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Report Number: 214-TRC-04-004

Safety Compliance Testing For FMVSS 214

Side Impact Protection

Indicant

Toyota Motor Corporation

2005 Scion TC 2-door

NHTSA Number: C55102

Transportation Research Center Inc.

10820 State Route 347

P. O. Box B-67

East Liberty, OH 43319



Test Date: October 20, 2004

Final Report: November 1, 2004

**U. S. Department Of Transportation
National Highway Traffic Safety Administration
Enforcement**

**Office of Vehicle Safety Compliance
400 Seventh Street, S. W.
Room No. 6111 (NVS-220)
Washington, DC 20590**

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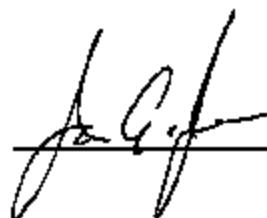
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16. Abstract This 56/28 km/h 90° Impact (Moving Deformable Barrier) Compliance Test was conducted on the subject vehicle, a 2005 Scion TC 2-door hatchback in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-214D-06 (except the test was conducted 8 km/h (5 mph) faster than the standard specifies) to determine FMVSS 214 Side Impact Protection compliance. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on October 20, 2004. The impact velocity of the Moving Deformable Barrier (MDB) was 62.0 km/h, and the ambient temperature at the struck (Driver side) side of the target vehicle at the time of impact was 21° C. The target vehicle's post-test maximum crush was 248 mm at Level 2. The test or target vehicle's performance is given below (with FIR filter): <table border="1"> <thead> <tr> <th></th> <th>Front SID HIH</th> <th></th> <th>Rear SID HIH</th> <th></th> </tr> </thead> <tbody> <tr> <td>Left Upper Rib Acceleration:</td> <td>55.7</td> <td>g's</td> <td>52.0</td> <td>g's</td> </tr> <tr> <td>Left Lower Rib Acceleration:</td> <td>56.8</td> <td>g's</td> <td>67.6</td> <td>g's</td> </tr> <tr> <td>Lower Spine Acceleration:</td> <td>67.4</td> <td>g's</td> <td>56.4</td> <td>g's</td> </tr> <tr> <td>Thoracic Trauma Index, (TTI):</td> <td>62.1</td> <td>g's</td> <td>62.0</td> <td>g's</td> </tr> <tr> <td>Pelvis Acceleration (PEV):</td> <td>54.1</td> <td>g's</td> <td>42.8</td> <td>g's</td> </tr> </tbody> </table> The door on the struck side of the vehicle did not separate from the body at the hinge or latch and the opposite door did not open during side impact event.				Front SID HIH		Rear SID HIH		Left Upper Rib Acceleration:	55.7	g's	52.0	g's	Left Lower Rib Acceleration:	56.8	g's	67.6	g's	Lower Spine Acceleration:	67.4	g's	56.4	g's	Thoracic Trauma Index, (TTI):	62.1	g's	62.0	g's	Pelvis Acceleration (PEV):	54.1	g's	42.8	g's
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17. Key Words Compliance Testing Side Impact Protection FMVSS 214 Side Impact Dummy (SID HIH)	18. Distribution Statement Copies of this report are available from: NHTSA Technical Information Services (TIS) Room 5108 (NPO-230), 400 Seventh Street, S.W. Washington, DC 20590 Telephone No. (202) 366-4946 Attn: Robert Hornicle																															
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Section 1

Purpose and Test Procedure

This side impact test is part of the FMVSS 214 Side Impact Protection Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-02-D-11114. The purpose of this test was to evaluate side impact protection in a 2005 Scion TC 2-door. The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-214D-06, dated July 2001) (except the test was conducted 8 km/h (5 mph) faster than the standard specifies).

Section 2

Summary of Side Impact Test

A 2005 Scion TC 2-door was impacted on the driver side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the monorail at a velocity of 62.0 km/h (38.5 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, Ohio on October 20, 2004. Pre-test and post-test photographs of the test vehicle, the moving deformable barrier (MDB), and the side impact dummies (SID HIIIs) are included in Appendix A.

Two restrained Side Impact Dummies (SID HIIIs) were placed in the driver (Pos. #1) and left rear (Pos. #4) designated seating positions according to the instructions specified in the OVSC Side Impact Laboratory Test Procedure (TP-214D-06, dated July 2001). Both SID HIII dummies were certified prior to this test. The side impact test was documented by one real-time camera and 9 high-speed cameras. Camera locations and other pertinent camera information are included in this report.

The SID HIIIs were instrumented with the following accelerometers:

1. Head (HED) triaxial and redundant accelerometers (X, Y, and Z-directions)
2. Neck (NEK) triaxial force and moment load cells (X, Y, and Z-directions)
3. Left Upper Rib (LUR) uniaxial and redundant accelerometer (Y-direction)
4. Left Lower Rib (LLR) uniaxial and redundant accelerometer (Y-direction)
5. Lower Thoracic Spine (T₁₂) uniaxial and redundant accelerometer (Y-direction)
6. Pelvic (PEV) section uniaxial and redundant accelerometer (Y-direction)

A summary of the side impact dummy (SID HIII) configuration and verification test data can be found in Appendix C. A total of 68 channels of data were recorded. Appendix B contains the vehicle, MDB, and dummy response data traces.

The following tables summarize the results of the test:

Injury Criteria	Front SID HIII	Rear SID HIII
TTI (g)	62.1	62.0
PEV (g)	54.1	42.8

Head Injury Criteria (HIC)

Injury Criteria	Front SID HIII	Rear SID HIII
HIC	771	698
t_1 (ms)	68.88	40.80
t_2 (ms)	72.56	48.08
Average Acceleration $t_1 - t_2$ (g)	133.3	97.9

HIC is as defined in FMVSS 208. The maximum time interval t_1 to t_2 is 36 ms.

Neck Injury Criteria

Maximum Values	Front SID HIII	Rear SID HIII
Neck X-axis Force (N)	-789	948
Neck Y-axis Force (N)	693	-1529
Neck Z-axis Force (N)	2128	-1136
Moment About X-axis (Nm) ¹	-72	-45
Moment About Y-axis (Nm)	-36	29
Moment About Z-axis (Nm)	-18	-17

¹ Calculated about the occipital condyle with the following formula: $M_{occ} = M_x + 0.01778F_y$.

Data Acquisition Explanations

The vehicle's left lower B-pillar Y-axis acceleration channel, LLBYG1, exceeded full-scale at approximately 20 milliseconds. The velocity was also affected.

The vehicle's left lower A-pillar Y-axis acceleration channel, LLAYG1, recorded no valid data after approximately 23 milliseconds. The velocity was also affected.

The vehicle's left mid A-pillar Y-axis acceleration channel, LUAYG1, exceeded full-scale at approximately 58 milliseconds. The velocity was also affected.

The vehicle's center of gravity X-, Y-, and Z-axis acceleration channels, VCGXG1, VCGYG1, and VCGZG1, respectively, recorded questionable data throughout the test. The resultant and velocity were also affected.

The onboard moving deformable barrier center high-speed camera did not start correctly and missed recording the impact event.

The onboard vehicle side front door high-speed camera ran slower than the intended 1,000 fps.

Section 3

Summary of Test Results

Data Sheet 1

General Test Vehicle Parameter Data

Test Vehicle Information:

Vehicle Year/Make/Model: 2005 Scion TC
Vehicle Body Style/Color: 2-door/White VIN: JTKDE177650014545
Vehicle NHTSA No.: C55102 Build Date: 07/04
Engine Data: 4 Cylinders; CID; 2.4 Liters; cc
Placement: - Longitudinal; or X Lateral; or - Horizontal
Transmission: 5 Speed; X Manual; - Automatic; - Overdrive
Final Drive: - RWD; X FWD; - Four-Wheel Drive
Odometer Reading: 51
Options: X A/C; X Power steering; X Pwr. brakes; X Power windows

Data From Vehicle's Tire Placard:

Tire Pressure (at capacity)* 220 kPa Front; 200 kPa Rear
Recommended Tire Size: P215/45ZR17
Tires on Test Vehicle: P215/45ZR17 Manufacturer: Bridgestone, Potenza

Vehicle Capacity Data:

Number of Occupants: 2 Front; 3 Rear; 3rd seat; 5 Total
Type of Front Seats: X Bucket; - Bench; - Split bench
Type of Front Seat Back: - Fixed; X Adjustable with X Lever or - Knob
Vehicle Max. Capacity Loading = 392 kg (A)
No. of Occupants x 68.04 kg. = 340 kg (B)
Vehicle Cargo Capacity (A-B) = 52 kg

Test Vehicle Delivered Weight With Maximum Fluids:

Left Front	=	<u>398.0</u> kg	Left Rear	=	<u>260.5</u> kg
Right Front	=	<u>387.0</u> kg	Right Rear	=	<u>256.0</u> kg
Total Front	=	<u>785.0</u> kg	Total Rear	=	<u>516.5</u> kg
Front % of Total Weight	=	<u>60.3</u> %	Rear % of Total Weight	=	<u>39.7</u> %
Total Weight	=	<u>1301.5</u> kg			

* Tire pressure used in test.

Data Sheet 1 (continued)

General Test Vehicle Parameter Data

Calculation Of Vehicle's Target Test Weight:

Total Test Vehicle Delivered Weight With Max. Fluids = 1301.5 kg (A)
Maximum Cargo Carrying Capacity of Test Vehicle = 52.0 kg (B)
Weight of Instrumented Side Impact Dummies (2 X 84.0 kg) = 168.0 kg (C)
Test Vehicle Target Weight: = 1521.5 kg (A+B+C)

Fully Loaded Test Vehicle (UDW + 2 SID HIII s + Cargo):

Left Front	=	<u>448.5</u> kg	Left Rear	=	<u>354.0</u> kg
Right Front	=	<u>393.0</u> kg	Right Rear	=	<u>315.5</u> kg
Total Front	=	<u>841.5</u> kg	Total Rear	=	<u>669.5</u> kg
Front % of Total Weight	=	<u>55.7</u> %	Rear % of Total Weight	=	<u>44.3</u> %
Total Weight	=	<u>1511.0</u> kg			

As Tested Weight of Test Vehicle (2 SID HIII s + Cargo + Equipment & Instrumentation):

Left Front	=	<u>449.6</u> kg	Left Rear	=	<u>336.6</u> kg
Right Front	=	<u>413.2</u> kg	Right Rear	=	<u>317.6</u> kg
Total Front	=	<u>862.8</u> kg	Total Rear	=	<u>654.2</u> kg
Front % of Total Weight	=	<u>56.9</u> %	Rear % of Total Weight	=	<u>43.1</u> %
Total Weight	=	<u>1517.0</u> kg			

Test Vehicle Attitude (all dimensions in millimeters):

As Delivered	Fully Loaded	Ready For Test
Right Front <u>682</u>	Right Front <u>663</u>	Right Front <u>665</u>
Left Front <u>681</u>	Left Front <u>650</u>	Left Front <u>661</u>
Right Rear <u>690</u>	Right Rear <u>653</u>	Right Rear <u>660</u>
Left Rear <u>690</u>	Left Rear <u>637</u>	Left Rear <u>655</u>

Test Vehicle Wheelbase: 2695 mm

C.G. = 1162 mm rearward of front wheel centerline

Total Vehicle Length:

Right Side = 4150 mm
Left Side = 4155 mm
Centerline = 4405 mm

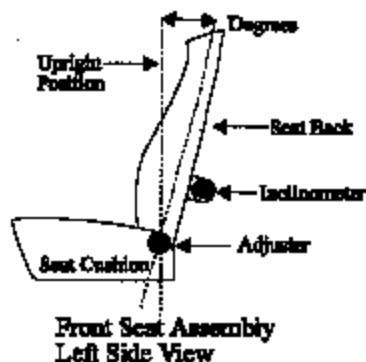
Data Sheet 1 (continued)

General Test Vehicle Parameter Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



Front Seat Cushion Placement: Middle (8th notch rearward of full forward, 9th of 17 notches total)

Total Length of Fore/Aft Adjustment Travel: 240 mm

Total Number of Adjustment Positions or Detents: 17

Front Seat Back Adjustment Position: 4th notch rearward of full upright position

Seat Back Torso Angle: 3.9 degrees¹

Second Position Seat Placement: Fixed

Total Length Of Fore/Aft Adjustment Travel: N/A

Seat Back Adjustment Position: 3rd notch rearward of full upright position

Adjustable Steering Column Position: 19.7°-middle of geometric range of travel

Window Positions:

Right Front: Open

Right Rear: Open

Left Front: Closed

Left Rear: Fixed

Note: Windows will be in closed position on struck side of test vehicle and in open position on opposite side.

Amount of Stoddard Solvent In Fuel Tank:

54.9 liters (fuel tank usable capacity)

51.1 liters used in test (92% - 94% of fuel tank usable capacity)

Location of Impact Point On Test Vehicle Side To Be Impacted:

Wheelbase = 2695 millimeters

Intended impact point is 410 millimeters rearward of front axle centerline
(which is 940 ± 50 millimeters forward of the wheelbase midpoint)

Actual Impact Point is 430 millimeters rearward of front axle centerline

¹ Measured at the headrest support post.

Data Sheet 2

Test Vehicle Summary of Results

Vehicle Year/Make/Model: 2005/Scion/TC

Body Style: 2-door

VIN: JTKDE177650014545

NHTSA No.: C55102

Build Date: 07/04

Test Date: 10/20/04

Vehicle Overall Length = 4405 mm

Overall Width = 1740 mm

Vehicle Test Weight (Pre-Test):

Left Front	=	<u>449.6</u>	kg	Left Rear	=	<u>336.6</u>	kg
Right Front	=	<u>413.2</u>	kg	Right Rear	=	<u>317.6</u>	kg
Total Front	=	<u>862.8</u>	kg	Total Rear	=	<u>654.2</u>	kg
Total Weight	=	<u>1517.0</u>	kg				
Wheelbase	=	<u>2695</u>	mm				

Longitudinal C.G. From Center Of Front Axle = 1162 mm

Impact Angle With Respect To Impactor = 90 degrees

Impact Point:

Actual Impact Point is 20 mm right of nominal impact ref. line (Lateral)

Actual Impact Point is 0 mm from nominal impact point (Vertical)

Maximum Exterior Static Crush:

1. Level 1 (	<u>260</u>	mm above ground) =	<u>32</u>	mm
2. Level 2 (	<u>507</u>	mm above ground) =	<u>248</u>	mm
3. Level 3 (	<u>650</u>	mm above ground) =	<u>232</u>	mm
4. Level 4 (	<u>920</u>	mm above ground) =	<u>207</u>	mm
5. Level 5 (	<u>1365</u>	mm above ground) =	<u>9</u>	mm

Maximum Post-Test Intrusion = 248 mm

Occupants:

Front Passenger

Rear Passenger

Dummy Identification 906

055

Restraints Used 3-point seat belt

3-point seat belt

Instrumentation:

Number of Vehicle Data Channels: = 21

Number of Cameras: Onboard = 3 Offboard = 6 Total = 9

Data Sheet 3

Moving Deformable Barrier(MDB) Summary

MDB Face Manufacturer And Serial Number:

Plascore, 101AD804 028A1004

Position Of Impactor (MDB) On Monorail:

Crabbed 27° to the left

MDB Specifications:

Overall Width of Framework Carriage = 1251 mm

Overall Length of MDB (Incl. honeycomb impact face) = 4014 mm

Wheelbase of Framework Carriage = 2591 mm

Track of Framework Carriage (Front & Rear) = 1881 mm

C.G. Location Rearward of Front Axle = 1110 mm

MDB Weight:

Left Front = 533.8 kg Left Rear = 138.6 kg

Right Front = 245.6 kg Right Rear = 446.0 kg

Total Front = 779.4 kg Total Rear = 584.6 kg

Total MDB Weight = 1364.0 kg

Impact Angle (MDB C/L to Target Vehicle C/L) = 90 degrees

Impact Speed = 62.0 km/h

Maximum Static Crush of Honeycomb Impact Face:

1. Row A at Center of Bumper Level = 177 millimeters

2. Row B at Top of Bumper Level = 70 millimeters

3. Row C at Mid Level = 104 millimeters

4. Row D at Top of Stack Level = 130 millimeters

Instrumentation:

Number of MDB Data Channels = 5

Data Sheet 4

Post-Test Observations

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Visible Dummy Contact Points:

Left Front SID HIII

Left Rear SID HIII

Head: Door panel/head restraint
trim/rear window

C-pillar/rear window

Upper Torso: Door panel

Door panel

Lower Torso: Door panel

Door panel

Left Knee: Door panel

Door panel

Right Knee: None

None

Door Opening:

Left Side

Right Side

Front: Jammed & latched

Easy

Rear: N/A

N/A

MDB Distance From Target Impact Point:

Vertical: 0 mm from target

Horizontal: 20 mm right from target

Arm Rest Locations:

Front: 312 mm below the bottom of the window

Rear: 375 mm below the bottom of the window

Seat Movement:

Front: None

Rear: None

Glazing Damage:

Windshield: None

Window: Driver side window broken.

Pillar Separation: No

Sill Separation: No

Other Notable Impact Effects:

None

Section 4

Occupant and Vehicle Information

Data Sheet 5

SID III Instrumentation Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

TEST NUMBER: 041020

DRIVER DUMMY SERIAL NUMBER: 906

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

HEAD ACCELERATION

LONGITUDINAL	7.4 g	@ 205.1 ms	90.4 g	@ 71.0 ms
LATERAL	145.4 g	@ 70.4 ms	5.0 g	@ 35.8 ms
VERTICAL	54.2 g	@ 52.2 ms	9.9 g	@ 69.4 ms
RESULTANT	171.0 g	@ 70.7 ms		
HIC 36	771 from 68.9 to 72.6 ms			

HEAD REDUNDANT ACCELERATION

LONGITUDINAL	7.3 g	@ 203.5 ms	90.7 g	@ 70.9 ms
LATERAL	145.0 g	@ 70.4 ms	4.6 g	@ 32.6 ms
VERTICAL	66.3 g	@ 51.0 ms	61.8 g	@ 50.7 ms
RESULTANT	170.9 g	@ 70.7 ms		
HIC 36	771 from 68.9 to 72.6 ms			

NECK FORCE

X-AXIS SHEAR	23.3 N	@ 116.1 ms	788.7 N	@ 68.7 ms
Y-AXIS SHEAR	693.4 N	@ 49.5 ms	301.8 N	@ 71.0 ms
Z-AXIS AXIAL	2127.8 N	@ 71.4 ms	119.2 N	@ 0.8 ms

NECK MOMENT

ABOUT X-AXIS	66.2 N-m	@ 70.5 ms	79.5 N-m	@ 44.3 ms
ABOUT Y-AXIS	9.9 N-m	@ 208.3 ms	36.4 N-m	@ 50.2 ms
ABOUT Z-AXIS	9.2 N-m	@ 67.2 ms	17.6 N-m	@ 248.3 ms
OCCIPITAL COND	64.2 N-m	@ 67.4 ms	71.6 N-m	@ 44.2 ms

LEFT UPPER RIB ACCELERATION

LATERAL (P)	55.7 g	@ 30.6 ms	14.2 g	@ 72.5 ms
LATERAL (R)	56.6 g	@ 30.6 ms	13.7 g	@ 72.5 ms

LEFT LOWER RIB ACCELERATION

LATERAL (P)	56.8 g	@ 33.1 ms	10.0 g	@ 88.1 ms
LATERAL (R)	56.0 g	@ 33.1 ms	10.0 g	@ 88.1 ms
TTI d (P)	62.1			
TTI d (R)	61.0			

LOWER SPINE ACCELERATION

LATERAL (P)	67.4 g	@ 35.6 ms	13.7 g	@ 60.6 ms
LATERAL (R)	65.4 g	@ 35.6 ms	14.2 g	@ 60.6 ms

PELVIS ACCELERATION

LATERAL (P)	54.1 g	@ 28.7 ms	10.2 g	@ 52.5 ms
LATERAL (R)	54.2 g	@ 28.7 ms	10.2 g	@ 52.5 ms

POSITIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

NEGATIVE DIRECTION

LONGITUDINAL: REARWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

Data Sheet 5 (Continued)

SID III Instrumentation Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

TEST NUMBER: 041020

PASSENGER DUMMY SERIAL NUMBER: 055

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

HEAD ACCELERATION

LONGITUDINAL	12.9 g	@ 192.7 ms	19.4 g	@ 42.5 ms
LATERAL	135.3 g	@ 44.9 ms	17.6 g	@ 197.9 ms
VERTICAL	23.0 g	@ 49.5 ms	24.1 g	@ 59.8 ms
RESULTANT	136.1 g	@ 44.9 ms		
HIC 36	698 from 40.8 to 48.1 ms			

HEAD REDUNDANT ACCELERATION

LONGITUDINAL	13.1 g	@ 193.3 ms	19.1 g	@ 42.5 ms
LATERAL	136.5 g	@ 44.9 ms	17.5 g	@ 197.8 ms
VERTICAL	24.2 g	@ 49.5 ms	23.5 g	@ 60.2 ms
RESULTANT	137.4 g	@ 44.9 ms		
HIC 36	722 from 40.8 to 48.1 ms			

NECK FORCE

X-AXIS SHEAR	948.0 N	@ 67.1 ms	144.7 N	@ 145.7 ms
Y-AXIS SHEAR	217.3 N	@ 164.7 ms	1528.8 N	@ 66.0 ms
Z-AXIS AXIAL	342.8 N	@ 101.7 ms	1136.1 N	@ 63.8 ms

NECK MOMENT

ABOUT X-AXIS	43.2 N-m	@ 201.0 ms	24.5 N-m	@ 58.5 ms
ABOUT Y-AXIS	29.3 N-m	@ 53.4 ms	21.2 N-m	@ 223.0 ms
ABOUT Z-AXIS	5.6 N-m	@ 305.0 ms	17.2 N-m	@ 224.7 ms
OCCIPITAL COND	41.9 N-m	@ 201.6 ms	45.3 N-m	@ 58.9 ms

LEFT UPPER RIB ACCELERATION

LATERAL (P)	52.0 g	@ 45.6 ms	11.7 g	@ 105.0 ms
LATERAL (R)	51.5 g	@ 45.6 ms	17.2 g	@ 97.5 ms

LEFT LOWER RIB ACCELERATION

LATERAL (P)	67.6 g	@ 45.0 ms	16.1 g	@ 105.6 ms
LATERAL (R)	67.2 g	@ 45.0 ms	64.7 g	@ 98.7 ms
TTI d (P)	62.0			
TTI d (R)	61.5			

LOWER SPINE ACCELERATION

LATERAL (P)	56.4 g	@ 56.9 ms	12.8 g	@ 74.4 ms
LATERAL (R)	55.8 g	@ 56.9 ms	12.8 g	@ 74.4 ms

PELVIS ACCELERATION

LATERAL (P)	42.8 g	@ 46.3 ms	5.8 g	@ 161.3 ms
LATERAL (R)	42.9 g	@ 46.3 ms	5.6 g	@ 161.3 ms

POSITIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

NEGATIVE DIRECTION

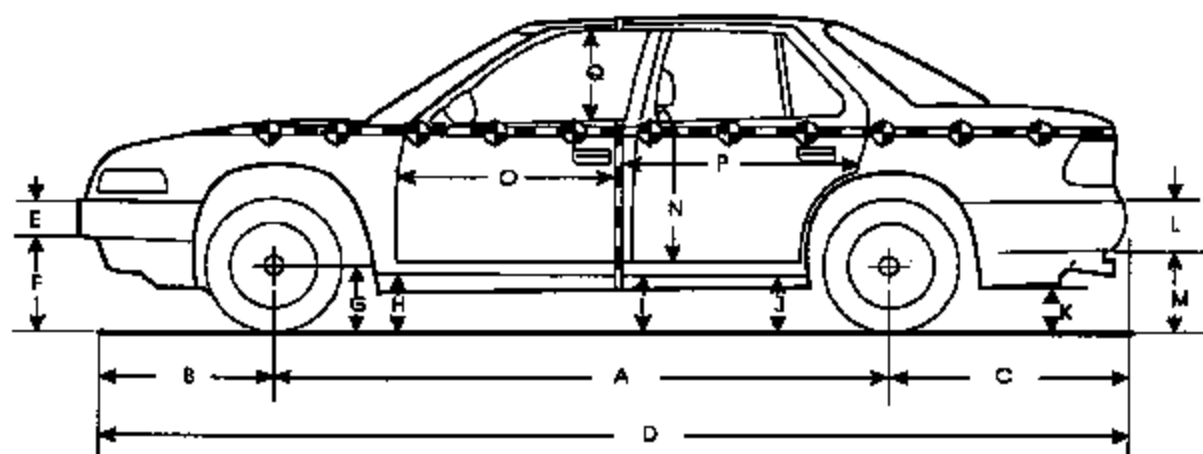
LONGITUDINAL: REARWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

Data Sheet 6

Vehicle Pre-Test And Post-Test Measurements

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



Left Side View

Note: All dimensions are in millimeters with tolerance of ± 3 mm

	Pre-Test (as delivered)	Pre-Test (as tested)	Post-Test (as tested)	Change
A	2695	2695	2690	5
B	895	895	890	5
C	815	815	795	20
D	4405	4405	4398	7
E	168	168	170	-2
F	370	354	365	-11
G	296	296	270	26
H	241	234	240	-6
I	261	241	282	-41
J1	196	170	175	-5
J2	266	239	302	-63
K	315	280	258	22
L	208	208	204	4
M	428	395	380	15
N	N/A	N/A	N/A	N/A
O	800	800	750	50
P	N/A	N/A	N/A	N/A
Q	356	356	340	16
R	4150	4150	4135	15
S	4155	4155	4119	36
T	1299	1299	1205	94

D = Length at centerline
T = Width at B-pillar

E&L = Bumper Thickness
J1 = To Finish Weld

R = Right Side Length
J2 = To Sill

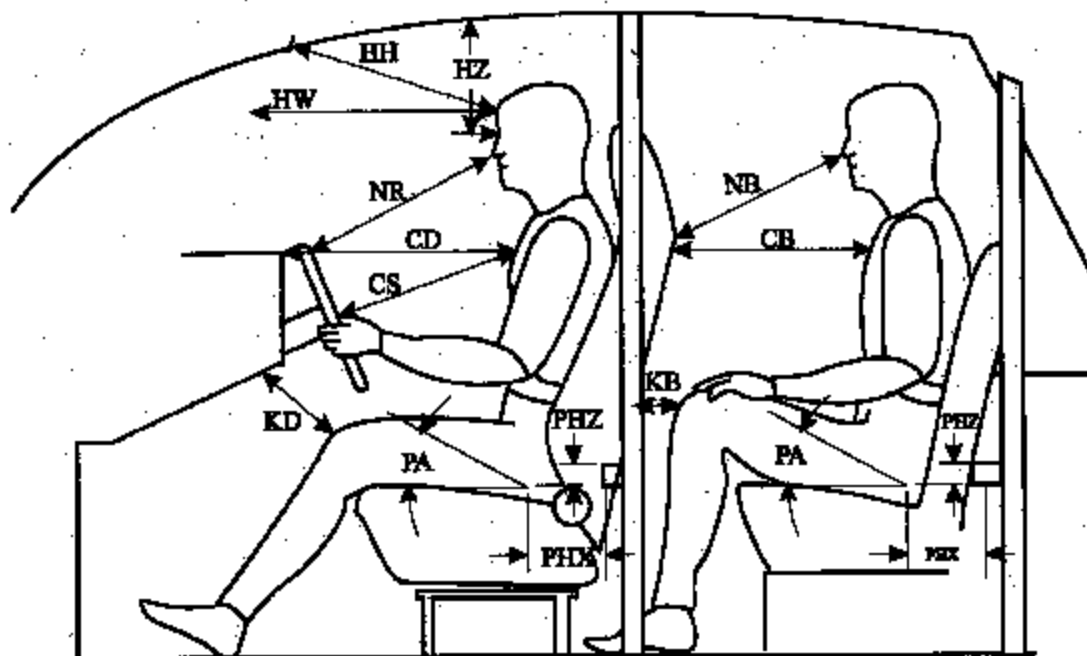
S = Left Side Length

Data Sheet 7

SID III Longitudinal Clearance Dimensions

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



Left Side View

Note: All measurements are in millimeters with tolerance of ± 3 mm

Measurement	Driver SID III # 906	Left Rear Pass. SID III # 055
HH	408	N/A
HW	660	N/A
HZ	149	114
NR/NB	433	682
CD/CB	523	637
CS	343	N/A
KDL(KDA°)/KBL(KBA°)	113/(31.5°)	219/(0.0°)
KDR(KDA°)/KBR(KBA°)	110/(24.0°)	218/(0.0°)
PA°	24.3°	23.9°
PHX	460	458
PHZ	250	226

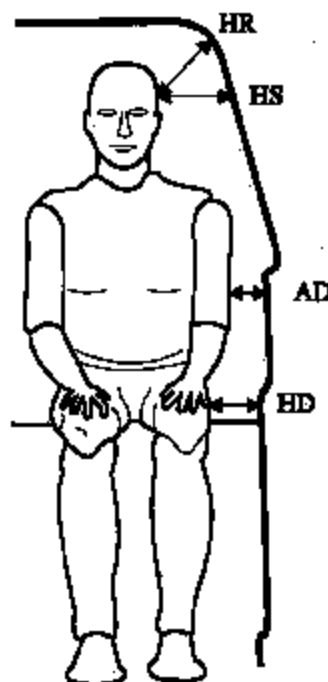
Note: 2-door vehicle shown. Rear dummy PHX and PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

Data Sheet 8

SID HIII Lateral Clearance Dimensions

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



Note: All measurements are in millimeters with tolerance of ± 3 mm

Measurement	Driver SID HIII # 906	Left Rear Pass. SID HIII # 055
HR	206	147
HS	323	380
AD*	Lower: 140 Upper: 122	Lower: 112 Upper: 46
HD	148	125

* Lower measurement is taken laterally at center of the lower rib accelerometer height from the SID HIII arm segment to the closest part of the vehicle side.

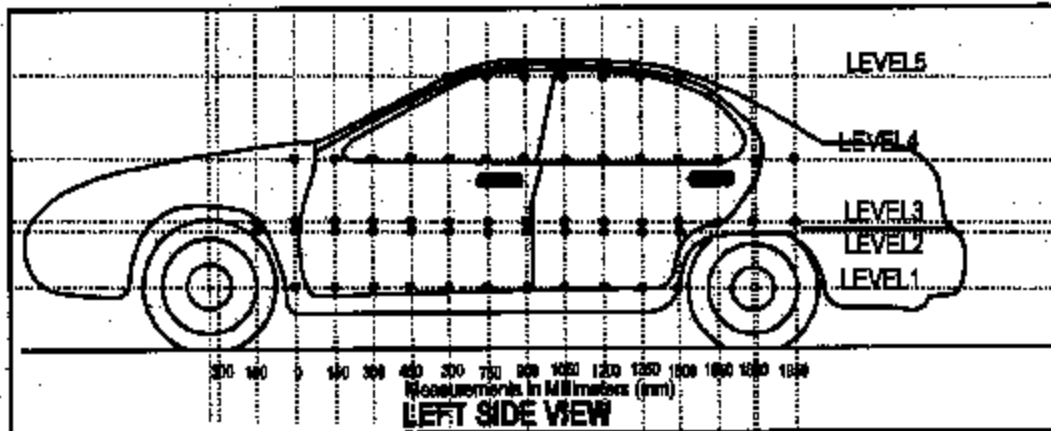
Upper measurement is taken laterally at center of the upper rib accelerometer height from the SID HIII arm segment to the closest part of the vehicle side.

Data Sheet 9

Vehicle Side Measurements

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



Level 5 - Window Top

Level 4 - Window Sill

Level 3 - Mid-Door

Level 2 - Occupant H-Point

Level 1 - Axle Centerline Height or Sill Top Height

Measurements Are Taken When The Vehicle Is In The "As Tested" Configuration.

Measurements along the vertical 750 mm line shown above:

Level 5 @ Window Top	=	<u>1365</u>	mm
Level 4 @ Window Sill	=	<u>920</u>	mm
Level 3 @ Mid Door	=	<u>650</u>	mm
Level 2 @ Occupant H-Point	=	<u>507</u>	mm
Level 1 @ Axle Centerline Height (or Sill Top Height)	=	<u>260</u>	mm

Data Sheet 10

Vehicle Exterior Crush Profiles - All Levels

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Location	Height		(mm) From Impact Point													
			-1200	-1050	-900	-750	-600	-450	-300	-150	0	150	300	450	600	750
Level 1 Side Sill	260	Pre	---	---	---	---	---	---	---	---	662	660	660	655	655	650
		Post	---	---	---	---	---	---	---	690	676	677	687	677	674	
		Crush	---	---	---	---	---	---	---	28	16	17	32	22	24	
Level 2 H-Point	507	Pre	---	---	700	645	---	---	---	---	637	648	648	648	648	650
		Post	---	---	698	646	---	---	---	---	748	831	878	891	896	894
		Crush	---	---	-2	1	---	---	---	---	111	183	230	243	248	244
Level 3 Mid-Door	650	Pre	---	---	---	665	630	---	---	624	640	644	644	640	638	638
		Post	---	---	---	670	636	---	---	667	707	797	832	841	839	850
		Crush	---	---	---	5	6	---	---	43	67	153	188	201	201	212
Level 4 Window Sill	920	Pre	---	---	---	---	661	749	734	720	710	700	697	691	687	682
		Post	---	---	---	---	771	752	740	735	727	755	805	845	849	845
		Crush	---	---	---	---	110	3	6	15	17	55	108	154	162	163
Level 5 Window Top	1365	Pre	---	---	---	---	---	---	---	---	---	---	---	---	---	910
		Post	---	---	---	---	---	---	---	---	---	---	---	---	---	905
		Crush	---	---	---	---	---	---	---	---	---	---	---	---	---	-5

Data Sheet 10 (Continued)

Vehicle Exterior Crush Profiles - All Levels

Vehicle: 2005 Seion TC 2-door

NHTSA No.: C55102

Location	Height	(mm) From Impact Point													
		900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	2550	2700	
Level 1 Side Sill	260	Pre	652	650	650	656	655	655	657	---	---	---	---	---	
		Post	674	676	676	675	681	682	677	676	---	---	---	---	
		Crush	22	26	26	19	26	27	20	---	---	---	---	---	
Level 2 H-Point	507	Pre	648	650	648	653	646	647	645	630	---	---	---	652	
		Post	894	893	892	894	865	863	836	725	---	---	---	665	
		Crush	246	243	244	241	219	216	191	95	---	---	---	13	
Level 3 Mid-Door	650	Pre	636	636	638	642	638	638	642	633	623	---	633	670	
		Post	850	850	856	842	870	863	865	780	725	---	---	681	
		Crush	214	214	218	200	232	225	223	147	102	---	---	18 11	
Level 4 Window Sill	920	Pre	675	672	668	667	665	665	665	670	674	678	685	698	---
		Post	844	846	827	806	872	865	842	790	740	702	700	700	---
		Crush	169	174	159	139	207	200	177	120	66	24	15	2	---
Level 5 Window Top	1365	Pre	908	910	910	919	910	920	937	---	---	---	---	---	---
		Post	905	905	906	915	919	925	941	---	---	---	---	---	---
		Crush	-3	-5	-4	-4	9	5	4	---	---	---	---	---	---

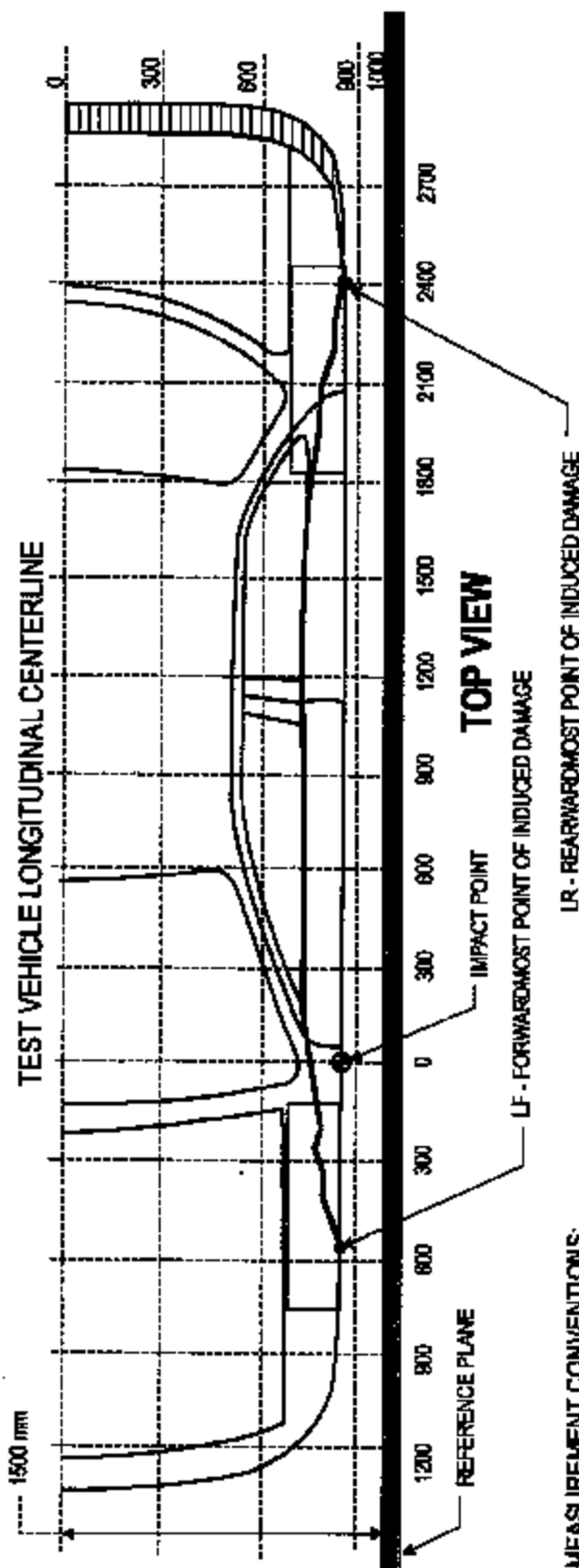
Data Sheet 11

Vehicle Damage Profile Distances

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

NOTE: All measurements are in millimeters (mm) and should be accurate to plus or minus 3mm.



MEASUREMENT CONVENTIONS:

Forward of the impact point (towards front of vehicle) is considered negative (-)

Rearward of the impact point (towards rear end of vehicle) is considered positive (+)

DPD Measurements	Post-Test (mm)	Pre-Test (mm)	Static Crush (mm)
6: LF = -150 mm (Level 3)	667	624	43
5: 300 mm (Level 2)	874	648	230
4: 750 mm (Level 2)	894	650	244
3: 1200 mm (Level 2)	892	648	244
2: 1500 mm (Level 3)	870	638	232
1: LR = 2100 mm (Level 3)	725	623	102

Full length of induced damage was 2250 mm.

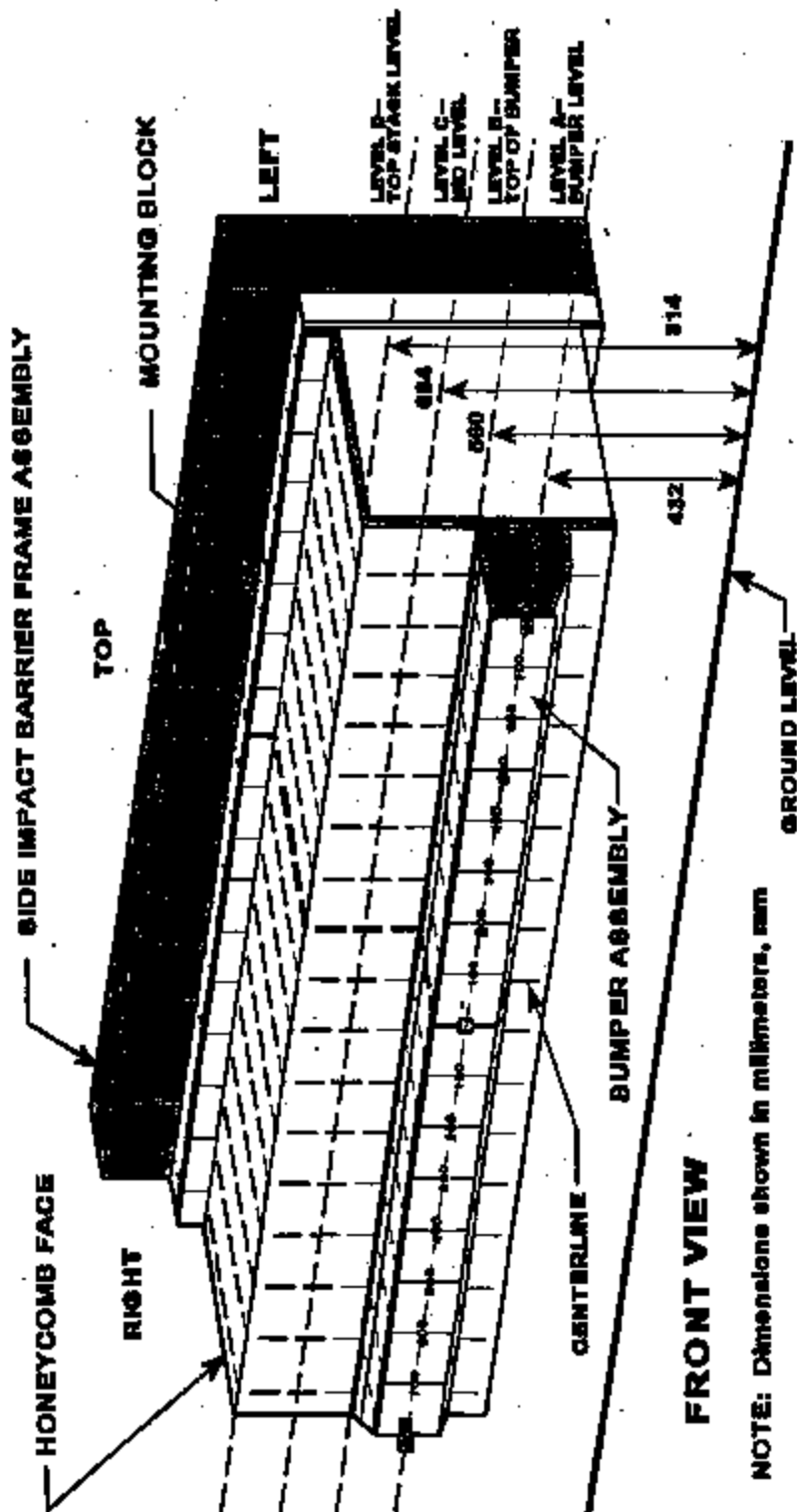
Data Sheet 12

Exterior Static Crush For Impactor Face

(Grid as looking at MDB from front)

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



FRONT VIEW

NOTE: Dimensions shown in millimeters, mm

Data Sheet 12 (Continued)
Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

		Distance Right of Center (mm)										Distance Left of Center (mm)							
		Height At CL	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
Top Stack Level																			
- Level D	811	-76	-52	-43	-34	-93	-91	-49	-18	-19	-19	-19	-21	-23	-26	-52	-86	-130	
Mid Level																			
Level C	685	-59	-32	-32	-50	-83	-66	-34	-14	-8	-8	-11	-14	-18	-22	-29	-48	-104	
Top Bumper																			
Level-Level B ¹	559	-70	-66	-66	-67	N/A	N/A	-43	-36	-33	-30	-29	-29	-31	-34	-41	-53	-69	
Mid Bumper																			
Level - Level A	432	-177	-172	-169	-176	-160	-142	-131	-122	-114	-109	-105	-102	-100	-100	-105	-116	-128	

All measurements are in millimeters and have a tolerance of ± 3 mm.

¹ Top bumper measurement points are at 560 mm to avoid bumper element interference post-test.

Data Sheet 12 (Continued)

Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Deformable Barrier Face Profile

Level D - Top Stack

Pre-Test

Index	Xmm	Ymm	Zmm
1	-382	798	-41
2	-382	699	-41
3	-382	598	-42
4	-382	499	-42
5	-382	398	-43
6	-382	299	-44
7	-382	199	-45
8	-382	98	-45
9	-383	-1	-46
10	-383	-101	-45
11	-383	-201	-47
12	-383	-301	-47
13	-382	-401	-48
14	-382	-501	-48
15	-382	-601	-49
16	-382	-700	-49
17	-382	-800	-50

Post-Test

Index	Xmm	Ymm	Zmm
1	-306	746	-102
2	-330	650	-102
3	-338	549	-104
4	-328	451	-109
5	-289	359	-115
6	-292	264	-117
7	-333	173	-109
8	-364	78	-102
9	-364	-22	-98
10	-364	-122	-94
11	-364	-221	-89
12	-362	-321	-84
13	-359	-421	-77
14	-356	-520	-70
15	-330	-616	-67
16	-296	-709	-65
17	-252	-797	-66

Difference

Index	Xmm	Ymm	Zmm
1	-76	52	61
2	-52	49	61
3	-43	48	63
4	-54	48	66
5	-93	39	72
6	-91	35	73
7	-49	26	65
8	-18	21	57
9	-19	21	52
10	-19	20	48
11	-19	20	42
12	-21	20	37
13	-23	20	29
14	-26	20	22
15	-52	15	18
16	-86	9	16
17	-130	-3	16

Data Sheet 12 (Continued)

Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Deformable Barrier Face Profile Cont'd.

Level C - Mid Level

Pre-Test

Index	Xmm	Ymm	Zmm
18	-382	799	-167
19	-382	700	-168
20	-382	600	-168
21	-382	500	-170
22	-382	400	-171
23	-382	300	-172
24	-382	200	-171
25	-382	100	-172
26	-383	1	-172
27	-383	-99	-174
28	-383	-199	-174
29	-382	-300	-175
30	-382	-399	-176
31	-382	-499	-177
32	-382	-600	-177
33	-382	-700	-178
34	-382	-800	-179

Post-Test

Index	Xmm	Ymm	Zmm
18	-324	750	-226
19	-350	655	-226
20	-350	556	-229
21	-333	458	-235
22	-299	364	-241
23	-317	265	-238
24	-348	170	-232
25	-368	72	-228
26	-375	-27	-224
27	-374	-127	-220
28	-372	-228	-214
29	-369	-328	-209
30	-365	-427	-203
31	-360	-527	-198
32	-353	-627	-191
33	-334	-725	-187
34	-278	-806	-192

Difference

Index	Xmm	Ymm	Zmm
18	-59	49	59
19	-32	45	58
20	-32	44	61
21	-50	43	66
22	-83	36	70
23	-66	35	66
24	-34	31	61
25	-14	28	56
26	-8	28	52
27	-8	28	46
28	-11	29	40
29	-14	28	34
30	-18	28	27
31	-22	28	21
32	-29	27	14
33	-48	25	9
34	-104	6	13

Data Sheet 12 (Continued)

Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Deformable Barrier Face Profile Conf'd.

Level B - Top of Bumper

Pre-Test

Index	Xmm	Ymm	Zmm
35	-383	801	-293
36	-383	702	-293
37	-383	601	-294
38	-383	502	-294
39	-383	402	-295
40	-383	302	-296
41	-383	201	-296
42	-383	101	-297
43	-383	1	-298
44	-383	-99	-298
45	-383	-199	-299
46	-383	-299	-299
47	-383	-399	-300
48	-382	-499	-301
49	-382	-598	-302
50	-382	-698	-302
51	-382	-799	-303

Post-Test

Index	Xmm	Ymm	Zmm
35	-313	763	-333
36	-317	663	-336
37	-317	563	-338
38	-316	464	-344
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	-339	166	-352
42	-346	66	-350
43	-350	-34	-344
44	-352	-134	-340
45	-354	-234	-335
46	-354	-334	-330
47	-352	-435	-325
48	-348	-534	-321
49	-342	-633	-315
50	-330	-732	-308
51	-314	-831	-301

Difference

Index	Xmm	Ymm	Zmm
35	-70	39	40
36	-66	39	43
37	-66	38	44
38	-67	37	50
39	N/A	N/A	N/A
40	N/A	N/A	N/A
41	-43	35	56
42	-36	35	53
43	-33	35	46
44	-30	35	42
45	-29	35	37
46	-29	35	31
47	-31	36	25
48	-34	35	20
49	-41	35	13
50	-53	34	6
51	-69	32	-2

Data Sheet 12 (Continued)

Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Deformable Barrier Face Profile Conf'd

Level A - Mid Bumper

Pre-Test

Index	Xmm	Ymm	Zmm
52	-476	798	-417
53	-485	700	-419
54	-485	599	-419
55	-485	500	-420
56	-485	400	-421
57	-485	300	-422
58	-485	199	-423
59	-485	100	-424
60	-485	0	-425
61	-485	-100	-425
62	-485	-200	-426
63	-485	-301	-427
64	-485	-401	-428
65	-485	-501	-429
66	-485	-600	-429
67	-485	-701	-430
68	-475	-798	-431

Post-Test

Index	Xmm	Ymm	Zmm
52	-299	753	-479
53	-313	656	-487
54	-316	556	-483
55	-310	457	-473
56	-325	360	-478
57	-343	261	-484
58	-354	162	-486
59	-364	62	-486
60	-371	-38	-485
61	-376	-138	-484
62	-380	-237	-482
63	-383	-337	-480
64	-385	-438	-478
65	-385	-537	-474
66	-380	-637	-470
67	-370	-737	-462
68	-347	-832	-452

Difference

Index	Xmm	Ymm	Zmm
52	-177	44	62
53	-172	44	69
54	-169	44	64
55	-176	42	53
56	-160	41	57
57	-142	39	62
58	-131	38	63
59	-122	38	62
60	-114	38	60
61	-109	37	59
62	-105	37	56
63	-102	37	53
64	-100	37	50
65	-100	37	46
66	-105	37	41
67	-116	36	32
68	-128	34	21

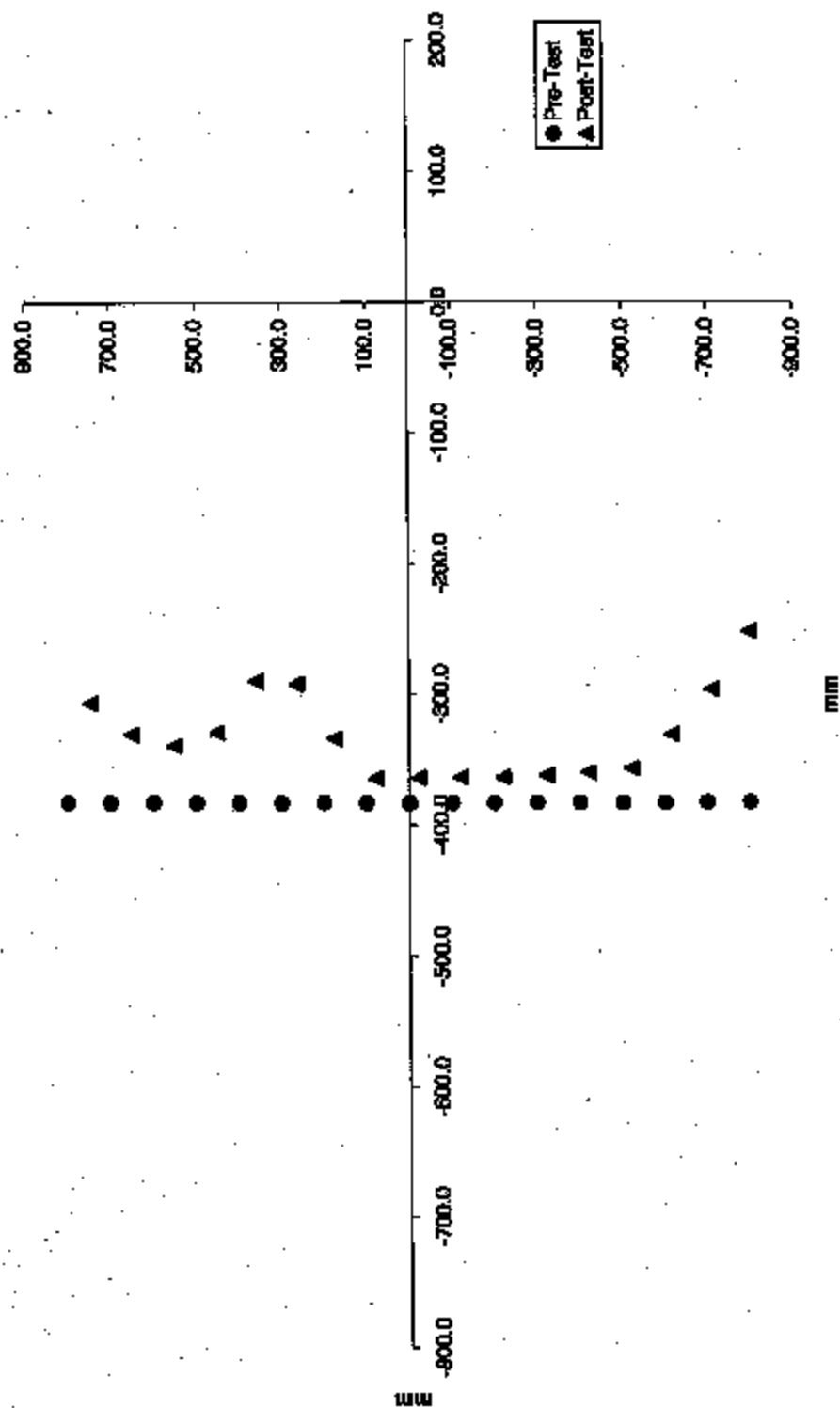
Data Sheet 12 (Continued)

Exterior Static Crush For Impactor Face

Vehicle: 2005 Seion TC 2-door

NHTSA No.: C55102

Level D - Deformable Barrier Face Profile 1-17

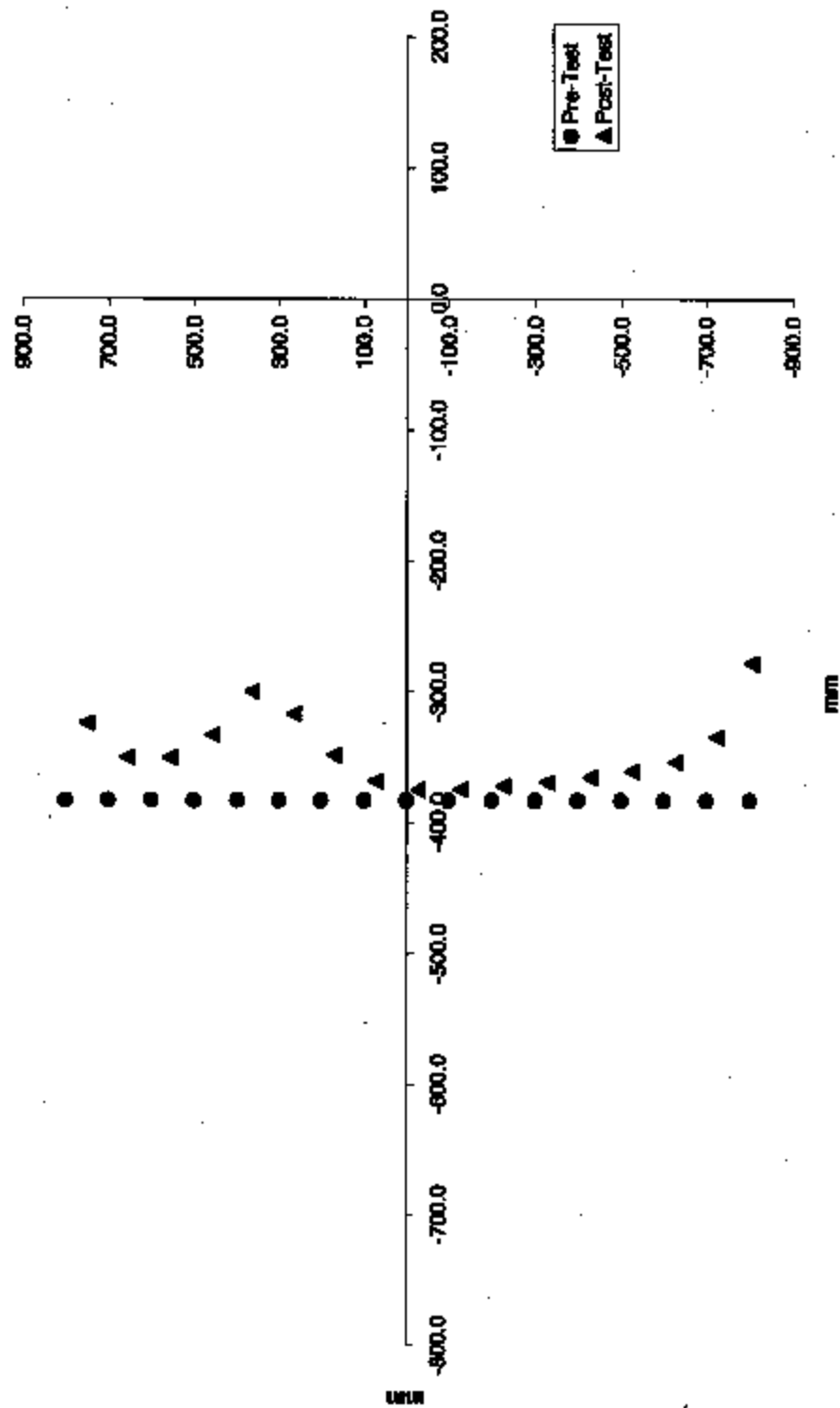


Data Sheet 12 (Continued)
Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Level C - Deformable Barrier Face Profile 18-34



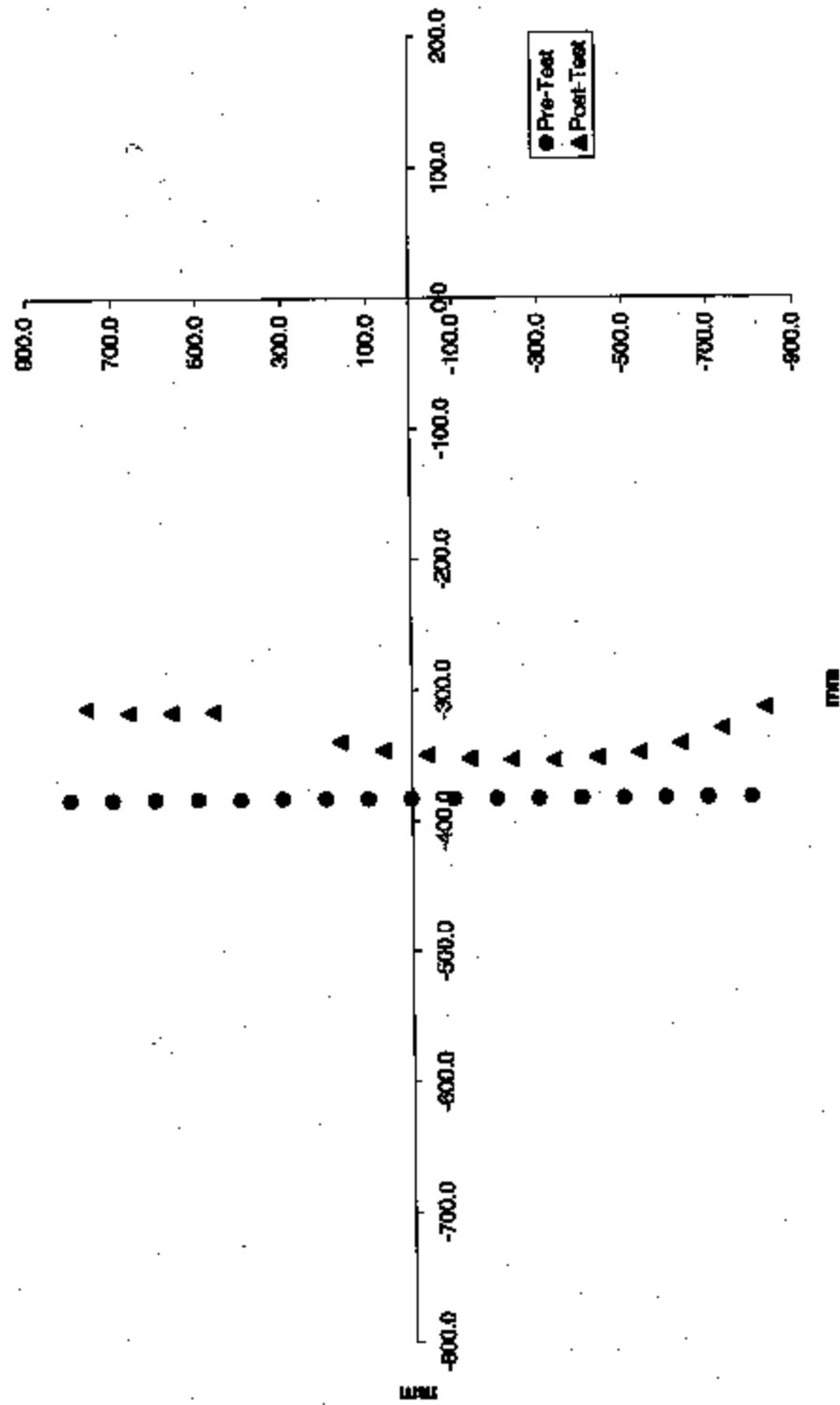
Data Sheet 12 (Continued)

Exterior Static Crush For Impactor Face

Vehicle: 2005 Seion TC 2-door

NHTSA No.: C55102

Level B - Deformable Barrier Face Profile 35-51

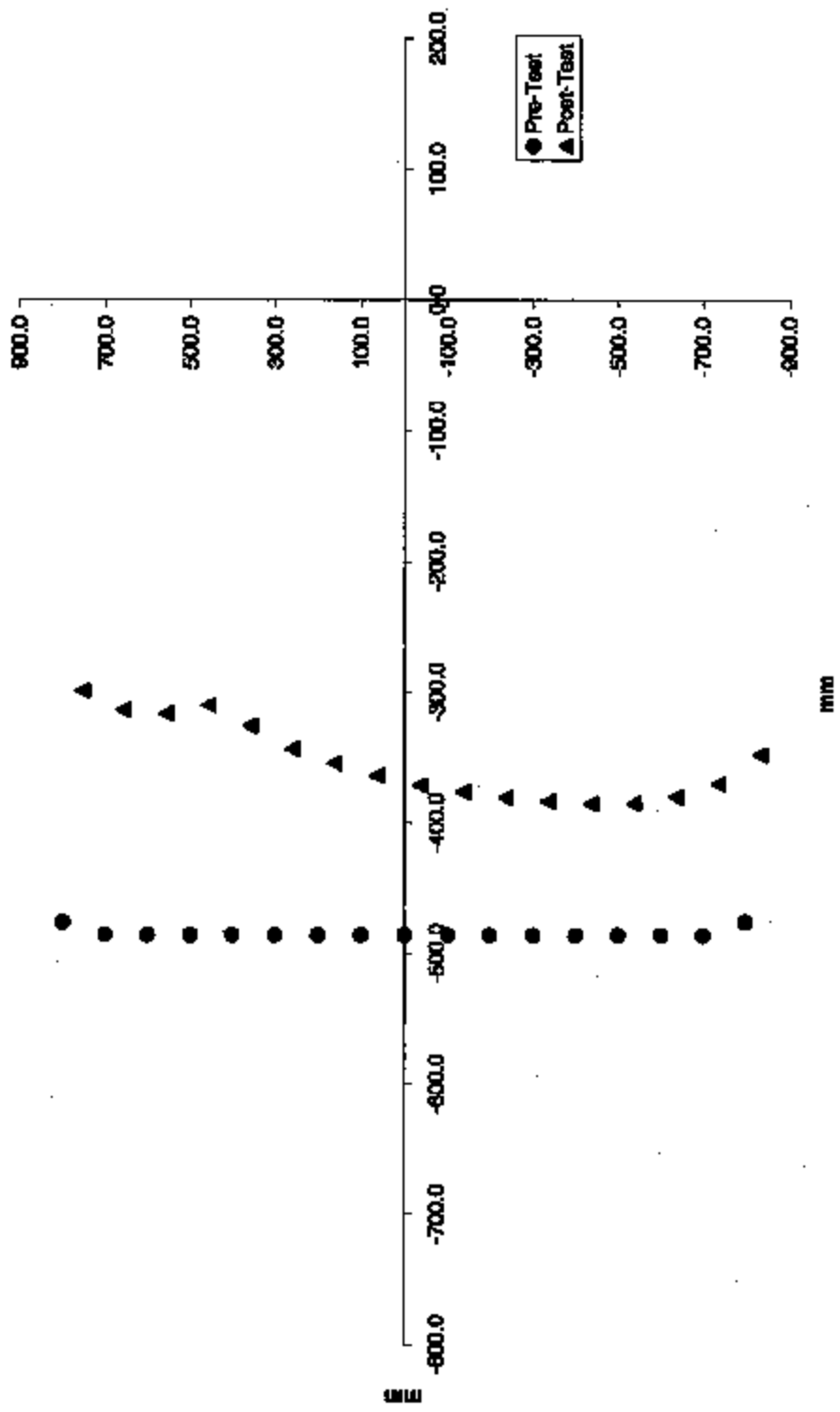


Data Sheet 12 (Continued)
Exterior Static Crush For Impactor Face

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

Level A - Deformable Barrier Face Profile 52-5B

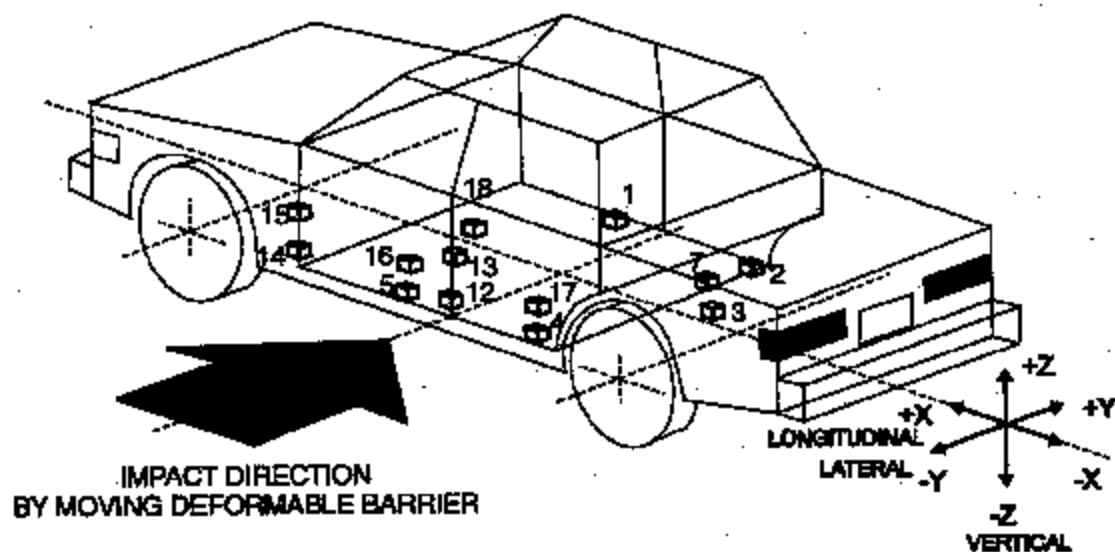


Data Sheet 13

Test Vehicle Accelerometer Locations and Data Summary

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



- 1-Right Front Side Sill
- 2-Right Side Sill at Rear Seat
- 3-Rear Floorpan above Axle
- 4-Left Side Sill at Rear Seat
- 5-Left Front Side Sill
- 7-Right Rear Occupant Compartment
- 12-Left Side Lower B-pillar

- 13-Left Side Middle B-pillar
- 14-Left Side Lower A-pillar
- 15-Left Side Middle A-pillar
- 16-Left Side Front Seat Track at H-point
- 17-Left Rear Seat Track at H-point
- 18-Vehicle Center of Gravity

Data Sheet 13 (Continued)

Test Vehicle Accelerometer Locations and Data Summary

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

TEST NUMBER: 041020
No. LOCATION

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

X Y Z

1 RIGHT SIDE SILL AT FRONT SEAT	2908 mm	650 mm	-307 mm			
LONGITUDINAL				3.2 g	@ 56.5 ms	@ 14.3 ms
LATERAL				24.3 g	@ 14.0 ms	@ 229.1 ms
VERTICAL				5.3 g	@ 60.2 ms	@ 16.0 ms
RESULTANT				26.4 g	@ 14.3 ms	
2 RIGHT SIDE SILL AT REAR SEAT	1808 mm	650 mm	-288 mm			
LONGITUDINAL				3.7 g	@ 57.0 ms	@ 9.3 ms
LATERAL				31.4 g	@ 14.4 ms	@ 137.9 ms
VERTICAL				5.7 g	@ 48.8 ms	@ 17.5 ms
RESULTANT				32.6 g	@ 14.4 ms	
3 REAR FLOORPAN ABOVE AXLE	815 mm	0 mm	-481 mm			
LONGITUDINAL				2.6 g	@ 61.0 ms	@ 18.4 ms
LATERAL				29.1 g	@ 27.2 ms	@ 82.4 ms
VERTICAL				10.5 g	@ 13.9 ms	@ 25.9 ms
RESULTANT				30.2 g	@ 27.0 ms	
4 LEFT SIDE SILL AT REAR SEAT	1778 mm	-650 mm	-266 mm			
LATERAL				58.2 g	@ 9.8 ms	@ 15.9 ms

Data Sheet 13 (Continued)

Test Vehicle Accelerometer Locations and Data Summary

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

TEST NUMBER: 041020 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
5 LEFT SIDE SILL AT FRONT SEAT LATERAL	2893 mm	-650 mm	-290 mm	47.2 g @ 10.5 ms	13.8 g @ 18.2 ms
7 RIGHT REAR OCCUPANT COMPARTMENT LATERAL	1738 mm	590 mm	-287 mm	30.9 g @ 13.9 ms	2.8 g @ 81.4 ms
12 LEFT LOWER B-POST LATERAL ¹	1783 mm	-700 mm	-592 mm	---	---
13 LEFT MIDDLE B-POST LATERAL	1763 mm	-715 mm	-885 mm	159.5 g @ 6.1 ms	57.8 g @ 16.2 ms
14 LEFT LOWER A-POST LATERAL ¹	3018 mm	-760 mm	-482 mm	---	---
15 LEFT MIDDLE A-POST LATERAL ¹	3033 mm	-760 mm	-829 mm	---	---
16 LEFT FRONT SEAT TRACK LATERAL	2193 mm	-550 mm	-265 mm	31.2 g @ 12.6 ms	2.0 g @ 134.6 ms
17 LEFT REAR SEAT TRACK LATERAL	1298 mm	-555 mm	-240 mm	26.9 g @ 28.0 ms	1.9 g @ 100.6 ms

Data Sheet 13 (Continued)

Test Vehicle Accelerometer Locations and Data Summary

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

TEST NUMBER: 041020

No. LOCATION

	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
18 VEHICLE CENTER OF GRAVITY	2578 mm	-40 mm	-503 mm		
LONGITUDINAL ¹				---	---
LATERAL ¹				---	---
VERTICAL ¹				---	---
RESULTANT ¹				---	---

REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + RIGHTWARD FROM VEHICLE CENTERLINE
Z: + DOWNWARD FROM GROUND LEVEL

For acceleration data sign convention see Report Sign Convention in Appendix D.

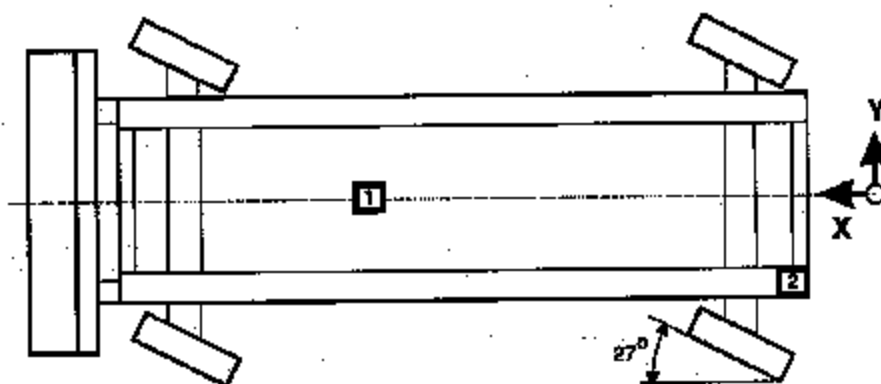
¹ See DATA ACQUISITION EXPLANATIONS on page 2-3

Data Sheet 14

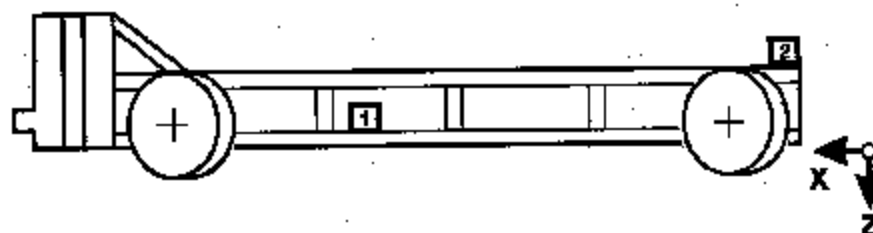
MDB Accelerometer Locations and Data Summary

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



TOP VIEW



SIDE VIEW

Accel. No.	Location	Coordinates (millimeters)			Positive Direction		Negative Direction	
		X*	Y*	Z*	Max. (g)	Time (ms)	Max. (g)	Time (ms)
1	MDB Center of Gravity	1855	0	-520				
	Longitudinal X				2.6	72.4	21.8	33.4
	Lateral Y				3.9	60.1	8.0	33.7
	Vertical Z				8.9	52.7	12.5	18.2
	Resultant R				23.3	33.6		
2	Rear Frame Member	412	-677	-625				
	Longitudinal X				2.3	121.7	25.0	34.6
	Lateral Y				3.6	18.6	2.5	57.8

*Reference: X = Rear Bumper (+ Forward)

Y = Vehicle Centerline (+ To Right)

Z = Ground Level (+ Down)

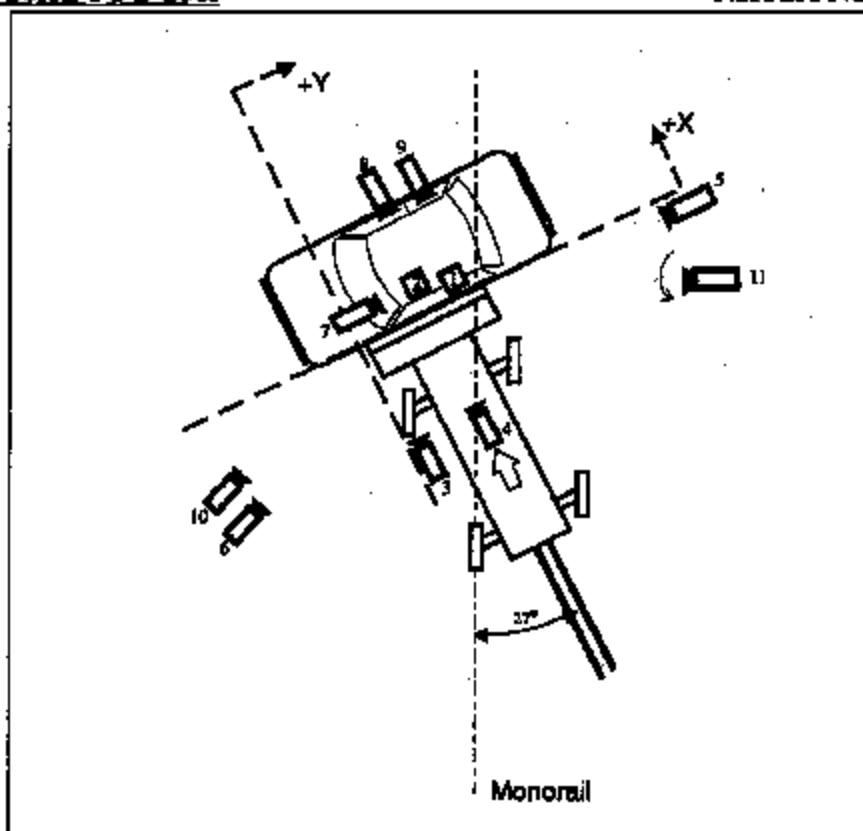
All measurements accurate to within ± 3 mm.

Data Sheet 15

High-Speed Camera Locations and Data Summary

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102



Camera Number	Location	Location, mm			Angle (deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Overhead wide	250	2150	-5750	-855.6	8	1000
2	Overhead tight	370	1800	-5750	-87.5	25	1000
3	Onboard MDB left side	-1750	-40	-720	0.1	13	1000
4	Onboard MDB center ¹	-2480	830	-1353	-5.2	25	1000
5	Right side of MDB	0	8830	-950	-9.7	25	1000
6	Left side of MDB	-2250	-5130	-940	-3.5	25	1000
7	Onboard vehicle front	550	560	-1200	1.2	8	1000
8	Onboard side front door ²	1700	700	-1070	-10.5	8	755
9	Onboard side rear door	1700	1780	-1100	-5.3	8	1000
10	Digital overall event	-2450	-5330	-950	-3.4	13	1000
11	Real-time Panning-Video	N/A	N/A	N/A	N/A	Zoom	30

+X: Forward (referenced to MDB) from impact point

+Y: Rightward (referenced to MDB) from impact point

+Z: Downward from ground level

¹ Camera started late and missed impact event.

² Camera ran slower than 1000 fps set point.

Section 5

Vehicle Fuel System Integrity

Data Sheet 16

FMVSS 301 Fuel System Integrity Data

NHTSA No.: C55102

Test Date: 10/20/04

Vehicle Year/Make/Model/Body Style: 2005 Scion TC 2-door

Test Vehicle Impact Type :

- ☐ Frontal (48.28 km/h)
☐ Oblique (48.28 km/h) with ____° barrier face
first contacting the (driver/passenger) side
☐ Rear Moving Barrier (48.28 km/h)
☐ Lateral Moving Barrier (32.19 km/h)
☒ Side Impact Moving Deformable Barrier (62.0
kph) contacting the driver side

Fuel Spillage Measurement:

1. From impact until vehicle motion ceases
2. For five-minute period after vehicle motion ceases
3. For next 25 minutes.

Actual	Maximum Allowed
0 g	28 g
0 g	142 g
0 g	28 g/1 minute

Solvent Spillage Details :

None

Data Sheet 17

FMVSS 301 Rollover Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

0 - 90 Degrees



1. Determination of Solvent Collection Time Period:

Rollover Fixture 90° Rotation Time	<u>1</u>	minutes	<u>30</u>	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	<u>5</u>	minutes	<u>0</u>	seconds
Total	<u>6</u>	minutes	<u>30</u>	seconds
Next whole minute interval	<u>7</u>	minutes		

2. FMVSS 301 Requirements:

(1) Time Period

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

3. Actual Test Vehicle Solvent Spillage:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

4. Solvent Spillage Location(s):

None

Data Sheet 17 (Continued)

FMVSS 301 Rollover Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

90 - 180 Degrees



1. Determination of Solvent Collection Time Period:

Rollover Fixture 90° Rotation Time 1 minutes 30 seconds
(Spec. Range = 1 to 3 minutes)
FMVSS 301 Position Hold Time + 5 minutes 0 seconds
Total 6 minutes 30 seconds
Next whole minute interval 7 minutes

2. FMVSS 301 Requirements:

(1) Time Period

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

3. Actual Test Vehicle Solvent Spillage:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

4. Solvent Spillage Location(s):

None

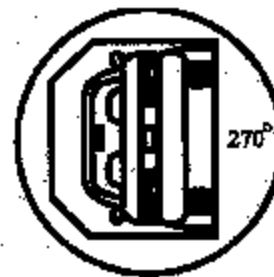
Data Sheet 17 (Continued)

FMVSS 301 Rollover Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

180 - 270 Degrees



1. Determination of Solvent Collection Time Period:

Rollover Fixture 90° Rotation Time	<u>1</u>	minutes	<u>30</u>	seconds
(Spec. Range = 1 to 3 minutes)				
FMVSS 301 Position Hold Time +	<u>5</u>	minutes	<u>0</u>	seconds
Total	<u>6</u>	minutes	<u>30</u>	seconds
Next whole minute interval	<u>7</u>	minutes		

2. FMVSS 301 Requirements:

(1) Time Period

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

3. Actual Test Vehicle Solvent Spillage:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

4. Solvent Spillage Location(s):

None

Data Sheet 17 (Continued)

FMVSS 301 Rollover Data

Vehicle: 2005 Scion TC 2-door

NHTSA No.: C55102

270 - 360 Degrees



1. Determination Of Solvent Collection Time Period:

Rollover Fixture 90° Rotation Time 1 minutes 30 seconds
(Spec. Range = 1 to 3 minutes)
FMVSS 301 Position Hold Time + 5 minutes 0 seconds
Total 6 minutes 30 seconds
Next whole minute interval 7 minutes

2. FMVSS 301 Requirements:

(1) Time Period

First 5 minutes from onset of rotation	6th min.	7th min.	8th min. (if required)
--	----------	----------	------------------------

(2) Maximum Allowable Solvent Spillage

142 g	28 g	28 g	28 g
-------	------	------	------

3. Actual Test Vehicle Solvent Spillage:

0 g	0 g	0 g	N/A
-----	-----	-----	-----

Note: Record spillage for whole minute intervals only as determined above.

4. Solvent Spillage Location(s):

None

Appendix A

Photographs

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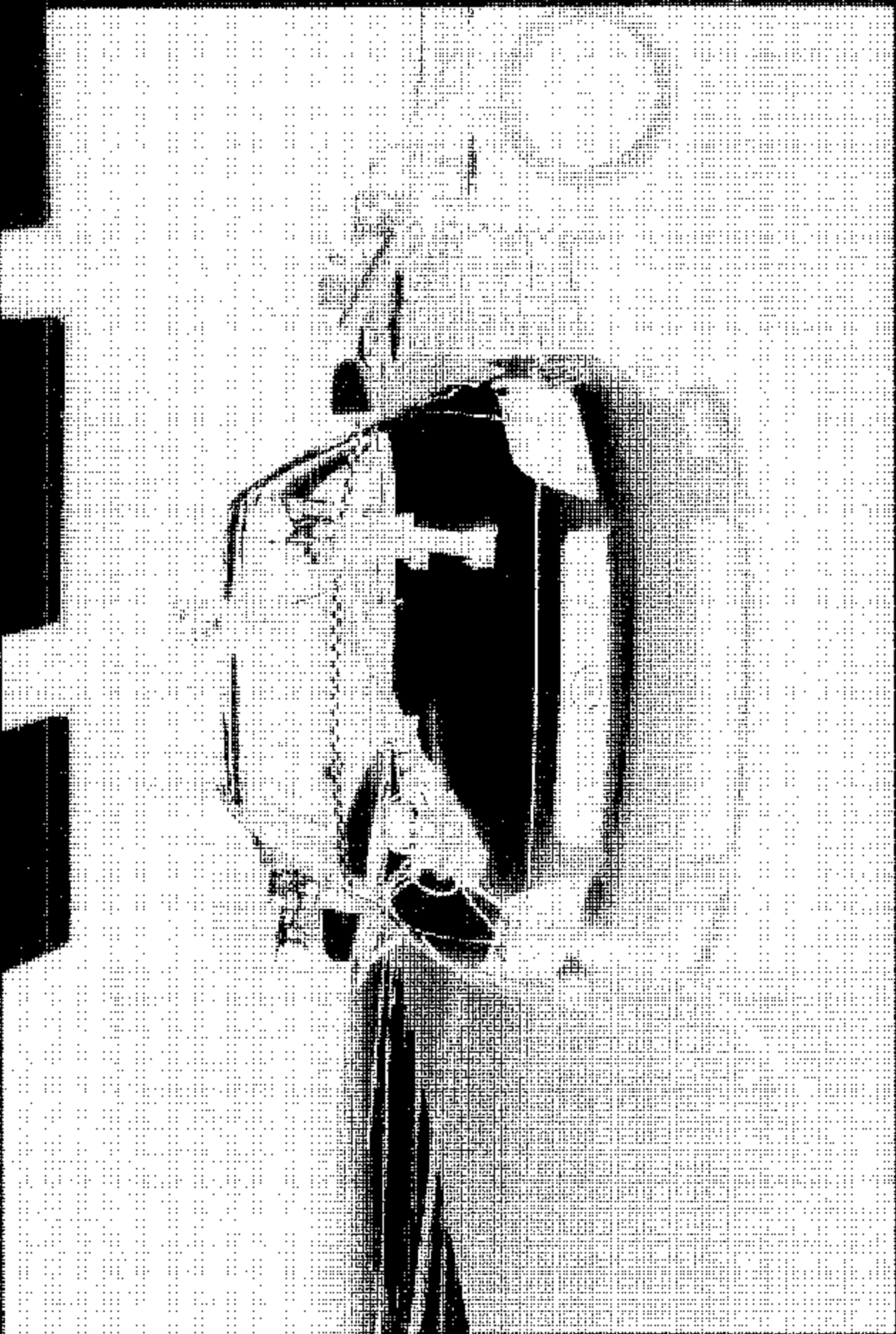


Figure A-1 Pre-Test Front View of Test Vehicle

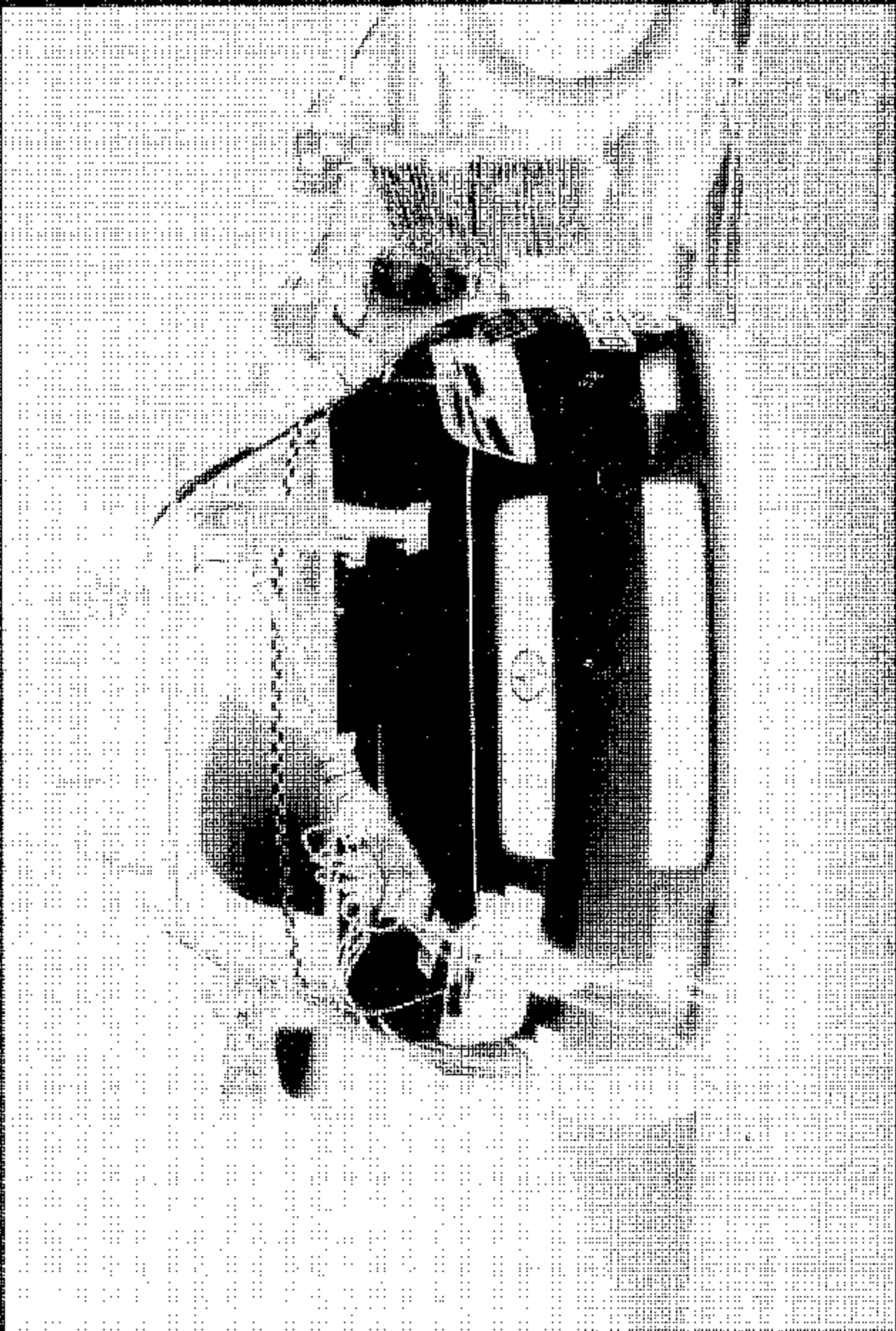


Figure A-2 Post-Test Front View of Test Vehicle

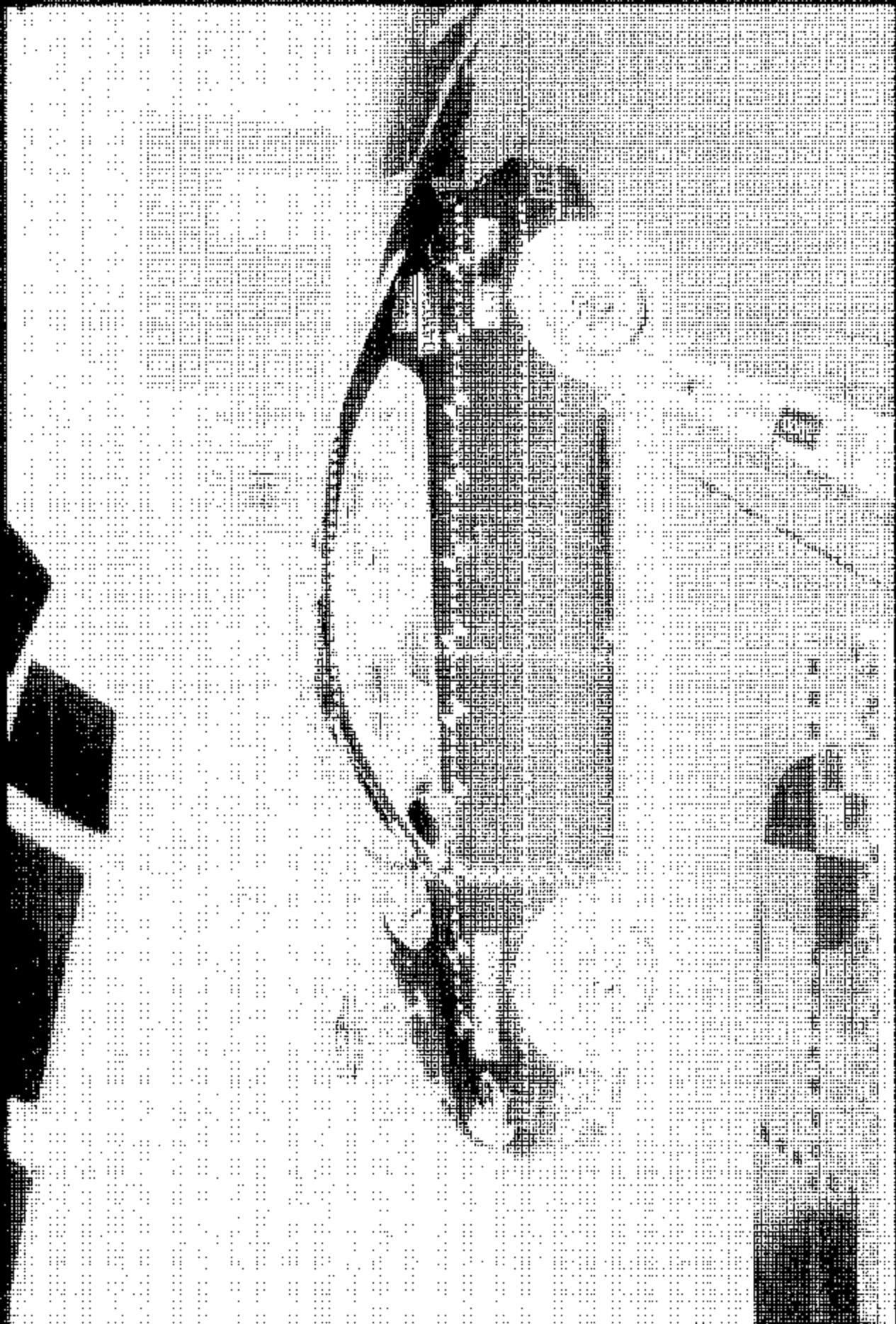


Figure A-3 Pre-Test Impacted Side View of Test Vehicle

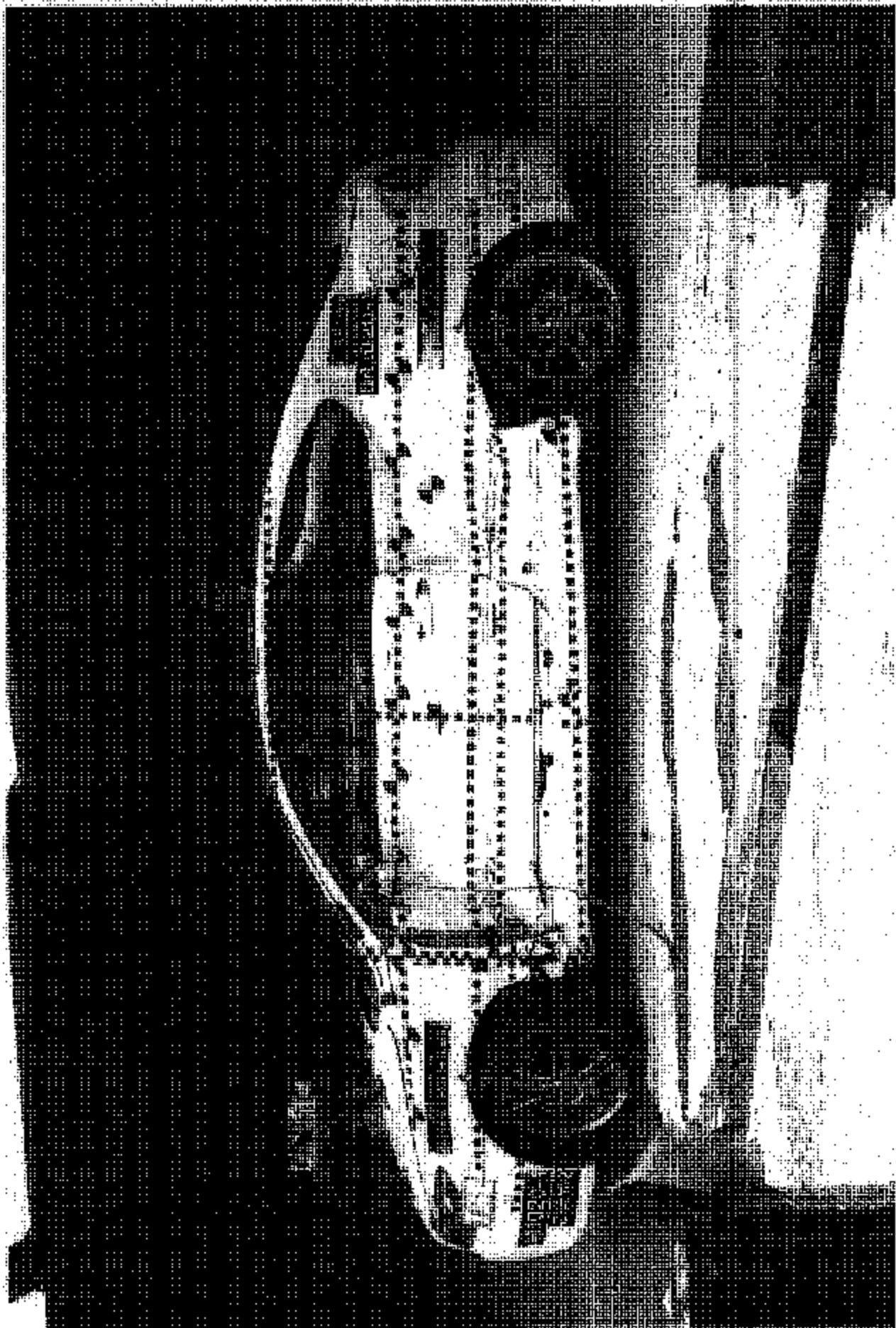


Figure A-4 Post-Test Impacted Side View of Test Vehicle

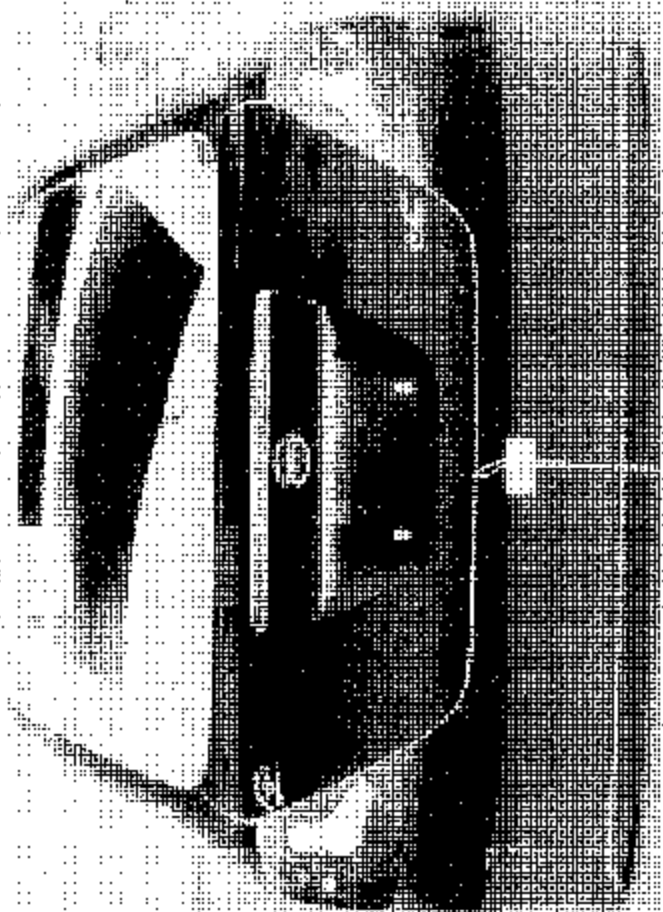


Figure A-5 Pre-Test Rear View of Test Vehicle

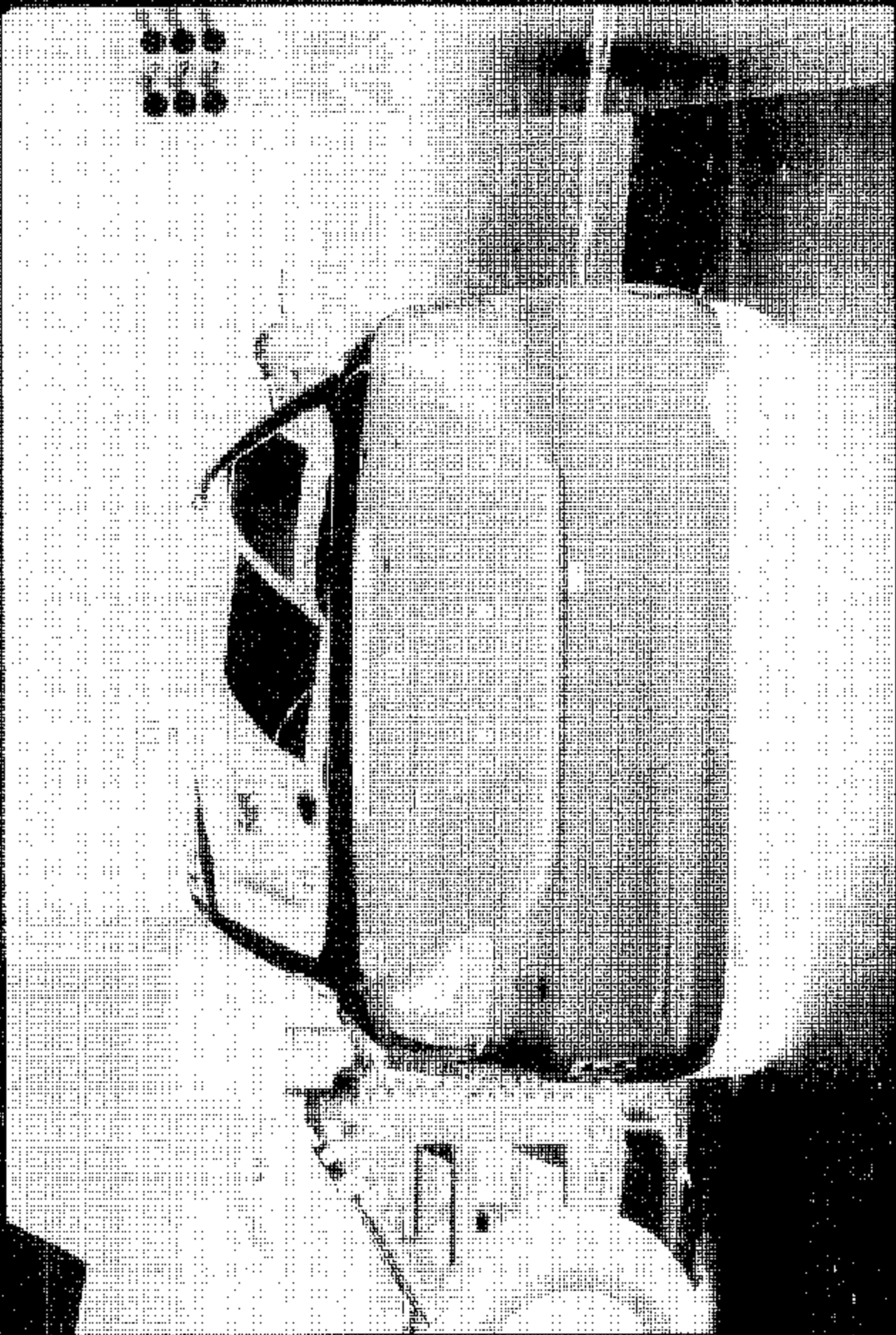


Figure A-6 Post-Test Rear View of Test Vehicle
A-10

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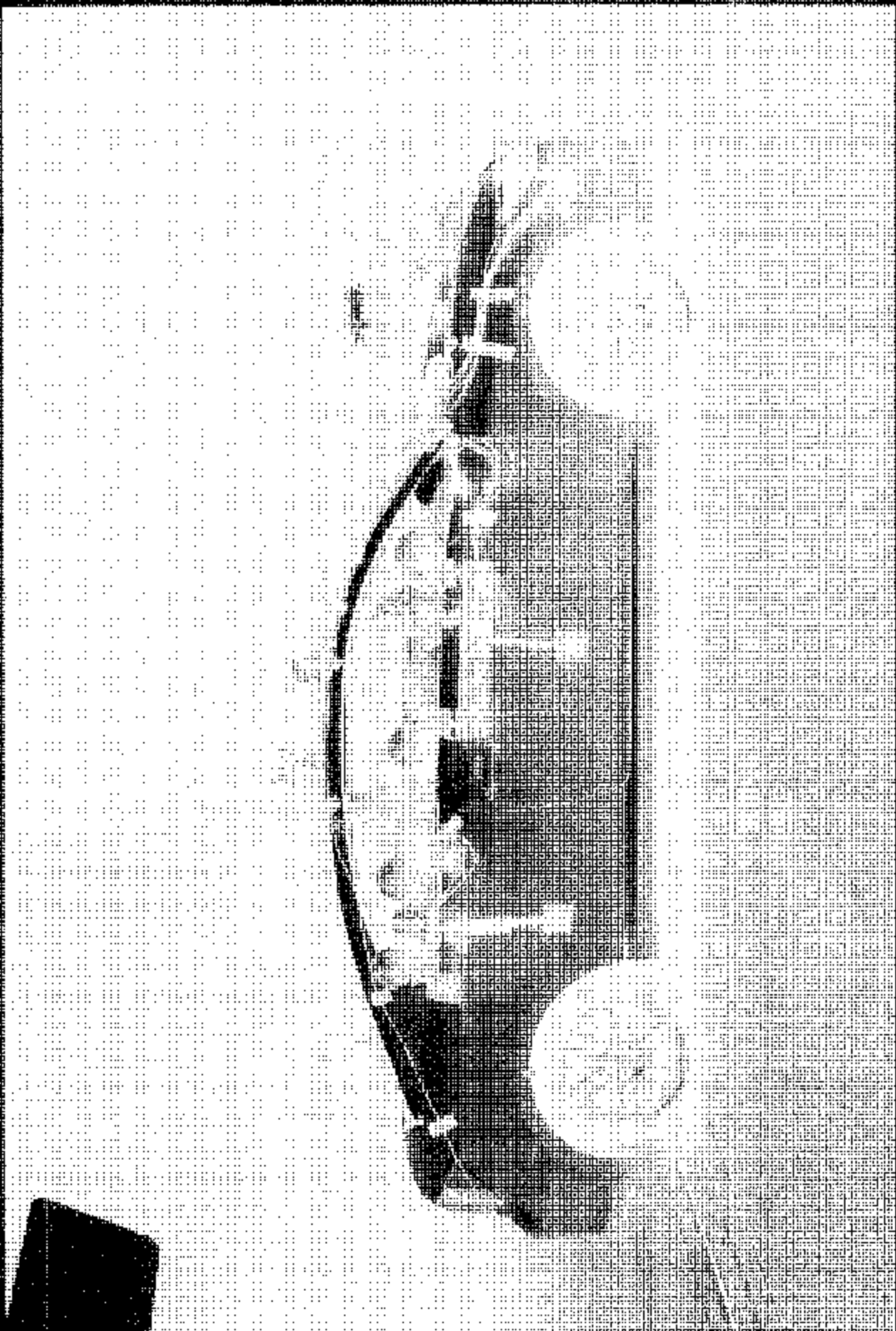


Figure A-7 Pre-Test Non-Struck Side View of Test Vehicle

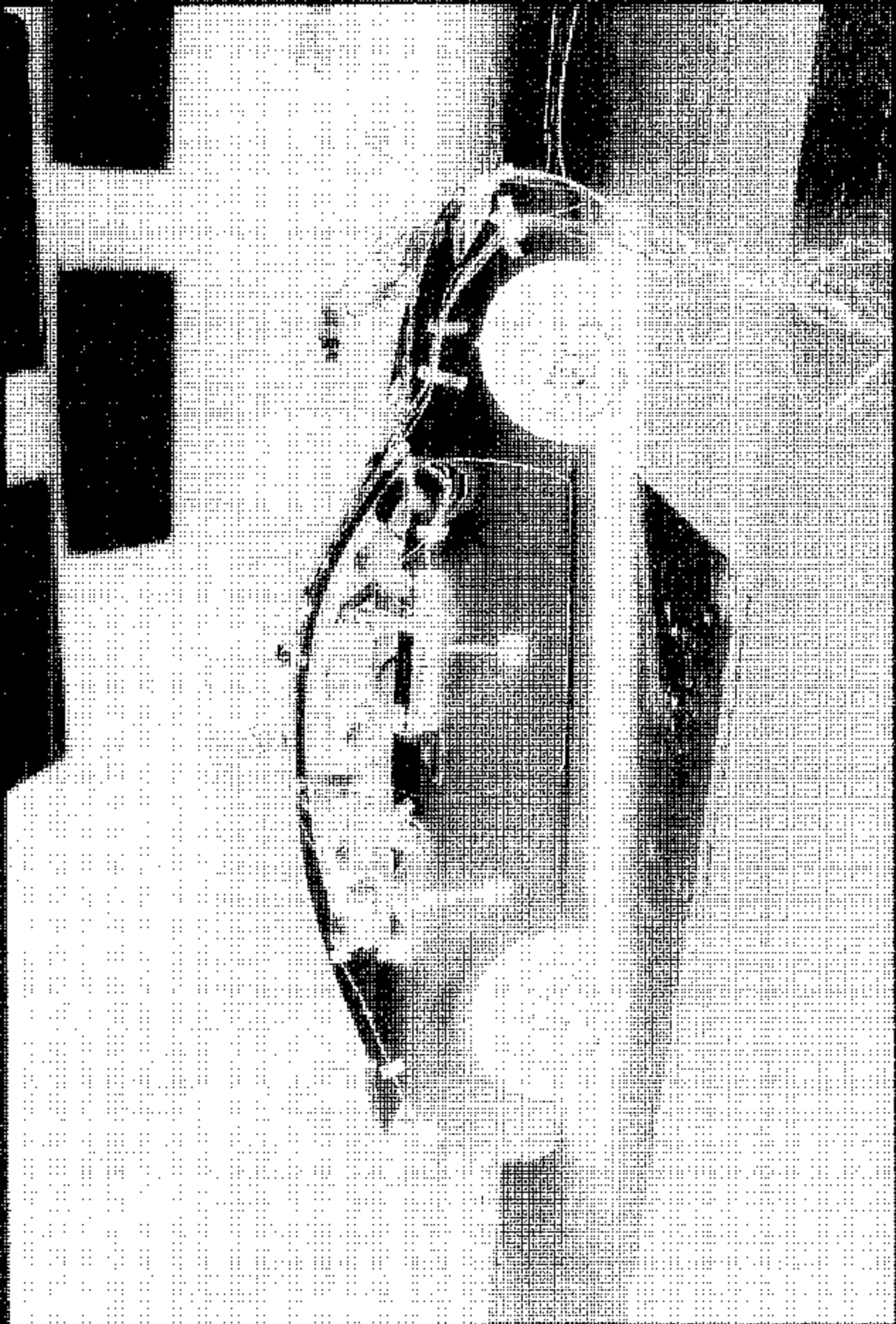


Figure A-8 Post-Test Non-Struck Side View of Test Vehicle

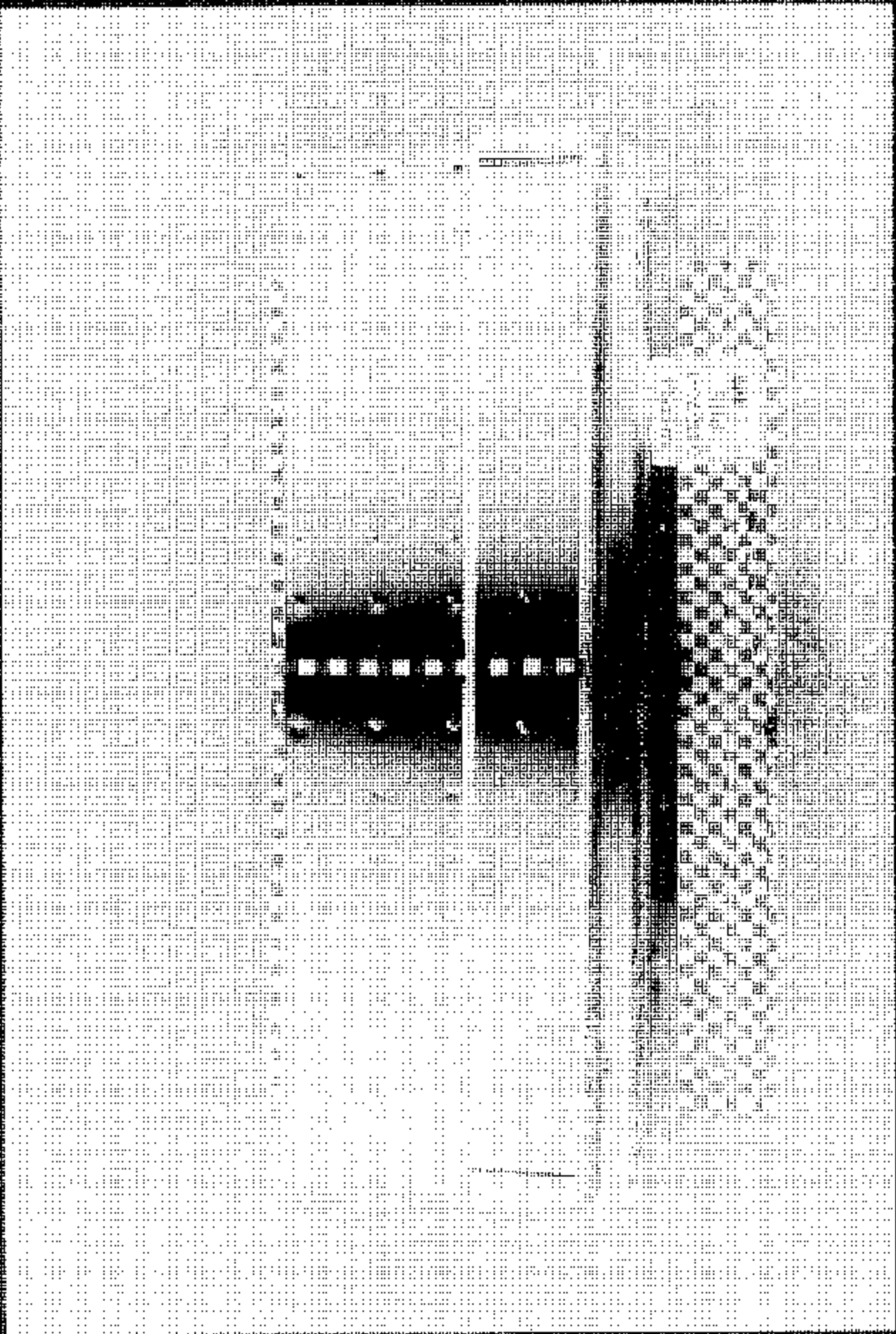


Figure A-9 Pre-Test Frontal View of Impactor Face



Figure A-10 Post-Test Frontal View of Impactor Face

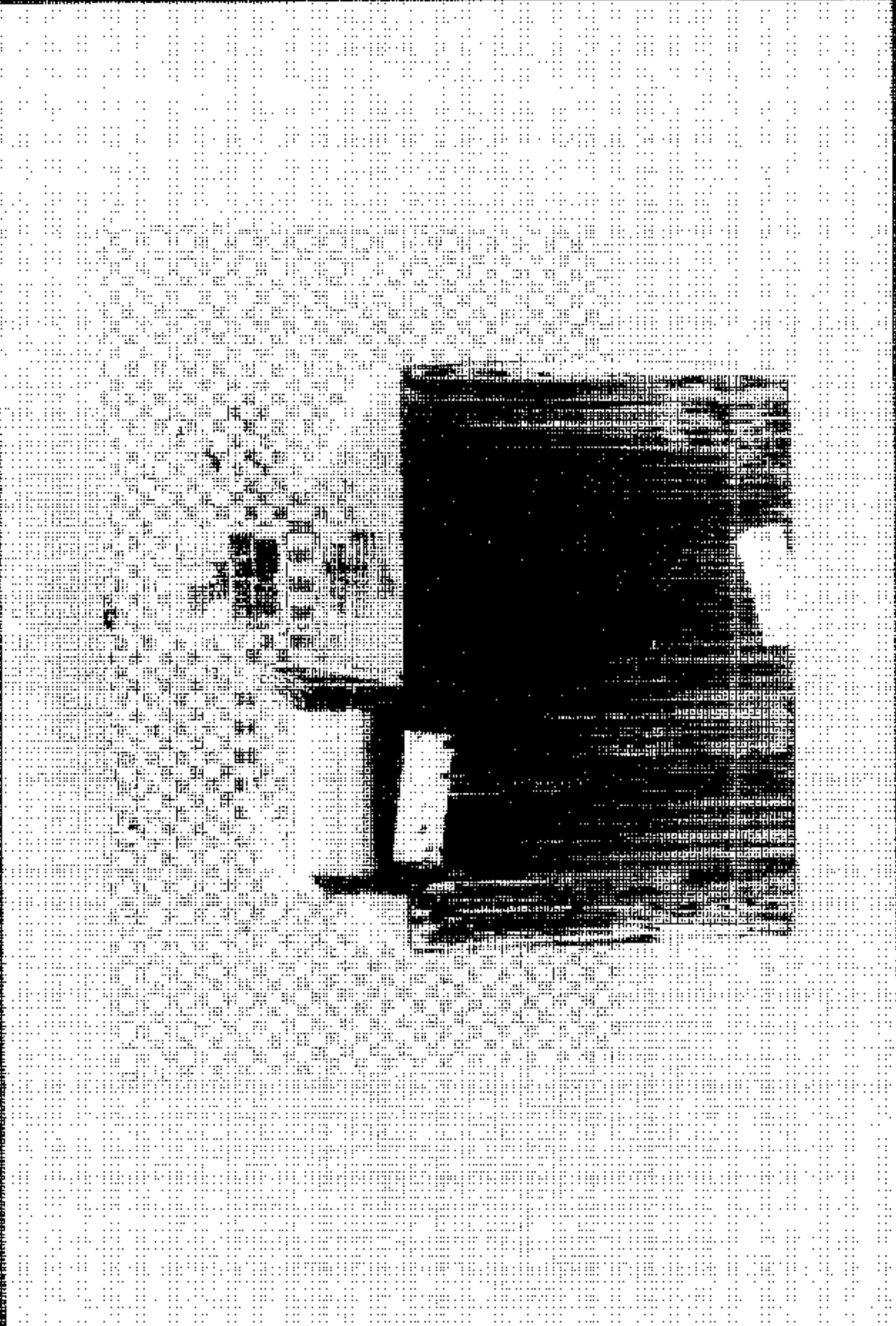


Figure A-11 Pre-Test Left Side View of Impactor Face
A-15

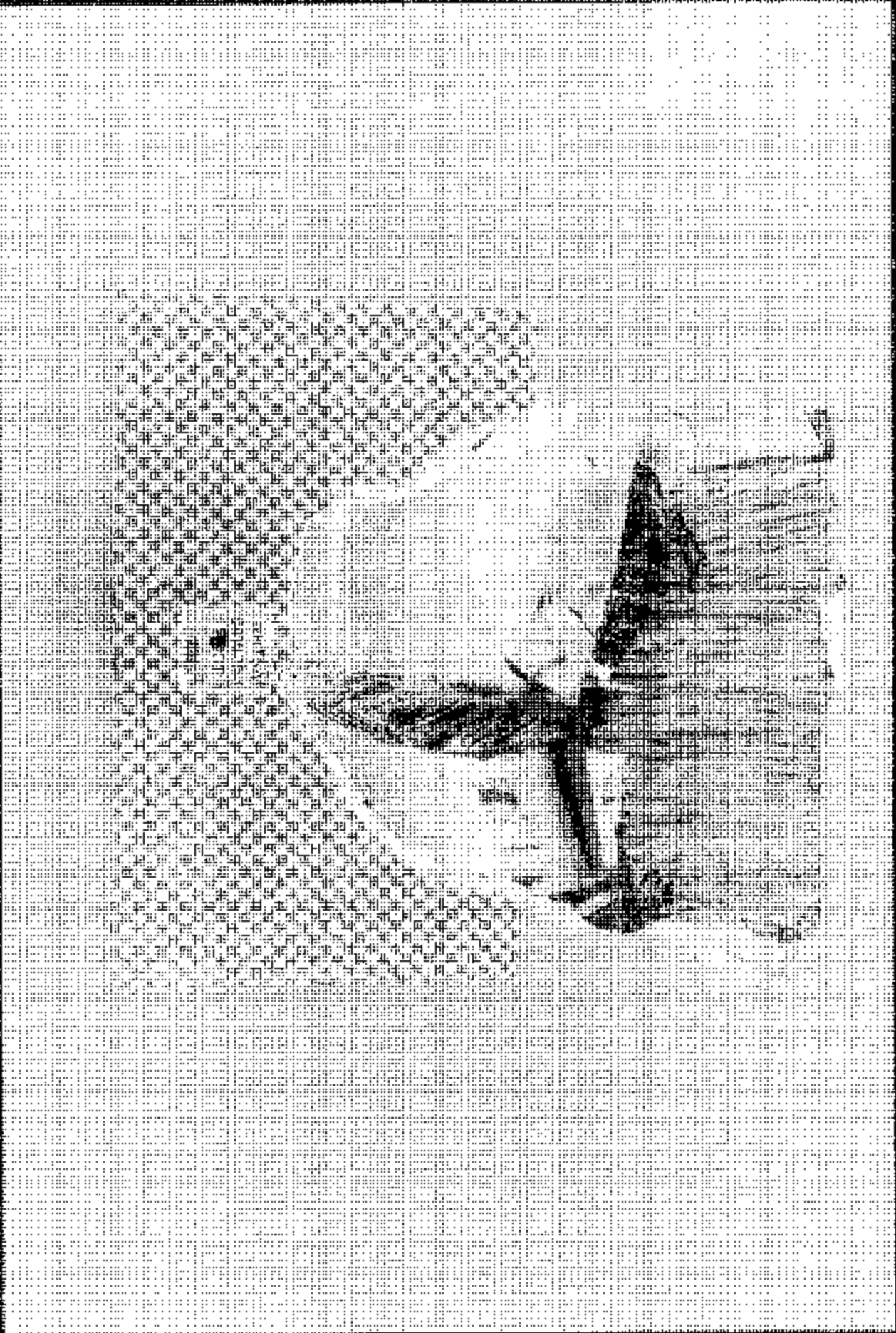


Figure A-12 Post-Test Left Side View of Impactor Face

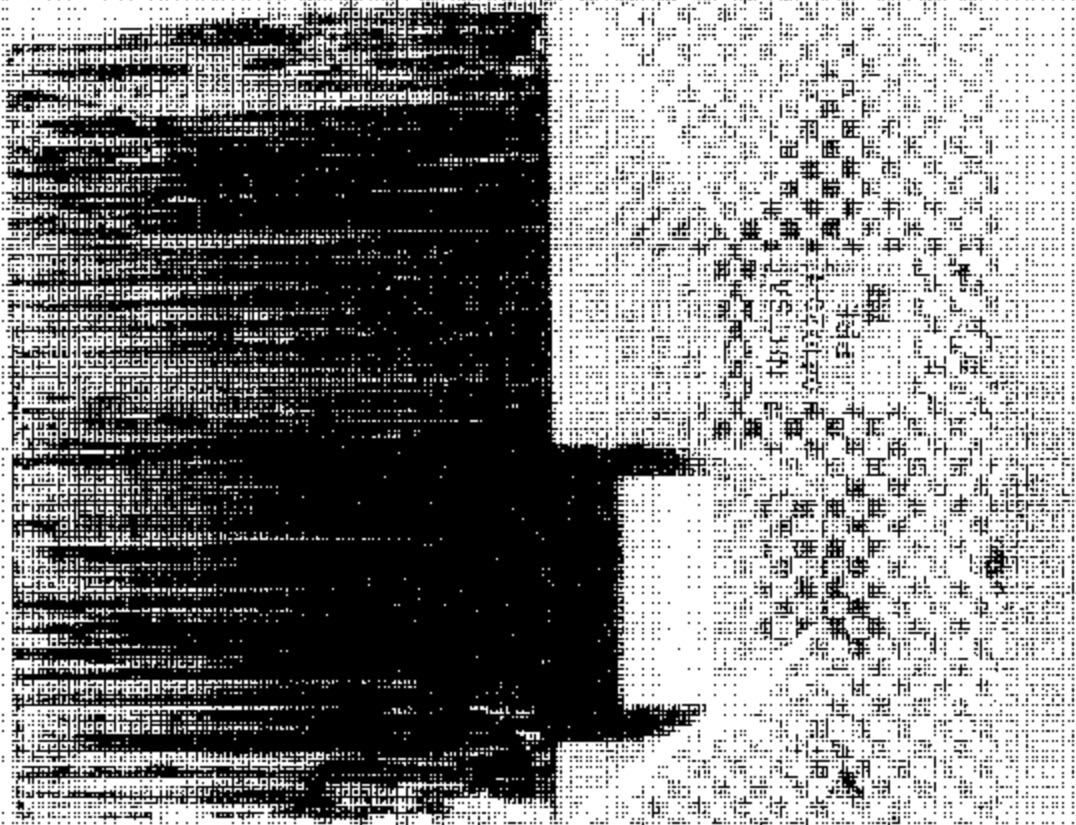


Figure A-13 Pre-Test Right Side View of Impactor Face

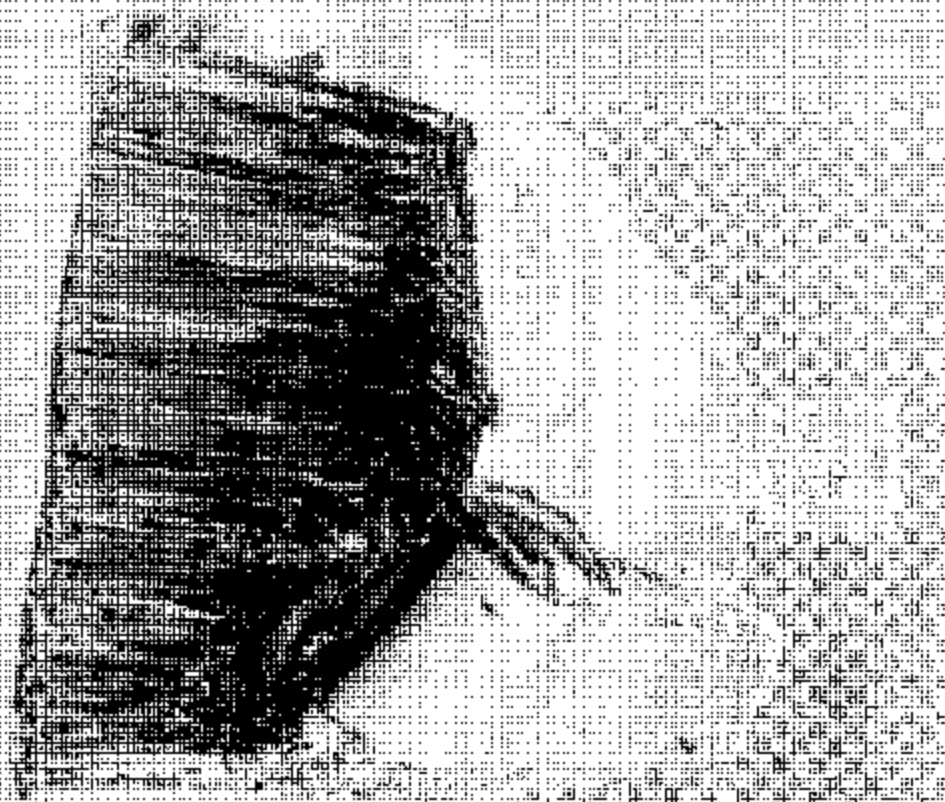


Figure A-14 Post-Test Right Side View of Impactor Face
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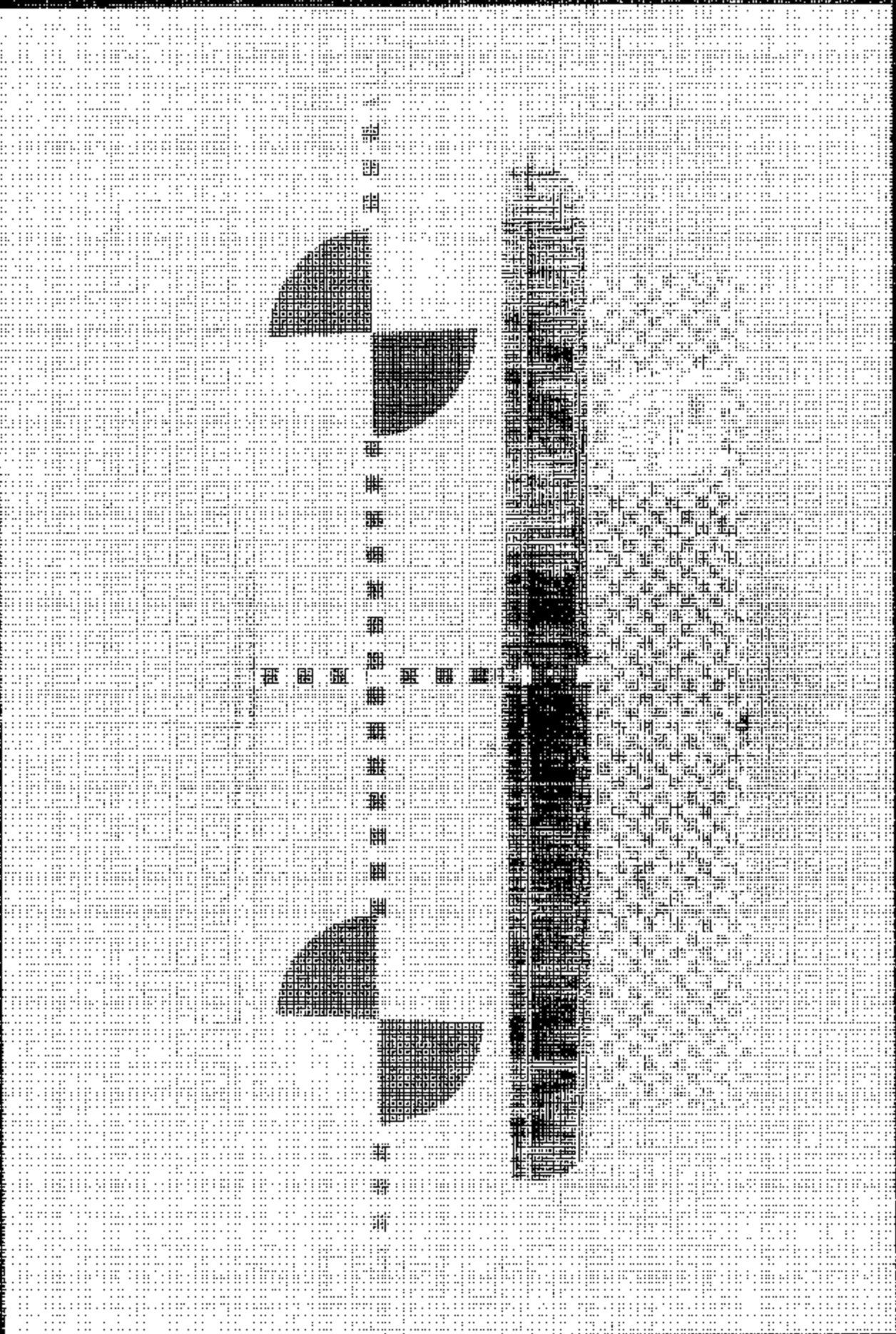


Figure A-15 Pre-Test Top View of Impactor Face

A-19

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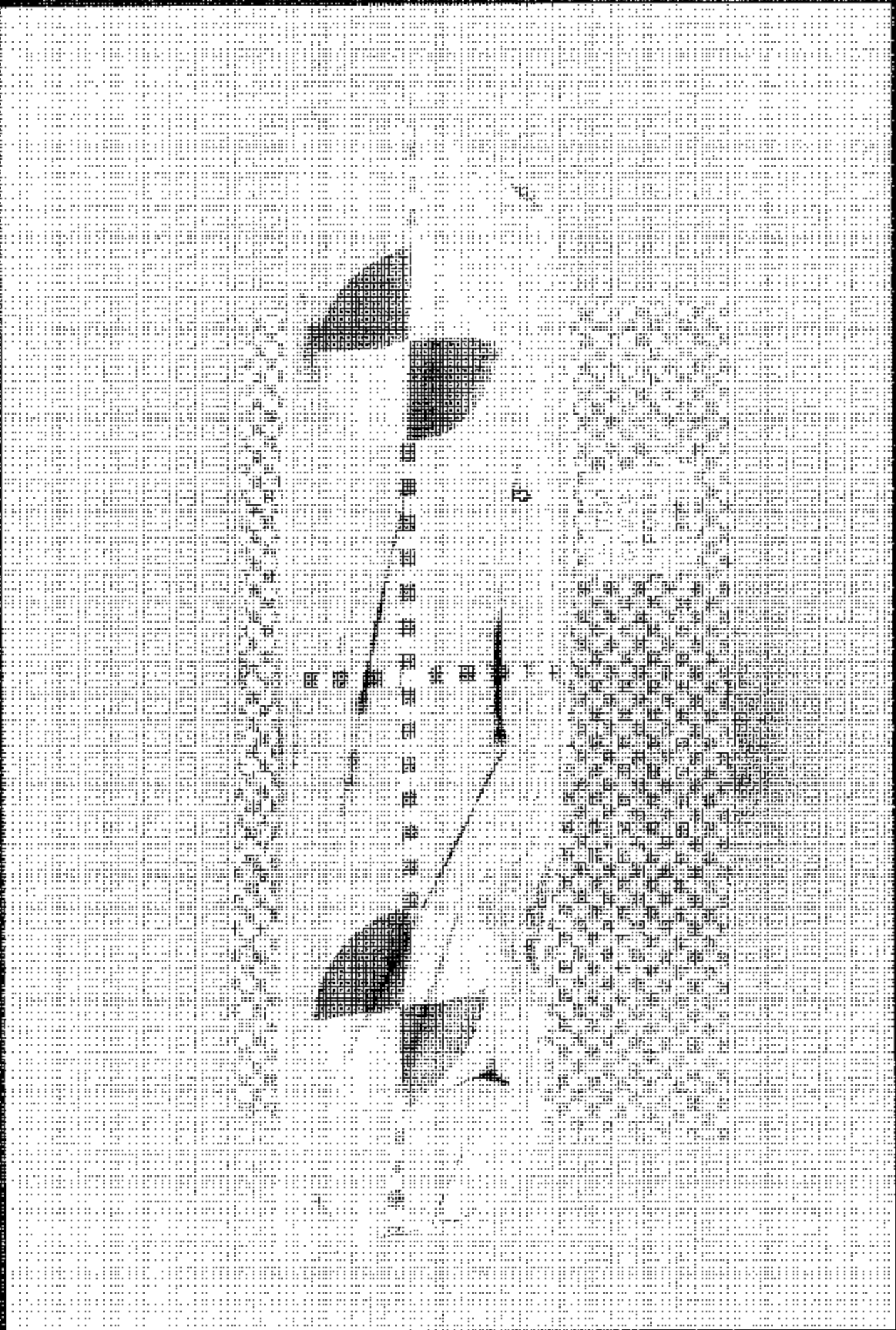


Figure A-16 Post-Test Top View of Impactor Face

A-20

041020-1

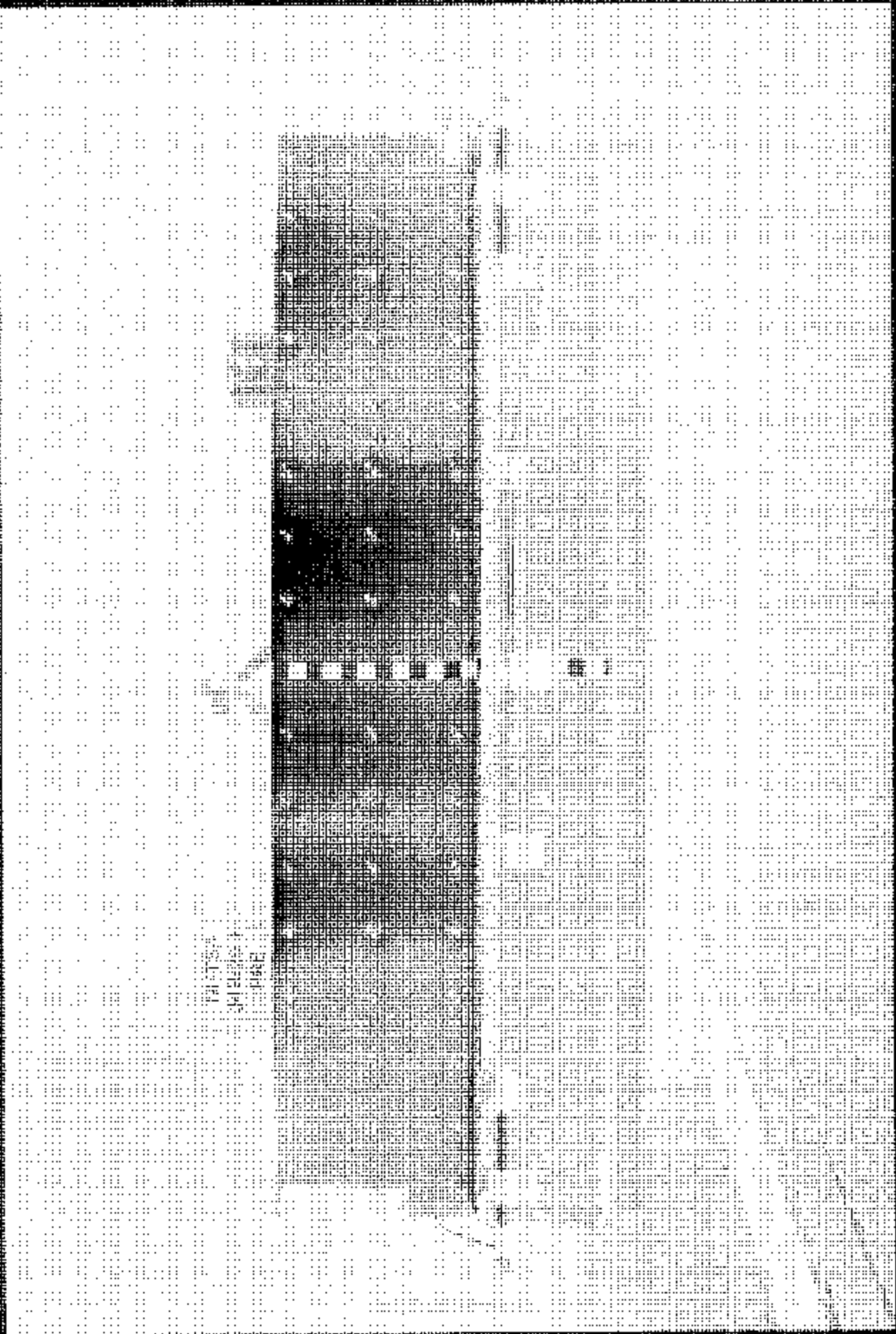


Figure A-17 Pre-Test View of MDB Showing Contact Switches in Place

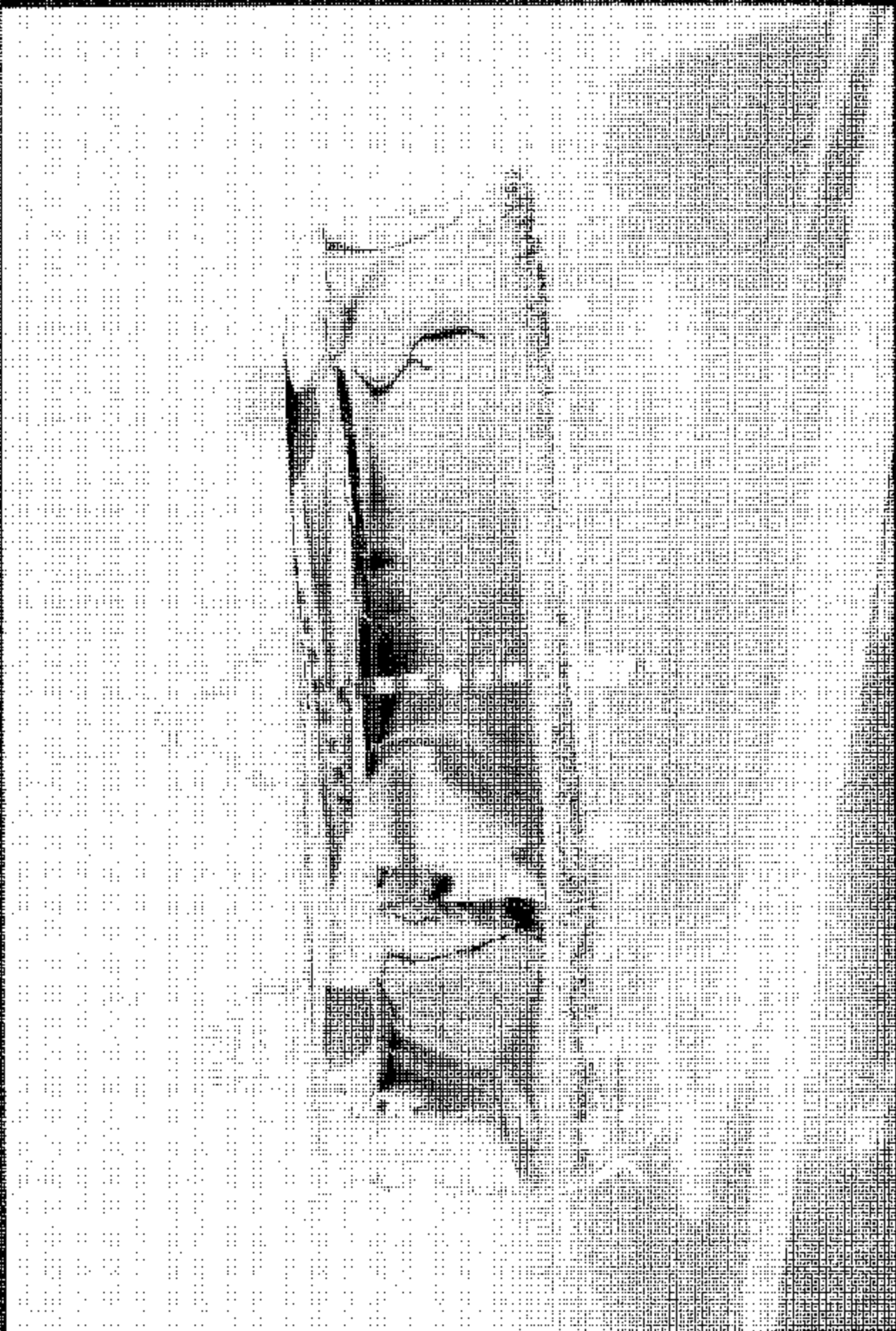


Figure A-18 Post-Test View of MDB Showing Contact Switches in Place

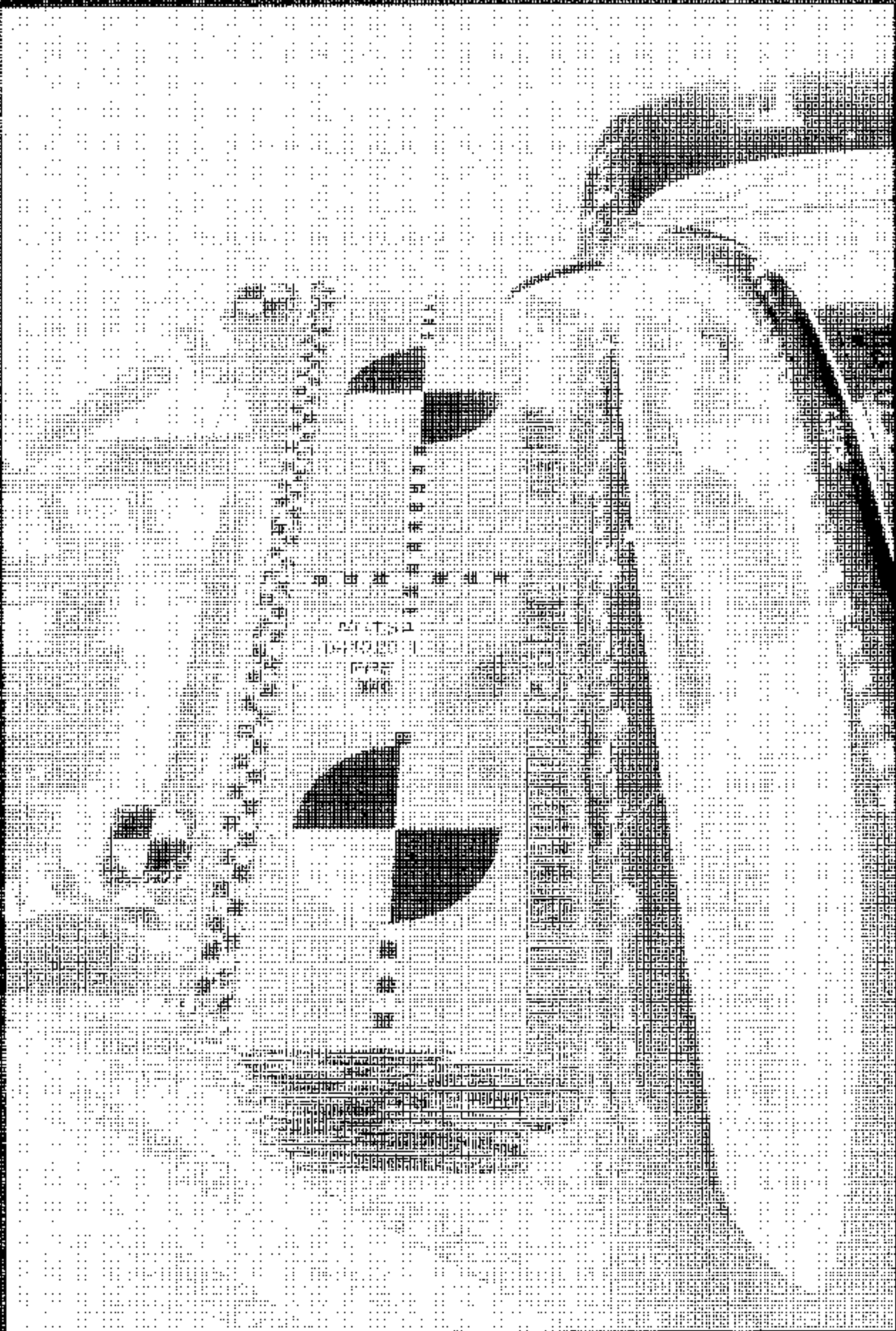


Figure A-19 Pre-Test Overhead View of MDB Aligned with Vehicle

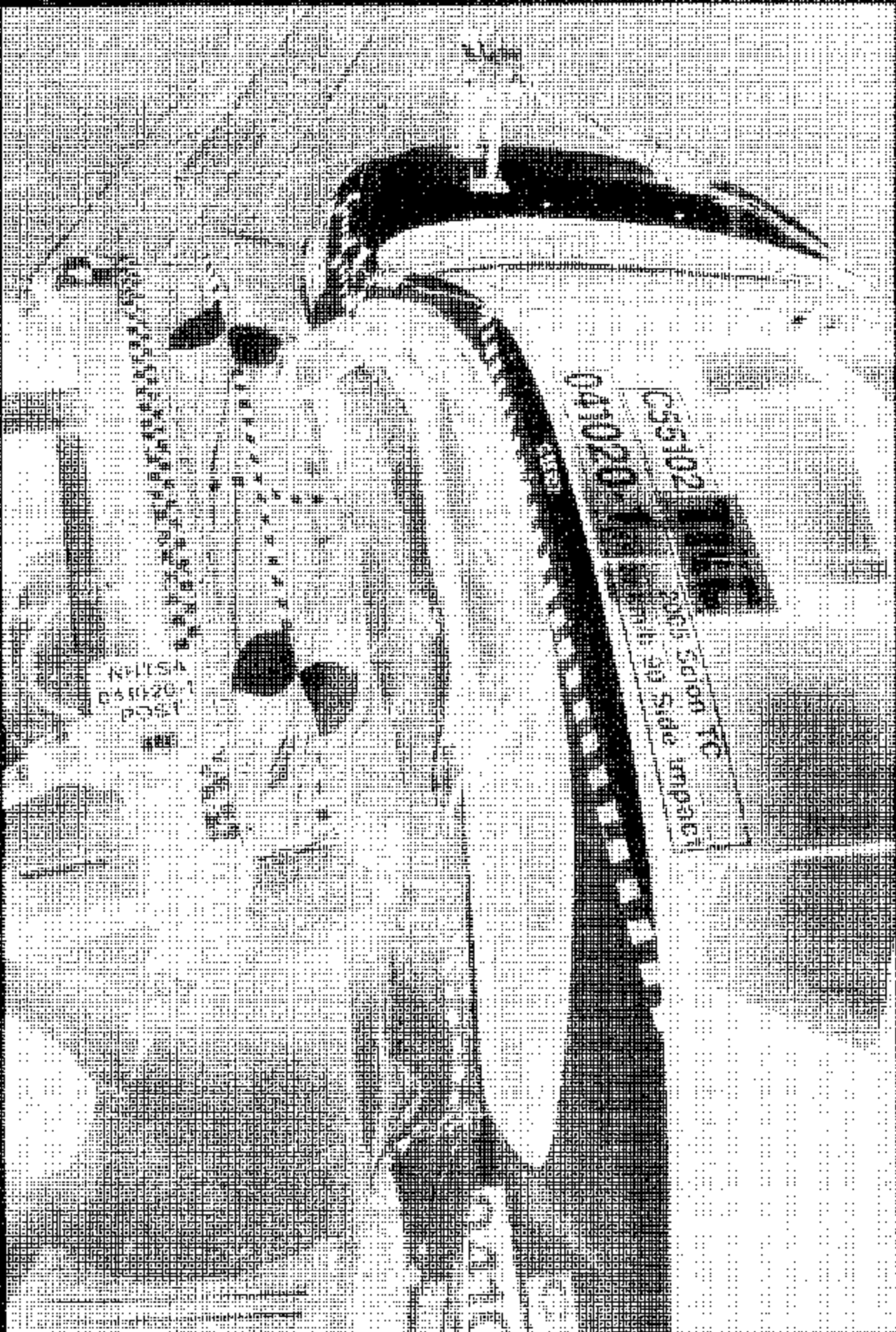


Figure A-20 Post-Test Overhead View of Vehicle



Figure A-21 Pre-Test Right Occupant Compartment View of Front SID Hill

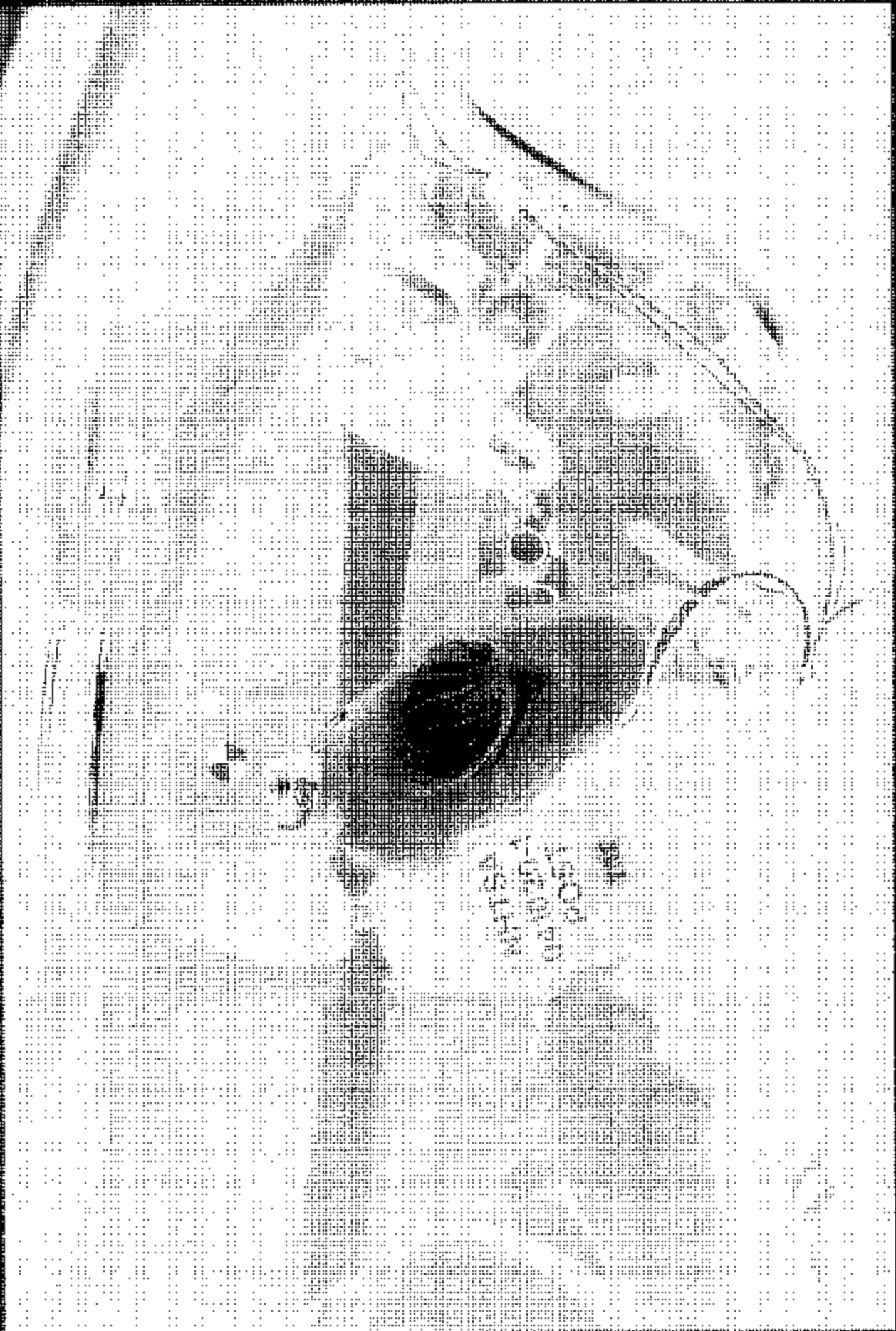


Figure A-22 Post-Test Right Occupant Compartment View of Front SIB HMI



Figure A-23 Pre-Test Right Occupant Compartment View of Rear SID HII



Figure A-24 Post-Test Right Occupant Compartment View of Rear SID HIII

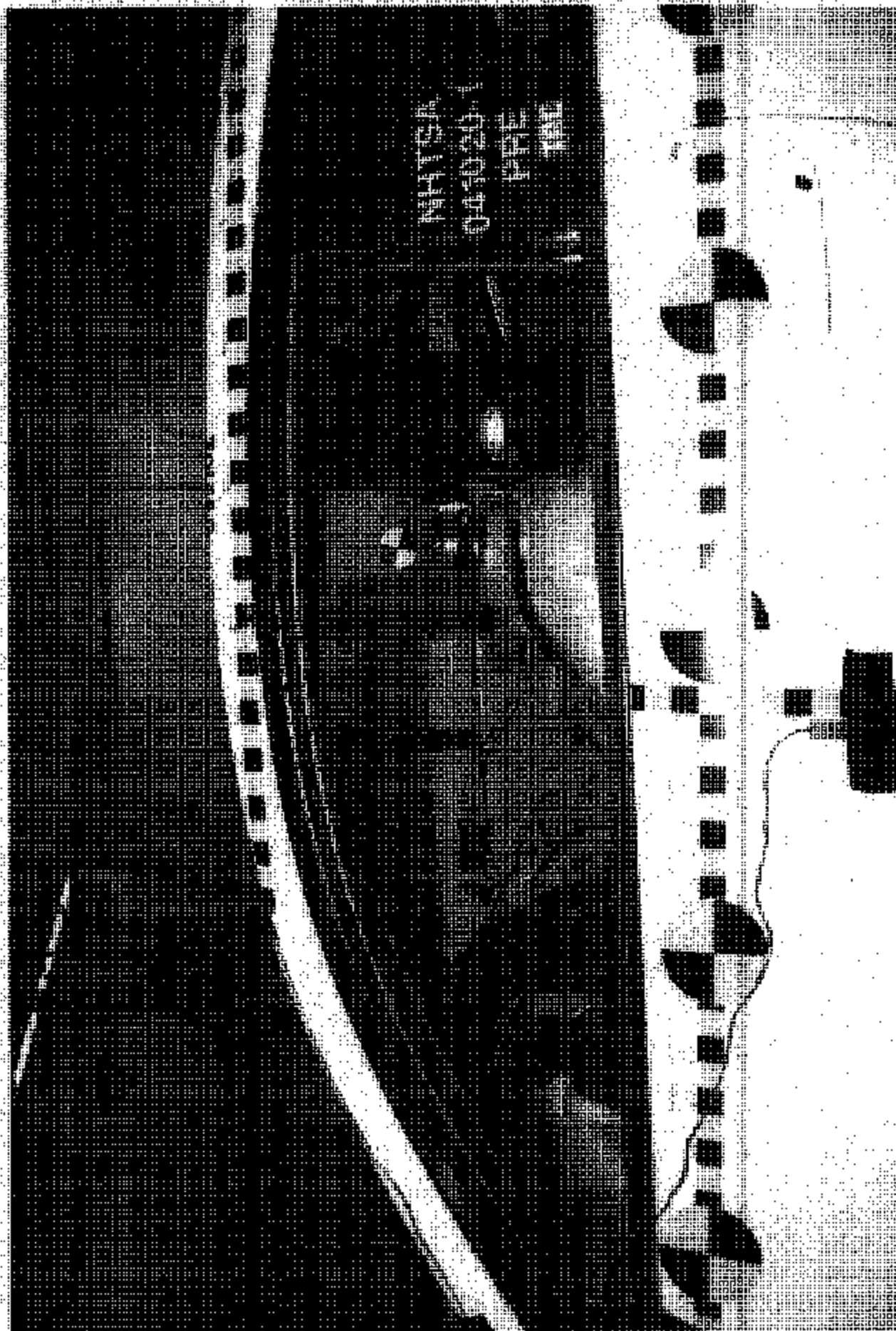


Figure A-25 Pre-Test Left View of Front SID H1B

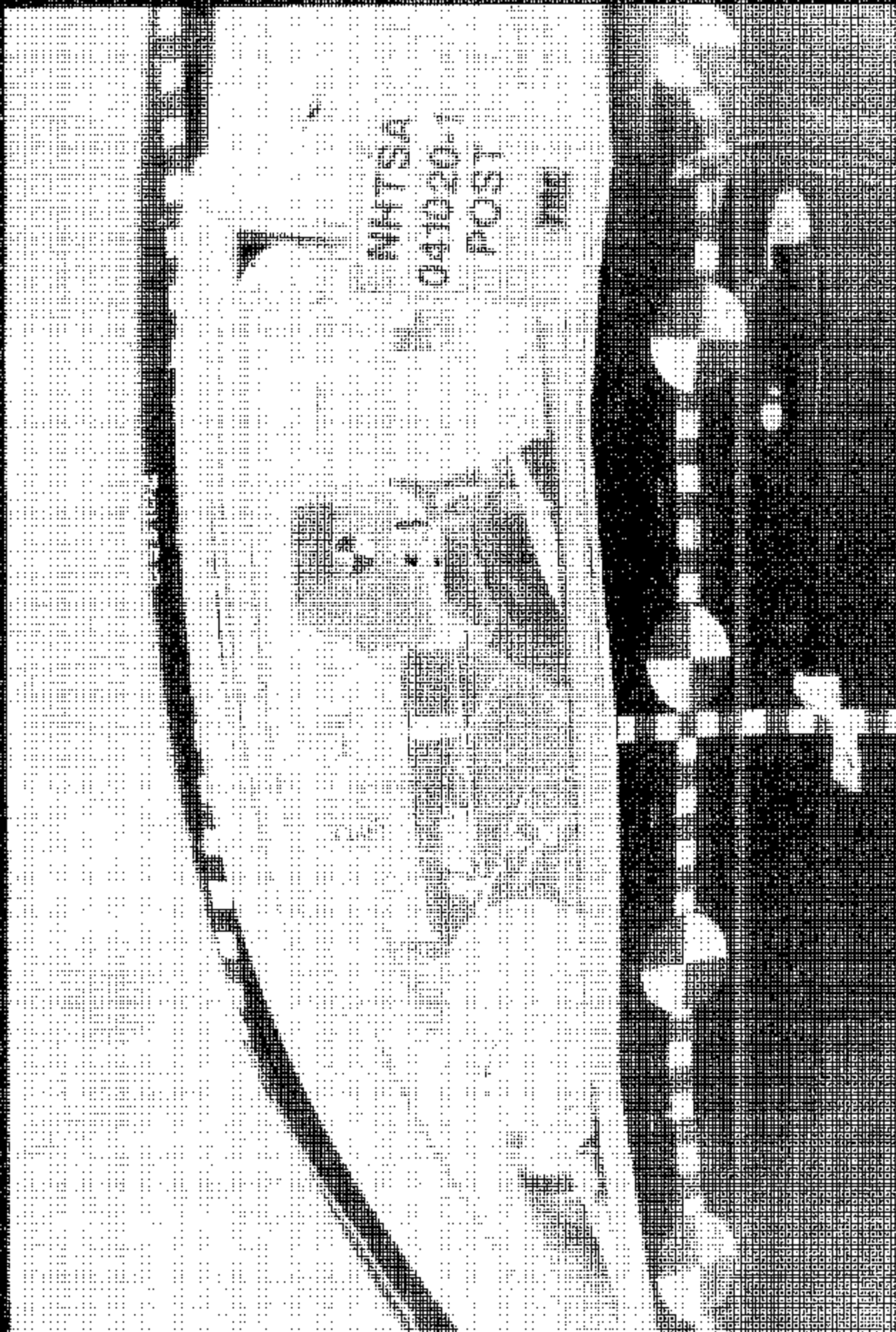


Figure A-26 Post-Test Left View of Front SID Hull



Figure A-27 Pre-Test Left View of Front SID HMI and Belt Position



Figure A-28 Post-Test Left View of Front SID HIII and Belt Position



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Figure A-29 Pre-Test View of Front SID EHM and Door Clearance



Figure A-30 Post-Test View of Front SID HHH and Door Clearance

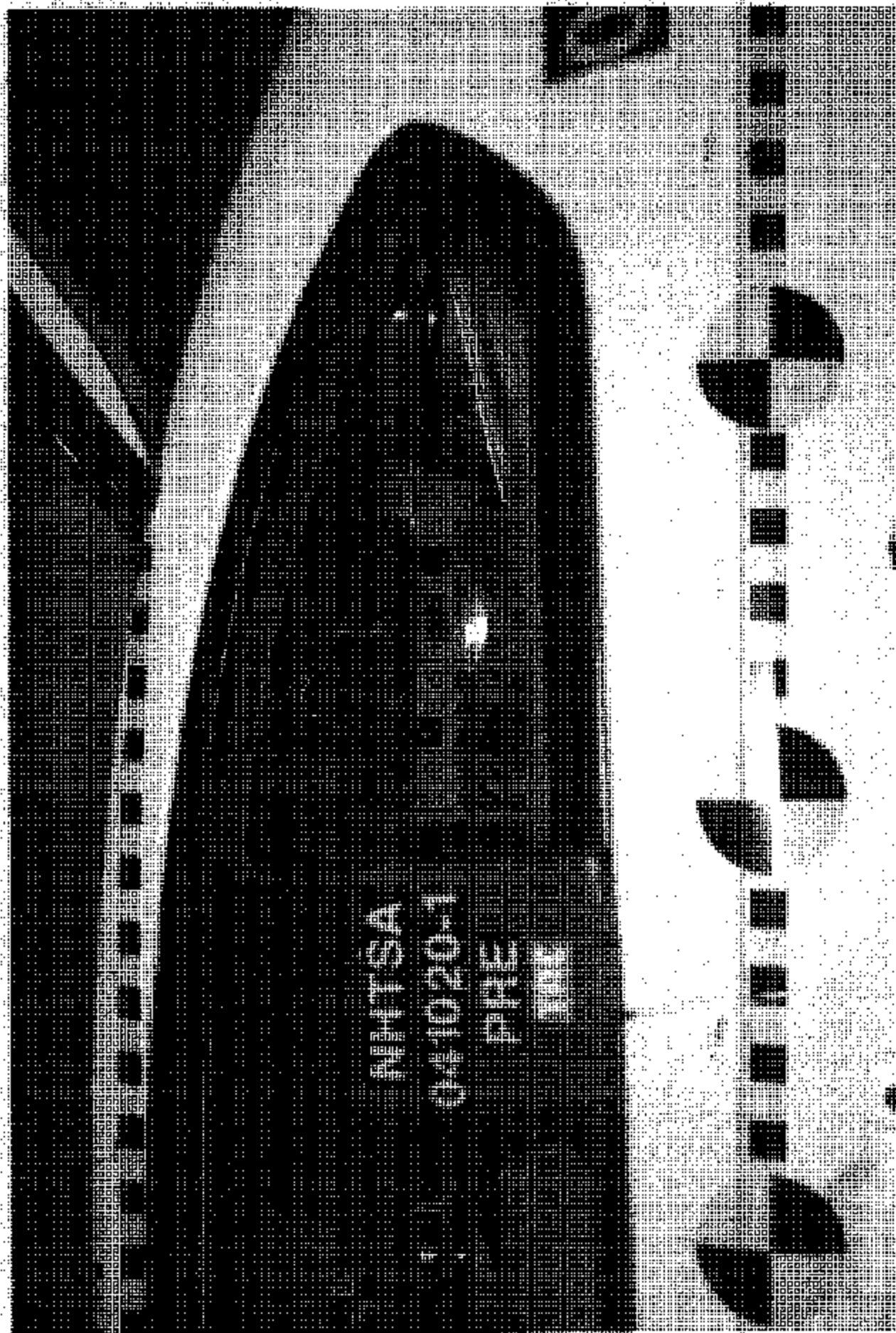


Figure A-31 Pre-Test Left View of Rear SID HHH

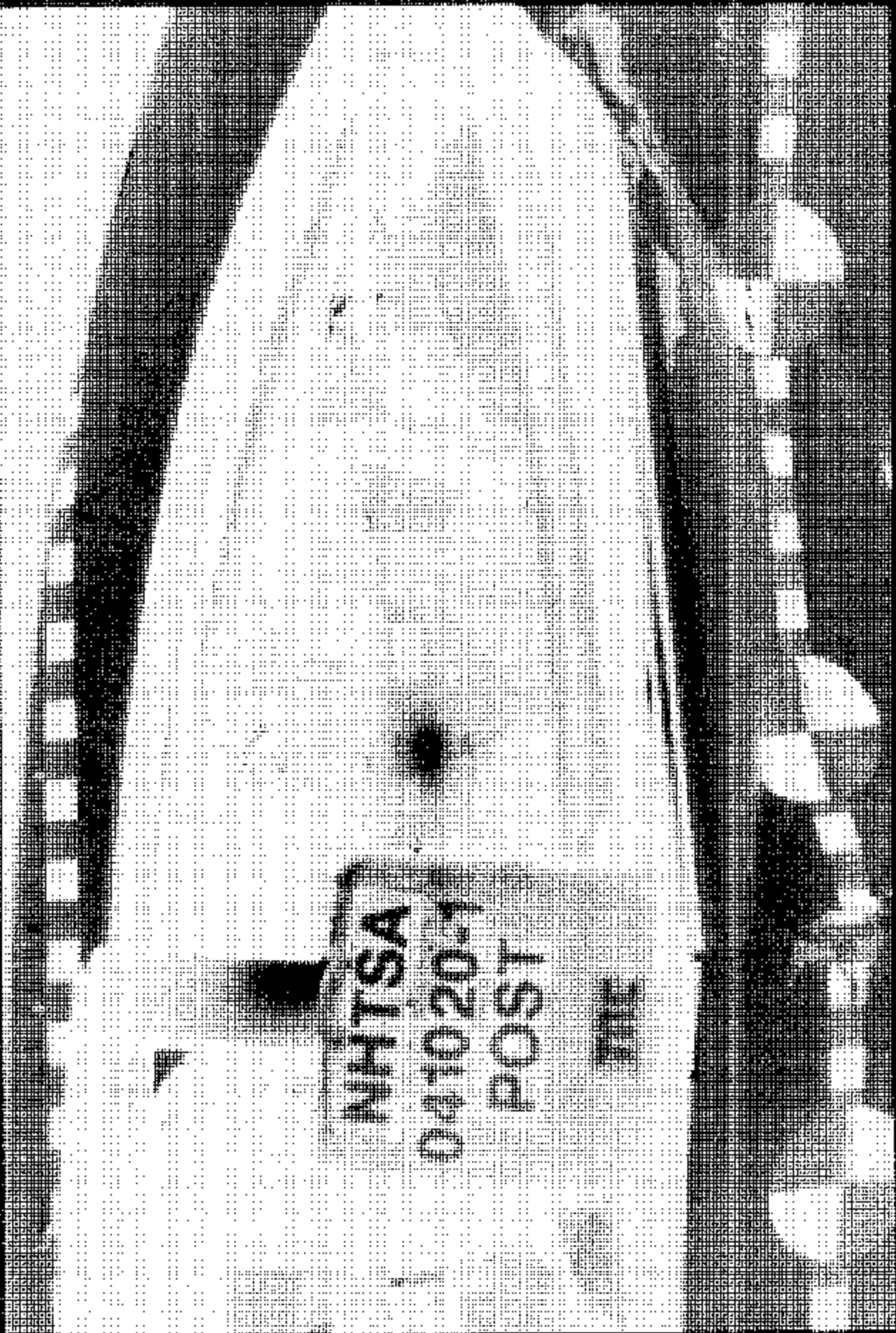


Figure A-32 Post-Test Left View of Rear SID EHE



Figure A-33 Pre-Test Angled View of Rear SID HIII

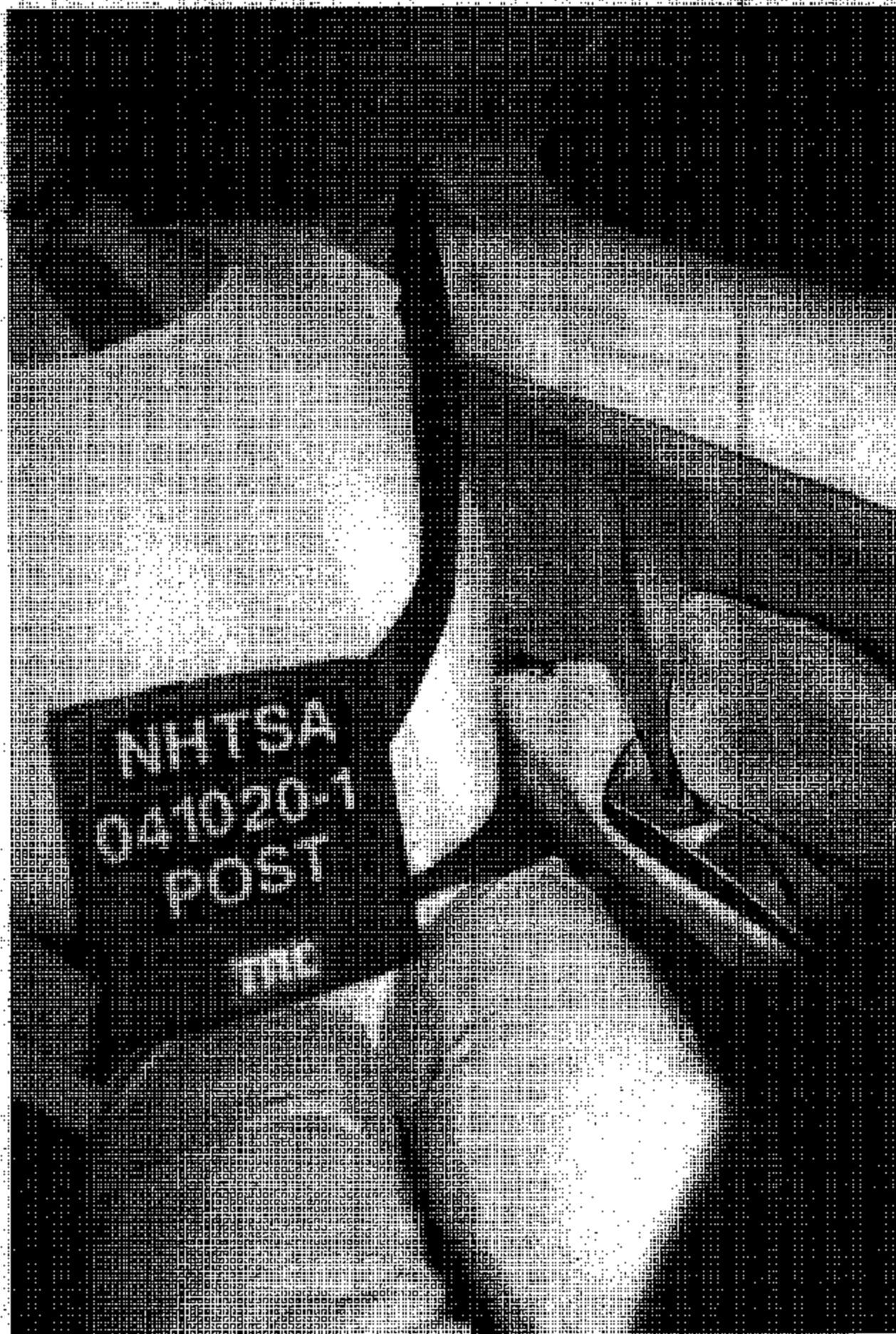


Figure A-34 Post-Test Angled View of Rear SID IIII

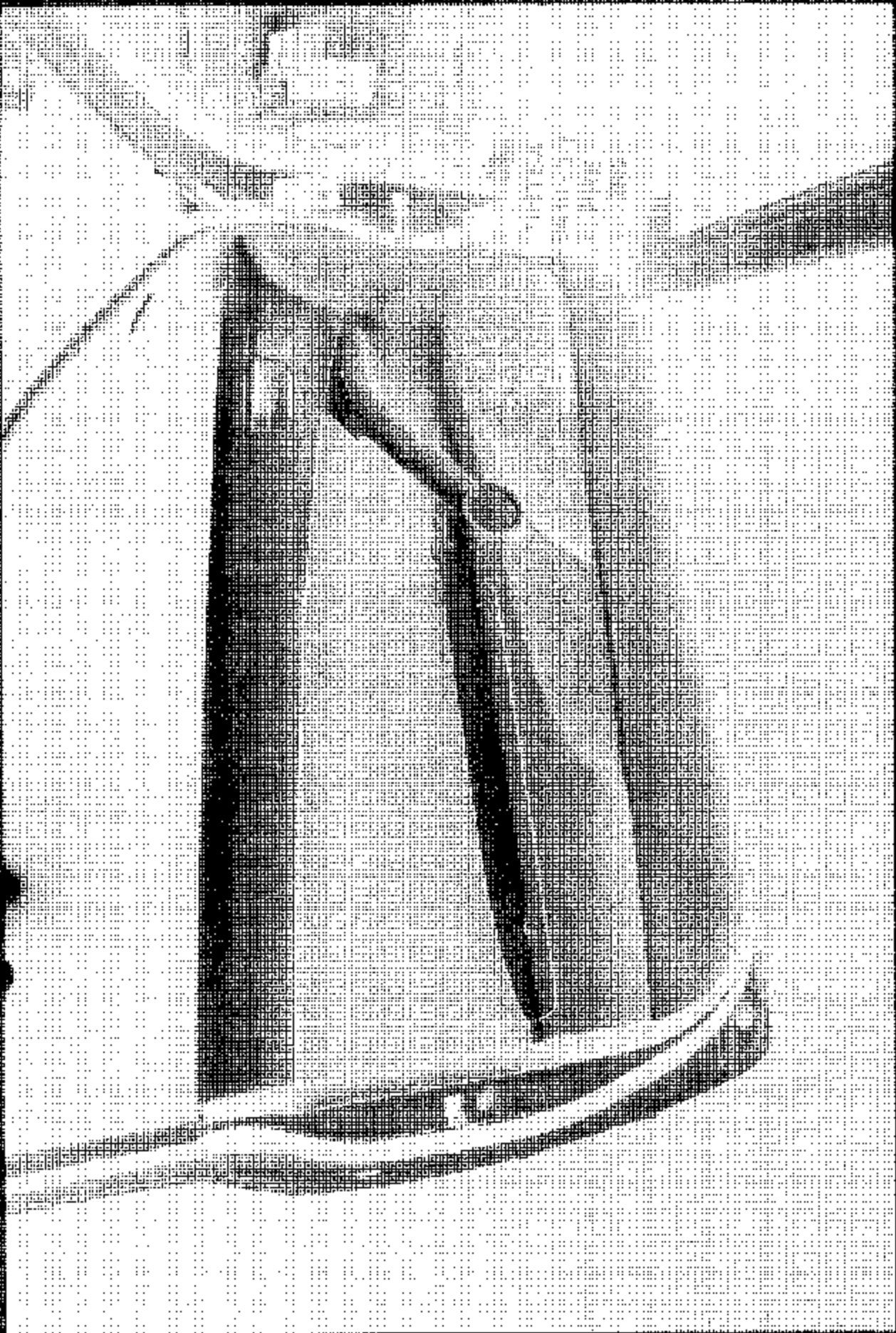


Figure A-35 Pre-Test Interior of Front Door

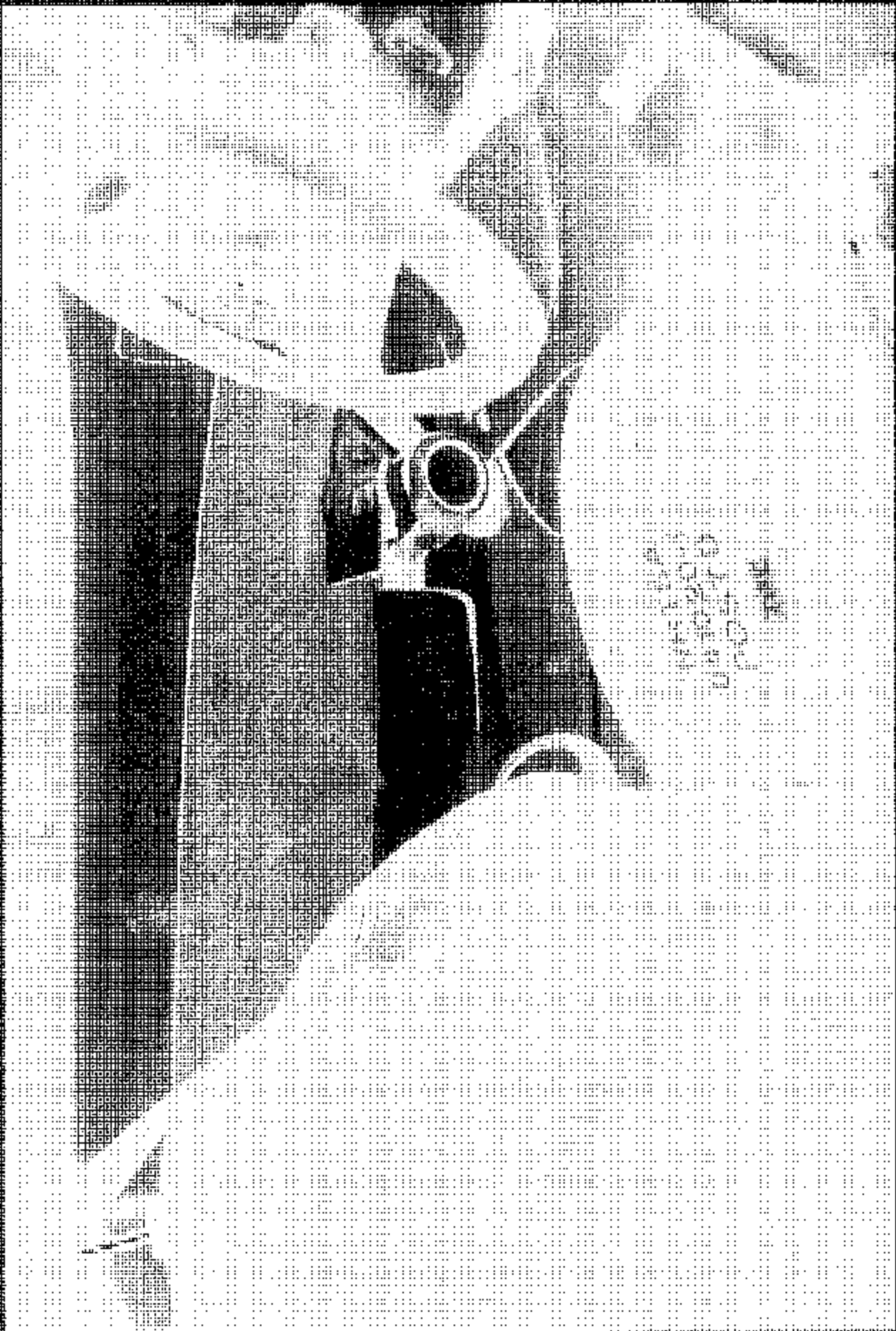


Figure A-36 Post-Test Interior of Front Door Showing SID III Impact Locations

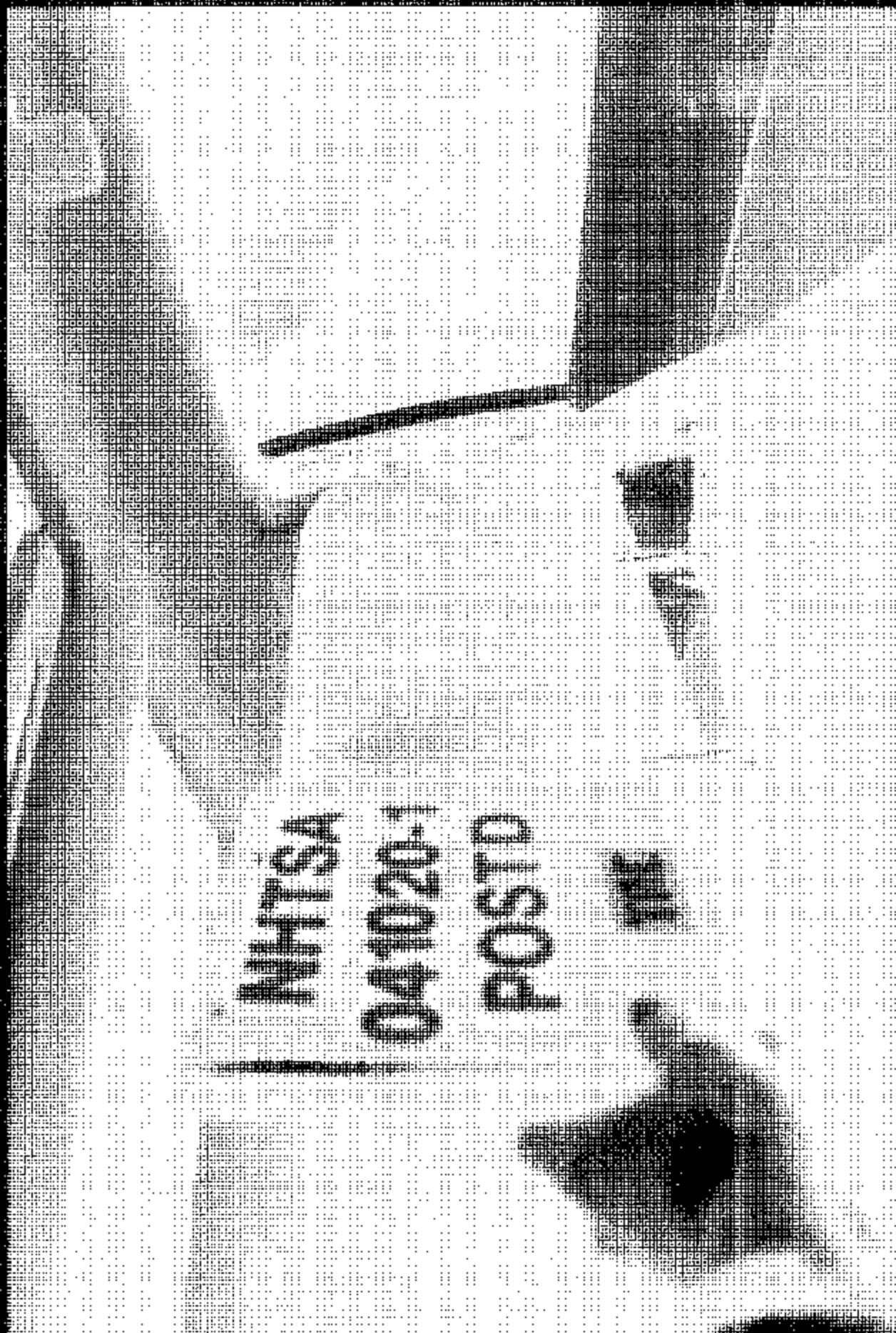


Figure A-37 Post-Test Front SID HIB Contact - View 1



Figure A-38 Post-Test Front SID HHH Contact - View 2

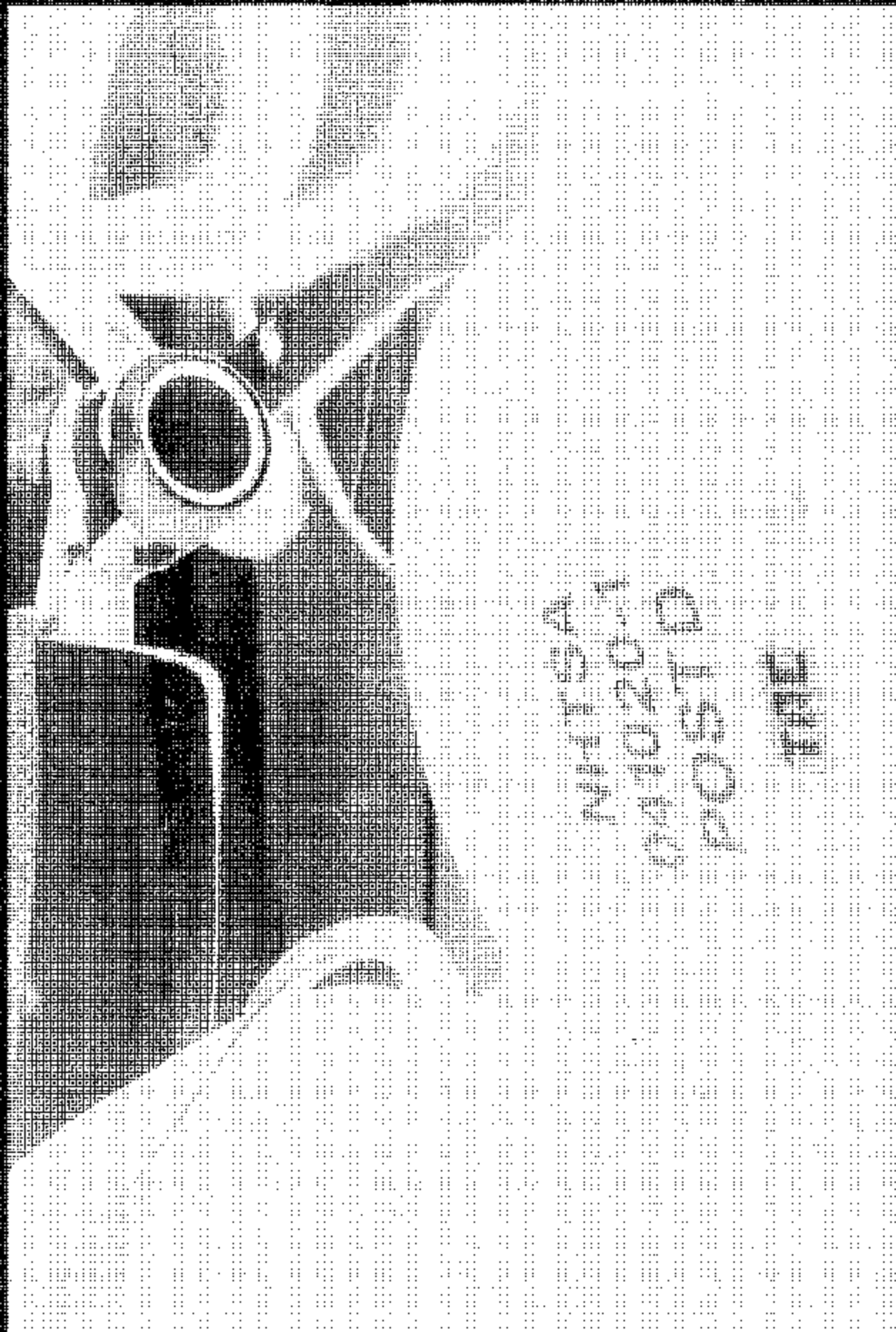


Figure A-39 Post-Test Front SID Hill Contact - View 3

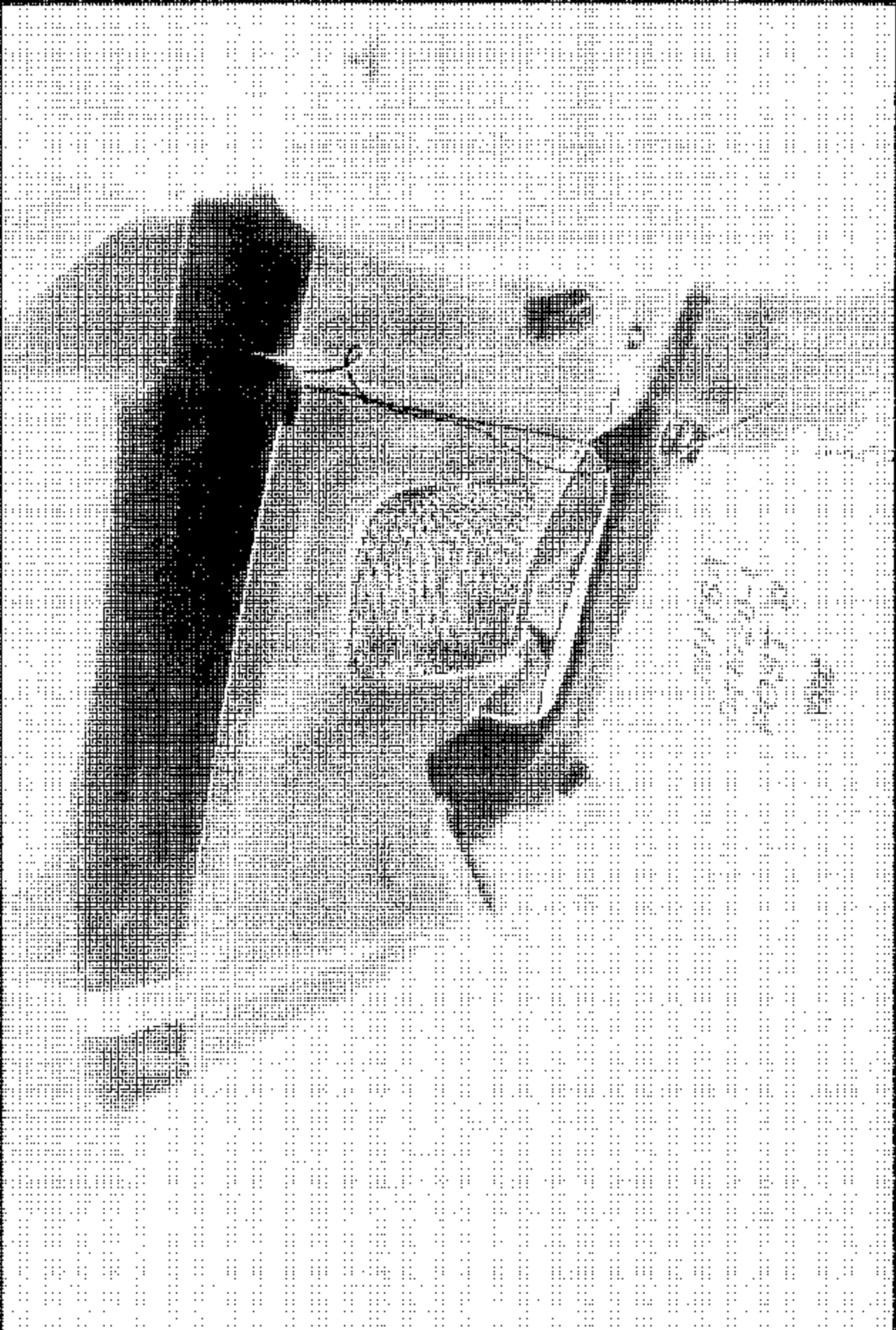


Figure A-40 Post-Test Interior of Rear Panel Showing SID HH Impact Locations

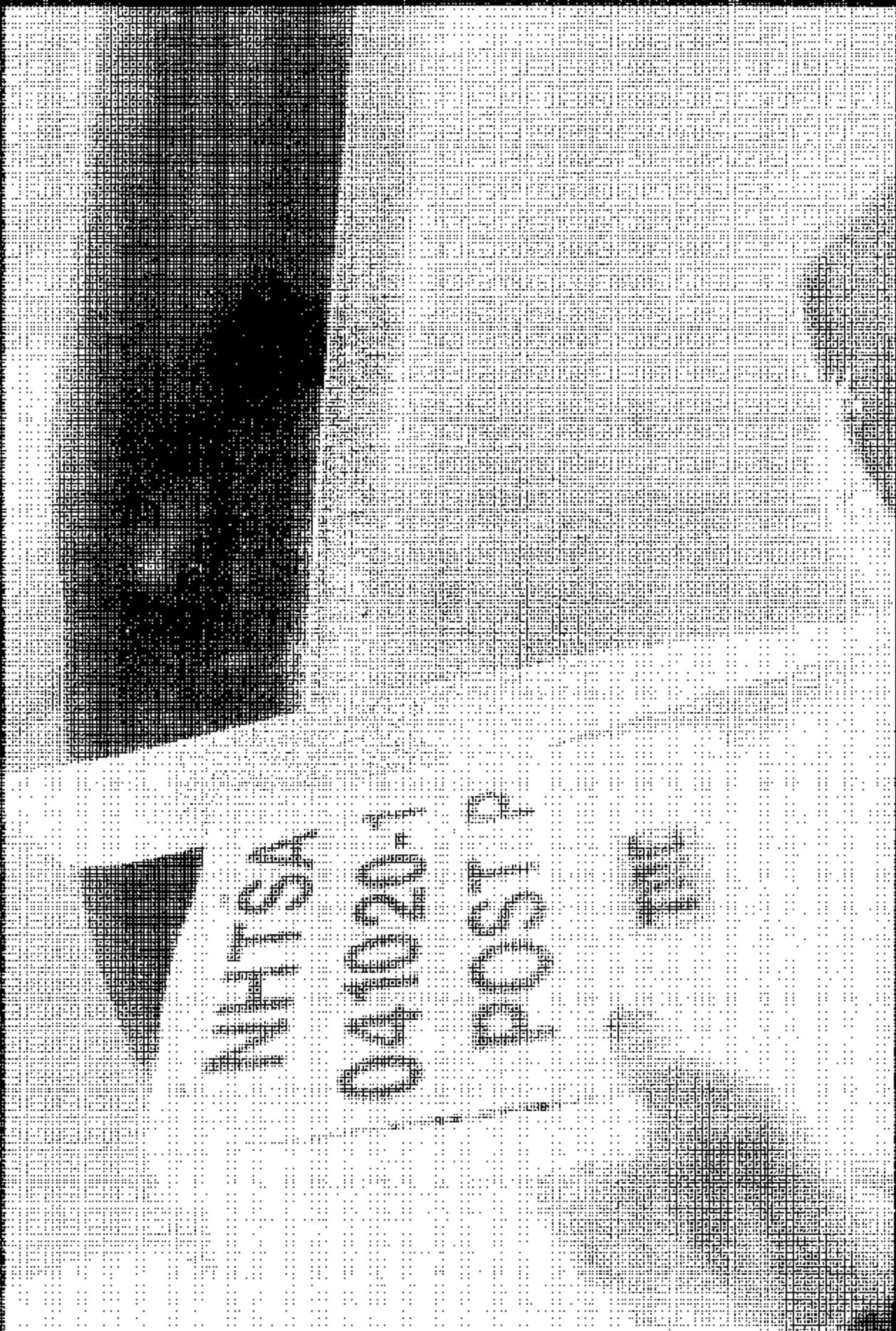


Figure A-41 Post-Test Rear SID Hill Contact - View 1

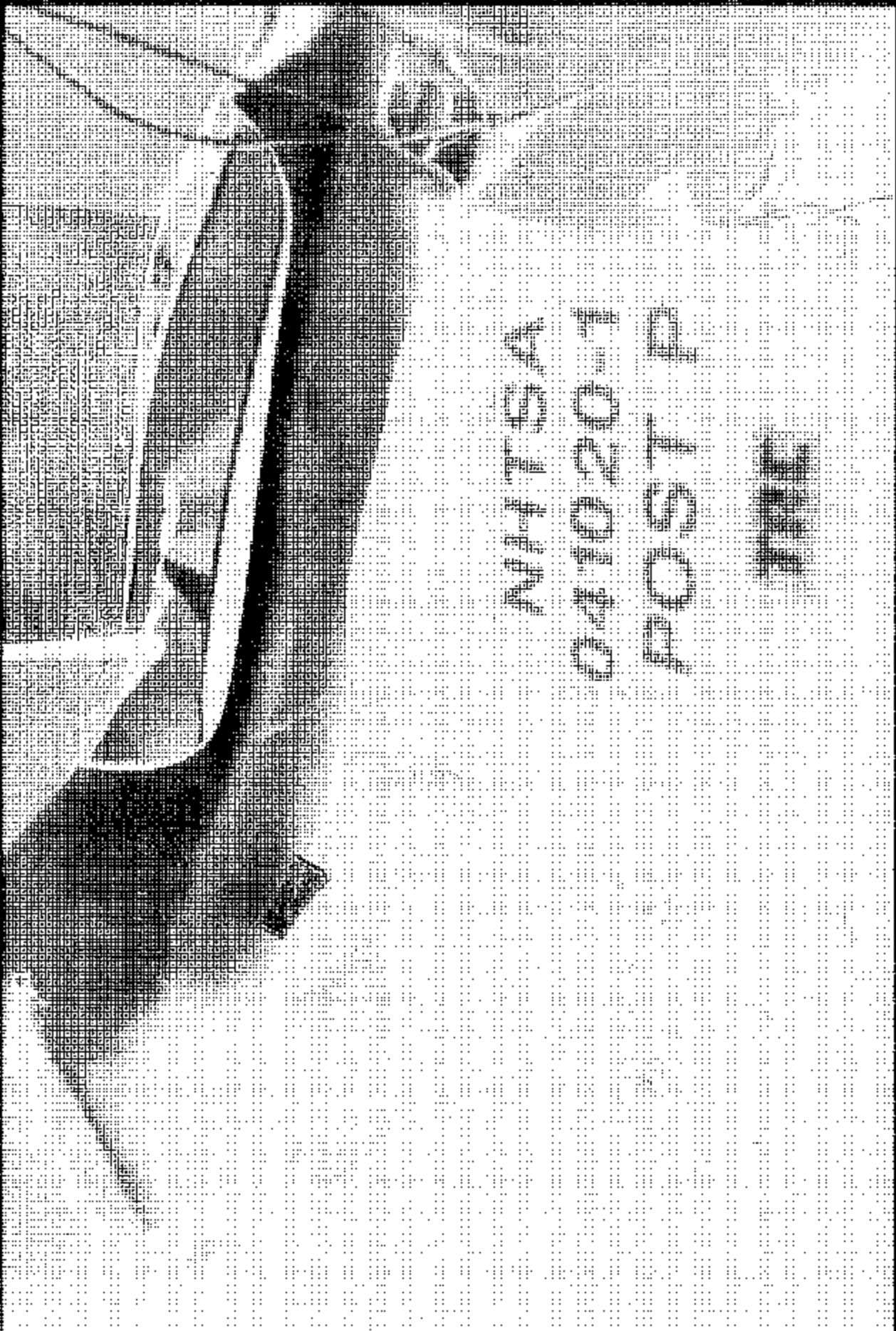


Figure A-42 Post-Test Rear SID HIII Contact - View 2



Figure A-43 Post-Test Rear SID HIII Contact - View 3

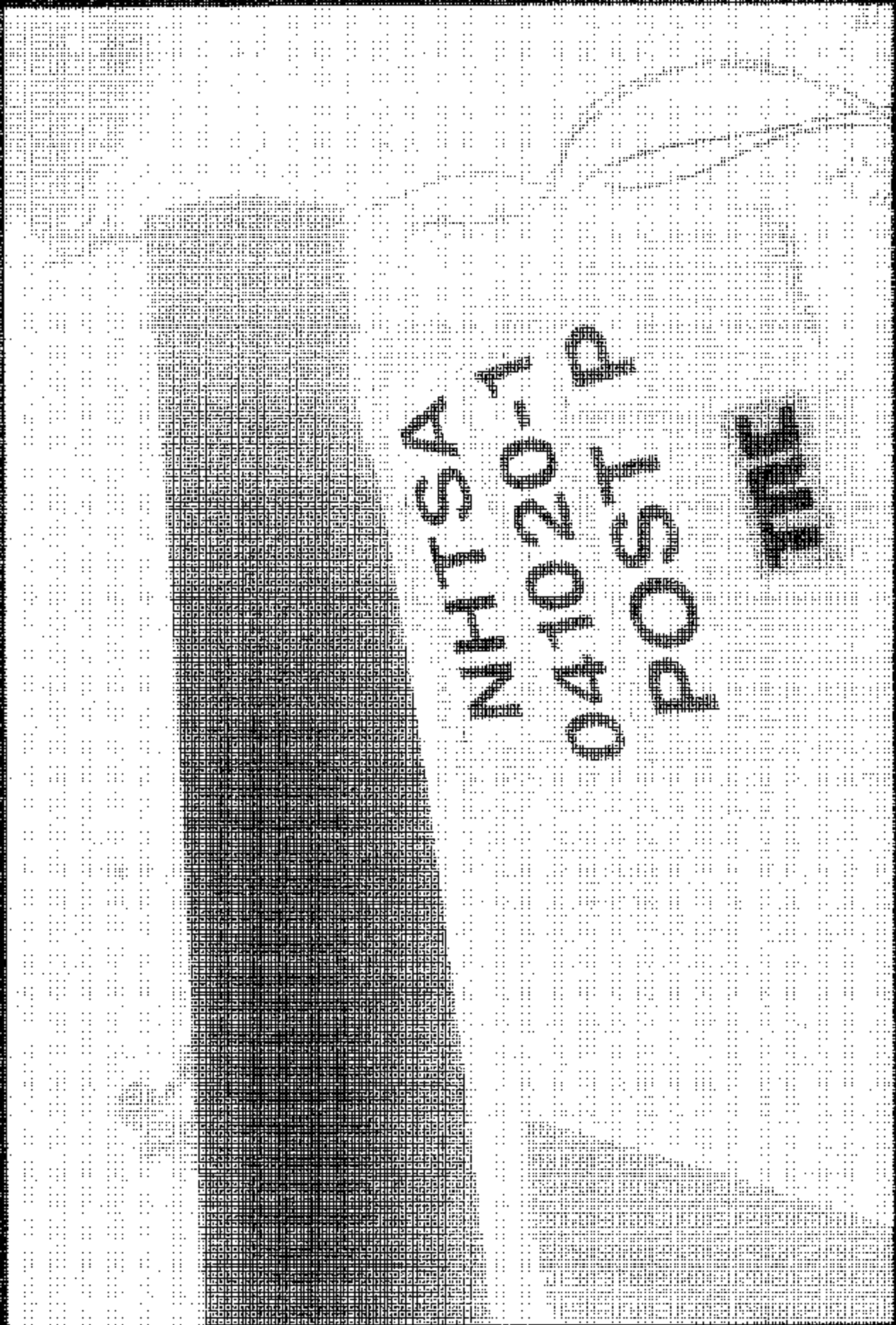


Figure A-44 Post-Test Rear SID HHH Contact - View 4

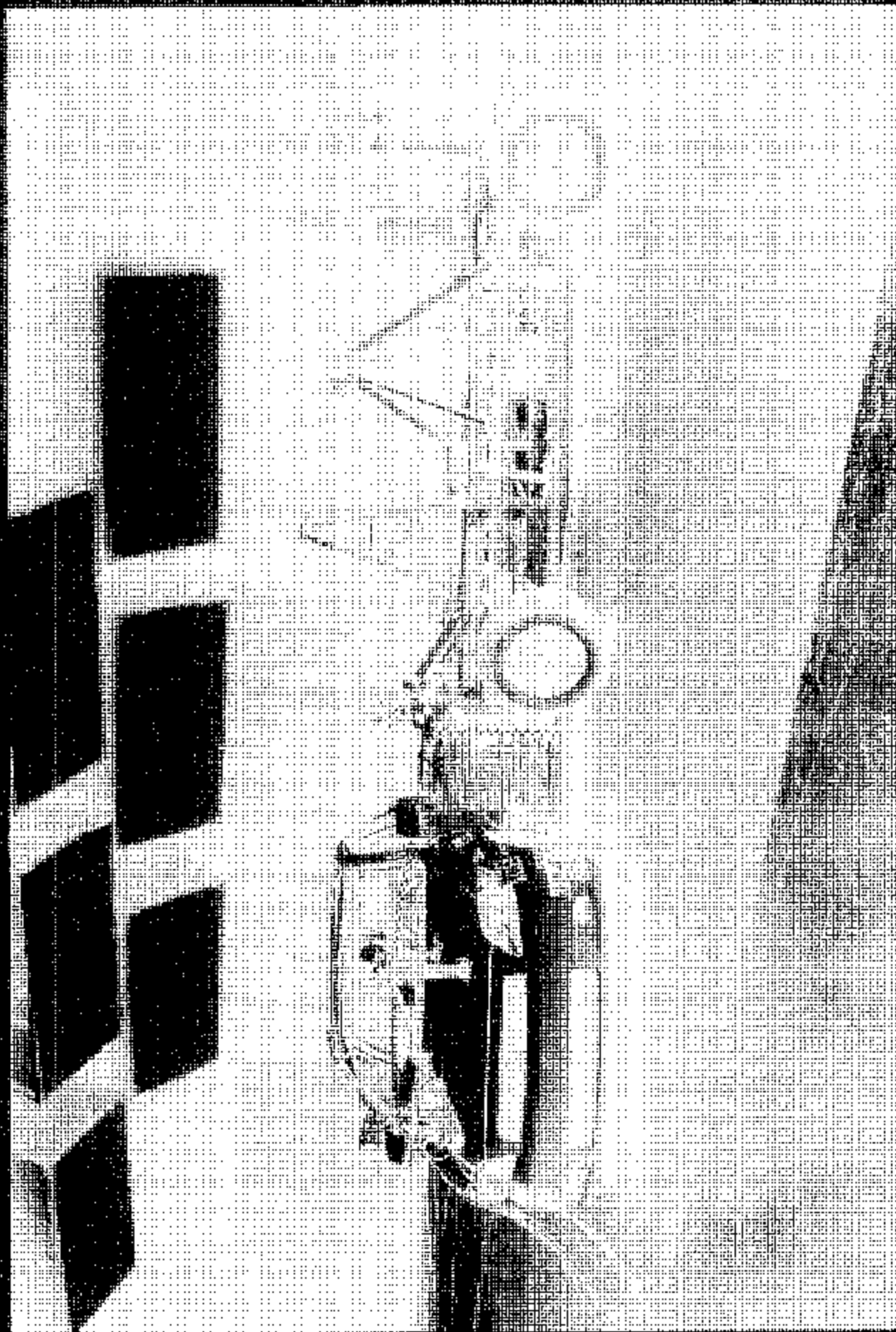


Figure A-45 Pre-Test Left Side View of MDB With Impactor Face in Position

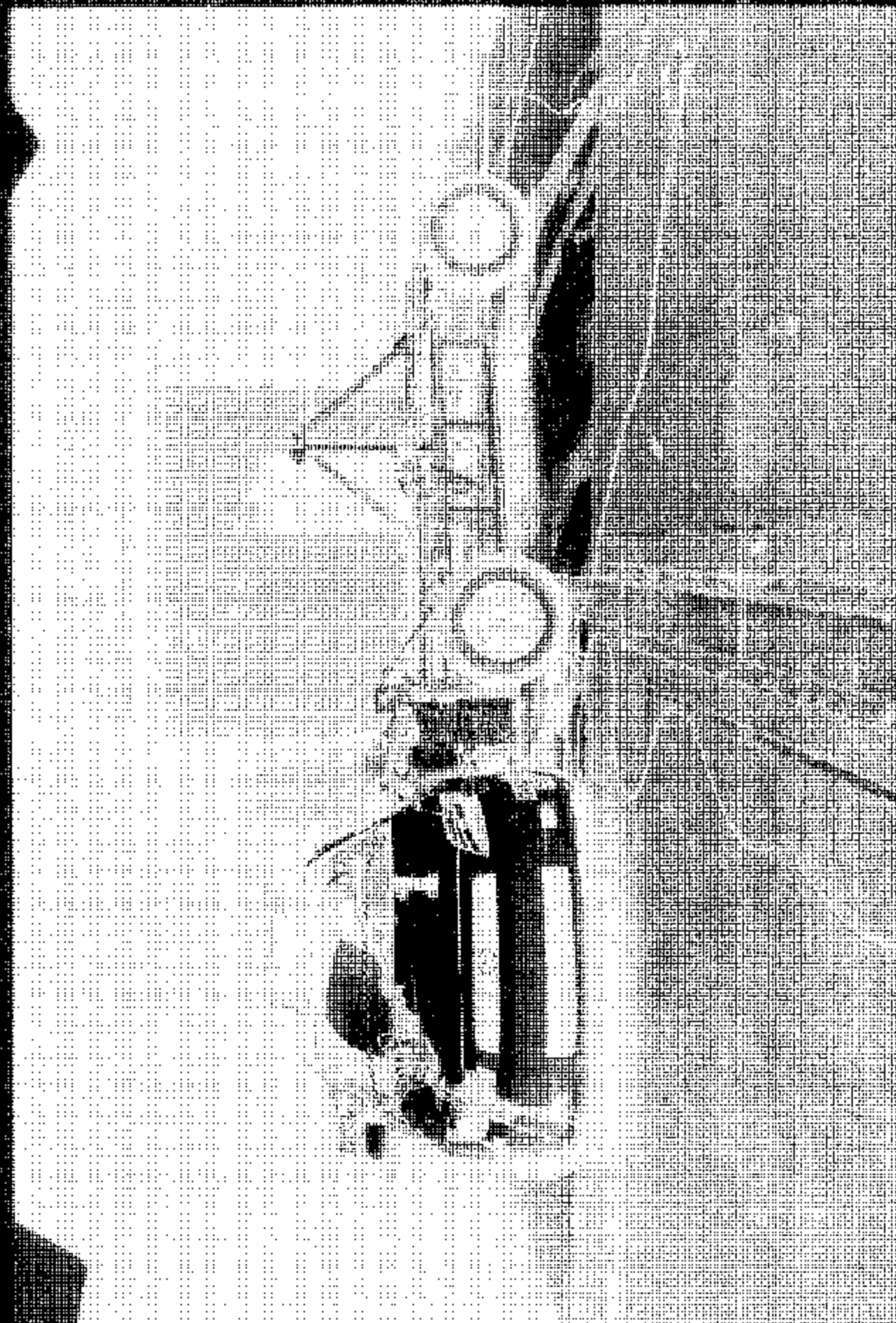


Figure A-46 Post-Test Left Side View of MDB With Impactor Face in Position

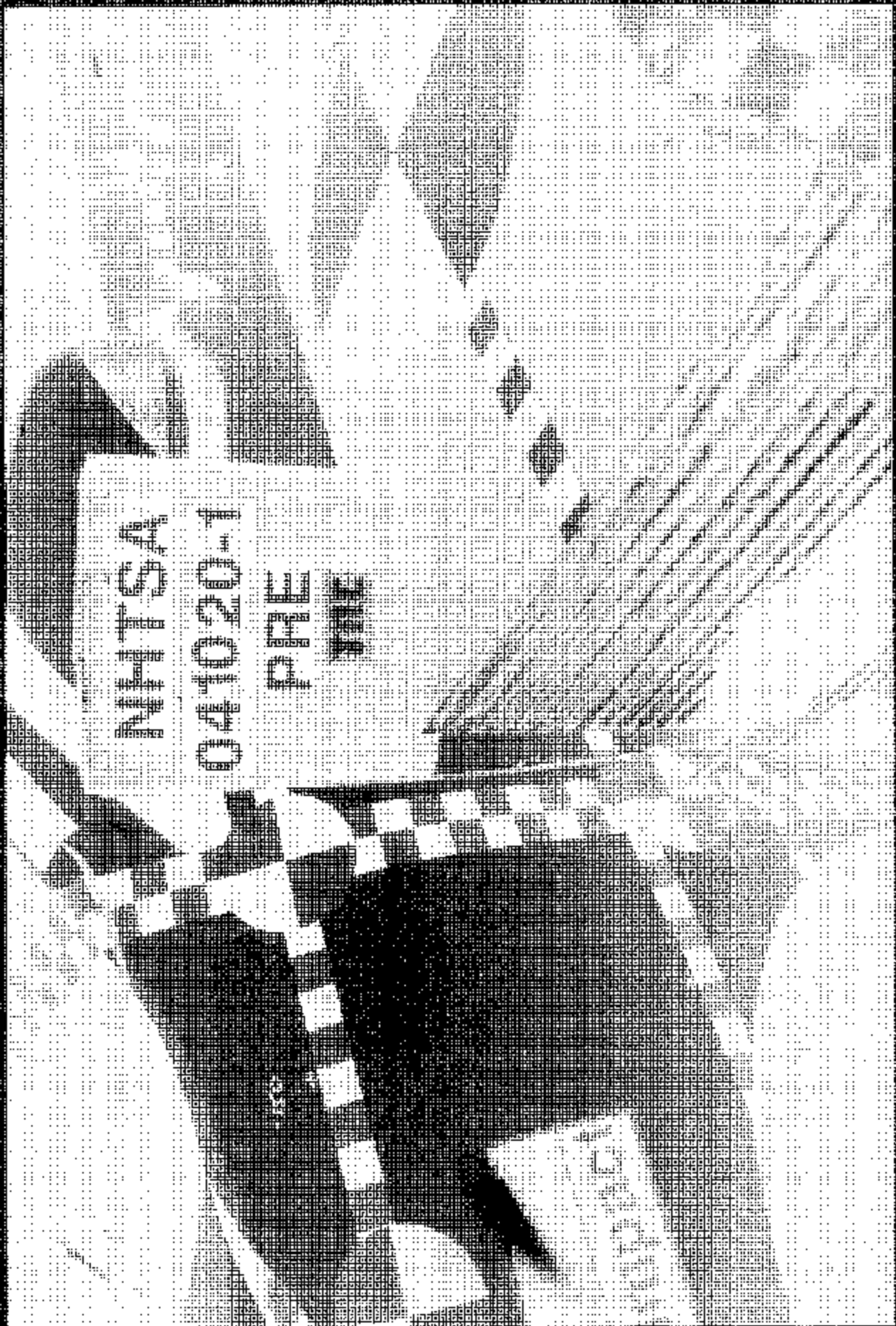


Figure A-47 Pre-Test Primary Impact Point View



Figure A-48 Post-Test Primary Impact Point View

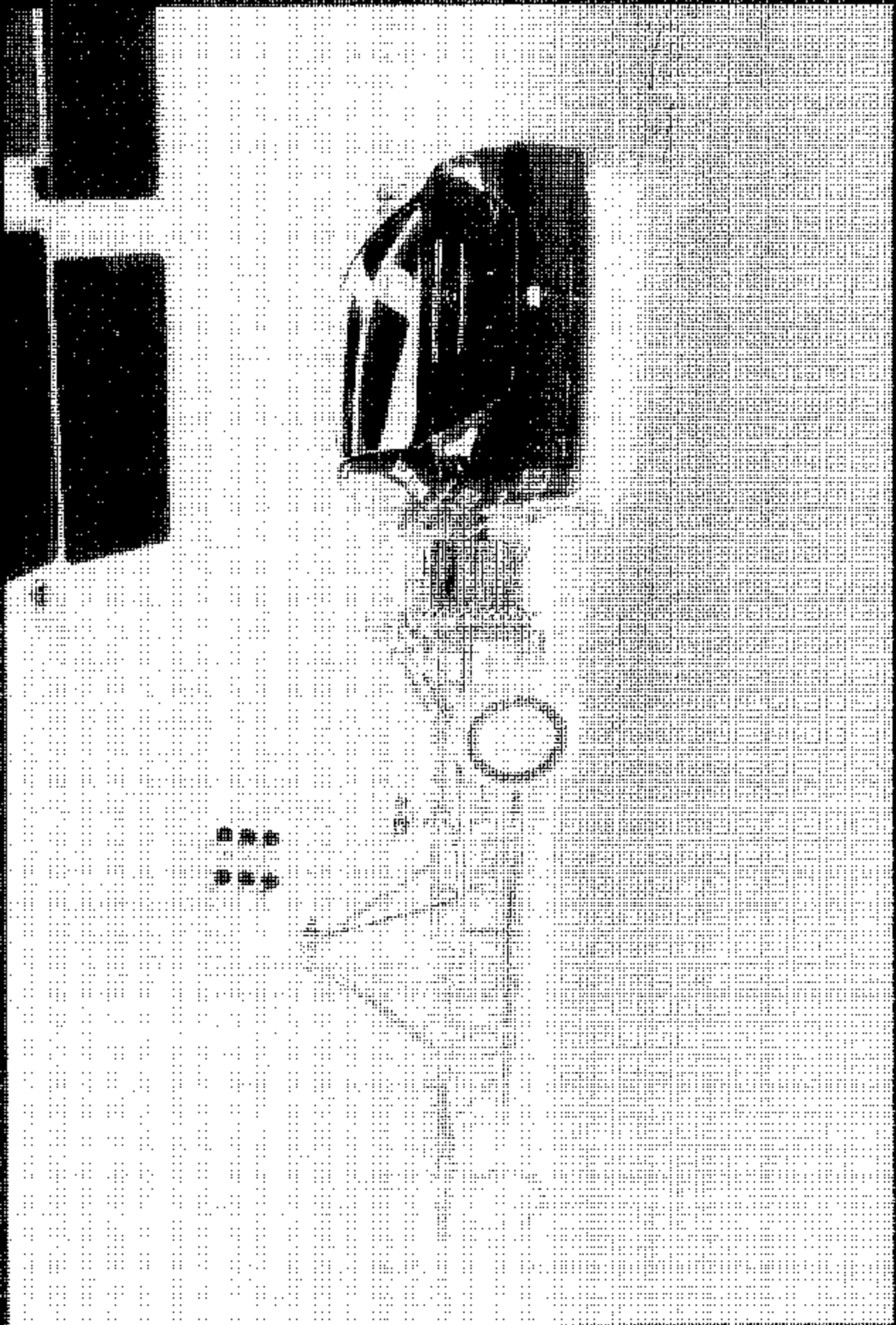


Figure A-49 Pre-Test Right Side View of MDB With Impactor Face in Position

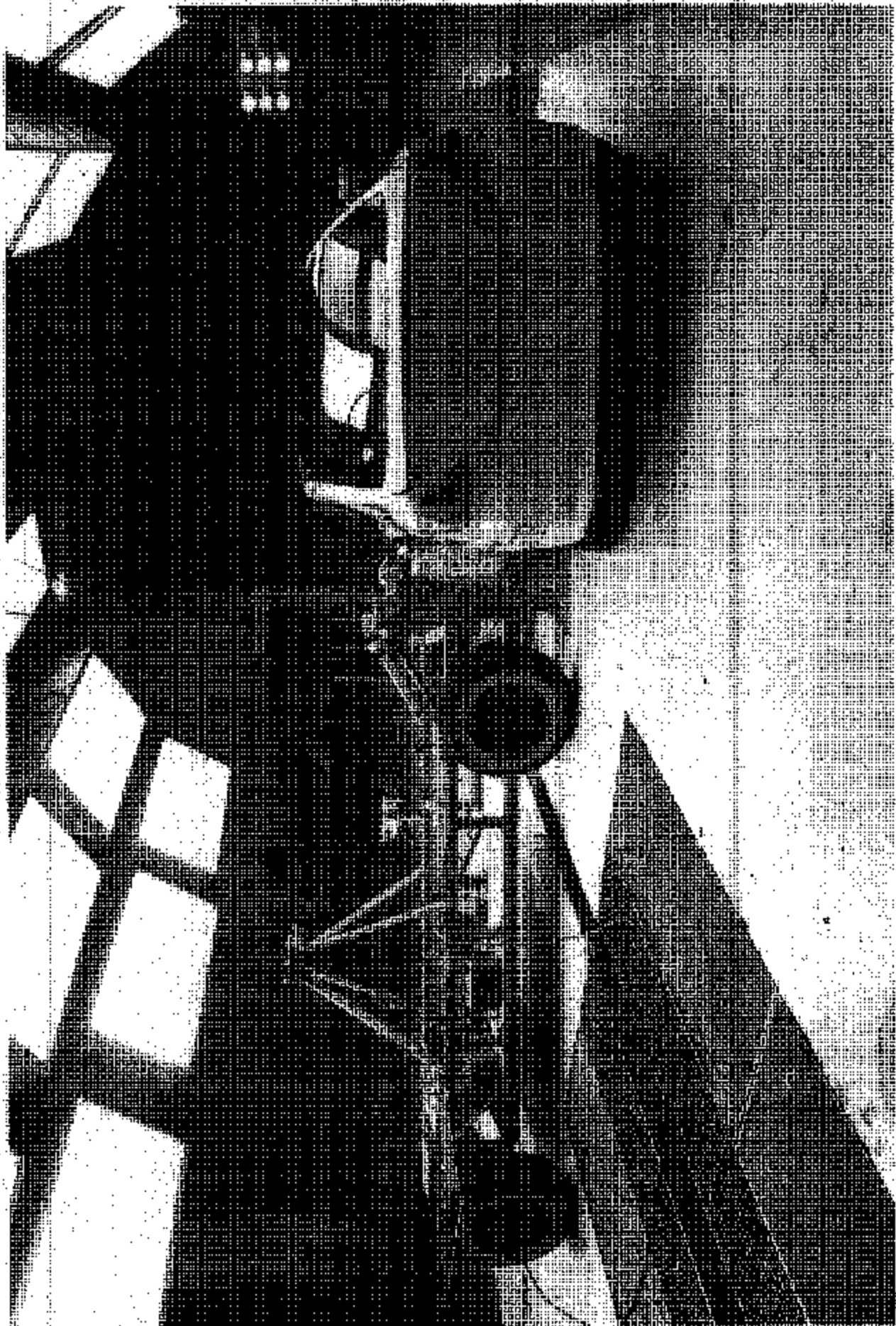
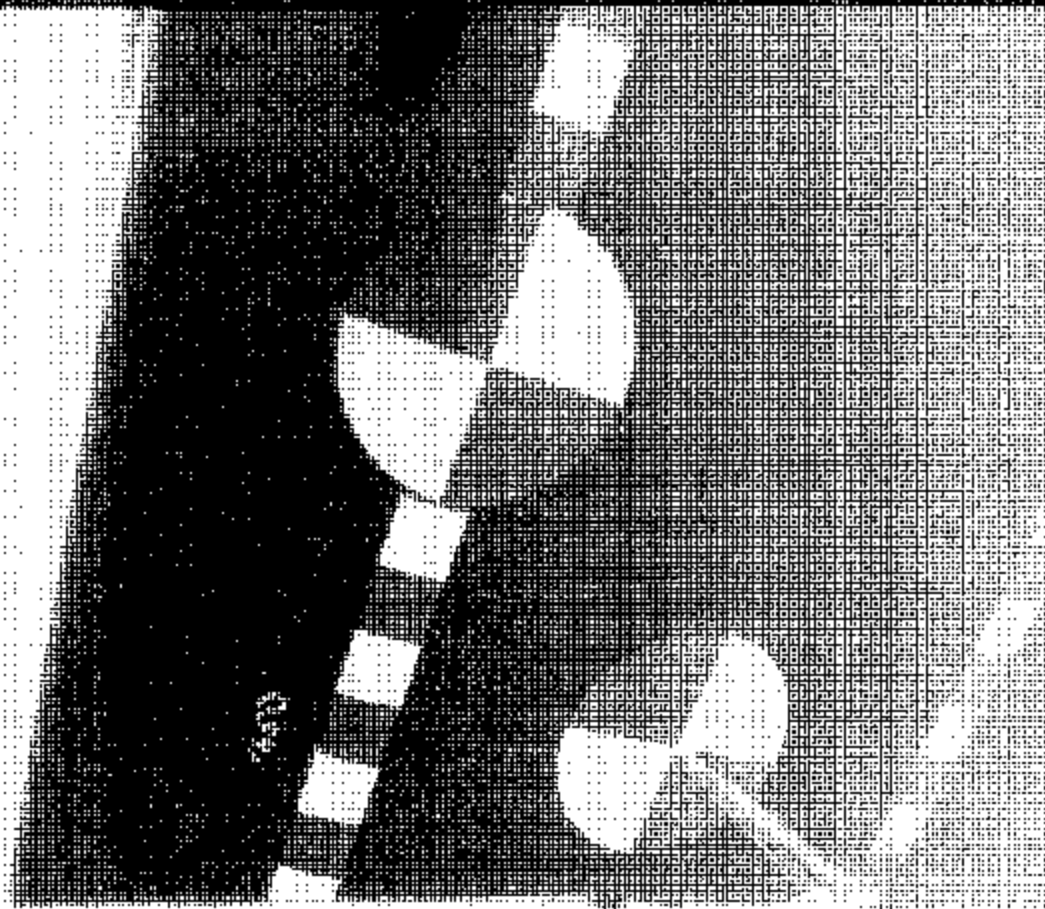


Figure A-50 Post-Test Right Side View of MDB With Impactor Face in Position



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041020-1
PRE
TIME



Figure A-51 Pre-Test Secondary Impact Point View



Figure A-52 Post-Test Secondary Impact Point View

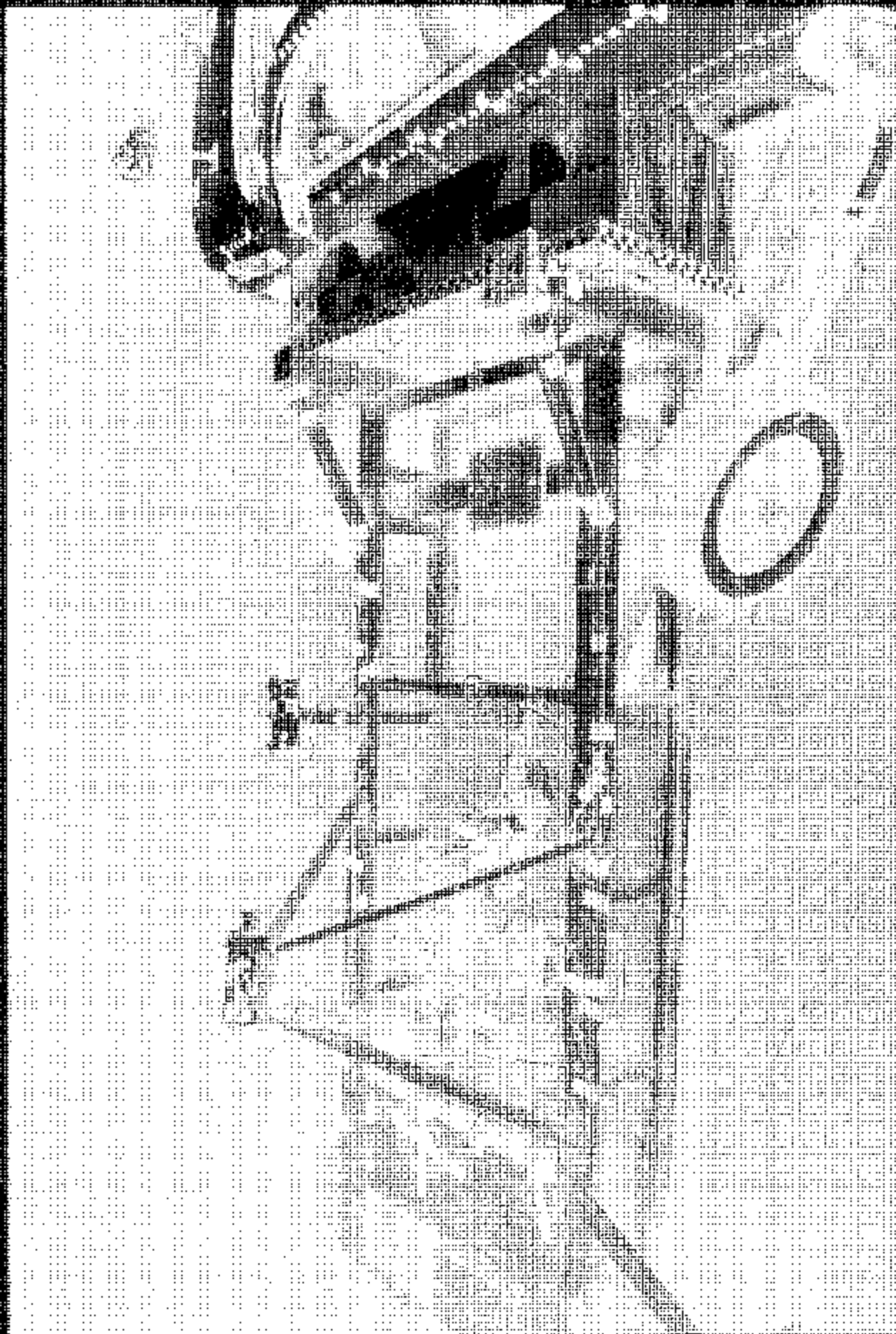
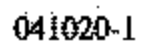


Figure A-53 Pre-Test Overhead View of MDB with Impactor Face in Position



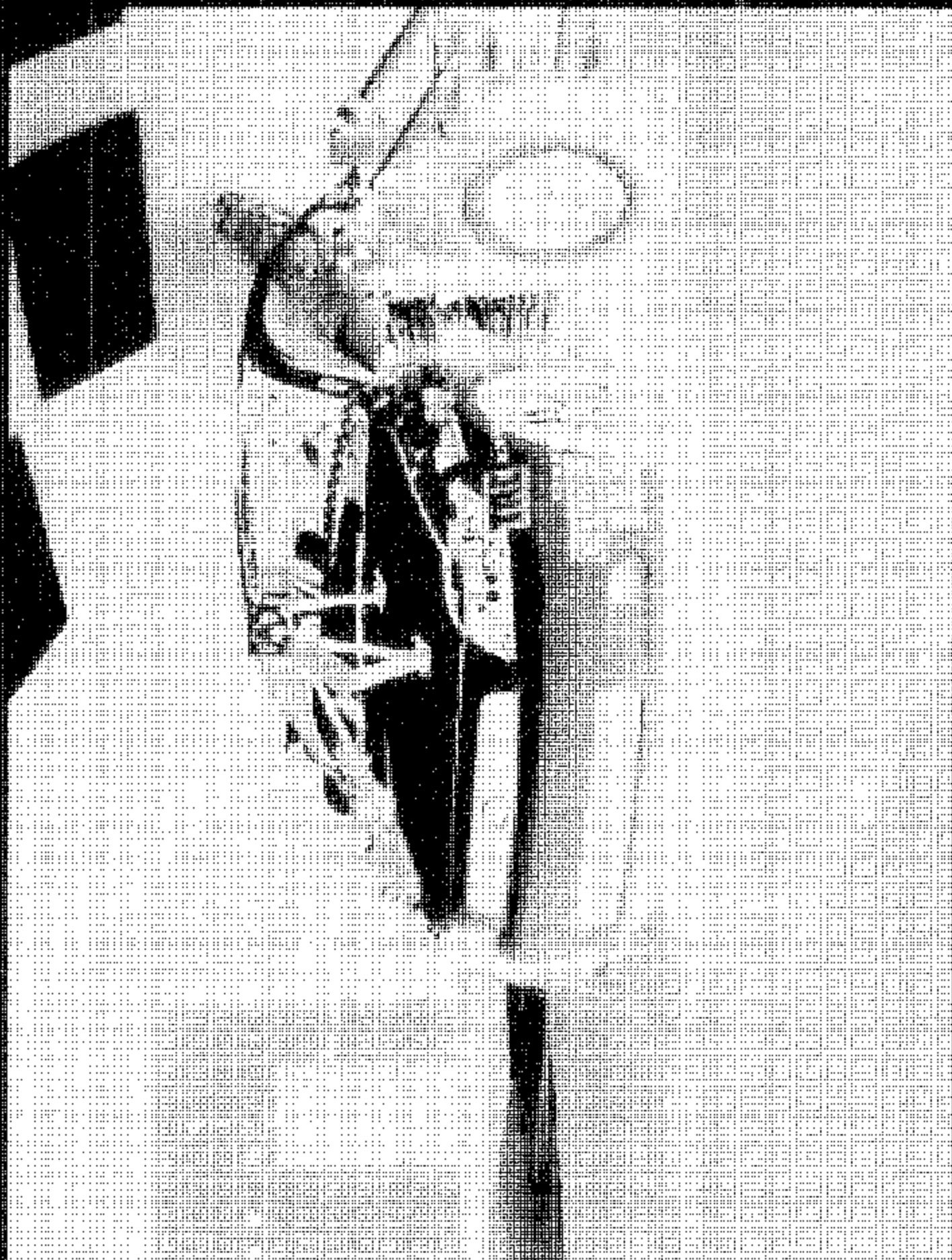


Figure A-56 Impact Event

A-60

041020-1

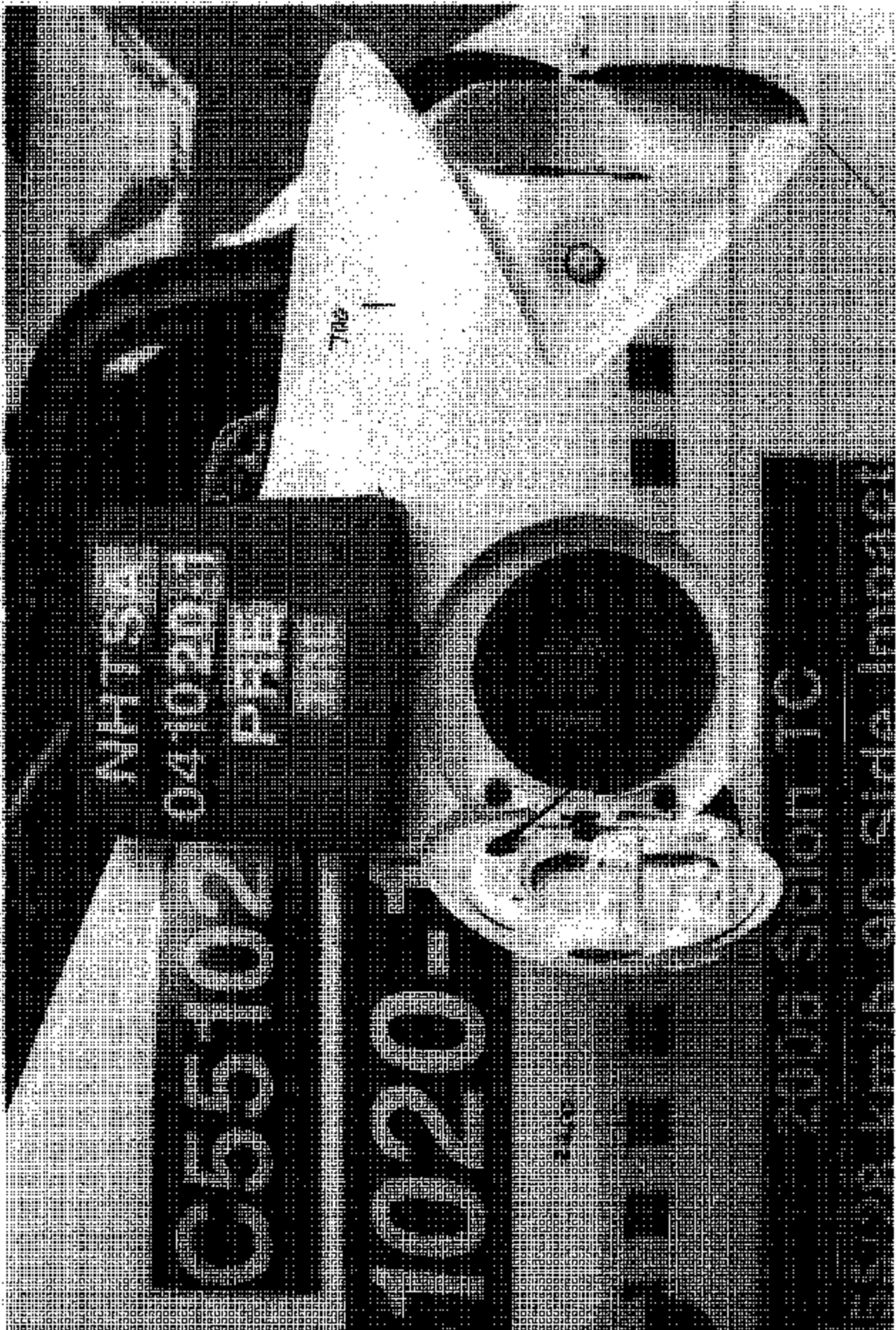


Figure A-57 Pre-Test Fuel Cap



Figure A-58 Post-Test Fuel Cap



Figure A-59 FMVSS 301 Rollover View at 90°



Figure A-60 FMVSS 301 Rollover View at 180°

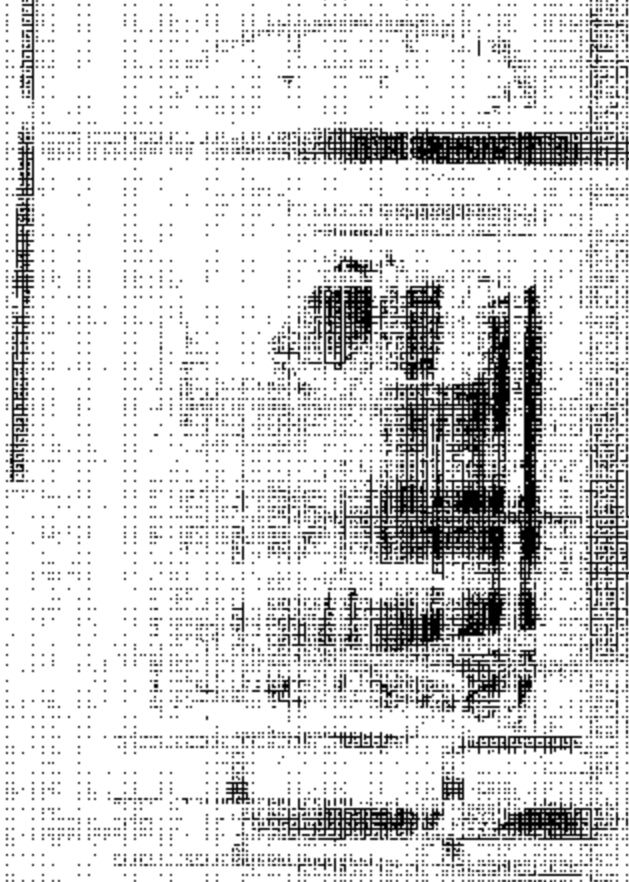


Figure A-61 FMVSS 301 Rollover View at 270°

A-65

041020-1

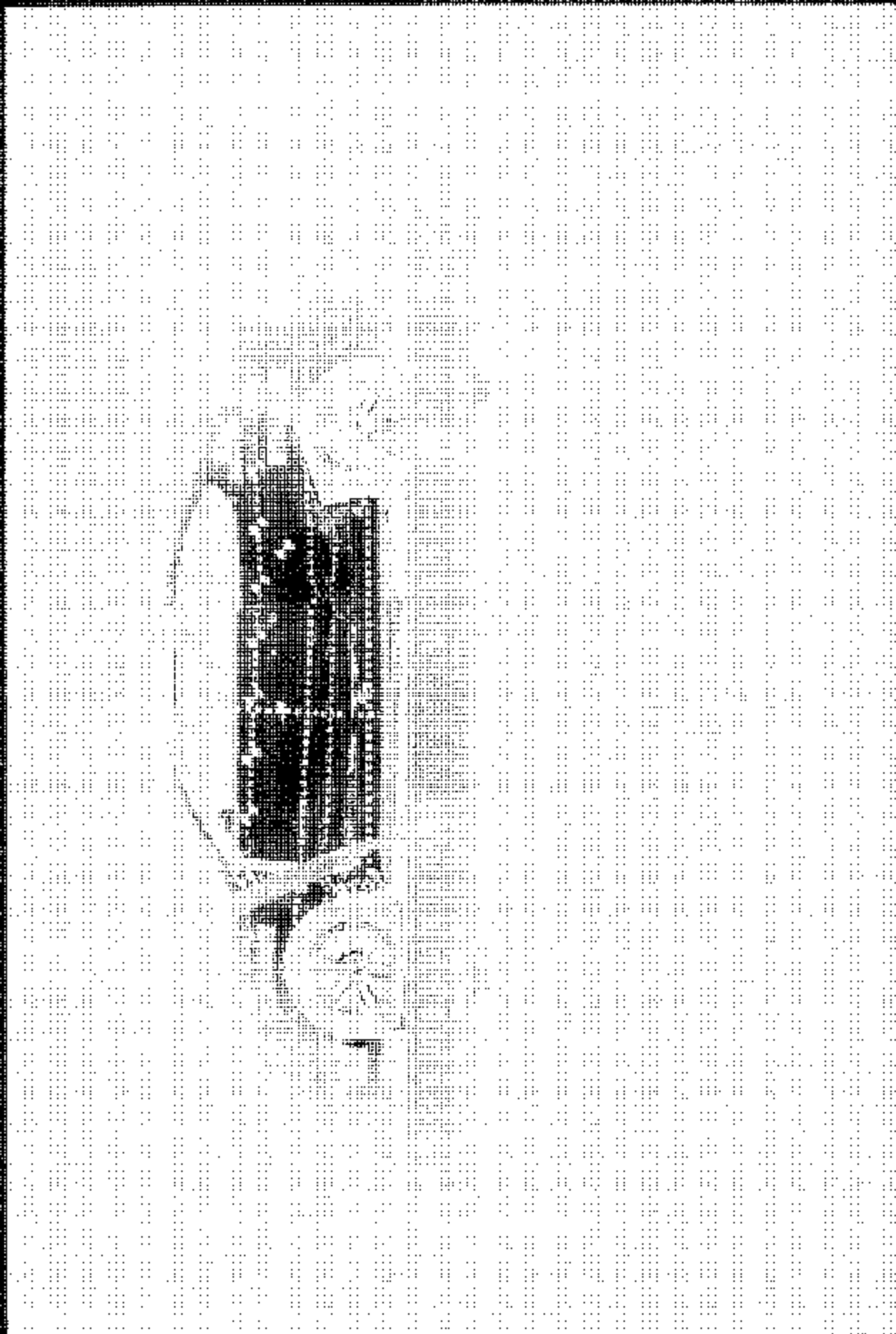


Figure A-62 FMVSS 301 Rollover View at 360°

Appendix B

Data Plots

Table of Data Plots

Driver and Passenger Dummy Instrumentation Plots

Acceleration Data - Filter Class 1000

Integration Data - Filter Class 180

Force Data - Filter Class 1000

Moment Data - Filter Class 600

Contact Data - Filter Class 1000

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
1	Driver Head X-Axis Acceleration	B-10
2	Driver Head X-Axis Velocity	B-11
3	Driver Head Y-Axis Acceleration	B-12
4	Driver Head Y-Axis Velocity	B-13
5	Driver Head Z-Axis Acceleration	B-14
6	Driver Head Z-Axis Velocity	B-15
7	Driver Head Resultant Acceleration	B-16
8	Driver Neck X-Axis Shear Force	B-17
9	Driver Neck Y-Axis Shear Force	B-18
10	Driver Neck Z-Axis Axial Force	B-19
11	Driver Neck Moment about X Axis	B-20
12	Driver Neck Moment about Y Axis	B-21
13	Driver Neck Moment about Z Axis	B-22
14	Driver Neck Occipital Condyle Moment about X Axis	B-23
15	Driver Upper Rib Y-Axis Acceleration	B-24
16	Driver Upper Rib Y-Axis Velocity	B-25
17	Driver Lower Rib Y-Axis Acceleration	B-26
18	Driver Lower Rib Y-Axis Velocity	B-27
19	Driver Lower Spine Y-Axis Acceleration	B-28
20	Driver Lower Spine Y-Axis Velocity	B-29
21	Driver Pelvis Y-Axis Acceleration	B-30
22	Driver Pelvis Y-Axis Velocity	B-31

Table of Data Plots (Continued)

Driver and Passenger Dummy Instrumentation Plots (Continued)

Acceleration Data - Filter Class 1000

Integration Data - Filter Class 180

Force Data - Filter Class 1000

Moment Data - Filter Class 600

Contact Data - Filter Class 1000

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
23	Left Rear Passenger Head X-Axis Acceleration	B-32
24	Left Rear Passenger Head X-Axis Velocity	B-33
25	Left Rear Passenger Head Y-Axis Acceleration	B-34
26	Left Rear Passenger Head Y-Axis Velocity	B-35
27	Left Rear Passenger Head Z-Axis Acceleration	B-36
28	Left Rear Passenger Head Z-Axis Velocity	B-37
29	Left Rear Passenger Head Resultant Acceleration	B-38
30	Left Rear Passenger Neck X-Axis Shear Force	B-39
31	Left Rear Passenger Neck Y-Axis Shear Force	B-40
32	Left Rear Passenger Neck Z-Axis Axial Force	B-41
33	Left Rear Passenger Neck Moment about X Axis	B-42
34	Left Rear Passenger Neck Moment about Y Axis	B-43
35	Left Rear Passenger Neck Moment about Z Axis	B-44
36	Left Rear Passenger Neck Occipital Condyle Moment about X Axis	B-45
37	Left Rear Passenger Upper Rib Y-Axis Acceleration	B-46
38	Left Rear Passenger Upper Rib Y-Axis Velocity	B-47
39	Left Rear Passenger Lower Rib Y-Axis Acceleration	B-48
40	Left Rear Passenger Lower Rib Y-Axis Velocity	B-49
41	Left Rear Passenger Lower Spine Y-Axis Acceleration	B-50
42	Left Rear Passenger Lower Spine Y-Axis Velocity	B-51
43	Left Rear Passenger Pelvis Y-Axis Acceleration	B-52
44	Left Rear Passenger Pelvis Y-Axis Velocity	B-53

Table of Data Plots (Continued)

Driver and Passenger Dummy Redundant Instrumentation Plots

Acceleration Data - Filter Class 1000 - Redundant

Integration Data - Filter Class 180 - Redundant

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
45	Driver Head X-Axis Redundant Acceleration	B-55
46	Driver Head X-Axis Redundant Velocity	B-56
47	Driver Head Y-Axis Redundant Acceleration	B-57
48	Driver Head Y-Axis Redundant Velocity	B-58
49	Driver Head Z-Axis Redundant Acceleration	B-59
50	Driver Head Z-Axis Redundant Velocity	B-60
51	Driver Head Resultant Redundant Acceleration	B-61
52	Driver Upper Rib Y-Axis Redundant Acceleration	B-62
53	Driver Upper Rib Y-Axis Redundant Velocity	B-63
54	Driver Lower Rib Y-Axis Redundant Acceleration	B-64
55	Driver Lower Rib Y-Axis Redundant Velocity	B-65
56	Driver Lower Spine Y-Axis Redundant Acceleration	B-66
57	Driver Lower Spine Y-Axis Redundant Velocity	B-67
58	Driver Pelvis Y-Axis Redundant Acceleration	B-68
59	Driver Pelvis Y-Axis Redundant Velocity	B-69
60	Left Rear Passenger Head X-Axis Redundant Acceleration	B-70
61	Left Rear Passenger Head X-Axis Redundant Velocity	B-71
62	Left Rear Passenger Head Y-Axis Redundant Acceleration	B-72
63	Left Rear Passenger Head Y-Axis Redundant Velocity	B-73
64	Left Rear Passenger Head Z-Axis Redundant Acceleration	B-74
65	Left Rear Passenger Head Z-Axis Redundant Velocity	B-75
66	Left Rear Passenger Head Resultant Redundant Acceleration	B-76
67	Left Rear Passenger Upper Rib Y-Axis Redundant Acceleration	B-77
68	Left Rear Passenger Upper Rib Y-Axis Redundant Velocity	B-78

Table of Data Plots (Continued)

Driver and Passenger Dummy Redundant Instrumentation Plots (Continued)

Acceleration Data - Filter Class 1000 - Redundant

Integration Data - Filter Class 180 - Redundant

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
69	Left Rear Passenger Lower Rib Y-Axis Redundant Acceleration	B-79
70	Left Rear Passenger Lower Rib Y-Axis Redundant Velocity	B-80
71	Left Rear Passenger Lower Spine Y-Axis Redundant Acceleration	B-81
72	Left Rear Passenger Lower Spine Y-Axis Redundant Velocity	B-82
73	Left Rear Passenger Pelvis Y-Axis Redundant Acceleration	B-83
74	Left Rear Passenger Pelvis Y-Axis Redundant Velocity	B-84

Test Vehicle Instrumentation Plots

Acceleration Data - Filter Class 60

Integration Data - Filter Class 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
75	Right Side Sill at Front Seat X-Axis Acceleration	B-86
76	Right Side Sill at Front Seat X-Axis Velocity	B-87
77	Right Side Sill at Front Seat Y-Axis Acceleration	B-88
78	Right Side Sill at Front Seat Y-Axis Velocity	B-89
79	Right Side Sill at Front Seat Z-Axis Acceleration	B-90
80	Right Side Sill at Front Seat Z-Axis Velocity	B-91
81	Right Side Sill at Front Seat Resultant Acceleration	B-92
82	Right Side Sill at Rear Seat X-Axis Acceleration	B-93
83	Right Side Sill at Rear Seat X-Axis Velocity	B-94
84	Right Side Sill at Rear Seat Y-Axis Acceleration	B-95
85	Right Side Sill at Rear Seat Y-Axis Velocity	B-96
86	Right Side Sill at Rear Seat Z-Axis Acceleration	B-97
87	Right Side Sill at Rear Seat Z-Axis Velocity	B-98
88	Right Side Sill at Rear Seat Resultant Acceleration	B-99
89	Rear Floorpan Above Axle X-Axis Acceleration	B-100

Table of Data Plots (Continued)
Test Vehicle Instrumentation Plots (Continued)
Acceleration Data - Filter Class 60
Integration Data - Filter Class 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
90	Rear Floorpan Above Axle X-Axis Velocity	B-101
91	Rear Floorpan Above Axle Y-Axis Acceleration	B-102
92	Rear Floorpan Above Axle Y-Axis Velocity	B-103
93	Rear Floorpan Above Axle Z-Axis Acceleration	B-104
94	Rear Floorpan Above Axle Z-Axis Velocity	B-105
95	Rear Floorpan Above Axle Resultant Acceleration	B-106
96	Left Side Sill at Front Seat Y-Axis Acceleration	B-107
97	Left Side Sill at Front Seat Y-Axis Velocity	B-108
98	Left Side Sill at Front Seat Y-Axis Displacement	B-109
99	Left Side Sill at Rear Seat Y-Axis Acceleration	B-110
100	Left Side Sill at Rear Seat Y-Axis Velocity	B-111
101	Left Side Sill at Rear Seat Y-Axis Displacement	B-112
102	Right Rear Occupant Compartment Y-Axis Acceleration	B-113
103	Right Rear Occupant Compartment Y-Axis Velocity	B-114
104	Right Rear Occupant Compartment Y-Axis Displacement	B-115
105	Left Lower A-Post Y-Axis Acceleration	B-116
106	Left Lower A-Post Y-Axis Velocity	B-117
107	Left Middle A-Post Y-Axis Acceleration	B-118
108	Left Middle A-Post Y-Axis Velocity	B-119
109	Left Lower B-Post Y-Axis Acceleration	B-120
110	Left Lower B-Post Y-Axis Velocity	B-121
111	Left Middle B-Post Y-Axis Acceleration	B-122
112	Left Middle B-Post Y-Axis Velocity	B-123
113	Left Front Seat Track Y-Axis Acceleration	B-124
114	Left Front Seat Track Y-Axis Velocity	B-125
115	Left Rear Seat Track Y-Axis Acceleration	B-126

Table of Data Plots (Continued)

Test Vehicle Instrumentation Plots (Continued)

Acceleration Data - Filter Class 60

Integration Data - Filter Class 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
116	Left Rear Seat Track Y-Axis Velocity	B-127
117	Vehicle Center of Gravity X-Axis Acceleration	B-128
118	Vehicle Center of Gravity X-Axis Velocity	B-129
119	Vehicle Center of Gravity Y-Axis Acceleration	B-130
120	Vehicle Center of Gravity Y-Axis Velocity	B-131
121	Vehicle Center of Gravity Z-Axis Acceleration	B-132
122	Vehicle Center of Gravity Z-Axis Velocity	B-133
123	Vehicle Center of Gravity Resultant Acceleration	B-134

MDB Instrumentation Plots

Acceleration Data - Filter Class 60

Integration Data - Filter Class 180

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
124	MDB Center of Gravity X-Axis Acceleration	B-136
125	MDB Center of Gravity X-Axis Velocity	B-137
126	MDB Center of Gravity Y-Axis Acceleration	B-138
127	MDB Center of Gravity Y-Axis Velocity	B-139
128	MDB Center of Gravity Z-Axis Acceleration	B-140
129	MDB Center of Gravity Z-Axis Velocity	B-141
130	MDB Center of Gravity Resultant Acceleration	B-142
131	MDB Left Rear X-Axis Acceleration	B-143
132	MDB Left Rear X-Axis Velocity	B-144
133	MDB Left Rear Y-Axis Acceleration	B-145
134	MDB Left Rear Y-Axis Velocity	B-146
135	MDB Right Side Contact Switch	B-147
136	MDB Left Side Contact Switch	B-148

Table of Data Plots (Continued)
Driver and Passenger Dummy Instrumentation Plots
Acceleration Data - FIR Filtered

<u>Plot No.</u>	<u>Data Plot Title</u>	<u>Page</u>
137	Driver Upper Rib Y-Axis Acceleration	B-150
138	Driver Lower Rib Y-Axis Acceleration	B-151
139	Driver Lower Spine Y-Axis Acceleration	B-152
140	Driver Pelvis Y-Axis Acceleration	B-153
141	Left Rear Passenger Upper Rib Y-Axis Acceleration	B-154
142	Left Rear Passenger Lower Rib Y-Axis Acceleration	B-155
143	Left Rear Passenger Lower Spine Y-Axis Acceleration	B-156
144	Left Rear Passenger Pelvis Y-Axis Acceleration	B-157
145	Driver Upper Rib Y-Axis Redundant Acceleration	B-158
146	Driver Lower Rib Y-Axis Redundant Acceleration	B-159
147	Driver Lower Spine Y-Axis Redundant Acceleration	B-160
148	Driver Pelvis Y-Axis Redundant Acceleration	B-161
149	Left Rear Passenger Upper Rib Y-Axis Redundant Acceleration	B-162
150	Left Rear Passenger Lower Rib Y-Axis Redundant Acceleration	B-163
151	Left Rear Passenger Lower Spine Y-Axis Redundant Acceleration	B-164
152	Left Rear Passenger Pelvis Y-Axis Redundant Acceleration	B-165

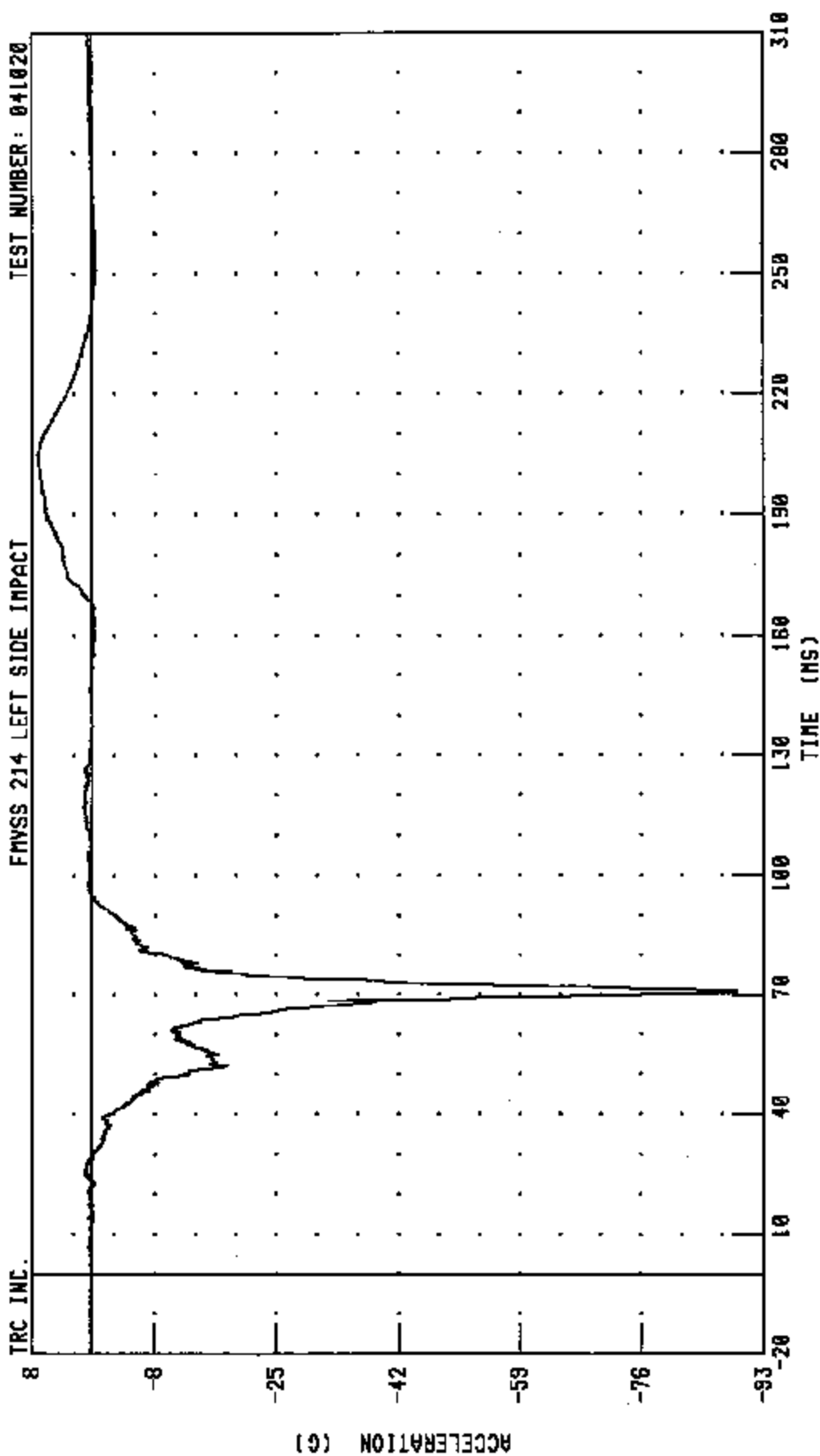
Driver and Passenger Dummy Instrumentation Plots

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD X-AXIS ACCELERATION

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

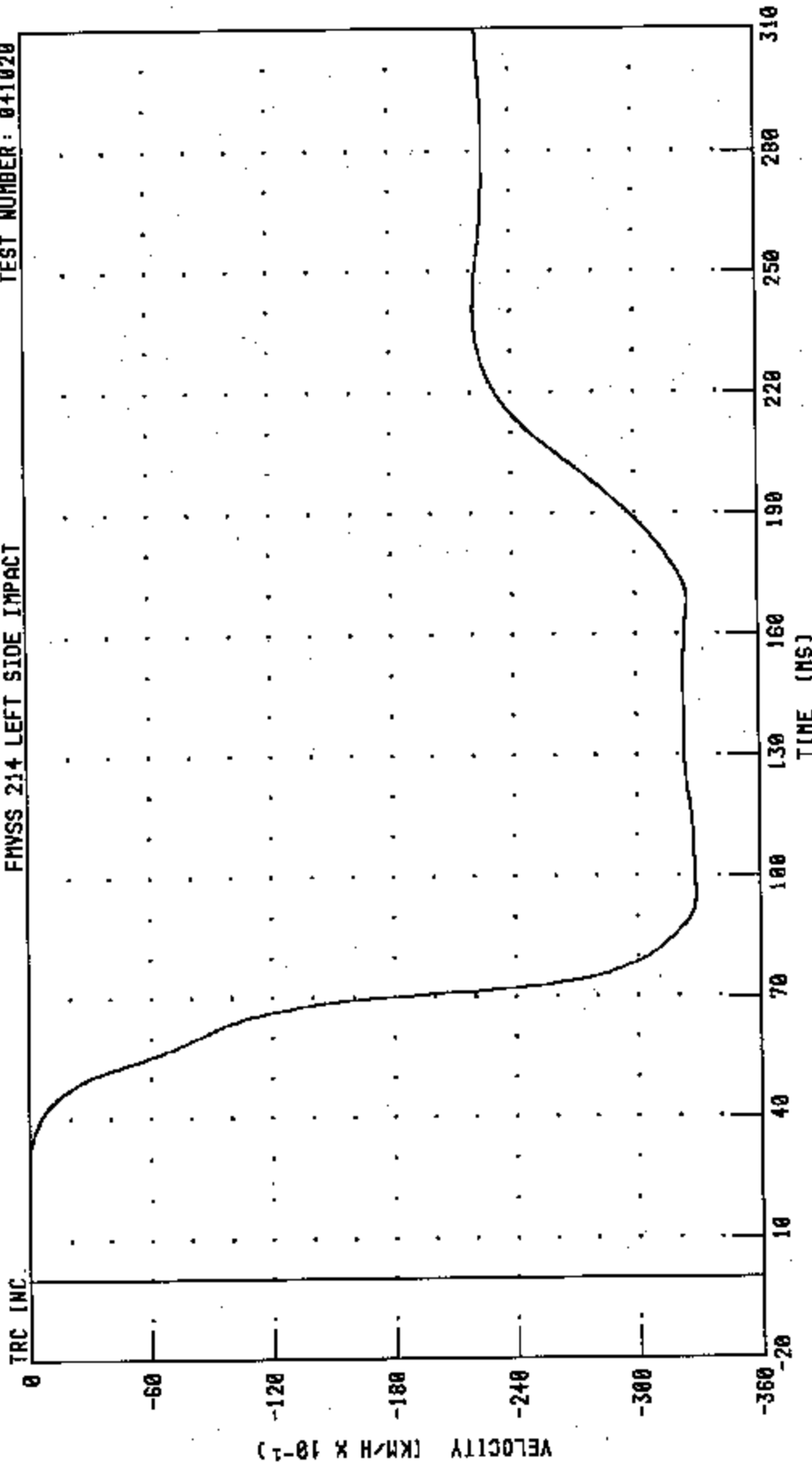
PEAK DATA: 7.37 G @ 205.12 MS, -90.35 G @ 70.96 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD X-AXIS VELOCITY

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: HEDXV1 FILTER: CH. CLASS 100

PEAK DATA: 0.06 KM/H @ 29.04 MS; -32.85 KM/H @ 95.52 MS

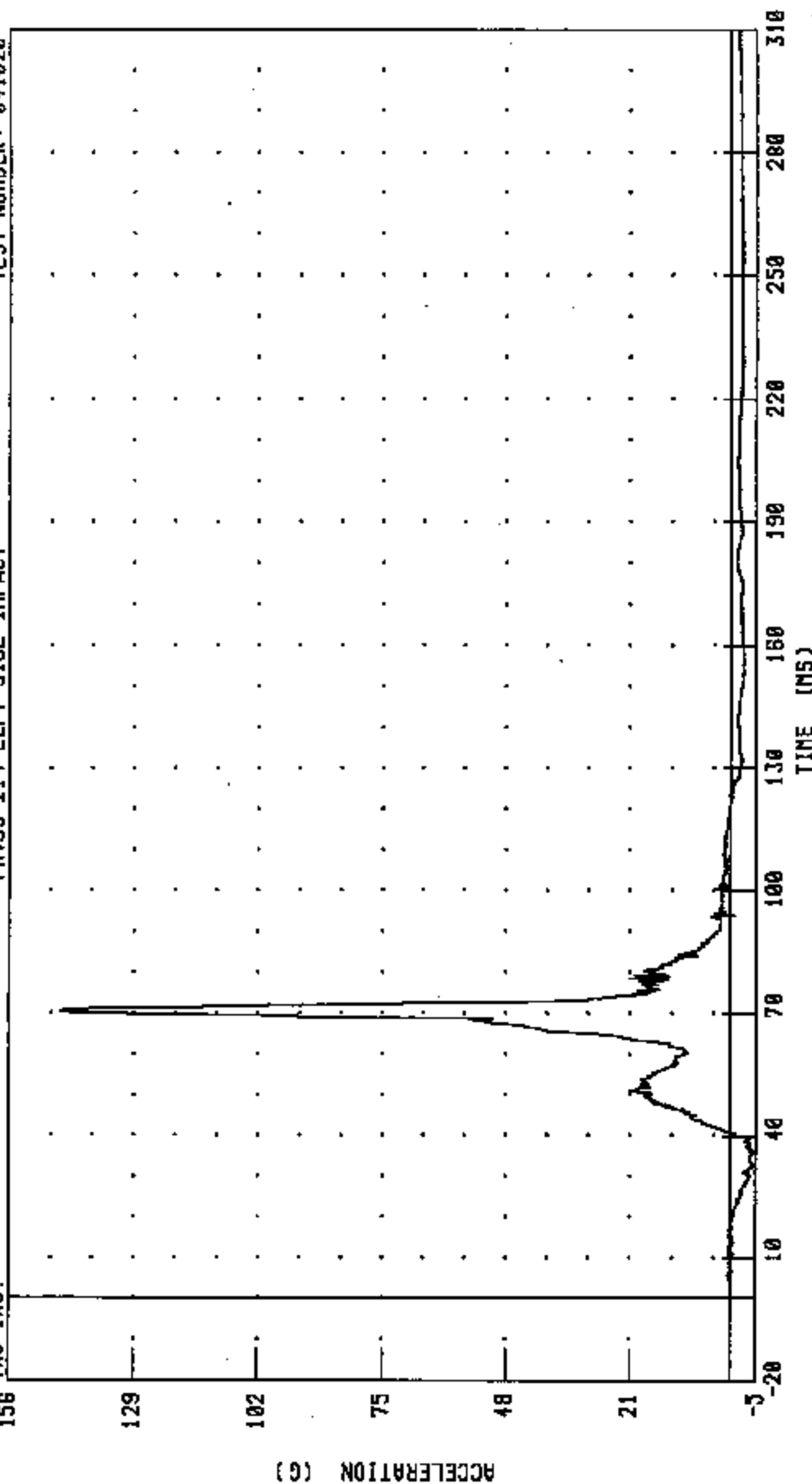
55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

TRC INC.



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

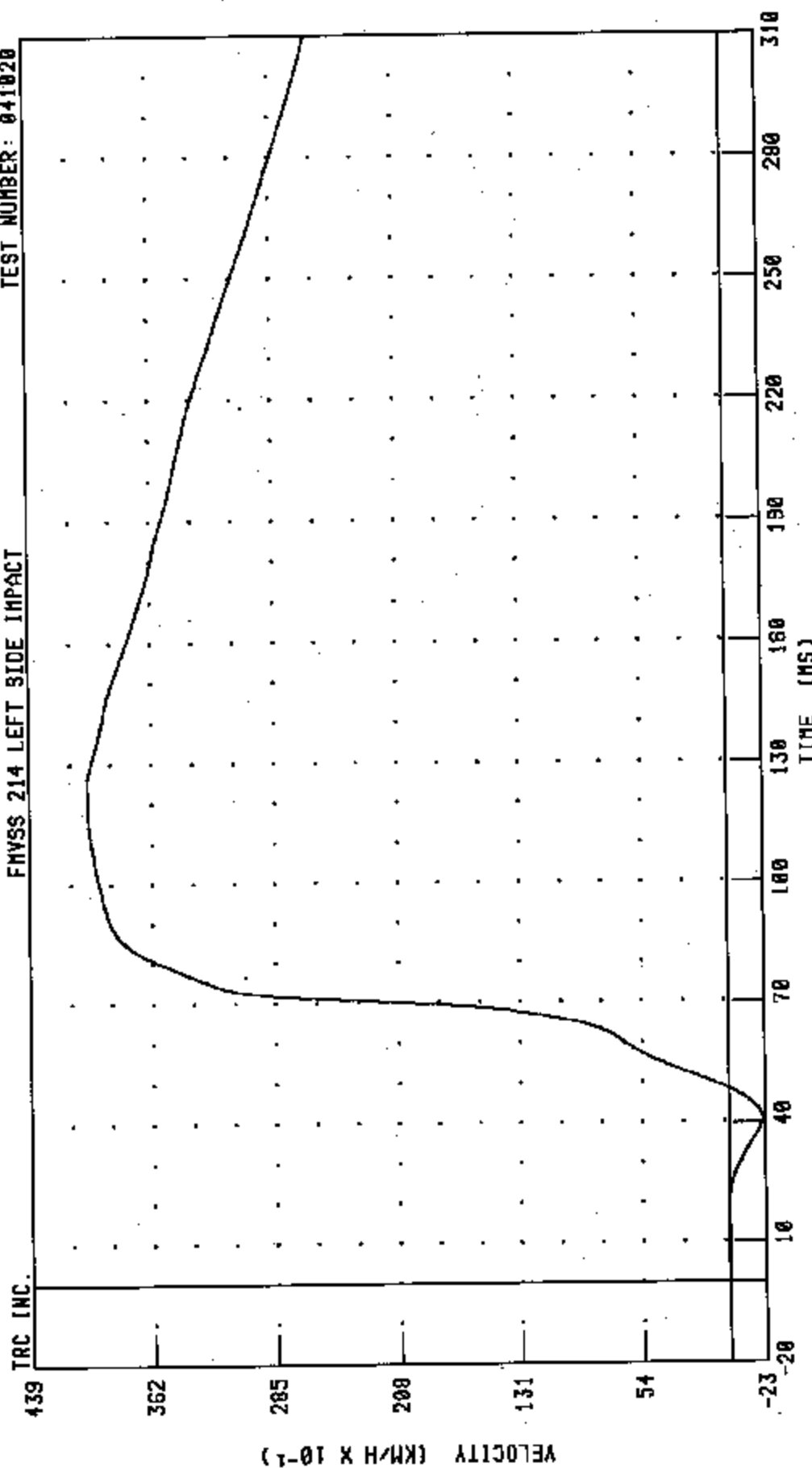
PEAK DATA: 145.36 G @ 70.40 MS, -4.97 G @ 35.84 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD Y-AXIS VELOCITY

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: HEDYV1 FILTER: CH. CLASS 180

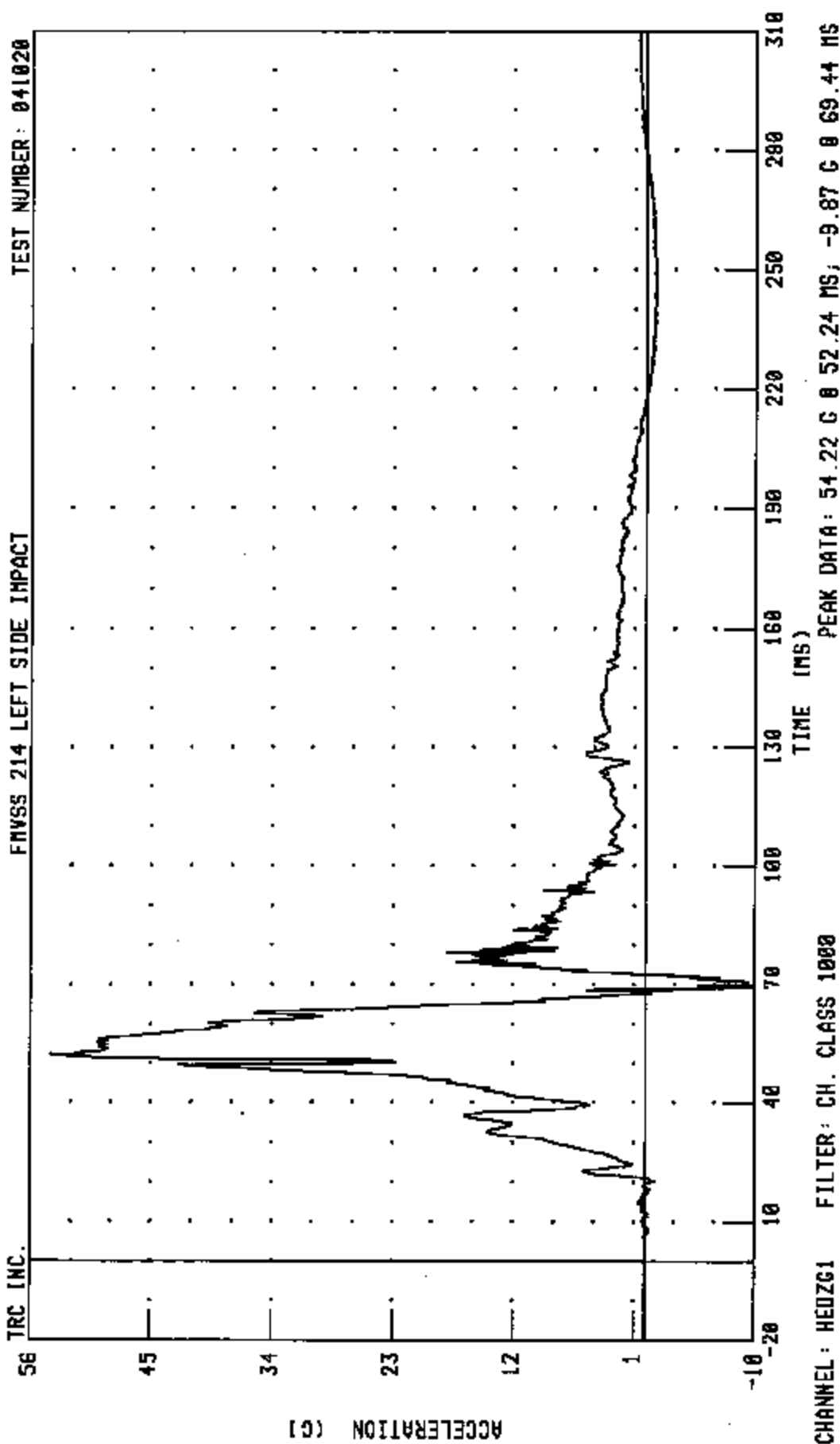
PEAK DATA: 40.28 KM/H @ 122.00 MS; -2.16 KM/H @ 40.80 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD Z-AXIS ACCELERATION

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020

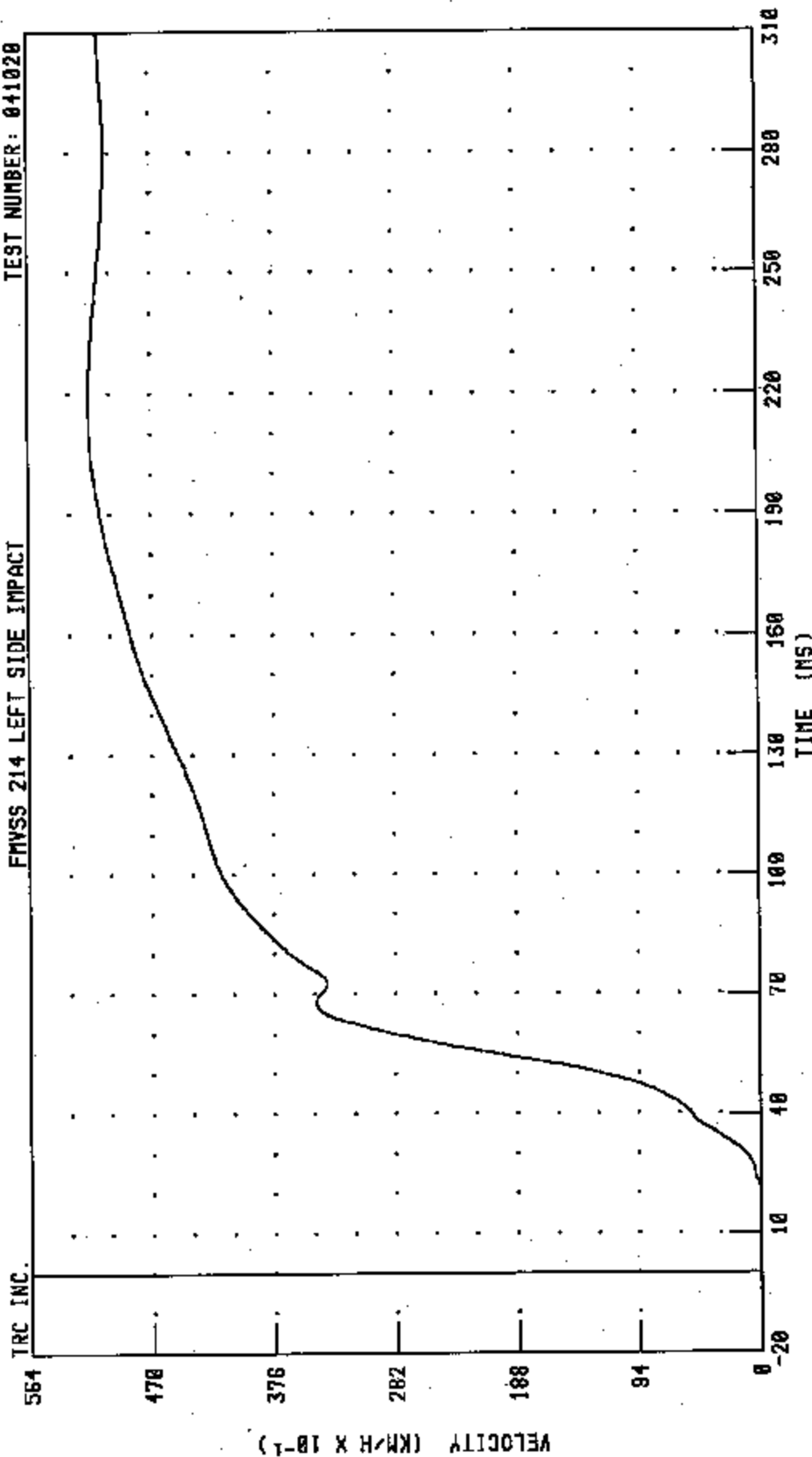


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2805 SECTION TC

DRIVER HEAD Z-AXIS VELOCITY

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



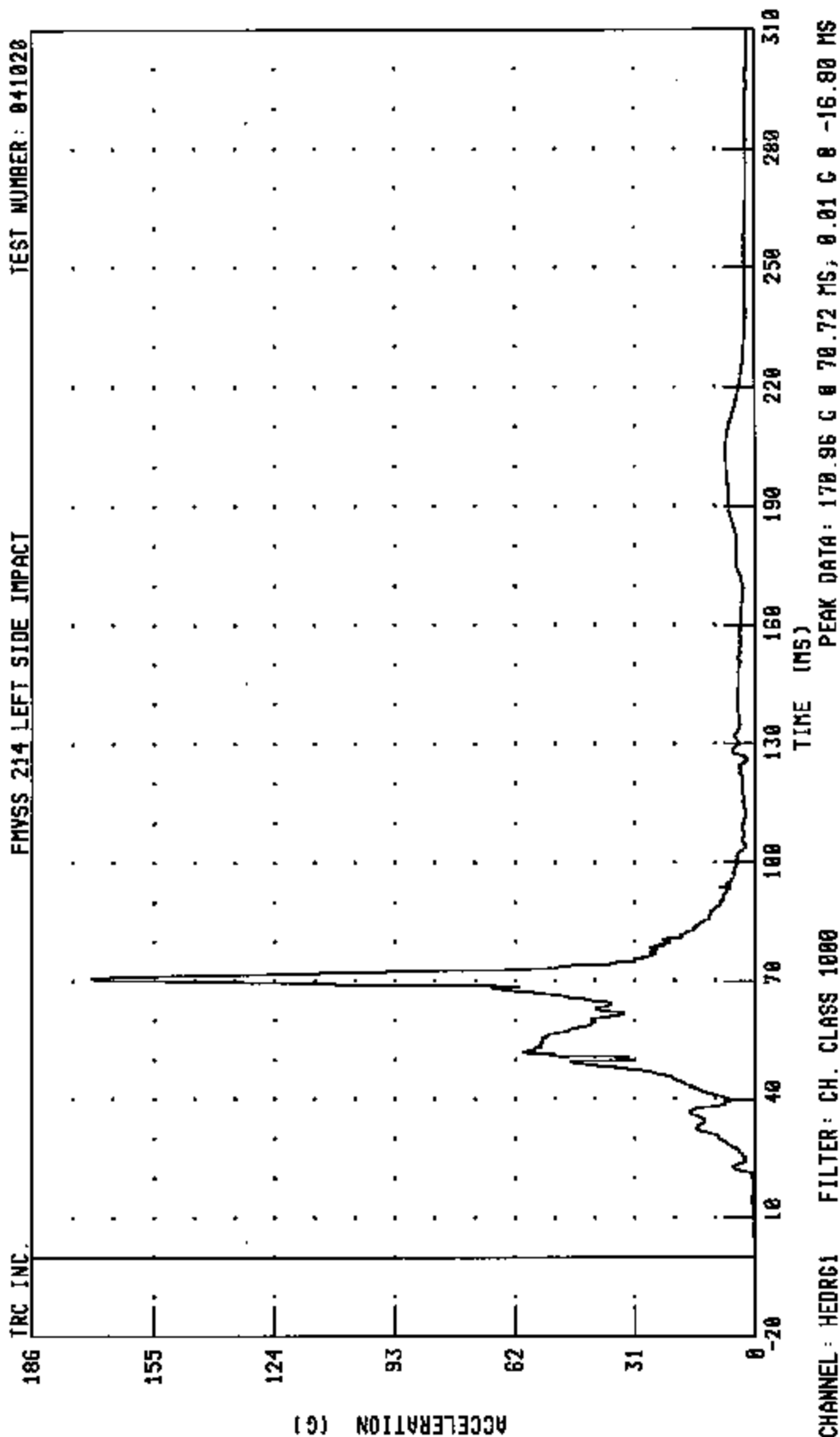
CHANNEL: HEDZV1 FILTER: CH. CLASS 1B0

PEAK DATA: 51.77 KM/H @ 217.44 MS; -0.03 KM/H @ 20.96 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
 DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

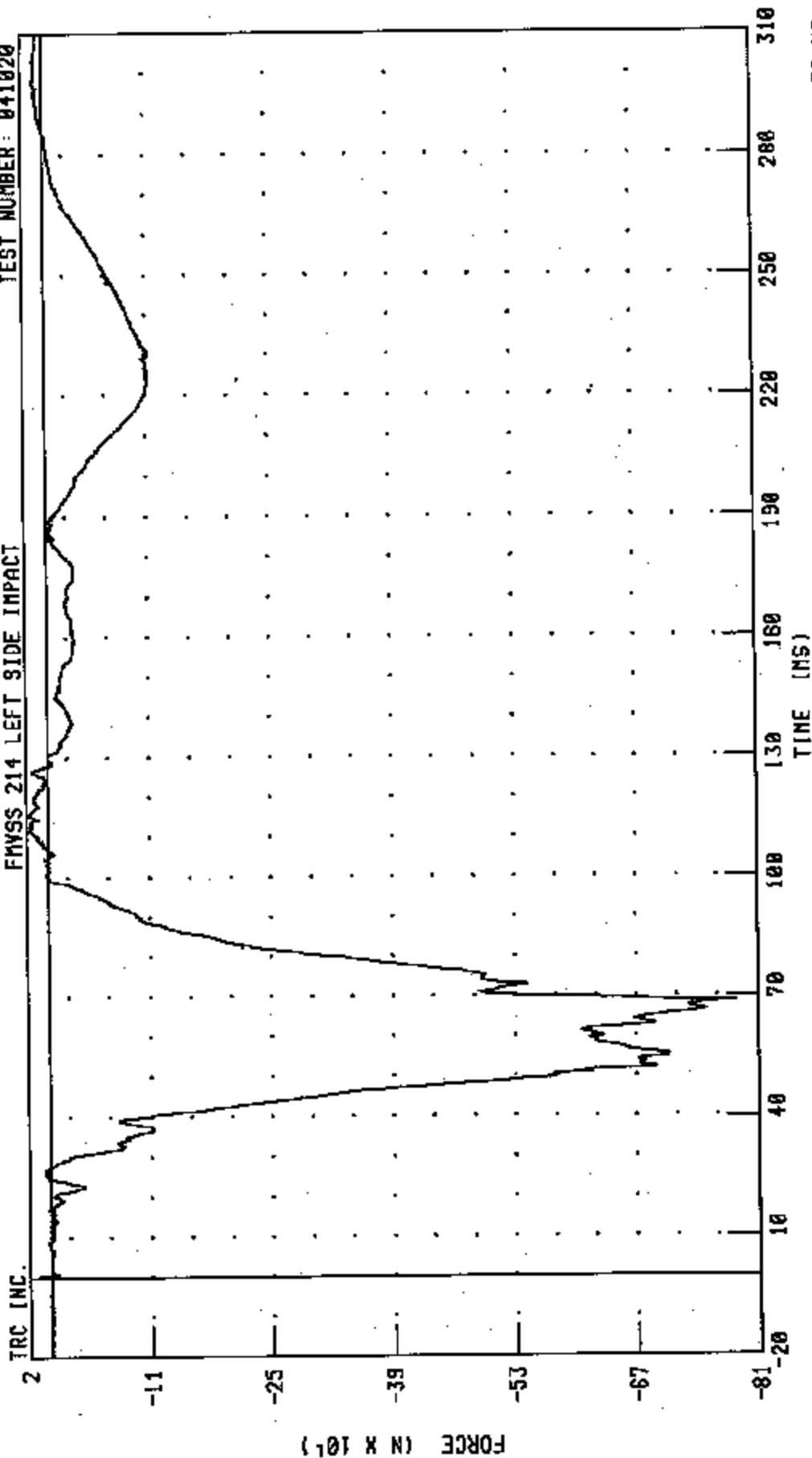


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER NECK X-AXIS SHEAR FORCE

FHWSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: NEKXF1 FILTER: CH. CLASS 1000

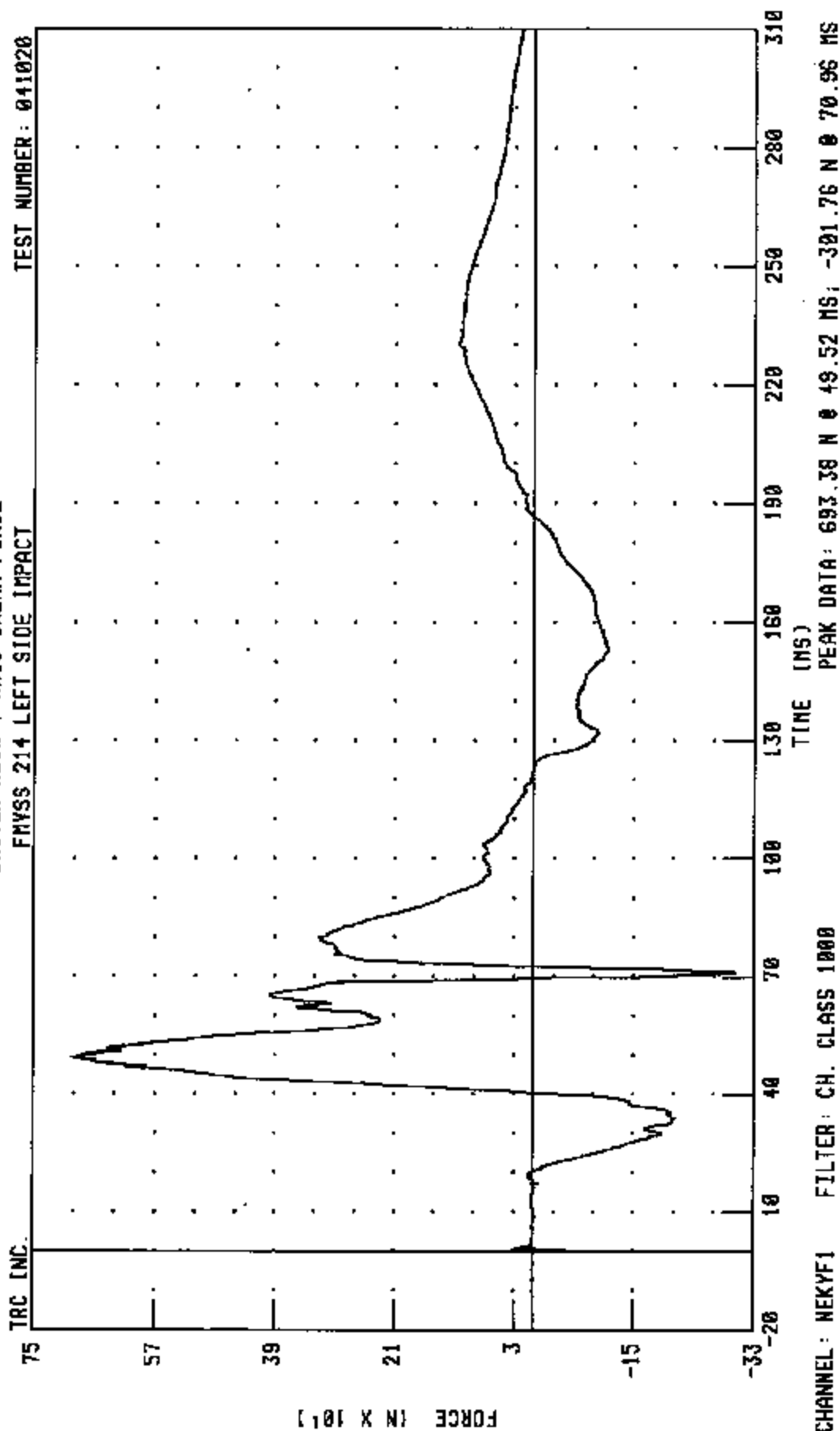
PEAK DATA: 23.31 N @ 116.00 MS, -700.60 N @ 68.72 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

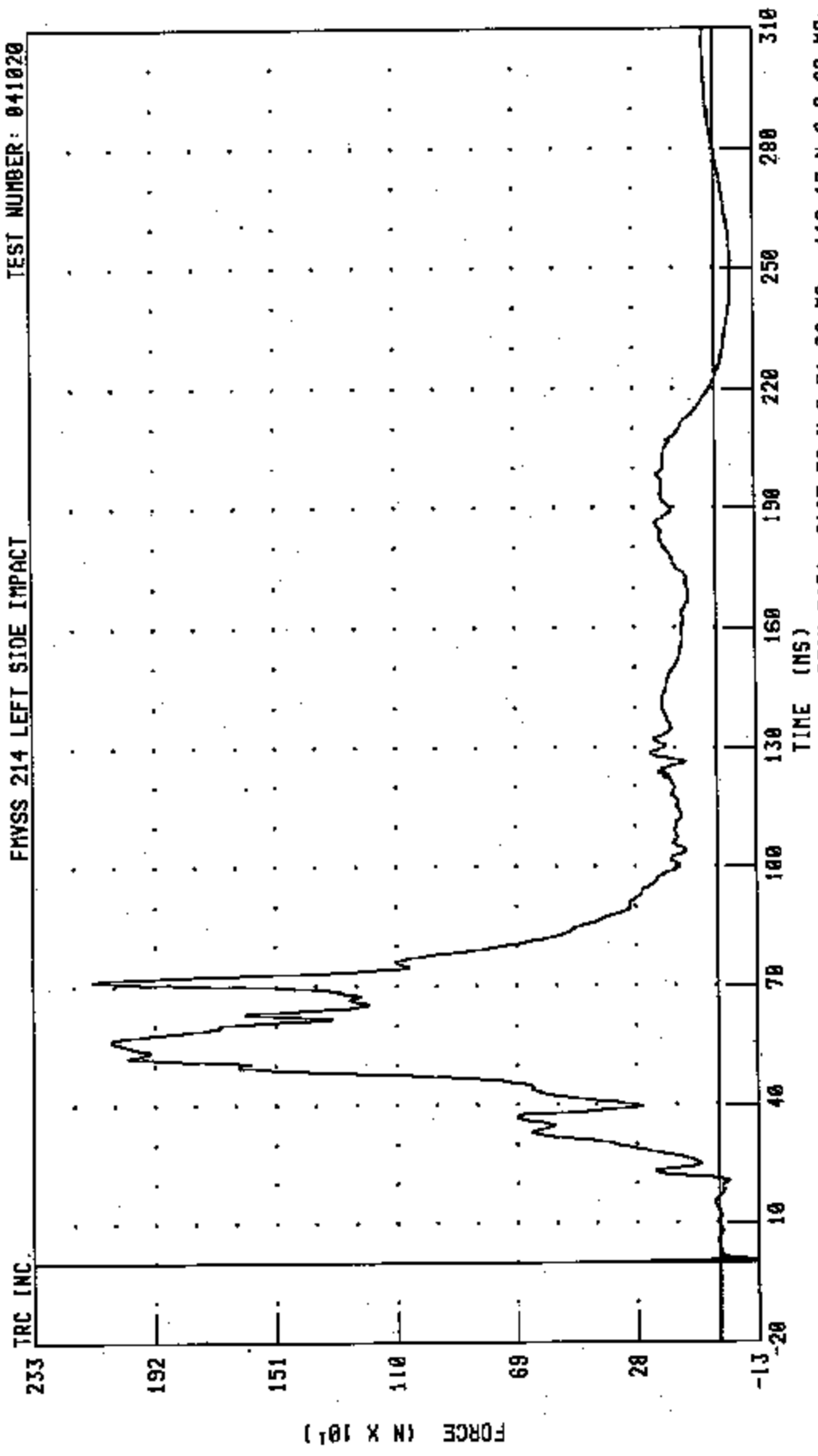


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER NECK Z-AXIS AXIAL FORCE

PHYSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



PEAK DATA: 2127.76 N @ 71.36 MS, -119.17 N @ 0.80 MS

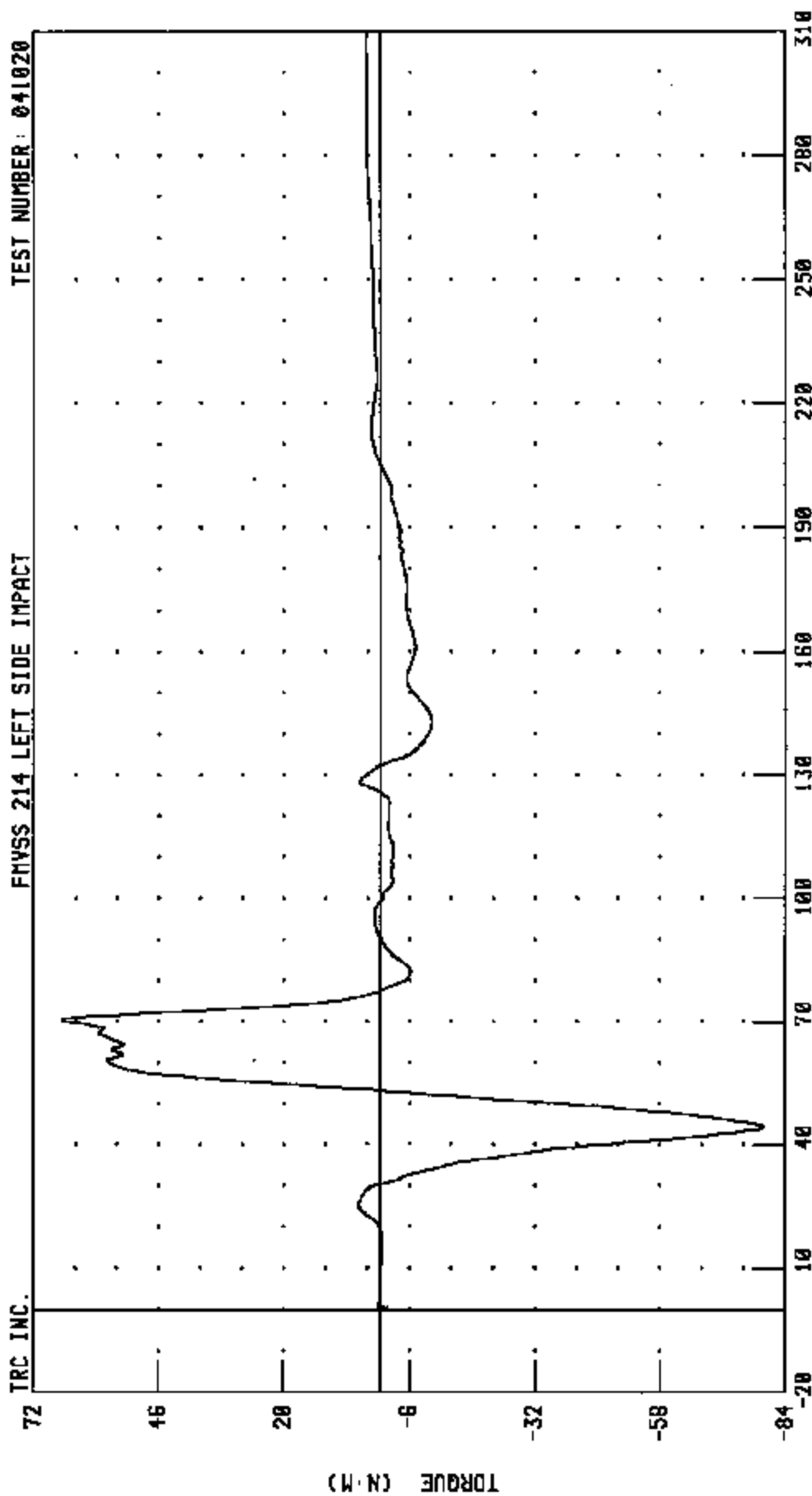
CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER NECK MOMENT ABOUT X AXIS

FHVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020

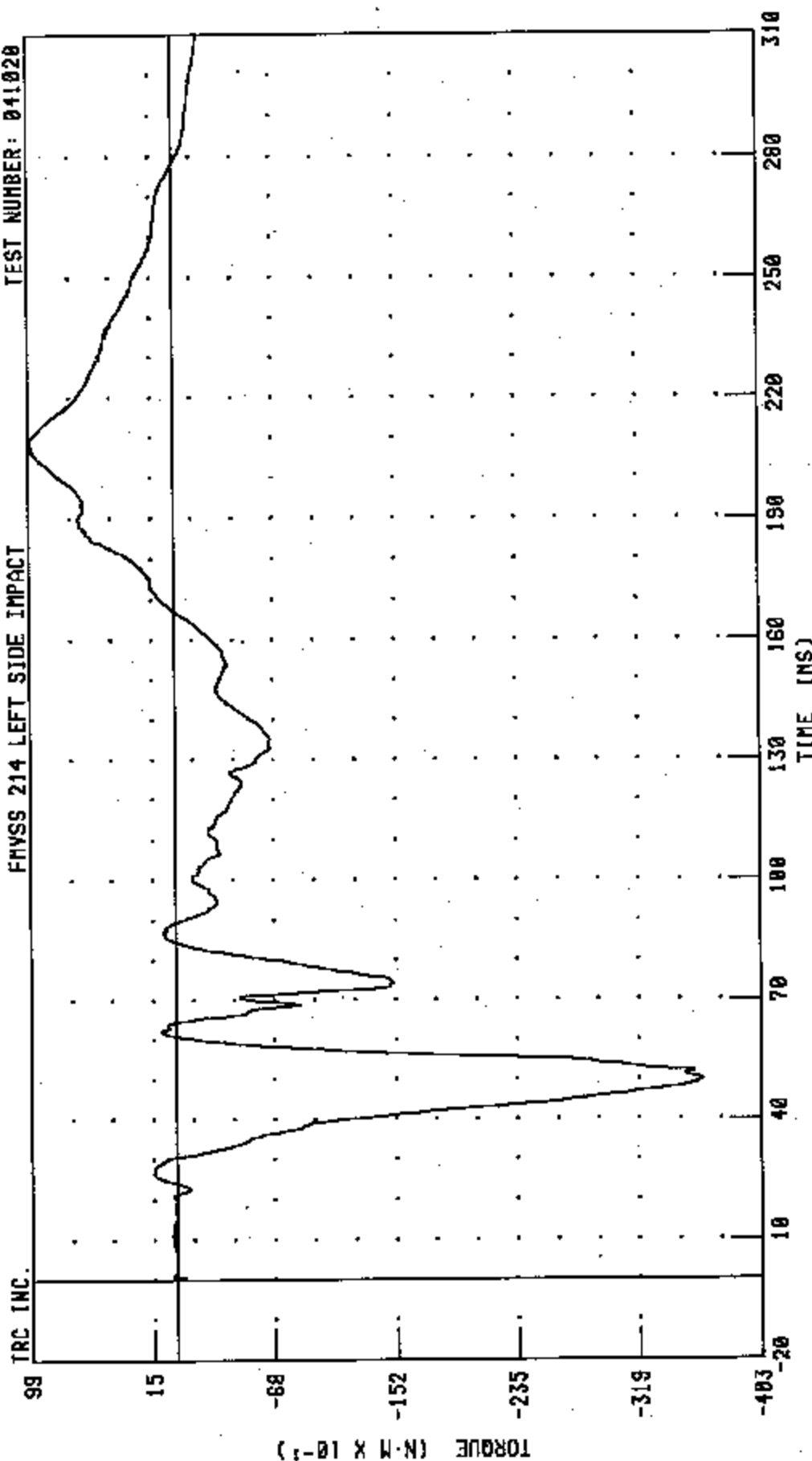


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2085 SECTION TC

DRIVER NECK MOMENT ABOUT Y AXIS

FHYSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: NEKYM1 FILTER: CH. CLASS 600

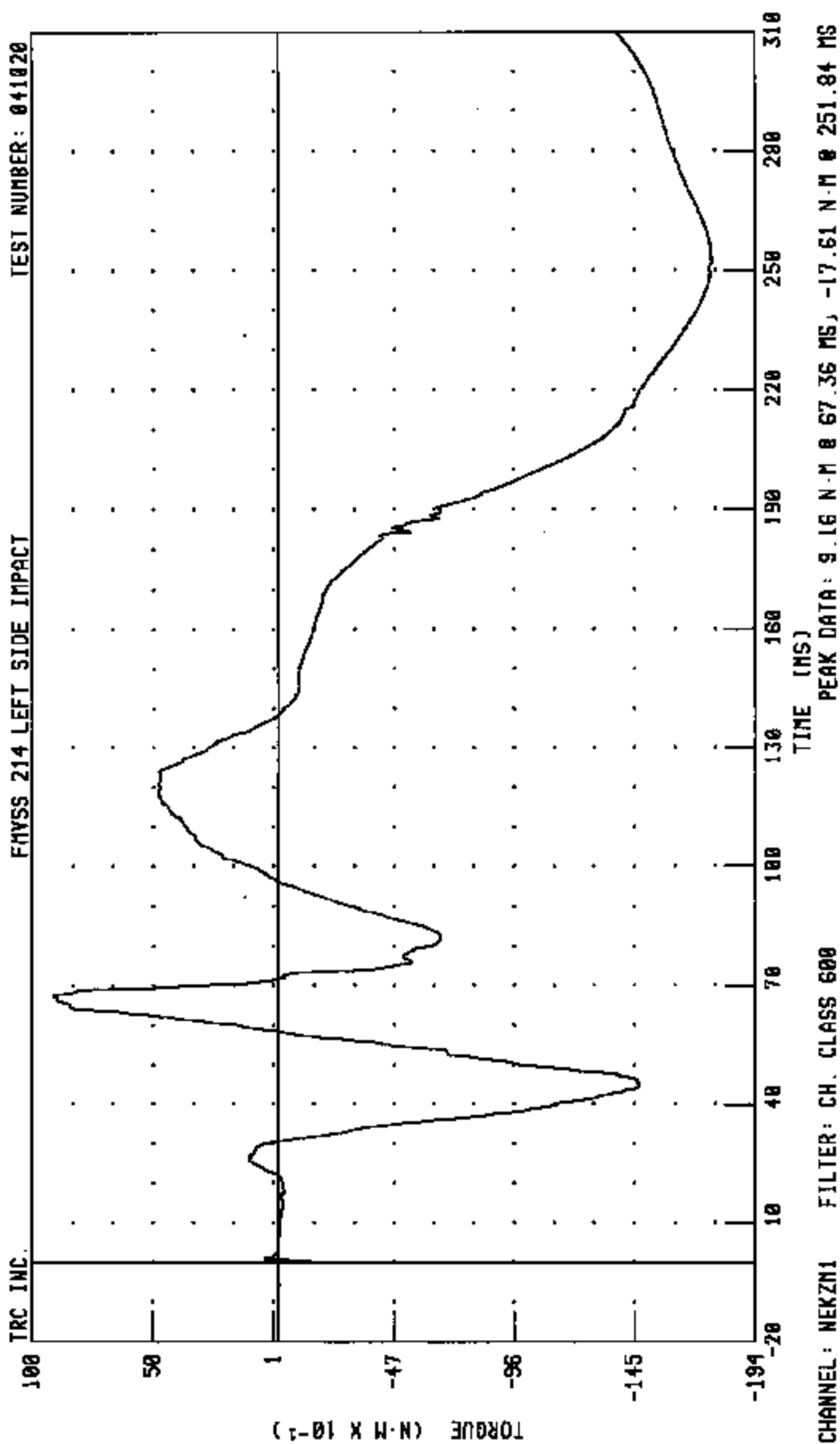
PEAK DATA: 9.88 N-M @ 208.48 MS; -36.34 N-M @ 50.16 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER NECK MOMENT ABOUT Z AXIS

FNVS 214 LEFT SIDE IMPACT

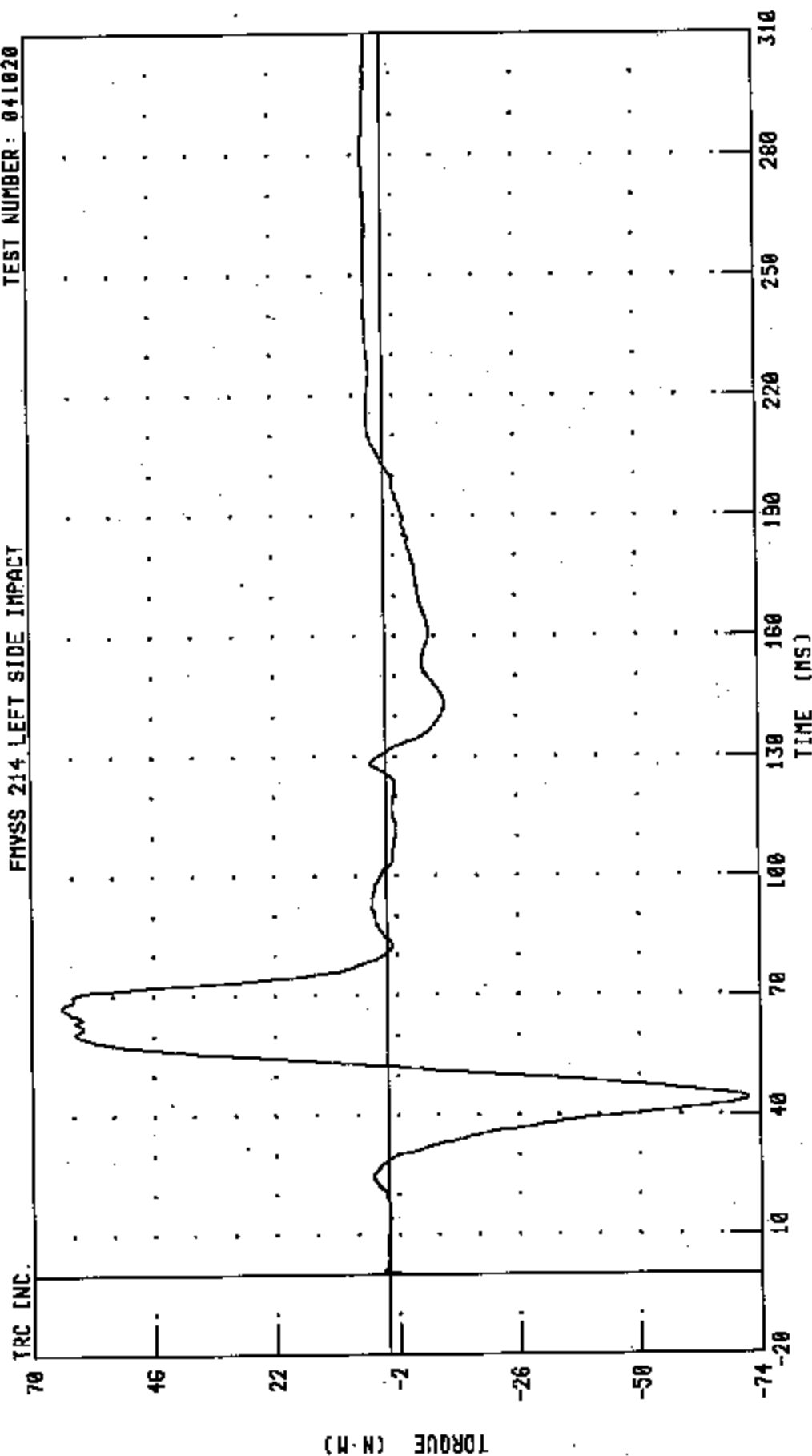
TEST NUMBER: 041020



55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER NECK OCCIPITAL CONDYLE MOMENT ABOUT X AXIS

TEST NUMBER: 041020

FHYSS 214 LEFT SIDE IMPACT



TIME (MS)

CHANNEL: NKORMI FILTER: CH. CLASS 600

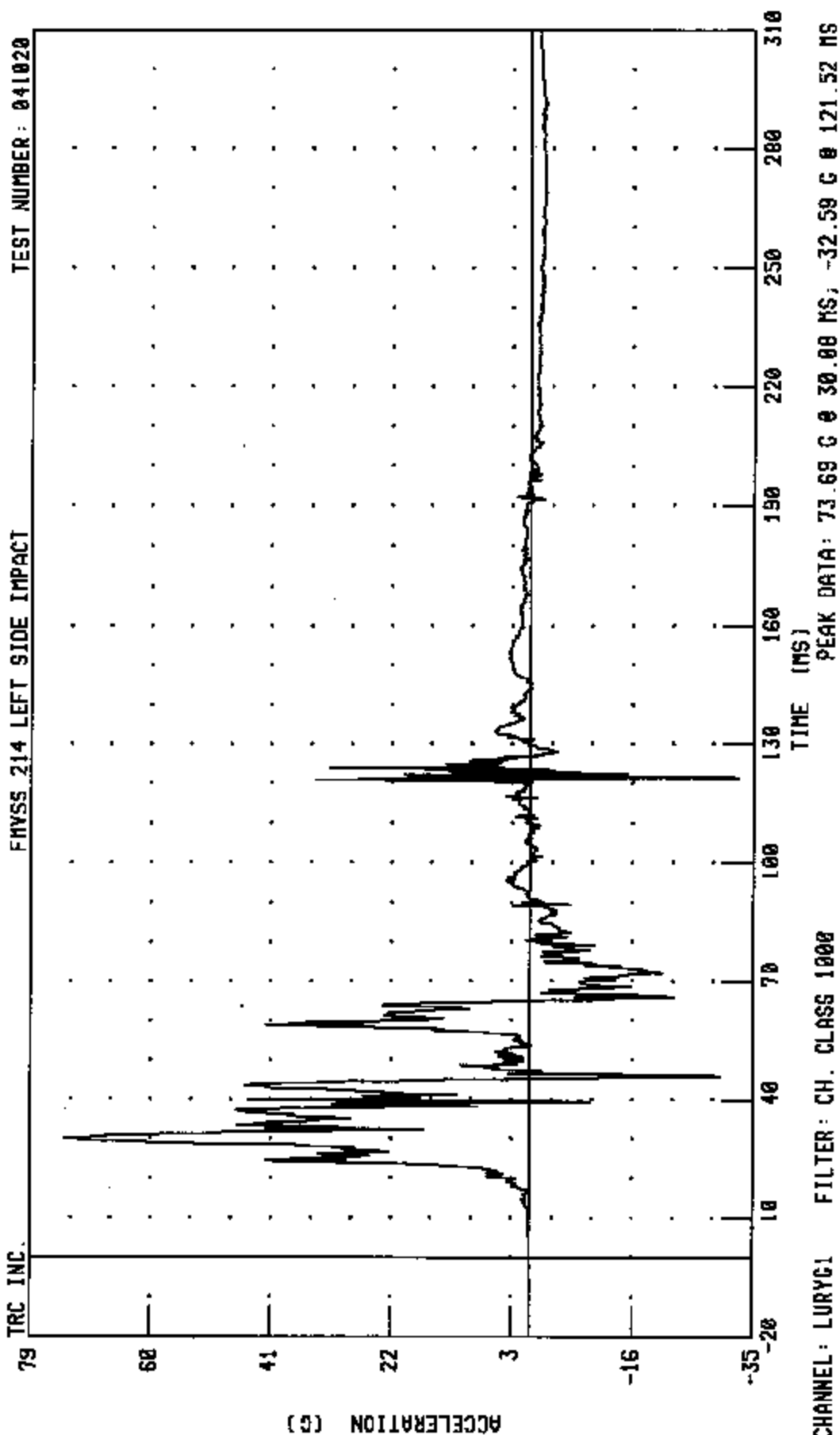
PEAK DATA: 64.22 N-M @ 67.44 MS; -71.60 N-M @ 44.16 MS

55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER UPPER RIB Y-AXIS ACCELERATION

TEST NUMBER: 041020

FHVSS 214 LEFT SIDE IMPACT

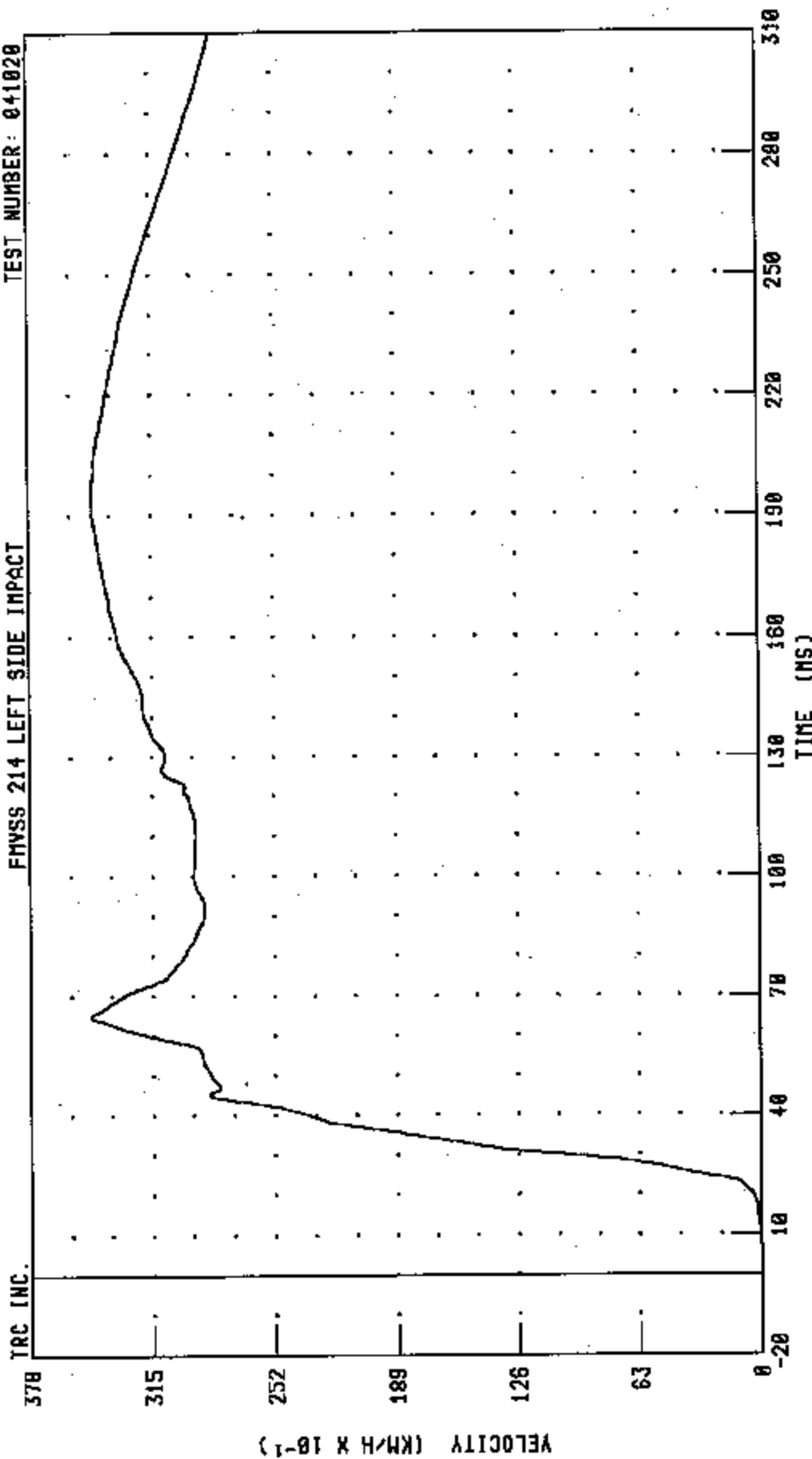


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER UPPER RIB Y-AXIS VELOCITY

FMVSS 214 LEFT SIDE IMPACT

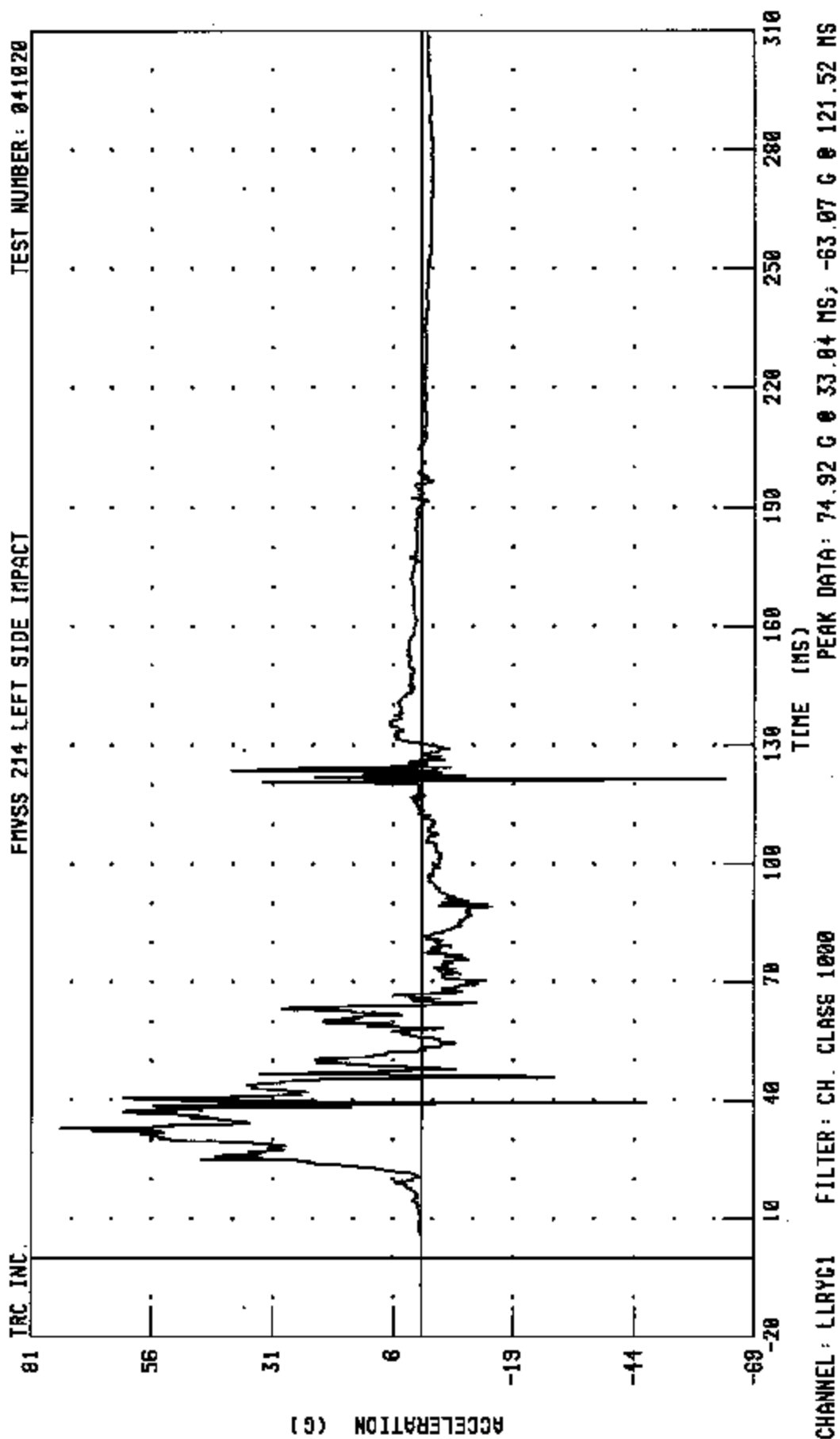
TEST NUMBER: 041020



CHANNEL: LURVVI FILTER: CH. CLASS 180

PEAK DATA: 34.67 KM/H @ 65.12 MS; 0.00 KM/H @ 0.00 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER LOWER RIB Y-AXIS ACCELERATION

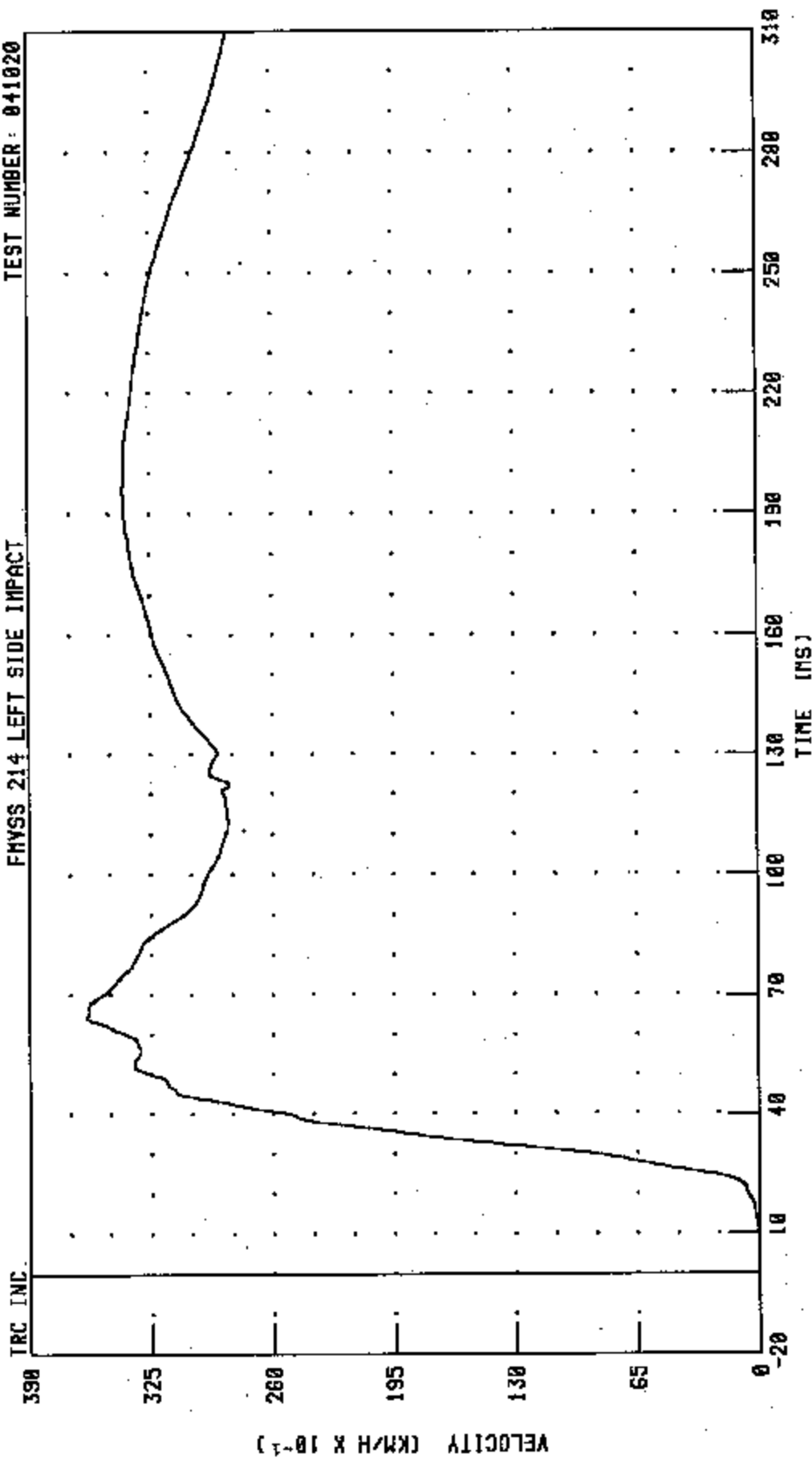


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER LOWER RIB Y-AXIS VELOCITY

PHYSS 214 LEFT SIDE IMPACT

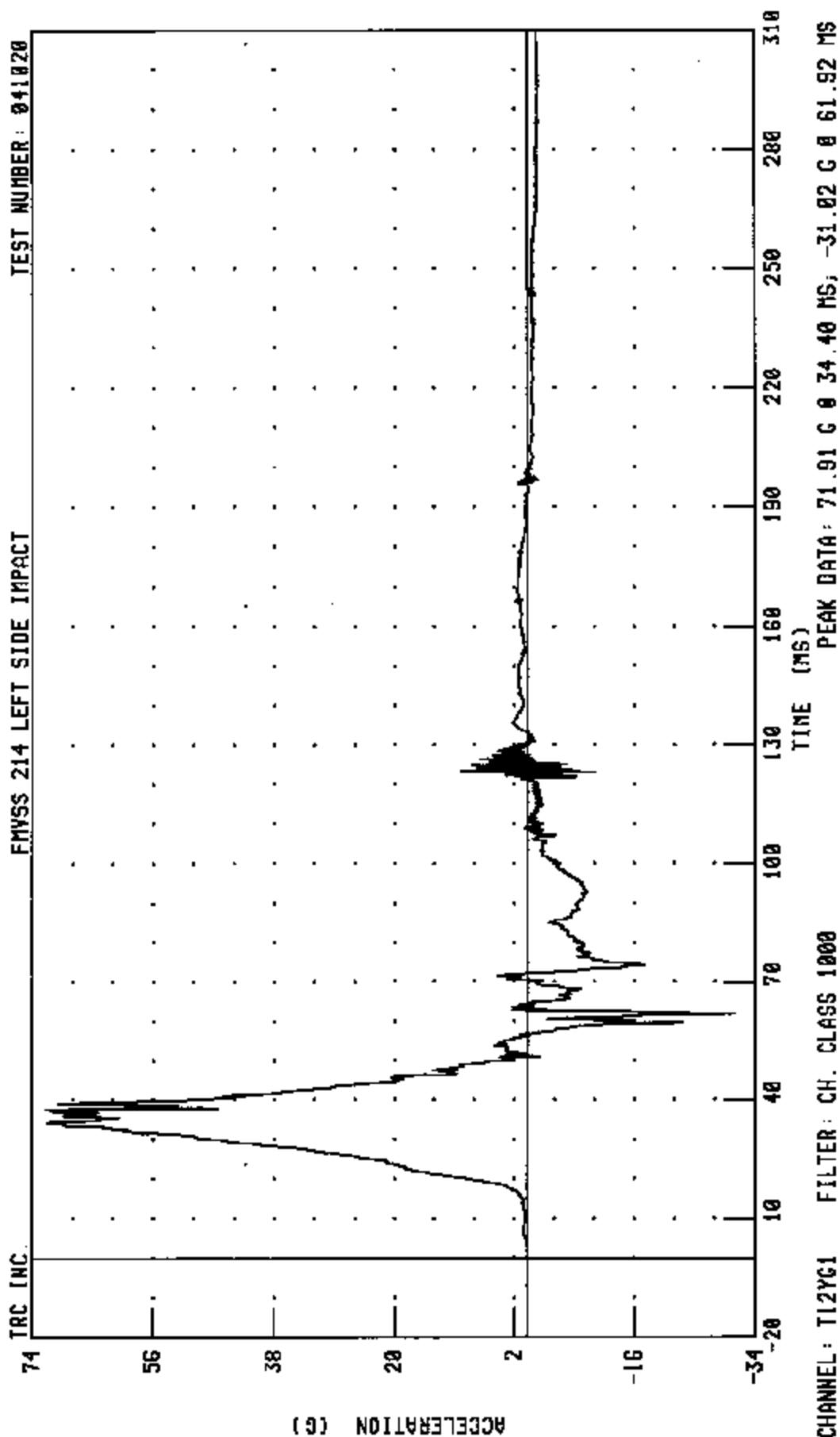
TEST NUMBER: 041020



CHANNEL: LLRYV1 FILTER: CH. CLASS 100

PEAK DATA: 35.36 KM/H @ 64.48 MS, 0.00 KM/H @ 5.04 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
 DRIVER LOWER SPINE Y-AXIS ACCELERATION

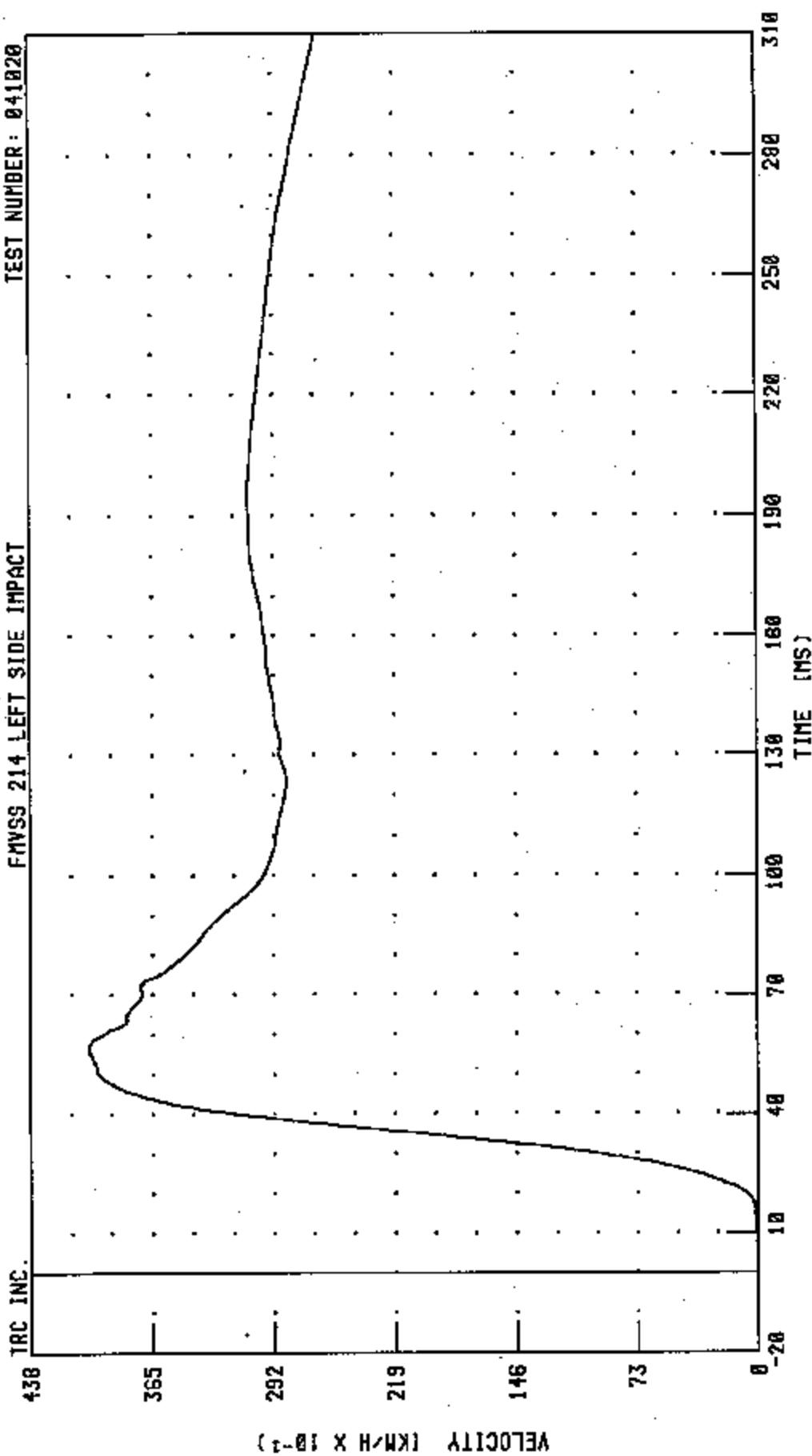


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER LOWER SPINE Y-AXIS VELOCITY

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: T12VY1 FILTER: CH. CLASS 180

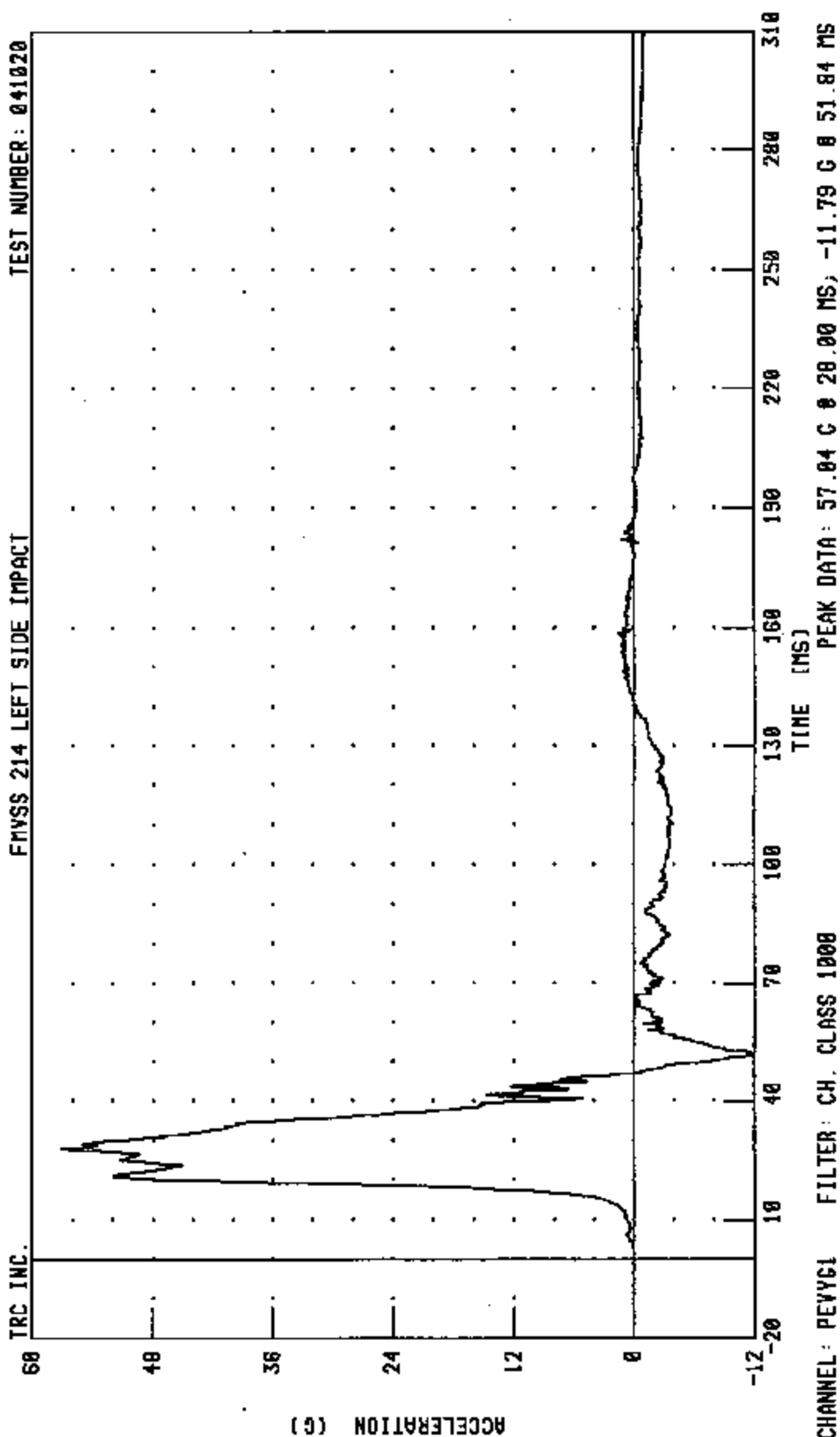
PEAK DATA: 40.29 KM/H @ 56.64 MS, 0.00 KM/H @ 0.00 MS

S5/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT



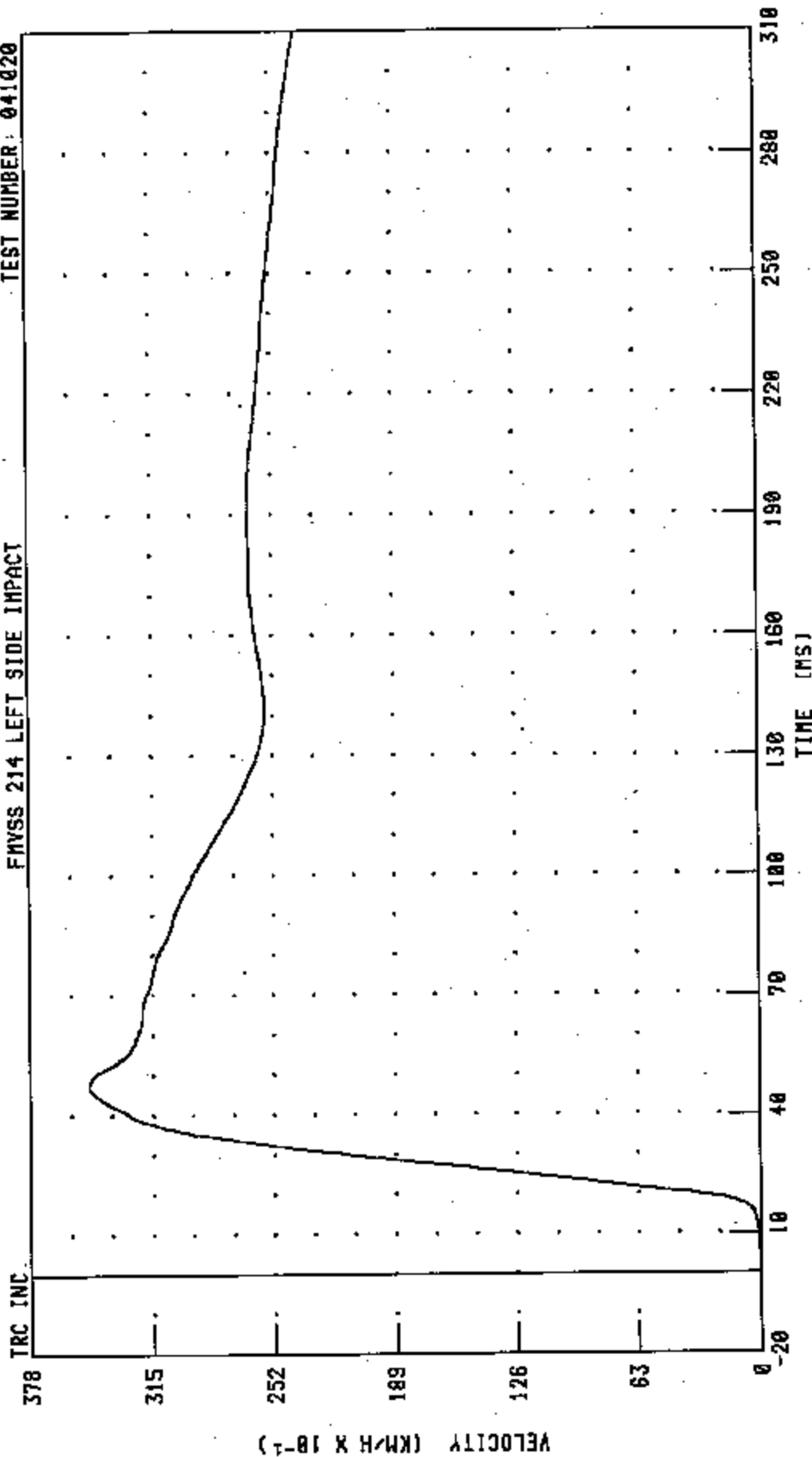
CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2805 SCION TC

DRIVER PELVIS Y-AXIS VELOCITY

FMVSS 214 LEFT SIDE IMPACT

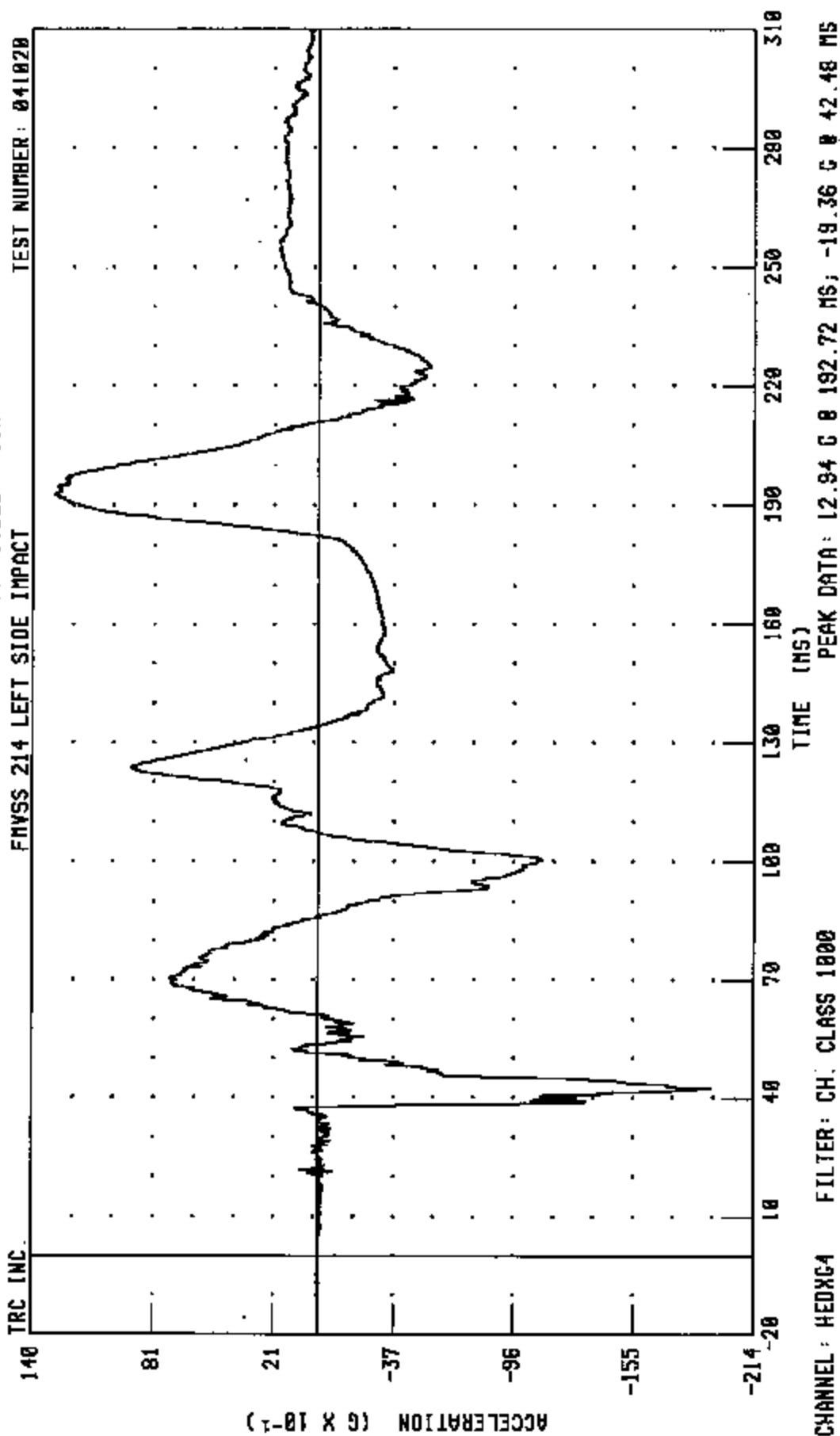
TEST NUMBER: 041020



CHANNEL: PEVYV1 FILTER: CH. CLASS 100

PEAK DATA: 34.77 KM/H @ 47.36 MS; 0.00 KM/H @ 0.00 MS

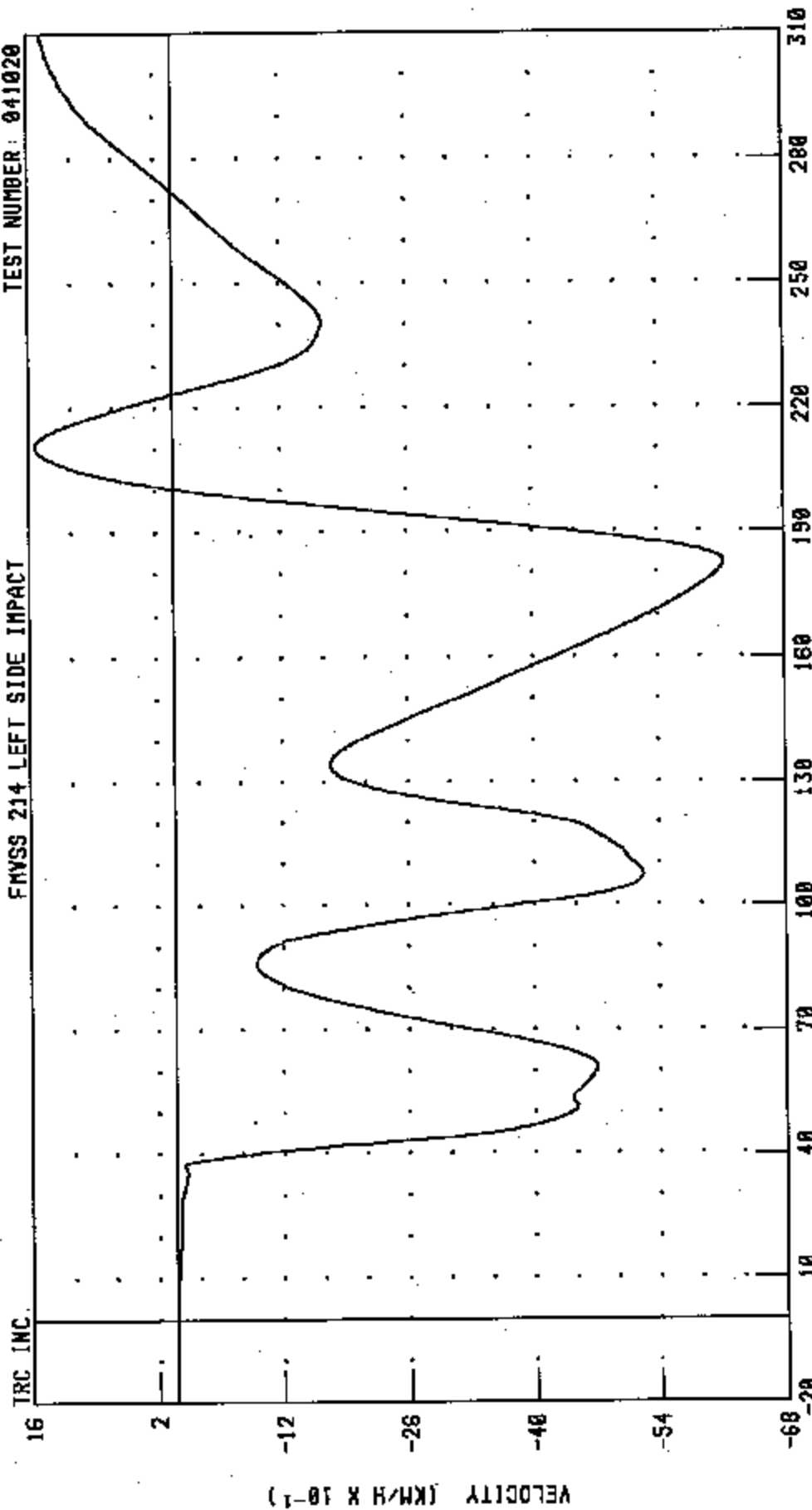
55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD X-AXIS ACCELERATION



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD X-AXIS VELOCITY

TEST NUMBER: 041020

FRVSS 214 LEFT SIDE IMPACT



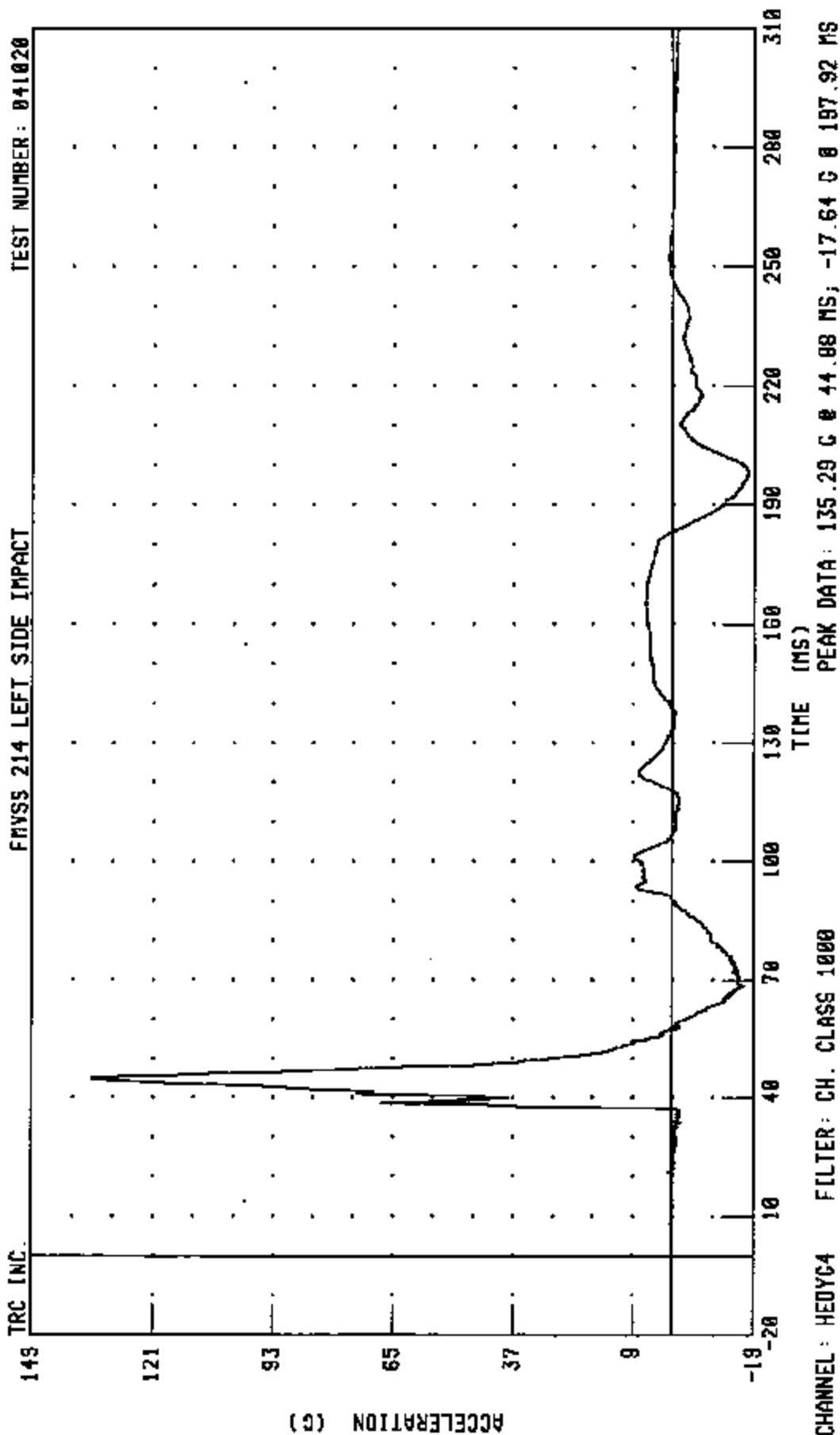
TIME (MS)

PEAK DATA: 1.53 KM/H @ 210.96 MS; -6.14 KM/H @ 182.48 MS

CHANNEL: HEDXV4 FILTER: CH. CLASS 180

VELOCITY (KM/H X 10-1)

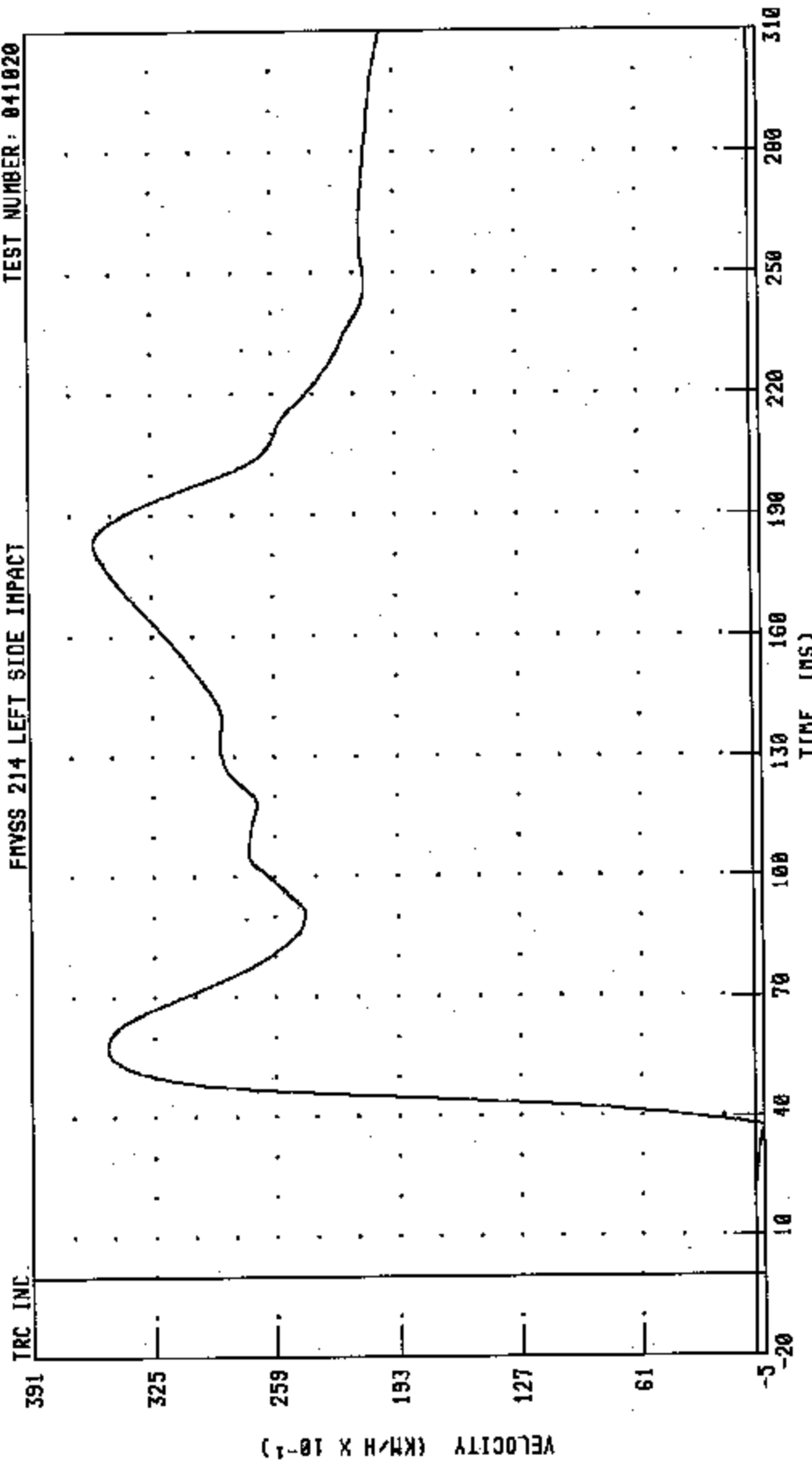
55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD Y-AXIS ACCELERATION



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD Y-AXIS VELOCITY

TEST NUMBER: 041020

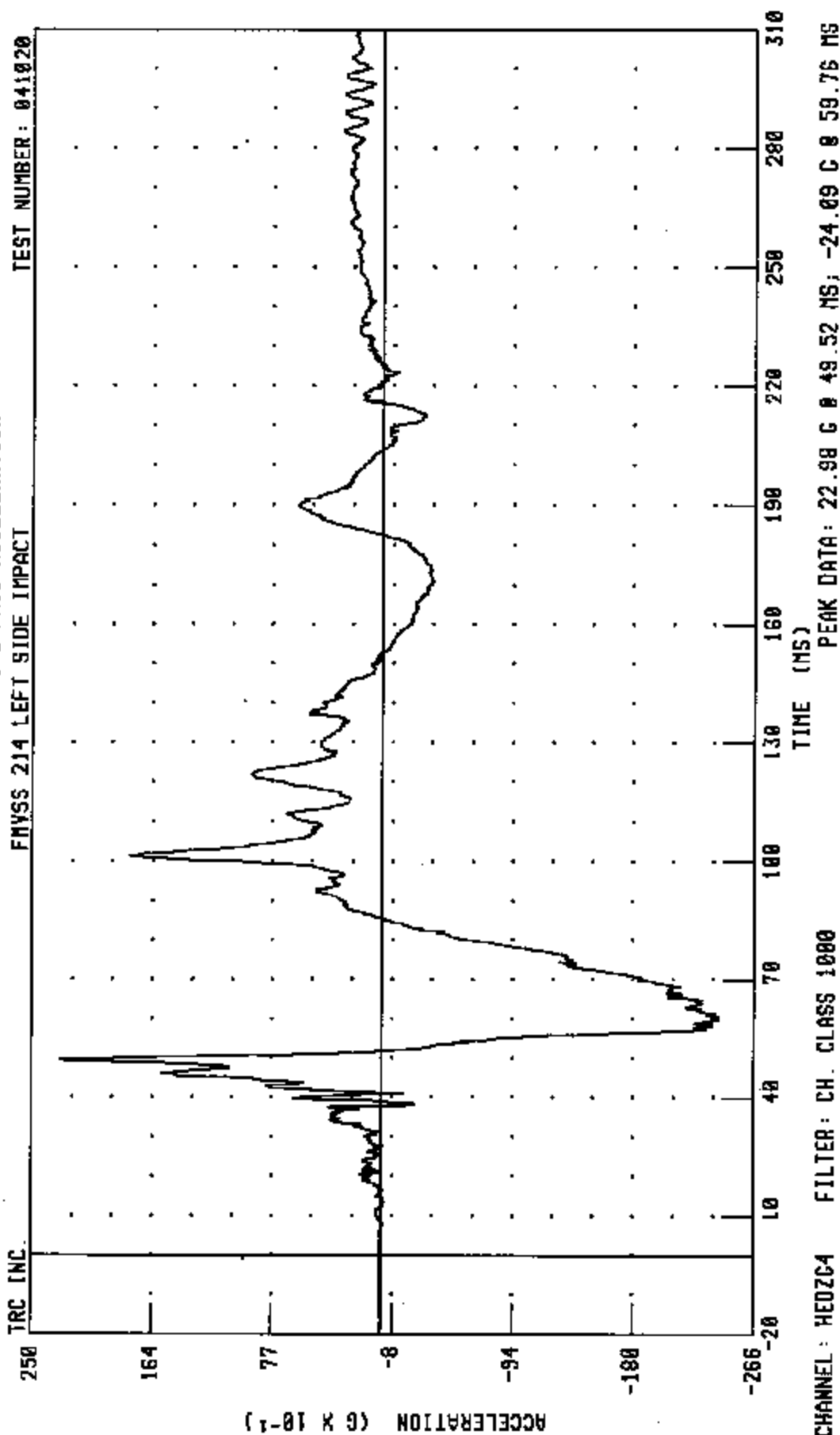
FRVSS 214 LEFT SIDE IMPACT



CHANNEL: HEDYV4 FILTER: CH. CLASS 180

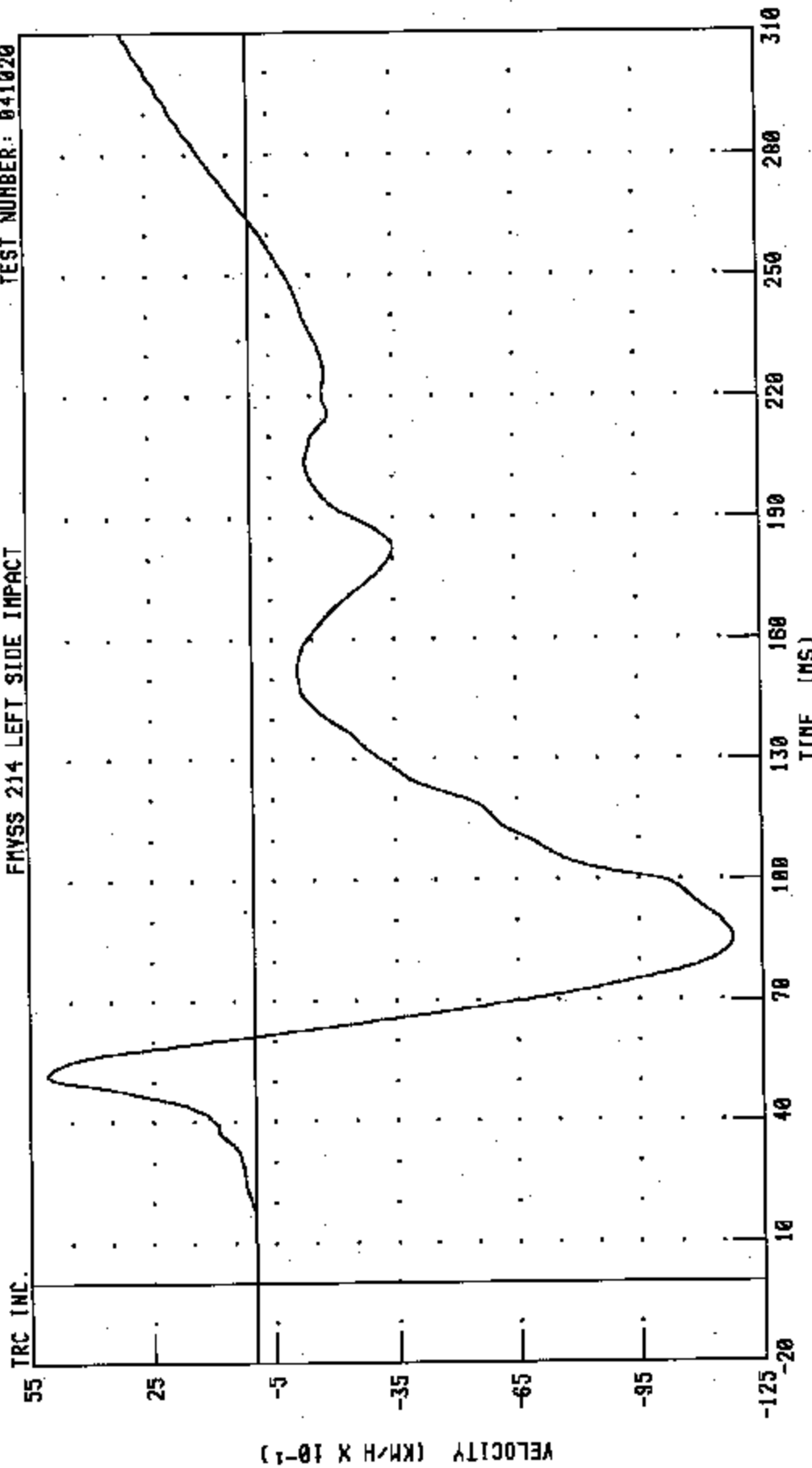
PEAK DATA: 35.65 KM/H @ 183.20 MS; -0.54 KM/H @ 36.96 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD Z-AXIS ACCELERATION



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2805 SECTION TC
LEFT REAR PASSENGER HEAD Z-AXIS VELOCITY

TRC INC. FVSS 214 LEFT SIDE IMPACT TEST NUMBER: 041020



CHANNEL: HEDZV4 FILTER: CH. CLASS 180

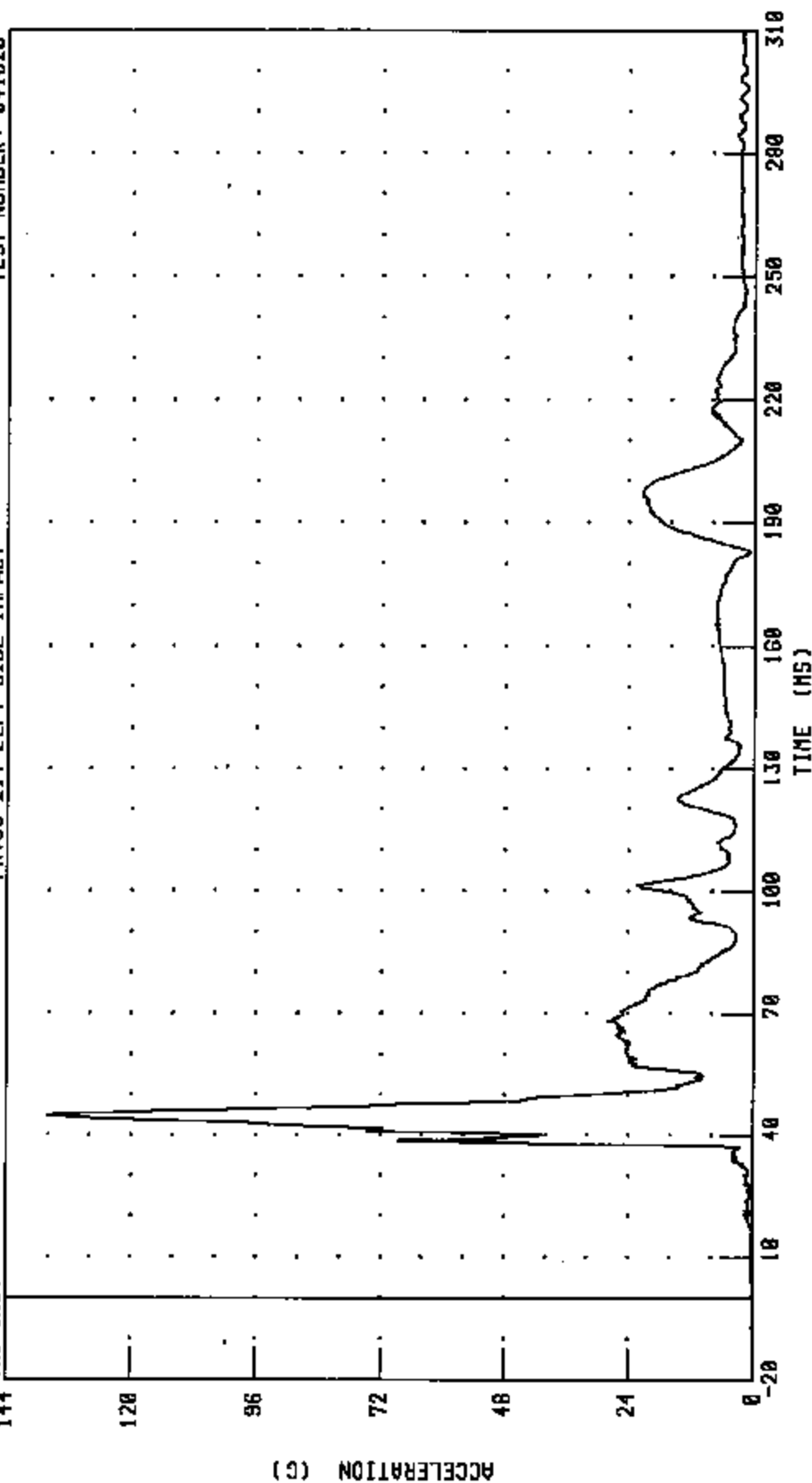
PEAK DATA: 5.07 KM/H @ 51.76 MS, -11.77 KM/H @ 85.52 MS

55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD RESULTANT ACCELERATION

TRC INC.

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



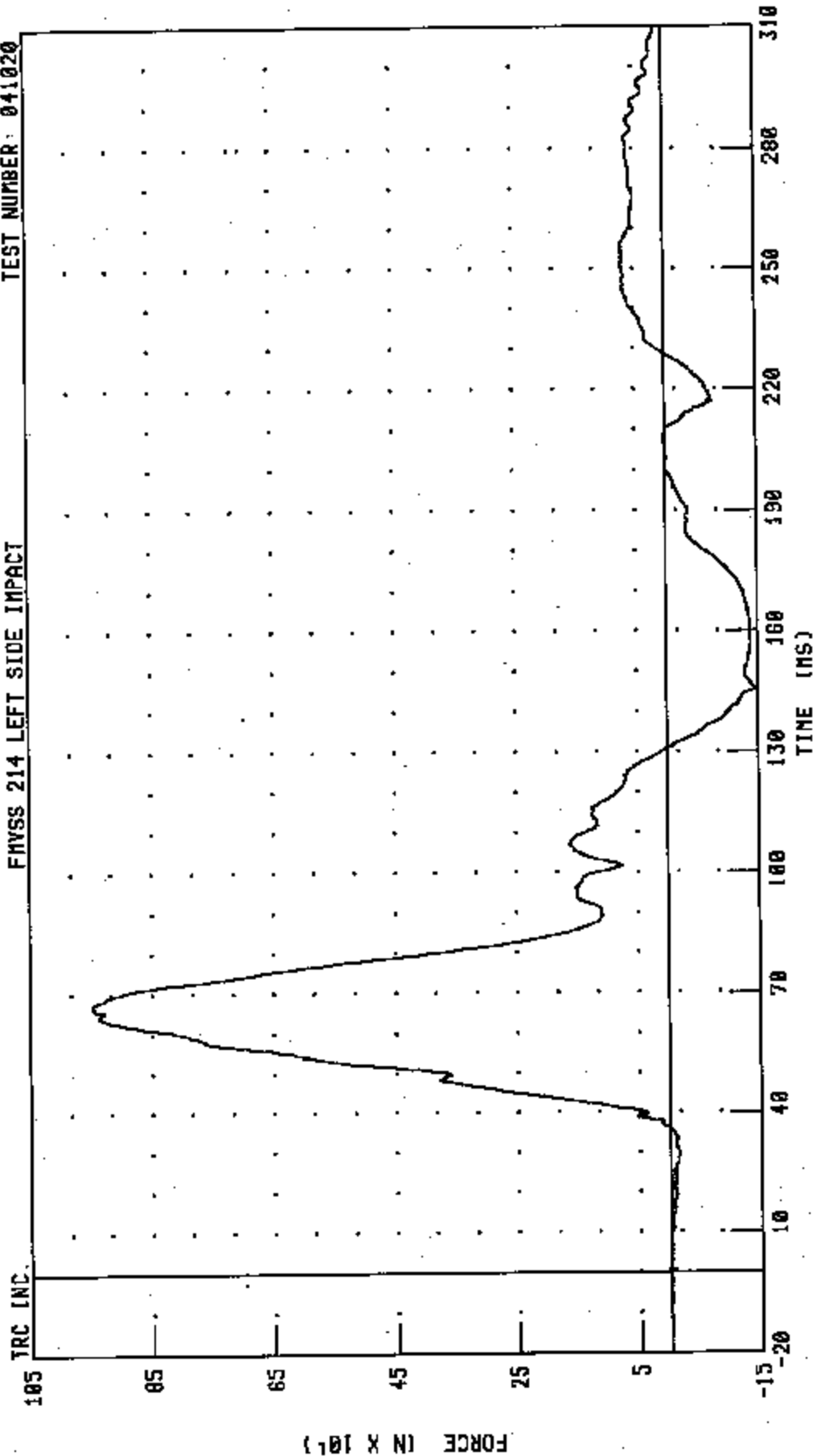
CHANNEL: HEDRC4 FILTER: CH. CLASS 1000

PEAK DATA: 136.15 G @ 44.88 MS; 0.01 G @ -20.00 MS

55/26 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER NECK X-AXIS SHEAR FORCE

TEST NUMBER: 041020

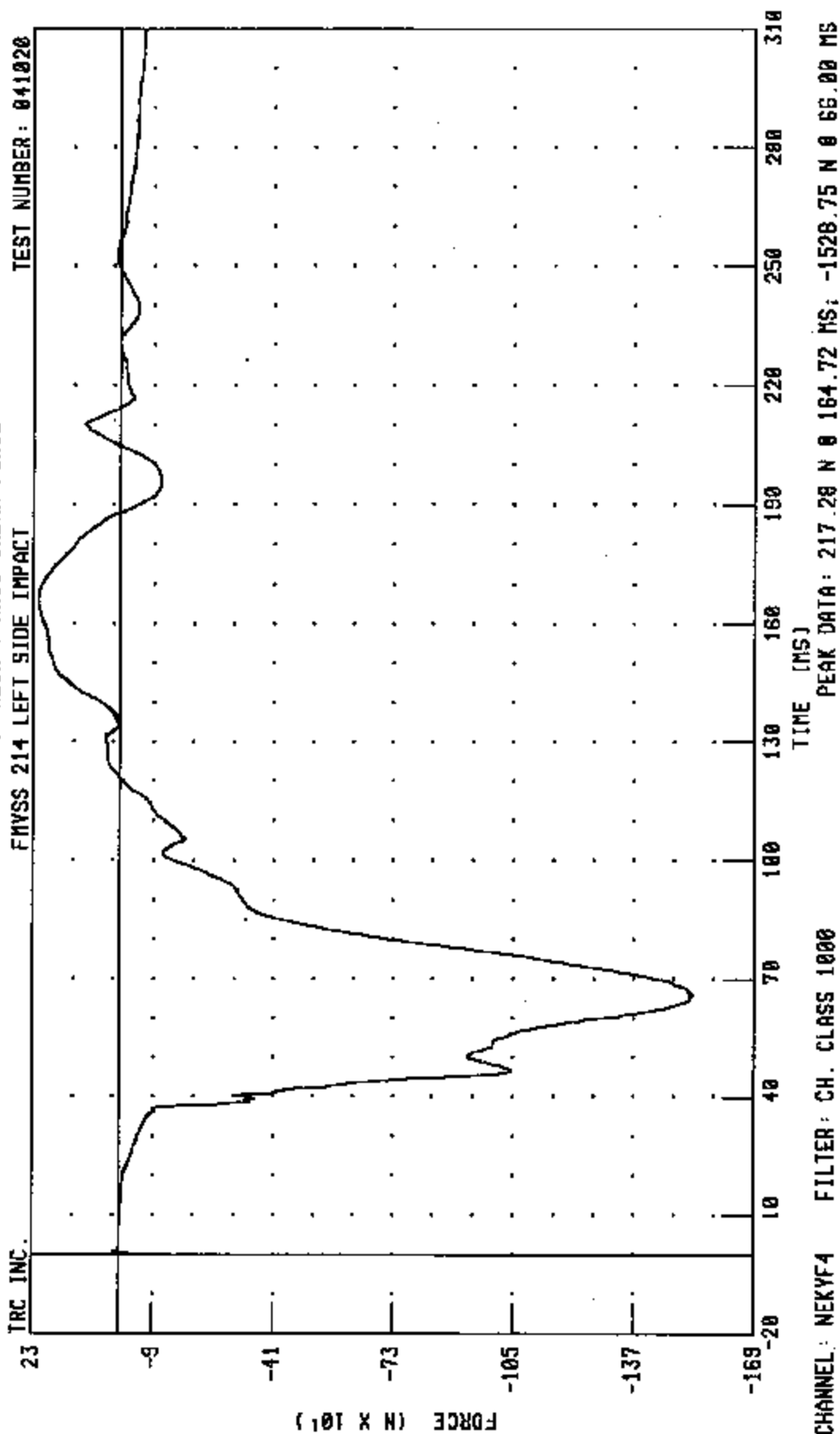
FRYSS 214 LEFT SIDE IMPACT



CHANNEL: NEKXF4 FILTER: CH. CLASS 1000

PEAK DATA: 848.03 N @ 67.12 MS, -144.68 N @ 145.68 MS

55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER NECK Y-AXIS SHEAR FORCE

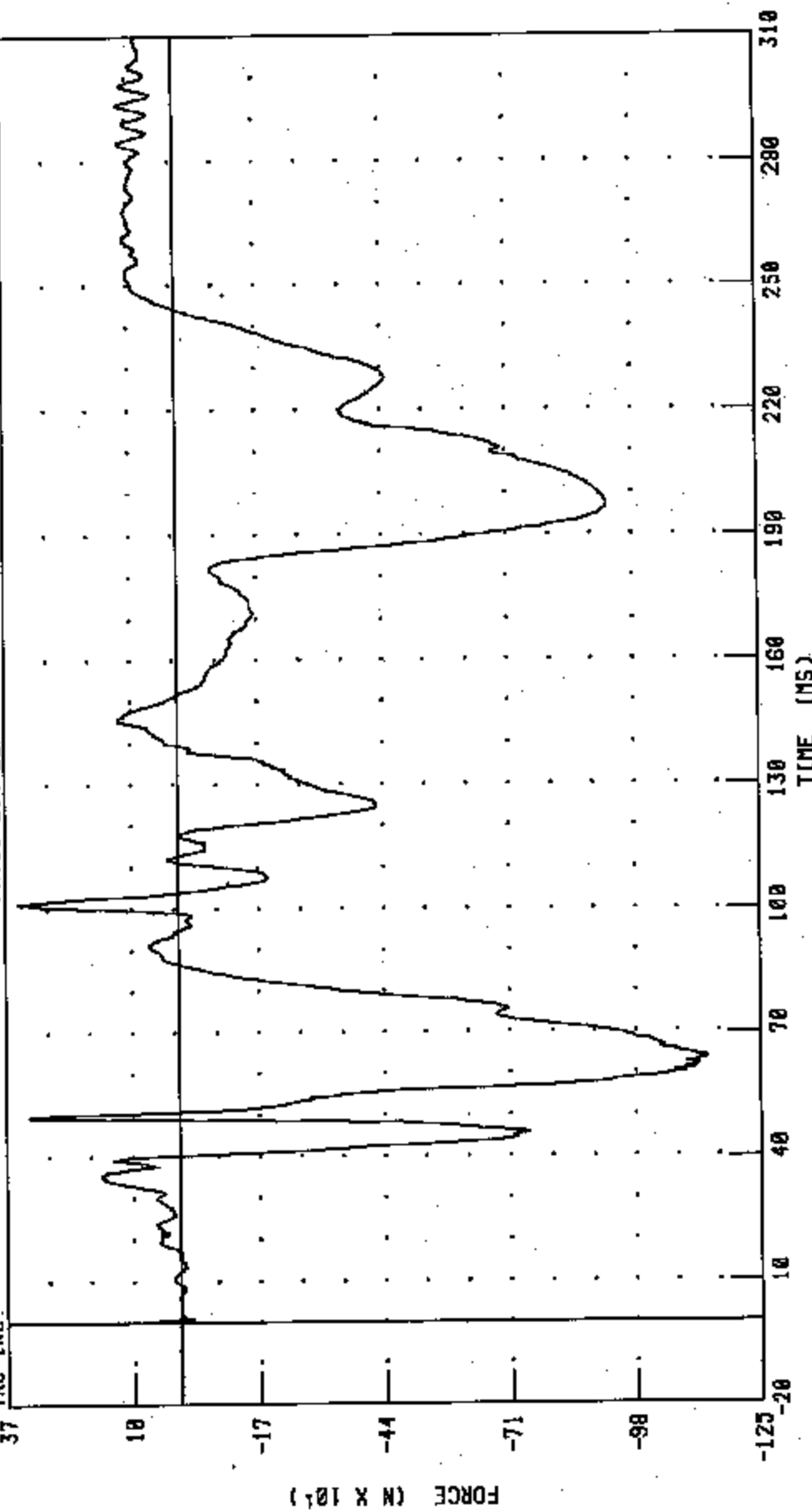


55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFURNABLE BARRIER) INTO LEFT SIDE OF 2085 SCION TC
LEFT REAR PASSENGER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

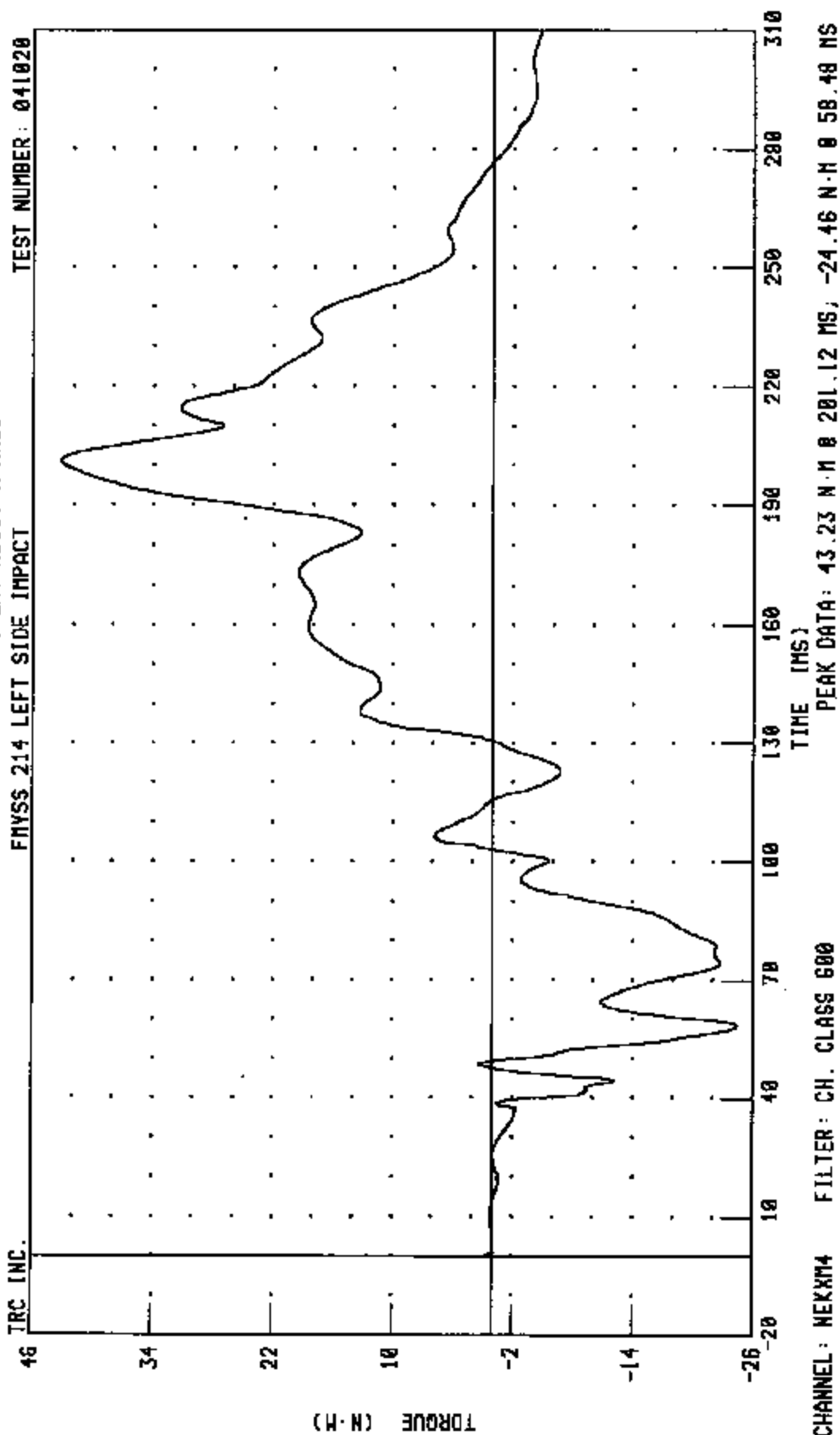
TRC INC.



CHANNEL: NEKZF4 FILTER: CH. CLASS 1000

PEAK DATA: 342.80 N @ 101.68 MS, -1136.13 N @ 63.76 MS

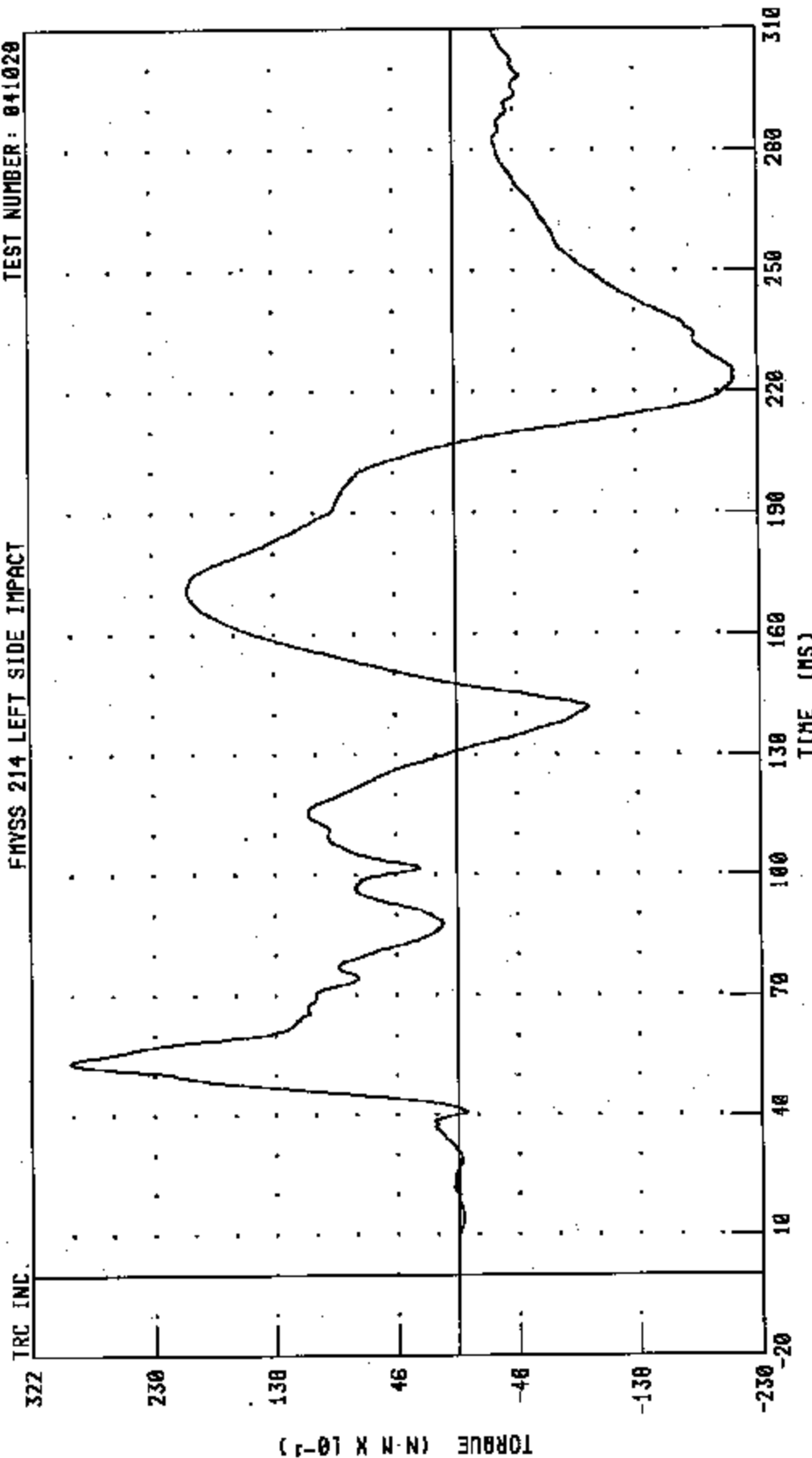
55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2085 SCION TC
LEFT REAR PASSENGER NECK MOMENT ABOUT X AXIS



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2805 SCION TC
LEFT REAR PASSENGER NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 041020

FRYSS 214 LEFT SIDE IMPACT

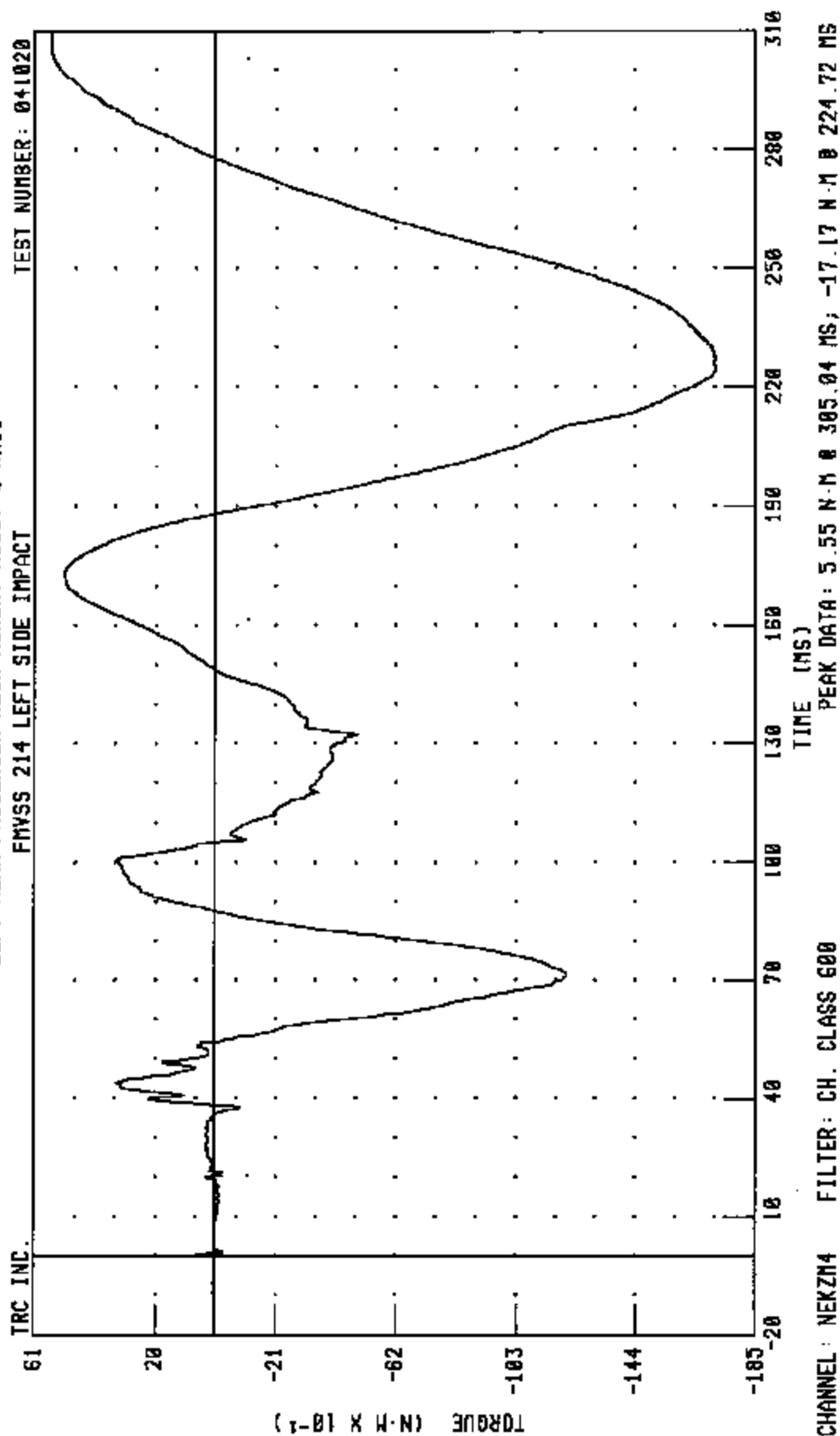


TIME (MS)

CHANNEL: NEKYN4 FILTER: CH. CLASS 600

PEAK DATA: 29.26 N-H B 53.44 MS; -21.19 N-H B 223.12 MS

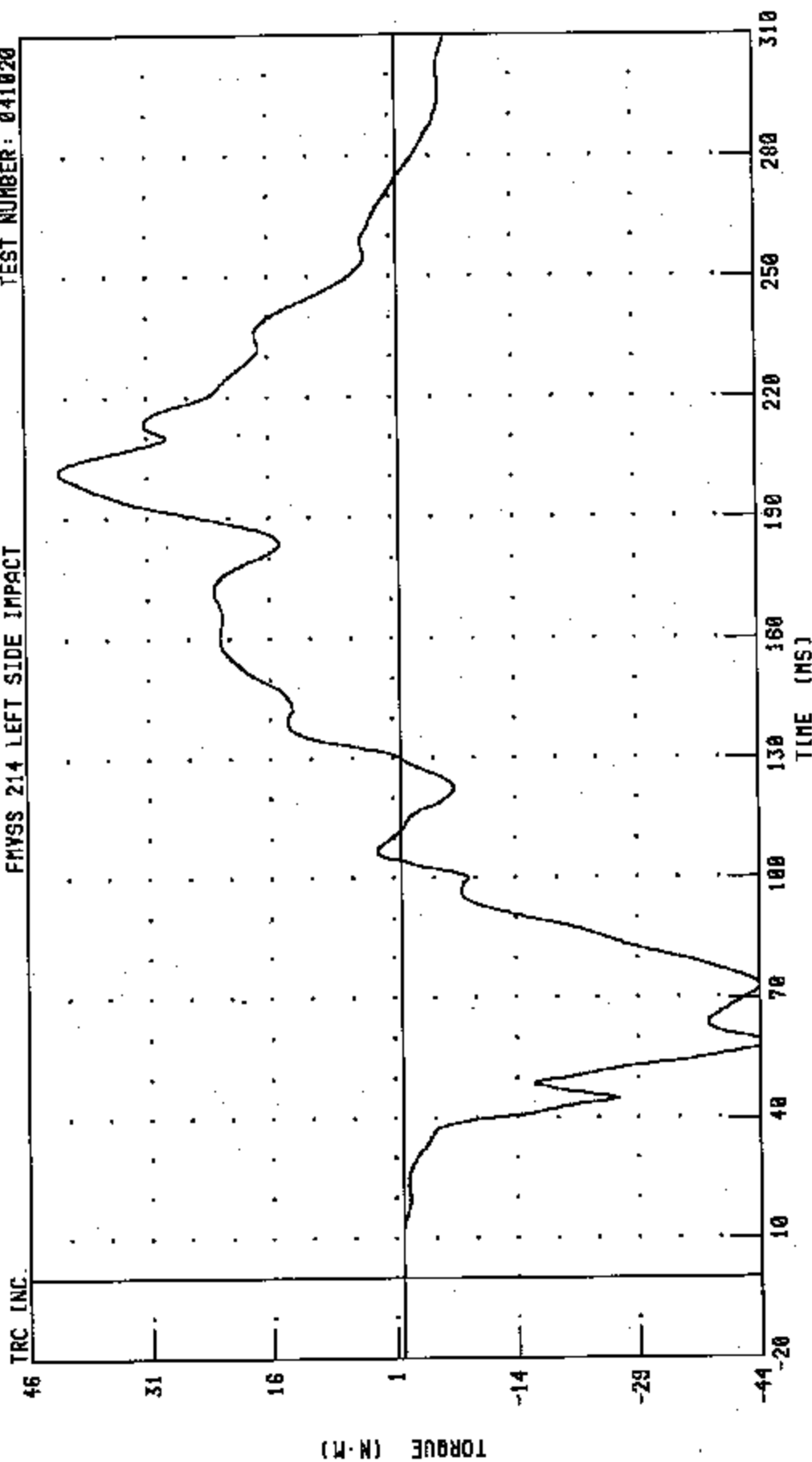
55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER NECK MOMENT ABOUT Z AXIS



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2085 SCION TC
LEFT REAR PASSENGER NECK OCCIPITAL CONDYLE MOMENT ABOUT X AXIS

TEST NUMBER: 041020

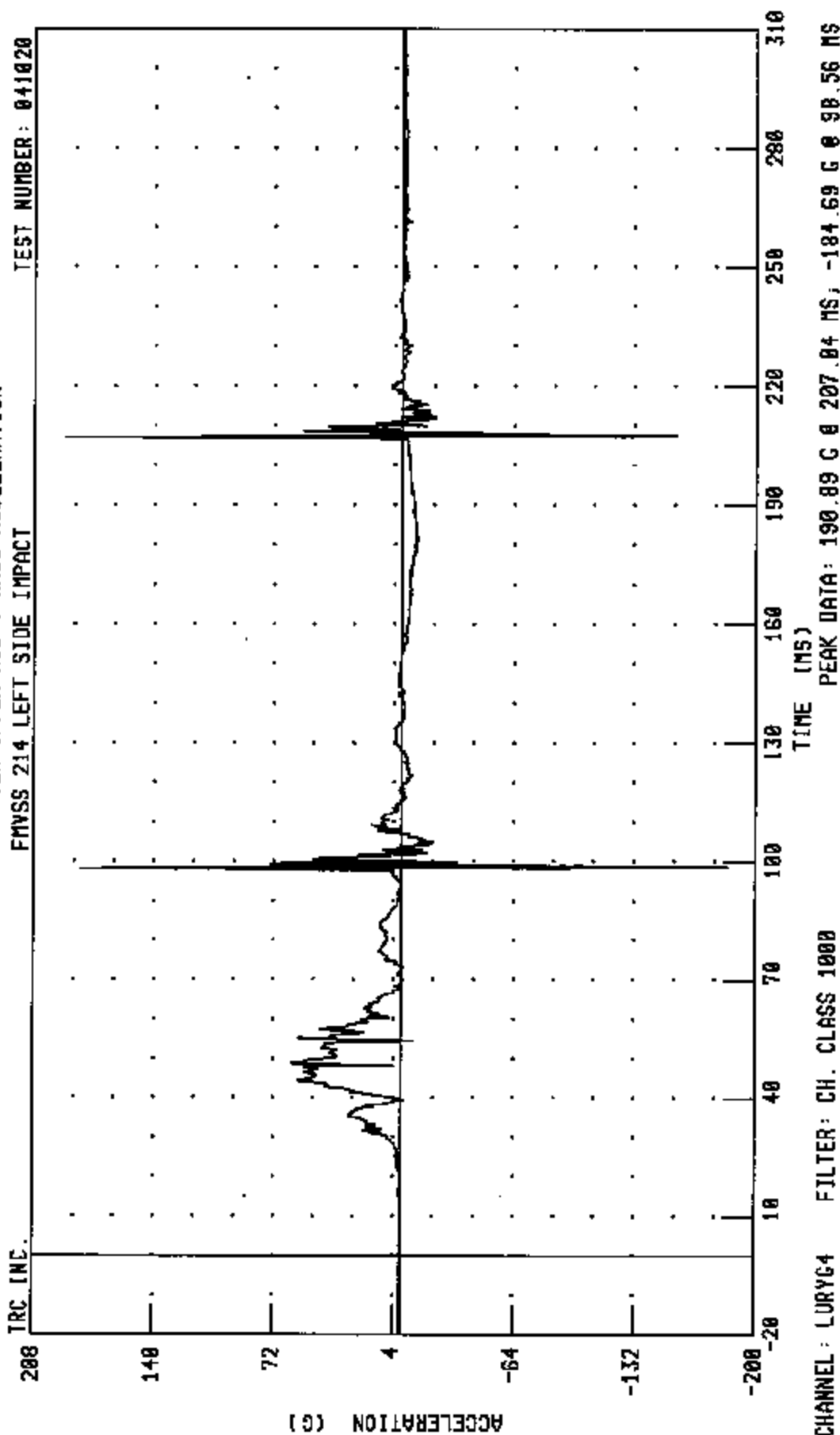
FMVSS 214 LEFT SIDE IMPACT



CHANNEL: NK0XM4 FILTER: CH. CLASS 600

PEAK DATA: 41.89 N·m @ 201.60 ms, -45.30 N·m @ 58.80 ms

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER UPPER RIB Y-AXIS ACCELERATION

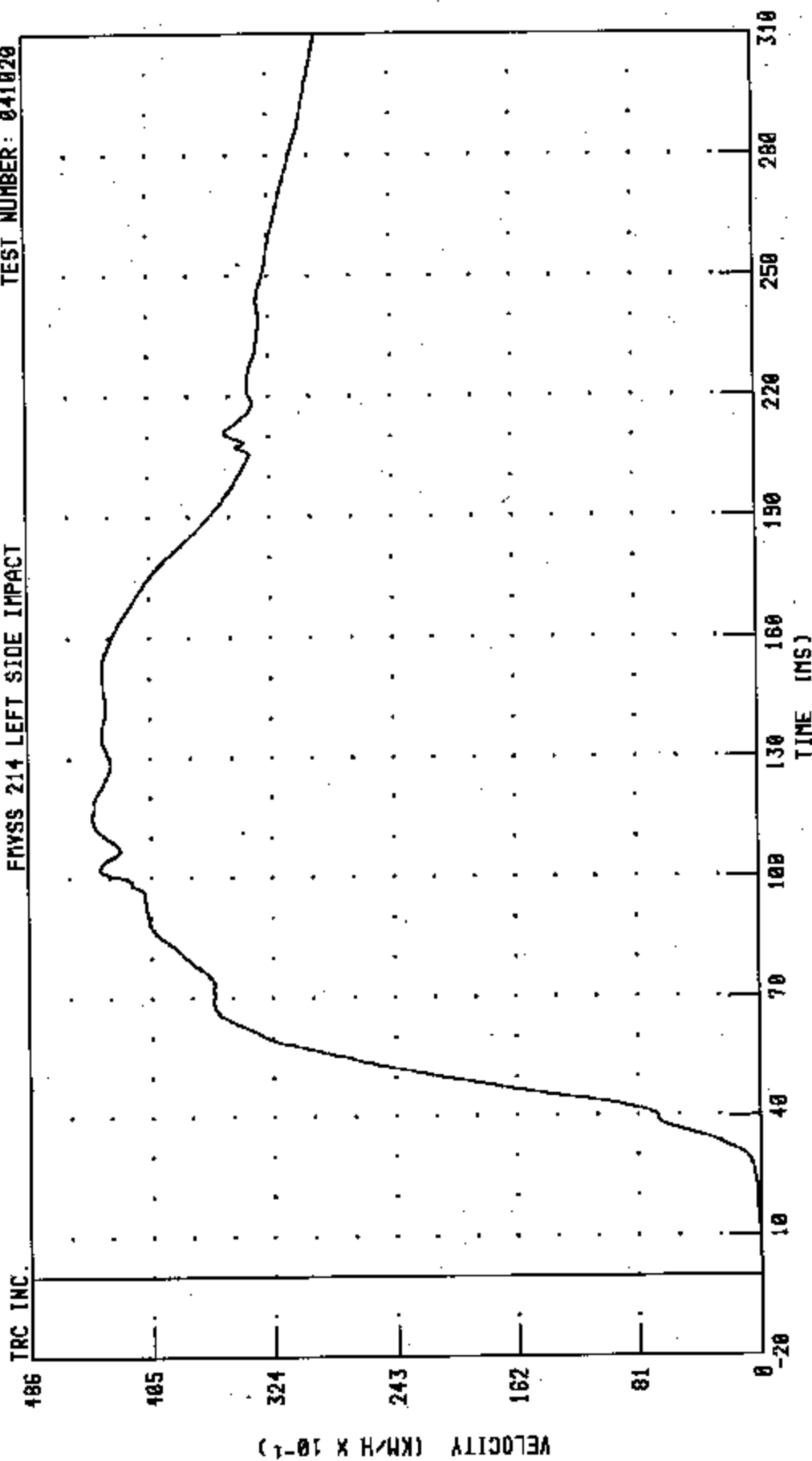


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

LEFT REAR PASSENGER UPPER RIB Y-AXIS VELOCITY

TEST NUMBER: 041020

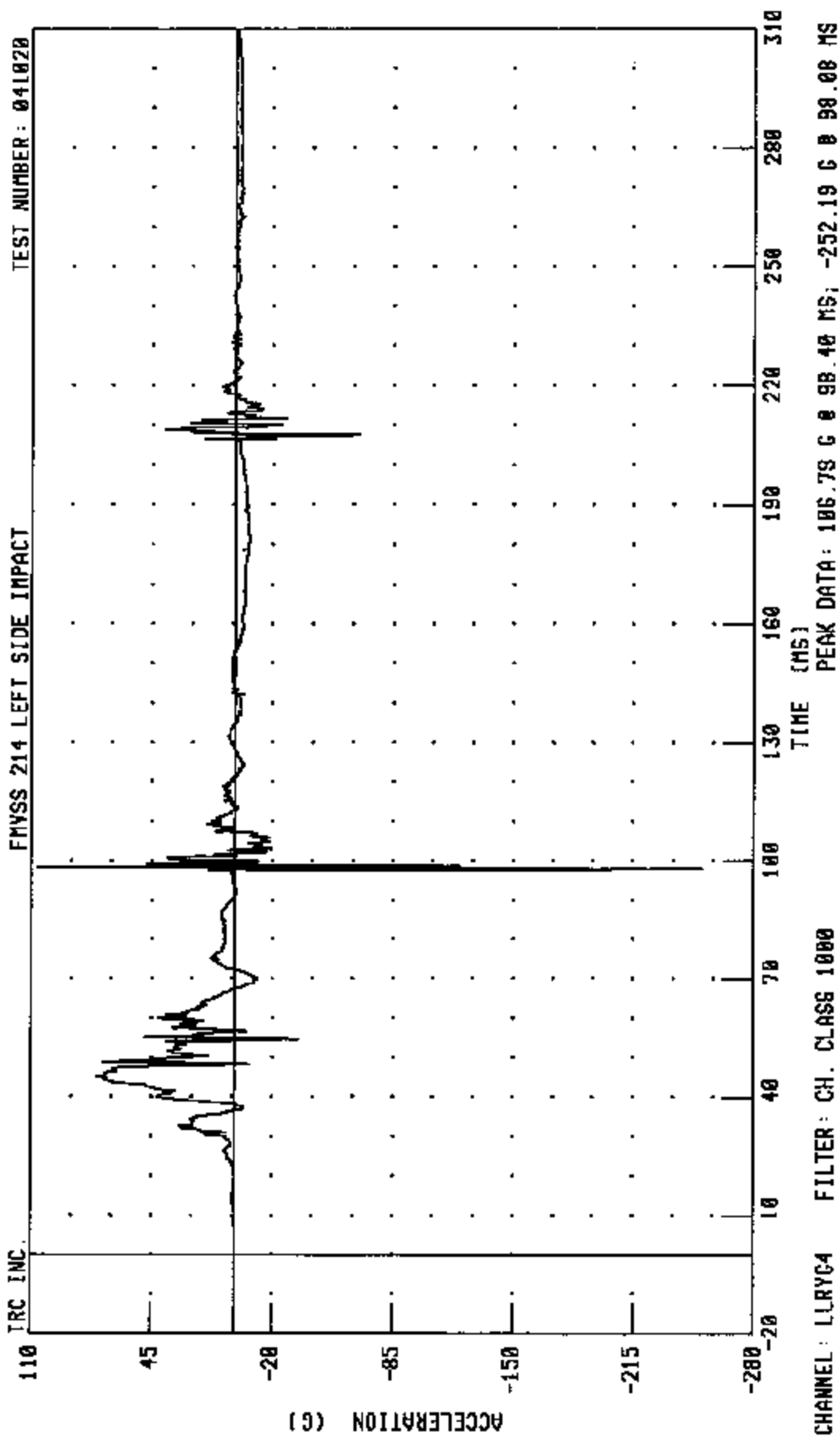
FNYS 214 LEFT SIDE IMPACT



CHANNEL: LURYV4 FILTER: CH. CLASS 180

PEAK DATA: 44.36 KM/H @ 115.28 MS, 0.00 KN/H @ 0.00 MS

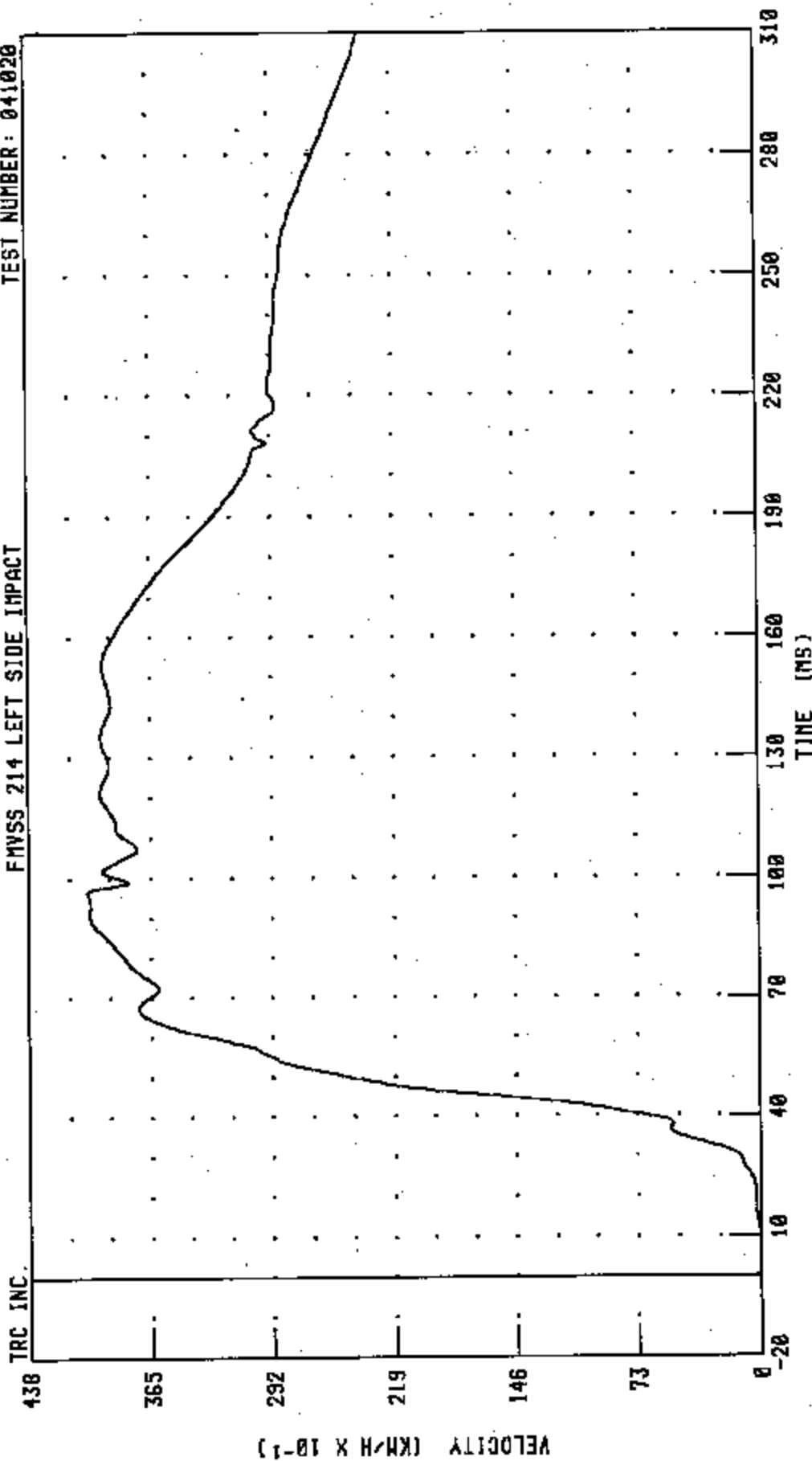
55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER LOWER RIB Y-AXIS ACCELERATION



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER LOWER RIB Y-AXIS VELOCITY

TEST NUMBER: 041020

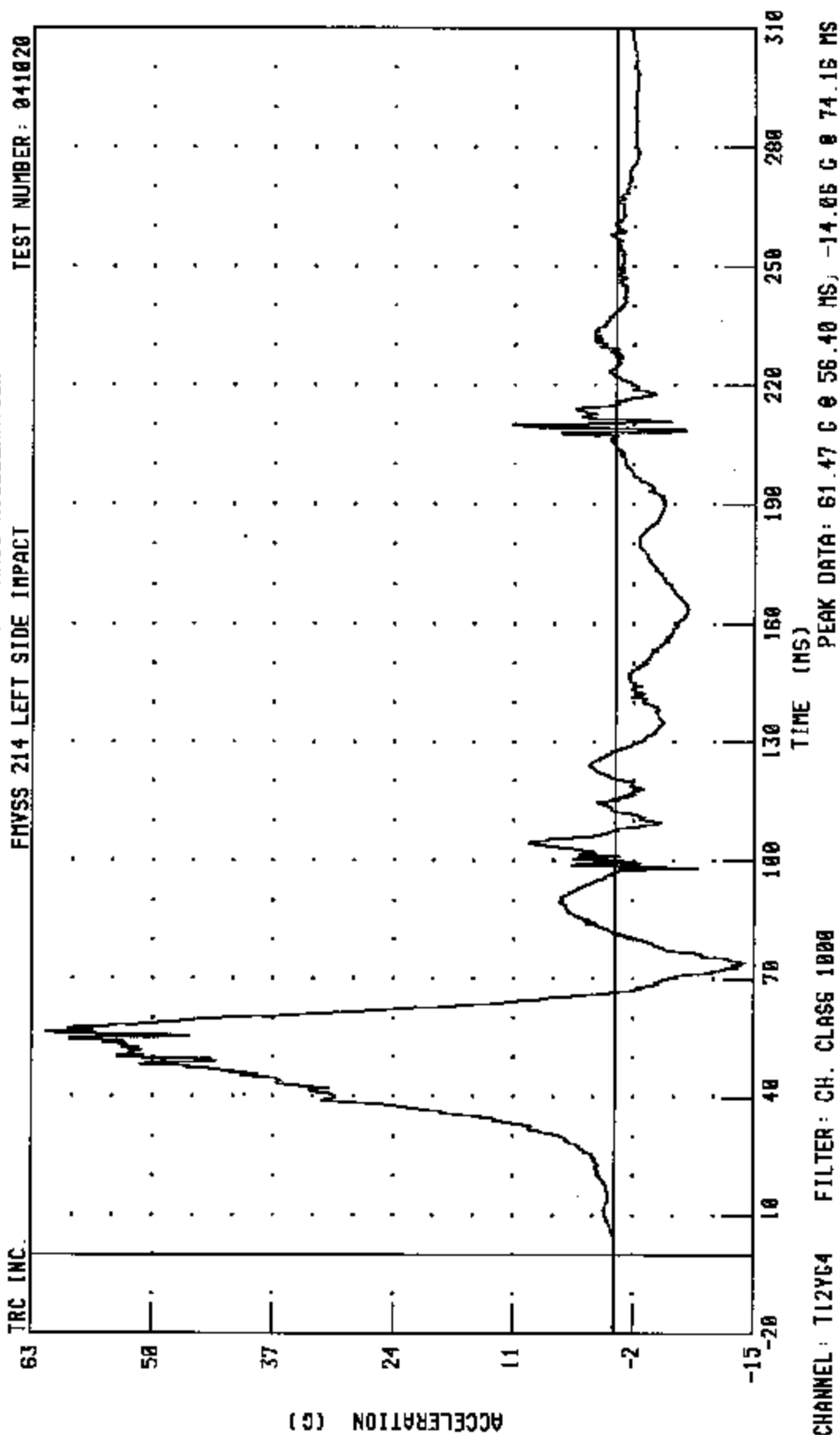
FMVSS 214 LEFT SIDE IMPACT



CHANNEL: LLRYV4 FILTER: CH. CLASS 180

PEAK DATA: 40.33 KM/H @ 96.72 MS; 0.00 KM/H @ 0.00 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER LOWER SPINE Y-AXIS ACCELERATION

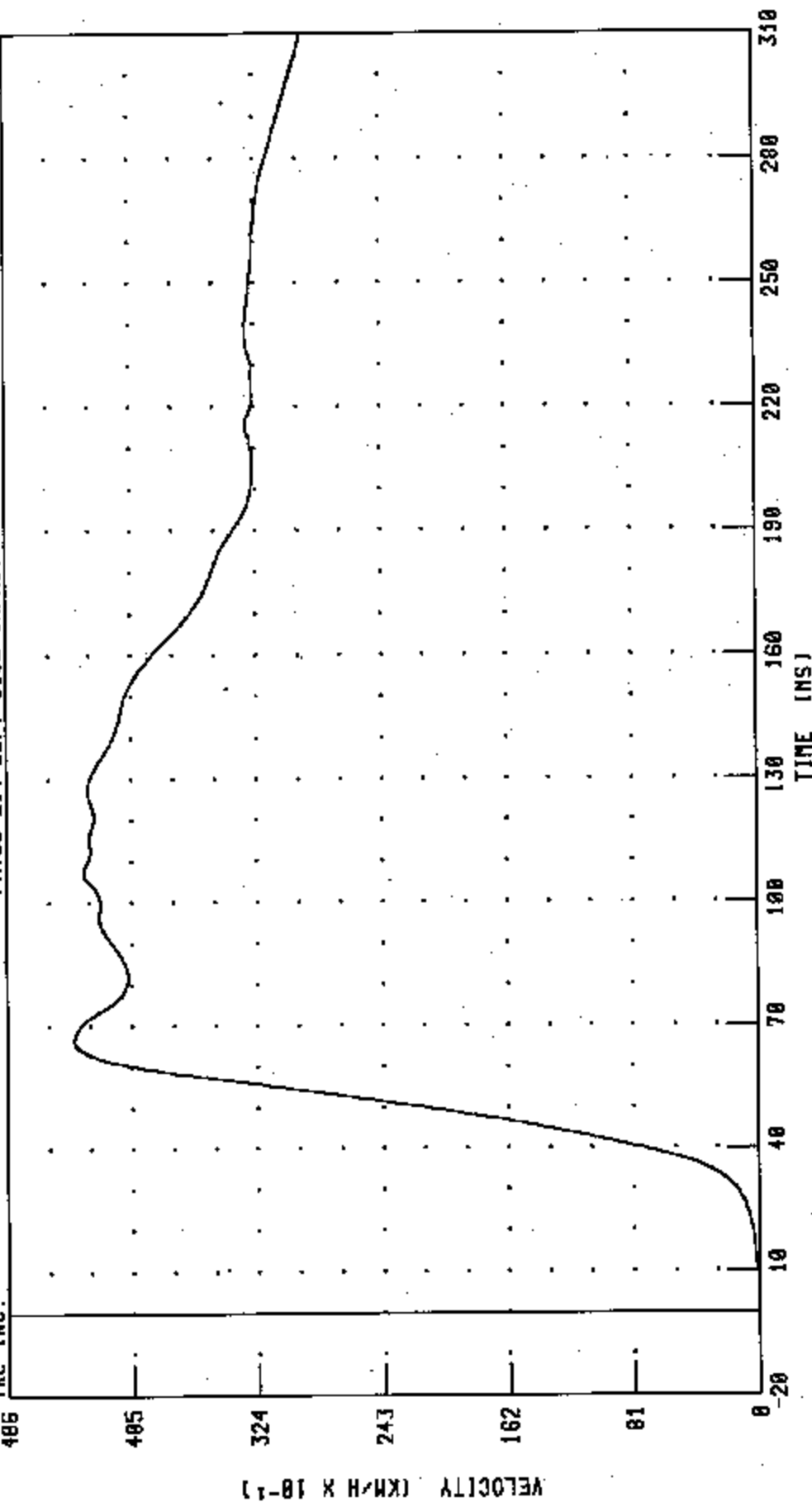


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER LOWER SPINE Y-AXIS VELOCITY

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

TRC INC.



CHANNEL: T12VY4 FILTER: CH. CLASS 180

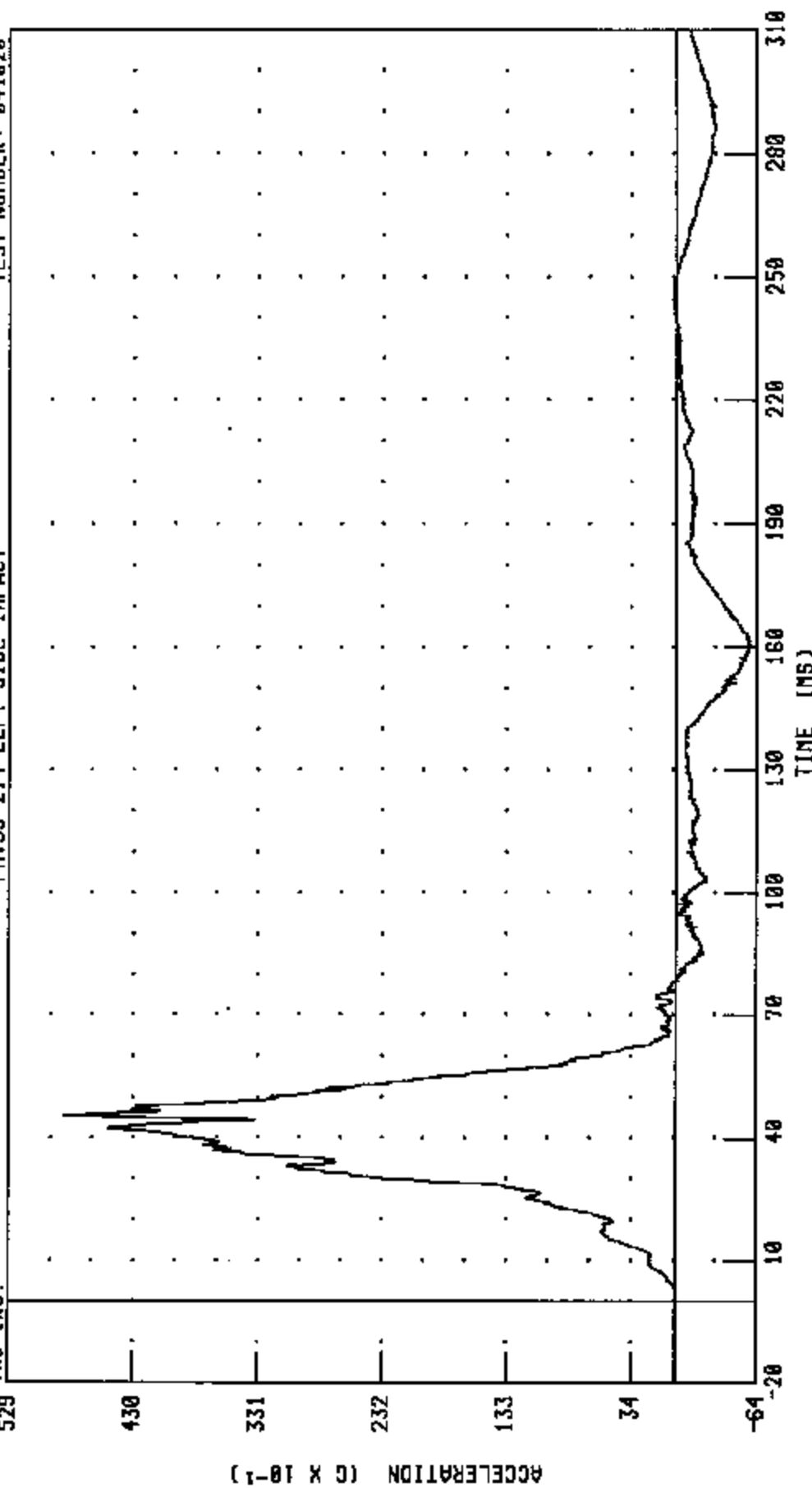
PEAK DATA: 44.27 KM/H @ 66.64 MS; 0.00 KM/H @ 0.00 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER PELVIS Y-AXIS ACCELERATION

TRC INC.

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: PEVYG4 FILTER: CH. CLASS 1000

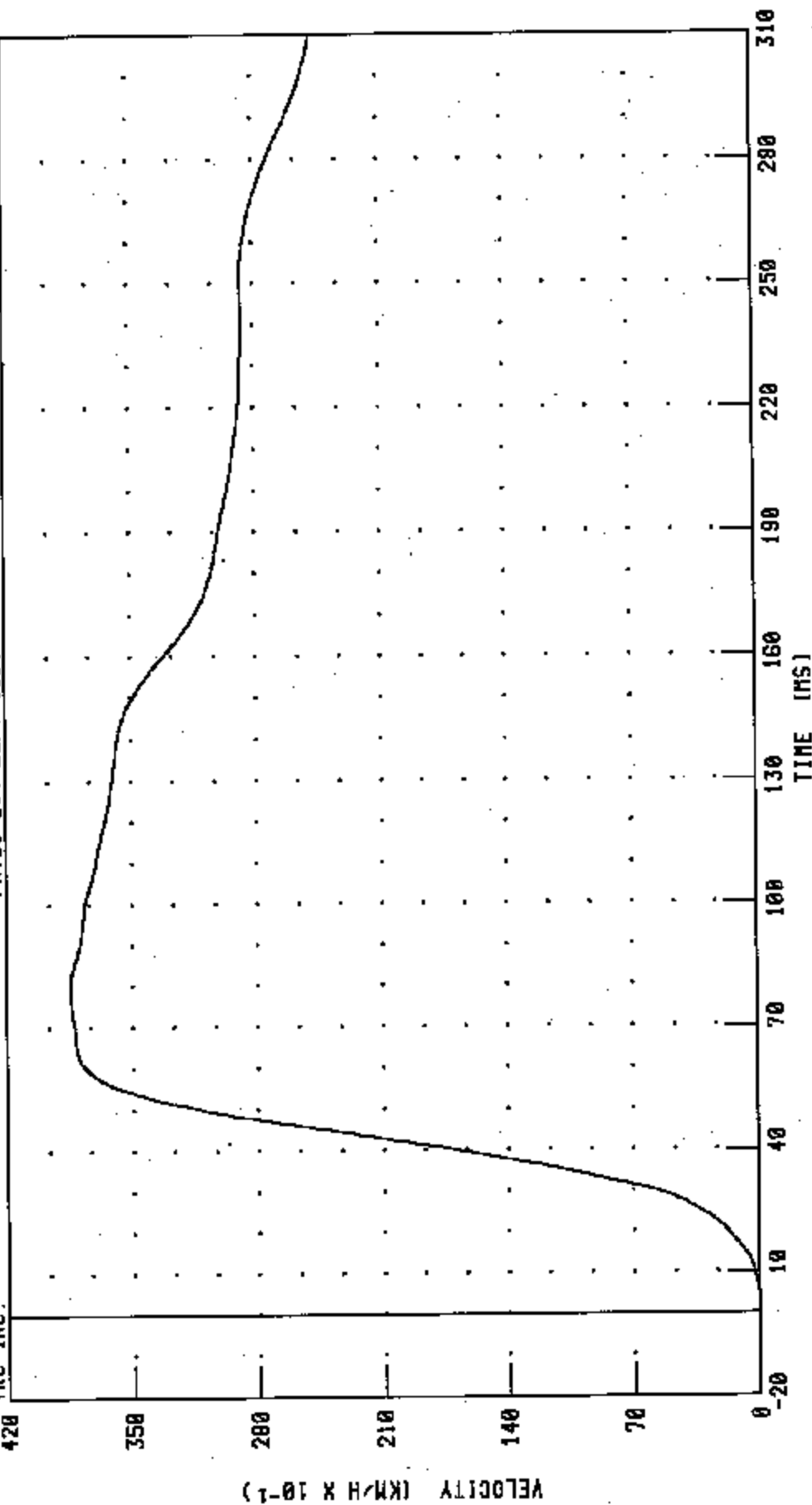
PEAK DATA: 48.55 G @ 45.68 MS; -5.82 G @ 159.92 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER PELVIS Y-AXIS VELOCITY

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

TRC INC.



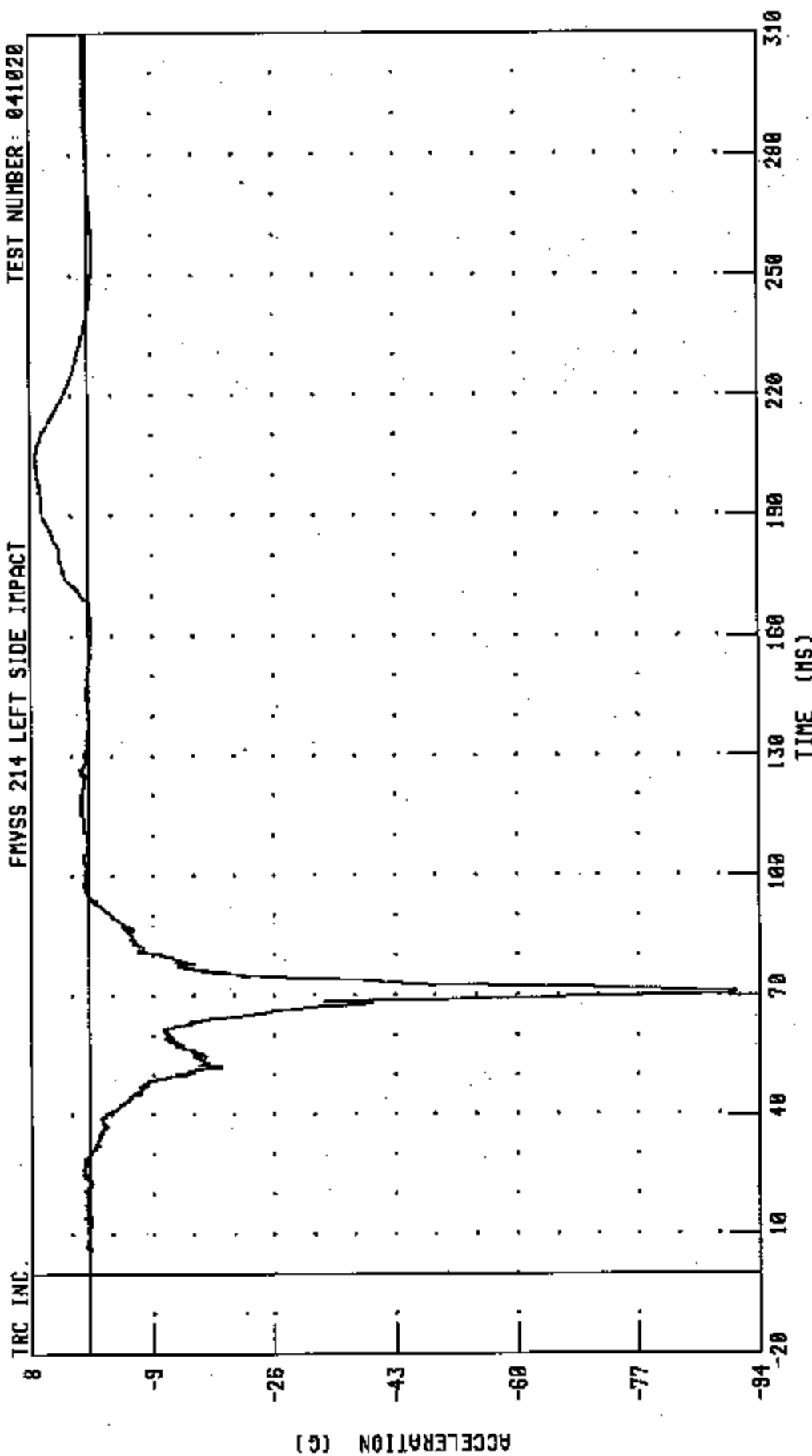
CHANNEL: PEVYV4 FILTER: CH. CLASS 100

PEAK DATA: 38.45 KM/H @ 78.48 MS; 0.00 KM/H @ 0.00 MS

Driver and Passenger Dummy Redundant Instrumentation Plots

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER HEAD X-AXIS REDUNDANT ACCELERATION
FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



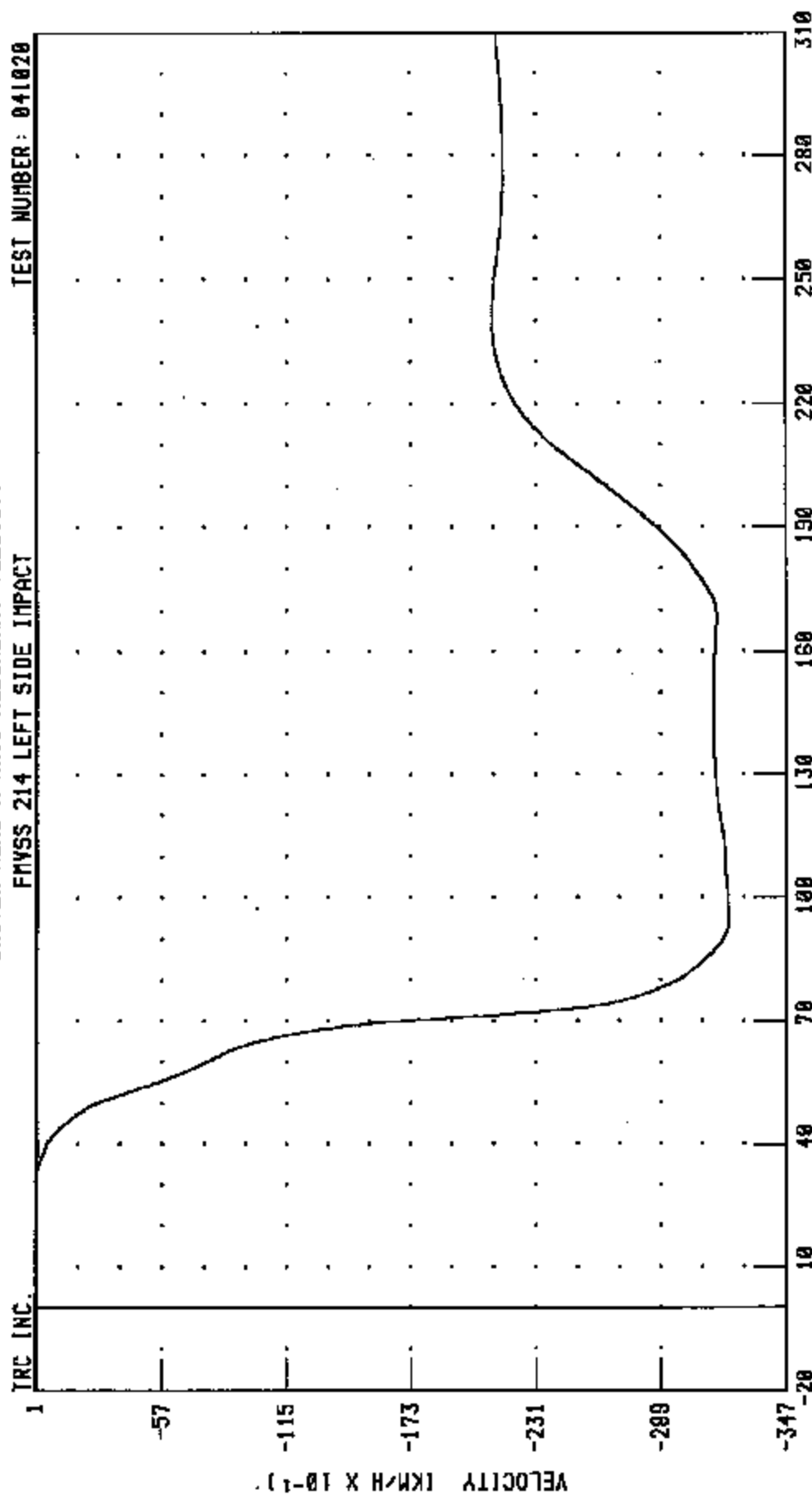
CHANNEL: HEDXR1 FILTER: CH. CLASS 1000

PEAK DATA: 7.33 G @ 203.52 MS, -90.71 G @ 70.80 MS

55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
 DRIVER HEAD X-AXIS REDUNDANT VELOCITY

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT



CHANNEL: HEDXVI FILTER: CH. CLASS 180

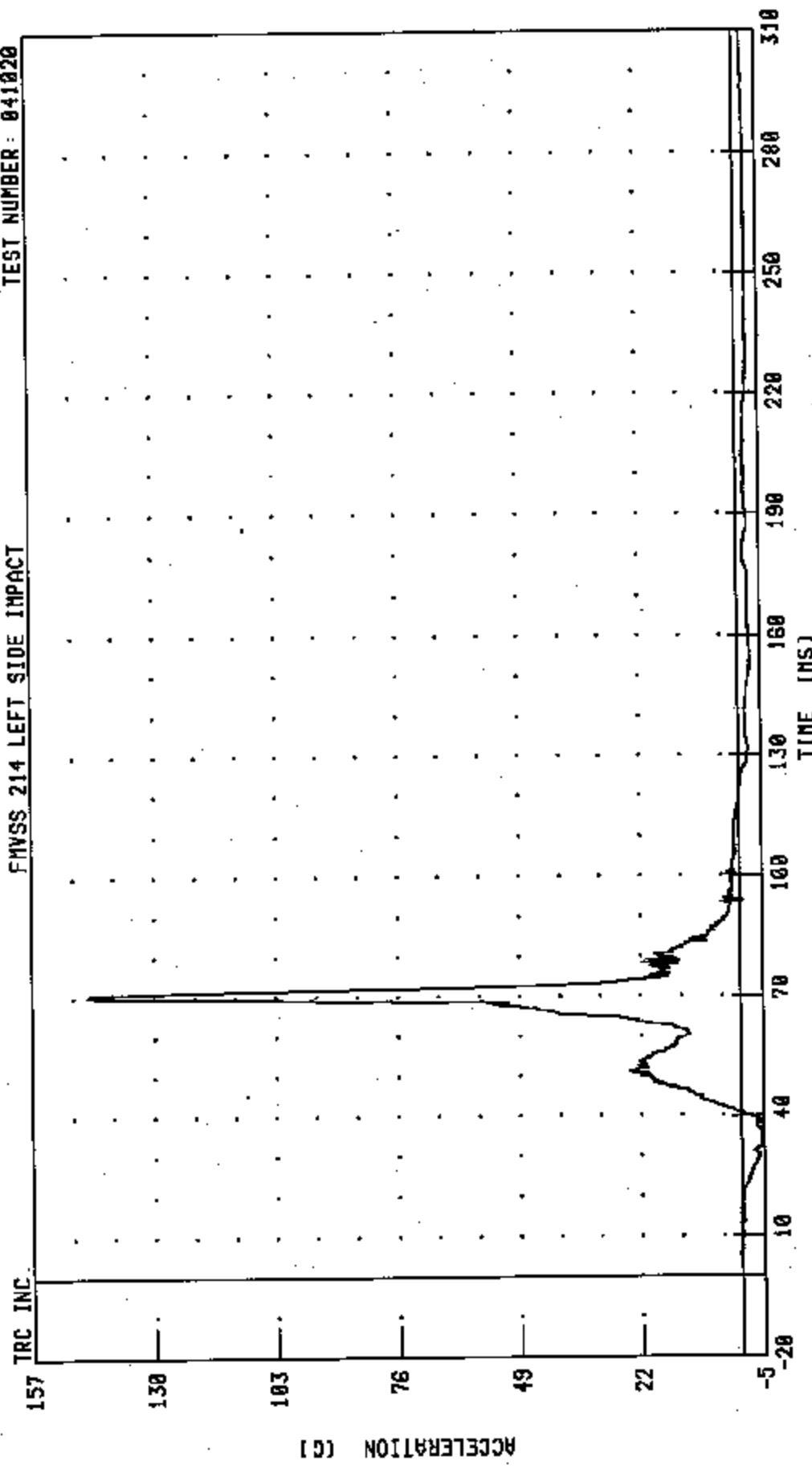
PEAK DATA: 0.12 KM/H @ 29.68 MS; -32.06 KM/H @ 95.12 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD Y-AXIS REDUNDANT ACCELERATION

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT



PEAK DATA: 145.03 G @ 70.40 MS, -4.62 G @ 32.64 MS

CHANNEL: HEDYR1 FILTER: CH. CLASS 1000

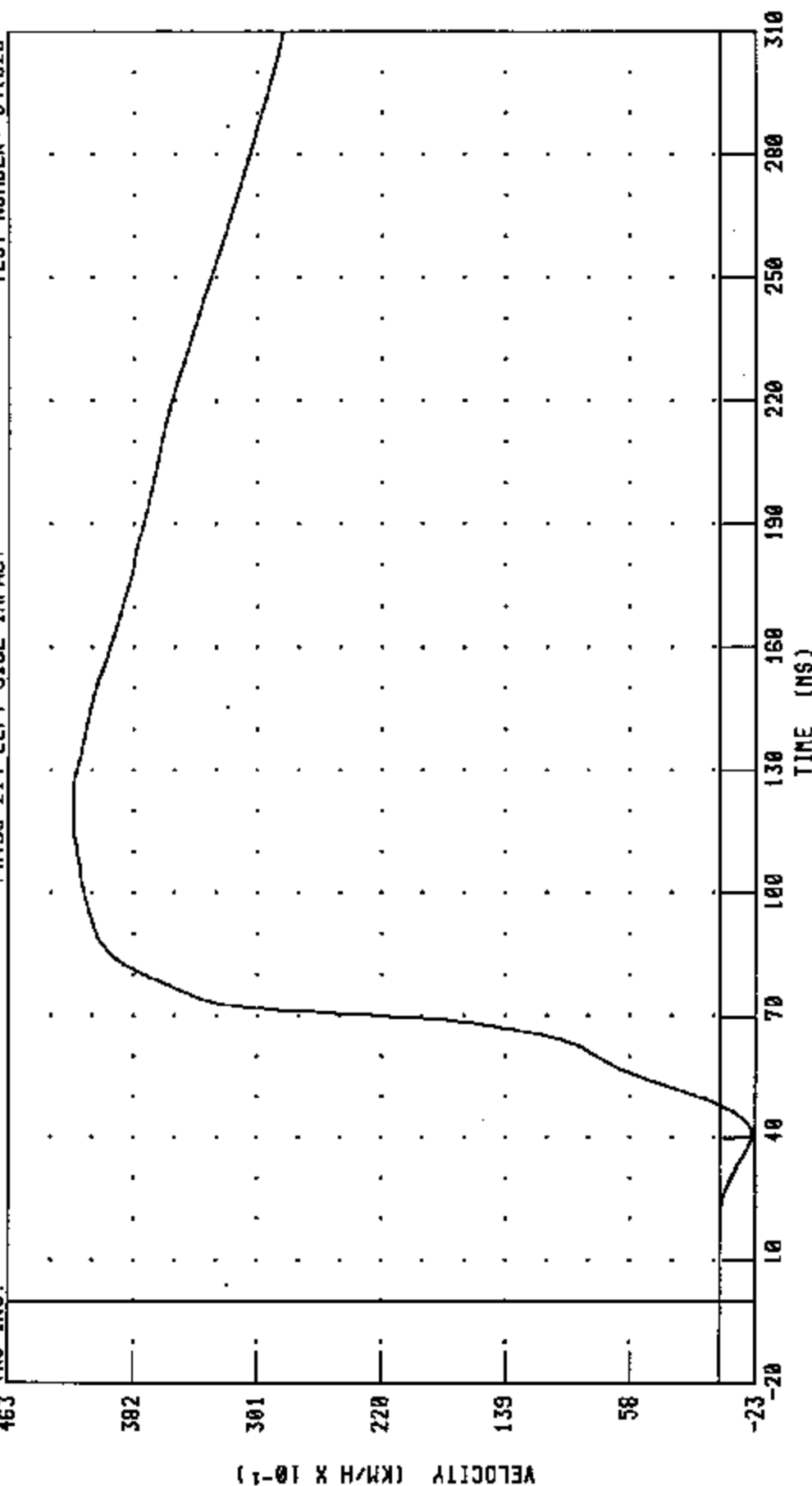
55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD Y-AXIS REDUNDANT VELOCITY

TRC INC.

FNVS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: HEDYVI FILTER: CH. CLASS 100

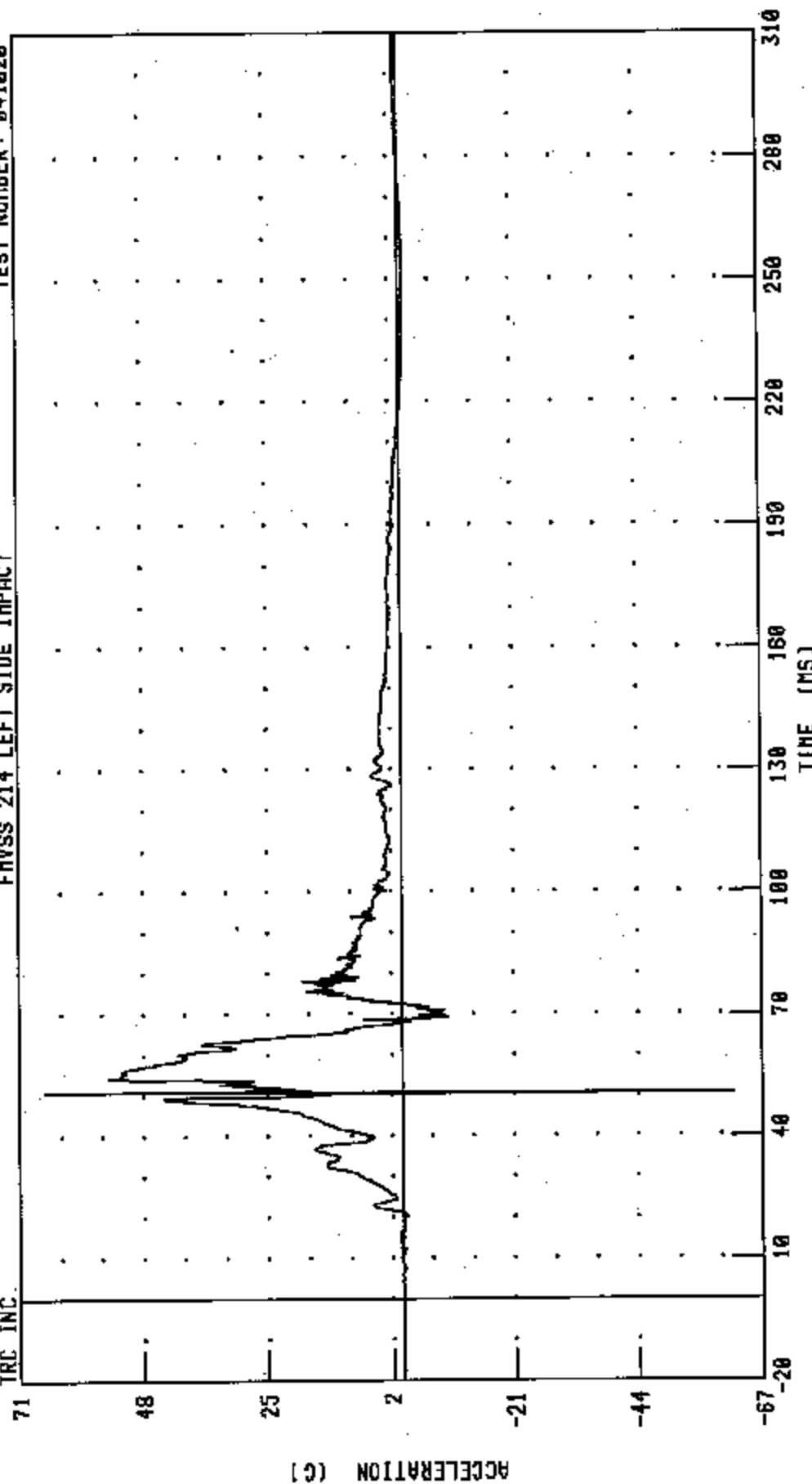
PEAK DATA: 42.15 KM/H @ 121.44 MS, -2.11 KM/H @ 40.80 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
 DRIVER HEAD Z-AXIS REDUNDANT ACCELERATION

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

TRC INC.



CHANNEL: HEDZR1 FILTER: CH. CLASS 1000

PEAK DATA: 66.26 G @ 51.04 MS, -61.76 G @ 50.72 MS

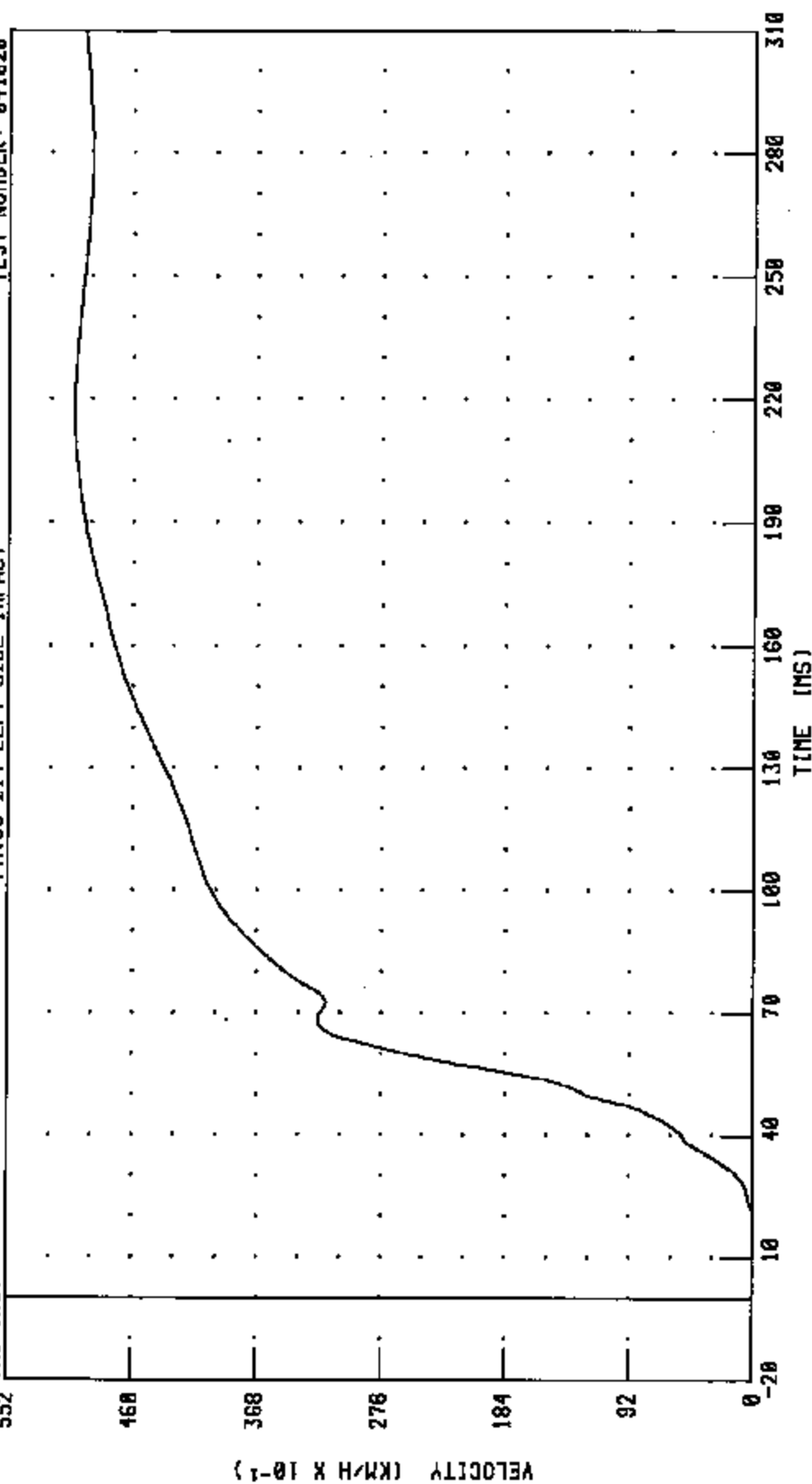
55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD Z-AXIS REDUNDANT VELOCITY

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT

TRC INC.



CHANNEL: HEDZVI FILTER: CH. CLASS 100

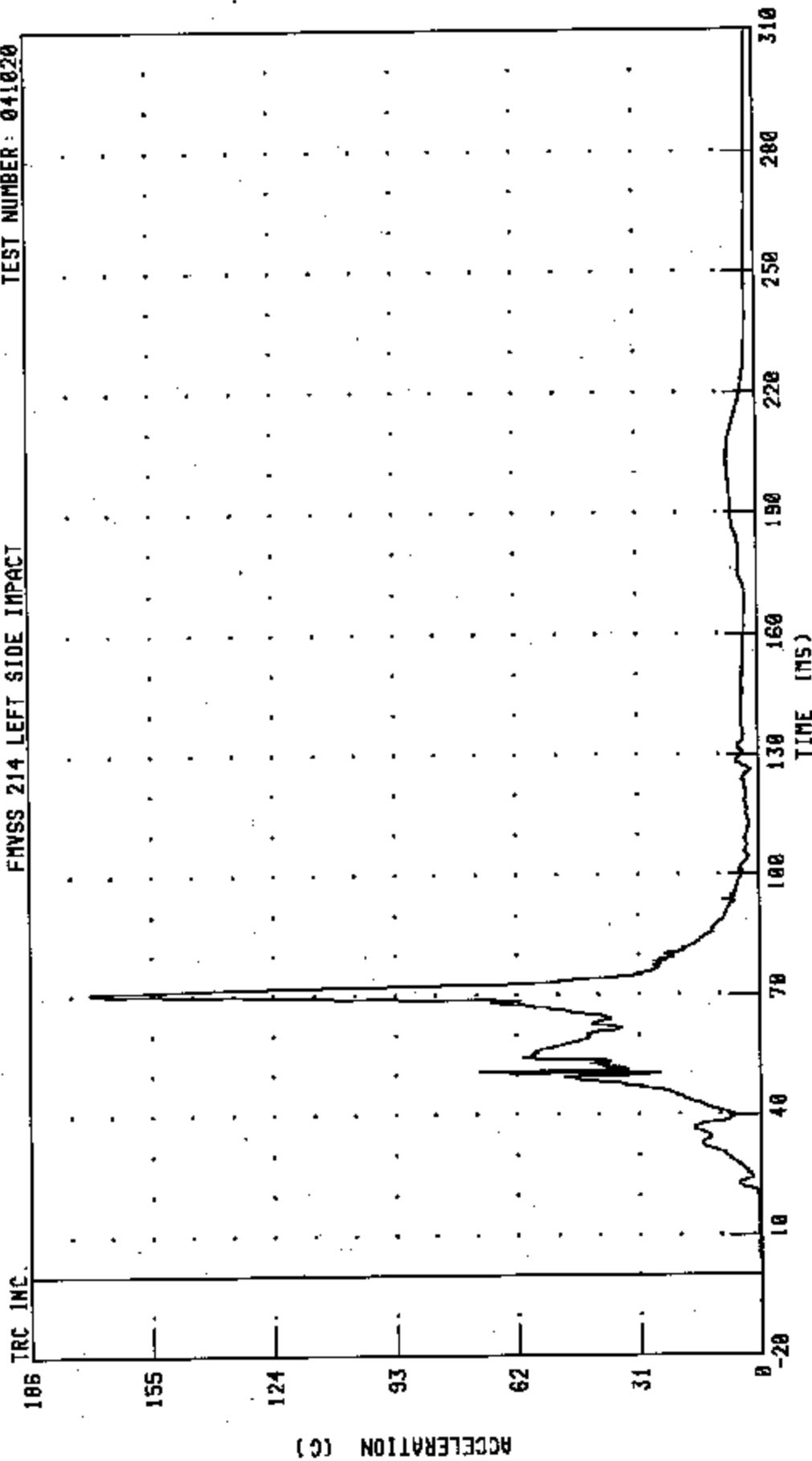
PEAK DATA: 50.40 KM/H @ 216.88 MS; -0.03 KM/H @ 21.04 MS

55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER HEAD RESULTANT REDUNDANT ACCELERATION

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: HEDR1 FILTER: CH. CLASS 1000

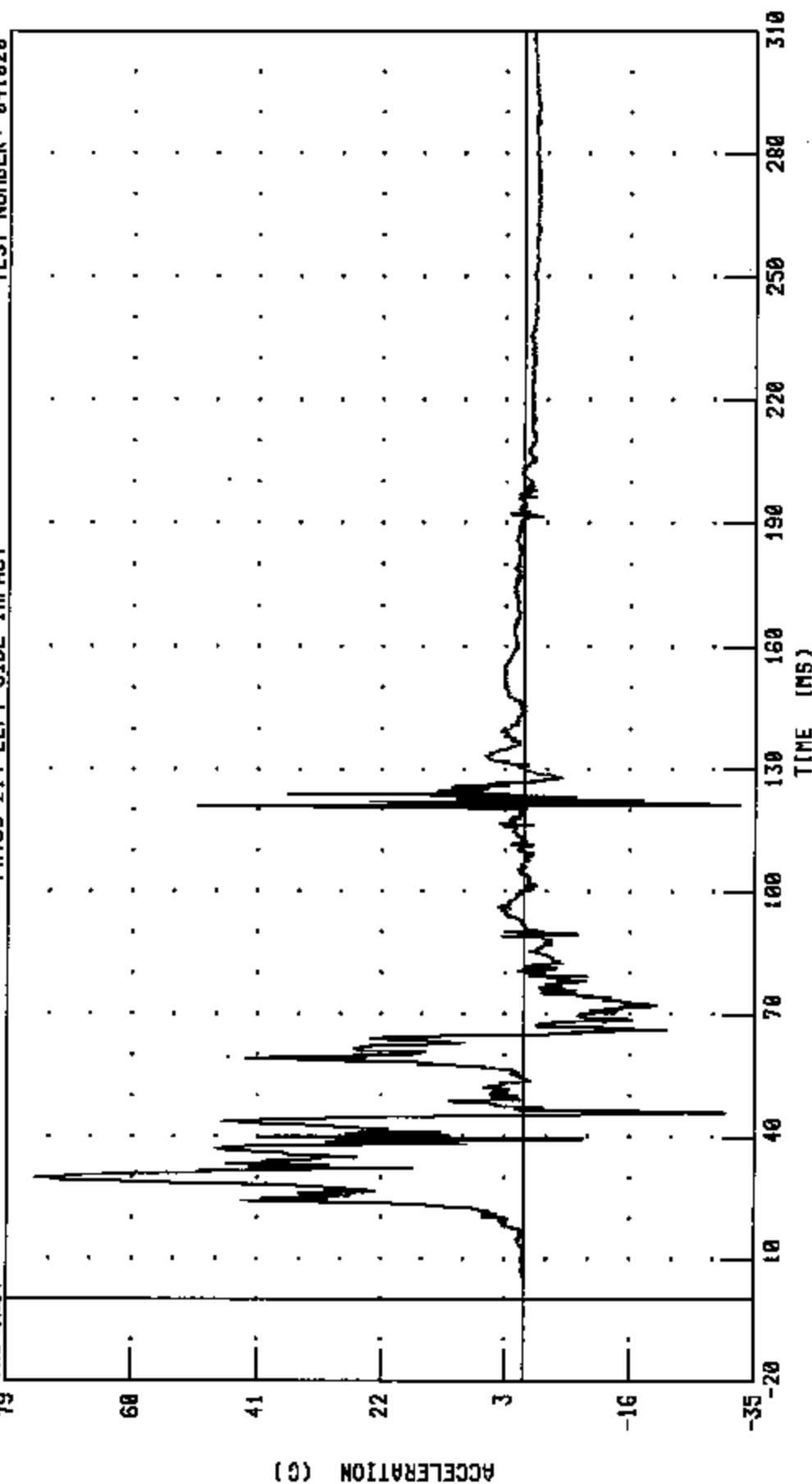
PEAK DATA: 170.87 G @ 70.72 MS, 0.01 G @ -19.84 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER UPPER RIB Y-AXIS REDUNDANT ACCELERATION

TEST NUMBER: 041020

FNVS 214 LEFT SIDE IMPACT

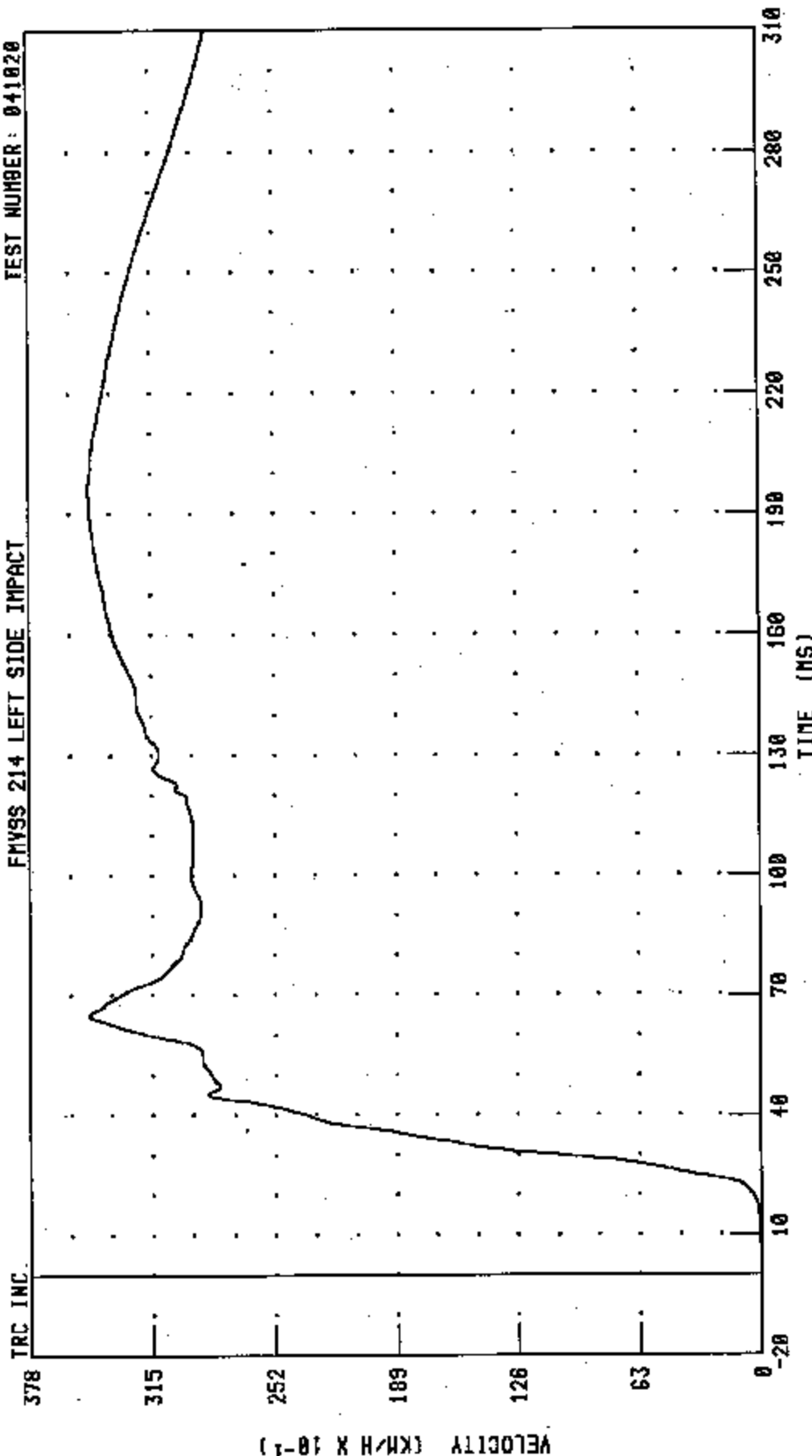
TRC INC.



55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER UPPER RIB Y-AXIS REDUNDANT VELOCITY

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT



CHANNEL: LURYVI FILTER: CH. CLASS 180

PEAK DATA: 34.75 KM/H @ 65.12 MS, 0.00 KM/H @ 0.00 MS

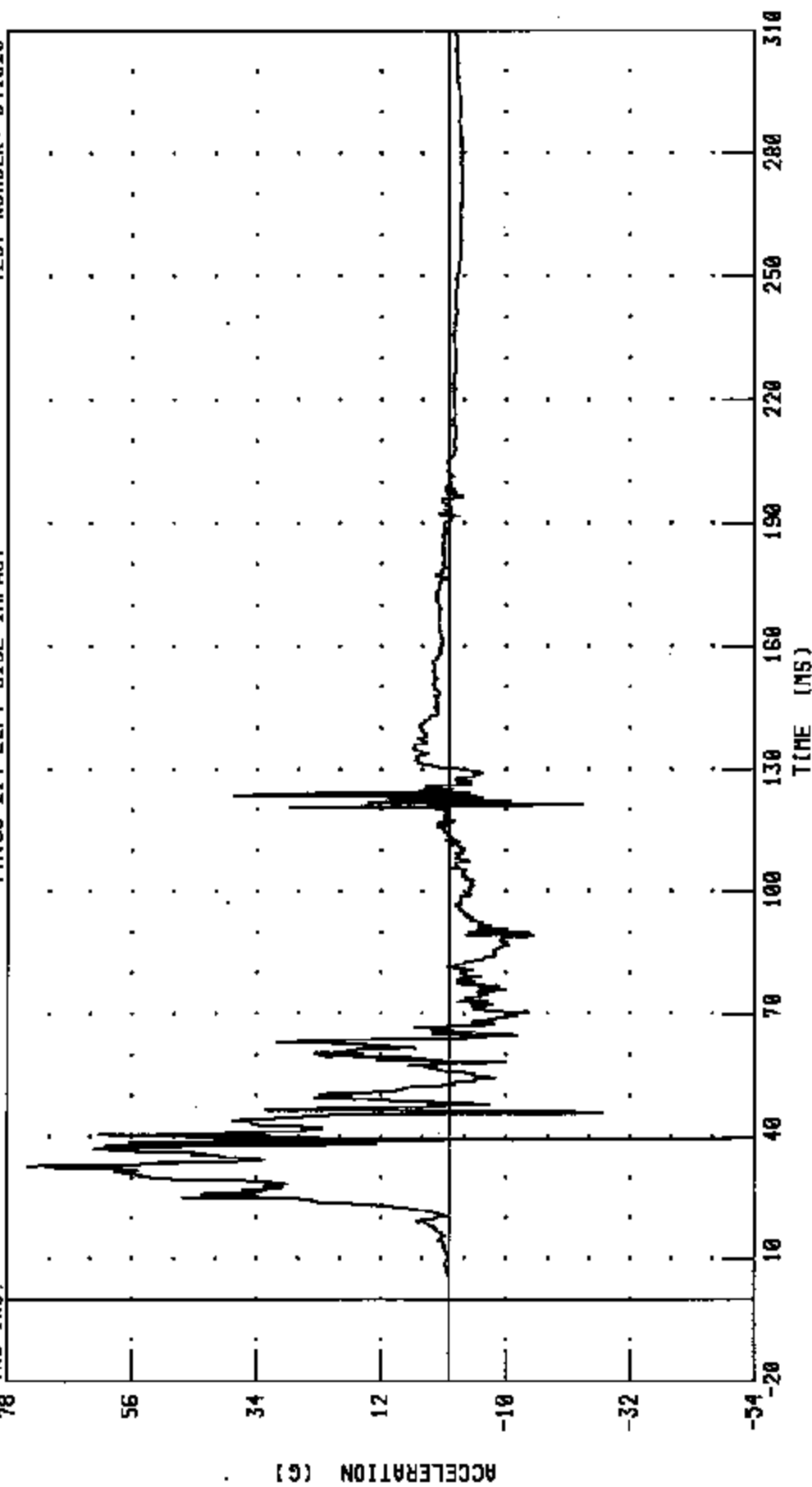
55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER LOWER RIB Y-AXIS REDUNDANT ACCELERATION

TRC INC.

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



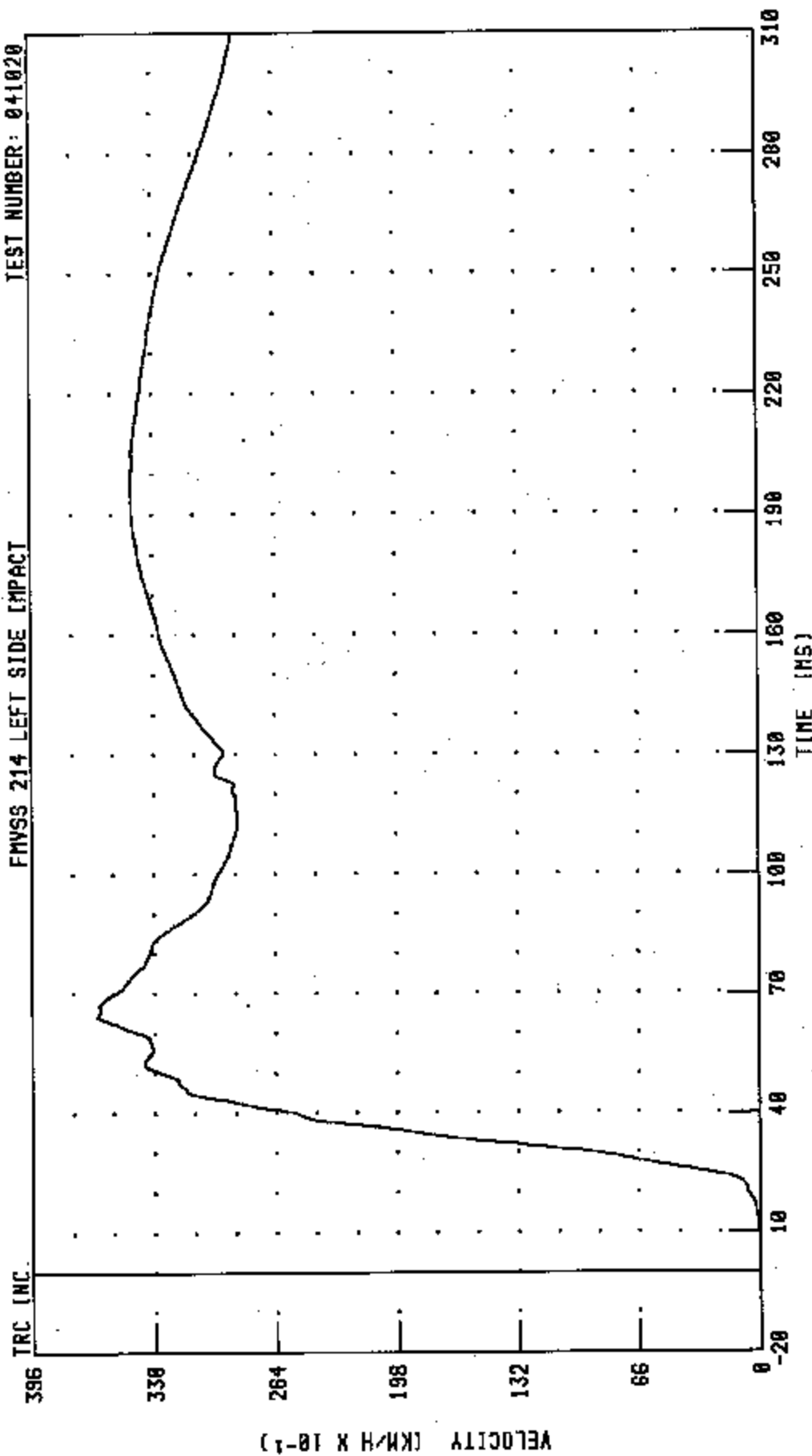
CHANNEL: LLRYR1 FILTER: CH. CLASS 1000

PEAK DATA: 74.48 G @ 33.04 MS, -49.65 G @ 39.52 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER LOWER RIB Y-AXIS REDUNDANT VELOCITY

TEST NUMBER: 041020

FMVSS 214 LEFT SIDE IMPACT



CHANNEL: LLRYVI FILTER: CH. CLASS 180

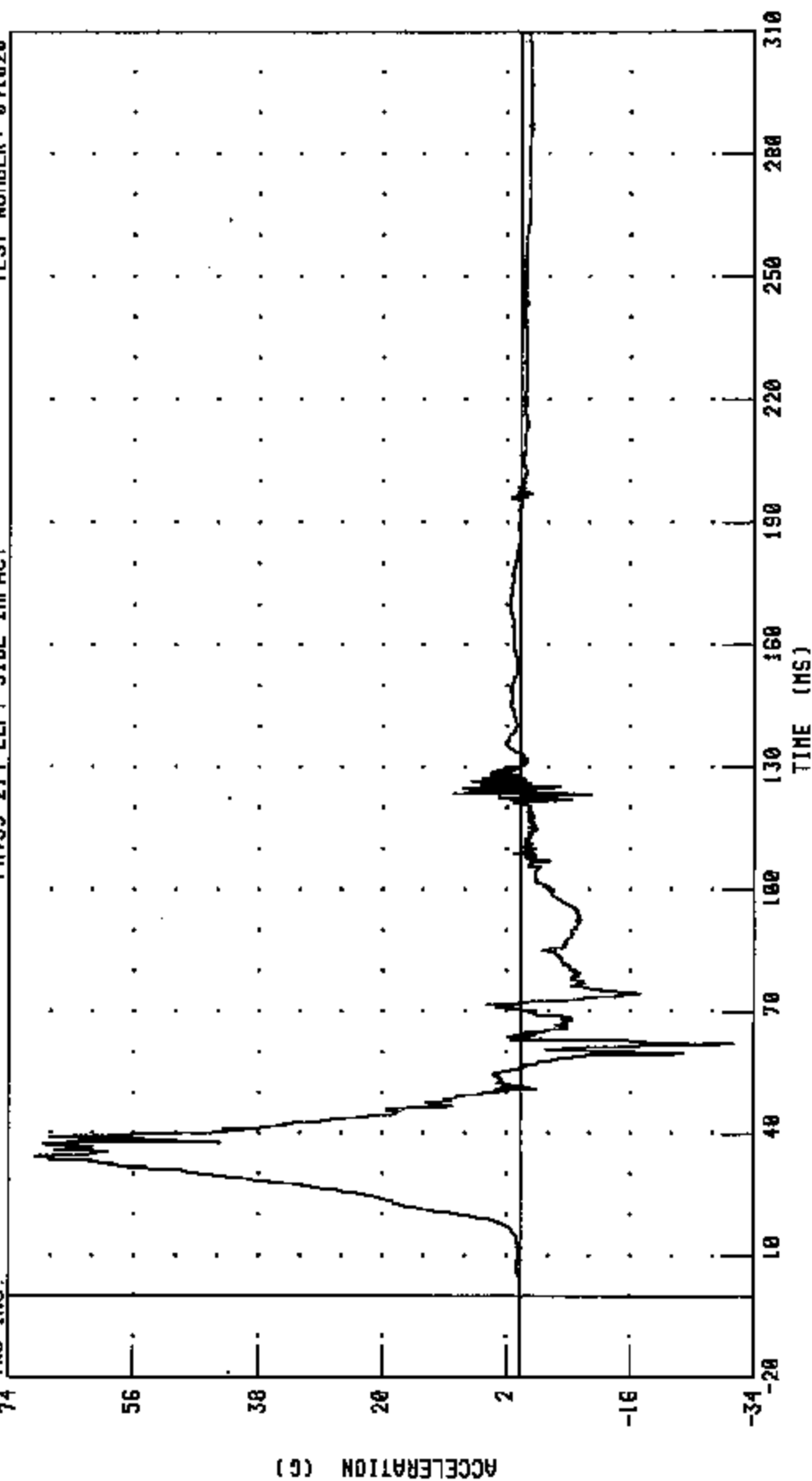
PEAK DATA: 36.07 KM/H @ 64.40 MS; 0.00 KM/H @ 5.04 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
DRIVER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION

TRC INC.

FNVS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



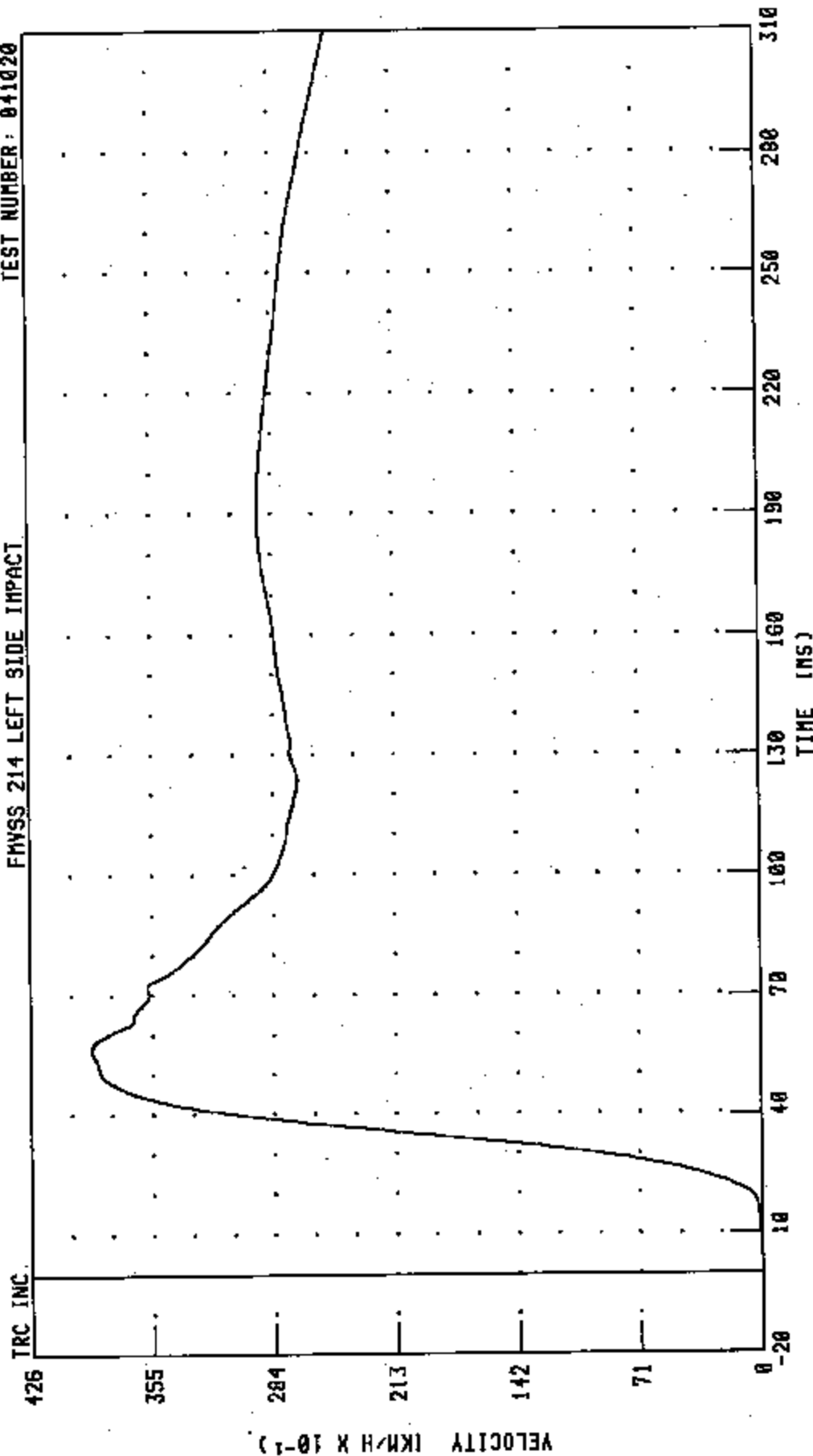
CHANNEL: T12YR1 FILTER: CH. CLASS 1000

PEAK DATA: 70.17 G @ 34.40 MS, -30.92 G @ 61.92 MS

55/20 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SECTION TC
 DRIVER LOWER SPINE Y-AXIS REDUNDANT VELOCITY

TEST NUMBER: 041020

FNYS 214 LEFT SIDE IMPACT



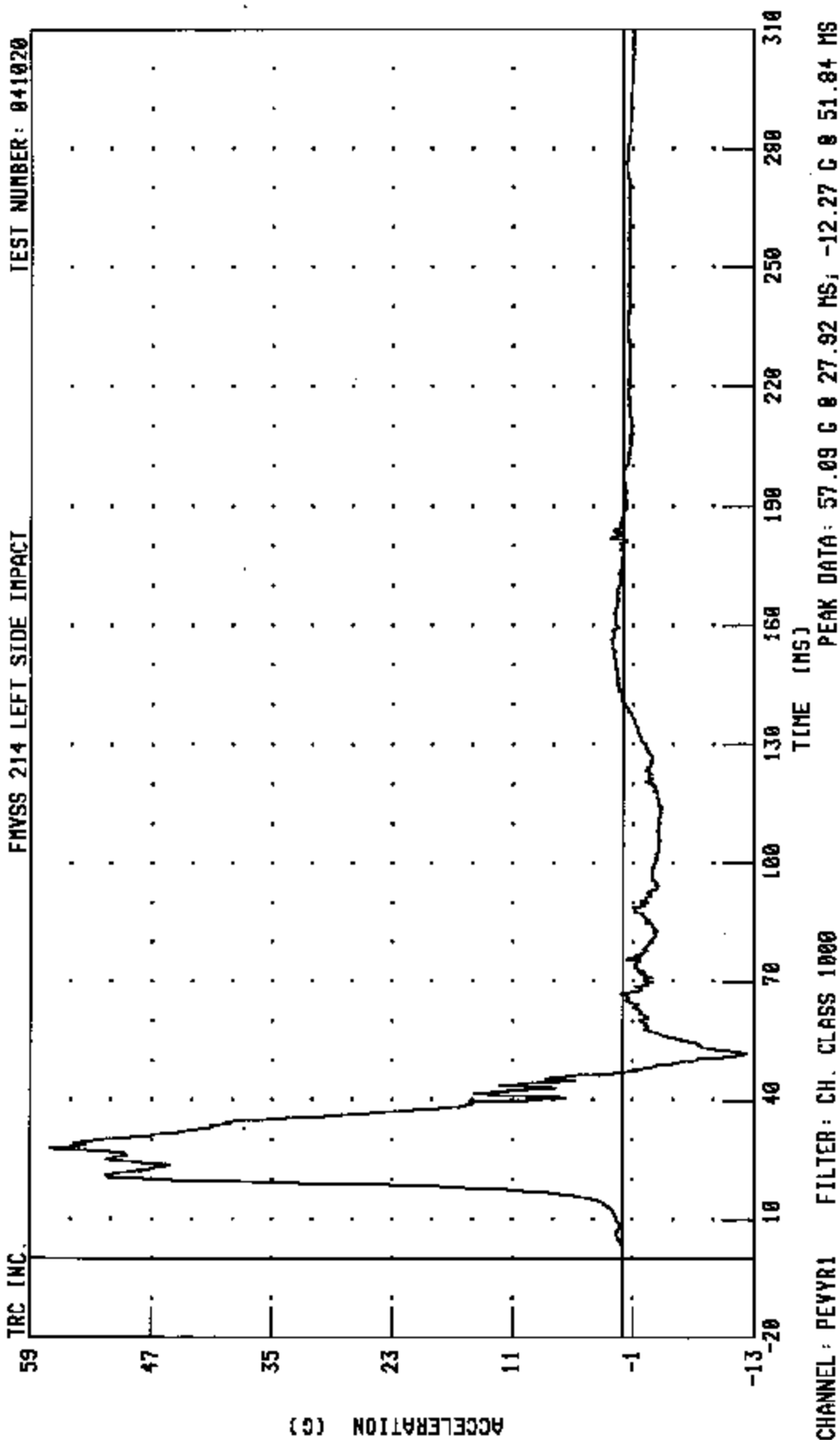
TIME (MS)

PEAK DATA: 39.01 KM/H @ 56.24 MS; 0.00 KM/H @ 0.00 MS

CHANNEL: T12YVI FILTER: CH. CLASS 180

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER PELVIS Y-AXIS REDUNDANT ACCELERATION

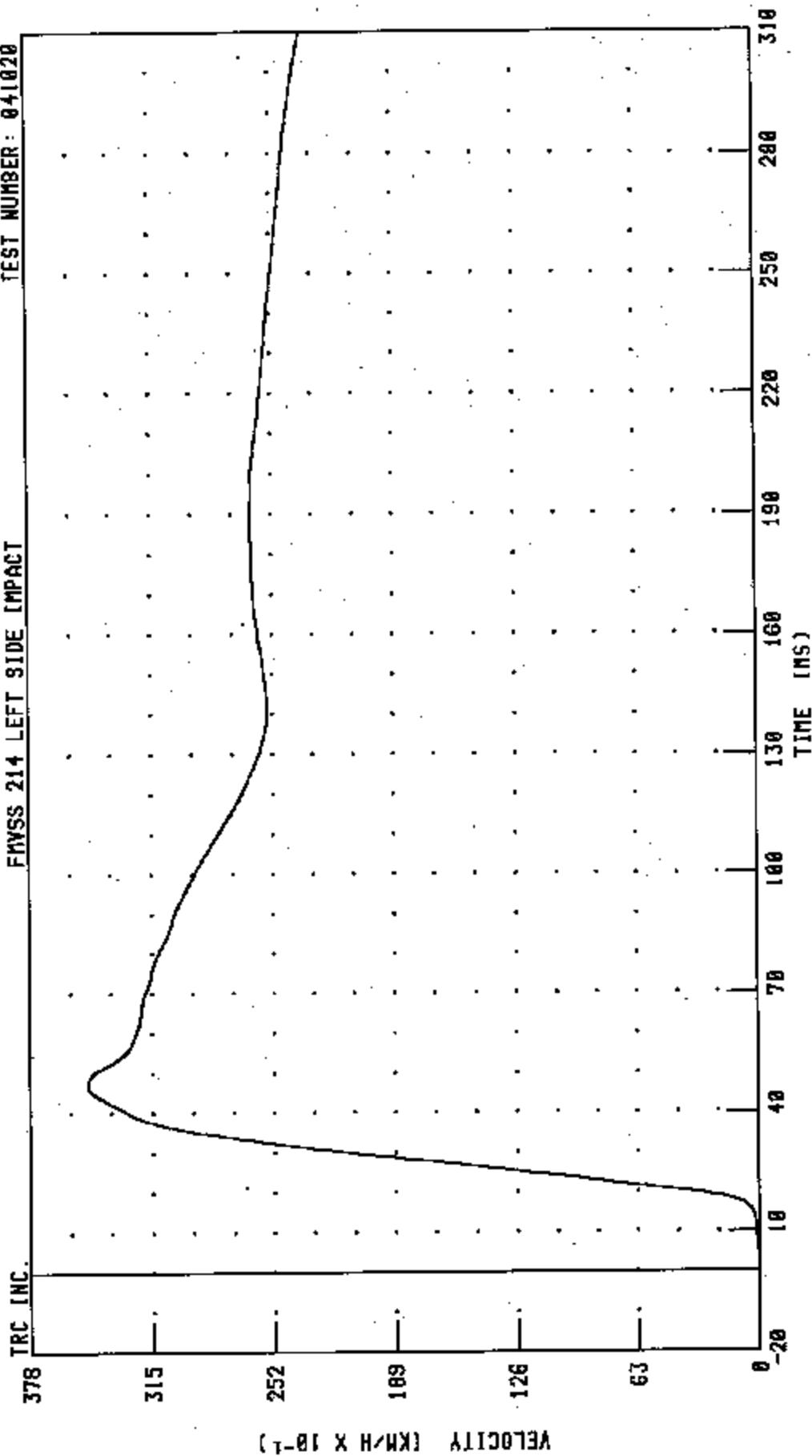


55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC

DRIVER PELVIS Y-AXIS REDUNDANT VELOCITY

FMVSS 214 LEFT SIDE IMPACT

TEST NUMBER: 041020



CHANNEL: PEVYVI FILTER: CH. CLASS 180

PEAK DATA: 34.85 KM/H @ 47.28 MS; 0.00 KM/H @ 0.00 MS

55/28 KPH 90 DEGREE SIDE IMPACT (MOVING DEFORMABLE BARRIER) INTO LEFT SIDE OF 2005 SCION TC
LEFT REAR PASSENGER HEAD X-AXIS REDUNDANT ACCELERATION

