

Stock 1997 Ford Explorer

Pole Test

SAFE050603



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1. INTRODUCTION

On May 6, 2003 a pole impact test was performed on a stock 1997 Ford Explorer to evaluate the roof's structural performance and resulting intrusion pursuant to a dynamic loading environment.

2. TEST PROCEDURE

The 1997 Ford Explorer (see Appendix A for test vehicle identification data) was subjected to a roof-to-pole impact on May 6, 2003. The test vehicle was inspected for defects. The doors were closed and the power front seats were placed in their the mid-point longitudinally and the lowest vertical settings. The test vehicle was equipped with a Psi-tronix DVT-50A displacement transducer mounted to the top of the driver's side A-pillar. A tri-axial array of Endevco 7231c-750TS accelerometers were mounted on the center tunnel at the vehicle's approximate center of gravity. (Figure 1) A tri-axial array of Endevco 7264B-2000T accelerometers were mounted the vehicle's side header adjacent to the intended point of first contact.(Figure 1)

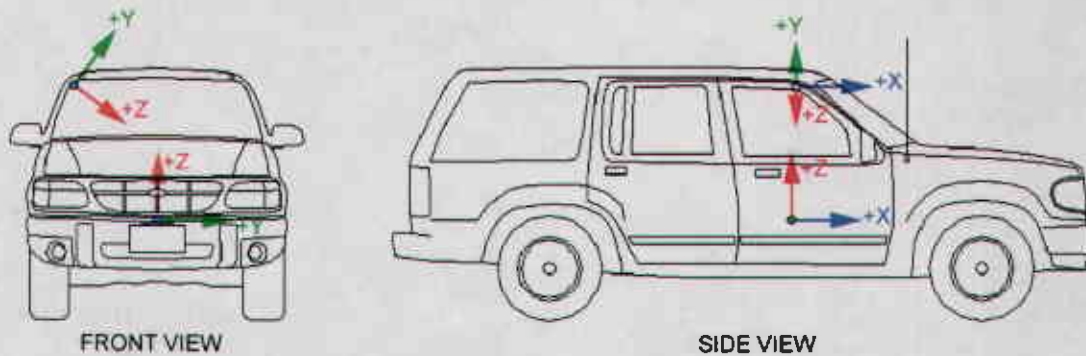


FIGURE 1: ACCELEROMETER DIAGRAM

Four real-time and two high-speed cameras were used to document the test from multiple angles. Four water dummies were belted into the occupant compartment with the production 3-point restraints. Ballast was placed in the front foot wells and the rear cargo area. The total test weight of the vehicle was 5118 lb.(See Appendix A for vehicle specifications) The vehicle was placed on a tilt table, adjacent to a wooden utility pole, and rotated up to 57 degrees from horizontal. The vehicle was chained to the tilt table at the passenger frame rail and a 6" lip next to the driver's side tires maintained the orientation of the test vehicle. When an inline release mechanism was disengaged at the chain and frame connection, the vehicle was free to rotate under its own weight into the wooden pole (see Figure 2 for test setup). The vehicle rotated such that the driver side roof rail just cleared the pole and the primary impact was at the passenger side roof rail between the A- and B-pillars. This impact occurred at approximately 9 mph (at the roof rail). Additional photographs of the vehicle and test setup are shown in Appendix C.



FIGURE 2: POLE TEST CONFIGURATION DIAGRAM

3. SUMMARY OF RESULTS

The vehicle sustained significant damage to the roof structure over the passenger compartment. The passenger's side A-pillar was bent downward, inward and rearward. The pole deformed the roof to the extent that it was allowed to contact and impact the passenger door at the daylight opening.

Table 1 below summarizes the test results. The maximum deformation at the passenger's A-pillar during the primary impact was approximately 12.6" dynamically as measured at the displacement transducer. (See Appendix B for complete data).

TABLE 1: SUMMARY OF RESULTS

Data Plot	Units	Max	Time (s)	Min	Time (s)	SAE Class
CG Acceleration x	G's	2.0	0.284	-1.0	0.266	60
CG Acceleration y	G's	1.6	-0.977	-3.6	0.283	60
CG Acceleration z	G's	2.7	-0.976	-5.7	0.319	60
Roof Rail Acceleration x	G's	4.2	0.073	-5.9	0.005	60
Roof Rail Acceleration y	G's	3.6	0.033	-18.6	0.003	60
Roof Rail Acceleration z	G's	9.9	0.009	-7.4	0.072	60
Roof Displacement	Inches	0.1	-1.000	-12.6	0.271	60

APPENDIX A

VEHICLE INFORMATION

TEST VEHICLE INFORMATION

Date Received	3/18/03	VIN	1FMDU35P2VUA53615
Manufacturer (Basic Vehicle)	FORD	Manufacturing Date	9/96
Manufacturer (Modifier)	N/A	Vehicle Model Year	1997
Vehicle Model	EXPLORER XLT	Color	WHITE
Odometer Reading	109,859	Fuel Type	UNLEADED
Engine Displacement	5.0L	Cylinders	8
Transmission	AUTOMATIC	Wheel Drive Type	AWD
Performance Equipment	N/A	Spare Tire	N/A
Recommended Tire Size	P235/75R15	Tire Manufacturer	GOODYEAR WRANGLER
Tire Size on Vehicle	P235/75R15	Cargo Capacity (Basic Vehicle)	
GVWR (Basic Vehicle)	5580 LB	Left Front Occupant Weight	168
GAWR Front (Basic Vehicle)	2,850 LB	Right Front Occupant Weight	215
GAWR Rear (Basic Vehicle)	3000 LB	Left Rear Occupant Weight	149
GAWR Front (Modifier)	N/A	Right Rear Occupant Weight	84
GAWR Rear (Modifier)	N/A	Total Occupant Weight	616
WEIGHT AS TESTED			
Left Front	1194 LB	Right Front	1134 LB
Left Rear	970 LB	Right Rear	944 LB
Front Axle	2328 LB	Rear Axle	1914 LB
Ballast	260 LB**	Removed Weight	0 LB*
Total Test Weight	5118 LB		

*Fluids, spare tire and battery removed prior to weigh-in.

** 50 lb in driver's footwell, 50 lb in passenger footwell, and 160 in rear cargo area

VEHICLE ARRIVAL PHOTOGRAPHS

A - 2

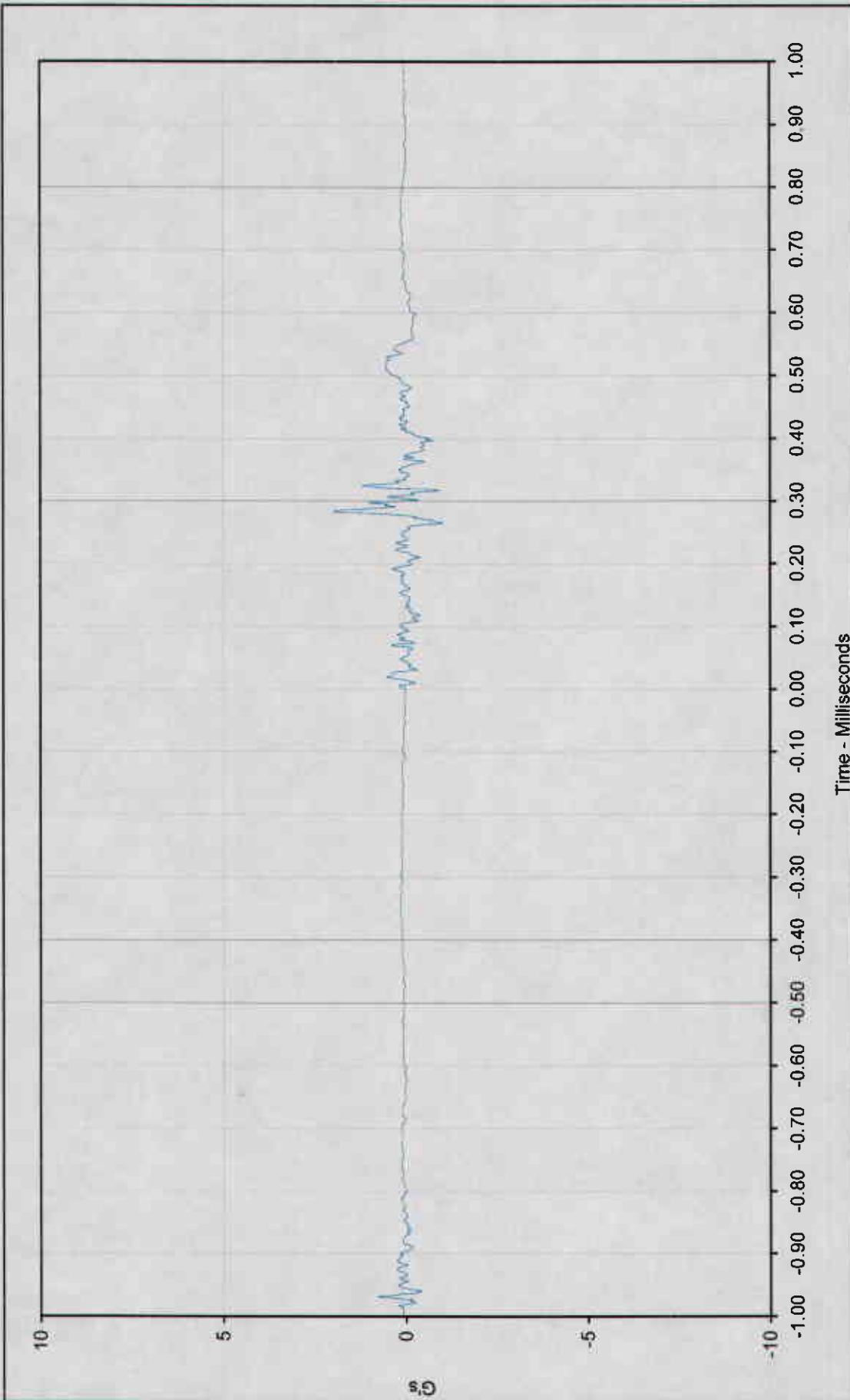
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APPENDIX B

DATA PLOTS



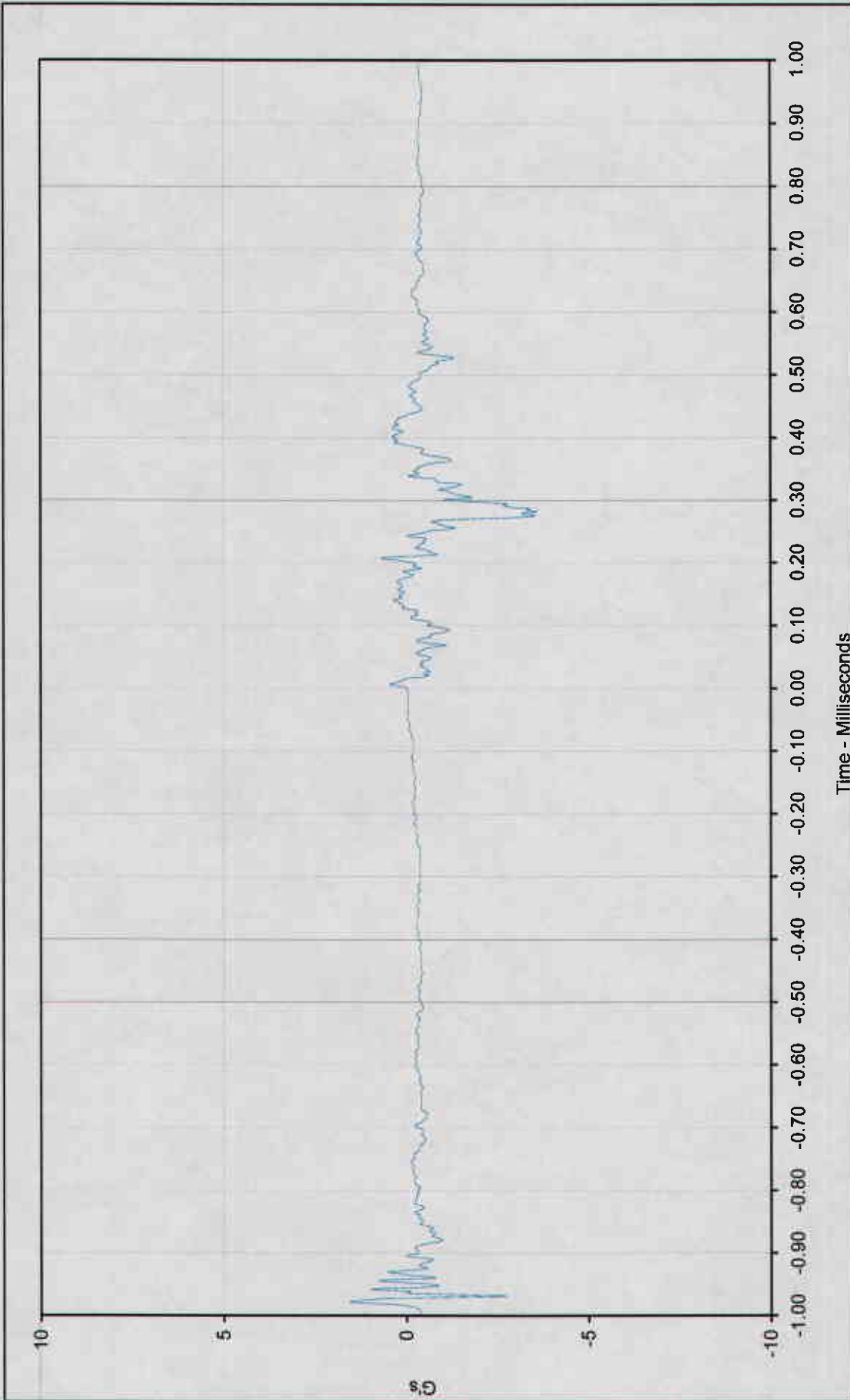
Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
CG acceleration x	001	G's	2.0	0.284	-1.0	0.266	60

Test Date: 5/6/2003

Project No.: SAFE050603

Test Vehicle: 1997 Stock Ford Explorer

Test Program: Pole Impact



Time - Milliseconds



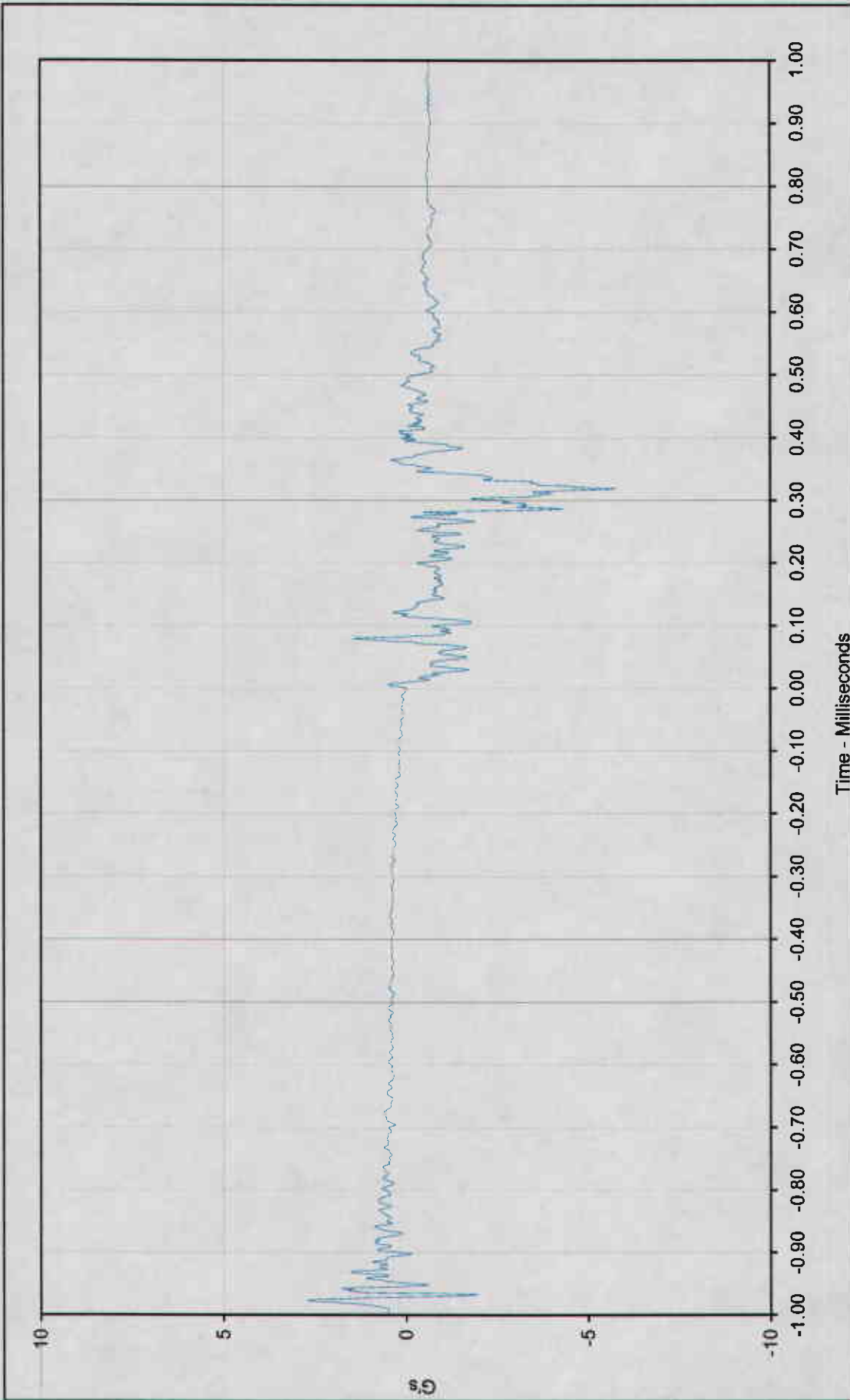
Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
CG acceleration y	002	G's	1.6	-0.977	-3.6	0.283	60

Test Date: 5/6/2003

Project No.: SAFE050603

Test Vehicle: 1997 Stock Ford Explorer

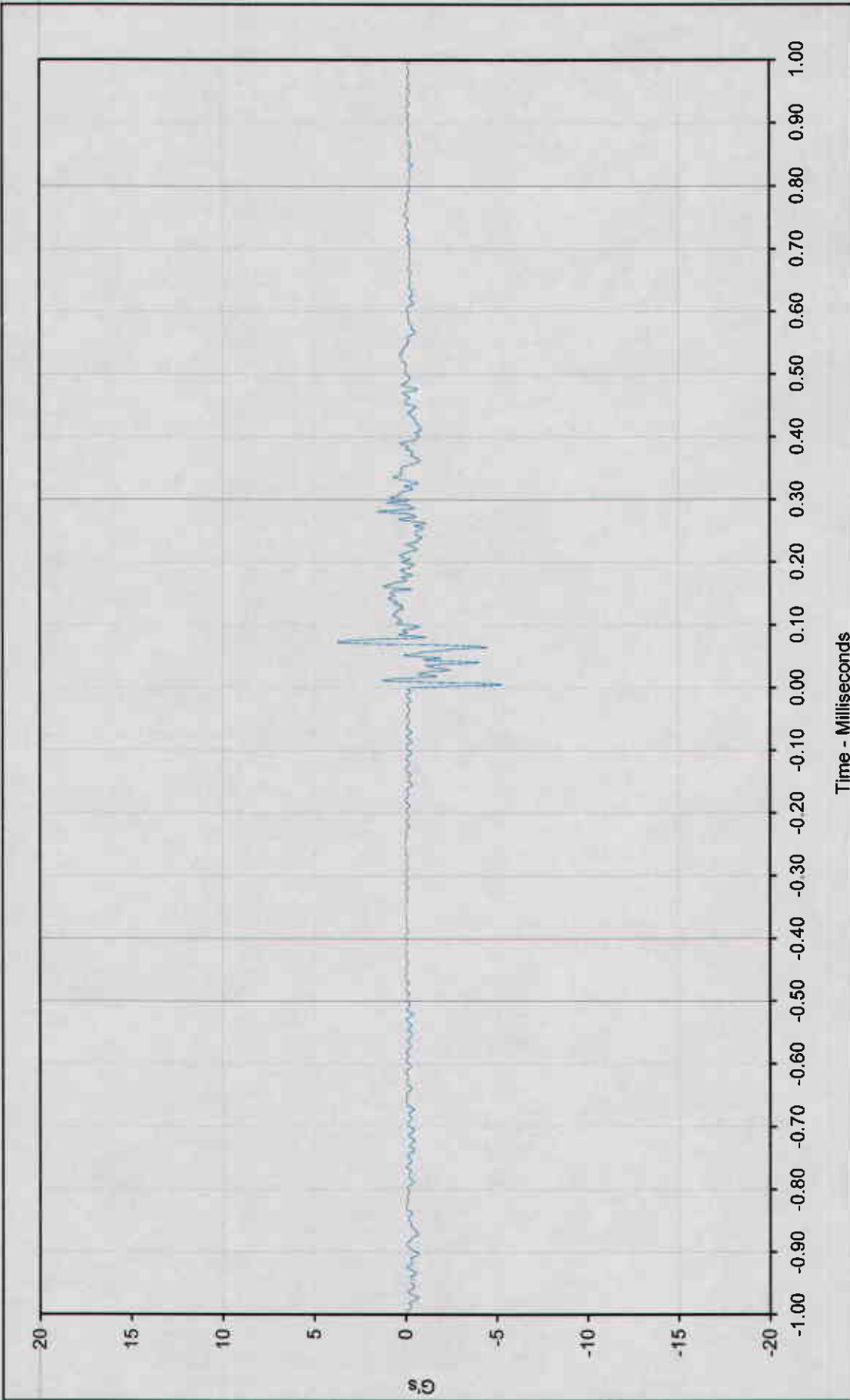
Test Program: Pole Impact



Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
CG Acceleration z	003	G's	2.7	-0.976	-5.7	0.319	60

Test Date: 5/6/2003
 Project No.: SAFE050603

Test Vehicle: 1997 Stock Ford Explorer
 Test Program: Pole Impact



Time - Milliseconds



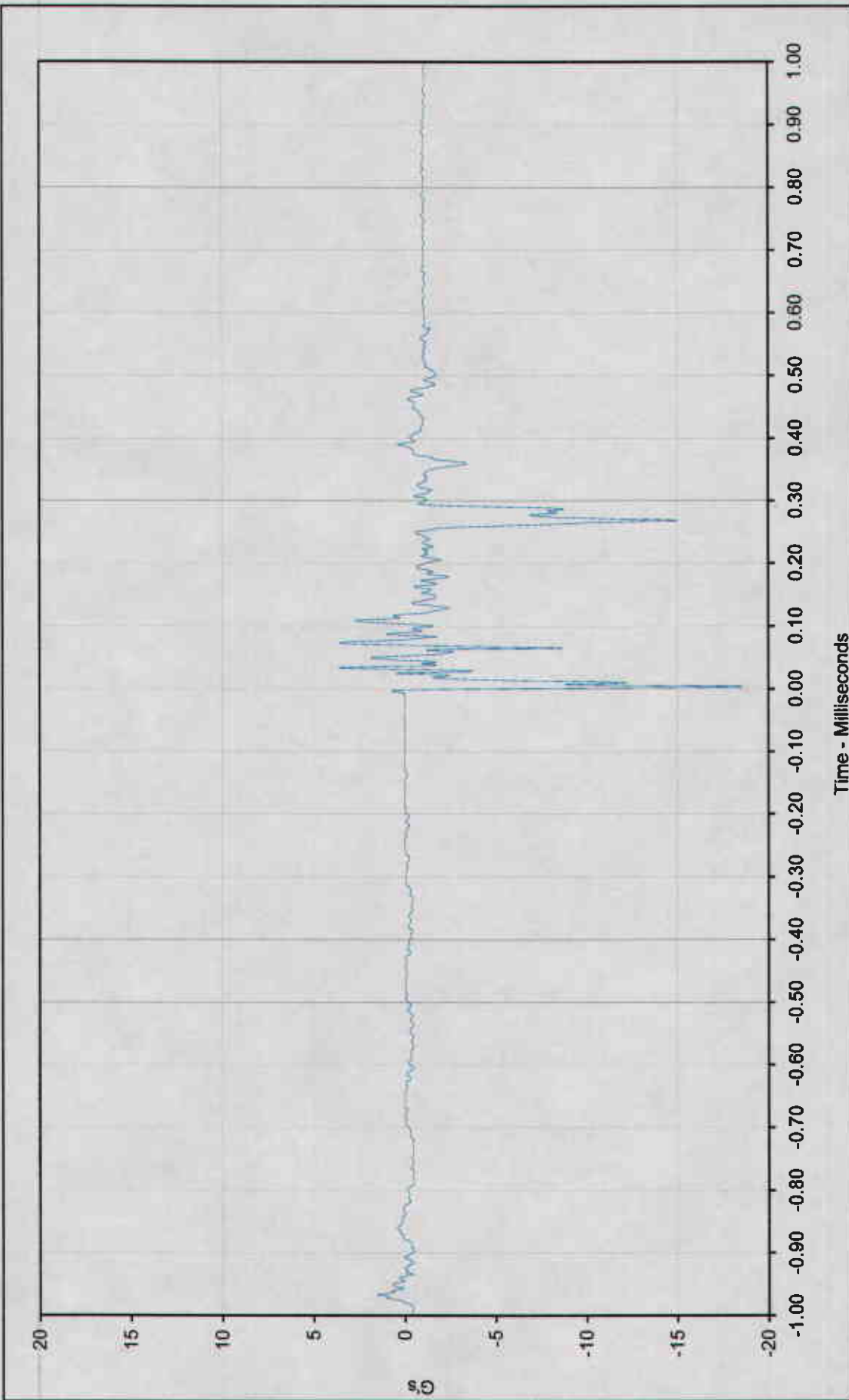
Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
Roof Rail Acceleration x	004	G's	3.7	0.073	-5.3	0.005	60

Test Vehicle: 1997 Stock Ford Explorer

Test Date: 5/6/2003

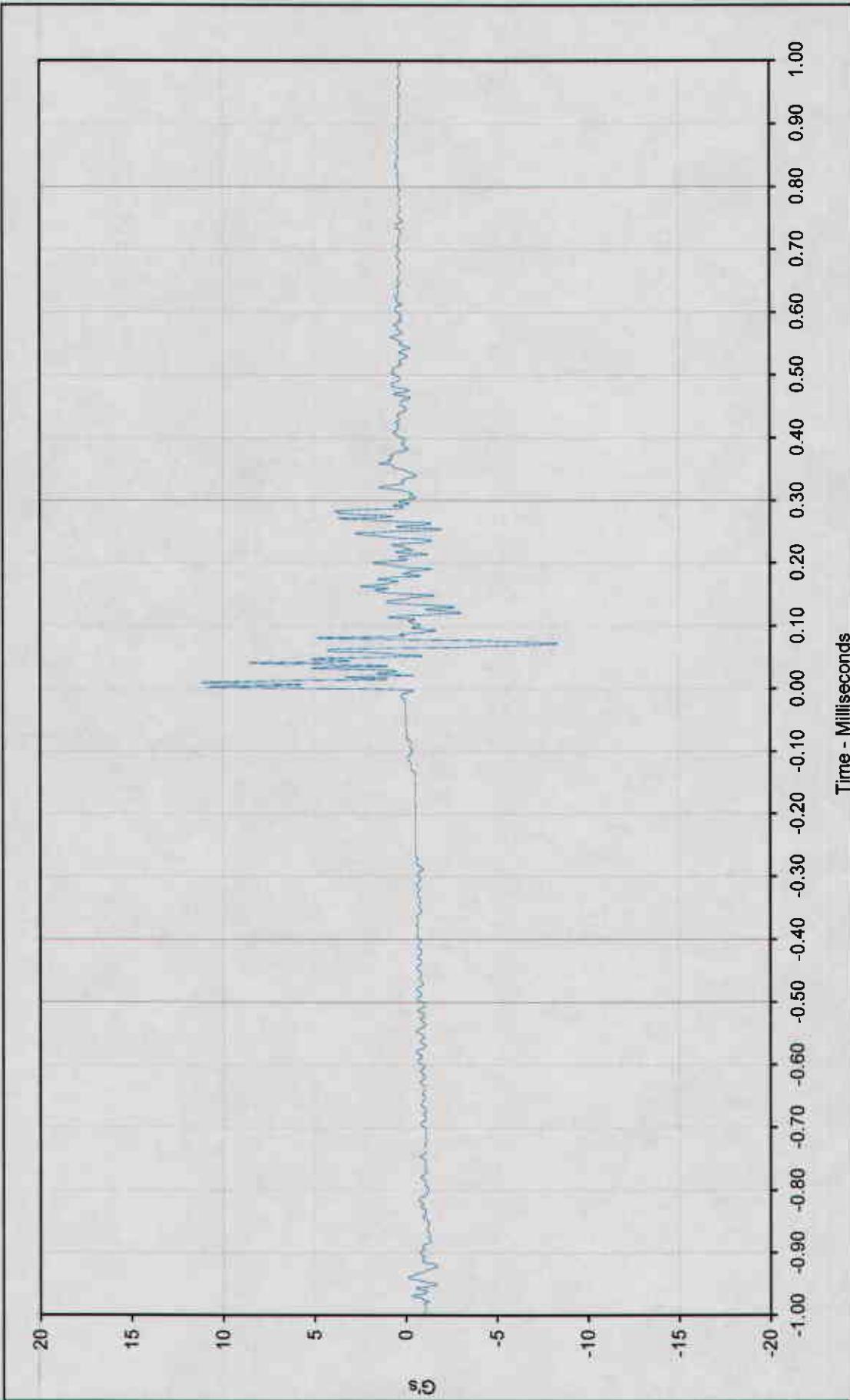
Test Program: Pole Impact

Project No.: SAFE050603



Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
Roof Rail Acceleration y	005	G's	3.6	0.033	-18.6	0.003	60

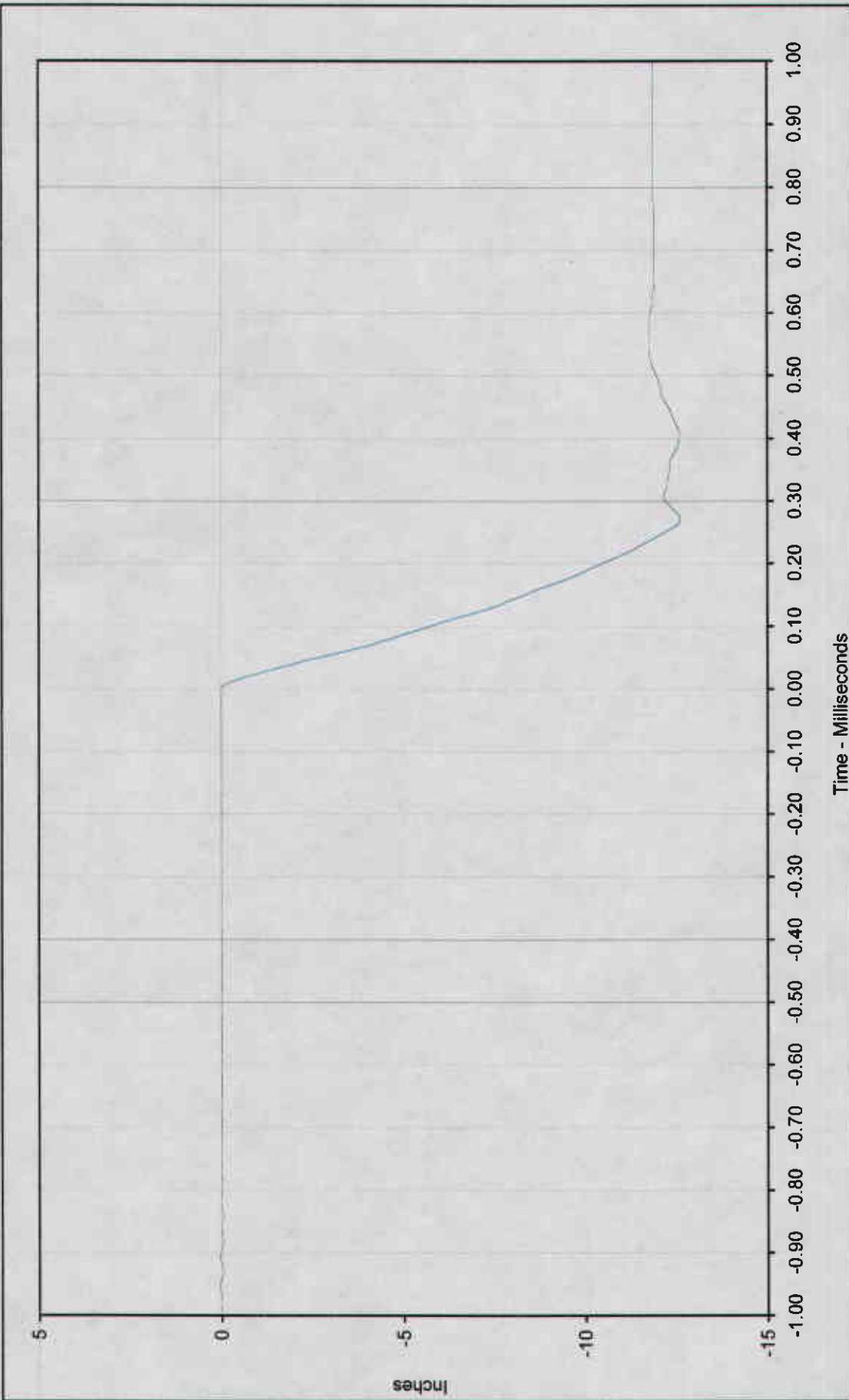
Test Vehicle: 1997 Stock Ford Explorer
 Test Program: Pole Impact
 Test Date: 5/6/2003
 Project No.: SAFE050603



Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
Roof Rail Acceleration z	006	G's	11.1	0.009	-8.3	0.072	60

Test Date: 5/6/2003
 Project No.: SAFE050603

Test Vehicle: 1997 Stock Ford Explorer
 Test Program: Pole Impact



Curve Description	CURNO	Units	Max	Time	Min	Time	SAE Class
Roof Displacement	007	Inches	0.1	-1.000	-12.6	0.271	60

Test Date: 5/6/2003

Project No.: SAFE050603

Test Vehicle: 1997 Stock Ford Explorer

Test Program: Pole Impact

APPENDIX C

TEST PHOTOGRAPHS

Coben/Owens

File #8526

Pole Test

Steven E. Meyer

May 6, 2003

ROLL # ① 2 3 4 5
6 7 8 9 10 11 12

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