

V3047

REPORT NUMBER: CAL-99-12

**NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST**

**CHRYSLER CORPORATION
1999 JEEP WRANGLER
SPECIAL PURPOSE**

NHTSA NUMBER: MX0311

CALSPAN TEST NUMBER: 8413-36

CALSPAN CORPORATION
TRANSPORTATION SCIENCE CENTER
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February 16, 1999

FINAL REPORT

PREPARED FOR:

U. S. DEPARTMENT OF TRANSPORTATION
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Safety Performance Standards
Office of Crashworthiness Standards
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16. <i>Abstract</i> A frontal load cell barrier test of a 1999 Jeep Wrangler Special Purpose was performed at Calspan Corporation crash test facility in Buffalo, New York, on February 16, 1999. The impact velocity was 56.2 kph and the temperature at the barrier face was 20°C. The maximum post-test vehicle crush was 565.8 mm. The test vehicle was equipped with 3-point restraint systems, knee bolsters, and next generation airbags at both the driver and right outboard passenger seating positions. With respect to FMVSS 208 "Occupant Crash Protection - Injury Criteria" both the driver and passenger appeared to comply with head, chest, and femur requirements.			
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Section 1

PURPOSE AND SUMMARY OF TEST MX0311

PURPOSE

This 56.2 kph frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-96-D-02010. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 48.3 kph requirements.

The 56.2 kph frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Indicant Test procedure.

SUMMARY

A load cell barrier consisting of 36 load cells was impacted by a 1999 Jeep Wrangler Special Purpose at a velocity of 56.2 kph. The test was performed at the Calspan Corporation on February 16, 1999. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by 1 real-time camera and 14 high-speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs), were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Indicant Test Procedure.

Both ATDs were fully instrumented with head, chest, and pelvis triaxial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 150) was used in two previous tests (MX0100 and MX0202) where it did not exceed FMVSS 208 head, chest, and femur injury criteria. The right-front passenger (position 2) ATD (Serial No. 064) was used in one previous test (MX0202) where it did not exceed FMVSS 208 head, chest, and femur injury criteria. Certification details, along with instrumentation calibration data, are found in Appendix C.

The 133 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

The driver's HIC was 588.9. The maximum chest deceleration over 3 milliseconds was 54.5 g's and maximum chest deflection was 61.9 mm. Femur loads were 5842.6 Newtons on the left and 3943.8 Newtons on the right.

The right front passenger's HIC was 748.4. Maximum chest deceleration over 3 milliseconds was 45.1 g's and maximum chest deflection was 38.9 mm. Femur loads were 4966.9 Newtons on the left and 4130.3 Newtons on the right.

Driver and passenger view seat belt spool out cameras were not used due to the location of the seatbelt d-rings on the sport bar. Spool out data was recorded electronically and mechanically. The vehicle engine top (accelerometer #3) accelerometer data is not accurate after 15 ms. The vehicle right side disc brake caliper (accelerometer #5) accelerometer sustained a cut wire during the event. This data is not accurate after 15 ms. The vehicle left side disc brake caliper (accelerometer #7) accelerometer sustained a cut wire during the event. This data is not accurate after 60 ms. The position #1 left lower tibia Mx load cell, right lower tibia Mx load cell, and left ankle Z accelerometer did not record accurately during the event. The position #2 right lower tibia Fz load cell did not record during the event. The position #2 right toe Az accelerometer data is questionable.

SECTION 2

GENERAL TEST AND VEHICLE PARAMETER DATA

DATA SHEET NO. 1 CRASH TEST SUMMARY

Vehicle NHTSA No. : MX0311 Test Mode : 56.3 kph Frontal Barrier

Test Date : February 16, 1999 Time: 13:30 Temperature : 13.9 °C

Vehicle Make/Model/Body Style : 1999 Jeep Wrangler Special Purpose

Vehicle Test Weight : 1787.0 kg

Vehicle/Barrier Impact Angle : 0 °

Impact Velocity : 56.2 kph

Maximum Static Crush : 565.8 mm

Vehicle Rebound : 852.3 mm

DUMMIES:

DRIVER

PASSENGER

Type : 572E 572E

Restraint System : Seatbelt, Airbag, Knee Bolster Seatbelt, Airbag, Knee Bolster

Number of Data Channels : 133

Number of Cameras : 1 Real Time

14 High Speed

DOOR OPENING DATA : Closed/Operable - Left Front

Closed/Operable - Right Front

Front Seat(s) Data : DRIVER PASSENGER

Seat Track Failure :(mm of shift) 0 0

Seat Back Failure : None None

VISIBLE DUMMY CONTACT POINTS :

DRIVER

PASSENGER

Head : The face contacted the top of center of the airbag. The back of the head contacted the left side of the headrest. The face contacted the center of the airbag. The back of the head contacted the center and the left side of the headrest.

Abdomen : None None

Chest Airbag Airbag

Knees Knee Bolster Knee Bolster

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA

TEST VEHICLE INFORMATION :

Year/Make/Model/Body Style : 1999 Jeep Wrangler Special Purpose
NHTSA No. : MX0311 ; VIN: 1J4FY29P7XP408120 ; Color : Red
Engine Data: 4 cylinders; - CID; 2.5 Liters; - cc
Placement : X Longitudinal or In-Line; - Transverse or Lateral
Transmission Data : 5 speeds; X Manual; - Automatic; X Overdrive
Final Drive : - Rear Wheel Drive; - Front Wheel Drive; X Four Wheel Drive
Major Options : - A/C; X Pwr.Strg.; X Pwr. Brakes
- Pwr. Windows; - Pwr. Door Locks; X Tilt Wheel
Date Received : 01/29/99 ; Odometer Reading 35 km
Selling Dealer : Downing and Hall's Jeep Eagle
& Address: 6179 South Transit Road Lockport, NY 14094-6395

DATA FROM TIRE VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured by : Chrysler Corporation
Date of Manufacture 9-98
GVWR : 2019 kg; GAWR: 998 kg FRONT; 1203 kg REAR

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load : 300 kpa FRONT
300 kpa REAR
Recommended Tire Size : P225/75R15
* Recommended Cold Tire Pressure : 227 kpa FRONT; 277 kpa REAR
Size of Tires on Test Vehicle: P225/75R15 ; Manufacturer: Michelin
Vehicle Capacity Data :
Type of Front Seats: - Bench; X Bucket; - Split Bench
Number of Occupants: 2 Front; 2 Rear; 4 Total
Vehicle Capacity Weight (VCW) = 512.5 kg
No. of Occupants x 68 kg = 272.0 kg
Rated Cargo/Luggage Weight (RCLW) = 240.5 kg

*Tire pressure used for test

DATA SHEET NO. 2 GENERAL TEST AND VEHICLE PARAMETER DATA (cont.)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

Right Front	=	360.0	kg	Right Rear	=	392.5	kg
Left Front	=	352.5	kg	Left Rear	=	401.5	kg
TOTAL FRONT	=	712.5	kg	TOTAL REAR	=	794.0	kg
TOTAL DELIVERED WEIGHT =		1506.5	kg				
% of Total Front of Vehicle Weight =		47.3	%	% of Total Rear Weight =		52.7	%

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT :

Total Delivered Weight (UDW)	=	1506.5	kg
Rated Cargo/Luggage Weight (RCLW)	=	136.0	kg (136 kg maximum)
Weight of 2 p.572 Dummies @ 76 each	=	152.0	kg
TARGET TEST WEIGHT	=	1794.5	kg

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 128.5 KG OF CARGO WEIGHT:

Right Front	=	373.0	kg	Right Rear	=	517.5	kg
Left Front	=	370.5	kg	Left Rear	=	526.0	kg
TOTAL FRONT	=	743.5	kg	TOTAL REAR	=	1043.5	kg
TOTAL TEST WEIGHT =		1787.0	kg				
% of Total Front Weight =		41.6	%	% of Total Rear Weight =		58.4	%
Weight of Ballast Secured in Vehicle Trunk Area =		76	kg				
Vehicle Components Removed for Weight Reduction:		None					

VEHICLE ATTITUDE (all dimension in millimeters):

AS DELIVERED :	RF	831	LF	844	RR	871	LR	868
FULLY LOADED :	RF	825	LF	835	RR	825	LR	820
AS TESTED :	RF	826	LF	836	RR	826	LR	827
Vehicle's Wheel Base :		2378 mm						
Location of Vehicle's C.G. :		1388.6 mm rearward of front wheel center.						

FUEL SYSTEM DATA :

Fuel System Capacity From Owner's Manual	=	56.8	liters
Usable Capacity Figure Furnished by COTR	=	56.8	liters
Test Volume Range (92 to 94% of Usable Capacity)	=	52.2	to 53.4 liters
ACTUAL TEST VOLUME	=	52.5	liters (with entire fuel system filled)
Test Fluid Type:	Stoddard Solution ; Spec. Grav. = 0.764		
Kinematic Viscosity	=	0.96	centistokes; Color = Orange
Type of Fuel Pump:	Electric- ☒ ; Mechanical- ☐		
Does Electric Pump operate with ignition switch "ON" & engine "OFF"	Yes- ☒ No- ☐		
Details of Fuel System <u>The fuel tank is centered behind the rear axle. The filler neck is on the left side of the vehicle, behind the rear axle. The fuel lines run along the inside of the left frame rail.</u>			

DATA SHEET NO. 3 POST IMPACT DATA

TYPE OF TEST:

Type of Test : Frontal Barrier Impact Angle : 0°
Test Date : February 16, 1999 Time: 13:30 Temperature: 13.9 °C
Vehicle NHTSA No. : MX0311
Required Impact Velocity Range : 55.5 to 57.1 kph

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

Trap No. 1 = 56.2 kph; Trap No. 2 = 56.2 kph
Distance from vehicle to barrier : (1) entering trap = 813 mm
(2) exiting trap = 305 mm

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

Vehicle Length:

Pre-Test Right = 3810.8 ; C/L = 3770.0 ; Left = 3826.5
Post-Test Right = 3245.0 ; C/L = 3235.0 ; Left = 3334.0
Crush Right = 565.8 ; C/L = 535.0 ; Left = 492.5
AVERAGE = 531.1 mm

VEHICLE REBOUND: (From rigid barrier only.)

Distance from front of test vehicle to impact point :

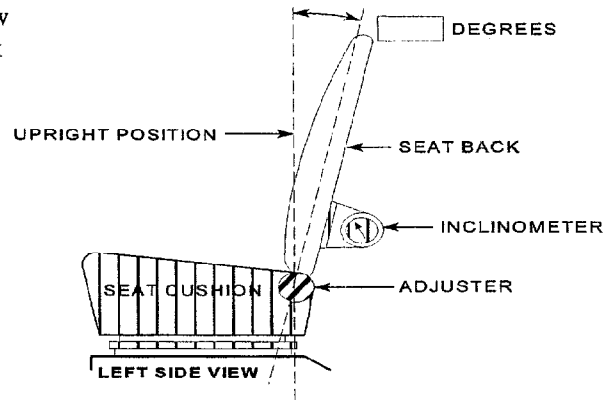
Right = 815 ; C/L = 888 ; Left = 854
AVERAGE = 852.3 mm

DATA SHEET NO. 4 TEST VEHICLE INFORMATION

VEHICLE IDENTIFICATION:

Model Year : 1999 Vehicle Model: Jeep Wrangler Body Style : Special Purpose

1. Nominal Design Riding Position for adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable.



FRONT SEAT ASSEMBLY

Seat back angle for driver's seat : 24°

Measurement instructions : Lift recliner handle to dump seat full forward. Push seat back to full up. Cut away rear seat cover padding to expose frame tube and recline seat 7° from full up. The inclinometer will register 24° from a level sill.

Seat back angle for passenger's seat : 24°

Measurement instructions : Same as the driver's seat

2. Seat Fore and Aft Positioning

Positioning of the driver's seat : Seats are set at mid-track position. There are a total of 20 detents, with the forward most detent labeled 0. The seat was placed at detent 10.

Positioning of the passenger's seat (if applicable) : Same as the driver's seat.

3. Fuel Tank Capacity Data

3.1

A. "Usable Capacity" of the standard equipment fuel tank is	<u>56.8</u> liters
B. "Usable Capacity" of the optional equipment fuel tank is	<u>-</u> liters
C. "Usable Capacity" of the vehicle(s) used for certification testing to requirements of FMVSS 301 =	<u>56.8</u> liters

3.2 Amount of Stoddard solvent added to vehicle(s) used for certification test(s) = 53.8 liters

3.3 Is vehicle equipped with electric fuel pump? Yes- X ; No- -

If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.

The fuel pump runs in either ignition start or ignition run positions. The pump stops after one second if the engine is not run.

DATA SHEET NO. 4 TEST VEHICLE INFORMATION (cont.)

4. STEERING COLUMN ADJUSTMENTS :

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions. If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.

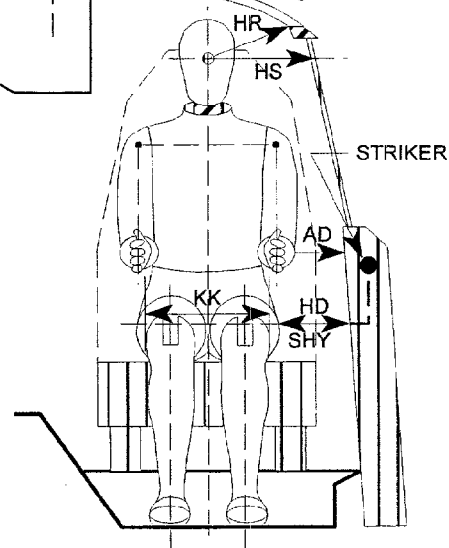
Operational Instructions: The steering column was placed in mid-position. The column was placed full up, the angle was measured. The column was placed full down, the angle was measured. The column was placed at the position midway between angle up and angle down.

5. SEAT BELT UPPER ANCHORAGE

Nominal design riding position: There are 5 adjustment positions. The anchorage was placed at mid position, detent number 3.

-

-



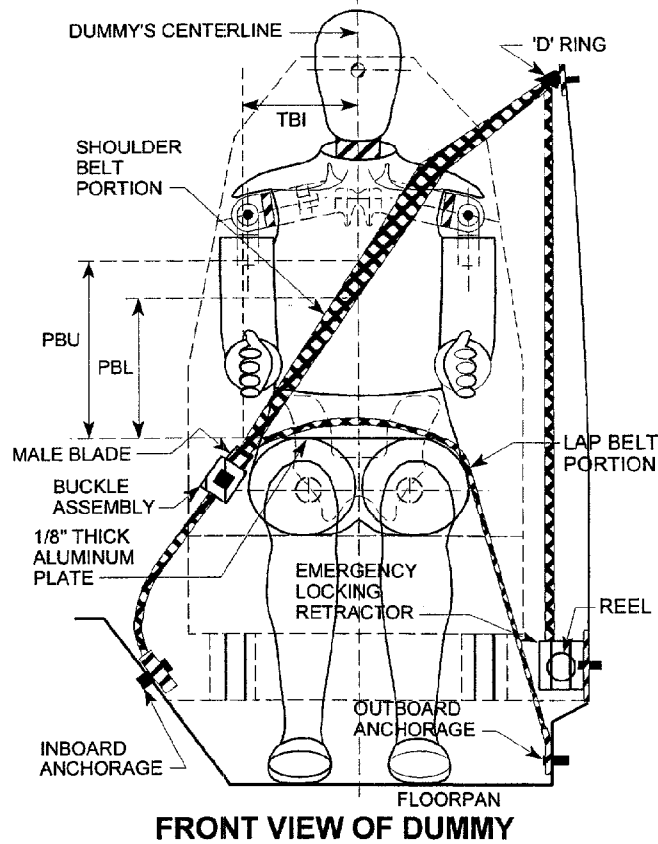
DATA SHEET NO. 5 FRONT SEAT DUMMY POSITIONING MEASUREMENTS IN VEHICLE

	DRIVER (Serial #150)			PASS. (Serial # 064)		
WA ^o	61 deg.			N/A		
SWA ^o	66.5 deg.			N/A		
SCA ^o	23.5 deg.			N/A		
SA ^o	24 deg.			24 deg.		
HZ	235			232		
HH	527			529		
HW	583			583		
HR	262			296		
NR	351	Angle	-18 deg.	N/A		
CD	490			462		
CS	240			N/A		
RA	144			N/A		
KDL	145	Angle (KDA)	35 deg.	126		
KDR	147			132	Angle (KDA)	27 deg.
PA ^o	23.7 deg.			21.4 deg.		
TA ^o	-45.5 deg.			-48.5 deg.		
KK	306			270		
ST	510	Angle	12 deg.	570	Angle	7 deg.
SK	590	Angle	97 deg.	590	Angle	93 deg.
SH	245	Angle	122 deg.	225	Angle	124 deg.
SHY	135			150		
HS	328			371		
HD	100			97		
AD	38			43		

Dimensions in millimeters

DATA SHEET NO. 6 SEAT BELT POSITIONING DATA

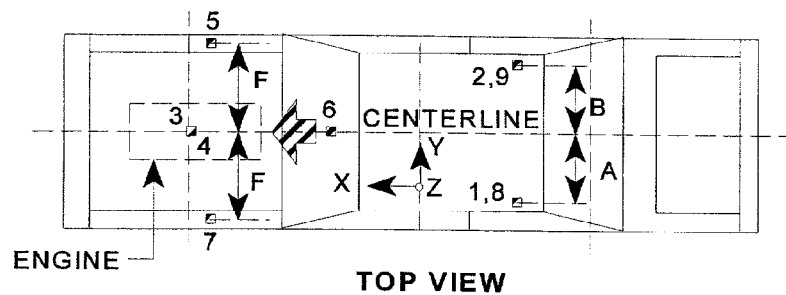
SEAT BELT POSITIONING DATA



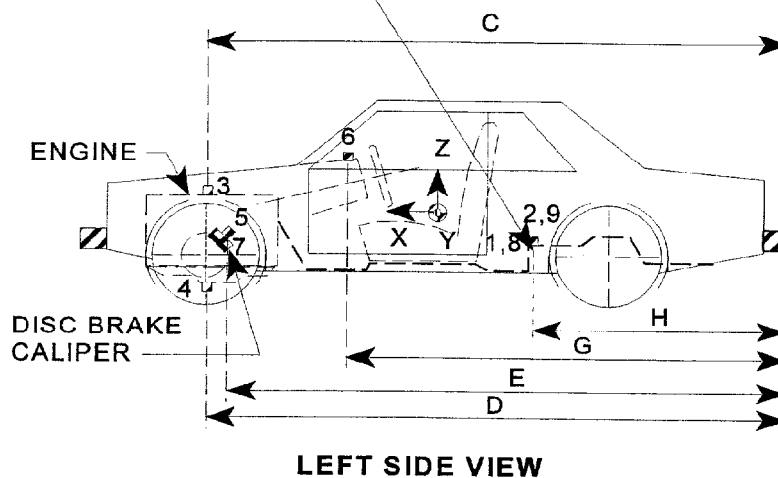
FRONT VIEW OF DUMMY

	DRIVER DUMMY (mm)	PASSENGER DUMMY (mm)
PBU -- Top surface of alum. plate to upper edge	335	318
PBL-- Top surface of alum. plate to belt lower edge	265	250
<u>LAP BELT TENSION</u>	10 Newtons	10 Newtons
<u>SHOULDER BELT TENSION</u>	Retractor	Retractor

VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



Note: Vehicle accelerometer location and data summary shown in DATA SHEET NO. 7

DATA SHEET NO. 7 VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

DIMENSION	LENGTH (mm)
	PRE-TEST VALUES
A Left Rear Seat Crossmember Y	-434.7
B Right Rear Seat Crossmember Y	408.5
C Top of Engine X	3051.0
D Bottom of Engine X	2703.8
E Disc Brake Calipers X	3234.5
F Disc Brake Calipers Y	430.7
G Instrument Panel X	2122.7
H Rear Seat Crossmembers X	1197.1

LOCATION NUMBER	DESCRIPTION	MAXIMUM VALUE (g's)			
		Pos.	msec.	Neg.	msec.
1	Rear Seat X-Member @ Left Side	2.5	151.2	-34.9	9.8
2	Rear Seat X-Member @ Right Side	3.1	148.9	-38.5	10.2
3	Top of Engine Block	*	*	*	*
4	Bottom of Engine	4.3	405.6	-39.0	39.3
5	Disc Brake Caliper @ Right Side	*	*	*	*
6	Instrument Panel	85.6	40.0	-142.0	52.8
7	Disc Brake Caliper @Left Side	**	**	**	**
8	Rear Seat X-Member @ Left-Redundant	2.8	151.4	-35.0	9.7
9	Rear Seat X-Member @ Right-Redundant	3.1	149.0	-38.6	10.3

* Data is not accurate after 15 ms.

** Data is not accurate after 60 ms.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES

NHTSA Test No.: MX0311 Vehicle: 1999 Jeep Wrangler Special Purpose

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec.	Neg.	msec.
Pos. 1 Head X	g's	6.4	336.4	-52.8	92.8
Pos. 1 Head Y	g's	15.7	93.1	-1.1	432.8
Pos. 1 Head Z	g's	31.5	71.4	-2.6	113.0
Pos. 1 Head Resultant	g's	58.2	92.8	0.1	-43.8
Pos. 2 Head X	g's	7.3	340.3	-64.5	85.3
Pos. 2 Head Y	g's	22.9	91.2	-1.9	153.1
Pos. 2 Head Z	g's	21.7	72.8	-7.7	102.2
Pos. 2 Head Resultant	g's	69.2	84.5	0.0	-45.5
Pos. 1 Chest X	g's	3.3	268.6	-53.9	65.8
Pos. 1 Chest Y	g's	2.7	112.8	-11.7	66.4
Pos. 1 Chest Z	g's	9.4	50.8	-9.9	99.8
Pos. 1 Chest Resultant	g's	55.1	66.0	0.0	-55.8
Pos. 1 Chest Displacement	mm	0.0	11.3	-61.9	73.0
Pos. 2 Chest X	g's	5.2	214.6	-44.5	77.4
Pos. 2 Chest Y	g's	12.1	84.6	-1.4	389.8
Pos. 2 Chest Z	g's	8.9	71.9	-11.4	104.3
Pos. 2 Chest Resultant	g's	45.7	77.3	0.0	-59.9
Pos. 2 Chest Displacement	mm	0.0	-62.6	-38.9	87.5
Pos. 1 Left Femur	N	593.9	27.9	-5842.6	61.1
Pos. 1 Right Femur	N	120.6	167.1	-3943.8	71.0
Pos. 2 Left Femur	N	202.9	456.1	-4966.9	66.2
Pos. 2 Right Femur	N	249.1	427.0	-4130.3	68.8
Pos. 1 Left Belt Load	N	2558.6	50.4	-8.4	1.5
Pos. 1 Torso Belt Load	N	5582.3	67.8	-26.5	333.4
Pos. 2 Right Belt Load	N	2026.6	103.1	-6.9	-87.5
Pos. 2 Torso Belt Load	N	5531.5	78.8	-13.5	357.3

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)

NHTSA Test No.: MX0311 Vehicle: 1999 Jeep Wrangler Special Purpose

HEAD INJURY CRITERIA (HIC)				
	HIC**	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂
Position #1 - Driver	588.9	63.0	99.0	48.5
Position #2 - Passenger	748.4	66.6	102.6	53.4

** HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

CLIP SUMMARY*				
	CLIP (g's)	t ₁ (msec)	t ₂ (msec)	CSI
Position #1 - Driver	54.5	64.2	67.2	502.7
Position #2 - Passenger	45.1	76.6	79.6	436.0

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
HYBRID III NECK AND PELVIC DATA SHEET

Vehicle Year/Make/Model/Body Style: 1999 Jeep Wrangler Special Purpose
 NHTSA Test No.: MX0311 Test Date: February 16, 1999

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
Pos. 1 Upper Neck Fx	N	91.6	319.3	-445.0	72.1
Pos. 1 Upper Neck Fy	N	126.0	173.1	-243.0	67.9
Pos. 1 Upper Neck Fz	N	2749.2	71.1	-110.1	115.2
Pos. 1 Neck Force Result	N	2787.9	71.1	5.3	-39.0
Pos. 1 Upper Neck Mx	N-m	14.3	60.1	-5.3	77.0
Pos. 1 Upper Neck My	N-m	40.6	84.2	-32.7	53.5
Pos. 1 Upper Neck Mz	N-m	4.0	183.7	-12.7	69.7
Pos. 1 Neck Moment Result	N-m	41.8	84.3	0.3	25.9
Pos. 2 Upper Neck Fx	N	206.5	77.8	-313.3	61.3
Pos. 2 Upper Neck Fy	N	183.9	63.9	-247.2	102.8
Pos. 2 Upper Neck Fz	N	1714.7	77.9	-246.3	112.7
Pos. 2 Neck Force Result	N	1728.6	77.9	2.1	-47.5
Pos. 2 Upper Neck Mx	N-m	31.7	73.5	-8.3	149.9
Pos. 2 Upper Neck My	N-m	16.1	76.3	-25.6	60.6
Pos. 2 Upper Neck Mz	N-m	7.5	68.1	-13.0	97.1
Pos. 2 Neck Moment Result	N-m	39.2	98.0	0.0	-50.1
Pos. 1 Pelvic (X)	g's	2.6	442.9	-44.7	59.7
Pos. 1 Pelvic (Y)	g's	5.0	104.6	-8.5	75.5
Pos. 1 Pelvic (Z)	g's	5.7	47.9	-13.5	95.2
Pos. 1 Pelvic (R)	g's	45.1	59.7	0.0	-77.7
Pos. 2 Pelvic (X)	g's	2.9	267.1	-37.0	61.4
Pos. 2 Pelvic (Y)	g's	7.1	65.8	-7.2	51.3
Pos. 2 Pelvic (Z)	g's	6.0	48.5	-15.7	102.2
Pos. 2 Pelvic (R)	g's	37.7	61.4	0.0	-60.4

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
HYBRID III LOWER LEG DATA SHEET

Vehicle Year/Make/Model/Body Style: 1999 Jeep Wrangler Special Purpose
 NHTSA Test No.: MX0311 Test Date: February 16, 1999

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
P1 Lt Upper Tibia Mx	N-m	24.8	48.1	-11.6	426.6
P1 Lt Upper Tibia My	N-m	104.5	34.7	-175.9	48.4
P1 Lt Lower Tibia Fz	N	632.1	29.5	-5874.6	48.0
P1 Lt Lower Tibia Mx	N-m	*	*	*	*
P1 Lt Lower Tibia My	N-m	51.3	27.3	-45.7	44.8
P1 Rt Upper Tibia Mx	N-m	9.5	262.5	-54.9	53.0
P1 Rt Upper Tibia My	N-m	144.2	29.6	-123.9	48.3
P1 Rt Lower Tibia Fz	N	462.4	29.4	-4619.4	48.1
P1 Rt Lower Tibia Mx	N-m	*	*	*	*
P1 Rt Lower Tibia My	N-m	19.1	39.2	-88.6	29.4
Pos. 2 Lt Upper Tibia Mx	N-m	36.5	55.4	-39.7	46.6
Pos. 2 Lt Upper Tibia My	N-m	166.4	35.6	-106.0	50.2
Pos. 2 Lt Lower Tibia Fz	N	454.7	29.4	-5967.5	50.0
Pos. 2 Lt Lower Tibia Mx	N-m	10.2	43.1	-134.8	52.7
Pos. 2 Lt Lower Tibia My	N-m	14.1	456.1	-73.8	29.9
Pos. 2 Rt Upper Tibia Mx	N-m	11.1	225.0	-51.1	56.2
Pos. 2 Rt Upper Tibia My	N-m	176.7	38.9	-31.7	428.2
Pos. 2 Rt Lower Tibia Fz	N	**	**	**	**
Pos. 2 Rt Lower Tibia Mx	N-m	21.3	49.3	-18.3	74.2
Pos. 2 Rt Lower Tibia My	N-m	22.4	47.1	-120.5	52.0

* Did not record accurately.

** Did not record.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
HYBRID III ANKLE DATA SHEET

Vehicle Year/Make/Model/Body Style: 1999 Jeep Wrangler Special Purpose
 NHTSA Test No.: MX0311 Test Date: February 16, 1999

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
Pos. 1 Left Ankle X	g's	49.3	45.8	-88.8	29.6
Pos. 1 Left Ankle Z	g's	*	*	*	*
Pos. 1 Left Toe Z	g's	141.2	38.9	-278.1	45.8
Pos. 1 Right Ankle X	g's	27.3	442.3	-189.5	29.5
Pos. 1 Right Ankle Z	g's	42.6	30.8	-102.2	50.4
Pos. 1 Right Toe Z	g's	99.0	29.9	-158.2	29.4
Pos. 2 Left Ankle X	g's	31.9	28.8	-125.8	29.7
Pos. 2 Left Ankle Z	g's	61.6	30.0	-121.2	47.4
Pos. 2 Left Toe Z	g's	115.0	30.0	-226.4	47.8
Pos. 2 Right Ankle X	g's	39.9	51.3	-94.3	40.0
Pos. 2 Right Ankle Z	g's	44.1	38.4	-80.2	48.8
Pos. 2 Right Toe Z**	g's	767.6	113.3	-377.4	87.2

* Did not record accurately.

** Data is questionable.

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
REDUNDANT DUMMY DATA

NHTSA Test No.: MX0311 Vehicle: 1999 Jeep Wrangler Special Purpose

DESCRIPTION	UNIT	MAXIMUM VALUE			
		Pos.	msec	Neg.	msec
Pos. 1 Head X(R)	g's	7.3	334.9	-62.6	70.5
Pos. 1 Head Y(R)	g's	25.3	93.0	-6.0	73.7
Pos. 1 Head Z(R)	g's	35.5	71.1	-5.1	101.7
Pos. 1 Head Resultant(RR)	g's	72.0	71.1	0.1	-39.2
Pos. 2 Head X(R)	g's	7.1	341.0	-64.4	84.6
Pos. 2 Head Y(R)	g's	22.6	86.5	-1.8	361.3
Pos. 2 Head Z(R)	g's	25.0	65.7	-8.9	101.7
Pos. 2 Head Resultant(RR)	g's	68.1	84.5	0.0	-46.9
Pos. 1 Chest X(R)	g's	3.1	268.5	-51.1	66.4
Pos. 1 Chest Y(R)	g's	2.8	112.6	-12.2	61.9
Pos. 1 Chest Z(R)	g's	9.8	50.7	-11.8	99.5
Pos. 1 Chest Resultant(RR)	g's	52.3	66.4	0.0	-59.4
Pos. 2 Chest X(R)	g's	5.1	214.7	-42.0	78.5
Pos. 2 Chest Y(R)	g's	13.2	83.9	-1.4	390.4
Pos. 2 Chest Z(R)	g's	10.3	72.3	-11.0	103.5
Pos. 2 Chest Resultant(RR)	g's	43.8	79.3	0.0	-58.0

DATA SHEET NO. 8 DUMMY INJURY CRITERIA VALUES (cont.)
REDUNDANT DUMMY DATA

NHTSA Test No.: MX0311 Vehicle: 1999 Jeep Wrangler Special Purpose

HEAD INJURY CRITERIA (HIC) REDUNDANT				
	HIC**	t ₁ (msec)	t ₂ (msec)	Average Acceleration t ₁ to t ₂
Position #1 - Driver	936.4	62.5	98.5	58.4
Position #2 - Passenger	719.6	65.1	101.1	52.5

** HIC is as defined in FMVSS 208. The maximum time interval from t₁ to t₂ is 36 milliseconds.

CLIP SUMMARY* REDUNDANT				
	CLIP (g's)	t ₁ (msec)	t ₂ (msec)	CSI
Position #1 - Driver	50.8	64.6	67.6	428.5
Position #2 - Passenger	43.4	76.9	79.9	402.6

* The maximum chest resultant acceleration is defined as the maximum acceleration which exceeds 0.003 seconds in duration.

DATA SHEET NO. 9 SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:

	<u>Driver</u>	<u>Passenger</u>
Belt length from trim panel exit to bolt hole anchor point for continuous webbing systems.	<u>2415</u>	<u>2400</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>875</u>	<u>850</u>
Lap belt length as measured on Part 572 Dummy.	<u>790</u>	<u>800</u>

SHOULDER BELT SPOOL-OFF DATA:

As determined by film analysis.	<u>*</u>	<u>*</u>
As determined mechanically.	<u>40 mm</u>	<u>46 mm</u>
As determined electronically.	<u>74.4 mm</u>	<u>66.1 mm</u>

BELT STRETCH DATA:

Measured electronically between shoulder belt load cell and the "D" ring.	<u>2.1 mm</u>	<u>2.3 mm</u>
Measured mechanically.	<u>1 mm</u>	<u>1 mm</u>

Dimensions in millimeters

* Seat belt spool out view cameras were not used due to the location of the d-ring on the sport bar.

DATA SHEET NO.10 SUMMARY OF FMVSS 212 DATA

FMVSS NO. 212 - "WINDSHIELD MOUNTING" DATA

DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:

Windshield is bonded in place and covered with 19 mm molding.

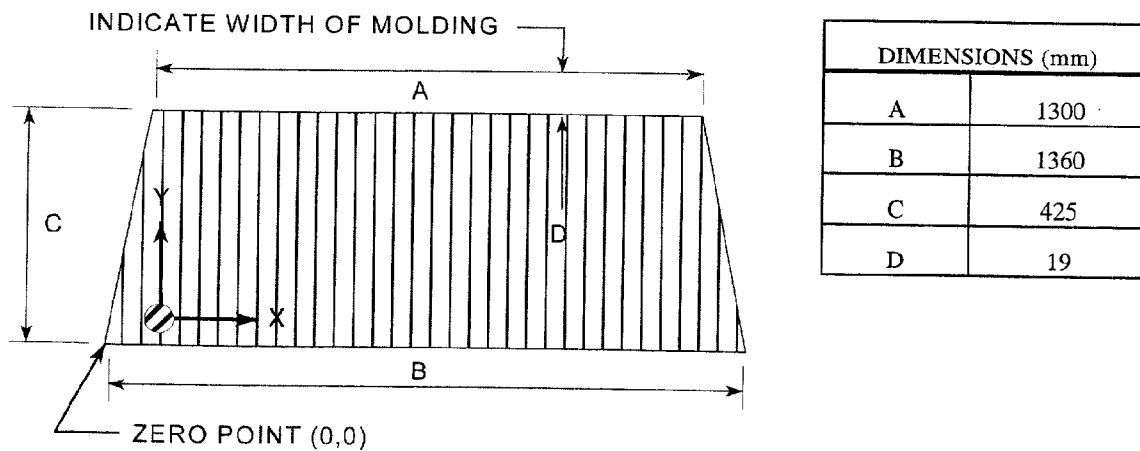
FMVSS 212 REQUIREMENTS:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of the windshield for vehicles equipped with automatic restraint systems for front occupants,

FMVSS 212 TEST DATA

	WINDSHIELD PERIPHERY		% OF RETENTION
	PRE-TEST (mm)	POST-TEST(mm)	
RIGHT SIDE	1755	1755	100
LEFT SIDE	1755	1755	100
TOTAL	3510.0	3510.0	100

AREA OF RETENTION FAILURE: None



FRONT VIEW OF WINDSHIELD

FAILURE DETAILS: None

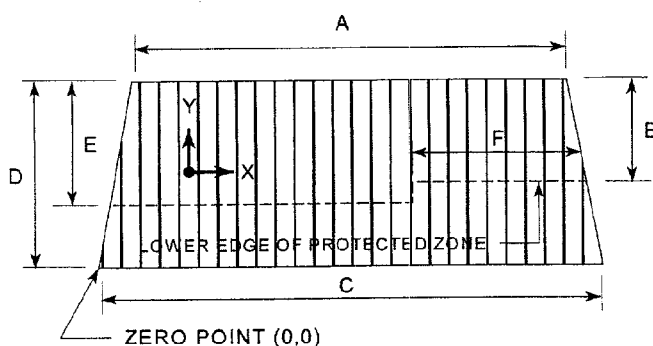
DATA SHEET NO. 11 FMVSS NO. 219 (PARTIAL) - "WINDSHIELD ZONE INTRUSION" DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 165 mm diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. The locus of points is drawn on the inner surface of the windshield contacted by the sphere across the width of the instrument panel. From the outermost contactable points extend the locus line horizontally to the edges of the windshield, then draw a line on the inner surface of the windshield below and 13 mm distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection of this line onto the outer surface of the windshield.

FMVSS 219 TEST DATA:

(Dimensions in mm)



FRONT VIEW OF WINDSHIELD

DIMENSIONS	
A	1300
B	283
C	1360
D	425
E	276
F	582

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 6 mm:

None

(Show location of penetration on the above sketch)

COORDINATES		
	X	Y
1.	-	-
2.	-	-
3.	-	-
4.	-	-

DATA SHEET NO. 12 FMVSS NO. 301-75 "FUEL SYSTEM INTEGRITY" POST IMPACT TEST DATA

NHTSA TEST No.: MX0311 TEST DATE: February 16, 1999

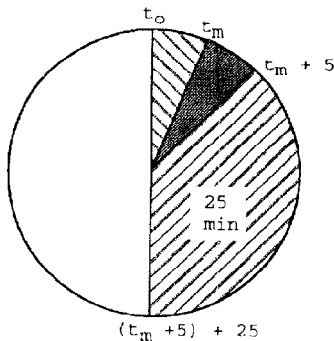
VEHICLE MAKE/MODEL: 1999 Jeep Wrangler

The test vehicle was filled from 92% to 94% of the manufacture's "usable" capacity. The electric fuel pump was operating if it will operate without engine operation. Two Part 572 anthropomorphic test devices were located at each of the front designated seating positions.

=====

TEST VEHICLE IMPACT TYPE: X Frontal (56 kph)
- Oblique (48 kph) with _____ deg. barrier face first contacting _____
 (driver/passenger) side
- Rear Moving Barrier (48 kph)
- Lateral Moving Barrier (32 kph)

FUEL SPILLAGE MEASUREMENT:



1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes

ACTUAL	MAX ALLOWED
0	28 g
0	141 g
0	28 g/min.

SOLVENT SPILLAGE DETAILS: None

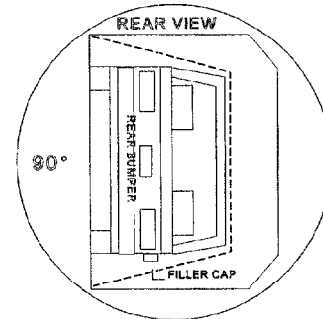
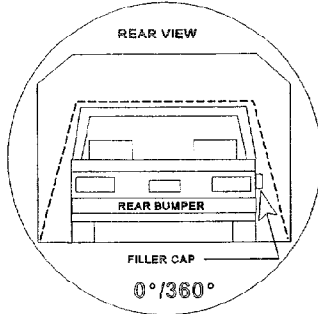
DATA SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

TEST PHASE:

0-90 deg.

NHTSA Test No.:

MX0311



INDETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

1 minutes 13 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 13 seconds

Next whole minute interval

7 minutes 00 seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

141 g	28 g	28 g	28 g
-------	------	------	------

III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
---	---	---	-----

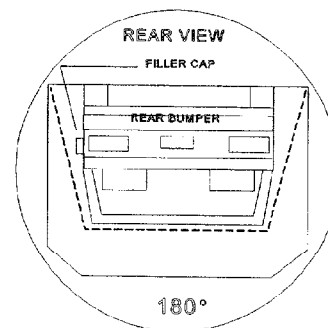
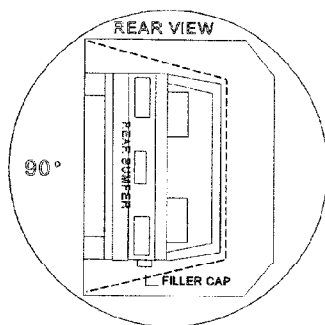
Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S): None

TEST SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
90-180 deg.

NHTSA Test No.:
MX0311



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

1 minutes 03 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 3 seconds

Next whole minute interval

7 minutes 00 seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

141 g	28 g	28 g	28 g
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III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
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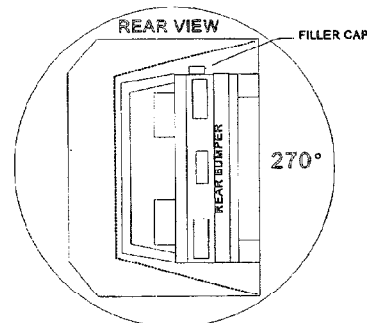
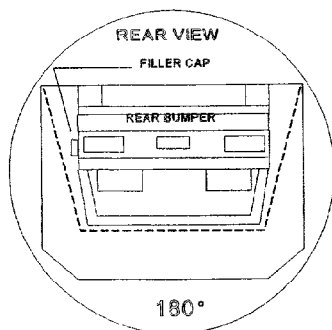
Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S): None

TEST SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
180-270 deg.

NHTSA Test No.:
MX0311



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

1 minutes 04 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 4 seconds

Next whole minute interval

7 minutes 00 seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

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

(2) Maximum Allowable Solvent Spillage

141 g	28 g	28 g	28 g
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III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
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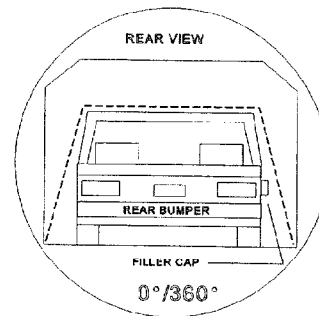
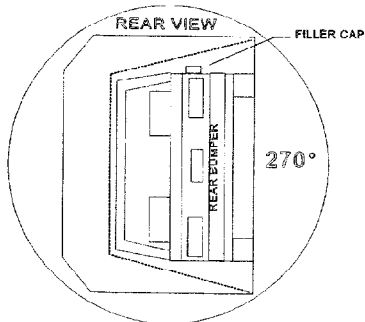
Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S): None

TEST SHEET NO. 13 FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (cont.)

TEST PHASE:
270-360 deg.

NHTSA Test No.:
MX0311



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

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

1 minutes 09 seconds

FMVSS 301 Position Hold Time +

5 minutes 00 seconds

TOTAL

6 minutes 9 seconds

Next whole minute interval

7 minutes 00 seconds

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min. from onset of rotation	6th min.	7th min.	8th min. if reqd.
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(2) Maximum Allowable Solvent Spillage

141 g	28 g	28 g	28 g
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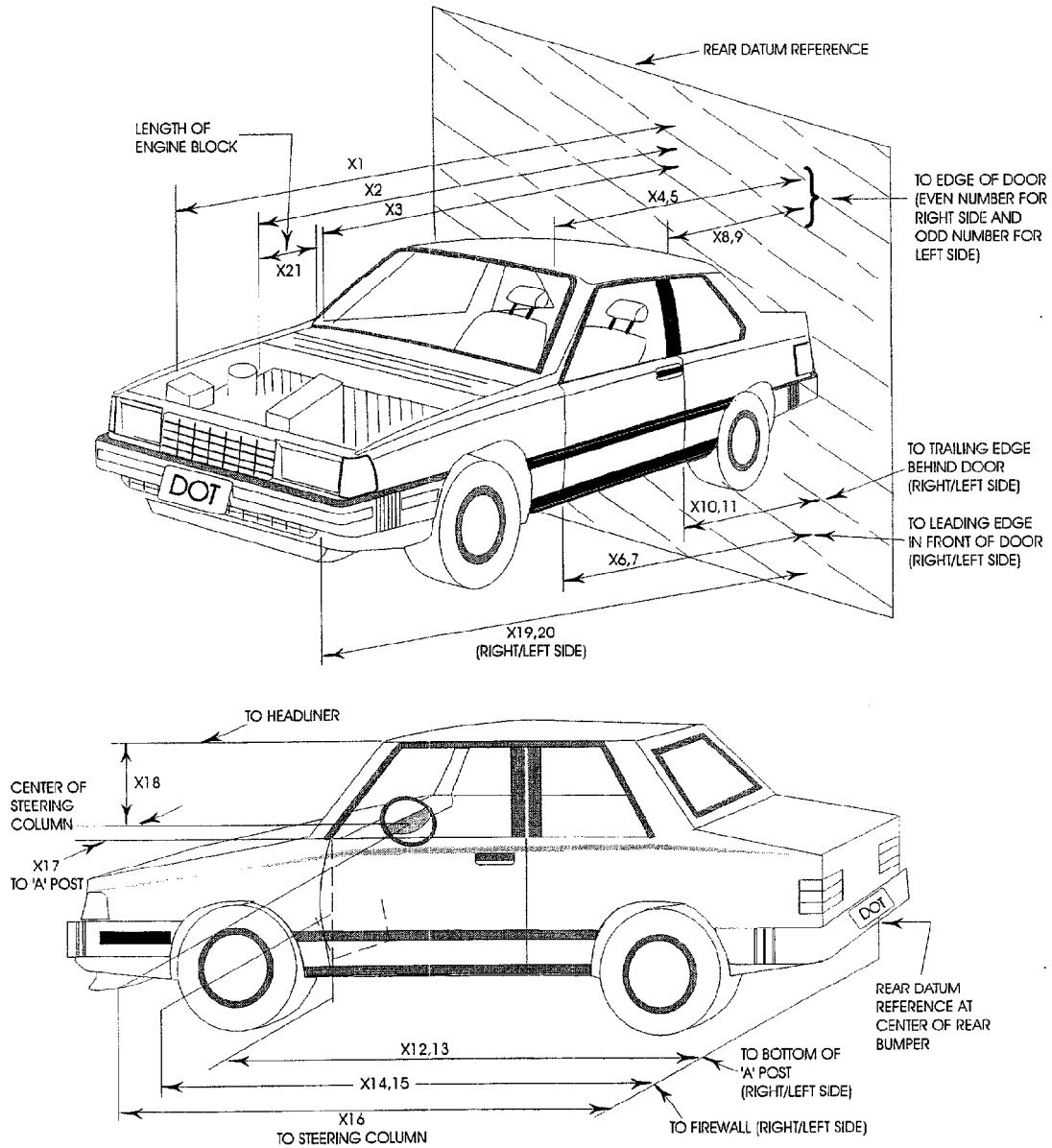
III. ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

0	0	0	N/A
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Note: Record spillage for whole minute intervals only as determined above.

IV. SOLVENT SPILLAGE LOCATION(S): None

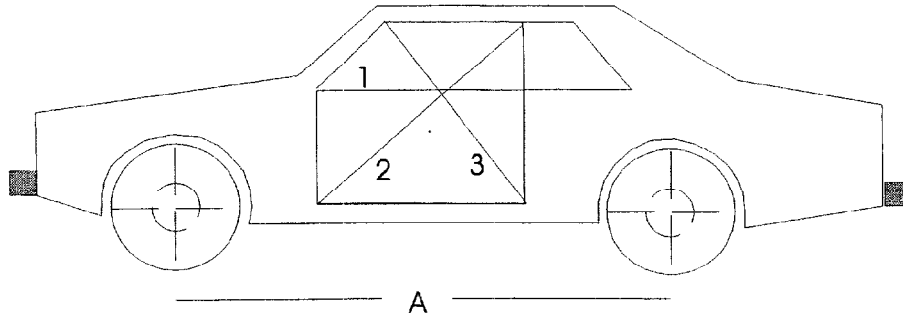
TEST VEHICLE MEASUREMENTS



DATA SHEET NO.14 VEHICLE MEASUREMENTS

No.		All Dimensions in mm		
		Pre-Test	Post-Test	Differences
X1	Total Length of Vehicle at Centerline	3770.0	3235.0	535.0
X2	Rear Surface of Vehicle to Front of Engine	2941.6	2837.0	104.6
X3	Rear Surface of Vehicle to Firewall	2476.5	2389.0	87.5
X4	Rear Surface of Vehicle to Upper Leading Edge of Right Door	2163.5	2204.0	-40.5
X5	Rear Surface of Vehicle to Upper Leading Edge of Left Door	2168.8	2197.0	-28.2
X6	Rear Surface of Vehicle to Lower Leading Edge of Right Door	2160.3	2205.0	-44.7
X7	Rear Surface of Vehicle to Lower Leading Edge of Left Door	2172.4	2208.0	-35.6
X8	Rear Surface of Vehicle to Upper Trailing Edge of Right Door	1255.8	1295.0	-39.2
X9	Rear Surface of Vehicle to Upper Trailing Edge of Left Door	1258.3	1287.0	-28.7
X10	Rear Surface of Vehicle to Lower Trailing Edge of Right Door	1323.3	1370.0	-46.7
X11	Rear Surface of Vehicle to Lower Trailing Edge of Left Door	1447.2	1482.0	-34.8
X12	Rear Surface of Vehicle to Bottom of "A" Post of Right Side	2493.6	2511.0	-17.4
X13	Rear Surface of Vehicle to Bottom of "A" Post of Left Side	2500.0	2522.0	-22.0
X14	Rear Surface of Vehicle to Firewall, Right Side	2490.4	2420.0	70.4
X15	Rear Surface of Vehicle to Firewall, Left Side	2481.8	2441.0	40.8
X16	Rear Surface of Vehicle to Steering Column	1798.2	1807.0	-8.8
X17	Center of Steering Column to "A" Post	365.2	373.0	-7.8
X18	Center of Steering Column to Headliner	544.6	538.0	6.6
X19	Rear Surface of Vehicle to Right Side of Front Bumper	3810.8	3245.0	565.8
X20	Rear Surface of Vehicle to Left Side of Front Bumper	3826.5	3334.0	492.5
X21	Length of Engine Block	536.0	536.0	0.0
RD	Rear Surface of Vehicle to Right Side of Dash Panel	2010.0	2046.0	-36.0
CD	Rear Surface of Vehicle to Center of Dash Panel	1960.7	1979.0	-18.3
LD	Rear Surface of Vehicle to Left Side of Dash Panel	2015.6	2041.0	-25.4

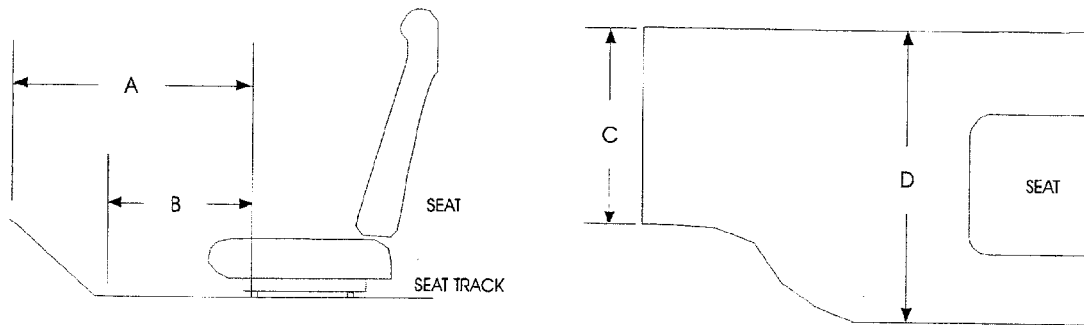
DATA SHEET NO. 14 VEHICLE MEASUREMENTS (cont.)
VEHICLE INTRUSION MEASUREMENTS
DOOR OPENING WIDTH



UNITS (mm)	LEFT			RIGHT		
MEASUREMENT	1	2	3	1	2	3
BEFORE TEST	911.7	1276.1	1144.9	910.9	1279.6	1154.0
AFTER TEST	892.8	1259.5	1172.1	902.9	1270.1	1173.2
DIFFERENCE	18.9	16.7	-27.1	7.9	9.5	-19.2

UNITS (mm)	A = WHEELBASE LEFT	A = WHEELBASE RIGHT
BEFORE TEST	2378.7	2377.4
AFTER TEST	2194.0	2138.9
DIFFERENCE	184.7	238.5

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
VEHICLE INTRUSION MEASUREMENTS
STATIC FOOTWELL DEFORMATION



DRIVER

Measurement	Pre-Test	Post-Test	Difference
A	768.2	700.1	68.1
B	609.6	621.2	-11.6
C	403.0	372.4	30.6
D	465.7	447.7	18.0

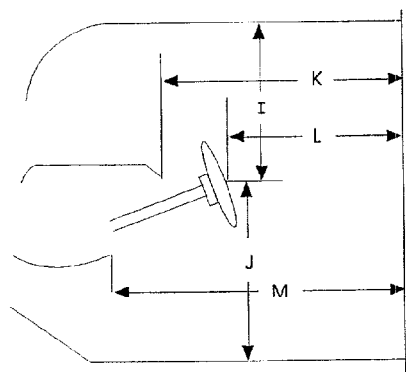
PASSENGER

Measurement	Pre-Test	Post-Test	Difference
A	710.6	678.7	31.9
B	578.1	566.1	12.0
C	418.8	406.9	11.9
D	467.9	457.9	10.0

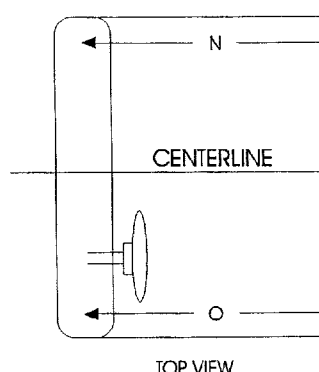
Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)

VEHICLE INTRUSION MEASUREMENTS STATIC PASSENGER COMPARTMENT INTRUSION

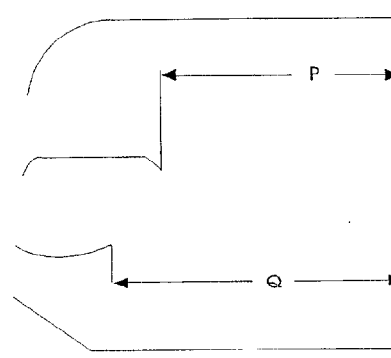


DRIVER'S SIDE



TOP VIEW

MEASUREMENTS
FROM C-PILLAR
BELT ANCHORAGE

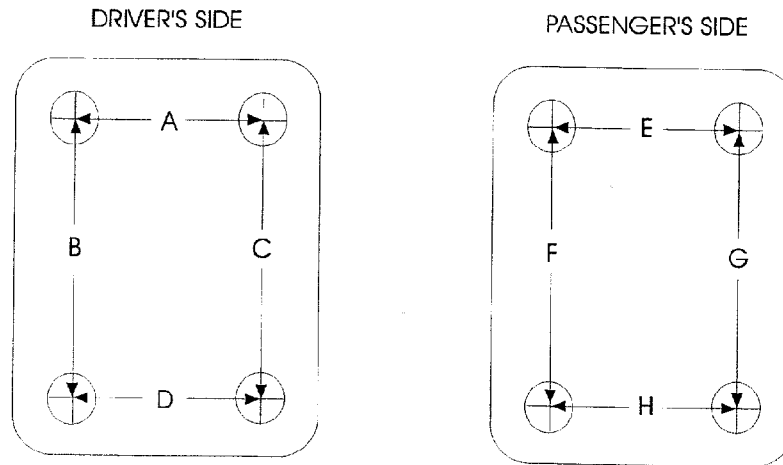


PASSENGER'S SIDE

Measurement	Pre-Test	Post-Test	Difference
I	551.0	543.3	7.7
J	719.2	747.2	-28.0
K	730.8	684.8	46.0
L	504.5	476.8	27.7
M	766.5	790.0	-23.5
N	753.7	736.0	17.7
O	756.4	723.6	32.8
P = K (PASS.)	727.6	689.5	38.1
Q = M (PASS.)	753.5	782.4	-28.9

Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
FLOORBOARD DEFORMATION

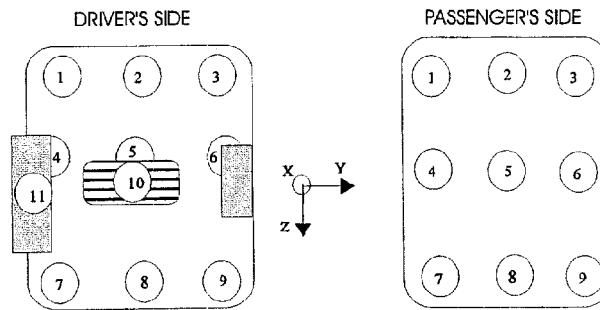


TOP VIEW THROUGH FLOOR PAN

Measurement	Pre-Test	Post-Test	Difference
A	150	150	0
B	198	200	-2
C	204	203	1
D	150	150	0
E	150	150	0
F	200	200	0
G	204	204	0
H	150	150	0

Units = mm

DATA SHEET NO.14 VEHICLE MEASUREMENTS (cont.)
TOE-PAN INTRUSION



Driver Side Floorpan Measurements

Reference: X = Rear Bumper; Z = Ground

Floorpan Location	X Deformation			Z Deformation		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	2663.1	2627.0	36.1	-609.8	-627.7	17.9
2	2670	2607.8	62.2	-613.4	-637.0	23.6
3	2670.3	2586.0	84.3	-603.7	-646.6	42.9
4	2609.1	2601.5	7.6	-554.9	-583.2	28.3
5	2568.7	2547.1	21.6	-538.4	-546.7	8.3
6	2580.5	2572.0	8.5	-539.7	-562.5	22.8
7	2486.5	2477.9	8.6	-521.1	-511.5	-9.6
8	2470.7	2461.5	9.2	-498.3	-511.0	12.7
9	2464.6	2451.0	13.6	-502	-500.2	-1.8
10	2440.2	2337.2	103.0	-666	-686.1	20.1
11	-	-	-	-	-	-

Passenger Side Floorpan Measurements

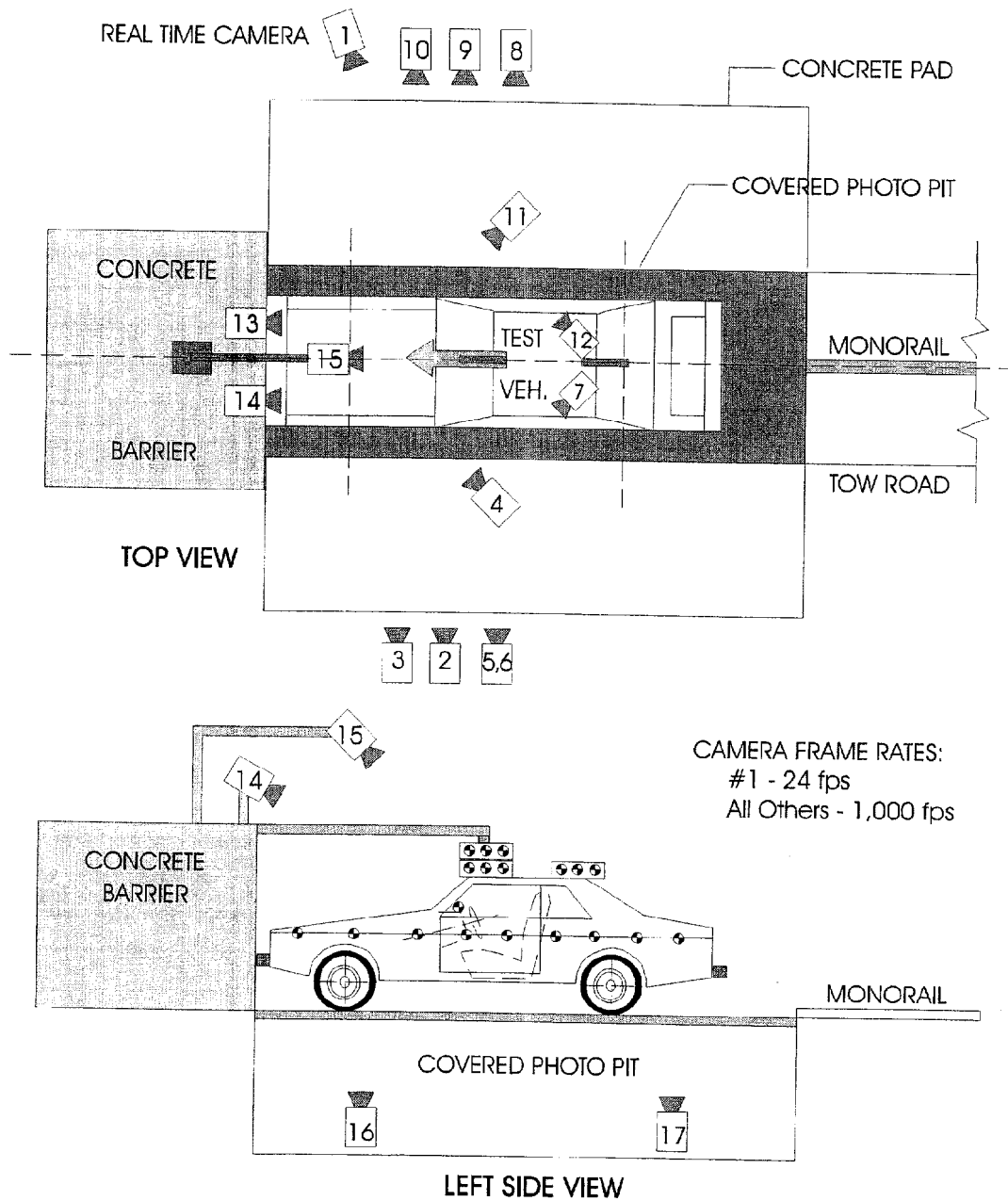
Reference: X = Rear Bumper; Z = Ground

Floorpan Location	X Deformation			Z Deformation		
	Pre-Test	Post-Test	Difference	Pre-Test	Post-Test	Difference
1	2591.7	2531.2	60.5	-583.4	-645.6	62.2
2	2646.6	2605.7	40.9	-574.7	-600.1	25.4
3	2656.4	2602.4	54.0	-584.9	-588.8	3.9
4	2539.2	2486.4	52.8	-558.4	-561.7	3.3
5	2579.4	2552.8	26.6	-534.2	-546.3	12.1
6	2588.1	2564.6	23.5	-532.3	-543.9	11.6
7	2443.5	2411.0	32.5	-507.1	-503.3	-3.8
8	2477.3	2451.2	26.1	-498.6	-483.0	-15.6
9	2525.6	2494.0	31.6	-515.9	-515.9	0.0

Units in mm

CAMERA POSITIONS FOR FRONTAL IMPACTS

NOTE: Camera information shown in DATA SHEET NO. 15.



DATA SHEET NO.15 HIGH-SPEED CAMERA LOCATIONS

NHTSA Test No.:

MX0311

Vehicle:

1999 Jeep Wrangler Special Purpose

CAMERA NO.	VIEW	CAMERA POSITIONS (mm)*			ANGLE** (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Camera	-	-	-	-	-	-	24
2	Overall Left Side	6096	1506	1036	-3	1195	12.5	1000
3	Left Side View	8176	872	1085	-2	561	25	1000
4	Driver and Interior View	4822	2879	2074	-12	-	25	1000
5	Steering Column (Bottom)	7019	1780	1174	-2	1469	25	1000
6	Steering Column (Top)	7019	1780	1774	-8	1469	25	1000
7	Left Belt	-	-	-	-	-	-	-
8	Overall Right Side	6096	1724	1084	-4	2677	13	1000
9	Right Side View	7670	1194	1150	-3	2157	25	1000
10	Right Passenger View	7608	1814	1412	-2	2767	35	1000
11	Passenger and Interior View	4765	2762	1904	-10	-	25	1000
12	Right Belt	-	-	-	-	-	-	-
13	Passenger Front View	610	-78	2033	-28	-	13	1000
14	Driver Front View	610	-78	2033	-27	-	13	1000
15	Windshield View	0	-528	3374	-46	-	13	1000
16	Pit View of Engine	0	822	-3048	90	-	13	1000
17	Pit View of Fuel Tank	0	3058	-3048	90	-	13	1080

*X = film plane to monorail centerline ** = referenced to horizontal plane

Y = film plane to impact location

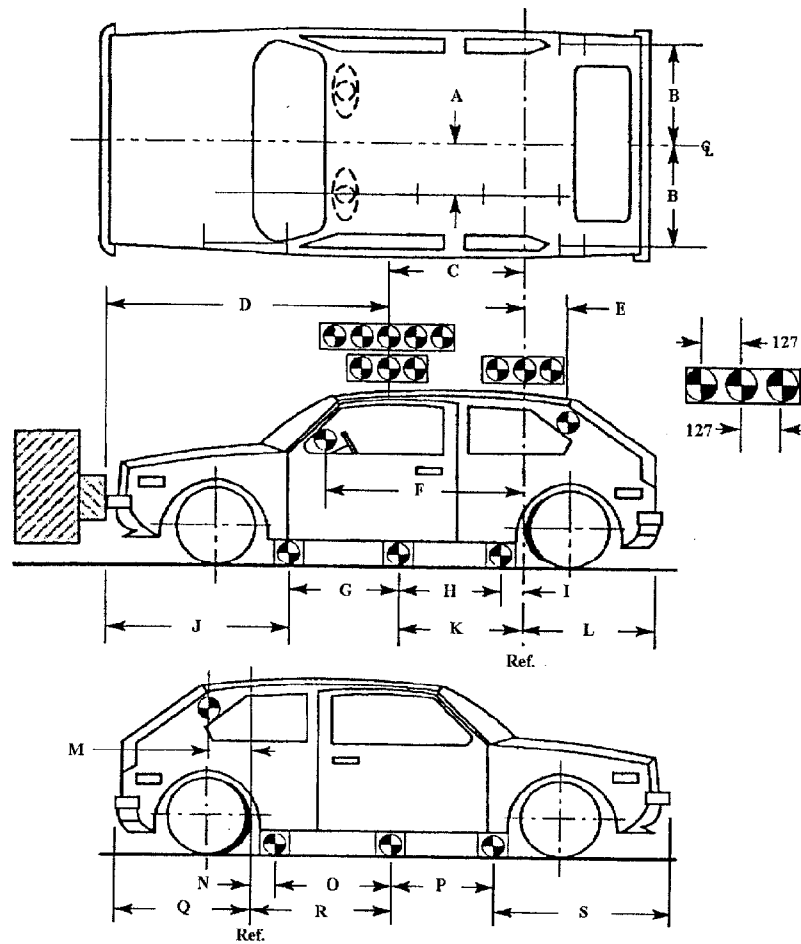
N.T. indicates No Timing

Z = film plane to ground

DATA SHEET NO. 16 VEHICLE REFERENCE PHOTO TARGET LOCATIONS

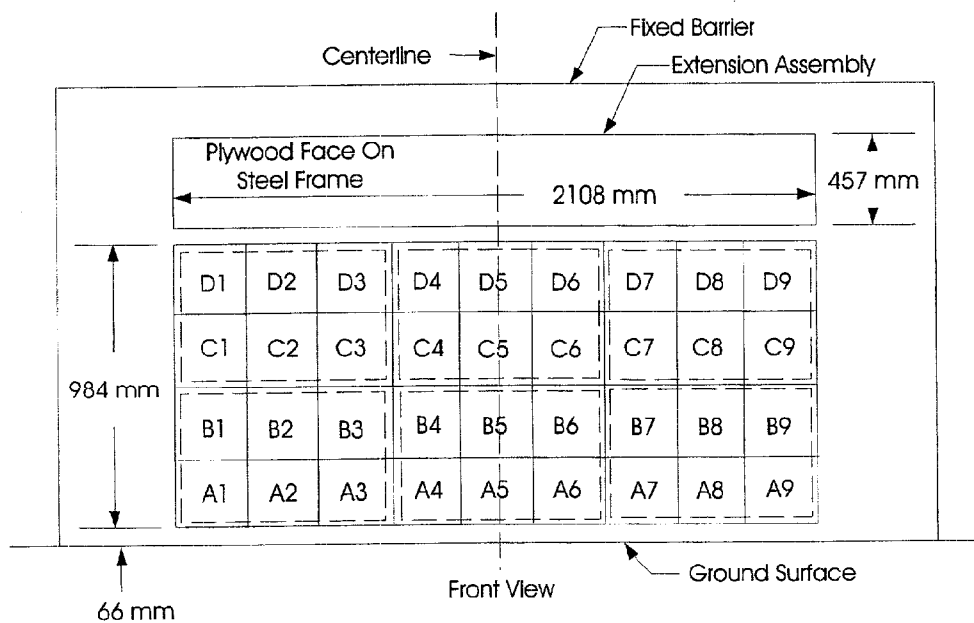
(Dimensions in millimeters)

A	331
B	642
C	914
D	1733
E	367
F	847
G	624
H	505
I	267
J	1253
K	772
L	1278
M	355
N	265
O	509
P	627
Q	1268
R	773
S	1258



DATA SHEET NO. 17 LOAD CELL LOCATIONS ON FIXED BARRIER

- 36 Load Cells
- 4 Rows
- 9 Columns
- 6 Groupings (6 cells/group)



6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

The following data is presented in Appendix B:

- (1) Data from 36 individual load cells
- (2) Total or Sum of 36 individual load cells
- (3) Data from 6 Groupings shown above (6 cells/group)

DATA SHEET NO. 18 POST TEST AIR BAG DATA

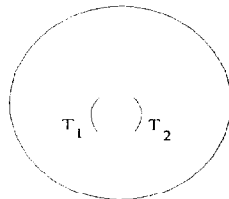
NHTSA No. : MX0311; Test Date: February 16, 1999; Technician: P. MacDiarmid

Vehicle Model Year/Make/Model: 1999 Jeep Wrangler

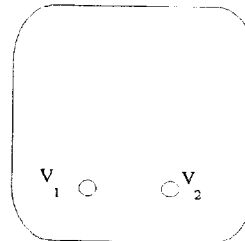
- A. No. of vent holes: 0 -Driver 2 -Passenger
- B. Size of vent holes: (mm²) - -Driver 962 -Passenger
- C. Total vent area: (mm²) - -Driver 1924 -Passenger
- D. Deflated air bag length and width dimensions or, if round, diameter. (mm)
- Driver: 250 -Length; 580 -Width; 480 -Diameter
- Passenger: 700 -Height; 460 -Width; 650 -Depth
- E. Is the air bag tethered?
- Driver: X -Yes; - -No; If yes, record length of tether- 200
- Passenger: - -Yes; X -No; If yes, record length of tether- -

Sketch the air bag showing the location of the vent holes, how the bag is tethered, and where the bag is tethered. Also describe how the tethers are attached to the bag and the steering wheel.
(Note: Not to scale; V_n = Vent hole_n, T_n = Tether_n).

Driver



Passenger



- F. Record part numbers and manufacturer name of the air bag and gas generator.

Driver: Air bag: TMJ2048G0475 P118137-02C 21/G 277

Generator: TCJDM2118C0232 P5GC51LA2AB CCJ J7X 5C AFW CBVJ6P32GPL

Passenger: Air bag: Breed Technologies TB2481970273

Generator: Allied Signal 1998 0491 55314982AA 73427C C/L:A TCTPB204810043

DATA SHEET NO. 19 ACCIDENT INVESTIGATION DIVISION DATA

FOR 56.3 KPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: Jeep Wrangler Special Purpose

NHTSA Test No.: MX0311 VIN: 1J4FY29P7XP408120

Model Year: 1999 Build Date: 9-98 Test Date: February 16, 1999

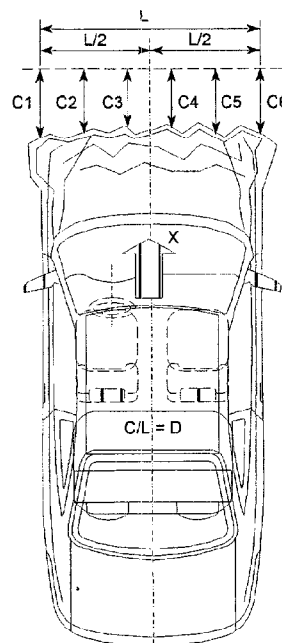
Vehicle Size Category: Special Purpose Test Weight: 1787.0 kg

Vehicle Wheelbase: 2378 mm; Front Overhang: 1253 mm; Overall Width: 1694 mm

Collision Deformation Classification (CDC) Code: 12FDEW3

Crush Depth Dimensions:

	PRE	POST	DIFF	
C1 =	3906.3	3508.3	-398.0	mm
C2 =	3915.6	3409.4	-506.2	mm
C3 =	3914.7	3370.2	-544.5	mm
C4 =	3922.8	3339.2	-583.6	mm
C5 =	3916.6	3299.3	-617.3	mm
C6 =	3903.9	3370.8	-533.1	mm



Midpoint of Damage: D = Vehicle Centerline
(Longitudinal)

Length of Damaged Region:

L1 = 1560 mm

L2 = 780 mm

L3 = 520 mm

Appendix A
PHOTOGRAPHS

PHOTOGRAPHS

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A-5	POST-TEST LEFT SIDE VIEW	A-8
A-6	PRE-TEST RIGHT SIDE VIEW	A-9
A-7	POST-TEST RIGHT SIDE VIEW	A-10
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A-9	POST-TEST RIGHT FRONT THREE-QUARTER VIEW	A-12
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A-27	POST-TEST DRIVER AND INTERIOR VIEW	A-30
A-28	PRE-TEST PASSENGER AND INTERIOR VIEW	A-31
A-29	POST-TEST PASSENGER AND INTERIOR VIEW	A-32
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A-32	PRE-TEST PASSENGER HEAD LOCATION	A-35
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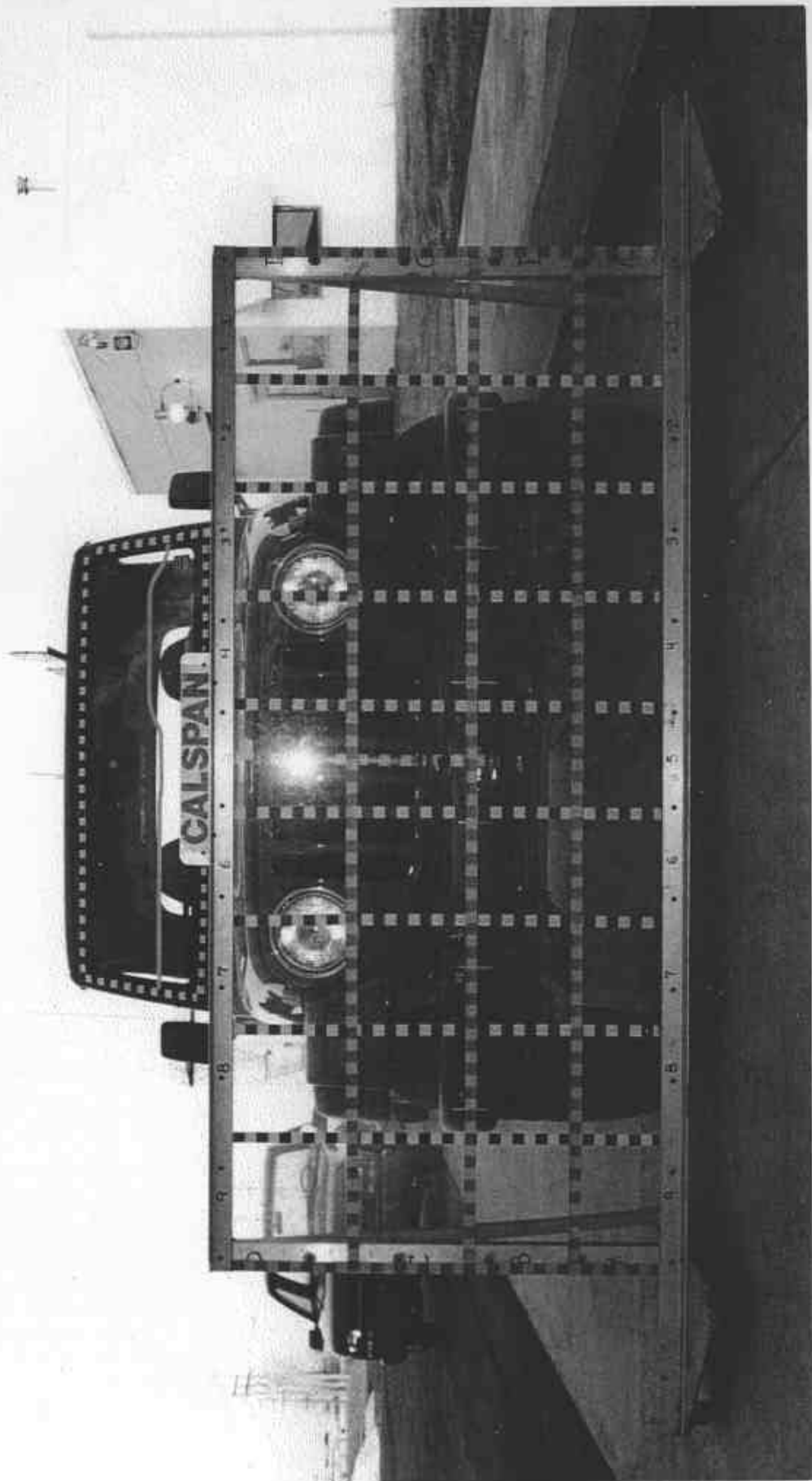
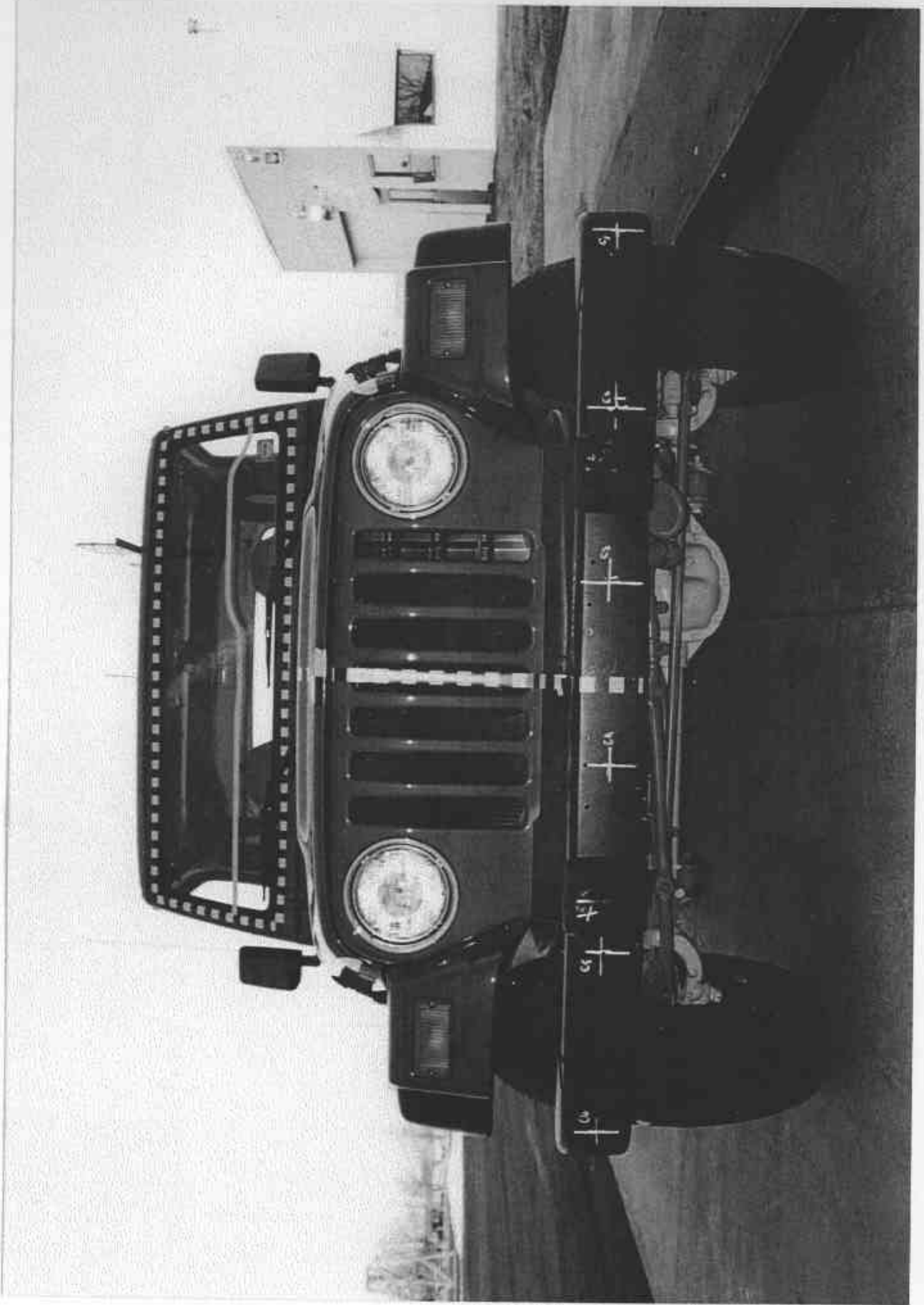


Figure A-1 LOAD CELL LOCATIONS

Figure A-2 PRE-TEST FRONT VIEW



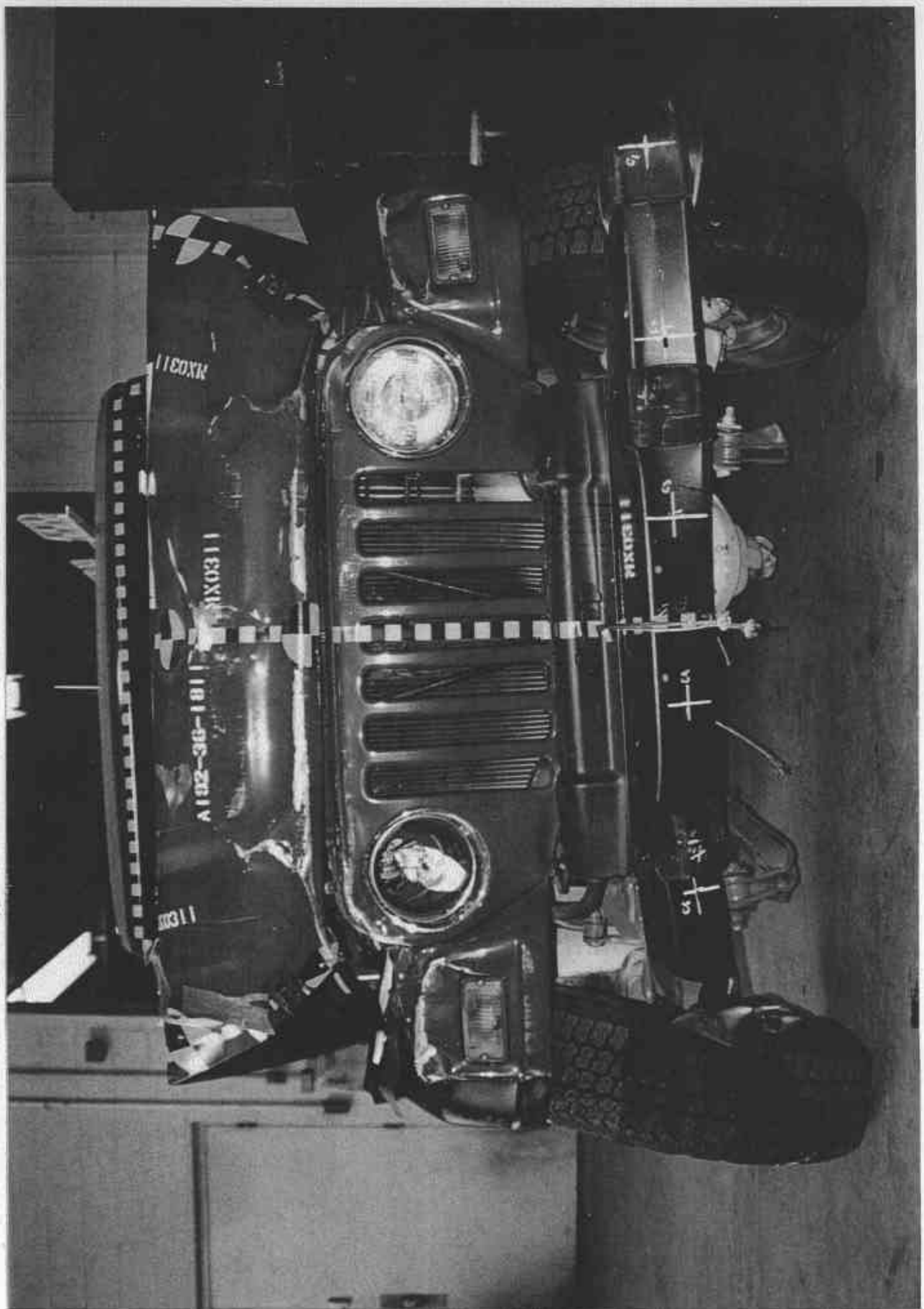


Figure A-3 POST-TEST FRONT VIEW

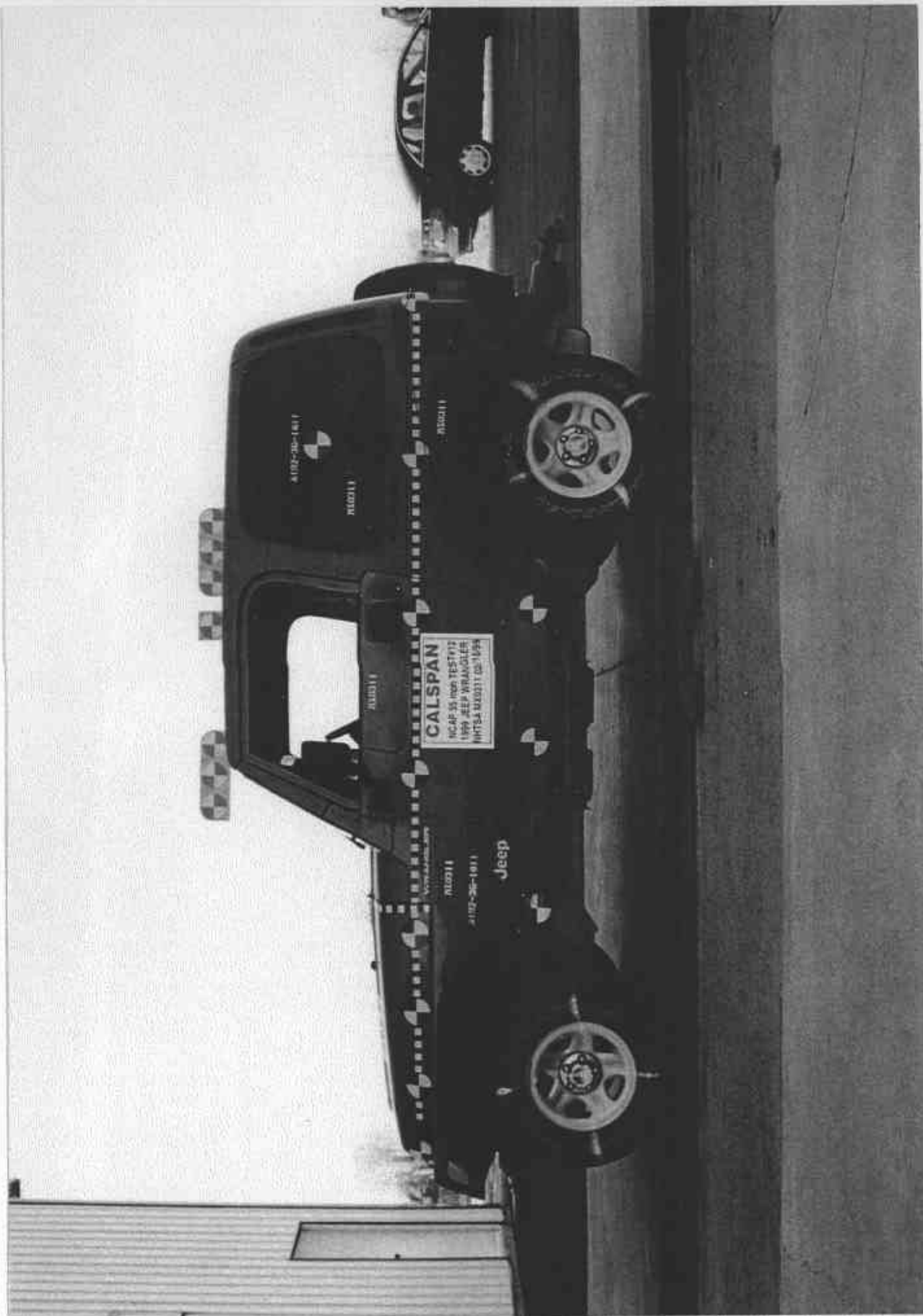


Figure A-4 PRE-TEST LEFT SIDE VIEW



Figure A-5 POST-TEST LEFT SIDE VIEW

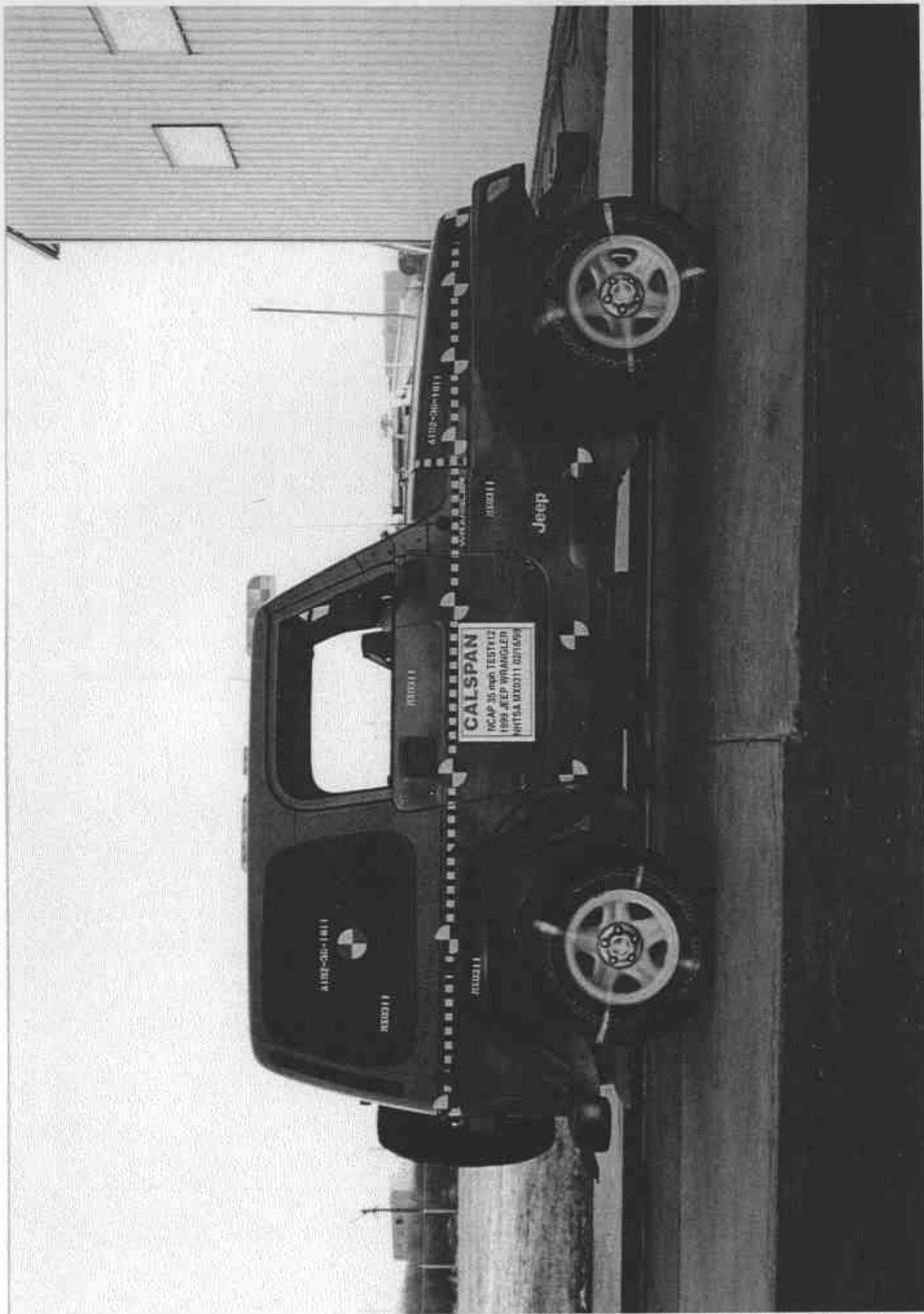


Figure A-6 PRE-TEST RIGHT SIDE VIEW

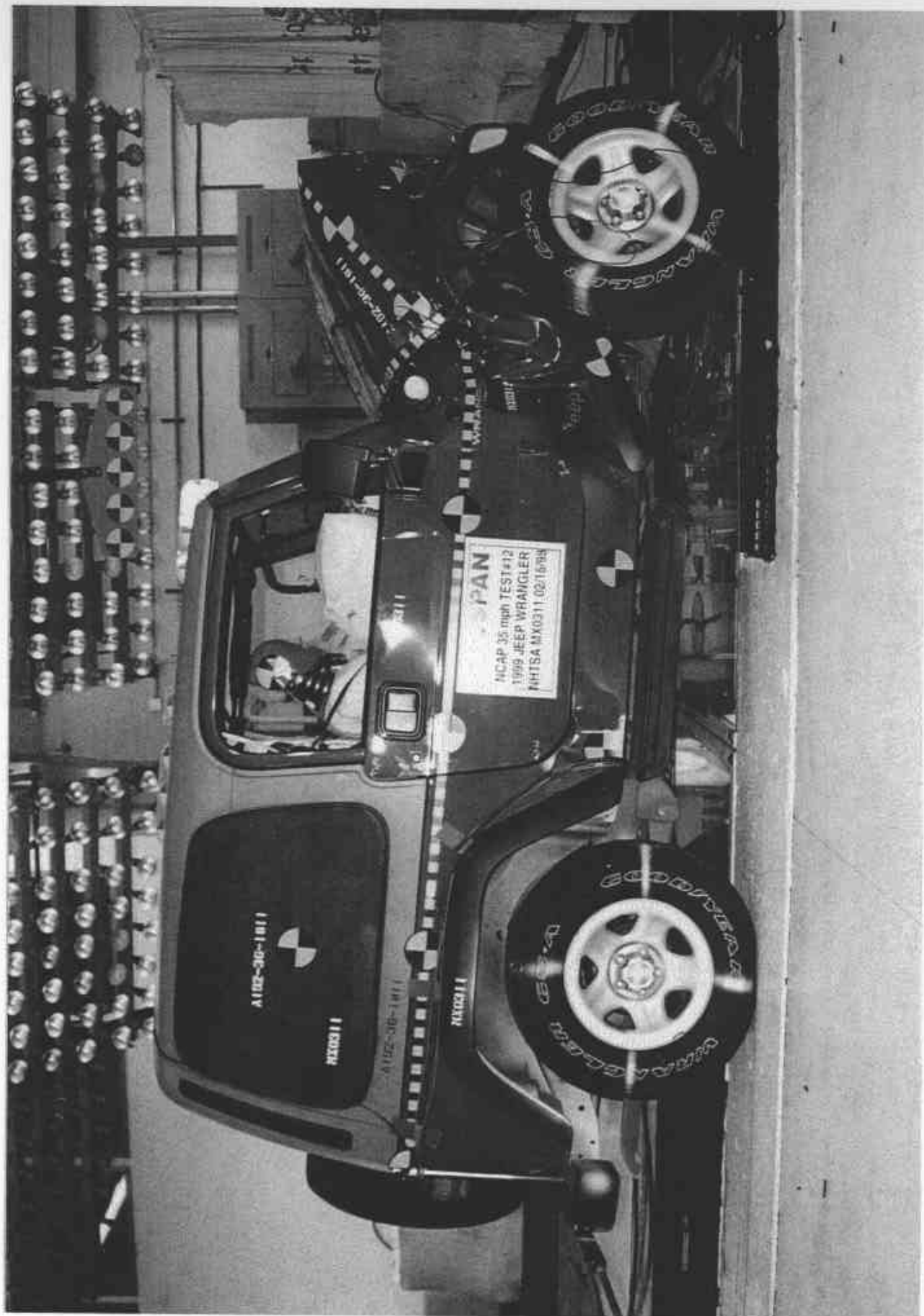


Figure A-7 POST-TEST RIGHT SIDE VIEW

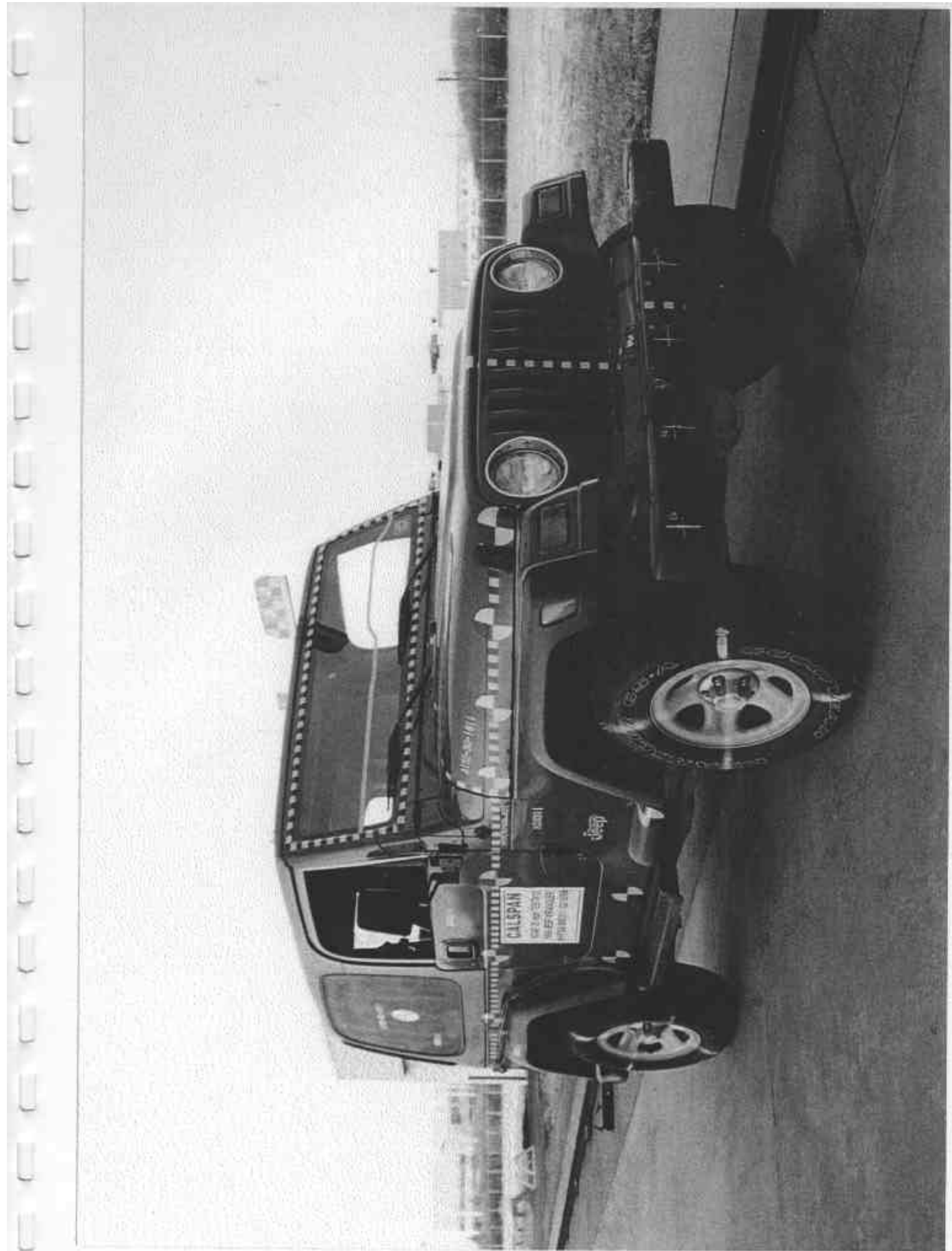


Figure A-8 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

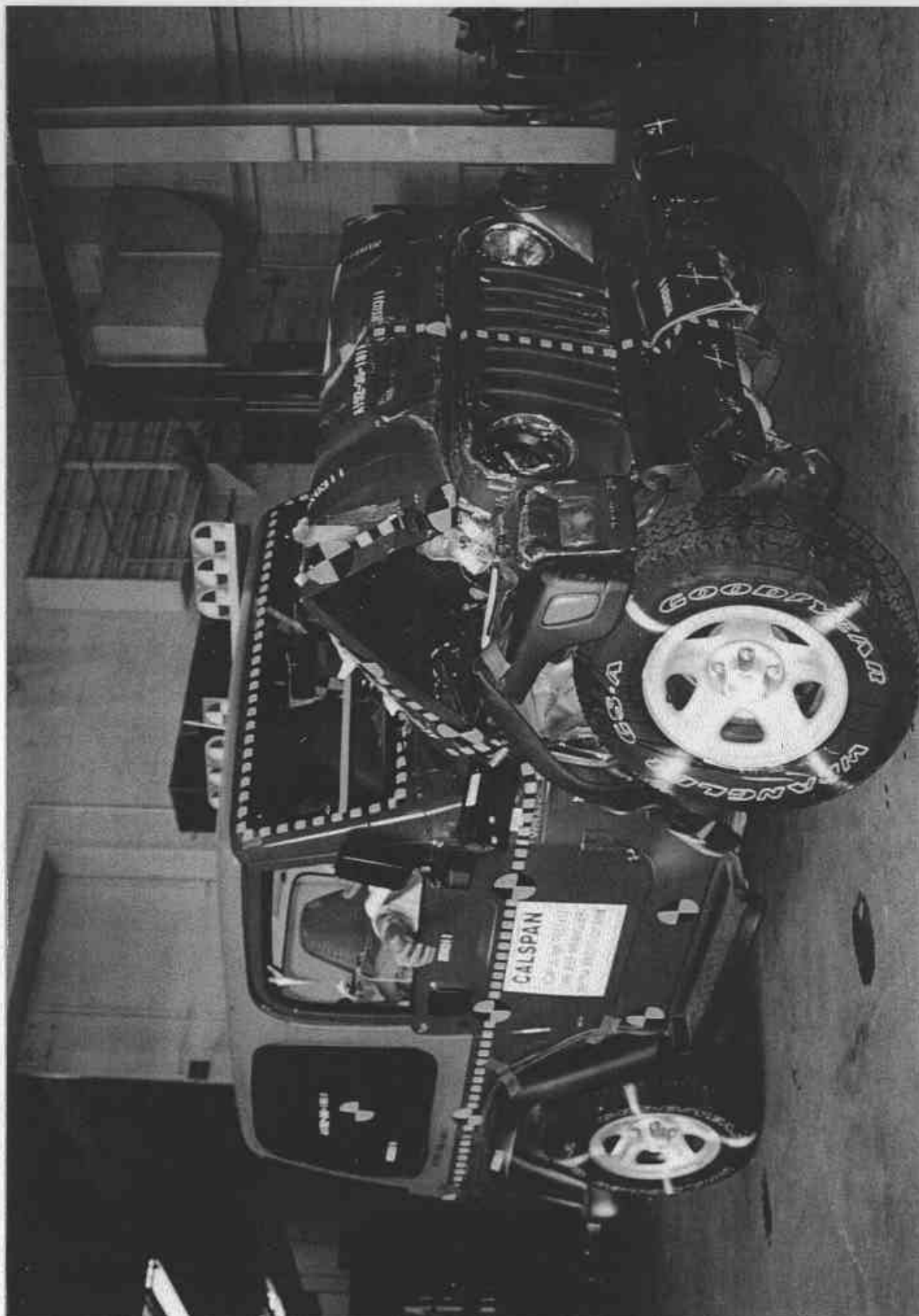


Figure A-9 POST-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-10 PRE-TEST LEFT REAR THREE-QUARTER VIEW

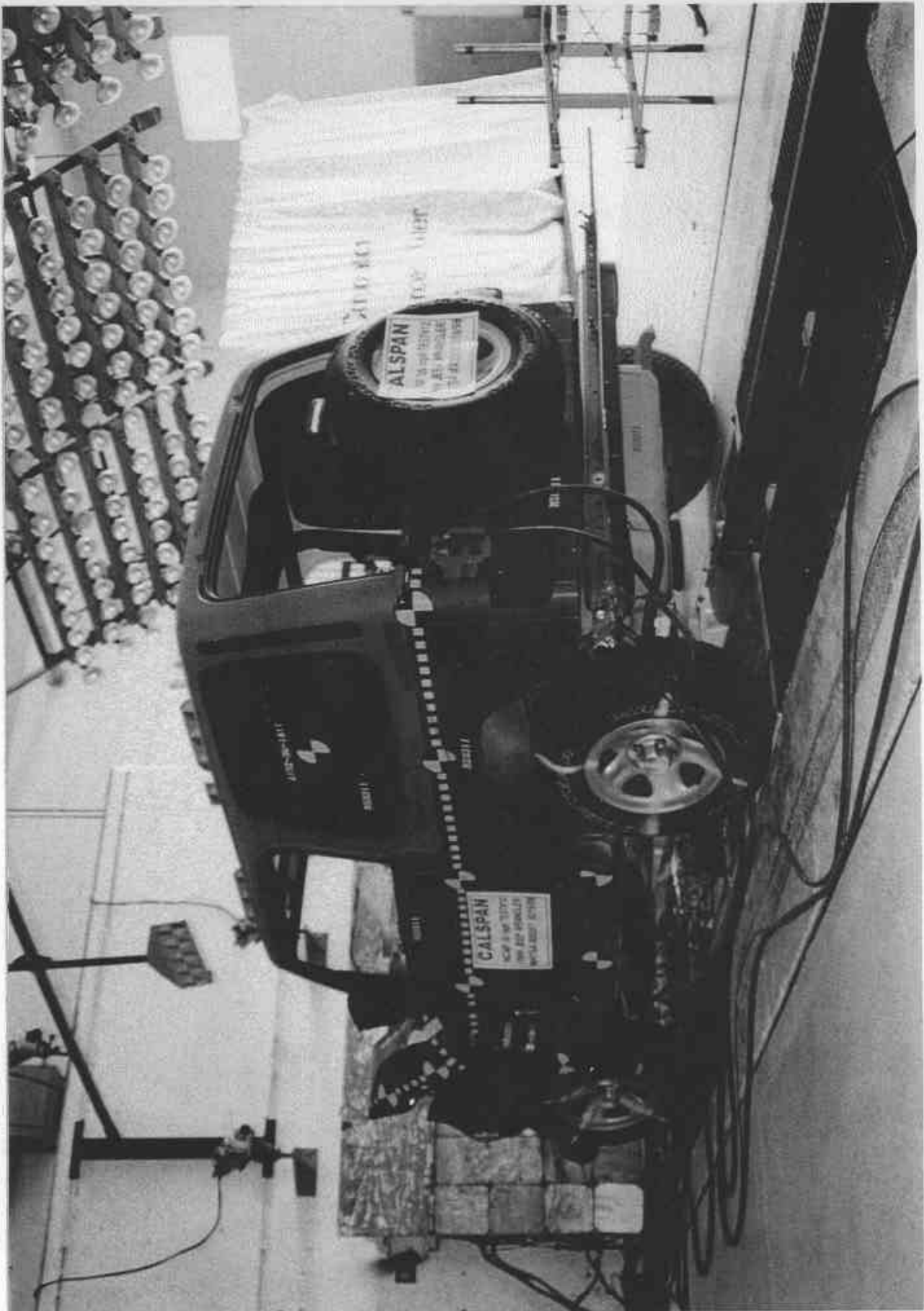


Figure A-11 POST-TEST LEFT REAR THREE-QUARTER VIEW

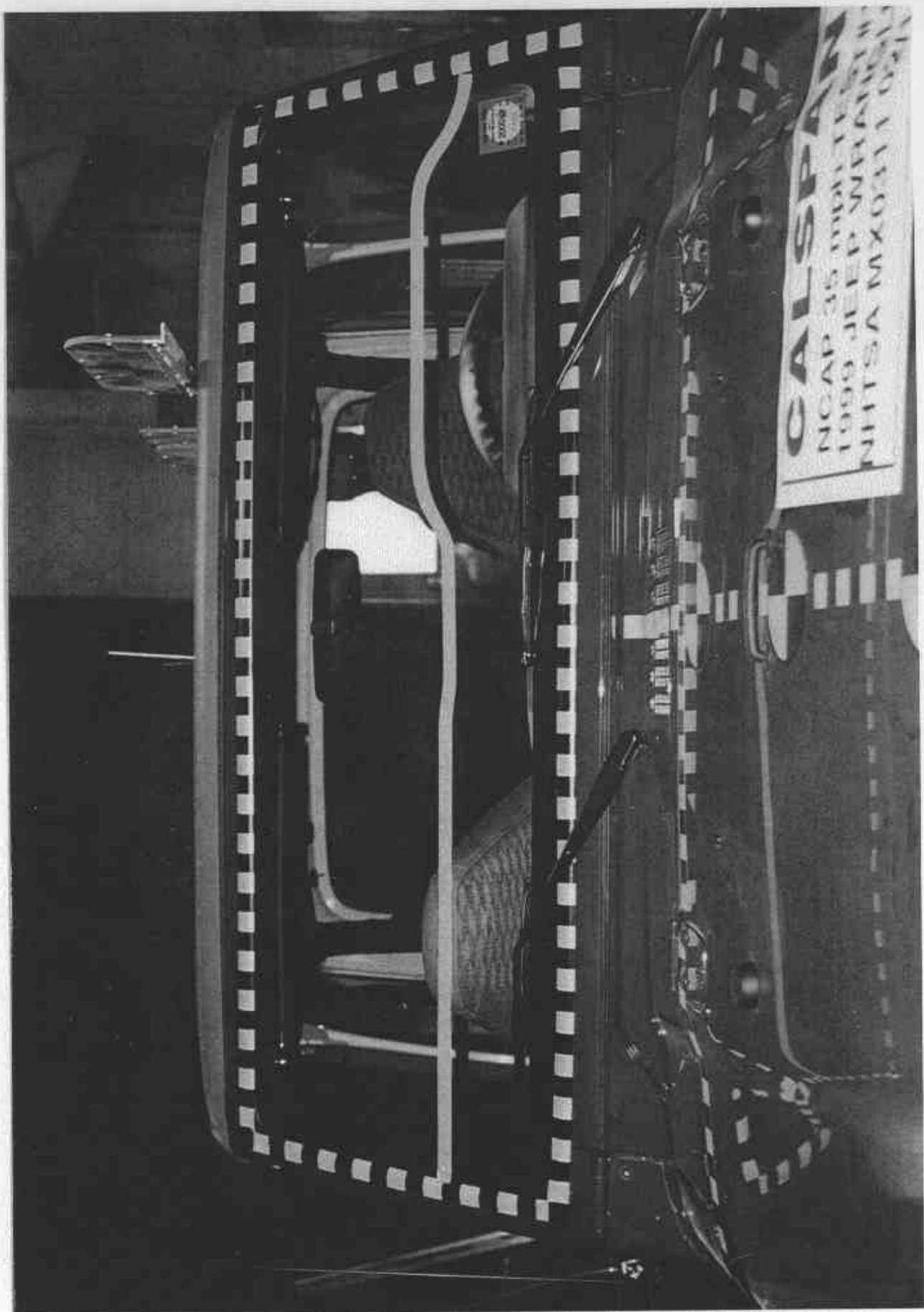


Figure A-12 PRE-TEST WINDSHIELD VIEW

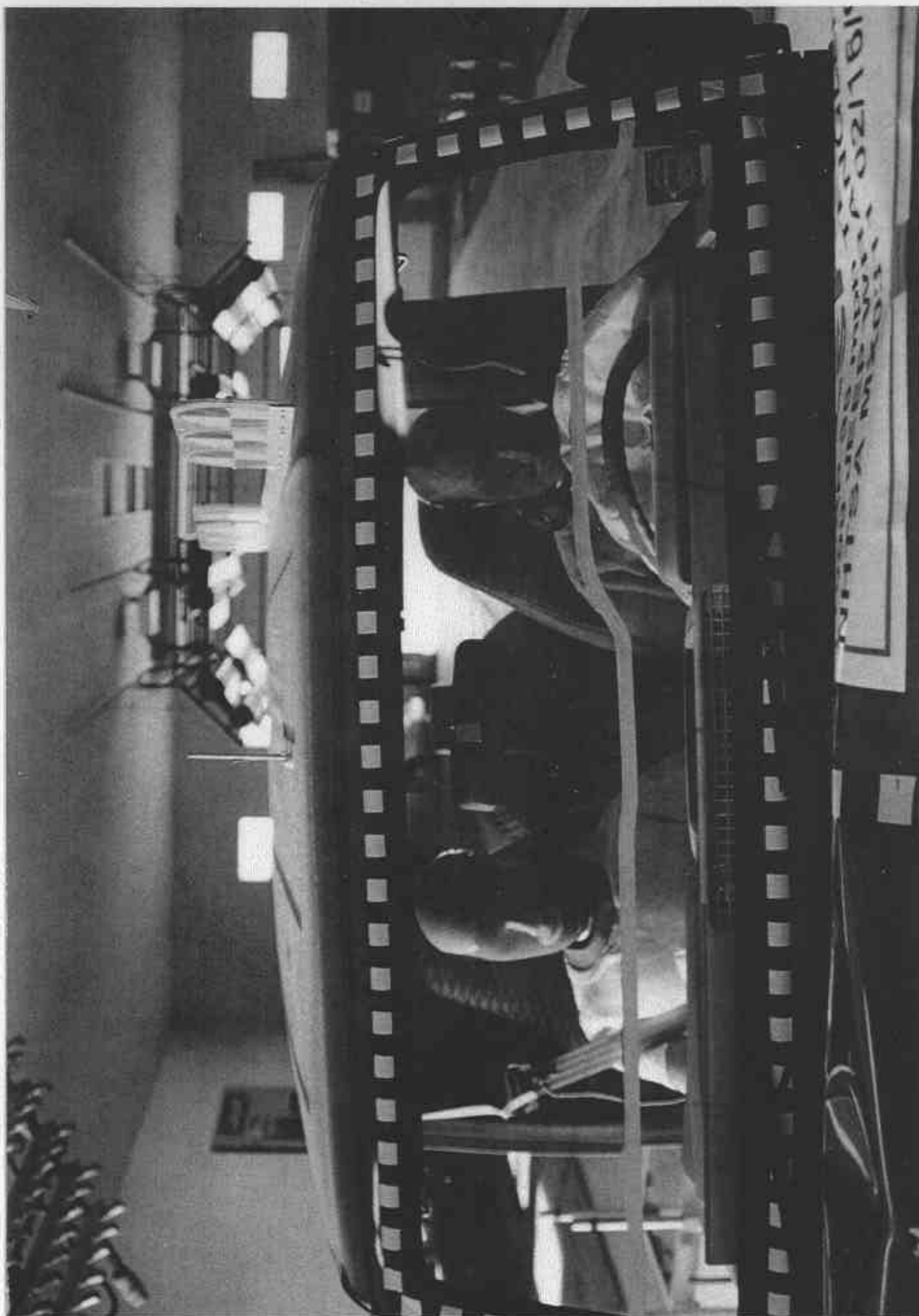


Figure A-13 POST-TEST WINDSHIELD VIEW

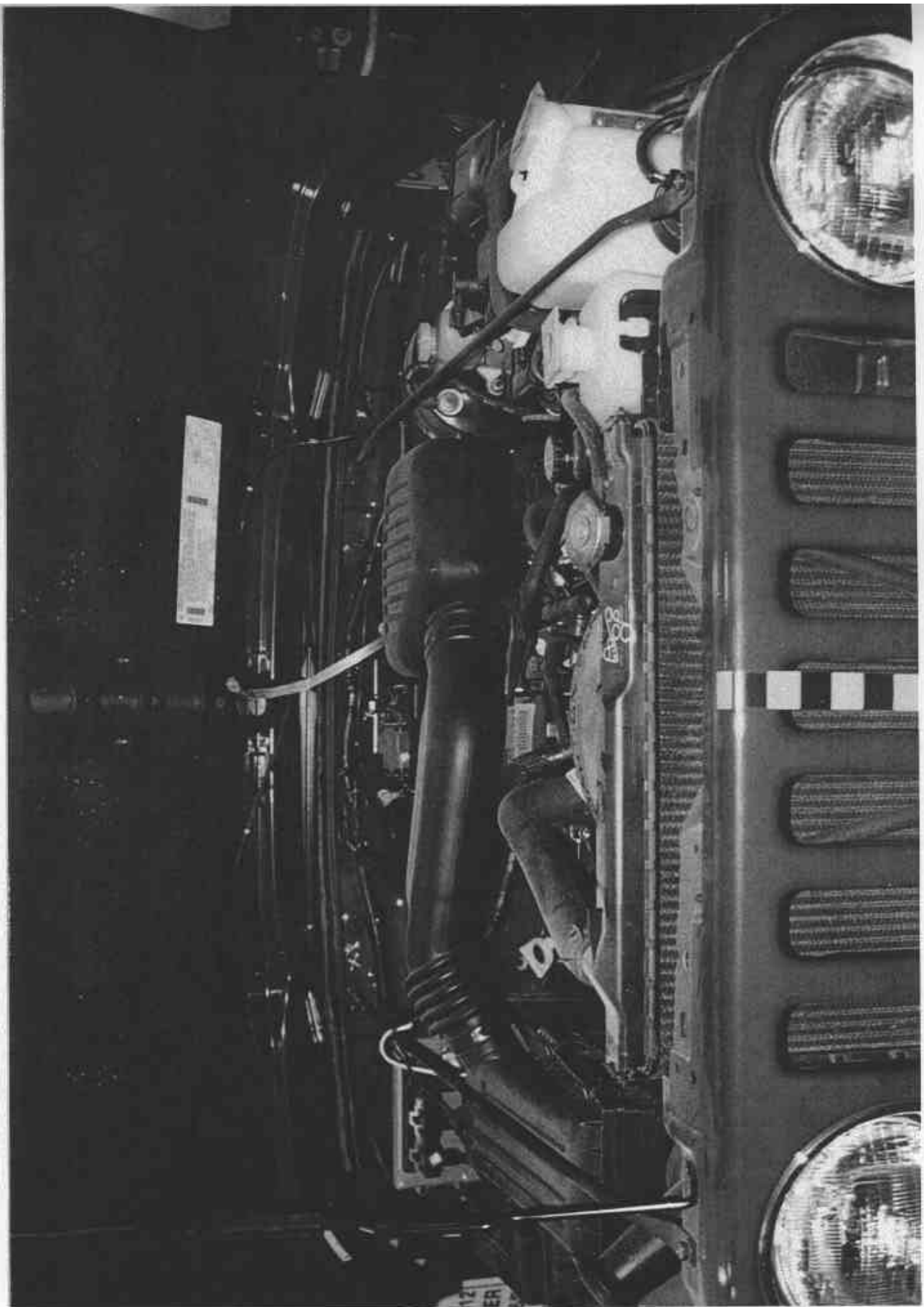


Figure A-14 PRE-TEST ENGINE COMPARTMENT VIEW

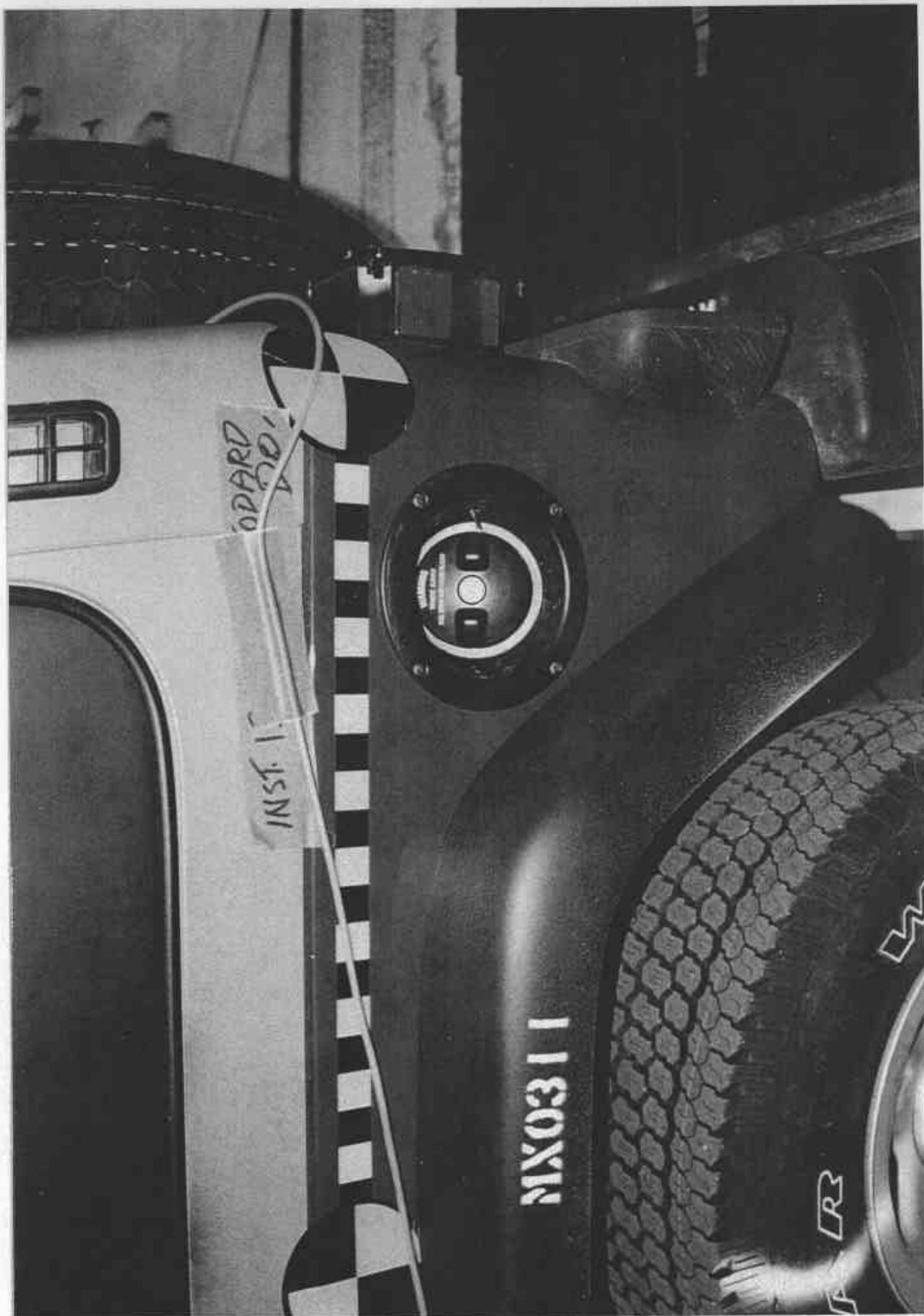


Figure A-15 FUEL CAP VIEW

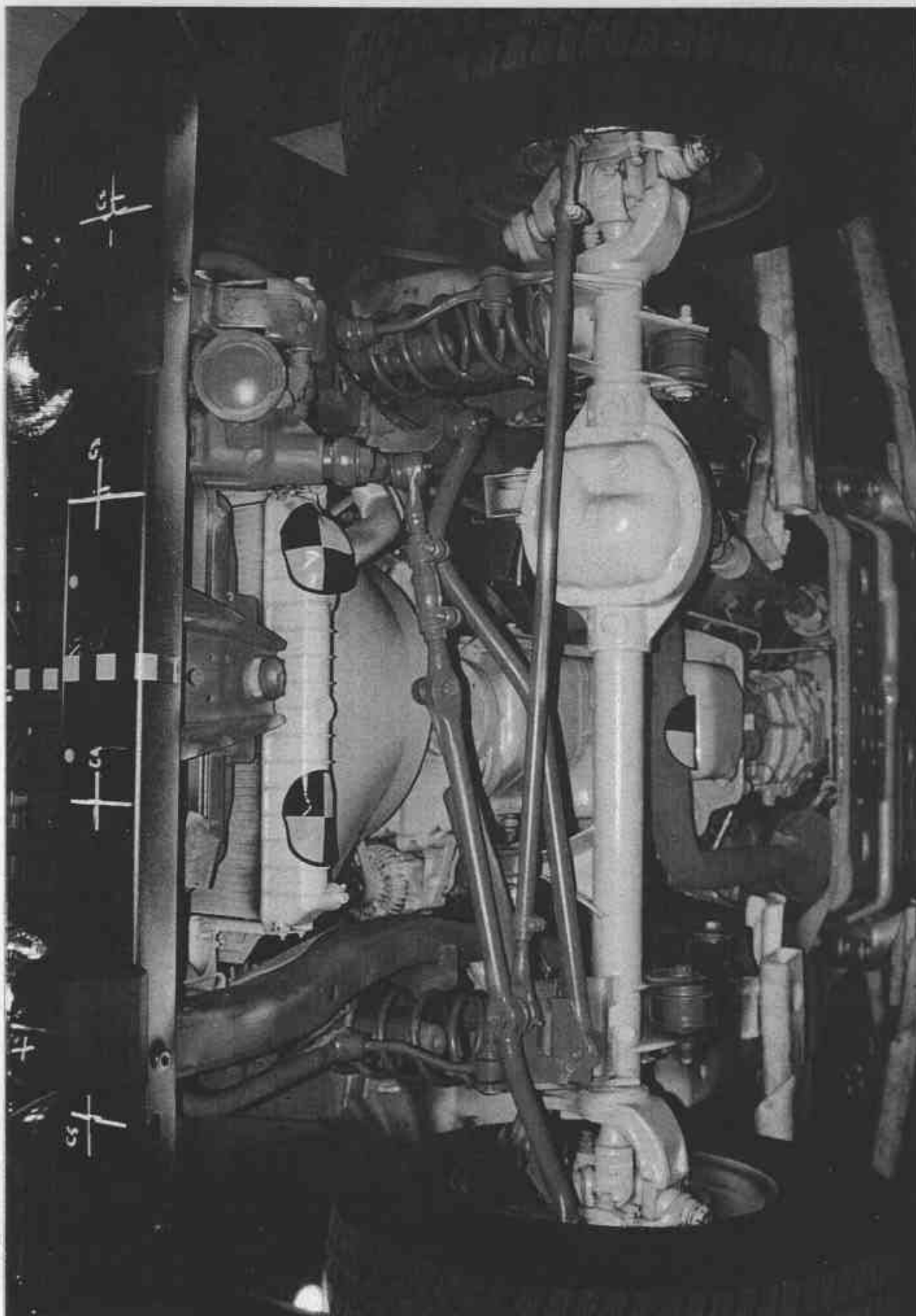


Figure A-16 PRE-TEST FRONT UNDERBODY VIEW

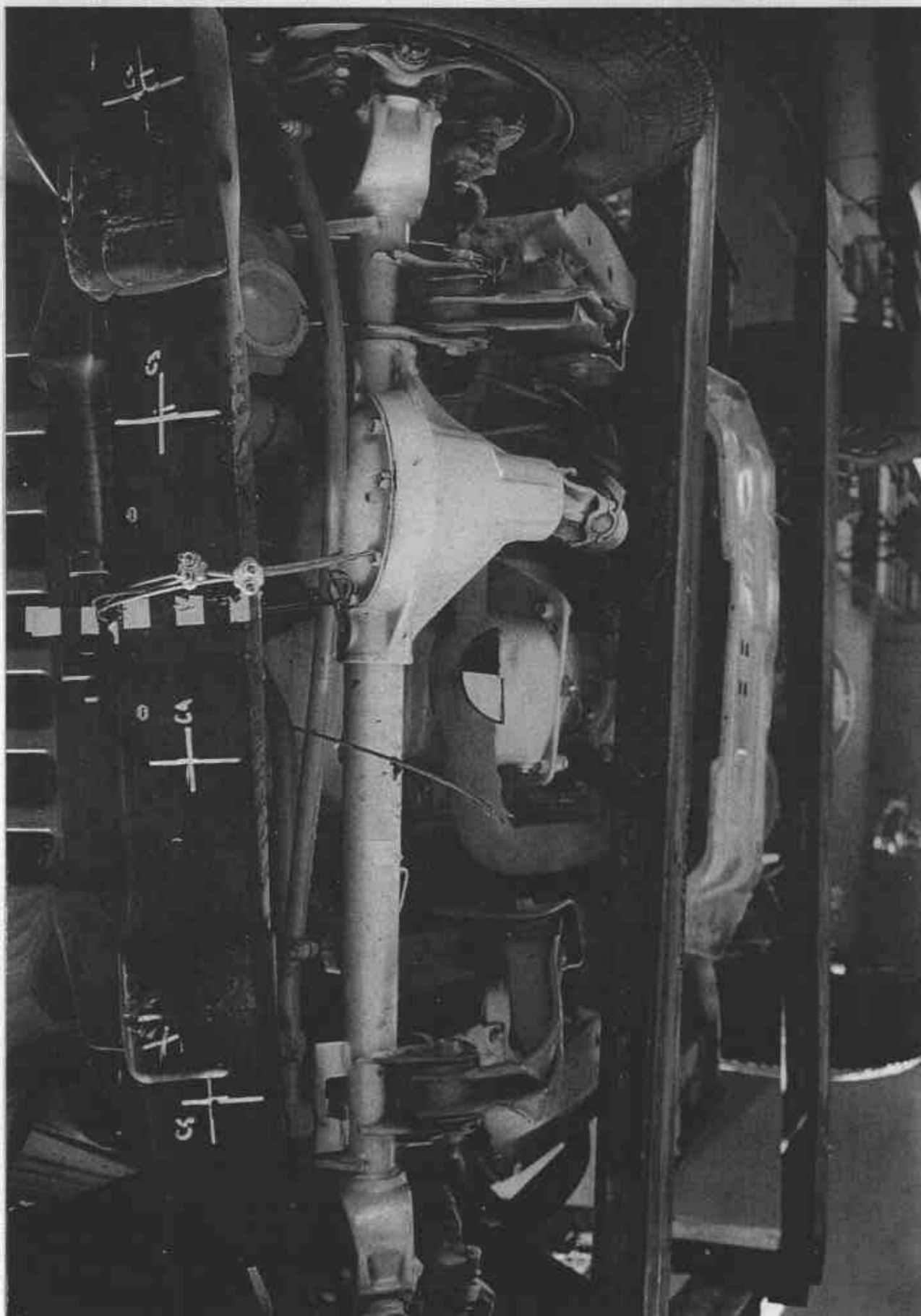


Figure A-17 POST-TEST FRONT UNDERBODY VIEW



Figure A-18 PRE-TEST FRONT SIDE UNDERBODY VIEW

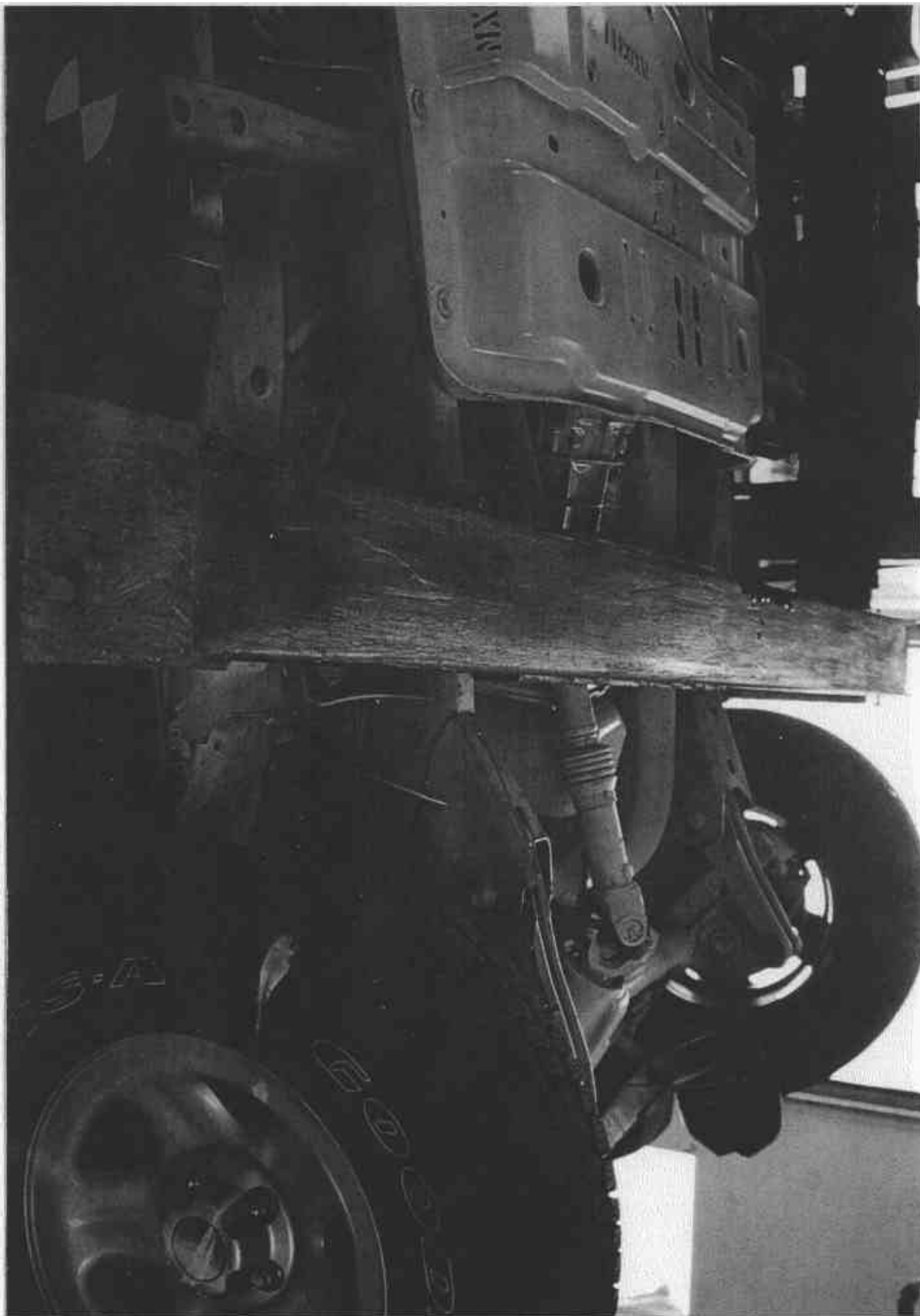


Figure A-19 POST-TEST FRONT SIDE UNDERBODY VIEW



Figure A-20 PRE-TEST REAR UNDERBODY VIEW



Figure A-21 POST-TEST REAR UNDERBODY VIEW

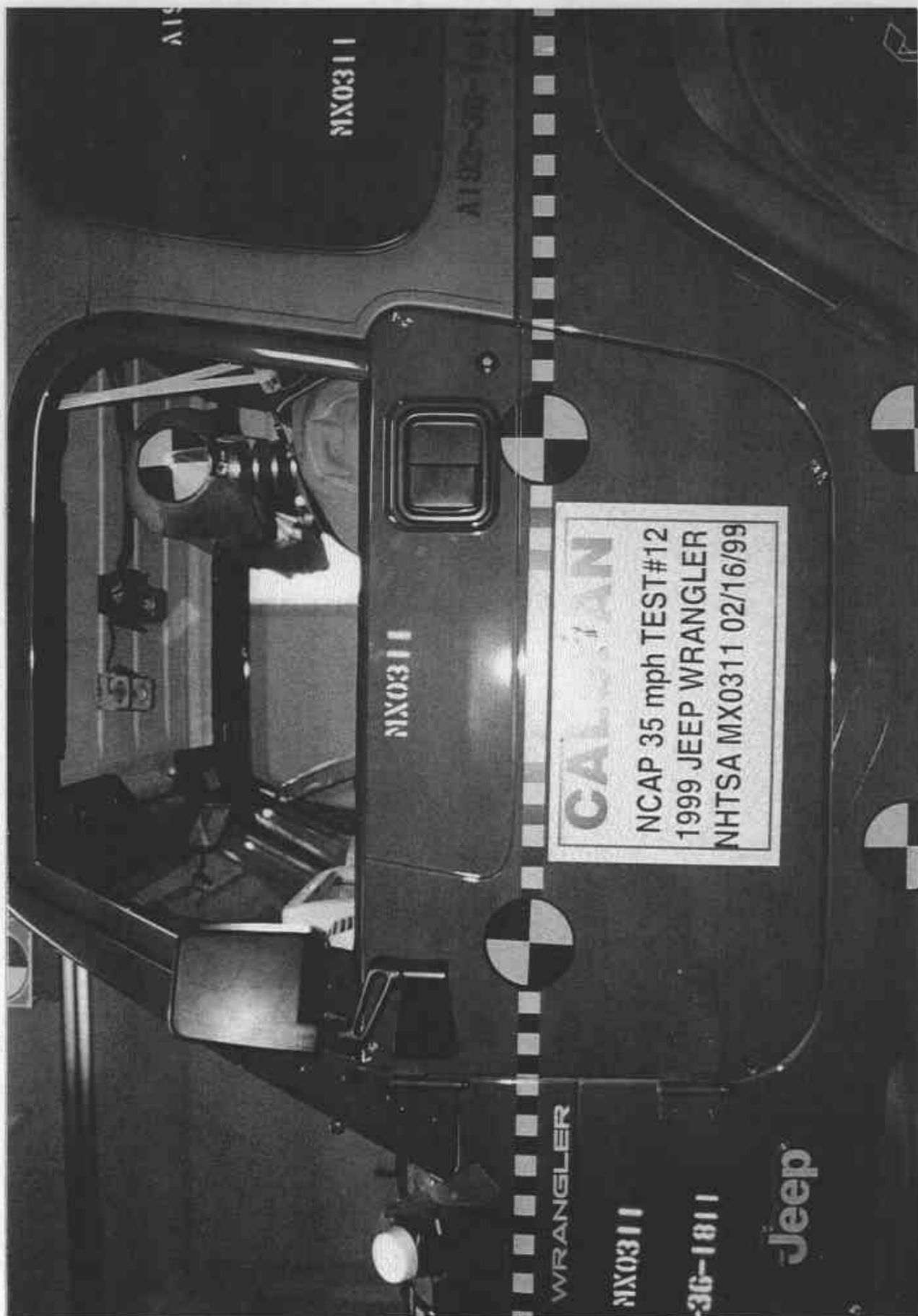


Figure A-22 PRE-TEST DRIVER POSITION VIEW

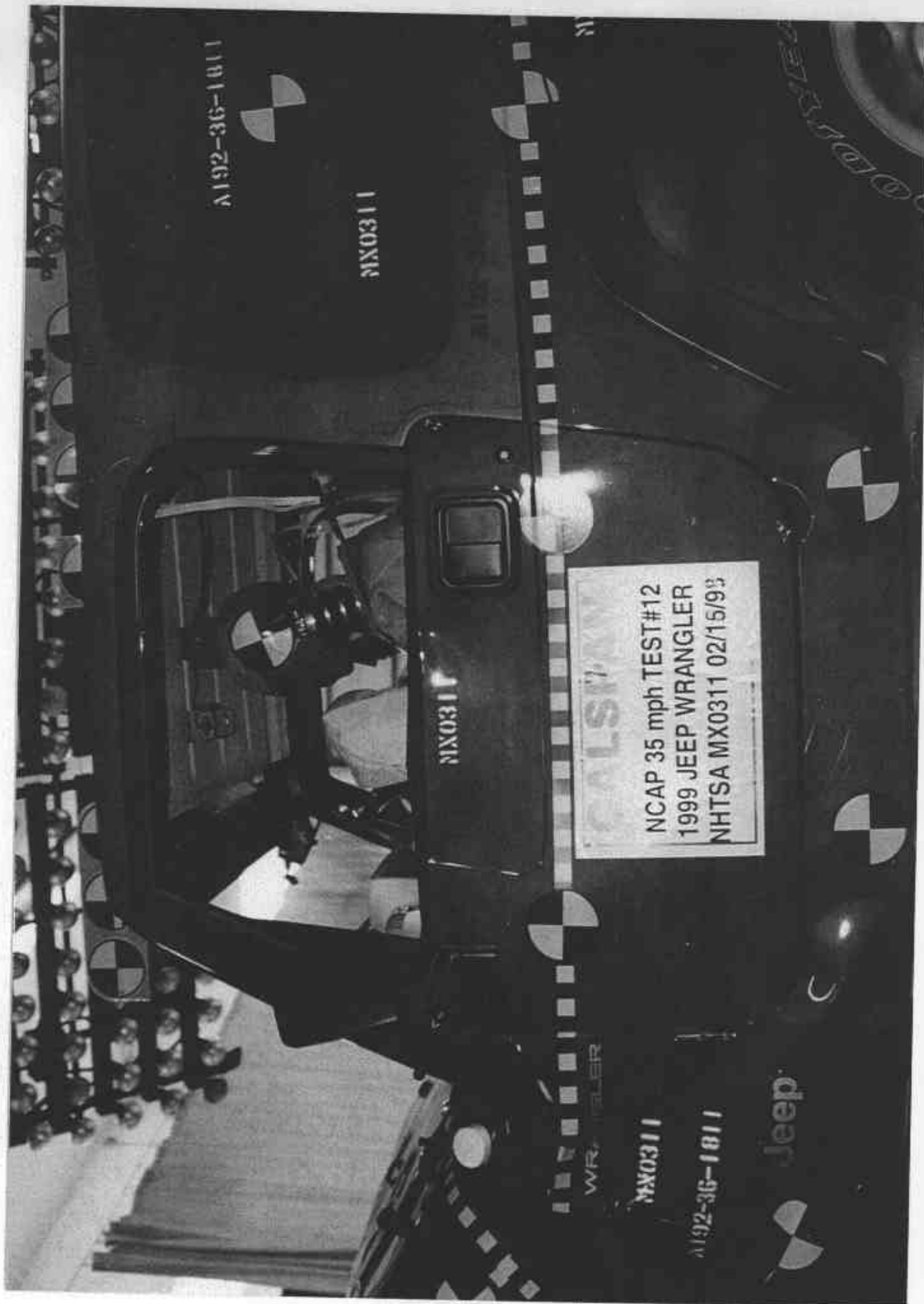


Figure A-23 POST-TEST DRIVER POSITION VIEW



Figure A-25 POST-TEST PASSENGER POSITION VIEW

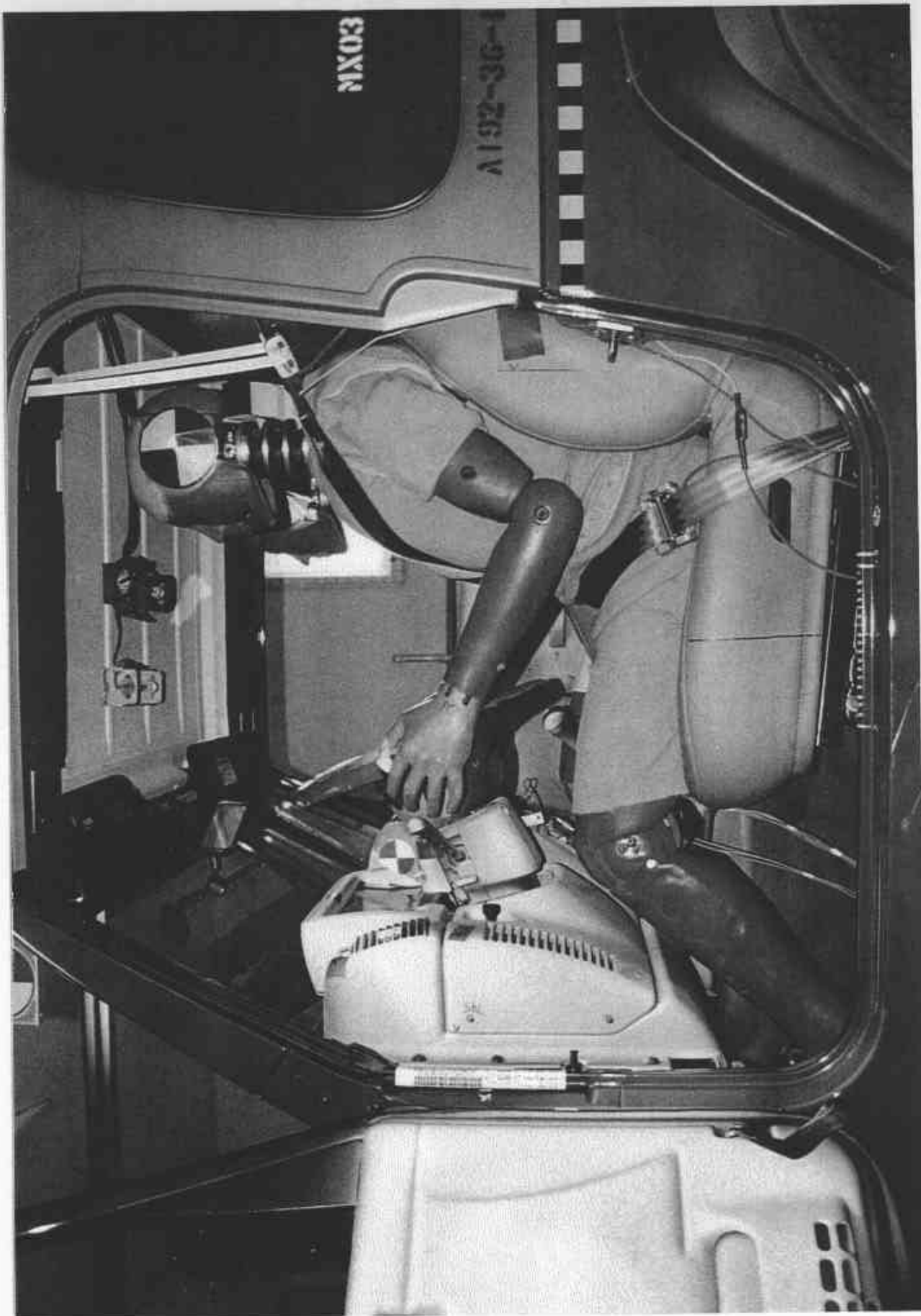


Figure A-26 PRE-TEST DRIVER AND INTERIOR VIEW

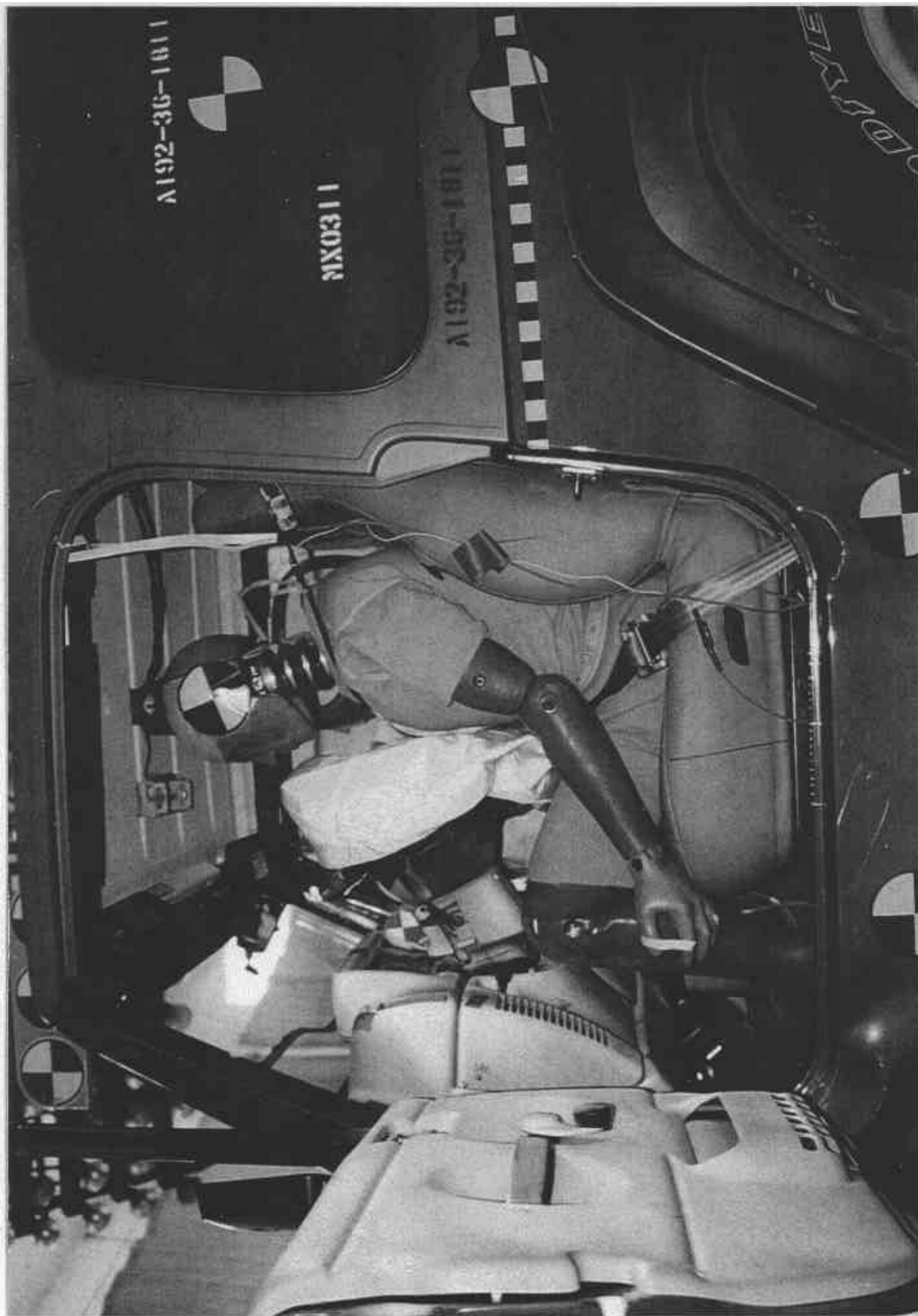


Figure A-27 POST-TEST DRIVER AND INTERIOR VIEW

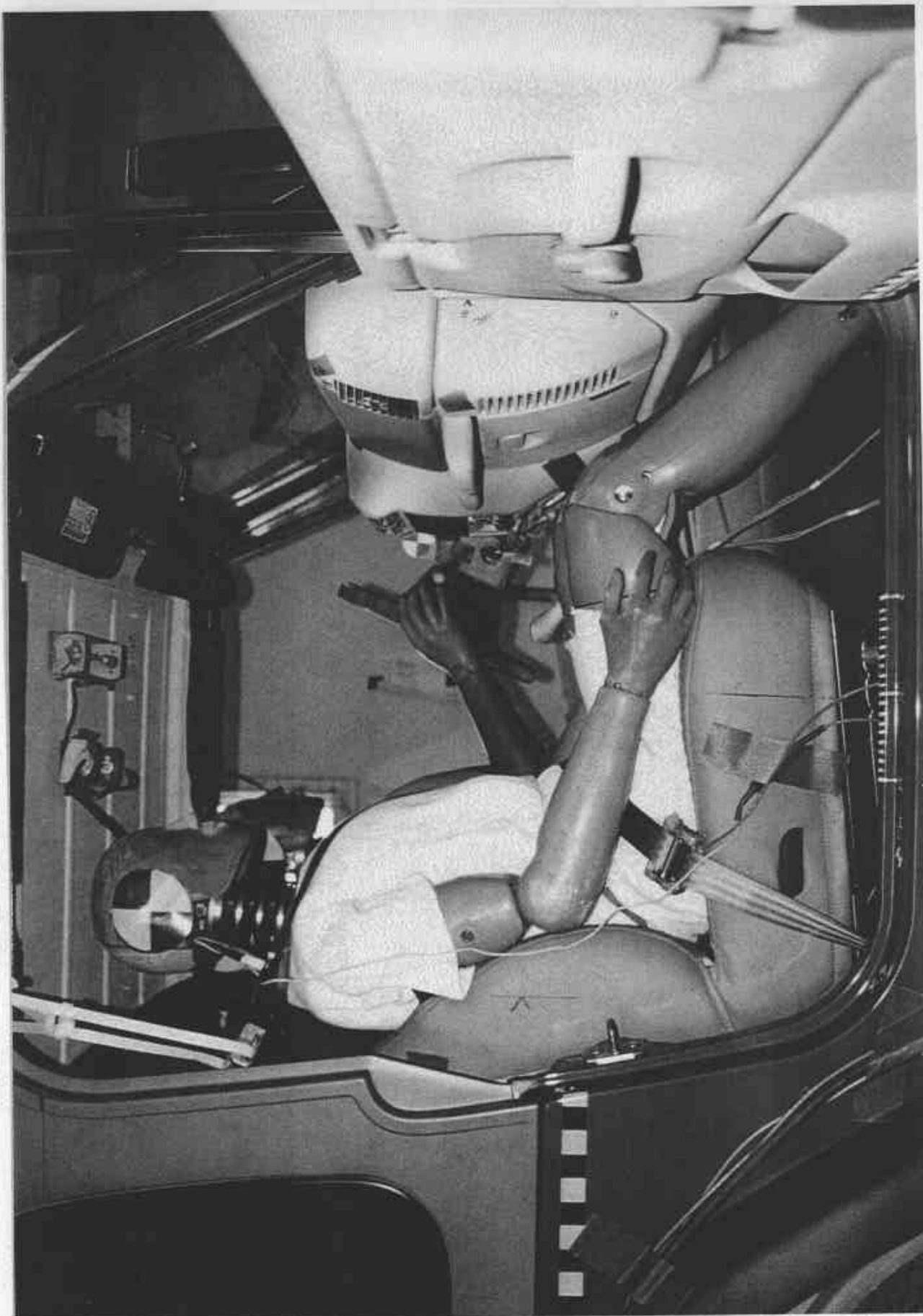


Figure A-28 PRE-TEST PASSENGER AND INTERIOR VIEW

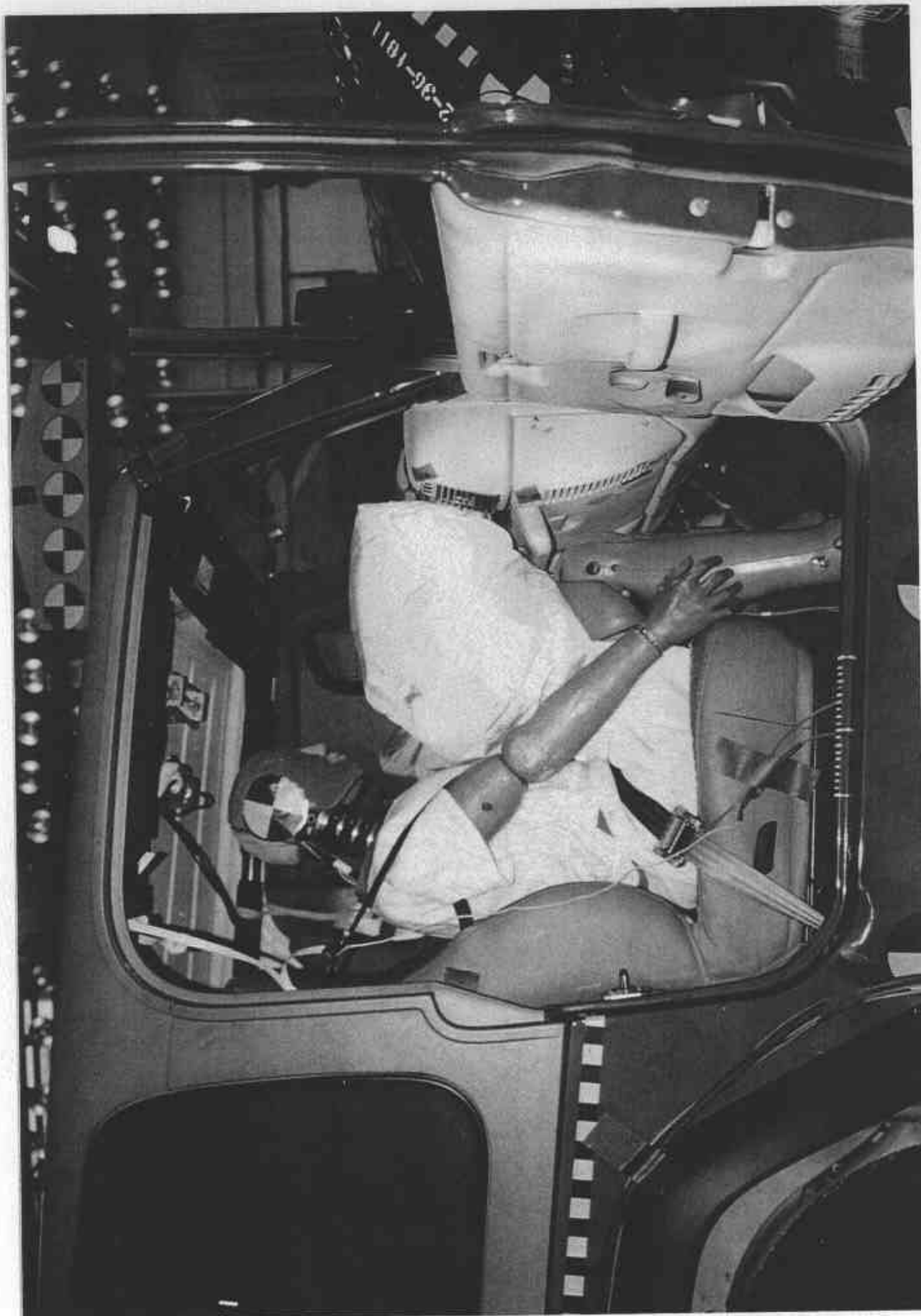


Figure A-29 POST-TEST PASSENGER AND INTERIOR VIEW



Figure A-30 PRE-TEST DRIVER HEAD LOCATION



Figure A-31 POST-TEST DRIVER HEAD LOCATION



Figure A-32 PRE-TEST PASSENGER HEAD LOCATION



Figure A-33 POST-TEST PASSENGER HEAD LOCATION

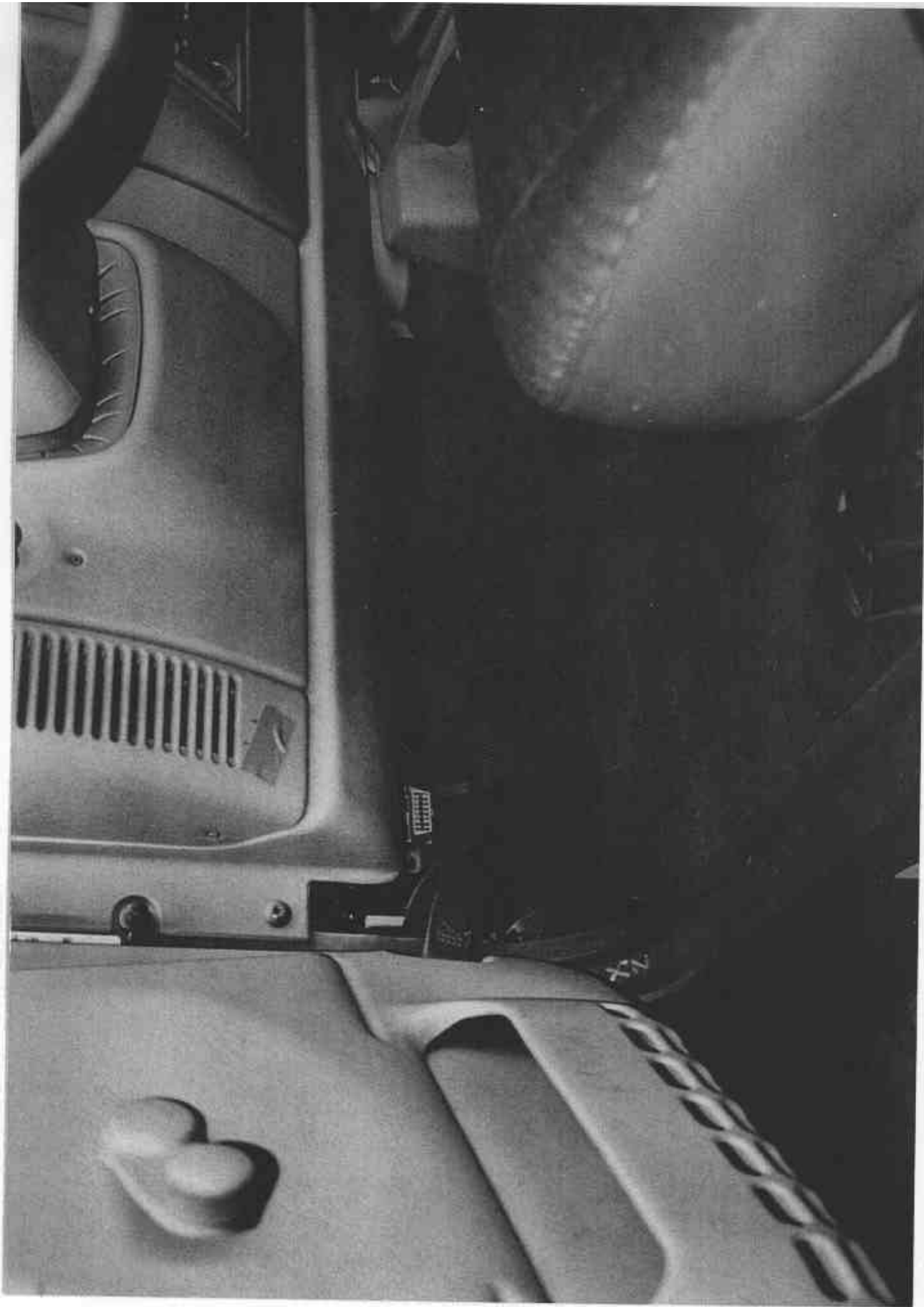


Figure A-34 PRE-TEST DRIVER FLOOR PAN VIEW



Figure A-35 POST-TEST DRIVER FLOOR PAN VIEW



Figure A-36 PRE-TEST PASSENGER FLOOR PAN VIEW



Figure A-37 POST-TEST PASSENGER FLOOR PAN VIEW

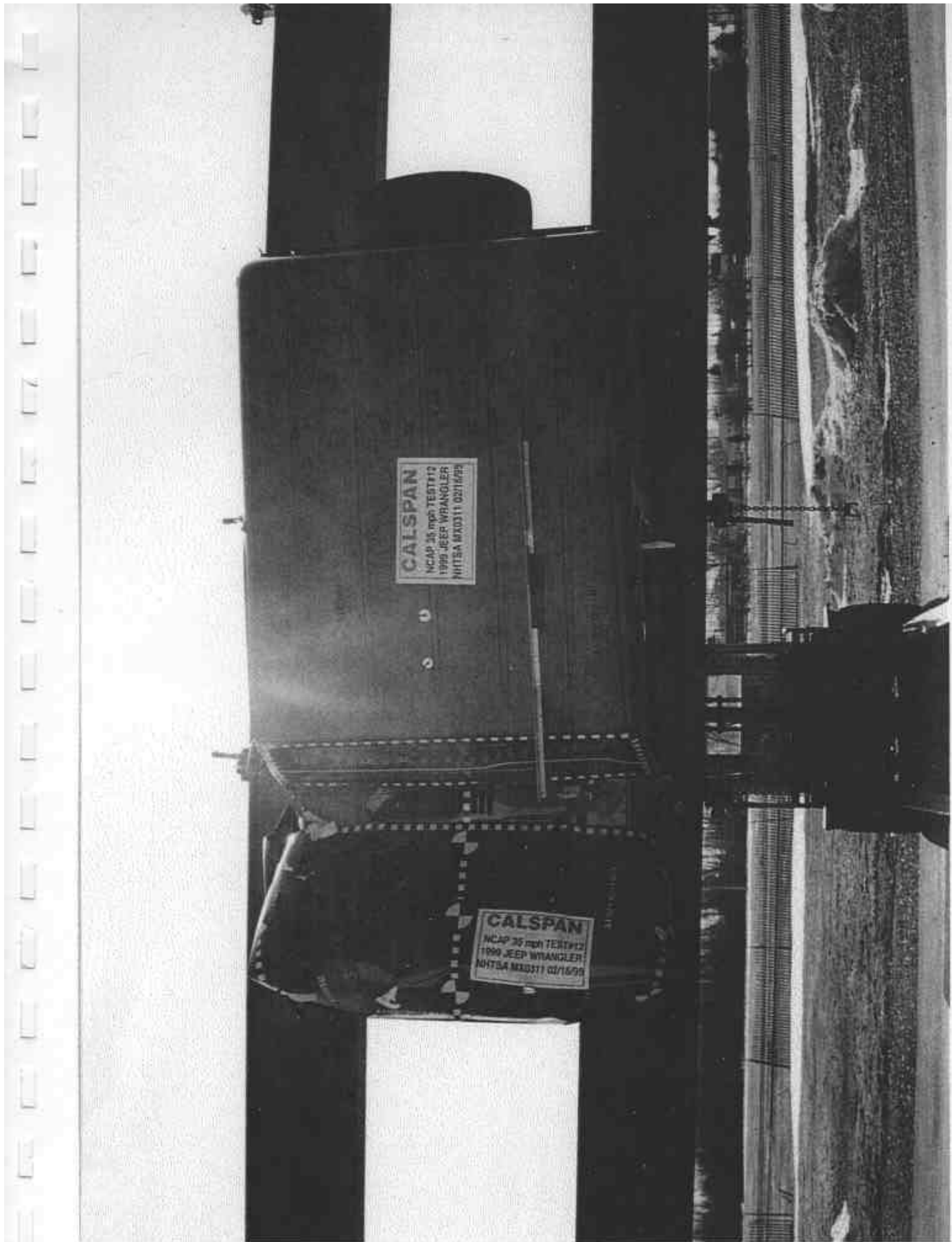


Figure A-38 ROLLOVER VIEW

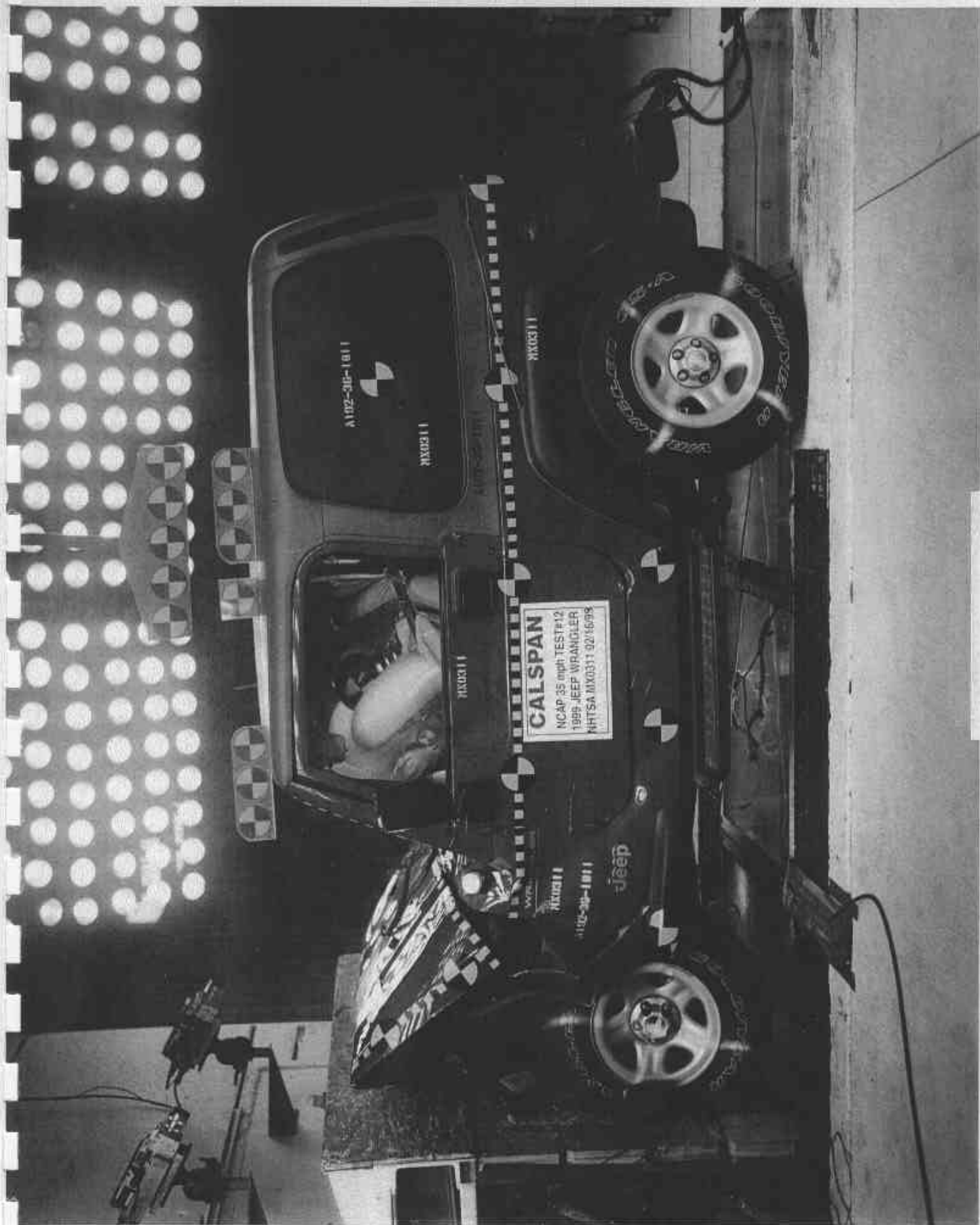


Figure A-39 IMPACT VIEW

Appendix B
DUMMY, VEHICLE AND LOAD CELL BARRIER RESPONSE DATA

**Hybrid III Dummy Sign Conventions
Load Cells and Special Transducers**

Transducer	SAE Sign Convention (positive unless noted)
Upper Neck Load Cell	Fx Head rearward Fy Head left Fz Neck in tension Mx Left ear to left shoulder My Chin to chest (flexion) Mz Chin to left shoulder (look left)
Chest Displacement Potentiometer	Compression is negative
Pelvic Load Cell (Lower Lumbar)	Fx Chest rearward Fy Chest left Fz Spine in tension
Femur Load Cell	Compression is negative
Upper Tibia Load Cell (right and left leg)	Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center
Lower Tibia Load Cell (right and left leg)	Fz Tibia in tension Mx Support tibia at ends, load left side center My Support tibia at ends, load front (shin) center

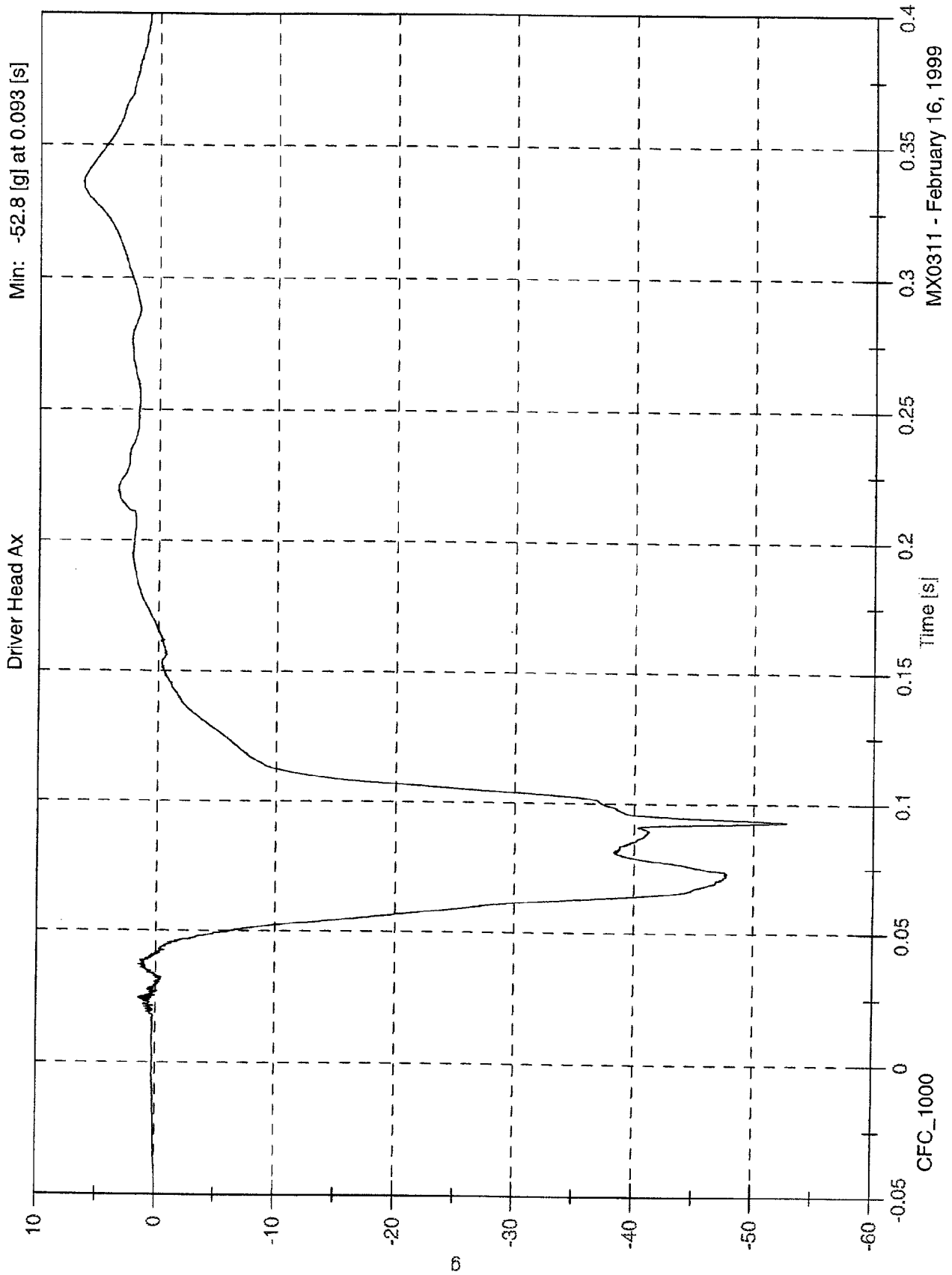
NHTSA TEST NO. MX0311

DUMMY DATA

CLASS	FILTER CHANNEL
Head Accelerations	1000
Chest Accelerations	180
Chest Displacements	60
Femur Forces	600
Belt Loads	60
Belt Displacements	180
Neck Forces	1000
Neck Moments	600

NCAP Test #12 - 1999 Jeep Wrangler

Max: 6.4 [g] at 0.336 [s]
Min: -52.8 [g] at 0.093 [s]

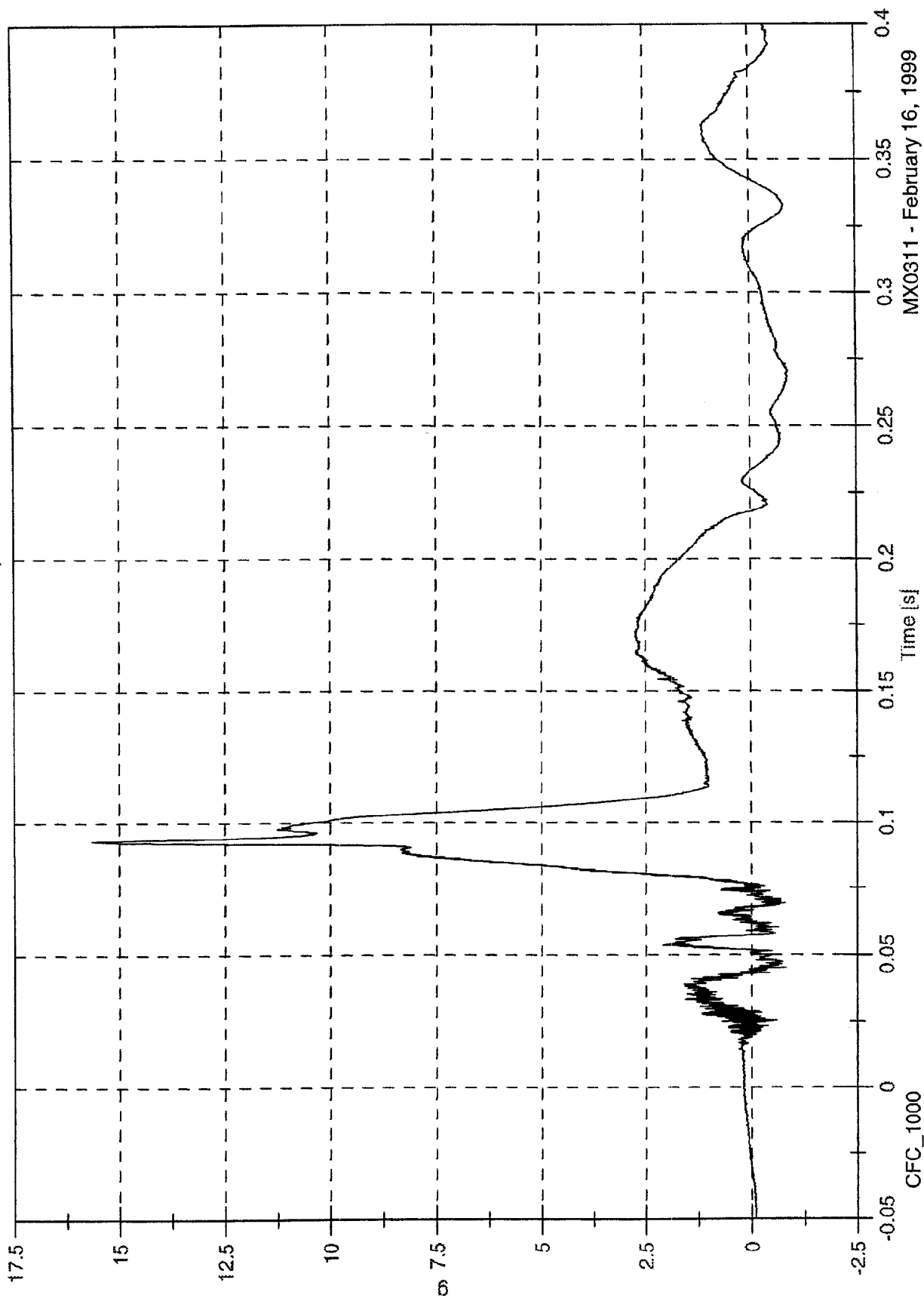


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 15.7 [g] at 0.093 [s]
Min: -1.1 [g] at 0.433 [s]

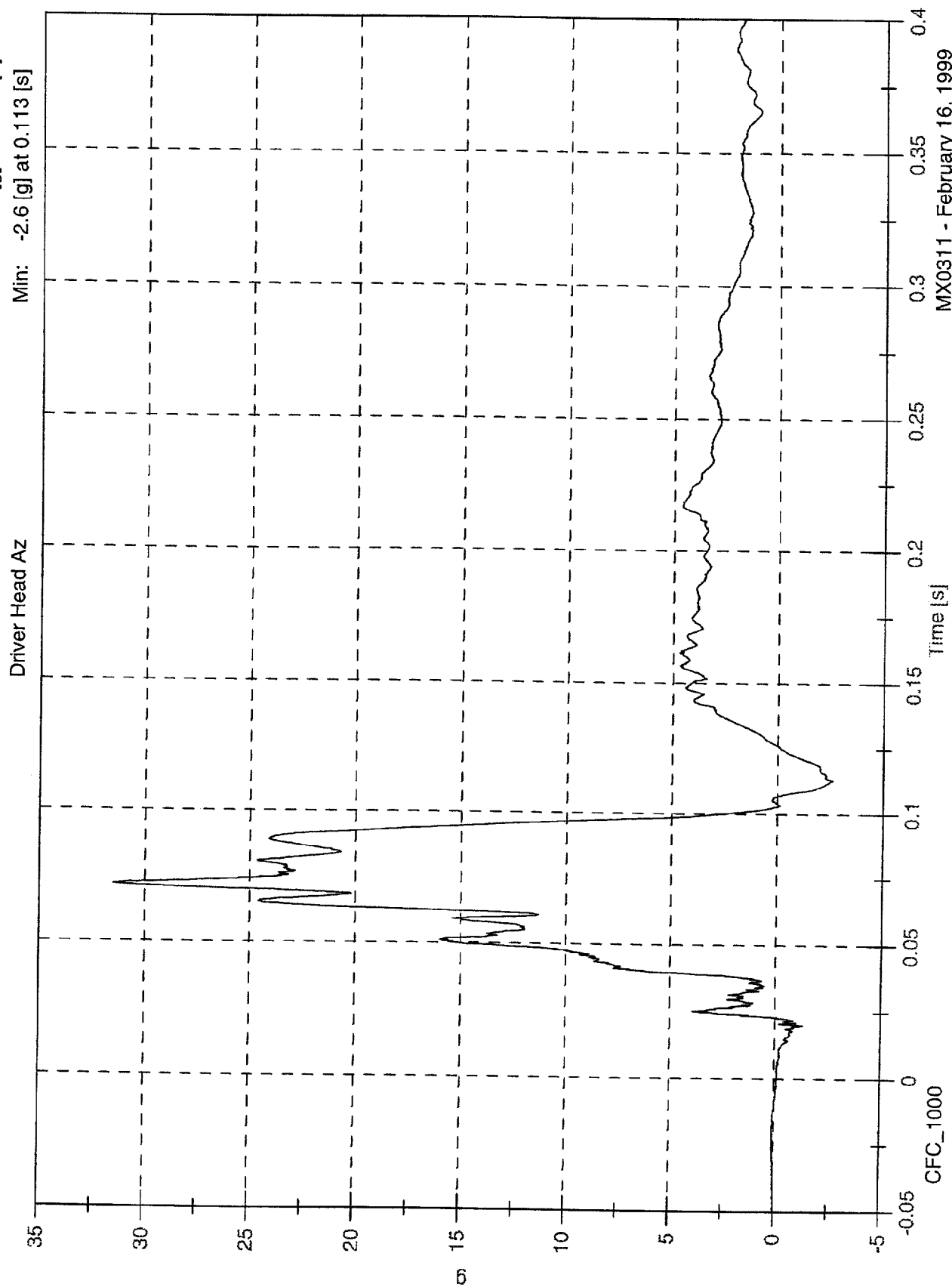
Driver Head Ay



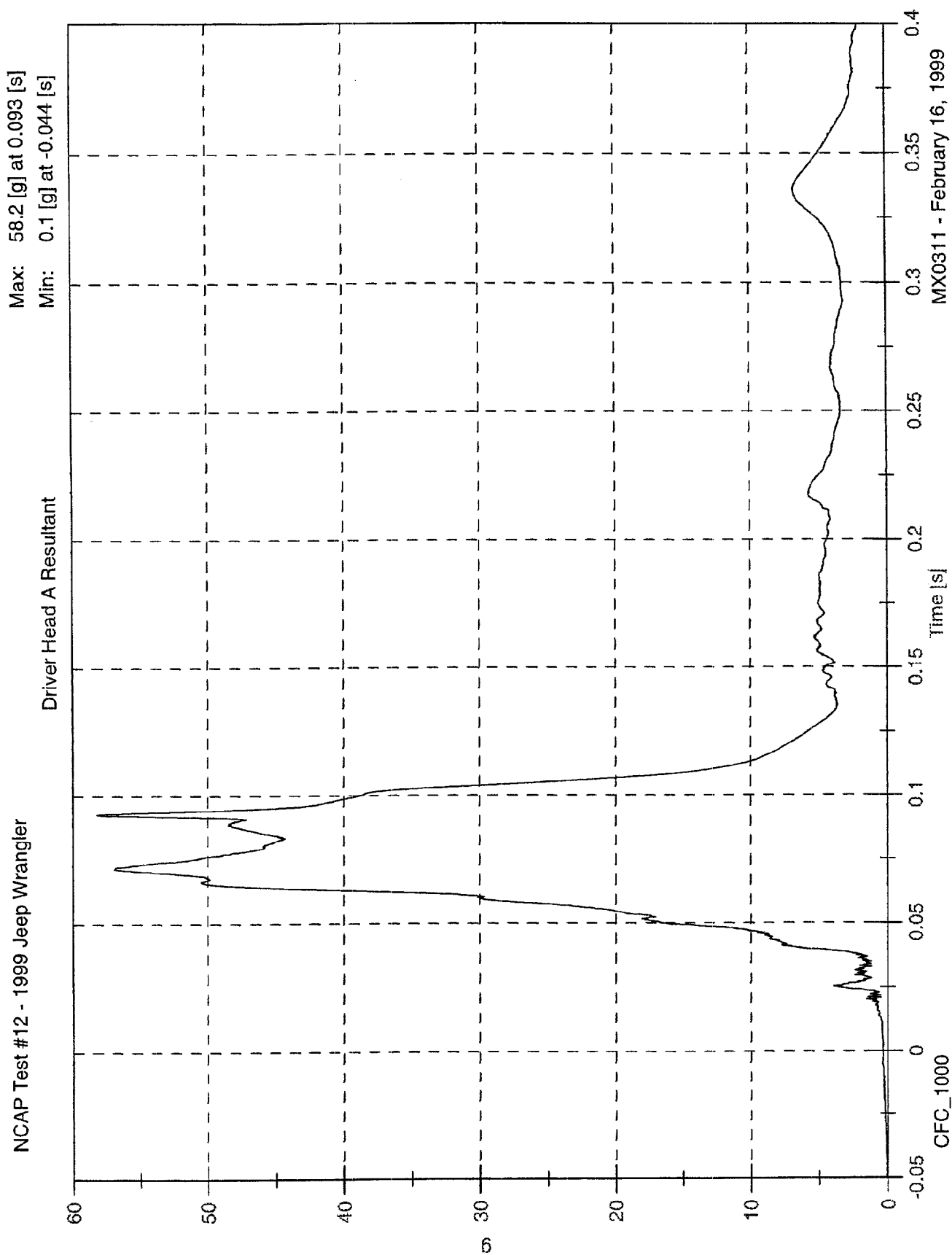
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

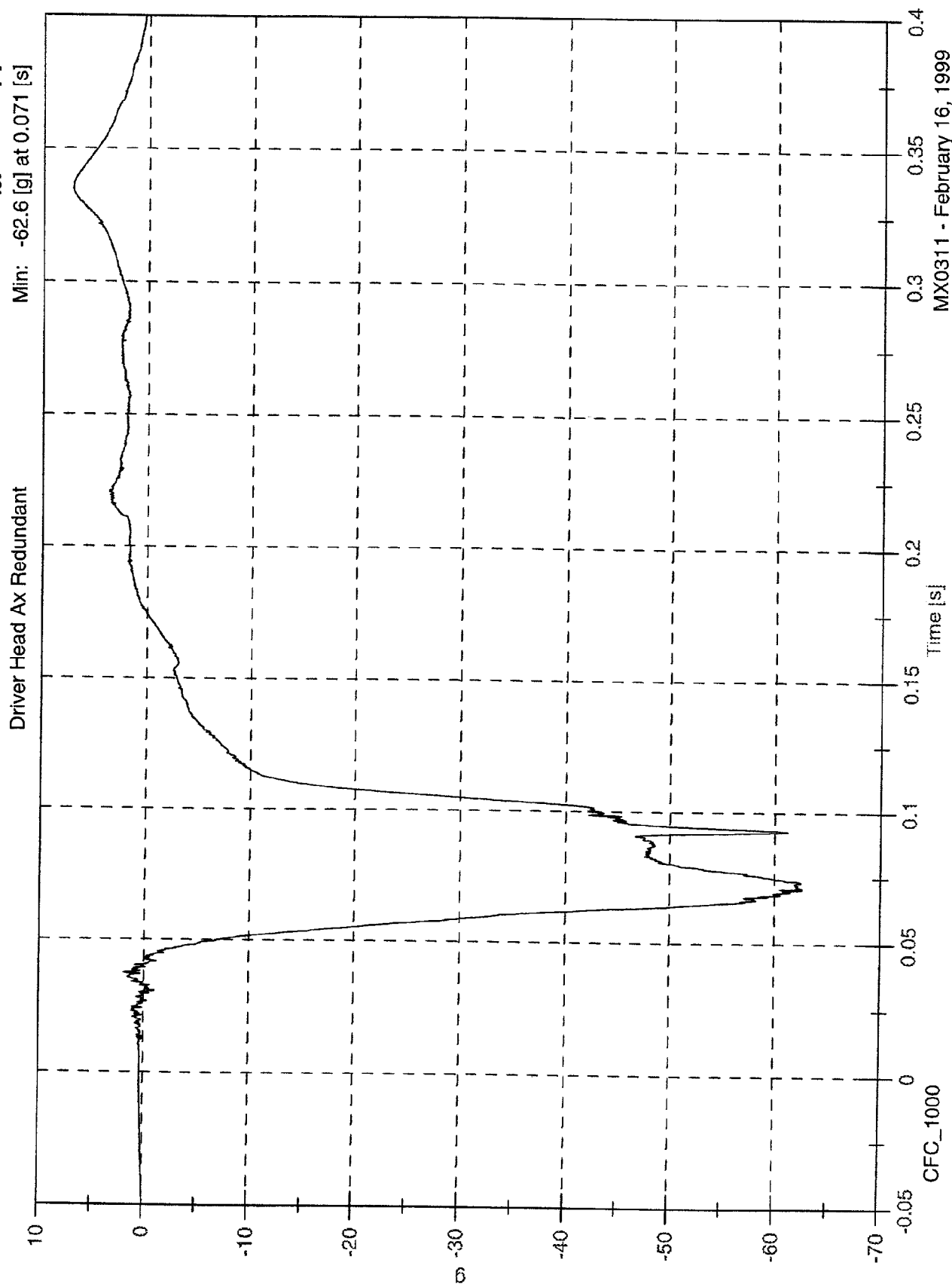
Max: 31.5 [g] at 0.071 [s]
Min: -2.6 [g] at 0.113 [s]



MX0311 - February 16, 1999



NCAP Test #12 - 1999 Jeep Wrangler

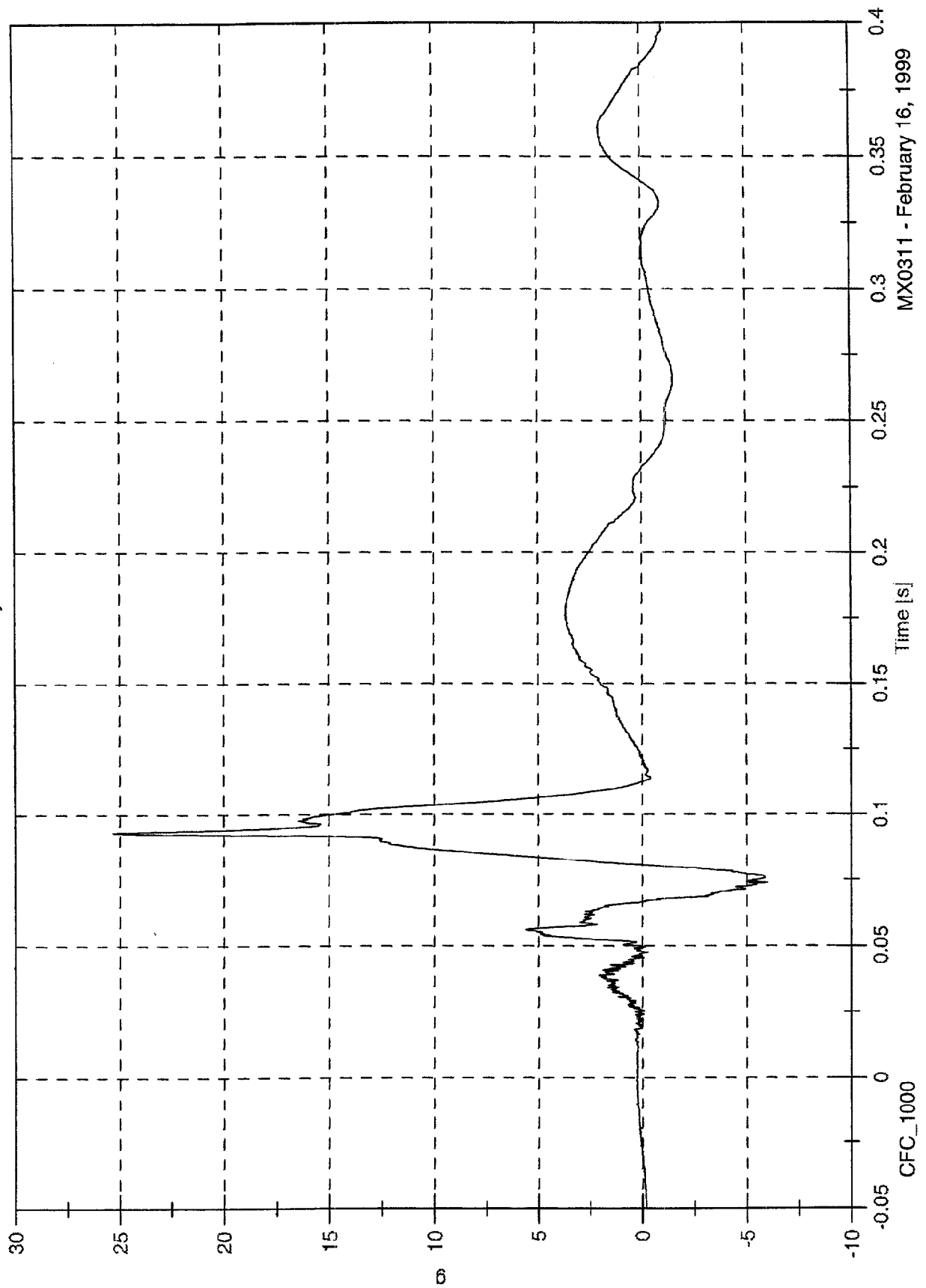


NCAP Test #12 - 1999 Jeep Wrangler

Max: 25.3 [g] at 0.093 [s]

Min: -6.0 [g] at 0.074 [s]

Driver Head Ay Redundant

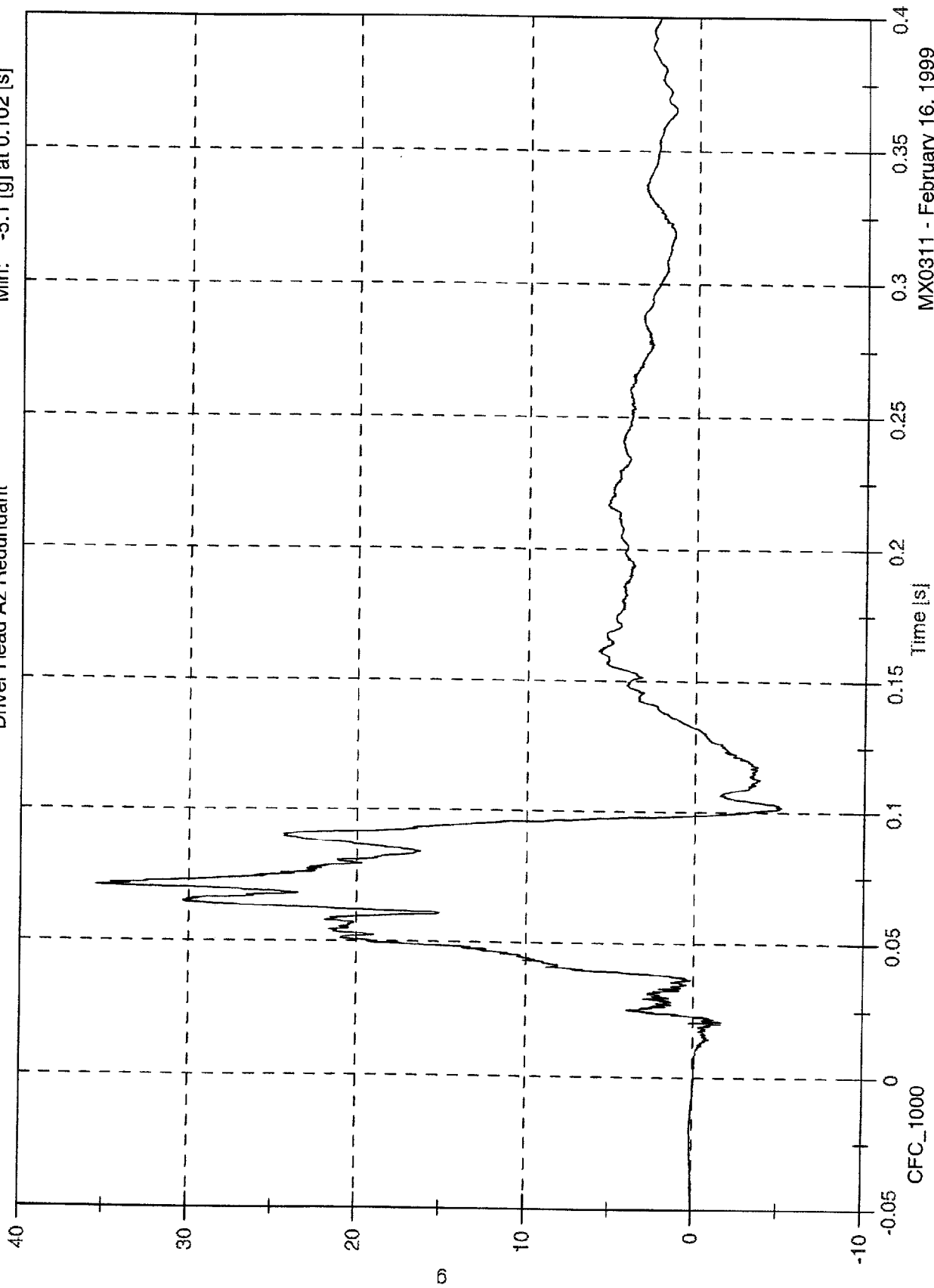


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 35.5 [g] at 0.071 [s]
Min: -5.1 [g] at 0.102 [s]

Driver Head Az Redundant



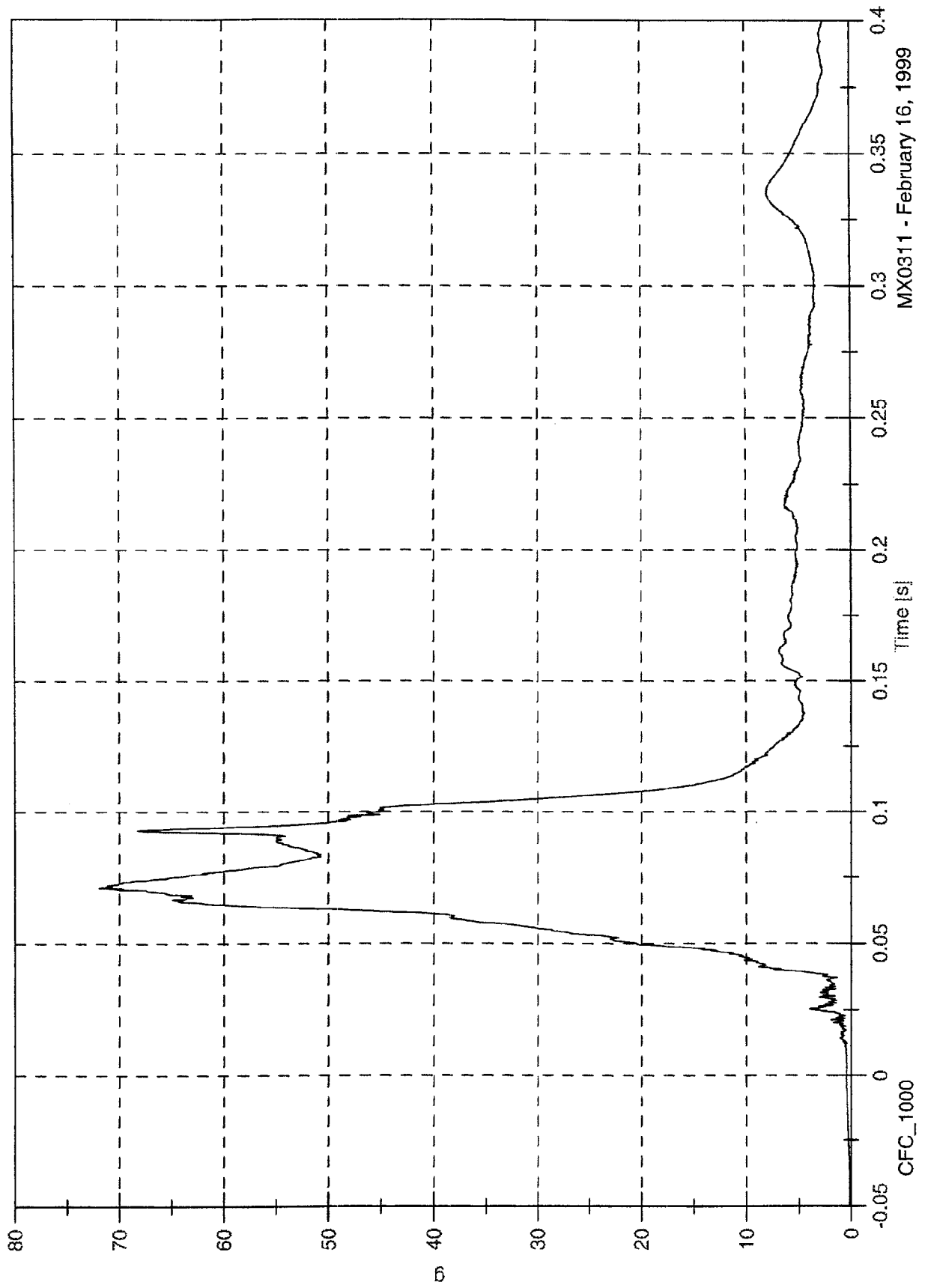
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 72.0 [g] at 0.071 [s]

Min: 0.1 [g] at -0.039 [s]

Driver Head Ax Redundant Resultant

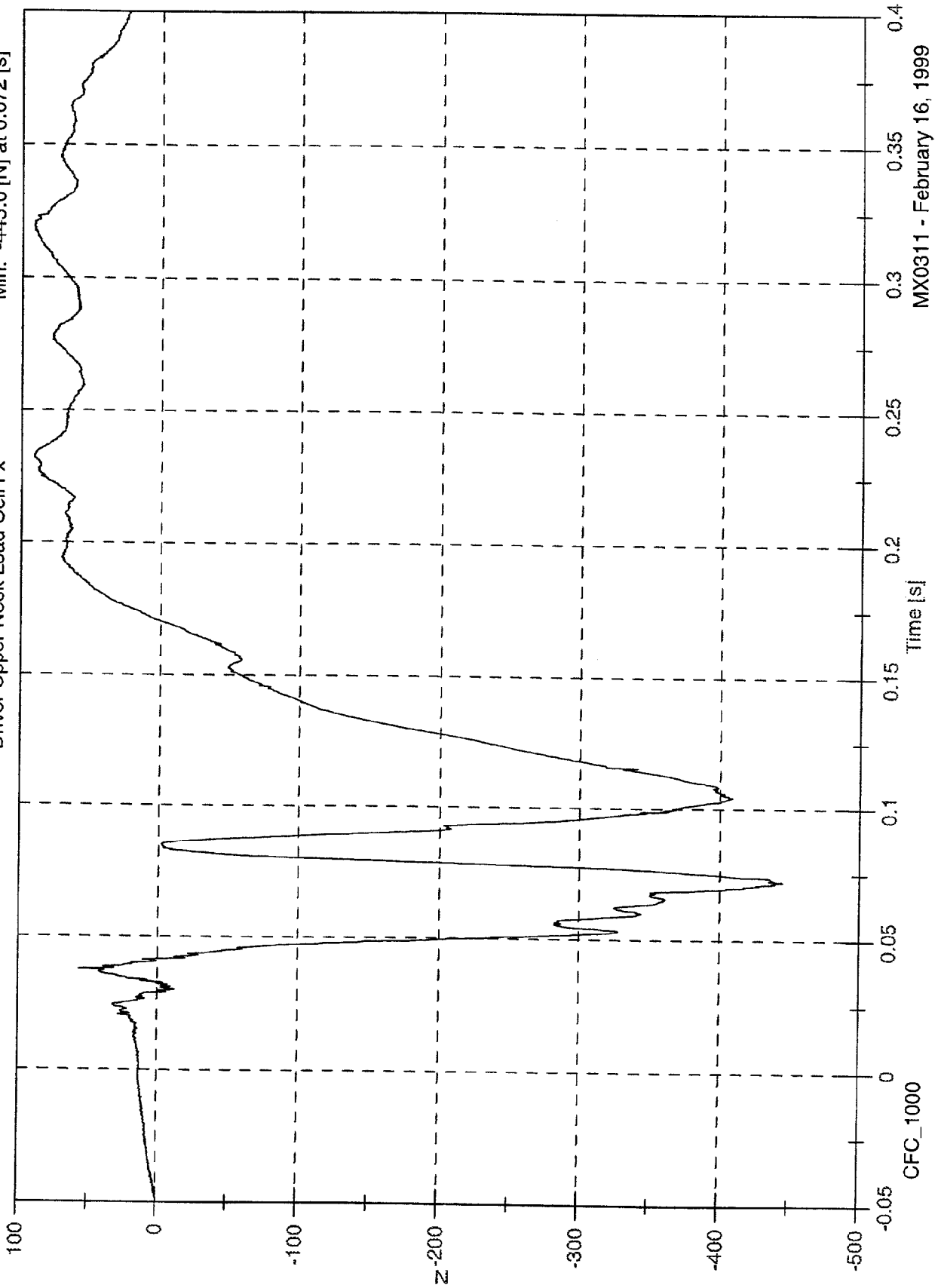


MX0311 - February 16, 1999

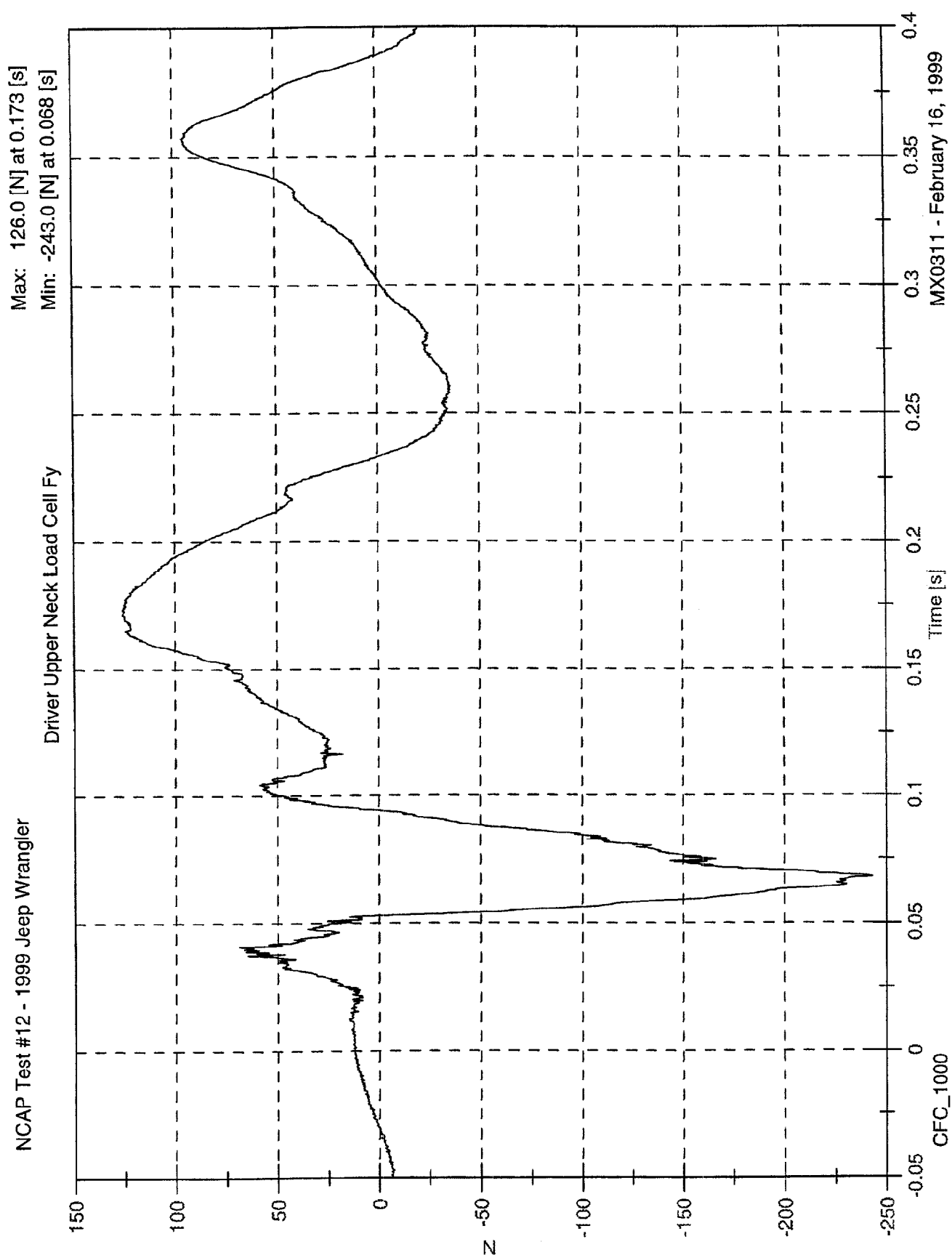
NCAP Test #12 - 1999 Jeep Wrangler

Max: 91.6 [N] at 0.319 [s]
Min: -445.0 [N] at 0.072 [s]

Driver Upper Neck Load Cell Fx



MX0311 - February 16, 1999

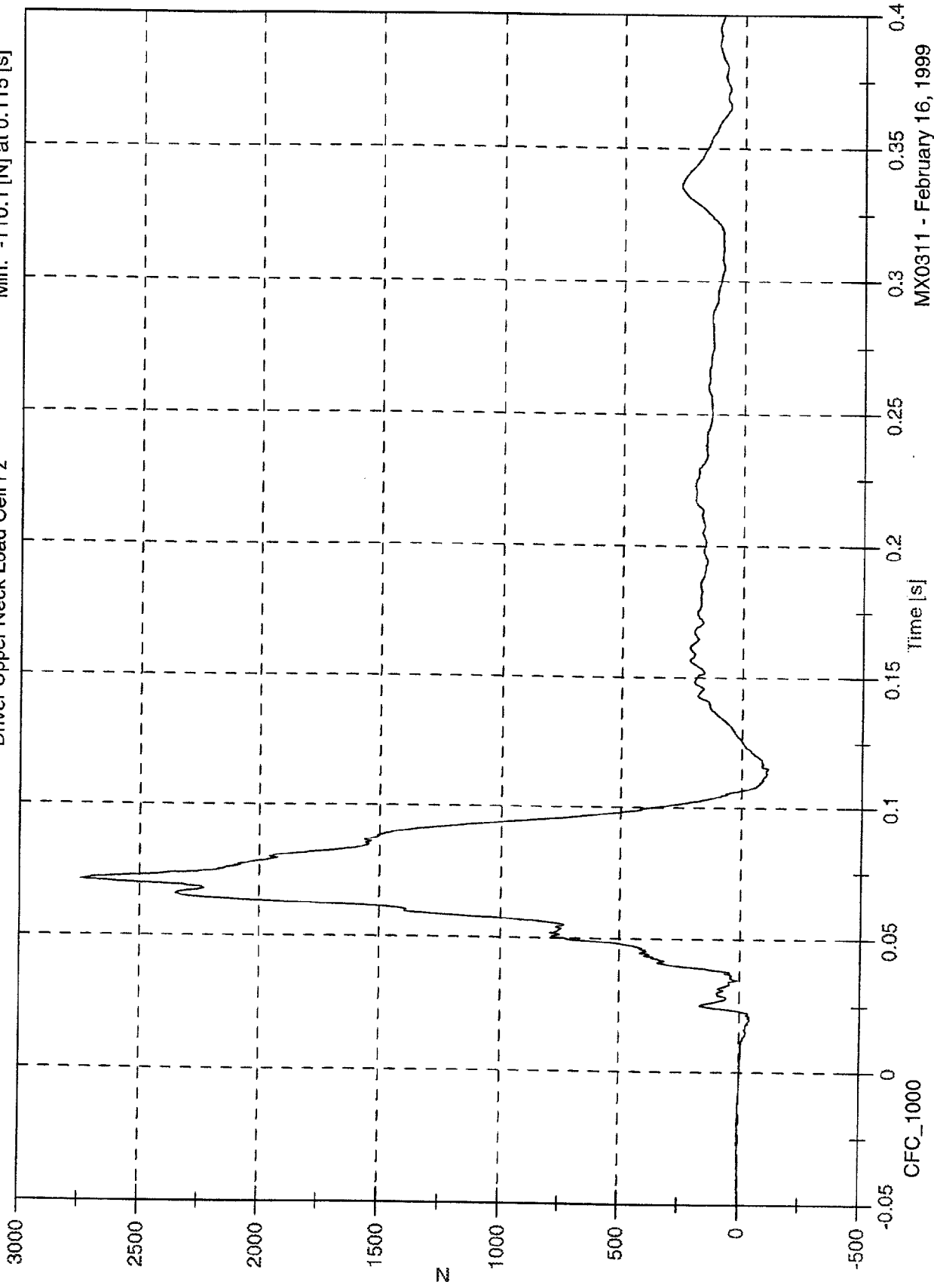


NCAP Test #12 - 1999 Jeep Wrangler

Max: 2749.2 [N] at 0.071 [s]

Min: -110.1 [N] at 0.115 [s]

Driver Upper Neck Load Cell Fz

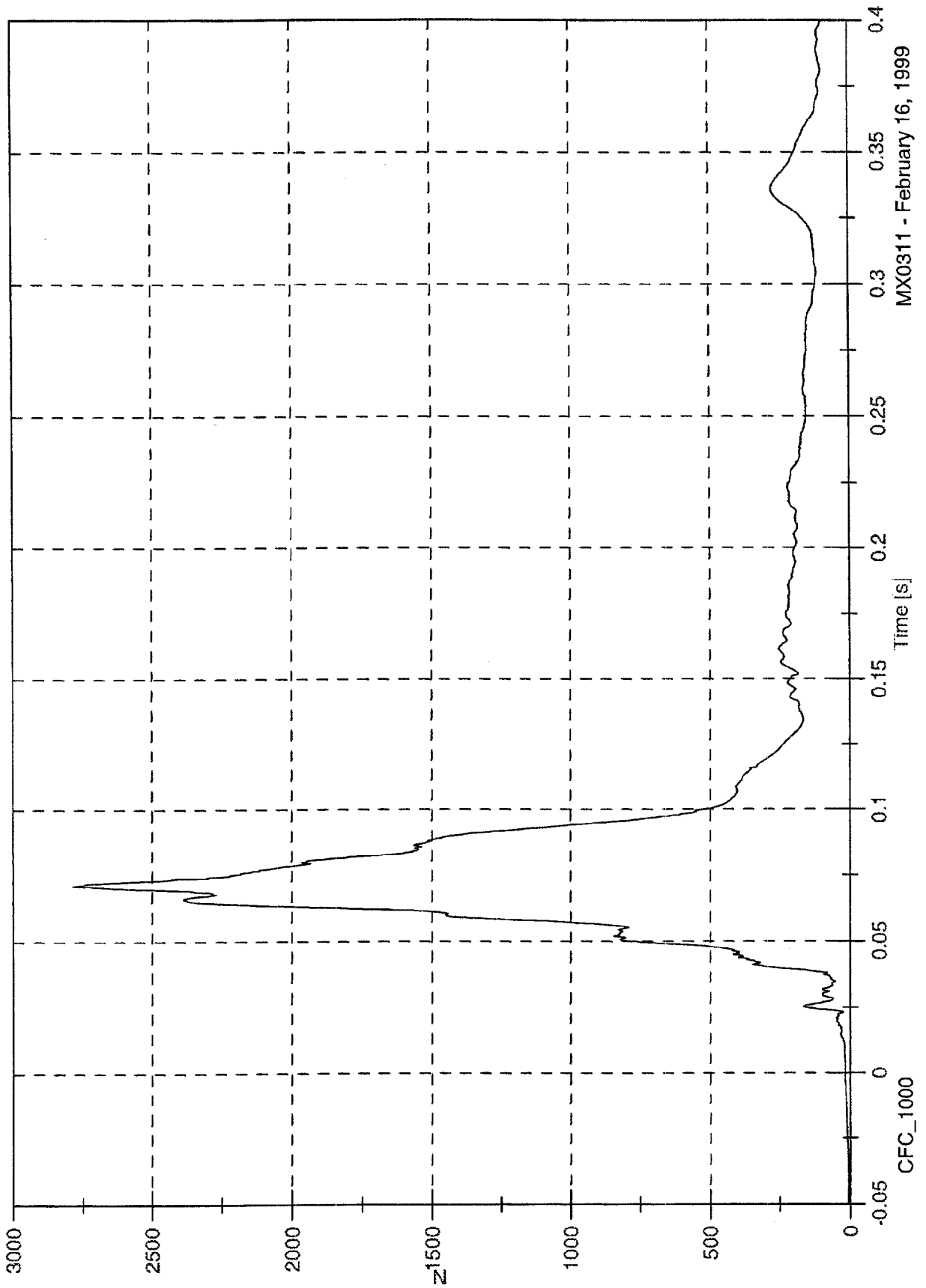


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NCAP Test #12 - 1999 Jeep Wrangler

Driver Upper Neck Load Cell F Resultant

Max: 2787.9 [N] at 0.071 [s]
Min: 5.3 [N] at -0.039 [s]



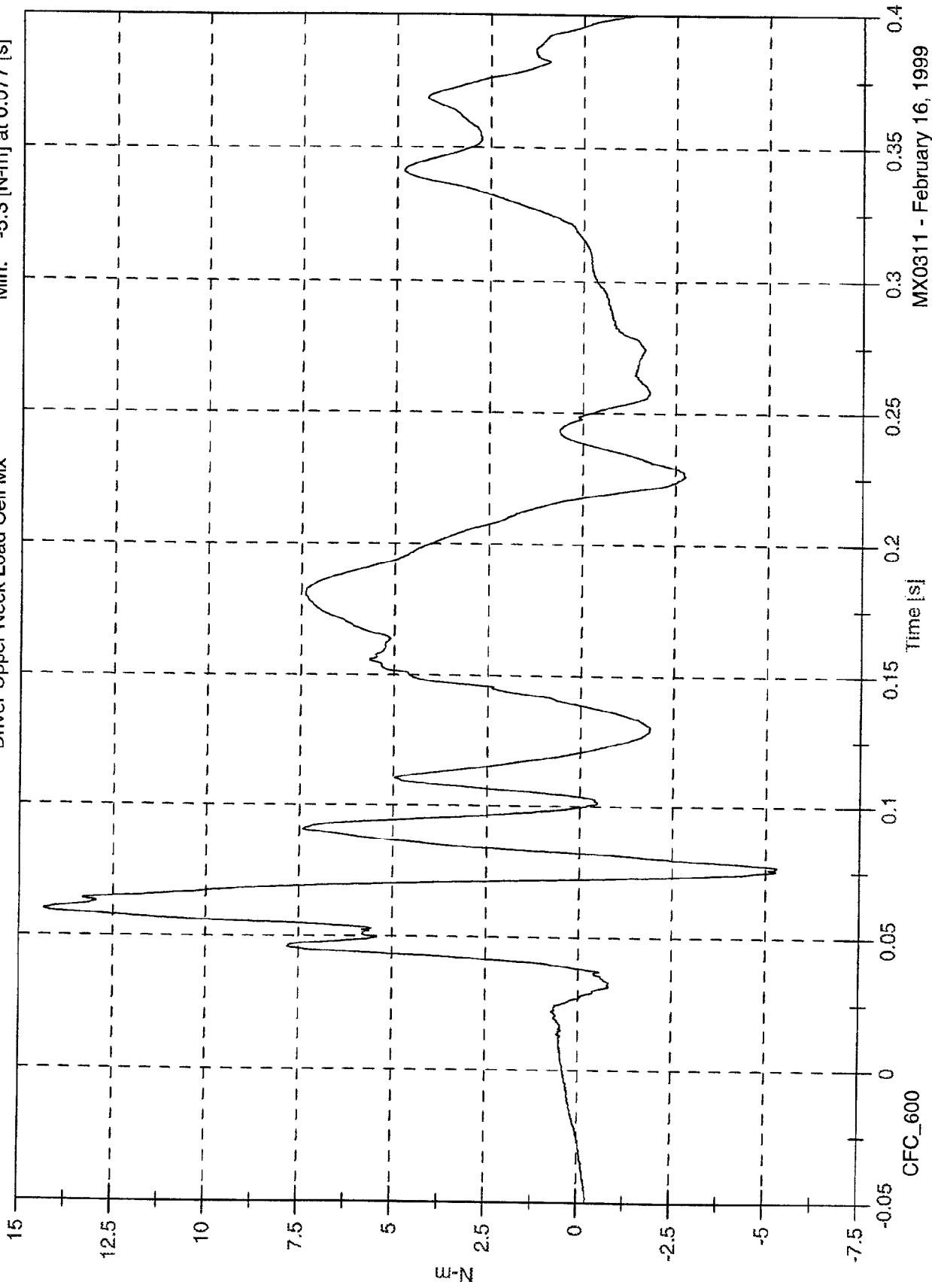
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 14.3 [N-m] at 0.060 [s]

Min: -5.3 [N-m] at 0.077 [s]

Driver Upper Neck Load Cell Mx

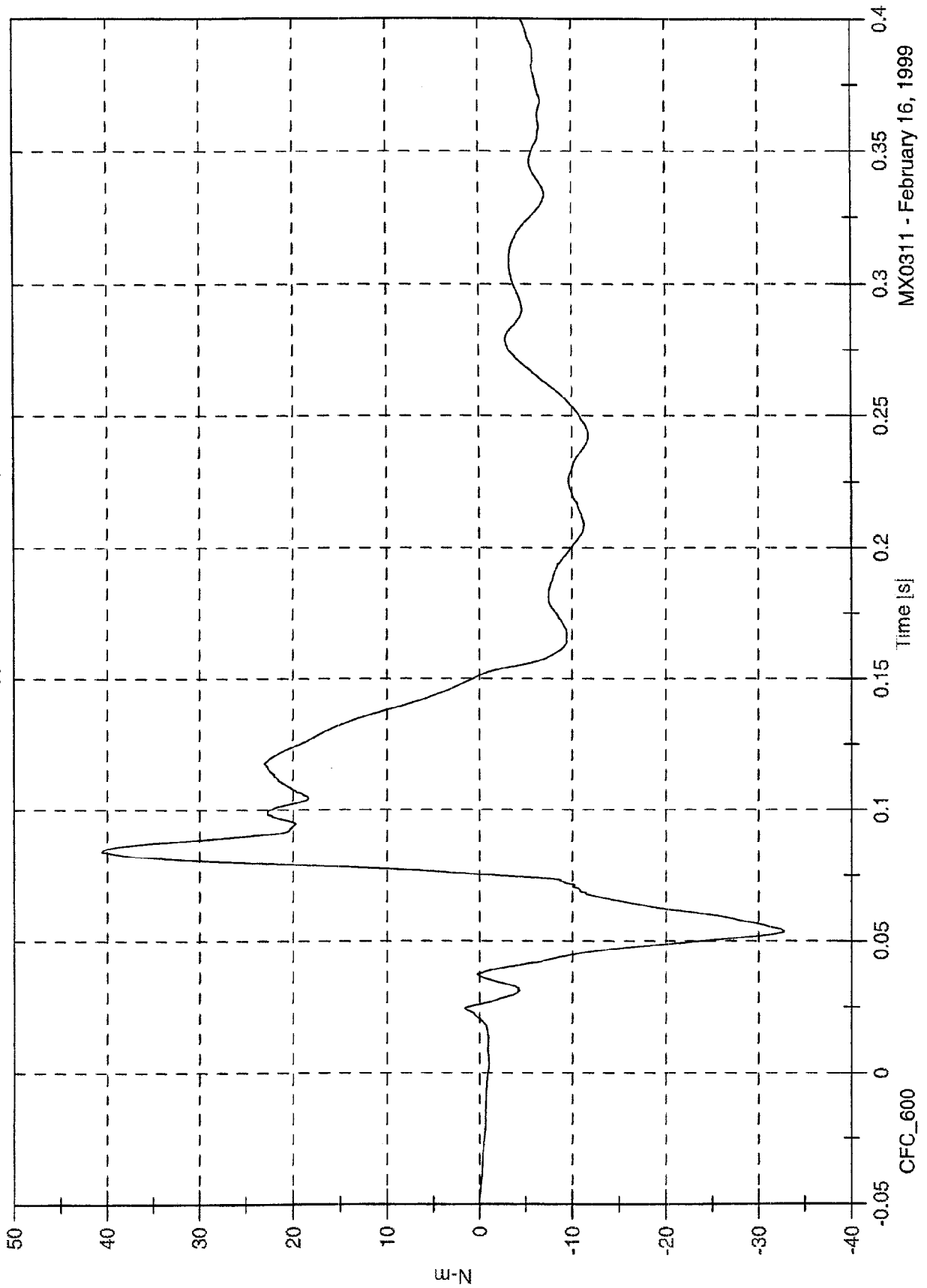


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NCAP Test #12 - 1999 Jeep Wrangler

Driver Upper Neck Load Cell My

Max: 40.6 [N-m] at 0.084 [s]
Min: -32.7 [N-m] at 0.053 [s]

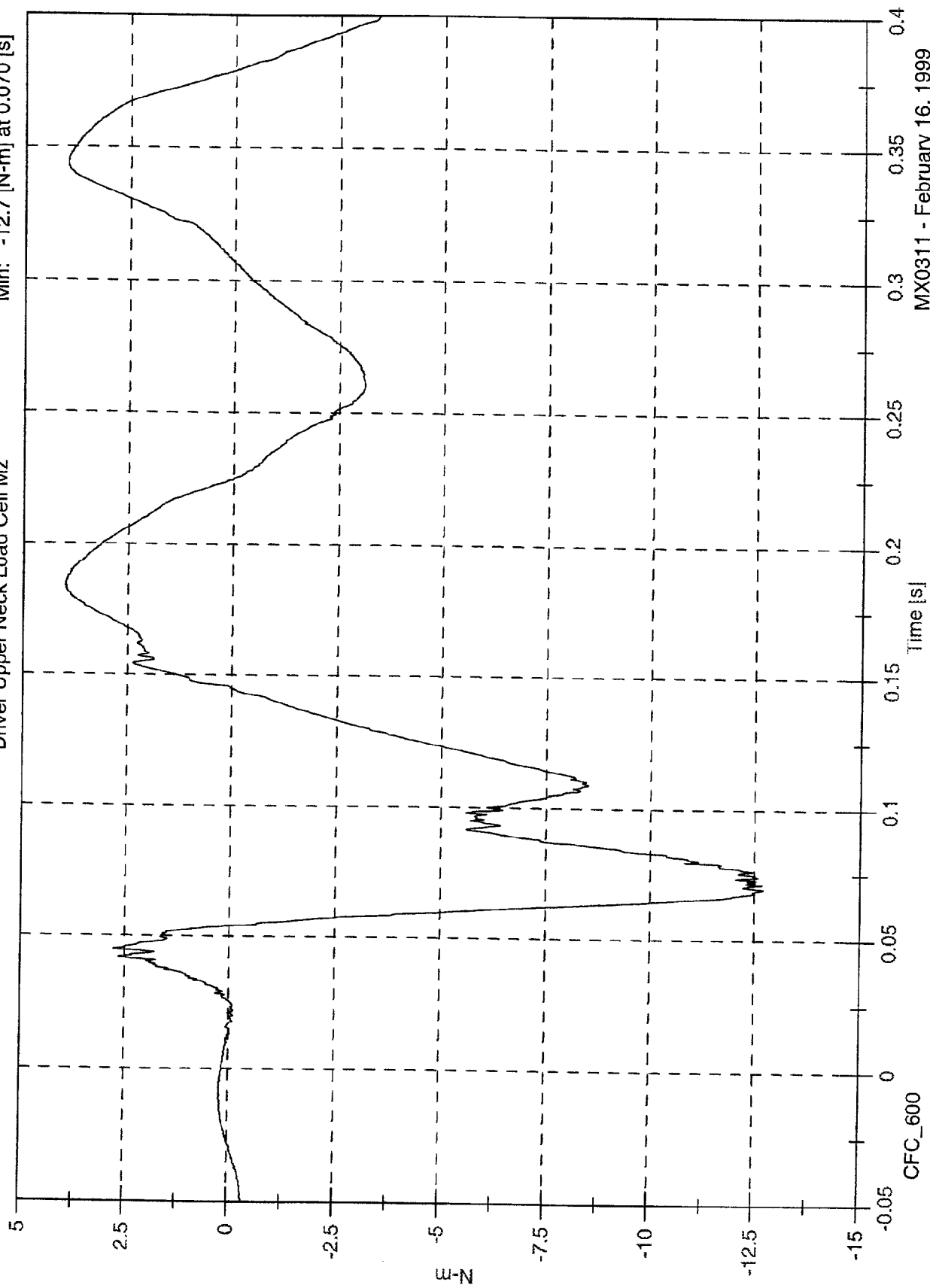


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 4.0 [N-m] at 0.184 [s]
Min: -12.7 [N-m] at 0.070 [s]

Driver Upper Neck Load Cell Mz

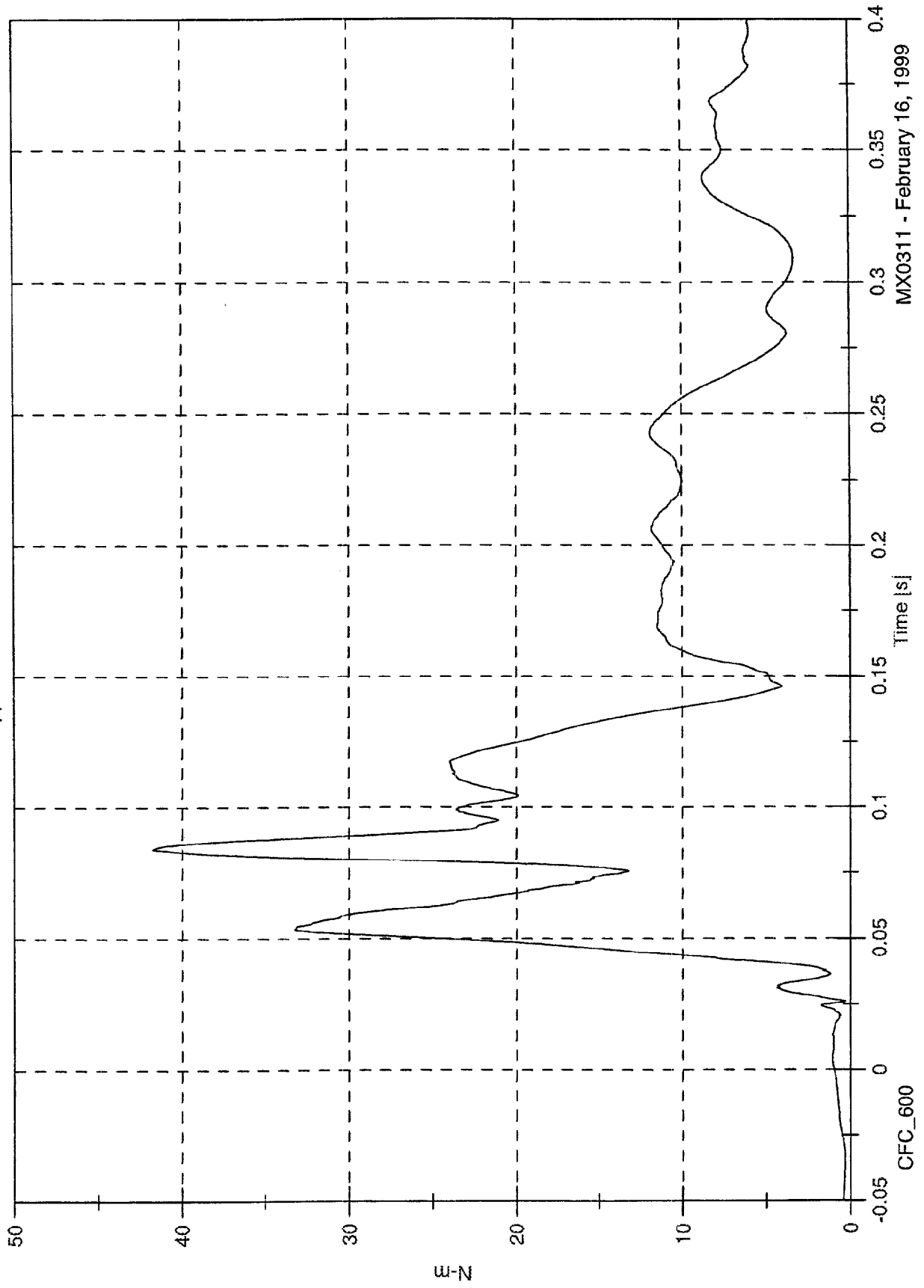


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 41.8 [N-m] at 0.084 [s]
Min: 0.3 [N-m] at 0.026 [s]

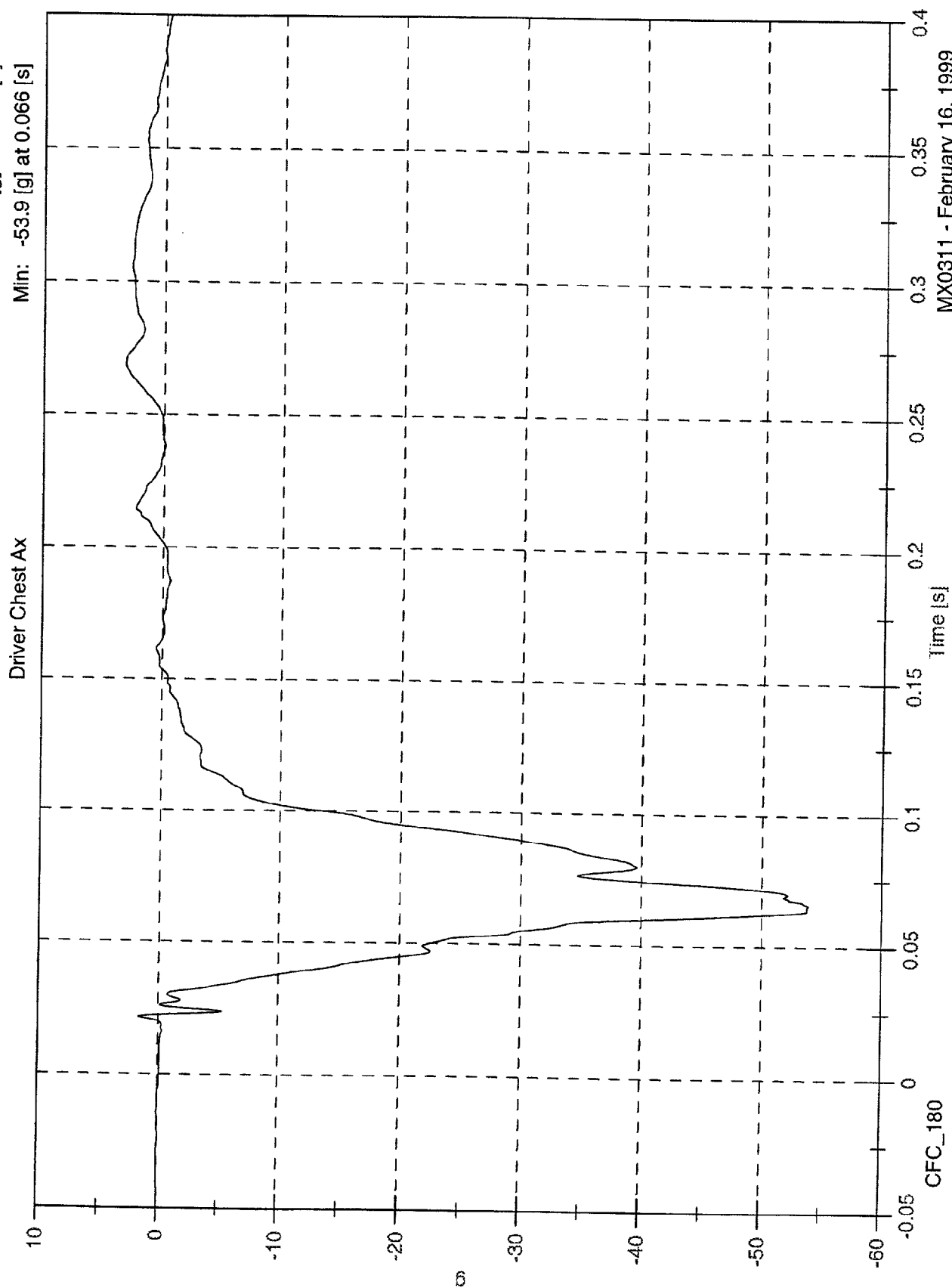
Driver Upper Neck Load Cell M Resultant



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NCAP Test #12 - 1999 Jeep Wrangler

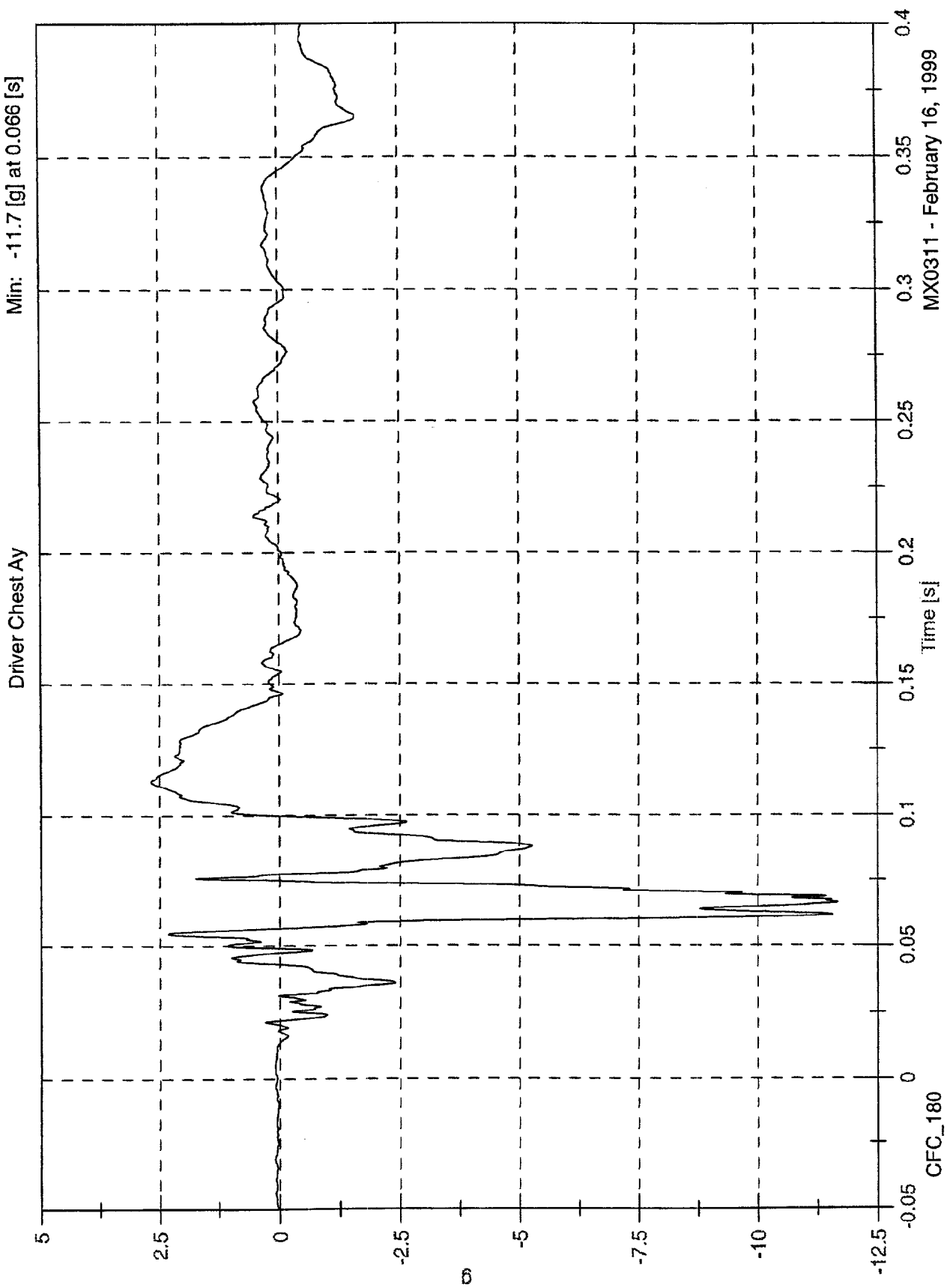
Max: 3.3 [g] at 0.269 [s]
Min: -53.9 [g] at 0.066 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

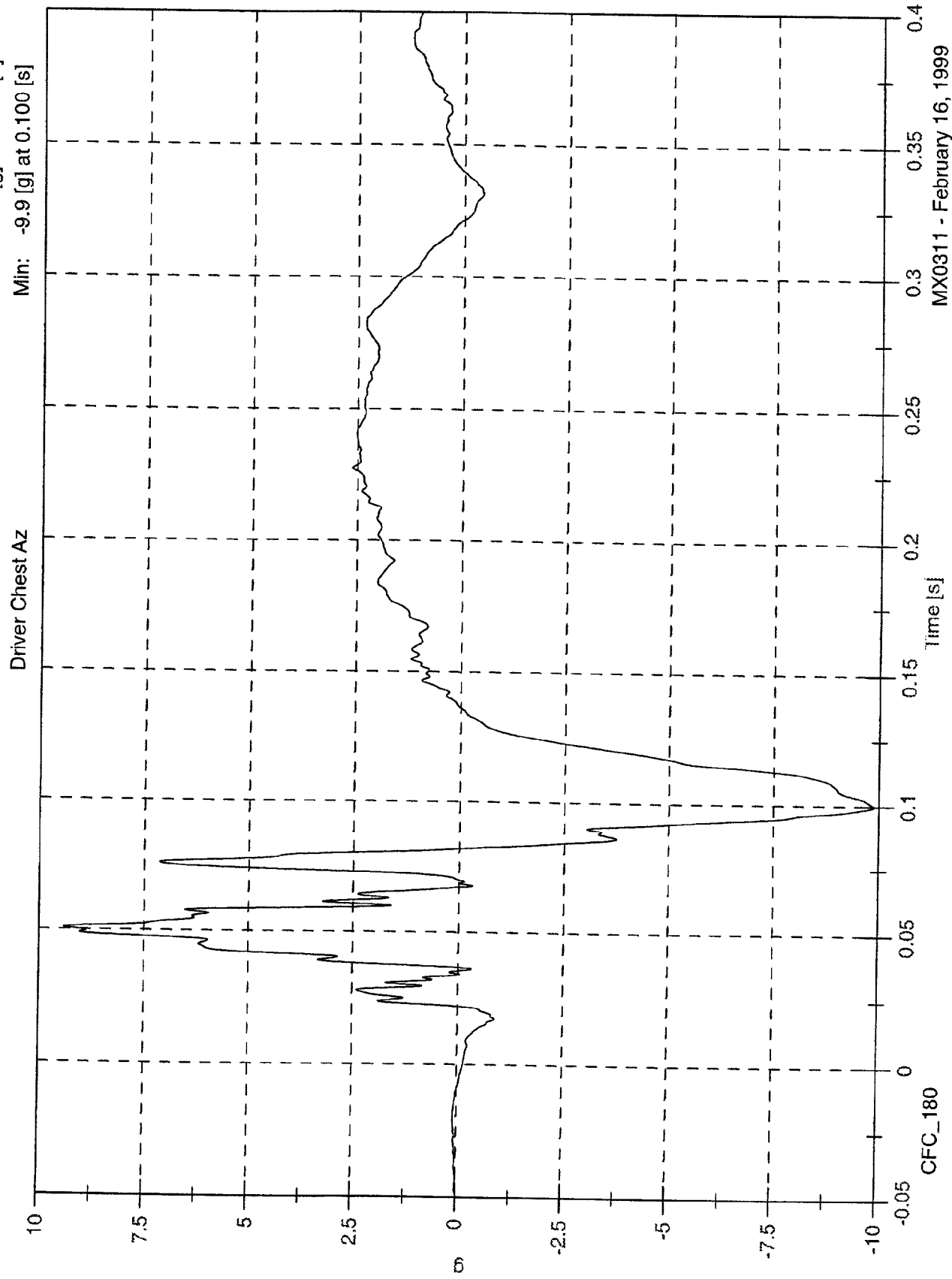
Max: 2.7 [g] at 0.113 [s]
Min: -11.7 [g] at 0.066 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

Max: 9.4 [g] at 0.051 [s]
Min: -9.9 [g] at 0.100 [s]



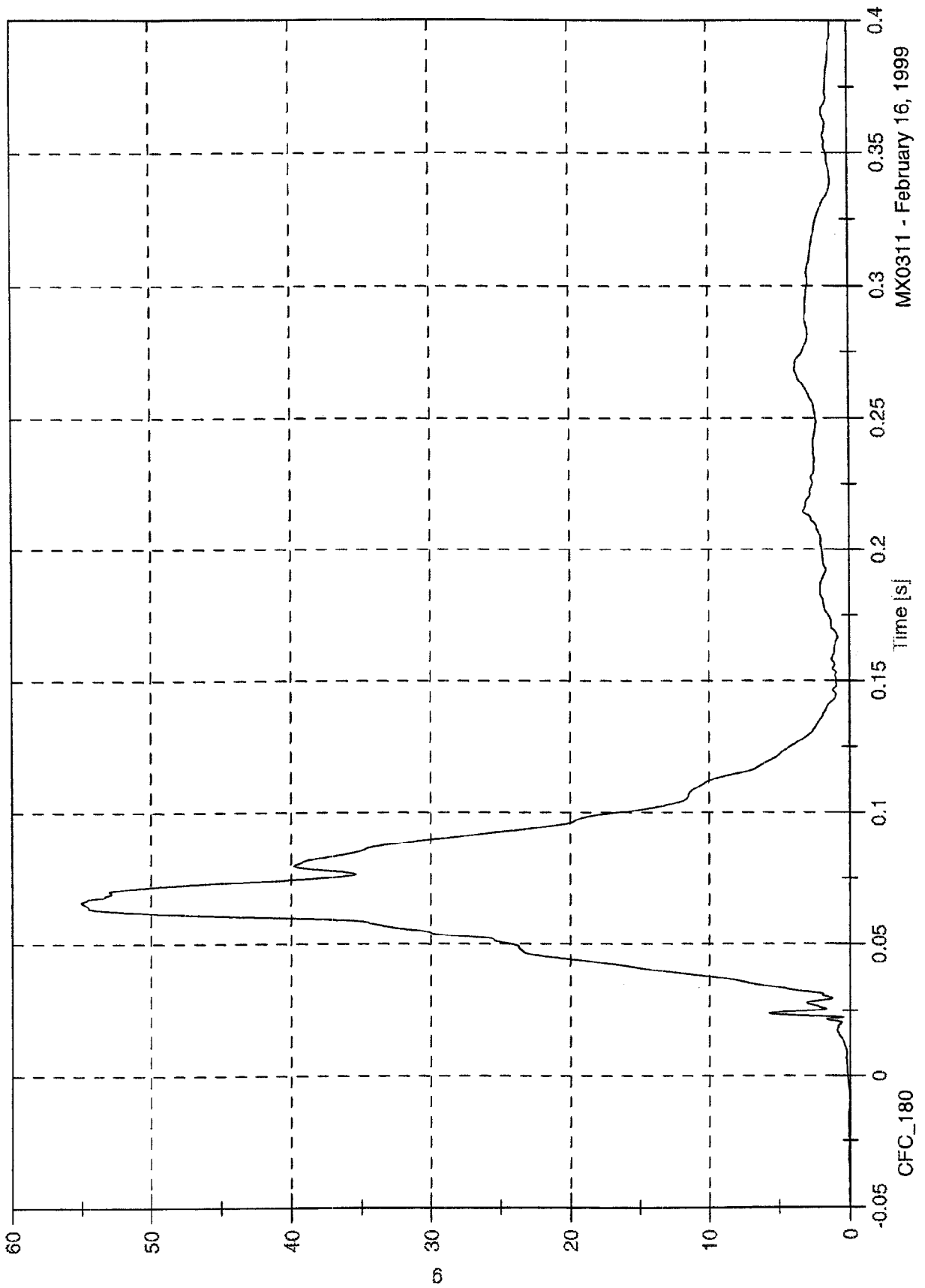
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 55.1 [g] at 0.066 [s]

Min: 0.0 [g] at -0.056 [s]

Driver Chest A Resultant

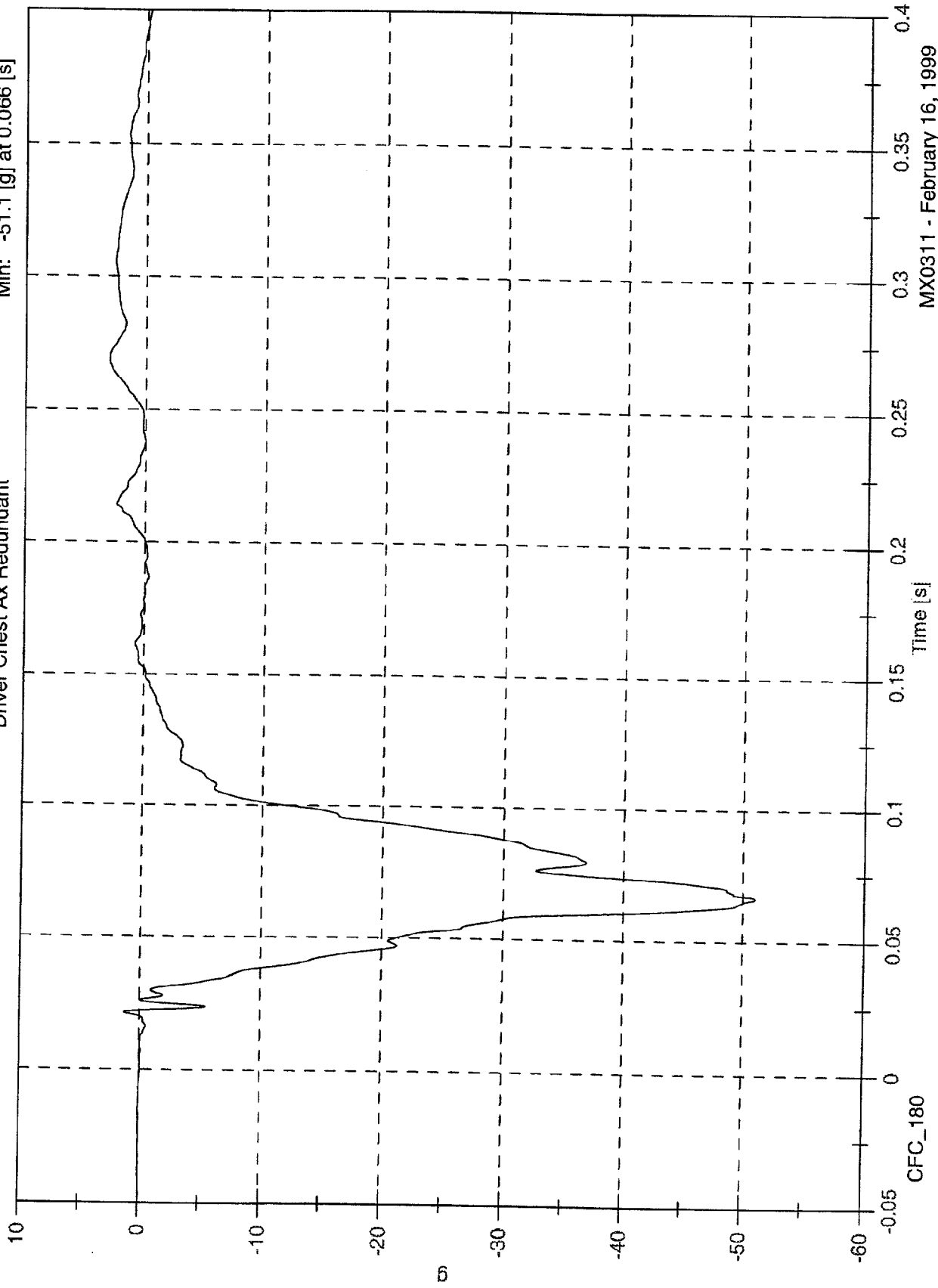


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 3.1 [g] at 0.269 [s]
Min: -51.1 [g] at 0.066 [s]

Driver Chest Ax Redundant

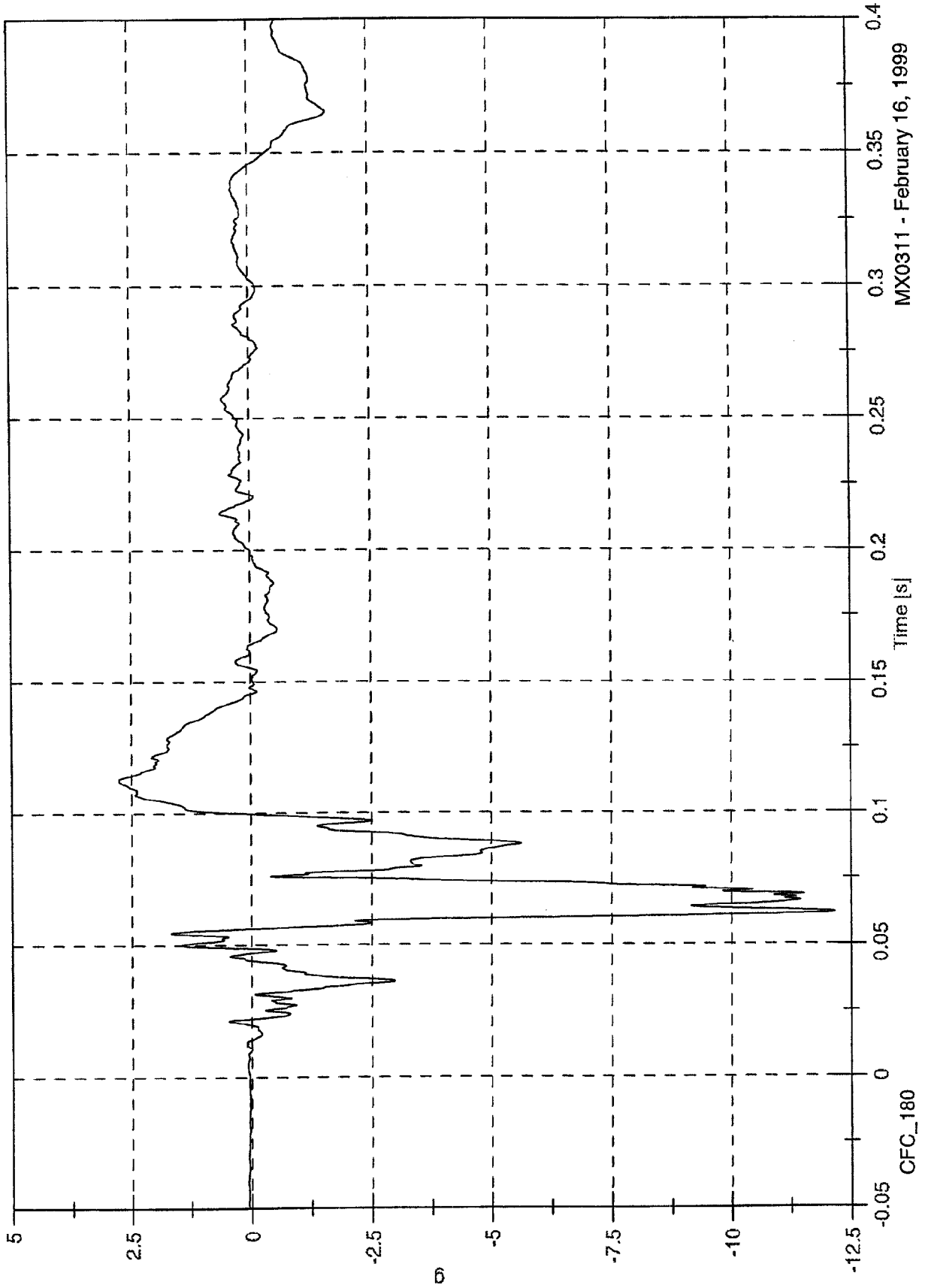


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 2.8 [g] at 0.113 [s]
Min: -12.2 [g] at 0.062 [s]

Driver Chest Ay Redundant



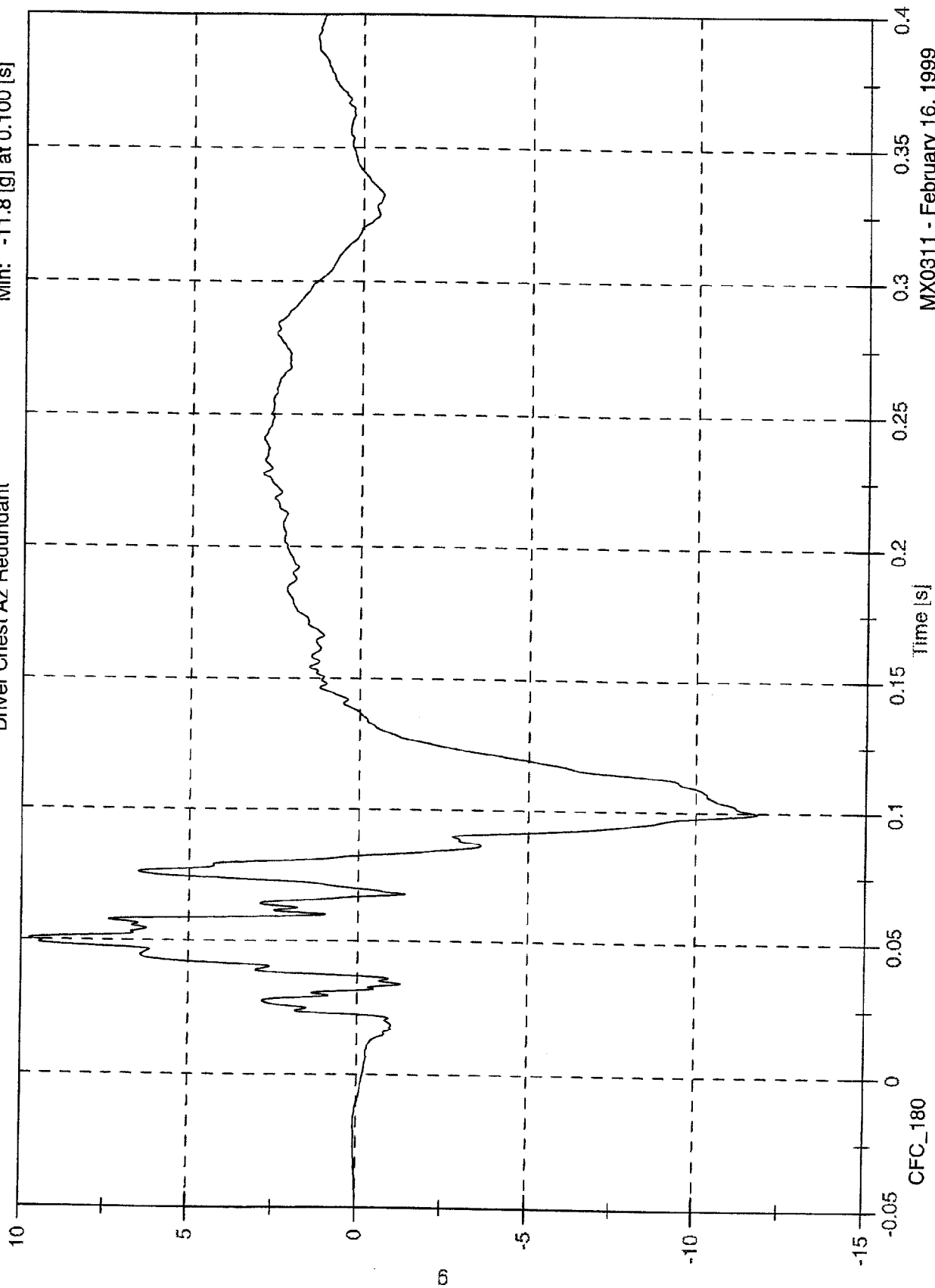
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 9.8 [g] at 0.051 [s]

Min: -11.8 [g] at 0.100 [s]

Driver Chest Az Redundant

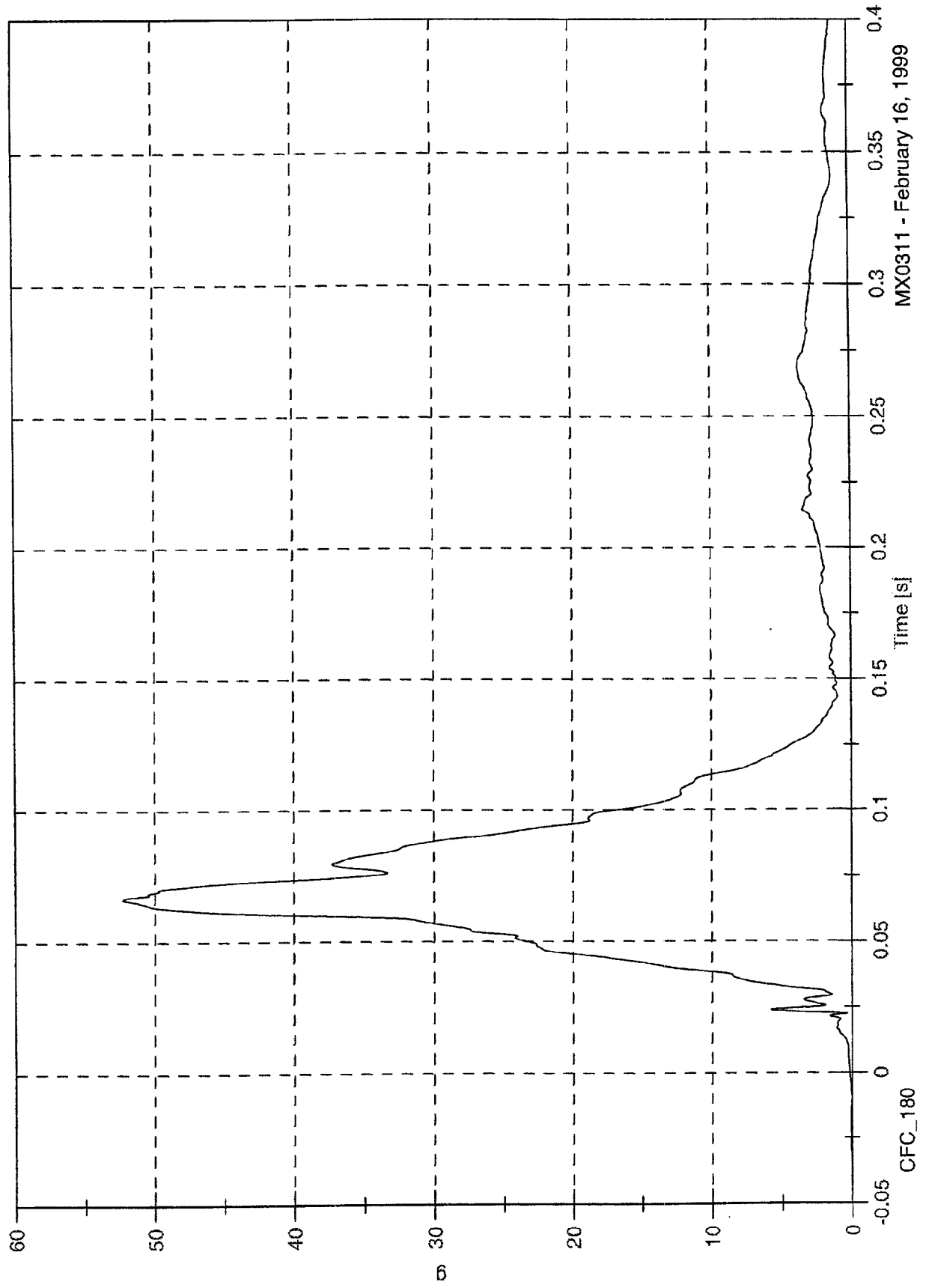


MX0311 - February 16, 1999

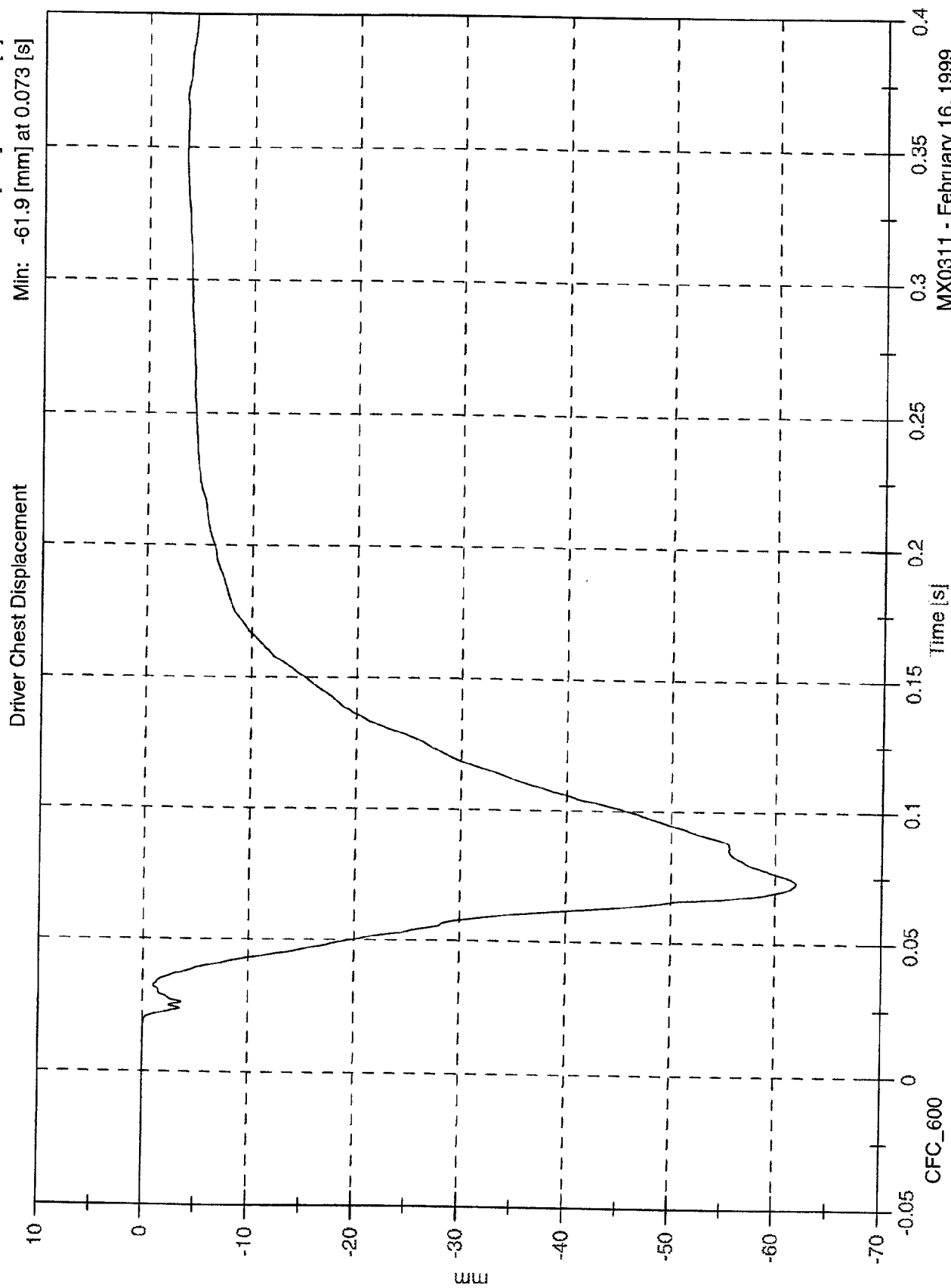
NCAP Test #12 - 1999 Jeep Wrangler

Driver Chest Ax Redundant Resultant

Max: 52.3 [g] at 0.066 [s]
Min: 0.0 [g] at -0.059 [s]



NCAP Test #12 - 1999 Jeep Wrangler

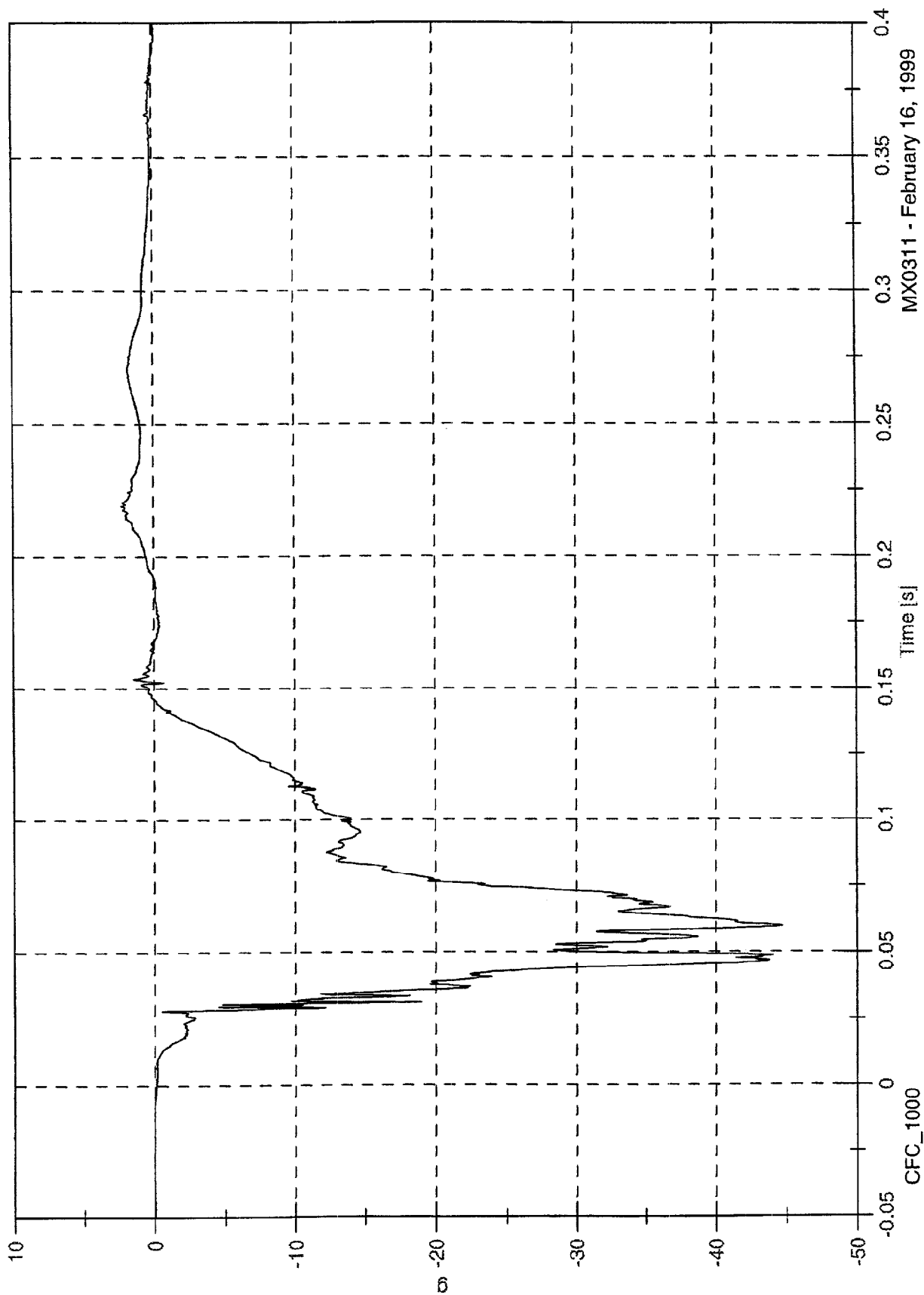


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 2.6 [g] at 0.443 [s]
 Min: -44.7 [g] at 0.060 [s]

Driver Pelvic Ax



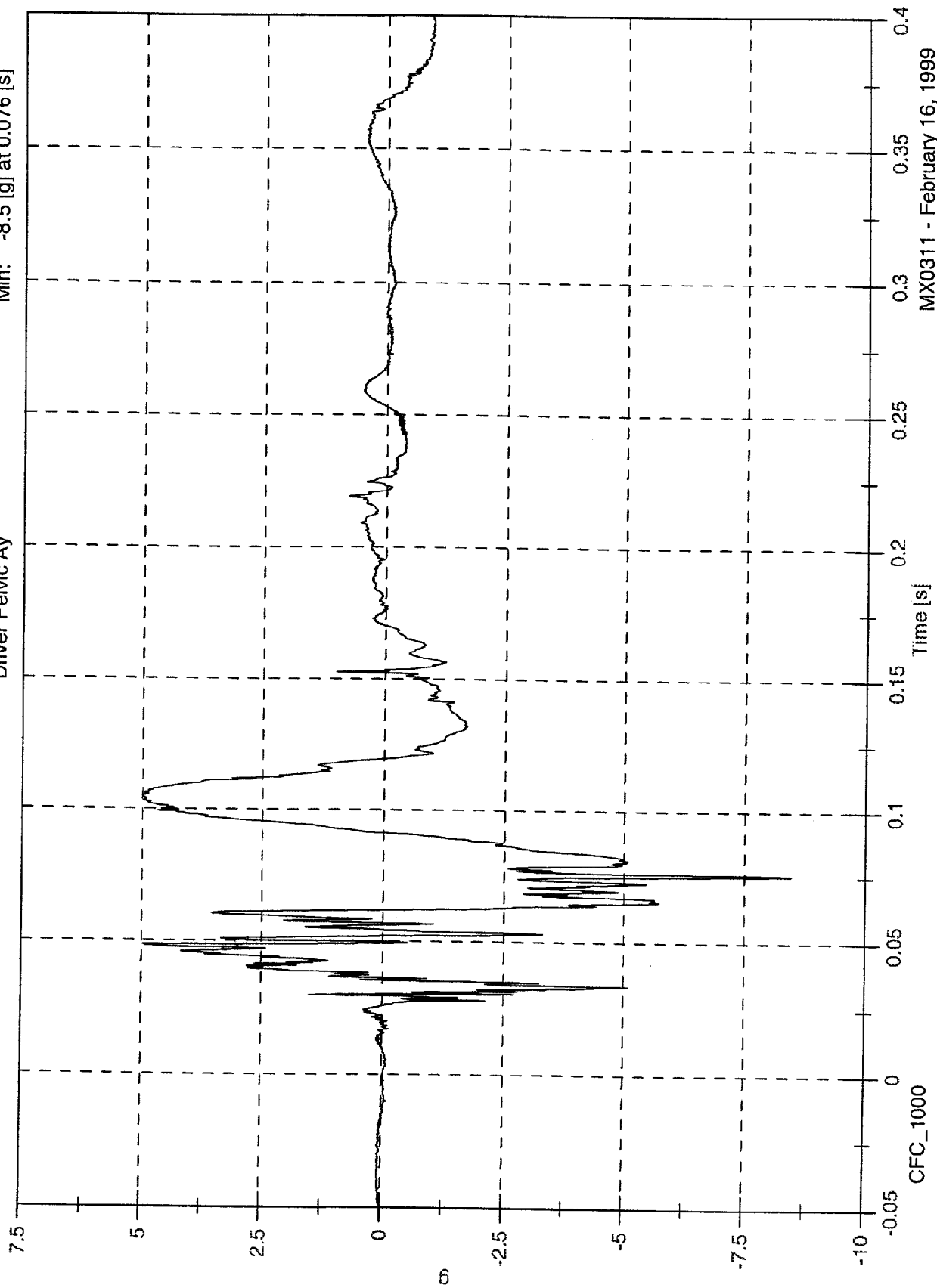
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 5.0 [g] at 0.105 [s]

Min: -8.5 [g] at 0.076 [s]

Driver Pelvic Ay



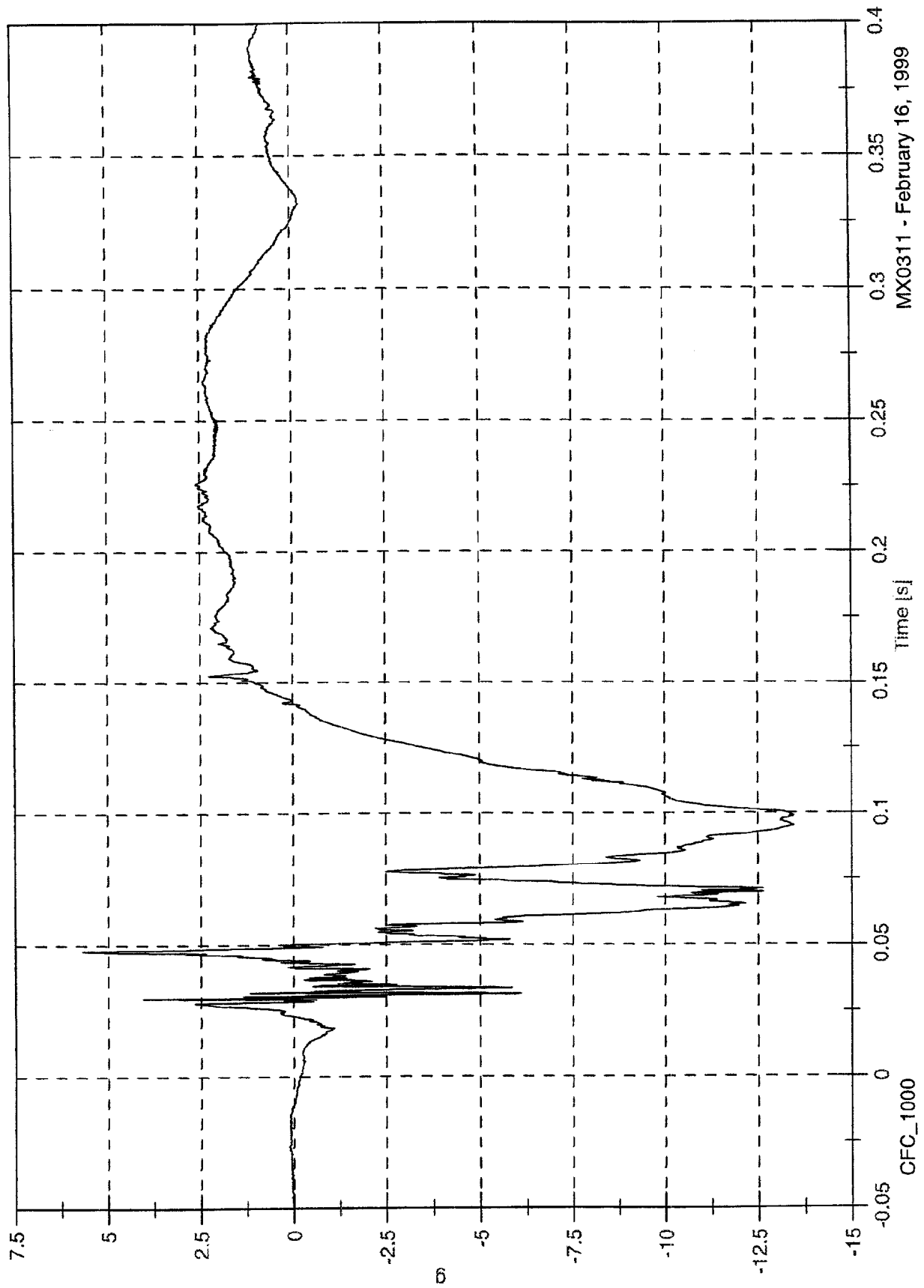
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 5.7 [g] at 0.048 [s]

Min: -13.5 [g] at 0.095 [s]

Driver Pelvic Az

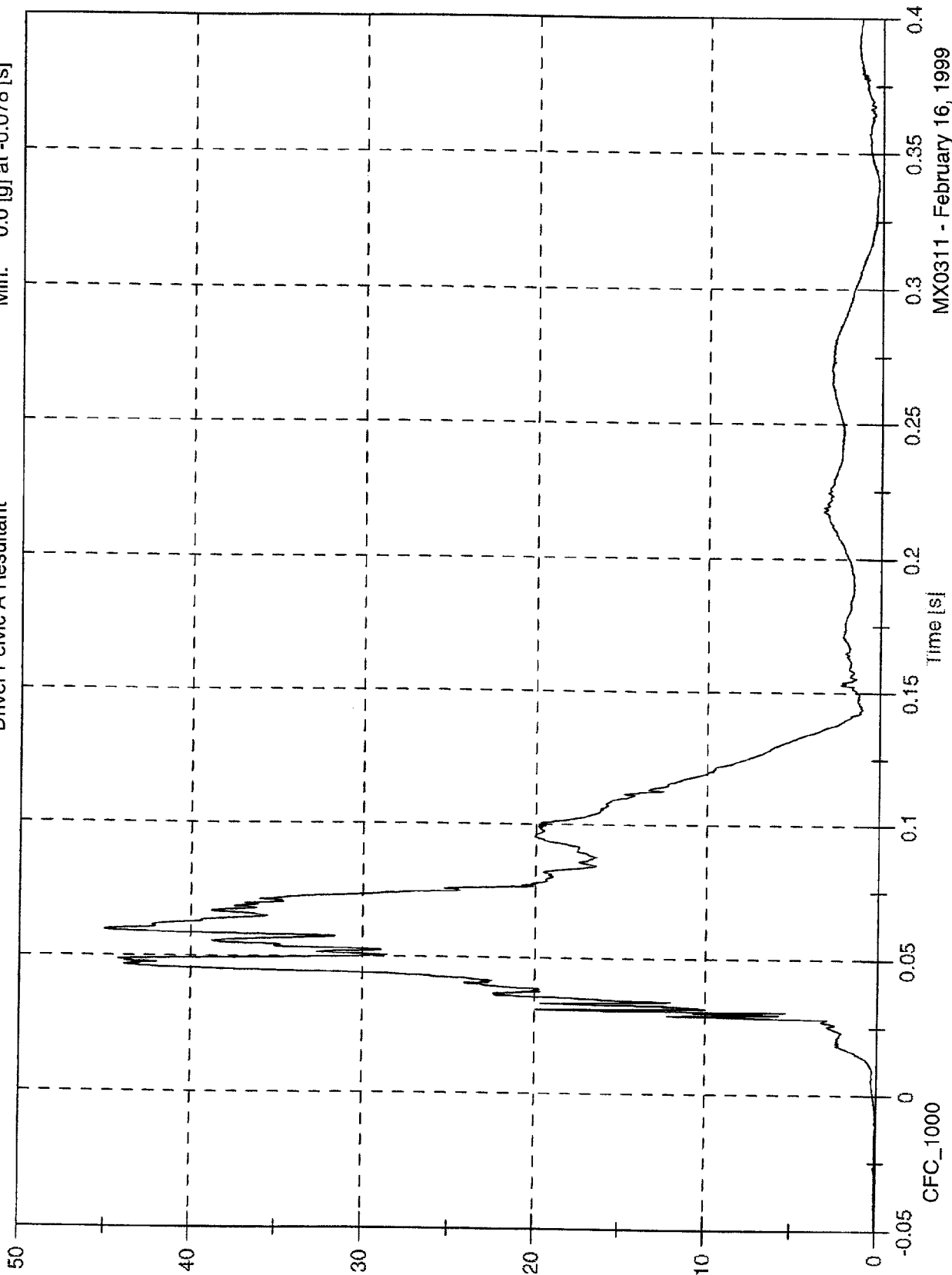


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NCAP Test #12 - 1999 Jeep Wrangler

Driver Pelvic A Resultant

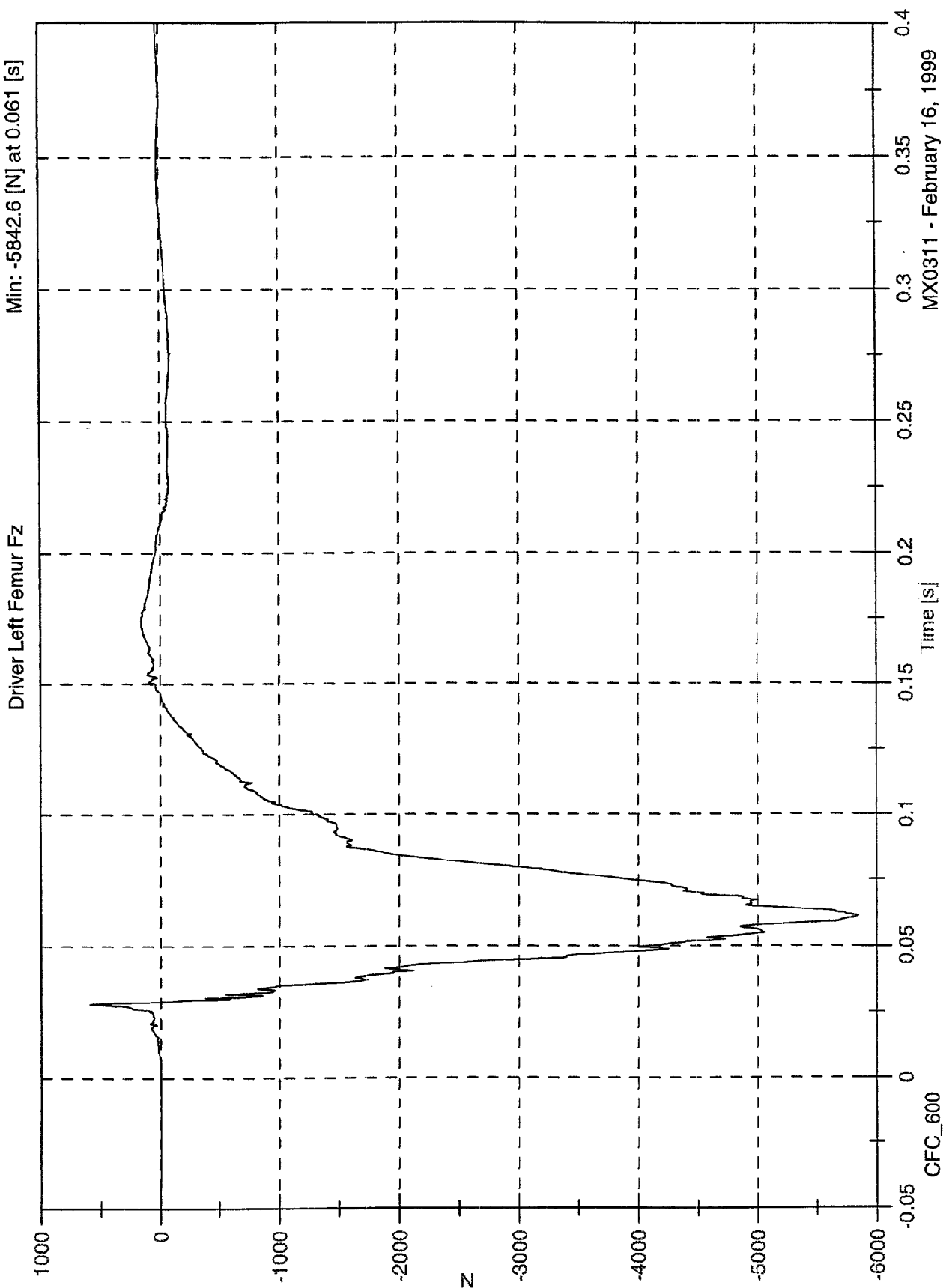
Max: 45.1 [g] at 0.060 [s]
Min: 0.0 [g] at -0.078 [s]



MX0311 - February 16, 1999

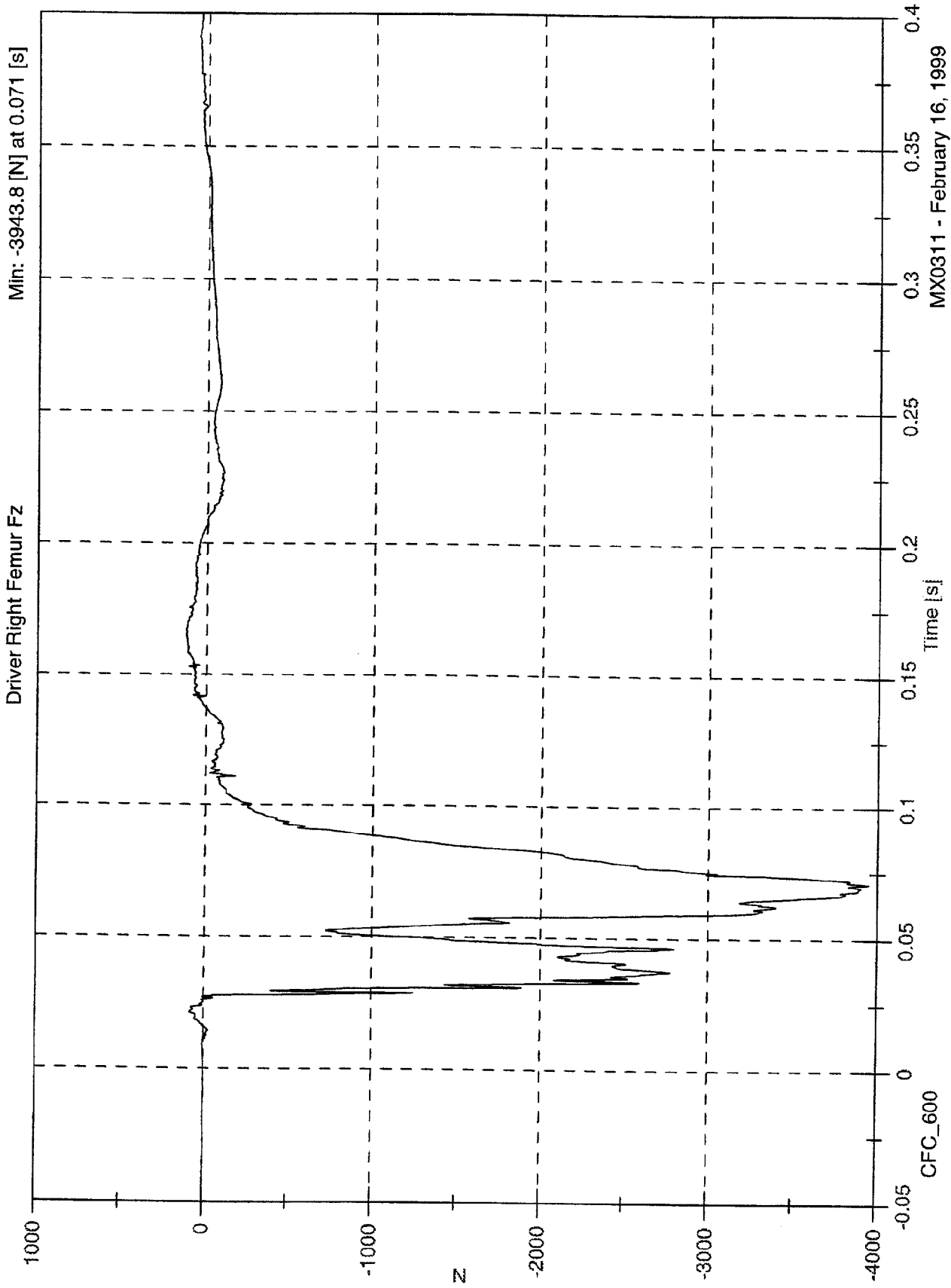
NCAP Test #12 - 1999 Jeep Wrangler

Max: 593.9 [N] at 0.028 [s]
Min: -5842.6 [N] at 0.061 [s]



NCAP Test #12 - 1999 Jeep Wrangler

Max: 120.6 [N] at 0.167 [s]
Min: -3943.8 [N] at 0.071 [s]



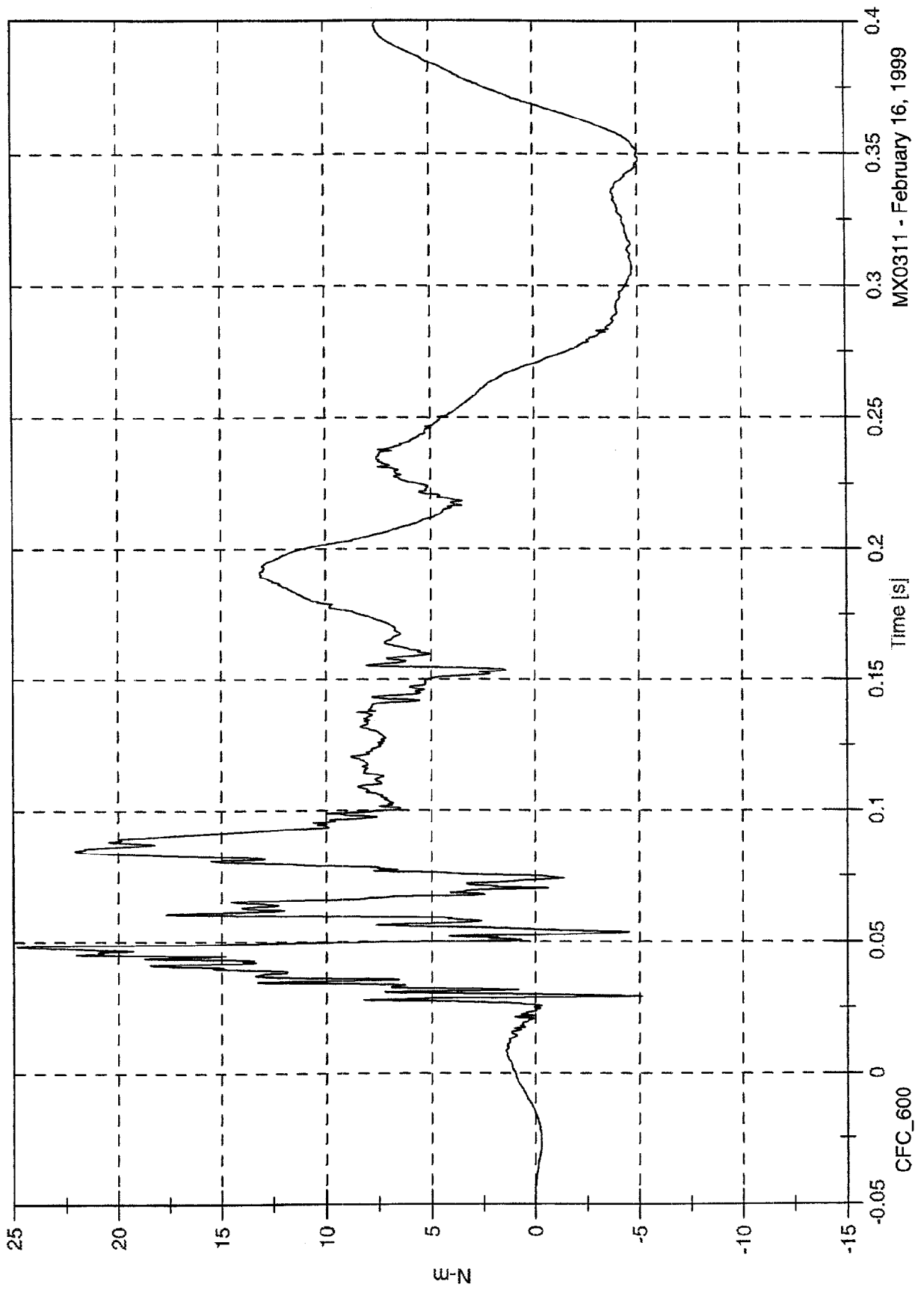
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 24.8 [N-m] at 0.048 [s]

Min: -11.6 [N-m] at 0.427 [s]

Driver Left Upper Tibia Mx

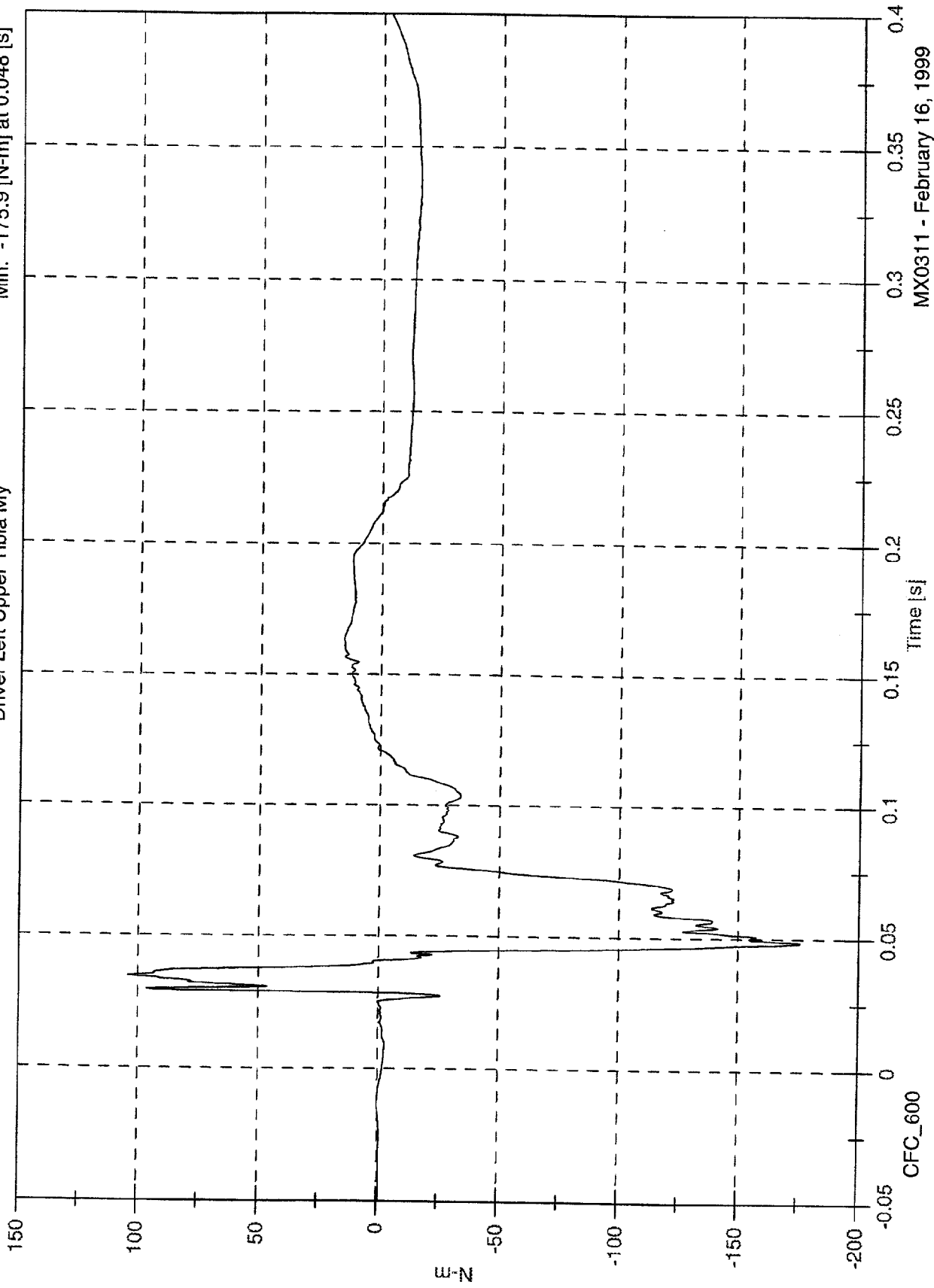


MX0311 - February 16, 1999

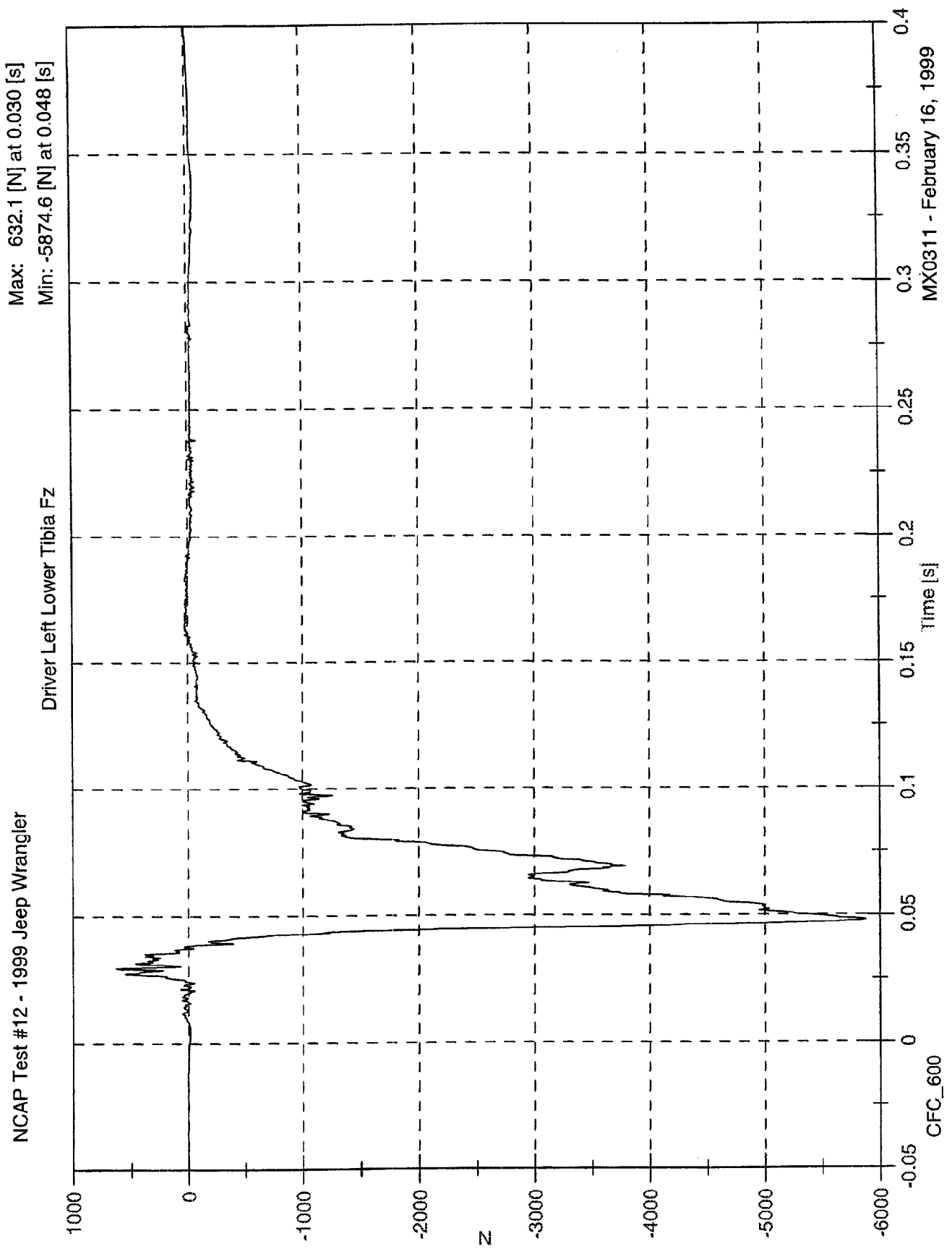
NCAP Test #12 - 1999 Jeep Wrangler

Driver Left Upper Tibia My

Max: 104.5 [N-m] at 0.035 [s]
Min: -175.9 [N-m] at 0.048 [s]



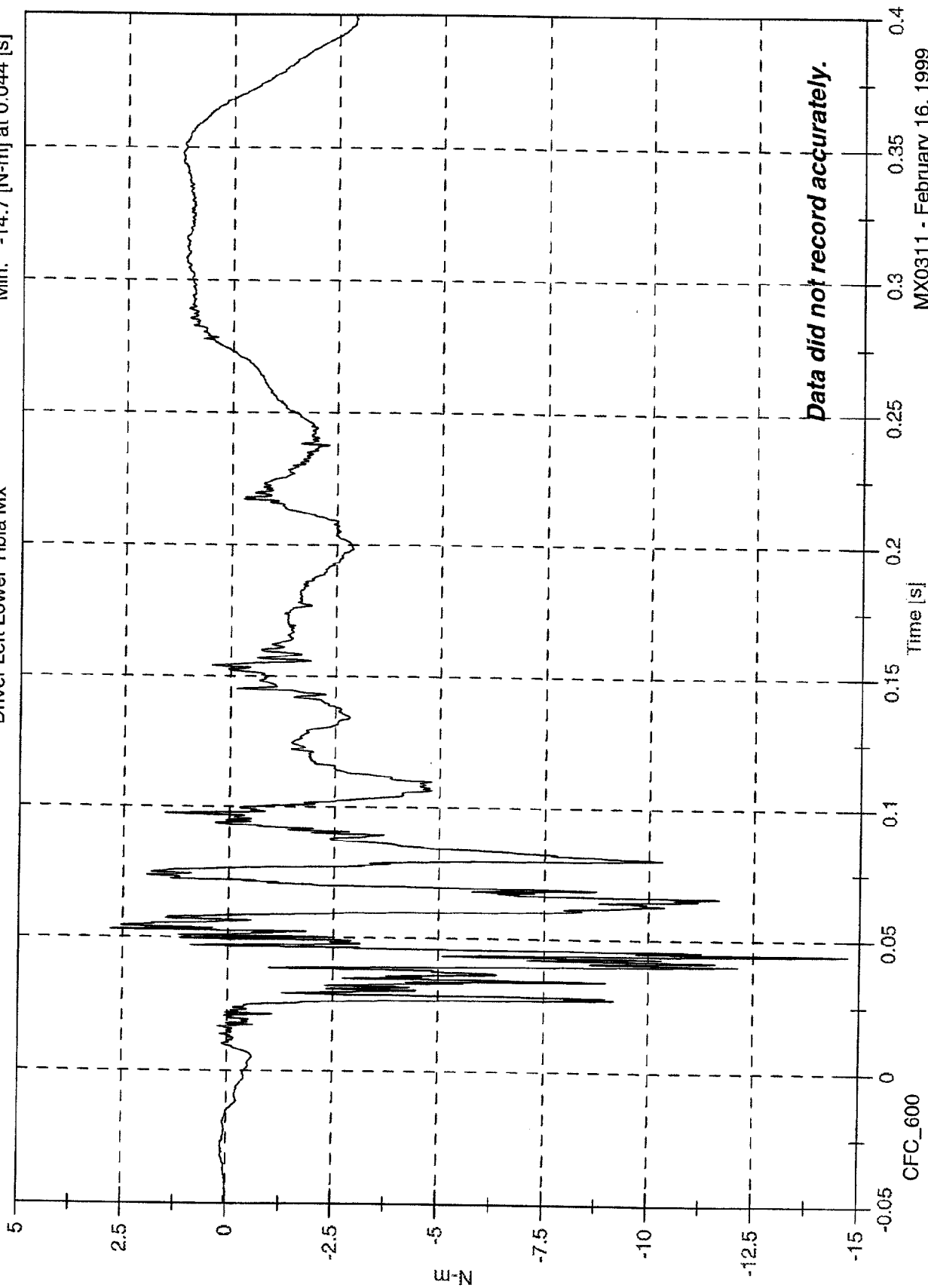
MX0311 - February 16, 1999



NCAP Test #12 - 1999 Jeep Wrangler

Max: 4.4 [N-m] at 0.427 [s]
 Min: -14.7 [N-m] at 0.044 [s]

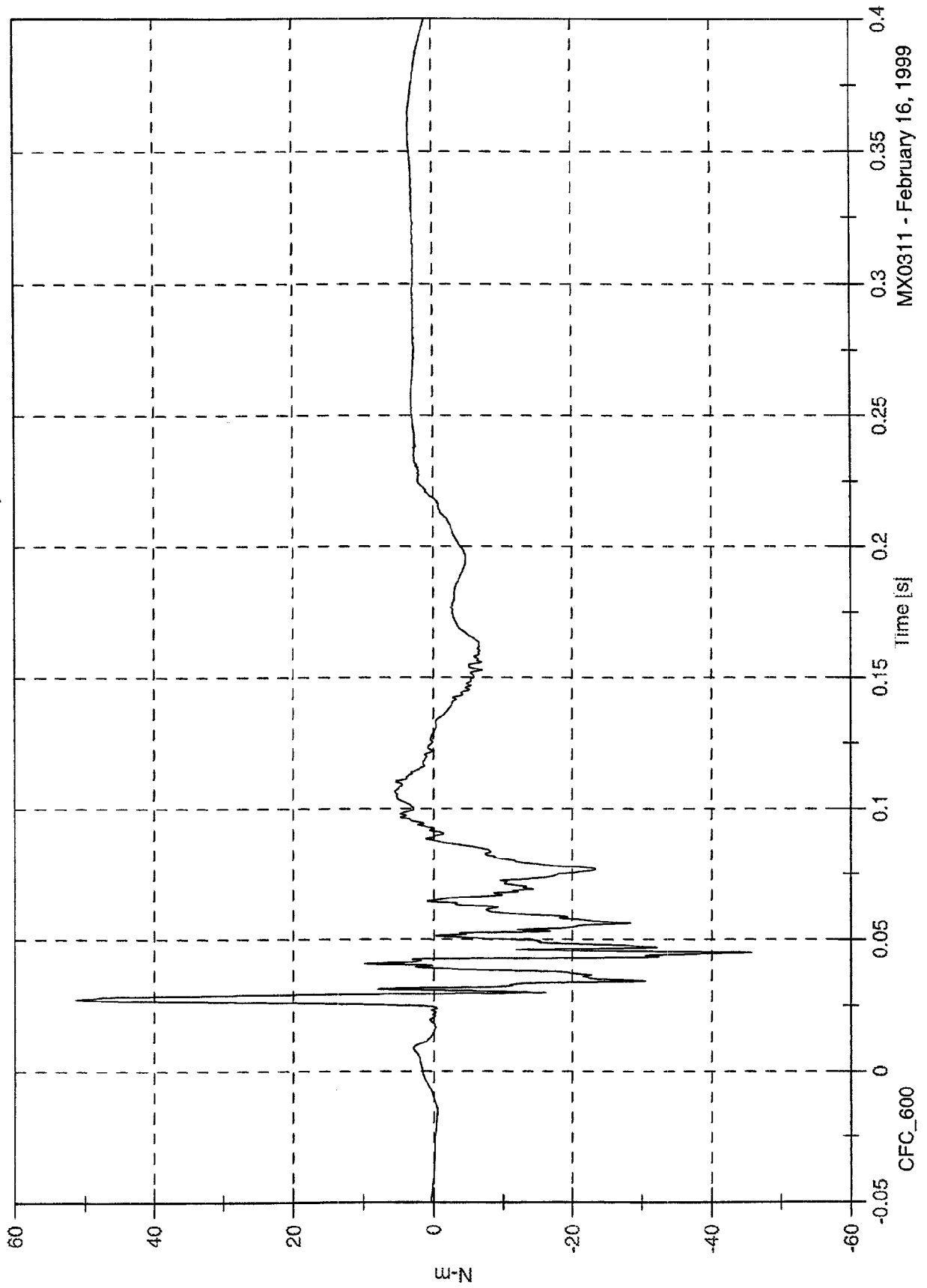
Driver Left Lower Tibia Mx



NCAP Test #12 - 1999 Jeep Wrangler

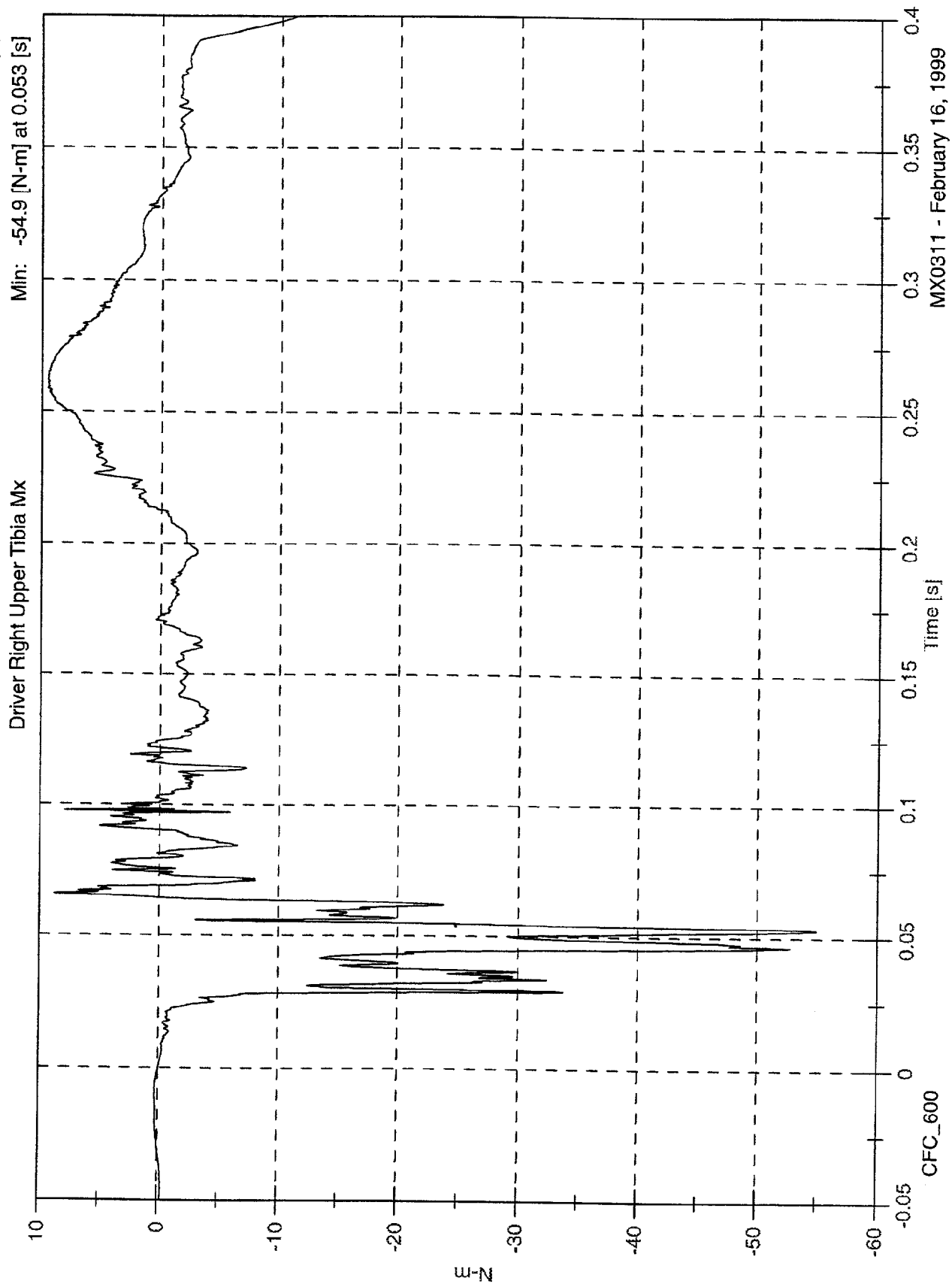
Driver Left Lower Tibia My

Max: 51.3 [N-m] at 0.027 [s]
Min: -45.7 [N-m] at 0.045 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

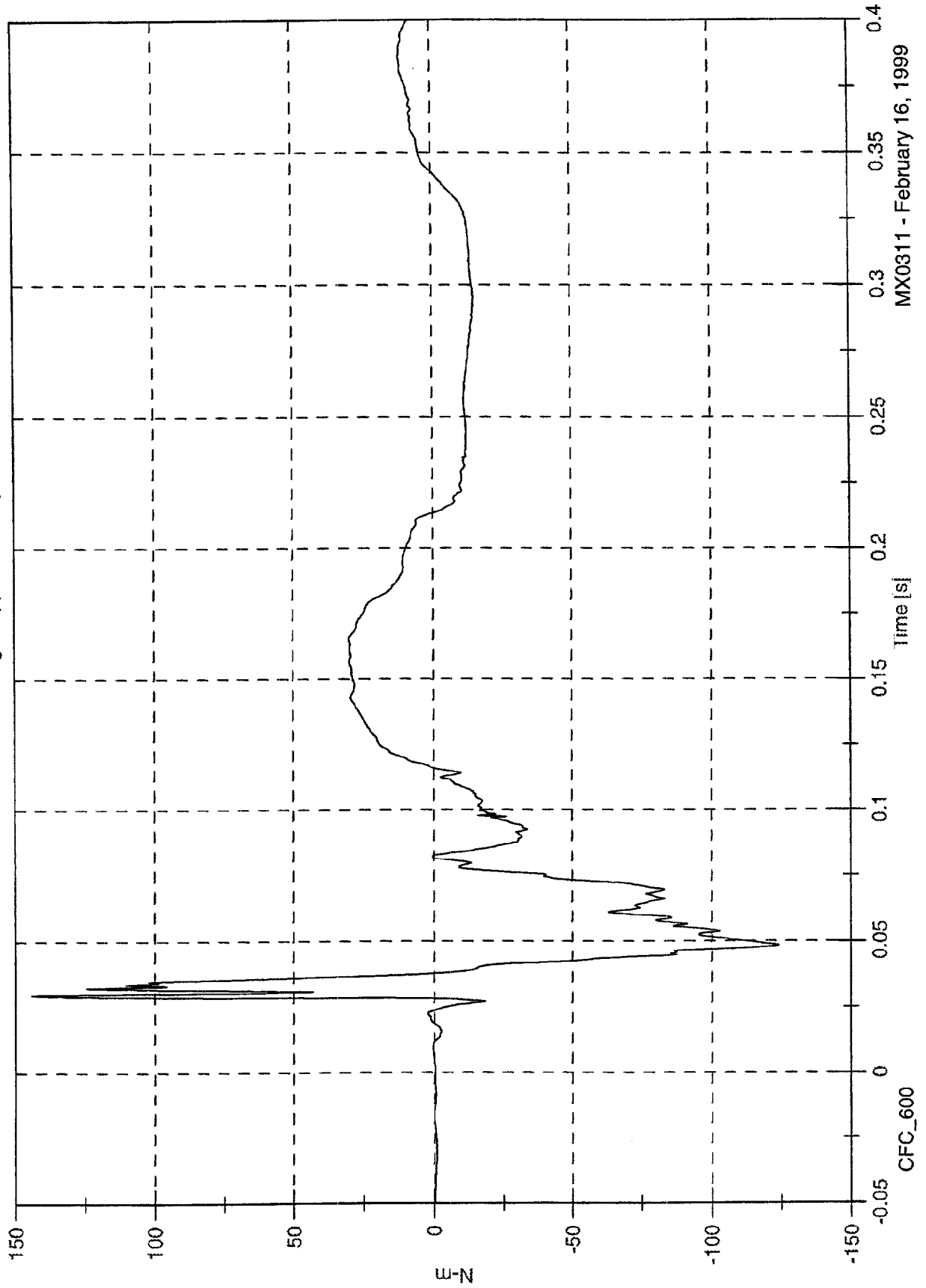


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NCAP Test #12 - 1999 Jeep Wrangler

Driver Right Upper Tibia My

Max: 144.2 [N-m] at 0.030 [s]
Min: -123.9 [N-m] at 0.048 [s]



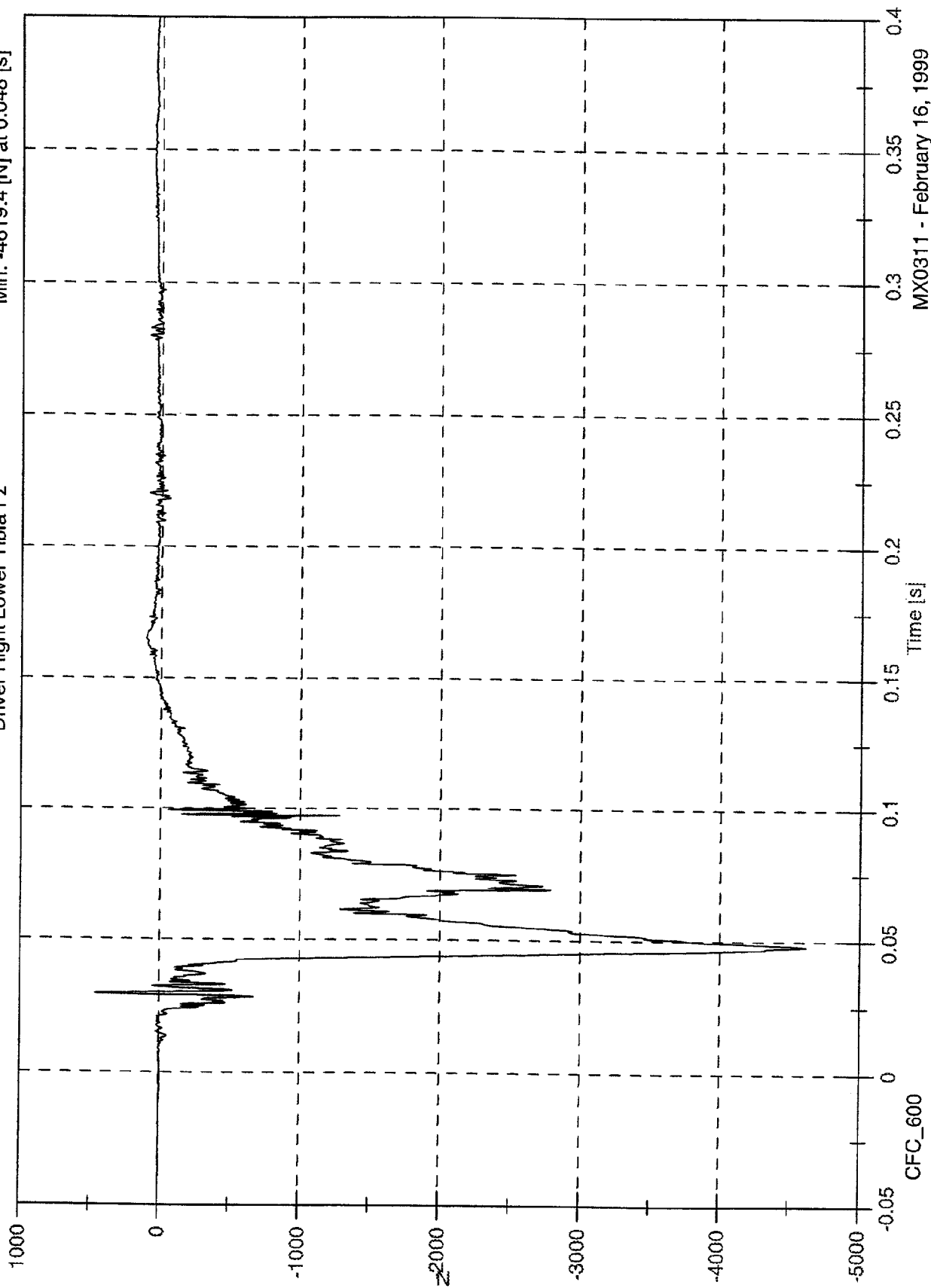
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 462.4 [N] at 0.029 [s]

Min: -4619.4 [N] at 0.048 [s]

Driver Right Lower Tibia Fz

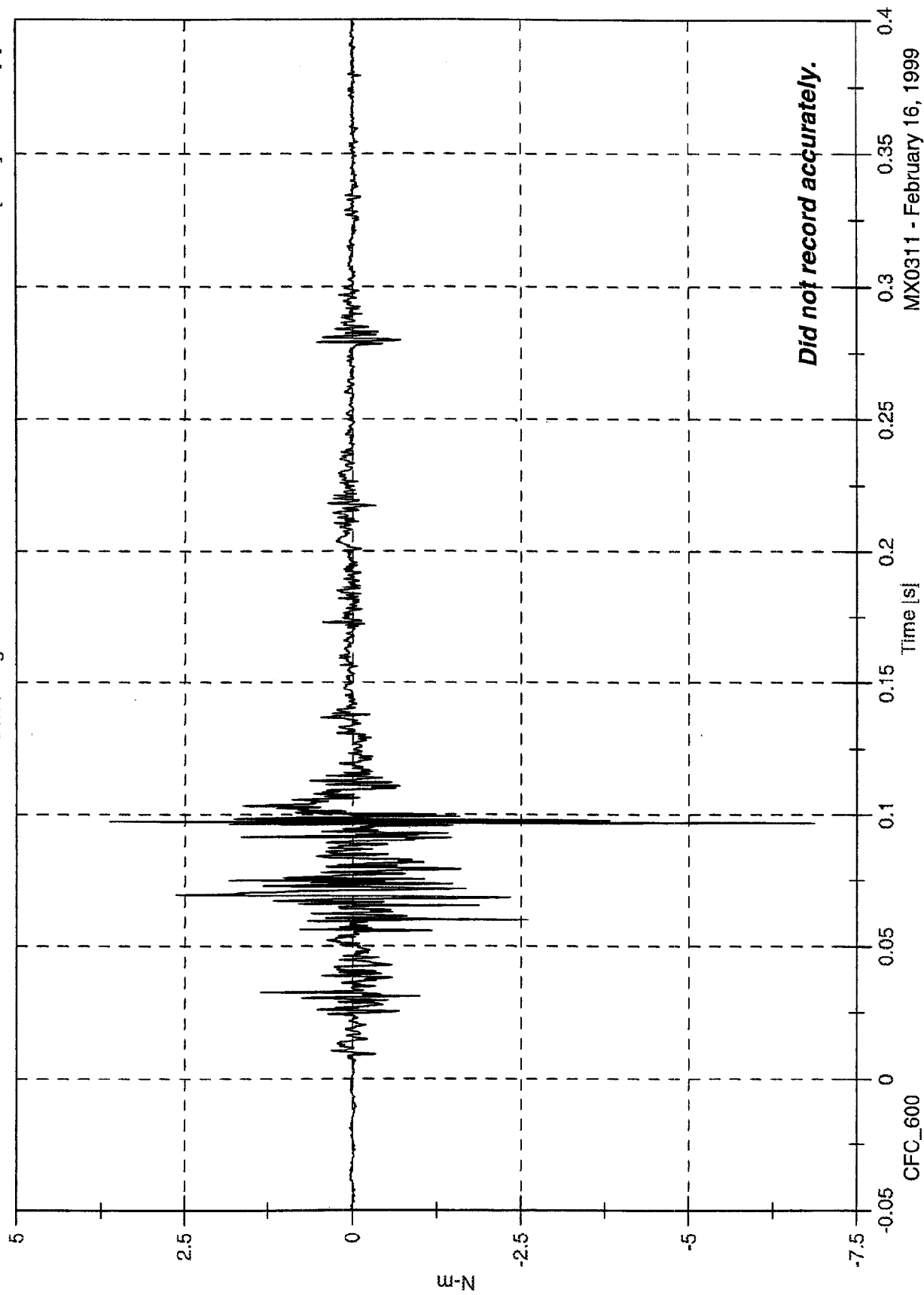


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 3.6 [N-m] at 0.097 [s]
Min: -6.9 [N-m] at 0.097 [s]

Driver Right Lower Tibia Mx



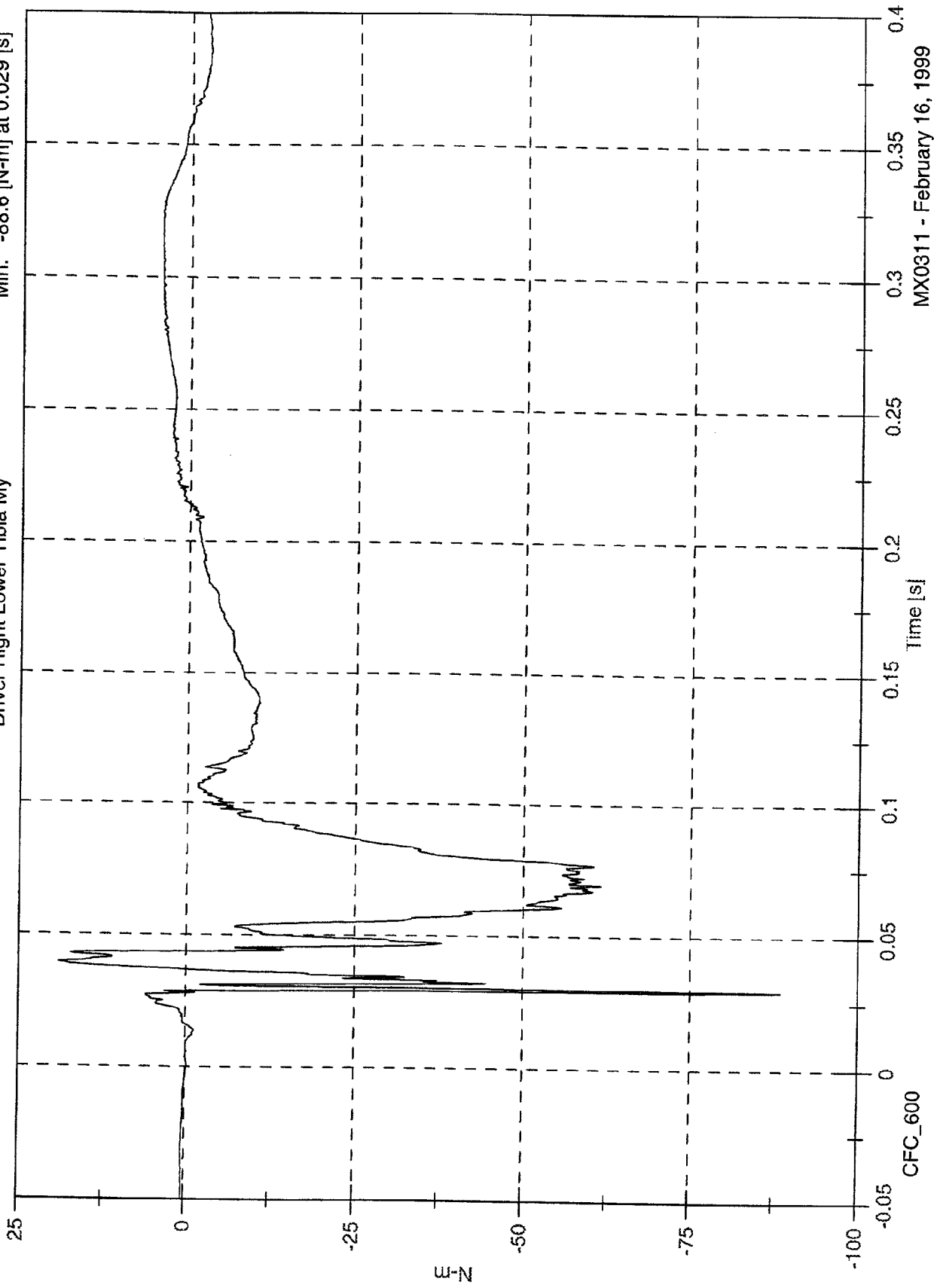
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 19.1 [N-m] at 0.039 [s]

Min: -88.6 [N-m] at 0.029 [s]

Driver Right Lower Tibia My

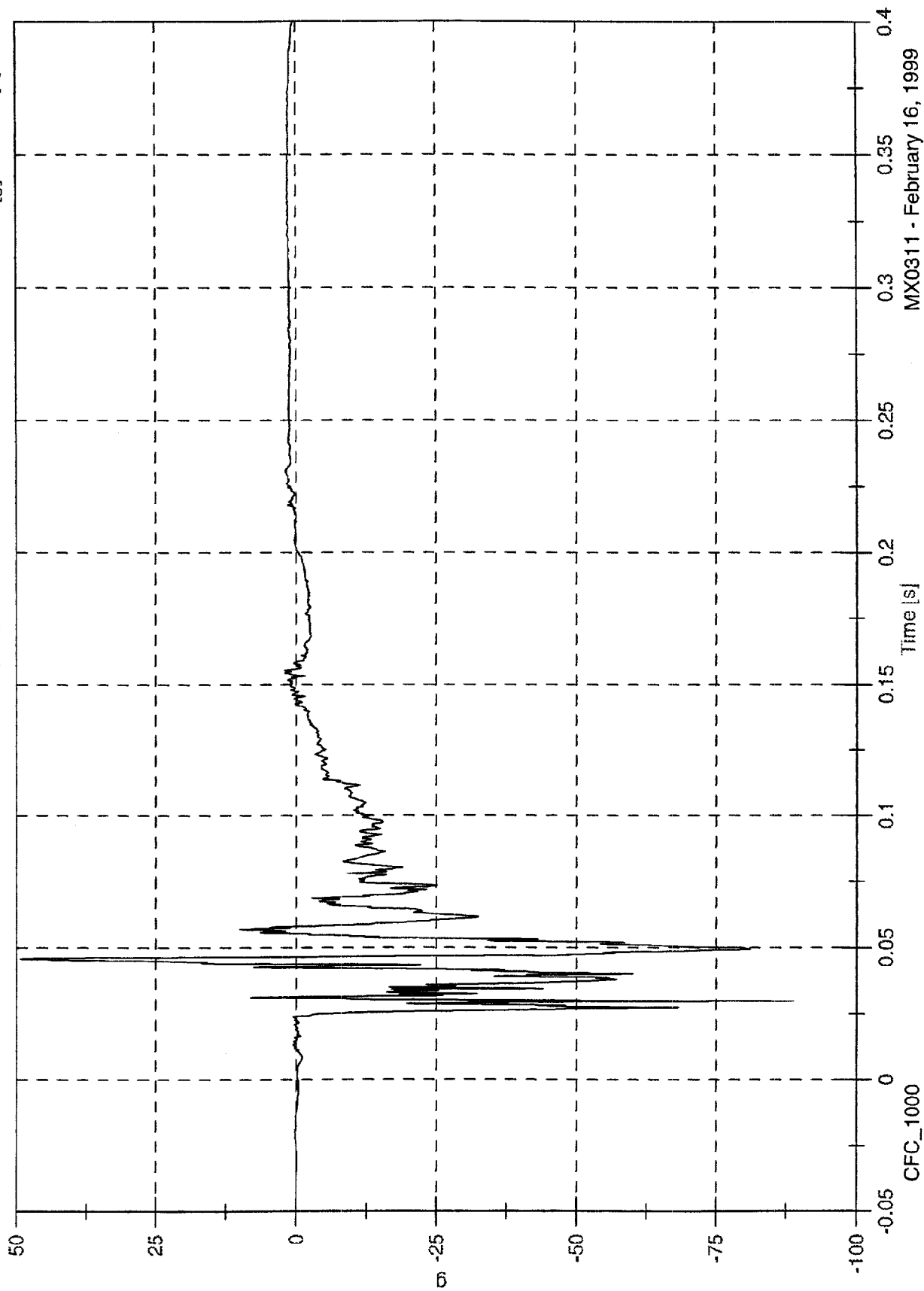


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 49.3 [g] at 0.046 [s]
Min: -88.8 [g] at 0.030 [s]

Driver Left Ankle Ax

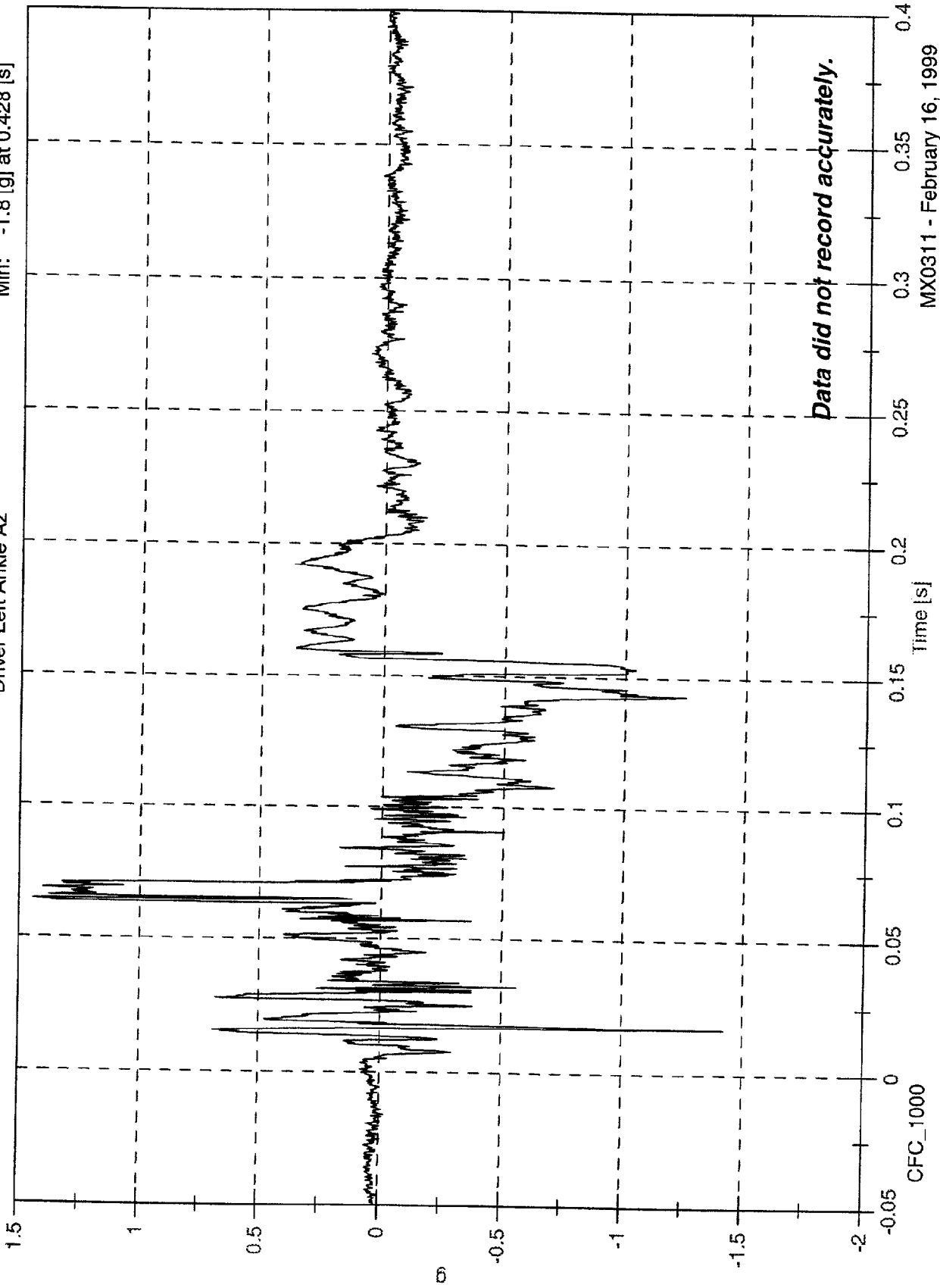


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NCAP Test #12 - 1999 Jeep Wrangler

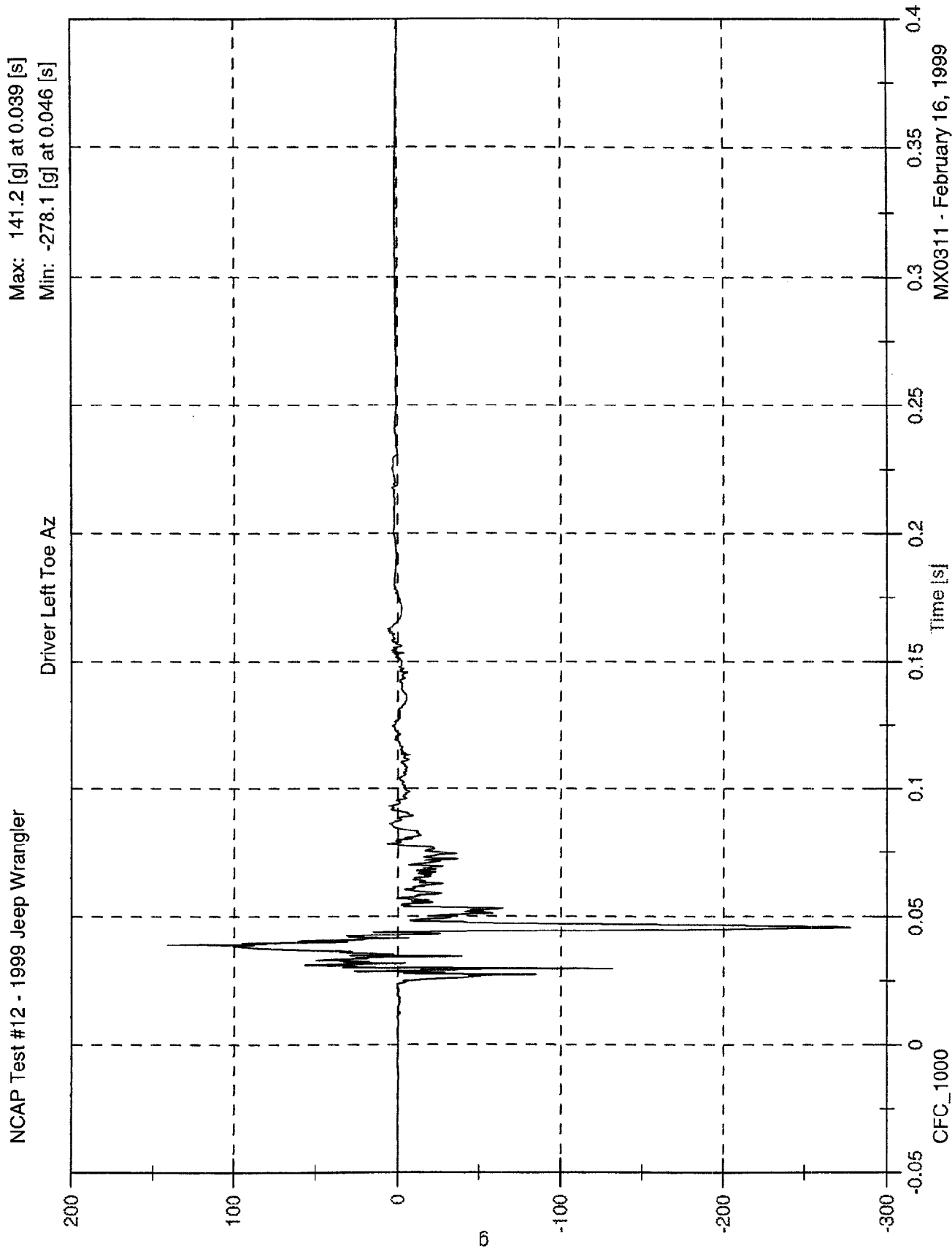
Max: 1.4 [g] at 0.064 [s]
Min: -1.8 [g] at 0.428 [s]

Driver Left Ankle Az



Data did not record accurately.

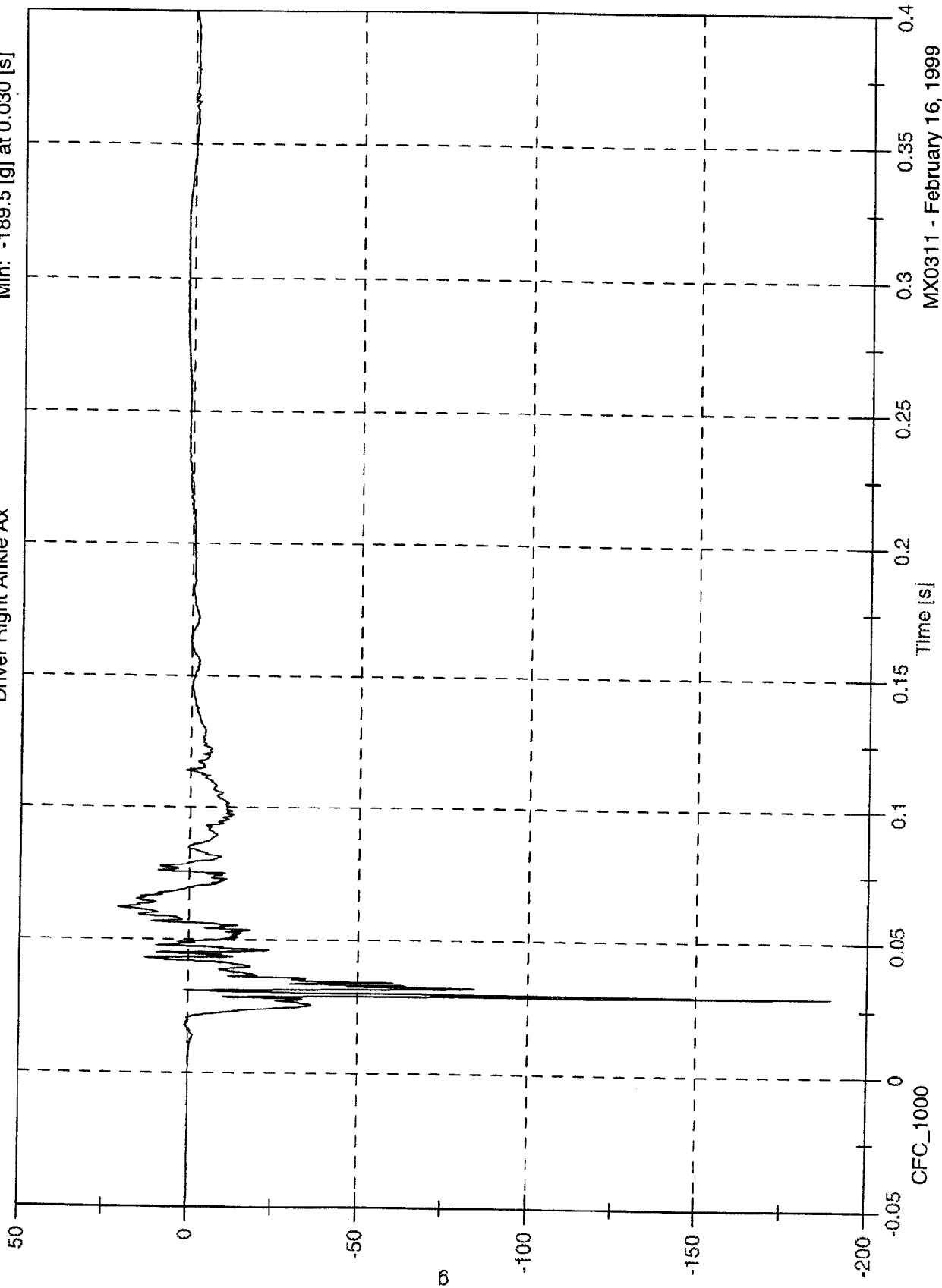
MX0311 - February 16, 1999



NCAP Test #12 - 1999 Jeep Wrangler

Max: 27.3 [g] at 0.442 [s]
Min: -189.5 [g] at 0.030 [s]

Driver Right Ankle Ax



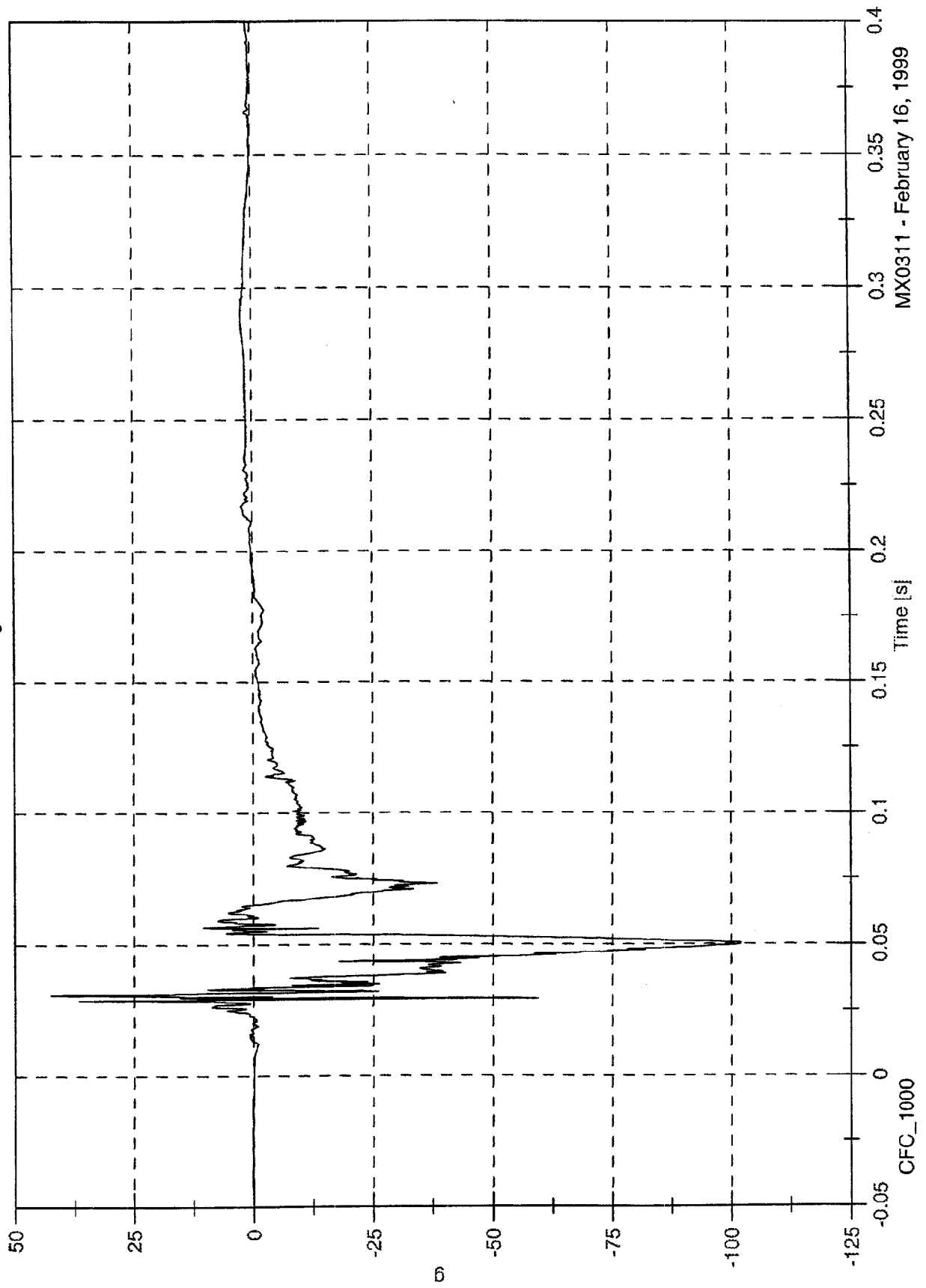
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 42.6 [g] at 0.031 [s]

Min: -102.2 [g] at 0.050 [s]

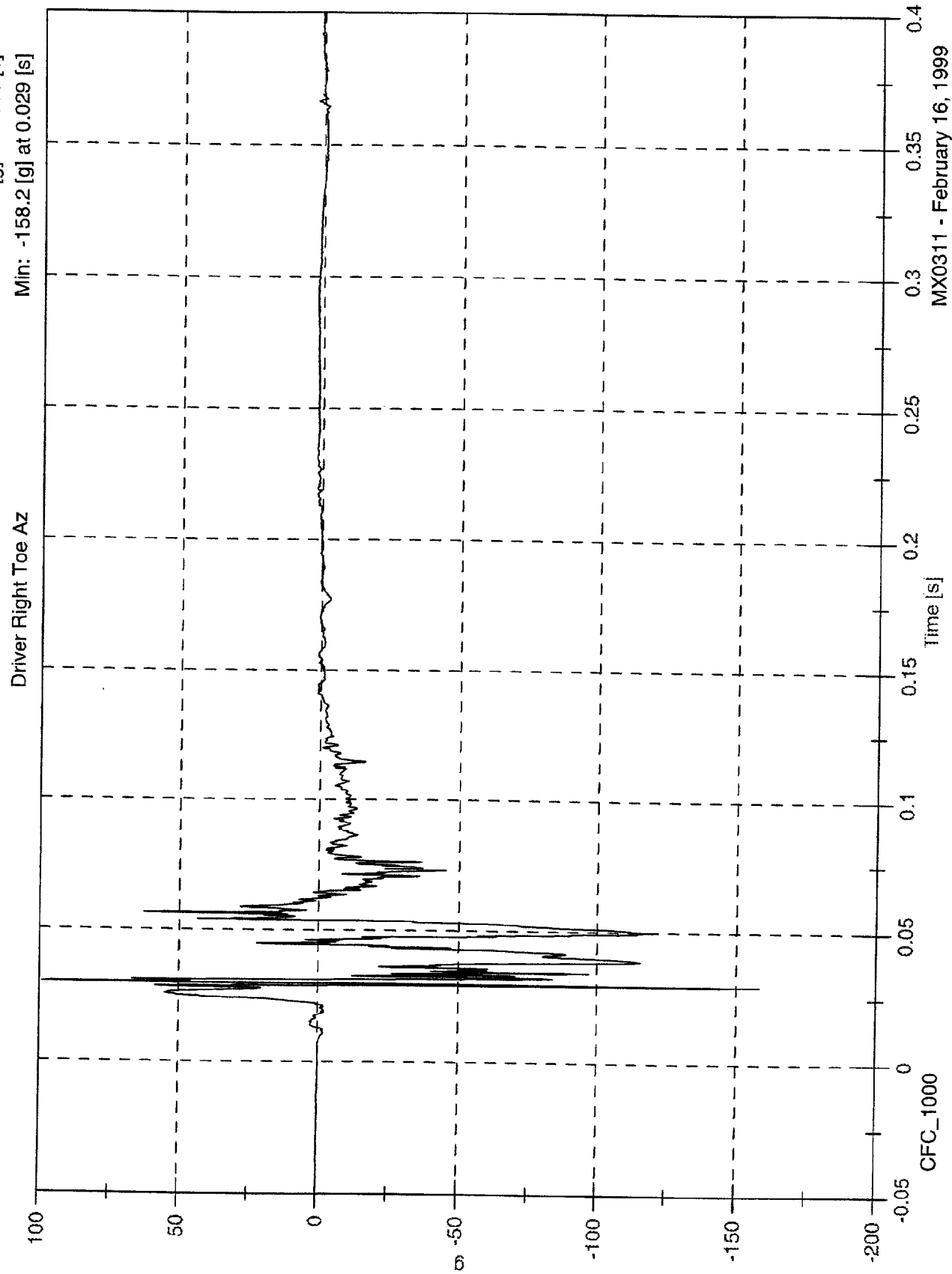
Driver Right Ankle Az



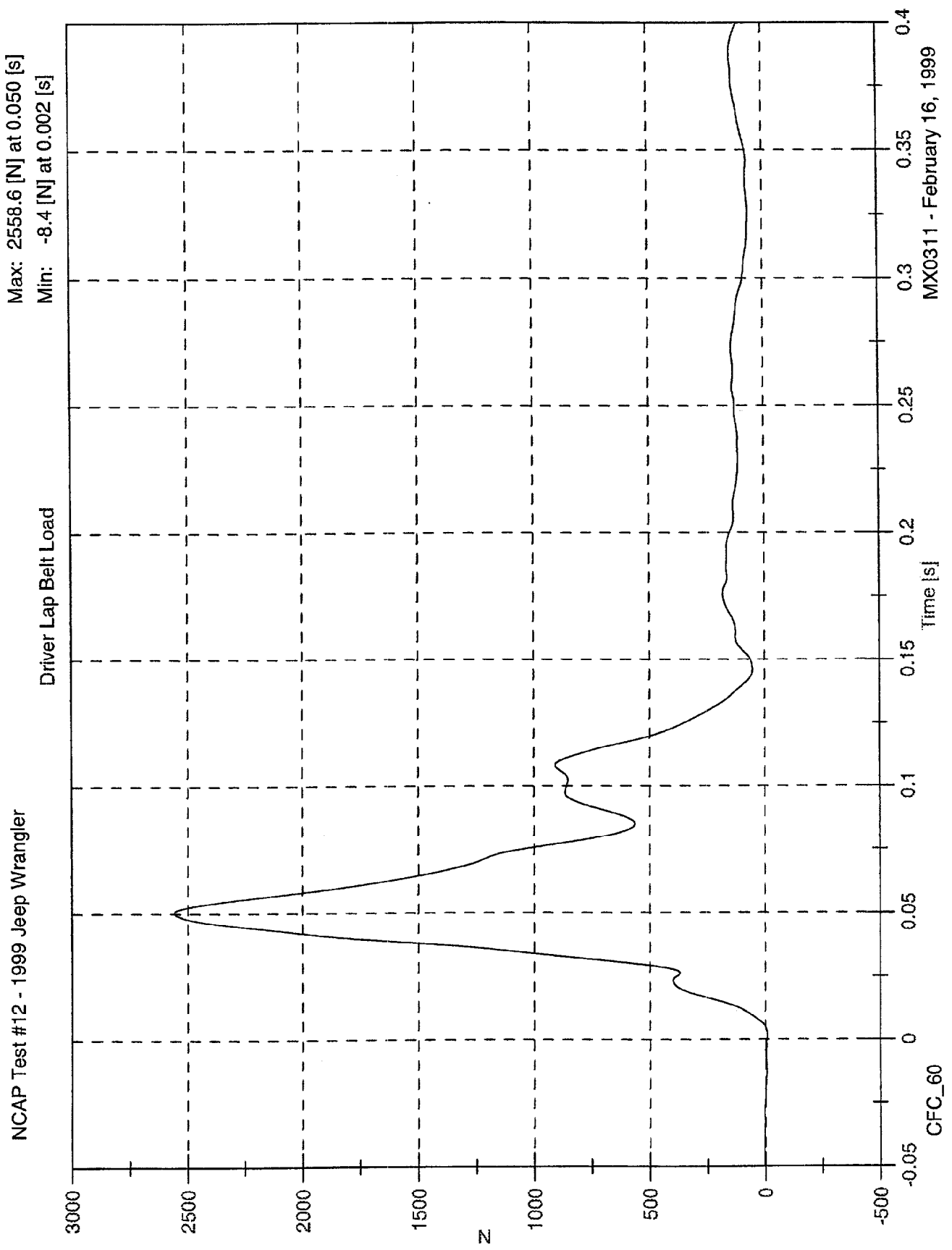
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 99.0 [g] at 0.030 [s]
Min: -158.2 [g] at 0.029 [s]



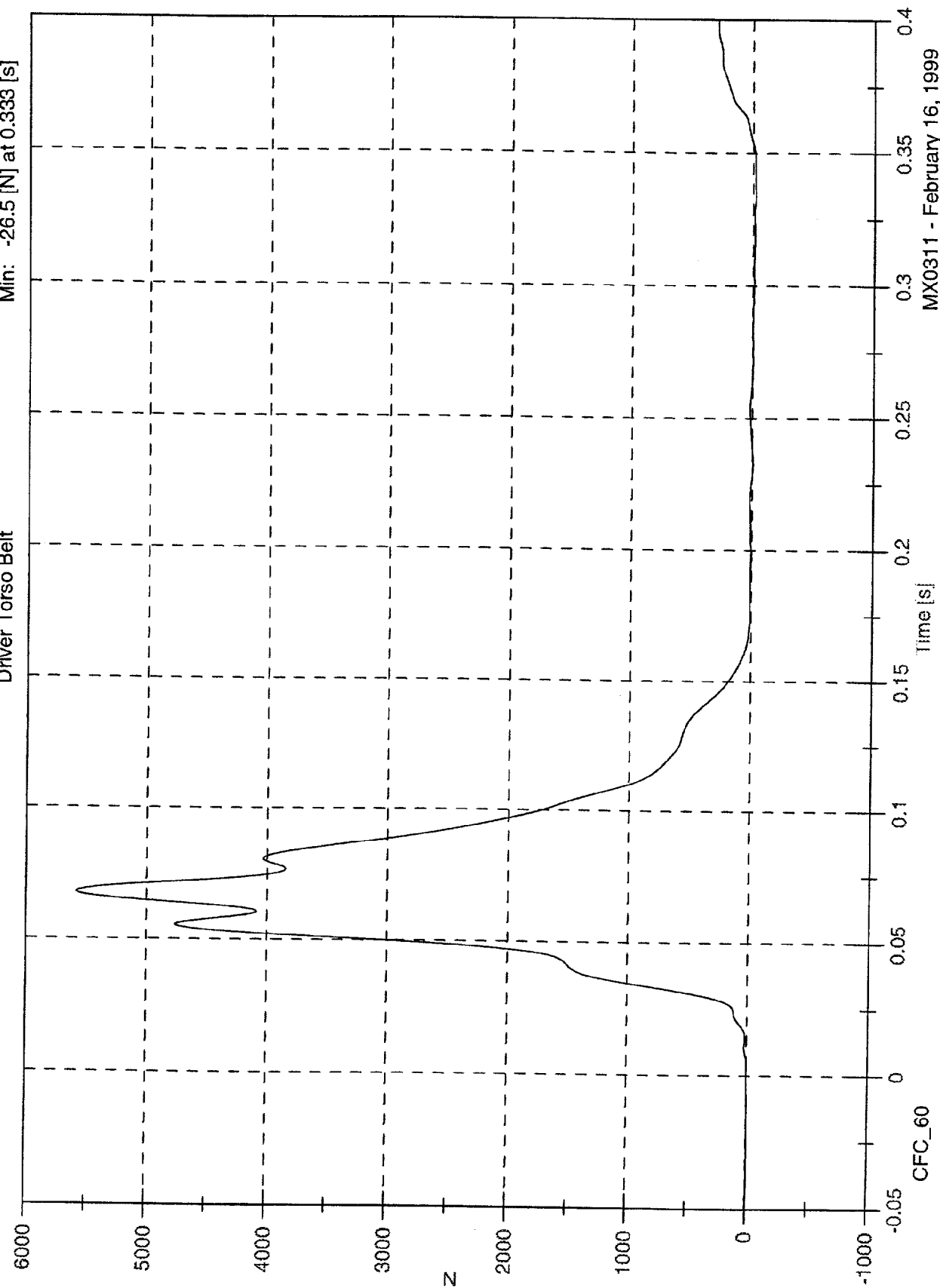
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NCAP Test #12 - 1999 Jeep Wrangler

Driver Torso Belt

Max: 5582.3 [N] at 0.068 [s]
Min: -26.5 [N] at 0.333 [s]

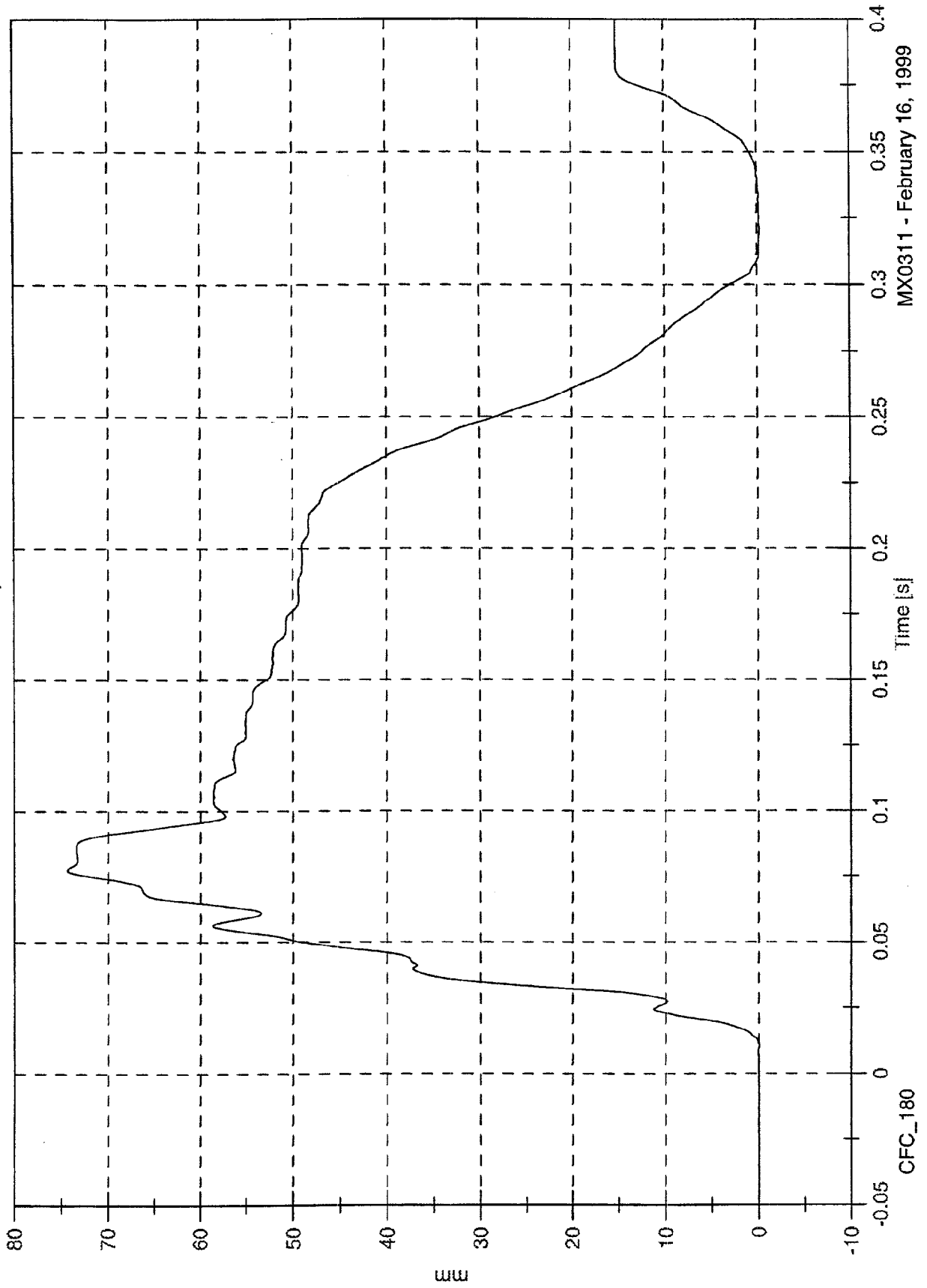


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NCAP Test #12 - 1999 Jeep Wrangler

Driver Belt Spoolout

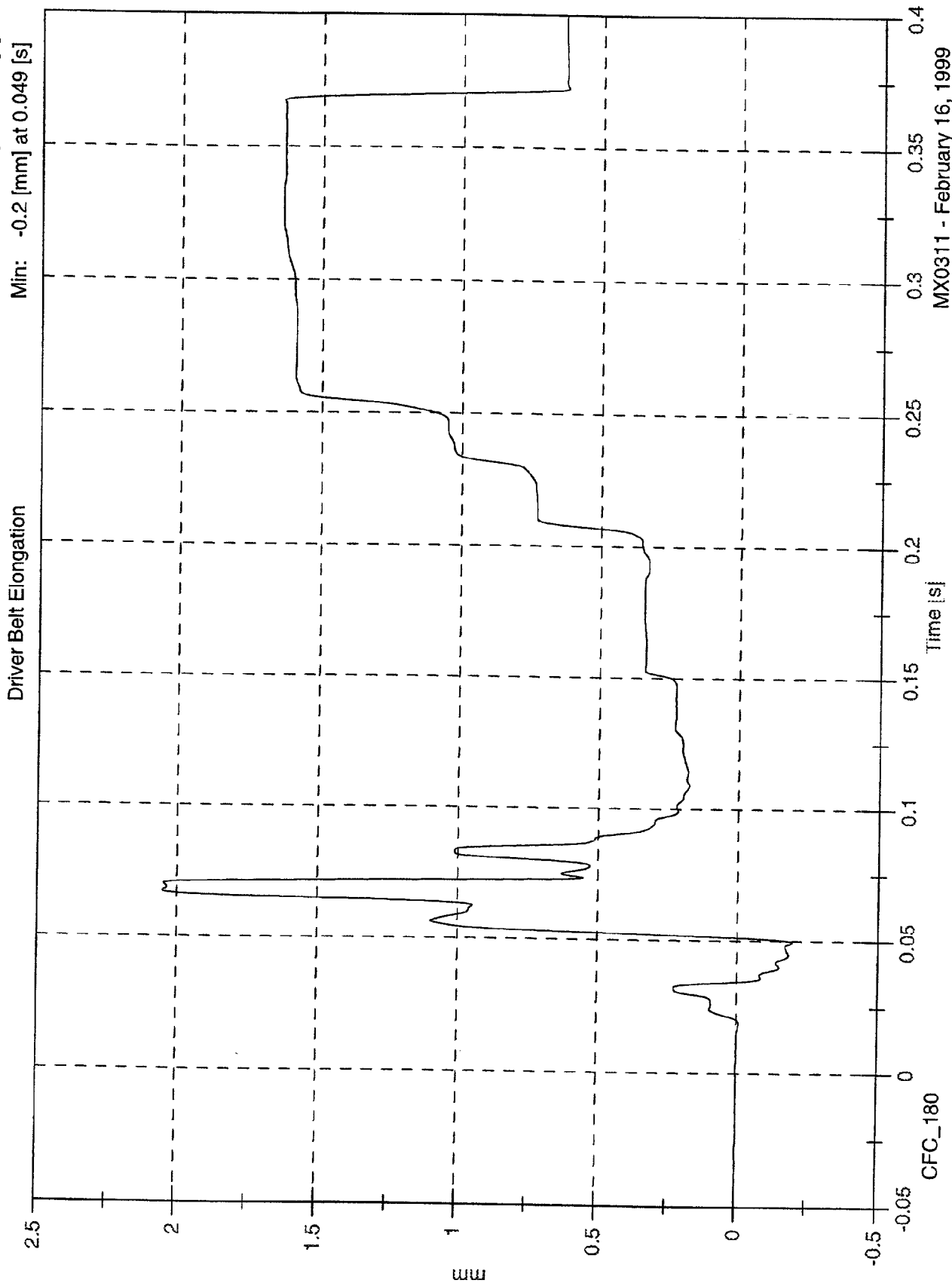
Max: 74.4 [mm] at 0.077 [s]
Min: -0.3 [mm] at 0.320 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

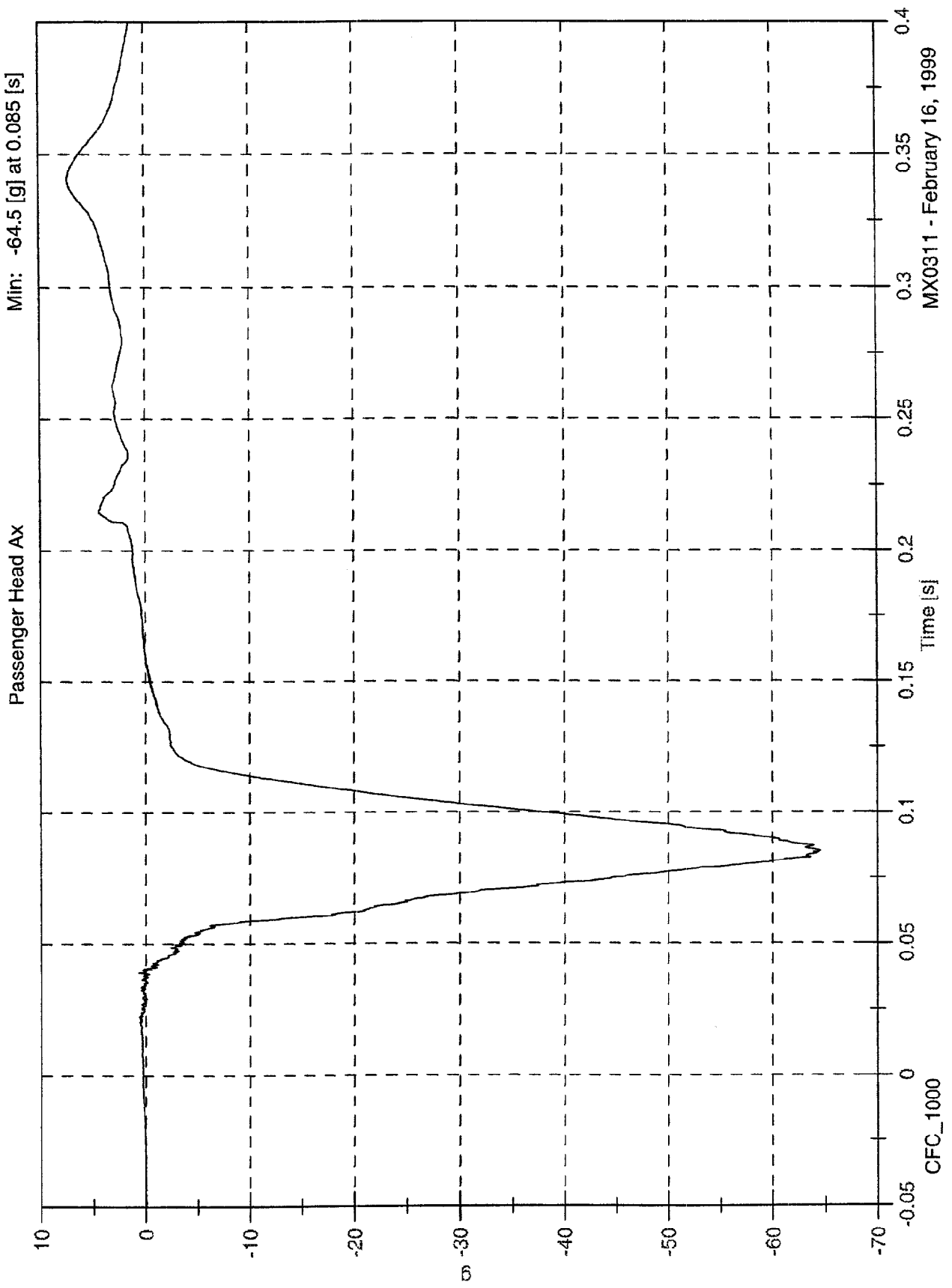
Max: 2.1 [mm] at 0.067 [s]
 Min: -0.2 [mm] at 0.049 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

Max: 7.3 [g] at 0.340 [s]
Min: -64.5 [g] at 0.085 [s]



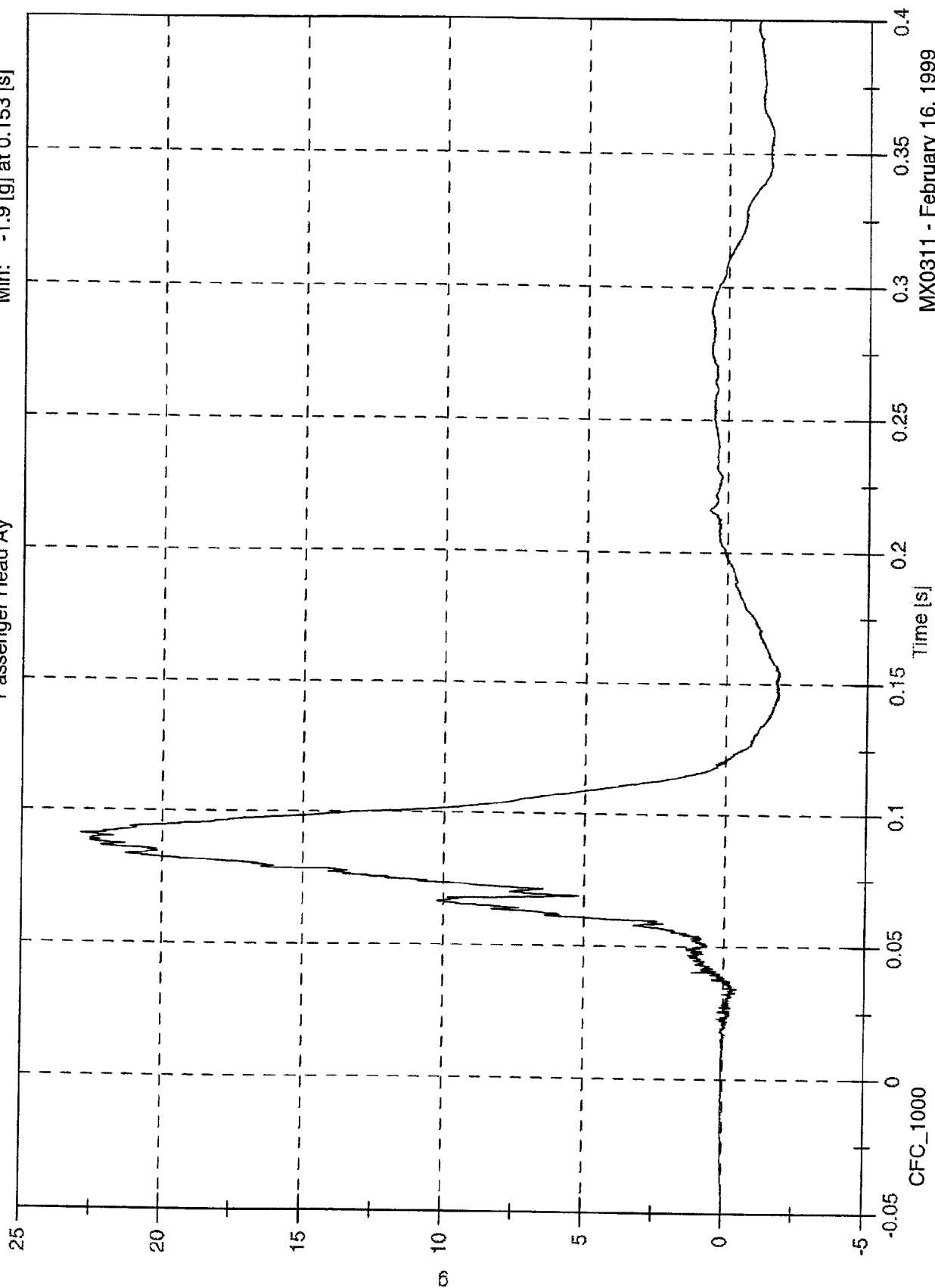
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Passenger Head Ay

Max: 22.9 [g] at 0.091 [s]

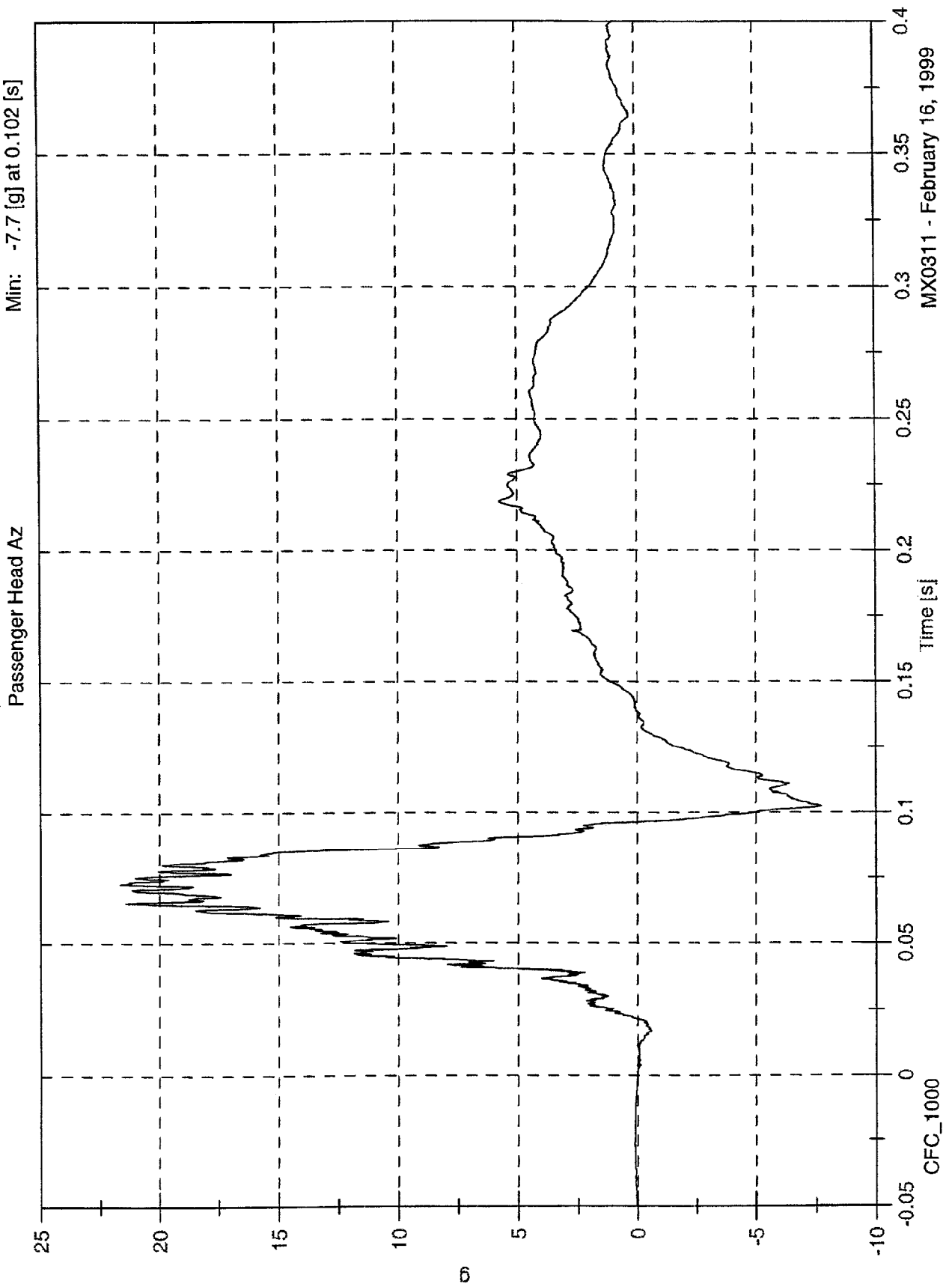
Min: -1.9 [g] at 0.153 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

Max: 21.7 [g] at 0.073 [s]
Min: -7.7 [g] at 0.102 [s]

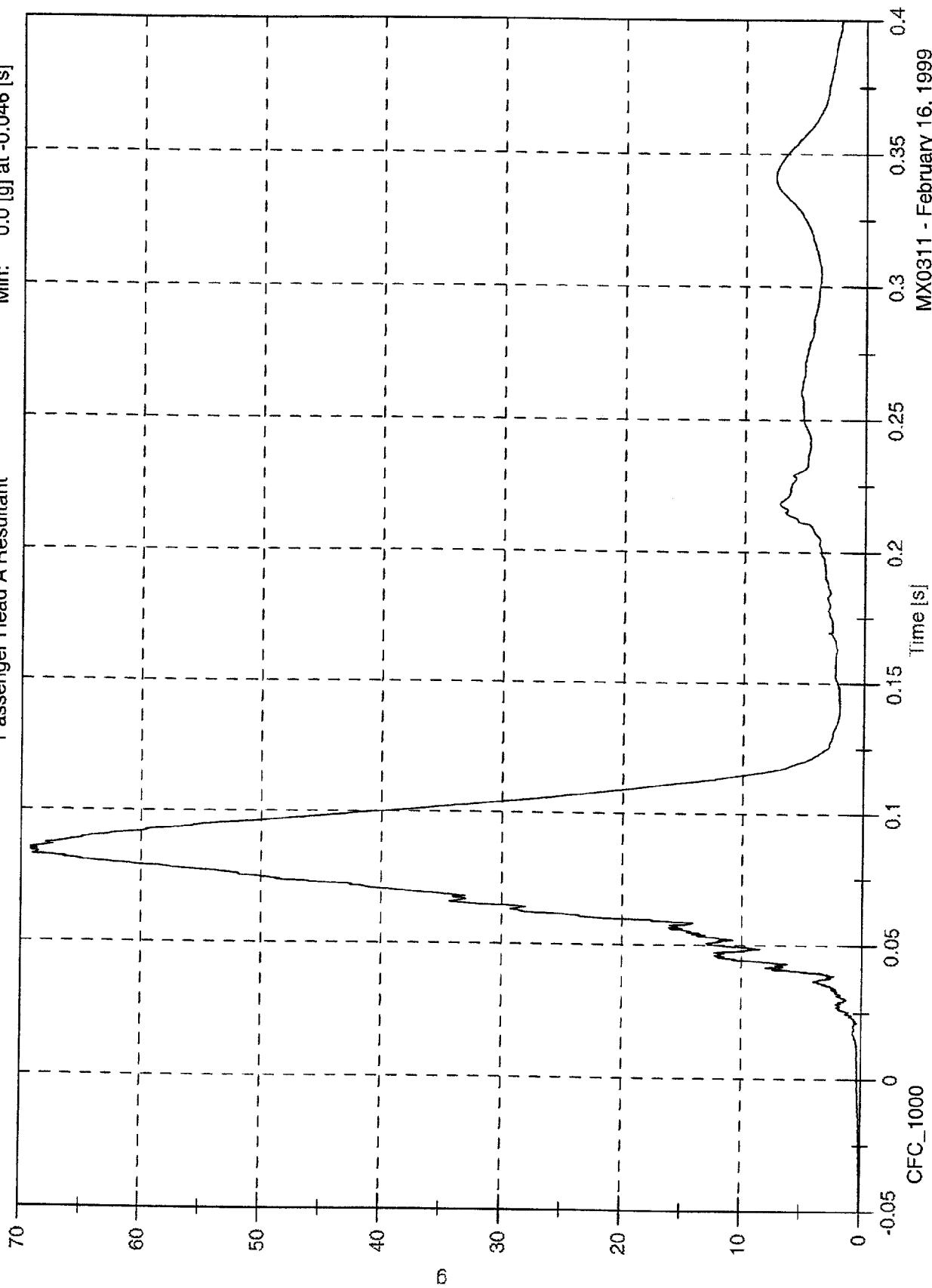


NCAP Test #12 - 1999 Jeep Wrangler

Passenger Head A Resultant

Max: 69.2 [g] at 0.085 [s]

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



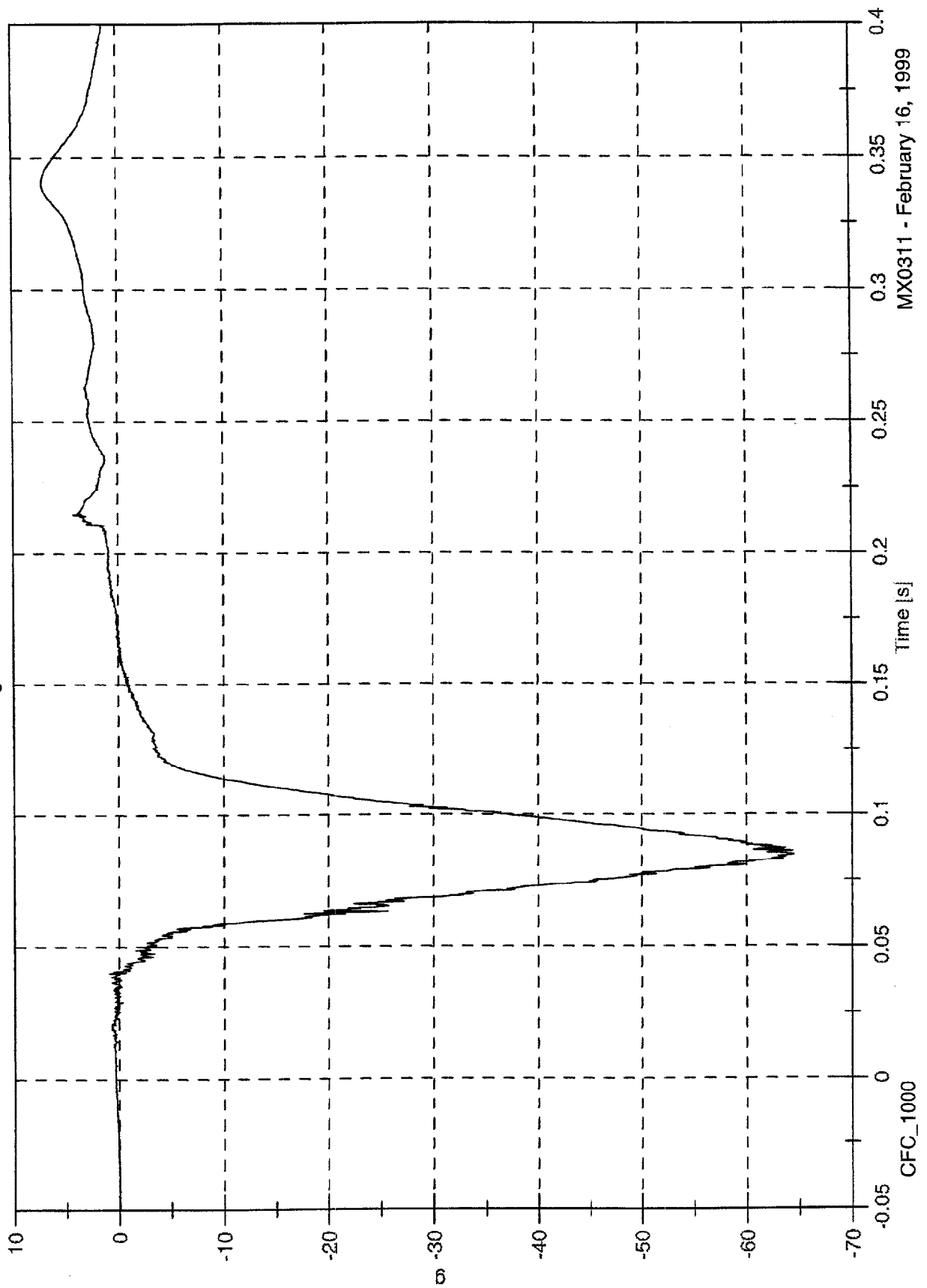
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 7.1 [g] at 0.341 [s]

Min: -64.4 [g] at 0.085 [s]

Passenger Head Ax Redundant



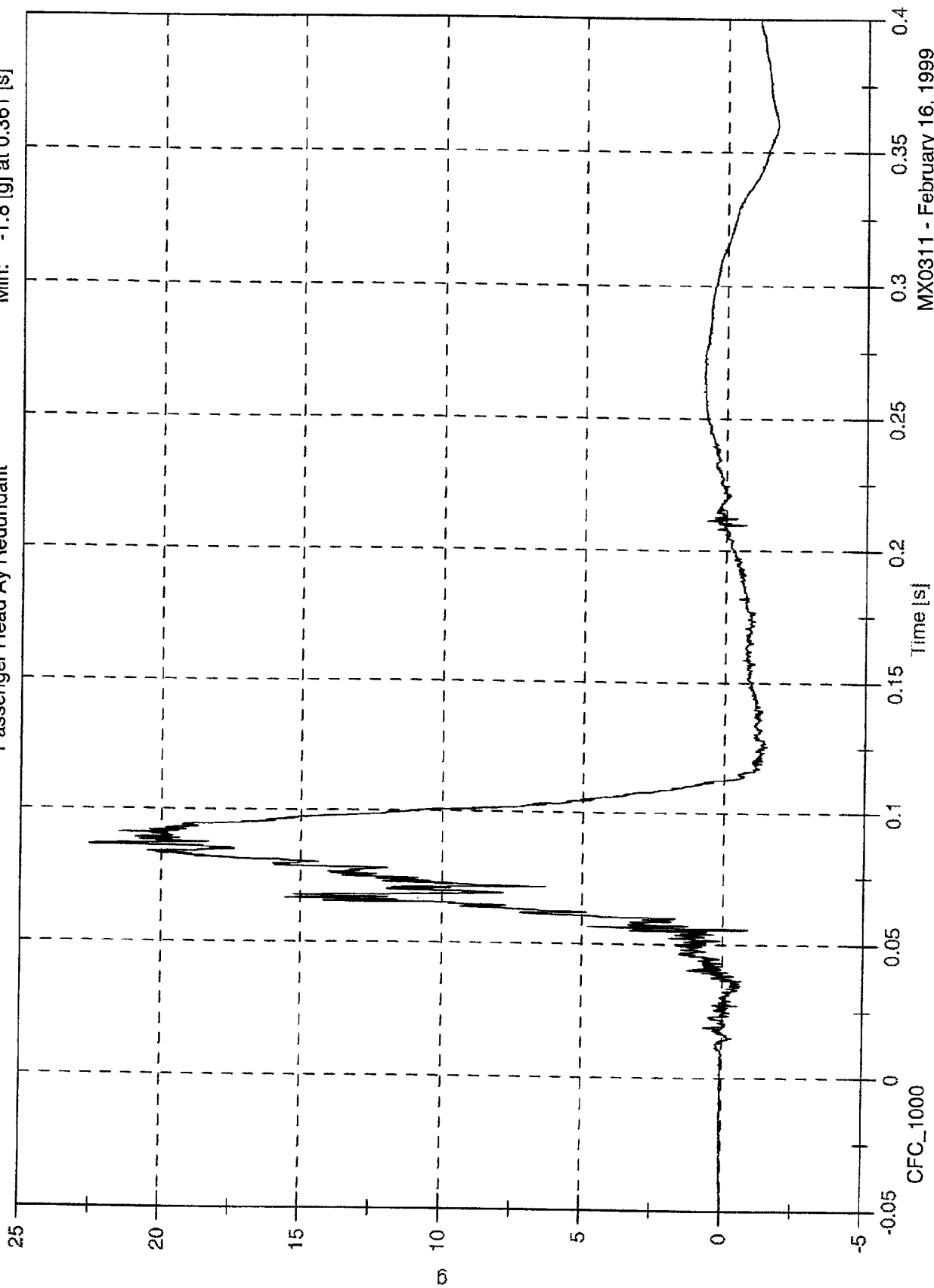
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 22.6 [g] at 0.087 [s]

Min: -1.8 [g] at 0.361 [s]

Passenger Head Ay Redundant

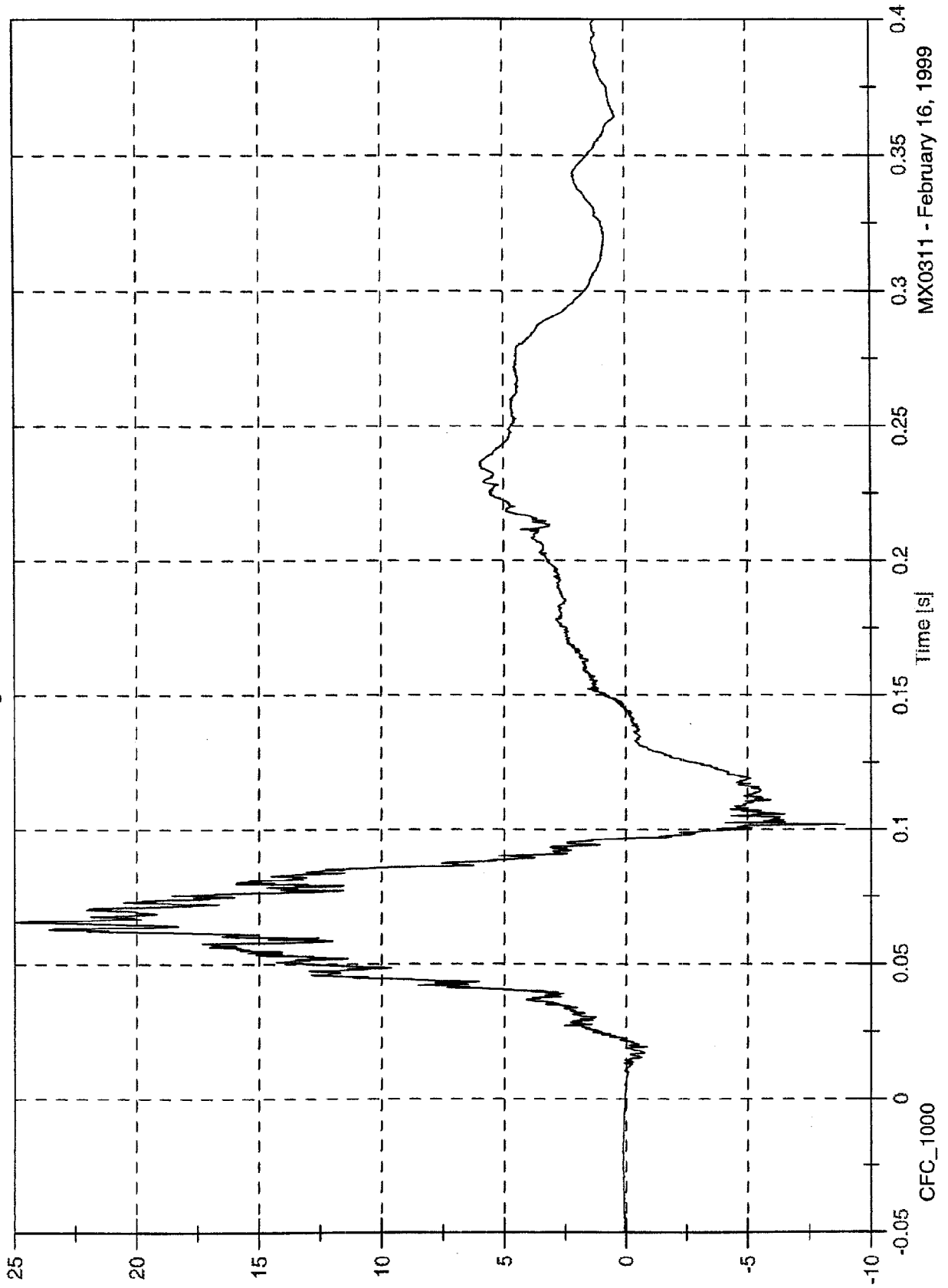


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NCAP Test #12 - 1999 Jeep Wrangler

Passenger Head Az Redundant

Max: 25.0 [g] at 0.066 [s]
Min: -8.9 [g] at 0.102 [s]

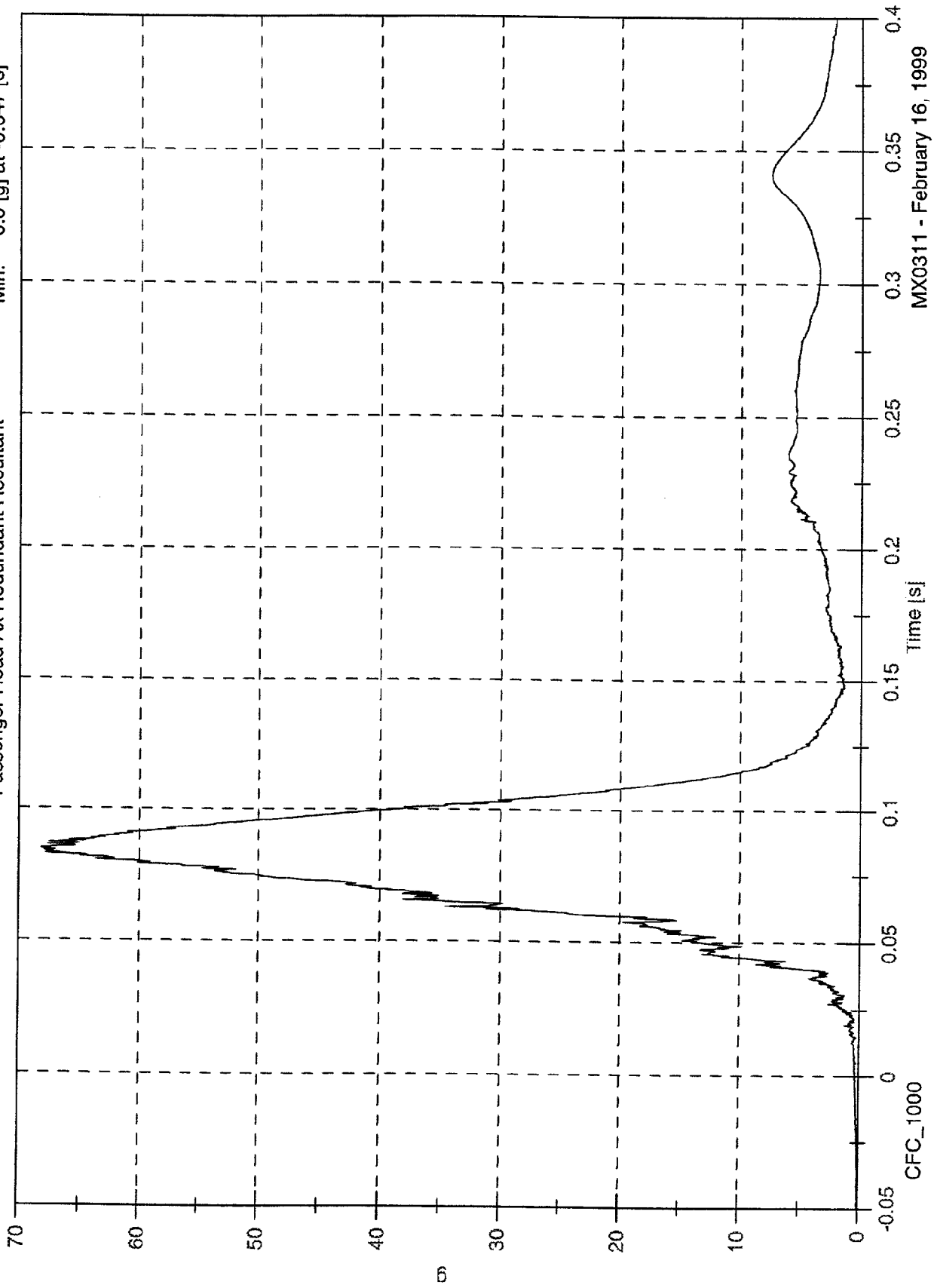


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 68.1 [g] at 0.085 [s]
Min: 0.0 [g] at -0.047 [s]

Passenger Head Ax Redundant Resultant

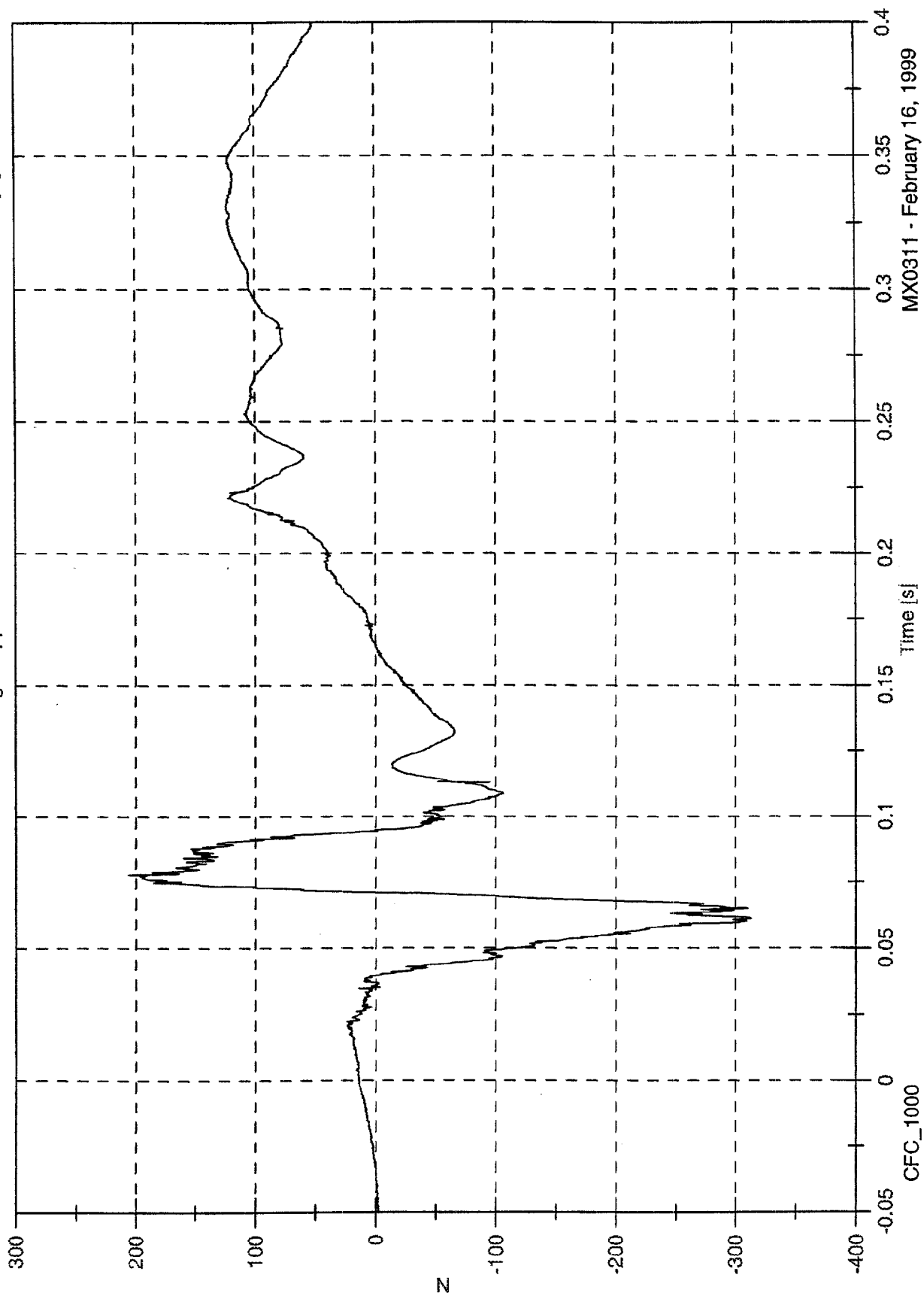


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 206.5 [N] at 0.078 [s]
Min: -313.3 [N] at 0.061 [s]

Passenger Upper Neck Load Fx

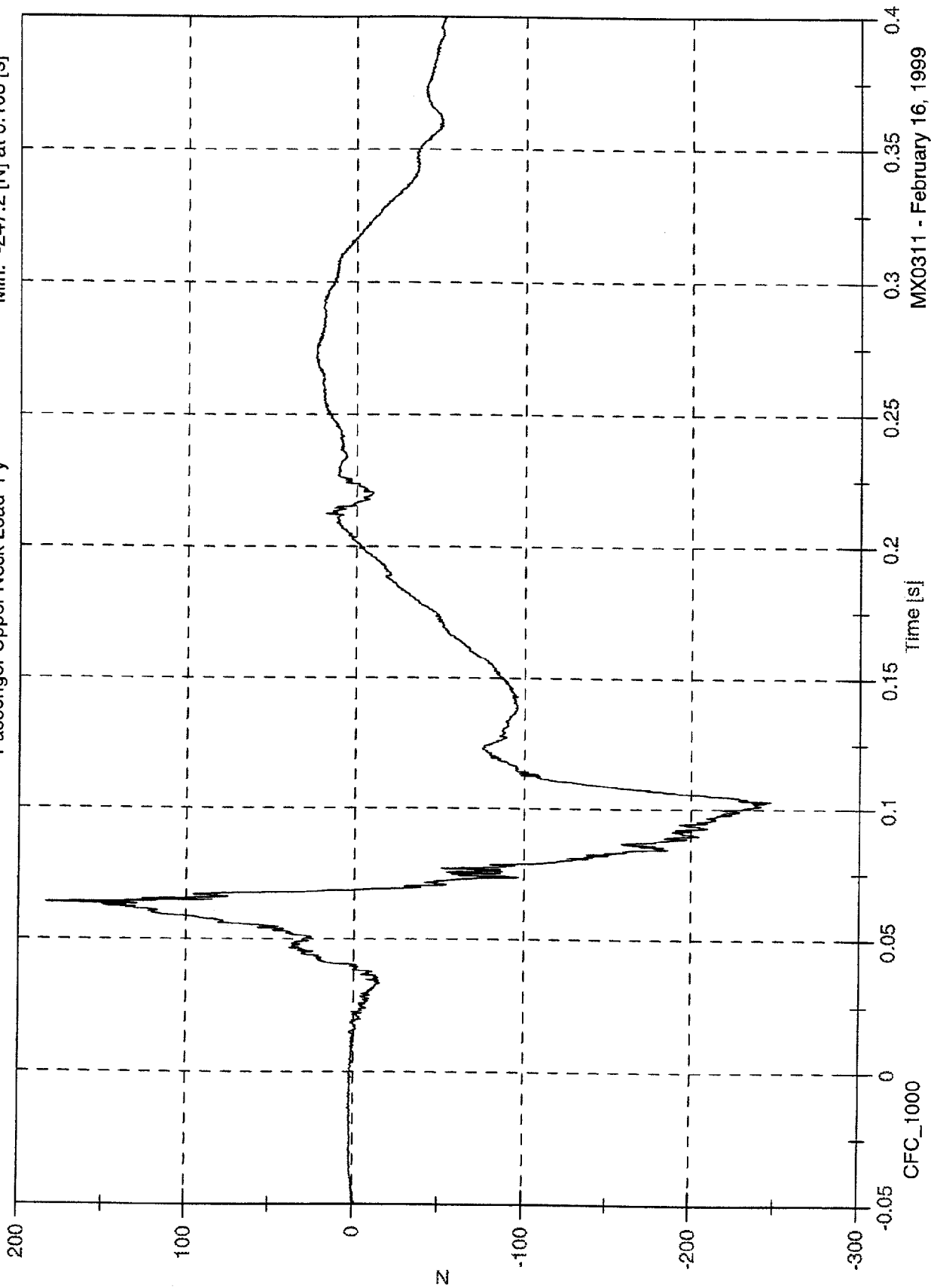


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 183.9 [N] at 0.064 [s]
Min: -247.2 [N] at 0.103 [s]

Passenger Upper Neck Load Fy



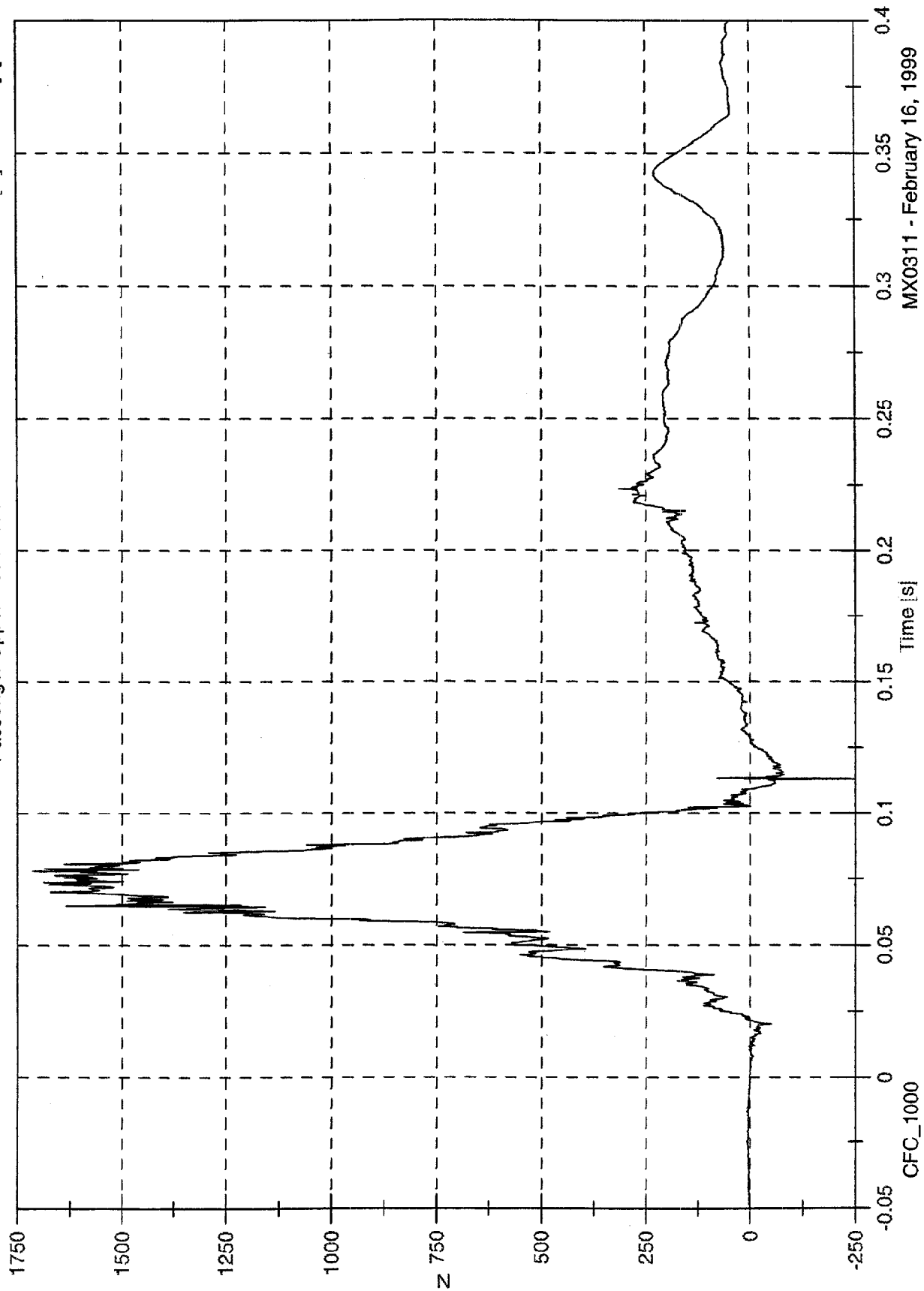
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 1714.7 [N] at 0.078 [s]

Min: -246.3 [N] at 0.113 [s]

Passenger Upper Neck Load Fz



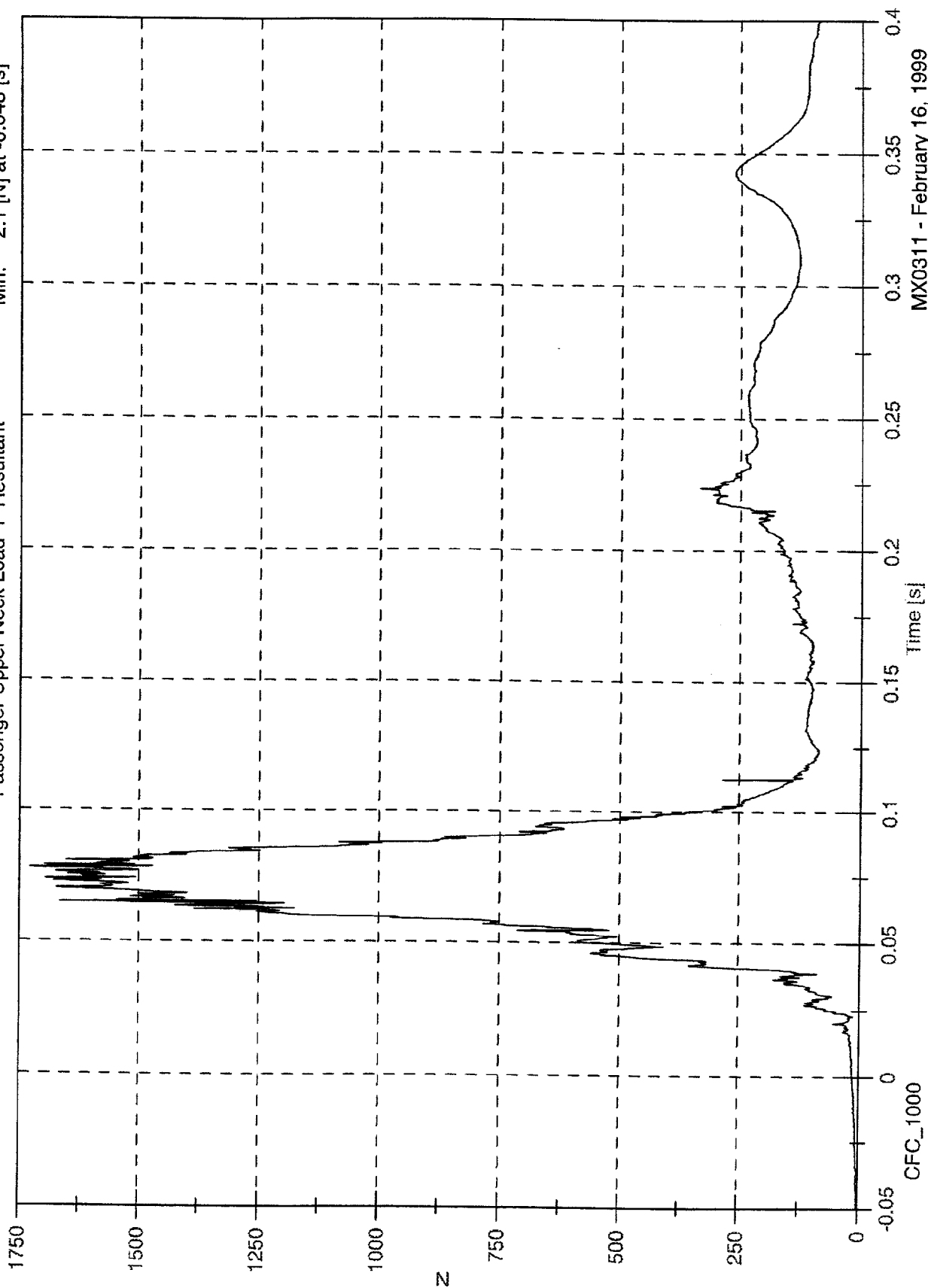
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 1728.6 [N] at 0.078 [s]

Min: 2.1 [N] at -0.048 [s]

Passenger Upper Neck Load F Resultant

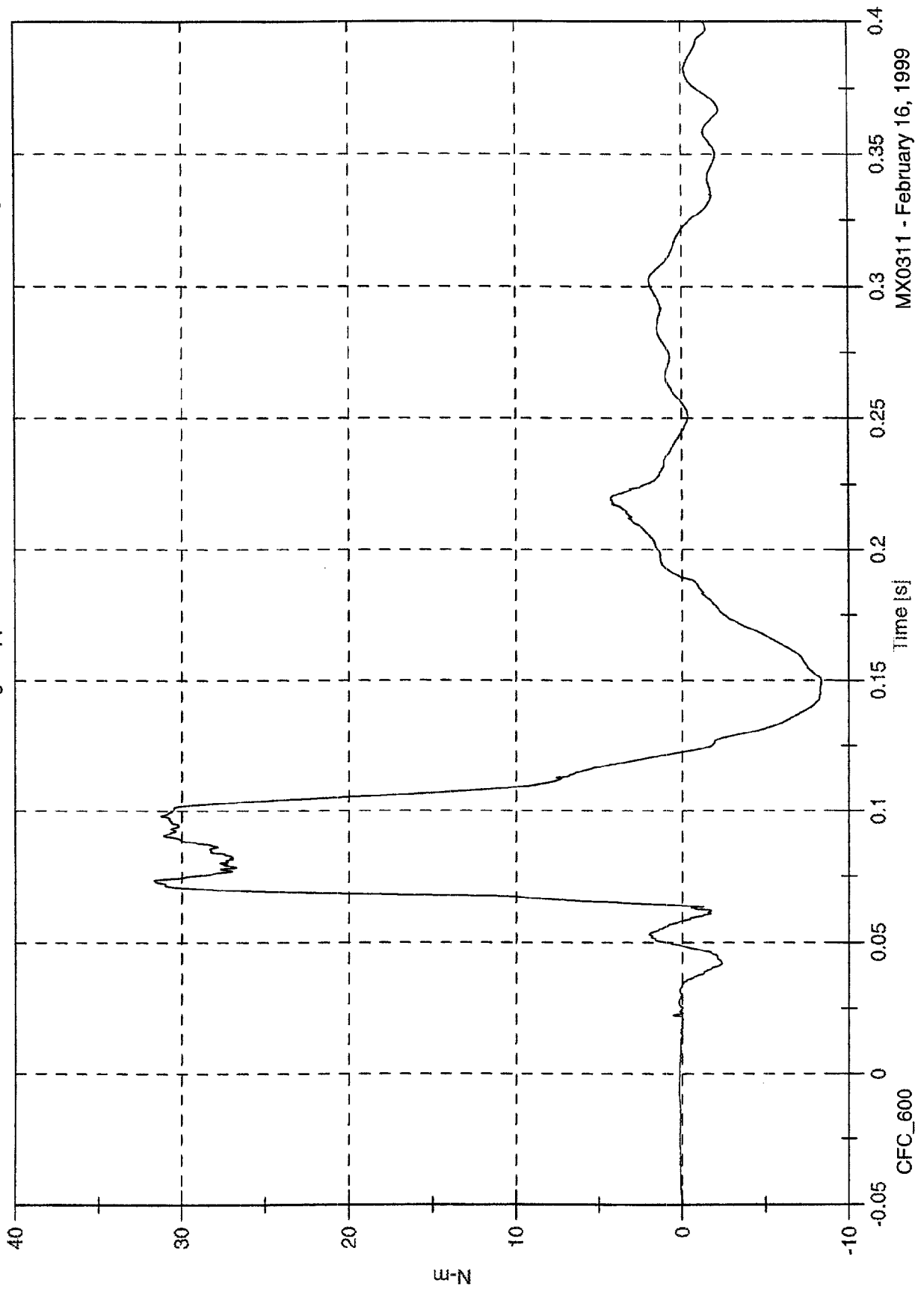


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 31.7 [N-m] at 0.073 [s]
Min: -8.3 [N-m] at 0.150 [s]

Passenger Upper Neck Load Mx

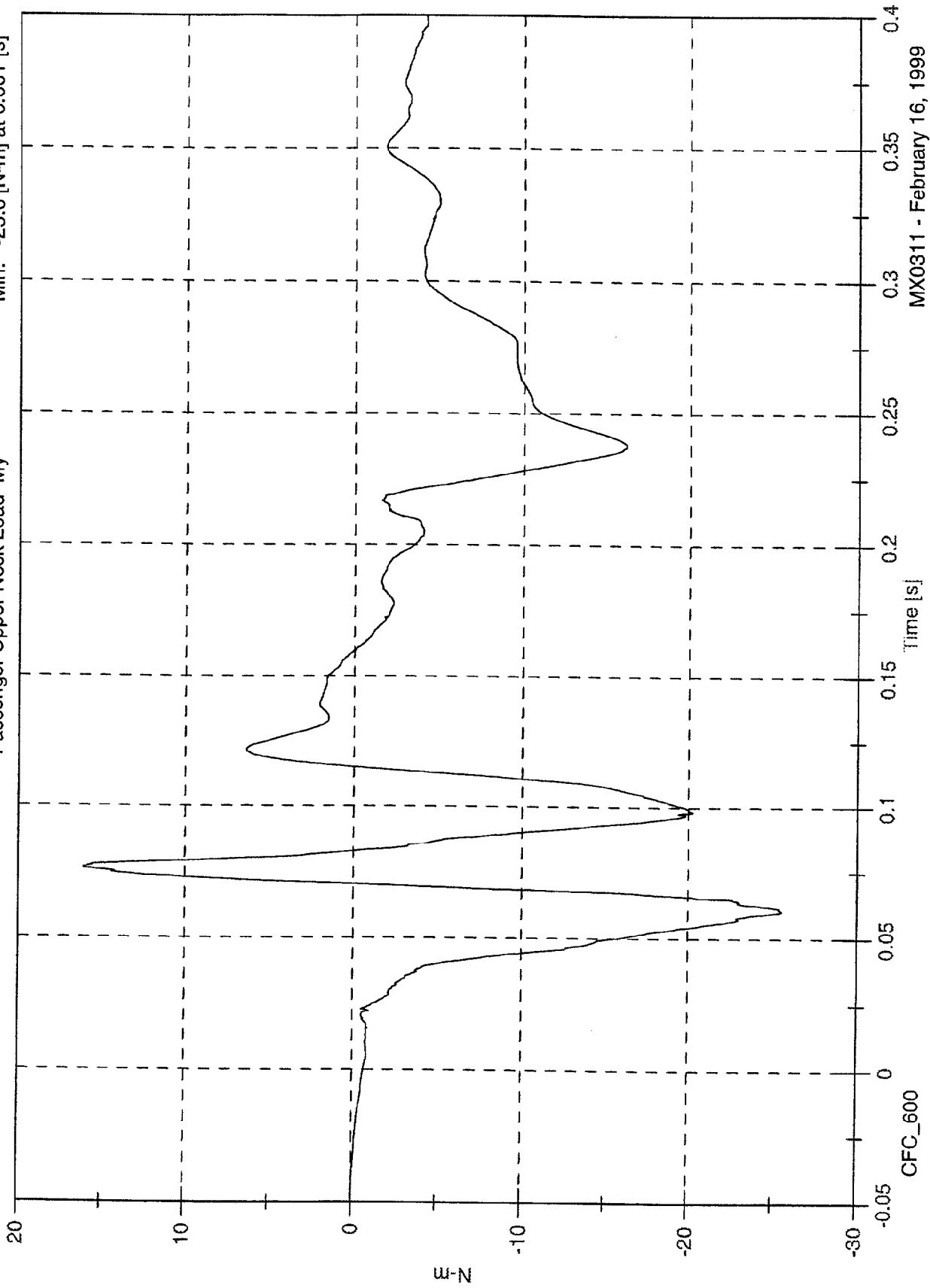


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 16.1 [N-m] at 0.076 [s]
 Min: -25.6 [N-m] at 0.061 [s]

Passenger Upper Neck Load My

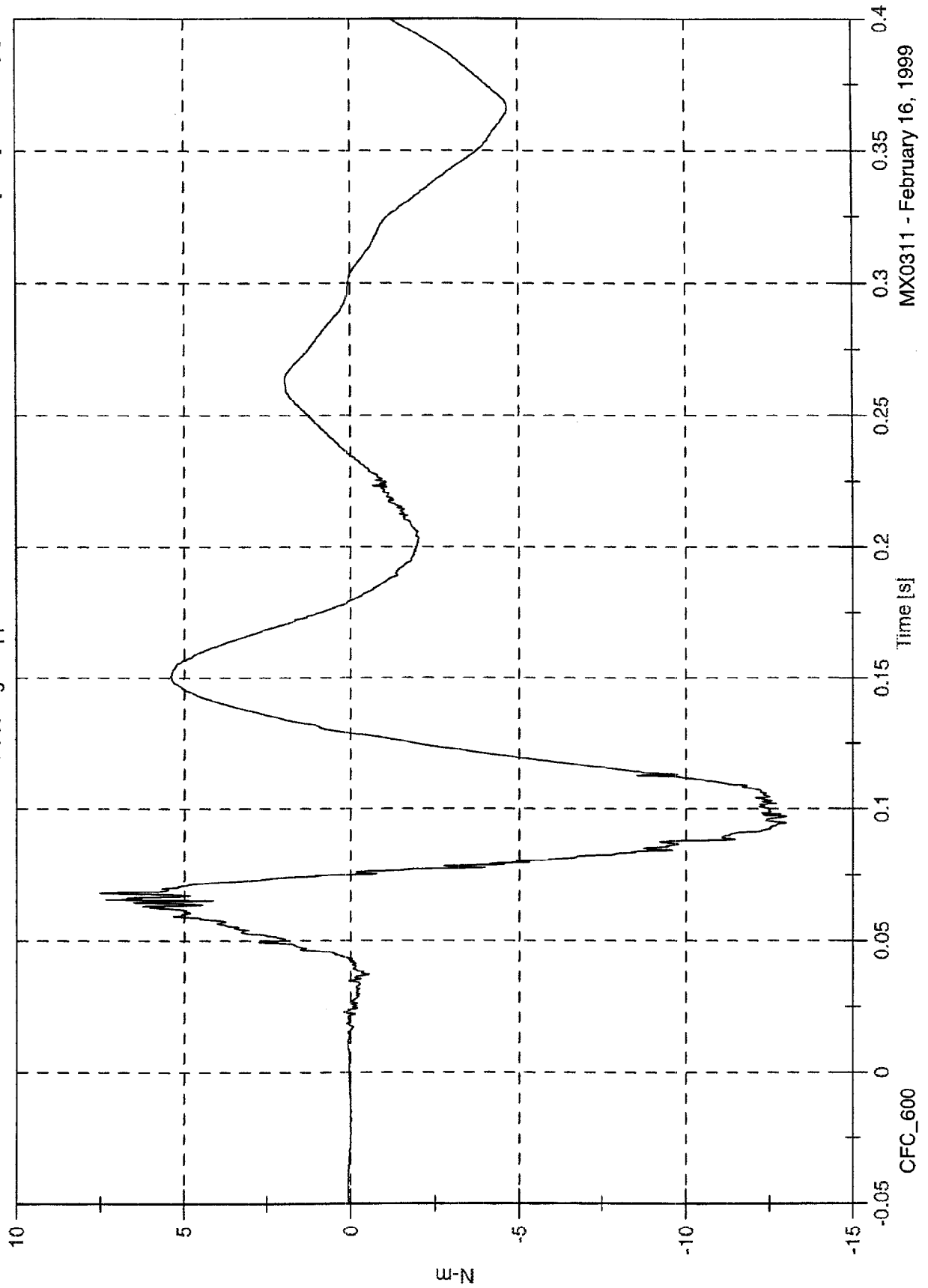


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

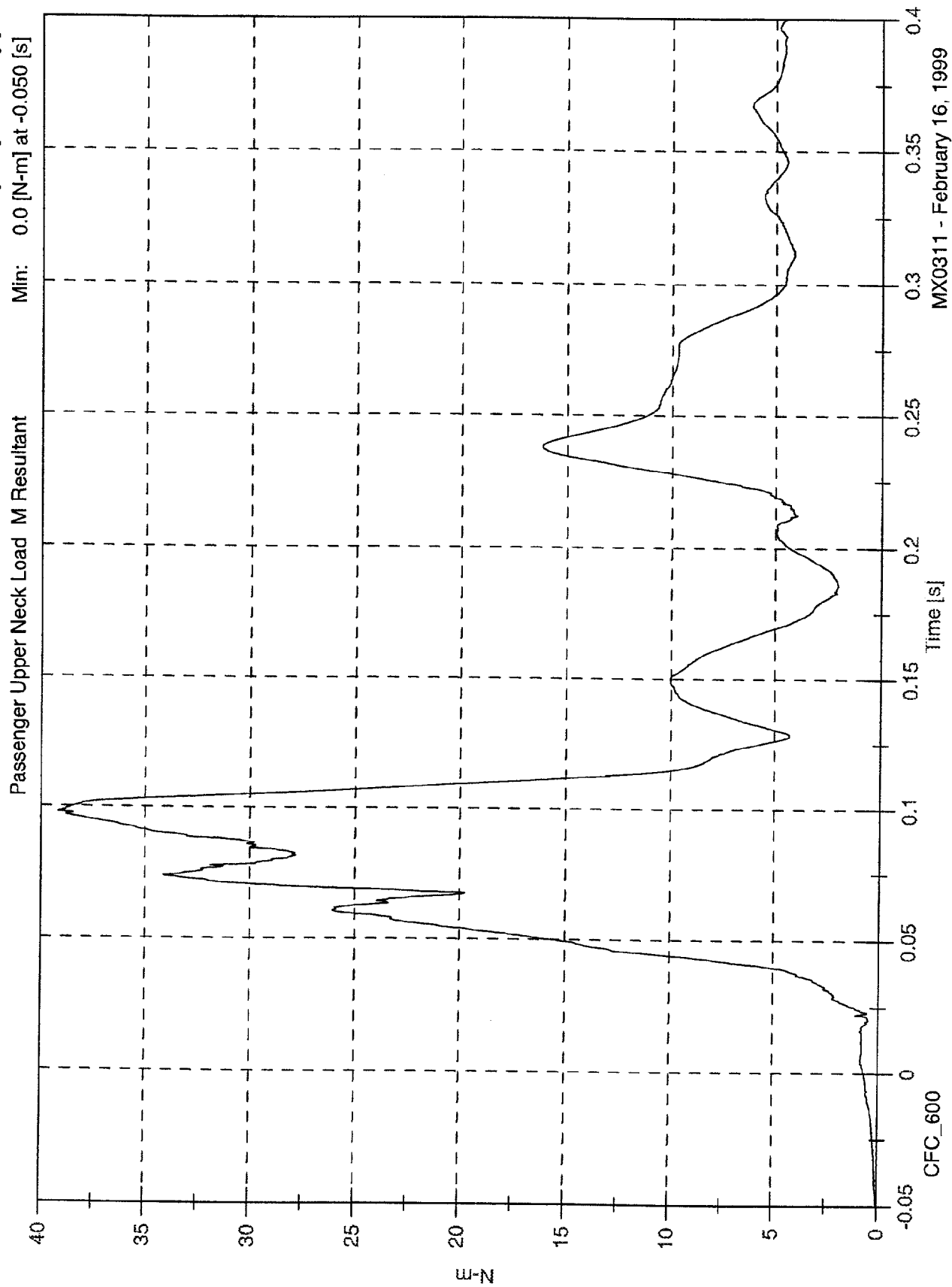
Passenger Upper Neck Load Mz

Max: 7.5 [N-m] at 0.068 [s]
Min: -13.0 [N-m] at 0.097 [s]



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NCAP Test #12 - 1999 Jeep Wrangler

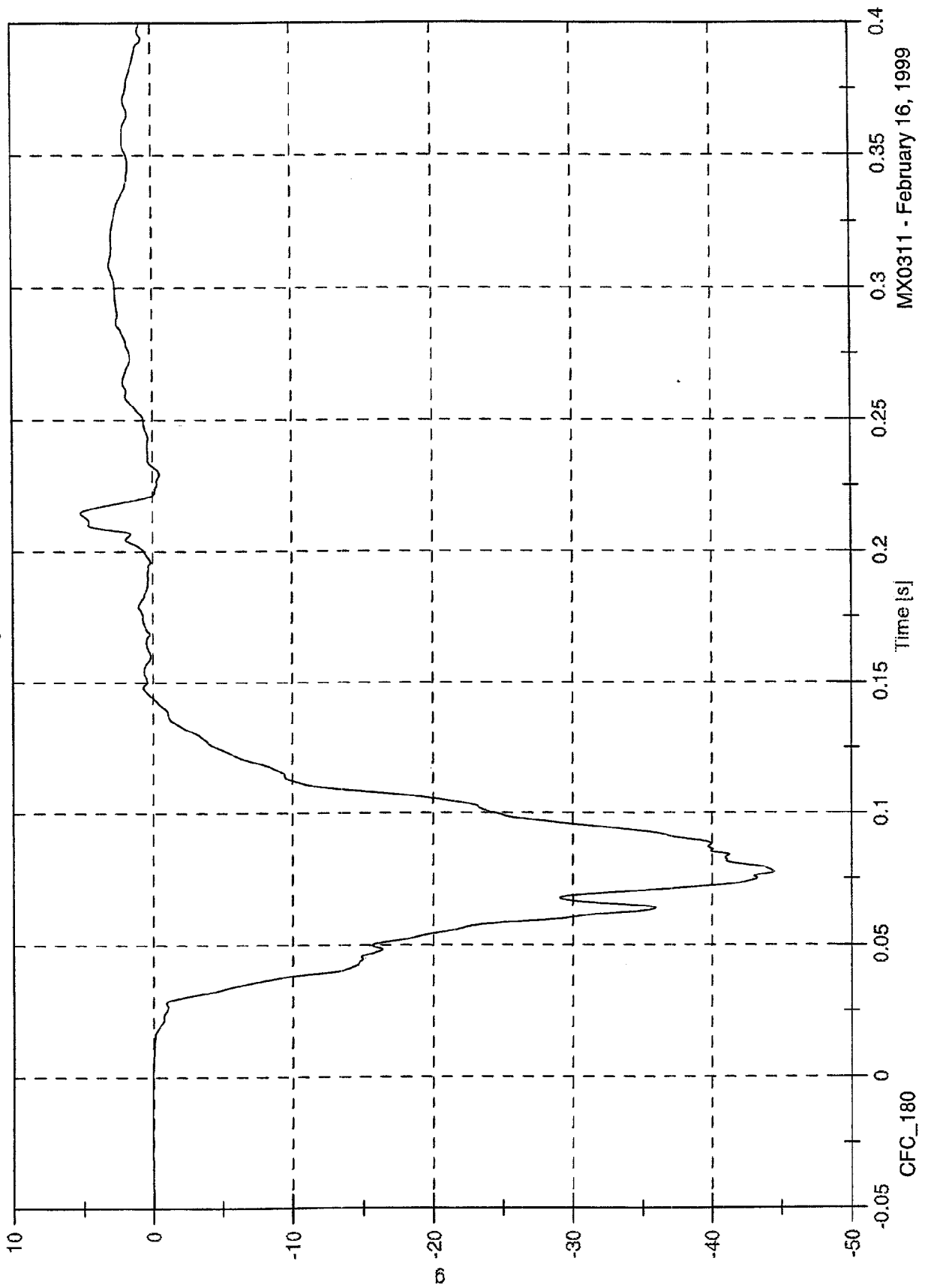


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 5.2 [g] at 0.215 [s]
Min: -44.5 [g] at 0.077 [s]

Passenger Chest Ax

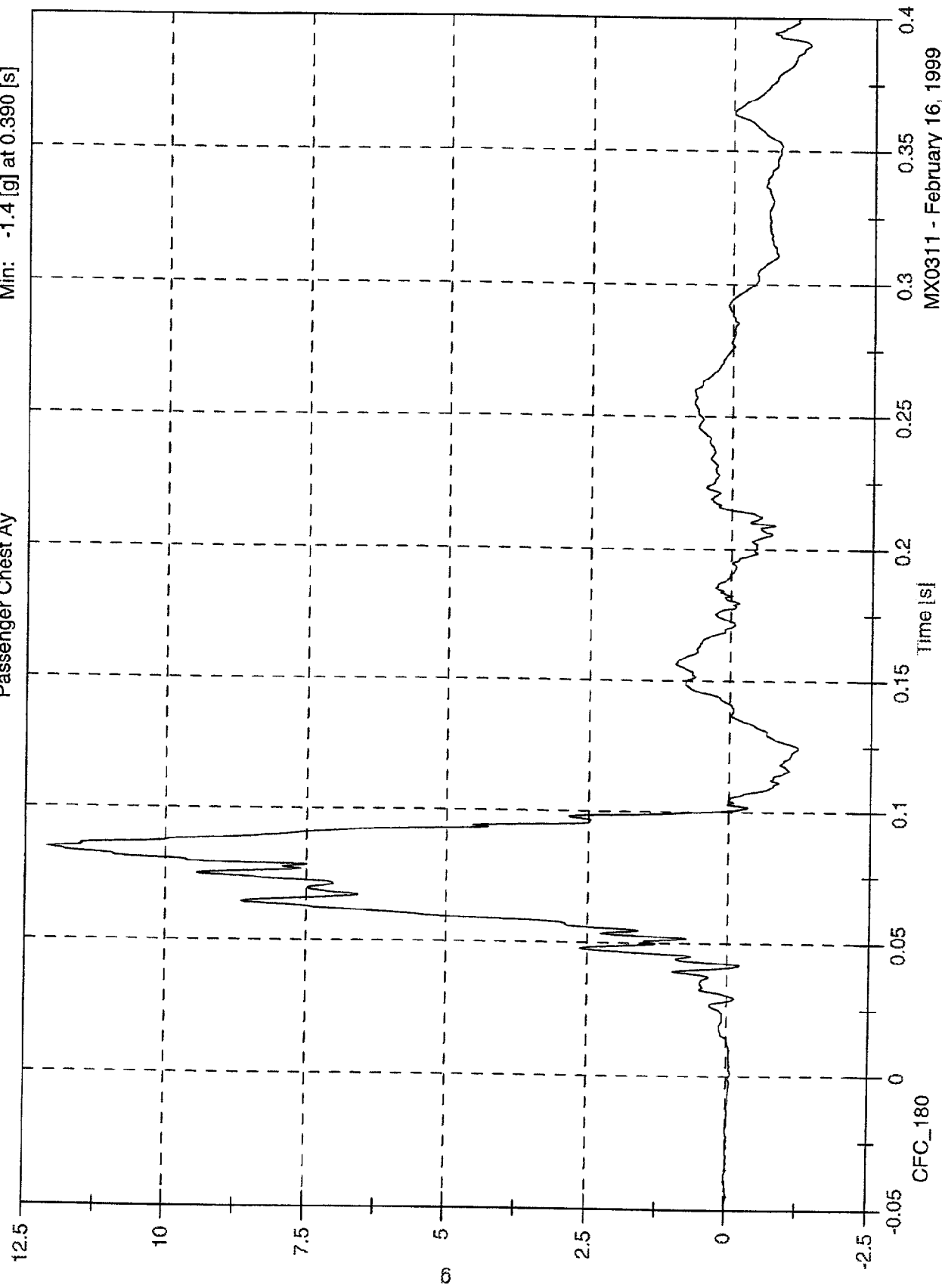


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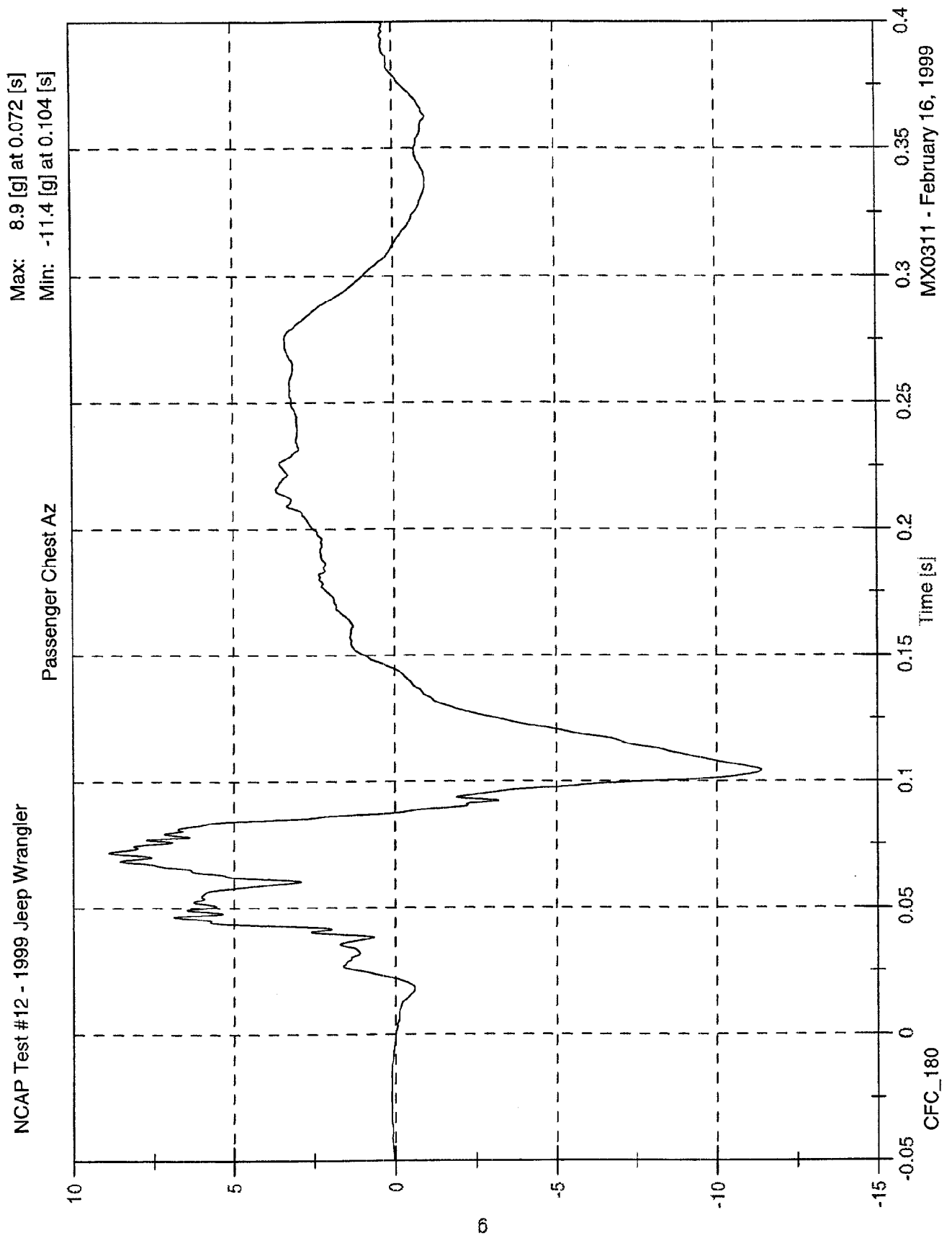
NCAP Test #12 - 1999 Jeep Wrangler

Passenger Chest Ay

Max: 12.1 [g] at 0.085 [s]
Min: -1.4 [g] at 0.390 [s]



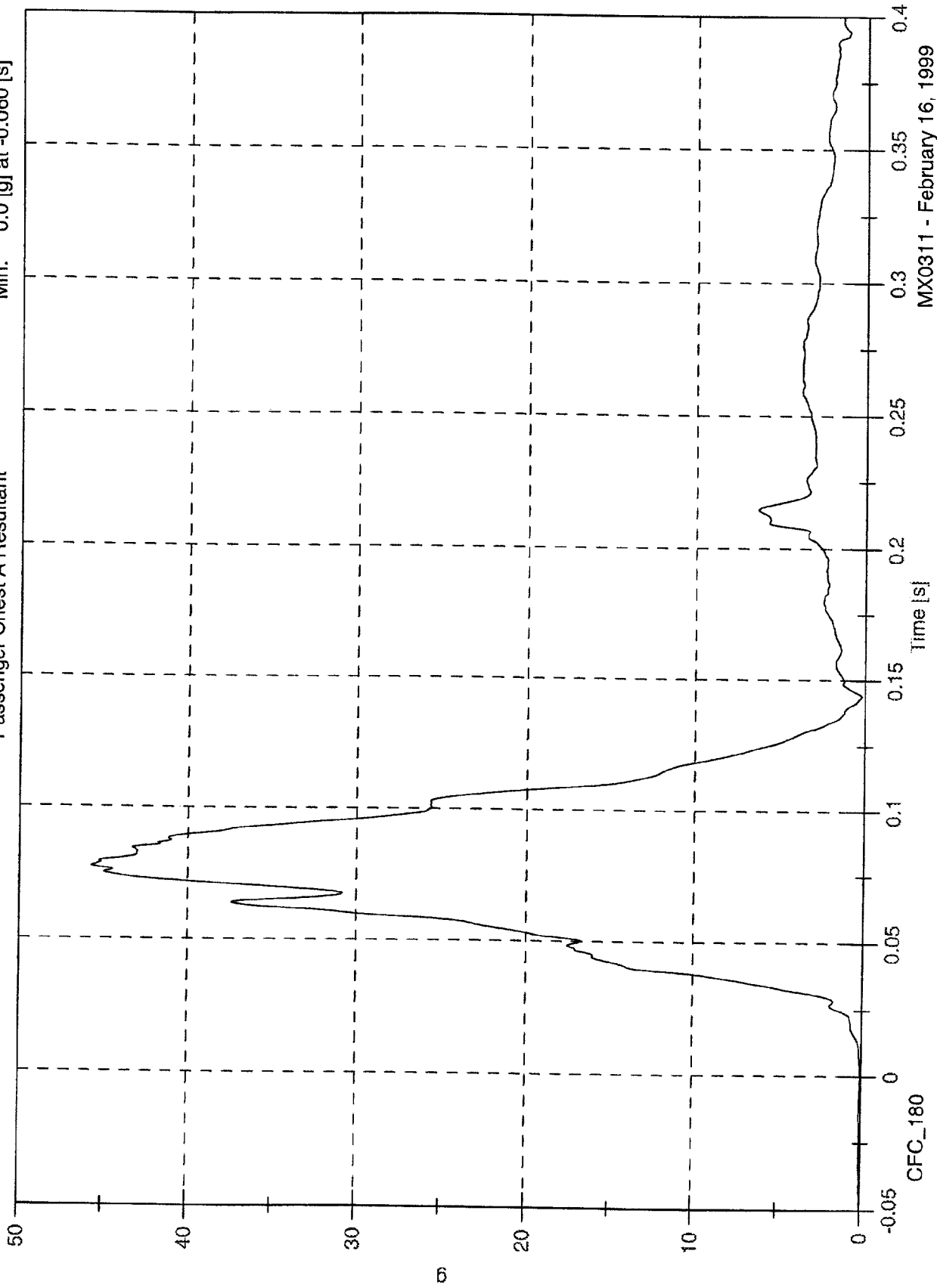
MX0311 - February 16, 1999



NCAP Test #12 - 1999 Jeep Wrangler

Max: 45.7 [g] at 0.077 [s]
Min: 0.0 [g] at -0.060 [s]

Passenger Chest A Resultant



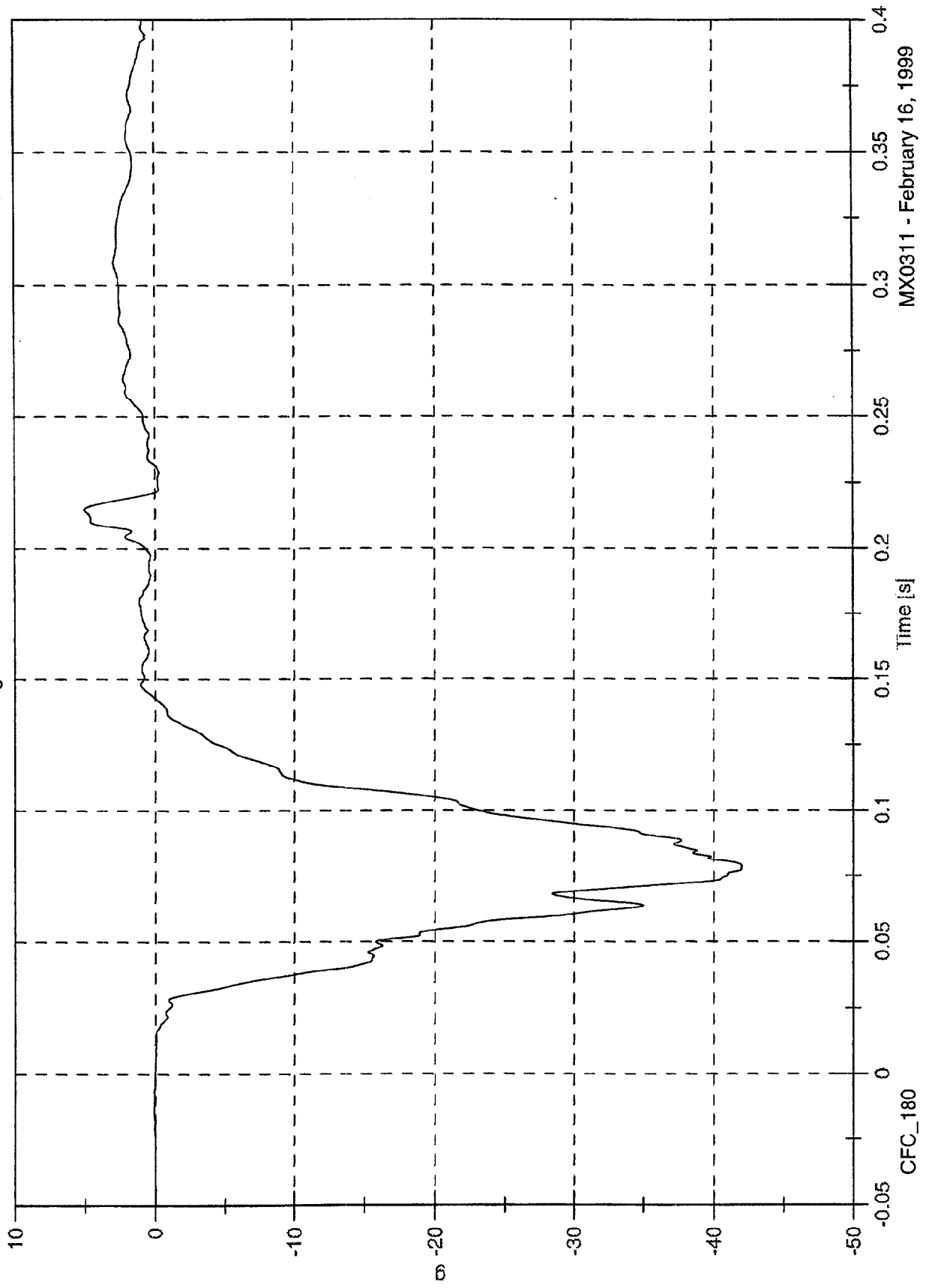
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Passenger Chest Ax Redundant

Max: 5.1 [g] at 0.215 [s]

Min: -42.0 [g] at 0.078 [s]



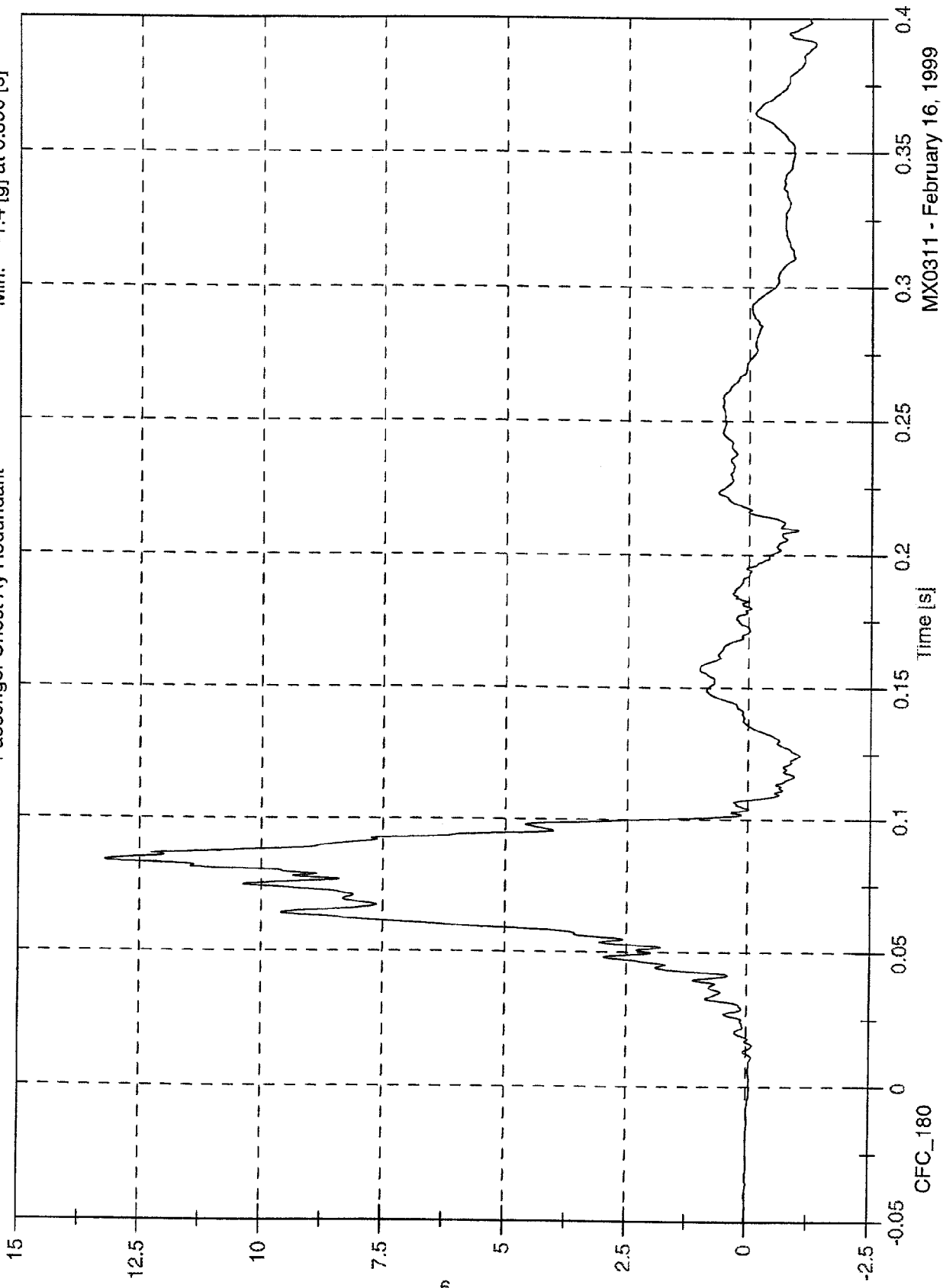
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Passenger Chest Ay Redundant

Max: 13.2 [g] at 0.084 [s]

Min: -1.4 [g] at 0.390 [s]

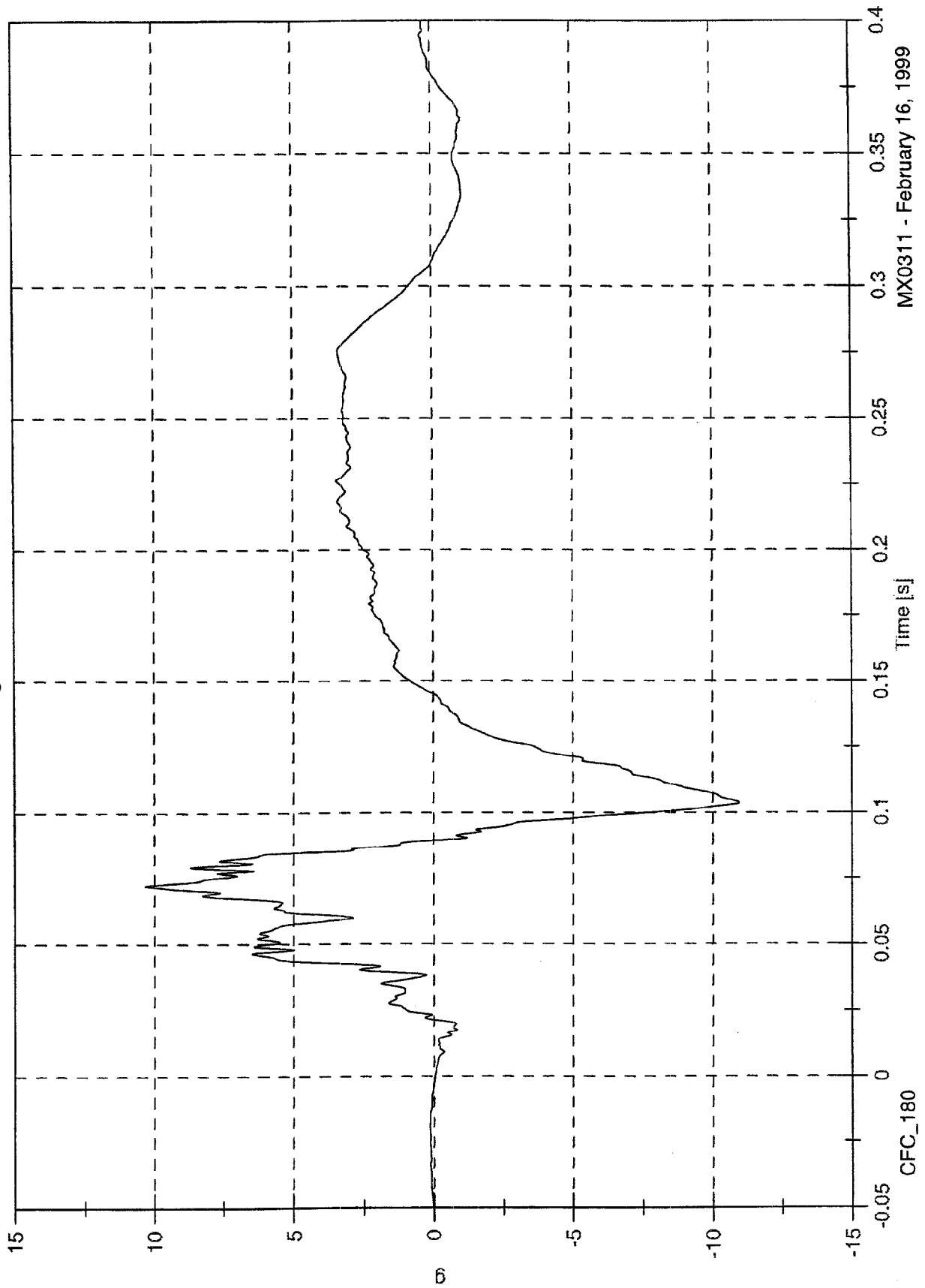


MX0311 - February 16, 1999

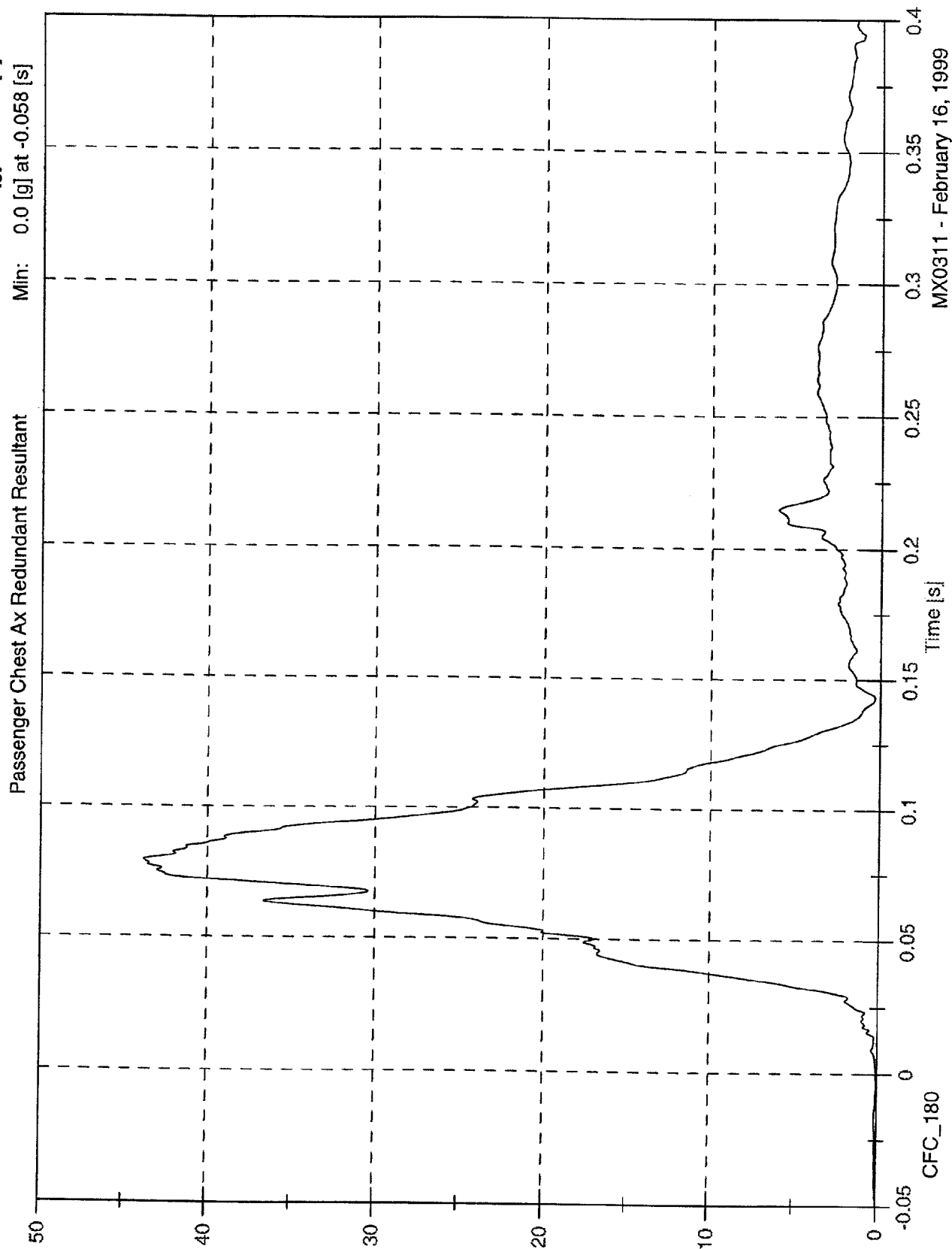
NCAP Test #12 - 1999 Jeep Wrangler

Max: 10.3 [g] at 0.072 [s]
Min: -11.0 [g] at 0.104 [s]

Passenger Chest Az Redundant



NCAP Test #12 - 1999 Jeep Wrangler

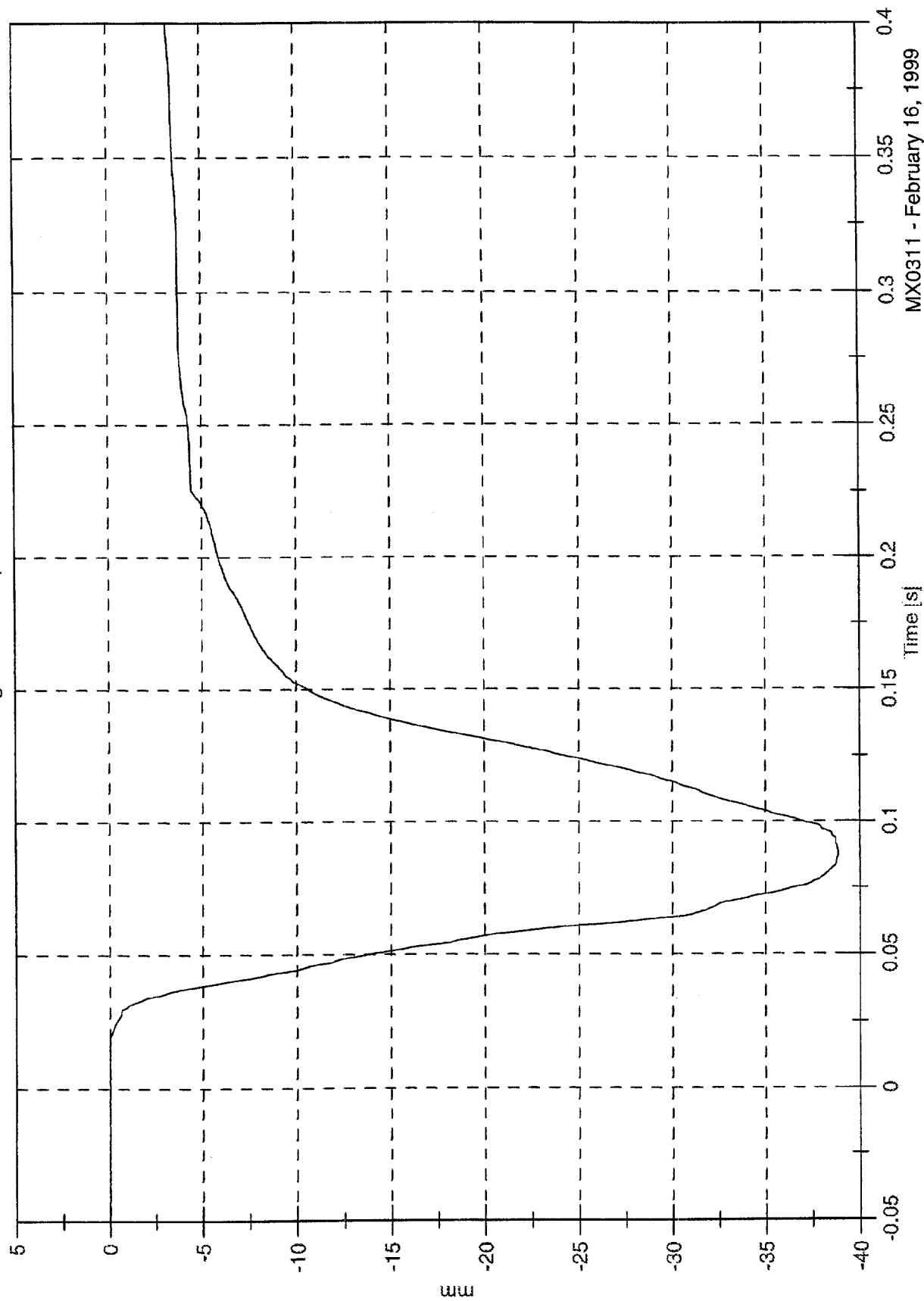


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

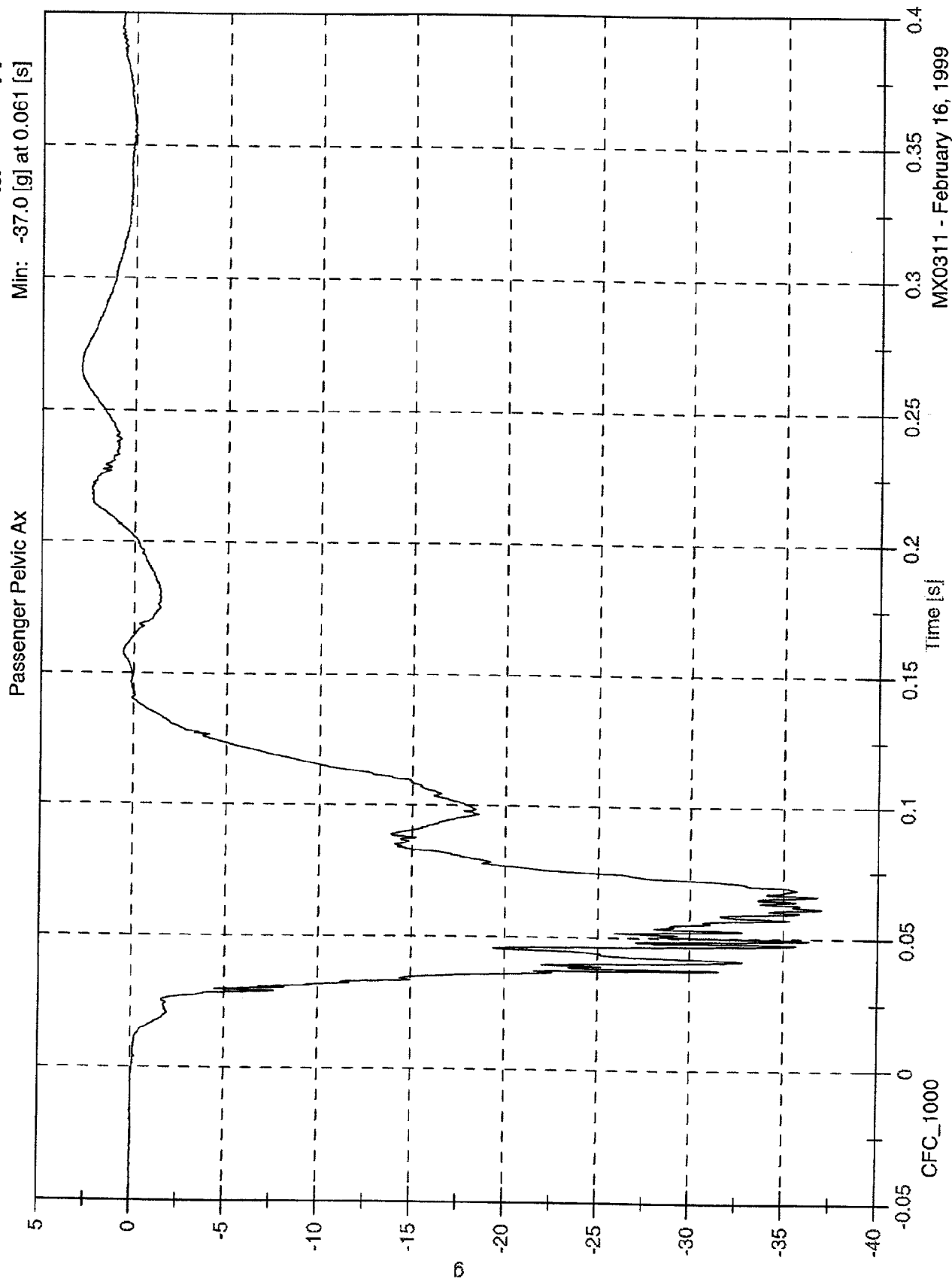
Max: 0.0 [mm] at -0.063 [s]
 Min: -38.9 [mm] at 0.087 [s]

Passenger Chest Displacement



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NCAP Test #12 - 1999 Jeep Wrangler

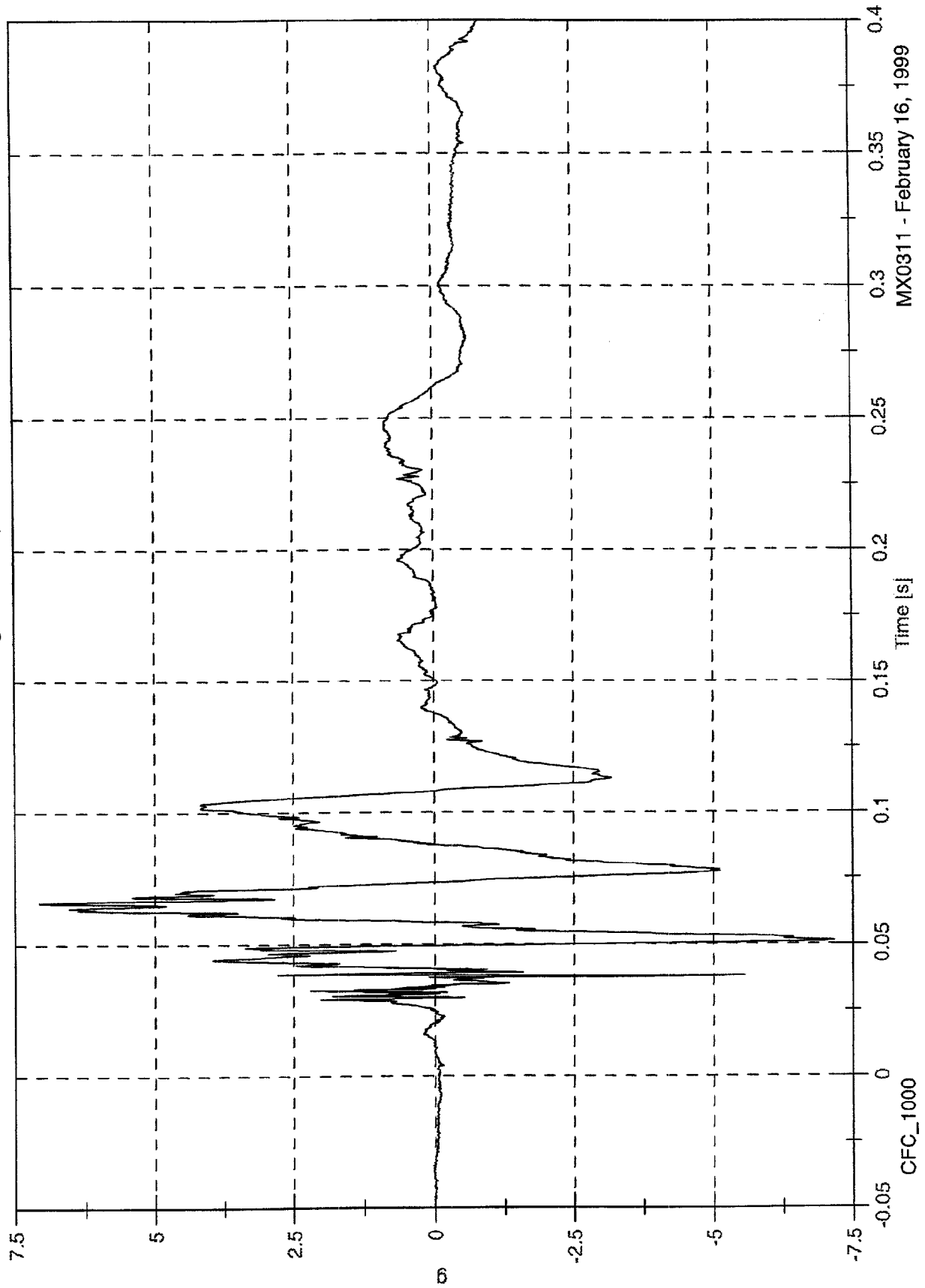


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 7.1 [g] at 0.066 [s]
Min: -7.2 [g] at 0.051 [s]

Passenger Pelvic Ay

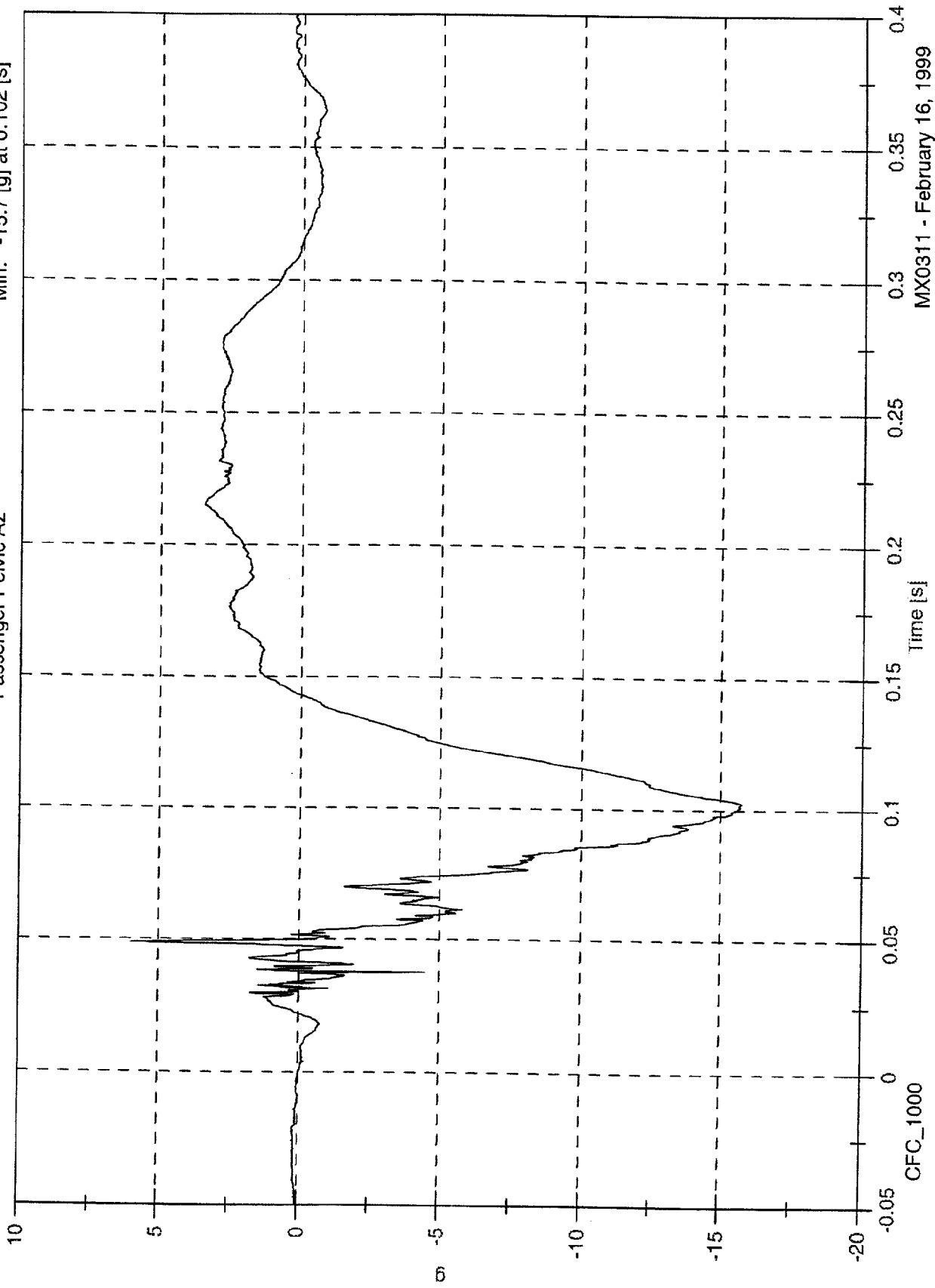


MX0311 - February 16, 1999

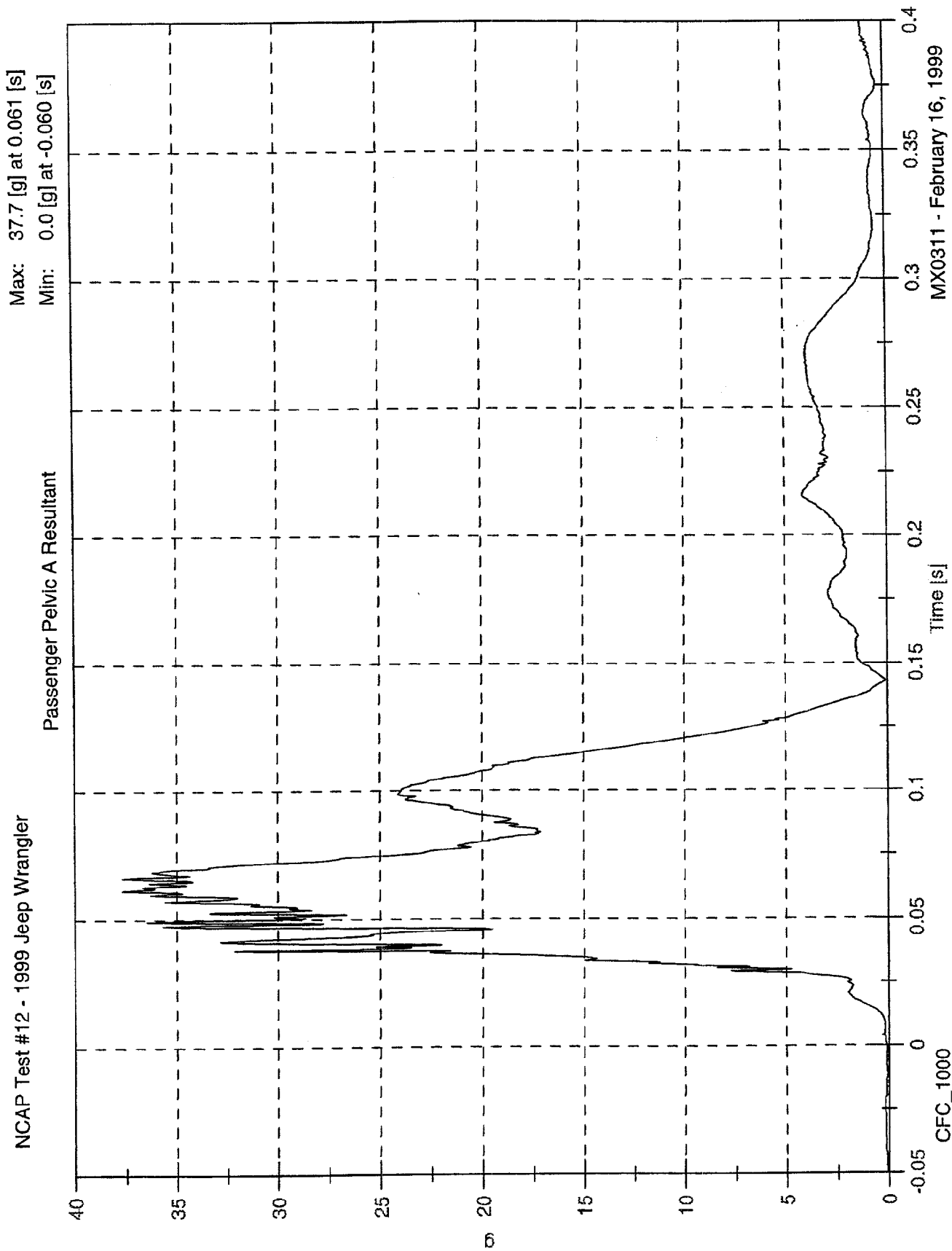
NCAP Test #12 - 1999 Jeep Wrangler

Max: 6.0 [g] at 0.048 [s]
Min: -15.7 [g] at 0.102 [s]

Passenger Pelvic Az



MX0311 - February 16, 1999

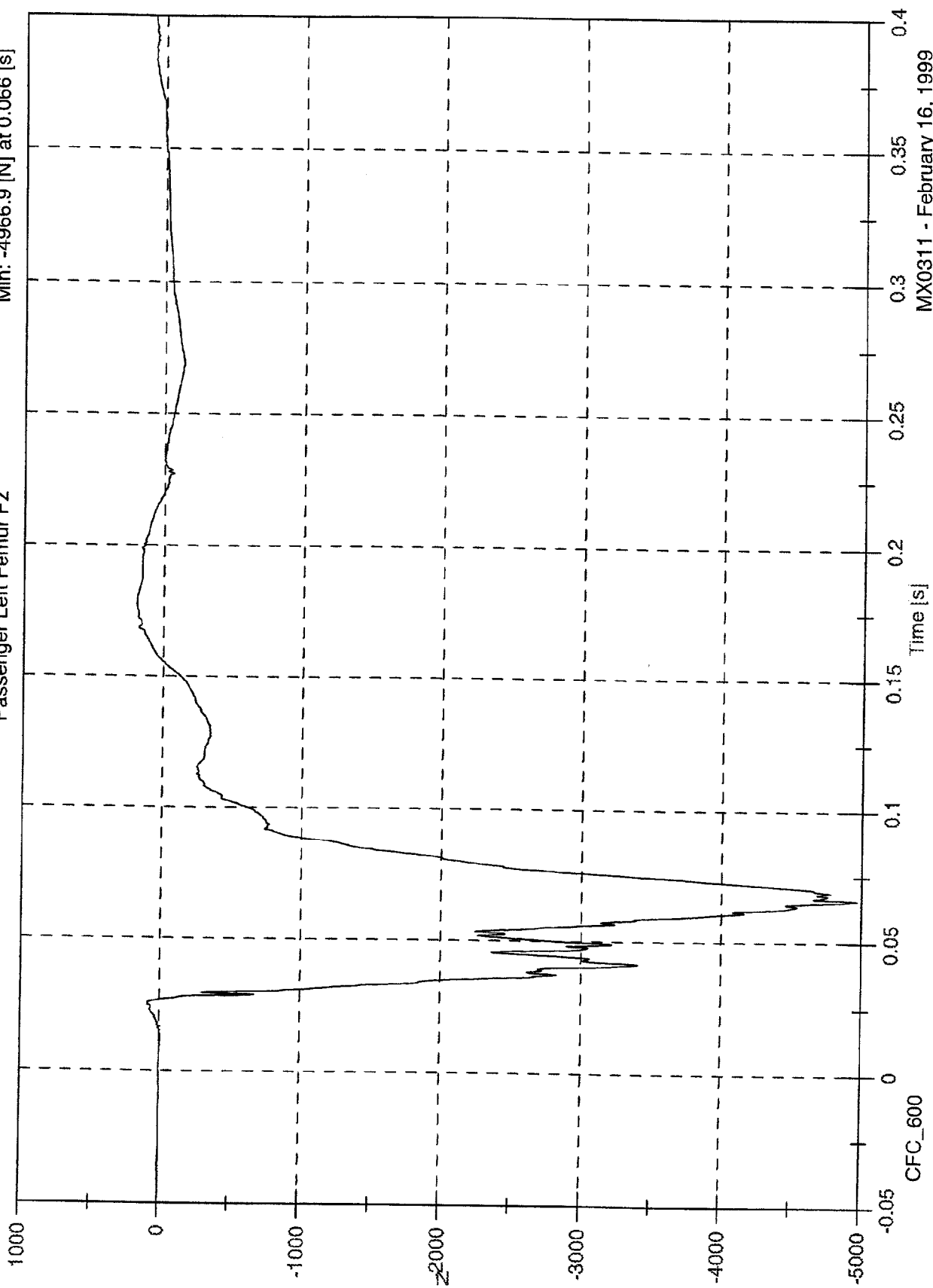


NCAP Test #12 - 1999 Jeep Wrangler

Passenger Left Femur Fz

Max: 202.9 [N] at 0.456 [s]

Min: -4966.9 [N] at 0.066 [s]

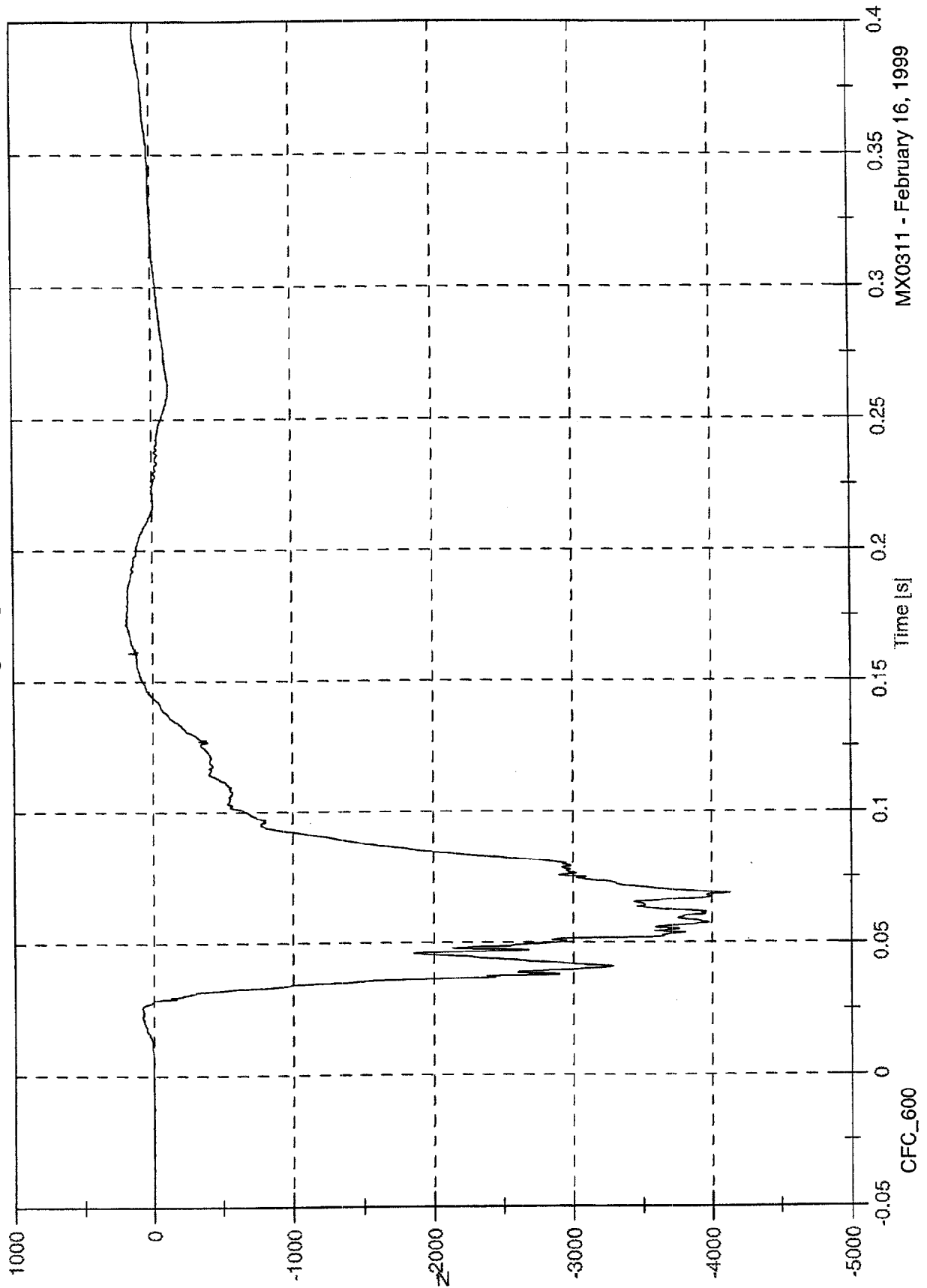


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 249.1 [N] at 0.427 [s]
Min: -4130.3 [N] at 0.069 [s]

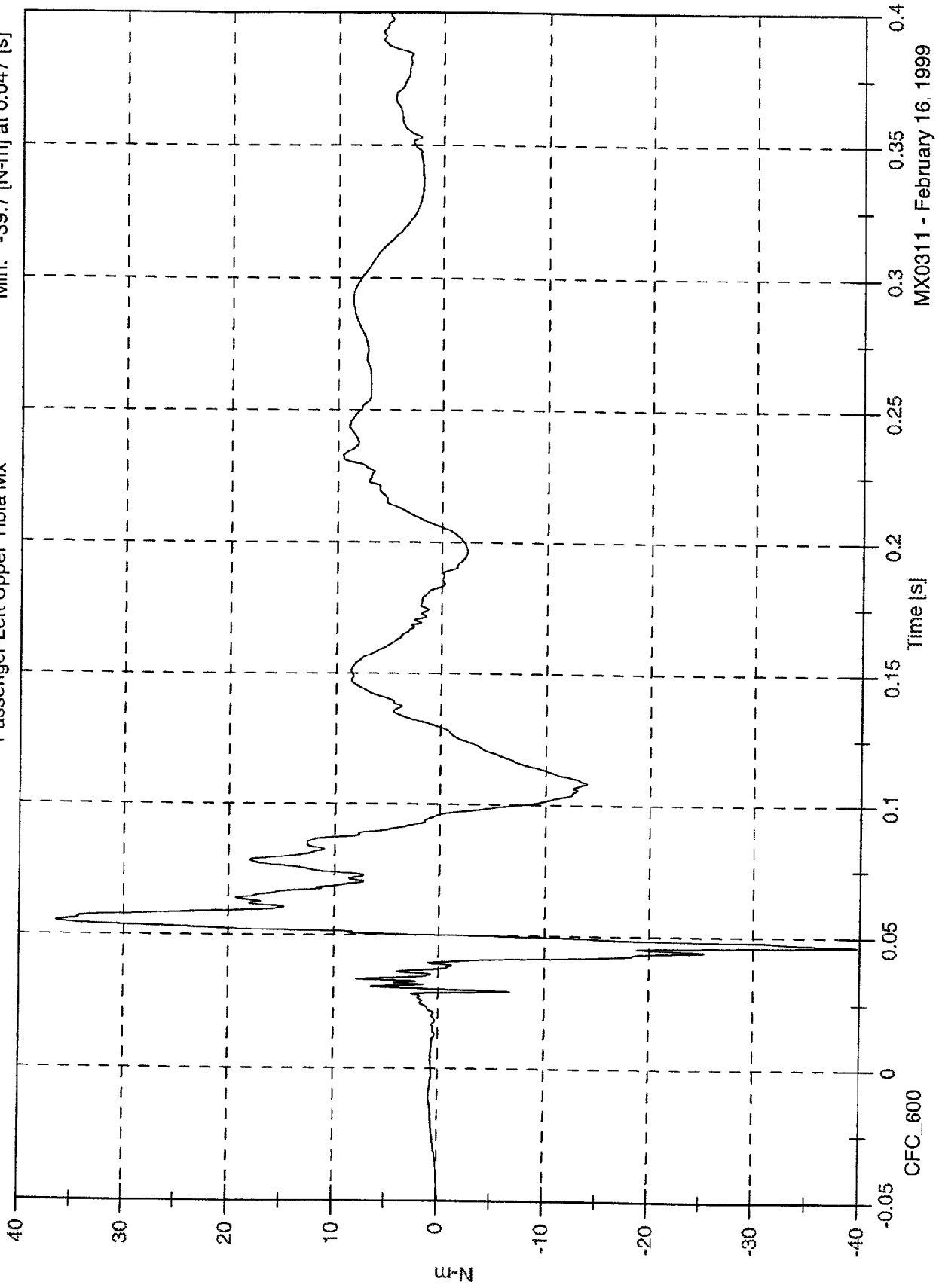
Passenger Right Femur Fz



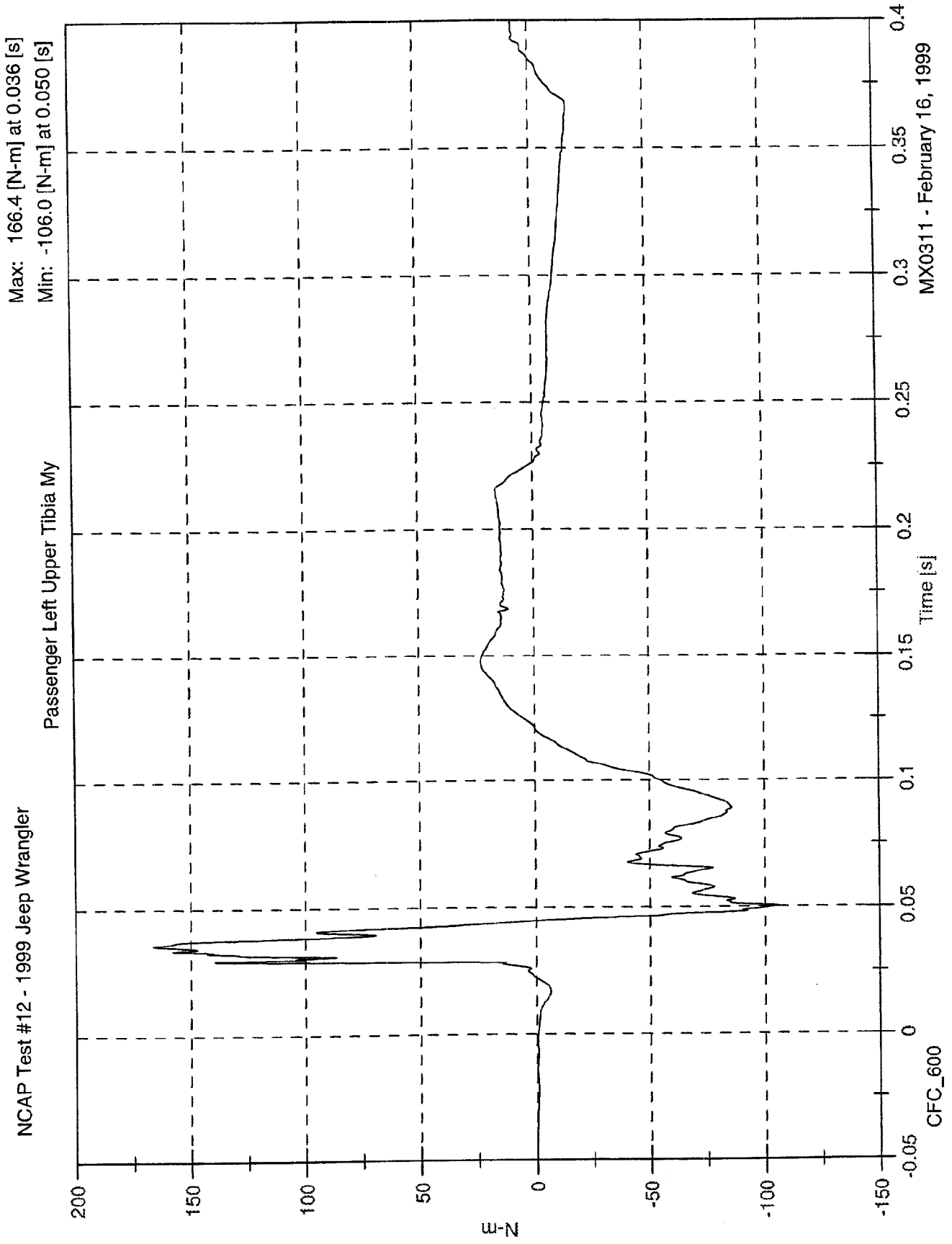
NCAP Test #12 - 1999 Jeep Wrangler

Max: 36.5 [N-m] at 0.055 [s]
Min: -39.7 [N-m] at 0.047 [s]

Passenger Left Upper Tibia Mx



MX0311 - February 16, 1999

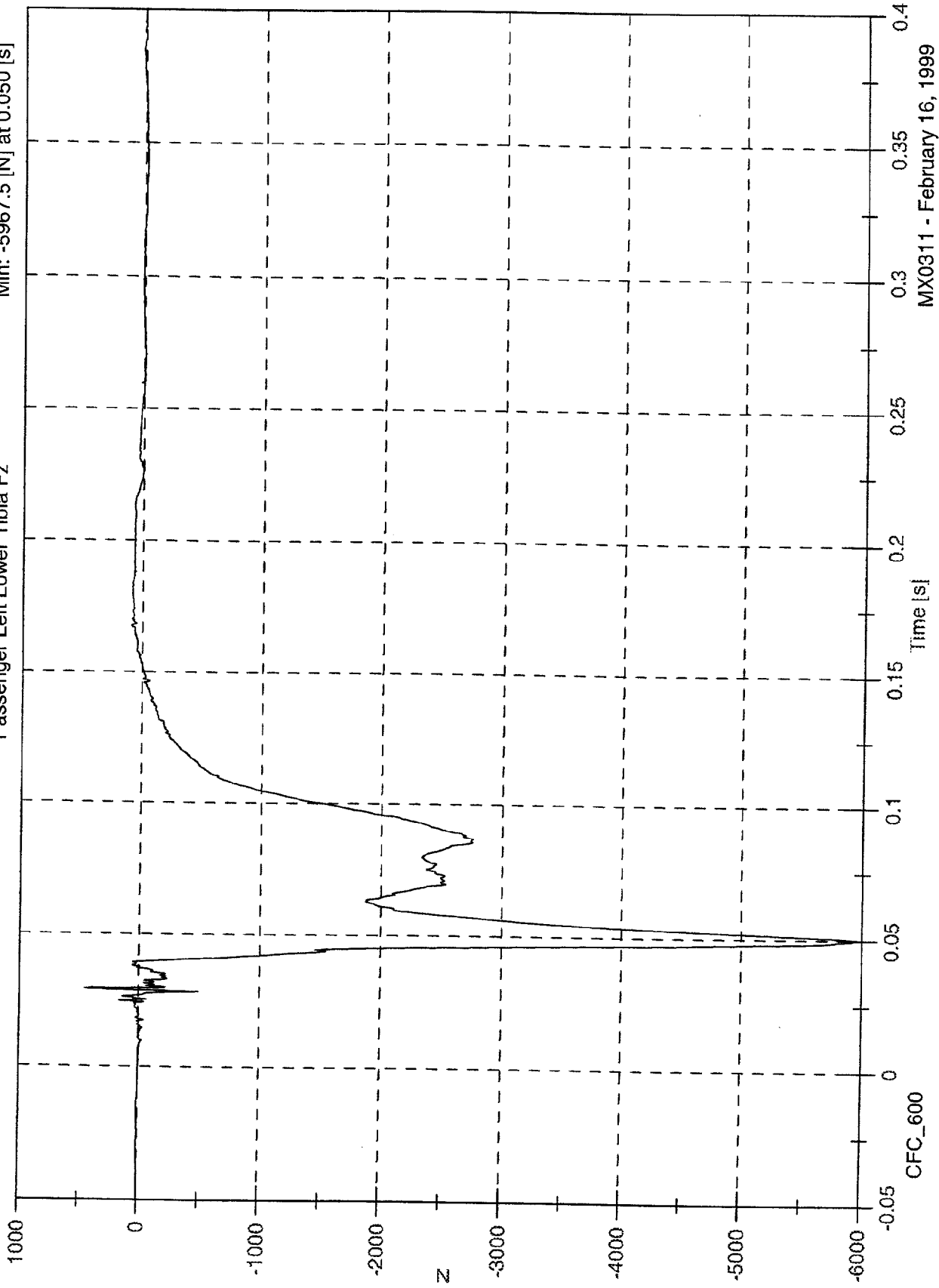


NCAP Test #12 - 1999 Jeep Wrangler

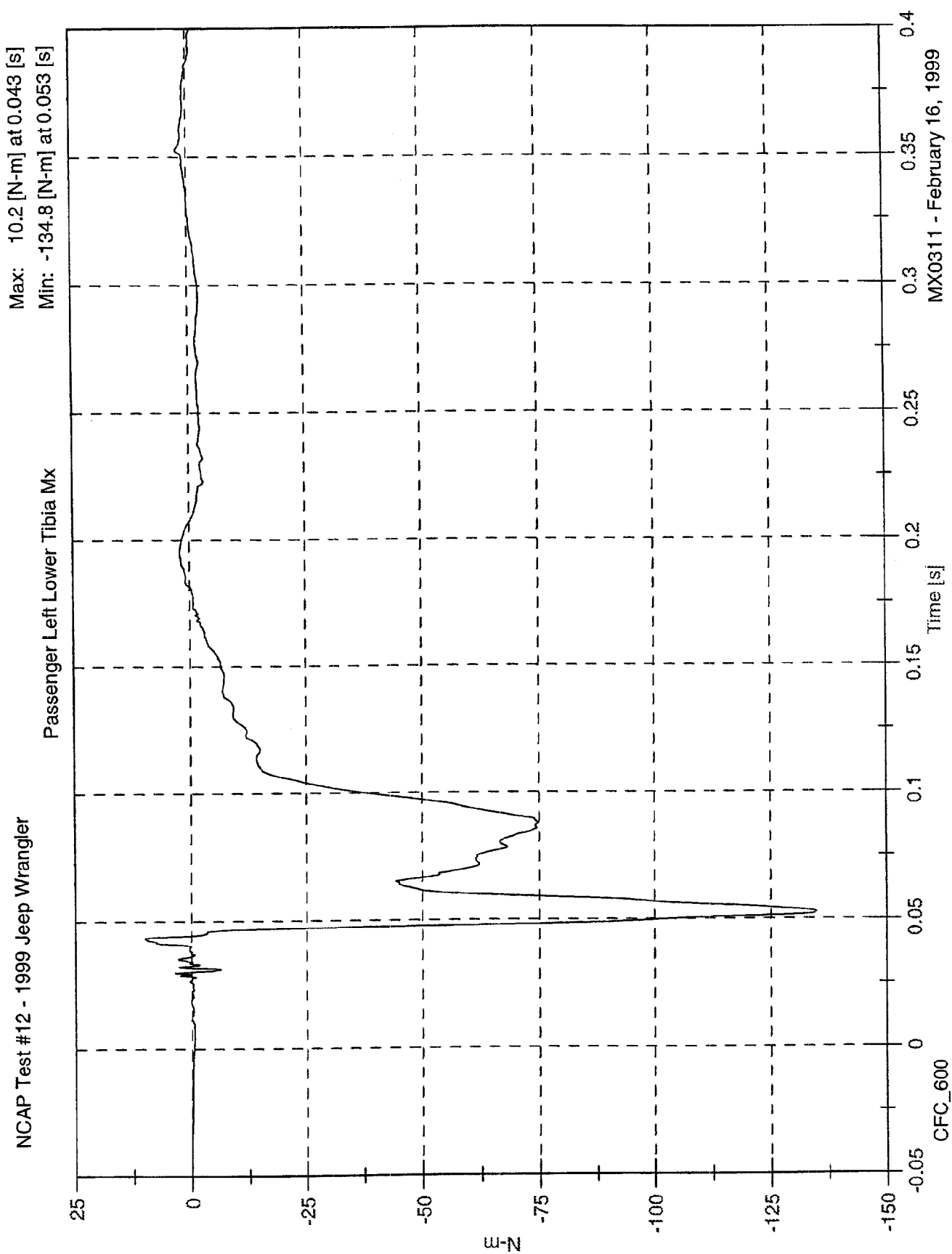
Max: 454.7 [N] at 0.029 [s]

Min: -5967.5 [N] at 0.050 [s]

Passenger Left Lower Tibia Fz



MX0311 - February 16, 1999

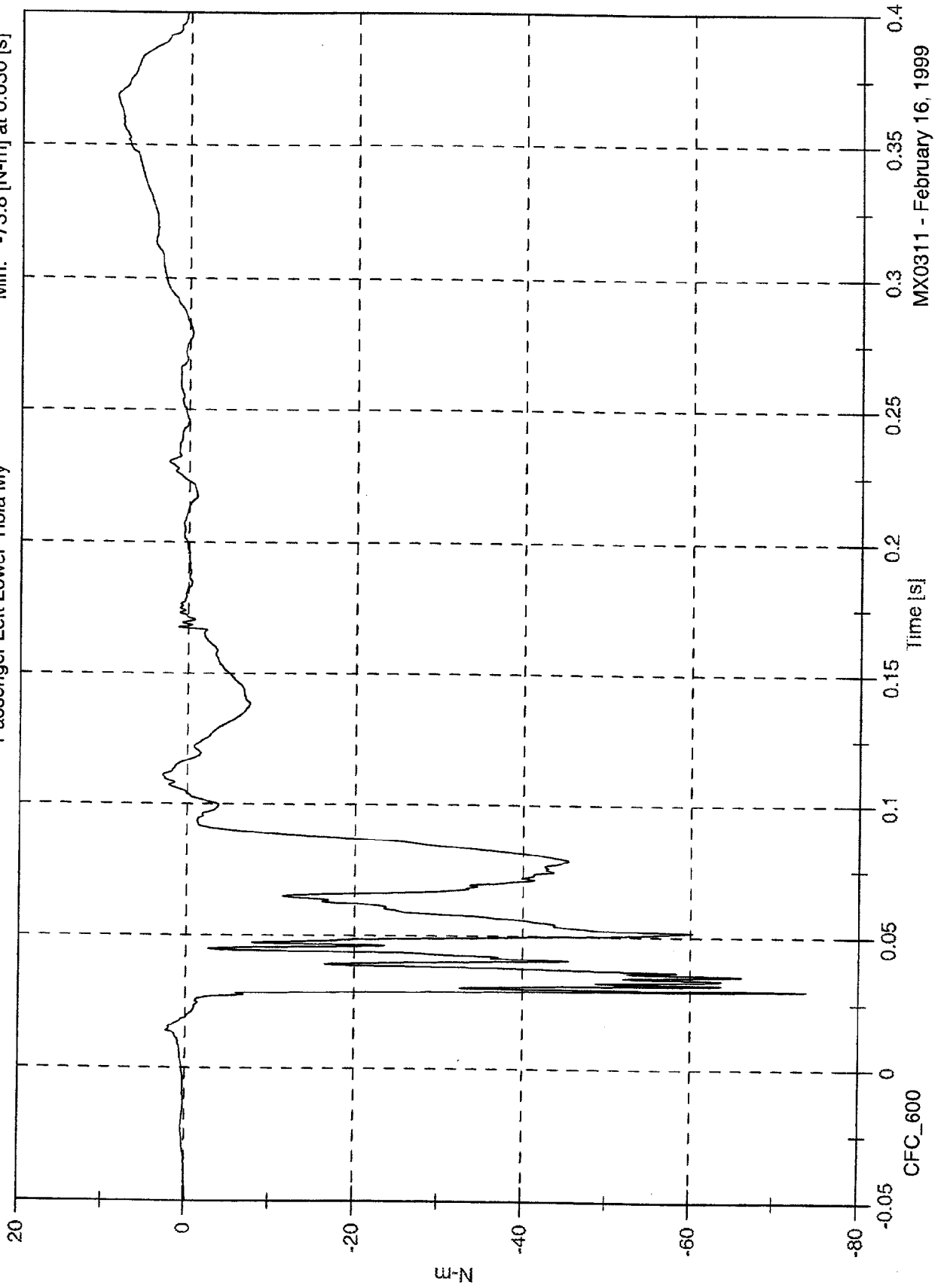


NCAP Test #12 - 1999 Jeep Wrangler

Passenger Left Lower Tibia My

Max: 14.1 [N-m] at 0.456 [s]

Min: -73.8 [N-m] at 0.030 [s]

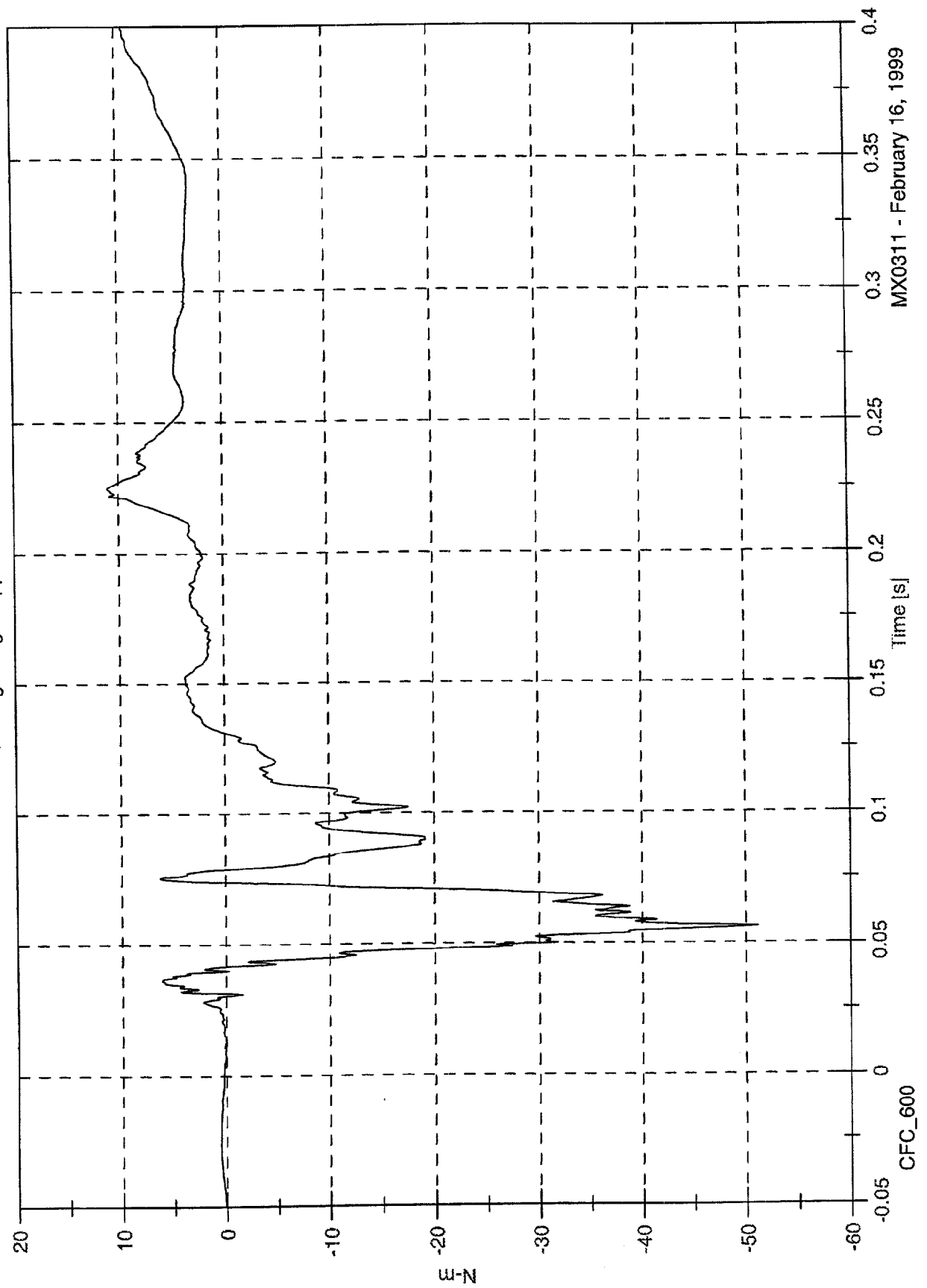


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 11.1 [N-m] at 0.225 [s]
Min: -51.1 [N-m] at 0.056 [s]

Passenger Right Upper Tibia Mx



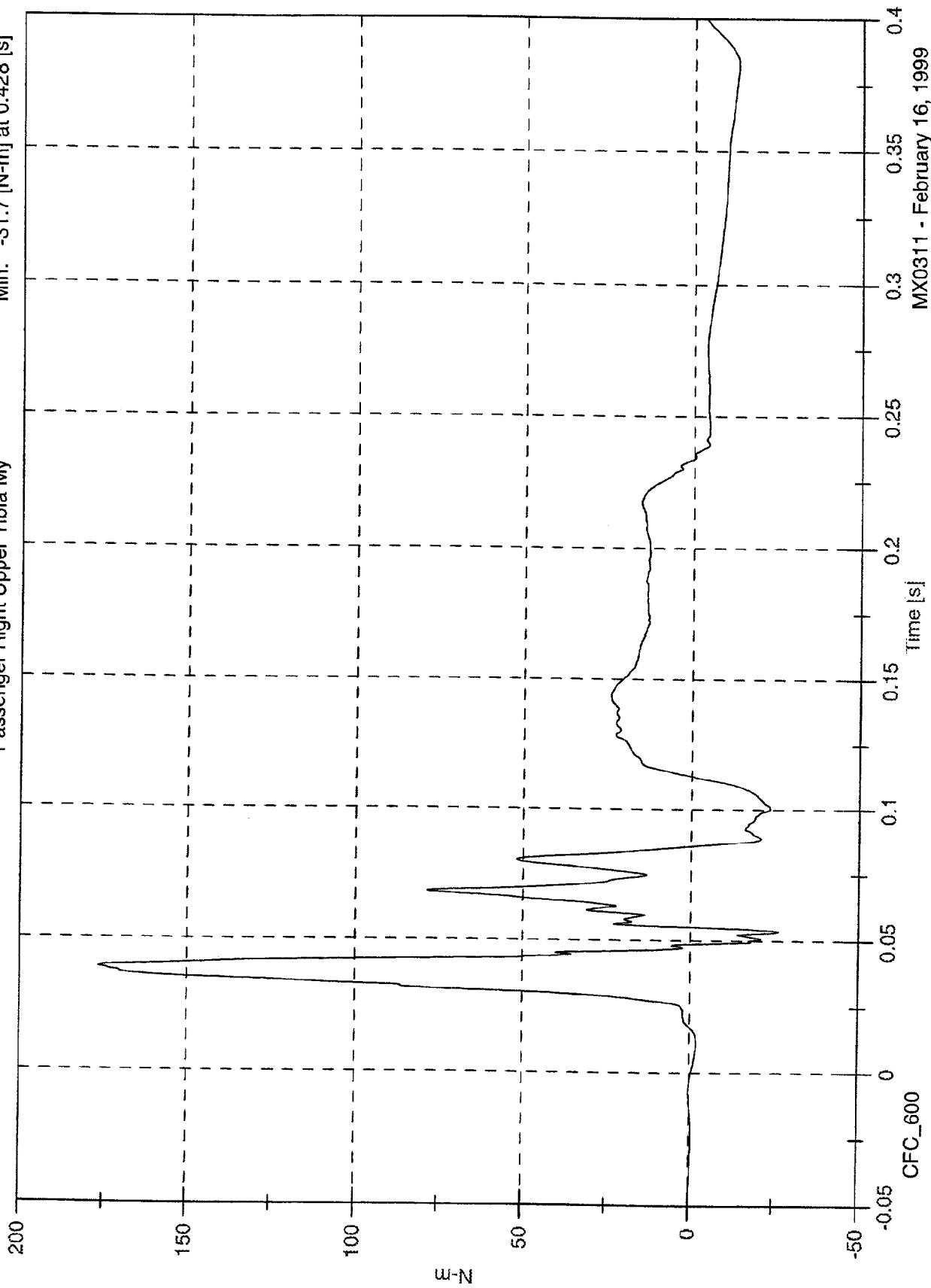
MX0311 - February 16, 1999

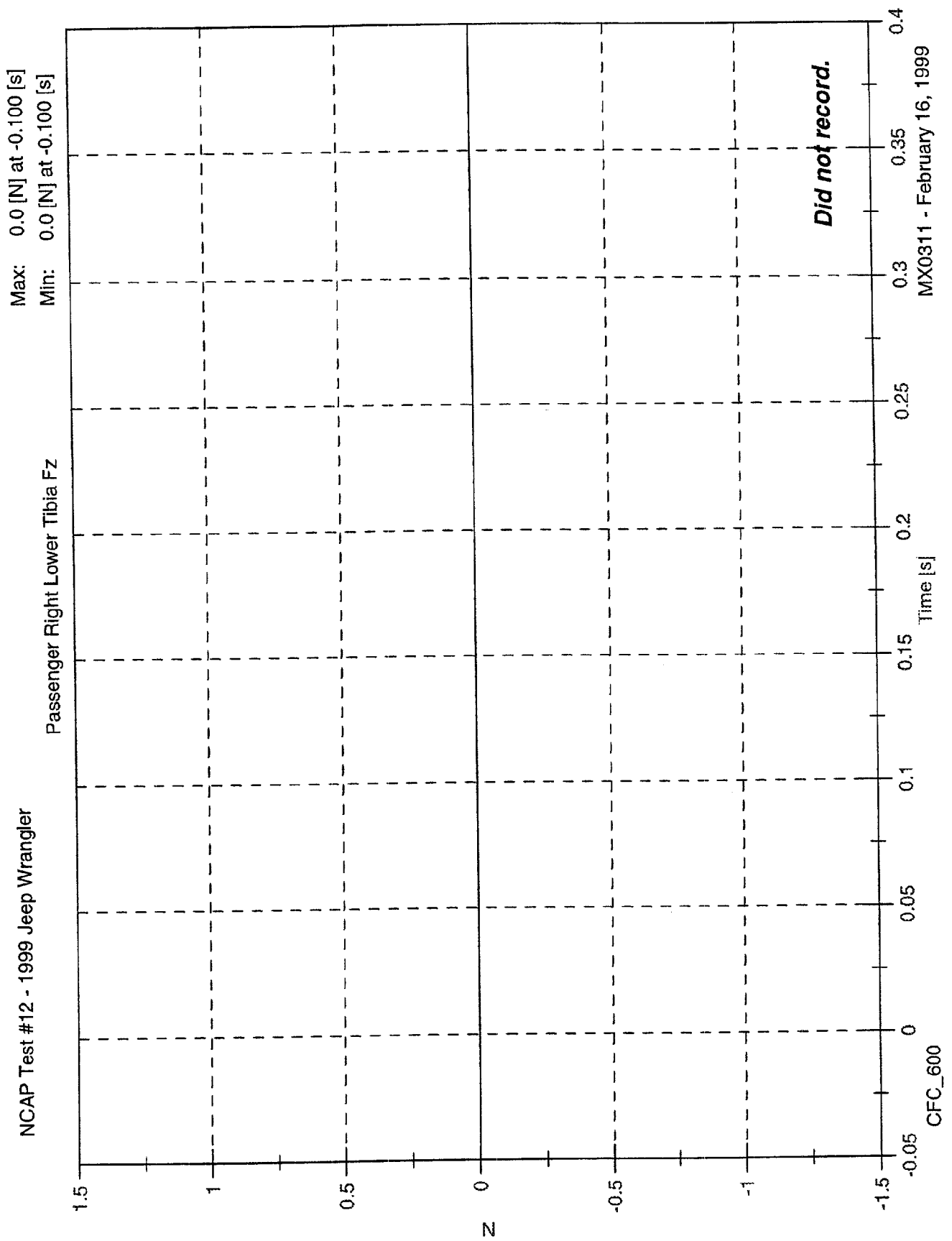
NCAP Test #12 - 1999 Jeep Wrangler

Passenger Right Upper Tibia My

Max: 176.7 [N-m] at 0.039 [s]

Min: -31.7 [N-m] at 0.428 [s]

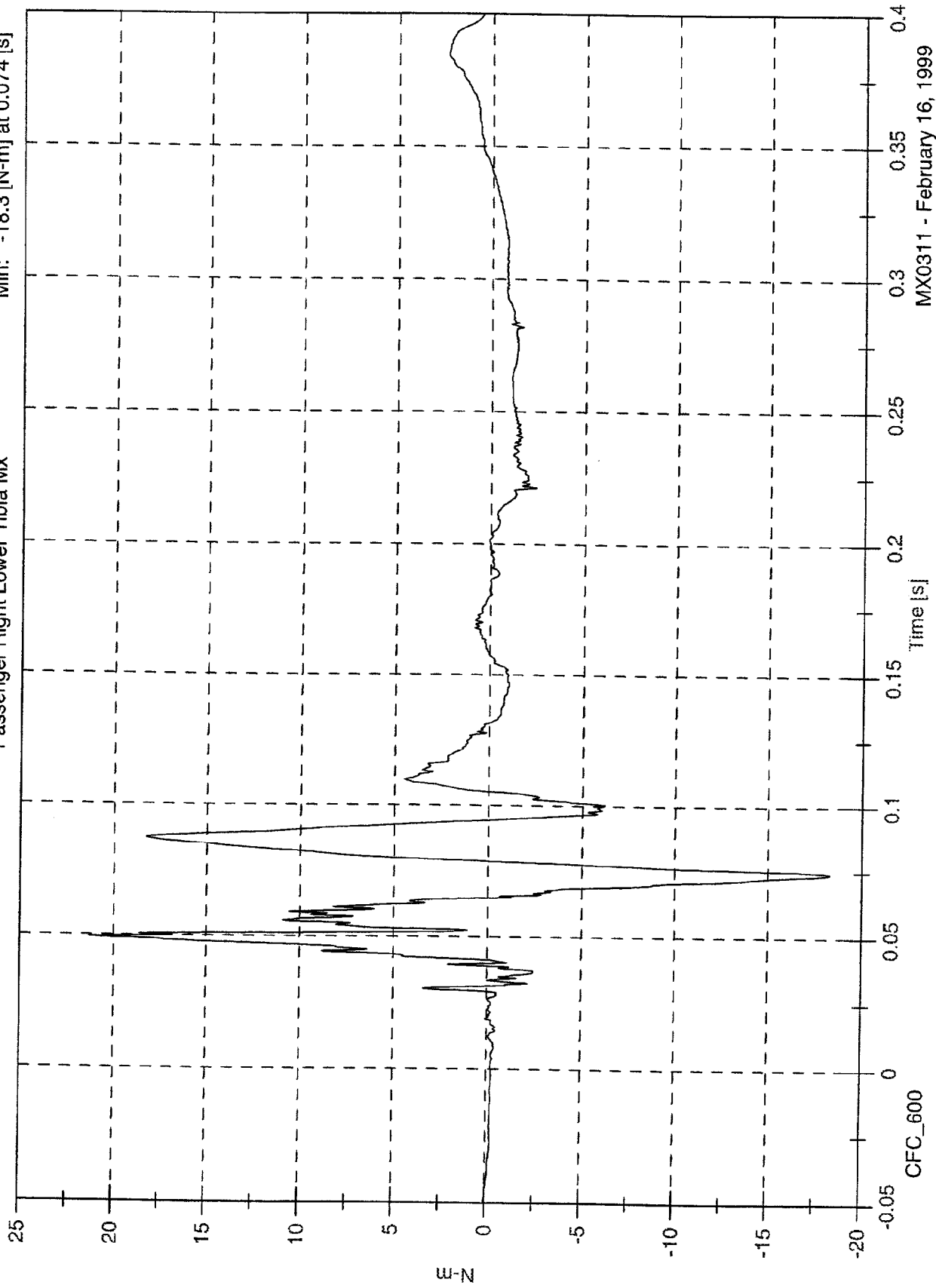




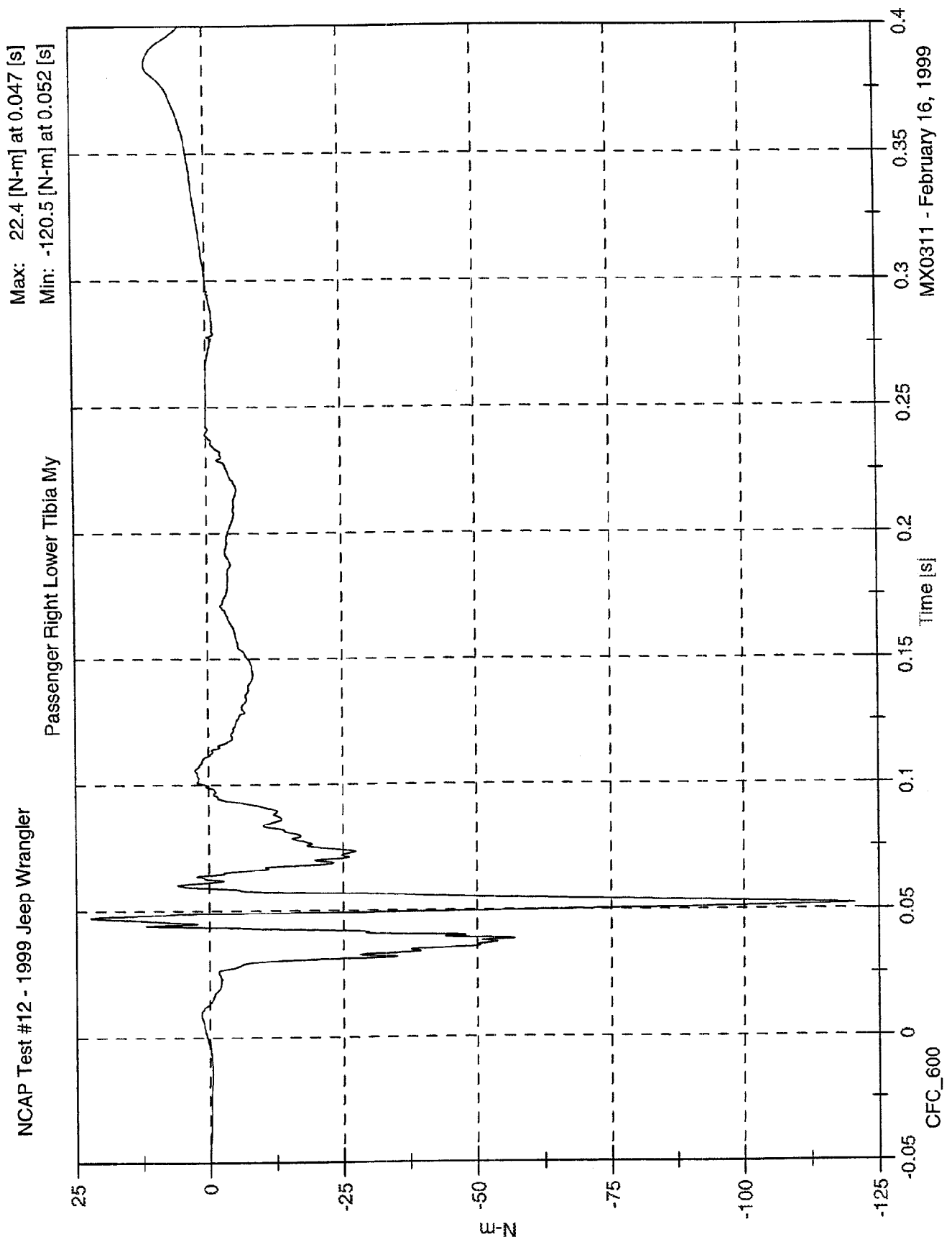
NCAP Test #12 - 1999 Jeep Wrangler

Max: 21.3 [N-m] at 0.049 [s]
 Min: -18.3 [N-m] at 0.074 [s]

Passenger Right Lower Tibia Mx



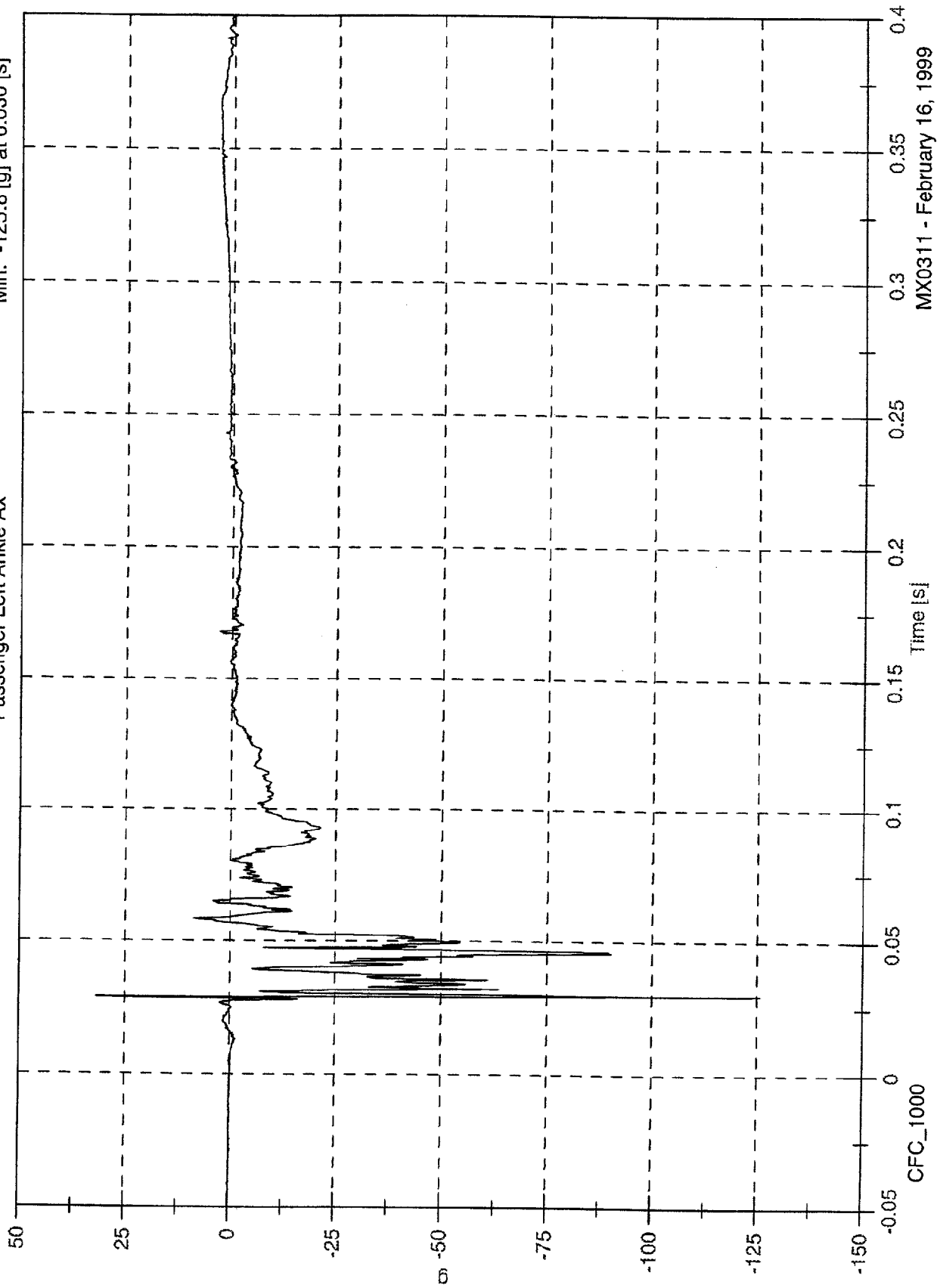
MX0311 - February 16, 1999



NCAP Test #12 - 1999 Jeep Wrangler

Max: 31.9 [g] at 0.029 [s]
Min: -125.8 [g] at 0.030 [s]

Passenger Left Ankle Ax

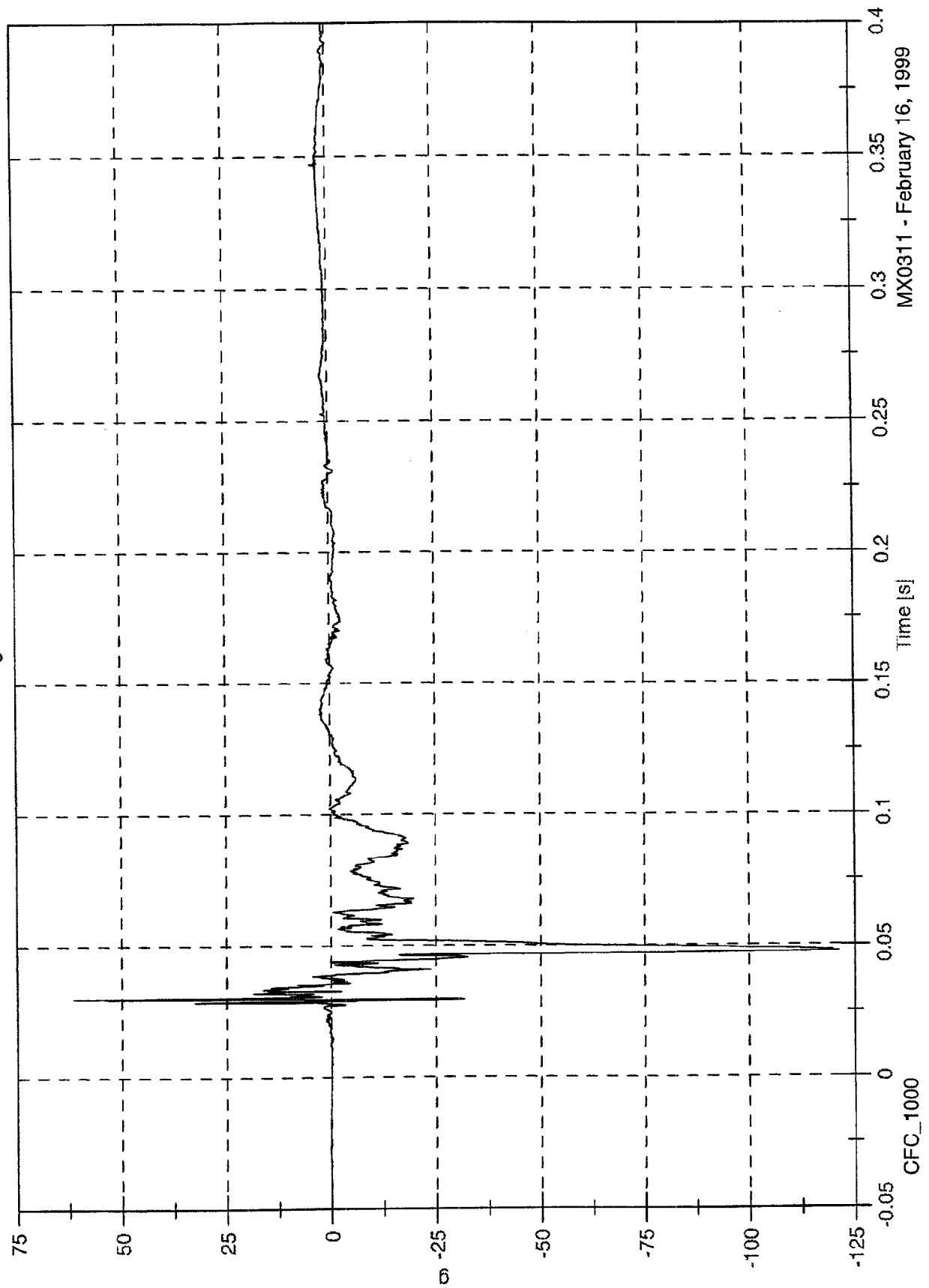


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 61.6 [g] at 0.030 [s]
Min: -121.2 [g] at 0.047 [s]

Passenger Left Ankle Az



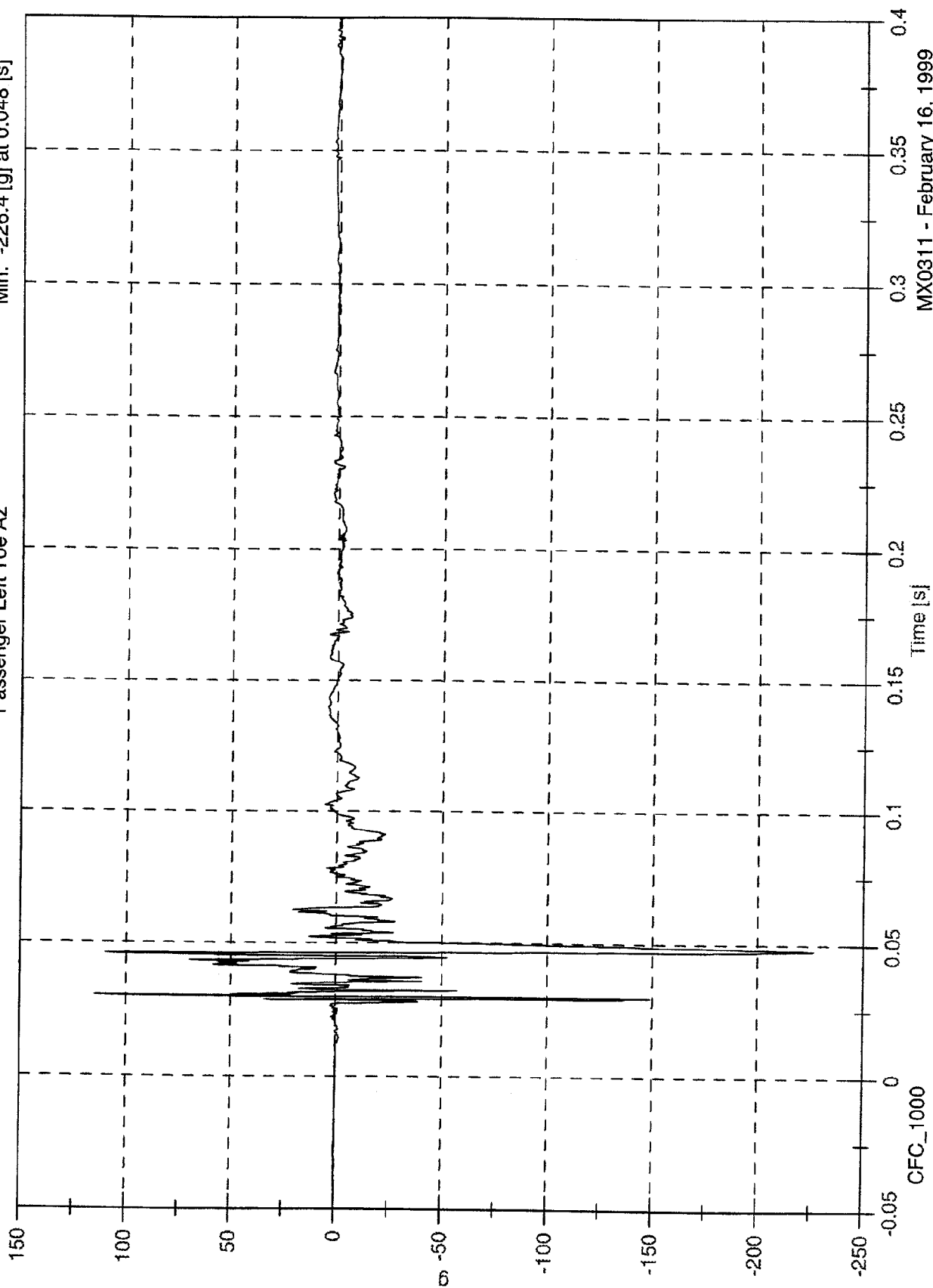
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

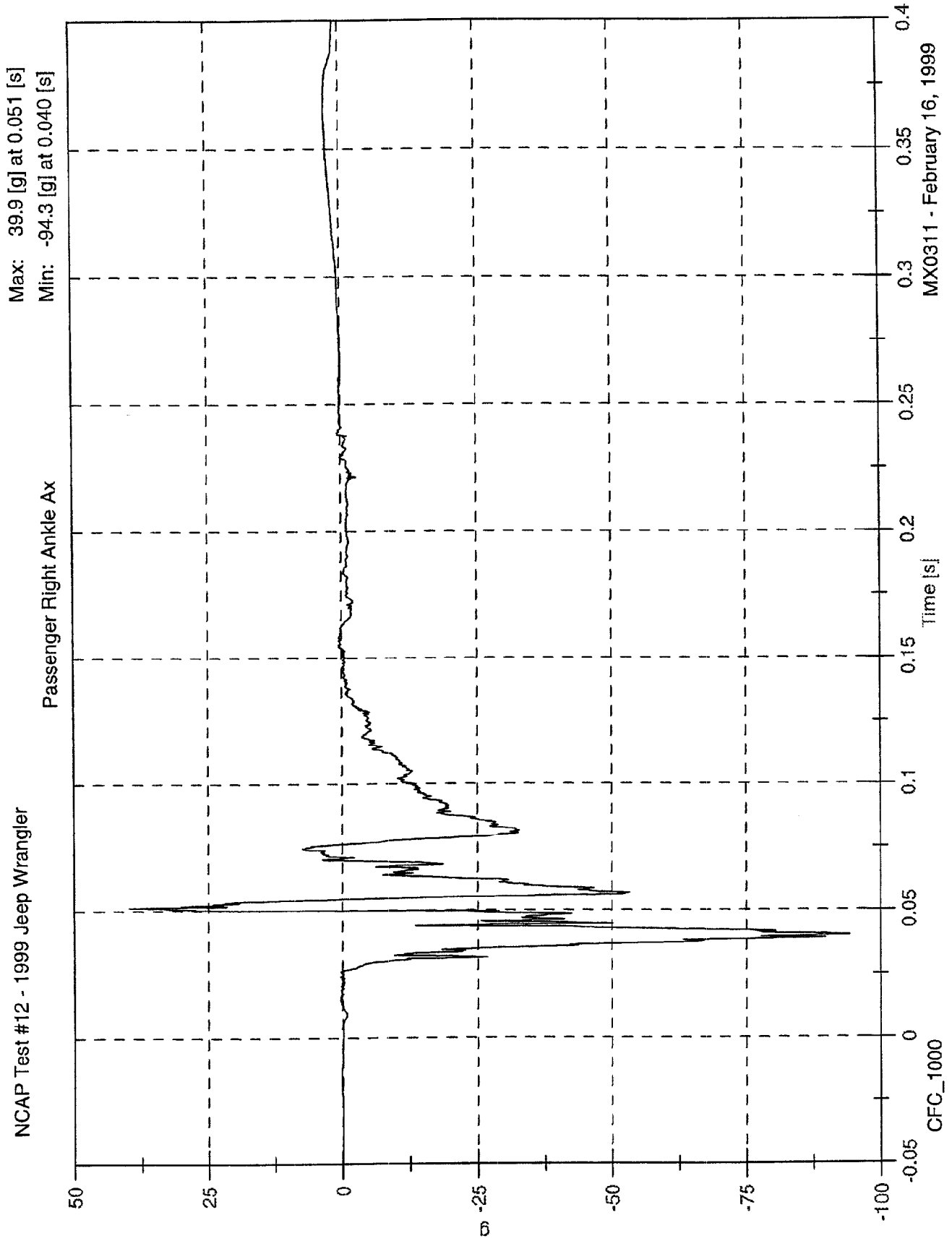
Max: 115.0 [g] at 0.030 [s]

Min: -226.4 [g] at 0.048 [s]

Passenger Left Toe Az



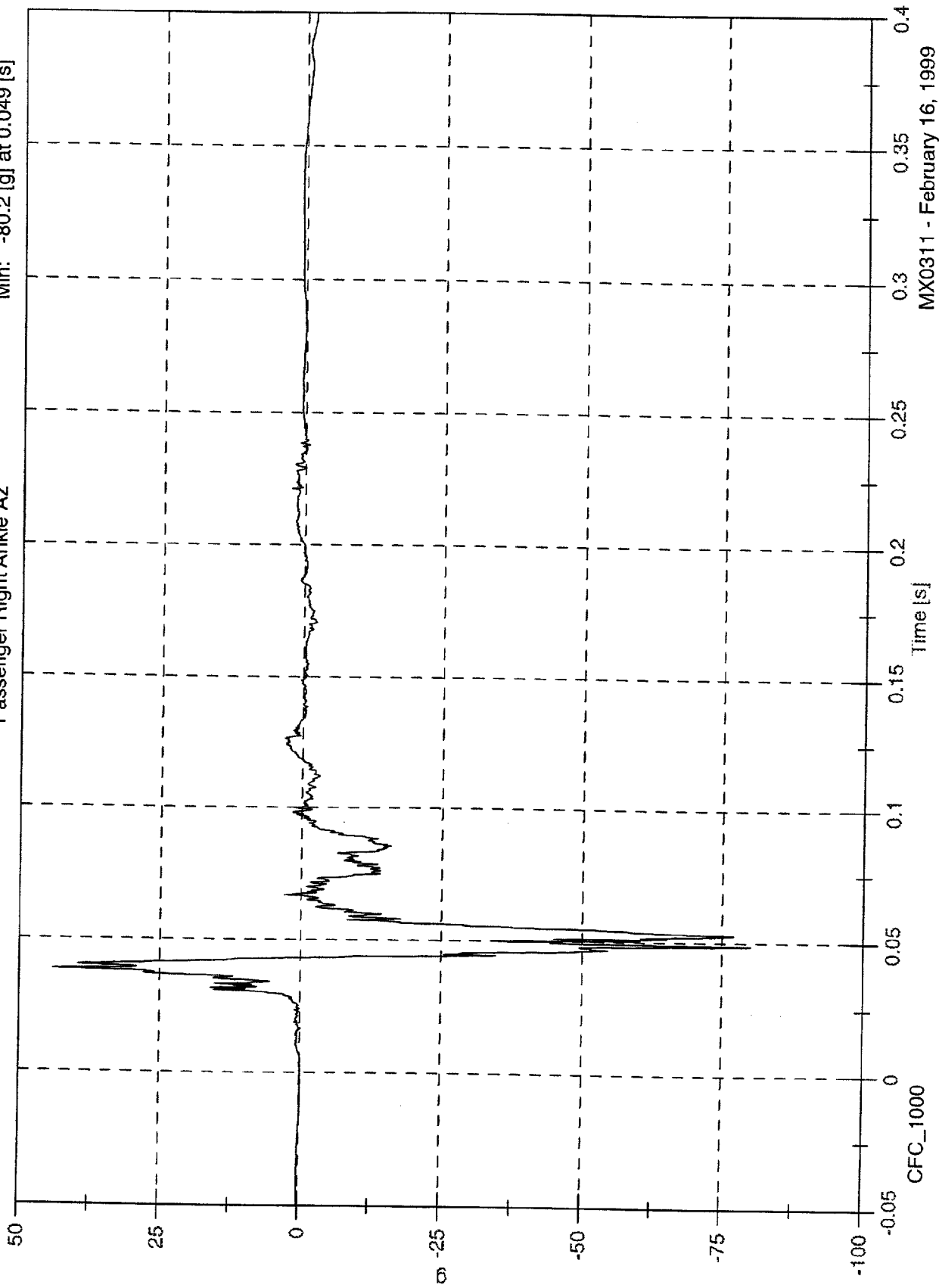
MX0311 - February 16, 1999



NCAP Test #12 - 1999 Jeep Wrangler

Max: 44.1 [g] at 0.038 [s]
Min: -80.2 [g] at 0.049 [s]

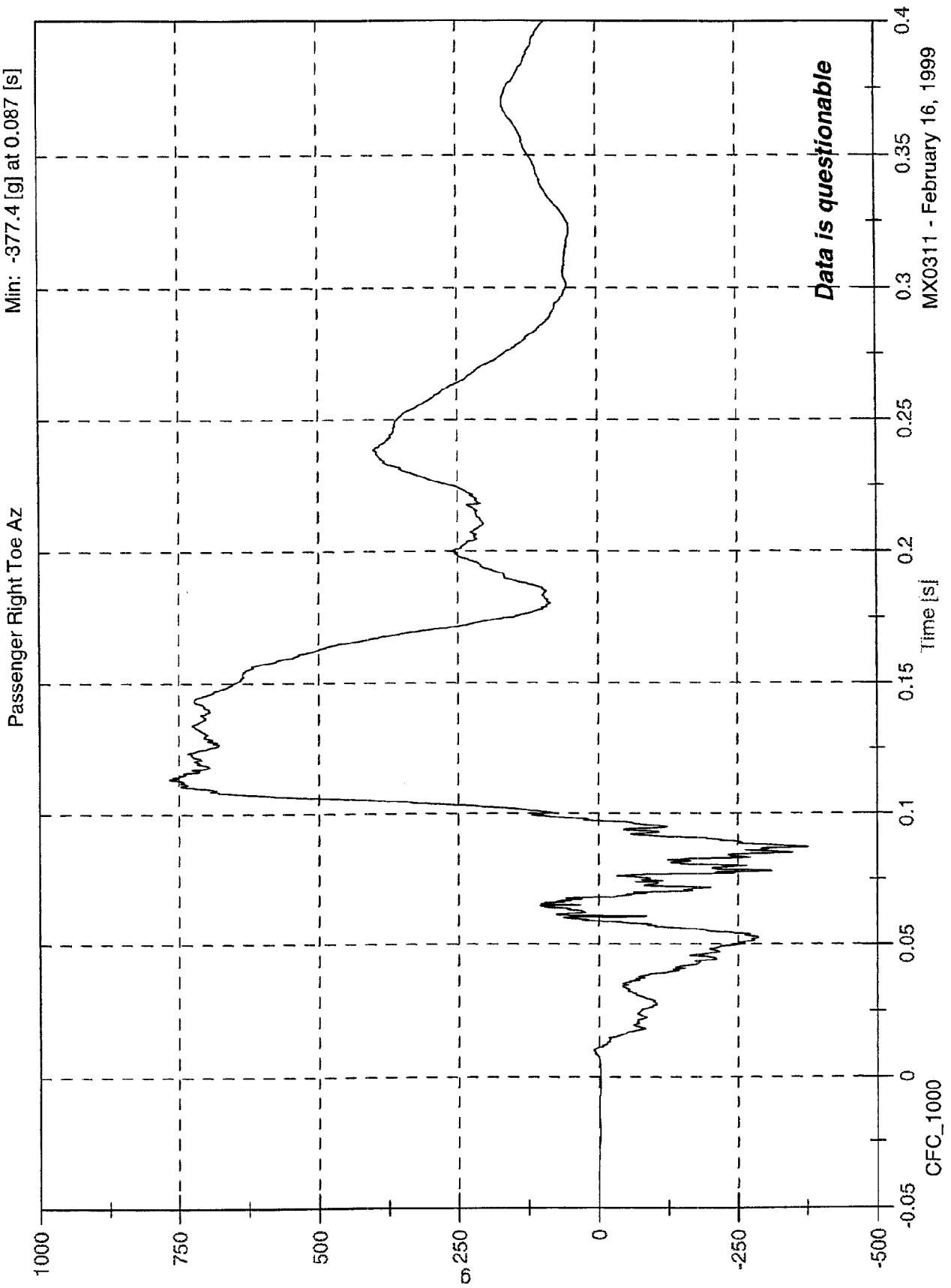
Passenger Right Ankle Az

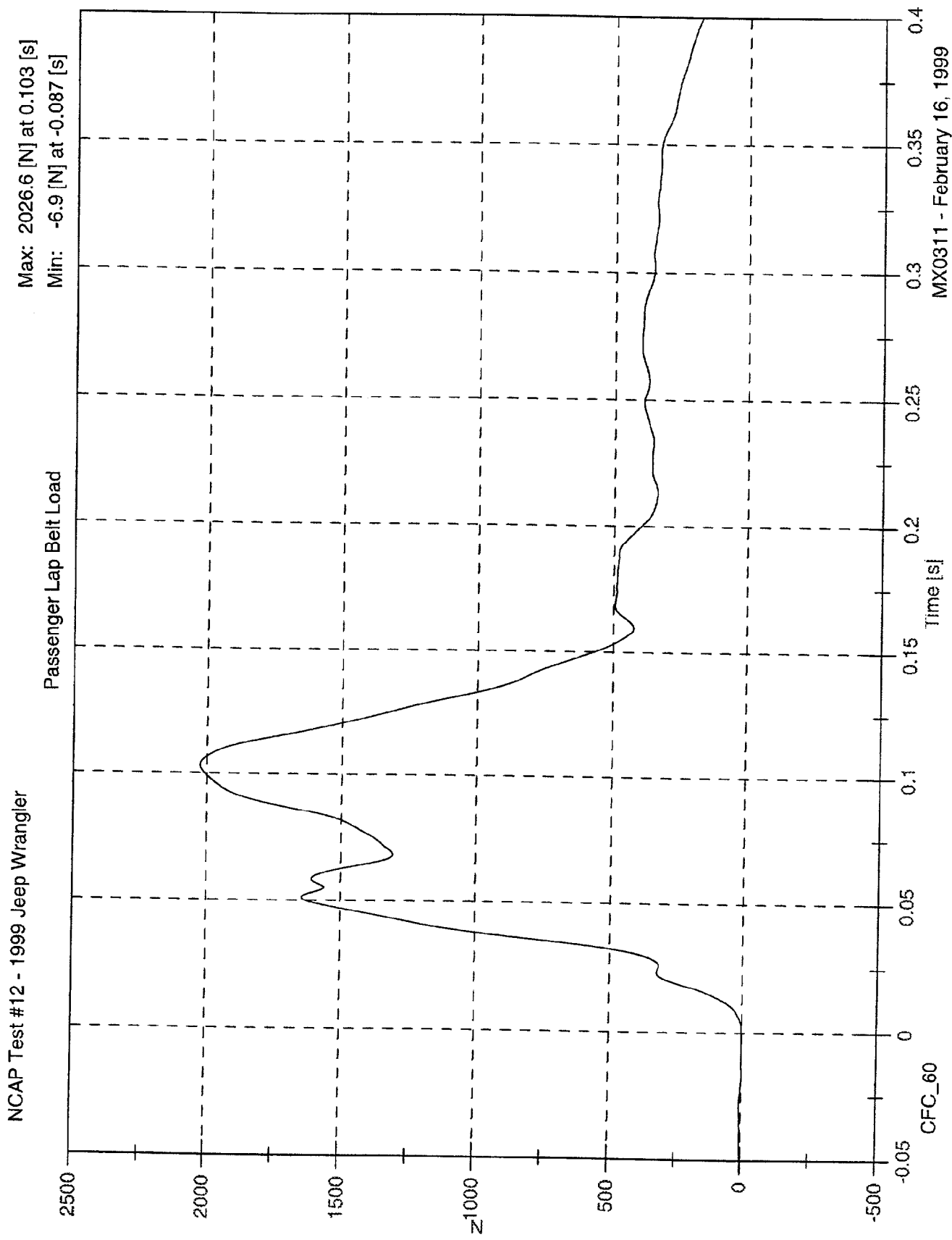


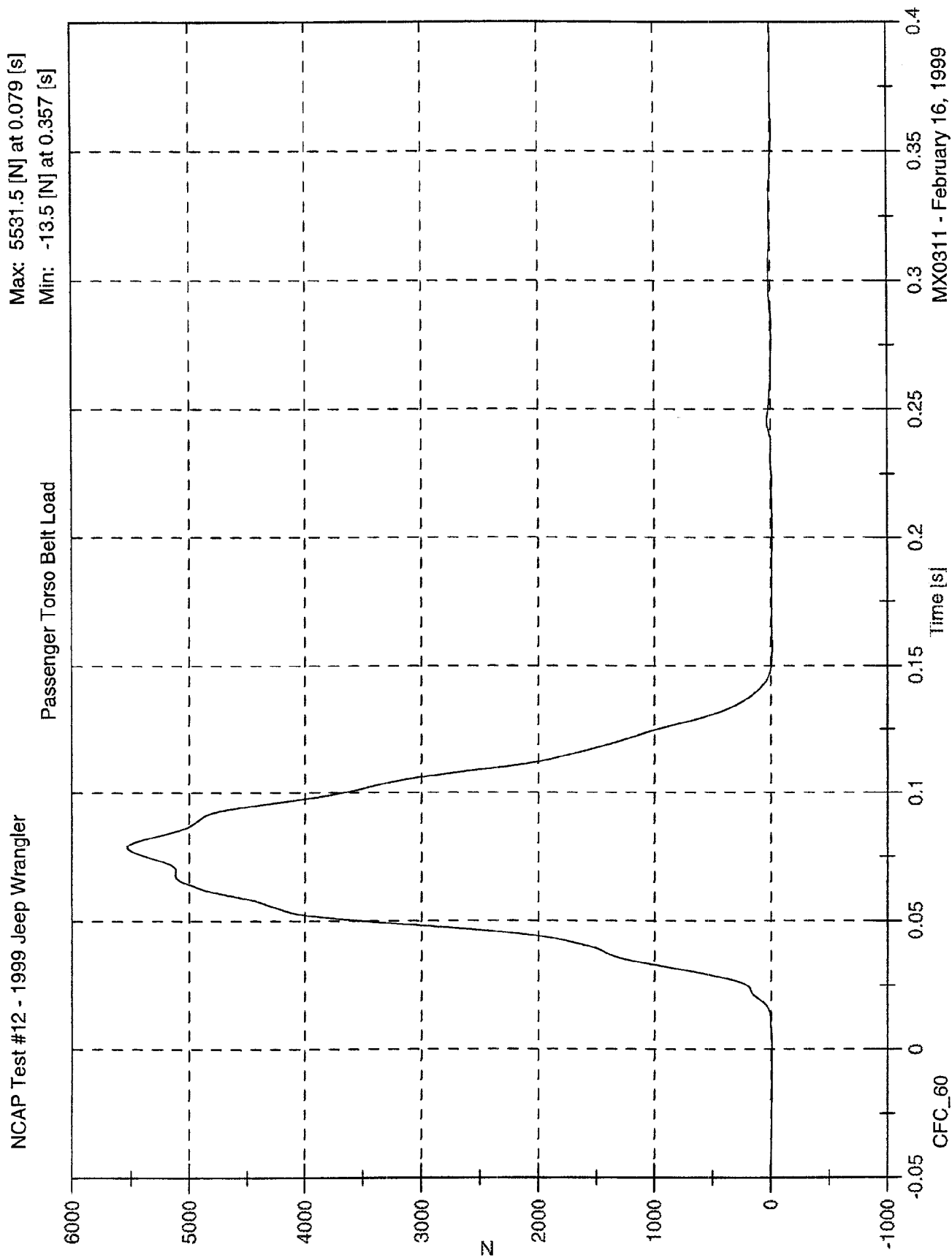
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 767.6 [g] at 0.113 [s]
Min: -377.4 [g] at 0.087 [s]

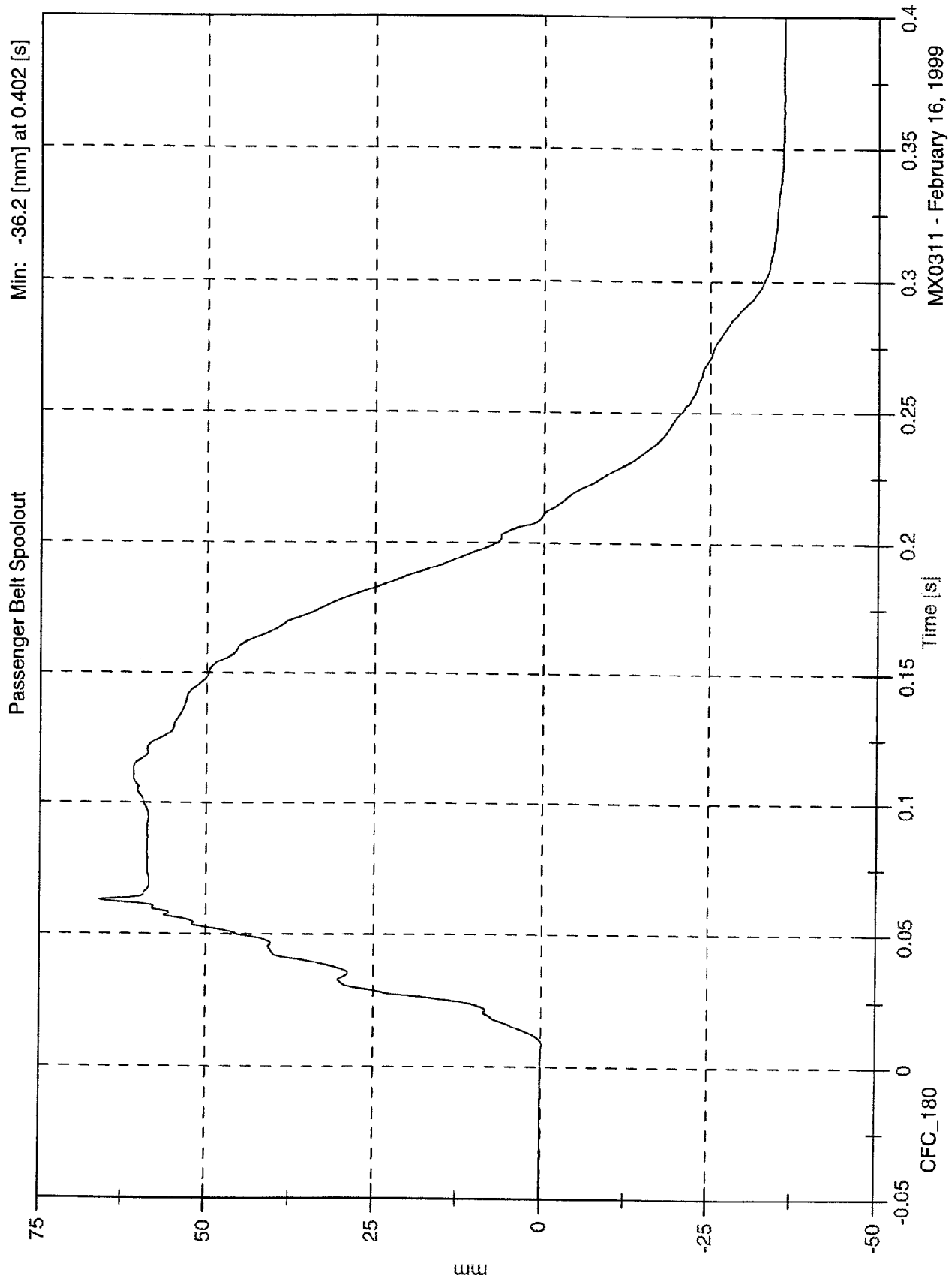






NCAP Test #12 - 1999 Jeep Wrangler

Max: 66.1 [mm] at 0.063 [s]
 Min: -36.2 [mm] at 0.402 [s]

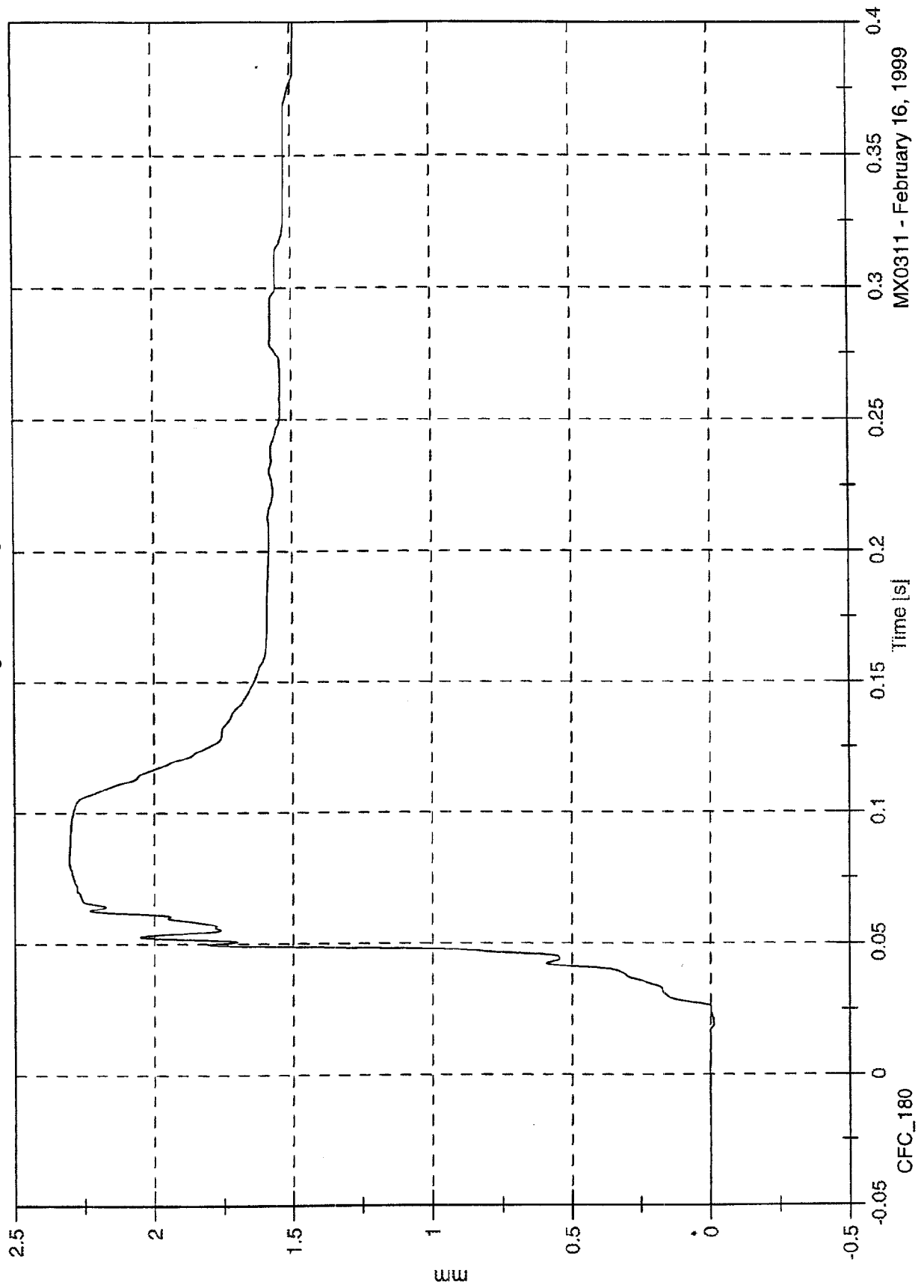


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NCAP Test #12 - 1999 Jeep Wrangler

Max: 2.3 [mm] at 0.081 [s]
Min: -0.0 [mm] at 0.019 [s]

Passenger Belt Elongation



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NHTSA TEST NO. MX0311

VEHICLE DATA

Acceleration

Velocity

Displacement

FILTER CHANNEL CLASS

60

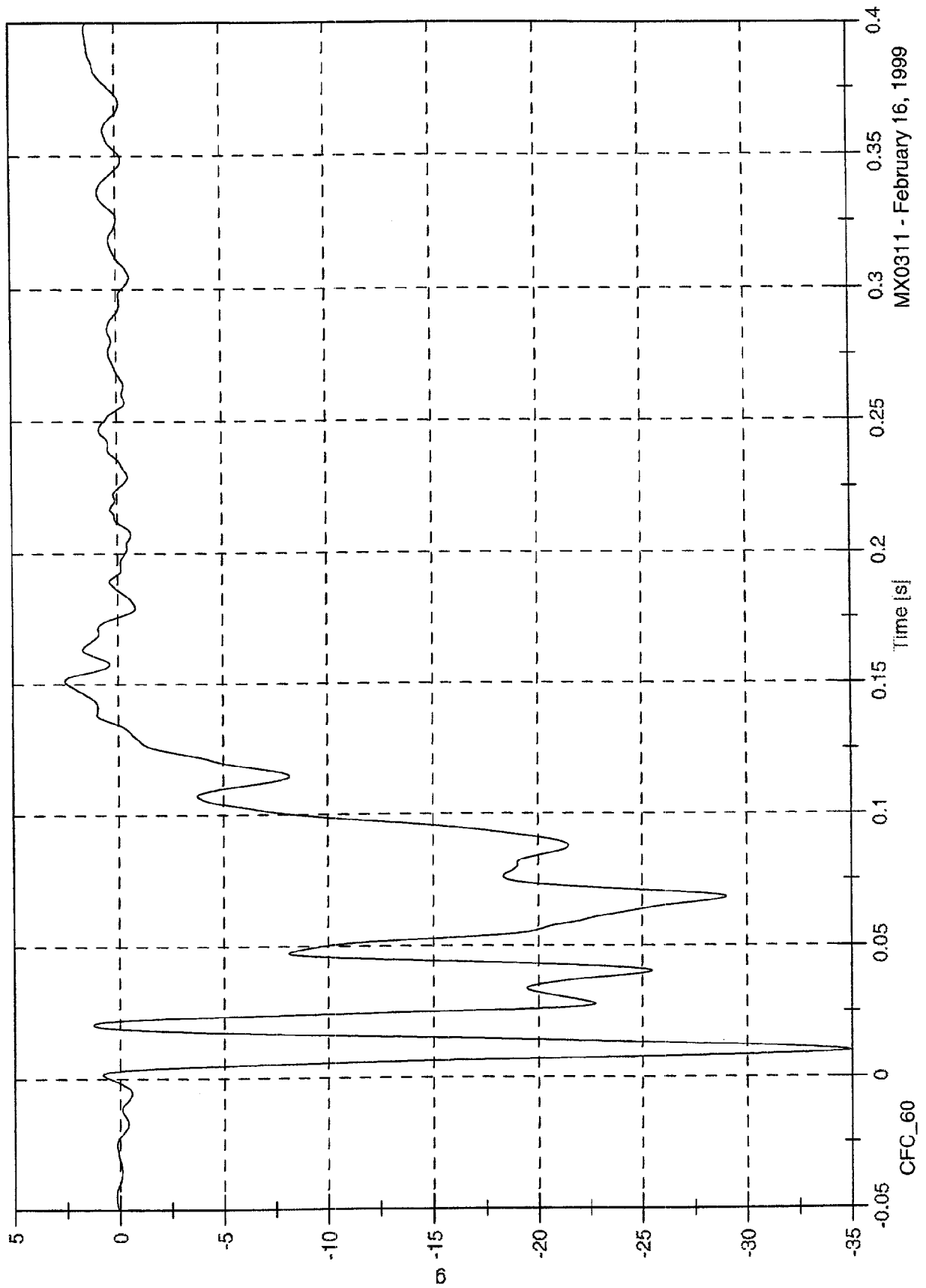
180

180

NCAP Test #12 - 1999 Jeep Wrangler

Max: 2.5 [g] at 0.151 [s]
Min: -34.9 [g] at 0.010 [s]

Acc 1 L Rear Crossmember X

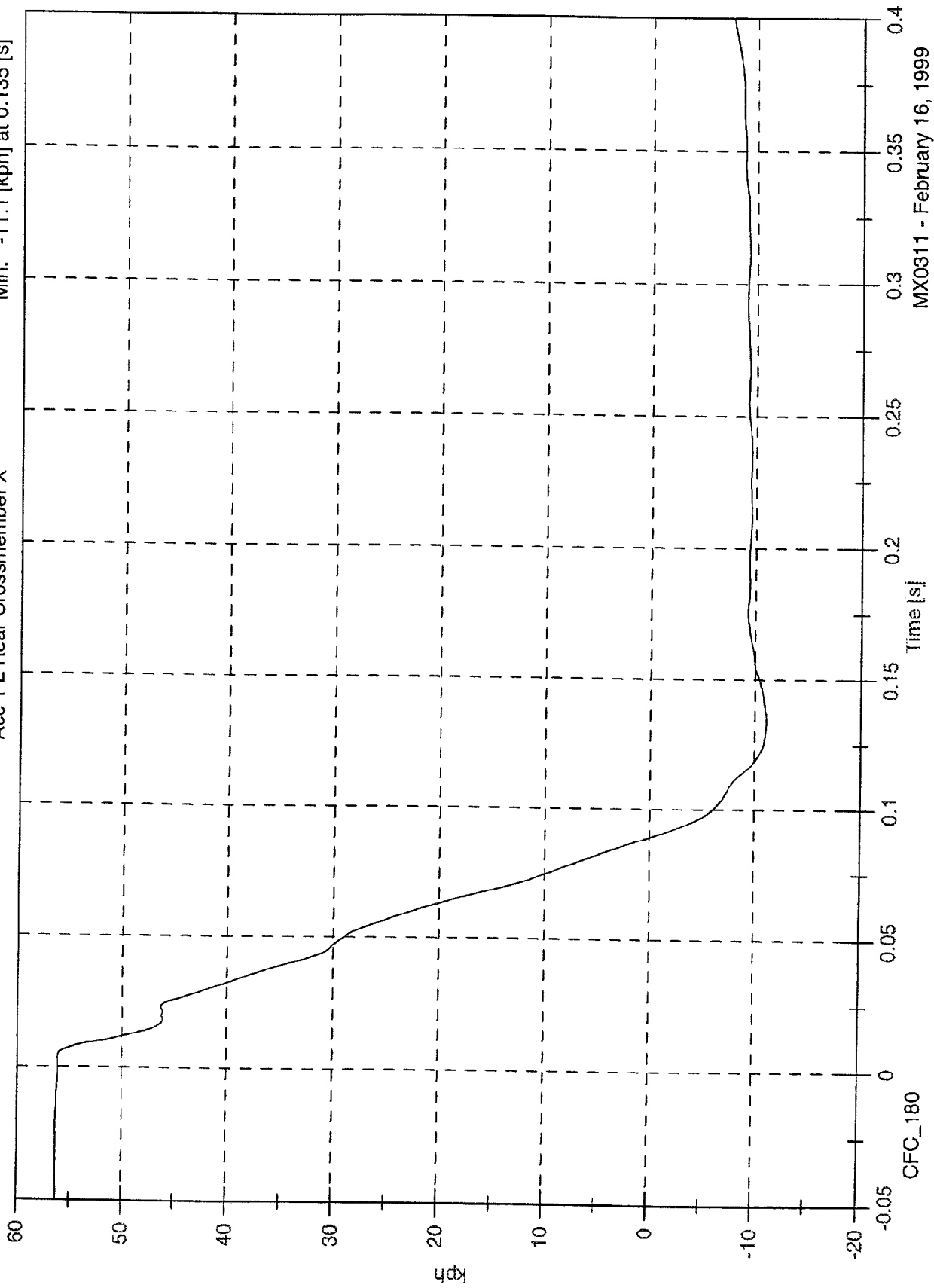


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 56.4 [kph] at -0.022 [s]
Min: -11.1 [kph] at 0.135 [s]

Acc 1 L Rear Crossmember X

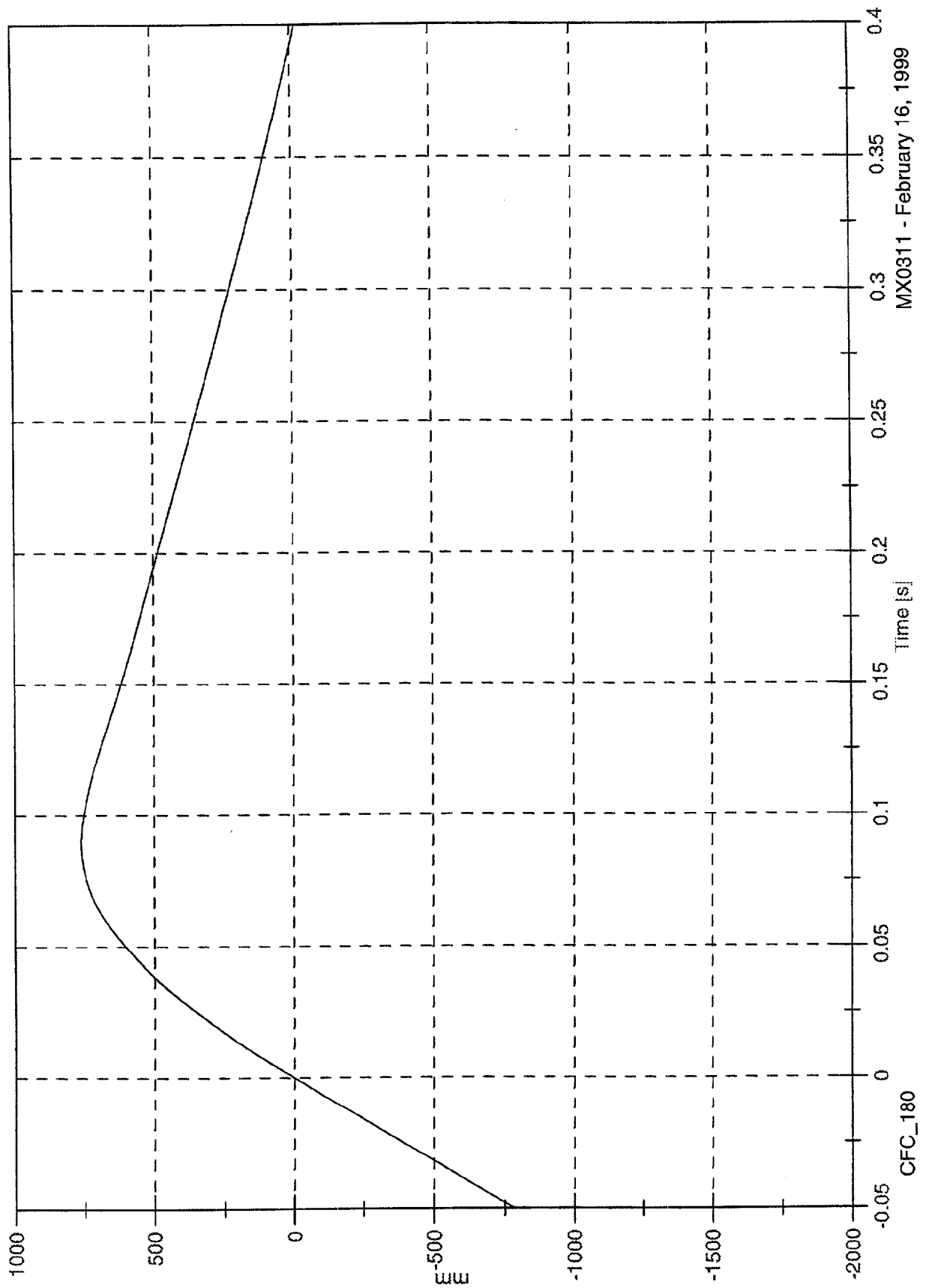


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 1 L Rear Crossmember X

Max: 763.1 [mm] at 0.089 [s]
Min: -1562.8 [mm] at -0.100 [s]

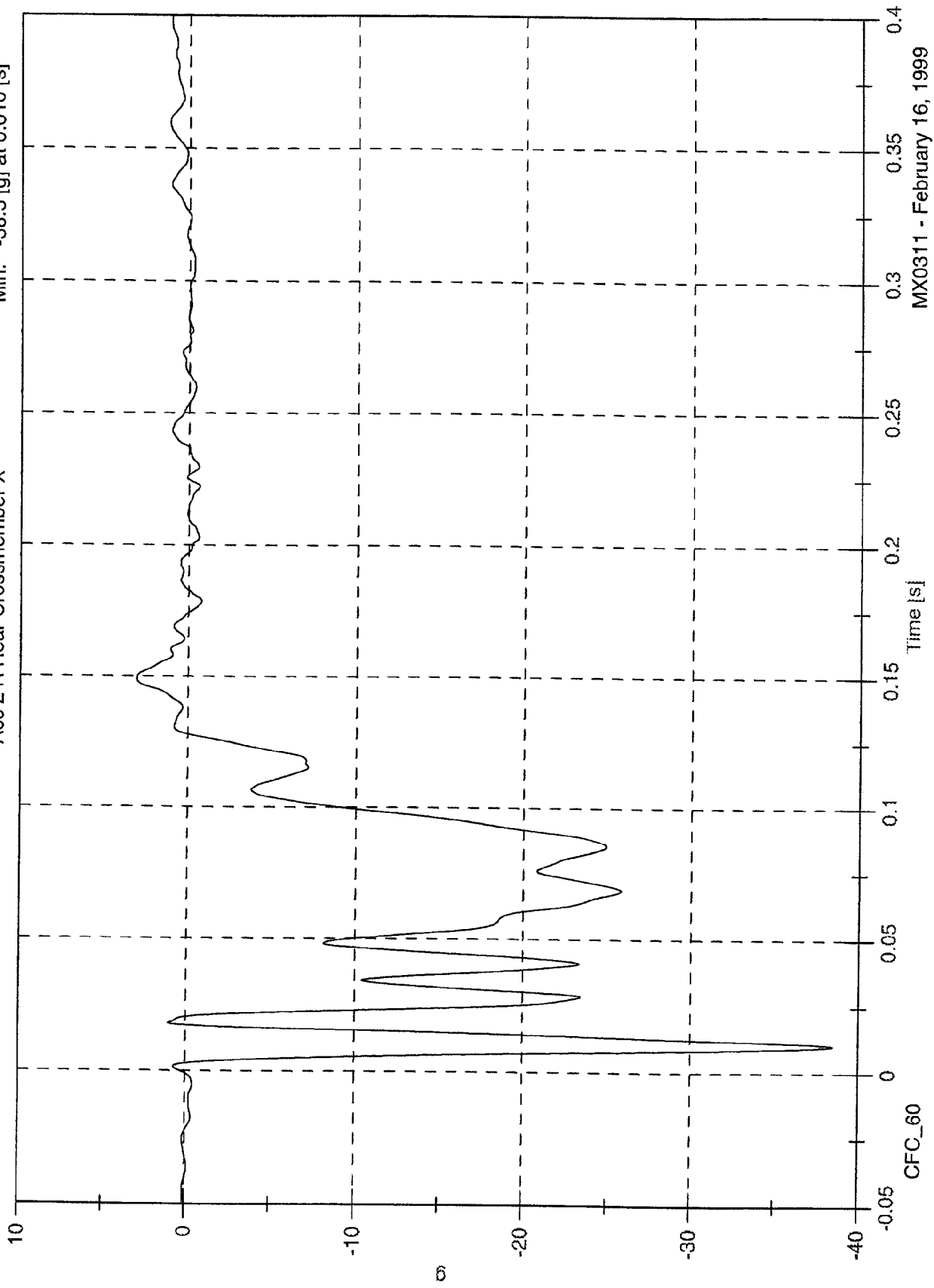


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 3.1 [g] at 0.149 [s]
Min: -38.5 [g] at 0.010 [s]

Acc 2 R Rear Crossmember X



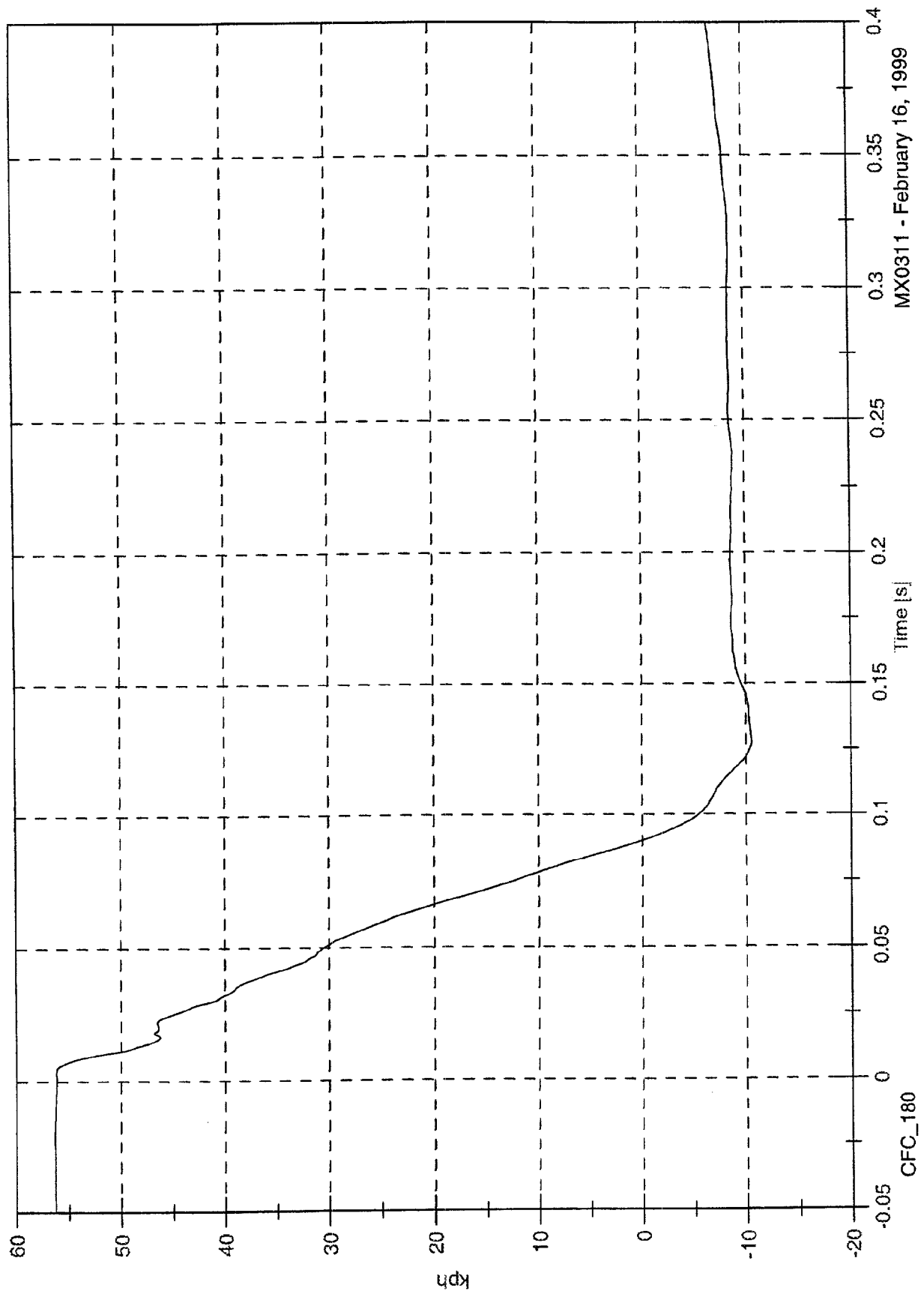
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Max: 56.4 [kph] at -0.022 [s]

Min: -10.5 [kph] at 0.128 [s]

Acc 2 R Rear Crossmember X

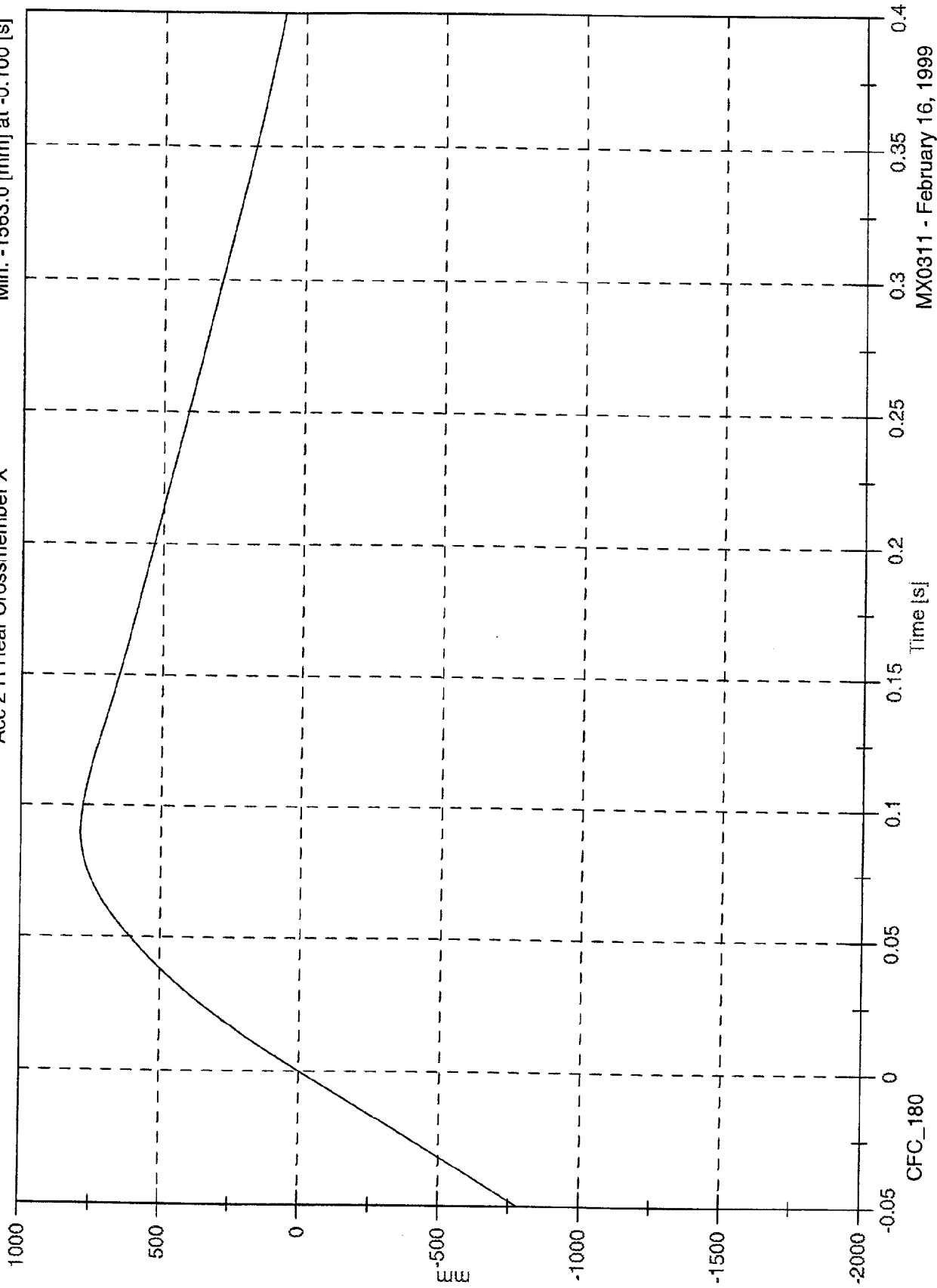


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 2 R Rear Crossmember X

Max: 790.3 [mm] at 0.090 [s]
Min: -1563.0 [mm] at -0.100 [s]



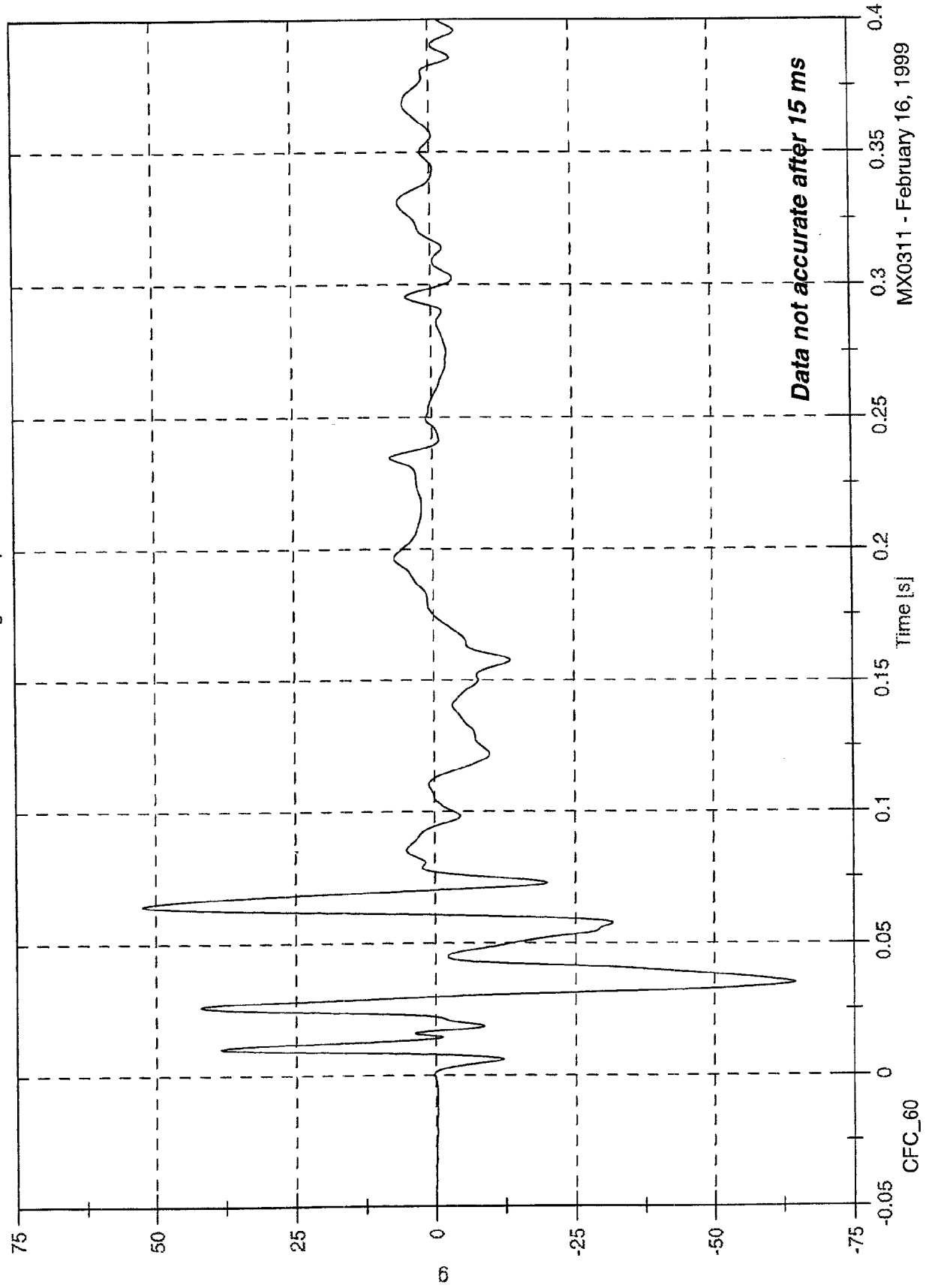
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 3 Engine Top X

Max: 52.5 [g] at 0.064 [s]

Min: -64.6 [g] at 0.035 [s]



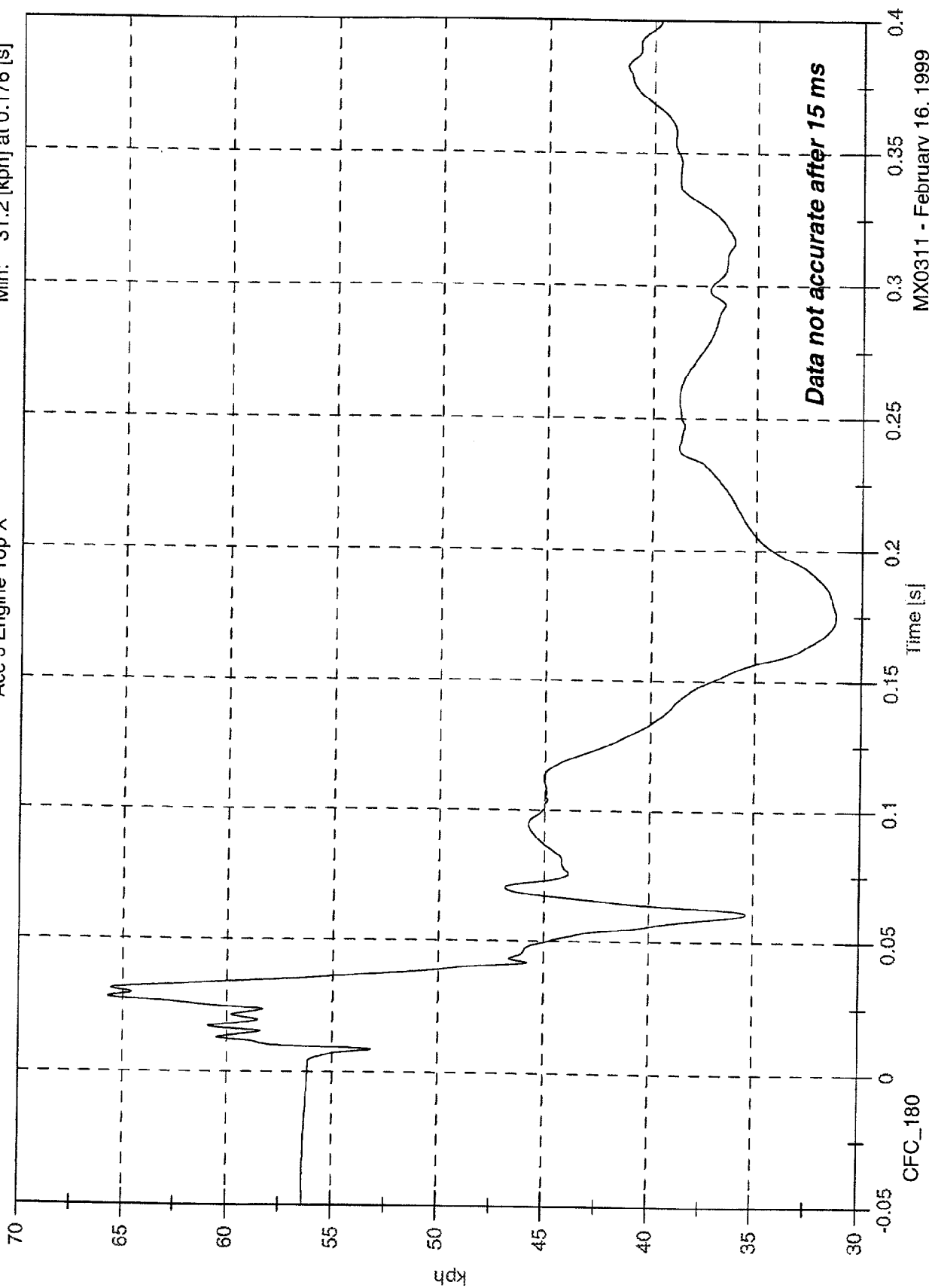
Data not accurate after 15 ms

MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 3 Engine Top X

Max: 65.7 [kph] at 0.028 [s]
Min: 31.2 [kph] at 0.176 [s]

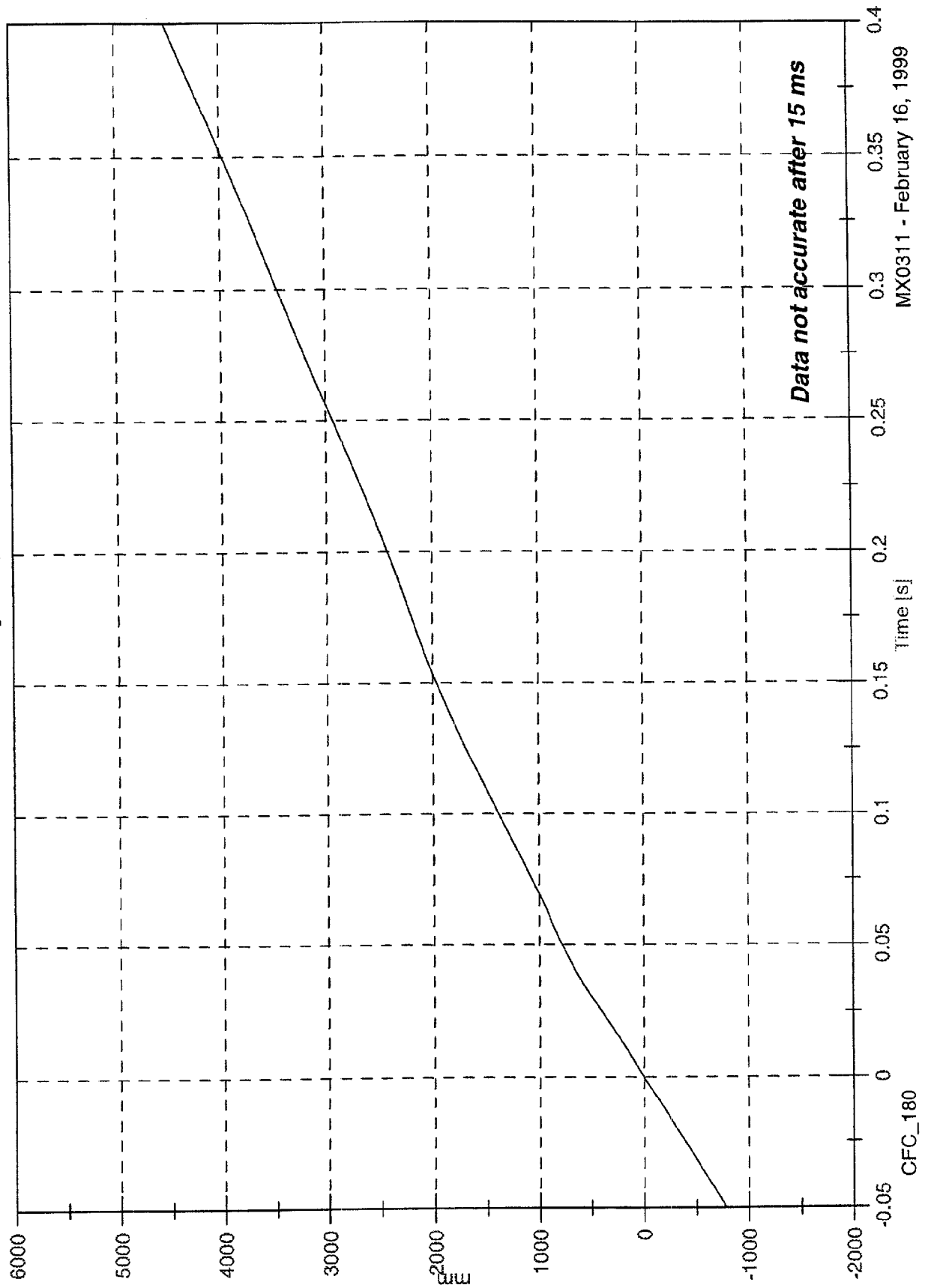


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

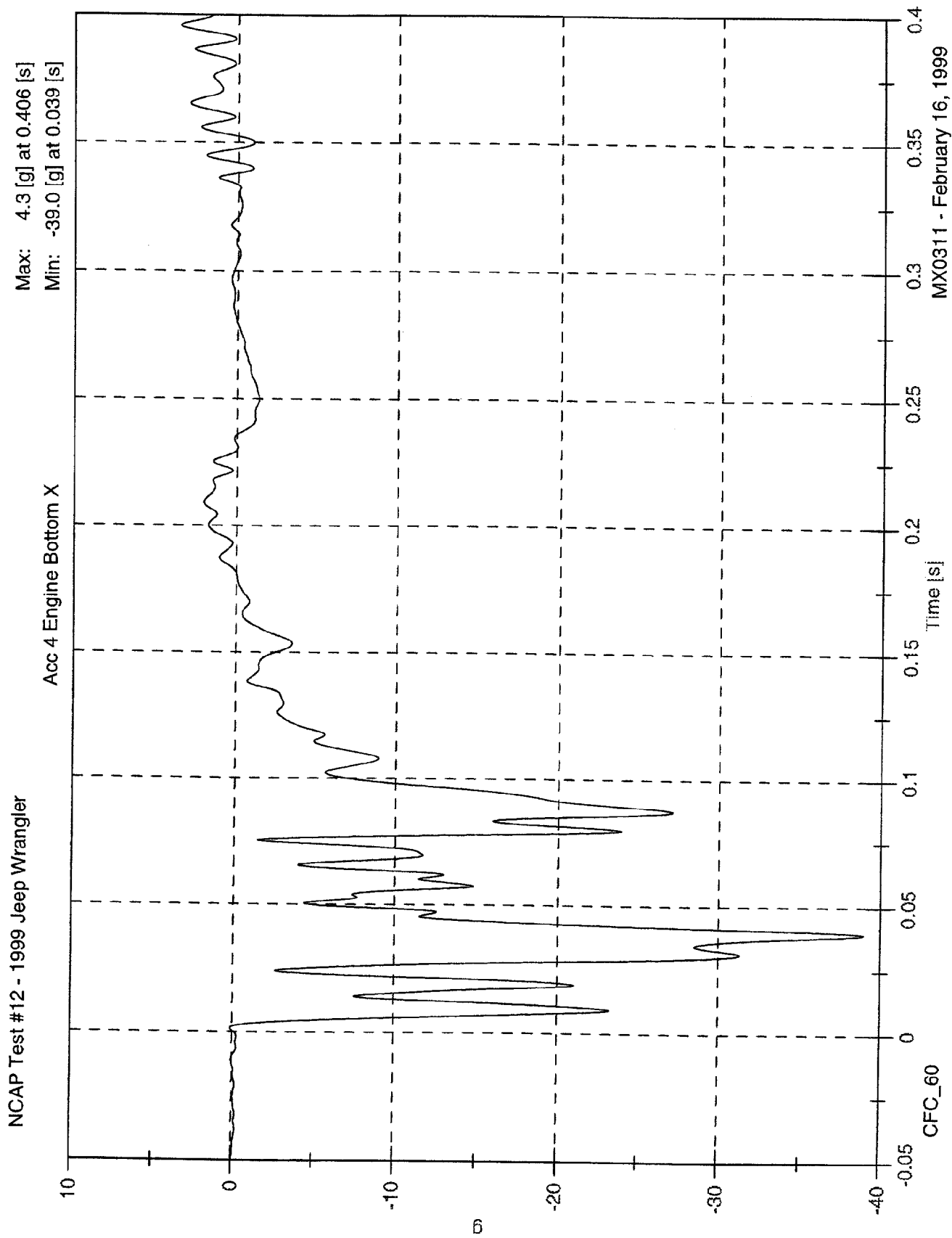
Max: 5680.9 [mm] at 0.500 [s]
Min: -1563.6 [mm] at -0.100 [s]

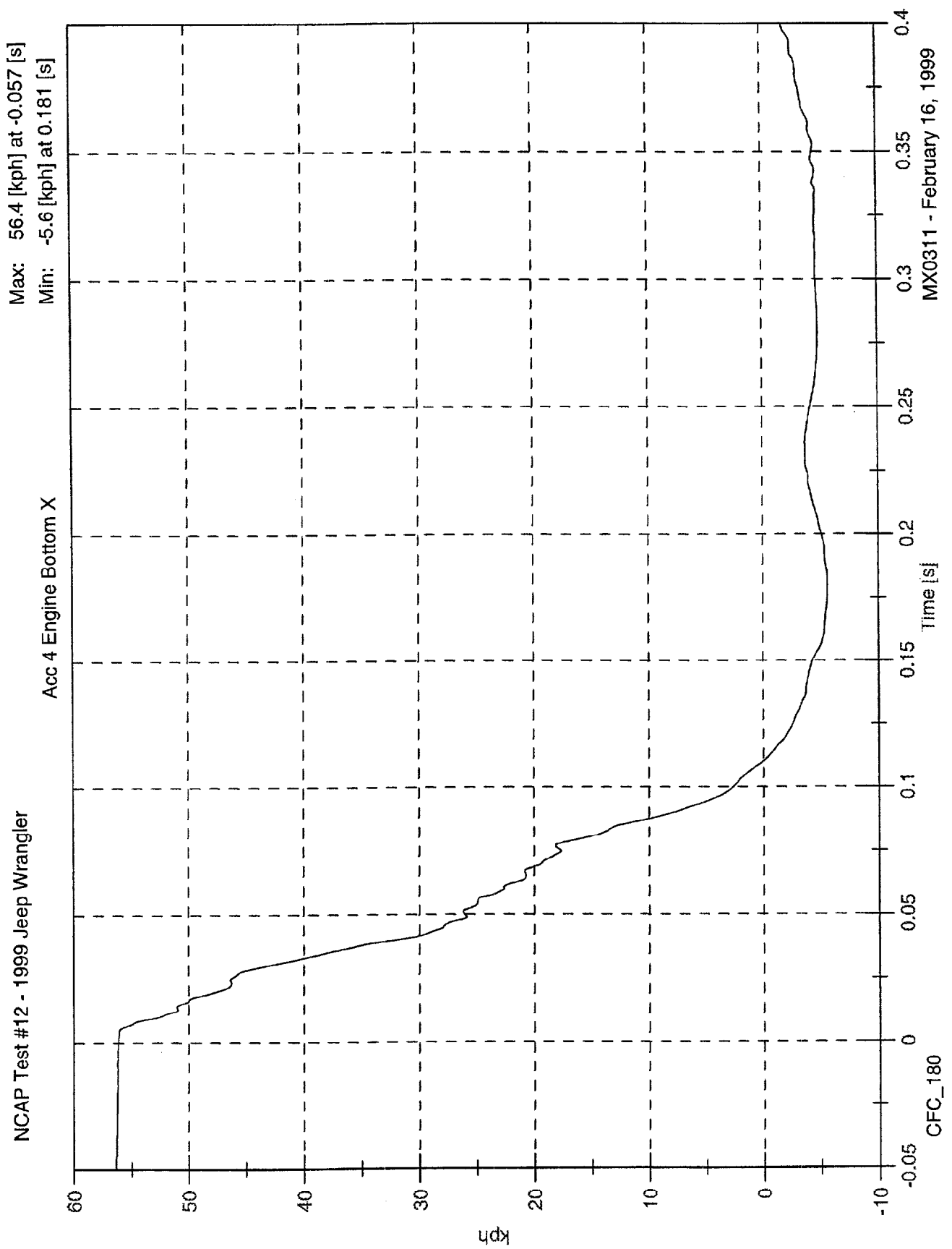
Acc 3 Engine Top X

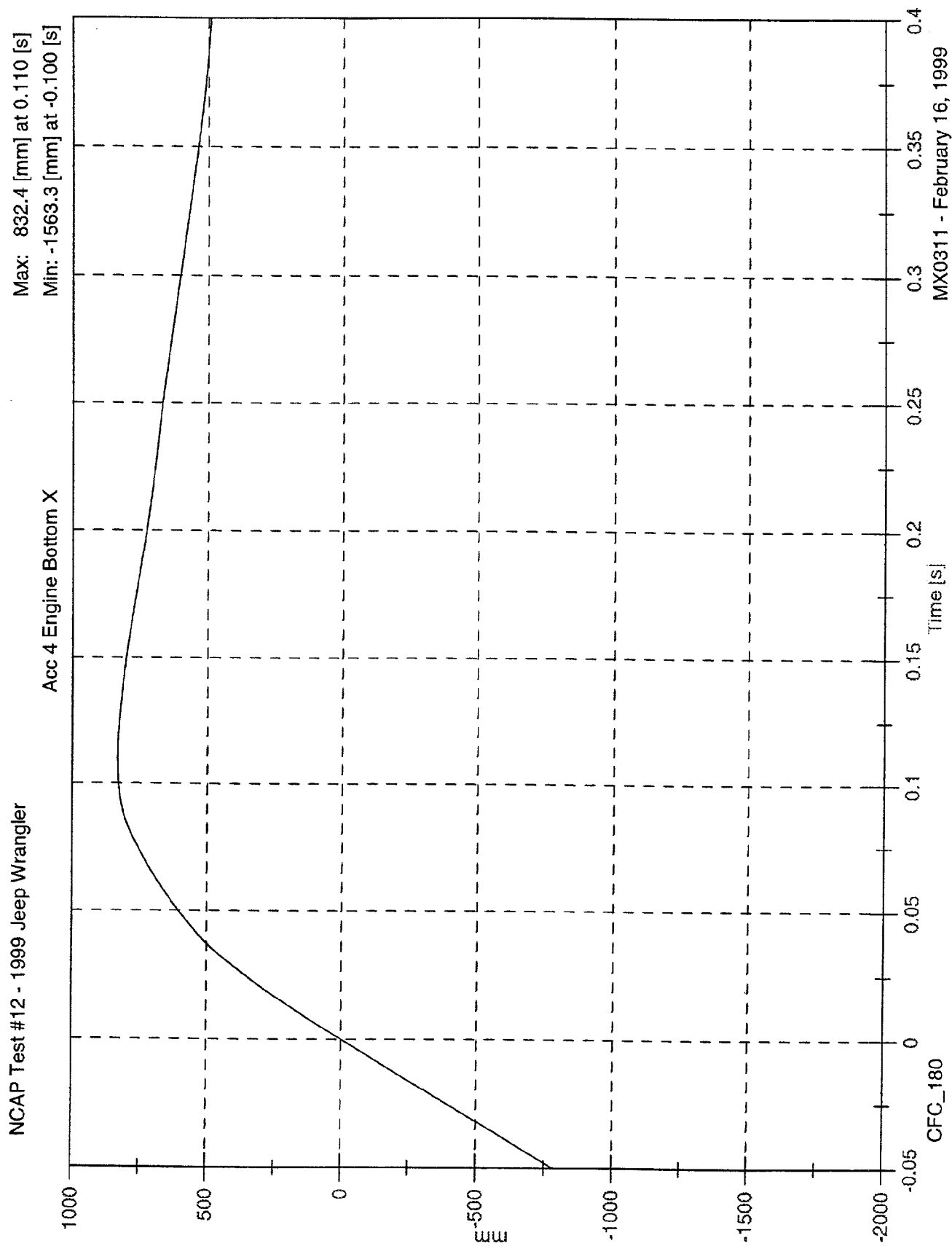


Data not accurate after 15 ms

MX0311 - February 16, 1999



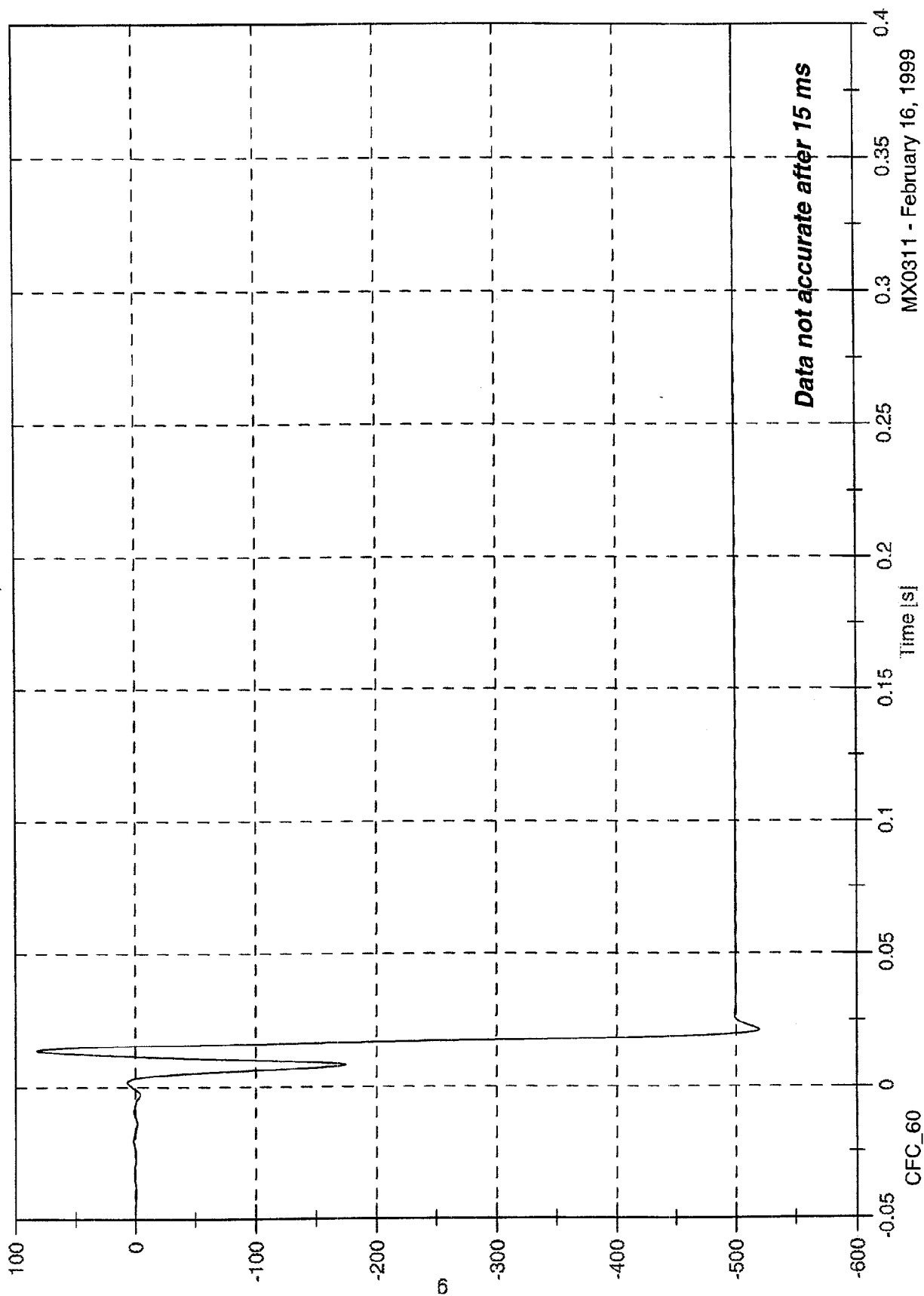




NCAP Test #12 - 1999 Jeep Wrangler

Max: 82.4 [g] at 0.014 [s]
Min: -519.7 [g] at 0.021 [s]

Acc 5 R Caliper X

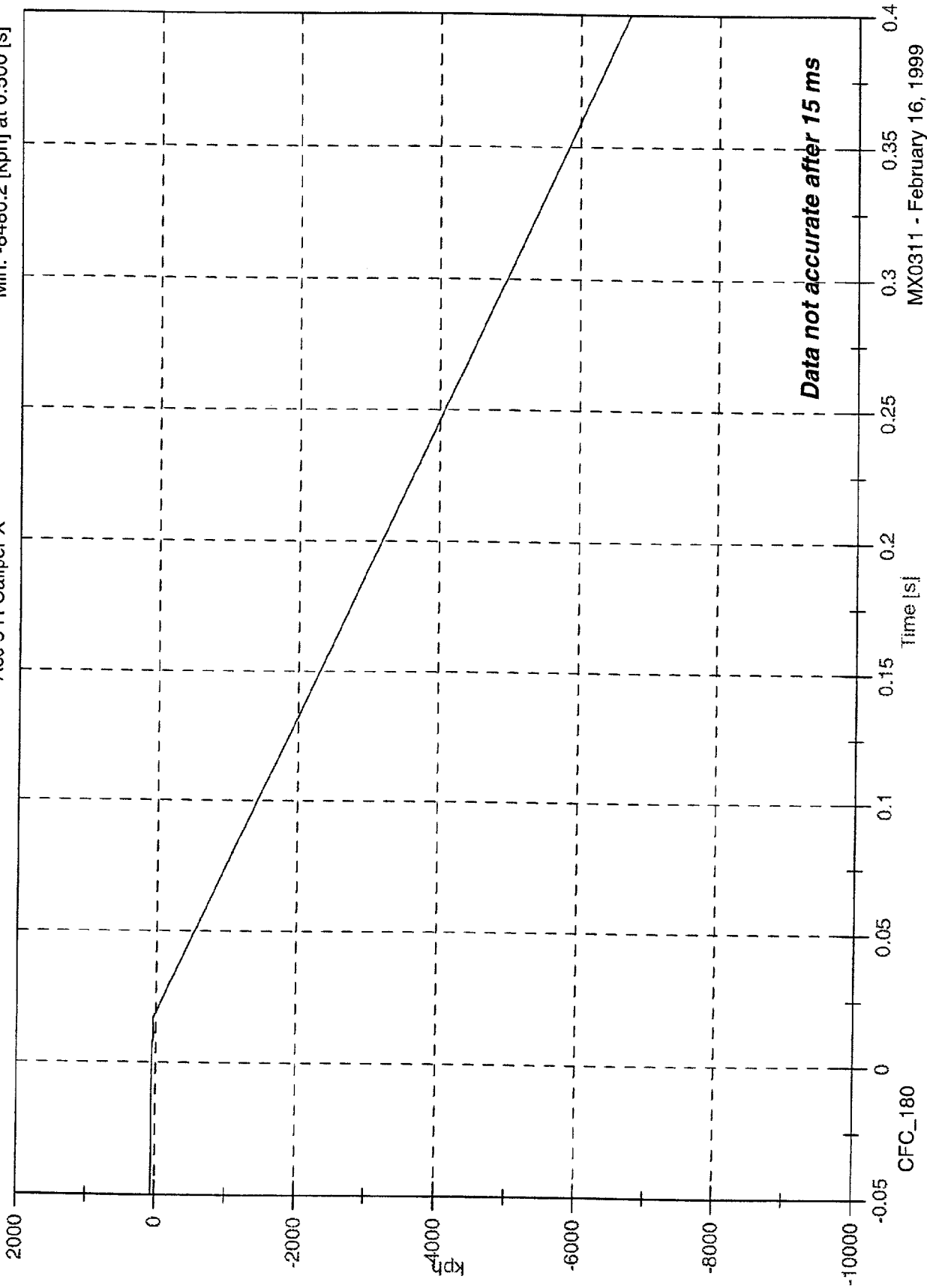


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 5 R Caliper X

Max: 56.7 [kph] at -0.004 [s]
Min: -8480.2 [kph] at 0.500 [s]

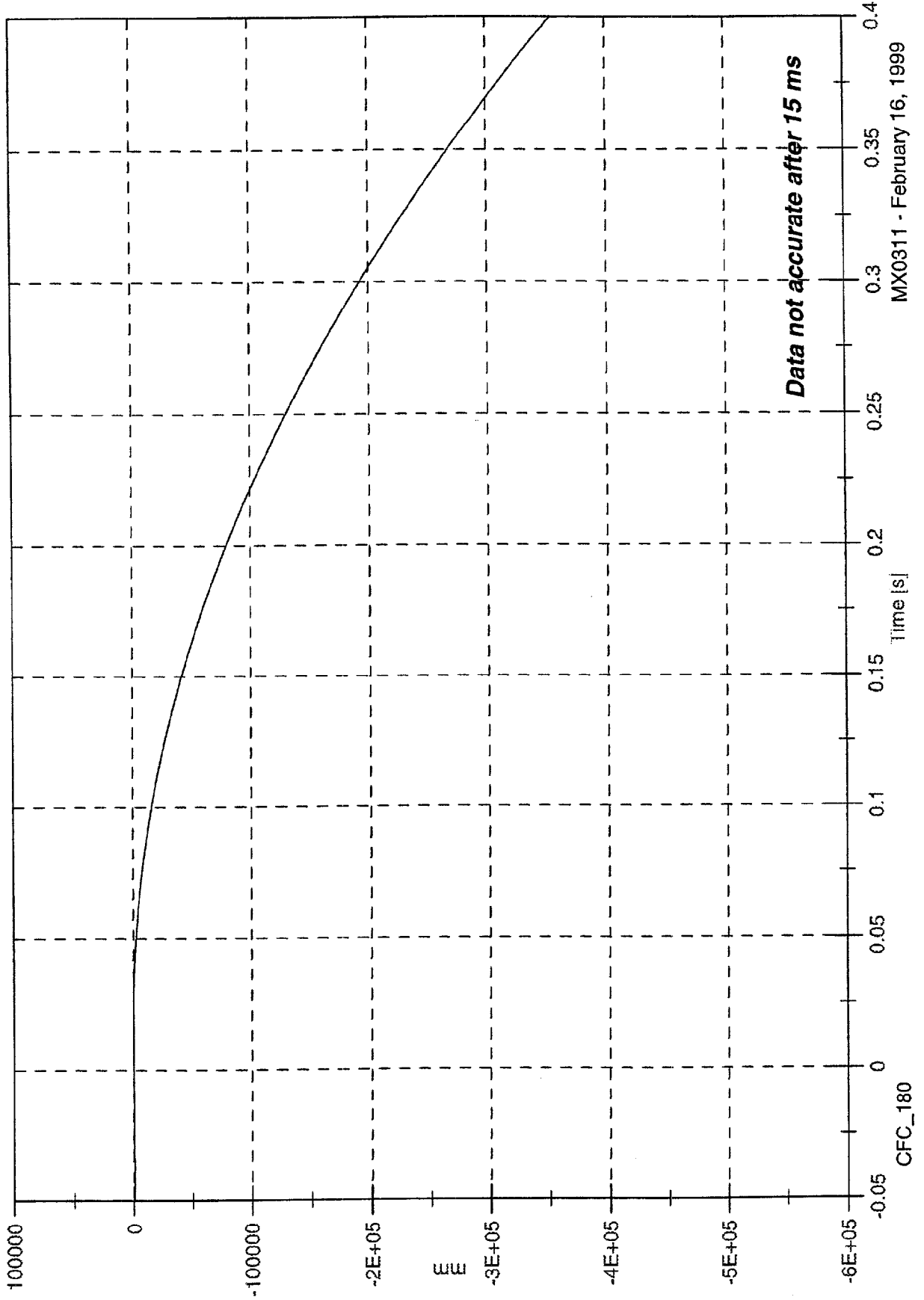


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 5 R Caliper X

Max: 222.4 [mm] at 0.019 [s]
Min: -565813.4 [mm] at 0.500 [s]



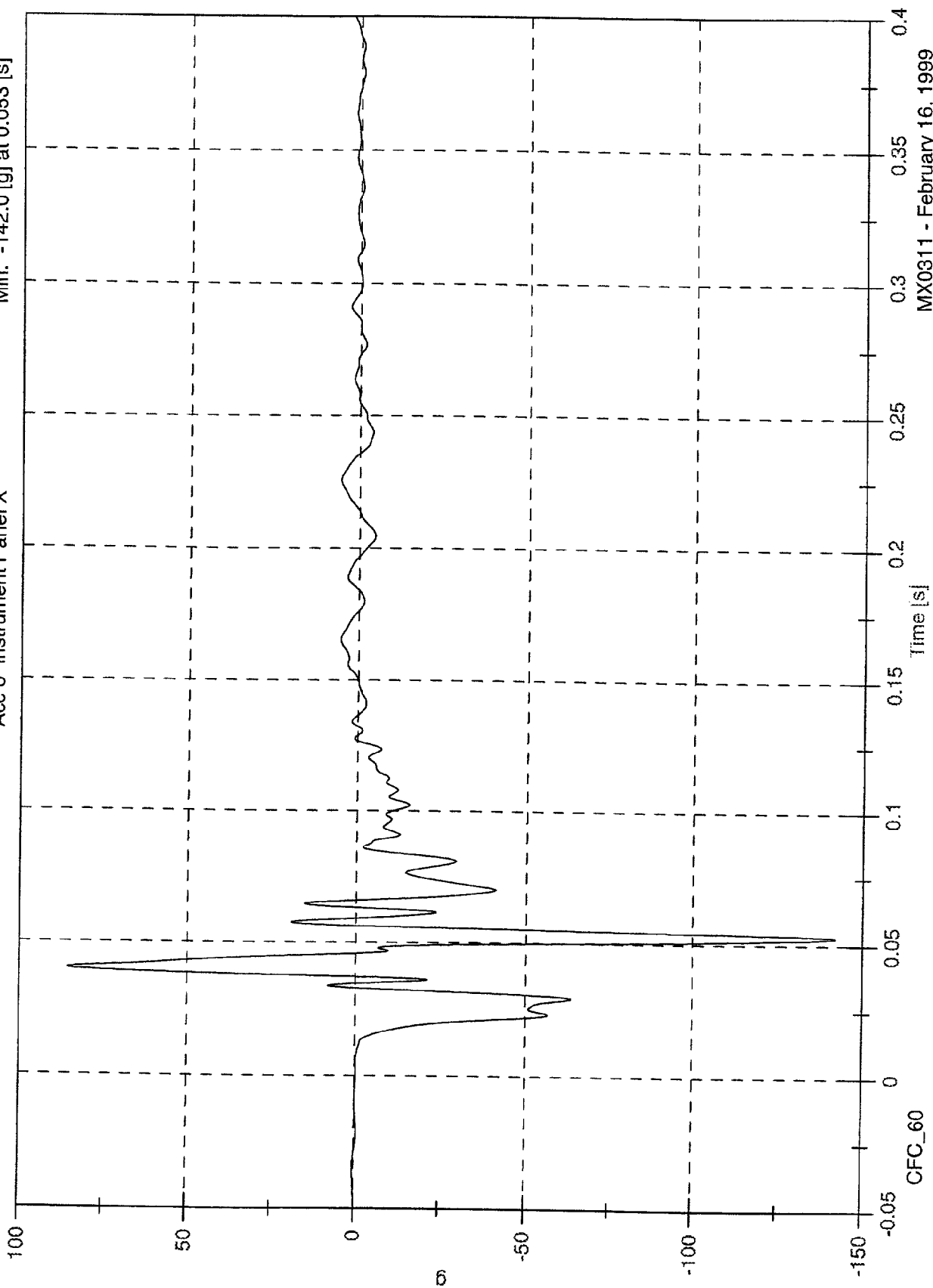
MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

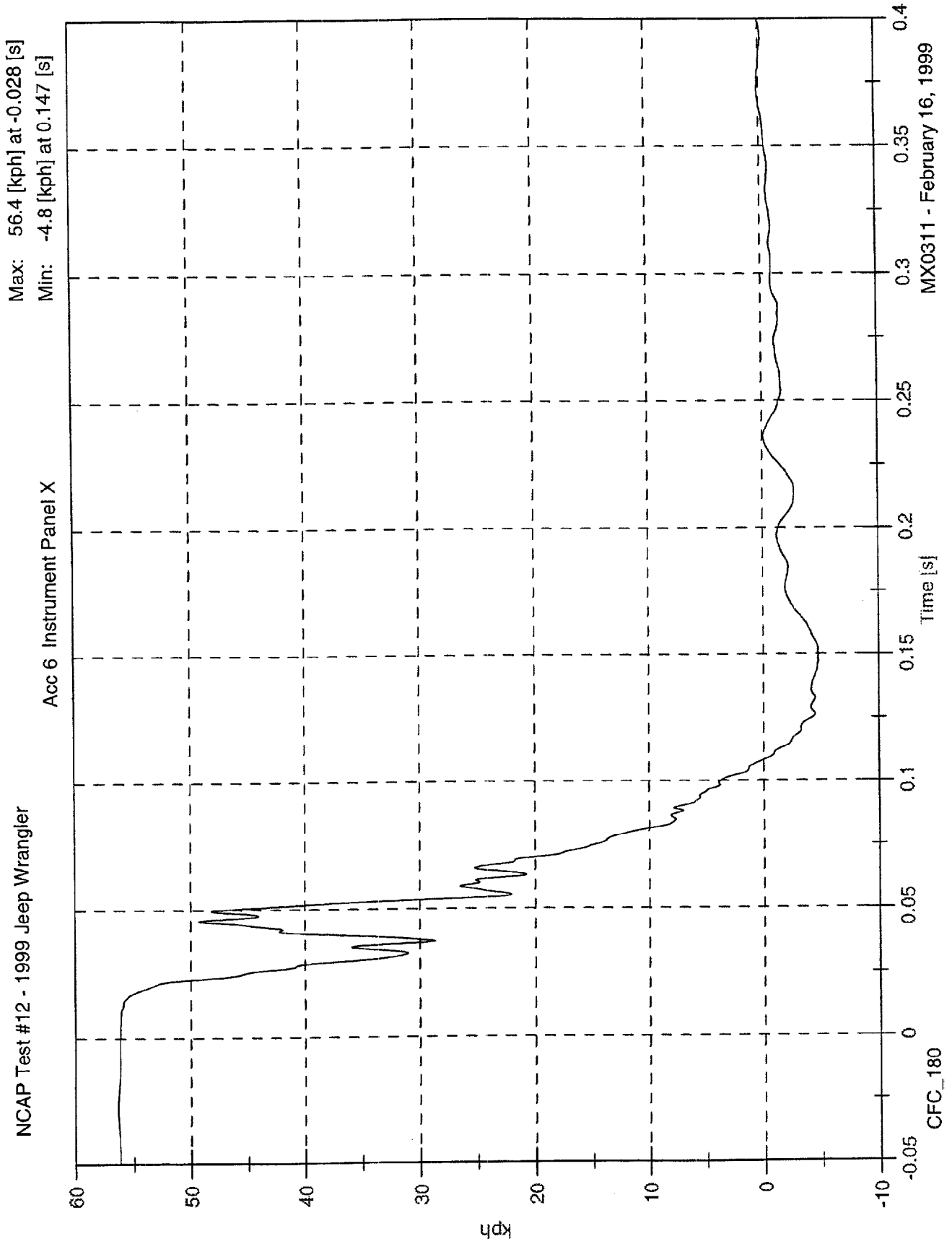
Max: 85.6 [g] at 0.040 [s]

Min: -142.0 [g] at 0.053 [s]

Acc 6 Instrument Panel X



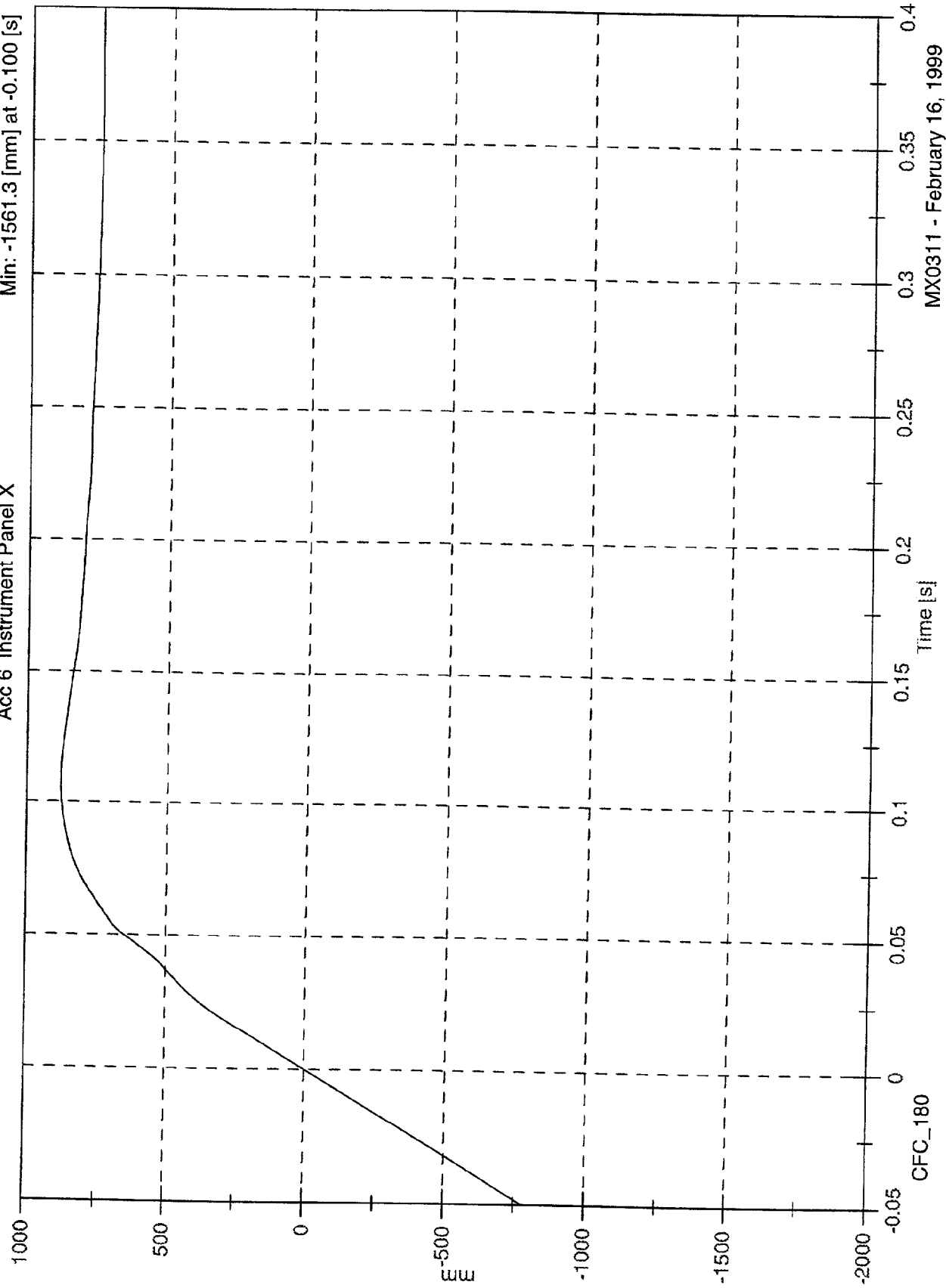
MX0311 - February 16, 1999



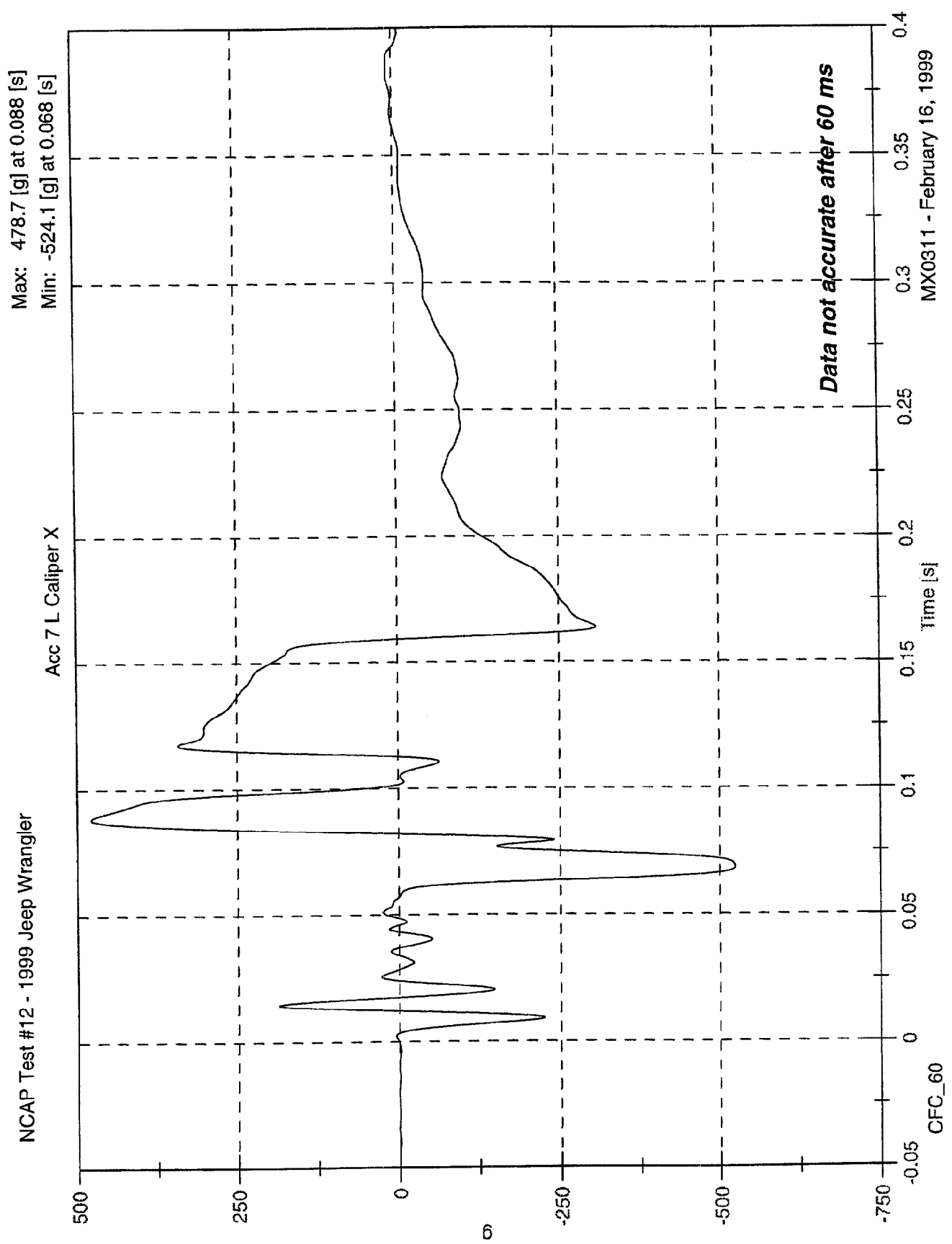
NCAP Test #12 - 1999 Jeep Wrangler

Acc 6 Instrument Panel X

Max: 882.1 [mm] at 0.108 [s]
Min: -1561.3 [mm] at -0.100 [s]



MX0311 - February 16, 1999

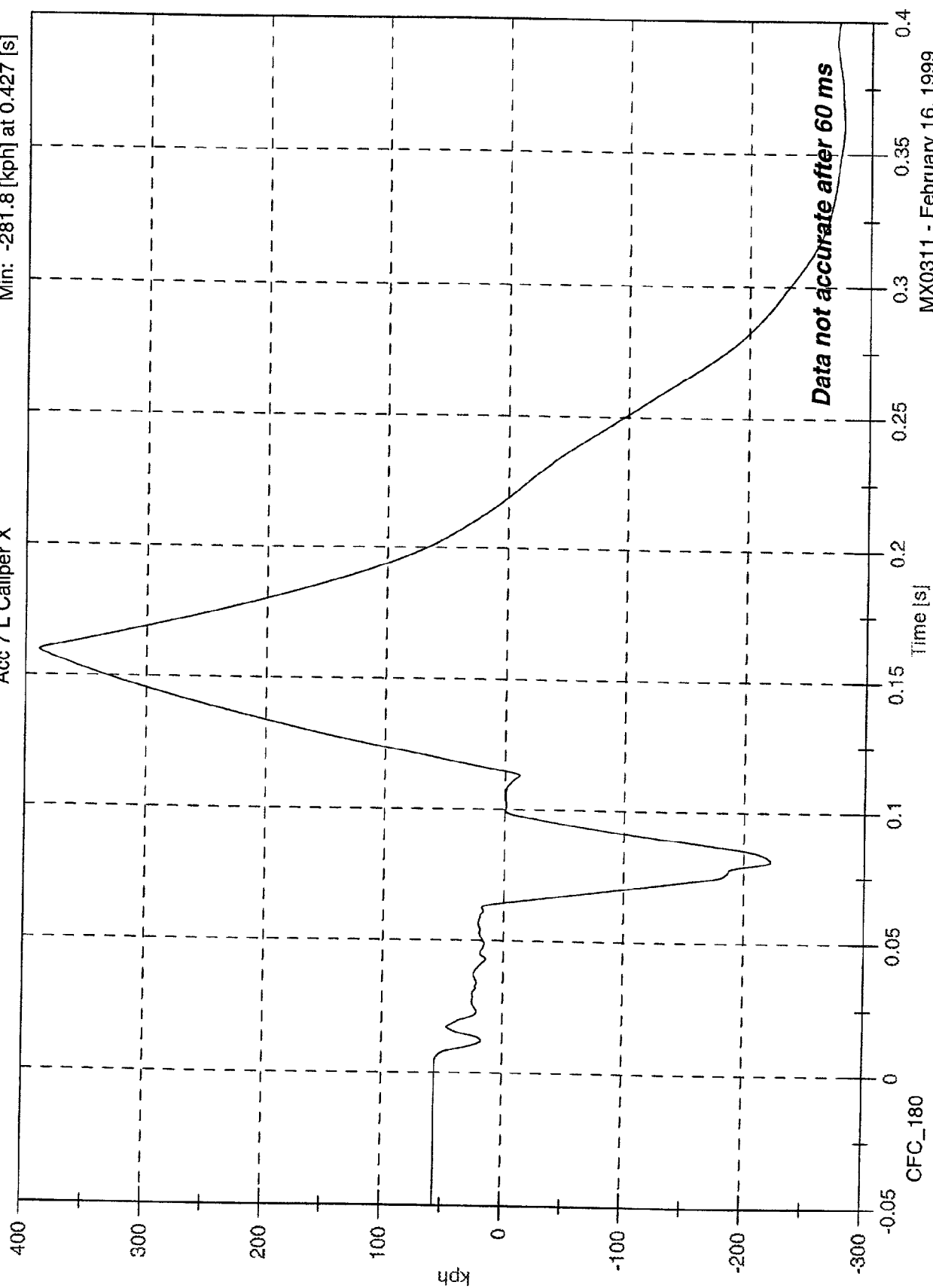


NCAP Test #12 - 1999 Jeep Wrangler

Max: 388.7 [kph] at 0.160 [s]

Min: -281.8 [kph] at 0.427 [s]

Acc 7 L Caliper X



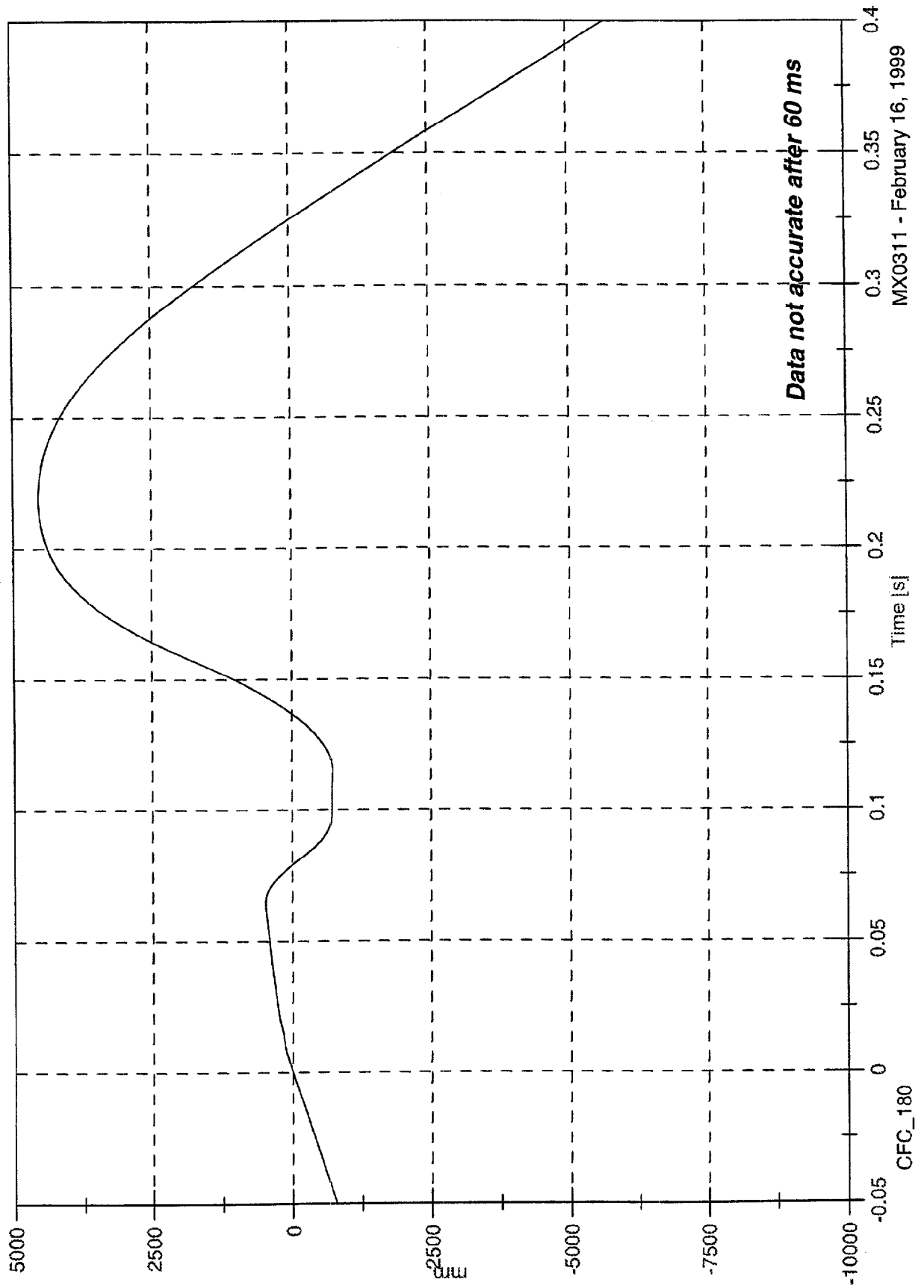
Data not accurate after 60 ms

MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

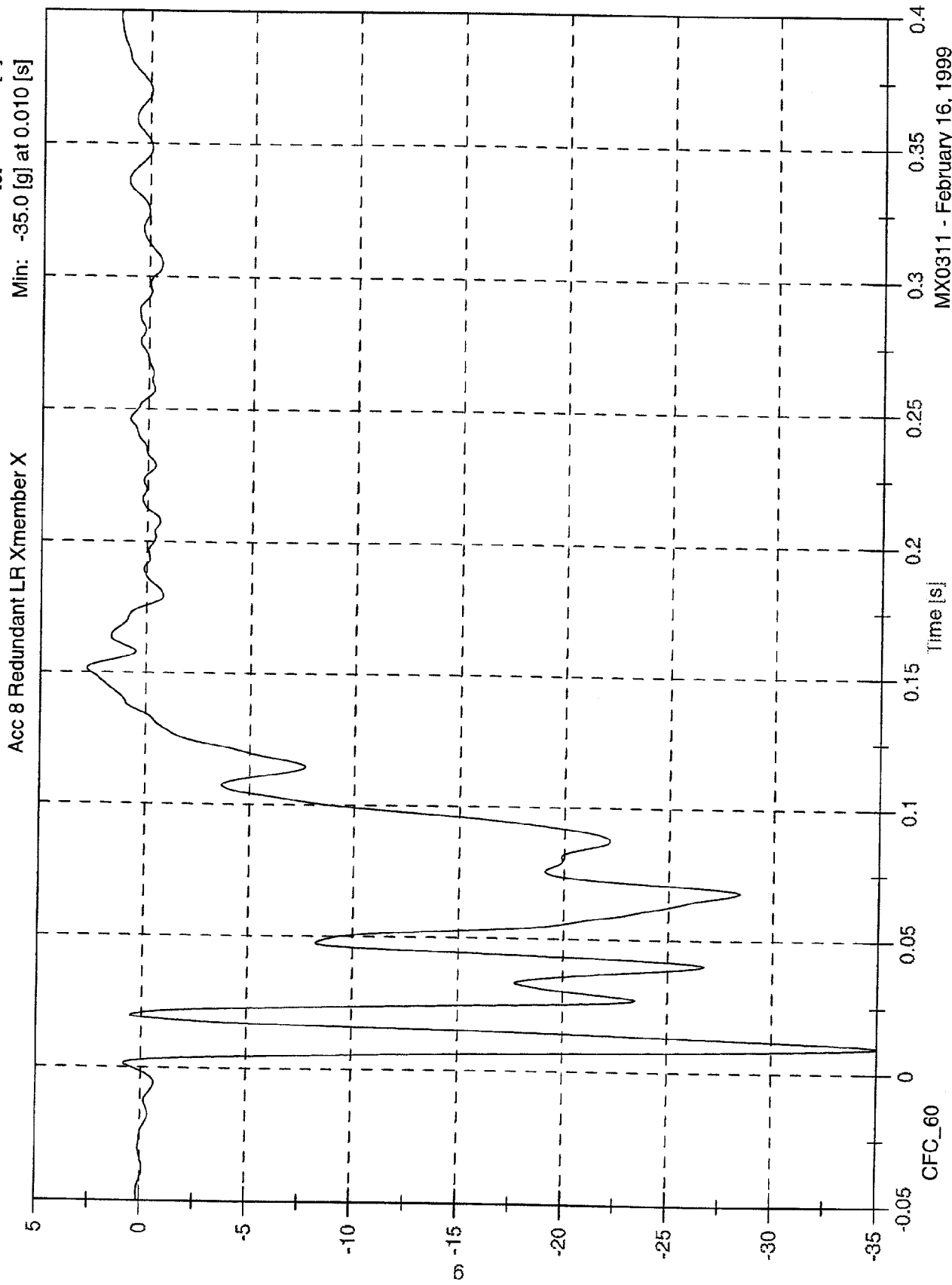
Acc 7 L Caliper X

Max: 4546.2 [mm] at 0.219 [s]
Min: -9018.7 [mm] at 0.455 [s]



MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

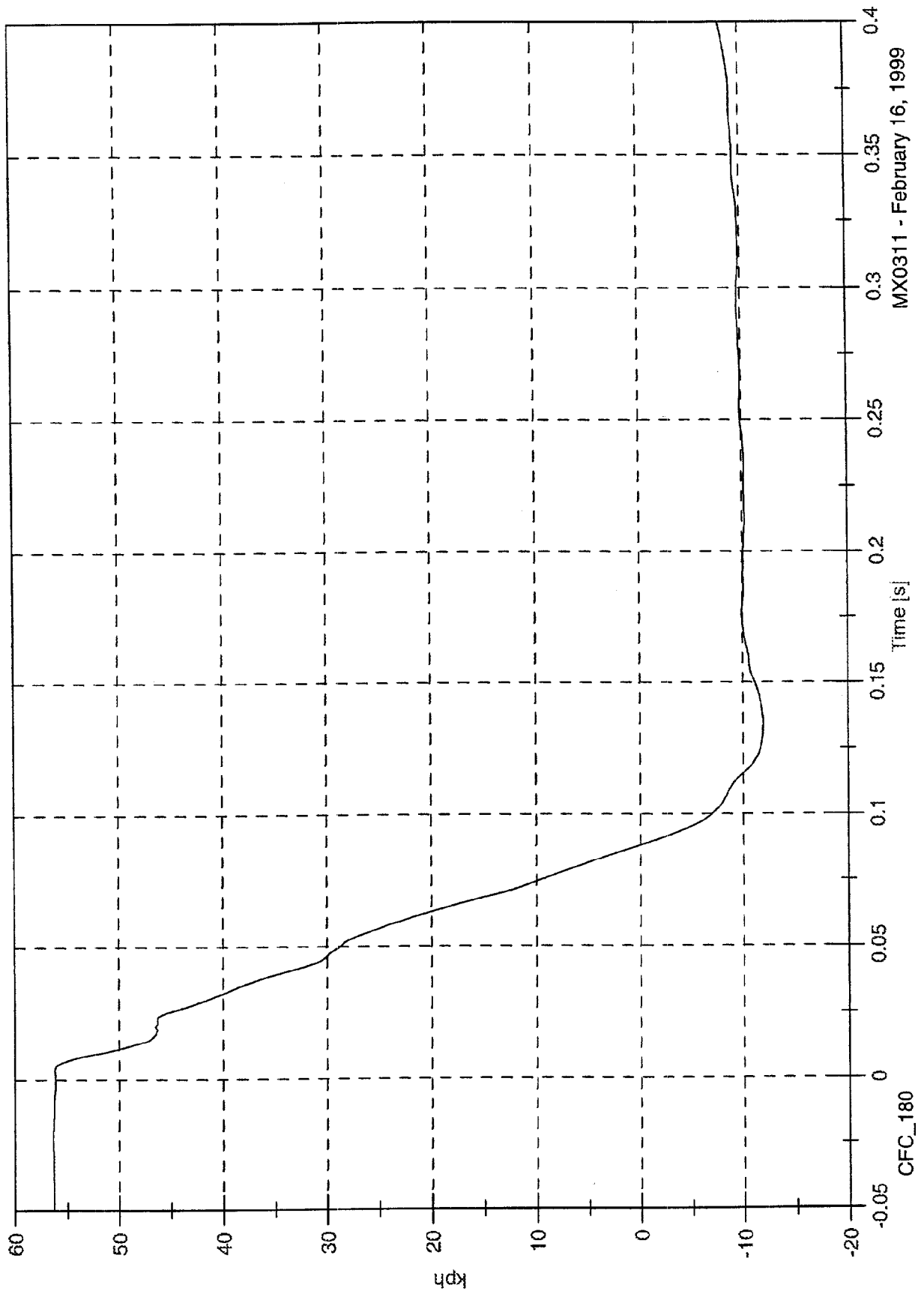


MX0311 - February 16, 1999

NCAP Test #12 - 1999 Jeep Wrangler

Acc 8 Redundant LR Xmember X

Max: 56.4 [kph] at -0.023 [s]
Min: -11.9 [kph] at 0.135 [s]

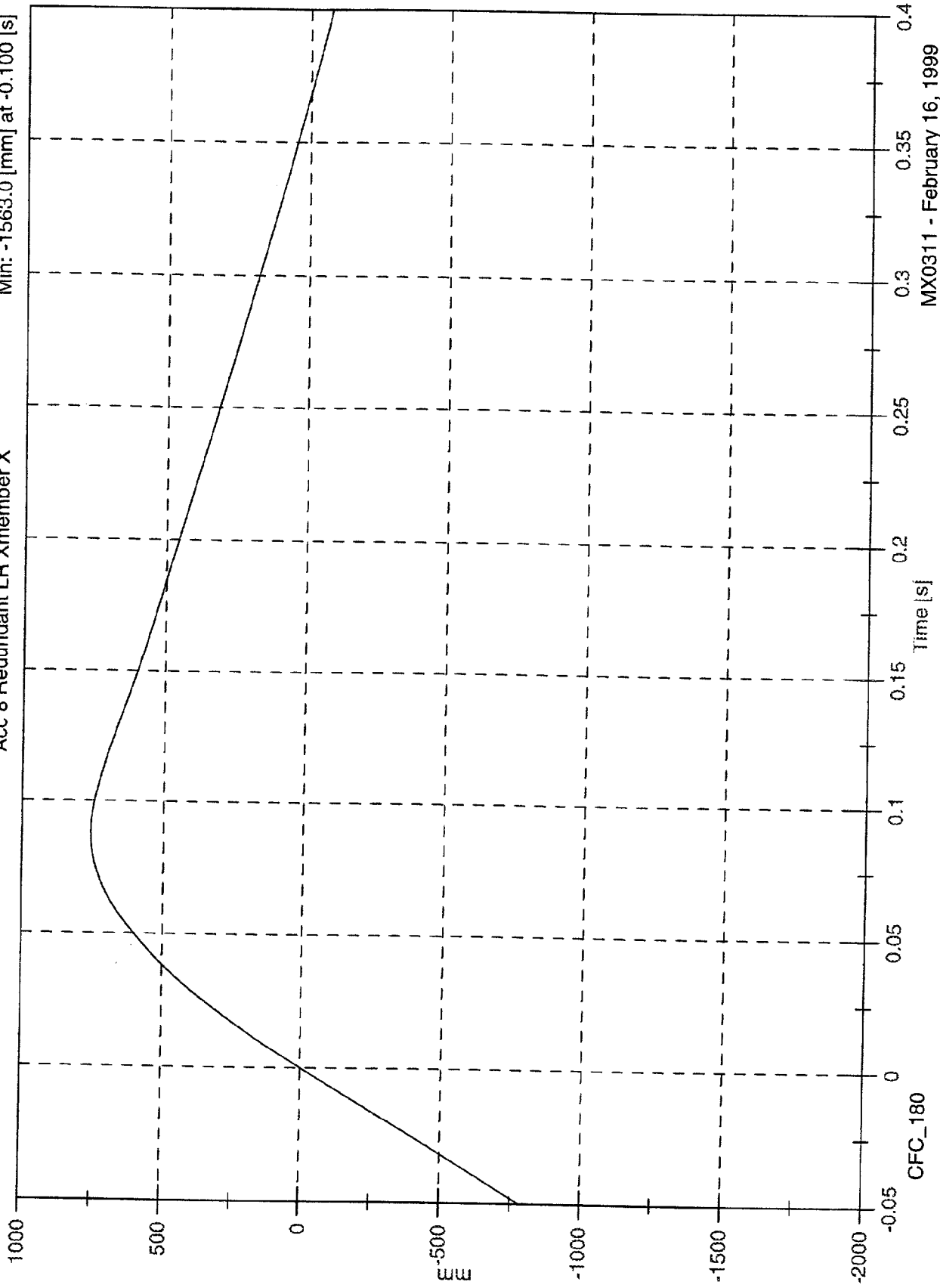


MX0311 - February 16, 1999

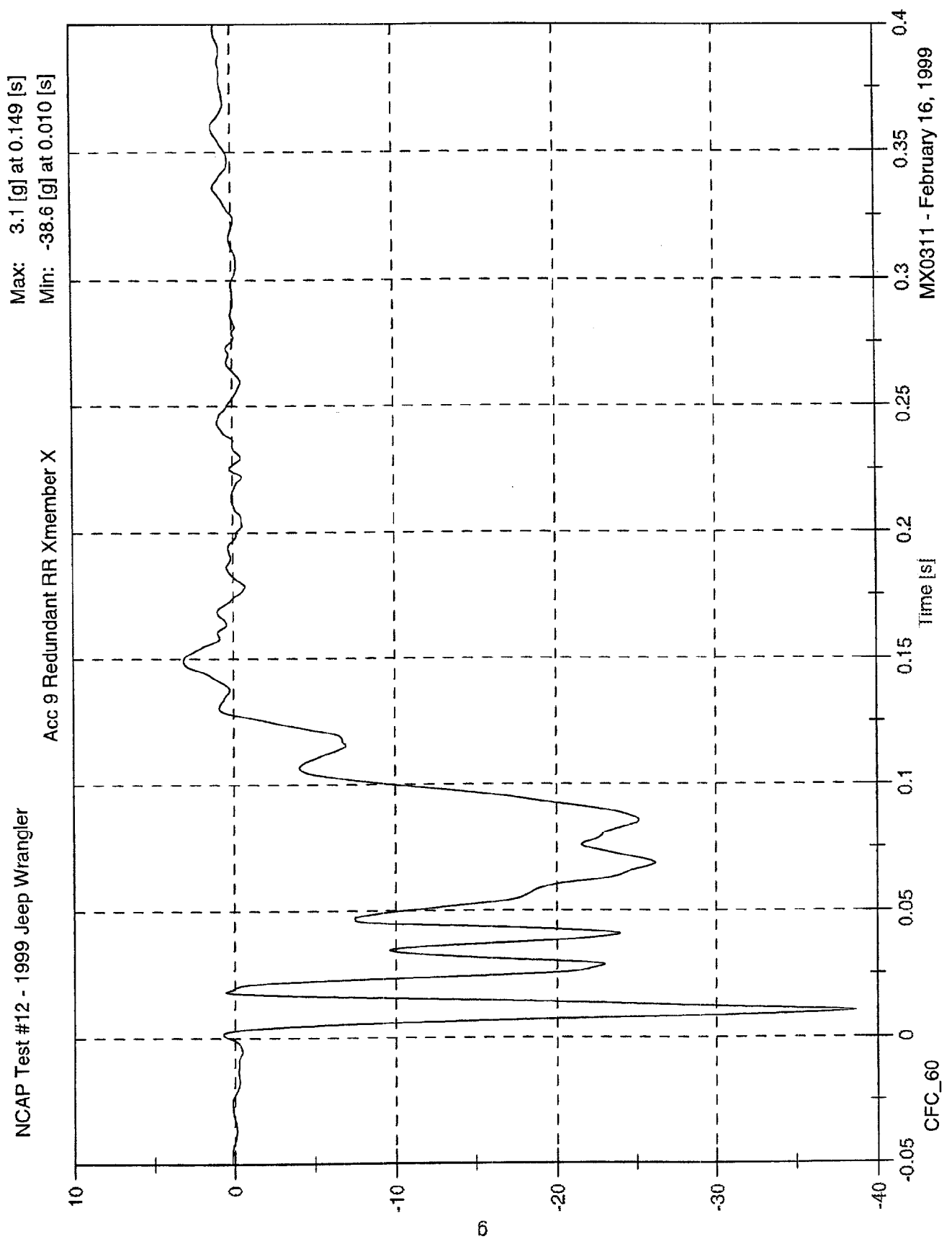
NCAP Test #12 - 1999 Jeep Wrangler

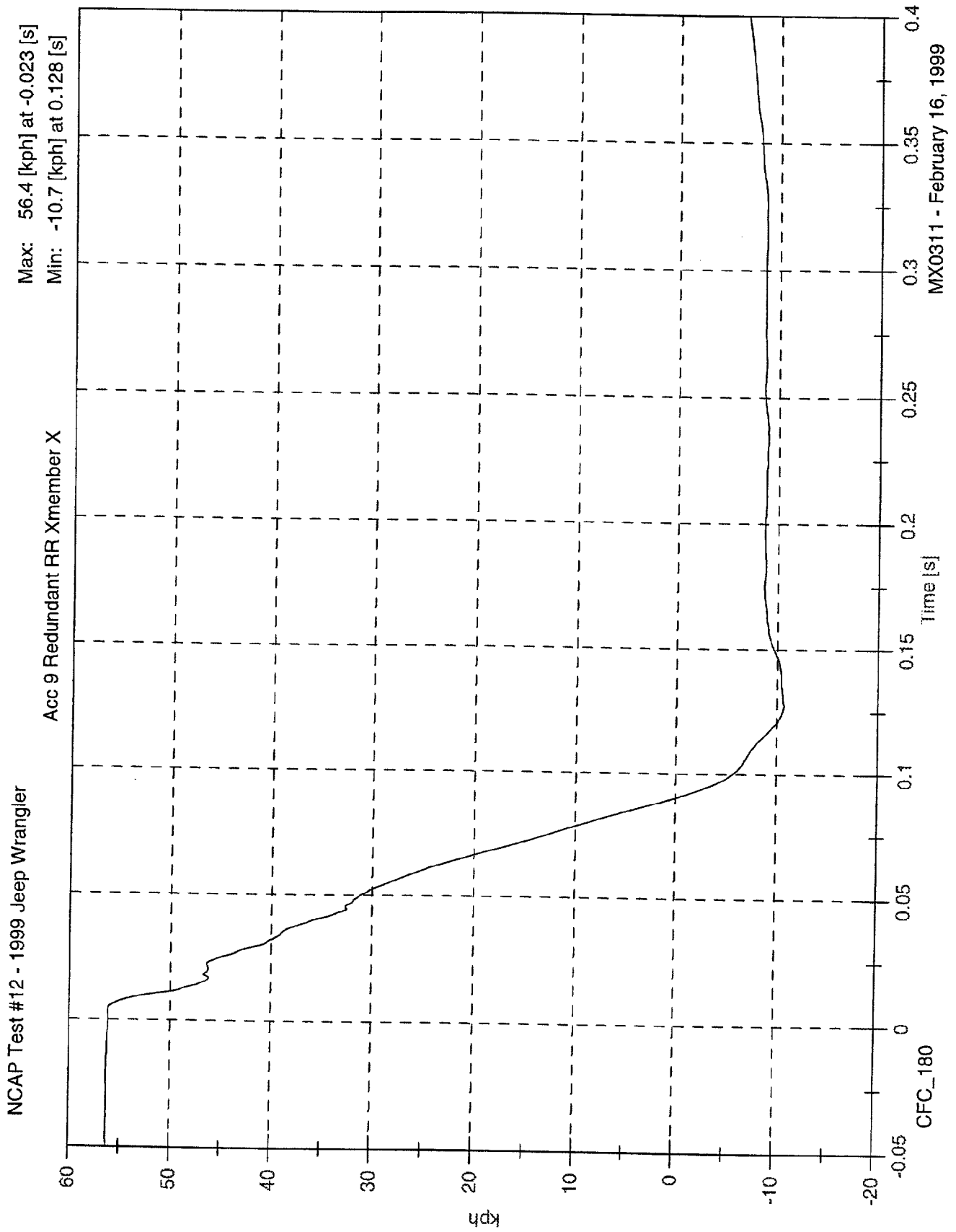
Max: 759.3 [mm] at 0.088 [s]
Min: -1563.0 [mm] at 0.100 [s]

Acc 8 Redundant LR Xmember X



MX0311 - February 16, 1999

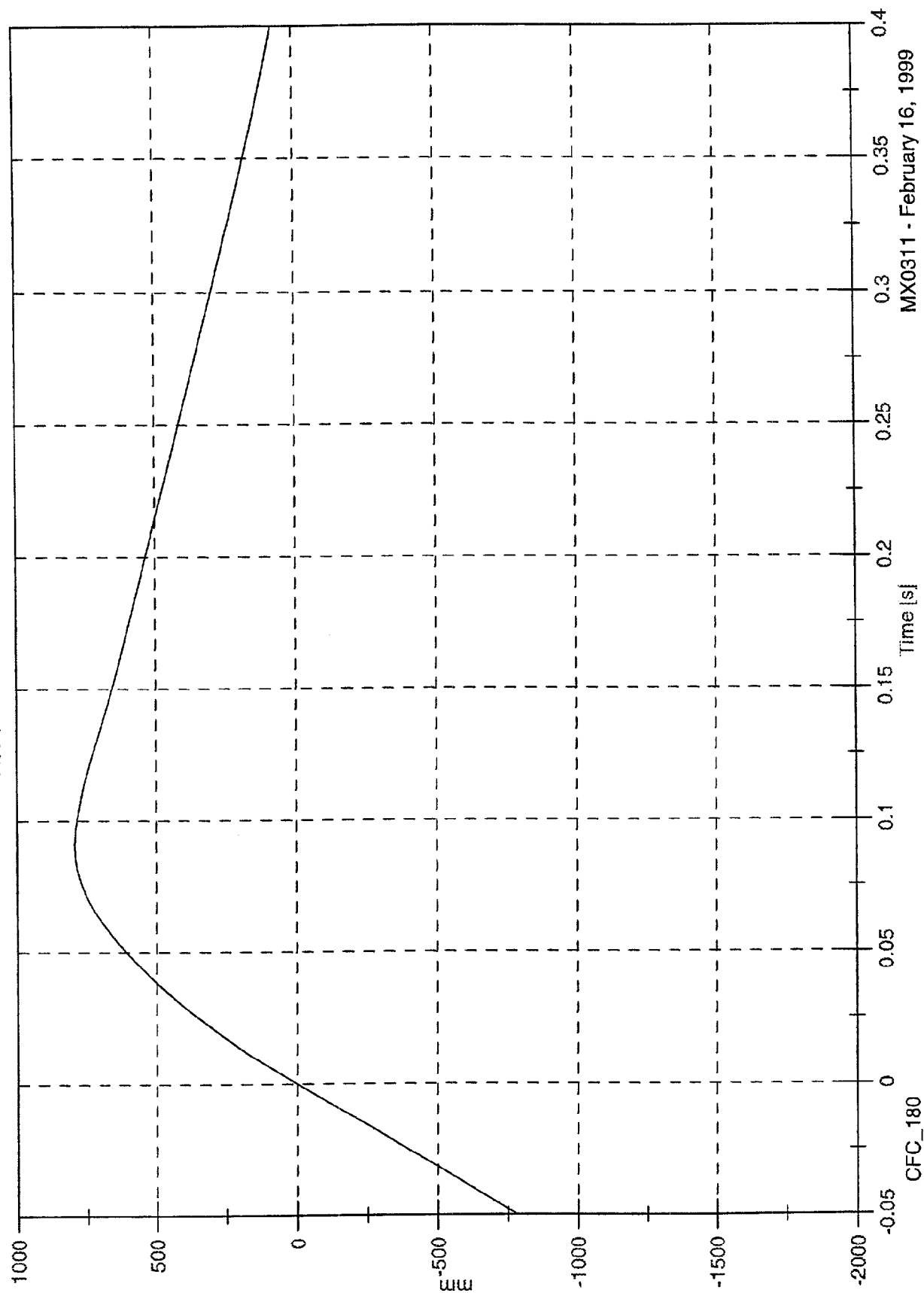




NCAP Test #12 - 1999 Jeep Wrangler

Acc 9 Redundant RR Xmember X

Max: 795.2 [mm] at 0.090 [s]
Min: -1563.1 [mm] at -0.100 [s]



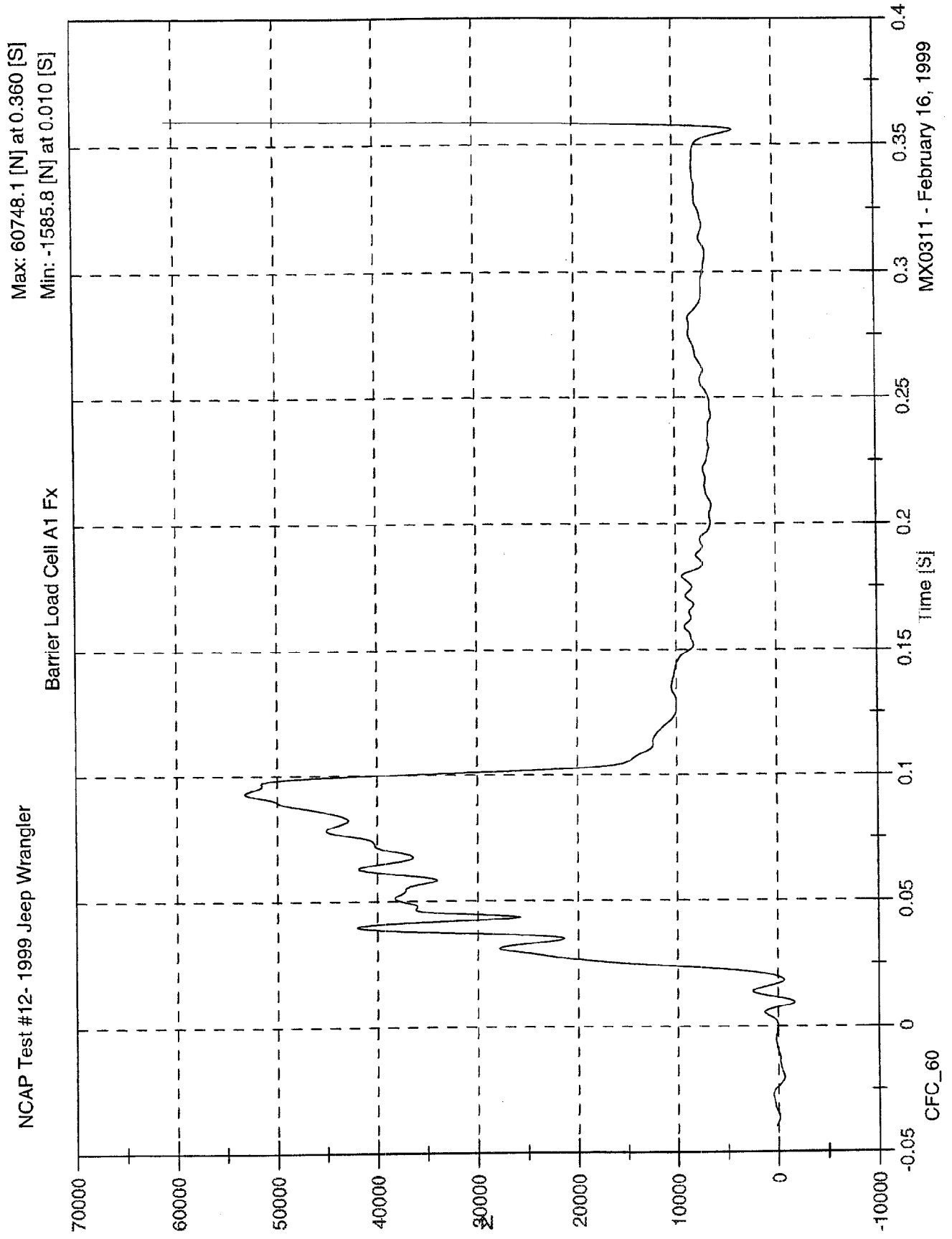
MX0311 - February 16, 1999

NHTSA TEST NO. MX0311

LOAD CELL BARRIER DATA

FILTER CHANNEL CLASS

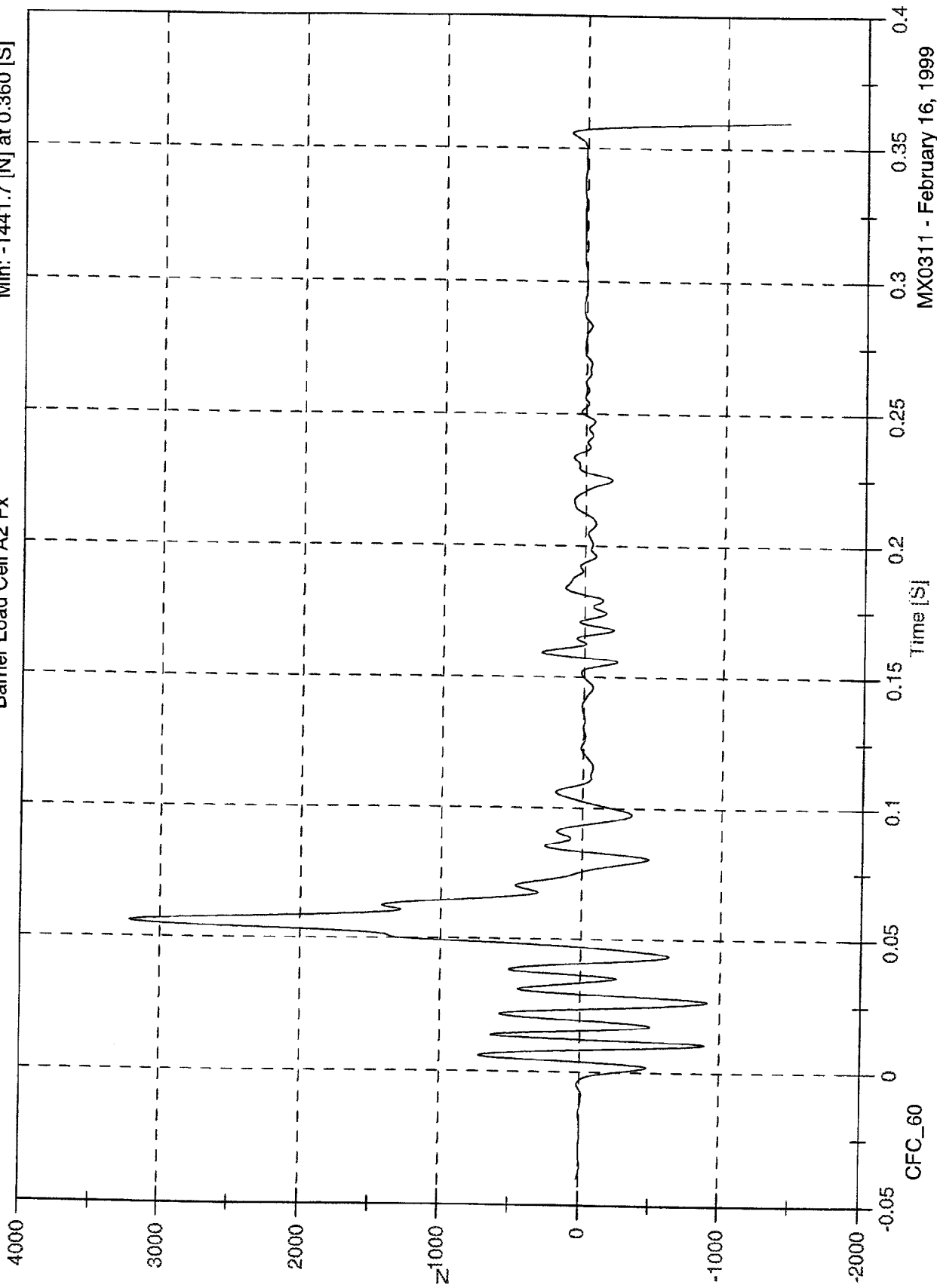
60



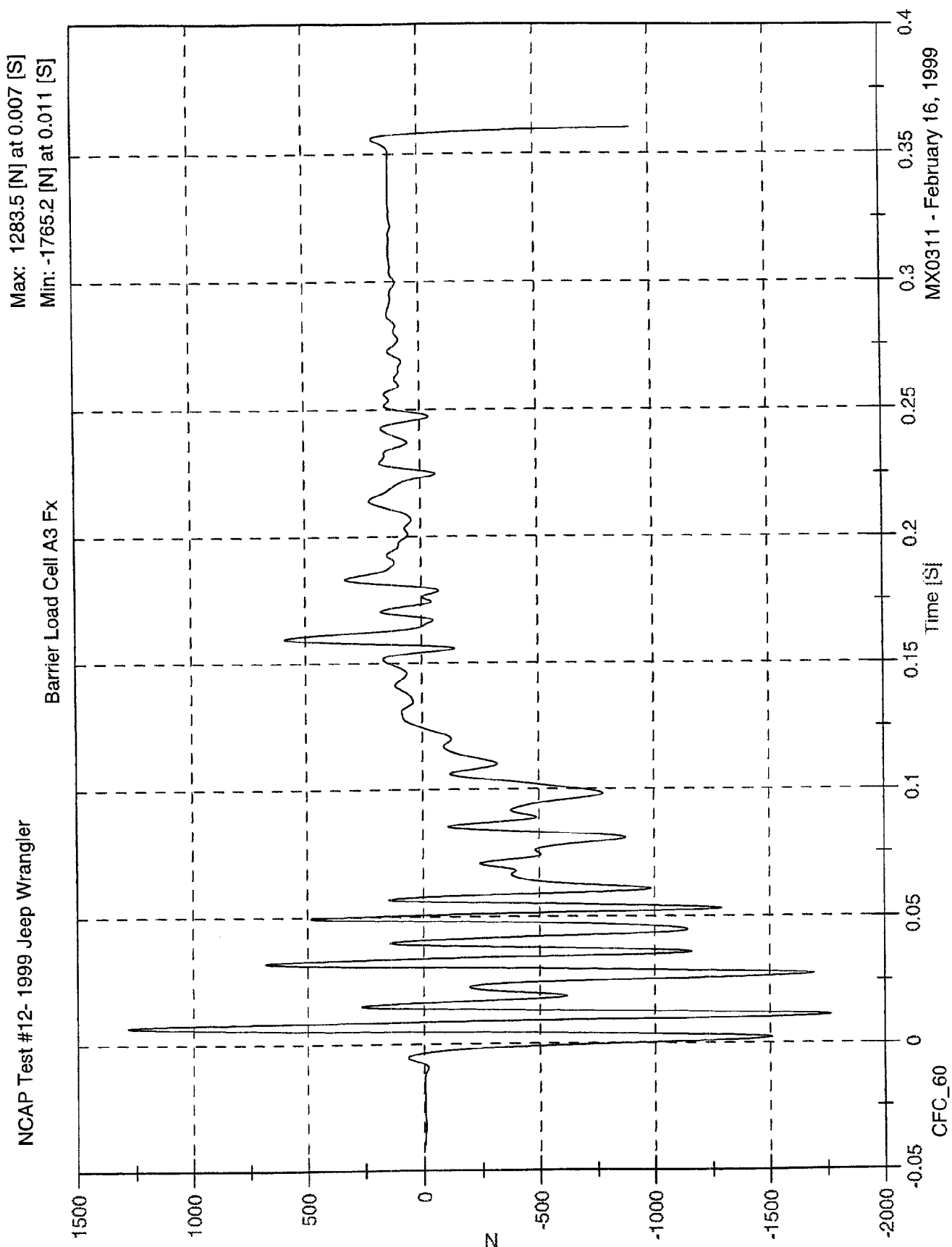
NCAP Test #12- 1999 Jeep Wrangler

Barrier Load Cell A2 Fx

Max: 3220.0 [N] at 0.056 [S]
Min: -1441.7 [N] at 0.360 [S]



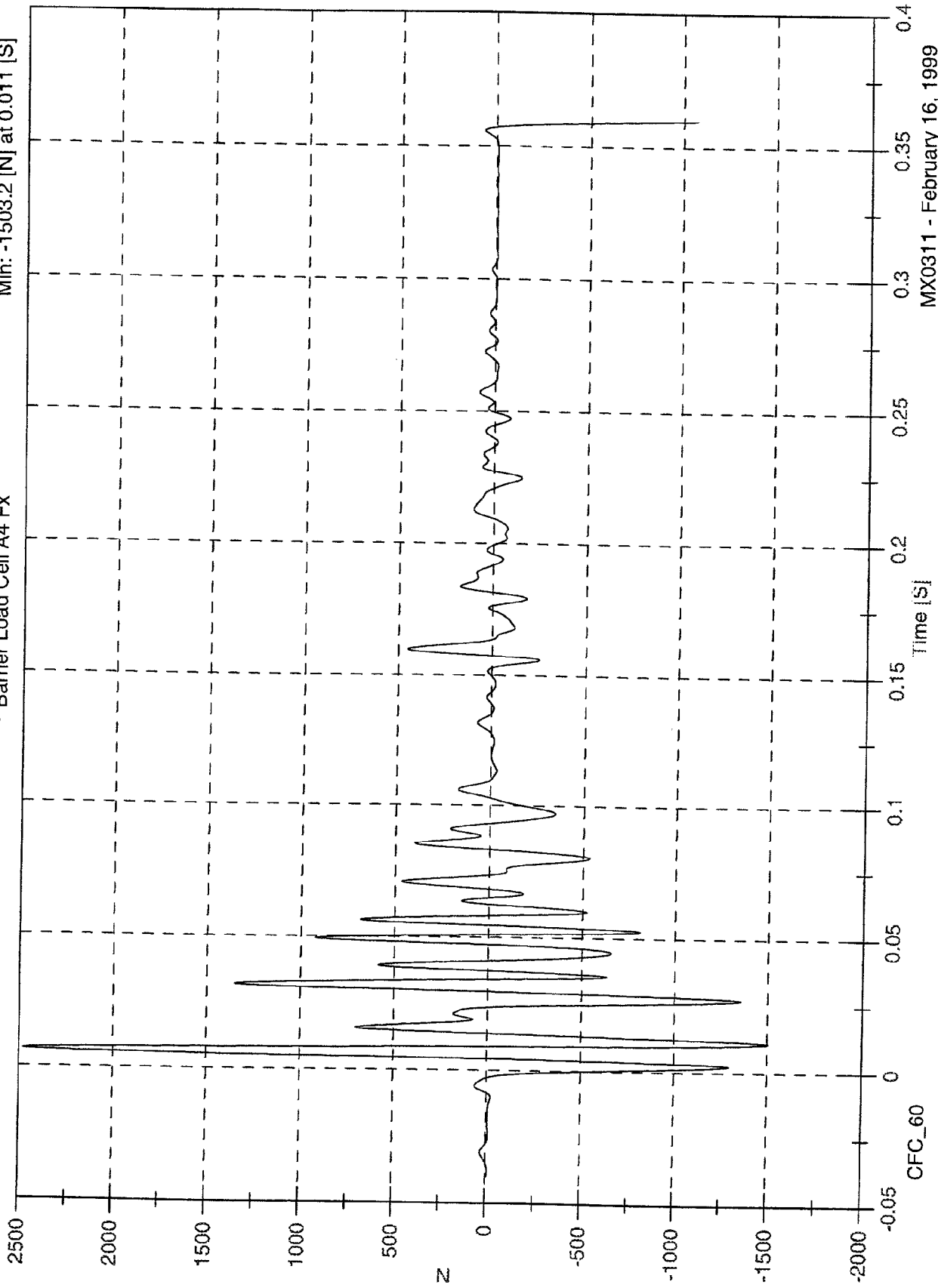
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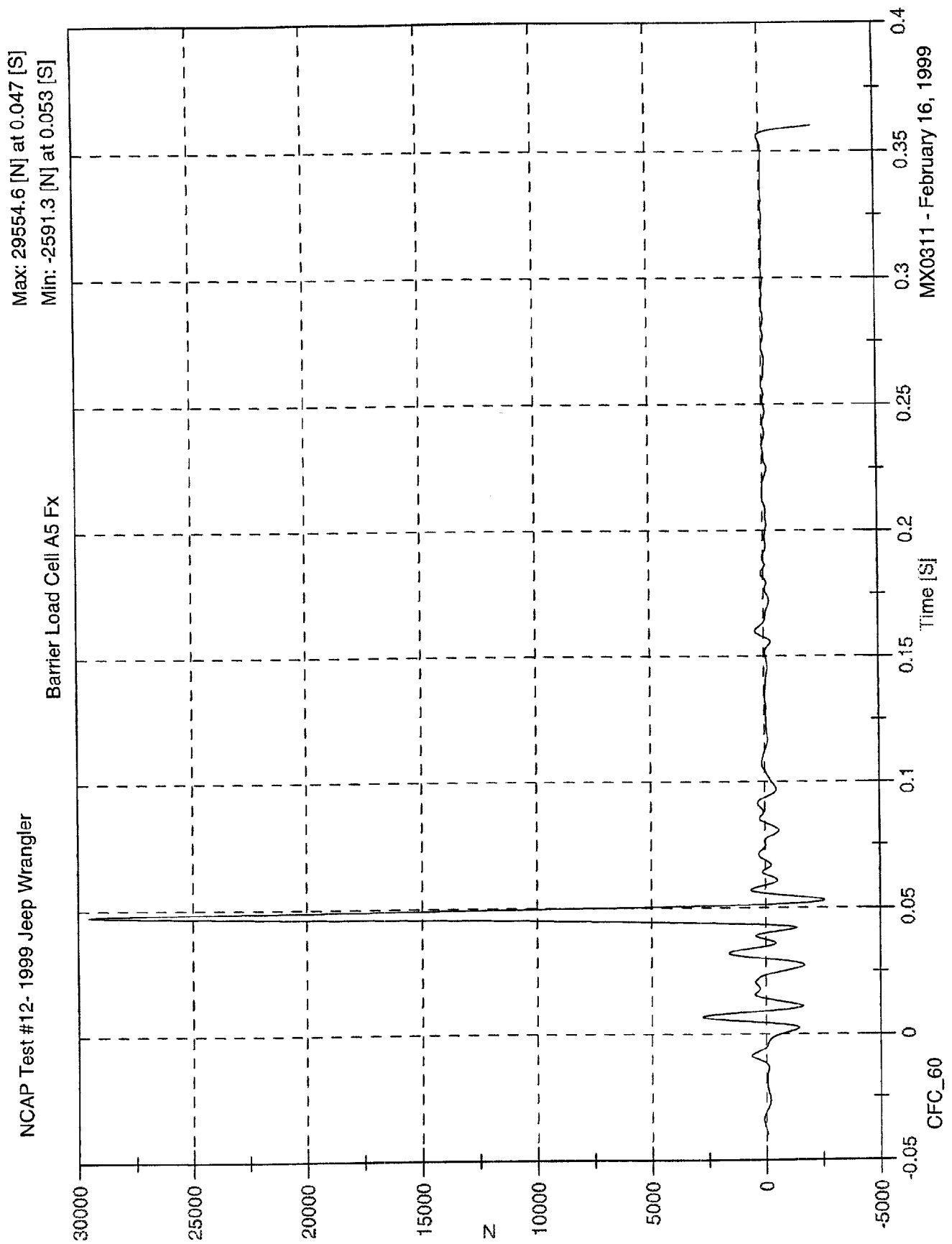
NCAP Test #12- 1999 Jeep Wrangler

Max: 2478.3 [N] at 0.007 [S]
 Min: -1503.2 [N] at 0.011 [S]

Barrier Load Cell A4 Fx



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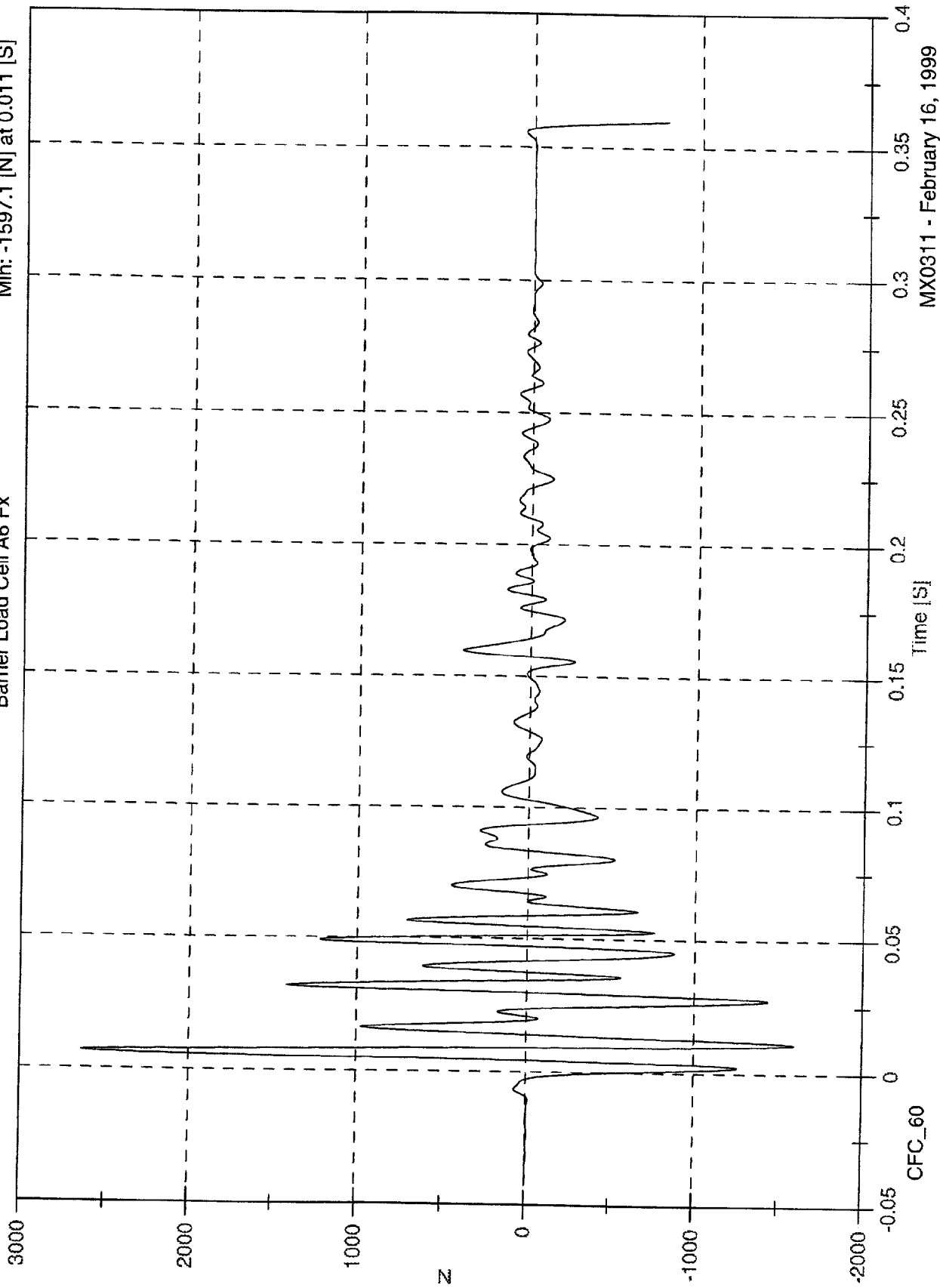


NCAP Test #12- 1999 Jeep Wrangler

Max: 2637.9 [N] at 0.007 [S]

Min: -1597.1 [N] at 0.011 [S]

Barrier Load Cell A6 Fx

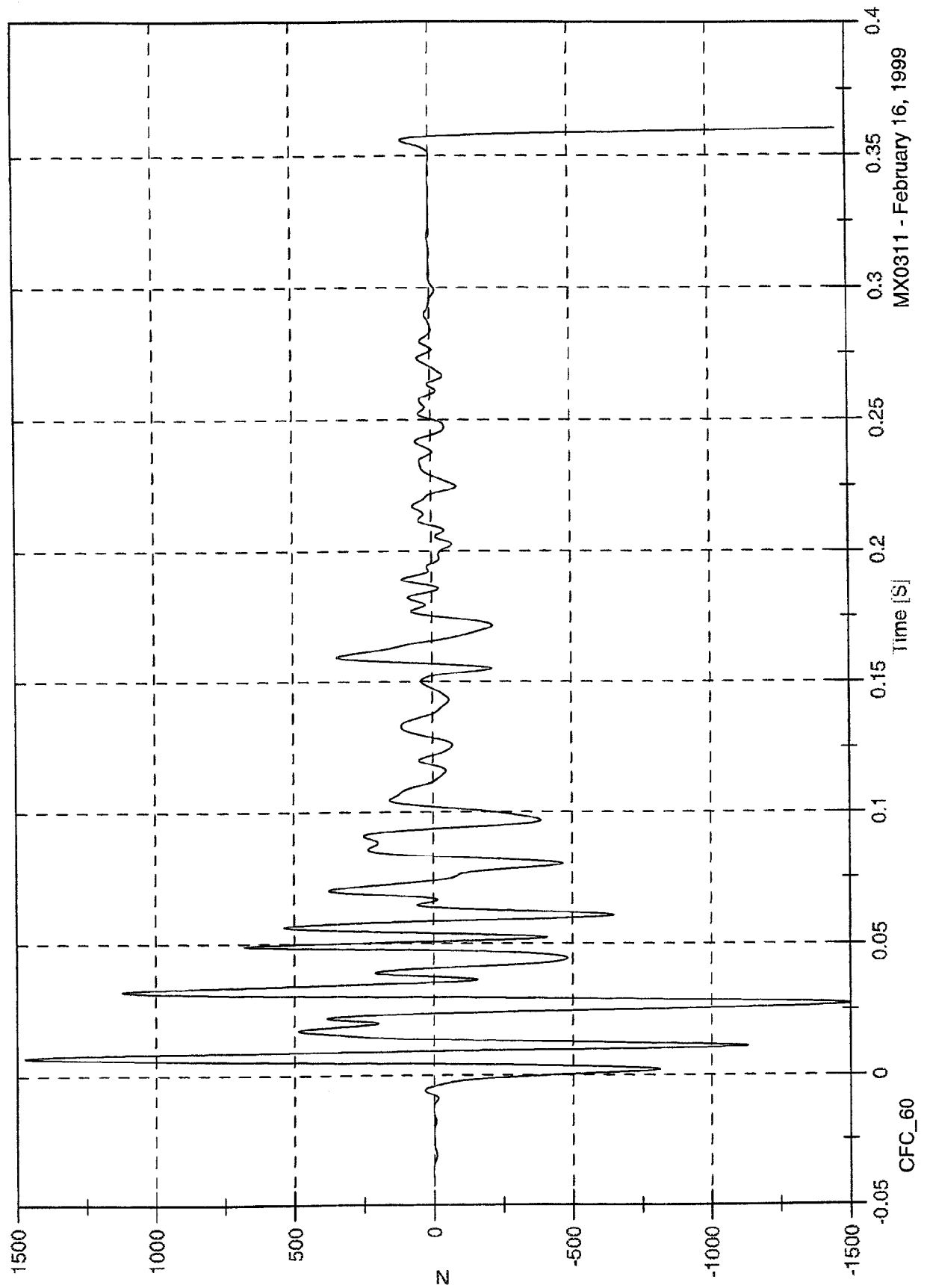


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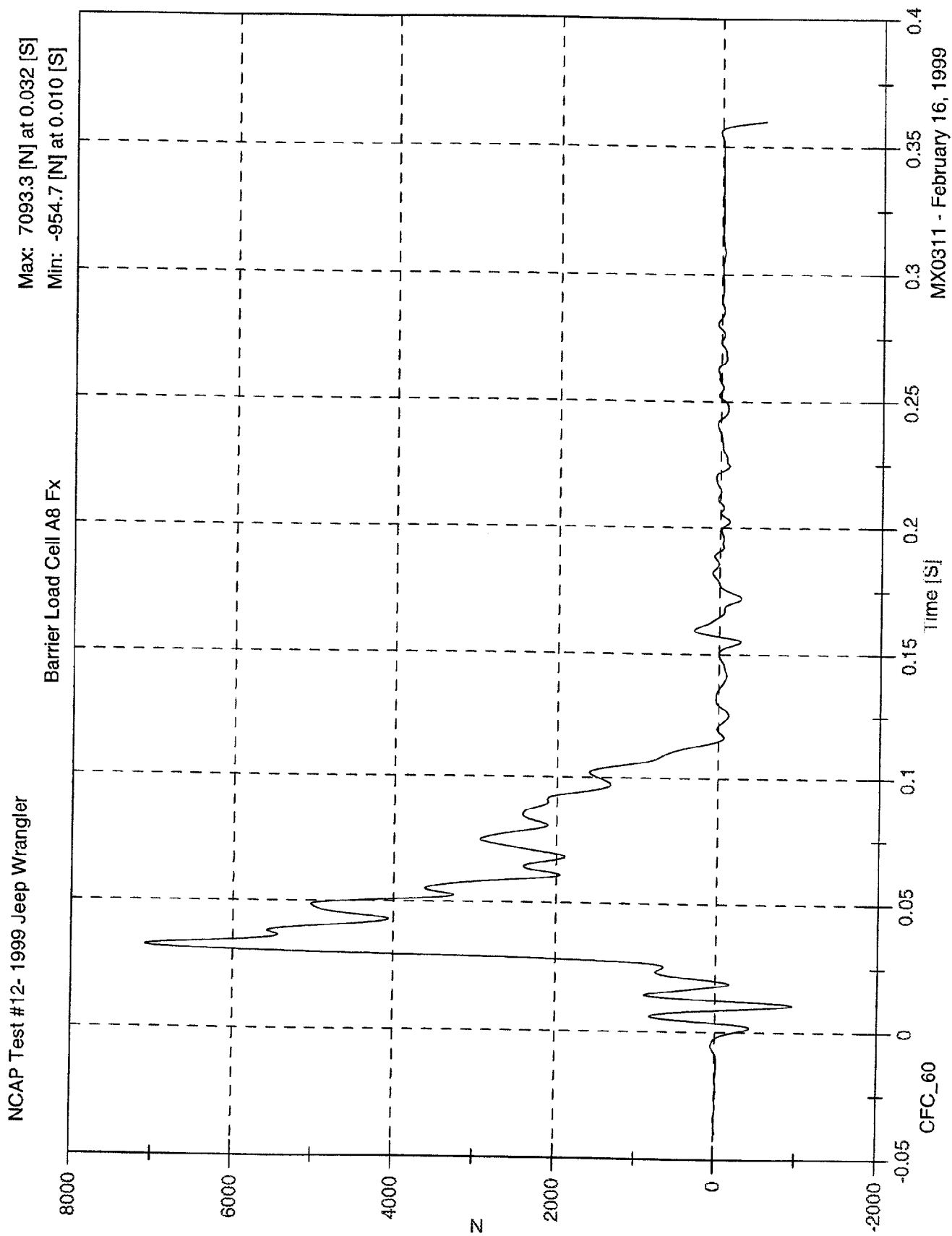
NCAP Test #12- 1999 Jeep Wrangler

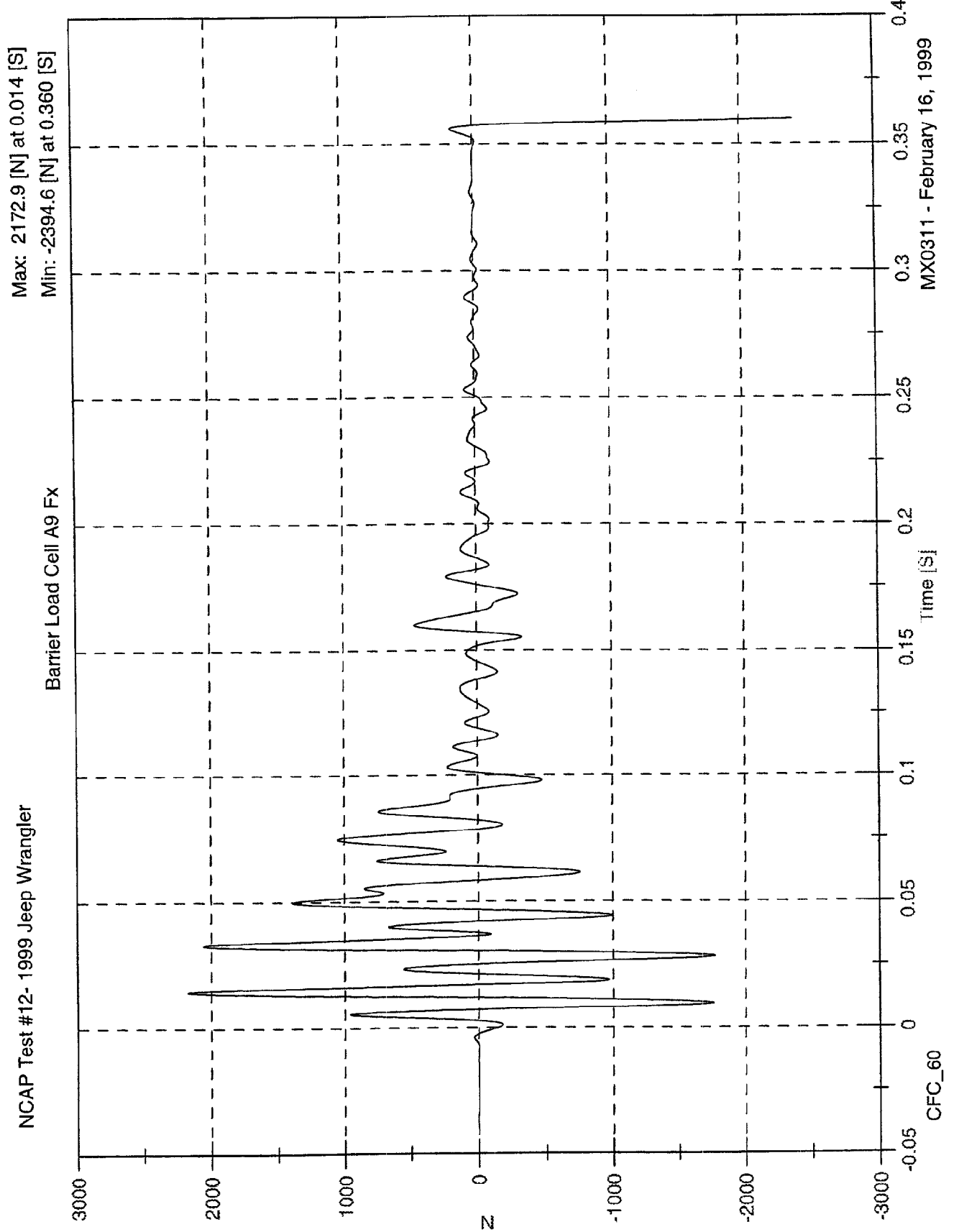
Barrier Load Cell A7 Fx

Max: 1472.7 [N] at 0.007 [S]
Min: -1498.8 [N] at 0.027 [S]



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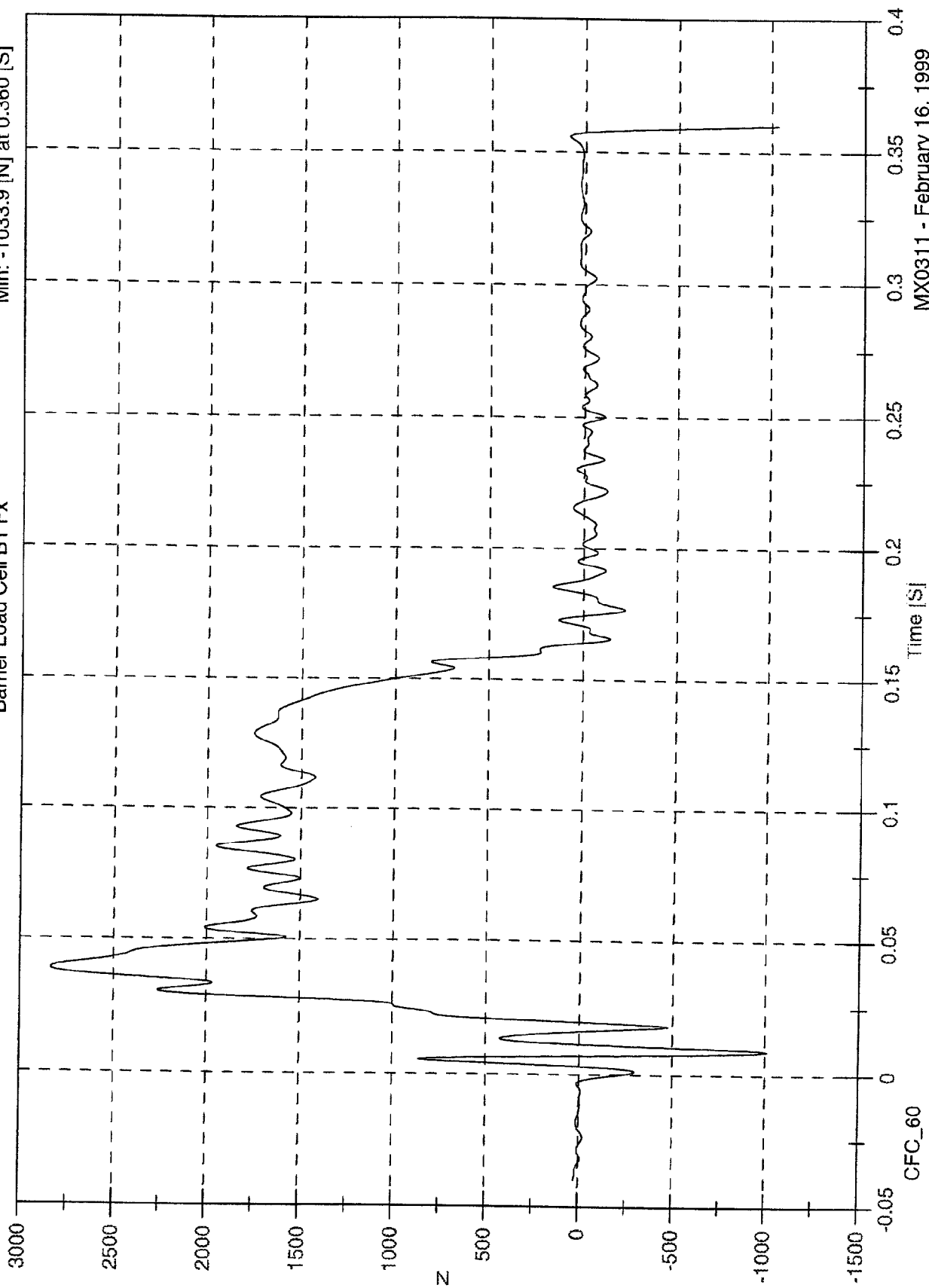




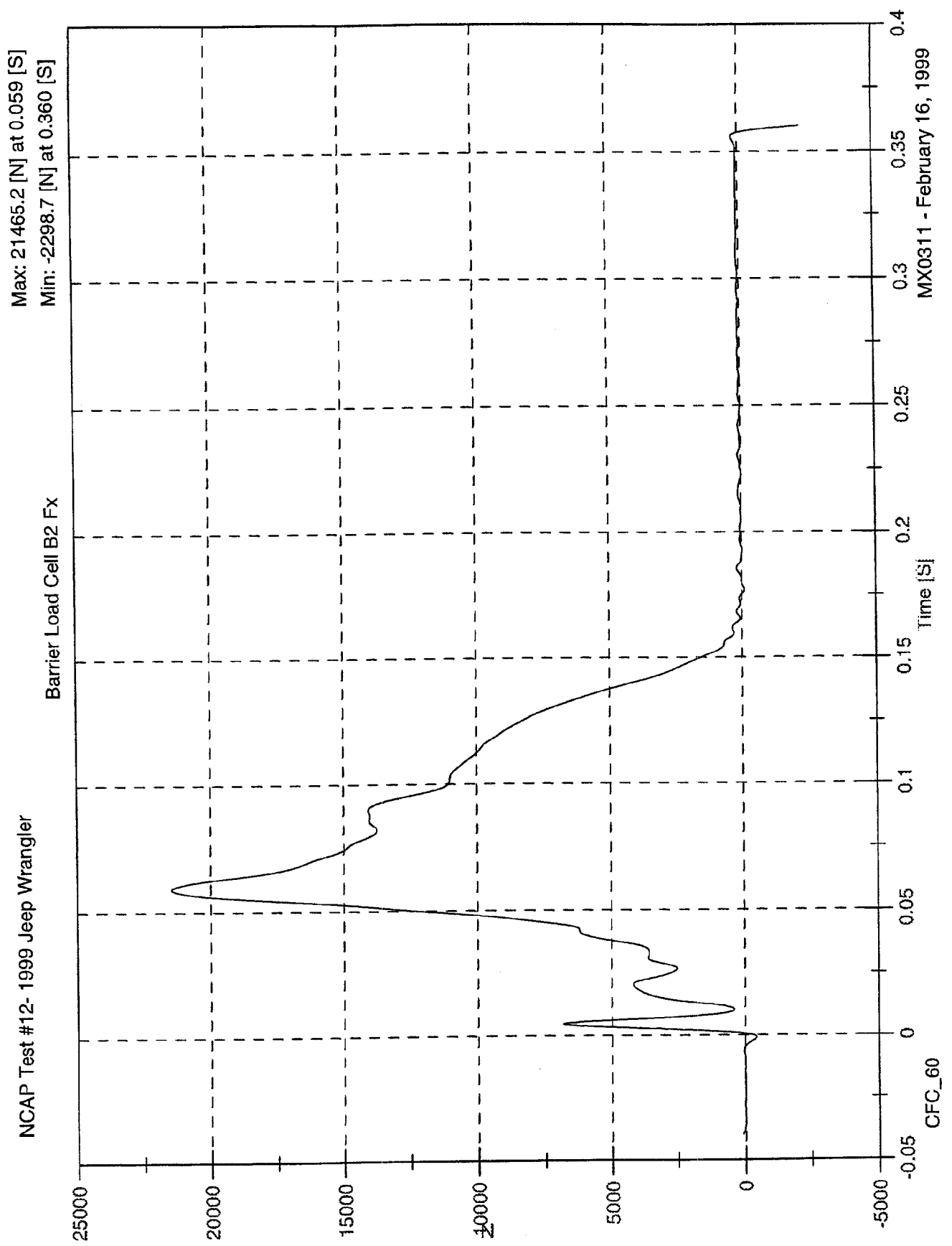
NCAP Test #12- 1999 Jeep Wrangler

Max: 2836.0 [N] at 0.039 [S]
Min: -1033.9 [N] at 0.360 [S]

Barrier Load Cell B1 Fx



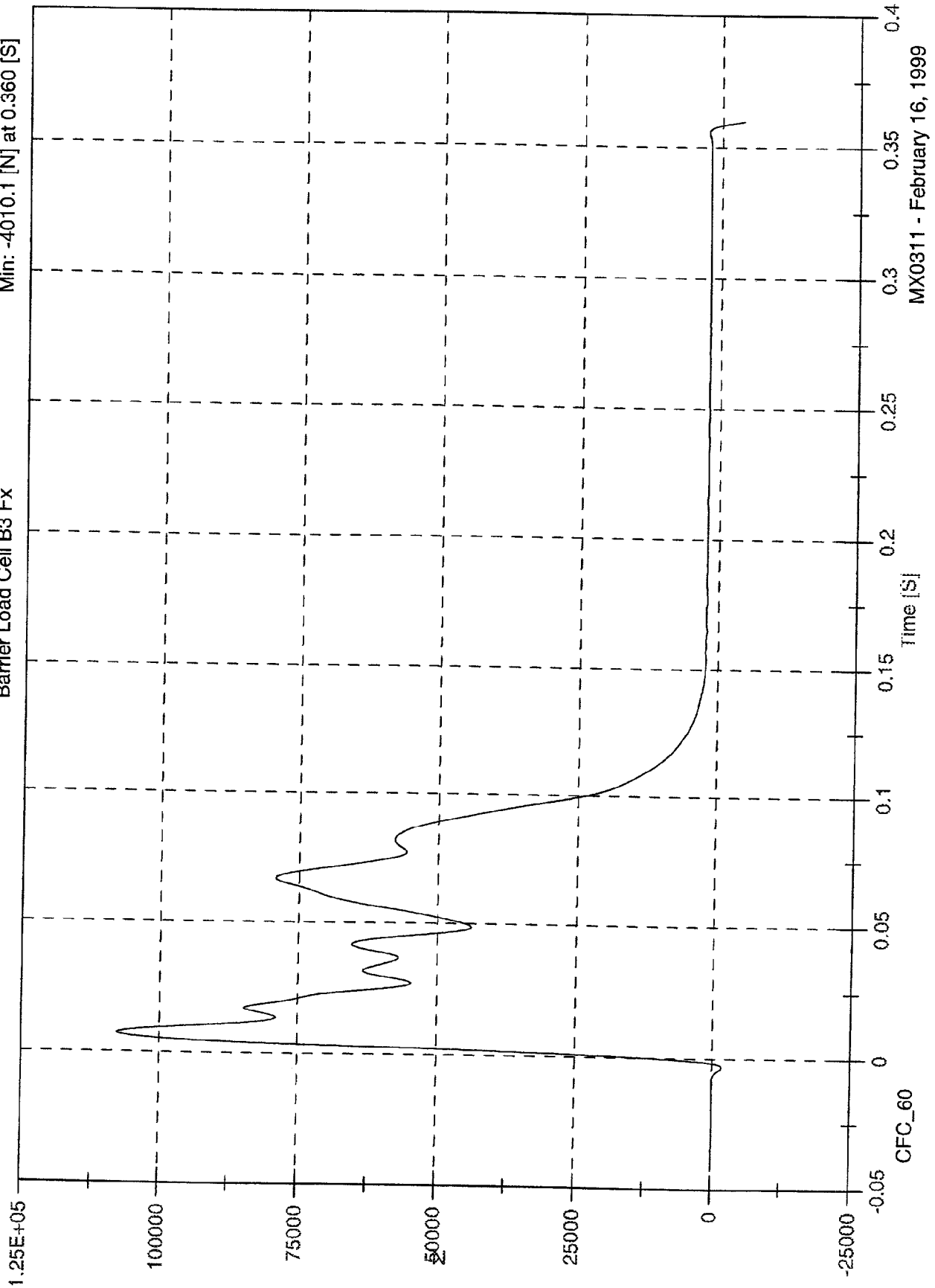
MX0311 - February 16, 1999



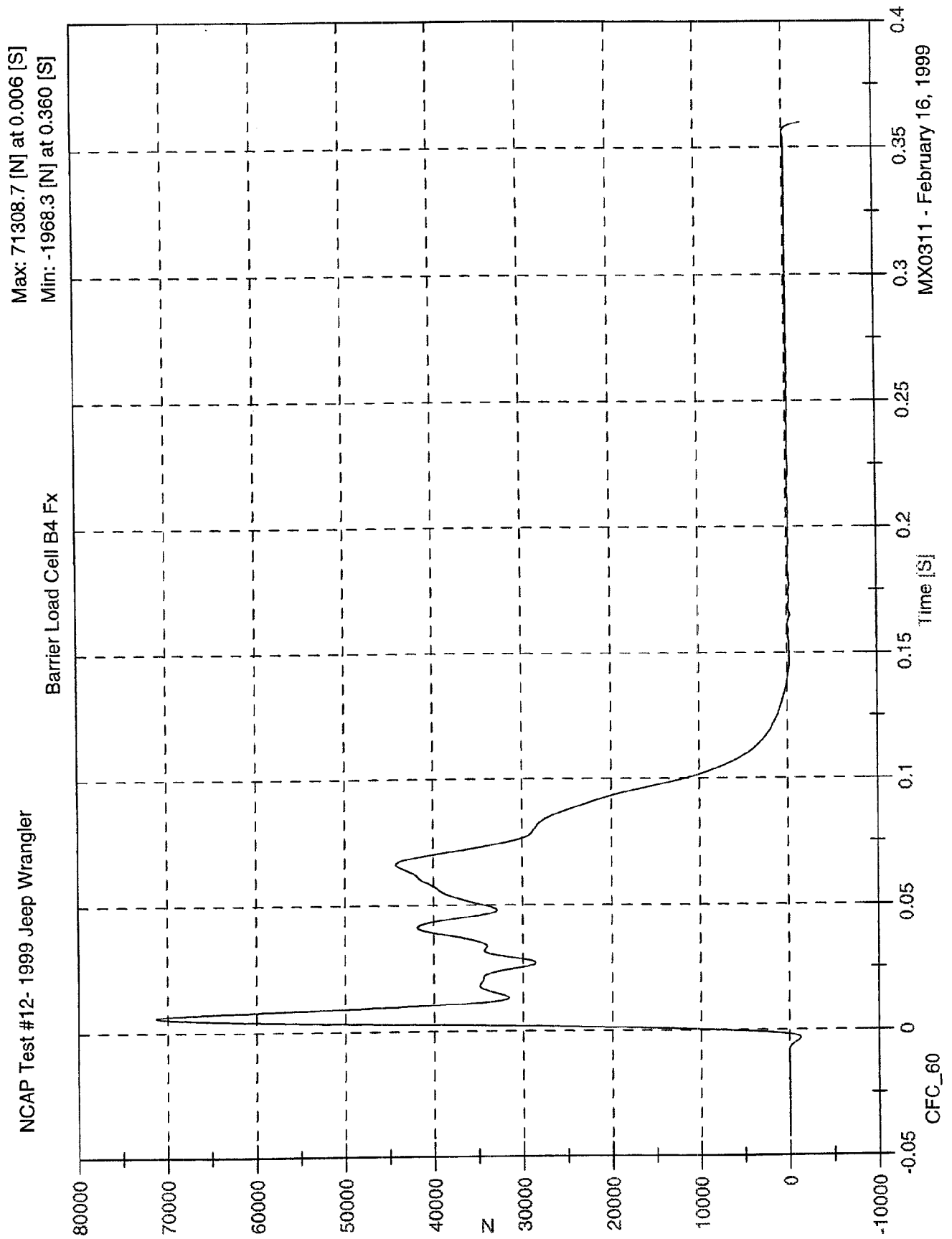
NCAP Test #12- 1999 Jeep Wrangler

Max: 107760.6 [N] at 0.007 [S]
Min: -4010.1 [N] at 0.360 [S]

Barrier Load Cell B3 Fx



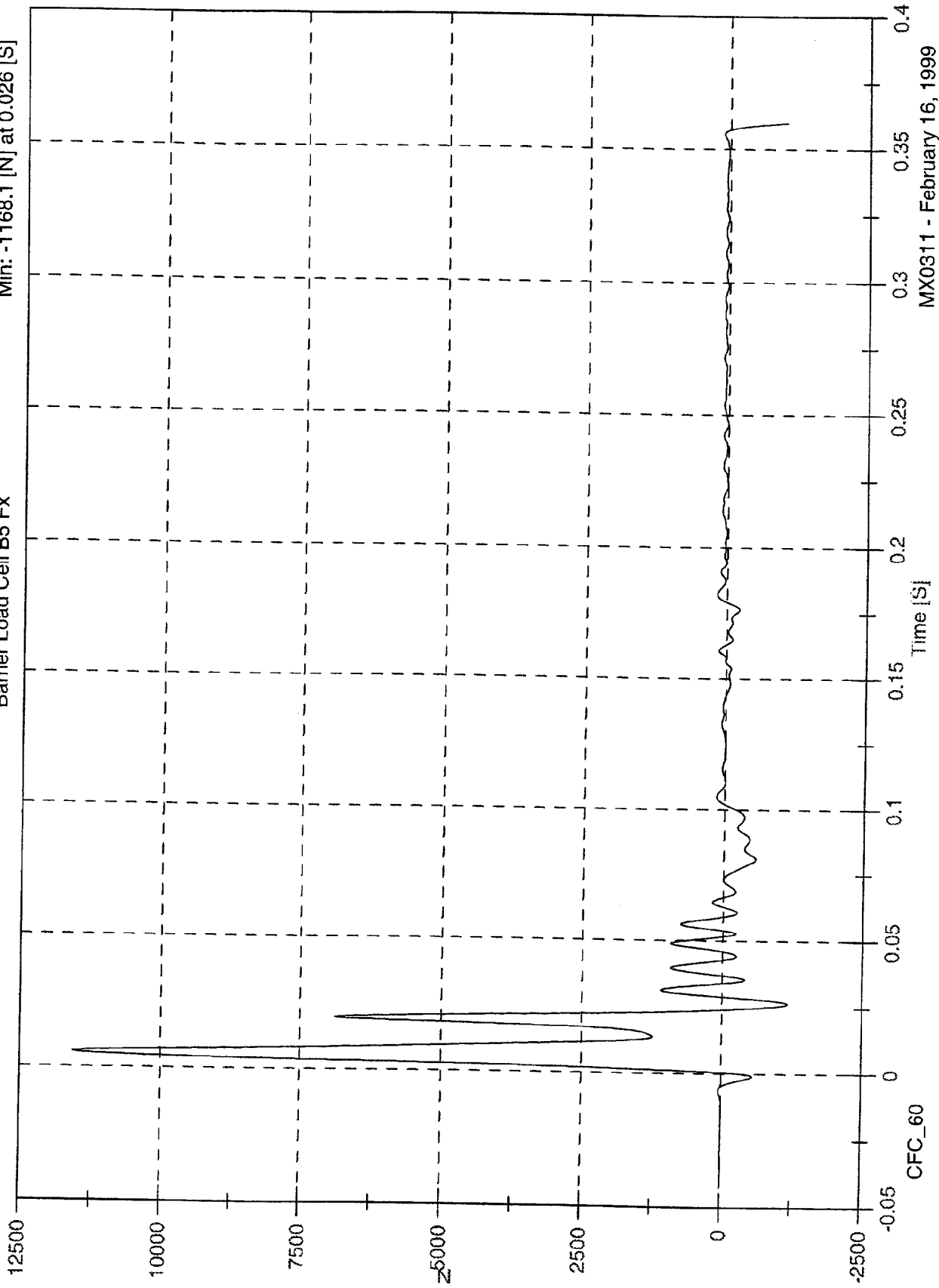
MX0311 - February 16, 1999



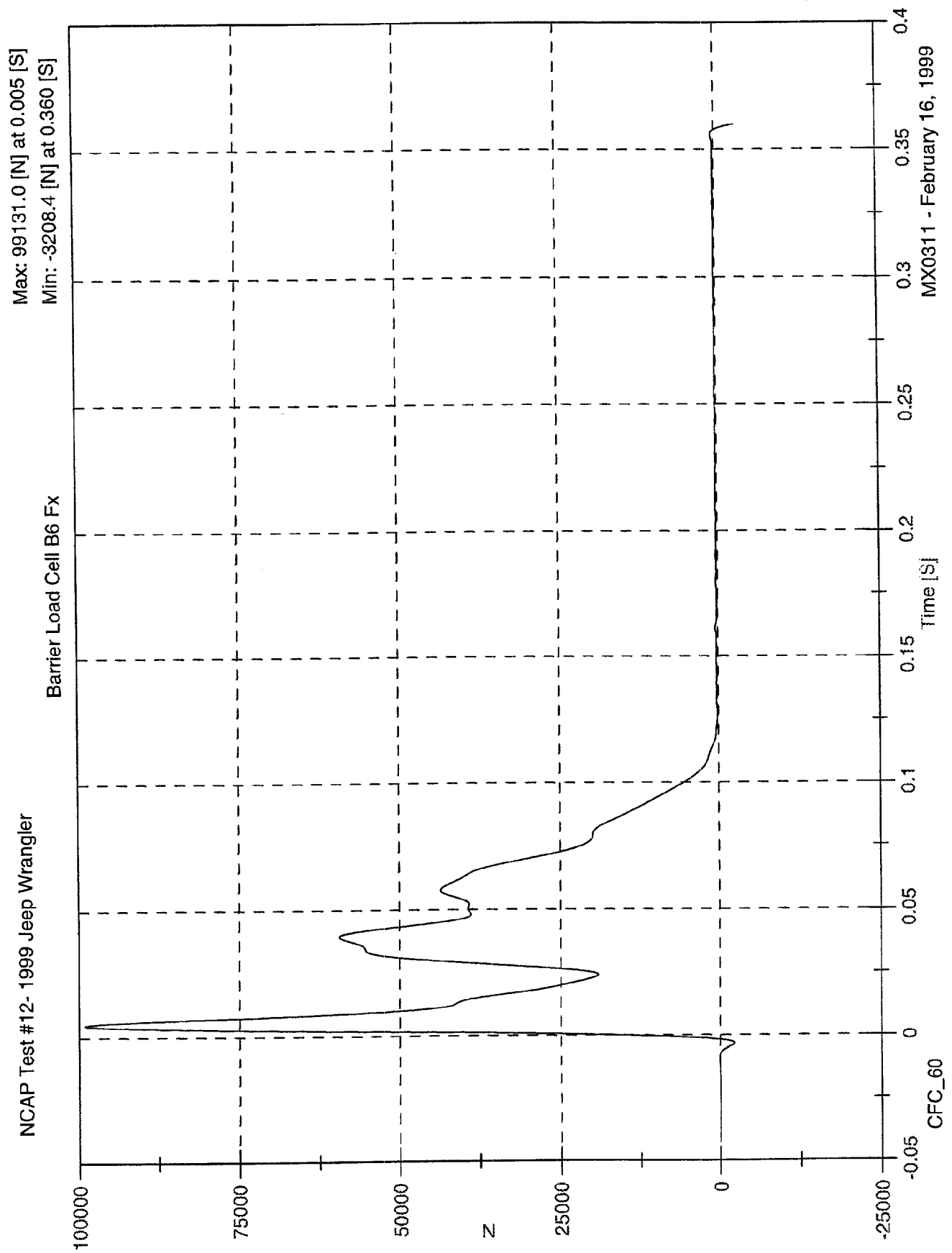
NCAP Test #12- 1999 Jeep Wrangler

Max: 11568.2 [N] at 0.006 [S]
Min: -1168.1 [N] at 0.026 [S]

Barrier Load Cell B5 Fx



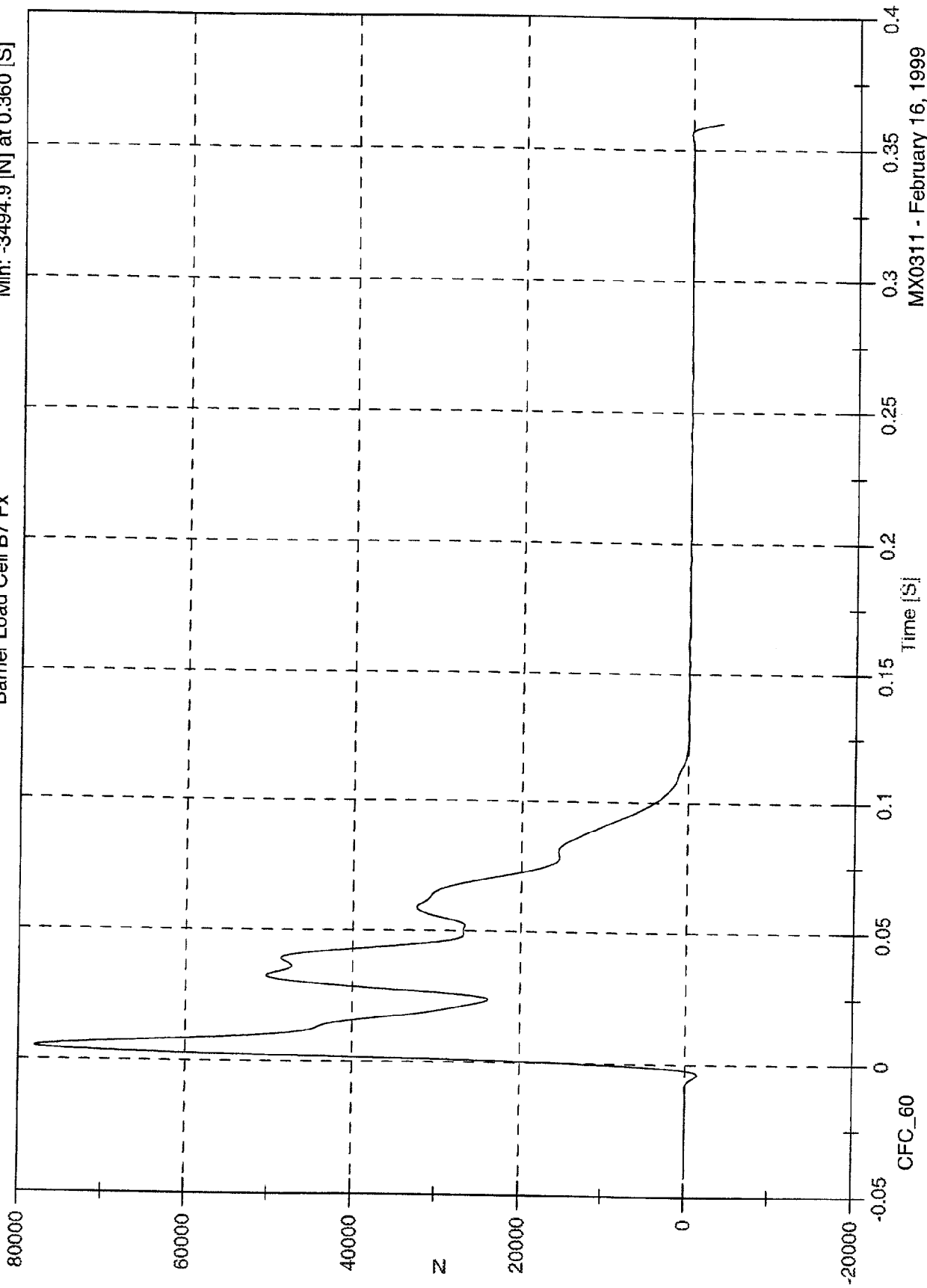
MX0311 - February 16, 1999



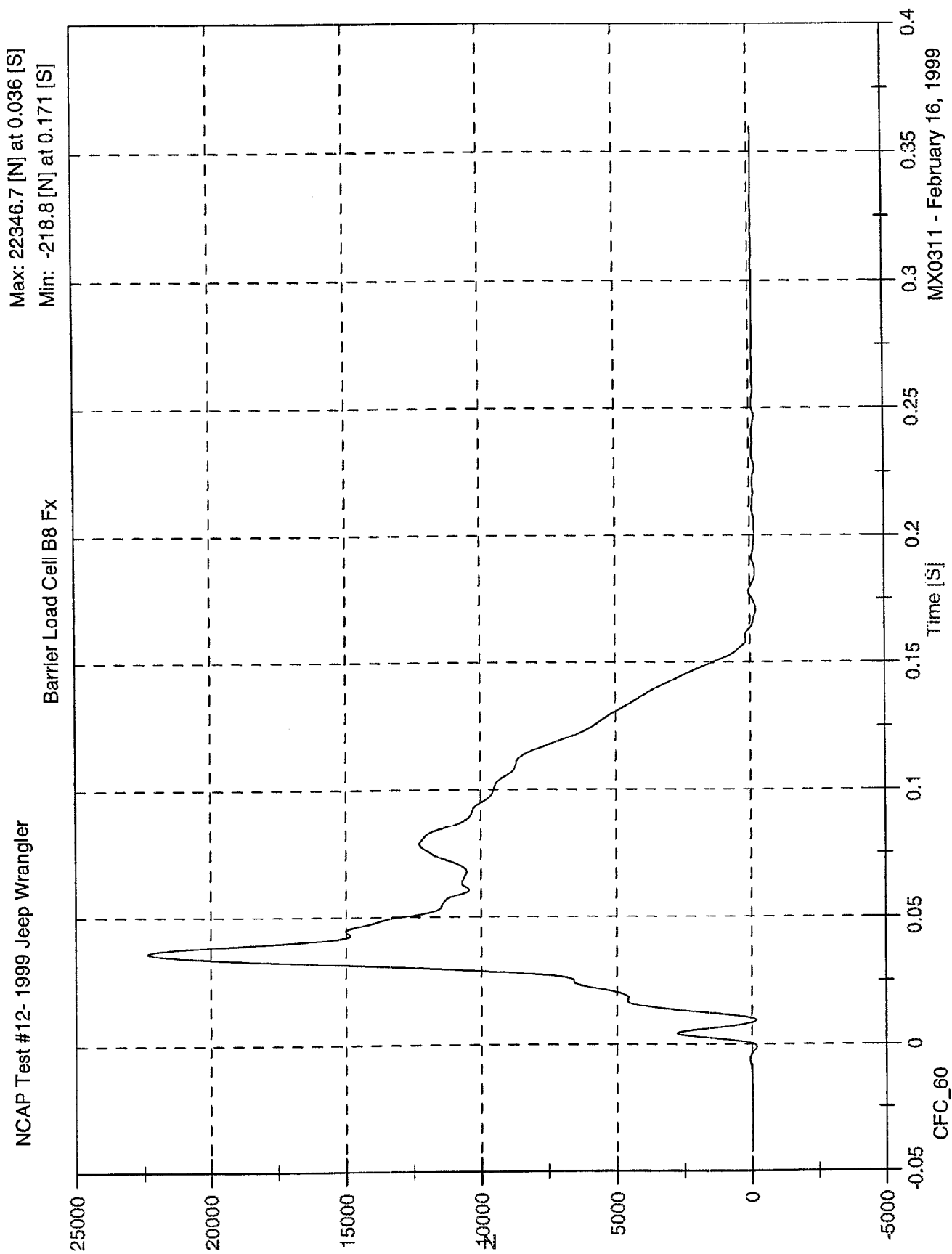
NCAP Test #12- 1999 Jeep Wrangler

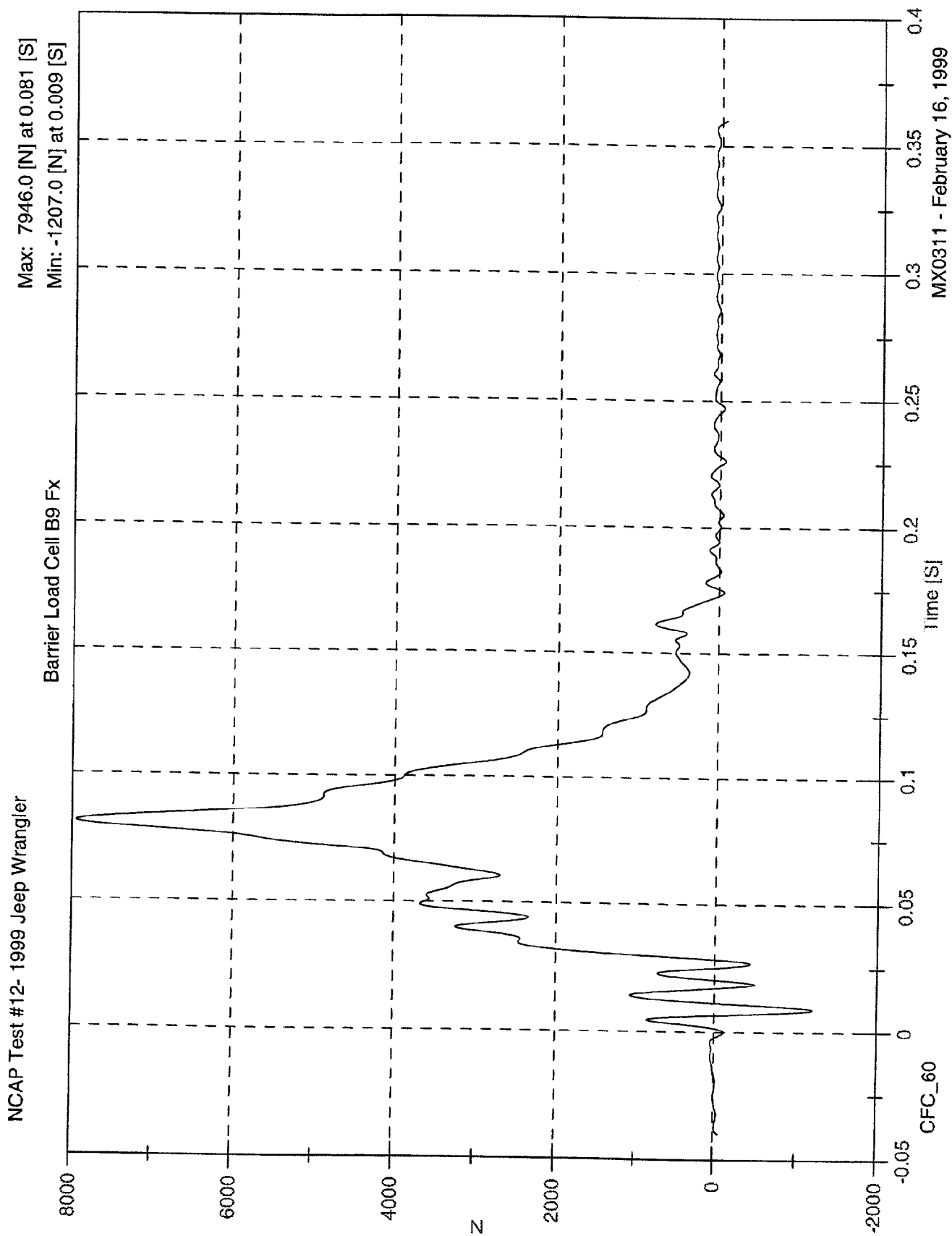
Max: 78081.2 [N] at 0.005 [S]
Min: -3494.9 [N] at 0.360 [S]

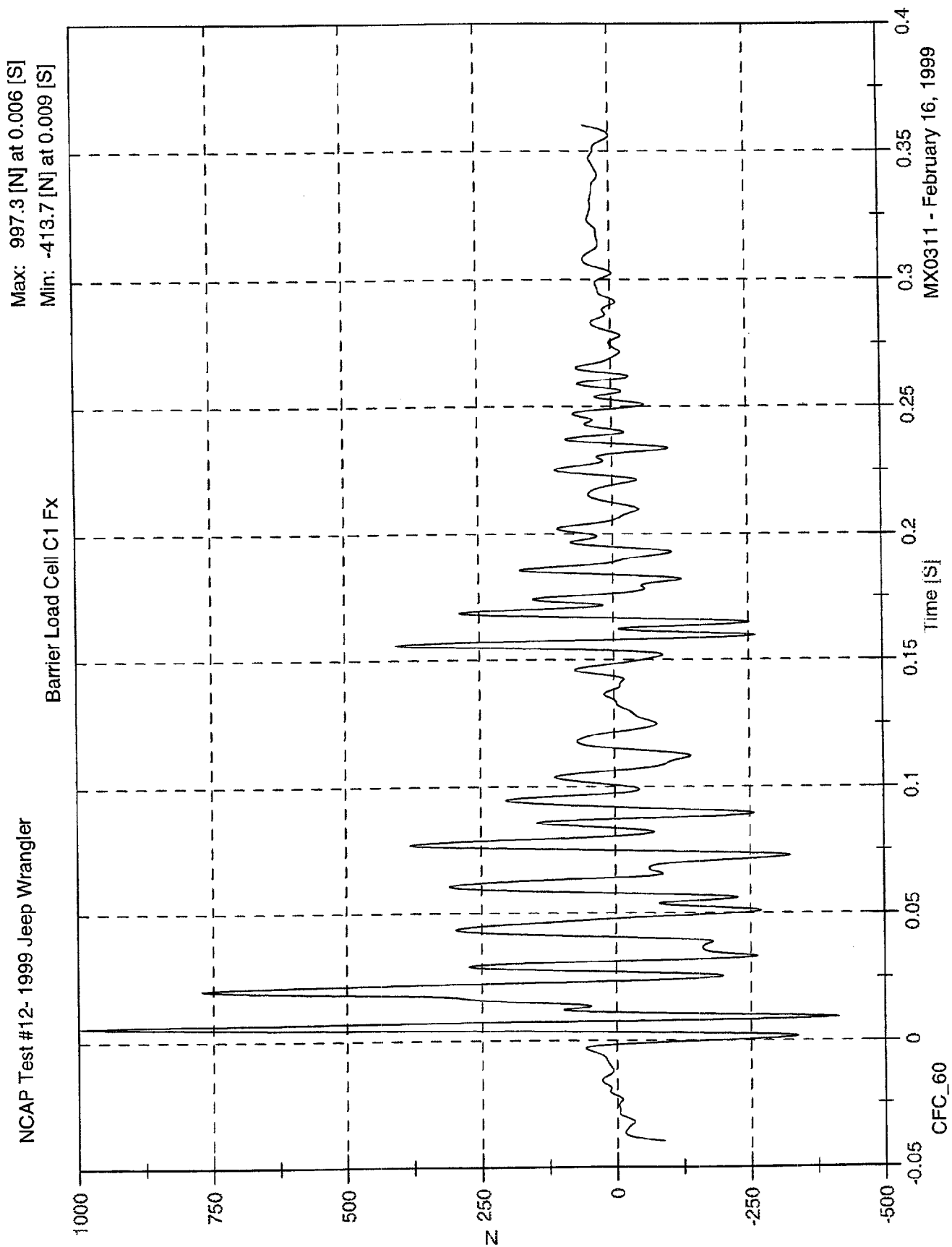
Barrier Load Cell B7 Fx



MX0311 - February 16, 1999



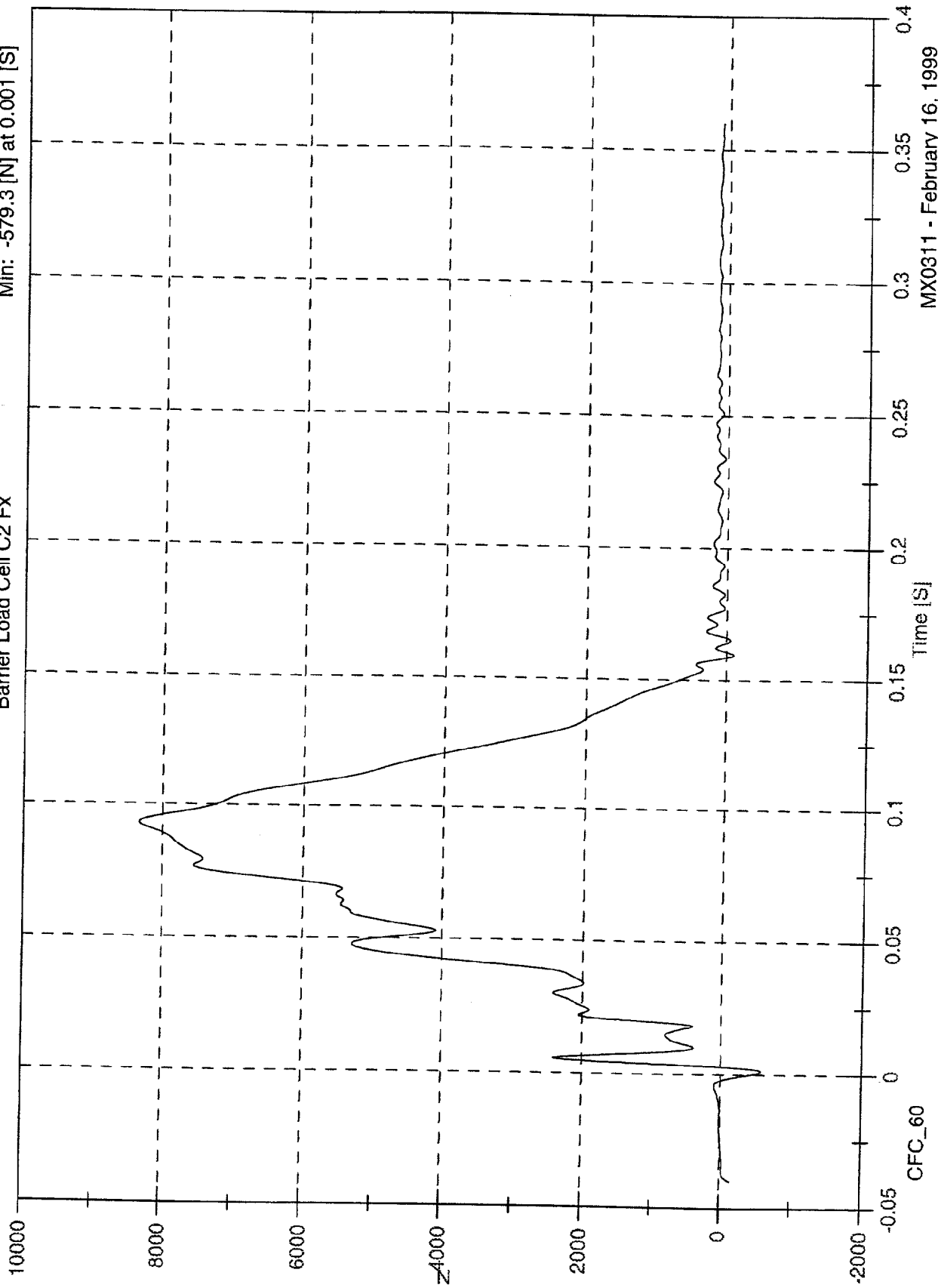




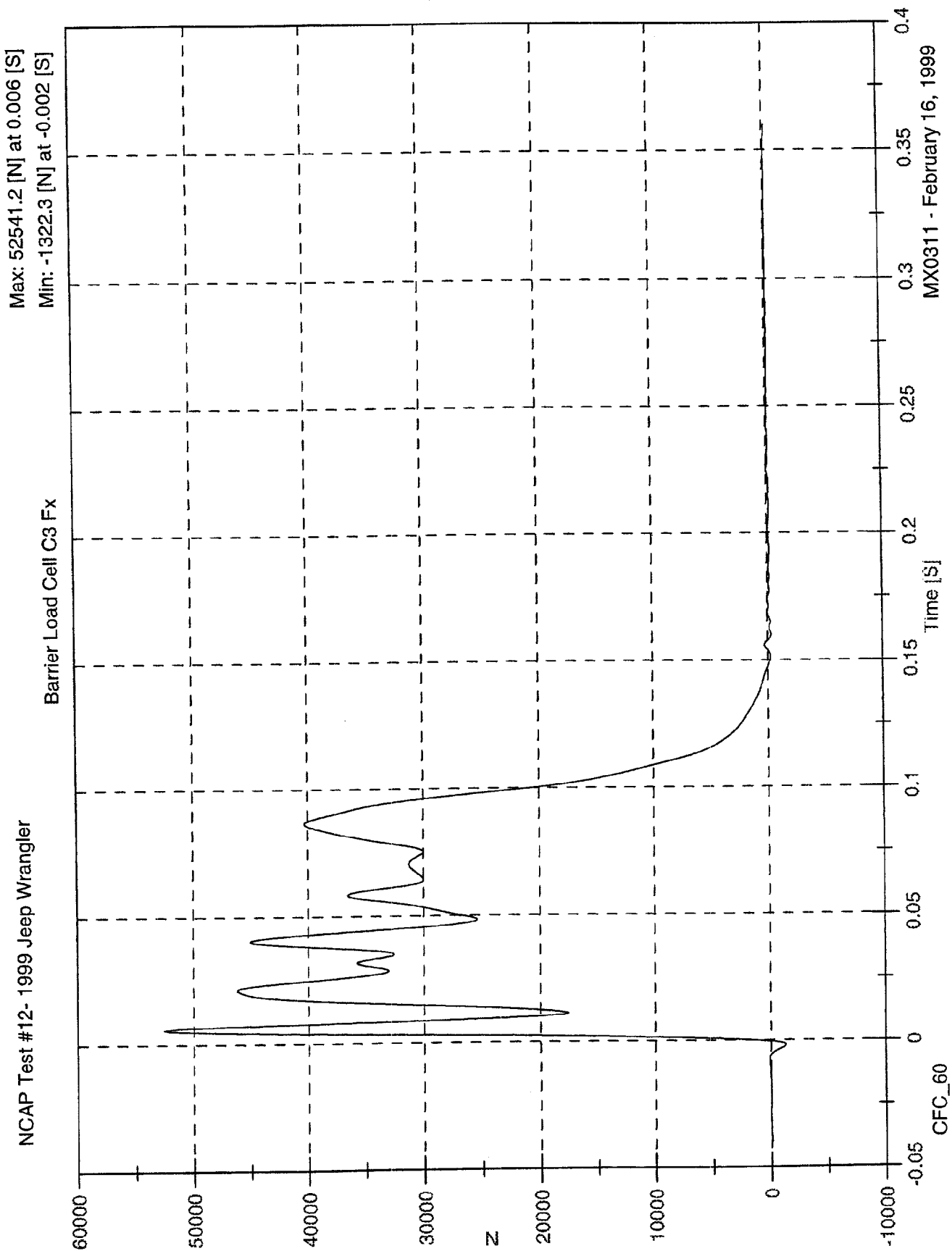
NCAP Test #12- 1999 Jeep Wrangler

Max: 8338.6 [N] at 0.093 [S]
Min: -579.3 [N] at 0.001 [S]

Barrier Load Cell C2 Fx



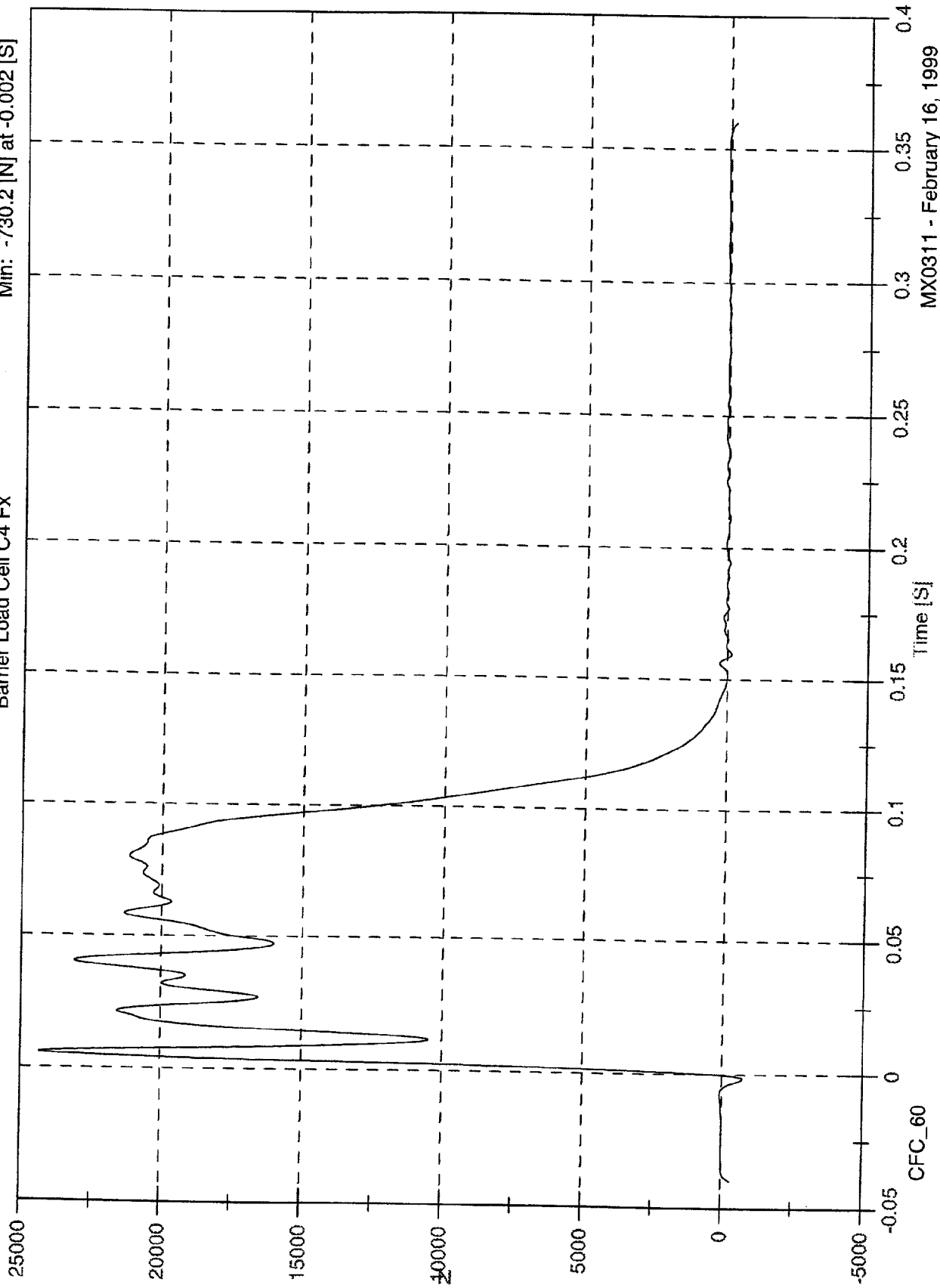
MX0311 - February 16, 1999



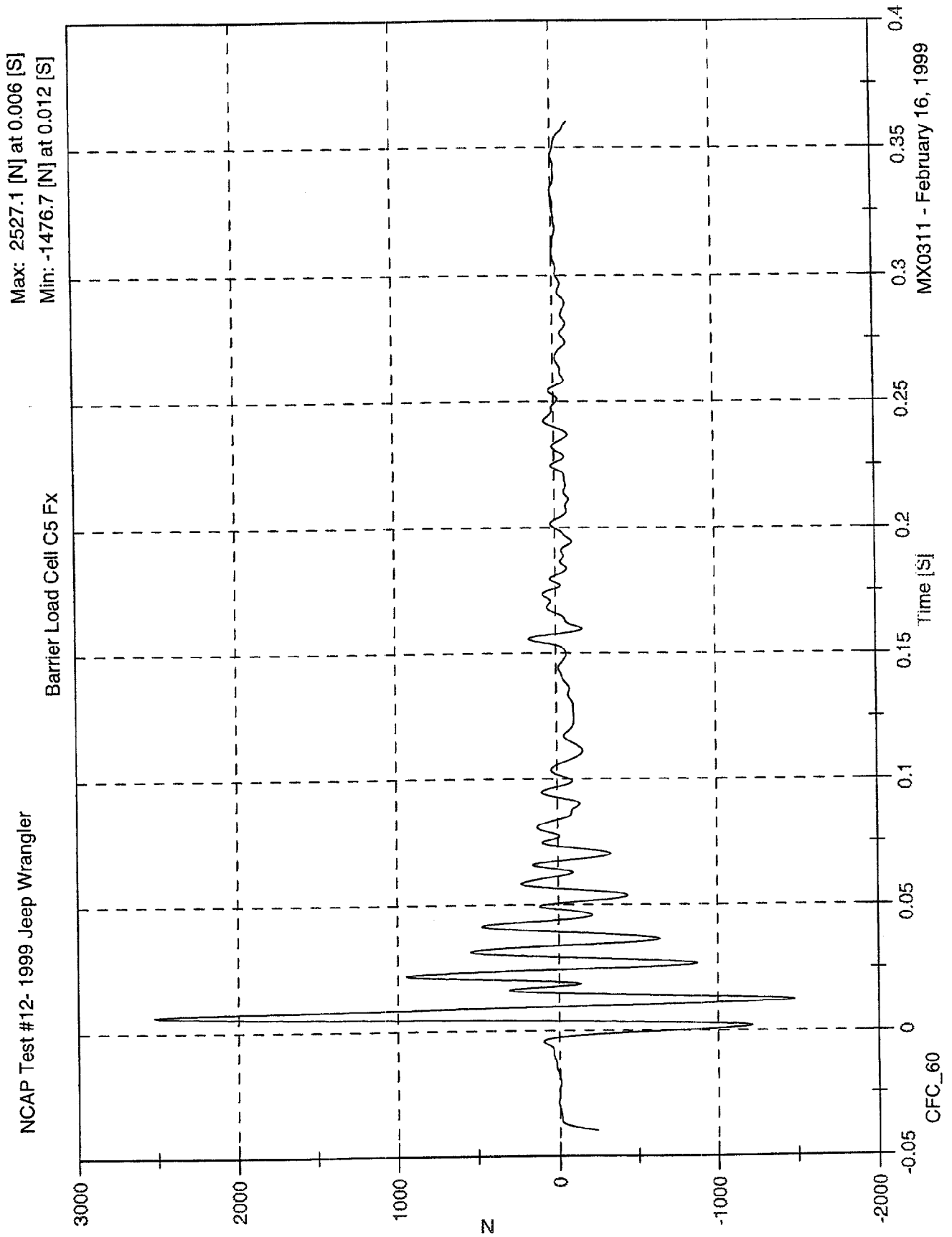
NCAP Test #12- 1999 Jeep Wrangler

Max: 24344.9 [N] at 0.006 [S]
 Min: -730.2 [N] at -0.002 [S]

Barrier Load Cell C4 Fx



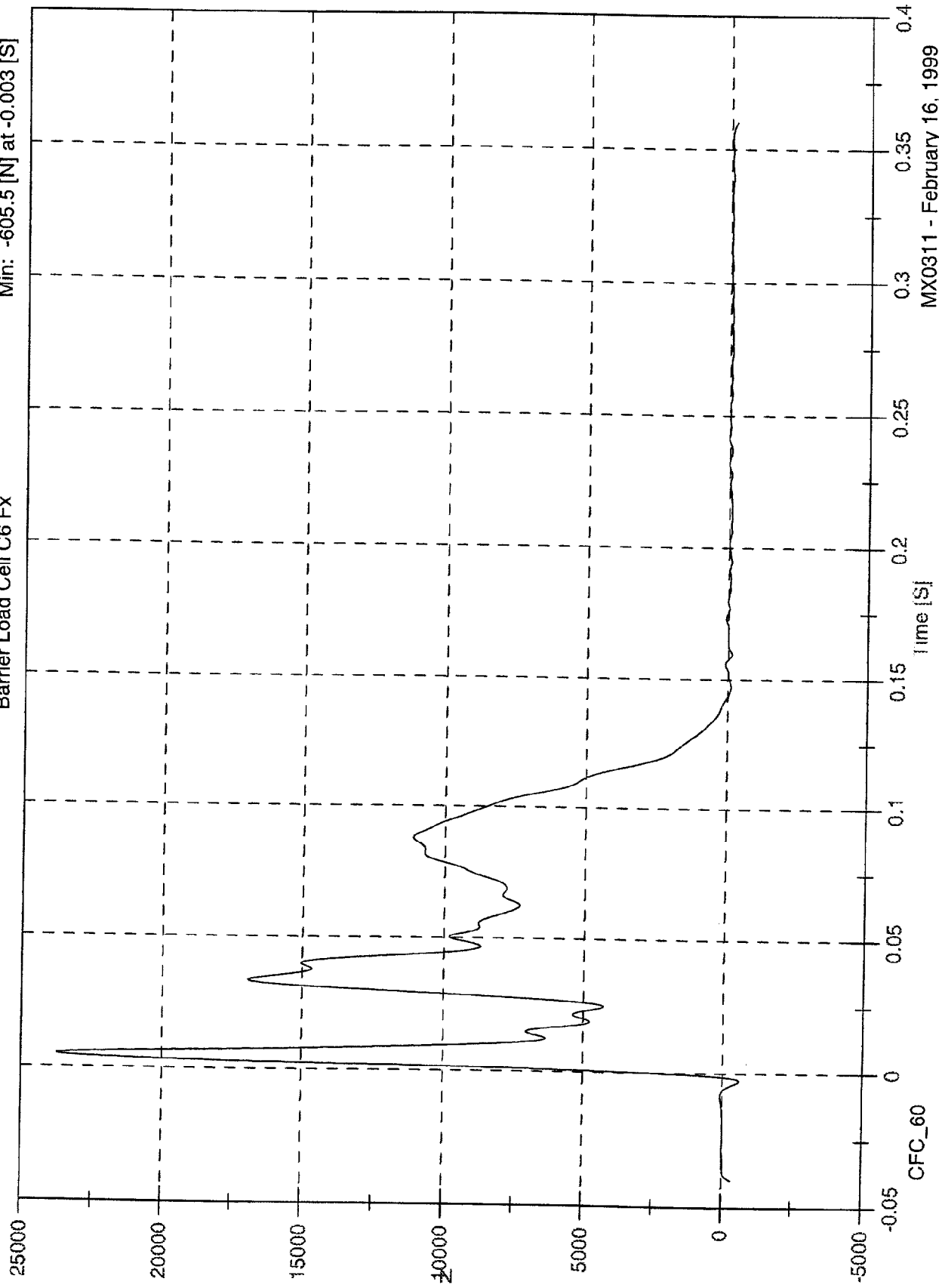
MX0311 - February 16, 1999



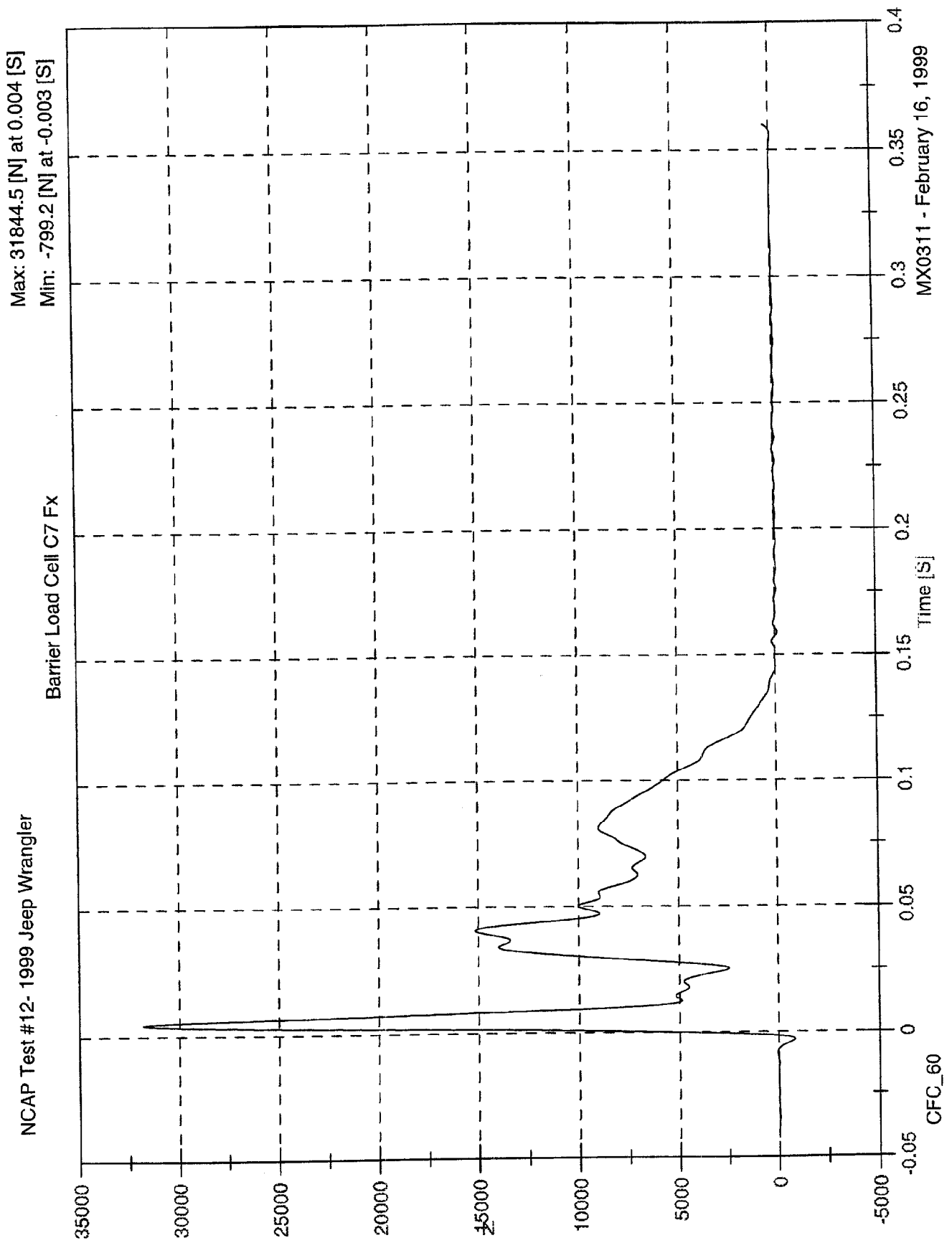
NCAP Test #12- 1999 Jeep Wrangler

Barrier Load Cell C6 Fx

Max: 23741.8 [N] at 0.005 [S]
Min: -605.5 [N] at -0.003 [S]



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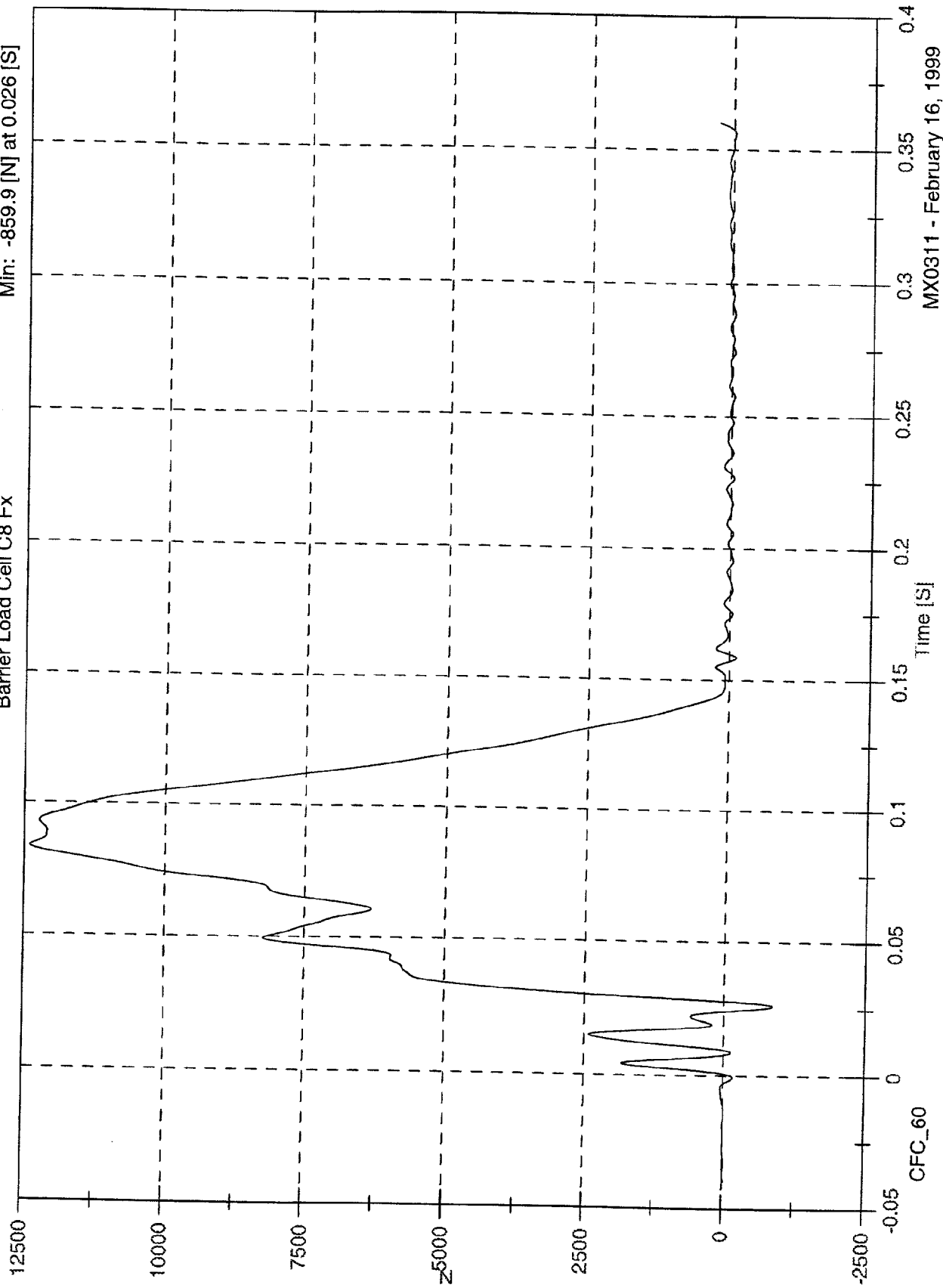


NCAP Test #12- 1999 Jeep Wrangler

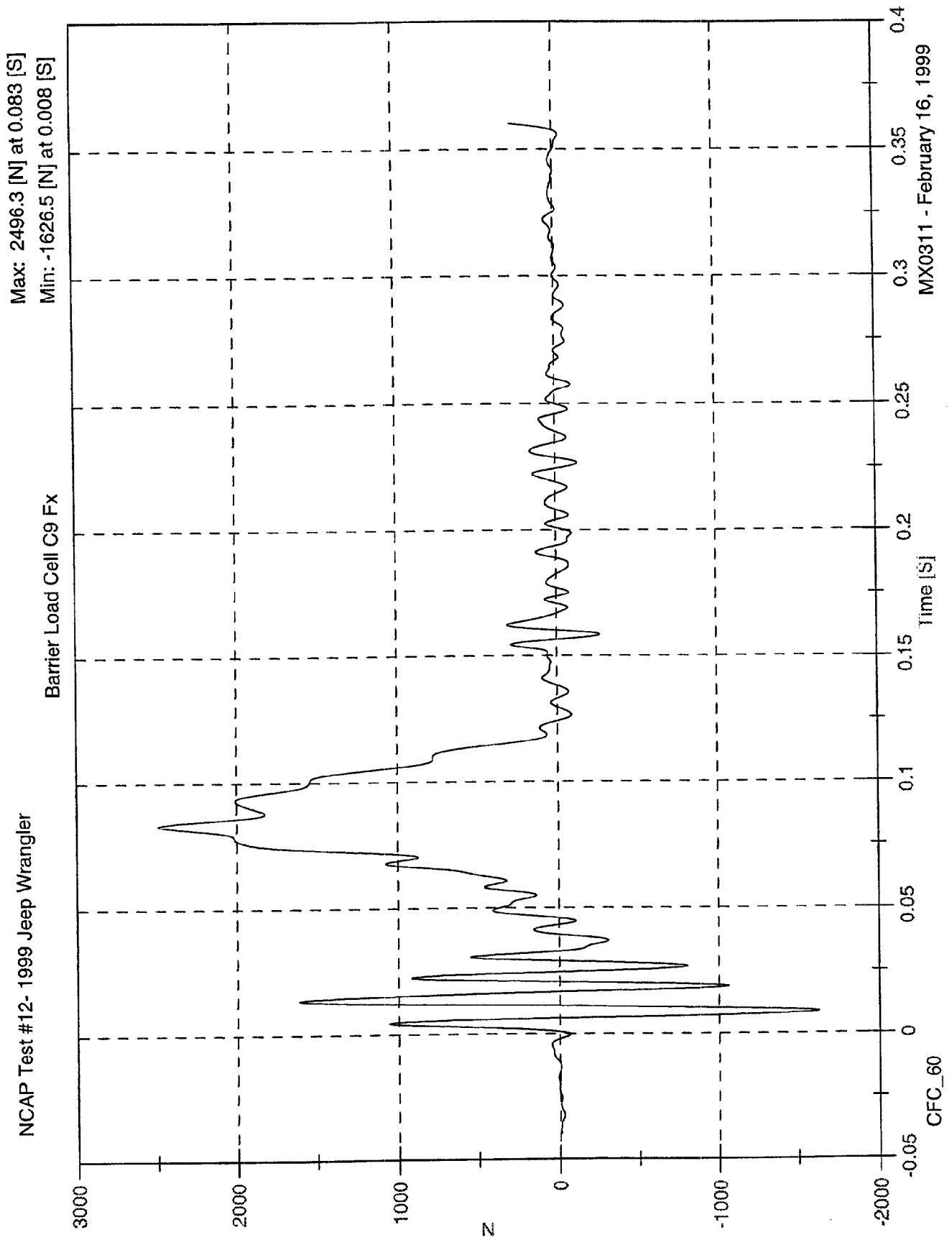
Max: 12400.6 [N] at 0.083 [S]

Min: -859.9 [N] at 0.026 [S]

Barrier Load Cell C8 Fx



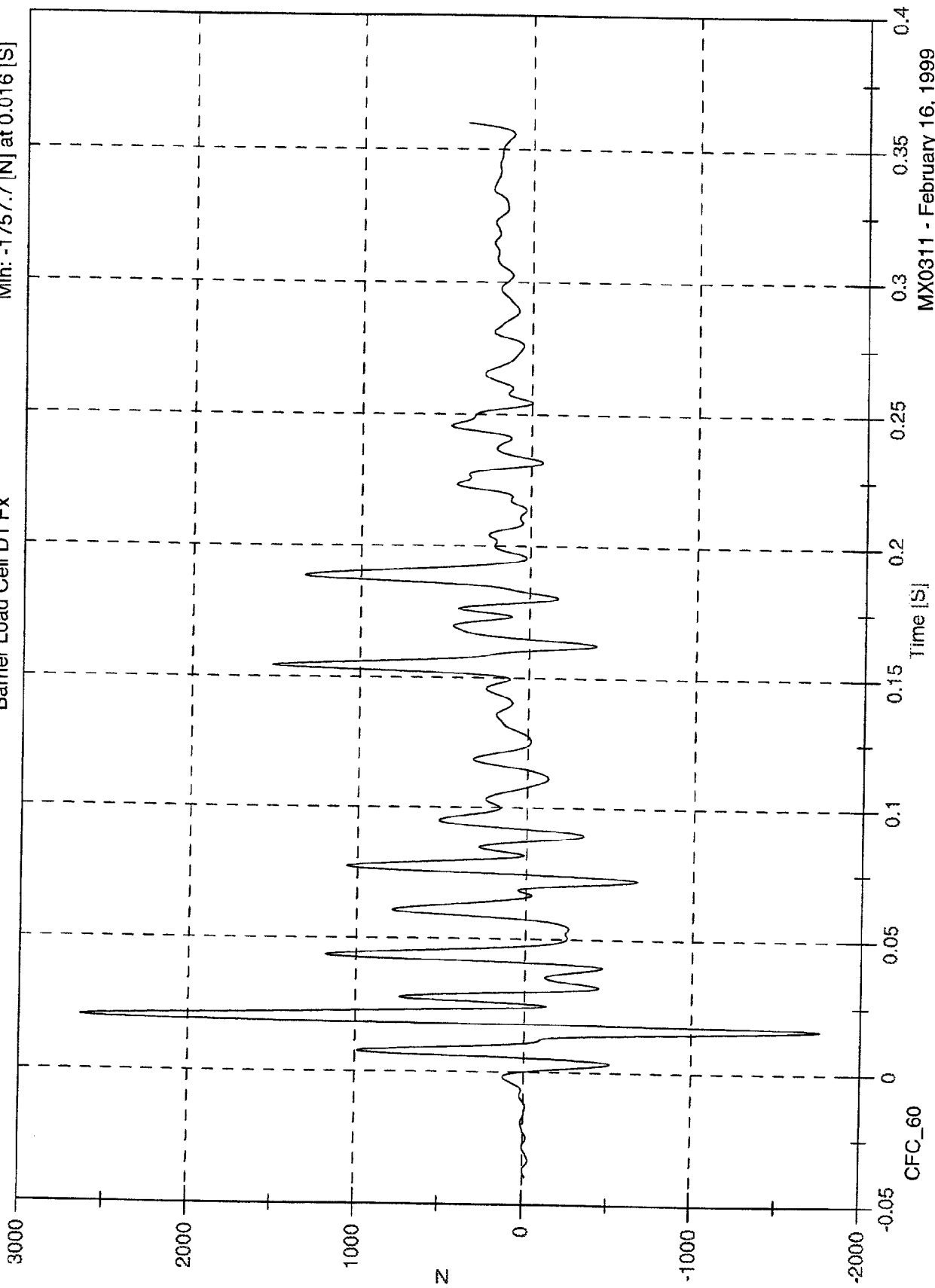
MX0311 - February 16, 1999

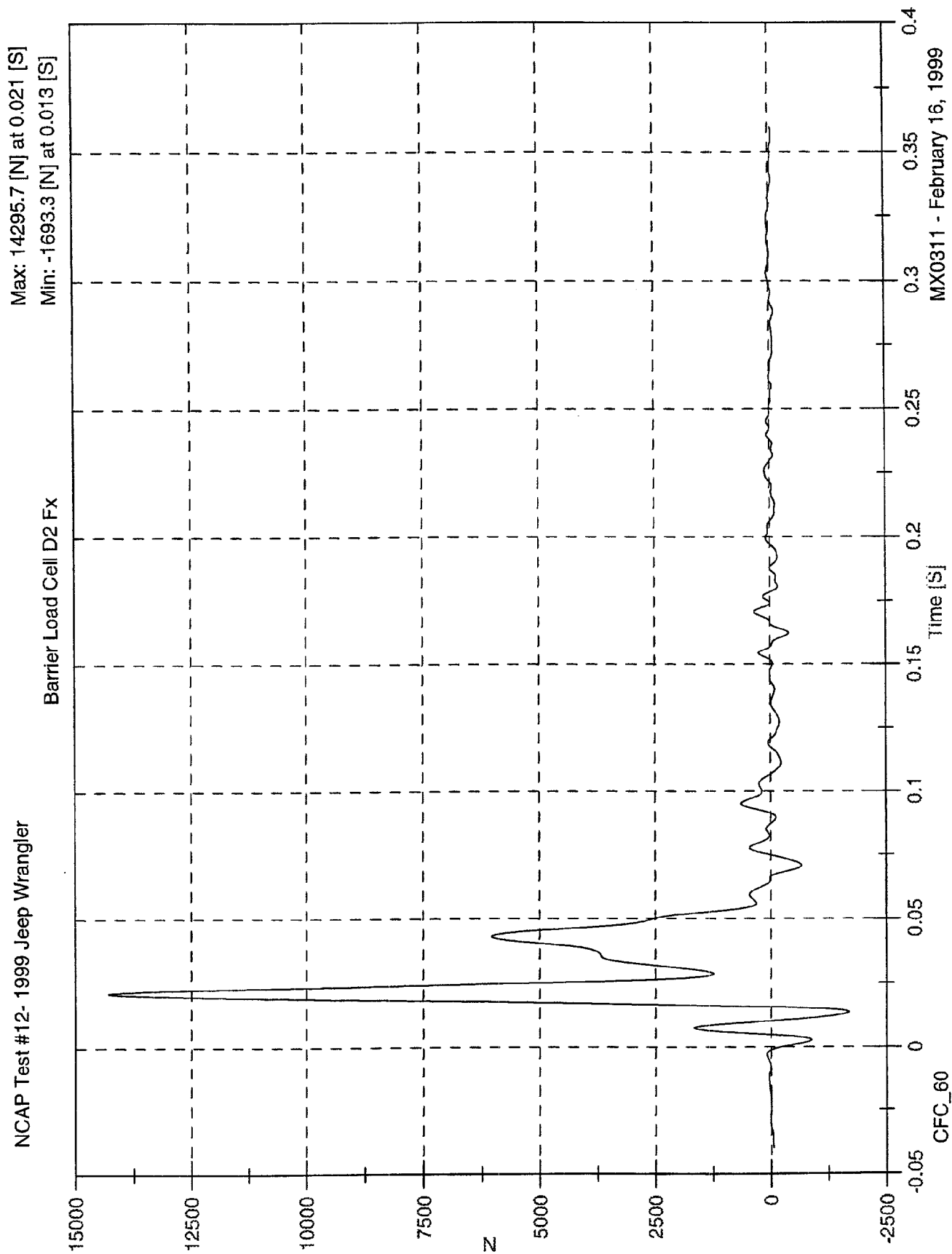


NCAP Test #12- 1999 Jeep Wrangler

Max: 2641.9 [N] at 0.020 [S]
Min: -1757.7 [N] at 0.016 [S]

Barrier Load Cell D1 Fx

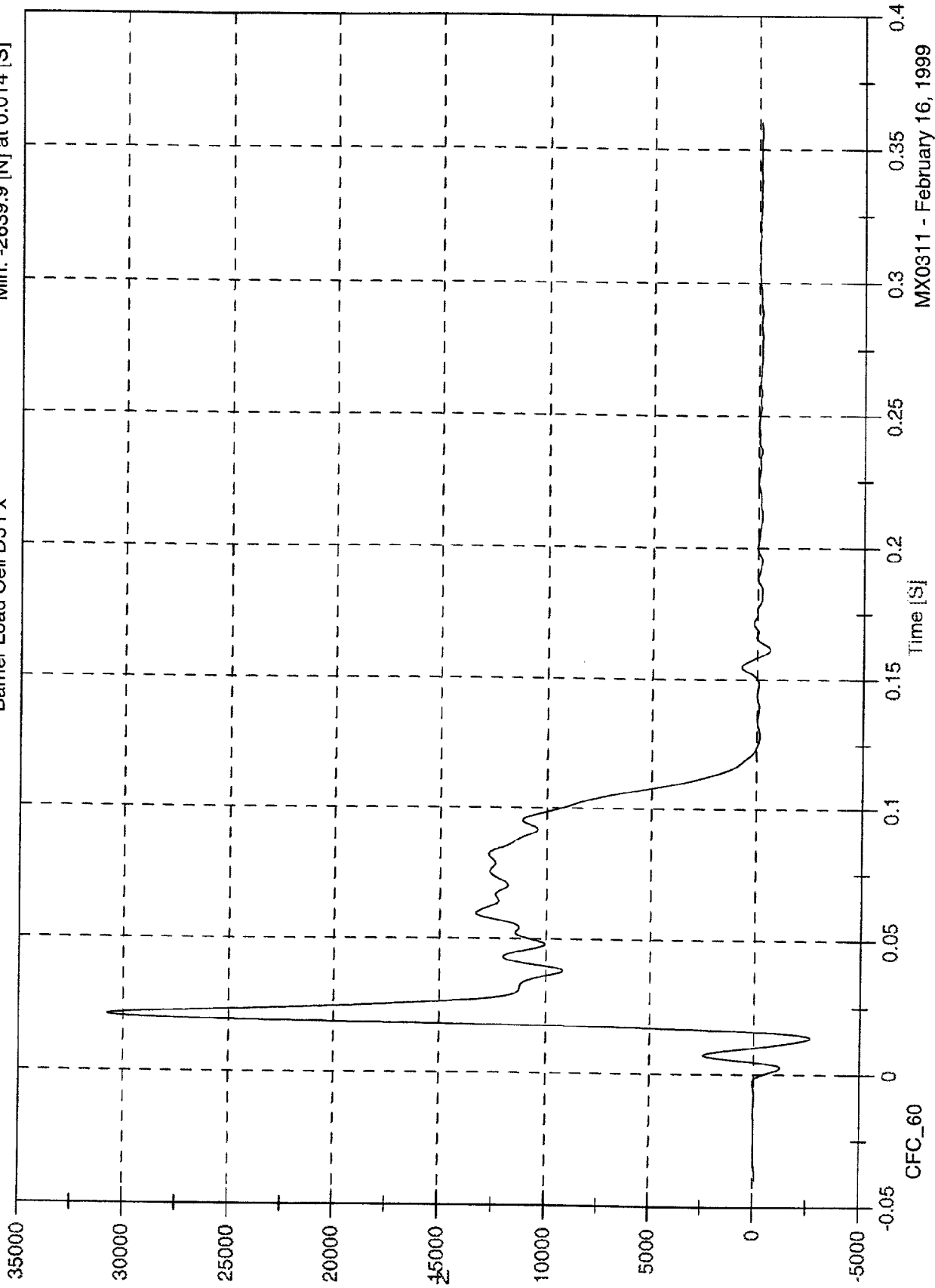




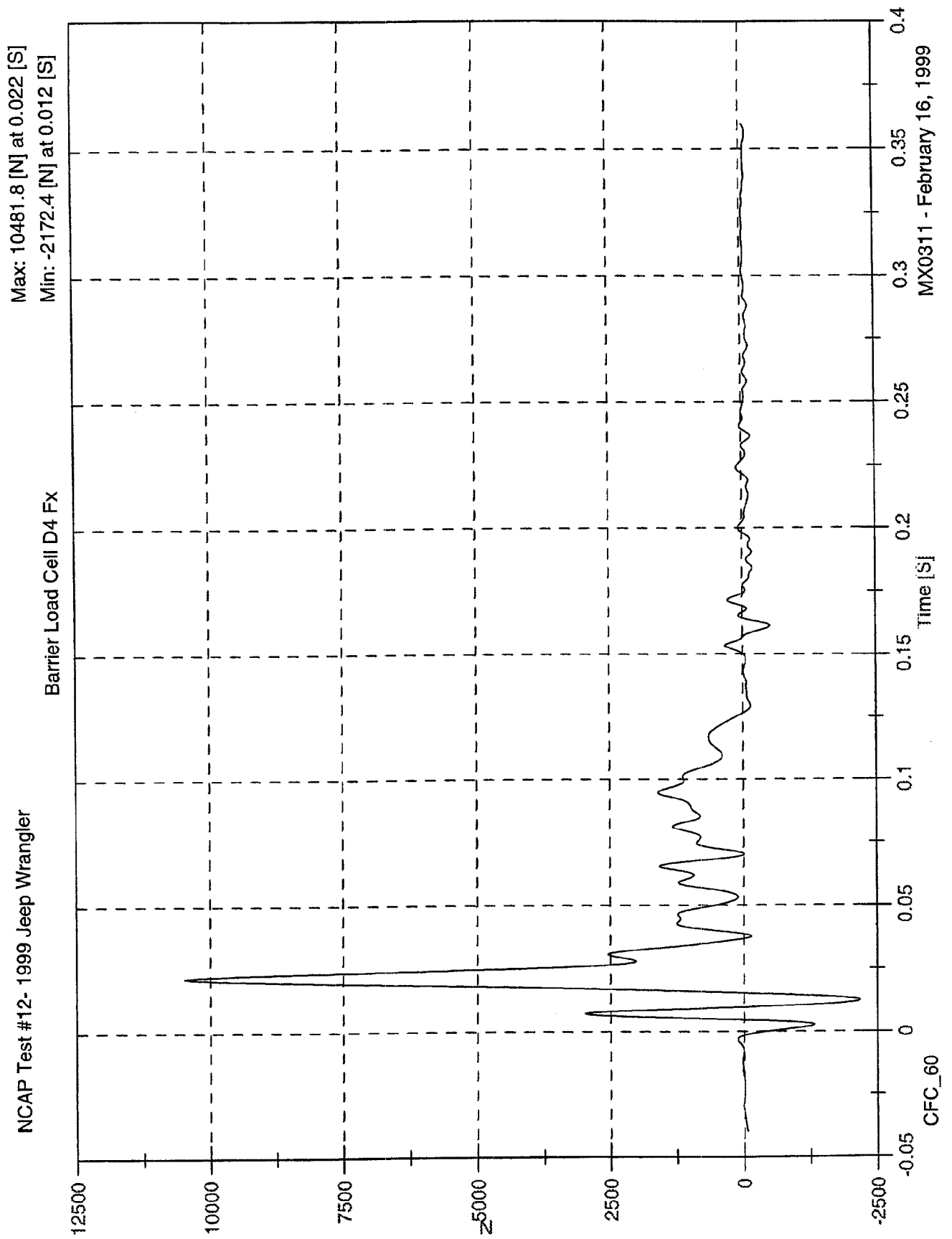
NCAP Test #12- 1999 Jeep Wrangler

Max: 30776.6 [N] at 0.021 [S]
Min: -2639.9 [N] at 0.014 [S]

Barrier Load Cell D3 Fx



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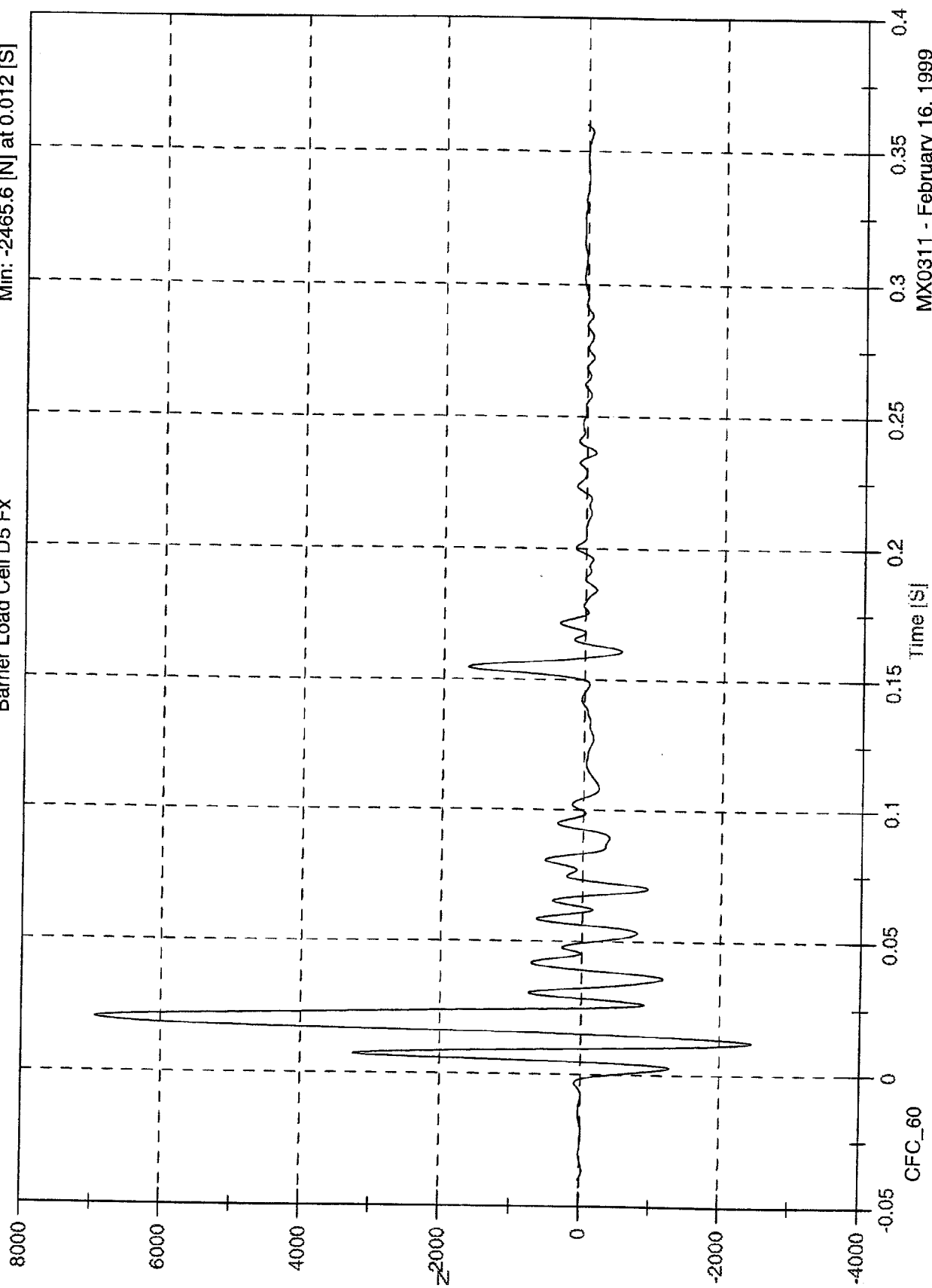


NCAP Test #12- 1999 Jeep Wrangler

Barrier Load Cell D5 Fx

Max: 6951.8 [N] at 0.020 [S]

Min: -2465.6 [N] at 0.012 [S]

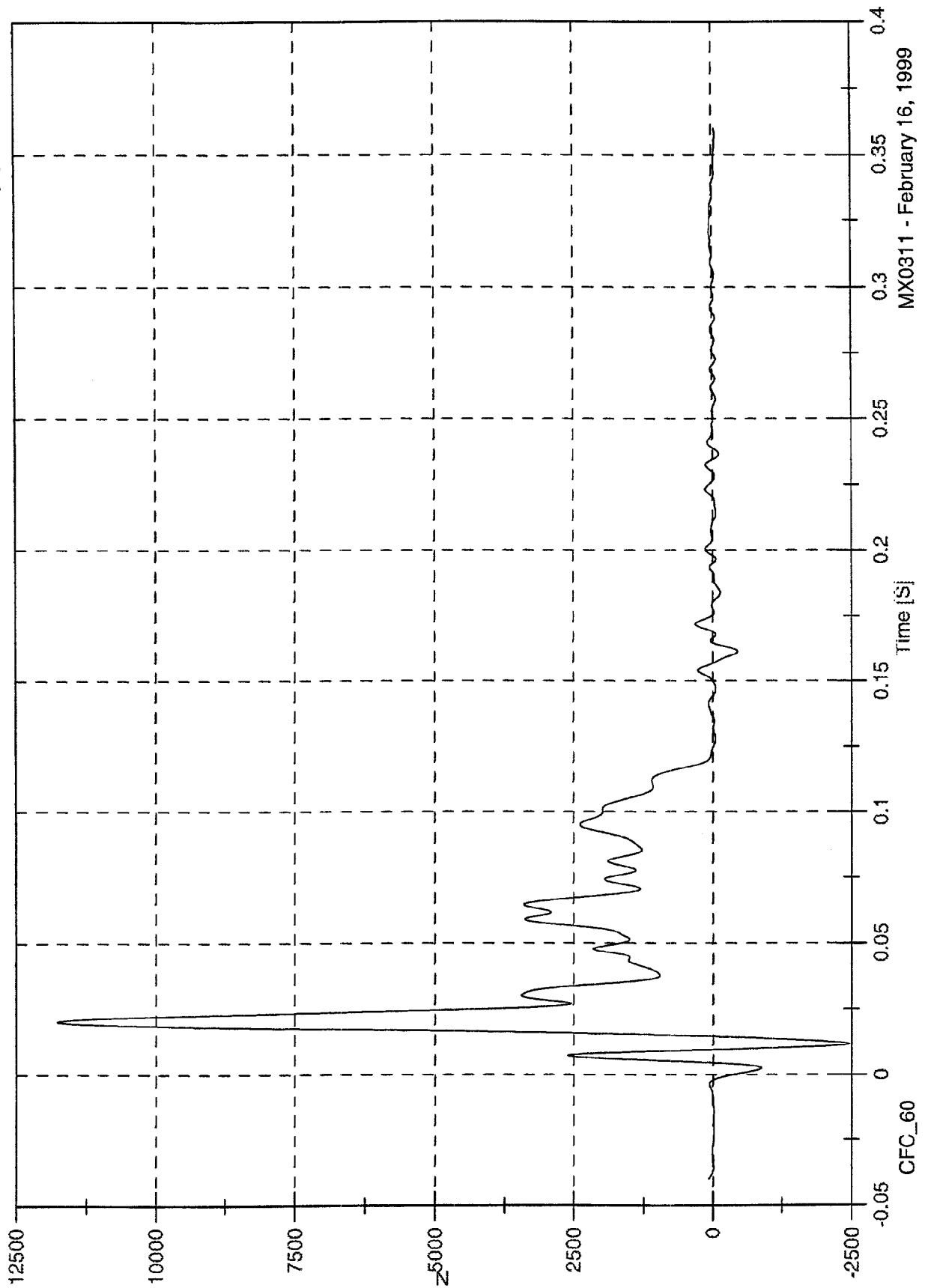


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NCAP Test #12- 1999 Jeep Wrangler

Max: 11770.2 [N] at 0.020 [S]
Min: -2447.0 [N] at 0.012 [S]

Barrier Load Cell D6 Fx

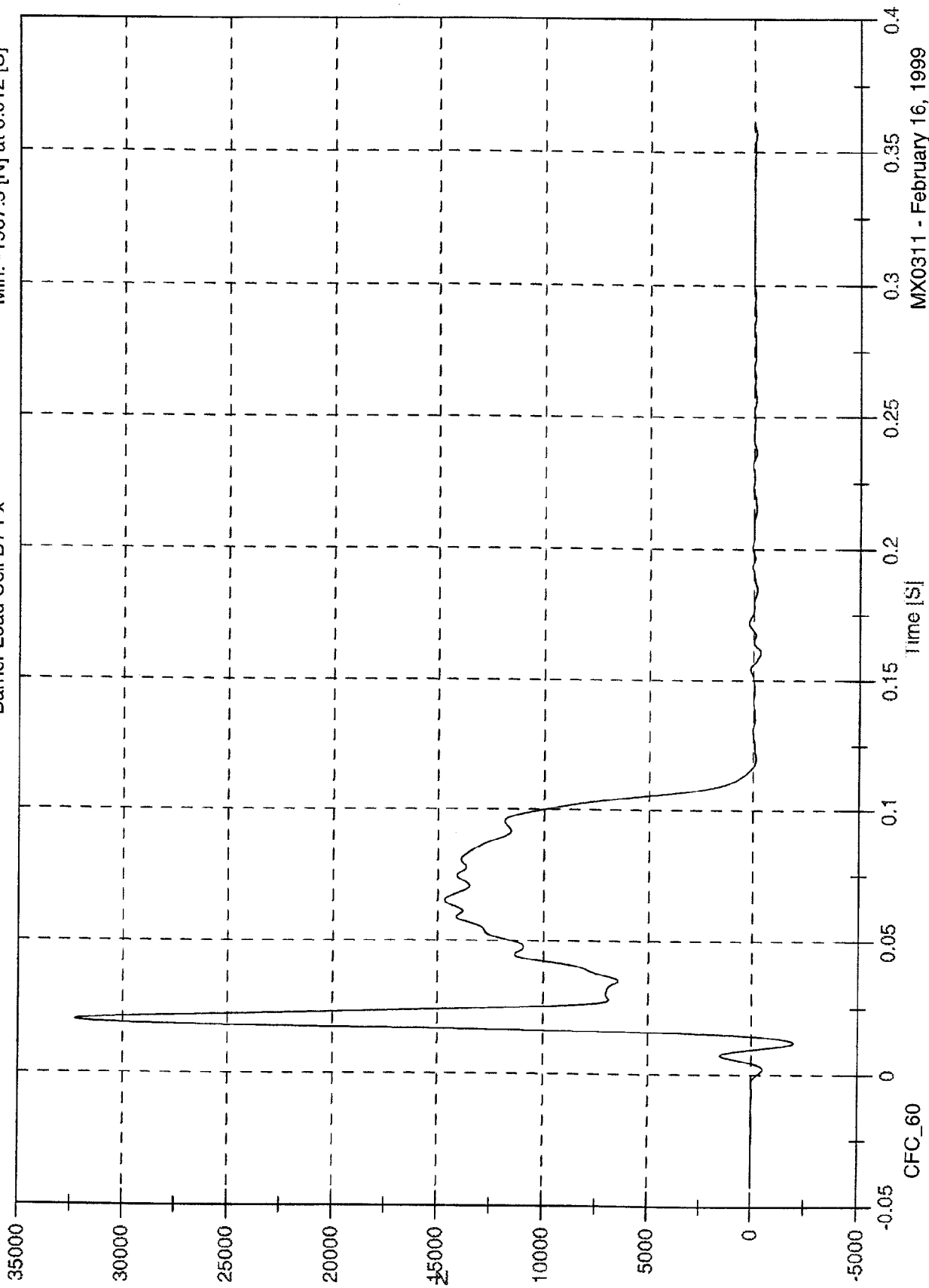


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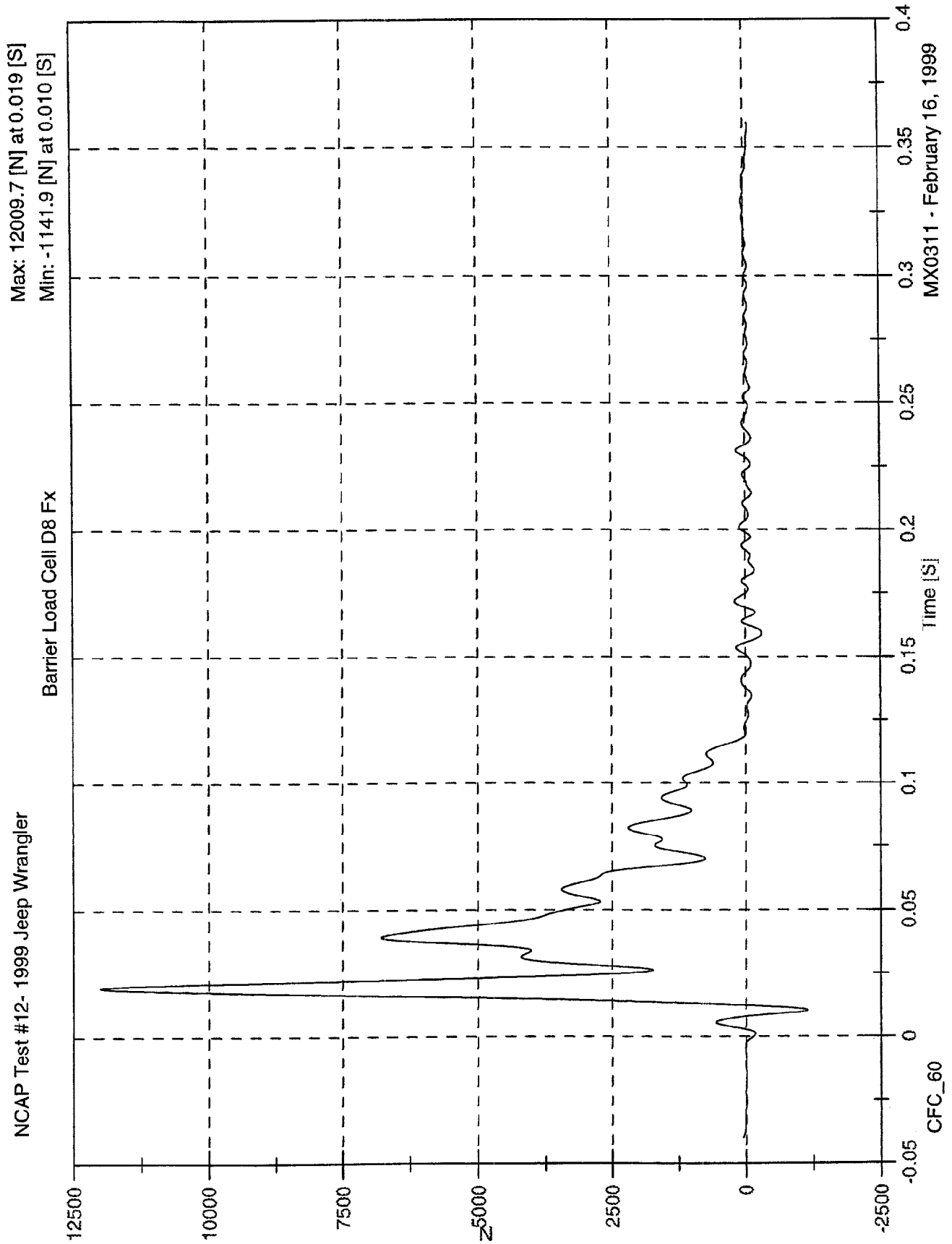
NCAP Test #12- 1999 Jeep Wrangler

Max: 32294.8 [N] at 0.020 [S]
Min: -1967.5 [N] at 0.012 [S]

Barrier Load Cell D7 Fx



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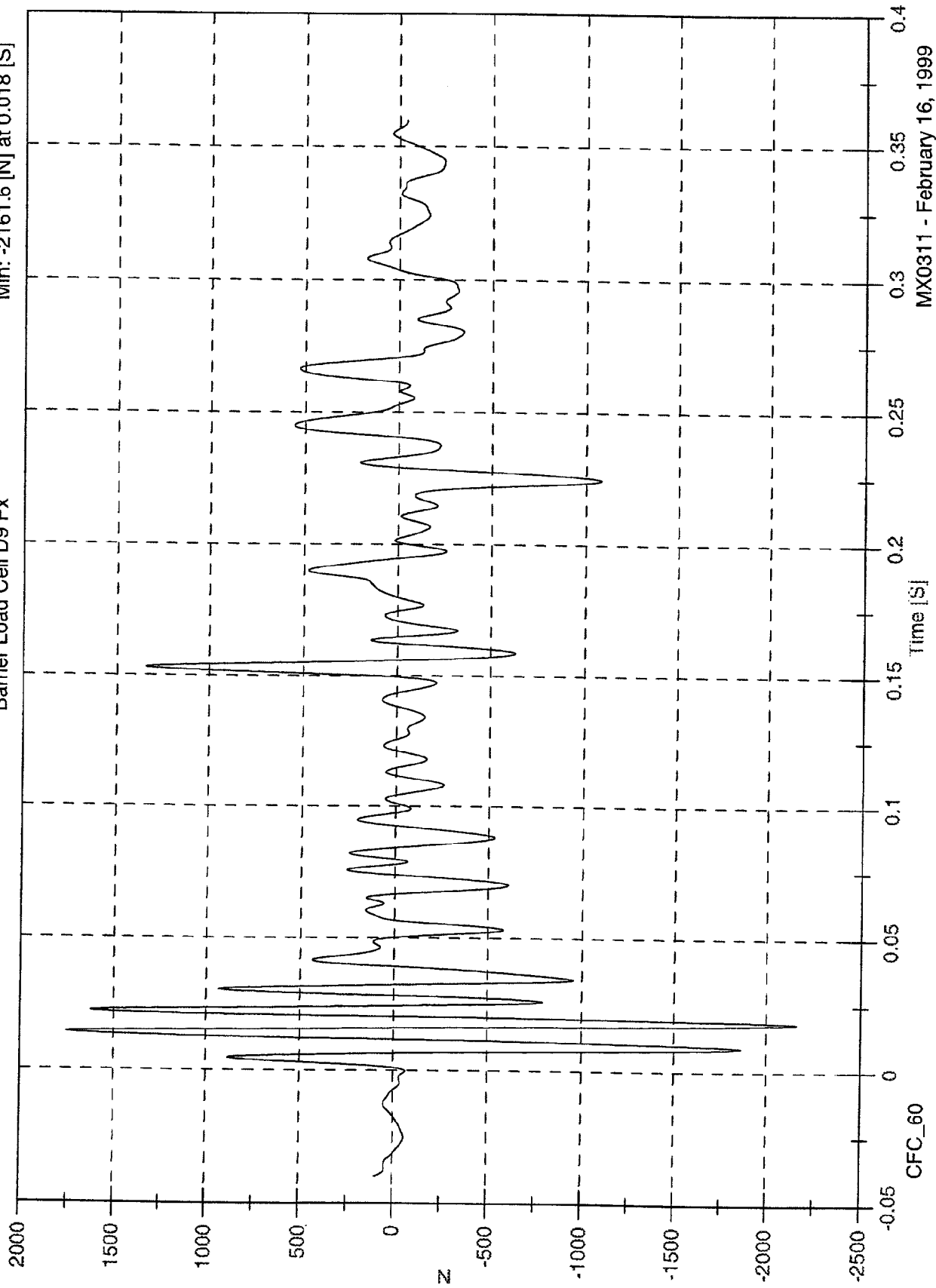


NCAP Test #12- 1999 Jeep Wrangler

Barrier Load Cell D9 Fx

Max: 1753.5 [N] at 0.014 [S]

Min: -2161.6 [N] at 0.018 [S]

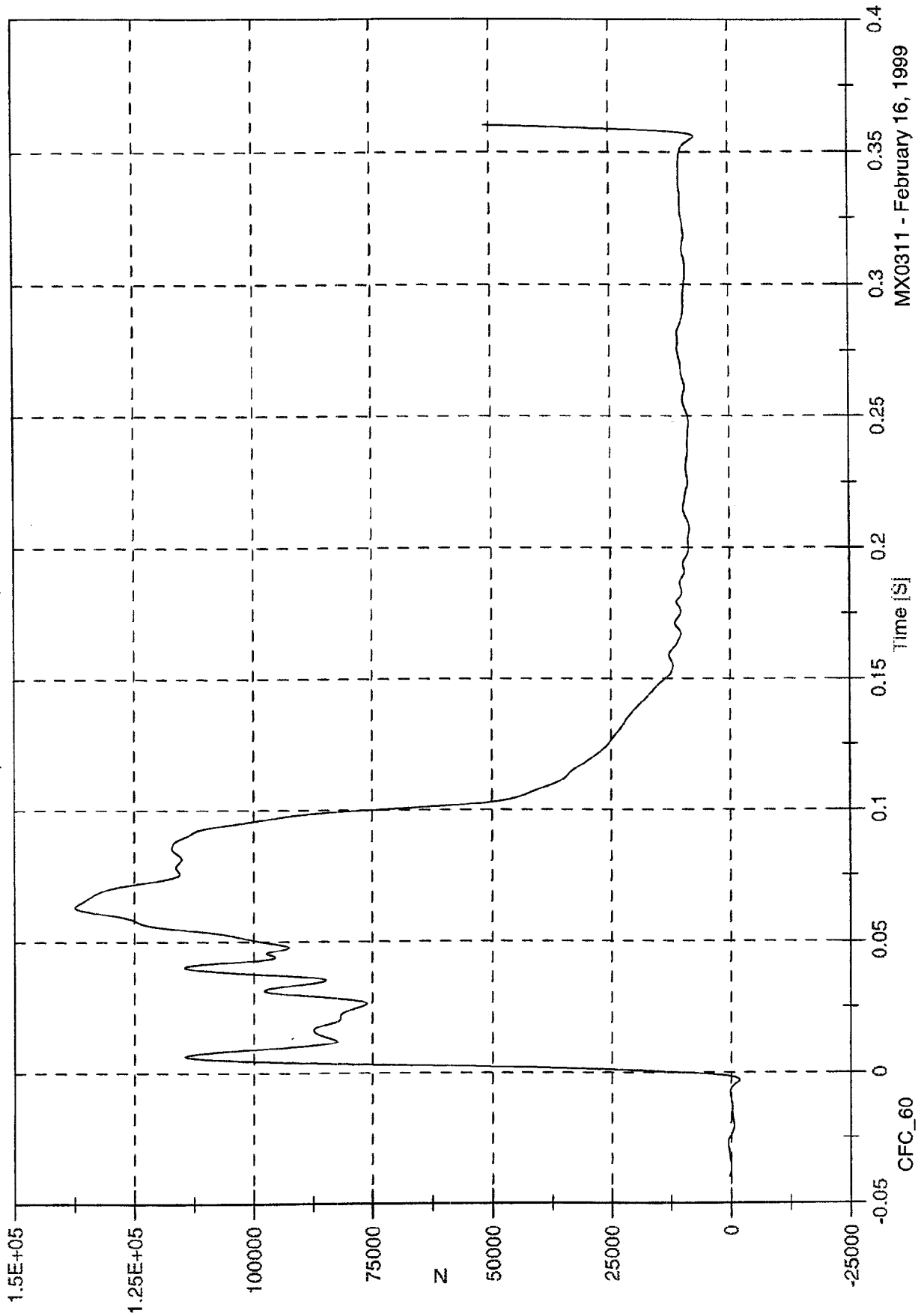


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NCAP Test #12- 1999 Jeep Wrangler

Max: 137432.6 [N] at 0.063 [S]
 Min: -1785.8 [N] at -0.003 [S]

Group 1 Load Cell Sum (A1,A2,A3,B1,B2,B3)

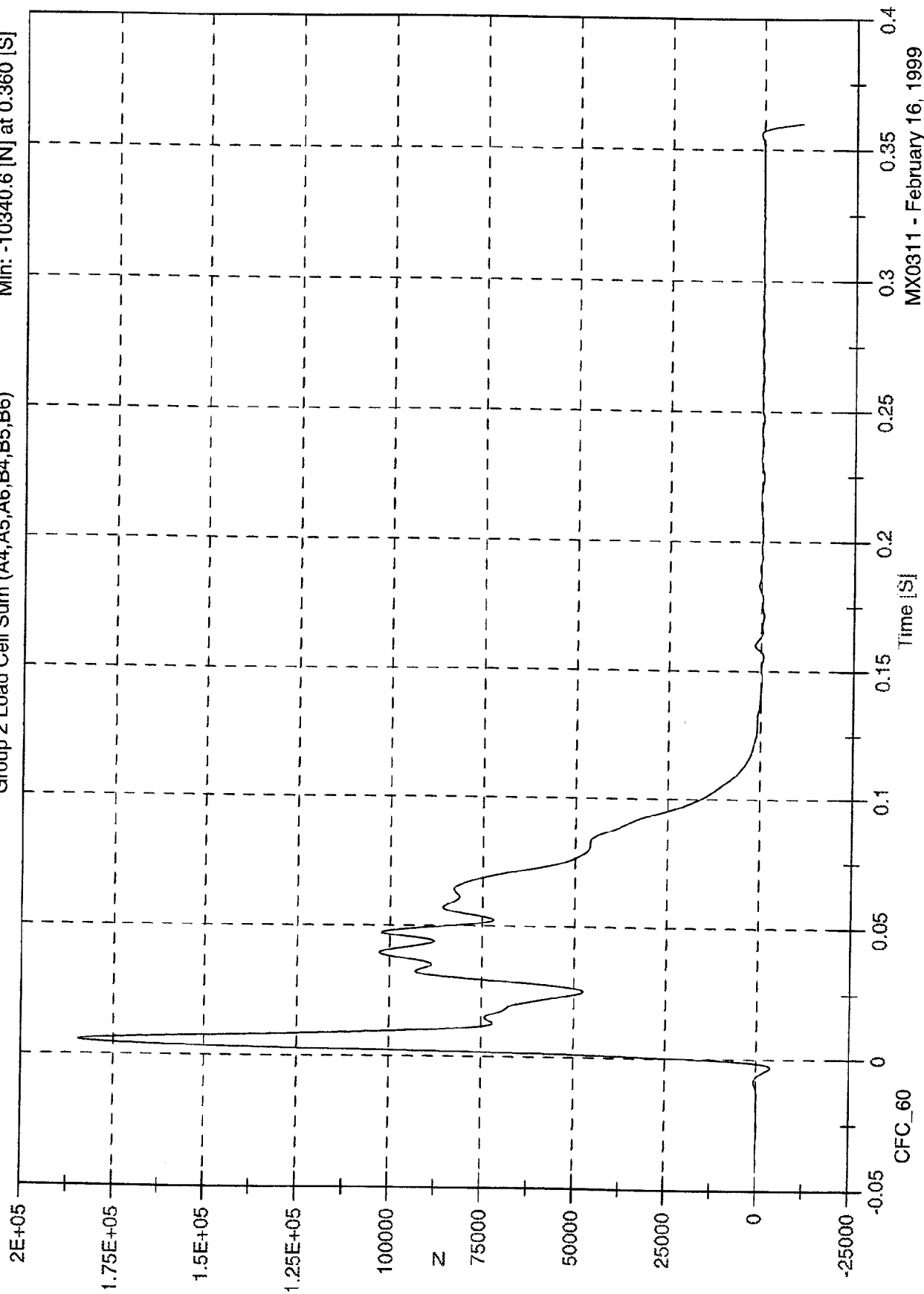


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NCAP Test #12- 1999 Jeep Wrangler

Max: 184402.5 [N] at 0.005 [S]
 Min: -10340.6 [N] at 0.360 [S]

Group 2 Load Cell Sum (A4,A5,A6,B4,B5,B6)

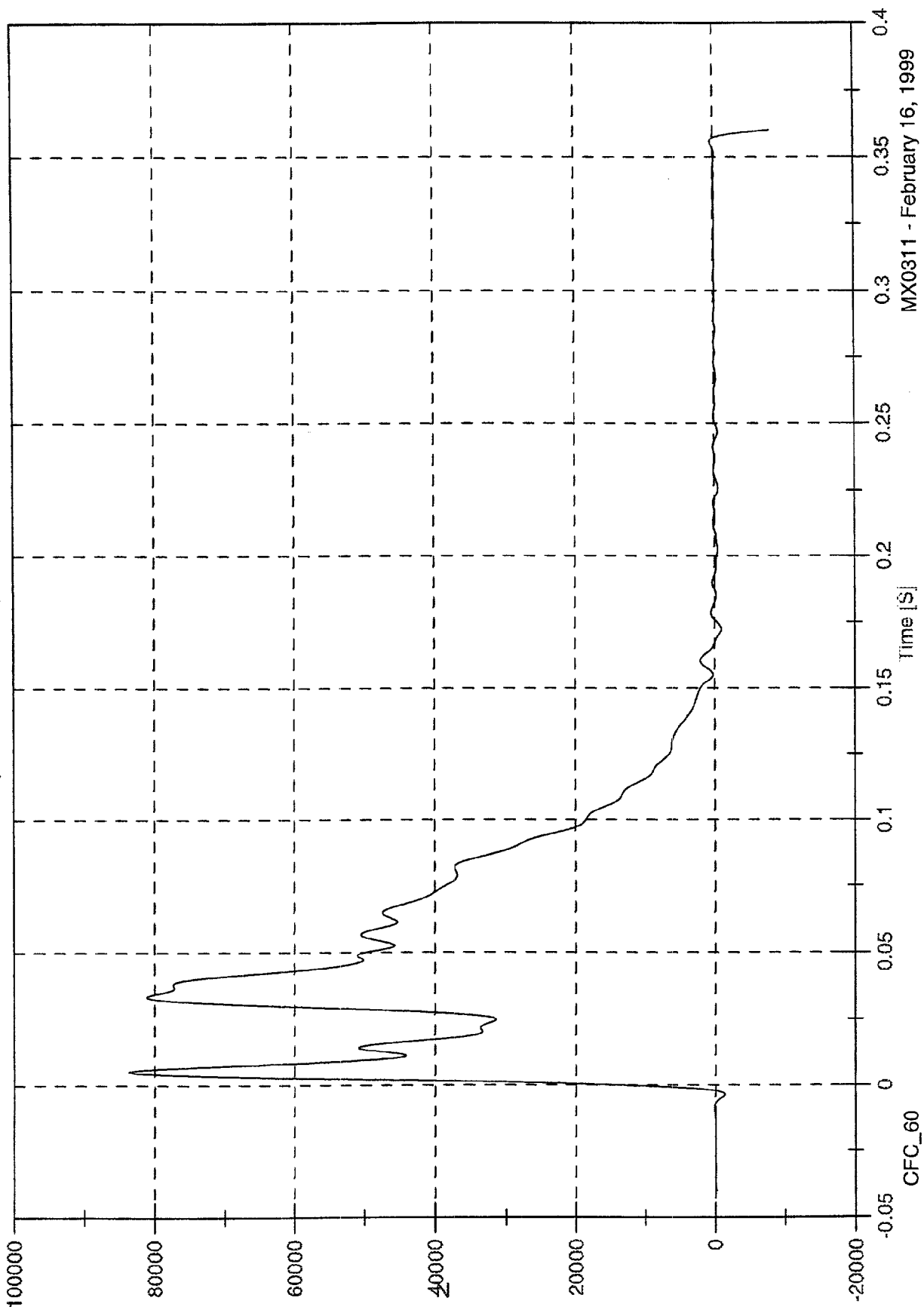


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NCAP Test #12- 1999 Jeep Wrangler

Max: 83655.7 [N] at 0.005 [S]
Min: -8089.5 [N] at 0.360 [S]

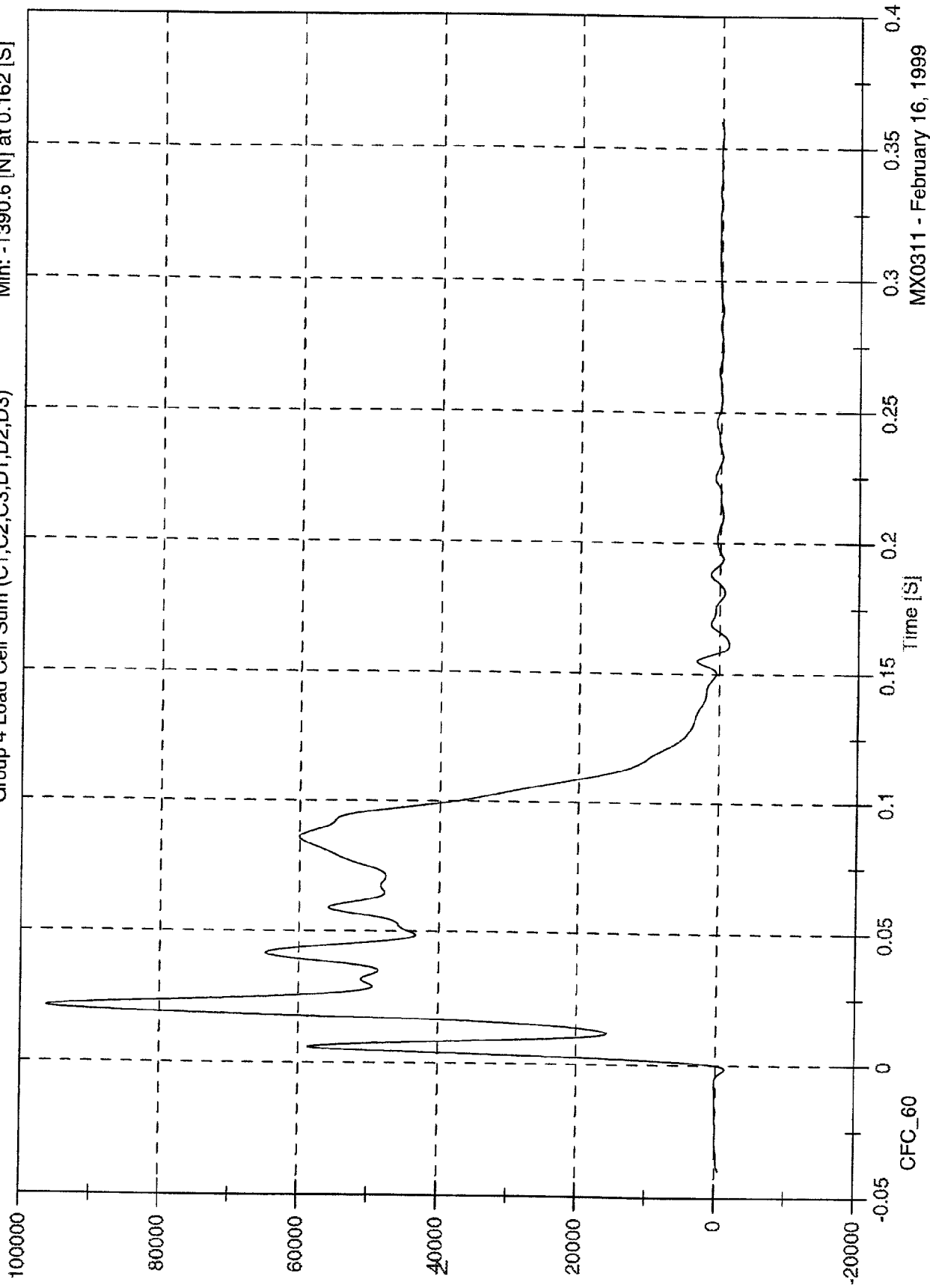
Group 3 Load Cell Sum (A7,A8,A9,B7,B8,B9)



NCAP Test #12- 1999 Jeep Wrangler

Max: 96219.8 [N] at 0.021 [S]
 Min: -1390.6 [N] at 0.162 [S]

Group 4 Load Cell Sum (C1,C2,C3,D1,D2,D3)

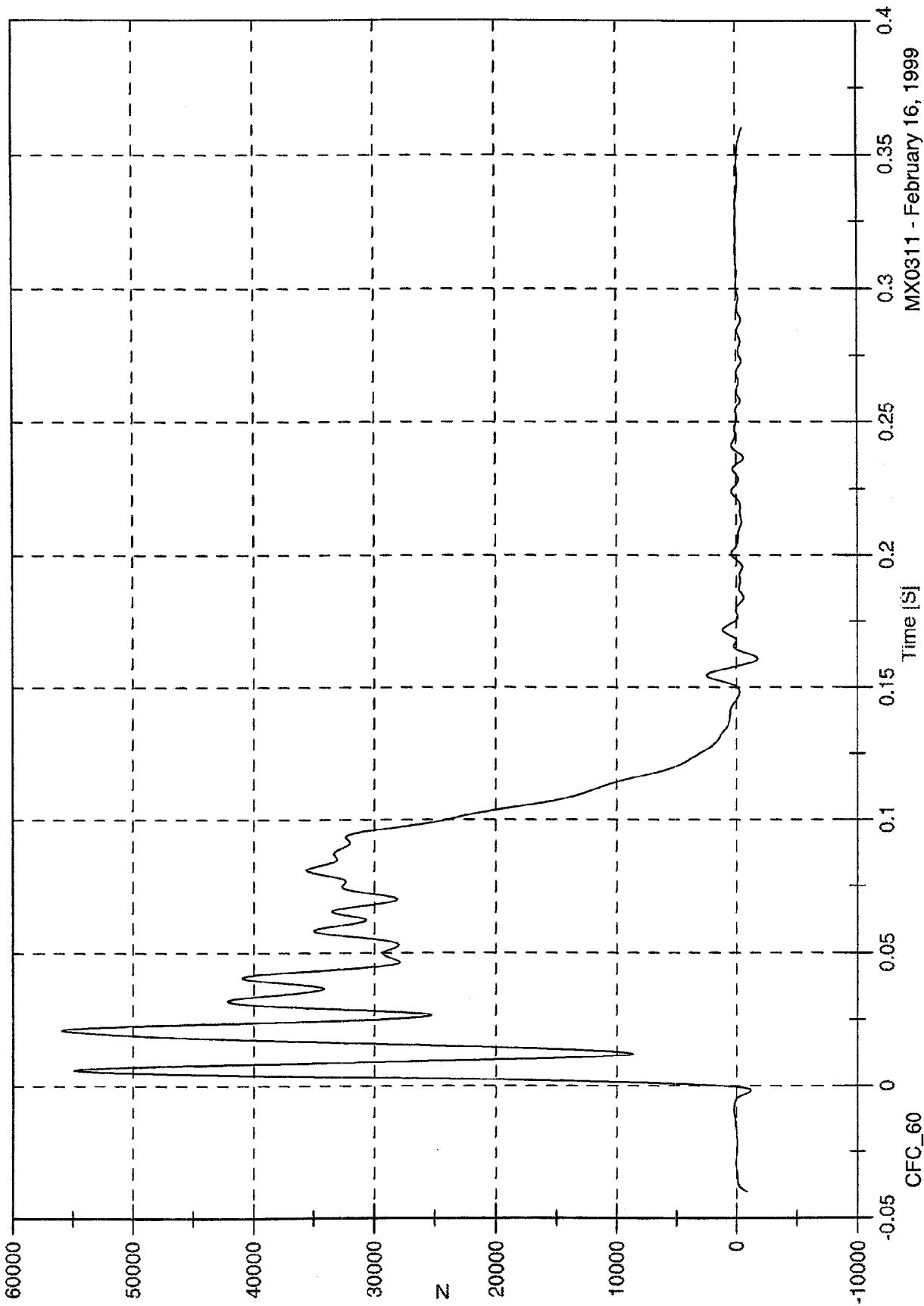


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NCAP Test #12- 1999 Jeep Wrangler

Max: 55948.3 [N] at 0.021 [S]
Min: -1790.2 [N] at 0.161 [S]

Group 5 Load Cell Sum (C4,C5,C6,D4,D5,D6)

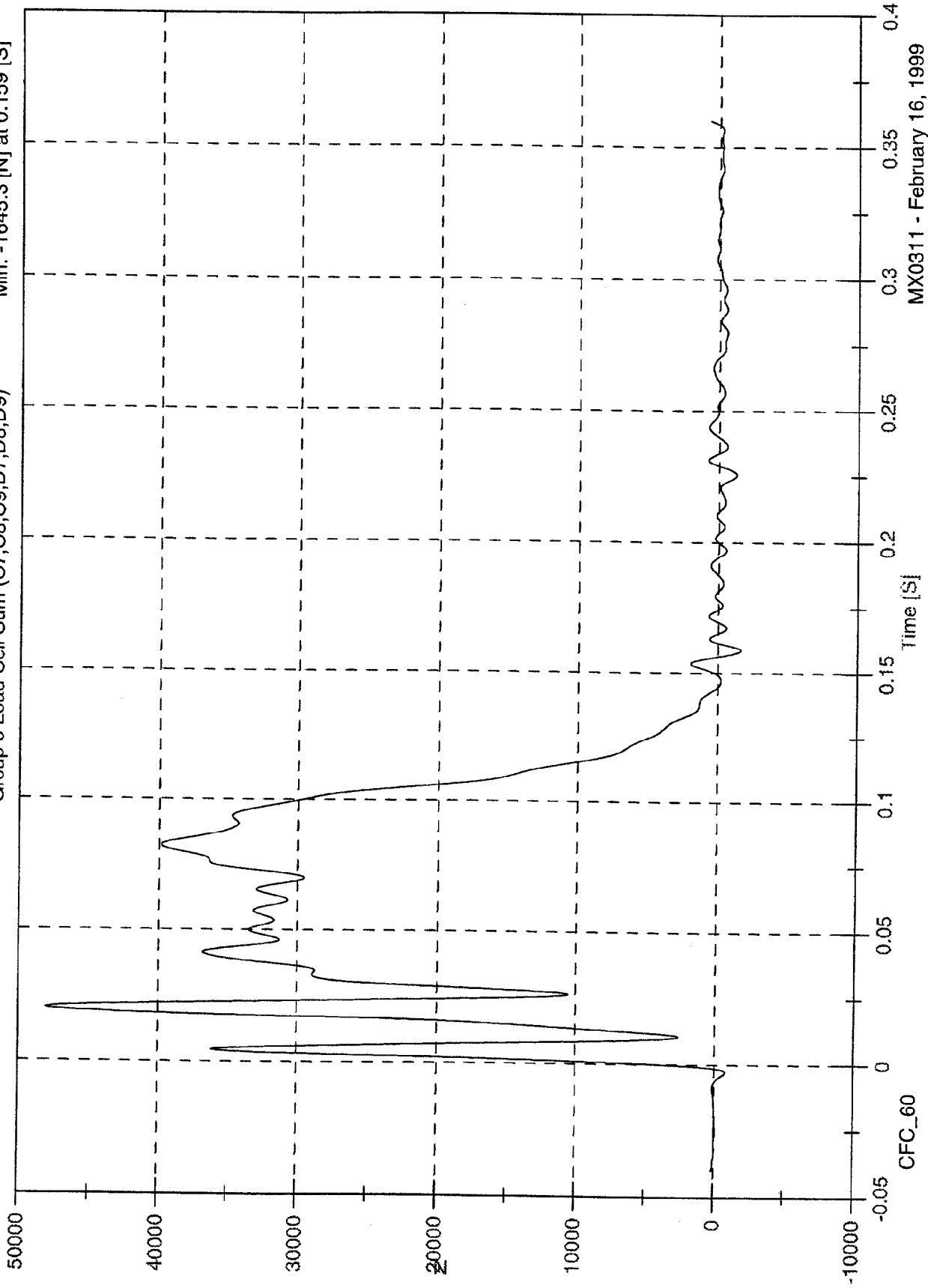


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NCAP Test #12- 1999 Jeep Wrangler

Max: 48031.5 [N] at 0.020 [S]
Min: -1645.3 [N] at 0.159 [S]

Group 6 Load Cell Sum (C7,C8,C9,D7,D8,D9)

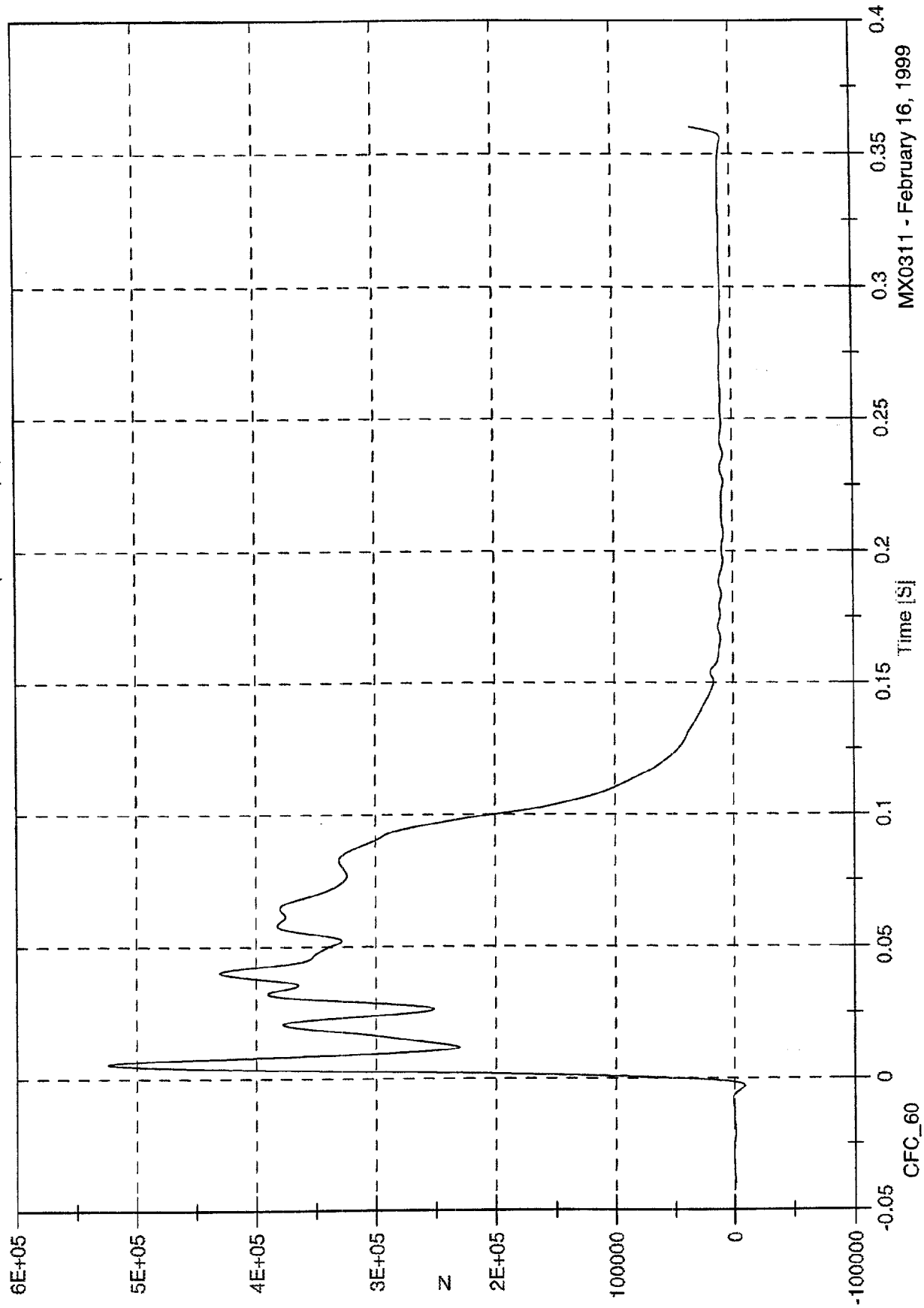


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NCAP Test #12- 1999 Jeep Wrangler

Max: 524353.0 [N] at 0.005 [S]
 Min: -8871.3 [N] at -0.003 [S]

Total Load Cell Sum (All 6 Groups)



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Appendix C
PART 572B/E DUMMY CONFIGURATION
AND PERFORMANCE VERIFICATION DATA SHEETS

Appendix C contains the results from certification tests performed on the 50th percentile male anthropomorphic test devices utilized for this crash test. The results indicate that the dummies meet all of the performance requirements of the six standard tests as specified in 49 CFR Part 572, Federal Register, Volume 42, No. 25, dated February 7, 1977.

The tests were conducted at the Dummy Certification Test Facility of Calspan Corporation. A summary of the test results, and Part 572 specifications are included in this Appendix.

Dummy serial numbers and certification dates are:

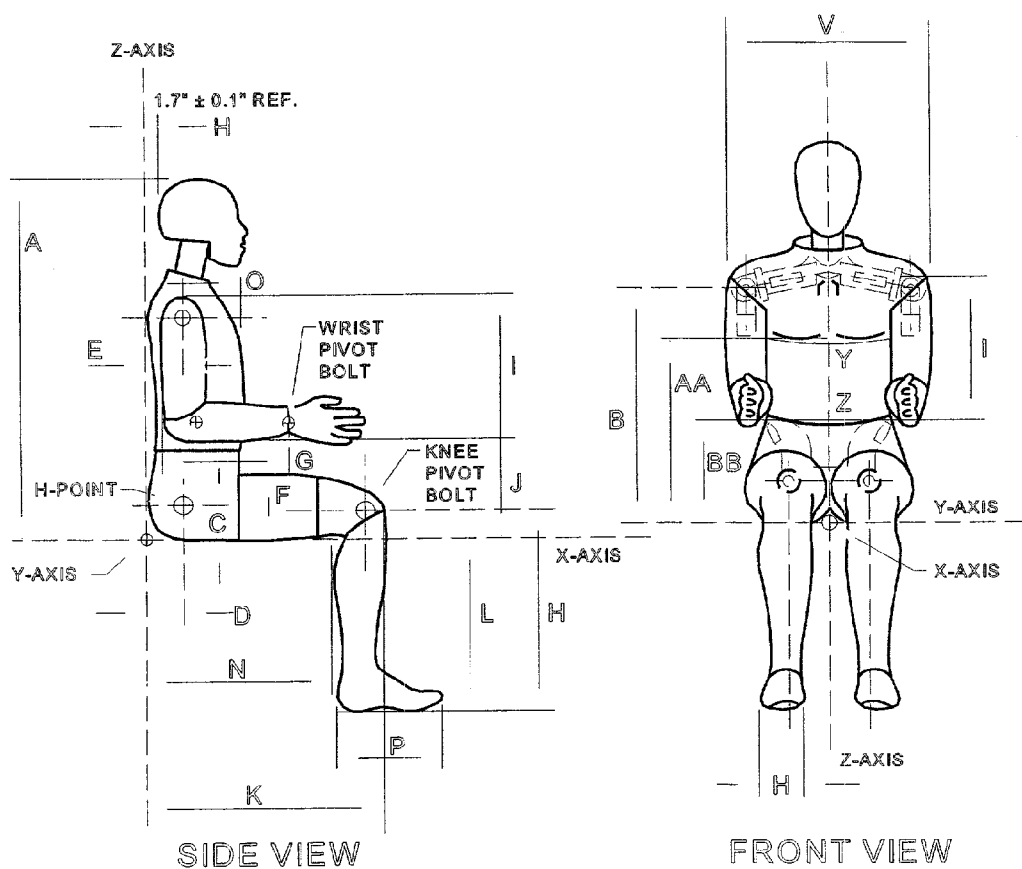
<u>Position No./Location</u>	<u>Serial No.</u>	<u>Completion Date</u>
#1/Driver	150	02/03/99
#2/Right Front Passenger	064	02/09/99

Electronic Test Equipment

The complement of signal conditioning, recording and display equipment, in conjunction with dummy certification testing, can be found in New Car Assessment and Standards Inducant Testing Final Report No. 6525-V-1.

DUMMY CONFIGURATION DIMENSIONS

EXTERNAL DIMENSIONS SPECIFICATIONS



NOTE: Figure is referenced to the erect seated position. The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.
(REF: S572.31(A)(6))

PART 572E
HEAD DROP TEST

Dummy Serial Number 150
Calspan Sequential Test Number 1
Date 02/03/99
Workfile 150199.hdp

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	72
Relative Humidity	10% - 70%	25
Peak Resultant Acceleration	225-275 G's	249.7
Peak Lateral Acceleration	15 G's Max	4.6
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK FLEXION TEST

Dummy Serial Number 150
 Calspan Sequential Test Number 1
 Date 02/01/99
 Workfile 150199.nfl

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	30
Impact Velocity		22.60 - 23.40 Ft/s	22.94
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	24.95
	20 ms	17.60 - 22.60 G's	20.57
	30 ms	12.50 - 18.50 G's	14.64
Max Pendulum G's Above 30 ms		29 G's Max	14.64
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	40.00
D Plane Rotation	Max	64 - 78 Deg	70.48
	Time	57 - 64 ms	71.45
Moment About Occipital Condyle	Max	65 - 80 Ft-Lbs	63.25
	Time	47 - 58 ms	53.88
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	118.38
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	102.75

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number 150
 Calspan Sequential Test Number 1
 Date 02/03/99
 Workfile 150199.nex

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	71
Relative Humidity		10% - 70%	25
Impact Velocity		19.50 - 20.30 Ft/s	19.95
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.55
	20 ms	14.00 - 19.00 G's	16.53
	30 ms	11.00 - 16.00 G's	14.08
Max Pendulum G's Above 30 ms		22 G's Max	14.08
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	42.00
D Plane Rotation	Max	81 - 106 Deg	95.07
	Time	72 - 82 ms	73.50
Moment About Occipital Condyle	Max	-59.0 - -39.0 Ft-Lbs	-50.64
	Time	65 - 79 ms	71.13
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	148.13
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	135.25

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 150
Calspan Sequential Test Number 1
Date 02/03/99
Workfile 150199.th3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70
Relative Humidity	10% - 70%	25
Pendulum Velocity	21.6 - 22.4 Ft/s	21.65
Maximum Deflection	2.50 - 2.86 in	2.70
Maximum Resistive Force	1160 - 1325 Lbs	1168.35
Internal Hysteresis	69 - 85 %	75.4

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 150
Calspan Sequential Test Number 1
Date 02/01/99
Workfile 15099

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66 - 78 Deg F	72
Relative Humidity	10% - 70%	25
Probe Velocity	6.8 - 7.0 Ft/s	6.90
Peak Knee Impact Force	1060 - 1300 Lbs	1215.0
RIGHT KNEE		
Temperature	66 - 78 Deg F	72
Relative Humidity	10% - 70%	25
Probe Velocity	6.8 - 7.0 Ft/s	7.00
Peak Knee Impact Force	1060 - 1300 Lbs	1207.0

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 150
Calspan Sequential Test Number 1
Date 02/03/99

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70
Relative Humidity			25
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	39.2
Waist Circumference	Z	32.9 - 34.1 in	34.0
Chest Depth	O	8.4 - 9.0 in	8.4
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.8
Thigh Clearance	F	5.5 - 6.1 in	5.7
Buttock Knee Length	K	22.8 - 23.8 in	23.4
Buttock Popliteal Length	N	17.8 - 18.8 in	18.5
Popliteal Height	L	16.9 - 17.9 in	17.8
Knee Pivot Height	M	19.1 - 19.7 in	19.6
Foot Length	P	9.9 - 10.5 in	10.1
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.7
Shoulder Breadth	V	16.6 - 17.2 in	16.9
Shoulder Pivot Height	B	19.9 - 20.5 in	20.2
Elbow Rest Height	J	7.5 - 8.3 in	8.1
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.2
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
HEAD DROP TEST

Dummy Serial Number 064
Calspan Sequential Test Number 2
Date 02/03/99
Workfile 064299.hdp

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	66-78 Deg F	70
Relative Humidity	10% - 70%	25
Peak Resultant Acceleration	225-275 G's	234.0
Peak Lateral Acceleration	15 G's Max	13.3
Is Acceleration Curve Unimodal?	YES	YES

Remarks:

Laboratory Technician: B. Swiecicki

**PART 572E
NECK FLEXION TEST**

Dummy Serial Number 064
 Calspan Sequential Test Number 2
 Date 02/09/99
 Workfile 064299.nfl

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	24
Impact Velocity		22.60 - 23.40 Ft/s	23.32
Pendulum Deceleration	10 ms	22.50 - 27.50 G's	25.29
	20 ms	17.60 - 22.60 G's	21.04
	30 ms	12.50 - 18.50 G's	12.63
Max Pendulum G's Above 30 ms		29 G's Max	12.63
Deceleration - Time Curve Decay Time to 5 G's		34 - 42 ms	41.25
D Plane Rotation	Max	64 - 78 Deg	75.71
	Time	57 - 64 ms	57.00
Moment About Occipital Condyle	Max	65 - 80 Ft-Lbs	79.77
	Time	47 - 58 ms	55.00
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 ms	126.38
Positive Moment - Time Curve Decay Time to Zero		97 - 107 ms	98.88

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
NECK EXTENSION TEST

Dummy Serial Number 064
 Calspan Sequential Test Number 2
 Date 02/09/99
 Workfile 064299.nex

6 Axis Neck Transducer

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature		69-72 Deg F	70
Relative Humidity		10% - 70%	24
Impact Velocity		19.50 - 20.30 Ft/s	20.14
Pendulum Deceleration	10 ms	17.20 - 21.20 G's	18.38
	20 ms	14.00 - 19.00 G's	16.60
	30 ms	11.00 - 16.00 G's	13.62
Max Pendulum G's Above 30 ms		22 G's Max	13.62
Deceleration - Time Curve Decay Time to 5 G's		38 - 46 ms	44.88
D Plane Rotation	Max	81 - 106 Deg	97.32
	Time	72 - 82 ms	72.25
Moment About Occipital Condyle	Max	-59.0 - -39.0 Ft-Lbs	-58.37
	Time	65 - 79 ms	67.75
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 ms	147.13
Positive Moment - Time Curve Decay Time to Zero		120 - 148 ms	137.75

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
THORAX IMPACT TEST

Dummy Serial Number 064
Calspan Sequential Test Number 2
Date 02/09/99
Workfile 064299.th3

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	69-72 Deg F	70
Relative Humidity	10% - 70%	24
Pendulum Velocity	21.6 - 22.4 Ft/s	21.65
Maximum Deflection	2.50 - 2.86 in	2.51
Maximum Resistive Force	1160 - 1325 Lbs	1186.34
Internal Hysteresis	69 - 85 %	80.7

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
KNEE IMPACT TEST

Dummy Serial Number 064
Calspan Sequential Test Number 2
Date 02/09/99
Workfile 064299

TEST PARAMETER	SPECIFICATION	TEST RESULTS
LEFT KNEE		
Temperature	66 - 78 Deg F	71
Relative Humidity	10% - 70%	20
Probe Velocity	6.8 - 7.0 Ft/s	6.90
Peak Knee Impact Force	1060 - 1300 Lbs	1238.0
RIGHT KNEE		
Temperature	66 - 78 Deg F	70
Relative Humidity	10% - 70%	20
Probe Velocity	6.8 - 7.0 Ft/s	6.98
Peak Knee Impact Force	1060 - 1300 Lbs	1204.0

Remarks:

Laboratory Technician: B. Swiecicki

PART 572E
EXTERNAL DIMENSIONS

Dummy Serial Number 064
Calspan Sequential Test Number 2
Date 02/09/99

TEST PARAMETER		SPECIFICATION	TEST RESULTS
Temperature			70
Relative Humidity			24
Location for Chest Circumference	AA	16.9 - 17.1 in	17.0
Location for Waist Circumference	BB	8.9 - 9.1 in	9.0
Chest Circumference (With Jacket)	Y	38.2 - 39.4 in	38.8
Waist Circumference	Z	32.9 - 34.1 in	33.2
Chest Depth	O	8.4 - 9.0 in	8.6
H-Point Height	C	3.3 - 3.5 in	3.4
H-Point from Backline	D	5.3 - 5.5 in	5.4
Skull Cap to Backline	H	1.6 - 1.8 in	1.7
Total Sitting Height	A	34.6 - 35.0 in	34.8
Thigh Clearance	F	5.5 - 6.1 in	6.0
Buttock Knee Length	K	22.8 - 23.8 in	23.6
Buttock Popliteal Length	N	17.8 - 18.8 in	18.4
Popliteal Height	L	16.9 - 17.9 in	17.3
Knee Pivot Height	M	19.1 - 19.7 in	19.4
Foot Length	P	9.9 - 10.5 in	10.1
Foot Breadth	W	3.6 - 4.2 in	3.8
Shoulder Pivot from Backline	E	3.3 - 3.7 in	3.6
Shoulder Breadth	V	16.6 - 17.2 in	16.8
Shoulder Pivot Height	B	19.9 - 20.5 in	20.4
Elbow Rest Height	J	7.5 - 8.3 in	8.0
Shoulder - Elbow Length	I	13.0 - 13.6 in	13.3
Back of Elbow to Wrist Pivot	G	11.4 - 12.0 in	11.6

Remarks:

Laboratory Technician: B. Swiecicki

Appendix D

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY (S/N 150)	Serial #	Manufacturer	Calibration	
			Last	Next
Head				
X	AF5P8	ENDEVCO	10/98	4/99
Y	C14948	ENDEVCO	10/98	4/99
Z	AH5F3	ENDEVCO	12/98	6/99
Chest				
X	ADL50	ENDEVCO	12/98	6/99
Y	AC2P5	ENDEVCO	12/98	6/99
Z	AL6C8	ENDEVCO	12/98	6/99
Right Femur Load Cell	F551	GSE	9/98	3/99
Left Femur Load Cell	F548	GSE	9/98	3/99
Neck Load Cell	076	DENTON	8/98	2/99
Y	076	DENTON	8/98	2/99
Z	076	DENTON	8/98	2/99
Neck Moment	076	DENTON	8/98	2/99
Y	076	DENTON	8/98	2/99
Z	076	DENTON	8/98	2/99
Chest Deflection Gauge	CP150	HUMANOID	9/98	3/99
Hybrid III Use Only				
Lap Belt Load Cells	706	LEBOW	9/98	3/99
Shoulder Belt Load Cells	707	LEBOW	9/98	3/99
Spool-Out Potentiometer	M10	MAGNETEK	10/98	4/99
Belt Stretch Transducer	E5	CALSPAN	10/98	4/99

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head				
X (R)	A14150	ENDEVCO	10/98	4/99
Y (R)	B10954	ENDEVCO	10/98	4/99
Z (R)	A14126	ENDEVCO	10/98	4/99
Chest				
X (R)	A13939	ENDEVCO	10/98	4/99
Y (R)	A14181	ENDEVCO	10/98	4/99
Z (R)	A14124	ENDEVCO	10/98	4/99
Pelvic				
X	C15018	ENDEVCO	9/98	3/99
Y	C14883	ENDEVCO	9/98	3/99
Z	C14972	ENDEVCO	9/98	3/99
Left Upper Tibia				
Mx	016	DENTON	9/98	3/99
Left Upper Tibia				
My	016	DENTON	9/98	3/99
Left Lower Tibia				
Fz	123	DENTON	8/98	2/99
Left Lower Tibia				
Mx	123	DENTON	8/98	2/99
Left Lower Tibia				
My	123	DENTON	8/98	2/99
Right Upper Tibia				
Mx	015	DENTON	9/98	3/99
Right Upper Tibia				
My	015	DENTON	9/98	3/99
Right Lower Tibia				
Fz	122	DENTON	8/98	2/99
Right Lower Tibia				
Mx	122	DENTON	8/98	2/99
Right Lower Tibia				
My	122	DENTON	8/98	2/99

INSTRUMENT CALIBRATION FOR DRIVER DUMMY

(6 Month Calibration Minimum)

DRIVER DUMMY	Serial #	Manufacture	Calibration	
			Last	Next
Left Foot Front Z	A14307	ENDEVCO	12/98	6/99
Left Foot Rear X	A14510	ENDEVCO	12/98	6/99
Left Foot Rear Z	A14383	ENDEVCO	12/98	6/99
Right Foot Front Z	A14485	ENDEVCO	12/98	6/99
Right Foot Rear X	A14321	ENDEVCO	12/98	6/99
Right Foot Rear Z	A14381	ENDEVCO	12/98	12/98

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY (S/N 064)	Serial #	Manufacturer	Calibration	
			Last	Next
Head	X	AD4A9	ENDEVCO	11/98
	Y	AE8T7	ENDEVCO	11/98
	Z	AF5R1	ENDEVCO	11/98
Chest	X	A08A	ENDEVCO	11/98
	Y	ADL42	ENDEVCO	11/98
	Z	A28F	ENDEVCO	11/98
Right Femur Load Cell	659	GSE	9/98	3/99
Left Femur Load Cell	658	GSE	9/98	3/99
Neck Load Cell	X	440	DENTON	9/98
	Y	440	DENTON	9/98
	Z	440	DENTON	9/98
Neck Moment	X	440	DENTON	9/98
	Y	440	DENTON	9/98
	Z	440	DENTON	9/98
Chest Deflection Gauge	X	064	HUMANOID	10/98
	Y			
	Z			
Hybrid III Use Only				
Lap Belt Load Cells	711	LEBOW	9/98	3/99
Shoulder Belt Load Cells	712	LEBOW	9/98	3/99
Spool-Out Potentiometer	M6	MAGNETEK	10/98	4/99
Belt Stretch Transducer	E6	CALSPAN	10/98	4/99

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacturer	Calibration	
			Last	Next
Head				
X (R)	A13924	ENDEVCO	12/98	6/99
Y (R)	A13827	ENDEVCO	11/98	5/99
Z (R)	A13921	ENDEVCO	11/98	5/99
Chest				
X (R)	A14077	ENDEVCO	11/98	5/99
Y (R)	A13882	ENDEVCO	11/98	5/99
Z (R)	ACCW0	ENDEVCO	11/98	5/99
Pelvic				
X	AF480	ENDEVCO	12/98	6/99
Y	AC2M6	ENDEVCO	12/98	6/99
Z	AF5C1	ENDEVCO	12/98	6/99
Left Upper Tibia				
Mx	045	DENTON	9/98	3/99
Left Upper Tibia				
My	045	DENTON	9/98	3/99
Left Lower Tibia				
Fz	0125	DENTON	8/98	2/99
Left Lower Tibia				
Mx	0125	DENTON	8/98	2/99
Left Lower Tibia				
My	0125	DENTON	8/98	2/99
Right Upper Tibia				
Mx	038	DENTON	9/98	3/99
Right Upper Tibia				
My	038	DENTON	9/98	3/99
Right Lower Tibia				
Fz	0124	DENTON	9/98	3/99
Right Lower Tibia				
Mx	0124	DENTON	8/98	2/99
Right Lower Tibia				
My	0124	DENTON	8/98	2/99

INSTRUMENT CALIBRATION FOR PASSENGER DUMMY

(6 Month Calibration Minimum)

PASSENGER DUMMY	Serial #	Manufacture	Calibration	
			Last	Next
Left Foot Front	Z	ENDEVCO	12/98	6/99
Left Foot Rear	X	ENDEVCO	12/98	6/99
Left Foot Rear	Z	ENDEVCO	12/98	6/99
Right Foot Front	Z	ENDEVCO	12/98	6/99
Right Foot Rear	X	ENDEVCO	12/98	6/99
Right Foot Rear	Z	ENDEVCO	12/98	6/99

INSTRUMENT CALIBRATION FOR VEHICLE ACCELEROMETERS

(6 Month Calibration Minimum)

	Serial #	Manufacturer	Calibration	
			Last	Next
Left Seat Rear Crossmember	D85	ICS	12/98	6/99
Right Rear Seat Crossmember	Y85	ICS	2/99	8/99
Top of Engine	D79	ICS	12/98	6/99
Bottom of Engine	D29	ICS	1/99	7/99
Left Disc Brake Caliper	D37	CEC	12/98	6/99
Right Disc Brake Caliper	A183	CEC	1/99	7/99
Instrument Panel	D53	CEC	8/98	2/99
Left Seat Rear Crossmember (R)	D72	ICS	1/99	7/99
Right Seat Rear Crossmember (R)	D69	ICS	2/99	8/99