

Report Number: 201-EXI-2003-001

**Safety Compliance Testing
for FMVSS 201
Rigid Pole Side Impact Test**

**General Motors Corporation
2002 Saturn Vue Sport Utility Vehicle
NHTSA Number C20110**

**Prepared By:
Exponent Failure Analysis
Test and Engineering Center
1850 West Pinnacle Peak Road
Phoenix, Arizona 85027**



March 14, 2003

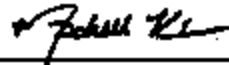
Final Report

**Prepared for:
U.S. Department of Transportation
National Highway Traffic Safety Administration
Office of Vehicle Safety Compliance (NSA-30)
400 Seventh Street, S.W., Room 6111
Washington, DC 20590**

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-01-D-11033.

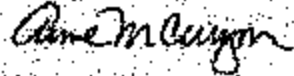
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Report Prepared By:


_____, Senior Engineer
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Exponent® Failure Analysis

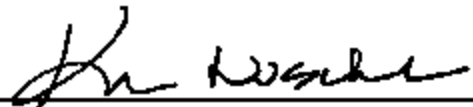
Date January 10, 2003

Report Approved By:


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Date January 10, 2003

Final Report Accepted By:



Contracting Officer's Technical Representative (COTR),
NHTSA, Office of Vehicle Safety Compliance

Date April 4, 2003

Technical Report Documentation Page

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16. Abstract A rigid pole side impact test was conducted on a 2002 Saturn Vue Sport Utility Vehicle in accordance with FMVSS 201, "Occupant Protection in Interior Impact", S6.1(b)(3) and the Office of Vehicle Safety Compliance Test Procedure No. TP-201P-02 "Rigid Pole Side Impact Test." The test was conducted by the Exponent Test and Engineering Center in Phoenix, Arizona, on October 25, 2002. The impact velocity of the vehicle was 28.5 kph, and the ambient temperature at the driver side of the vehicle at the time of impact was 22.2°C. The post-test maximum crush was 436 mm at level 3. The test vehicle's performance follows: HIC Required: <1000 Measured: 532.5 Test Failures: None The doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.		
17. Key Words Compliance Testing Rigid Pole Side Impact Test FMVSS 201	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Adm. Technical Information Services (TIS) Room 5108 (NPO-230) 400 Seventh Street, S.W. Washington, DC 20590 Telephone No. (202) 366-4946	
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Section 1 -- Purpose and Test Procedure

This side impact test is part of the FMVSS 201 "Occupant protection in interior impact" compliance test program sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract No. DTNH22-01-D-11033. The purpose of this test was to evaluate the dynamic head protection system in a 2002 Saturn Vue Sport Utility Vehicle. The rigid pole side impact test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-201P-02, dated October 21, 2001).

Section 2 – Summary of Rigid Pole Side Impact Test

A rigid pole side impact test was conducted on a 2002 Saturn Vue Sport Utility Vehicle. The subject vehicle was towed into the rigid pole at a velocity of 28.5 kph. The test was conducted by the Exponent Test and Engineering Center in Phoenix, Arizona, on October 25, 2002. Pre-test and post-test photographs of the test vehicle and the side impact dummy (SID/HIII) are included in Appendix A of this report.

One SID/HIII was placed in the left front outboard designated seating position according to instructions specified in TP-201P-02 dated October 21, 2001. The side impact event was documented by 13 cameras. Camera locations and other pertinent camera information are included in this report.

The SID/HIII was instrumented with the following accelerometers:

1. Head CG triaxial accelerometers
2. Upper neck 6 channel load cell (X, Y and Z force and moment)
3. Left Upper Rib (LUR) uniaxial accelerometer (Y-direction)
4. Left Lower Rib (LLR) uniaxial accelerometer (Y-direction)
5. Lower Thoracic Spine (T₁₂) uniaxial accelerometer (Y-direction)
6. Pelvic (PEV) section uniaxial accelerometer (Y-direction)

Appendix B contains the vehicle and dummy response data traces. A summary of the side impact dummy (SID/HIII) configuration and performance verification test data is shown in Appendix C. Dummy and vehicle calibration data can be found in Appendix D of this report.

The following table summarizes the results of the test.

Injury Criteria	Front SID/HIII
HIC (# 1000)	532.5
TTI (g)*	53.07
Pelvic (g)*	51.5
Neck X Force (N)*	230.5**
Neck Y Force (N)*	581.1
Neck Z Force (N)*	996.1
Neck Moment X (N-m)*	-65.1
Neck Moment Y (N-m)*	17.4**
Neck Moment Z (N-m)*	-10.5

*Information purposes only

**Data spike recorded that affects the maximum value, refer to page 2-2

Data Acquisition Explanations

Data spike recorded or A/D saturation that affects the maximum and/or minimum value (and corresponding resultant calculation if applicable) for the following channels:

Driver ATD Neck Force (Fx)
Driver ATD Neck Moment (My)
Driver ATD Upper Rib Acceleration (Ay)
Driver ATD Lower Rib Acceleration (Ay)
Left A-Pillar Sill (Ay)
Left A-Pillar Sill (Vy)
Left A-Pillar Low (Ay)
Left A-Pillar Low (Vy)

Data spikes recorded that do not affect the maximum and/or minimum value or the following channels:

Driver ATD Head Acceleration (Ax)
Driver ATD Head Velocity (Vx)
Driver ATD Head Resultant Acceleration (Ar)
Driver ATD Neck Force (Fy)
Driver ATD Neck Force (Fz)
Driver ATD Neck Moment (Mx)
Driver ATD Lower Spine Acceleration (Ay)
Driver ATD Pelvis Acceleration (Ay)
Vehicle Tunnel Near C.G. – Yaw Rate

Channel Failure:

Left A-Pillar Mid (Ay)
Rear Deck Acceleration (Ay)
Vehicle Tunnel Near C.G. (Ay)
Primary Trigger – backup trigger used resulting in a 16 msec time shift.

Section 3 – Vehicle Test Data Summary

Data Sheet 1 – General Test Vehicle Parameter Data

Data Sheet 2 – Test Vehicle Summary of Results

Data Sheet 3 – Post Test Observations

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Model Year/Make/Model: 2002 Saturn Vue
Body Style/Color: 4-door Sport Utility Vehicle/Black VIN: 5GZCZ63BX2S804900
NHTSA No.: C20110 Build Date: 1/02
Engine Data: 6 Cylinders CID 3.0 Liter cc
Placement: longitudinal X lateral
Transmission: 5 speeds manual X automatic X overdrive
Final Drive: rear wheel drive front wheel drive X four wheel drive
Odometer Reading: 256 km.
Options: X A/C; X pwr. steering X pwr. brakes X pwr. windows

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): 210 kpa Front 210 kpa Rear
Recommended Tire Size: P235/65R16
Tires on Vehicle: P235/65R16 Mfr.: Bridgestone

VEHICLE CAPACITY DATA:

Number of Occupants: 2 front 3 rear 5 Total
Type of Front Seat(s): X buckets bench split bench
Type of Front Seat Back: Fixed X adjustable with: X lever knob
Vehicle Maximum Capacity Loading = 378 kg. (A)
Number of Occupants X 68.04 kg. = 340 kg. (B)
Vehicle Cargo Capacity (A-B) = 38 kg.

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA (CONTINUED)

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Right Front = 458 kg. Right Rear = 332 kg.

Left Front = 475 kg. Left Rear = 340 kg.

Total Front = 933 kg. Total Rear = 672 kg.

Total Weight = 1605 kg.

Percent of Total Weight: Percent Front = 58 Percent Rear = 42

CALCULATION OF TEST VEHICLE TARGET WEIGHT:

A. Total Vehicle Delivered Weight/Max Fluids = 1605 kg. (UVW)

B. Max. Cargo Carrying Capacity of Vehicle = 38 kg. (RCLW (<136 kg))

C. Weight of Instrumented SID/HIII Dummy = 80 kg. (C)

Test Vehicle Target Weight (A+B+C) = 1723 kg. (TVTW)

FULLY LOADED TEST VEHICLE (UDVW + SID/HIII + CARGO):

Right Front = 468 kg. Right Rear = 362 kg.

Left Front = 500 kg. Left Rear = 393 kg.

Total Front = 968 kg. Total Rear = 755 kg.

Percent Front = 58 Percent Rear = 44

Total Weight = 1723 kg.

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA (CONTINUED)

AS TESTED WEIGHT OF VEHICLE (SID/HII DUMMY + CARGO + EQUIPMENT & INSTRUMENTATION):

Right Front = <u>464</u> kg.	Right Rear = <u>382</u> kg.
Left Front = <u>476</u> kg.	Left Rear = <u>396</u> kg.
Total Front = <u>940</u> kg.	Total Rear = <u>778</u> kg.
Total Weight = <u>*1718</u> kg.	
Percent Front = <u>55</u>	Percent Rear = <u>45</u>

*Removed vehicle battery; front bumper & light assembly; rear bumper & light assembly

TEST VEHICLE ATTITUDE:

	As Delivered	Fully Loaded	Ready for Test
Right Front	<u>346</u> mm	<u>334</u> mm	<u>***NR</u> mm
Left Front	<u>343</u> mm	<u>331</u> mm	<u>***NR</u> mm
Right Rear	<u>375</u> mm	<u>368</u> mm	<u>***NR</u> mm
Left Rear	<u>373</u> mm	<u>355</u> mm	<u>***NR</u> mm
Right Door Sill Angle	<u>0.41</u>	<u>0.29</u>	<u>0.32</u>
Left Door Sill Angle	<u>0.14</u>	<u>0.32</u>	<u>0.29</u>
Front Bumper Angle	<u>0.10</u>	<u>0.21</u>	<u>**0.12</u>
Rear Bumper Angle	<u>-0.08</u>	<u>-0.18</u>	<u>**0.10</u>
Test Vehicle Wheelbase =	<u>2705</u> mm		

C.G. = 1225 mm rearward of front wheel centerline

** Measurements taken before bumpers were removed

*** Unable to record measurements after bumpers were removed

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA (CONTINUED)

TOTAL VEHICLE LENGTH:

Right Side = 4213 mm** Left Side = 4216 mm** Centerline = 4623 mm*
Centerline = 4331 mm**

* Measurements were taken before bumpers were removed

** Measurements were taken after bumpers were removed

FRONT SEAT CUSHION PLACEMENT:

Total length of Adjustment Travel = 239 mm

Total Number of Adjustment Positions or Detents = 25

Final Seat Position = 57 mm forward of mid

FRONT SEAT BACK ADJUSTMENT POSITION:

Initial Seat Back Torso Angle = 18° degrees

Final Seat Back Torso Angle = 13° degrees

*Measured 4.5 degrees when inclinometer was positioned across headrest support posts which is comparable to an 18 degree seat back angle

ADJUSTABLE STEERING COLUMN POSITION: mid-position

WINDOW POSITIONS:

Right Front = Down Right Rear = Down

Left Front = Down Left Rear = Down

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Volume = 54.9 liters (92% to 94% of usable capacity)

LOCATION OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase = 2705 mm

Impact Reference Line is 1381 mm rearward of front axle centerline

RECORDED BY: *John K.* DATE: November 8, 2002

APPROVED BY: *Ann McCarty* DATE: November 8, 2002

DATA SHEET 2
TEST VEHICLE SUMMARY OF RESULTS

Model Year/Make/Model: 2002 Saturn Vue

Body Style: 4-door Sport Utility Vehicle VIN: 5GZCZ63BX2S804900

NHTSA No. C20110 Build Date: 1/02

Test Date: 10/25/02

Vehicle Overall Length = 4216 mm** Vehicle Overall Width 1808 mm

** Measurement taken after front & rear bumpers were removed

VEHICLE TEST WEIGHT (PRETEST):

Left Front = 476 kg. Left Rear = 396 kg.

Right Front = 464 kg. Right Rear = 382 kg.

Total Front = 940 kg. Total Rear = 778 kg.

Total Vehicle Test Weight = 1718 kg.

Wheelbase = 2705 mm

Longitudinal C.G. from center of front axle = 1225 mm

Impact Angle with respect to Impactor = 90 degrees

IMPACT POINT:

Actual Impact Point = 5 mm rearward of nominal impact ref. line

DATA SHEET 2
TEST VEHICLE SUMMARY OF RESULTS (CONTINUED)

MAXIMUM EXTERIOR STATIC CRUSH:

Level 1 (415 mm above ground) = 376 mm

Level 2 (667 mm above ground) = 425 mm

Level 3 (785 mm above ground) = 436 mm

Level 4 (1064 mm above ground) = 406 mm

Level 5 (1631 mm above ground) = — mm

Maximum Post Test Intrusion = 436 mm

OCCUPANTS:

Dummy ID: 052 SID/HIII No. 062

Restraint Used: 3-pt Active Belt

INSTRUMENTATION:

Number of Data Channels = 32

Number of Cameras:

Onboard = 3

Offboard = 10

Total Cameras = 13

Remarks: _____

RECORDED BY: *Robert Ke*

DATE: November 8, 2002

APPROVED BY: *Alme McCarty*

DATE: November 8, 2002

**DATA SHEET 3
POST TEST OBSERVATIONS**

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

Visible Dummy Contact Points:

	SID/HIII
Face	None
Top of the Head	Interior headliner, side curtain airbag
Left Side of the Head	Side curtain airbag
Back of the Head	Side curtain airbag
Left Hip	Driver Seat, driver door panel, seat belt
Left Shoulder	Headrest, side curtain airbag, driver seat, driver door panel, seat belt

Door Opening:

	Left Side	Right Side
Front	Tools Needed	Easy
Rear	Tools Needed	Easy

Arm Rest Location:

Front = N/A

Rear = N/A

Seat Movement:

Front = None

Rear = None

DATA SHEET 3
POST TEST OBSERVATIONS (CONTINUED)

Glazing Damage:

Windshield: Broken

Window: Driver side window broken, all others not broken

Pillar Performance:

No separation

Sill Separation:

None

Other Notable Impact Effects:

Level 5 plastic trim broke off – profile points not taken

Remarks:

None

RECORDED BY:

John K.

DATE: November 8, 2002

APPROVED BY:

Alme McCullough

DATE: November 8, 2002

Section 4 – Occupant and Vehicle Information

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Data Sheet 5 – Vehicle Pre- and Post- Test Vehicle Measurements

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Data Sheet 12 – Post-Test Dummy Inspection List

Data Sheet 13 – Test Vehicle Accelerometer Location and Data Summary

Data Sheet 14 – Fuel System Integrity Summary

DATA SHEET 4
SID/HIII INSTRUMENTATION DATA

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

SID/HIII ID# 052

Description	Units	Filter	Max Data	Max Data Time	Min Data	Min Data Time	*
<i>VHEAD.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Head (Ax)	g	CFC 1000	4.3	0.143	-8.6	0.064	1
Driver ATD Head (Vx)	kph	CFC 180	4.3	0.284	-8.0	0.113	1
Driver ATD Head (Ay)	g	CFC 1000	75.5	0.053	-8.6	0.181	
Driver ATD Head (Vy)	kph	CFC 180	20.8	0.072	-28.9	0.032	
Driver ATD Head (Az)	g	CFC 1000	15.9	0.041	-3.2	0.057	
Driver ATD Head (Vz)	kph	CFC 180	42.8	0.400	0.0	-0.084	
Driver ATD Head (Ar)	g	CFC 1000	75.7	0.053	0.0	-0.043	1
Driver HIC: 532.5 from 0.028 to 0.048 sec.							
<i>VUNCK.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Neck (Fx)	N	CFC 1000	230.5	0.071	-217.5	0.054	1
Driver ATD Neck (Fy)	N	CFC 1000	581.1	0.050	-328.8	0.181	1
Driver ATD Neck (Fz)	N	CFC 1000	986.1	0.049	-184.4	0.062	1
Driver ATD Neck (Mx)	N-m	CFC 600	11.5	0.110	-85.1	0.050	1
Driver ATD Neck (My)	N-m	CFC 600	17.4	0.071	-15.4	0.154	1
Driver ATD Neck (Mz)	N-m	CFC 600	9.9	0.057	-10.5	0.211	
<i>VRBL SPL FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	CFC 1000	55.6	0.034	-42.0	0.040	1
Driver ATD Lower Rib (Ay)	g	CFC 1000	73.0	0.040	-68.0	0.040	1
Driver ATD Lower Spine (Ay)	g	CFC 1000	55.2	0.041	-9.5	0.073	1
Driver ATD Pelvis (Ay)	g	CFC 1000	51.5	0.040	-12.7	0.075	1
<i>VFIR100.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	Fir 100	54.8	0.034	-5.9	0.144	
Driver ATD Upper Rib (Vy)	kph	Fir 100	8.9	0.077	-28.5	0.000	
Driver ATD Lower Rib (Ay)	g	Fir 100	62.8	0.038	-13.5	0.039	
Driver ATD Lower Rib (Vy)	kph	Fir 100	10.4	0.280	-28.5	-0.084	
Driver ATD Lower Spine (Ay)	g	Fir 100	52.6	0.040	-8.5	0.073	
Driver ATD Lower Spine (Vy)	kph	Fir 100	7.4	0.064	-28.5	-0.084	
Driver ATD Pelvis (Ay)	g	Fir 100	51.5	0.040	-11.5	0.075	
Driver ATD Pelvis (Vy)	kph	Fir 100	4.5	0.246	-28.5	-0.084	
Driver TTI [g]: 53.07							

REFERENCE:

Positive Direction:

Longitudinal (X) =

Forward

Lateral (Y) =

To Right

Vertical (Z) =

Down

Negative Direction:

Longitudinal (X) =

Rearward

Lateral (Y) =

To Left

Vertical (Z) =

Up

REMARKS:

*1 - See Data Acquisition Explanations, page 2-2

RECORDED BY:

John K.

DATE:

November 8, 2002

APPROVED BY:

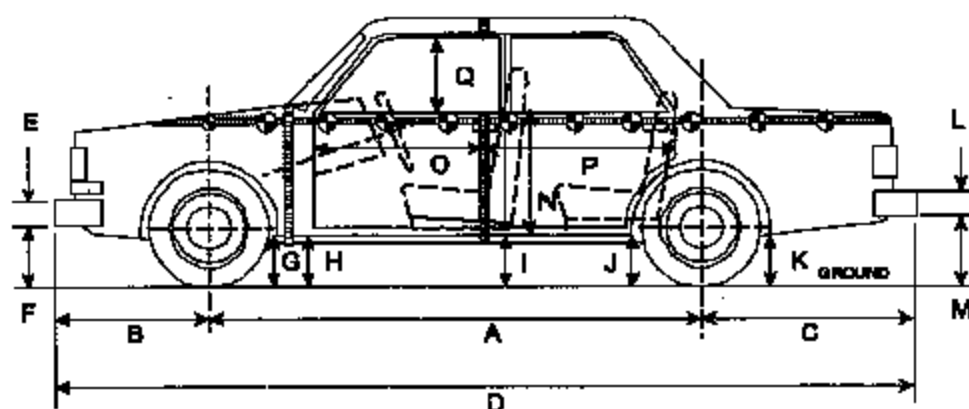
Gene McCarty

DATE:

November 8, 2002

DATA SHEET 5
VEHICLE PRETEST AND POST TEST MEASUREMENTS

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110



LEFT SIDE VIEW

All MEASUREMENTS IN MILLIMETERS (mm) WITH TOLERANCE OF ± 3 mm

	PRETEST	POST TEST	CHANGE
A	2705	2639	-66
B	748**	734**	-14
C	763**	794**	31
D	4216**	4167**	-49
E	NR	NR	NR

**Measurements taken after front and rear bumpers were removed

(Continued on next page)

PRETEST				
	As-Delivered	As-Tested	POST TEST	CHANGE
*F	343	360**	393**	33
*G	263	268	278	10
*H	263	268	281	13
*I	267	265	301	36
*J1/J2	272/412	285/703	295/444	30/41
*K	271	217**	328**	111
L	NR		NR	NR
*M	373	408**	434**	26
O	1036		954	-82
P	928		930	4
Q	490		460	-30

D = Length at Centerline

E & L = Bumper thickness

J1 = To Pinch Weld

J2 = To Sill

R = Right Side Length

S = Left Side Length

T = Width at B-Post

* These measurements are to be taken in the "as delivered" and in the "as tested" configuration (which includes SID/HIII dummy, instrumentation, cameras, ETC.)

** Measurements taken after front and rear bumpers were removed

REMARKS:

Positive x-axis measurements are forward of the rear bumper center, positive

z-axis (height) measurements are up from the ground.

RECORDED BY:

John Ke

DATE: November 8, 2002

APPROVED BY:

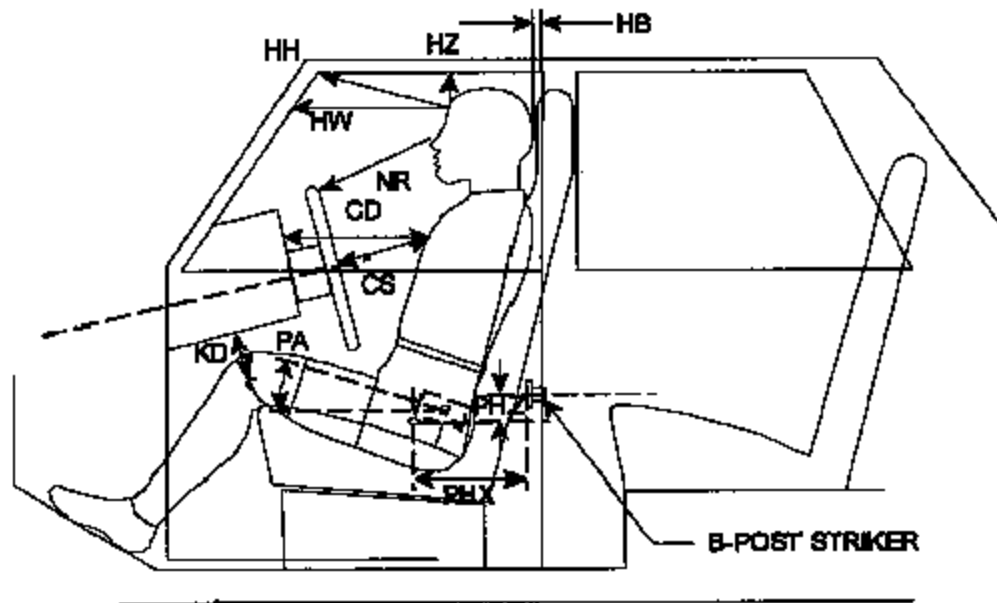
Ann McCusker

DATE: November 8, 2002

DATA SHEET 6
SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2002 Saturn Vue NHTSA No.: C2011D

SID/HIII DUMMY LONGITUDINAL MEASUREMENTS



LEFT SIDE VIEW

MEASUREMENT (mm)	SID/HIII ID# 052
HB	50
HH	350
HW	632
HZ	175
NR	352
CD	504
CS	275

(Continued on next page)

MEASUREMENT (mm)	SID/HIII ID# 052
KDL(KDA°)/KBL(KDA°)	82 / (28°) WRTH
KDR(KBA°)/KBR(KBA°)	97 / (34°) WRTH
PA°	25.5
PHX	274
PHY	235
PHZ	99

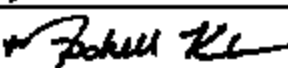
REMARKS:

RECORDED BY:



DATE: November 8, 2002

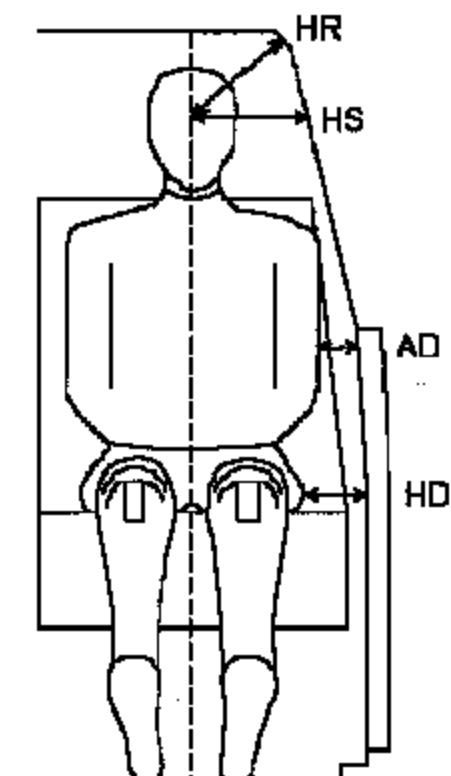
APPROVED BY:



DATE: November 8, 2002

DATA SHEET 7
SID/HIII DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110



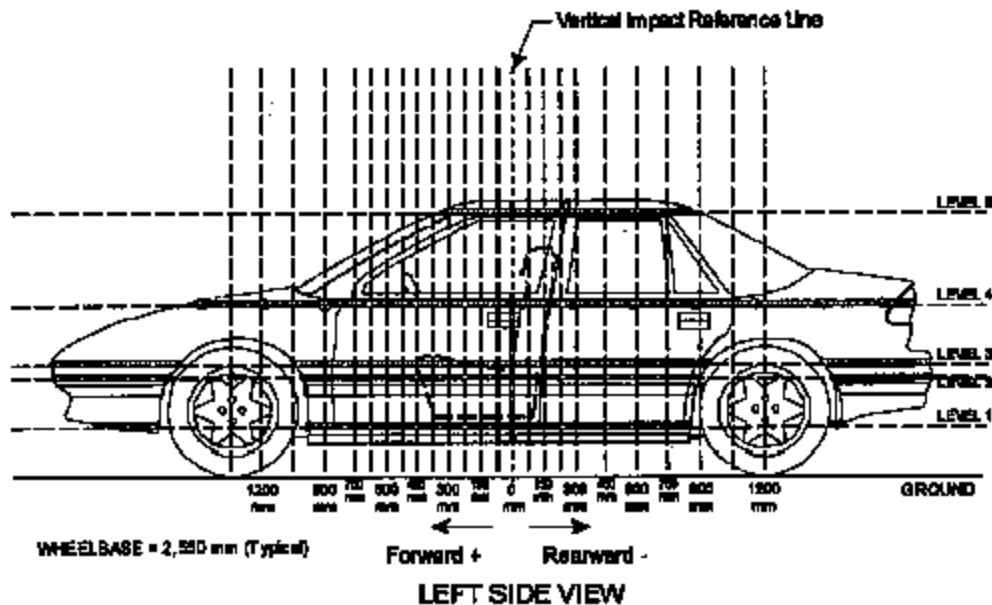
MEASUREMENT(mm)	SID/HIII ID# 052
HR	202
HS	322
AD	87
HD	142

**DATA SHEET 8
VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

PRETEST AND POST TEST EXTERIOR PROFILE MEASUREMENTS

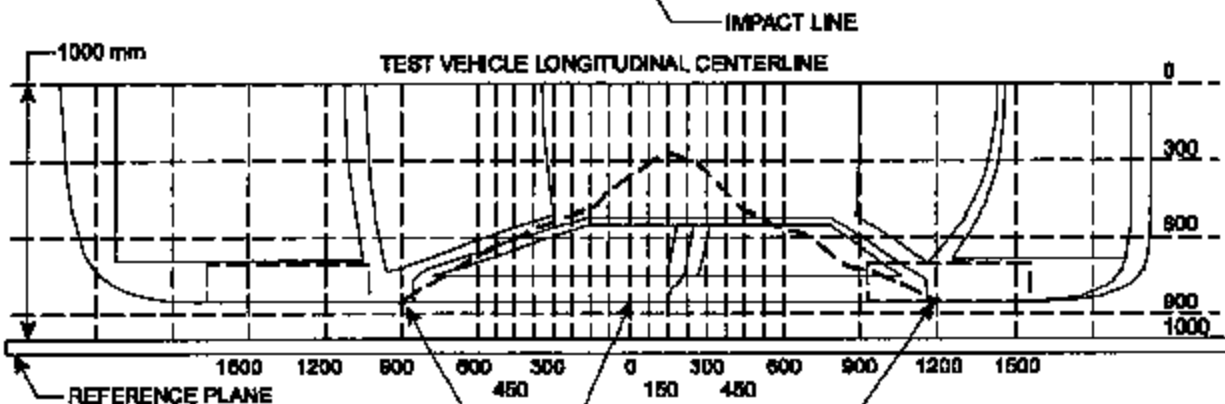
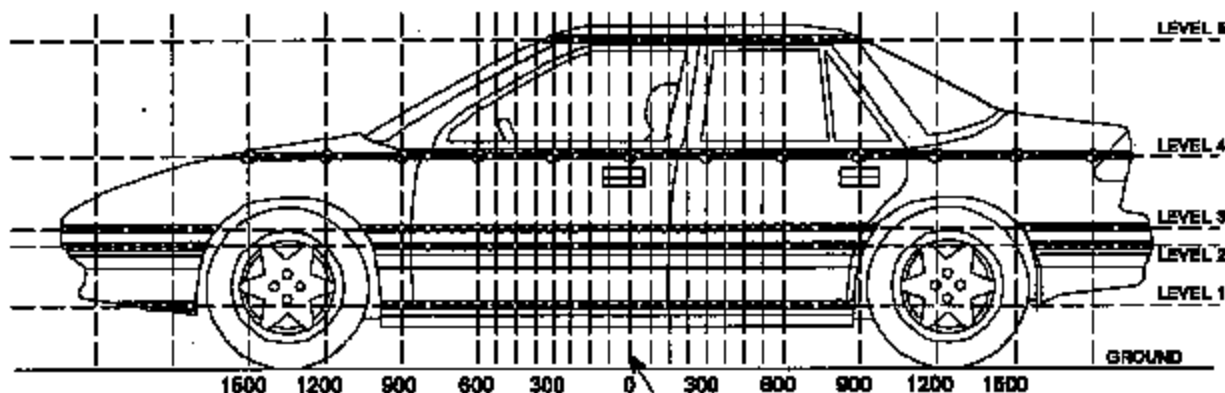


MEASUREMENTS ALONG THE VERTICAL 0 mm. LINE SHOWN ABOVE:

LEVEL 5 @ Window Top =	<u>1631</u> mm
LEVEL 4 @ Window Sill =	<u>1064</u> mm
LEVEL 3 @ Mid Door =	<u>785</u> mm
LEVEL 2 @ Occupant H-Point =	<u>687</u> mm
LEVEL 1 @ Sill Top Height	<u>415</u> mm

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110



FORWARDMOST POINT OF INDUCED DAMAGE

REARWARDMOST POINT OF INDUCED DAMAGE

NOTE: All measurements are in millimeters (mm)

Forward (+)

Rearward (-)

**DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS**

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
			-1600	-1425	-1350	-1275	-1200	-1125	-1050
LEVEL 1 SIDE SILL	415	PRE							
		POST							
		CRUSH							
LEVEL 2 H-POINT	687	PRE							
		POST							
		CRUSH							
LEVEL 3 MID-DOOR	785	PRE						98	102
		POST						95	118
		CRUSH						4	16
LEVEL 4 WINDOW SILL	1064	PRE	158	155	154	152	153	149	151
		POST	207	208	209	211	214	204	221
		CRUSH	48	53	55	59	61	65	70
LEVEL 5 WINDOW TOP	1531	PRE	389	382	381	377	377	375	376
		POST	*	*	*	*	*	*	*
		CRUSH	*	*	*	*	*	*	*

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS (CONTINUED)

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
			-975	-900	-825	-750	-675	-600	-525
LEVEL 1 SIDE SILL	415	PRE		138	151	172	188	169	168
		POST		153	190	227	254	275	301
		CRUSH		18	39	55	86	108	133
LEVEL 2 H-POINT	587	PRE	102	114	124	121	124	125	124
		POST	121	153	182	207	232	258	284
		CRUSH	19	39	58	86	108	133	160
LEVEL 3 MID-DOOR	785	PRE	114	124	120	123	121	123	121
		POST	150	180	201	223	247	270	297
		CRUSH	38	58	81	100	126	147	175
LEVEL 4 WINDOW SILL	1064	PRE	150	151	150	150	151	152	153
		POST	241	269	277	295	313	333	351
		CRUSH	91	108	127	145	162	181	198
LEVEL 5 WINDOW TOP	1631	PRE	377	379	381	381	383	383	385
		POST	*	*	*	*	*	*	*
		CRUSH	*	**	*	*	*	*	*

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

			DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
LOCATION	HEIGHT		-450	-375	-300	-225	-150	-75	0
LEVEL 1 SIDE SILL	415	PRE	158	157	169	186	167	162	155
		POST	324	353	379	405	470	522	541
		CRUSH	155	155	210	239	303	360	375
LEVEL 2 H-POINT	687	PRE	124	123	124	124	123	119	122
		POST	309	338	364	395	502	544	547
		CRUSH	185	215	240	271	379	425	425
LEVEL 3 MID-DOOR	785	PRE	123	123	123	124	123	123	122
		POST	321	347	376	402	504	547	558
		CRUSH	198	224	253	278	381	424	436
LEVEL 4 WINDOW SILL	1064	PRE	153	155	158	158	158	160	163
		POST	372	392	415	445	508	553	569
		CRUSH	219	237	259	287	350	393	406
LEVEL 5 WINDOW TOP	1631	PRE	388	388	386	389	387	393	399
		POST	*	*	*	*	*	*	*
		CRUSH	*	*	*	*	*	*	*

**DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS (CONTINUED)**

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

			DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
LOCATION	HEIGHT		75	150	225	300	375	450	525
LEVEL 1 SIDE SILL	416	PRE	162	165	163	166	168	169	170
		POST	502	446	401	367	343	320	297
		CRUSH	340	281	238	201	177	161	127
LEVEL 2 H-POINT	687	PRE	121	123	124	123	125	126	125
		POST	512	469	428	382	345	304	271
		CRUSH	391	346	304	269	220	178	145
LEVEL 3 MID-DOOR	785	PRE	123	123	125	125	127	127	129
		POST	524	484	442	400	352	316	279
		CRUSH	401	361	317	275	225	189	150
LEVEL 4 WINDOW SILL	1064	PRE	166	167	172	174	179	180	186
		POST	643	505	462	429	395	366	336
		CRUSH	377	338	290	255	218	186	150
LEVEL 5 WINDOW TOP	1631	PRE	403	427					
		POST	.	.					
		CRUSH	.	.					

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES – ALL LEVELS (CONTINUED)

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
			600	675	750	825	900	975	1050
LEVEL 1 SIDE SILL	415	PRE	171	172	171	164	139		
		POST	269	248	213	215	193		
		CRUSH	98	73	42	81	54		
LEVEL 2 H-POINT	687	PRE	129	127	131	134	129	106	
		POST	236	205	172	143	187	164	
		CRUSH	108	78	41	9	58	58	
LEVEL 3 MID-DOOR	786	PRE	129	132	131	136	133	132	108
		POST	246	211	179	148	192	187	164
		CRUSH	117	79	48	12	59	55	58
LEVEL 4 WINDOW SILL	1064	PRE	189	197	200	204	208	215	NR
		POST	308	287	268	272	274	273	276
		CRUSH	119	90	68	68	66	58	NR
LEVEL 5 WINDOW TOP	1631	PRE							
		POST							
		CRUSH							

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS (CONTINUED)

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT						
			1125	1200	1275	1350	1425	1500	
LEVEL 1 SIDE SILL	415	PRE							
		POST							
		CRUSH							
LEVEL 2 H-POINT	667	PRE							
		POST							
		CRUSH							
LEVEL 3 MID-DOOR	765	PRE	97						
		POST	150						
		CRUSH	63						
LEVEL 4 WINDOW SILL	1064	PRE	229	234	242	249	257		
		POST	281	285	290	284	302		
		CRUSH	62	51	48	45	45		
LEVEL 5 WINDOW TOP	1631	PRE							
		POST							
		CRUSH							

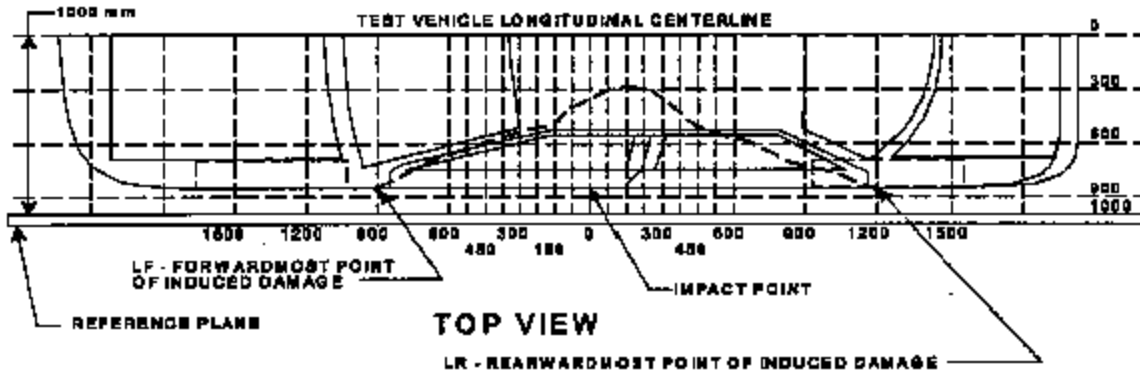
REMARKS:

* Level 5 plastic trim broke off --post profile points not taken

**DATA SHEET 10
VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110



MEASUREMENT CONVENTIONS:

Forward of the impact point (towards front of vehicle) is considered positive (+).
Rearward of the impact point (toward rear of vehicle) is considered negative (-).

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

DPD MEASUREMENTS	POST TEST (mm)	PRETEST (mm)	STATIC CRUSH (mm)
1 (LR = -1125mm)	95	99	4
2 -875	247	121	126
3 -225	402	124	278
4 225	442	125	317
5 875	211	132	79
6 (LF = 1125mm)	160	97	53

REMARKS:

Data from Level 3.

RECORDED BY:

Fahed K.

DATE: November 8, 2002

APPROVED BY:

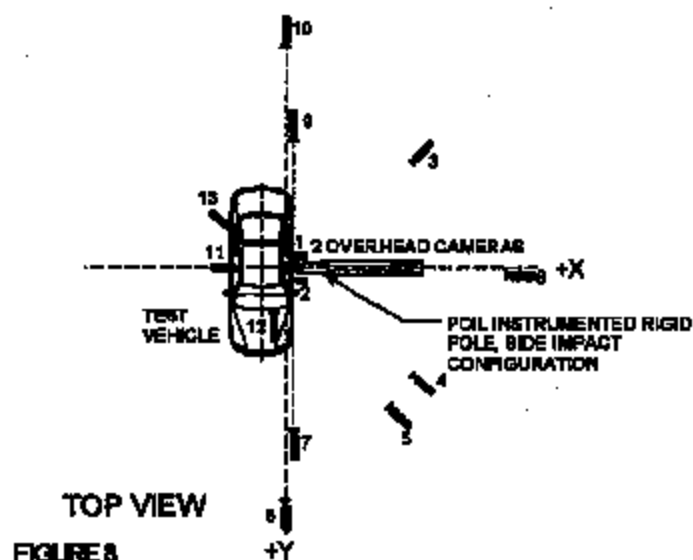
Aimee McCusker

DATE: November 8, 2002

**DATA SHEET 11
HIGH SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110



REFERENCE (from Point of Impact): +X = Forward, +Y = To Right, +Z = Down

* All measurements accurate to ± 6 mm.

CAMERA NO.	VIEW	COORDINATES (mm)			ANGLE	LENS (mm)	NOMINAL FILM SPEED (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle	-91	0	8049	90	13	1000
2	Overhead close-up view of impact plane	-81	-152	8849	90	25	1000
3	Left side 45° - rearward pole view	3871	-3871	1494	45	13	1000
4	Left side 45° - forward pole view	3871	3871	1494	45	13	1000
5	Real time (24 fps) film coverage of test	4145	4511	1554	N/A	N/A	24
6	Left side - rear pole view	2449	0	1402	90	25	1000
7	Front ground level - vehicle/pole impact	0	8778	1280	90	25	1000
8	Front ground level - vehicle roof targets and vehicle/pole impact	-368	8931	1311	90	25	1000
9	Rear ground level - vehicle/pole impact	0	-8787	1524	90	25	1000
10	Rear ground level	-368	-8949	1615	90	25	1000
11	Test vehicle onboard driver - side view	N/A	N/A	N/A	N/A	7.5	1000
12	Test vehicle onboard driver - front view	N/A	N/A	N/A	N/A	7.6	1000
13	Test vehicle o/b driver - 3/4 rear view	N/A	N/A	N/A	N/A	7.5	1000

**DATA SHEET 12
POST TEST DUMMY INSPECTION LIST**

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

DATE: 11/05/02
SID/HII NUMBER: 052

PART	ITEMS CHECKED	COMMENTS
SKIN	VISUAL INSPECTION	OK
HEAD	VISUAL, BALLAST, ACCELEROMETER MOUNT	OK
NECK	VISUAL, BROKEN OR CRACKS IN RUBBER, UPPER BRACKET FIRMLY ATTACHED TO LOWER BRACKET, LOOSE CONDYLE JOINT, NODDING BLOCKS- CRACKED OR OUT OF POSITION	OK
SPINE BOX	VISUAL, BALLAST, WELDMENT, ACCELEROMETER MOUNT, RUBBER CRACKS	OK
RIB CAGE	VISUAL, MEASURE, STIFFENERS, BUMPERS IN PLACE	OK
STERNUM	VISUAL	OK
LUMBAR SPINE	VISUAL	OK
ABDOMEN	VISUAL	OK
PELVIS	VISUAL, PALPATE, ACCELEROMETER MOUNT	OK
UPPER LEGS	VISUAL	OK
KNEES	VISUAL, STOPS, INSERTS	OK
LOWER LEGS	VISUAL, RANGE OF MOTION	OK
ANKLES	VISUAL, RANGE OF MOTION	OK
FEET	VISUAL, RANGE OF MOTION	OK
JOINTS	1 TO 2 g RANGE	OK
HEAD/NECK	BRACKET ATTACHMENT CRACKED OR BROKEN	OK
OTHER		N/A

TEST DATES: 10/25/02

RECORDED BY: 

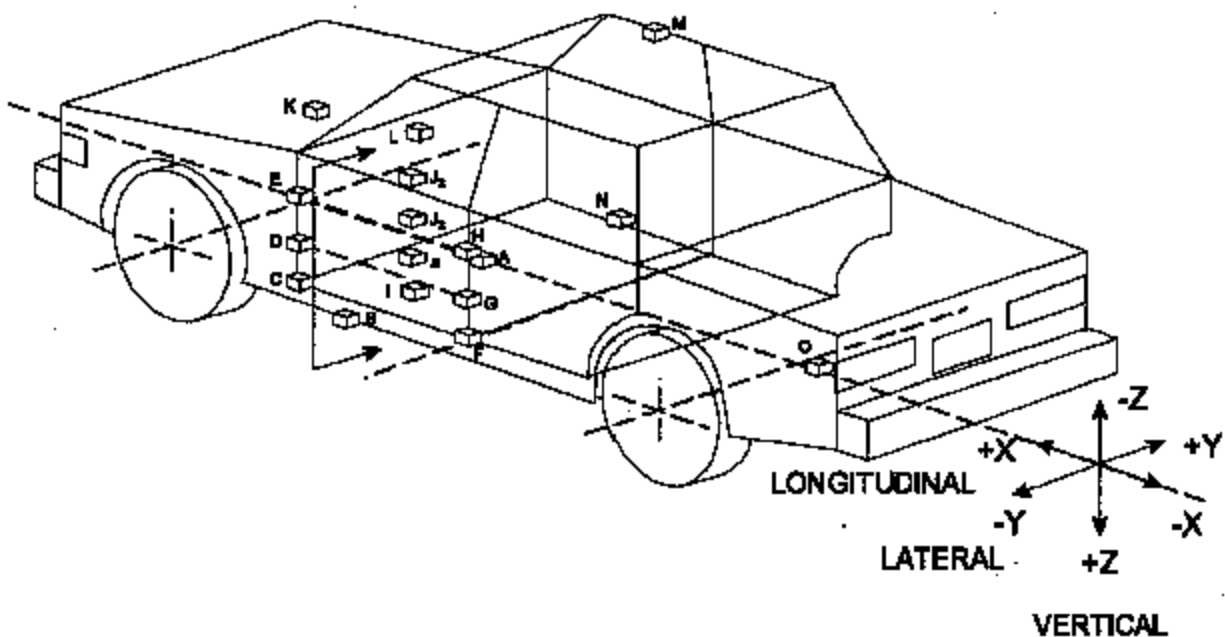
DATE: November 8, 2002

APPROVED BY: 

DATE: November 8, 2002

DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110



A	VEHICLE CG	I	DRIVER SEAT
B	LEFT FLOOR SILL	J1, J2 & J3*	DRIVER DOOR (LOW, MID, UPPER)
C	A PILLAR SILL	K	ENGINE
D	A PILLAR LOW	L	FIREWALL
E	A PILLAR MID	M	RIGHT ROOF
F*	B PILLAR SILL	N	RIGHT FLOOR SILL
G*	B PILLAR LOW	O	REAR DECK
H*	B PILLAR MID		

*Accelerometers were not installed.

DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

Test Vehicle: 2002 Saturn Vue

NHTSA No.:

C20110

Accel.	LOCATION	Pre-Test			Post Test			Difference		
		X	Y	Z	X	Y	Z	X	Y	Z
A	VEHICLE CG	1665	40	479	1523	87	456	-42	47	-23
B	LEFT FLOOR SILL	1730	-741	410	1653	-584	404	-77	157	-8
C	A PILLAR SILL	2074	-766	398	1976	-689	372	-98	77	-8
D	A PILLAR LOW	2097	-773	587	2013	-693	674	-84	80	-13
E	A PILLAR MID	2106	-762	850	2019	-689	839	-87	73	-11
F	B PILLAR SILL	1076	-764	388	1082	-526	392	14	238	3
G	B PILLAR LOW									
H	B PILLAR MID									
I	DRIVER SEAT	1408	-573	484	1370	-375	452	-38	197	-32
J1	DRIVER DOOR LOW									
J2	DRIVER DOOR MID									
J3	DRIVER DOOR UPPER									
K	ENGINE	2969	55	936	2908	74	918	-61	19	-18
L	FIREWALL	2520	340	804	2452	358	824	-77	18	20
M	RIGHT ROOF	1343	480	1814	1298	585	1587	-45	105	-27
N	RIGHT FLOOR SILL	1324	775	401	1284	823	377	-40	48	-24
O	REAR DECK	-671	23	359	-712	29	356	-41	6	-11

NOTE: Positive x-axis measurements are forward of rear axle centerline; positive y-axis measurements are right of the pre-test vehicle centerline; positive z-axis measurements are up from the ground.

DATA SHEET 14
FUEL SYSTEM INTEGRITY SUMMARY

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

STODDARD SOLVENT SPILLAGE MEASUREMENT:

A. From impact until vehicle motion ceases —

Actual = 0 oz. Maximum Allowable = 1 ounce

B. For 5 minute period after vehicle motion ceases —

Actual = 0 oz. Maximum Allowable = 5 ounces

C. For next 25 minutes —

Actual = 0 oz. Maximum Allowable = 1 oz./minute

D. Provide Spillage Details: None

DATA SHEET 14
FUEL SYSTEM INTEGRITY SUMMARY (CONTINUED)

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

A. Test Phase = 90° to 180°

Determination of Stoddard Solvent
Collection Time Period:

1. Rollover Fixture 90° Rotation Time =
1 minutes, 16 seconds

(Specified Range is 1 to 3
minutes)

2. FMVSS 301 Position Hold
Time = 5 minutes, 0 seconds

3. TOTAL = 6 minutes, 16 seconds

4. NEXT WHOLE MINUTE INTERVAL = 7 minutes

Actual Test Vehicle Stoddard Solvent Spillage:

1. First 5 minutes from onset of
rotation = 0 oz.
(5 oz. allowed)

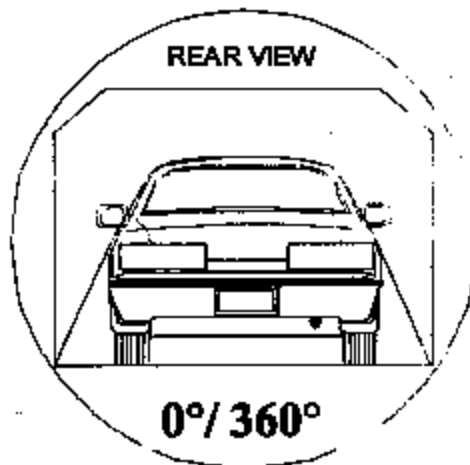
2. 6th minute = 0 oz.
(1 oz. allowed)

3. 7th minute = 0 oz.
(1 oz. allowed)

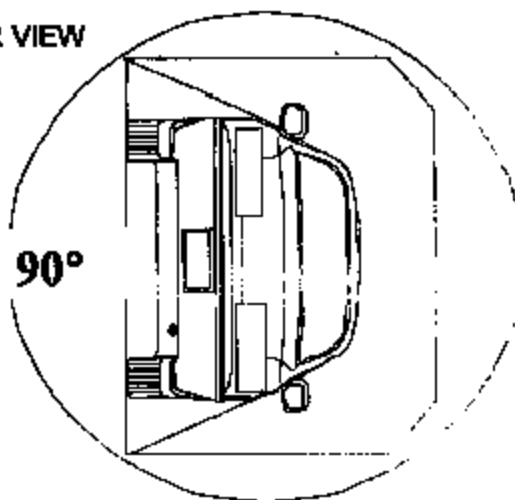
4. 8th minute (if required) = * oz.
(1 oz. allowed)
*Not required

Provide Details of Stoddard Solvent Spillage Locations:

None



REAR VIEW



DATA SHEET 14
FUEL SYSTEM INTEGRITY SUMMARY (CONTINUED)

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

B. Test Phase = 90° to 180°

Determination of Stoddard
Solvent Collection Time Period:

1. Rollover Fixture 90°
Rotation Time = 1 minutes, 10 seconds

(Specified Range is 1 to 3
minutes)

2. FMVSS 301 Position Hold
Time = 5 minutes, 0 seconds

3. TOTAL = 13 minutes, 10 seconds

4. NEXT WHOLE MINUTE INTERVAL = 14
minutes

Actual Test Vehicle Stoddard
Solvent Spillage:

1. First 5 minutes from onset of rotation = 0 oz.
(5 oz. allowed)

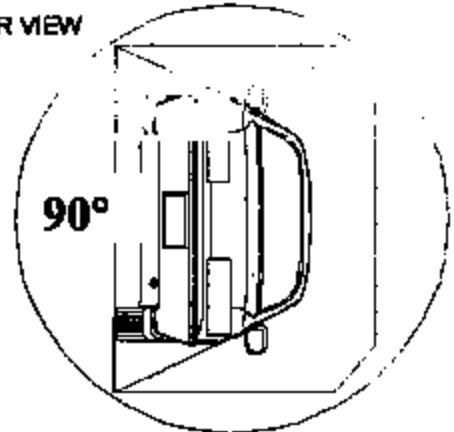
2. 6th minute = 0 oz.
(1 oz. allowed)

3. 7th minute = 0 oz..
(1 oz. allowed)

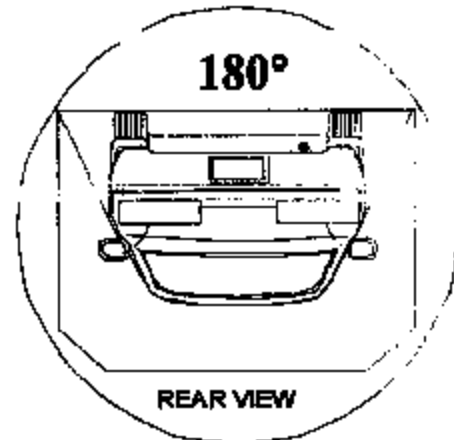
4. 8th minute (if required) = * oz.
(1 oz. allowed)
* Not required

Provide Details of Stoddard Solvent Spillage Locations:
None

REAR VIEW



180°



REAR VIEW

DATA SHEET 14
FUEL SYSTEM INTEGRITY SUMMARY (CONTINUED)

Test Vehicle: 2002 Saturn Vue

NHTSA No.: C20110

C. Test Phase = 180° to 270°

Determination of Stoddard
Solvent Collection Time Period:

1. Rollover Fixture 90°
Rotation Time = 1 minutes, 8 seconds

(Specified Range is 1 to 3
minutes)

2. FMVSS 301 Position Hold
Time = 5 minutes, 0 seconds

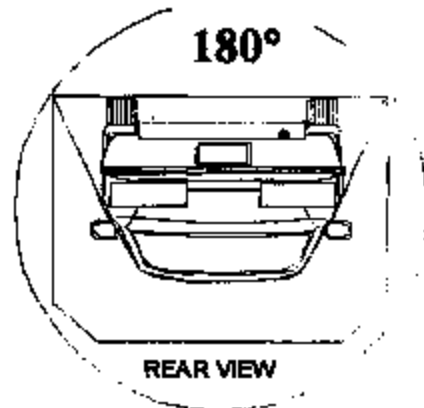
3. TOTAL = 20 minutes, 8 seconds

4. NEXT WHOLE MINUTE
INTERVAL = 21 minutes

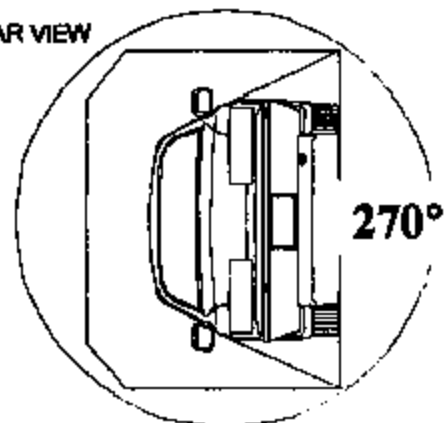
Actual Test Vehicle Stoddard
Solvent Spillage:

1. First 5 minutes from onset of rotation = 0 oz.
(5 oz. allowed)
2. 6th minute = 0 oz.
(1 oz. allowed)
3. 7th minute = 0 oz.
(1 oz. allowed)
4. 8th minute (if required) = * oz.
(1 oz. allowed)
*Not required

Provide Details of Stoddard Solvent Spillage Locations:
None



REAR VIEW



DATA SHEET 14
FUEL SYSTEM INTEGRITY SUMMARY (CONTINUED)

Test Vehicle: 2002 Saturn Vue NHTSA No.: C20110

D. Test Phase = 270° to 360°

Determination of Stoddard
Solvent Collection Time Period:

1. Rollover Fixture 90°
Rotation Time = 1 minutes,
10 seconds

(Specified Range is 1 to 3
minutes)

2. FMVSS 301 Position Hold
Time = 5 minutes, 0 seconds

3. TOTAL = 27 minutes, 10 seconds

4. NEXT WHOLE MINUTE INTERVAL = 28 minutes

Actual Test Vehicle Stoddard
Solvent Spillage:

1. First 5 minutes from onset of rotation =
0 oz (5 oz. allowed)

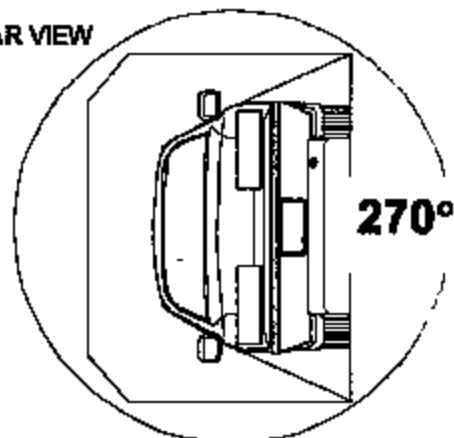
2. 6th minute = 0 oz.
(1 oz. allowed)

3. 7th minute = 0 oz.
(1 oz. allowed)

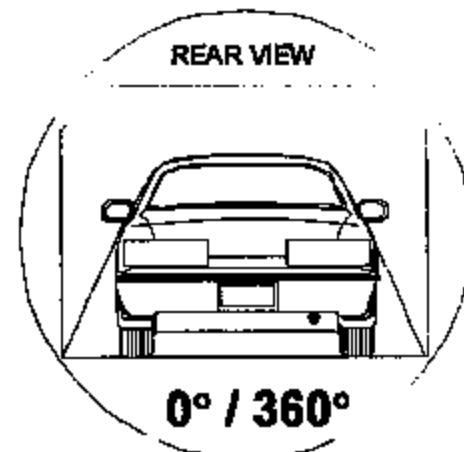
4. 8th minute (if required) = * oz.
(1 oz. allowed)
* Not Required

Provide Details of Stoddard Solvent Spillage Locations:
None

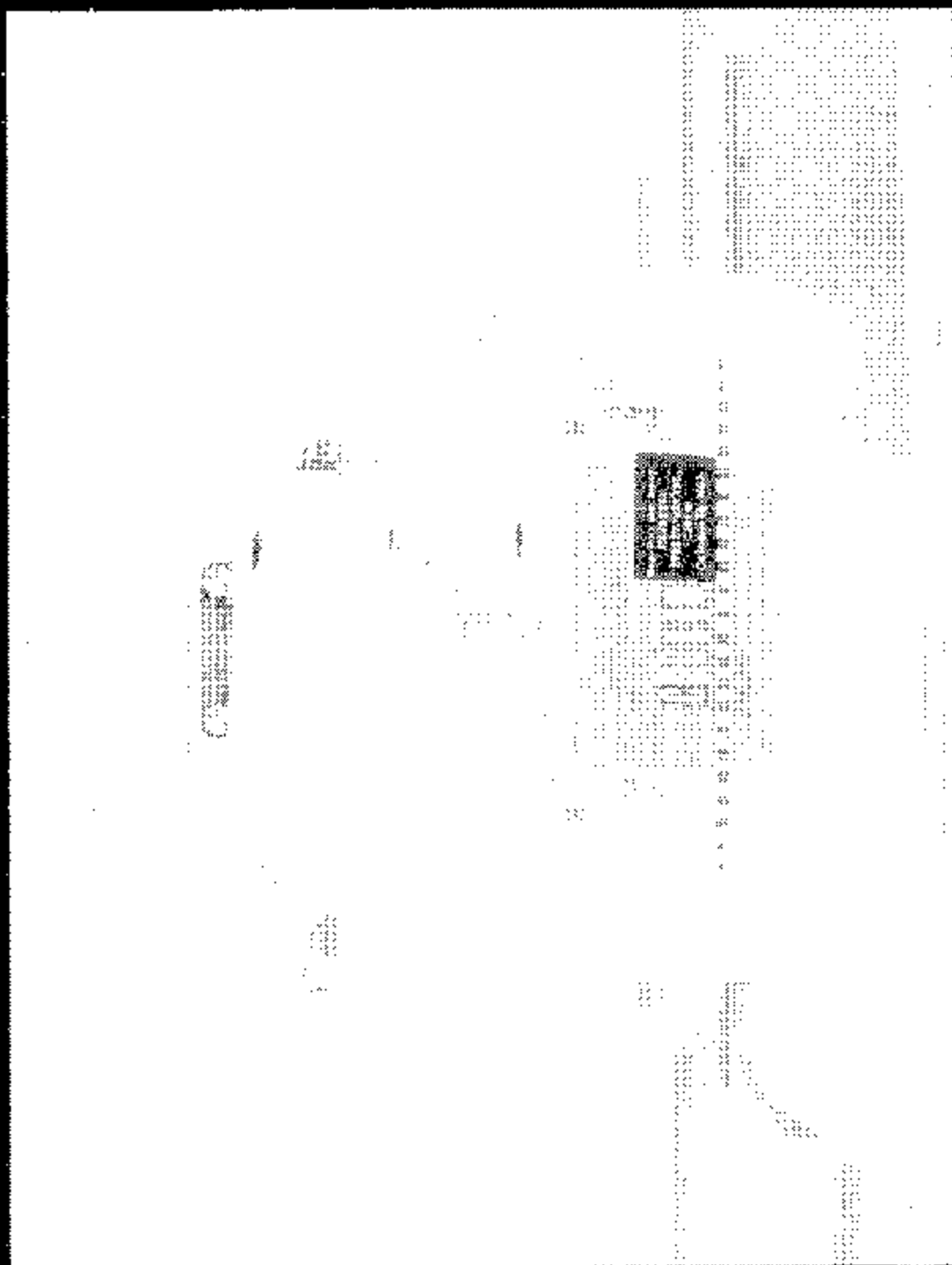
REAR VIEW



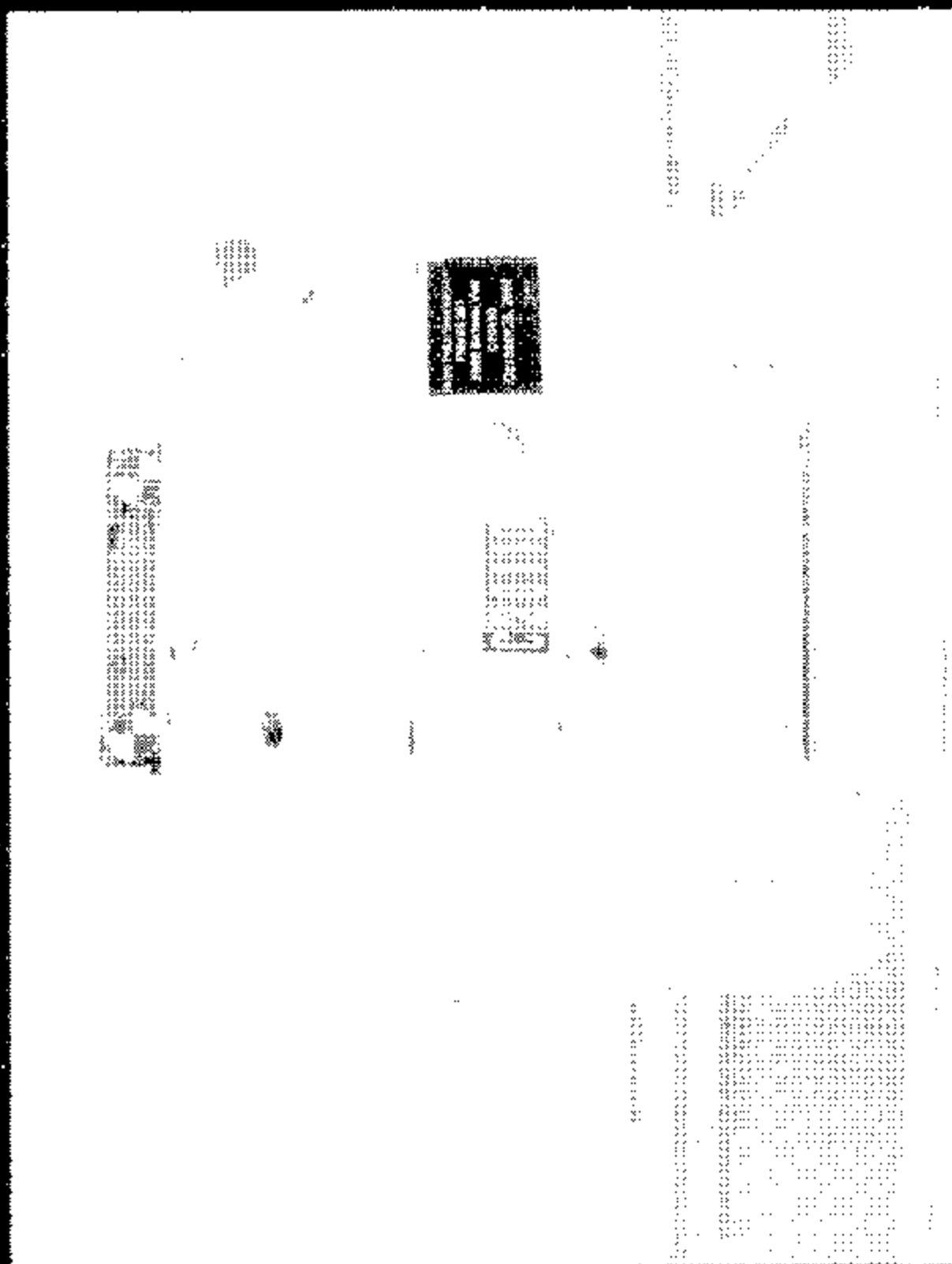
REAR VIEW



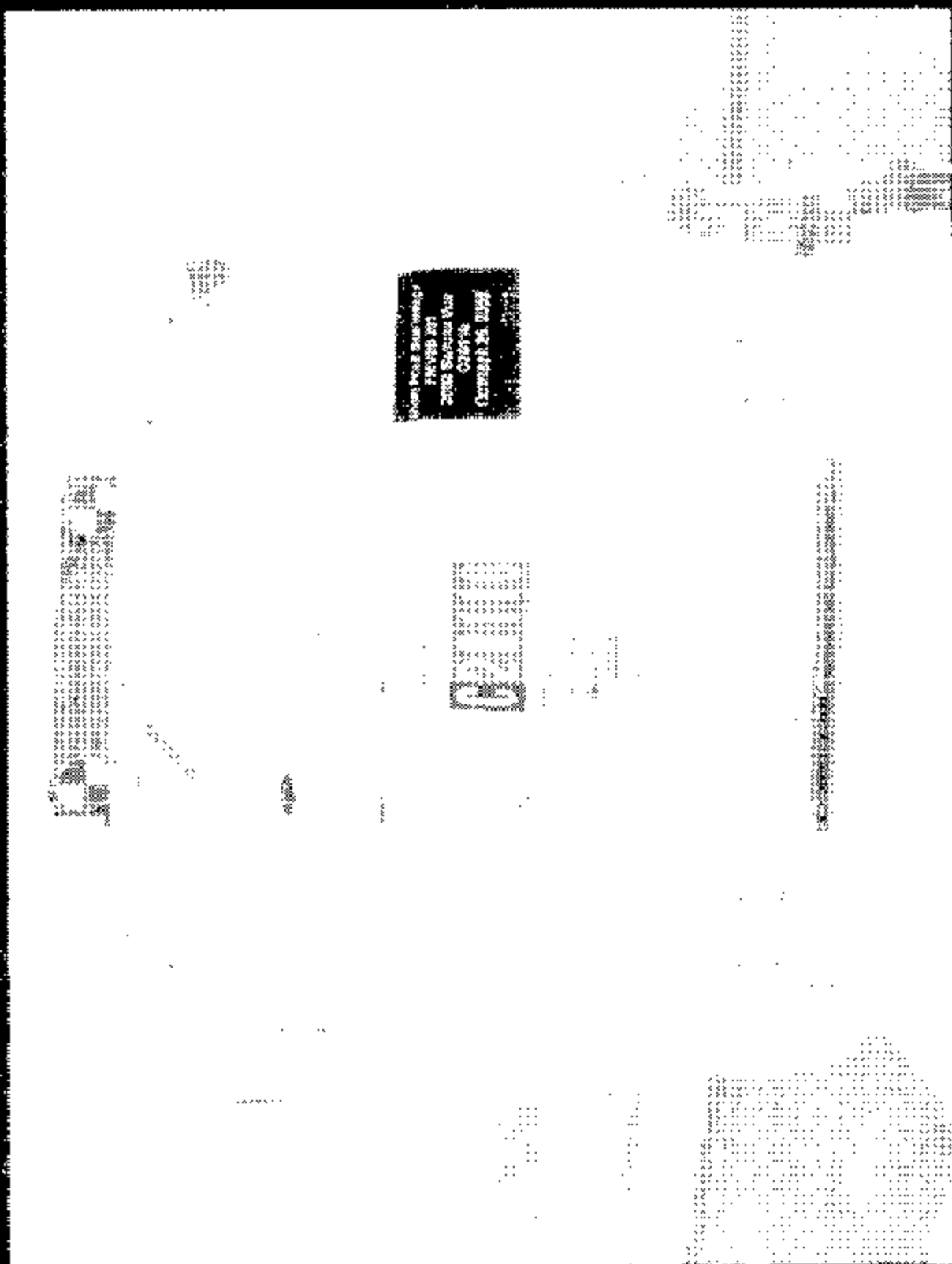
Appendix A – Photographs



Pre-test Frontal View of Test Vehicle



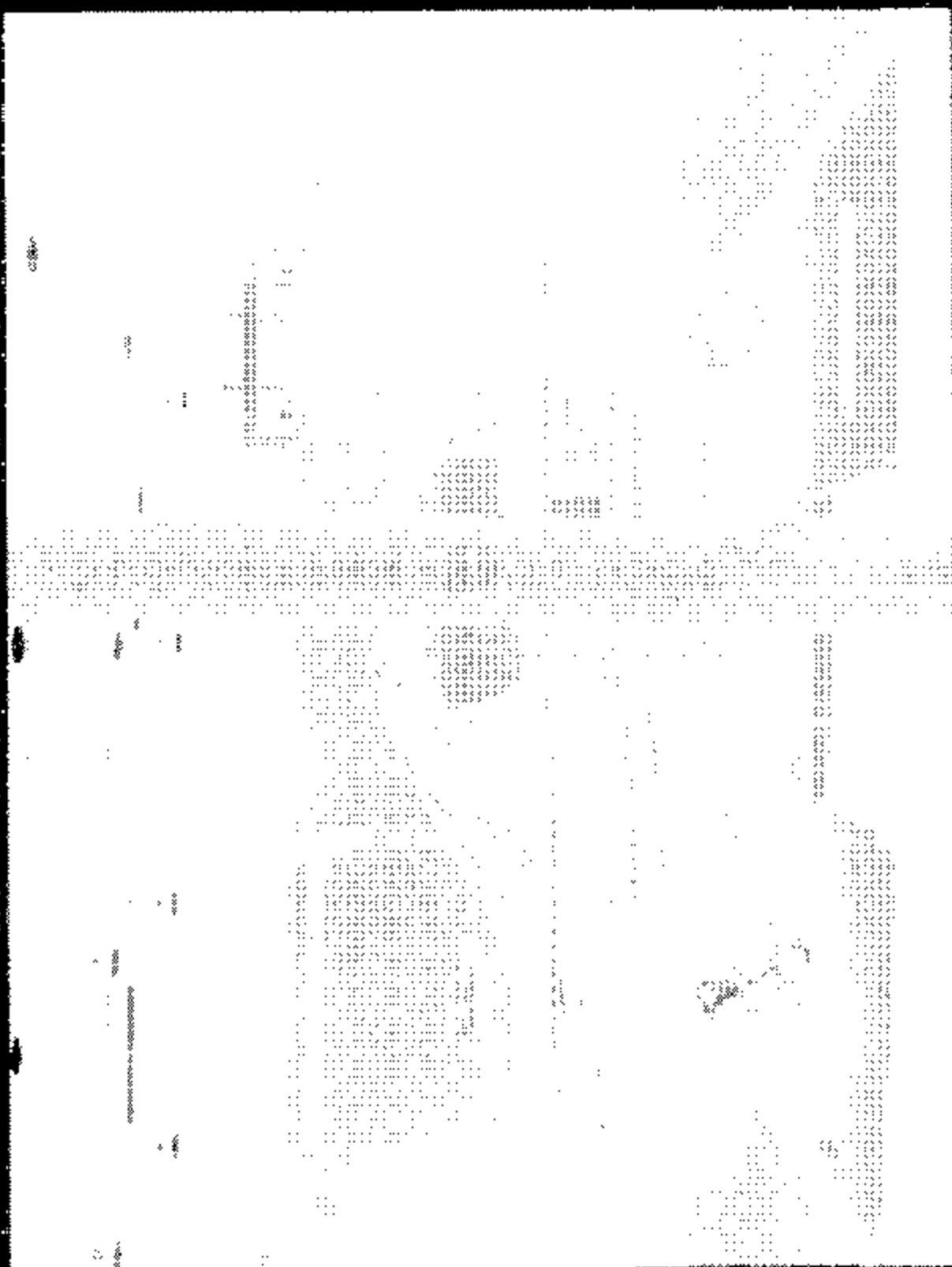
Pre-test Rear View of Test Vehicle
A-4



Post Test Rear View of Test Vehicle



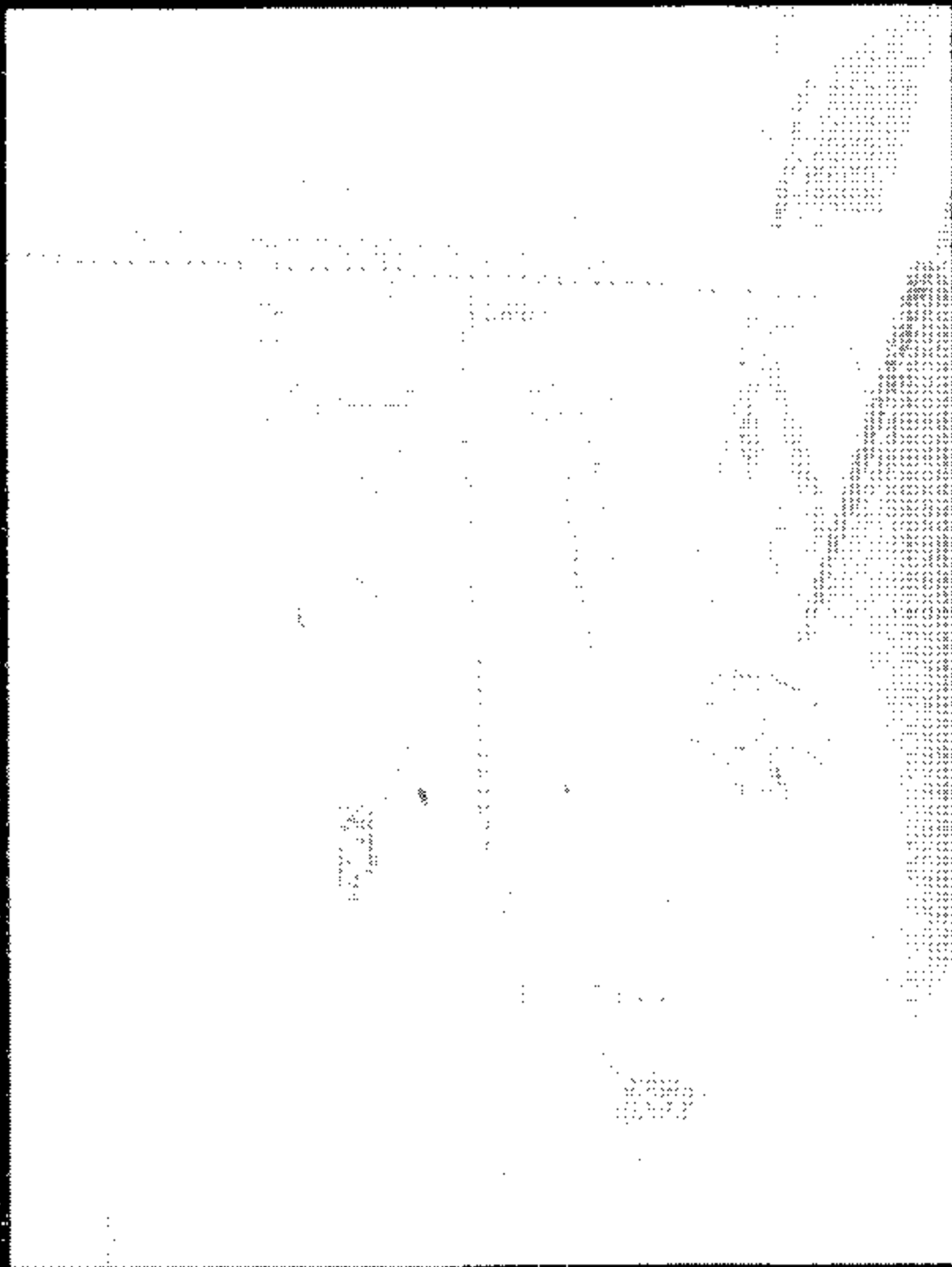
Pre-test Impacted Side View of Test Vehicle
A-6



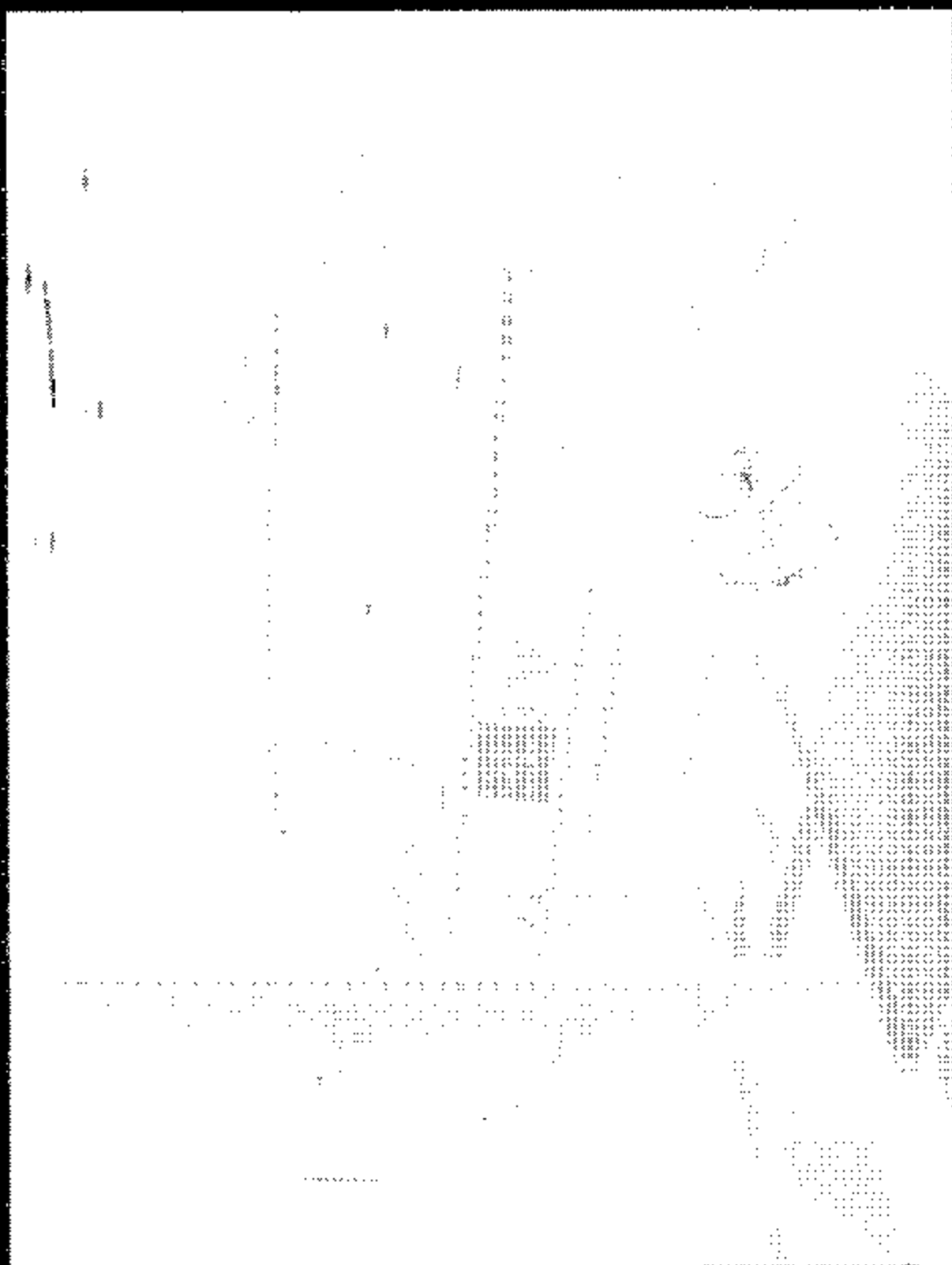
Post Test Impacted Side View of Test Vehicle
A-7



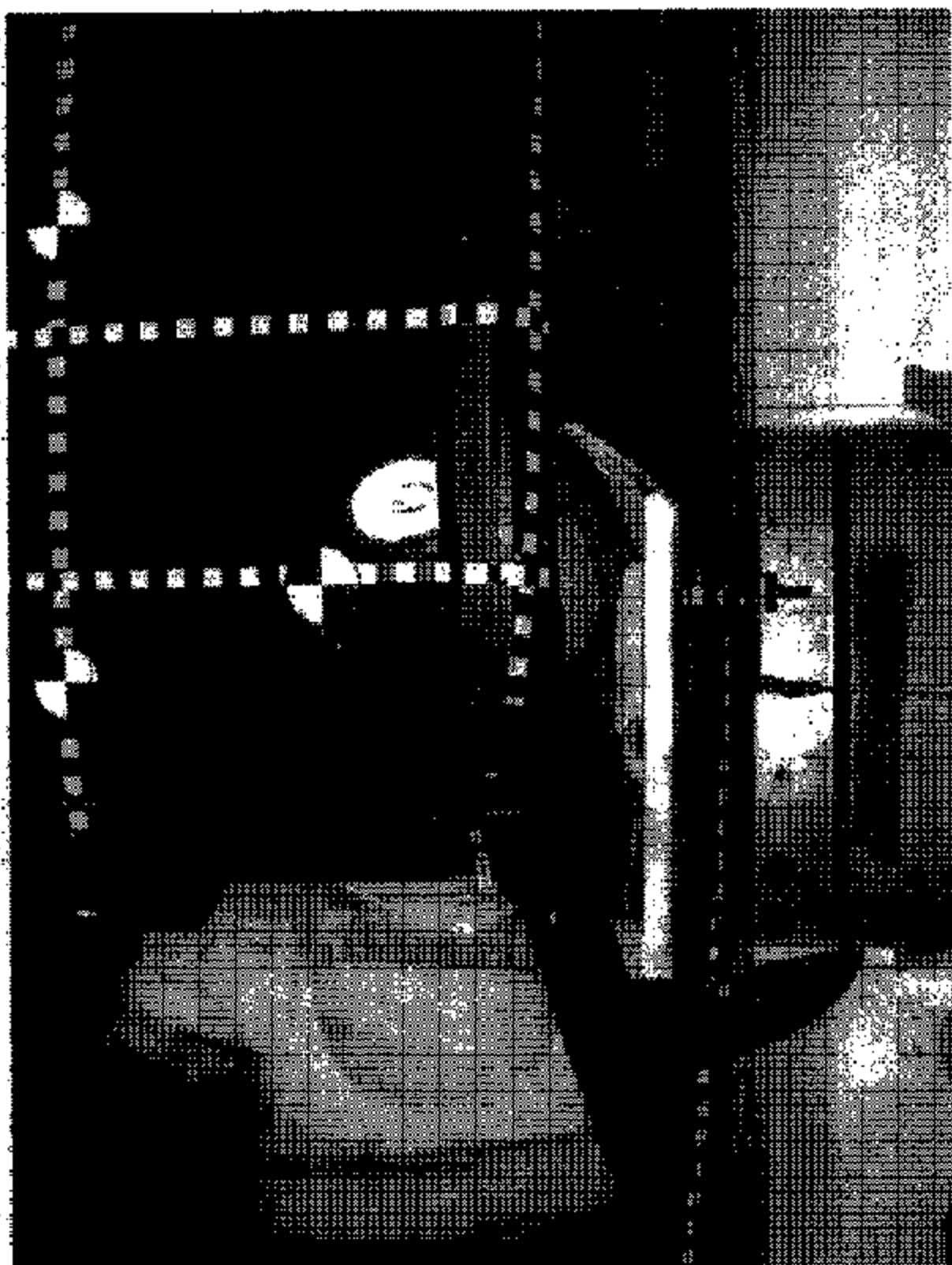
Post Test Impacted Side View of Test Vehicle



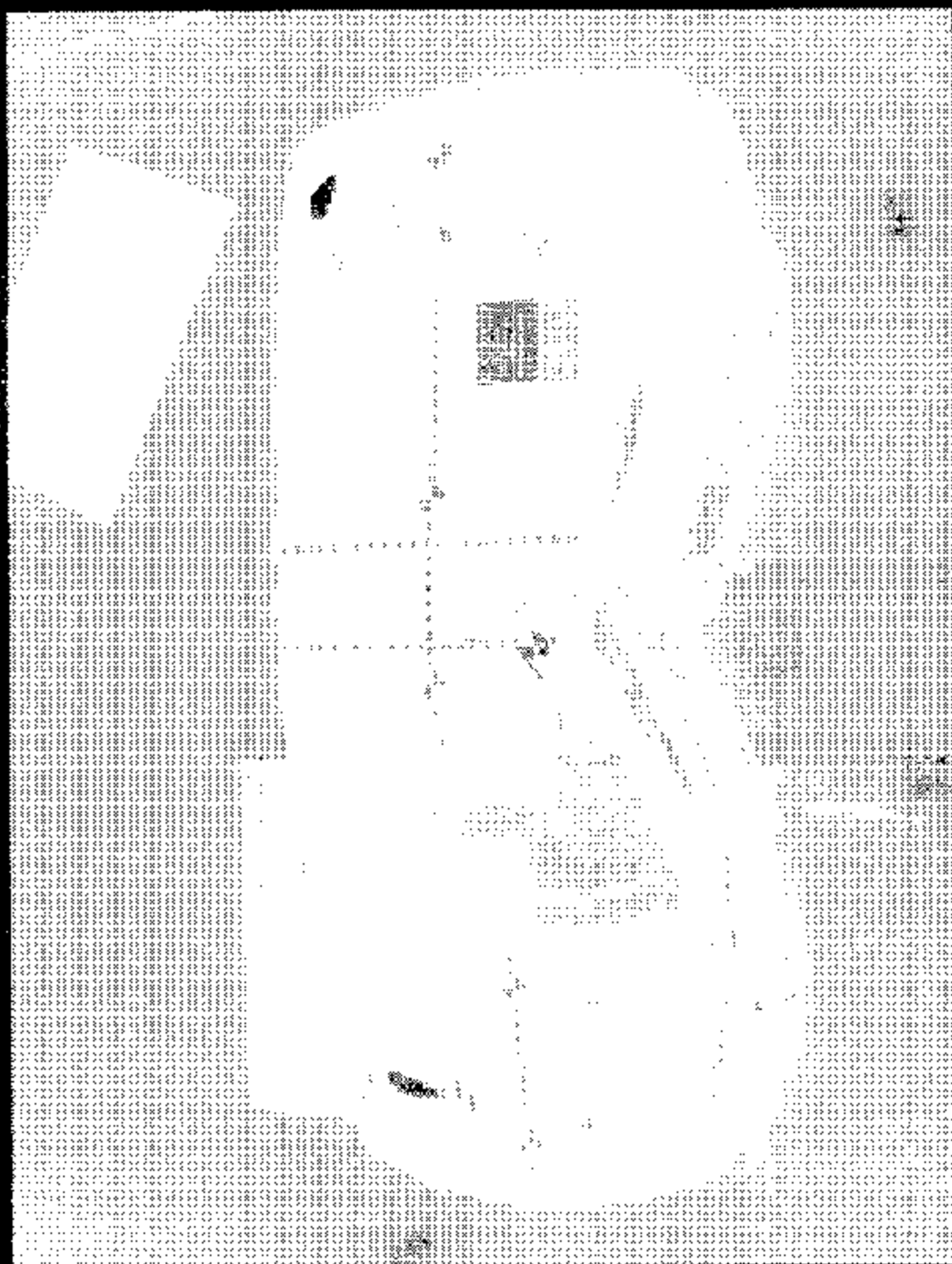
Pre-test Left $\frac{3}{4}$ Front View of Vehicle and Pole
A-8



Pretest Left $\frac{3}{4}$ Rear View of Vehicle and Pole
A-8



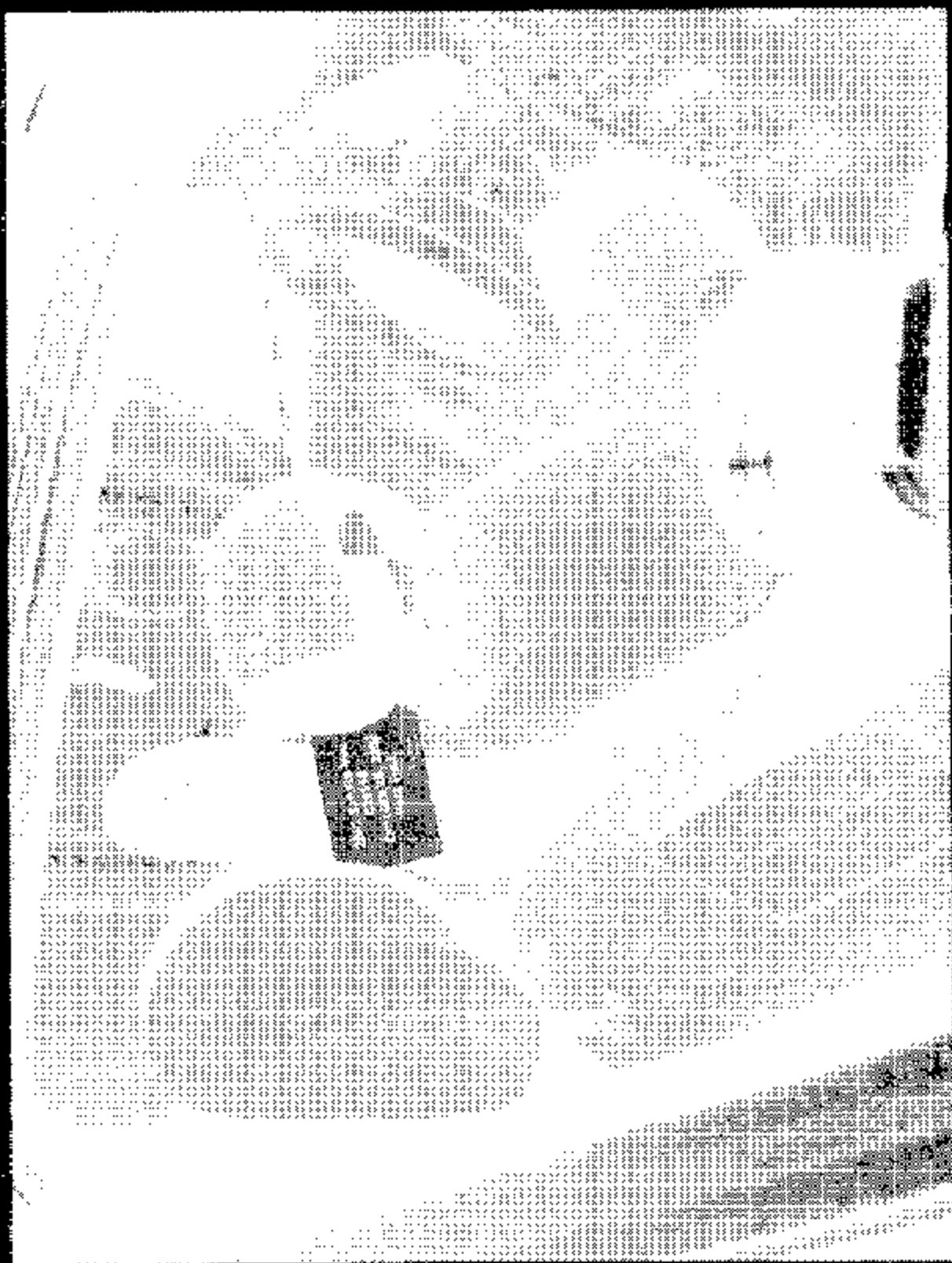
Pretest Overhead View of Test Vehicle
A-10



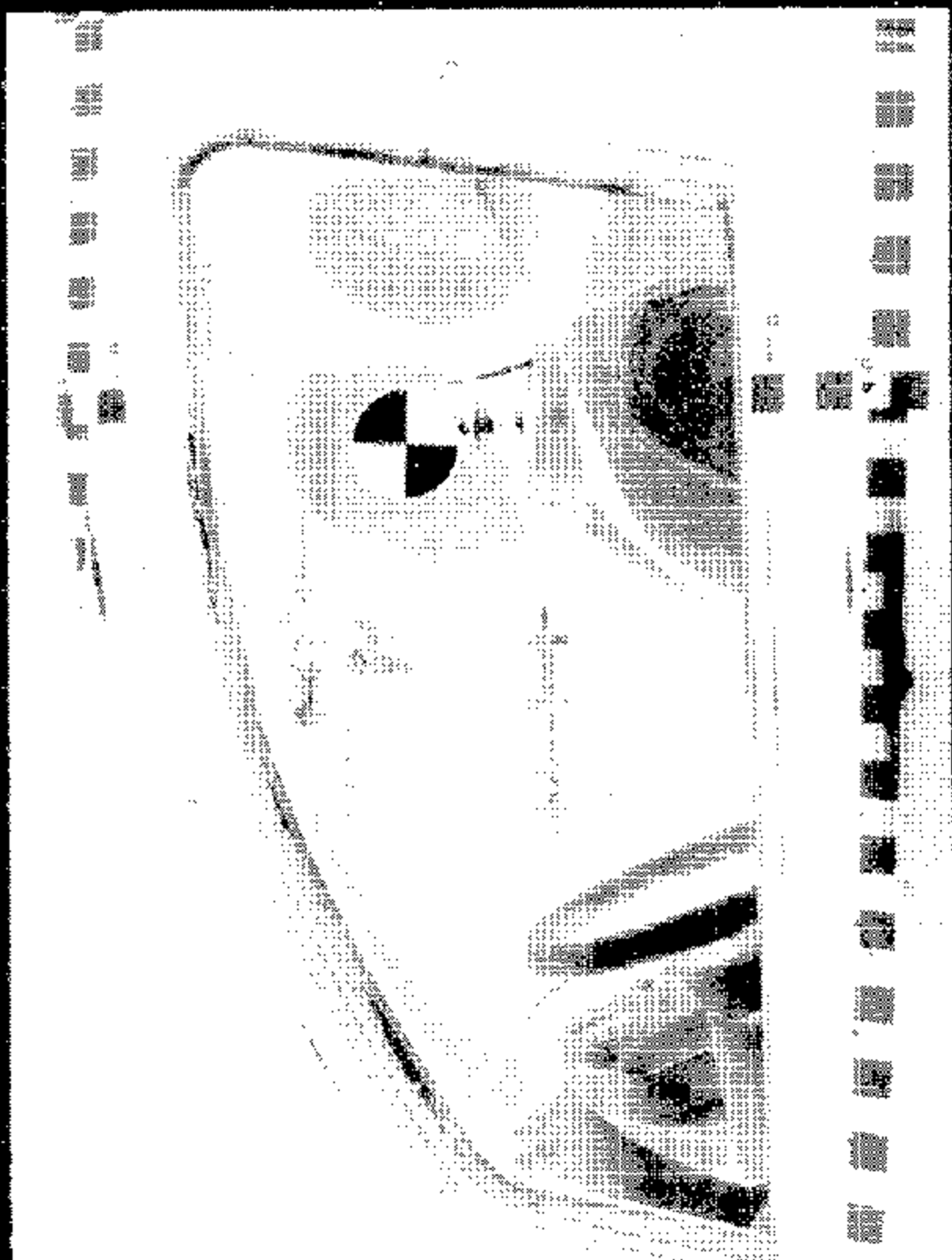
Post Test Overhead View of Test Vehicle
A-11



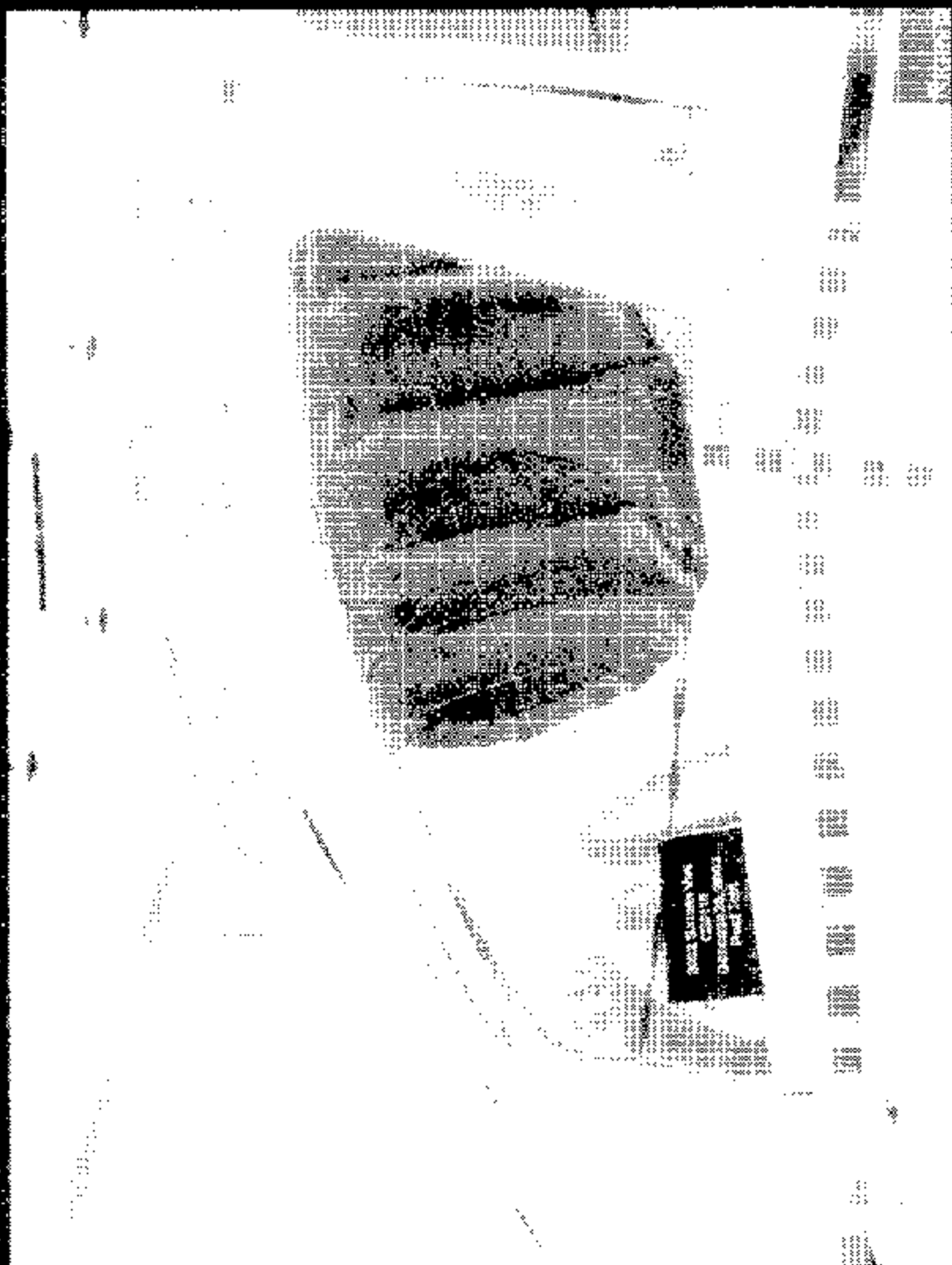
Pre-test Dummy Through Opposite Window
A-12



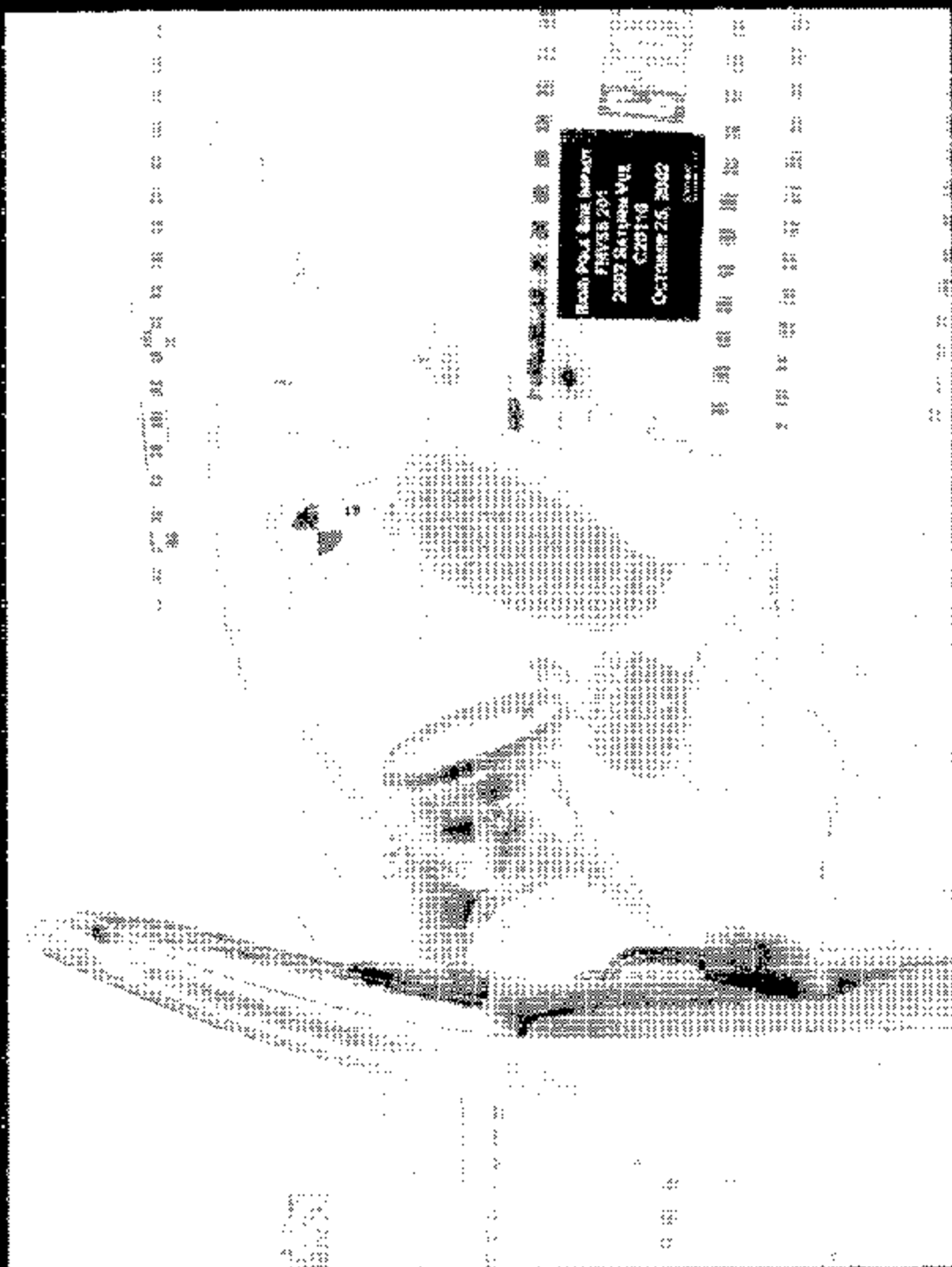
Post Test Dummy Through Opposite Window
A-13



Pre-test Dummy Impact Side View
A-14

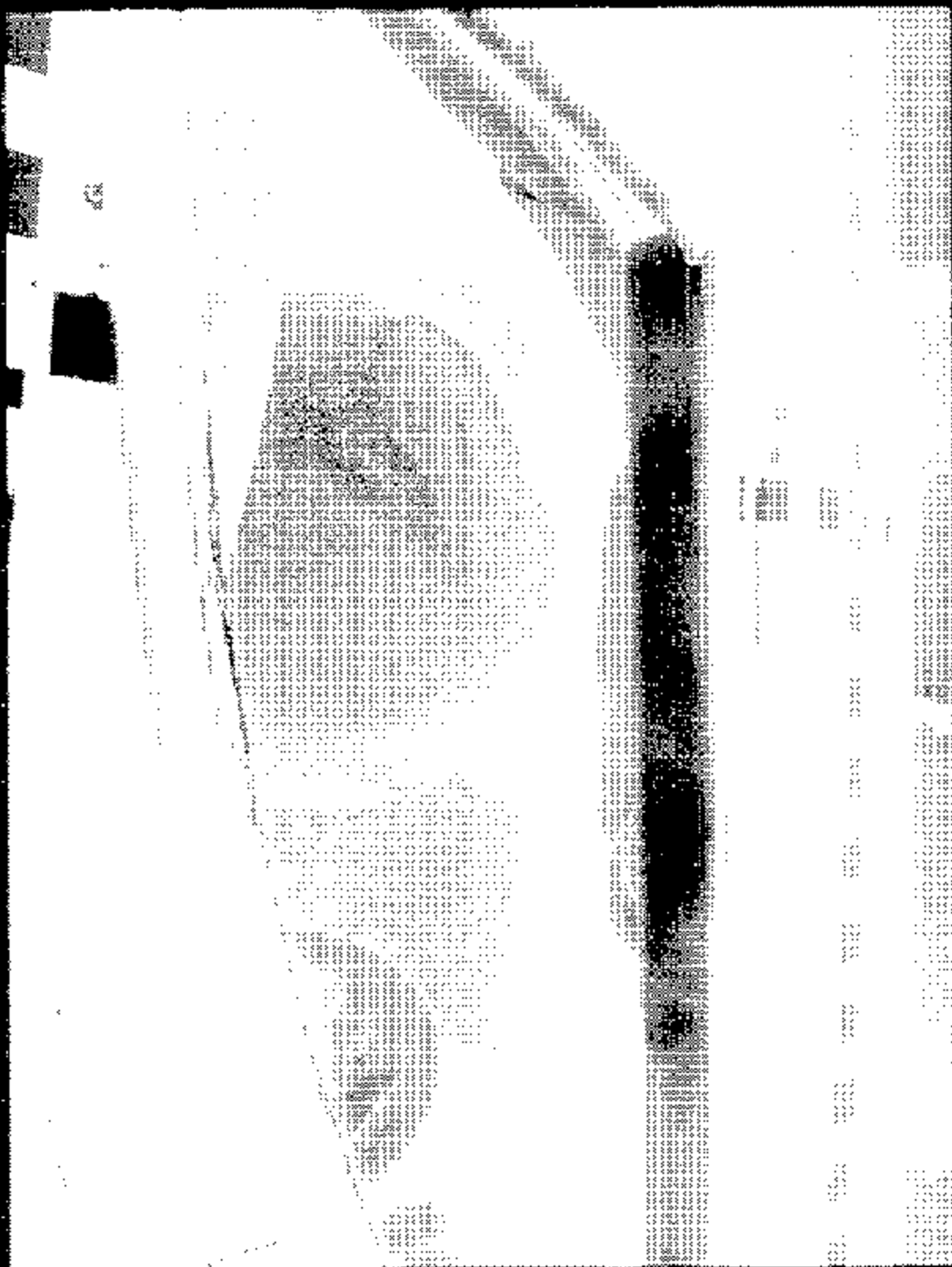


Post Test Dummy Impact Side View
A-15

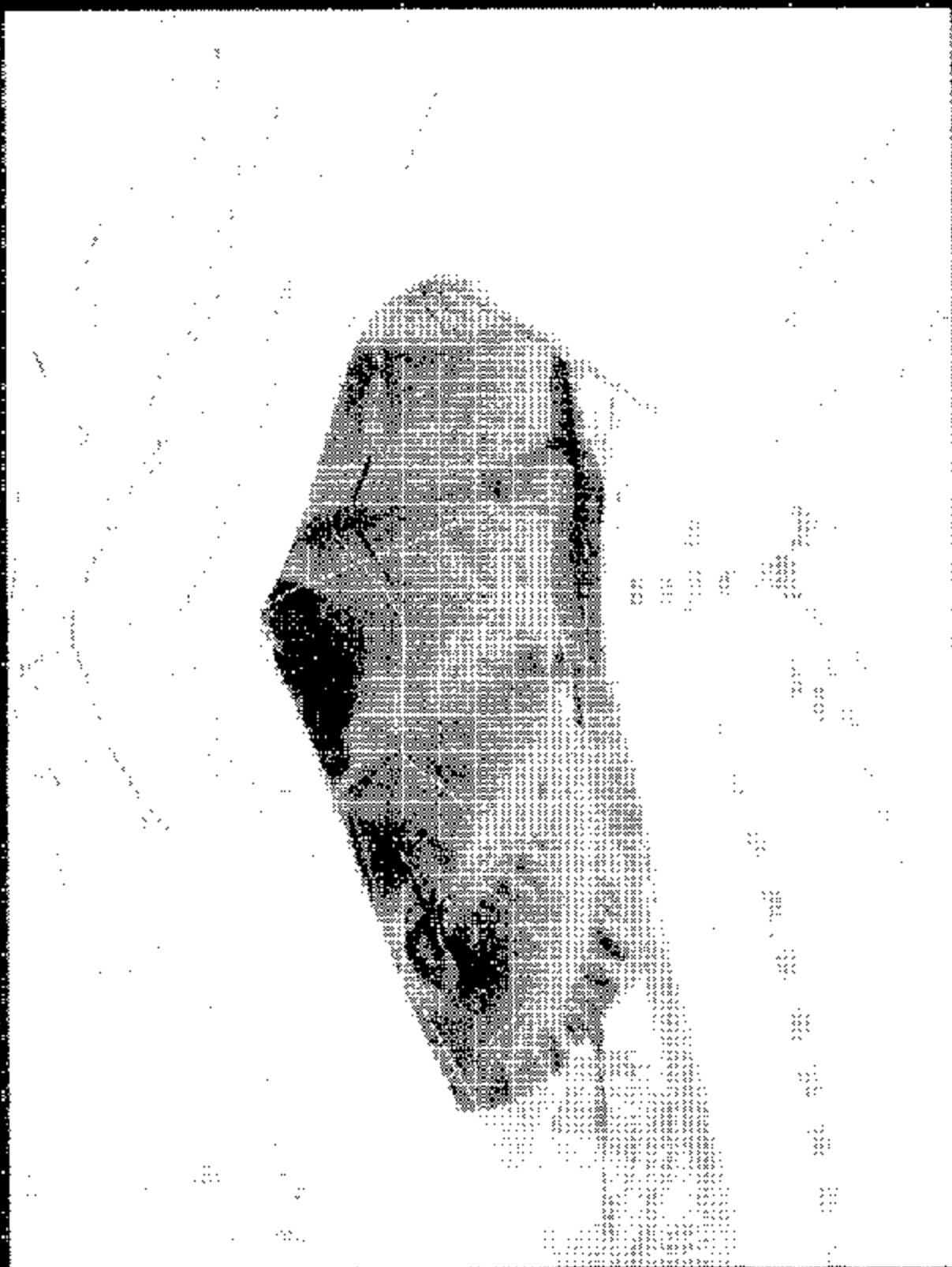


Black Box Data Report
FHVSS 201
2002 Series V01
C20110
October 26, 2002

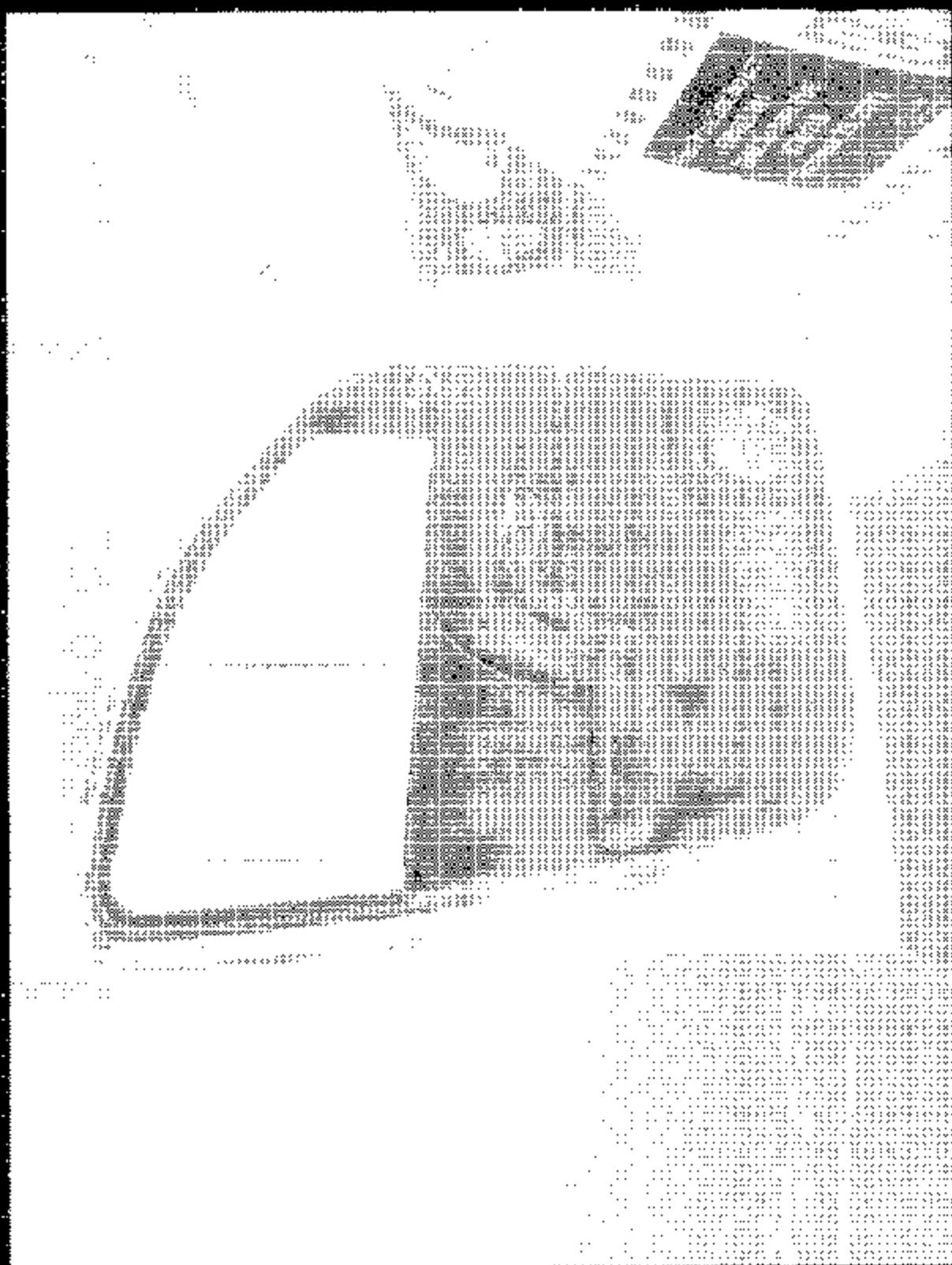
Pre-test Dummy Door Open
A-15



Pre-test Dummy Shoulder and Door Top View
A-17



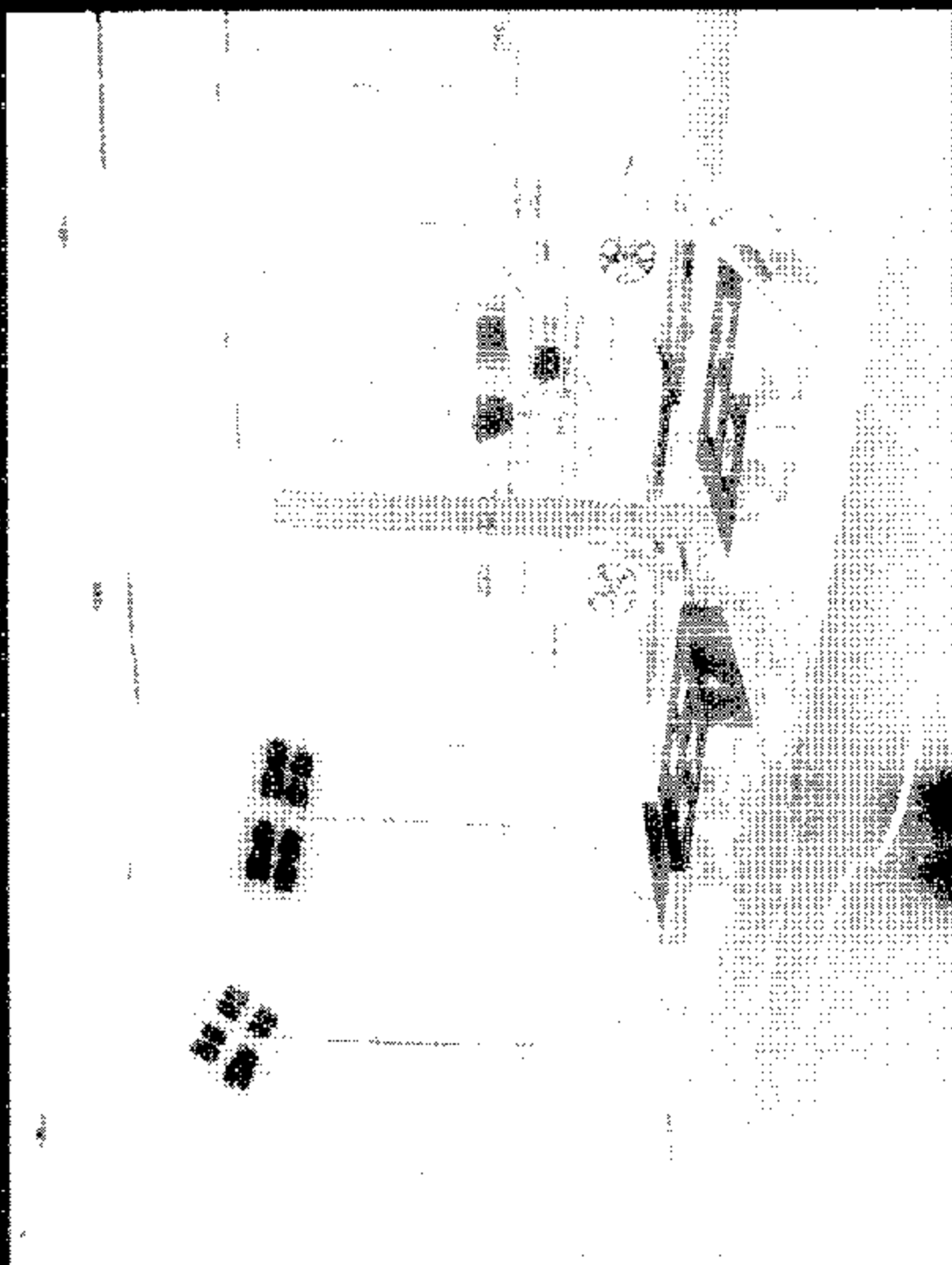
Post Test Dummy Shoulder and Door Top View
A-18



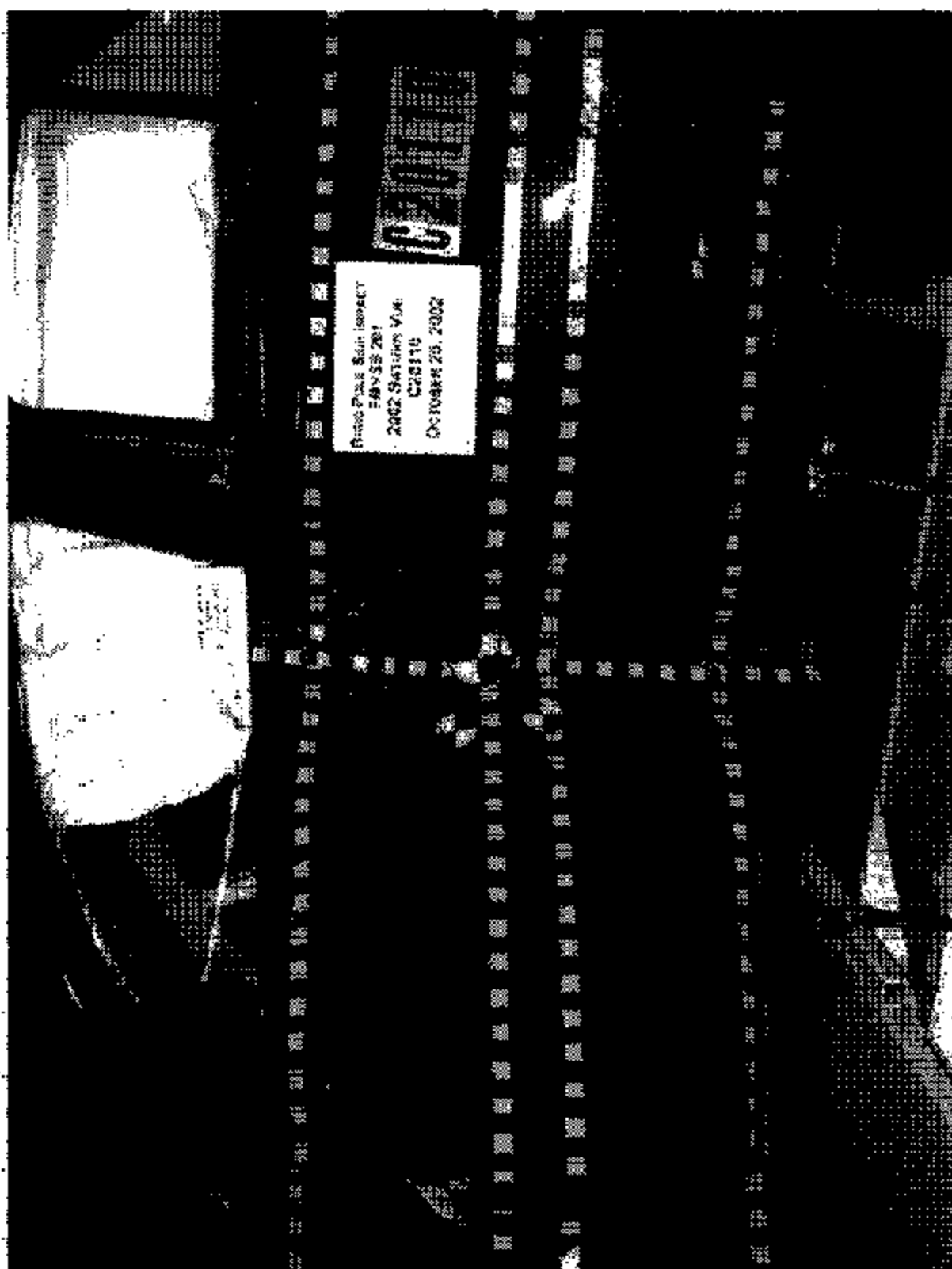
Pre-test Interior of Front Door



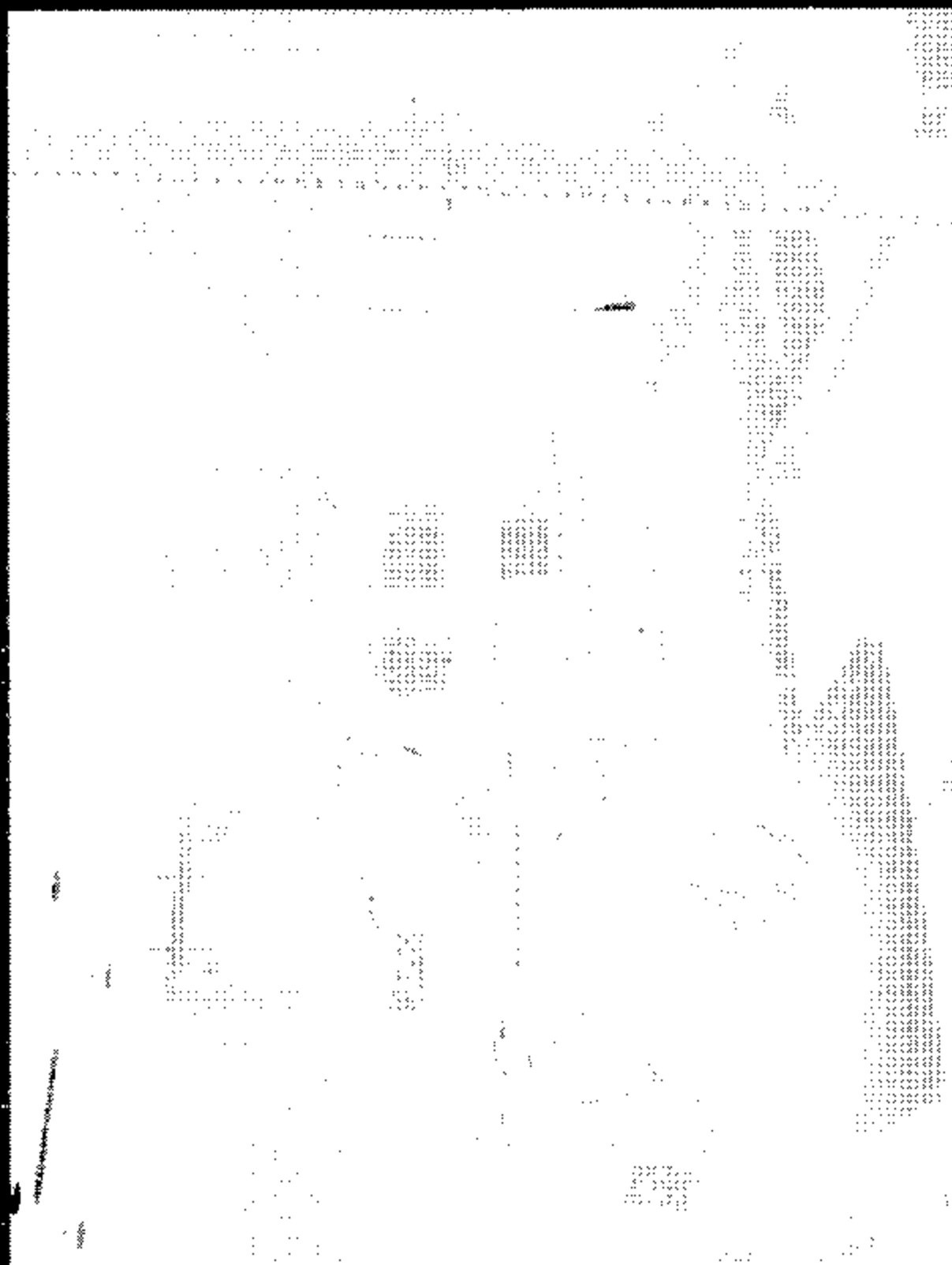
Post Test Interior of Front Door Showing SID/HIII Impact Locations



Impact
A-21



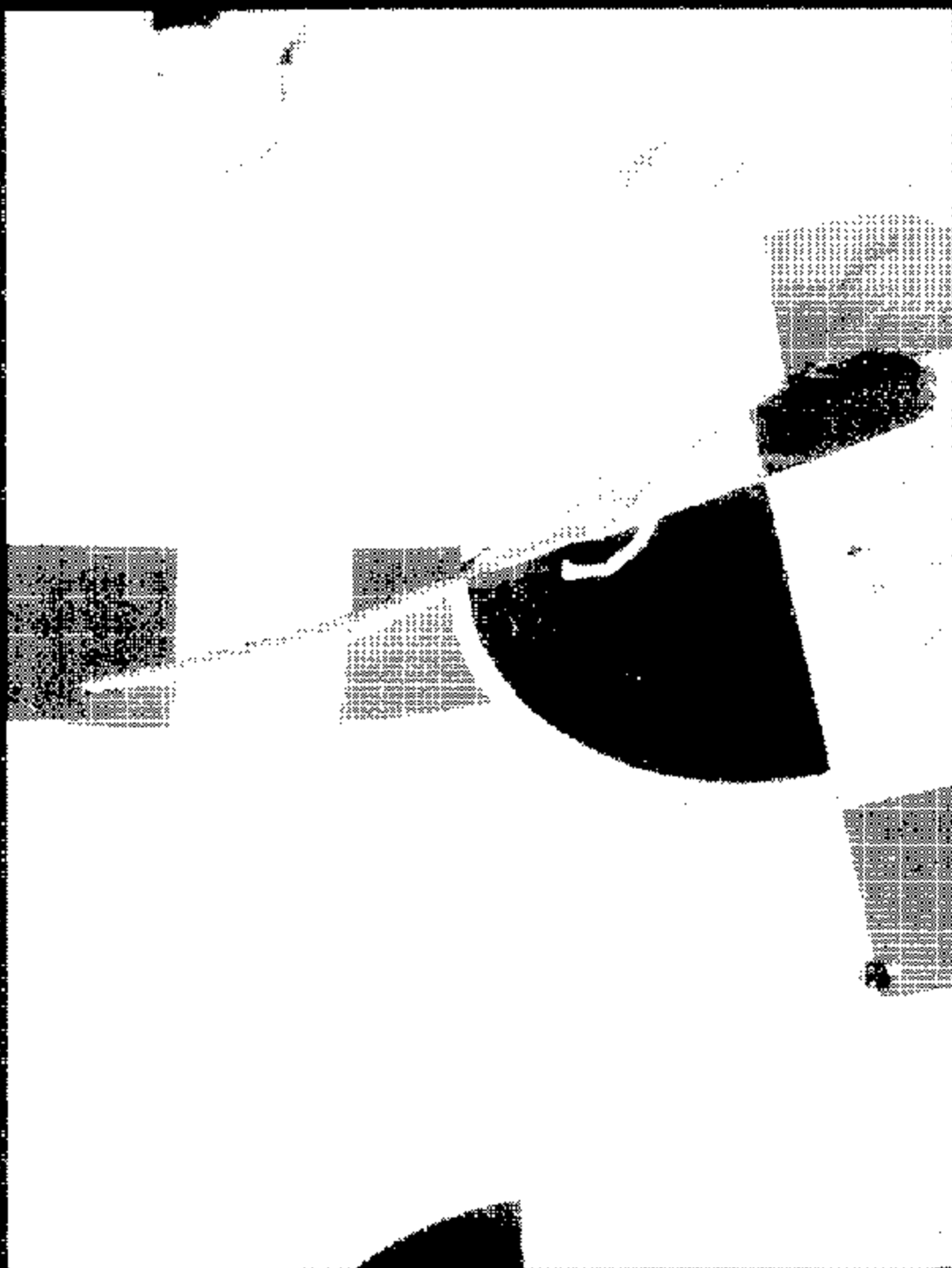
Post Test Impact Zone Close-up View
A-22



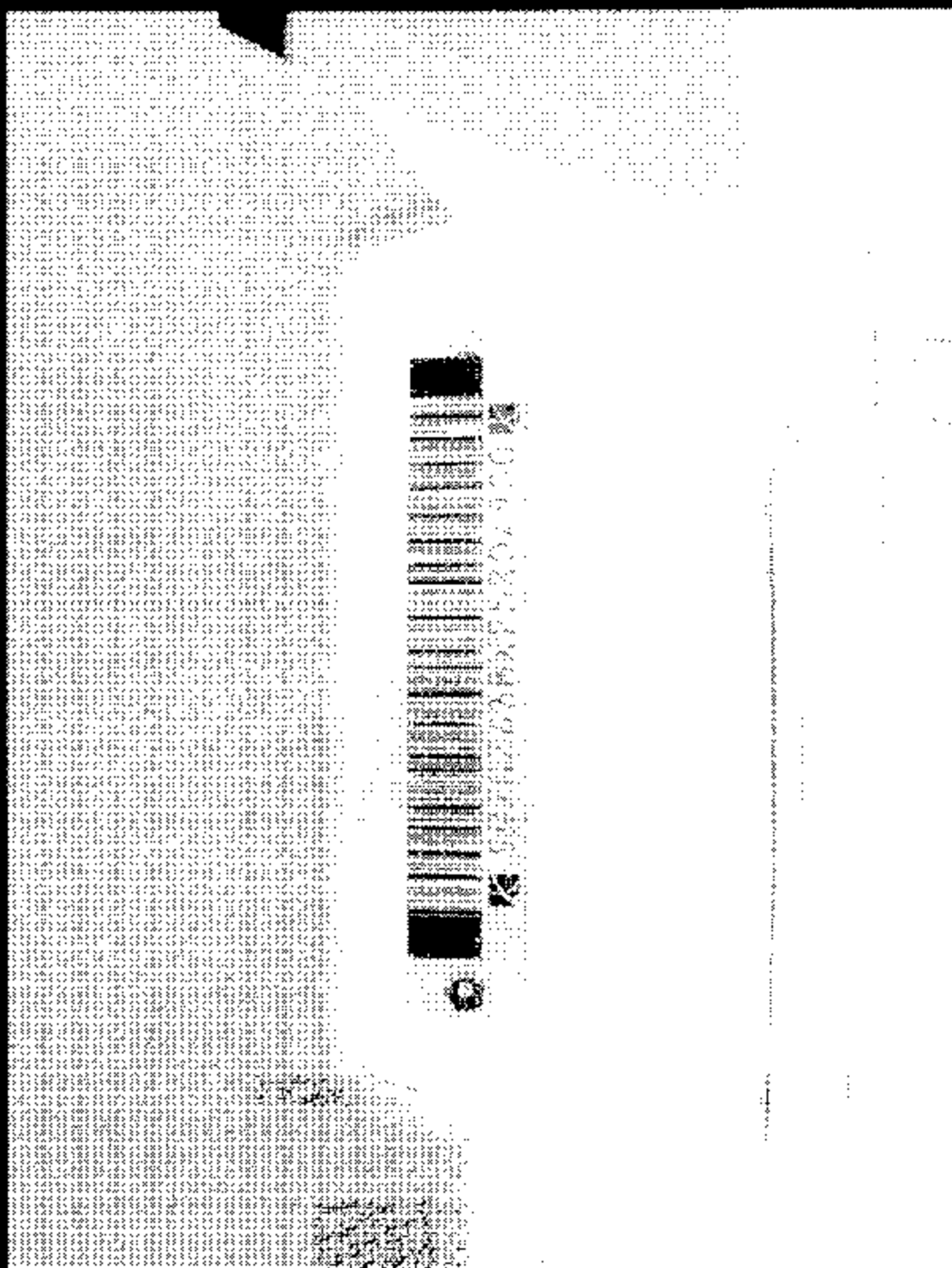
Post Test $\frac{3}{4}$ Front View of Impact Zone
A-29



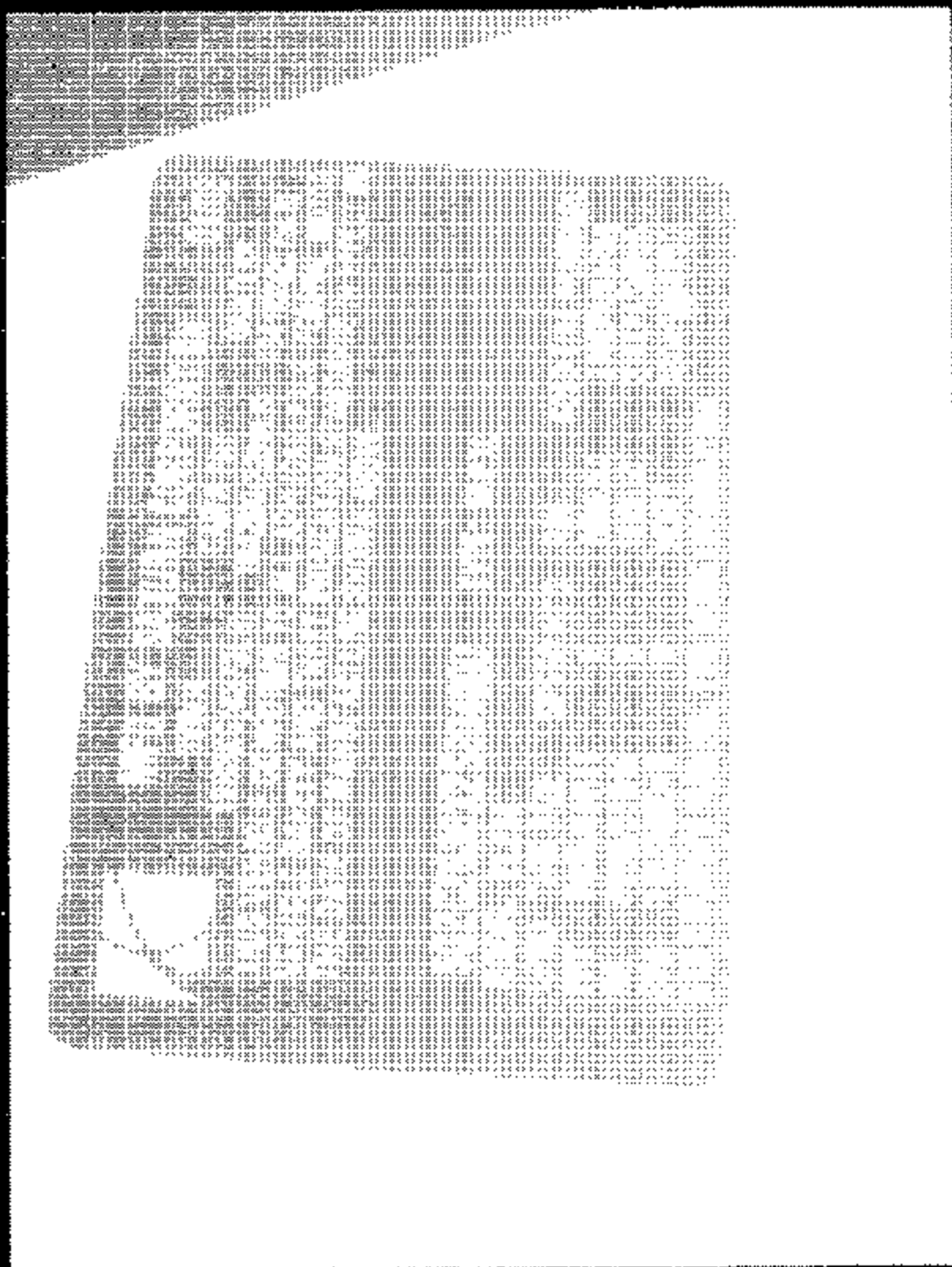
Post Test $\frac{3}{4}$ Rear View of Impact Zone



Post Test Close-up View of Impact Point Target
A-25



Close-up View of Vehicle's VIN Plate
A-26



Close-up View of Vehicle's Tire Placard Label
A-27

Appendix B – Vehicle and SID/HIII Response Data

Rigid Pole Side Impact Test

Test Data Summary

Test Vehicle: 2002 Saturn Vue

NHTSA No. C20110

Description	Units	Filter	Max Data	Max Data Time	Min Data	Min Data Time	*
<i>VHEAD.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Head (Ax)	g	CFC 1000	4.3	0.143	-8.6	0.064	1
Driver ATD Head (Vx)	kph	CFC 180	4.3	0.284	-8.0	0.113	1
Driver ATD Head (Ay)	g	CFC 1000	75.5	0.053	-8.6	0.181	
Driver ATD Head (Vy)	kph	CFC 180	20.8	0.072	-28.9	0.032	
Driver ATD Head (Az)	g	CFC 1000	15.9	0.041	-3.2	0.057	
Driver ATD Head (Vz)	kph	CFC 180	42.8	0.400	0.0	-0.084	
Driver ATD Head (Ar)	g	CFC 1000	75.7	0.053	0.0	-0.043	1
Driver HIC: 532.5 from 0.028 to 0.048 sec.							
<i>VUNCK.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Neck (Fx)	N	CFC 1000	230.5	0.071	-217.5	0.054	1
Driver ATD Neck (Fy)	N	CFC 1000	681.1	0.050	-328.8	0.181	1
Driver ATD Neck (Fz)	N	CFC 1000	996.1	0.049	-184.4	0.062	1
Driver ATD Neck (Mx)	N-m	CFC 600	11.5	0.110	-85.1	0.050	1
Driver ATD Neck (My)	N-m	CFC 600	17.4	0.071	-15.4	0.154	1
Driver ATD Neck (Mz)	N-m	CFC 600	9.9	0.057	-10.5	0.211	
<i>VRBLSPL.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	CFC 1000	55.6	0.034	-42.0	0.040	1
Driver ATD Lower Rib (Ay)	g	CFC 1000	73.0	0.040	-68.0	0.040	1
Driver ATD Lower Spine (Ay)	g	CFC 1000	55.2	0.041	-9.5	0.073	1
Driver ATD Pelvis (Ay)	g	CFC 1000	51.5	0.040	-12.7	0.075	1
<i>VCG.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Vehicle Tunnel Near C.G. (Ax)	g	CFC 60	5.1	0.053	-4.0	0.033	
Vehicle Tunnel Near C.G. (Vx)	kph	CFC 180	1.7	0.170	-0.9	0.039	
Vehicle Tunnel Near C.G. (Ay)	g	CFC 60	10.2	0.016	-1.3	-0.003	1
Vehicle Tunnel Near C.G. (Vy)	kph	CFC 180	-14.1	0.400	-28.6	0.002	1
Vehicle Tunnel Near C.G. (Az)	g	CFC 60	6.5	0.032	-18.0	0.053	
Vehicle Tunnel Near C.G. (Vz)	kph	CFC 180	2.9	0.298	-2.9	0.059	
Vehicle Tunnel Near C.G. (Ar)	g	CFC 60	18.7	0.053	0.0	-0.045	1
<i>VRPY.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Vehicle Tunnel Near C.G. - Roll	deg/sec	CFC 180	356.3	0.056	-526.3	0.046	
Vehicle Tunnel Near C.G. - Pitch	deg/sec	CFC 180	74.6	0.039	-174.6	0.066	
Vehicle Tunnel Near C.G. - Yaw	deg/sec	CFC 180	78.4	0.047	-11.0	0.033	1
<i>VROOFFLOR.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left Floor Sill (Ay)	g	CFC 60	39.1	0.016	-16.1	0.026	
Left Floor Sill (Vy)	kph	CFC 180	-4.8	0.202	-28.6	0.001	
<i>VLAP.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left A-Pillar Sill (Ay)	g	CFC 60	18.6	0.020	-4.0	0.011	1
Left A-Pillar Sill (Vy)	kph	CFC 180	-0.1	0.242	-29.3	0.013	1

Left A-Pillar Low (Ay)	g	CFC 60	13.6	0.019	-5.2	0.004	1
Left A-Pillar Low (Vy)	kph	CFC 180	6.5	0.386	-28.7	0.000	1
Left A-Pillar Mid (Ay)	g	CFC 60	17.6	0.061	-2.5	-0.002	
Left A-Pillar Mid (Vy)	kph	CFC 180	45.8	0.400	-28.7	0.001	
<i>VLBPSEAT.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left B-Pillar SIII (Ay)	g	CFC 60	67.2	0.013	-17.5	0.008	
Left B-Pillar SIII (Vy)	kph	CFC 180	4.9	0.215	-29.1	0.011	
Driver Seat Track (Ay)	g	CFC 60	41.3	0.032	-2.4	0.001	
Driver Seat Track (Vy)	kph	CFC 180	5.8	0.398	-28.8	0.003	
<i>VENGFWAL.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Engine (Ax)	g	CFC 60	5.4	0.075	-4.7	0.038	
Engine (Vx)	kph	CFC 180	1.1	0.150	-3.3	0.063	
Engine (Ay)	g	CFC 60	12.5	0.057	-2.9	0.238	
Engine (Vy)	kph	CFC 180	2.3	0.154	-28.5	0.006	
Firewall (Ay)	g	CFC 60	10.6	0.062	-1.9	0.000	
Firewall (Vy)	kph	CFC 180	0.8	0.171	-28.7	0.003	
<i>VROOFFLR.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Right Roof Rail (Ay)	g	CFC 60	17.4	0.037	-2.0	0.045	
Right Roof Rail (Vy)	kph	CFC 180	3.3	0.213	-28.5	0.002	
Right Floor SIII (Ay)	g	CFC 60	15.4	0.043	-5.9	0.035	
Right Floor SIII (Vy)	kph	CFC 180	1.4	0.171	-28.5	0.002	
Rear Deck (Ax)	g	CFC 60	3.5	0.048	-2.7	0.085	
Rear Deck (Vx)	kph	CFC 180	1.5	0.068	-2.0	0.400	
Rear Deck (Ay)	g	CFC 60	0.4	0.072	-0.1	0.076	1
Rear Deck (Vy)	kph	CFC 180	-28.5	0.004	-28.7	0.391	1
<i>VFIR100.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	Fir 100	54.8	0.034	-5.9	0.144	
Driver ATD Upper Rib (Vy)	kph	Fir 100	8.9	0.077	-28.5	0.000	
Driver ATD Lower Rib (Ay)	g	Fir 100	62.8	0.038	-13.5	0.039	
Driver ATD Lower Rib (Vy)	kph	Fir 100	10.4	0.280	-28.5	-0.084	
Driver ATD Lower Spine (Ay)	g	Fir 100	52.8	0.040	-8.5	0.073	
Driver ATD Lower Spine (Vy)	kph	Fir 100	7.4	0.064	-28.5	-0.084	
Driver ATD Pelvis (Ay)	g	Fir 100	51.5	0.040	-11.5	0.075	
Driver ATD Pelvis (Vy)	kph	Fir 100	4.5	0.246	-28.5	-0.084	
Driver TTI [g]: 53.07							

*** Comments:**

1 - See Data Acquisition Explanations, p. 2-2

Notes for electronic files:

-File root names are listed above (e.g., VHEAD, VUNCK); all have extension FEU (formatted engrg. units) unless otherwise noted.

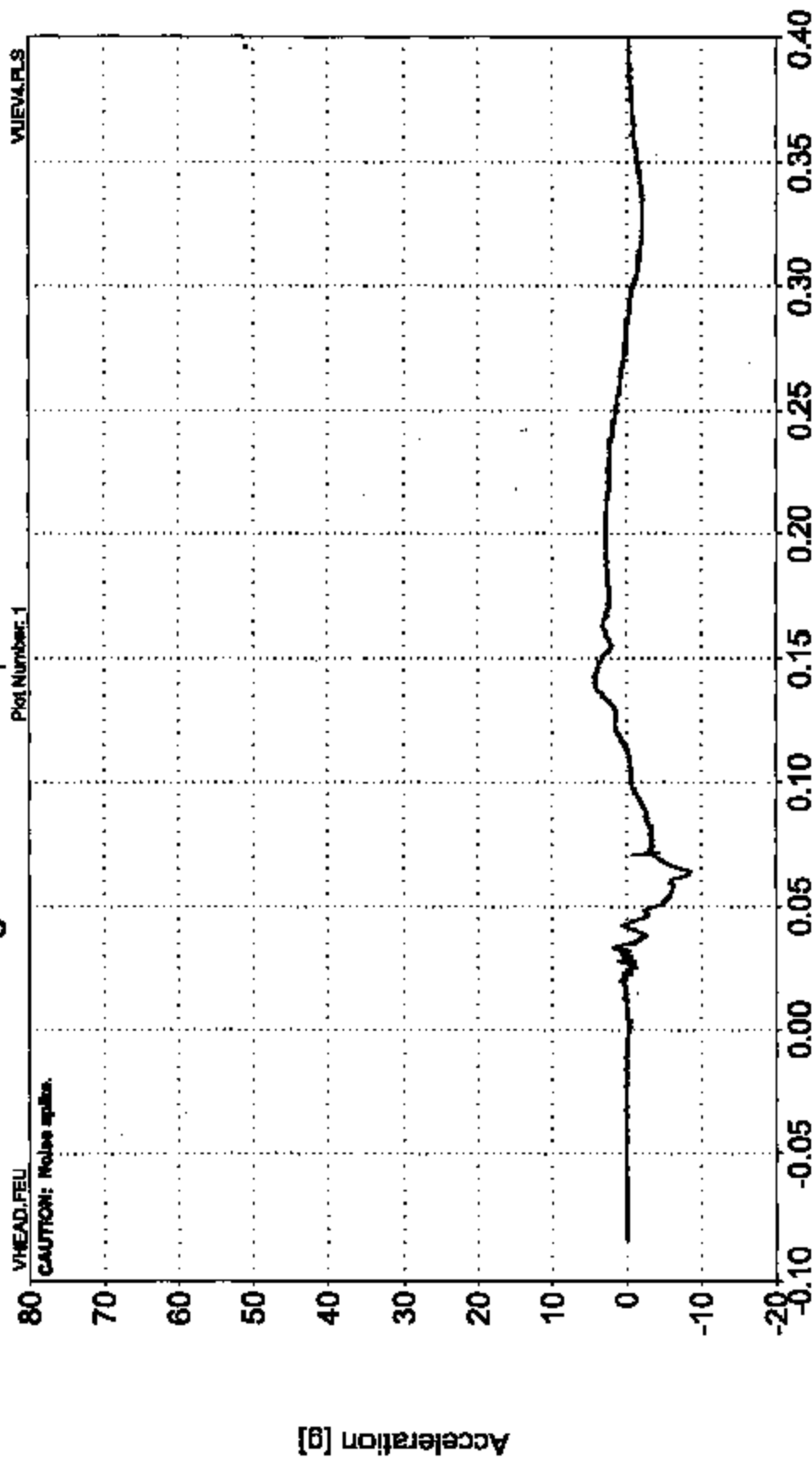
-Each file has time (seconds) in the first column, followed by the data listed above, in the order listed (excluding HIC, TTI).

Longitudinal Acceleration v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Min: 4.5 g @ 0.1425 sec.
Data Max: 4.8 g @ 0.0535 sec.

Rigid Pole Side Impact Test
PH07208

Time [s]

Exponent

Failure Analysis Associates®

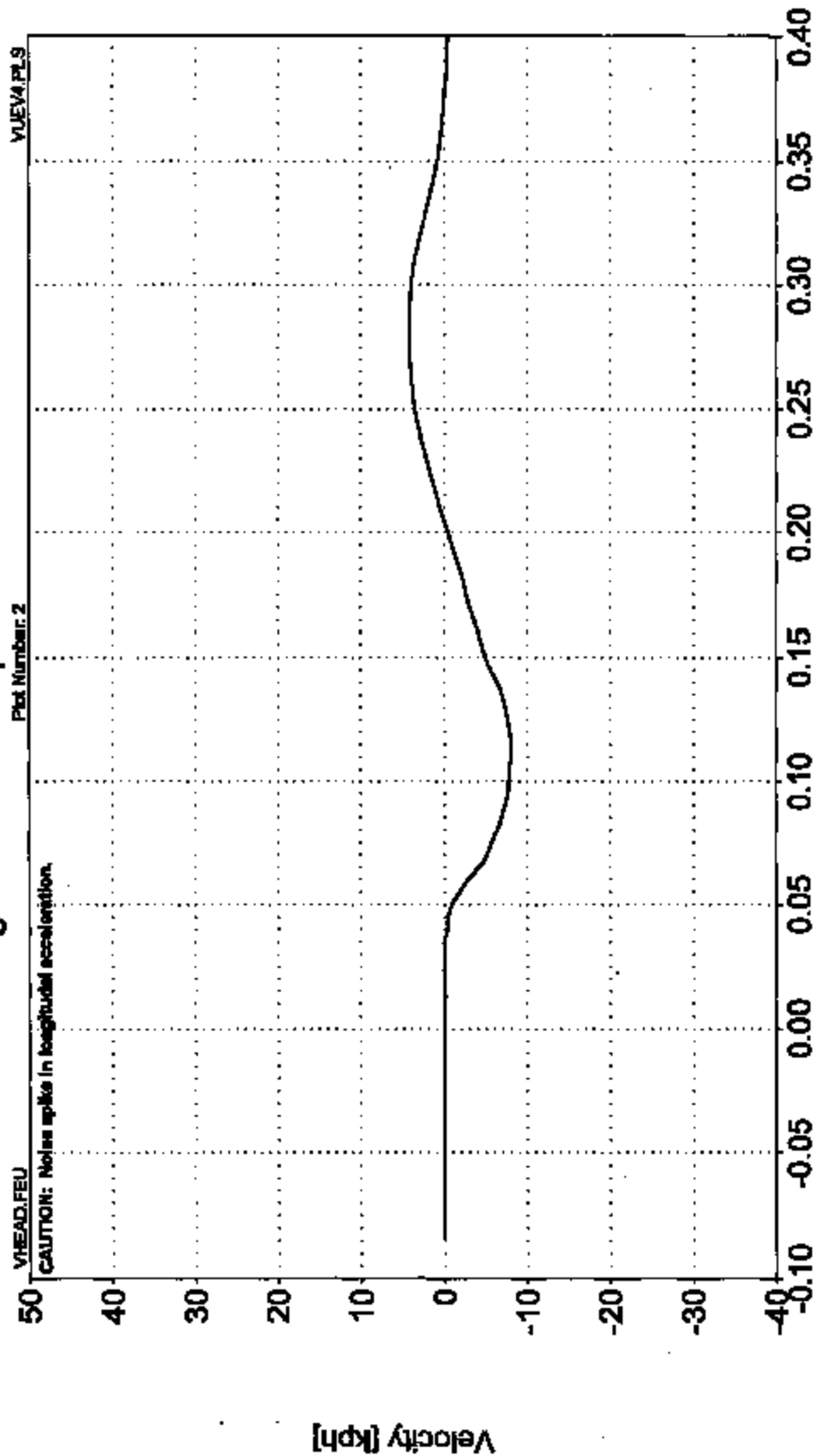
B-4

Longitudinal Velocity v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Min: 4.0 kph @ 0.250 sec
Data Max: 4.0 kph @ 0.1134 sec

Rigid Pole Side Impact Test
PH07336

Time [s]

Exponent

Failure Analysis Associates

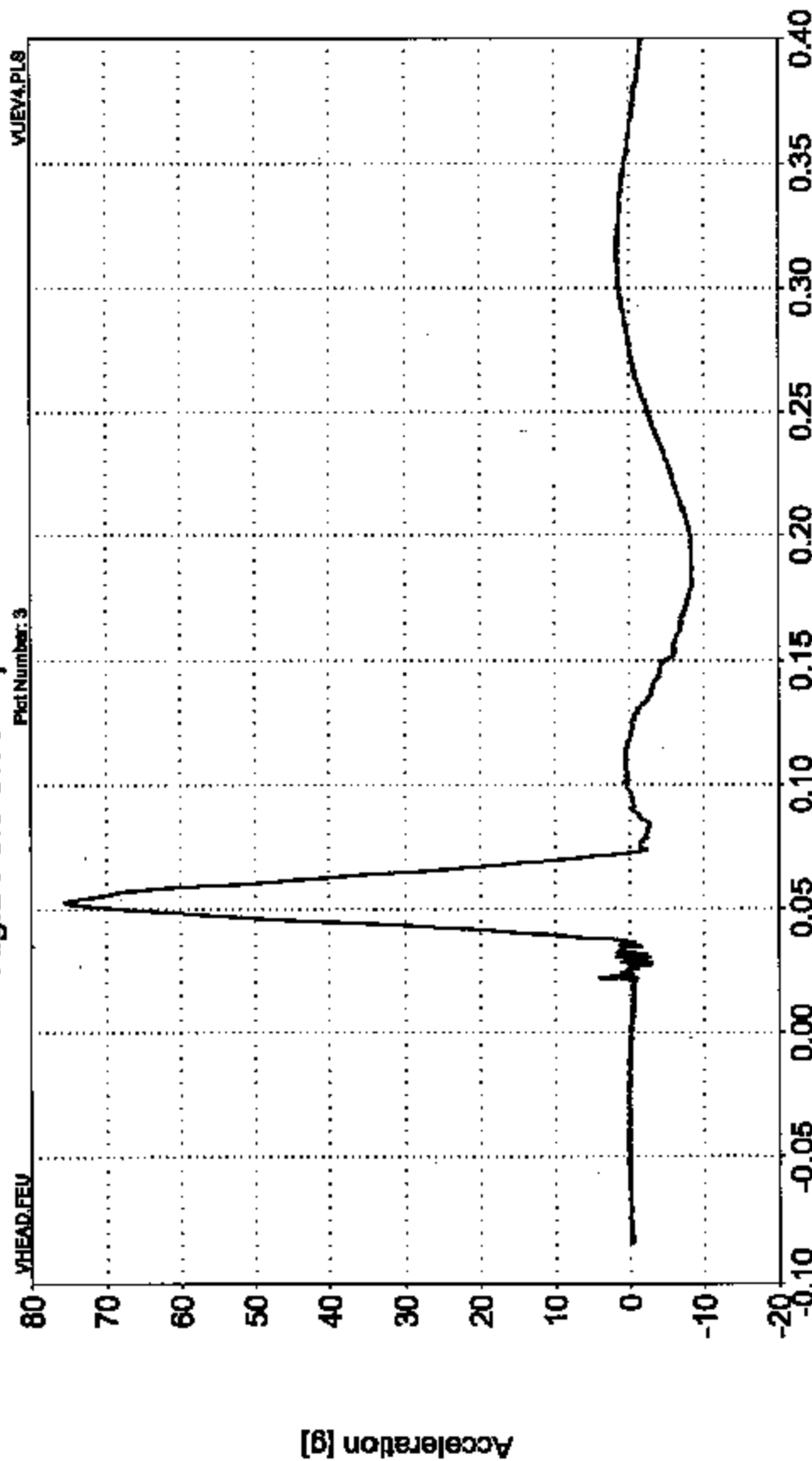
B-5

Lateral Acceleration v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 75.5 g @ 0.0505 sec.
Data Min: -8.8 g @ 0.1614 sec.

Time [s]

Rigid Pole Side Impact Test
PH07338

B-6

Exponent

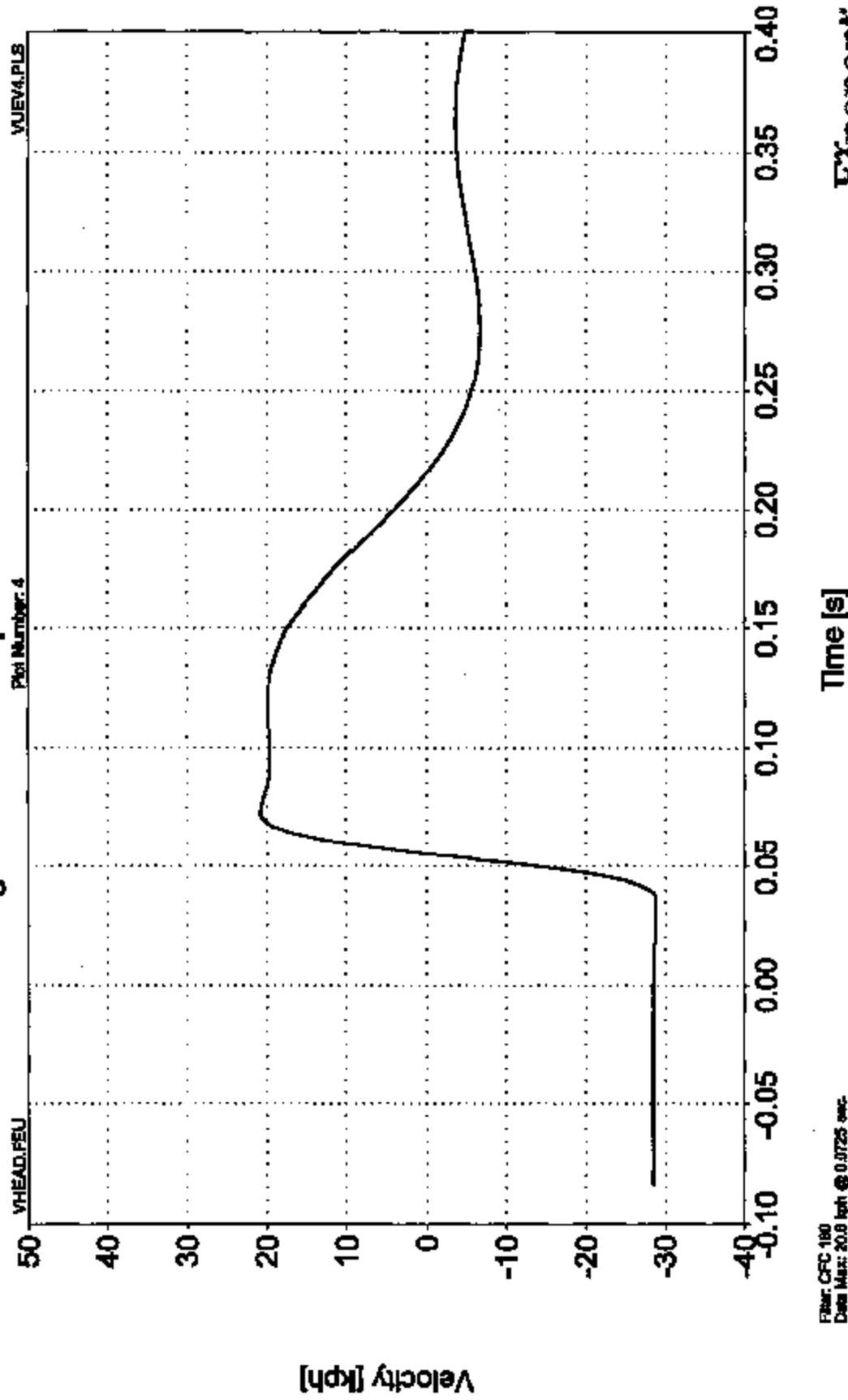
Failure Analysis Associates*

Lateral Velocity v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Max: 20.8 kph @ 0.0725 sec
Data Min: -28.9 kph @ 0.0320 sec

Rigid Pole Side Impact Test
PH07336

Time [s]

Exponent

Failure Analysis Associates*

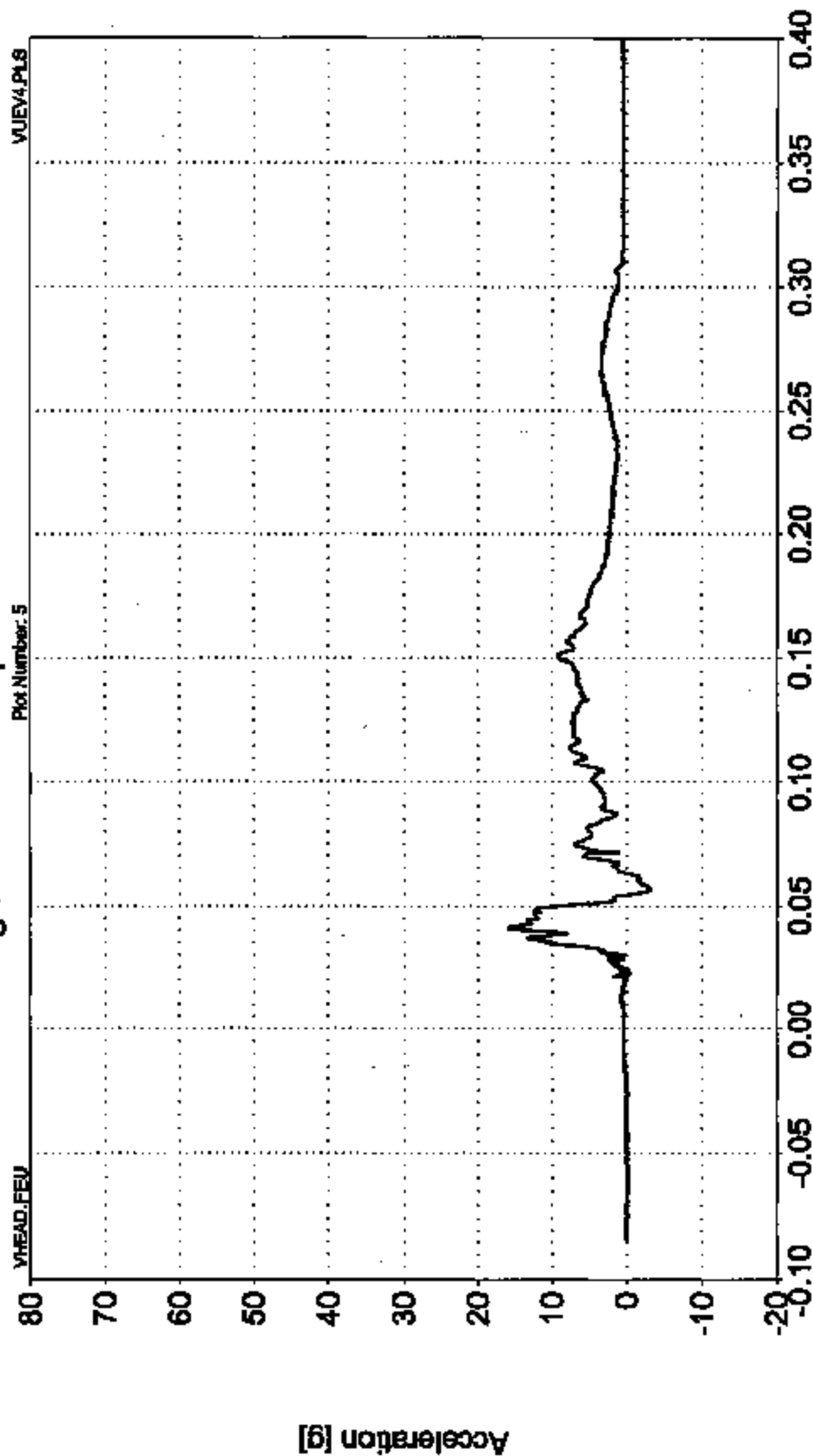
B-7

Vertical Acceleration v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 15.9 g @ 0.0406 sec.
Data Min: -3.2 g @ 0.0609 sec.

Rigid Pole Side Impact Test
P1107306

Time [s]

B-8

Exponent

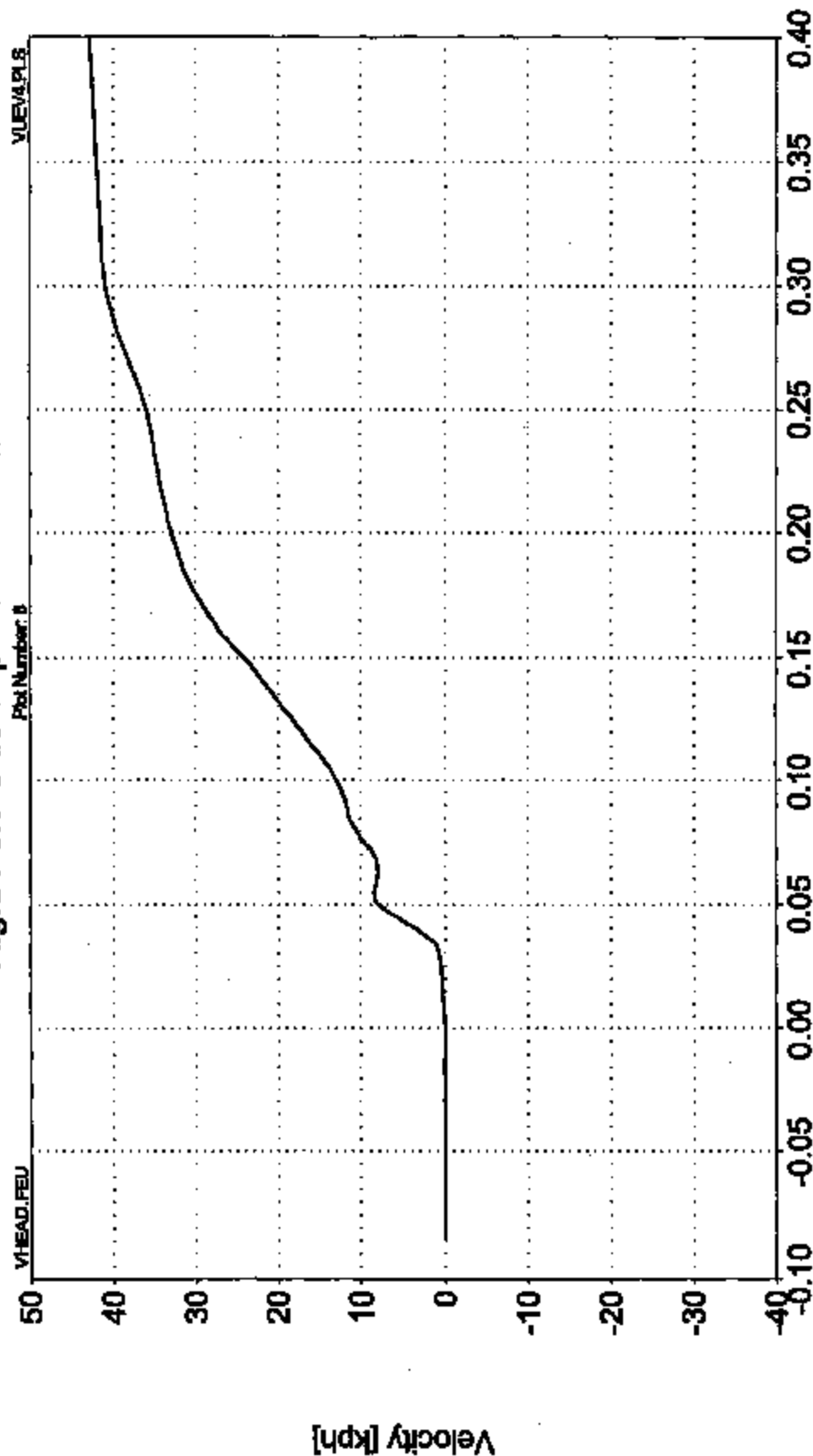
Failure Analysis Associates®

Vertical Velocity v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



File: CFC 100
Data Max: 42.0 kph @ 0.0500 sec.
Data Min: -38.0 kph @ 0.3000 sec.

Rigid Pole Side Impact Test
P4907336

Time [s]

B-8

Exponent

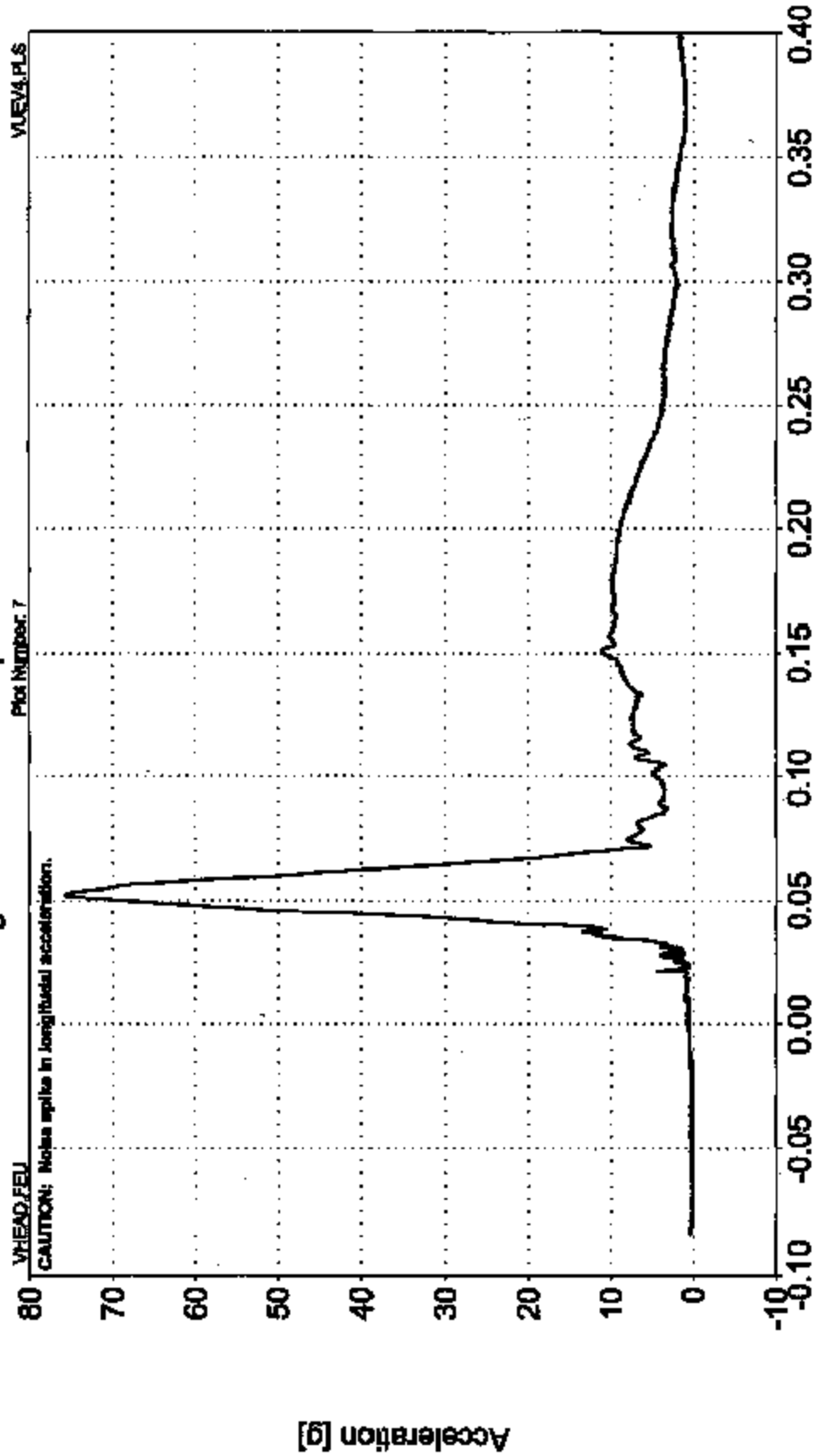
Failure Analysis Associates*

Resultant Acceleration v Time

Driver ATD Head

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 75.7 g @ 0.0526 sec.
Data Min: 0.0 g @ -0.0494 sec.

Rigid Pole Side Impact Test
P1107338

Time [s]

B-10

Exponent

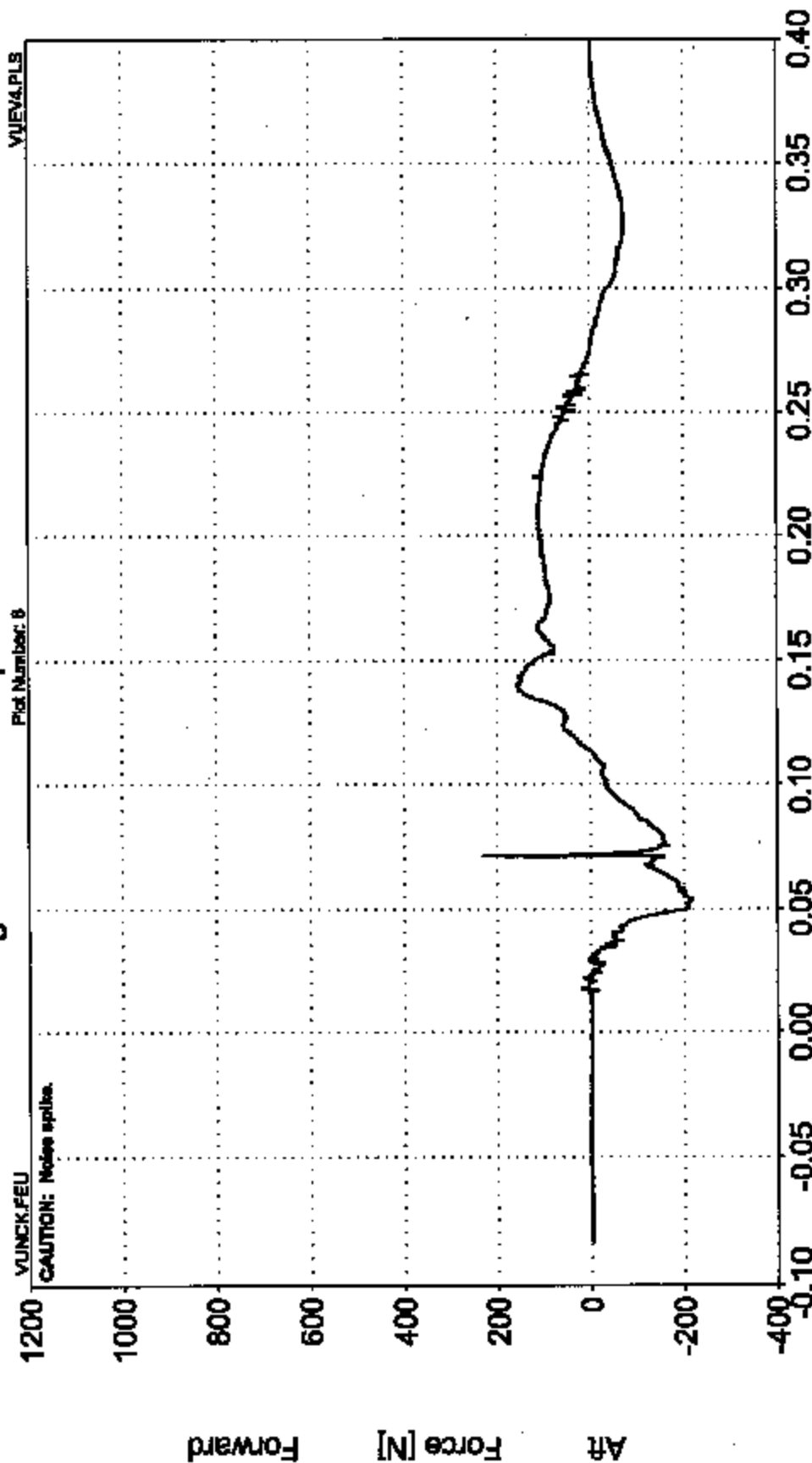
Failure Analysis Associates®

Long. Neck Force on Head (Fx) v Time

Driver ATD Neck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 230.5 N @ 0.0712 sec.
Data Min: -217.6 N @ 0.0640 sec.

Rigid Pole Side Impact Test
PI-07336

Time [s]

B-11

Exponent

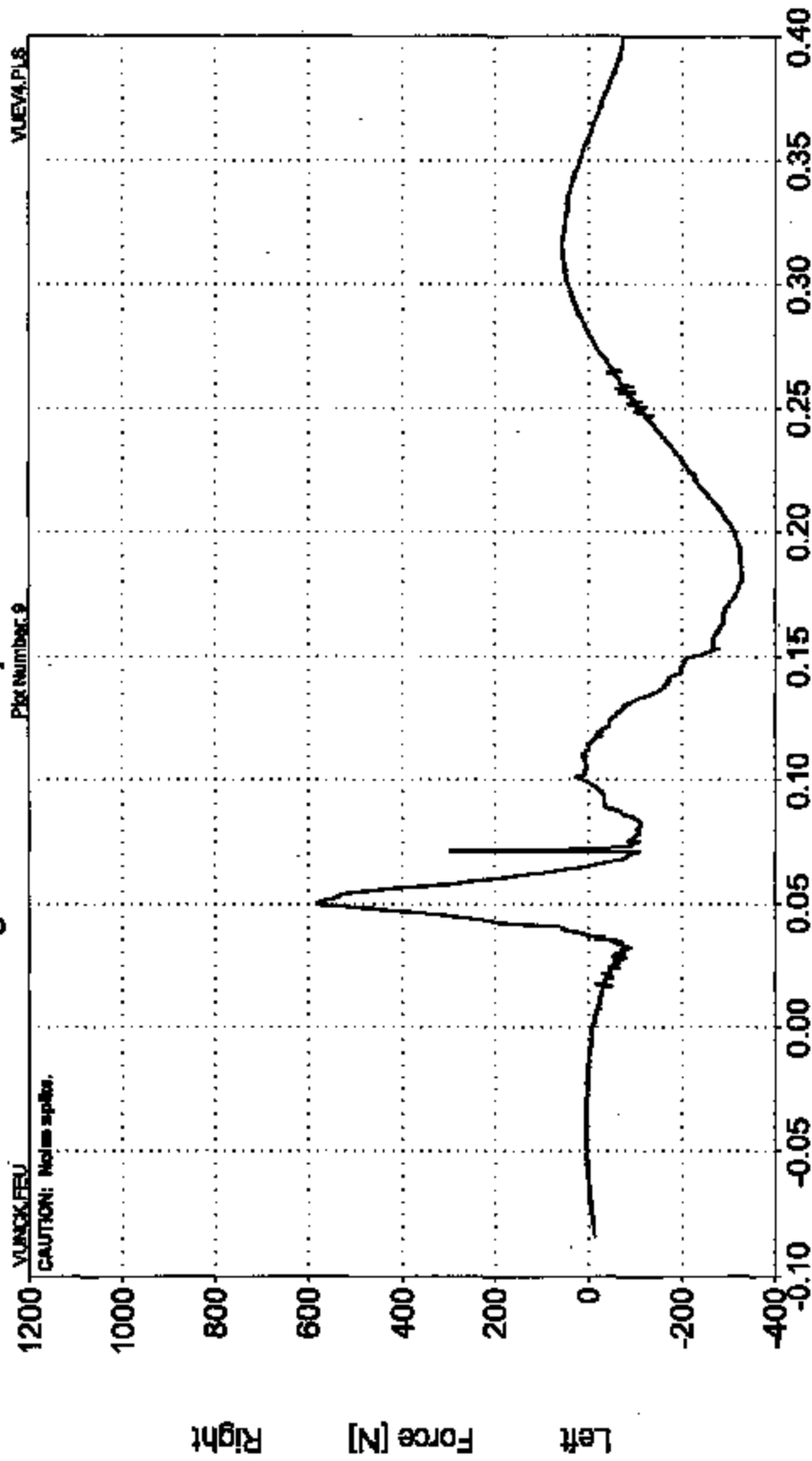
Failure Analysis Associates*

Lateral Neck Force on Head (Fy) v Time

Driver ATD Neck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 651.1 N @ 0.0502 sec.
Data Min: -320.8 N @ 0.1613 sec.

Rigid Pole Side Impact Test
PH07609

Time [s]

B-12

Exponent

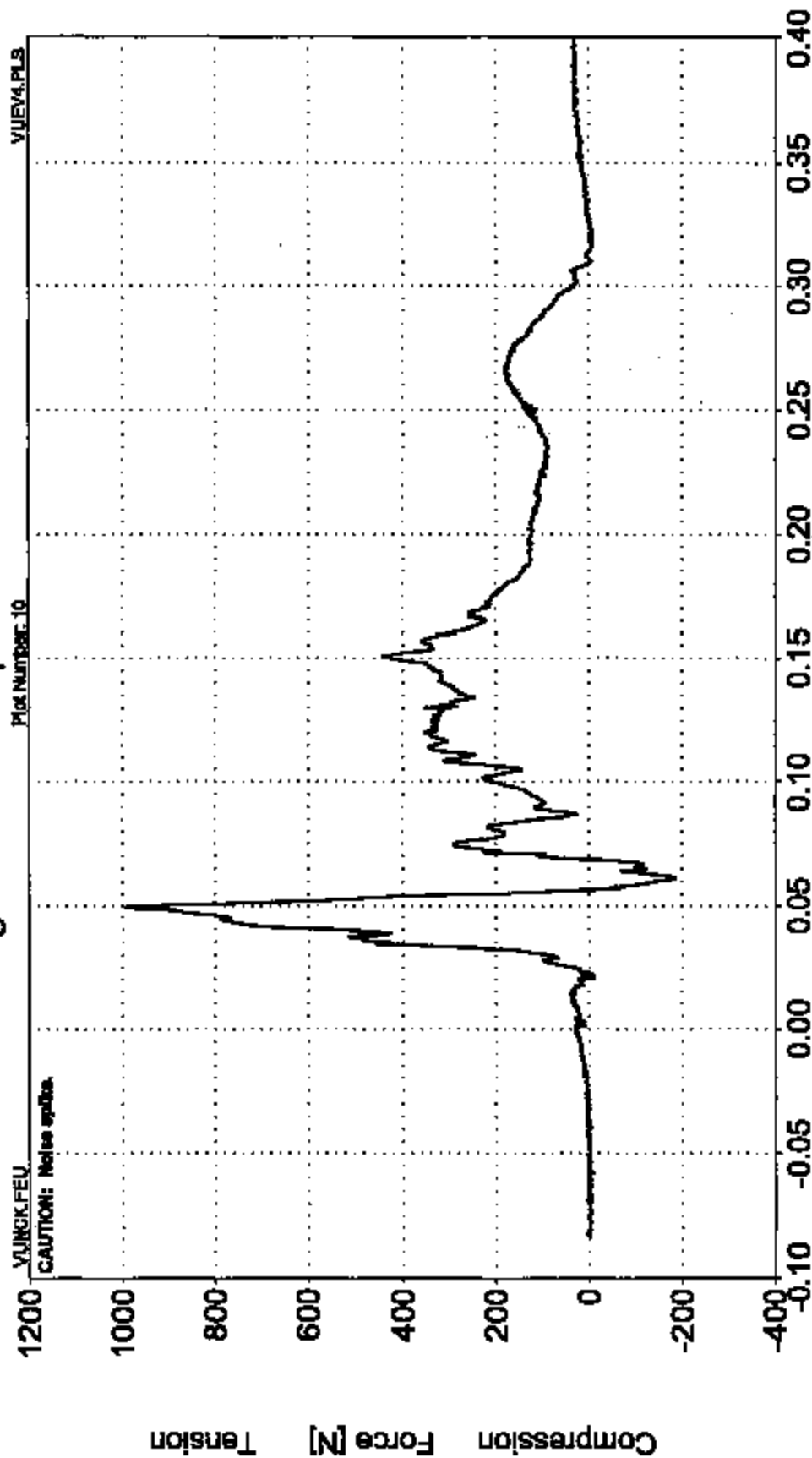
Failure Analysis Associates®

Vertical Neck Force on Head (Fz) v Time

Driver ATD Neck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 983.1 N @ 0.0493 sec.
Data Min: -184.4 N @ 0.0616 sec.

Rigid Pole Side Impact Test

PH0703B

Time [s]

B-13

Exponent

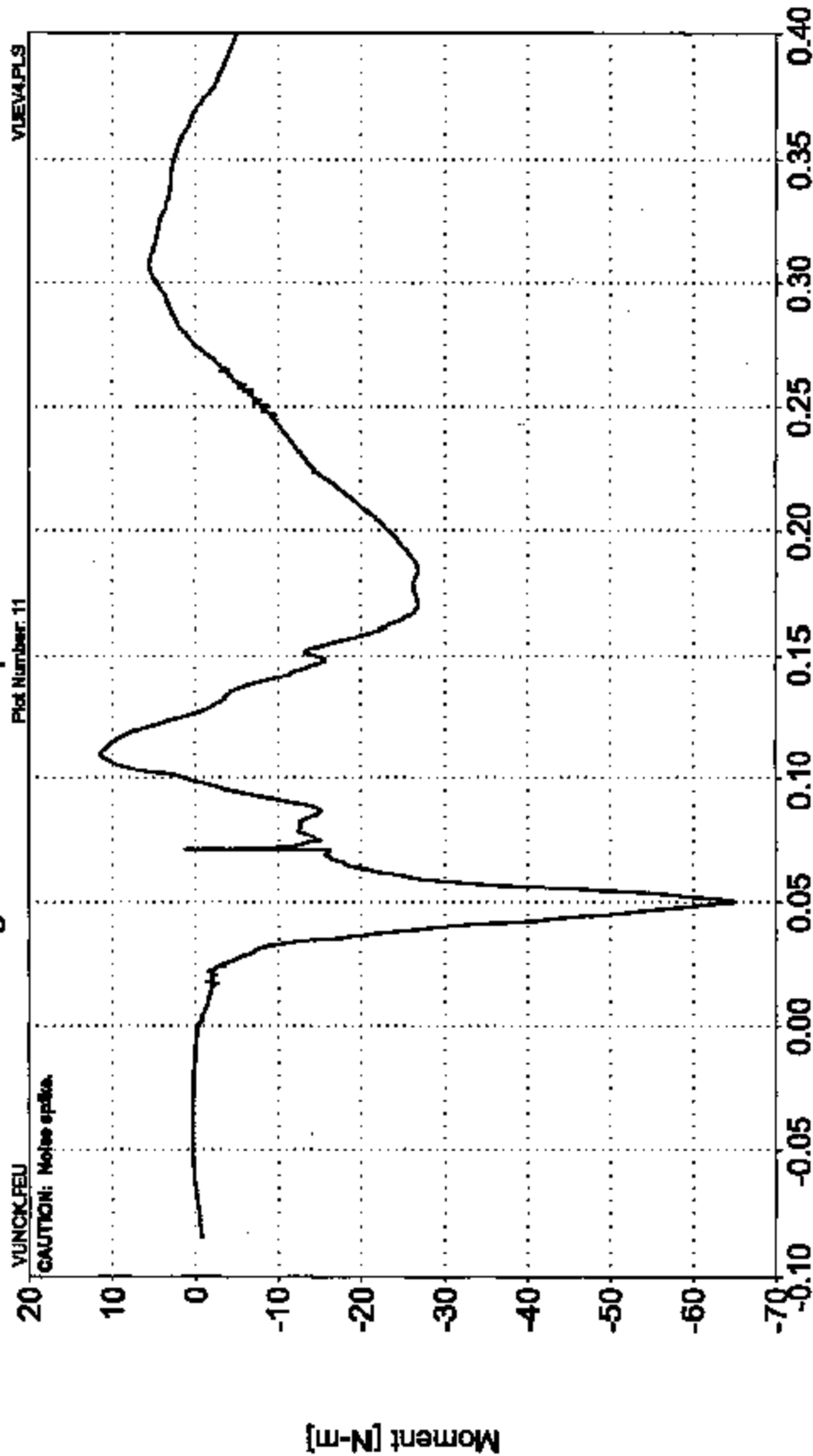
Failure Analysis Associates*

Lateral Neck Moment (Mx) v Time

Driver ATD Neck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



File: CFC 002
Data Max: 11.5 N-m @ 0.1104 sec.
Data Min: -65.1 N-m @ 0.0801 sec.

Rigid Pole Side Impact Test
PH07329

Time [s]

Exponent[®]
Failure Analysis Associates[®]

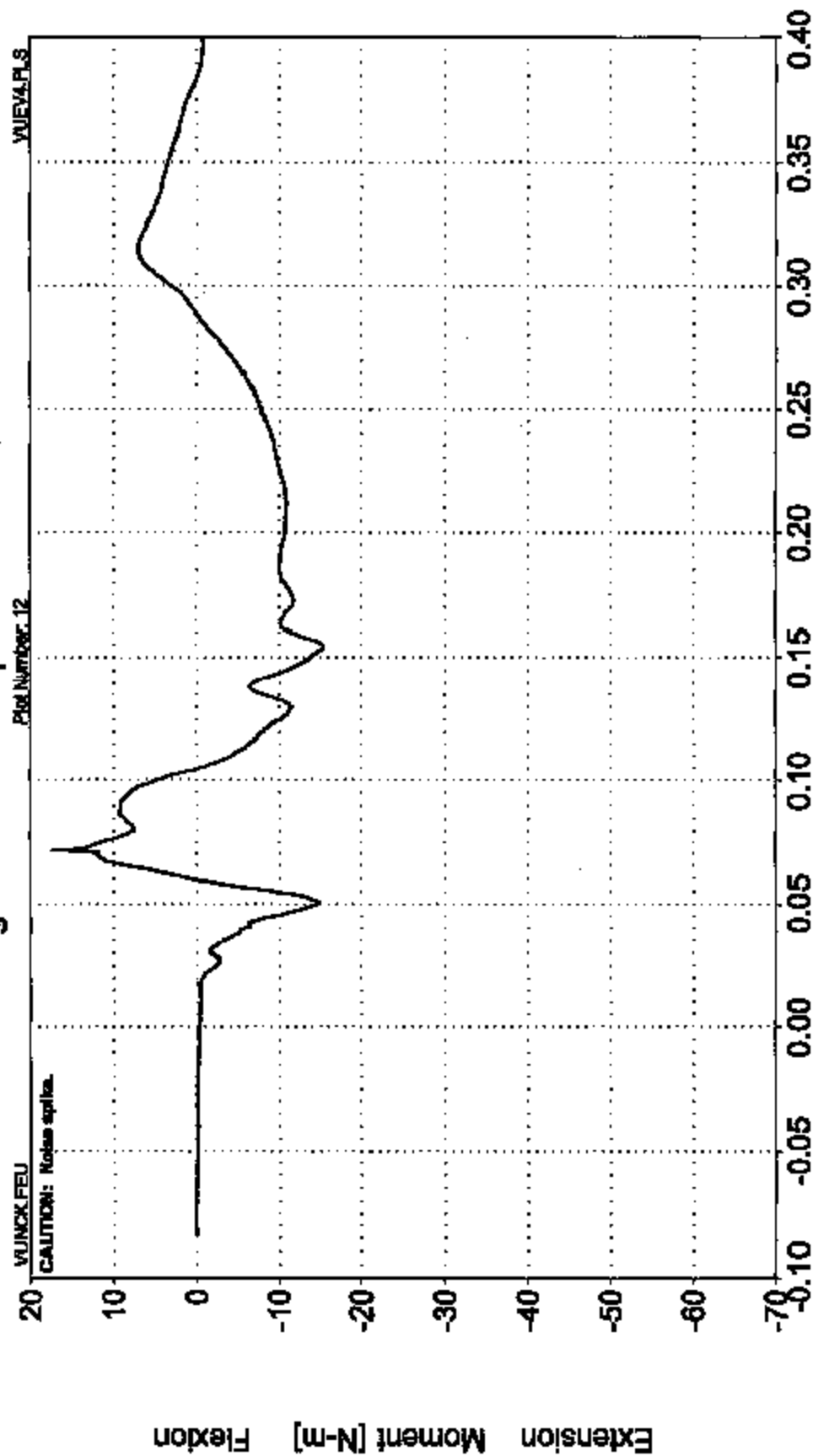
B-14

Fore/Aft Neck Moment (My) v Time

Driver ATD Neck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 800
Data Max: 17.4 N-m @ 0.0714 sec.
Data Min: -15.4 N-m @ 0.1541 sec.

Rigid Pole Side Impact Test
PH37335

Time [s]

Exponent

Failure Analysis Associates*

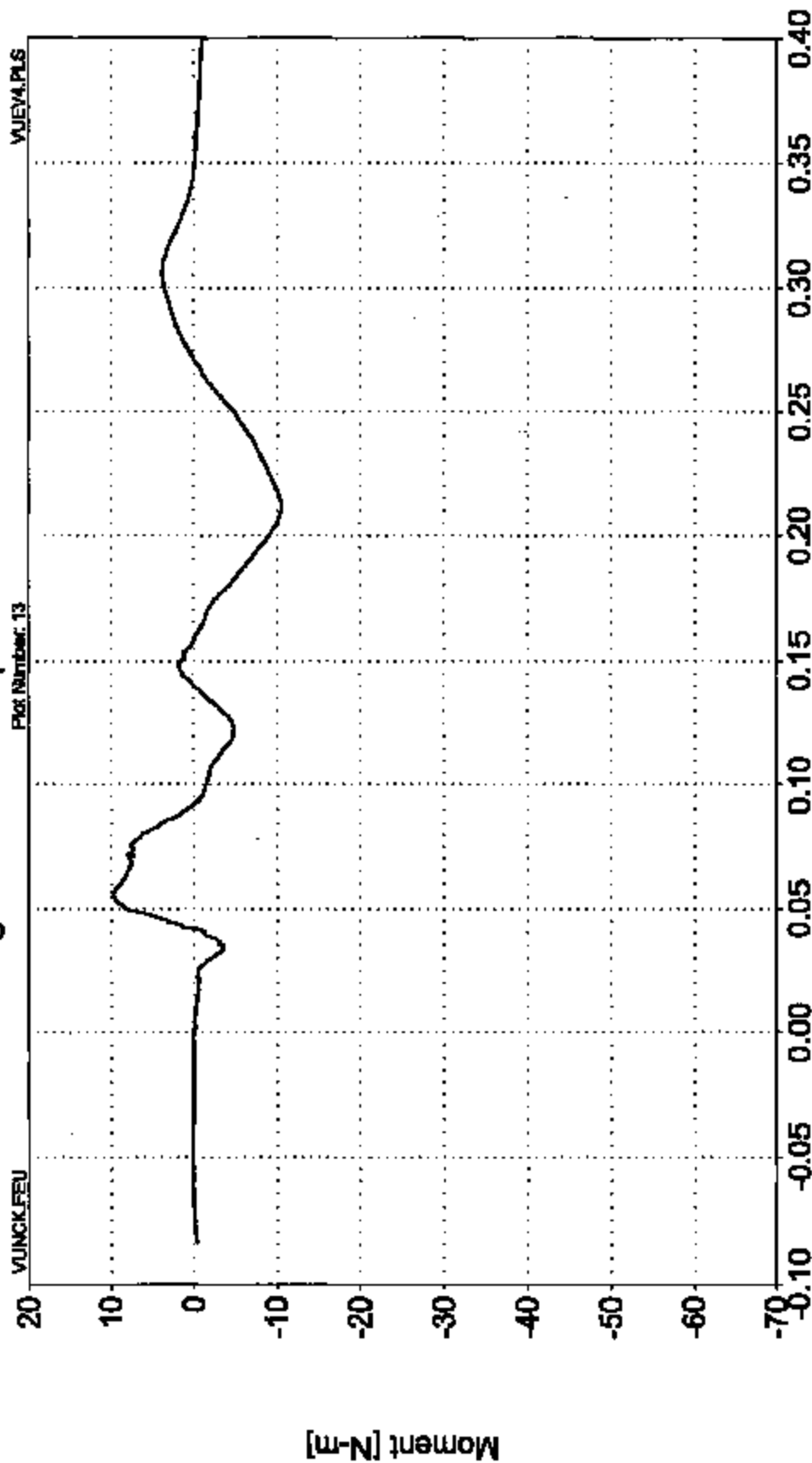
B-15

Torsional Neck Moment (Mz) v Time

Driver ATD Neck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 600
Data Max: 9.9 N-m @ 0.0000 sec.
Data Min: -10.5 N-m @ 0.2111 sec.

Rigid Pole Side Impact Test
PI-073388

Time [s]

B-16

Exponent

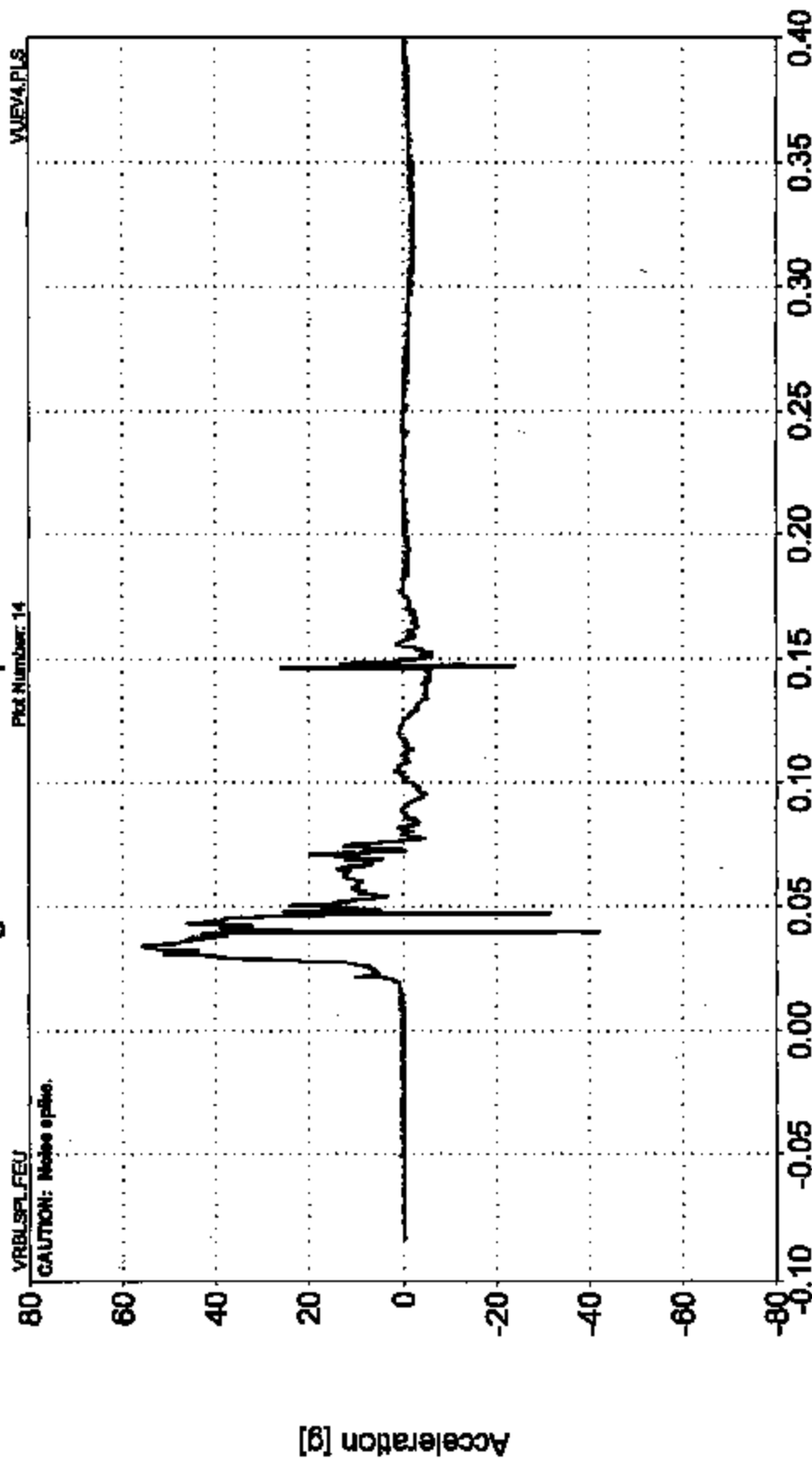
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Upper Rib

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 55.6 g @ 0.0343 sec.
Data Min: -43.0 g @ 0.0387 sec.

Rigid Pole Side Impact Test
PM07338

Time [s]

B-17

Exponent

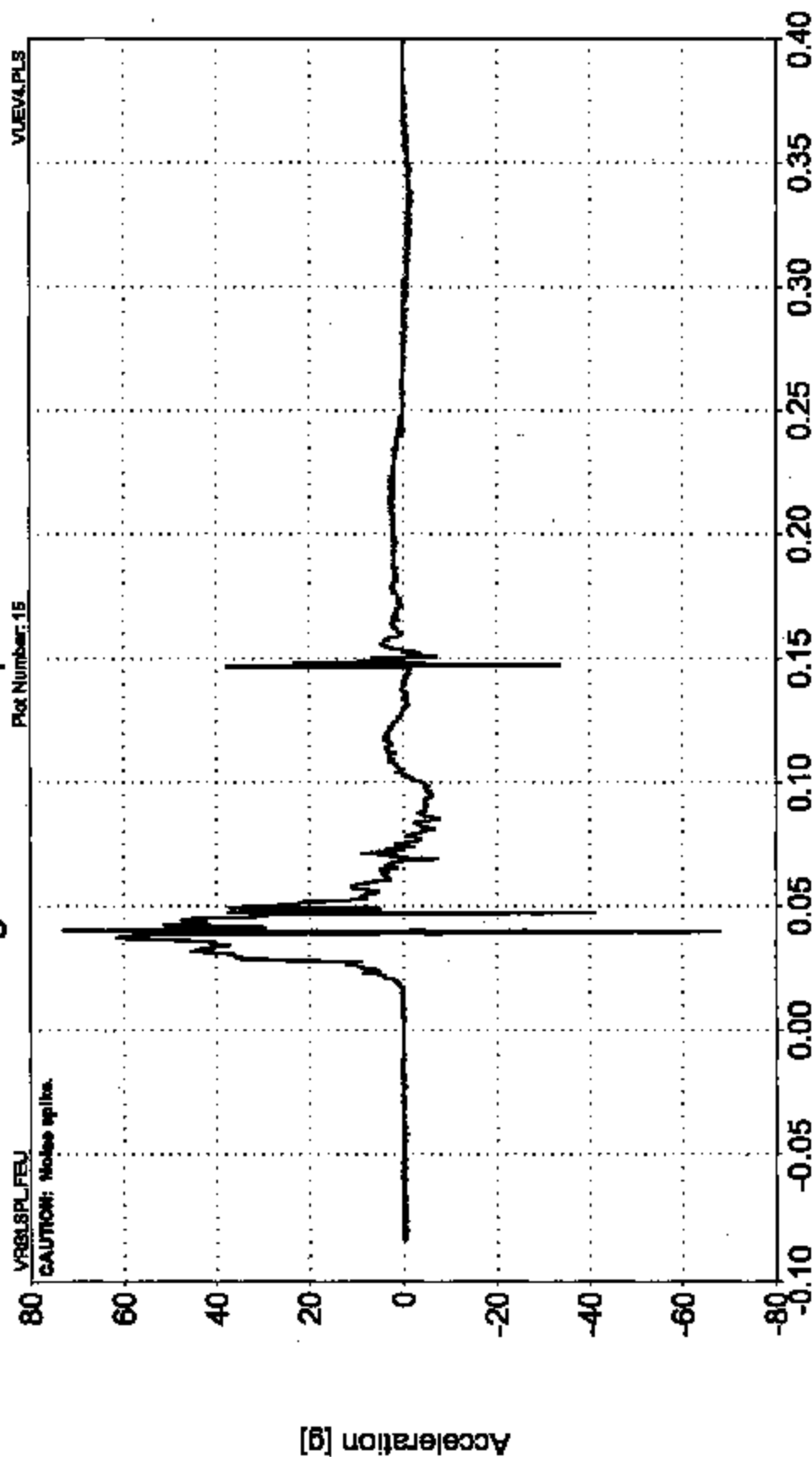
Failure Analysis Associates®

Lateral Acceleration v Time

Driver ATD Lower Rib

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: GFC 1000
Data Rate: 10.0 g @ 0.0003 sec.
Data Rate: -10.0 g @ 0.0003 sec.

Rigid Pole Side Impact Test
PH07336

Time [s]

Exponent

Failure Analysis Associates®

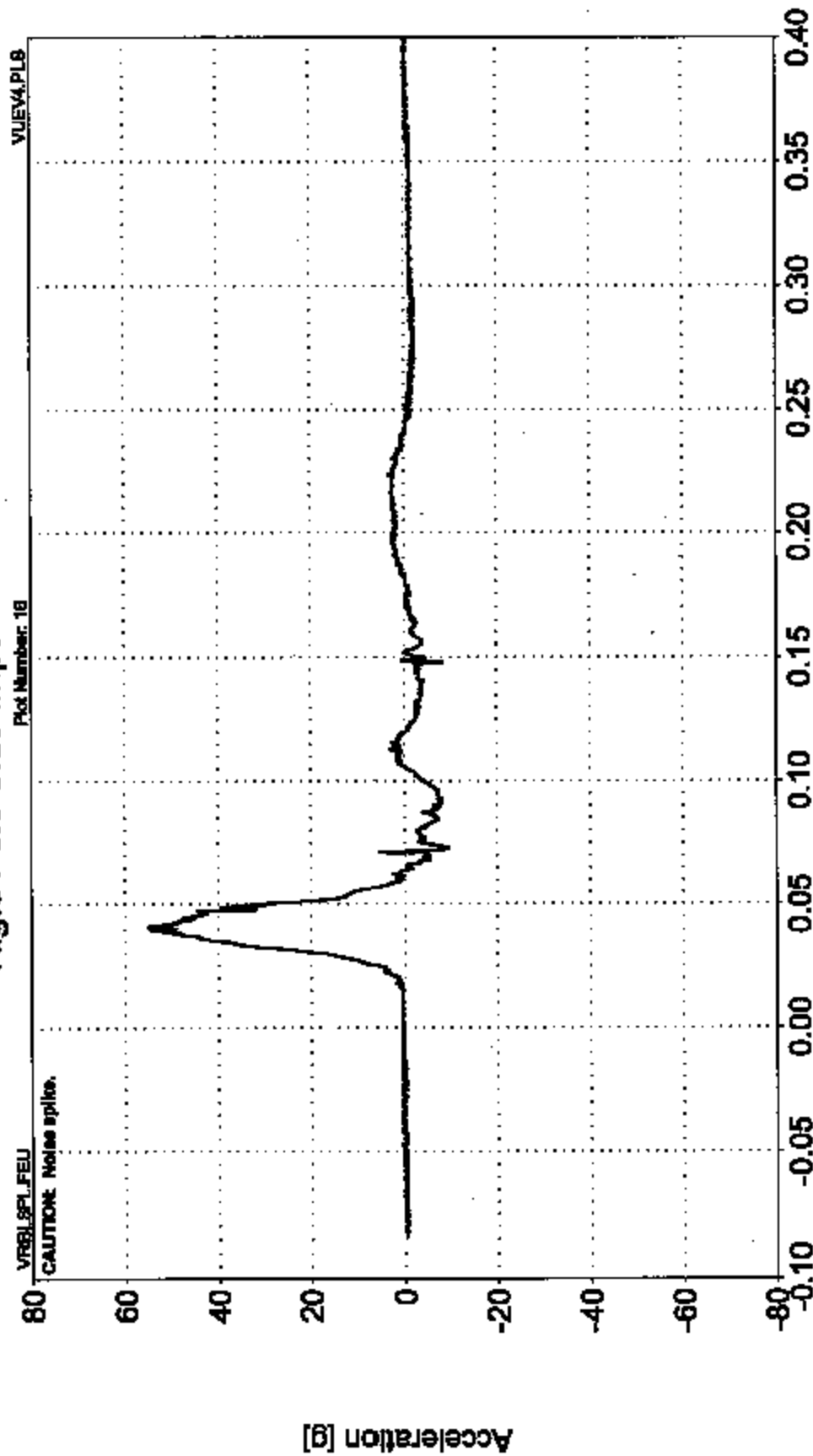
B-18

Lateral Acceleration v Time

Driver ATD Lower Spine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Data Max: 88.2 g @ 0.0412 sec.
Data Min: -8.8 g @ 0.0731 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

B-19

Exponent

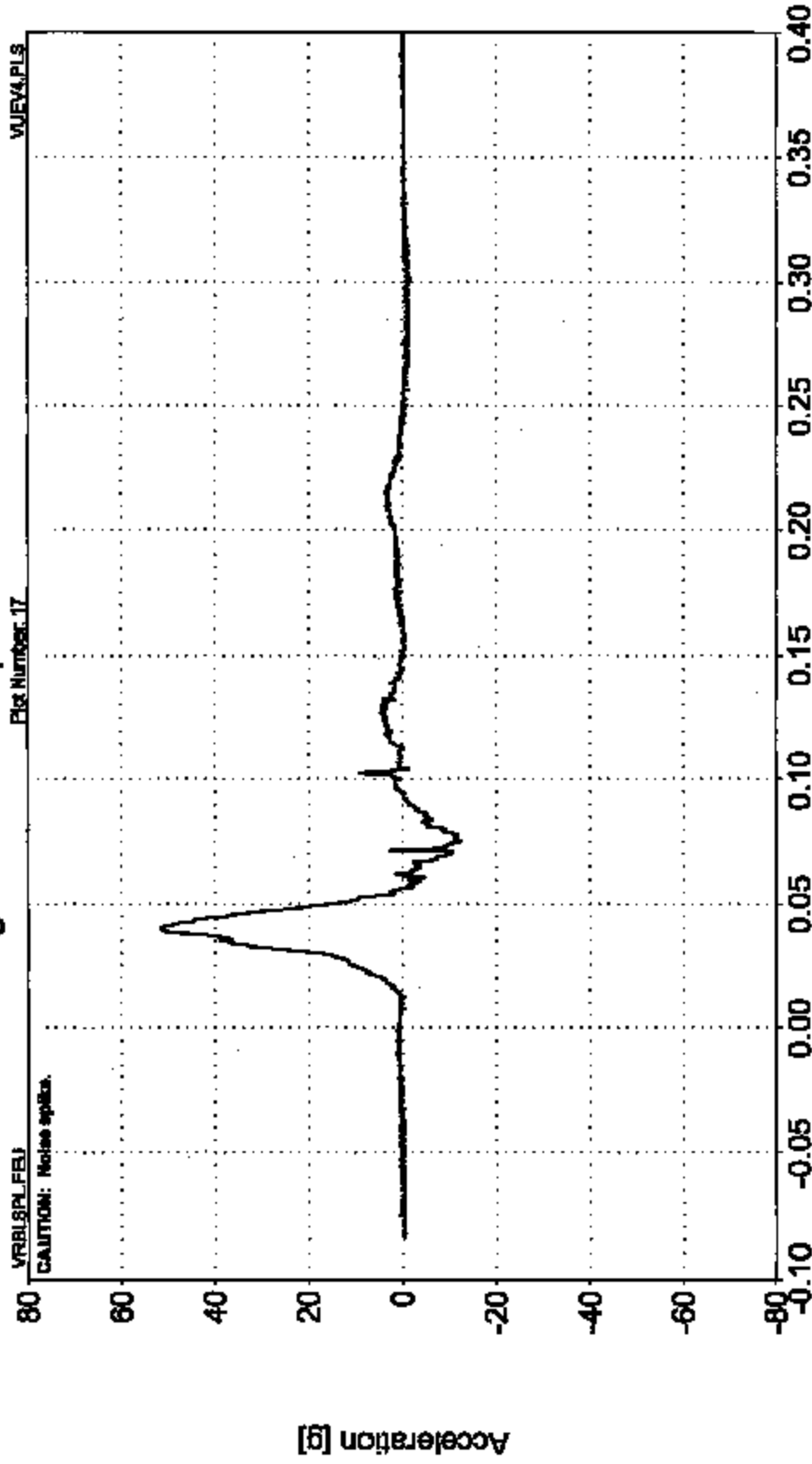
Failure Analysis Associates®

Lateral Acceleration v Time

Driver ATD Pelvis

2002 Saturn Vue Sport Utility Vehicle - NHTSA N0. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 1000
Delta Max: 51.5 g @ 0.0336 sec.
Delta Min: -12.7 g @ 0.0761 sec.

Rigid Pole Side Impact Test
FH-07386

Time [s]

B-20

Exponent

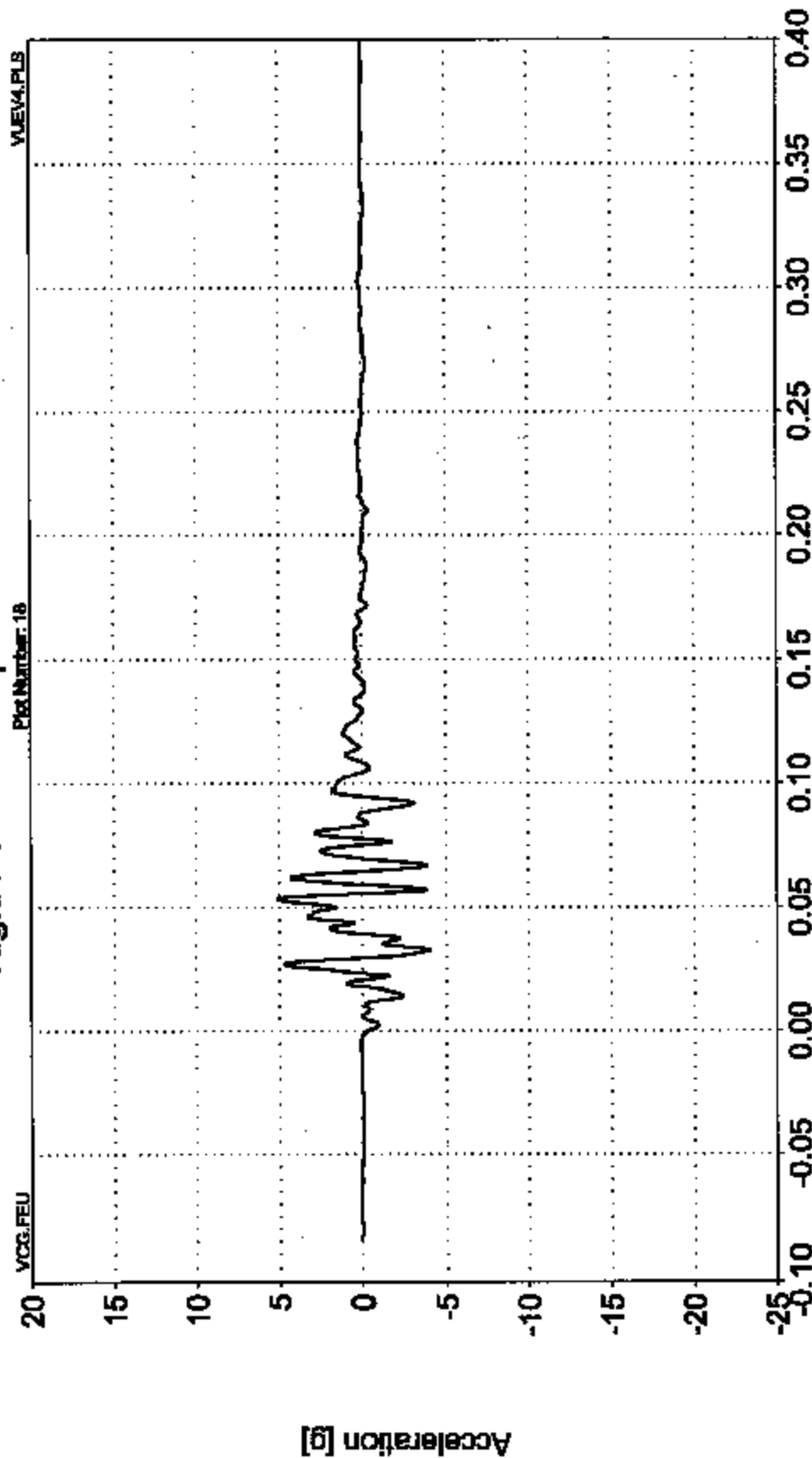
Failure Analysis Associates*

Longitudinal Acceleration v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Max: 5.1 g @ 0.0632 sec.
Data Min: -4.0 g @ 0.0330 sec.

Rigid Pole Side Impact Test
P1407338

Time [s]

B-21

Exponent

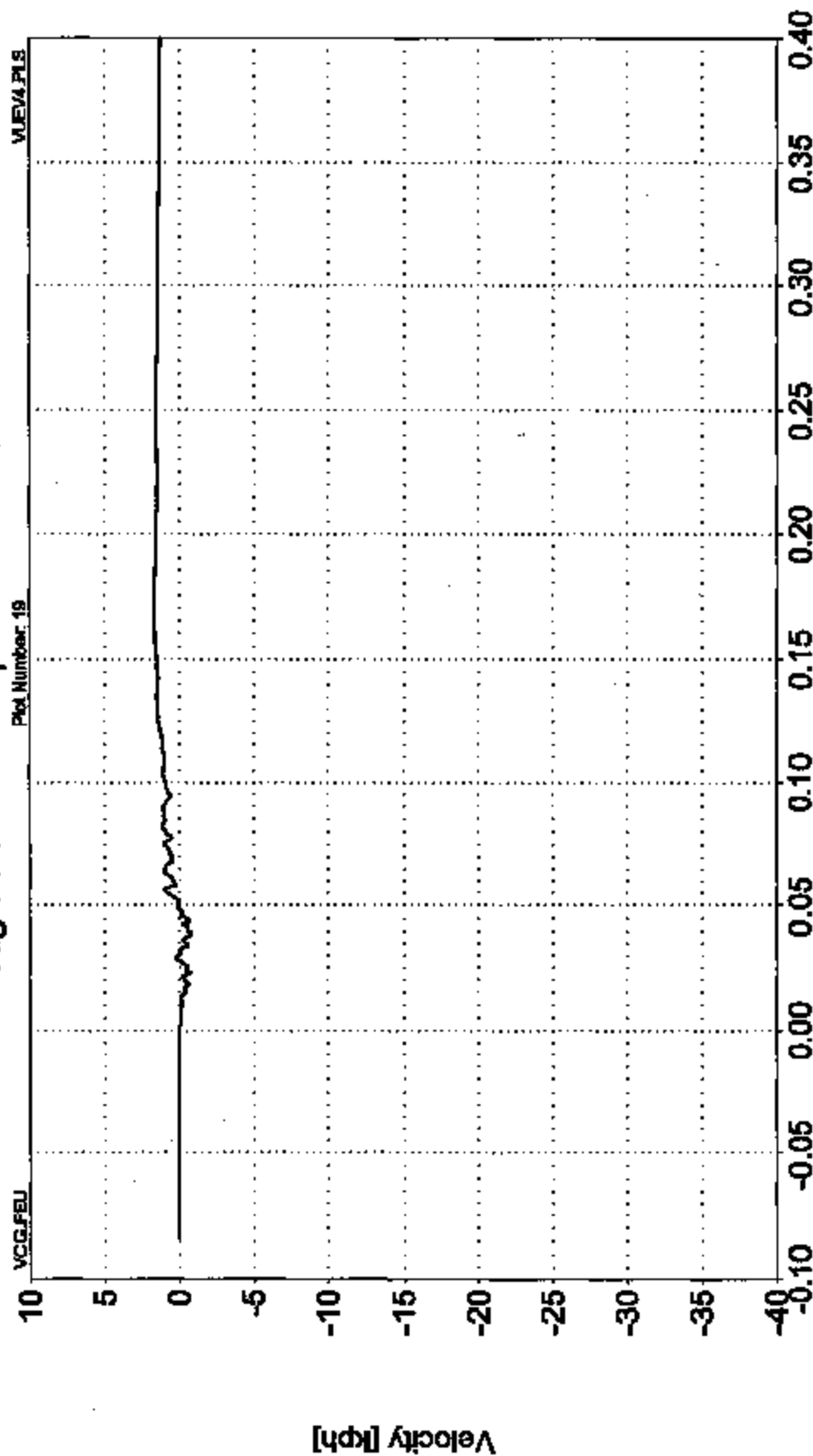
Failure Analysis Associates

Longitudinal Velocity v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Max: 1.7 kph @ 0.1700 sec.
Data Min: -0.9 kph @ 0.0000 sec.

Rigid Pole Side Impact Test
P407334

Time [s]

Exponent

Failure Analysis Associates*

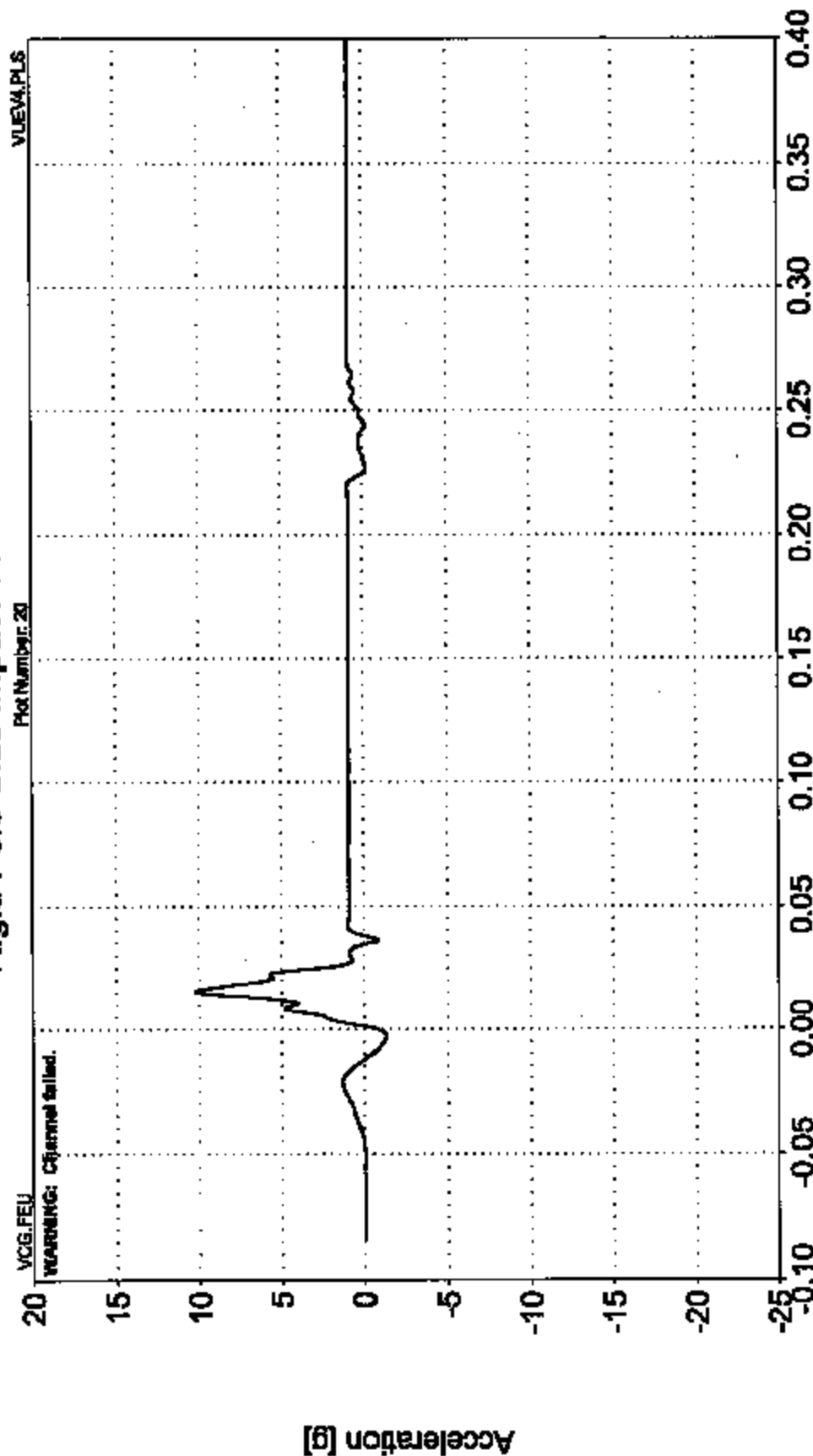
B-22

Lateral Acceleration v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: C500 60
Data Max: 10.2 g @ 0.0156 sec.
Data Min: -1.3 g @ -0.0028 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

B-23

Exponent

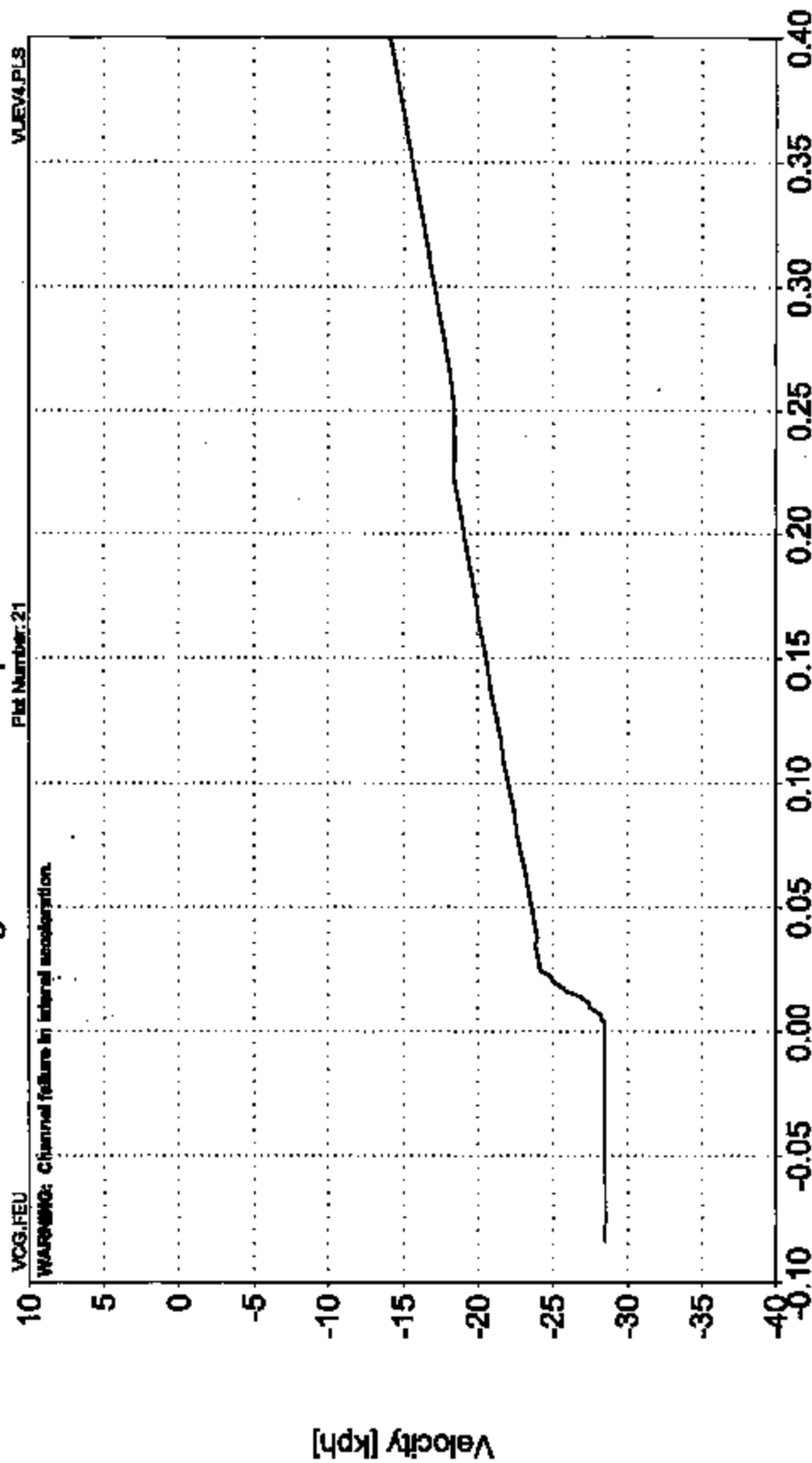
Failure Analysis Associates*

Lateral Velocity v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Rate: 14.1 kph @ 0.4000 sec.
Data Rate: 28.5 kph @ 0.0019 sec.

Rigid Pole Side Impact Test
PH07308

Time [s]

B-24

Exponent

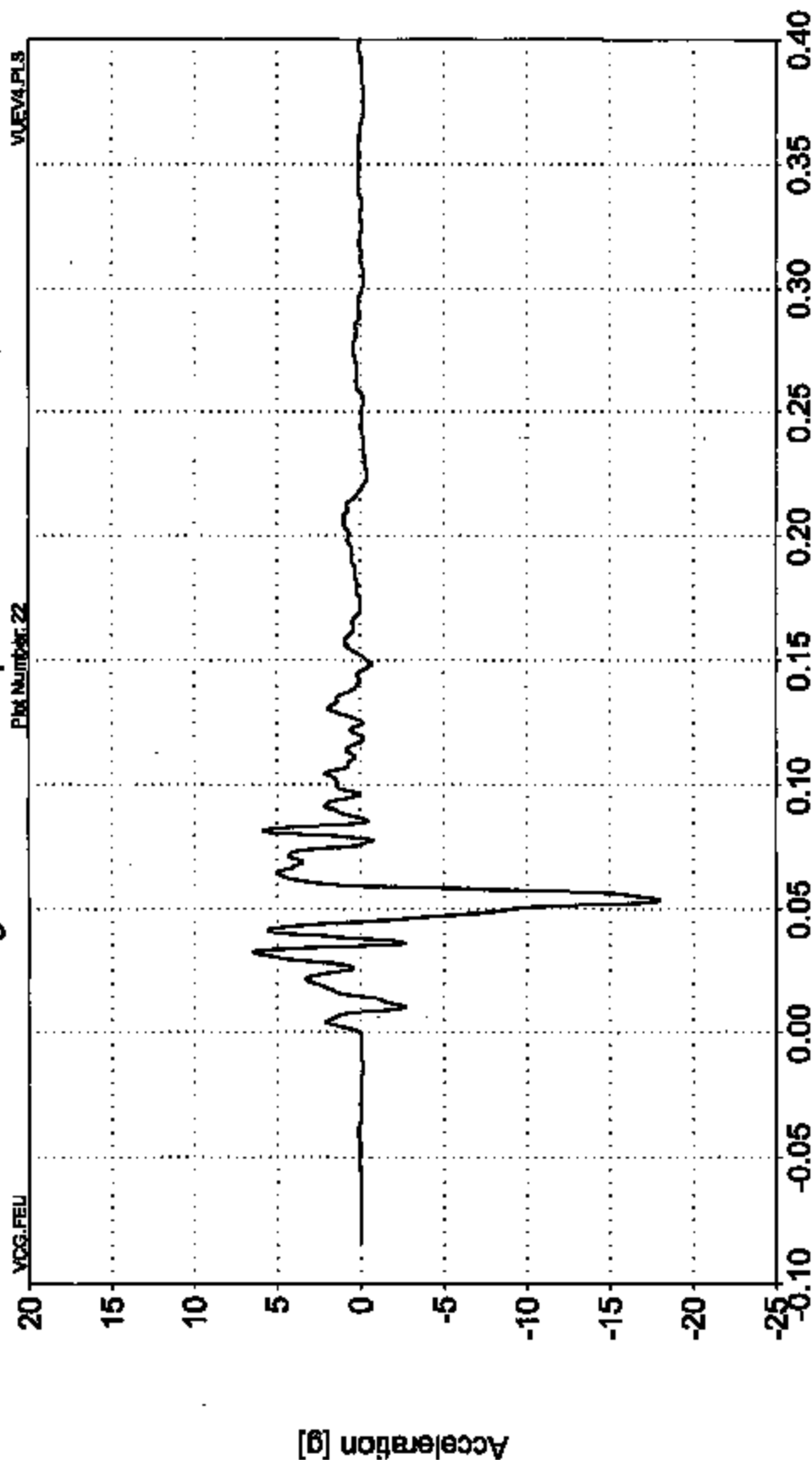
Failure Analysis Associates

Vertical Acceleration v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Max: 0.5 g @ 0.0022 sec.
Data Min: -16.0 g @ 0.0534 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

B-25

Exponent

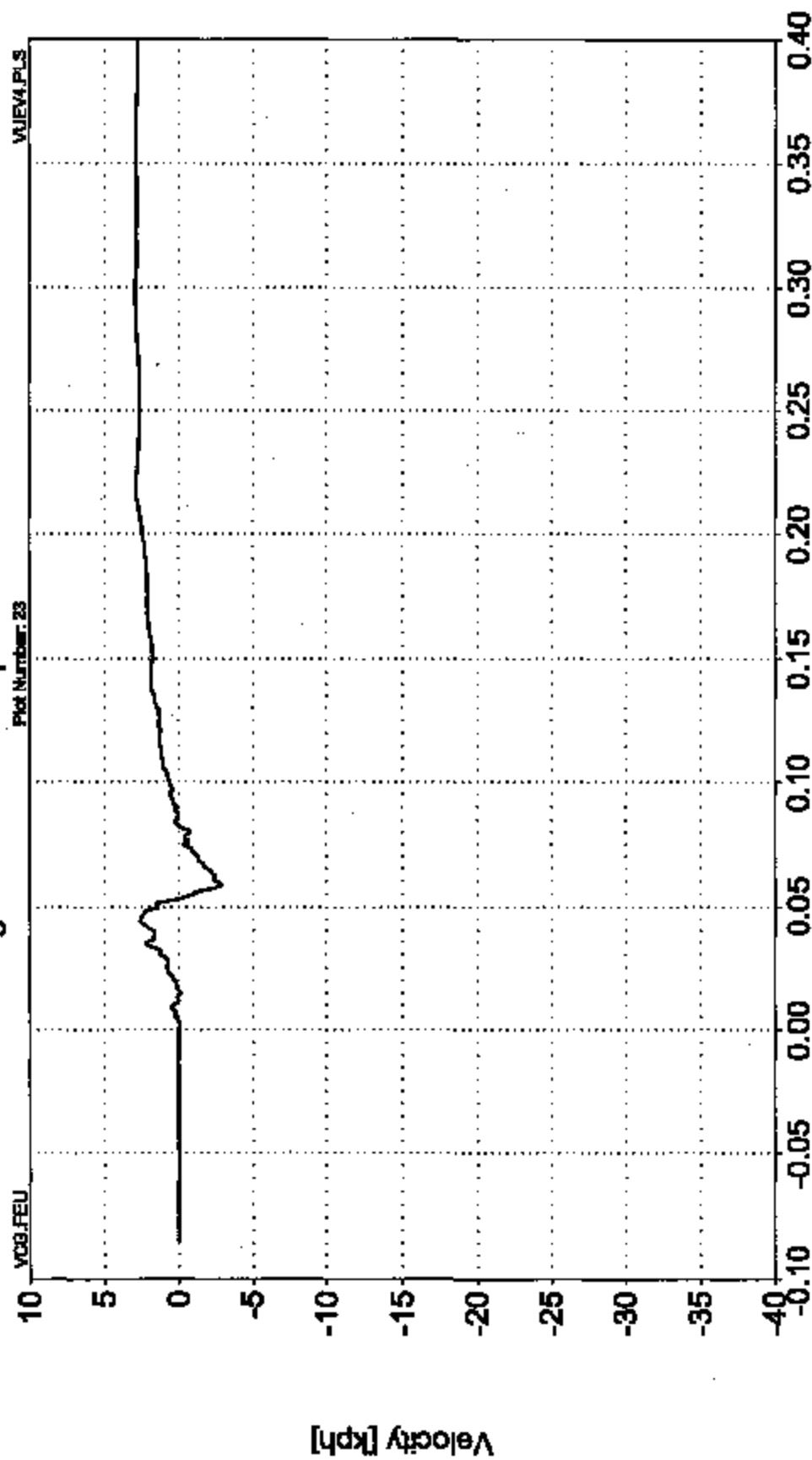
FedEx Associates

Vertical Velocity v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Max: 2.9 kph @ 0.2577 sec.
Data Min: -3.8 kph @ 0.0577 sec.

Rigid Pole Side Impact Test
P467336

Time [s]

B-26

Exponent

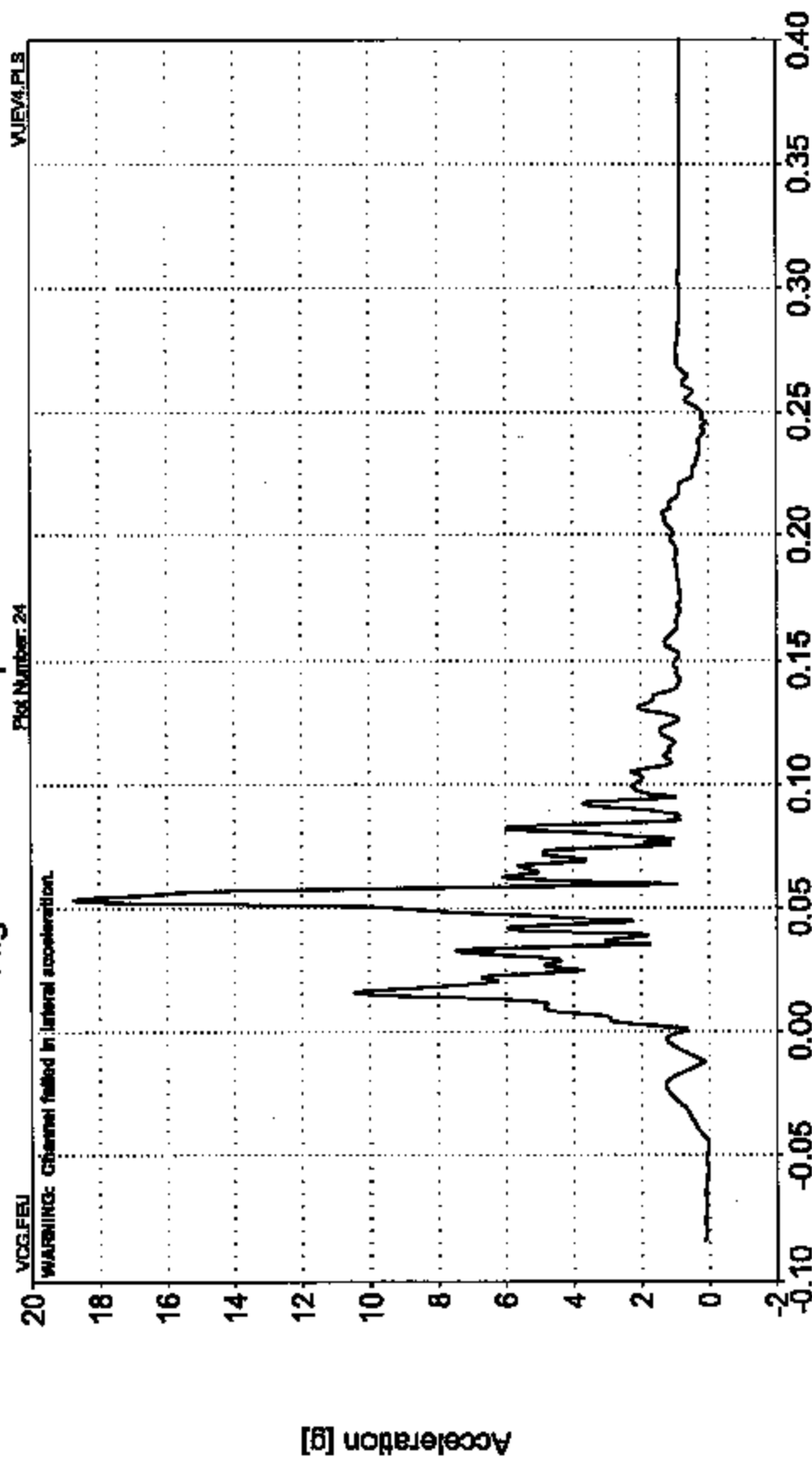
Failure Analysis Associates®

Resultant Acceleration v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CRF 50
Data Max: 10.7 g @ 0.0034 sec.
Data Min: 0.0 g @ -0.0480 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

B-27

Exponent

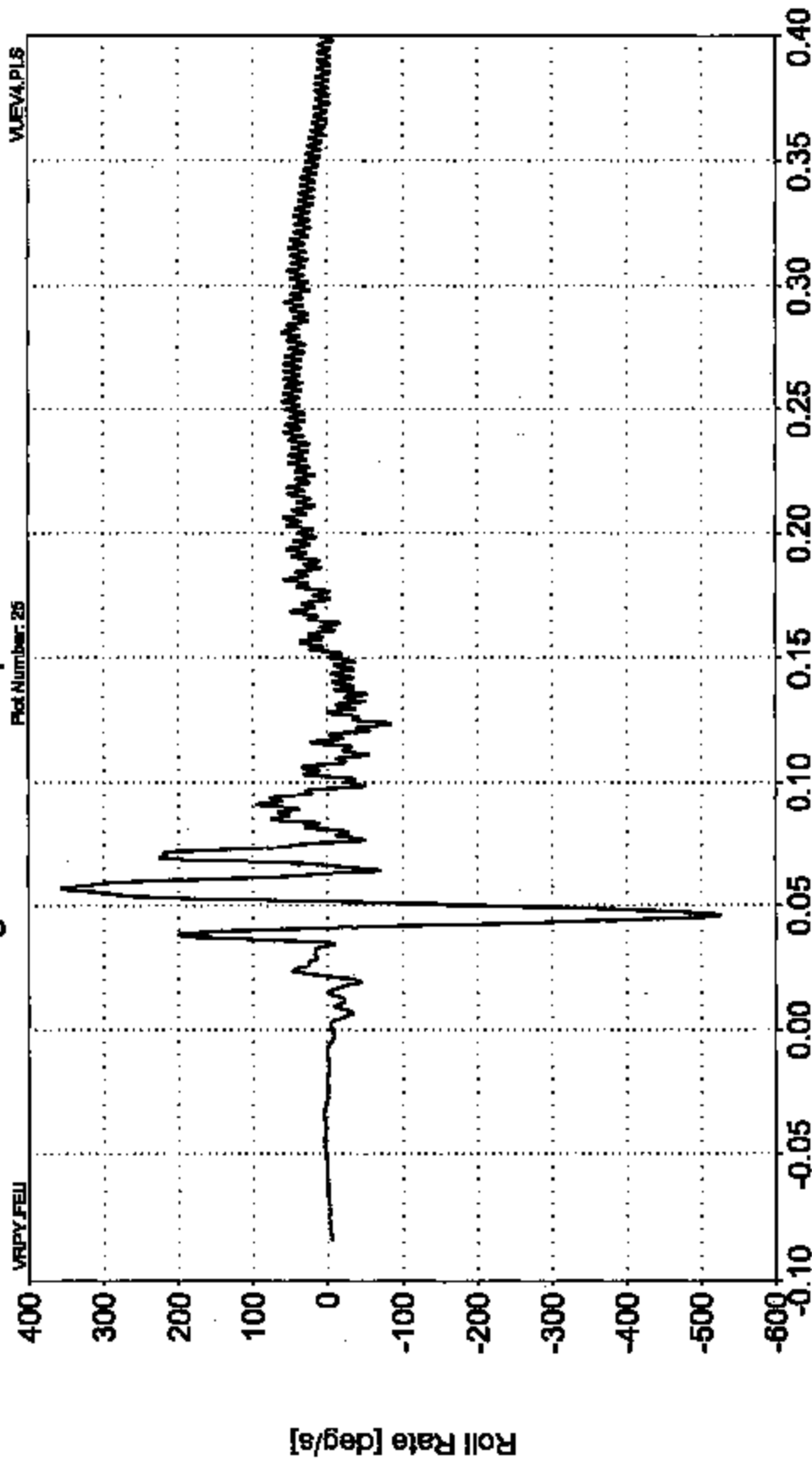
Failure Analysis Associates*

Roll Rate v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: GPC 100
Data Max: 358.3 deg/s @ 0.0255 sec.
Data Min: -536.3 deg/s @ 0.0481 sec.

Rigid Pole Side Impact Test
PI-07308

Time [s]

B-28

Exponent

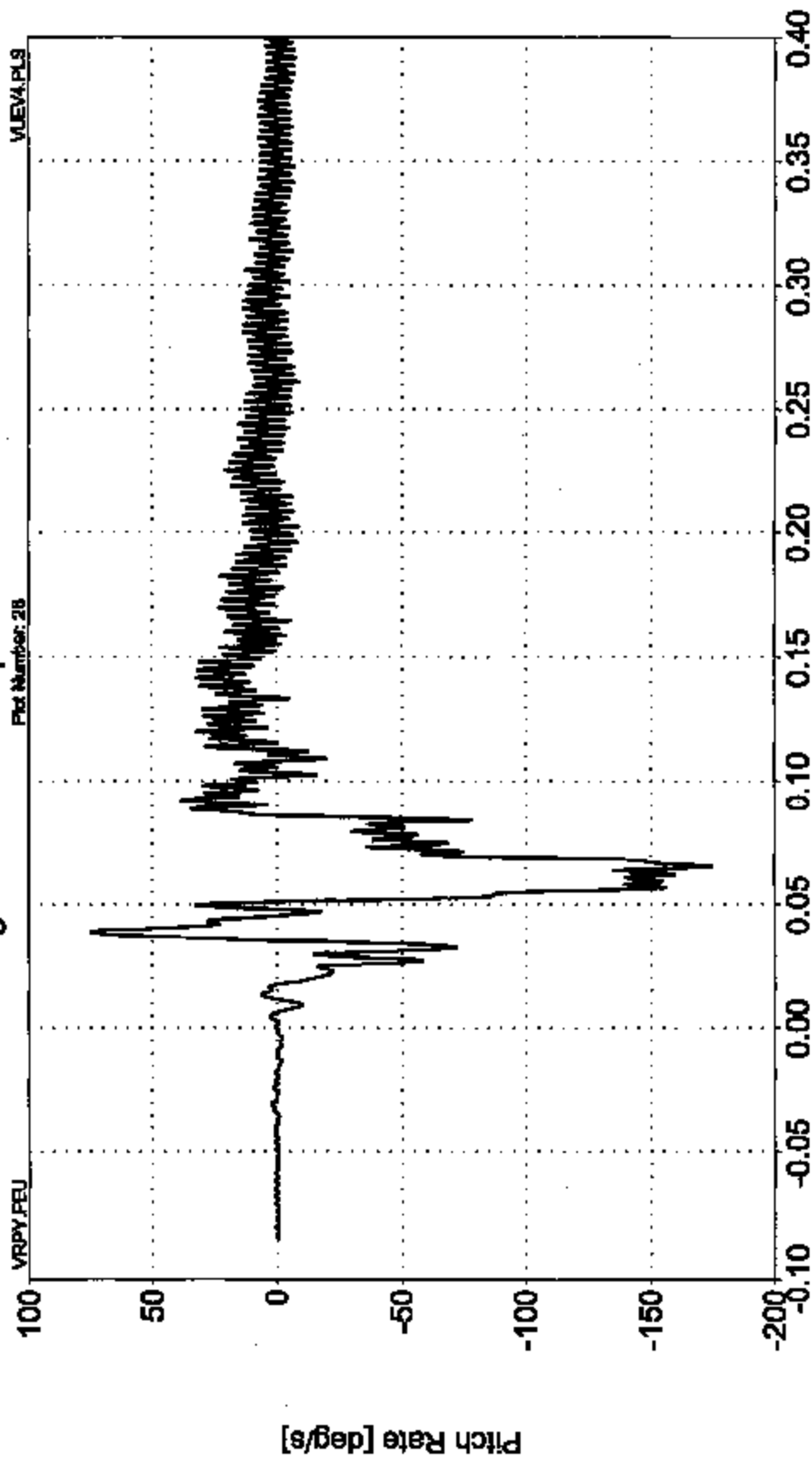
Failure Analysis Associates™

Pitch Rate v Time

Vehicle Tunnel Near C.G.

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Max: 74.6 deg/s @ 0.037 sec.
Data Min: -174.8 deg/s @ 0.0658 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

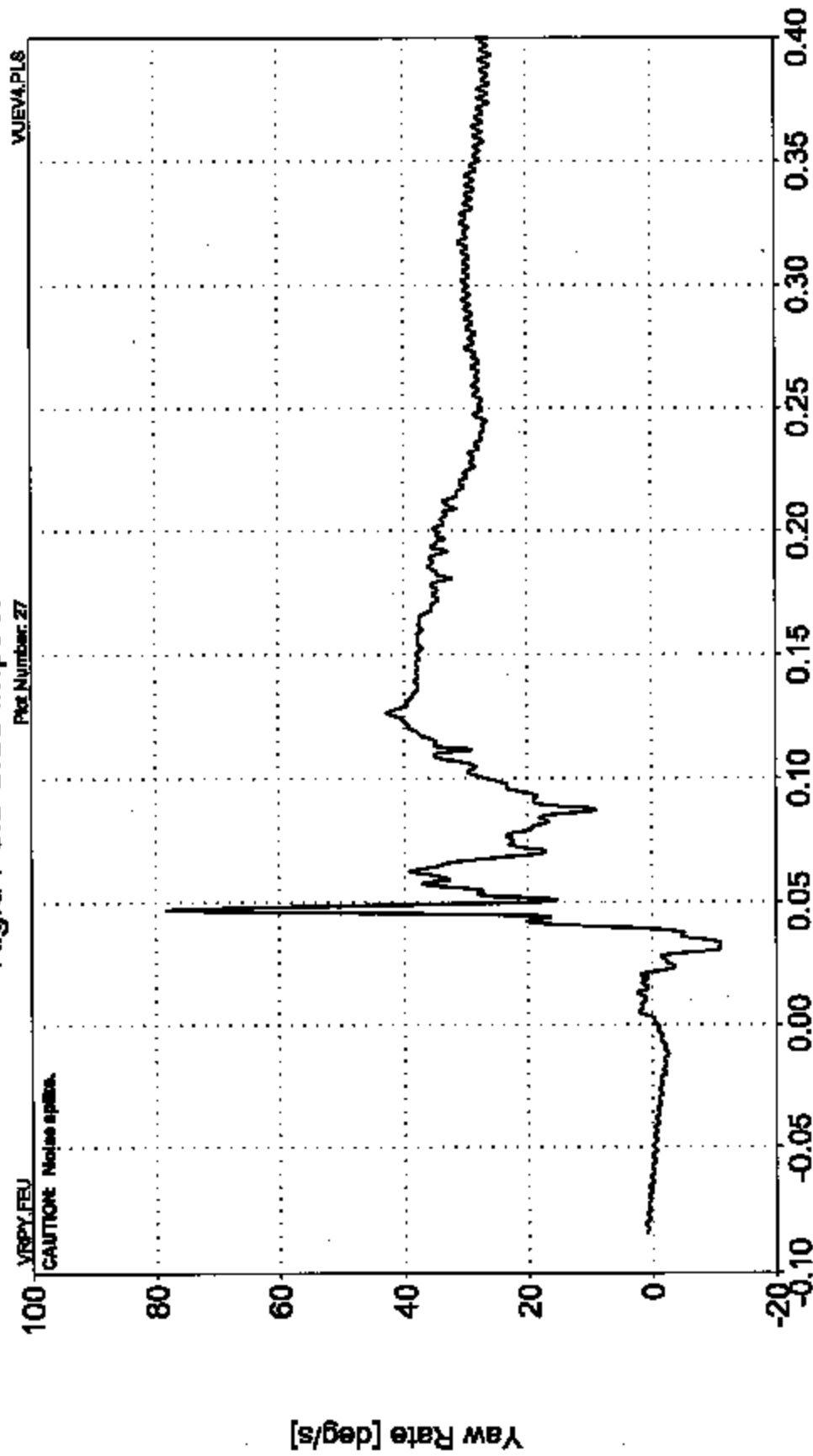
Exponent

Failure Analysis Associates*

B-29

Yaw Rate v Time

Vehicle Tunnel Near C.G.
2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110
Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Max: 79.4 deg/s @ 0.0472 sec.
Data Min: -11.0 deg/s @ 0.0330 sec.

Rigid Pole Side Impact Test

PH07538

Time [s]

B-30

Exponent

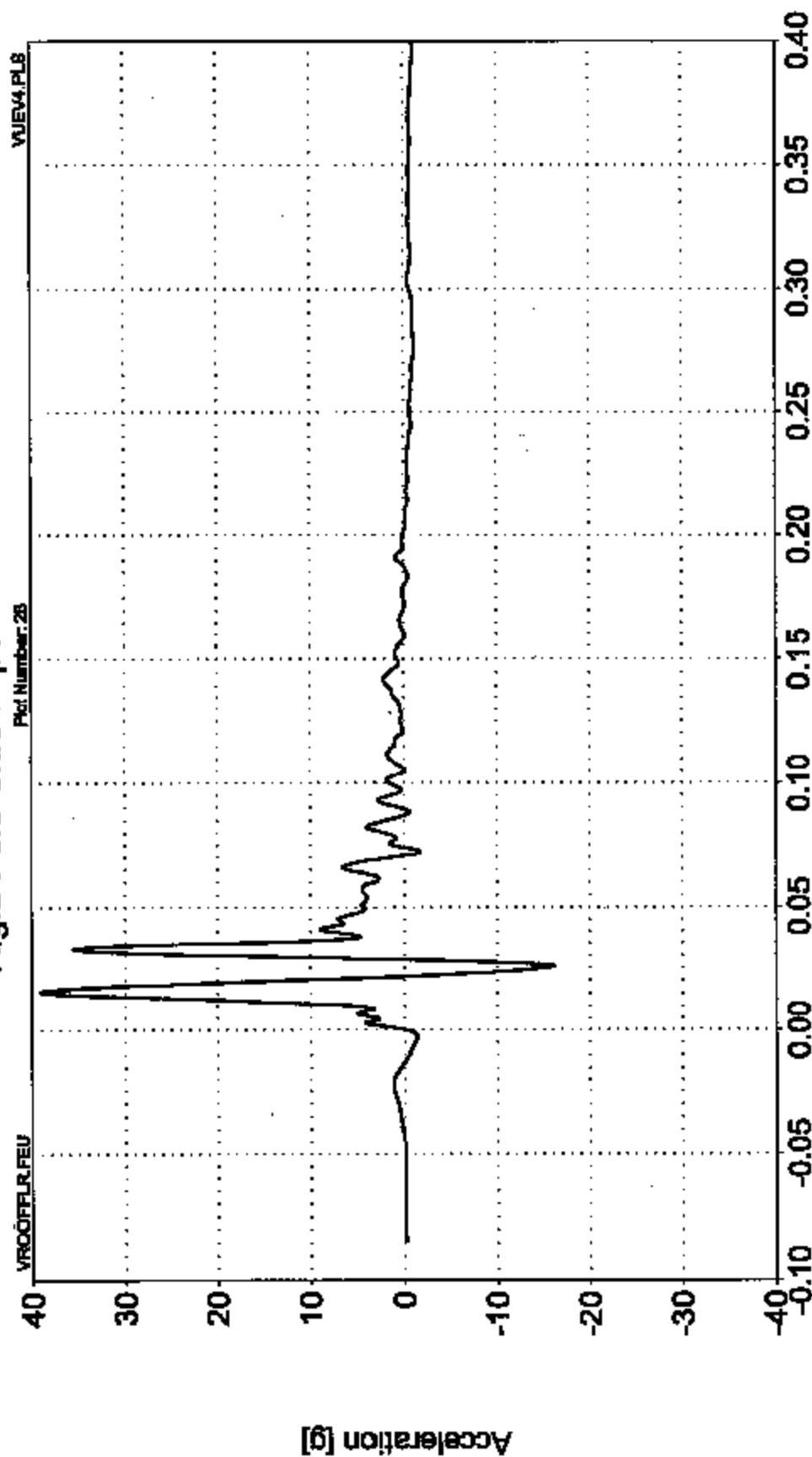
Failure Analysis Associates™

Lateral Acceleration v Time

Left Floor Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

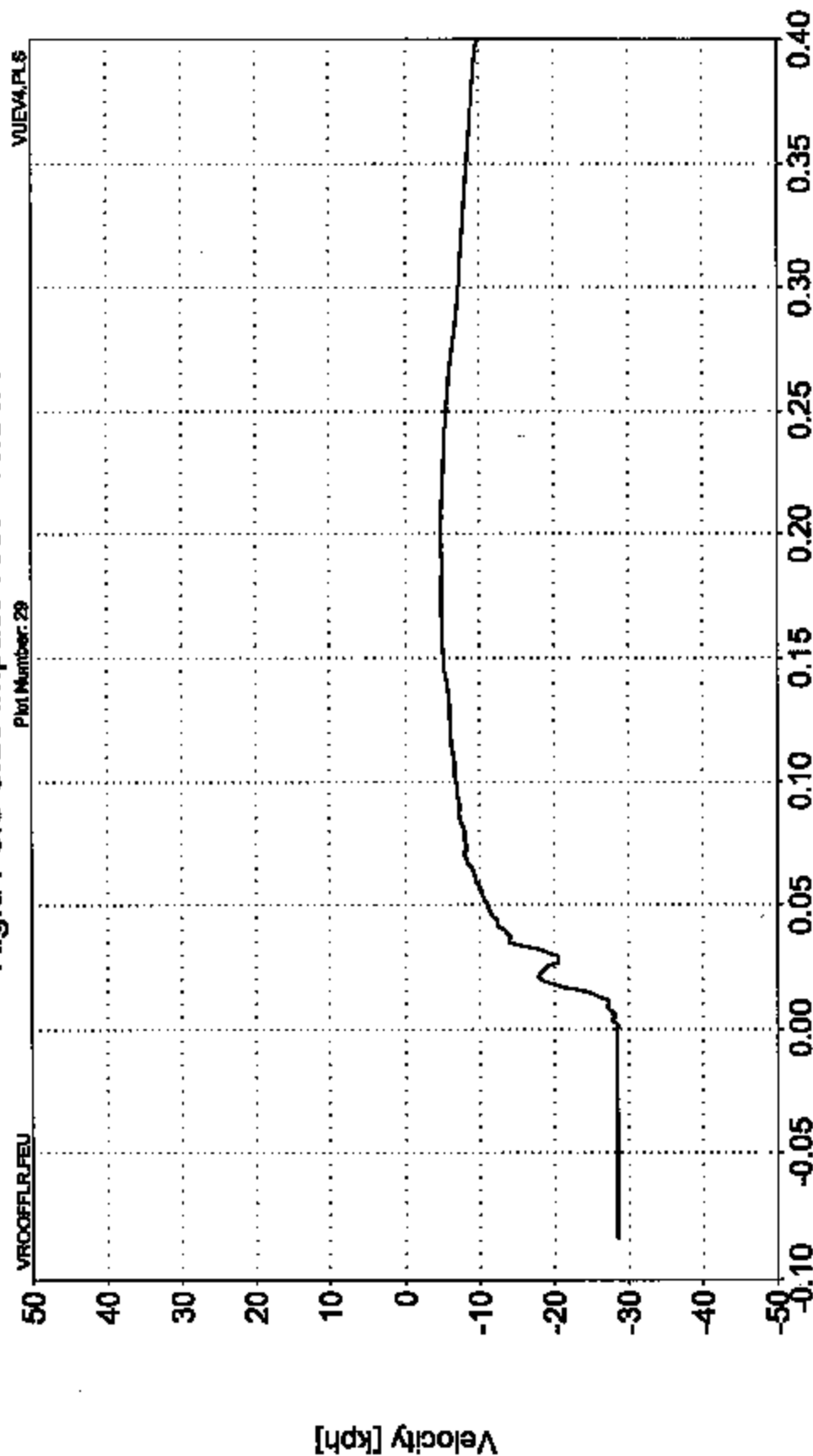
Rigid Pole Side Impact Test - 10/25/02



Lateral Velocity v Time

Left Floor Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110
Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Max: 4.8 kph @ 0.0021 sec.
Data Min: -28.0 kph @ 0.0012 sec.

Rigid Pole Side Impact Test
PH07336

Time [s]

B-32

Exponent

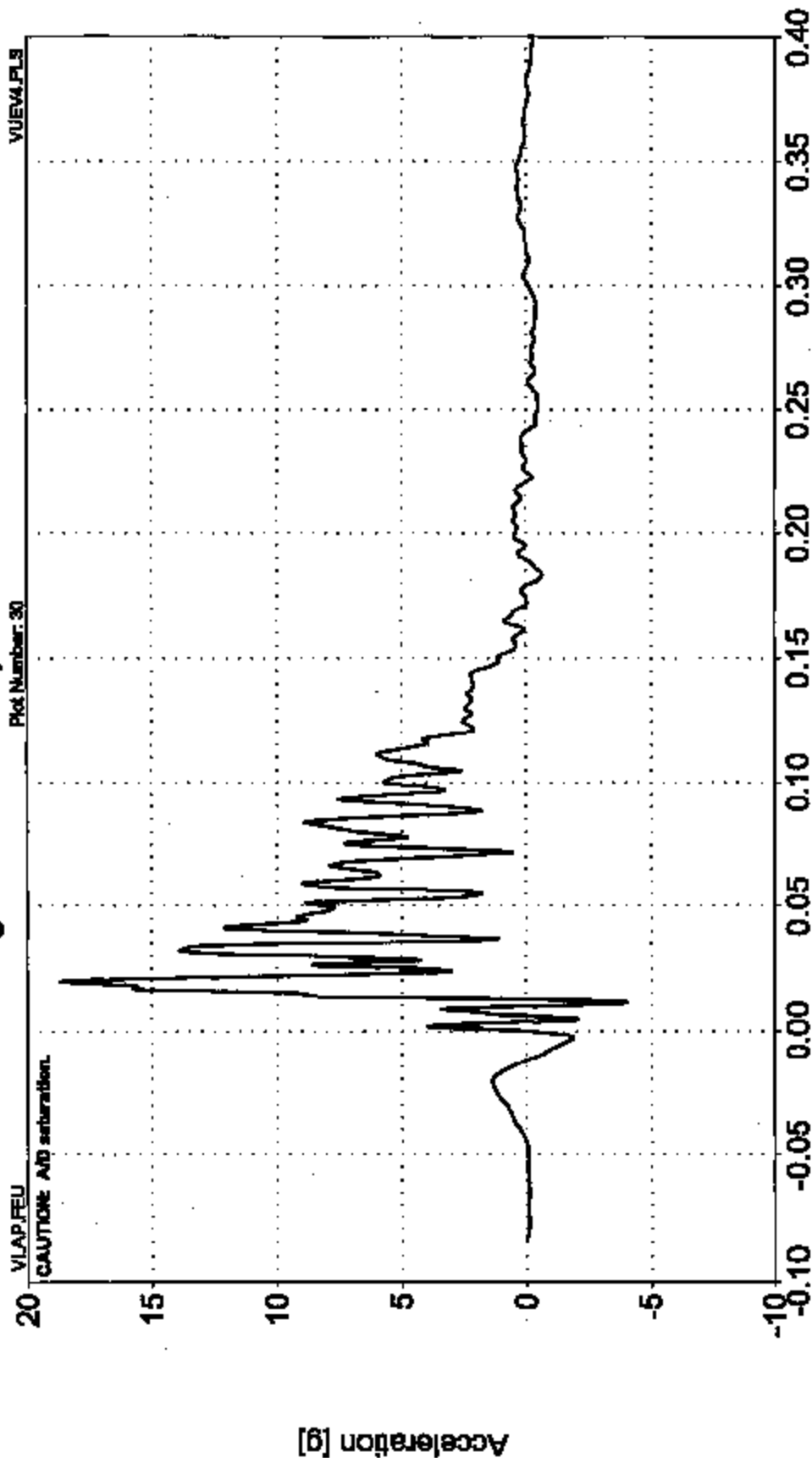
Failure Analysis Associates*

Lateral Acceleration v Time

Left A-Pillar Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 60
Data Max: 18.8 g @ 0.0785 sec.
Data Min: -4.0 g @ 0.0112 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

B-33

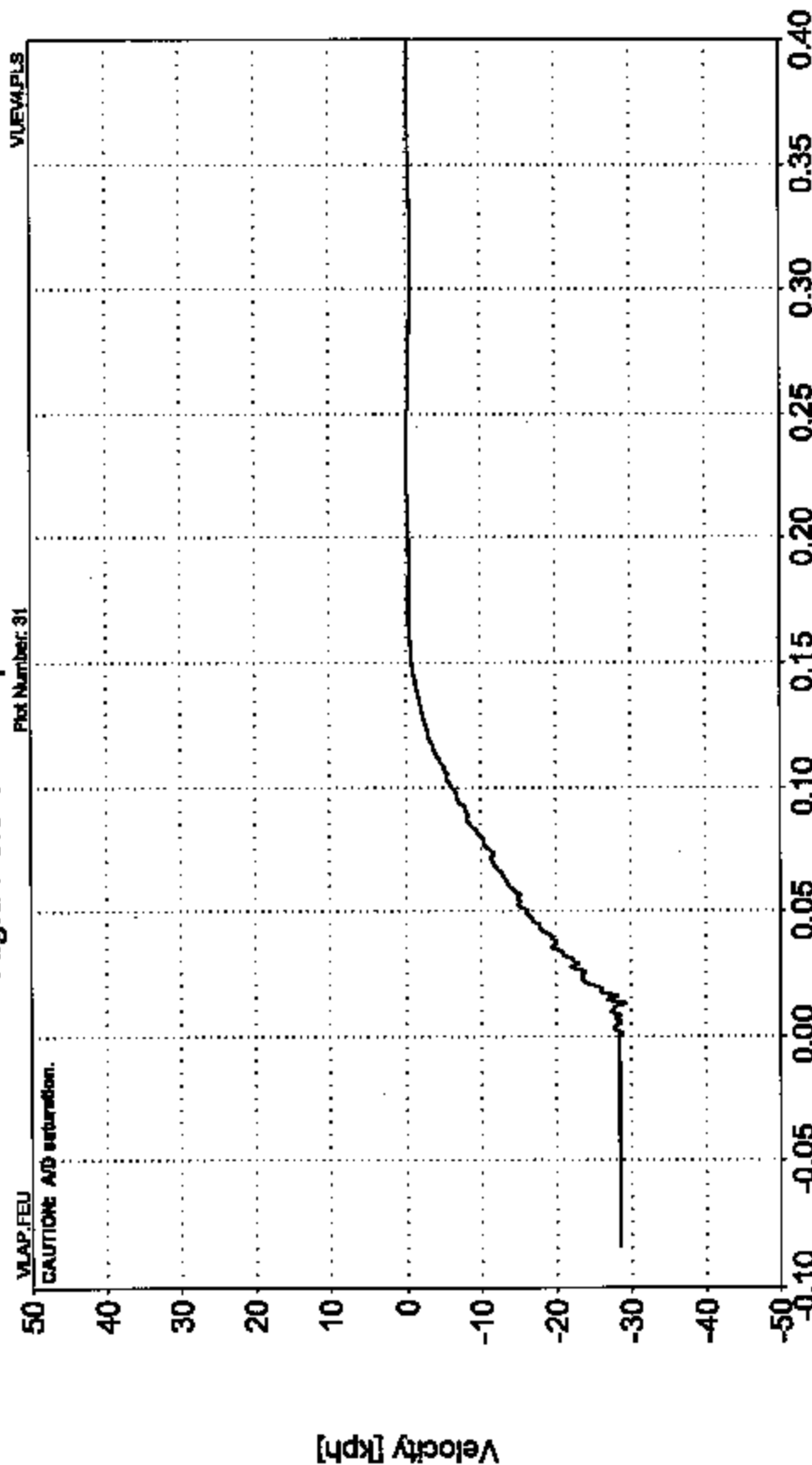
Exponent

Failure Analysis Associates*

Lateral Velocity v Time

Left A-Pillar Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110
Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Min: -4.1 kph @ 0.24271 sec.
Data Max: 29.3 kph @ 0.0127 sec.

Rigid Pole Side Impact Test
PH07335

Time [s]

B-34

Exponent®

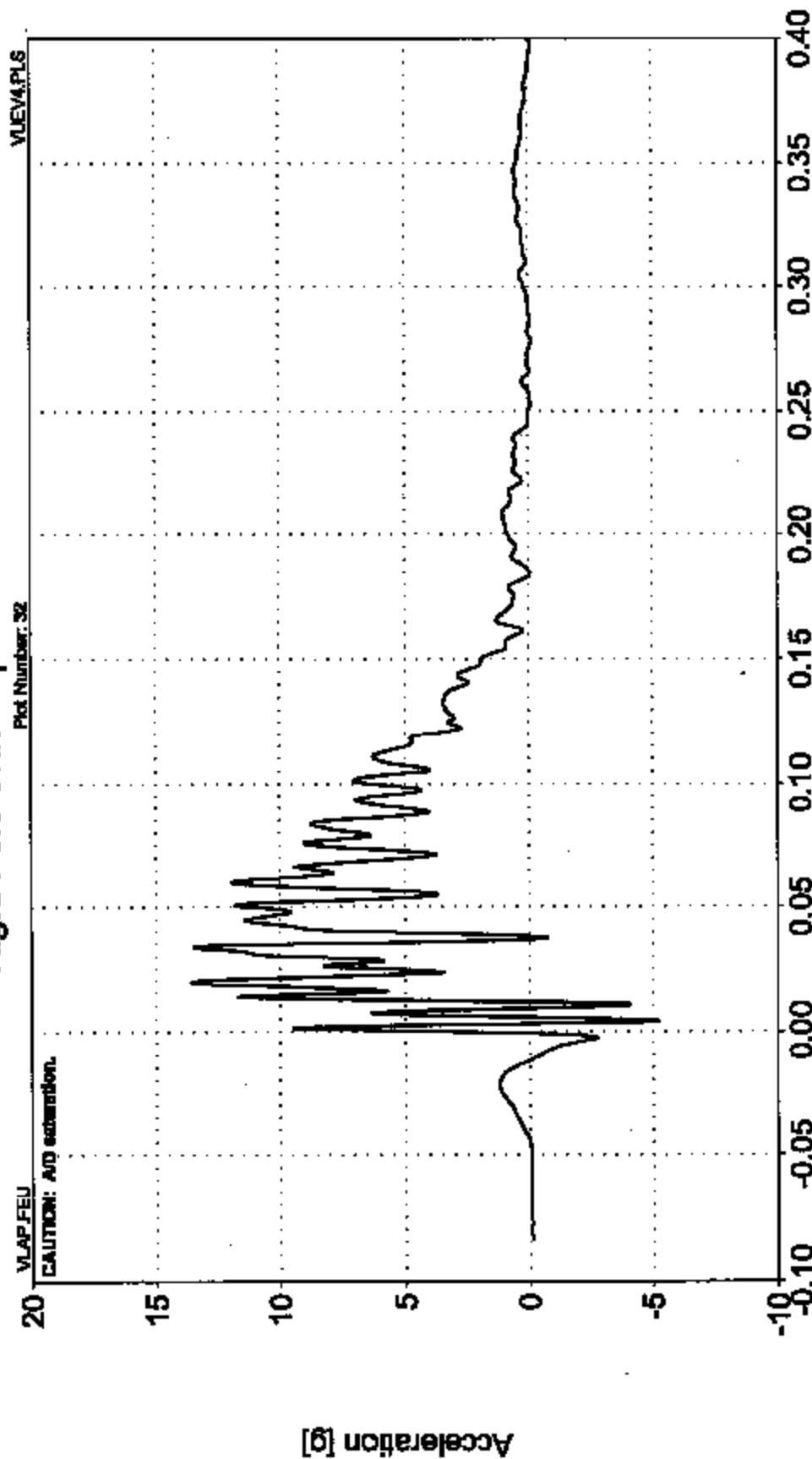
Failure Analysis Associates™

Lateral Acceleration v Time

Left A-Pillar Low

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Rate: 13.8 g @ 0.0104 sec.
Data Rate: 5.2 g @ 0.0042 sec.

Rigid Pole Side Impact Test
PH07330

Time [s]

B-35

Exponent

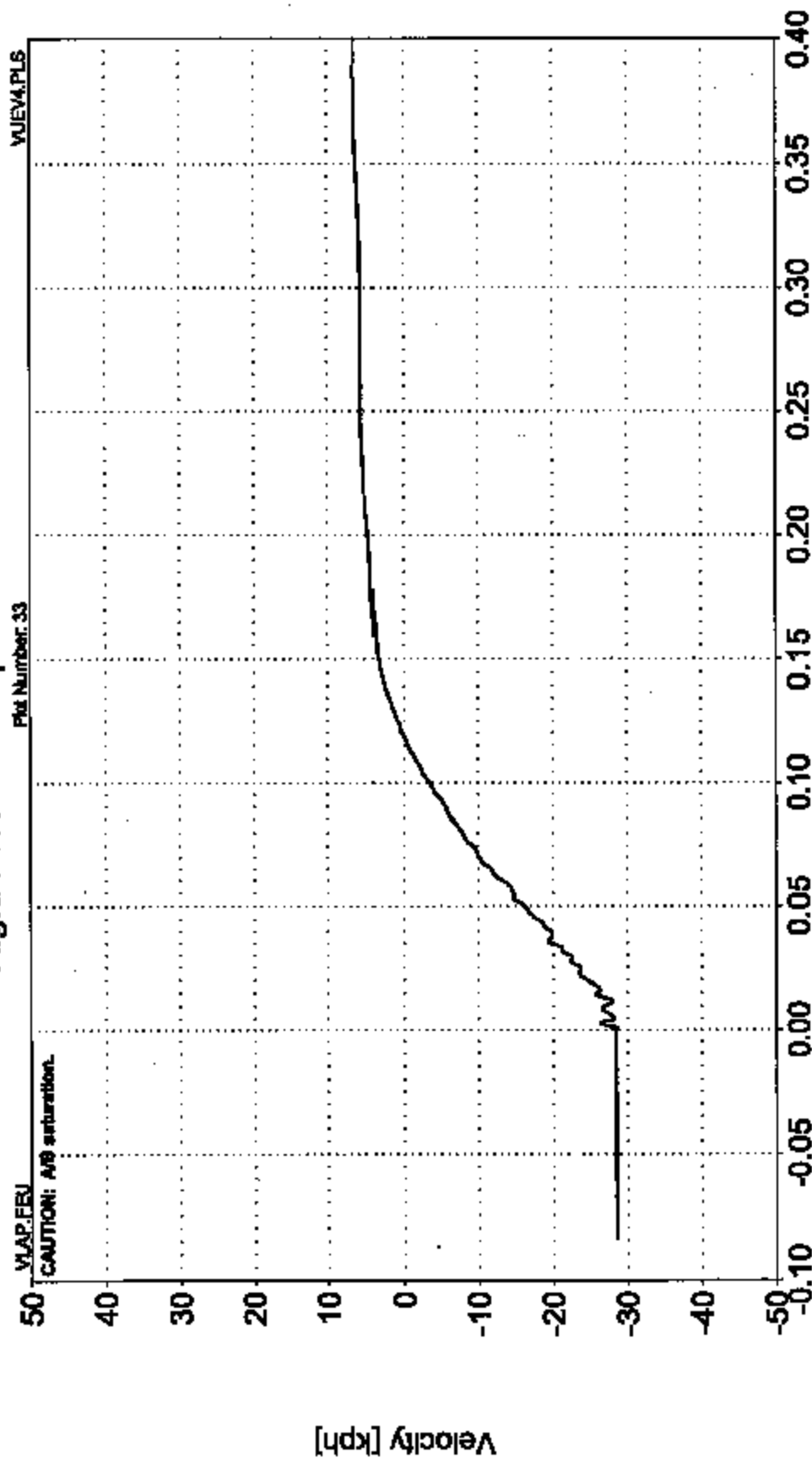
Failure Analysis Associates

Lateral Velocity v Time

Left A-Pillar Low

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Rate: 6.5 kph @ 0.3858 sec
Data Min: -28.7 kph @ 0.0005 sec

Rigid Pole Side Impact Test
P167338

Time [s]

B-36

Exponent

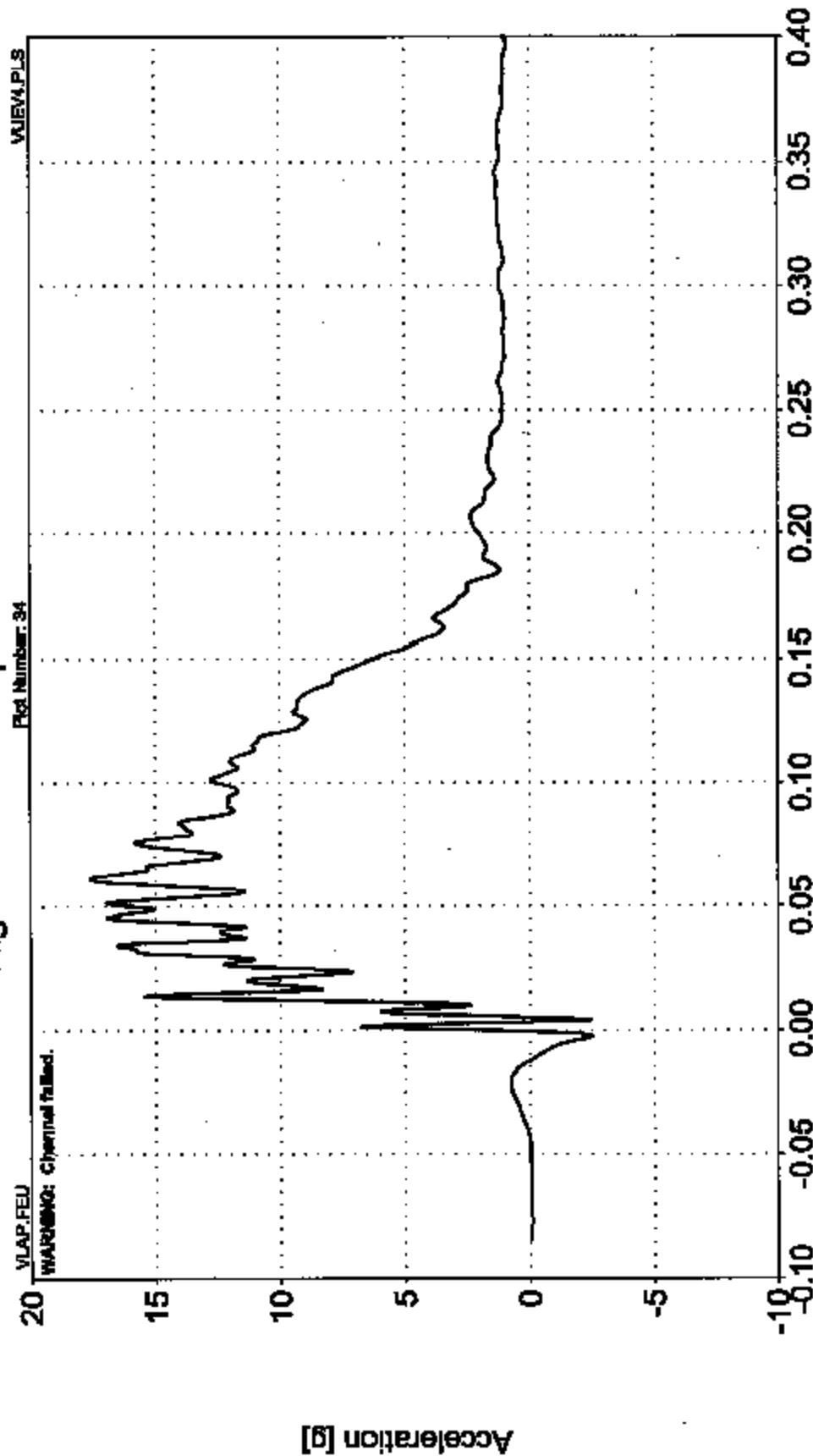
Failure Analysis Associates®

Lateral Acceleration v Time

Left A-Pillar Mid

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CRF 80
Data Max: 17.8 g @ 0.0009 sec.
Data Min: -2.5 g @ -0.0026 sec.

Rigid Pole Side Impact Test
P1407500

Time [s]

B-37

Exponent

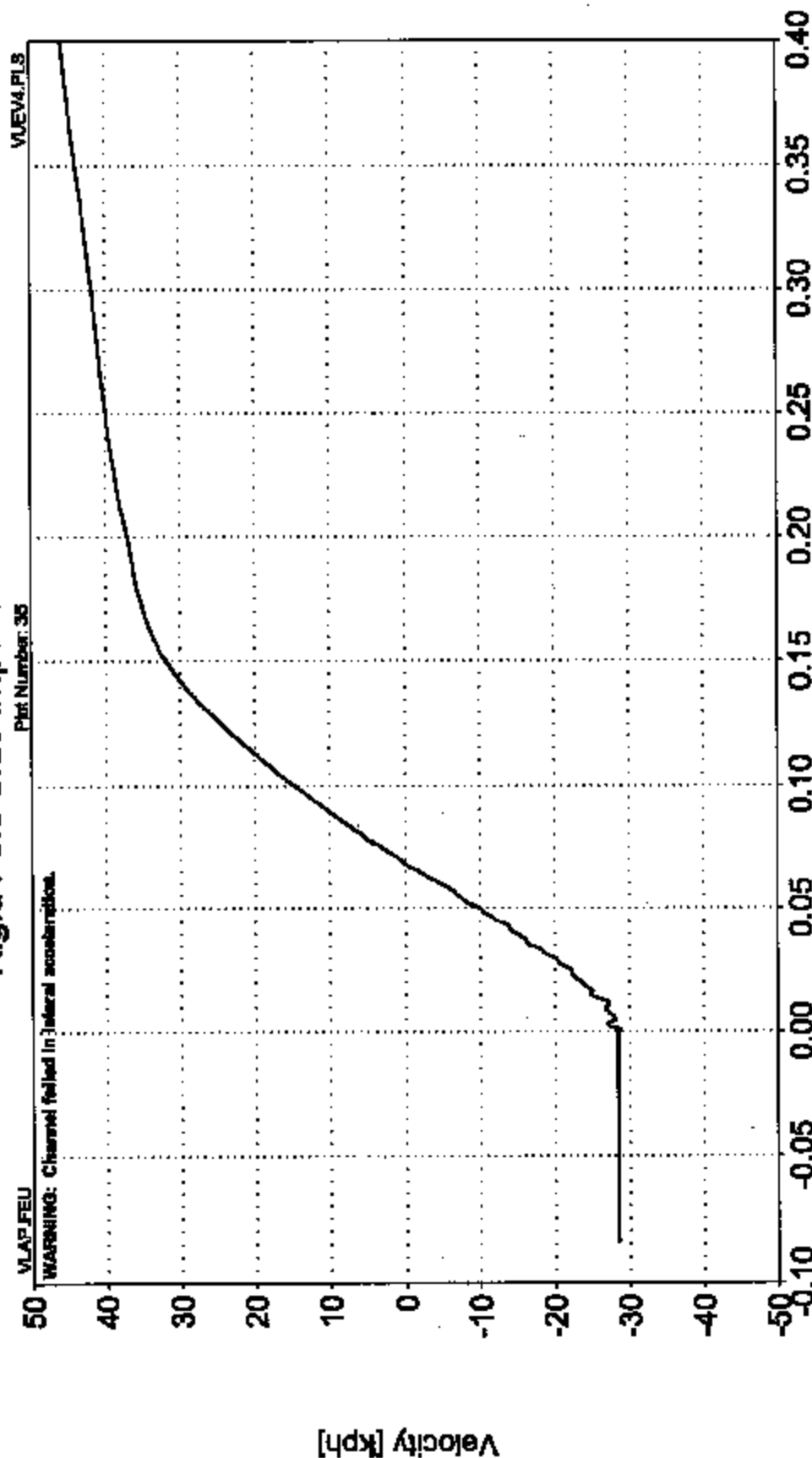
Failure Analysis Associates™

Lateral Velocity v Time

Left A-Pillar Mid

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Max: 45.8 kph @ 0.4000 sec.
Data Min: -28.7 kph @ 0.0000 sec.

Rigid Pole Side Impact Test
PH07538

Time [s]

B-38

Exponent

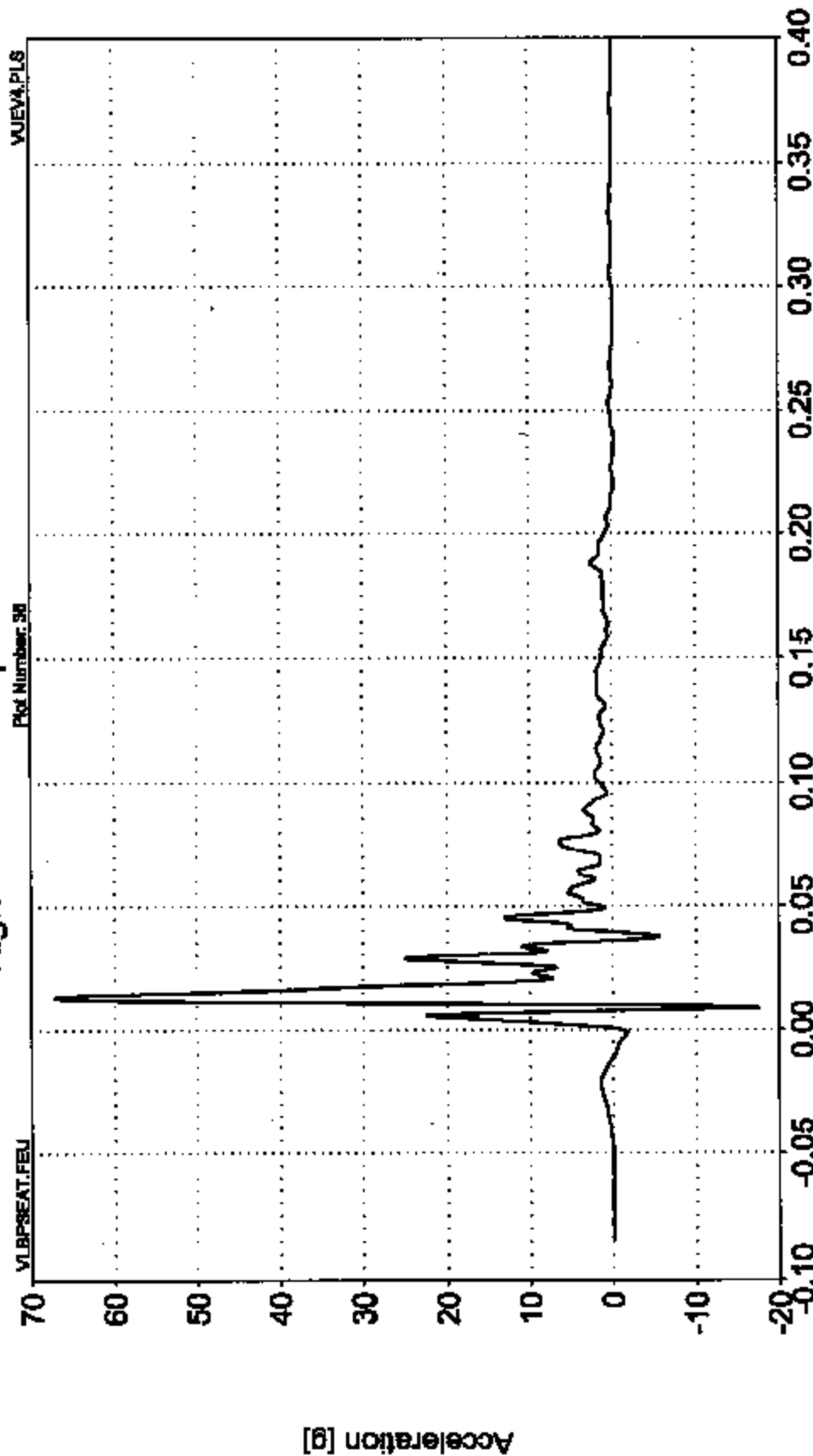
Failure Analysis Associates

Lateral Acceleration v Time

Left B-Pillar Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Max: 67.2 g @ 0.0133 sec.
Data Min: -17.5 g @ 0.0000 sec.

Rigid Pole Side Impact Test
PHS/308

Time [s]

B-39

Exponent

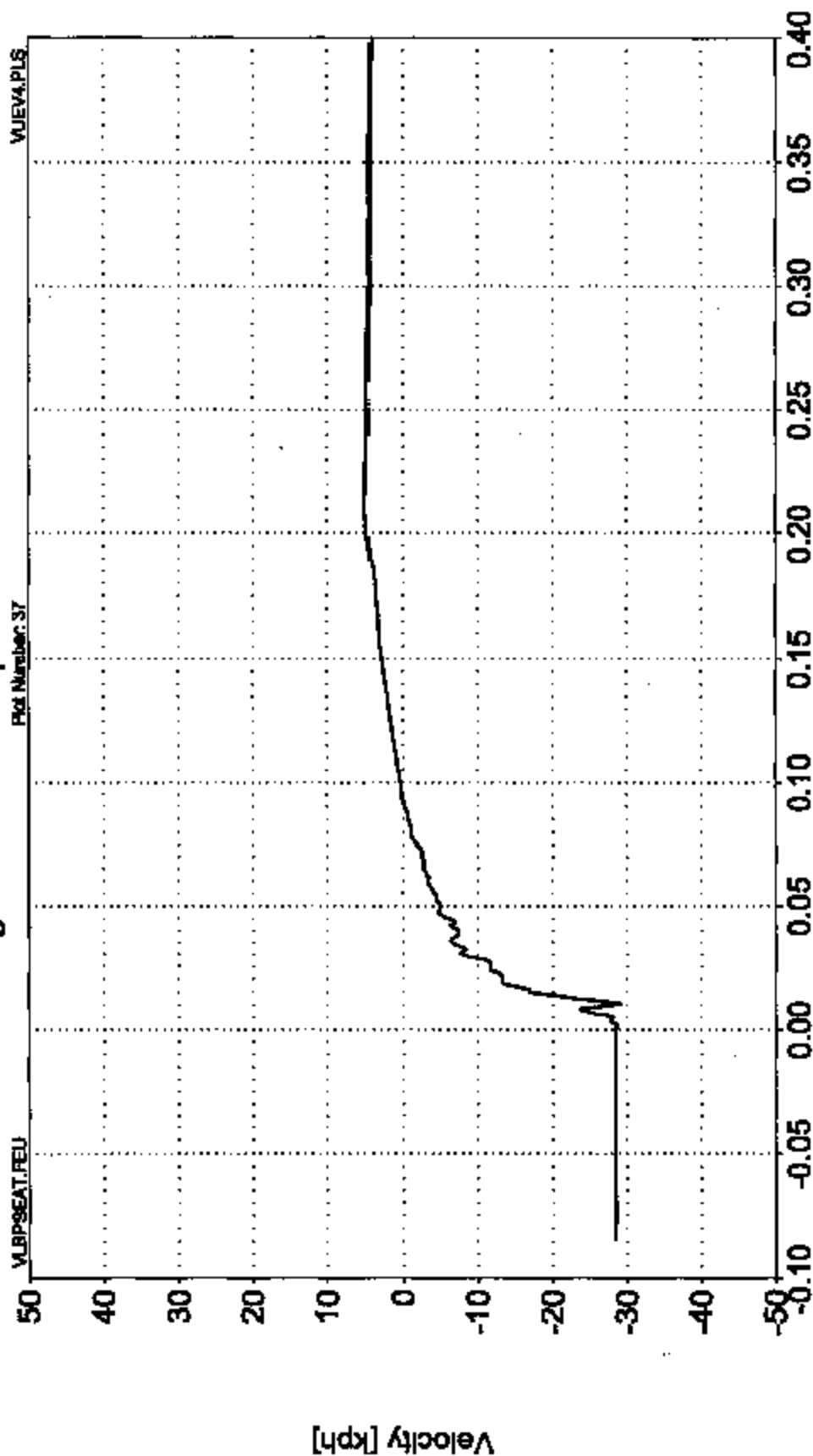
Failure Analysis Associates*

Lateral Velocity v Time

Left B-Pillar Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Max: 4.0 kph @ 0.2160 sec.
Data Min: -28.1 kph @ 0.0100 sec.

Rigid Pole Side Impact Test

PH07338

Time [s]

B-40

Exponent

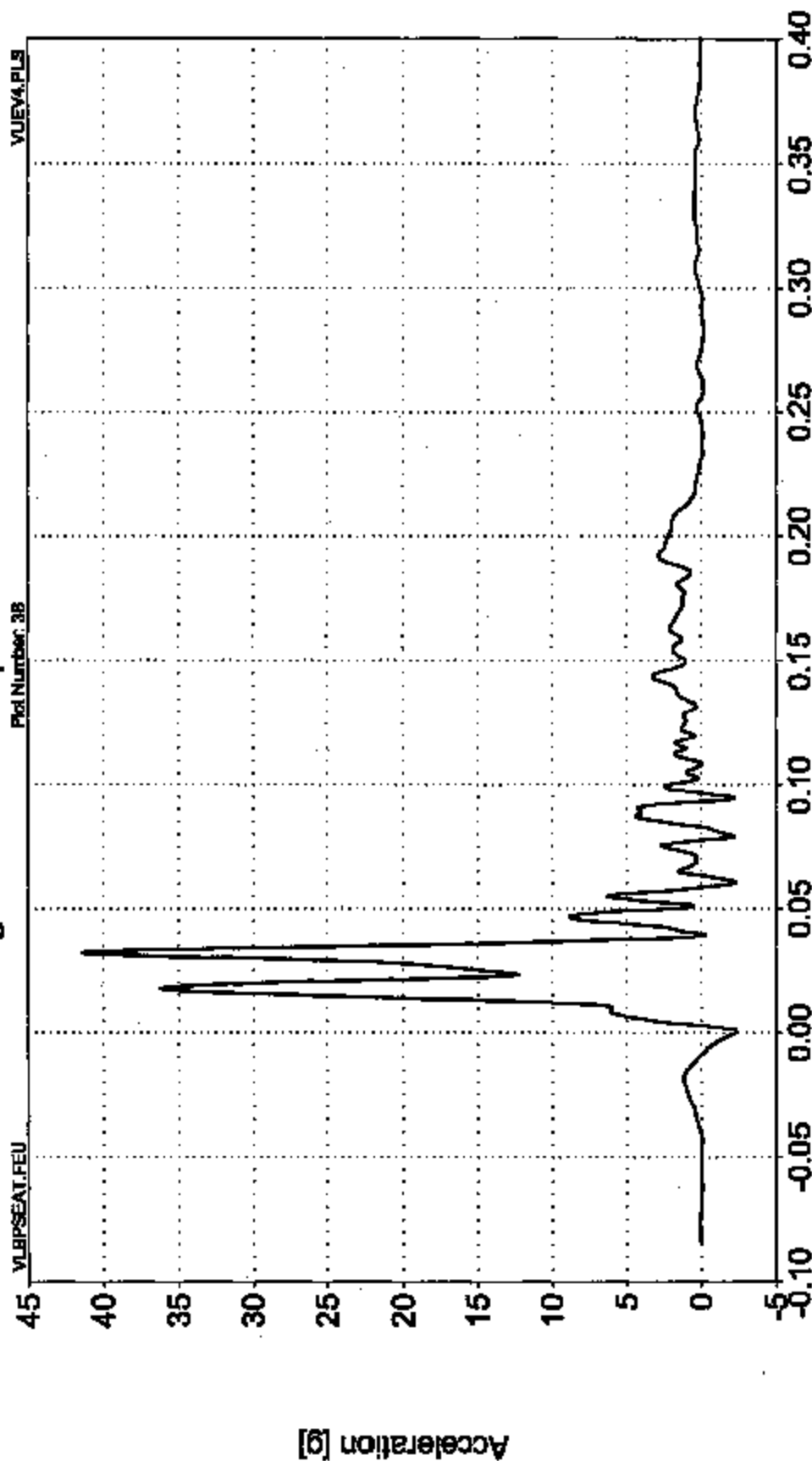
Failure Analysis Associates*

Lateral Acceleration v Time

Driver Seat Track

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CUTO 80
Data Max: 41.3 g @ 0.0021 sec.
Data Min: -2.4 g @ 0.0006 sec.

Rigid Pole Side Impact Test
P1407338

Time [s]

B-41

Exponent

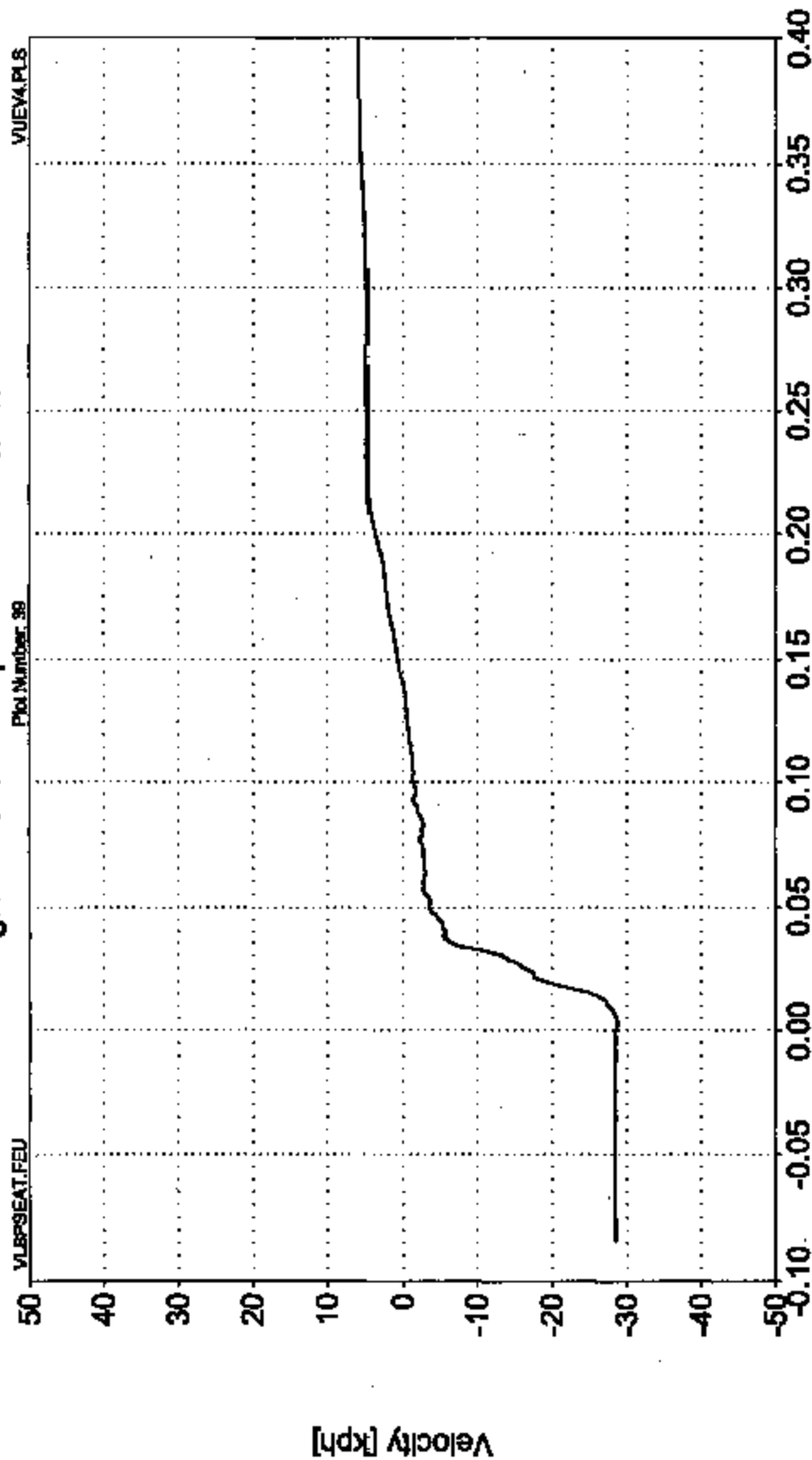
Failure Analysis Associates

Lateral Velocity v Time

Driver Seat Track

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



File: CFC 180
Data Name: 6.4 kph @ 0.3063 sec.
Data Min: -25.3 kph @ 0.0028 sec.

Rigid Pole Side Impact Test
PR07338

Time [s]

B-42

Exponent

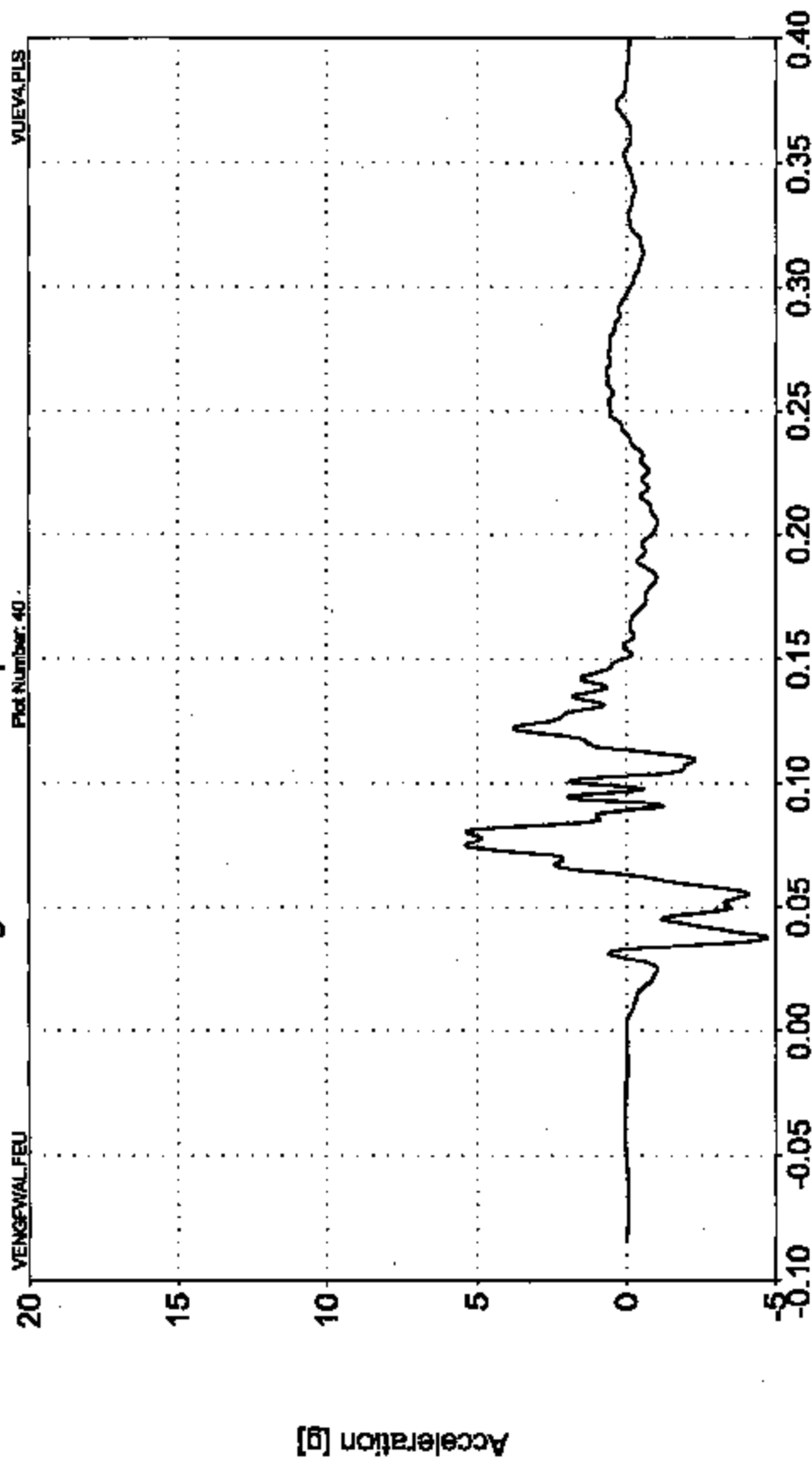
Failure Analysis Associates®

Longitudinal Acceleration v Time

Engine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



FRONT: CFC 60
Data Max: 5.4 g @ 0.0752 sec
Data Min: -4.7 g @ 0.0379 sec

Rigid Pole Side Impact Test
PH07338

Time [s]

B-43

Exponent

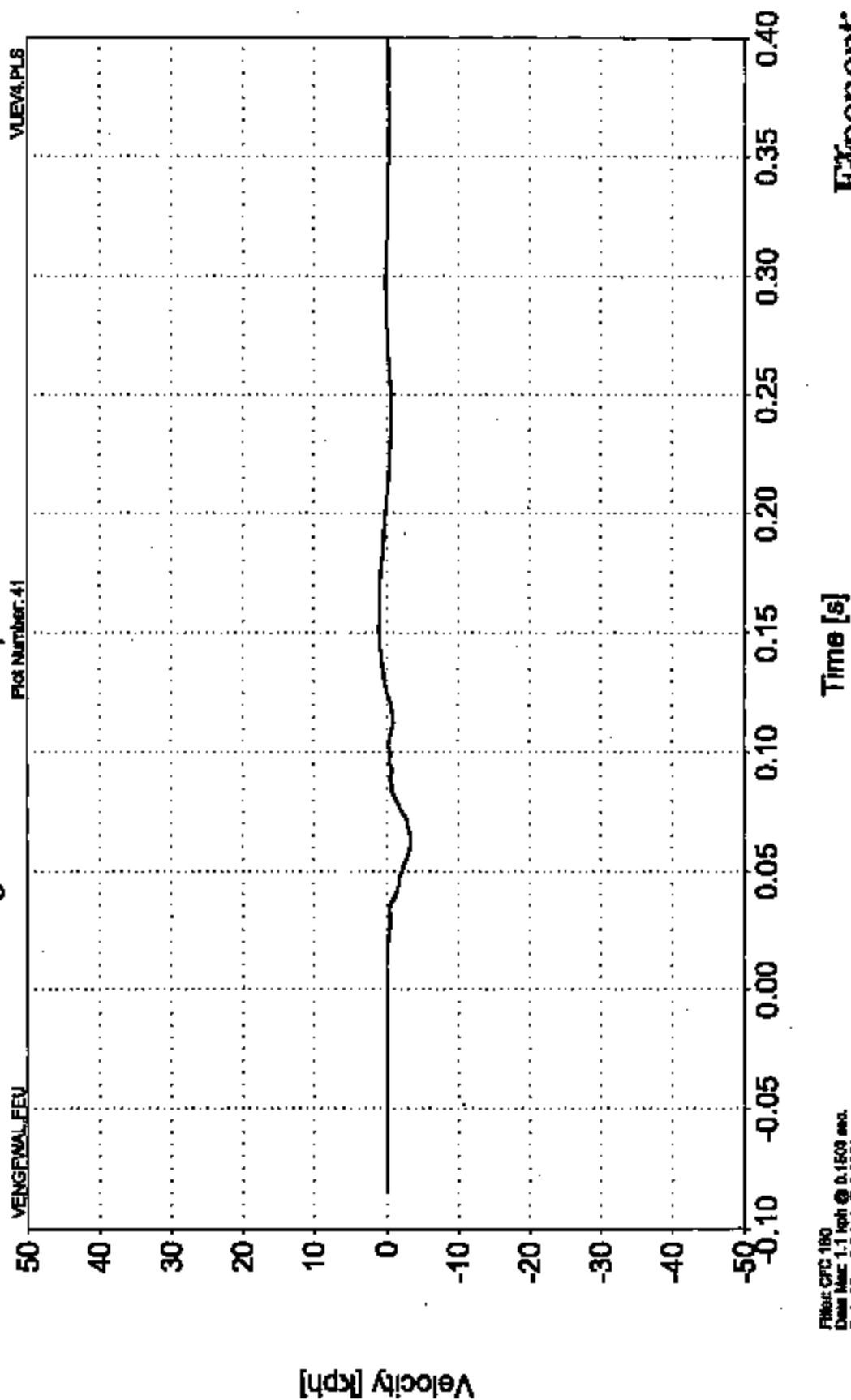
Failure Analysis Associates™

Longitudinal Velocity v Time

Engine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Max: 1.1 kph @ 0.1503 sec.
Data Min: -3.3 kph @ 0.0831 sec.

Rigid Pole Side Impact Test
P4-07308

Time [s]

B-44

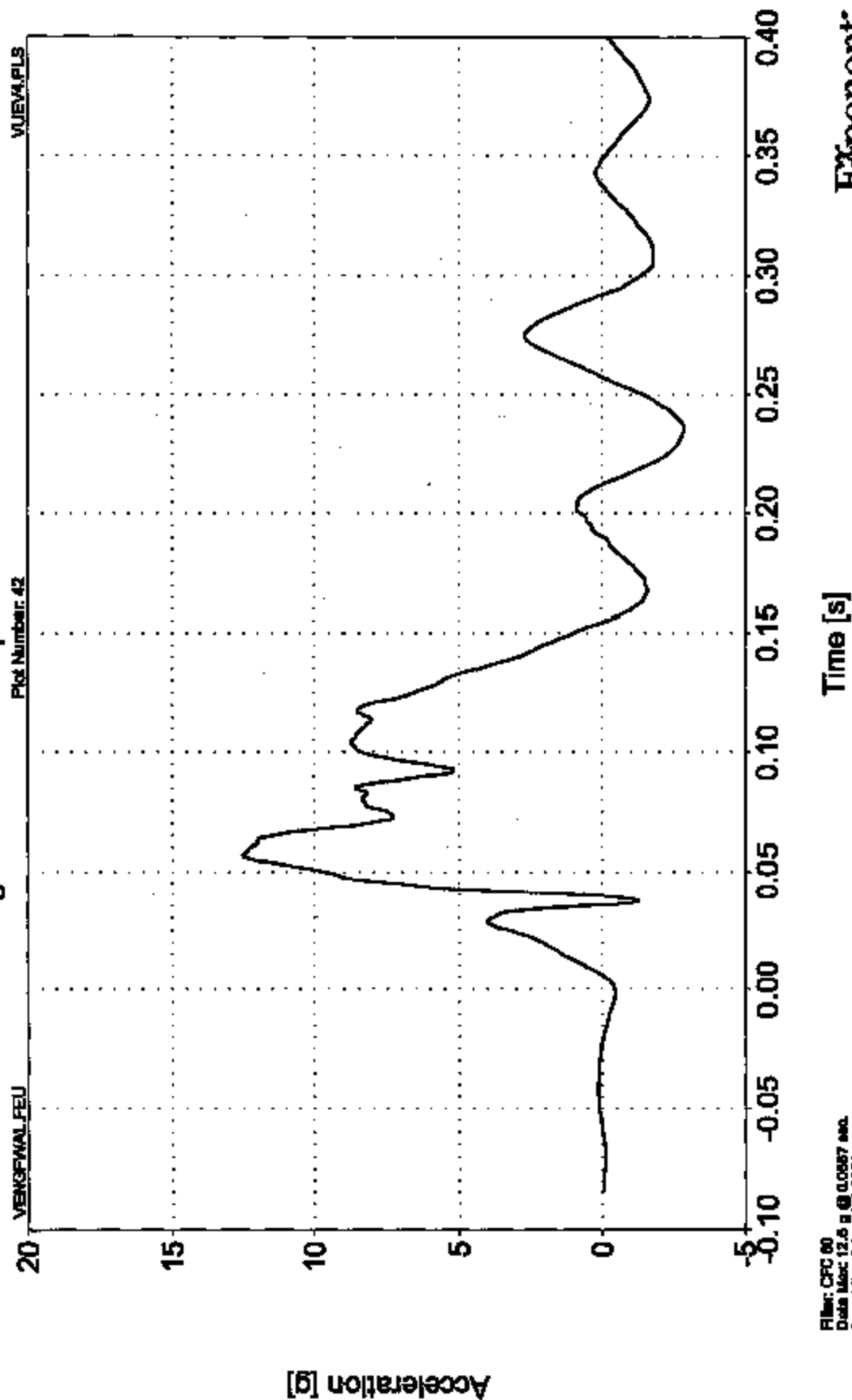
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Engine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Max: 12.6 g @ 0.0067 sec.
Data Min: -2.9 g @ 0.2356 sec.

Rigid Pole Side Impact Test
PI-107338

Time [s]

B-45

Exponent

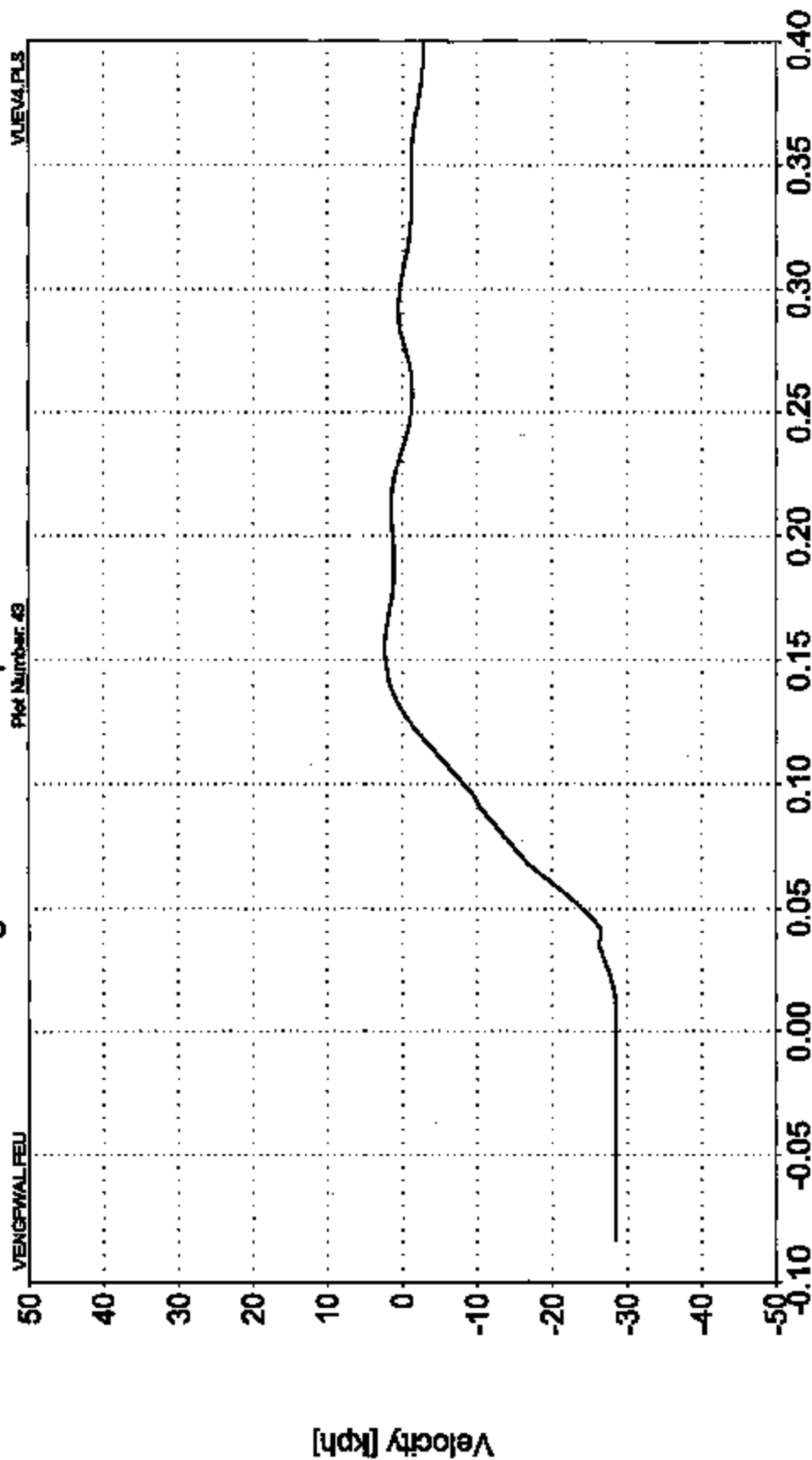
Failure Analysis Associates®

Lateral Velocity v Time

Engine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C201110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Max: 2.5 kph @ 0.1250 sec.
Data Min: -25.0 kph @ 0.0000 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

Exponent

Failure Analysis Associates*

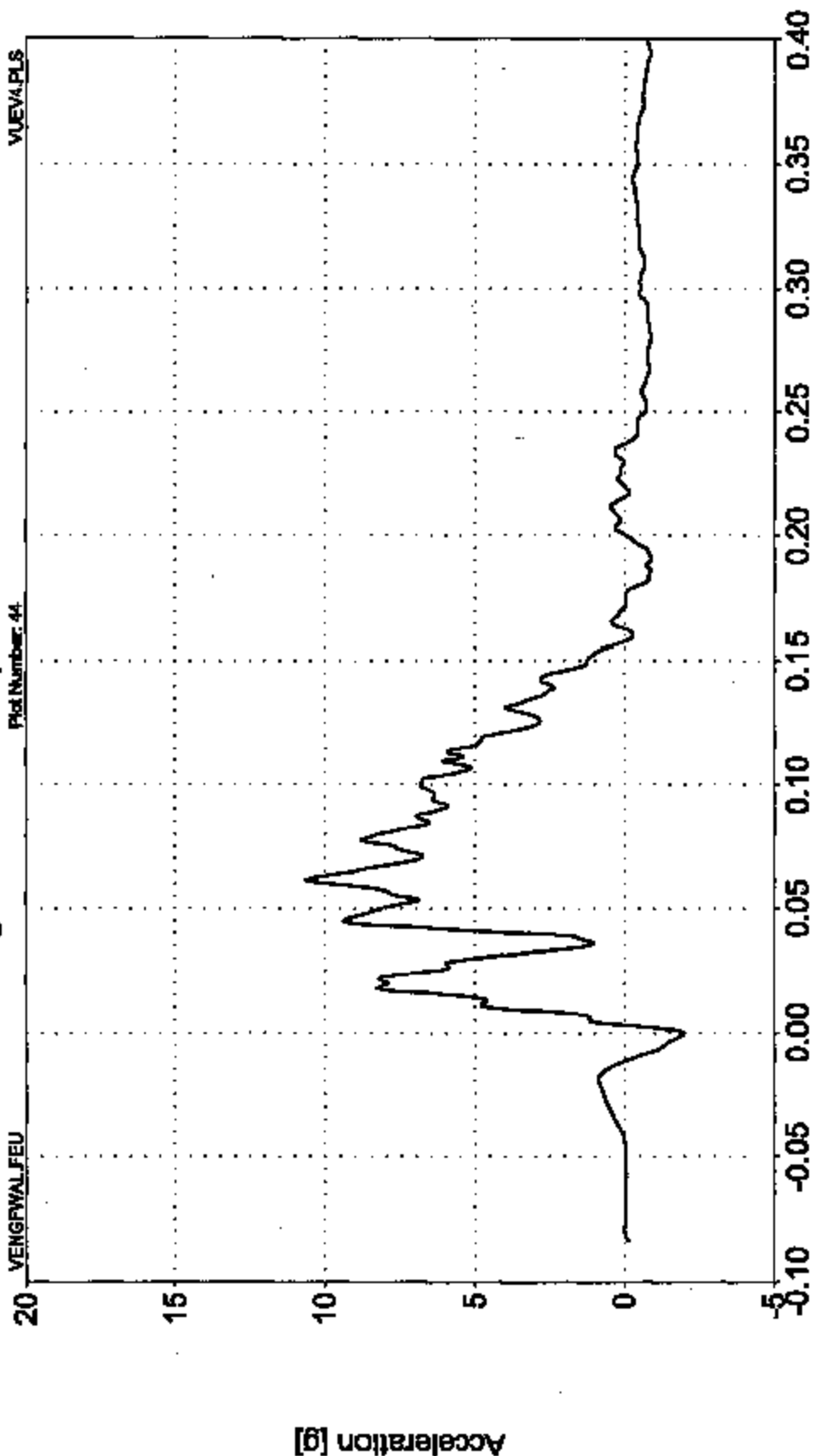
B-46

Lateral Acceleration v Time

Firewall

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



File: CFC 80
Data Max: 10.0 g @ 0.0016 sec.
Data Min: -1.0 g @ -0.0002 sec.

Rigid Pole Side Impact Test
P107338

Time [s]

Exponent

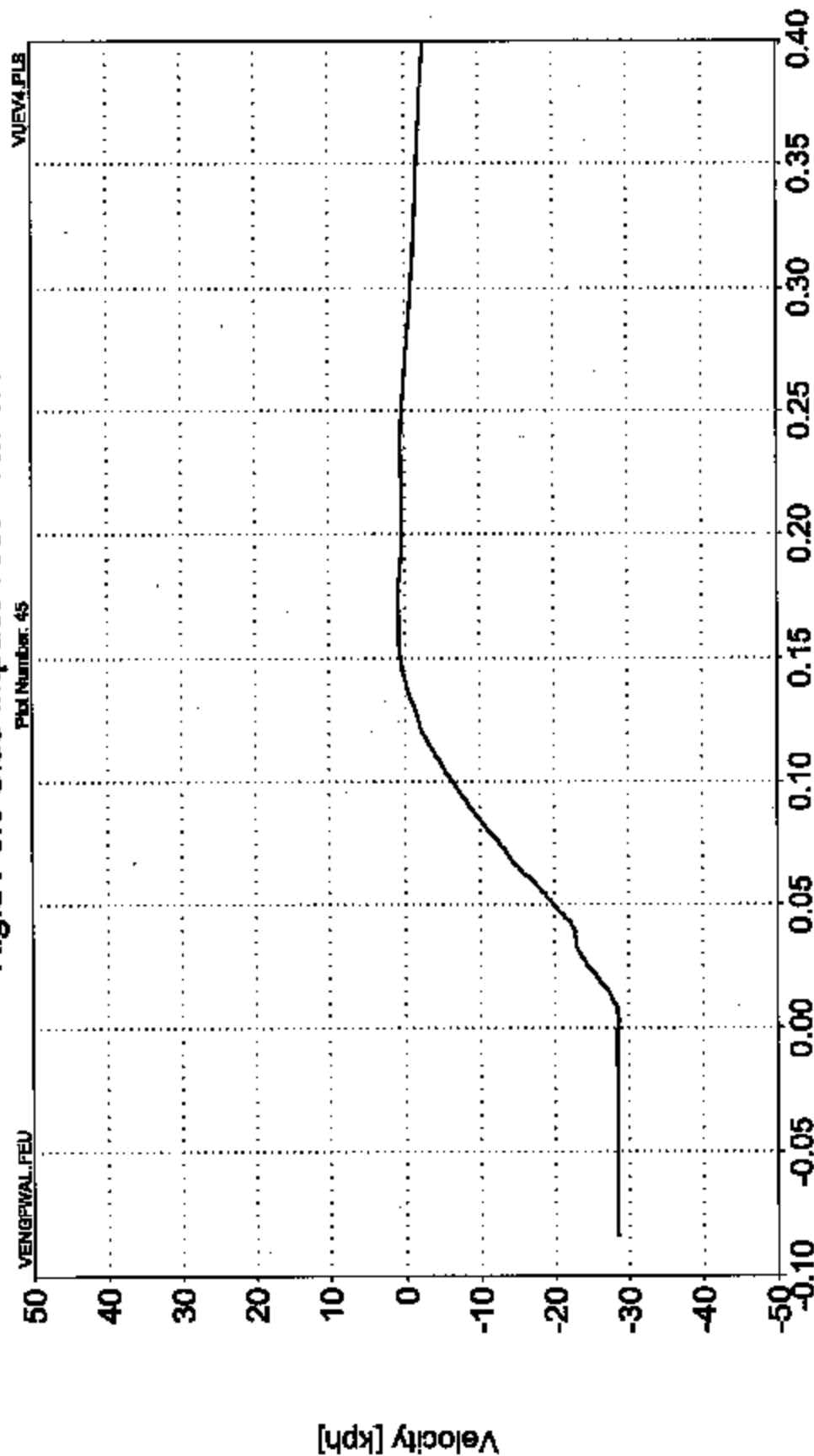
Failure Analysis Associates®

B-47

Lateral Velocity v Time

Firewall

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110
Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 160
Data Max: 0.8 kph @ 0.1710 sec.
Data Min: -28.7 kph @ 0.0029 sec.

Rigid Pole Side Impact Test
PH07336

Time [s]

B-48

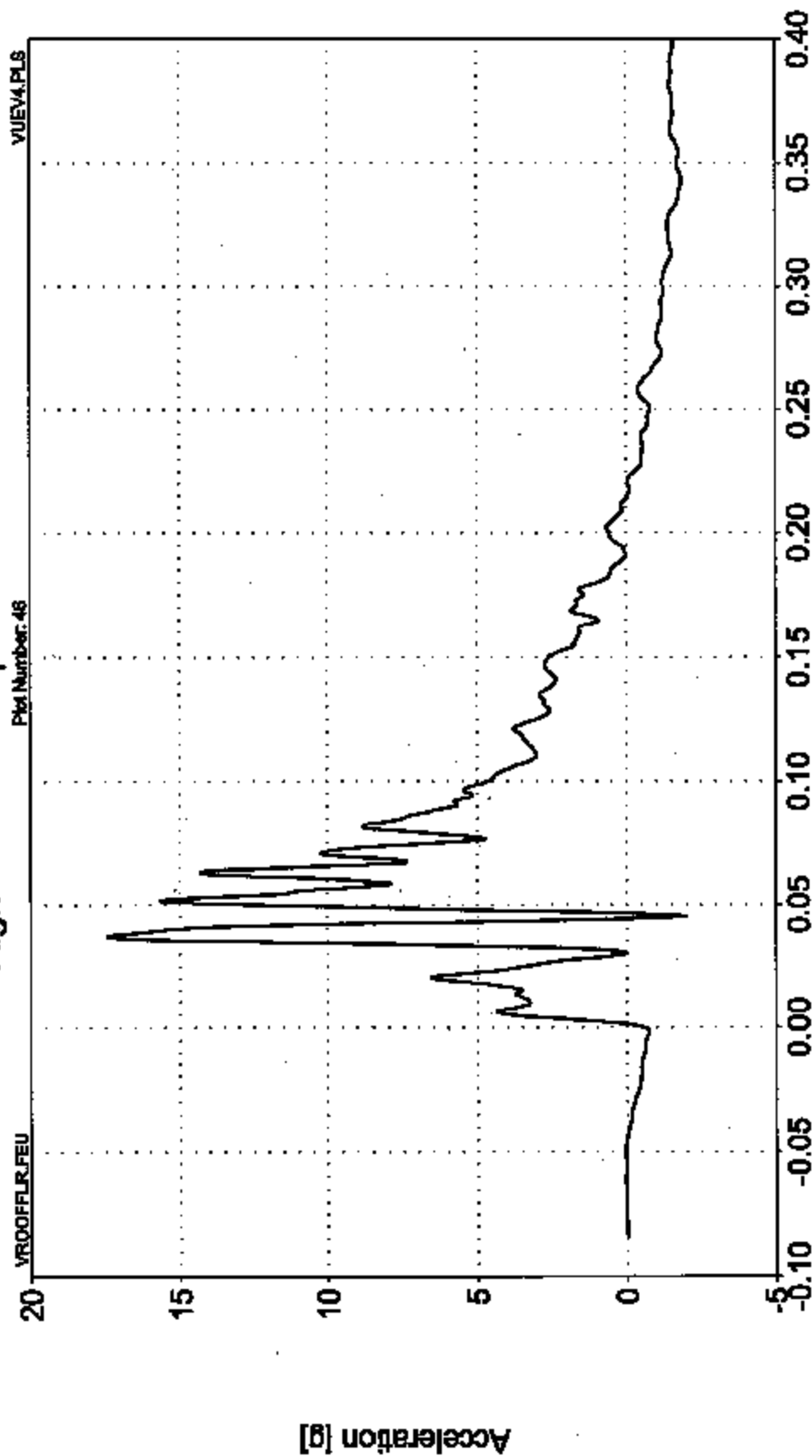
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Right Roof Rail

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Plot: CFC 80
Data Max: 17.0 g @ 0.05370 sec.
Data Min: -2.0 g @ 0.04622 sec.

Rigid Pole Side Impact Test
PH07333

Time [s]

B-49

Exponent

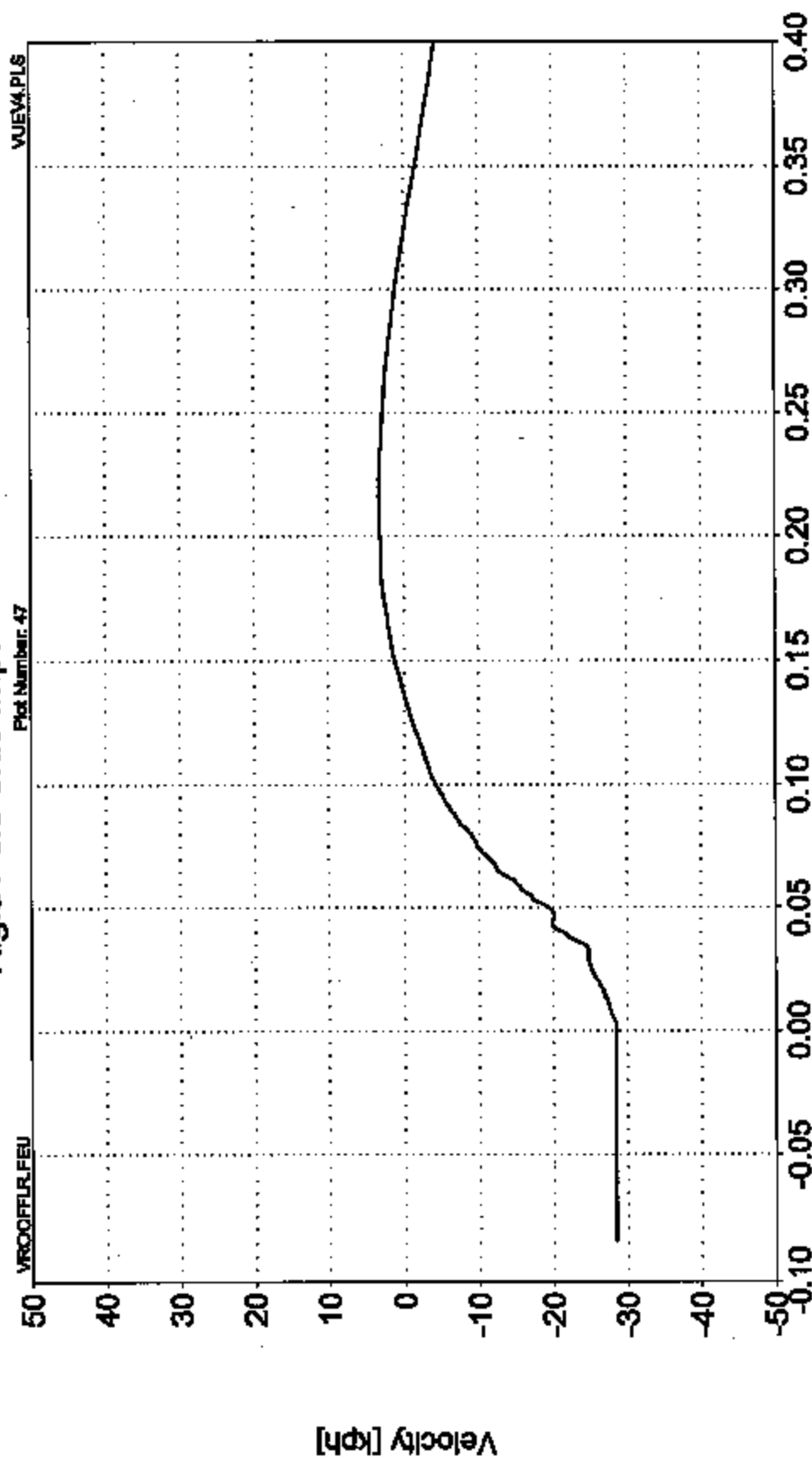
Failure Analysis Associates*

Lateral Velocity v Time

Right Roof Rail

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Max: 3.3 kph @ 0.0126 sec.
Data Min: -28.5 kph @ 0.0016 sec.

Rigid Pole Side Impact Test

PH07388

Time [s]

B-50

Exponent

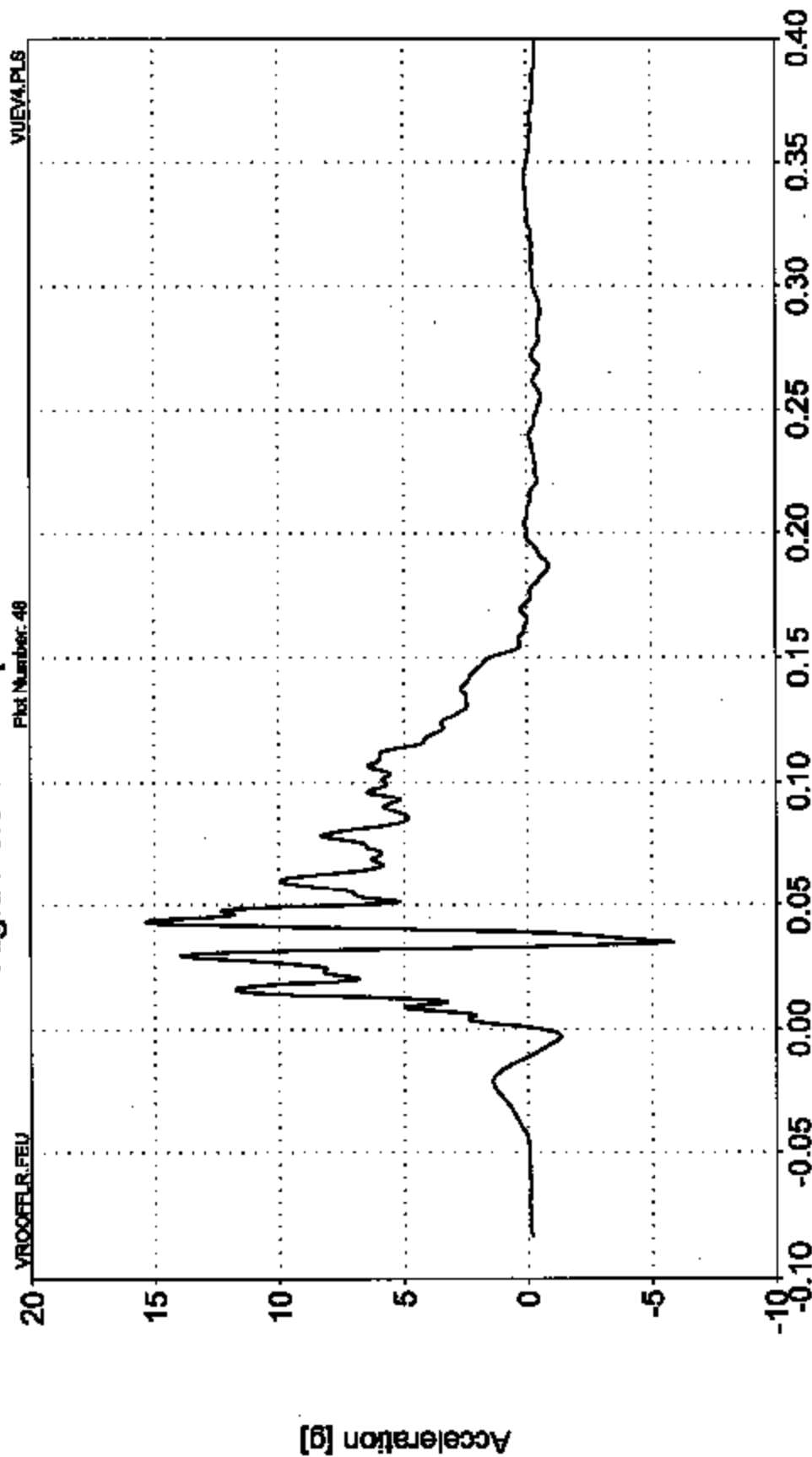
Failure Analysis Associates*

Lateral Acceleration v Time

Right Floor Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 60
Data Max: 15.4 g @ 0.0433 sec.
Data Min: -5.0 g @ 0.0254 sec.

Rigid Pole Side Impact Test
PH07538

Time [s]

B-51

Exponent

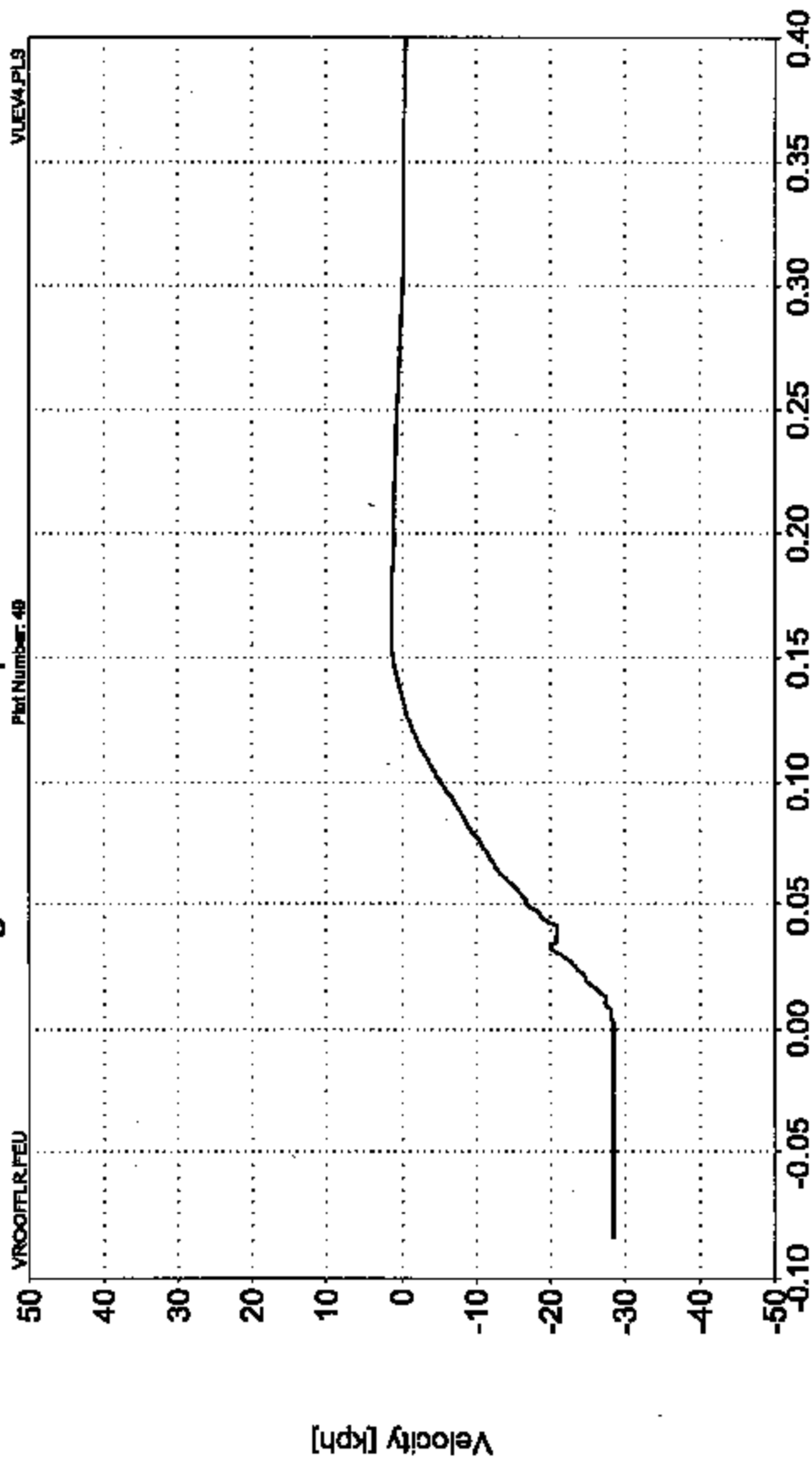
Failure Analysis Associates™

Lateral Velocity v Time

Right Floor Sill

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 100
Data Rate: 1.4 kph @ 0.1718 sec.
Data Min: -28.5 kph @ 0.0018 sec.

Rigid Pole Side Impact Test
PH07336

Time [s]

B-52

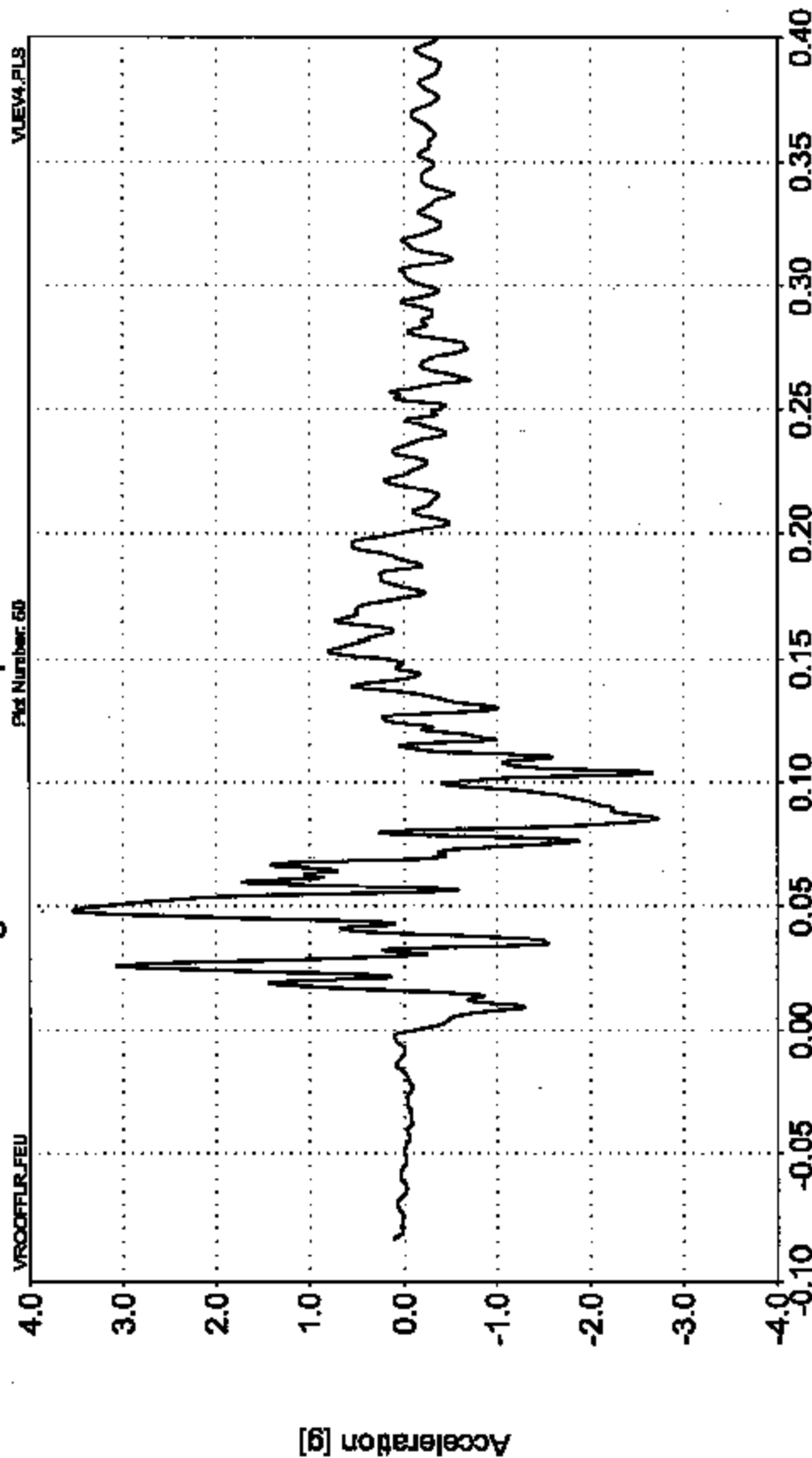
Exponent

Failure Analysis Associates

Longitudinal Acceleration v Time

Rear Deck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110
Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Min: 3.5 u @ 0.0492 sec.
Data Max: -2.7 g @ 0.0854 sec.

Rigid Pole Side Impact Test
PH07304

Time [s]

B-53

Exponent

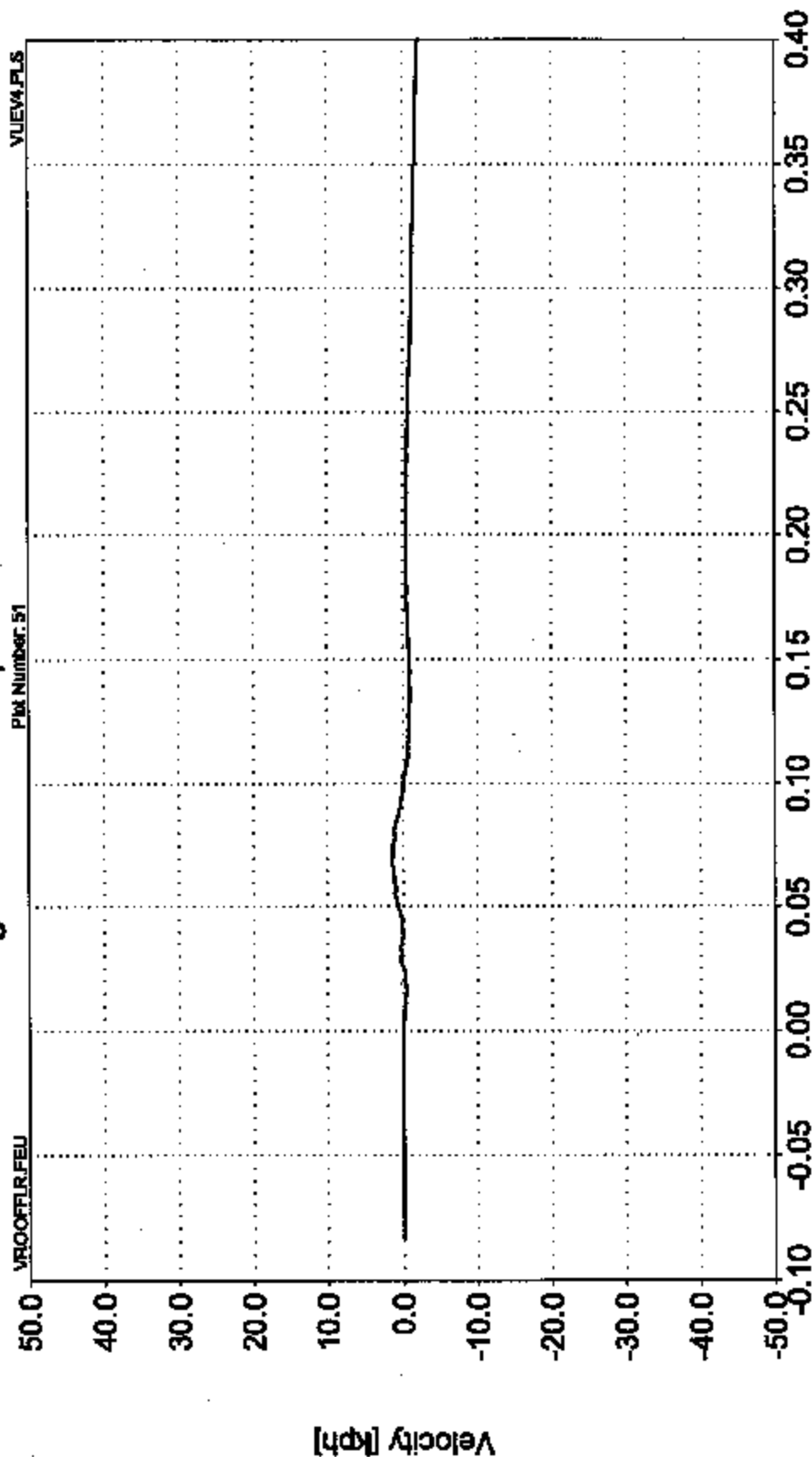
Failure Analysis Associates

Longitudinal Velocity v Time

Rear Deck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 180
Data Max: 1.0 kph @ 0.053 sec.
Data Min: -2.0 kph @ 0.400 sec.

Rigid Pole Side Impact Test
PH07538

Time [s]

B-54

Exponent

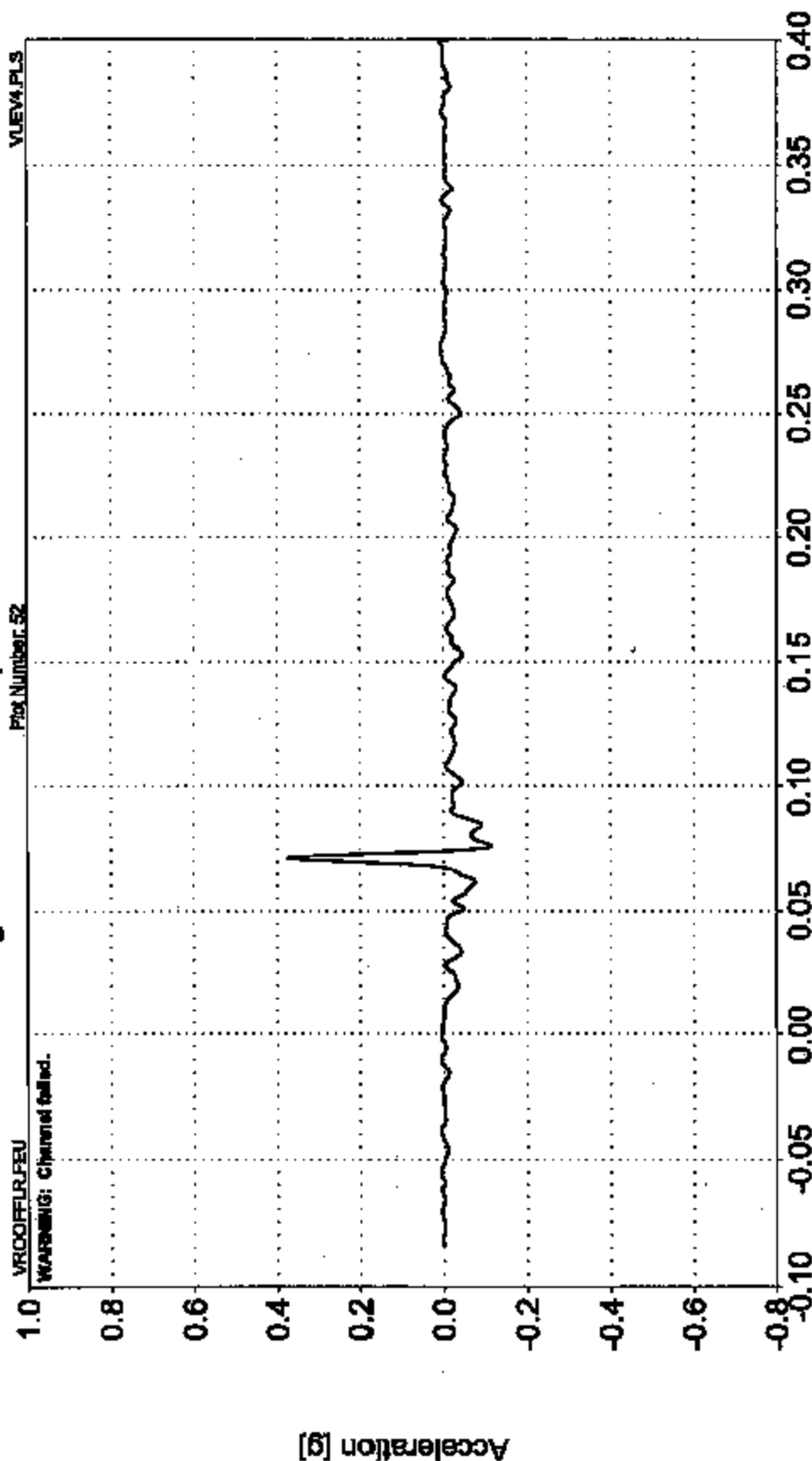
Failure Analysis Associates™

Lateral Acceleration v Time

Rear Deck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: CFC 80
Data Max: 0.4 g @ 0.0715 sec
Data Min: -0.1 g @ 0.0784 sec

Rigid Pole Side Impact Test
PH07335

Time [s]

B-55

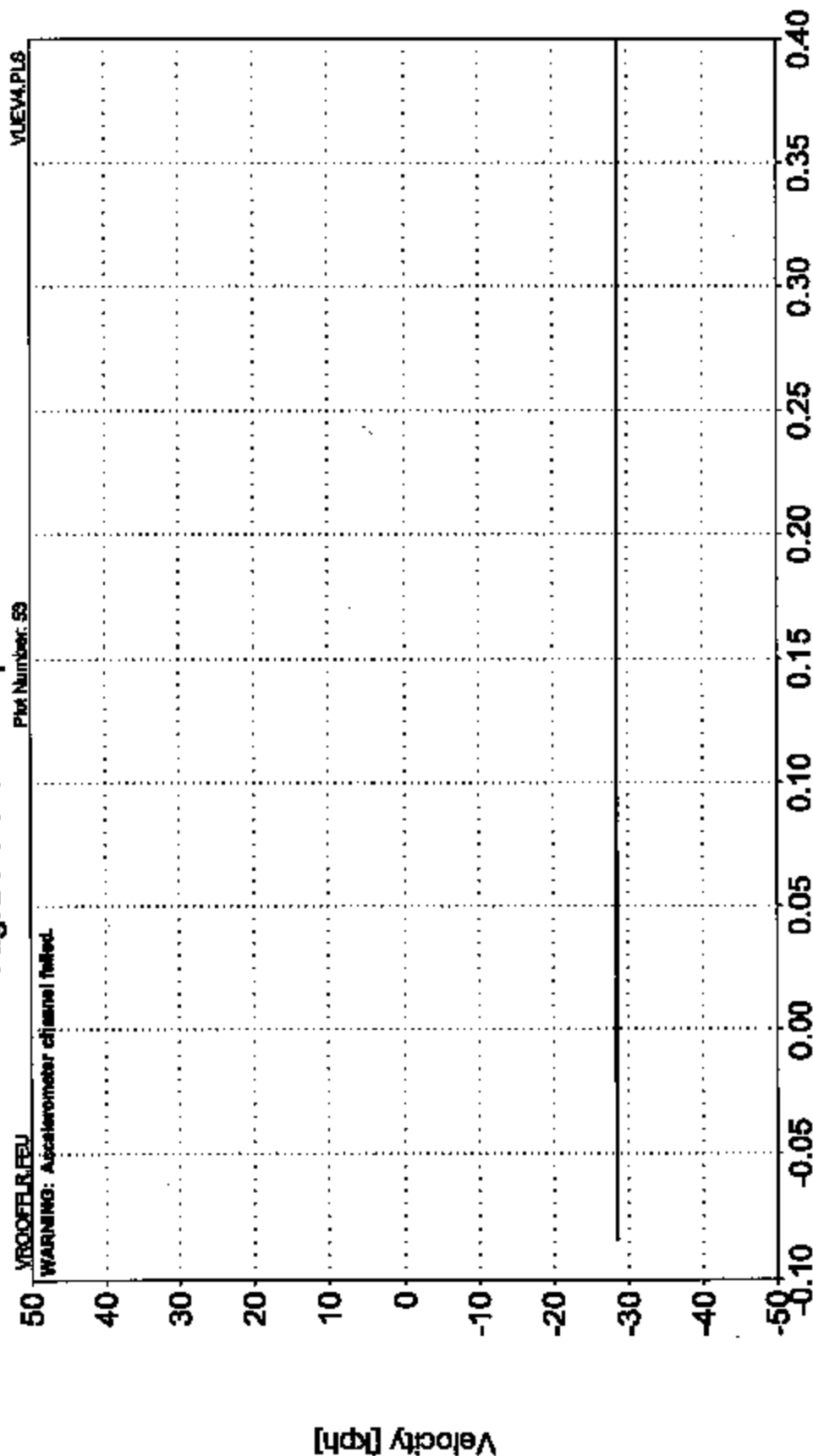
Exponent

Failure Analysis Associates®

Lateral Velocity v Time

Rear Deck

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110
Rigid Pole Side Impact Test - 10/25/02



Plot: CPC 180
Data Min: -28.5 kph @ 0.0045 sec.
Data Min: -28.7 kph @ 0.3508 sec.

Rigid Pole Side Impact Test
PH07338

Time [s]

B-56

Exponent

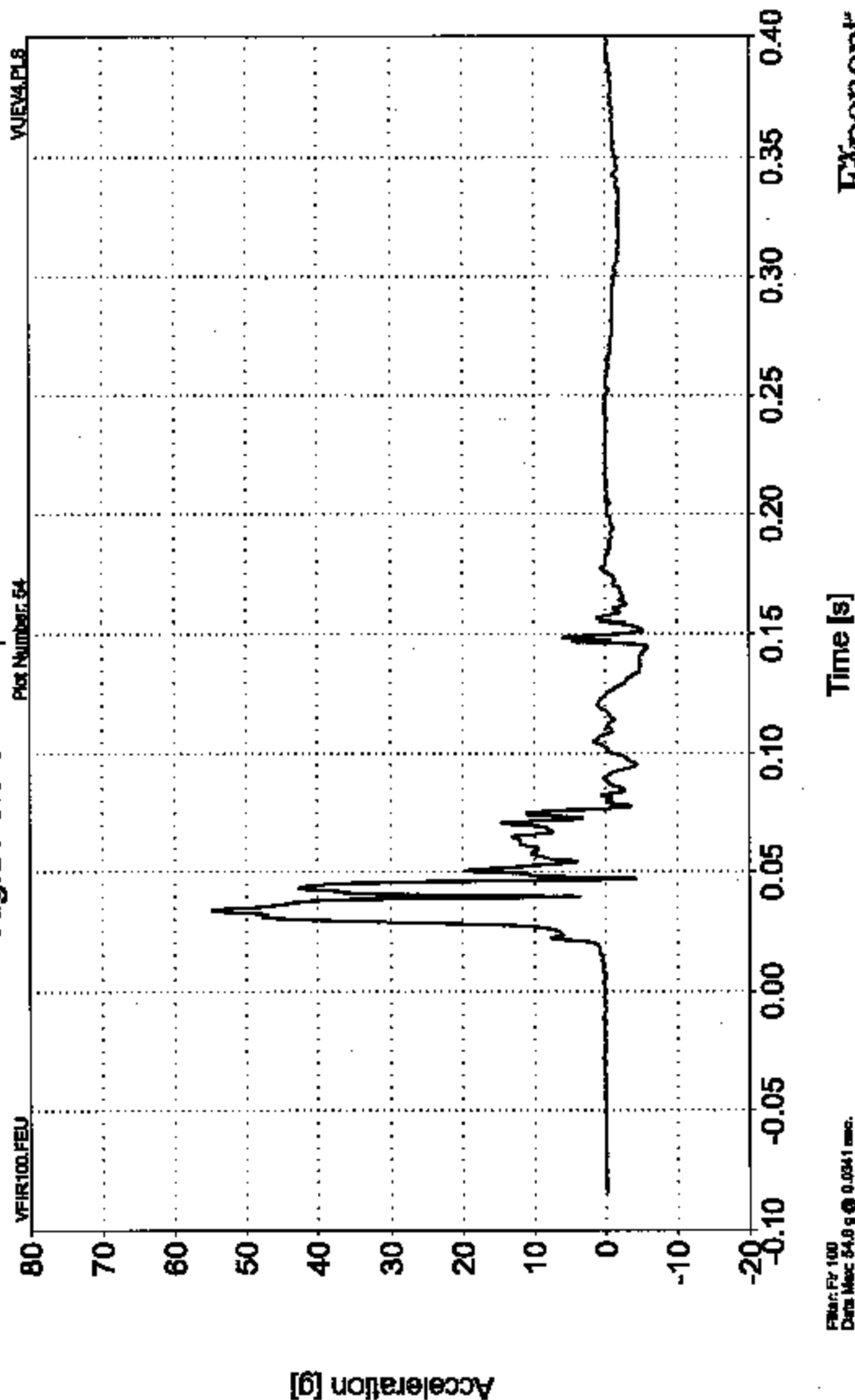
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Upper Rib

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



File: FV 100
Data Max: 54.9 g @ 0.0541 sec.
Data Min: -6.9 g @ 0.1445 sec.

Rigid Pole Side Impact Test
PH07538

Time [s]

Exponent

Failure Analysis Associates

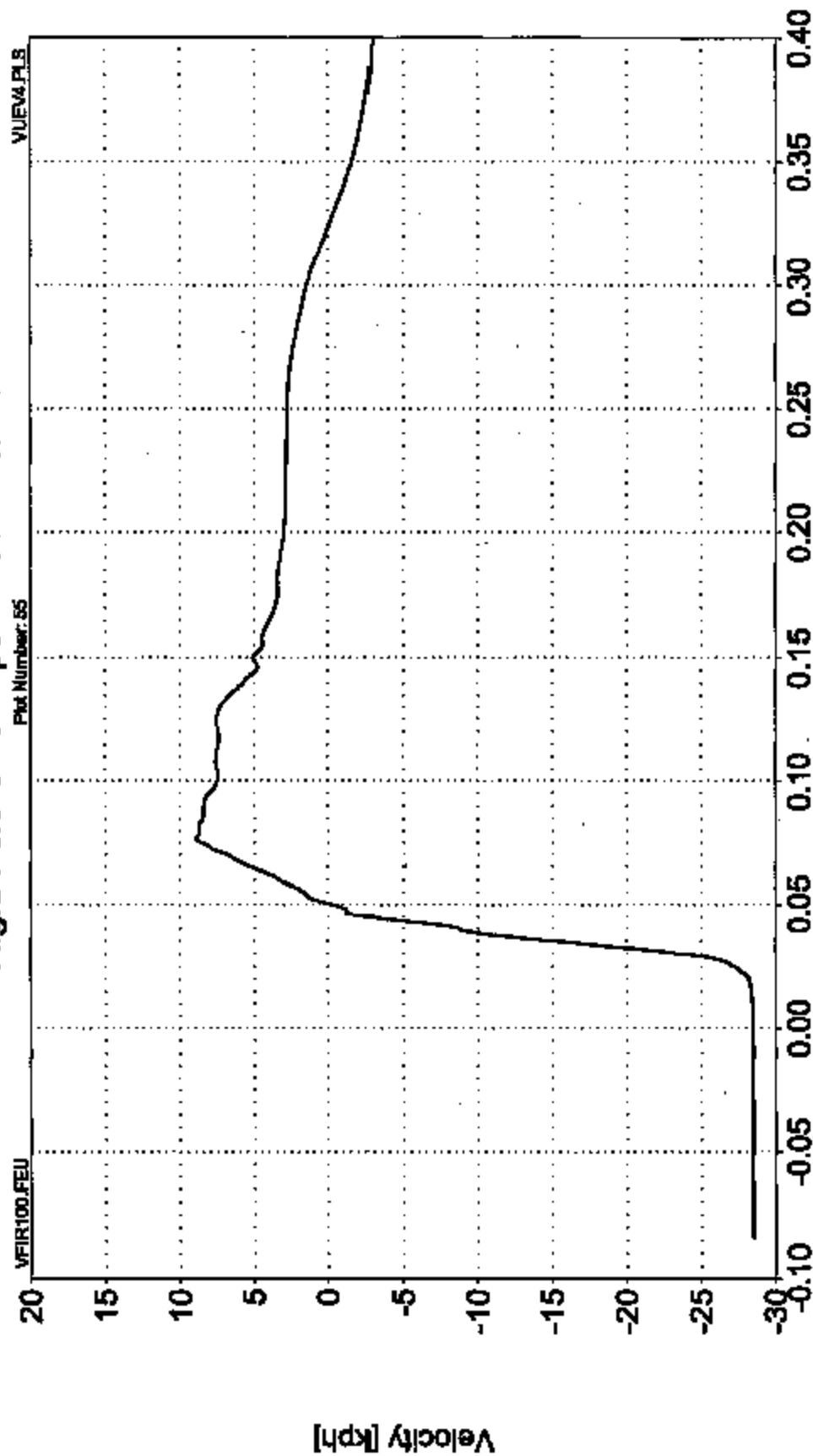
B-57

Lateral Velocity v Time

Driver ATD Upper Rib

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: Fv 100
Data Max: 8.9 kph @ 0.0707 sec.
Data Min: -28.6 kph @ 0.0005 sec.

Rigid Pole Side Impact Test
P107335

Time [s]

Exponent

Failure Analysis Associates®

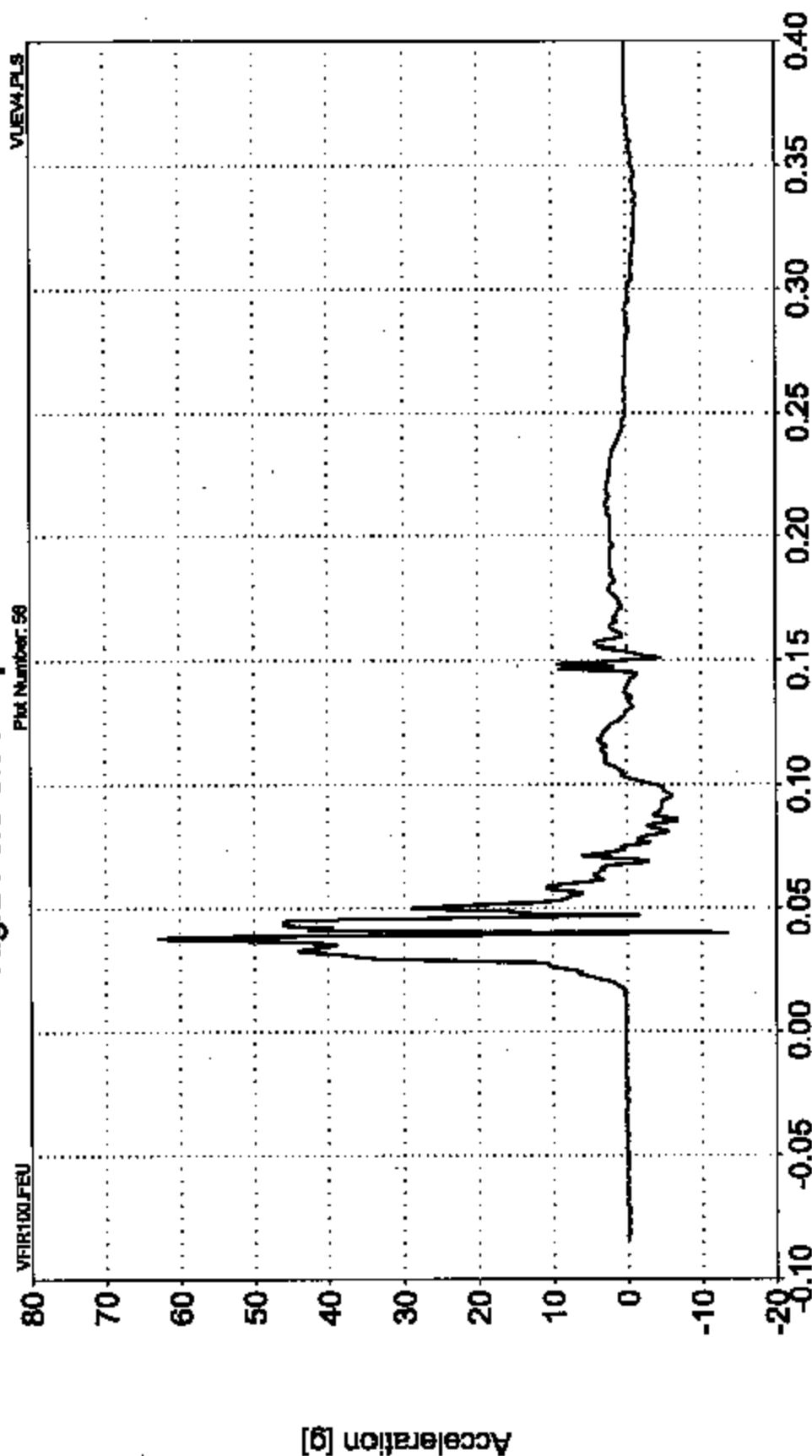
B-58

Lateral Acceleration v Time

Driver ATD Lower Rib

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: F4 100
Data Max: 62.8 g @ 0.0378 sec.
Data Min: -13.5 g @ 0.0386 sec.

Rigid Pole Side Impact Test
P107336

Time [s]

B-59

Exponent

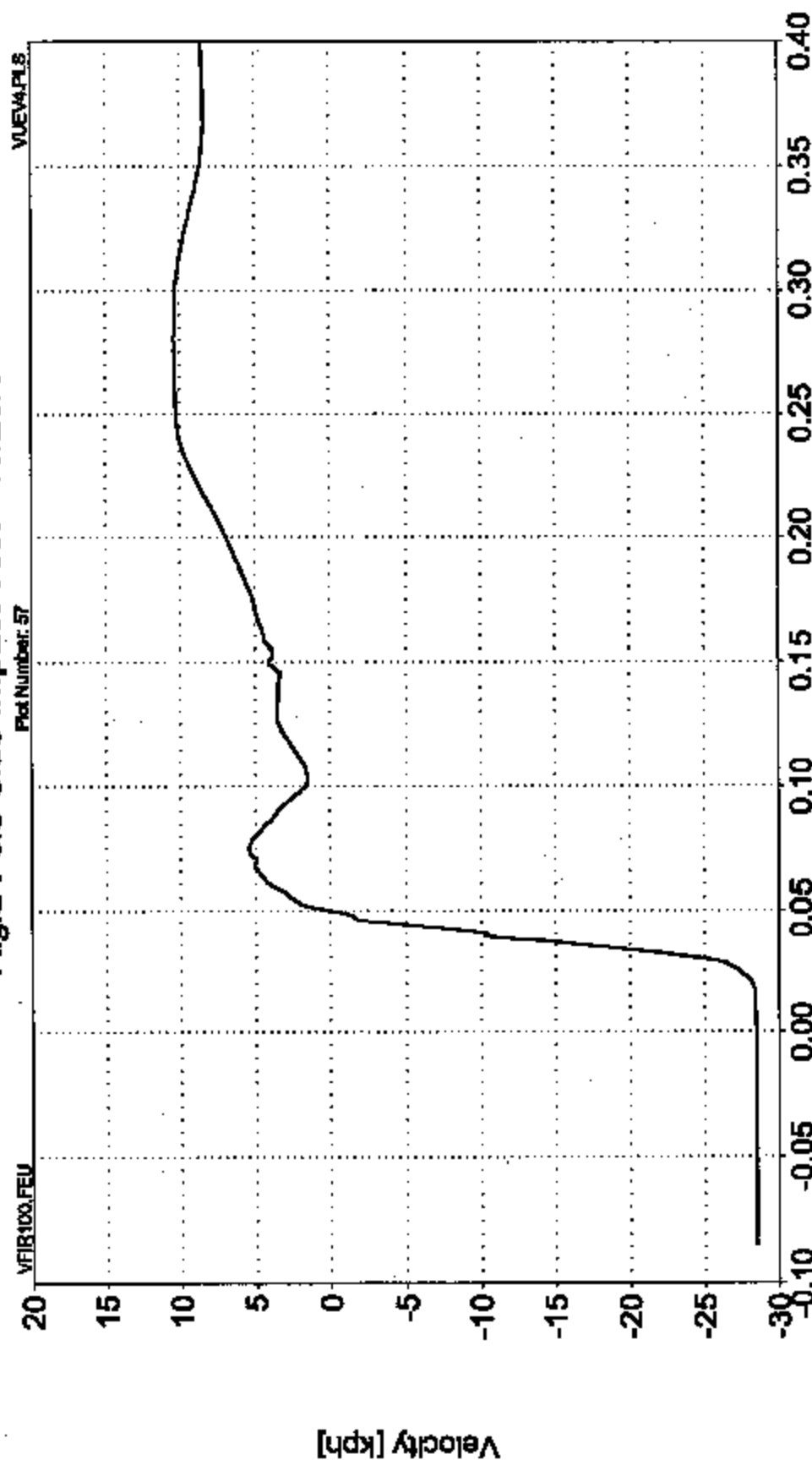
Failure Analysis Associates*

Lateral Velocity v Time

Driver ATD Lower Rib

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: F1 100
Data Max: 10.4 kph @ 0.2798 sec.
Data Min: -28.5 kph @ -0.0940 sec.

Rigid Pole Side Impact Test
PH07538

Time [s]

B-60

Exponent

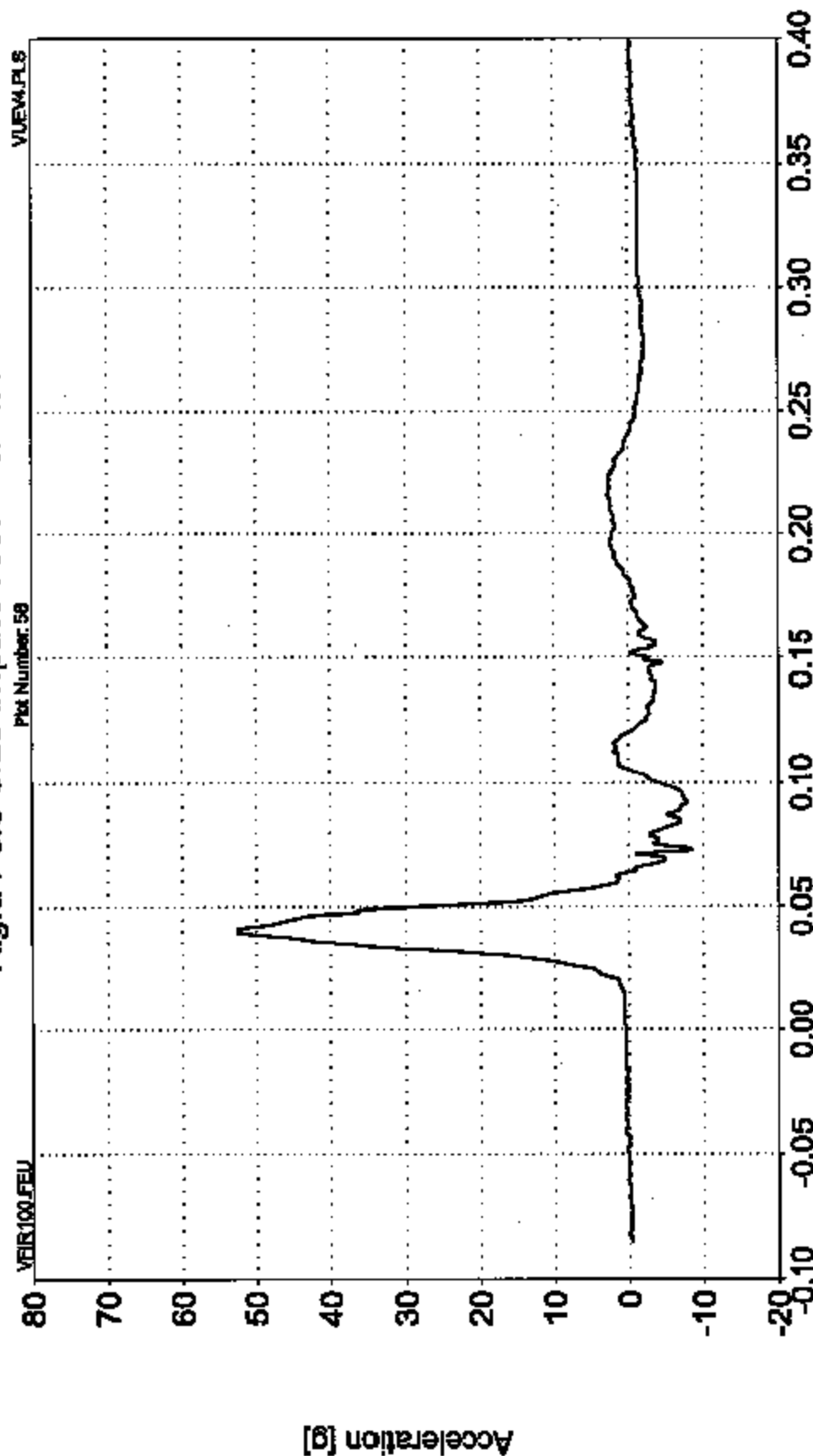
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Lower Spine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: Fv 100
Data Max: 82.9 g @ 0.0387 sec.
Data Min: -8.6 g @ 0.0732 sec.

Rigid Pole Side Impact Test
PHS7338

Time [s]

B-61

Exponent

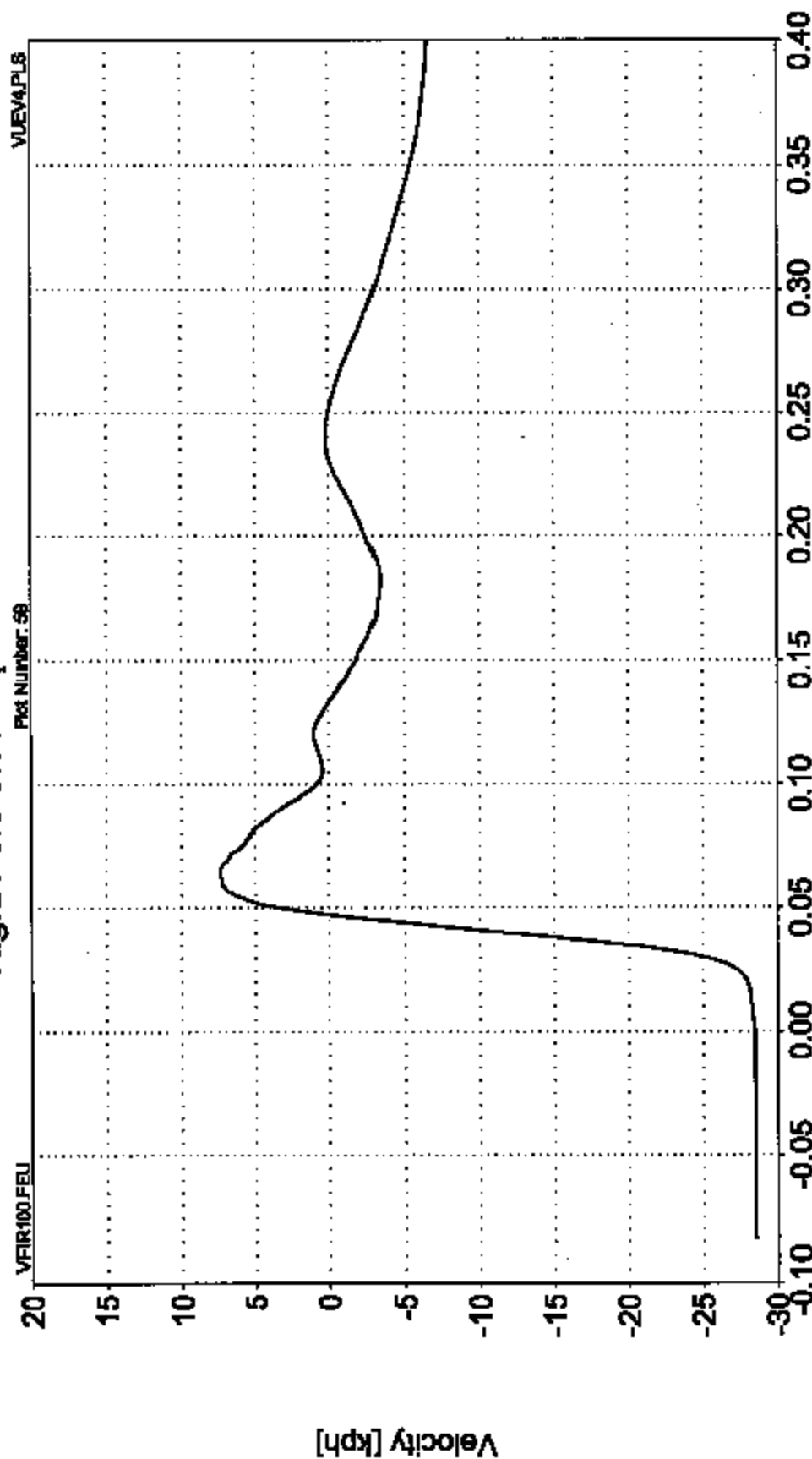
Failure Analysis Associates®

Lateral Velocity v Time

Driver ATD Lower Spine

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: Fv 100
Data Max: 7.4 kph @ 0.0838 sec.
Data Min: -28.5 kph @ -0.0840 sec.

Rigid Pole Side Impact Test
FMV305

Time [s]

B-62

Exponent

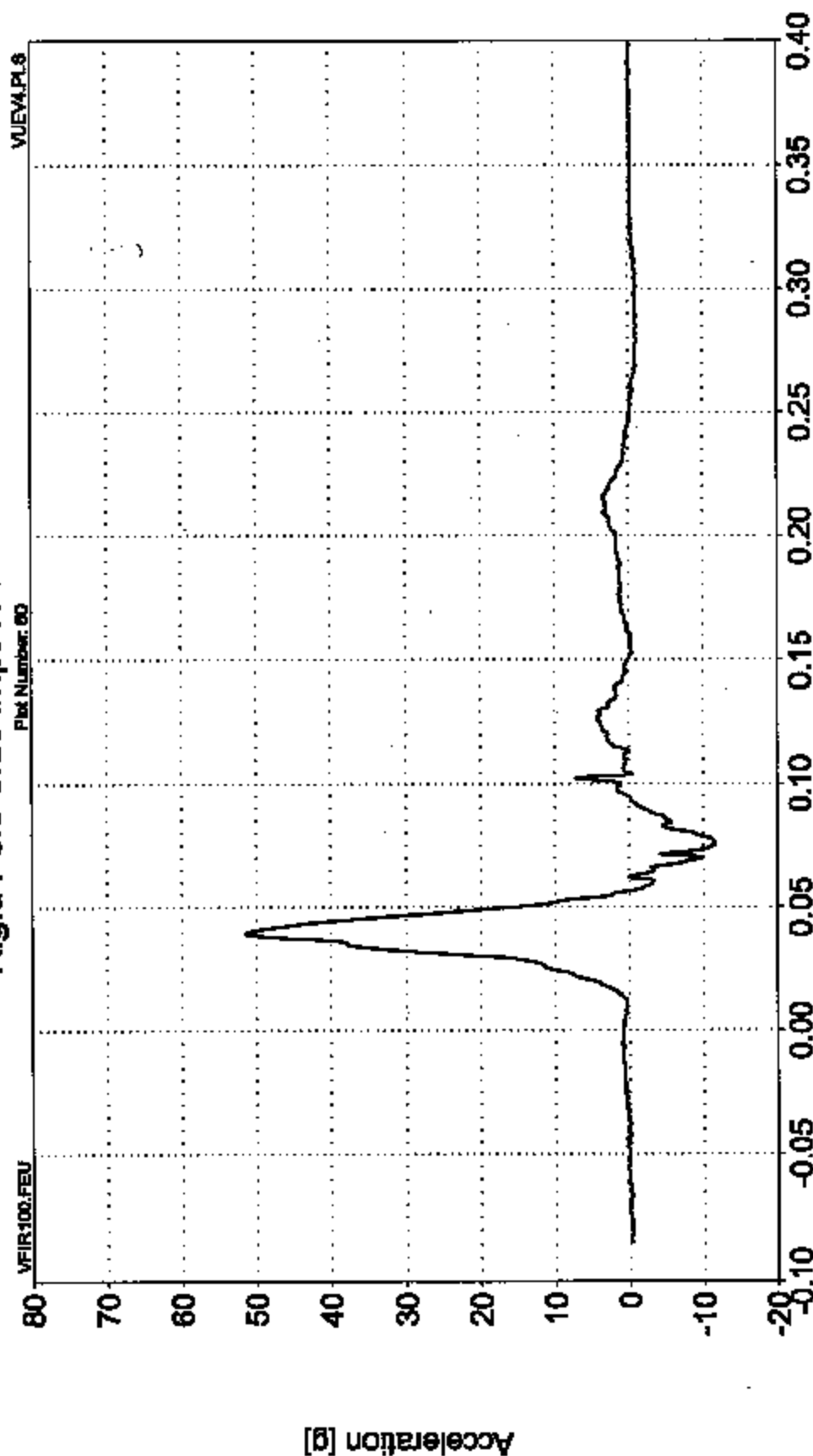
Failure Analysis Associates®

Lateral Acceleration v Time

Driver ATD Pelvis

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



Filter: FV 100
Data Max: 61.5 g @ 0.0230 sec.
Data Min: -11.5 g @ 0.0750 sec.

Rigid Pole Side Impact Test
PH07535

Time [s]

B-63

Exponent

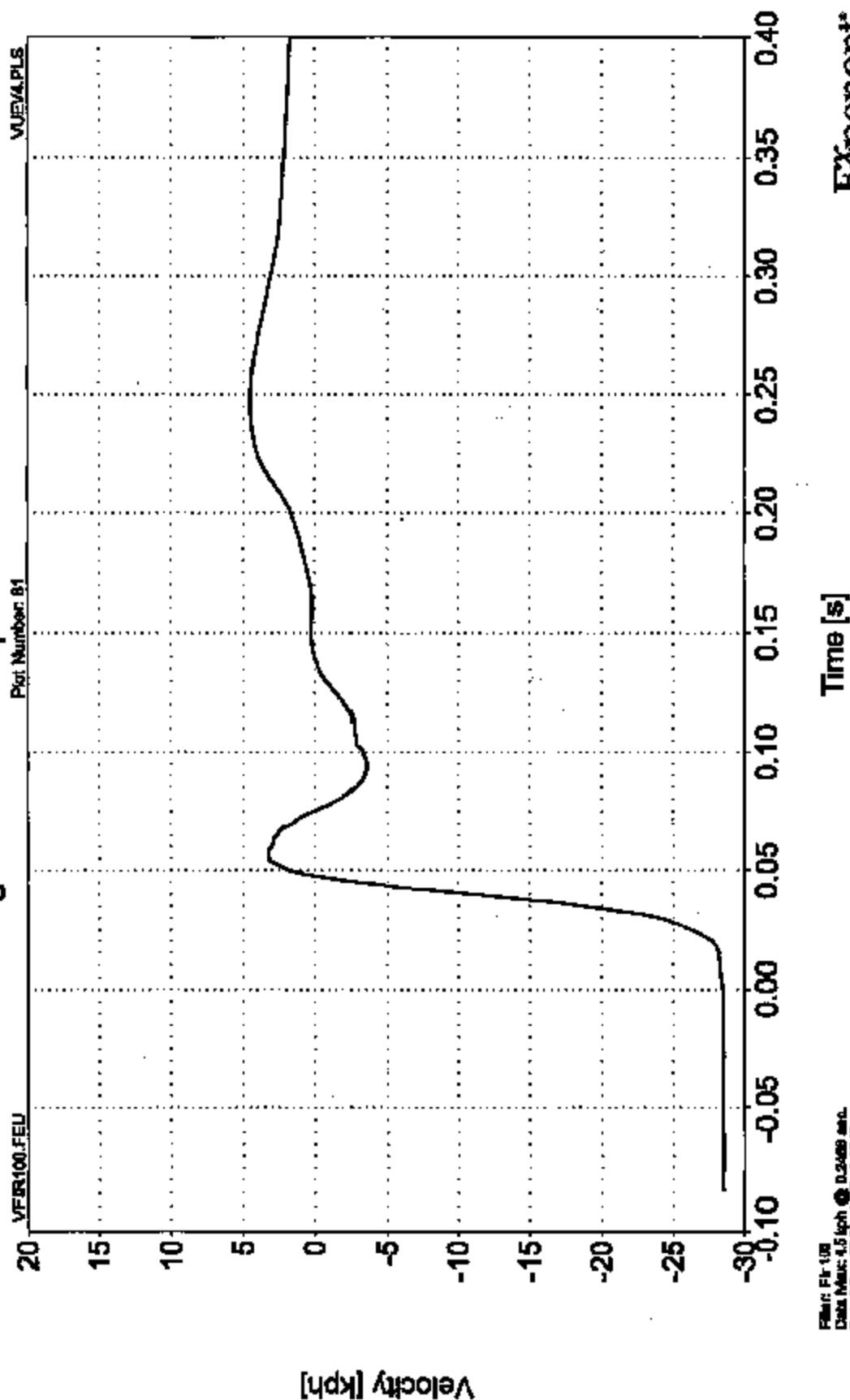
Failure Analysis Associates®

Lateral Velocity v Time

Driver ATD Pelvis

2002 Saturn Vue Sport Utility Vehicle - NHTSA NO. C20110

Rigid Pole Side Impact Test - 10/25/02



File: F1100
Data Max: 0.5 kph @ 0.2000 sec.
Data Min: -28.5 kph @ -0.0040 sec.

Rigid Pole Side Impact Test
PH07338

B-64

Appendix C – SID/HIII Configuration and Performance Verification Data

SUMMARY
SID/HIII PRETEST AND POST TEST CALIBRATION
CONFIGURED FOR LEFT/RIGHT SIDE IMPACT

SID/HIII CONFIGURATION VERIFICATION					
Test Parameter			Spec. (mm)	SID/HIII No. 052	
				Pretest	Post Test
SH	SEATED HEIGHT		889 – 909	909	898
RH	RIB HEIGHT		501 – 521	521	513
HP	HIP PIVOT HEIGHT	LEFT	99 ref.	100	92
		RIGHT		102	92
RD	RIB FROM BACK LINE		229 – 241	230	230
KH	KNEE PIVOT FROM BACK LINE	LEFT	511 – 526	524	525
		RIGHT		525	525
KV	KNEE PIVOT FROM FLOOR	LEFT	490 – 505	495	492
		RIGHT		492	492
HW	HIP WIDTH		356 – 391	368	365

TEST DATES: 010/25/02

RECORDED BY: 

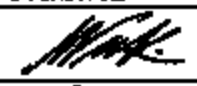
DATE: November 8, 2002

APPROVED BY: 

DATE: November 8, 2002

Head Drop Test (Lateral)				
Test Parameter		Spec.	SID/Hill No. 052	
			Pretest	Post Test
Temperature (°C)		18.9 - 25.6	21.1 / 20.6	21.7 / 21.7
Relative Humidity (%)		10 - 70	58 / 62	34 / 34
Peak Resultant Accel. (g's)		120 - 160	143.2 / 141.8	146.3 / 142.3
Is Resultant Curve Unimodal?		Yes	Yes / Yes	Yes / Yes
Peak Longitudinal Accel. (g's)		± 15	6.0 / 5.9	8.4 / 8.1
Neck Pendulum Test				
Temperature (°C)		18.9 - 25.5	20.6 / 20.6	21.1 / 21.1
Relative Humidity (%)		10 - 70	58 / 58	36 / 36
Impact Velocity (m/s)		6.89 - 7.13	7.0 / 7.0	7.0 / 7.0
Pendulum Deceleration	10 MS	1.96 - 2.55	2.1 / 2.1	2.1 / 2.1
	20 MS	4.12 - 5.10	4.4 / 4.4	4.4 / 4.5
	30 MS	5.73 - 7.01	6.3 / 6.3	6.2 / 6.4
	40-70 MS	6.27 - 7.65	7.4 / 7.4	7.4 / 7.4
Midsagittal Plane Max Rotation		66° - 82°	70.7 / 71.8	76.3 / 77.0
Head Rotation Peak to Zero Decay Time (MS)		58 - 67	61.7 / 61.5	65.9 / 63.1
Max Mx at Occipital Condyles (NM)		73 - 88	84.0 / 82.9	80.7 / 78.9
Mx Peak to Zero - Decay Time (MS)		49 - 64	57.9 / 56.3	55.8 / 56.5
Mx Peak to Max. Head Rotation (MS)		2 - 16	11.3 / 10.2	6.2 / 10.3

TEST DATES: 010/25/02

RECORDED BY: 

DATE: November 8, 2002

APPROVED BY: 

DATE: November 8, 2002

Thorax Impacts			
Test Parameter	Spec.	SID/HIII No. 062	
		Pretest	Post Test
Temperature (°C)	18.9 - 25.6	22.2 / 22.2	21.1 / 21.1
Relative Humidity (%)	10 - 70	31 / 31	41 / 41
Probe Speed (m/s)	4.27 - 4.33	4.21 / 4.21	4.28 / 4.29
Upper Rib (g's)	37 - 46	44.9 / 45.1	38.6 / 39.7
Lower Rib (g's)	37 - 46	42.6 / 42.7	37.4 / 39.4
Lower Spine (g's)	15 - 22	21.7 / 21.4	18.8 / 19.6
Pelvis Impact			
Temperature (°C)	18.9 - 25.5	21.7 / 22.2	21.7 / 21.7
Relative Humidity (%)	10 - 70	31.0 / 30.0	40.0 / 36.0
Probe Speed (m/s)	4.27 - 4.33	4.31 / 4.31	4.29 / 4.25
Pelvis (g's)	40 - 60	43.4 / 45.0	45.1 / 44.7

TEST DATES: 010/25/02

RECORDED BY: 

DATE: November 8, 2002

APPROVED BY: 

DATE: November 8, 2002

CALIBRATION TEST RESULTS SUMMARY

SID/HIII NUMBER: 052

Test	Comments
External Dimensions	None
Head Drop Test	None
Neck Pendulum Test	None
Thoracic Shock Absorber Test	None
Lateral Thorax Impact Test	None
Lateral Pelvis Impact Test	None
Abdominal Compression Test	Not Performed
Lumber Flexion Test	Not Performed

TEST DATES: 010/25/02

RECORDED BY: 

DATE: November 8, 2002

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DATE: November 8, 2002

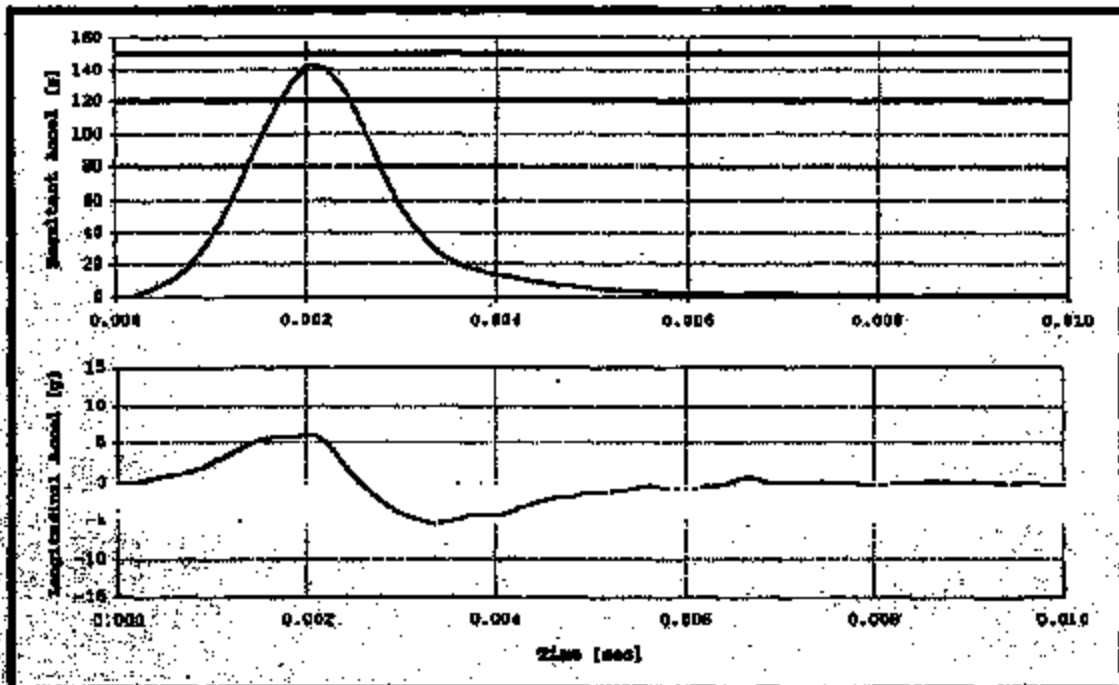
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH203	Test Date: 07/26/2002
SID/HIII Number: 4052	Test Time: 13:57
Part Serial No: 02101539	Drop Height: 200 mm
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	59.0 PASS
PEAK RESULTANT ACCEL. (g)	120 - 150	143.2 PASS
PEAK LONGITUDINAL ACCEL. (g)	15 g max.	6.0 PASS
ACCEL. CURVE UNIMODAL?	15% max.	4.6% PASS



RECORDED BY:

Mark

APPROVED BY:

Chase

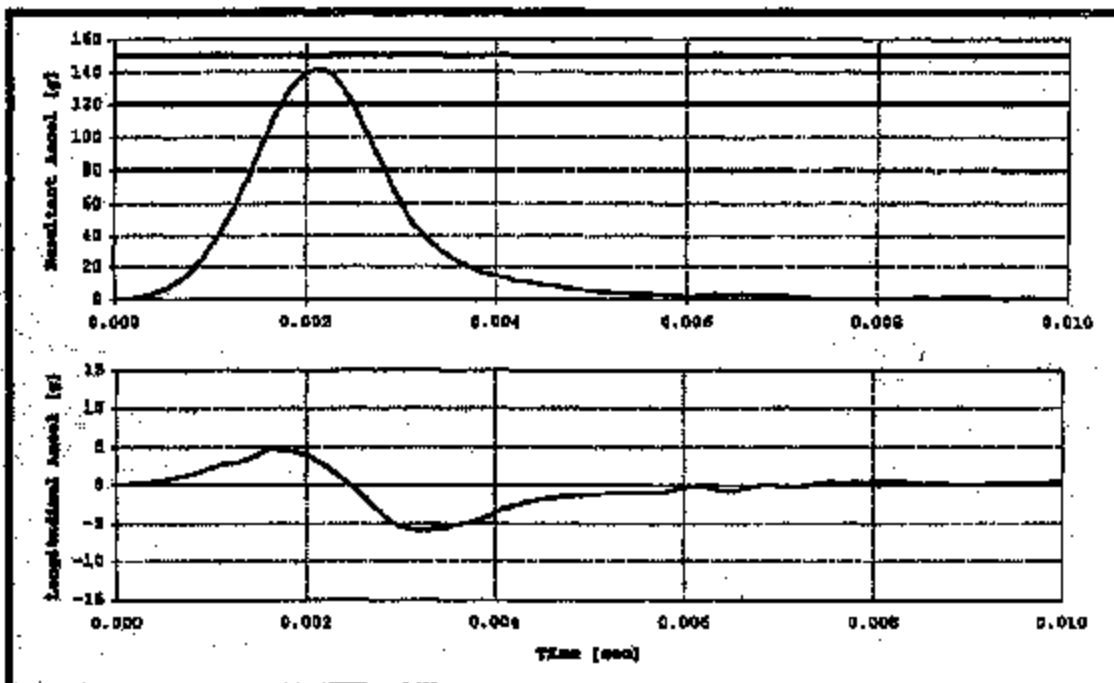
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1950 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH204	Test Date: 08/13/2002
SID/HIII Number: #052	Test Time: 10:18
Part Serial No: 02101539	Drop Height: 200 mm
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY (%)	10 - 70	62.0 PASS
PEAK RESULTANT ACCEL. (g)	120 - 150	141.8 PASS
PEAK LONGITUDINAL ACCEL. (g)	15 g MAX.	5.9 PASS
ACCEL. CURVE UNIMODAL?	15% MAX.	5.3% PASS



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APPROVED BY: [Signature]

EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lateral Neck Impact Calibration Test Summary

Test ID Number: SN203	Test Date: 08/15/2002
SID/HIII Number: #052	Test Time: 16:07
Comments: 119.5 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	20.6 PASS
RELATIVE HUMIDITY (%)	10 - 70	58.0 PASS
SPEED TRAP AVERAGE TIME (ms)	---	13.22 ---
IMPACT VELOCITY (m/s)	6.89 - 7.13	7.0 PASS
PENDULUM IMPULSE - 10 ms (m/s)	1.96 - 2.95	2.1 PASS
PENDULUM IMPULSE - 20 ms (m/s)	4.12 - 5.10	4.4 PASS
PENDULUM IMPULSE - 30 ms (m/s)	5.73 - 7.01	6.3 PASS
PENDULUM IMP [max] - 40-70 ms (m/s)	6.27 - 7.64	7.4 PASS
PENDULUM IMP [min] - 40-70 ms (m/s)	6.27 - 7.64	7.1 PASS
PEAK TOTAL HEAD/NECK ROTATION (°)	56 - 82	70.7 PASS
ROTATION PEAK-ZERO DECAY TIME (ms)	58 - 67	61.7 PASS
PEAK Mxoc (N-m)	73 - 88	84.0 PASS
Mxoc PEAK-ZERO DECAY TIME (ms)	49 - 64	57.9 PASS
Mxoc PEAK TO ROTATION PEAK (ms)	2 - 16	11.3 PASS

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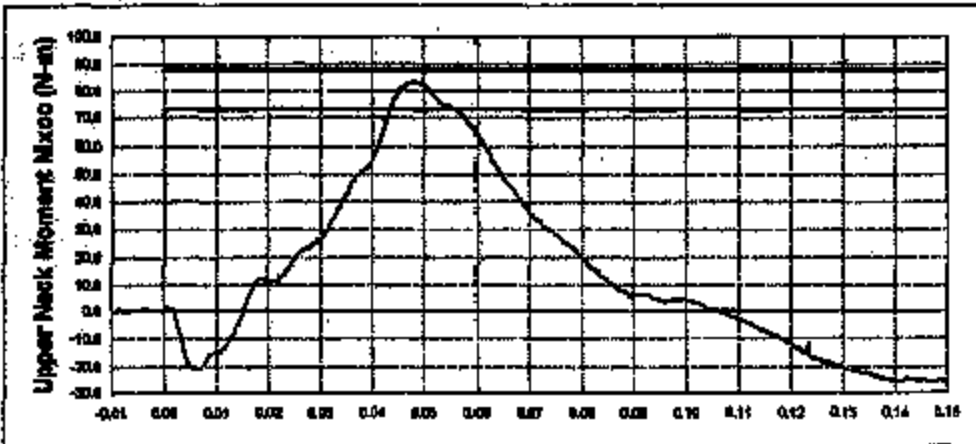
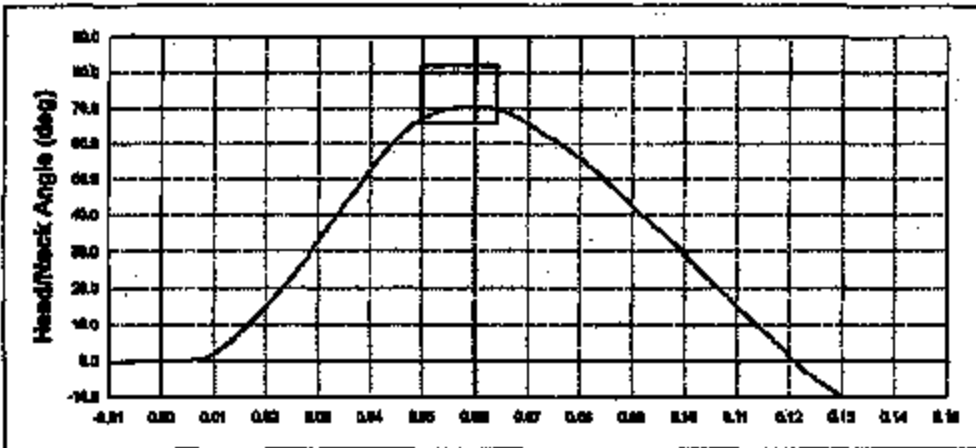
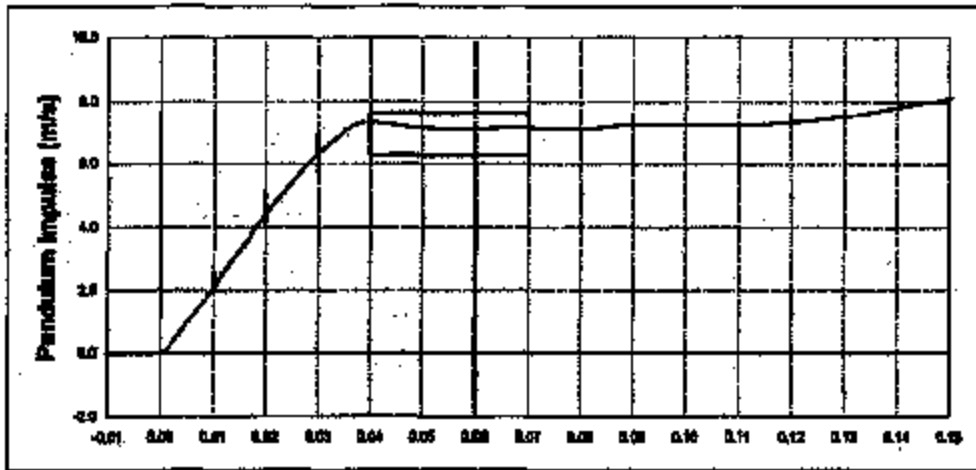
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EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: SN203

Date: 8/15/02



EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lateral Neck Impact Calibration Test Summary

Test ID Number: SN204	Test Date: 08/15/2002
SID/HIII Number: #052	Test Time: 17:09
Comments: 119.5 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	20.6 PASS
RELATIVE HUMIDITY (%)	10 - 70	58.0 PASS
SPEED TRAP AVERAGE TIME (ms)	---	13.23 ---
IMPACT VELOCITY (m/s)	6.89 - 7.13	7.0 PASS
PENDULUM IMPULSE - 10 ms (m/s)	1.96 - 2.55	2.1 PASS
PENDULUM IMPULSE - 20 ms (m/s)	4.12 - 5.10	4.4 PASS
PENDULUM IMPULSE - 30 ms (m/s)	5.73 - 7.01	6.3 PASS
PENDULUM IMP [max] - 40-70 ms (m/s)	6.27 - 7.64	7.4 PASS
PENDULUM IMP [min] - 40-70 ms (m/s)	6.27 - 7.64	7.1 PASS
PEAK TOTAL HEAD/NECK ROTATION (°)	66 - 82	71.8 PASS
ROTATION PEAK-ZERO DECAY TIME (ms)	58 - 67	61.5 PASS
PEAK Mxoc (N-m)	73 - 88	82.9 PASS
Mxoc PEAK-ZERO DECAY TIME (ms)	49 - 64	56.3 PASS
Mxoc PEAK TO ROTATION PEAK (ms)	2 - 16	10.2 PASS

RECORDED BY:

Mark

APPROVED BY:

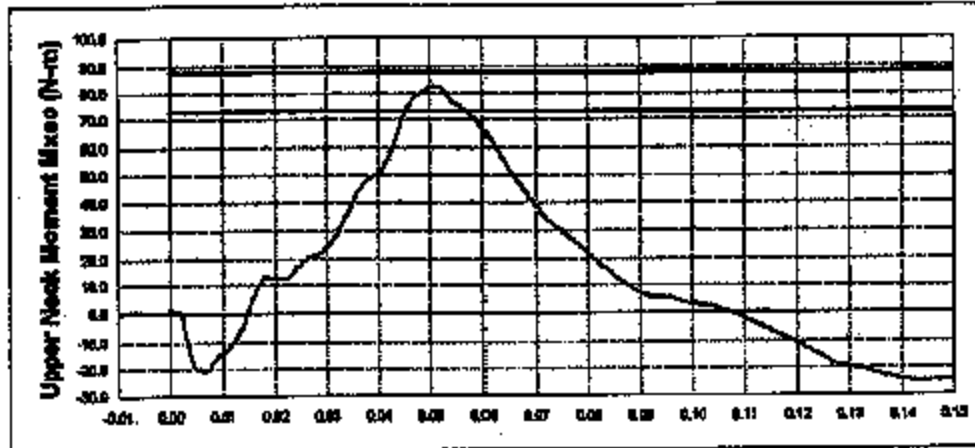
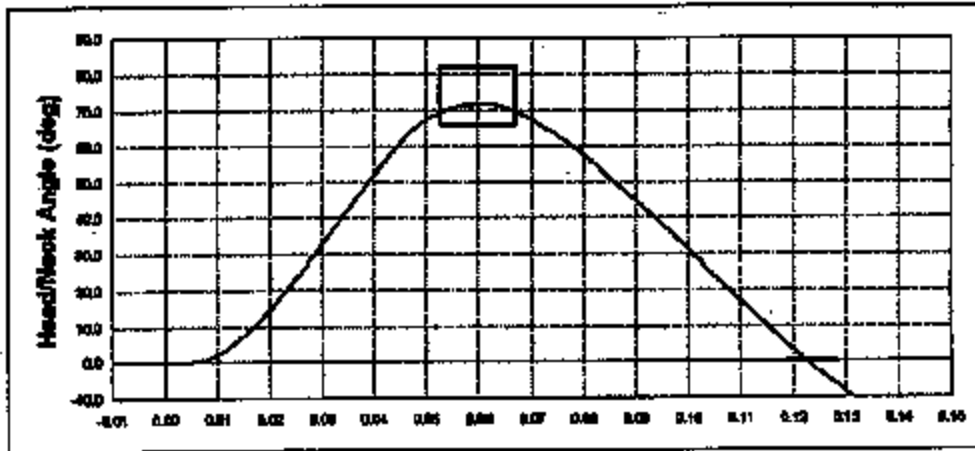
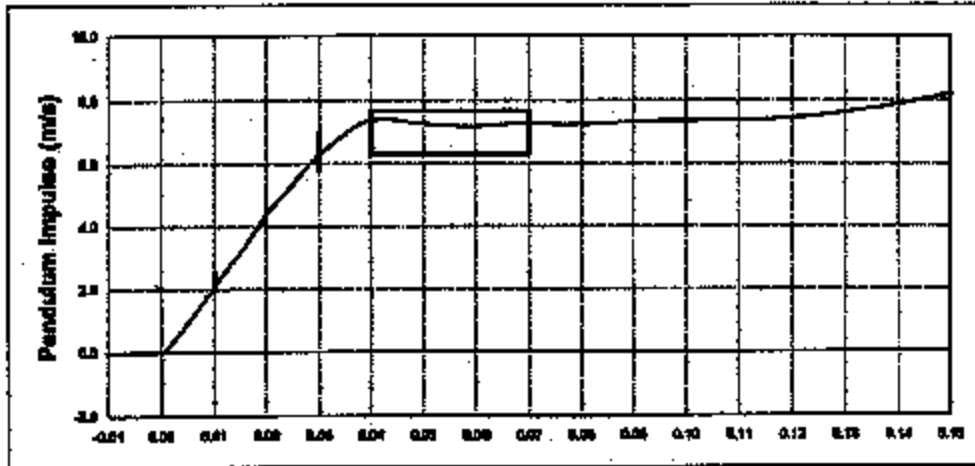
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EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: 9N204

Date: 8/16/02



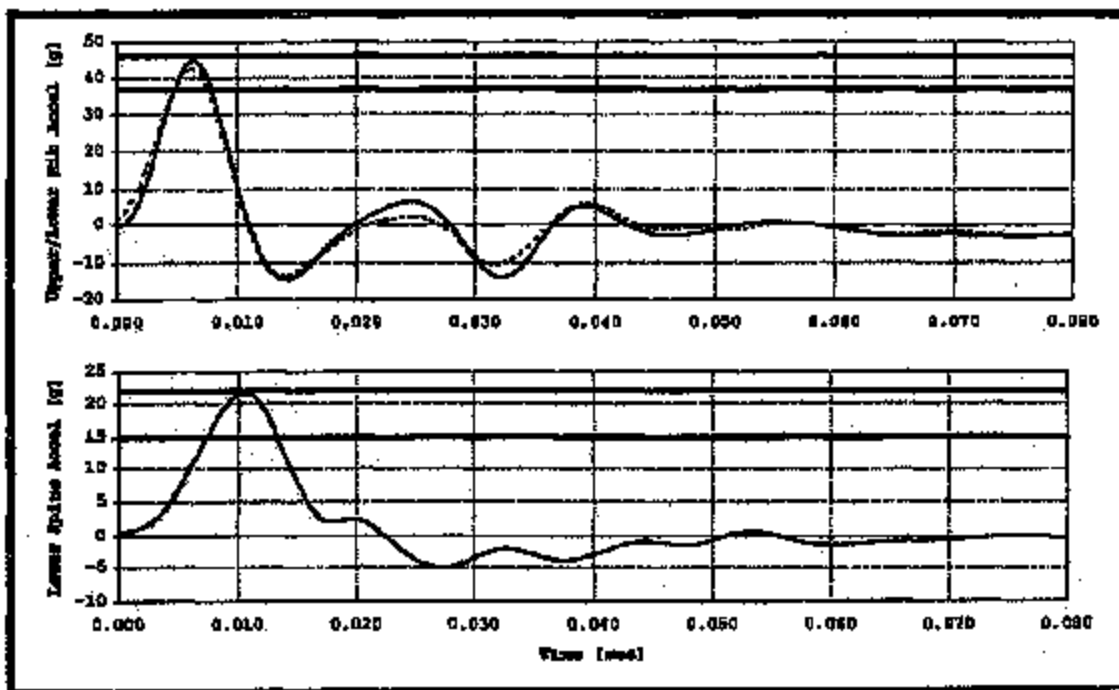
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST203	Test Date: 08/27/2002
SID/HIII Number: #052	Test Time: 15:41
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	22.2 PASS
RELATIVE HUMIDITY (%)	10 - 70	31.0 PASS
SPEED TRAP TIME (ms)	---	24.12 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.21 PASS
UPPER RIB ACCELERATION (g)	37 - 46	44.9 PASS
LOWER RIB ACCELERATION (g)	37 - 46	42.6 PASS
LOWER SPINE ACCELERATION (g)	15 - 22	21.7 PASS



RECORDED BY:

Mark

APPROVED BY:

Chad

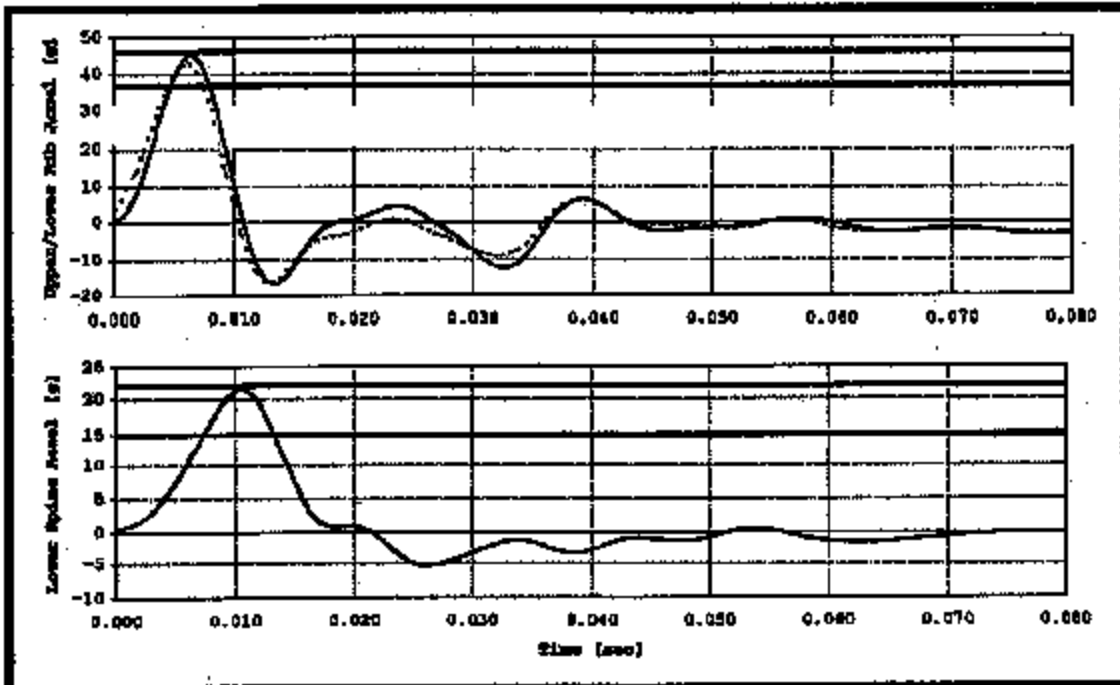
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST204	Test Date: 06/27/2002
SID/HIII Number: #052	Test Time: 16:09
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 23.6	22.2 PASS
RELATIVE HUMIDITY (%)	10 - 70	31.0 PASS
SPEED TRAP TIME (ms)	---	24.13 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.21 PASS
UPPER RIB ACCELERATION (g)	37 - 46	45.1 PASS
LOWER RIB ACCELERATION (g)	37 - 46	42.7 PASS
LOWER SPINE ACCELERATION (g)	15 - 22	21.4 PASS



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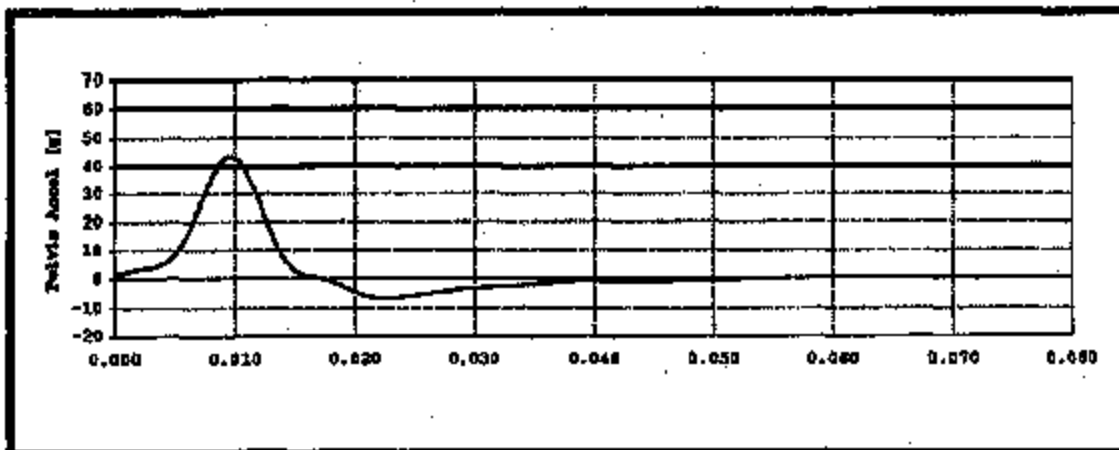
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lumbar Spine and Pelvis Lateral Impact Test Summary

Test ID Number: SP203	Test Date: 08/27/2002
SID/HIII Number: #052	Test Time: 12:04
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.7 PASS
RELATIVE HUMIDITY (%)	10 - 70	31.0 PASS
SPEED TRAP TIME (ms)	---	23.59 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.31 PASS
PELVIS ACCELERATION (g)	40 - 60	43.4 PASS
ACCEL CURVE UNIMODAL?	10% MAX	0.7% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



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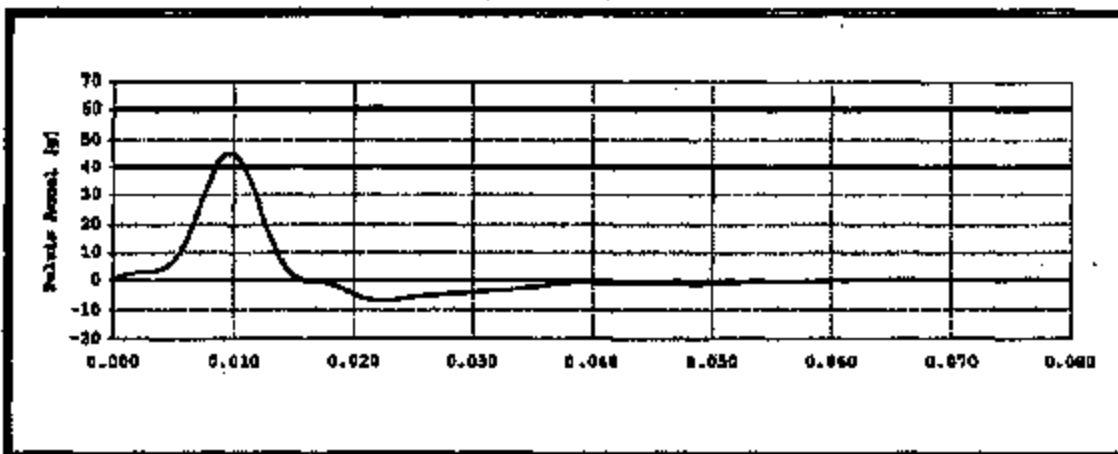
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lumbar Spine and Pelvis Lateral Impact Test Summary

Test ID Number: SP204	Test Date: 08/27/2002
SID/HIII Number: #052	Test Time: 14:17 PM
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	22.2 PASS
RELATIVE HUMIDITY	(%)	10 - 70	30.0 PASS
SPEED TRAP TIME	(ms)	---	23.59 ---
IMPACT VELOCITY	(m/s)	4.21 - 4.33	4.31 PASS
PELVIS ACCELERATION	(g)	40 - 60	45.0 PASS
ACCEL CURVE UNIMODAL?	(%)	10% max	1.0% PASS
PELVIS ACCEL TIME > 20 g	(ms)	3 - 7	6.3 PASS



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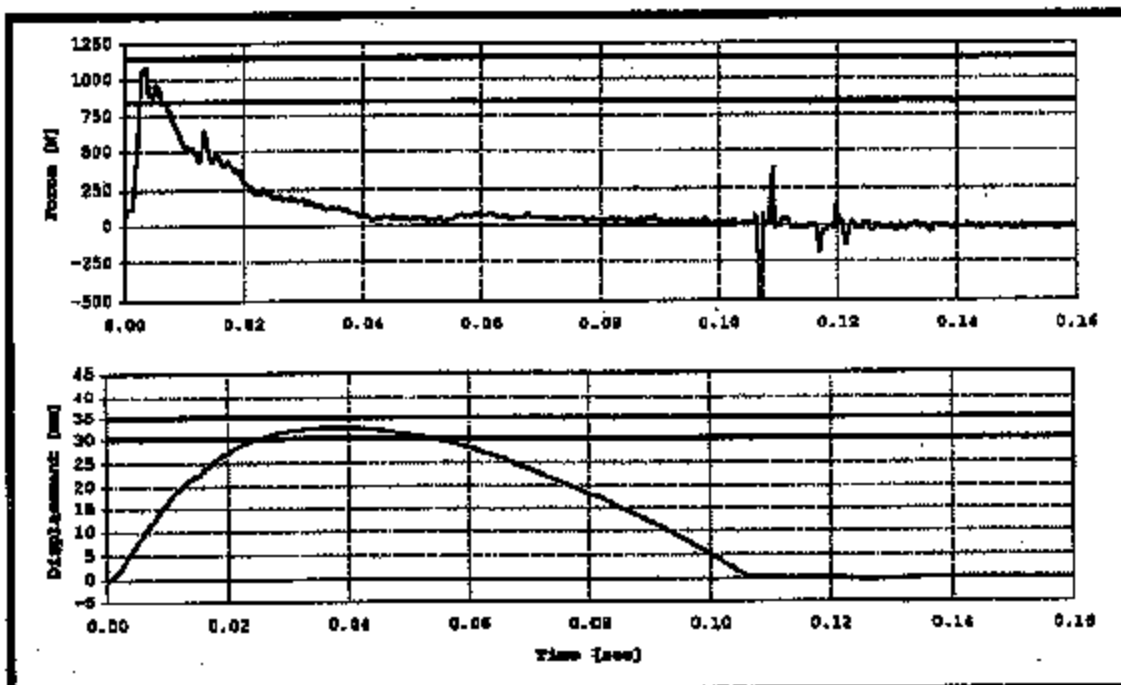
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1050 W. Pinnacle Peak Rd.
Phoenix, Arizona 85027

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS201	Test Date: 08/29/2002
SID/HIII Number: #052	Test Time: 17:51
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	22.8 PASS
RELATIVE HUMIDITY	(%)	10 - 70	52.0 PASS
SPEED TRAP TIME	(ms)	---	33.23 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	3.06 PASS
SHOCK ABSORBER FORCE	(N)	845 1147	1087.7 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	30.2 35.2	32.7 PASS



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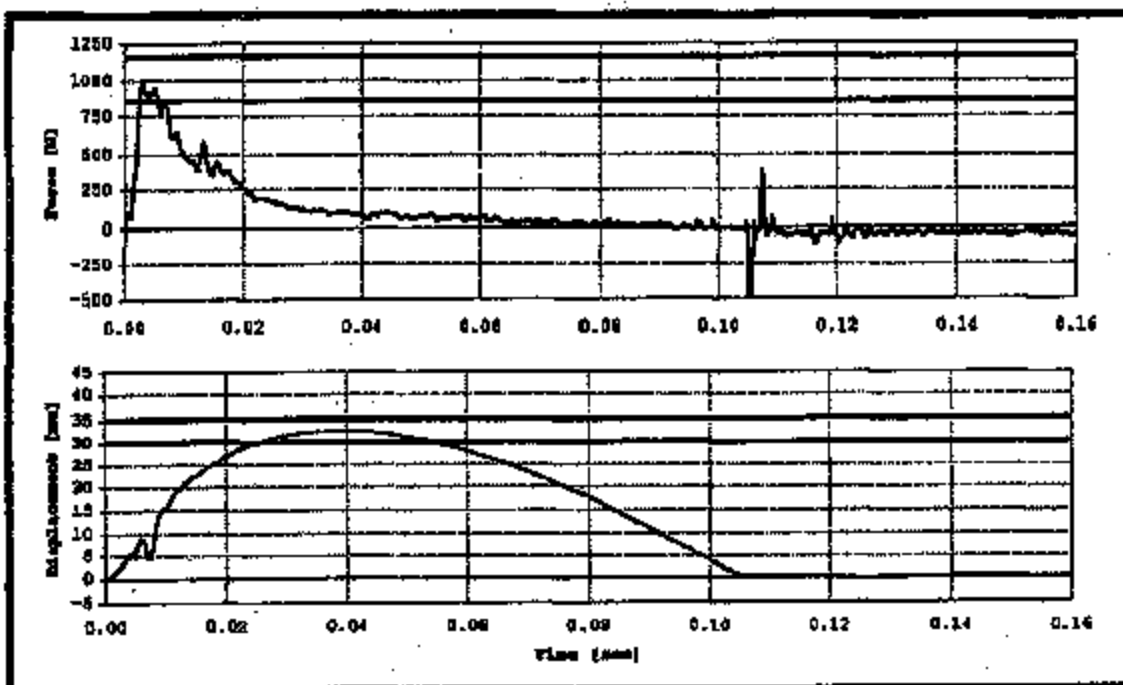
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS202	Test Date: 08/29/2002
SID/HIII Number: #052	Test Time: 18:11
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	22.8 PASS
RELATIVE HUMIDITY (%)	10 - 70	52.0 PASS
SPEED TRAP TIME (ms)	---	33.03 ---
IMPACT VELOCITY (m/s)	2.74 - 6.40	3.08 PASS
SHOCK ABSORBER FORCE (N)	856 1161	1004.9 PASS
SHOCK ABSORBER DISPLACEMENT (mm)	30.2 35.2	32.7 PASS



RECORDED BY:

Mark

APPROVED BY:

Chen

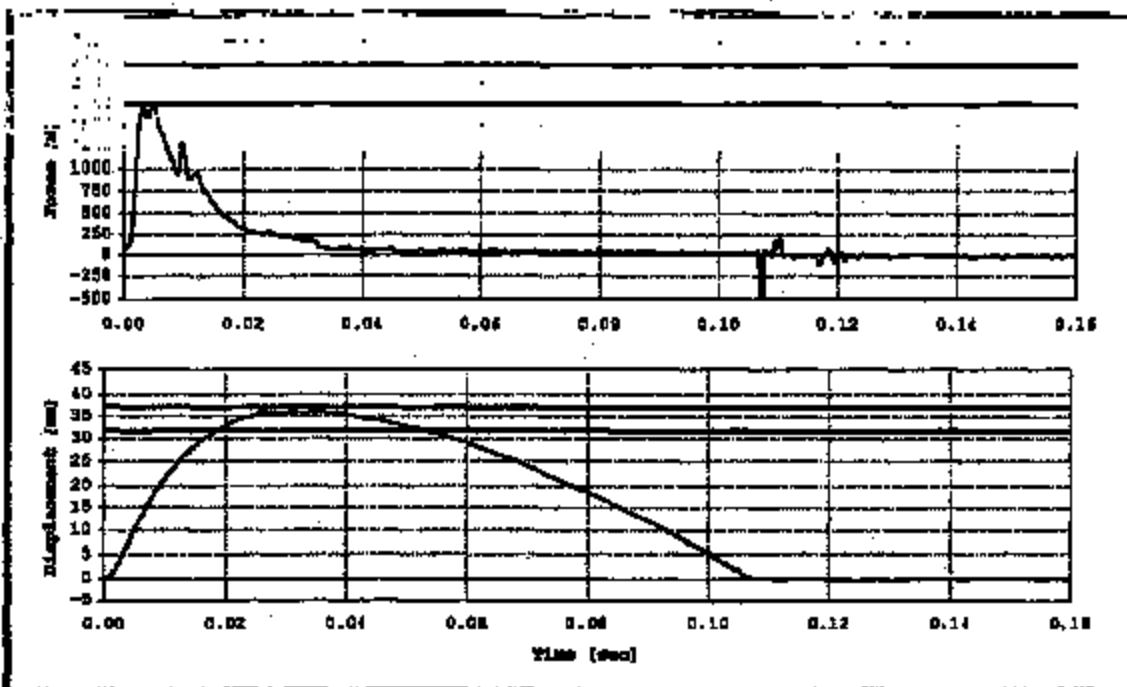
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS203	Test Date: 09/29/2002
SID/HIII Number: #052	Test Time: 18:43
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	22.8 PASS
RELATIVE HUMIDITY	(%)	10 - 70	51.0 PASS
SPRINT TRAP TIME	(ms)	---	23.72 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	4.28 PASS
SHOCK ABSORBER FORCE	(N)	1749 2222	1760.3 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	31.7 37.2	35.9 PASS



RECORDED BY: W. H. H.

APPROVED BY: C. H. H.

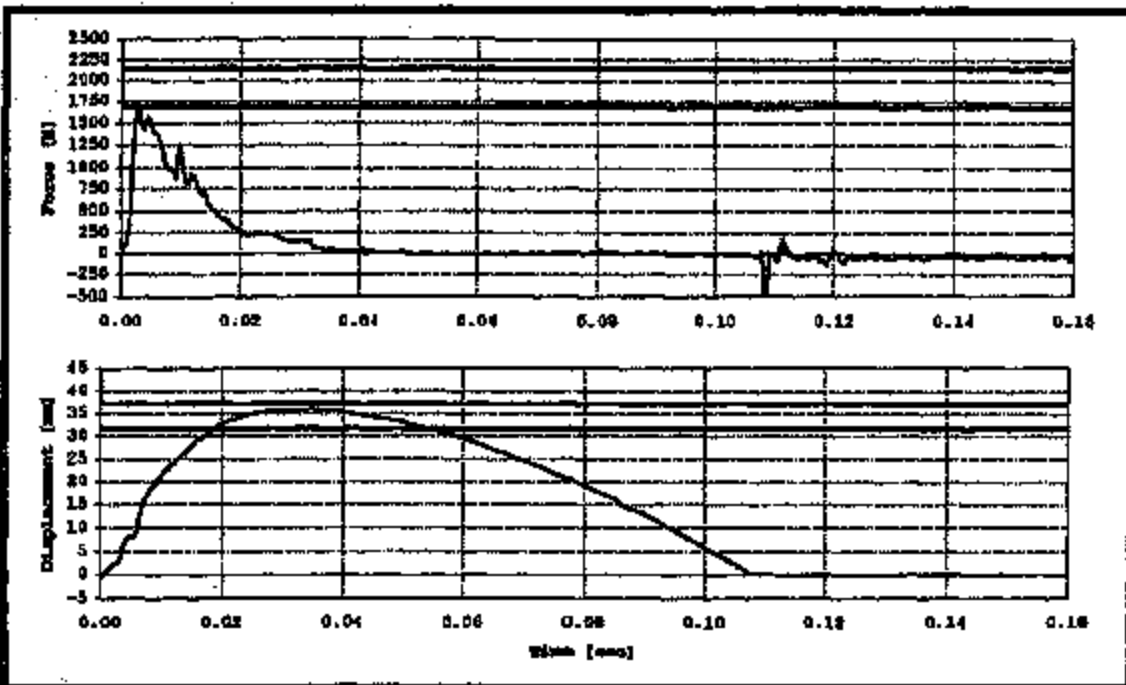
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS204	Test Date: 08/30/2002
SID/HIII Number: #052	Test Time: 10:23
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY	(%)	10 - 70	52.0 PASS
SPEED TRAP TIME	(ms)	---	24.12 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	4.21 PASS
SHOCK ABSORBER FORCE	(N)	1687 2150	1729.0 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	31.6 37.1	35.9 PASS



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[Signature]

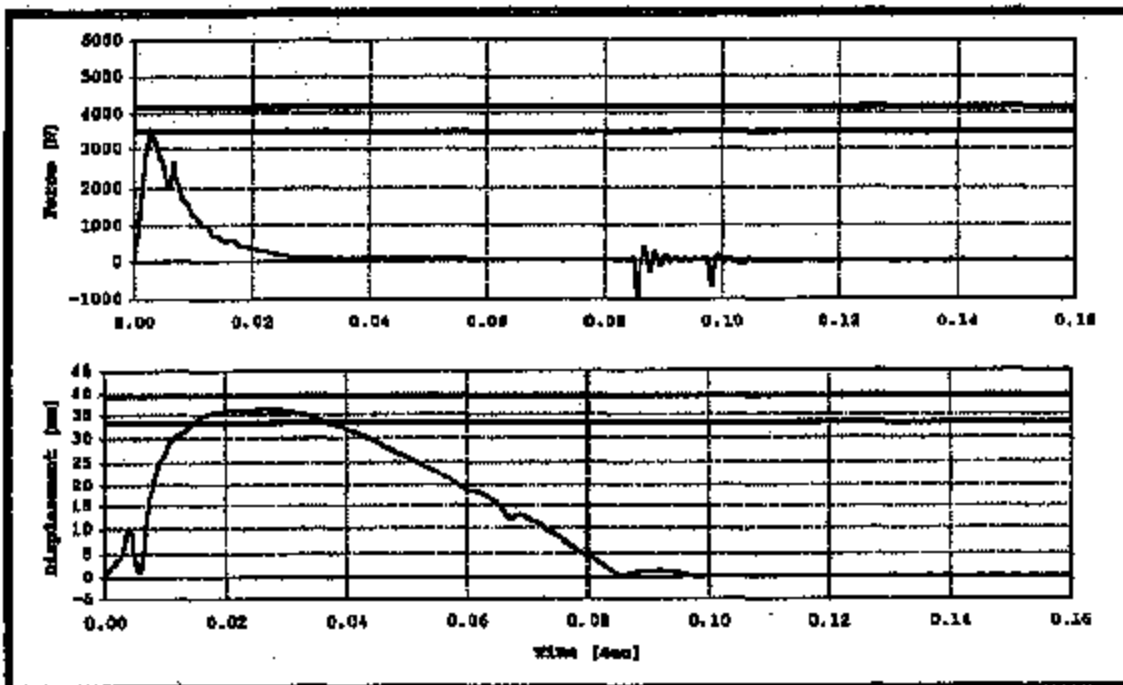
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS205	Test Date: 08/30/2002
SID/HIII Number: #052	Test Time: 14:23
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY	(%)	10 - 70	52.0 PASS
SPEED TRAP TIME	(ms)	---	17.22 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	5.90 PASS
SHOCK ABSORBER FORCE	(N)	3490 4164	3542.5 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	33.2 39.3	36.3 PASS



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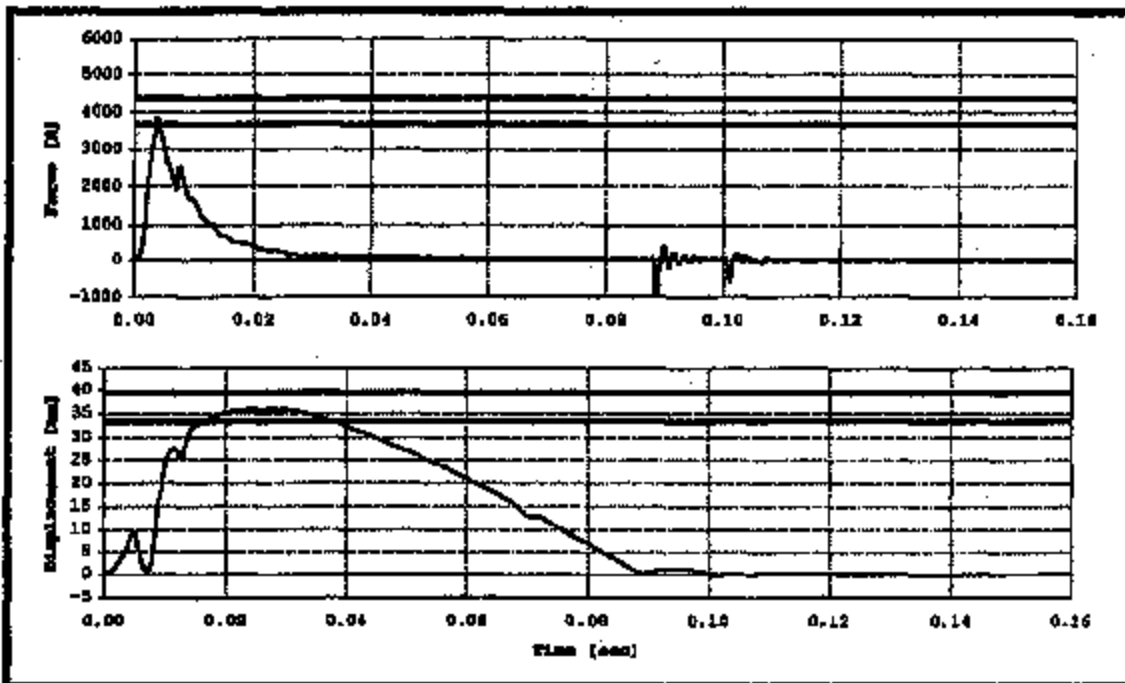
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS206	Test Date: 08/30/2002
SID/HIII Number: #052	Test Time: 14:41
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY	(%)	10 - 70	52.0 PASS
SPEED TRAP TIME	(ms)	---	16.83 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	6.04 PASS
SHOCK ABSORBER FORCE	(N)	3667 4355	3849.9 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	33.3 39.5	35.9 PASS



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[Signature]

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[Signature]

SID/HIII CONFIGURATION VERIFICATION without Chest Flash Installed

DATE: 09/26/2002

SID/HIII NUMBER: 052

SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*: _____

* For NHTSA Compliance testing only (Sequential number beginning with "1" at the start of each fiscal year's crash test program)

Test Parameter			Specification	Measurement
SH	SEATED HEIGHT		889 mm – 909 mm 35.0 in – 35.8 in	909 mm
RH	RIB HEIGHT		501 mm – 521 mm 19.7 in – 20.5 in	521 mm
HP	HIP PIVOT HEIGHT	LEFT	100 mm	100 mm
		RIGHT		102 mm
RD	RIB FROM BACK LINE		229 mm – 241 mm 9.0 in – 9.5 in	230 mm
KH	KNEE PIVOT FROM BACK LINE	LEFT	511 mm – 526 mm 20.1 in – 20.7 in	524 mm
		RIGHT		525 mm
KV	KNEE PIVOT FROM FLOOR	LEFT	490 mm – 505 mm 19.3 in – 19.9 in	495 mm
		RIGHT		492 mm
HW	HIP WIDTH		356 mm – 391 mm 14.0 in – 15.4 in	368 mm

COMMENTS:

RECORDED BY:

Mark E

DATE:

09/26/02

APPROVED BY:

[Signature]

DATE:

09/26/02

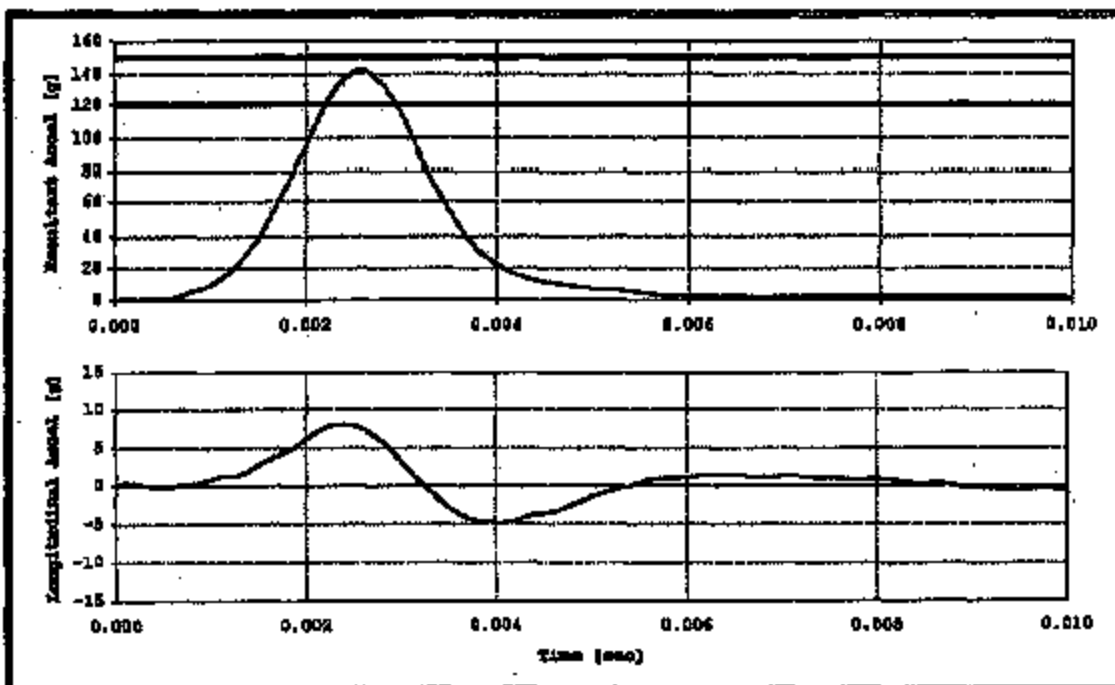
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH209	Test Date: 11/01/2002
SID/HIII Number: #052	Test Time: 7:43
Part Serial No: 02101539	Drop Height: 200 mm
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 ~ 25.6	21.7 PASS
RELATIVE HUMIDITY	(%)	10 ~ 70	34.0 PASS
PEAK RESULTANT ACCEL.	(g)	120 ~ 150	142.3 PASS
PEAK LONGITUDINAL ACCEL.	(g)	15 g max.	8.1 PASS
ACCEL. CURVE UNIMODAL?	(g)	15% max.	1.8% PASS



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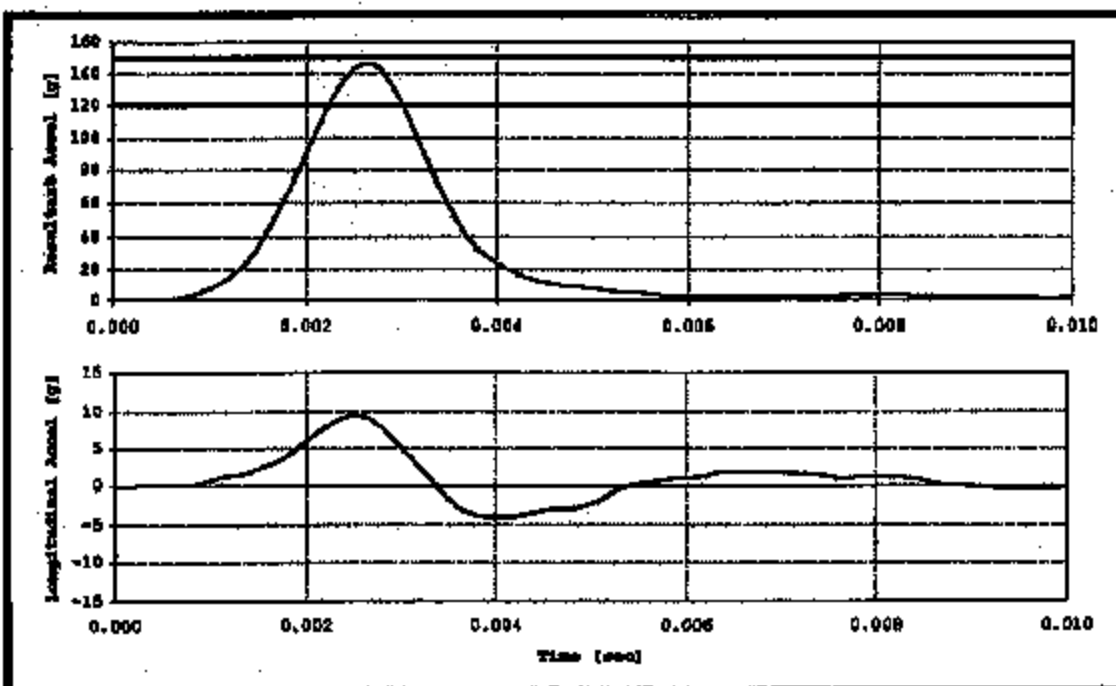
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH210	Test Date: 11/01/2002
SID/HIII Number: #052	Test Time: 11:10
Part Serial No: 02101539	Drop Height: 200 mm
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.7 PASS
RELATIVE HUMIDITY (%)	10 - 70	34.0 PASS
PEAK RESULTANT ACCEL. (g)	120 - 150	146.3 PASS
PEAK LONGITUDINAL ACCEL. (g)	15 g max.	9.4 PASS
ACCEL. CURVE UNIMODAL?	15% max.	2.4% PASS



RECORDED BY:

Mark

APPROVED BY:

Phan

EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1050 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lateral Neck Impact Calibration Test Summary

Test ID Number: SN209	Test Date: 10/31/2002
SID/HIII Number: #052	Test Time: 16:14
Comments: 119.5 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	36.0 PASS
SPEED TRAP AVERAGE TIME (ms)	---	13.20 ---
IMPACT VELOCITY (m/s)	6.89 - 7.13	7.0 PASS
PENDULUM IMPULSE - 10 ms (m/s)	1.96 - 2.55	2.1 PASS
PENDULUM IMPULSE - 20 ms (m/s)	4.12 - 5.10	4.4 PASS
PENDULUM IMPULSE - 30 ms (m/s)	5.73 - 7.01	6.2 PASS
PENDULUM IMP [max] - 40-70 ms (m/s)	6.27 - 7.64	7.4 PASS
PENDULUM IMP [min] - 40-70 ms (m/s)	6.27 - 7.64	7.2 PASS
PEAK TOTAL HEAD/NECK ROTATION (°)	66 - 82	76.3 PASS
ROTATION PEAK-ZERO DECAY TIME (ms)	58 - 67	65.9 PASS
PEAK Mxoc (N-m)	73 - 88	80.7 PASS
Mxoc PEAK-ZERO DECAY TIME (ms)	49 - 64	55.8 PASS
Mxoc PEAK TO ROTATION PEAK (ms)	2 - 16	6.2 PASS

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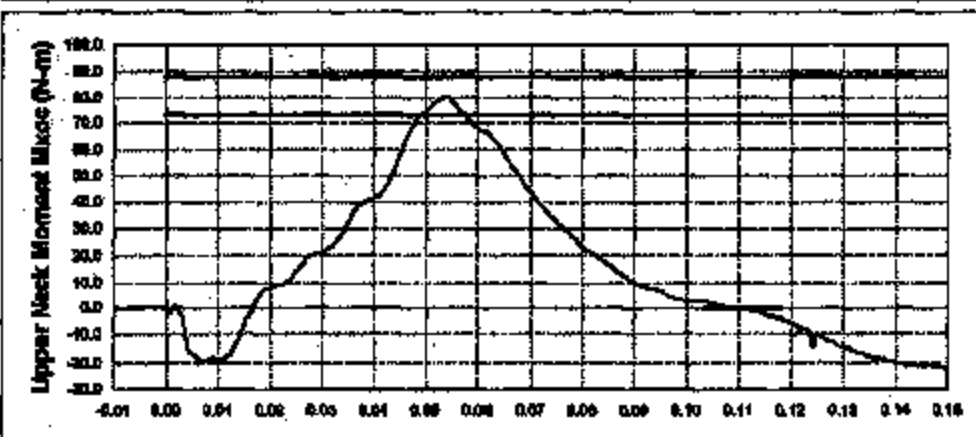
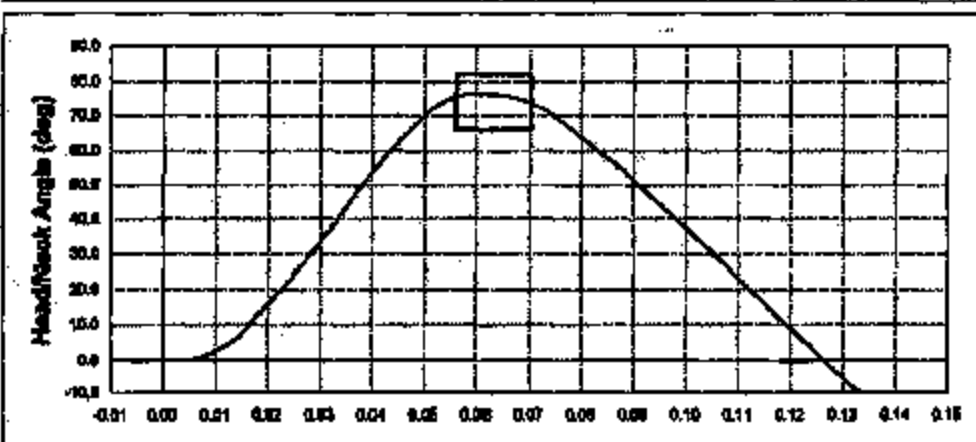
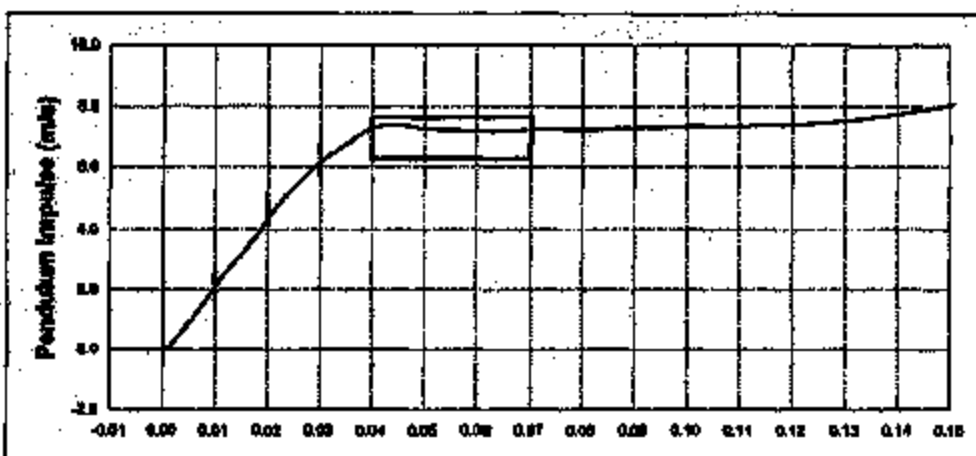
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EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: 6N209

Date: 10/31/02



EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lateral Neck Impact Calibration Test Summary

Test ID Number: SN210	Test Date: 10/31/2002
SID/HIII Number: #052	Test Time: 16:50
Comments: 119.5 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	36.0 PASS
SPEED TRAP AVERAGE TIME (ms)	---	13.21 ---
IMPACT VELOCITY (m/s)	6.89 - 7.13	7.0 PASS
PENDULUM IMPULSE - 10 ms (m/s)	1.96 - 2.55	2.1 PASS
PENDULUM IMPULSE - 20 ms (m/s)	4.12 - 5.10	4.5 PASS
PENDULUM IMPULSE - 30 ms (m/s)	5.73 - 7.01	6.4 PASS
PENDULUM IMP [max] - 40-70 ms (m/s)	6.27 - 7.64	7.4 PASS
PENDULUM IMP [min] - 40-70 ms (m/s)	6.27 - 7.64	7.2 PASS
PEAK TOTAL HEAD/NECK ROTATION (°)	66 - 82	77.0 PASS
ROTATION PEAK-ZERO DECAY TIME (ms)	58 - 67	63.1 PASS
PEAK M _{xoc} (N-m)	73 - 88	78.9 PASS
M _{xoc} PEAK-ZERO DECAY TIME (ms)	49 - 64	56.5 PASS
M _{xoc} PEAK TO ROTATION PEAK (ms)	2 - 16	10.3 PASS

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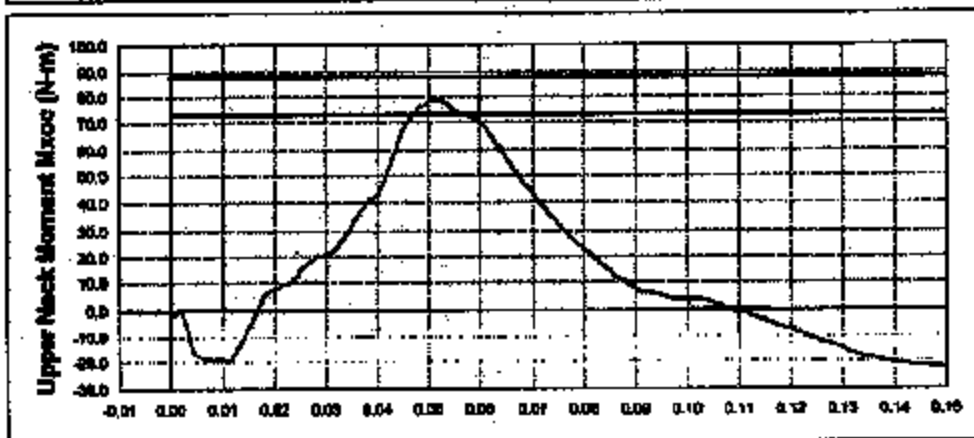
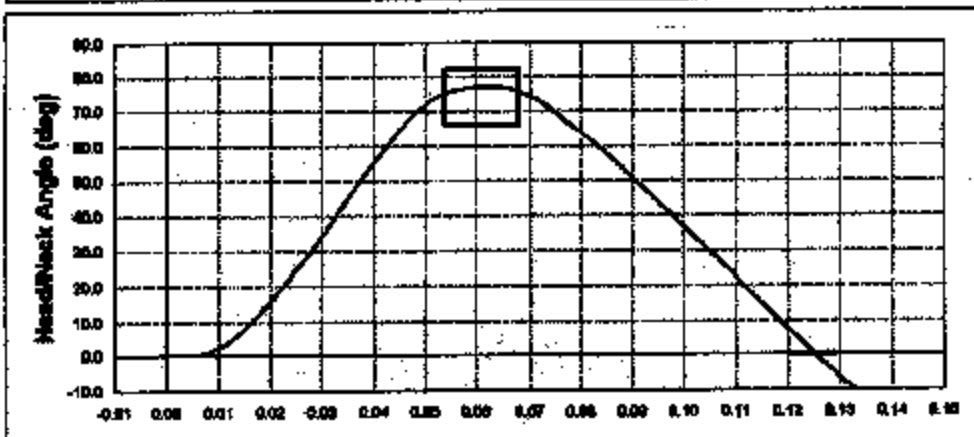
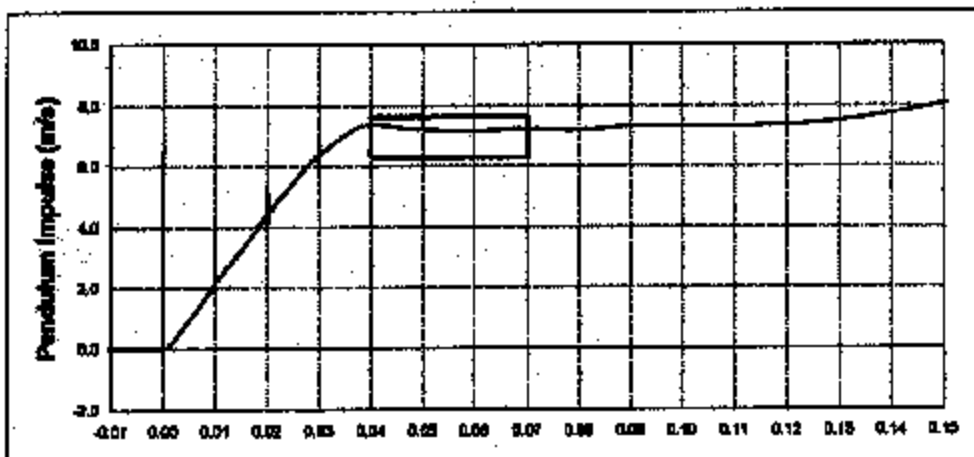
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EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: 8N210

Date: 10/31/02



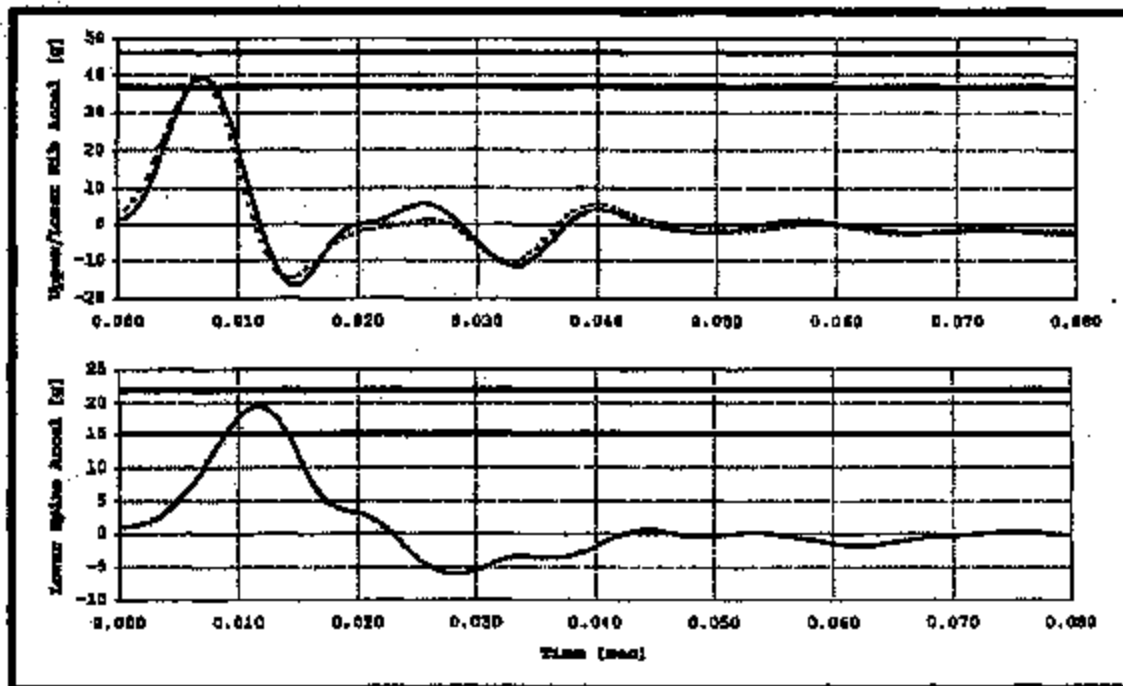
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST212	Test Date: 10/30/2002
SID/HIII Number: #052	Test Time: 16:02
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	41.0 PASS
SPEED TRAP TIME (ms)	---	23.68 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.29 PASS
UPPER RIB ACCELERATION (g)	37 - 46	39.7 PASS
LOWER RIB ACCELERATION (g)	37 - 46	39.4 PASS
LOWER SPINE ACCELERATION (g)	15 - 22	19.6 PASS



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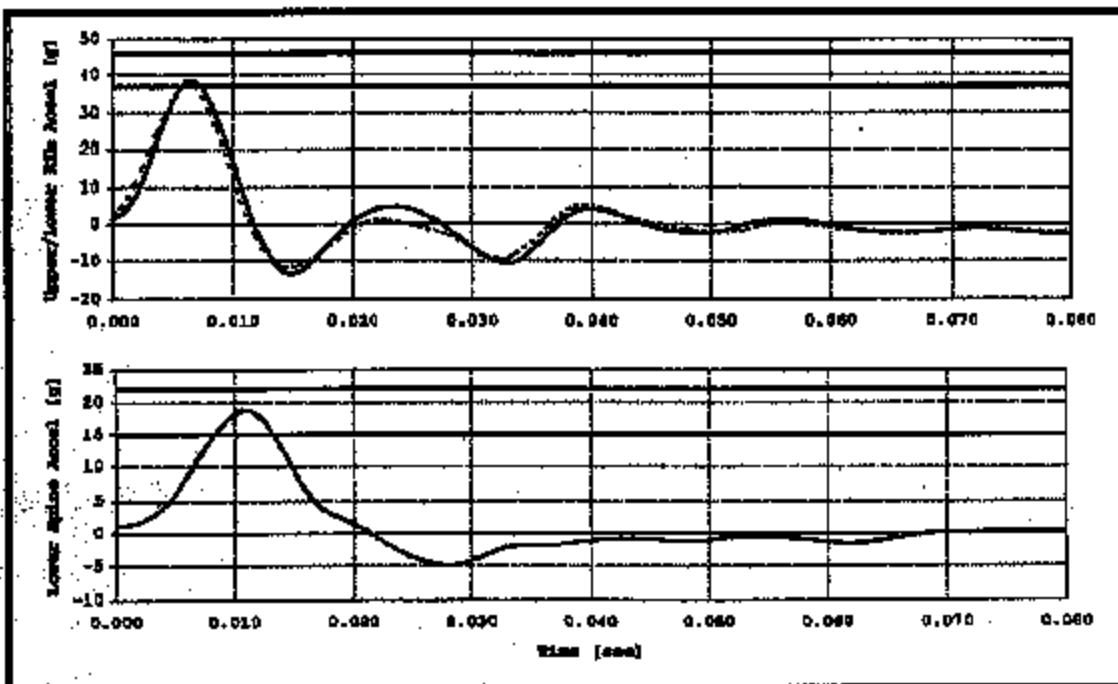
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST211	Test Date: 10/30/2002
SID/HIII Number: #052	Test Time: 15:41
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	41.0 PASS
SPEED TRAP TIME	(ms)	---	23.73 ---
IMPACT VELOCITY	(m/s)	4.21 - 4.33	4.28 PASS
UPPER RIB ACCELERATION	(g)	37 - 46	38.6 PASS
LOWER RIB ACCELERATION	(g)	37 - 46	37.4 PASS
LOWER SPINE ACCELERATION	(g)	15 - 22	18.8 PASS



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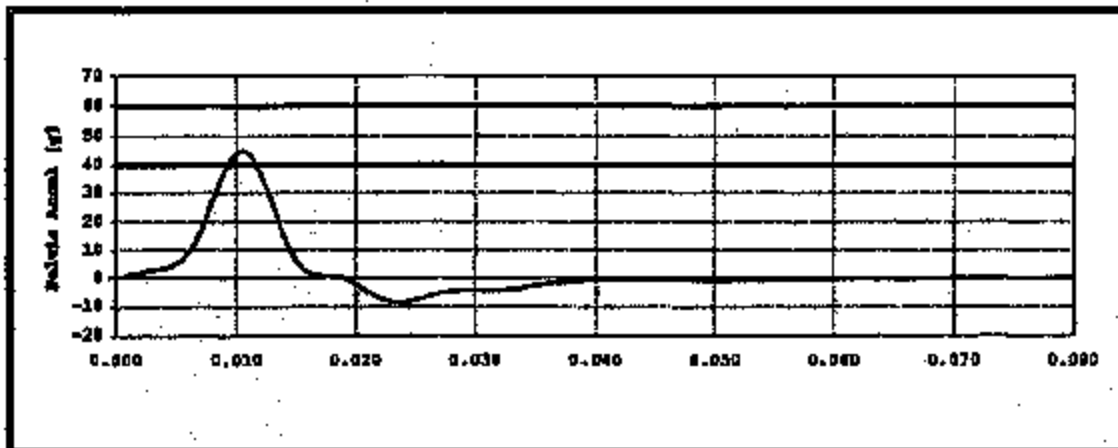
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lumbar Spine and Pelvis Lateral Impact Test Summary

Test ID Number: SP209	Test Date: 10/30/2002
SID/HIII Number: #052	Test Time: 16:51
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	40.0 PASS
SPEED TRAP TIME (ms)	---	23.71 PASS
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.29 PASS
PELVIS ACCELERATION (g)	40 - 60	45.1 PASS
ACCEL CURVE UNIMODAL?	10% max	0.3% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



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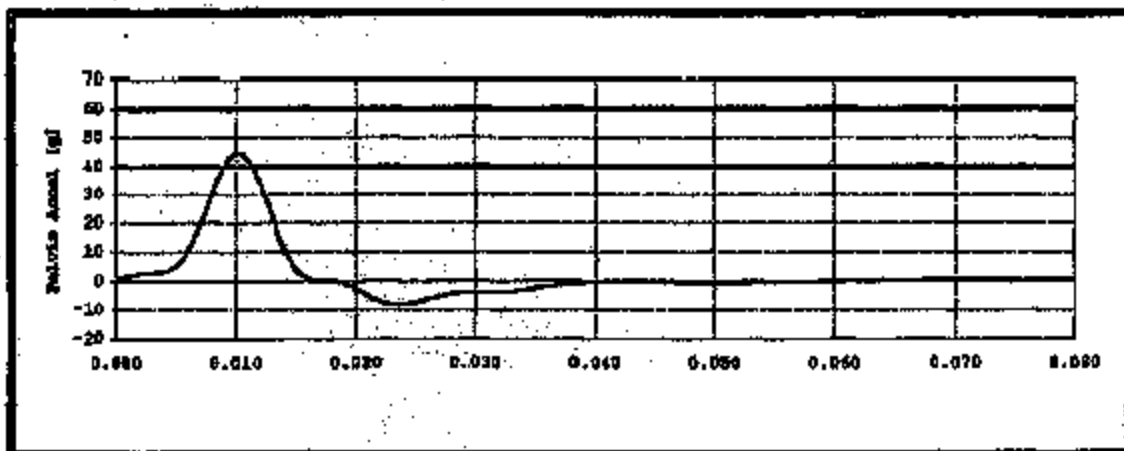
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lumbar Spine and Pelvis Lateral Impact Test Summary

Test ID Number: SP210	Test Date: 10/31/2002
SID/HIII Number: #052	Test Time: 8:22
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.7 PASS
RELATIVE HUMIDITY (%)	10 - 70	36.0 PASS
SPEED TRAP TIME (ms)	---	23.90 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.25 PASS
PELVIS ACCELERATION (g)	40 - 60	44.7 PASS
ACCEL. CURVE UNIMODAL? (%)	10% max	1.2% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



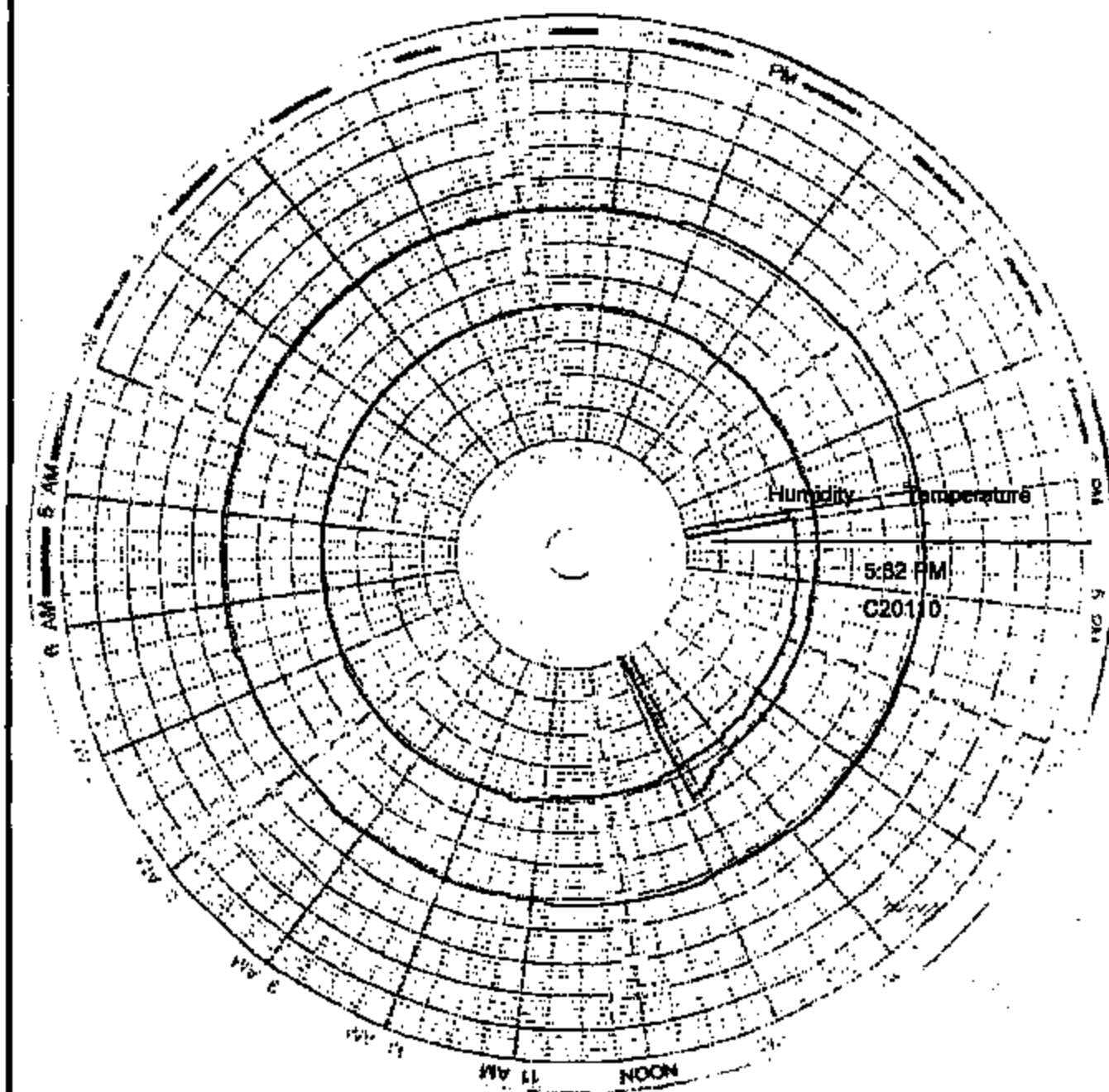
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TEMPERATURE/HUMIDITY DATA



TEST	DATE	TIME	JOB NAME: Rigid Pole Side Impact Test	JOB NO.: PH07338
C20110	10/25/02	5:32 pm	Omega Temperature/Humidity Recorder Model No.: CT485-RS Serial No.: Z1985 Cal. Due: 3/31/03	Exponent Failure Analysis Associates

POST TEST DUMMY INSPECTION LIST
INSPECTION DATE 9/27/02
SID/HIN NUMBER: 052

Part	Items Checked	Comments
Skin	Visual inspection	OK
Head	Visual, ballast, accelerometer mount	OK
Neck	Visual, broken or cracks in rubber, upper bracket firmly attached to lower bracket, loose condyle joint, nodding blocks – cracked or out of position	OK
Spine Box	Visual, ballast, weldment, accelerometer mount, rubber cracks	OK
Rib Cage	Visual, measure, stiffeners, bumpers in place	OK
Sternum	Visual	OK
Lumbar spine	Visual	OK
Abdomen	Visual	OK
Pelvis	Visual, palpate, accelerometer mount	OK
Upper Legs	Visual	OK
Knees	Visual, stops, inserts	OK
Lower Legs	Visual, range of motion	OK
Ankles	Visual, range of motion	OK
Feet	Visual, range of motion	OK
Joints	1 to 2 g range	OK
Head/Neck	Bracket attachment cracked or broken	OK
Other		N/A

Appendix D— Test Equipment List and Calibration Information

Test Vehicle: 2002 Saturn VueNHTSA No.: C20110

	Vehicle Instrumentation		
	Serial No.	Manufacturer	Calibration Date
Vehicle CG (X)	A92B	Endevco	8/13/02
Vehicle CG (Y)	A58E	Endevco	8/13/02
Vehicle CG (Z)	A61E	Endevco	8/13/02
Vehicle CG Roll Rate	17834	Syston Donner	9/26/02
Vehicle CG Pitch Rate	6188	Syston Donner	9/26/02
Vehicle CG Yaw Rate	9273	Syston Donner	9/26/02
Left Floor Sill (Y)	Z1824	Entran	7/16/02
Left A-Pillar Sill (Y)	Z1835	Entran	7/16/02
Left A-Pillar Low (Y)	Z1831	Entran	7/15/02
Left A-Pillar Mid (Y)	Z1717	Entran	7/15/02
Left B-Pillar Sill (Y)	Z1822	Entran	7/12/02
Driver Seat Track (Y)	Z1837	Entran	4/2/02
Engine (X)	Z1720	Entran	8/1/02
Engine (Y)	Z1721	Entran	8/1/02
Firewall (Y)	Z1823	Entran	7/16/02
Right Roof Rail (Y)	Z1869	Entran	6/7/02
Right Floor Sill (Y)	Z1740	Entran	4/16/02
Rear Deck (X)	Z1738	Entran	7/31/02
Rear Deck (Y)	Z1710	Entran	7/31/02

Remarks: _____

Test Vehicle: 2002 Saturn VueNHTSA No.: C20110

	Dummy Instrumentation		
	Serial No.	Manufacturer.	Calibration Date
Head CG (X)	C12839	Endevco	9/18/02
Head CG (Y)	C14863	Endevco	9/18/02
Head CG (Z)	C14938	Endevco	9/18/02
Neck Force (X)	993	Denton	8/22/02
Neck Force (Y)	993	Denton	8/22/02
Neck Force (Z)	993	Denton	8/22/02
Neck Moment (X)	993	Denton	8/22/02
Neck Moment (Y)	993	Denton	8/22/02
Neck Moment (Z)	993	Denton	8/22/02
Upper Rib	AETL4	Endevco	9/23/02
Lower Rib	AJRT0	Endevco	9/23/02
Lower Spine	AETJ7	Endevco	9/23/02
Pelvis	AETR5	Endevco	7/30/02

Remarks: _____