

REPORT NUMBER: 301-CAL-99-08

V3246

**SAFETY COMPLIANCE TESTING FOR FMVSS 301
FUEL SYSTEM INTEGRITY**

Hyundai Motor Company
1999 Hyundai Accent GL
4-door sedan

V3246

NHTSA NUMBER: CX0511

VERIDIAN TEST NUMBER: 8480-8

VERIDIAN ENGINEERING
P.O. BOX 400
BUFFALO, NEW YORK 14225



June 4, 1999

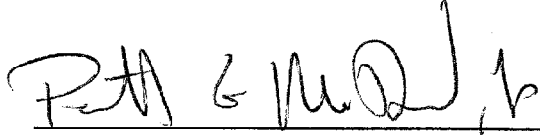
FINAL REPORT

PREPARED FOR:

U. S. Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, S. W.
Room No. 6115 (NEF-30)
Washington, DC 20590

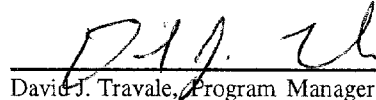
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Approval Date:

August 4, 1999

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16. Abstract Compliance tests were conducted on the subject 1999 Hyundai Accent GL 4-door sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301-01 for the determination of FMVSS 301 compliance. Test failures identified were as follows: The test vehicle appeared to comply with all requirements of FMVSS 301 "Fuel System Integrity."			
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TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	PURPOSE OF COMPLIANCE TEST	1-1
2	SUMMARY OF COMPLIANCE TEST RESULTS	2-1
3	COMPLIANCE TEST DATA	3-1
4	NONCOMPLIANCE DATA	4-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	VEHICLE AND DUMMY RESPONSE DATA (REAR IMPACT ONLY)	B-1

LIST OF FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	PART 572 DUMMY IN-VEHICLE POSITION	3-2
2	CAMERA POSITION FOR REAR IMPACT	3-9

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1	CRASH TEST SUMMARY	2-2
2	GENERAL TEST AND VEHICLE PARAMETER DATA	2-3
3	MOVING BARRIER PARAMETER DATA	2-6
4	POST-IMPACT DATA	2-7
5	FRONT SEAT OCCUPANT MEASUREMENTS	3-3
6	FMVSS NO. 301 - "FUEL SYSTEM INTEGRITY" POST-IMPACT TEST DATA	3-4
7	FMVSS NO. 301 - STATIC ROLLOVER DATA SHEET	3-5
8	HIGH-SPEED CAMERA LOCATIONS	3-10
9	TEST VEHICLE NONCOMPLIANCE NOTICE	4-2
10	LABORATORY NOTICE OF TEST FAILURE TO OVSC	4-3
11	ANTI-SIPHONING DEVICE FOR ALCOHOL FUEL VEHICLE	4-4

Section 1

PURPOSE OF COMPLIANCE TEST

This 30 mph rear moving barrier impact test is part of the Federal Motor Vehicle Safety Standard (FMVSS) 301 Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) by Veridian Engineering under Contract No. DTNH22-95-D-11000. The purpose of this test was to determine if the subject vehicle, a 1999 Hyundai Accent GL 4-door sedan, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." This compliance test was conducted using the requirements found in the OVSC Laboratory Test Procedure No. TP-301-01, dated March 28, 1994.

Section 2

COMPLIANCE TEST RESULTS SUMMARY

A 2589 pound 1999 Hyundai Accent GL 4-door sedan was impacted from the rear by a 3961 pound moving barrier at a velocity of 29.8 mph. The test was performed by Veridian Engineering on June 4, 1999.

One instrumented Part 572 E and non-instrumented Part 572 B, 50th percentile male Anthropomorphic Test Device (ATD) were placed in the driver and right-front passenger seating positions respectively.

Average longitudinal crush was 15.7 inches. Pre- and post-test photographs of the vehicle can be found in appendix A.

The 11.9 gallon fuel tank was filled to 92 percent capacity with orange Stoddard fluid prior to the impact. After the impact, there was no fluid leakage for the first 30 minutes nor during any phase of the rollover test. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity." Section 3 presents the results of these tests.

The crash event was recorded by one real-time and eight high-speed cameras. Camera locations and other pertinent camera information are found on pages 3-9 and 3-10 of this report.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No.: CX0511 Test Mode: 30 mph Rear Barrier
 Test Date: June 4, 1999 Time: 15:10 Temperature : 82 °F
 Vehicle Make/Model/Body Style: 1999 Hyundai Accent GL 4-door sedan
 Vehicle Test Weight: 2589 lbs Impact Velocity: 29.8 mph
 Static Crush: Left Side = 14.8 inches
 Right Side = 16.2 inches
 Centerline = 16.1 inches
 Average Crush: 15.7 inches

TYPE OF FRONT OCCUPANT RESTRAINT SYSTEM INSTALLED IN TEST VEHICLE:

Driver's DSP: Air Bag with 3 point belt system
 Right Passenger's DSP: Air Bag with 3 point belt system

VISIBLE DUMMY CONTACT POINTS:

Driver: Rear of head with headrest.

 Passenger: Rear of head with headrest

DOOR OPENING DATA:

closed-not operable - Left Front
closed-not operable - Right Front

Stoddard Solvent Spillage from Vehicle's Fuel System: None

Remarks: Driver and passenger seat backs fully reclined. All doors could not be opened by hand.
Air bags did not deploy in vehicle.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION:

Year/Make/Model/Body Style: 1999 Hyundai Accent GL 4-door sedan

NHTSA No.: CX0511 ; VIN: KMHVF24N9XU551578 ; Color: green

Engine Data: 4 cylinders; CID; 1.5 Liters; cc

Placement: Longitudinal or In-Line; X Transverse or Lateral

Transmission Data: 5 speeds; X Manual; Automatic; Overdrive

Final Drive: Rear Wheel Drive; X Front Wheel Drive; Four Wheel Drive

Major Options: A/C; X Pwr.Strg.; X Pwr. Brakes

 Pwr. Windows; Pwr. Door Locks; Tilt Wheel

Date Received: 3/2/99 ; Odometer Reading 100 miles

Selling Dealer: Manassas Hyundai

& Address: 8846 Mathis Ave, Manassas VA 22110

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by: Hyundai Motor Company

Date of Manufacture: 11/98

GVWR: 3210 lbs.; GAWR: 1742 lbs. FRONT; 1698 lbs. REAR

DATA FROM TIRE PLACARD:

Location of Placard on Vehicle: inside glove box door

Tire Pressure with Maximum Capacity Vehicle Load: 32 psi FRONT 32 psi REAR

Recommended Tire Size: P175/70R-13

* Recommended Cold Tire Pressure: 32 psi FRONT; 32 psi REAR

Size of Tires on Test Vehicle: P175/70R-13

Type of Spare Tire: temporary

Vehicle Capacity Data:

Type of Front Seats:	<u> </u> Bench;	<u>X</u> Bucket;	<u> </u> Split Bench
Number of Occupants:	<u>2</u> Front;	<u>3</u> Rear;	<u>5</u> Total
Vehicle Capacity Weight (VCW) =	<u>850</u>	lbs.	
No. of Occupants x 150 lbs. =	<u>750</u>	lbs.	
Rated Cargo/Luggage Weight (RCLW) =	<u>100</u>		

*Tire pressure used for test

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

Right Front	=	<u>655</u>	lbs.	Right Rear	=	<u>419</u>	lbs.
Left Front	=	<u>661</u>	lbs.	Left Rear	=	<u>440</u>	lbs.
TOTAL FRONT	=	<u>1,316</u>	lbs.	TOTAL REAR	=	<u>859</u>	lbs.
TOTAL DELIVERED WEIGHT	=	<u>2,175</u>	lbs.				
% of Total Front of Vehicle Weight	=	<u>61</u>		% of Total Rear Weight	=	<u>39</u>	%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight	=	<u>2,175</u>	lbs.
Rated Cargo/Luggage Weight (RCLW)	=	<u>100</u>	lbs.
Weight of 2 p.572 Dummies, 167 & 164 lbs	=	<u>331</u>	lbs.
TARGET TEST WEIGHT	=	<u>2,606</u>	lbs.

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 83 POUNDS OF CARGO WEIGHT:

Right Front	=	<u>780</u>	lbs.	Right Rear	=	<u>517</u>	lbs.
Left Front	=	<u>771</u>	lbs.	Left Rear	=	<u>521</u>	lbs.
TOTAL FRONT	=	<u>1,551</u>	lbs.	TOTAL REAR	=	<u>1,038</u>	lbs.
TOTAL TEST WEIGHT	=	<u>2,589.0</u>	lbs.				
% of Total Front Weight	=	<u>59.9</u>	%	% of Total Rear Weight	=	<u>40.1</u>	%

* Weight of Ballast Secured in Vehicle Trunk Area = 0 lbs.

Type of Ballast: none

Method of Securing Ballast: not applicable

Vehicle Components Removed for Weight Reduction: none

VEHICLE ATTITUDE (all dimension in inches):

AS DELIVERED:	RF	<u>25.5</u>	LF	<u>25.3</u>	RR	<u>25.0</u>	LR	<u>24.9</u>
AS TESTED:	RF	<u>24.9</u>	LF	<u>24.7</u>	RR	<u>23.9</u>	LR	<u>23.7</u>
Vehicle's Wheel Base:		<u>94.1</u>	in.					
Location of Vehicle's C.G.:		<u>37.7</u>	inches rearward of front wheel center.					

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual	=	<u>11.9</u>	gallons
Usable Capacity Figure Furnished by COTR	=	<u>11.89</u>	gallons
Test Volume Range (91 to 94% of Usable Capacity)	=	<u>10.8</u>	to <u>11.2</u> gallons
ACTUAL TEST VOLUME	=	<u>10.9</u>	gallons (with entire fuel system filled)

* Ballast weight includes the RCLW, the weight of drained vehicle fluids and the weight of any removed vehicle components less the weight of onboard instrumentation, cameras, and hardware.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)FUEL SYSTEM DATA (continued):

Test Fluid Type:	Stoddard Solution
Test Fluid Specific Gravity:	0.764
Test Fluid Kinematic Viscosity:	0.96 centistokes
Test Fluid Color:	Orange ("red" is preferred)
Type of Vehicle Fuel Pump:	Electric
Electric Fuel Pump Operation with Ignition Switch ON and Engine OFF - Fuel pump operated.	
Details of Fuel System:	Fuel filler in left rear quarter panel. Fuel lines run along left inside frame rail.
Fuel tank located in front of rear "axle" and slightly left of center laterally.	

Table 3

MOVING BARRIER PARAMETER DATAWEIGHT OF MOVING BARRIER:

Right Front	=	<u>1113</u>	lbs.	Right Rear	=	<u>868</u>	lbs.
Left Front	=	<u>1102</u>	lbs.	Left Rear	=	<u>878</u>	lbs.
TOTAL FRONT	=	<u>2,215</u>	lbs.	TOTAL REAR	=	<u>1,746</u>	lbs.
TOTAL BARRIER WEIGHT	=	<u>3,961</u>	lbs.				

MOVING BARRIER DIMENSIONS:

Barrier Face Height:	<u>60.0</u>	in.
Barrier Face Width:	<u>78.0</u>	in.
Barrier Face		
Ground Clearance:	<u>5.0</u>	in.
Tread Width:	<u>59.5</u>	in.
Wheel Base:	<u>120.0</u>	in.
Location of C.G.:	X: <u>52.9</u> inches rearward of front wheel center.	
	Y: <u>0.0</u> inches from longitudinal-vertical plane of symmetry.	
	Z: <u>16.3</u> inches above ground.	

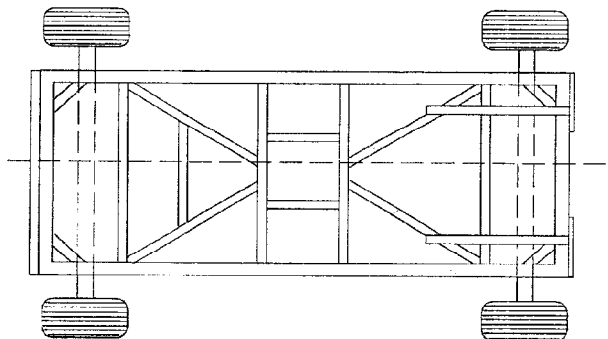
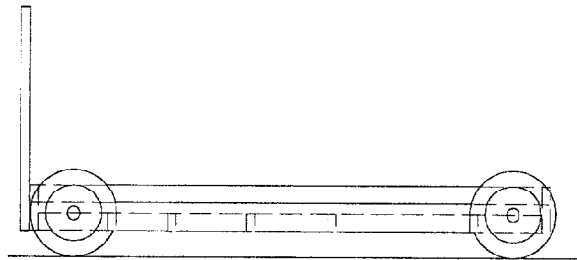


Table 4

POST IMPACT DATATYPE OF TEST:

Type of Test: Rear Barrier Impact Angle: 0°
 Test Date: June 4, 1999 Time: 15:10 Temperature: 82 °F
 Vehicle NHTSA No.: CX0511
 Required Impact Velocity Range: 28.9 to 29.9 mph

BARRIER IMPACT VELOCITY: (Speed traps within 5 feet of impact plane.)

Trap No. 1 = 29.8 mph; Trap No. 2 = 29.8 mph
 Average Impact Speed = 29.8 mph

VEHICLE STATIC CRUSH: (For frontal and rear impacts only.)

Vehicle Length:

Pre-Test	Right =	<u>157.2</u>	; C/L =	<u>162.6</u>	; Left =	<u>157.1</u>
Post-Test	Right =	<u>141.0</u>	; C/L =	<u>146.5</u>	; Left =	<u>142.3</u>
Crush	Right =	<u>16.2</u>	; C/L =	<u>16.1</u>	; Left =	<u>14.8</u>
AVERAGE	=	<u>15.7</u>	inches			

Section 3

COMPLIANCE TEST DATA

Figure 1

PART 572 DUMMY IN-VEHICLE POSITION
(FOR REAR IMPACTS ONLY)

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS

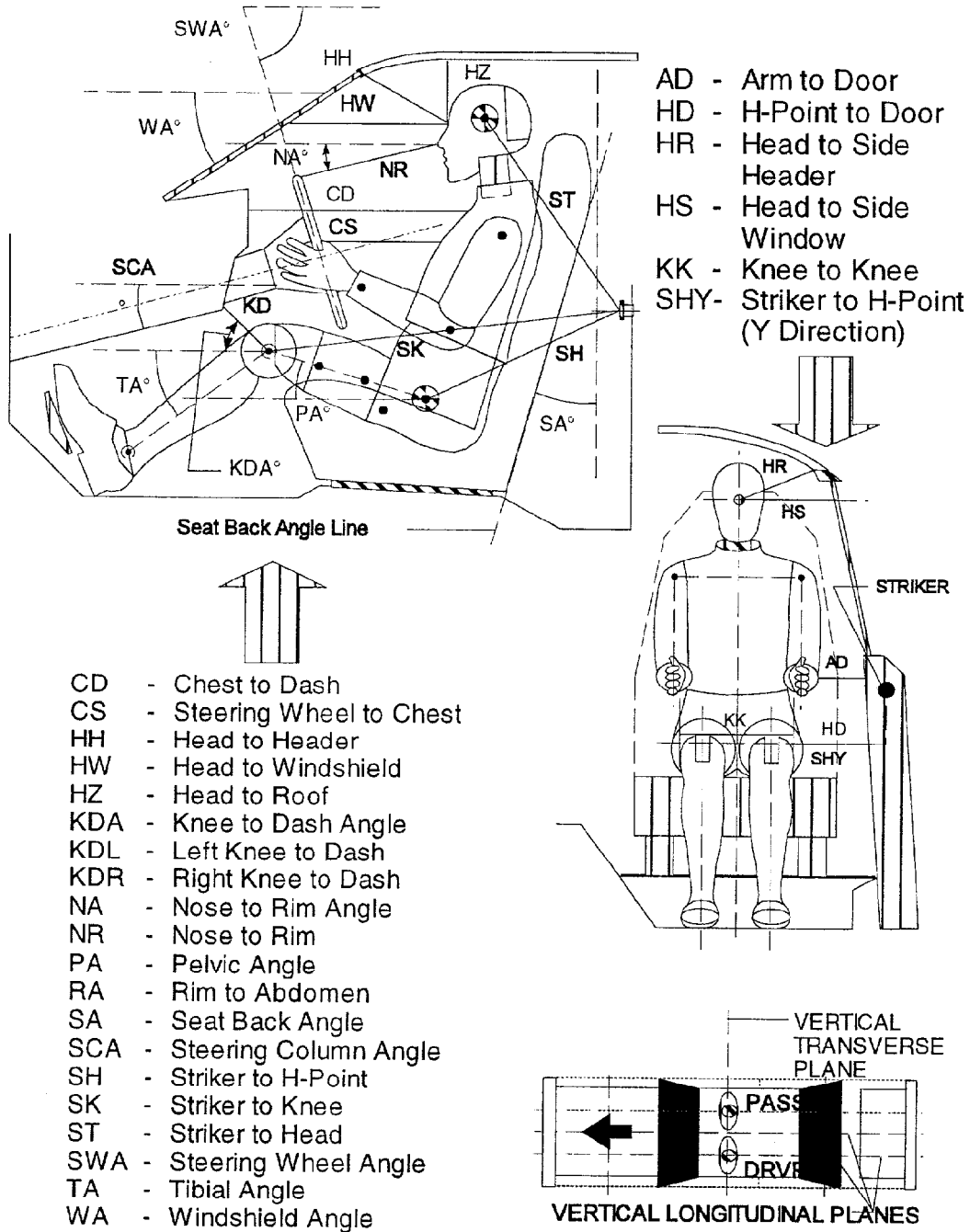


Table 5

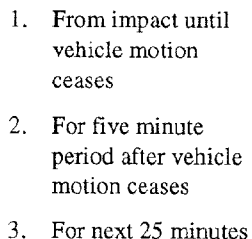
FRONT SEAT OCCUPANT MEASUREMENTS
(FOR REAR IMPACT ONLY)

	DRIVER (Serial #152)		
WA°	30 deg.		
SWA°	27 deg.		
SCA°	63 deg.		
SA°	27 deg.		
HZ	5.6		
HH	10.6		
HW	17.9		
HR	7.8		
NR	17.4	Angle	deg.
CD	20.6		
CS	13.3		
RA	7.6		
KDL	7.5	Angle (KDA)	deg.
KDR	6.3 (curved dash)		
PA°	23 deg.		
TA°	45 deg.		
KK	10.4		
ST	19.9	Angle	20 deg.
SK	22.1	Angle	92 deg.
SH	9.1	Angle	135 deg.
SHY	8.9		
HS	11.7		
HD	6.7		
AD	3.7		

FMVSS NO. 301

Vehicle Mfgr./Make/Model: 1999 Hyundai Accent GL 4-door sedan

FUEL SPILLAGE MEASUREMENT:



ACTUAL	MAX ALLOWED
0	1 oz.
0	5 oz.
0	1 oz./1 min.

None

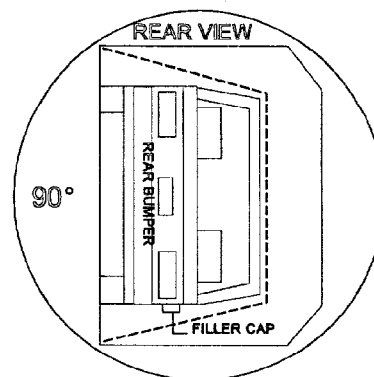
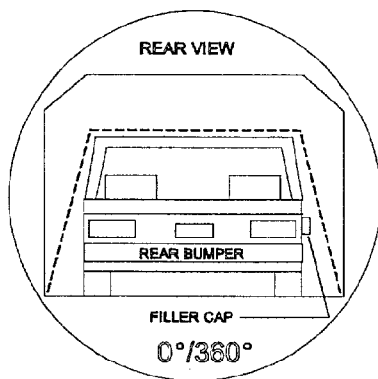
Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEETTEST PHASE :

0-90 Deg.

Vehicle NHTSA ID No.:

CX0511

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time
(Spec. Range = 1 to 3 minutes)

1 minutes 05 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 5 seconds

Next-whole minute interval

7 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a
---	---	---	-----

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

IV. SOLVENT SPILLAGE LOCATION(S):

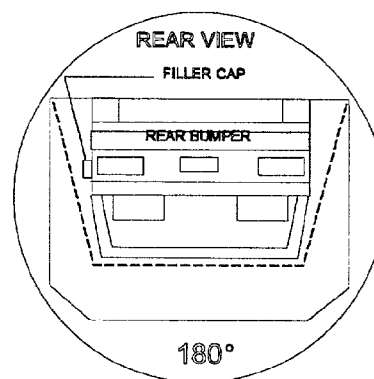
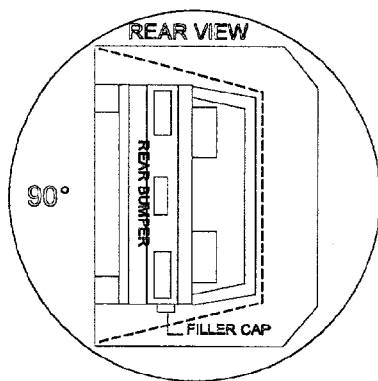
None

Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
90-180 Deg.

Vehicle NHTSA ID No. :
CX0511

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time
 (Spec. Range = 1 to 3 minutes)

1 minutes 11 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 11 seconds

Next whole minute interval

7 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a
---	---	---	-----

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

IV. SOLVENT SPILLAGE LOCATION(S):

None

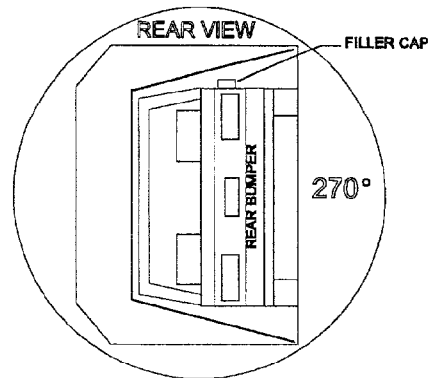
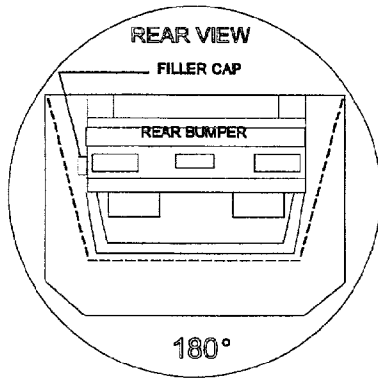
Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)TEST PHASE :

180-270 Deg.

Vehicle NHTSA ID No.:

CX0511

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:Rollover Fixture 90° Rotation Time
(Spec. Range = 1 to 3 minutes)1 minutes 02 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 2 seconds

Next whole minute interval

7 minutesII. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a
---	---	---	-----

Note: Record spillage for whole minute
intervals only as determined above.IV. SOLVENT SPILLAGE LOCATION(S):

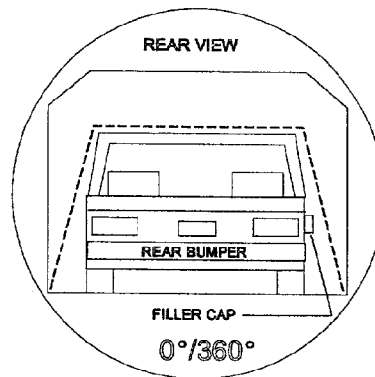
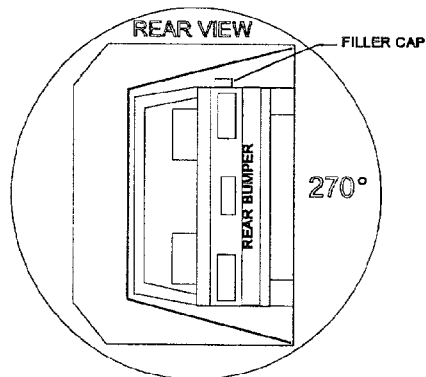
None

Table 7

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE :
270-360 Deg.

Vehicle NHTSA ID No. :
CX0511

I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 1 minutes 06 seconds
 (Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 00 seconds
 TOTAL 6 minutes 6 seconds
 Next whole minute interval 7 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 minutes FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
--	----------	----------	----------------------

(2) Maximum Allowable Solvent Spillage

5 ounces	1 ounce	1 ounce	1 ounce
----------	---------	---------	---------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	n/a
---	---	---	-----

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

IV. SOLVENT SPILLAGE LOCATION(S):

None

Figure 2

CAMERA POSITIONS FOR REAR IMPACTS

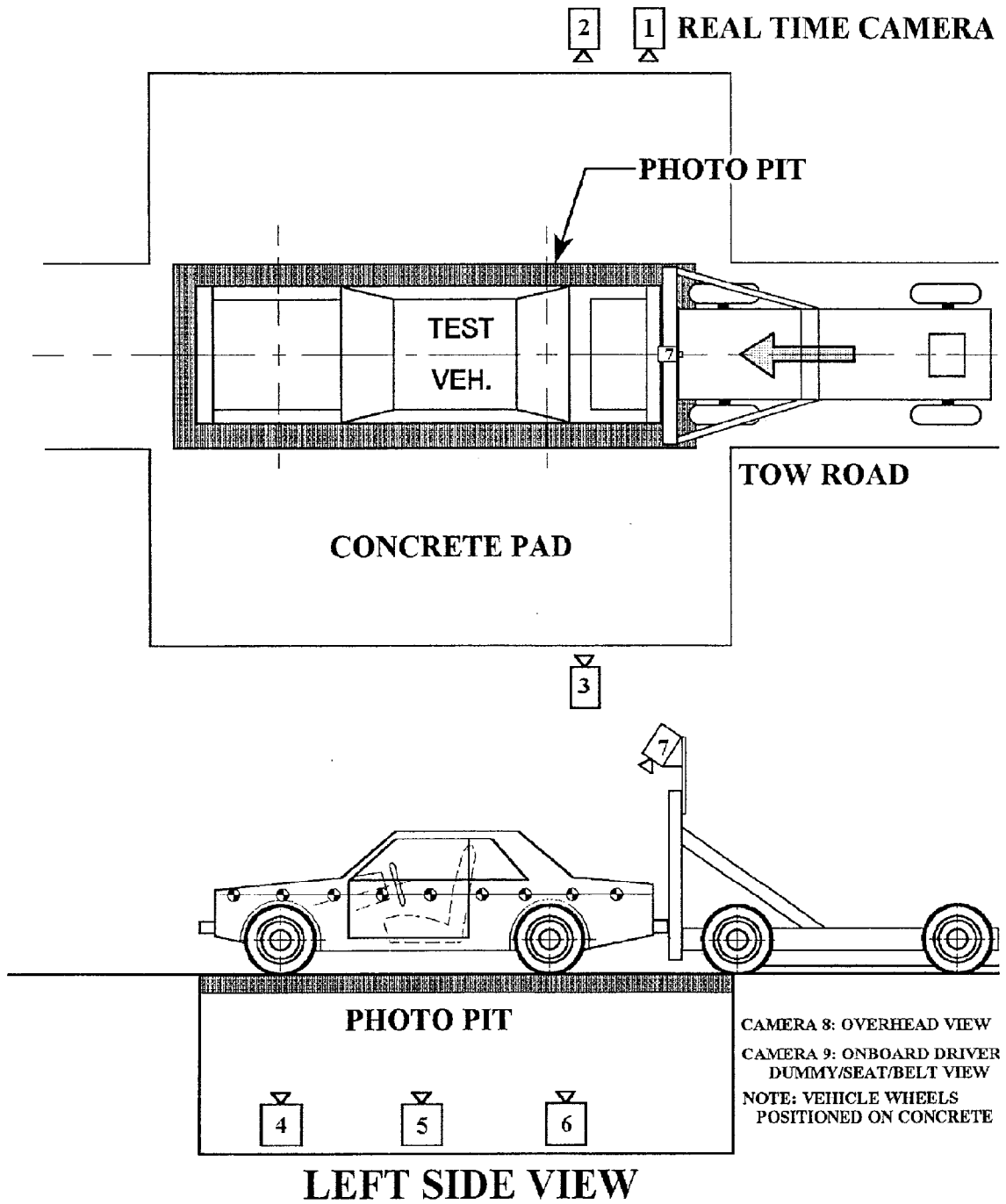


Table 8

HIGH-SPEED CAMERA LOCATIONSNHTSA No. : CX0511 Vehicle : 1999 Hyundai Accent GL 4-door sedan

CAMERA NO.	VIEW	CAMERA POSITIONS (inches)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Right Side View	-541	75	44	-2	25	1010
3	Left Side View	521	79	49	-1	25	1010
4	Vehicle Front Underbody View	0	144	-77	90	13	605
5	Vehicle Mid-Section Underbody View	0	114	-77	90	13	605
6	Vehicle Rear Underbody View	0	40	-77	90	13	610
7	Moving Barrier View	0	0	99	-105	13	1010
8	Overhead Overall View	-20	0	386	-90	13	1010
9	Onboard Driver Dummy/Seat/Belt View	-	-	-	-	13	655

* X = film plant to monorail centerline (+ to left of rail)

Y = film plane to impact location (+ ahead of impact location)

Z = film plane to ground (+ above ground)

** = referenced to horizontal plane

Section 4

NONCOMPLIANCE DATA

Table 9

TEST VEHICLE NONCOMPLIANCE NOTICE

NHTSA Contract Lab: Veridian Engineering

Lab Project Manager & Telephone No.: David J. Travale (716) 632 - 7500

Date of Test: June 4, 1999 Vehicle NHTSA No.: CX0511

Vehicle Manufacturer: Hyundai Motor Company

Model Year: 1999 VIN: KMHVF24N9XU551578

Model: Accent GL Body Style: 4-door sedan Build Date: 11/98

Dummy Stabilized Temperature at Time of Test: 70 °F (Spec. = 69 - 72 °F)

Impact Velocity: 29.8 mph; Time of Test: 15:10

Type of Automatic Restraint System:

Driver: Air Bag with 3 point belt system

Passenger: Air Bag with 3 point belt system

Failure Details:

None

Requirements:

Approximate date that final test report will be made available to CTM:

Date Mfg. Rep. Notified: _____ Rep. Name: _____

Remarks: _____

Date of Proposed Joint Inspection of Test Vehicle: _____

NHTSA CMT: _____ CIR No.: _____ Date: _____

Table 10

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 301; Test Date: June 4, 1999

Laboratory: Veridian Engineering

Contract No.: DTNH22-95-D-11000; Delv. Order No.: _____

Laboratory Project Engineer's Name: _____

Test Vehicle Year/Make/Model/Body Style: _____

1999 Hyundai Accent GL 4-door sedan

Vehicle NHTSA No.: CX0511; VIN: KMHVF24N9XU551578

Manufacturer: Hyundai Motor Company

Test Failure Description: None

FMVSS Requirement, Paragraph(s) _____:

Notification to NHTSA (COTR): _____

Date: _____; By: _____

Remarks: _____

Table 11

ANTI-SIPHONING DEVICE FOR ALCOHOL FUEL VEHICLES

Vehicle Model Year/Make/Model/Body:	<u>1999 Hyundai Accent GL 4-door sedan</u>	
Vehicle NHTSA No.:	<u>CX0511</u>	VIN: <u>KMHVF24N9XU551578</u>
Vehicle Build Date:	<u>11/98</u>	Test Date: <u>June 4, 1999</u>
Test Laboratory:	<u>Veridian Engineering</u>	
Observers:	<u></u>	

1. Provide a description of the anti-siphoning device if possible.

Not Applicable

2. Did the test hose pass through the anti-siphoning device opening?

Yes - No -

3. The test hose length outside of the fuel filler neck at maximum insertion:

Length = cm

4. The maximum inserted test hose length is (120.00 cm - measurement from item 3):

Length = cm

5. Was there evidence that the test hose contacted the surface of the Stoddard fluid in the fuel tank of the test vehicle?

Yes - (Fail) No - (Pass)

6. Measure the length of the portion of the hose that was submerged in the Stoddard solvent:

Length = cm

Appendix A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

<u>Figure</u>	<u>Photograph Title</u>	<u>Page No.</u>
A-1	PRE-TEST FRONT VIEW	A-3
A-2	POST-TEST FRONT VIEW	A-4
A-3	PRE-TEST LEFT SIDE VIEW	A-5
A-4	POST-TEST LEFT SIDE VIEW	A-6
A-5	PRE-TEST RIGHT SIDE VIEW	A-7
A-6	POST-TEST RIGHT SIDE VIEW	A-8
A-7	PRE-TEST REAR VIEW	A-9
A-8	POST-TEST REAR VIEW	A-10
A-9	PRE-TEST LEFT FRONT THREE-QUARTER VIEW	A-11
A-10	POST-TEST LEFT FRONT THREE-QUARTER VIEW	A-12
A-11	PRE-TEST RIGHT REAR THREE-QUARTER VIEW	A-13
A-12	POST-TEST RIGHT REAR THREE-QUARTER VIEW	A-14
A-13	PRE-TEST FRONT UNDERBODY VIEW	A-15
A-14	POST-TEST FRONT UNDERBODY VIEW	A-16
A-15	PRE-TEST REAR UNDERBODY VIEW	A-17
A-16	POST-TEST REAR UNDERBODY VIEW	A-18
A-17	CERTIFICATION PLACARD	A-19
A-18	TIRE PLACARD	A-20
A-19	ROLLOVER 90°	A-21
A-20	ROLLOVER 180°	A-22
A-21	ROLLOVER 270°	A-23
A-22	ROLLOVER 360°	A-24

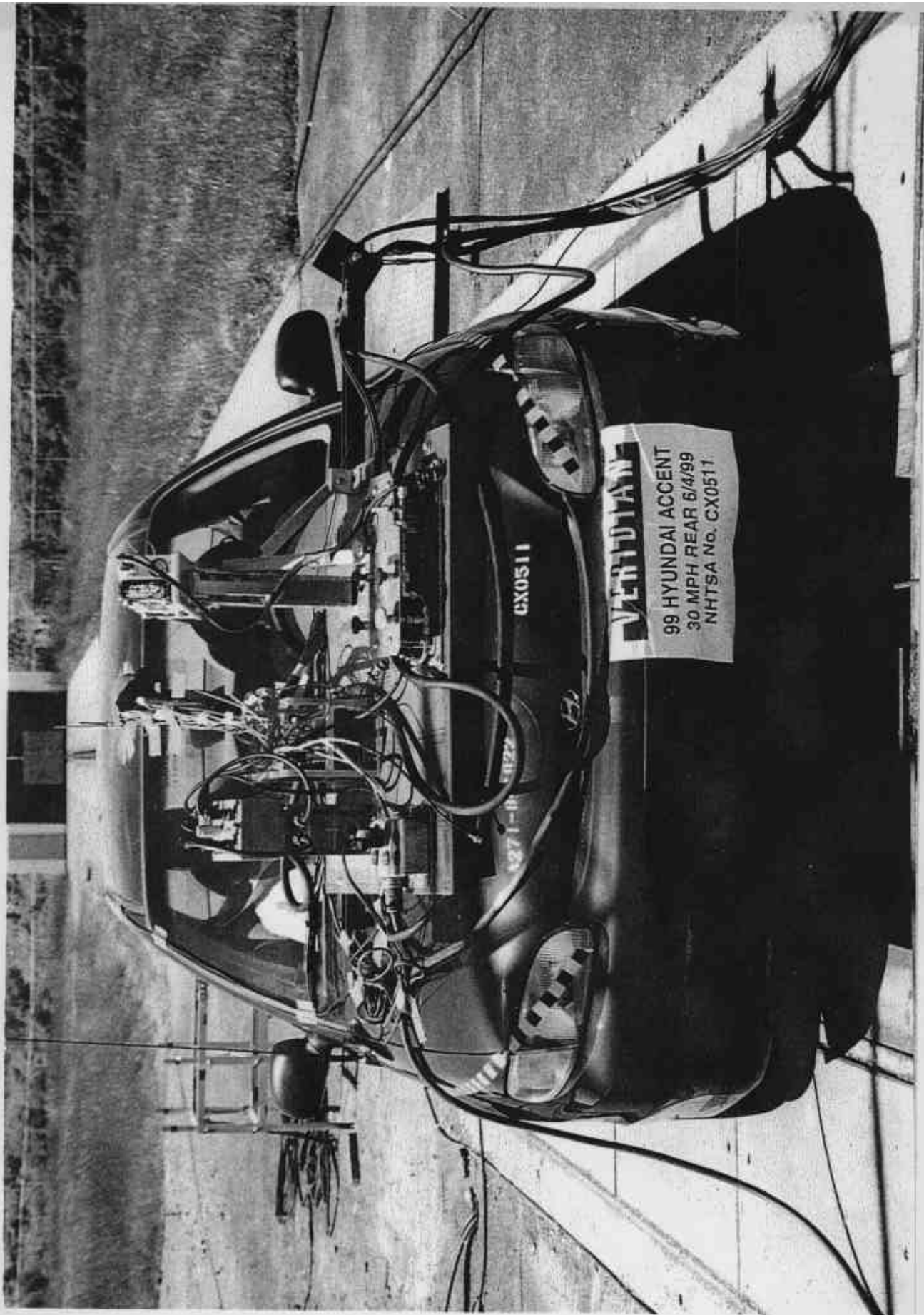


Figure A-1 PRE-TEST FRONT VIEW



Figure A-2 POST-TEST FRONT VIEW

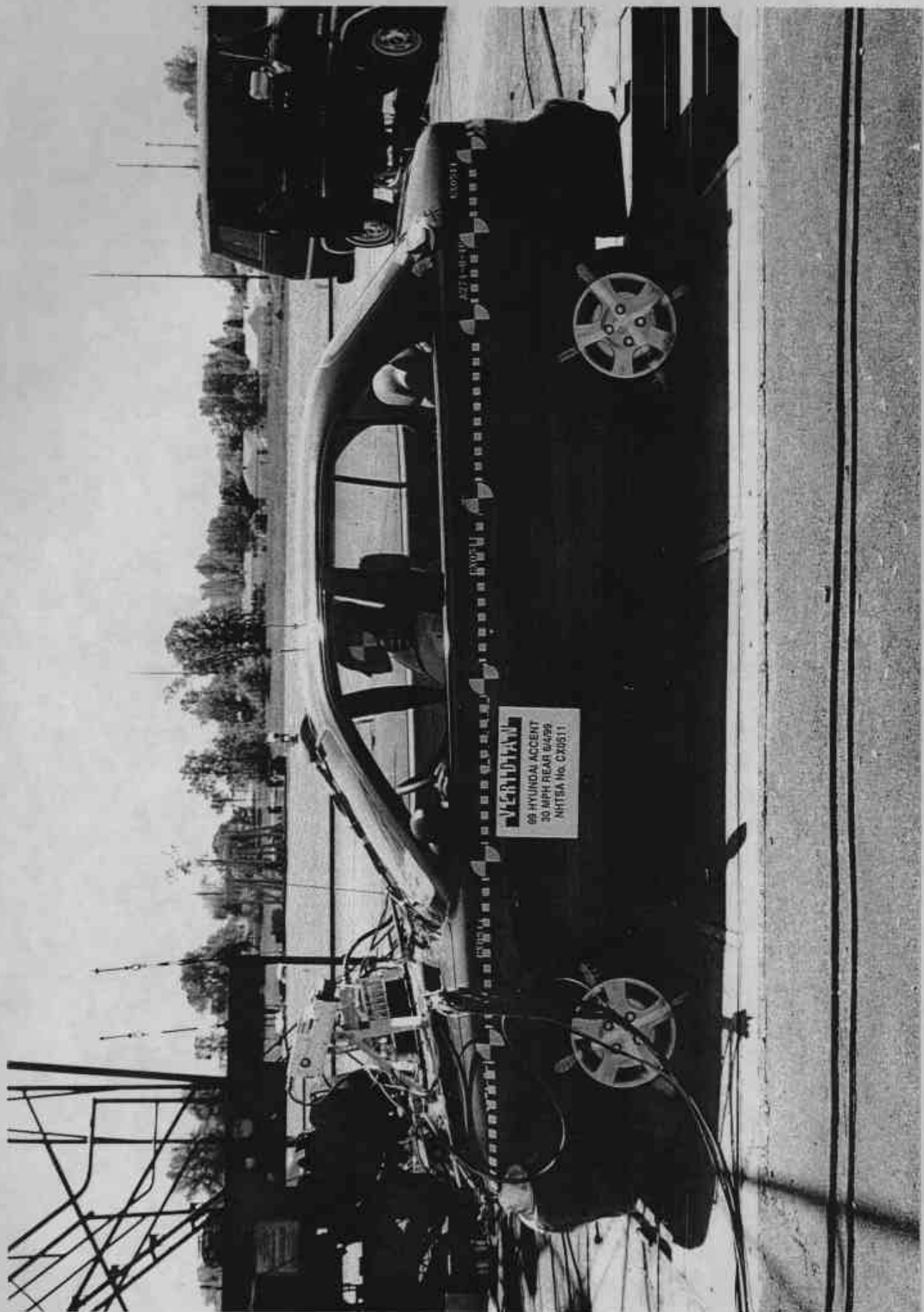


Figure A-3 PRE-TEST LEFT SIDE VIEW



Figure A-4 POST-TEST LEFT SIDE VIEW

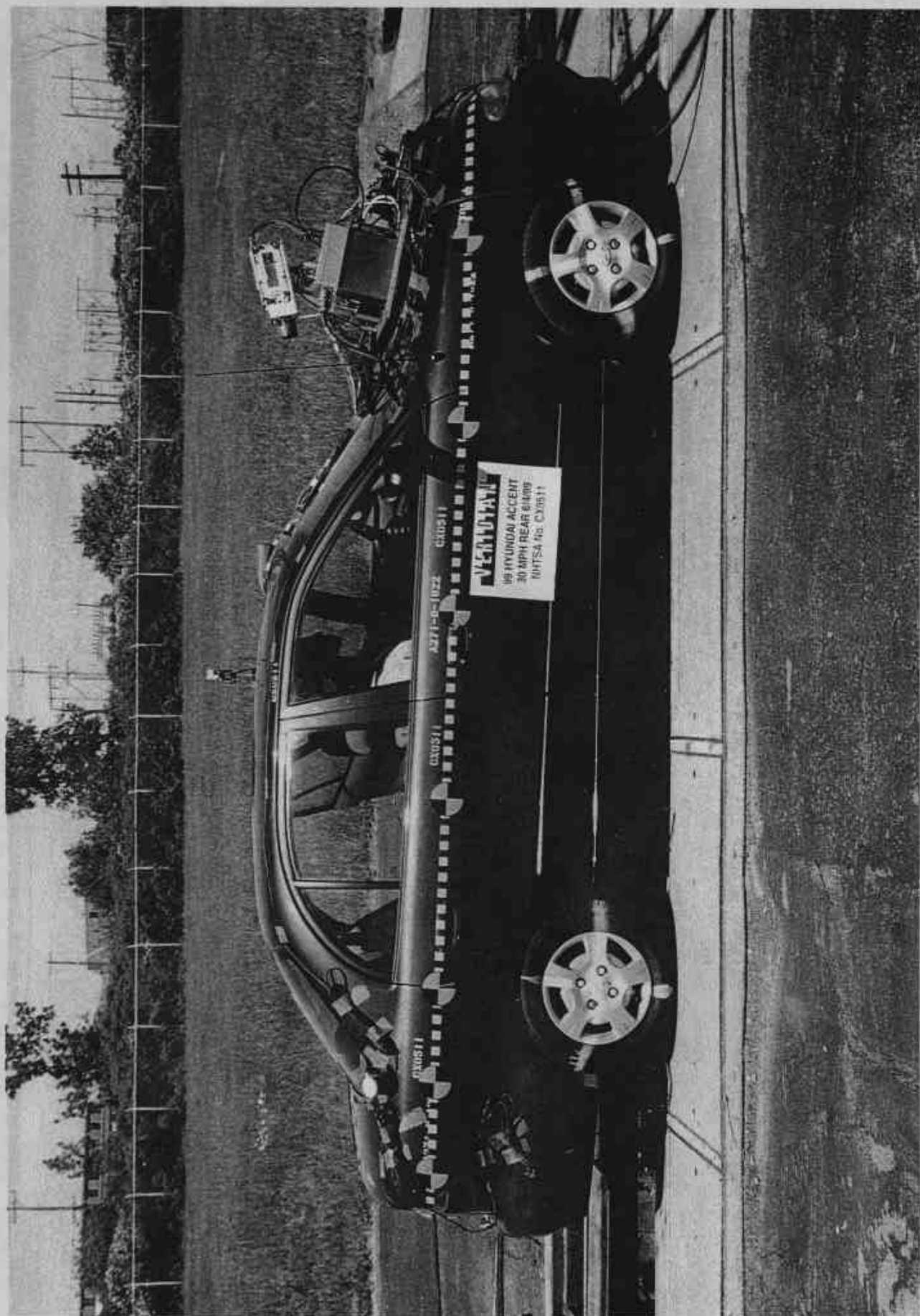


Figure A-5 PRE-TEST RIGHT SIDE VIEW

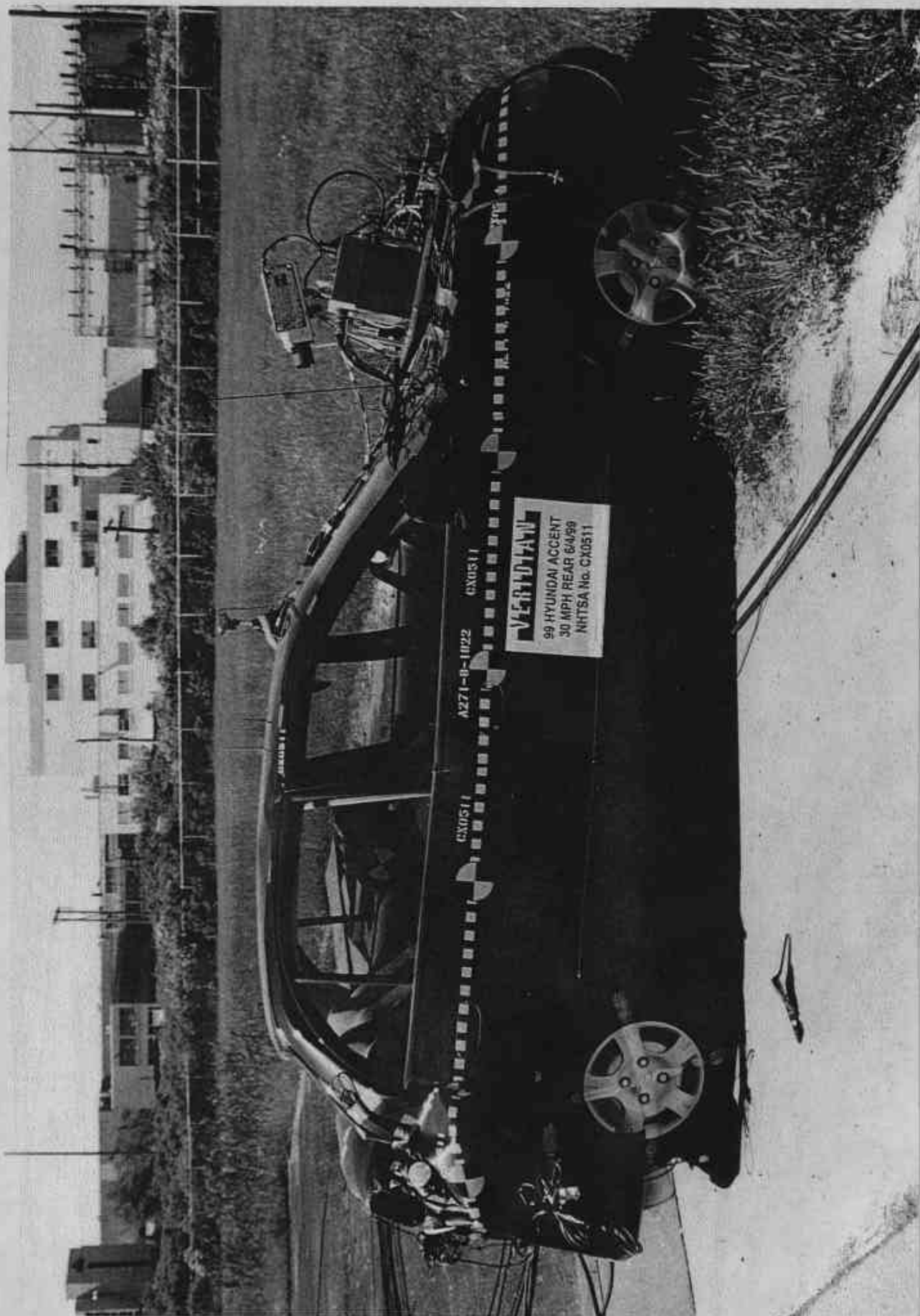


Figure A-6 POST-TEST RIGHT SIDE VIEW



Figure A-7 PRE-TEST REAR VIEW

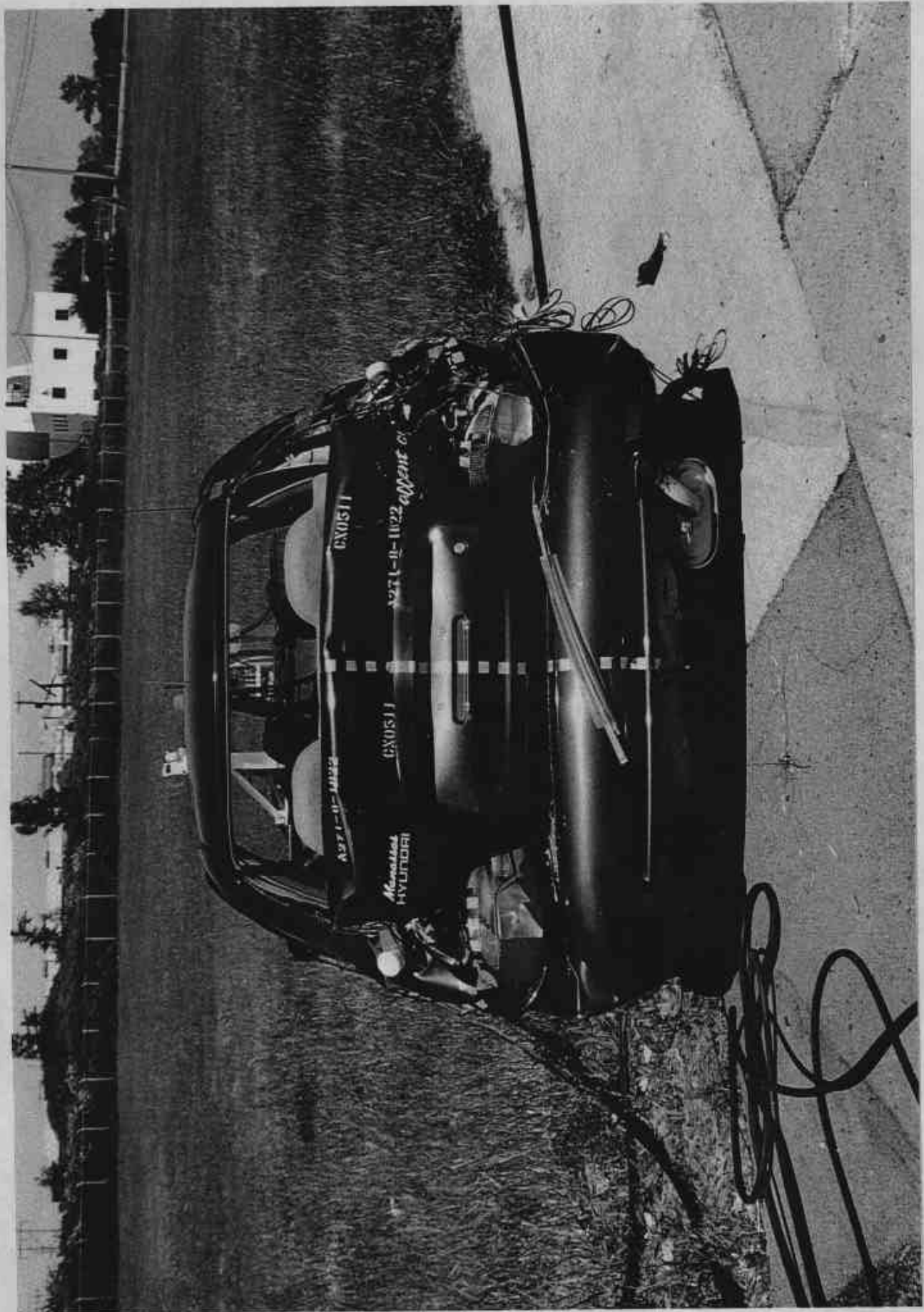


Figure A-8 POST-TEST REAR VIEW

PHOTOGRAPH NOT AVAILABLE

PHOTOGRAPH NOT AVAILABLE



Figure A-11 PRE-TEST RIGHT REAR THREE-QUARTER VIEW

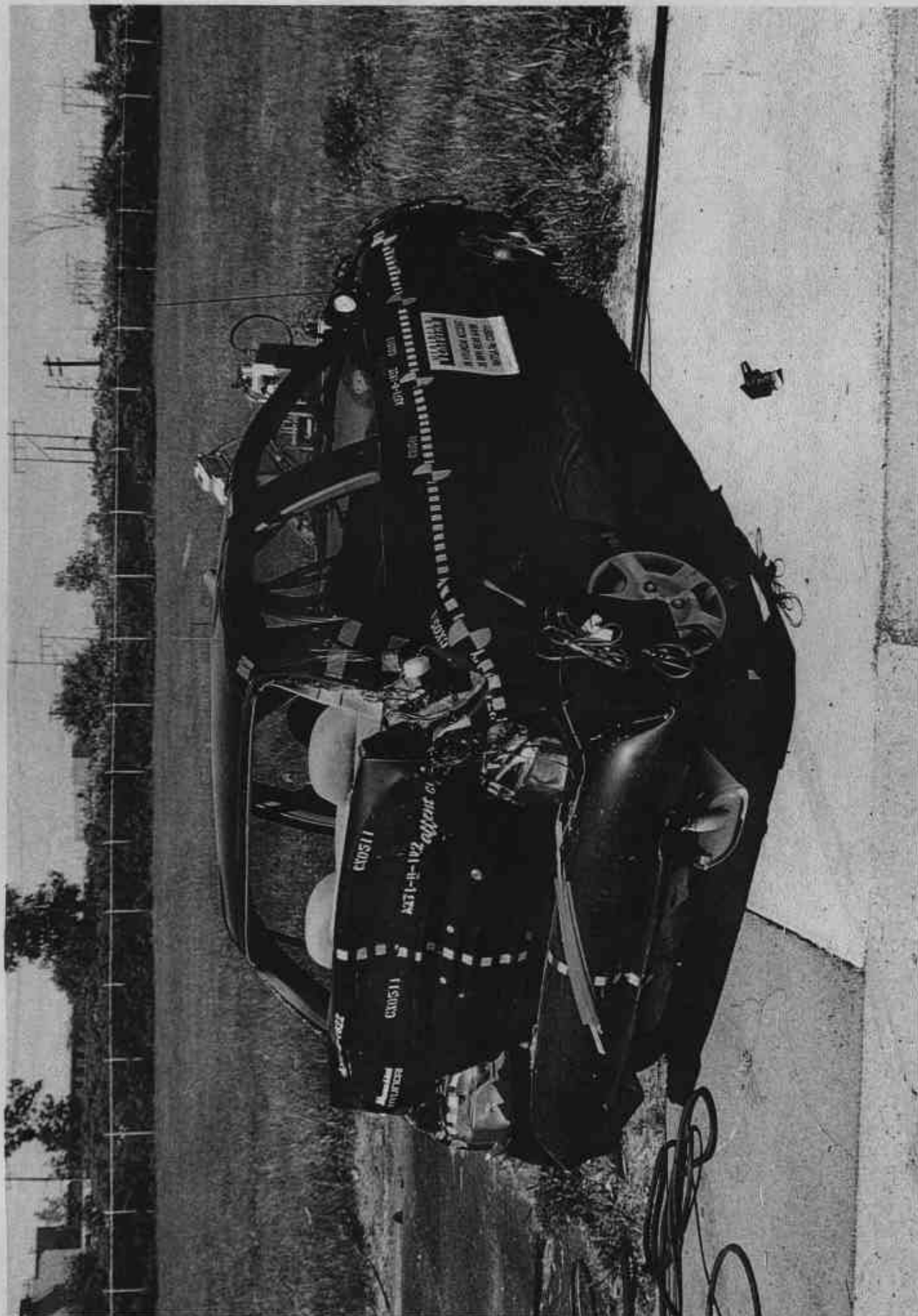


Figure A-12 POST-TEST RIGHT REAR THREE-QUARTER VIEW



Figure A-13 PRE-TEST FRONT UNDERBODY VIEW

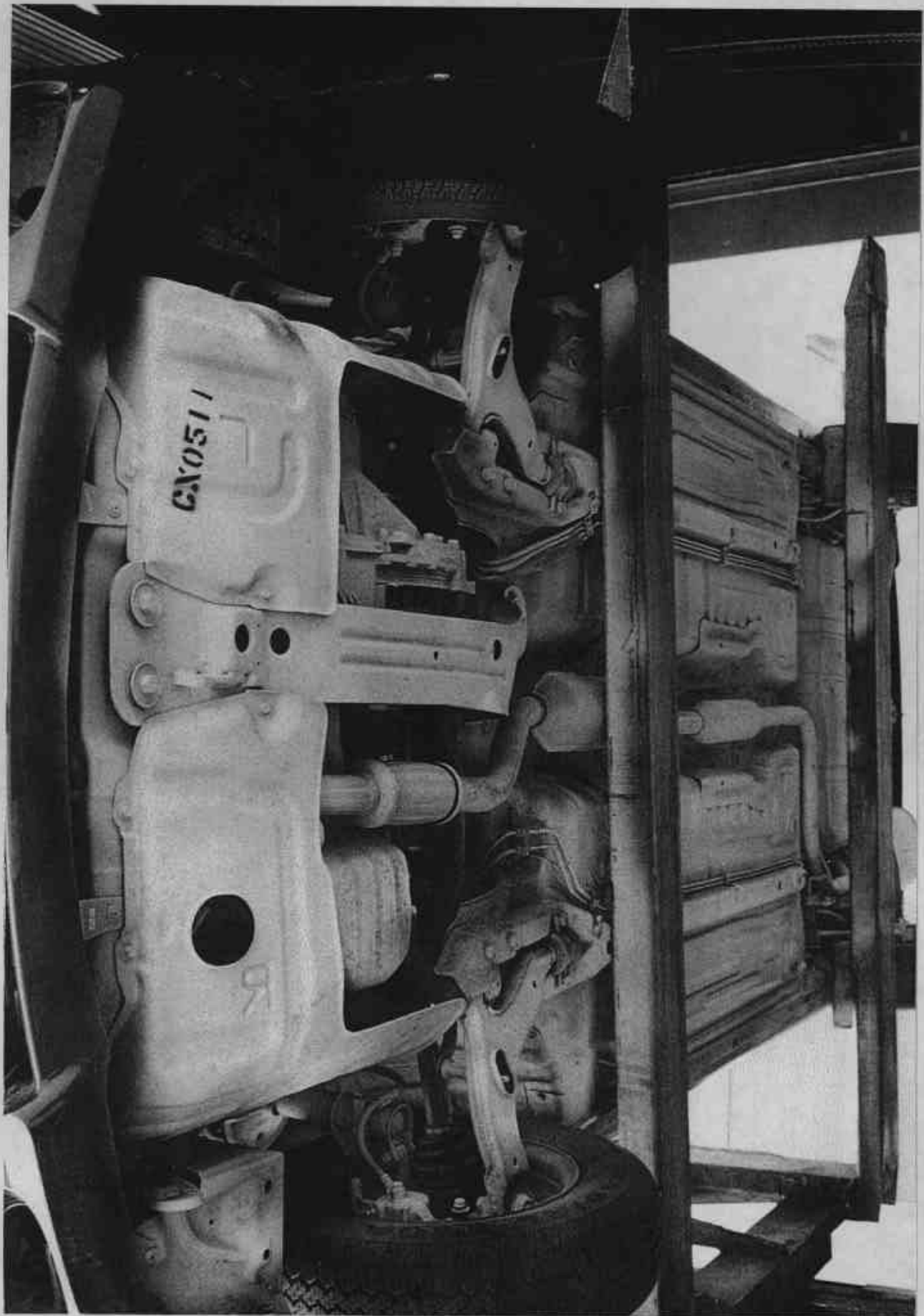


Figure A-14. POST-TEST FRONT UNDERBODY VIEW

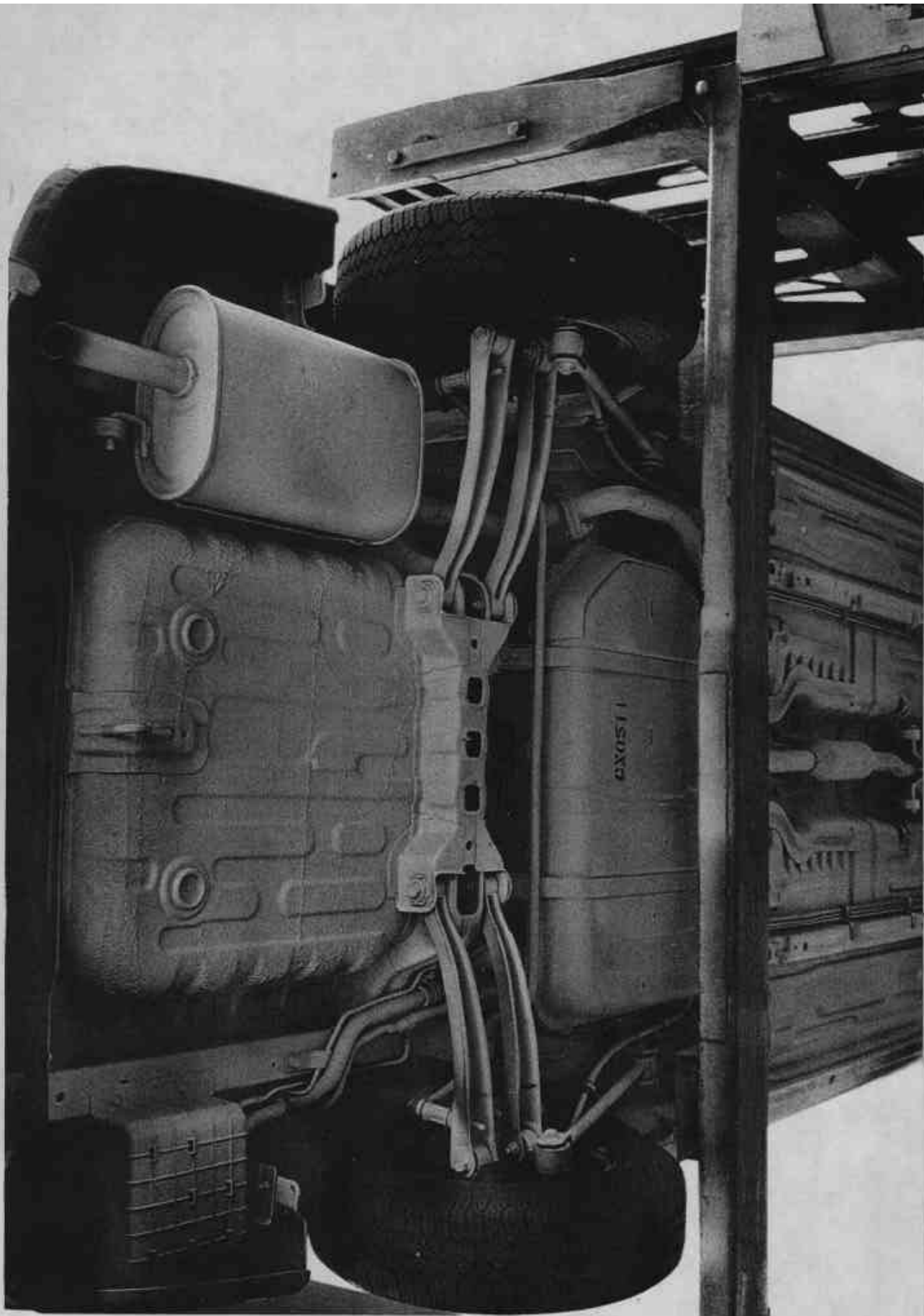


Figure A-15 PRE-TEST REAR UNDERBODY VIEW

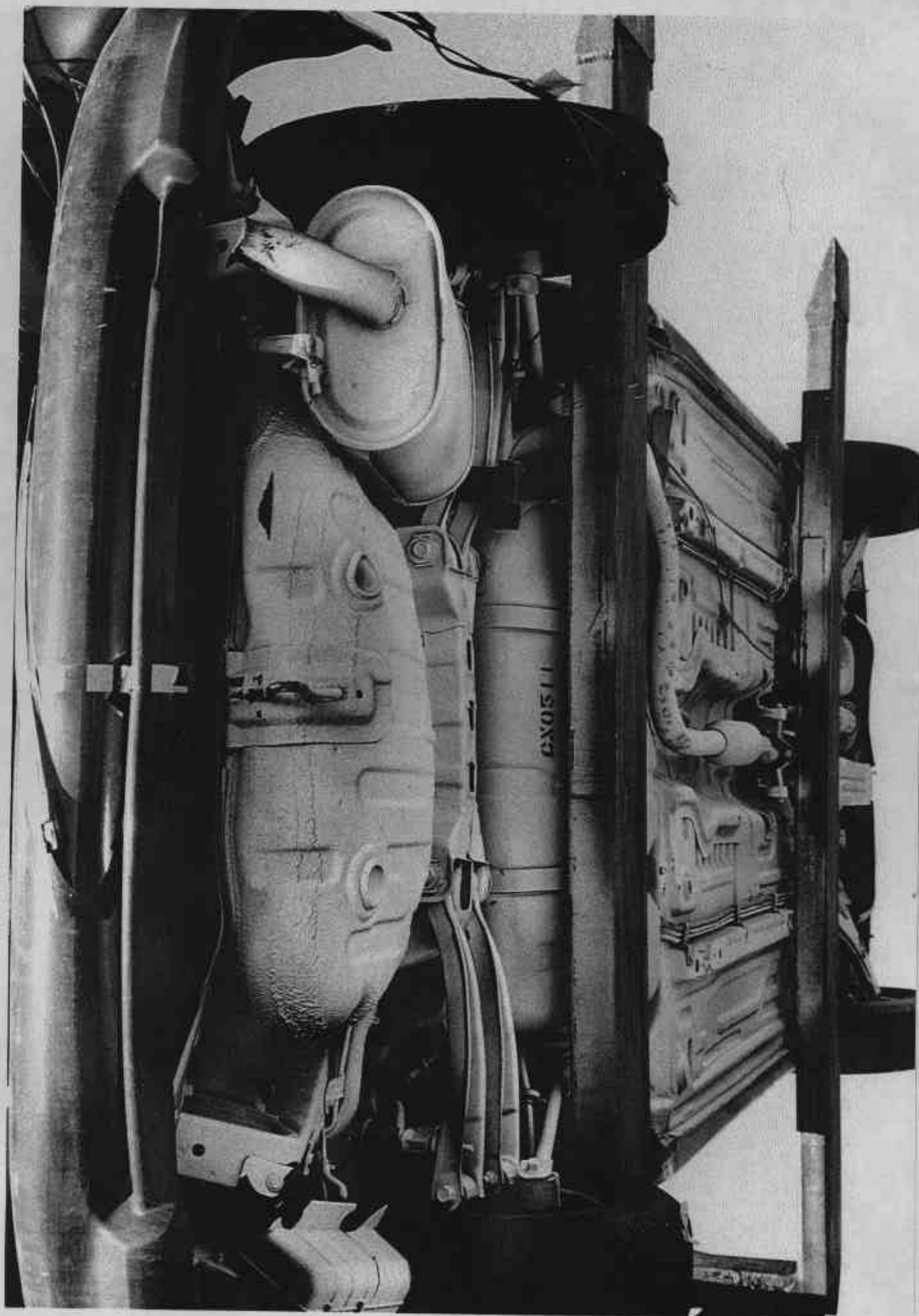


Figure A-16 POST-TEST REAR UNDERBODY VIEW

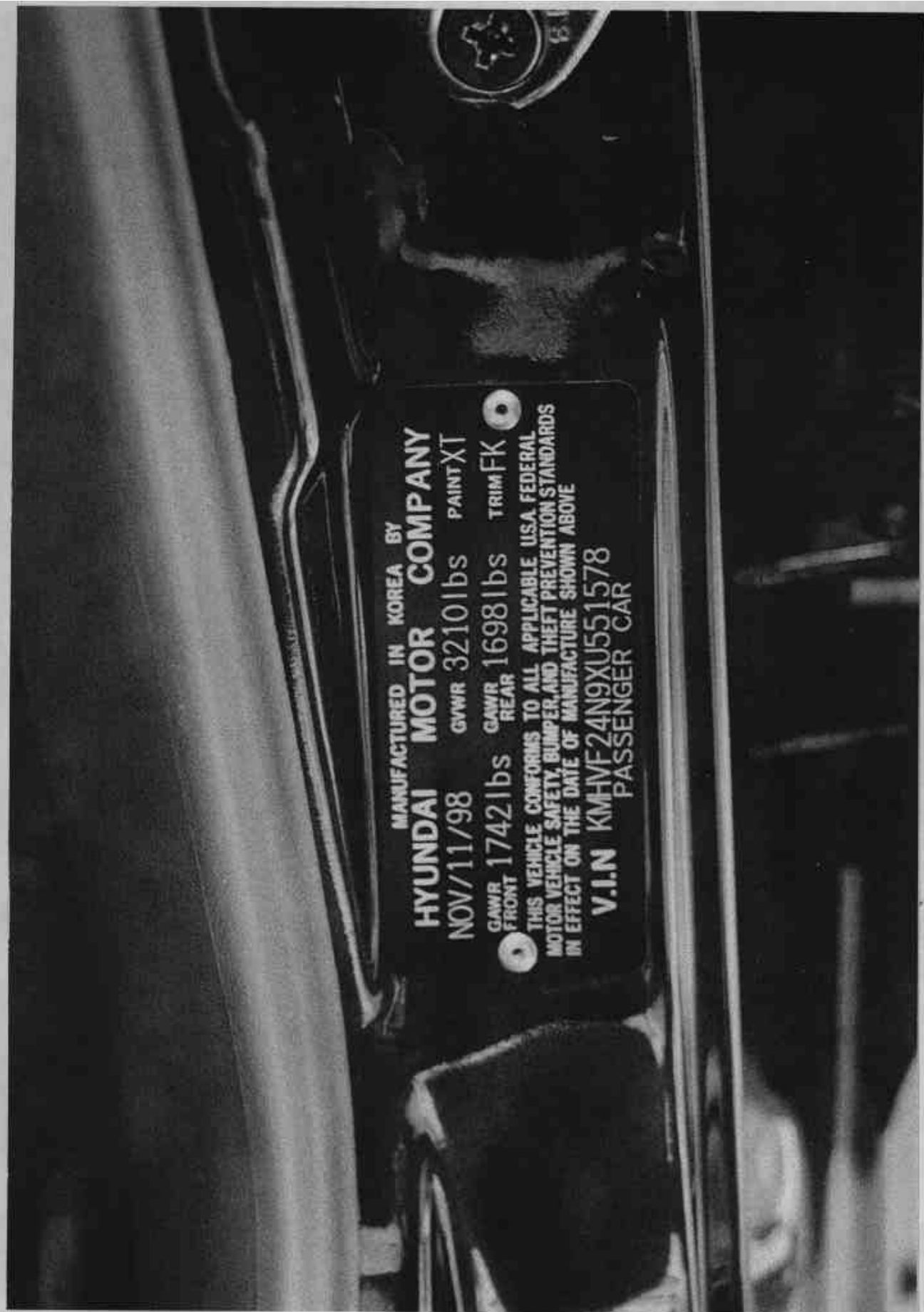


Figure A-17 CERTIFICATION PLACARD

TIRE INFLATION PRESSURE La Pression De Gonflage Des Pneus				
VEHICLE CAPACITY WEIGHT, LBS : 850 Poids en lb de la capacité du véhicule, 850				
SEATING CAPACITY : TOTAL 5 FRONT 2 REAR 3 Capacité de transport : total 5 : 2 à l' avant 3 à l' arriere				
TIRE PRESSURES-COLD, KPA (PSI) : Pression de gonflage à froid kPa (lb/po2)				
TIRE SIZE Dimension du pneu	UP TO 2 PERSONS Jusqu' a 2 Personnes		UP TO MAX. LOAD Pour charge maximum	
	FRONT Avant	REAR Arrière	FRONT Avant	REAR Arrière
P155/80 R13	207 (30)	207 (30)	221 (32)	221 (32)
P175/70 R13	207 (30)	207 (30)	221 (32)	221 (32)
P175/65 R14	207 (30)	207 (30)	221 (32)	221 (32)
T105/70 D14	414 (60)	414 (60)	414 (60)	414 (60)

Figure A-18 TIRE PLACARD
A-20

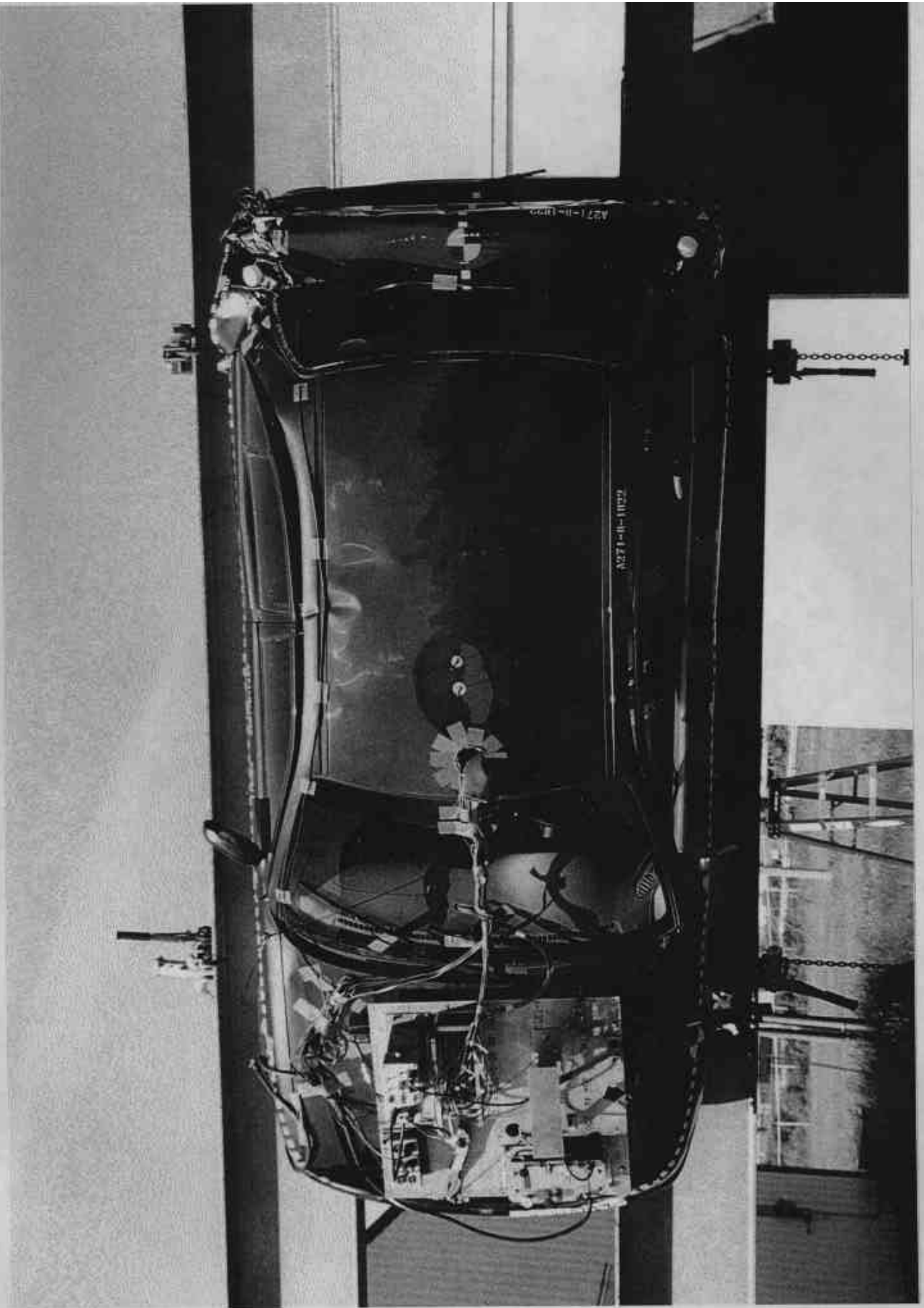


Figure A-19 ROLLOVER 90°

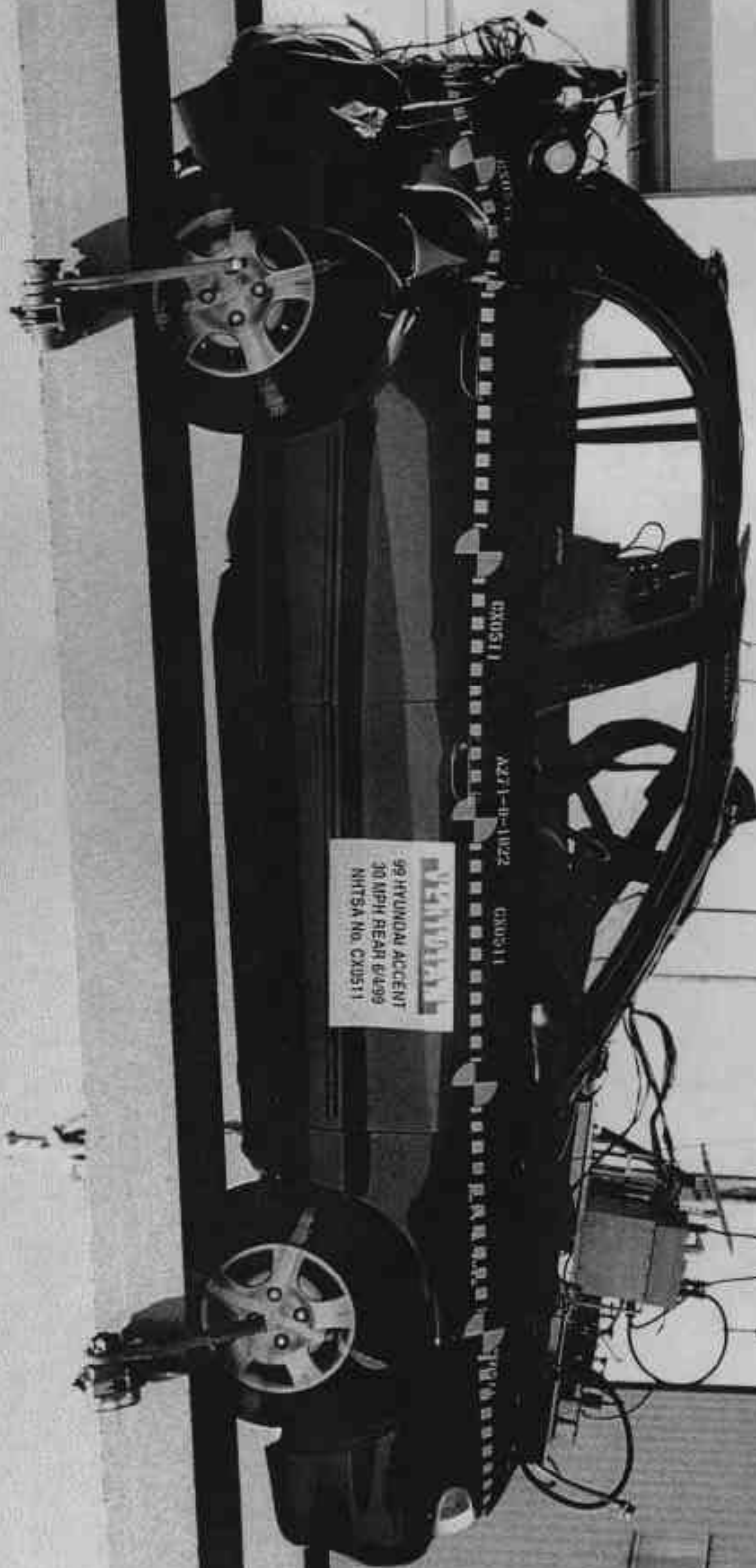


Figure A-20 ROLLOVER 180°

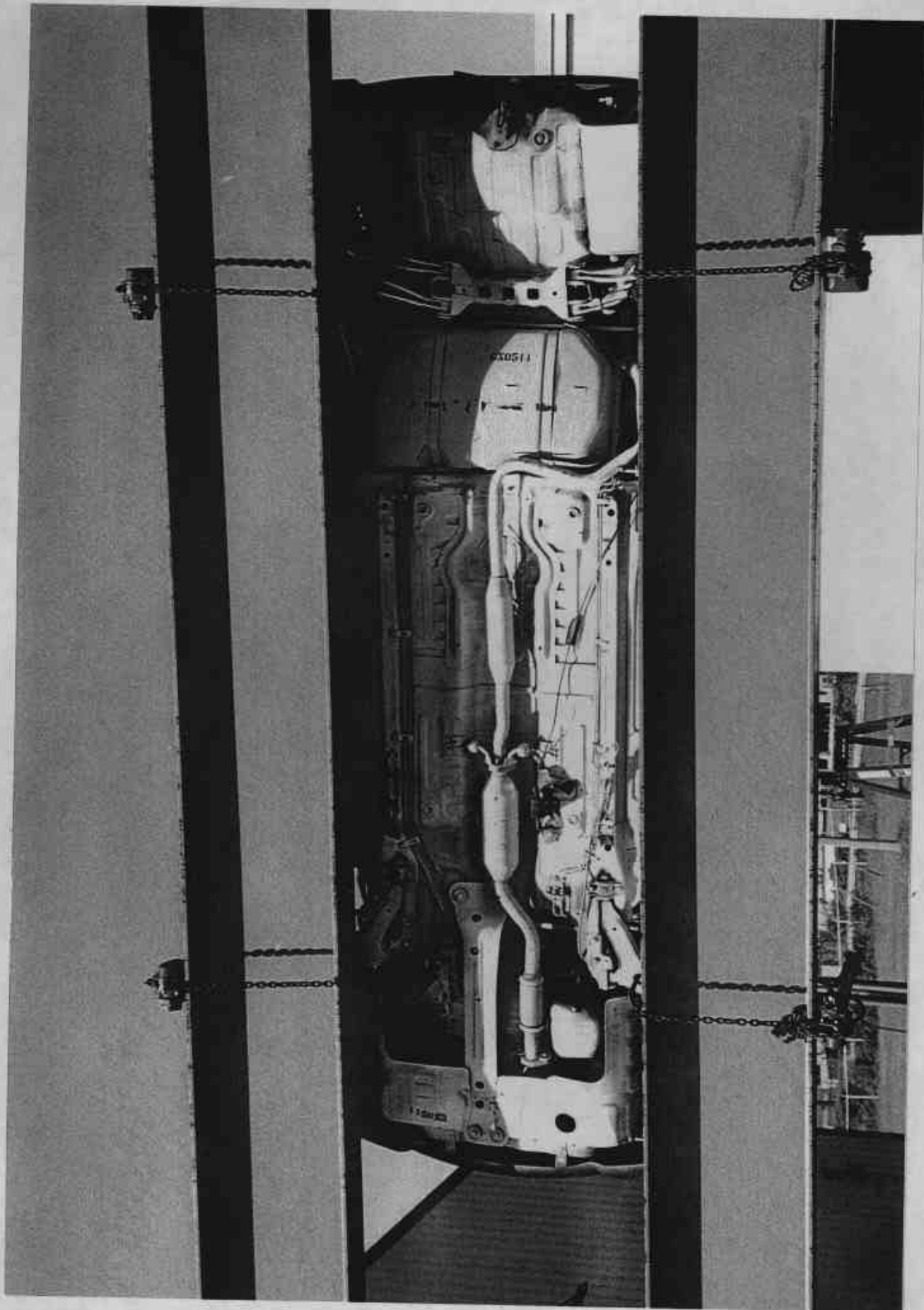


Figure A-21 ROLLOVER 270°



A-24



Figure A-22 ROLLOVER 360°

8480-8

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

(REAR IMPACT ONLY)

FACILITY: VERF

DATE: June 04, 1999

TEST#: A271-0080-1821

TITLE: 301 Test #8 1999 Hyundai Accent CX0511

CHN	NAME	Unit	Max	msec	Min	msec	Filt
23	Acc #3(X) Upper Seat Back X	g	22.0	9.2	-8.5	103.0	60
24	Acc #4(X) Lower Seat Back X	g	22.1	8.0	-5.5	16.8	60
28	Acc #1(X) Left Rear Xmember	g	18.5	6.3	-2.5	175.3	60
31	Acc #2(X) Right Rear Xmember	g	18.4	5.9	-2.7	176.3	60
34	Driver Head X	g	42.2	138.4	-4.0	81.4	1000
35	Driver Head Y	g	6.1	156.7	-7.1	144.7	1000
36	Driver Head Z	g	32.1	124.9	-20.1	138.4	1000
37	Driver Head Resultant	g	46.9	138.4	0.0	-45.8	1000
38	Driver Upper Neck Fx	lbf	32.7	200.3	-75.9	133.9	1000
39	Driver Upper Neck Fy	lbf	9.1	440.5	-29.7	137.9	1000
40	Driver Upper Neck Fz	lbf	488.7	133.6	-29.8	170.4	1000
41	Driver Upper Neck F Resultant	lbf	494.7	133.6	0.0	-74.7	1000
42	Driver Upper Neck Mx	in-lb	76.1	156.8	-44.4	131.7	600
43	Driver Upper Neck My	in-lb	209.0	98.0	-252.2	133.6	600
44	Driver Upper Neck Mz	in-lb	18.9	104.1	-82.8	156.7	600
45	Driver Upper Neck M Resultant	in-lb	252.8	133.6	0.0	-91.1	600
46	Driver Chest X	g	15.0	91.4	-5.6	138.8	180
47	Driver Chest Y	g	1.8	156.7	-2.2	117.3	180
48	Driver Chest Z	g	15.5	156.8	-1.9	201.8	180
49	Driver Chest Resultant	g	15.8	91.5	0.0	-67.3	180
50	Driver Chest Displacement	in	0.0	142.4	0.0	181.4	600
51	Driver Pelvic X	g	19.3	67.8	-4.6	156.3	1000
52	Driver Pelvic Y	g	12.7	156.7	-1.3	157.0	1000
53	Driver Pelvic Z	g	10.5	156.7	-2.1	210.8	1000
54	Driver Pelvic Resultant	g	20.3	71.6	0.0	-84.8	1000
55	Driver Lap Belt	lbf	70.1	159.4	-21.6	84.5	60

P1 HIC(36ms): 249.7

t1: 111.1 msec

t2: 147.1 msec

Duration: 36.0 msec

Average Acceleration: 34.4 g

Input channels: Driver Head X (2) CFC_1000

Driver Head Y (3) CFC_1000

Driver Head Z (4) CFC_1000

P1 CLIP(3ms): 15.6 g

t1: 89.7 msec

t2: 92.7 msec

Duration: 3.0 msec

P1 CSI: 35.7

Input channels: Driver Chest X (5) CFC_180

Driver Chest Y (6) CFC_180

Driver Chest Z (7) CFC_180

TEST NO. CX0511

VEHICLE

SAE FILTER CHANNEL CLASS

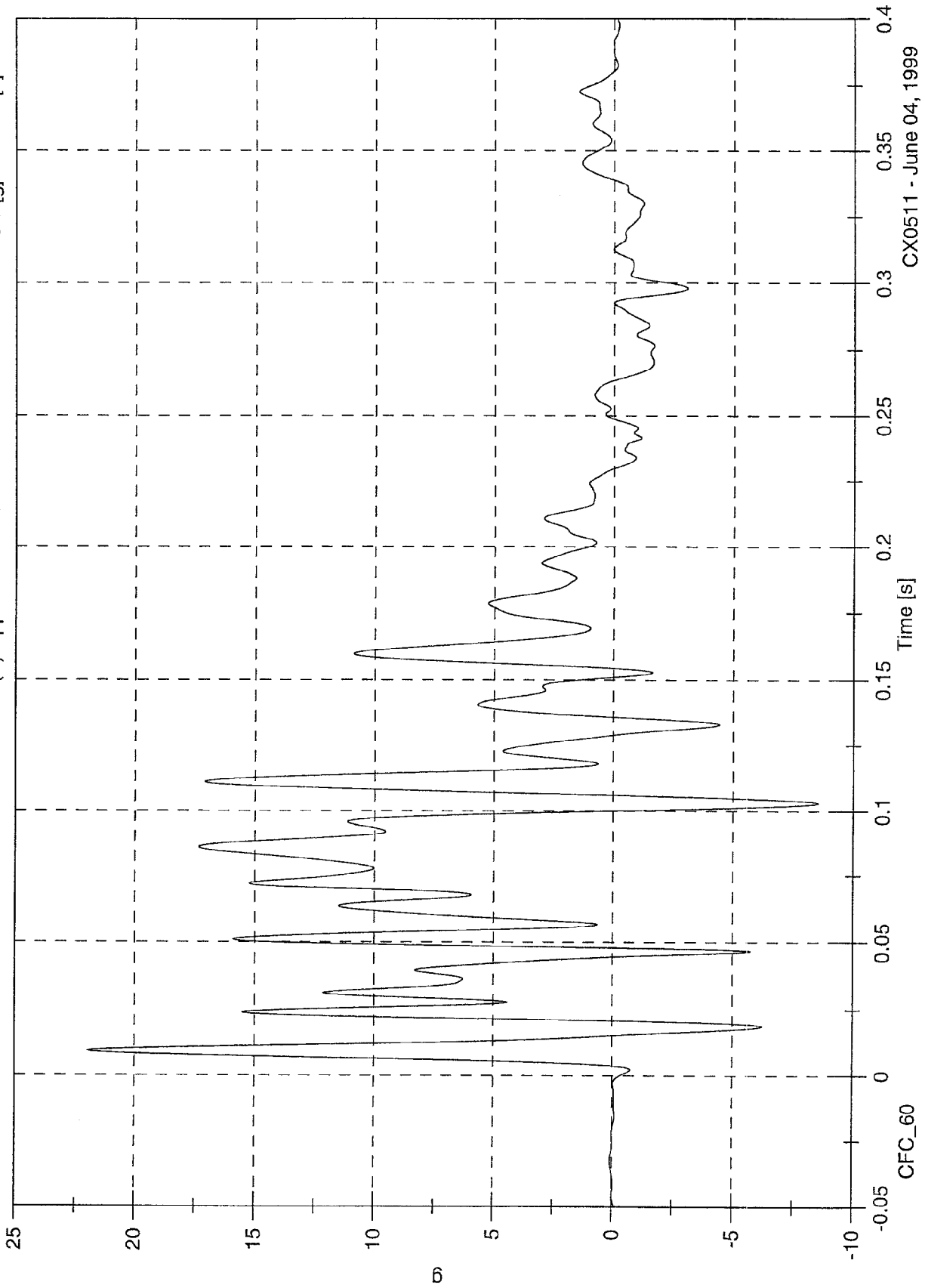
60

Note: Angular seatback position is measured in degrees of rotation from the initial (design) position.

301 Test #8 1999 Hyundai Accent

Max: 22.0 [g] at 0.009 [s]
Min: -8.5 [g] at 0.103 [s]

Acc #3(X) Upper Seat Back X

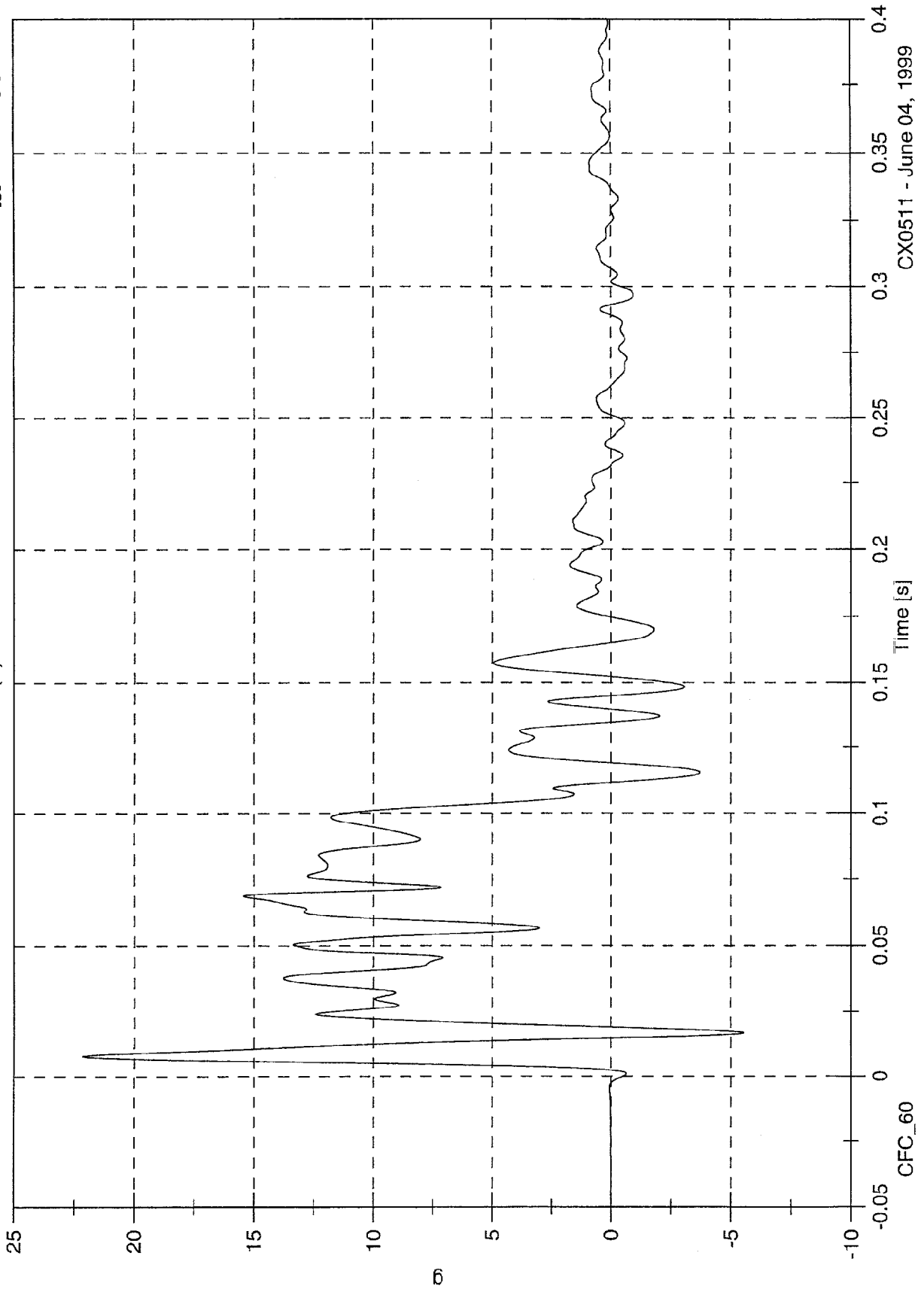


301 Test #8 1999 Hyundai Accent

Acc #4(X) Lower Seat Back X

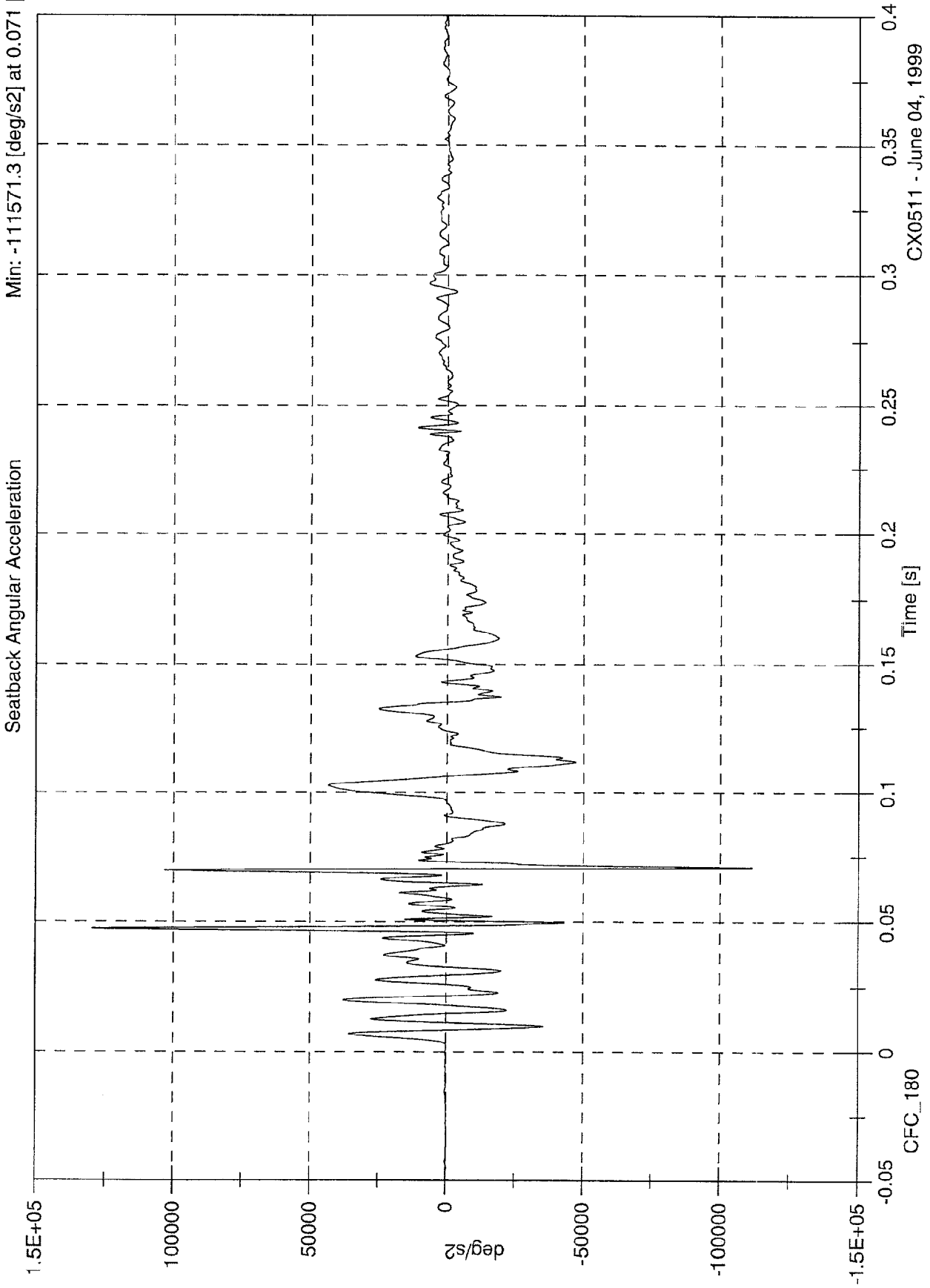
Max: 22.1 [g] at 0.008 [s]

Min: -5.5 [g] at 0.017 [s]



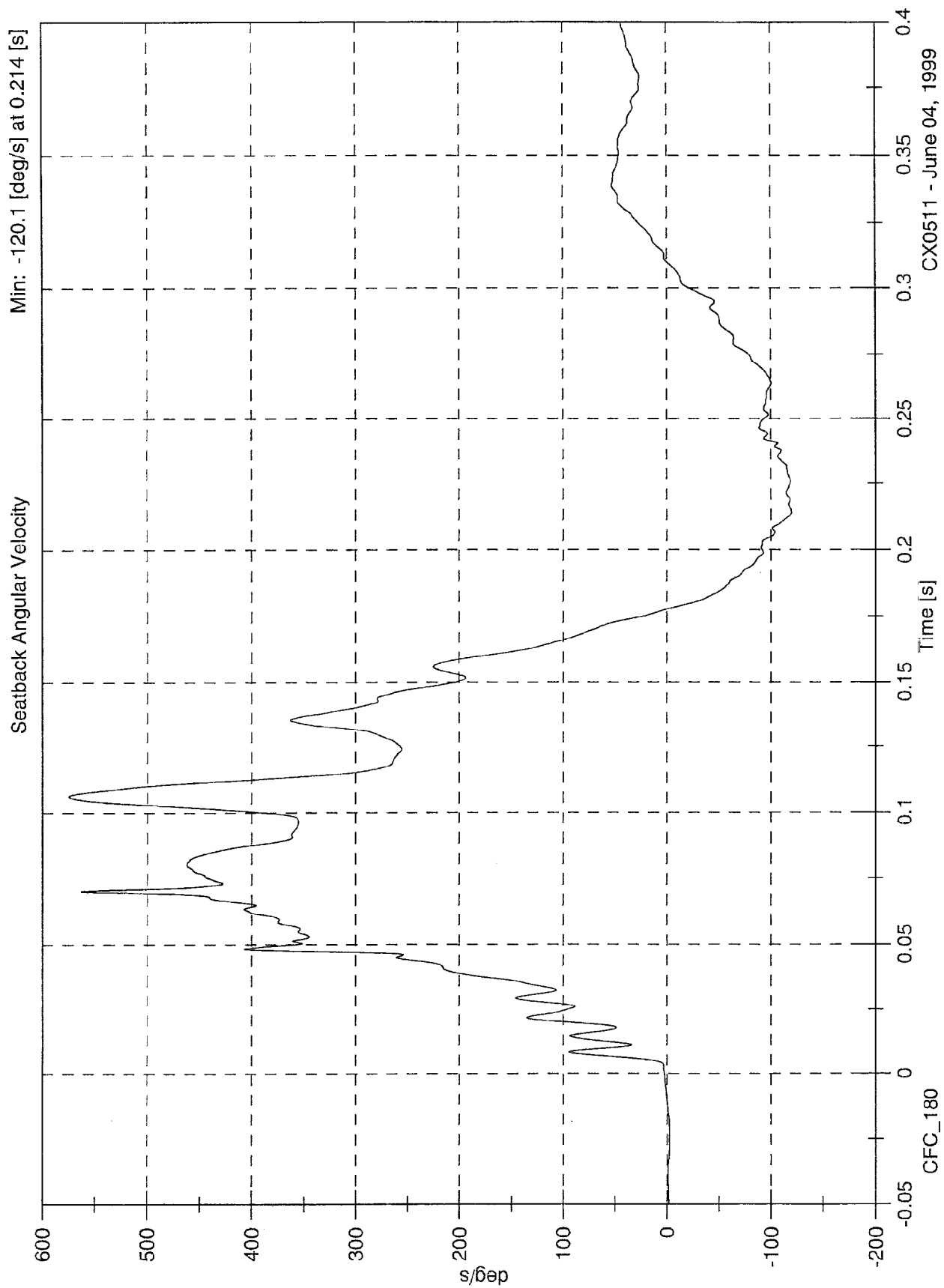
301 Test #8 1999 Hyundai Accent

Max: 129477.9 [deg/s²] at 0.047 [s]
Min: -111571.3 [deg/s²] at 0.071 [s]



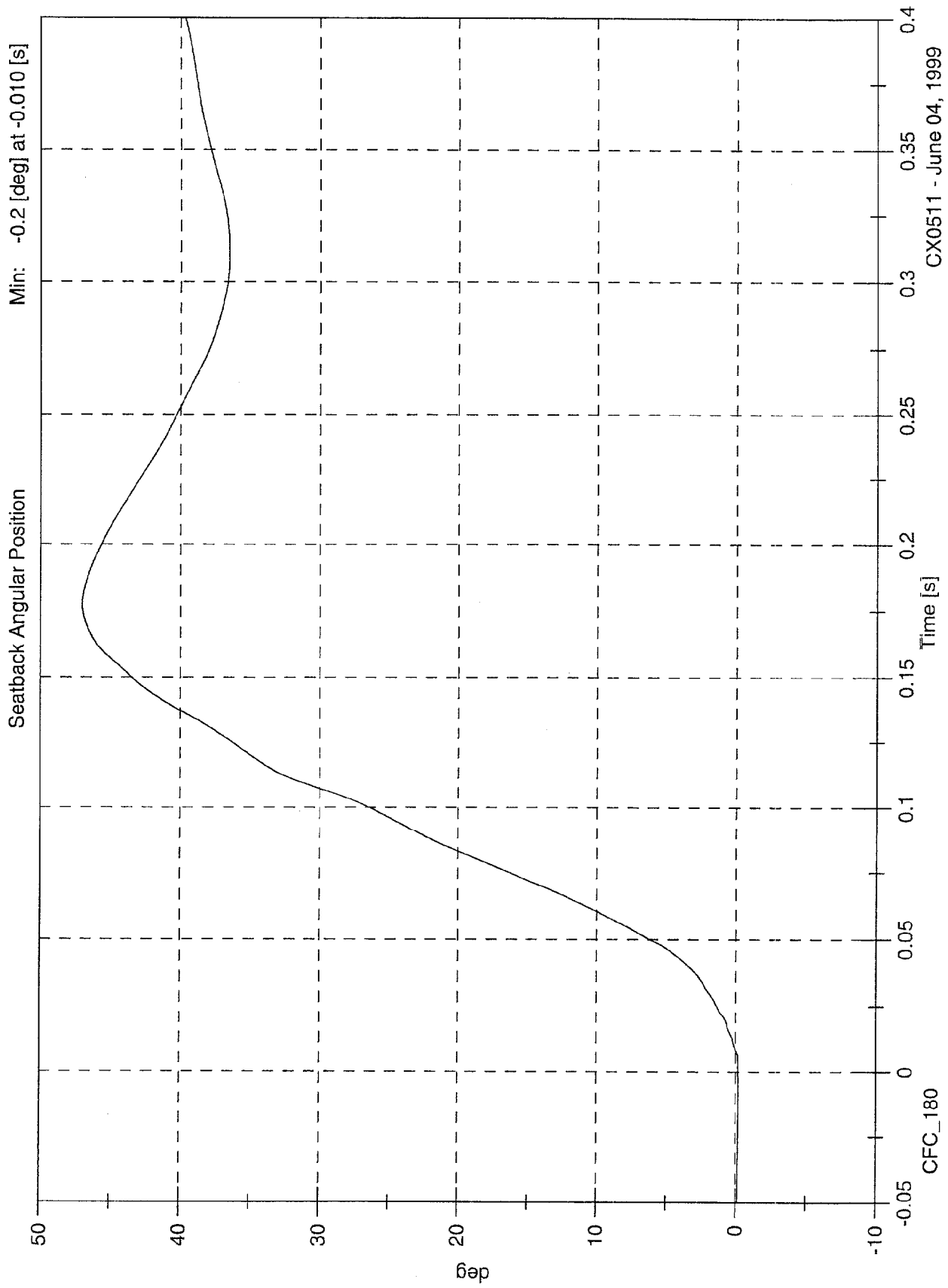
301 Test #8 1999 Hyundai Accent

Max: 574.5 [deg/s] at 0.106 [s]
Min: -120.1 [deg/s] at 0.214 [s]



301 Test #8 1999 Hyundai Accent

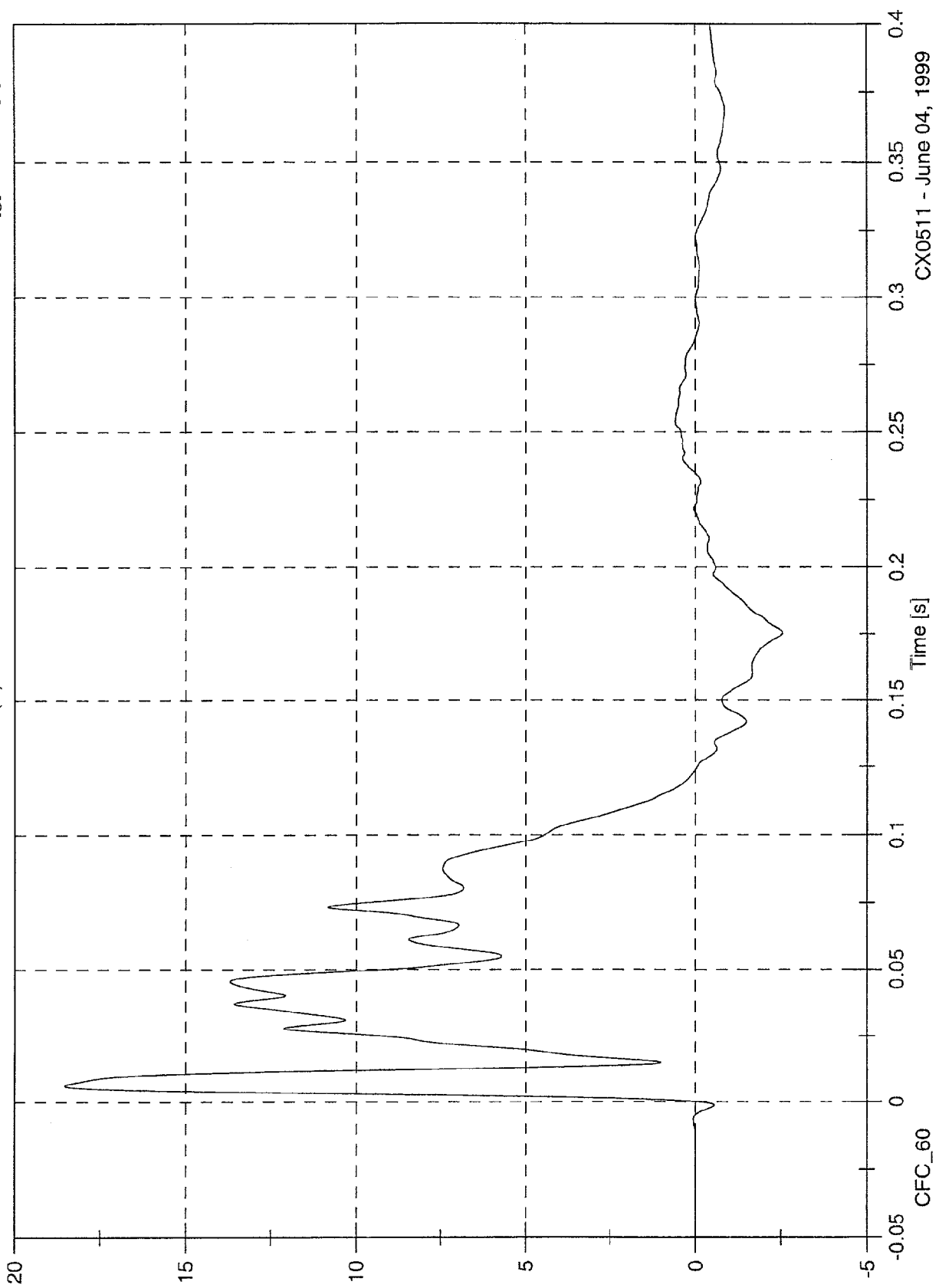
Max: 47.0 [deg] at 0.178 [s]
Min: -0.2 [deg] at -0.010 [s]



301 Test #8 1999 Hyundai Accent

Acc #1(X) Left Rear Xmember

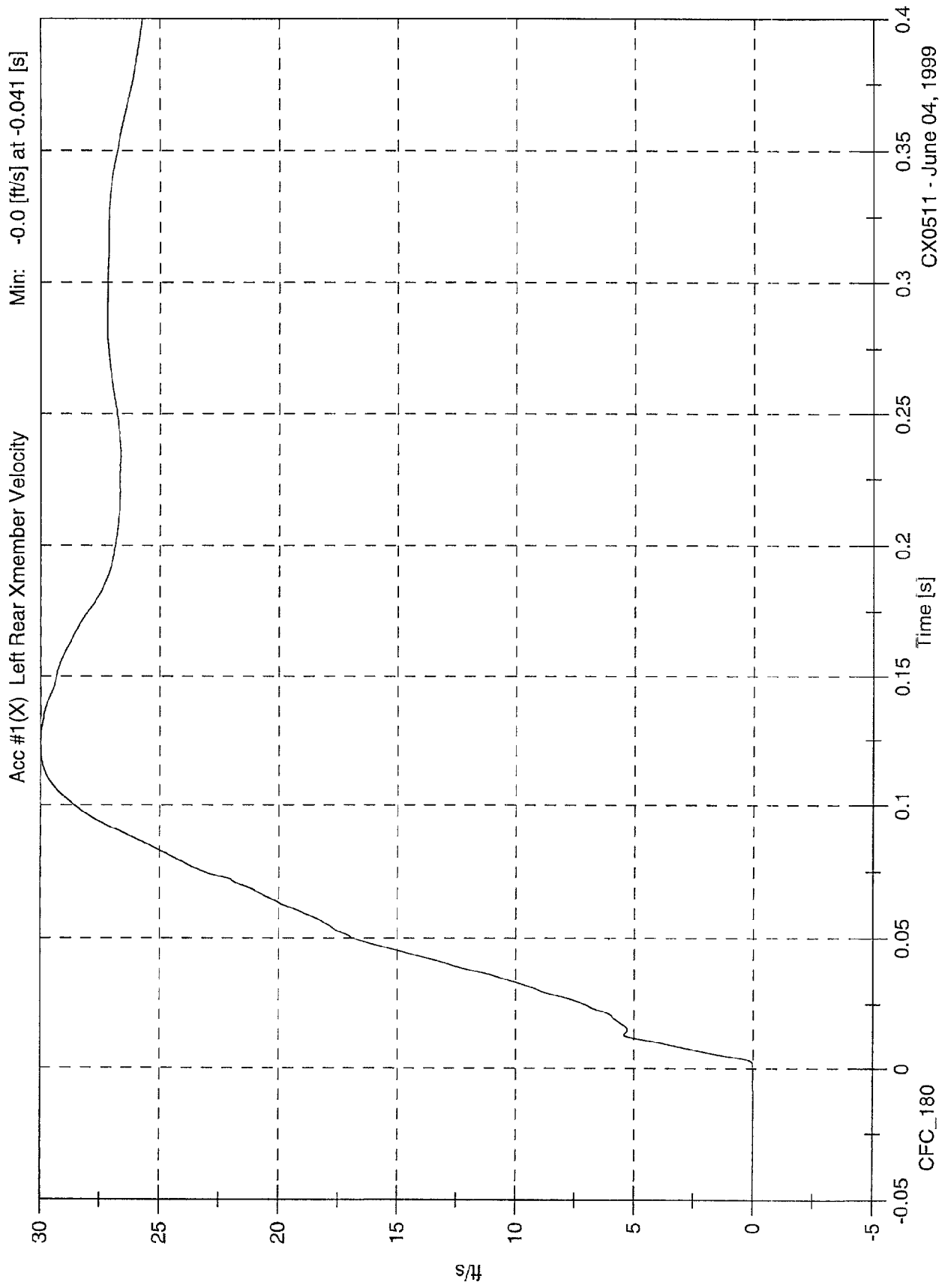
Max: 18.5 [g] at 0.006 [s]
Min: -2.5 [g] at 0.175 [s]



CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 30.0 [ft/s] at 0.123 [s]
Min: -0.0 [ft/s] at -0.041 [s]

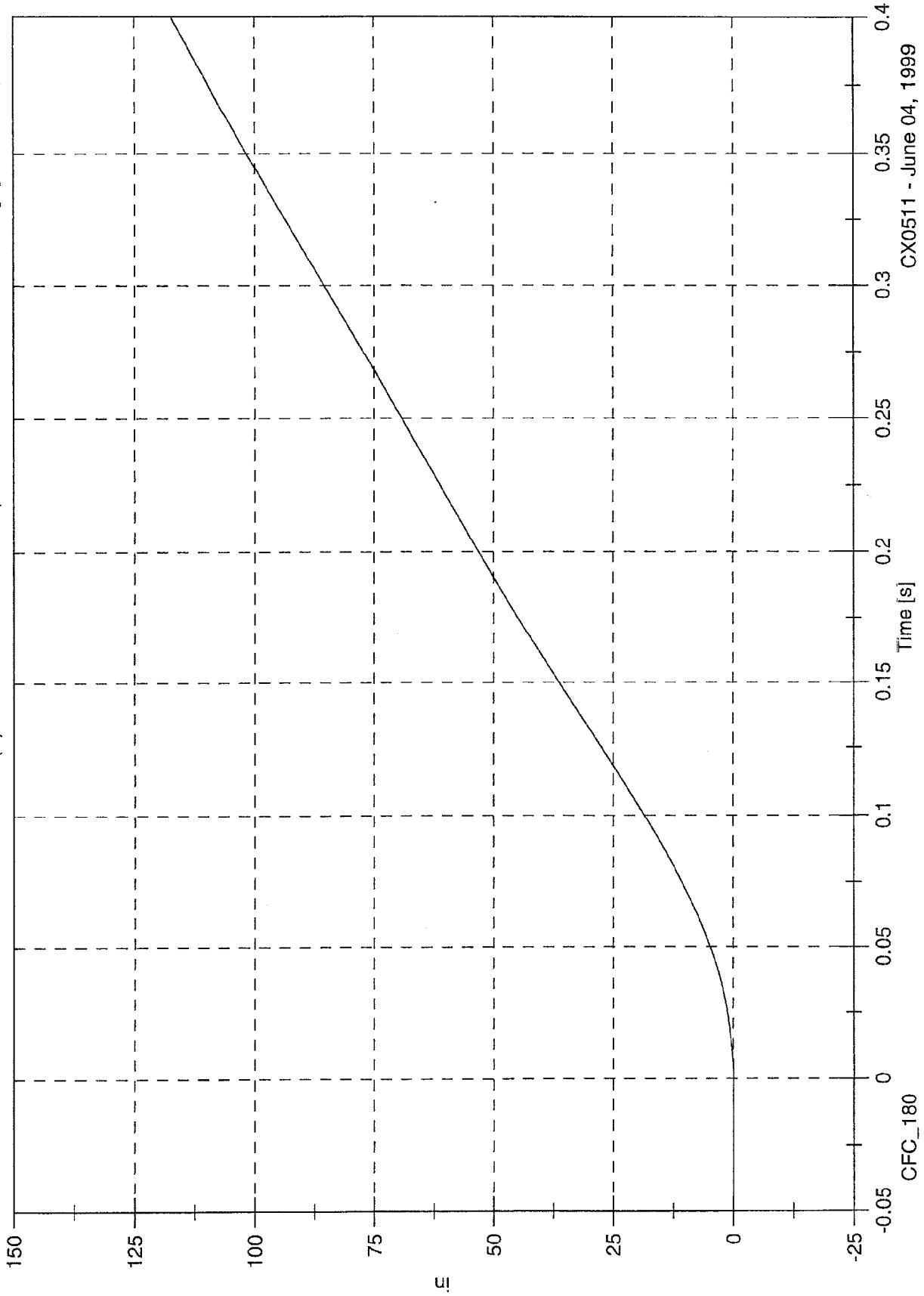


301 Test #8 1999 Hyundai Accent

Max: 148.0 [in] at 0.500 [s]

Min: -0.0 [in] at -0.010 [s]

Acc #1(X) Left Rear Xmember Displacement

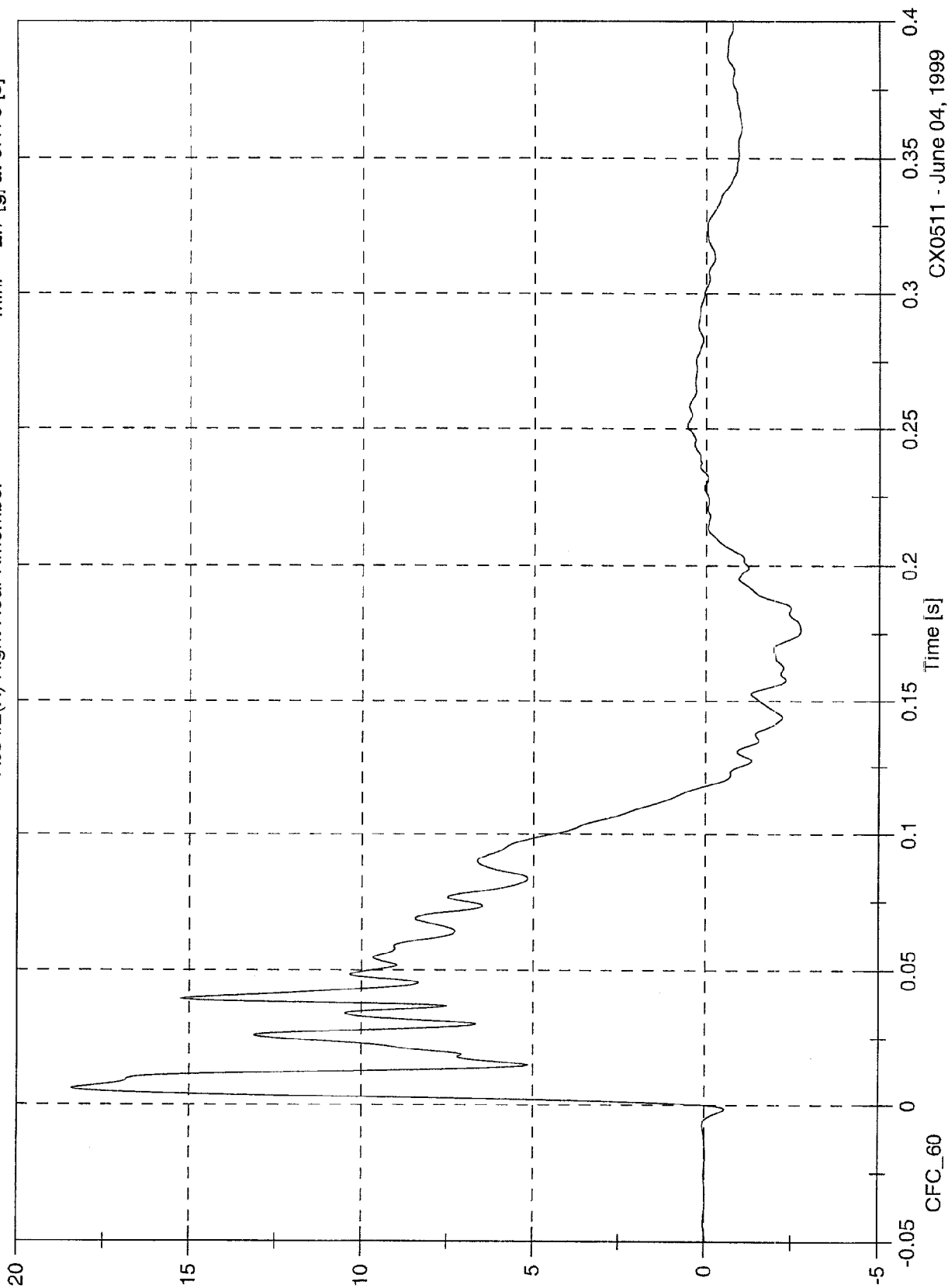


CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 18.4 [g] at 0.006 [s]
Min: -2.7 [g] at 0.176 [s]

Acc #2(X) Right Rear Xmember

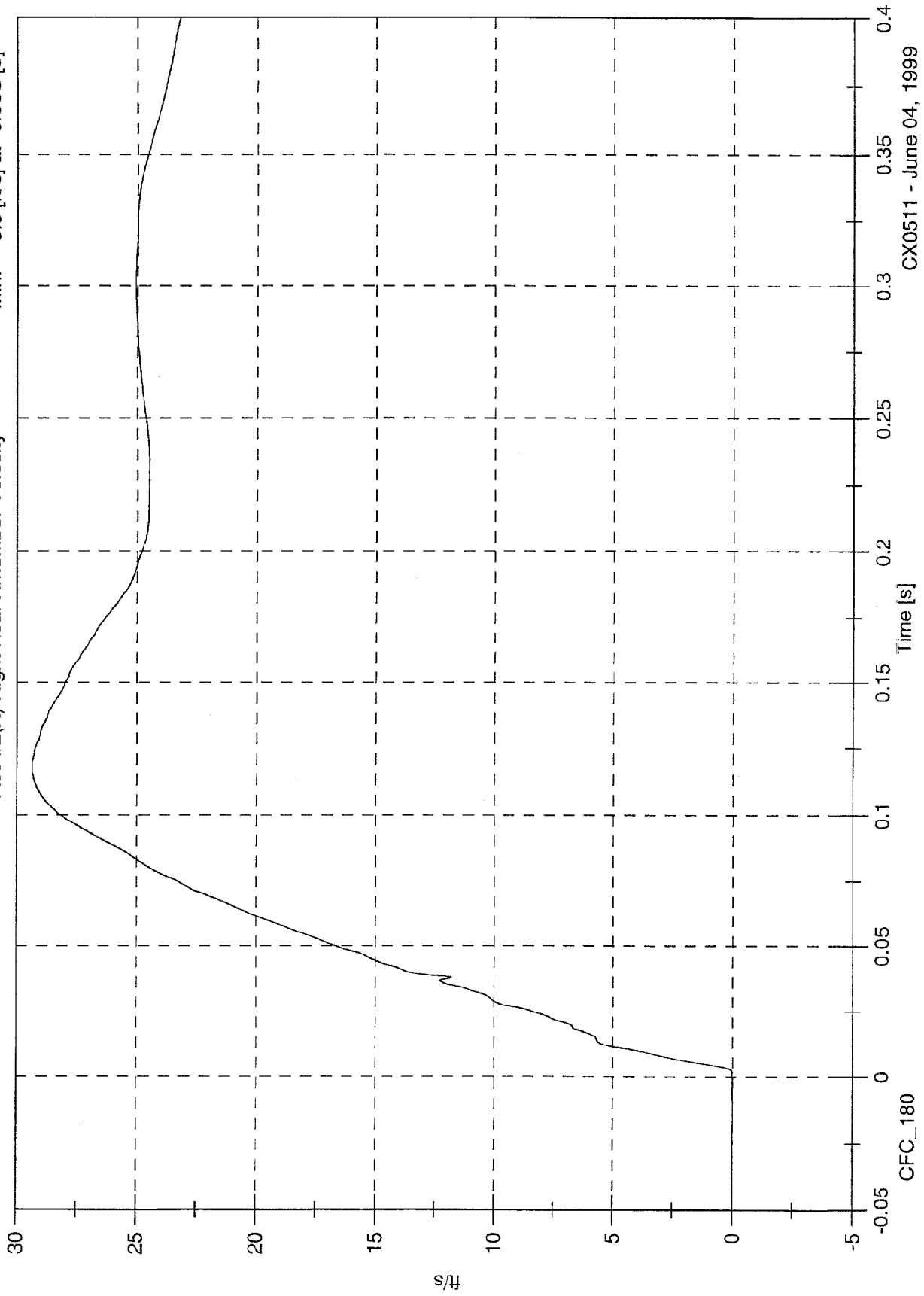


CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 29.4 [ft/s] at 0.118 [s]
Min: -0.0 [ft/s] at -0.063 [s]

Acc #2(X) Right Rear Xmember Velocity

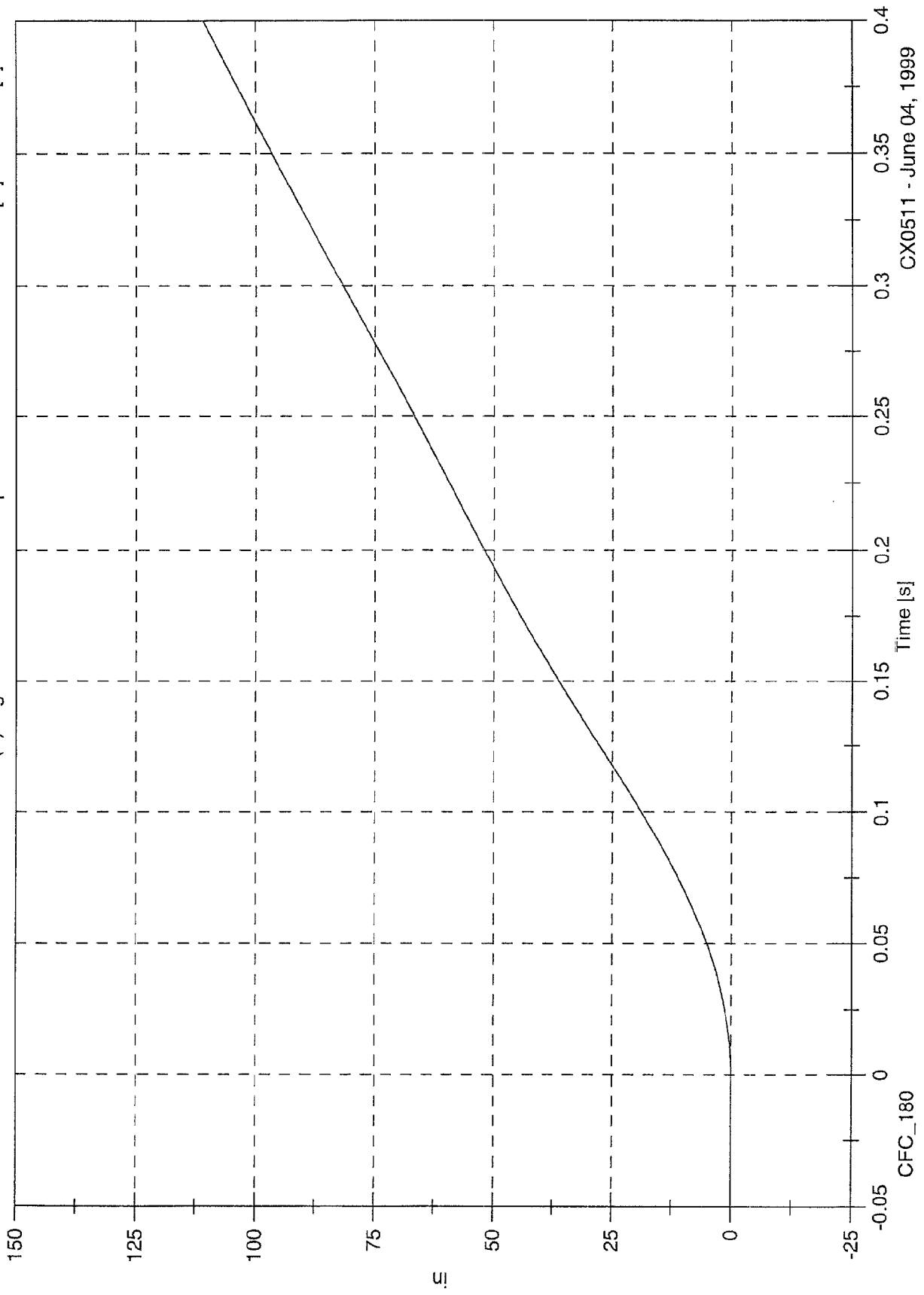


CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 138.2 [in] at 0.500 [s]
Min: -0.0 [in] at -0.010 [s]

Acc #2(X) Right Rear Xmember Displacement



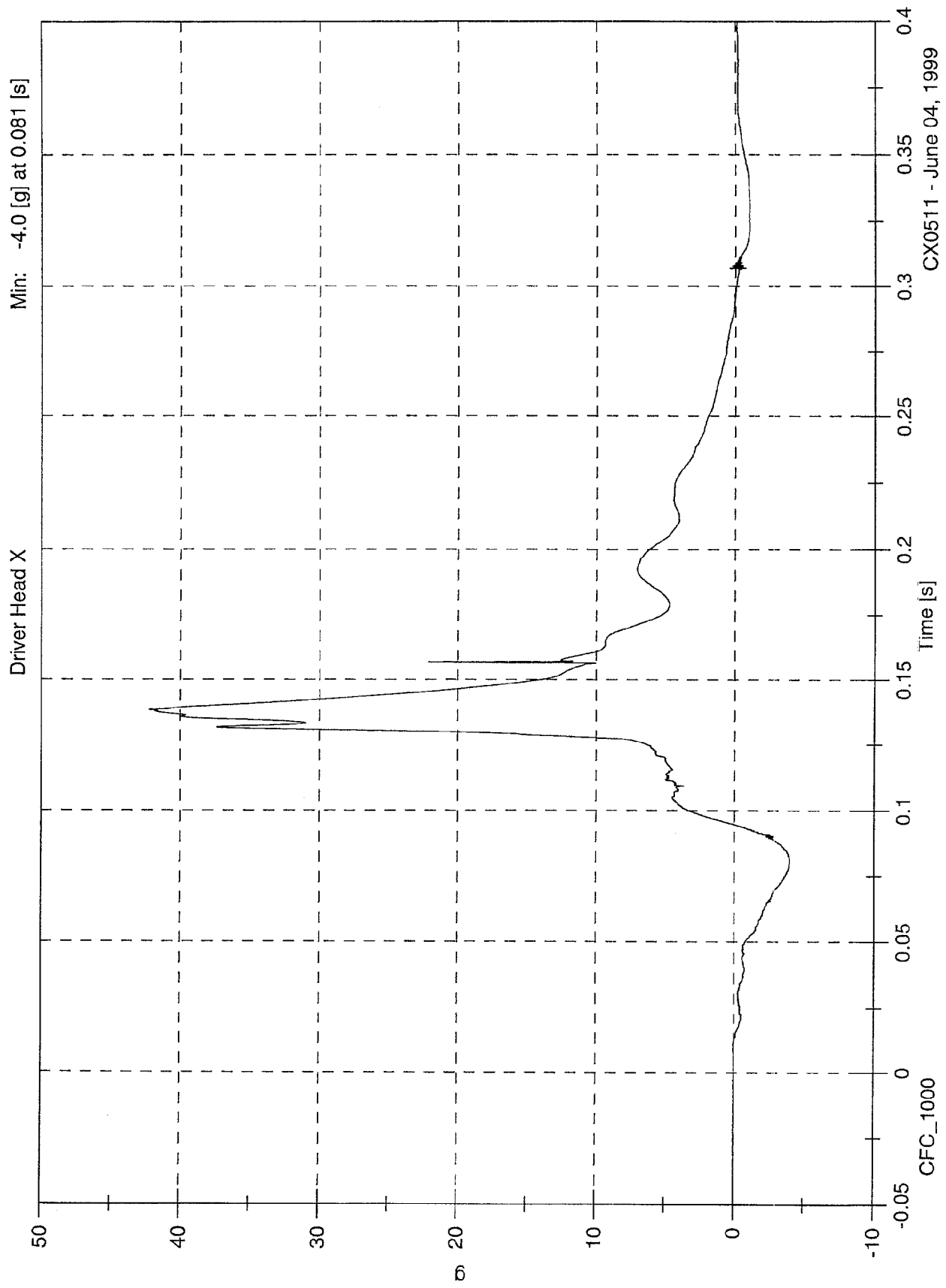
CX0511 - June 04, 1999

TEST NO. CX0511

DRIVER DUMMY (Pos. 1)	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Pelvic Accelerations	1000
Upper Neck Forces	1000
Upper Neck Moments	600
Belt Forces	60
Belt Spoolout	60

301 Test #8 1999 Hyundai Accent

Max: 42.2 [g] at 0.138 [s]
Min: -4.0 [g] at 0.081 [s]

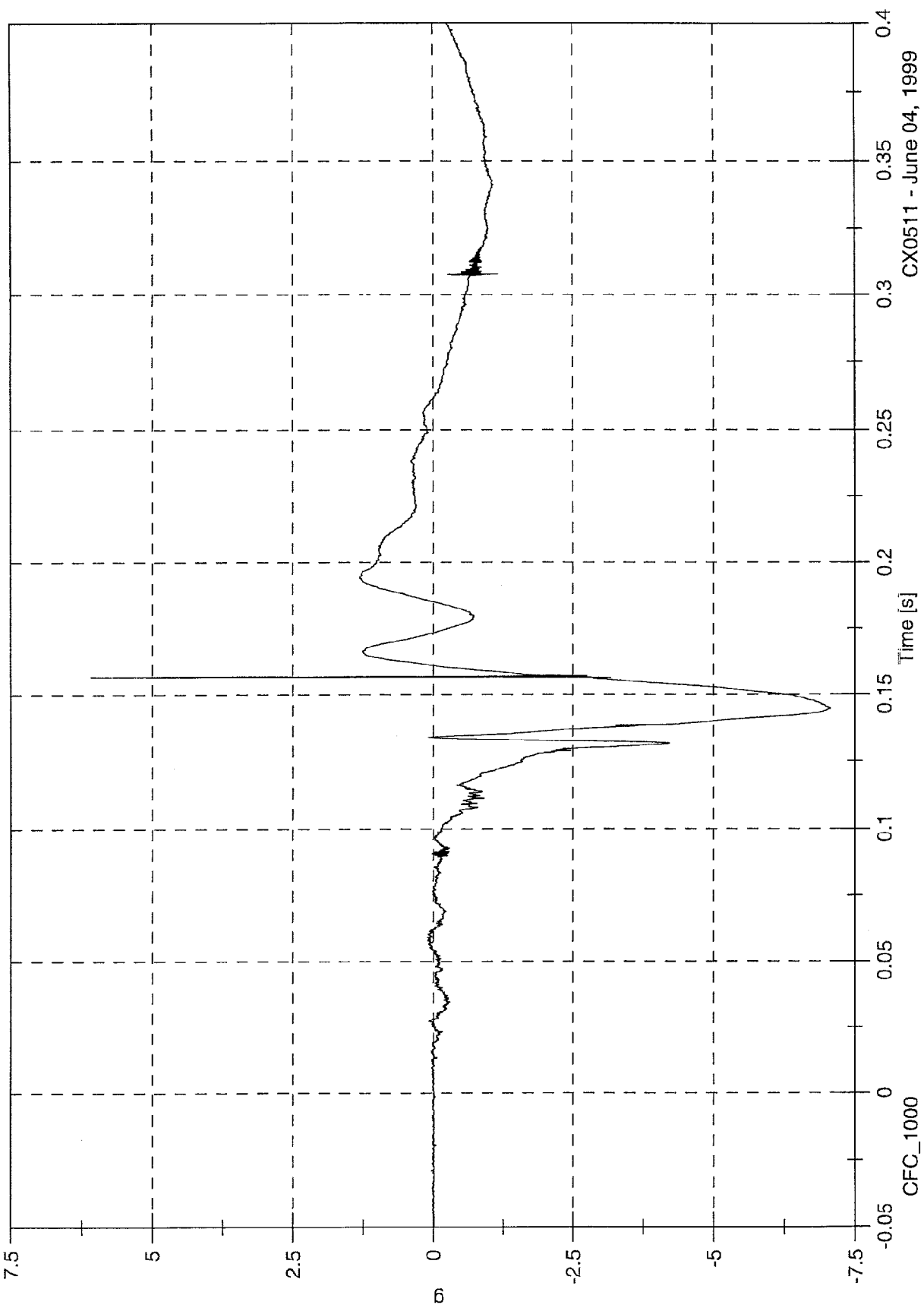


30i Test #8 1999 Hyundai Accent

Max: 6.1 [g] at 0.157 [s]

Min: -7.1 [g] at 0.145 [s]

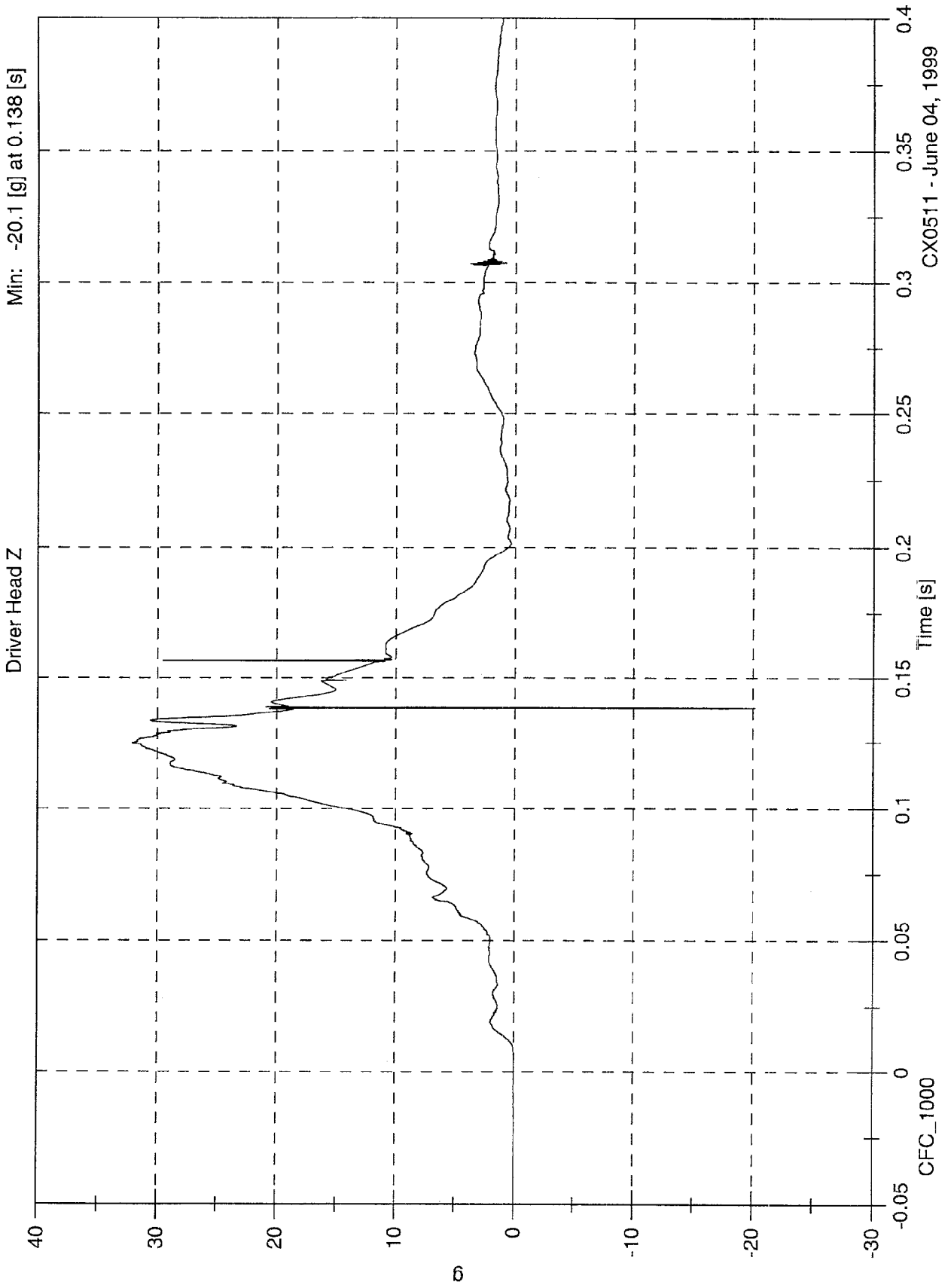
Driver Head Y



301 Test #8 1999 Hyundai Accent

Max: 32.1 [g] at 0.125 [s]

Min: -20.1 [g] at 0.138 [s]

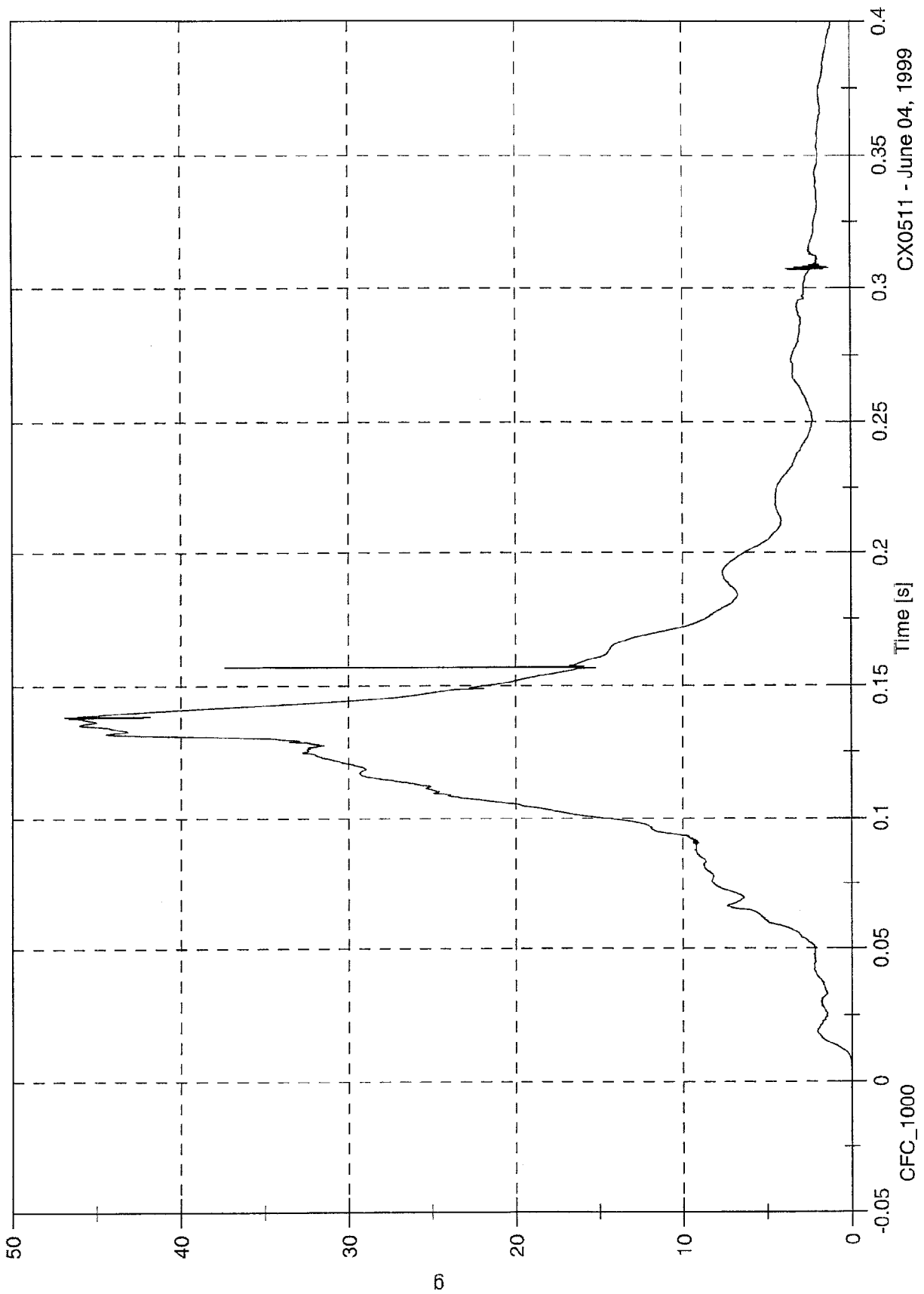


301 Test #8 1999 Hyundai Accent

Max: 46.9 [g] at 0.136 [s]

Min: 0.0 [g] at -0.046 [s]

Driver Head Resultant

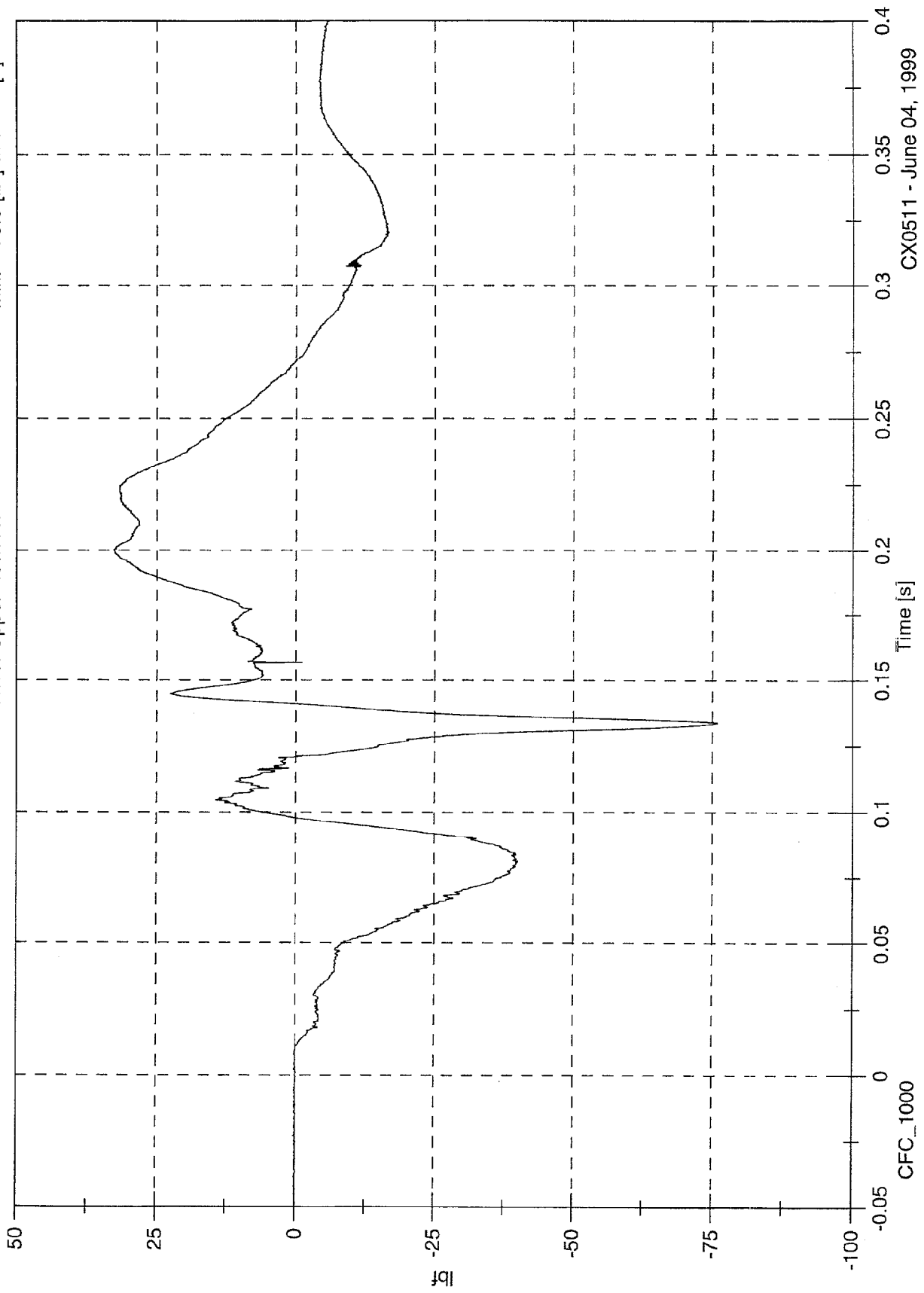


301 Test #8 1999 Hyundai Accent

Driver Upper Neck Fx

Max: 32.7 [lbf] at 0.200 [s]

Min: -75.9 [lbf] at 0.134 [s]



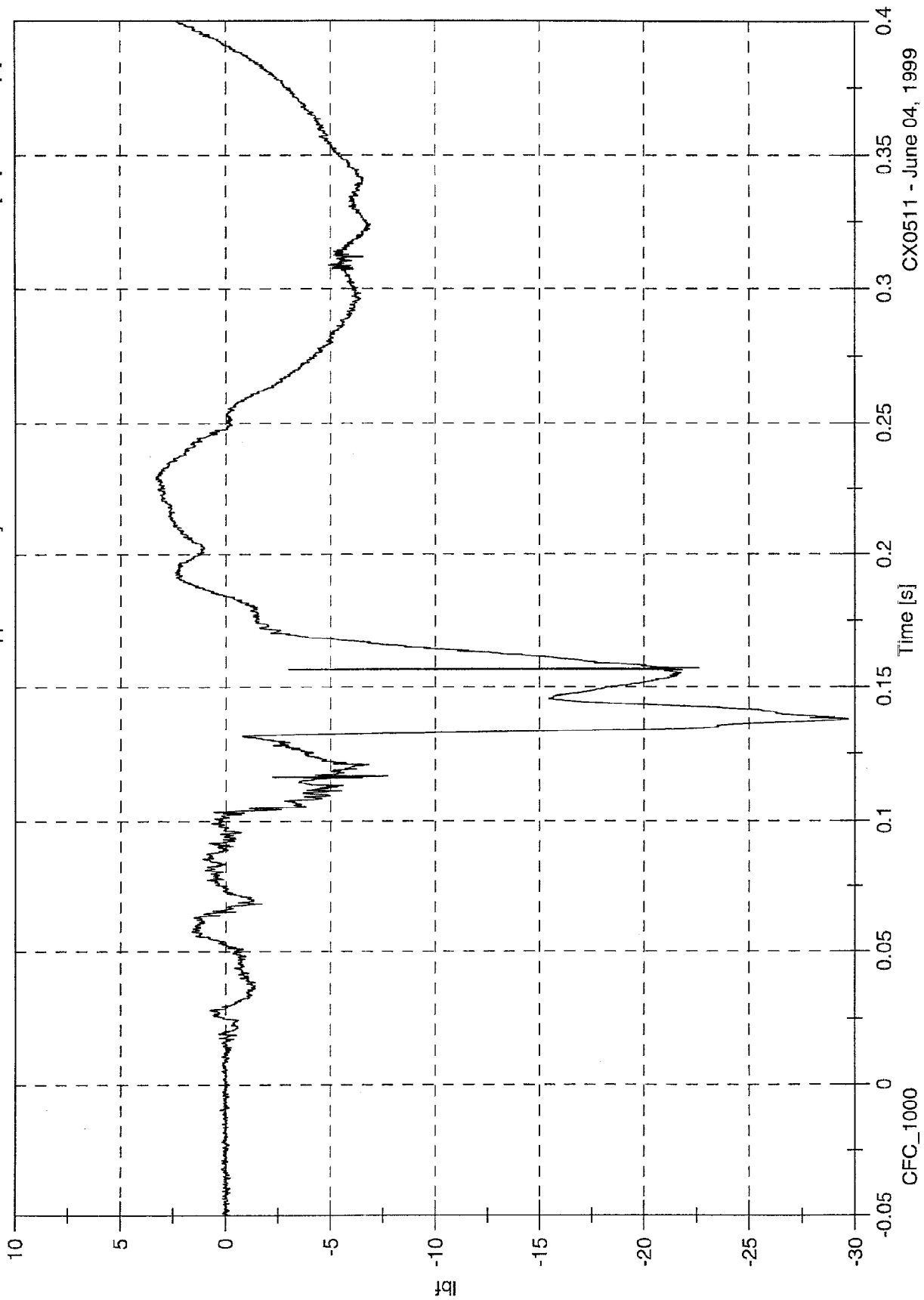
CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 9.1 [lbf] at 0.441 [s]

Min: -29.7 [lbf] at 0.138 [s]

Driver Upper Neck Fy

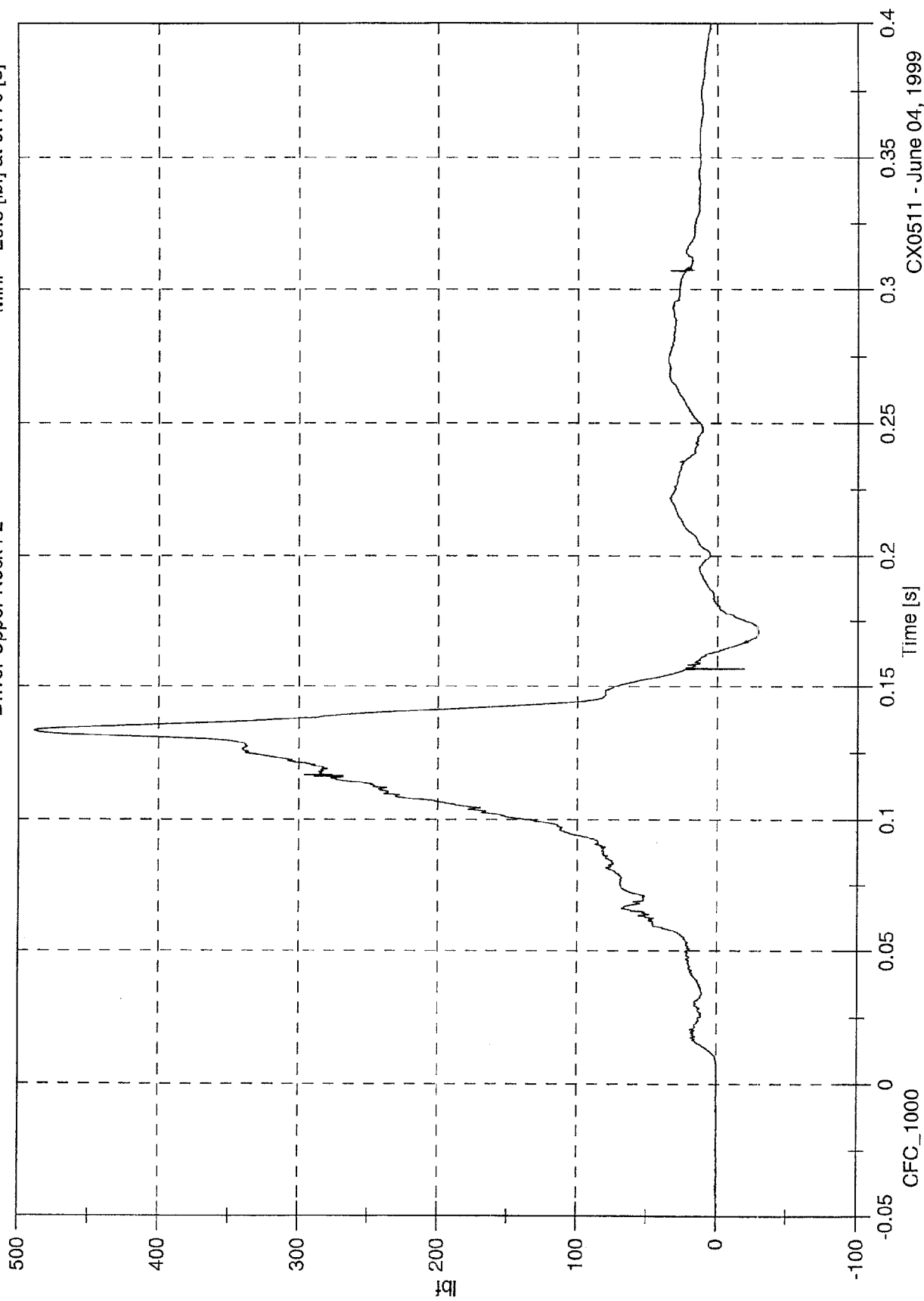


CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 488.7 [lbf] at 0.134 [s]
Min: -29.8 [lbf] at 0.170 [s]

Driver Upper Neck Fz



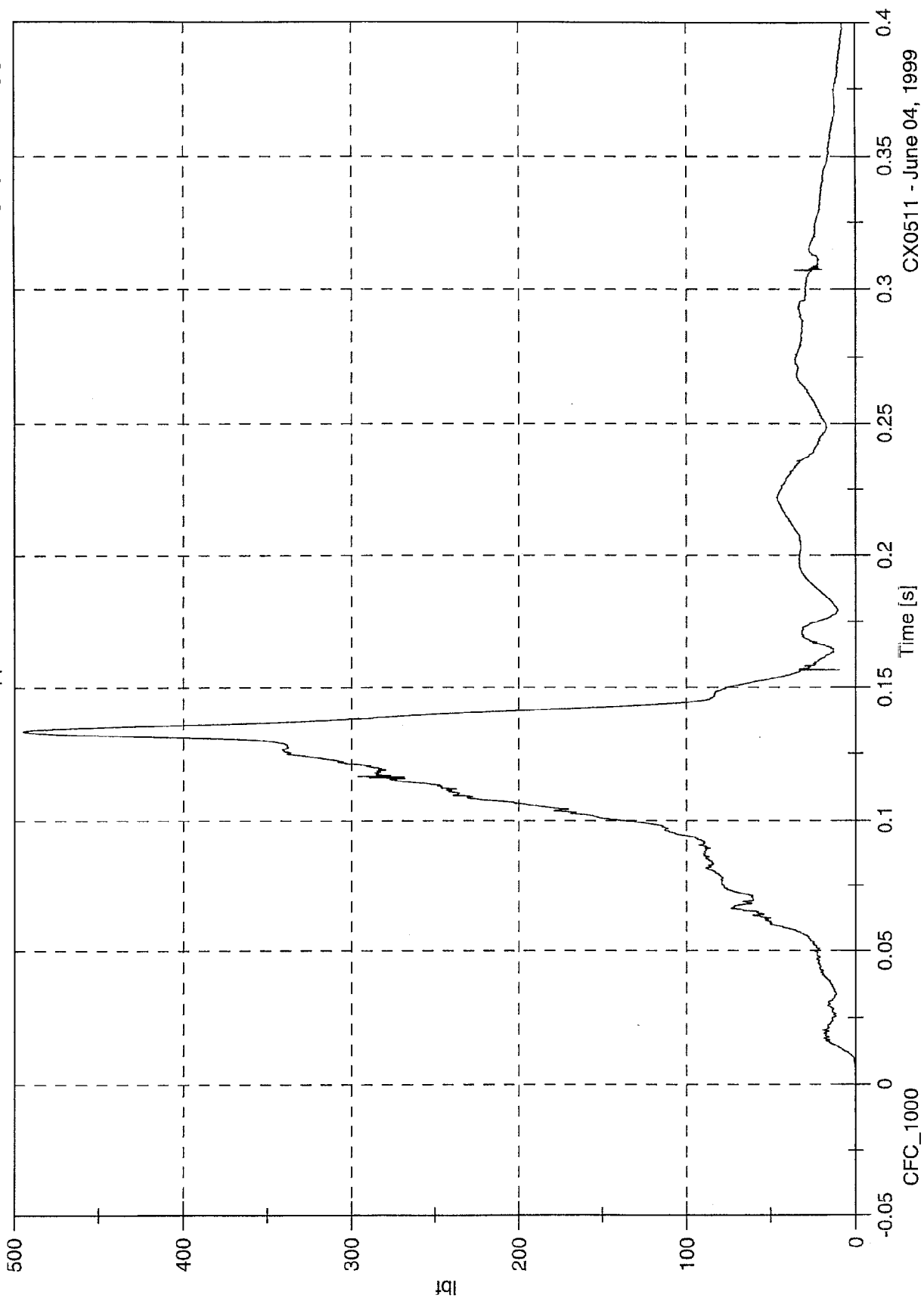
CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 494.7 [lbf] at 0.134 [s]

Min: 0.0 [lbf] at -0.075 [s]

Driver Upper Neck F Resultant

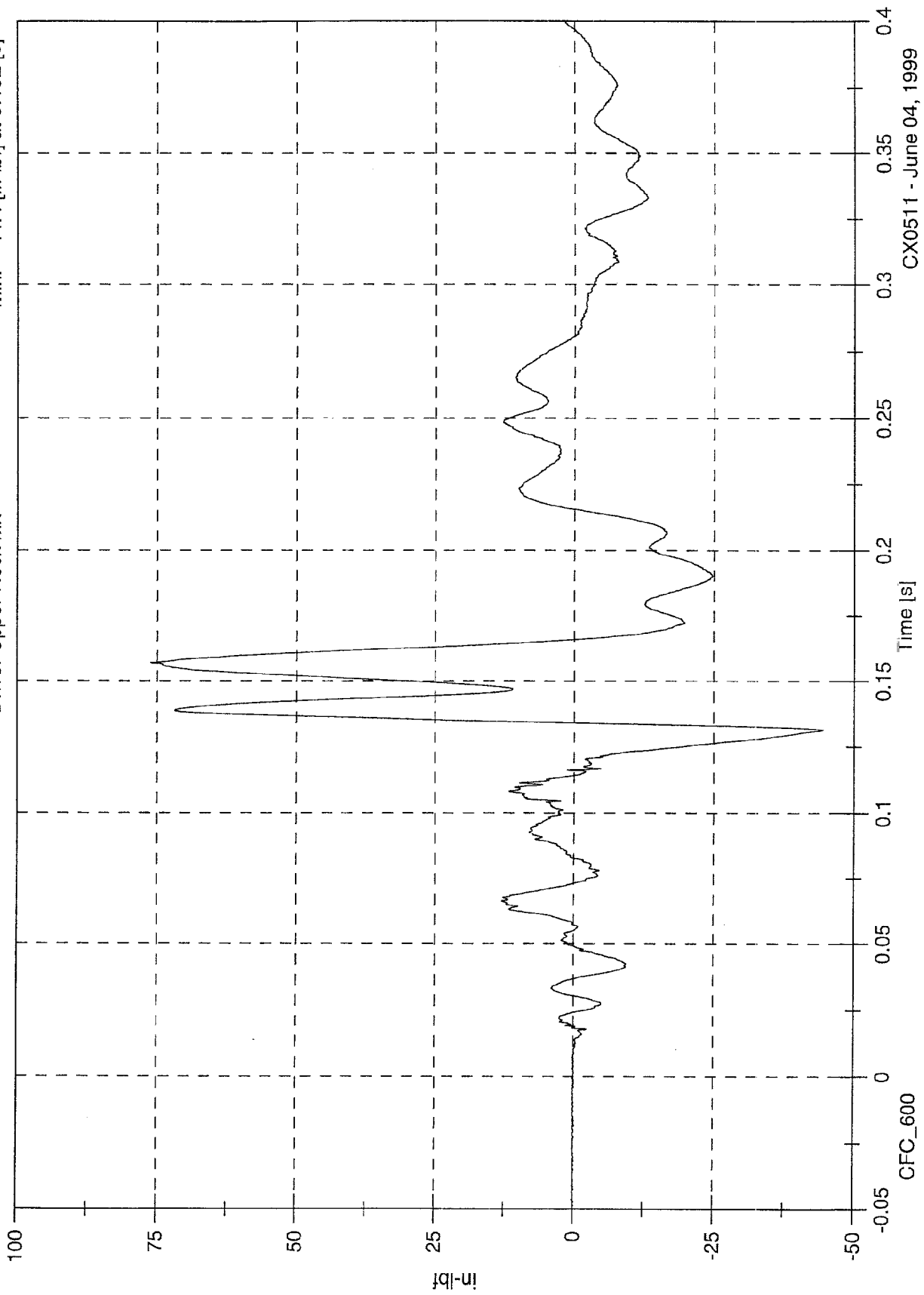


CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 76.1 [in-lbf] at 0.157 [s]
Min: -44.4 [in-lbf] at 0.132 [s]

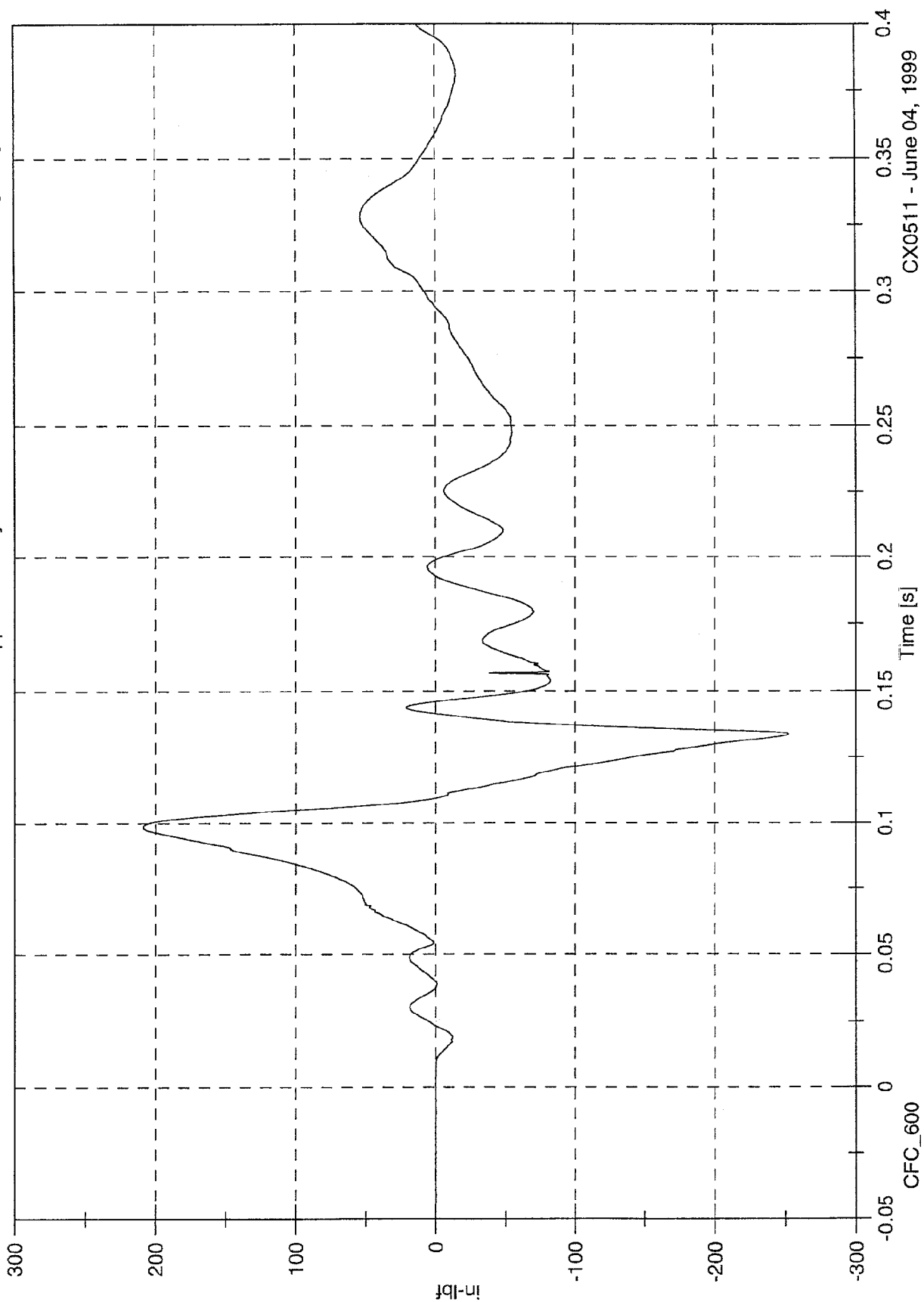
Driver Upper Neck Mx



301 I est #8 1999 Hyundai Accent

Max: 209.0 [in-lbf] at 0.098 [s]
Min: -252.2 [in-lbf] at 0.134 [s]

Driver Upper Neck My



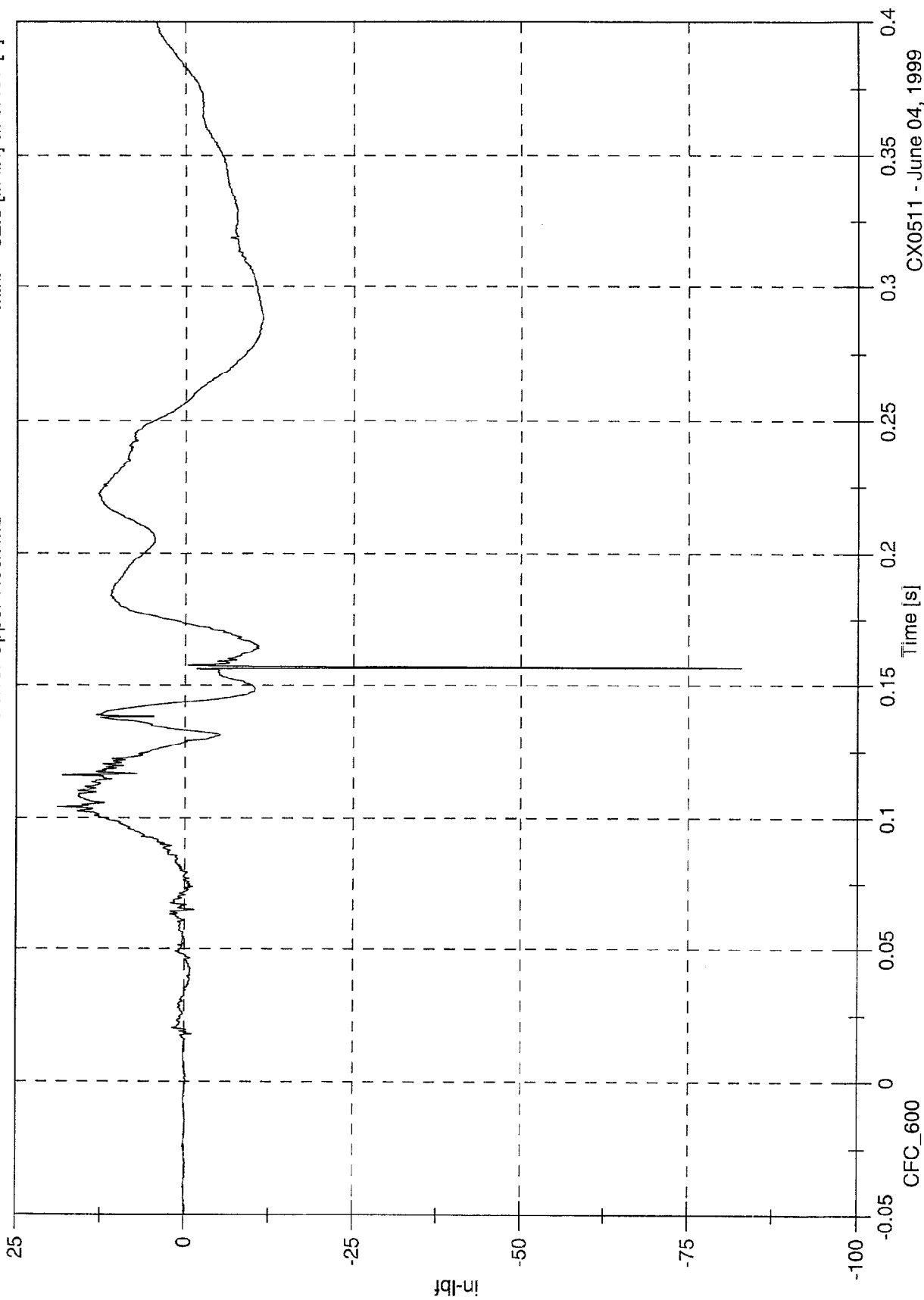
CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 18.9 [in-lbf] at 0.104 [s]

Min: -82.8 [in-lbf] at 0.157 [s]

Driver Upper Neck Mz



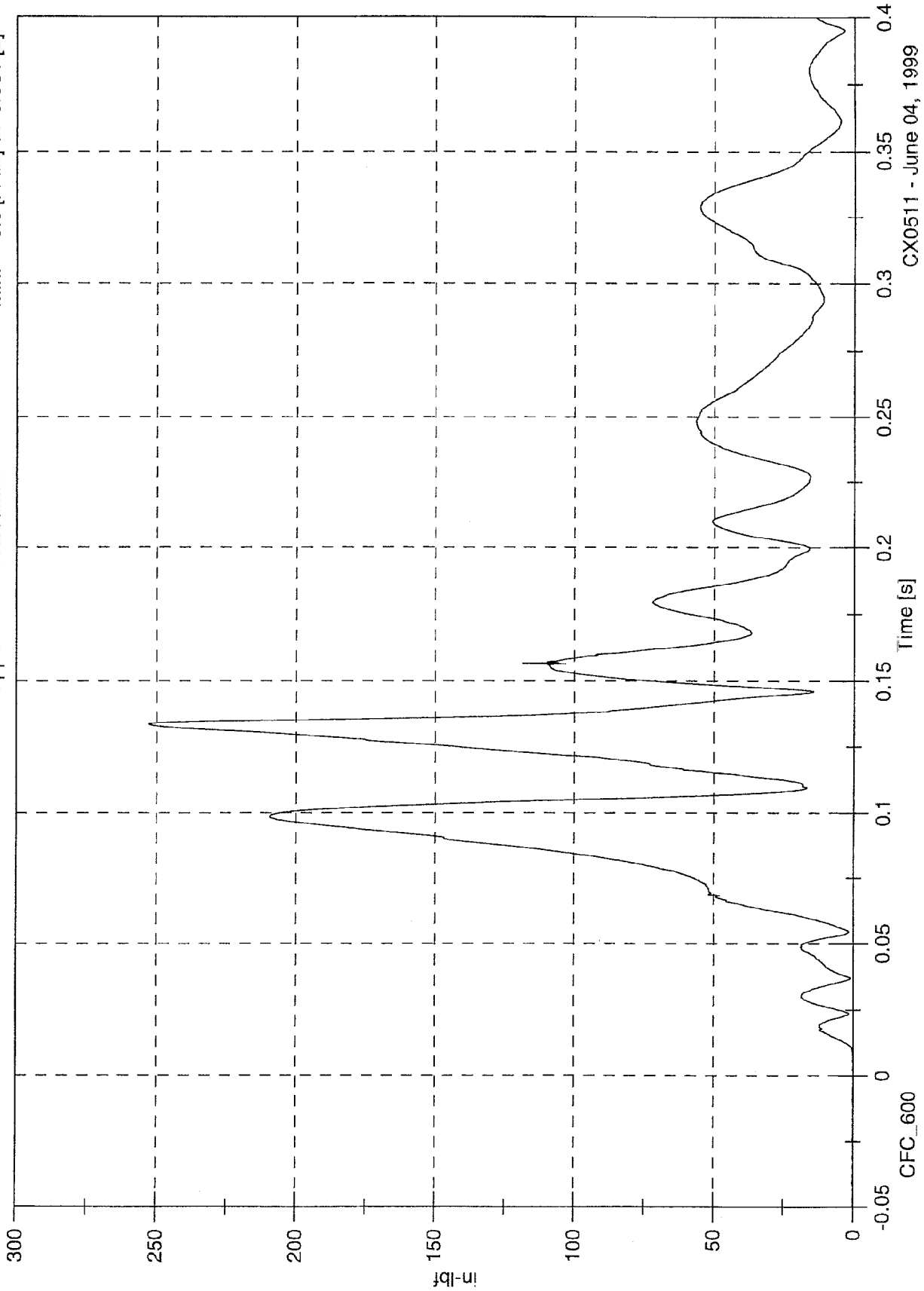
CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Driver Upper Neck M Resultant

Max: 252.8 [in-lbf] at 0.134 [s]

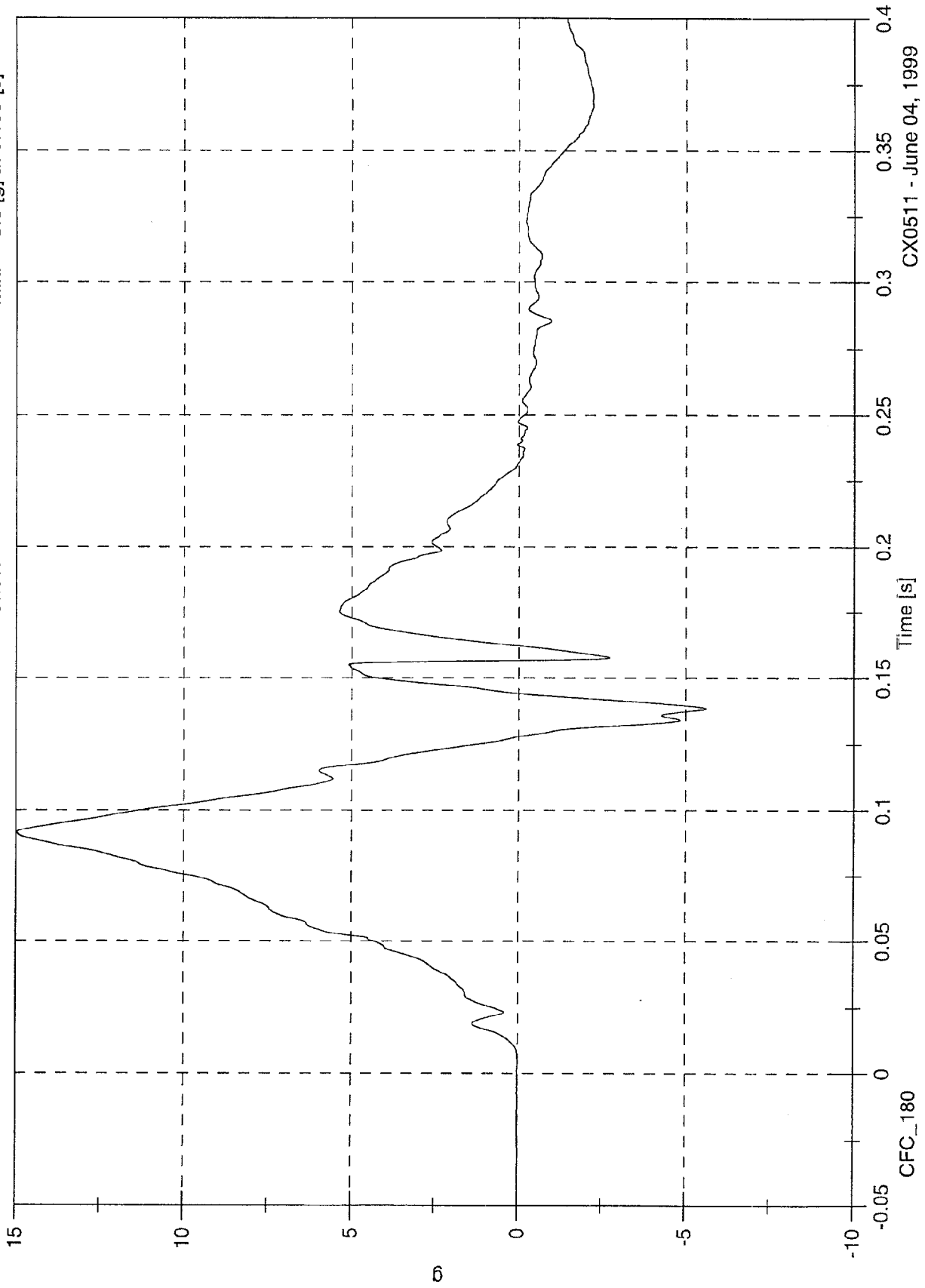
Min: 0.0 [in-lbf] at -0.091 [s]



301 Test #8 1999 Hyundai Accent

Max: 15.0 [g] at 0.091 [s]
Min: -5.6 [g] at 0.139 [s]

Driver Chest X

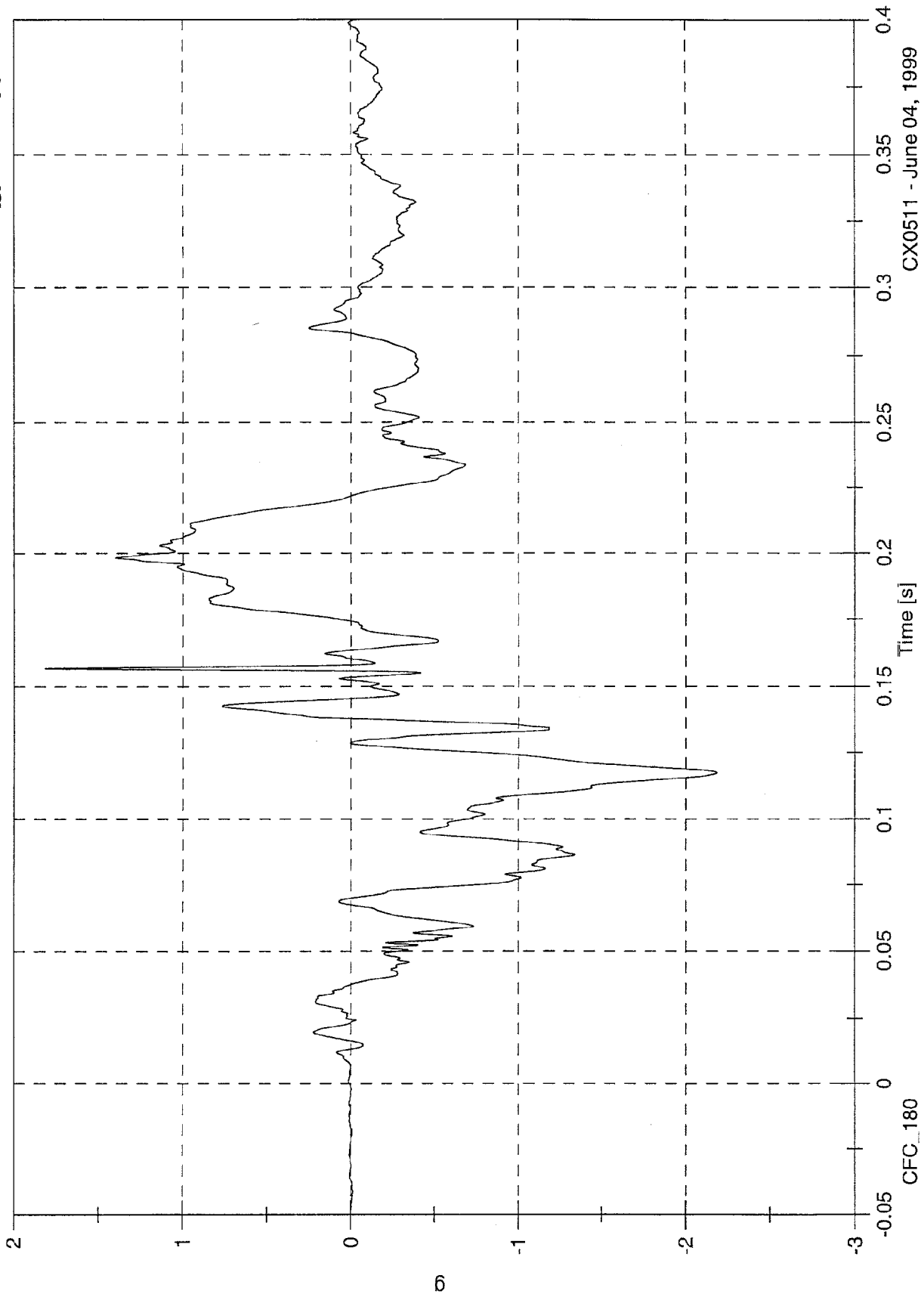


301 Test #8 1999 Hyundai Accent

Max: 1.6 [g] at 0.157 [s]

Min: -2.2 [g] at 0.117 [s]

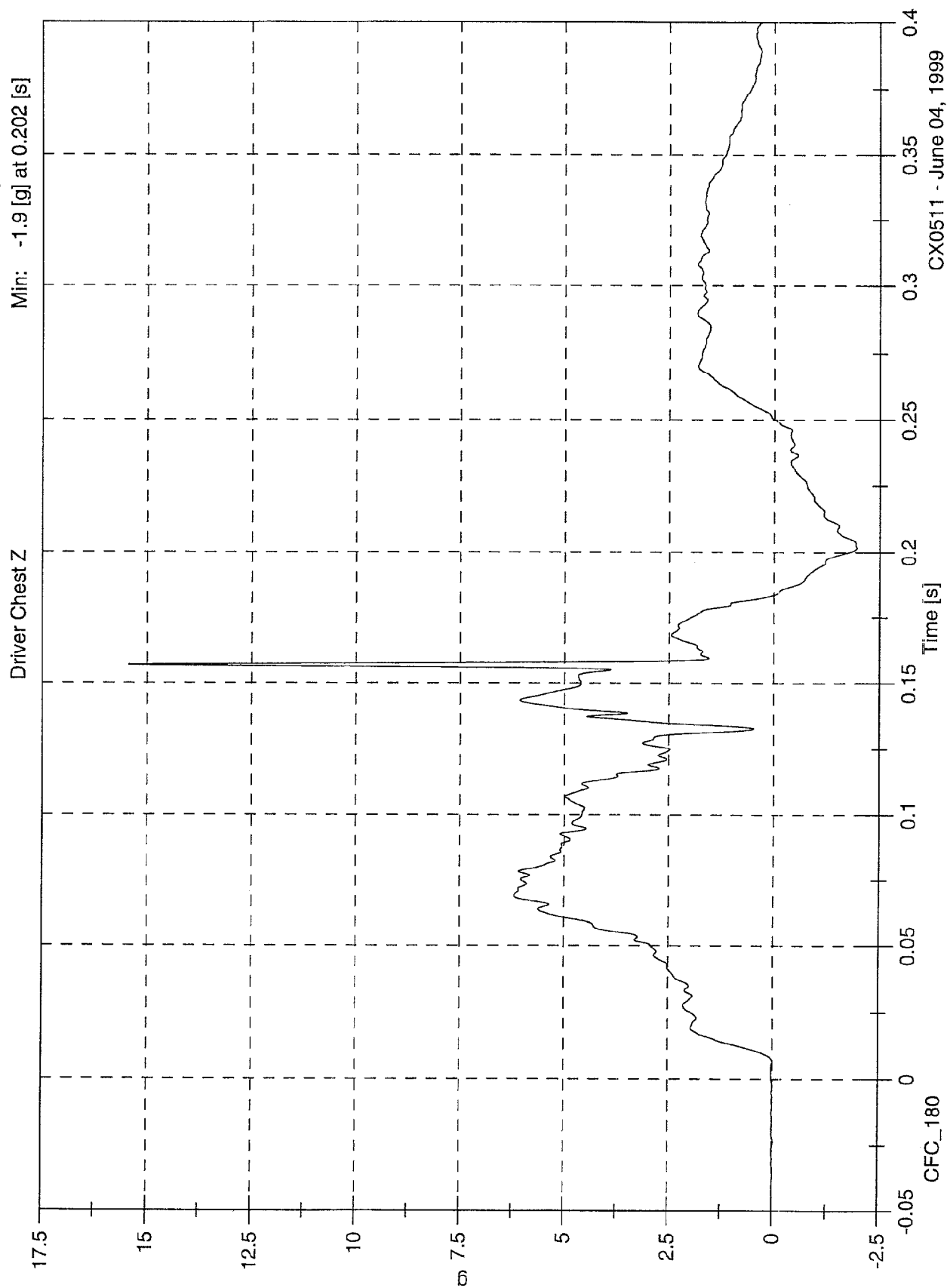
Driver Chest Y



CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 15.5 [g] at 0.157 [s]
Min: -1.9 [g] at 0.202 [s]

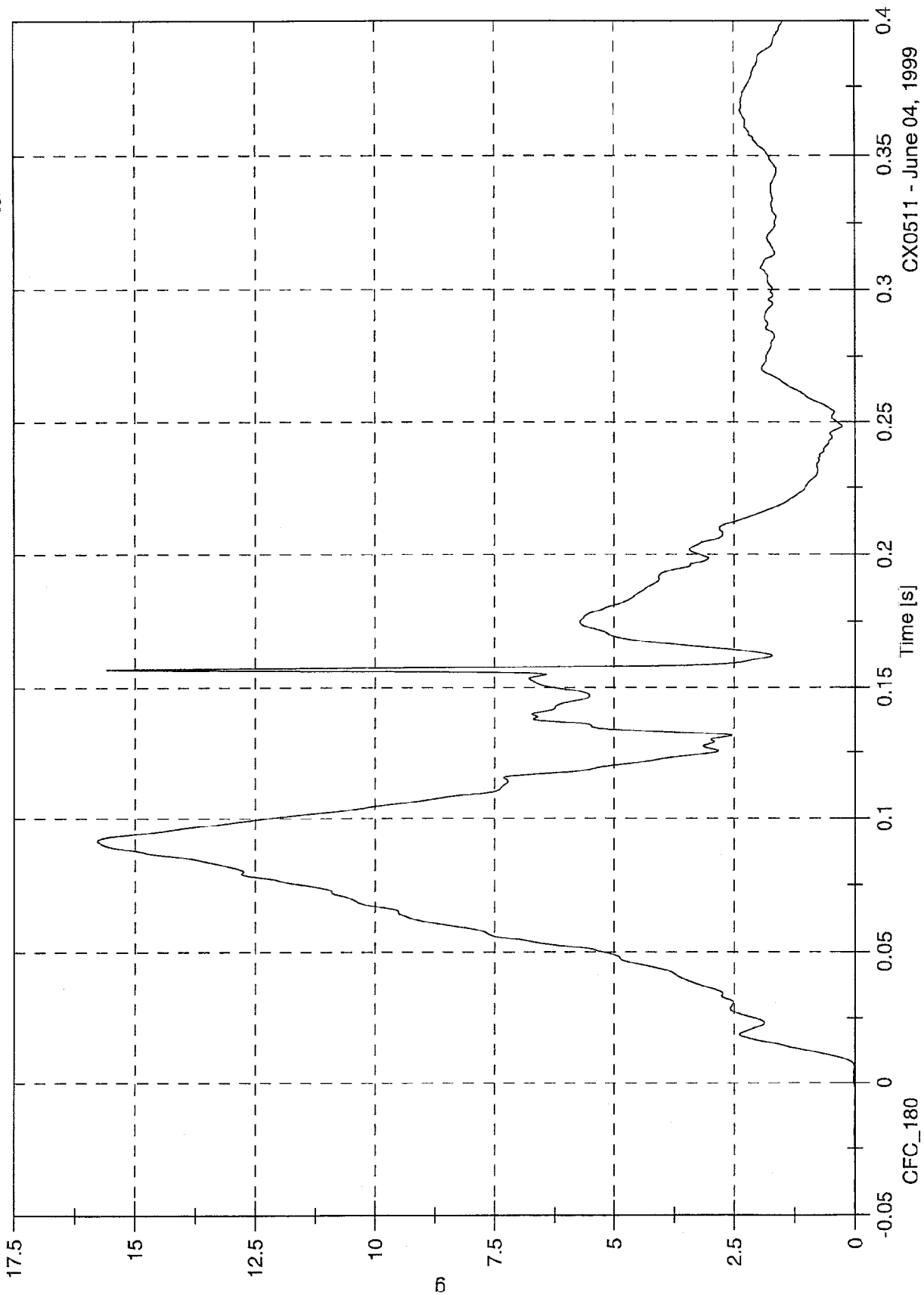


30i Test #8 1999 Hyundai Accent

Max: 15.8 [g] at 0.091 [s]

Min: 0.0 [g] at -0.067 [s]

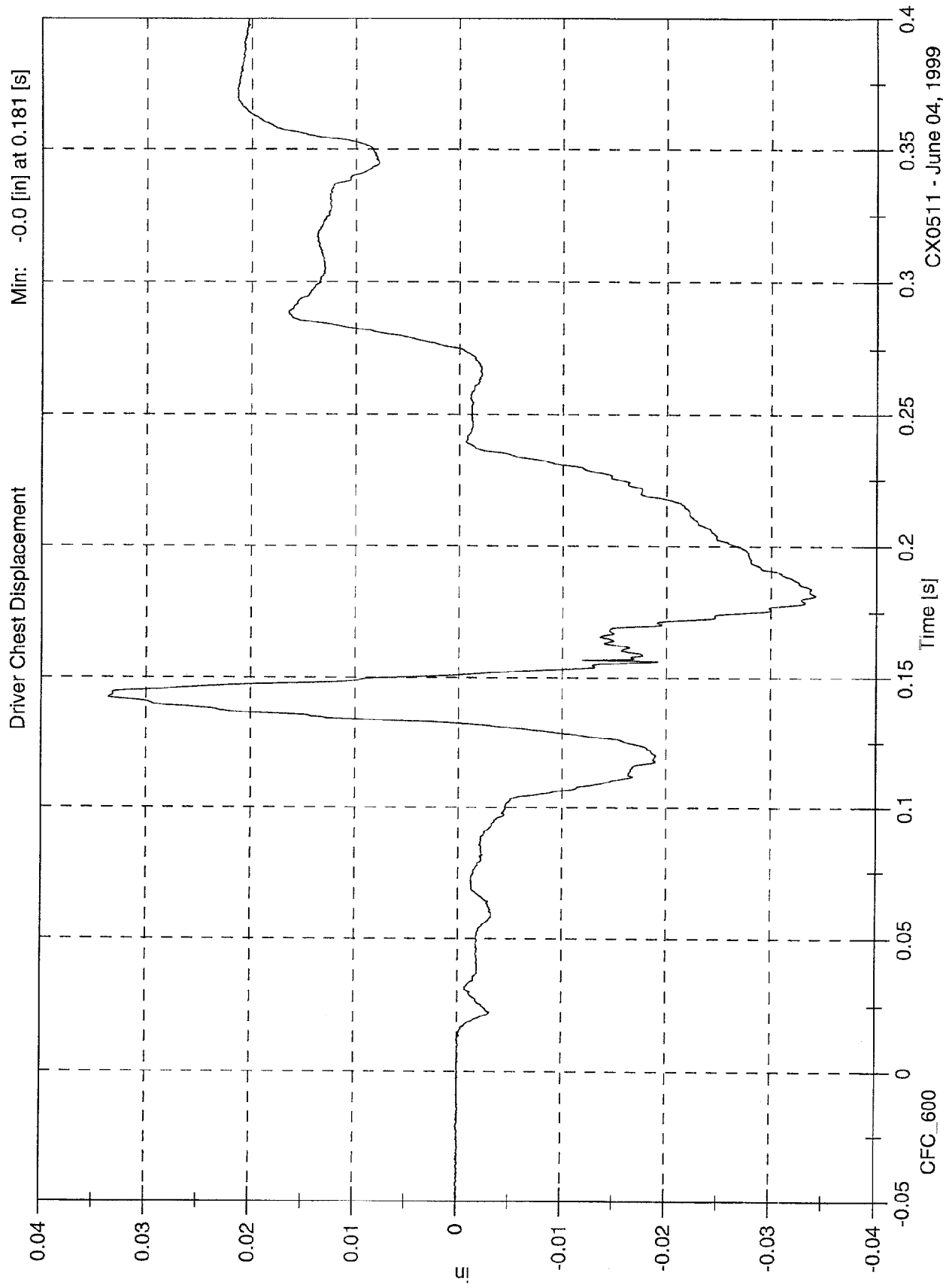
Driver Chest Resultant



CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

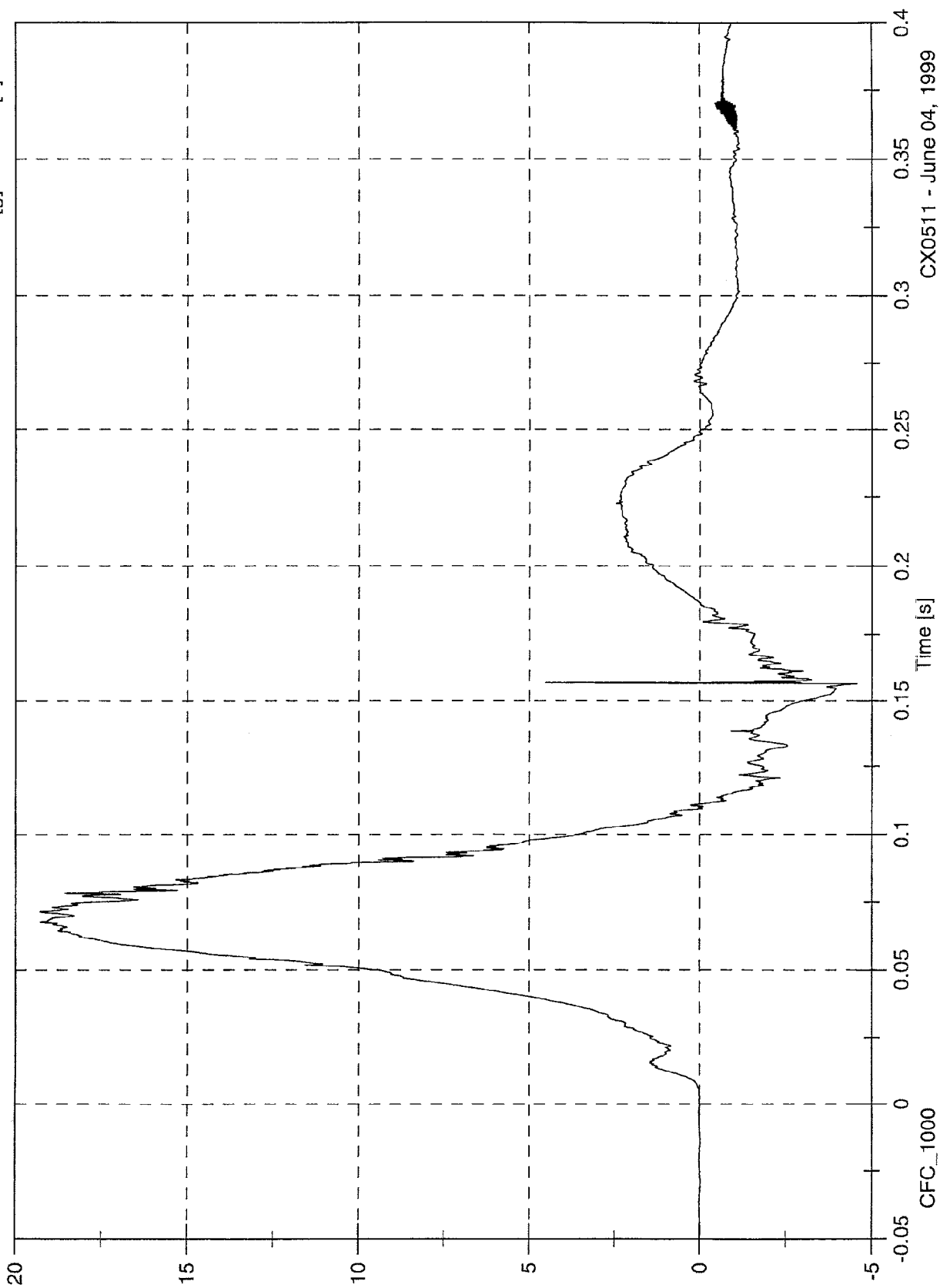
Max: 0.0 [in] at 0.142 [s]
Min: -0.0 [in] at 0.181 [s]



301 Test #8 1999 Hyundai Accent

Max: 19.3 [g] at 0.068 [s]
Min: -4.6 [g] at 0.156 [s]

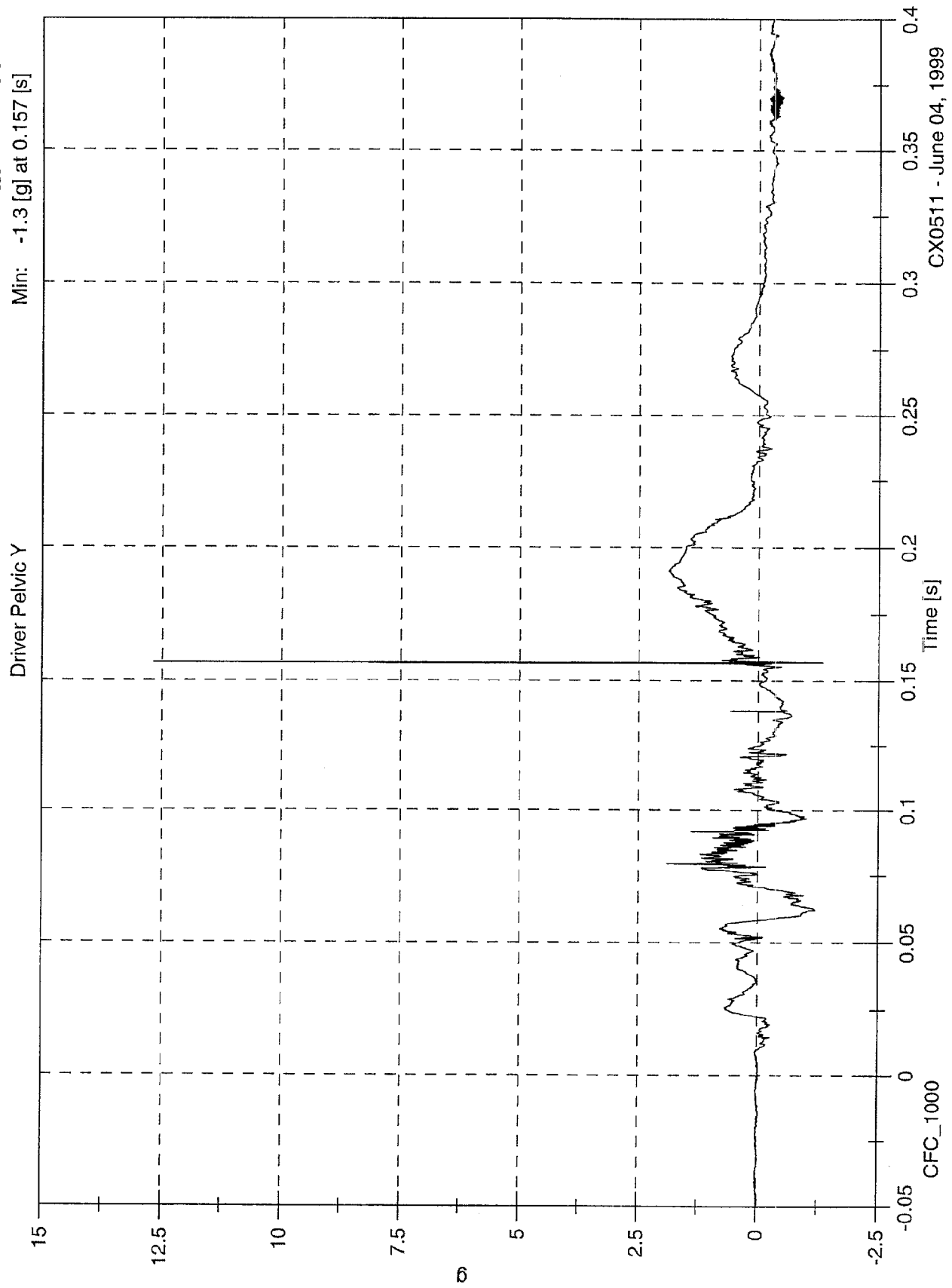
Driver Pelvic X



CX0511 - June 04, 1999

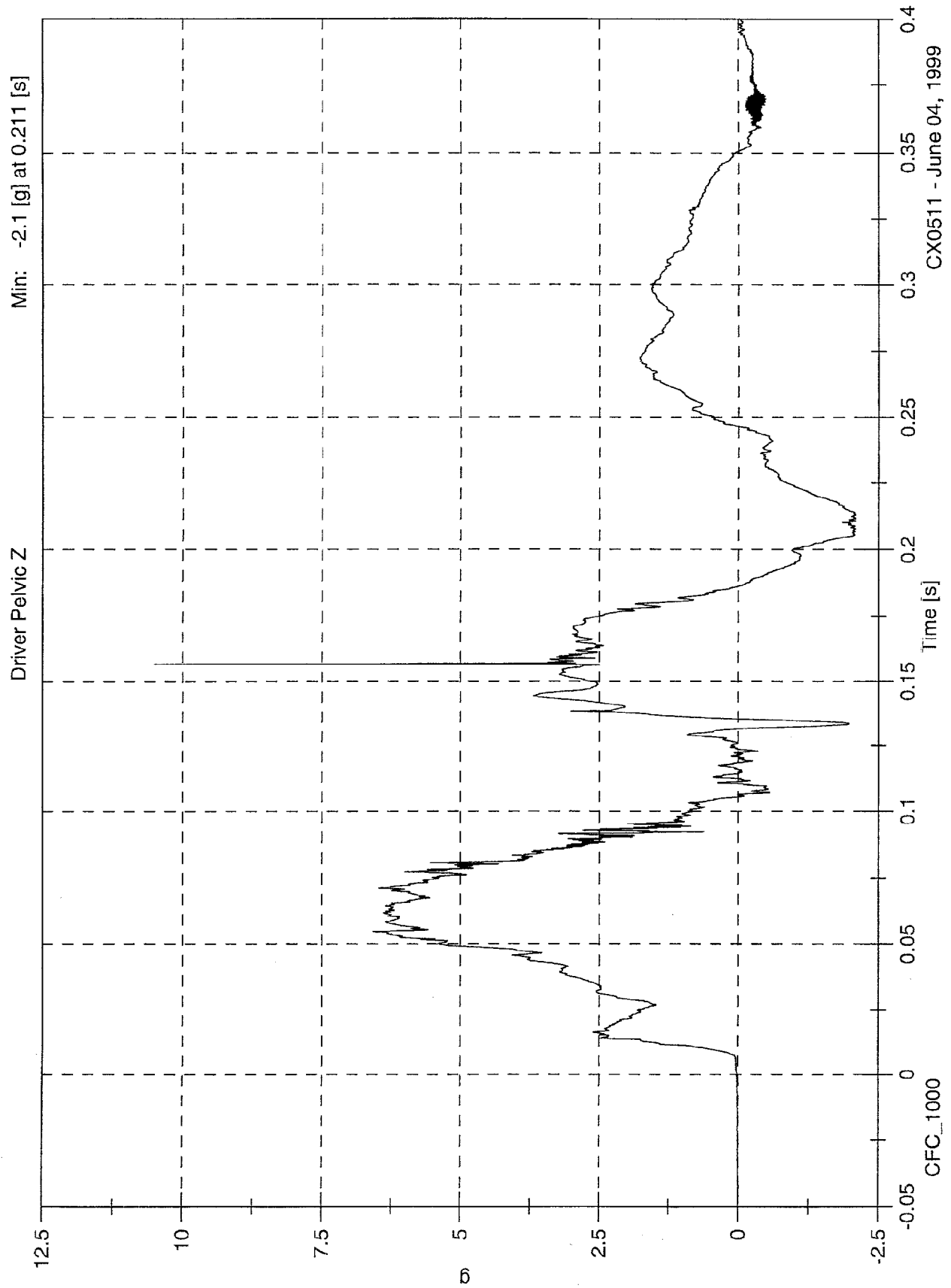
301 Test #8 1999 Hyundai Accent

Max: 12.7 [g] at 0.157 [s]
Min: -1.3 [g] at 0.157 [s]



301 Test #8 1999 Hyundai Accent

Max: 10.5 [g] at 0.157 [s]
Min: -2.1 [g] at 0.211 [s]

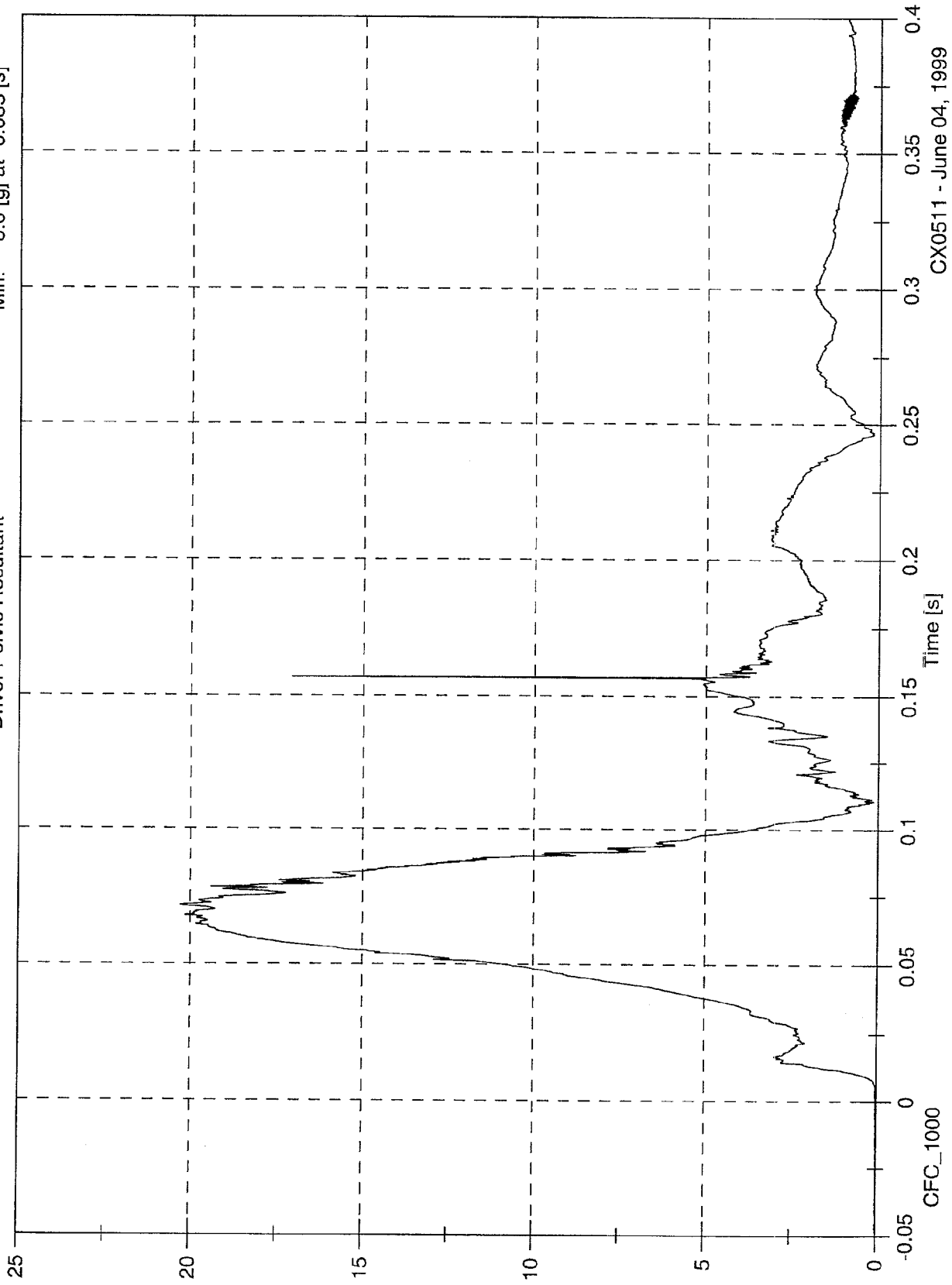


301 Test #8 1999 Hyundai Accent

Max: 20.3 [g] at 0.072 [s]

Min: 0.0 [g] at -0.085 [s]

Driver Pelvic Resultant

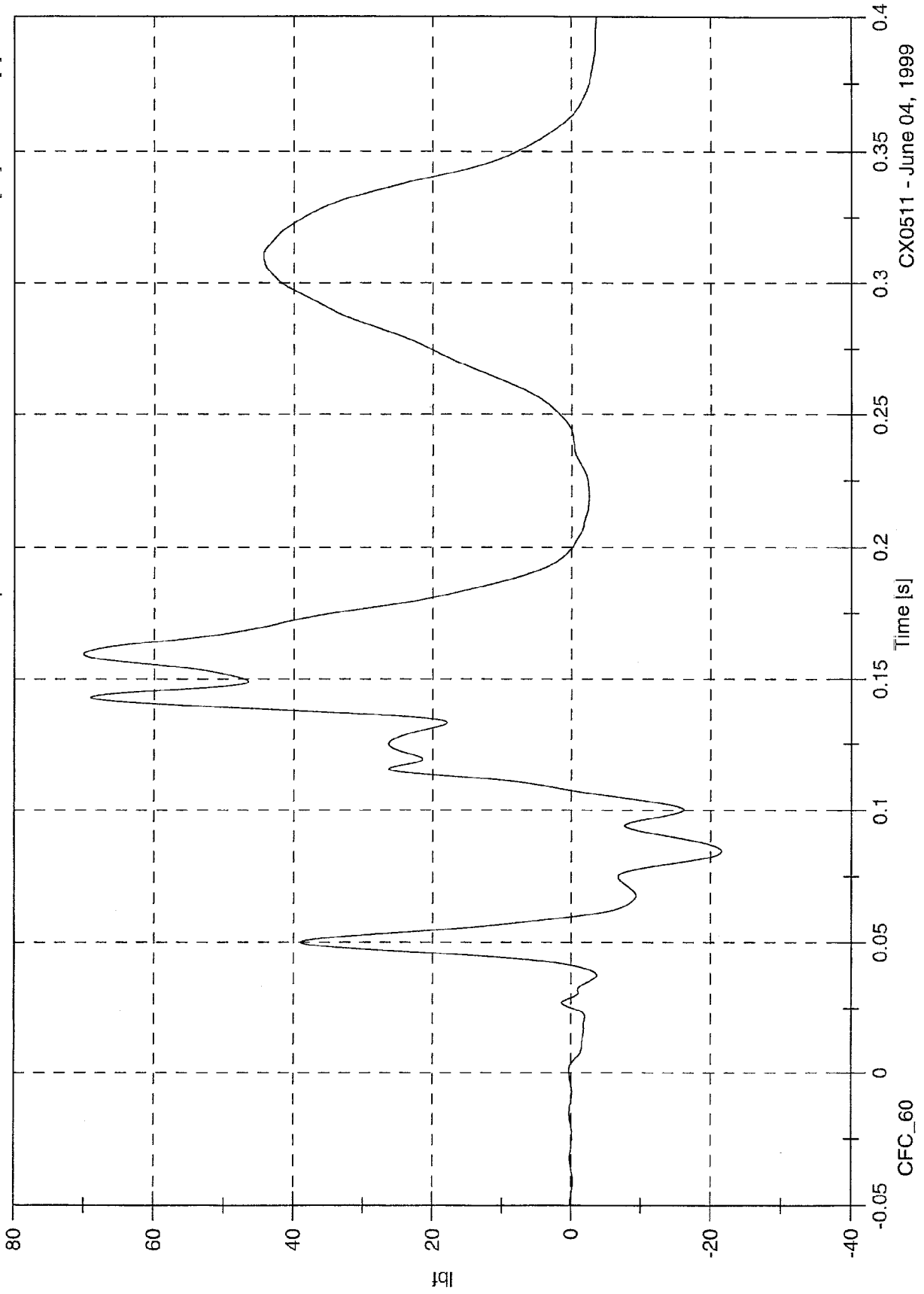


CX0511 - June 04, 1999

301 Test #8 1999 Hyundai Accent

Max: 70.1 [lbf] at 0.159 [s]
Min: -21.6 [lbf] at 0.085 [s]

Driver Lap Belt



CX0511 - June 04, 1999