

Report Number: 201-EXI-2004-002

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

**General Motors Corporation
2004 Pontiac Grand Prix
NHTSA No. C40103**

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**Test Date: May 19, 2004
Report Date: September 15, 2004**

Final Report

**Prepared for:
U.S. Department of Transportation
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance (NVS-221)
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:



James Heald, Project Engineer
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Date 8/15/04

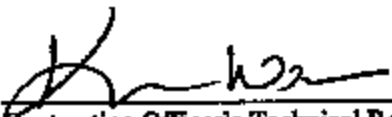
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Exponent Failure Analysis Associates

Date 8/15/04

Final Report Accepted By:



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

Date 10.6. 2004

Technical Report Documentation Page

1. Report No. 201-EXI-2004-002	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 201 Safety Compliance Rigid Pole Side Impact Test of 2004 Pontiac Grand Prix NHTSA No. C40103		5. Report Date September 15, 2004	
		6. Performing Organization Code	
7. Author(s) James Heald, Project Engineer		8. Performing Organization Report No. PH08682.000/SPF1/0604/R287	
9. Performing Organization Name and Address Exponent Failure Analysis Associates 23445 North 19 th Avenue Phoenix, Arizona 85027		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No. DTNH22-01-D-11033	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NVS-221) 400 Seventh Street, S.W., Room 6111 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report 09/15/04	
		14. Sponsoring Agency Code NVS-221	
15. Supplemental Notes.			
16. Abstract A rigid pole side impact test was conducted on a 2004 Pontiac Grand Prix 4-door sedan in accordance with FMVSS 201, "Occupant Protection in Interior Impact", S6.2(b)(3), and the Office of Vehicle Safety Compliance Test Procedure No. TP-201P-02, "Rigid Pole Side Impact Test." The test was conducted by the Exponent Test and Engineering Center in Phoenix, Arizona, on May 19, 2004. The impact velocity of the vehicle was 27.7 kph, and the ambient temperature at the driver side of the vehicle at the time of impact was 22.2 °C. The posttest maximum crush was 445 mm at level 3. The test vehicle's performance follows: HIC: Required: <1000 Measured: 247.0 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. *Note: The SID/HIII head and upper neck load cell separated from the neck approximately 0.055 seconds after impact.			
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) 400 Seventh Street, S.W. Washington, DC 20590 Telephone No. (202) 366-4946	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. Number of Pages 193	22. Price

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Appendix D - Test Equipment List and Calibration Information

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 2004 Pontiac Grand Prix 4-door sedan. 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 2004 Pontiac Grand Prix 4-door sedan. The subject vehicle was towed into the rigid pole at a velocity of 27.7 kph. The test was conducted by the Exponent Test and Engineering Center in Phoenix, Arizona, on May 19, 2004. Pretest and posttest 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 uniaxial accelerometer (Y-direction)
4. Left Lower Rib uniaxial accelerometer (Y-direction)
5. Lower Thoracic Spine uniaxial accelerometer (Y-direction)
6. Pelvic 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)	247.0 ²
TTI (g)*	70.6
Pelvic (g)*	49.6
Neck X Force (N)*	-245.9 ²
Neck Y Force (N)*	-1438.1 ^{1,2}
Neck Z force (N)*	-2139.2 ^{1,2}
Neck Moment X (N-m)*	-108.4 ²
Neck Moment Y (N-m)*	-14.8 ²
Neck Moment Z (N-m)*	16.4 ²

*For informational purposes only

Notes:

1. Data spike recorded that affects the maximum value; refer to Appendix B.
2. ATD head separated from the neck approximately 0.055 seconds after impact.

Section 3 – Side Impact Dummy (SID/HIII) and Vehicle Test Summary Data

Data Sheet 1 – General Test Vehicle Parameter Data

Data Sheet 2 – Test Vehicle Summary of Results

Data Sheet 3 – Posttest Observations

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION:

Model Year/Make/Model: 2004 Pontiac Grand Prix

Body Style/Color: 4-door sedan / Silver VIN: 2G2WB542941239753

NHTSA No.: C40103 Build Date: 11/03

Engine Data: 6 cylinders CID 3.6 Liter cc

Placement: longitudinal X lateral

Transmission: 4 speeds manual X automatic X overdrive

Final Drive: rear wheel drive X front wheel drive four wheel drive

Odometer Reading: 108 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): 30 psi Front 30 psi Rear

Recommended Tire Size: P225/60R16

Tires on Vehicle: P225/60R16 Mfr.: GOODYEAR

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 = 416 kg (A)

Number of Occupants X 68.04 kg = 340 kg (B)

Vehicle Cargo Capacity (A-B) = 76 kg

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA (CONTINUED)

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Right Front = 507 kg Right Rear = 290 kg
Left Front = 482 kg Left Rear = 295 kg
Total Front = 989 kg Total Rear = 585 kg
Total Weight = 1574 kg (UVW)
Percent of Total Weight: Percent Front = 63 Percent Rear = 37

CALCULATION OF TEST VEHICLE TARGET WEIGHT:

A. Total Vehicle Delivered Weight/Max Fluids = 1574 kg (UVW)
B. Rated Cargo and Luggage Weight of Vehicle = 78 kg (RCLW (<136 kg))
C. Weight of Instrumented SID/HIII Dummy = 80 kg
Test Vehicle Target Weight (A+B+C) = 1730 kg (TVTW)

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

Right Front = 508 kg Right Rear = 346 kg
Left Front = 508 kg Left Rear = 363 kg
Total Front = 1017 kg Total Rear = 709 kg
Percent Front = 59 Percent Rear = 41
Total Weight = 1726 kg

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA (CONTINUED)

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

Right Front =	<u>518</u> kg	Right Rear =	<u>343</u> kg
Left Front =	<u>511</u> kg	Left Rear =	<u>350</u> kg
Total Front =	<u>1029</u> kg	Total Rear =	<u>693</u> kg
Total Weight =	<u>1722</u> kg		
Percent Front =	<u>60</u>	Percent Rear =	<u>40</u>

TEST VEHICLE ATTITUDE:

	As Delivered	Fully Loaded	Ready for Test
Right Front	<u>730</u> mm	<u>724</u> mm	<u>725</u> mm
Left Front	<u>727</u> mm	<u>716</u> mm	<u>721</u> mm
Right Rear	<u>745</u> mm	<u>714</u> mm	<u>721</u> mm
Left Rear	<u>740</u> mm	<u>705</u> mm	<u>714</u> mm
Right Door Sill Angle	<u>-0.1</u> deg	<u>0.3</u> deg	<u>-0.1</u> deg
Left Door Sill Angle	<u>-0.5</u> deg	<u>0.0</u> deg	<u>0.0</u> deg
Front Bumper Angle	<u>0.2</u> deg	<u>-0.6</u> deg	<u>-0.6</u> deg
Rear Bumper Angle	<u>0.2</u> deg	<u>-0.1</u> deg	<u>0.0</u> deg
Test Vehicle Wheelbase =	<u>2820</u> mm		
C.G. =	<u>1135</u> mm rearward of front wheel centerline		

DATA SHEET 1
GENERAL TEST VEHICLE PARAMETER DATA (CONTINUED)

TOTAL VEHICLE LENGTH:

Right Side = 4693 mm Left Side = 4699 mm Centerline = 5060 mm

FRONT SEAT CUSHION PLACEMENT:

Total length of Adjustment Travel = 250 mm

Total Number of Adjustment Positions or Detents = N/A - Power Seats

Final Seat Position = 125 mm forward of rearmost position

FRONT SEAT BACK ADJUSTMENT POSITION:

Initial Seat Back Torso Angle = 23.4° degrees

Final Seat Back Torso Angle = 22.1° degrees

* Measurement taken on upper third of outer seat back frame. Seat fabric cut for access.

ADJUSTABLE STEERING COLUMN POSITION: 5th position, 4 positions down from top

WINDOW POSITIONS:

Right Front = Down Right Rear = Down

Left Front = Down Left Rear = Down

AMOUNT OF STODDARD SOLVENT IN FUEL TANK:

Volume = 59.5 liters (92% to 94% of useable capacity)

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

Wheelbase = 2820 mm

Impact Reference Line is 1438 mm rearward of front axle centerline

RECORDED BY:

DATE: May 19, 2004

APPROVED BY:

[Signature]
[Signature]

DATA SHEET 2
TEST VEHICLE SUMMARY OF RESULTS

Model Year/Make/Model: 2004 Pontiac Grand Prix

Body Style: 4-door sedan VIN: 2G2WS542941239753

NHTSA No. C40103 Build Date: 11/03

Test Date: 05/19/2004

Vehicle Overall Length = 5060 mm Vehicle Overall Width 1838 mm

VEHICLE TEST WEIGHT (PRETEST):

Left Front = 511 kg Left Rear = 350 kg

Right Front = 518 kg Right Rear = 343 kg

Total Front = 1029 kg Total Rear = 693 kg

Total Vehicle Test Weight = 1722 kg

Wheelbase = 2820 mm

Longitudinal C.G. from center of front axle = 1135 mm

Impact Angle with respect to impactor = 90 degrees

IMPACT POINT:

Actual Impact Point = 11 mm rearward of nominal impact ref. line

DATA SHEET 2
TEST VEHICLE SUMMARY OF RESULTS (CONTINUED)

MAXIMUM EXTERIOR STATIC CRUSH:

Level 1 (294 mm above ground) = 357 mm

Level 2 (541 mm above ground) = 433 mm

Level 3 (624 mm above ground) = 445 mm

Level 4 (852 mm above ground) = 443 mm

Level 5 (1335 mm above ground) = 270 mm

Maximum Post Test Intrusion = 445 mm

OCCUPANTS:

Dummy ID: 052 SID/HIII No. 052

Restraint Used: 3-Point Active Restraint

INSTRUMENTATION:

Number of Data Channels = 37

Number of Cameras:

Onboard = 3

Offboard = 10

Total Cameras = 13

Remarks: None

RECORDED BY: *John Paul*

DATE: May 19, 2004

APPROVED BY: *John J. Fiedler*

**DATA SHEET 3
POSTTEST OBSERVATIONS**

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

VISIBLE DUMMY CONTACT POINTS:

	SID/HIII
Face	Headliner, side curtain airbag
Top of the Head	Headliner
Left Side of the Head	Headliner, side curtain airbag
Back of the Head	Headliner
Left Hip	Driver seat, door panel, seat belt
Left Shoulder	Driver seat, door panel, seat belt

DOOR OPENING:

	Left Side	Right Side
Front	Tools needed	Easy
Rear	Tools needed	Tools needed

ARM REST LOCATION:

Front = N/A

Rear = N/A

SEAT MOVEMENT:

Front = None

Rear = None

DATA SHEET 3
POSTTEST OBSERVATIONS (CONTINUED)

GLAZING DAMAGE:

Windshield: Front and rear glass broken*

Window: Front and rear glass broken on left side, right glass was not broken

PILLAR PERFORMANCE:

No separation

SILL SEPARATION:

None

OTHER NOTABLE IMPACT EFFECTS:

None

REMARKS:

*Rear windshield separated from vehicle at impact

RECORDED BY:

James Hall

DATE: May 19, 2004

APPROVED BY:

John J. [Signature]

Section 4 – Occupant and Vehicle Information

Data Sheet 4 – SID/HIII Instrumentation Data

Data Sheet 5 – Vehicle Pretest and Posttest Measurements

Data Sheet 6 – SID/HIII Longitudinal Clearance Dimensions

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Data Sheet 10 – Vehicle Damage Profile Distances

Data Sheet 11 – High-Speed Camera Locations and Data

Data Sheet 12 – Dummy Damage Checklist – SID/HIII

Data Sheet 13 – Test Vehicle Accelerometer Locations Summary

Data Sheet 14 – Fuel System Integrity Summary

DATA SHEET 4
SID/HII INSTRUMENTATION DATA

Test Vehicle: 2004 Pontiac Grand Prix

NHTSA No.: C40103

SID/HII ID# 052

Description	Units	Filter	Max Data	Max Data Time [s]	Min Data	Min Data Time [s]	*
<i>PHEAD.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Head (Ax)	g	CFC 1000	56.6	0.055	-35.8	0.056	1
Driver ATD Head (Vx)	kph	CFC 180	4.0	0.301	-5.4	0.088	1
Driver ATD Head (Ay)	g	CFC 1000	112.6	0.055	-59.9	0.055	1
Driver ATD Head (Vy)	kph	CFC 180	13.4	0.282	-27.9	0.017	1
Driver ATD Head (Az)	g	CFC 1000	22.1	0.018	-50.9	0.058	1
Driver ATD Head (Vz)	kph	CFC 180	21.1	0.400	-8.5	0.092	1
Driver ATD Head (Ar)	g	CFC 1000	118.4	0.055	0.0	-0.087	1
Driver HIC: 247.0 from 0.0489 to 0.0657 s.							1
<i>PUNCK.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Neck (Fx)	N	CFC 1000	123.7	0.055	-245.9	0.054	1
Driver ATD Neck (Fy)	N	CFC 1000	895.1	0.055	-1438.1	0.055	1
Driver ATD Neck (Fz)	N	CFC 1000	434.4	0.044	-2139.2	0.055	1
Driver ATD Neck (Mx)	N-m	CFC 600	7.5	0.170	-108.4	0.064	1
Driver ATD Neck (My)	N-m	CFC 600	4.1	0.035	-14.8	0.050	1
Driver ATD Neck (Mz)	N-m	CFC 600	16.4	0.064	-0.7	0.171	1
<i>PRBLSPL.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	CFC 1000	88.8	0.041	-40.8	0.179	
Driver ATD Lower Rib (Ay)	g	CFC 1000	80.2	0.179	-87.3	0.179	
Driver ATD Lower Spine (Ay)	g	CFC 1000	70.7	0.044	-15.8	0.077	
Driver ATD Pelvis (Ay)	g	CFC 1000	50.7	0.044	-13.1	0.068	
<i>PFIR100.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	FIR 100	71.6	0.040	-8.0	0.102	
Driver ATD Upper Rib (Vy)	kph	FIR 100	9.2	0.087	-27.7	-0.100	
Driver ATD Lower Rib (Ay)	g	FIR 100	62.6	0.041	-13.9	0.102	
Driver ATD Lower Rib (Vy)	kph	FIR 100	7.9	0.086	-27.7	-0.100	
Driver ATD Lower Spine (Ay)	g	FIR 100	69.5	0.044	-13.2	0.077	
Driver ATD Lower Spine (Vy)	kph	FIR 100	12.3	0.070	-27.7	-0.100	
Driver ATD Pelvis (Ay)	g	FIR 100	49.6	0.044	-12.6	0.089	
Driver ATD Pelvis (Vy)	kph	FIR 100	5.6	0.059	-27.7	0.000	
Driver TTI [g]: 70.6							

*** Comments:**

1:

Data affected by ATD head separating from neck approximately 0.055 seconds after impact

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:

None

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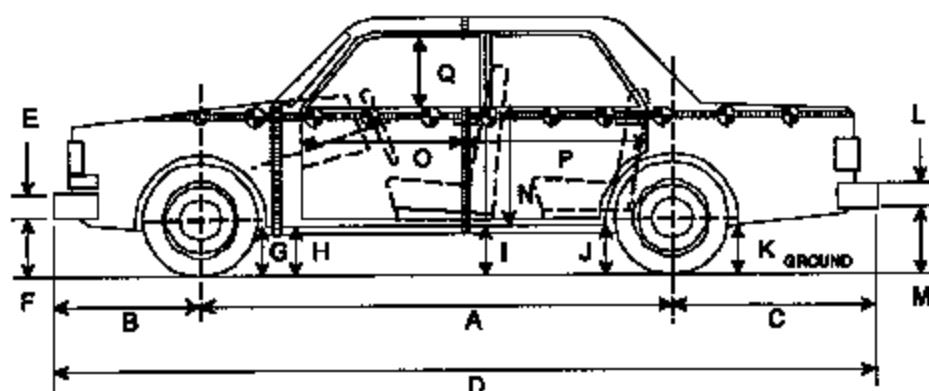
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DATA SHEET 5
VEHICLE PRETEST AND POSTTEST MEASUREMENTS

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103



LEFT SIDE VIEW

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

	PRETEST	POSTTEST	CHANGE
A	2820	2670	-150
B	1118	1111	-7
C	1112	1113	1
D	5050	4894	-156
E	158	158	0

(Continued on next page)

	PRETEST			
	As-Delivered	As-Tested	POSTTEST	CHANGE
*F	362	361	395	34
*G	196	189	178	-11
*H	203	197	150	-47
*I	218	203	201	-2
*J1/J2	208/208	198/198	208/203	10/5
*K	224	197	170	-27
L	160		160	0
*M	415	394	409	15
O	952		886	-66
P	1029		1022	-7
Q	274		267	-7

D = Length at Centerline
 E & L = Bumper thickness
 J1 = To Pinch Weld
 J2 = To Sill

* THESE MEASUREMENTS ARE TO BE TAKEN IN THE "AS DELIVERED" AND IN THE "AS TESTED" CONFIGURATION (WHICH INCLUDES SID/HIII DUMMY, INSTRUMENTATION, CAMERAS, ETC.)

REMARKS:

None

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DATE: May 18, 2004

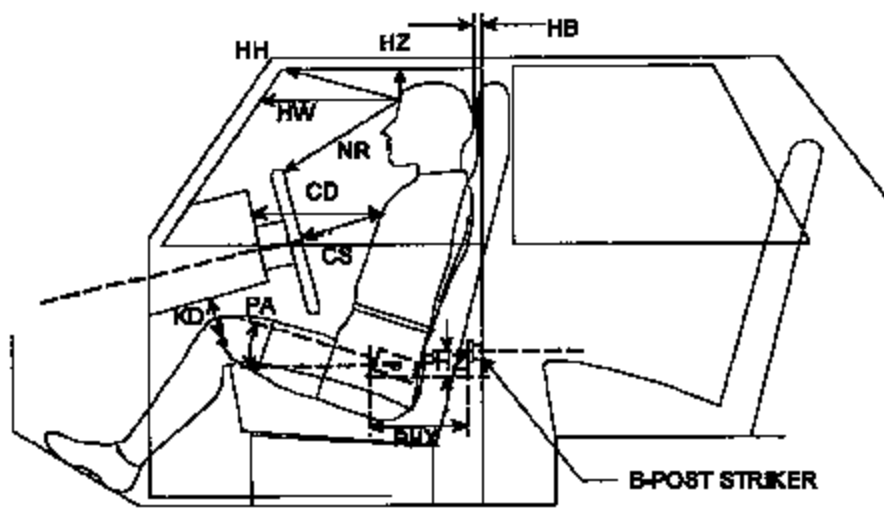
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DATA SHEET 6
SID/HIII LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

SID/HIII DUMMY LONGITUDINAL MEASUREMENTS



LEFT SIDE VIEW

SID/HIII ID# 052	MEASUREMENT (mm)
HB	54
HH	292
HW	589
HZ	157
NR	389
CD	523
CS	282

(Continued on next page)

SID/HIII ID# 052	MEASUREMENT (mm)
KDL/(KDA°)	180/ (36° WRTH*)
KDR	178
PA°	25°
PHX	132
PHY	74
PHZ	74

REMARKS:

PHX, PHY, PHZ taken from forward-most point on striker to outside edge of SID/HIII H-point tool
which extended 165 mm out from hip flesh.

*WRTH = With Respect to Horizontal

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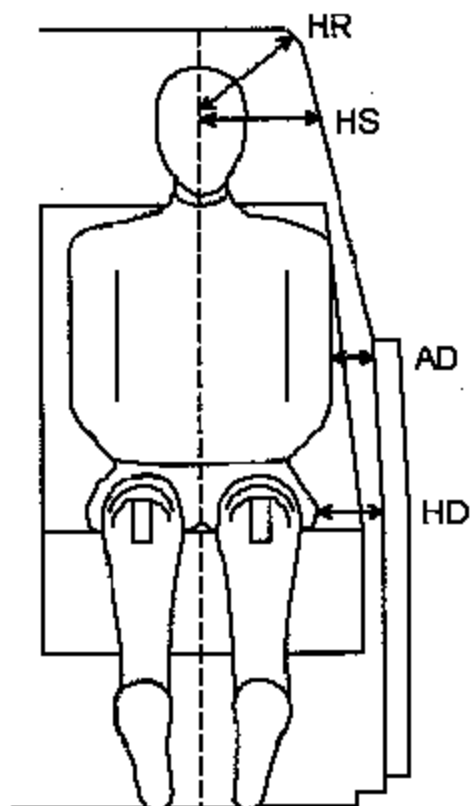
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DATA SHEET 7
SID/HII DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

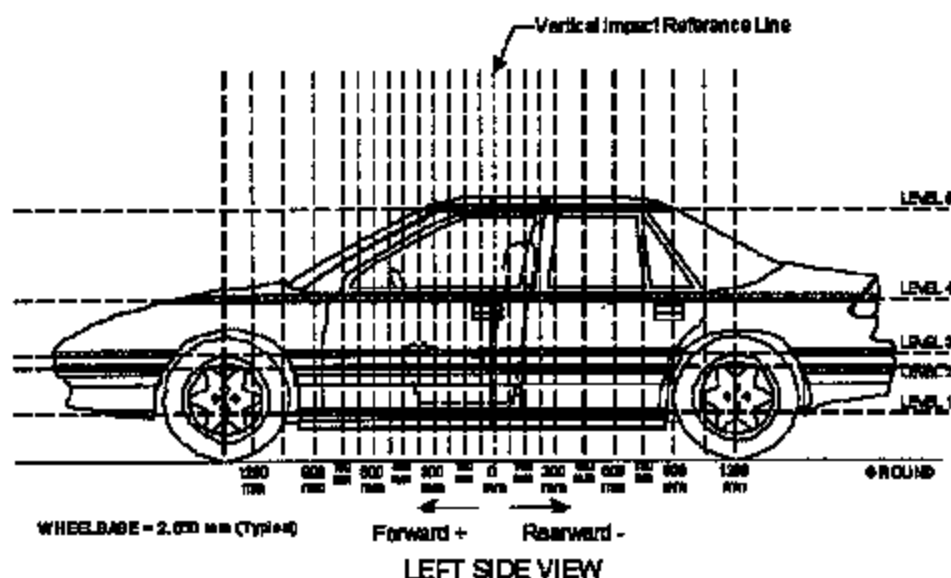


SID/HII ID# 052	MEASUREMENT (mm)
HR	188
HS	330
AD	114
HD	147

**DATA SHEET 8
VEHICLE SIDE MEASUREMENTS**

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

PRETEST AND POSTTEST EXTERIOR PROFILE MEASUREMENTS

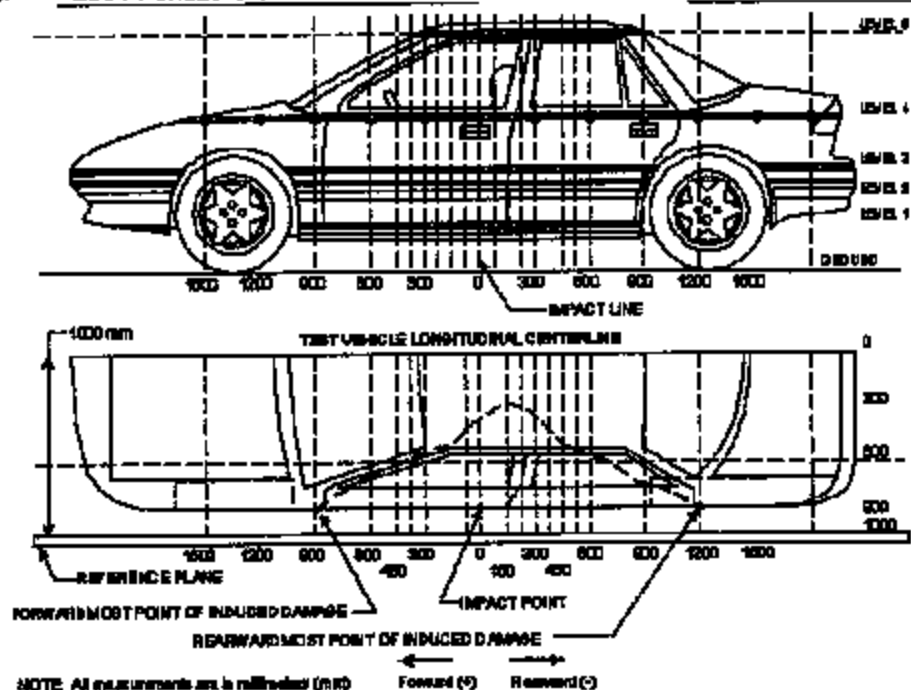


VERTICAL MEASUREMENTS ALONG THE 0-mm LINE SHOWN ABOVE:

	Pretest		Posttest	
LEVEL 5 @ Window Top =	<u>1335</u>	mm	<u>1368</u>	mm
LEVEL 4 @ Window Sill =	<u>852</u>	mm	<u>844</u>	mm
LEVEL 3 @ Mid Door =	<u>624</u>	mm	<u>621</u>	mm
LEVEL 2 @ Occupant H-Point =	<u>541</u>	mm	<u>540</u>	mm
LEVEL 1 @ Sill Top Height	<u>294</u>	mm	<u>286</u>	mm

DATA SHEET 9
VEHICLE EXTERIOR CRUSH PROFILES - ALL LEVELS

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103



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

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
			1350	1200	1050	975	900	825	750
LEVEL 1 SIDE SILL	294	PRE				103	115	112	113
		POST				103	123	145	167
		CRUSH				0	8	33	54
LEVEL 2 H-POINT	641	PRE			69	71	71	72	71
		POST			69	85	96	125	150
		CRUSH			0	14	25	53	79
LEVEL 3 MID-DOOR	624	PRE			87	71	70	72	88
		POST			78	89	98	125	150
		CRUSH			11	18	28	53	82
LEVEL 4 WINDOW SILL	852	PRE	124	116	109	105	103	102	100
		POST	155	142	135	134	139	151	166
		CRUSH	31	28	26	29	36	49	65
LEVEL 5 WINDOW TOP	1335	PRE							
		POST							
		CRUSH							

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

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
			675	600	525	450	375	300	225
LEVEL 1 SIDE SILL	294	PRE	114	116	115	117	118	117	117
		POST	190	214	238	263	289	319	346
		CRUSH	78	99	123	146	173	202	229
LEVEL 2 H-POINT	541	PRE	72	77	72	76	73	78	73
		POST	179	202	229	258	298	340	389
		CRUSH	107	125	157	182	225	264	316
LEVEL 3 MID-DOOR	624	PRE	73	71	73	72	70	70	69
		POST	178	201	229	270	313	358	406
		CRUSH	106	130	156	198	243	288	338
LEVEL 4 WINDOW SILL	862	PRE	97	99	93	93	91	90	88
		POST	190	224	261	298	339	376	424
		CRUSH	93	125	168	205	246	286	336
LEVEL 5 WINDOW TOP	1395	PRE						457	400
		POST						698	574
		CRUSH						141	174

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

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

LOCATION	HEIGHT		DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
			160	75	0	-75	-150	-225	-375
LEVEL 1 SIDE SILL	294	PRE	120	119	119	119	120	121	122
		POST	404	458	478	453	409	357	289
		CRUSH	284	339	357	334	289	236	147
LEVEL 2 H-POINT	541	PRE	74	75	73	76	75	78	76
		POST	443	483	506	479	395	351	284
		CRUSH	369	408	433	403	320	273	208
LEVEL 3 MID-DOOR	824	PRE	69	70	70	72	71	73	74
		POST	454	487	516	488	409	359	299
		CRUSH	385	417	445	416	338	286	225
LEVEL 4 WINDOW SILL	852	PRE	86	87	87	86	87	86	86
		POST	489	517	530	503	432	397	342
		CRUSH	381	430	443	417	345	311	257
LEVEL 5 WINDOW TOP	1335	PRE	363	348	349	350	353	351	353
		POST	561	592	603	629	614	569	541
		CRUSH	198	244	254	279	261	218	188

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

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

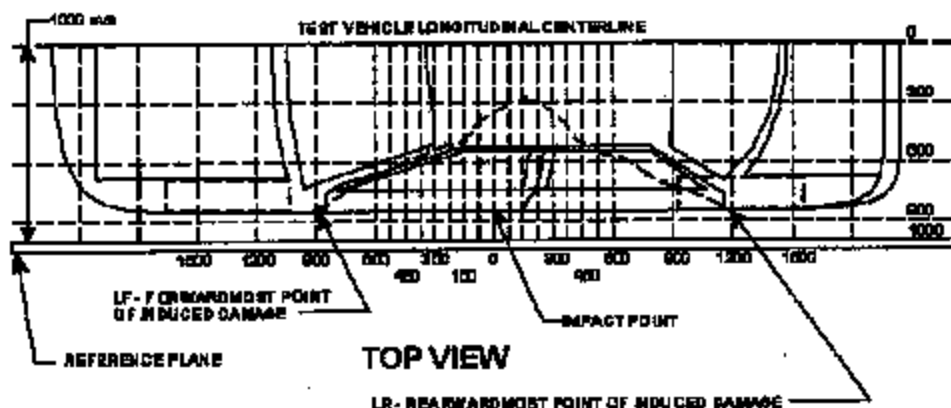
			DISTANCE IN MILLIMETERS (mm) FROM IMPACT POINT (Measurements Continued on Next Page)						
LOCATION	HEIGHT		-525	-675	-825	-975	-1125	-1275	-1425
LEVEL 1 SIDE SILL	294	PRE	123	124	122	104			
		POST	195	157	114	58			
		CRUSH	72	33	-8	-46			
LEVEL 2 H-POINT	541	PRE	80	78	80	71			
		POST	227	169	114	57			
		CRUSH	147	81	34	-14			
LEVEL 3 MID-DOOR	624	PRE	73	79	77	73			
		POST	243	187	131	70			
		CRUSH	170	108	54	-3			
LEVEL 4 WINDOW SILL	852	PRE	84	86	88	86	98	98	101
		POST	287	234	180	128	74	93	86
		CRUSH	203	148	92	42	-24	-3	-15
LEVEL 5 WINDOW TOP	1336	PRE	356	379	401				
		POST	501	471	470				
		CRUSH	146	92	69				

REMARKS:

None

**DATA SHEET 10
VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103



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

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

DPD MEASUREMENTS	POSTTEST (mm)	PRETEST (mm)	STATIC CRUSH (mm)
1 (LR = <u>-675</u> mm)	70	73	-3
2 <u>-675</u>	167	79	106
3 <u>-225</u>	359	73	286
4 <u>225</u>	405	89	336
5 <u>675</u>	178	73	105
6 (LF = <u>1080</u> mm)	78	67	11

REMARKS:

Data from measured locations on Level 3 that best approximated an even distribution along the vehicle length.

RECORDED BY:

[Signature]

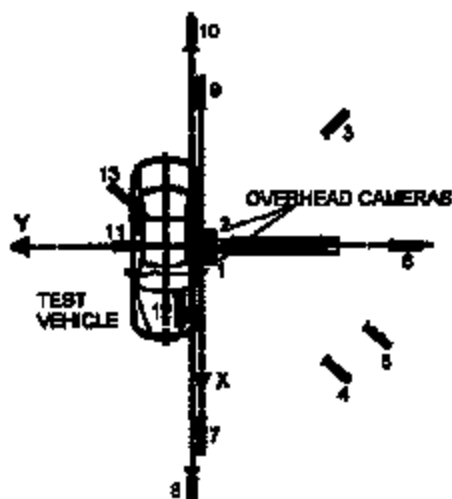
DATE: May 19, 2004

APPROVED BY:

[Signature]

DATA SHEET 11
HIGH SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103



REFERENCE (from Point of Impact): + X = Forward, + Y = To Right, + Z = Down from Ground, +θ = Clockwise from +X-axis

* All measurements accurate to ± 6 mm.

CAMERA NO.	VIEW	COORDINATES (mm)			ANGLE (deg)	LENS (mm)	FILM SPEED (fps)
		X*	Y*	Z*			
1	Overhead view of test vehicle	152	0	-6949	N/A	13	1000
2	Overhead close-up view of impact plane	0	0	-6949	N/A	25	1000
3	Left side 45° - rearward pole view	-3962	-3962	-1372	225	13	1000
4	Left side 45° - forward pole view	3962	-3962	-1372	315	13	1000
5	Real time (24 fps) film coverage of test	2696	-5182	-1402	298	N/A	24
6	Left side - rear pole view	0	-7010	-1372	270	13	1000
7	Front ground level - vehicle/pole impact	8585	0	-1219	0	25	1000
8	Front ground level - vehicle roof targets and vehicle/pole impact	8778	457	-1372	0	25	1000
9	Rear ground level - vehicle/pole impact	-7183	0	-1219	180	25	1000
10	Rear ground level	-7285	457	-1372	180	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	7.5	1000
13	Test vehicle onboard driver - 3/4 rear view	N/A	N/A	N/A	N/A	7.5	1000

**DATA SHEET 12
DUMMY DAMAGE CHECKLIST - SID/HII**

Dummy Serial No. 2004 Pontiac Grand Prix Date: C40103

DATE: 8/9/2004
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	Broke Nodding Joint Assy During Test
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

Note: Nodding joint assembly was replaced for posttest calibration

TEST DATES: 05/19/04
RECORDED BY: *[Signature]*

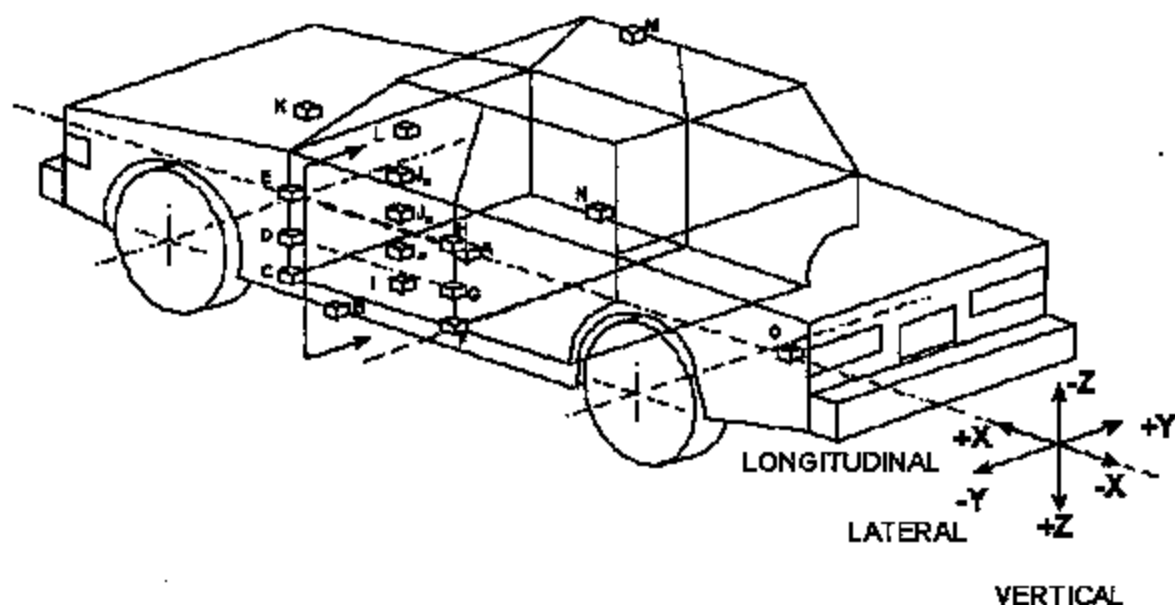
DATE: 08/09/04

APPROVED BY: *[Signature]*

DATE: 08/09/04

DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS SUMMARY

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103



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		

DATA SHEET 13
TEST VEHICLE ACCELEROMETER LOCATIONS SUMMARY (CONTINUED)

Test Vehicle: 2004 Pontiac Grand Prix

NHTSA No.: C40103

Accelerometers	LOCATION	Coord.±3mm		
		X	Y	Z
A	VEHICLE CG	1788	7	-347
B	LEFT FLOOR SILL	1487	-785	-315
C	A PILLAR SILL	2307	-824	-313
D	A PILLAR LOW	2310	-793	-482
E	A PILLAR MID	2304	-792	-690
F	B PILLAR SILL	1222	-827	-338
G	B PILLAR LOW	1218	-831	-416
H	B PILLAR MID	1208	-829	-690
I	DRIVER SEAT	1299	-631	-327
J1	DRIVER DOOR LOW	1885	-750	-423
J2	DRIVER DOOR MID	1870	-783	-678
J3	DRIVER DOOR UPPER	1863	-810	-679
K	ENGINE	3017	-13	-790
L	FIREWALL	2703	-10	-817
M	RIGHT ROOF	1400	489	-1375
N	RIGHT FLOOR SILL	1398	814	-308
O	REAR DECK	-779	-28	-588

Note: Positive X-direction measurements forward of rear axle centerline, positive Y-direction measurements right of vehicle longitudinal centerline, positive Z-direction measurements down from ground

REMARKS:

None

**DATA SHEET 14
FUEL SYSTEM INTEGRITY SUMMARY**

Test Vehicle: 2004 Pontiac Grand Prix NHTSA No.: C40103

Amount of spillage from time of impact to static rollover test commencement = 0

TIME AND LEAKAGE LOG		
Cumulative Time	Description	Stoddard Spillage [mL]
0m, 0s	Begin driver side down rotation to -90 degrees	0
1m, 9s	End roll to -90 degrees	0
6m, 9s	End of 5-minute interval at -90 degrees; begin rotation to -180 degrees	0
7m, 19s	End roll to -180 degrees	0
12m, 19s	End of 5-minute interval at -180 degrees; begin rotation to -270 degrees	0
13m, 25s	End roll to -270 degrees	0
18m, 25s	End of 5-minute interval at -270 degrees; begin rotation to -360 degrees	0
19m, 35s	End roll to -360 degrees	0
24m, 35s	End of 5-minute interval at -360 degrees	0

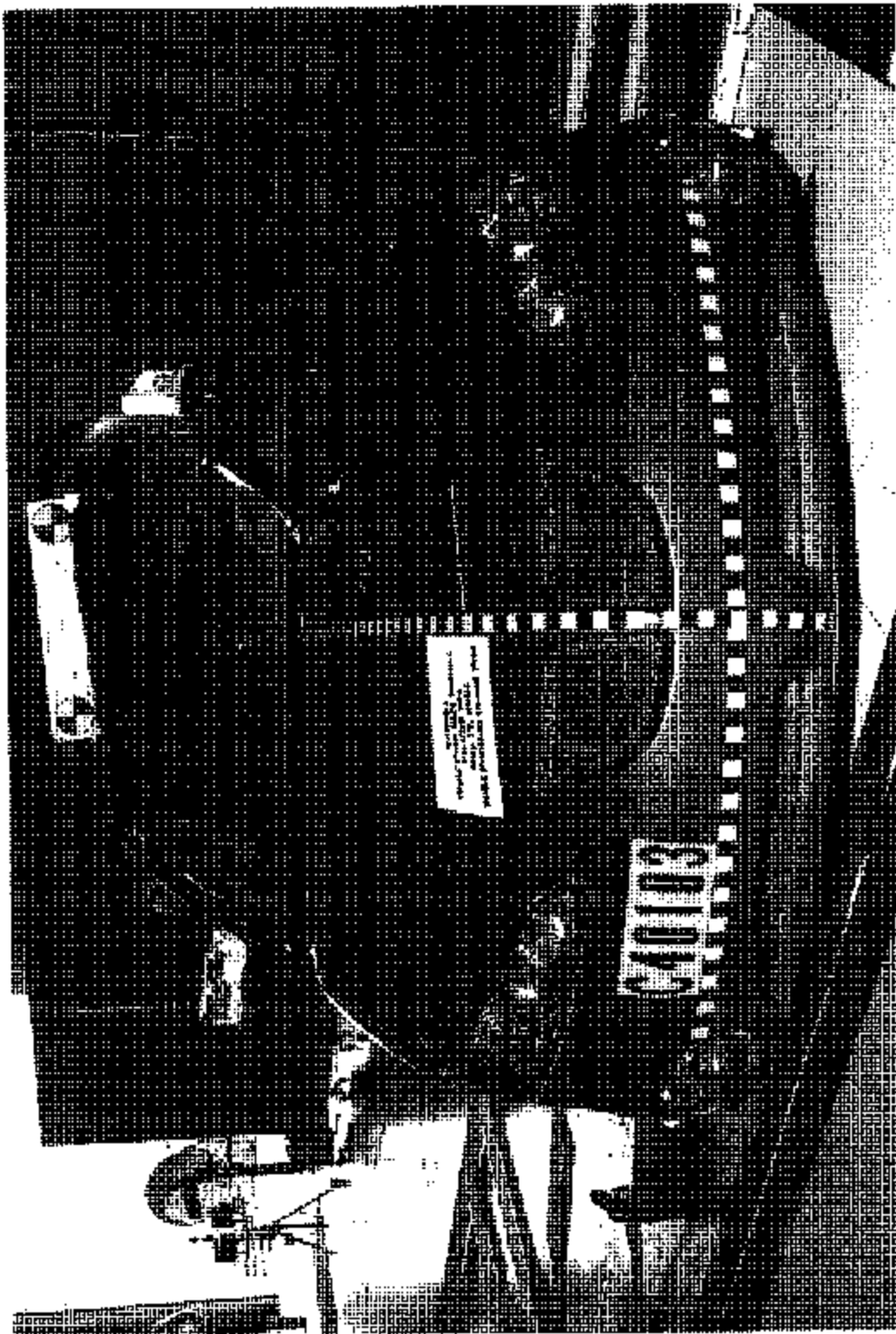
REMARKS:

None

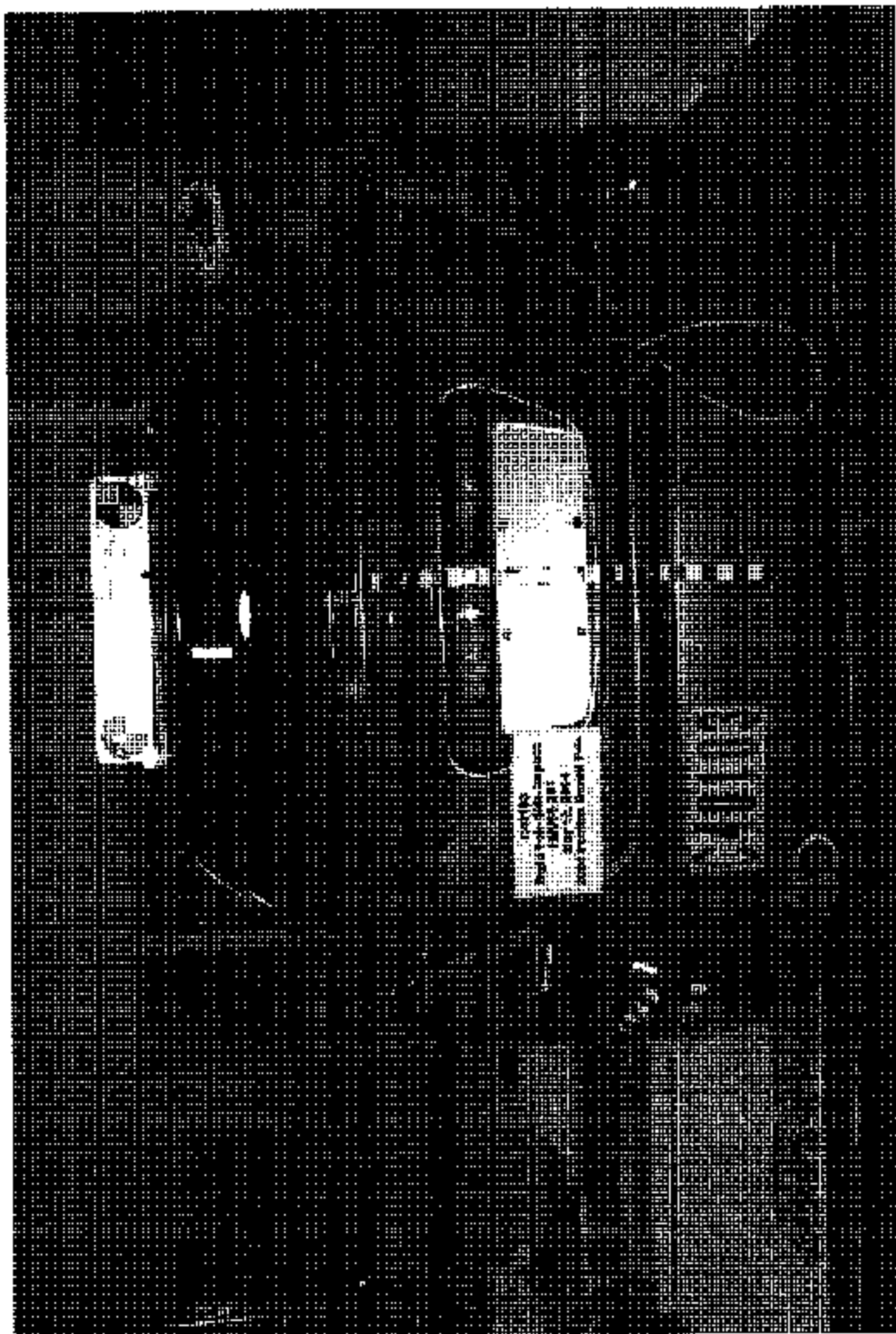
Appendix A – Photographs



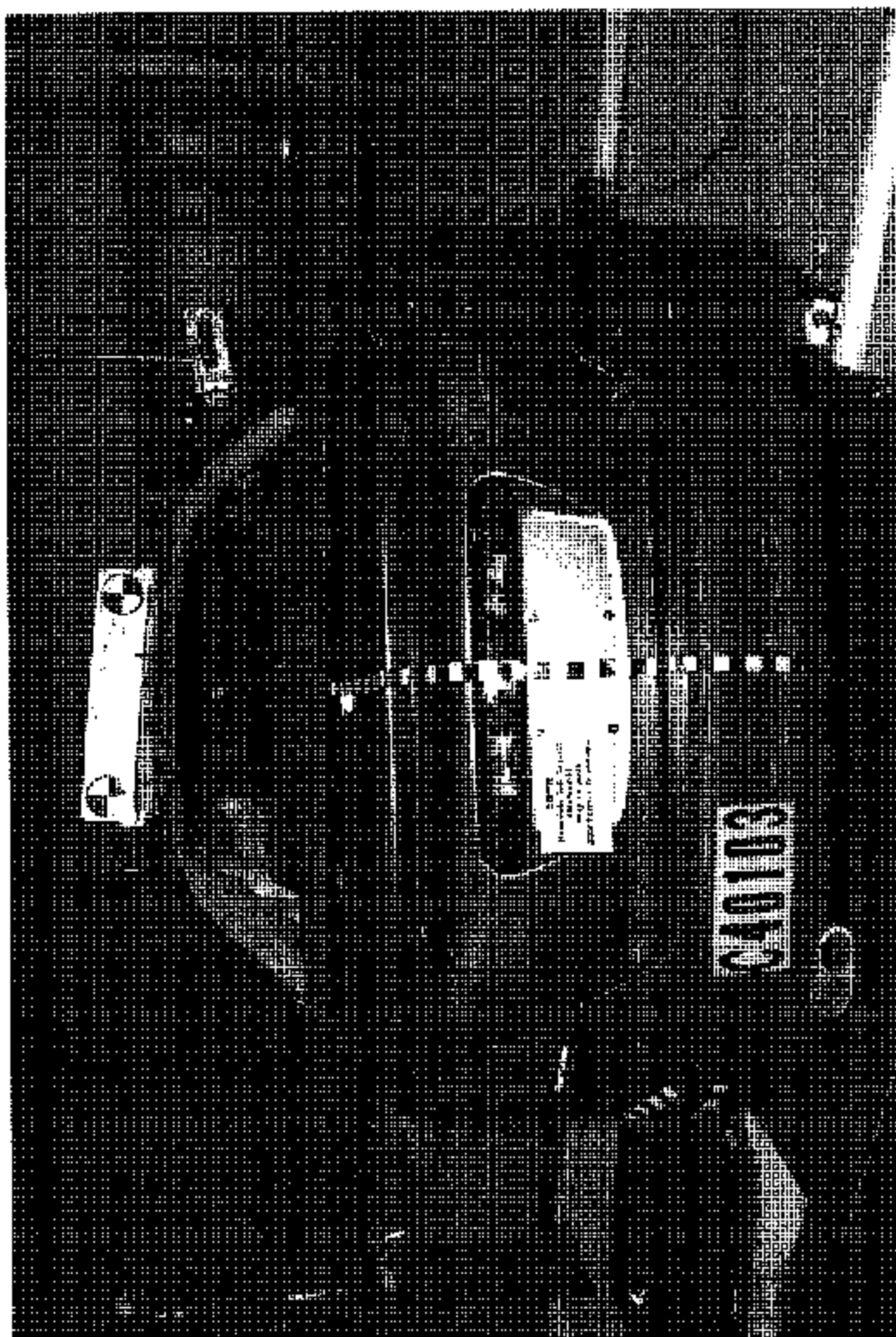
Pretest Frontal View of Test Vehicle



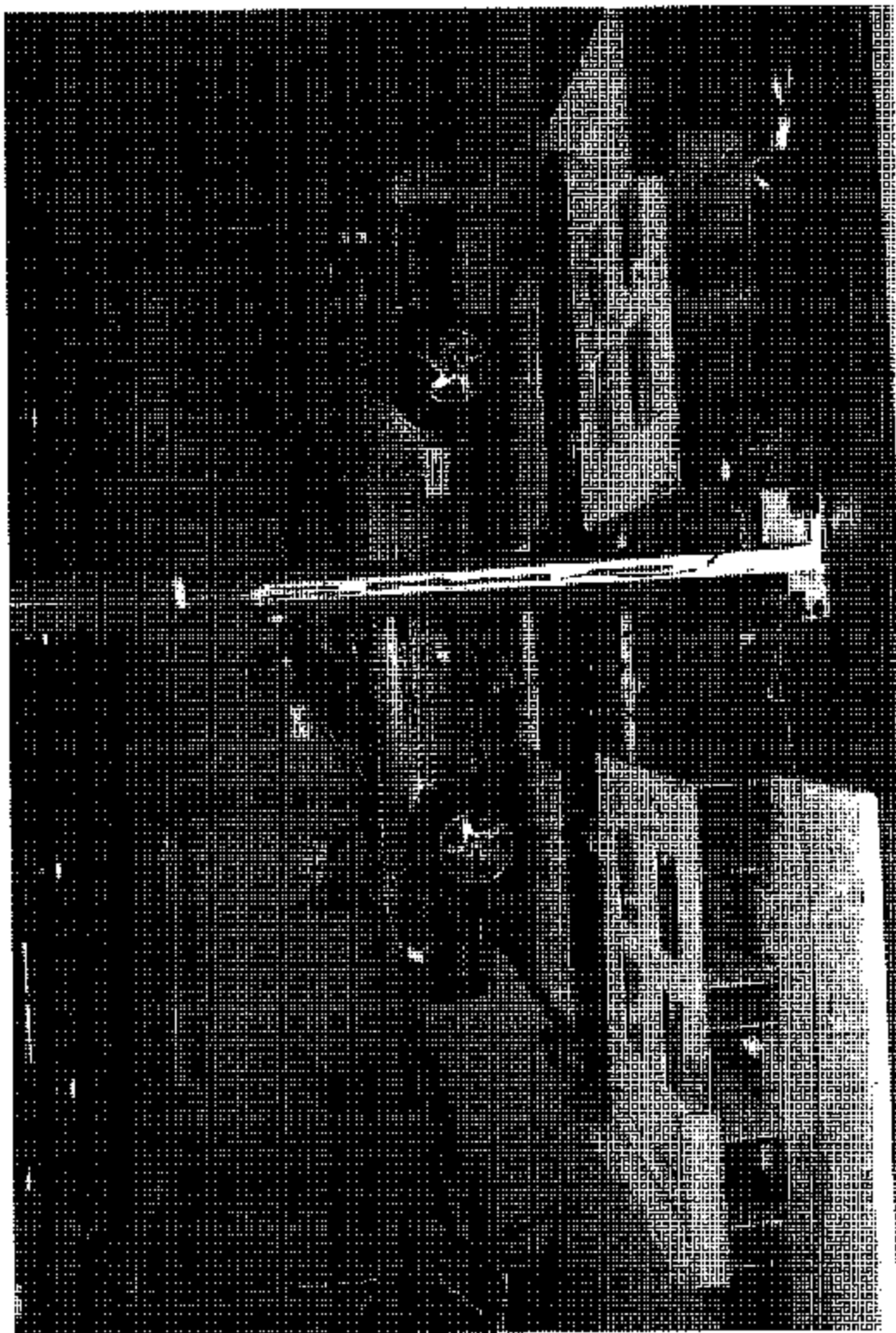
Posttest Frontal View of Test Vehicle



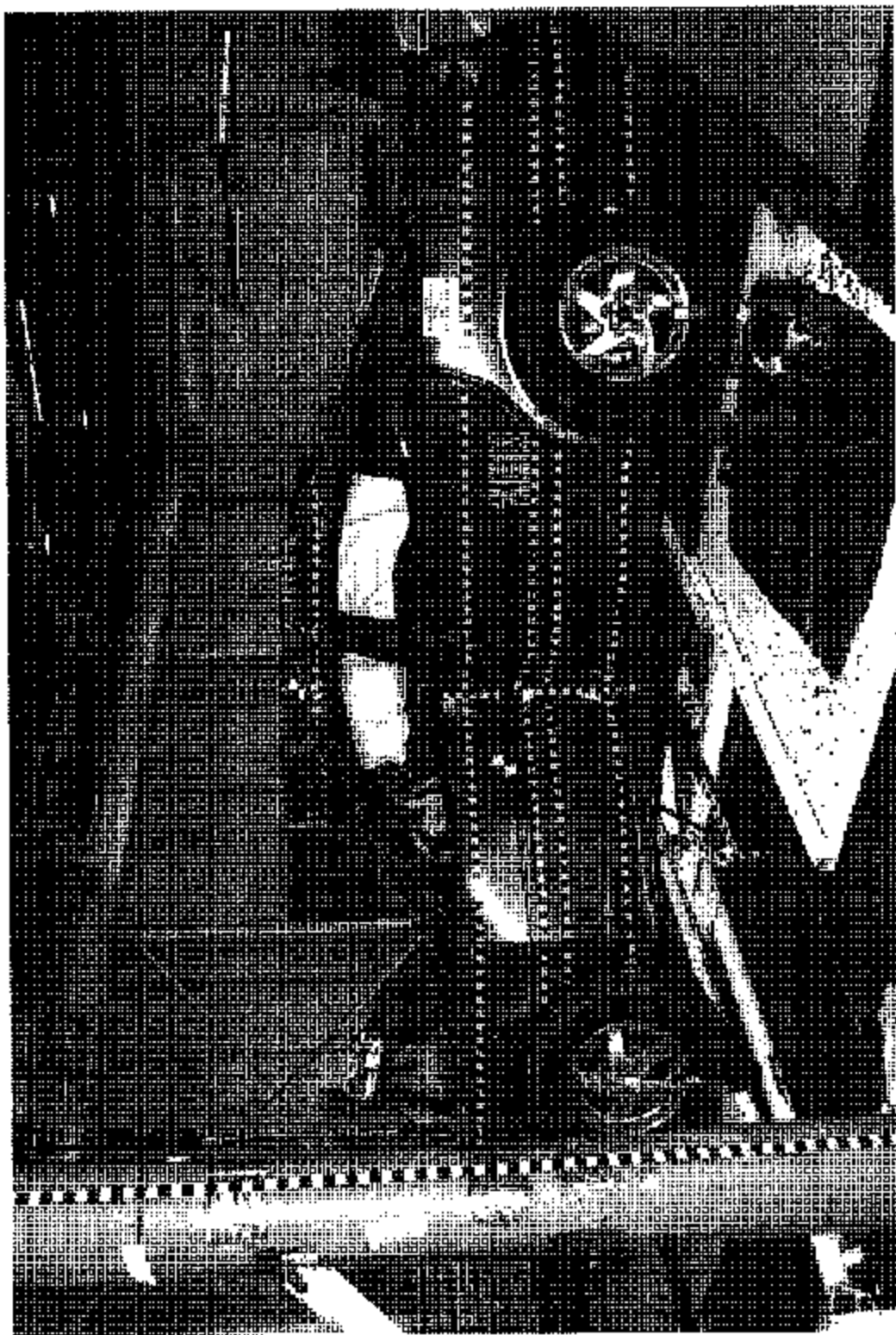
Pretest Rear View of Test Vehicle



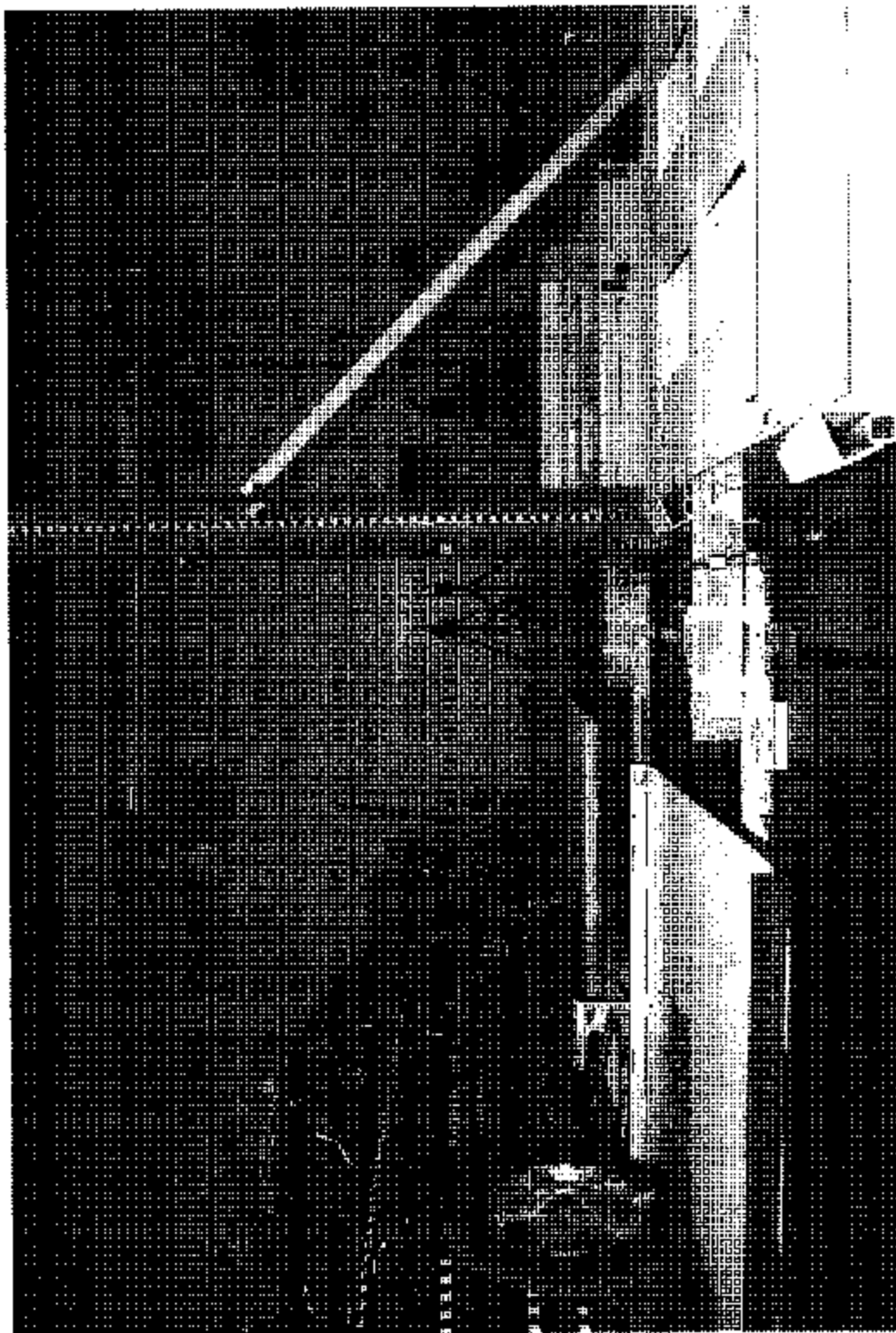
Posttest Rear View of Test Vehicle
A-5



Pretest Impacted Side View of Test Vehicle
A-8



Posttest Impacted Side View of Test Vehicle
A-7

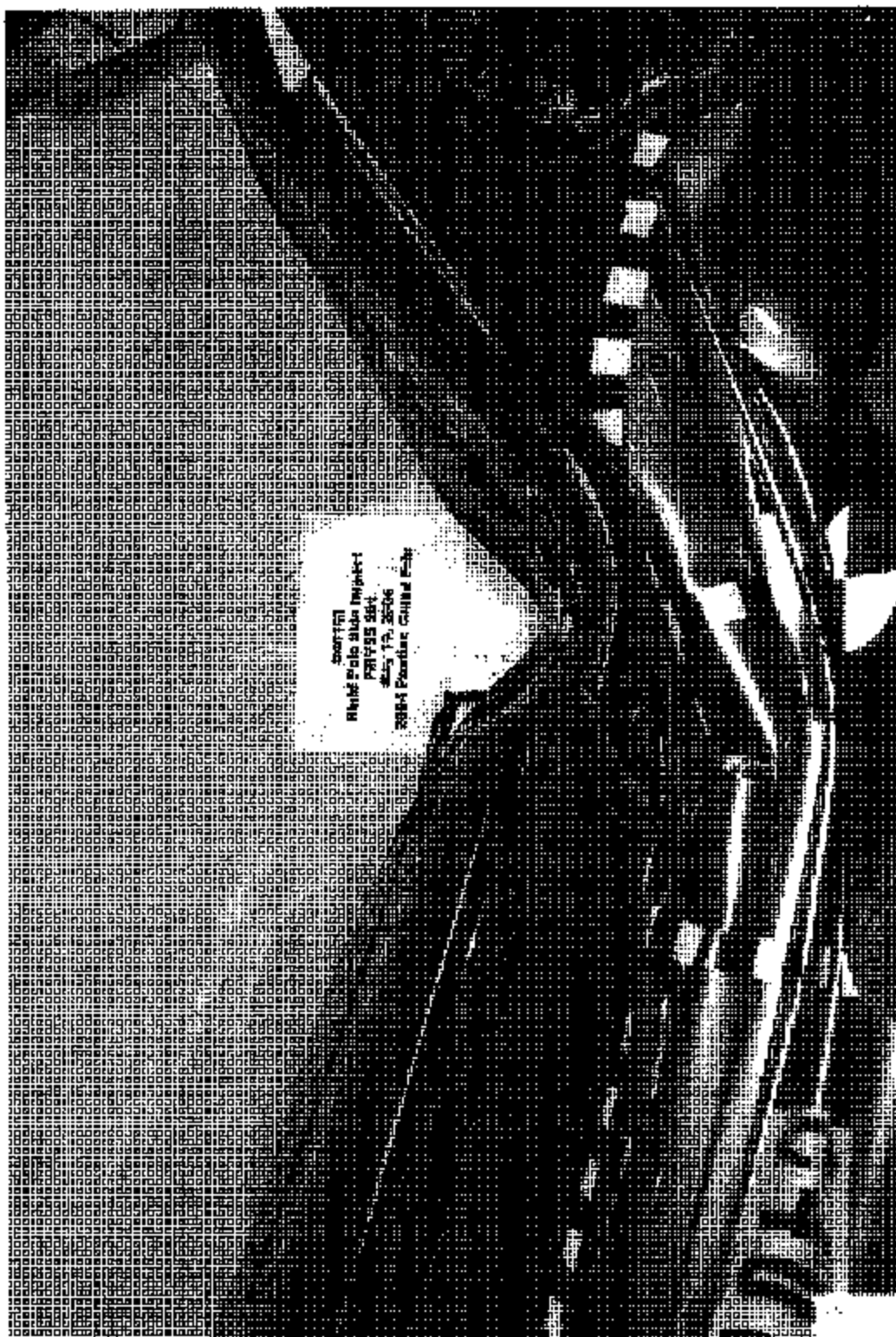


Pretest Left $\frac{3}{4}$ Front View of Vehicle and Pole



Pretest Left $\frac{3}{4}$ Rear View of Vehicle

A-8



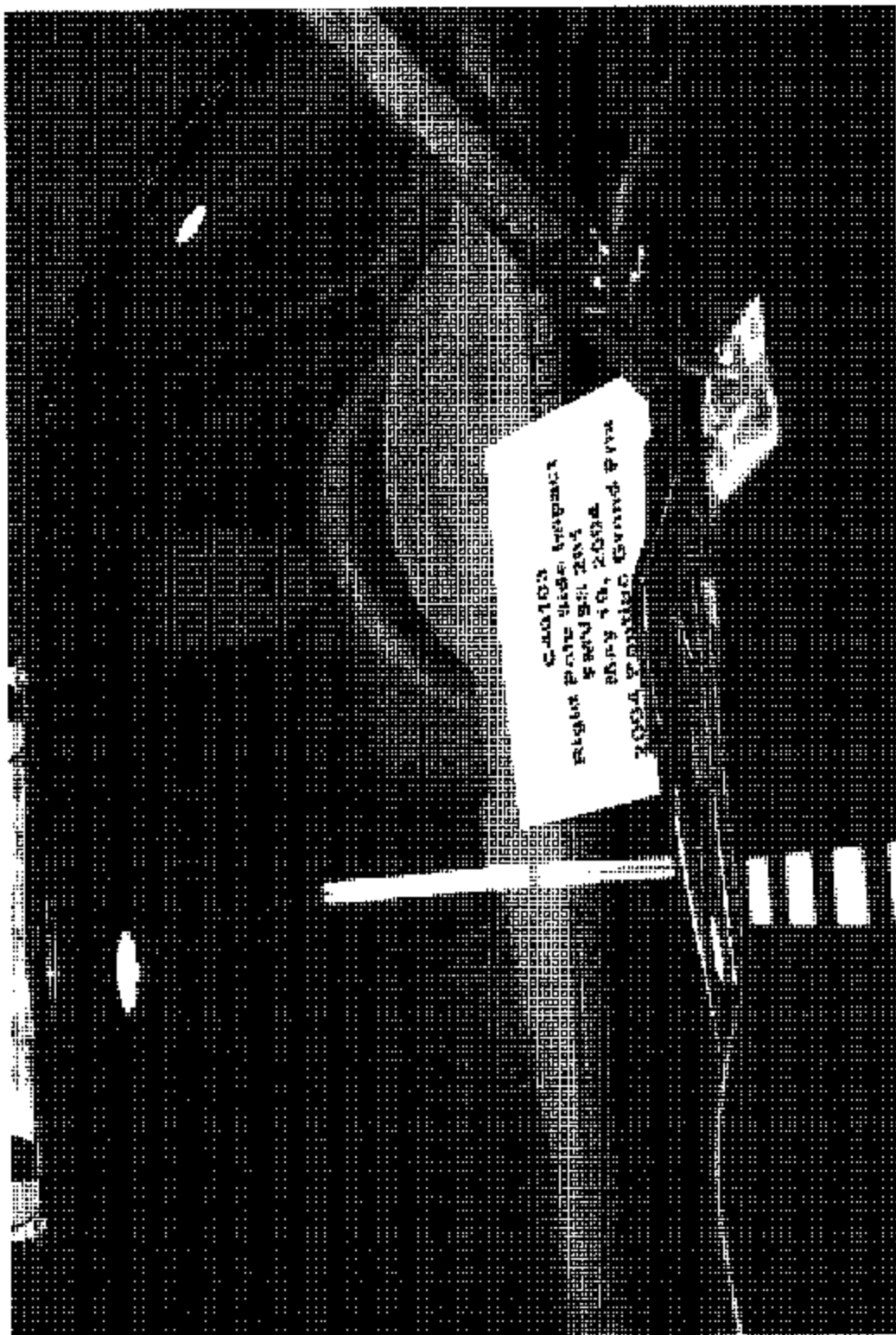
Posttest Overhead View of
Impact Location on Test Vehicle



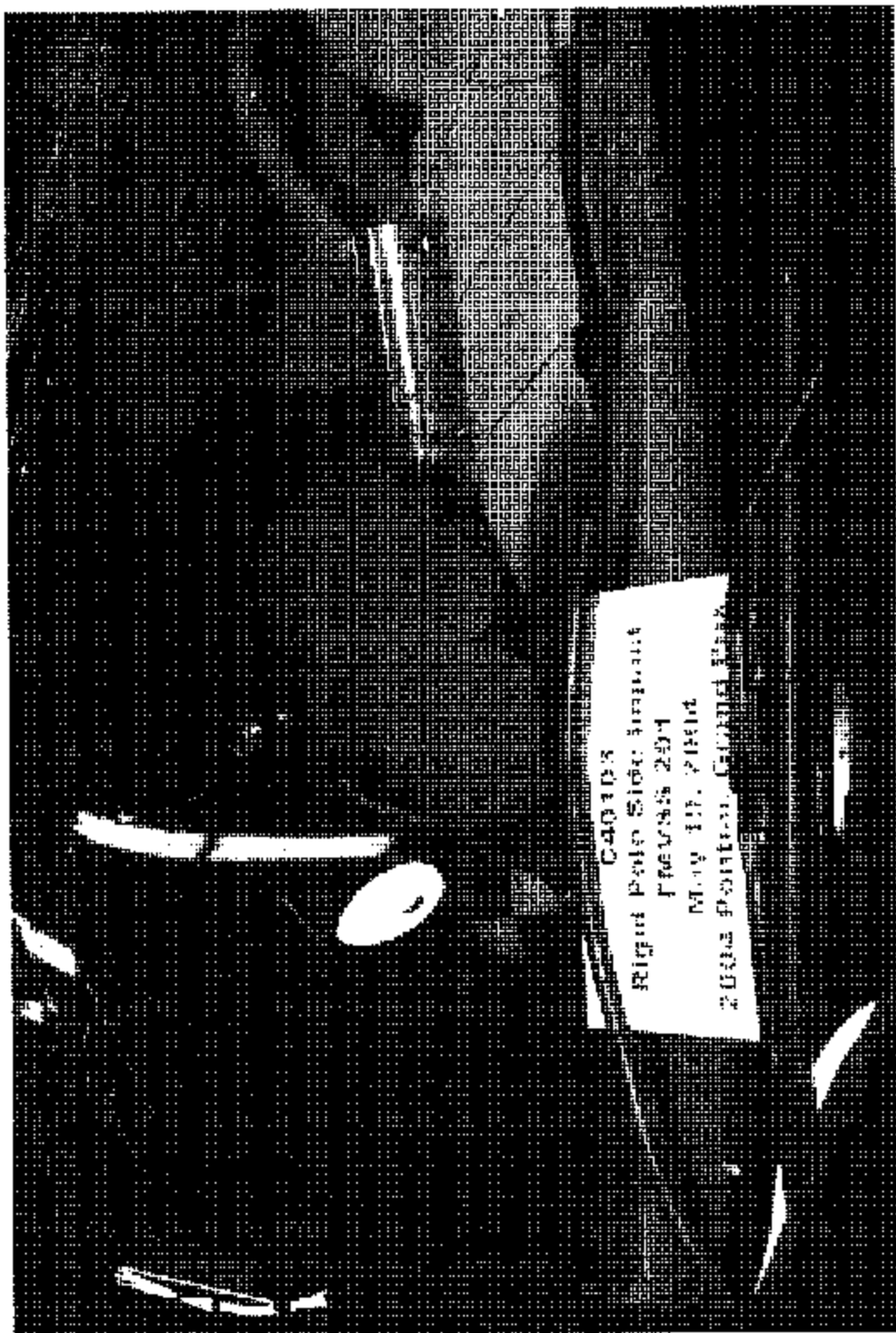
Pretest Dummy through Opposite Window
A-11



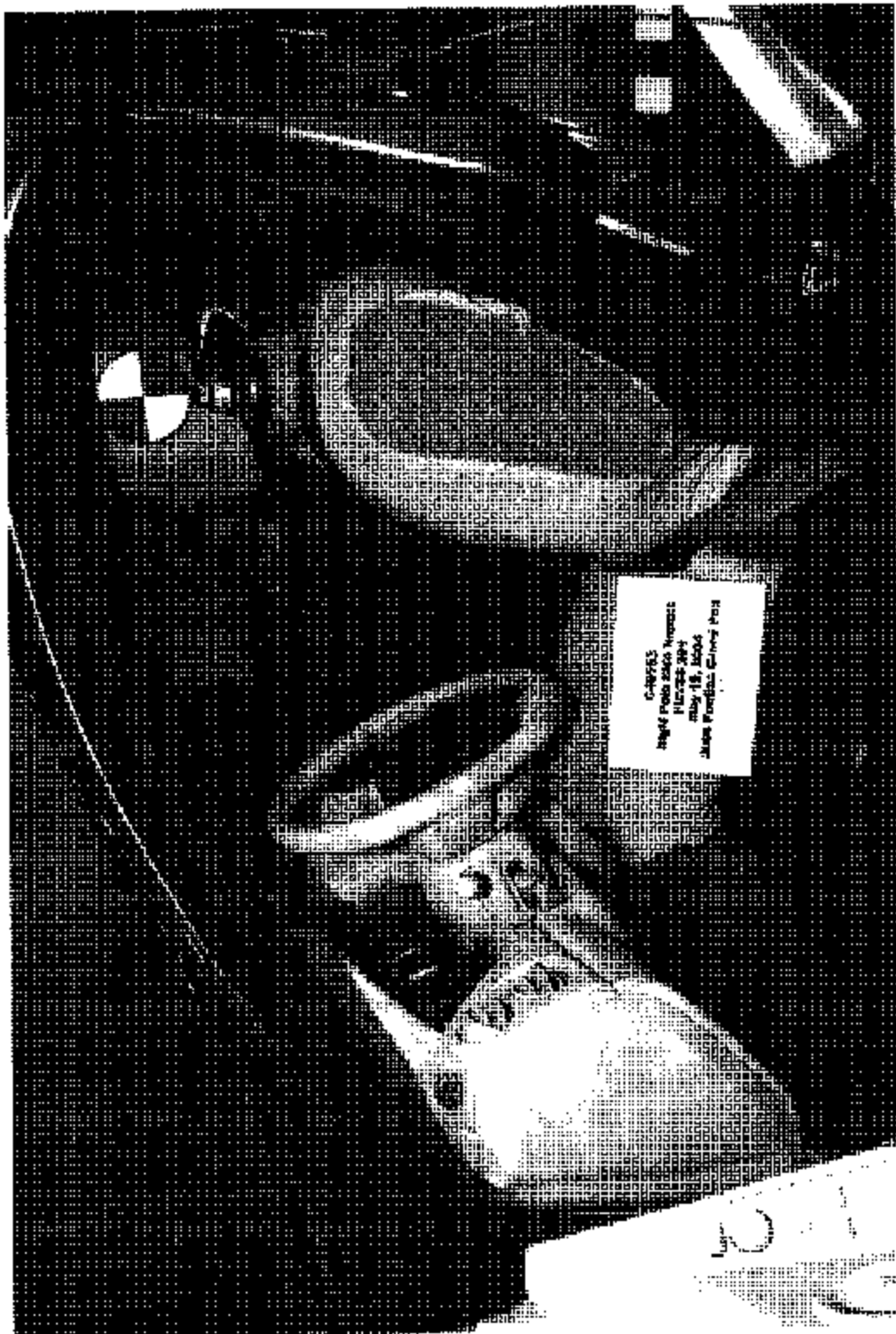
Posttest Dummy through Opposite Window
A-12



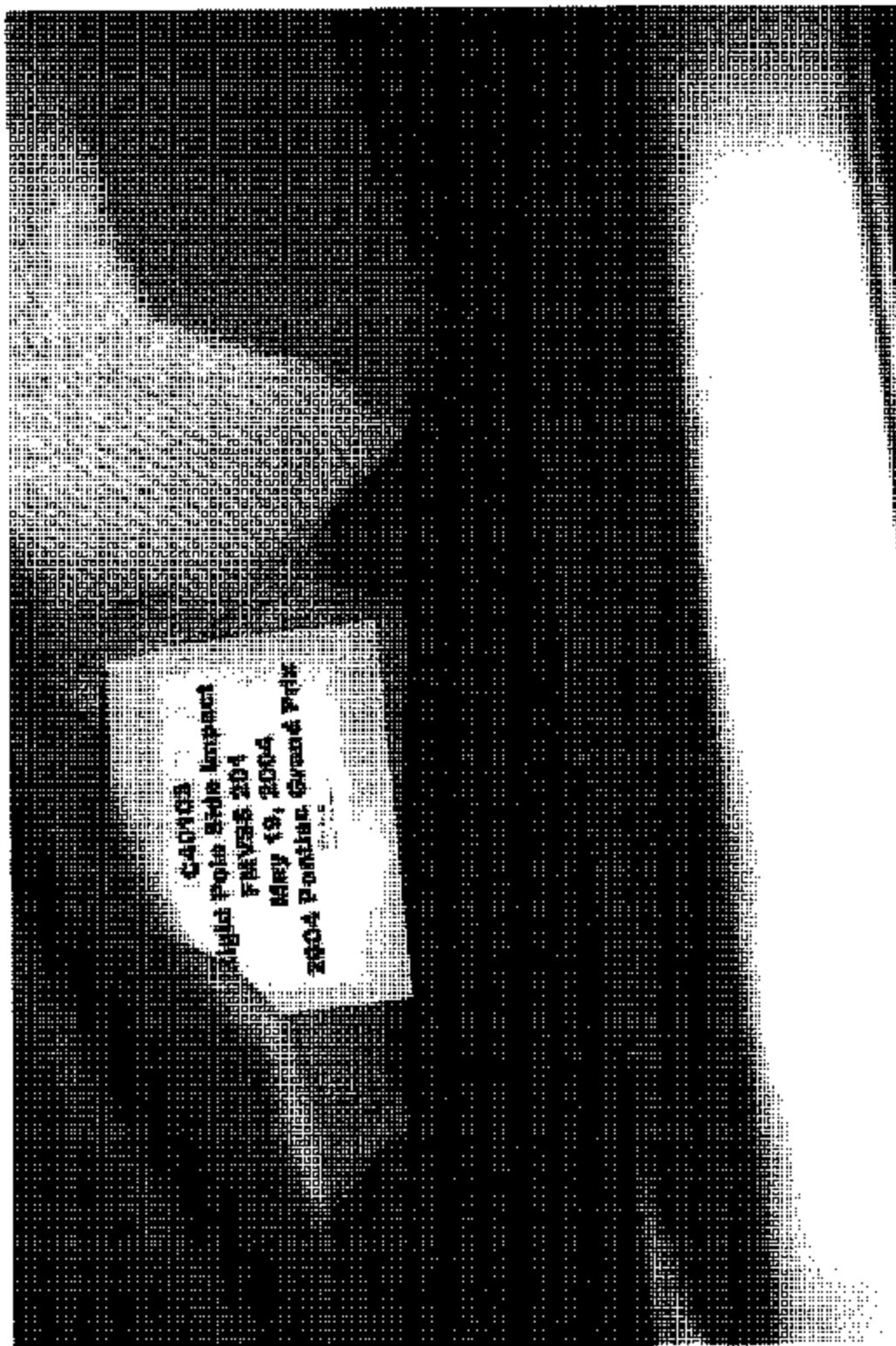
Pretest Dummy Front View through Windshield



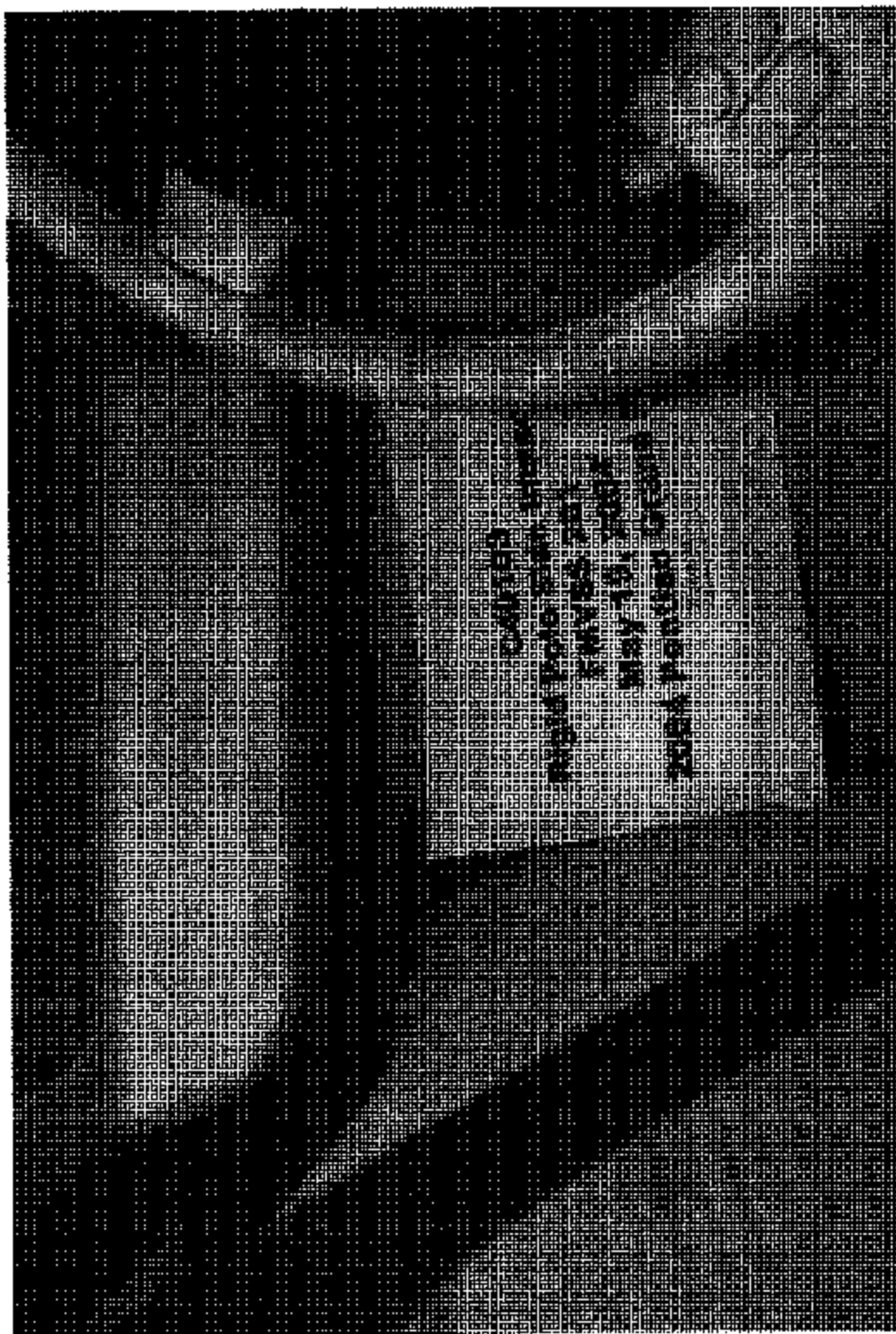
Posttest Dummy Front View through Windshield



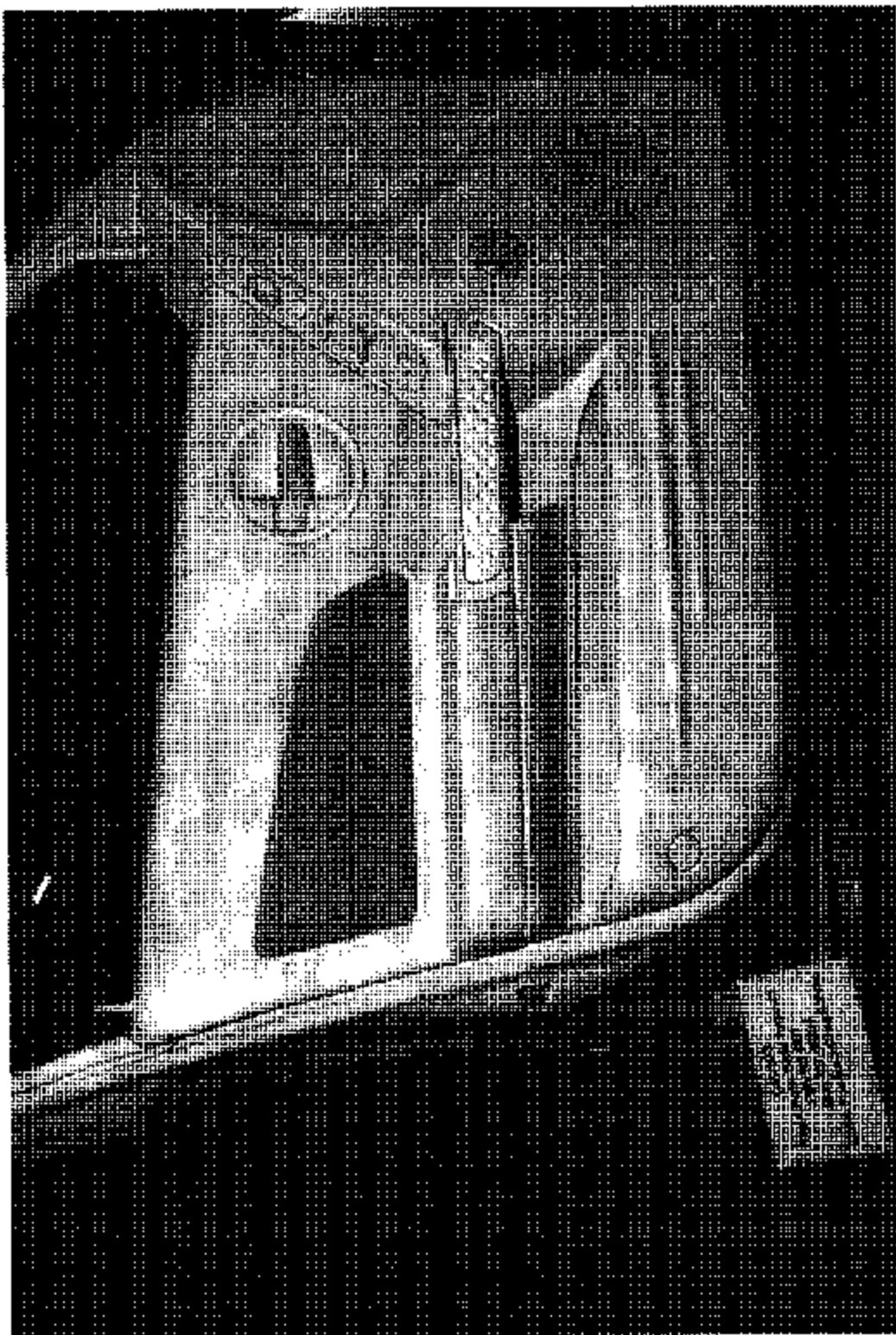
Pretest Dummy Door Open
A-15



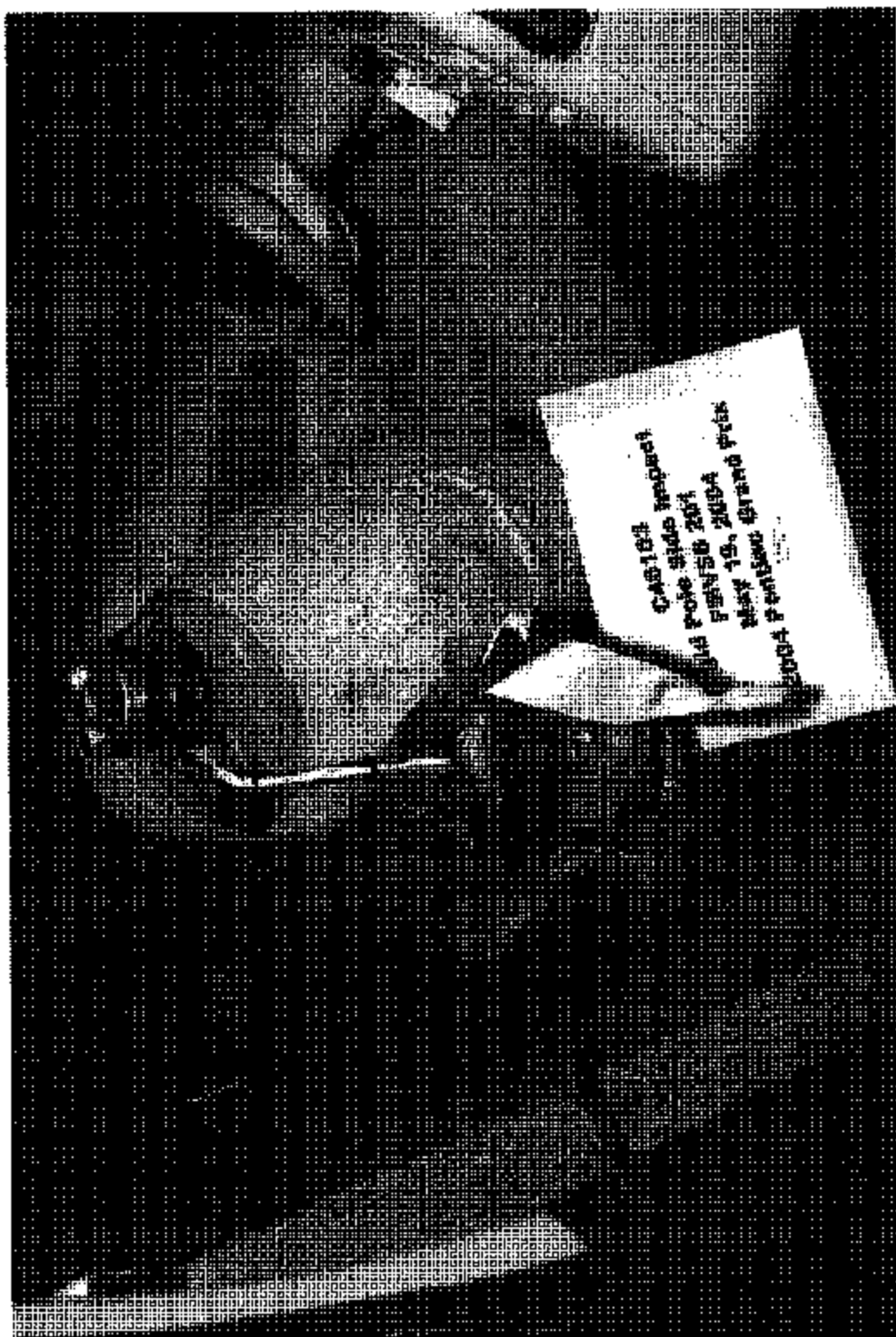
Pretest Dummy Shoulder and Door Top View



Posttest Dummy Shoulder and Door Top View
A-17



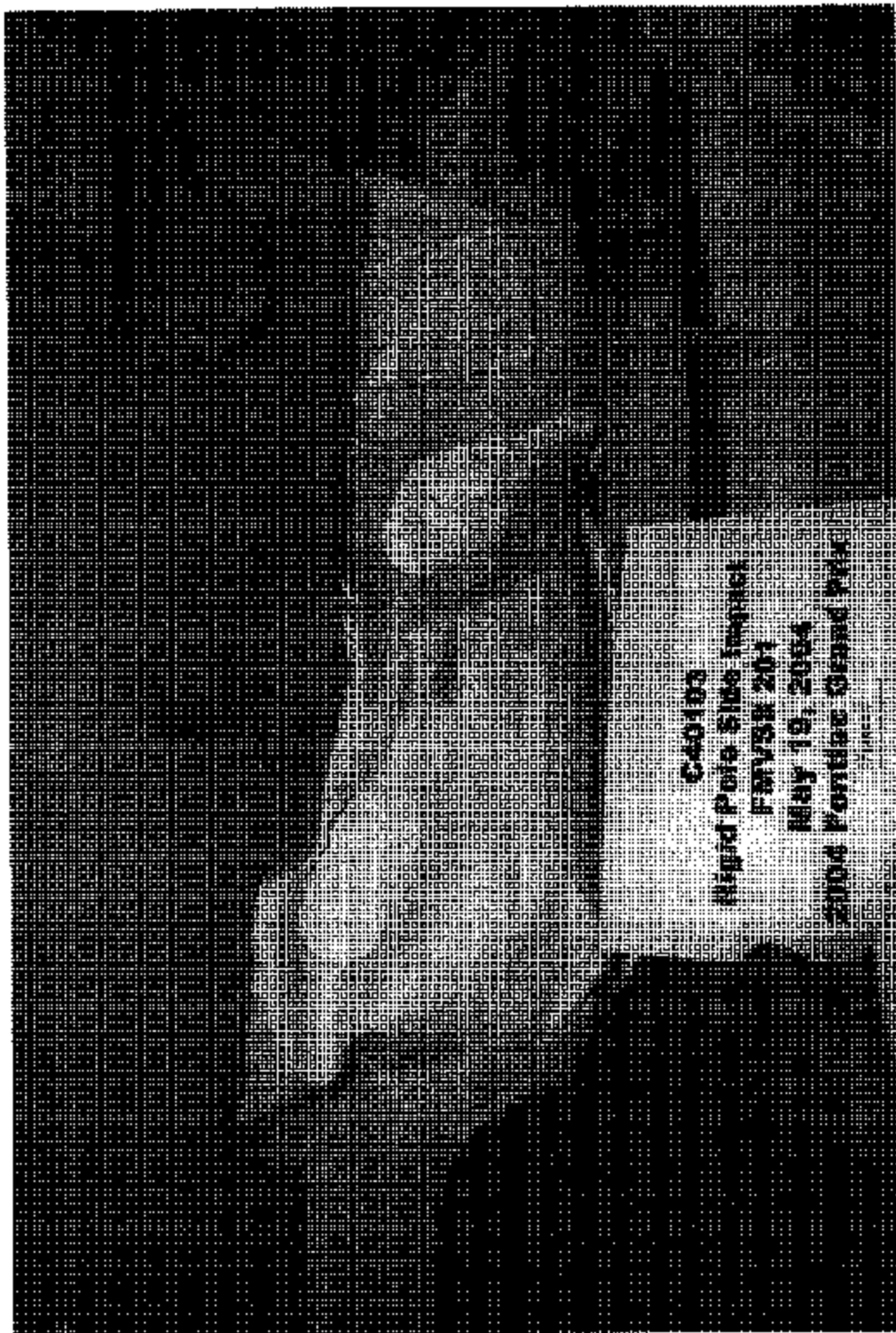
Pretest Interior of Front Door
A-18



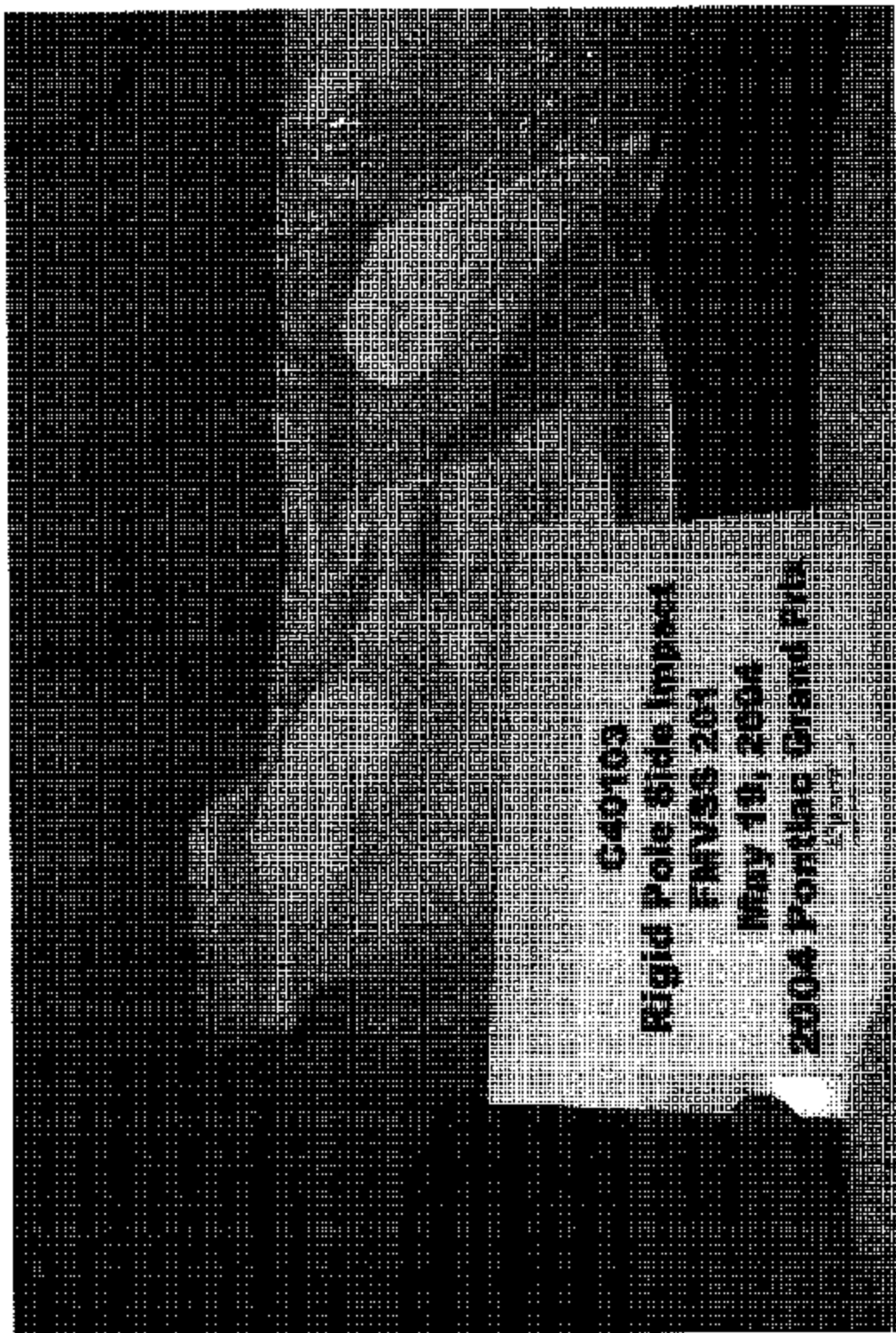
Posttest Interior of SID/HIII Impact Location – Side View



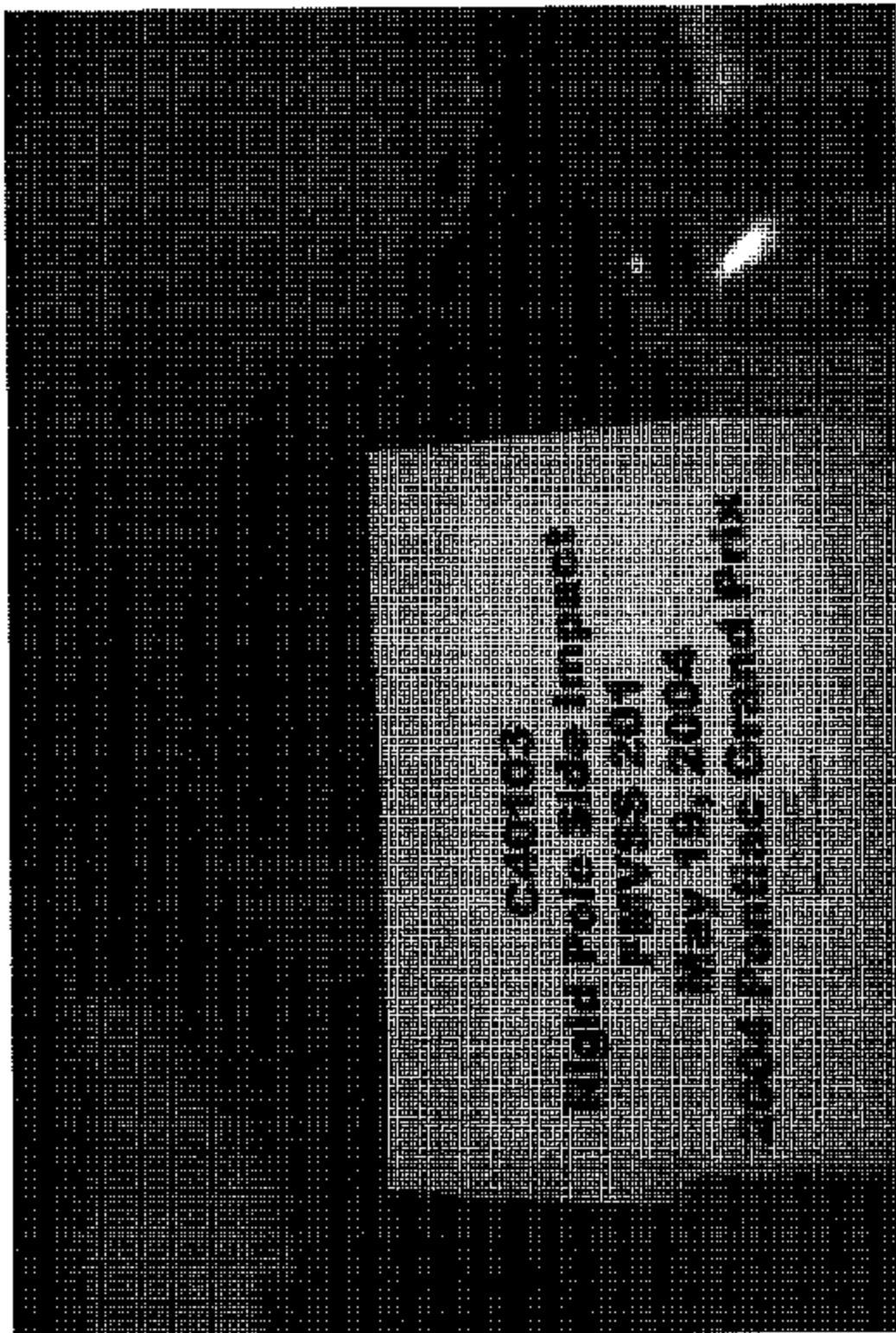
Posttest Interior of SID/HIII Impact Location –
Shoulder Contact Point



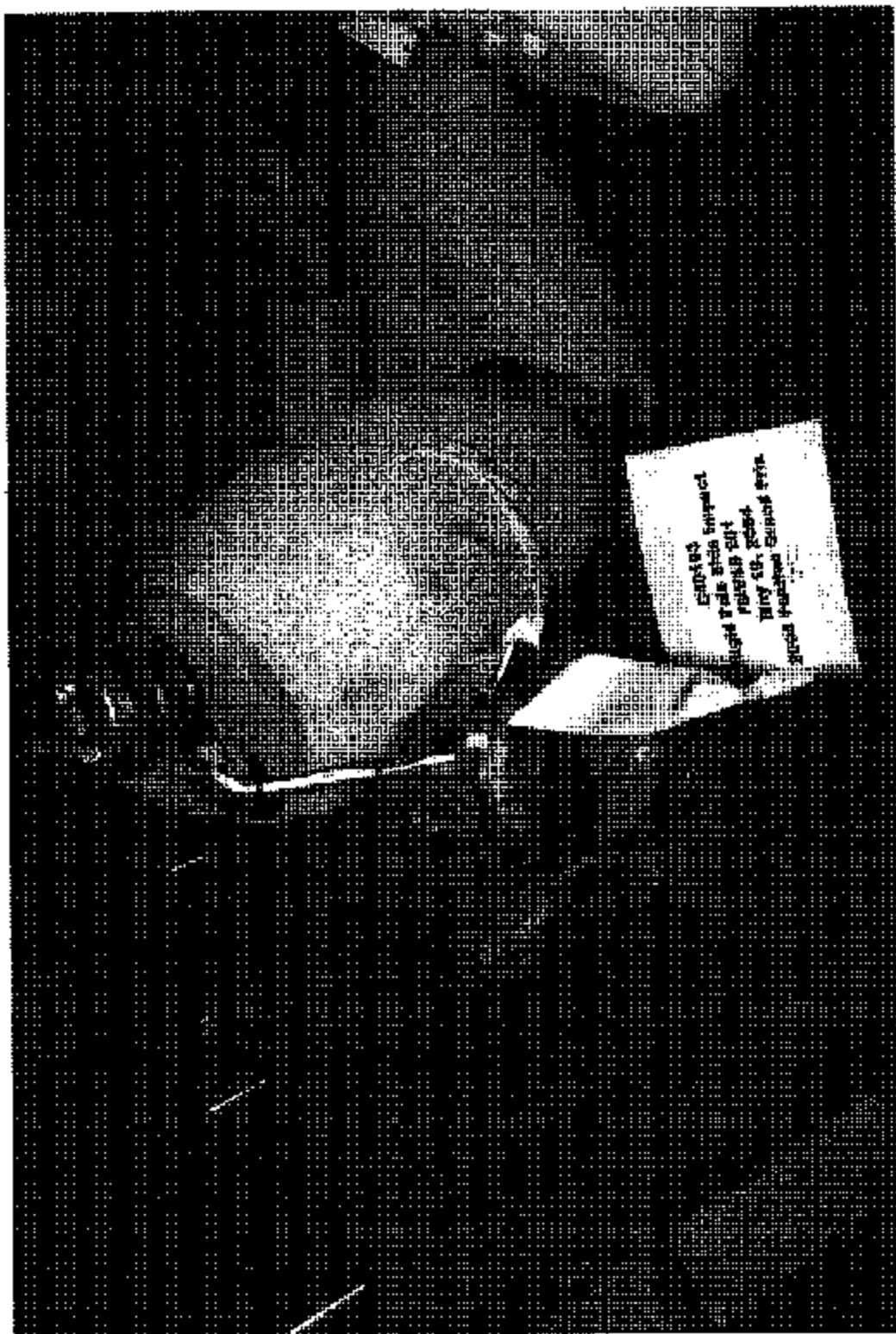
Posttest Interior of SID/HIII Impact Location --
Head Contact Point



Posttest Interior of SID/HIII Impact Location –
Head Contact Point



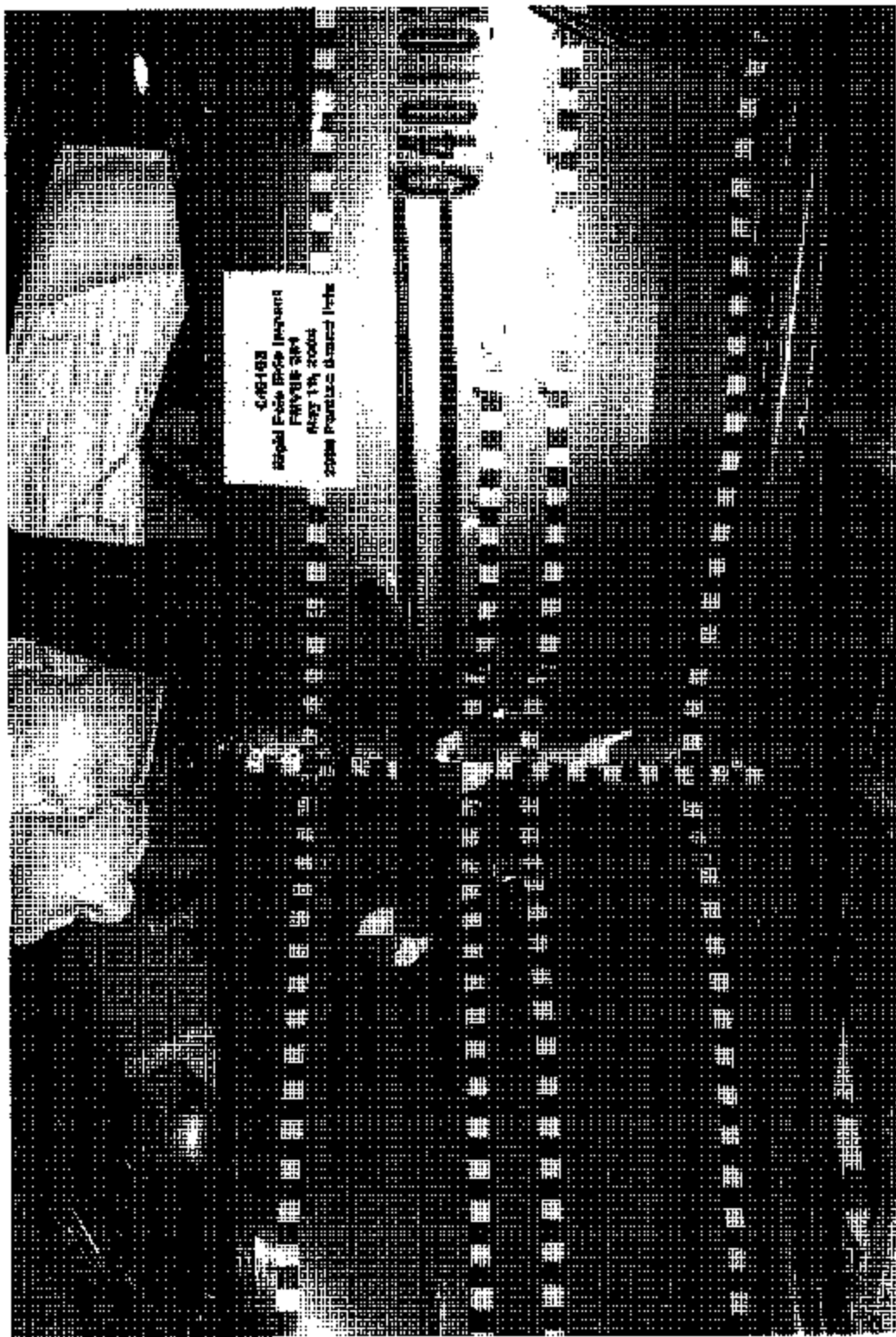
Posttest Interior of SID/HII Impact Location –
Head Contact Point



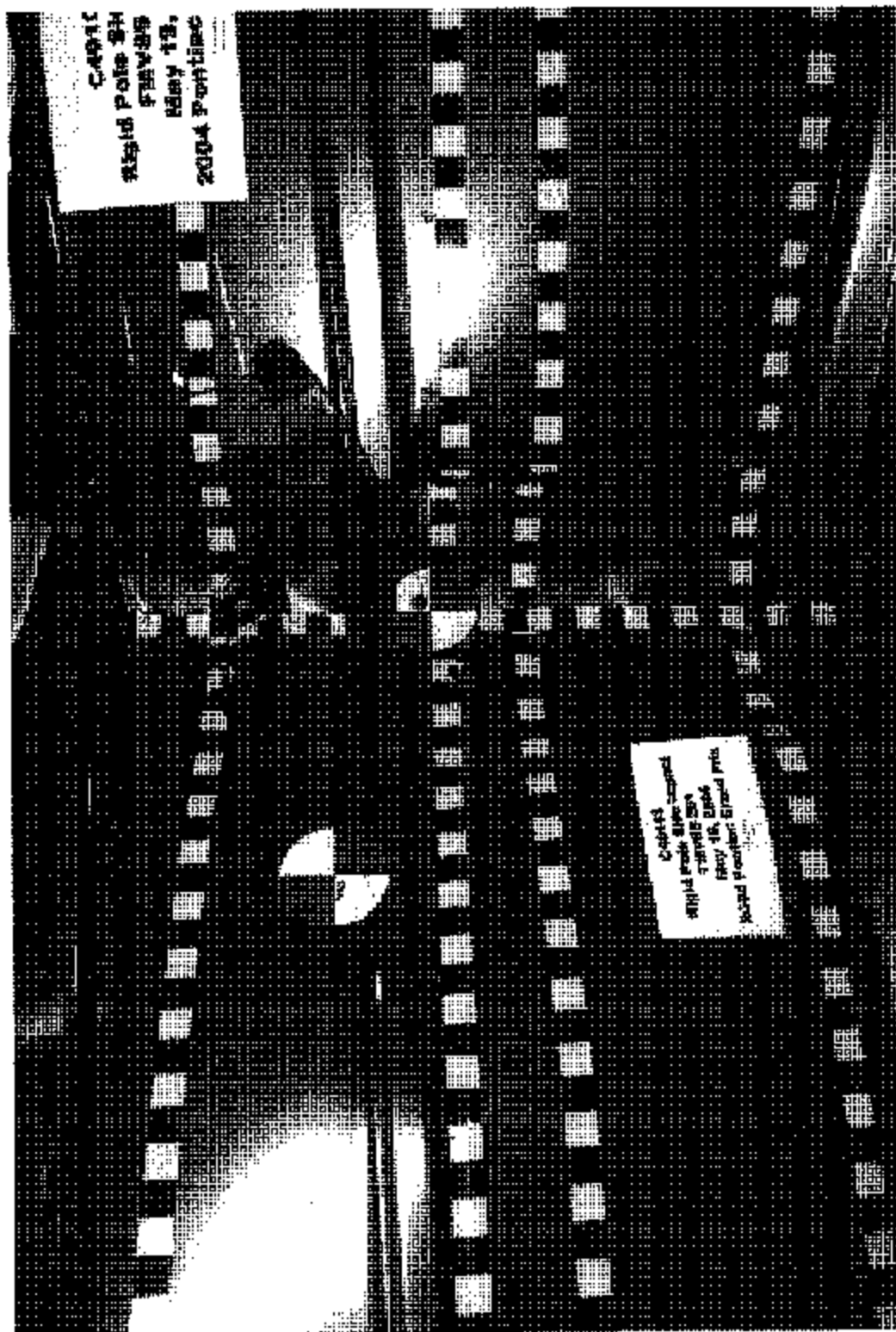
Posttest Interior of SID/HIII Impact Location
A-25



Posttest Interior of SID/HIL Impact Location –
Shoulder Contact Point



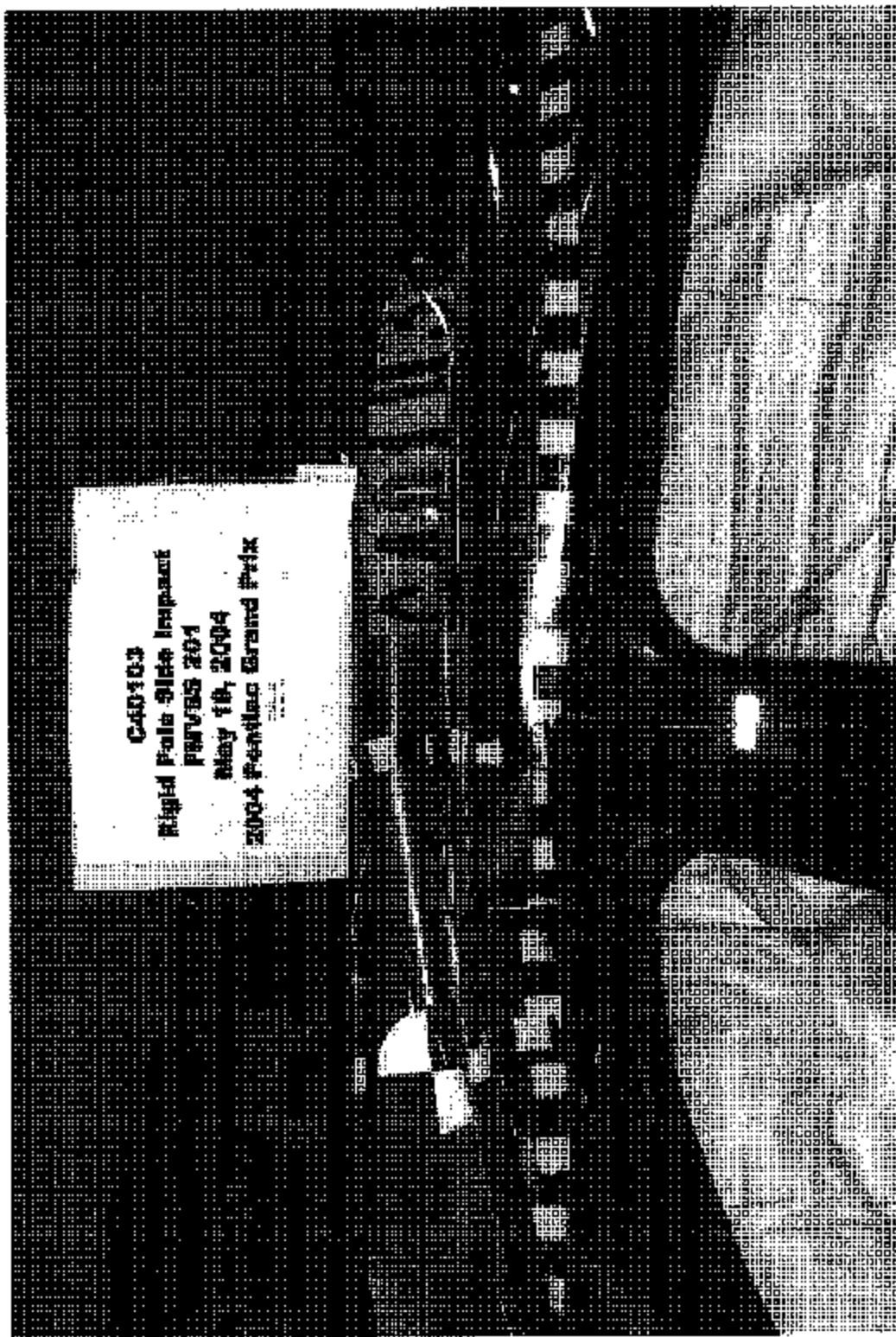
Post Impact Zone
A-27



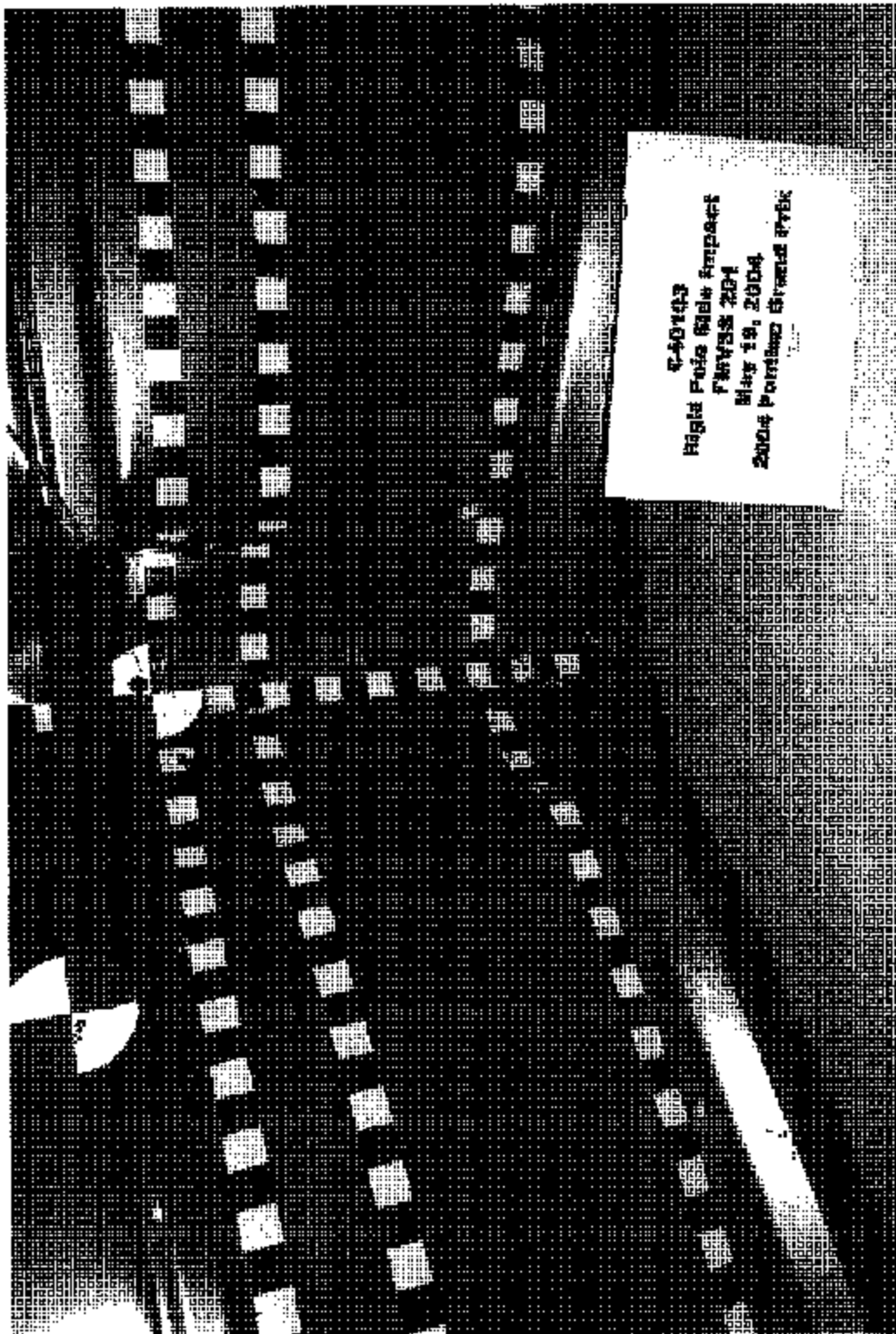
Post Impact Zone – Close-up View



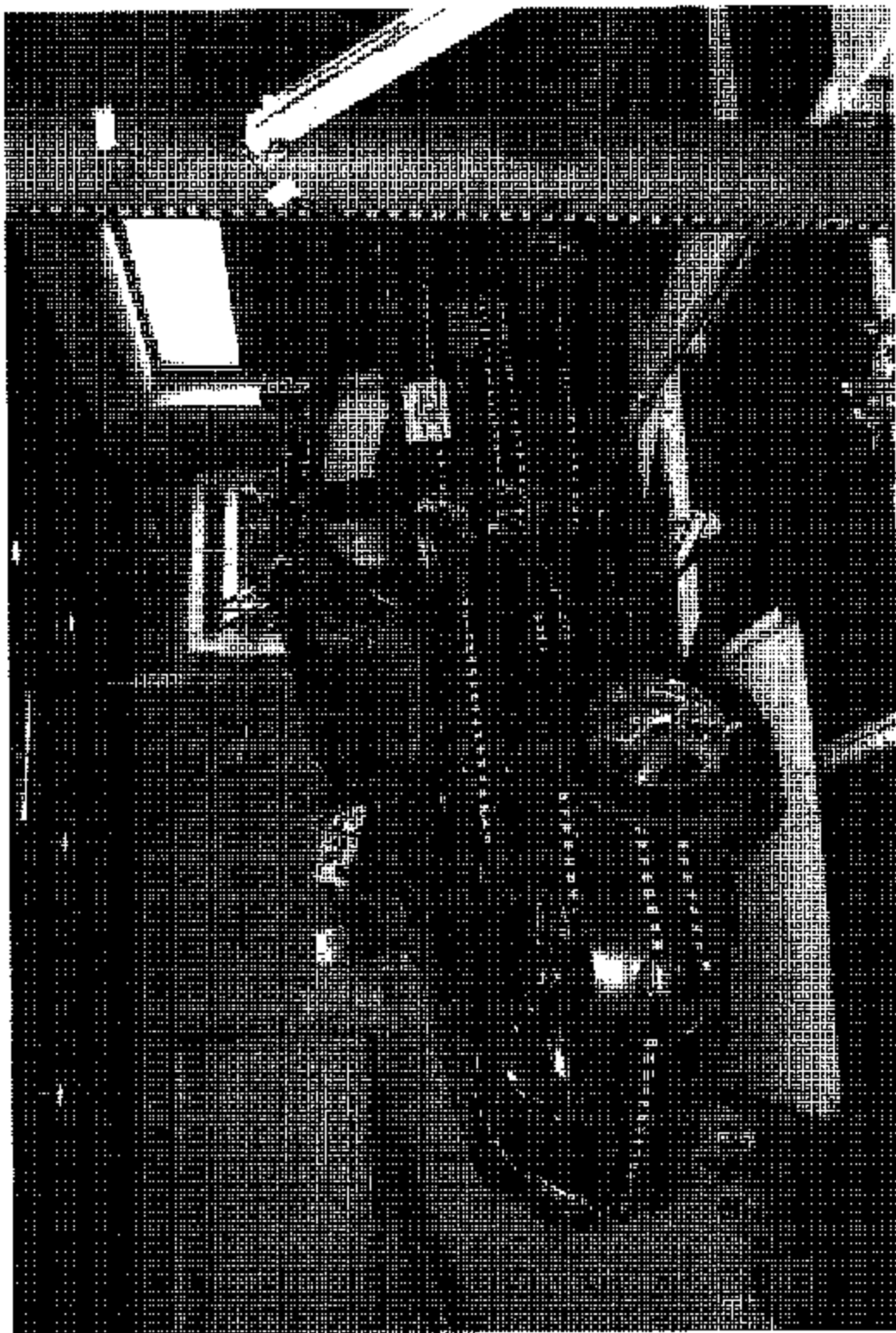
Post Impact Zone -- Close-up View
A-29



Post Impact Zone -- Close-up View of Roof
A-30



Post Impact Zone – Close-up View of Sill



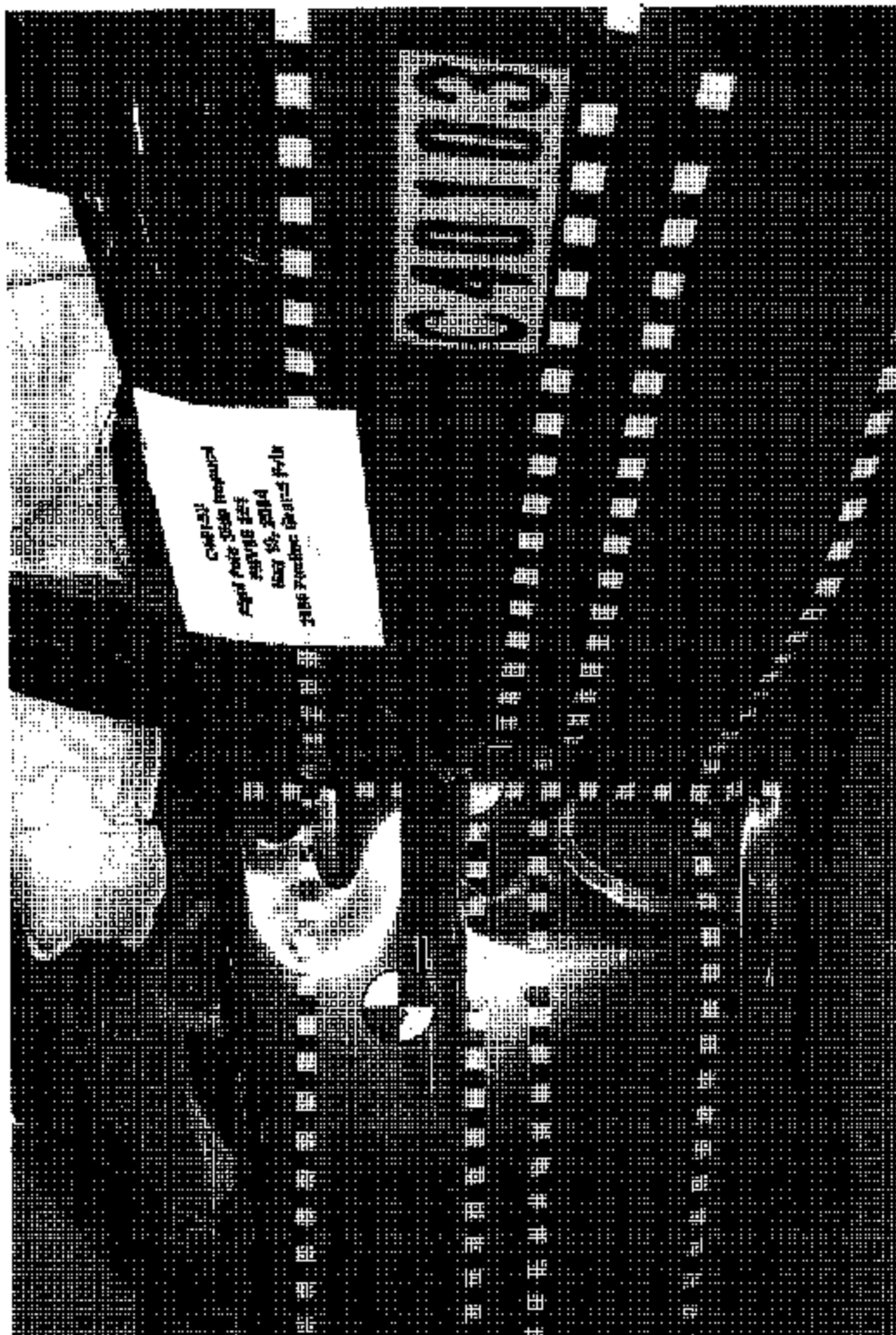
Post Impact Zone – $\frac{3}{4}$ Front View with Pole
A-32



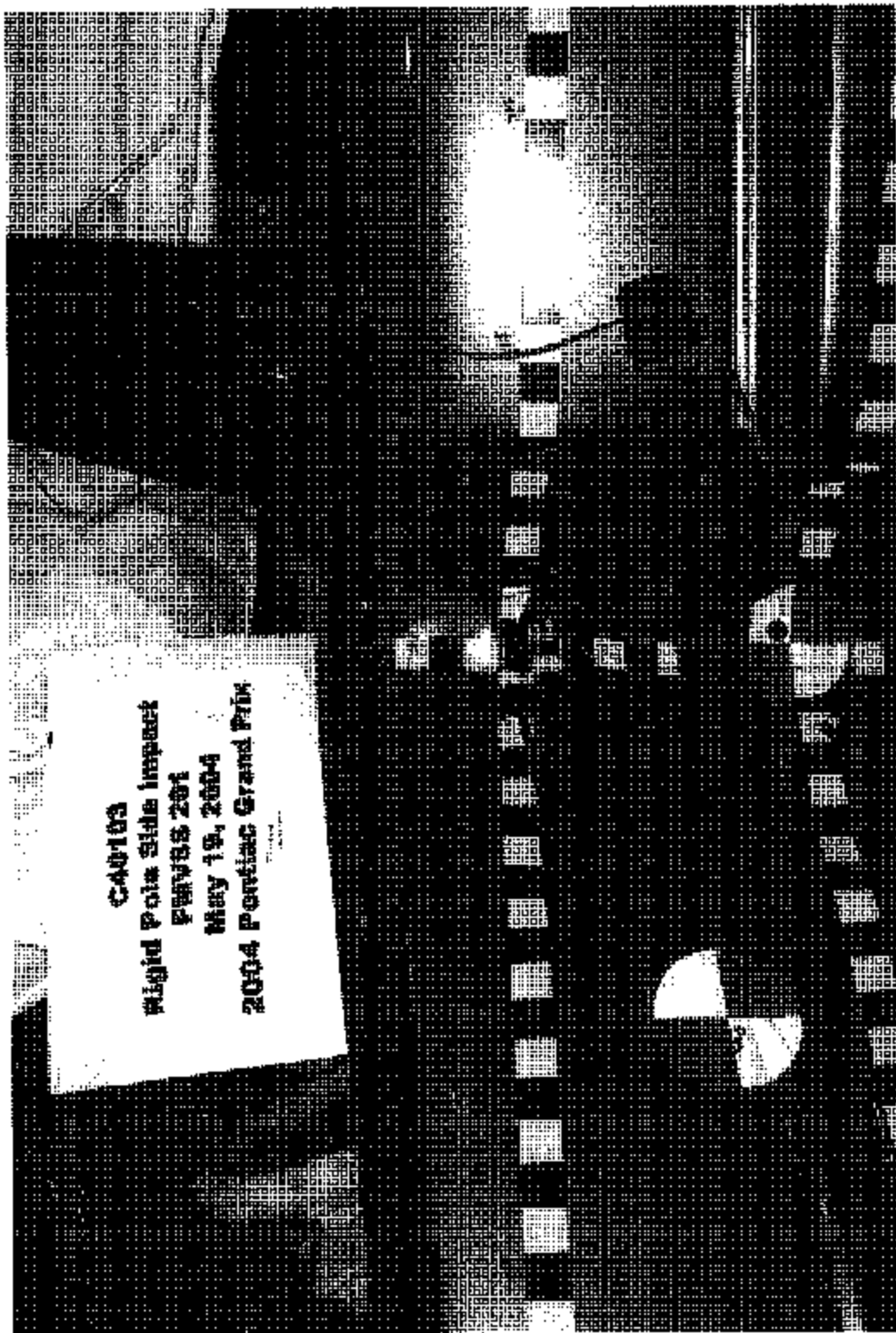
Post Impact Zone – ¾ Front View
A-33



Post Impact Zone -- $\frac{3}{4}$ Rear View with Pole
A-34



Post Impact Zone - $\frac{3}{4}$ Rear View
A-35



Impact Point Target and Cement Tack



MFD BY GENERAL MOTORS OF CANADA LTD.

DATE	GVWR	GAWR FR	GAWR RR
11/03	2021 KG	1103 KG	918 KG
	4456 LB	2432 LB	2024 LB

THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR
VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN
EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

2G2WS542941239753

TYPE: PASS CAR

Test Vehicle Certification Label

A-37

TIRE - LOADING INFORMATION

OCCUPANTS			VEHICLE CAP. WT.		
PRT.	CTR.	NR.	TOTAL	KG	LEB
2	0	3	5	416	917

MAX. LOADING @ GVWR SAME AS VEHICLE CAPACITY WEIGHT.
262W83-029-11238753

MODEL: WPM9 WAJ

PRT.	TIRE SIZE	SPEED RTG	COLD TIRE PRESSURE
FR	P225/60R16	S	210KPA(30PSI)
RR	P225/60R16	S	210KPA(30PSI)
GPA	T125/70D16	M	420KPA(60PSI)

IF TIRES ARE HOT, ADD 20KPA(4PSI).

SEE OWNER'S MANUAL ☐ FOR MORE INFORMATION.

Test Vehicle Tire Placard Label

Appendix B – Vehicle and SID/HIII Response Data

Test Data Summary
NHTSA No. C40103
Rigid Pole Side Impact Test

Description	Units	Filter	Max Data	Max Data Time [s]	Min Data	Min Data Time [s]	*
<i>PHEAD.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Head (Ax)	g	CFC 1000	58.8	0.055	-36.8	0.056	1
Driver ATD Head (Vx)	kph	CFC 180	4.0	0.301	-5.4	0.088	1
Driver ATD Head (Ay)	g	CFC 1000	112.8	0.055	-59.9	0.056	1
Driver ATD Head (Vy)	kph	CFC 180	13.4	0.292	-27.9	0.017	1
Driver ATD Head (Az)	g	CFC 1000	22.1	0.018	-50.9	0.058	1
Driver ATD Head (Vz)	kph	CFC 180	21.1	0.400	-8.5	0.092	1
Driver ATD Head (Ar)	g	CFC 1000	118.4	0.055	0.0	-0.087	1
Driver HIC:247.0 from 0.0489 to 0.0657 s.							1
<i>PUNCK.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Neck (Fx)	N	CFC 1000	123.7	0.055	-245.8	0.054	1
Driver ATD Neck (Fy)	N	CFC 1000	895.1	0.055	-1438.1	0.066	1
Driver ATD Neck (Fz)	N	CFC 1000	434.4	0.044	-2139.2	0.056	1
Driver ATD Neck (Mx)	N-m	CFC 600	7.5	0.170	-108.4	0.064	1
Driver ATD Neck (My)	N-m	CFC 600	4.1	0.035	-14.8	0.060	1
Driver ATD Neck (Mz)	N-m	CFC 600	16.4	0.054	-0.7	0.171	1
<i>PRBLSPL.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	CFC 1000	88.8	0.041	-40.8	0.179	
Driver ATD Lower Rib (Ay)	g	CFC 1000	80.2	0.179	-87.3	0.179	
Driver ATD Lower Spine (Ay)	g	CFC 1000	70.7	0.044	-15.8	0.077	
Driver ATD Pelvis (Ay)	g	CFC 1000	60.7	0.044	-13.1	0.088	
<i>PCG.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Vehicle Tunnel Near C.G. (Ax)	g	CFC 60	3.2	0.028	-4.0	0.040	
Vehicle Tunnel Near C.G. (Vx)	kph	CFC 180	1.7	0.198	-1.4	0.054	
Vehicle Tunnel Near C.G. (Ay)	g	CFC 60	13.7	0.032	-0.7	0.004	
Vehicle Tunnel Near C.G. (Vy)	kph	CFC 180	4.0	0.400	-27.9	0.007	
Vehicle Tunnel Near C.G. (Az)	g	CFC 60	5.3	0.042	-8.1	0.027	
Vehicle Tunnel Near C.G. (Vz)	kph	CFC 180	9.8	0.400	-0.6	0.028	
Vehicle Tunnel Near C.G. (Ar)	g	CFC 60	14.1	0.033	0.0	-0.002	
<i>PRPY.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Vehicle Tunnel Near C.G. - Roll	deg	CFC 180	57.7	0.221	-847.3	0.048	
Vehicle Tunnel Near C.G. - Pitch	deg	CFC 180	58.8	0.054	-105.1	0.039	
Vehicle Tunnel Near C.G. - Yaw	deg	CFC 180	54.2	0.088	-85.2	0.055	
<i>PROFFLOR.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left Floor Sill (Ay)	g	CFC 60	61.3	0.018	-12.9	0.008	

Test Data Summary (CONTINUED)
NHTSA No. C40103
Rigid Pole Side Impact Test

Description	Units	Filter	Max Data	Max Data Time [s]	Min Data	Min Data Time [s]	*
Left Floor Sill (Vy)	kph	CFC 180	-0.4	0.273	-27.7	-0.100	
<i>PLAP.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left A-Pillar Sill (Ay)	g	CFC 60	10.9	0.006	-2.0	0.010	
Left A-Pillar Sill (Vy)	kph	CFC 180	4.8	0.400	-28.3	0.005	
Left A-Pillar Low (Ay)	g	CFC 60	14.3	0.047	-1.2	0.001	
Left A-Pillar Low (Vy)	kph	CFC 180	4.0	0.275	-28.2	0.004	
Left A-Pillar Mid (Ay)	g	CFC 60	21.6	0.047	-2.8	0.060	
Left A-Pillar Mid (Vy)	kph	CFC 180	3.2	0.274	-28.2	0.005	
<i>PLBP.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left B-Pillar Sill (Ay)	g	CFC 60	84.6	0.018	-9.9	0.008	
Left B-Pillar Sill (Vy)	kph	CFC 180	-0.4	0.252	-27.8	0.003	
Left B-Pillar Low (Ay)	g	CFC 60	65.3	0.018	-16.6	0.008	
Left B-Pillar Low (Vy)	kph	CFC 180	4.2	0.267	-27.7	-0.100	
Left B-Pillar Mid (Ay)	g	CFC 60	51.9	0.022	-5.6	0.008	
Left B-Pillar Mid (Vy)	kph	CFC 180	19.3	0.400	-27.7	-0.100	
<i>PSEAT.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver Seat Track (Ay)	g	CFC 60	58.1	0.024	-13.6	0.039	
Driver Seat Track (Vy)	kph	CFC 180	3.3	0.267	-27.7	0.002	
<i>PLDOOR.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Left Door Lower (Ay)	g	CFC 60	105.9	0.009	-95.2	0.013	2
Left Door Lower (Vy)	kph	CFC 180	0.0	0.257	-31.0	0.015	2
Left Door Middle (Ay)	g	CFC 60	71.2	0.010	-47.5	0.016	
Left Door Middle (Vy)	kph	CFC 180	4.1	0.281	-27.7	0.000	
Left Door Upper (Ay)	g	CFC 60	50.8	0.019	-32.6	0.081	
Left Door Upper (Vy)	kph	CFC 180	-0.2	0.258	-27.8	0.001	
<i>PENGFWAL.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Engine (Ax)	g	CFC 60	1.6	0.108	-4.4	0.042	
Engine (Vx)	kph	CFC 180	0.0	-0.100	-5.1	0.098	
Engine (Ay)	g	CFC 60	18.2	0.069	-4.0	0.266	
Engine (Vy)	kph	CFC 180	1.8	0.223	-27.7	-0.100	
Firewall (Ay)	g	CFC 60	8.2	0.051	-1.1	0.004	
Firewall (Vy)	kph	CFC 180	-0.5	0.273	-27.8	0.008	
<i>PROOFFLR.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Right Roof Rail (Ay)	g	CFC 60	15.9	0.049	-1.1	0.367	
Right Roof Rail (Vy)	kph	CFC 180	4.2	0.268	-27.7	0.003	
Right Floor Sill (Ay)	g	CFC 60	9.6	0.025	-1.6	0.283	

Test Data Summary (CONTINUED)
NHTSA No. C40103
Rigid Pole Side Impact Test

Description	Units	Filter	Max Data	Max Data Time [s]	Min Data	Min Data Time [s]	*
Right Floor Sill (Vy)	kph	CFC 180	-2.1	0.163	-27.7	0.001	
Rear Deck (Ax)	g	CFC 60	3.4	0.028	-2.3	0.091	
Rear Deck (Vx)	kph	CFC 180	2.8	0.400	-0.8	0.168	
Rear Deck (Ay)	g	CFC 60	11.5	0.082	-1.9	0.241	
Rear Deck (Vy)	kph	CFC 180	15.5	0.182	-27.7	0.000	
<i>PFIR100.FEU (Results calculated from -0.1 to 0.4 sec.)</i>							
Driver ATD Upper Rib (Ay)	g	FIR 100	71.6	0.040	-8.0	0.102	
Driver ATD Upper Rib (Vy)	kph	FIR 100	9.2	0.067	-27.7	-0.100	
Driver ATD Lower Rib (Ay)	g	FIR 100	82.6	0.041	-19.9	0.102	
Driver ATD Lower Rib (Vy)	kph	FIR 100	7.9	0.088	-27.7	-0.100	
Driver ATD Lower Spine (Ay)	g	FIR 100	89.5	0.044	-19.2	0.077	
Driver ATD Lower Spine (Vy)	kph	FIR 100	12.3	0.070	-27.7	-0.100	
Driver ATD Pelvis (Ay)	g	FIR 100	49.6	0.044	-12.6	0.089	
Driver ATD Pelvis (Vy)	kph	FIR 100	5.6	0.069	-27.7	0.000	
Driver TTI [g]: 70.56							

*** Comments:**

- 1:
Data affected by ATD head separating from neck approximately 0.055 seconds after impact
- 2:
Data spike recorded or A/D saturation that affects the maximum or minimum values (and corresponding resultant calculations, if applicable)

Notes for electronic files:

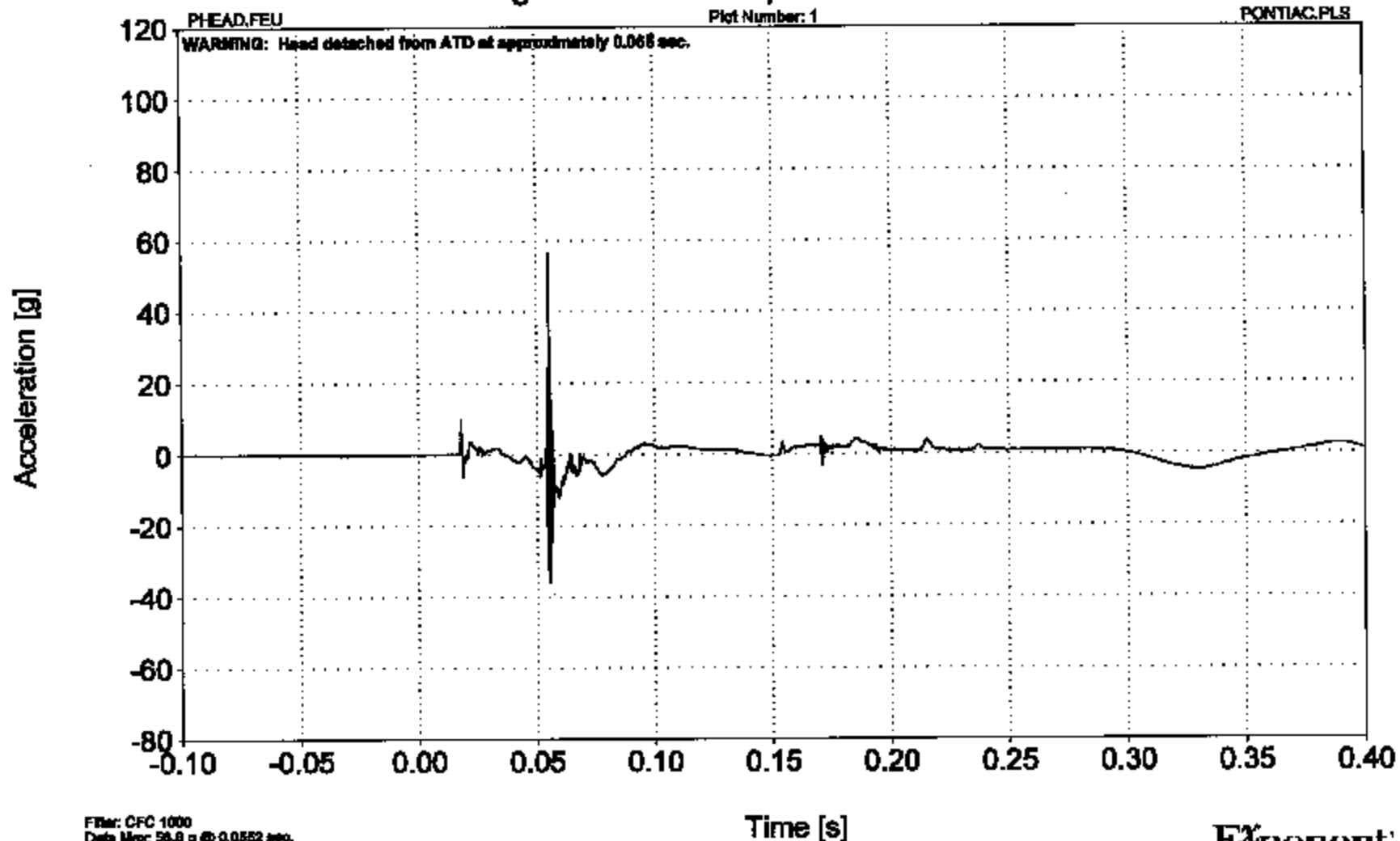
- File root names are listed above (e.g., PHEAD, PUNCK); all have extension FEU (formatted engineering units) unless otherwise noted.
- Each file has time (seconds) in the first column, followed by the data listed above, in the order listed (excluding HIC, TTI).

Longitudinal Acceleration v Time

Driver ATD Head

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 55.8 g @ 0.0552 sec.
Data Min: -35.8 g @ 0.0666 sec.

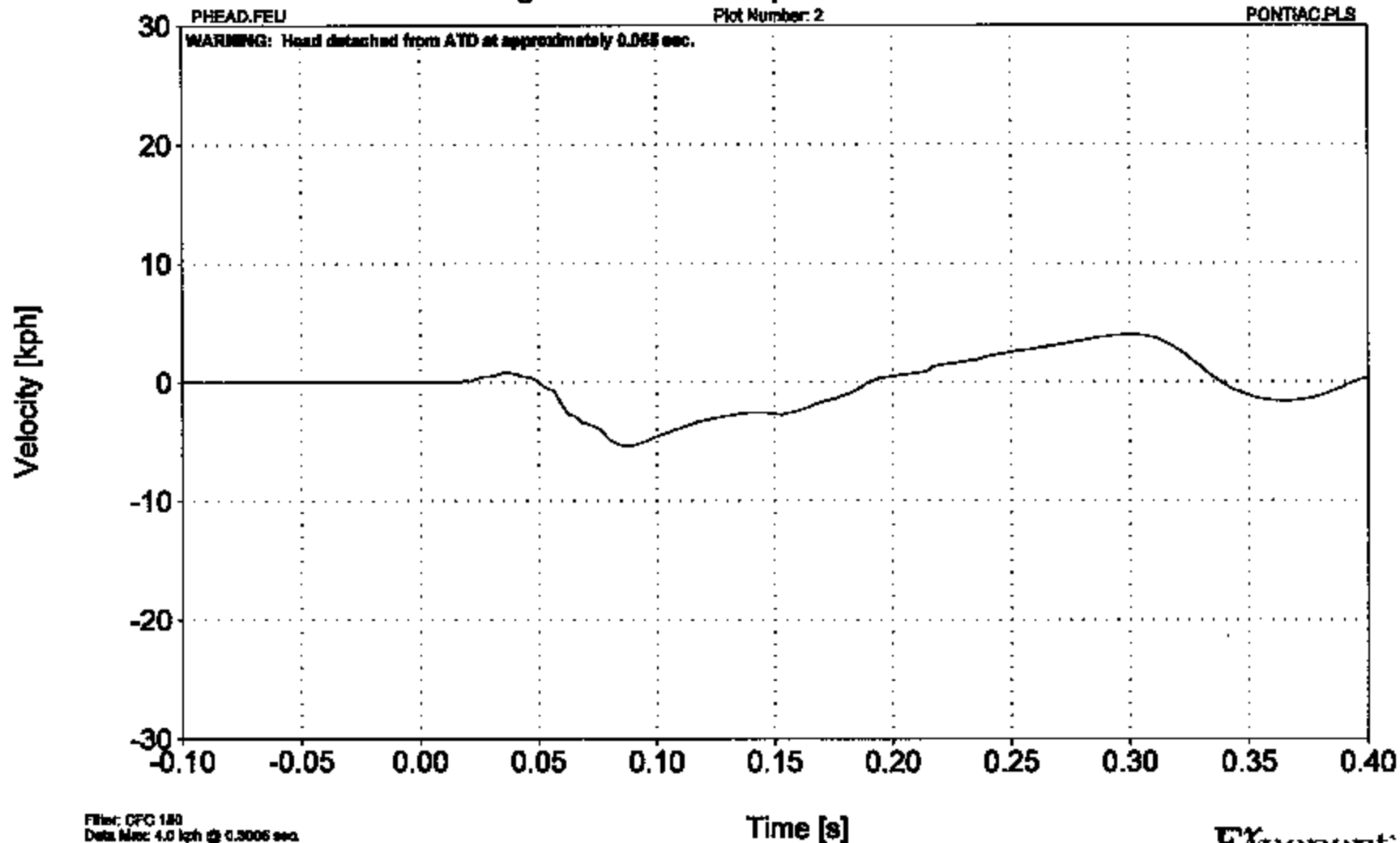
201P Side Pole Impact Testing
PH06662

Longitudinal Velocity v Time

Driver ATD Head

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 4.0 kph @ 0.3006 sec.
Data Min: -5.4 kph @ 0.0877 sec.

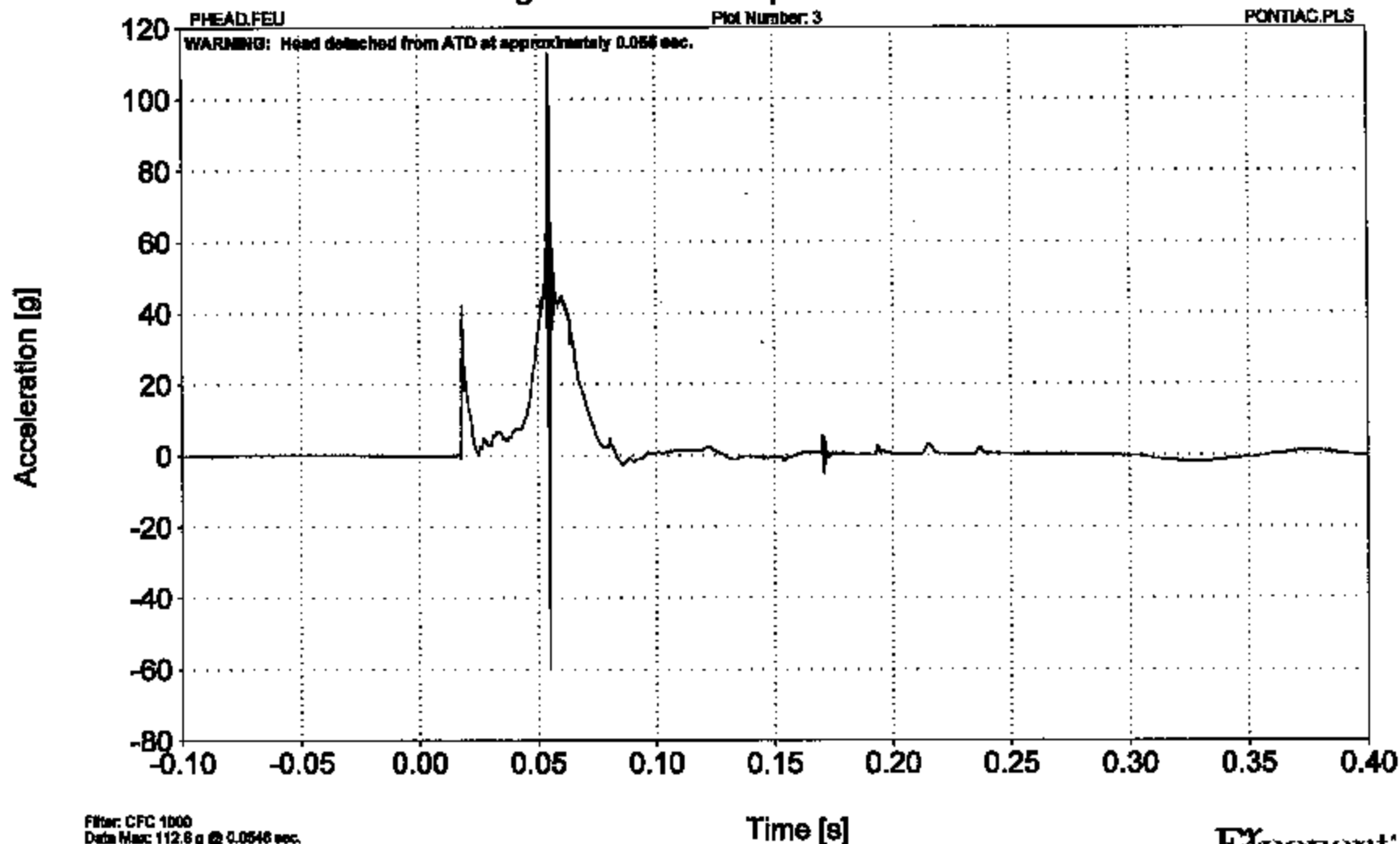
201P Side Pole Impact Testing
PH09992

Lateral Acceleration v Time

Driver ATD Head

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 112.6 g @ 0.0546 sec.
Data Min: -59.9 g @ 0.0549 sec.

201P Side Pole Impact Testing
PH08883

B-7

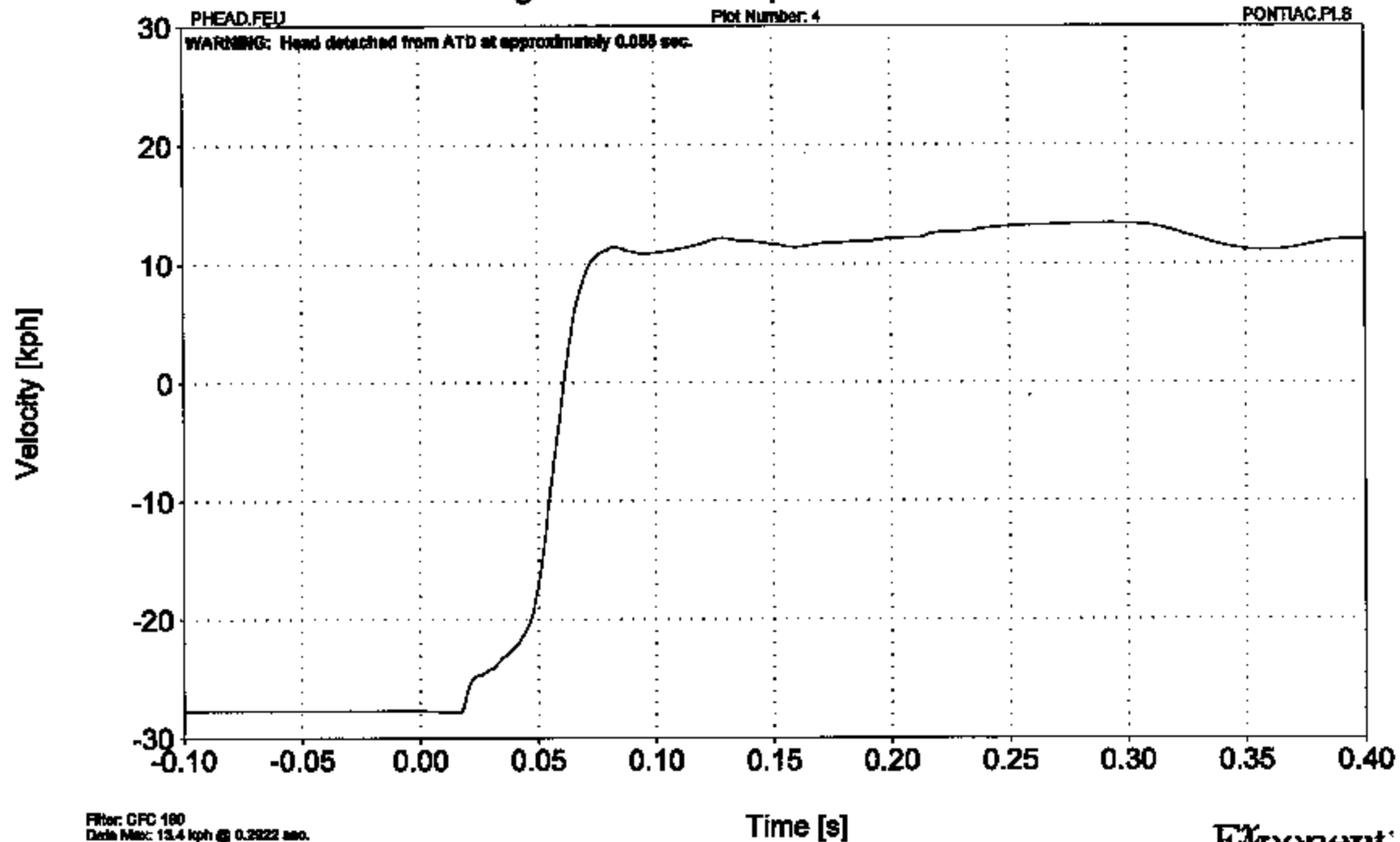
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Driver ATD Head

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: GFC 100
Data Max: 13.4 kph @ 0.2922 sec.
Data Min: -27.9 kph @ 0.0167 sec.

201P Side Pole Impact Testing
PH06682

B-8

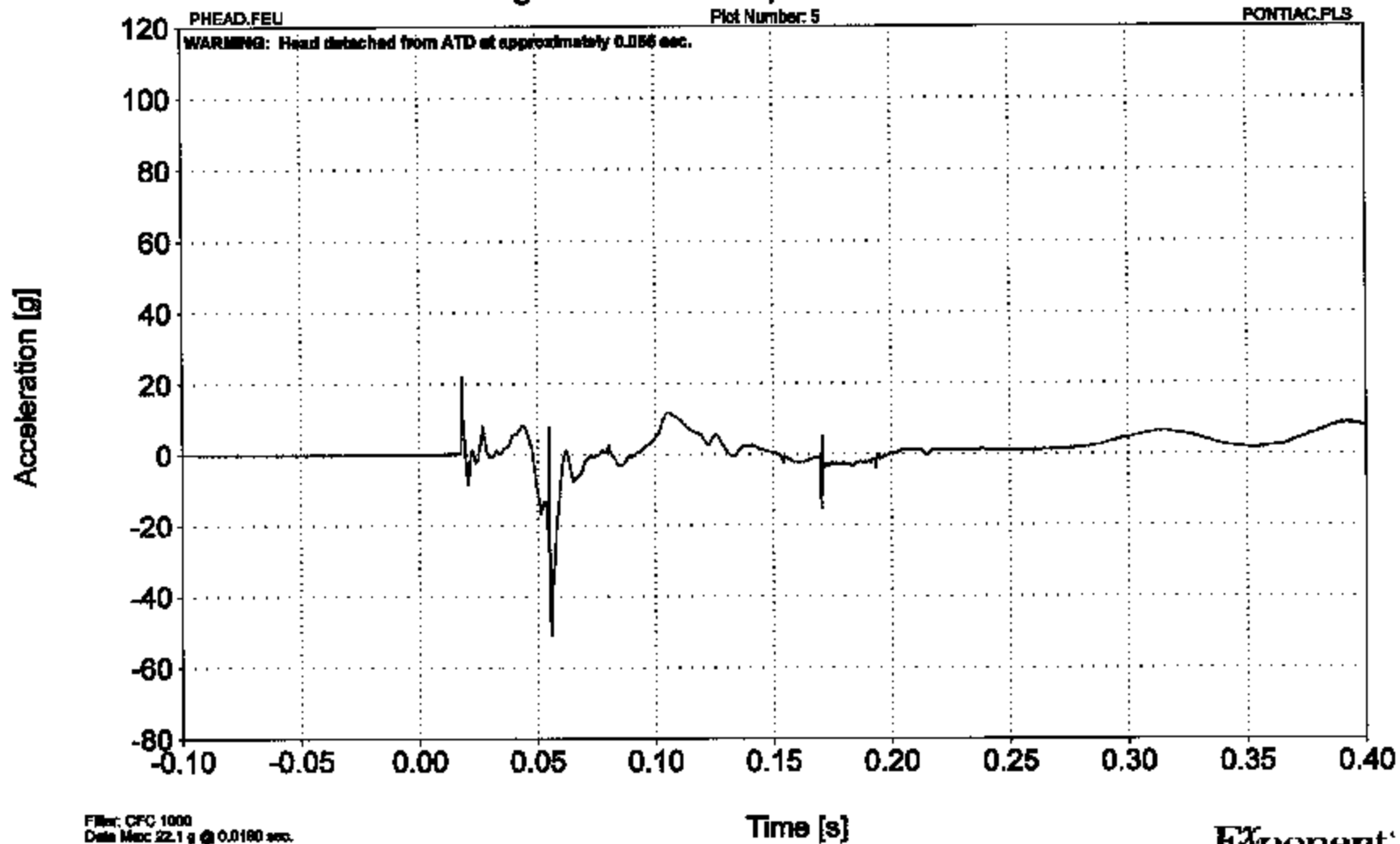
Exponent
Failure Analysis Associates™

Vertical Acceleration v Time

Driver ATD Head

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 22.1 g @ 0.0180 sec.
Data Min: -50.9 g @ 0.0558 sec.

201P Side Pole Impact Testing
PH06682

B-9

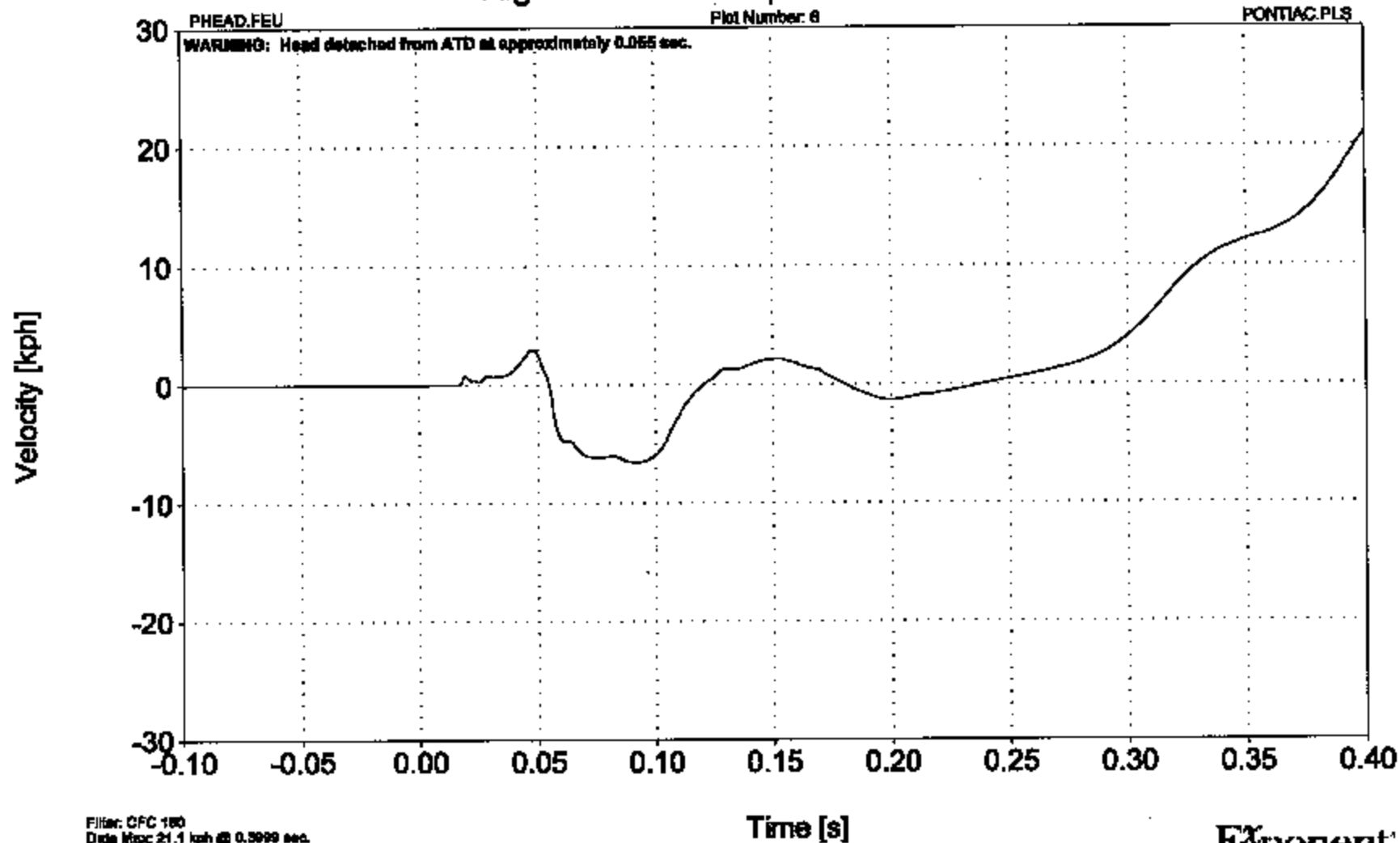
Exponent
Failure Analysis Associates®

Vertical Velocity v Time

Driver ATD Head

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 21.1 kph @ 0.3999 sec.
Data Min: -6.5 kph @ 0.0916 sec.

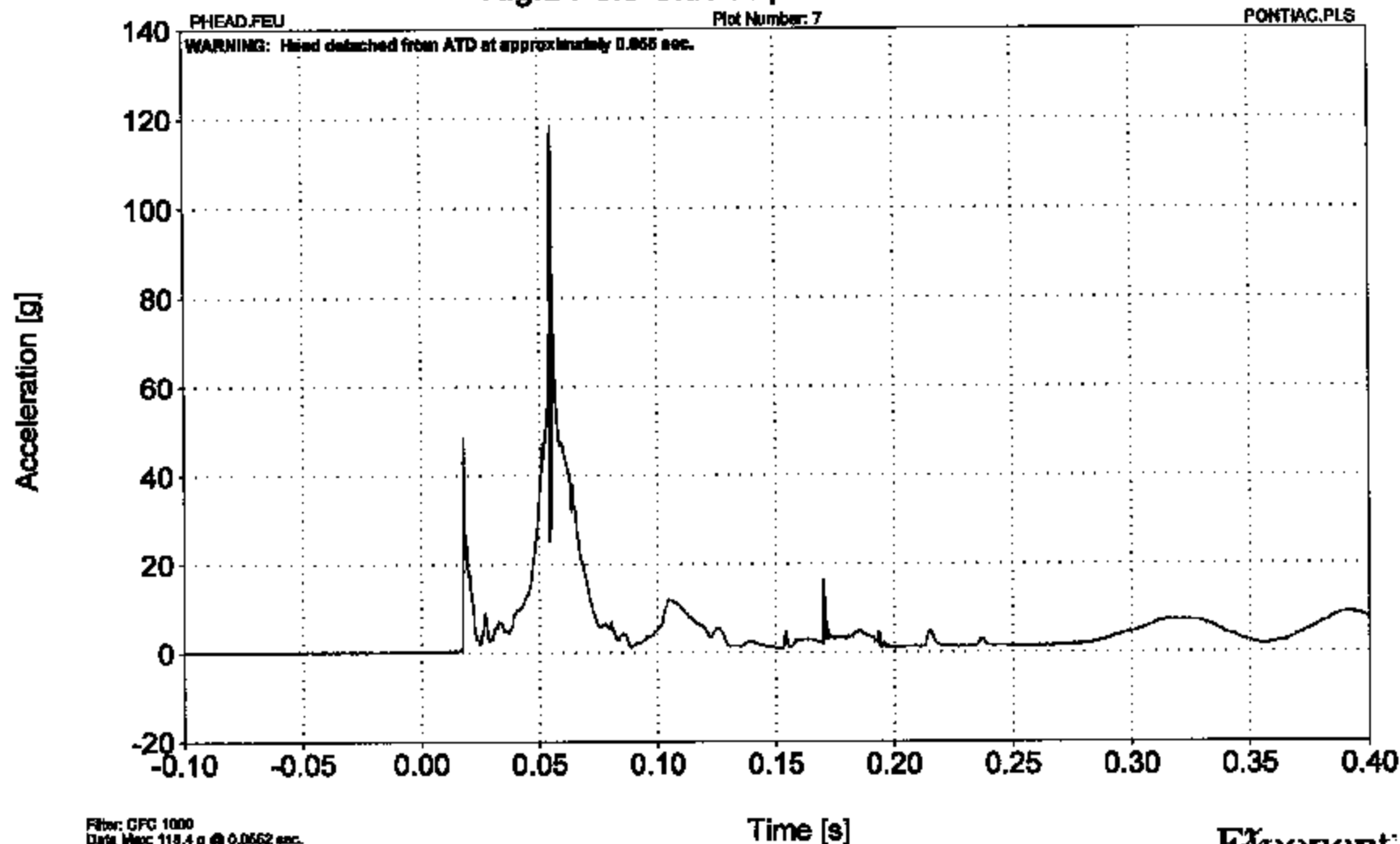
201P Side Pole Impact Testing
PH06682

B-10

Exponent
Failure Analysis Associates™

Resultant Acceleration v Time

Driver ATD Head
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH08862

Time [s]

B-11

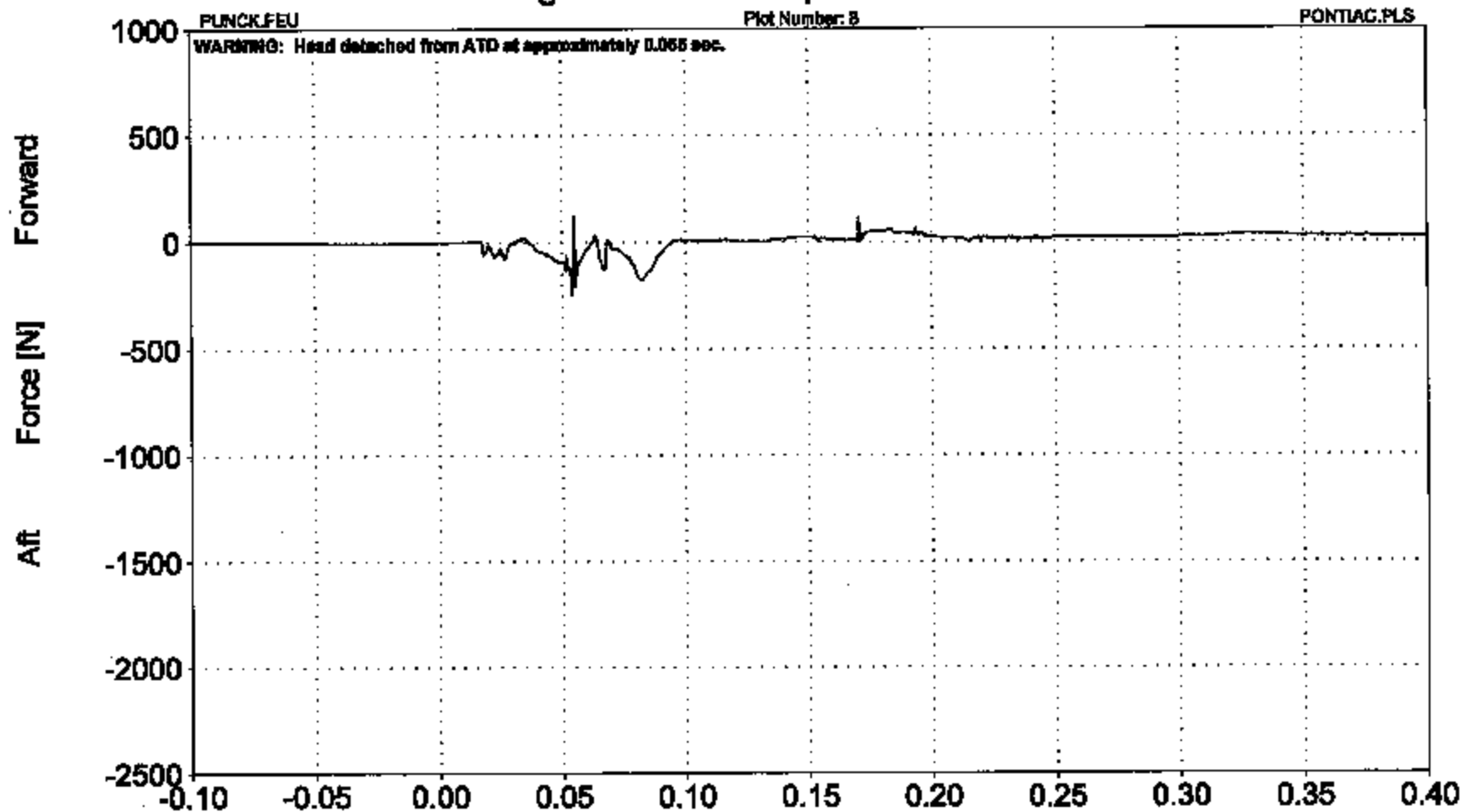
Exponent
Failure Analysis Associates[®]

Longitudinal Neck Force on Head (Fx) v Time

Driver ATD Neck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 123.7 N @ 0.0660 sec.
Data Min: -245.0 N @ 0.0543 sec.

201P Side Pole Impact Testing
PH06882

Time [s]

B-12

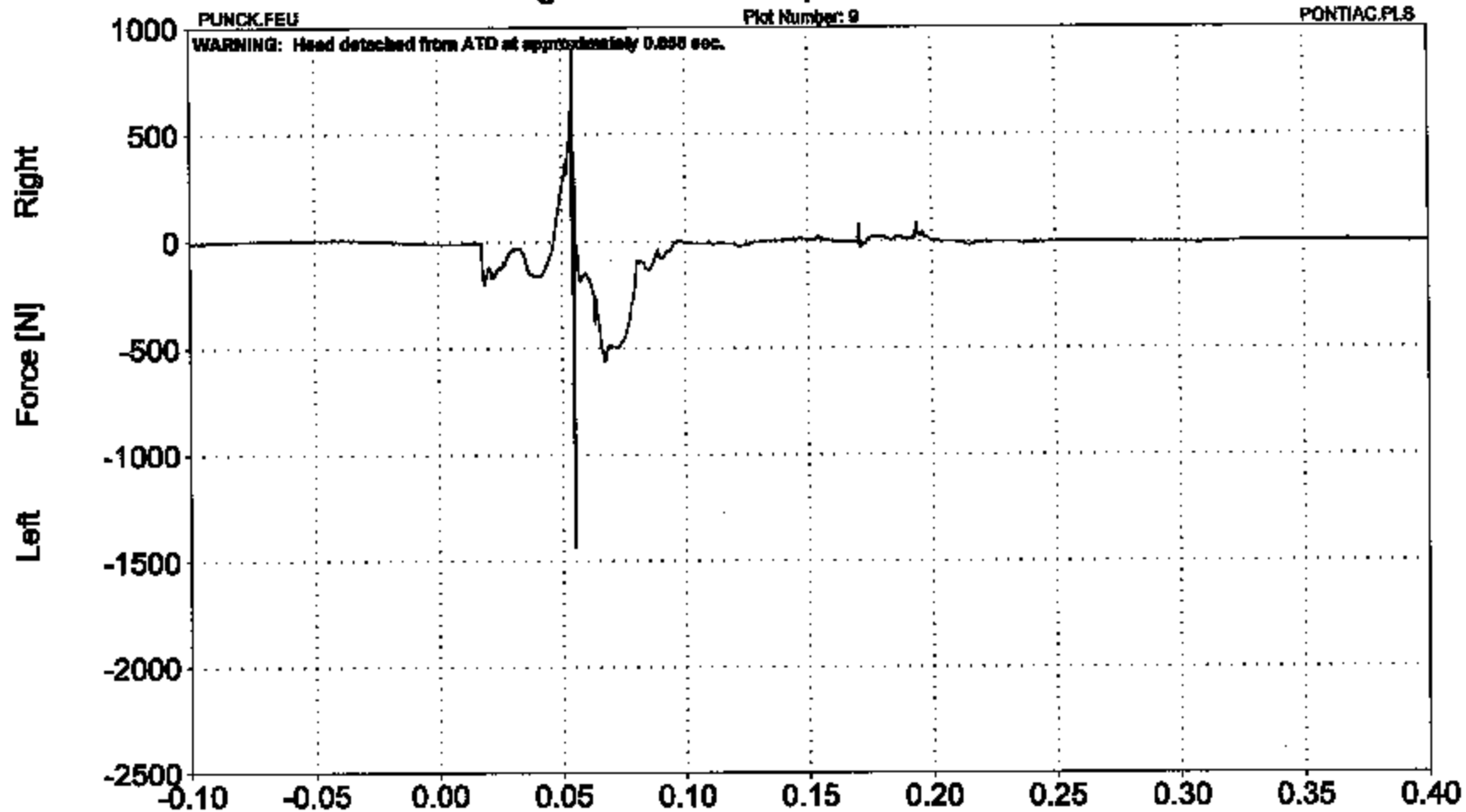
Exponent
Failure Analysis Associates™

Lateral Neck Force on Head (F_y) v Time

Driver ATD Neck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFG 1000
Data Max: 895.1 N @ 0.0648 sec.
Data Min: -1438.1 N @ 0.0549 sec.

201P Side Pole Impact Testing
PH06662

Time [s]

B-13

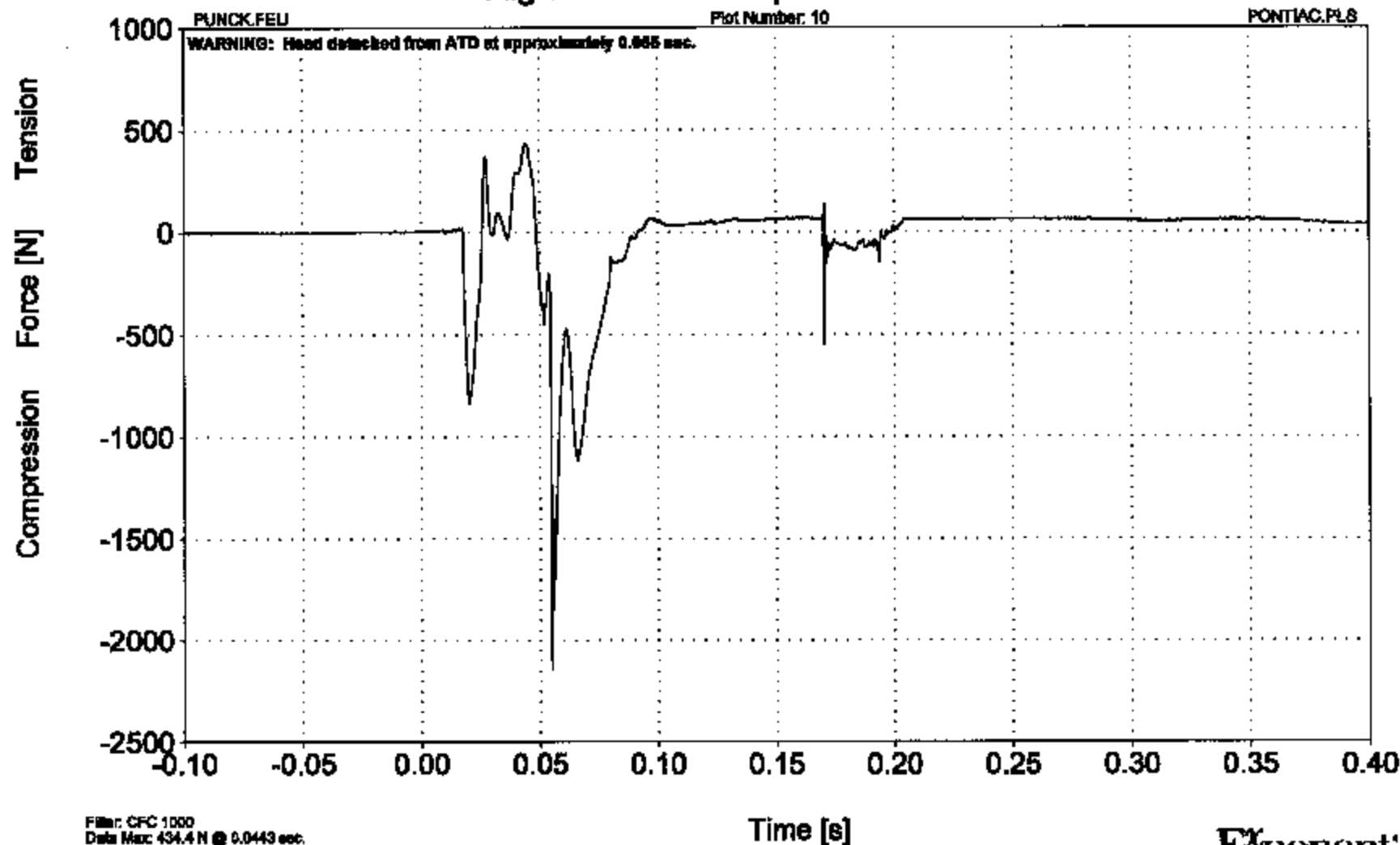
Exponent
Failure Analysis Associates[®]

Vertical Neck Force on Head (Fz) v Time

Driver ATD Neck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 434.4 N @ 0.0443 sec.
Data Min: -2139.2 N @ 0.0550 sec.

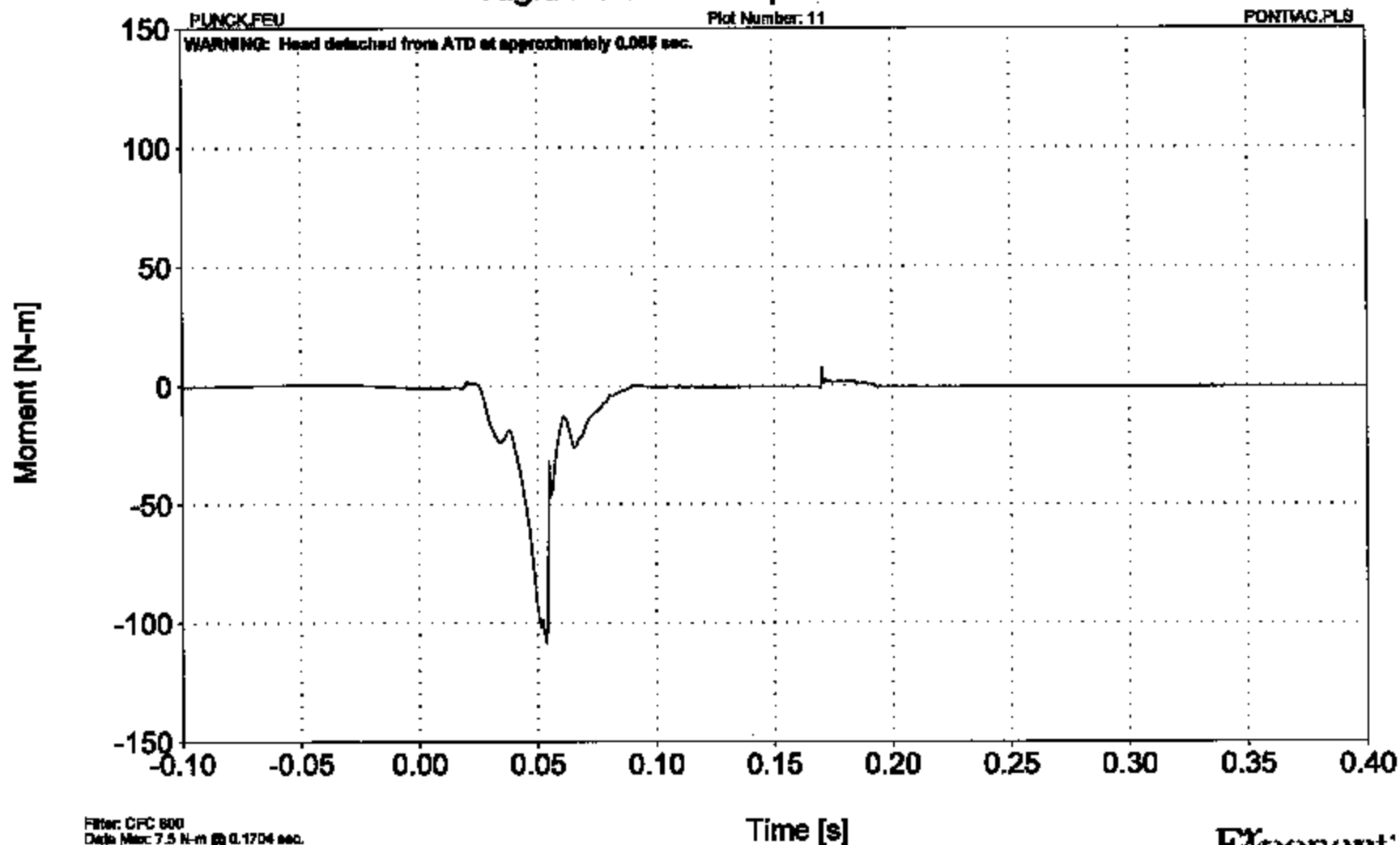
201P Side Pole Impact Testing
PH00002

B-14

Exponent
Failure Analysis Associates®

Lateral Neck Moment (Mx) v Time

Driver ATD Neck
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH08852

B-15

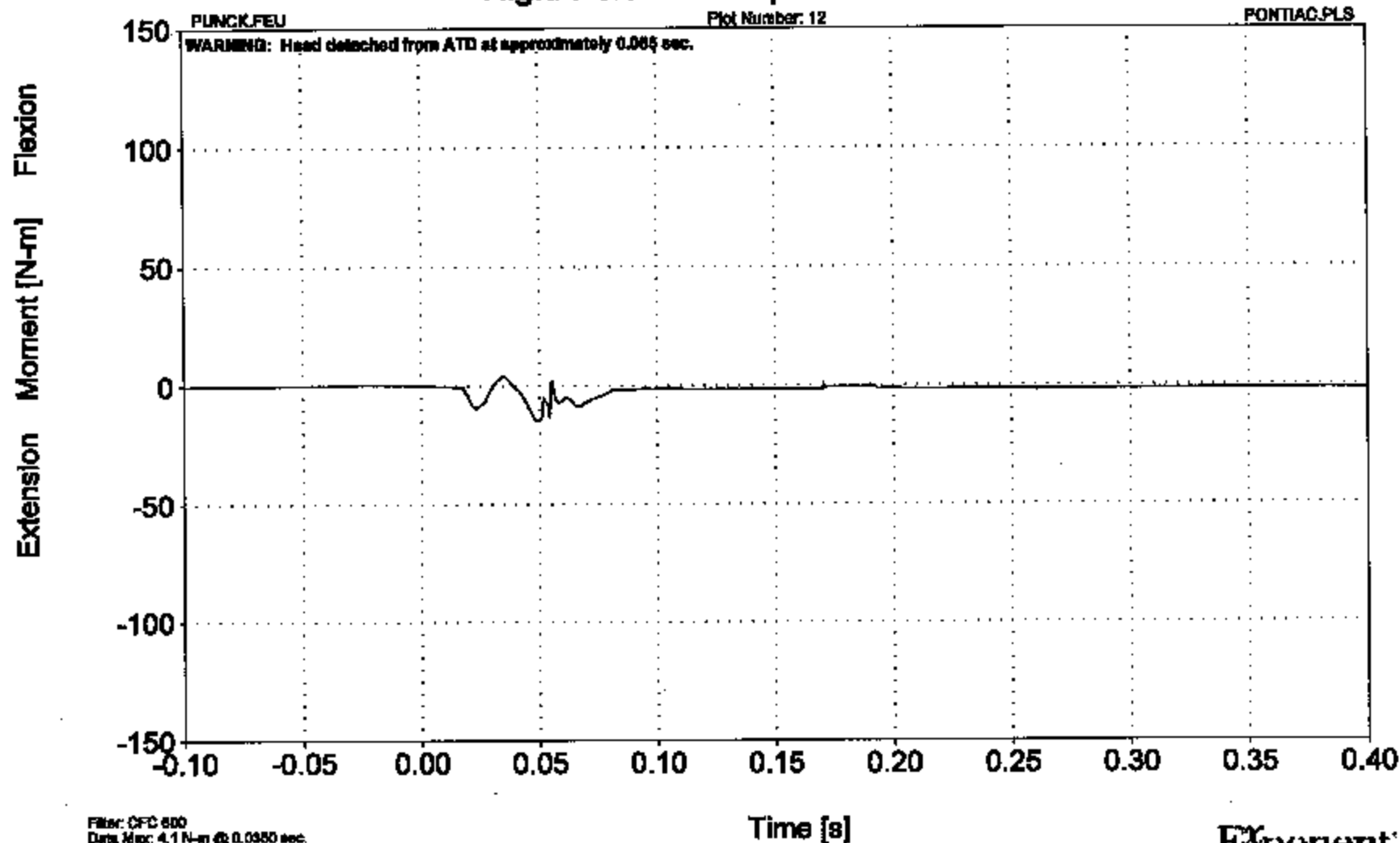
Exponent
Failure Analysis Associates®

Fore/Aft Neck Moment (My) v Time

Driver ATD Neck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 800
Data Max: 4.1 N-m @ 0.0350 sec.
Data Min: -14.8 N-m @ 0.0465 sec.

201P Side Pole Impact Testing
PH08882

B-16

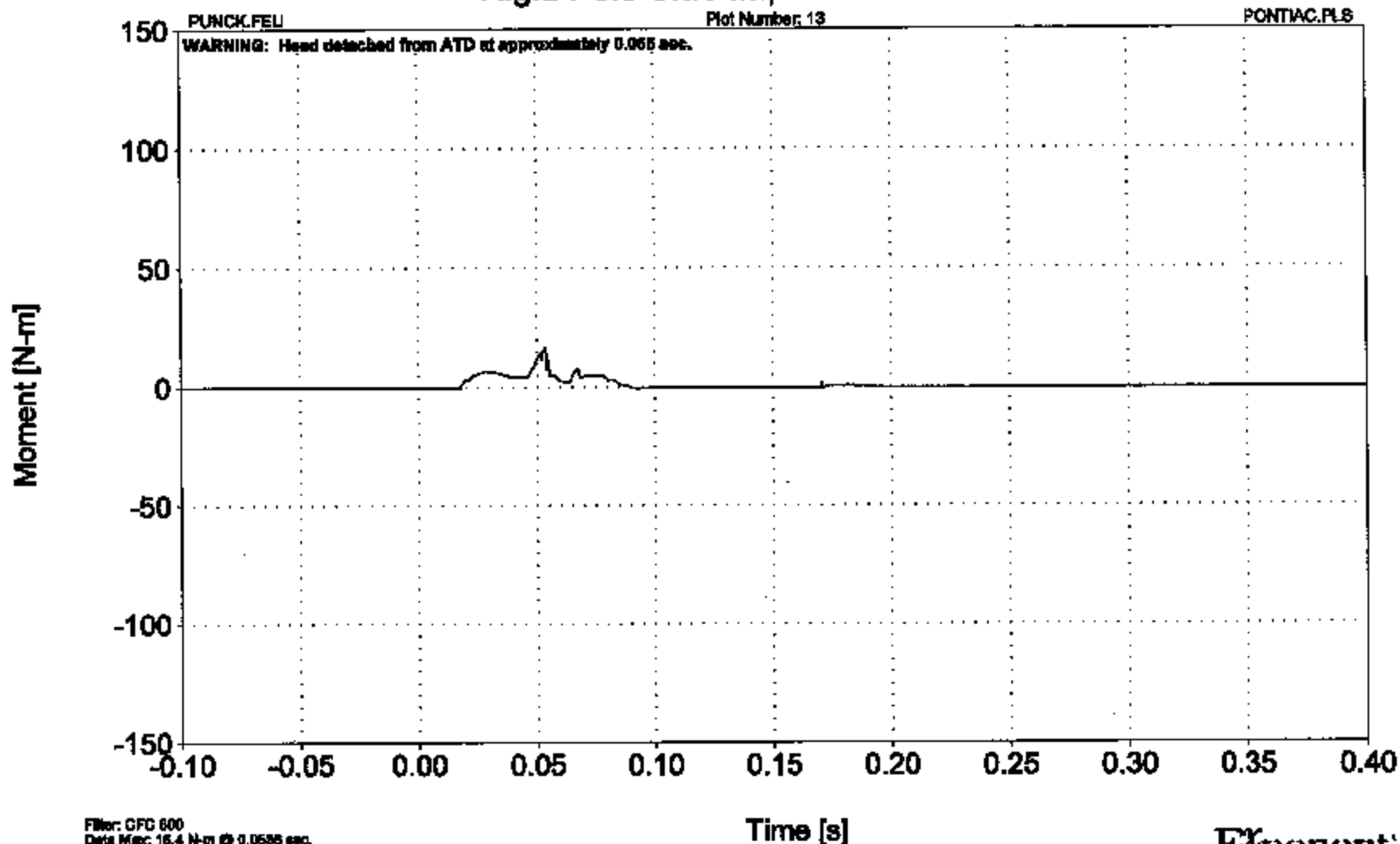
Exponent
Failure Analysis Associates®

Torsional Neck Moment (Mz) v Time

Driver ATD Neck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: GFC 600
Data Max: 16.4 N-m @ 0.0585 sec.
Data Min: -0.7 N-m @ 0.1710 sec.

201P Side Pole Impact Testing
PH08882

B-17

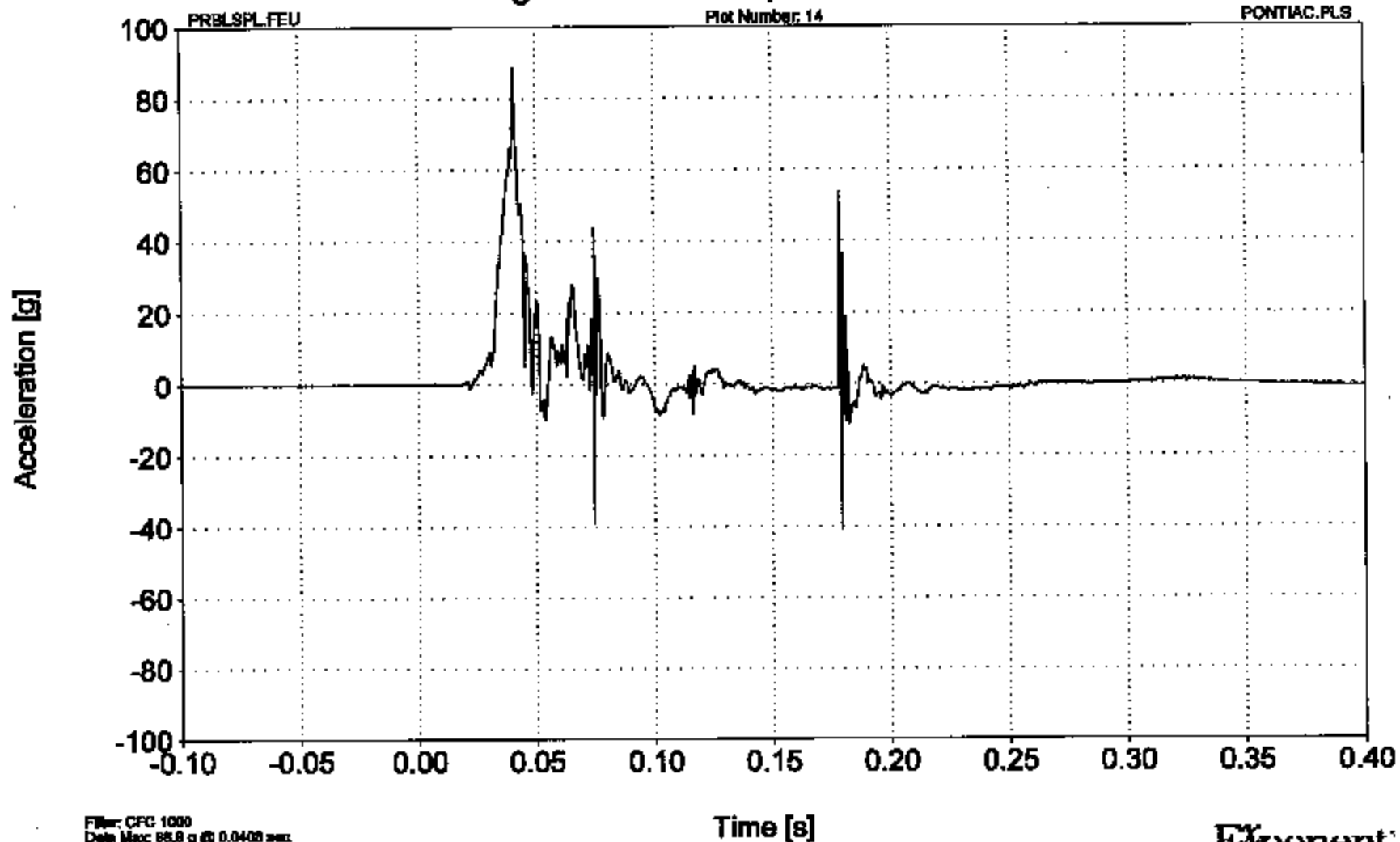
Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Upper Rib

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 85.8 g @ 0.0408 sec.
Data Min: -40.8 g @ 0.1795 sec.

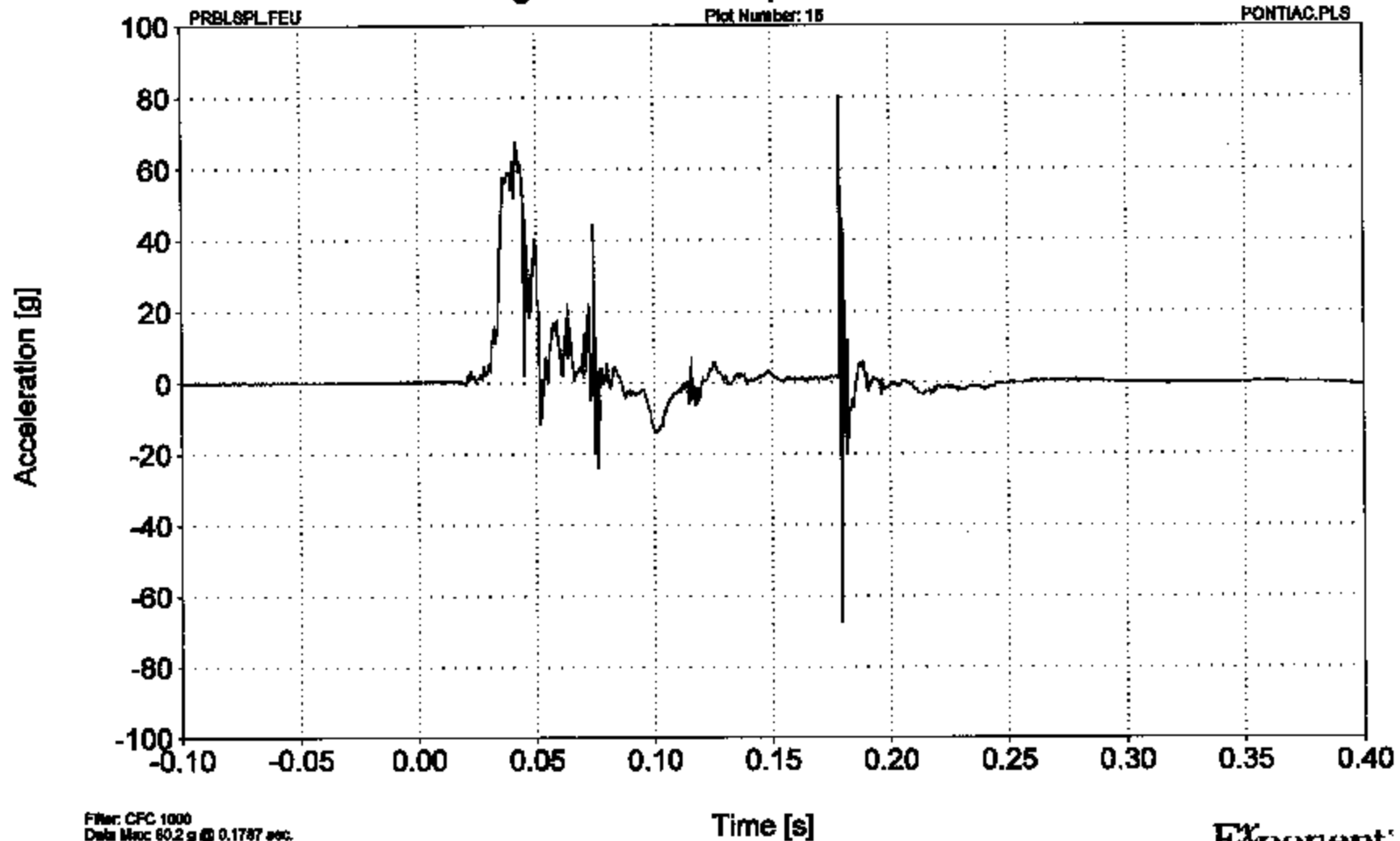
201P Side Pole Impact Testing
PH00002

B-18

Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Lower Rib
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



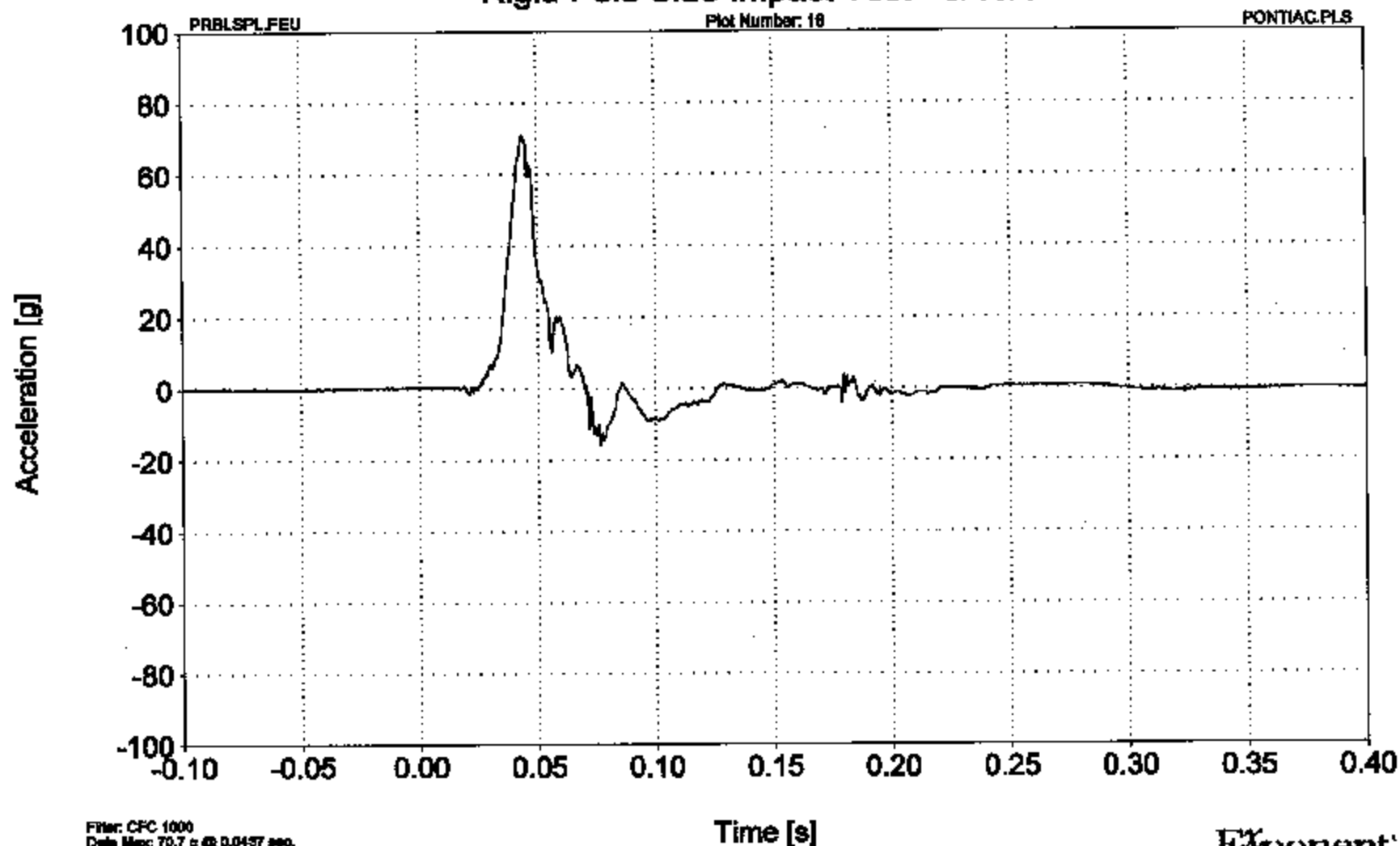
201P Side Pole Impact Testing
PH00582

B-19

Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Driver ATD Lower Spine
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 1000
Data Max: 70.7 g @ 0.0437 sec.
Data Min: -16.9 g @ 0.0785 sec.

201P Side Pole Impact Testing
PH00002

B-20

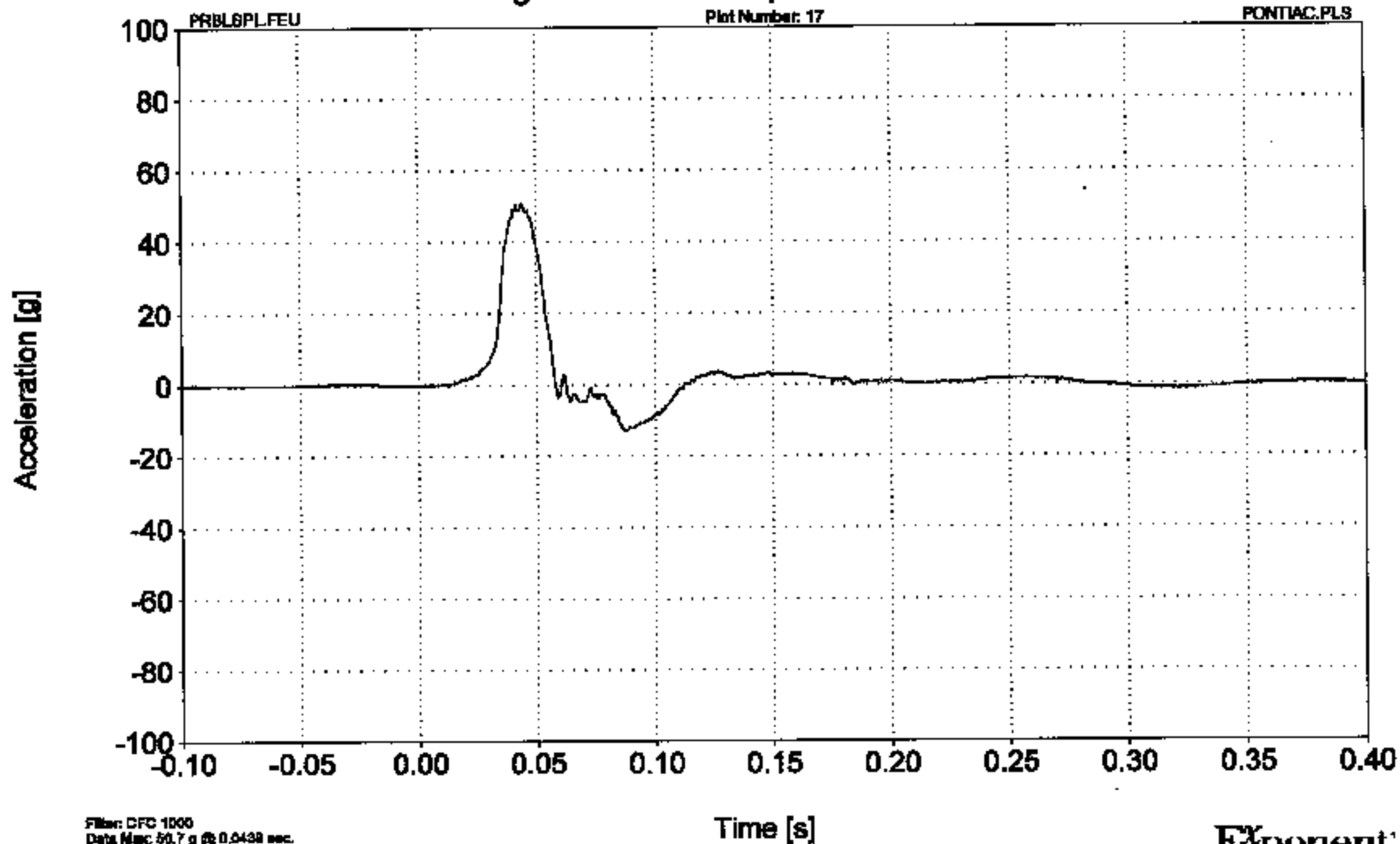
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Driver ATD Pelvis

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



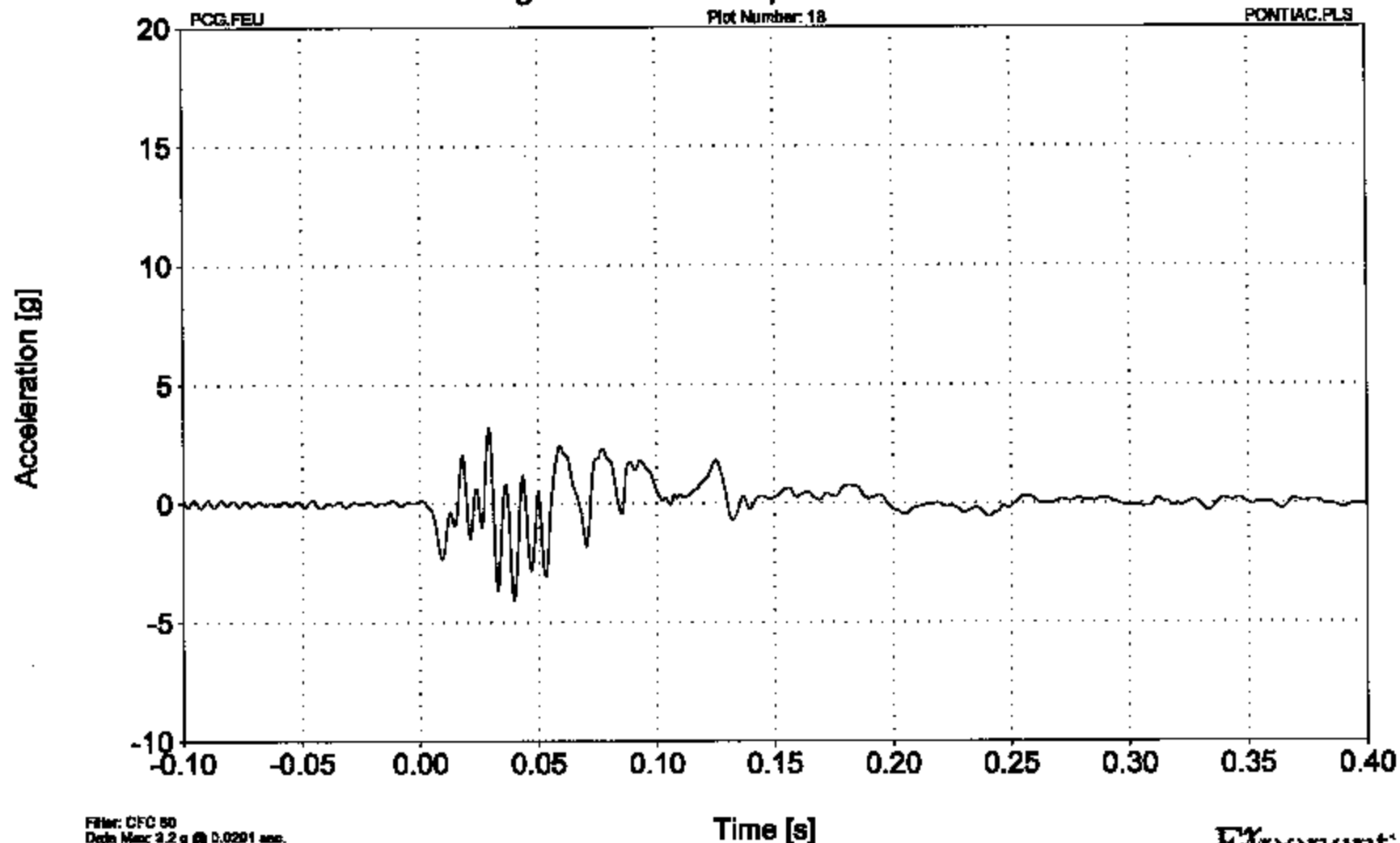
Filter: DFC 1000
Data Max: 50.7 g @ 0.0432 sec.
Data Min: -13.1 g @ 0.0877 sec.
201P Side Pole Impact Testing
PH0552

B-21

Exponent
Failure Analysis Associates™

Longitudinal Acceleration v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



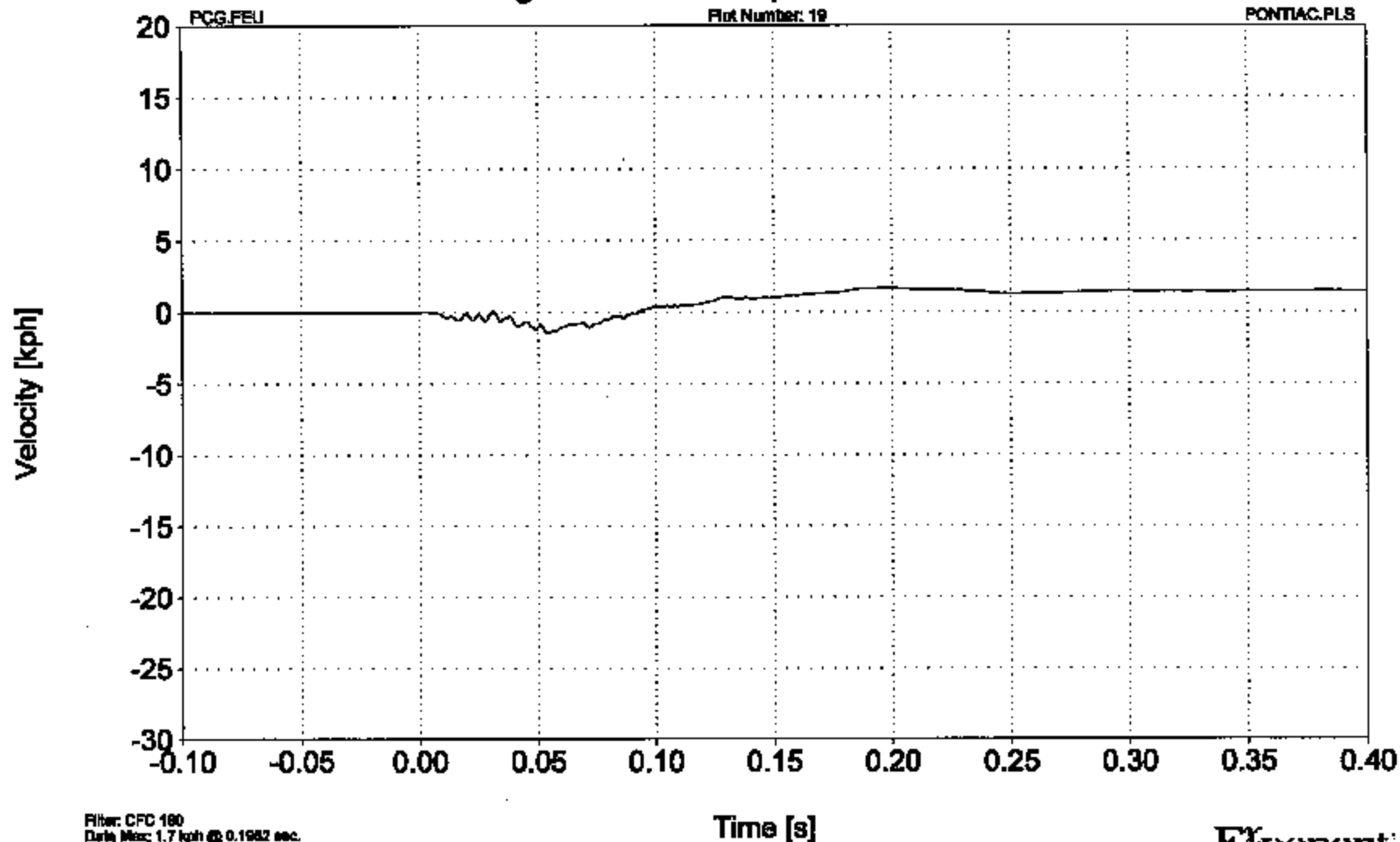
File: CFC 50
Data Max: 3.2 g @ 0.0291 sec.
Data Min: -4.0 g @ 0.0398 sec.
201P Side Pole Impact Testing
PH00002

B-22

Exponent
Failure Analysis Associates™

Longitudinal Velocity v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 1.7 kph @ 0.1582 sec.
Data Min: -1.4 kph @ 0.0643 sec.

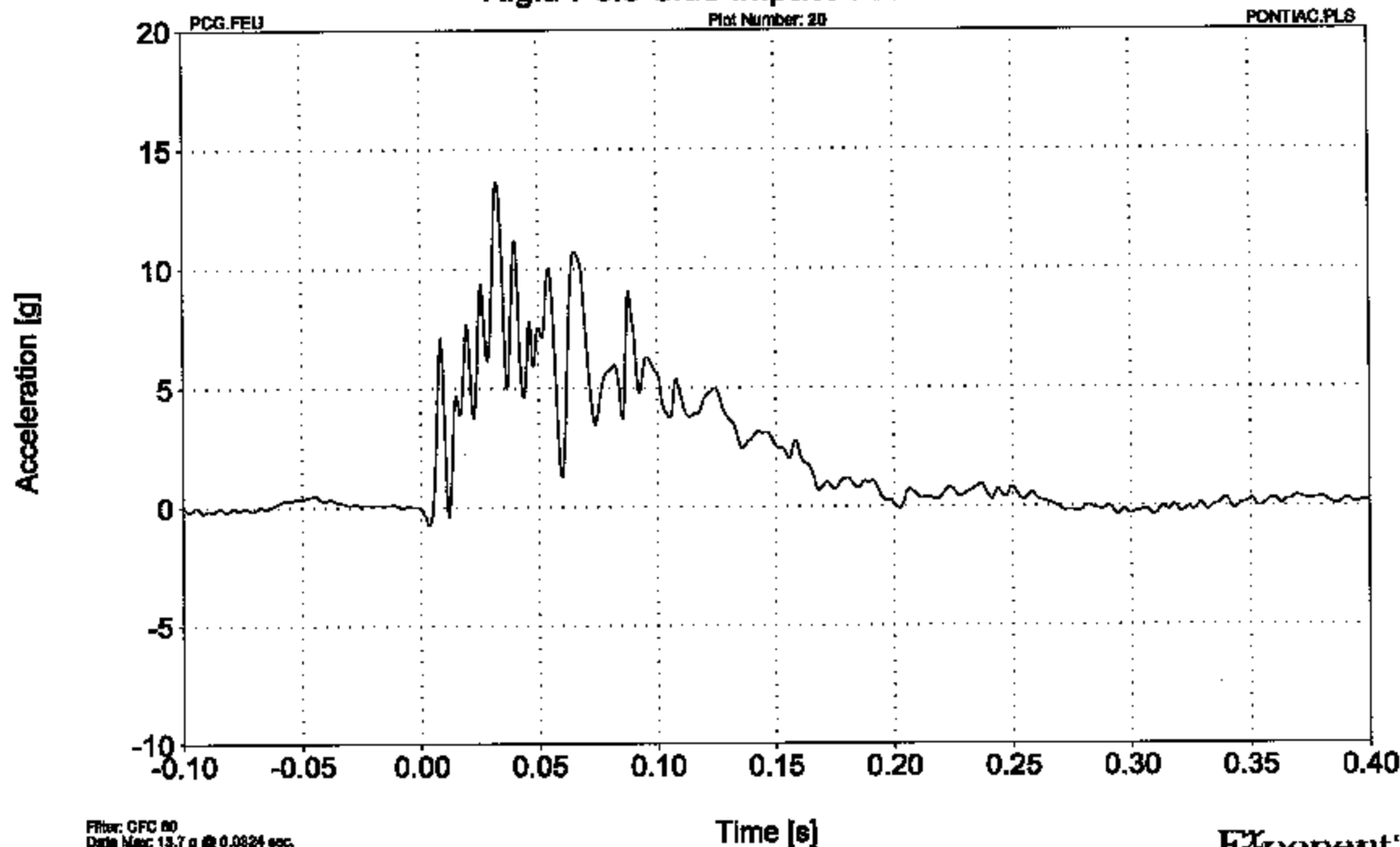
201P Side Pole Impact Testing
PH06602

B-23

Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



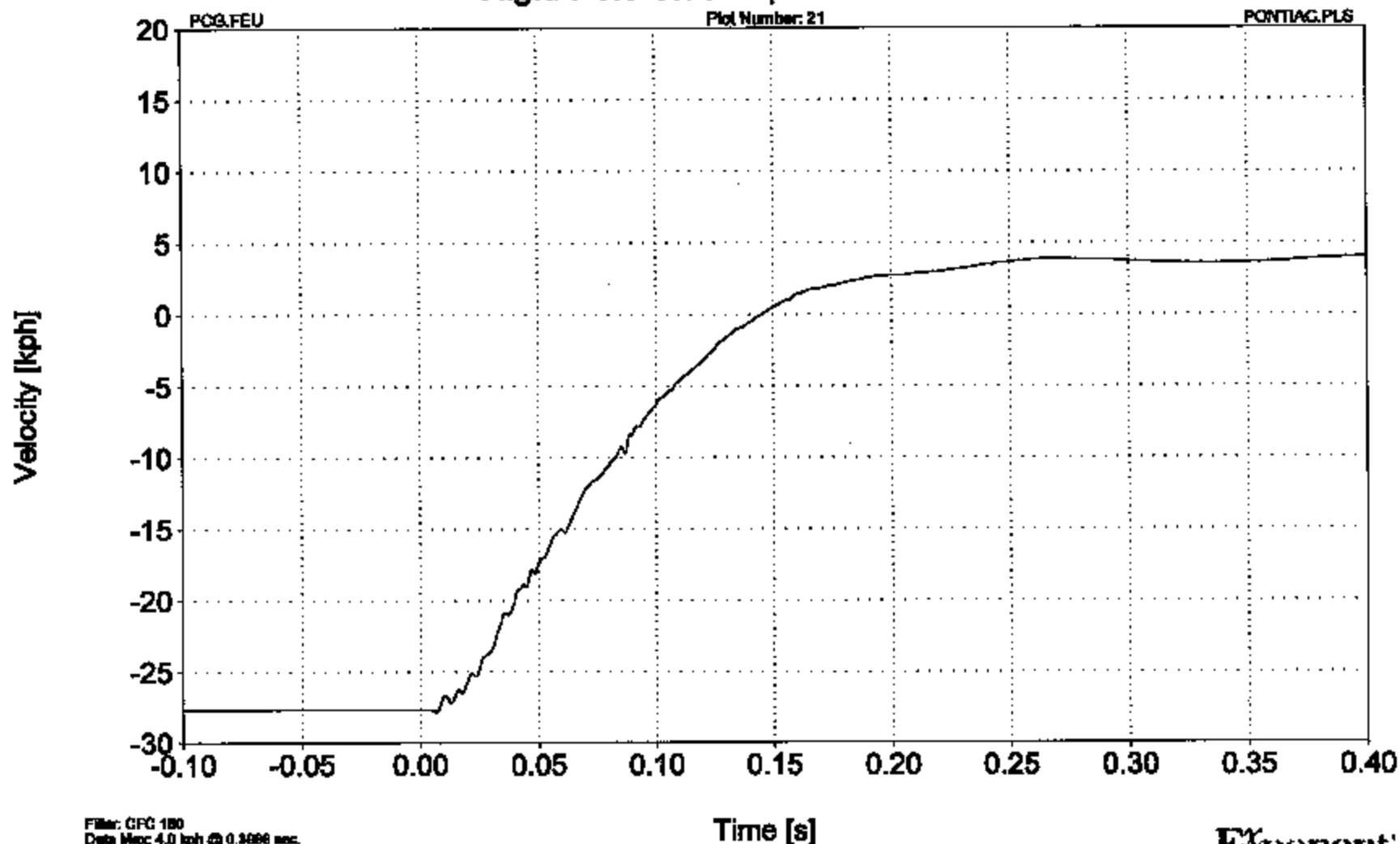
201P Side Pole Impact Testing
PH08662

B-24

Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: GFC 100
Data Max: 4.0 kph @ 0.3066 sec.
Data Min: -27.2 kph @ 0.0069 sec.

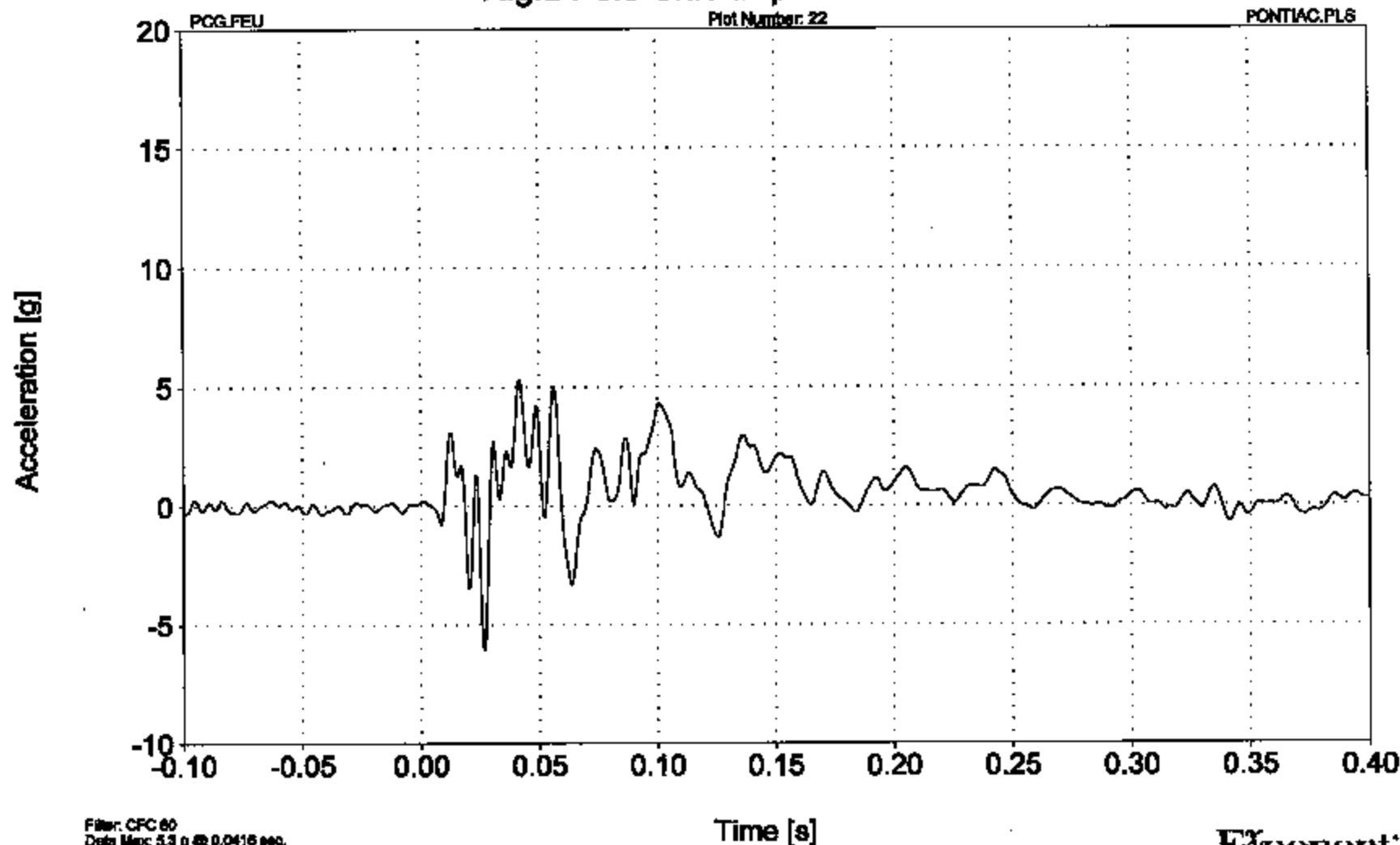
201P Side Pole Impact Testing
PH08882

B-25

Exponent
Failure Analysis Associates®

Vertical Acceleration v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 60
Data Max: 5.3 g @ 0.0416 sec.
Data Min: -6.1 g @ 0.0267 sec.

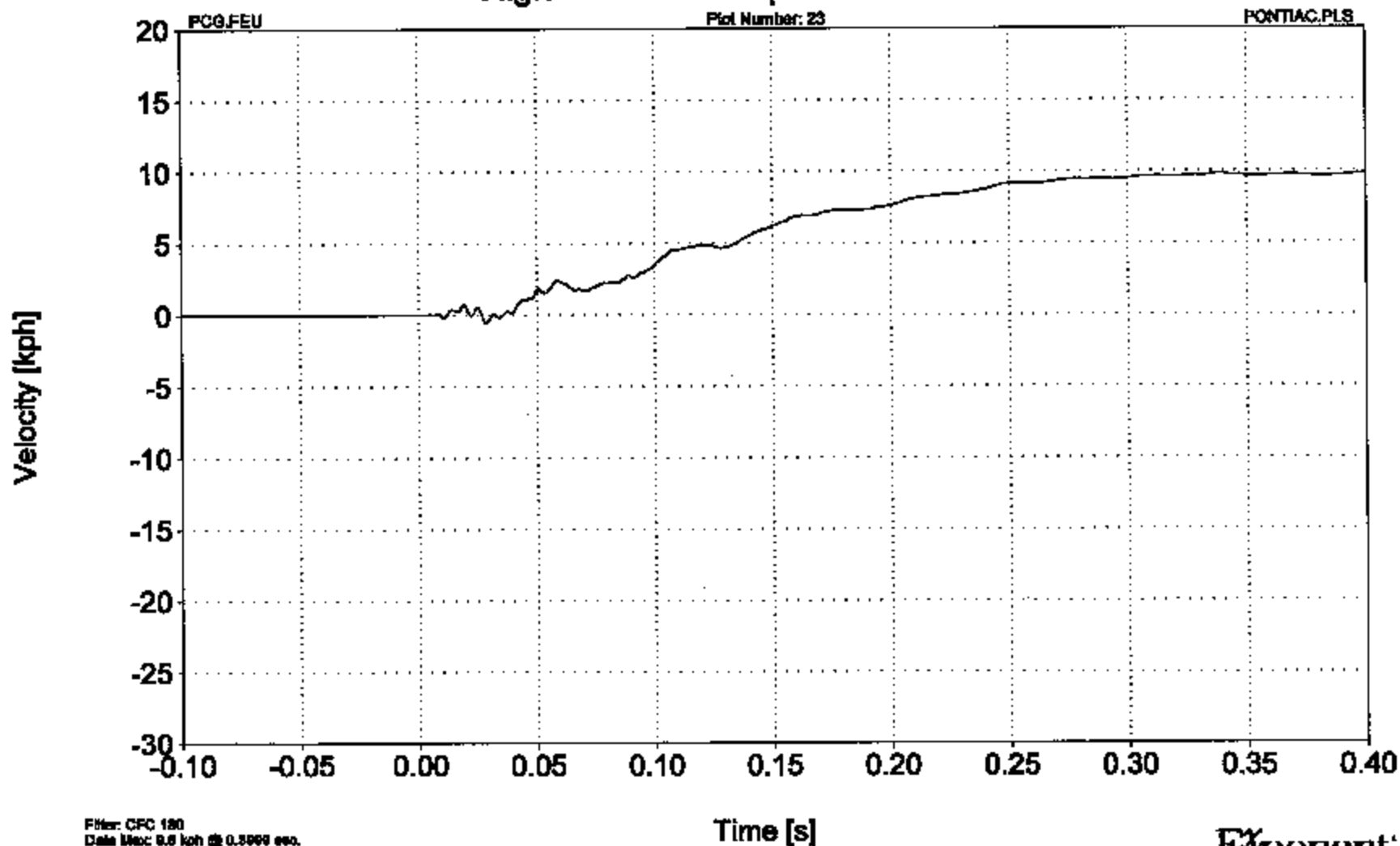
201P Side Pole Impact Testing
PH08892

B-28

Exponent
Failure Analysis Associates®

Vertical Velocity v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04

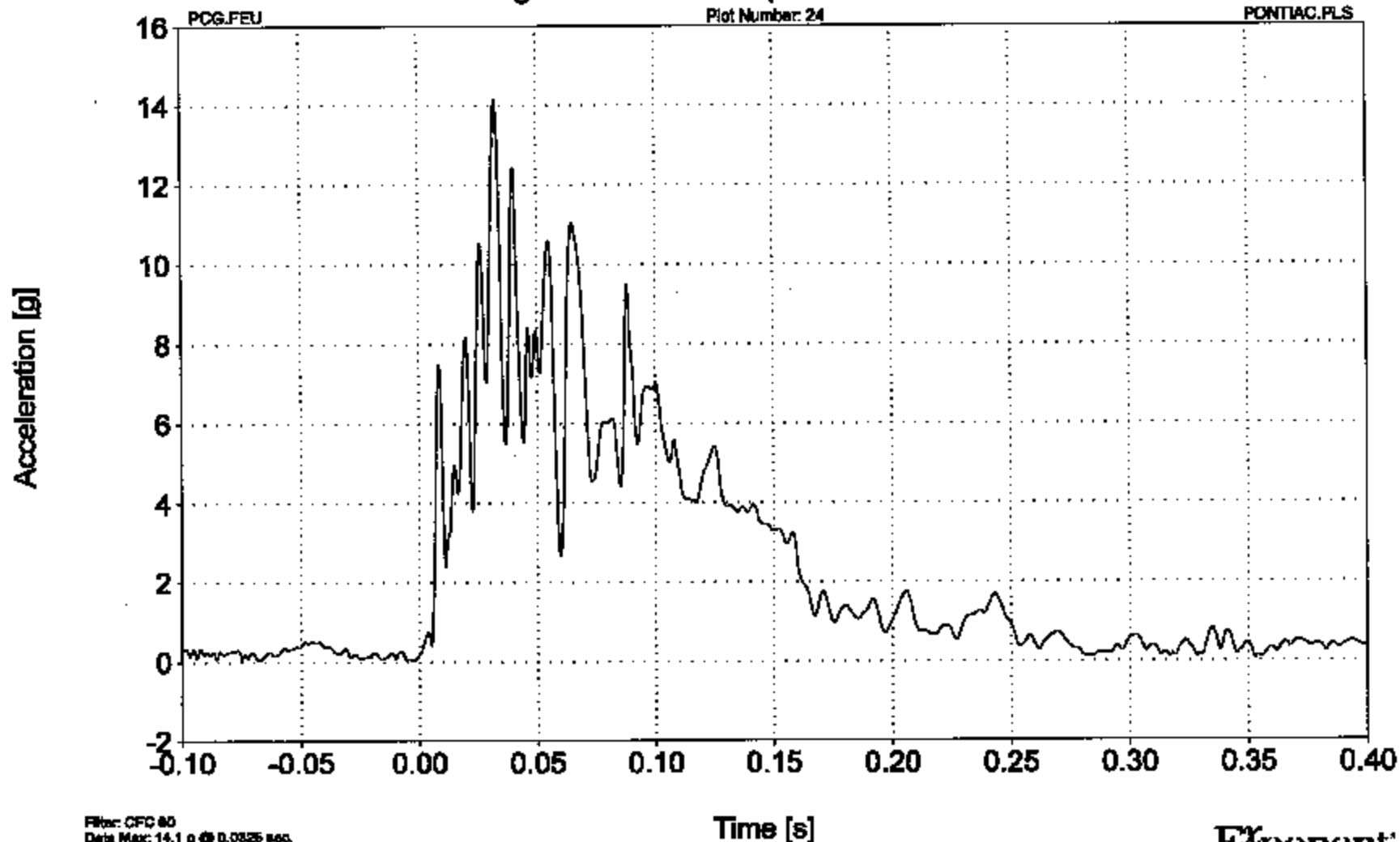


Filter: CFC 180
Data Max: 9.6 kph @ 0.3999 sec.
Data Min: -0.6 kph @ 0.0265 sec.

201P Side Pole Impact Testing
PH00002

Resultant Acceleration v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04

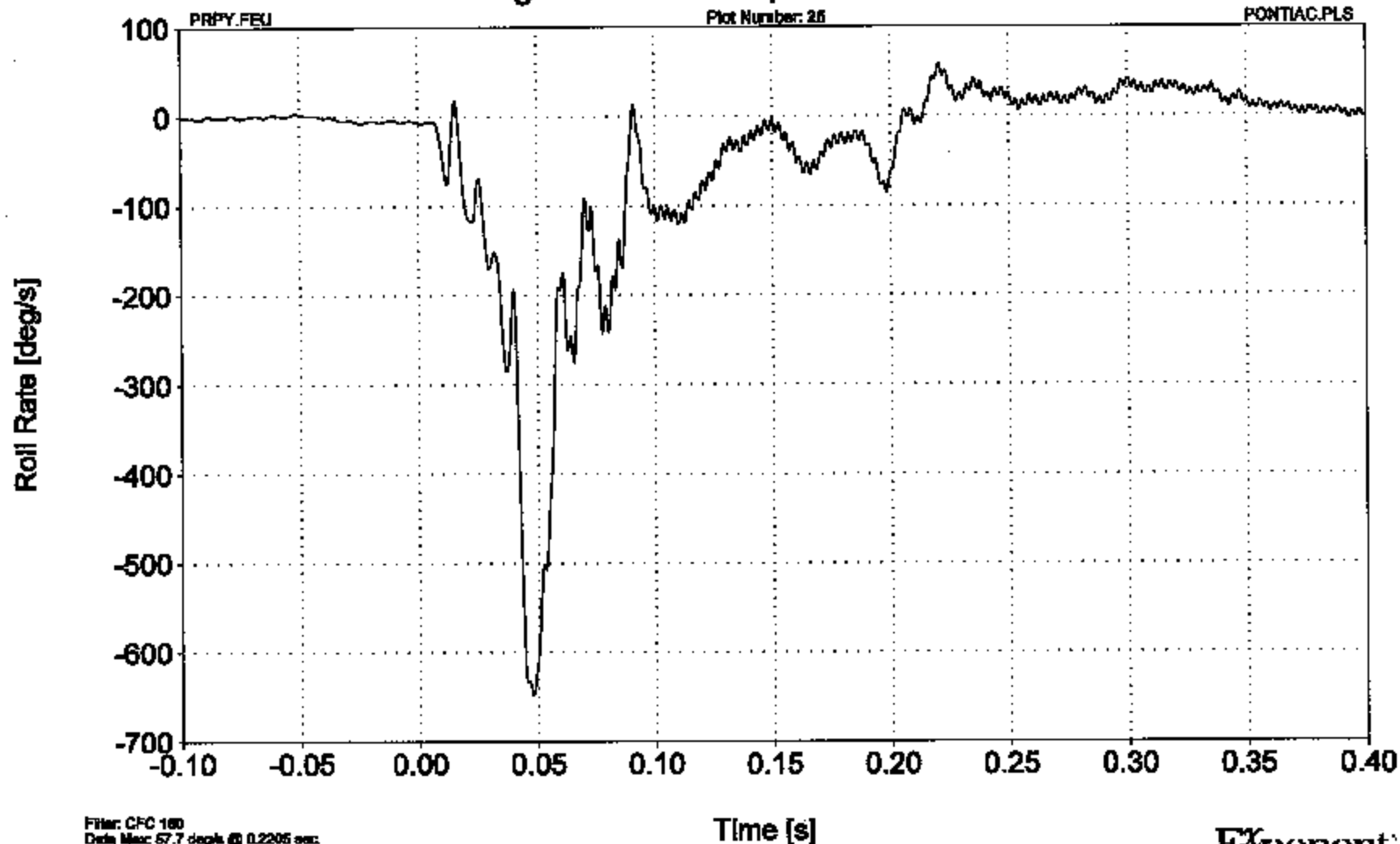


Filter: CFC 80
Data Max: 14.1 g @ 0.0325 sec.
Data Min: 0.0 g @ -0.0023 sec.
201P Side Pole Impact Testing
PH00002

B-28

Exponent
Failure Analysis Associates®

Roll Rate v Time
Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04

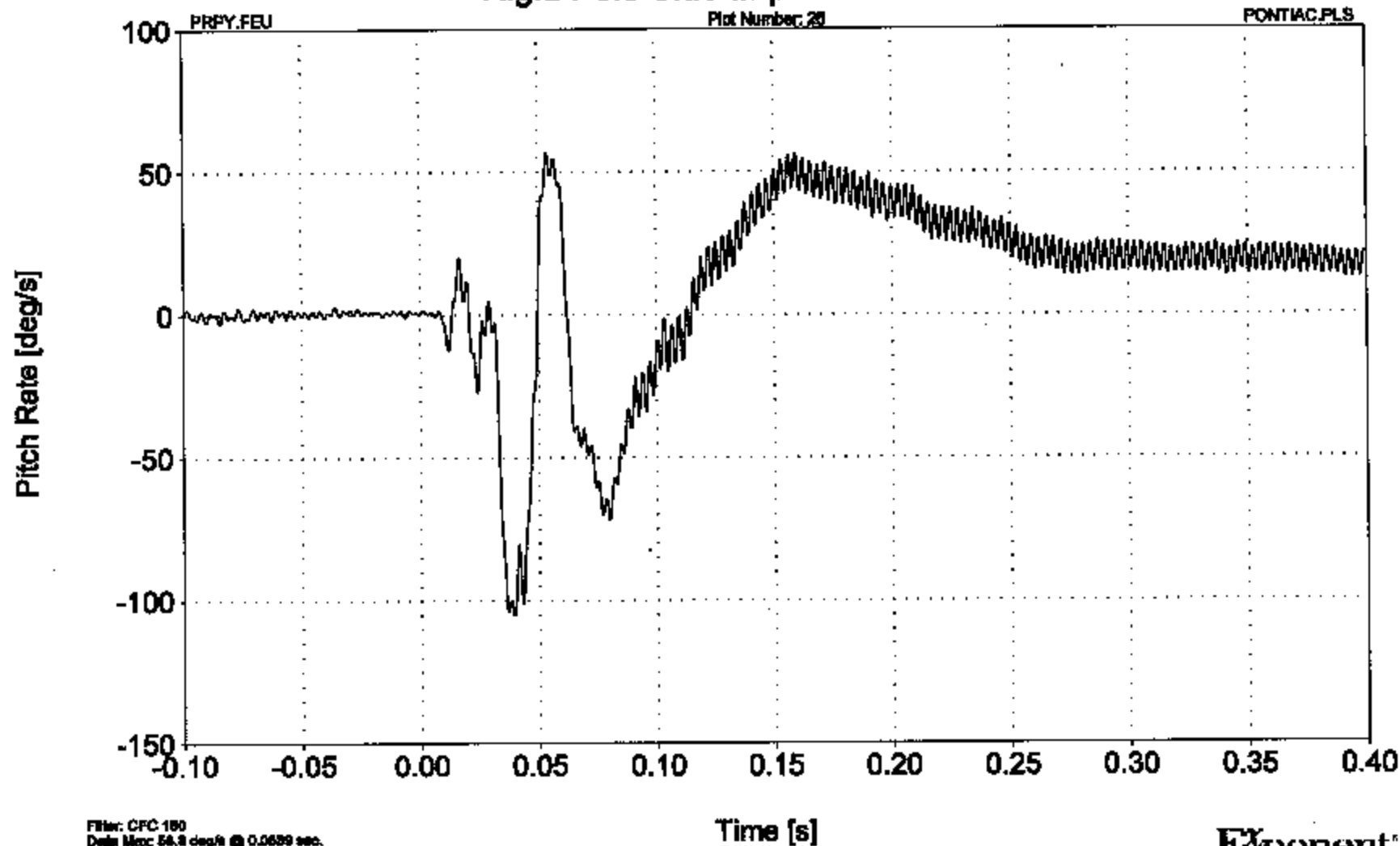


Filter: CFC 100
Data Max: 57.7 deg/s @ 0.2205 sec.
Data Min: -647.3 deg/s @ 0.0479 sec.

201P Side Pole Impact Testing
PH06682

Pitch Rate v Time

Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



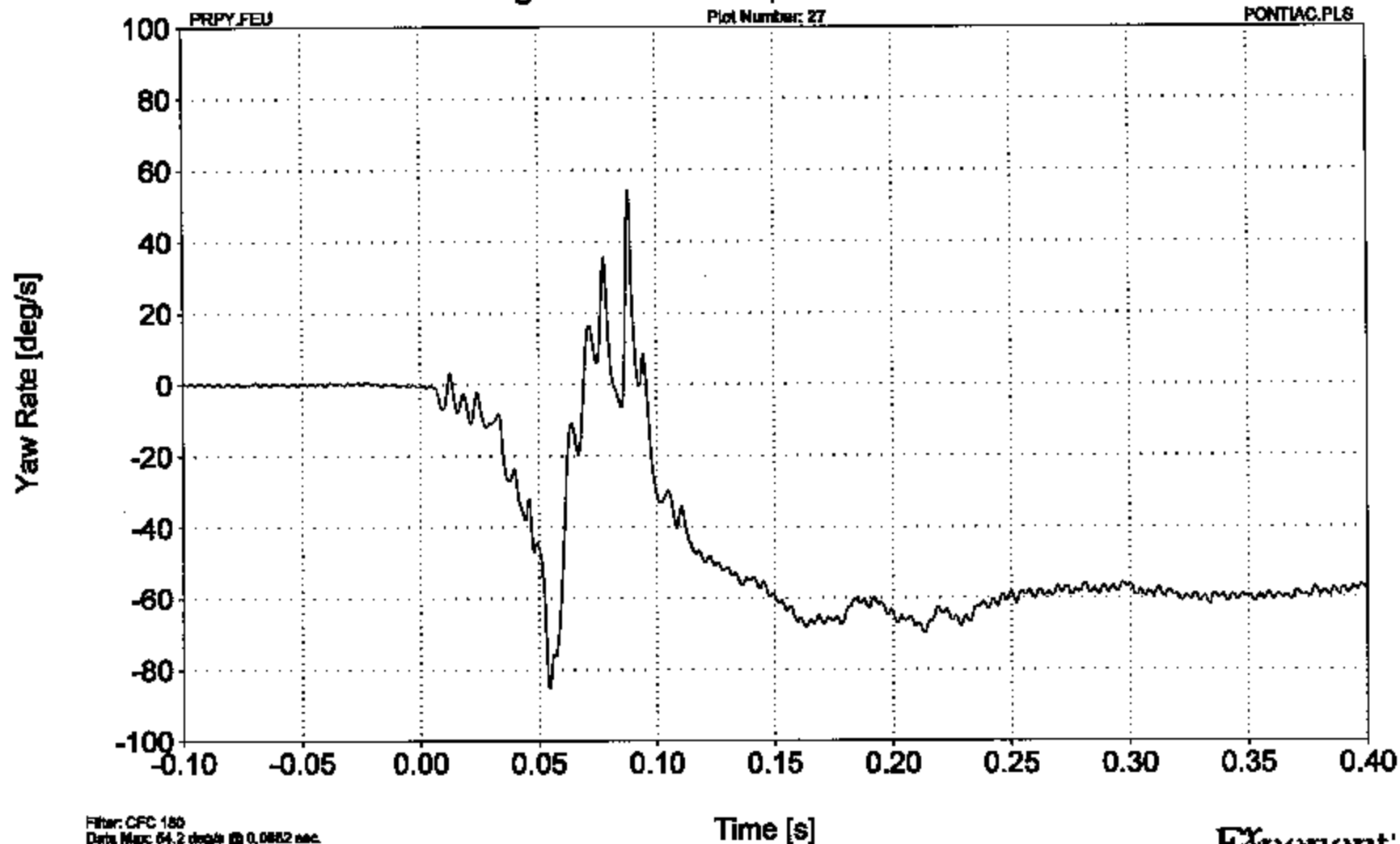
Filter: CFC-180
Data Msec: 50.0 deg/s @ 0.0000 sec.
Data Msec: -100.1 deg/s @ 0.0004 sec.

201P Side Pole Impact Testing
PH00002

B-30

Exponent[®]
Failure Analysis Associates[®]

Yaw Rate v Time
Vehicle Tunnel Near C.G.
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH06692

B-31

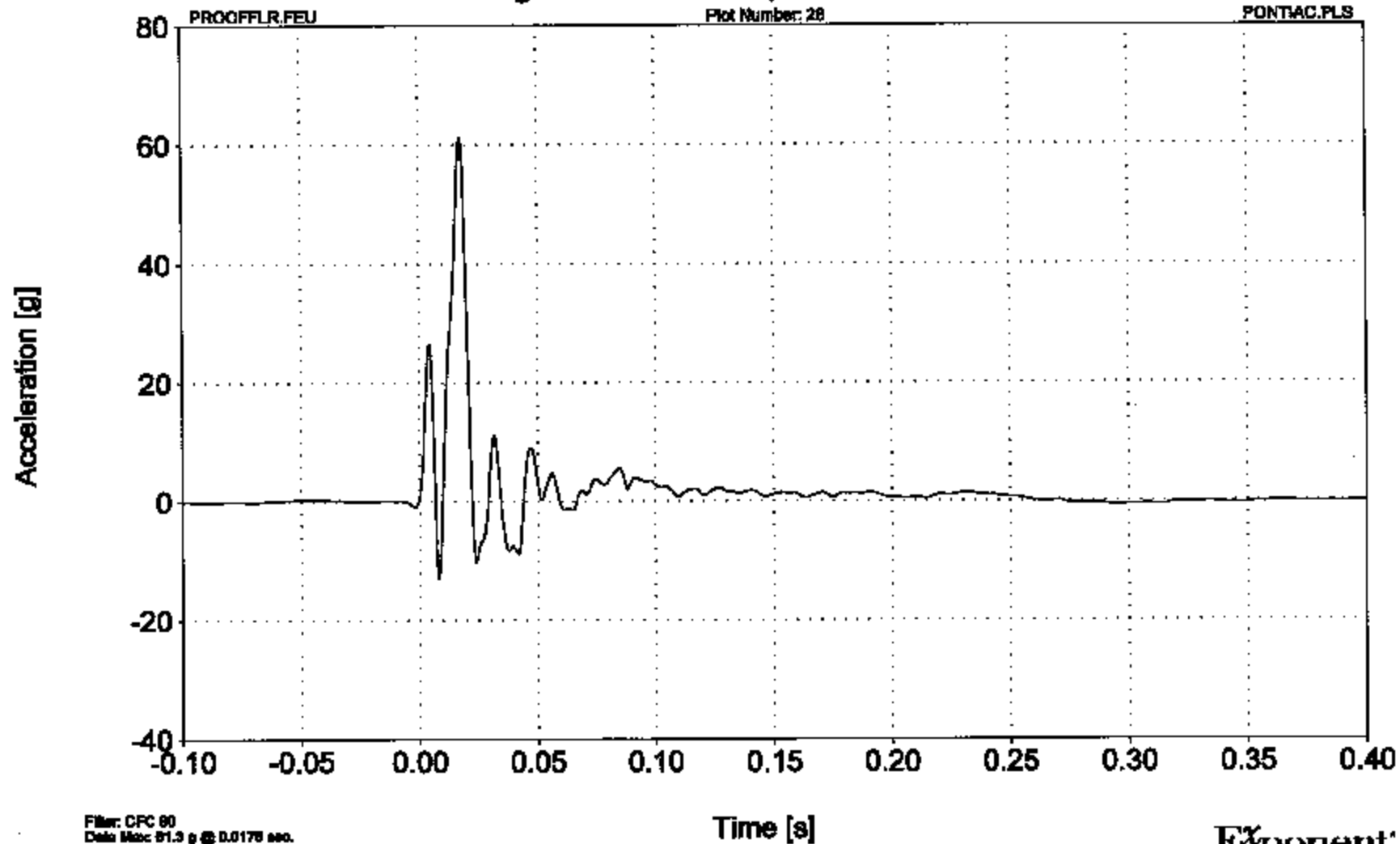
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left Floor Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH06662

B-32

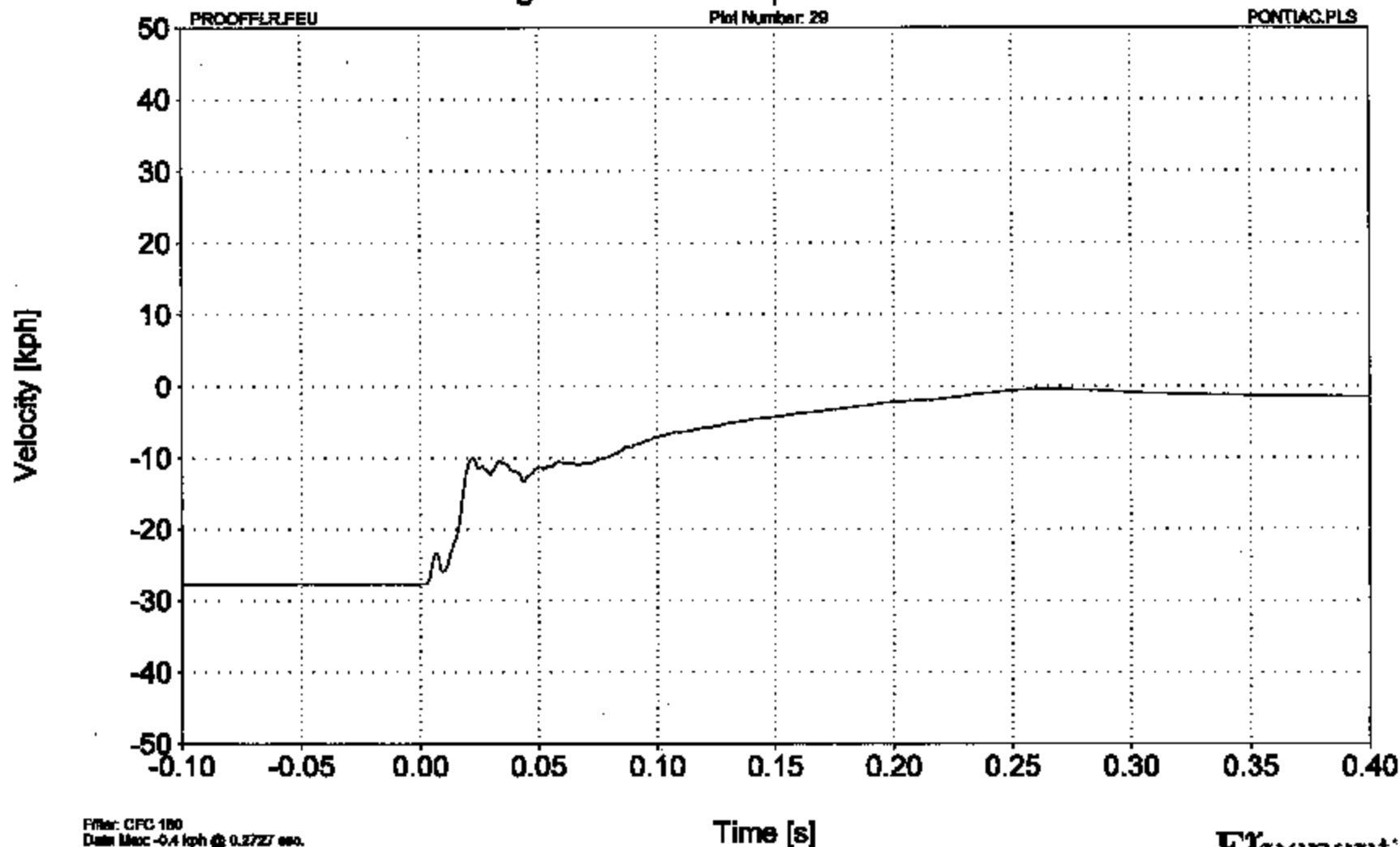
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Left Floor Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: -0.4 kph @ 0.2727 sec.
Data Min: -27.7 kph @ -0.1000 sec.

201P Side Pole Impact Testing
PH06062

B-33

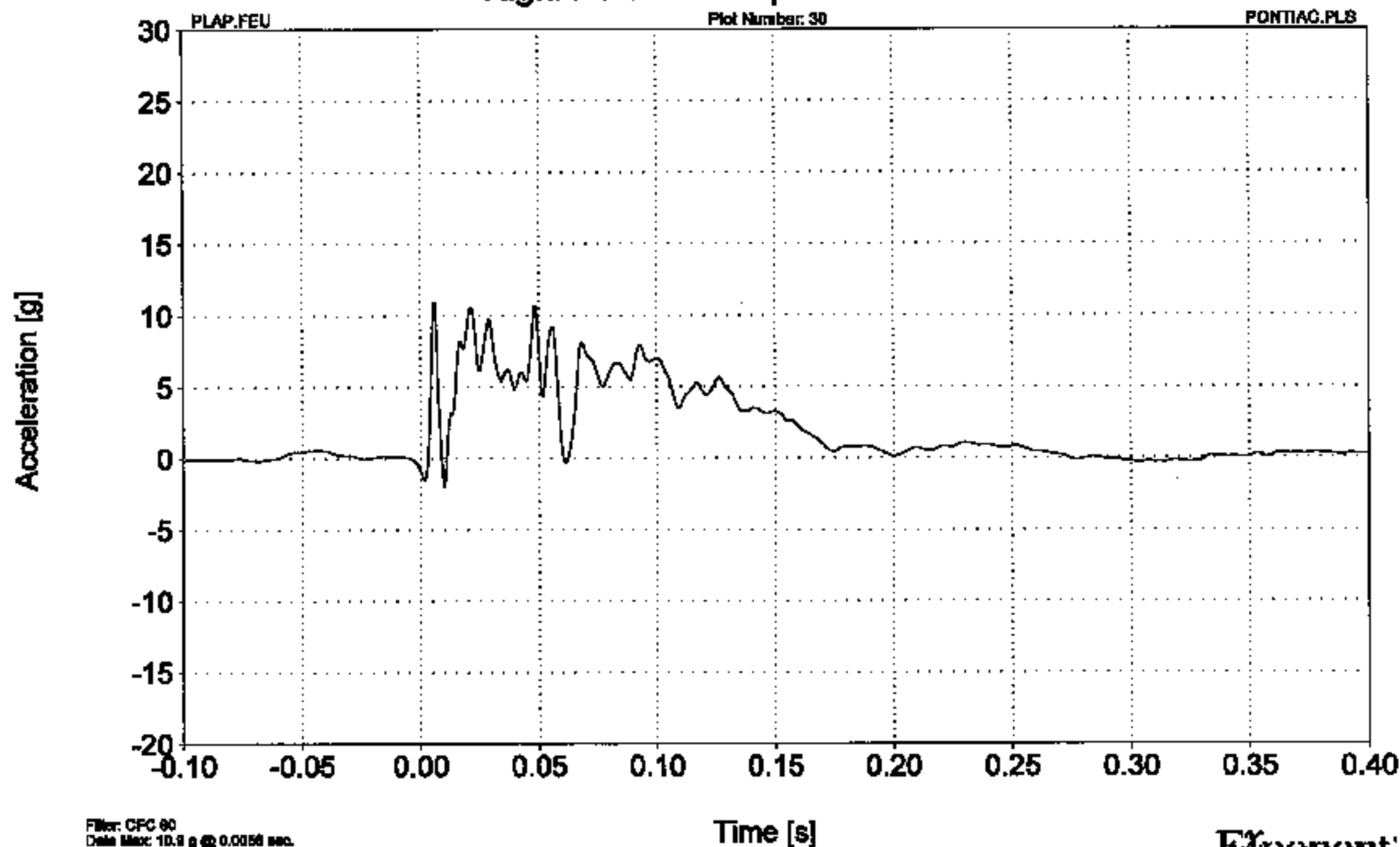
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left A-Pillar Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CPC 80
Data Max: 10.8 g @ 0.0056 sec.
Data Min: -2.0 g @ 0.0100 sec.

201P Side Pole Impact Testing
P406662

Time [s]

B-34

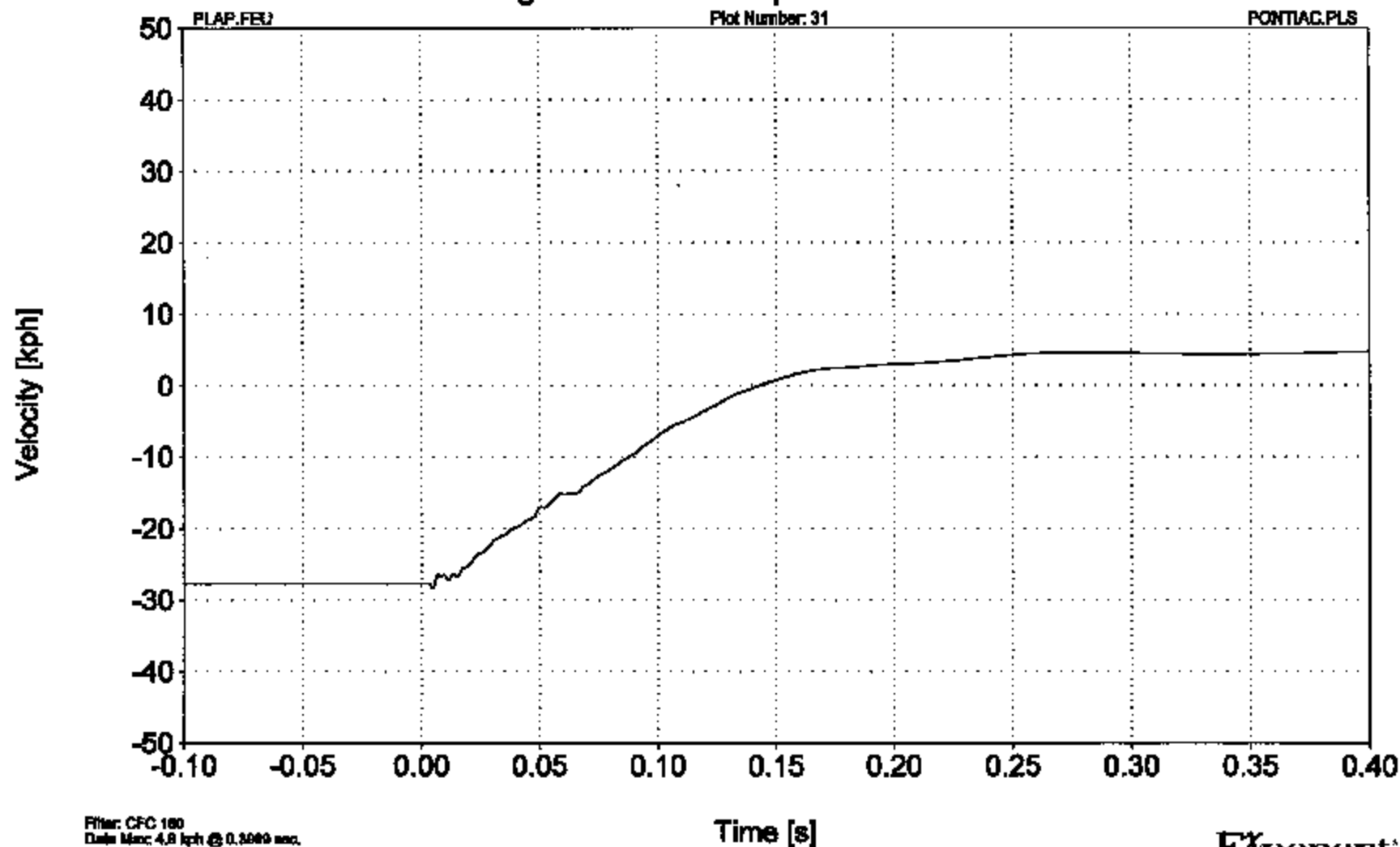
Exponent
Failure Analysis Associates[®]

Lateral Velocity v Time

Left A-Pillar Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 4.8 kph @ 0.3069 sec.
Data Min: -28.2 kph @ 0.0046 sec.

201P Side Pole Impact Testing
PH05582

B-35

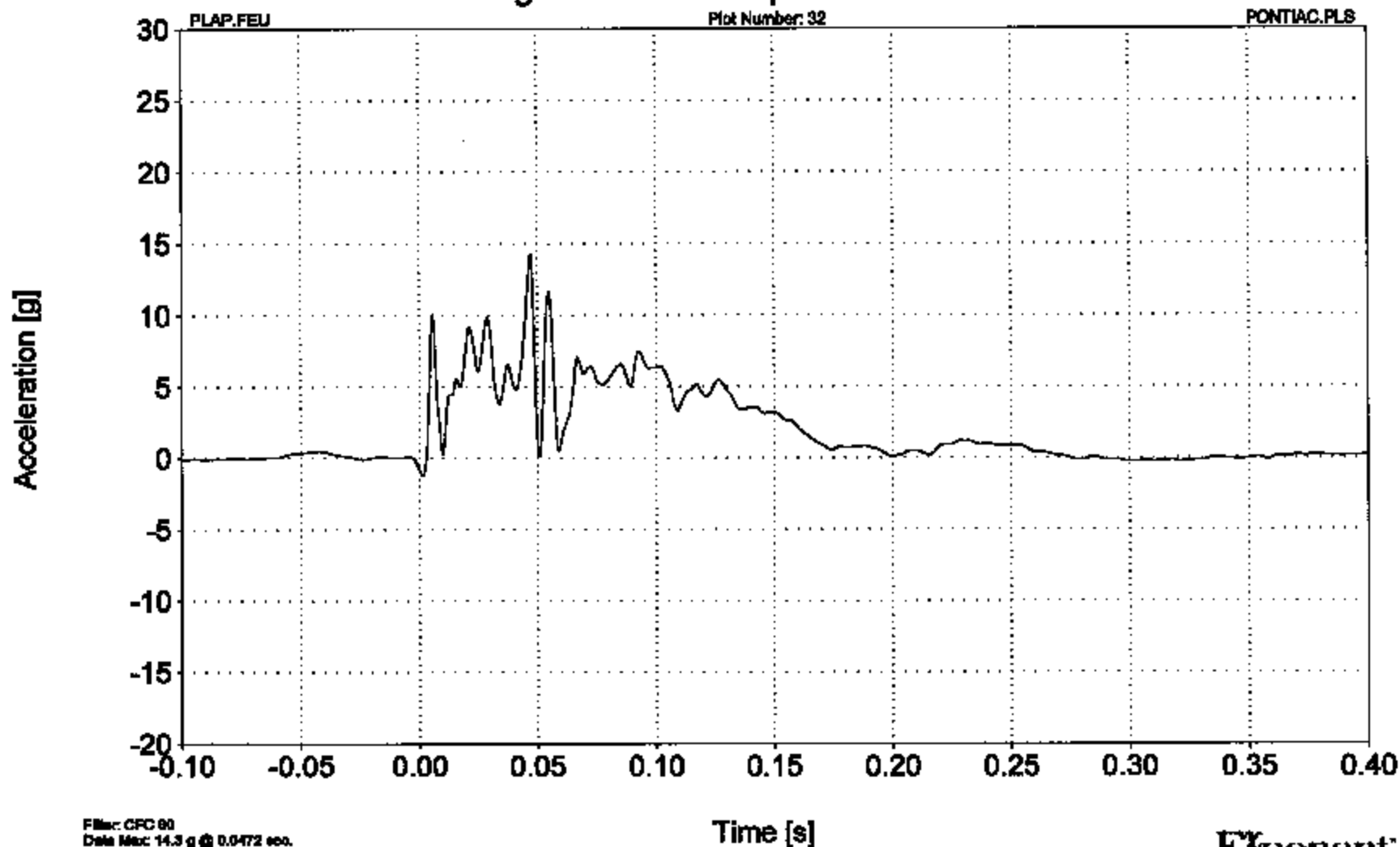
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left A-Pillar Low

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



File: CFC 00
Data Max: 14.3 g @ 0.0472 sec.
Data Min: -1.2 g @ 0.0012 sec.
201F Side Pole Impact Testing
PH00002

B-36

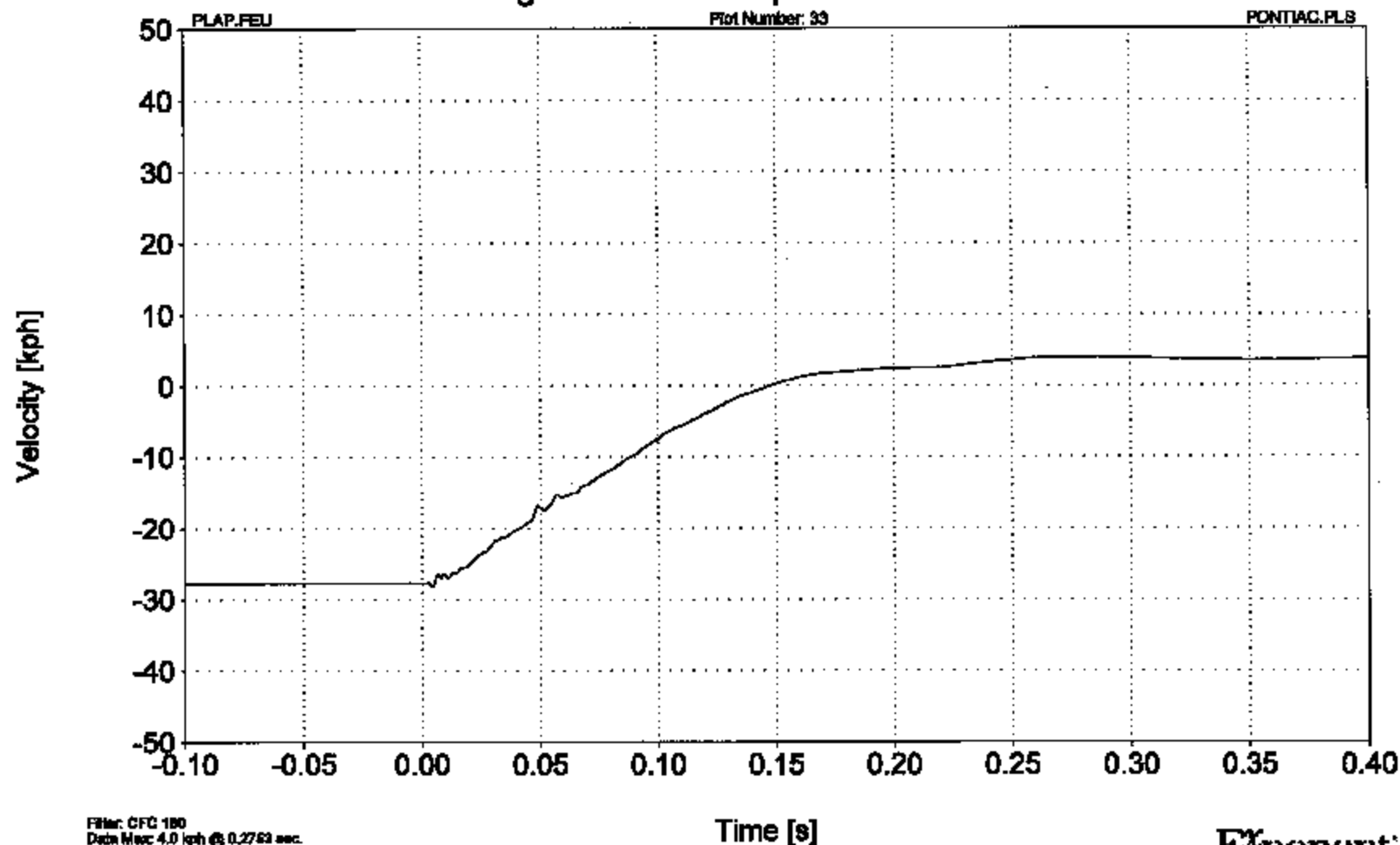
Exponent
Failure Analysis Associates®

Lateral Velocity v. Time

Left A-Pillar Low

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Rate: 4.0 kph @ 0.2763 sec.
Data Rate: -28.2 kph @ 0.0045 sec.

201P Side Pole Impact Testing
PH09882

Time [s]

B-37

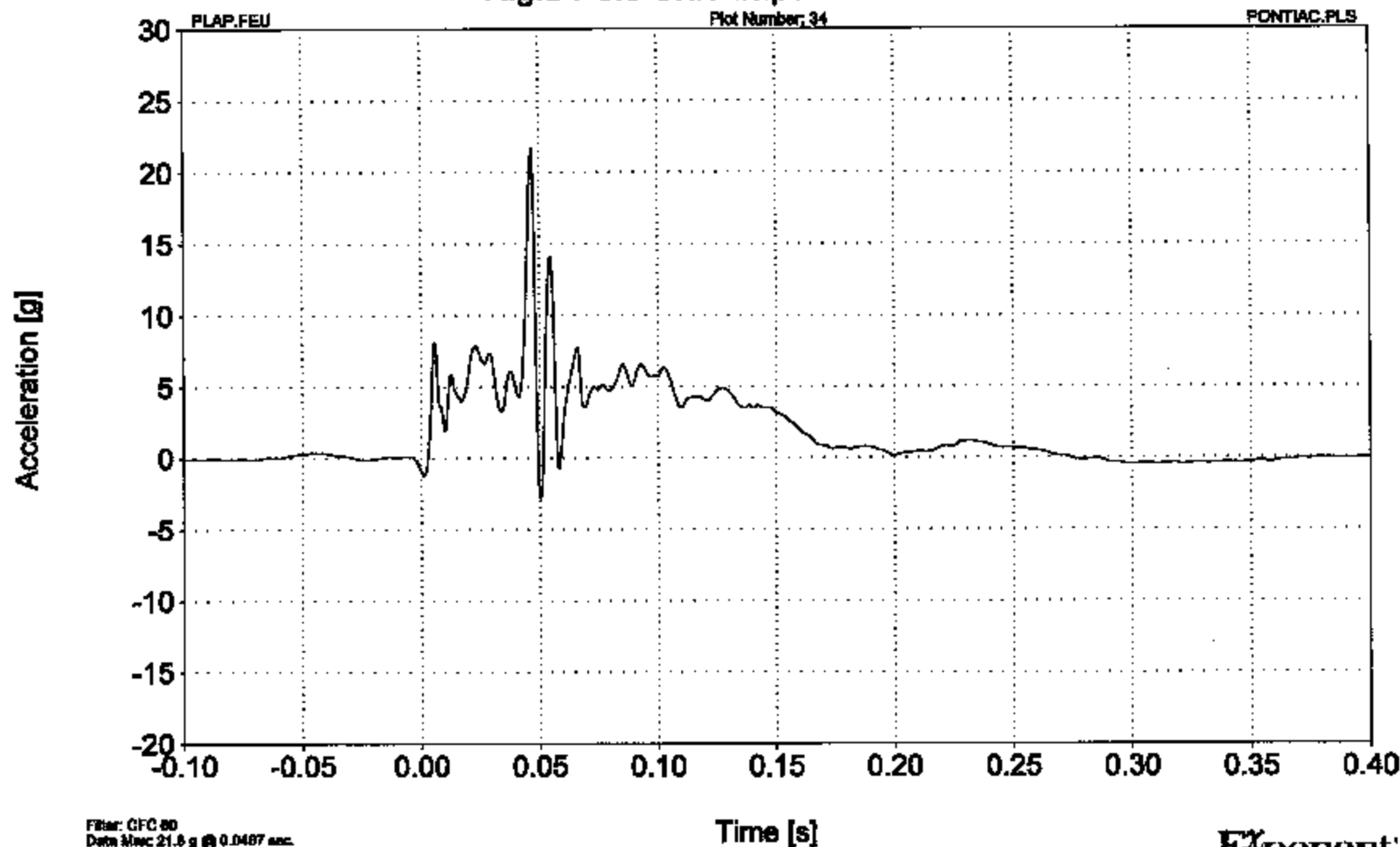
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left A-Pillar Mid

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 80
Data Max: 21.6 g @ 0.0467 sec.
Data Min: -2.8 g @ 0.0505 sec.

201P Side Pole Impact Testing
PH08882

B-38

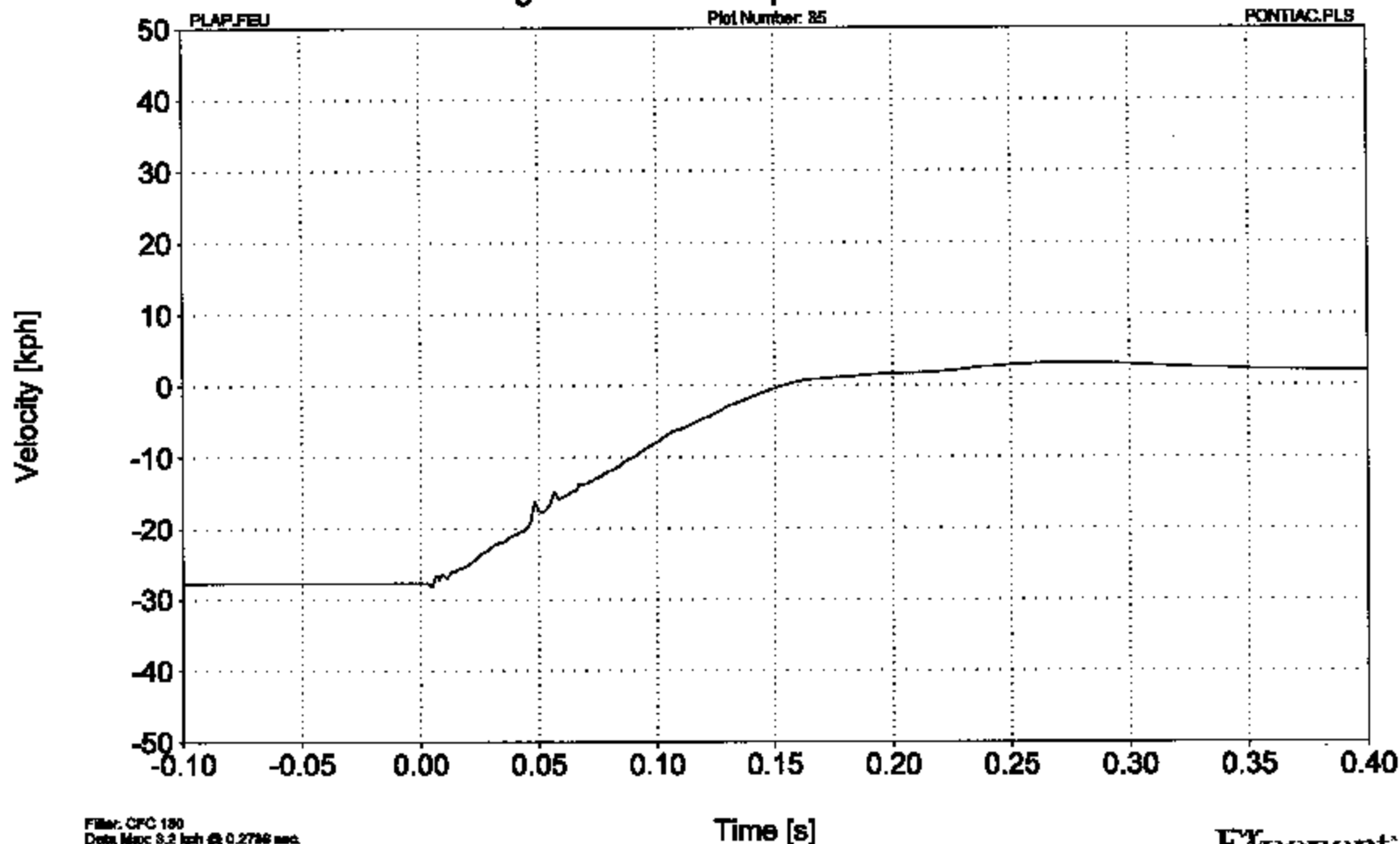
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Left A-Pillar Mid

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 3.2 kph @ 0.2796 sec.
Data Min: -28.2 kph @ 0.0048 sec.

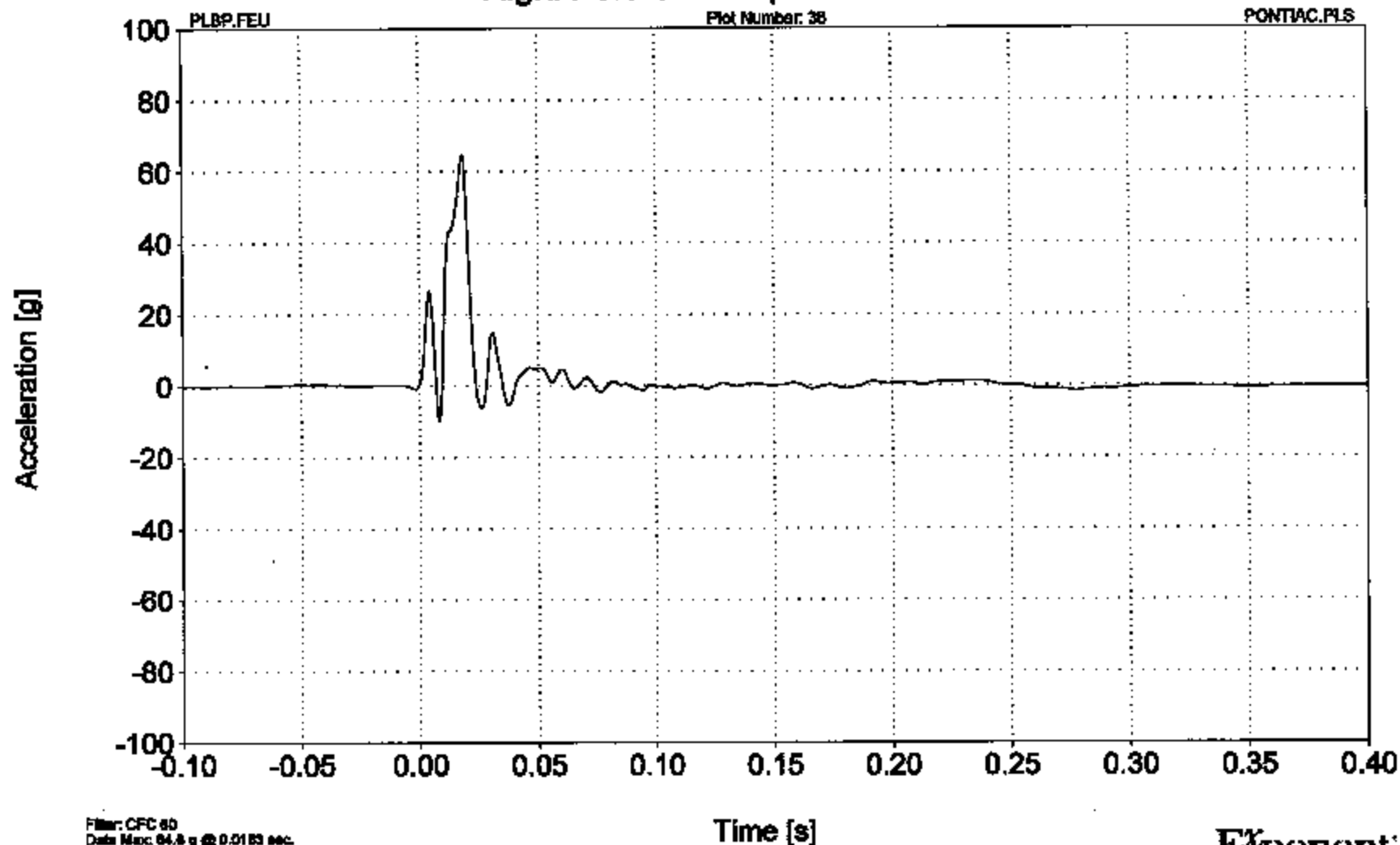
201P Side Pole Impact Testing
PH00002

Lateral Acceleration v Time

Left B-Pillar Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 60
Data Max: 64.8 g @ 0.0183 sec.
Data Min: -9.9 g @ 0.0084 sec.

201P Side Pole Impact Testing
PH06002

B-40

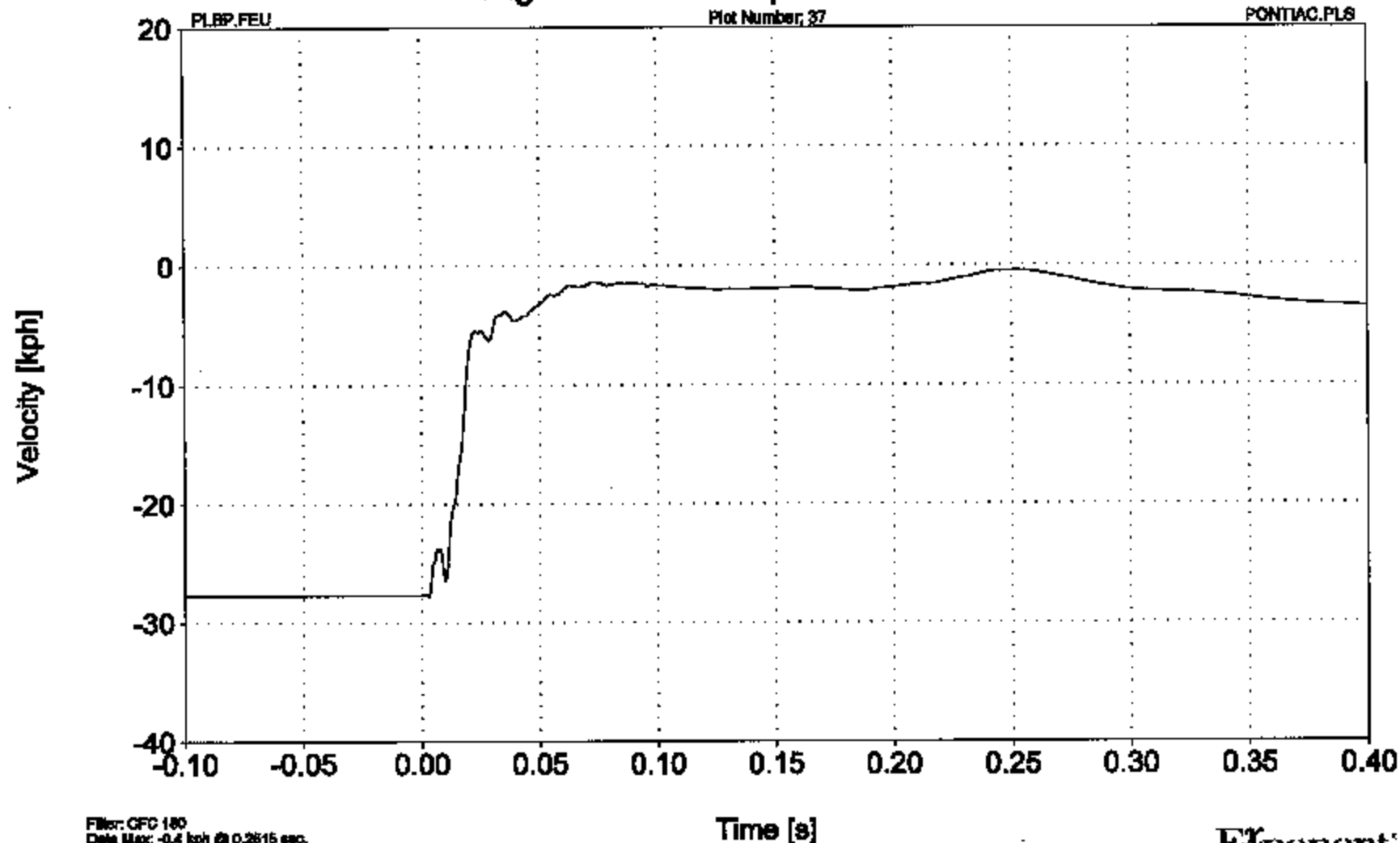
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Left B-Pillar Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: -0.4 kph @ 0.2615 sec.
Data Min: -27.8 kph @ 0.0000 sec.

201P Side Pole Impact Testing
PH00992

B-41

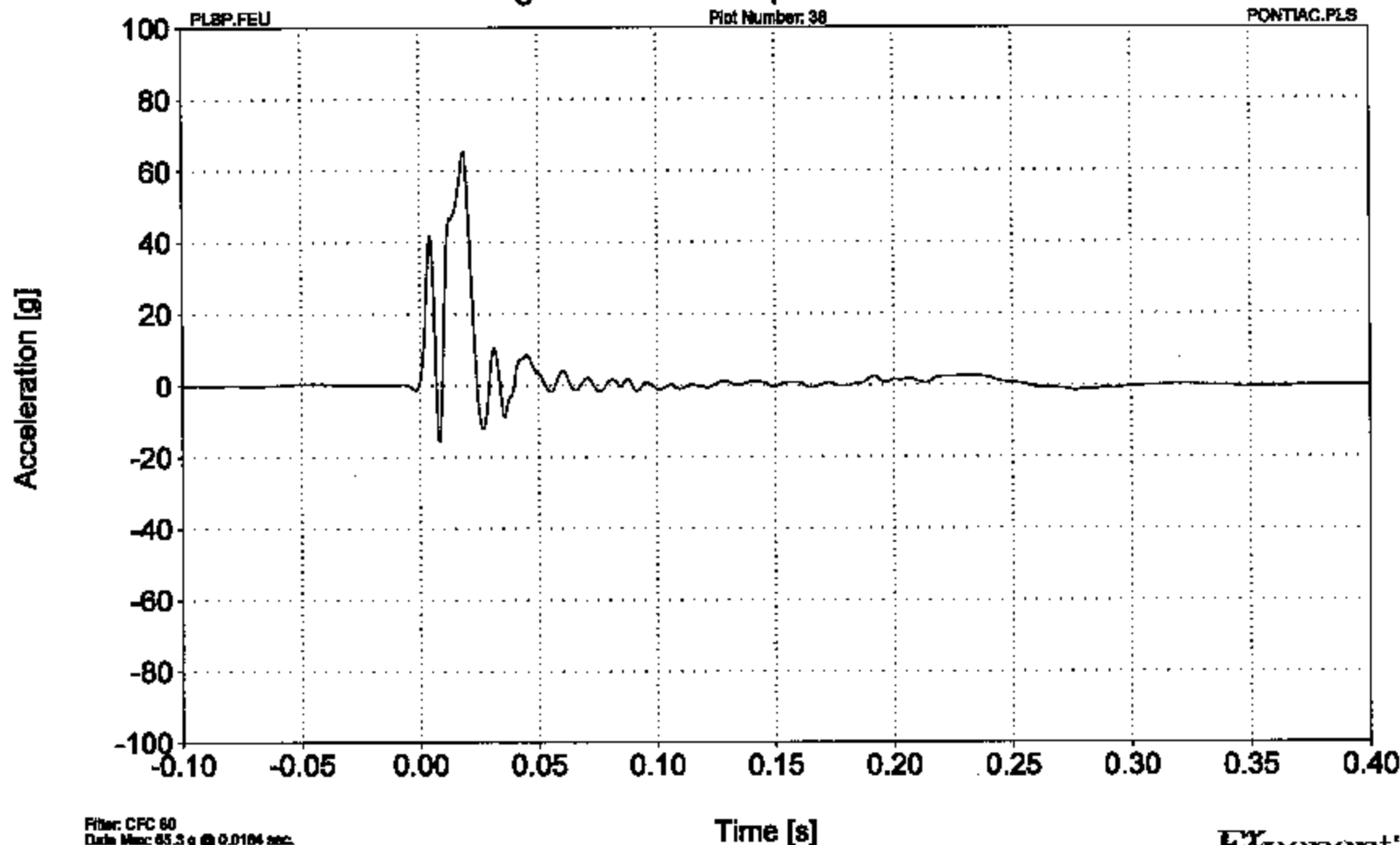
Exponent
Failure Analysis Associates™

Lateral Acceleration v Time

Left B-Pillar Low

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 60
Data Max: 65.3 g @ 0.0104 sec.
Data Min: -15.6 g @ 0.0061 sec.

201P Side Pole Impact Testing
PH0662

B-42

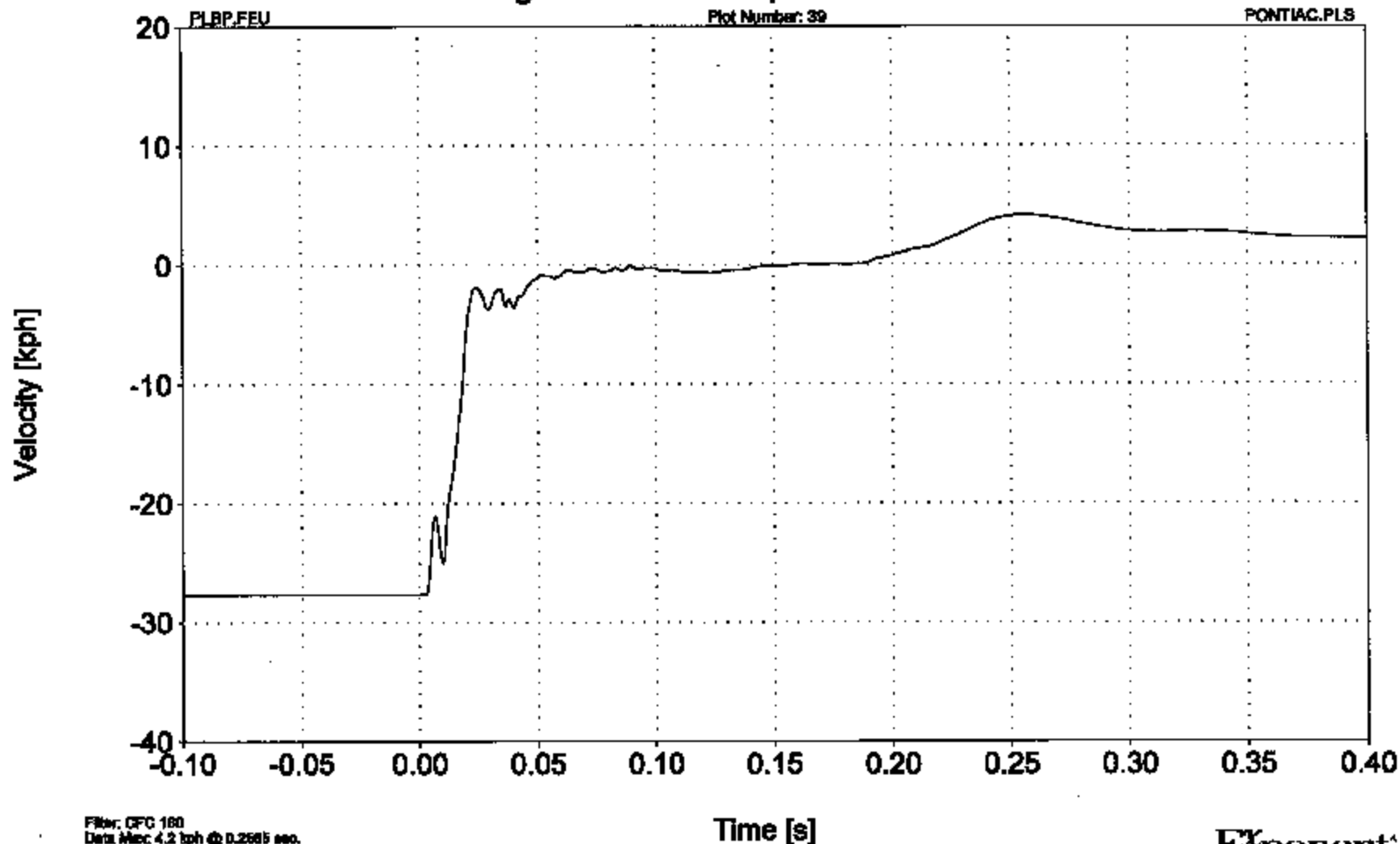
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Left B-Pillar Low

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH08042

B-43

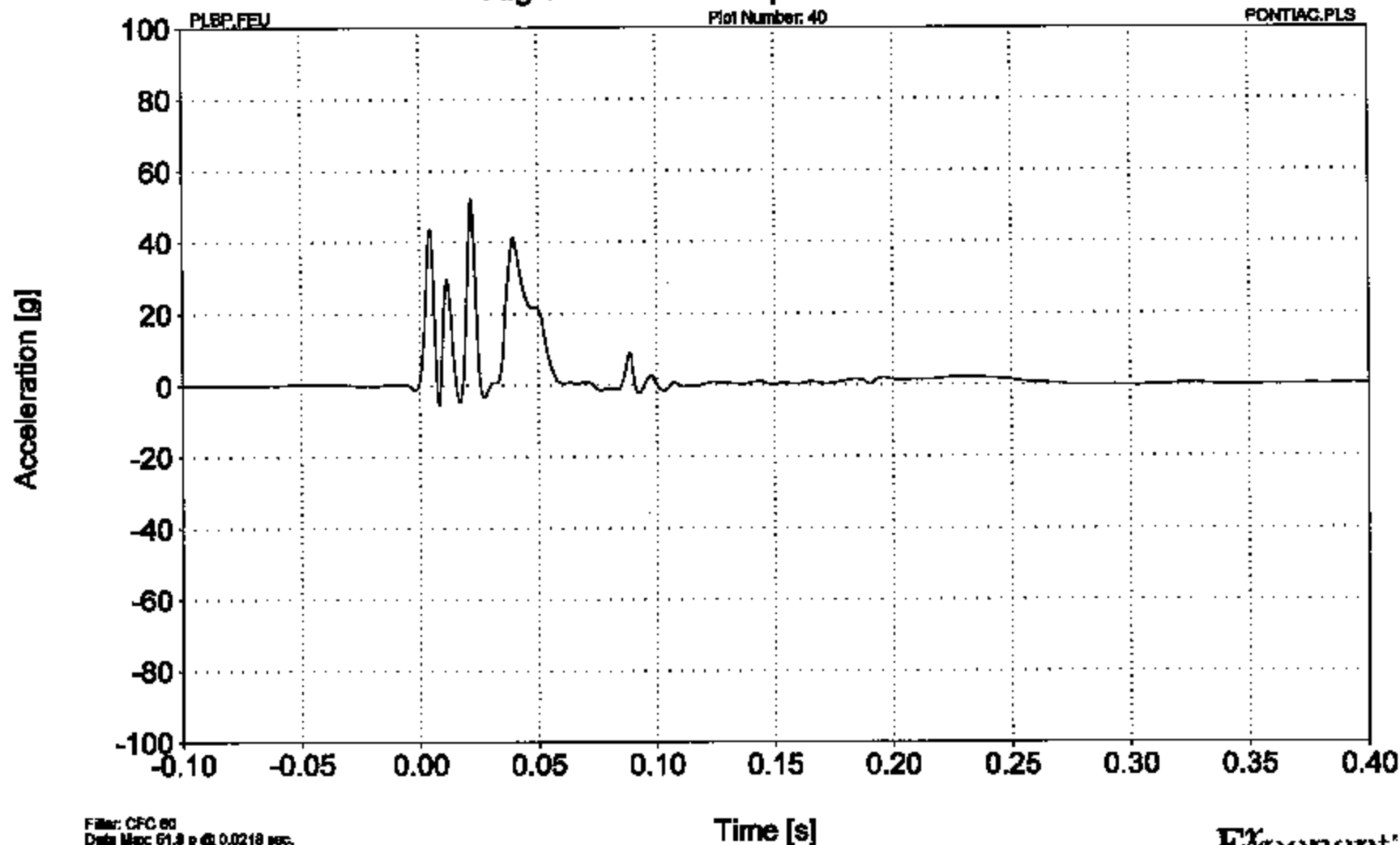
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left B-Pillar Mid

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH08882

B-44

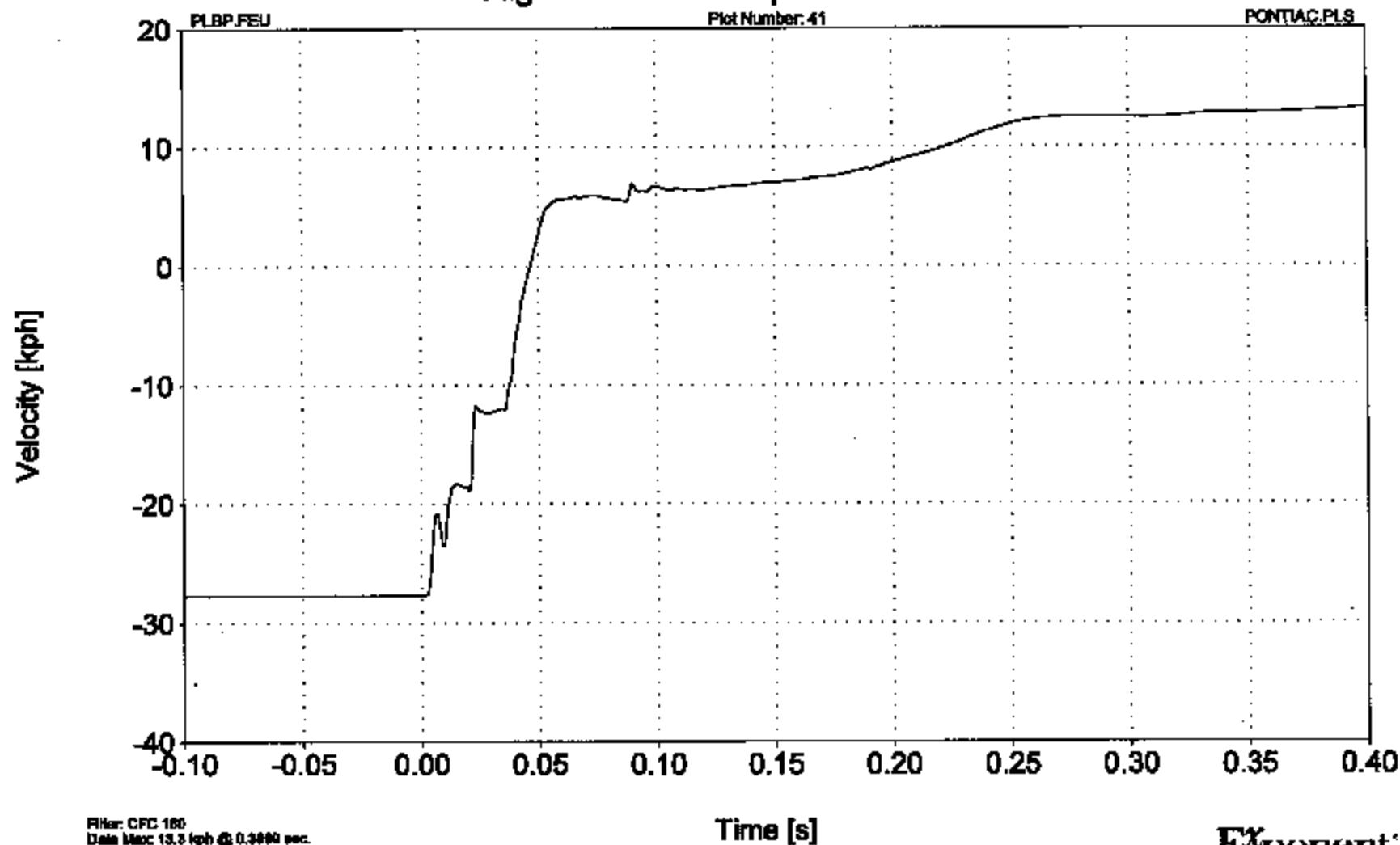
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Left B-Pillar Mid

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 160
Data Max: 13.3 kph @ 0.3400 sec.
Data Min: -27.7 kph @ -0.1000 sec.

201P Side Pole Impact Testing
PH08882

B-45

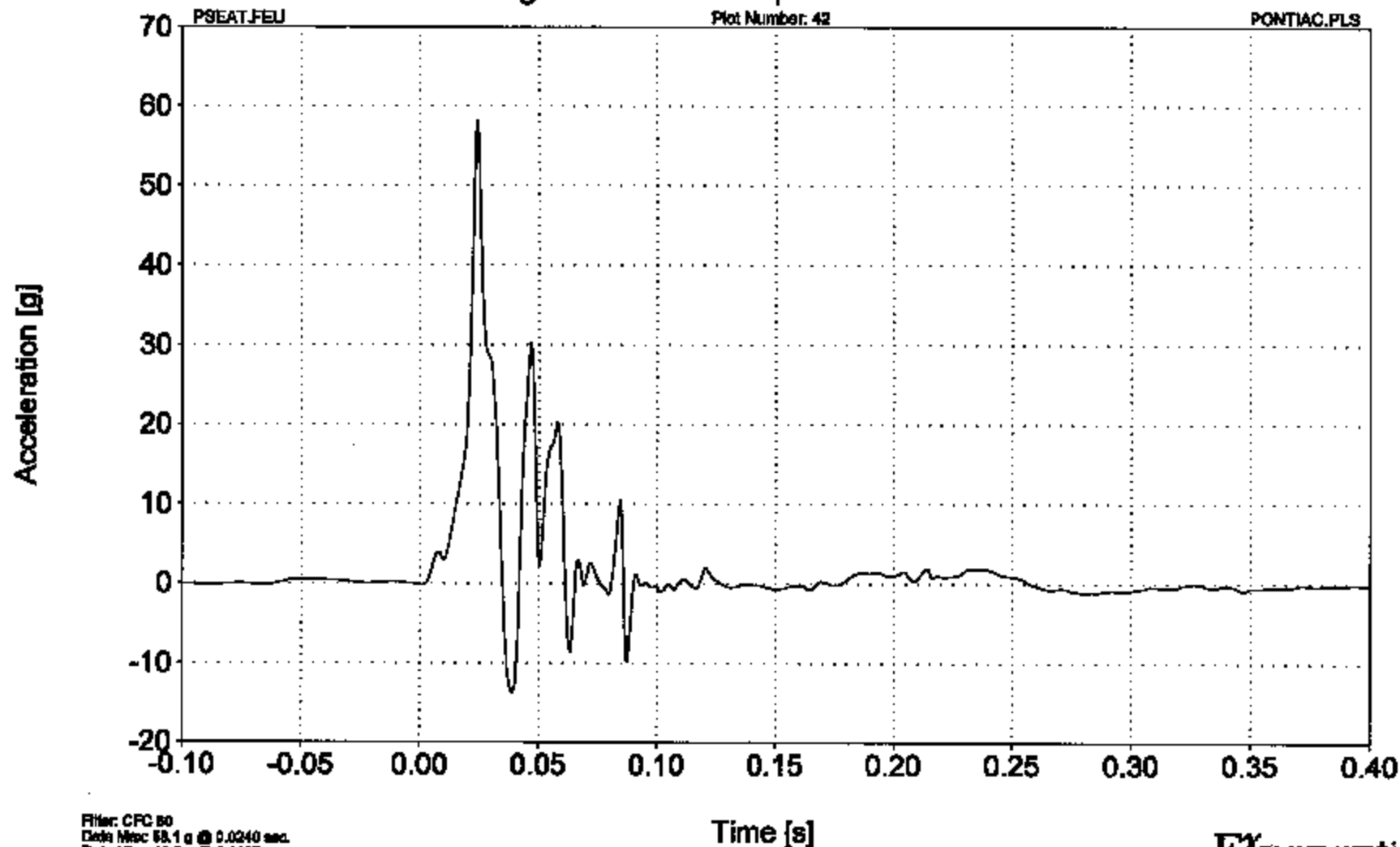
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Driver Seat Track

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 80
Data Minc: 58.1 g @ 0.0240 sec.
Data Minc: -18.6 g @ 0.0387 sec.

201P Side Pole Impact Testing
PH08682

B-46

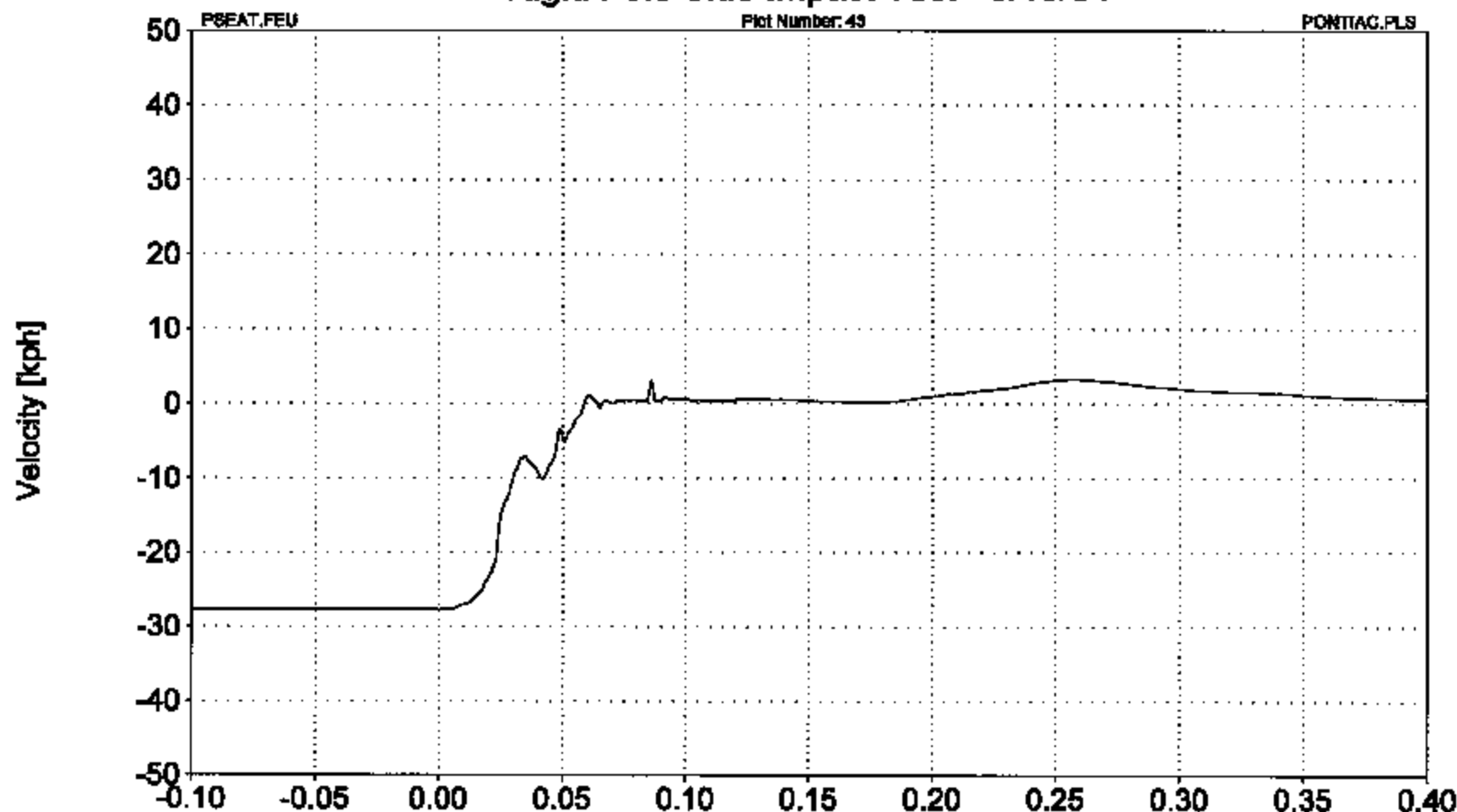
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Driver Seat Track

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CPC 180
Data Max: 8.3 kph @ 0.2667 sec.
Data Min: -27.7 kph @ 0.0023 sec.

201P Side Pole Impact Testing
PH05682

Time [s]

B-47

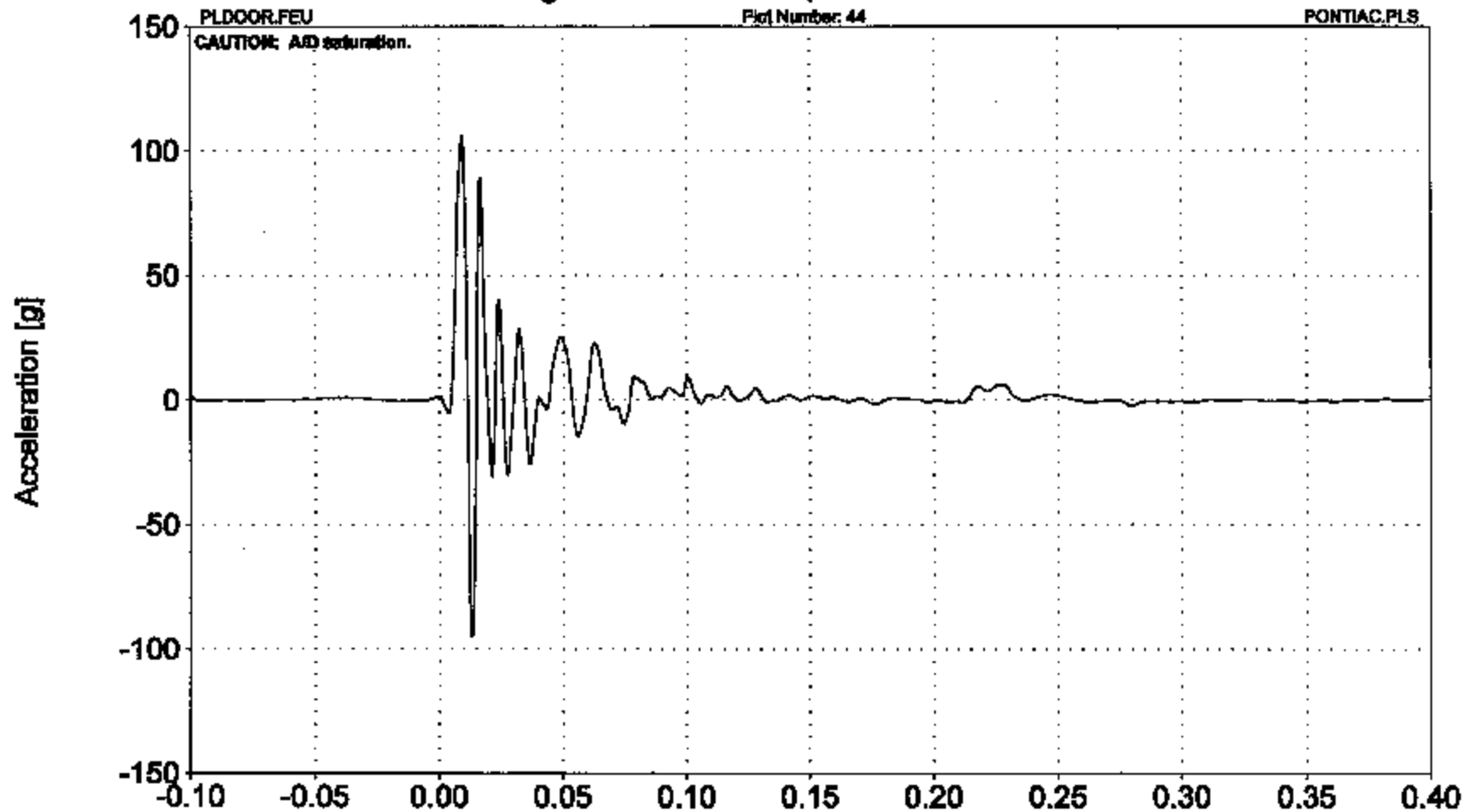
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left Door Lower

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 100
Data Max: 105.0 g @ 0.0083 sec.
Data Min: -95.2 g @ 0.0133 sec.

201P Side Pole Impact Testing
PH0662

Time [s]

B-48

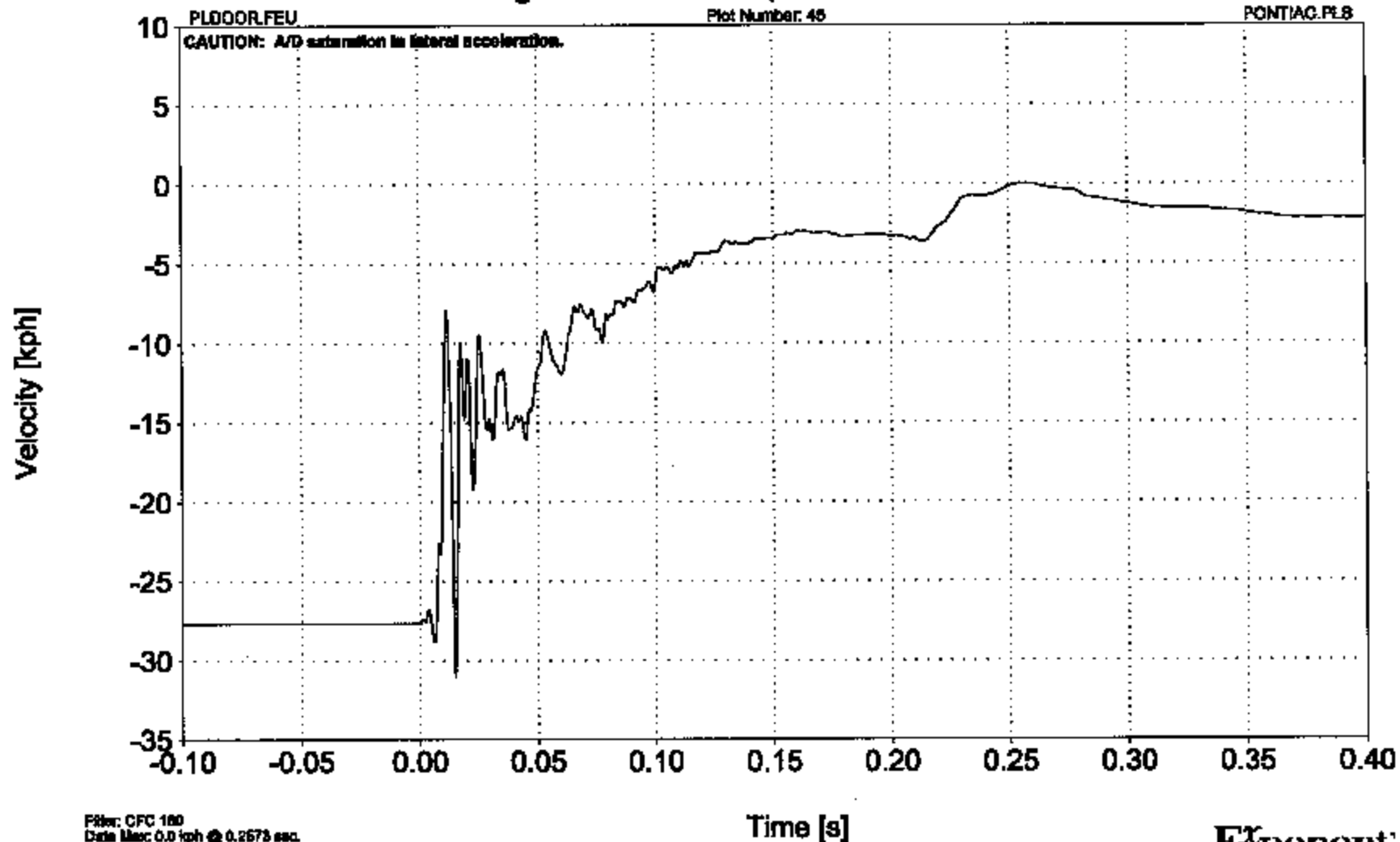
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Left Door Lower

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 100
Data Max: 0.0 kph @ 0.2673 sec.
Data Min: -31.0 kph @ 0.0150 sec.

201P Side Pole Impact Testing
PH06662

B-49

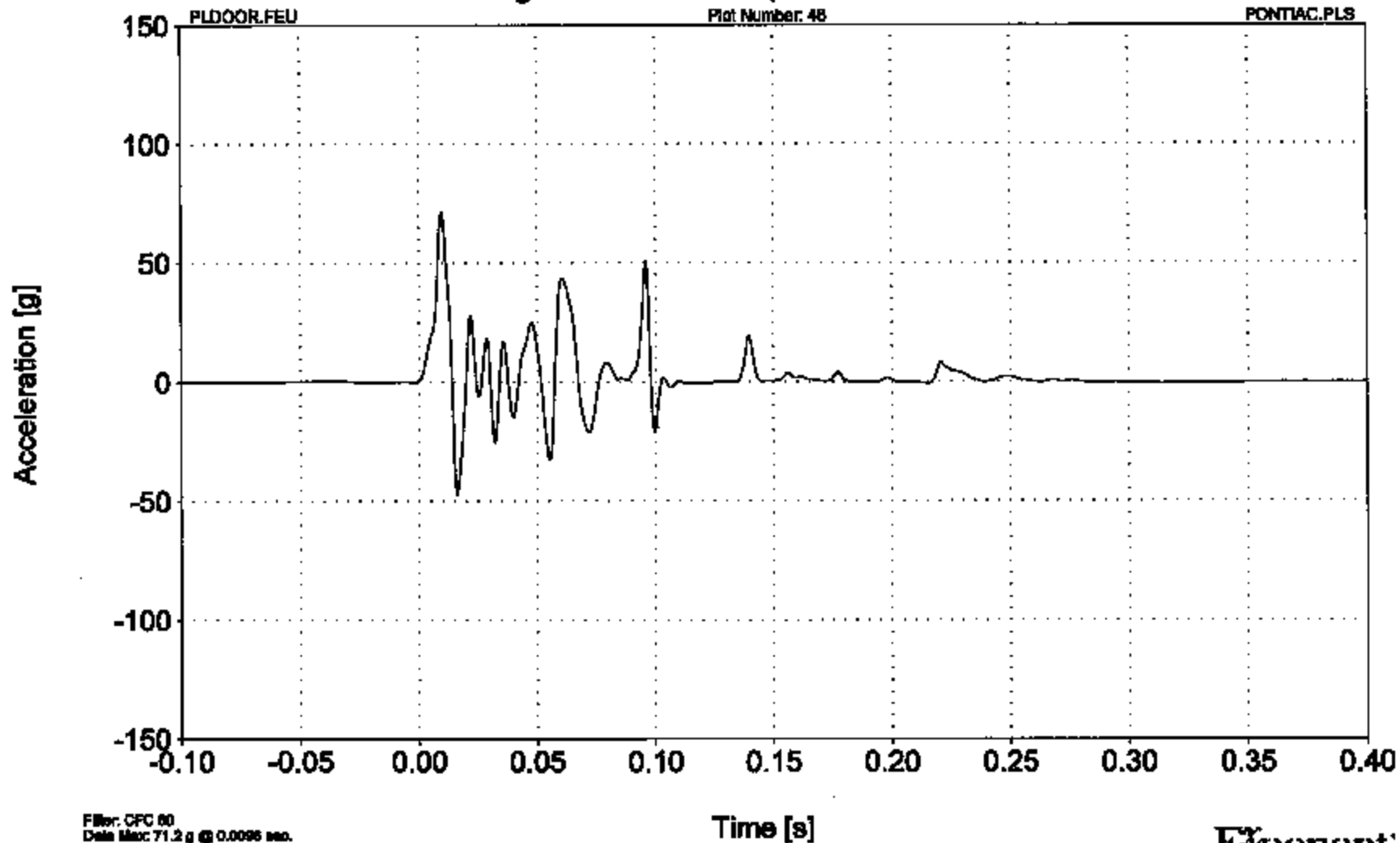
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left Door Middle

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 80
Data Max: 71.2 g @ 0.0096 sec.
Data Min: -47.5 g @ 0.0161 sec.

201P Side Pole Impact Testing
PH06662

B-50

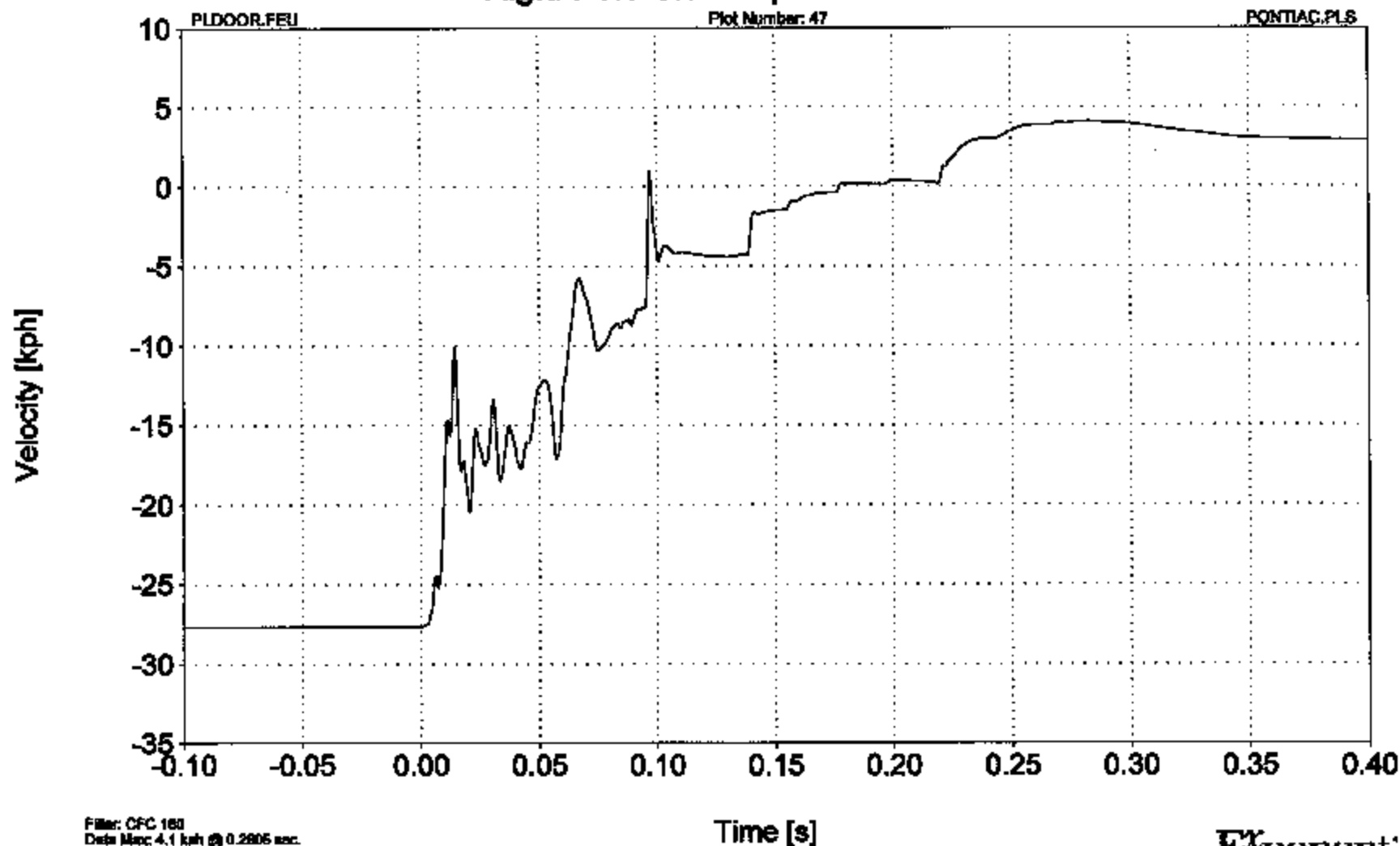
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Left Door Middle

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



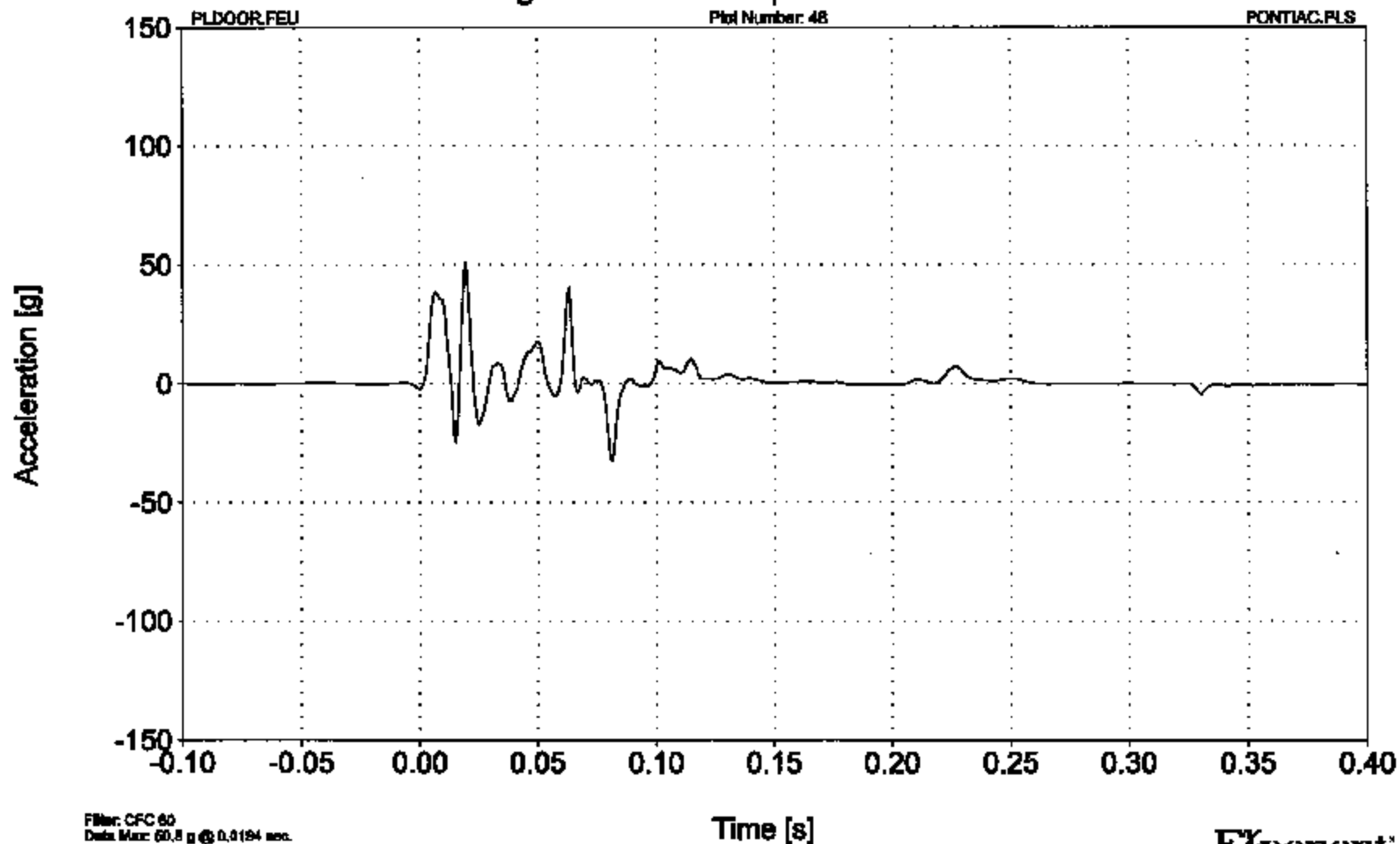
201P Side Pole Impact Testing
PH08882

B-51

Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Left Door Upper
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



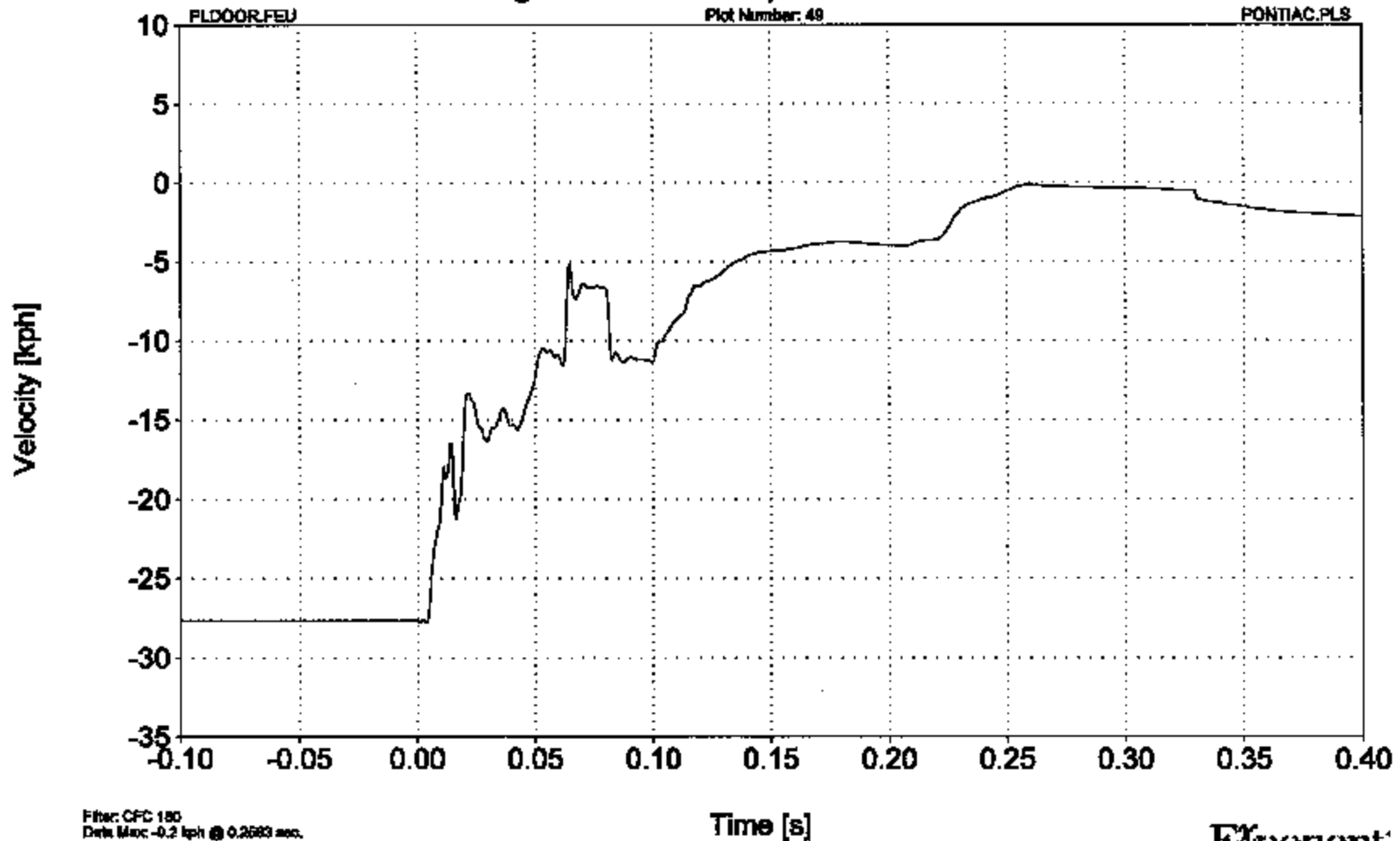
Filter: CFC 80
Data Max: 60.8 g @ 0.0184 sec.
Data Min: -32.6 g @ 0.0813 sec.
201P Side Pole Impact Testing
PH00002

B-52

Exponent
Failure Analysis Associates™

Lateral Velocity v Time

Left Door Upper
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
PH00002

B-53

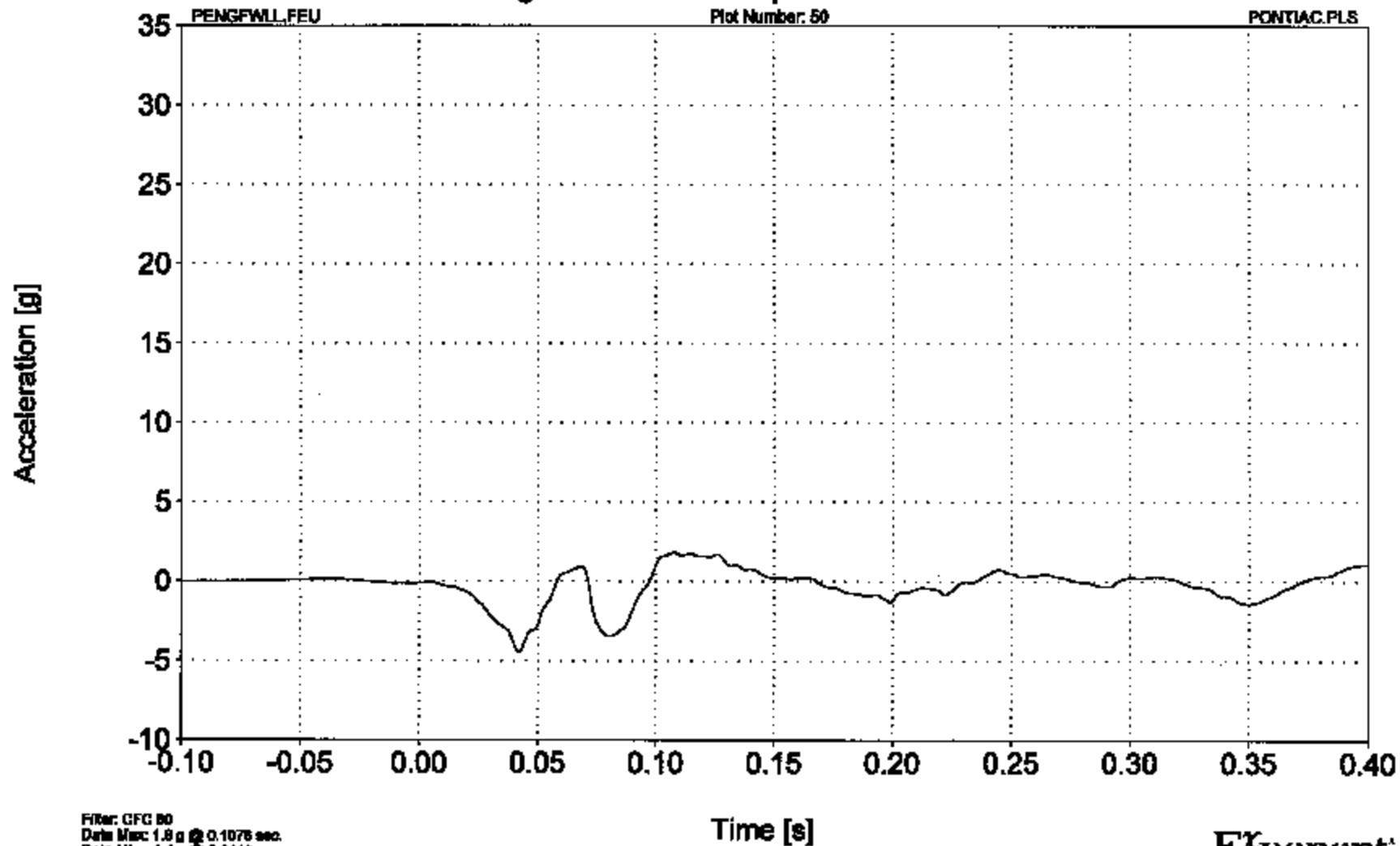
Exponent
Failure Analysis Associates®

Longitudinal Acceleration v Time

Engine

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: GFC 80
Data Max: 1.8 g @ 0.1076 sec.
Data Min: -4.4 g @ 0.0419 sec.

201P Side Pole Impact Testing
PH08882

B-54

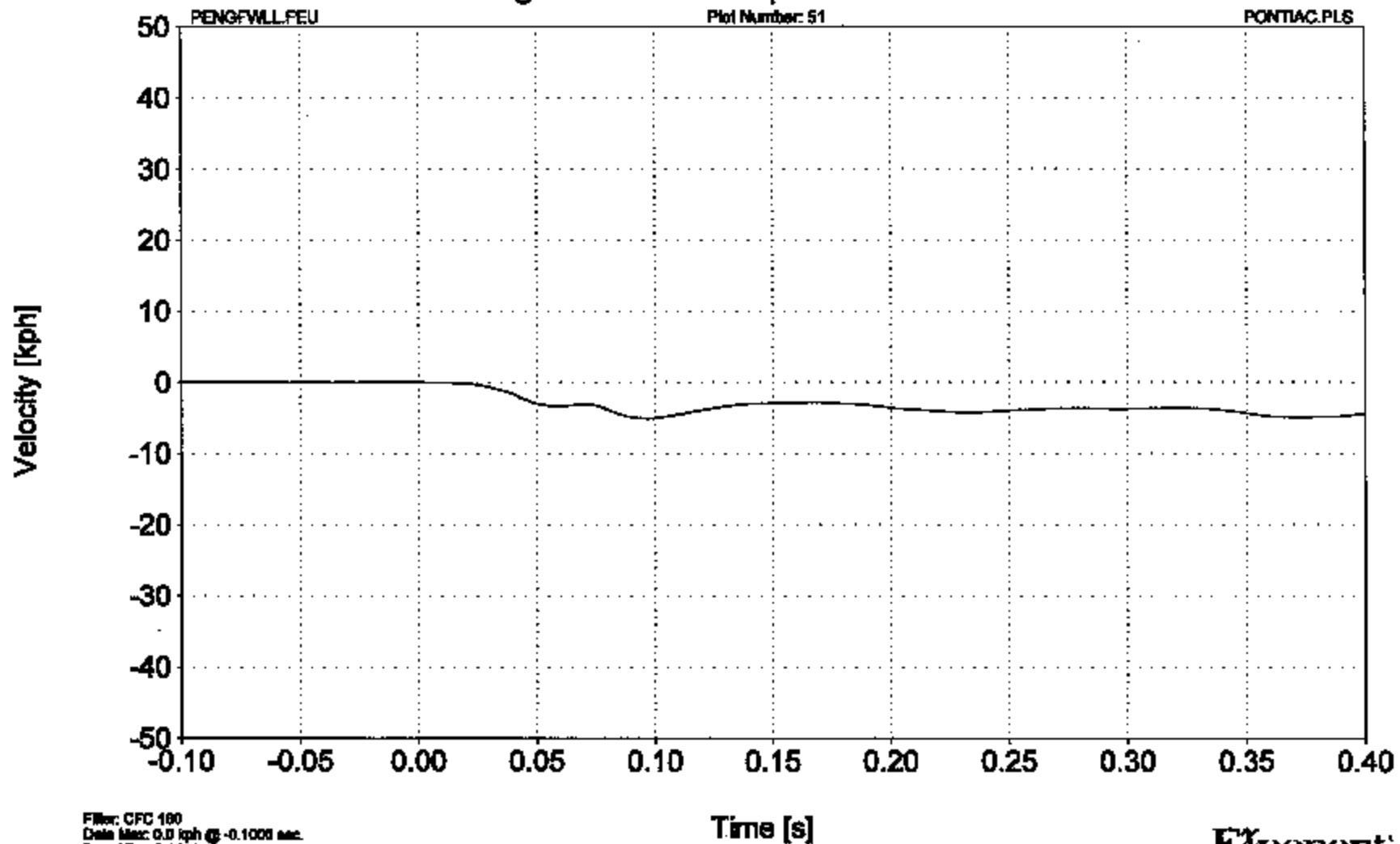
Exponent
Failure Analysis Associates*

Longitudinal Velocity v Time

Engine

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 0.0 kph @ -0.1000 sec.
Data Min: -6.1 kph @ 0.0976 sec.

201P Side Pole Impact Testing
PH08682

B-55

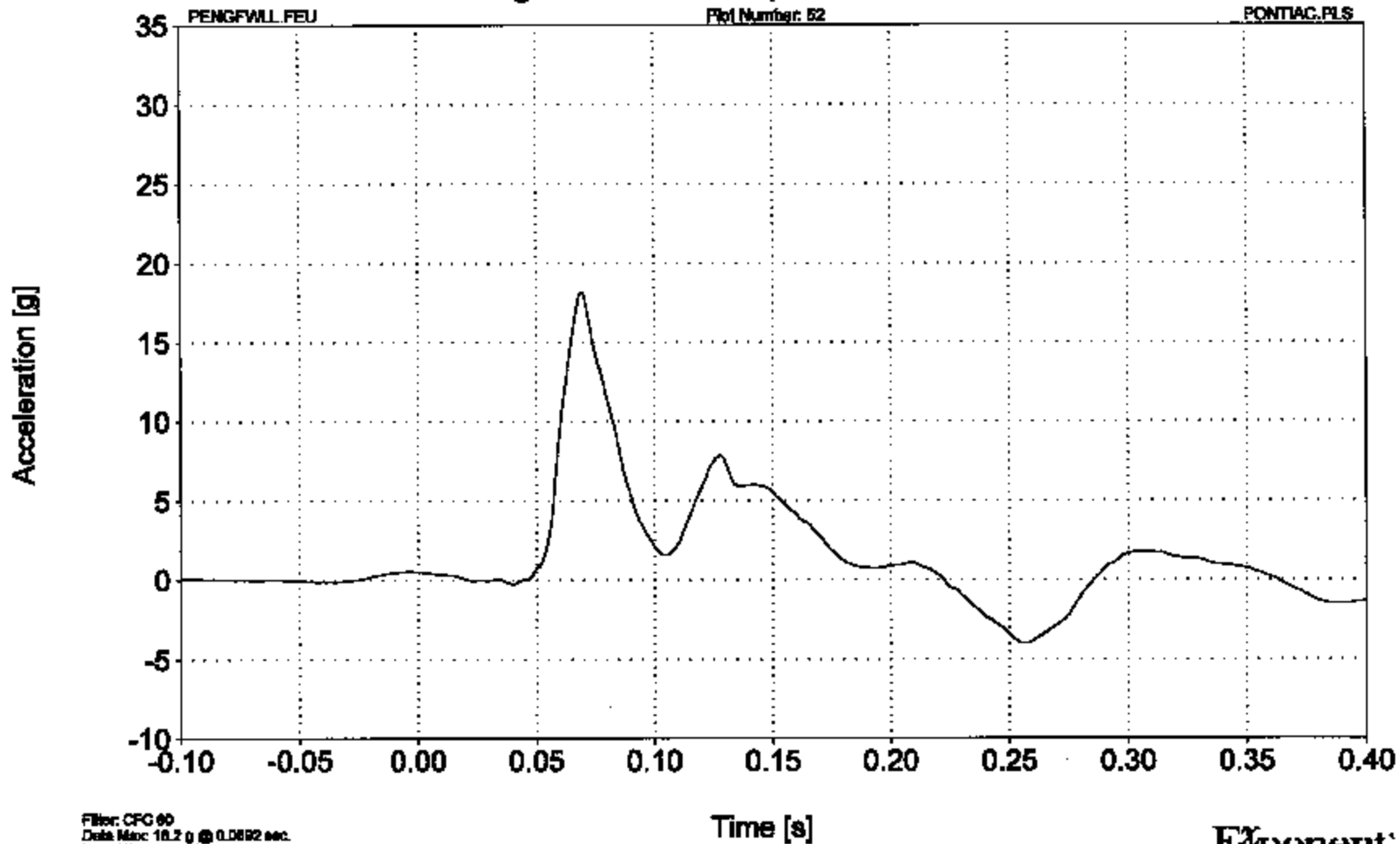
Exponent
Failure Analysis Associates™

Lateral Acceleration v Time

Engine

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 60
Data Max: 18.2 g @ 0.0692 sec.
Data Min: -4.0 g @ 0.2663 sec.

201P Side Pole Impact Testing
PH09982

B-56

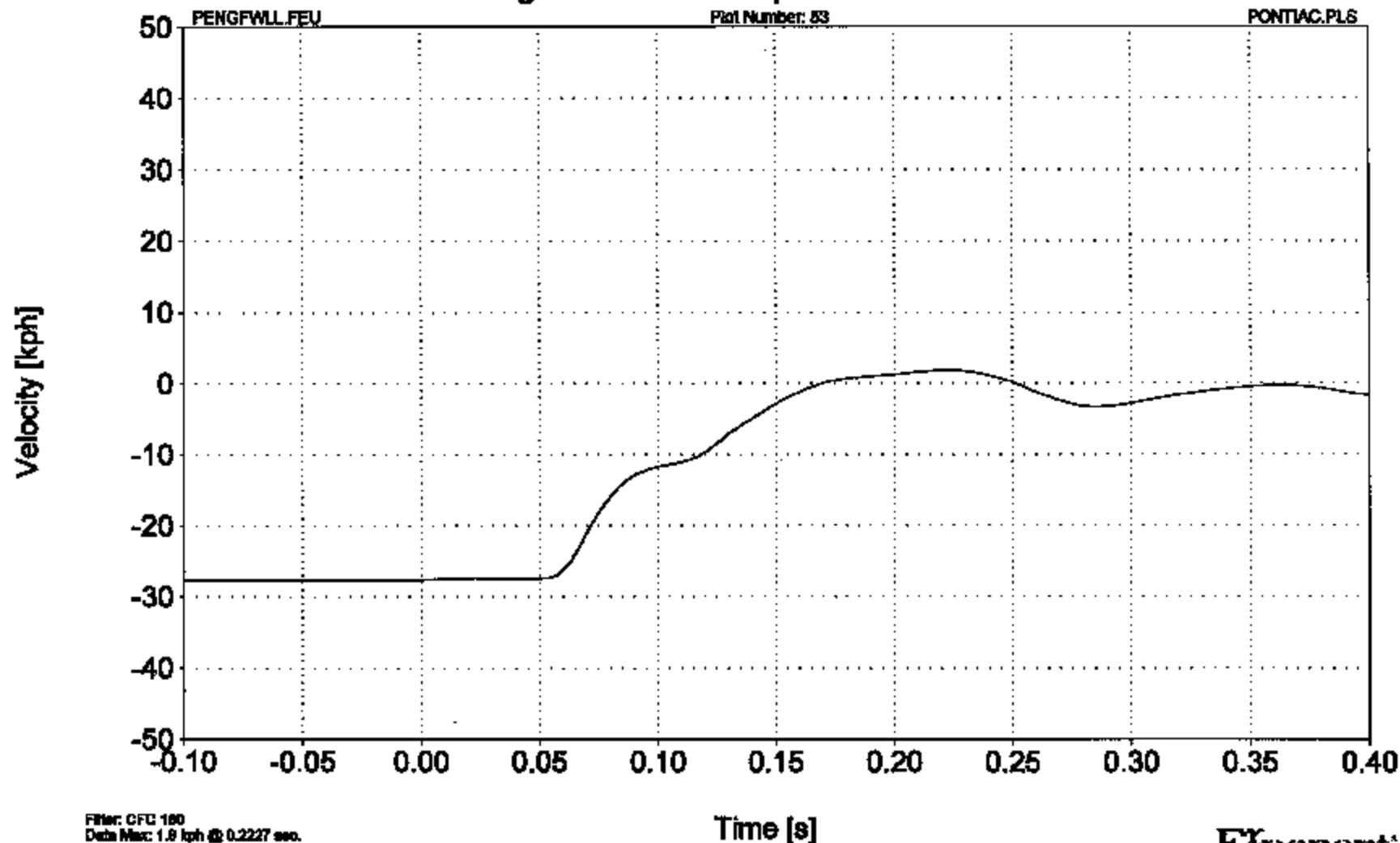
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Engine

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFZ 180
Data Max: 1.8 kph @ 0.2227 sec.
Data Min: -27.7 kph @ -0.1000 sec.

201P Side Pole Impact Testing
PH08082

B-57

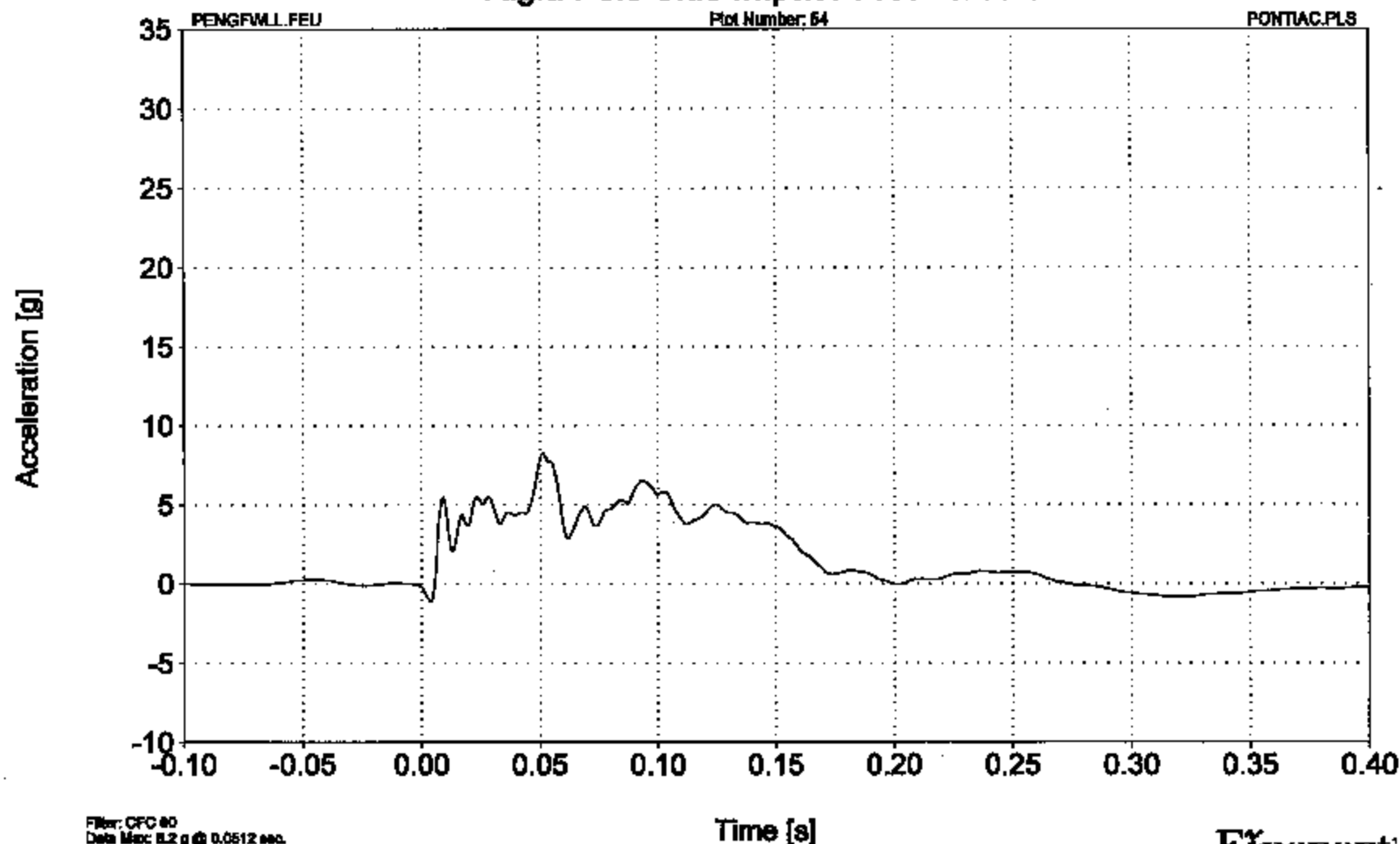
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Firewall

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 80
Data Max: 8.2 g @ 0.0512 sec.
Data Min: -1.1 g @ 0.0088 sec.

201P Side Pole Impact Testing
PH09082

B-58

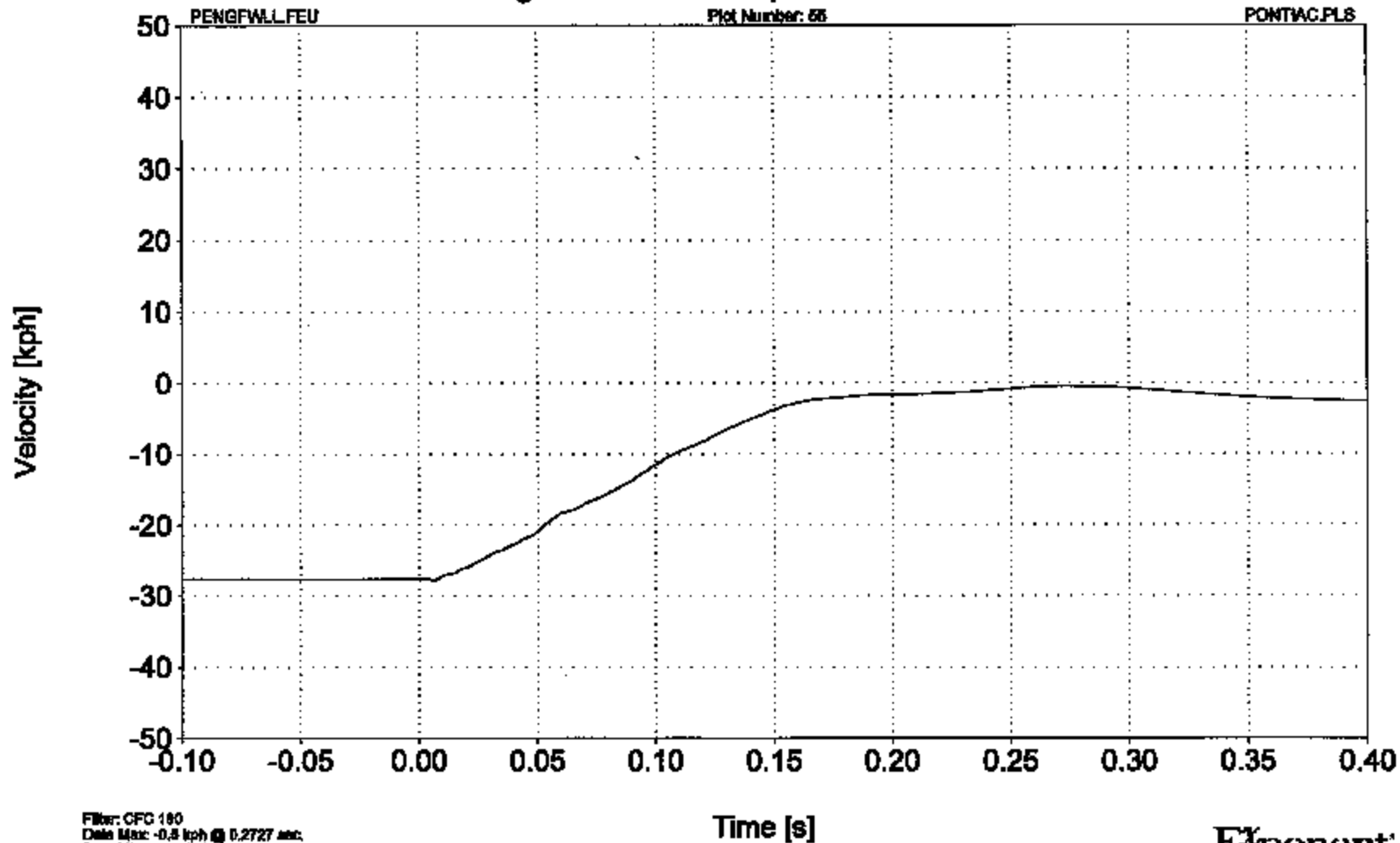
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Firewall

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: -0.8 kph @ 0.2727 sec.
Data Min: -27.8 kph @ 0.0081 sec.

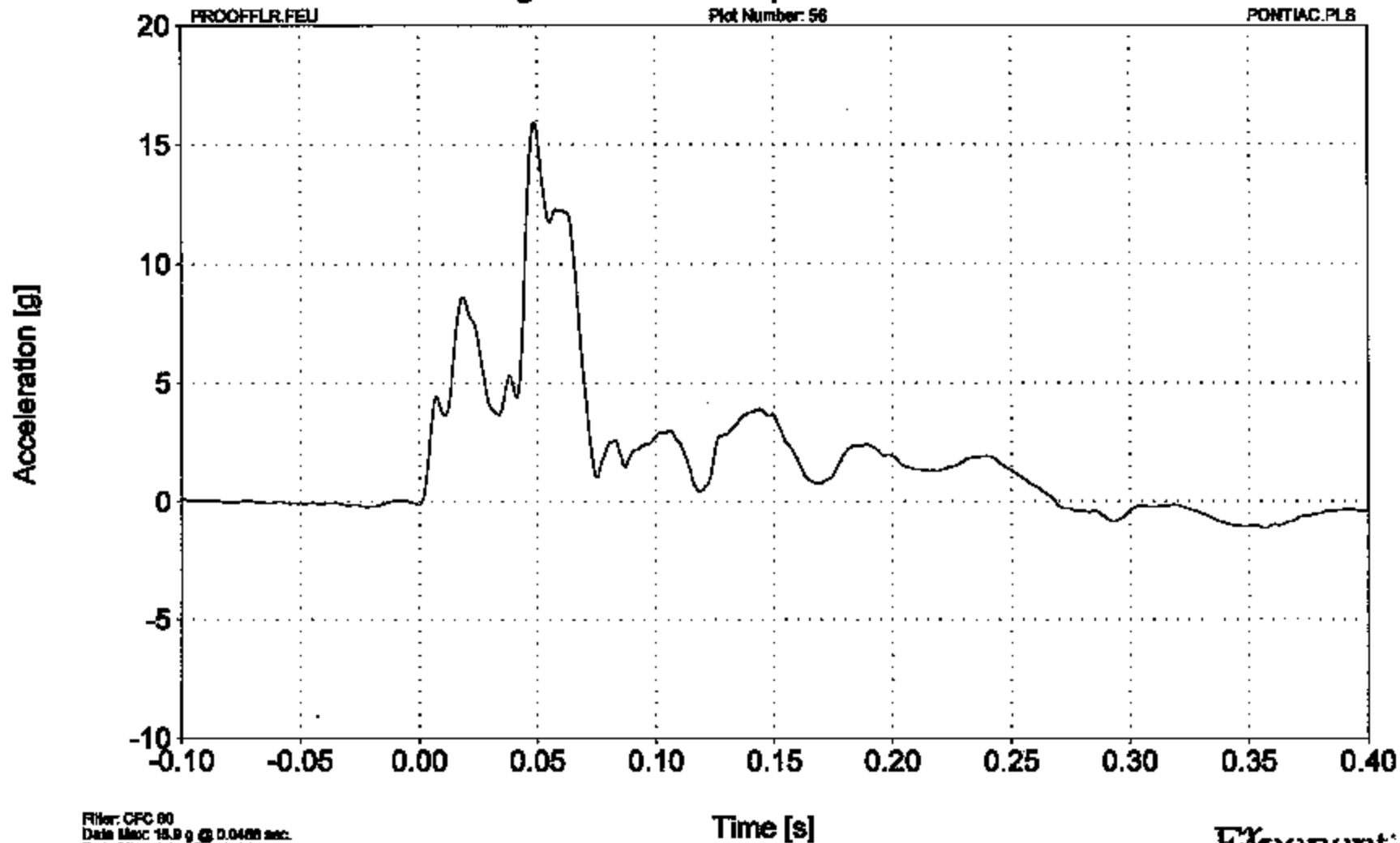
201P Side Pole Impact Testing
PI-106662

B-59

Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Right Roof Rail
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 80
Data Max: 15.9 g @ 0.0488 sec.
Data Min: -1.1 g @ 0.3588 sec.

201P Side Pole Impact Testing
PH06662

B-60

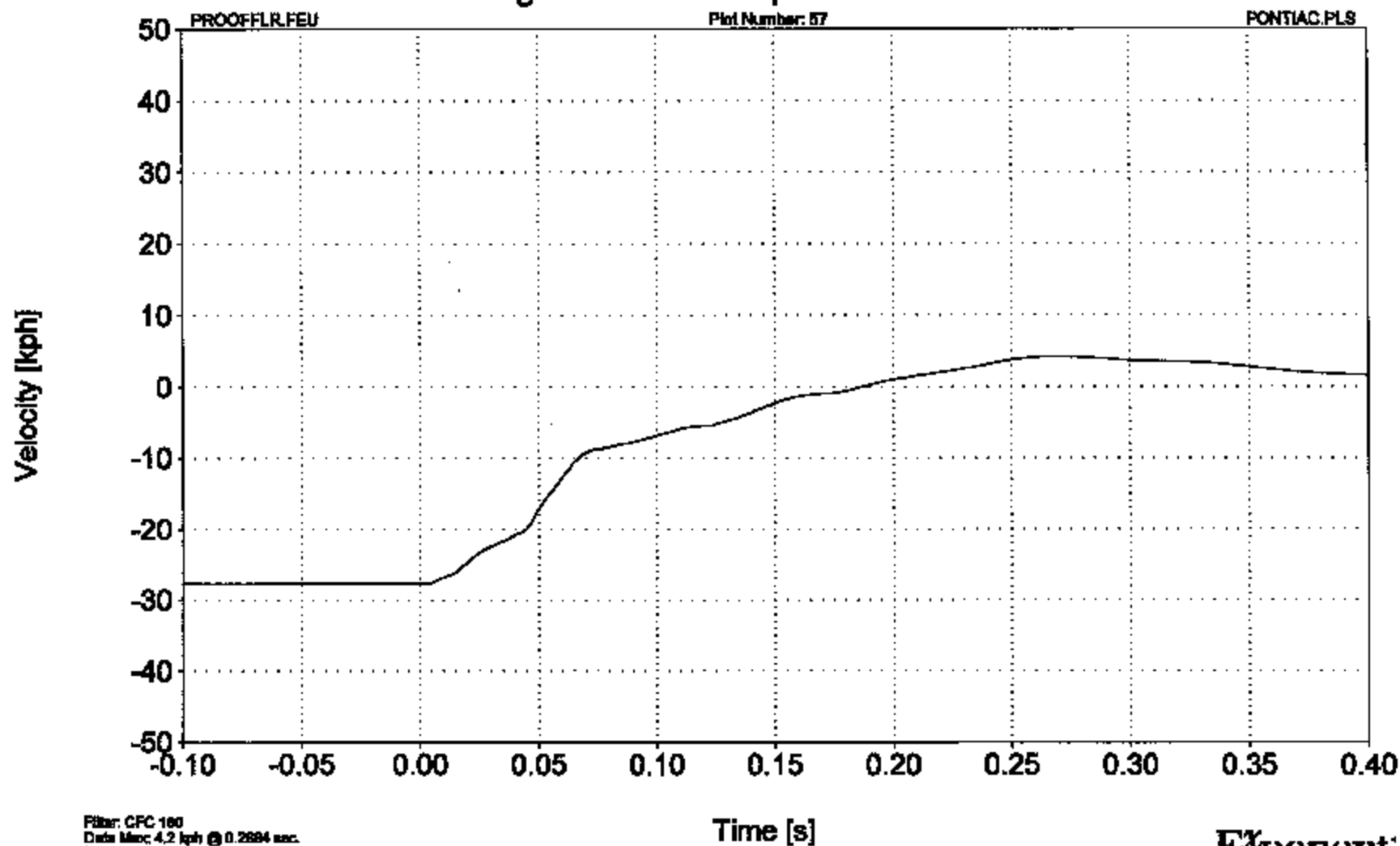
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Right Roof Rail

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 100
Data Max: 4.2 kph @ 0.2894 sec.
Data Min: -27.7 kph @ 0.0030 sec.

201P Side Pole Impact Testing
PH000002

B-61

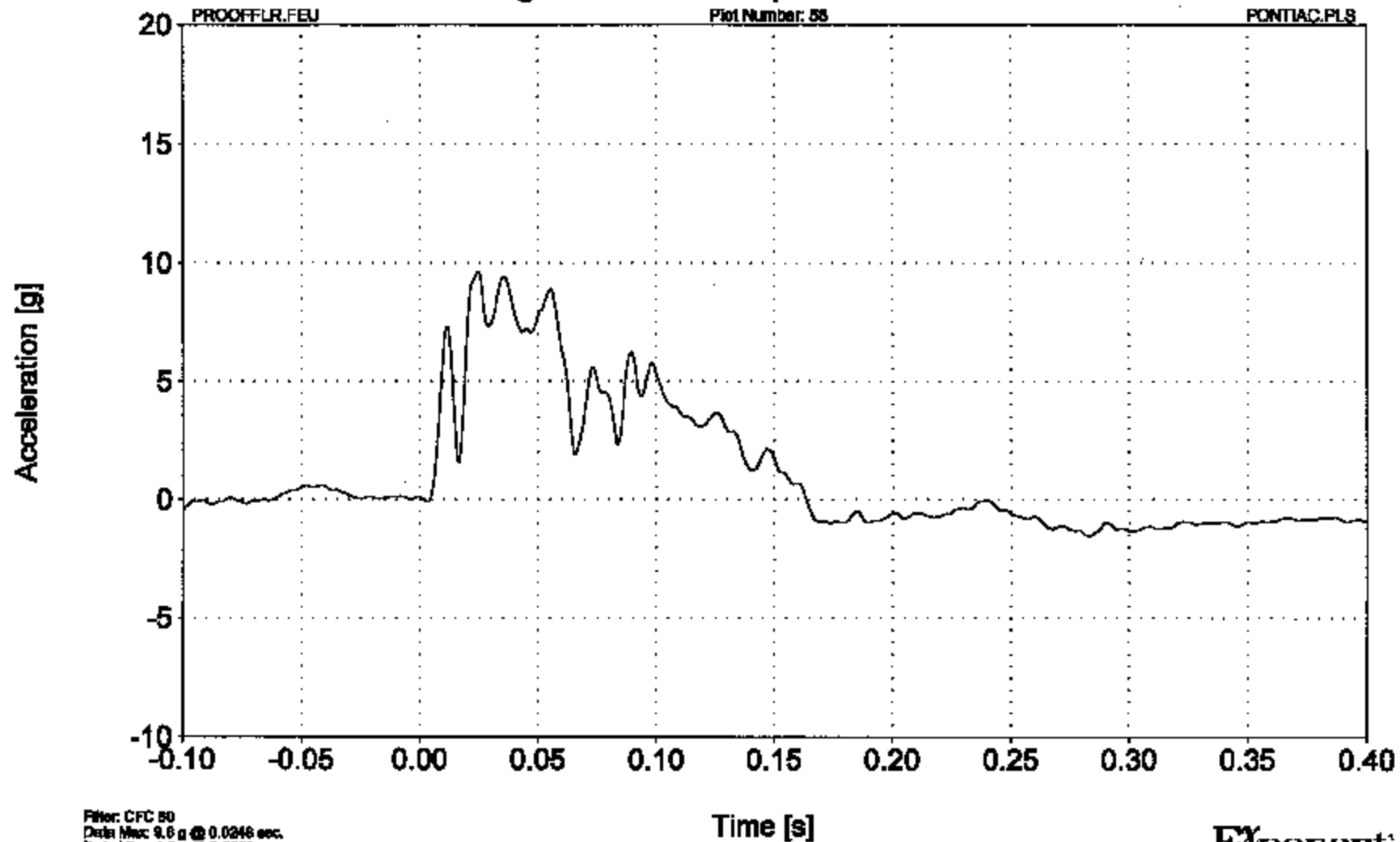
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Right Floor Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 50
Data Max: 9.6 g @ 0.0246 sec.
Data Min: -1.6 g @ 0.2828 sec.

201P Side Pole Impact Testing
PH05682

B-62

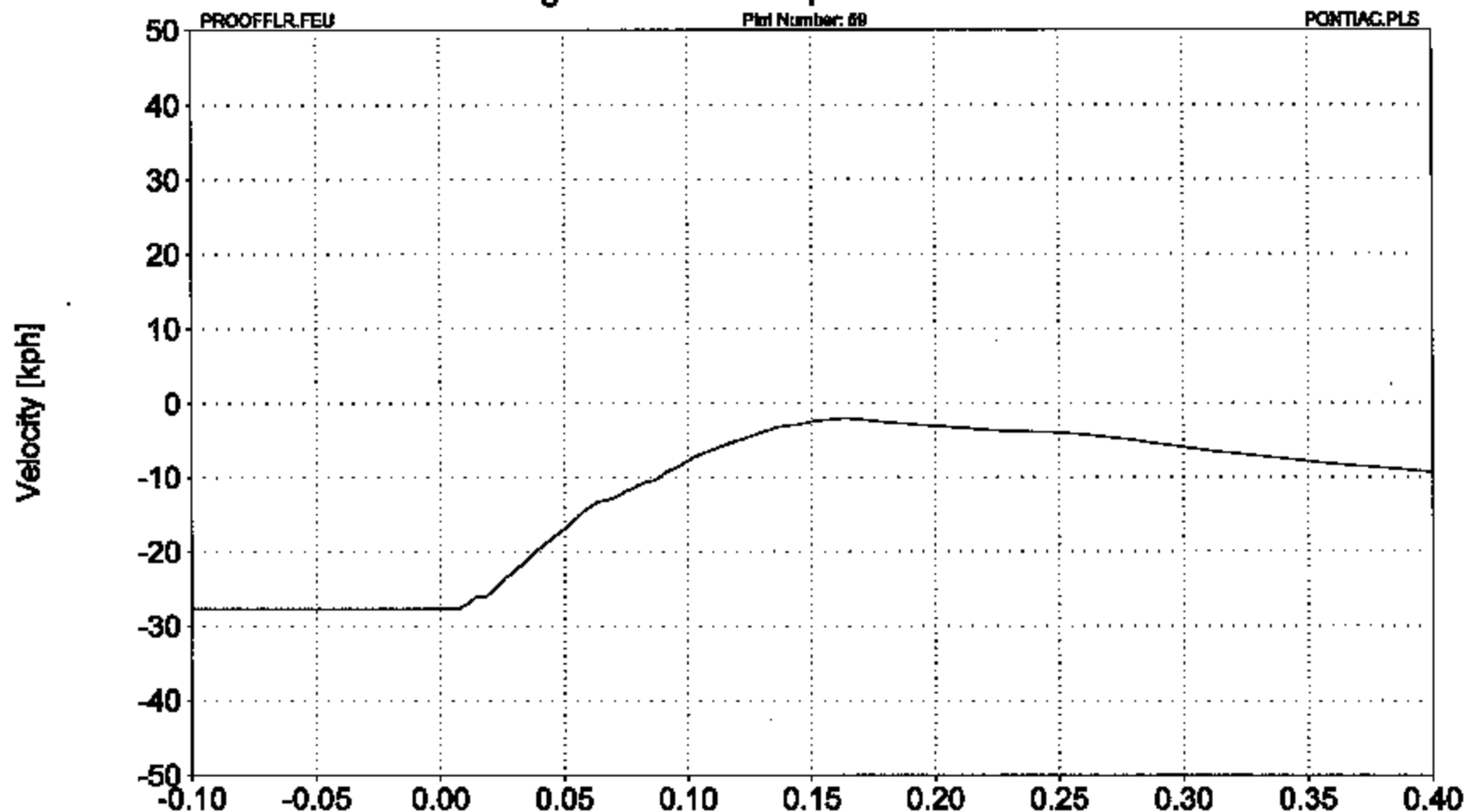
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Right Floor Sill

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: -2.1 kph @ 0.1025 sec.
Data Min: -27.7 kph @ 0.0010 sec.

201P Side Pole Impact Testing
PH06682

Time [s]

B-63

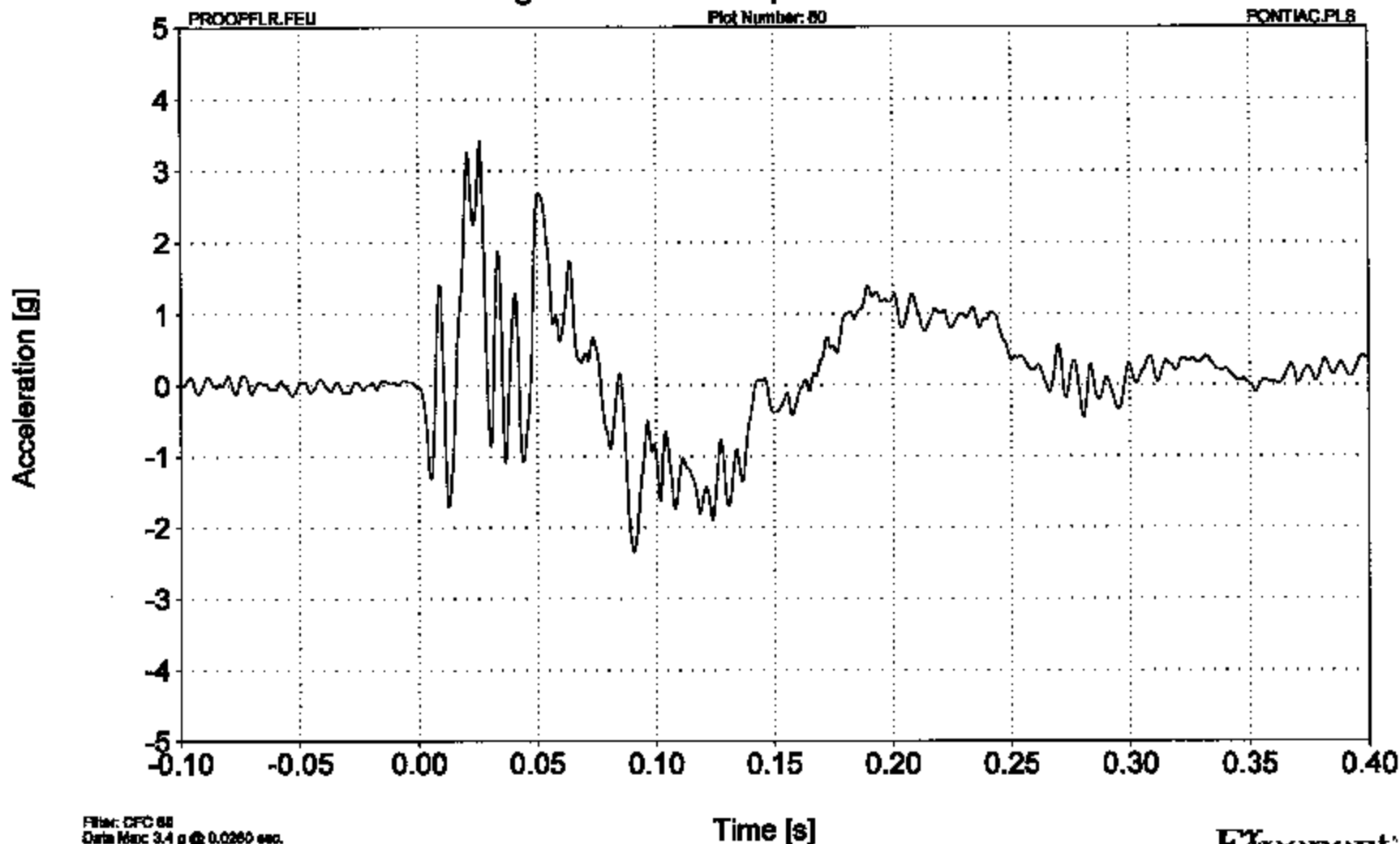
Exponent
Failure Analysis Associates®

Longitudinal Acceleration v Time

Rear Deck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 60
Data Max: 3.4 g @ 0.0260 sec.
Data Min: -2.3 g @ 0.0908 sec.

201P Side Pole Impact Testing
PH08032

B-64

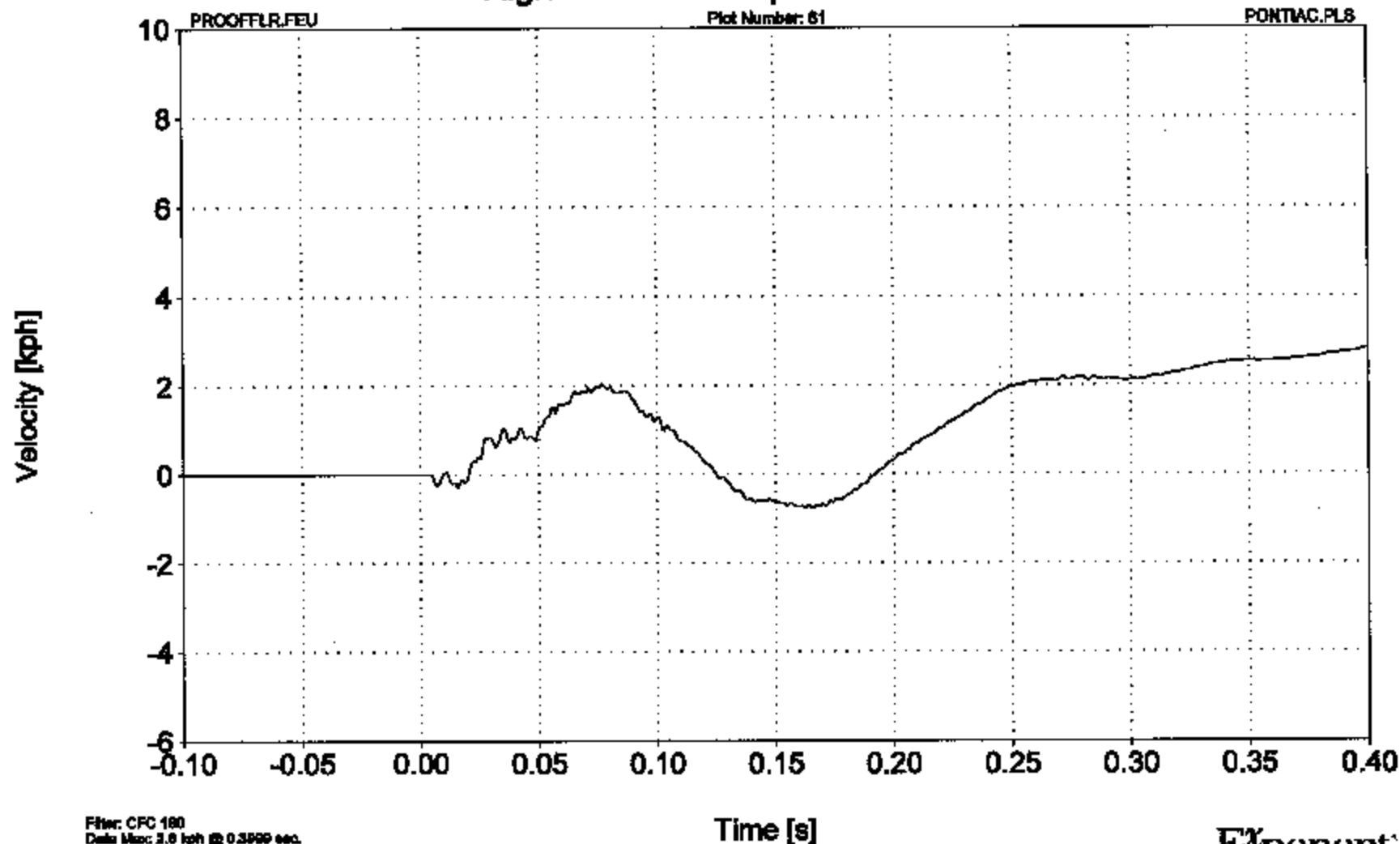
Exponent
Failure Analysis Associates®

Longitudinal Velocity v Time

Rear Deck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 3.0 kph @ 0.3599 sec.
Data Min: -0.8 kph @ 0.1657 sec.

201P Side Pole Impact Testing
PH06082

B-65

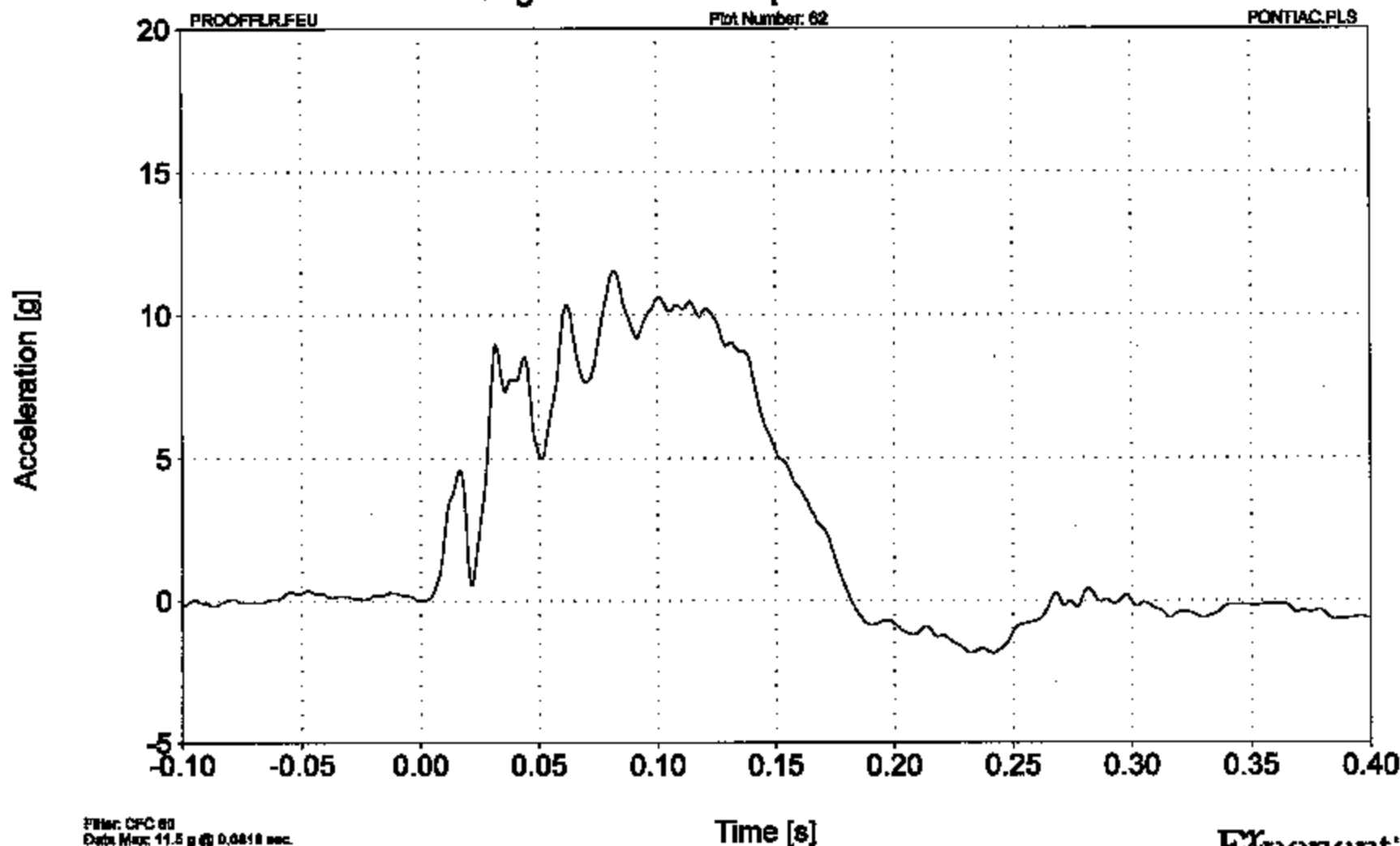
Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Rear Deck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 60
Data Max: 11.5 g @ 0.0818 sec.
Data Min: -1.9 g @ 0.2414 sec.

201P Side Pole Impact Testing
PH09582

B-66

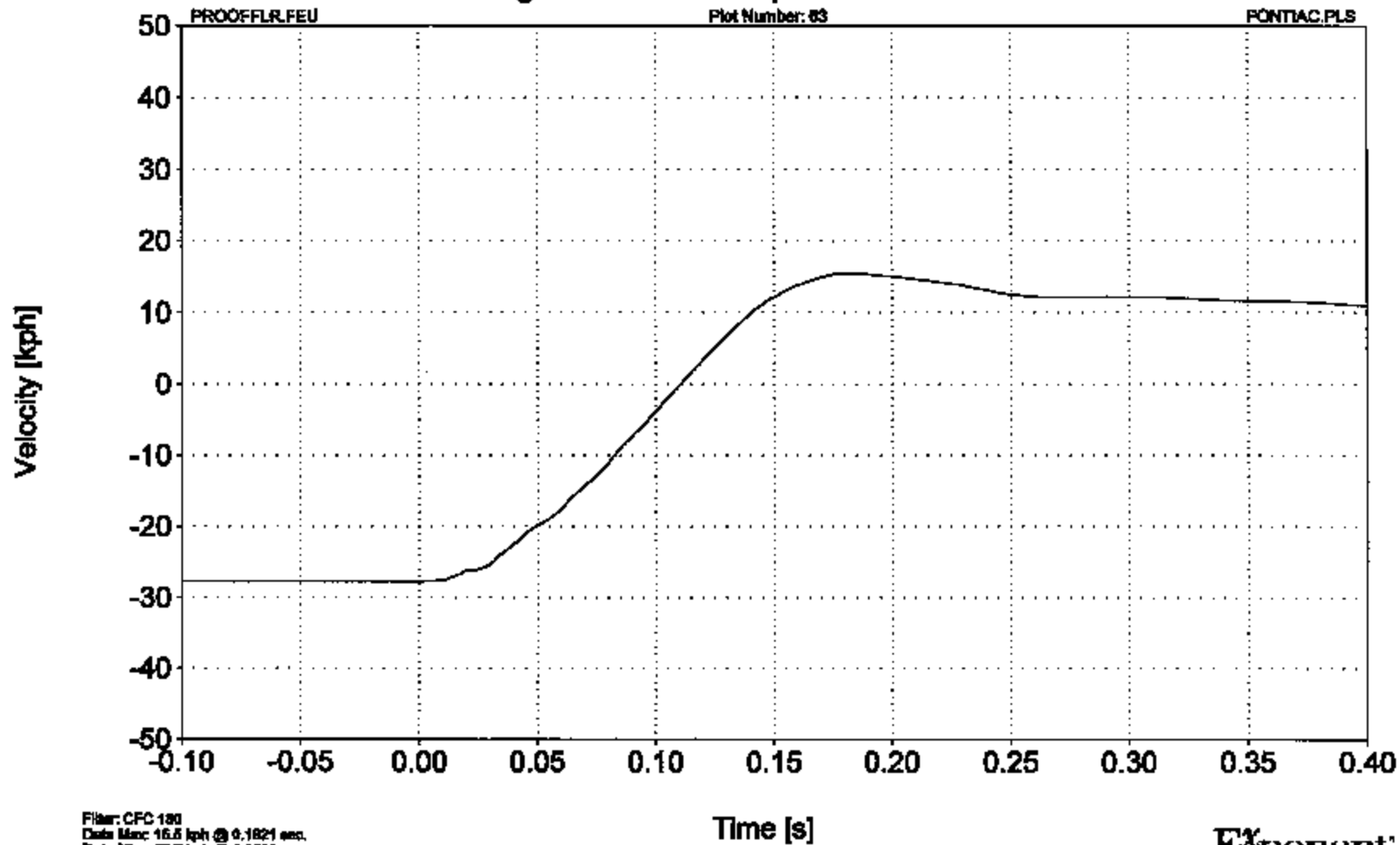
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Rear Deck

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: CFC 180
Data Max: 15.6 kph @ 0.1821 sec.
Data Min: -27.7 kph @ 0.0002 sec.

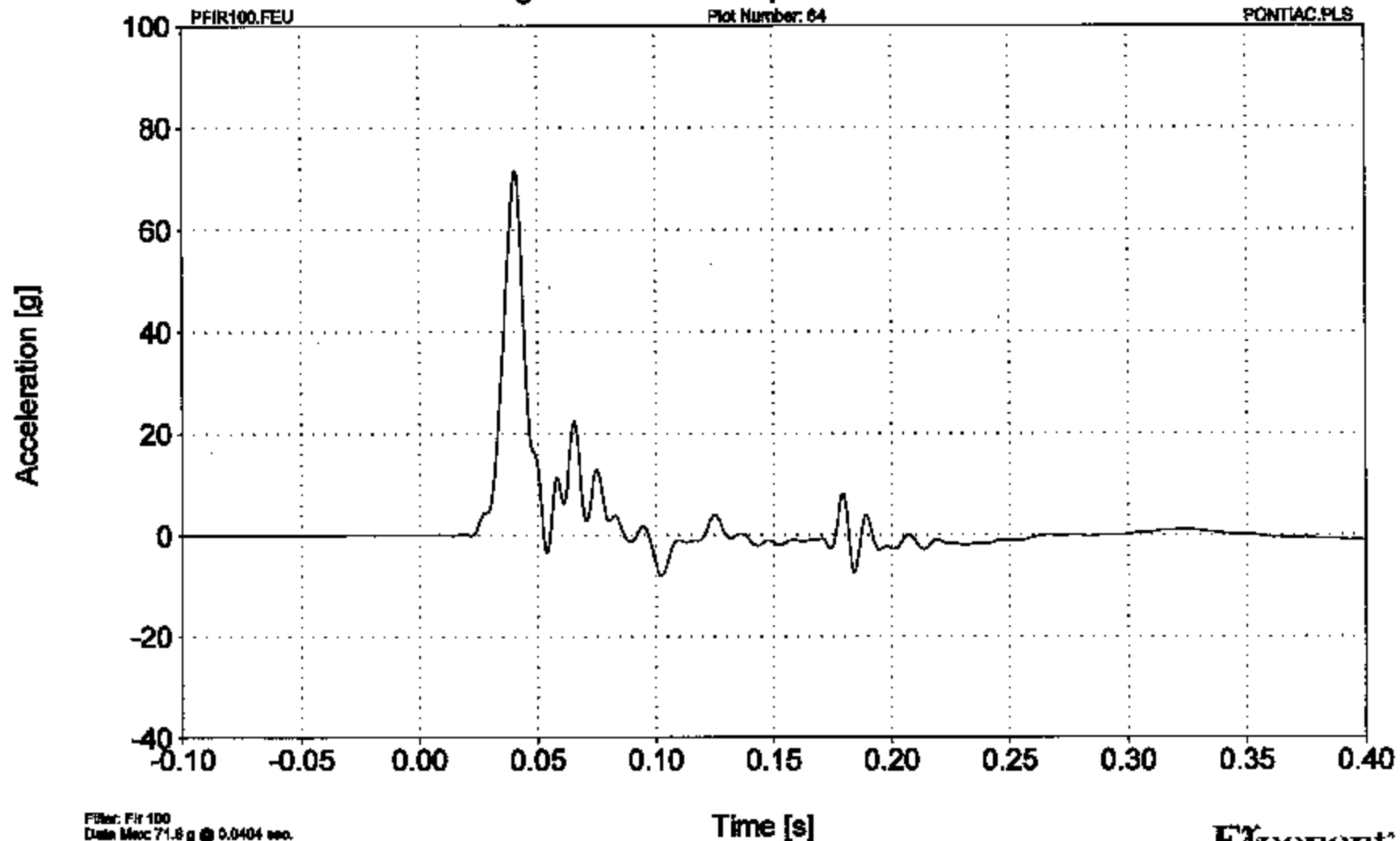
201P Side Pole Impact Testing
PH06662

B-67

Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Upper Rib
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: Fir 100
Data Max: 71.6 g @ 0.0404 sec.
Data Min: -6.0 g @ 0.1022 sec.
201P Side Pole Impact Testing
PH08592

B-68

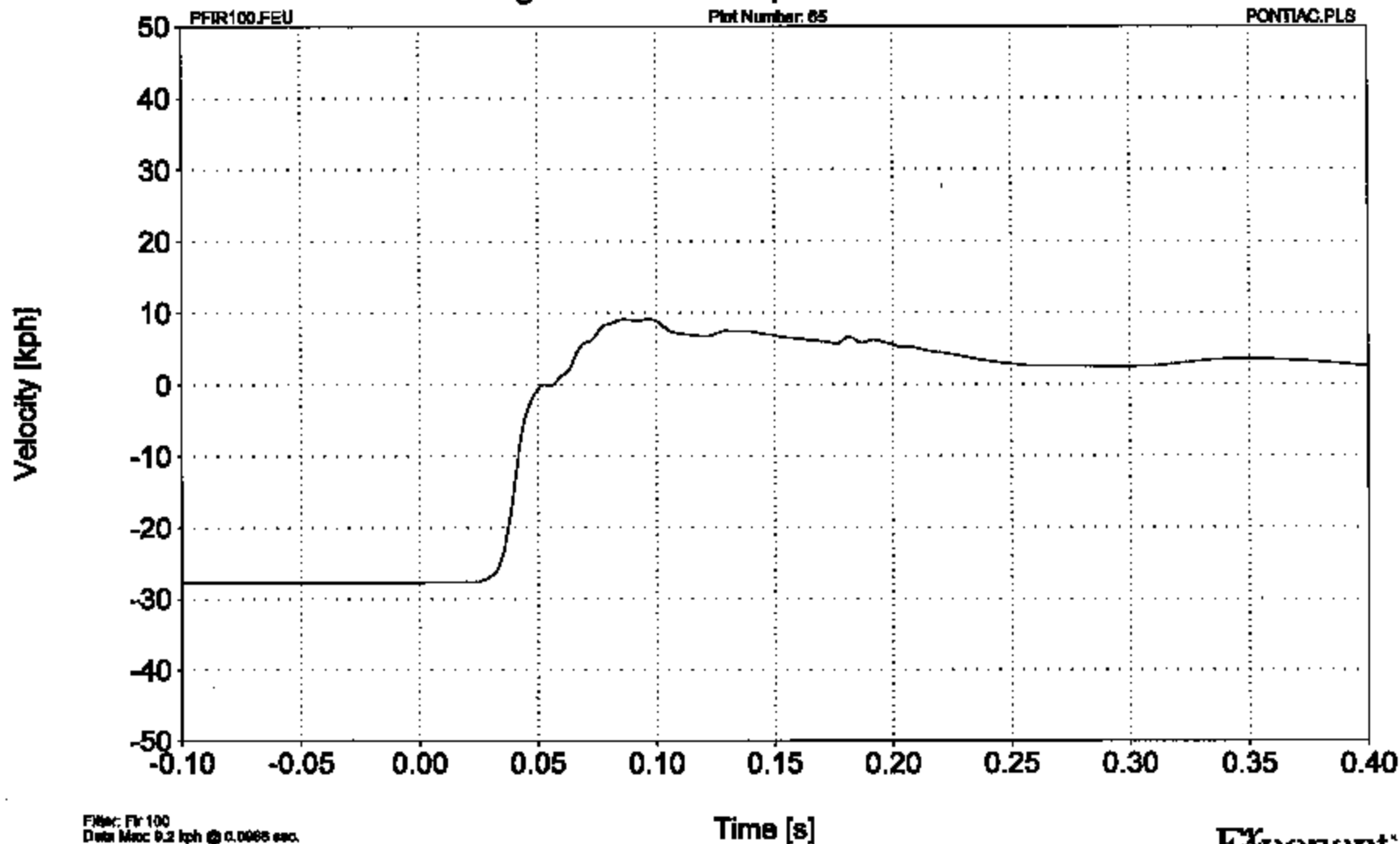
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Driver ATD Upper Rib

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: F1r 100
Data Max: 9.2 kph @ 0.0666 sec.
Data Min: -27.7 kph @ -0.1000 sec.

201F Side Pole Impact Testing
PI-00002

B-69

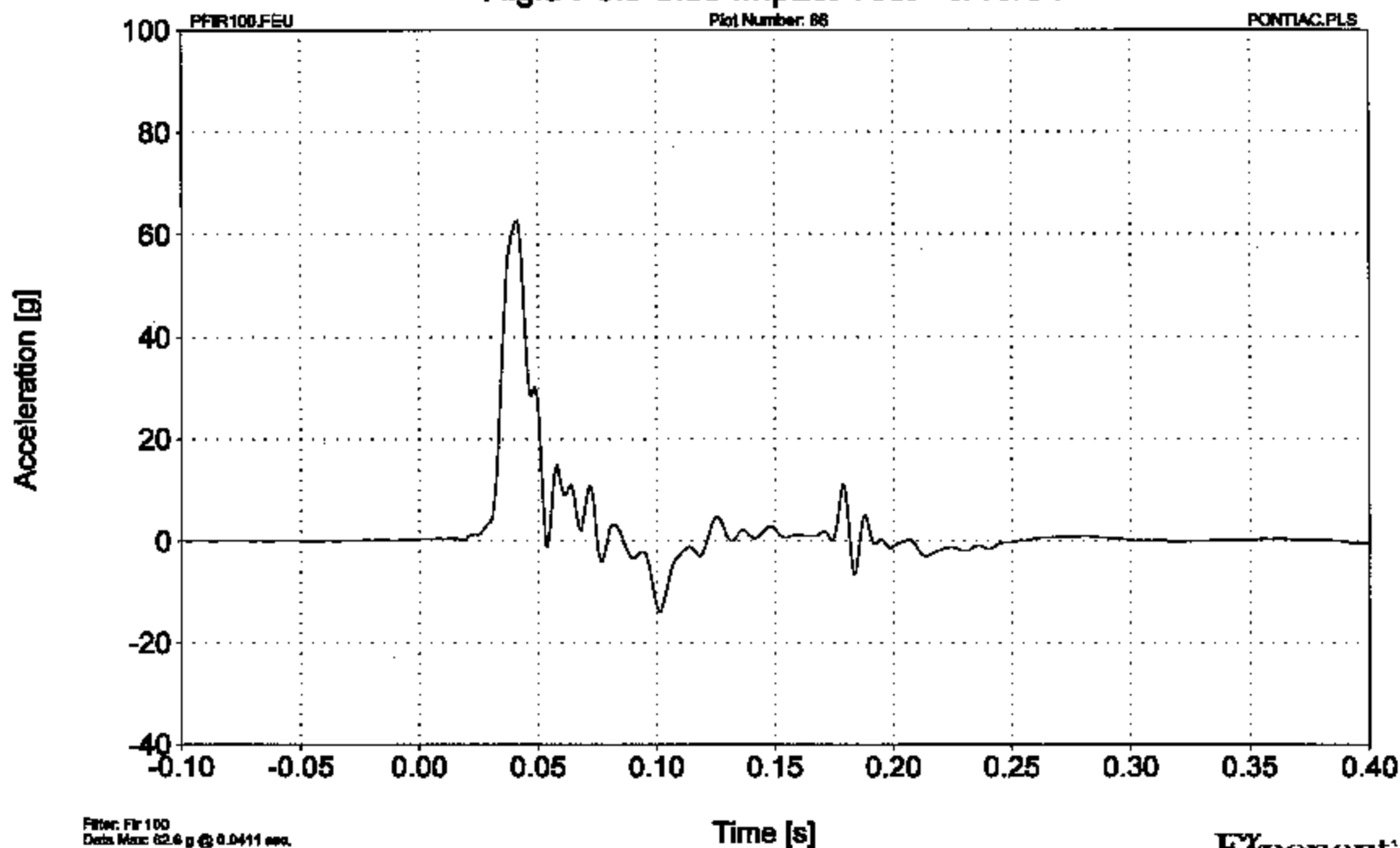
Exponent
Failure Analysis Associates®

Lateral Acceleration v Time

Driver ATD Lower Rib

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



201P Side Pole Impact Testing
FH00082

B-70

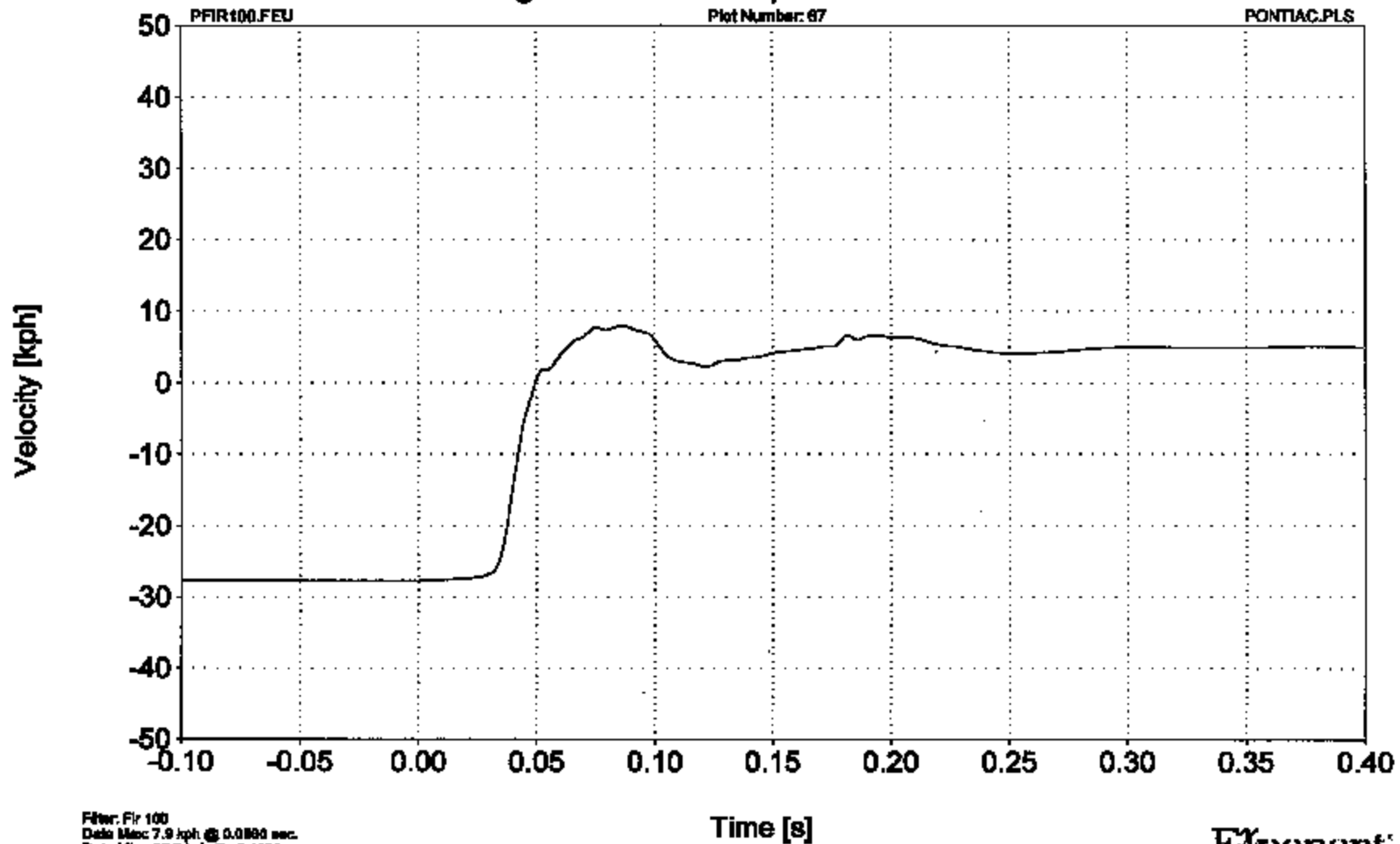
Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Driver ATD Lower Rib

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



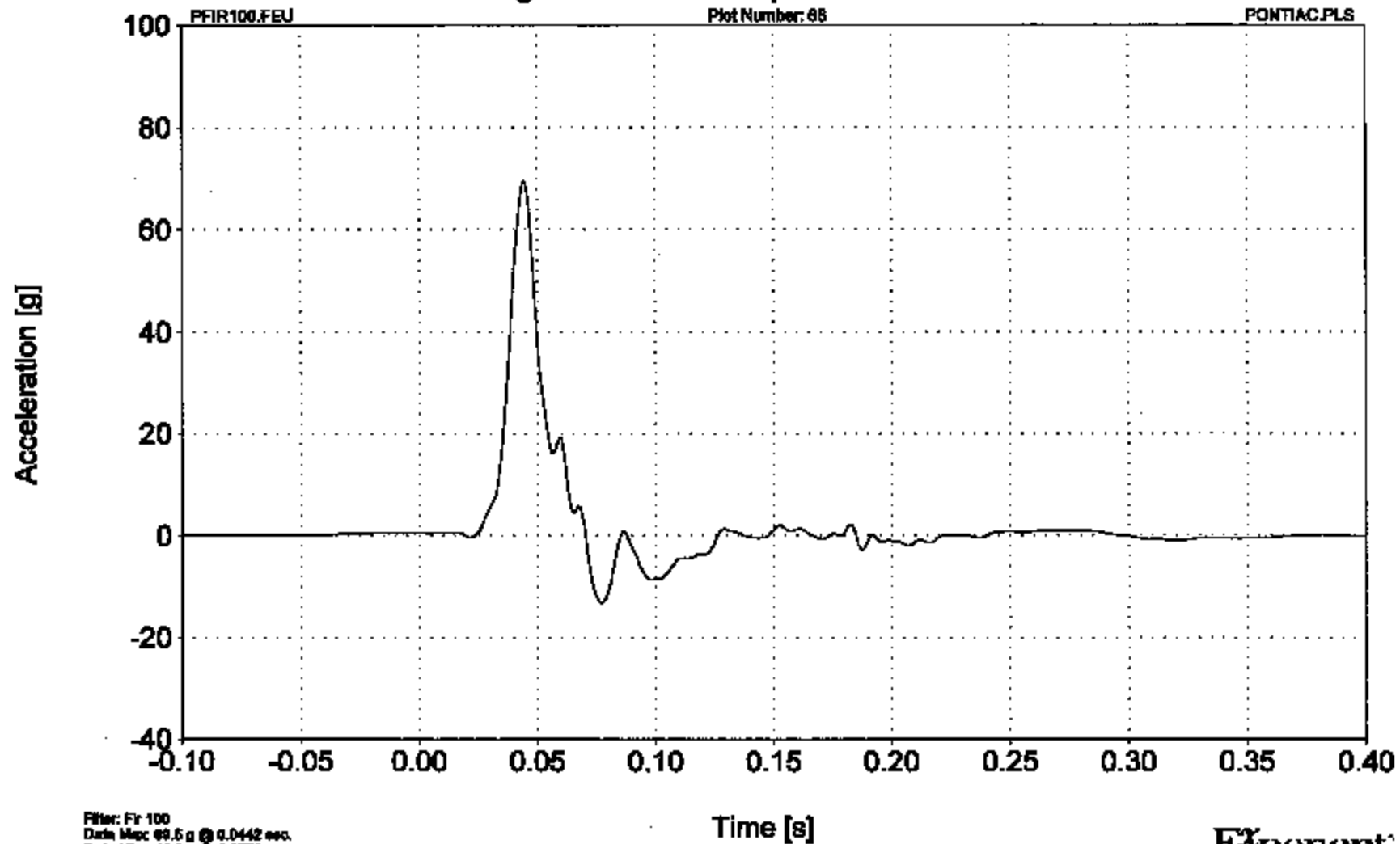
201P Side Pole Impact Testing
PH06862

B-71

Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Lower Spine
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



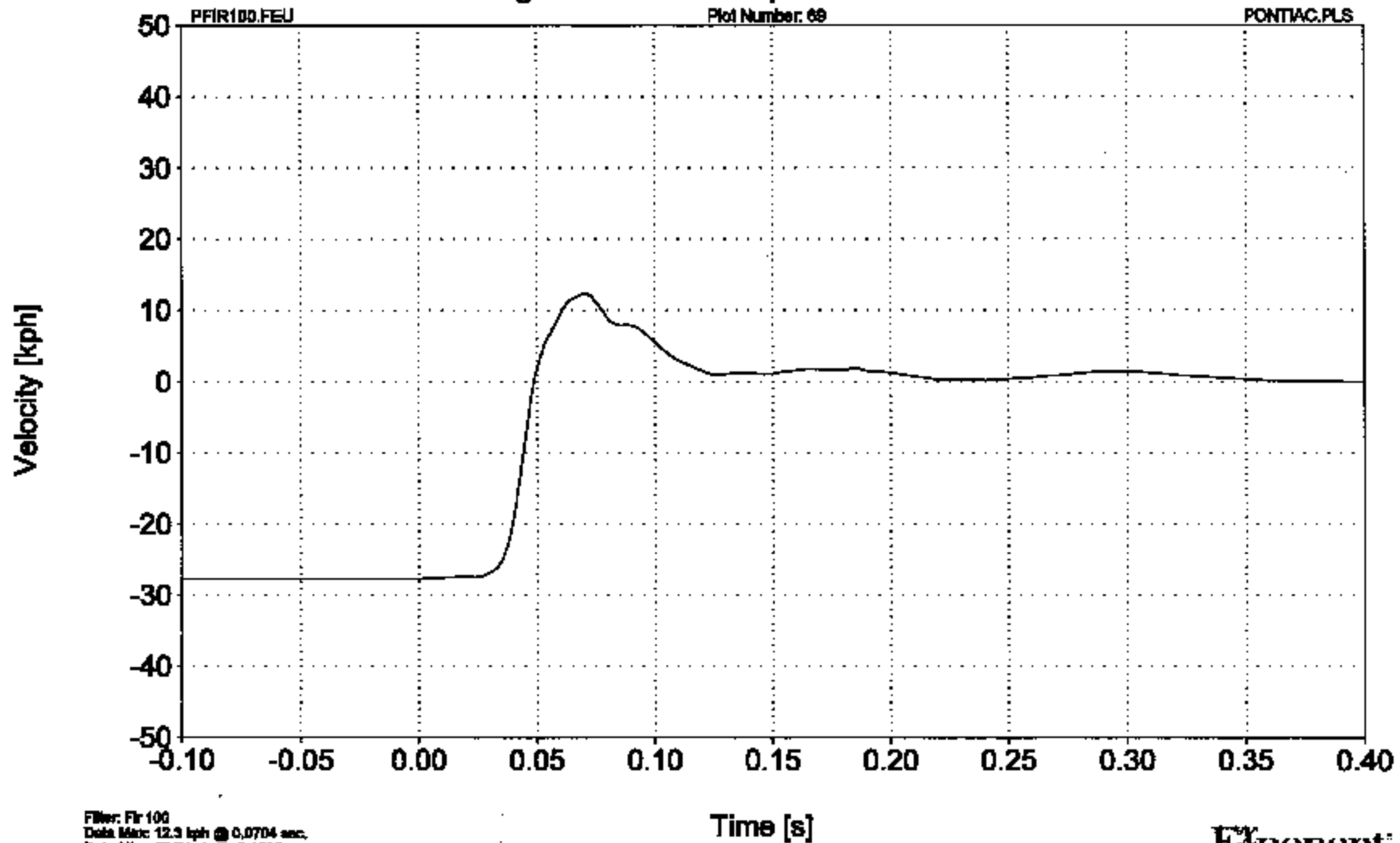
201P Side Pole Impact Testing
PH00002

B-72

Exponent
Failure Analysis Associates®

Lateral Velocity v Time

Driver ATD Lower Spine
2004 Pontiac Grand Prix - NHTSA No. C40103
Rigid Pole Side Impact Test - 5/19/04



Filter: F1r 100
Data Max: 12.3 kph @ 0.0704 sec.
Data Min: -27.7 kph @ -0.1000 sec.
201P Side Pole Impact Testing
PH06082

Time [s]

B-73

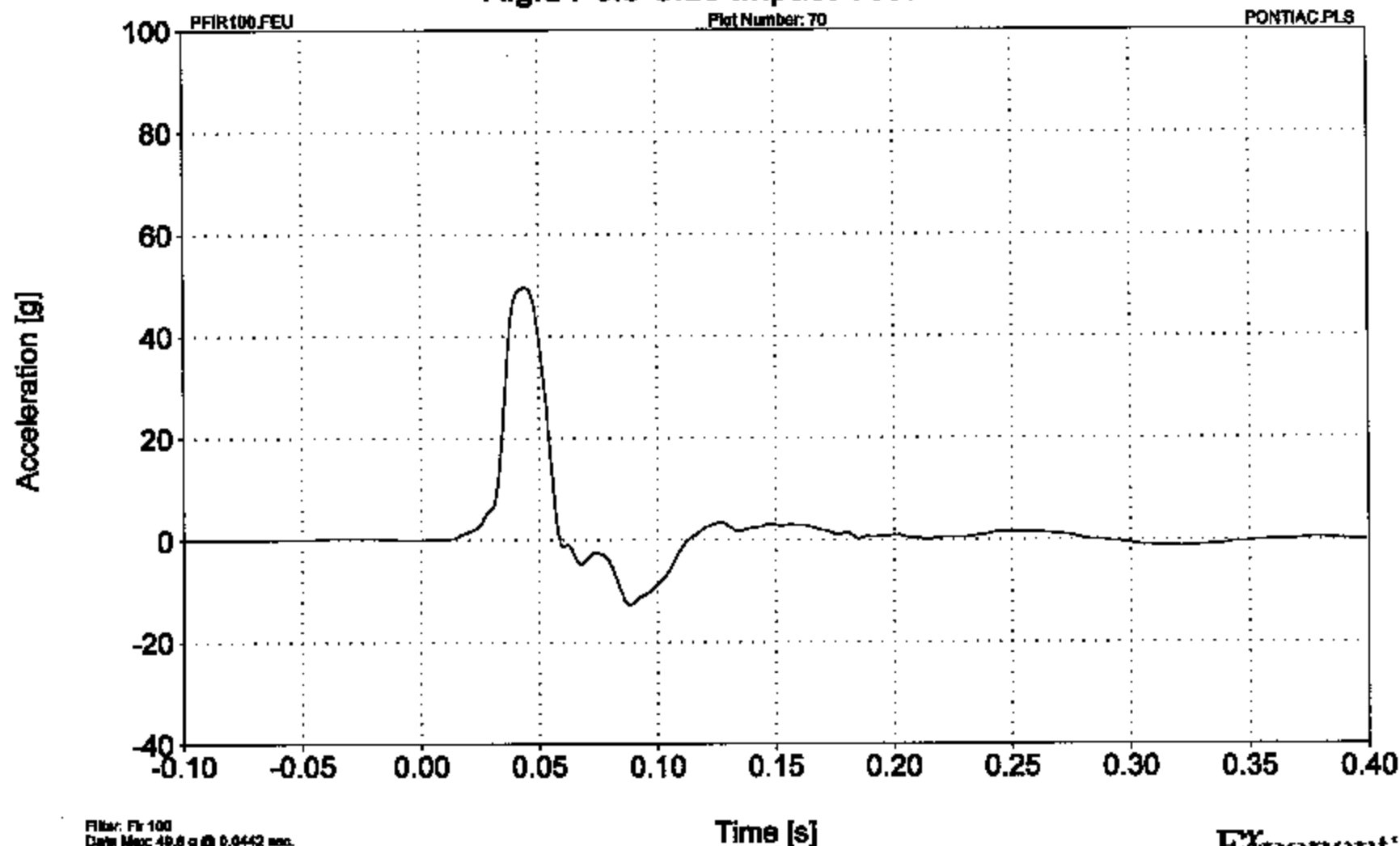
Exponent
Failure Analysis Associates*

Lateral Acceleration v Time

Driver ATD Pelvis

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: Fx 100
Data Max: 49.6 g @ 0.0442 sec.
Data Min: -12.6 g @ 0.0686 sec.

201P Side Pole Impact Testing
FH100002

B-74

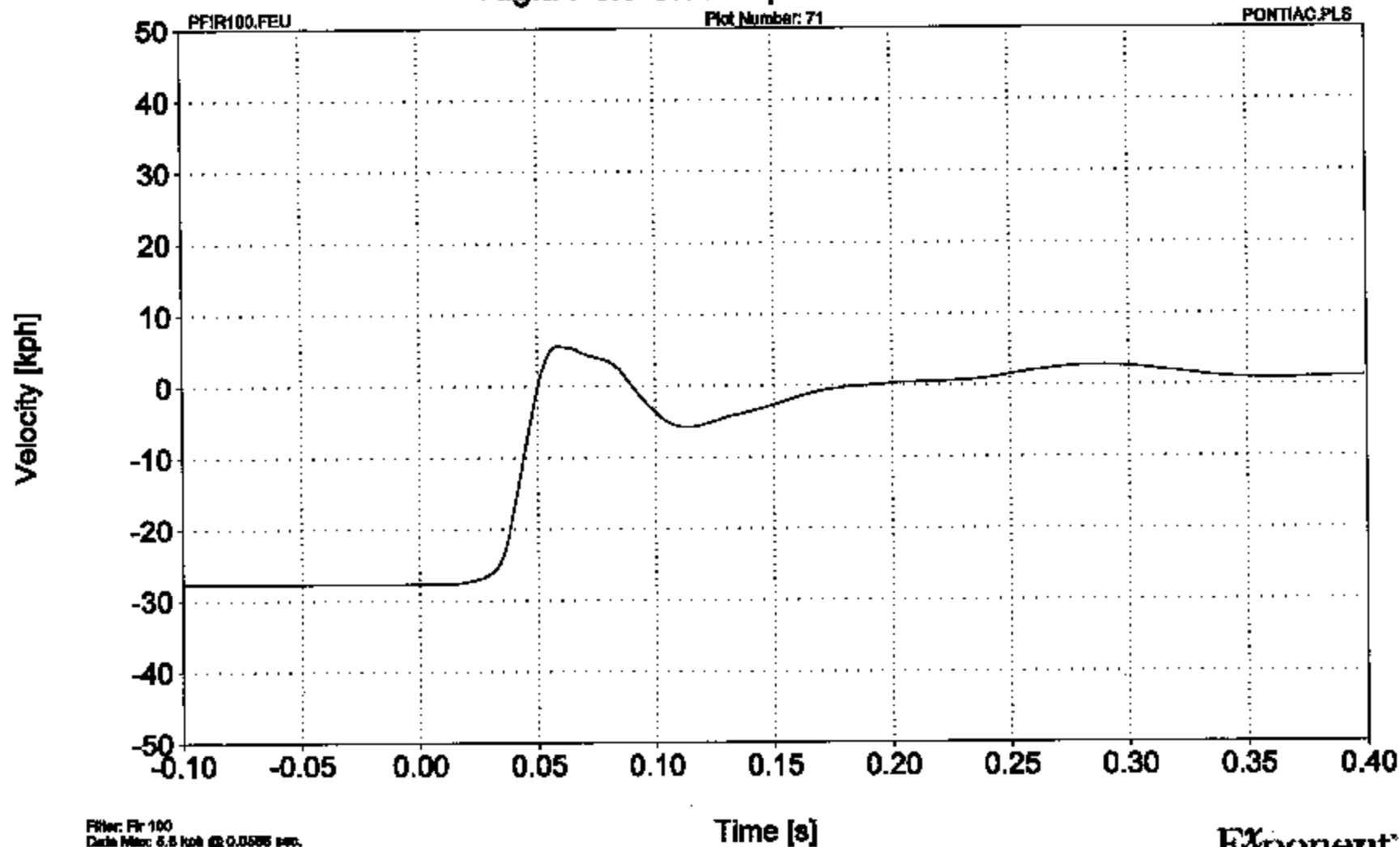
Exponent
Failure Analysis Associates*

Lateral Velocity v Time

Driver ATD Pelvis

2004 Pontiac Grand Prix - NHTSA No. C40103

Rigid Pole Side Impact Test - 5/19/04



Filter: F1r 100
Data Max: 6.5 kph @ 0.0555 sec.
Data Min: -27.7 kph @ 0.0005 sec.

201P Side Pole Impact Testing
PH06662

B-75

Exponent
Failure Analysis Associates®

Appendix C – SID/HIII Configuration and Performance Verification Data

POSTTEST DUMMY INSPECTION LIST

DATE: 6/9/2004

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	Broke Nodding Joint Assy During Test
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

Note: Nodding joint assembly was replaced for posttest calibration

TEST DATES: 05/19/04

RECORDED BY:



DATE: 06/09/04

APPROVED BY:



DATE: 06/09/04

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

DATE: 06/08/04

SID/HIII CONFIGURATION VERIFICATION					
Test Parameter			Spec. (mm)	SID/HIII No. 052	
				Pretest	POSTTEST
SH	SEATED HEIGHT		889 – 909	906	907
RH	RIB HEIGHT		501 – 521	508	509
HP	HIP PIVOT HEIGHT	LEFT	99 ref.	100	100
		RIGHT		100	100
RD	RIB FROM BACK LINE		229 – 241	229	230
KH	KNEE PIVOT FROM BACK LINE	LEFT	511 – 526	518	524
		RIGHT		518	524
KV	KNEE PIVOT FROM FLOOR	LEFT	490 – 505	490	490
		RIGHT		490	490
HW	HIP WIDTH		356 – 391	376	376

TEST DATES: 05/18/04

RECORDED BY: 

DATE: 06/08/04

APPROVED BY: 

DATE: 06/08/04

Head Drop Test (Lateral)			
Test Parameter	Spec.	SID/HIII No. 052	
		Pretest	POSTTEST
Temperature (°C)	18.9 - 25.5	20.6/20.0	21.7/22.2
Relative Humidity (%)	10 - 70	26/27	32/36
Peak Resultant Accel. (g's)	120 - 150	146.2/149.8	142.0/147.8
Is Resultant Curve Unimodal?	Yes	Yes / Yes	Yes / Yes
Peak Longitudinal Accel. (g's)	± 15	4.4/6.4	5.8/6.1
Neck Pendulum Test			
Temperature (°C)	18.9 - 25.5	21.1 / 21.1	21.7/21.1
Relative Humidity (%)	10 - 70	36/31	37/38
Impact Velocity (m/s)	6.89 - 7.13	7.0 / 7.0	7.0 / 7.0
Pendulum Deceleration	10 MS	1.96 - 2.55	2.2 / 2.1
	20 MS	4.12 - 5.10	4.5 / 4.4
	30 MS	5.73 - 7.01	6.5/6.4
	40-70 MS	6.27 - 7.64	7.4/7.3
Midsagittal Plane Max Rotation	66° - 82°	67.6/71.8	71.8/73.1
Head Rotation Peak to Zero Decay Time (MS)	58 - 67	62.1/61.9	61.7/61.1
Max Mx at Occipital Condyles (NM)	73 - 88	81.6/85.8	84.8/86.3
Mx Peak to Zero - Decay Time (MS)	49 - 64	52.3/51.7	56.2/56.4
Mx Peak to Max. Head Rotation (MS)	2 - 16	7.4/7.2	10.9/9.3

TEST DATES: 05/19/04

RECORDED BY: 

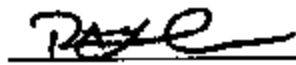
DATE: 06/09/04

APPROVED BY: 

DATE: 06/09/04

Thorax Impacts			
Test Parameter	Spec.	SID/Hill No. 052	
		Pretest	POSTTEST
Temperature (°C)	18.8 - 25.5	21.1/21.1	20.0/20.0
Relative Humidity (%)	10 - 70	31/36	31/31
Probe Speed (m/s)	4.27 - 4.33	4.31/4.31	4.29/4.29
Upper Rib (g's)	37 - 46	39.8/41.1	42.7/43.7
Lower Rib (g's)	37 - 46	38.7/39.1	37.3/39.7
Lower Spine (g's)	15 - 22	20.9/20.5	19.7/20.1
Pelvis Impact			
Temperature (°C)	18.8 - 25.5	20.6/20.6	20.5/20.5
Relative Humidity (%)	10 - 70	30/30	28/28
Probe Speed (m/s)	4.27 - 4.33	4.32/4.33	4.29/4.29
Pelvis (g's)	40 - 60	46.0/48.8	45.0/50.0

TEST DATES: 05/14/04

RECORDED BY: 

DATE: 06/09/04

APPROVED BY: 

DATE: 06/09/04

CALIBRATION TEST RESULTS SUMMARY

DATE: 06/09/04

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
Lumbar Flexion Test	Not Performed

TEST DATES: 05/14/04

RECORDED BY: *Ray*

DATE: 06/09/04

APPROVED BY: *Mark*

DATE: 06/09/04

CALIBRATION TEST RESULTS SUMMARY

DATE: 08/09/04

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
Lumbar Flexion Test	Not Performed

TEST DATES: 05/14/04

RECORDED BY: *[Signature]*

DATE: 08/09/04

APPROVED BY: *[Signature]*

DATE: 08/09/04

SID/HIII CONFIGURATION VERIFICATION without Chest Flash Installed

DATE: 05/17/2004

SID/HIII NUMBER: 052

SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*: SC402

* 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	906 mm
RH	RIB HEIGHT		502 mm – 520 mm 19.7 in – 20.5 in	508 mm
HP	HIP PIVOT HEIGHT	LEFT	99 mm 3.9 in Ref.	100 mm
		RIGHT		100 mm
RD	RIB FROM BACK LINE		229 mm – 241 mm 9.0 in – 9.5 in	229 mm
KH	KNEE PIVOT FROM BACK LINE	LEFT	511 mm – 526 mm 20.1 in – 20.7 in	518 mm
		RIGHT		518 mm
KV	KNEE PIVOT FROM FLOOR	LEFT	490 mm – 605 mm 19.3 in – 19.9 in	490 mm
		RIGHT		490 mm
HW	HIP WIDTH		358 mm – 391 mm 14.0 in – 15.4 in	378 mm

COMMENTS:

RECORDED BY:

PAJE

DATE:

6/9/04

APPROVED BY:

MAK

DATE:

6/9/04

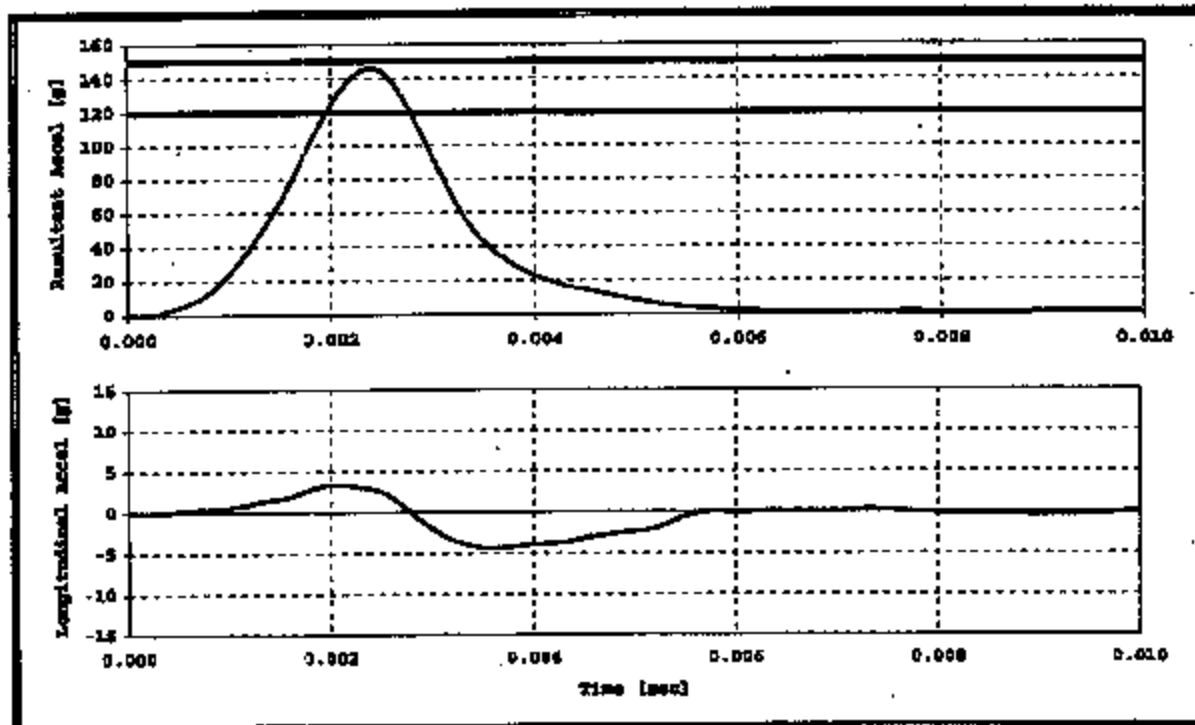
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH402	Test Date: 05/03/2004
SID/HIII Number: #52	Test Time: 16:28
Part Serial No: 02101956A	Drop Height: 200 mm
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY (%)	10 - 70	26.0 PASS
PEAK RESULTANT ACCEL. (g)	120 - 150	146.2 PASS
PEAK LONGITUDINAL ACCEL. (g)	15 g max.	4.4 PASS
ACCEL. CURVE UNIMODAL?	15% max.	1.9% PASS



RECORDED BY:

RSR

APPROVED BY:

MHL

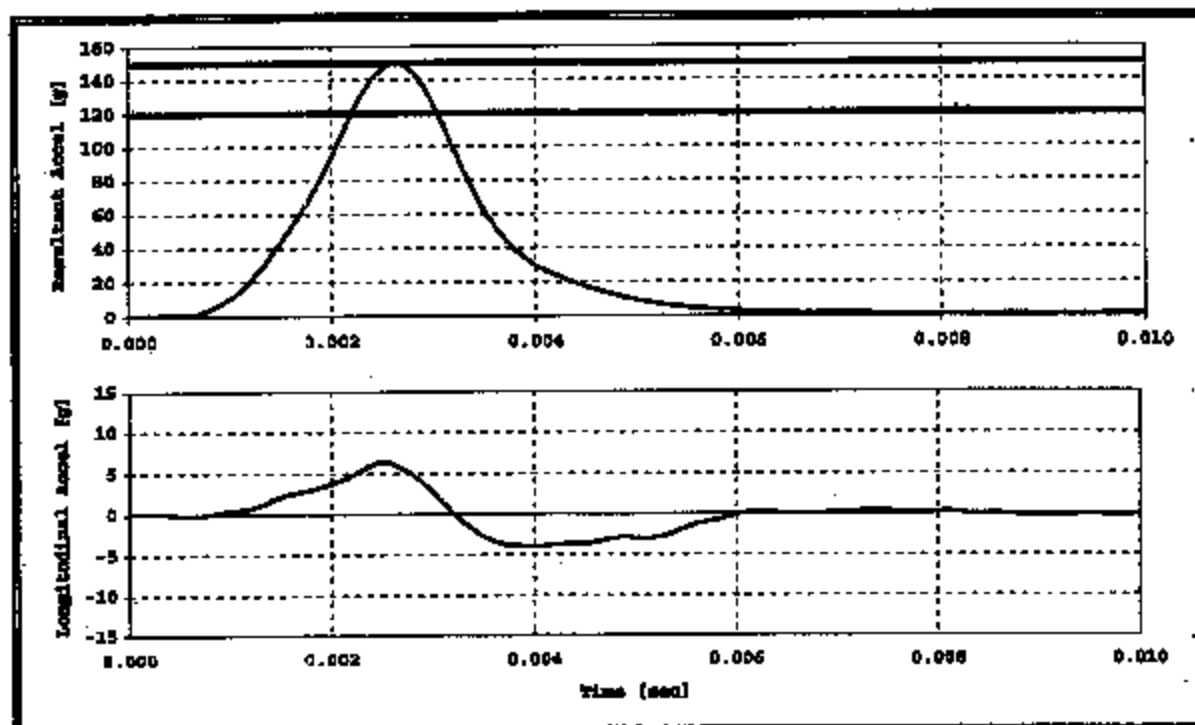
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH405	Test Date: 05/04/2004
SID/HIII Number: #52	Test Time: 10:07
Part Serial No: 02101956A	Drop Height: 200 mm
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY	(%)	10 - 70	27.0 PASS
PEAK RESULTANT ACCEL.	(g)	120 - 150	149.8 PASS
PEAK LONGITUDINAL ACCEL.	(g)	15 g max.	6.4 PASS
ACCEL. CURVE UNIMODAL?	(%)	15% max.	1.4% PASS



RECORDED BY:

[Signature]

APPROVED BY:

[Signature]

EXPORENT FAILURE ANALYSIS ASSOCIATES

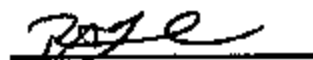
Test and Engineering Center
1850 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lateral Neck Impact Calibration Test Summary

Test ID Number: SN401	Test Date: 05/05/2004
SID/HIII Number: #052	Test Time: 12:05
Comments: 120 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)	---	13.17 ---
IMPACT VELOCITY (m/s)	6.89 - 7.13	7.0 PASS
PENDULUM IMPULSE - 10 ms (m/s)	1.96 - 2.55	2.2 PASS
PENDULUM IMPULSE - 20 ms (m/s)	4.12 - 5.10	4.5 PASS
PENDULUM IMPULSE - 30 ms (m/s)	5.73 - 7.01	6.5 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	67.6 PASS
ROTATION PEAK-ZERO DECAY TIME (ms)	58 - 67	62.1 PASS
PEAK MxOC (N-m)	73 - 88	81.6 PASS
MxOC PEAK-ZERO DECAY TIME (ms)	49 - 64	52.3 PASS
MxOC PEAK TO ROTATION PEAK (ms)	2 - 16	7.4 PASS

RECORDED BY:



APPROVED BY:

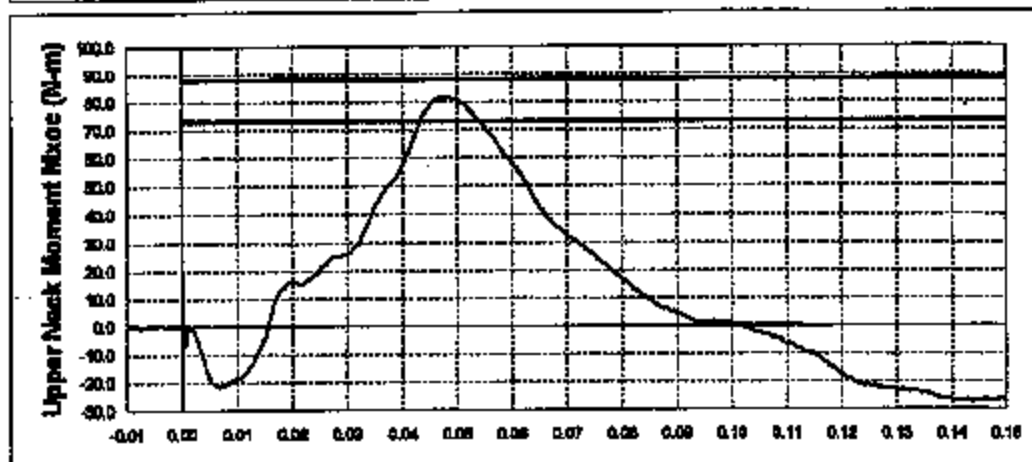
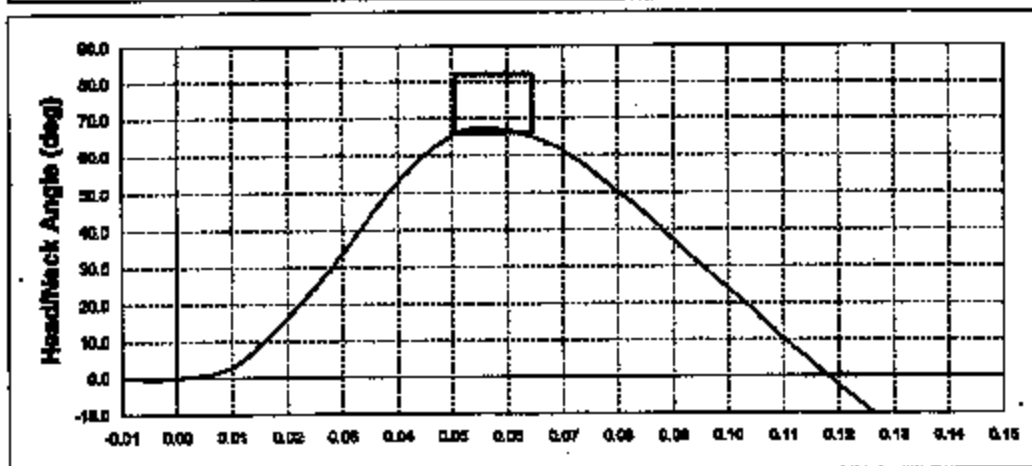
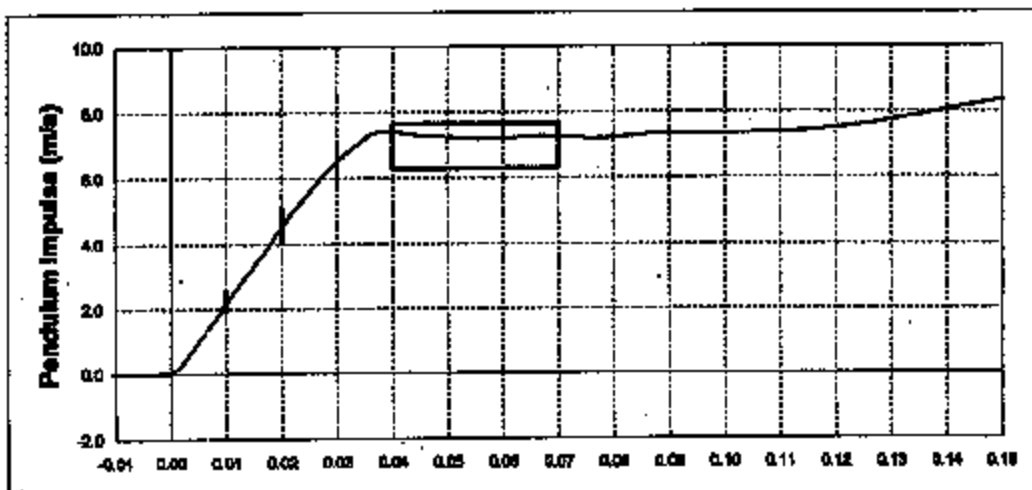


EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: SN4D1

Date: 5/5/2004



EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/IIII Lateral Neck Impact Calibration Test Summary

Test ID Number: SN402	Test Date: 05/05/2004
SID/IIII Number: #052	Test Time: 15:16
Comments: 119 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	31.0 PASS
SPEED TRAP AVERAGE TIME (ms)	---	13.16 ---
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	6.4 PASS
PENDULUM IMP [max] - 40-70 ms (m/s)	6.27 - 7.64	7.3 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	61.9 PASS
PEAK Mxoc (N-m)	73 - 88	85.8 PASS
Mxoc PEAK-ZERO DECAY TIME (ms)	49 - 64	51.7 PASS
Mxoc PEAK TO ROTATION PEAK (ms)	2 - 16	7.2 PASS

RECORDED BY:



APPROVED BY:

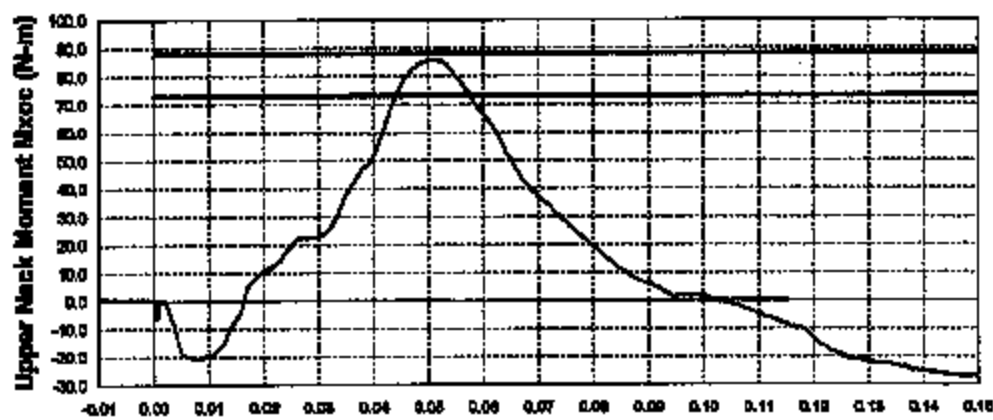
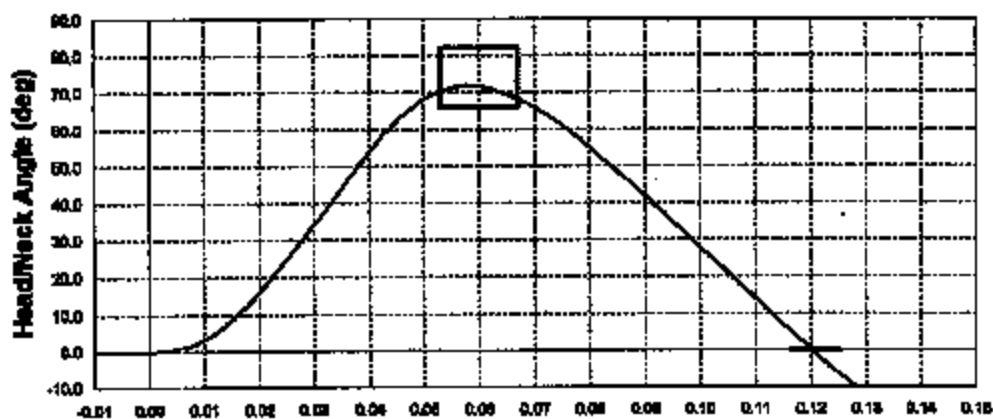
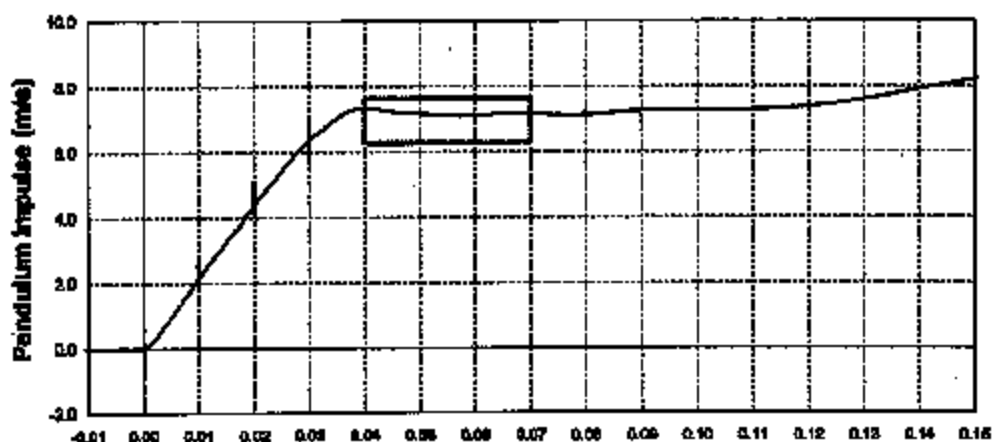


EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: 8N402

Date: 5/5/2004



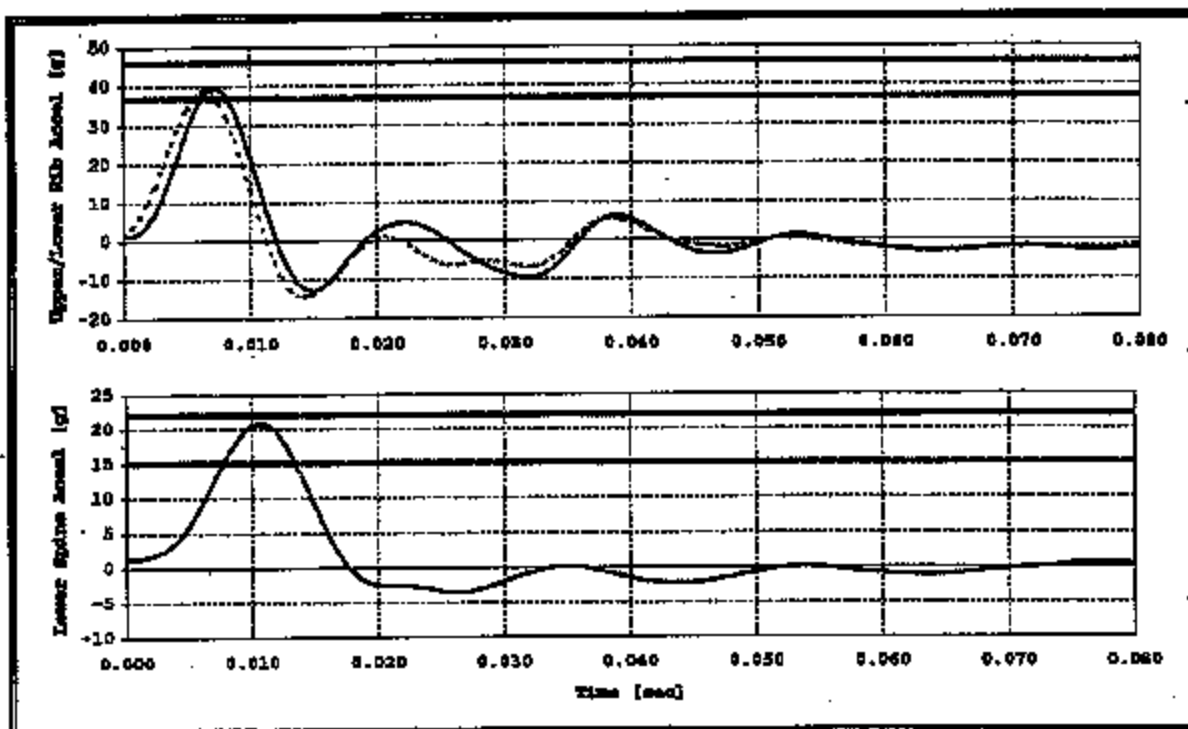
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST403	Test Date: 05/07/2004
SID/HIII Number: #52	Test Time: 10:59
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	31.0 PASS
SPEED TRAP TIME	(ms)	---	23.56 ---
IMPACT VELOCITY	(m/s)	4.21 - 4.33	4.31 PASS
UPPER RIB ACCELERATION	(g)	37 - 46	39.8 PASS
LOWER RIB ACCELERATION	(g)	37 - 46	38.7 PASS
LOWER SPINE ACCELERATION	(g)	15 - 22	20.9 PASS



RECORDED BY:

RAZOR

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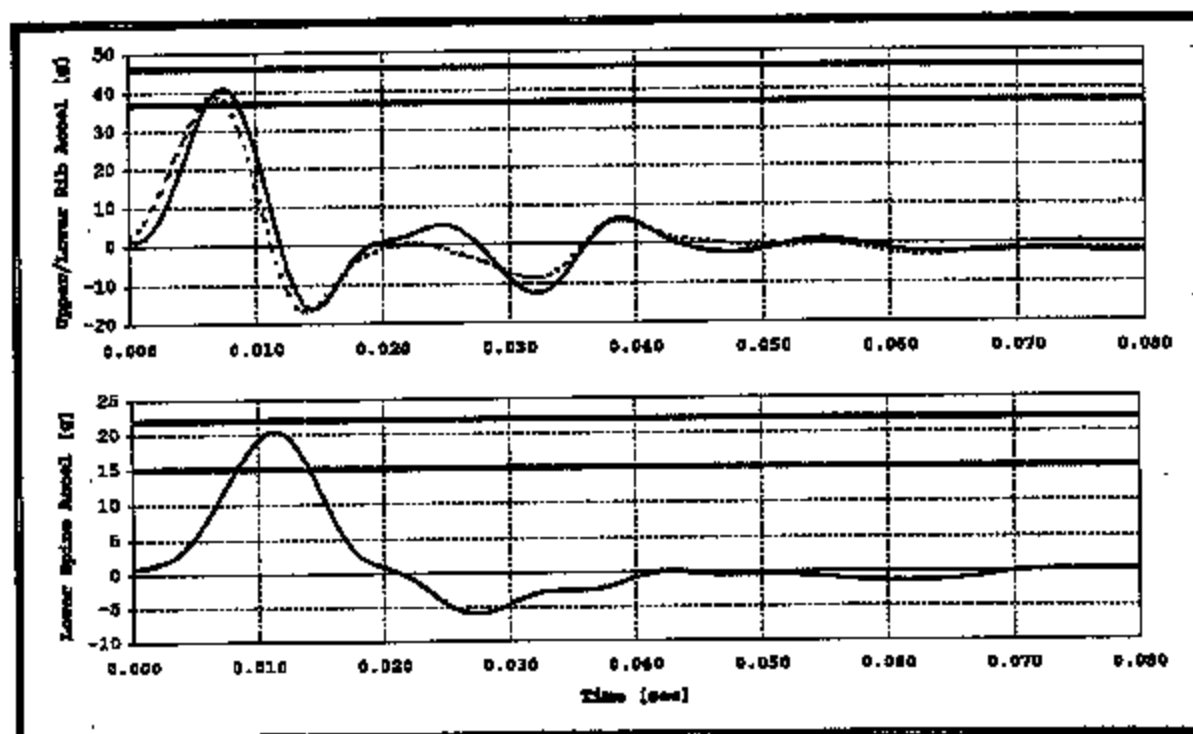
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST404	Test Date: 05/07/2004
SID/HIII Number: #52	Test Time: 11:38
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	36.0 PASS
SPEED TRAP TIME	(ms)	---	23.58 ---
IMPACT VELOCITY	(m/s)	4.21 - 4.33	4.31 PASS
UPPER RIB ACCELERATION	(g)	37 - 46	41.1 PASS
LOWER RIB ACCELERATION	(g)	37 - 46	39.1 PASS
LOWER SPINE ACCELERATION	(g)	15 - 22	20.5 PASS



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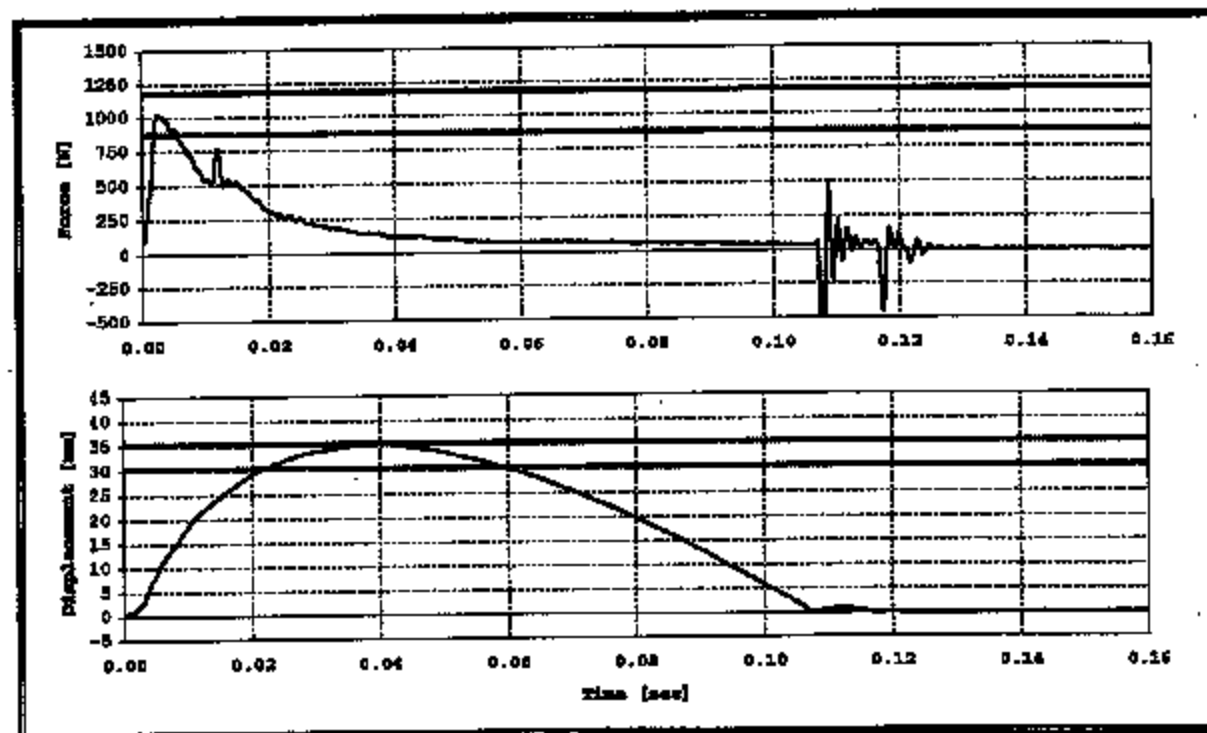
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: 88413	Test Date: 05/14/2004
SID/HIII Number: #052	Test Time: 8:24
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	32.75 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	3.10 PASS
SHOCK ABSORBER FORCE	(N)	872 1180	1025.0 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	30.2 35.2	35.0 PASS



RECORDED BY:

RAJO

APPROVED BY:

[Signature]

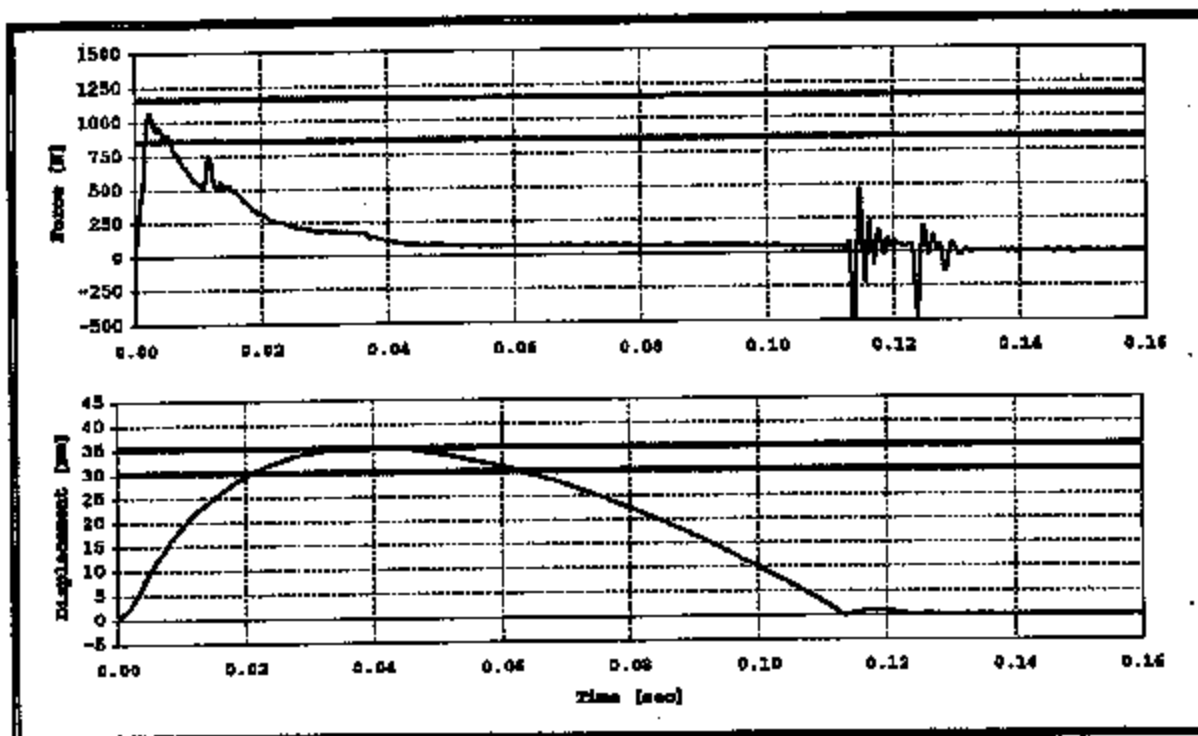
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS414	Test Date: 05/14/2004
SID/HIII Number: #052	Test Time: 8:50
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	26.0 PASS
SPEED TRAP TIME (ms)	---	33.07 ---
IMPACT VELOCITY (m/s)	2.74 - 6.40	3.07 PASS
SHOCK ABSORBER FORCE (N)	854 1158	1063.8 PASS
SHOCK ABSORBER DISPLACEMENT (mm)	30.2 35.2	34.9 PASS



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[Signature]

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[Signature]

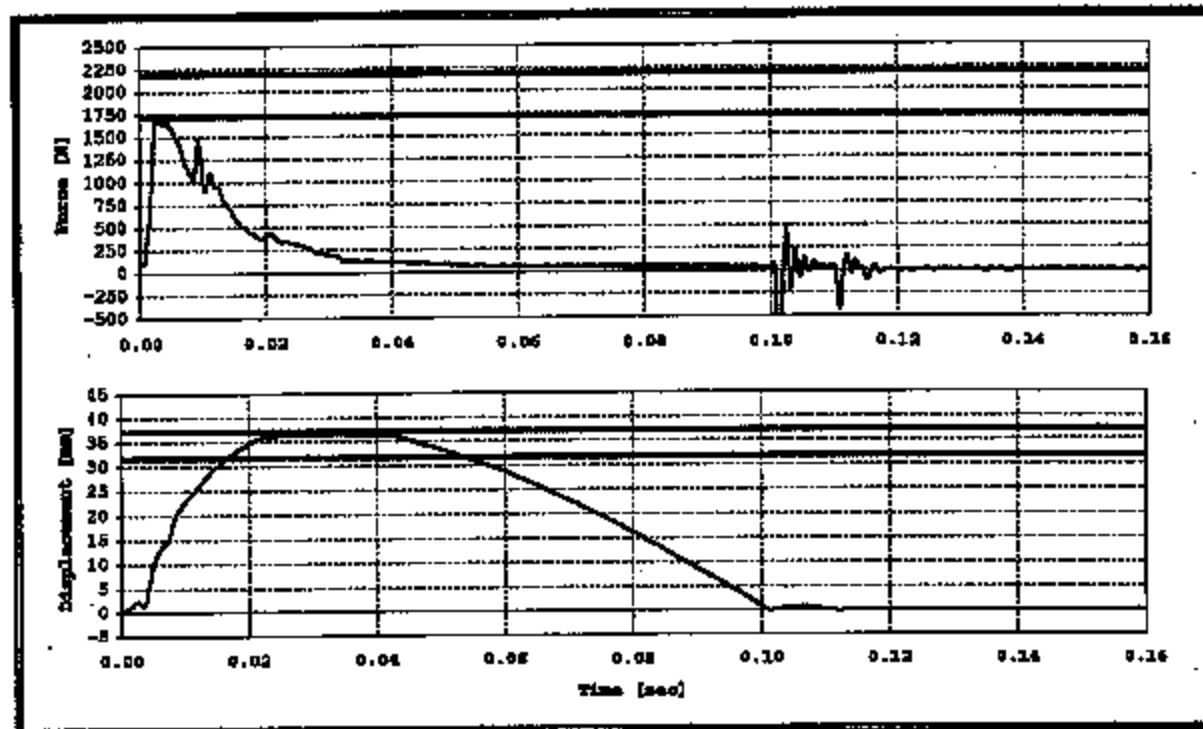
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS415	Test Date: 05/14/2004
SID/HIII Number: #052	Test Time: 8:59
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	23.90 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	4.25 PASS
SHOCK ABSORBER FORCE	(N)	1720 2189	1748.4 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	31.7 37.2	36.4 PASS



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[Signature]

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[Signature]

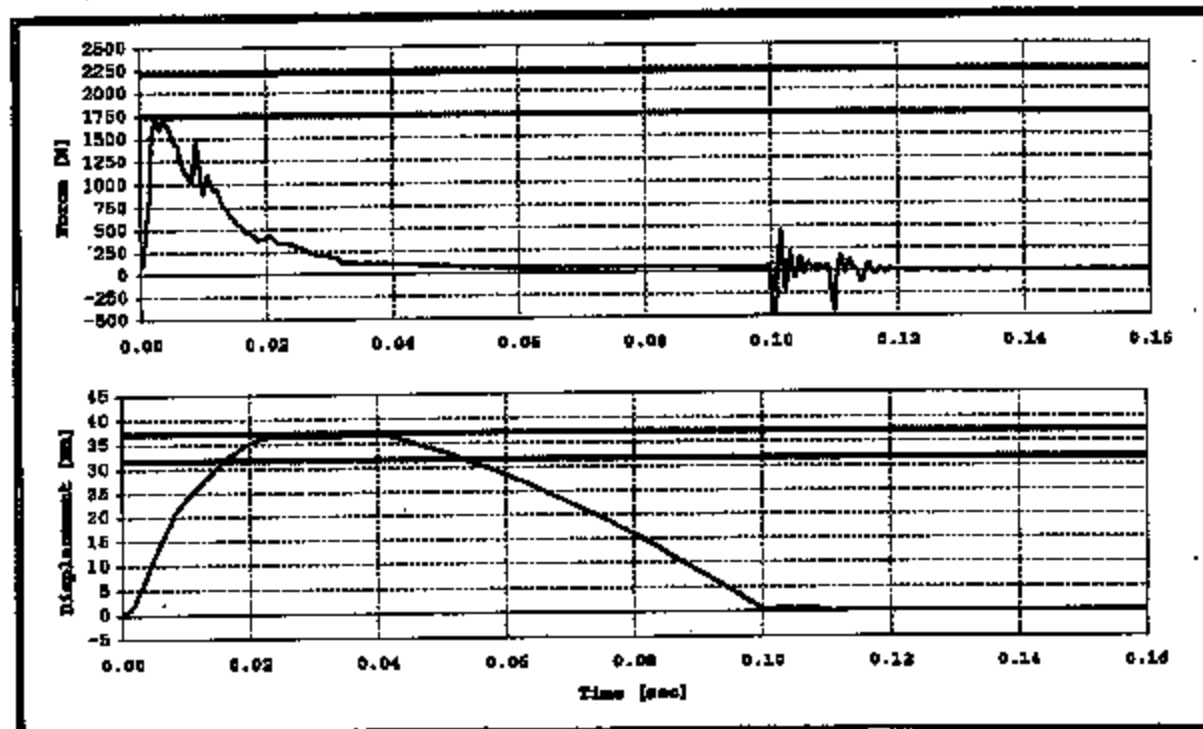
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS416	Test Date: 05/14/2004
SID/HIII Number: #052	Test Time: 9:06
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	26.0 PASS
SPEED TRAP TIME (ms)	---	23.76 ---
IMPACT VELOCITY (m/s)	2.74 - 6.40	4.28 PASS
SHOCK ABSORBER FORCE (N)	1742 2214	1752.0 PASS
SHOCK ABSORBER DISPLACEMENT (mm)	31.7 37.2	36.6 PASS



RECORDED BY:

Base

APPROVED BY:

[Signature]

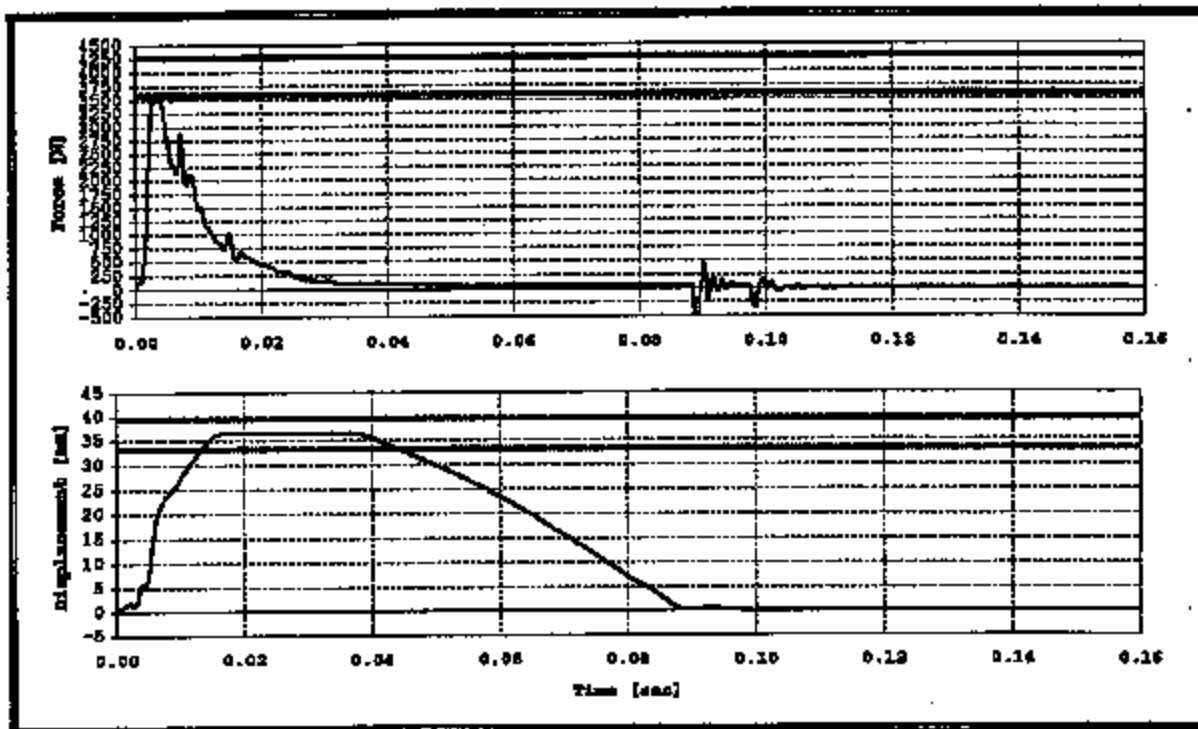
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS417	Test Date: 05/14/2004
SID/HIII Number: #052	Test Time: 9:31
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	17.00 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	5.98 PASS
SHOCK ABSORBER FORCE	(N)	3588 4270	3612.7 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	33.3 39.4	36.5 PASS



RECORDED BY:

[Signature]

APPROVED BY:

[Signature]

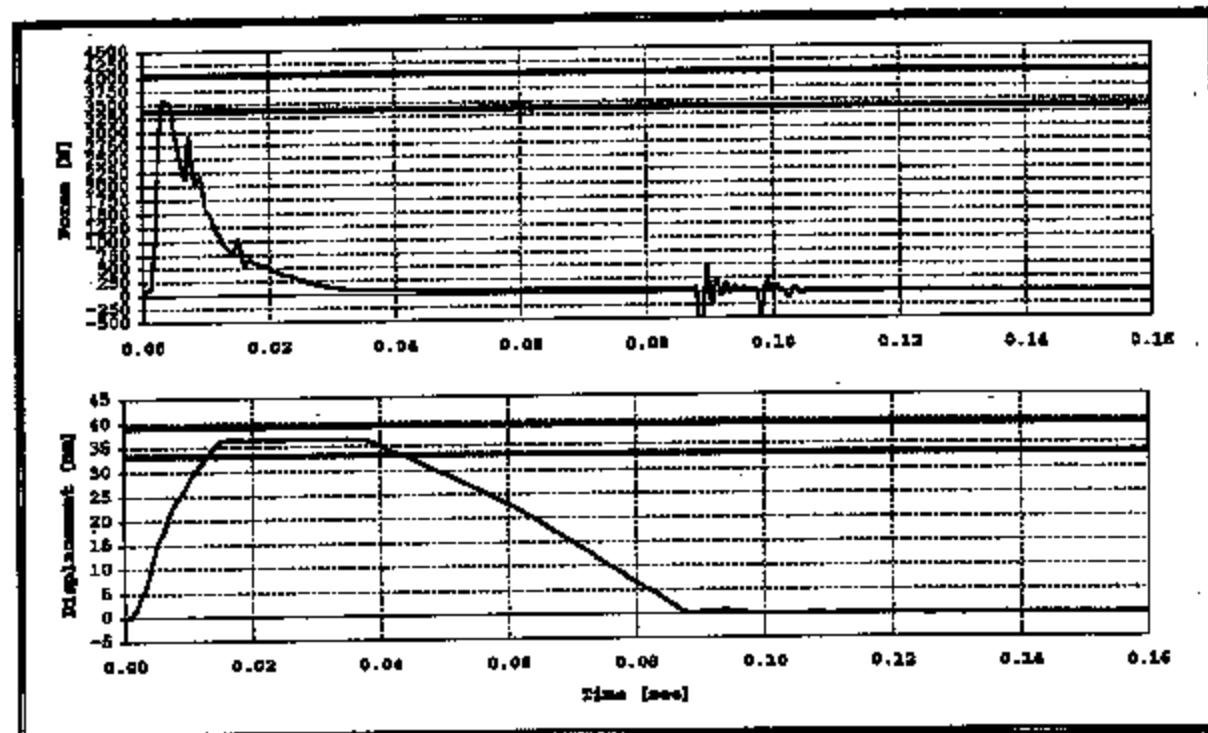
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: 88418	Test Date: 05/14/2004
SID/HIII Number: #052	Test Time: 9:42
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	21.1 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	17.48 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	5.81 PASS
SHOCK ABSORBER FORCE	(N)	3379 4043	3589.4 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	33.1 39.2	36.5 PASS



RECORDED BY:

Paul

APPROVED BY:

Mark

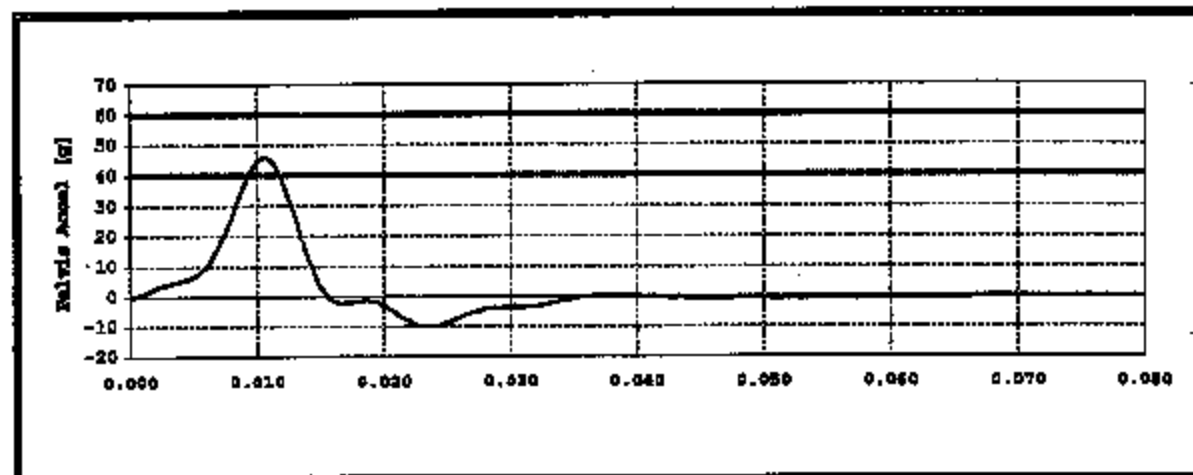
EXPONENT FAILURE ANALYSIS ASSOCIATES

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: SP403	Test Date: 05/11/2004
SID/HIII Number: #052	Test Time: 9:11
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY (%)	10 - 70	30.0 PASS
SPEED TRAP TIME (ms)	---	23.51 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.32 PASS
PELVIS ACCELERATION (g)	40 - 60	46.0 PASS
ACCEL CURVE UNIMODAL?	10% max	0.3% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



RECORDED BY:

RECORDED

APPROVED BY:

APPROVED

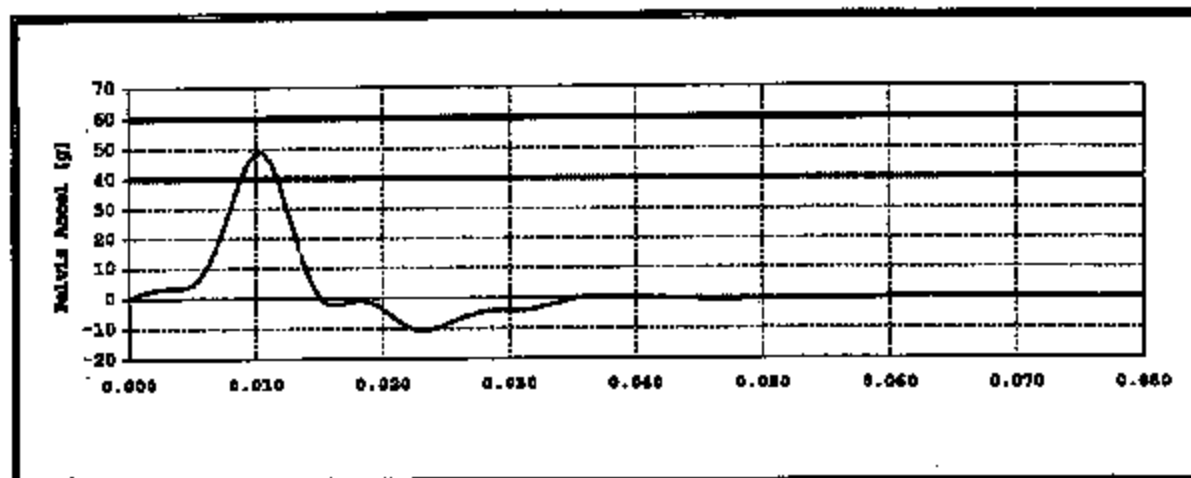
EXPONENT FAILURE ANALYSIS ASSOCIATES

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: SP404	Test Date: 05/11/2004
SID/HIII Number: #052	Test Time: 9:45
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.6 PASS
RELATIVE HUMIDITY (%)	10 - 70	30.0 PASS
SPEED TRAP TIME (ms)	---	23.48 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.33 PASS
PELVIS ACCELERATION (g)	40 - 60	48.8 PASS
ACCEL CURVE UNIMODAL?	10% max	1.0% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



RECORDED BY:

[Signature]

APPROVED BY:

[Signature]

SID/HIII CONFIGURATION VERIFICATION

without Chest Flesh Installed

DATE: 06/08/2004

SID/HIII NUMBER: 062

SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*: SC405

* 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	907 mm
RH	RIB HEIGHT		502 mm – 520 mm 19.7 in – 20.5 in	509 mm
HP	HIP PIVOT HEIGHT	LEFT	99 mm 3.9 in Ref.	100 mm
		RIGHT		100 mm
RD	RIB FROM BACK LINE		229 mm – 241 mm 9.0 in – 9.6 in	230 mm
KH	KNEE PIVOT FROM BACK LINE	LEFT	511 mm – 528 mm 20.1 in – 20.7 in	524 mm
		RIGHT		524 mm
KV	KNEE PIVOT FROM FLOOR	LEFT	490 mm – 505 mm 19.3 in – 19.9 in	490 mm
		RIGHT		490 mm
HW	HIP WIDTH		355 mm – 391 mm 14.0 in – 15.4 in	378 mm

COMMENTS:

RECORDED BY:

Ray E

DATE:

06/09/04

APPROVED BY:

W. H.

DATE:

06/09/2004

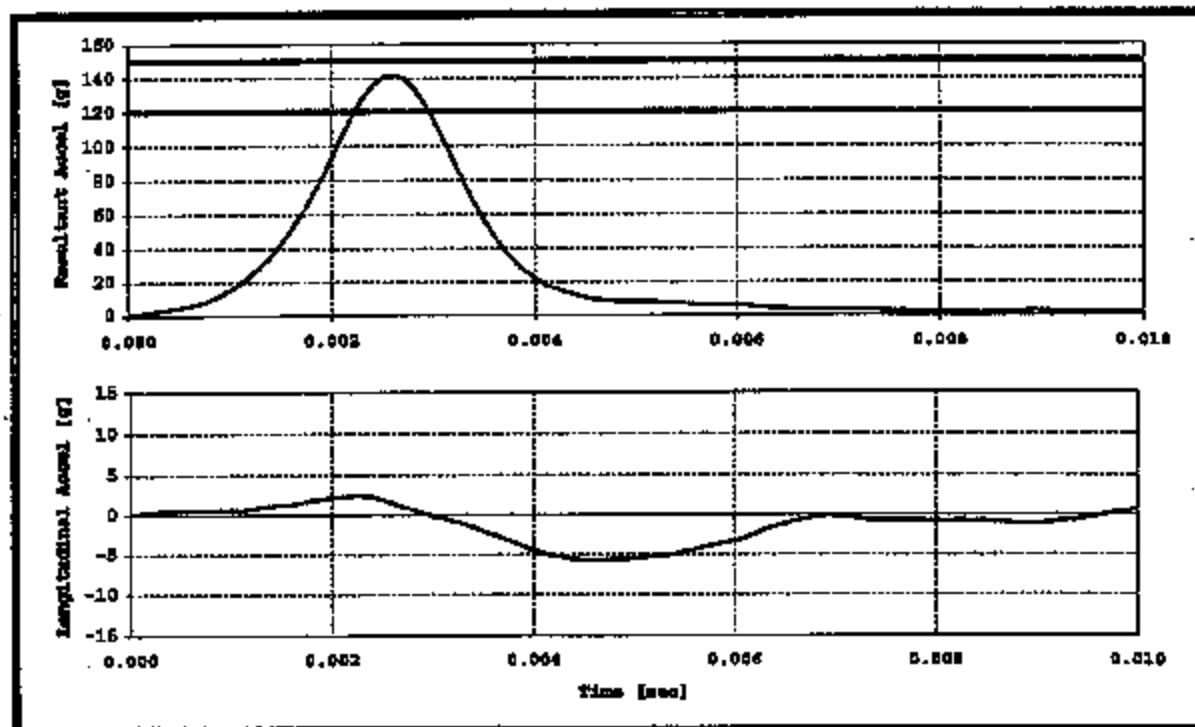
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Head Lateral Impact Test Summary

Test ID Number: SH411	Test Date: 06/07/2004
SID/HIII Number: #52	Test Time: 15:02
Part Serial No:	Drop Height: 200 mm
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	21.7 PASS
RELATIVE HUMIDITY (%)	10 - 70	32.0 PASS
PEAK RESULTANT ACCEL. (g)	120 - 150	142.0 PASS
PEAK LONGITUDINAL ACCEL. (g)	15 g max.	5.8 PASS
ACCEL. CURVE UNIMODAL?	15% max.	4.0% PASS



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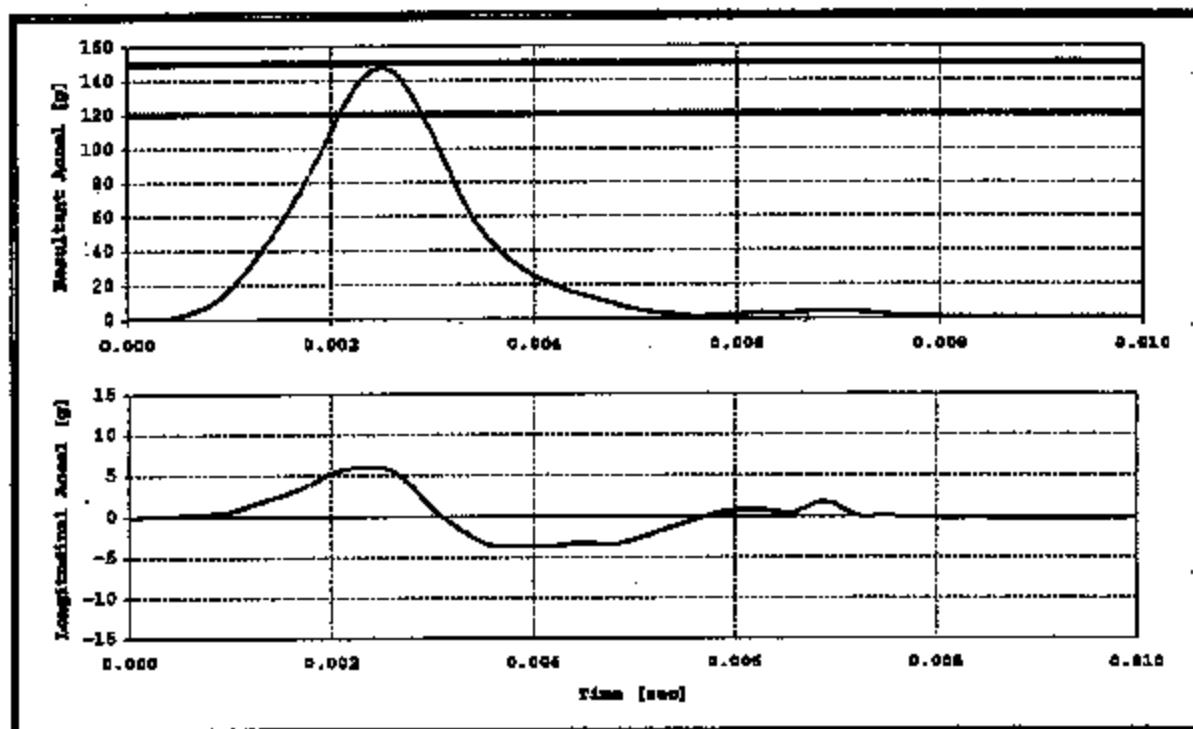
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/NIII Head Lateral Impact Test Summary

Test ID Number: SH412	Test Date: 06/07/2004
SID/NIII Number: #52	Test Time: 17:34
Part Serial No: 7231C	Drop Height: 200 mm
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	22.2 PASS
RELATIVE HUMIDITY (%)	10 - 70	36.0 PASS
PEAK RESULTANT ACCEL. (g)	120 - 150	147.8 PASS
PEAK LONGITUDINAL ACCEL. (g)	15 g max.	6.1 PASS
ACCEL. CURVE UNIMODAL?	15% max.	3.8% PASS



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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: SN411	Test Date: 06/07/2004
SID/HIII Number: #052	Test Time: 15:51
Comments: 120.0 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	21.7 PASS
RELATIVE HUMIDITY (%)	10 - 70	37.0 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 - 2.55	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	6.6 PASS
PENDULUM IMP [max] - 40-70 ms (m/s)	6.27 - 7.64	7.3 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	61.7 PASS
PEAK Mxoc (N-m)	73 - 88	84.8 PASS
Mxoc PEAK-ZERO DECAY TIME (ms)	49 - 64	56.2 PASS
Mxoc PEAK TO ROTATION PEAK (ms)	2 - 16	10.9 PASS

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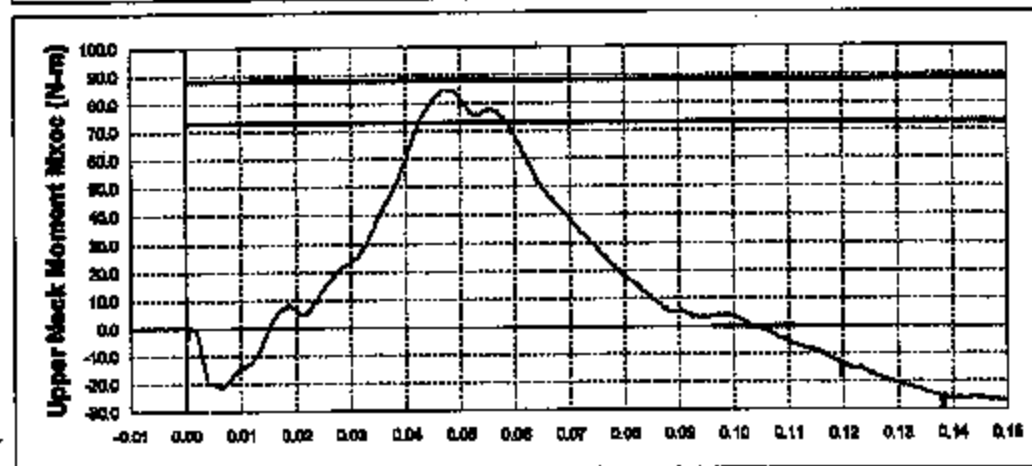
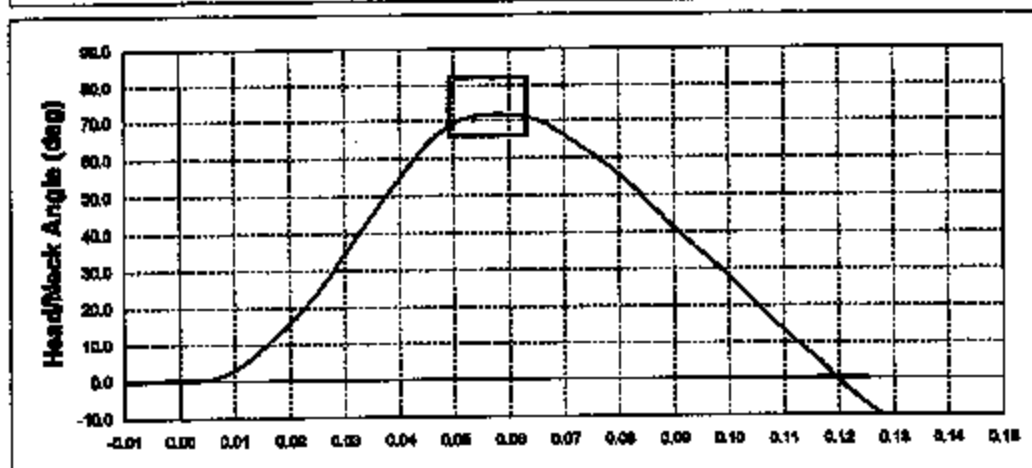
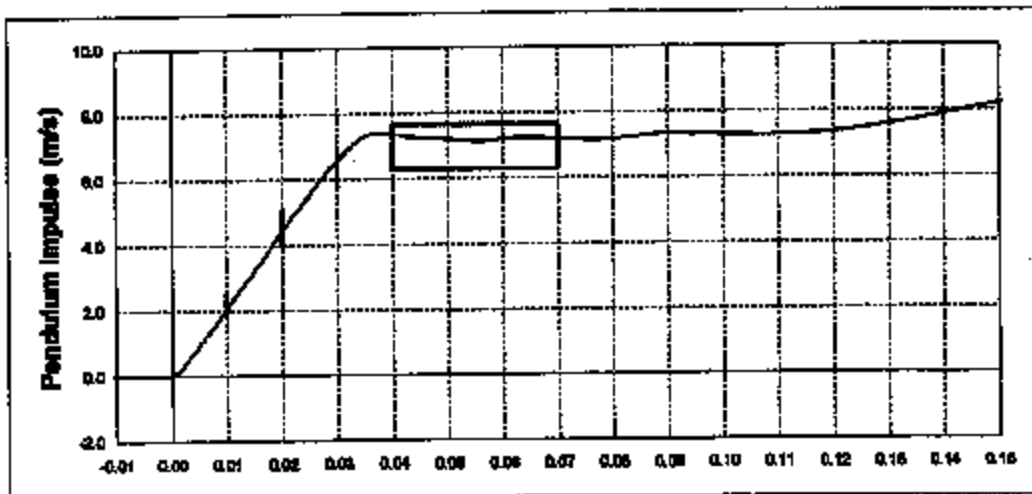
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EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: BN411

Date: 6/7/2004



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: SN412	Test Date: 06/07/2004
SID/HIII Number: #052	Test Time: 16:24
Comments: 120.0 deg, 27 cells	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	20.6 - 22.2	21.1 PASS
RELATIVE HUMIDITY (%)	10 - 70	38.0 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 - 2.56	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	6.5 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	73.1 PASS
ROTATION PEAK-ZERO DECAY TIME (ms)	58 - 67	61.1 PASS
PEAK MxOC (N-m)	73 - 88	86.3 PASS
MxOC PEAK-ZERO DECAY TIME (ms)	49 - 64	56.4 PASS
MxOC PEAK TO ROTATION PEAK (ms)	2 - 16	9.3 PASS

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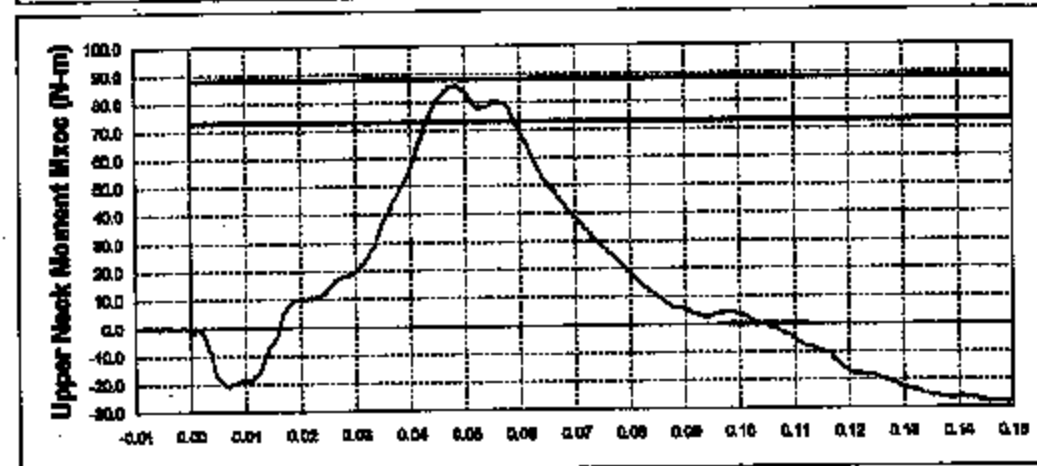
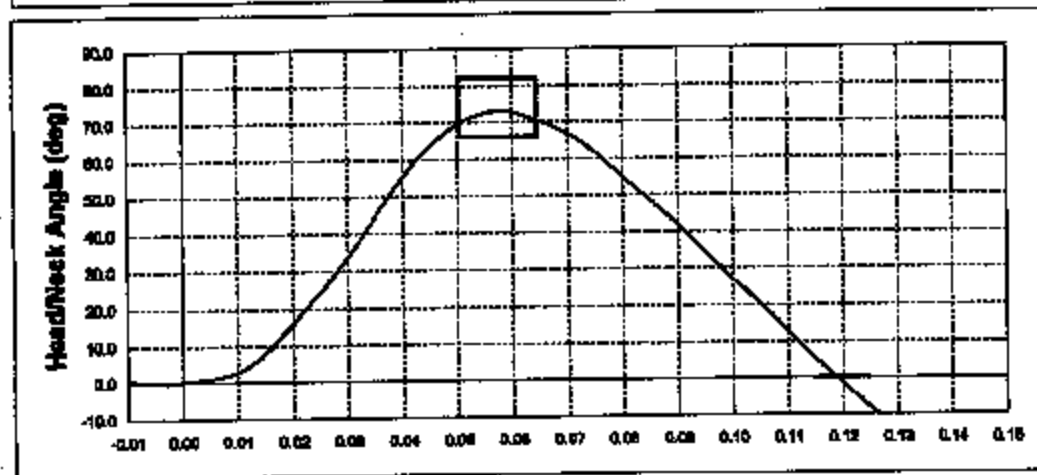
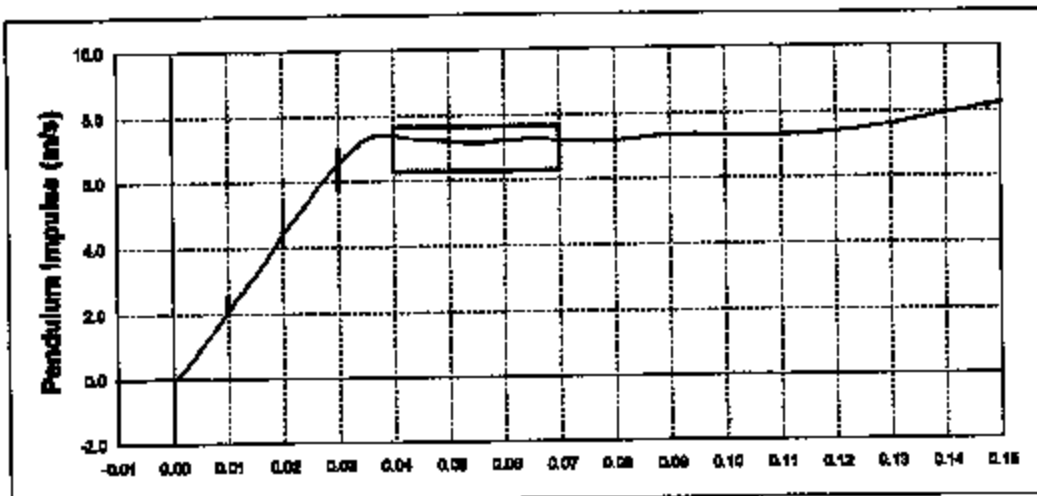
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EXPONENT FAILURE ANALYSIS ASSOCIATES

Neck Lateral Impact Test

Test ID: SN412

Date: 6/7/2004



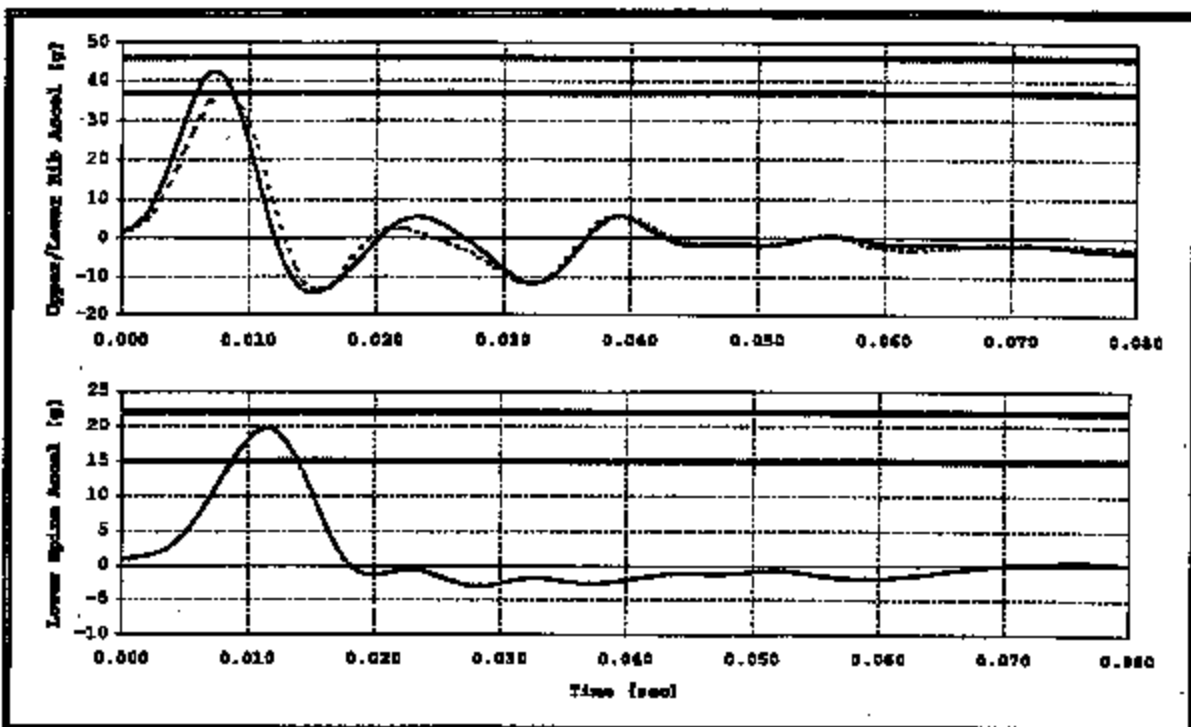
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST409	Test Date: 06/03/2004
SID/HIII Number: #52	Test Time: 15:10
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY	(%)	10 - 70	31.0 PASS
SPEED TRAP TIME	(ms)	---	23.69 ---
IMPACT VELOCITY	(m/s)	4.21 - 4.33	4.29 PASS
UPPER RIB ACCELERATION	(g)	37 - 46	42.7 PASS
LOWER RIB ACCELERATION	(g)	37 - 46	37.3 PASS
LOWER SPINE ACCELERATION	(g)	15 - 22	19.7 PASS



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APPROVED BY:

MEK

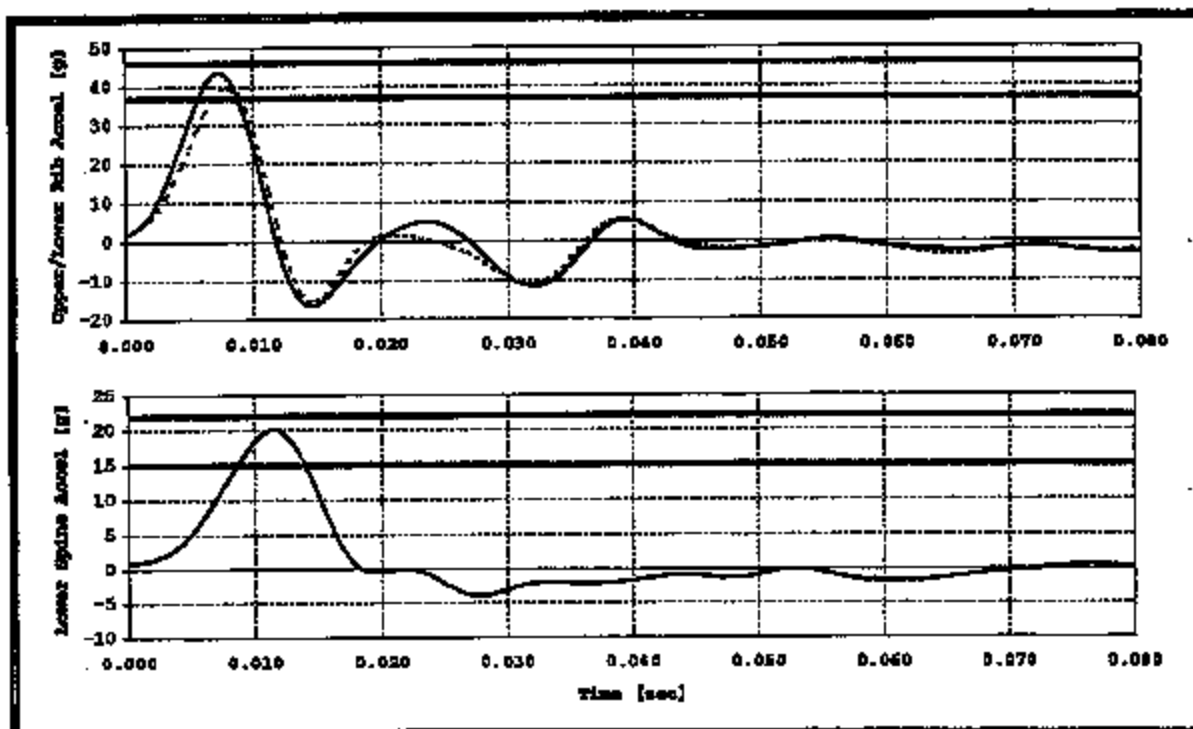
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Thorax Lateral Impact Test Summary

Test ID Number: ST410	Test Date: 06/03/2004
SID/HIII Number: #52	Test Time: 16:43
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY (%)	10 - 70	31.0 PASS
SPEED TRAP TIME (ms)	---	23.69 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.29 PASS
UPPER RIB ACCELERATION (g)	37 - 46	43.7 PASS
LOWER RIB ACCELERATION (g)	37 - 46	39.7 PASS
LOWER SPINE ACCELERATION (g)	15 - 22	20.1 PASS



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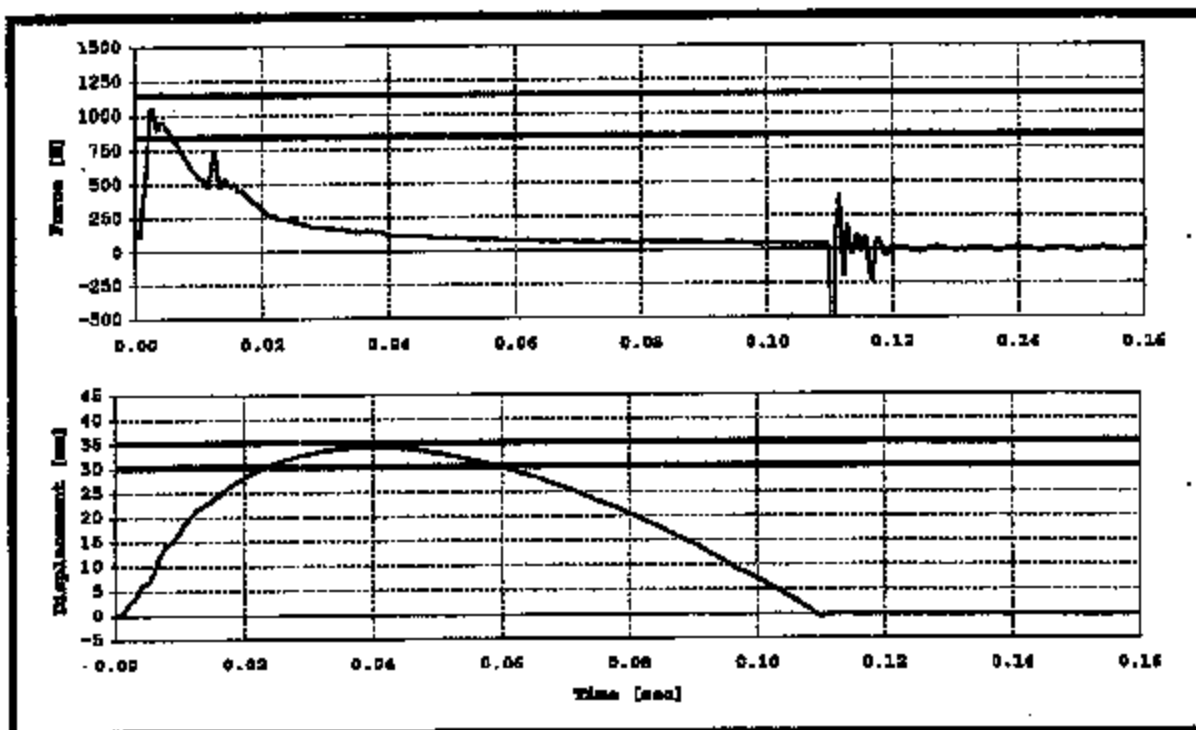
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SE425	Test Date: 06/02/2004
SID/HIII Number: #052	Test Time: 9:53
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	33.26 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	3.05 PASS
SHOCK ABSORBER FORCE	(N)	843 1145	1056.5 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	30.2 35.1	34.2 PASS



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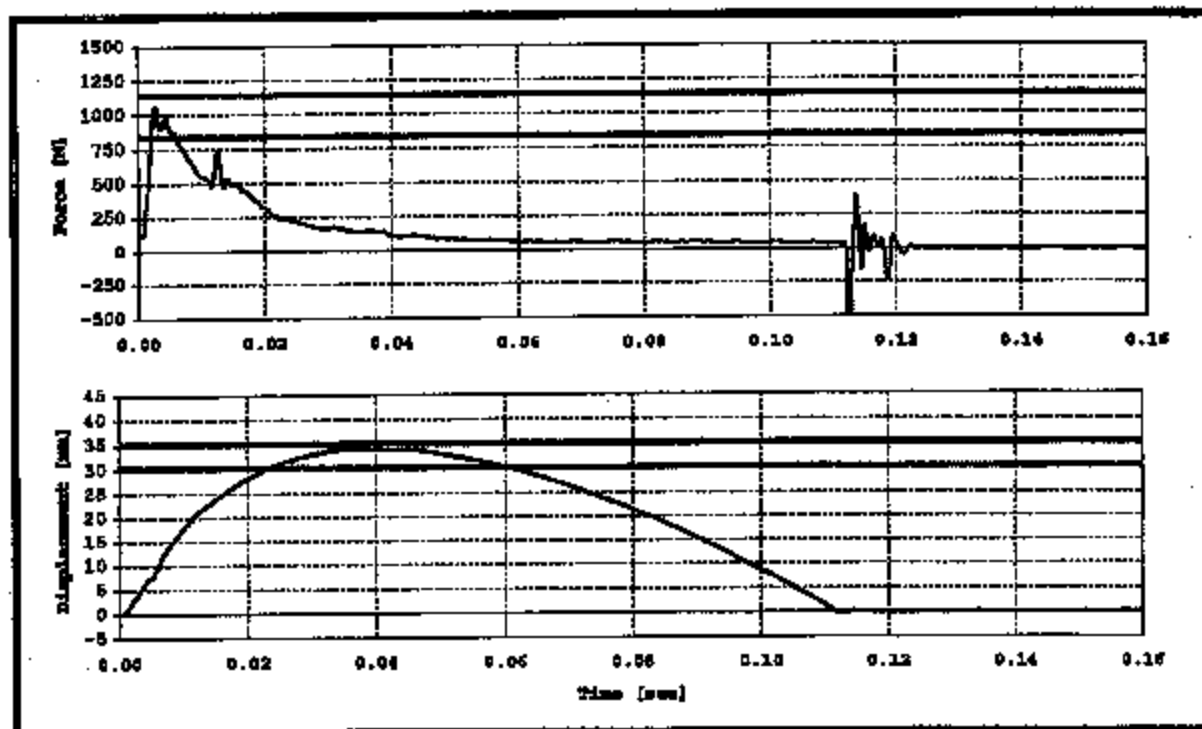
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: 88426	Test Date: 06/02/2004
SID/HIII Number: #052	Test Time: 10:03
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY (%)	10 - 70	26.0 PASS
SPEED TRAP TIME (ms)	---	33.33 ---
IMPACT VELOCITY (m/s)	2.74 - 6.40	3.05 PASS
SHOCK ABSORBER FORCE (N)	840 1140	1061.8 PASS
SHOCK ABSORBER DISPLACEMENT (mm)	30.2 35.1	34.1 PASS



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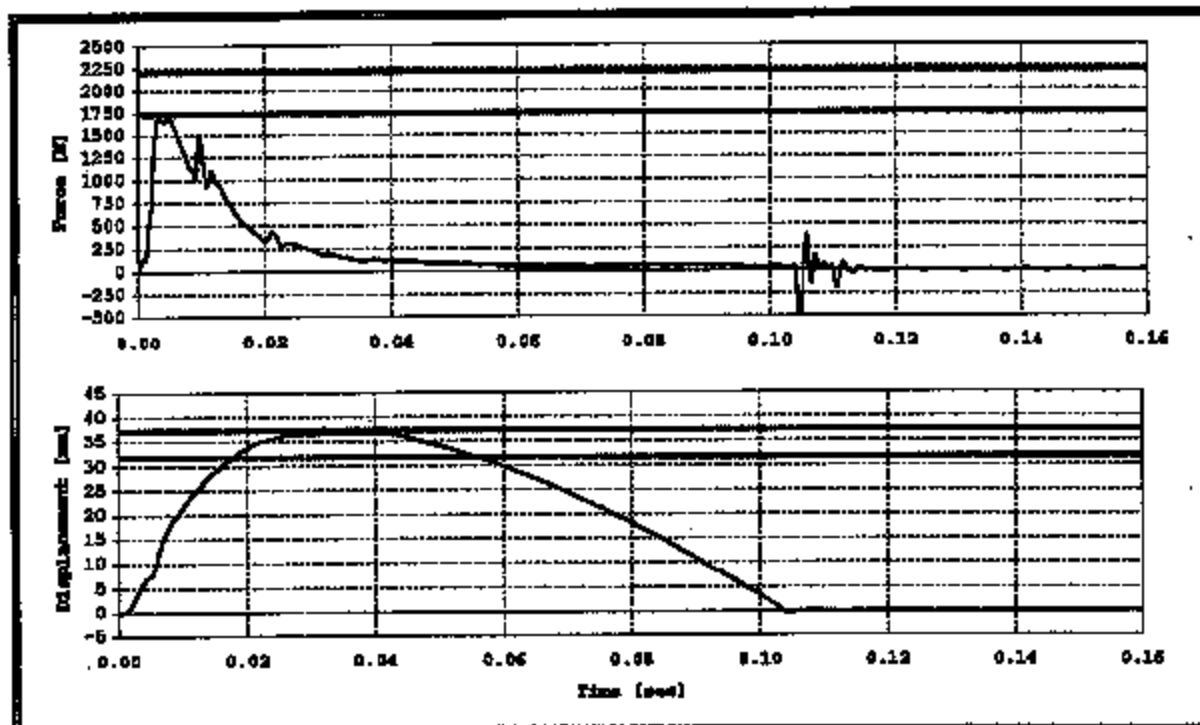
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS427	Test Date: 06/02/2004
SID/HIII Number: #052	Test Time: 10:10
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY (%)	10 - 70	26.0 PASS
SPEED TRAP TIME (ms)	---	23.78 ---
IMPACT VELOCITY (m/s)	2.74 - 6.40	4.27 PASS
SHOCK ABSORBER FORCE (N)	1739 2211	1743.2 PASS
SHOCK ABSORBER DISPLACEMENT (mm)	31.7 37.2	36.4 PASS



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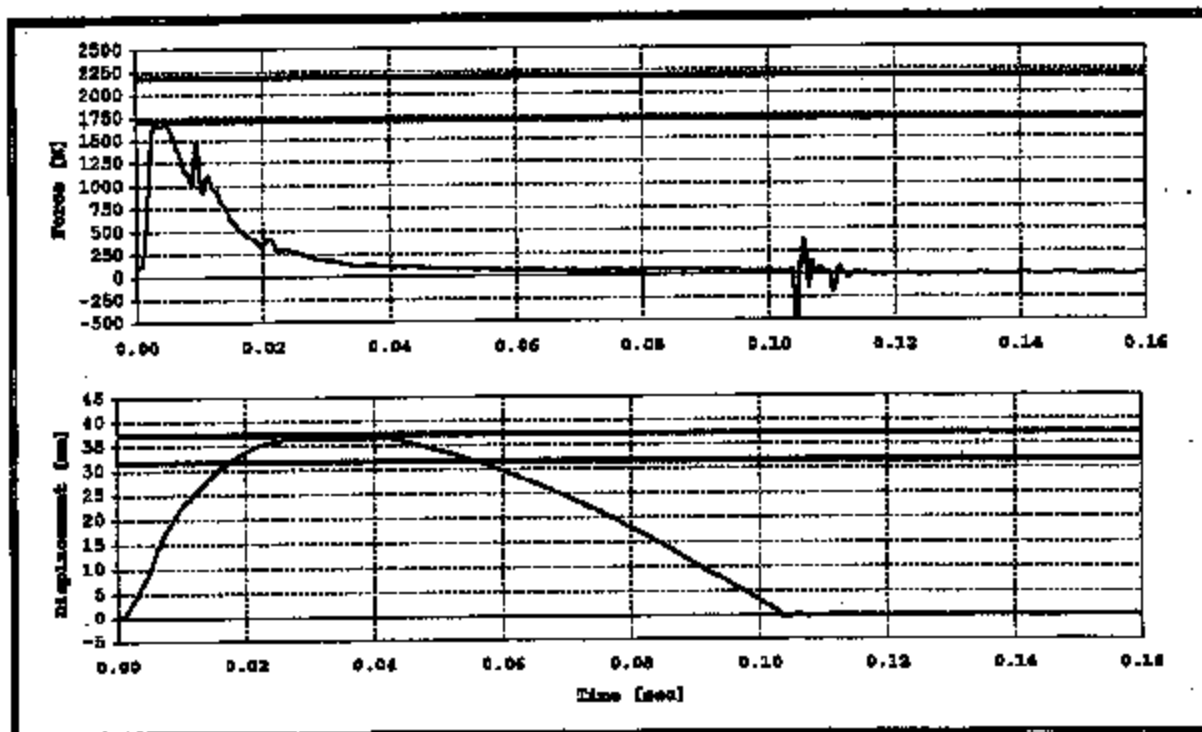
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: SS428	Test Date: 06/02/2004
SID/HIII Number: #052	Test Time: 10:16
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	23.94 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	4.24 PASS
SHOCK ABSORBER FORCE	(N)	1714 2182	1721.7 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	31.7 37.2	36.5 PASS



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RAE

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MAK

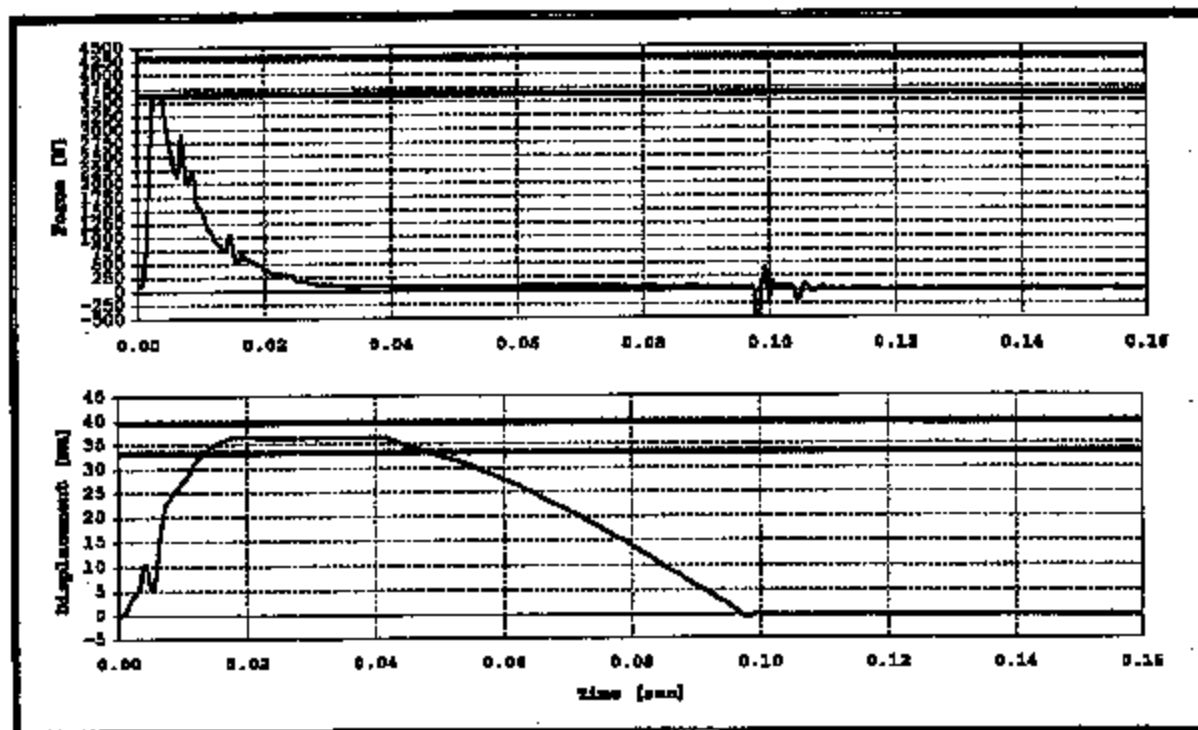
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: 88429	Test Date: 06/02/2004
SID/HIII Number: #052	Test Time: 10:26
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	16.92 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	6.00 PASS
SHOCK ABSORBER FORCE	(N)	3625 4310	3625.7 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	33.3 39.5	36.4 PASS



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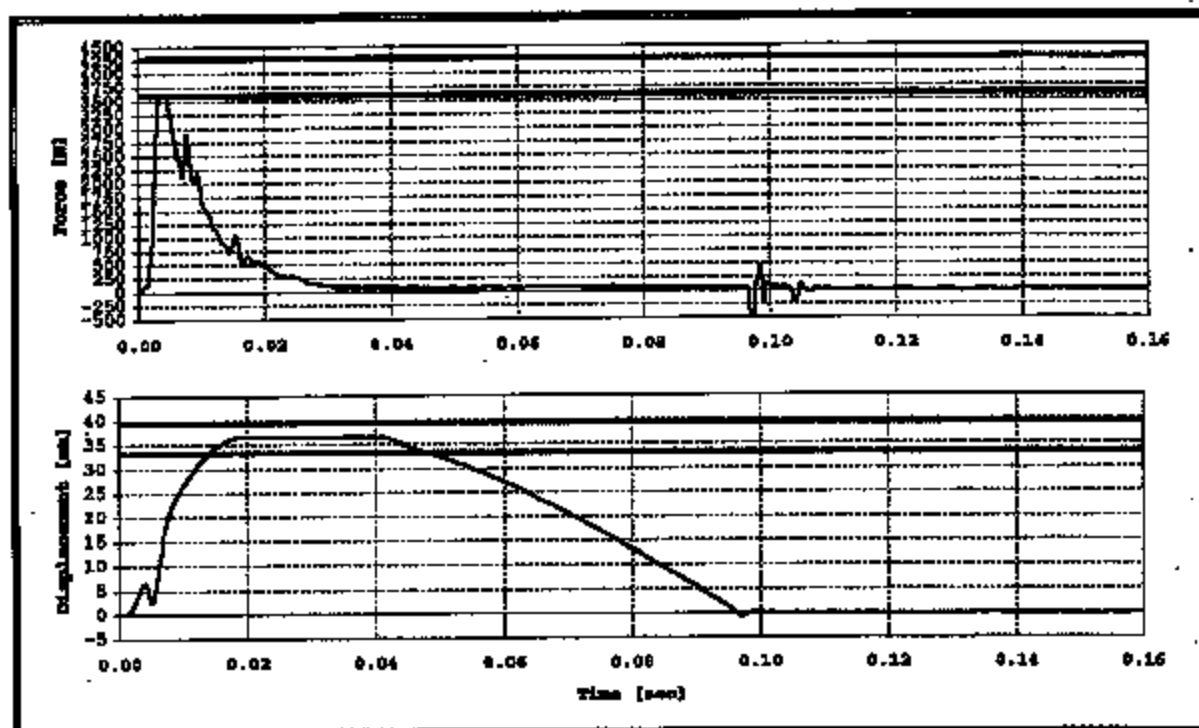
EXPONENT FAILURE ANALYSIS ASSOCIATES

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

SID/HIII Shock Absorber Bench Test Summary

Test ID Number: 88430	Test Date: 06/02/2004
SID/HIII Number: #052	Test Time: 10:35
Comments:	

TEST PARAMETER		SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE	(°C)	18.9 - 25.6	20.0 PASS
RELATIVE HUMIDITY	(%)	10 - 70	26.0 PASS
SPEED TRAP TIME	(ms)	---	16.98 ---
IMPACT VELOCITY	(m/s)	2.74 - 6.40	5.98 PASS
SHOCK ABSORBER FORCE	(N)	3597 4280	3612.8 PASS
SHOCK ABSORBER DISPLACEMENT	(mm)	33.3 39.4	36.5 PASS



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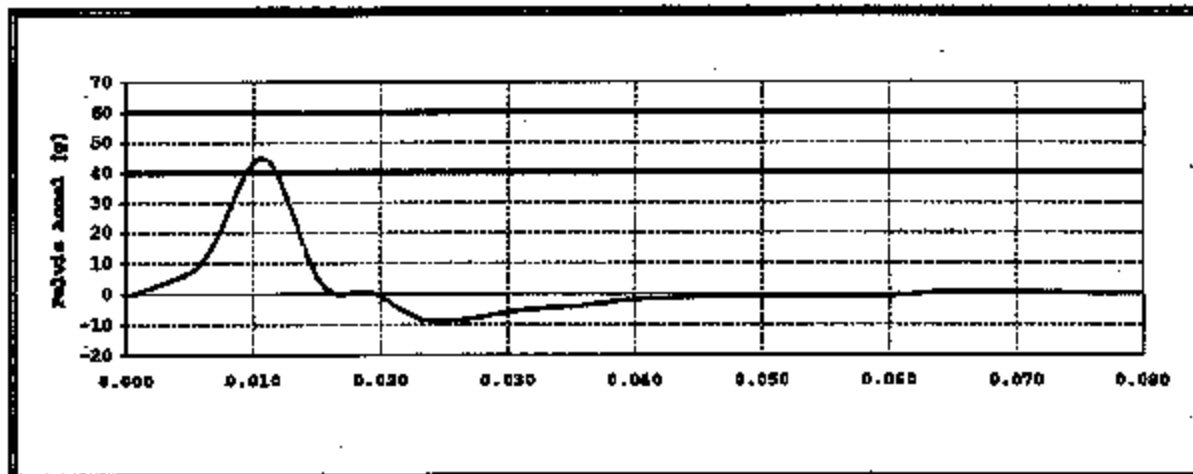
EXPONENT FAILURE ANALYSIS ASSOCIATES

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: SP409	Test Date: 06/04/2004
SID/HIII Number: #052	Test Time: 7:18
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.5 PASS
RELATIVE HUMIDITY (%)	10 - 70	28.0 PASS
SPEED TRAP TIME (ms)	---	23.67 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.29 PASS
PELVIS ACCELERATION (g)	40 - 60	45.0 PASS
ACCEL CURVE UNIMODAL?	10% max	1.6% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



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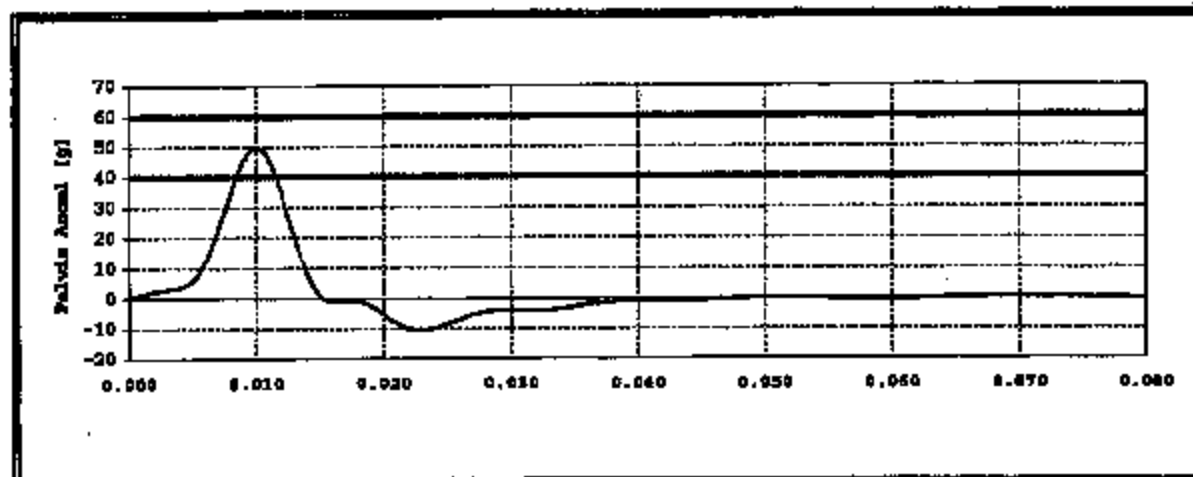
EXPONENT FAILURE ANALYSIS ASSOCIATES

Test and Engineering Center
1650 W. Pinnacle Peak Rd
Phoenix, Arizona 85027

SID/HIII Lumbar Spine and Pelvis Lateral Impact Test Summary

Test ID Number: SP410	Test Date: 06/04/2004
SID/HIII Number: #052	Test Time: 7:54
Comments:	

TEST PARAMETER	SPECIFICATION	TEST RESULTS
AMBIENT TEMPERATURE (°C)	18.9 - 25.6	20.5 PASS
RELATIVE HUMIDITY (%)	10 - 70	28.0 PASS
SPEED TRAP TIME (ms)	---	23.67 ---
IMPACT VELOCITY (m/s)	4.21 - 4.33	4.29 PASS
PELVIS ACCELERATION (g)	40 - 60	50.0 PASS
ACCEL CURVE UNIMODAL?	10% max	0.9% PASS
PELVIS ACCEL TIME > 20 g (ms)	3 - 7	6.3 PASS



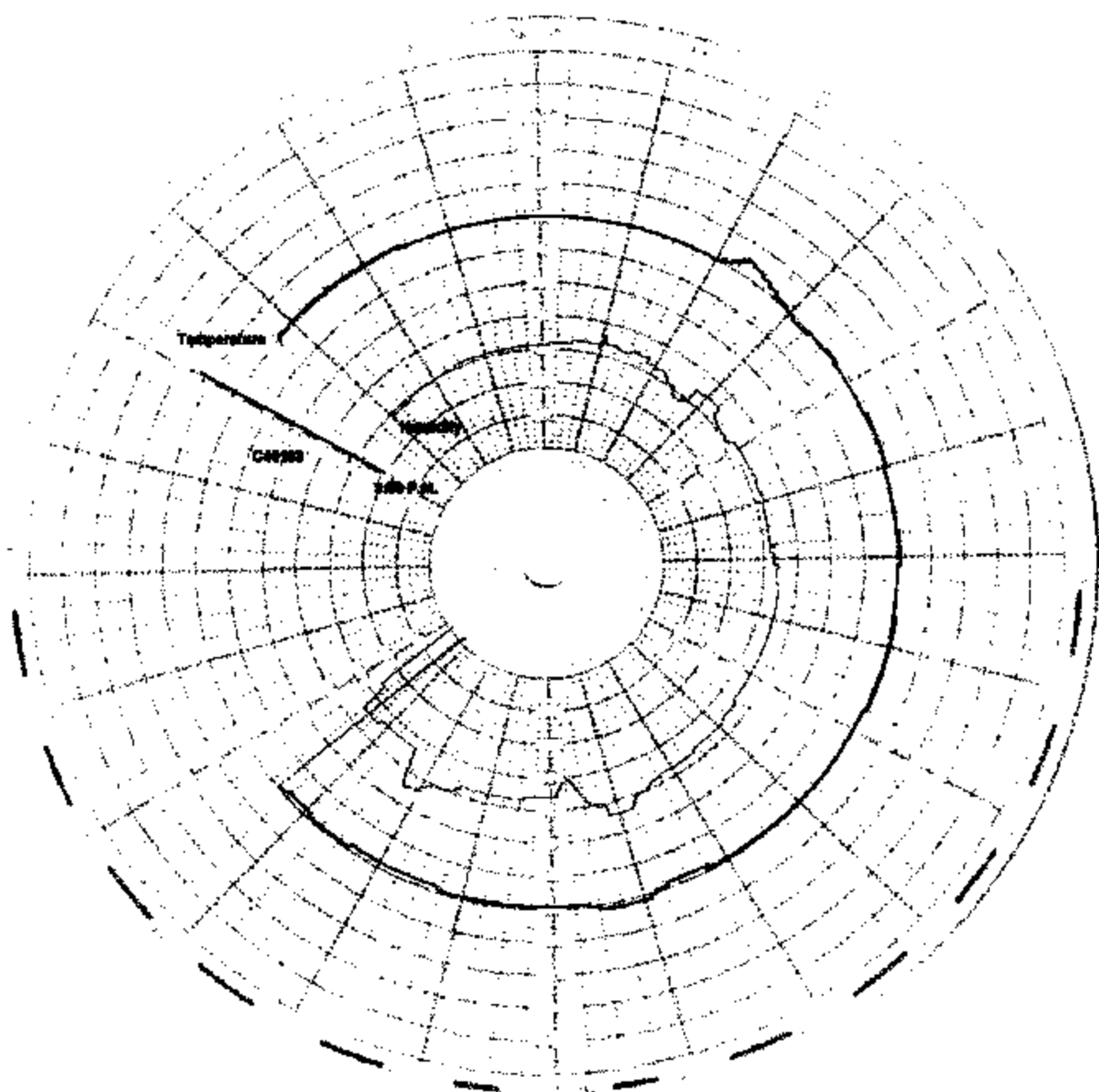
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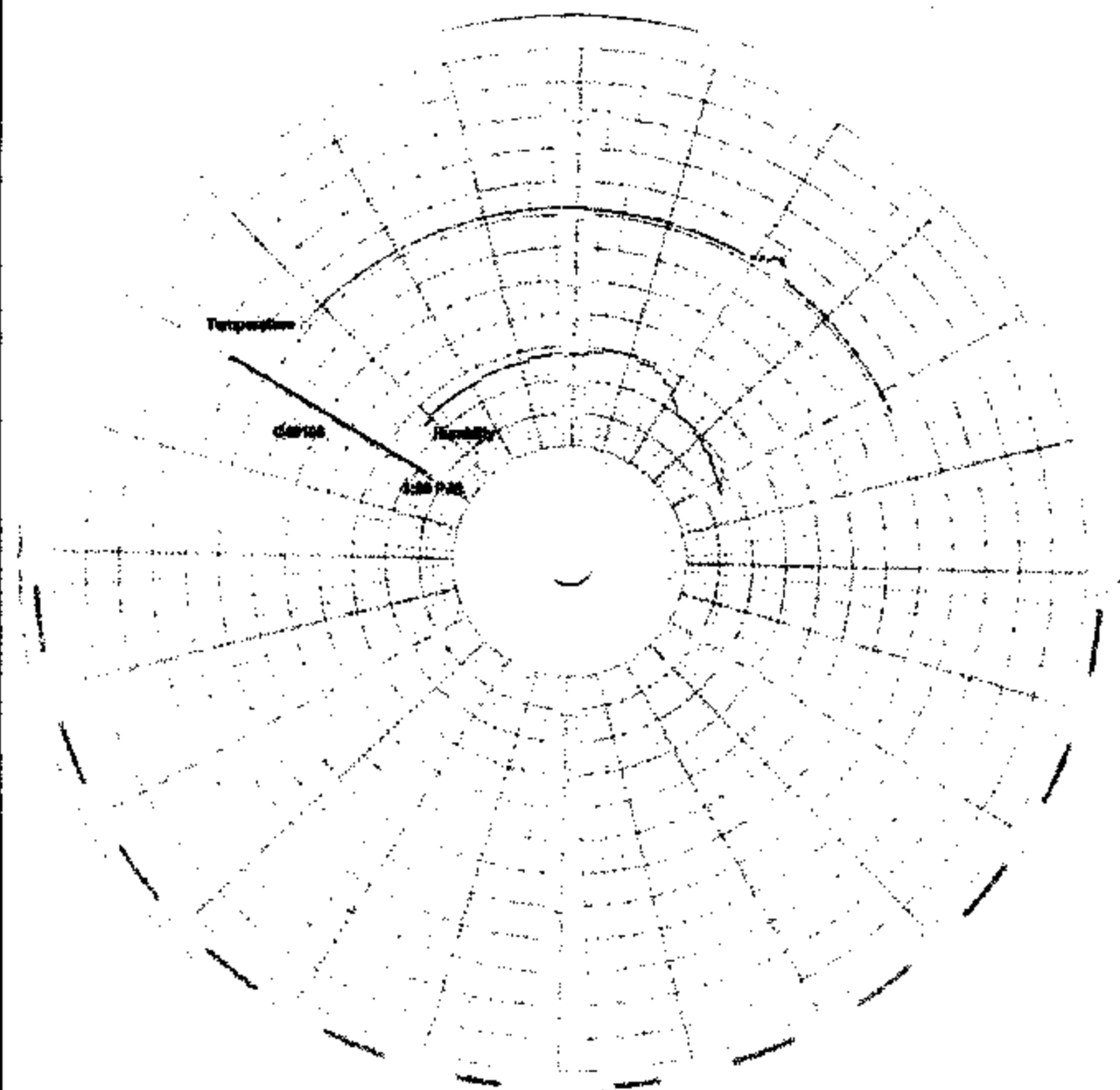
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ATD TEMPERATURE/HUMIDITY DATA



TEST	DATE	TIME	JOB NAME: Rigid Pole Side Impact Test	JOB NO.: PH08682
C40103	5/19/04	3:59 P.M.	Omega Temperature/Humidity Recorder Model No.: CT485-RS Serial No.: Z1986 Cal. Due: 6/30/04	Exponent <i>Failure Analysis Associates</i>

VEHICLE TEMPERATURE/HUMIDITY DATA



TEST	DATE	TIME	JOB NAME: Rigid Pole Side Impact Test	JOB NO.: PH08682
C40103	5/19/04	3:59 P.M.	Omega Temperature/Humidity Recorder Model No.: CT485-RS Serial No.: Z1985 Cal. Due: 6/30/04	Exponent <i>Failure Analysis Associates</i>

Appendix D— Test Equipment List and Calibration Information

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

	Dummy Instrumentation		
	Serial No.	Manufacturer	Last Calibration Date
Head CG X	C12823	Endevco	02/26/04
Head CG Y	C15643	Endevco	02/26/04
Head CG Z	C15677	Endevco	02/26/04
Neck Force X	88	Denton	03/02/04
Neck Force Y	88	Denton	03/02/04
Neck Force Z	88	Denton	03/02/04
Neck Moment X	88	Denton	03/02/04
Neck Moment Y	88	Denton	03/02/04
Neck Moment Z	88	Denton	03/02/04
Upper Rib	AETR5	Endevco	03/09/04
Lower Rib	A13118A	Endevco	03/09/04
Lower Spine	A13195A	Endevco	03/09/04
Pelvis	A13115A	Endevco	03/19/04

Remarks: None

	Vehicle Instrumentation		
	Serial No.	Manufacturer.	Last Calibration Date
Vehicle CG (X)	A66A	Endevco	03/26/04
Vehicle CG (Y)	A56E	Endevco	03/26/04
Vehicle CG (Z)	A65M	Endevco	03/26/04
Vehicle CG Roll Rate	36638	Syston Donner	11/03/03
Vehicle CG Pitch Rate	12577	Syston Donner	11/03/03
Vehicle CG Yaw Rate	9273	Syston Donner	11/03/03
Left Floor Sill (Y)	Z2120	Entran	03/20/04
Left A-Pillar Sill (Y)	9844-095	I.C.Sensors	05/13/04
Left A-Pillar Low (Y)	9844-004	I.C.Sensors	05/13/04
Left A-Pillar Mid (Y)	9844-011	I.C.Sensors	05/13/04
Left B-Pillar Sill (Y)	9844-013	I.C.Sensors	05/13/04
Left B-Pillar Low (Y)	9844-042	I.C.Sensors	05/13/04
Left B-Pillar Mid (Y)	9844-040	I.C.Sensors	05/13/04
Driver Seat (Y)	9844-003	I.C.Sensors	05/13/04
Left Door Low (Y)	9844-066	I.C.Sensors	05/13/04
Left Door Mid (Y)	9844-001	I.C.Sensors	05/13/04
Left Door Upper (Y)	9844-102	I.C.Sensors	05/13/04
Engine (X)	Z1881	Entran	03/20/04
Engine (Y)	Z1885	Entran	03/20/04
Firewall (Y)	Z1889	Entran	03/22/04
Right Roof (Y)	Z1831	Entran	03/22/04
Right Floor Sill (Y)	Z1838	Entran	03/22/04
Rear Deck (X)	Z2179	Entran	03/19/04
Rear Deck (Y)	Z2096	Entran	03/19/04

Remarks: None