V3748

REPORT NUMBER: 301-CAL-01-6

SAFETY COMPLIANCE TESTING FOR FMVSS 301 FUEL SYSTEM INTEGRITY

NISSAN MOTOR CORPORATION
2001 NISSAN
ALTIMA 4-DOOR SEDAN

NHTSA NUMBER: C15201

VERIDIAN TEST NUMBER: 8606-6

August 8, 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 Compliance
400 Seventh Street, SW
Room 6111 (NSA-30)
Washington, DC 20590

This publication is distributed by the U S Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration The United States Government assumes no liability for its contents or use thereof If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement The United States Government does not endorse products or manufacturers

Prepared By

Patrick G MacDiarmid, Jr , Project Engineer

Approved By

David J Travale, Program Manager
Transportation Sciences Center

Approval Date August 14, 2001

FINAL REPORT ACCEPTANCE BY OVSC·

Accepted By

Acceptance Date 9-24-01

TECHNICAL REPORT STANDARD TITLE PAGE

1 Report No 301-CAL-01-6	2 Government Accession No	3 Recipient's Catalog No
4 Title and Subtitle Final Report of FMVSS 301 Compliance Testing of a 2001 Nissan Altima 4-Door Sedan NHTSA No C15201		5 Report Date August 8, 2001 6 Performing Organization Code CAL
7 Author(s) Patrick G MacDiarmid, Jr , Project Engineer David J Travale, Program Manager		8 Performing Organization Report No 8606-6
9 Performing Organization Name and Address Veridian Engineering 4455 Genesee Street Buffalo, New York 14225		10 Work Unit No 11 Contract or Grant No DTNH22-01-C-01025
12 Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Vehicle Safety Compliance (NSA-30) 400 Seventh St , S W , Rm 6111, Washington, D C 20590		13 Type of Report and Period Covered Final Test Report August 2001 14 Sponsoring Agency Code NSA-30
15 Supplementary Notes		

16 Abstract

Compliance tests were conducted on the subject 2001 Nissan Altima 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 "

17 Key Words Compliance Testing Safety Engineering FMVSS 301	18 Distribution Statement Copies of this report are available from NHTSA Technical Reference Division Room 5108 (NAD-52), 400 Seventh , S W , Washington, D C 20590 Telephone No (202) 366-4946		
19 Security Classif (of this report) UNCLASSIFIED	20 Security Classif (of this page) UNCLASSIFIED	21 No of Pages 84	22 Price

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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 Nissan Altima 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 FOR C15201

A 3465 pound 2001 Nissan Altima 4-Door Sedan was impacted from the rear by a 3961 pound moving barrier at a velocity of 29 5 mph The test was performed by Veridian Engineering on August 8, 2001

One instrumented Part 572 E and one non-instrumented Part 572 E, 50th percentile male Anthropomorphic Test Device (ATD) were placed in the driver and right-front passenger seating positions respectively Additional ballast (0 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 15 8 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 12 87 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 · C15201 Test Mode. 30 mph Rear Barrier

Test Date August 8, 2001 Time 10 35 Temperature. 86 °F

Vehicle Make/Model/Body Style 2001 Nissan Altima 4-Door Sedan

Vehicle Test Weight· 3465 lbs Impact Velocity 29 5 mph

Static Crush.

Left Side· 12 0 inches

Centerline. 14 4 inches

Right Side 12.2 inches

Average. 12 87 inches

TYPE OF FRONT OCCUPANT RESTRAINT SYSTEM INSTALLED IN TEST VEHICLE

Driver's DSP Seatbelt, Airbag, Knee Bolster

Right Passenger's DSP Seatbelt, Airbag, Knee Bolster

VISIBLE DUMMY CONTACT POINTS

Driver The back of the head to the headrest The left and the right knee to the bottom of the steering wheel.

Passenger· The back of the head to the headrest

DOOR OPENING DATA Closed/Operable - Left Front

Closed/Operable - Right Front

Stoddard Solvent Spillage from Vehicle's Fuel System· None

Remarks The seat back angle was 24 4° after the event The initial angle was 14.7°. The rear window shattered upon impact The rear doors remained closed and operable after the event

Table 2

GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION

Year/Make/Model/Body Style: 2001 Nissan Altima 4-Door Sedan

NHTSA No C15201, VIN 1N4DL01A21C181883, Color Gold

Engine Data 4 cylinders, - CID, 2.4 Liters, 4 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 5-18-2001, Odometer Reading 946 miles

Selling Dealer Herb Gordon Nissan

& Address 313 Automobile Blvd. Silver Spring, MD 20904

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL

Vehicle Manufactured by Nissan Motor Corporation

Date of Manufacture 2/01

GVWR 3990 lbs, GAWR 2152 lbs FRONT, 1863 lbs REAR

DATA FROM TIRE PLACARD

Location of Placard on Vehicle Left B-Pillar

Tire Pressure with Maximum Capacity Vehicle Load 44 psi FRONT 44 psi REAR

Recommended Tire Size. P205/60R15

* Recommended Cold Tire Pressure 29 psi FRONT, 29 psi REAR

Size of Tires on Test Vehicle P205/60R15 Manufacturer General

Type of Spare Tire Temporary

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) = 860 lbs

No of Occupants x 150 lbs = 750 lbs

Rated Cargo/Luggage Weight (RCLW) = 110 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 =	945	lbs	Right Rear =	562	lbs.
Left Front =	952	lbs	Left Rear =	581	lbs
TOTAL FRONT =	1897	lbs	TOTAL REAR =	1143	lbs

TOTAL DELIVERED WEIGHT = 3040 lbs

% of Total Front of Vehicle Weight = 62 4% of Total Rear Weight = 37 6%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT

Total Delivered Weight =	3040	lbs
Rated Cargo/Luggage Weight (RCLW) =	110	lbs.
Weight of 2 p 572 Dummies, 167 & 164 lbs =	331	lbs
TARGET TEST WEIGHT =	3481	lbs

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 94 POUNDS OF CARGO WEIGHT·

Right Front =	1073	lbs	Right Rear =	639	lbs
Left Front =	1092	lbs	Left Rear =	661	lbs
TOTAL FRONT =	2165	lbs	TOTAL REAR =	1300	lbs.

TOTAL TEST WEIGHT = 3465 lbs

% of Total Front of Vehicle Weight = 62 5% of Total Rear Weight = 37 5%

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

Type of Ballast None

Method of Securing Ballast N/A

Vehicle Components Removed for Weight Reduction None

VEHICLE ATTITUDE (all dimension in inches)

AS DELIVERED	RF	26 5	LF	26 3	RR	26 6	LR	26 6
AS TESTED·	RF	25 9	LF	26 0	RR	26 3	LR	26 3

Vehicle's Wheel Base 103 1 in

Location of Vehicle's C G 38 68 inches rearward of front wheel center

FUEL SYSTEM DATA

Fuel System Capacity From Owner's Manual = 15 8 gallons

Usable Capacity Figure Furnished by COTR = 15 8 gallons

Test Volume Range (91 to 94% of Usable Capacity) = 14 38 to 14 85 gallons

ACTUAL TEST VOLUME= 14 6 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 Tank- Centered ahead of rear axle, Lines –Inside right frame stiffener, Filler - Left side behind rear axle

Table 3

MOVING BARRIER PARAMETER DATA

WEIGHT OF MOVING BARRIER.

Right Front	=	1113	lbs	Right Rear =	868 lbs
Left Front	=	1102	lbs	Left Rear =	878 lbs
TOTAL FRONT	=	2215	lbs	TOTAL REAR =	1746 lbs
TOTAL BARRIER WEIGHT =		3961	lbs		

MOVING BARRIER DIMENSIONS

Barrier Face Height	60 0	in
Barrier Face Width	78 0	in.
Barrier Face Ground Clearance	5.0	in
Tread Width	59 5	in
Wheel Base	120 0	in
Location of C G	X 52 9	inches rearward of front wheel center
	Y 0 0	inches from longitudinal-vertical plane of symmetry
	Z 16 3	inches above ground

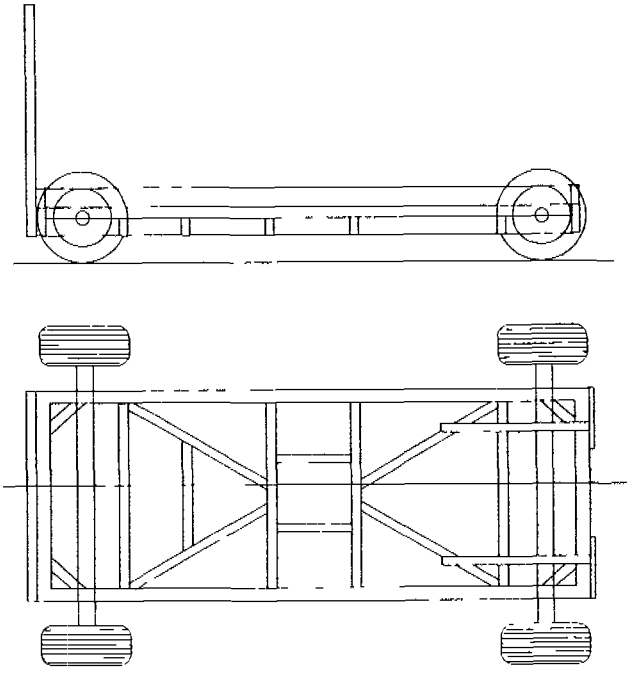


Table 4

POST IMPACT DATA

TYPE OF TEST·

Type of Test. Rear Barrier Impact Angle. 0°

Test Date· August 8, 2001 Time. 10 35 Temperature· 86 °F

Vehicle NHTSA No C15201

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 5 mph, Trap No 2 = 29 5 mph

Average Impact Speed = 29 5 mph

VEHICLE STATIC CRUSH

Vehicle Length

Pre-Test	Left =	179 1	, C/L =	185 6	Right =	179 1
Post-Test	Left =	167 1	, C/L =	171 2	Right =	166 9
Crush	Left =	12 0	, C/L =	14 4	Right =	12 2

AVERAGE = 12 87 inches

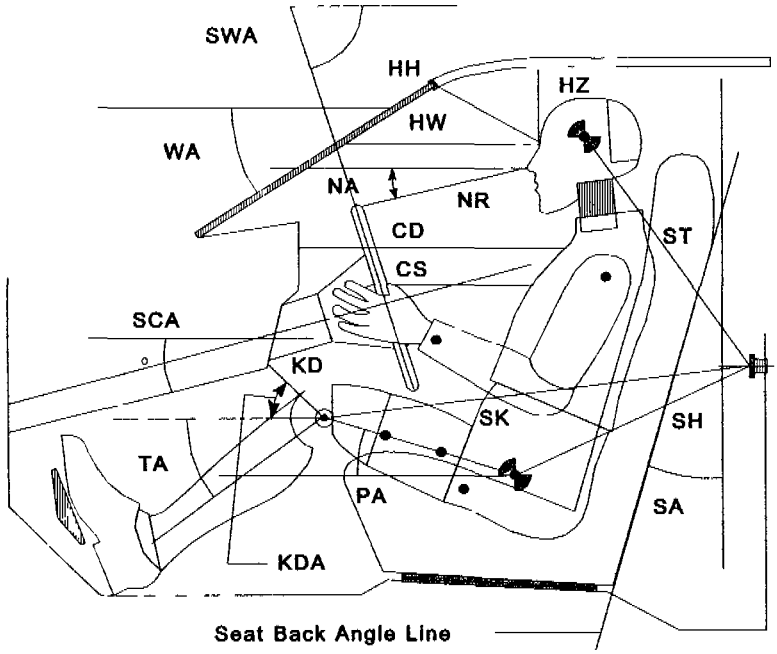
Section 3

COMPLIANCE TEST DATA

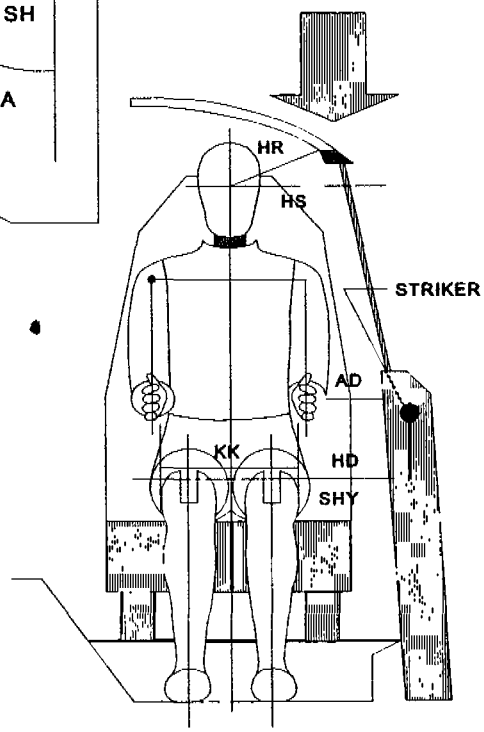
Figure 1

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

DUMMY MEASUREMENT FOR FRONT SEAT PASSENGERS



AD-Arm to Door
HD-H-Point to Door
HR-Head to Side Header
HS-Head to Side Window
KK-Knee to Knee
SHY-Striker to H-Point (Y Direction)



CD-Chest to Dash
CS-Steering Wheel to Chest
HH-Head to Header
HW-Head to Windshield
HZ-Head to Roof
KDA-Knee to Dash Angle
KDL-Left Knee to Dash
KDR-Right Knee to Dash
NA-Nose to Rim Angle
NR-Nose to Rim
PA-Pelvic Angle
RA-Rim to Abdomen
SA-Seat Back Angle
SCA-Steering Column Angle
SH-Striker to H-Point
SK-Striker to Knee
ST-Striker to Head
SWA-Steering Wheel Angle
TA-Tibial Angle
WA-Windshield Angle

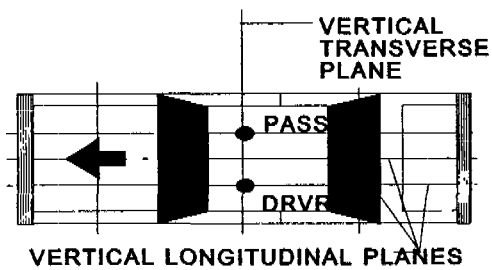


Table 5

FRONT SEAT OCCUPANT MEASUREMENTS
(FOR REAR IMPACT ONLY)

	DRIVER (Serial #152)
WA°	28 7 deg
SWA°	65 2 deg
SCA°	24 8 deg
SA°	14 7 deg
HZ	6 8
HH	11 7
HW	20 5
HR	7 9
NR	15 6 Angle -15 deg
CD	19 5
CS	11 3
RA	7 6
KDL	6 7 Angle (KDA) 35 deg
KDR	5 7
PA°	23 9 deg
TA°	40 7 deg
KK	11 8
ST	20 2 Angle 13 deg
SK	24 0 Angle 95 deg
SH	10 3 Angle 128 deg
SHY	10 0
HS	11 5
HD	5 6
AD	4 4

(Measurements in inches)

Table 6
FUELSYSTEM INTEGRITY POS I IMPACT TEST DATA

FMVSS NO 301

TEST VEHICLE NHTSA NO C15201 TEST DATE August 8, 2001

Vehicle Mfgr /Make/Model 2001 Nissan Altima 4-Door Sedan

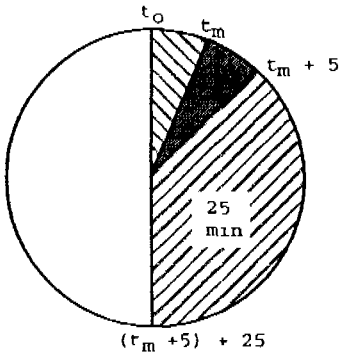
Test vehicle fuel tank filled to 91% to 94% of manufacturer's "usable" capacity and with electric fuel pump operating (if it will operate without engine operation) Part 572 test dummies located at each front designated seating position

****

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



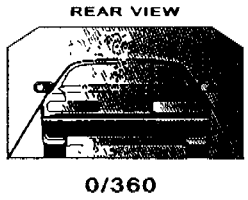
		ACTUAL	MAX ALLOWED
1	From impact until vehicle motion ceases	0	1 oz
2	For five minute period after vehicle motion ceases	0	5 oz
3	For next 25 minutes	0	1 oz /1 min

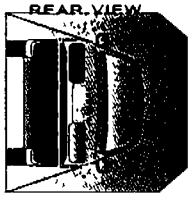
SOLVENT SPILLAGE DETAILS

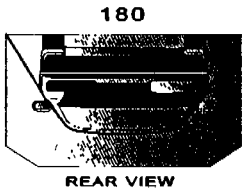
None

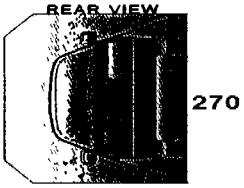
Table 7 FMVSS NO 301 - STATIC ROLLOVER DATA SHEET

Vehicle 2001 Nissan Altima 4-Door Sedan NHTSA No C15201









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	16	seconds	5	minutes	6	minutes	16	seconds	7	minutes
90° - 180°	1	minutes	01	seconds	5	minutes	6	minutes	1	seconds	7	minutes
180°-270°	1	minutes	01	seconds	5	minutes	6	minutes	1	seconds	7	minutes
270°-360°	1	minutes	12	seconds	5	minutes	6	minutes	12	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°	None
90° - 180°	None
180°-270°	None
270°-360°	None

Figure 2

CAMERA POSITIONS FOR REAR IMPACTS

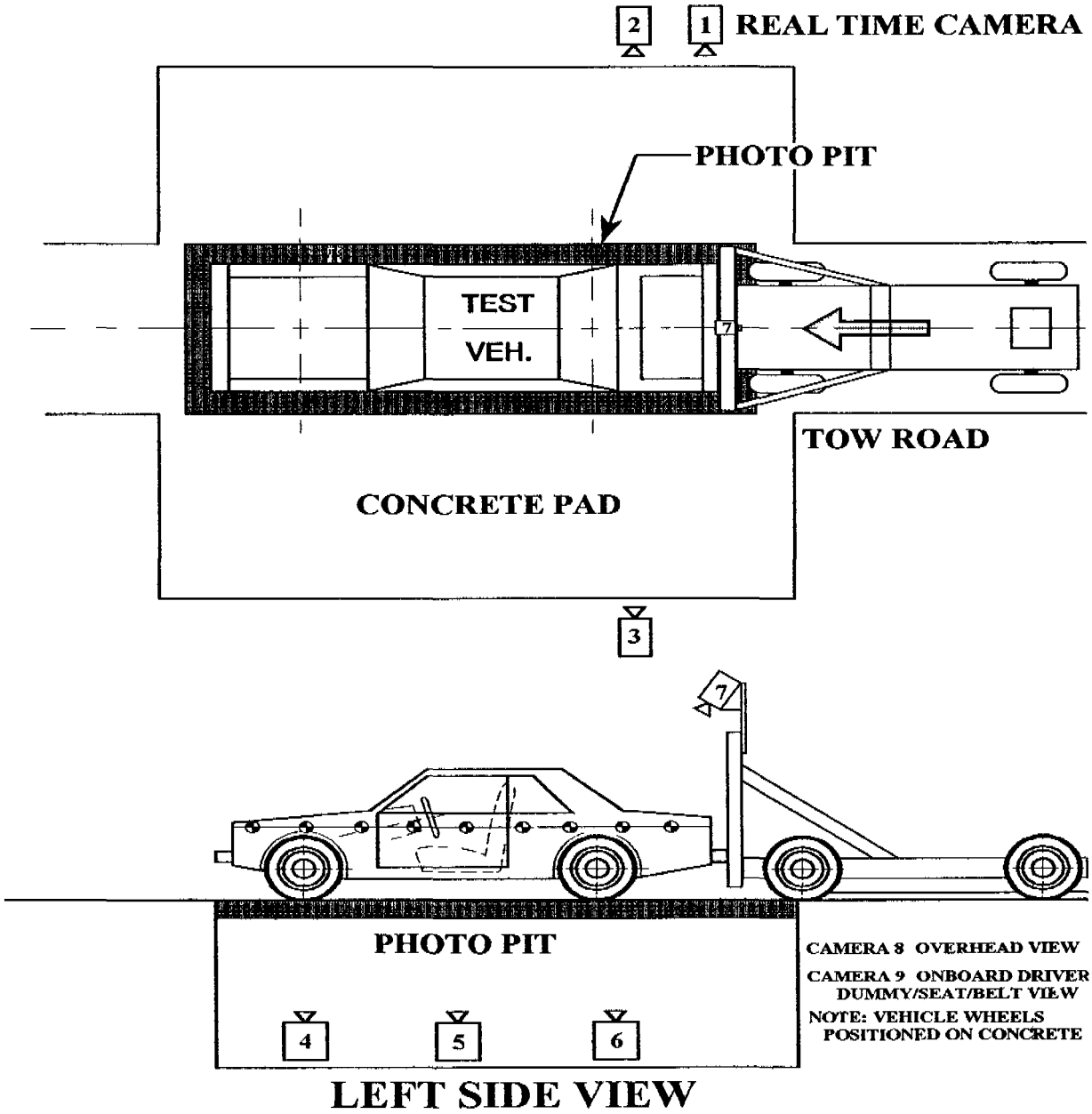


Table 8

HIGH-SPEED CAMERA LOCATIONS

NHTSA No C15201 Vehicle . 2001 Nissan Altima 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	551	86	43 7	1	13	1000
3	Left Side View	558	96	42 3	0	13	1000
4	Vehicle Front Underbody View	0	118	-77	90	13	1000
5	Vehicle Mid-Section Underbody View	0	72	-77	90	13	1000
6	Vehicle Rear Underbody View	0	35	-77	90	13	1000
7	Moving Barrier View	0	0	99	-105	13	1000
8	Overhead Overall View	-20	0	386	-90	13	1000
9	Onboard Driver Dummy/Seat/Belt View	-	-	-	-	8	750

* 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

Figure A-1 PRE-TEST FRONT VIEW

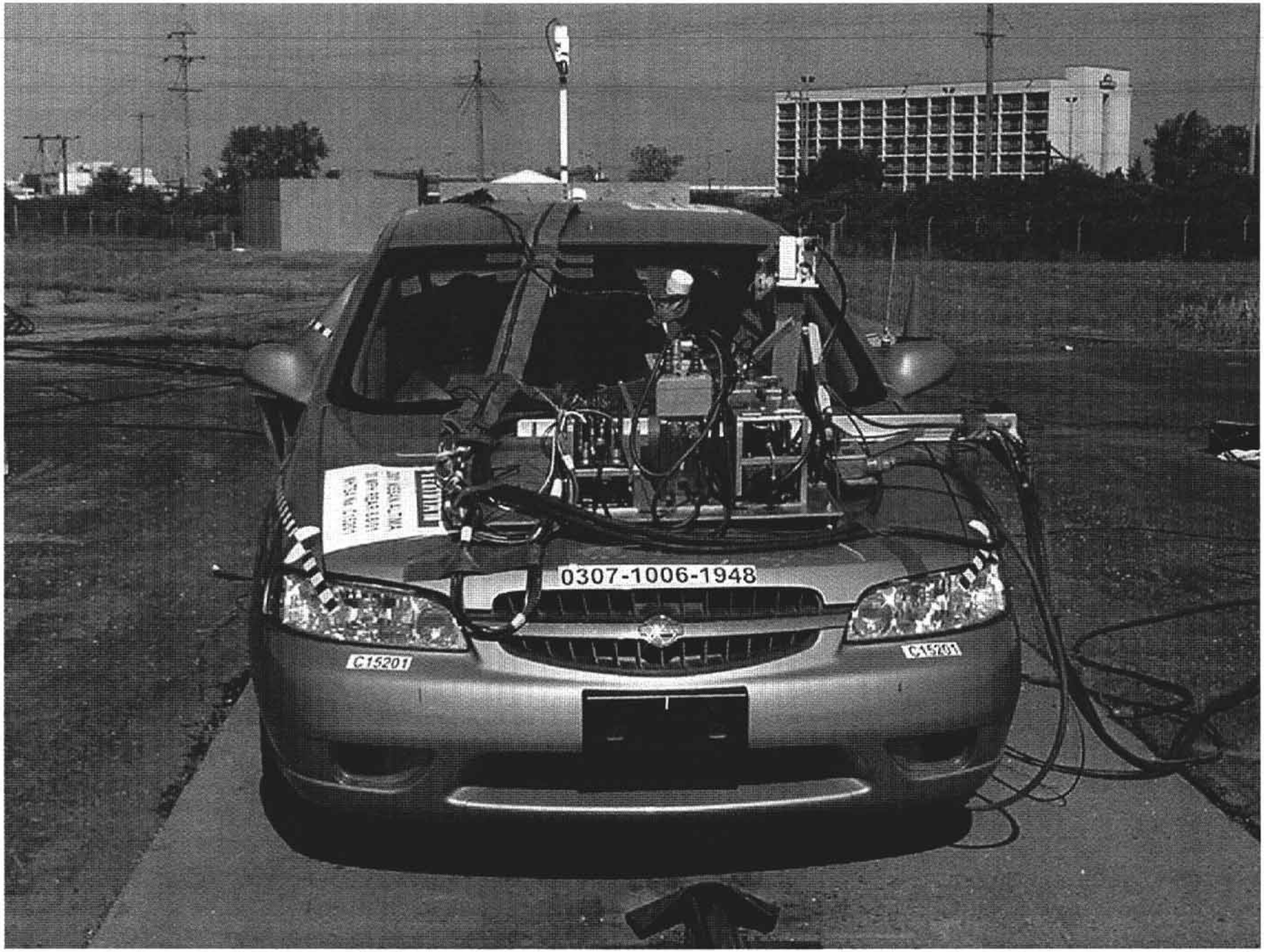


Figure A-2 POST-TEST FRONT VIEW

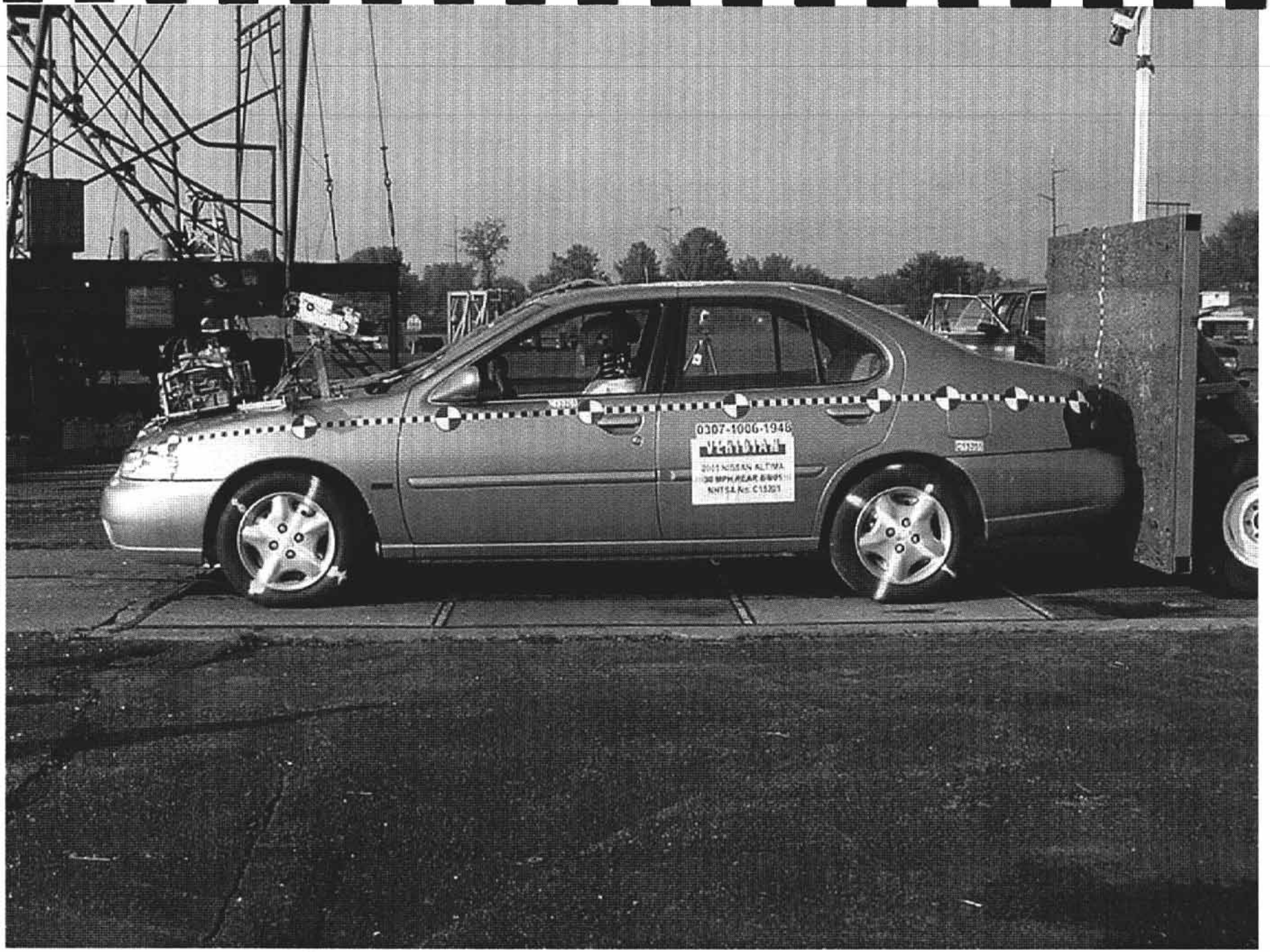


Figure A-3 PRE-TEST LEFT SIDE VIEW

Figure A-4 POST-TEST LEFT SIDE VIEW

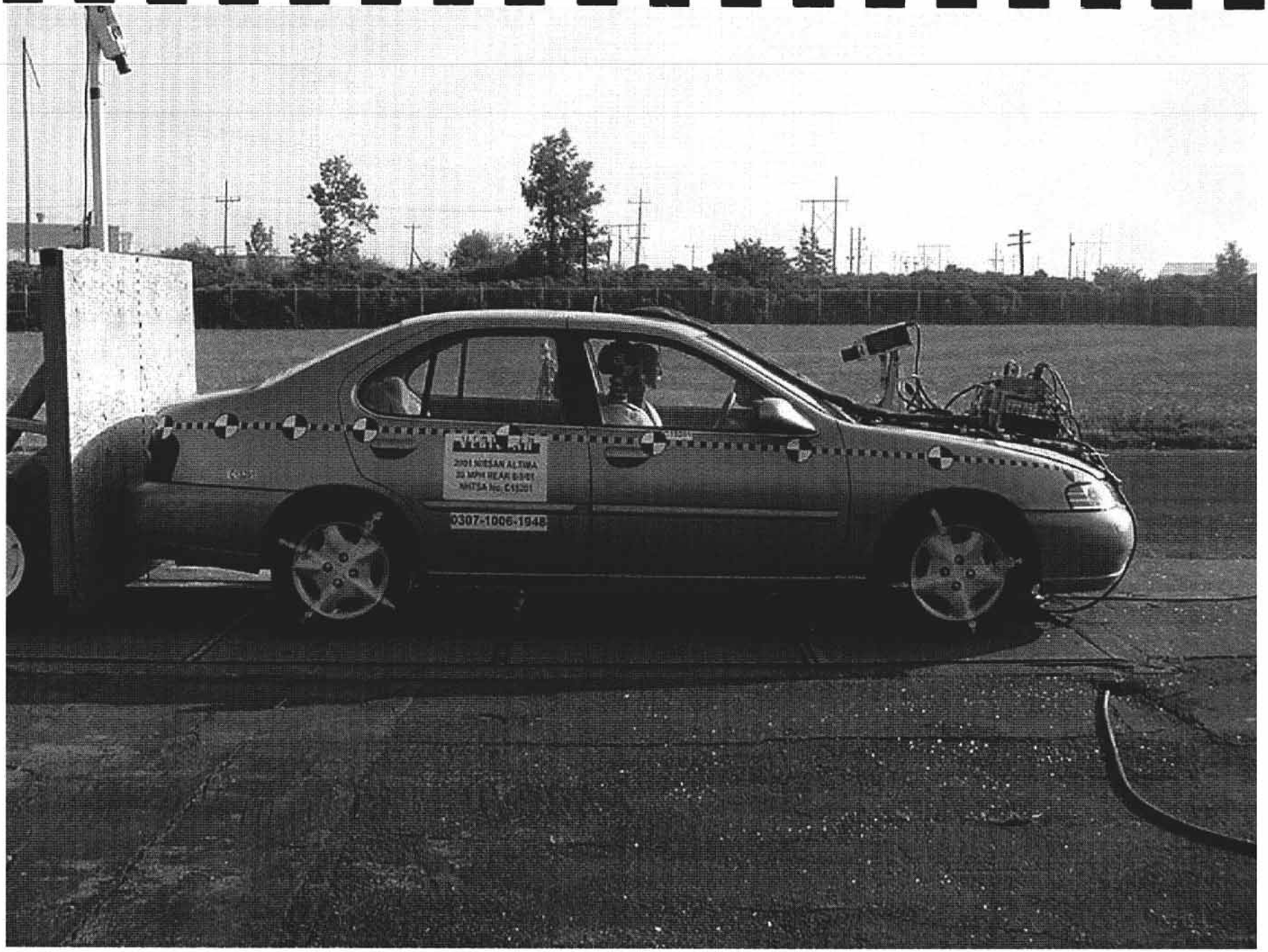


Figure A-5 PRE-TEST RIGHT SIDE VIEW

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

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

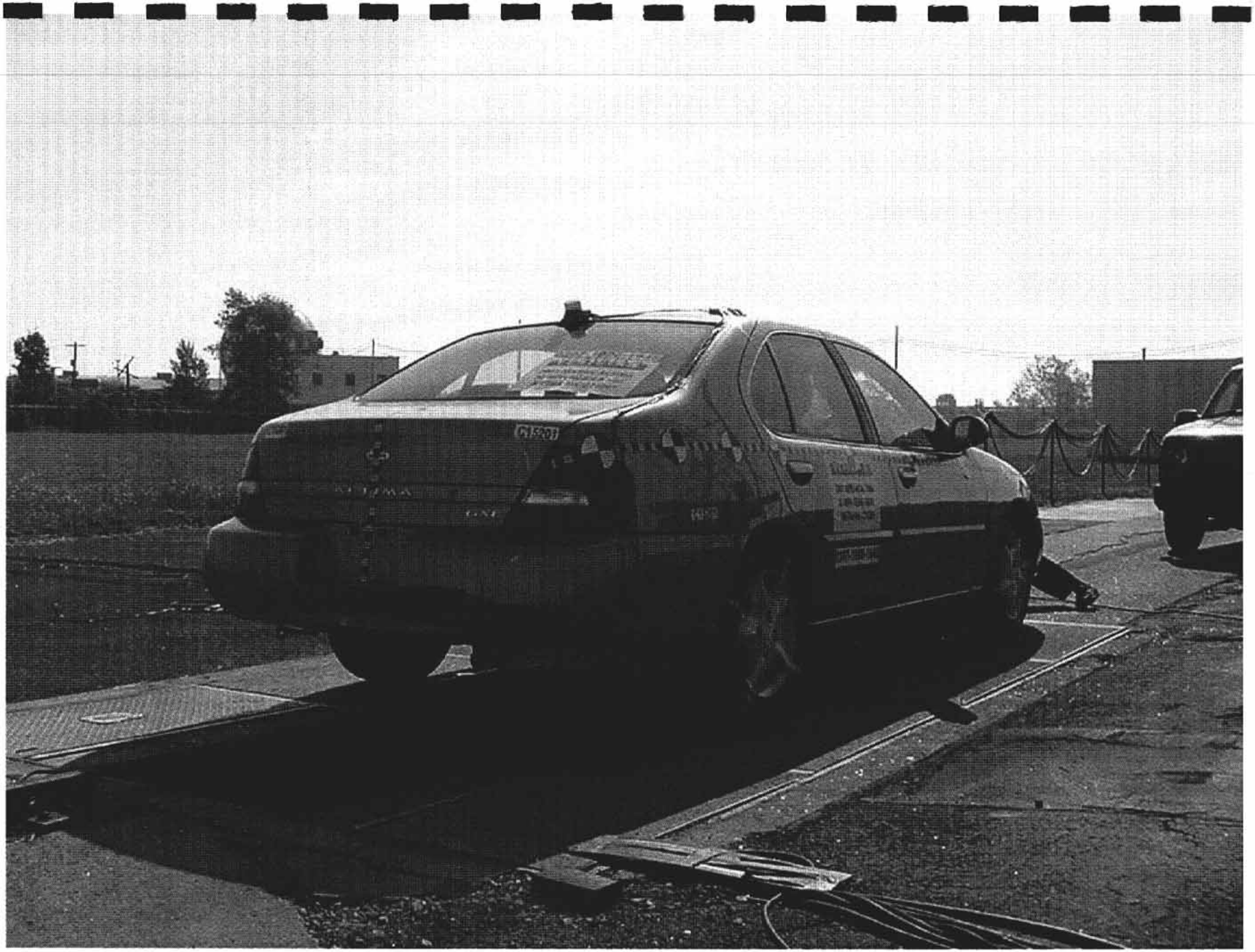


Figure A-11 PRE-TEST RIGHT REAR THREE-QUARTER VIEW

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

Figure A-13 PRE-TEST FRONT UNDERBODY VIEW

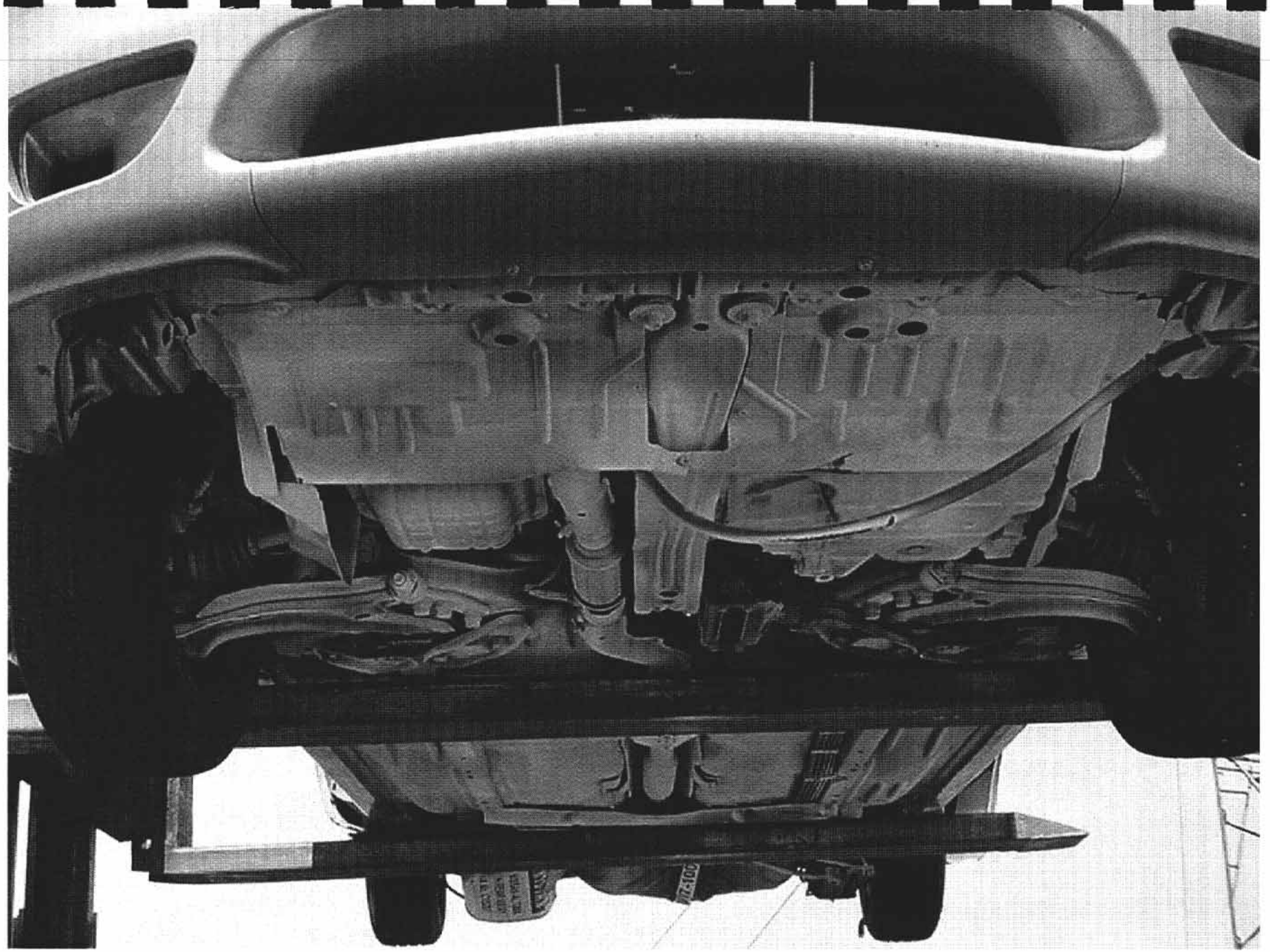


Figure A-14 POST-TEST FRONT UNDERBODY VIEW

Figure A-15 PRE-TEST REAR UNDERBODY VIEW

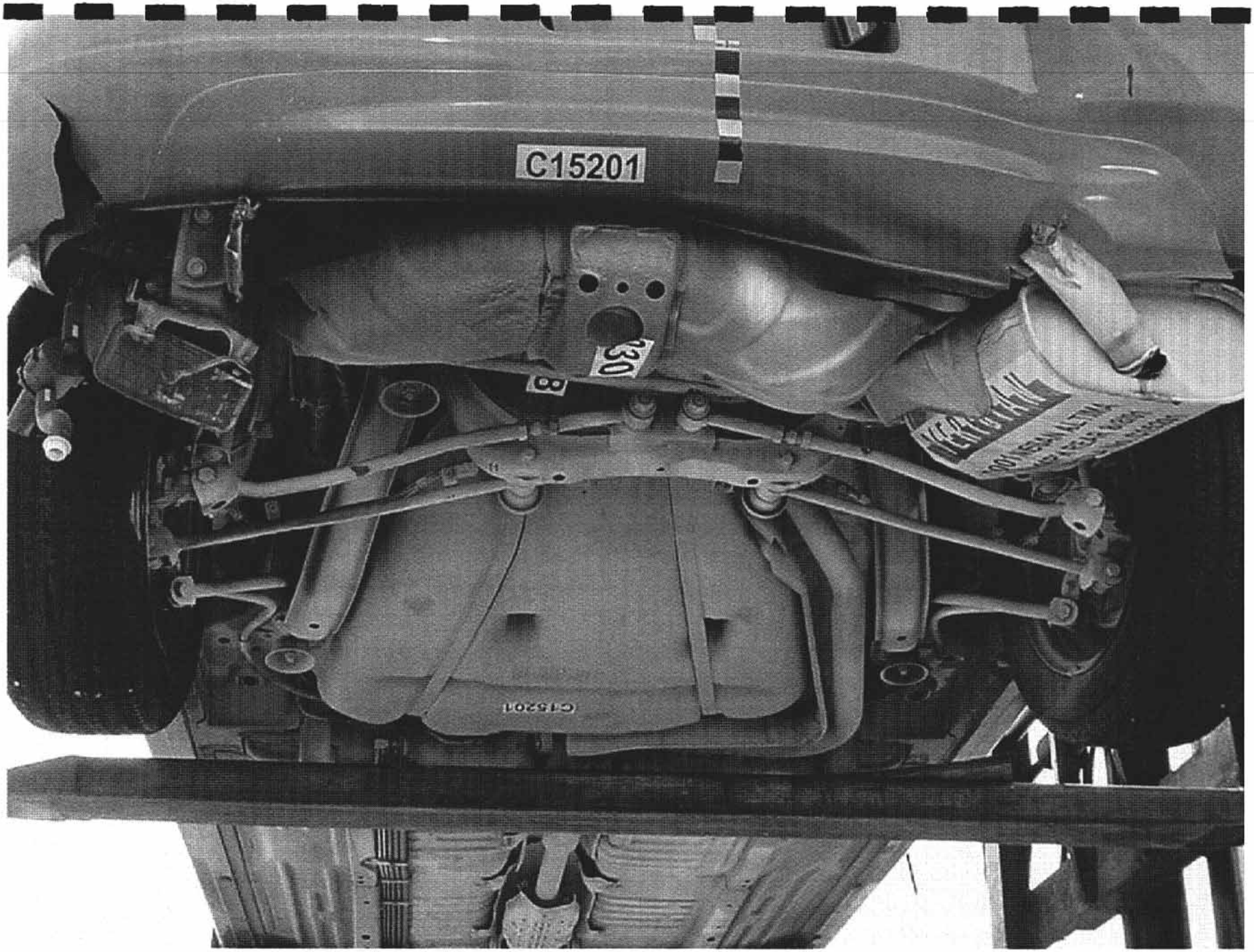


Figure A-16 POST-TEST REAR UNDERBODY VIEW

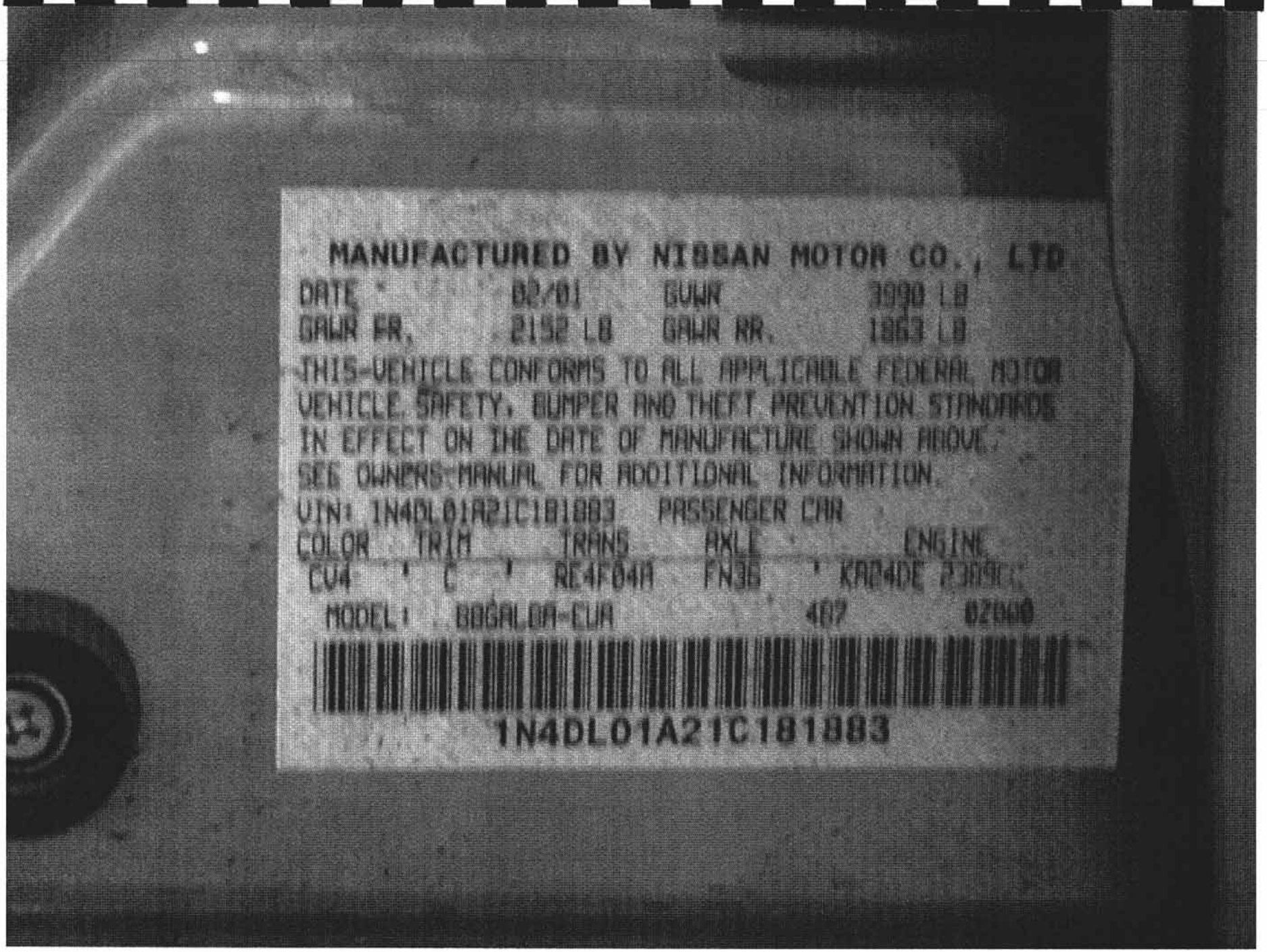


Figure A-17 CERTIFICATION PLACARD

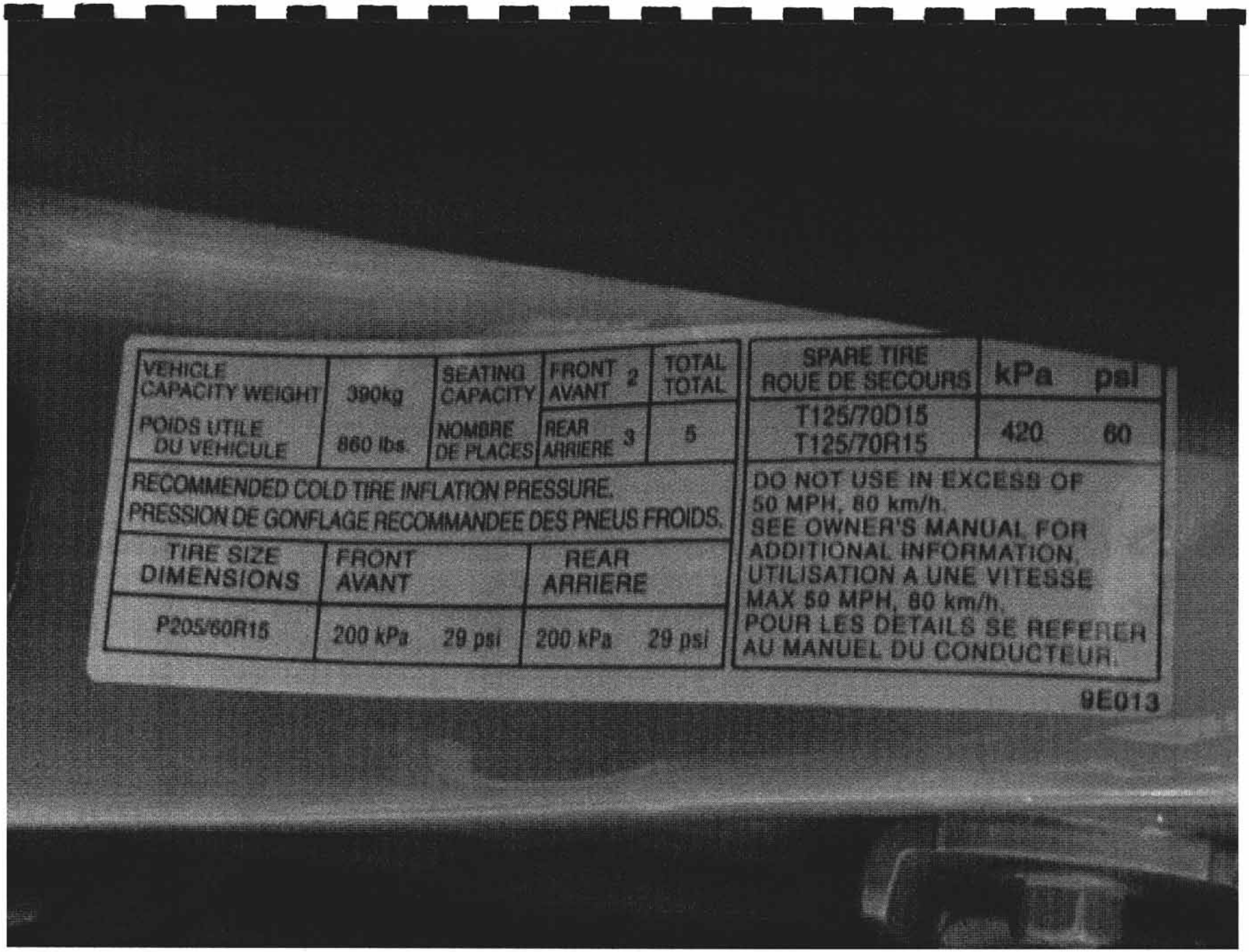


Figure A-18 TIRE PLACARD

Figure A-19 ROLLOVER 90°

Figure A-20 ROLLOVER 180°

Figure A-21 ROLLOVER 270°

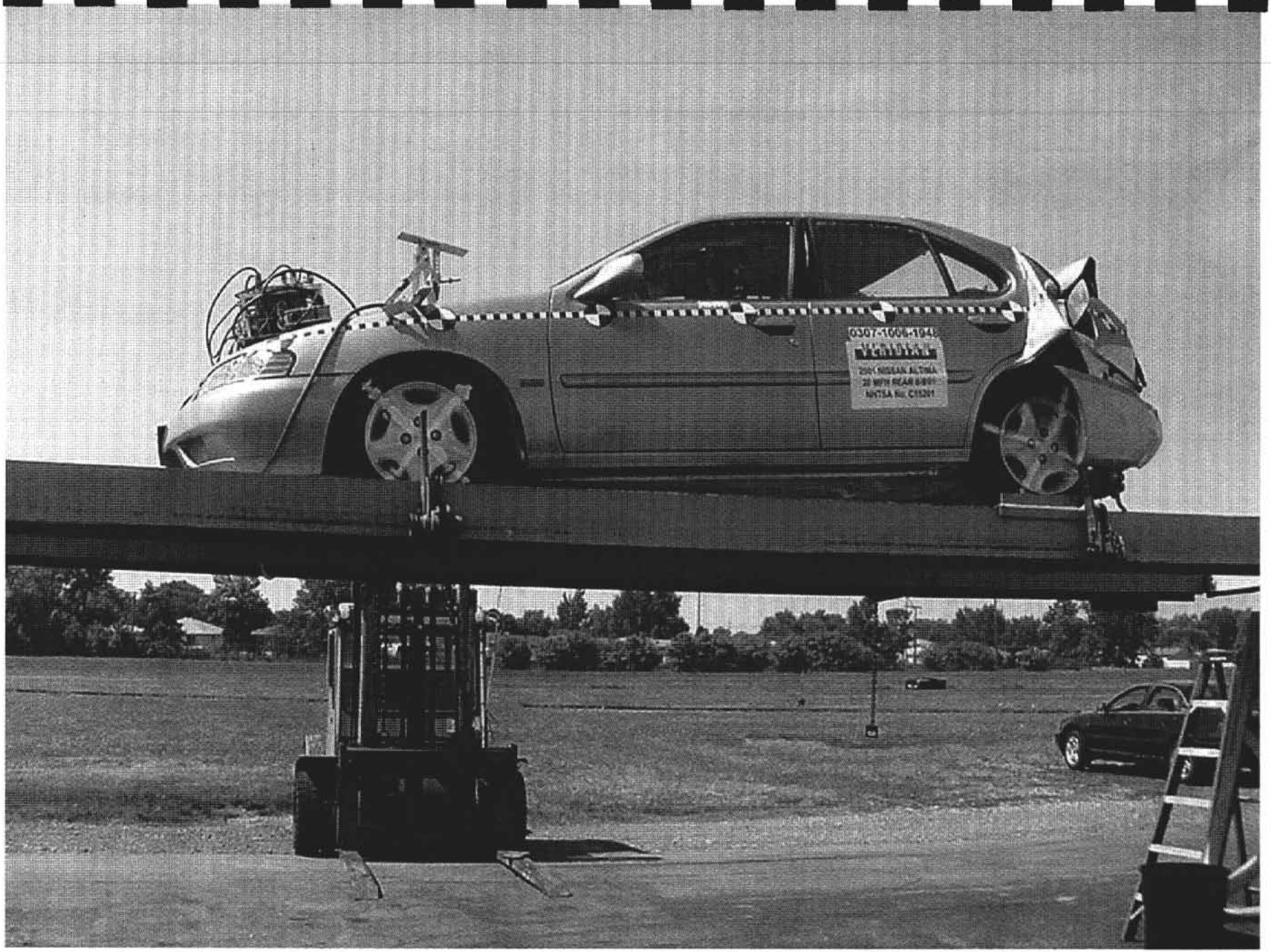


Figure A-22 ROLLOVER 360°

Appendix B

VEHICLE AND DUMMY RESPONSE DATA

FACILITY VERF DATE August 08, 2001
TEST# 307-1006-1948
TITLE NHTSA '301' 2001 Test 6-2001 Nissan Altima C15201

NAME	Unit	Max	msec	Min	msec	Filt
P1 Head x	g	28 8	119 5	-6 7	262 8	CFC_1000
P1 Head y	g	1 7	280 5	-1 4	370 9	CFC_1000
P1 Head z	g	15 8	101 5	-1 1	48 6	CFC_1000
P1 Upper Neck Fx	lbf	58 6	259 0	-69 6	115 7	CFC_1000
P1 Upper Neck Fy	lbf	12 7	373 0	-19 8	280 5	CFC_1000
P1 Upper Neck Fz	lbf	11 8	50 1	-205 5	103 6	CFC_1000
P1 Upper Neck Mx	in-lb	35 2	124 0	-57 4	286 8	CFC_600
P1 Upper Neck My	in-lb	136 2	149 7	-146 8	256 1	CFC_600
P1 Upper Neck Mz	in-lb	18 2	377 6	-17 4	311 1	CFC_600
P1 Chest x	g	15 2	90 7	-2 2	274 2	CFC_180
P1 Chest y	g	1 8	130 1	-1 7	104 1	CFC_180
P1 Chest z	g	2 4	64 2	-2 1	103 5	CFC_180
P1 Chest Compression	in	0 1	93 7	-0 2	259 6	CFC_600
P1 Pelvic x	g	17 0	88 4	-2 8	236 5	CFC_1000
P1 Pelvic y	g	1 4	80 3	-1 4	222 4	CFC_1000
P1 Pelvic z	g	6 8	83 7	-1 8	197 9	CFC_1000
P1 Left Femur	lbf	36 5	241 8	-199 9	94 4	CFC_600
P1 Right Femur	lbf	44 7	254.7	-160 0	93 8	CFC_600
P1 Lap Belt	lbf	68 1	278 5	-19 3	55 9	CFC_60
P1 Belt Spoolout	in	0 0	-33 1	-5 2	159 3	CFC_180
Acc #1 Left Rear Xm Ax	g	21 6	8.1	-12 0	18 1	CFC_60
Acc #2 Right Rear Xm Ax	g	22 8	8 8	-16 5	16 3	CFC_60
Acc #3 Upper Seatback Ax	g	26 7	25 9	-17 4	50 4	CFC_60
Acc #4 Lower Seat back Ax	g	19 4	18 6	-10 3	26 5	CFC_60
Seatback Angular Position	deg	9 1	126 7	-1 4	52 5	CFC_180

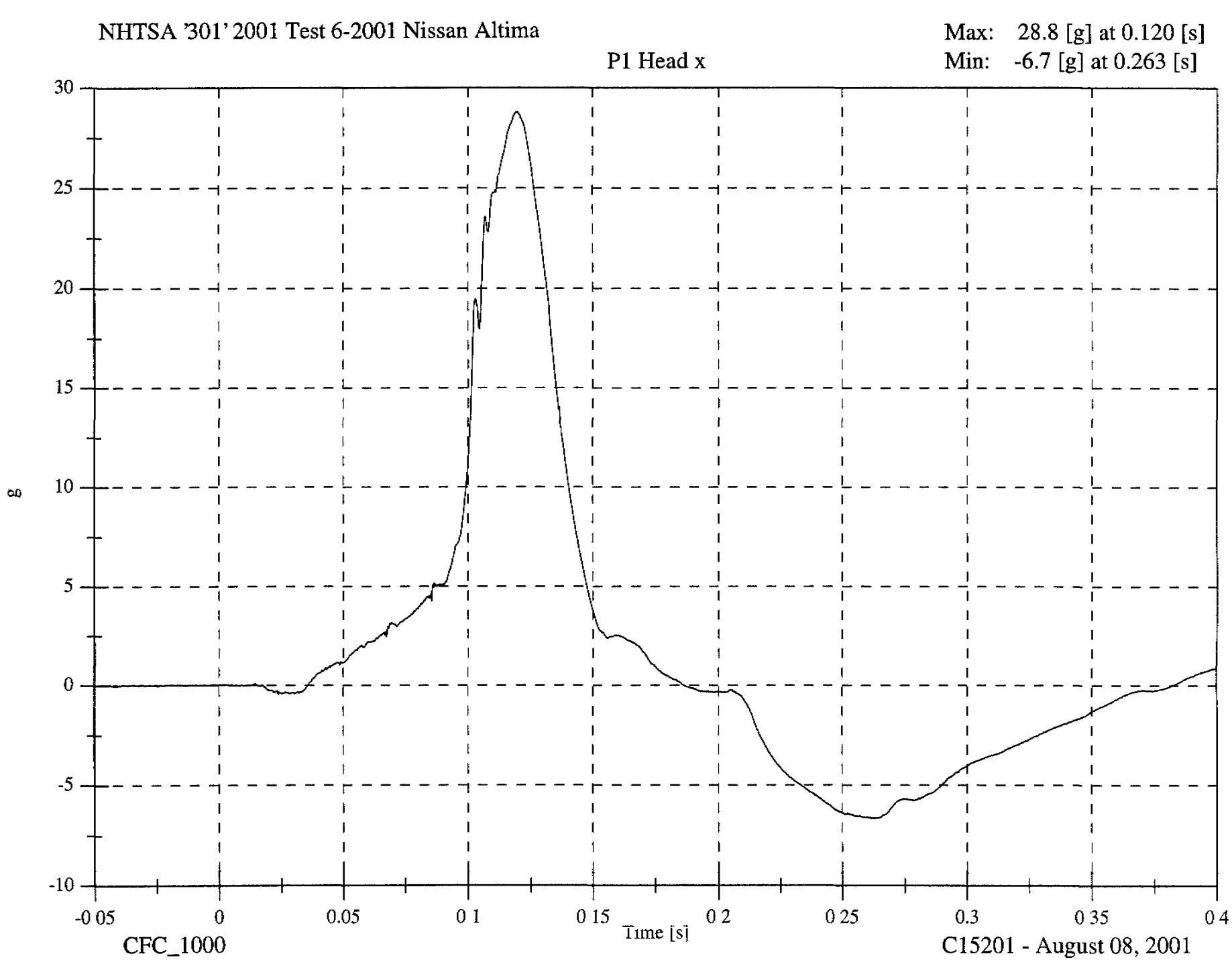
==========

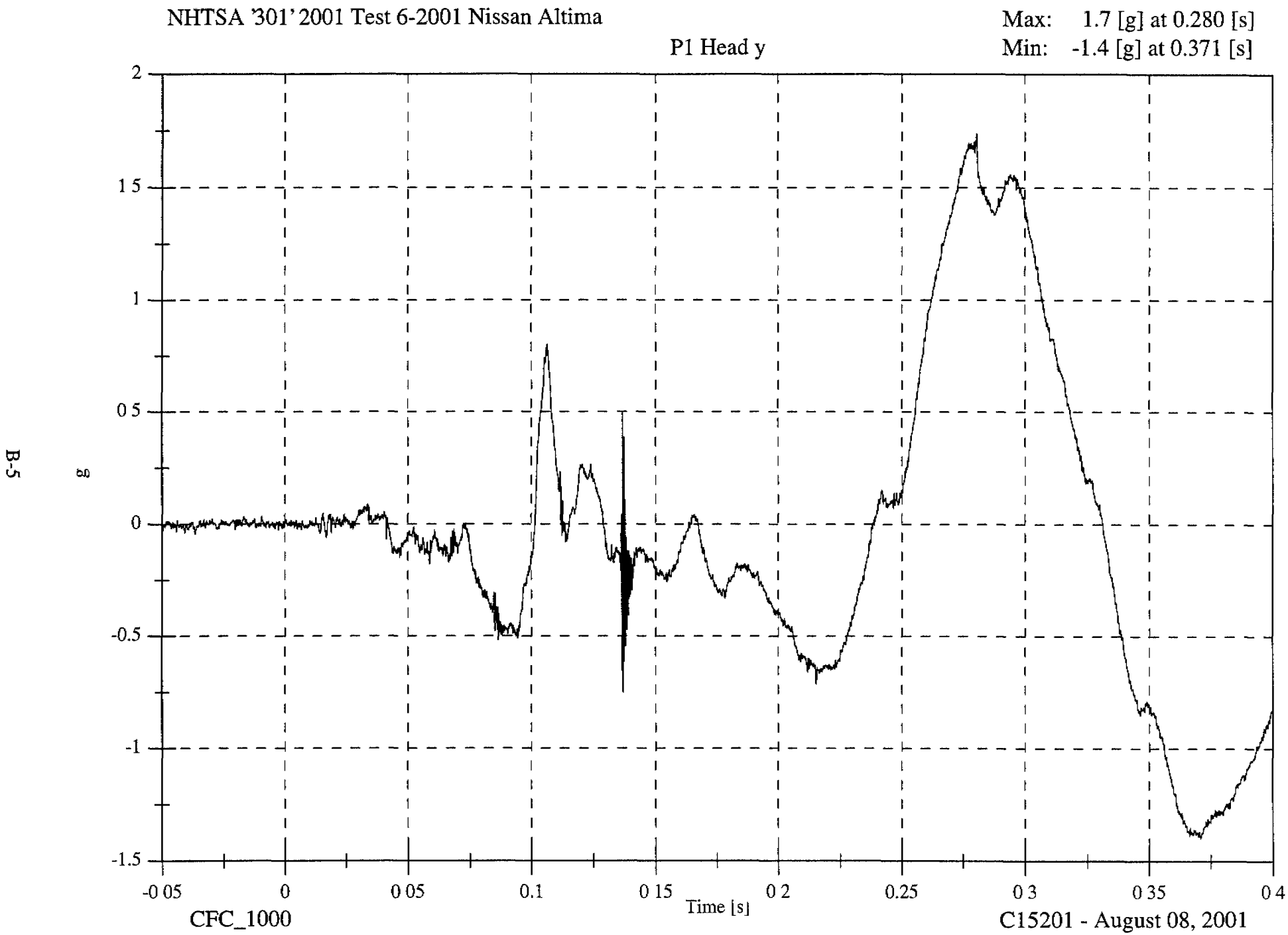
P1 HIC(36 ms) 125 4
t1 99 1 msec
t2 135 1 msec
Duration 36 0 msec
Average Acceleration 26 1 g

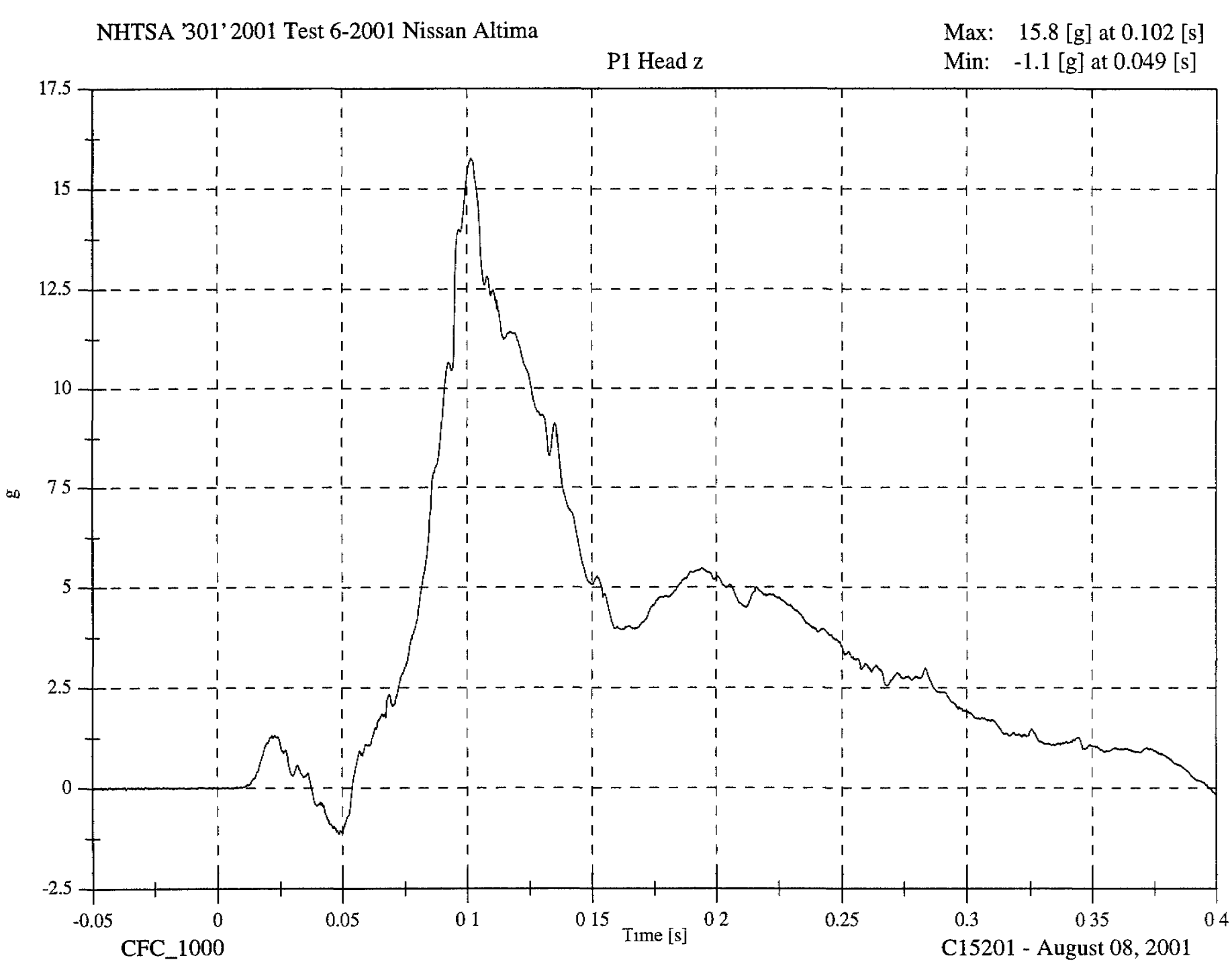
P1 CLIP(3 ms) 15 3 g
t1 88 7 msec
t2 91 7 msec
Duration 3.0 msec
P1 CSI 36 8

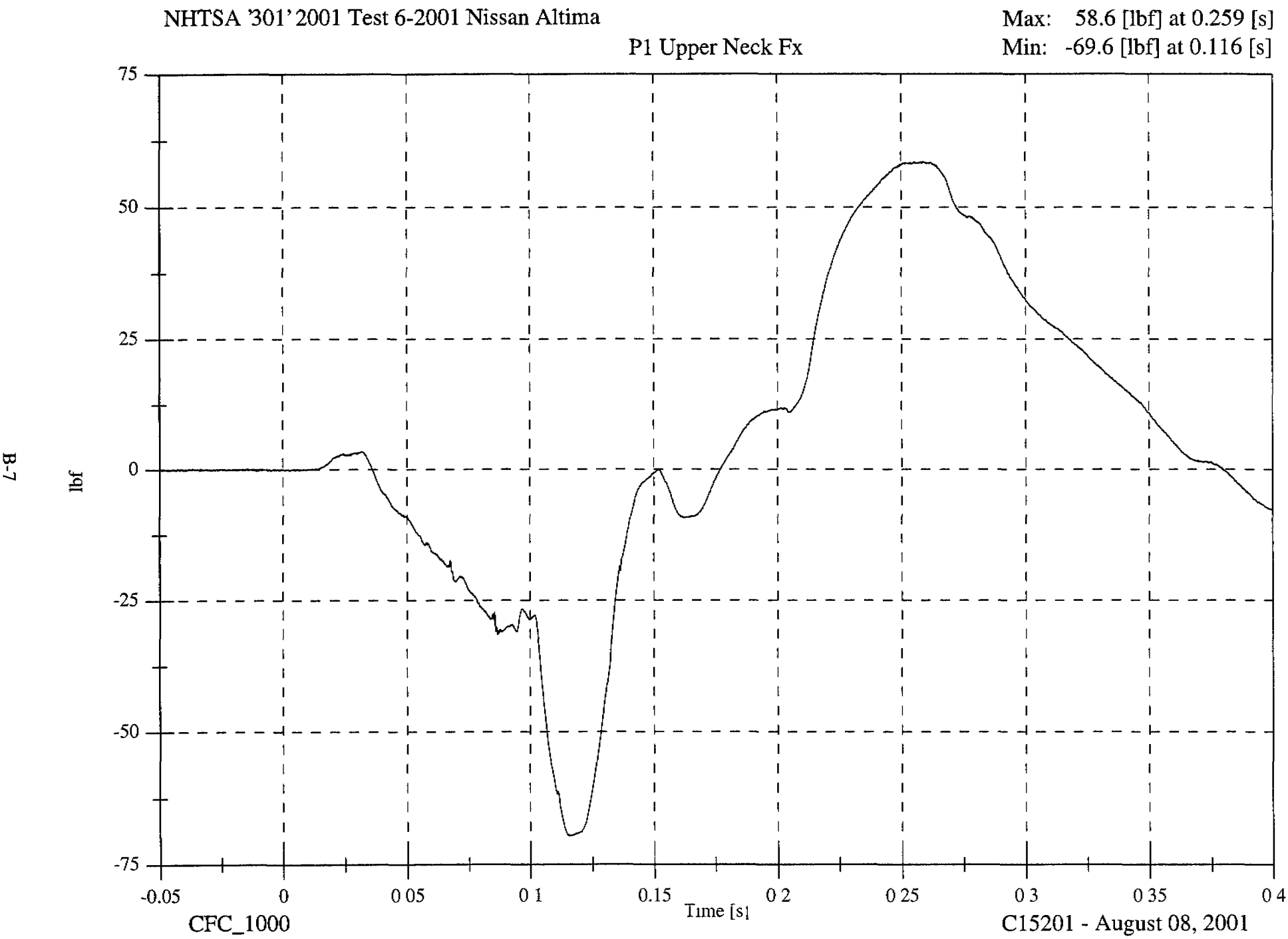
DRIVER DUMMY (Pos 1)	SAE FILTER CHANNEL CLASS
Head Accelerations	1000
Chest Accelerations	180
Pelvic Accelerations	1000
Upper Neck Forces	1000
Upper Neck Moments	600
Belt Forces	60
Belt Spoolout	60
Vehicle	60

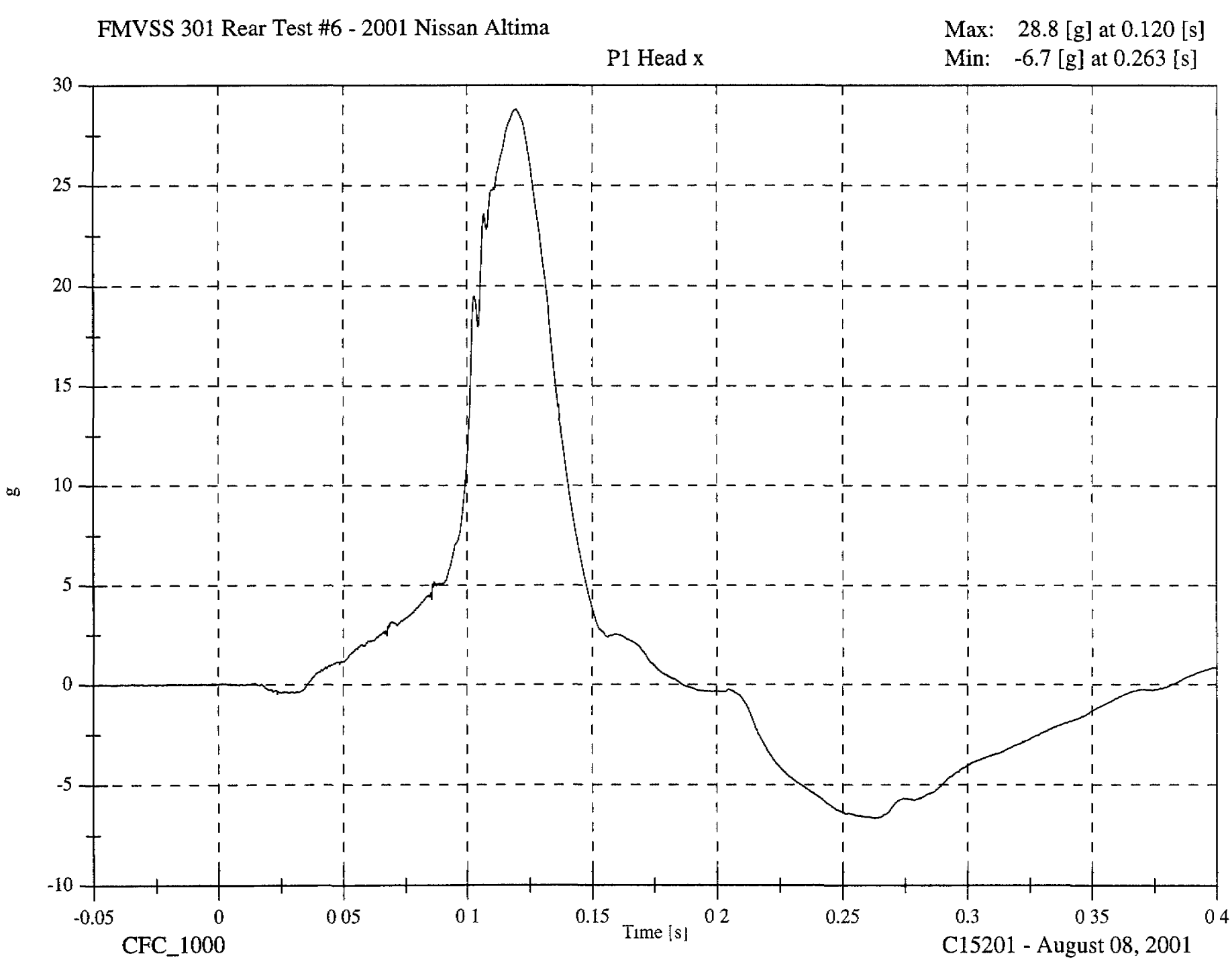
Note: Angular seatback position is measured in degrees of rotation from the initial (design) position

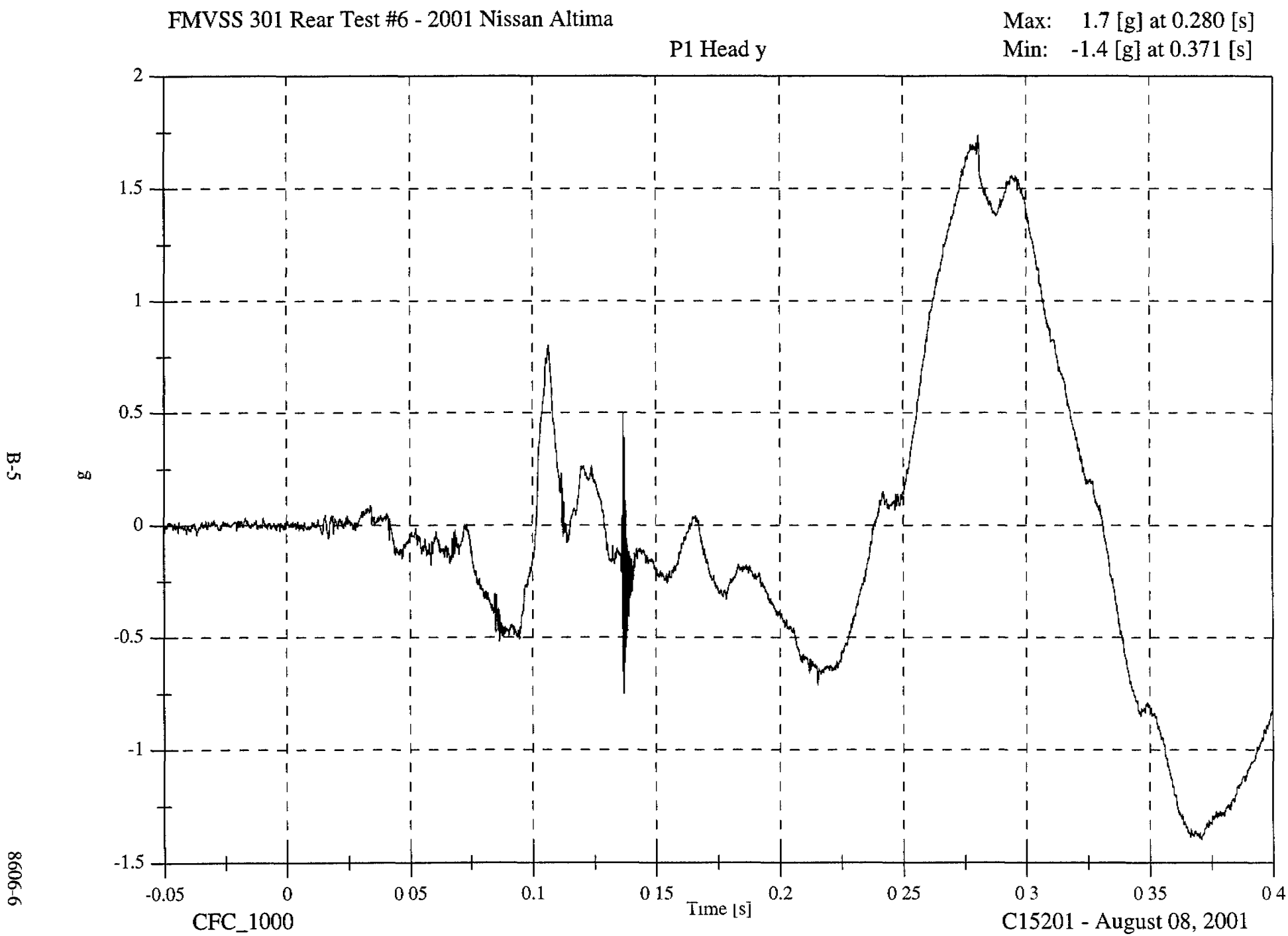

NHTSA '301' 2001 Test 6-2001 Nissan Altima
P1 Head x
Max: 28.8 [g] at 0.120 [s]
Min: -6.7 [g] at 0.263 [s]
30
25
20
15
10
5
0
-5
-10
g
-0 05
0
0.05
0 1
0 15
0 2
0 25
0.3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001

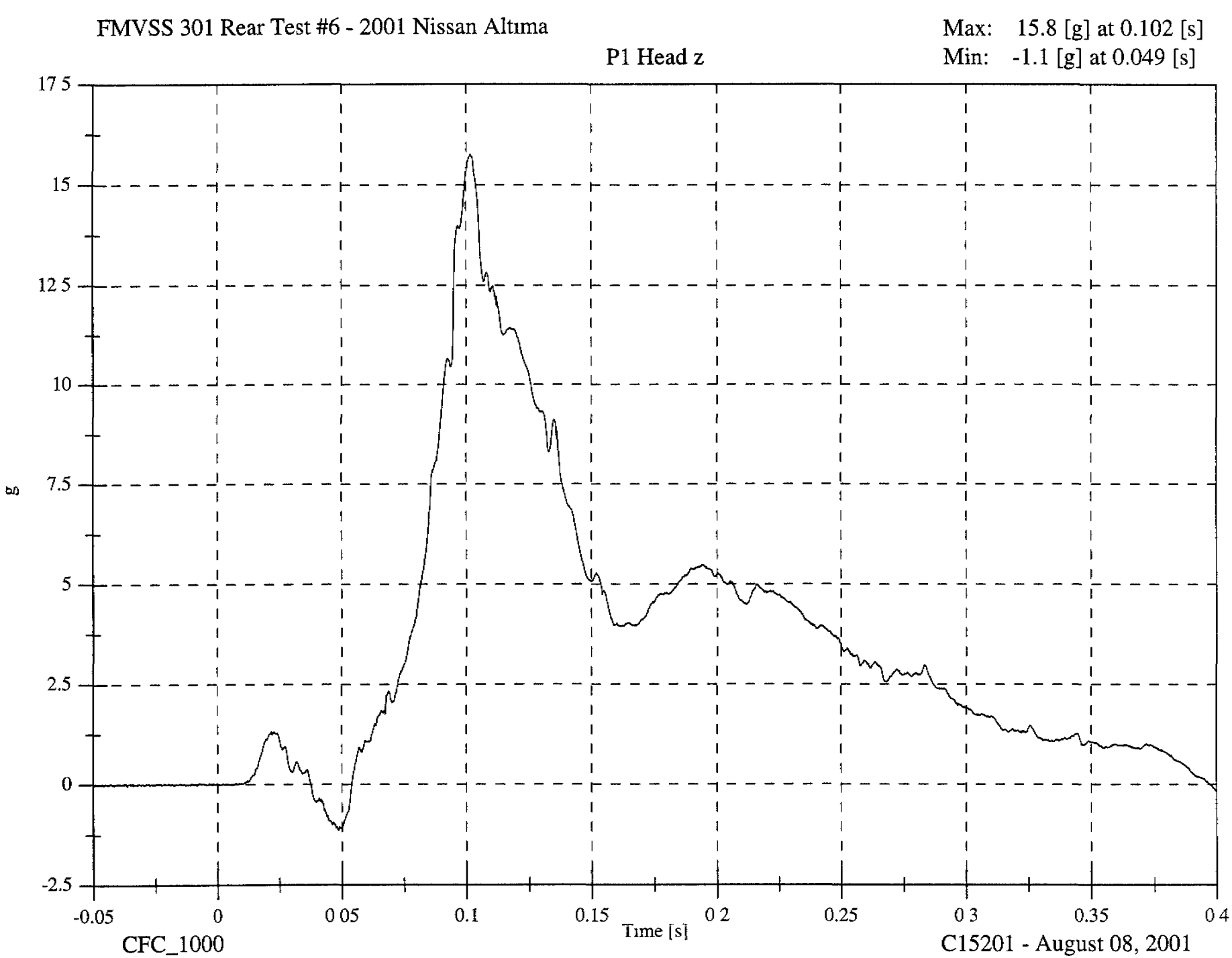

NHTSA '301' 2001 Test 6-2001 Nissan Altima
P1 Head y
Max: 1.7 [g] at 0.280 [s]
Min: -1.4 [g] at 0.371 [s]
2
1 5
1
0 5
0
-0.5
-1
-1.5
g
-0 05
0
0 05
0.1
0 15
0 2
0.25
0 3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001

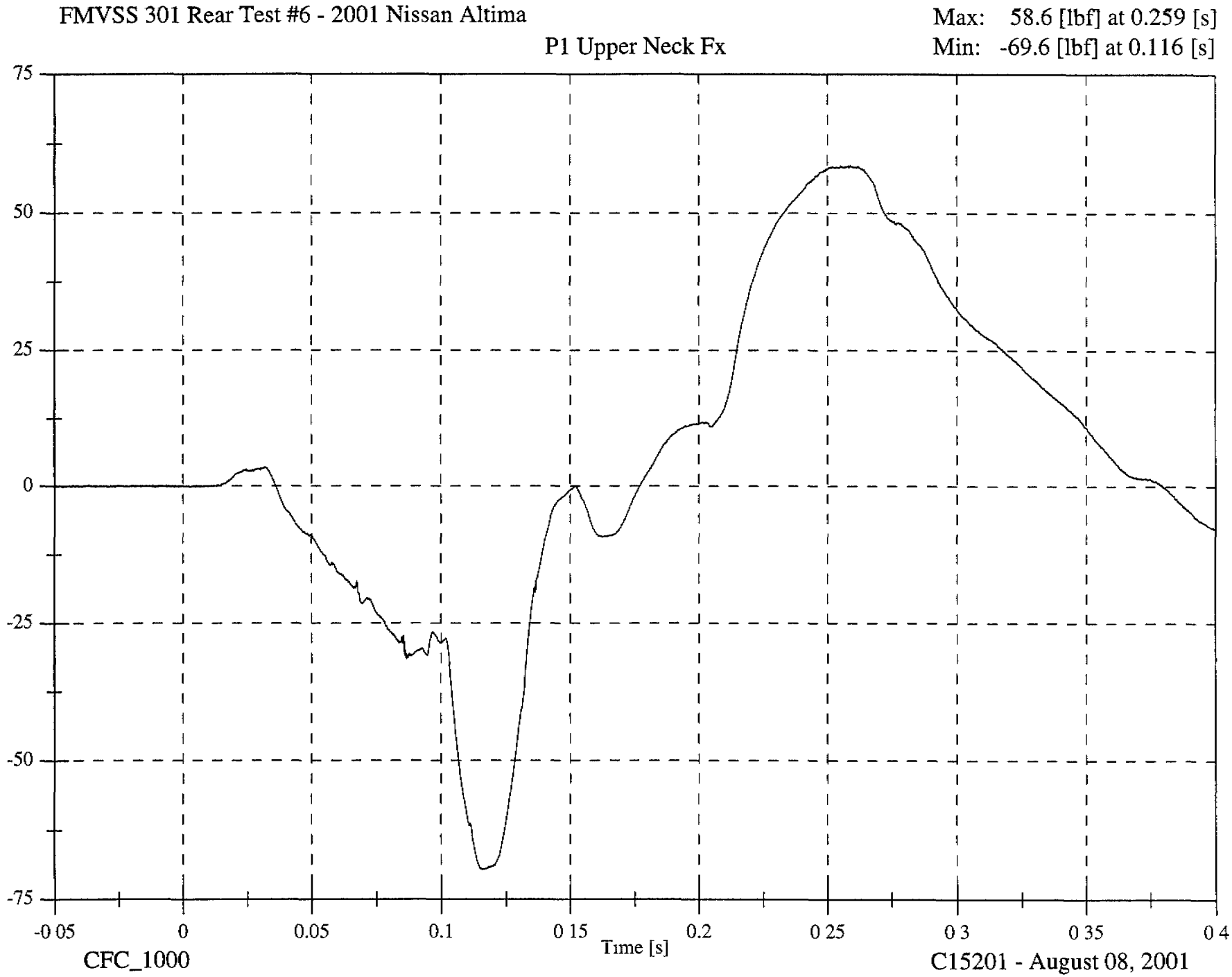

NHTSA '301' 2001 Test 6-2001 Nissan Altima
P1 Head z
Max: 15.8 [g] at 0.102 [s]
Min: -1.1 [g] at 0.049 [s]
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
g
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Time [s]
CFC_1000
C15201 - August 08, 2001

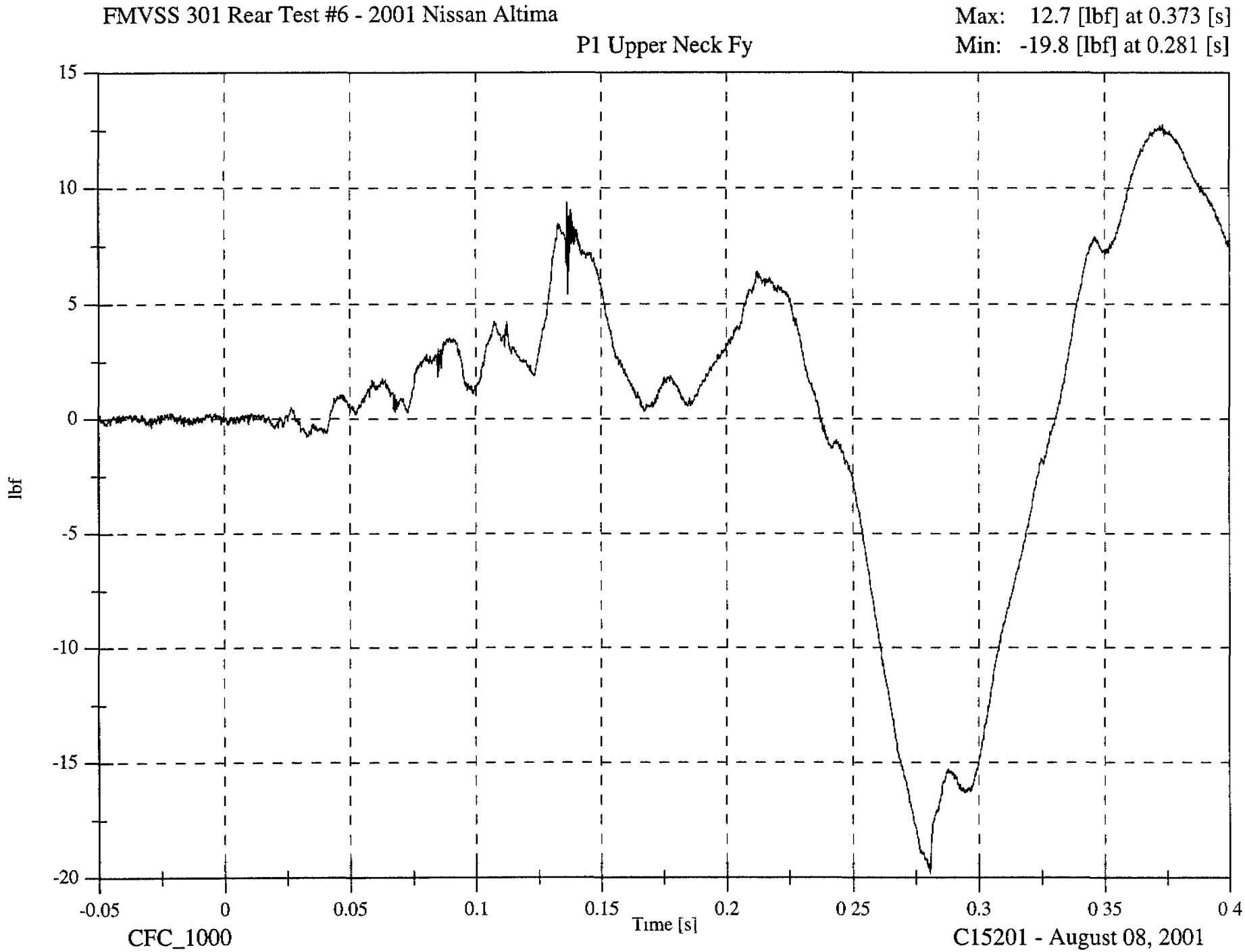

NHTSA '301' 2001 Test 6-2001 Nissan Altima
P1 Upper Neck Fx
Max: 58.6 [lbf] at 0.259 [s]
Min: -69.6 [lbf] at 0.116 [s]
75
50
25
0
-25
-50
-75
lbf
-0.05
0
0 05
0 1
0.15
0 2
0 25
0 3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001

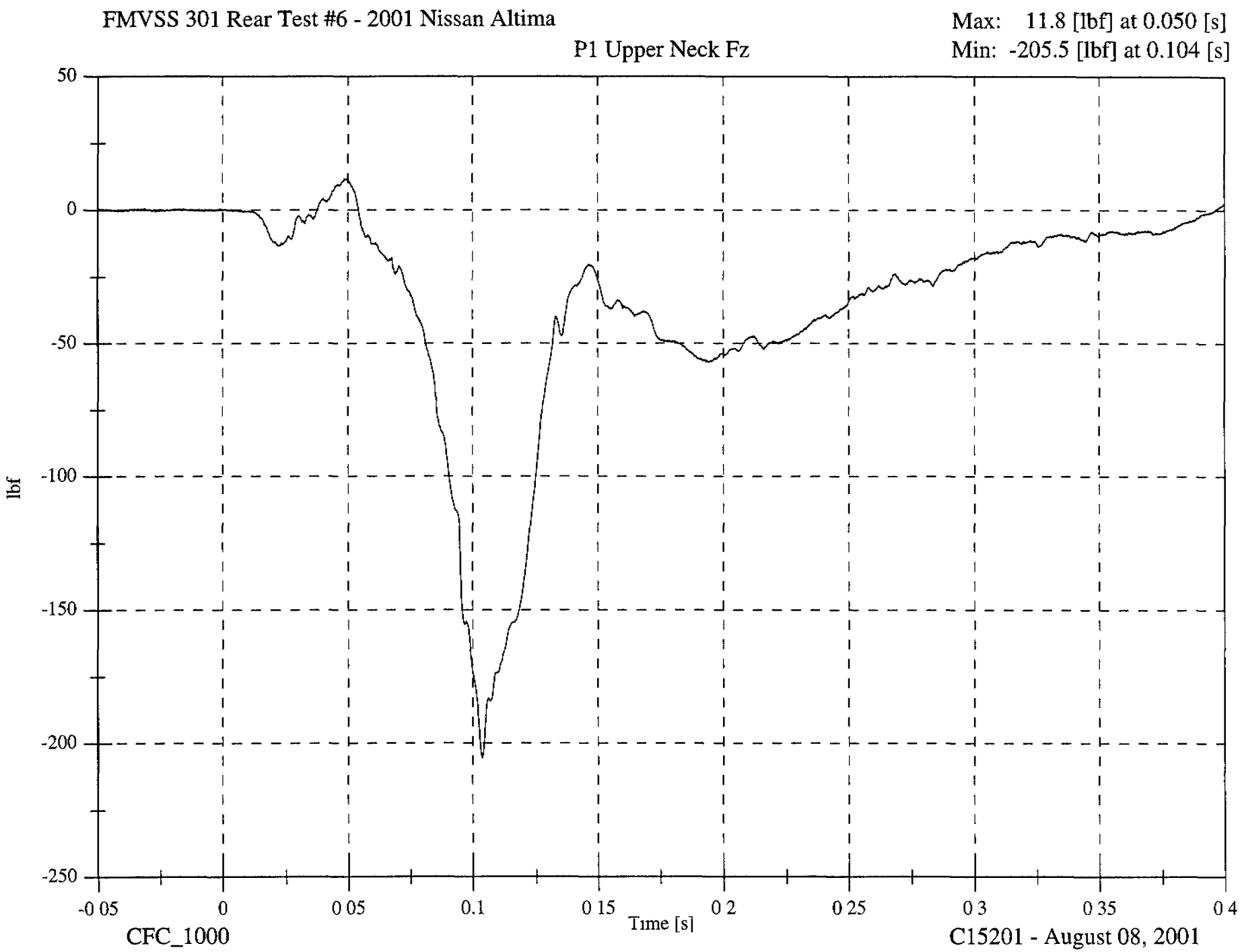

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Head x
Max: 28.8 [g] at 0.120 [s]
Min: -6.7 [g] at 0.263 [s]
30
25
20
15
10
5
0
-5
-10
g
-0.05
0
0 05
0 1
0.15
0 2
0.25
0.3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001

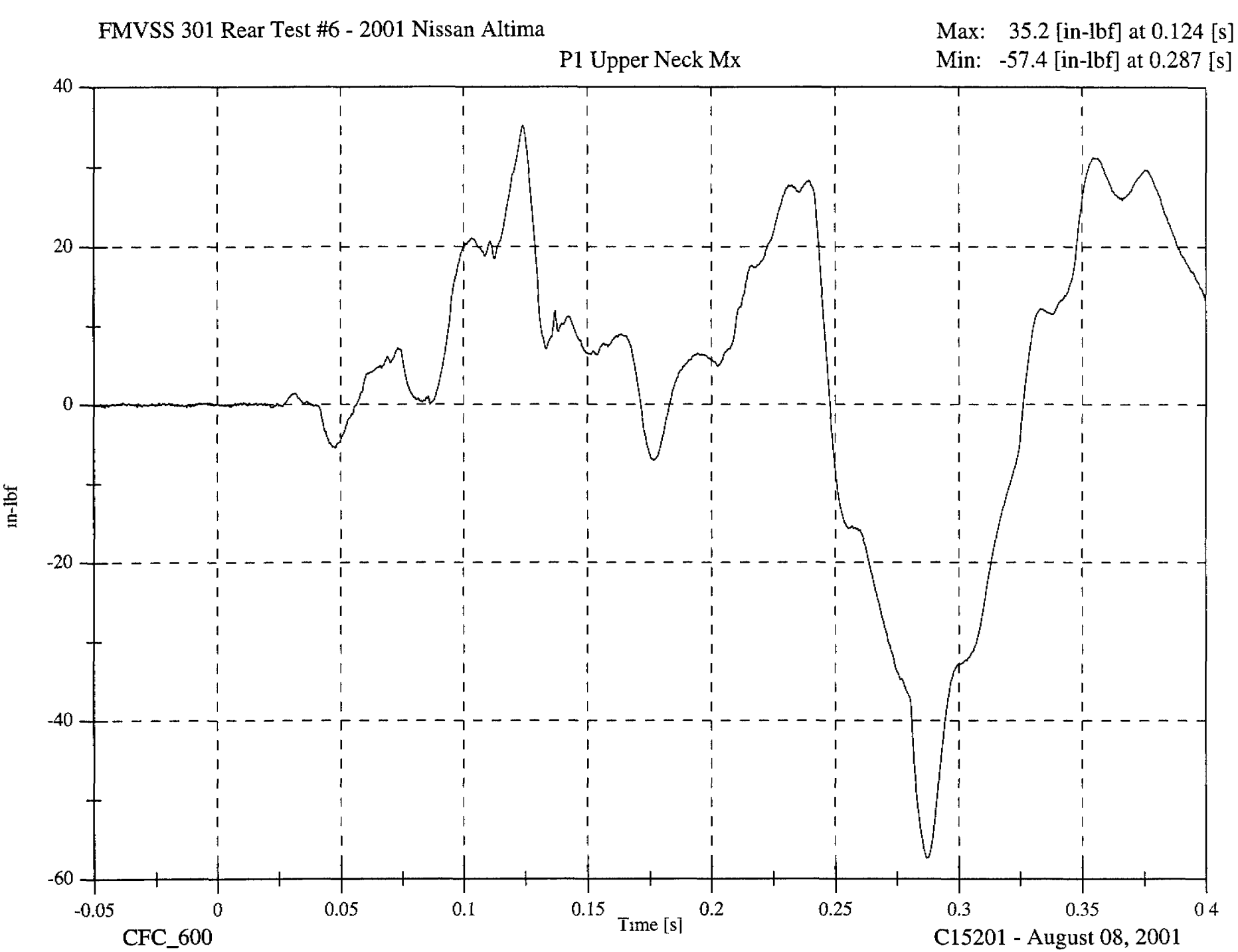

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Head y
Max: 1.7 [g] at 0.280 [s]
Min: -1.4 [g] at 0.371 [s]
2
1.5
1
0.5
0
-0.5
-1
-1.5
g
-0.05
0
0 05
0.1
0 15
0.2
0 25
0 3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001

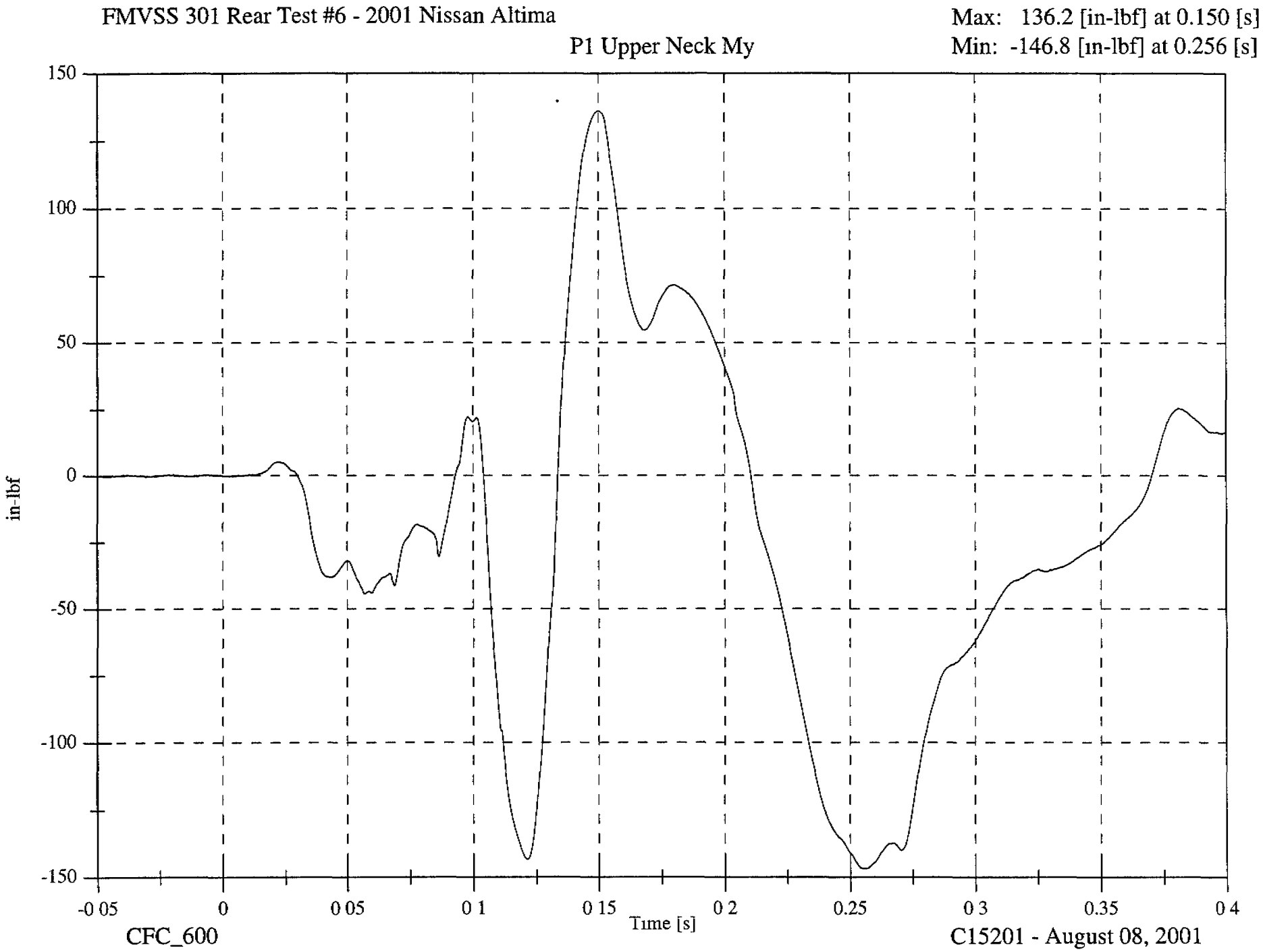

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Head z
Max: 15.8 [g] at 0.102 [s]
Min: -1.1 [g] at 0.049 [s]
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
g
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Time [s]
CFC_1000
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Upper Neck Fx
Max: 58.6 [lbf] at 0.259 [s]
Min: -69.6 [lbf] at 0.116 [s]
75
50
25
0
-25
-50
-75
lbf
-0 05
0
0.05
0.1
0 15
0.2
0 25
0 3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Upper Neck Fy
Max: 12.7 [lbf] at 0.373 [s]
Min: -19.8 [lbf] at 0.281 [s]
15
10
5
0
-5
-10
-15
-20
lbf
-0.05
0
0.05
0.1
0.15
0.2
0 25
0.3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Upper Neck Fz
Max: 11.8 [lbf] at 0.050 [s]
Min: -205.5 [lbf] at 0.104 [s]
50
0
-50
-100
-150
-200
-250
lbf
-0 05
0
0 05
0.1
0 15
0 2
0 25
0 3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Upper Neck Mx
Max: 35.2 [in-lbf] at 0.124 [s]
Min: -57.4 [in-lbf] at 0.287 [s]
40
20
0
-20
-40
-60
in-lbf
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0 4
Time [s]
CFC_600
C15201 - August 08, 2001

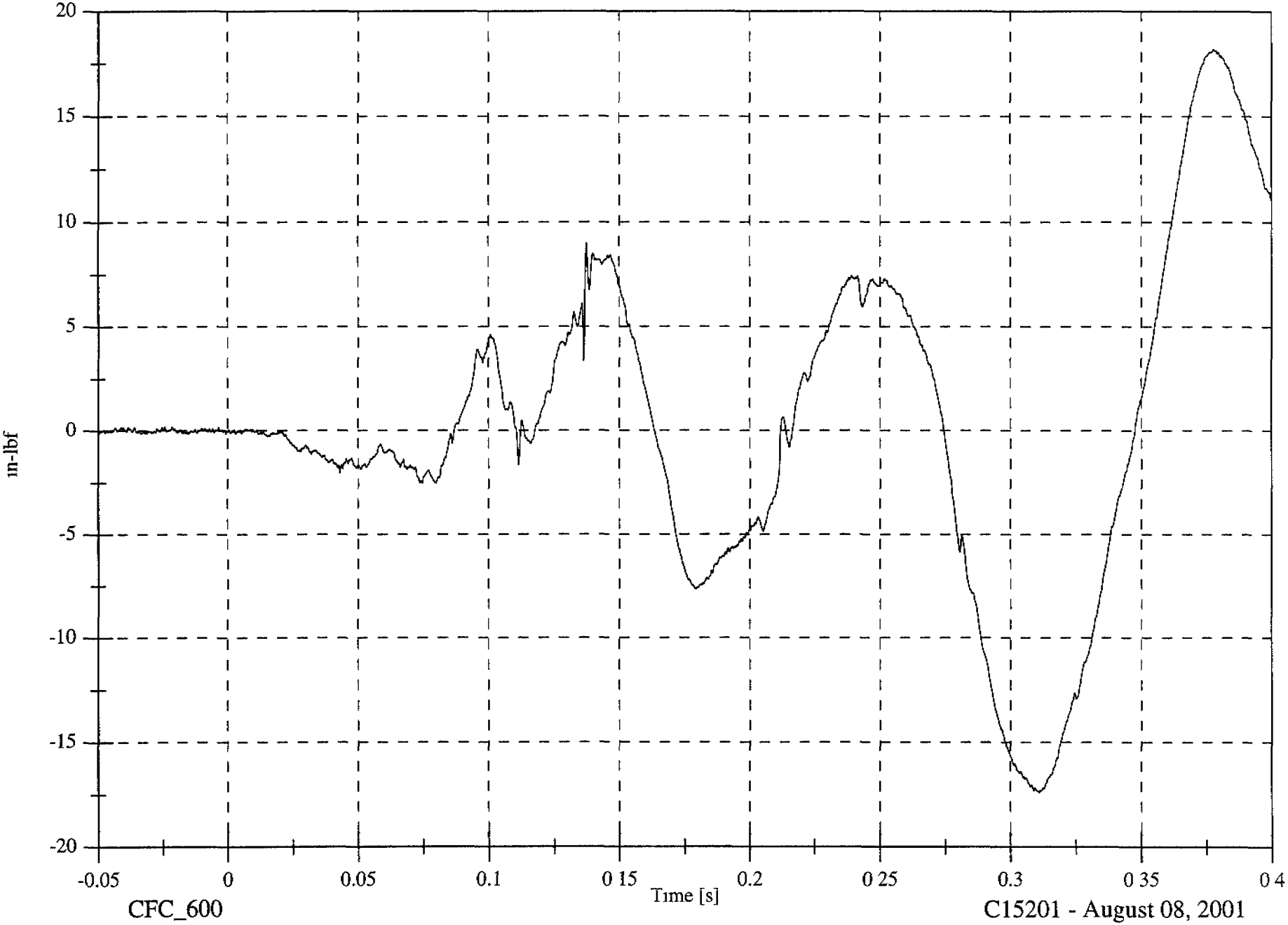

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Upper Neck My
Max: 136.2 [in-lbf] at 0.150 [s]
Min: -146.8 [in-lbf] at 0.256 [s]
150
100
50
0
-50
-100
-150
in-lbf
-0 05
0
0 05
0 1
0 15
0 2
0.25
0 3
0.35
0 4
Time [s]
CFC_600
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

P1 Upper Neck Mz

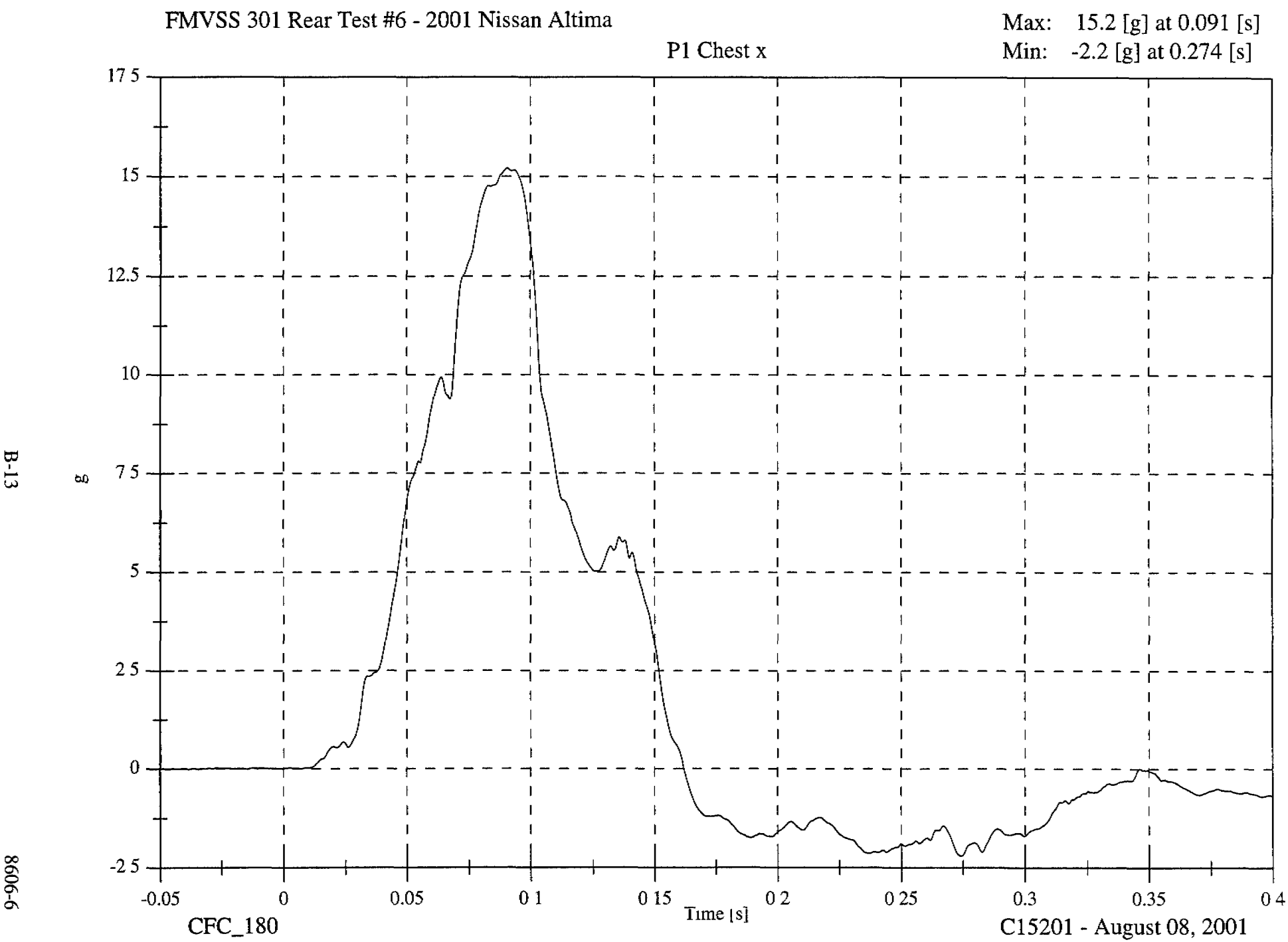
Max: 18.2 [in-lbf] at 0.378 [s]

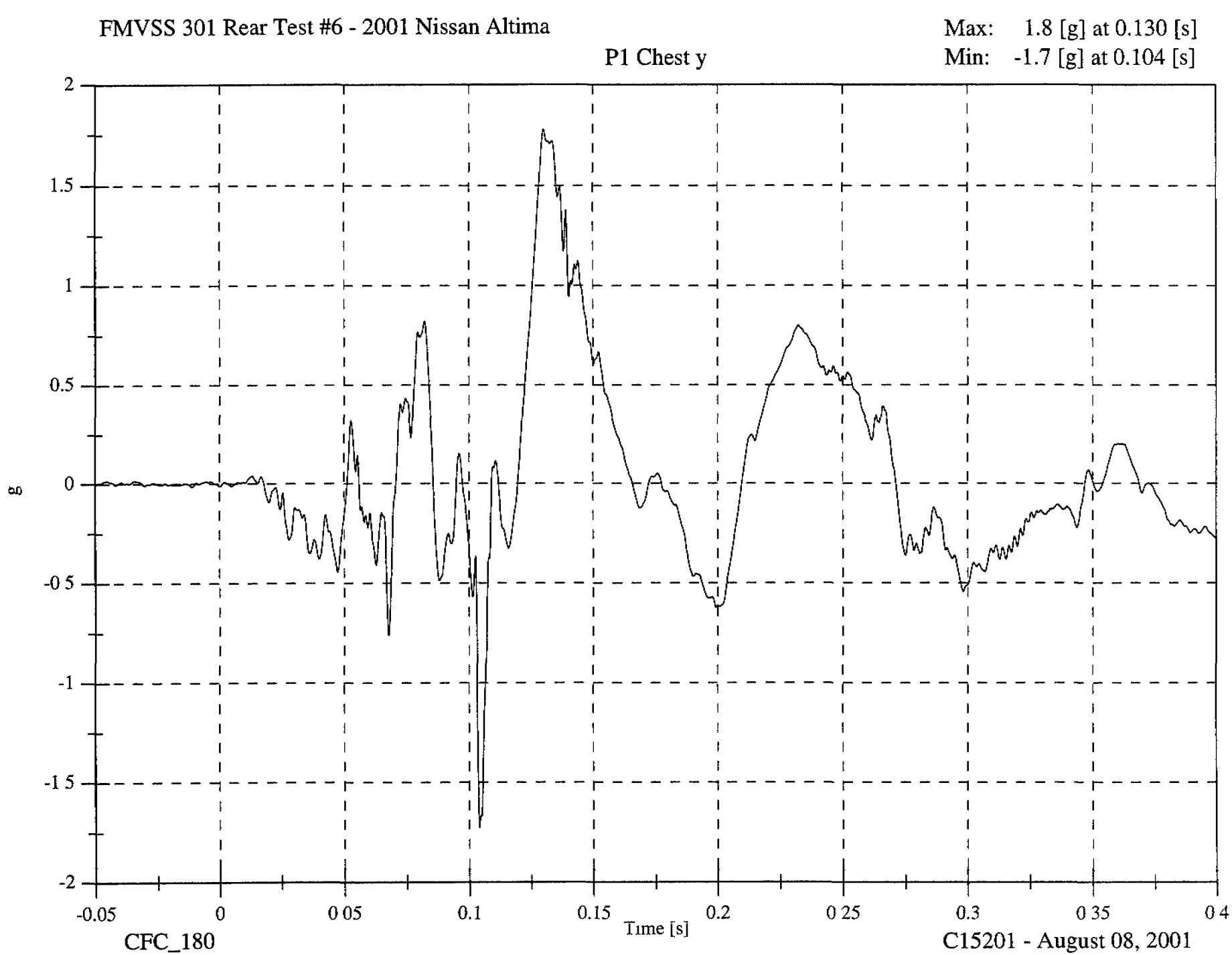
Min: -17.4 [in-lbf] at 0.311 [s]

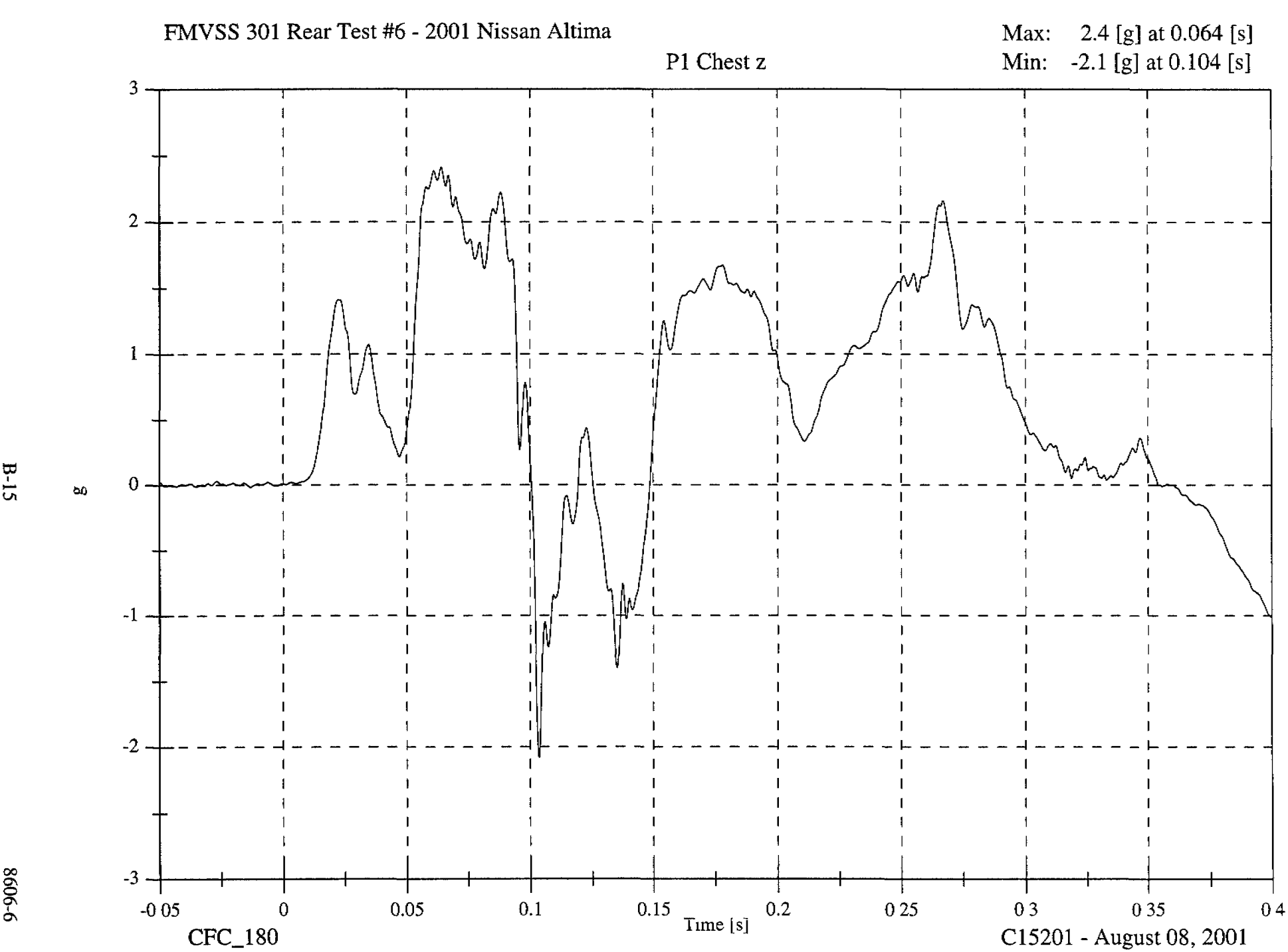


CFC_600

C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Chest x
Max: 15.2 [g] at 0.091 [s]
Min: -2.2 [g] at 0.274 [s]
17 5
15
12.5
10
7 5
5
2 5
0
-2 5
g
-0.05
0
0.05
0 1
0 15
0 2
0 25
0.3
0.35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Chest y
Max: 1.8 [g] at 0.130 [s]
Min: -1.7 [g] at 0.104 [s]
g
2
1.5
1
0.5
0
-0 5
-1
-1 5
-2
-0.05
0
0 05
0.1
0.15
0.2
0 25
0.3
0 35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001

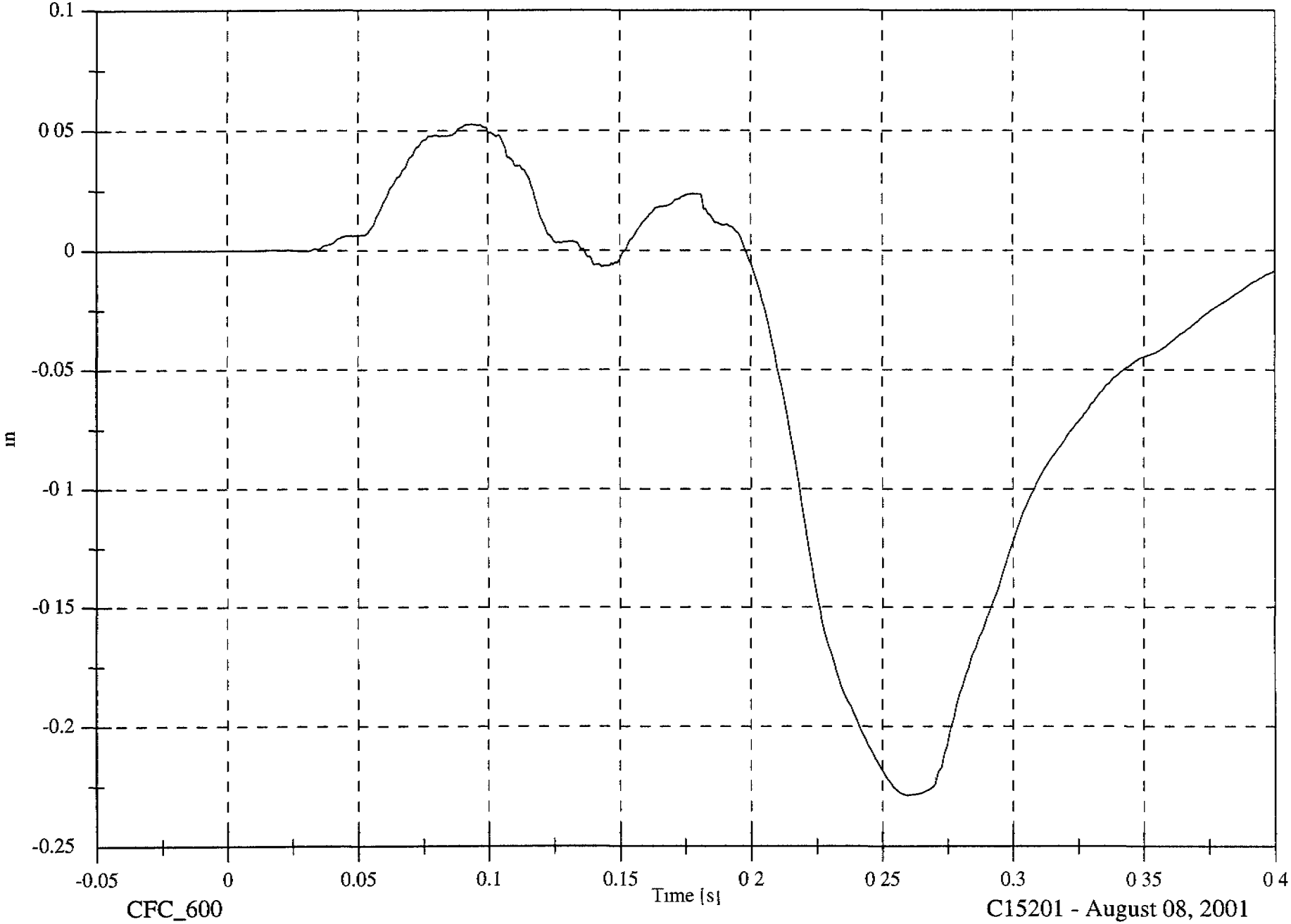

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Chest z
Max: 2.4 [g] at 0.064 [s]
Min: -2.1 [g] at 0.104 [s]
3
2
1
0
-1
-2
-3
g
-0 05
0
0.05
0.1
0.15
0.2
0 25
0 3
0 35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

P1 Chest Compression

Max: 0.1 [in] at 0.094 [s]

Min: -0.2 [in] at 0.260 [s]

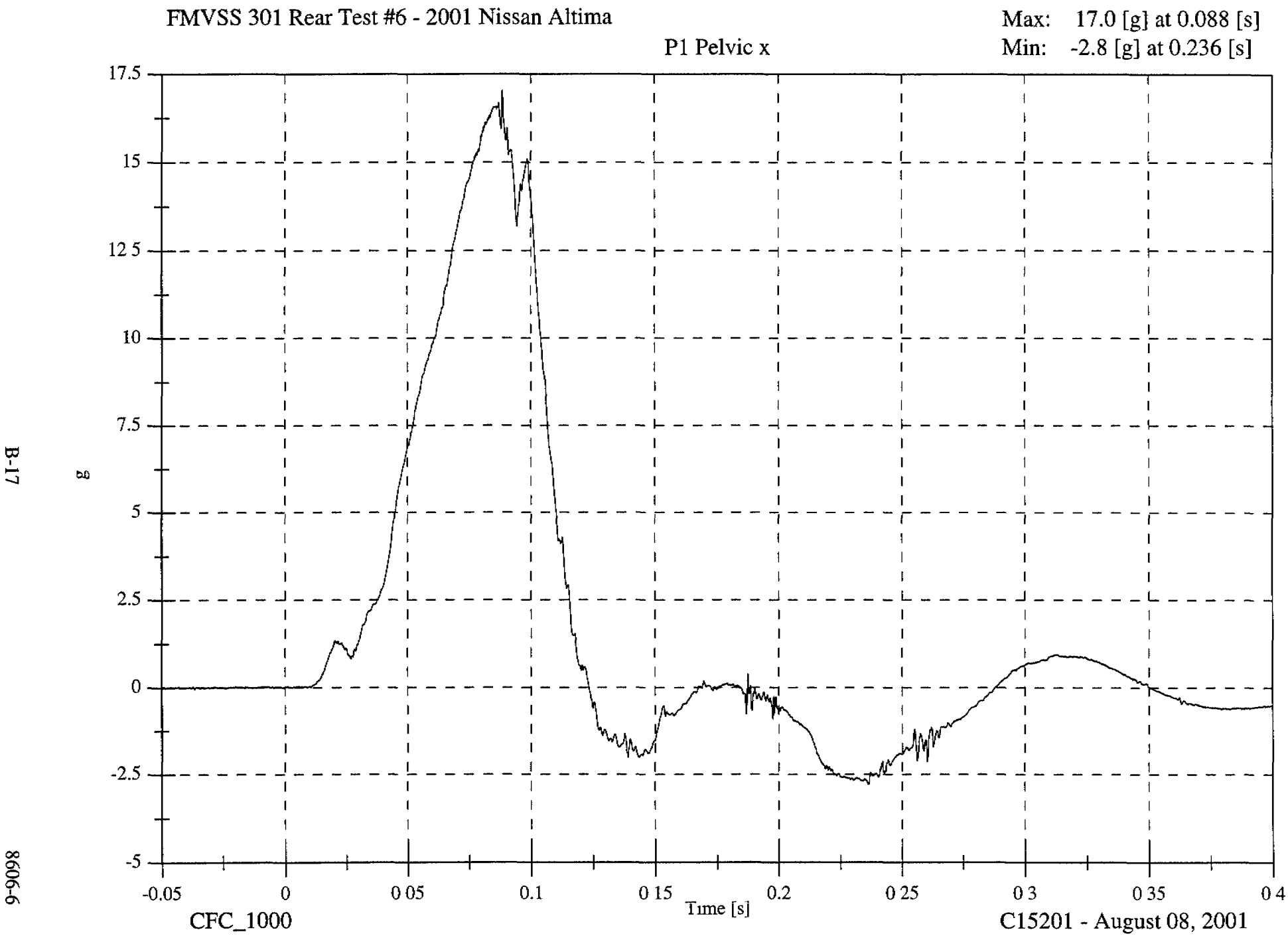


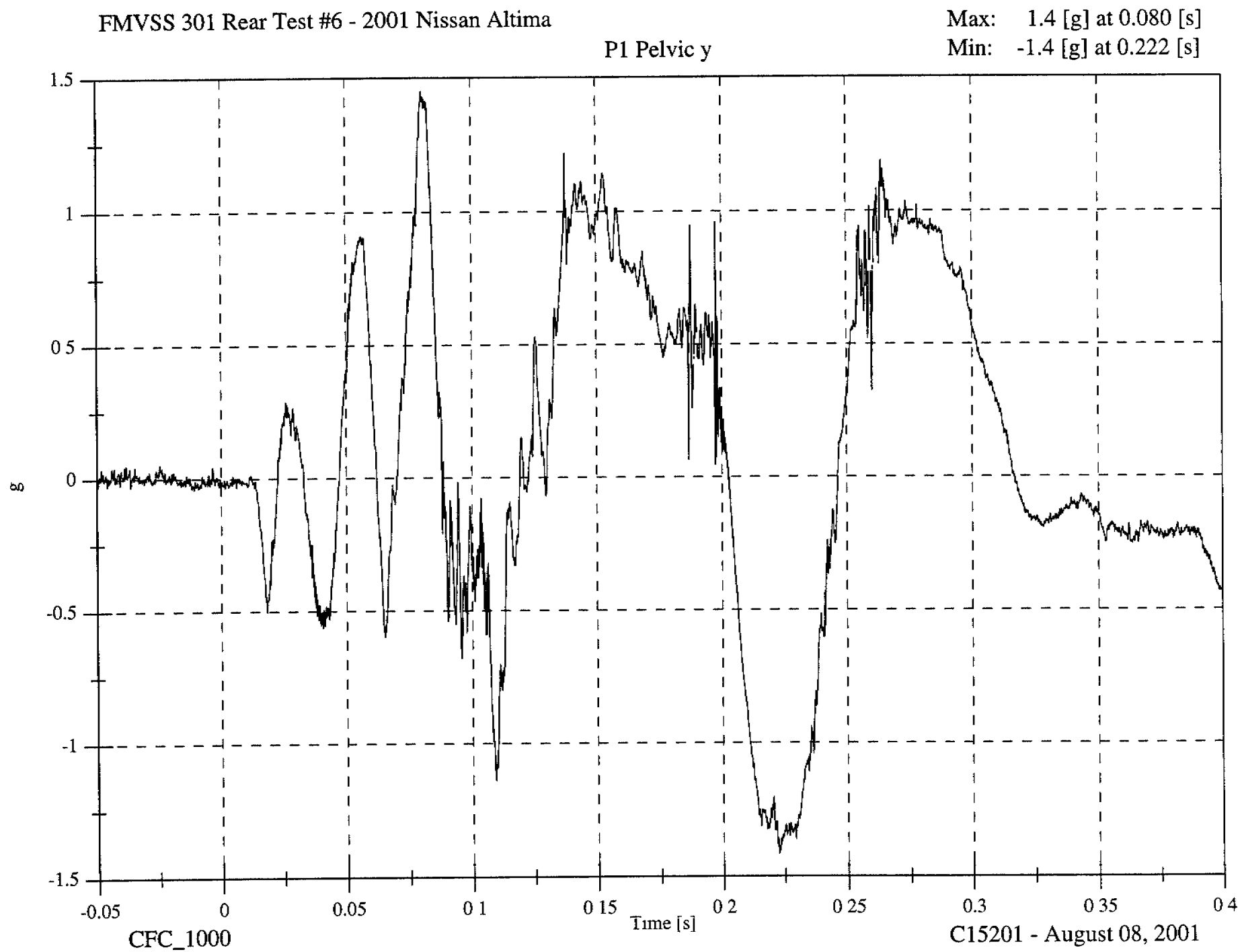
CFC_600

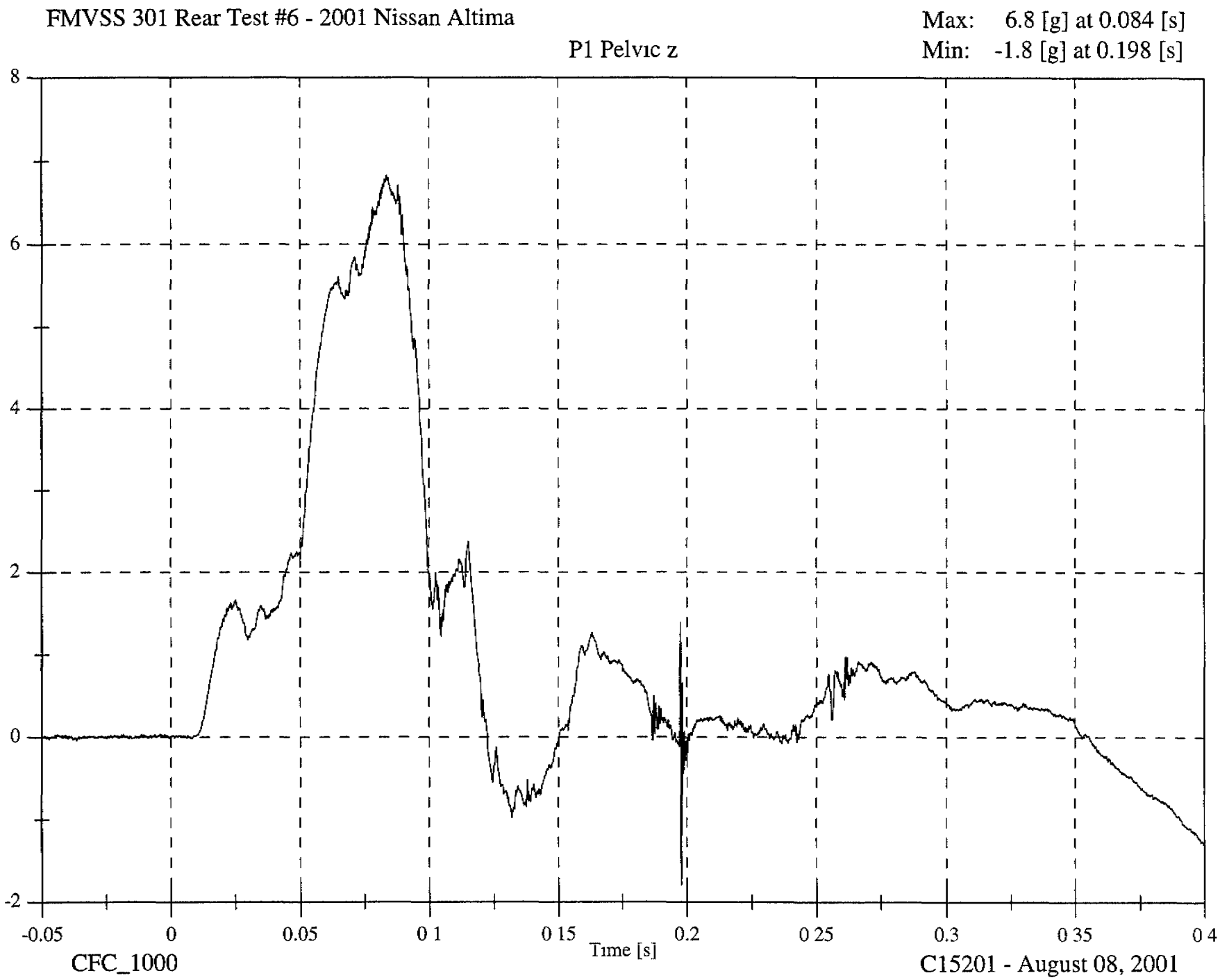
C15201 - August 08, 2001

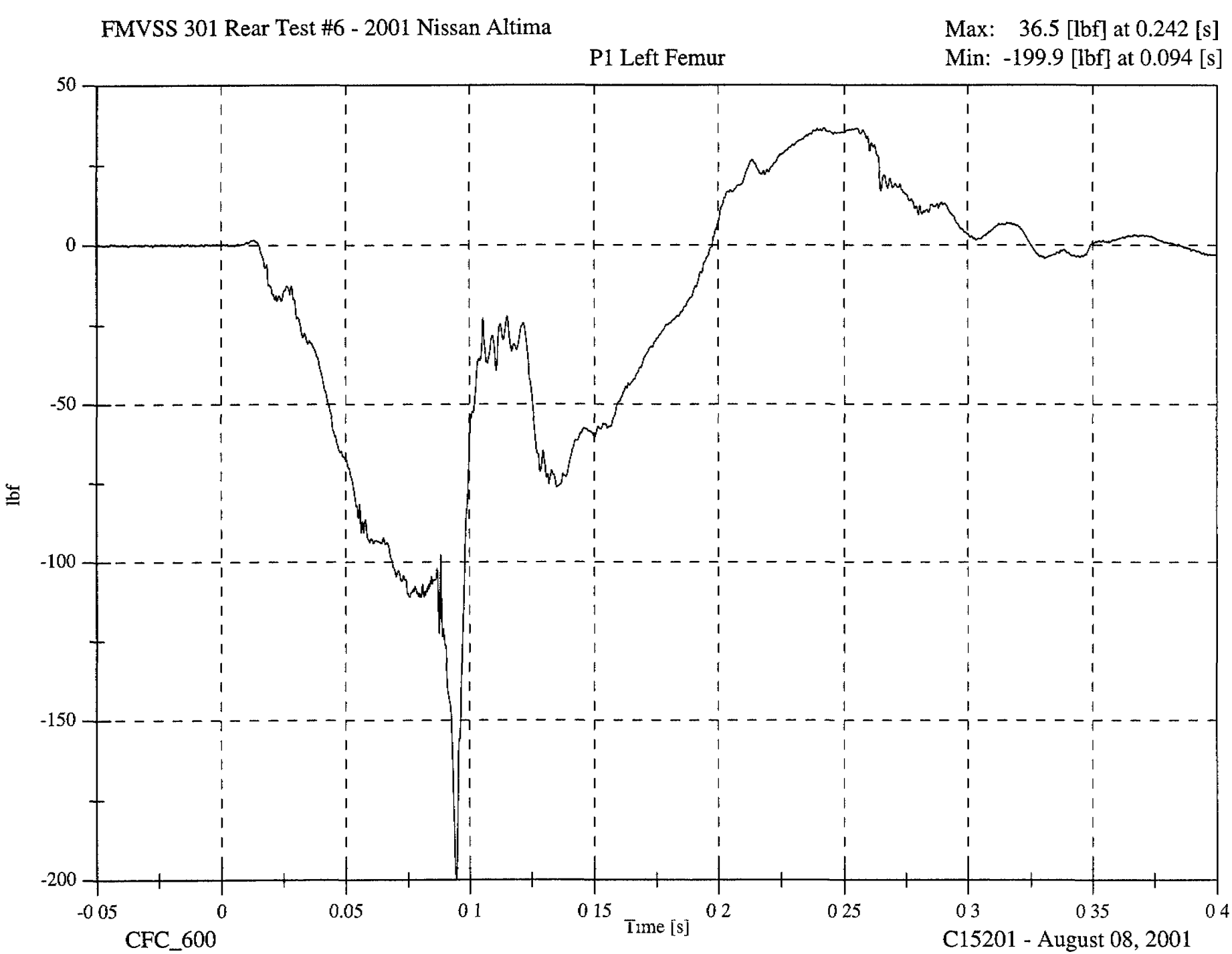
B-16

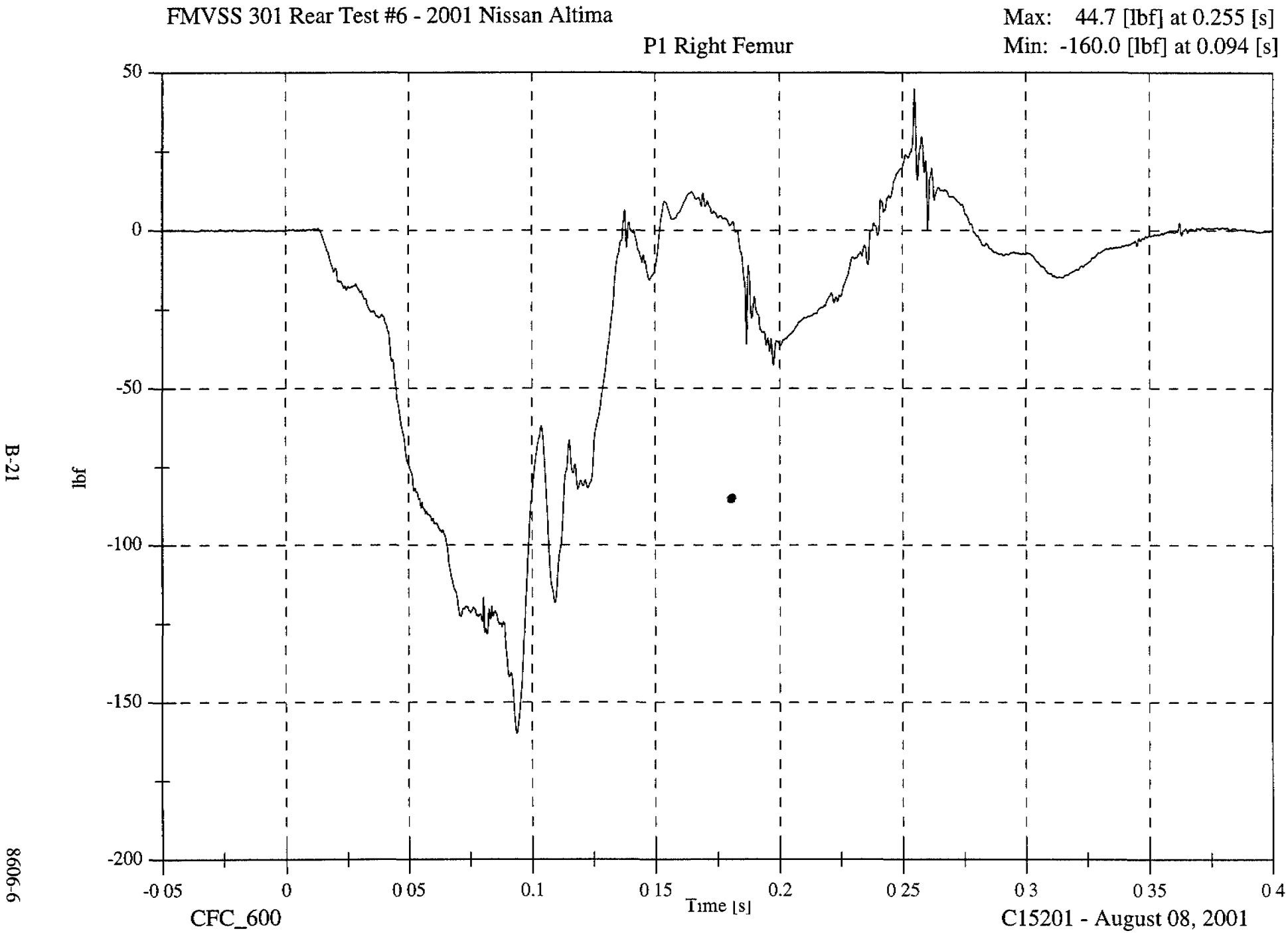
8606-6

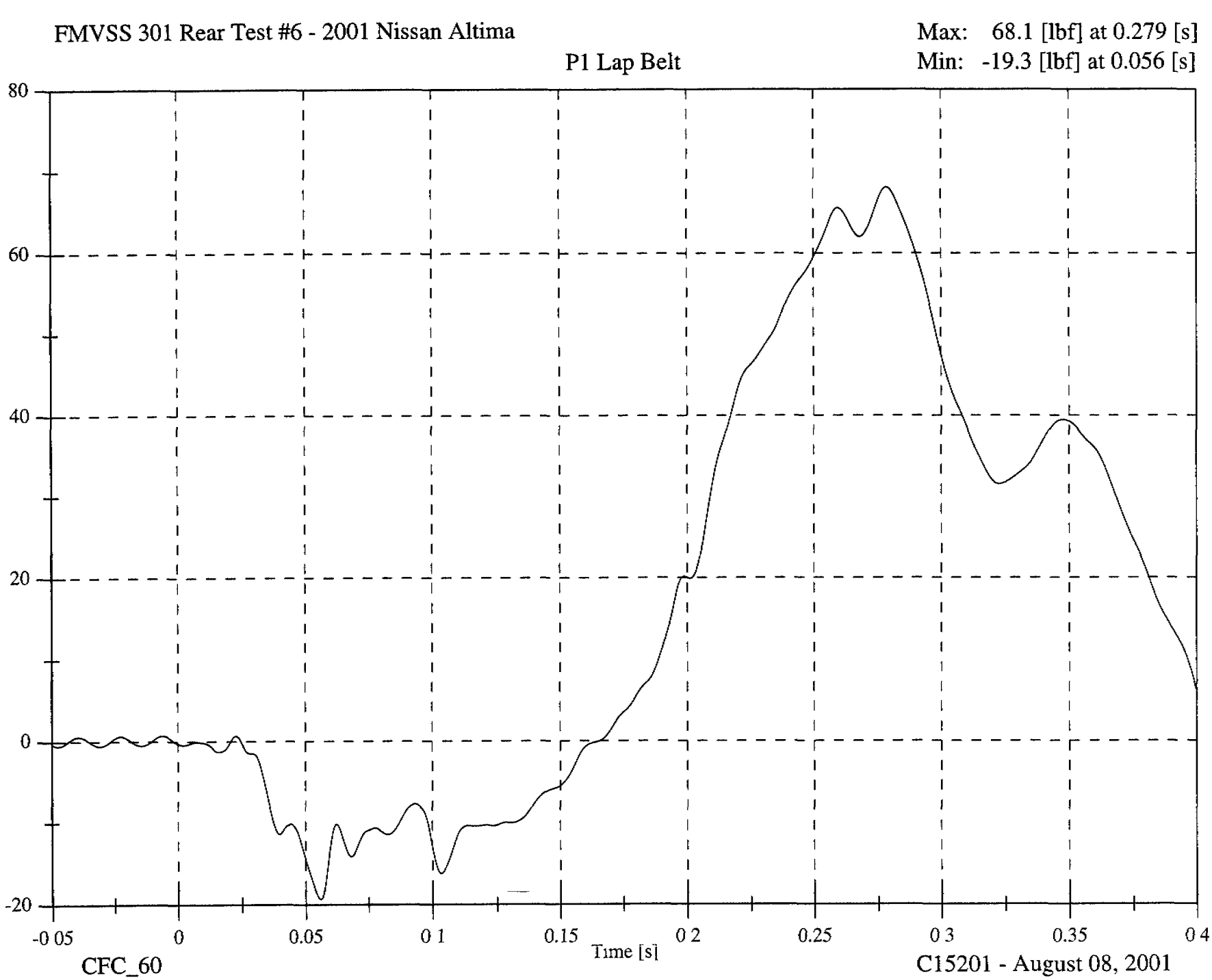

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Pelvic x
Max: 17.0 [g] at 0.088 [s]
Min: -2.8 [g] at 0.236 [s]
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-5
g
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Time [s]
CFC_1000
C15201 - August 08, 2001

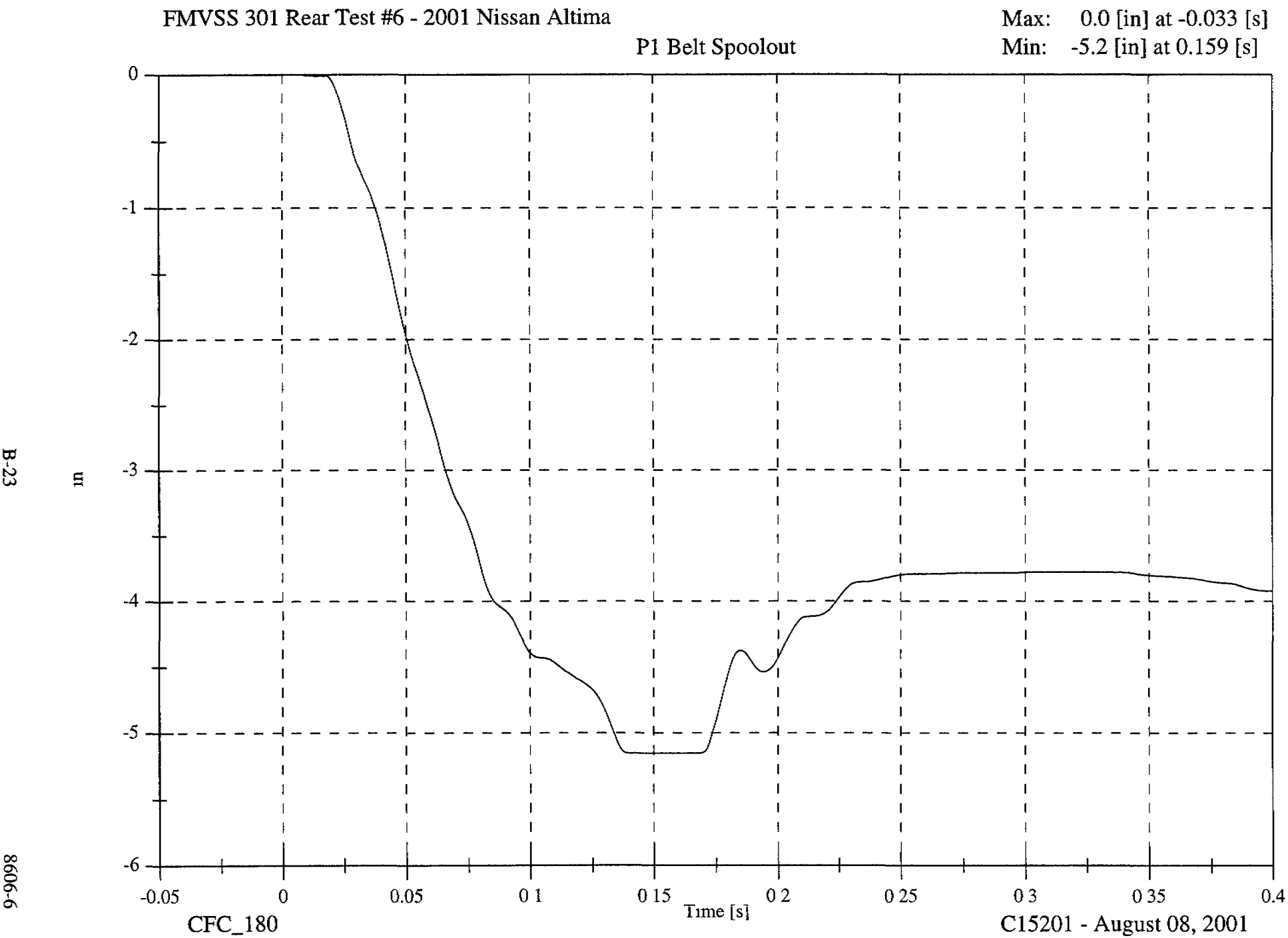

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Pelvic y
Max: 1.4 [g] at 0.080 [s]
Min: -1.4 [g] at 0.222 [s]
1.5
1
0 5
0
-0.5
-1
-1.5
g
-0.05
0
0.05
0 1
0 15
0 2
0 25
0.3
0 35
0 4
Time [s]
CFC_1000
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Pelvic z
Max: 6.8 [g] at 0.084 [s]
Min: -1.8 [g] at 0.198 [s]
8
6
4
2
0
-2
g
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Time [s]
CFC_1000
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Left Femur
Max: 36.5 [lbf] at 0.242 [s]
Min: -199.9 [lbf] at 0.094 [s]
50
0
-50
-100
-150
-200
lbf
-0 05
0
0.05
0 1
0 15
0 2
0 25
0 3
0 35
0 4
Time [s]
CFC_600
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Right Femur
Max: 44.7 [lbf] at 0.255 [s]
Min: -160.0 [lbf] at 0.094 [s]
50
0
-50
-100
-150
-200
lbf
-0 05
0
0 05
0.1
0 15
0.2
0 25
0 3
0 35
0 4
Time [s]
CFC_600
C15201 - August 08, 2001

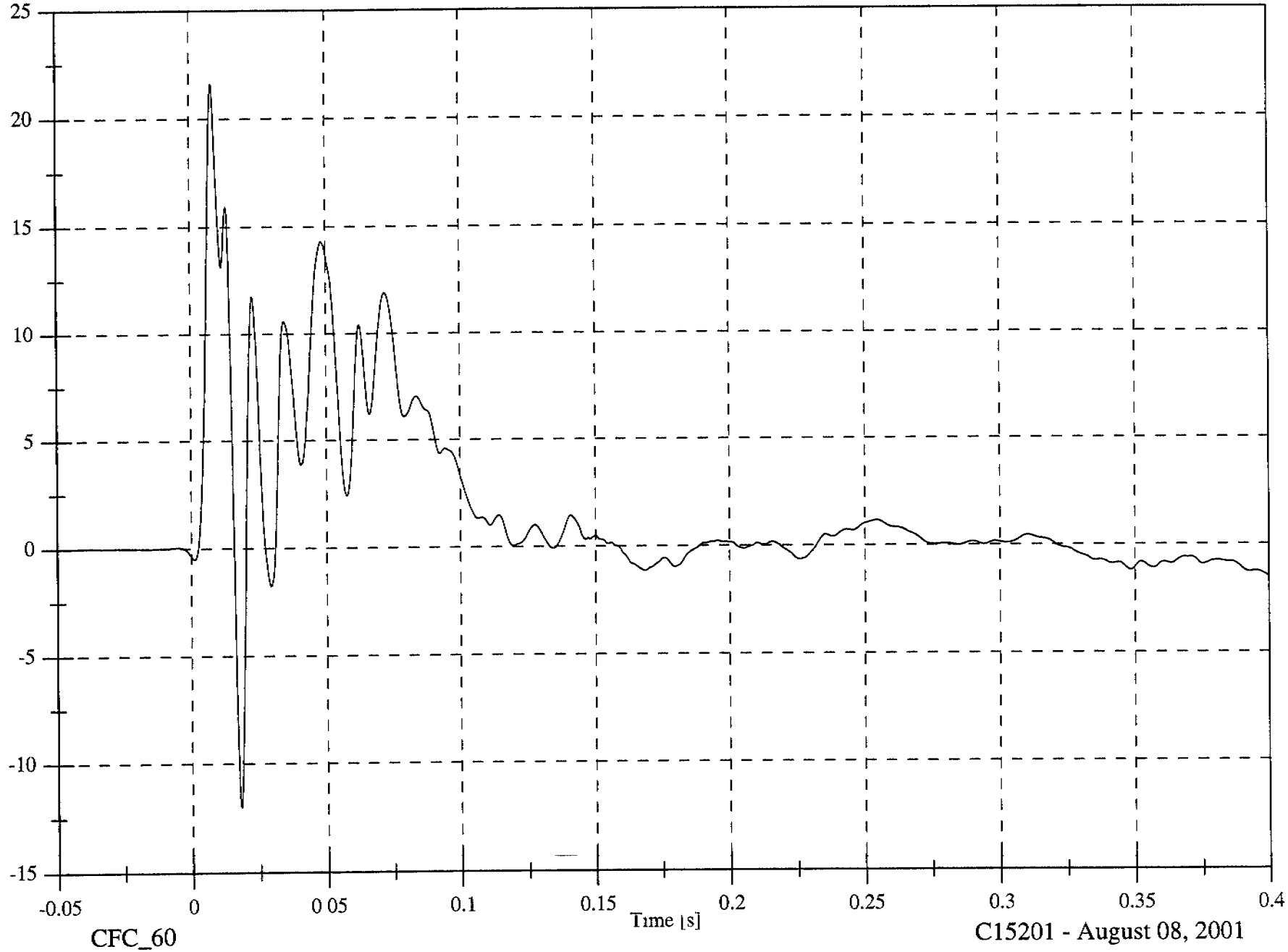

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Lap Belt
Max: 68.1 [lbf] at 0.279 [s]
Min: -19.3 [lbf] at 0.056 [s]
80
60
40
20
0
-20
lbf
-0 05
0
0.05
0 1
0.15
0 2
0.25
0 3
0.35
0 4
Time [s]
CFC_60
C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
P1 Belt Spoolout
Max: 0.0 [in] at -0.033 [s]
Min: -5.2 [in] at 0.159 [s]
0
-1
-2
-3
-4
-5
-6
in
-0.05
0
0.05
0 1
0 15
0 2
0 25
0 3
0 35
0.4
Time [s]
CFC_180
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

Acc #1 Left Rear Xm Ax

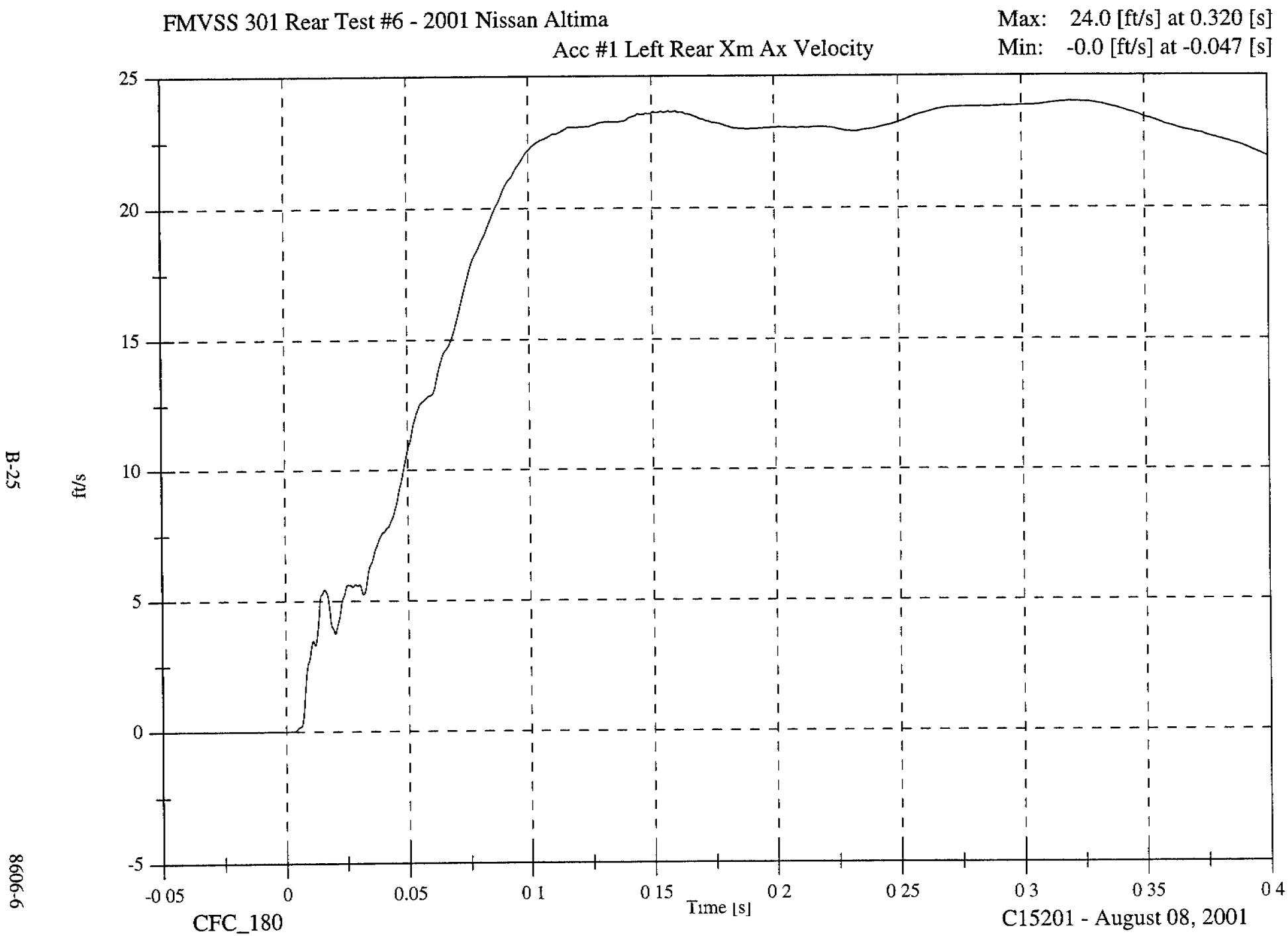
Max: 21.6 [g] at 0.008 [s]
Min: -12.0 [g] at 0.018 [s]



CFC_60

C15201 - August 08, 2001

8606-6

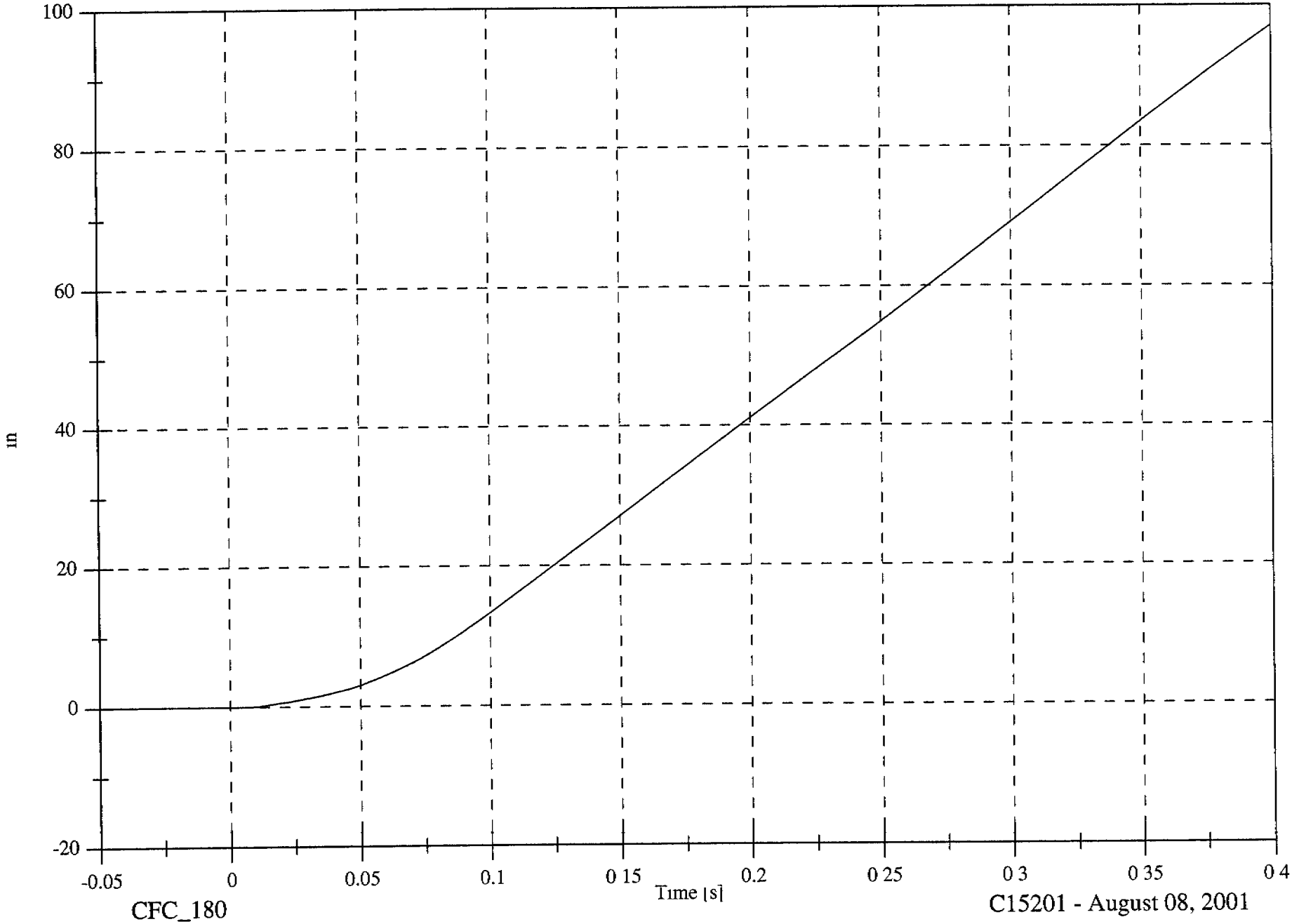

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
Acc #1 Left Rear Xm Ax Velocity
Max: 24.0 [ft/s] at 0.320 [s]
Min: -0.0 [ft/s] at -0.047 [s]
25
20
15
10
5
0
-5
ft/s
-0 05
0
0.05
0 1
0 15
0 2
0 25
0 3
0 35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

Acc #1 Left Rear Xm Ax Displacement

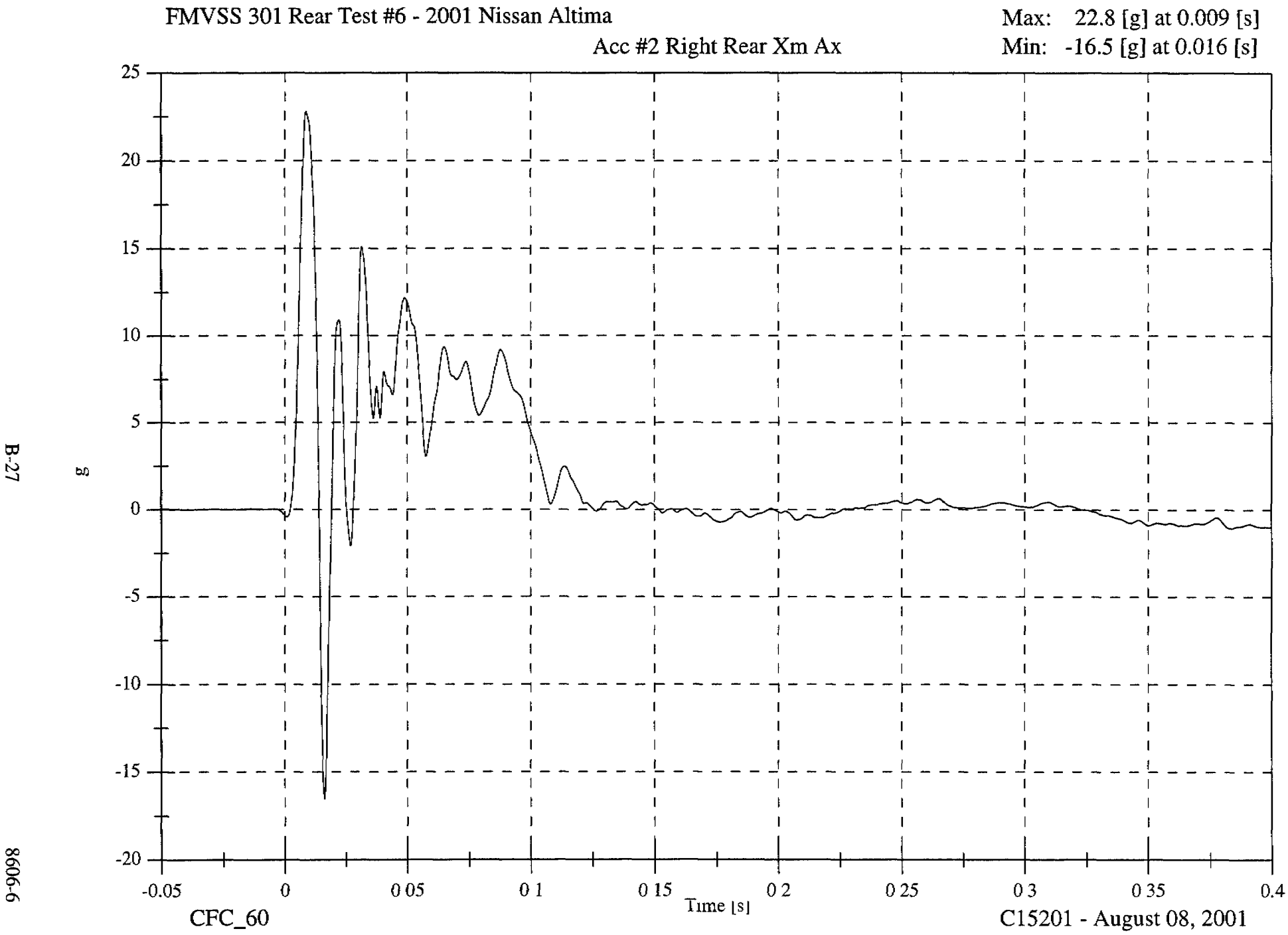
Max: 97.1 [in] at 0.400 [s]

Min: -0.0 [in] at -0.037 [s]



CFC_180

C15201 - August 08, 2001

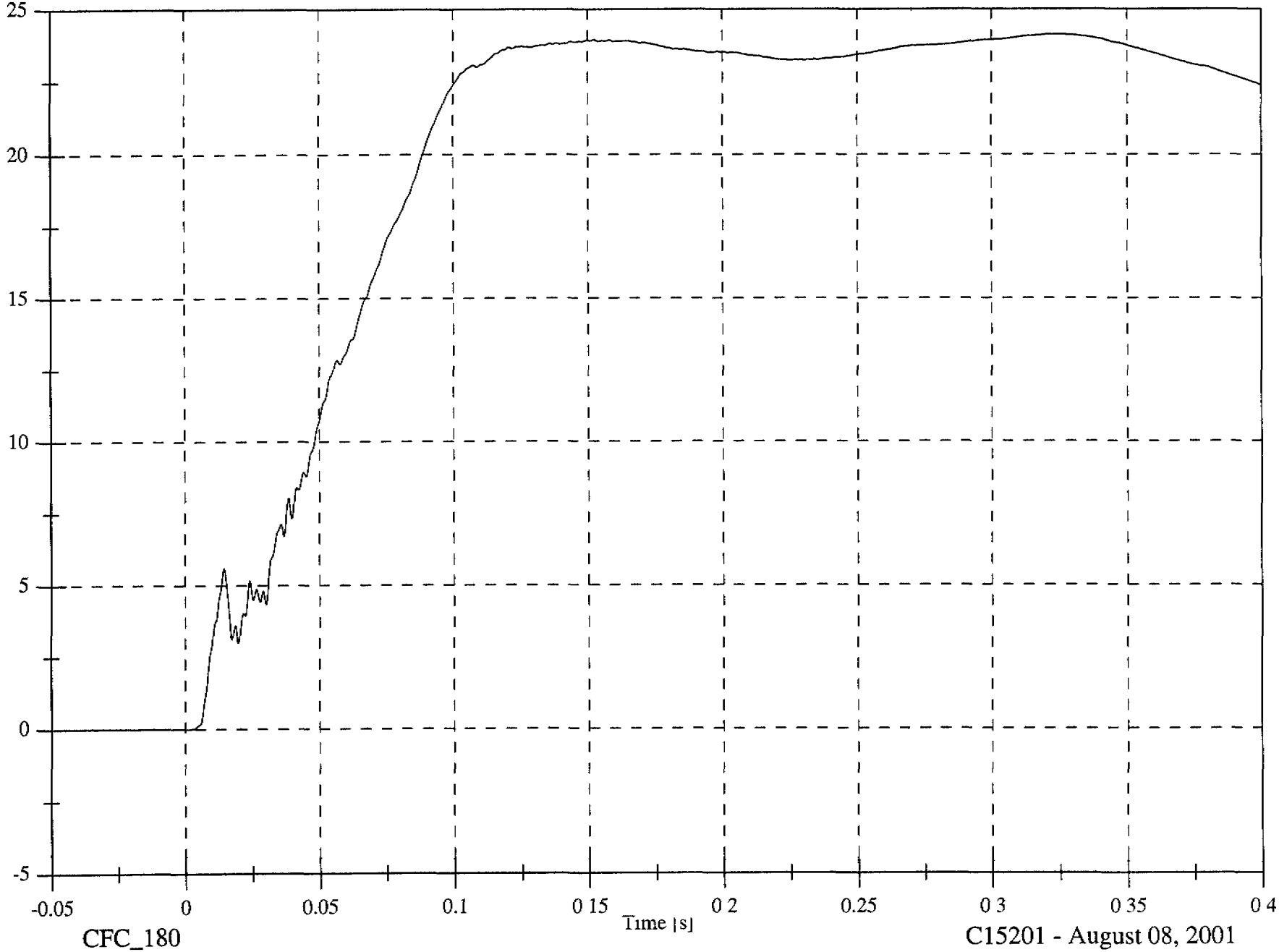

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
Acc #2 Right Rear Xm Ax
Max: 22.8 [g] at 0.009 [s]
Min: -16.5 [g] at 0.016 [s]
25
20
15
10
5
0
-5
-10
-15
-20
g
-0.05
0
0 05
0 1
0 15
0 2
0 25
0 3
0 35
0.4
Time [s]
CFC_60
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

Acc #2 Right Rear Xm Ax Velocity

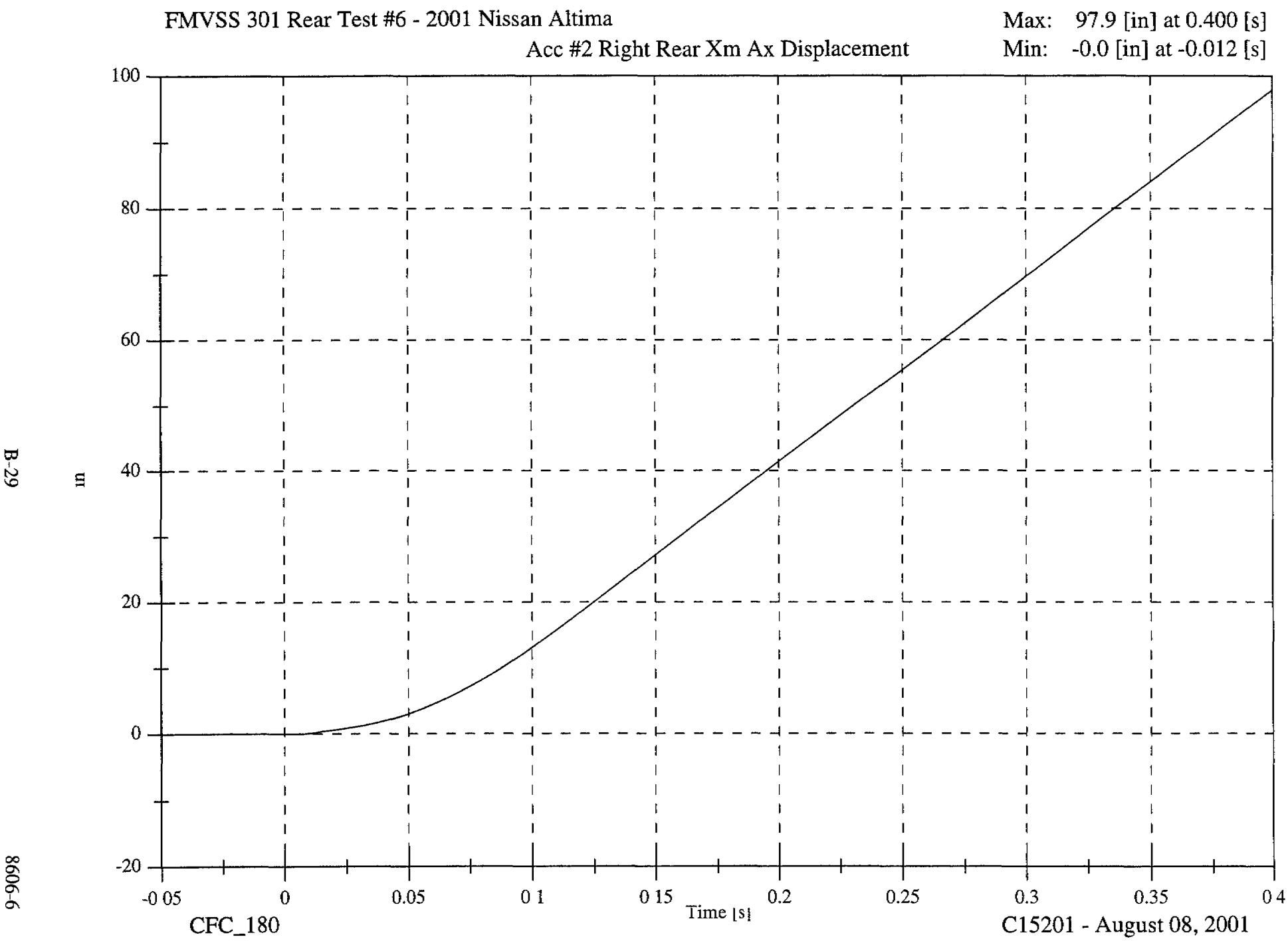
Max: 24.1 [ft/s] at 0.322 [s]

Min: -0.0 [ft/s] at -0.019 [s]



CFC_180

C15201 - August 08, 2001

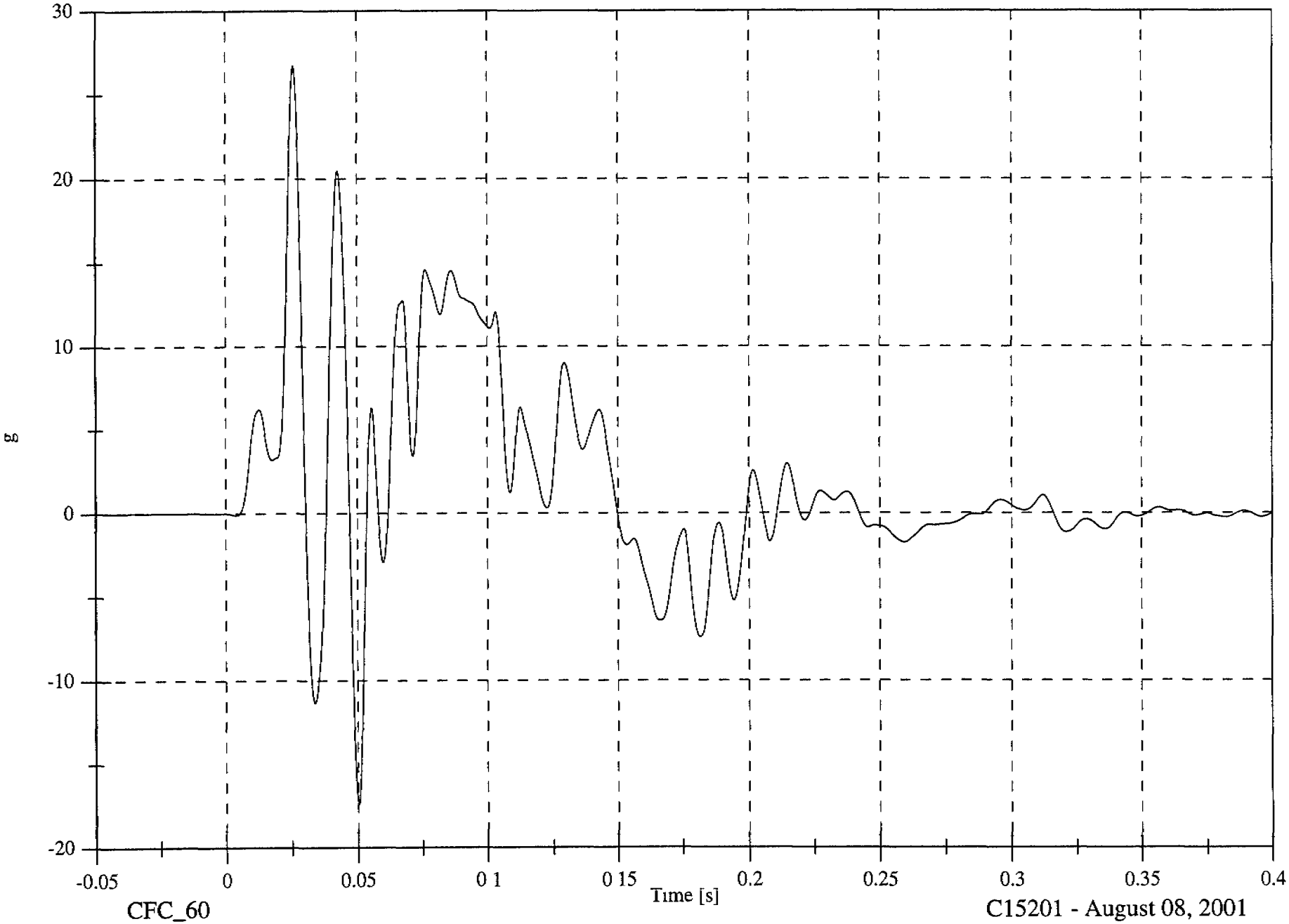

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
Acc #2 Right Rear Xm Ax Displacement
Max: 97.9 [in] at 0.400 [s]
Min: -0.0 [in] at -0.012 [s]
100
80
60
40
20
0
-20
in
-0 05
0
0.05
0 1
0 15
0.2
0.25
0.3
0.35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

Acc #3 Upper Seatback Ax

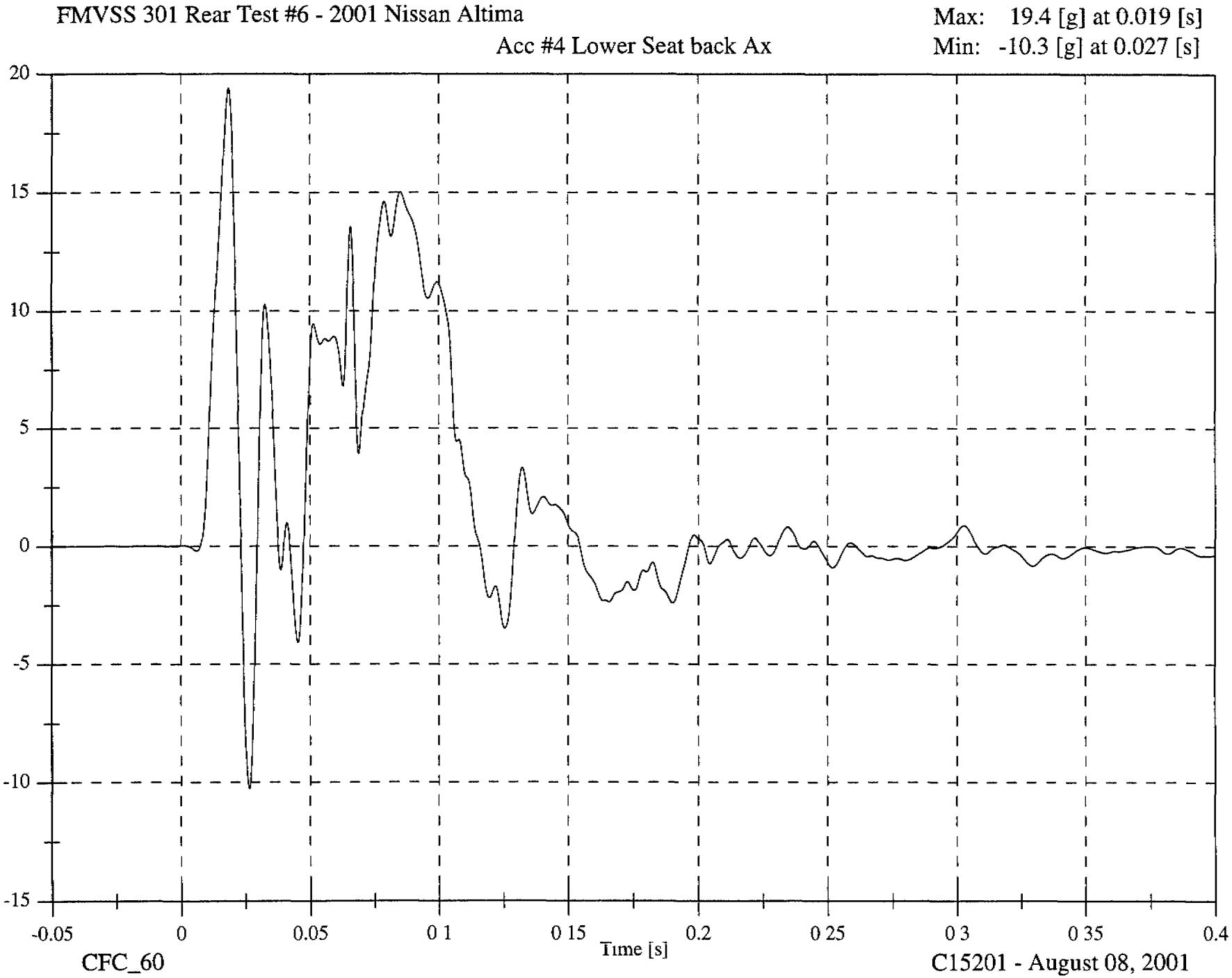
Max: 26.7 [g] at 0.026 [s]

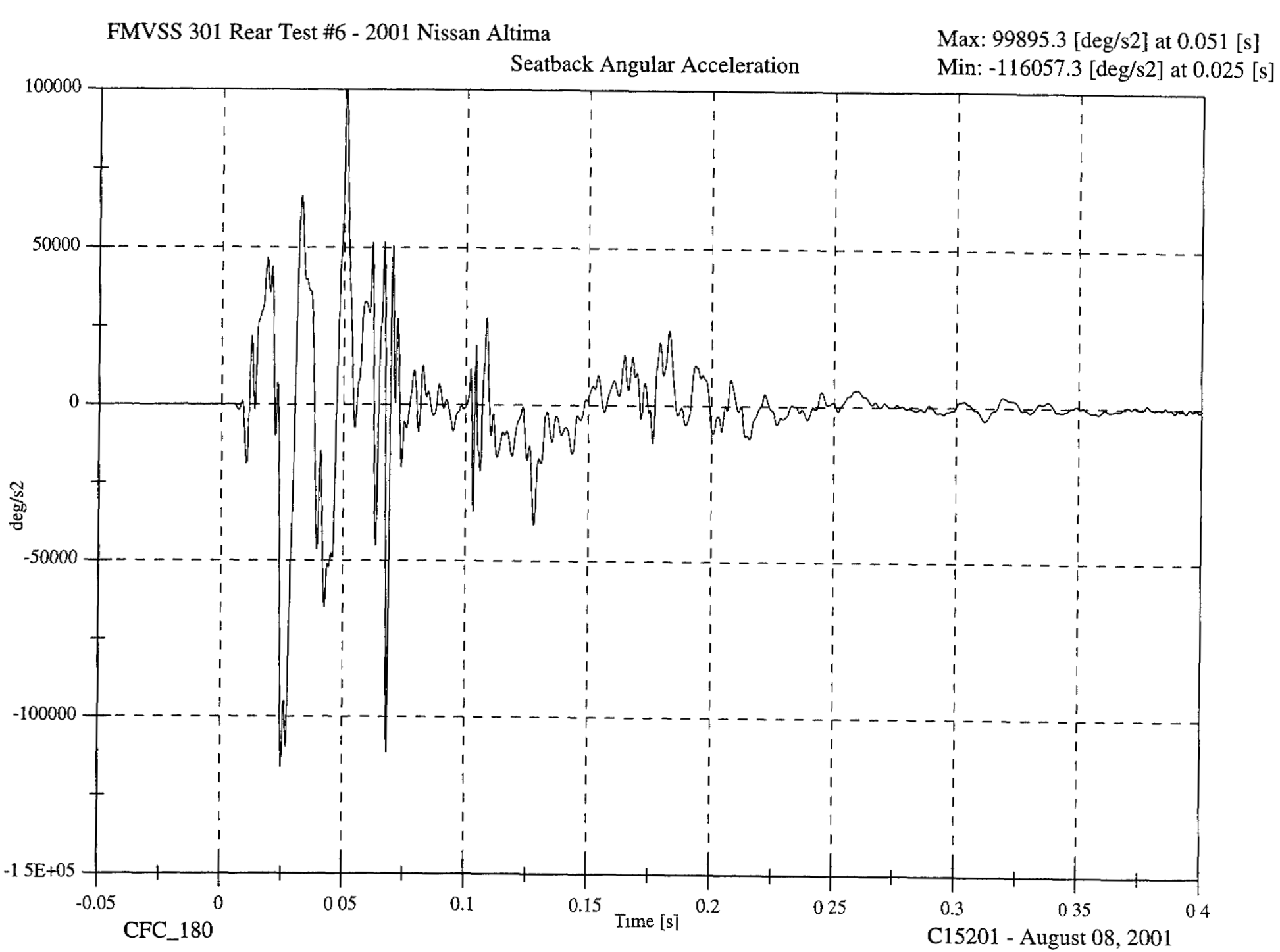
Min: -17.4 [g] at 0.050 [s]



CFC_60

C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
Acc #4 Lower Seat back Ax
Max: 19.4 [g] at 0.019 [s]
Min: -10.3 [g] at 0.027 [s]
20
15
10
5
0
-5
-10
-15
g
-0.05
0
0.05
0 1
0 15
0.2
0 25
0 3
0 35
0.4
Time [s]
CFC_60
C15201 - August 08, 2001

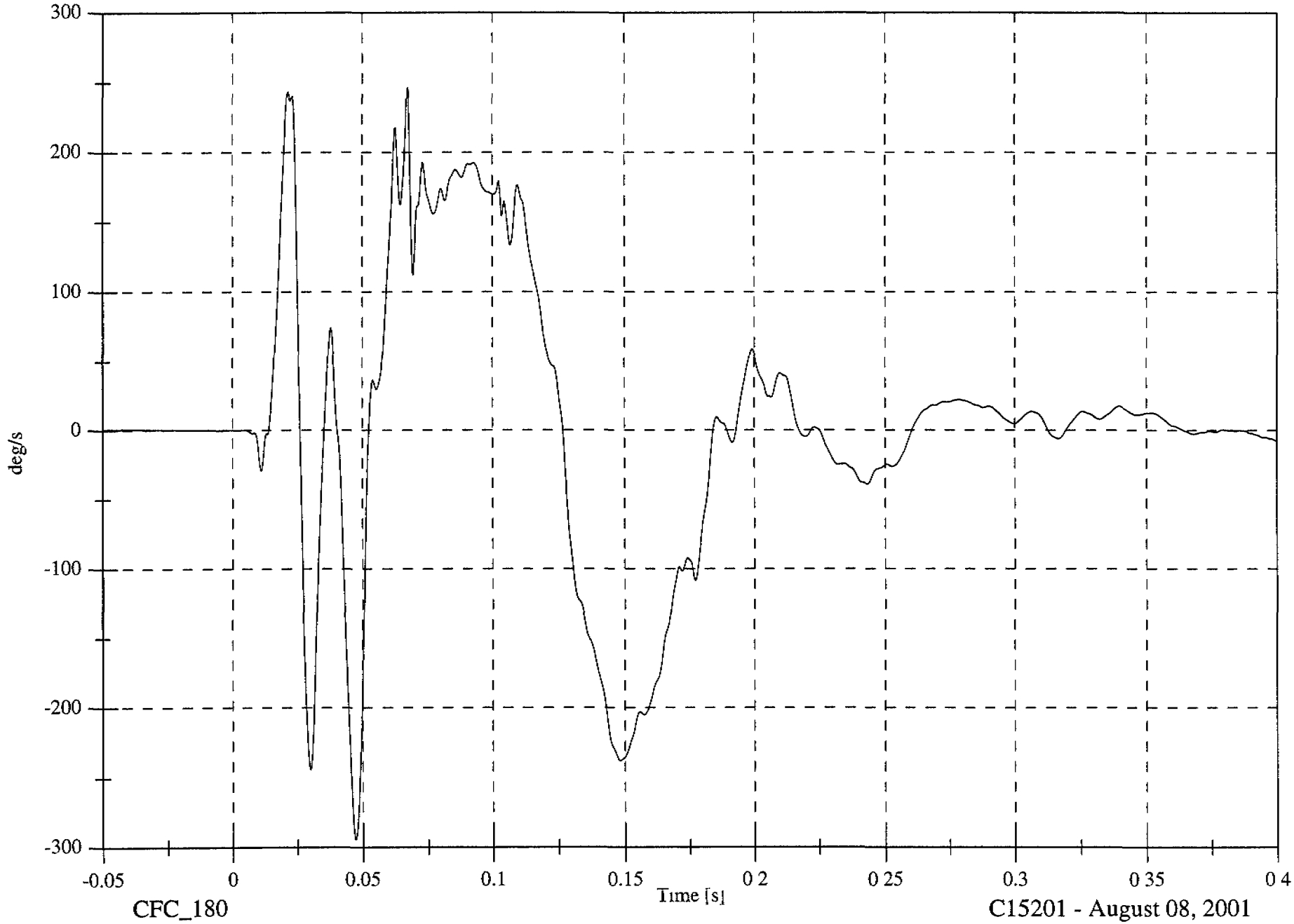

FMVSS 301 Rear Test #6 - 2001 Nissan Altima
Seatback Angular Acceleration
Max: 99895.3 [deg/s2] at 0.051 [s]
Min: -116057.3 [deg/s2] at 0.025 [s]
100000
50000
0
-50000
-100000
-1 5E+05
deg/s2
-0.05
0
0 05
0.1
0.15
0.2
0 25
0.3
0 35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001

FMVSS 301 Rear Test #6 - 2001 Nissan Altima

Seatback Angular Velocity

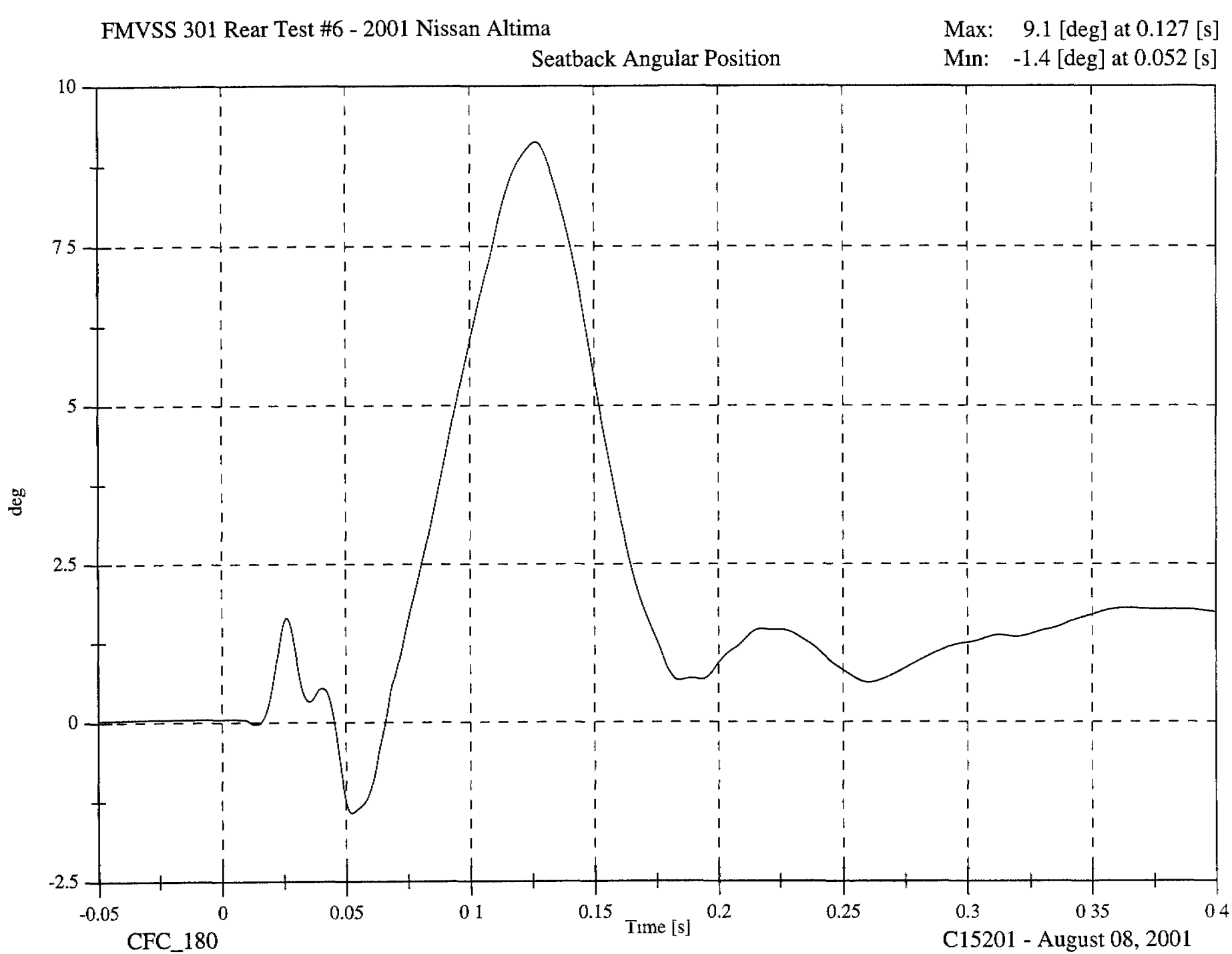
Max: 246.2 [deg/s] at 0.067 [s]

Min: -294.5 [deg/s] at 0.047 [s]



CFC_180

C15201 - August 08, 2001


FMVSS 301 Rear Test #6 - 2001 Nissan Altima
Seatback Angular Position
Max: 9.1 [deg] at 0.127 [s]
Mın: -1.4 [deg] at 0.052 [s]
10
7 5
5
2.5
0
-2.5
deg
-0.05
0
0.05
0 1
0.15
0.2
0.25
0.3
0 35
0 4
Time [s]
CFC_180
C15201 - August 08, 2001