

REPORT NUMBER. 301-CAL-01-01

V3751

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

HYUNDAI MOTOR COMPANY
2001 HYUNDAI
SANTA FE SUV

NHTSA NUMBER C10512

VERIDIAN TEST NUMBER 8606-1

July 25, 2001

VERIDIAN ENGINEERING
P O BOX 400
BUFFALO, NEW YORK 14225



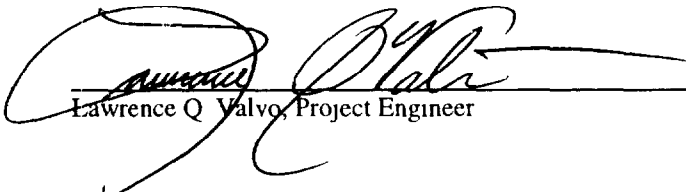
FINAL REPORT

PREPARED FOR

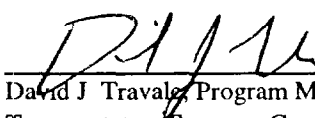
U S Department of Transportation
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, S W
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Prepared By


Lawrence Q. Valvo, Project Engineer

Approved By


David J. Travala, Program Manager
Transportation Sciences Center

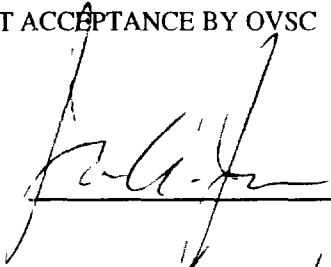
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7 Author(s) Lawrence Q Valvo, Project Engineer David J Travale, Program Manager		8 Performing Organization Report No 8606-1	
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		14 Sponsoring Agency Code NSA-30	
15 Supplementary Notes			
16 Abstract Compliance tests were conducted on the subject 2001 Hyundai Santa Fe SUV 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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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 DTNH22-01-C-01025. The purpose of this test was to determine if the subject vehicle, a 2001 Hyundai Santa Fe SUV, 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 FOR C10512

A 4101 pound 2001 Hyundai Santa Fe SUV was impacted from the rear by a 3961 pound moving barrier at a velocity of 29.1 mph. The test was performed by Veridian Engineering on July 25, 2001.

One instrumented Part 572 E and one non-instrumented 50th percentile male Anthropomorphic Test Device (ATD) were placed in the driver and right-front passenger seating positions respectively. Additional ballast (25 pounds) was secured in the vehicle cargo area.

The crash event was recorded by eight high-speed cameras and one real time camera. Camera locations and other pertinent camera information are found on pages 3-9 and 3-10 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A. Vehicle and ATD electronic data plots are presented in Appendix B.

The 17.2 gallon fuel tank was filled to 92.5 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. Average vehicle longitudinal crush was 11.8 inches. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity." Section 3 presents the results of these tests.

Table 1

CRASH TEST SUMMARY

Vehicle NHTSA No C10512 Test Mode 30 mph Rear Barrier
 Test Date July 25, 2001 Time 12 03 Temperature 71 °F
 Vehicle Make/Model/Body Style 2001 Hyundai Santa Fe SUV
 Vehicle Test Weight 4101 lbs Impact Velocity 29.1 mph
 Static Crush
 Left Side 10.5 inches
 Centerline 12.4 inches
 Right Side 12.5 inches
 Average 11.8 inches

TYPE OF FRONT OCCUPANT RESTRAINT SYSTEM INSTALLED IN TEST VEHICLE

Driver's DSP 3-Point Seatbelt, Airbag, Knee Bolster
 Right Passenger's DSP 3-Point Seatbelt, Airbag, Knee Bolster

VISIBLE DUMMY CONTACT POINTS

Driver Back of head to head restraint, back to center of seat back
 Passenger Back of head to head restraint, back to center of seat back

DOOR OPENING DATA

Closed / Operable - Left Front
Closed / Operable - Right Front

Stoddard Solvent Spillage from Vehicle's Fuel System None

Remarks The rear window shattered at impact and the rear quarter windows detached from the vehicle. The driver and passenger seat backs reclined approximately 7 degrees during the impact.

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATATEST VEHICLE INFORMATION

Year/Make/Model/Body Style	2001 Hyundai Santa Fe SUV			
NHTSA No	C10512	VIN	KM8SC83D01U038993	Color Silver
Engine Data	6 cylinders,	-	CID, 27	Liters, - cc
Placement	-	Longitudinal or In-Line,	X	Transverse or Lateral
Transmission Data	4 speeds,	Manual,	X	Automatic, X Overdrive
Final Drive	-	Rear Wheel Drive, X	Front Wheel Drive, -	Four Wheel Drive
Major Options	X A/C,	X	Power Steering, X	Power Brakes
	X Power Windows,	X	Power Door Locks, X	Tilt Wheel
Date Received	11/26/00	Odometer Reading	753	miles
Selling Dealer	Hatfield Hyundai			
& Address	1400 Auto Mall Drive, Columbus OH 43228			

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL

Vehicle Manufactured by	Hyundai Motor Company
Date of Manufacture	NOV/26/00
GVWR 5085 lbs , GAWR 2645 lbs FRONT,	2865 lbs REAR

DATA FROM TIRE PLACARD

Location of Placard on Vehicle	Driver side B-pillar
Tire Pressure with Maximum Capacity Vehicle Load	32 psi FRONT 32 psi REAR
Recommended Tire Size	P225/70R16
* Recommended Cold Tire Pressure	32 psi FRONT 32 psi REAR
Size of Tires on Test Vehicle	P225/70R16 Manufacturer BFGoodrich
Type of Spare Tire	Full Size
Vehicle Capacity Data	
Type of Front Seats	- Bench, X Bucket, - Split Bench
Number of Occupants	2 Front, 3 Rear, 5 Total
Vehicle Capacity Weight (VCW) =	880 lbs
No of Occupants x 150 lbs =	750 lbs
Rated Cargo/Luggage Weight (RCLW) =	130 lbs

*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>1065</u>	lbs	Right Rear =	<u>736</u>	lbs
Left Front	=	<u>1117</u>	lbs	Left Rear =	<u>741</u>	lbs
TOTAL FRONT	=	<u>2182</u>	lbs	TOTAL REAR =	<u>1477</u>	lbs
TOTAL DELIVERED WEIGHT =				<u>3659</u>	lbs	
% of Total Front of Vehicle Weight =				<u>59 6%</u>	of Total Rear Weight =	<u>40 4%</u>

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT

Total Delivered Weight	=	<u>3659</u>	lbs
Rated Cargo/Luggage Weight (RCLW)	=	<u>130</u>	lbs
Weight of 2 p 572 Dummies, 167 & 164 lbs	=	<u>331</u>	lbs
TARGET TEST WEIGHT	=	<u>4120</u>	lbs

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 111 POUNDS OF CARGO WEIGHT

Right Front	=	<u>1195</u>	lbs	Right Rear =	<u>811</u>	lbs
Left Front	=	<u>1238</u>	lbs	Left Rear =	<u>857</u>	lbs
TOTAL FRONT	=	<u>2433</u>	lbs	TOTAL REAR =	<u>1668</u>	lbs
TOTAL TEST WEIGHT =				<u>4101</u>	lbs	
% of Total Front of Vehicle Weight =				<u>59 3%</u>	of Total Rear Weight =	<u>40 7%</u>

* Weight of Ballast Secured in Vehicle Trunk Area = 25 lbs

Type of Ballast Lead Shot

Method of Securing Ballast Rear seat belt anchorages

Vehicle Components Removed for Weight Reduction None

VEHICLE ATTITUDE (all dimension in inches)

AS DELIVERED	RF	<u>32 0</u>	LF	<u>31 8</u>	RR	<u>32 4</u>	LR	<u>31 9</u>
AS TESTED	RF	<u>31 2</u>	LF	<u>30 6</u>	RR	<u>31 7</u>	LR	<u>31 2</u>
Vehicle's Wheel Base		<u>103 3</u> in						
Location of Vehicle's C G		<u>42 02</u> inches rearward of front wheel center						

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual	=	<u>17 2</u>	gallons
Usable Capacity Figure Furnished by COTR	=	<u>17 2</u>	gallons
Test Volume Range (91 to 94% of Usable Capacity)	=	<u>15 65</u>	to <u>16 17</u> gallons
ACTUAL TEST VOLUME=	<u>15 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 is located on the left rear quarter panel above the rear wheel, Fuel tank is located on the vehicle under body beneath the rear seat and between the rear wheels, Fuel lines are routed along the left side of the vehicle underbody

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>2215</u>	lbs	TOTAL REAR	=	<u>1746</u>	lbs
TOTAL BARRIER WEIGHT	=	<u>3961</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

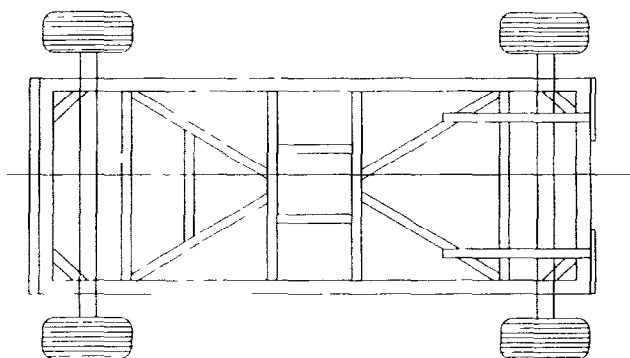
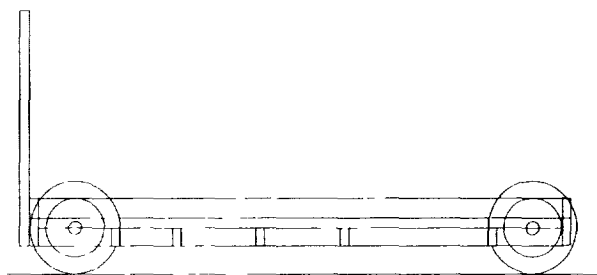


Table 4

POST IMPACT DATATYPE OF TEST

Type of Test Rear Barrier Impact Angle 0°
 Test Date July 25, 2001 Time 12 03 Temperature 71 °F
 Vehicle NHTSA No C10512
 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 1 mph, Trap No 2 = 29 1 mph
 Average Impact Speed = 29 1 mph

VEHICLE STATIC CRUSH

Vehicle Length

Pre-Test Left = 172 9, C/L = 177 4 Right = 172 9
 Post-Test Left = 162 4, C/L = 165 0 Right = 160 4
 Crush Left = 10 5, C/L = 12 4 Right = 12 5
 AVERAGE = 11 8 inches

Figure 1

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

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS

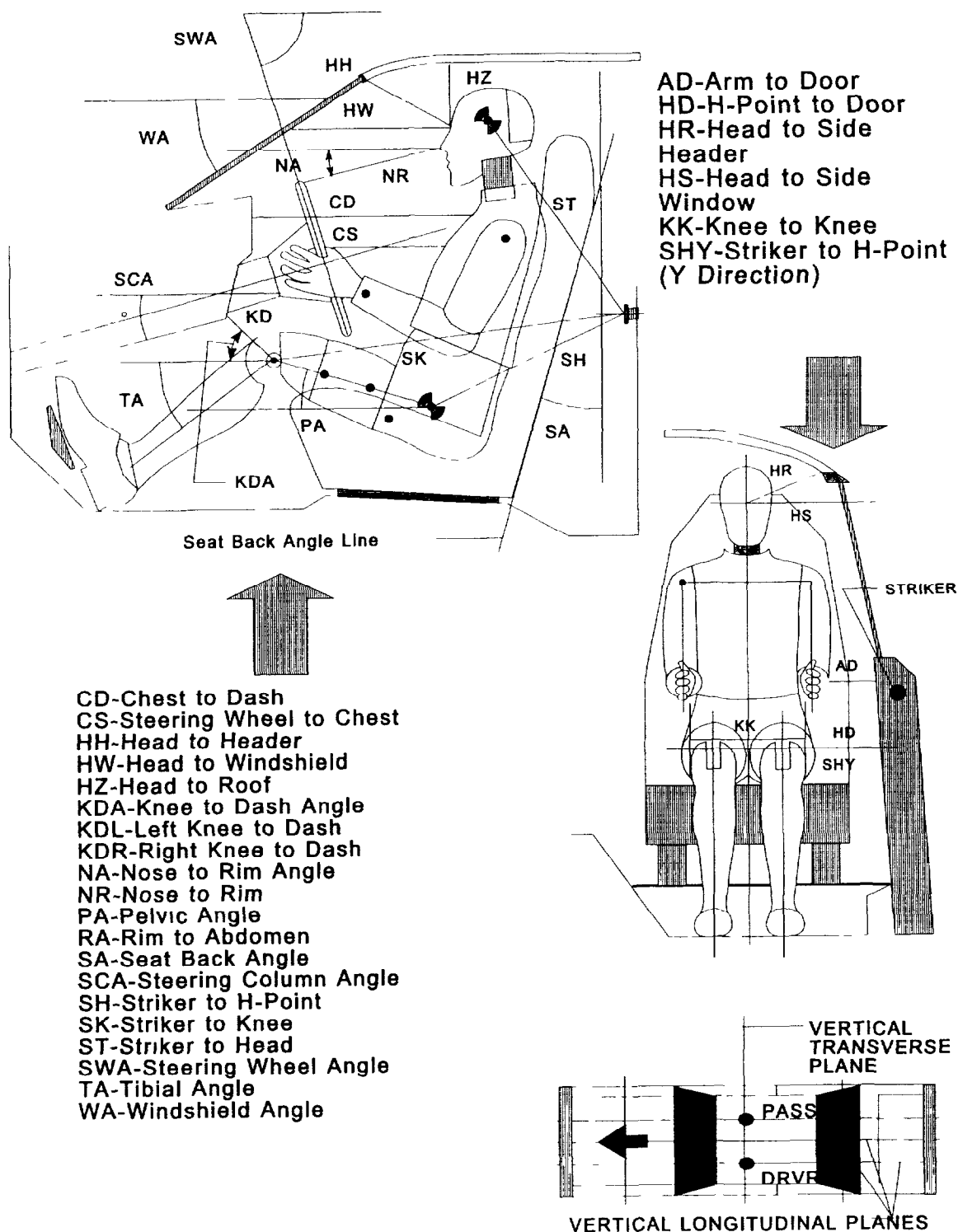


Table 5

**FRONT SEAT OCCUPANT MEASUREMENTS
(FOR REAR IMPACT ONLY)**

	DRIVER (Serial #116)			
WA°	31		deg	
SWA°	63		deg	
SCA°	27		deg	
SA°	25.9		deg	
HZ		6.7		
HH		12.8		
HW		22.4		
HR		9.5		
NR	15.3	Angle	15	deg
CD		19.8		
CS		10.7		
RA		6.8		
KDL	4.6	Angle (KDA)	15	deg
KDR		5.3		
PA°		22.5	deg	
TA°		50	deg	
KK		9.5		
ST	22.4	Angle	9	deg
SK	23.8	Angle	88	deg
SH	9.2	Angle	116	deg
SHY		10.5		
HS		12.6		
HD		7.4		
AD		4.5		

(Measurements in inches)

Table 6
FUELSYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO 301

TEST VEHICLE NHTSA NO C10512 TEST DATE July 25, 2001

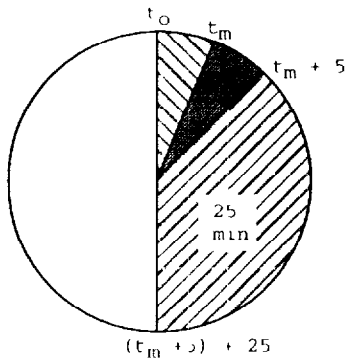
Vehicle Mfr /Make/Model 2001 Hyundai Santa Fe SUV

Test vehicle fuel tank filled to 91% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation) Part 572 test dummies located at each front designated seating position

TEST VEHICLE IMPACT TYPE

- Frontal (30 mph)
- Oblique (30 mph) with - ° barrier face first
 contacting -
 (driver/passenger) side
X Rear Moving Barrier (30 mph)
- Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT



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

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

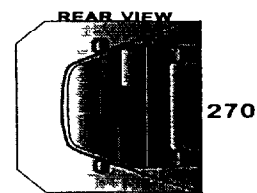
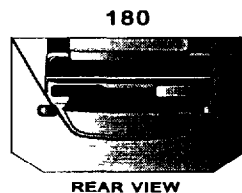
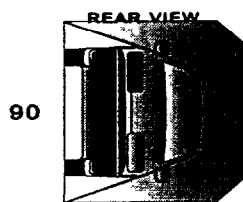
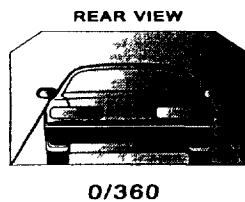
SOLVENT SPILLAGE DETAILS

None

Table 7 FMVSS NO 301 - STATIC ROLLOVER DATA SHEET

Vehicle 2001 Hyundai Santa Fe SUV

NHTSA No C10512



I DETERMINATION OF SOLVENT COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
0° - 90°	1	minutes	10	seconds	5	minutes	6	minutes	10	seconds	7	minutes
90° - 180°	1	minutes	4	seconds	5	minutes	6	minutes	4	seconds	7	minutes
180°-270°	1	minutes	2	seconds	5	minutes	6	minutes	2	seconds	7	minutes
270° 360°	1	minutes	11	seconds	5	minutes	6	minutes	11	seconds	7	minutes

II FMVSS 301 REQUIREMENTS (Maximum allowable solvent spillage)

First 5 minutes from onset of rotation	6th min	7th min	8th min (if required)
5 ounces	1 ounce	1 ounce	1 ounce

III ACTUAL TEST VEHICLE SOLVENT SPILLAGE

Rollover Stage	First 5 minutes from onset of rotation (oz)	6th min (oz)	7th min (oz)	8th min (if required) (oz)
0° - 90°	0	0	0	N/A
90° - 180°	0	0	0	N/A
180° 270°	0	0	0	N/A
270° 360°	0	0	0	N/A

Note Record spillage for whole minute intervals only as determined above

IV SOLVENT SPILLAGE LOCATION(S)

Rollover Stage	Spillage Location
0° - 90°	-
90° - 180°	-
180° 270°	-
270°-360°	-

Figure 2

CAMERA POSITIONS FOR REAR IMPACTS

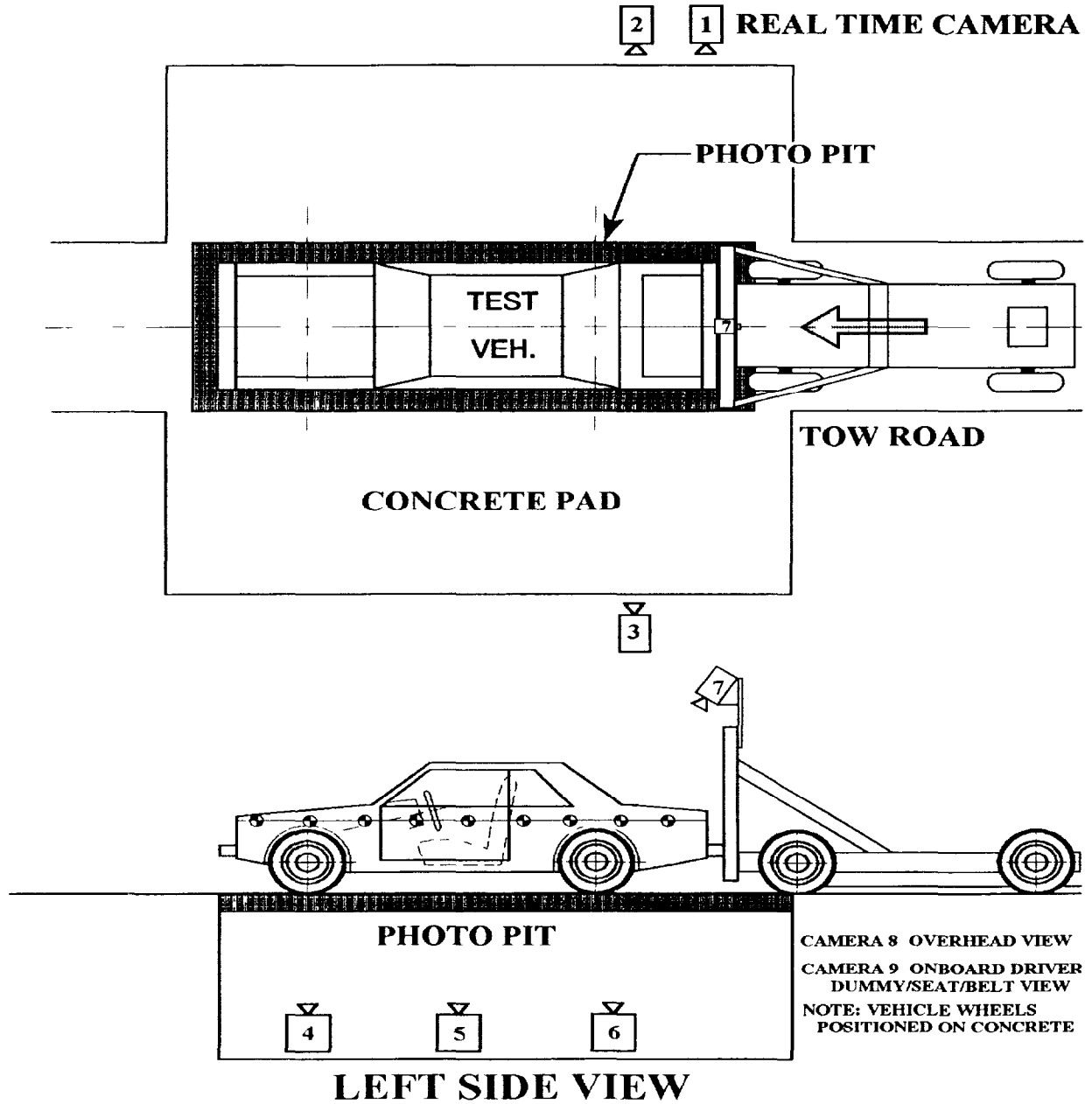


Table 8

HIGH-SPEED CAMERA LOCATIONSNHTSA No C10512Vehicle 2001 Hyundai Santa Fe SUV

CAMERA NO	VIEW	CAMERA POSITIONS (inches)*			ANGLE** (degrees)	LENS (mm)	SPEED (fps)
		X	Y	Z			
1	Real-Time Camera	-	-	-	-	-	24
2	Right Side View	-555 0	72 5	43 5	0	13	1000
3	Left Side View	530 0	87 5	49 5	0	13	1000
4	Vehicle Front Underbody View	0	135 0	-77 0	90	13	1000
5	Vehicle Mid-Section Underbody View	0	82 5	-77 0	90	13	1000
6	Vehicle Rear Underbody View	0	46 0	-77 0	90	13	740
7	Moving Barrier View	0	0	99 0	-105	13	1000
8	Overhead Overall View	-20 0	0	386 0	-90	13	1000
9	Onboard Driver Dummy/Seat/Belt View	-	-	-	-	8	1000

* 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

Appendix A
PHOTOGRAPHS

LIST OF PHOTOGRAPHS

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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

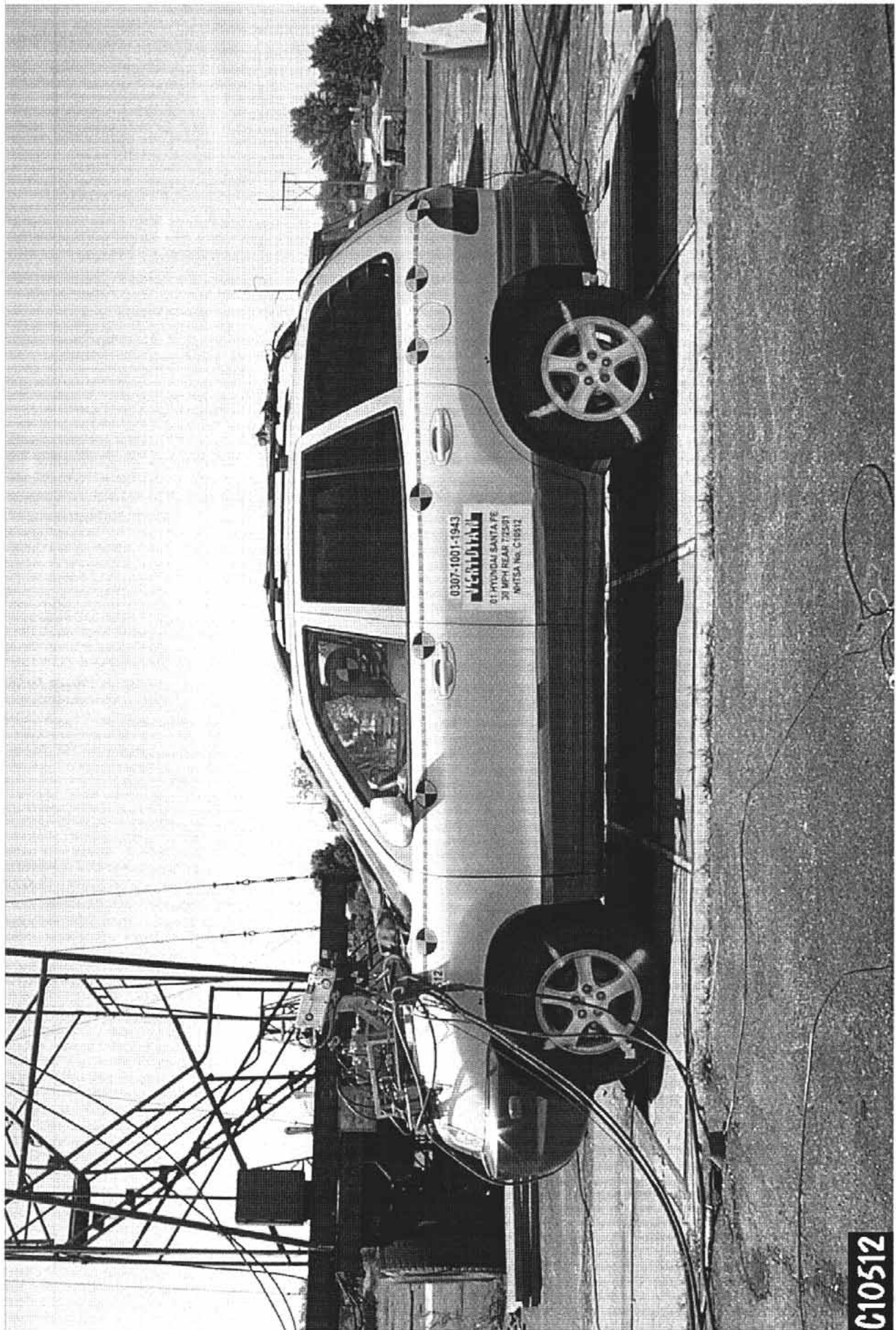


Figure A-5: PRE-TEST RIGHT SIDE VIEW



Figure A-6: POST-TEST RIGHT SIDE VIEW



Figure A-7: PRE-TEST REAR VIEW

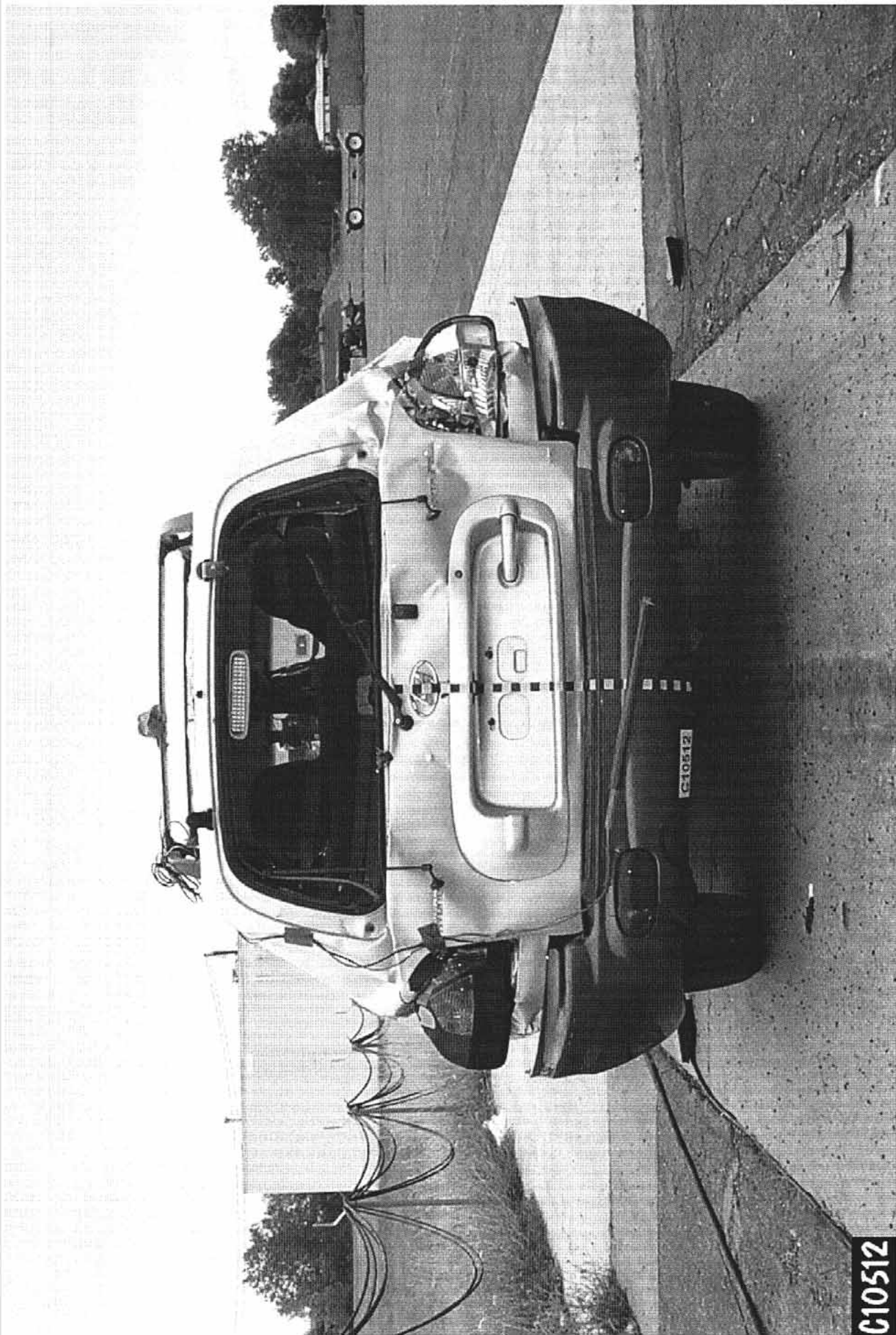


Figure A-8: POST-TEST REAR VIEW



Figure A-9: PRE-TEST LEFT FRONT THREE-QUARTER VIEW



C10512

Figure A-10: POST-TEST LEFT FRONT THREE-QUARTER VIEW



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



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

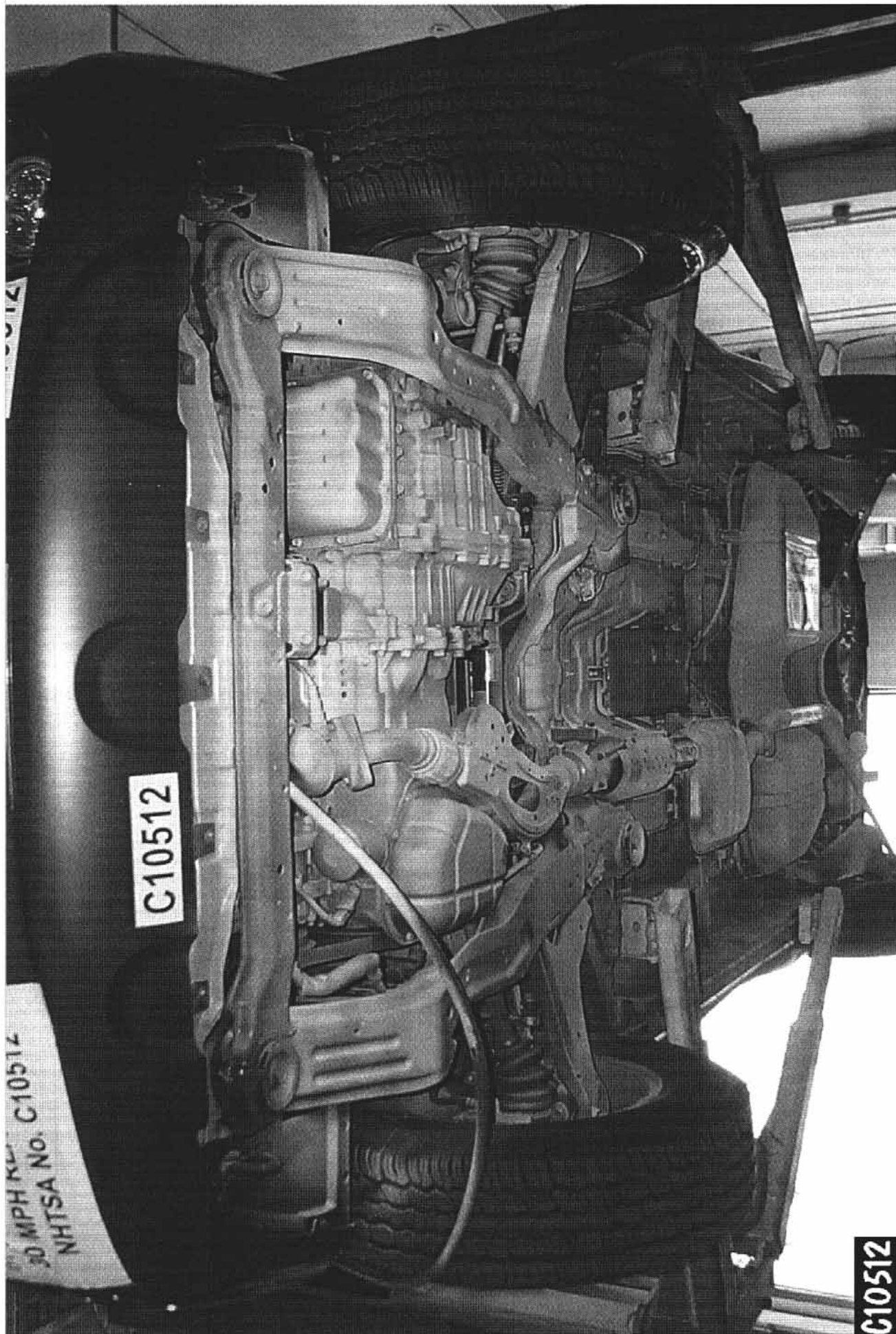


Figure A-13: PRE-TEST FRONT UNDERBODY VIEW

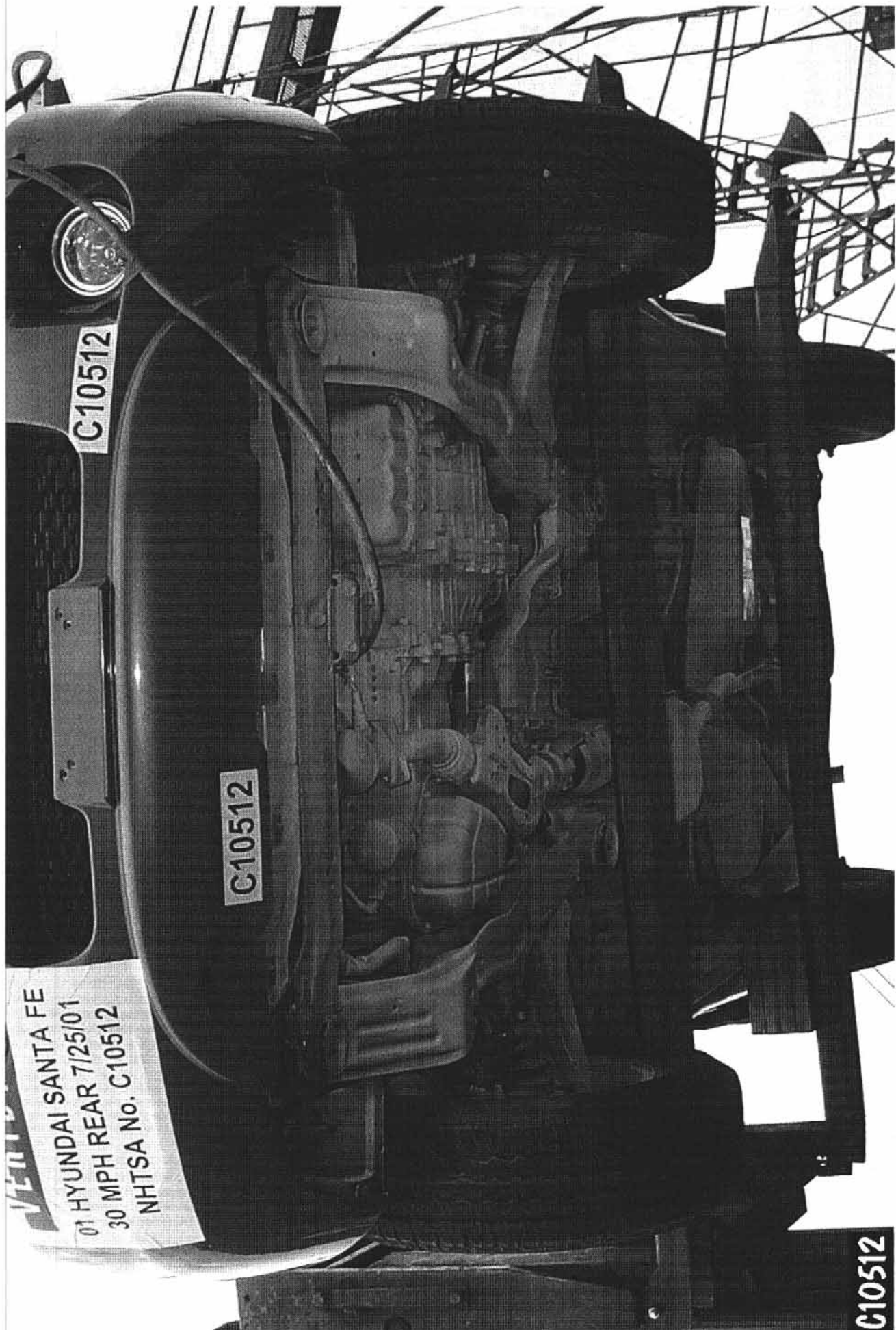


Figure A-14: POST-TEST FRONT UNDERBODY VIEW

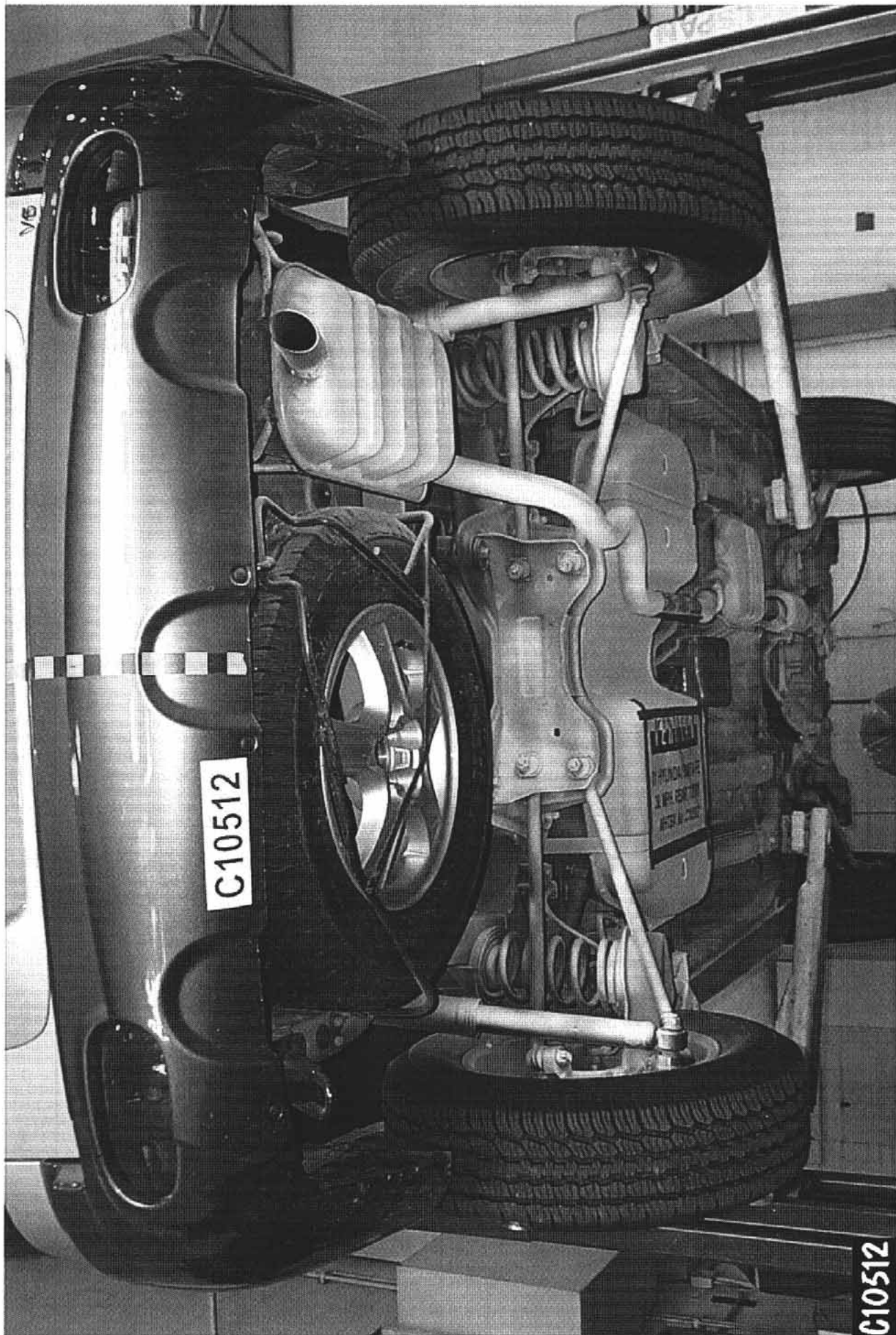


Figure A-15: PRE-TEST REAR UNDERBODY VIEW

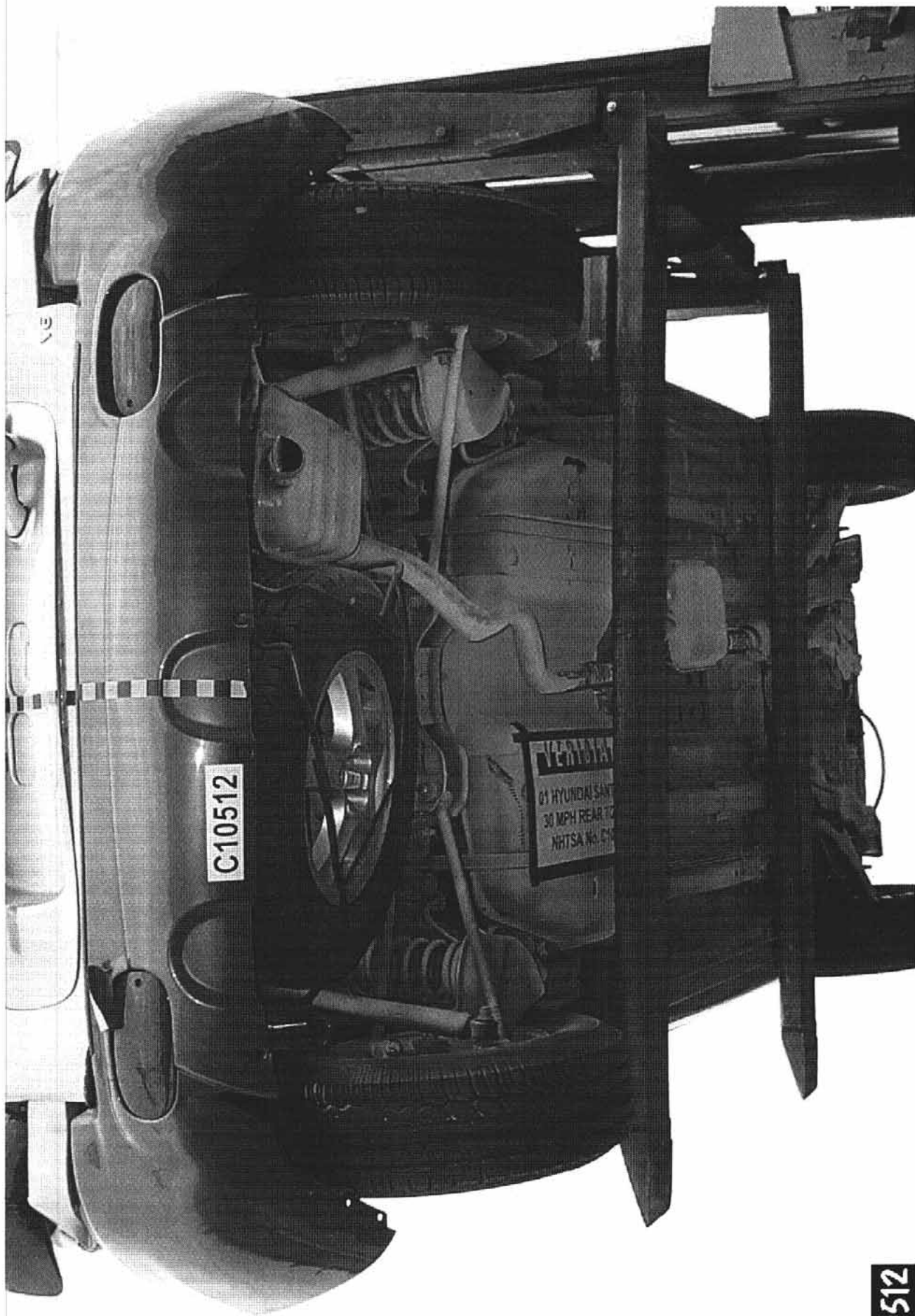


Figure A-16: POST-TEST REAR UNDERBODY VIEW

C10512

MANUFACTURED IN KOREA BY
HYUNDAI MOTOR COMPANY

NOV/26/00 GVWR **5085lbs**

GAWR
FRONT **2645lbs** REAR **2865lbs**

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

VIN **KM8SC83D01U038993**

MPV

C10512

Figure A-17: CERTIFICATION PLACARD

5

TIRE INFLATION PRESSURE

La Pression De Gonflage Des Pneus

VEHICLE CAPACITY WEIGHT, 400kg(880LBS)
Poids en lb de la capacite du vehicule, 400(880)

SEATING CAPACITY: TOTAL 5 FRONT 2 REAR 3
Capacite de transport; total 5; 2 a l avant
3 a l arriere

TIRE PRESSURES-COLD. KPA(PSI):

Pression de gonflage a 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 Arriere	FRONT Avant	REAR Arriere
P225/70 R16	207(30)	207(30)	221(32)	221(32)

C10512

Figure A-18: TIRE PLACARD



Figure A-19: ROLLOVER 90°



Figure A-20: ROLLOVER 180°

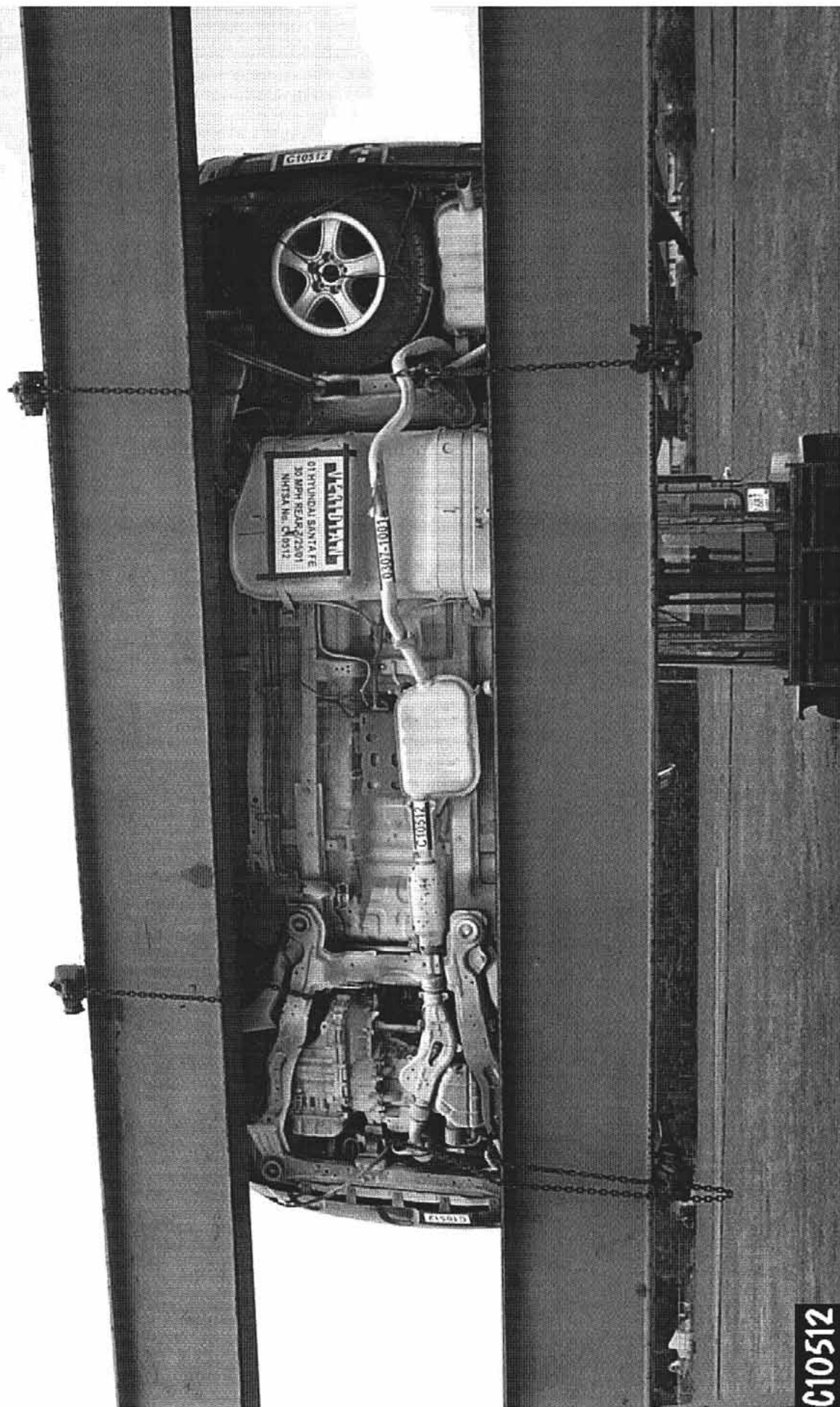


Figure A-21: ROLLOVER 270°

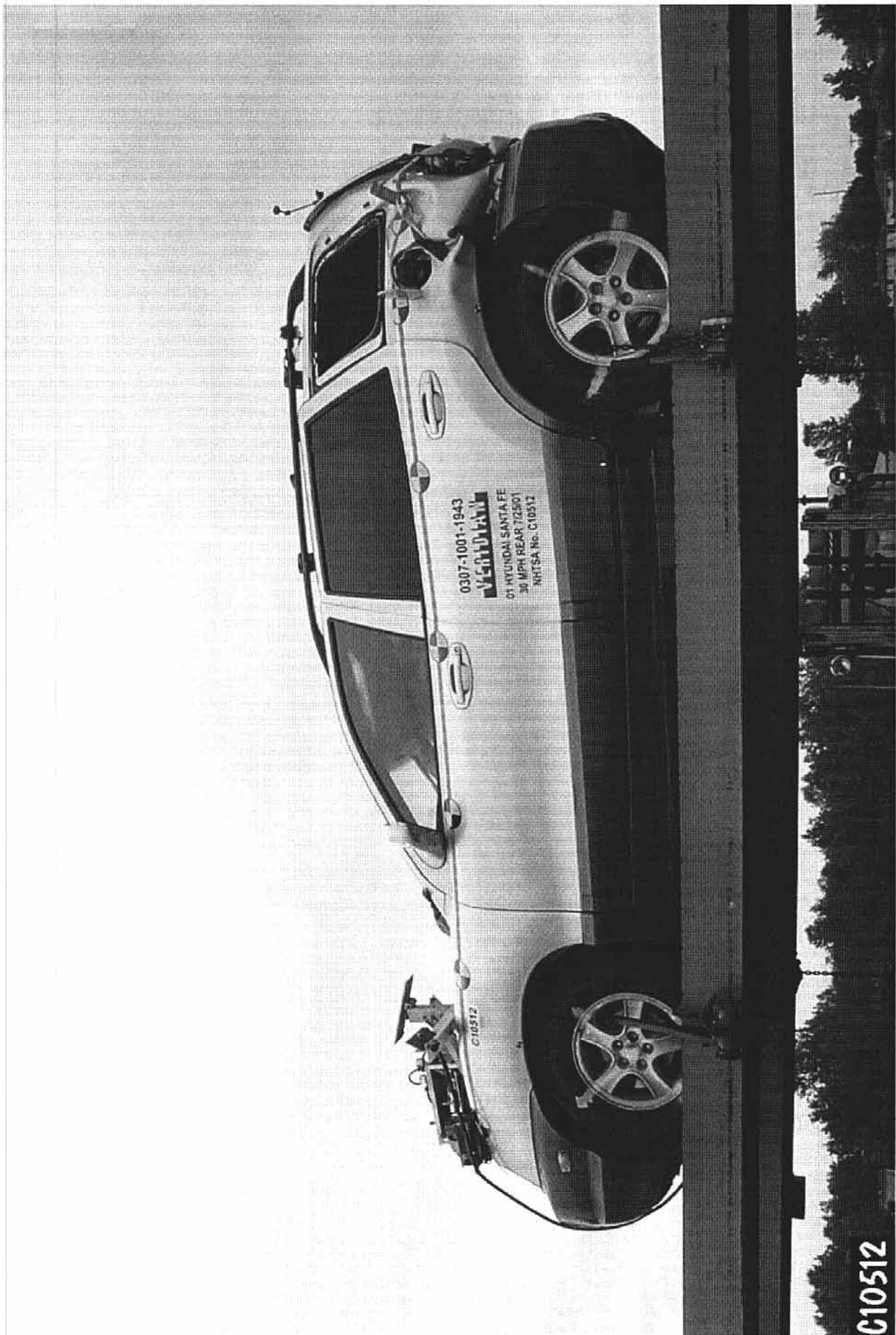


Figure A-22: ROLLOVER 360°

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

FACILITY VERF
 TEST# 307-1001 1942
 TITLE NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe C10512

NAME	Unit	Max	msec	Min	msec	Filt
P1 Head x	g	22.4	105.4	-4.7	281.2	CFC_1000
P1 Head y	g	1.3	75.6	2.9	126.6	CFC_1000
P1 Head z	g	10.0	103.4	-3.6	55.6	CFC_1000
P1 Head Resultant	g	24.5	104.3	0.0	-6.2	CFC_1000
P1 Upper Neck Fx	lbf	30.3	109.0	-41.8	256	CFC_1000
P1 Upper Neck Fy	lbf	9.8	200.5	-6.7	145.4	CFC_1000
P1 Upper Neck Fz	lbf	182.0	103.8	33.8	55.7	CFC_1000
P1 Upper Neck F Resultant	lbf	183.7	103.8	0.0	5.3	CFC_1000
P1 Upper Neck Mx	in-lb	24.7	205.3	-18.6	156.7	CFC_600
P1 Upper Neck My	in-lb	94.7	71.8	-139.8	137	CFC_600
P1 Upper Neck Mz	in-lb	31.4	214.3	-50.4	142.4	CFC_600
P1 Upper Neck M Resultant	in-lb	149.1	137.0	0.0	-17.3	CFC_600
P1 Chest x	g	14.9	70.2	-3.2	243.1	CFC_180
P1 Chest y	g	1.5	56.6	-1.2	105.9	CFC_180
P1 Chest z	g	3.6	80.2	-2.1	349.3	CFC_180
P1 Chest Resultant	g	15.1	78.2	0.0	-25.1	CFC_180
P1 Chest Compression	in	0.0	170.6	0.3	249.4	CFC_600
P1 Pelvic x	g	19.8	66.4	-2.7	239.7	CFC_1000
P1 Pelvic y	g	3.6	59.9	-1.7	122.8	CFC_1000
P1 Pelvic z	g	4.7	75.5	-1.6	359.8	CFC_1000
P1 Pelvic Resultant	g	20.2	66.4	0.0	-47	CFC_1000
P1 Left Femur	lbf	30.5	202.3	-138.9	71.4	CFC_600
P1 Right Femur	lbf	48.7	236.4	226.6	53.8	CFC_600
P1 Lap Belt	lbf	61.9	234.0	-2.0	21.4	CFC_60
P1 Belt Spoolout	in	0.0	-2.4	-4.4	103.3	CFC_180
Acc #1 Left Rear Xmember X	g	16.7	15.3	-1.2	332.2	CFC_60
Acc #2 Right Rear Xmember X	g	14.3	14.9	1.3	263.8	CFC_60
Acc #3 Upper Seatback X	g	15.8	36.2	-10.2	50.5	CFC_60
Acc #4 Lower Seatback X	g	17.1	32.5	3.5	51.3	CFC_60
Seatback Angular Position	deg	13.9	387.6	0.0	-50	CFC_180

=====

P1 HIC(36 ms) 68.7
 t1 89.0 msec
 t2 125.0 msec
 Duration 36.0 msec
 Average Acceleration 20.5 g

P1 CLIP(3 ms) 15.0 g
 t1 76.1 msec
 t2 79.1 msec
 Duration 3.0 msec
 P1 CSI 35.1

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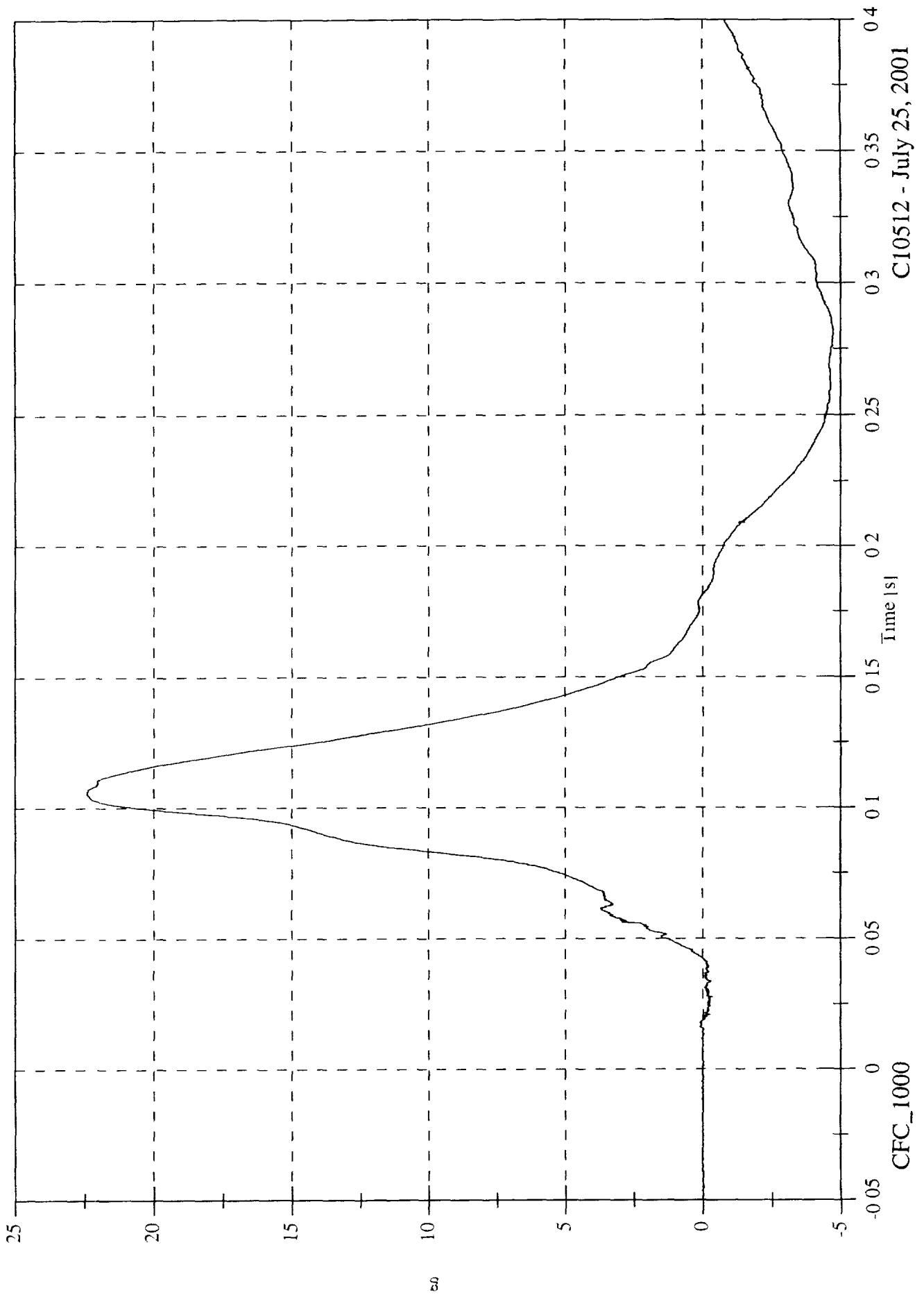
DRIVER DUMMY (Pos 1)	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Pelvic Accelerations	1000
Upper Neck Forces	1000
Upper Neck Moments	600
Belt Forces	60
Belt Spoolout	60
Vehicle	60

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

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Max: 22.4 [g] at 0.105 [s]
 Min: -4.7 [g] at 0.281 [s]

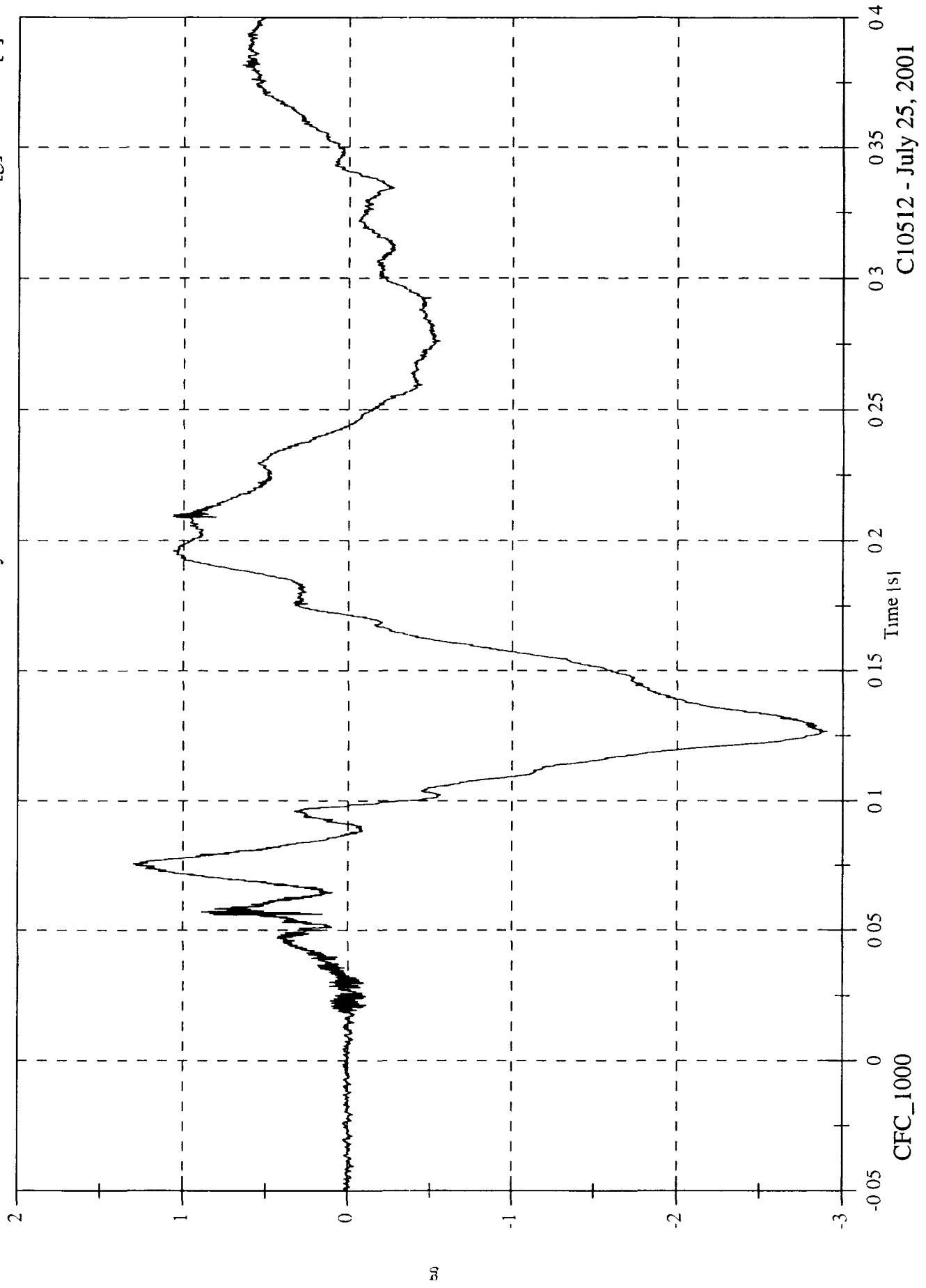
Pl Head x



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Max: 1.3 [g] at 0.076 [s]
Min: -2.9 [g] at 0.127 [s]

P1 Head y

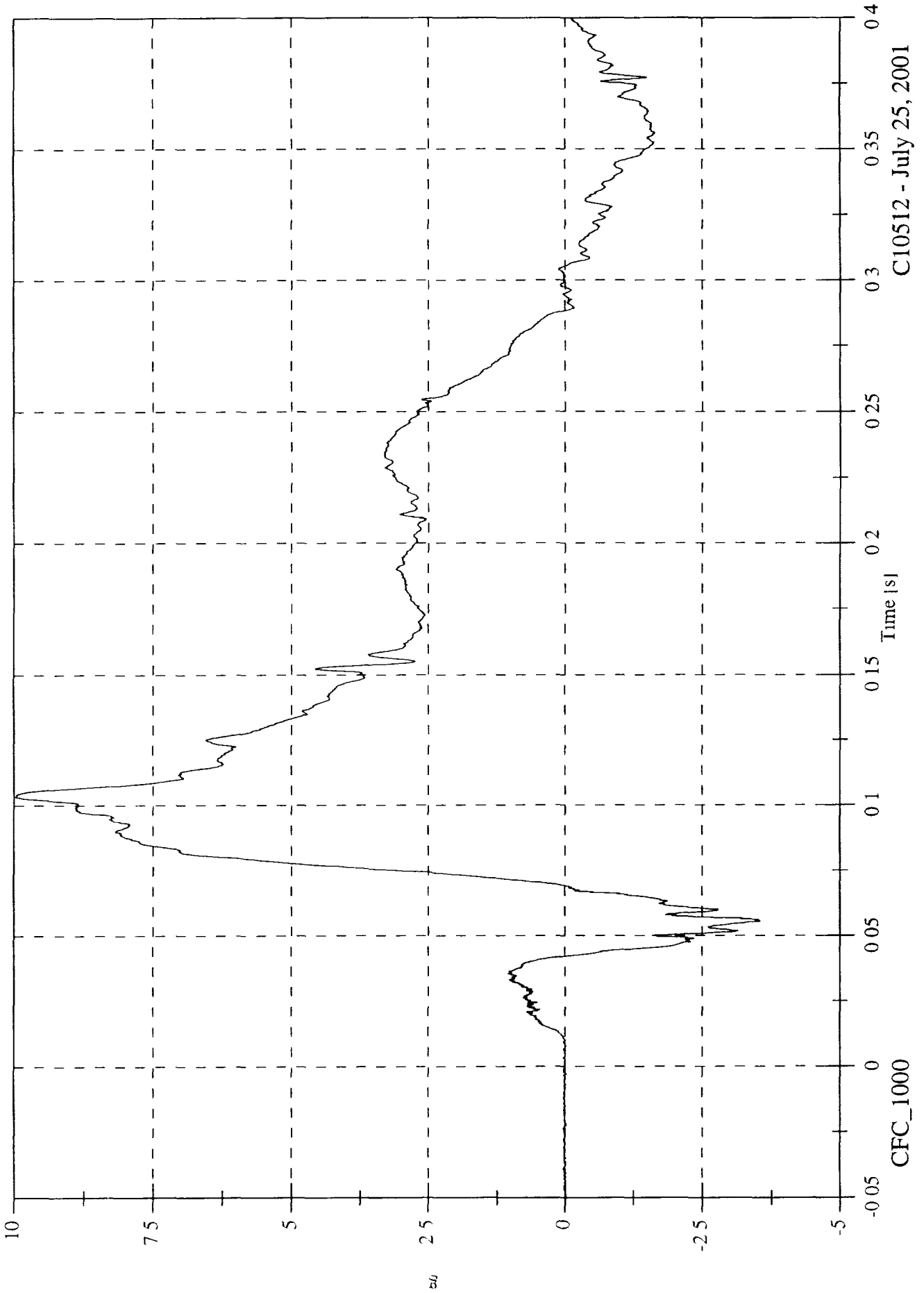


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Max: 10.0 [g] at 0.103 [s]
 Min: -3.6 [g] at 0.056 [s]

P1 Head z



CFC_1000

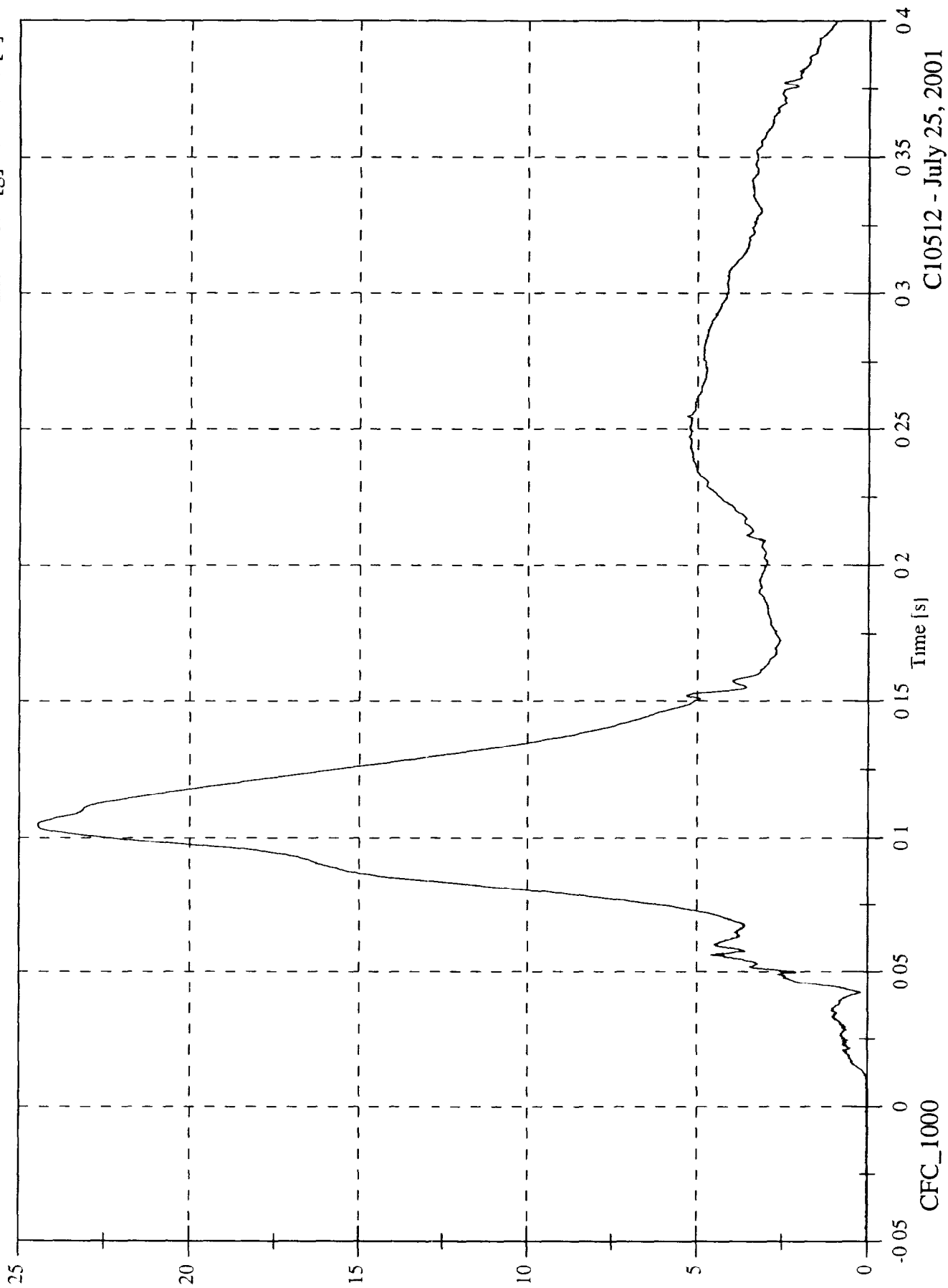
Time [s]

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P1 Head Resultant

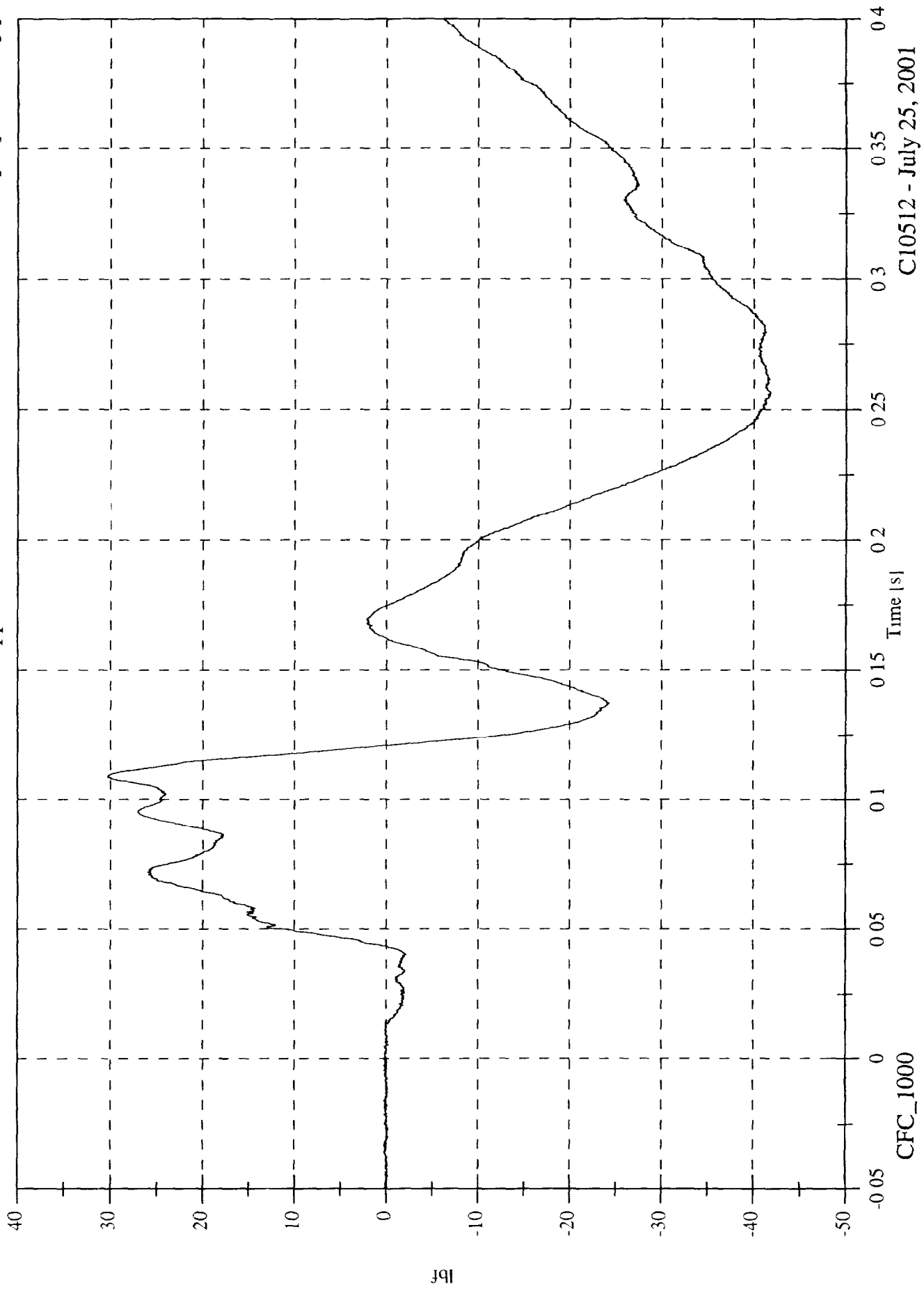
Max 24.5 [g] at 0.104 [s]
Min 0.0 [g] at -0.006 [s]



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P1 Upper Neck Fx

Max: 30.3 [lbf] at 0.109 [s]
Min: -41.8 [lbf] at 0.256 [s]

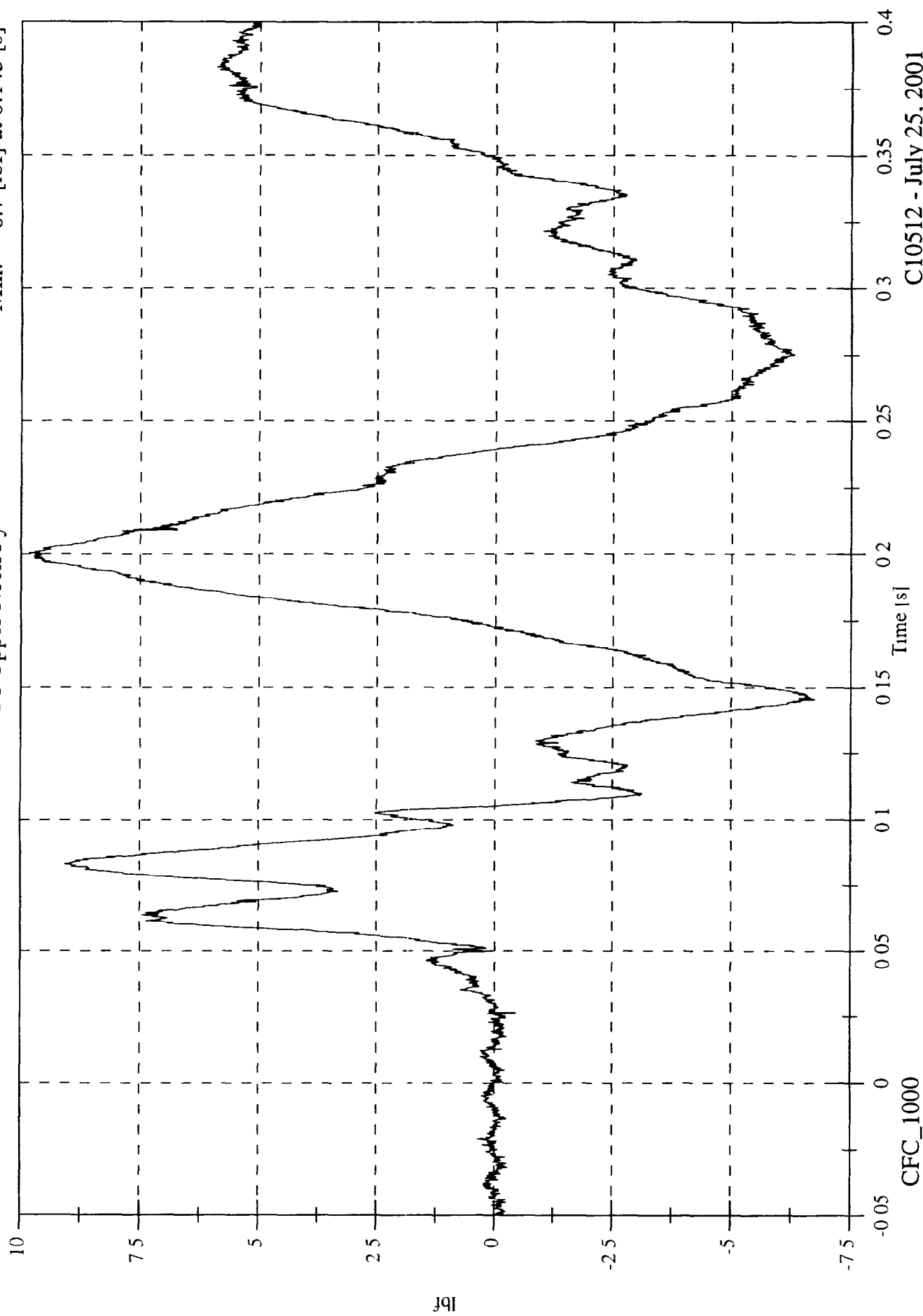


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P1 Upper Neck Fy

Max: 9.8 [lbf] at 0.200 [s]
Min: -6.7 [lbf] at 0.145 [s]

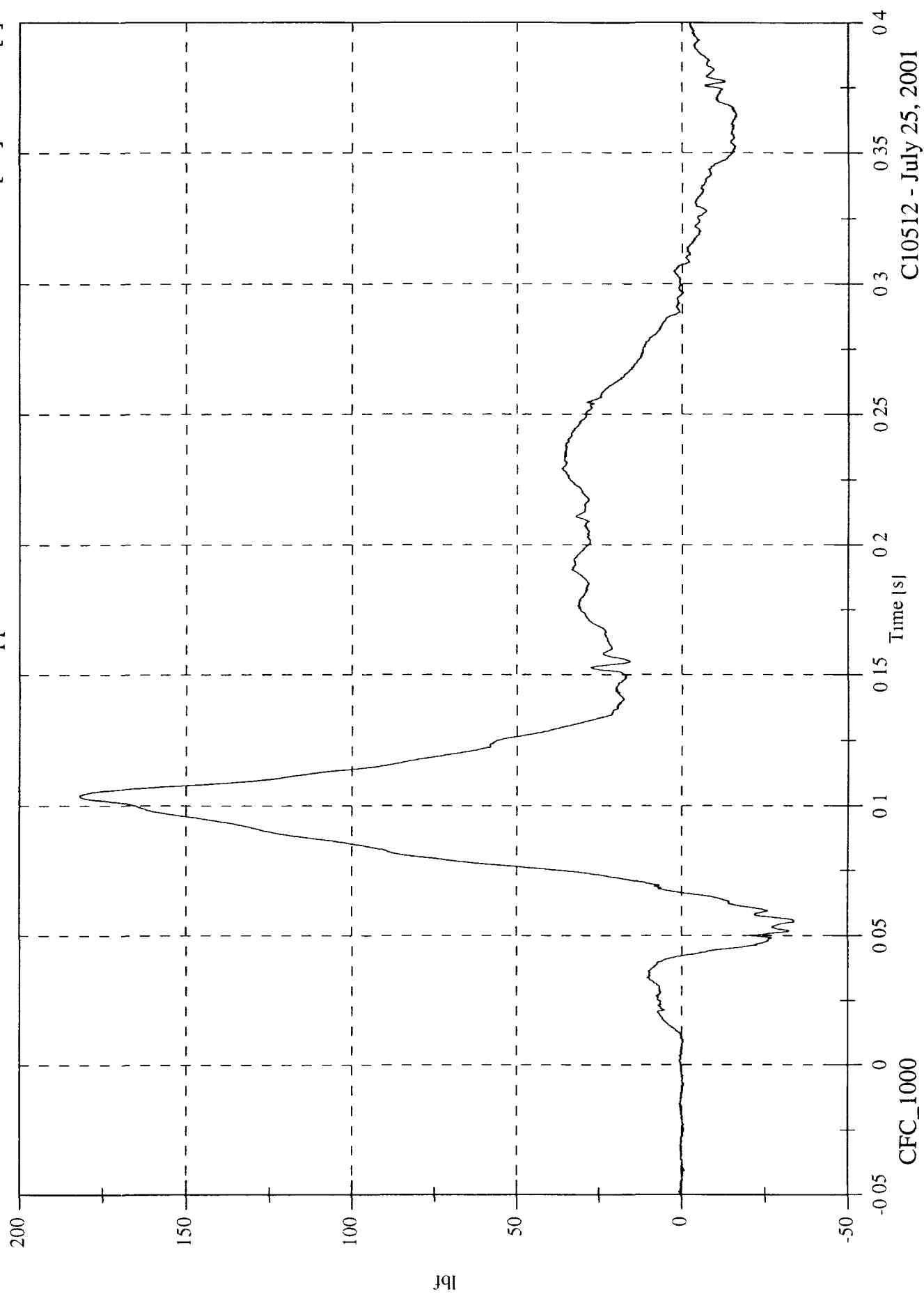


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P1 Upper Neck Fz

Max: 182.0 [lbf] at 0.104 [s]
Min: -33.8 [lbf] at 0.056 [s]

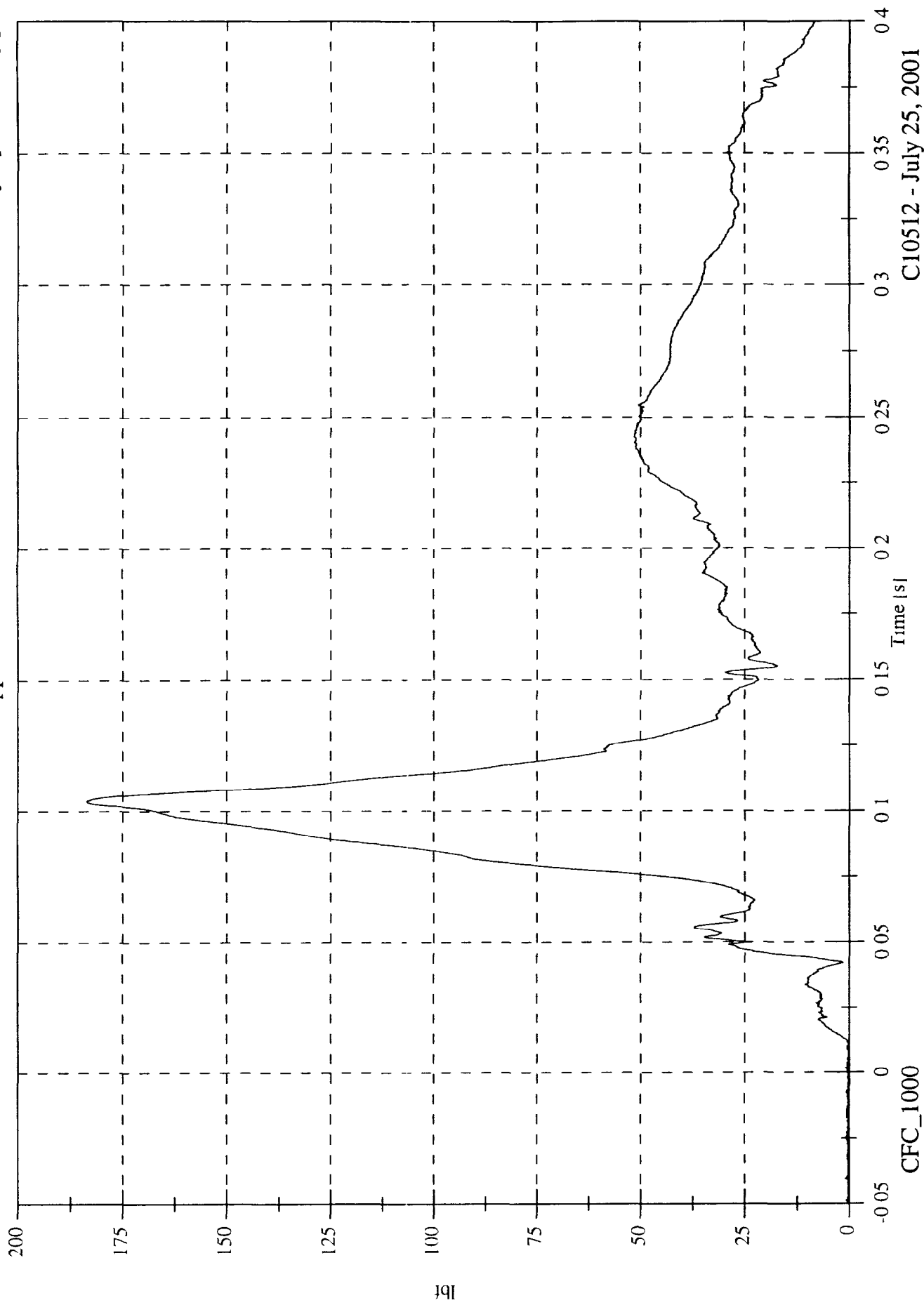


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P1 Upper Neck F Resultant

Max: 183.7 [lbf] at 0.104 [s]
Min: 0.0 [lbf] at 0.005 [s]

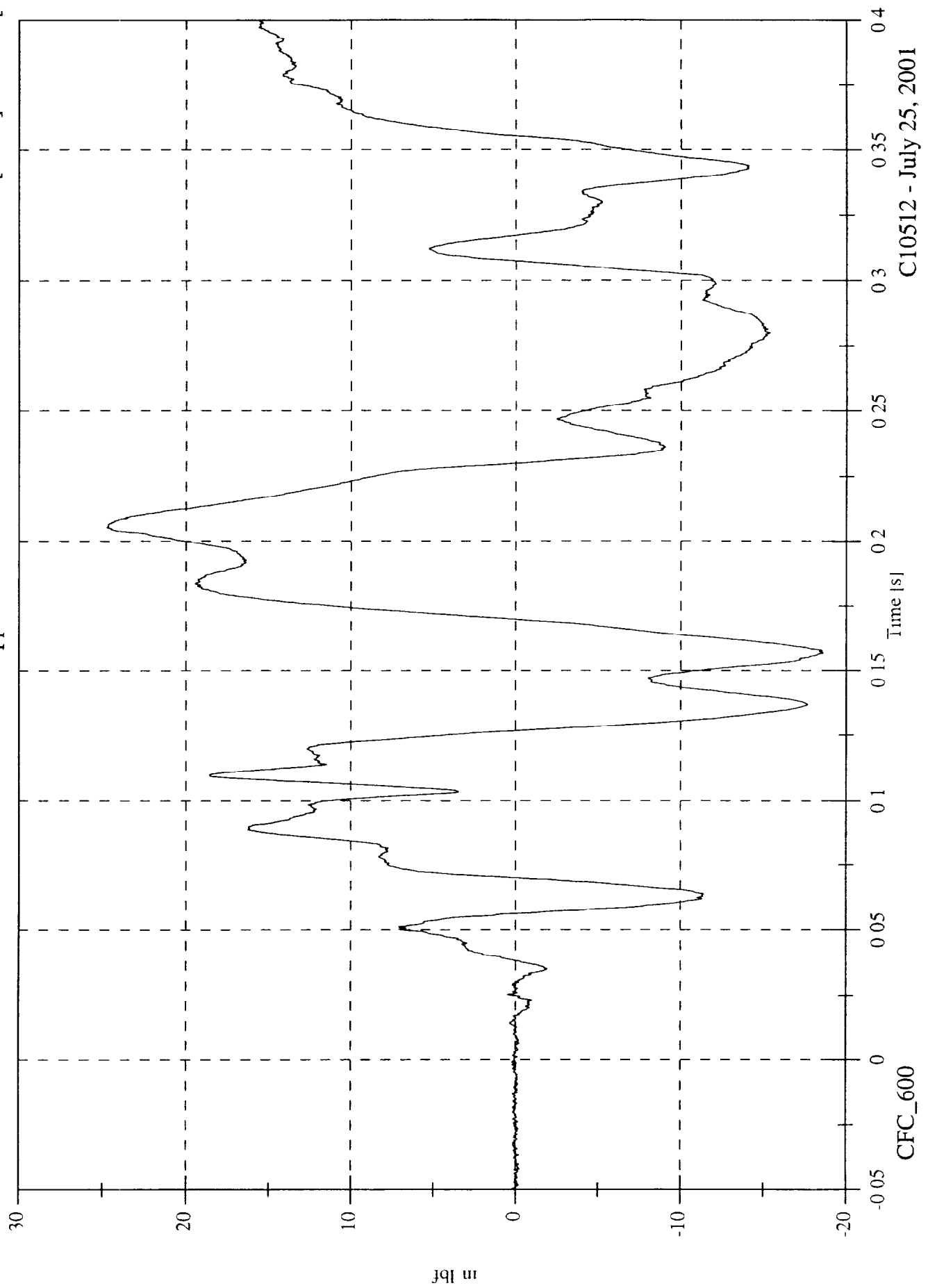


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 24.7 [in-lbf] at 0.205 [s]
Min: -18.6 [in-lbf] at 0.157 [s]

P1 Upper Neck Mx

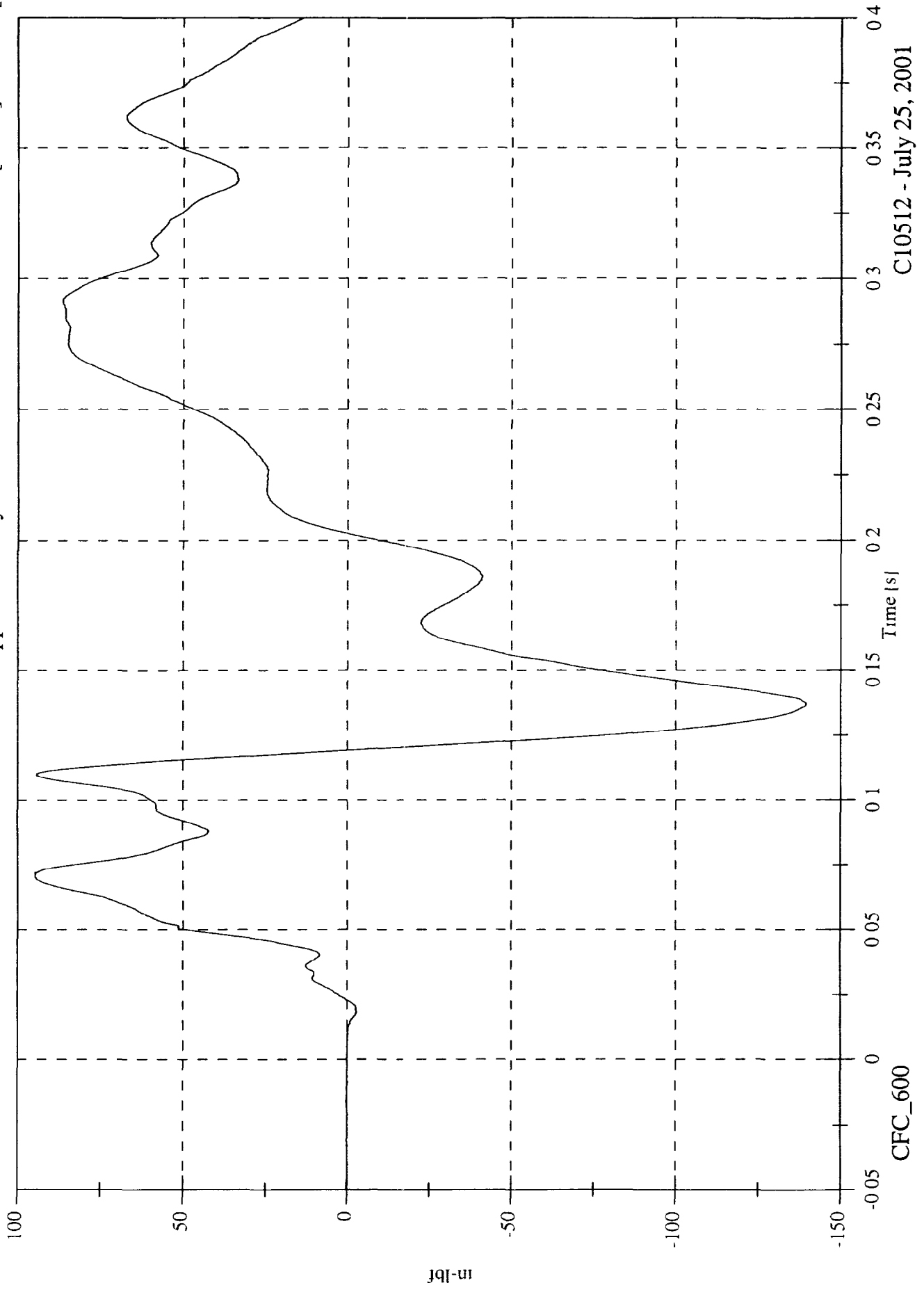


C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Upper Neck My

Max: 94.7 [in-lbf] at 0.072 [s]
Min: -139.8 [in-lbf] at 0.137 [s]

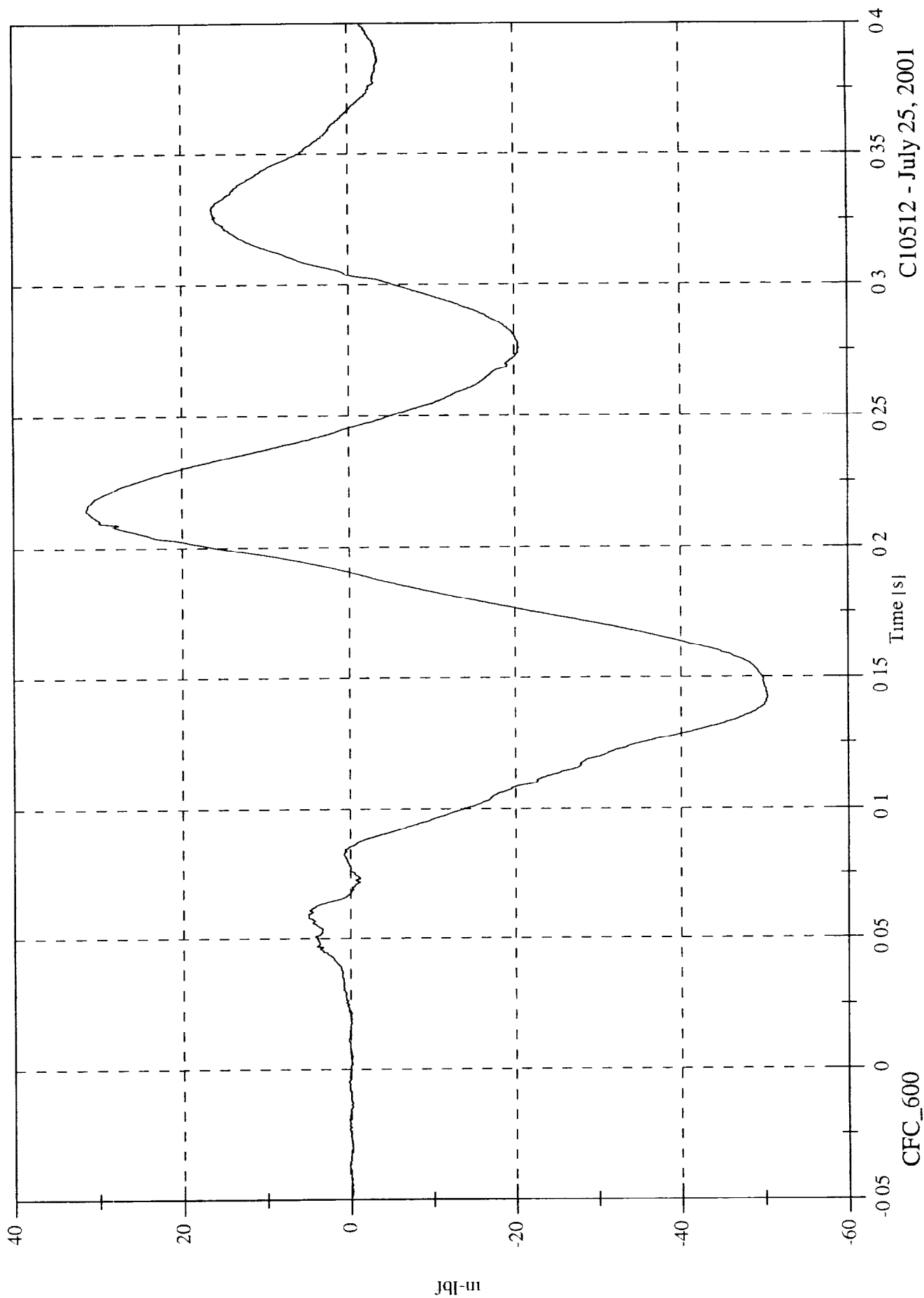


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Upper Neck Mz

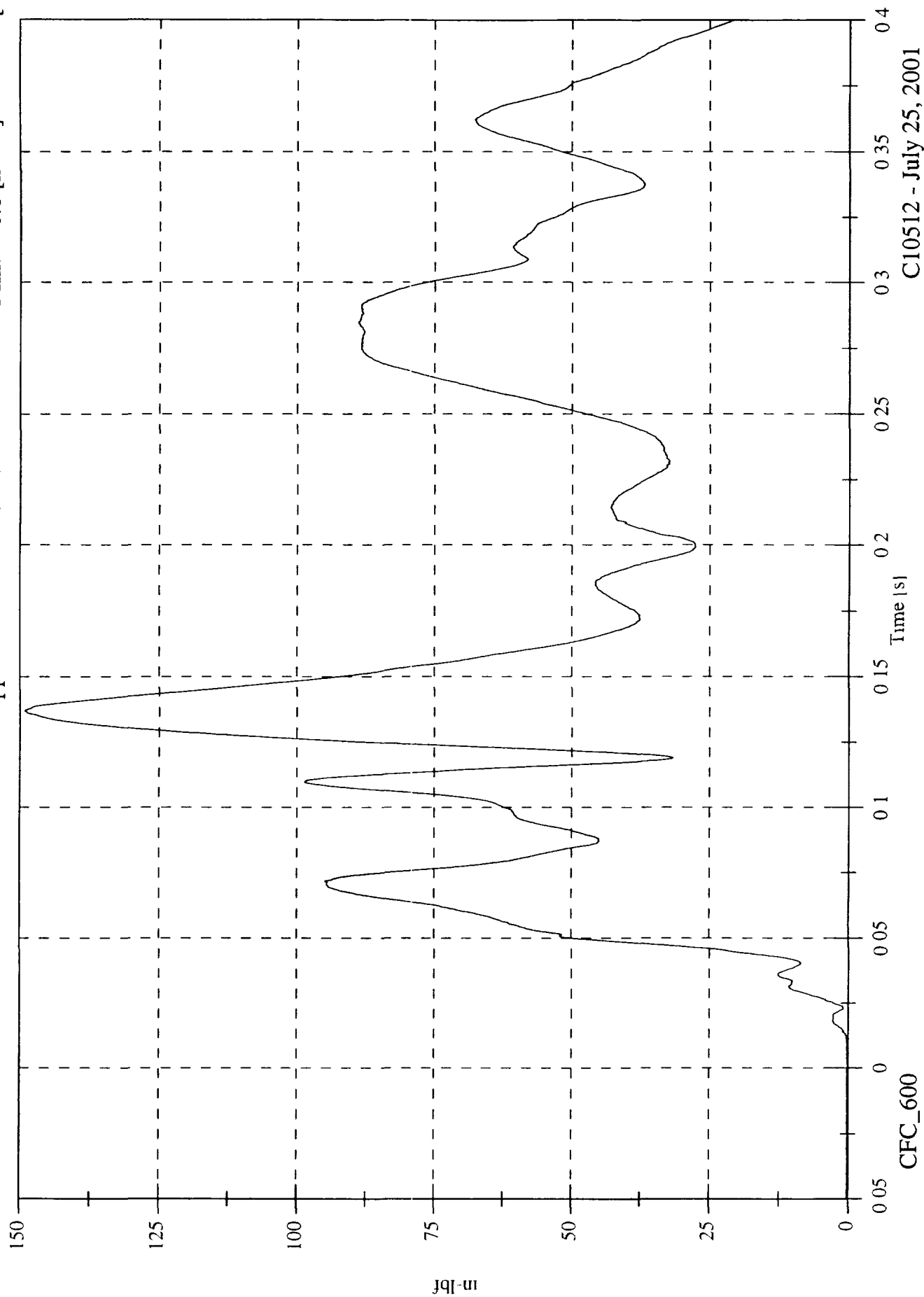
Max: 31.4 [in-lbf] at 0.214 [s]
Min: -50.4 [in-lbf] at 0.142 [s]



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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe
P1 Upper Neck M Resultant

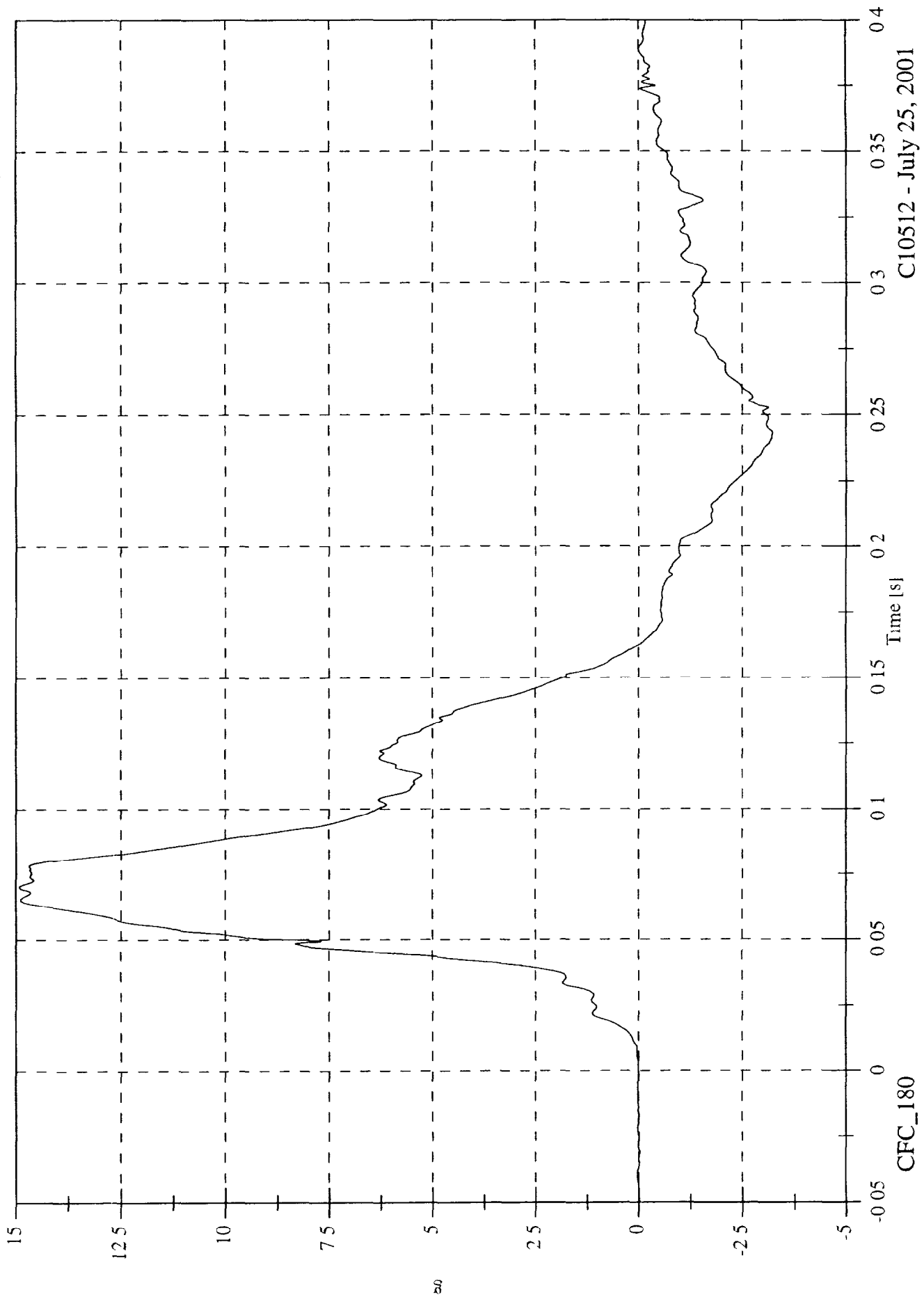
Max: 149.1 [in-lbf] at 0.137 [s]
Min: 0.0 [in-lbf] at -0.017 [s]



NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 14.9 [g] at 0.070 [s]
Min: -3.2 [g] at 0.243 [s]

P1 Chest x



CFC_180

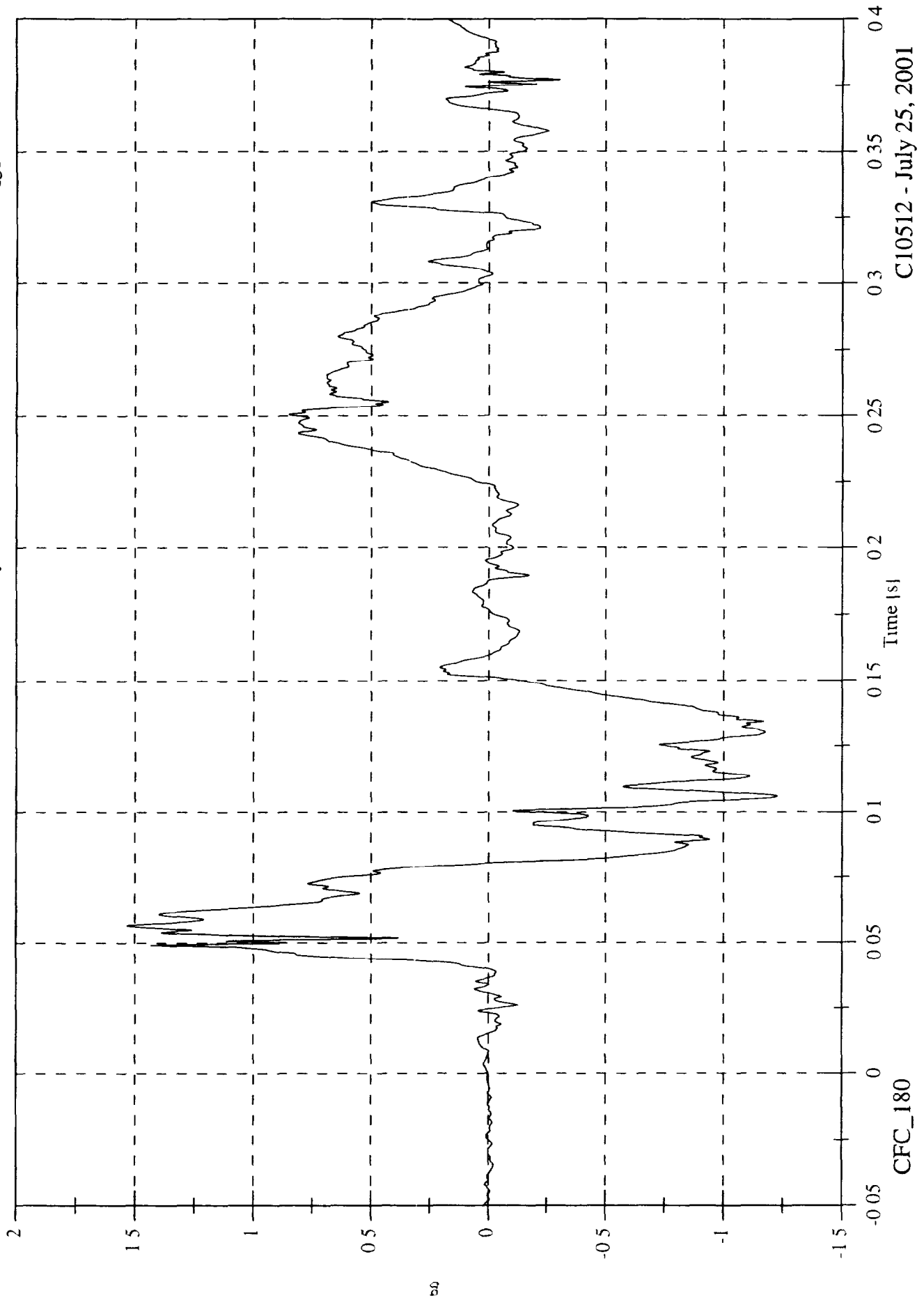
Time [s]

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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 1.5 [g] at 0.057 [s]
Min: -1.2 [g] at 0.106 [s]

P1 Chest y

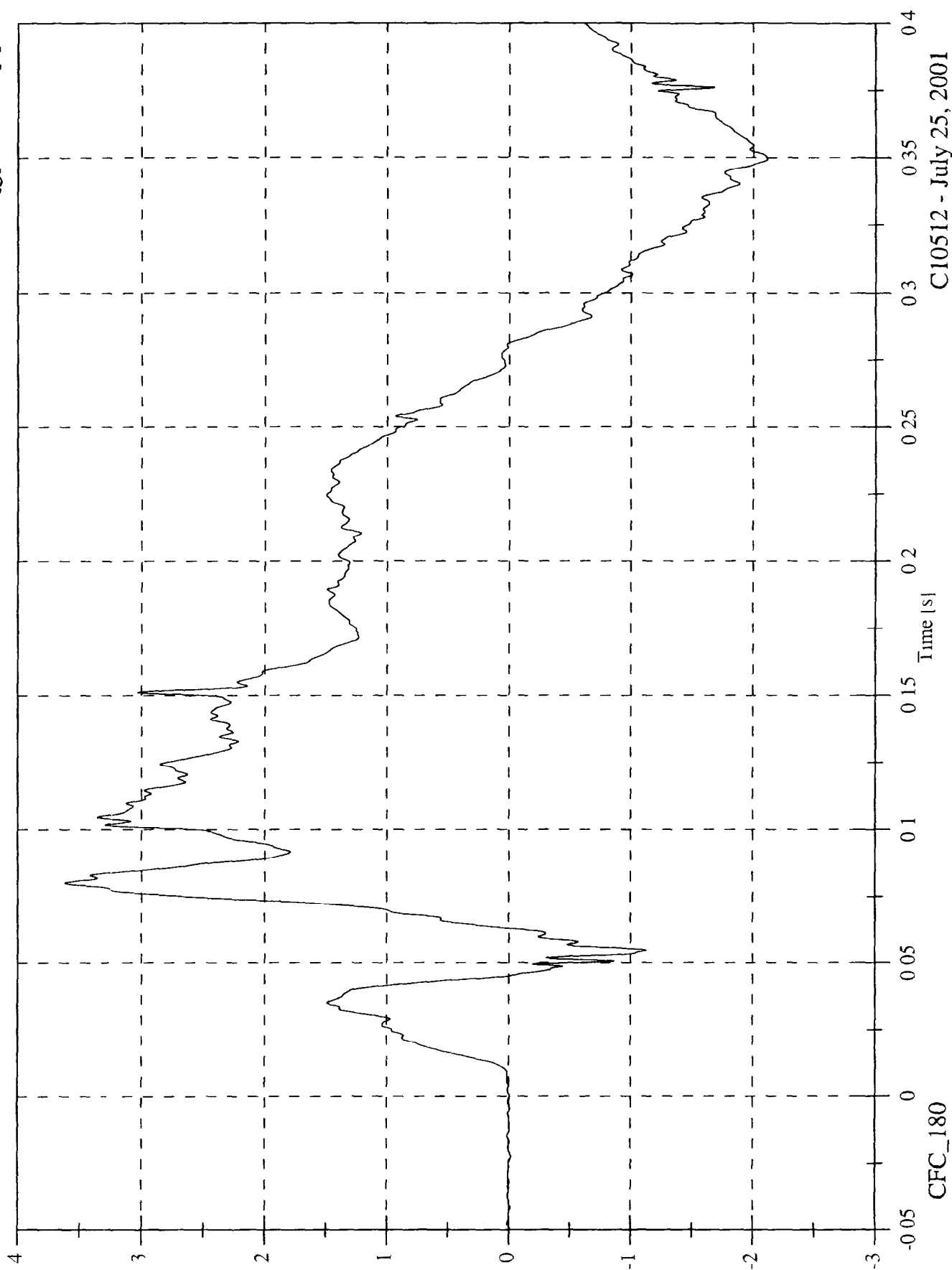


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Max: 3.6 [g] at 0.080 [s]
Min: -2.1 [g] at 0.349 [s]

P1 Chest z



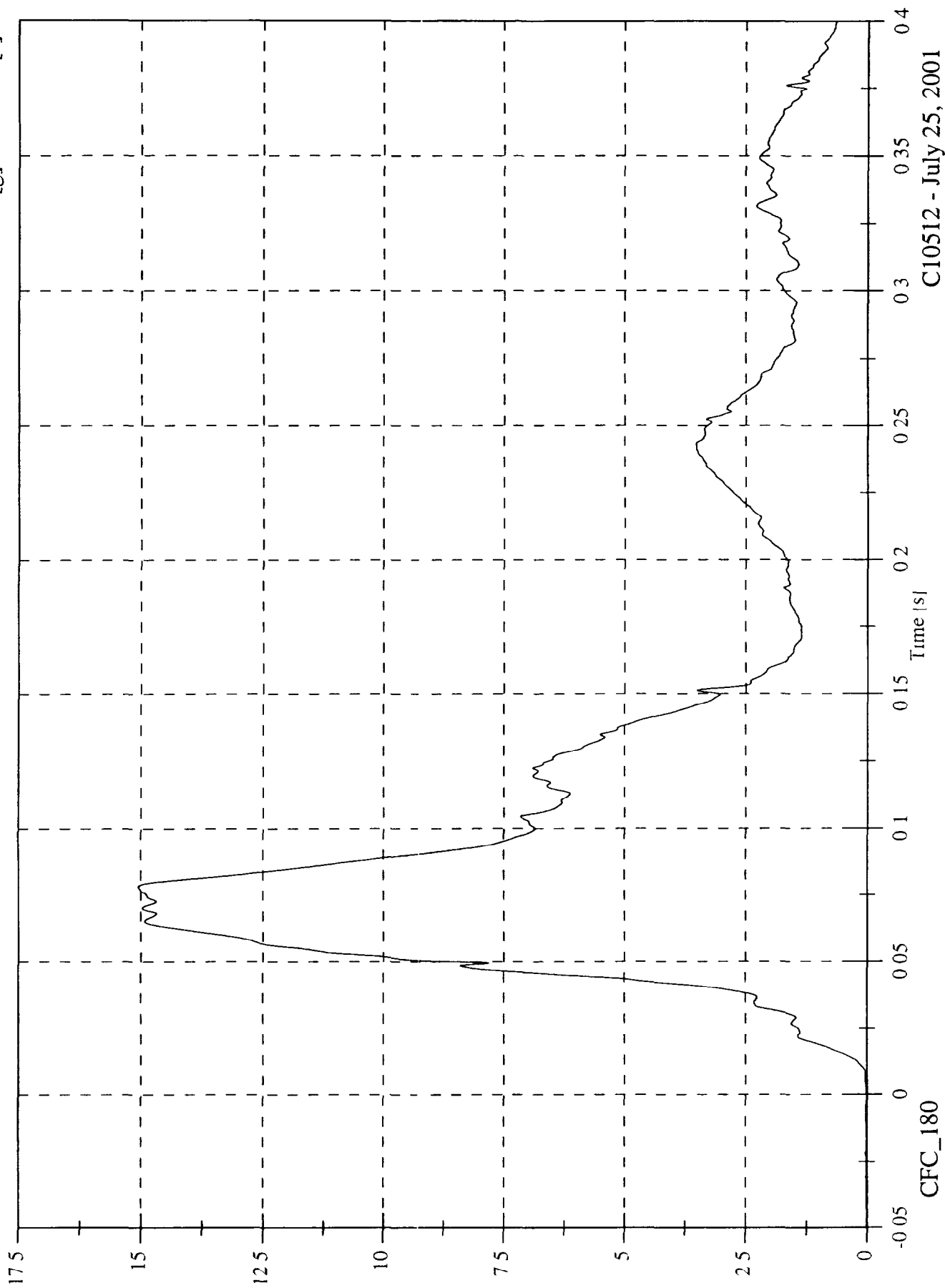
CFC_180

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P1 Chest Resultant

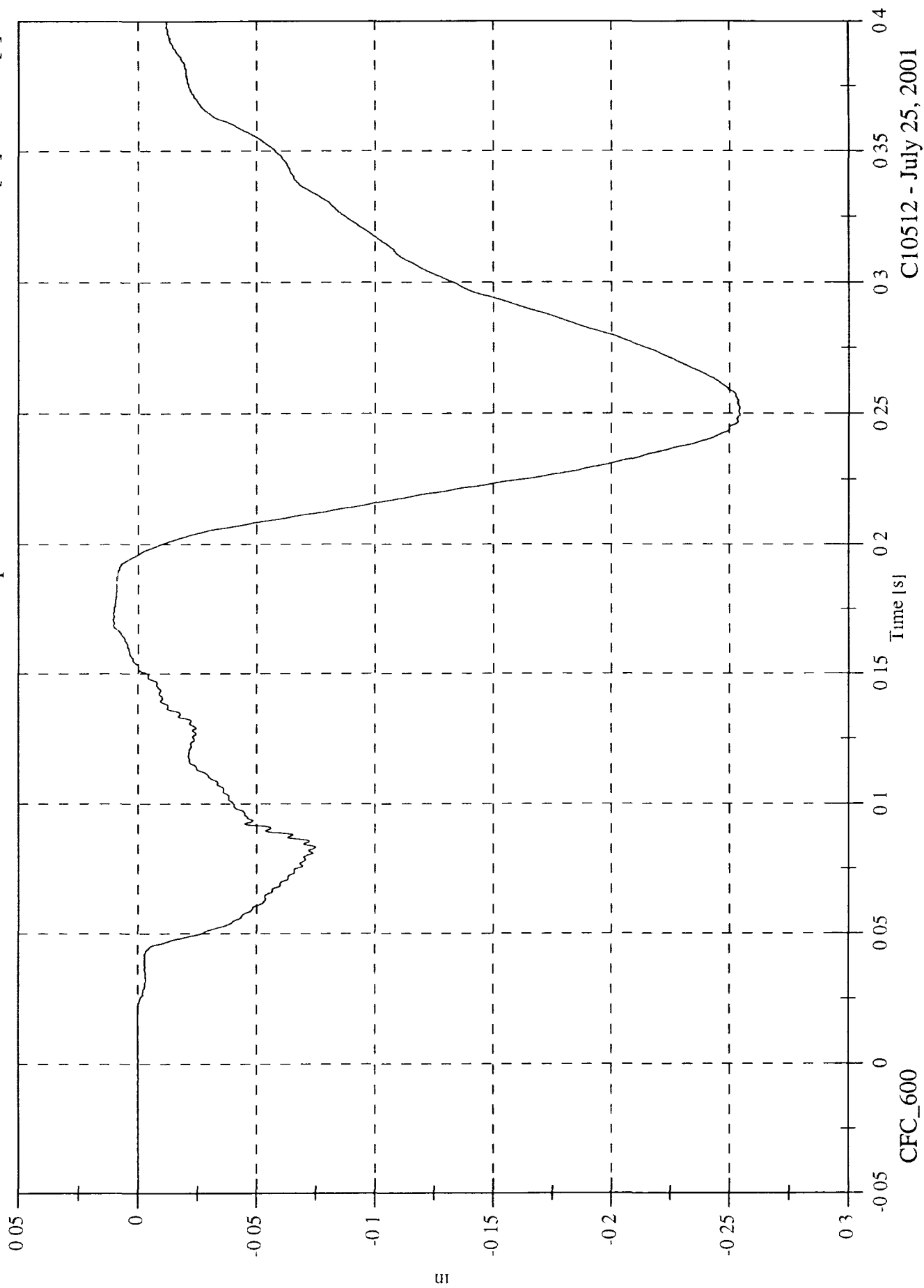
Max: 15.1 [g] at 0.078 [s]
Min: 0.0 [g] at -0.025 [s]



NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Chest Compression

Max: 0.0 [in] at 0.171 [s]
Min: -0.3 [in] at 0.249 [s]



CFC_600

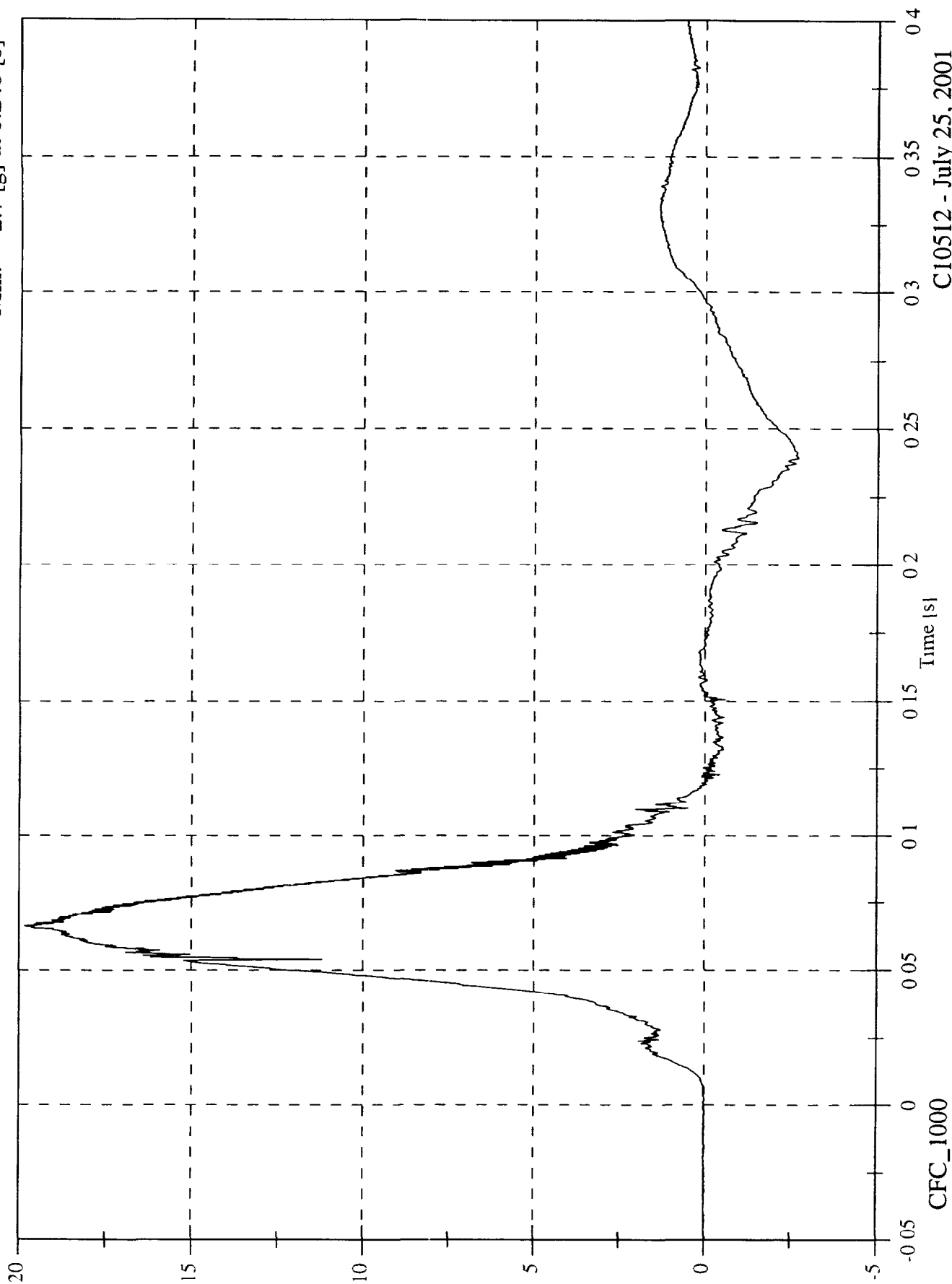
Time [s]

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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 19.8 [g] at 0.066 [s]
Min: -2.7 [g] at 0.240 [s]

P1 Pelvic x

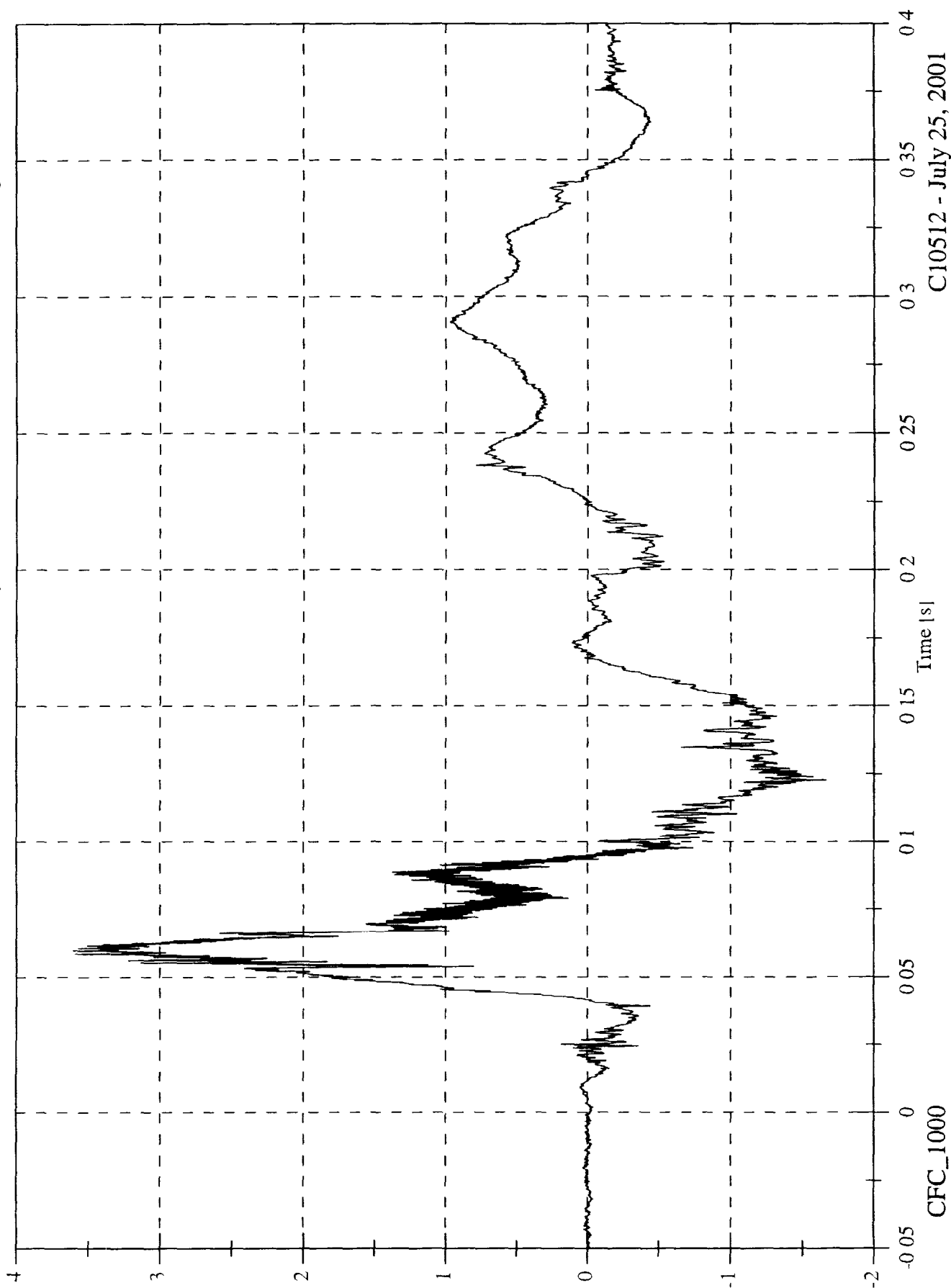


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max. 3.6 [g] at 0.060 [s]
Min: -1.7 [g] at 0.123 [s]

P1 Pelvic y

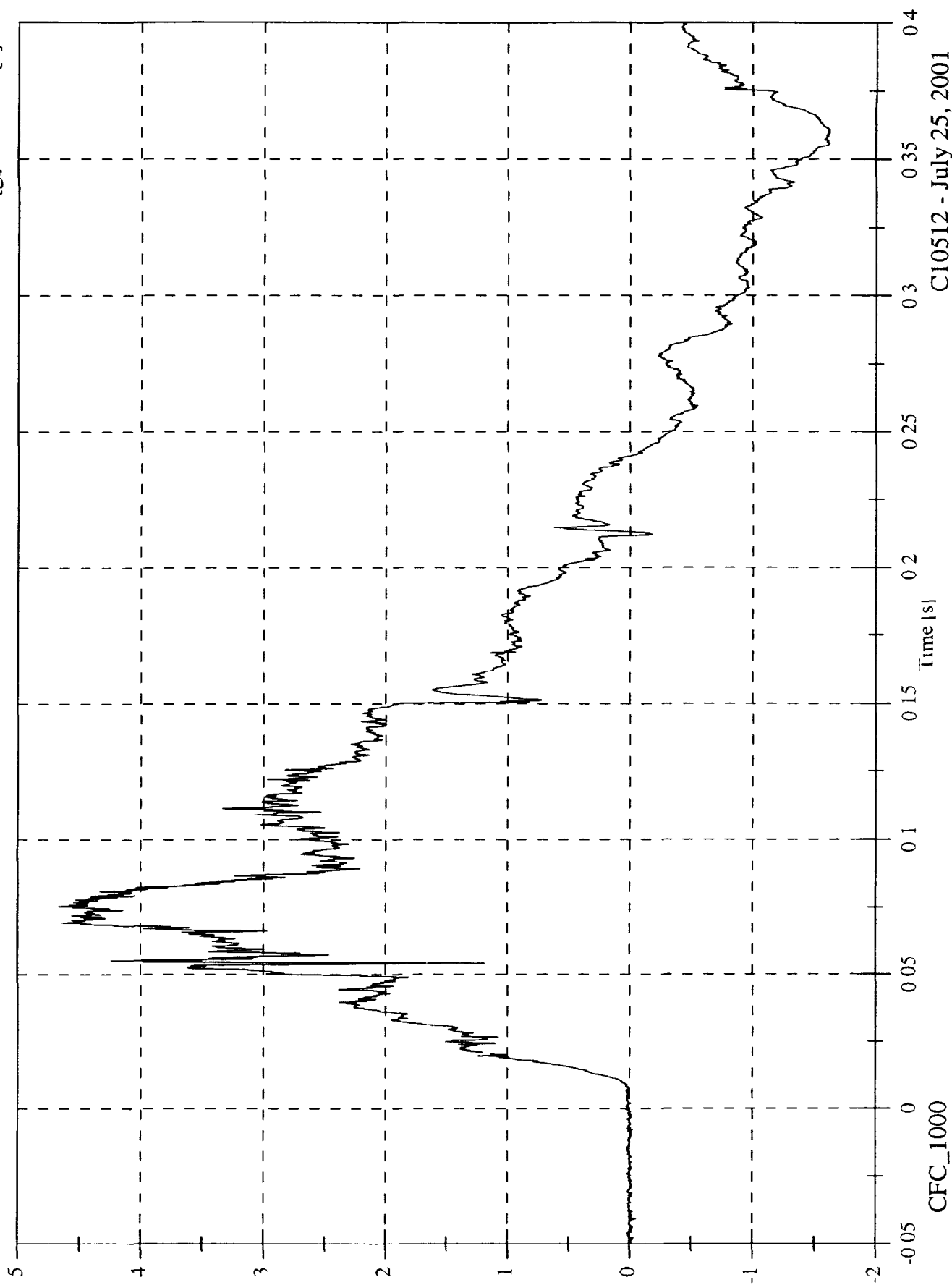


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 4.7 [g] at 0.076 [s]
Min: -1.6 [g] at 0.360 [s]

P1 Pelvic z

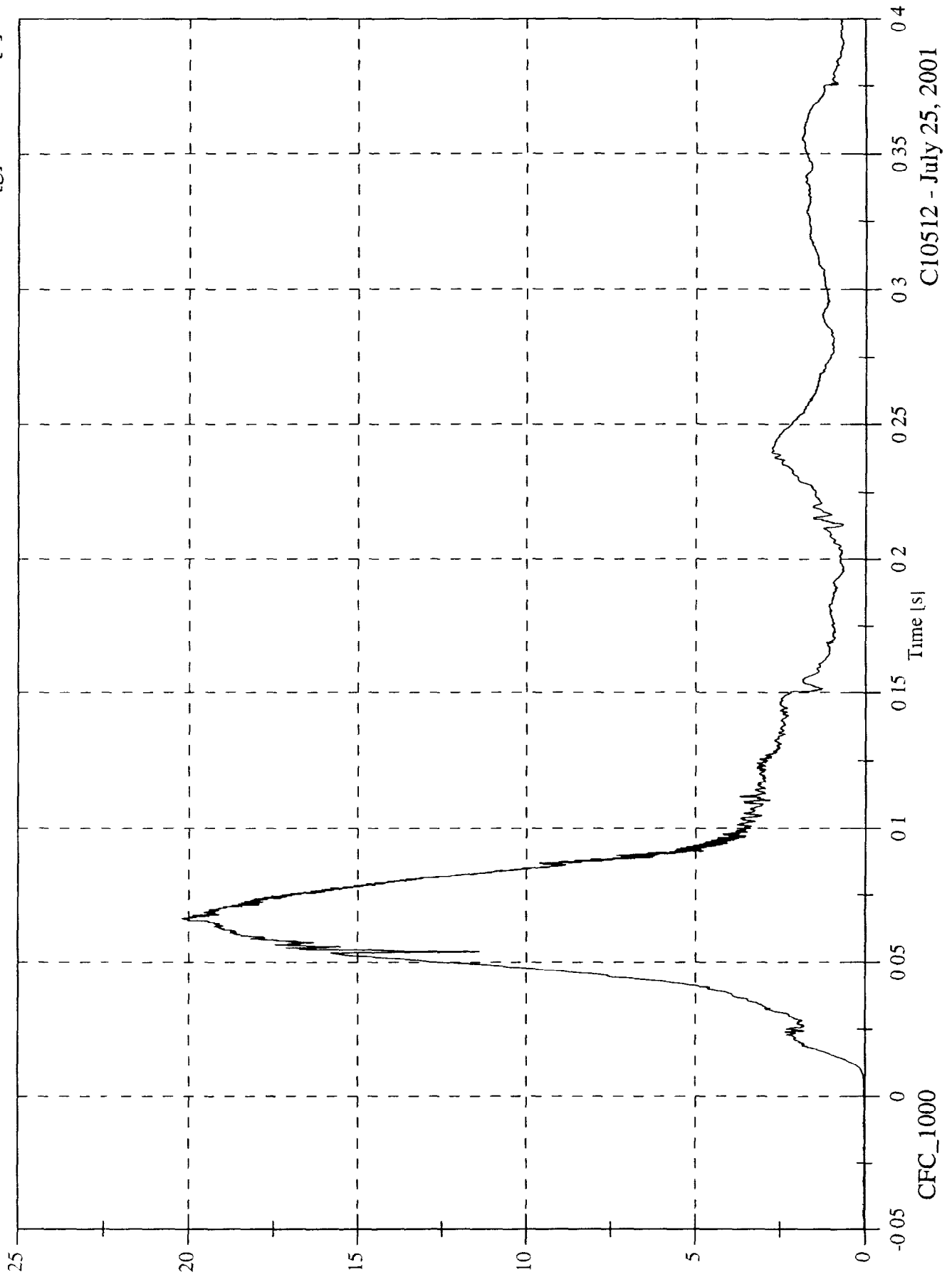


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Pelvic Resultant

Max: 20.2 [g] at 0.066 [s]
Min: 0.0 [g] at -0.047 [s]

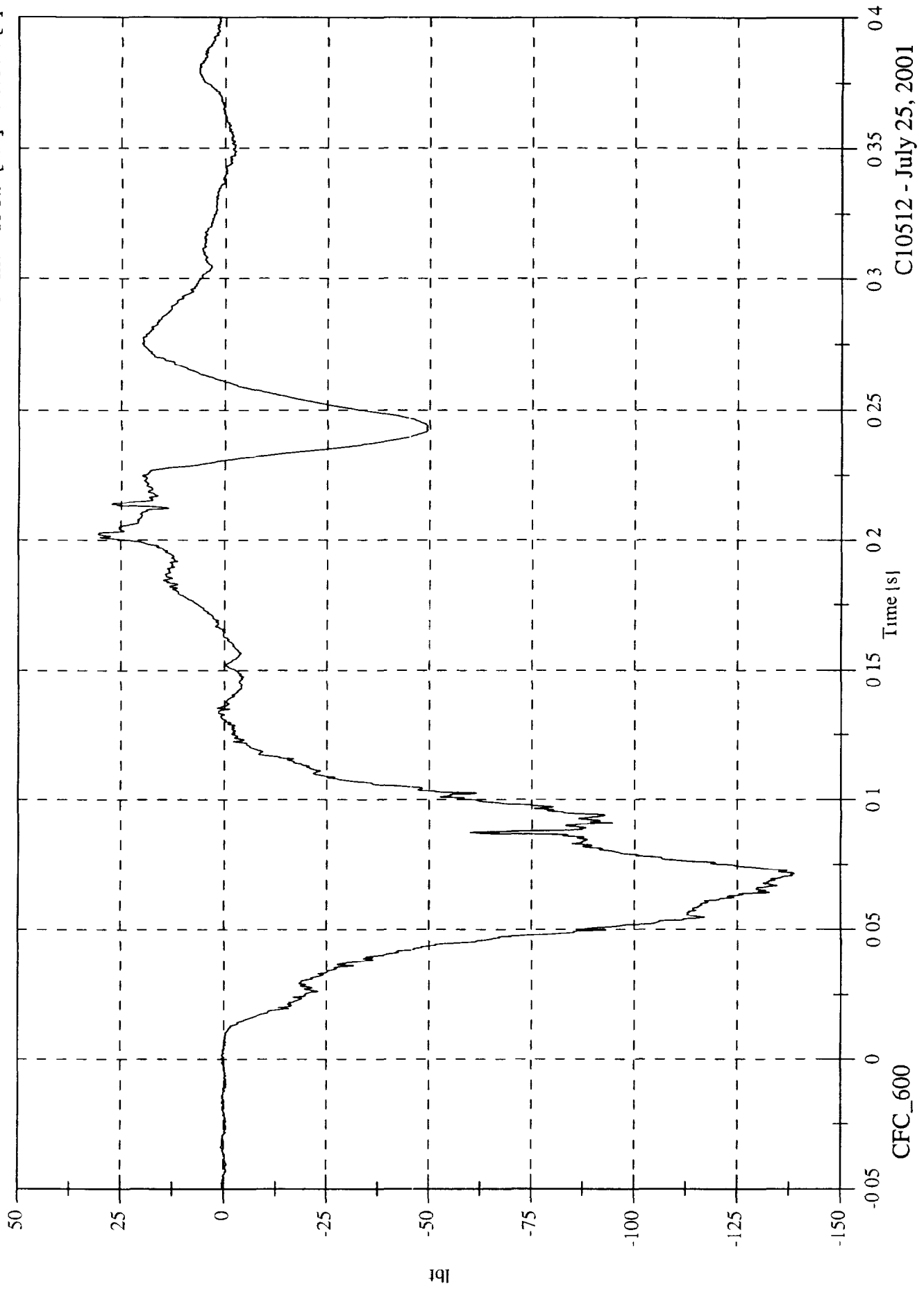


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Left Femur

Max: 30.5 [lbf] at 0.202 [s]
Min: -138.9 [lbf] at 0.071 [s]

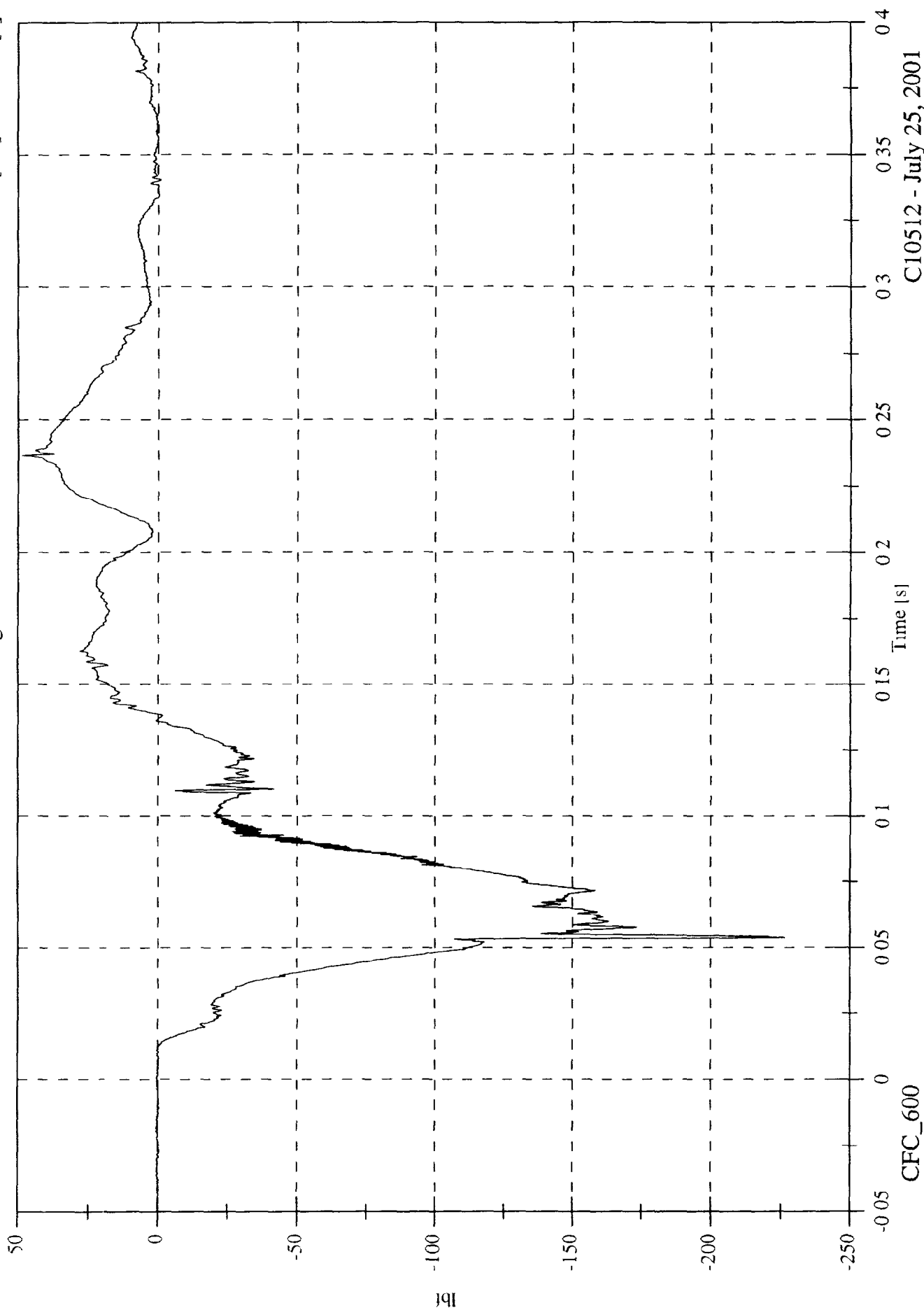


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Right Femur

Max. 48.7 [lbf] at 0.236 [s]
Min: -226.6 [lbf] at 0.054 [s]



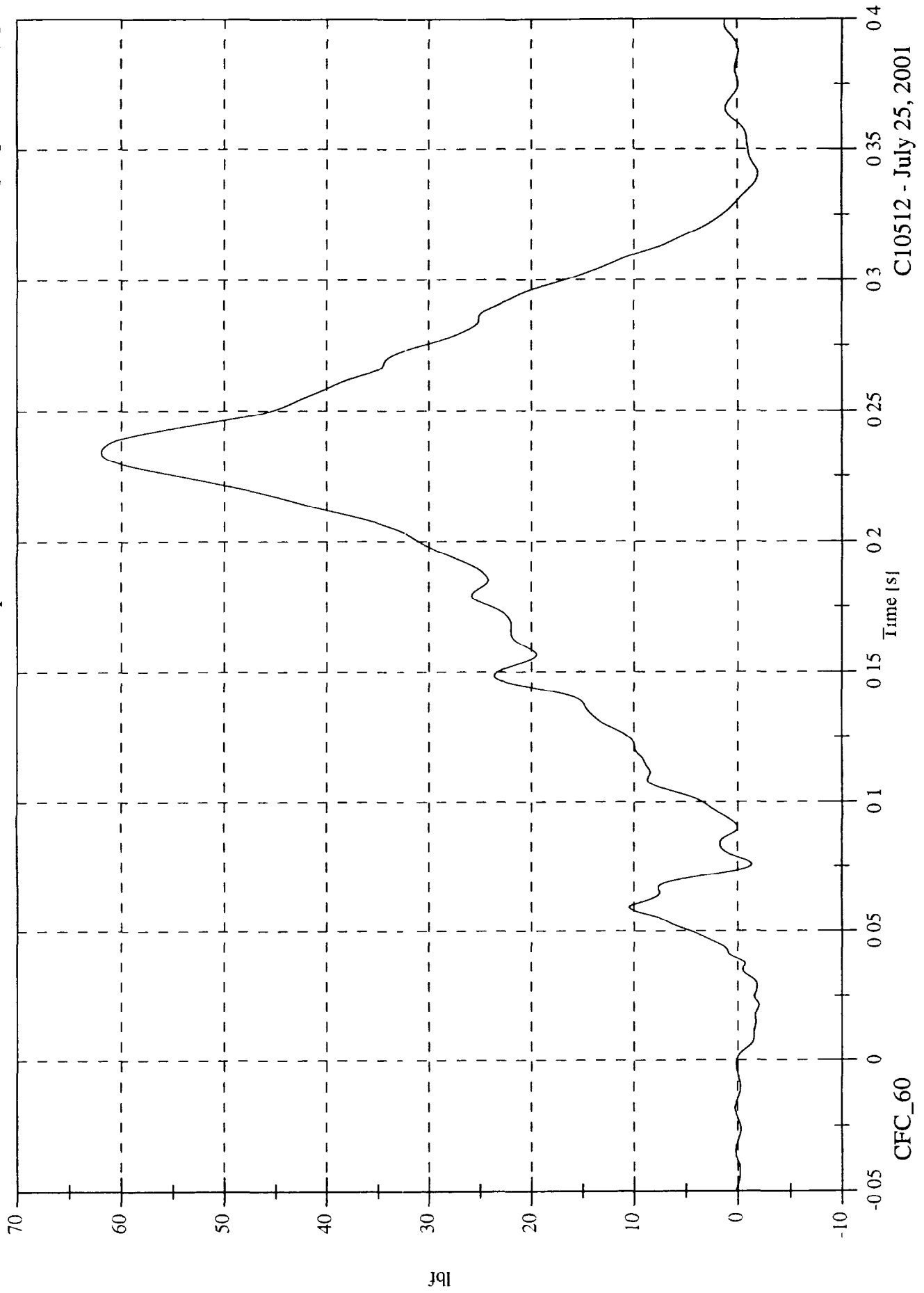
C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Lap Belt

Max: 61.9 [lbf] at 0.234 [s]

Min: -2.0 [lbf] at 0.021 [s]



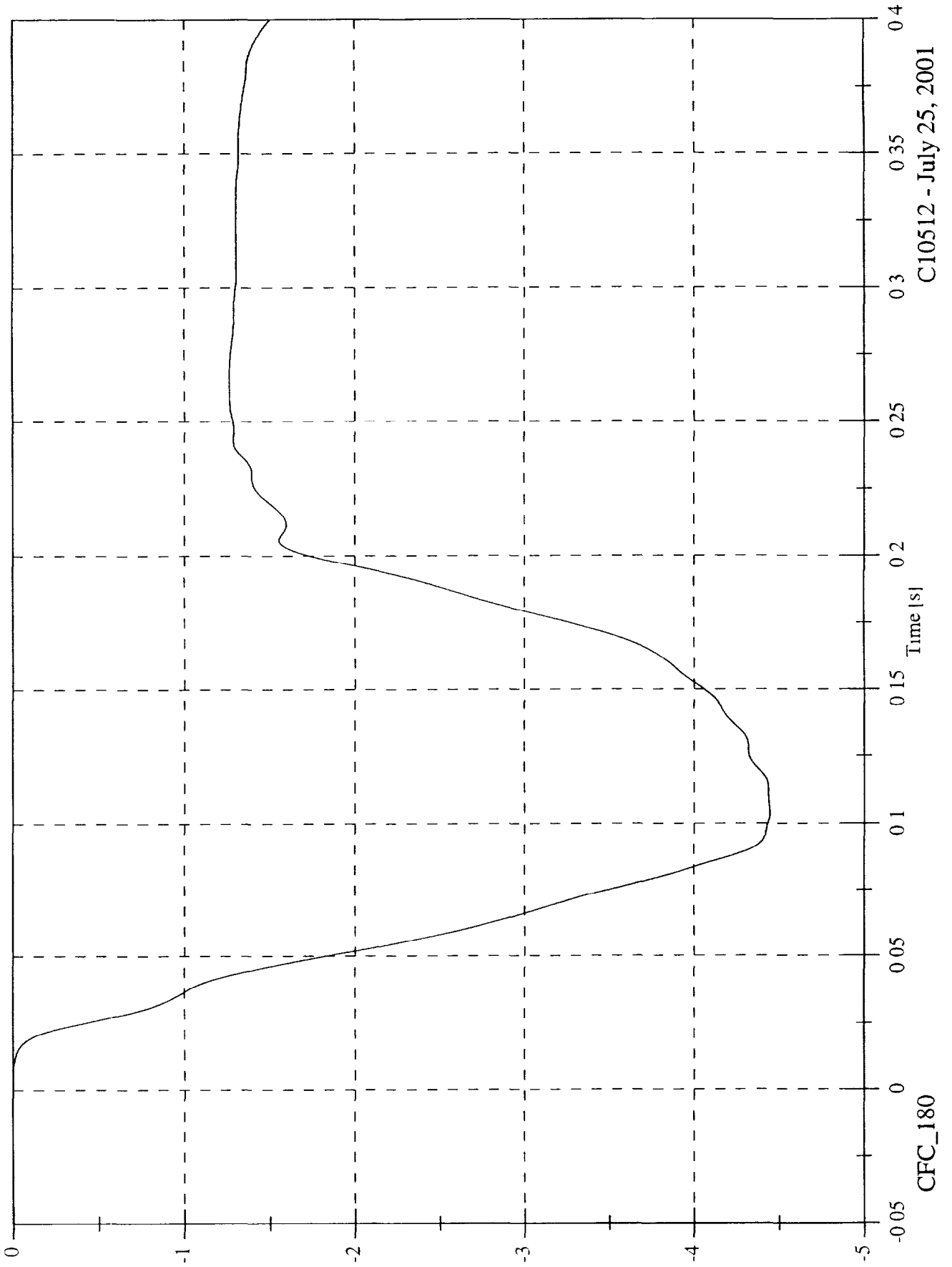
CFC_60

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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

P1 Belt Spoolout

Max. 0.0 [in] at -0.002 [s]
Min. -4.4 [in] at 0.103 [s]



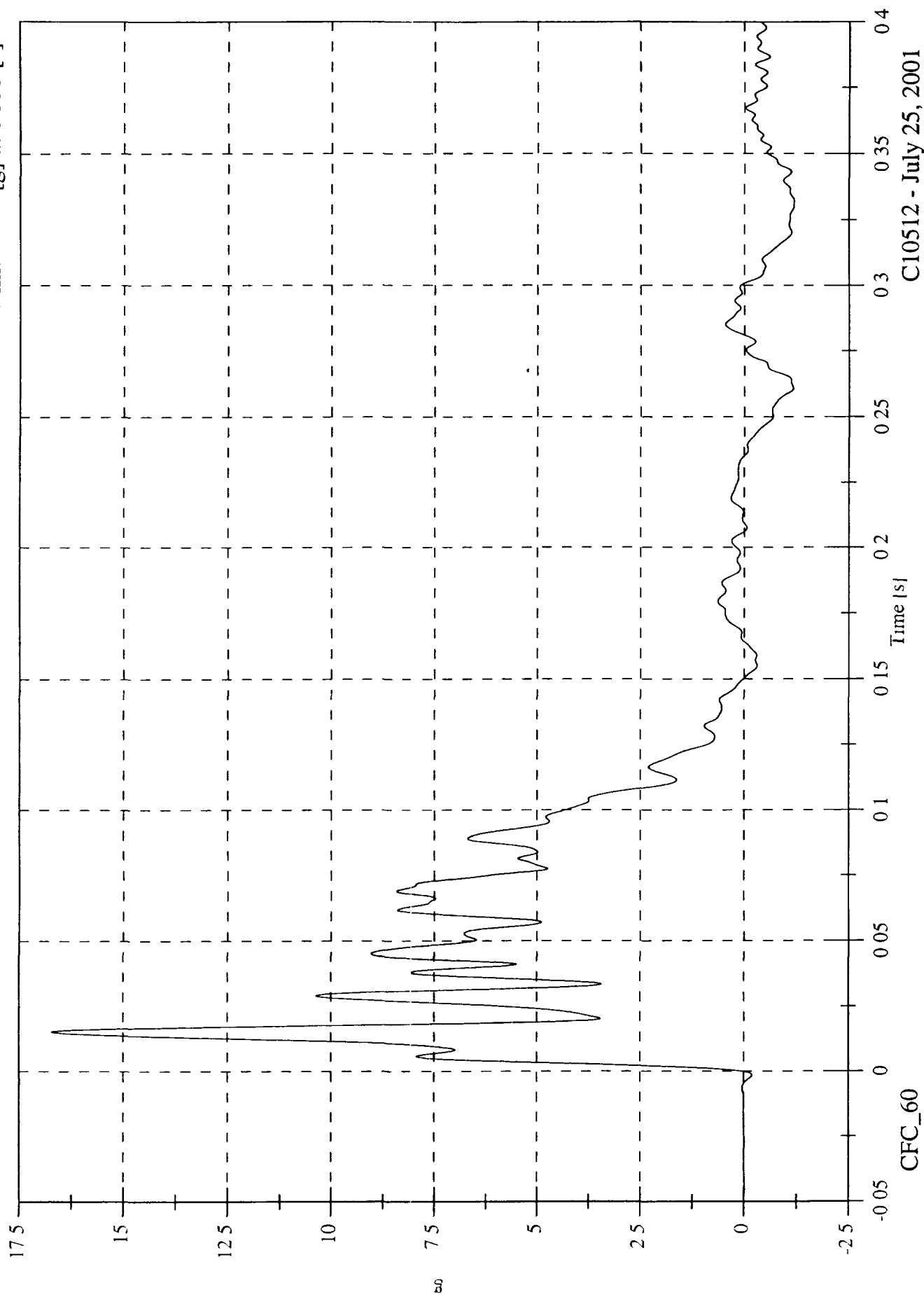
C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Acc #1 Left Rear Xmember X

Max: 16.7 [g] at 0.015 [s]

Min: -1.2 [g] at 0.332 [s]

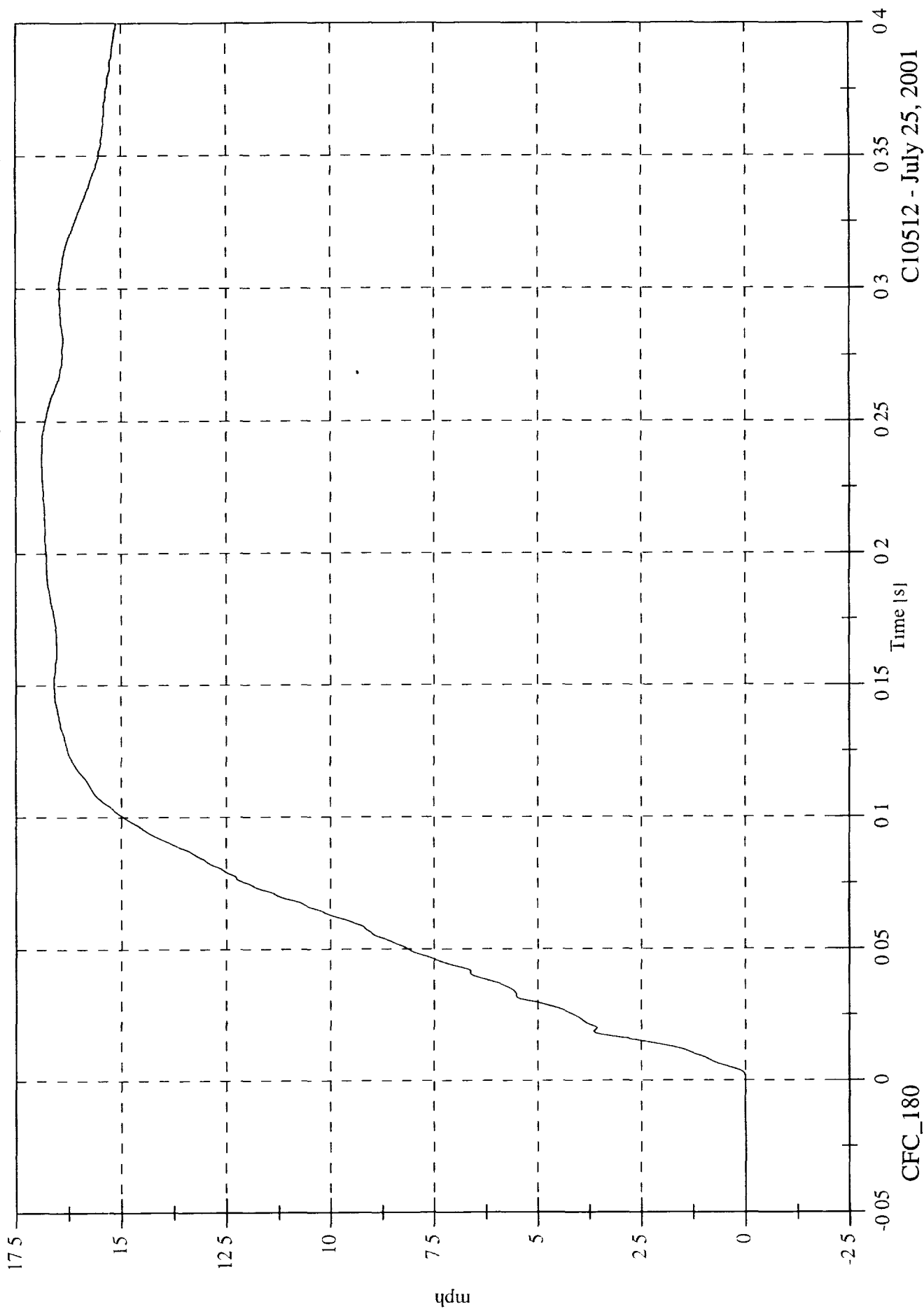


C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 16.9 [mph] at 0.235 [s]
Min: -0.0 [mph] at -0.040 [s]

Acc #1 Left Rear Xmember X Velocity



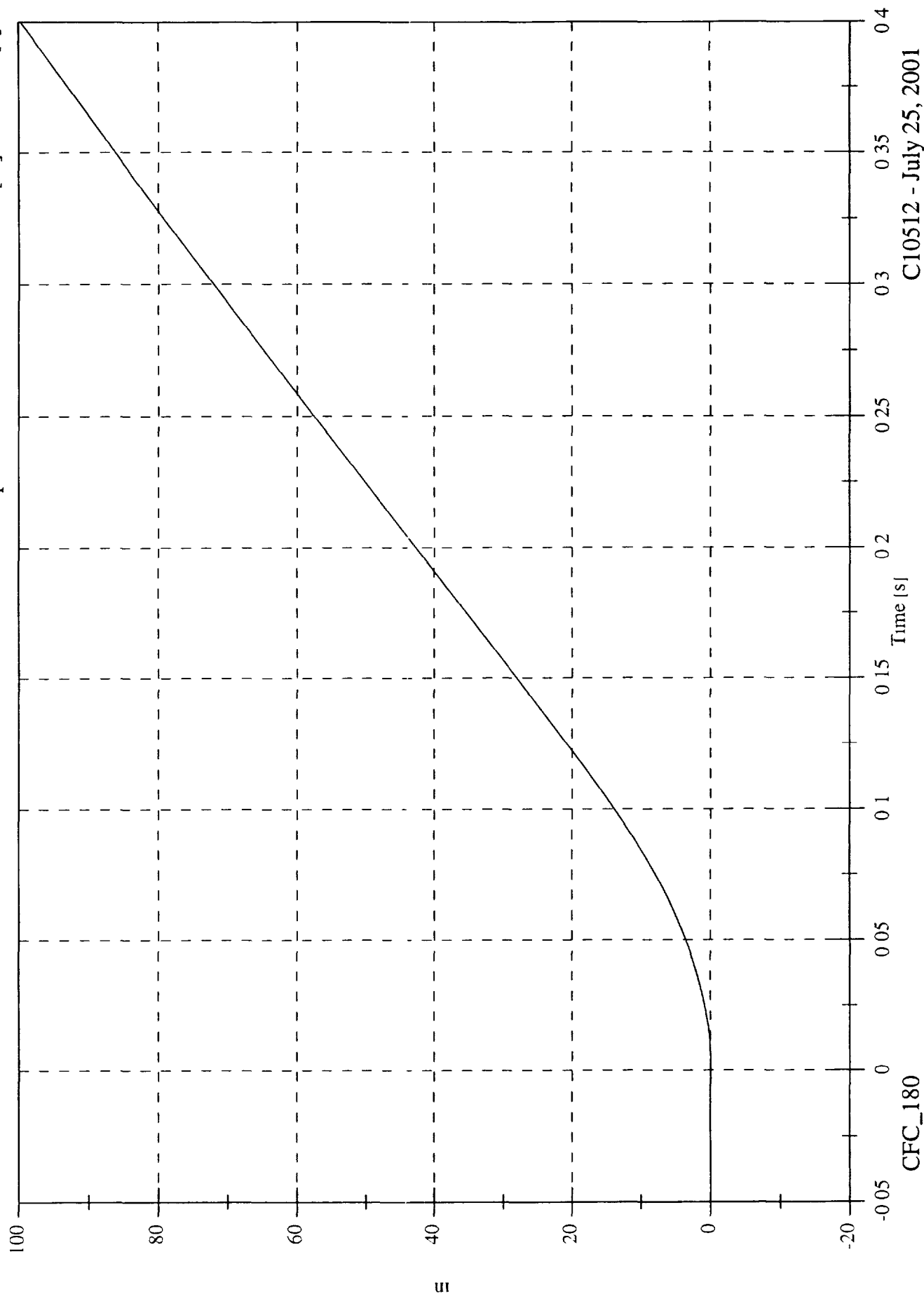
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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Acc #1 Left Rear Xmember X Displacement

Max: 99.7 [in] at 0.400 [s]

Min: -0.0 [in] at -0.008 [s]



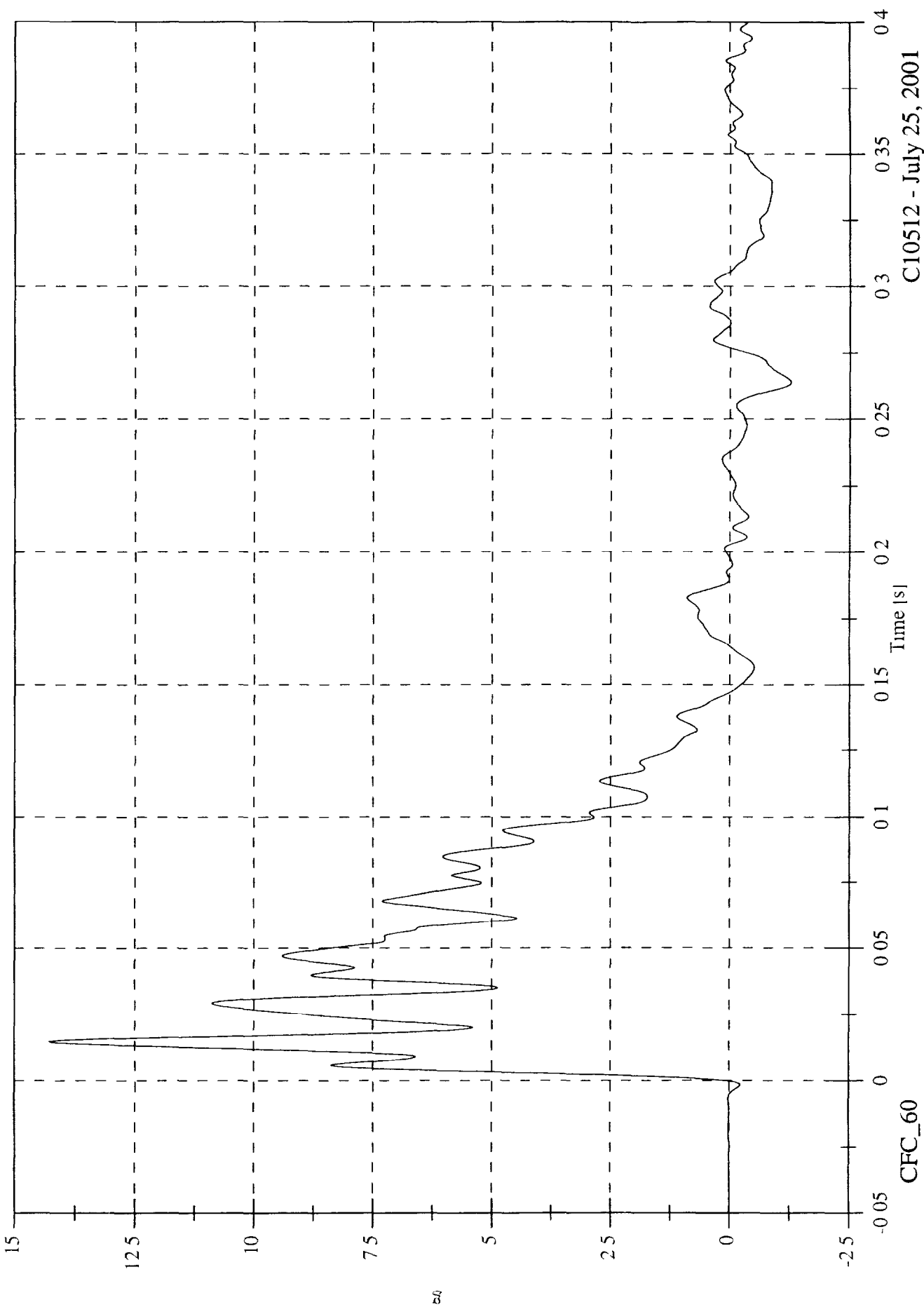
CFC_180

C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Acc #2 Right Rear Xmember X

Max: 14.3 [g] at 0.015 [s]
Min: -1.3 [g] at 0.264 [s]

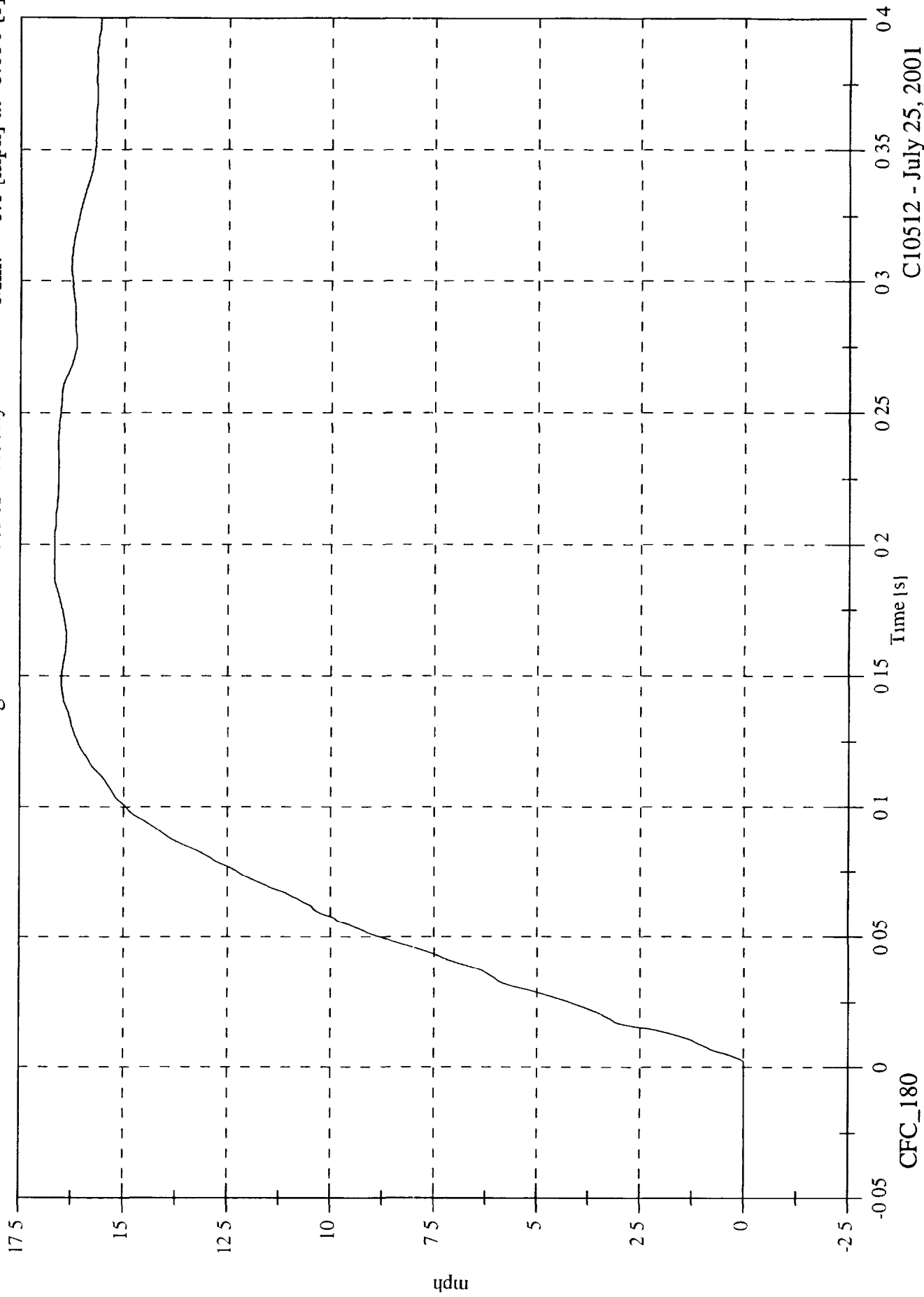


C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 16.7 [mph] at 0.203 [s]
Min: -0.0 [mph] at -0.050 [s]

Acc #2 Right Rear Xmember X Velocity



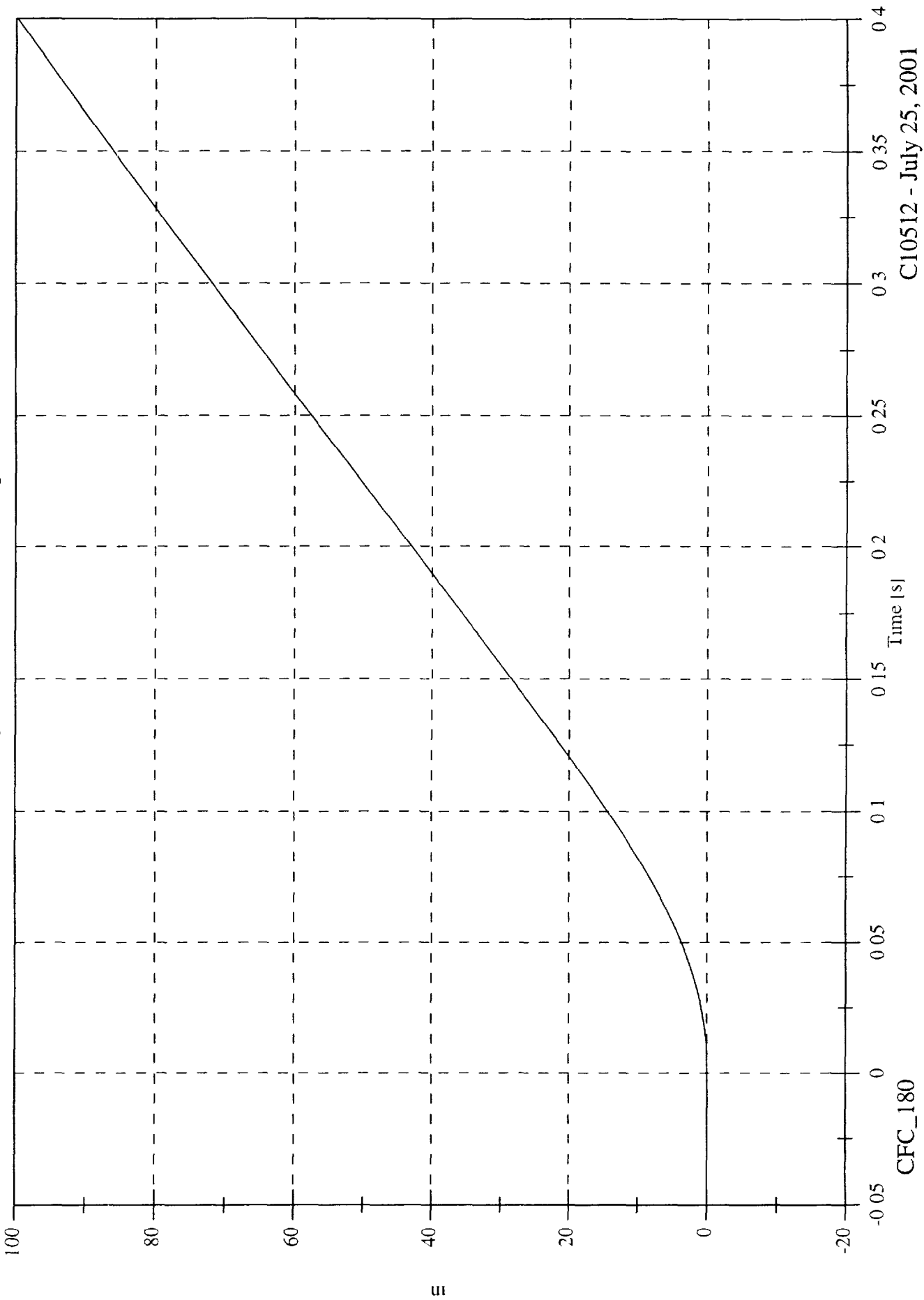
CFC_180

C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 99.8 [in] at 0.400 [s]
Min: -0.0 [in] at -0.008 [s]

Acc #2 Right Rear Xmember X Displacement



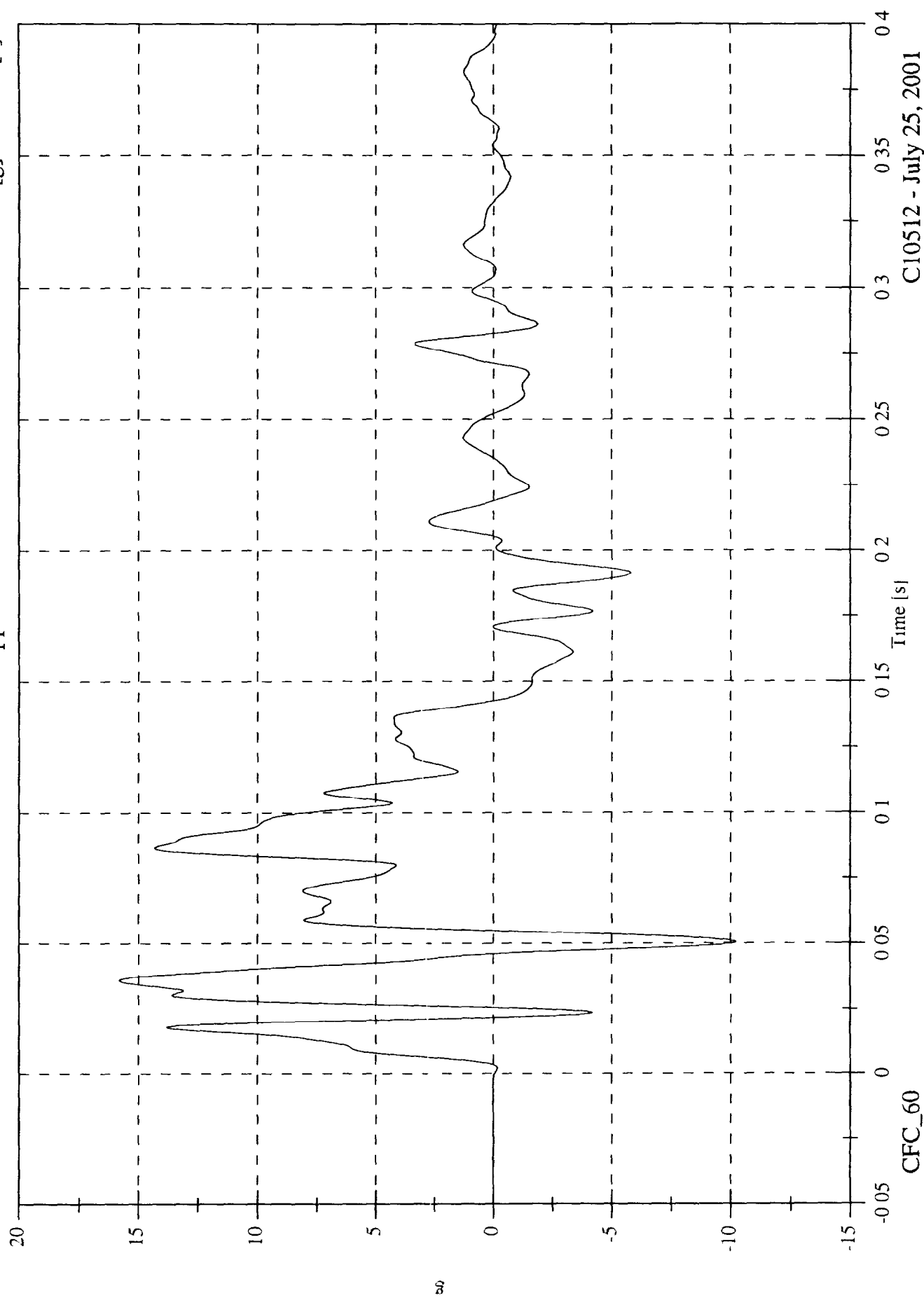
CFC_180

C10512 - July 25, 2001

NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Acc #3 Upper Seatback X

Max: 15.8 [g] at 0.036 [s]
Min: -10.2 [g] at 0.050 [s]

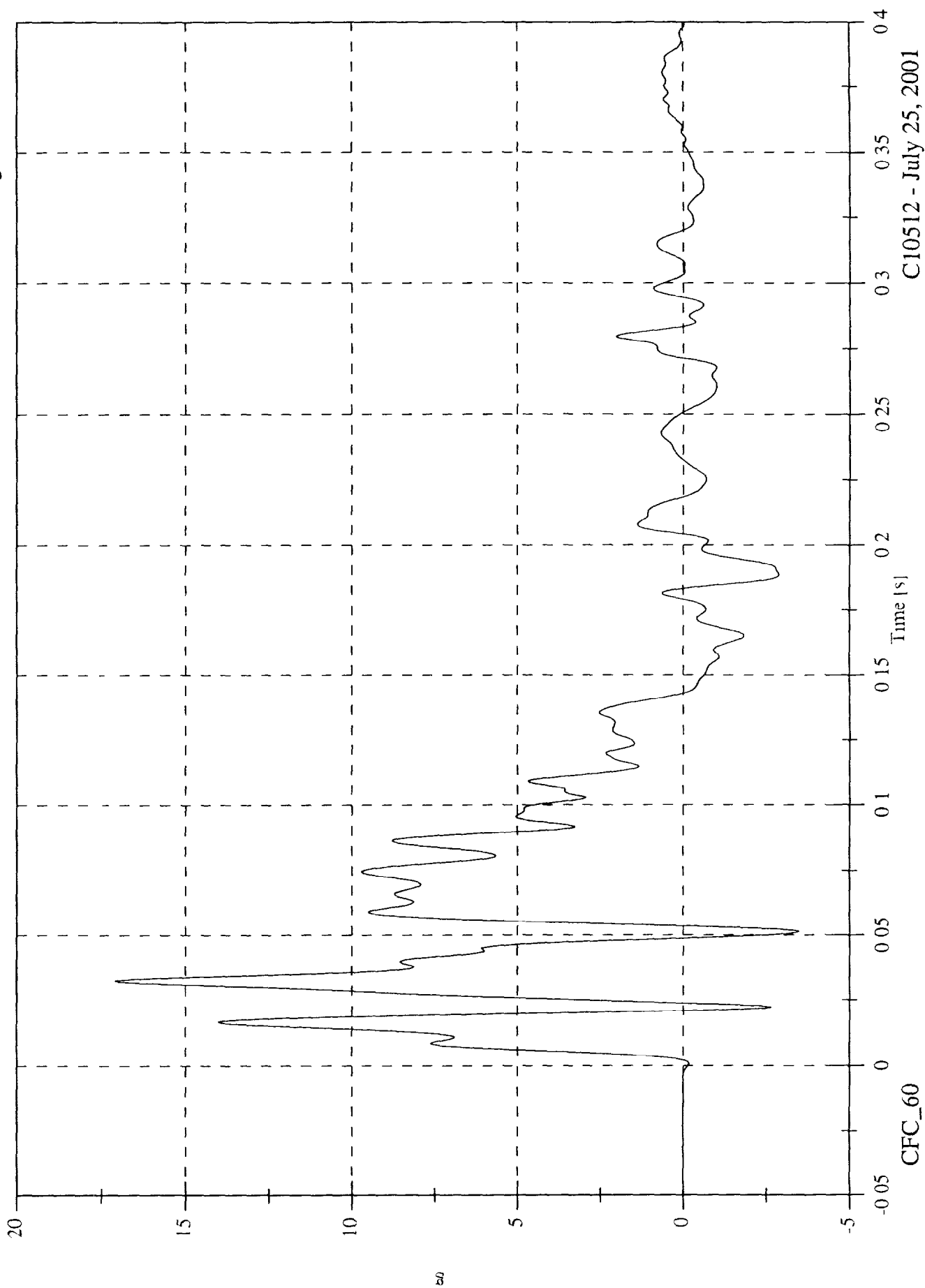


NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Acc #4 Lower Seaback X

Max: 17.1 [g] at 0.032 [s]

Min: -3.5 [g] at 0.051 [s]

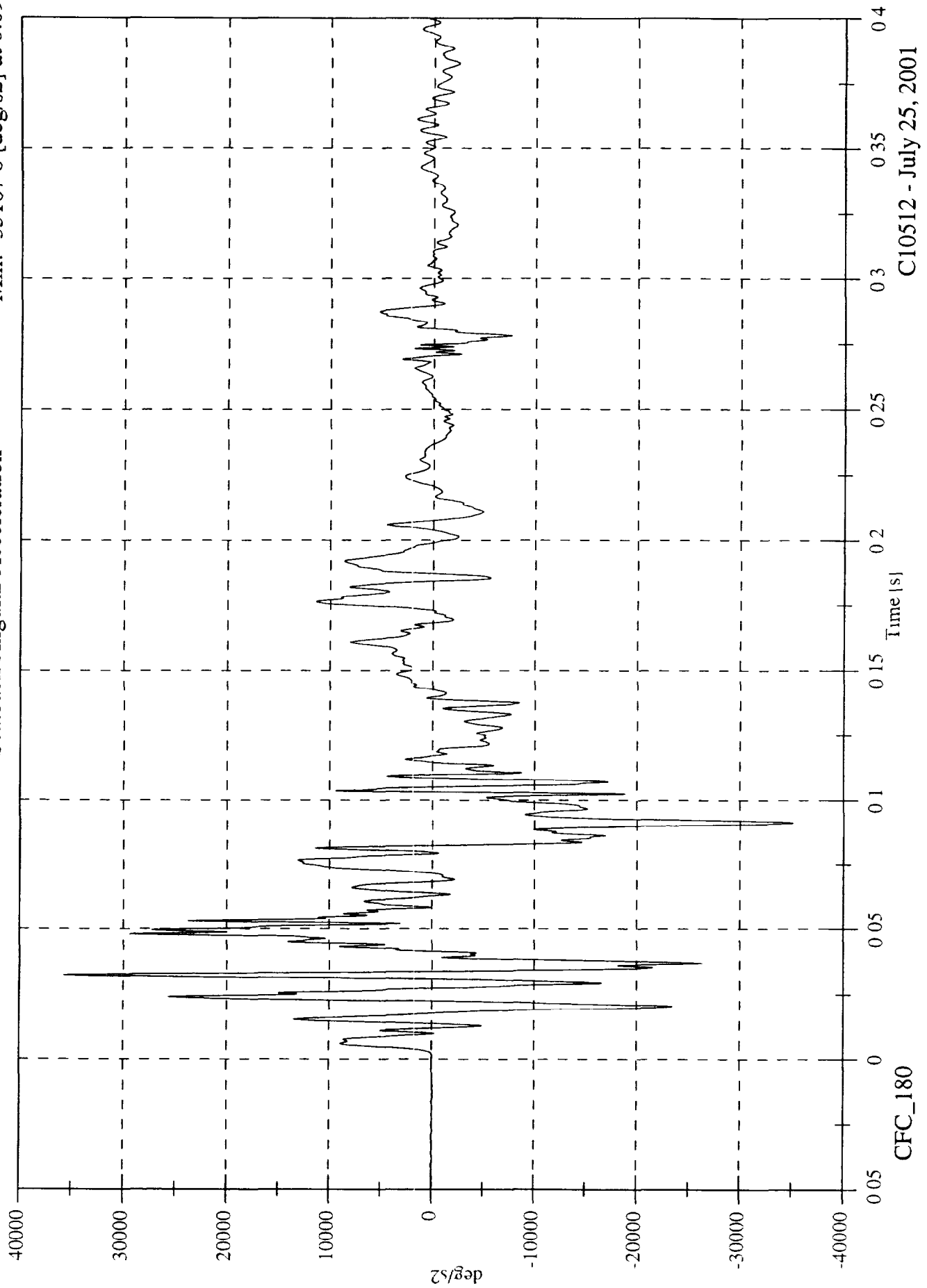


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 35678.1 [deg/s²] at 0.032 [s]
Min: -35107.8 [deg/s²] at 0.091 [s]

Seatback Angular Acceleration

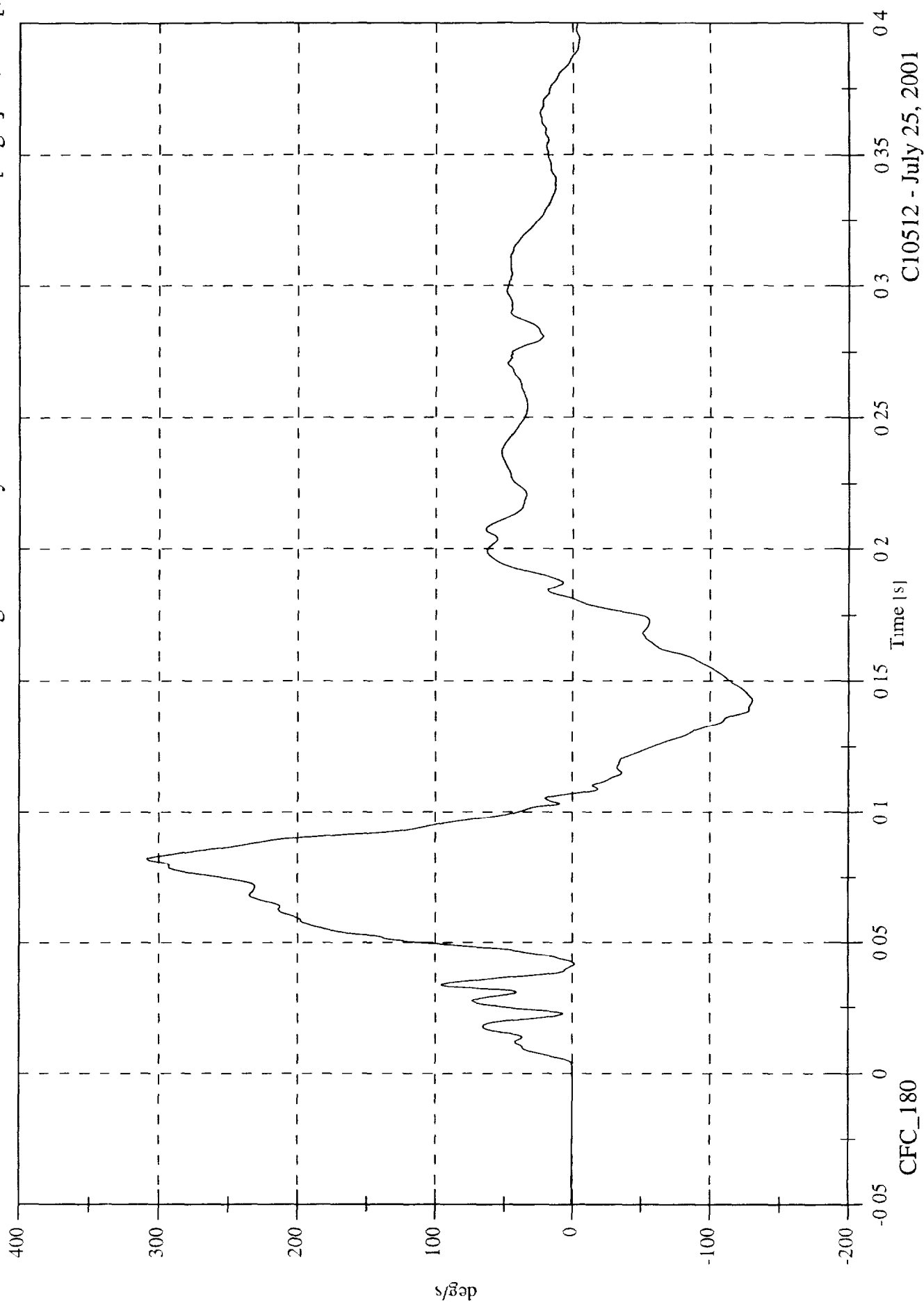


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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Max: 308.6 [deg/s] at 0.082 [s]
 Min: -130.4 [deg/s] at 0.143 [s]

Seatback Angular Velocity



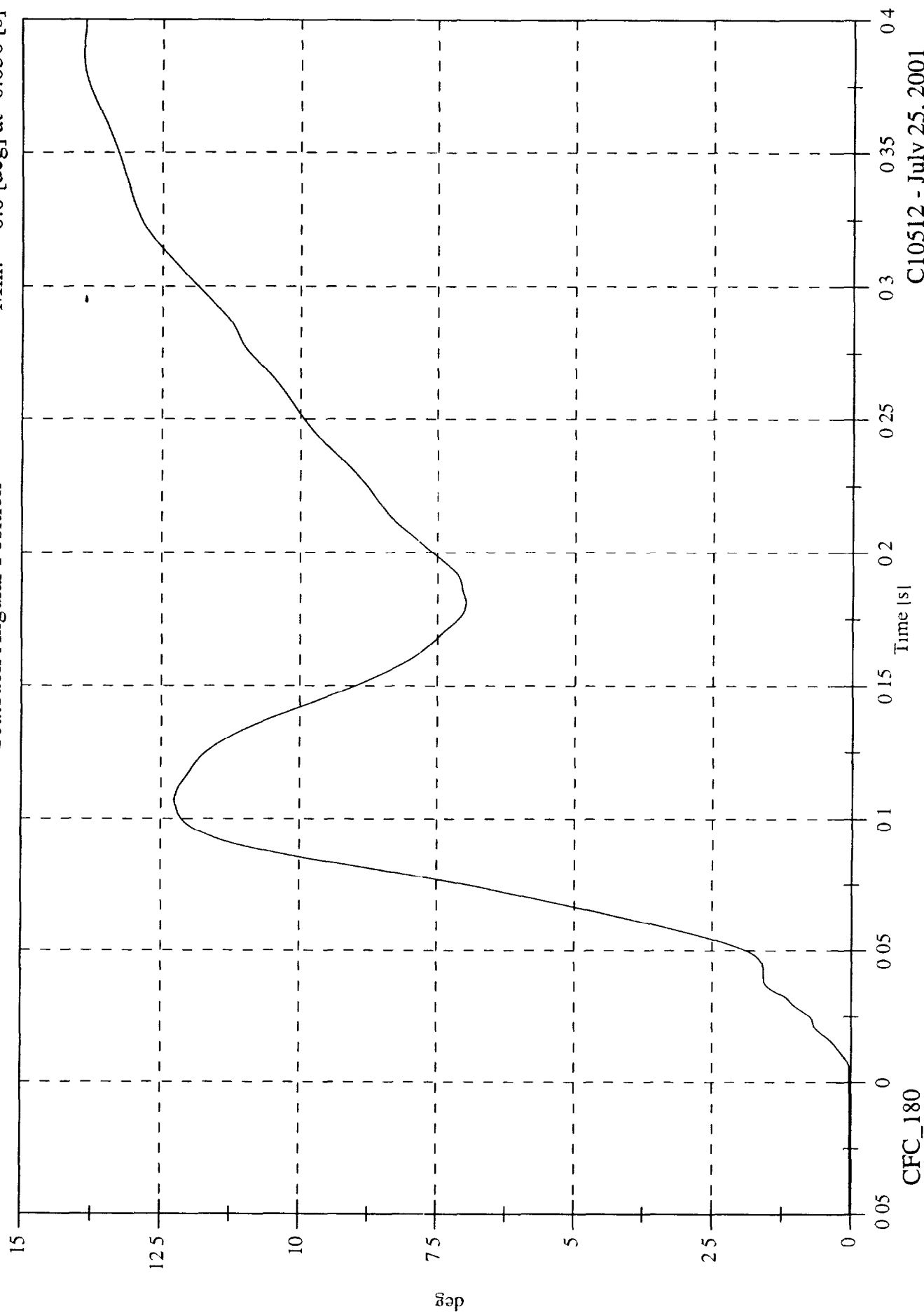
CFC_180

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NHTSA FMVSS 301 Test #1 - 2001 Hyundai Santa Fe

Seatback Angular Position

Max: 13.9 [deg] at 0.388 [s]
Min: 0.0 [deg] at -0.050 [s]



CFC_180

C10512 - July 25, 2001