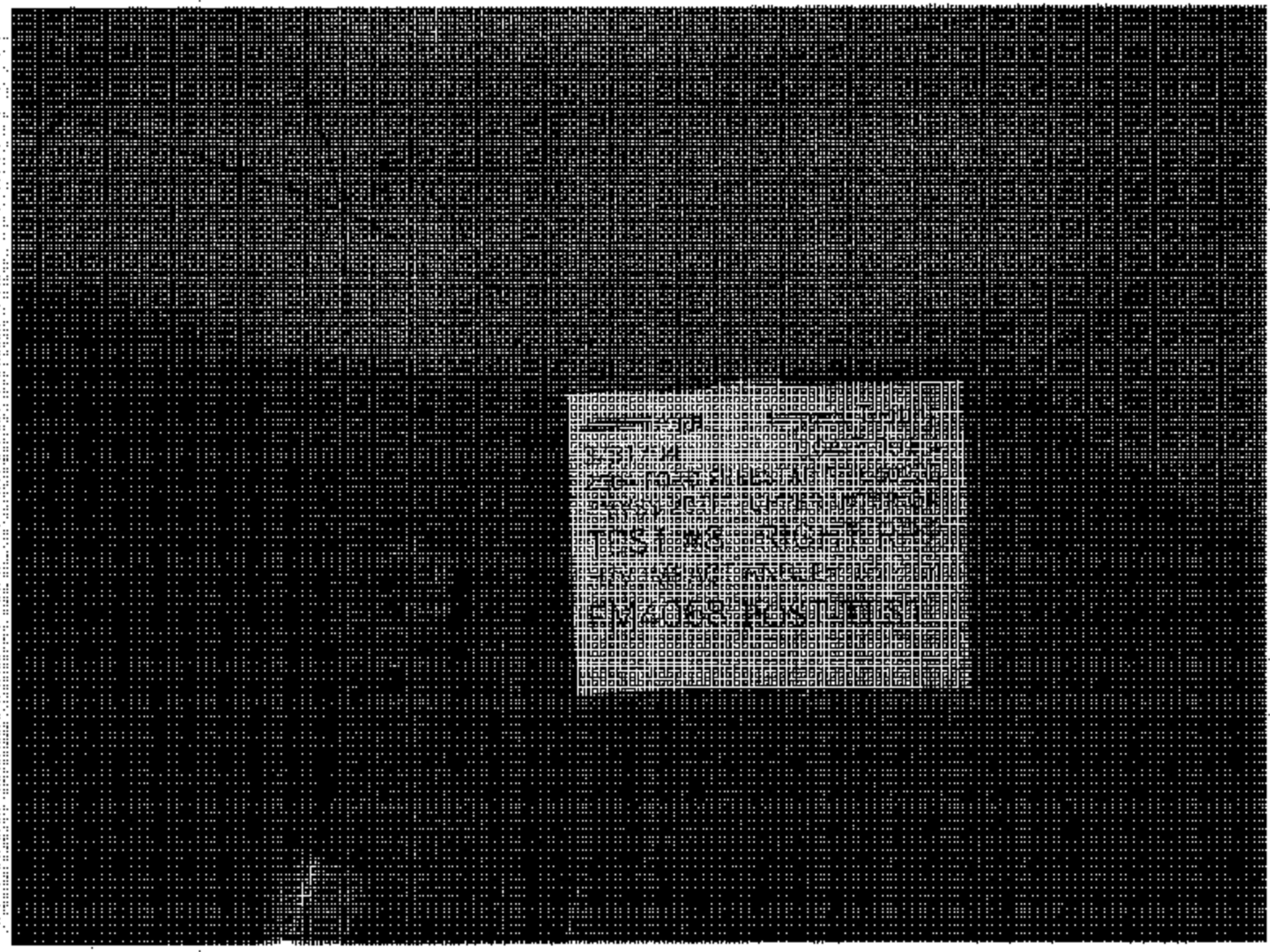
Model Year: 2004
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/0

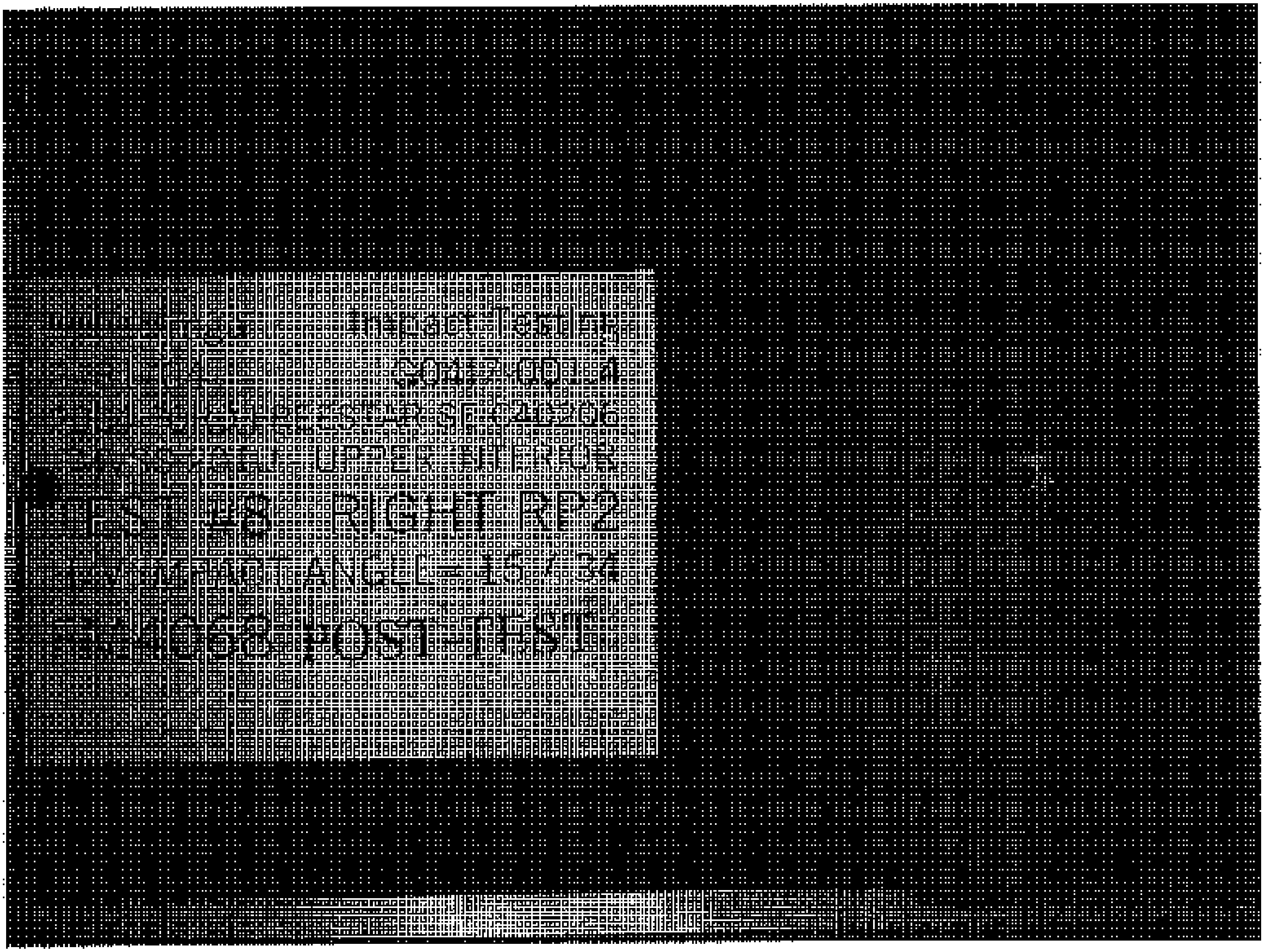
HIC(d) = 549, HIC = 508, Delta T = 9.2 msec

Max Displacement = 43.6 mm @ 10.5 msec



Displacement (mm) vs. Time (msec)




RIGHT RP2
POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: 020417-201-4 C40206 VEHICLE YR/MAKE/MODEL: 2004 Ford Freestar SE

GENERAL TEST PARAMETERS:

Test Number: 8

Target (Vehicle Side): left (right) RPZ

Temperature: 23 °F (C)

MGA Test Reference No.: FM4068

Humidity: 35 %

Approach Angles: Horizontal 15 °

Time of Test: 12:00 am/pm

Vertical 34 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
835	886	5.0	23.9	11	7

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.8	1.20	1.20
Y	6	J35919	93.5	1.23	1.23
Z	7	J31051	93.5	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, Invalid test, etc.): NO VISIBLE DAMAGE

Recorded By: [signature] Approved By*: Helen A. Kelsto Date: 3/3/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.4

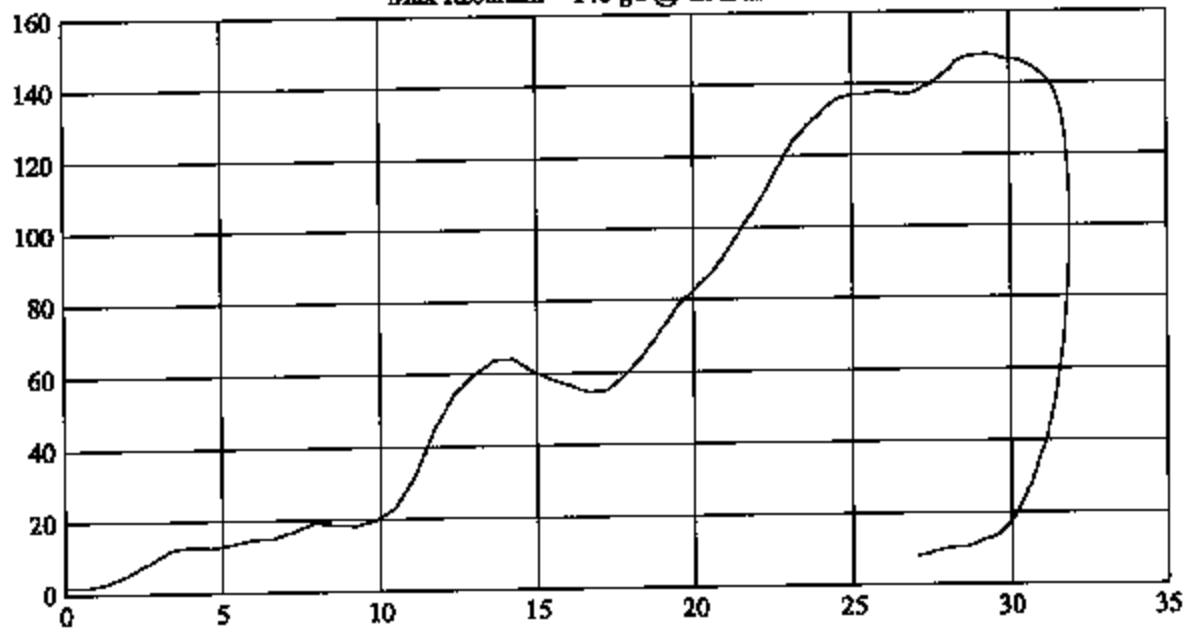
Customer: FORD
Test # 8
FM4068
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: RP2
Vehicle Side: Right
Horz/Vert Angle: 15/34

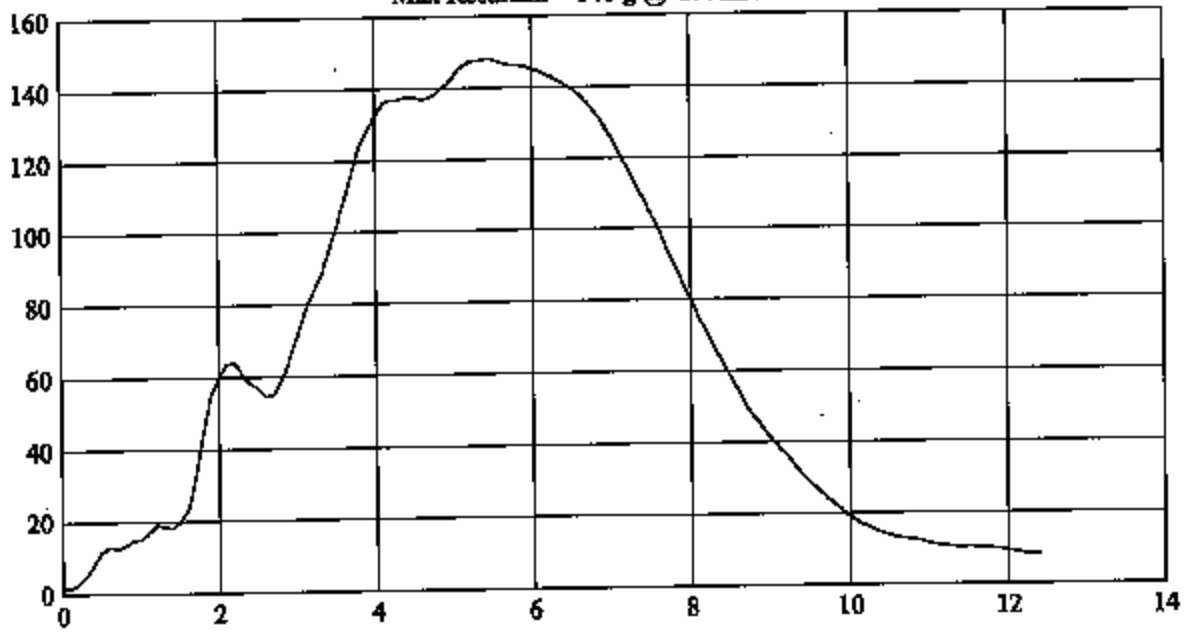
HIC(d) = 835, HIC = 886, Delta T = 5 msec

Max Resultant = 148 g's @ 29.2 mm



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

Max Resultant = 148 g @ 5.4 msec



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

FMH
G04I7-001.4

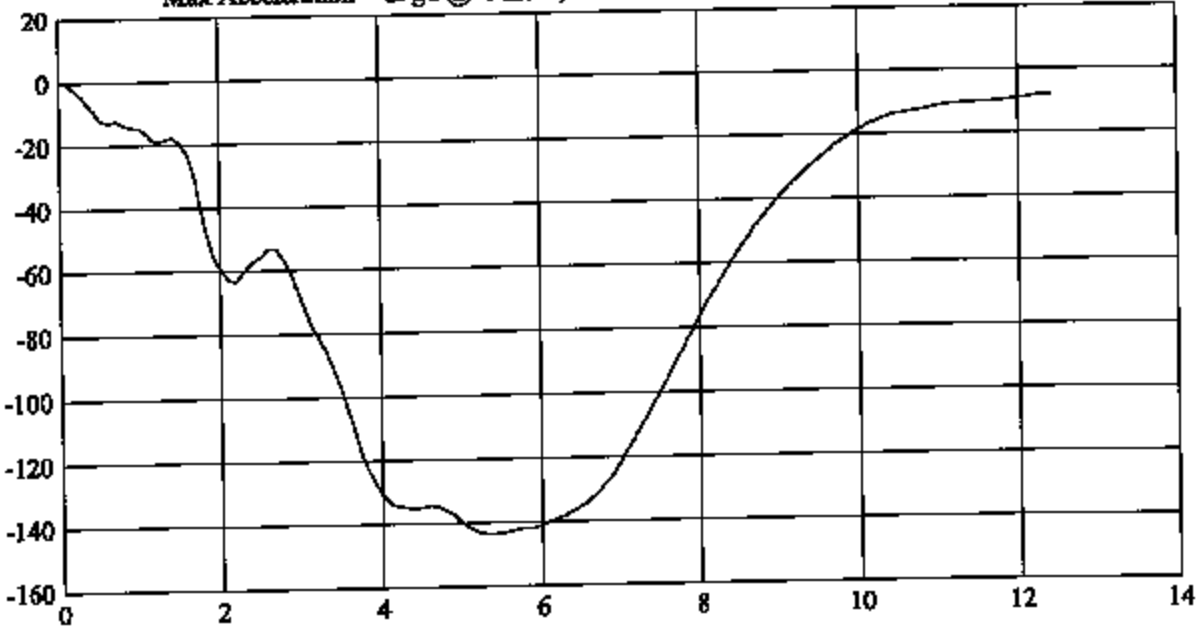
Customer: FORD
Test # 8
FM4068
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: RP2
Vehicle Side: Right
Horz/Vert Angle: 15/34

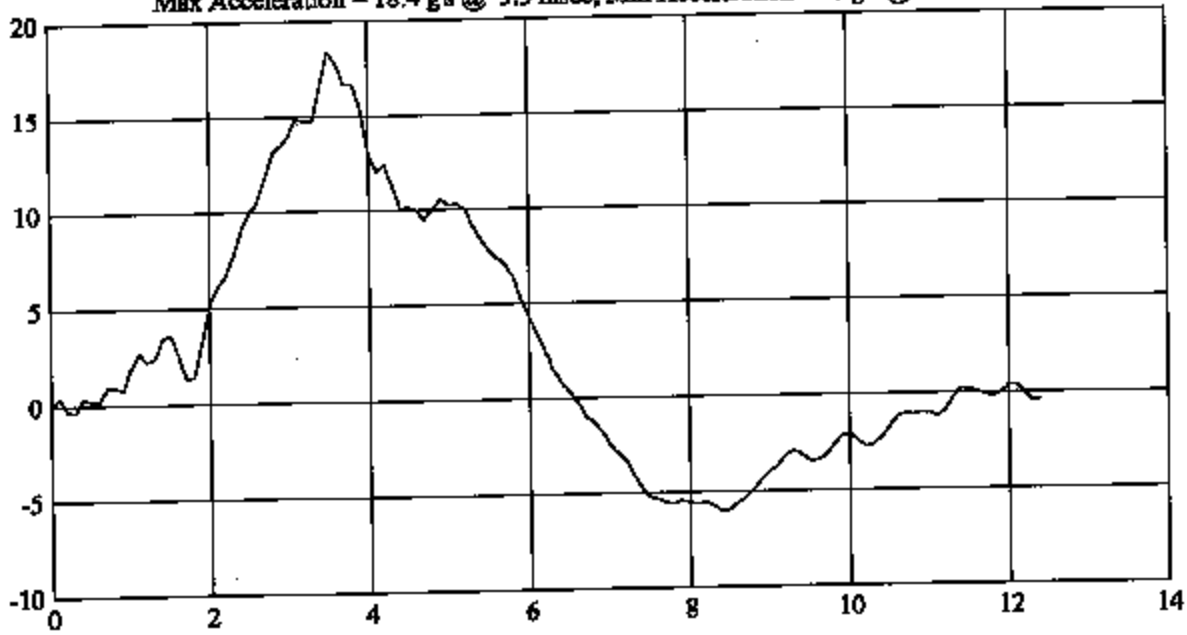
HIC(d) = 835, HIC = 886, Delta T = 5 msec

Max Acceleration = .2 g's @ 0 msec, Min Acceleration = -143.7 g's @ 5.4 msec



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

Max Acceleration = 18.4 g's @ 3.5 msec, Min Acceleration = -6 g's @ 8.4 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 8
FM4068
Additional Desc: N/A

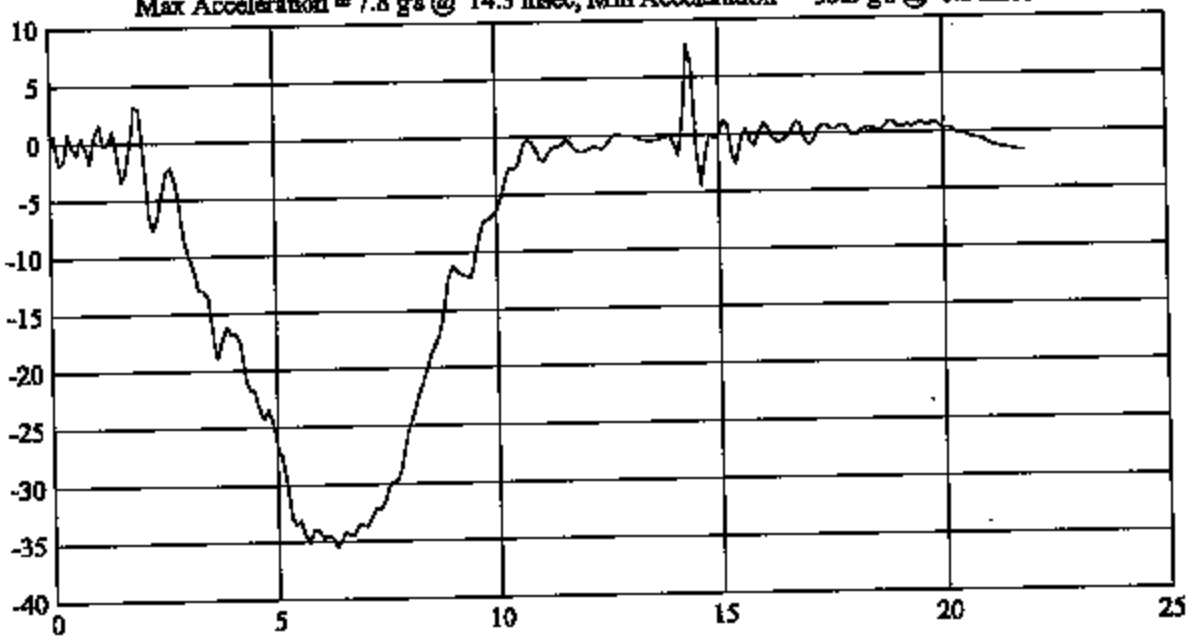
Vehicle Program : FREESTAR SH

Test Date: 3/31/04

Model Year: 2004
Target: RP2
Vehicle Side: Right
Horz/Vert Angle: 15/34

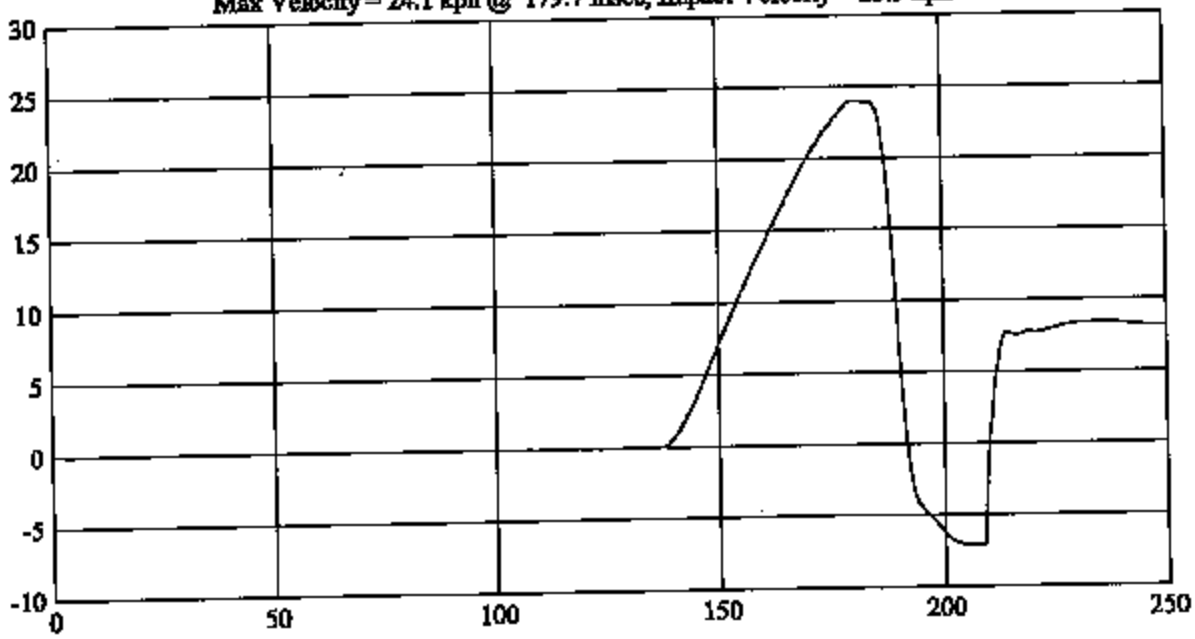
HIC(d) = 835, HIC = 886, Delta T = 5 msec

Max Acceleration = 7.8 g's @ 14.3 msec, Min Acceleration = -35.5 g's @ 6.3 msec



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

Max Velocity = 24.1 kph @ 179.7 msec, Impact Velocity = 23.9 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

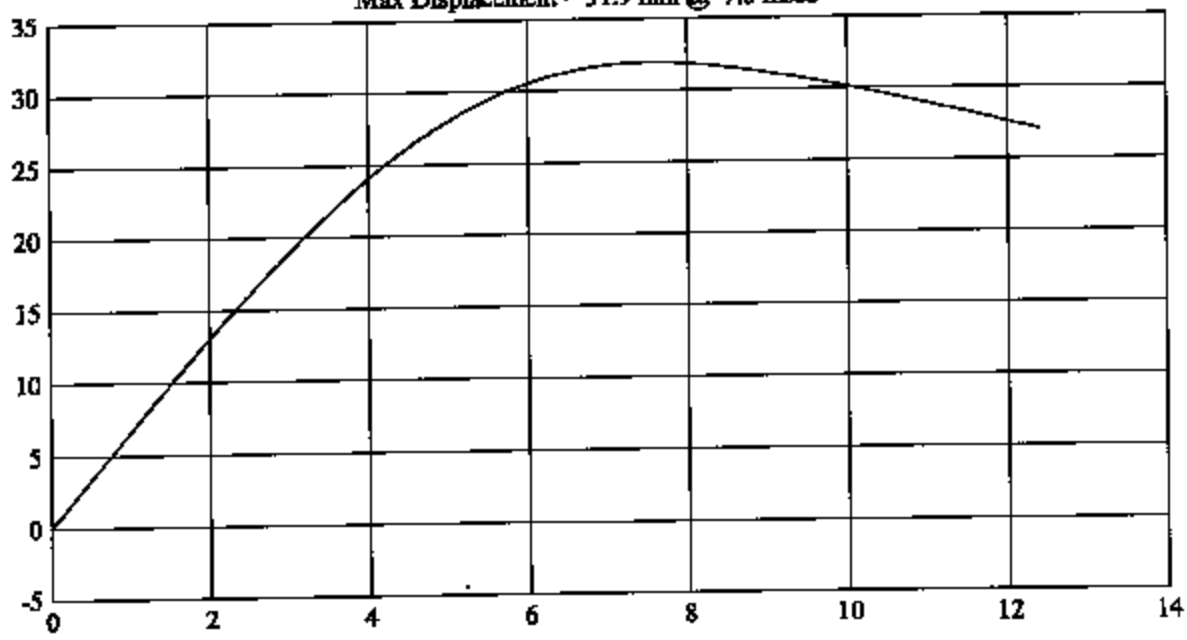
Customer: FORD
Test # 8
FM4068
Additional Desc: N/A

Vehicle Program : FREESTAR SE

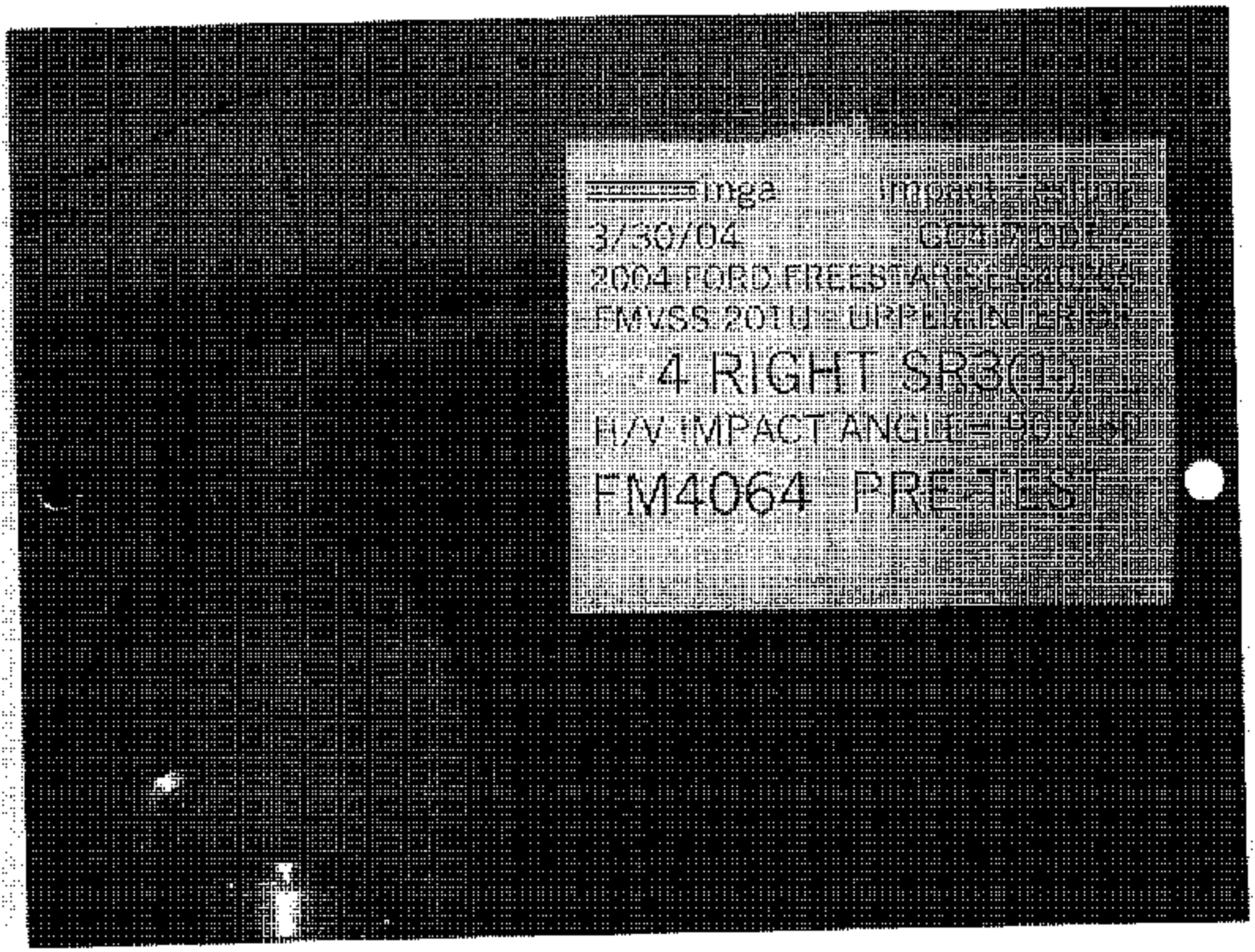
Model Year: 2004
Target: RP2
Vehicle Side: Right
Horz/Vert Angle: 15/34

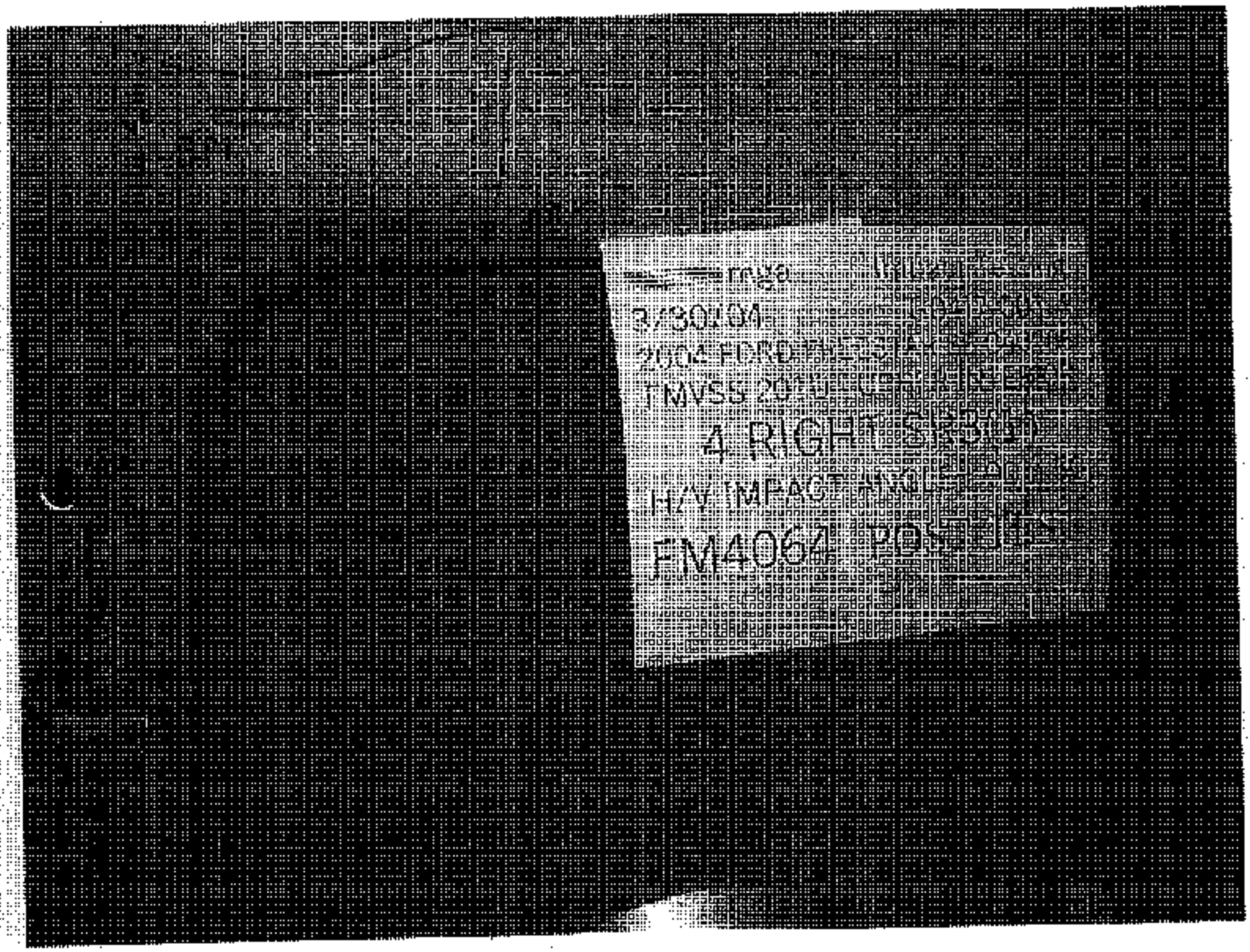
HIC(d) = 835, HIC = 886, Delta T = 5 msec

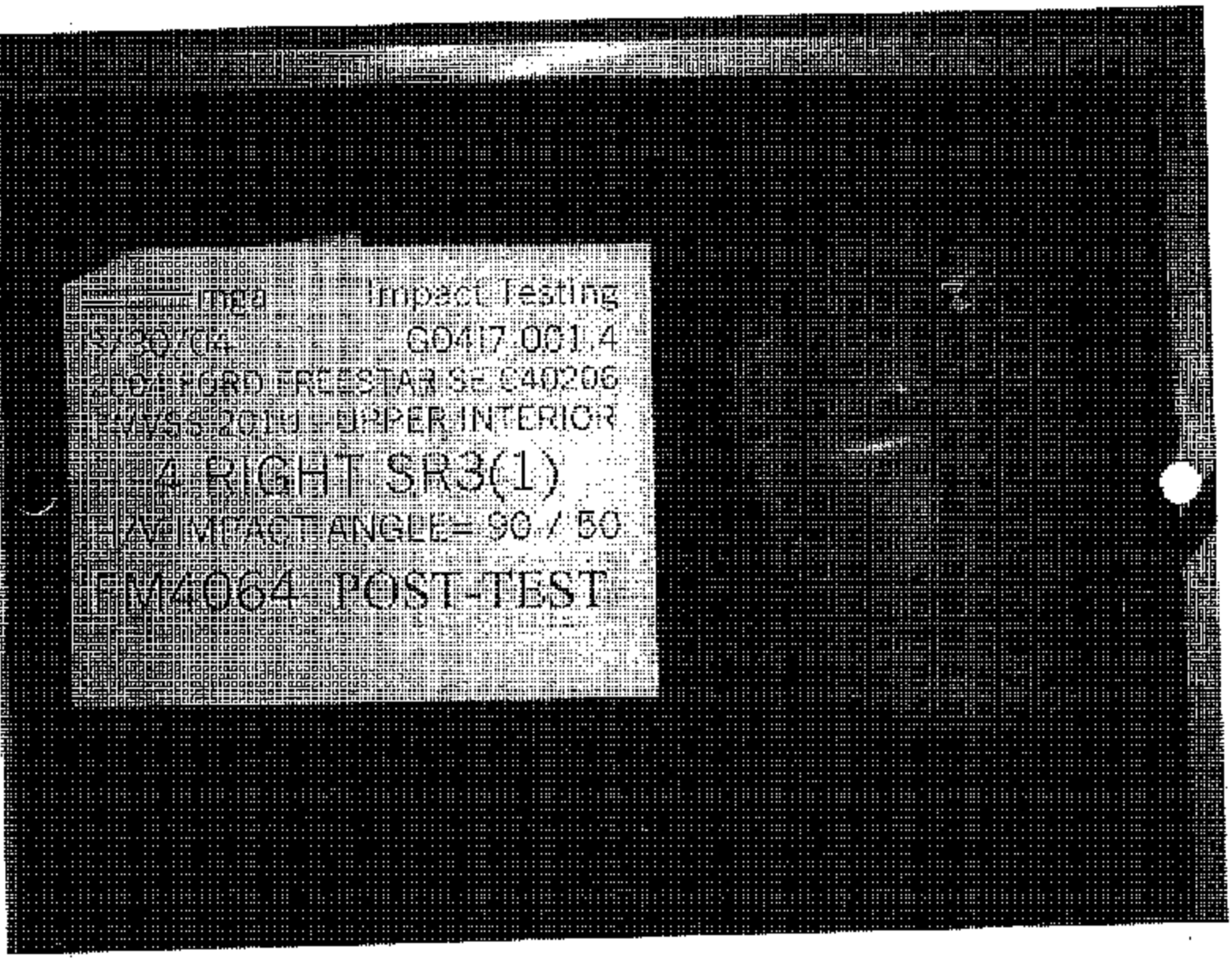
Max Displacement = 31.9 mm @ 7.5 msec



Displacement (mm) vs. Time (msec)


3/30/04
2004 FORD FREESTAR
FMVSS 201U - UPPER INTERIOR
4 RIGHT SR301
H/V IMPACT ANGLE
FM4064 PRE-TEST


3/30/04
TMVSS 201U
4 RIGHT
H/V IMPACT
FM4064


Impact Testing
G04I7 001 4
02 FORD FREESTAR SE 240206
2010 UPPER INTERIOR
4 RIGHT SR3(1)
IMPACT ANGLE= 90 / 50
FM4064 POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40206 VEHICLE YR/MAKE/MODEL: 2004 FORD FREESTAR SE

GENERAL TEST PARAMETERS:

Test Number: 4

Target (Vehicle Side): left/right SQ3-1

Temperature: 23 °F/(C)

MGA Test Reference No.: FM4064

Humidity: 52 %

Approach Angles: Horizontal 90 °

Time of Test: 8:48 am/pm

Vertical 50 °

FMH Serial No: 38

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
347	239	8.2	18.7	23	2

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-107.3	1.20	1.20
Y	6	J36193	101.1	1.23	1.23
Z	7	J36253	97.1	1.51	1.51

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

NO VISIBLE DAMAGE

Recorded By: [signature] Approved By*: Hee D. Kaluta Date: 3/30/07

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.4

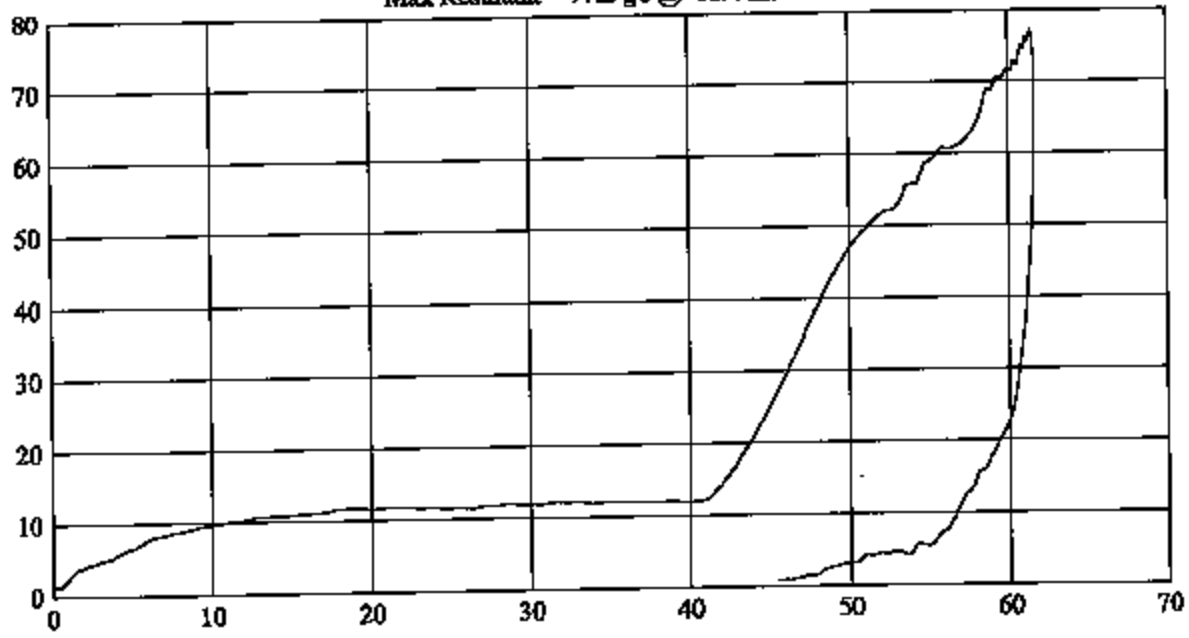
Customer: FORD
Test # 4
FM4064
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: SR3(1)
Vehicle Side: Right
Horz/Vert Angle: 90/50

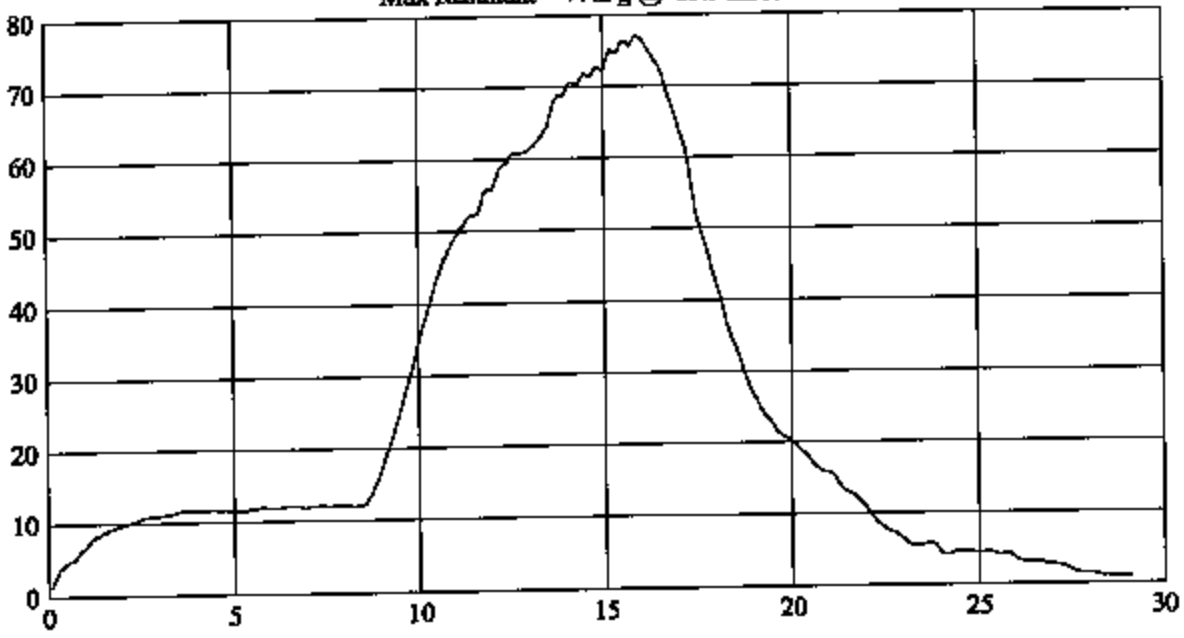
HIC(d) = 347, HIC = 239, Delta T = 8.2 msec

Max Resultant = 77.2 g's @ 61.4 mm



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

Max Resultant = 77.2 g @ 15.9 msec



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

FMH
G04I7-001.4

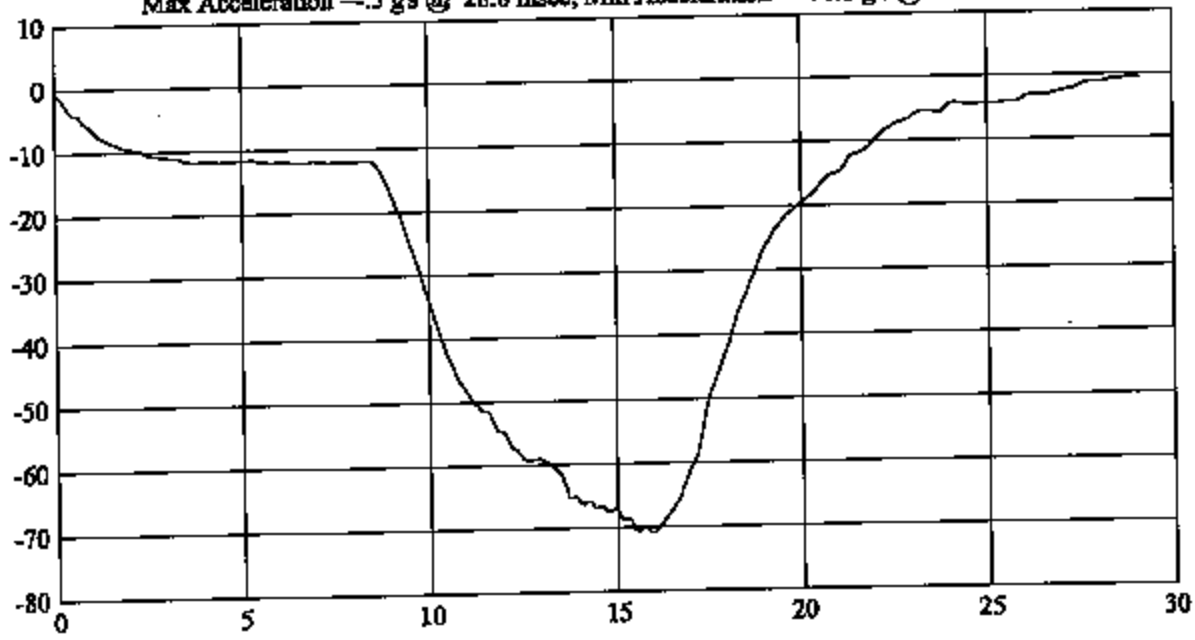
Customer: FORD
Test # 4
FM4064
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: SR3(1)
Vehicle Side: Right
Horz/Vert Angle: 90/50

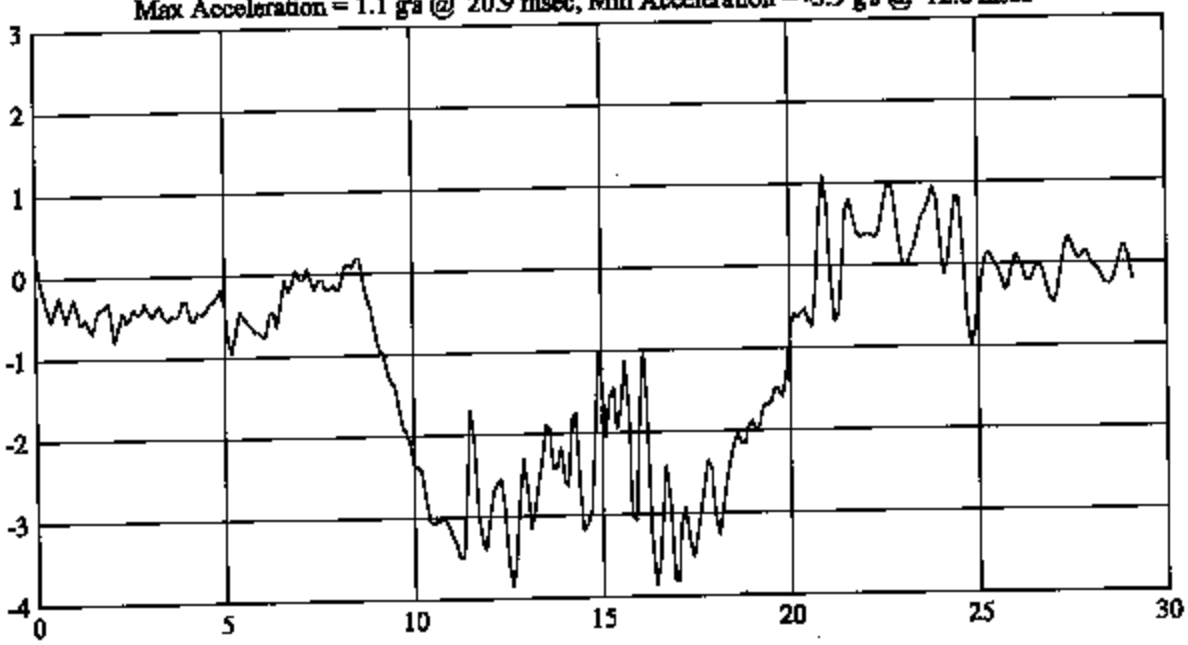
HIC(d) = 347, HIC = 239, Delta T = 8.2 msec

Max Acceleration = -.5 g's @ 28.8 msec, Min Acceleration = -70.8 g's @ 15.9 msec



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

Max Acceleration = 1.1 g's @ 20.9 msec, Min Acceleration = -3.9 g's @ 12.6 msec



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

FMH
G04I7-001.4

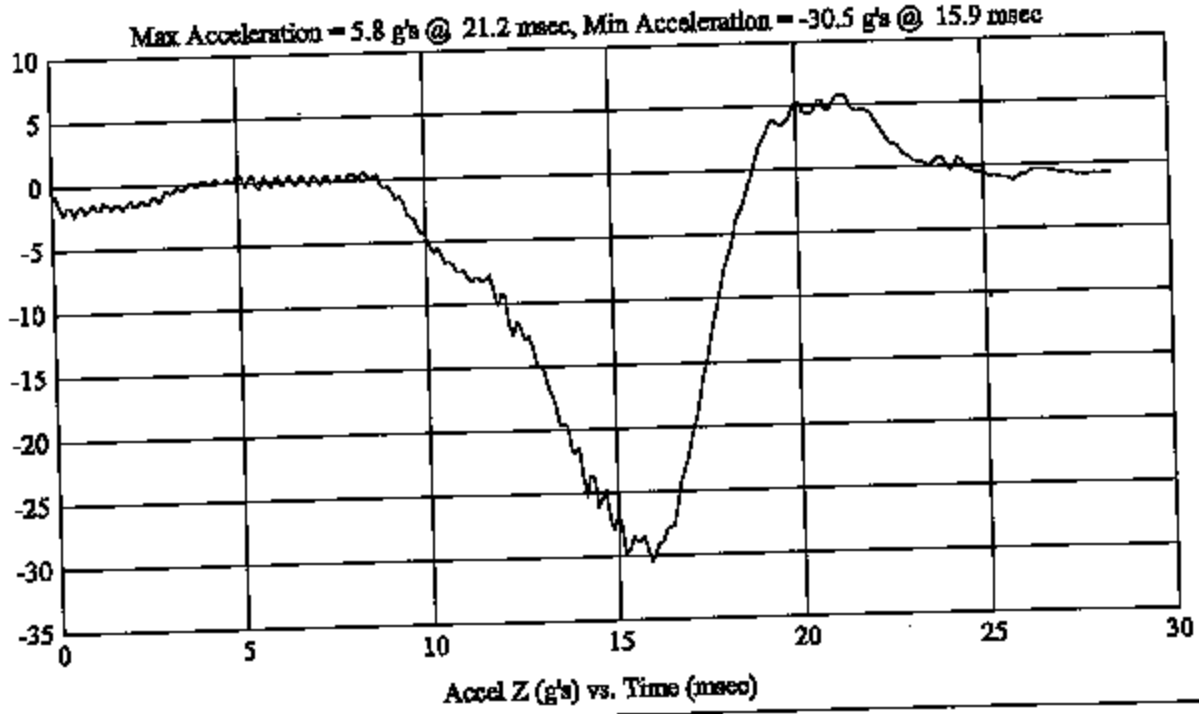
Customer: FORD
Test # 4
FM4064
Additional Desc: N/A

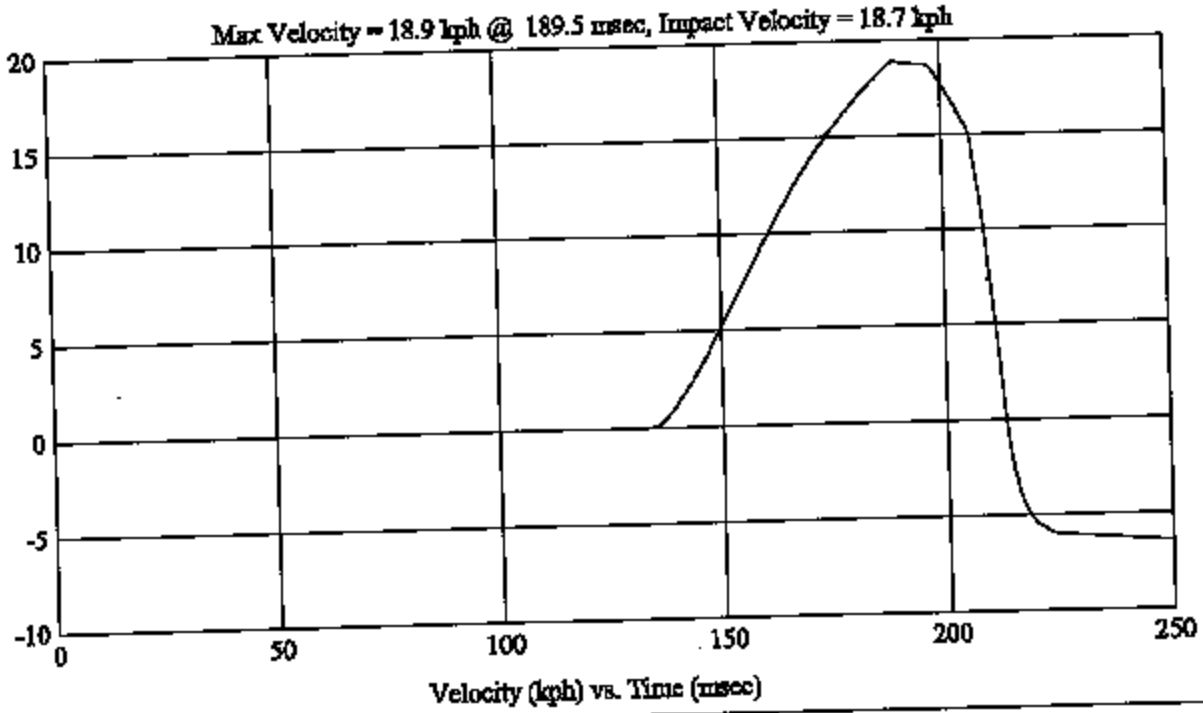
Vehicle Program : FREESTAR SE

Test Date: 3/30/04

Model Year: 2004
Target: SR3(1)
Vehicle Side: Right
Horz/Vert Angle: 90/50

HIC(d) = 347, HIC = 239, Delta T = 8.2 msec





FMH
G04I7-001.4

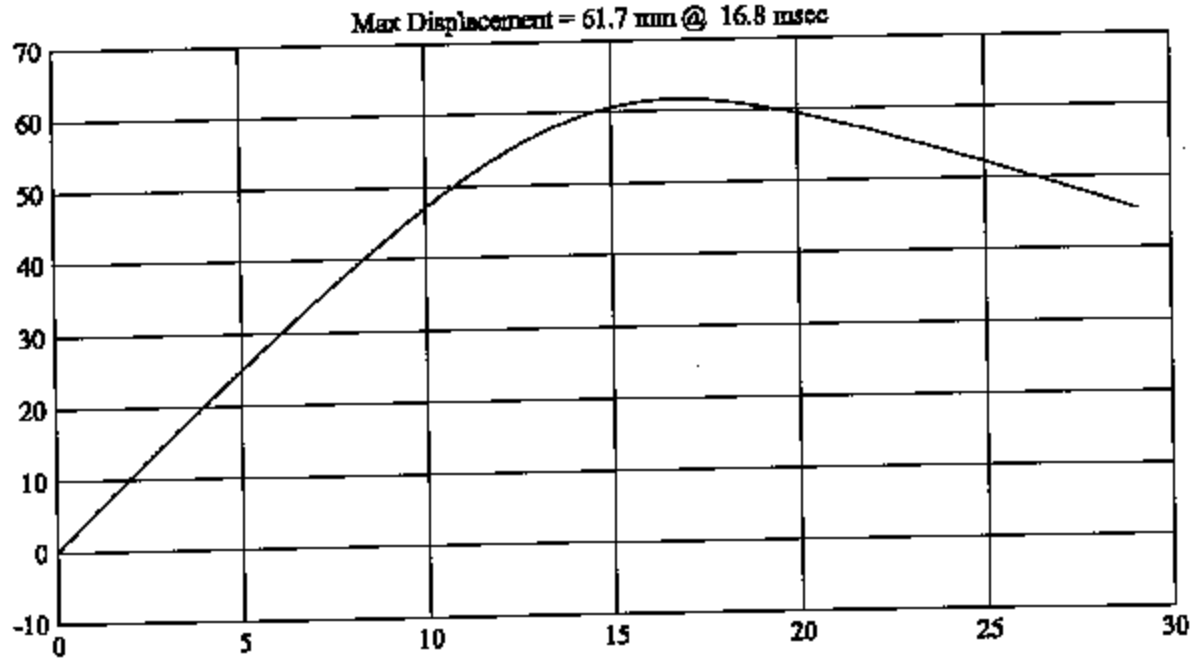
Customer: FORD
Test # 4
FM4064
Additional Desc: N/A

Vehicle Program : FREESTAR SE

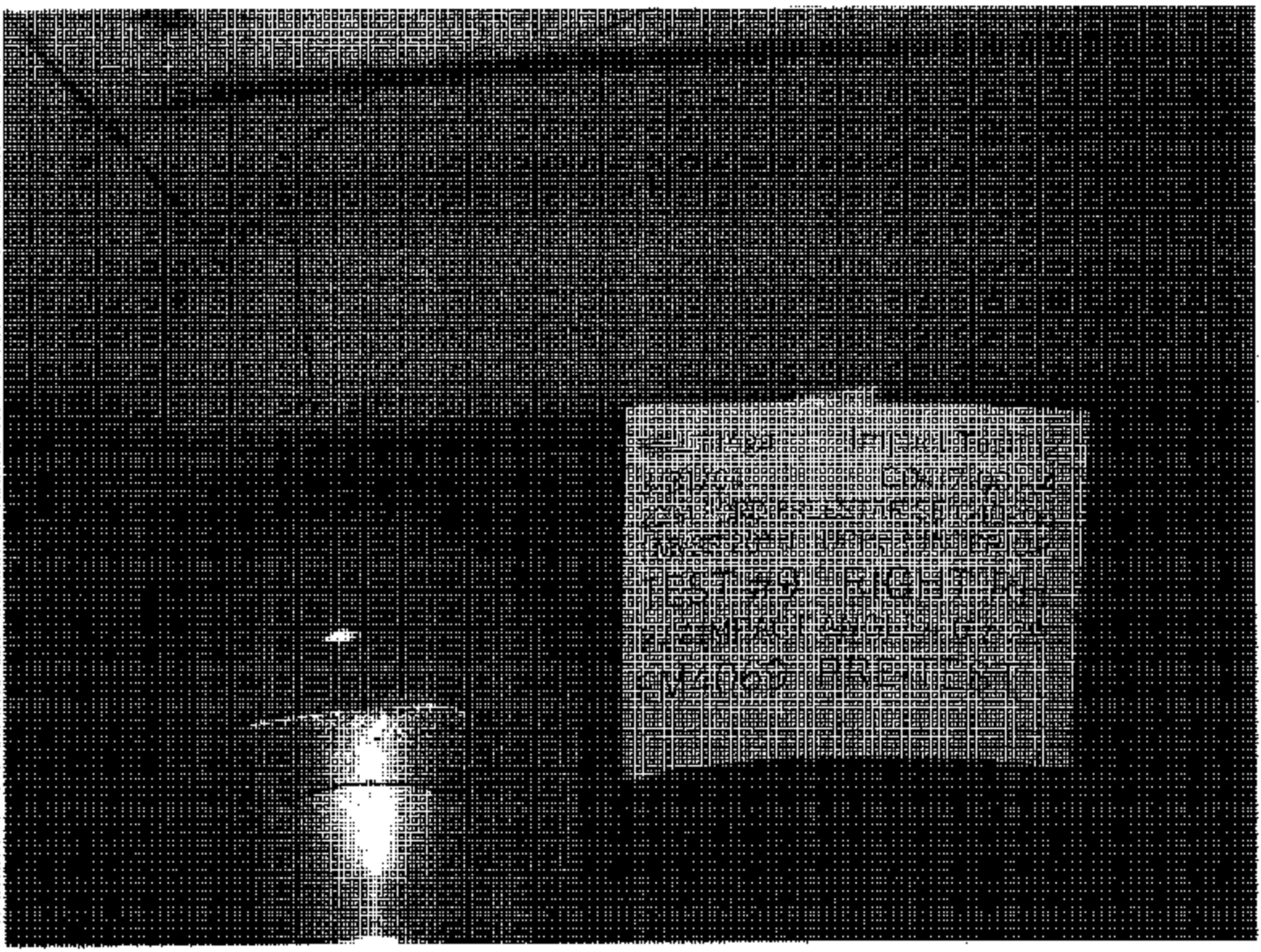
Model Year: 2004
Target: SR3(1)
Vehicle Side: Right
Horz/Vert Angle: 90/50

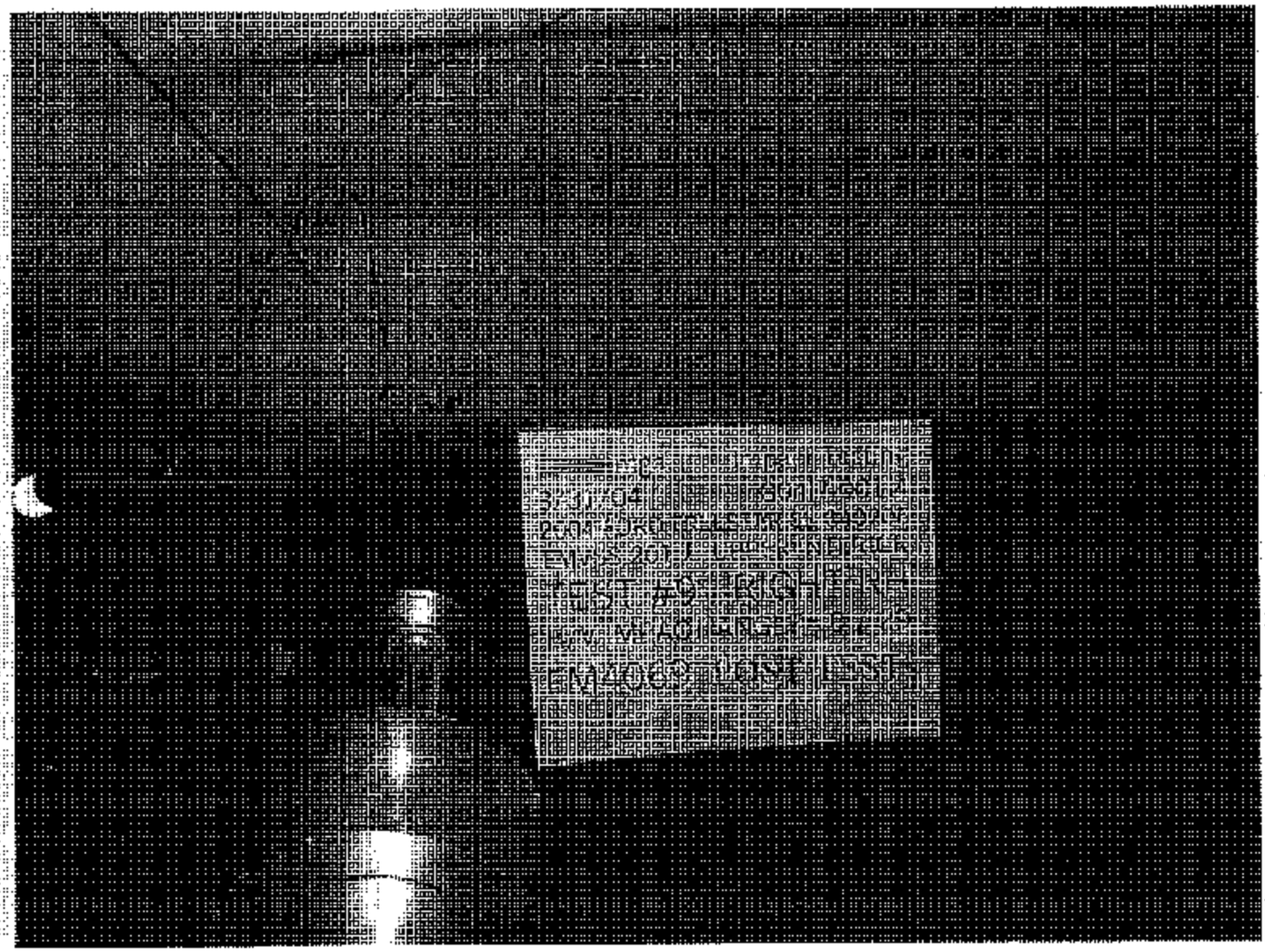
HIC(d) = 347, HIC = 239, Delta T = 8.2 msec

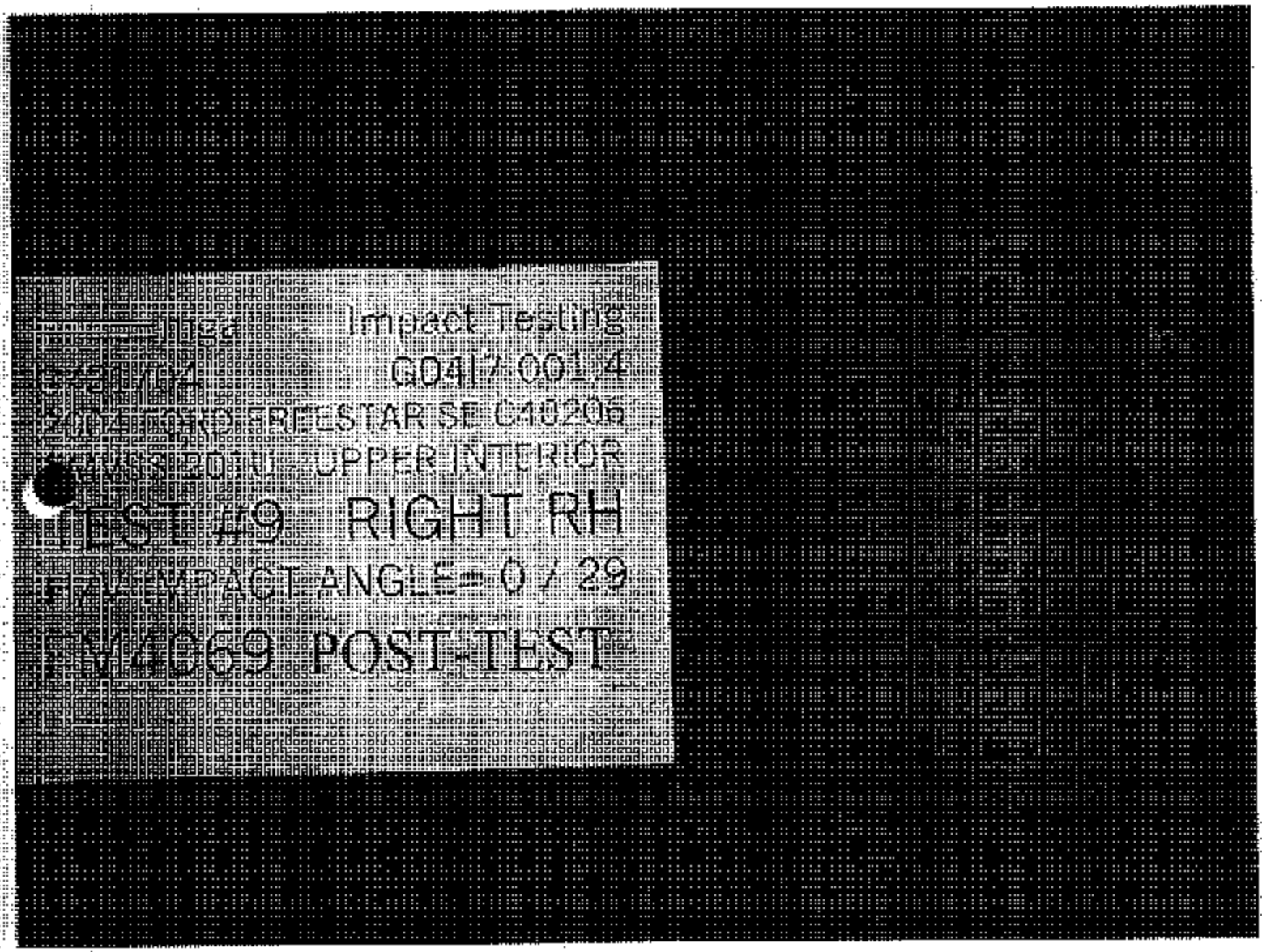
Max Displacement = 61.7 mm @ 16.8 msec



Displacement (mm) vs. Time (msec)






Impact Testing
G04I7-001.4
FREESTAR SE C4020S
UPPER INTERIOR
RIGHT RH
IMPACT ANGLE= 0 / 29
POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40266 VEHICLE YR/MAKE/MODEL: 2004 Ford Freestar SE

GENERAL TEST PARAMETERS:

Test Number: 9

Target (Vehicle Side): left/right RH

Temperature: 23 °F/°C

MGA Test Reference No.: FM4069

Humidity: 35 %

Approach Angles: Horizontal 0 °

Time of Test: 1:50 am/pm

Vertical 29 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
397	305	7.8	23.5	22	30

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	FMH #36 Tower	-99.2	1.20	1.20
Y	6	J3591C	99.6	1.23	1.23
Z	7	J3591B	99.1	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): NO VISIBLE DAMAGE

Recorded By: [signature] Approved By*: Helen A. Kaleto Date: 3/20/03

*Only necessary for NHTSA (Government) Compliance testing.

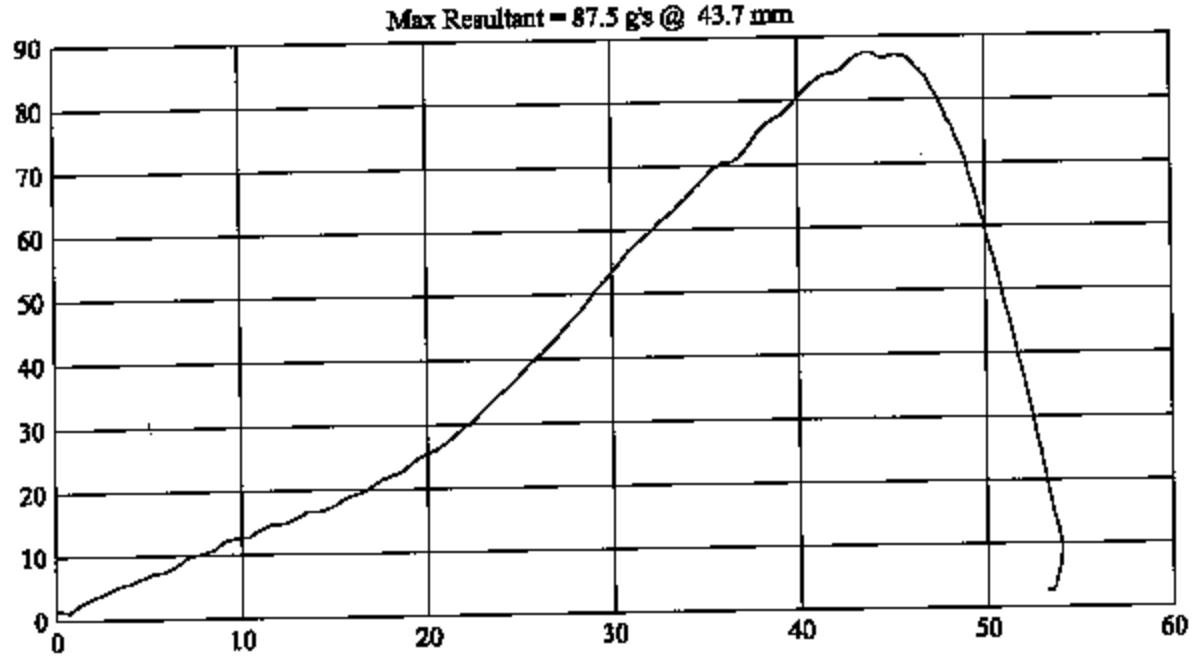
FMH
G04I7-001.4

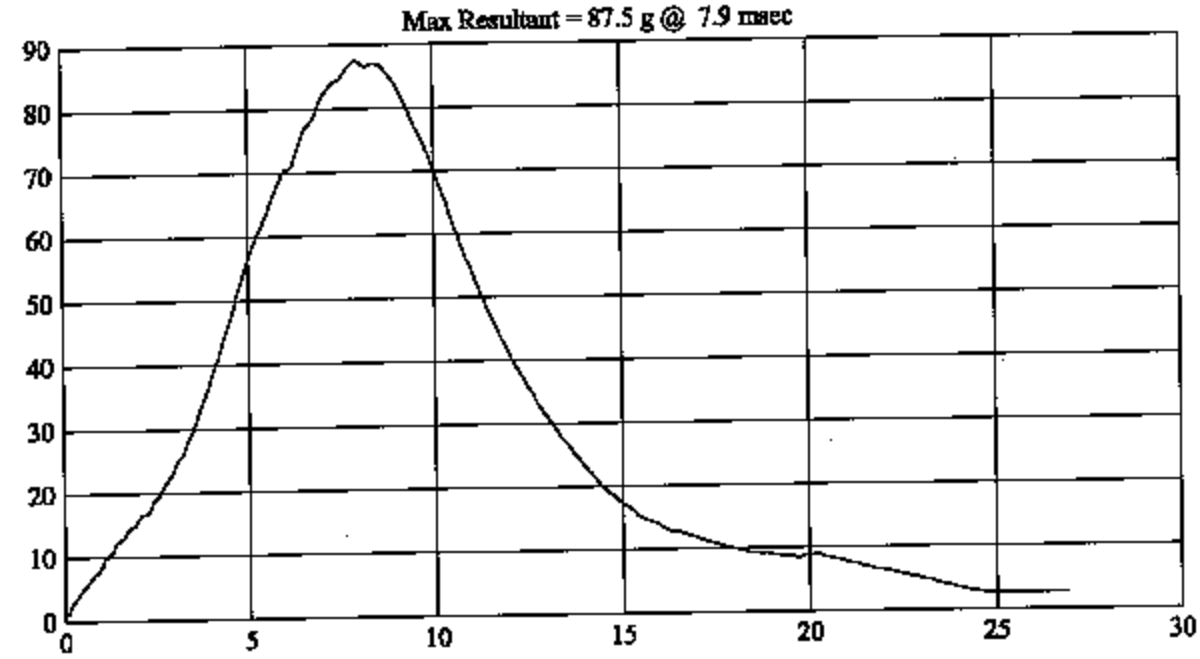
Customer: FORD
Test # 9
FM4069
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/29

HIC(d) = 397, HIC = 305, Delta T = 7.8 msec





FMH
G04I7-001.4

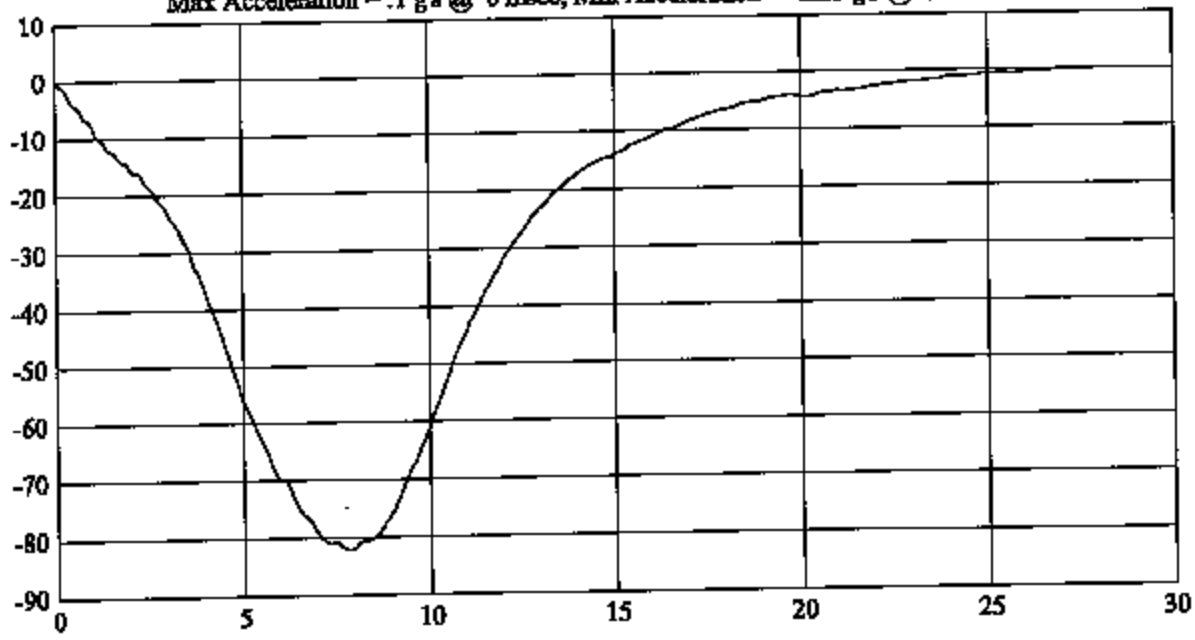
Customer: FORD
Test # 9
FM4069
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/29

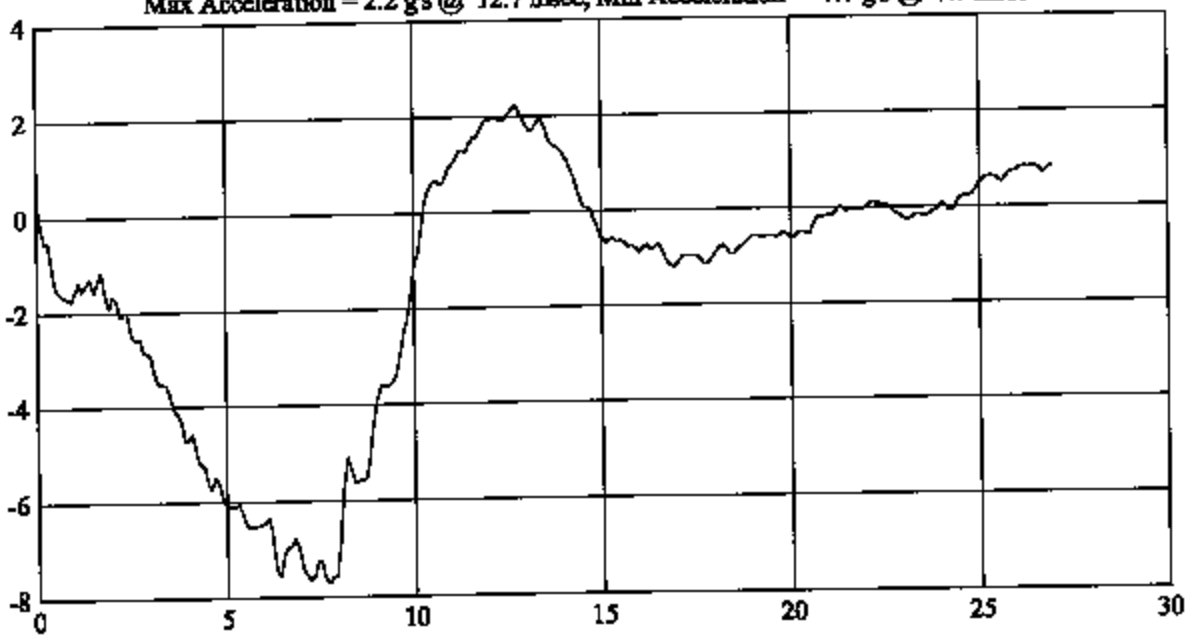
HIC(d) = 397, HIC = 305, Delta T = 7.8 msec

Max Acceleration = .1 g's @ 0 msec, Min Acceleration = -82.3 g's @ 7.9 msec



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

Max Acceleration = 2.2 g's @ 12.7 msec, Min Acceleration = -7.7 g's @ 7.7 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 9
FM4069
Additional Desc: N/A

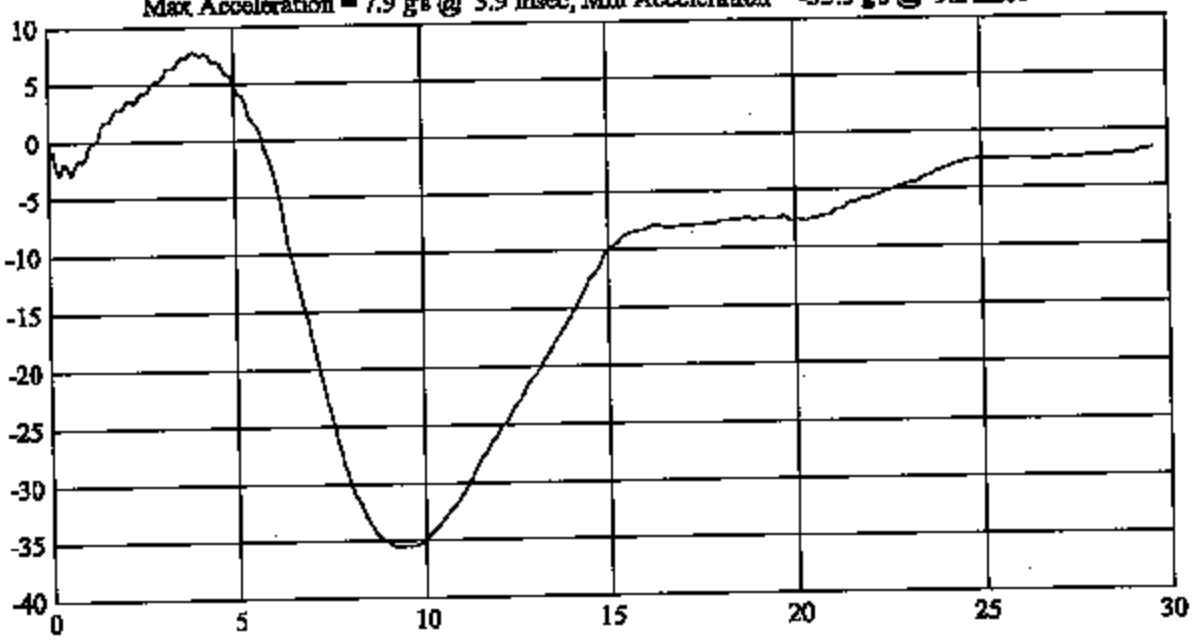
Vehicle Program : FREESTAR SE

Test Date: 3/31/04

Model Year: 2004
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/29

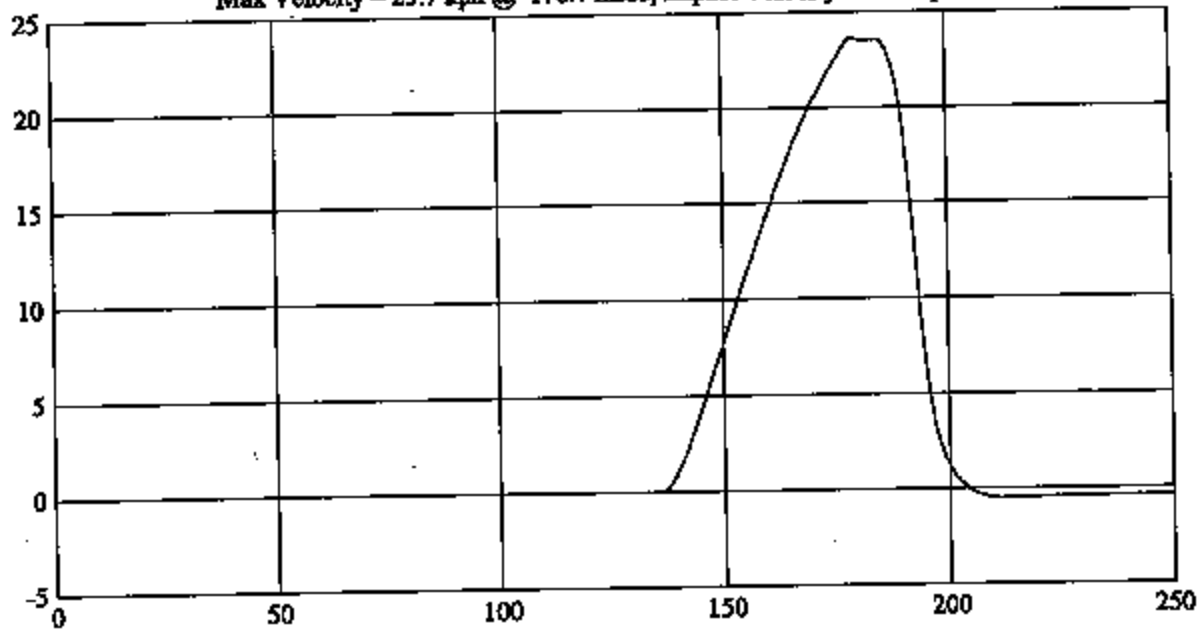
HIC(d) = 397, HIC = 305, Delta T = 7.8 msec

Max Acceleration = 7.9 g's @ 3.9 msec, Min Acceleration = -35.5 g's @ 9.2 msec



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

Max Velocity = 23.7 kph @ 178.7 msec, Impact Velocity = 23.5 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

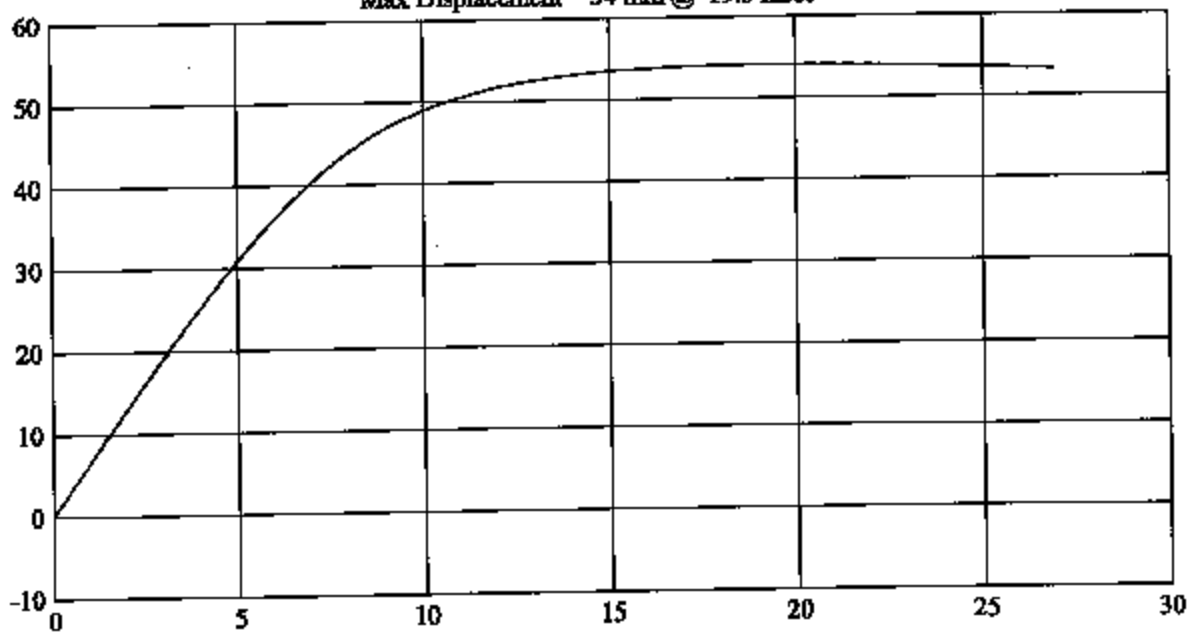
Customer: FORD
Test # 9
FM4069
Additional Desc: N/A

Vehicle Program : FREESTAR SE

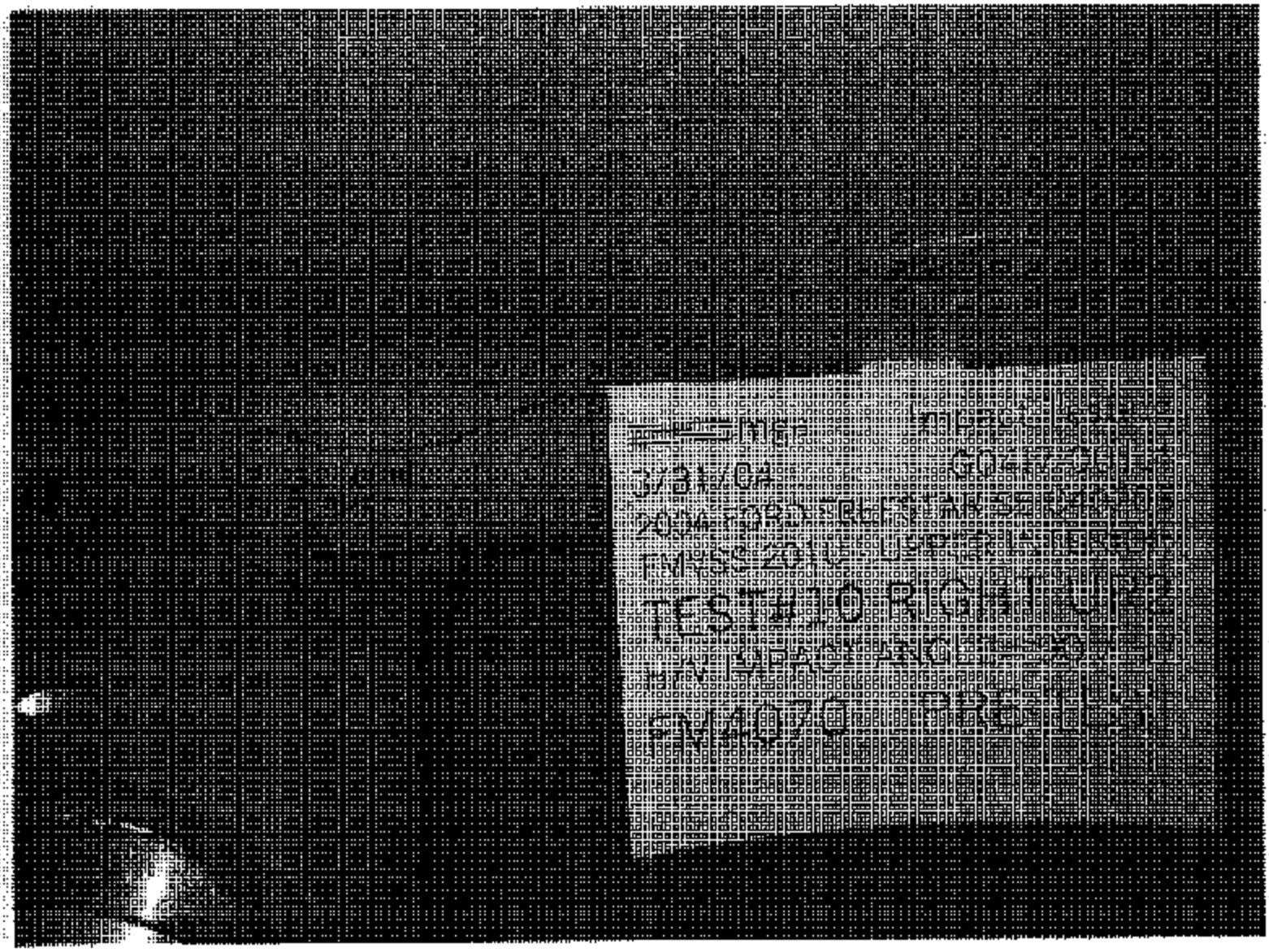
Model Year: 2004
Target: RH
Vehicle Side: Right
Horz/Vert Angle: 0/29

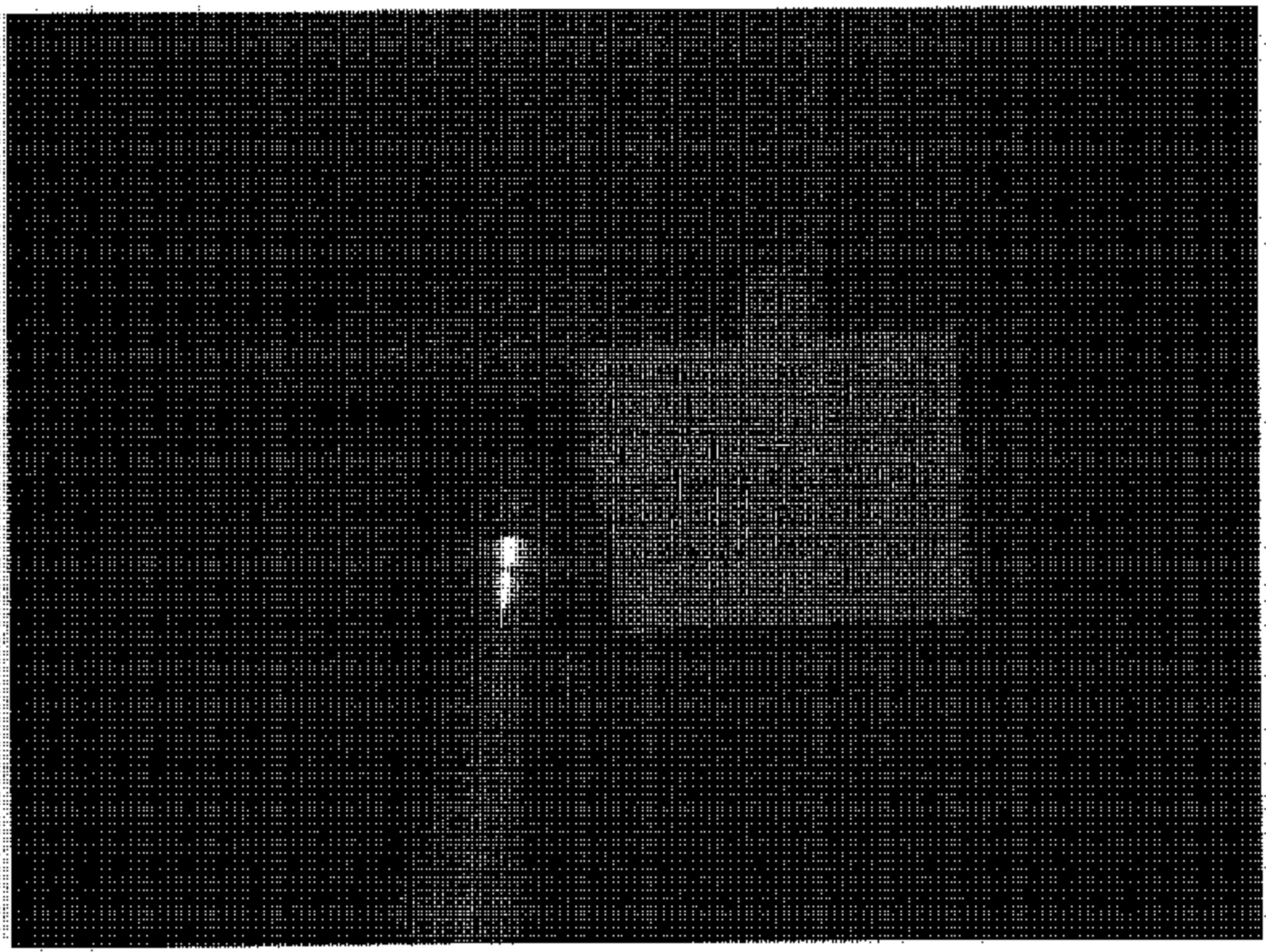
HIC(d) = 397, HIC = 305, Delta T = 7.8 msec

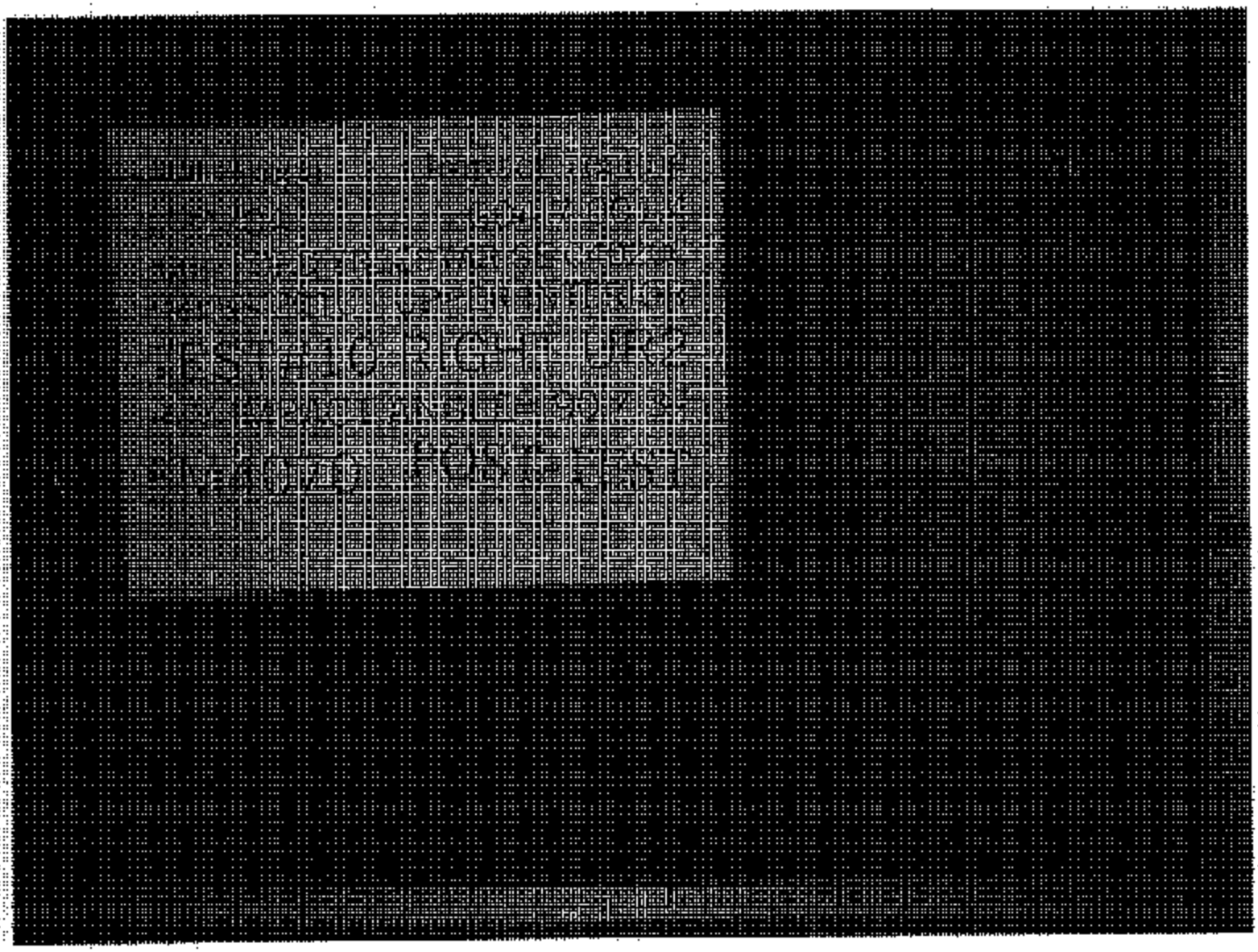
Max Displacement = 54 mm @ 19.3 msec



Displacement (mm) vs. Time (msec)


TEST#10 RIGHT





SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40Lox VEHICLE YR/MAKE/MODEL: 2004 Ford Freestar SE

GENERAL TEST PARAMETERS:

Test Number: 10

Target (Vehicle Side): left/right UR2

Temperature: 23 °F/(C)

MGA Test Reference No.: fm4070

Humidity: 35 %

Approach Angles: Horizontal 90 °

Time of Test: 4:35 am/pm

Vertical 37 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	(Left)/Right Pt. O
378	261	14.9	23.8	42	13

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-91.8	1.20	1.20
Y	6	J35919	93.5	1.23	1.23
Z	7	J31051	93.5	1.61	1.51

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

no visible damage

Recorded By: _____ Approved By*: _____ Date: 8/20/04

*Only necessary for NHTSA (Government) Compliance testing.

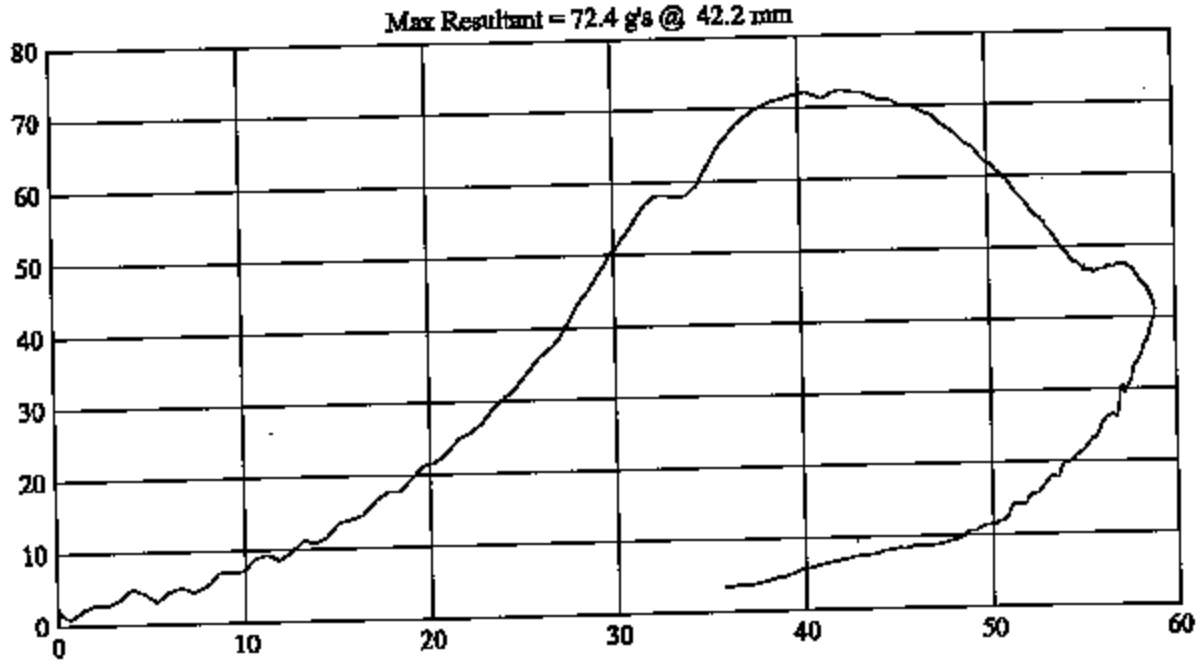
Customer: FORD
Test # 10
FM4070
Additional Desc: N/A

Vehicle Program : FREESTAR SB

Model Year: 2004
Target: UR2
Vehicle Side: Right
Horz/Vert Angle: 90/37

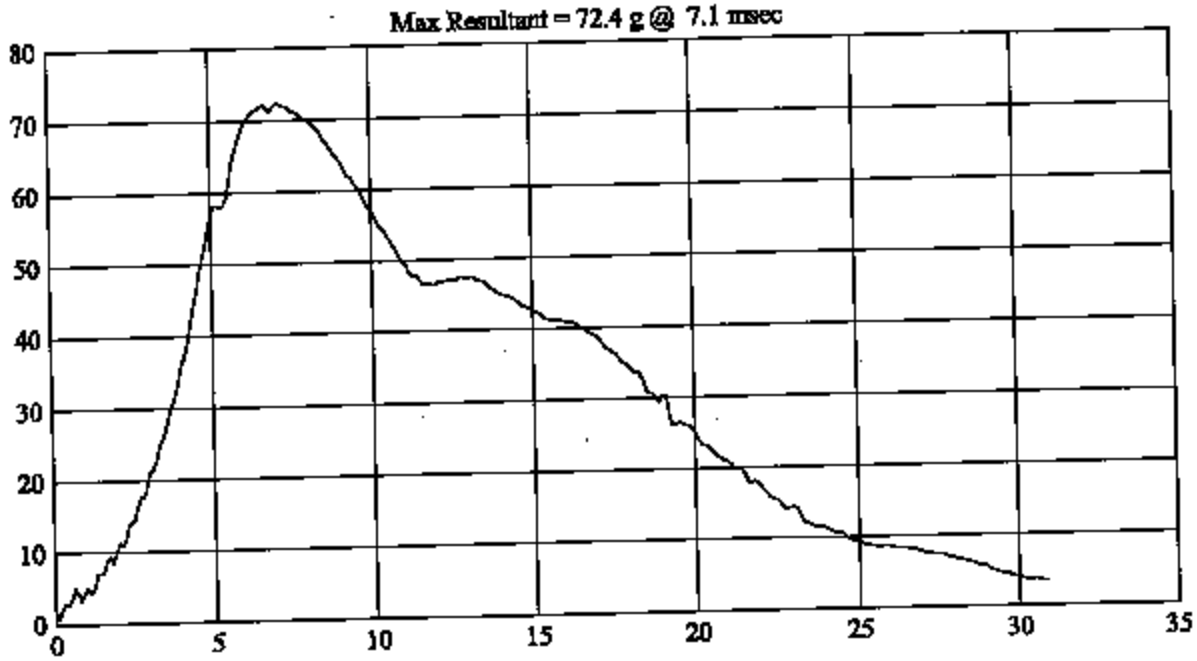
HIC(d) = 378, HIC = 281, Delta T = 14.9 msec

Max Resultant = 72.4 g's @ 42.2 mm



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

Max Resultant = 72.4 g @ 7.1 msec



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

FMH
G04I7-001.4

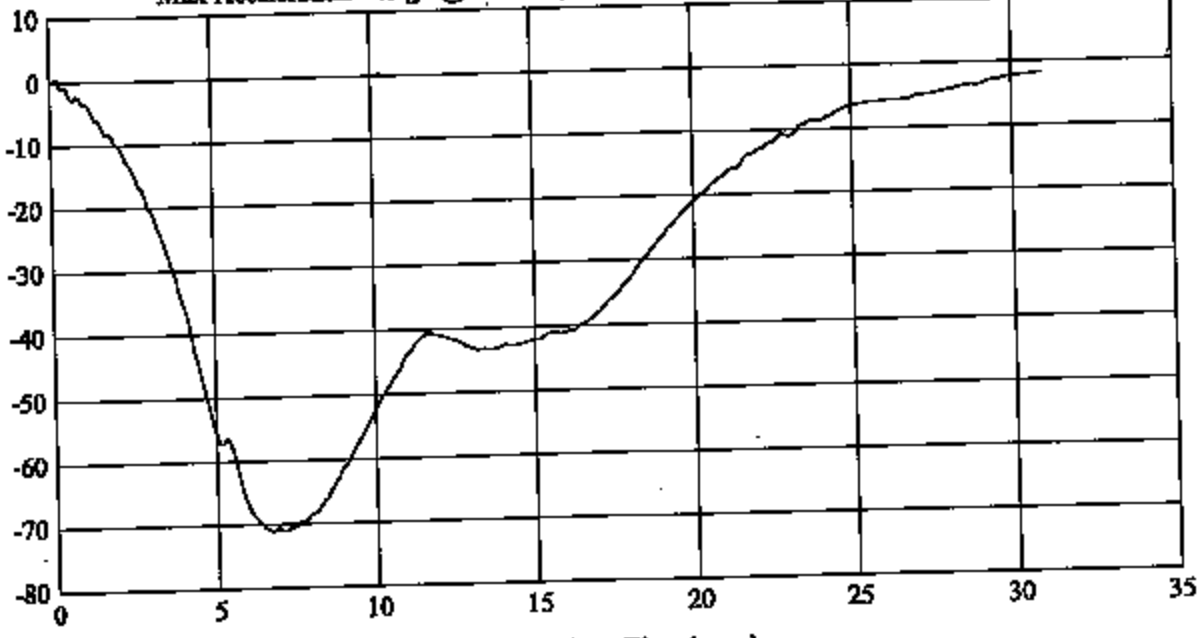
Customer: FORD
Test # 10
FM4070
Additional Desc: N/A

Vehicle Program : FREESTAR SB

Model Year: 2004
Target: UR2
Vehicle Side: Right
Horz/Vert Angle: 90/37

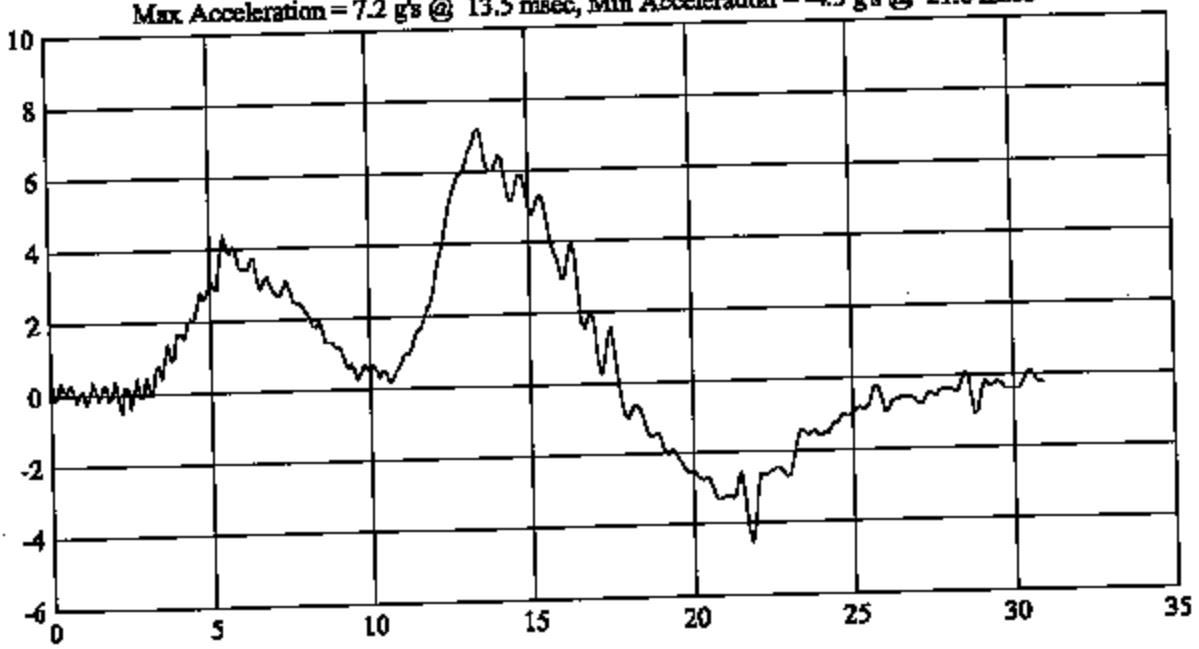
HIC(d) = 378, HIC = 281, Delta T = 14.9 msec

Max Acceleration = .6 g's @ .2 msec, Min Acceleration = -71.3 g's @ 6.7 msec



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

Max Acceleration = 7.2 g's @ 13.5 msec, Min Acceleration = -4.5 g's @ 21.8 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 10
FM4070
Additional Desc: N/A

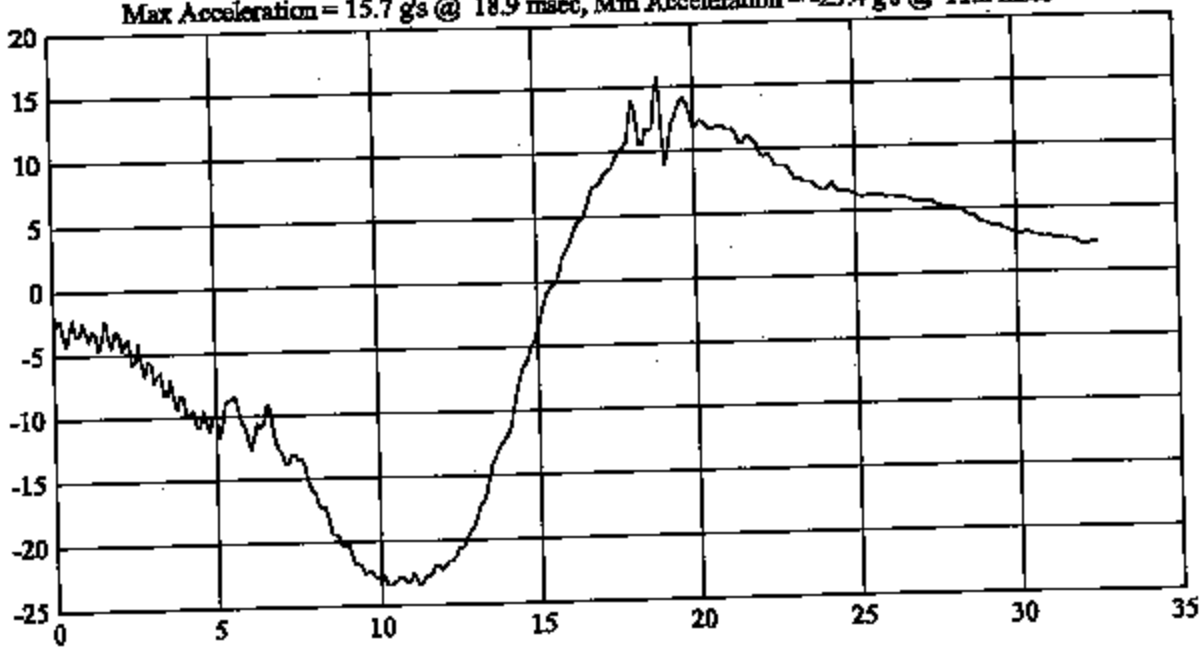
Vehicle Program : FREESTAR SE

Test Date: 3/31/04

Model Year: 2004
Target: UR2
Vehicle Side: Right
Horz/Vert Angle: 90/37

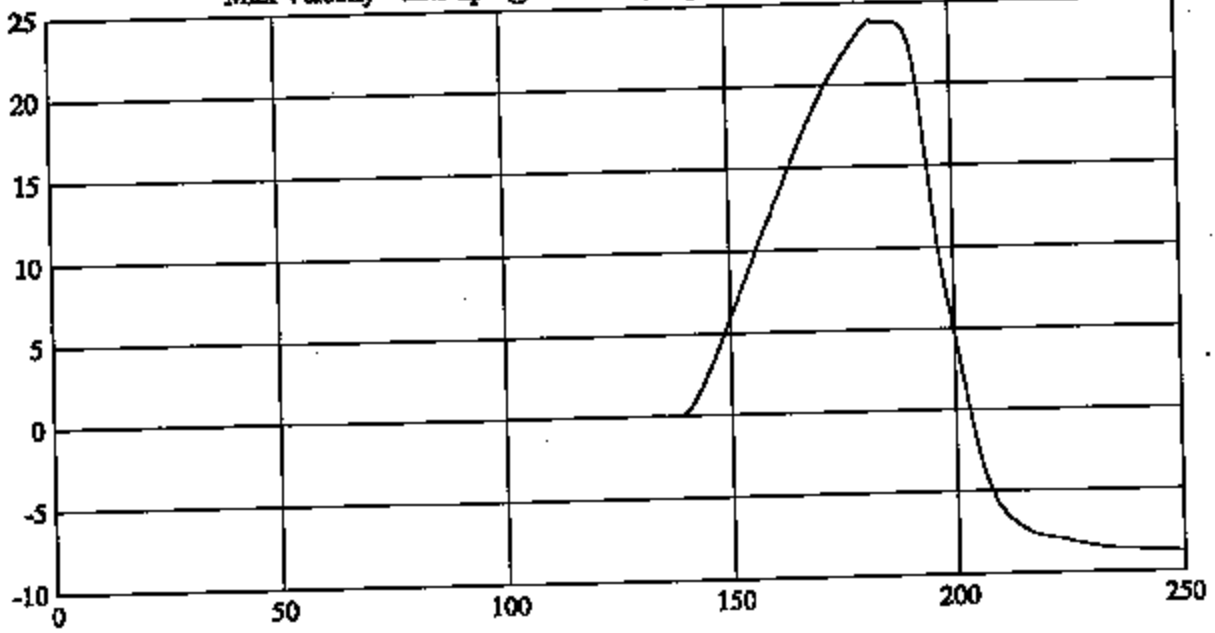
HIC(d) = 378, HIC = 281, Delta T = 14.9 msec

Max Acceleration = 15.7 g's @ 18.9 msec, Min Acceleration = -23.4 g's @ 11.2 msec



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

Max Velocity = 23.9 kph @ 182 msec, Impact Velocity = 23.8 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

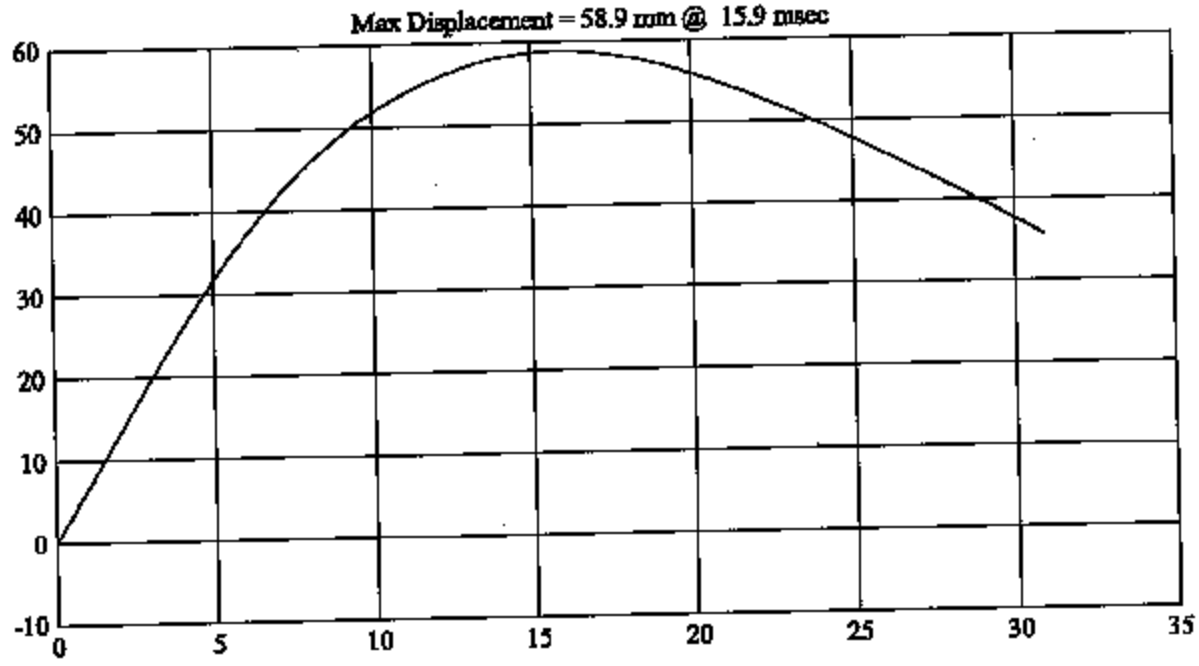
Customer: FORD
Test # 10
FM4070
Additional Desc: N/A

Vehicle Program : FREESTAR SE

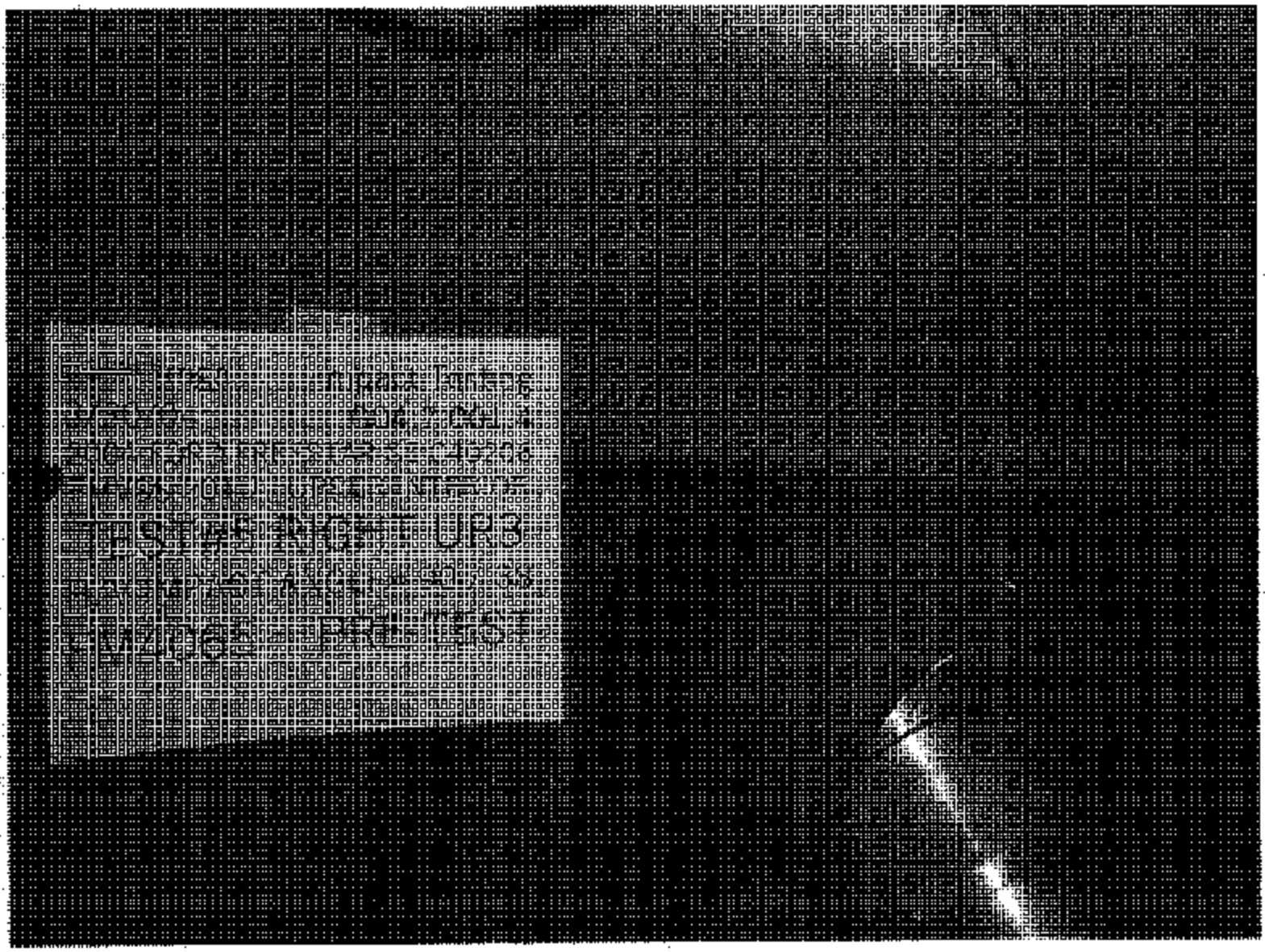
Model Year: 2004
Target: UR2
Vehicle Side: Right
Horz/Vert Angle: 90/37

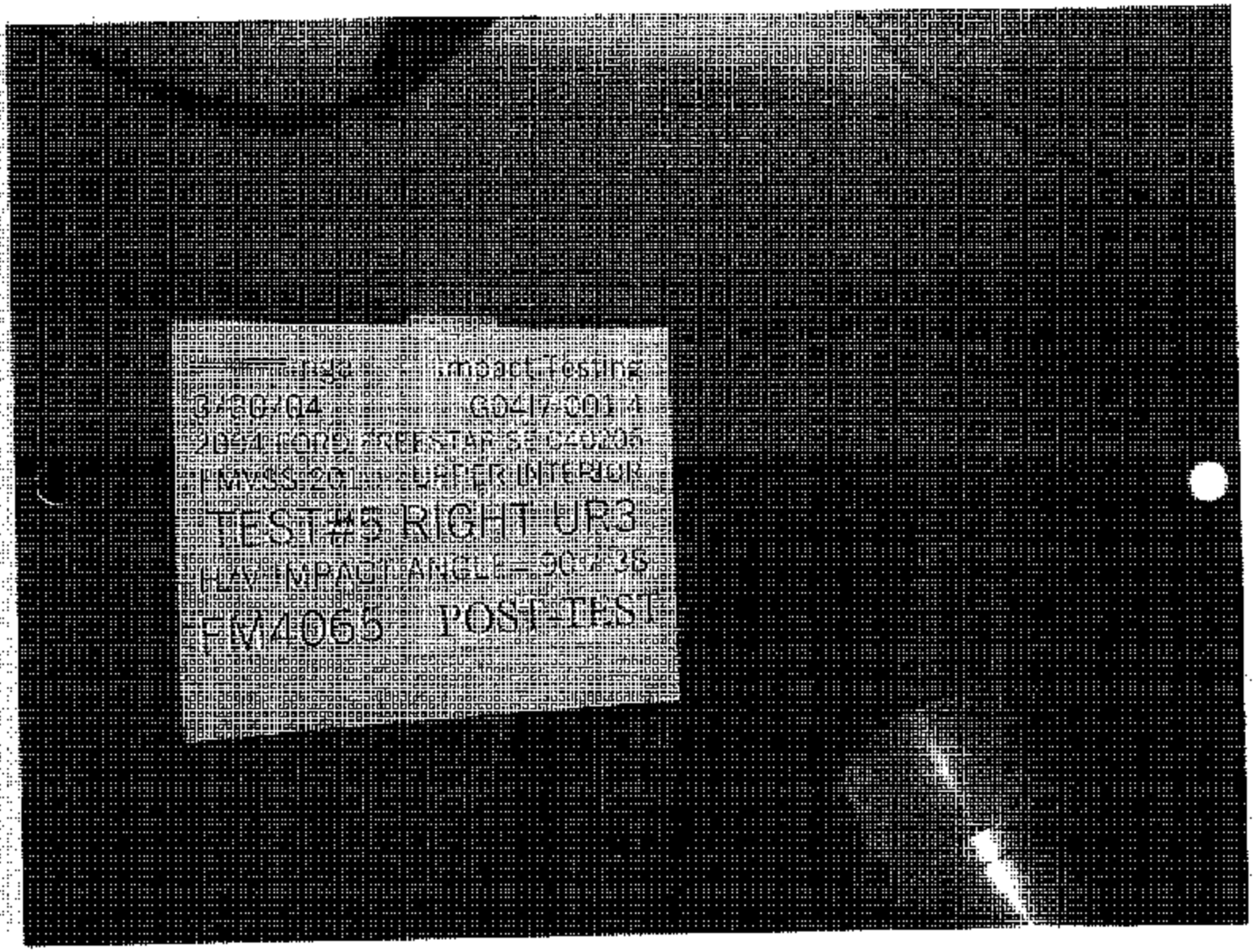
HIC(d) = 378, HIC = 281, Delta T = 14.9 msec

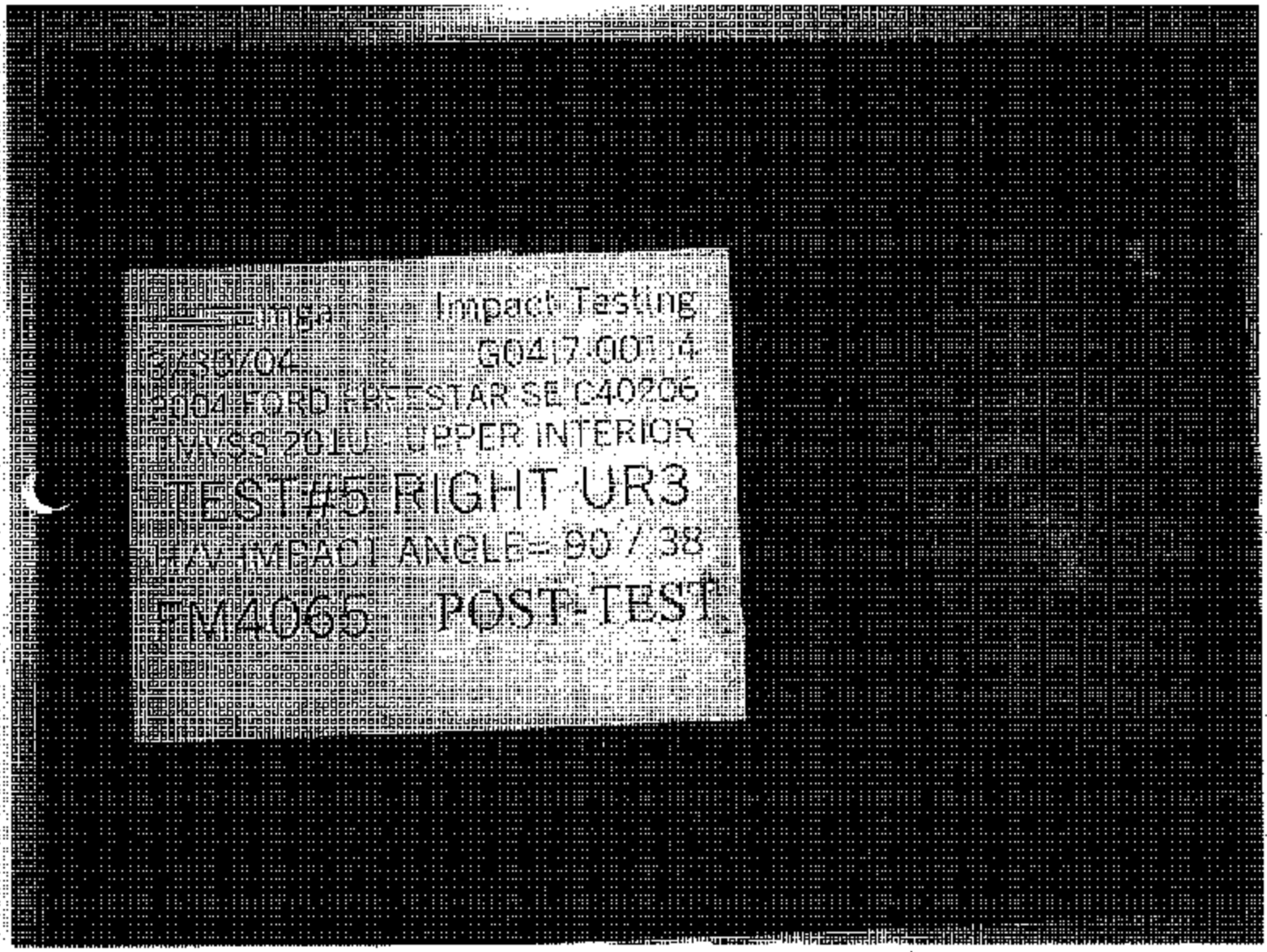
Max Displacement = 58.9 mm @ 15.9 msec



Displacement (mm) vs. Time (msec)




TEST #5 RIGHT UR3
FM4065 POST-TEST


Impact Testing
G04I7-001-4
2004 FORD FREESTAR SE C40206
UPPER INTERIOR
TEST #5 RIGHT UR3
FMVSS 201U
FAV IMPACT ANGLE= 90 / 38
FM4065 POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40206 VEHICLE YR/MAKE/MODEL: 2001 Ford Freestar SE

GENERAL TEST PARAMETERS:

Test Number: 5

Target (Vehicle Side): left/right URB

Temperature: 23 °F/C

MGA Test Reference No.: FM4065

Humidity: 52 %

Approach Angles: Horizontal 90 °

Time of Test: 9:30 am/pm

Vertical 30 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
480	416	6.0	23.9	40	18

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	[illegible]	-91.8	1.20	1.20
Y	6	[illegible]	93.5	1.23	1.23
Z	7	[illegible]	93.5	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): No Visible Damage

Recorded By: [signature] Approved By*: Helen A. Kabata Date: 3/20/03

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.4

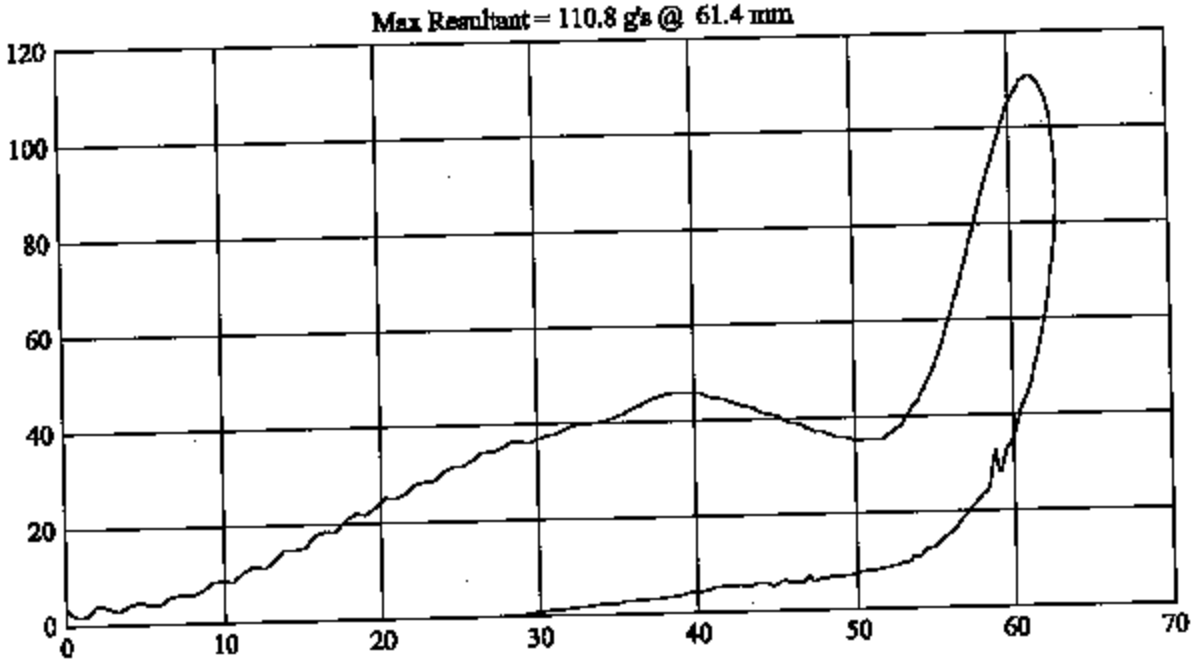
Customer: FORD
Test # 5
FM4065
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: UR3
Vehicle Side: Right
Horz/Vert Angle: 90/38

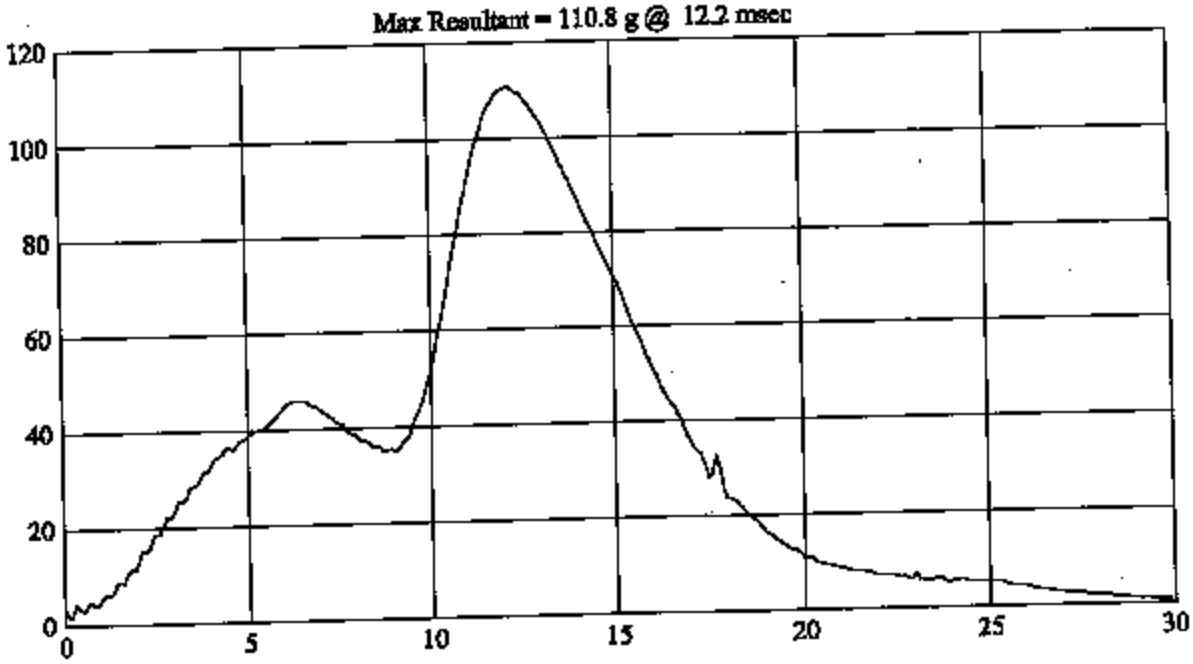
HIC(d) = 480, HIC = 416, Delta T = 6 msec

Max Resultant = 110.8 g's @ 61.4 mm



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

Max Resultant = 110.8 g @ 12.2 msec



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

FMH
G04I7-001.4

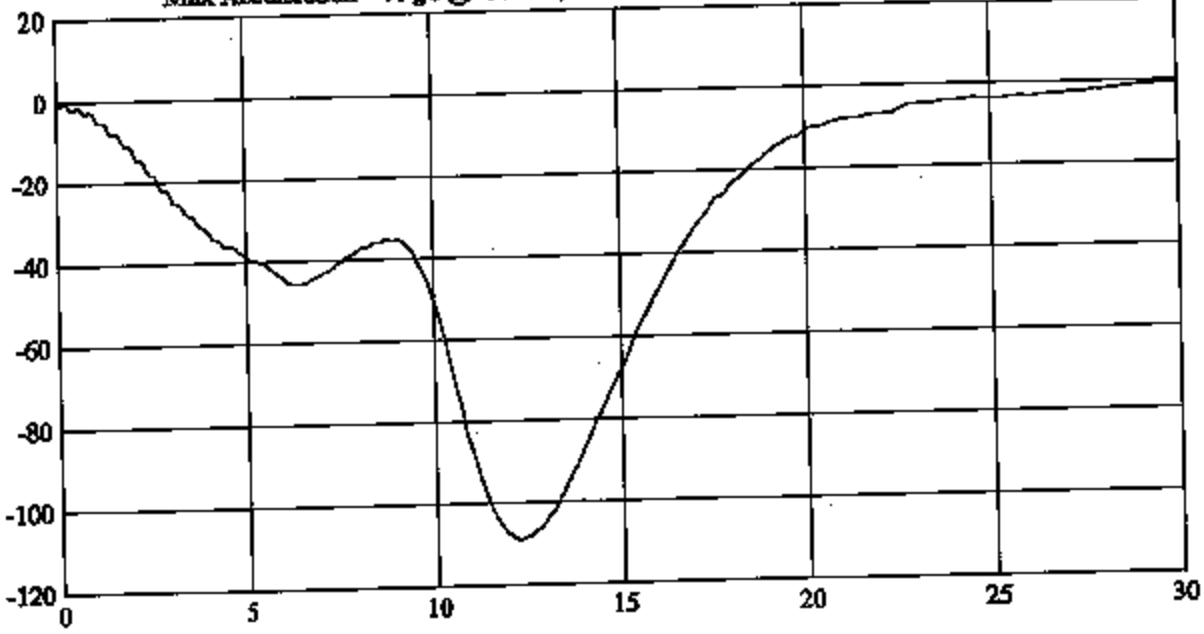
Customer: FORD
Test # 5
FM4065
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: UR3
Vehicle Side: Right
Horz/Vert Angle: 90/38

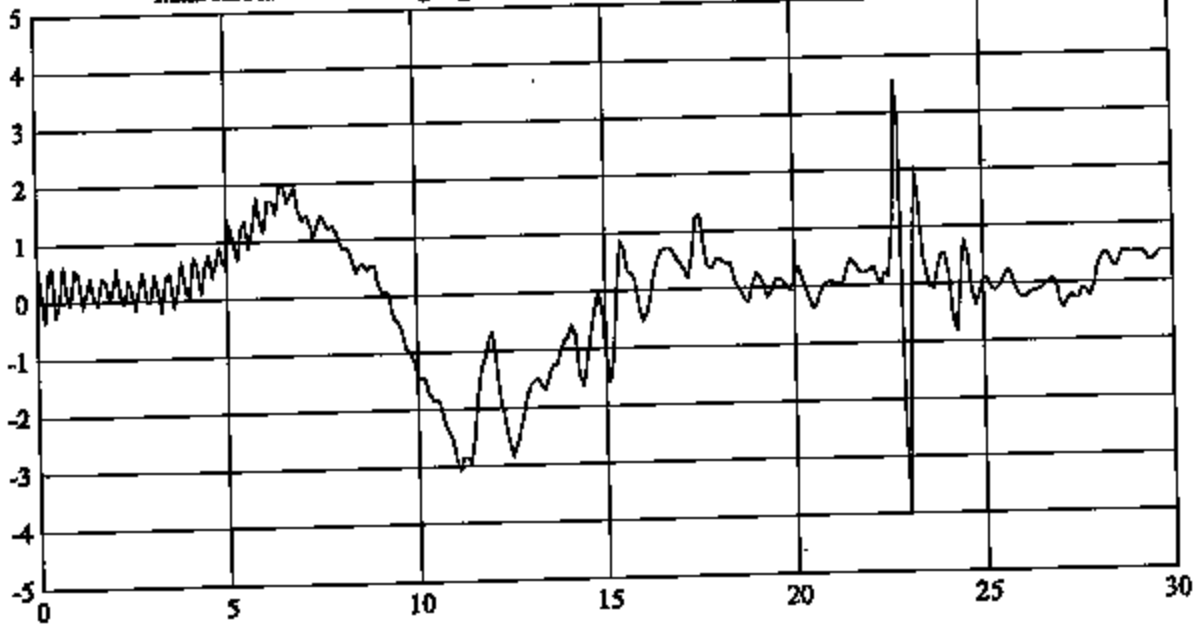
HIC(d) = 480, HIC = 416, Delta T = 6 msec

Max Acceleration = .4 g's @ 0 msec, Min Acceleration = -109 g's @ 12.2 msec



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

Max Acceleration = 3.5 g's @ 22.7 msec, Min Acceleration = -4 g's @ 23 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 5
FM4065
Additional Desc: N/A

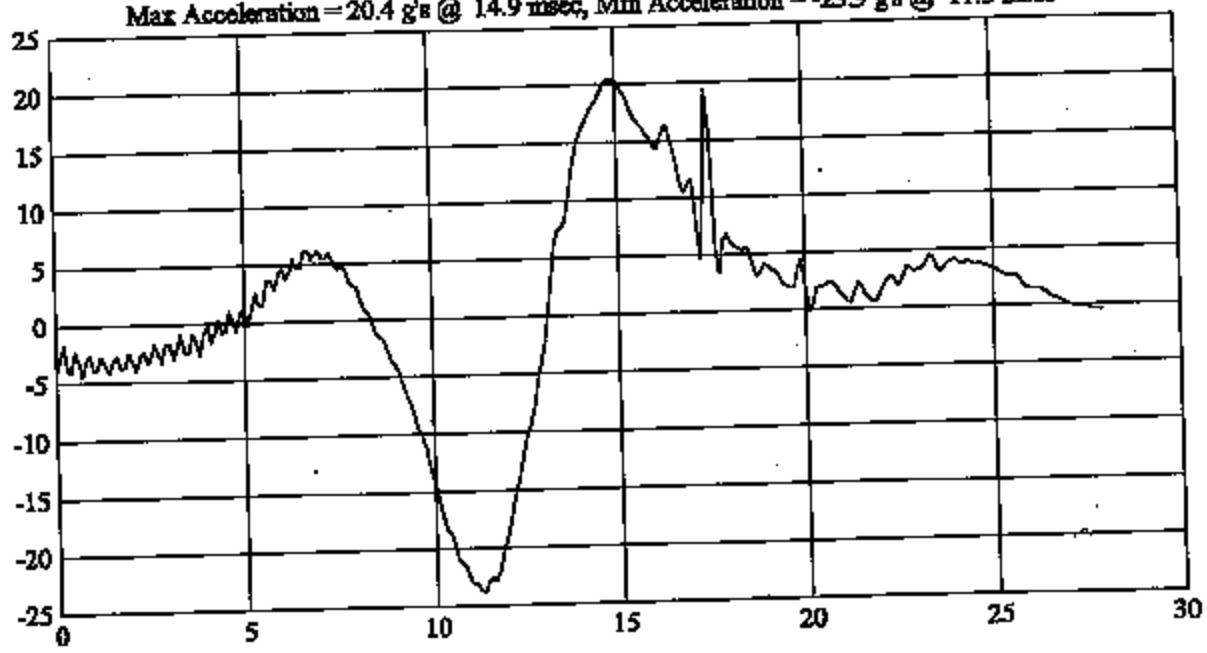
Vehicle Program : FREESTAR SE

Test Date: 3/30/04

Model Year: 2004
Target: UR3
Vehicle Side: Right
Horz/Vert Angle: 90/38

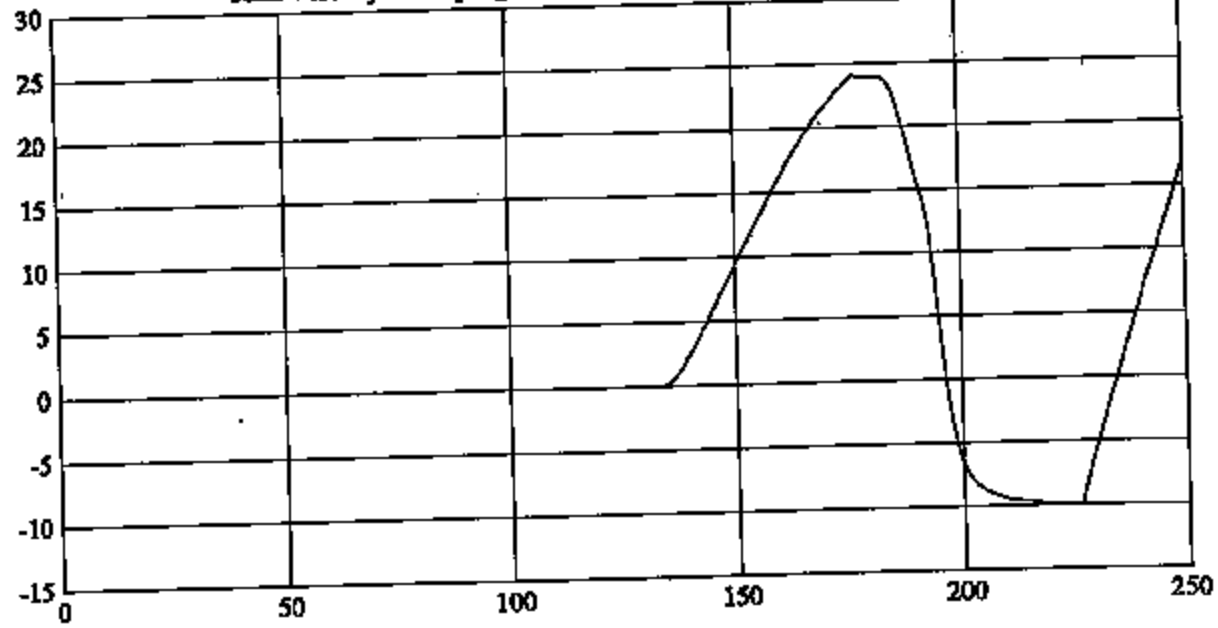
HIC(d) = 480, HIC = 416, Delta T = 6 msec

Max Acceleration = 20.4 g's @ 14.9 msec, Min Acceleration = -23.9 g's @ 11.3 msec



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

Max Velocity = 24 kph @ 176.9 msec, Impact Velocity = 23.9 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

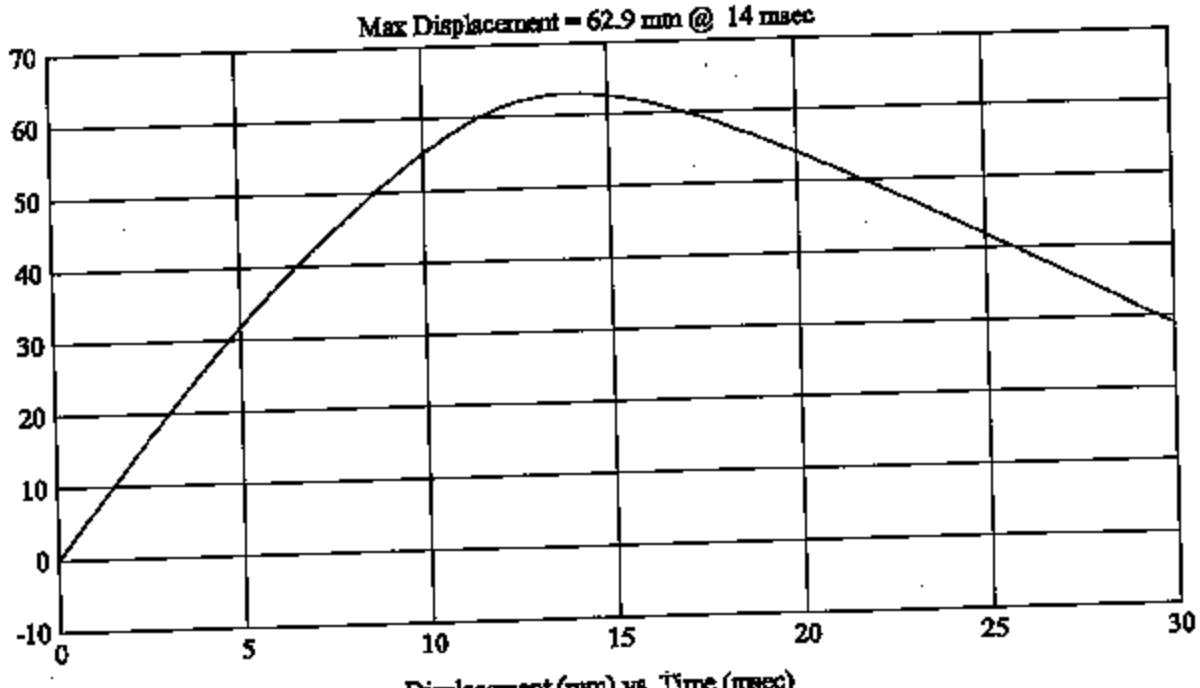
Customer: FORD
Test # 5
FM4065
Additional Deac: N/A

Vehicle Program : FREESTAR SE

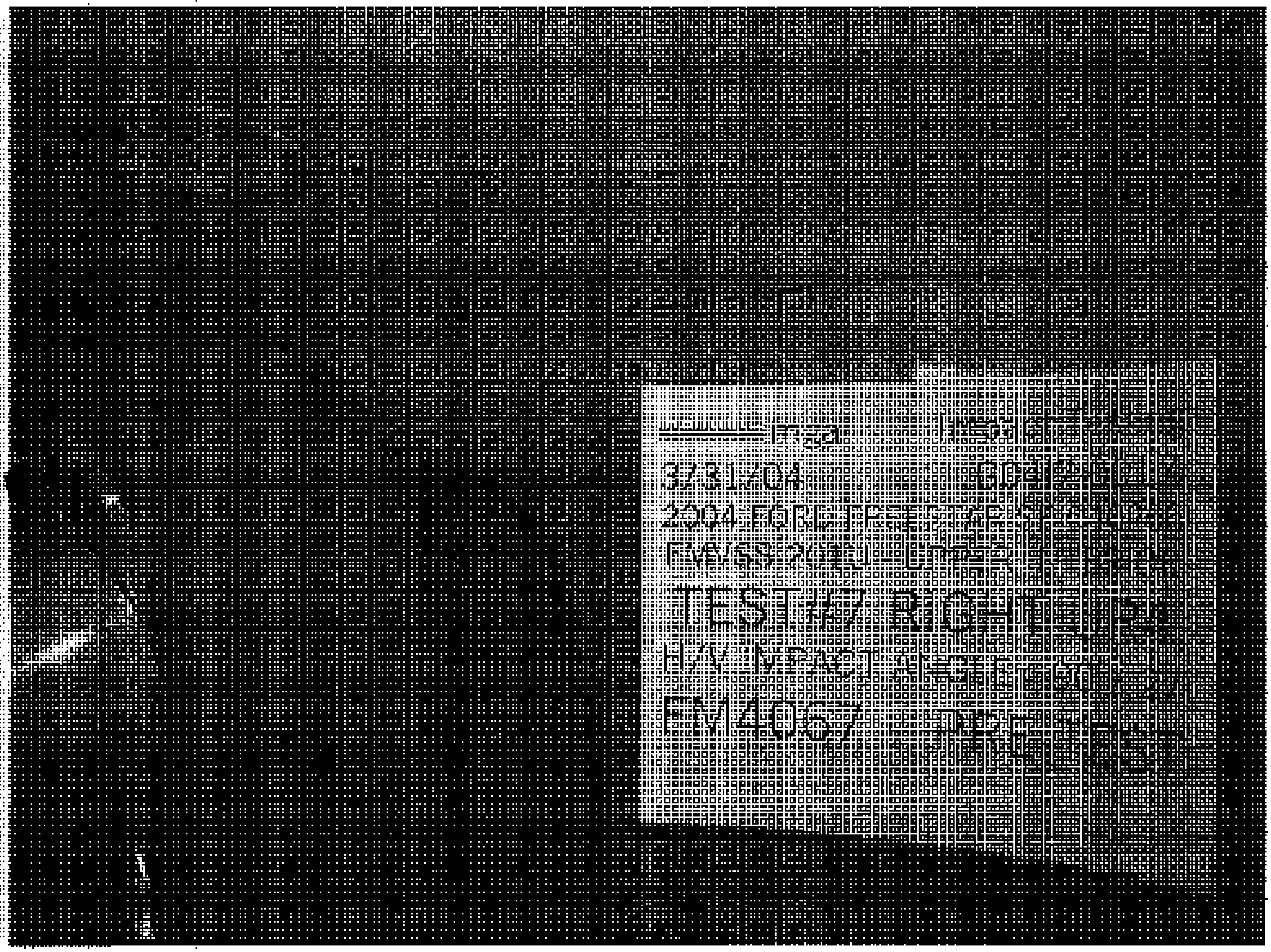
Model Year: 2004
Target: UR3
Vehicle Side: Right
Horz/Vert Angle: 90/38

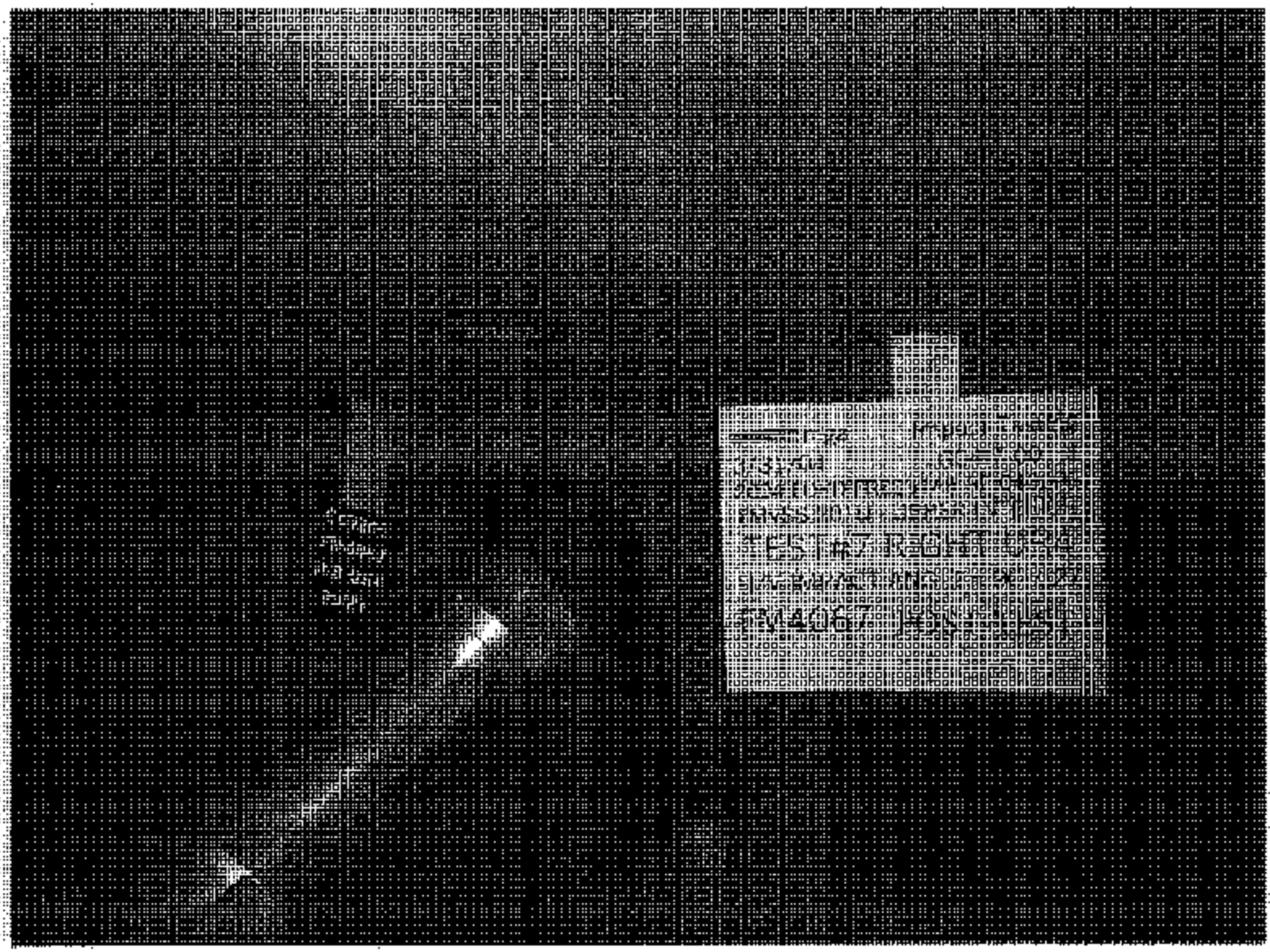
HIC(d) = 480, HIC = 416, Delta T = 6 msec

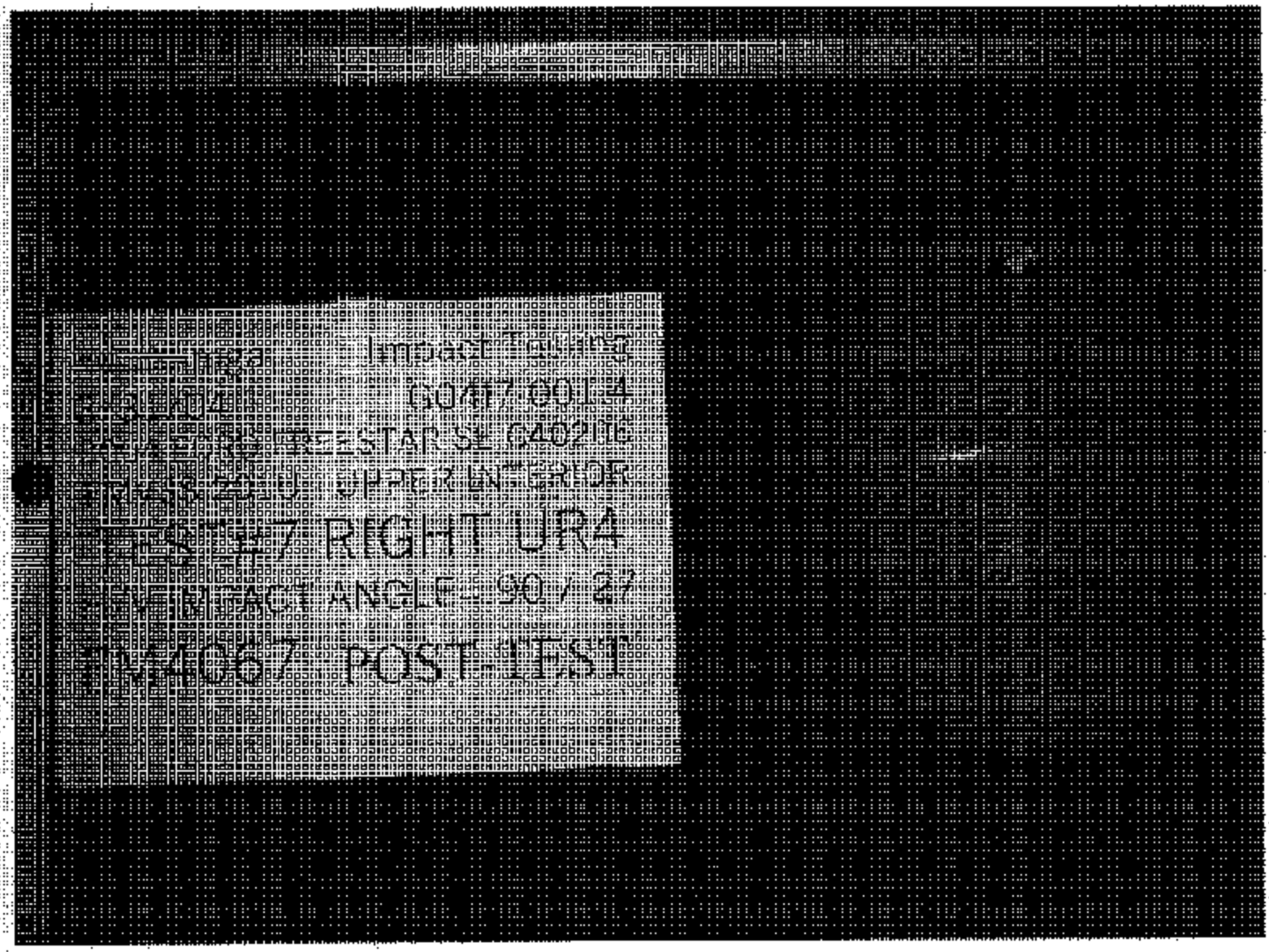
Max Displacement = 62.9 mm @ 14 msec



Displacement (mm) vs. Time (msec)


3/31/04
TEST#7 RIGHT
FM4067




Impact Duties
0047-0014
TESTAR SL 640210
UPPER INTERIOR
RIGHT UR4
IMPACT ANGLE - 90 / 37
POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: CY0206 VEHICLE YR/MAKE/MODEL: 2004 Ford Freestar SL

GENERAL TEST PARAMETERS: Test Number: 7

Target (Vehicle Side): left/(right) UR4 Temperature: 23 °F/(C)

MGA Test Reference No.: FMY067 Humidity: 35 %

Approach Angles: Horizontal 90 ° Time of Test: 10:45 (am)/pm

Vertical 27 ° FMH Serial No: 38

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/(Right) Pt. O
423	340	6.9	23.6	45	5

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-107.3	1.20	1.20
Y	6	J36193	101.1	1.23	1.23
Z	7	J36353	97.1	1.51	1.51

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

NO VISIBLE DAMAGE

Recorded By: [signature] Approved By*: [signature] Date: 3/31/04

*Only necessary for NHTSA (Government) Compliance testing.

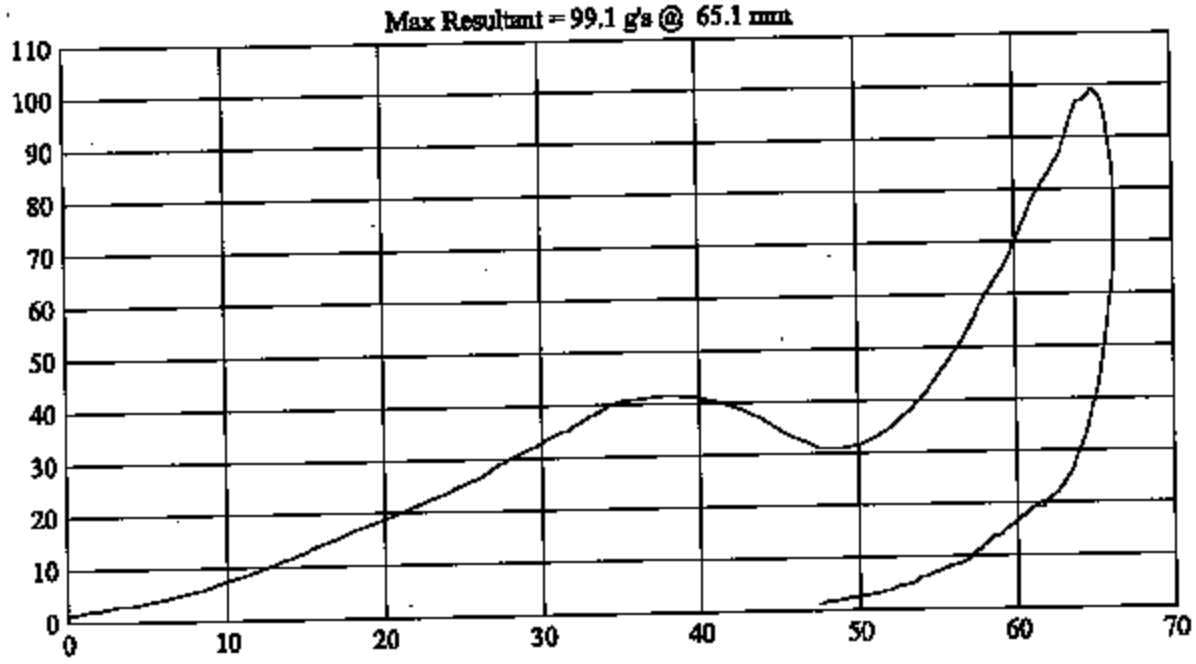
FMH
G04I7-001.4

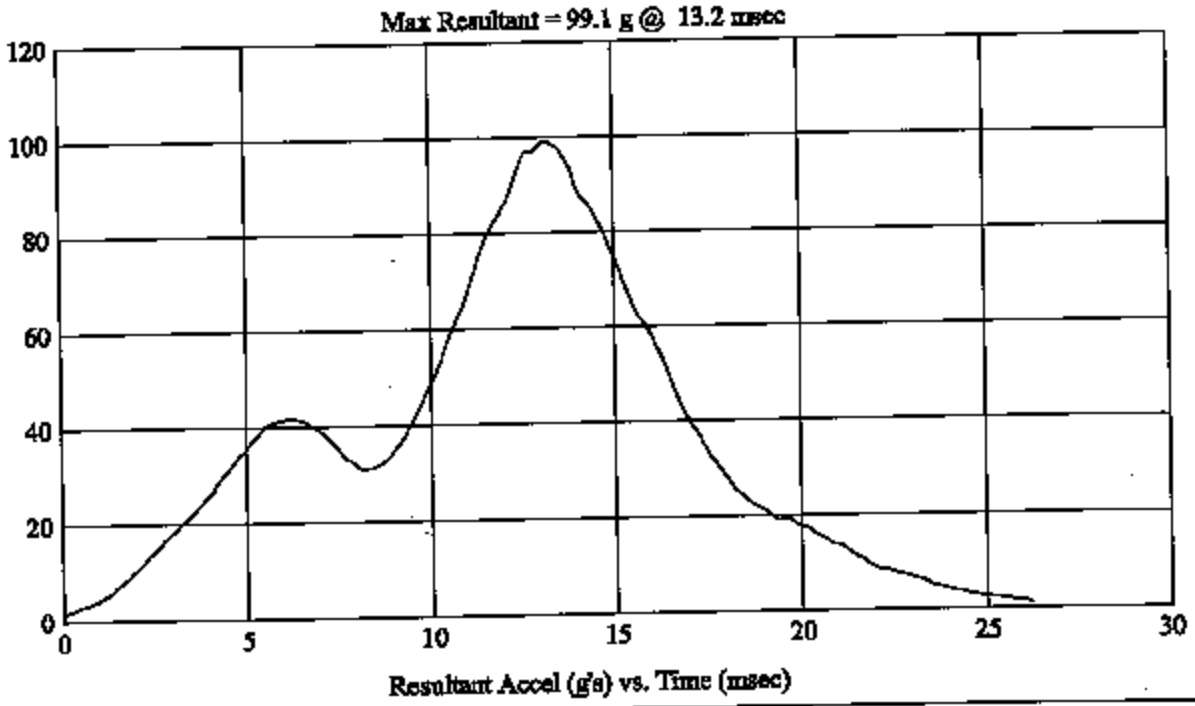
Customer: FORD
Test # 7
FM4067
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/27

HIC(d) = 423, HIC = 340, Delta T = 6.9 msec





FMH
G04I7-001.4

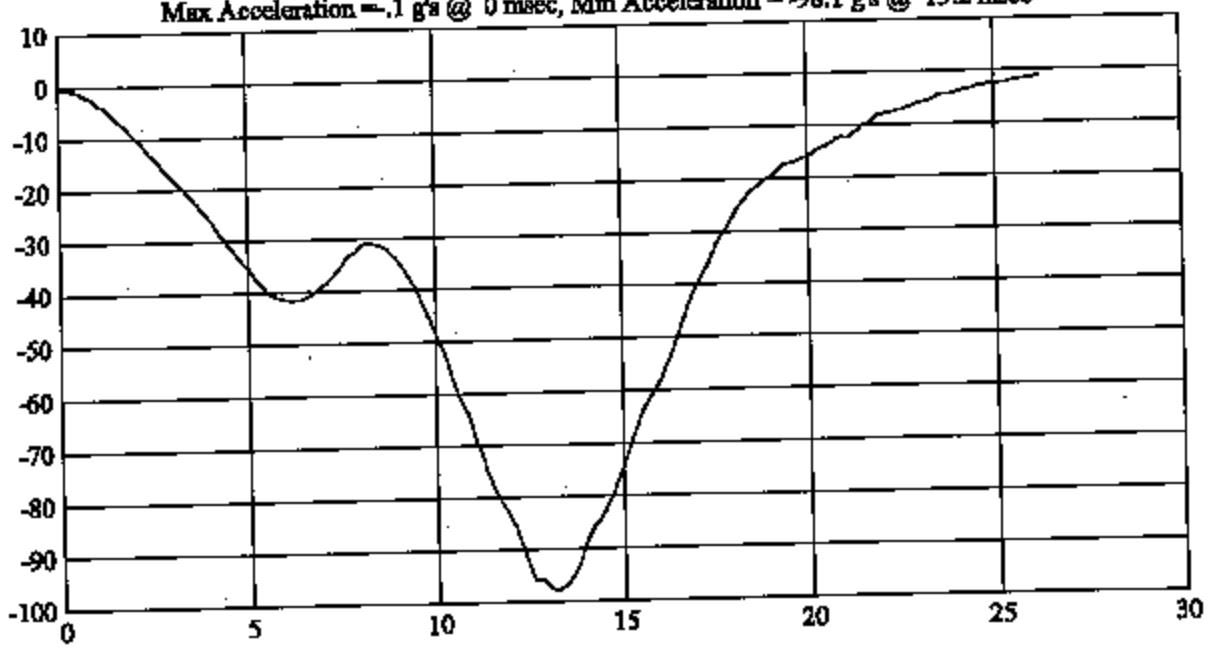
Customer: FORD
Test # 7
FM4067
Additional Deac: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/27

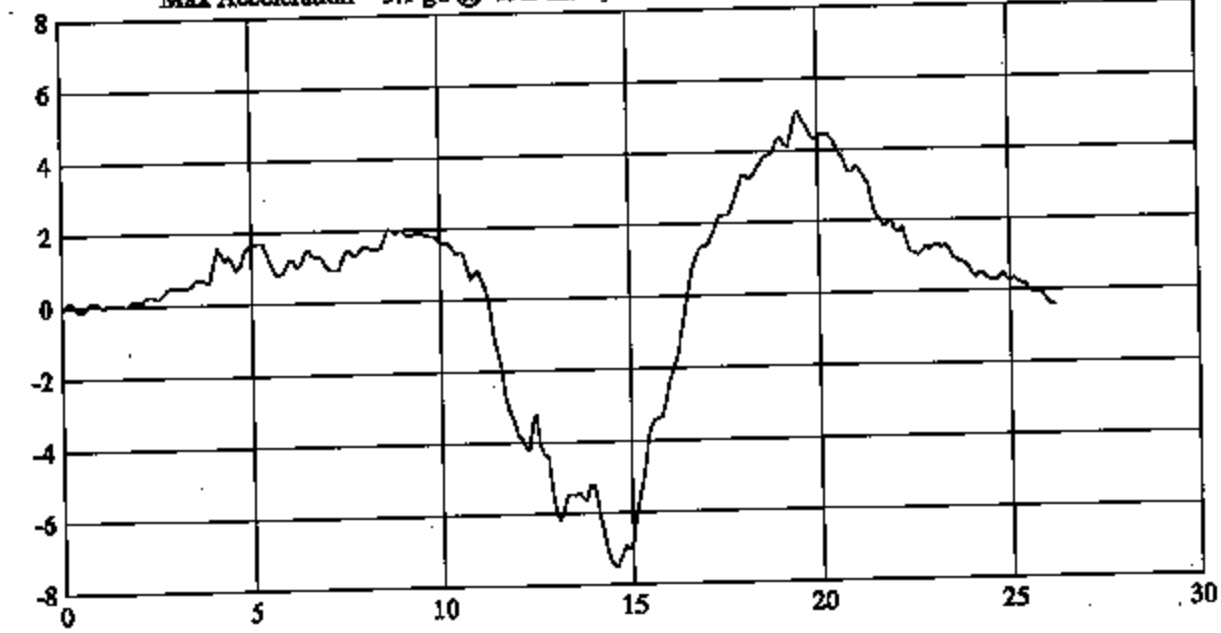
HIC(d) = 423, HIC = 340, Delta T = 6.9 msec

Max Acceleration = .1 g's @ 0 msec, Min Acceleration = -98.1 g's @ 13.2 msec



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

Max Acceleration = 5.1 g's @ 19.5 msec, Min Acceleration = -7.5 g's @ 14.6 msec



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

FMH
G04I7-001.4

Customer: FORD
Test # 7
FM4067
Additional Desc: N/A

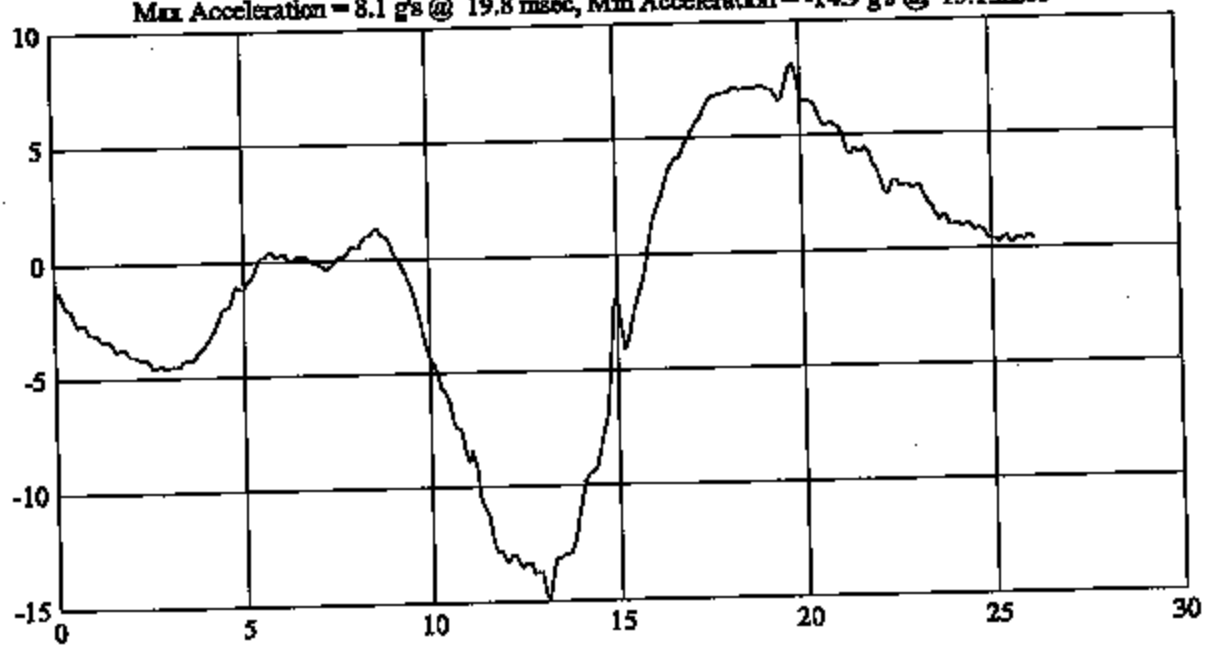
Vehicle Program : FREESTAR SE

Test Date: 3/31/04

Model Year: 2004
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/27

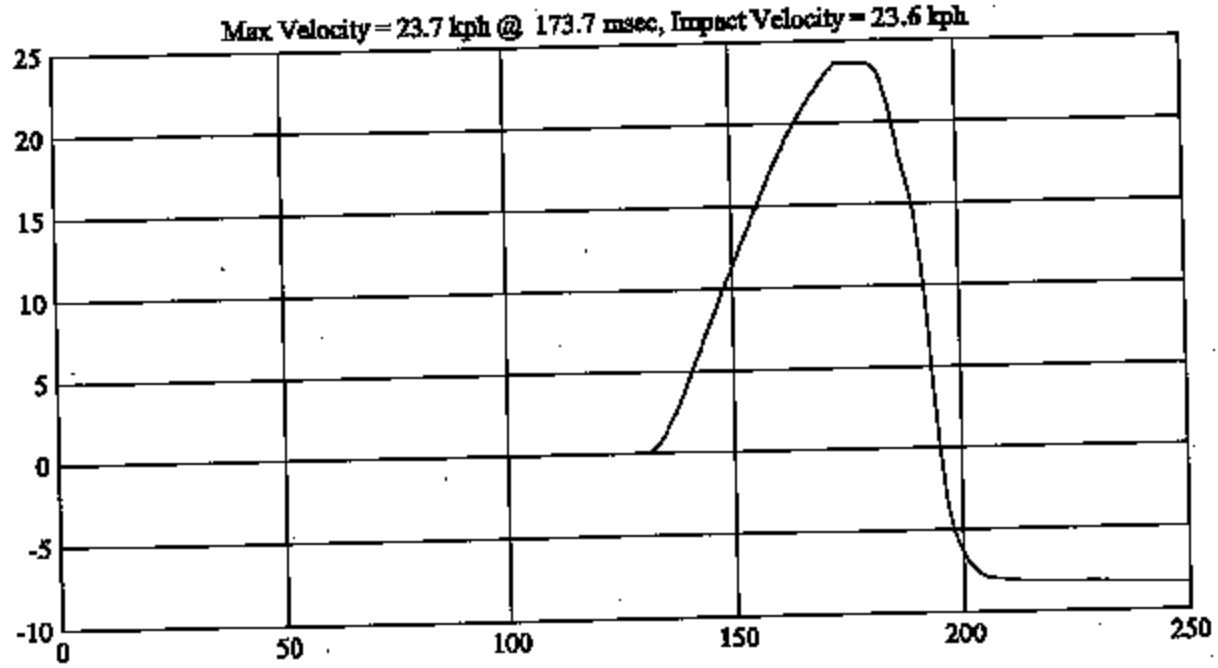
HIC(d) = 423, HIC = 340, Delta T = 6.9 msec

Max Acceleration = 8.1 g's @ 19.8 msec, Min Acceleration = -14.9 g's @ 13.1 msec



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

Max Velocity = 23.7 kph @ 173.7 msec, Impact Velocity = 23.6 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.4

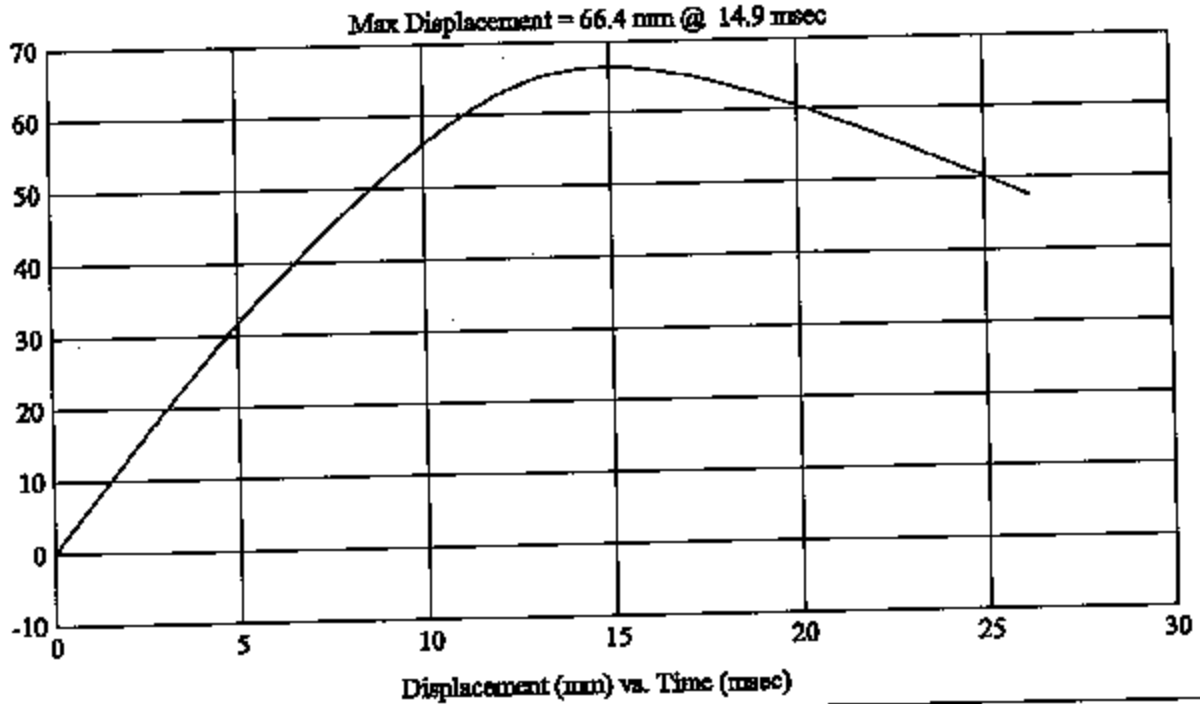
Customer: FORD
Test # 7
FM4067
Additional Desc: N/A

Vehicle Program : FREESTAR SE

Model Year: 2004
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/27

HIC(d) = 423, HIC = 340, Delta T = 6.9 msec

Max Displacement = 66.4 mm @ 14.9 msec



Displacement (mm) vs. Time (msec)

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the compliance 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.

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	S08059801273	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Protractor	Stanley N/A Craftsman	33-215 – –	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	TH8-24C	Record Temperature and Humidity	± 1°C ± 1% RH	Annual

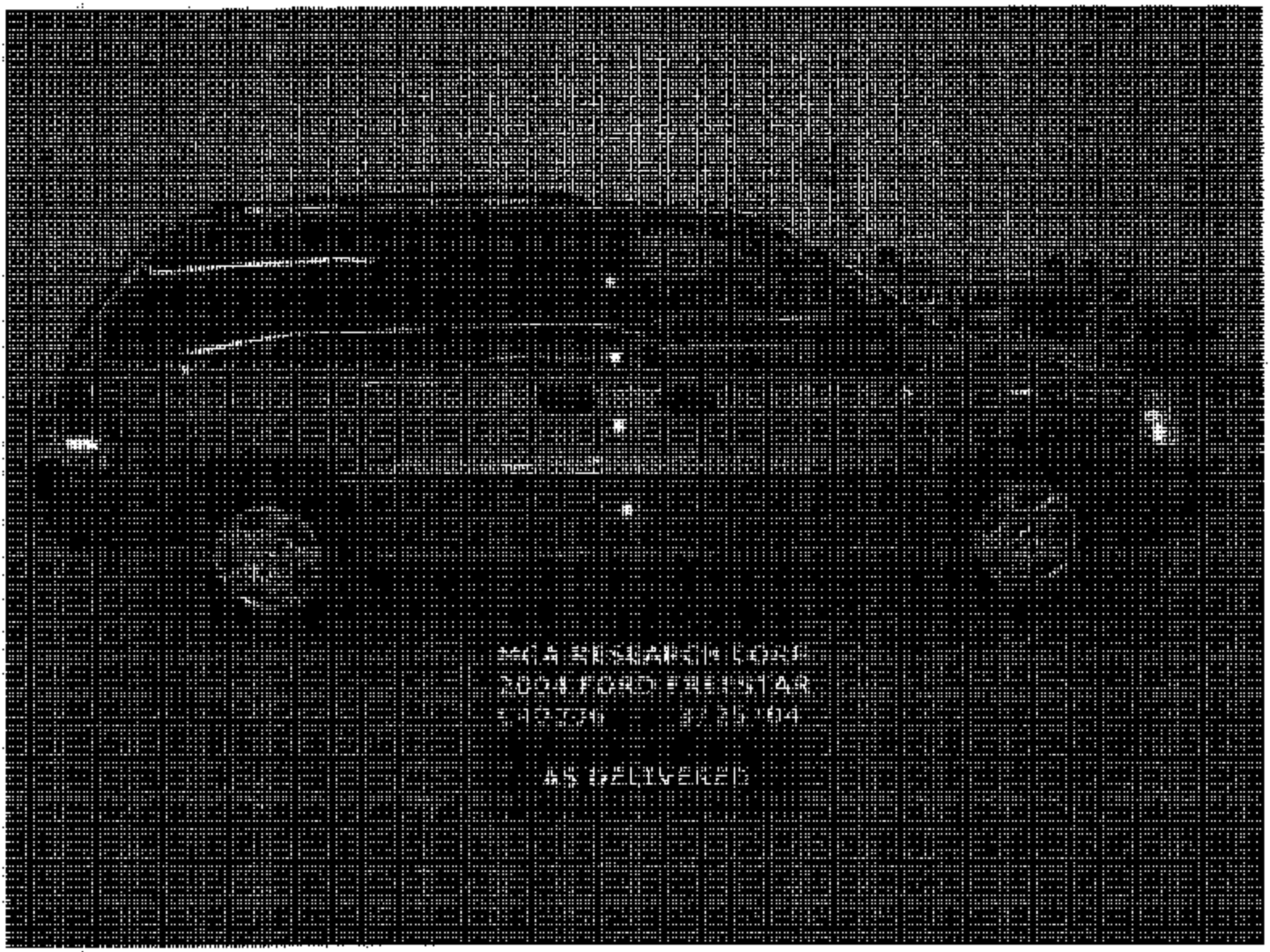
TABLE 4-2 FMH CALIBRATION SUMMARY DATA SUMMARY TABLE

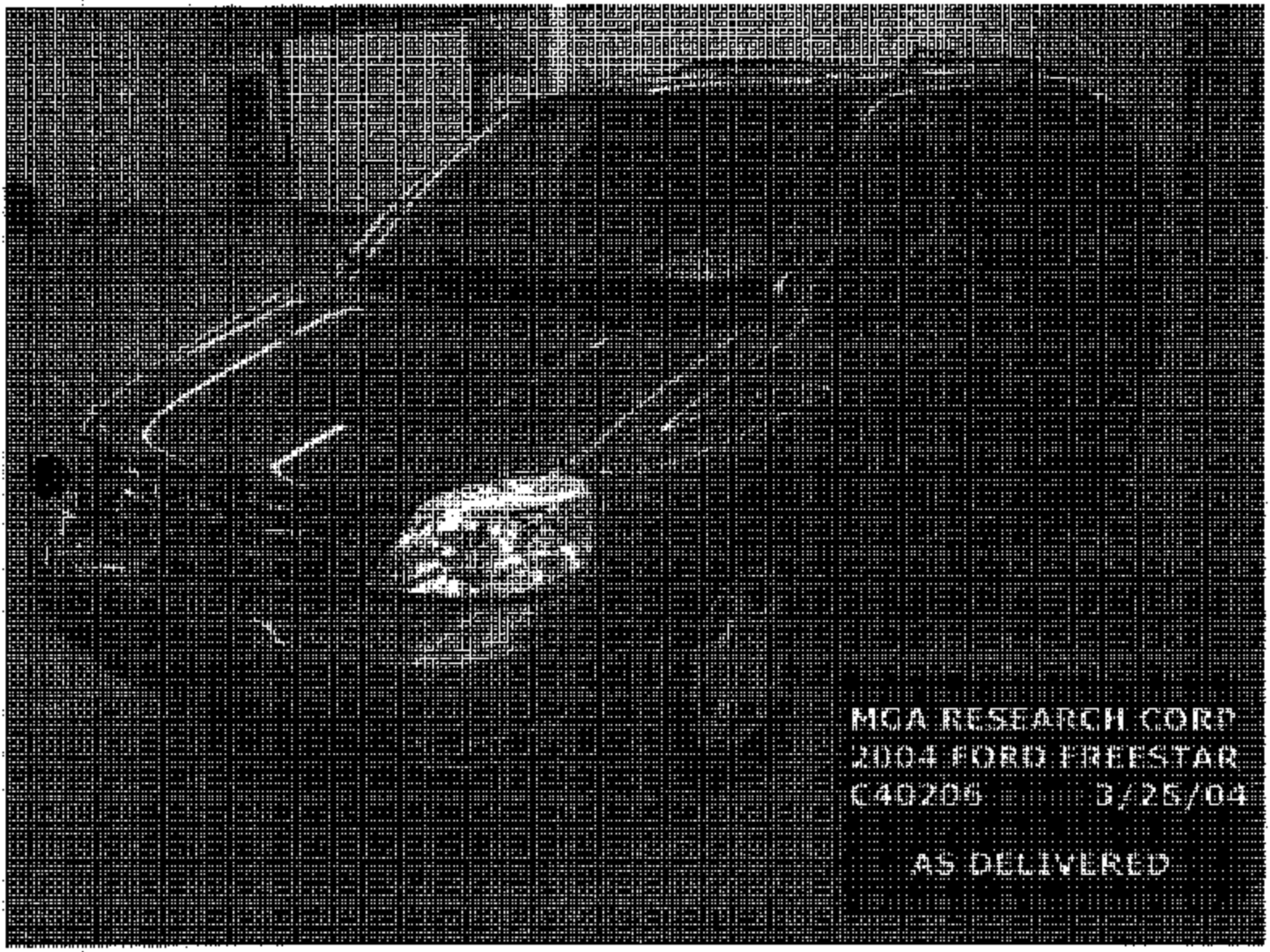
FMH Serial #		Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#35	10.02	24.0	35.0	238.4	5.8	Yes
Post	#35	10.02	23.0	28.0	250.9	6.0	Yes
Pre	#36	10.03	24.0	35.0	255.0	8.8	Yes
Post	#36	10.03	23.0	27.0	256.0	10.5	Yes
Pre	#38	9.99	22.0	50.0	260.3	3.7	Yes
Post	#38	9.99	23.0	27.0	246.7	2.8	Yes

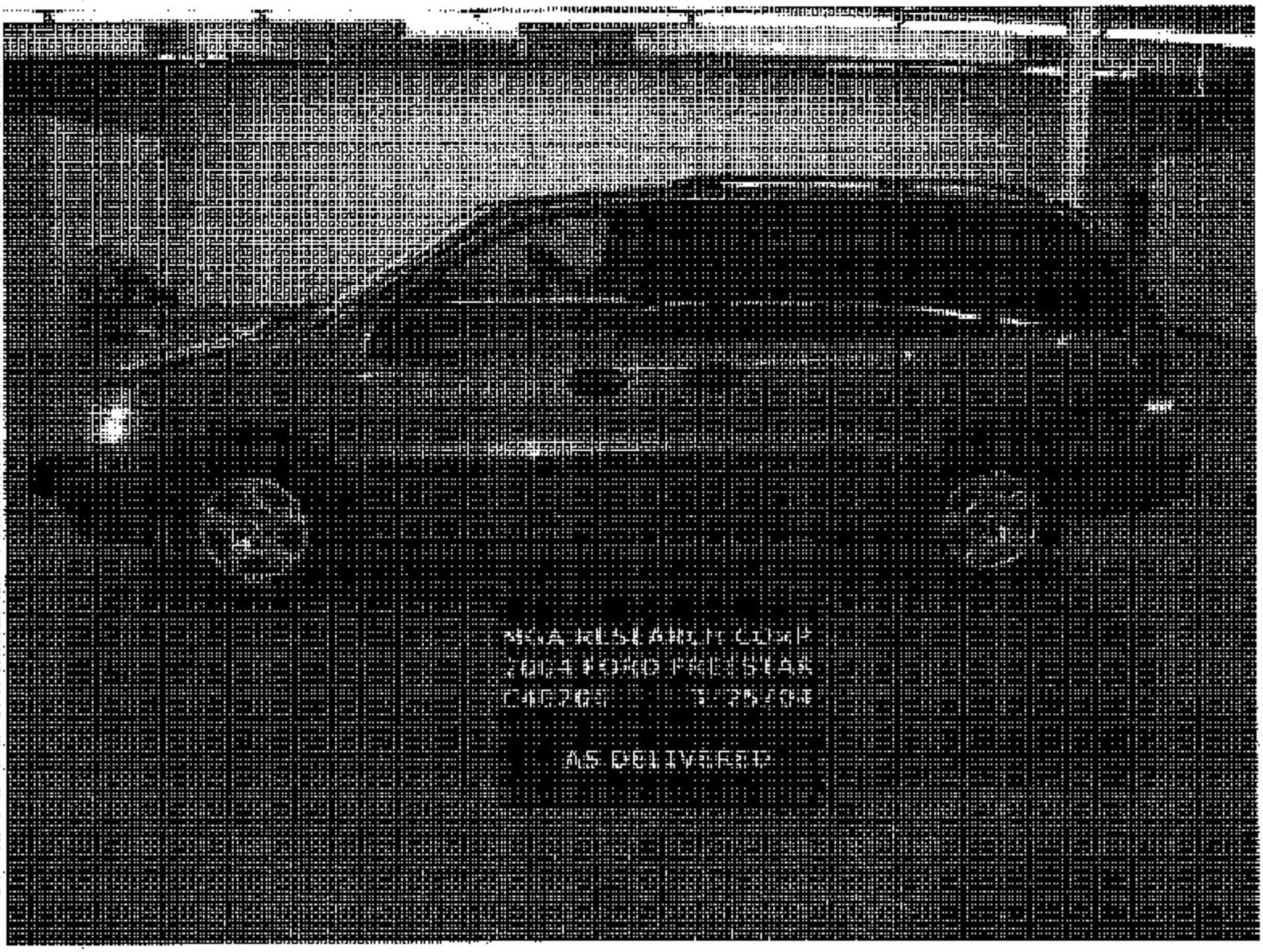
Calibration certificates and headform calibration information can be found in the P572L Performance Calibration report which accompanies this report.

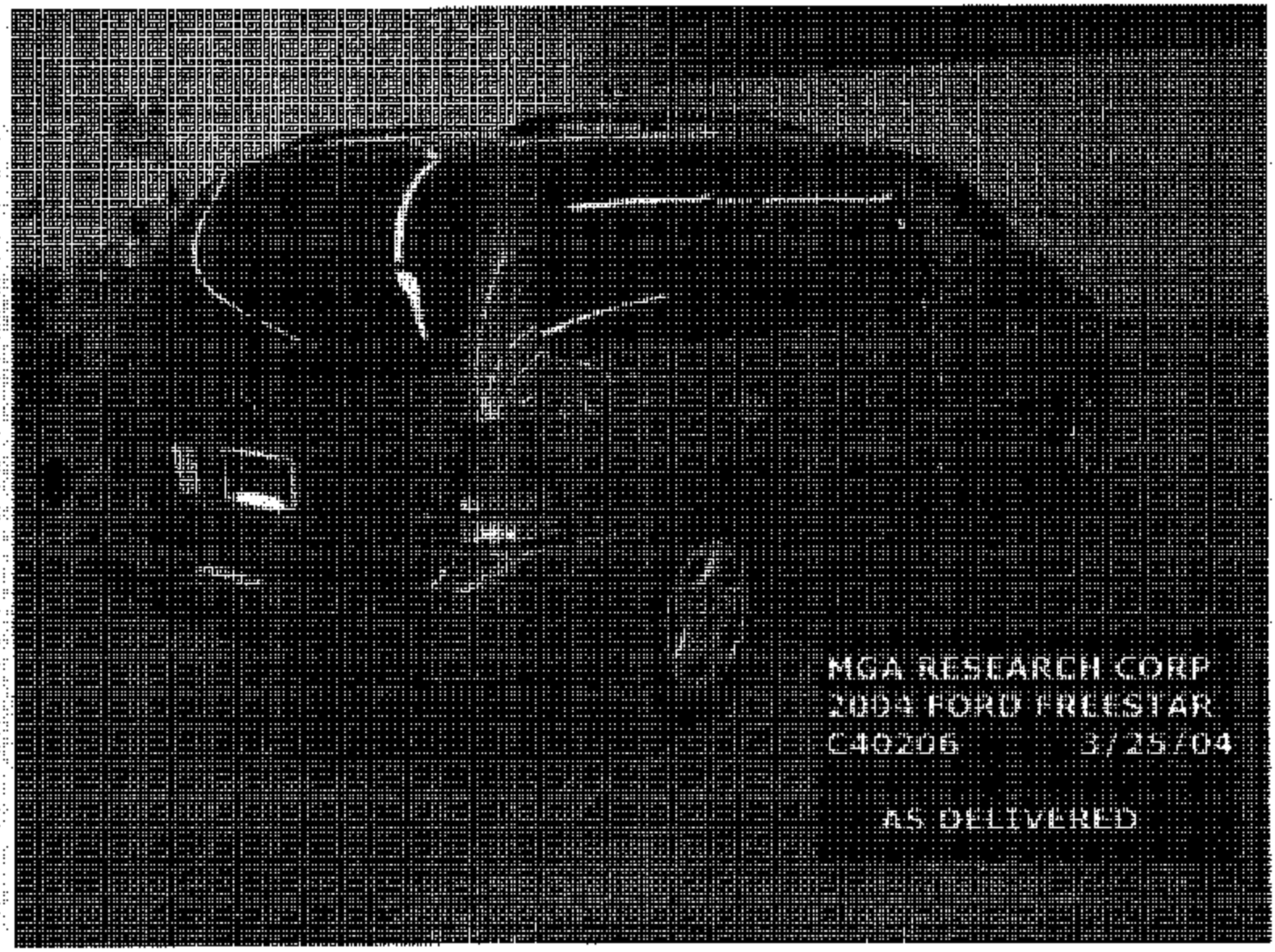
RECORDED BY: David G. Gotwals DATE: April 2, 2004

APPROVED BY: Helen A. Kaleto


2004 FORD FREESTAR
AS DELIVERED


MGA RESEARCH CORP
2004 FORD FREESTAR
C40206 3/26/04
AS DELIVERED


AS DELIVERED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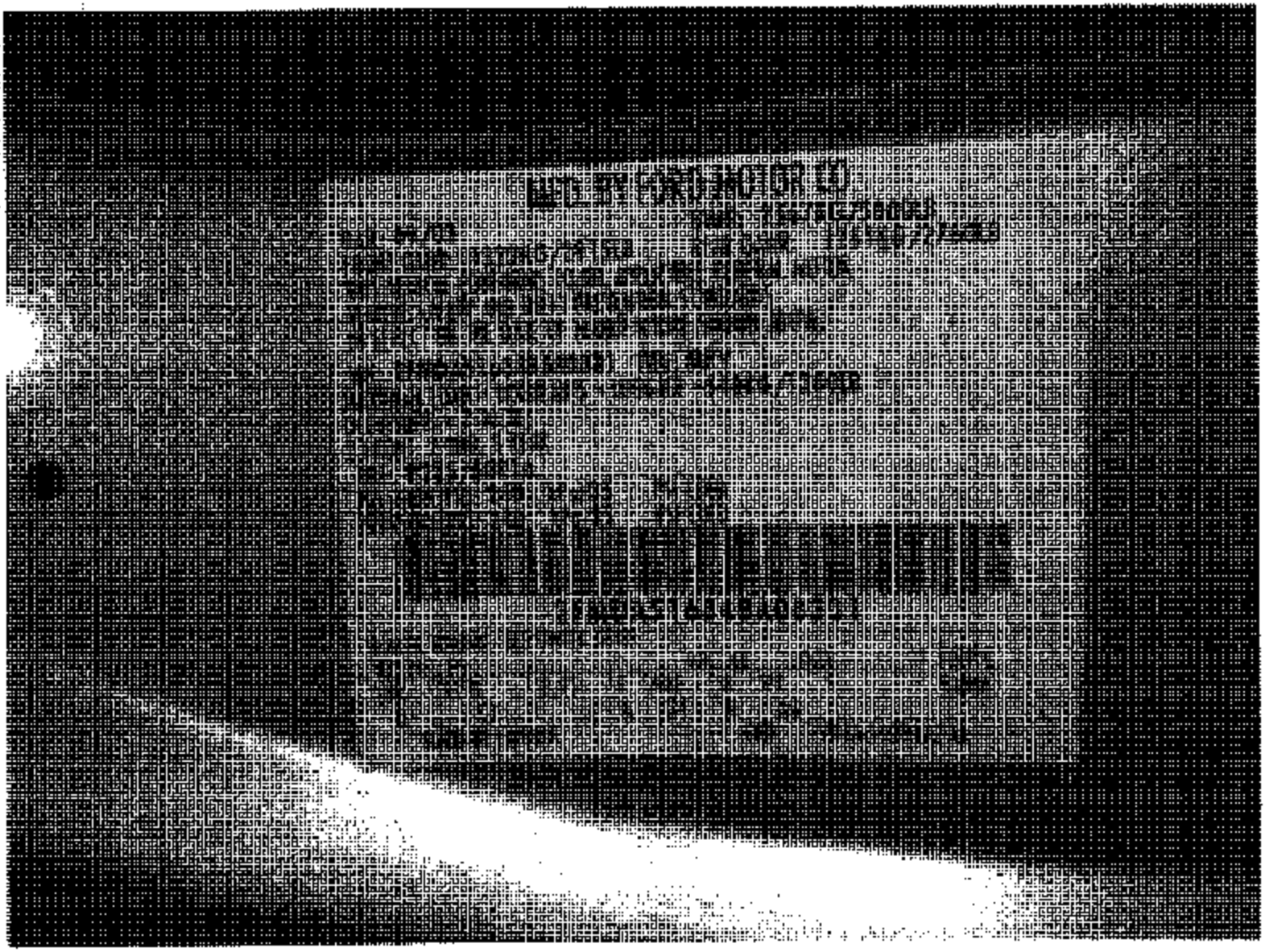
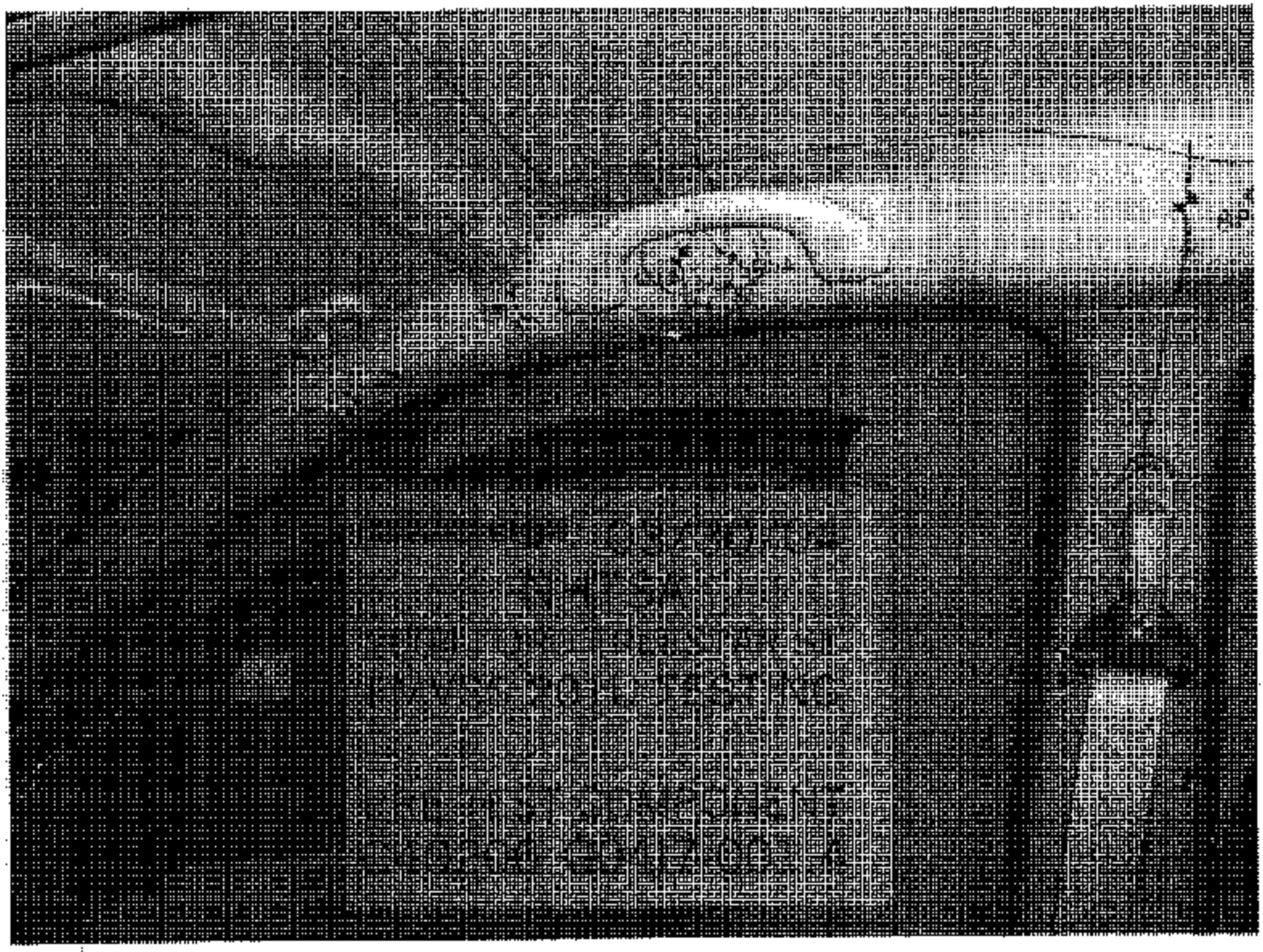
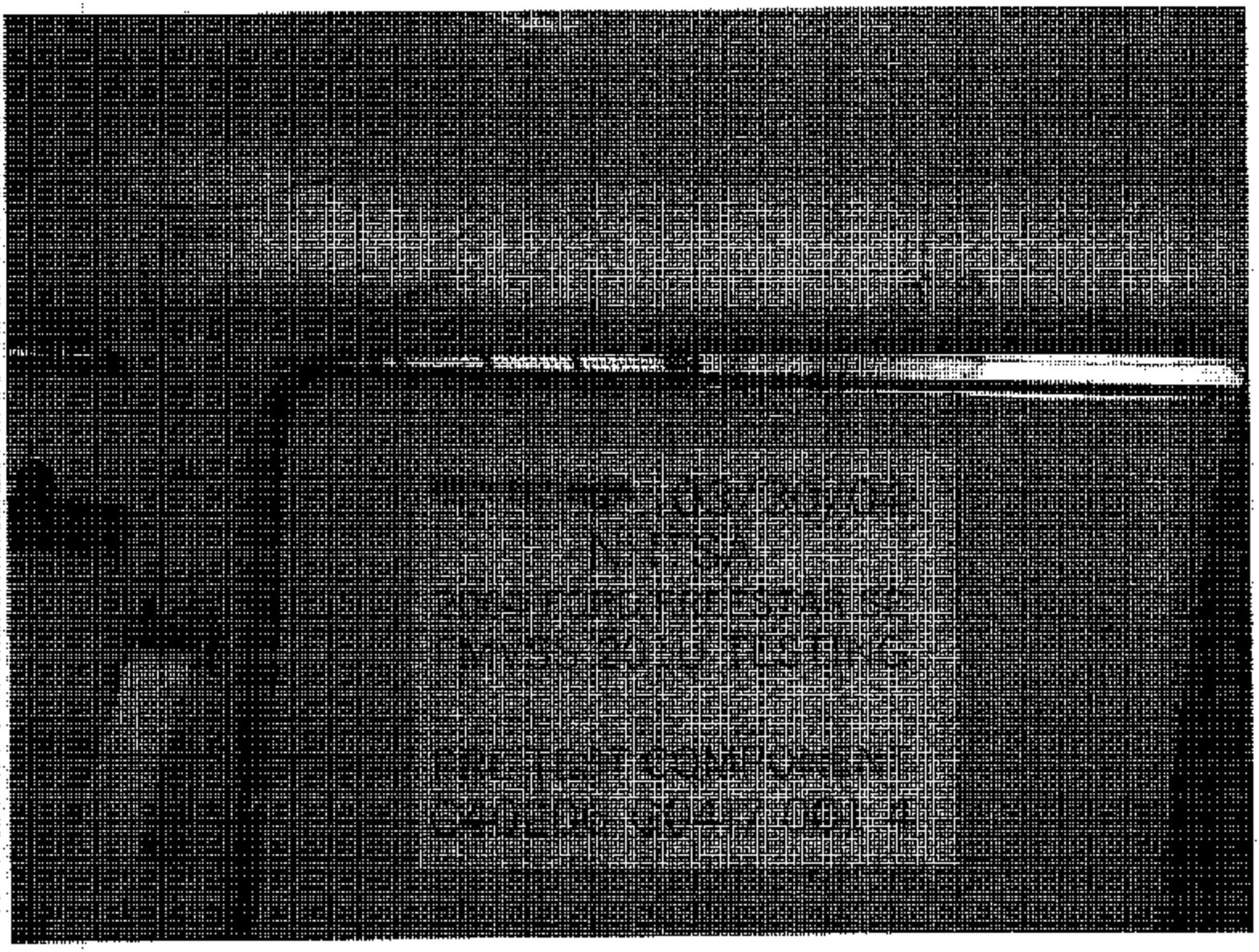
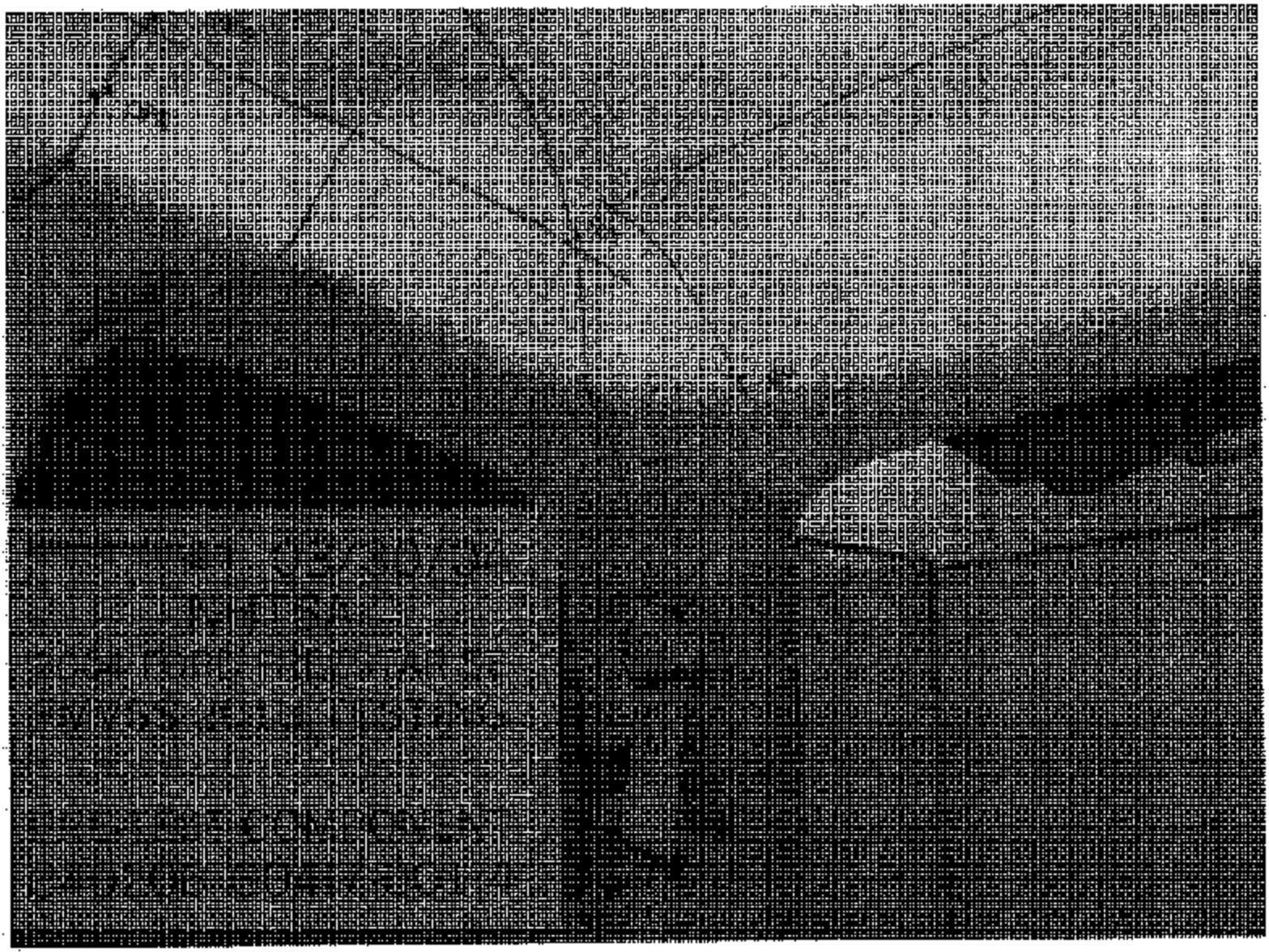
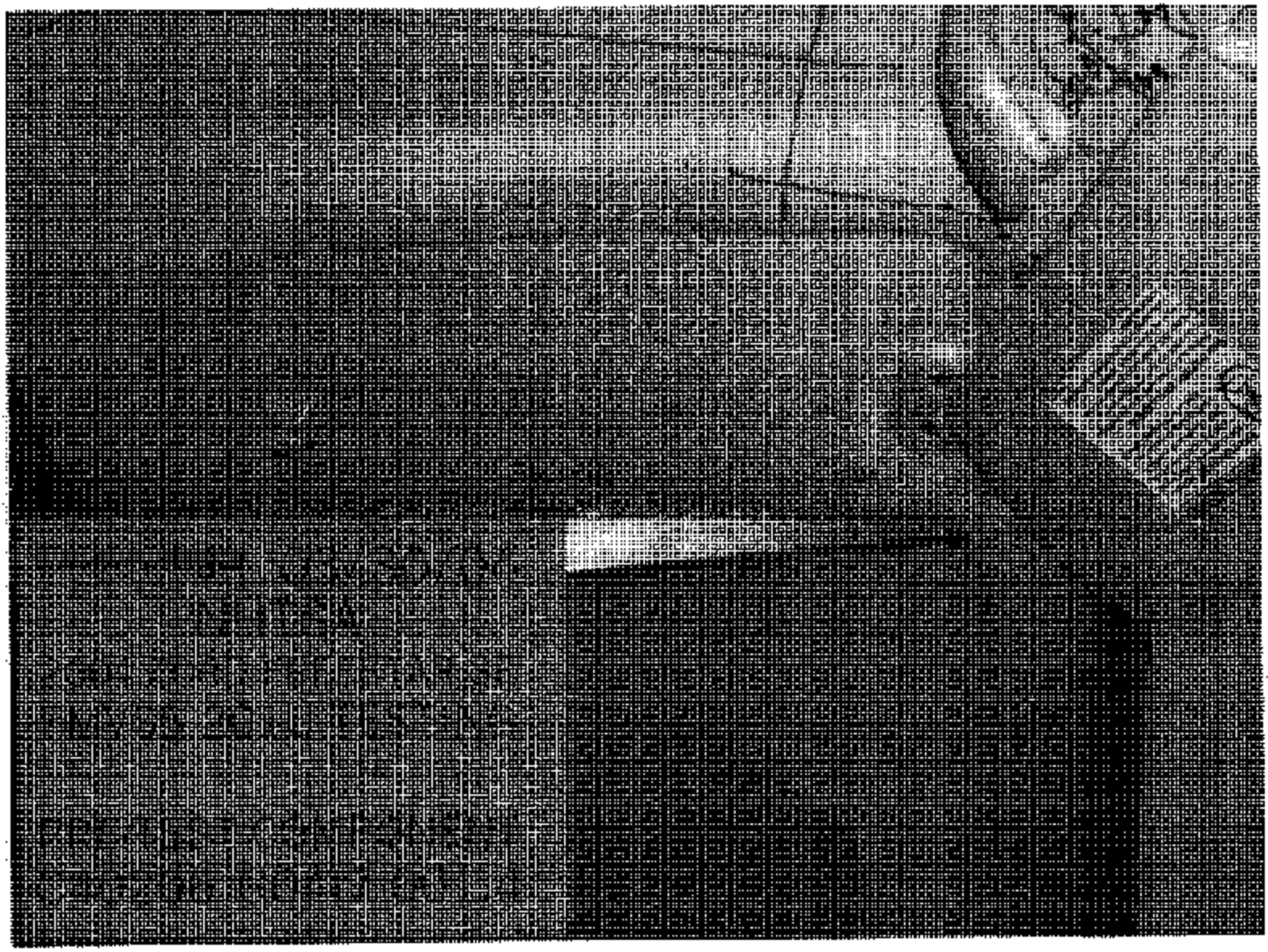
C40206 3/25/04
AS DELIVERED

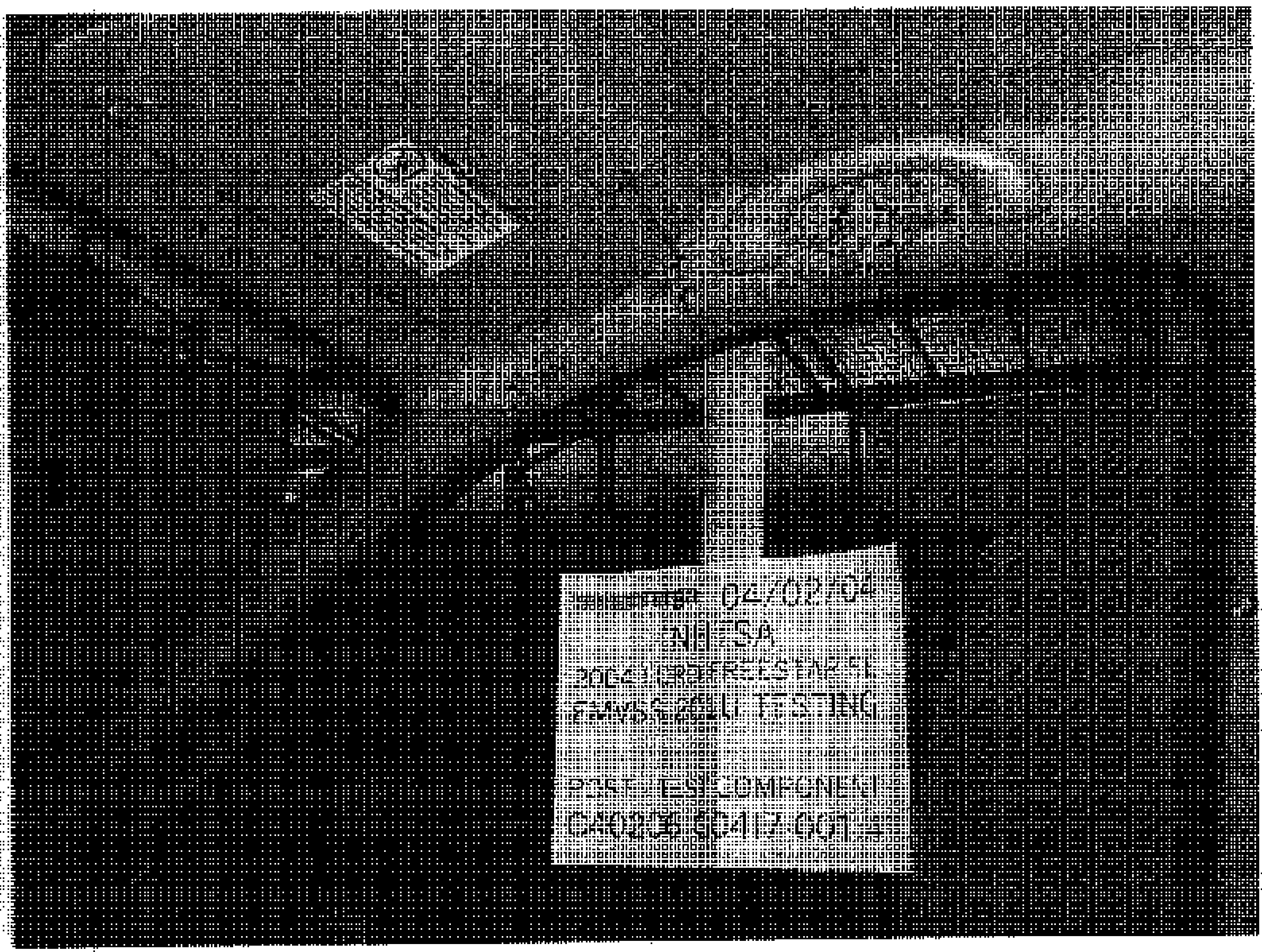


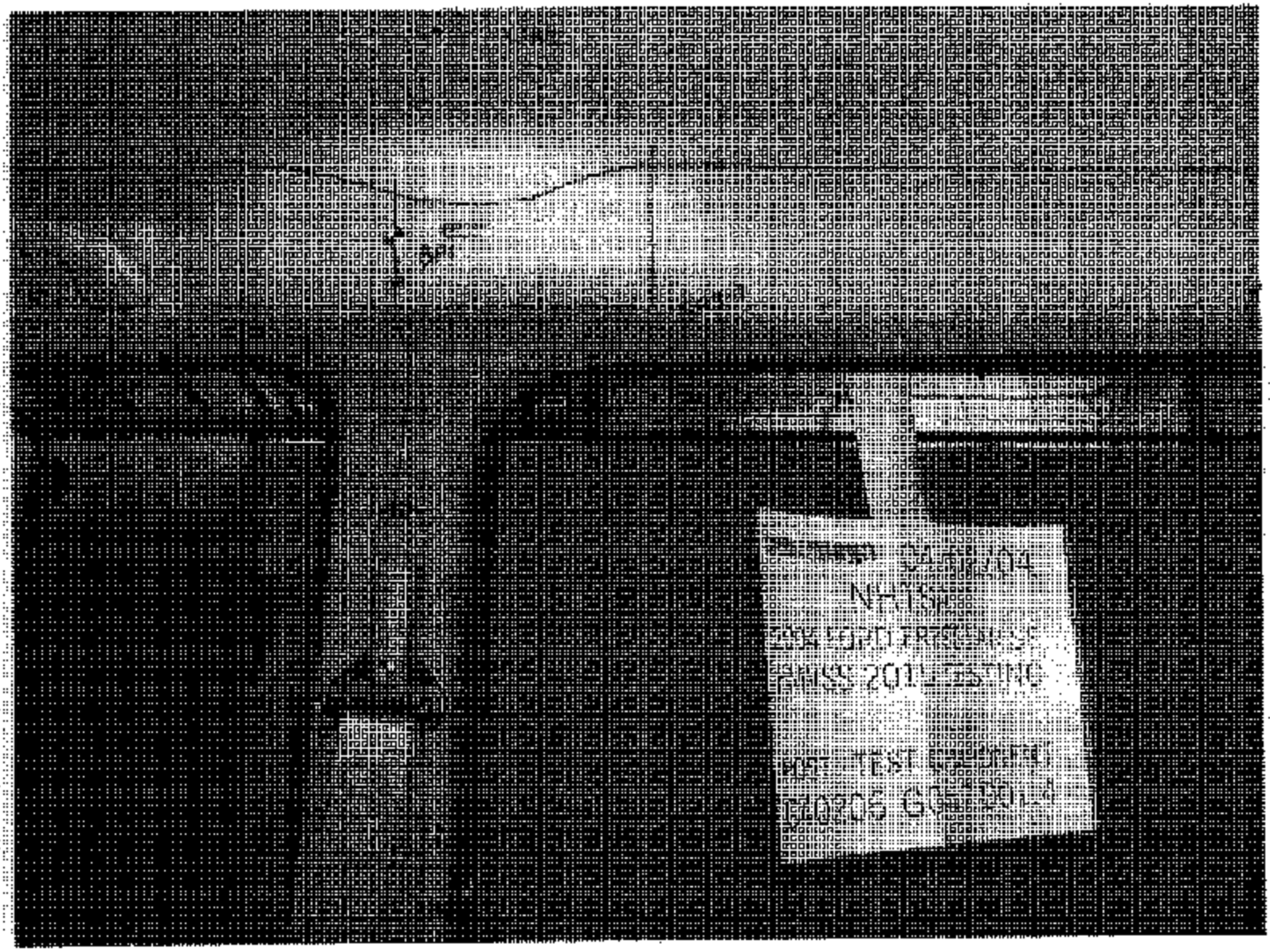


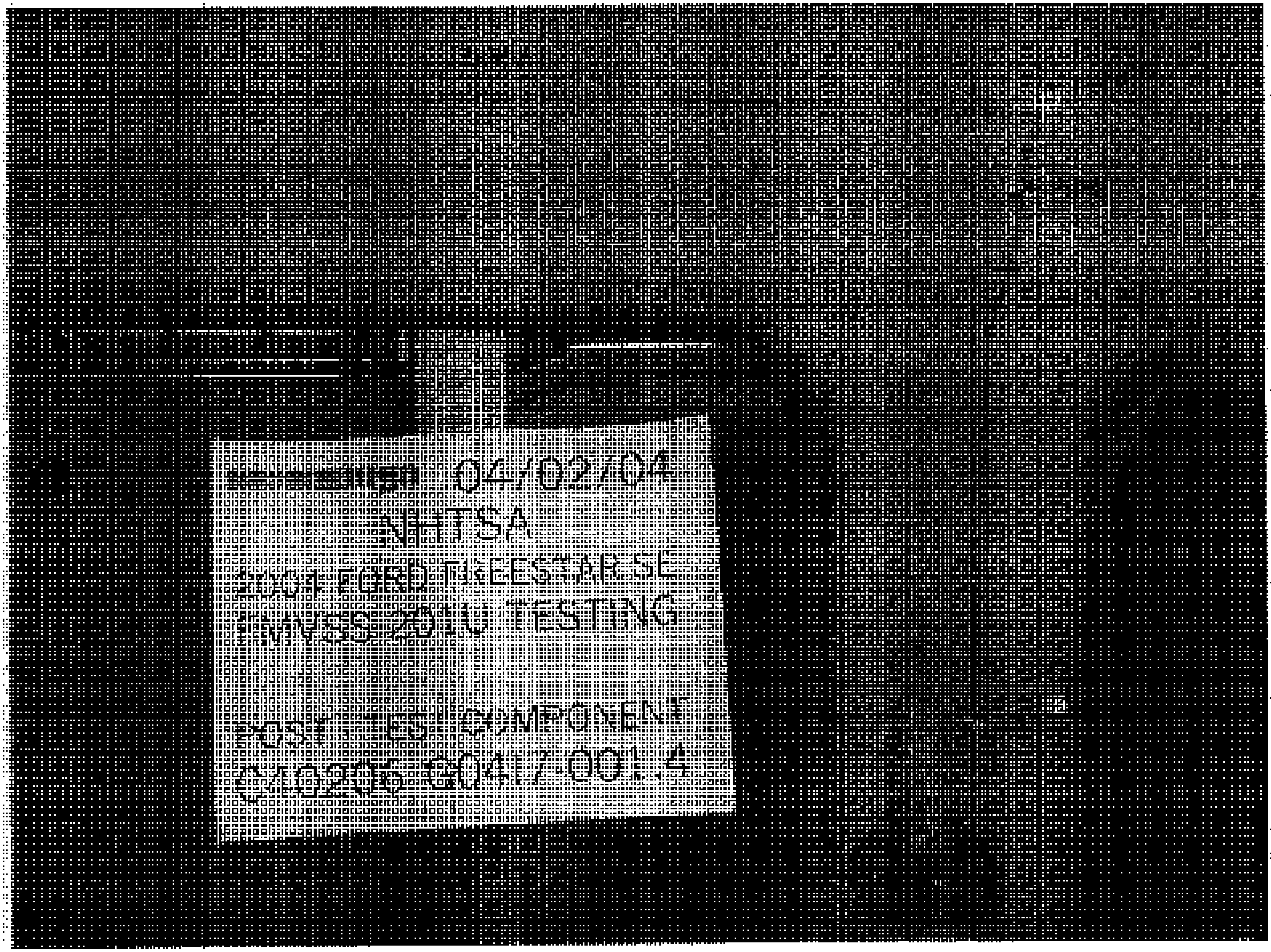


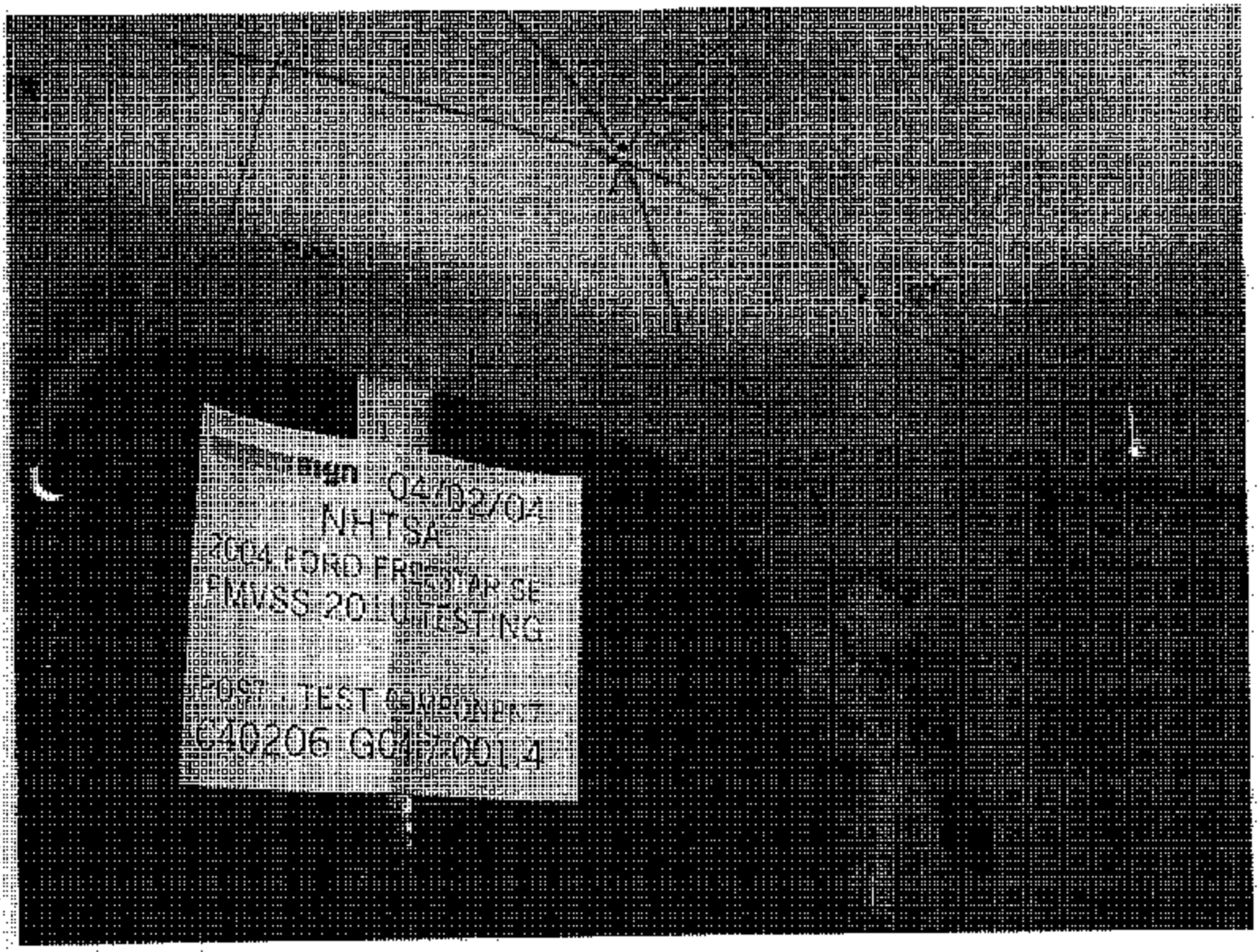


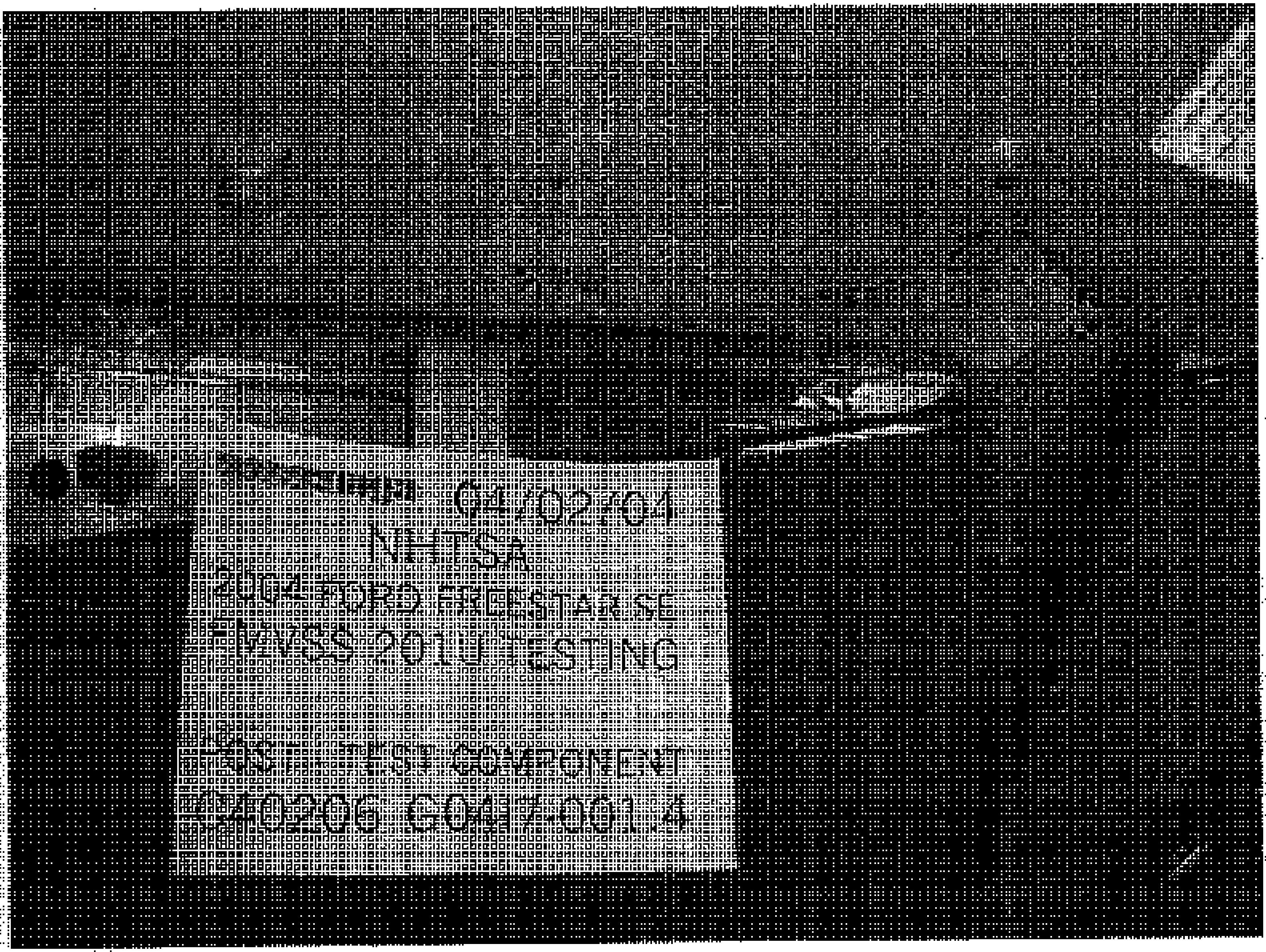


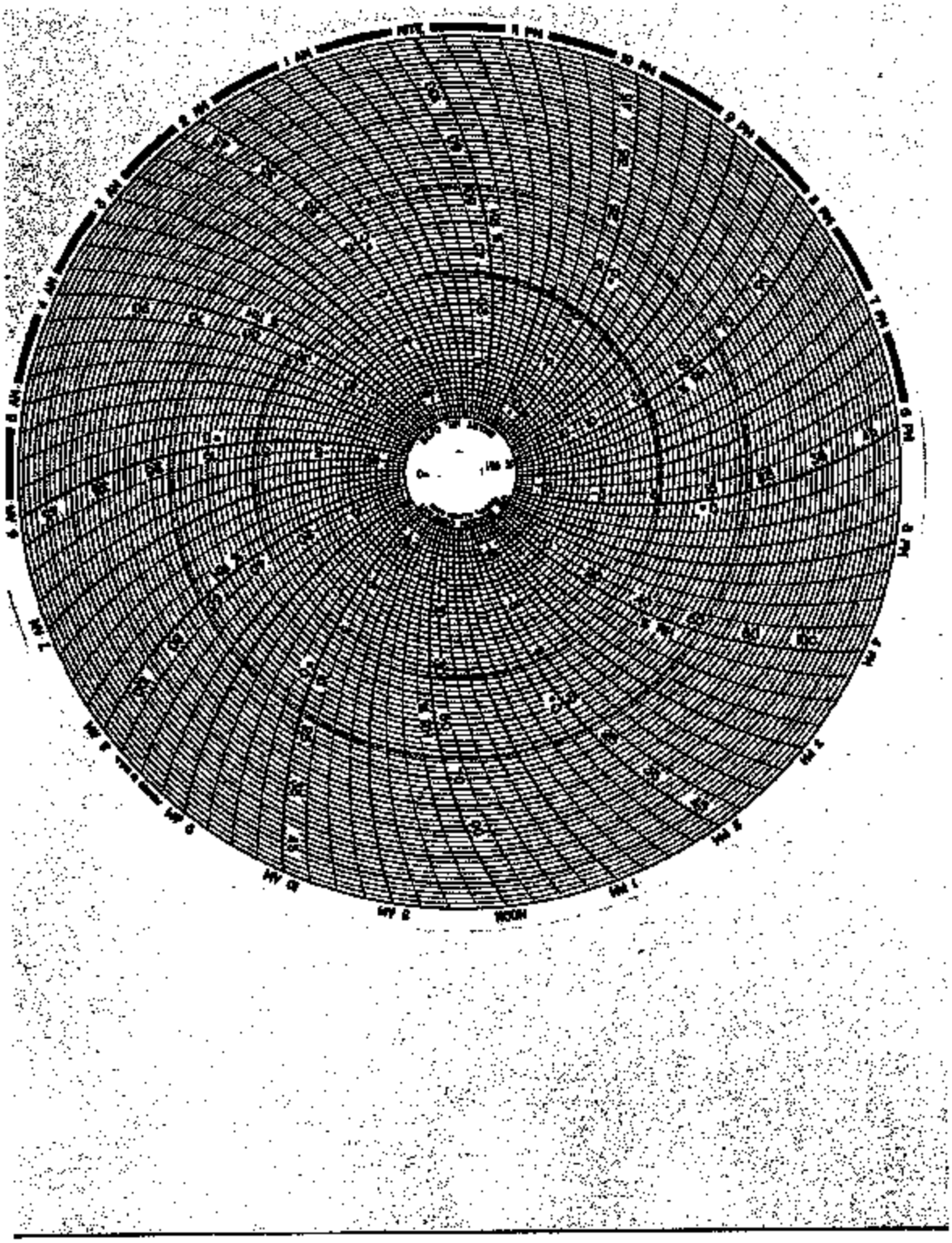

04/02/04
TESTING



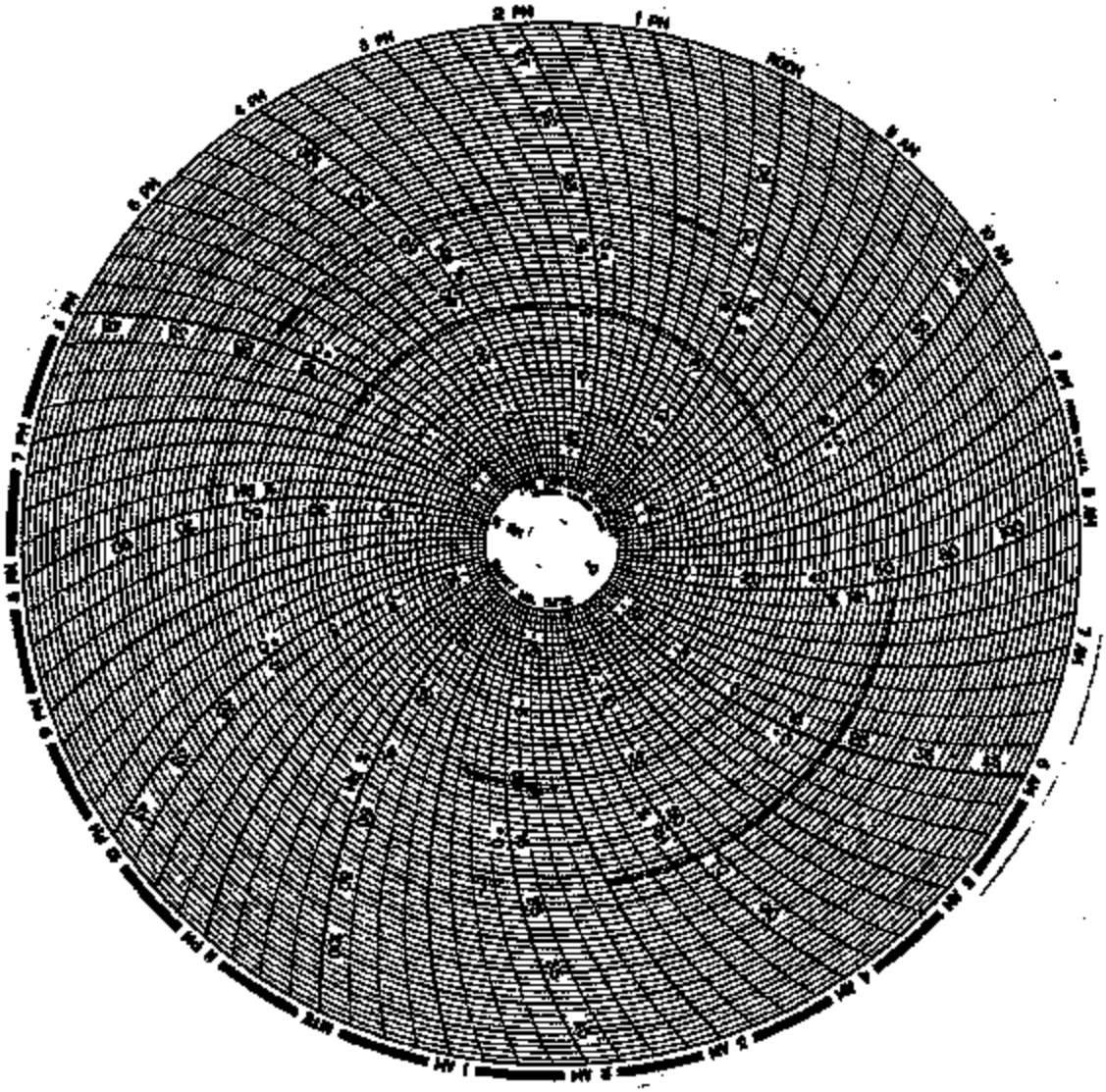

04/02/04
NHTSA
FMVSS 201U TESTING
POST TEST COMPONENT


Design 04/02/04
NHTSA
2004 FORD FREESTAR SE
FMVSS 201 U TESTING
POST TEST CONFIGURATION
040206 GC 2001.4

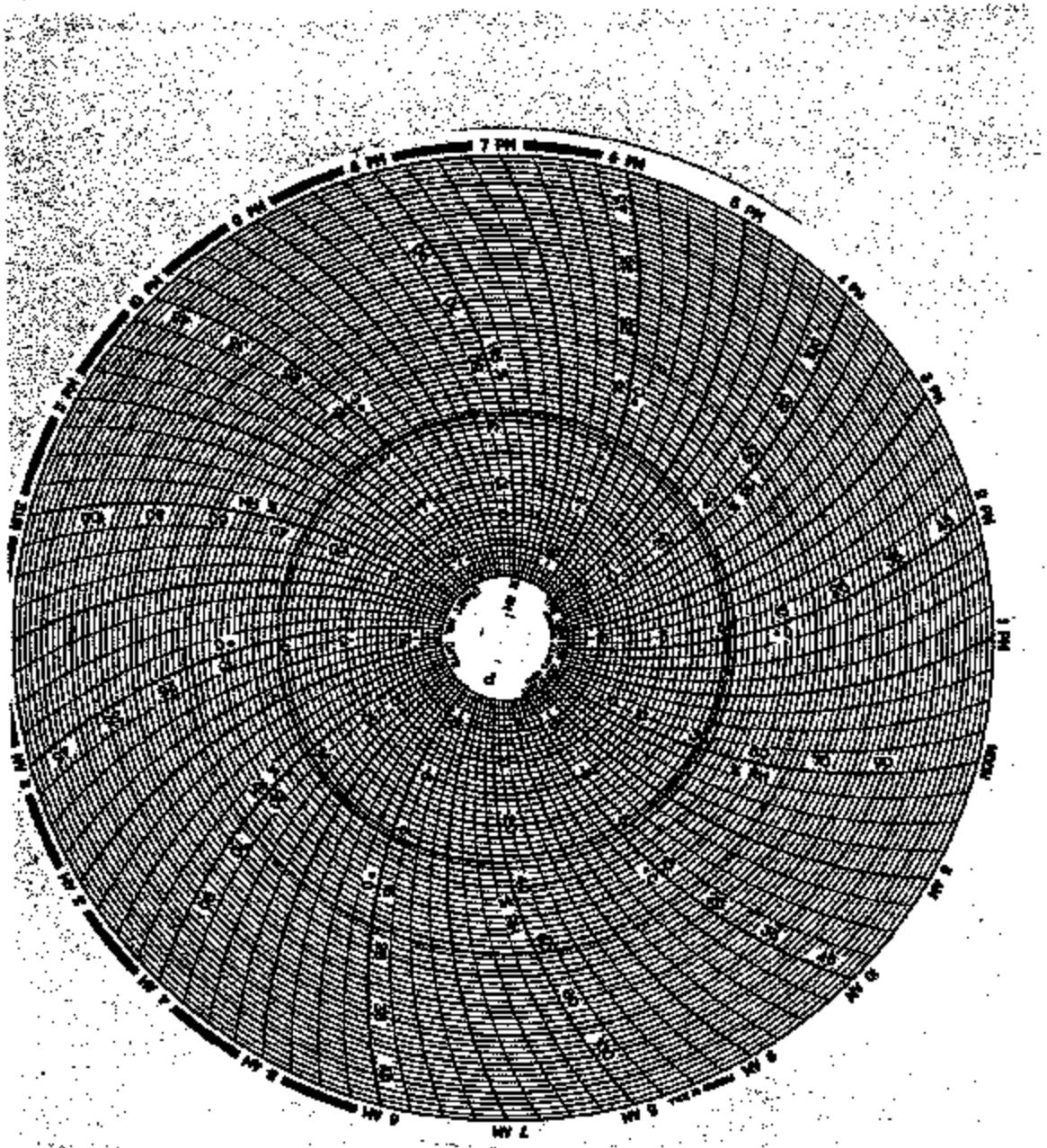

04/02/04
NHTSA
2004 FORD FREESTAR SE
FMVSS 201U TESTING
POST - TEST COMPONENT



March 30th-31st, 2004



March 31st-April 1st, 2004



April 1st-2nd , 2004