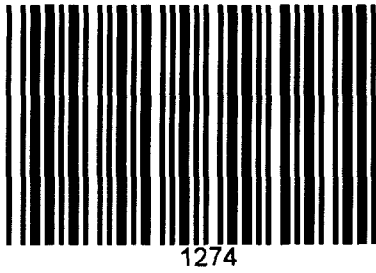


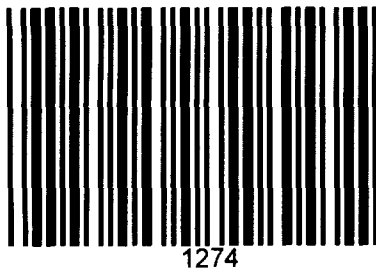
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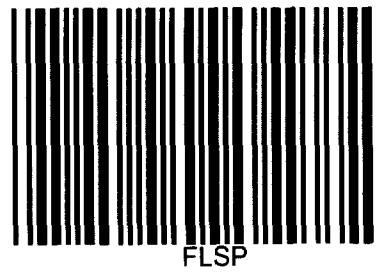
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x=1, dx=6.5; y=5 dy=1.25



1274



1274



FLSP

1274

VEHICLE AND DUMMY KINEMATICS  
IN A CONTROLLED ROLLOVER CRASH  
1988 NISSAN STANDARD REGULAR BED PICKUP

PREPARED BY:

THE TRANSPORTATION RESEARCH CENTER OF OHIO  
U.S. RT. 33, LOGAN COUNTY  
EAST LIBERTY, OHIO 43319

TEST REPORT

JUNE - JULY, 1988

PREPARED FOR:

SYSTEMS RESEARCH LABORATORIES, INC.  
2800 INDIAN RIPPLE ROAD  
DAYTON, OH 45440

NOTICE

The Transportation Research Center of Ohio does not endorse or certify products of manufacturers. The manufacturer's name appears solely to identify the test article. The Transportation Research Center assumes no liability for the report or use thereof. It is responsible for the facts and the accuracy of the data presented herein. This report does not constitute a standard, specification, or regulation.

Report Prepared By:

Najih A. ElHabash Date 7/27/88  
N.A. El-Habash  
Project Engineer

Report Approved By:

John C. Stultz Date 7-27-88  
J.C. Stultz  
Chief Engineer Impact Laboratory

John F. Shultz Date 7/27/88  
J.F. Shultz  
Manager Impact Laboratory

T.E. Elliot Date 7/28/88  
T.E. Elliot  
Project Manager

# METRIC CONVERSION FACTORS

## Approximate Conversions to Metric Measures

Symbol When You Know Multiply by To Find Symbol

### LENGTH

in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

### AREA

in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha

### MASS (weight)

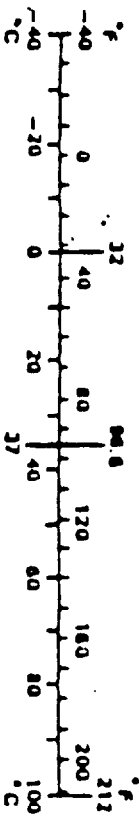
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	metric ton	t

### VOLUME

tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
in <sup>3</sup>	cubic inches	16	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>

### TEMPERATURE (exact)

°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C
----	--------------------	----------------------------	-----------------	----



## Approximate Conversions from Metric Measures

Symbol When You Know Multiply by To Find Symbol

### LENGTH

mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi

### AREA

cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10 000 m <sup>2</sup> )	2.5	acres	

### MASS (weight)

g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton (1000 kg)	1.1	short tons	

### VOLUME

ml	milliliters	0.03	fluid ounces	fl oz
ml	milliliters	0.06	cubic inches	in <sup>3</sup>
L	liters	2.1	pints	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>

### TEMPERATURE (exact)

°C	degrees Celsius	9/5 (then add 32)	degrees Fahrenheit	°F
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SECTION 1.0  
PURPOSE AND TEST PROCEDURE

This rollover crash test is the first test in a four test series. The test series has the main objective to investigate both vehicle and occupant dynamics during automobile rollover crashes.

This test was conducted by placing a 1988 Nissan Standard Regular Bed Pickup on the NHTSA rollover cart at an angle of 30° above the horizontal, crabbing the rollover cart 45°, towing the rollover cart to 30 mph, and releasing the test vehicle. The test vehicle contained an instrumented Part 572E dummy restrained by a production 3-point unbelt.

SECTION 2.0  
SUMMARY OF ROLLOVER CRASH TEST

A 1988 Nissan Standard Regular Bed Pickup containing one Part 572E instrumented test dummy was placed upon the rollover test device at 30 degrees above the horizontal and was released when the device had reached 30 mph. The device was attached to the tow cable of the drive system and crabbed 45° clockwise. After the vehicle had been released the device was brought to a stop with an auxiliary brake system. After release the vehicle impacted the ground on its left side. The vehicle made one and one-quarter complete rolls and came to rest on its roof. The rollover crash test was conducted by the Transportation Research Center of Ohio in East Liberty, Ohio on June 30, 1988. Pre-test and post-test photographs of the test vehicle, dummy and device are shown in Appendix A.

The Part 572E 50th percentile adult male anthropomorphic test device (ATD) was placed in the driver designated seating position according to the seating procedure in FMVSS 208 Notice 45. The ATD was instrumented with head, chest, and pelvis triaxial accelerometers, a six-axis neck load cell, and a chest displacement potentiometer. A summary of Dummy Calibration test data can be found in Appendix C.

The crash event was recorded on 35 channels of data on one 14-track tape drive. Appendix B contains the vehicle, rollover device and dummy response data plots.

The crash event was filmed by five high-speed motion picture cameras operating at approximately 500 frames per second and one real-time panning motion picture camera.

TEST NUMBER 880630

ROLL CART DATA SUMMARY

No.	LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
		MAX	SEC	MAX	SEC
1	CENTER OF GRAVITY				
	ACCELERATION (g)				
	LONGITUDINAL	62.1	0.1	8.9	0.1
	LATERAL	41.1	0.1	7.6	1.4
	VERTICAL	128.4	0.1	16.6	0.1
	RESULTANT	133.5	0.1		
2	PLATFORM DISPLACEMENT (in)				
	LEFT SIDE	24.2	2.6	0.1	0.4
	RIGHT SIDE	24.8	1.0	0.1	0.4

VEHICLE/ROLL CART SEPARATION TIMES:

UPPER SWITCH: 0.7 SEC

LOWER SWITCH: 0.8 SEC

POSITIVE DIRECTION

NEGATIVE DIRECTION

LONGITUDINAL: FORWARD  
 LATERAL: LEFTWARD  
 VERTICAL: UPWARD  
 DISPLACEMENT: OUTWARD

REARWARD  
 RIGHTWARD  
 DOWNWARD  
 INWARD

SEE TEST ANOMALIES

FINAL RESTING PLACES OF PARTS AND CAR

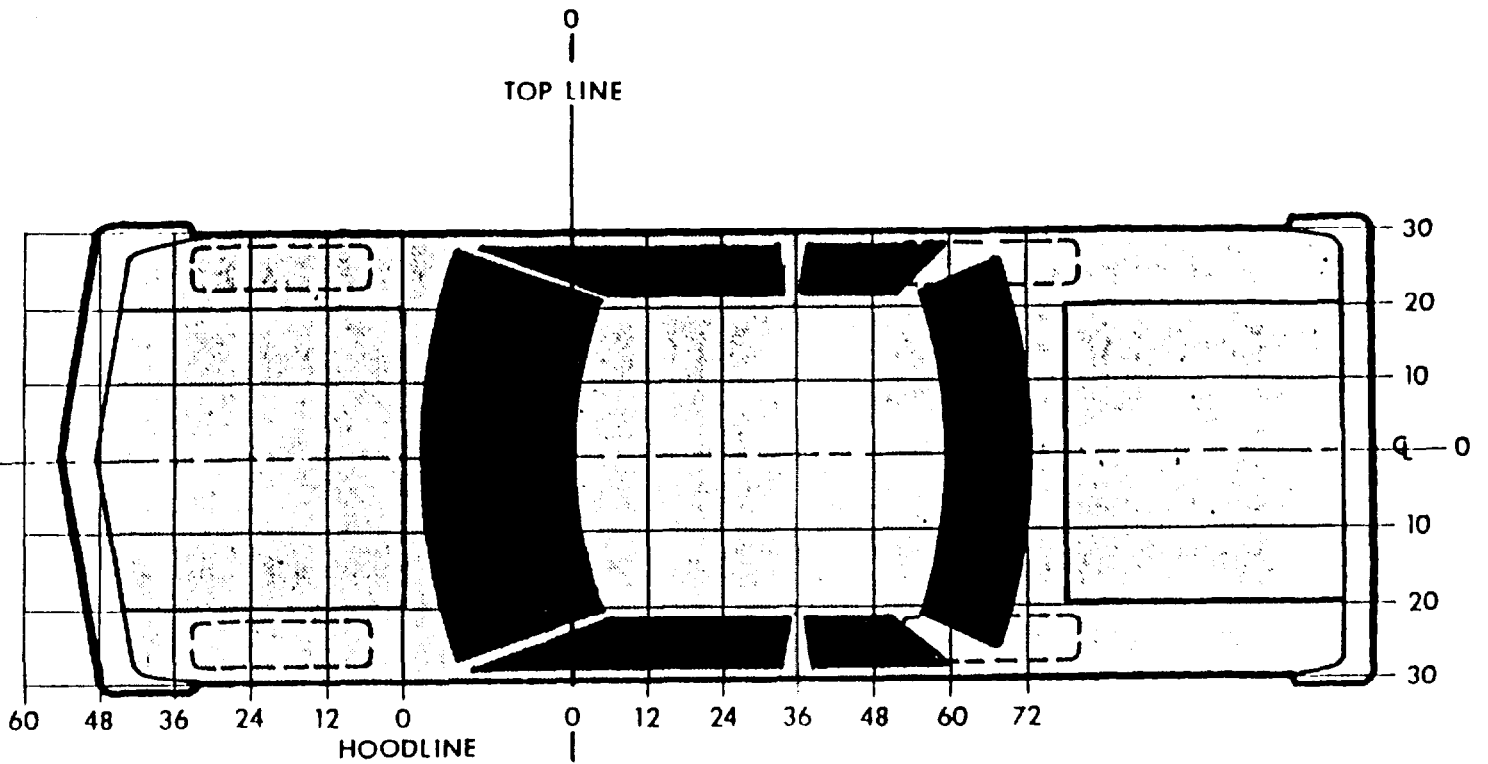
<u>DESCRIPTION OF PART</u>	<u>X DISTANCE, FT*</u>	<u>Y DISTANCE, FT*</u>
1988 Nissan Standard Regular Bed Pickup	109.9	5.1
Rear Glass Moulding	27.1	1.0

\*REFERENCE: \*X: FORWARD FROM RELEASE BLOCK  
\*Y: LEFTWARD FROM CENTER RELEASE BLOCK

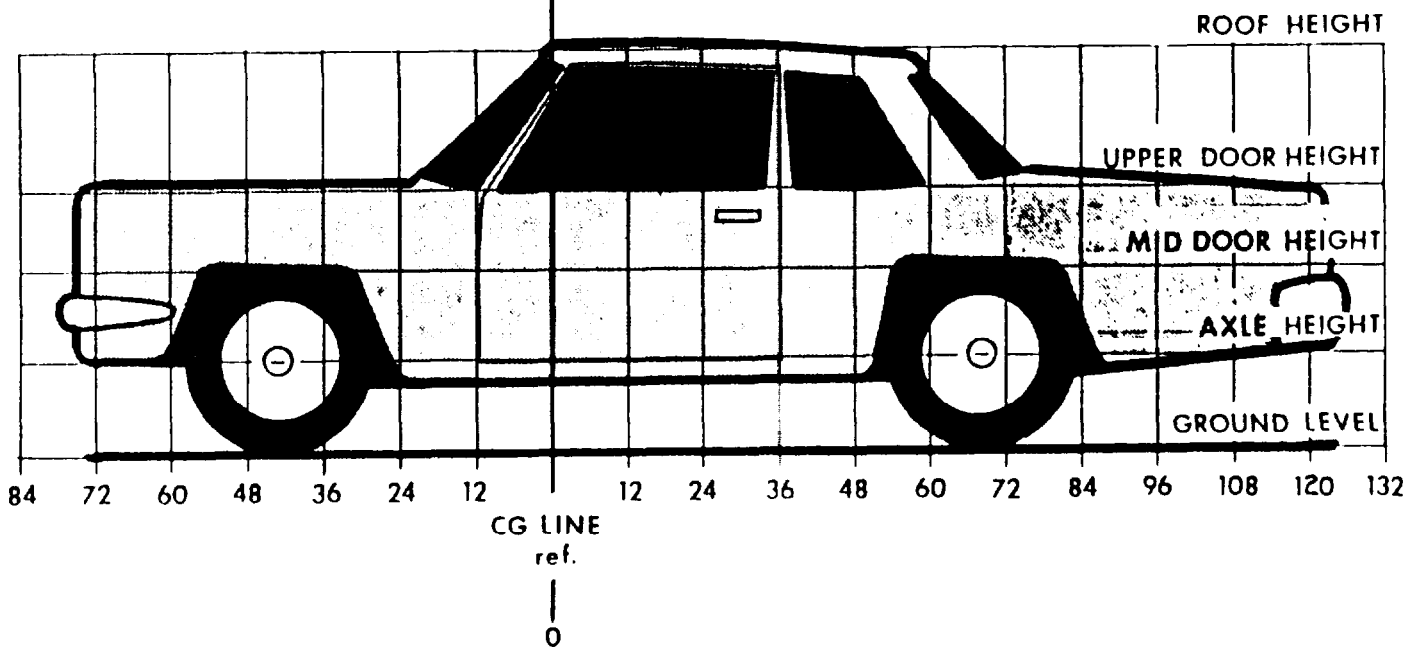
INTERIOR DIMENSIONS TAKEN

<u>DESCRIPTION</u>	<u>PRE</u>	<u>POST</u>	<u>DIFF</u>
Floor board to top of "A" post of left side	39.6	34.5	5.1
Floor board to top of "A" post of right side	39.9	30.8	9.1
Door sill to top of "B" post of left side	41.8	39.5	2.3
Door sill to top of "B" post of right side	41.4	34.4	7.0
Door sill to top of door opening of left side	40.8	39.2	1.6
Door sill to top of door opening of right side	40.5	35.0	5.5
Floor tunnel to windshield header	35.8	29.6	6.2
Floor tunnel to center of roof	40.8	31.4	9.4
Rear of floor tunnel to roof	40.7	25.5	15.2
Maximum width at "B" post	49.3	52.5	-3.2
Maximum width at "A" post	49.9	52.1	-2.2
Maximum width at top of door opening	48.8	42.1	6.7

ALL MEASUREMENTS ARE IN INCHES



HOOD AND ROOF STATIC CRUSH LOCATIONS



LEFT AND RIGHT SIDE STATIC CRUSH LOCATIONS

VEHICLE HOOD EXTERIOR PROFILES  
ZERO DISTANCE AT VEHICLE HOOD CENTERLINE\*

LOCATION	30	20	10	0	10	20	30
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)							
Trailing edge of cowl at centerline	X	41.8	42.1	42.2	42.0	41.8	X
Trailing edge of cowl + 12 inches	X	40.2	40.6	40.7	40.5	40.1	X
Trailing edge of cowl + 24 inches	X	38.2	38.4	38.6	38.4	37.9	X
Trailing edge of cowl + 36 inches	X	33.5	33.6	33.7	33.7	33.2	X
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE***)							
Trailing edge of cowl at centerline	X	42.2	42.2	42.1	42.1	41.8	X
Trailing edge of cowl + 12 inches	X	39.9	40.9	41.5	41.5	41.2	X
Trailing edge of cowl + 24 inches	X	37.1	38.4	39.0	39.4	39.4	X
Trailing edge of cowl + 36 inches	X	35.5	35.1	34.8	34.4	32.9	X
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

Trailing edge of cowl at centerline	X	0.4	0.1	-0.1	0.1	0.0	X
Trailing edge of cowl + 12 inches	X	-0.3	0.3	0.8	1.0	1.1	X
Trailing edge of cowl + 24 inches	X	-1.1	0.0	0.4	1.0	1.5	X
Trailing edge of cowl + 36 inches	X	2.0	1.5	1.1	0.7	-0.3	X
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

- \* Column reading are left to right from left to right on vehicle.
- \*\*Reference plane is a horizontal plane at ground level.
- + Static crush means vehicle structure is bowed upward.
- Static crush means vehicle structure is crushed.

VEHICLE ROOF EXTERIOR PROFILES  
ZERO DISTANCE AT VEHICLE ROOF CENTERLINE\*

LOCATION	20	10	0	10	20
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Longitudinal Center of Gravity	X	X	59.1	X	X
Longitudinal Center of Gravity + 12	60.8	61.4	61.6	61.4	60.6
Longitudinal Center of Gravity + 24	61.1	61.9	62.2	62.1	61.2
Longitudinal Center of Gravity + 36	X	X	X	X	X
Longitudinal Center of Gravity + 48	X	X	X	X	X
Longitudinal Center of Gravity + 60	X	X	X	X	X

POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Longitudinal Center of Gravity	X	X	53.0	X	X
Longitudinal Center of Gravity + 12	51.4	50.8	52.5	55.9	56.6
Longitudinal Center of Gravity + 24	58.2	55.0	49.9	47.6	53.4
Longitudinal Center of Gravity + 36	X	X	X	X	X
Longitudinal Center of Gravity + 48	X	X	X	X	X
Longitudinal Center of Gravity + 60	X	X	X	X	X

	STATIC CRUSH (IN)				
Longitudinal Center of Gravity	X	X	-6.1	X	X
Longitudinal Center of Gravity + 12	-9.4	-10.6	-9.1	-5.5	-4.0
Longitudinal Center of Gravity + 24	-2.9	-6.9	-12.3	-14.5	-7.8
Longitudinal Center of Gravity + 36	X	X	X	X	X
Longitudinal Center of Gravity + 48	X	X	X	X	X
Longitudinal Center of Gravity + 60	X	X	X	X	X

\* Column reading are left to right from left to right on vehicle.

\*\*Reference plane is a horizontal plane at ground level.

+ Static crush means vehicle structure is bowed upward.

- Static crush means vehicle structure is crushed.

VEHICLE LEFT SIDE EXTERIOR PROFILES AND STATIC CRUSH  
ZERO DISTANCE AT VEHICLE LONGITUDINAL CENTER OF GRAVITY\*

LOCATION	HEIGHT (IN)	72	60	48	36	24	12	0	12	24	36	48	60	72	84	96
----------	-------------	----	----	----	----	----	----	---	----	----	----	----	----	----	----	----

PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE\*\*)

Roof Height	60.0	X	X	X	X	X	X	23.9	23.6	X	X	X	X	X	X	X
Upper Door	39.6	X	X	18.4	17.8	17.1	17.1	16.9	16.8	X	16.8	16.9	16.7	16.9	17.1	17.2
Mid Door	27.6	X	16.8	X	X	15.8	15.7	15.7	X	X	15.8	X	X	15.9	16.2	16.3
Axle Height	14.5	X	X	X	X	17.9	17.9	18.1	18.4	X	18.8	X	X	X	X	X

POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE\*\*)

Roof Height	60.0	X	X	X	X	X	X	25.0	21.6	X	X	X	X	X	X	X
Upper Door	39.6	X	X	21.6	19.8	18.2	16.7	14.5	13.0	X	16.8	16.9	17.0	17.2	17.6	17.3
Mid Door	27.6	X	17.5	X	X	15.5	14.4	13.6	12.9	X	15.5	X	X	15.9	16.4	16.9
Axle Height	14.5	X	X	X	X	17.4	17.6	17.8	18.2	X	18.4	X	X	X	X	X

STATIC CRUSH (IN)

Roof Height	60.0	X	X	X	X	X	X	1.1	-2.0	X	X	X	X	X	X	X
Upper Door	39.6	X	X	3.2	2.0	1.1	0.4	-2.4	-3.8	X	0.0	0.0	0.3	0.3	0.5	0.1
Mid Door	27.6	X	0.7	X	X	-0.3	-1.3	-2.1	-2.8	X	-0.3	X	X	0.0	0.2	0.6
Axle Height	14.5	X	X	X	X	-0.5	-0.3	-0.3	-0.2	X	-0.4	X	X	X	X	X

\* Center of gravity is located 50.6 inches rearward of vehicle front wheels. Column readings are left to right from front to rear on vehicle.

\*\* Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

\* Static crush means that vehicle structure is crushed.

- Static crush means that vehicle structure is bowed outward.

VEHICLE RIGHT SIDE EXTERIOR PROFILES AND STATIC CRUSH  
ZERO DISTANCE AT VEHICLE LONGITUDINAL CENTER OF GRAVITY\*

LOCATION	HEIGHT (IN)	72	60	48	36	24	12	0	12	24	36	48	60	72	84	96
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)																
Roof Height	60.0	X	X	X	X	X	X	23.5	23.5	X	X	X	X	X	X	X
Upper Door	39.6	X	X	18.2	17.7	17.3	17.1	16.9	16.8	16.8	16.8	16.7	16.5	16.6	16.8	16.8
Mid Door	27.6	X	16.7	X	X	15.9	15.8	15.8	X	X	15.8	X	X	15.8	16.0	16.1
Axle Height	14.5	X	X	X	X	18.1	18.0	18.1	18.2	X	18.7	X	X	X	X	X
POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)																
Roof Height	60.0	X	X	X	X	X	X	27.8	29.0	X	X	X	X	X	X	X
Upper Door	39.6	X	X	19.0	18.6	18.2	17.2	16.6	16.2	17.8	17.6	17.6	17.4	17.8	17.3	17.5
Mid Door	27.6	X	17.8	X	X	16.8	16.2	15.5	15.2	X	16.5	X	X	16.2	16.2	16.2
Axle Height	14.5	X	X	X	X	18.9	18.7	18.8	18.9	X	19.2	X	X	X	X	X
STATIC CRUSH (IN)																
Roof Height	60.0	X	X	X	X	X	X	4.3	5.5	X	X	X	X	X	X	X
Upper Door	39.6	X	X	0.8	0.9	0.9	0.1	-0.3	0.6	1.0	0.8	0.9	0.9	1.2	1.0	0.7
Mid Door	27.6	X	0.9	X	X	0.9	0.4	-0.3	-0.6	X	0.7	X	X	0.4	0.2	0.1
Axle Height	14.5	X	X	X	X	0.8	0.7	0.7	0.7	X	0.5	X	X	X	X	X

\* Center of gravity is located 50.6 inches rearward of vehicle front wheels. Column readings are left to right from front to rear on vehicle.

\*\* Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

\* Static crush means that vehicle structure is crushed.

- Static crush means that vehicle structure is bowed outward.

## TEST ANOMALIES

The rollover cart center of gravity triaxial accelerometers; VCGXG2, VCGYG2, and VCGZG2; recorded anomalous spikes from .1 to .2 seconds. These spikes were caused by pieces of the tow skate striking the rollover cart after the skate had struck the release block.

The vehicle/roll cart separation time upper switch data channel recorded intermittent anomalous spikes due to the data cable grounding to the rollover cart.

SECTION 3.0  
GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Nissan Motor Company, Ltd.

MAKE/MODEL: Nissan VIN: 1N6ND1150JC361211

BODY STYLE: Standard Pickup MODEL YEAR: 1988

NHTSA NO.: COLOR: Vail white

ENGINE DATA: TYPE: Inline CYLINDERS: 4 DISPLACEMENT: 2389cc

TRANSMISSION DATA: 4 SPEED, X MANUAL,      AUTOMATIC,      FWD, X RWD,      4WD

DATE VEHICLE RECEIVED: 5/27/88 ODOMETER READING: 91.8

DEALER'S NAME AND ADDRESS: Buckeye Nissan, Inc.  
1562 King Avenue  
Columbus, Ohio 43212

ACCESSORIES:

POWER STEERING	No	AUTOMATIC TRANSMISSION	No
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	No
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	No	AIR CONDITIONING	No
RADIO	No	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER	No		

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? No\*
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: New

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Nissan Motor Company, Ltd.

DATE OF MANUFACTURE: 2/88

GVWR: 4000 LBS

GAWR: FRONT 2200 LBS., REAR 2200 LBS.

\*The driver and front passenger seat side glazing was replaced with an experimental bilayer type designed to help prevent occupant ejection through side windows. The glazing inside surface was covered with a multilayer plastic sheet that extended beyond the window edges and was fastened to the door frame on the top and sides. During impact, the plastic acts as a stretchable barrier that prevents ejection while also limiting head and neck loading.

TEST VEHICLE INFORMATION CONT'D

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 25 psi; REAR 34 psi

RECOMMENDED TIRE SIZE: P185/75R14 LOAD RANGE X B.    C.    D

TIRES ON VEHICLE (MFR., LINE, SIZE): Goodyear Invicta GL P185/75R14MS

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

VEHICLE CAPACITY: TYPES OF SEATS: FRONT: Bench  
REAR: NA

TYPE OF FRONT SEAT BACKS: Non-adjustable

\*NUMBER OF OCCUPANTS    FRONT    REAR    TOTAL

\*CARGO LOAD                            LBS. \*TOTAL                    LBS.

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS):

RIGHT FRONT 751 lbs. RIGHT REAR 594 lbs.

LEFT FRONT 772 lbs. LEFT REAR 566 lbs.

TOTAL FRONT WEIGHT 1523 lbs. (56.8% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1160 lbs. (43.2% OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2683 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2683 LBS)

VCW = VEHICLE CAPACITY WEIGHT ( LBS)\*

DSC = DESIGNATED SEATING CAPACITY ( )\*

RCLW = 300 LBS\*

TARGET TEST WEIGHT = UDW + RCLW + (1 DUMMY X 167 LBS/DUMMY)

= 2683 + 300 + 167 LBS

TARGET TEST WEIGHT = 3150 LBS

\*FOR MULTI PURPOSE VEHICLES, TRUCKS, AND BUSES A RATED CARGO AND LUGGAGE WEIGHT OF 300 POUNDS WAS USED.

TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 302 LBS. CARGO

RIGHT FRONT	783 lbs.	RIGHT REAR	767 lbs.
LEFT FRONT	844 lbs.	LEFT REAR	758 lbs.
TOTAL FRONT WEIGHT	1627 lbs.	(51.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1525 lbs.	(48.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3152 lbs.	( 0.1% OVER/UNDER TARGET WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE BED AREA: 127 LBS.

COMPONENTS REMOVED TO MEET TARGET WEIGHT None

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	LF 28.8	;RF 28.6	;LR 30.3	;RR 30.1
PRE-TEST ATTITUDE:	LF 28.2	;RF 28.9	;LR 27.9	;RR 28.5
POST-TEST ATTITUDE:	LF 25.4	;RF 28.5	;LR 27.4	;RR 29.2

WHEELBASE: 104.5 INCHES

CG = 50.6 INCHES REARWARD OF FRONT WHEEL CENTERLINE

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST:	L 172.2	;C 174.5	;R 172.4
	POST-TEST:	L 170.2	;C 176.1	;R 171.8
	TOTAL CRUSH:	L 2.0	;C -1.6	;R 0.6

TEST CONDITIONS

TEST NUMBER: 880630

DATE OF TEST: 6/30/88

TIME OF TEST: 1528

WIND VELOCITY: 4-6 mph @ 10°N

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 73°F

TEMPERATURE IN OCCUPANT COMPARTMENT: 78°F

DRIVER DUMMY TEMPERATURE: 72°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3152	3150
VEHICLE ORIENTATION (deg.) YAW*	45	45
VEHICLE ORIENTATION (deg.) ROLL**	30	30
VEHICLE VELOCITY (mph)	30	30

*1/2*  
30

DUMMIES

	DRIVER	MIDDLE PASSENGER	RT. FRONT PASSENGER	LEFT REAR PASSENGER	RT. REAR PASSENGER
TYPE:					
SERIAL NO.:					
INSTRUMENTATION:					
HEAD ACCEL.:					
NECK L.C.'C.:					
CHEST ACCEL.:					
PELVIS ACCEL.:					
CHEST DISPLACEMENT					
POTENTIOMETER:					
RESTRAINT SYSTEM:					

REMARKS:

\*AS MEASURED CLOCKWISE FROM THE DIRECTON OF TRAVEL.  
\*\*AS MEASURED FROM THE HORIZONTAL.

TEST NUMBER 880630

VEHICLE DATA SUMMARY

No.	LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
		MAX	MSEC	MAX	MSEC
1	SHOULDER BELT DISPLACEMENT (in) DRIVER	1.9	3.3	0.1	0.1
2	CENTER OF GRAVITY ACCELERATION (g)				
	LONGITUDINAL	3.3	1.1	5.5	1.1
	LATERAL	10.9	2.6	8.7	1.1
	VERTICAL	11.4	2.6	11.5	1.1
	RESULTANT	14.4	2.6		
3	CENTER OF GRAVITY ANGULAR VELOCITY				
	ROLL (X-AXIS)	16.5	0.4	276.1	2.8
	PITCH (Y-AXIS)	139.8	1.3	65.5	1.7
	YAW (Z-AXIS)	43.0	1.3	120.1	1.2
4	LEFT FRONT SUSPENSION DISPLACEMENT (in) VERTICAL	0.8	3.9	7.0	3.1
	DISPLACEMENT VERTICAL	0.4	3.1	5.3	2.6
6	LEFT REAR SUSPENSION DISPLACEMENT (in) VERTICAL	0.1	0.6	6.1	3.1
7	RIGHT REAR SUSPENSION DISPLACEMENT (in) VERTICAL	0.4	0.6	6.2	2.7

POSITIVE DIRECTION

NEGATIVE DIRECTION

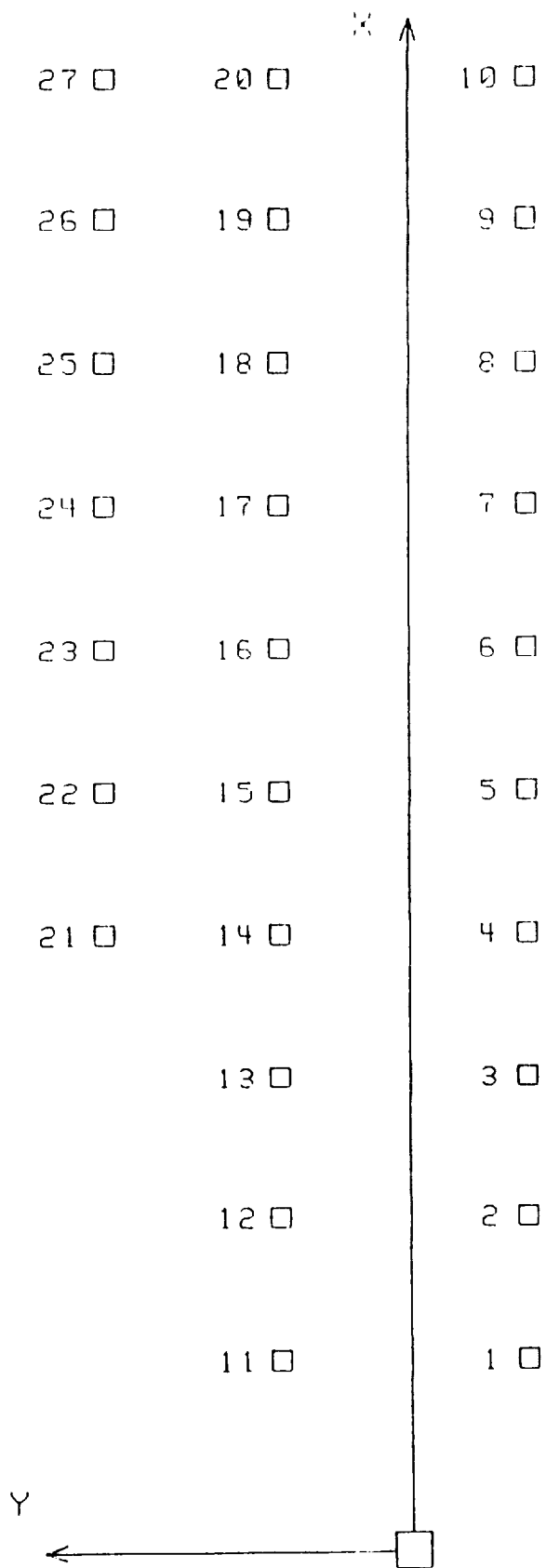
LONGITUDINAL: FORWARD  
 LATERAL: LEFTWARD  
 VERTICAL: UPWARD  
 ROLL: TO RIGHT  
 PITCH: NOSE DOWNWARD  
 YAW: COUNTER CLOCKWISE  
 DISPLACEMENT: OUTWARD

REARWARD  
 RIGHTWARD  
 DOWNWARD  
 TO LEFT  
 NOSE UPWARD  
 CLOCKWISE  
 INWARD

IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: 1988 NISSAN STANDARD REGULAR BED PICKUP TEST NUMBER: 880630

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	174.5	176.1	-1.6
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	157.8	156.0	1.8
X3	REAR SURFACE OF VEHICLE TO FIREWALL	136.8	136.4	0.4
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	127.8	126.9	0.9
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	127.8	127.2	0.6
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	126.2	126.0	0.2
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	126.4	126.1	0.3
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	82.5	81.6	0.9
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	82.5	81.9	0.6
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	81.6	81.4	0.2
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	81.5	81.5	0.0
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	125.4	125.0	0.4
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	125.1	125.6	-0.5
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	137.4	136.9	0.5
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	137.2	137.4	-0.2
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	109.6	109.2	0.4
X17	CENTER OF STEERING COLUMN TO "A" POST	12.7	14.5	-1.8
X18	CENTER OF STEERING COLUMN TO HEADLINING	17.8	15.3	2.5
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	172.4	171.8	0.6
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	172.2	170.2	2.0
X21	LENGTH OF ENGINE BLOCK	19.5	19.5	0.0



STADIA POLE LAYOUT AND NUMBERING SYSTEM

STADIA POLE LOCATIONS

<u>POLE NO.</u>	<u>X DISTANCE, FT. *</u>	<u>Y DISTANCE, FT. *</u>
1	34.0	-6.0
2	42.0	-6.0
3	50.0	-6.0
4	58.0	-6.0
5	66.0	-6.0
6	74.0	-6.0
7	82.0	-6.0
8	90.0	-6.0
9	98.0	-6.0
10	106.0	-6.0
11	34.0	8.0
12	42.0	8.0
13	50.0	8.0
14	58.0	8.0
15	66.0	8.0
16	74.0	8.0
17	82.0	8.0
18	90.0	8.0
19	98.0	8.0
20	106.0	8.0
21	58.0	18.0
22	66.0	18.0
23	74.0	18.0
24	82.0	18.0
25	90.0	18.0
26	98.0	18.0
27	106.0	18.0

\*REFERENCE: \*X: FORWARD FROM RELEASE BLOCK

\*Y: LEFTWARD FROM CENTER RELEASE BLOCK

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right panning	Kodak	25	24	Real Time Documentation
2	Right wide	Photosonic 1B	25	500	Vehicle Kinematics
3	Right angle	Photosonic 1B	25	495	Vehicle Kinematics
4	Front wide	Photosonic 1B	25	495	Vehicle Kinematics
5	Onboard - floor	Photosonic 1B	8	500	Dummy Kinematics
6	Onboard - upper	Photosonic 1B	8	498	Dummy Kinematics
7	Documentary	Beaulieu	16-105	24	Pre-test & Post-test Documentation

HIGH SPEED CAMERA INFORMATION

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CAMERA NO.	X* (ft.)	Y* (ft.)	Z* (ft.)
2	54.8	-297.0	3.6
3	181.5	-96.3	5.1
4	196.2	2.9	2.6

---

\*Reference:

- \*X = Forward from release block
- \*Y = Leftward from center release block
- \*Z = Upward from ground level

SECTION 4.  
OCCUPANT INFORMATION

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #192	PASSENGER #
Head	<u>Left side headliner and roof</u>	<u>NA</u>
Chest	<u>Left door panel</u>	<u>NA</u>
Abdomen	<u>None</u>	<u>NA</u>
Left knee	<u>None</u>	<u>NA</u>
Right knee	<u>None</u>	<u>NA</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Easy</u>	<u>Easy</u>
Rear	<u>NA</u>	<u>NA</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>None</u>	<u>None</u>
Rear	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

Rear window glass was shattered upon impact. Left door glass, right door glass, and windshield were cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

Entire rear glass moulding separated from vehicle upon impact. Top of windshield moulding separated from vehicle upon impact.

## DUMMY KINEMATIC SUMMARY

### Driver Dummy

Upon the vehicle's impact with the ground, the driver dummy's head struck the left side headliner and the roof and the dummy's left side of the upper torso impacted the left door panel. As the vehicle rolled onto its roof, the dummy's head remained in contact with the roof and the dummy's upper torso remained near the left door. As the vehicle continued to roll, the dummy rebounded rightward in the driver's seat and down into the seat as the vehicle rolled onto its wheels. The dummy's upper torso then rotated left and again contacted the left door panel. As the vehicle again rolled onto its left side, the dummy's head contacted the roof and the dummy translated left impacting its head against the left side headliner and roof. The vehicle came to rest on its top with the driver dummy's head resting against the roof and the dummy's torso restrained by the three-point unbelt's lap and shoulder belts.

DUMMY DATA SUMMARY

TEST NUMBER 880630

DRIVER DUMMY

SN: 192

	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
<b>HEAD ACCELERATION (g)</b>				
LONGITUDINAL	6.7	1.7	15.6	3.7
LATERAL	16.1	2.7	77.2	3.7
VERTICAL	5.6	2.7	21.0	1.6
RESULTANT	78.8	3.7		
HIC	228.9 FROM 3726 TO 3732 MSEC			
<b>NECK FORCE (lbs)</b>				
LONGITUDINAL	63.0	3.2	25.4	1.3
LATERAL	134.8	3.2	116.2	3.7
VERTICAL	87.8	1.1	243.9	1.1
<b>NECK MOMENT (in-lbs)</b>				
ABOUT LONGITUD.	325.6	1.2	248.4	3.2
ABOUT LATERAL	260.9	3.2	229.0	1.7
ABOUT VERTICAL	168.4	3.2	91.0	2.7
<b>CHEST ACCELERATION (g)</b>				
LONGITUDINAL	8.2	3.7	8.3	3.2
LATERAL	3.9	2.8	27.9	3.7
VERTICAL	14.4	3.2	9.7	1.1
RESULTANT	29.0	3.7		
3 MSEC CLIP	26.0 FROM 3729 TO 3732 MSEC			
<b>CHEST DISPLACEMENT (in)</b>				
LONGITUDINAL	0.1	1.2	0.5	3.2
<b>PELVIS ACCELERATION (g)</b>				
LONGITUDINAL	7.3	3.7	6.4	3.2
LATERAL	7.2	3.2	13.7	3.2
VERTICAL	14.5	3.2	9.5	1.1
RESULTANT	20.0	3.2		

POSITIVE DIRECTION

LONGITUDINAL: FORWARD  
 LATERAL: LEFTWARD  
 VERTICAL: UPWARD  
 DISPLACEMENT: OUTWARD

NEGATIVE DIRECTION

LONGITUDINAL: REARWARD  
 LATERAL: RIGHTWARD  
 VERTICAL: DOWNWARD  
 DISPLACEMENT: INWARD

SEE APPENDIX D FOR NECK LOAD CELL POLARITIES

## DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle and dummy were left inside the temperature controlled building eight hours prior to the time the dummy was loaded into the vehicle. After the vehicle had been positioned on the rollover device it was towed outside for launch.

One Part 572E dummy was instrumented for this test. The dummy instrumentation consisted of triaxial accelerometers in the head, chest, and pelvis, a displacement potentiometer in the chest, six (6) load cells in the neck and one displacement potentiometer attached to the driver's shoulder belt. Prior to seating the dummy, the driver's seat was positioned in the mid-adjustment notch of the seat track. The seat back angle was fixed. The dummy was positioned in the seat using NHTSA's Notice #45 seating procedure. The H-point location of seat was obtained by using the SAE J826 H-point machine as specified in the Notice #45. The driver dummy was restrained with a three-point unbelt.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

MFR./MAKE/MODEL: Nissan Pickup

SEAT TYPE: X Bench  
 \_\_\_\_\_ Bucket  
 \_\_\_\_\_ Split bench

ADJUSTER TYPE: X Manual  
 \_\_\_\_\_ Power

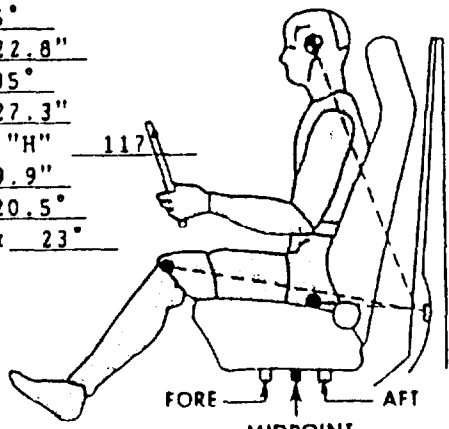
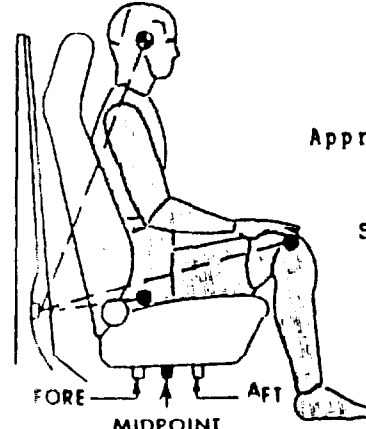
TECHNICIANS:

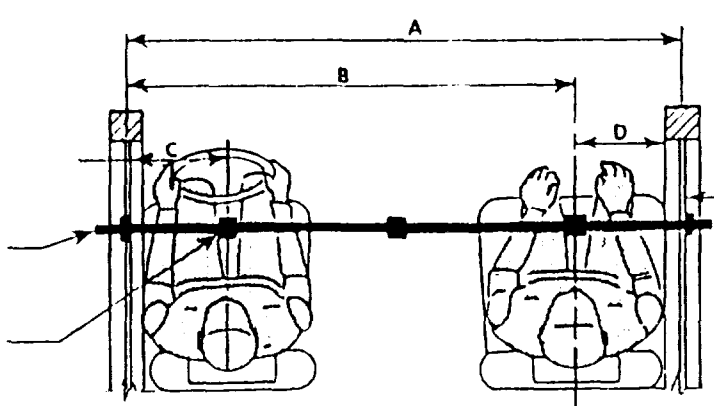
BUCKET SEAT BACK TYPE: \_\_\_\_\_ Fixed  
 \_\_\_\_\_ X Adjustable reclining

1. B. Crabtree
2. S. Erickson
3. R. Cribley
4. \_\_\_\_\_

POSITIONING DATE: 6/30/88

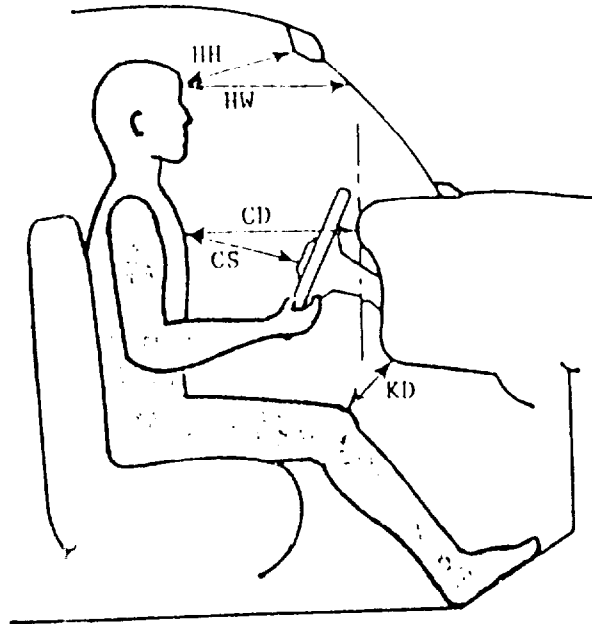
AMBIENT TEMP. 71° F TIME: 1120

<p><b>DRIVER DUMMY #192</b></p> <p>Head <u>15°</u>              Target <u>22.8"</u>              Knee <u>95°</u>              Joint <u>27.3"</u>              Approx. "H" <u>117"</u>              Point <u>9.9"</u>              Pelvis <u>20.5°</u>              Seatback <u>23°</u></p> 	<p><b>PASSENGER DUMMY #NA</b></p> <p>Head _____              Target _____              Knee _____              Joint _____              Approx. "H" _____              Point _____              Pelvis _____              Seatback _____</p> 
---	--

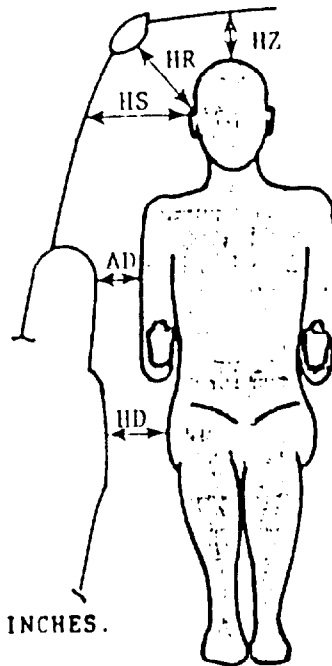
<p>A = <u>55.1"</u>              B = <u>NA</u>              C = <u>13.1"</u>              D = <u>NA</u></p>		<p>DOOR 10.8"              GLASS              HEIGHT</p>	
<p>LEFT FRONT DOOR</p>	<p>DRIVER DUMMY #192</p>	<p>PASSENGER DUMMY</p>	<p>RIGHT FRONT DOOR</p>

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER	PASSENGER
	192	NA
HH	16.3	
HW	21.9	
CD	23.2	
CS	14.1	
KDL	5.4	
KDR	5.4	



	DRIVER	PASSENGER
	192	NA
HR	8.2	
HS	9.8	
AD	4.0	
HD	7.4	
HZ	4.2	



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

APPENDIX A  
PHOTOGRAPHS

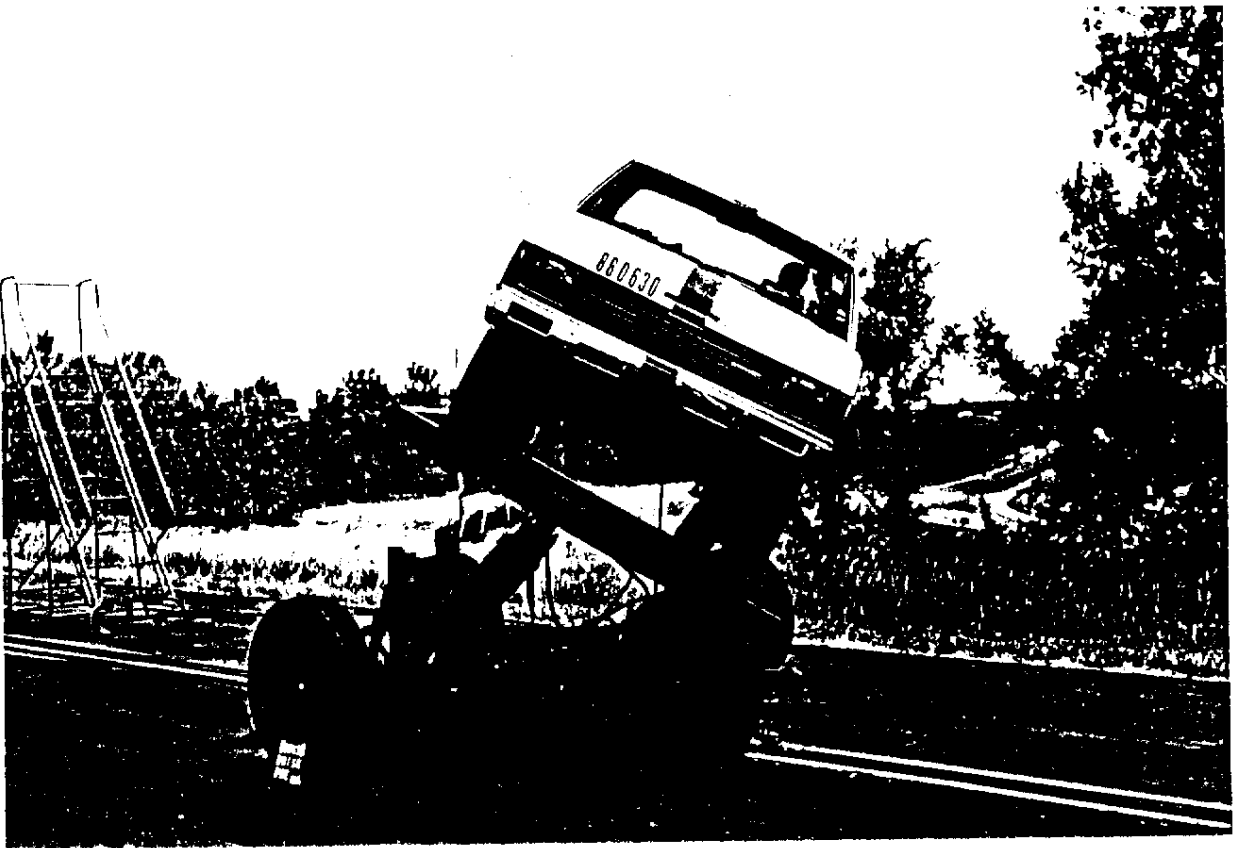


Figure A-1. PRE-TEST OVERALL FRONT VIEW

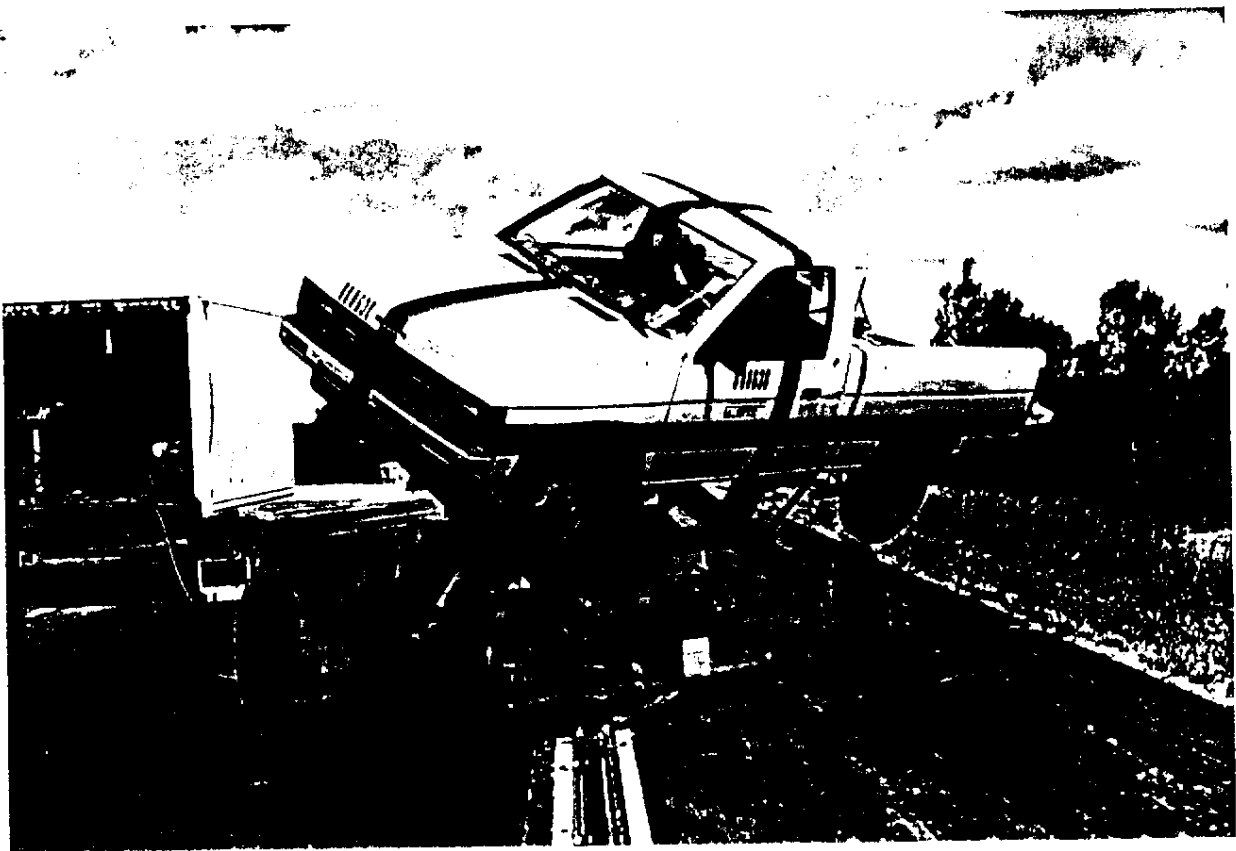


Figure A-2. PRE-TEST OVERALL LEFT SIDE VIEW

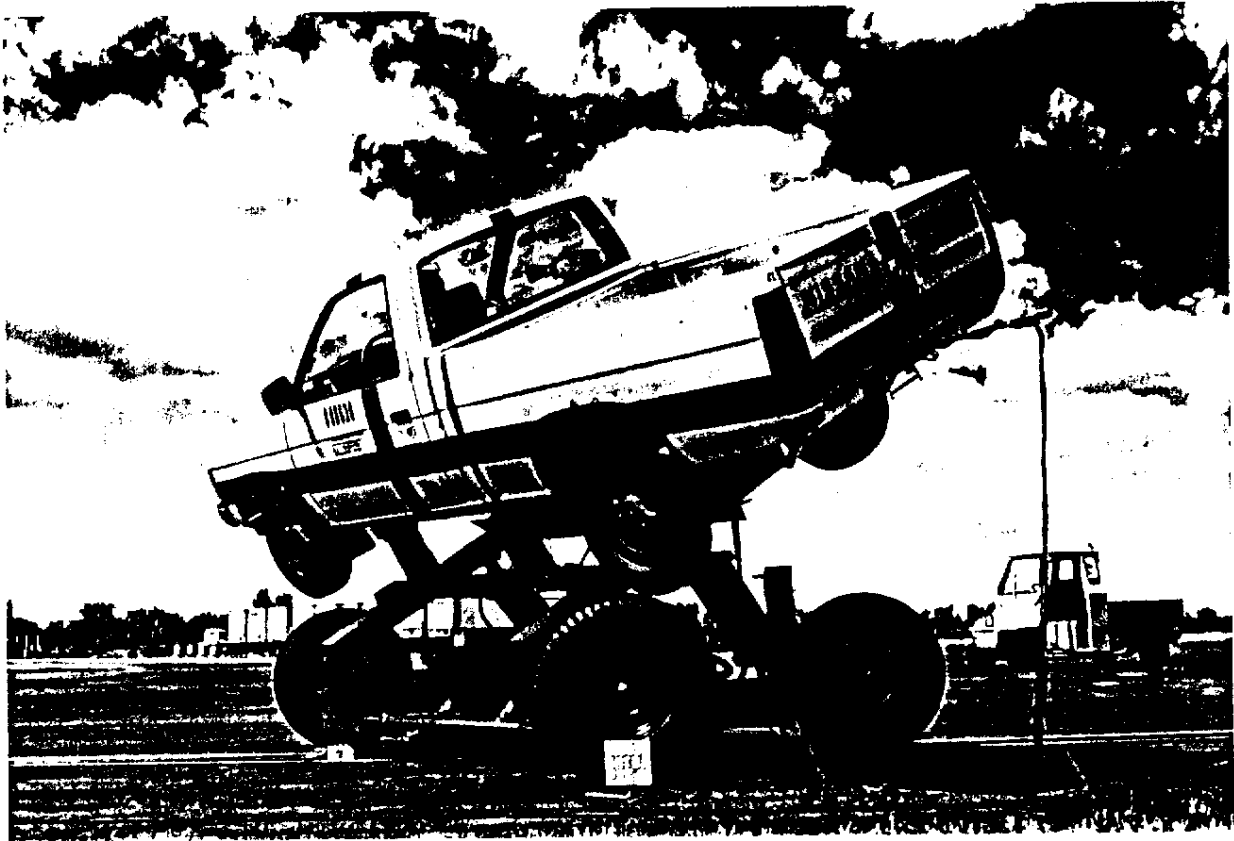


Figure A-3. PRE-TEST OVERALL REAR VIEW

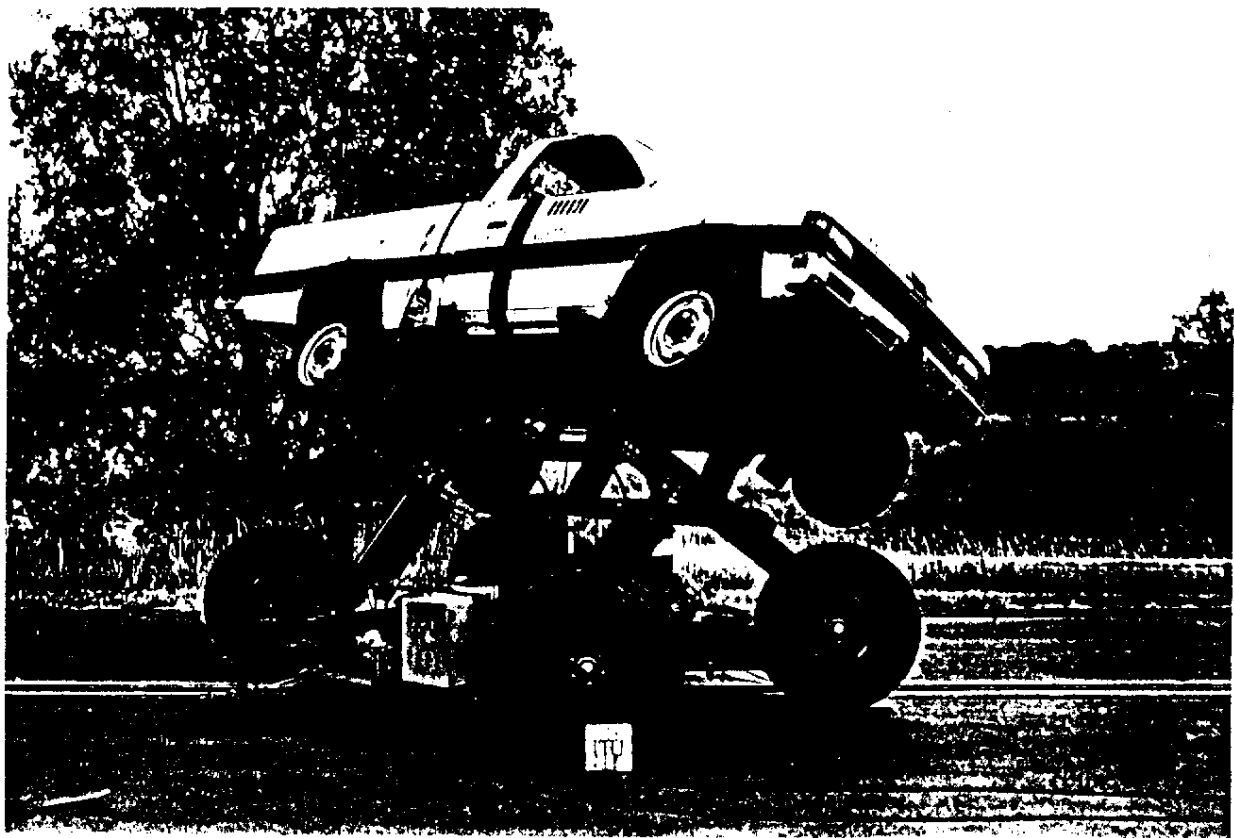


Figure A-4. PRE-TEST OVERALL RIGHT SIDE VIEW



Figure A-5. PRE-TEST CLOSE-UP FRONT VIEW



Figure A-6. PRE-TEST DRIVER DUMMY - VIEW 1



Figure A-7. PRE-TEST DRIVER DUMMY - VIEW 2

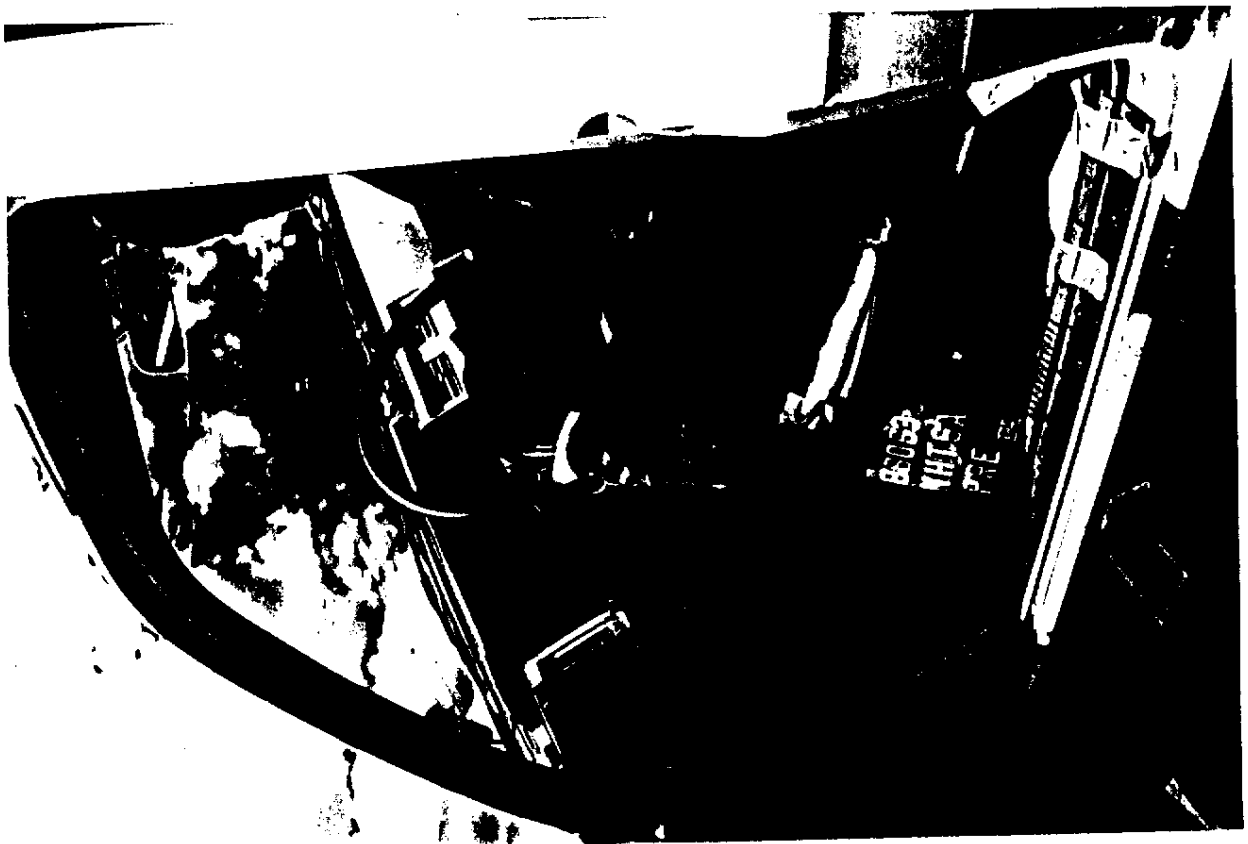


Figure A-8. PRE-TEST DRIVER DUMMY - VIEW 3



Figure A-9. PRE-TEST DRIVER DUMMY - VIEW 4

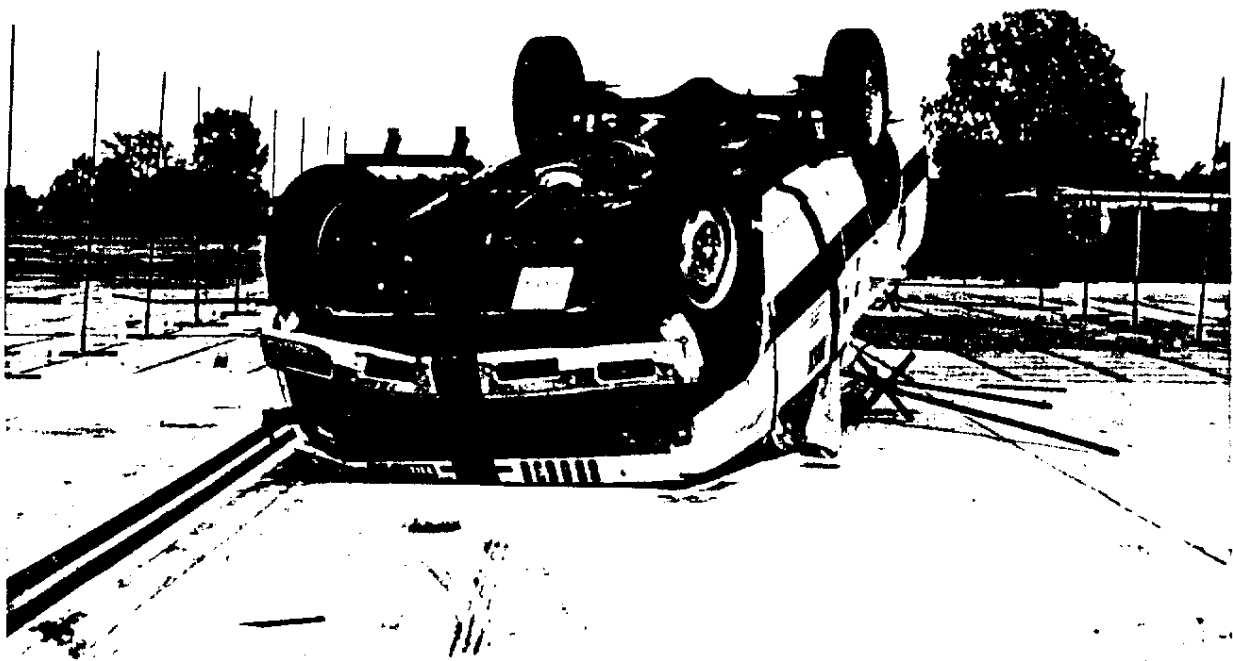


Figure A-10. POST-TEST OVERALL, FRONT - VIEW 1

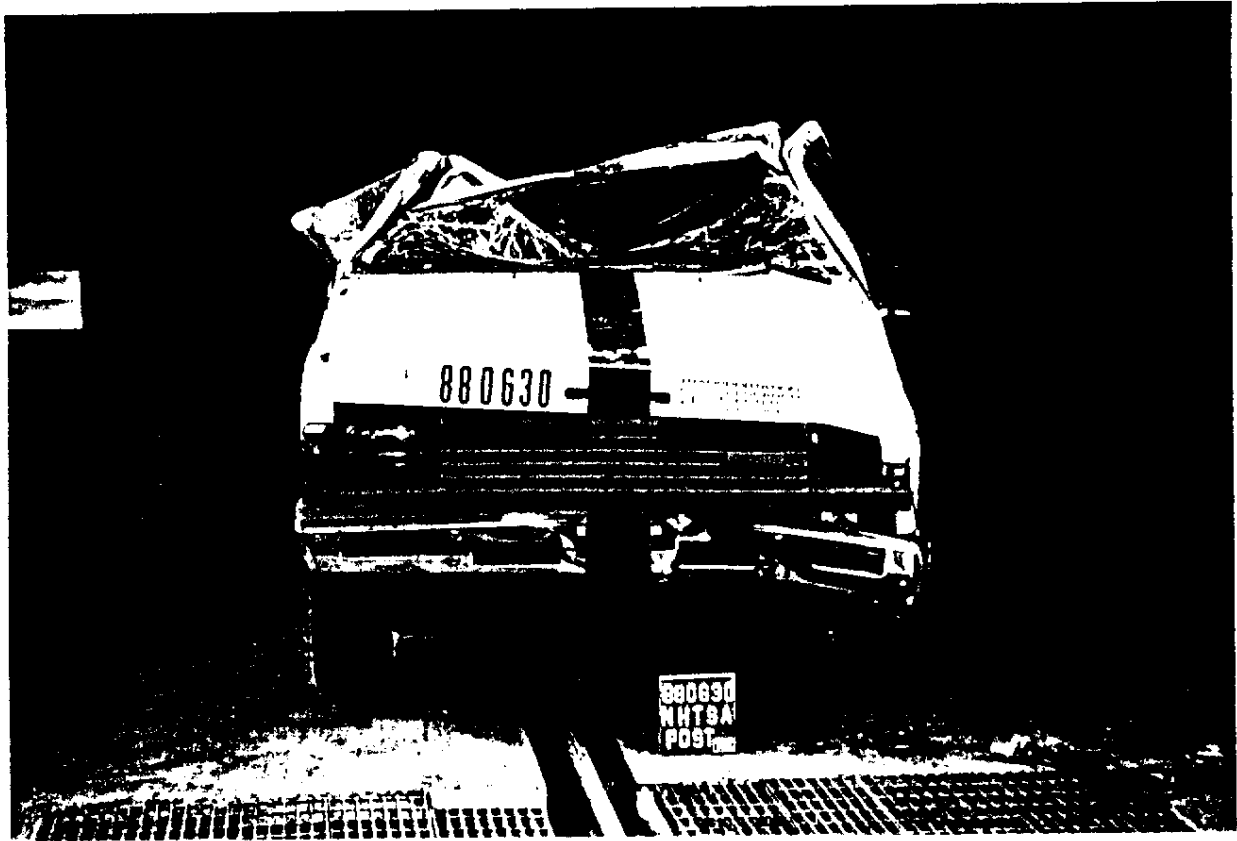


Figure A-11. POST-TEST OVERALL FRONT - VIEW 2

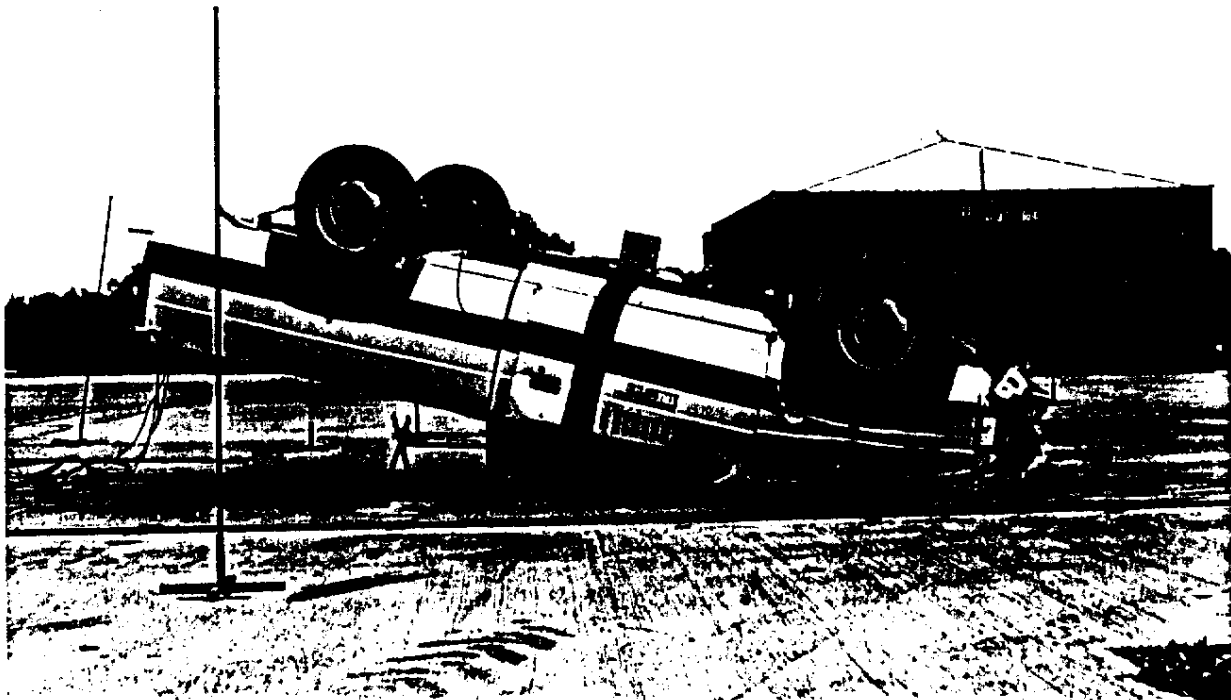


Figure A-12. POST-TEST OVERALL LEFT SIDE - VIEW 1

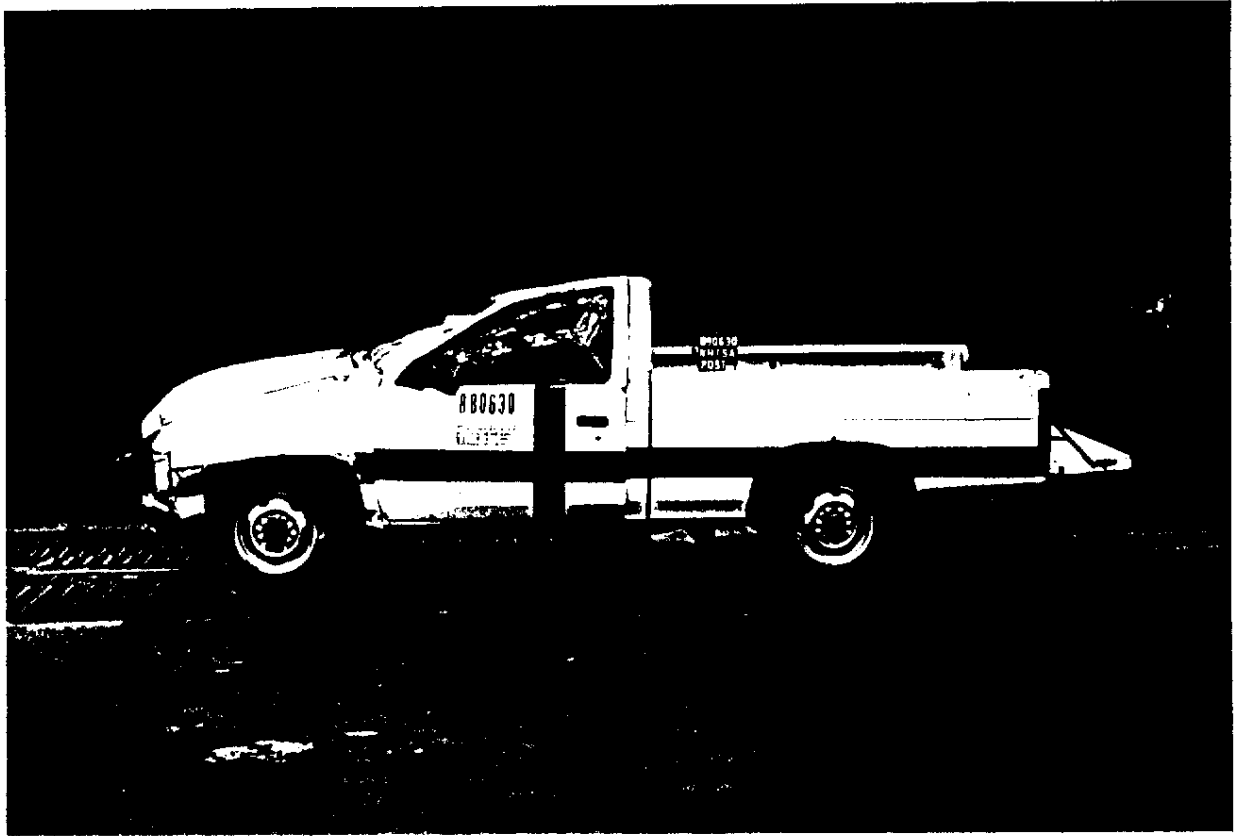


Figure A-13. POST-TEST OVERALL LEFT SIDE - VIEW 2

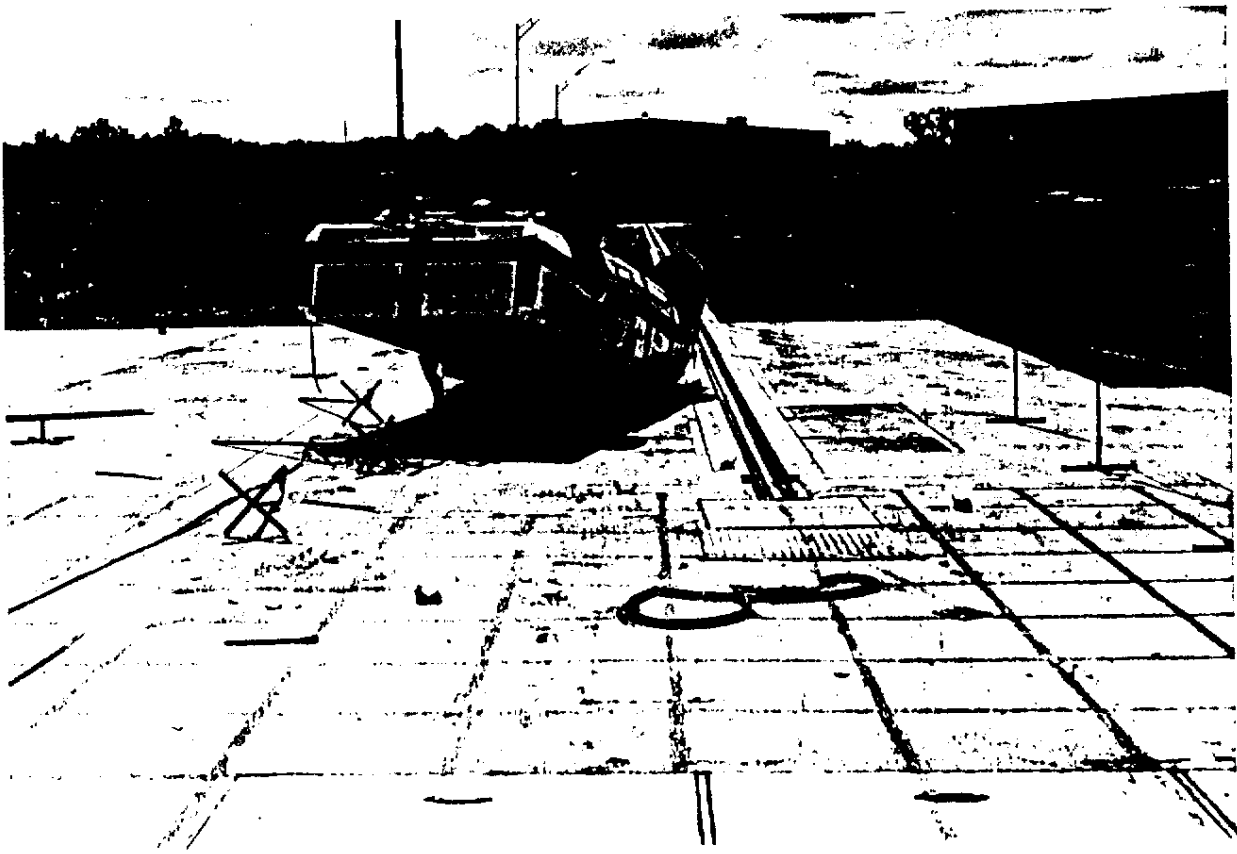


Figure A-14. POST TEST OVERALL REAR - VIEW 1

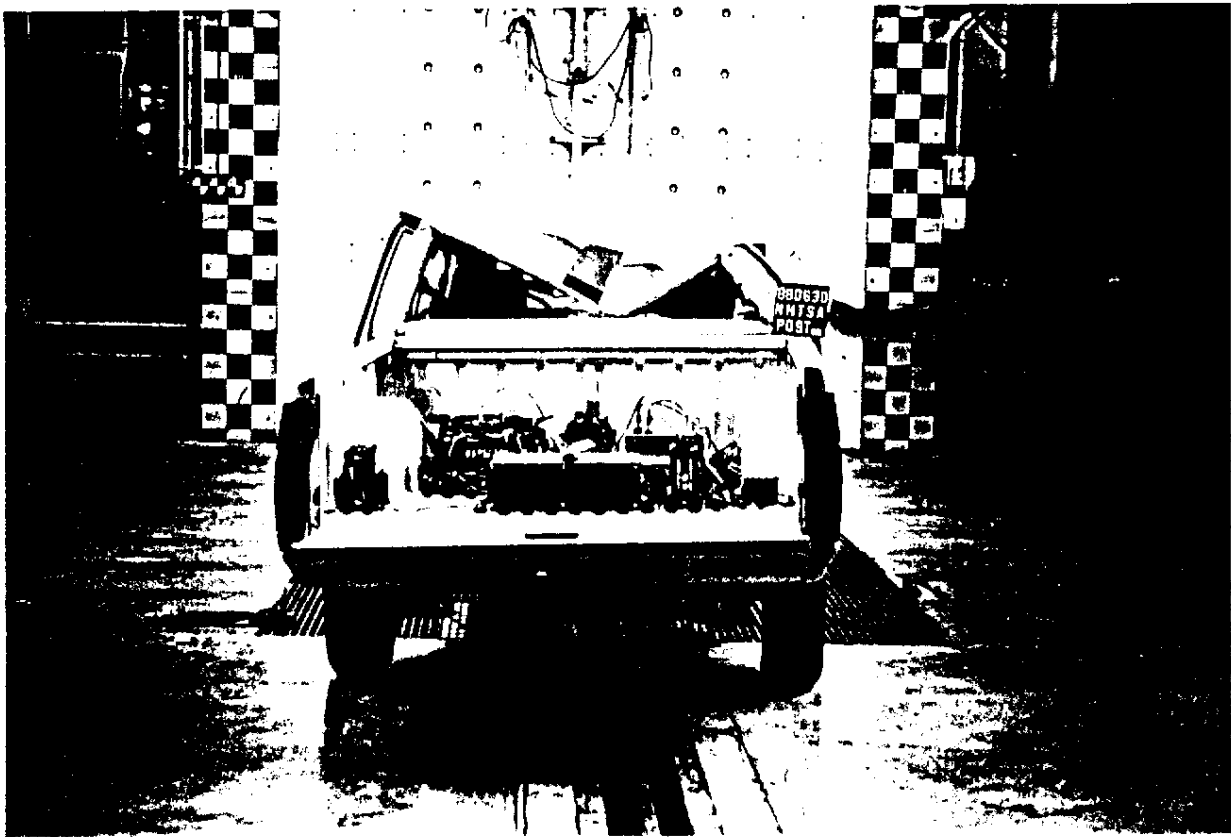


Figure A-15. POST TEST OVERALL REAR - VIEW 2



Figure A-16. POST TEST CLOSE UP REAR - VIEW 1

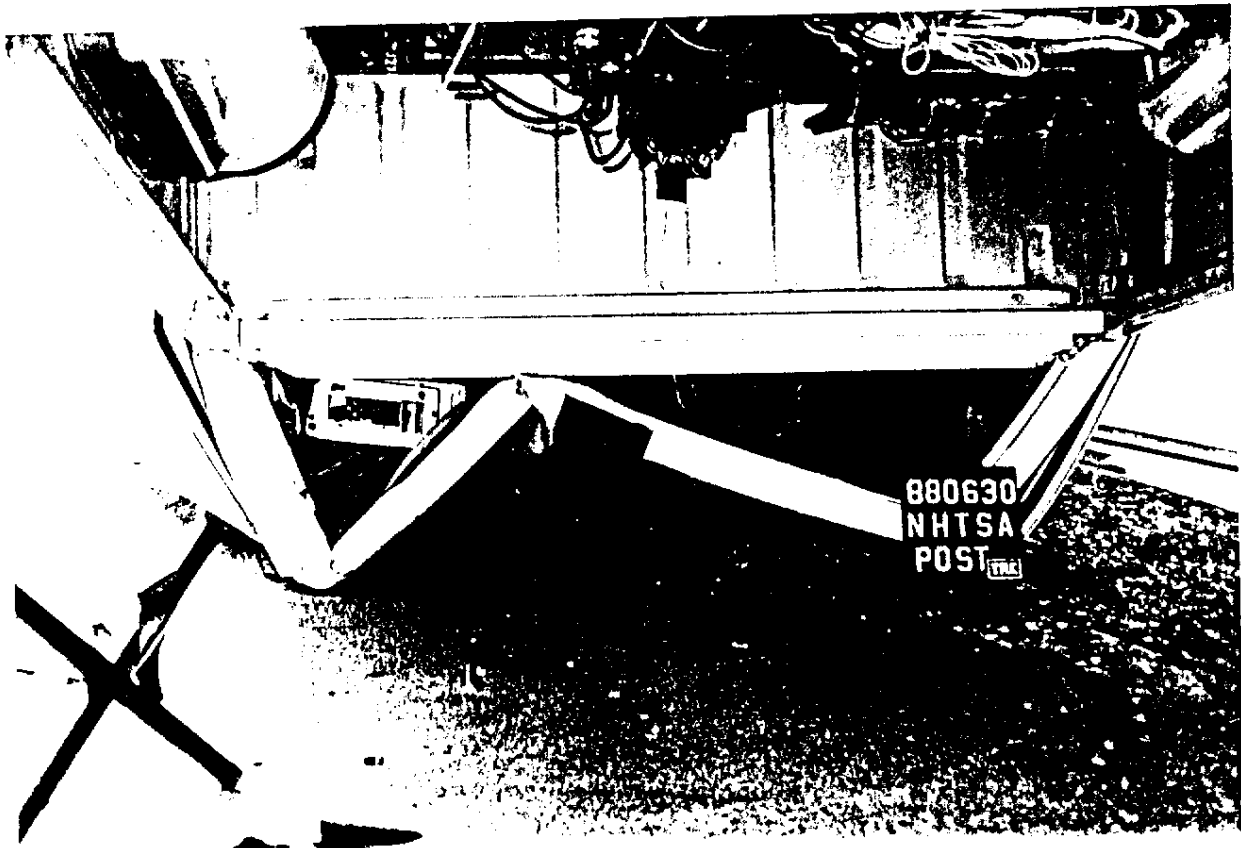


Figure A-17. POST-TEST CLOSE-UP REAR - VIEW 2

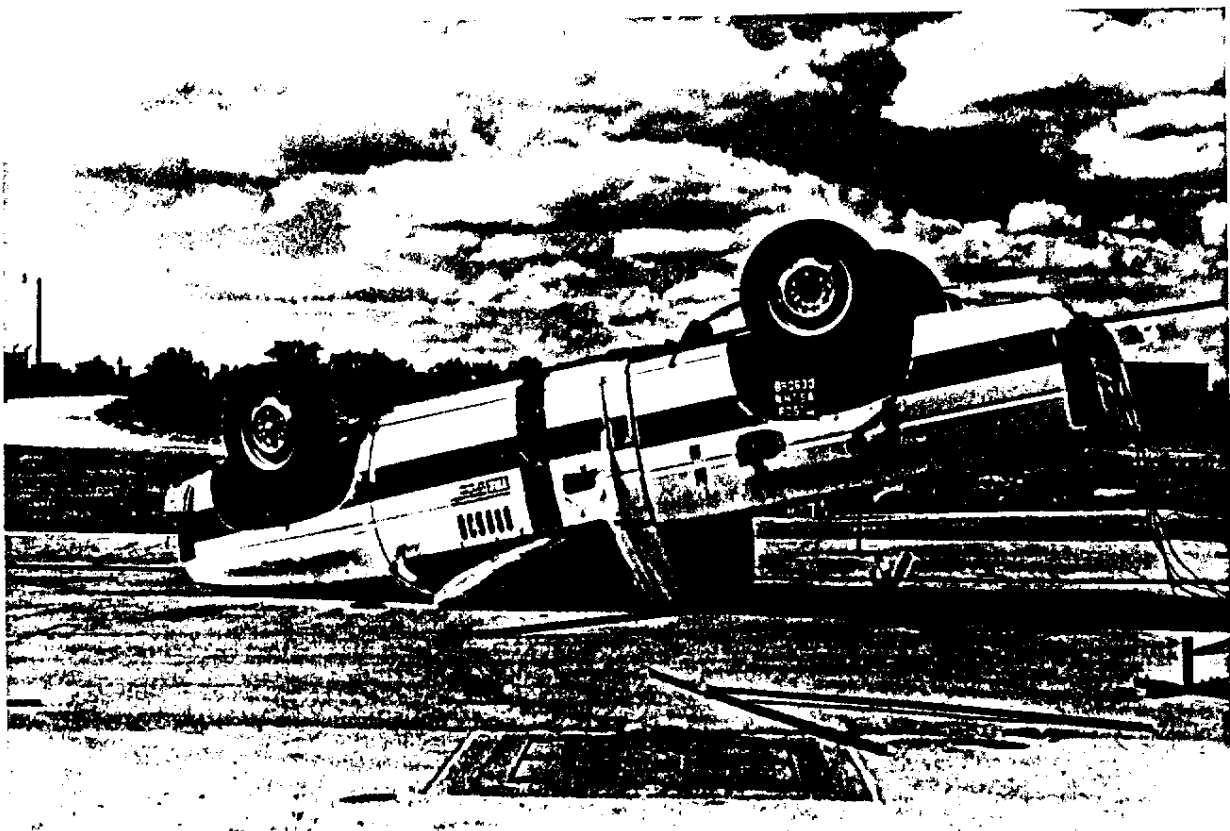


Figure A-18. POST-TEST OVERALL RIGHT SIDE - VIEW 1

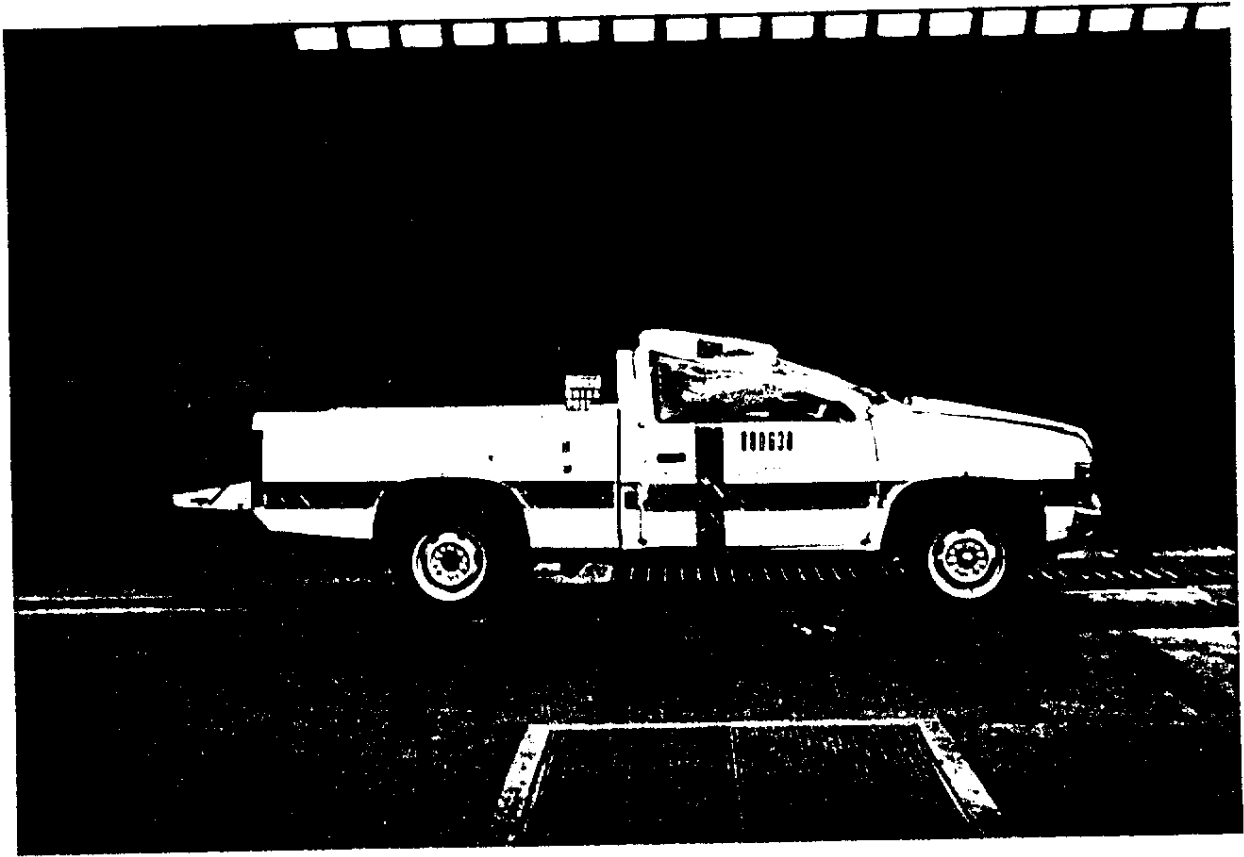


Figure A-19. POST-TEST OVERALL RIGHT SIDE - VIEW 2



Figure A-20. POST-TEST DRIVER DUMMY - VIEW 1



Figure A-21. POST-TEST DRIVER DUMMY - VIEW 2



Figure A-22. POST-TEST DRIVER DUMMY CLOSE-UP - VIEW 1



Figure A-23. POST-TEST DRIVER DUMMY CLOSE-UP - VIEW 2

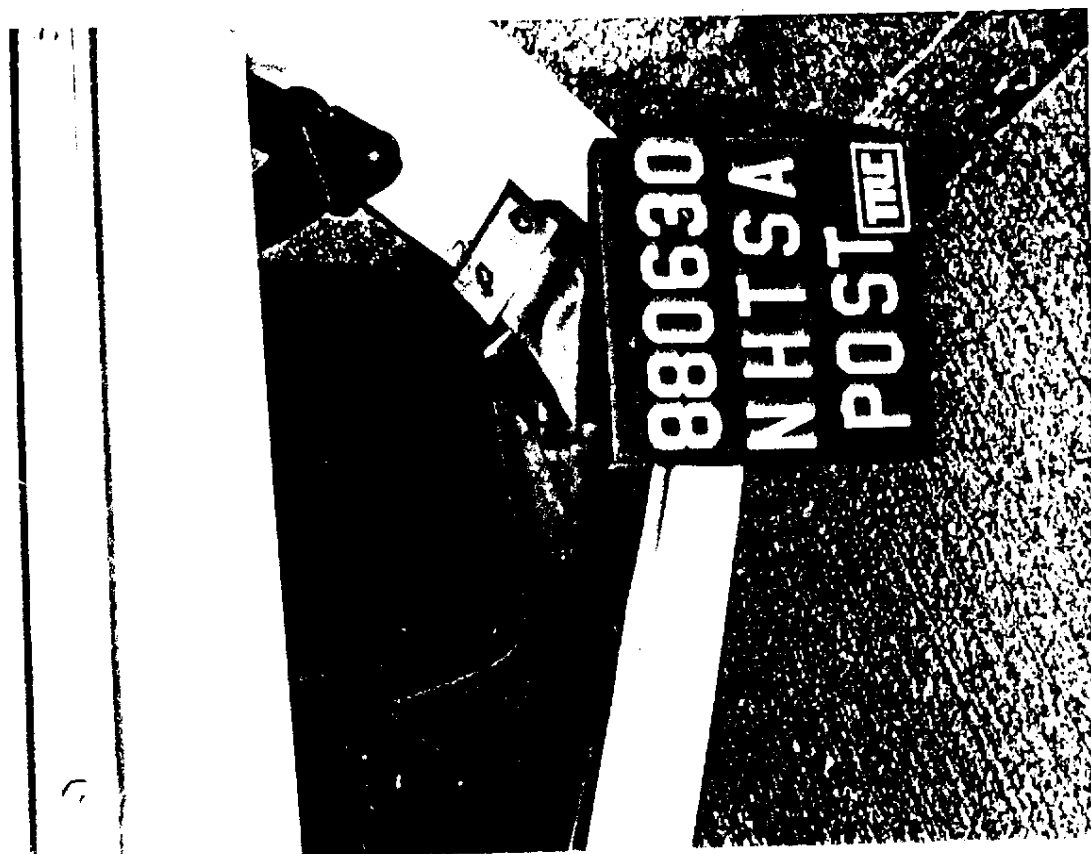


Figure A-24. POST TEST DRIVER DUMMY CLOSE-UP - VIEW 3

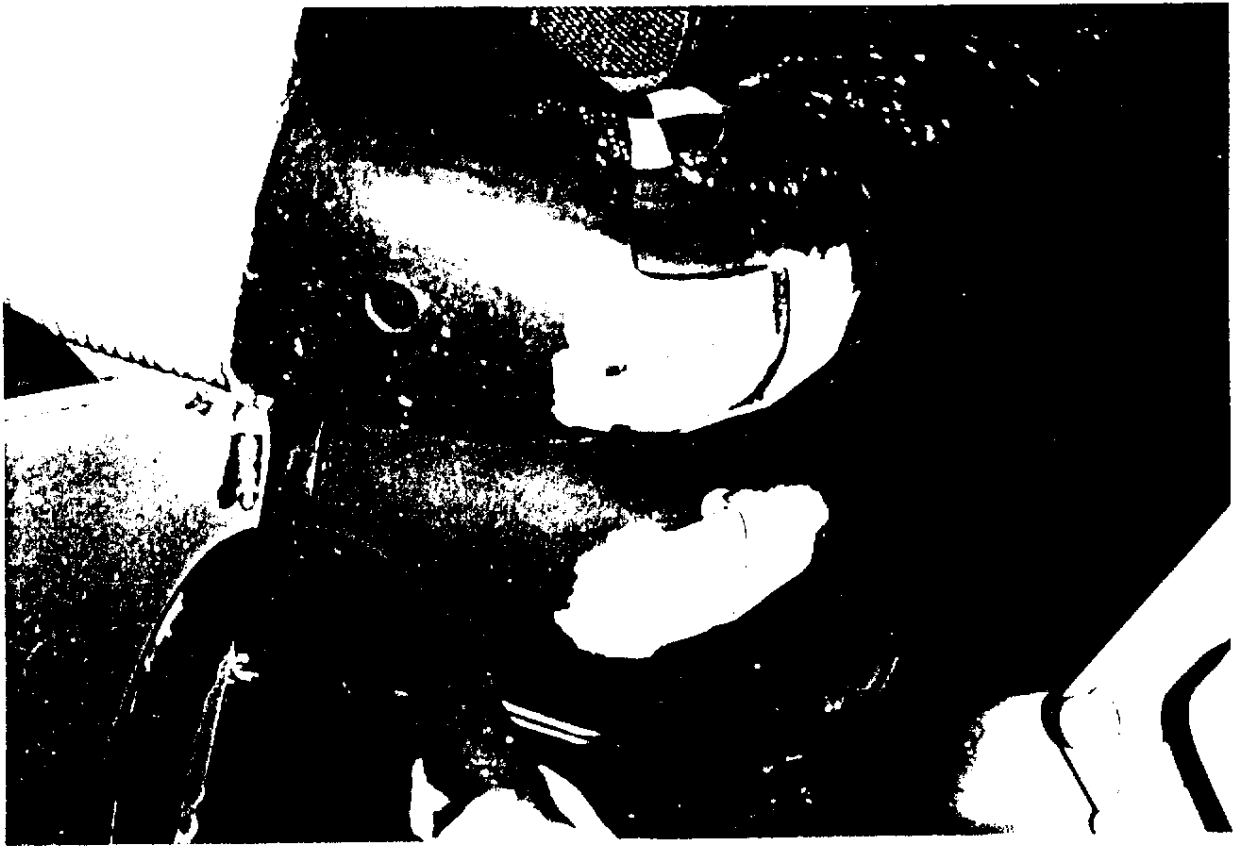


Figure A-25. POST-TEST DRIVER DUMMY CLOSE-UP - VIEW 4



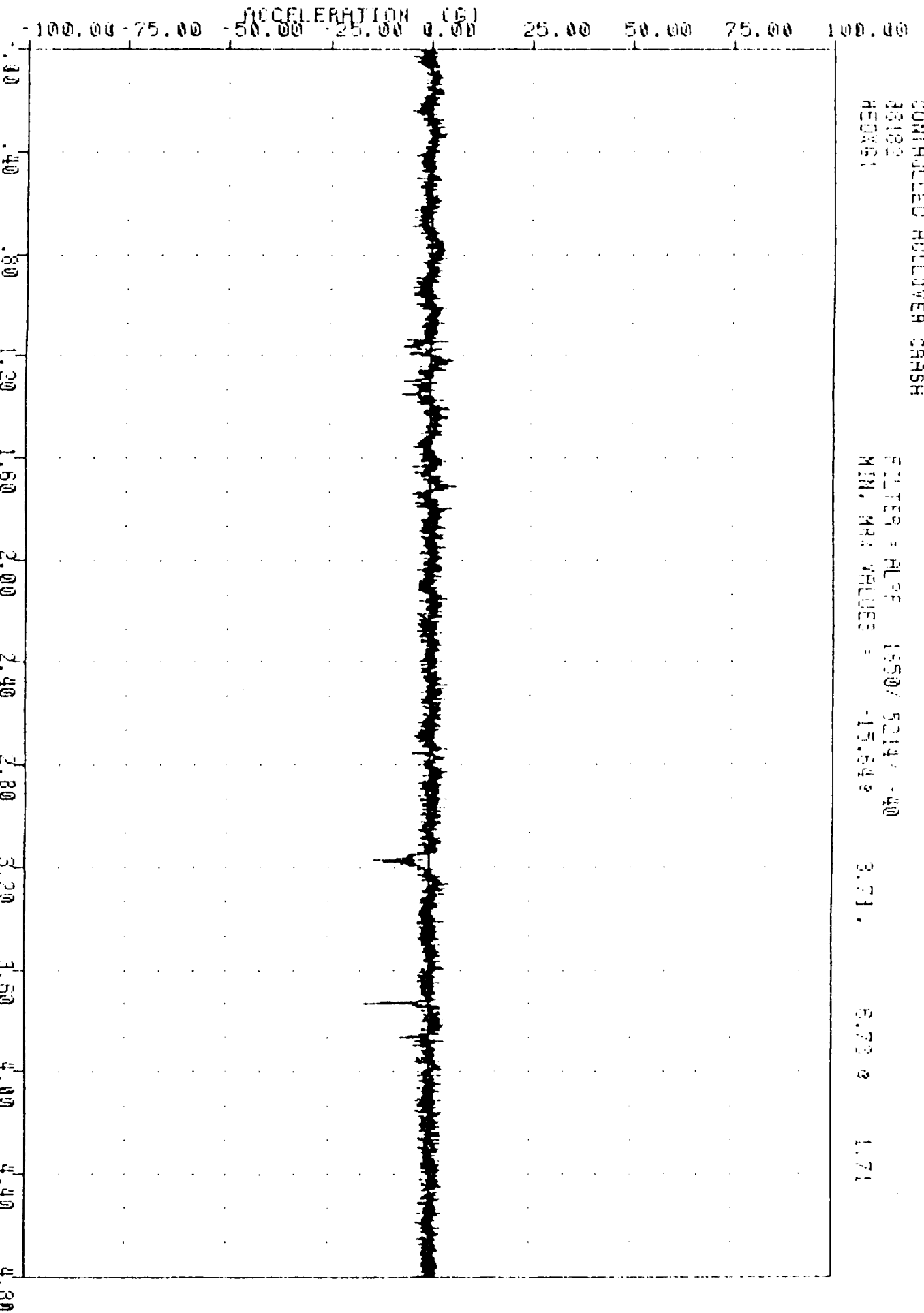
Figure A 26. POST-TEST LEFT FRONT DOOR VIEW

APPENDIX B  
DATA PLOT PRESENTATION

AL  
CONTROLLED FOLLOWER CRASH  
83182  
HEAD01

FILTER = ALPF 1650/5214/40  
MIN, MAX VALUES = -15.649

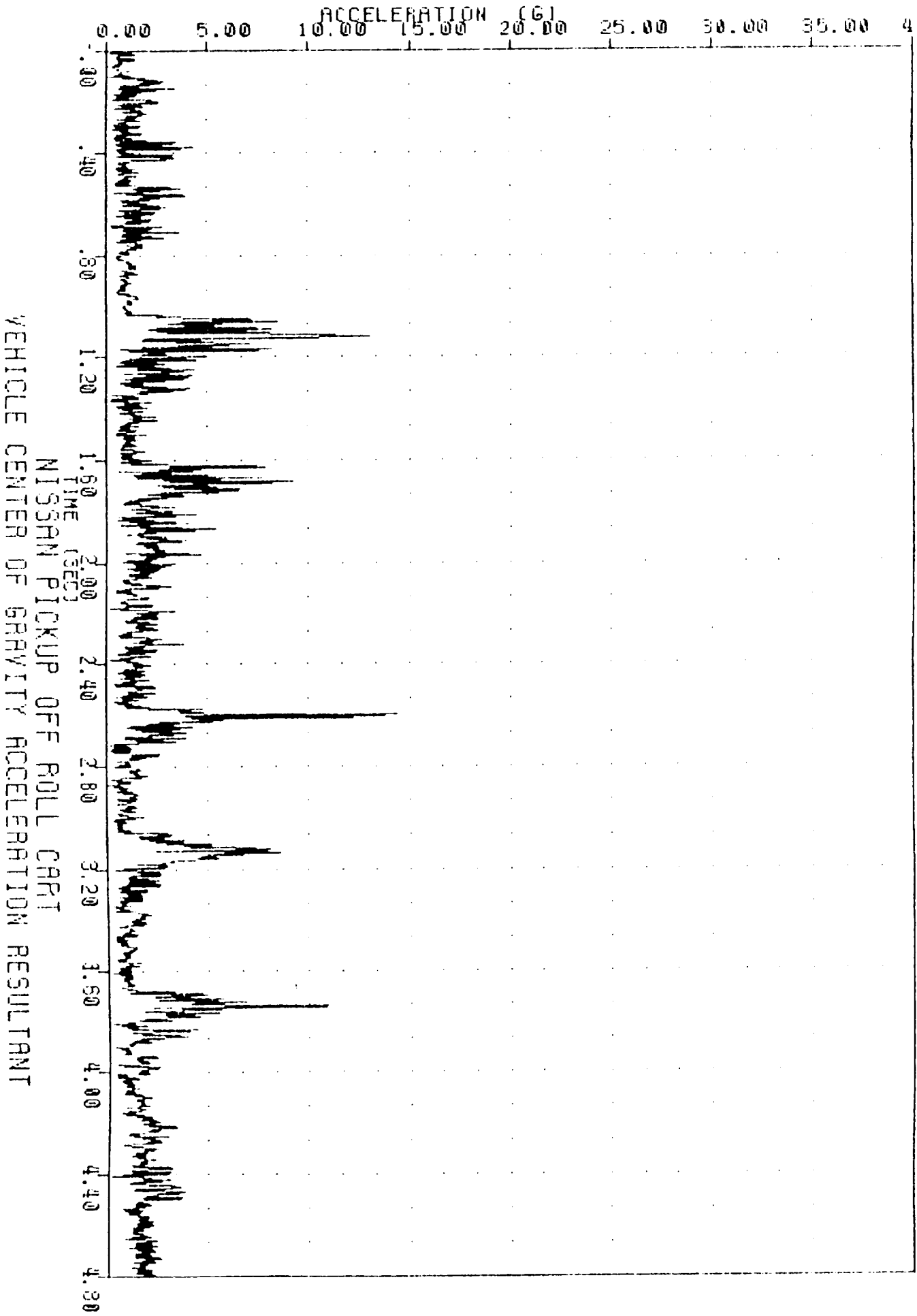
3.71 3.72 1.71



MISSAM PICKUP OFF ROLL CART  
DRIVER HEAD X AXIS ACCELERATION

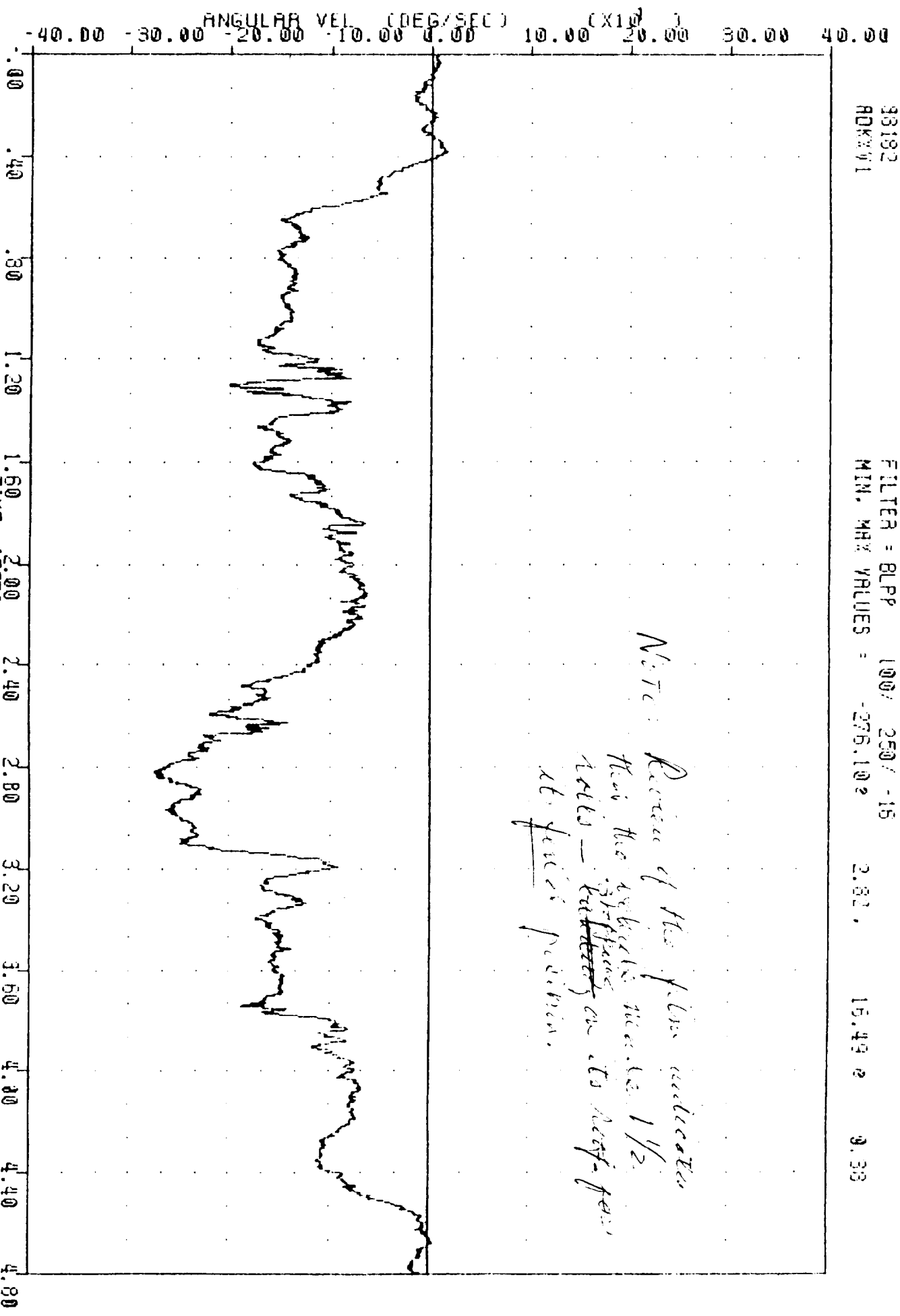
CONTROLLED FOLLOWER CRASH  
88132  
NCSB61

FILTER = 8LSP 100/ 250/ -15  
MIN, MAX VALUES = 0.112 0.13, 14.44 2.50



IL  
 CONTROLLED ROLL OVER CRASH  
 98182  
 ADKX01

380630  
 FILTER = BLPP 100/ 250/ -15  
 MIN. MAX VALUES = -276.10° 2.82 15.49° 9.38

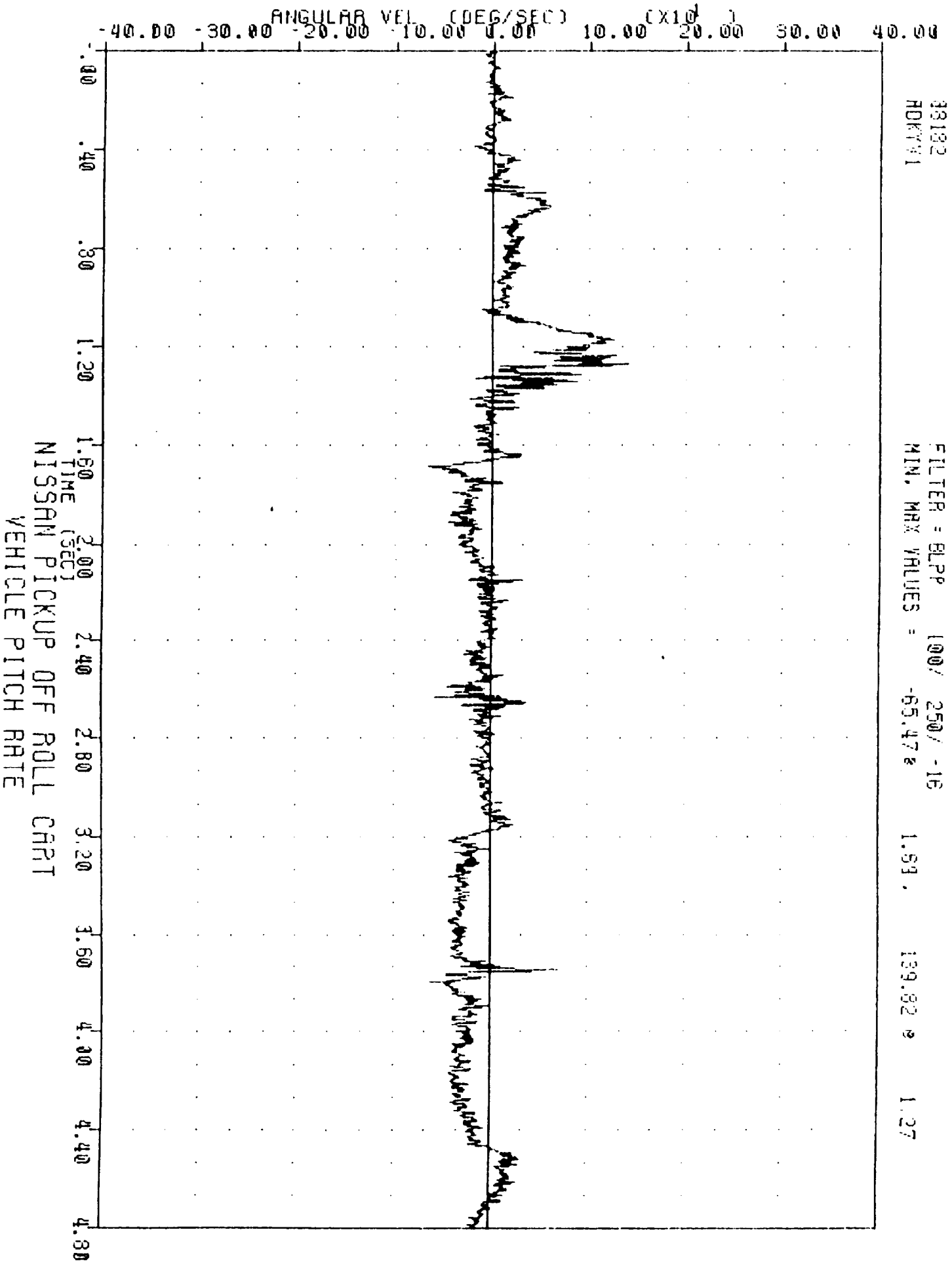


*Note: Review of the film indicates that the vehicle's wheels 1/2 rolls - ~~rolls~~ on its roof-rails at front's position.*

NISSAN PICKUP OFF ROLL CART  
 VEHICLE ROLL RATE

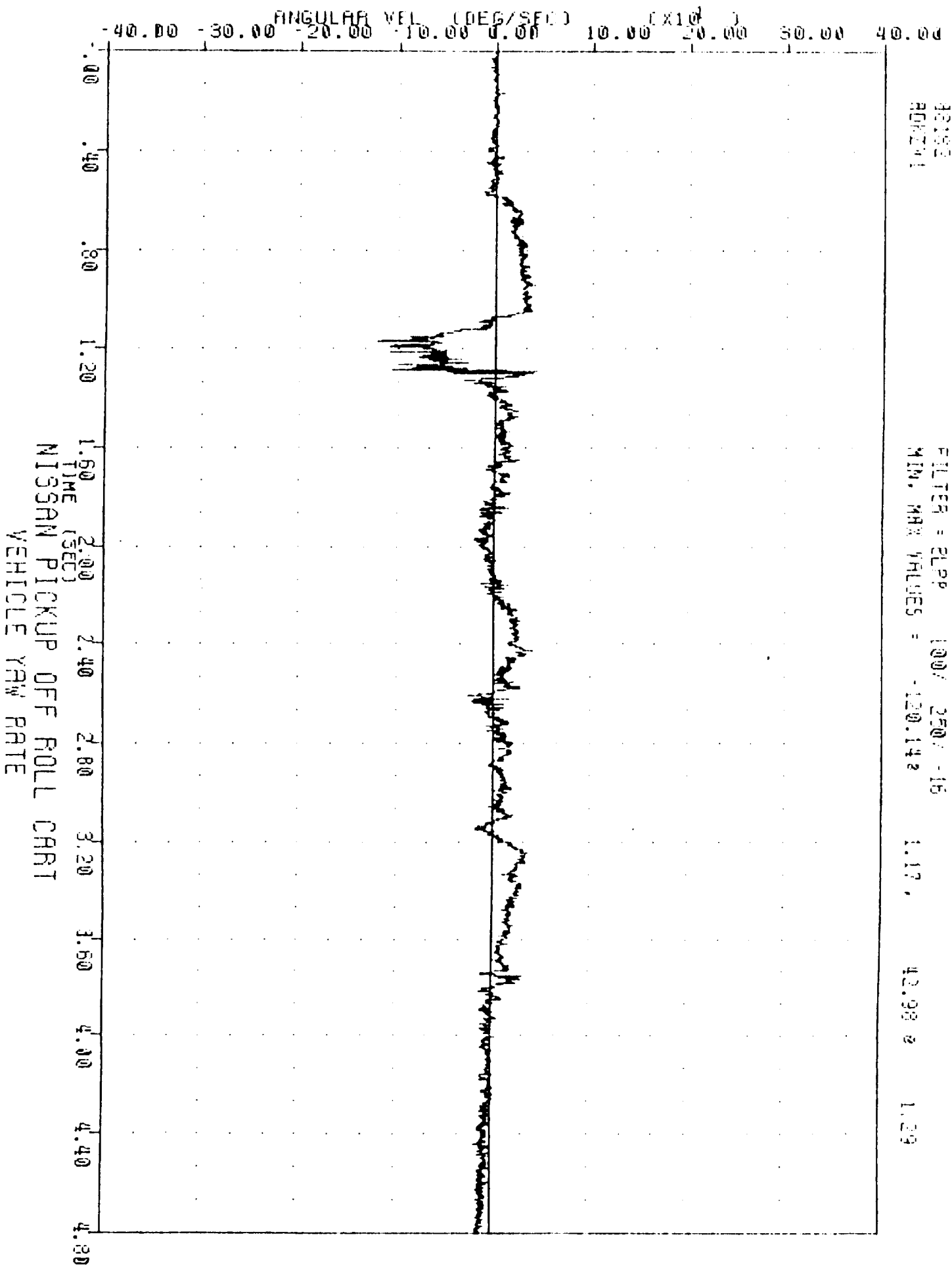
PL 380530  
CONTROLLED ROLLOVER CRASH  
38132  
ADK791

FILTER = 8LPP 100/ 250/ -16  
MIN, MAX VALUES = -65.47 & 1.93 , 139.82 & 1.27



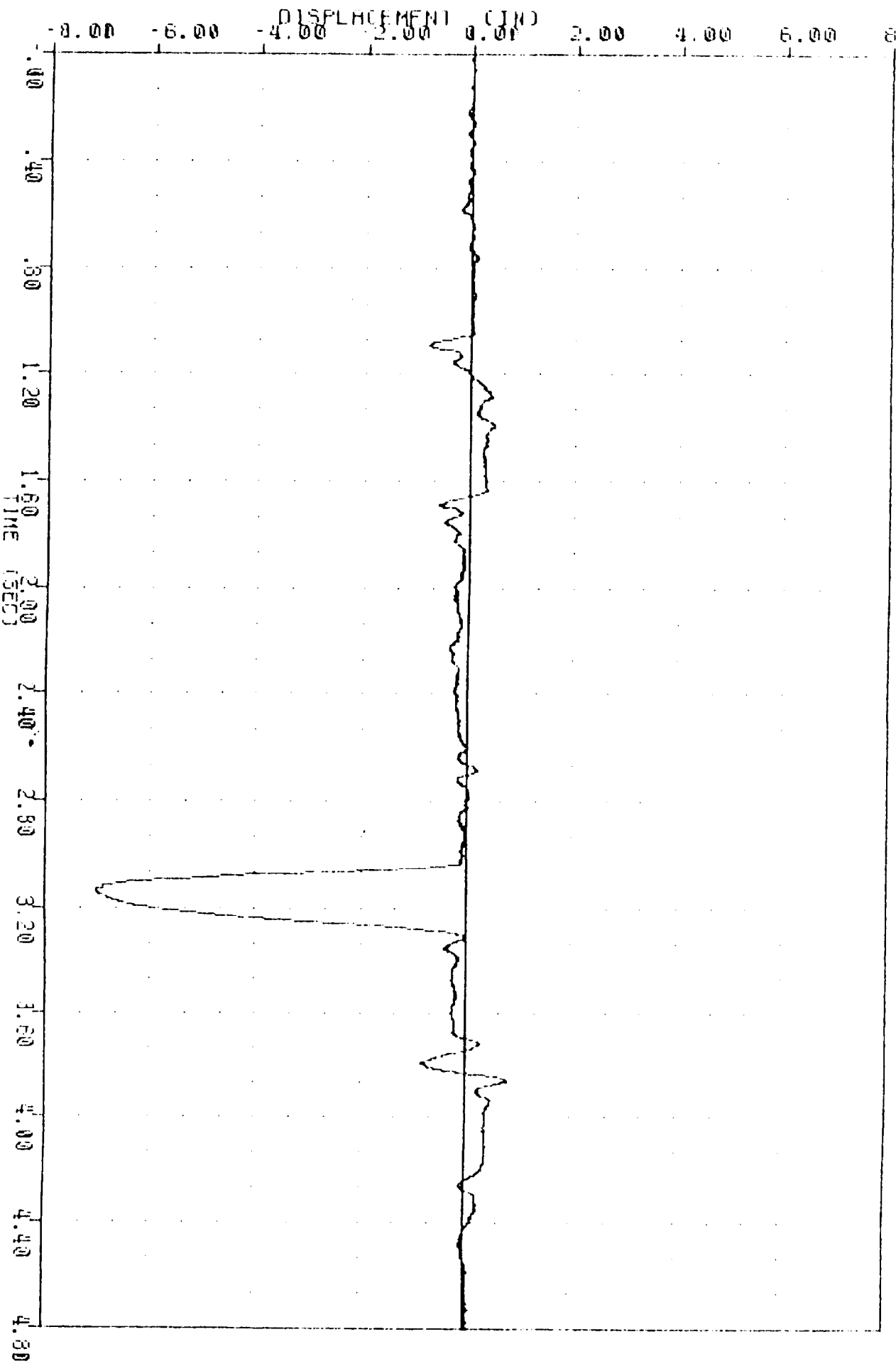
CONTROLLED FOLLOWER CRASH  
38182  
ADZM1

FILTER = ELP 100/ 250/ -16  
MIN. MAX VALUES = -120.142 1.17 42.98 2 1.29



001 000000  
CONTROLLED FOLLOWER CRASH  
00100  
00101

FILTER = BLPP 1001 2501 -16  
4191, MAX VALUES = -7.05% 3.14 . 0.88 % 3.35

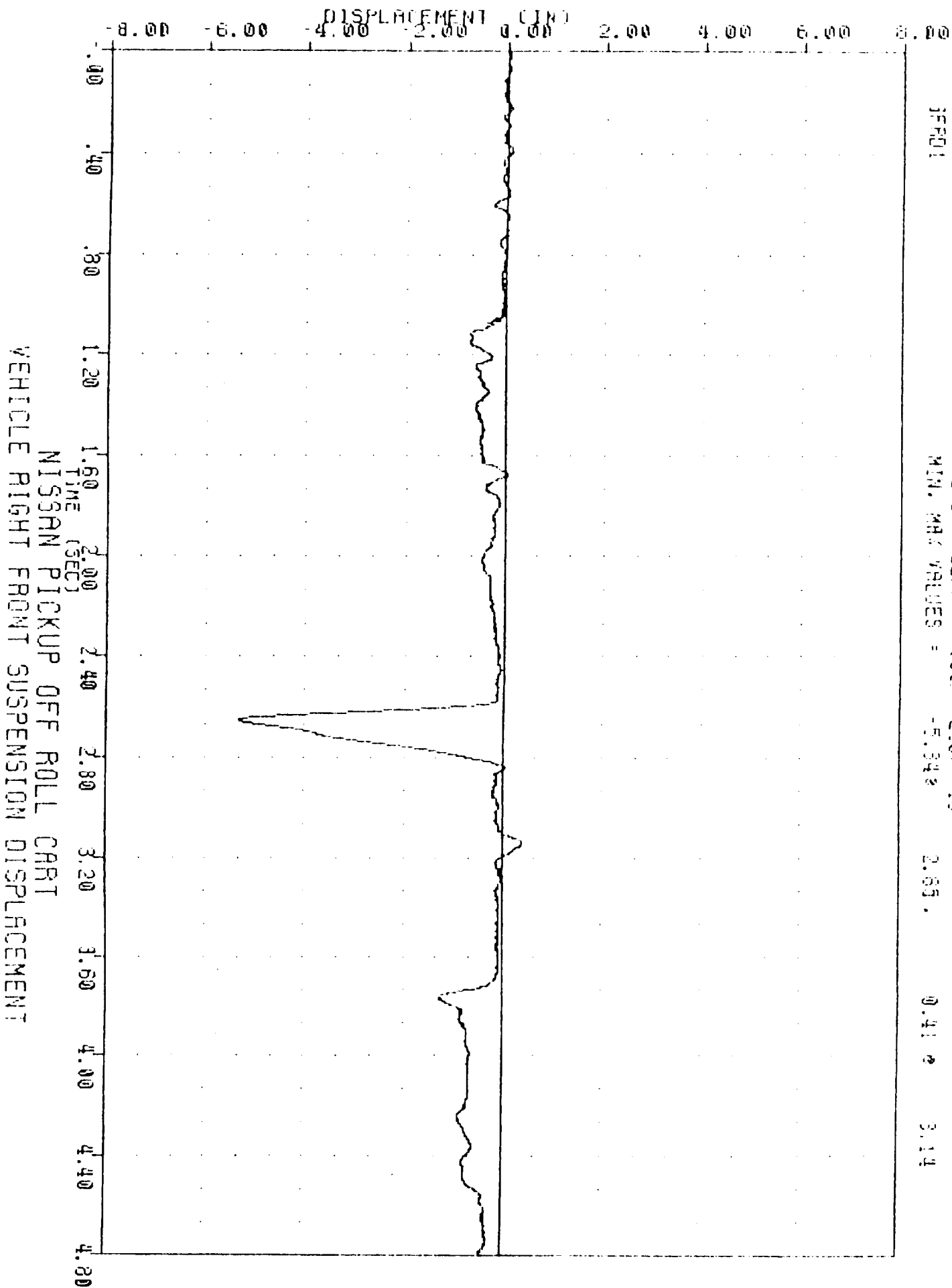


NISSAN PICKUP OFF ROLL CART  
VEHICLE LEFT FRONT SUSPENSION DISPLACEMENT

SRL  
CONTROLLED ROLL-OVER CRASH  
33192  
JFR01

FILTER = 6L50 100/ 250/ -16  
MIN. MAX VALUES = -5.342 2.65

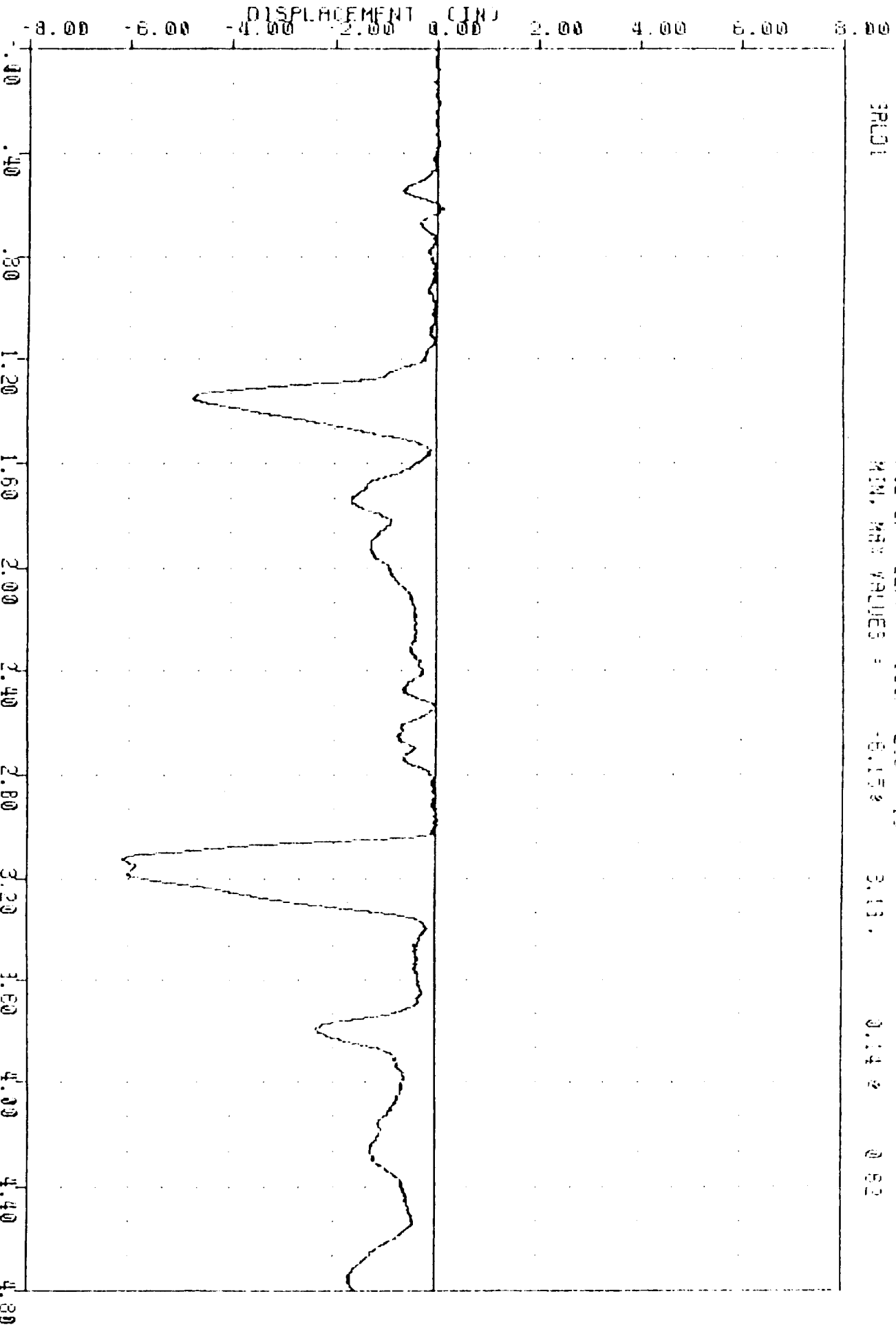
0.41 3.14



IFL  
CONTROLLED FOLLOWER CRASH  
30132  
3RD1

FILTER = 8UPP 100V 250V -15  
MIN. MAX VALUES = -6.15 2.13

0.14 0.02



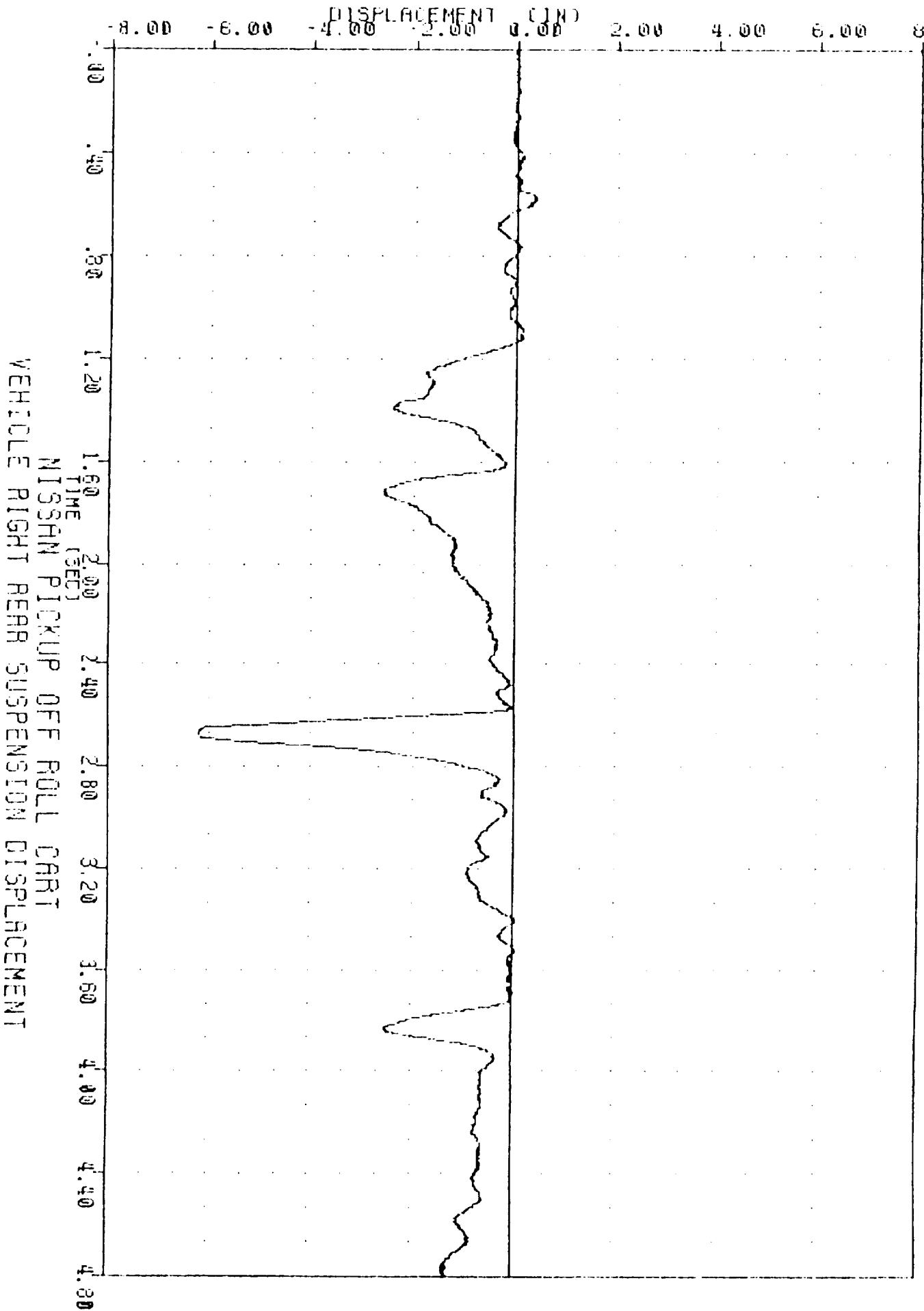
NISSAN PICKUP OFF ROLL CART  
VEHICLE LEFT REAR SUSPENSION DISPLACEMENT

INL  
300000  
CONTROLLED FOLLOWER CRASH  
38182  
SR001

FILTER = 2LPP  
MIN. MAX VALUES = 100/ 250/ -16  
-5.24

2.97

0.39 & 0.53



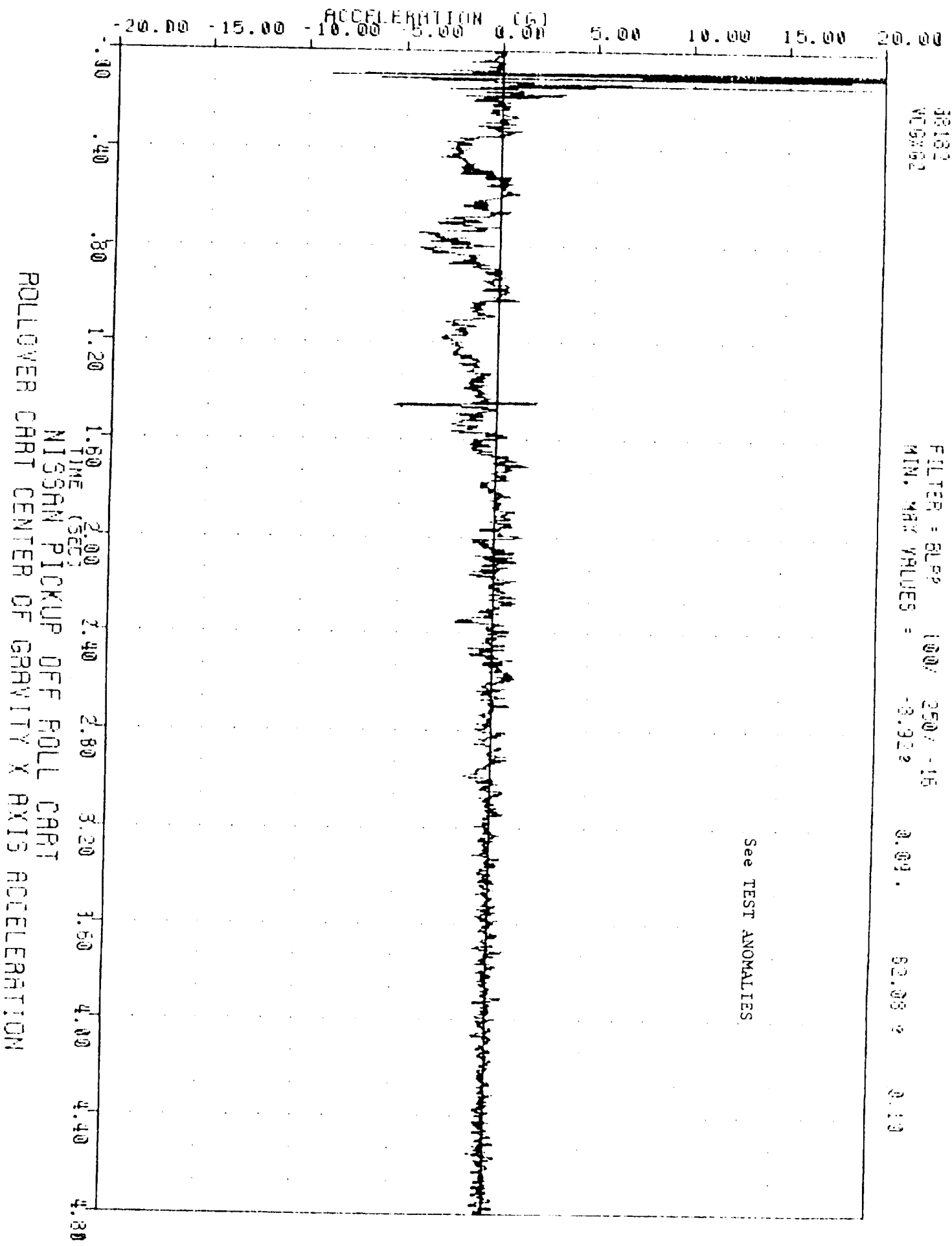
REP. CONTROLLED ROLLOVER CRASH

58182  
108162

FILTER = 8L50 100/ 250/ -16  
MIN. MAX VALUES = -8.922

0.001 52.08 0.10

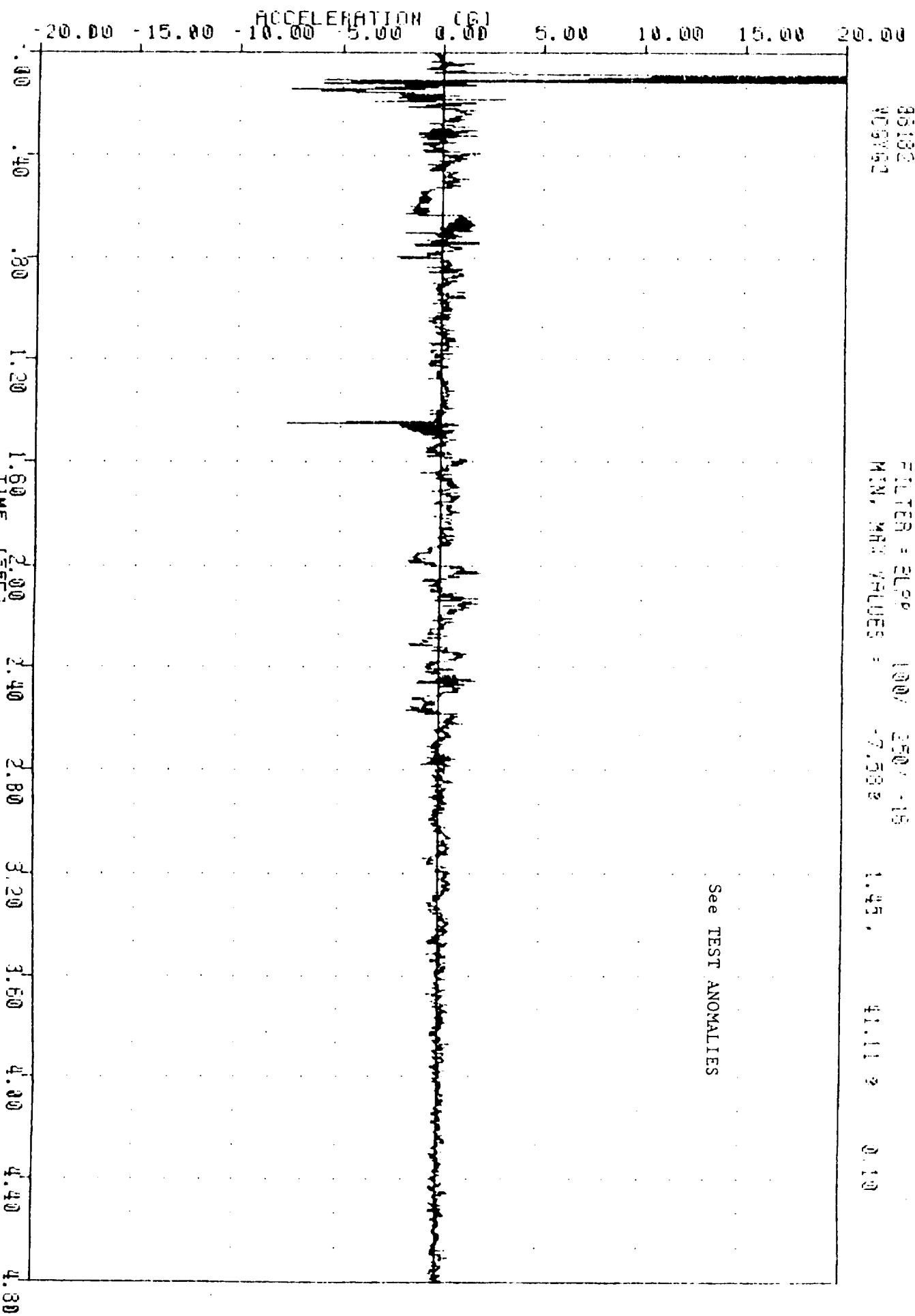
See TEST ANOMALIES



AL 380833  
CONTROLLED FOLLOWER CRASH  
85102  
109162

FILTER = 2LPP 100/ 250/ 15  
MIN. MAX VALUES = -7.582 1.45 41.11 2 0.10

See TEST ANOMALIES



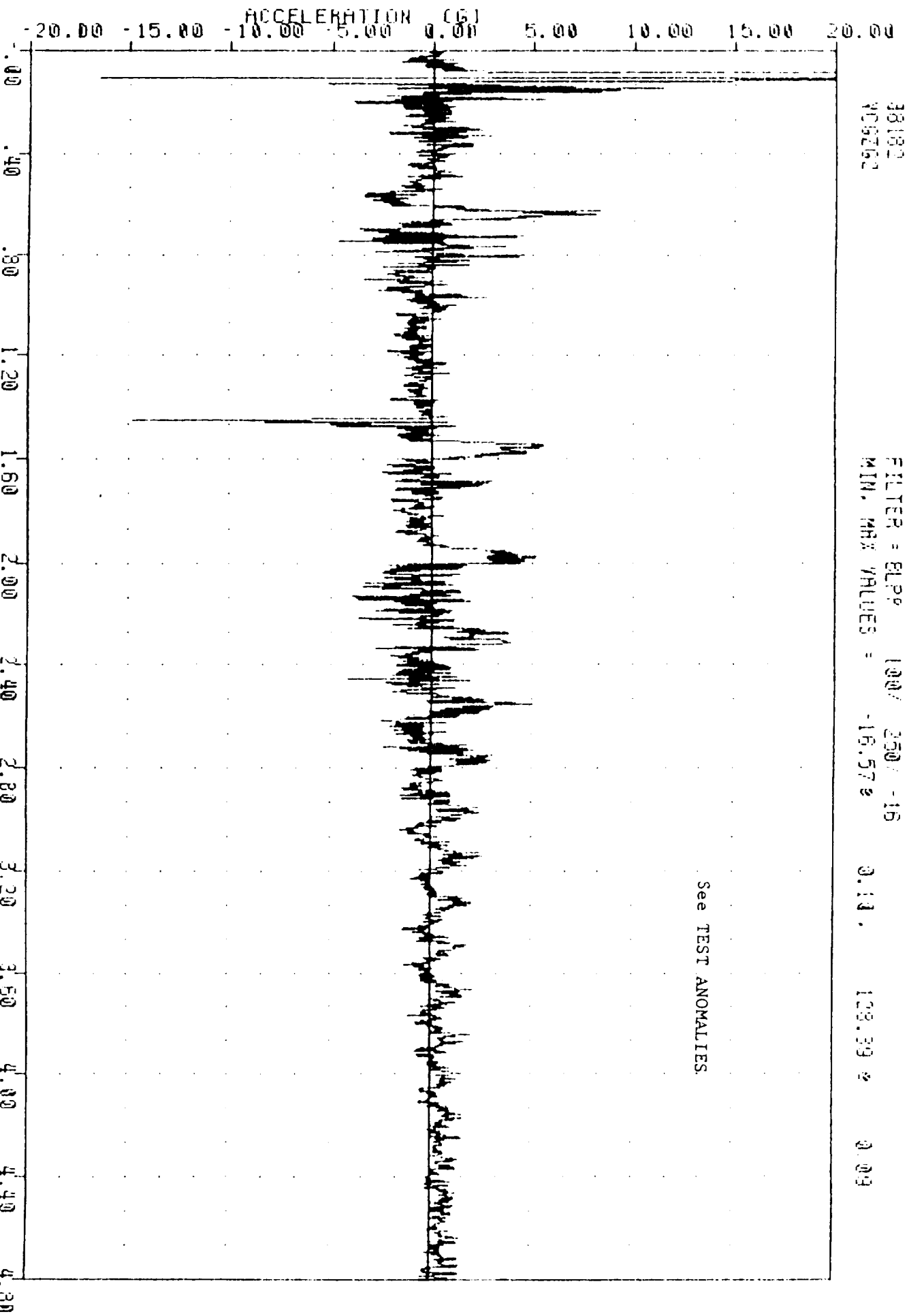
ROLLOVER CART CENTER OF GRAVITY Y AXIS ACCELERATION  
NISSAN PICKUP OFF ROLL CART

REL 38182  
CONTROLLED ROLLOVER CRASH  
NO5262

FILTER = 8LPP 100/ 250/ -16  
MIN. MAX VALUES = -16.57g

0.14 128.39g 0.09

See TEST ANOMALIES.

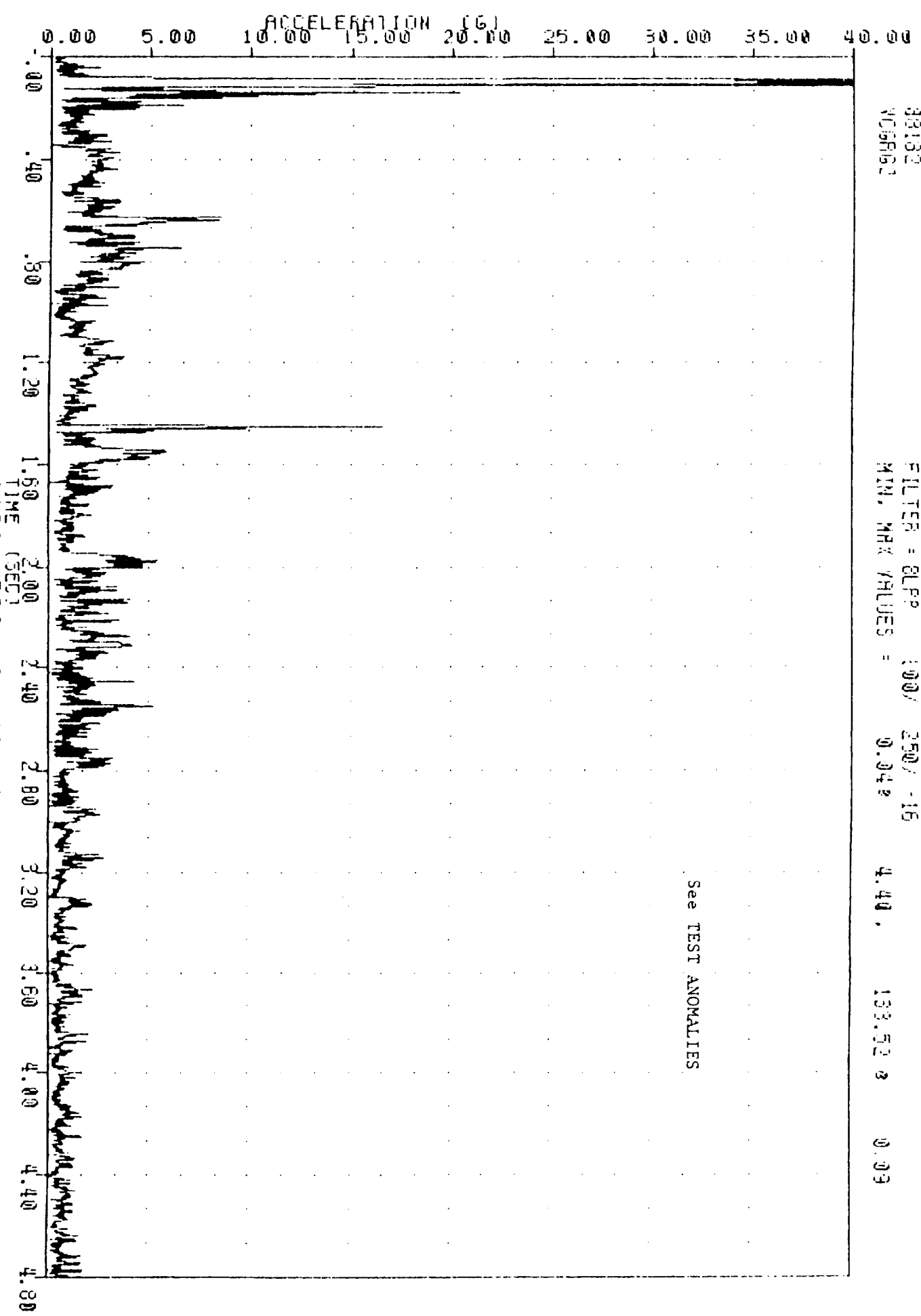


ROLLOVER CART CENTER OF GRAVITY Z AXIS ACCELERATION  
NISSAN PICKUP OFF ROLL CART

SHL 1 1 0000330  
CONTROLLED ROLLOVER CRASH  
38182  
N06862

FILTER = 8LPP 100/ 250/ -16  
MIN. MAX VALUES = 0.042 4.40 133.52 3 0.03

See TEST ANOMALIES

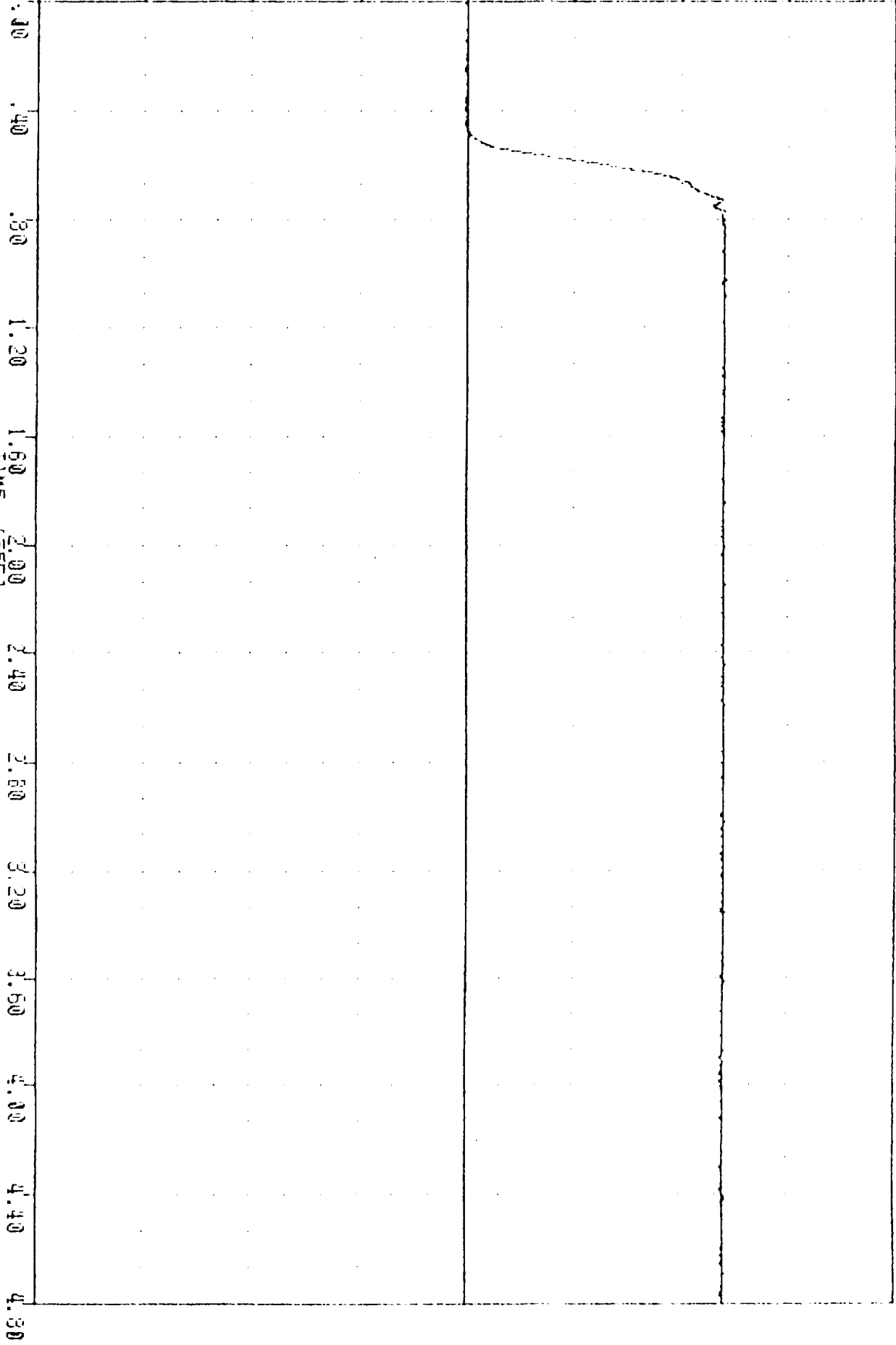


ROLLOVER CART CENTER OF GRAVITY ACCELERATION RESULTANT  
NISSAN PICKUP OFF ROLL CART

TEST 940550  
CONTROLLED ROLL OVER CRASH  
82132  
8050L

FILTER = SLP 100 250 16  
MRX VALUES = -0.11 0.44 24.13 2.59

DISPLACEMENT (IN) -40.00 -30.00 -20.00 -10.00 0.00 10.00 20.00 30.00 40.00

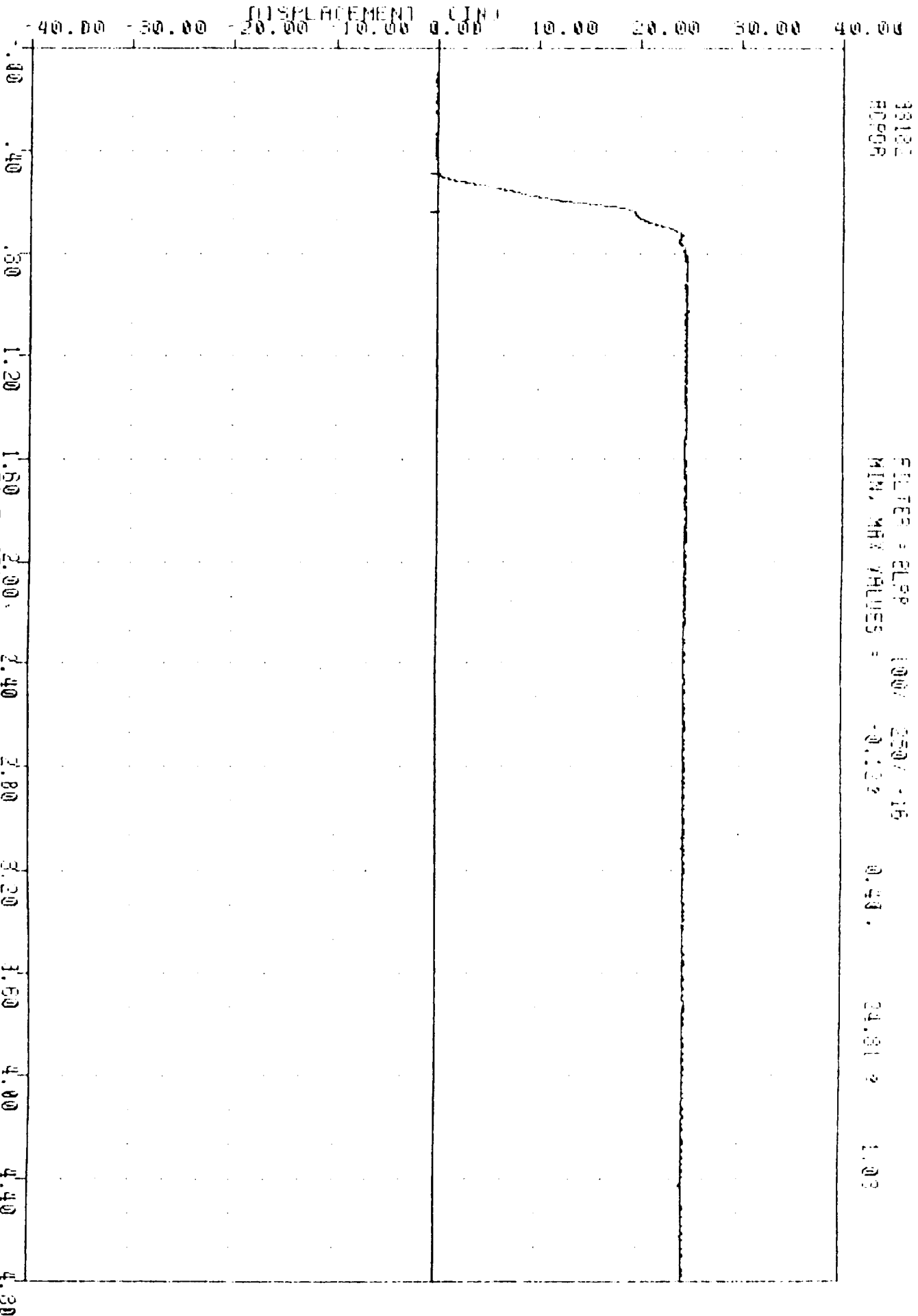


ROLL OVER CRASH PLATFORM DISPLACEMENT - LEFT SIDE

FILE 1 000000  
CONTROLLED ROLLOVER CRASH  
33122  
R0P08

FILTER = SLPP 1000 2500 16  
MIN, MAX VALUES = -0.102 0.430

24.81 1.03

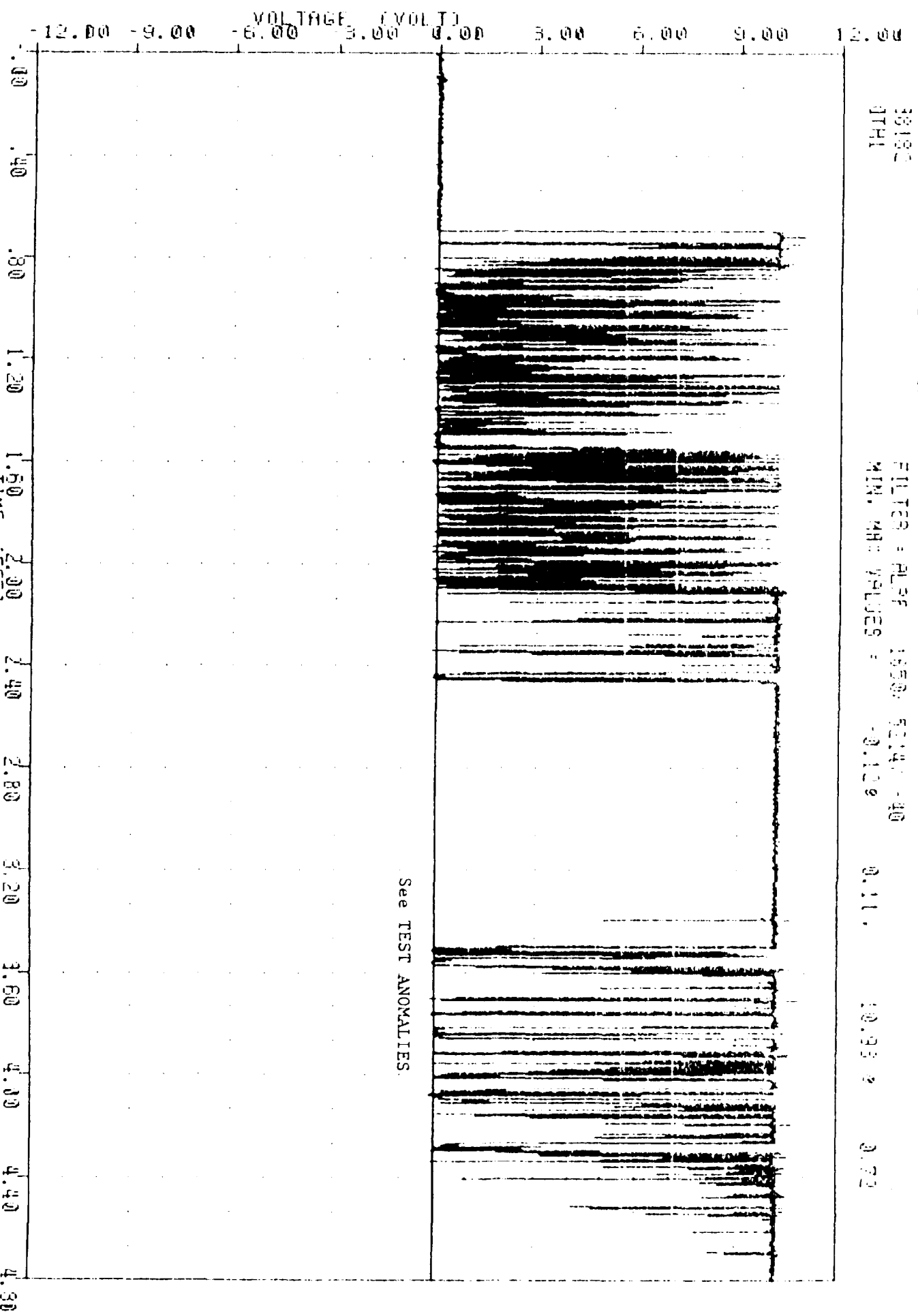


ROLLOVER CART PLATFORM DISPLACEMENT - RIGHT SIDE  
NISSAN PICKUP OFF ROLL CART  
TIME (SECS)

UN- 000000  
CONTROLLED FOLLOWER CRASH  
38192  
DTH1

FILTERS = PLZF 1050 50141 -40  
MIN. MAX. VALUES = -0.100 0.111

0.111 10.93 0.72

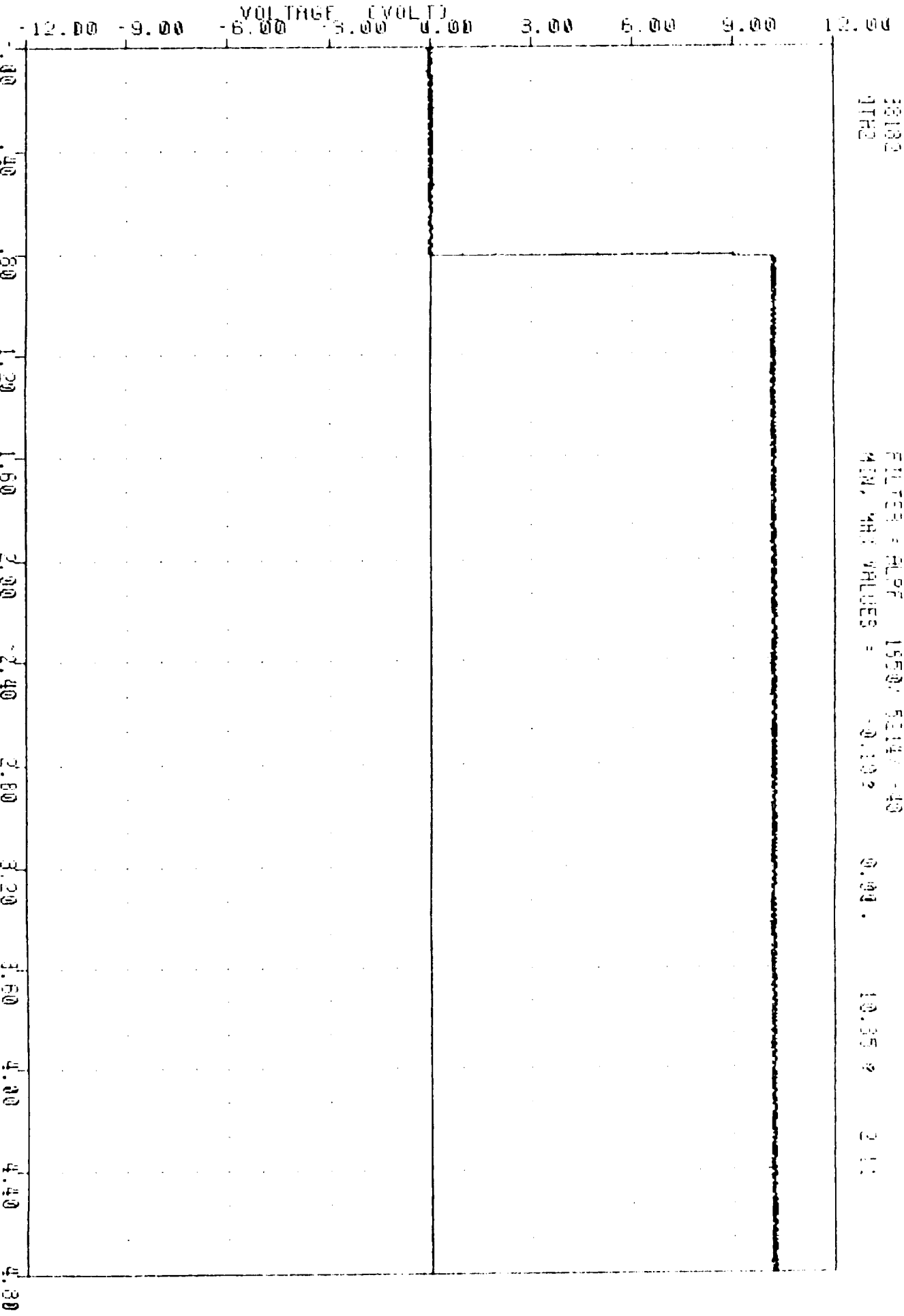


MISSRN PICKUP OFF ROLL CART  
VEHICLE/ROLL CART SEPARATION TIME - UPPER SWITCH

21  
 200590  
 CONTROLLED FOLLOWER CRASH  
 38182  
 9TH

FILTER = ALPF 1950  
 MIN. VMS VALUES = -0.102

0.00 10.35 2.11



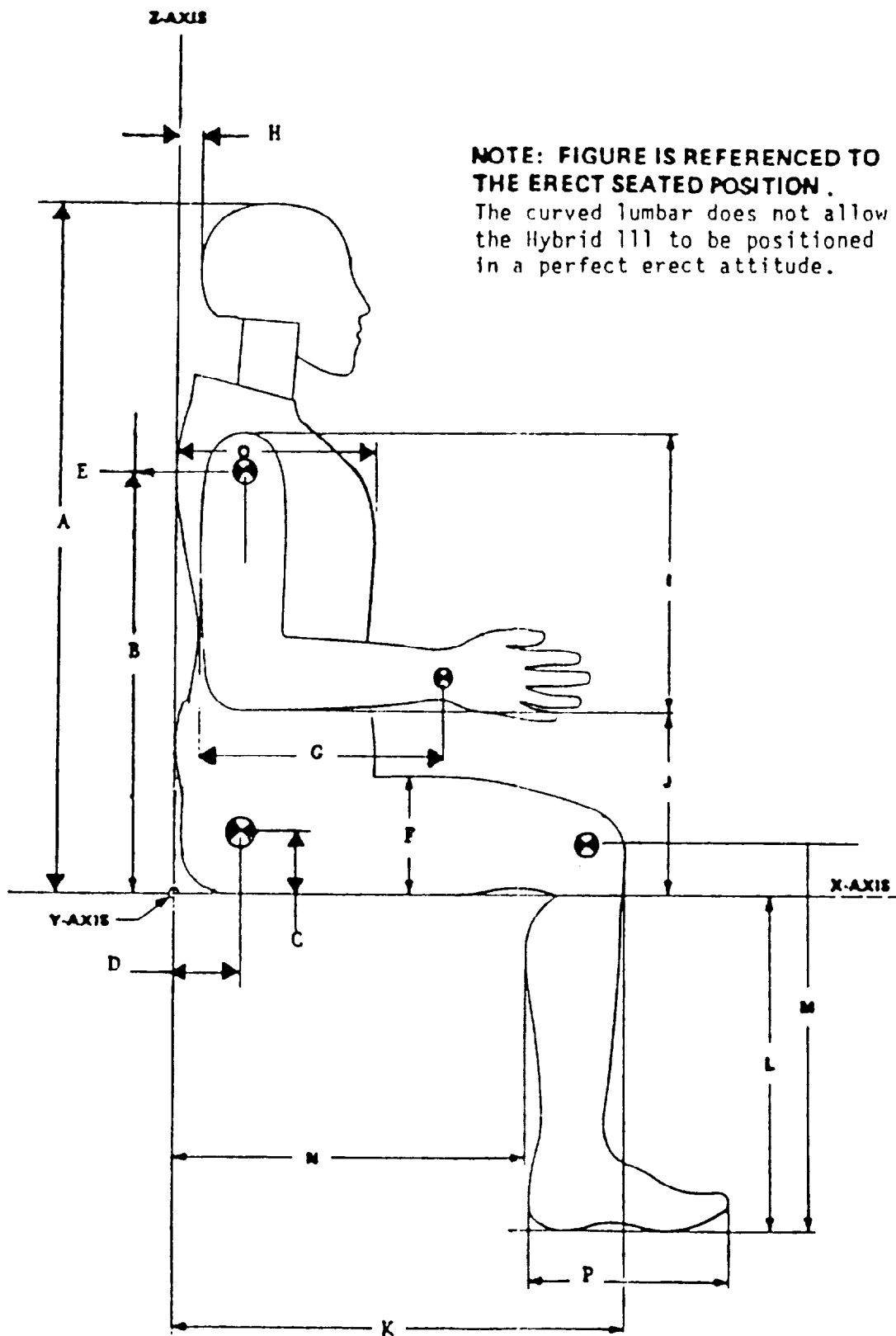
NISSAN PICKUP OFF ROLL CRPT  
 VEHICLE/ROLL CRPT SEPARATION TIME - LOWER SWITCH

APPENDIX C  
DUMMY CERTIFICATION

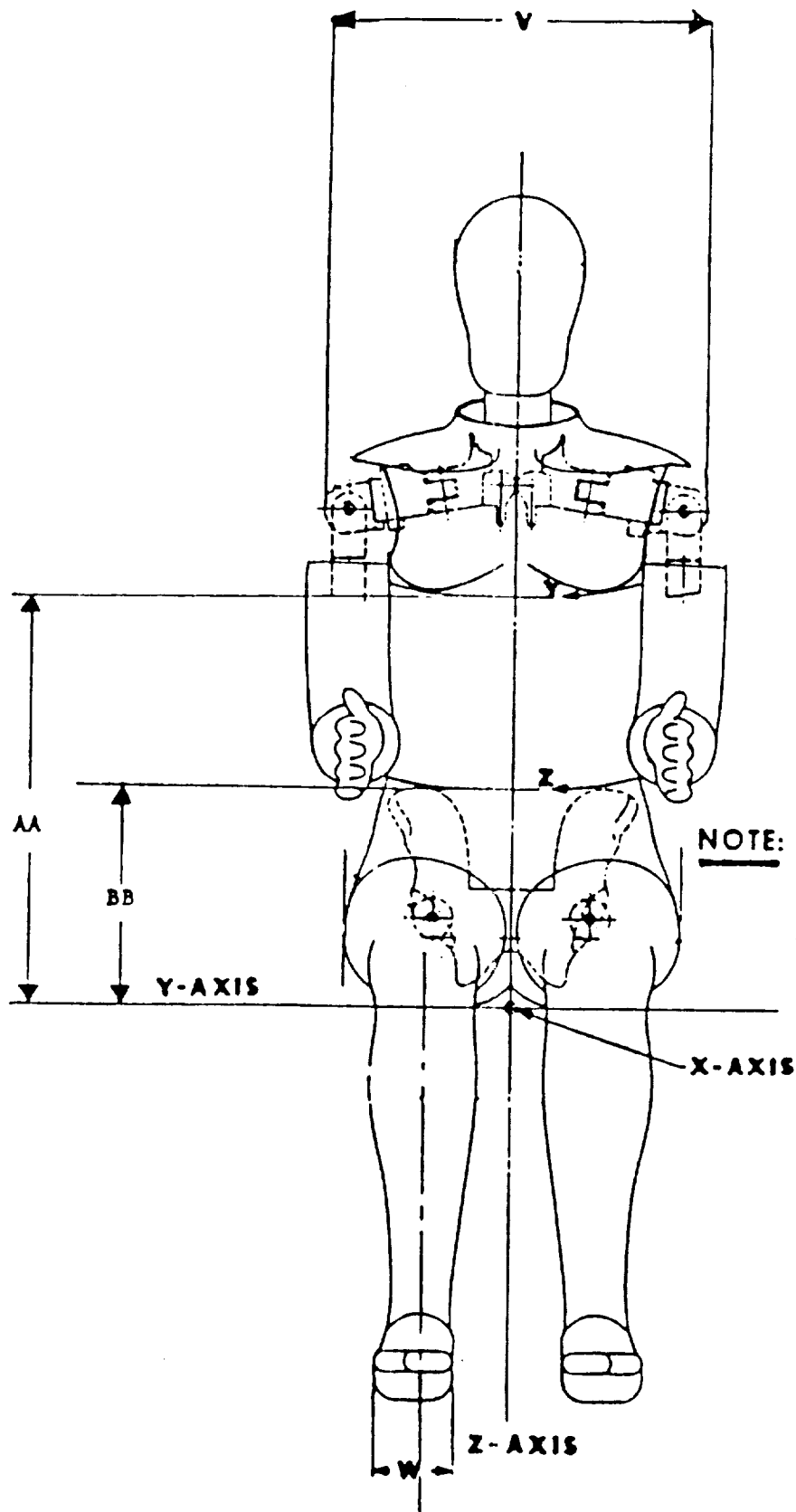
HYBRID III EXTERIOR DIMENSIONS

Dimensional Symbol	Description	Spec Dimension	Dummy Dimension S/N: 192
A	Sitting Height (Erect)	34.8 ± .2	<u>34.7</u>
B	Shoulder Pivot Height	20.2 ± .3	<u>20.3</u>
C	"H" Point Height	3.4 ref.	<u>3.4</u>
D	"H" Point Location from Back Line	5.4 ref.	<u>5.4</u>
E	Shoulder Pivot Location from Back Line	3.5 ± .2	<u>3.7</u>
F	Thigh Clearance	5.8 ± .3	<u>5.7</u>
G	Back of Elbow to Wrist Pivot	11.7 ± .3	<u>11.5</u>
H	Occiput to Z-Axis	1.7 ± .1	<u>1.7</u>
I	Shoulder - Elbow Length	13.3 ± .3	<u>13.1</u>
J	Elbow Rest Height	7.9 ± .4	<u>8.2</u>
K	Buttock Knee Length	23.3 ± .5	<u>23.3</u>
L	Popliteal Height	17.4 ± .5	<u>17.3</u>
M	Knee Pivot Height	19.4 ± .3	<u>19.1</u>
N	Buttock Popliteal Length	18.3 ± .5	<u>18.3</u>
O	Chest Depth	8.7 ± .3	<u>8.8</u>
P	Foot Length	10.2 ± .3	<u>10.2</u>
V	Shoulder Breadth	16.9 ± .3	<u>16.8</u>
W	Foot Breadth	3.9 ± .3	<u>4.0</u>
Y	Chest Circumference	38.8 ± .6	<u>38.4</u>
Z	Waist Circumference	33.5 ± .6	<u>33.3</u>
AA	Location for Measurement of Chest Circumference	17.0 ± .1	<u>17.0</u>
BB	Location for Measurement of Waist Circumference	9.0 ± .1	<u>9.0</u>

NOTE: The "H" point is located 1.83 inches forward and 2.57 inches down from the center of the pelvis angle reference hole.



HYBRID III Exterior Body Dimensions - Side View



**NOTE: FIGURE REFERENCED TO THE ERECT SEATED POSITION.**  
 The curved lumbar does not allow the Hybrid III to be positioned in a perfect erect attitude.

HYBRID III Exterior Body Dimensions - Front View

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

28 Jun-88

SRL

192C1HD1

572E SN192 HEAD DROP CAL 1

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	63.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	251.81 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.72 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

6 AXIS NECK TRANSDUCER

16-Jun-88

SRL

192C1NF1

572E SN192 NECK FLEXION CAL1

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	63.00 %
IMPACT VELOCITY	22.6-23.4 FT/SEC	22.83 FT/SEC
PENDULUM DECELERATION	10 MS   22.50 - 27.50 G	23.42 G
	20 MS   17.60 - 22.60 G	19.23 G
	30 MS   12.50 - 18.50 G	16.51 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	16.40 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	36.38 MS
D PLANE ROTATION	MAX   64 - 78 DEG.	69.04 DEG.
	TIME   57 - 64 MS	56.88 MS **
MOMENT ABOUT OCCIPITAL CONDYLE	MAX   65 - 80 FT.LBS	76.32 FT.LBS
	TIME   47 - 58 MS	49.75 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	117.00 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	92.75 MS **

\*\*\* TEST DOES NOT MEET SPECIFICATIONS \*\*\*

TECHNICIAN

*Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

6 AXIS NECK TRANSDUCER

16-Jun-88

SRL

192C1NE1

572E SN192 NECK EXTENSION CAL1

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	63.00 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.50 FT/SEC
PENDULUM DECELERATION	10 MS   17.20 - 21.20 G	17.32 G
	20 MS   14.00 - 19.00 G	15.51 G
	30 MS   11.00 - 16.00 G	14.02 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	13.97 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	41.38 MS
D PLANE ROTATION	MAX   81 - 106 DEG.	90.01 DEG.
	TIME   72 - 82 MS	78.38 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN   -59.0/-39.0 FT.LBS	-44.50 FT.LBS
	TIME   65 - 79 MS	72.00 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	165.13 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	139.00 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

16-Jun-88

SRL

192C1TH1

572E SN192 H.S.THORAX CAL1

HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	70.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	63.00 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.86 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.61 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1217.9 LBS
INTERNAL HYSTERESIS	69% - 85%	76.4%

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

15-Jun-88

RIGHT KNEE  
SRL 192CIRK1 572E SN192 R.KNEE 11LR CAL 1

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	57.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.77 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1265.63 LBS
PROBE WEIGHT	11.0 LBS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

15-Jun-88

LEFT KNEE  
SRL 19201LK1 572E SN192 L.KNEE 11LB CAL 1

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	57.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.77 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1265.47 LBS
PROBE WEIGHT	11.0 LBS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

APPENDIX D  
MISCELLANEOUS TEST INFORMATION

IPMD VEHICLE DATA SHEET

Version 2 -- June-25, 1987

Filled Out By: D. Clapsaddle Date: 6/27/88

Checked By: J. Chrstos Date: 7/7/88

VEHICLE DATA

Vehicle ID Code (7 characters): V88-183B

Vehicle Model Year (2 digits): 88

Vehicle Make (2 characters): 64

- |                 |                   |                 |
|-----------------|-------------------|-----------------|
| 11 - American   | 02 - Ford         | 64 - Nissan     |
| 12 - Audi       | 40 - GMC          | 48 - Odyssey    |
| 53 - Battronics | 23 - Honda        | 06 - Oldsmobile |
| 27 - BMW        | 34 - Hyundai      | 14 - Peugeot    |
| 04 - Buick      | 41 - IH           | 05 - Plymouth   |
| 10 - Cadillac   | 42 - Isuzu        | 03 - Pontiac    |
| 35 - Champion   | 44 - Jeep         | 17 - Renault    |
| 36 - Checker    | 54 - Jet          | 30 - Saab       |
| 01 - Chevrolet  | 22 - Lectra       | 26 - Subaru     |
| 37 - Chinook    | 59 - Lectric      | 33 - Suzuki     |
| 21 - Chrysler   | 13 - Lincoln      | 16 - Toyota     |
| 29 - Comuta     | 18 - Mazda        | 31 - Triumph    |
| 15 - Datsun     | 28 - Mercedes     | 56 - UM         |
| 38 - Delorean   | 09 - Mercury      | 08 - Volkswagen |
| 07 - Dodge      | 25 - MG           | 20 - Volvo      |
| 58 - Eva        | 62 - Mitsubishi   | 60 - Winnebago  |
| 19 - Fiat       | 32 - NHTSA        | 24 - Yugo       |
| 99 - Other      | <u>Nissan P/U</u> |                 |

Vehicle Model (2 characters - see appendix B): 99

Body Style (2 characters): PU

- |                    |                   |
|--------------------|-------------------|
| 2C - 2Dr Coupe     | SW - Stationwagon |
| 2S - 2Dr Sedan     | PU - Pickup Truck |
| 3H - 3Dr Hatchback | TR - Truck        |
| 4S - 4Dr Sedan     | VN - Van          |
| 5H - 5Dr Hatchback | BU - Bus          |
| OH - Other: _____  |                   |

VIN Number (20 Characters): 1 N 6 N D 1 1 S 0 J C 3 6 1 2 1 1 \_ \_ \_

Odometer Reading: 96.0 Thousands of Miles: 0

Wheelbase: 104.8 (in) x 25.4 -: 2662 (mm)

Front Track: 55.0 (in) x 25.4 -: 1397 (mm)

Rear Track: 54.6 (in) x 25.4 -: 1387 (mm)

Roof Height: 60.8 (in) x 25.4 -: 1543 (mm)

FRONT SUSPENSION

Suspension Number (4 digits): F183

Front/Rear Flag (1 character): F

Axle Type (1 character) I  
 I - Independent      S - Solid

Suspension Type (1 character): A  
 A - Unequal A Arm      T - Semi-Trailing Arm  
 L - Leaf      W - Twist  
 M - Multiple Link      4 - 4 Link  
 Q - Torque Arm      3 - 3 Link  
 S - Strut  
 O - Other: \_\_\_\_\_

Spring Type (2 characters): TB  
 CO - Coil      TB - Torsion Bar  
 LL - Longitudinal Leaf      TL - Transverse Leaf  
 OT - Other: \_\_\_\_\_

Brake Type (2 characters): DL  
 DI - Disk      LT - Leading-Trailing Shoe  
 DS - Duo-Servo Shoe  
 OT - Other: \_\_\_\_\_

Suspension Modified  
 N - No      Y - Yes      N

Suspension Modification  
 R - Raised      L - Lowered  
 S - Stiffened      W - Widened  
 O - Other  
 1 - \_\_\_\_\_  
 2 - \_\_\_\_\_

FRONT SUSPENSION

Tire Manufacturer (10 characters): Goodyear

Tire Size Code (10 characters): P185/75R14

Tire Construction (2 characters): SB

BB - Bias Belted                      GP - Glass Belted Radial  
BP - Bias Ply                            SB - Steel Belted Radial  
OT - Other: \_\_\_\_\_

Tire Rim Width: 5.0 (in) \* 25.4 =: 127 (mm)

Axle Height: 11.4 (in) \* 25.4 =: 289 (mm)

Tire Pressure: 26.0 (psi) \* 6.897 =: 179 (kpa)

REAR SUSPENSION

Suspension Number (4 digits): R183

Front/Rear Flag (1 character): R

Axle Type (1 character) S  
 I - Independent      S - Solid

Suspension Type (1 character): L  
 A - Unequal A Arm      T - Semi-Trailing Arm  
 L - Leaf      W - Twist  
 M - Multiple Link      4 - 4 Link  
 Q - Torque Arm      3 - 3 Link  
 S - Strut  
 O - Other: \_\_\_\_\_

Spring Type (2 characters): LL  
 CO - Coil      TB - Torsion Bar  
 LL - Longitudinal Leaf      TL - Transverse Leaf  
 OT - Other: \_\_\_\_\_

Brake Type (2 characters): DS  
 DI - Disk      LT - Leading-Trailing Shoe  
 DS - Duo-Servo Shoe  
 OT - Other: \_\_\_\_\_

Suspension Modified: N  
 N - No      Y - Yes

Suspension Modification:  
 R - Raised      L - Lowered  
 S - Stiffened      W - Widened  
 O - Other

1 - \_\_\_\_\_  
 2 - \_\_\_\_\_

REAR SUSPENSION

Tire Manufacturer (10 characters): Goodyear

Tire Size Code (10 characters): P185/75R14

Tire Construction (2 characters): SB

BB - Bias Belted            GP - Glass Belted Radial  
BP - Bias Ply                SB - Steel Belted Radial  
OT - Other: \_\_\_\_\_

Tire Rim Width: 5.0 (in) \* 25.4 =: 127 (mm)

Axle Height: 11.6 (in) \* 25.4 =: 294 (mm)

Tire Pressure: 34.0 (psi) \* 6.897 =: 234 (kpa)

IPMD MEASURED DATA

C.G. Height:

<u>Applied Weight (lbs)</u>	<u>Resultant Angle (deg)</u>	<u>Resultant Lateral Movement (mv)-(in)</u>
0	0.0	0.699
+100	3.7	0.797
+200	7.3	0.971
0	0.0	0.682
-100	3.7	0.504
-200	7.5	0.231
0	0.1	0.586

Calculated C.G. Height (in): 23.6

Pitch Inertia:

<u>Run</u>	<u>Period(sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	3.89	268	341
2	3.88	266	324
3	3.90	258	321

Pitch Inertia (ft·lb·sec<sup>2</sup>): 1706.0

Roll Inertia:

Distance between ramps (in): 44.5

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	2.41	209	409
2	2.40	209	395
3	2.40	205	384

Roll Inertia (ft·lb·sec<sup>2</sup>): 335.9

IP:ID MEASURED DATA

Yaw Inertia:

Distance between ramps (in): 44.5String Pot Offset from platform center (in): 69.0

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.31</u>	<u>159</u>	<u>418</u>
2	<u>2.31</u>	<u>177</u>	<u>497</u>
3	<u>2.31</u>	<u>157</u>	<u>428</u>

Yaw Inertia (ft·lb·sec<sup>2</sup>): 1812.0

Version 2 -- June-25, 1987

Filled Out By: B. Dotson Date: 7/1/88

Checked By: J. Chrstos Date: 7/7/88

VEHICLE DATA

Vehicle ID Code (7 characters): V88-183B

Vehicle Model Year (2 digits): 88

Vehicle Make (2 characters): 64

- |                 |                   |                 |
|-----------------|-------------------|-----------------|
| 11 - American   | 02 - Ford         | 64 - Nissan     |
| 12 - Audi       | 40 - GMC          | 48 - Odyssey    |
| 53 - Battronics | 23 - Honda        | 06 - Oldsmobile |
| 27 - BMW        | 34 - Hyundai      | 14 - Peugeot    |
| 04 - Buick      | 41 - IH           | 05 - Plymouth   |
| 10 - Cadillac   | 42 - Isuzu        | 03 - Pontiac    |
| 35 - Champion   | 44 - Jeep         | 17 - Renault    |
| 36 - Checker    | 54 - Jet          | 30 - Saab       |
| 01 - Chevrolet  | 22 - Lectra       | 26 - Subaru     |
| 37 - Chinook    | 59 - Lectric      | 33 - Suzuki     |
| 21 - Chrysler   | 13 - Lincoln      | 16 - Toyota     |
| 29 - Comuta     | 18 - Mazda        | 31 - Triumph    |
| 15 - Datsun     | 28 - Mercedes     | 56 - UM         |
| 38 - Delorean   | 09 - Mercury      | 08 - Volkswagen |
| 07 - Dodge      | 25 - MG           | 20 - Volvo      |
| 58 - Eva        | 62 - Mitsubishi   | 60 - Winnebago  |
| 19 - Fiat       | 32 - NHTSA        | 24 - Yugo       |
| 99 - Other      | <u>Nissan P/U</u> |                 |

Vehicle Model (2 characters - see appendix B): 99

Body Style (2 characters): PU

- |                    |                   |
|--------------------|-------------------|
| 2C - 2Dr Coupe     | SW - Stationwagon |
| 2S - 2Dr Sedan     | PU - Pickup Truck |
| 3H - 3Dr Hatchback | TR - Truck        |
| 4S - 4Dr Sedan     | VN - Van          |
| 5H - 5Dr Hatchback | BU - Bus          |
| OH - Other: _____  |                   |

VIN Number (20 Characters): 1 N 6 N D 1 1 S 0 J C 3 6 L 2 L L - - -

Odometer Reading: 96.0 Thousands of Miles: 0

Wheelbase: 104.8 (in) x 25.4 -: 2662 (mm)

Front Track: 55.0 (in) x 25.4 -: 1397 (mm)

Rear Track: 54.6 (in) x 25.4 -: 1387 (mm)

Roof Height: 60.5 (in) x 25.4 -: 1543 (mm)

G.V.W.R.: 4000 (lbs) x 4.45 =: 17,800 (N)  
 Front G.A.W.R: 2200 (lbs) x 4.45 =: 9,790 (N)  
 Rear G.A.W.R: 2200 (lbs) x 4.45 =: 9,790 (N)

The following tire loadings are measured with vehicle at Curb Weight.

Weight on RF Tire: 735 (lbs) x 4.45 =: 3,271 (N)  
 Weight on LF Tire: 824 (lbs) x 4.45 =: 3,667 (N)  
 Weight on LR Tire: 811 (lbs) x 4.45 =: 3,609 (N)  
 Weight on RR Tire: 700 (lbs) x 4.45 =: 3,115 (N)  
 Vehicle Test Weight: 3070 (lbs) x 4.45 =: 13,662 (N)

Lateral and Longitudinal Center of Gravity Location

From Front Axle: 51.6 (in) x 25.4 =: 1,311 (mm)  
 From Center Line: -1.8 (in) x 25.4 =: -46 (mm)

Engine Displacement: 145.8 (cu in) x 0.0164 =: 2.4 (l)

Engine Type (2 characters):

L3 F4 L4 L4  
 V4 F6 L6  
 V6 V8 RT - Rotary  
 L5 OT - Other: \_\_\_\_\_

Engine Location (1 character):

F - Front M - Mid R - Rear F

Engine Orientation (1 character):

L - Longitudinal T - Transverse L

Transmission Type:

M - Manual A - Automatic M

Drive Axle (1 character):

F - Front R - Rear R  
 4 - Four Wheel Drive

Vehicle Comments (30 characters):

Instrumented  
Post-test

FRONT SUSPENSION

Suspension Number (4 digits): F183B

Front/Rear Flag (1 character): F

Axle Type (1 character) I  
 I - Independent      S - Solid

Suspension Type (1 character): A  
 A - Unequal A Arm      T - Semi-Trailing Arm  
 L - Leaf      W - Twist  
 M - Multiple Link      4 - 4 Link  
 Q - Torque Arm      3 - 3 Link  
 S - Strut  
 O - Other: \_\_\_\_\_

Spring Type (2 characters): TB  
 CO - Coil      TB - Torsion Bar  
 LL - Longitudinal Leaf      TL - Transverse Leaf  
 OT - Other: \_\_\_\_\_

Brake Type (2 characters): DI  
 DI - Disk      LT - Leading-Trailing Shoe  
 DS - Duo-Servo Shoe  
 OT - Other: \_\_\_\_\_

Suspension Modified  
 N - No      Y - Yes      N

Suspension Modification  
 R - Raised      L - Lowered  
 S - Stiffened      W - Widened  
 O - Other

1 - \_\_\_\_\_  
 2 - \_\_\_\_\_

FRONT SUSPENSION

Tire Manufacturer (10 characters): Goodyear

Tire Size Code (10 characters): P185/75R14

Tire Construction (2 characters): SB  
BB - Bias Belted                      GP - Glass Belted Radial  
BP - Bias Ply                            SB - Steel Belted Radial  
OT - Other: \_\_\_\_\_

Tire Rim Width: 5.0 (in) \* 25.4 -: 127 (mm)

Axle Height: 11.4 (in) \* 25.4 -: 289 (mm)

Tire Pressure: 26.0 (psi) \* 6.897 -: 179 (kpa)

REAR SUSPENSION

Suspension Number (4 digits): R183B

Front/Rear Flag (1 character): R

Axle Type (1 character) S  
 I - Independent      S - Solid

Suspension Type (1 character): L  
 A - Unequal A Arm      T - Semi-Trailing Arm  
 L - Leaf      W - Twist  
 M - Multiple Link      4 - 4 Link  
 Q - Torque Arm      3 - 3 Link  
 S - Strut  
 O - Other: \_\_\_\_\_

Spring Type (2 characters): LL  
 CO - Coil      TB - Torsion Bar  
 LL - Longitudinal Leaf      TL - Transverse Leaf  
 OT - Other: \_\_\_\_\_

Brake Type (2 characters): DS  
 DI - Disk      LT - Leading-Trailing Shoe  
 DS - Duo-Servo Shoe  
 OT - Other: \_\_\_\_\_

Suspension Modified: N  
 N - No      Y - Yes

Suspension Modification:  
 R - Raised      L - Lowered  
 S - Stiffened      W - Widened  
 O - Other

1 - \_\_\_\_\_  
 2 - \_\_\_\_\_

REAR SUSPENSION

Tire Manufacturer (10 characters):

Goodyear

Tire Size Code (10 characters):

P185/75R14

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: \_\_\_\_\_

Tire Rim Width: 5.0(in) \* 25.4 =: 127 (mm)Axle Height: 11.6(in) \* 25.4 =: 294 (mm)Tire Pressure: 34.0(psi) \* 6.897 =: 234 (kpa)

IPMD MEASURED DATA

C.G. Height:

<u>Applied Weight (lbs)</u>	<u>Resultant Angle (deg)</u>	<u>Resultant Lateral Movement (mv)-(in)</u>
0	<u>0.0</u>	<u>1.418</u>
+100	<u>3.5</u>	<u>1.508</u>
+200	<u>7.2</u>	<u>1.642</u>
0	<u>0.0</u>	<u>1.415</u>
-100	<u>3.7</u>	<u>1.222</u>
-200	<u>7.3</u>	<u>1.105</u>
0	<u>0.1</u>	<u>1.338</u>

Calculated C.G. Height (in): 22.9

Pitch Inertia:

<u>Run</u>	<u>Period(sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>3.83</u>	<u>275</u>	<u>346</u>
2	<u>3.83</u>	<u>271</u>	<u>350</u>
3	<u>3.83</u>	<u>273</u>	<u>349</u>

Pitch Inertia (ft·lb·sec<sup>2</sup>): 1671.9

Roll Inertia:

Distance between ramps (in): 45.8

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.37</u>	<u>213</u>	<u>395</u>
2	<u>2.37</u>	<u>215</u>	<u>396</u>
3	<u>2.37</u>	<u>216</u>	<u>397</u>

Roll Inertia (ft·lb·sec<sup>2</sup>): 323.1

IPMD MEASURED DATA

Yaw Inertia:

Distance between ramps (in): 45.8String Pot Offset from platform center (in): 67.0

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.28</u>	<u>145</u>	<u>388</u>
2	<u>2.27</u>	<u>139</u>	<u>385</u>
3	<u>2.27</u>	<u>144</u>	<u>392</u>

Yaw Inertia (ft·lb·sec<sup>2</sup>): 1743.3

## SIGN CONVENTION

Tension on seat belt load cells is positive.

Outward chest displacement is positive.

All accelerometers:

+X: FORWARD

+Y: LEFTWARD

+Z: UPWARD

Neck load cell:

+X FORCE: HEAD FORWARD

+Y FORCE: HEAD RIGHTWARD

+Z FORCE: HEAD UPWARD (TENSION ON NECK)

+X MOMENT: RIGHT EAR TO RIGHT SHOULDER

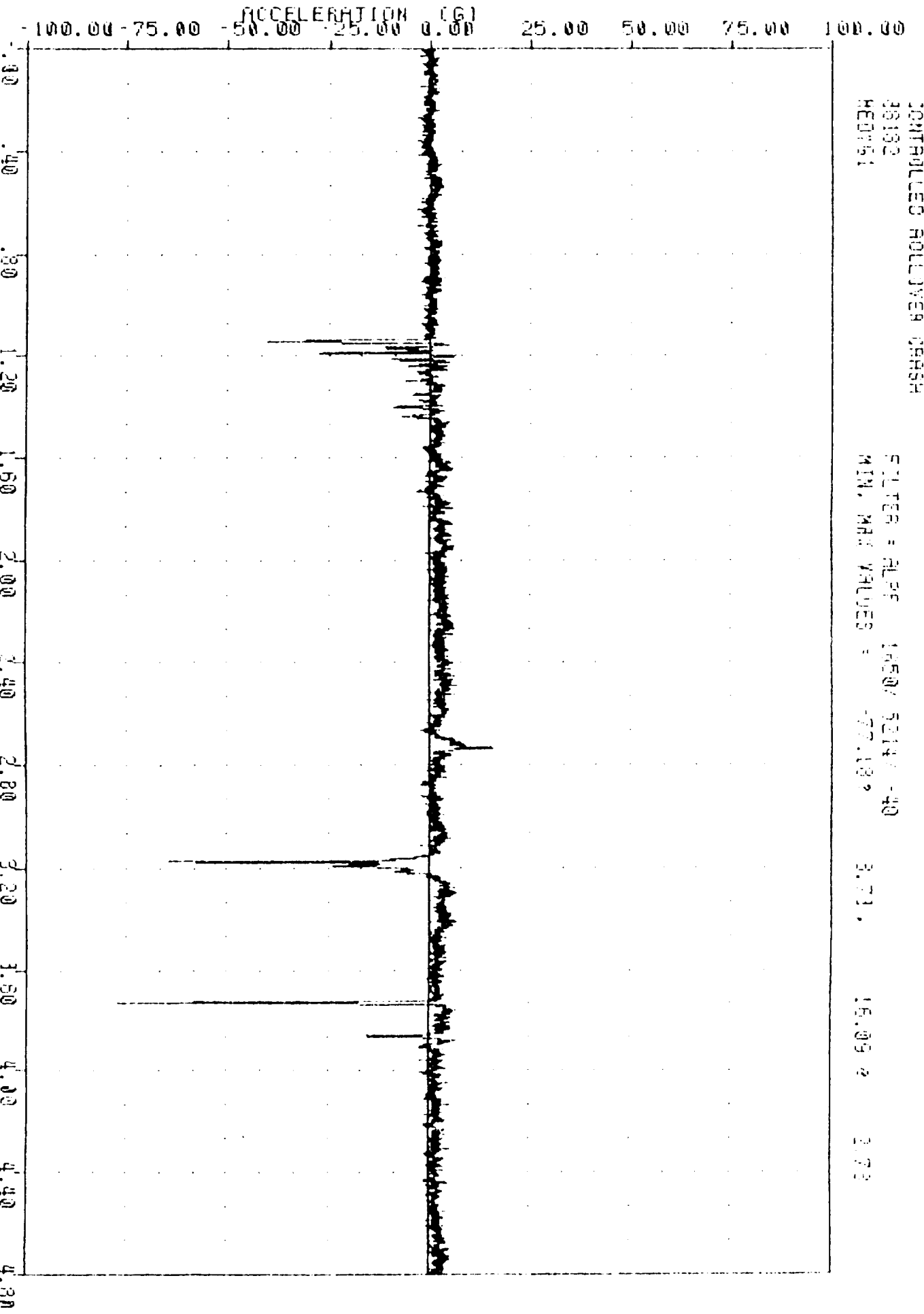
+Y MOMENT: HEAD ROTATING FORWARD

+Z MOMENT: HEAD ROTATIONG LEFTWARD

PL 300530  
CONTROLLED ROLL-OVER OBRSH  
36192  
HEADSET

FILTER = ALP 1850/5014/-40  
MIN. MAX VALUES = -57.18 2

3.71 15.09 2 2.73



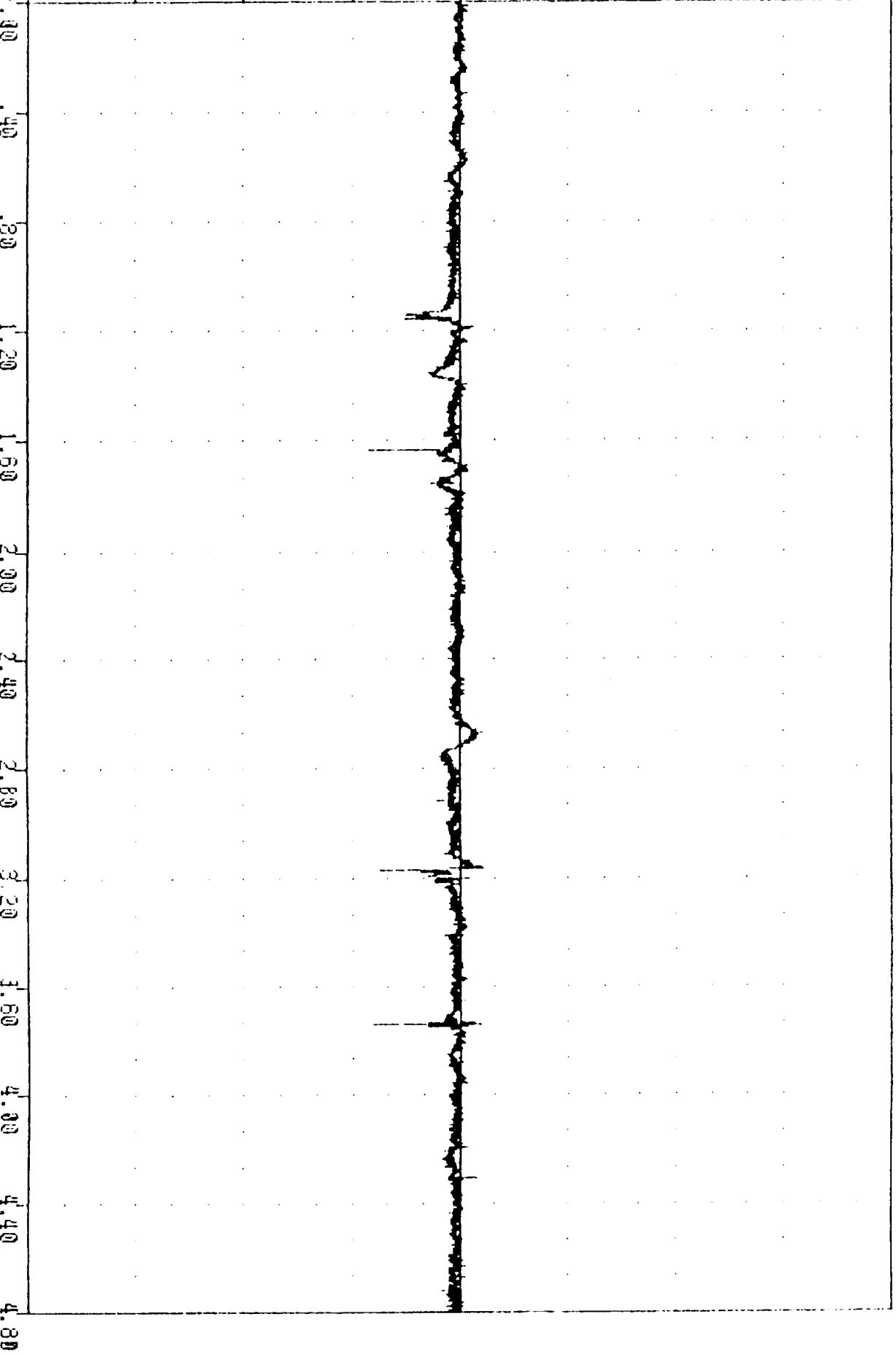
MISSAM PICKUP OFF ROLL CART  
DRIVER HEAD Y AXIS ACCELERATION

121  
5000932  
CONTROLLED FOLLOWER CRASH  
38192  
HEAD1

FILTER = ALP 1650/ 5214/ -40  
MIN. MAX VALUES = -21.04 1.64

5.56 2.87

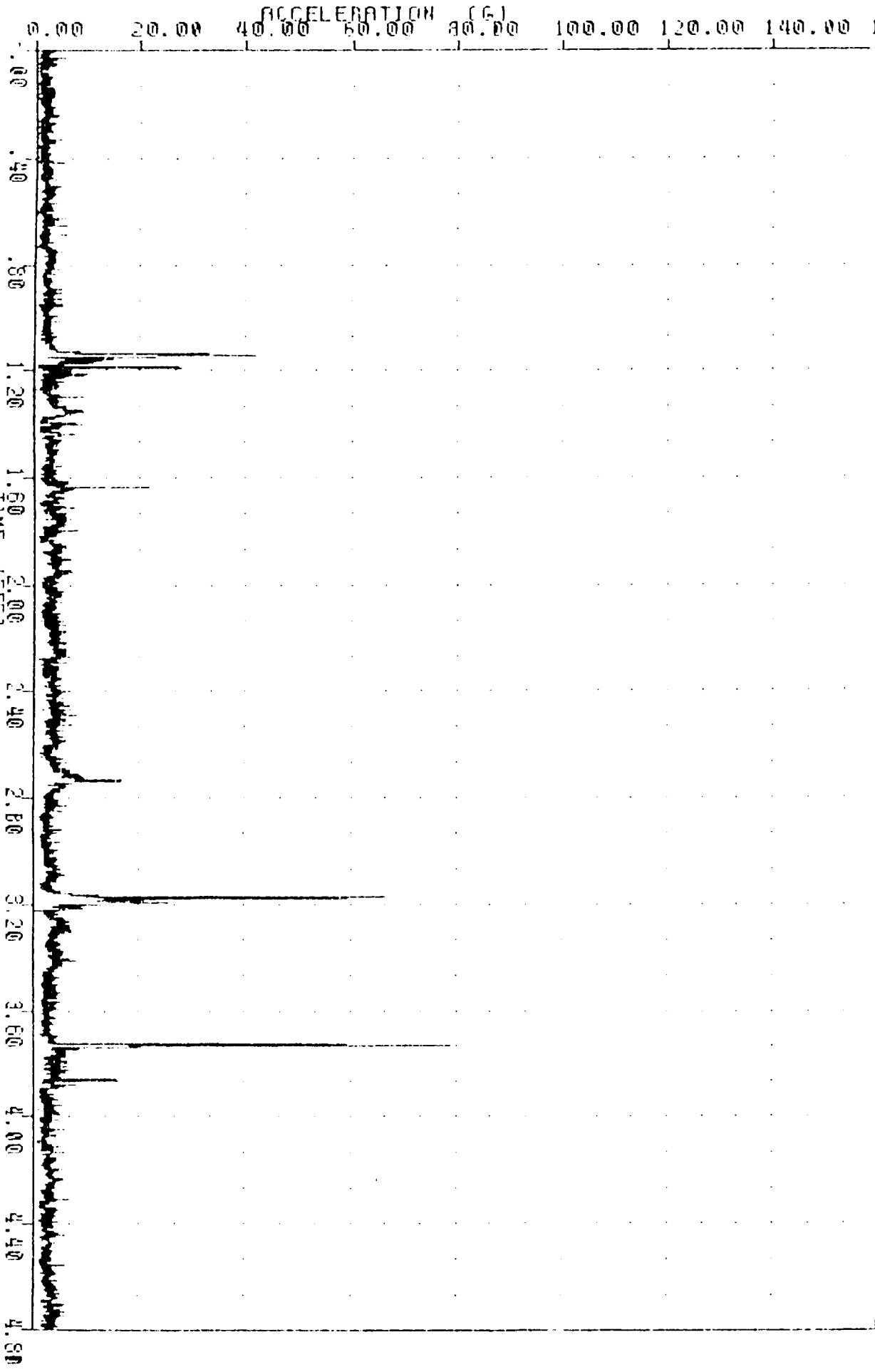
ACCELERATION (G) 100.00 75.00 50.00 25.00 0.00 25.00 50.00 75.00 100.00



TIME (SECS)  
1.60  
MISSEN PICKUP OFF ROLL CART  
DRIVER HEAD Z AXIS ACCELERATION

SEL 990830  
CONTROLLED ROLLOVER CRASH  
HEAD061

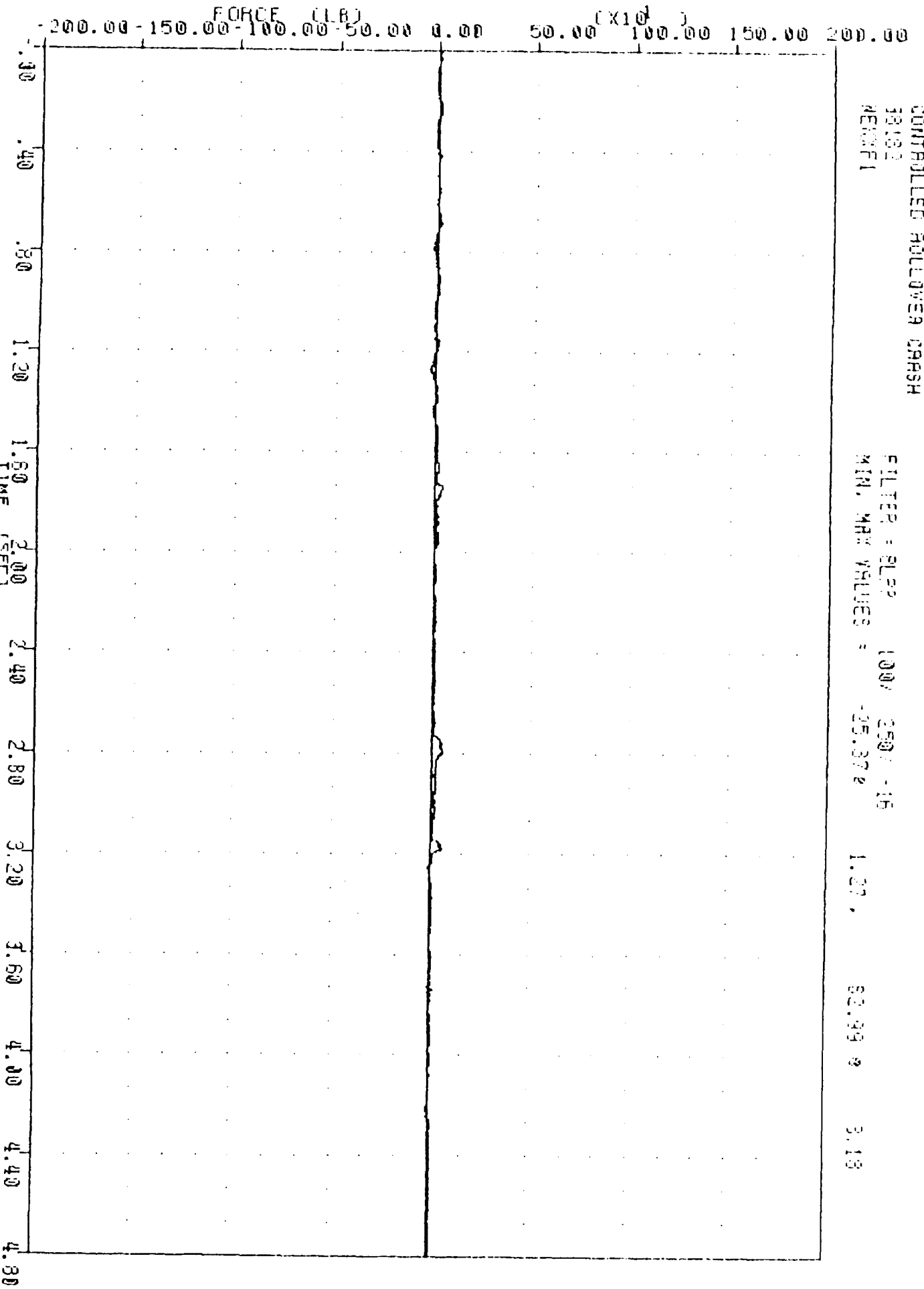
FILTER = ALPF 1650/5214/-40  
MIN. MAX VALUES = 0.12 0.18 78.75 3.73



NISSAN PICKUP OFF ROLL CART  
DRIVER HEAD ACCELERATION RECORD

RL  
 CONTROLLED FOLLOWER CRASH  
 38182  
 MEMO F1

FILTER = 8L5P 100 250 15  
 MIN. MAX VALUES = -25.87 1.27 52.99 3.18

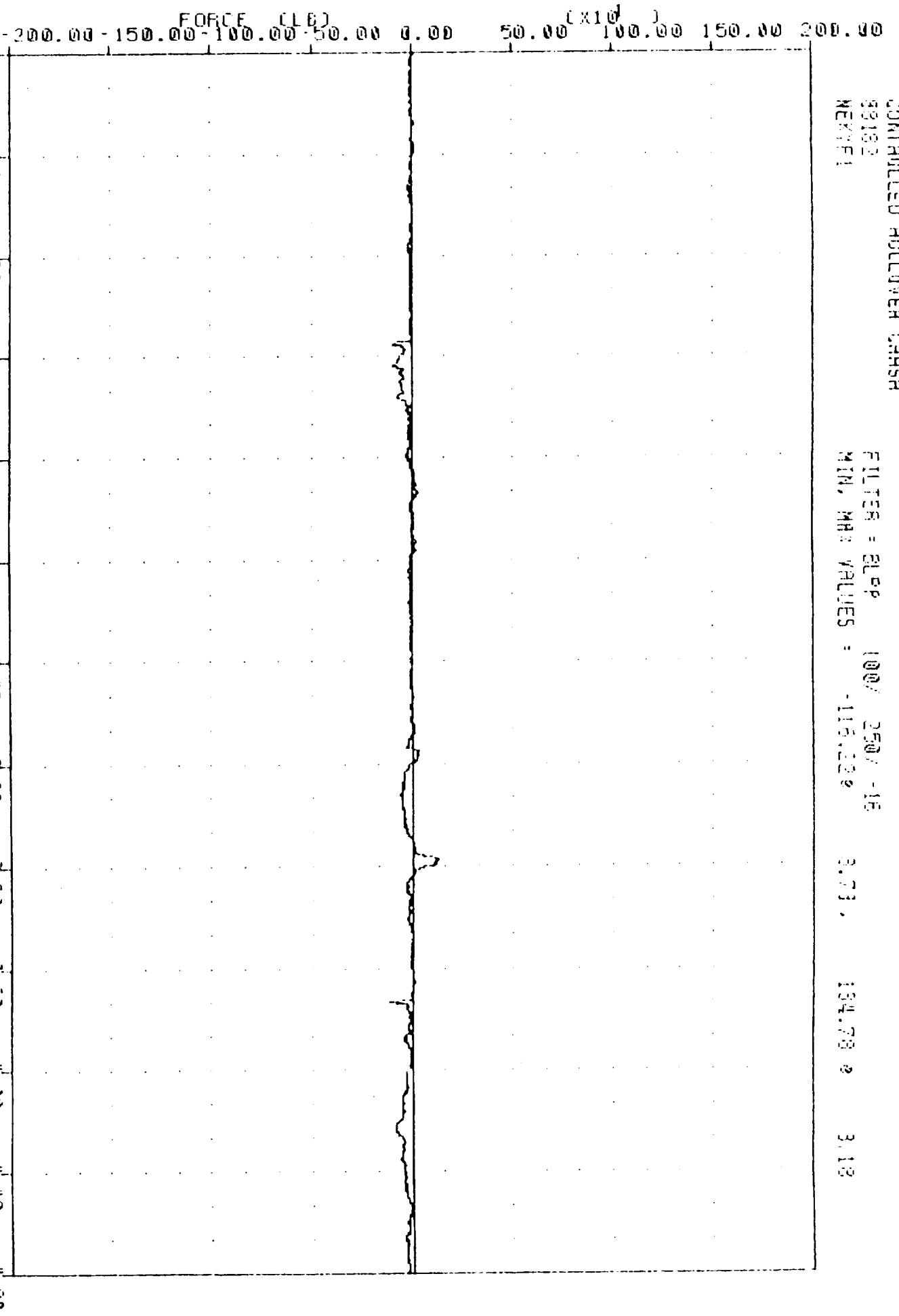


NISSAN PICKUP OFF ROLL CART  
 DRIVER NECK SHEAR FORCE X AXIS

CONTROLLED ROLL-OVER CRASH  
83182  
NEXSI1

7.000530  
FILTER = 5LP (100/ 250) -16  
MIN, MAX VALUES = -116.229 9.73

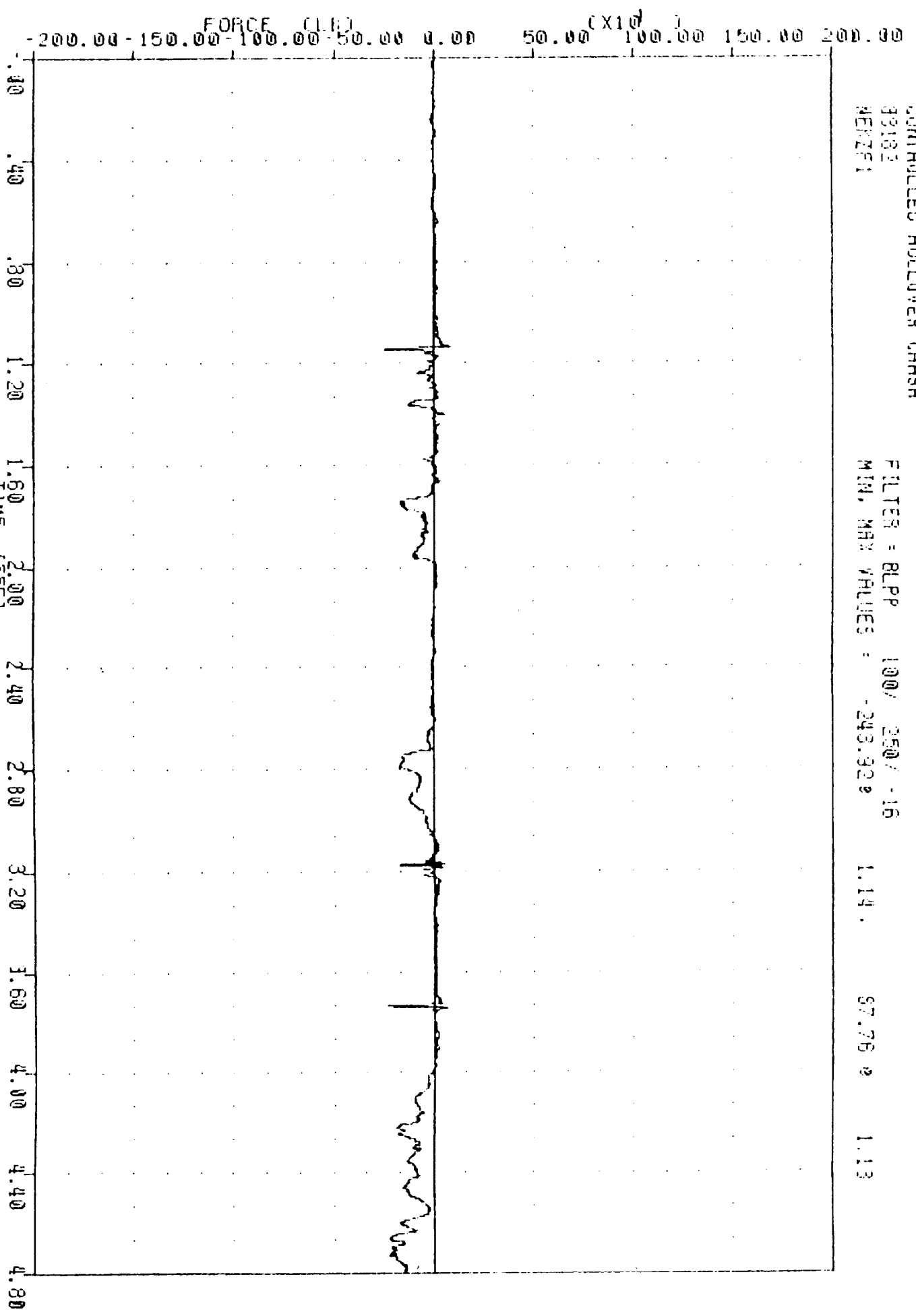
134.78 2 3.13



NISSAN PICKUP OFF ROLL CRPT  
DRIVER NECK SHEAR FORCE Y AXIS

TEL : 860136  
CONTROLLED FOLLOWER CRASH  
33182  
HERZF1

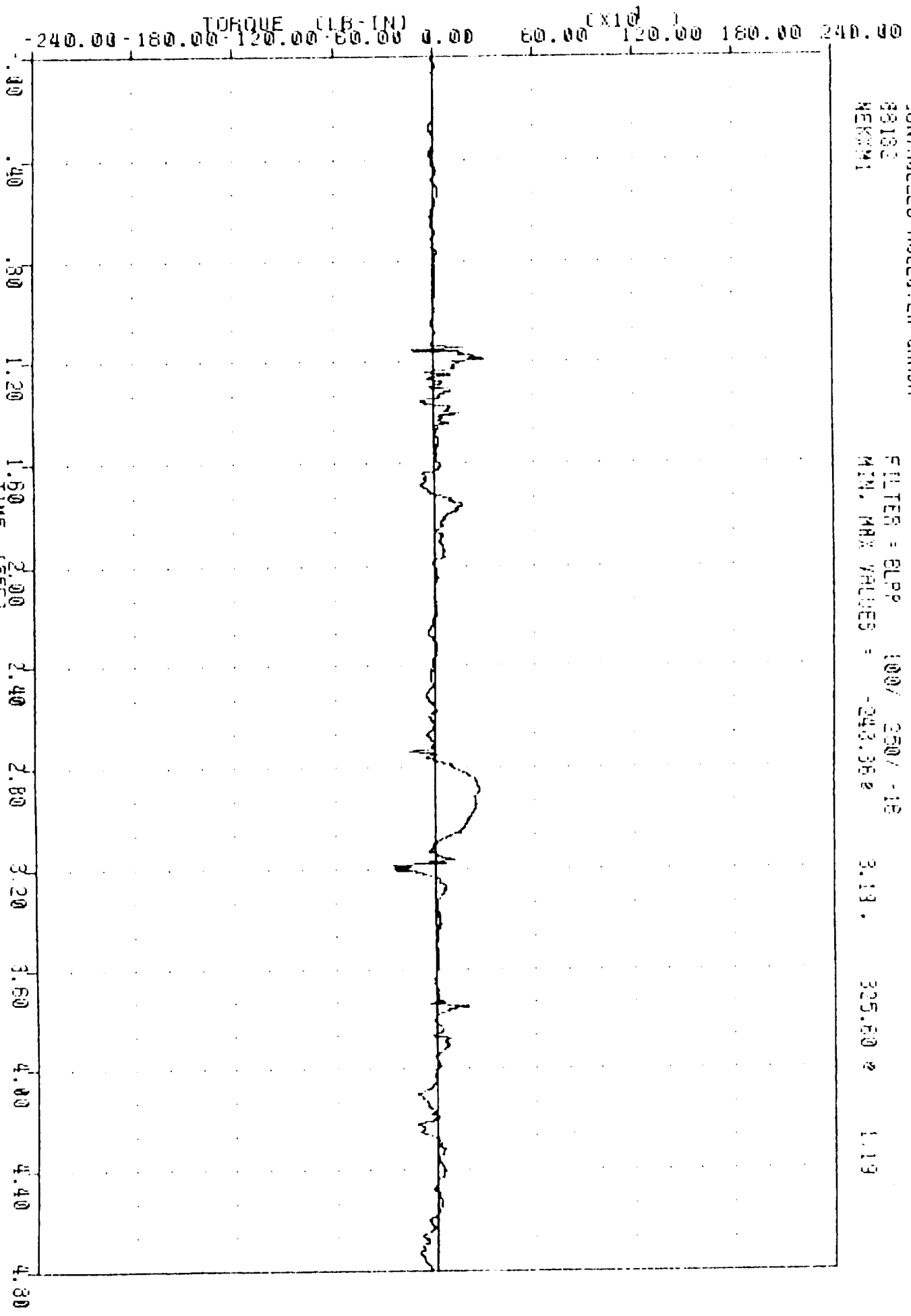
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -243.32 1.14 57.75 1.13



CONTROLLED ROLL-OVER CRASH  
88182  
MEMPHIS

FILTER = 6LP  
MIN. MAX. VALUES = -243.36 2

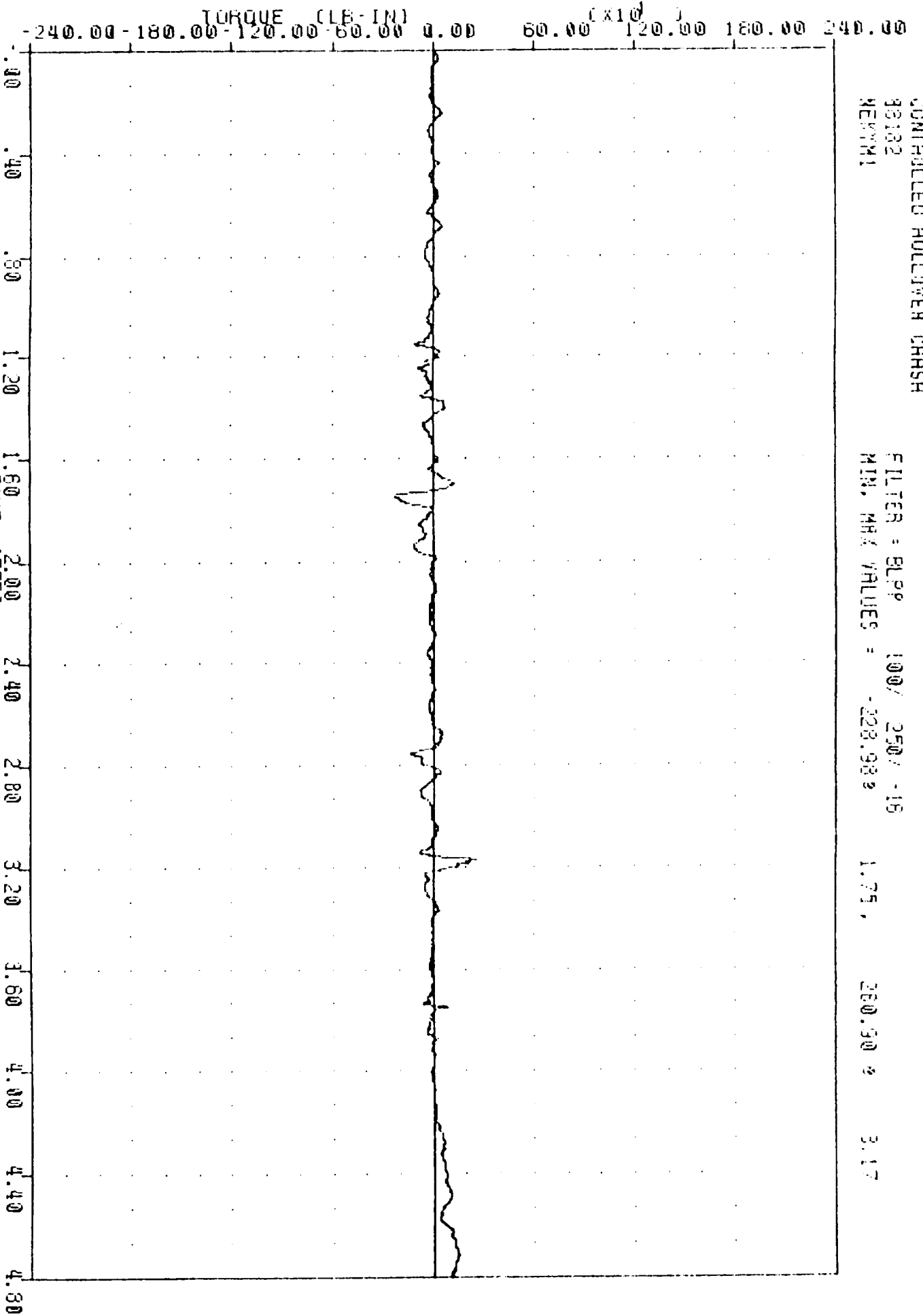
2.13 325.60 1.13



NISSAN PICKUP OFF ROLL CART  
DRIVER NECK MOMENT ABOUT X AXIS

PL 380930  
CONTROLLED FOLLOWER CRASH  
98182  
NEWMI

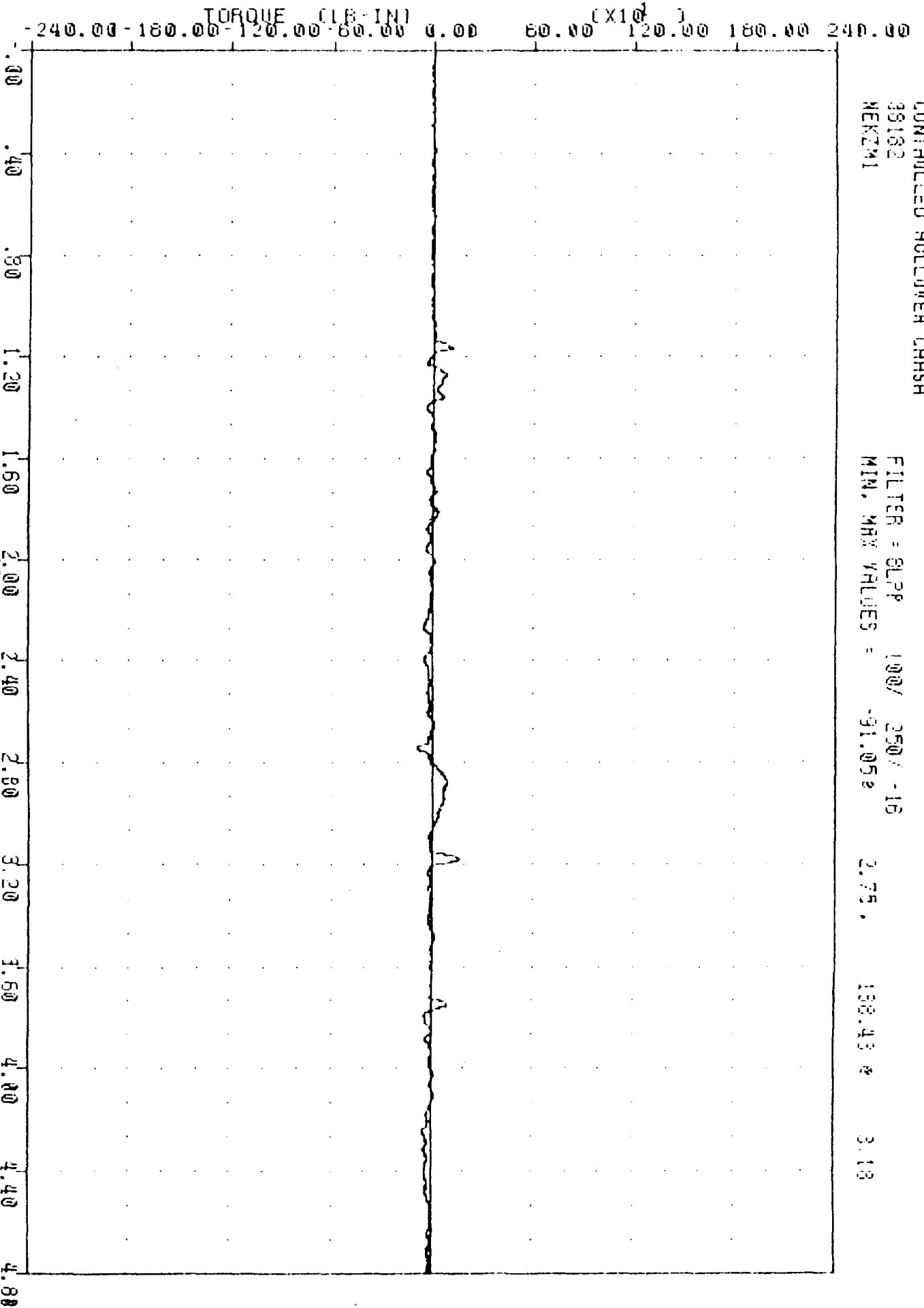
FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -228.98 260.30 3.17



NISSAN PICKUP OFF ROLL CART  
DRIVER NECK MOMENT ABOUT Y AXIS

3HL  
CONTROLLED ROLLOVER CRASH  
99182  
NEK2M1

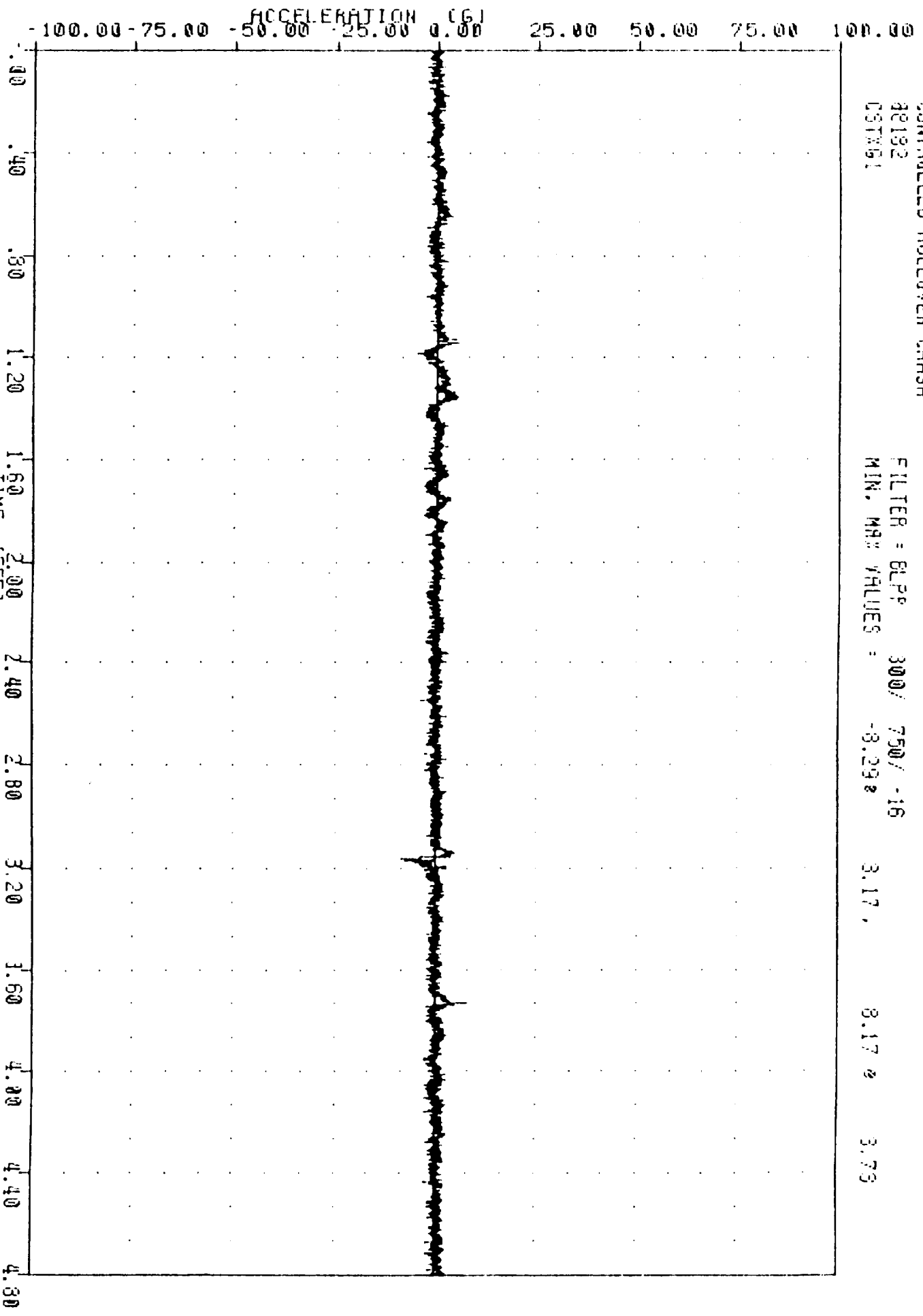
7/20/93  
FILTER = SLPF 100/ 250/ -16  
MIN, MAX VALUES = -91.052 2.75, 188.43 \* 3.18



NISSAN PICKUP OFF ROLL CART  
DRIVER NECK MOMENT ABOUT Z AXIS

SHL  
CONTROLLED ROLLOVER CRASH  
82182  
05T061

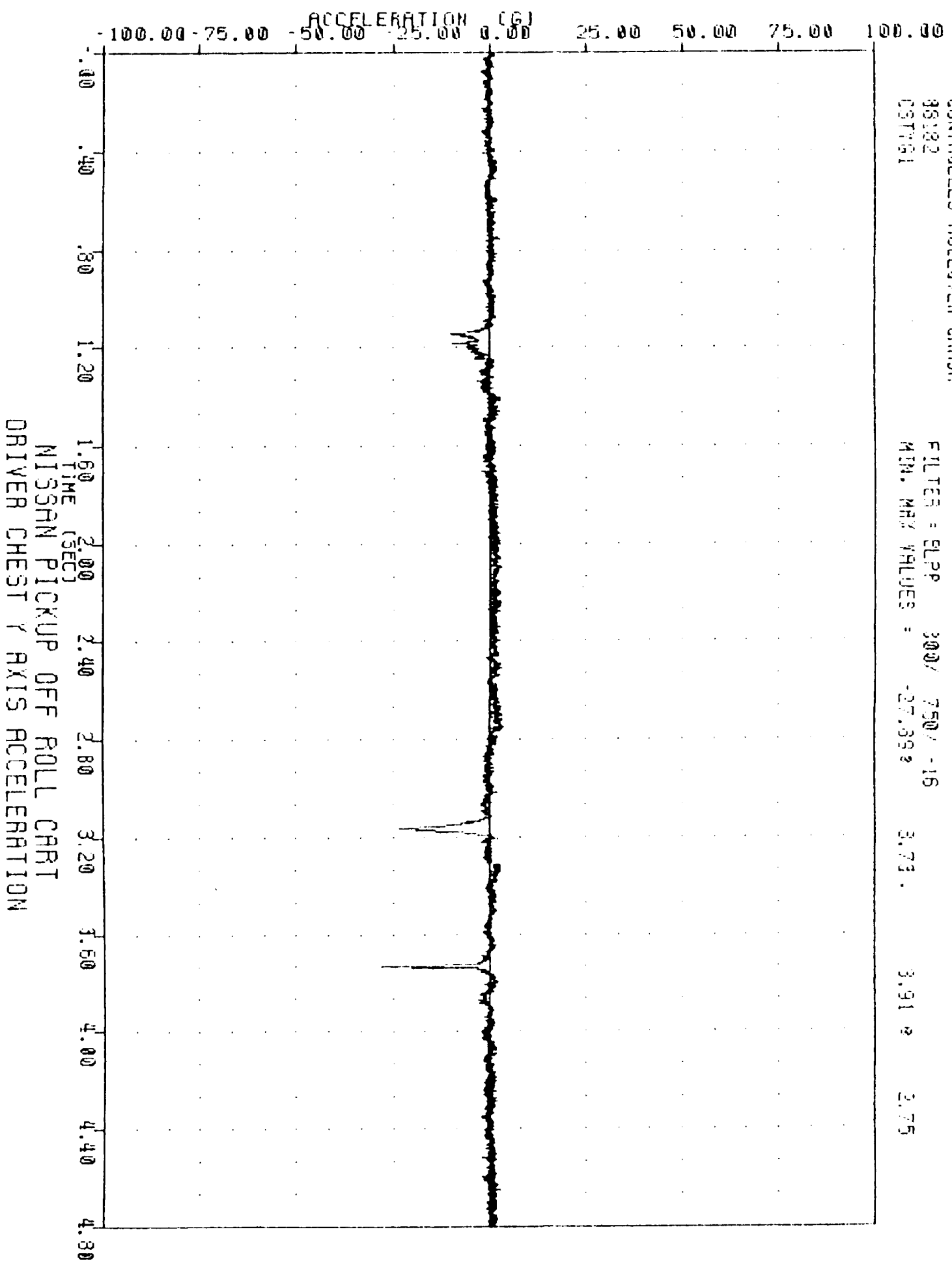
1000536  
FILTER = BLPF 300/ 750/ -16  
MIN. MAX. VALUES = -8.29 3.17, 8.17 3.75



NISSAN PICKUP OFF ROLL CART  
DRIVER CHEST X AXIS ACCELERATION

FILE 1 1000836  
CONTROLLED ROLL-OVER CRASH  
86182  
08T061

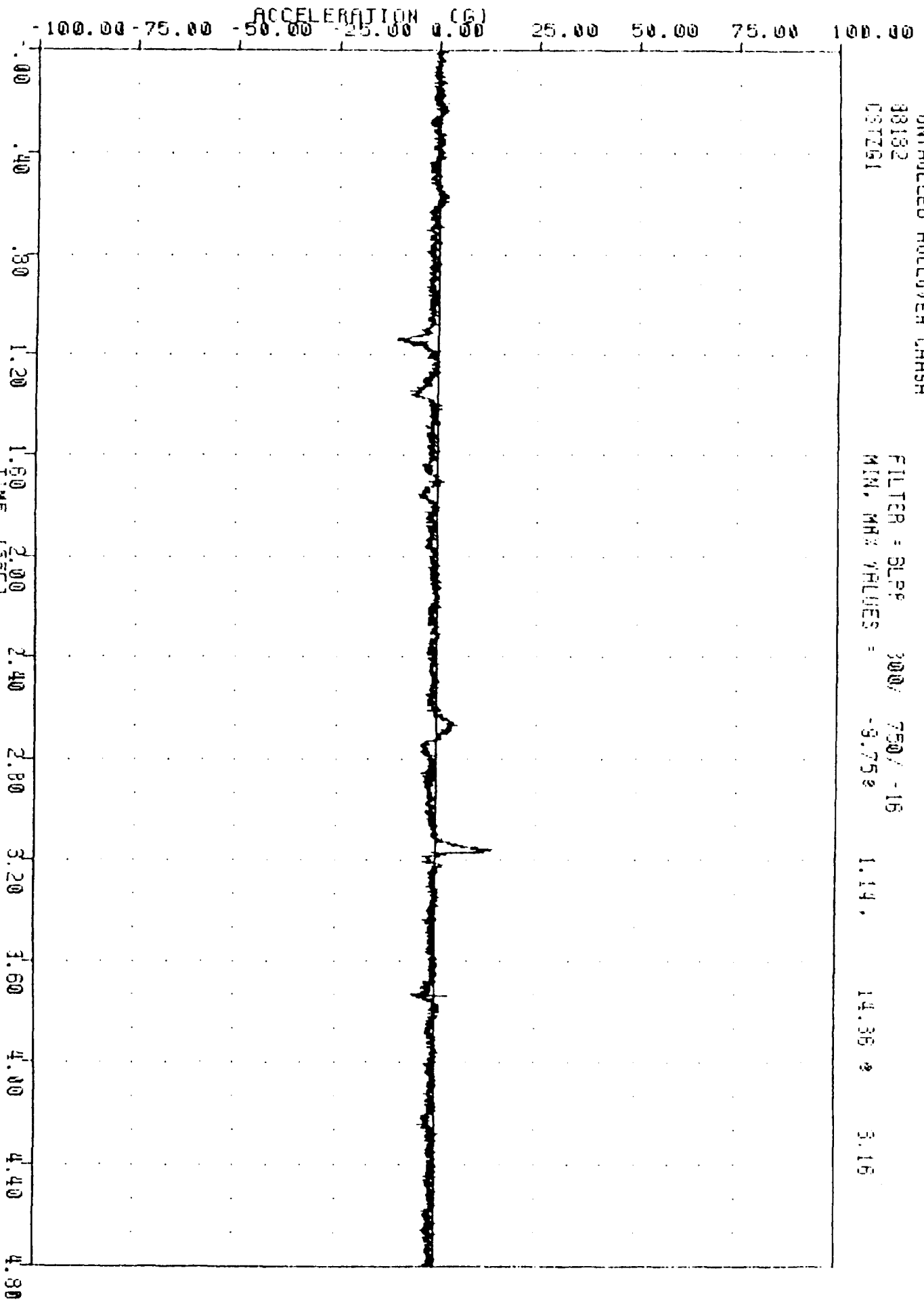
FILTER = 6LPP 300/ 750/ -16  
MIN. MAX VALUES = -27.89 3.73 3.91 2.75



Site: 100382  
CONTROLLED ROLLOVER CRASH  
88182  
031761

FILTER = 8LPP 3000 7500 -16  
MIN. MAX VALUES = -9.75e 1.14

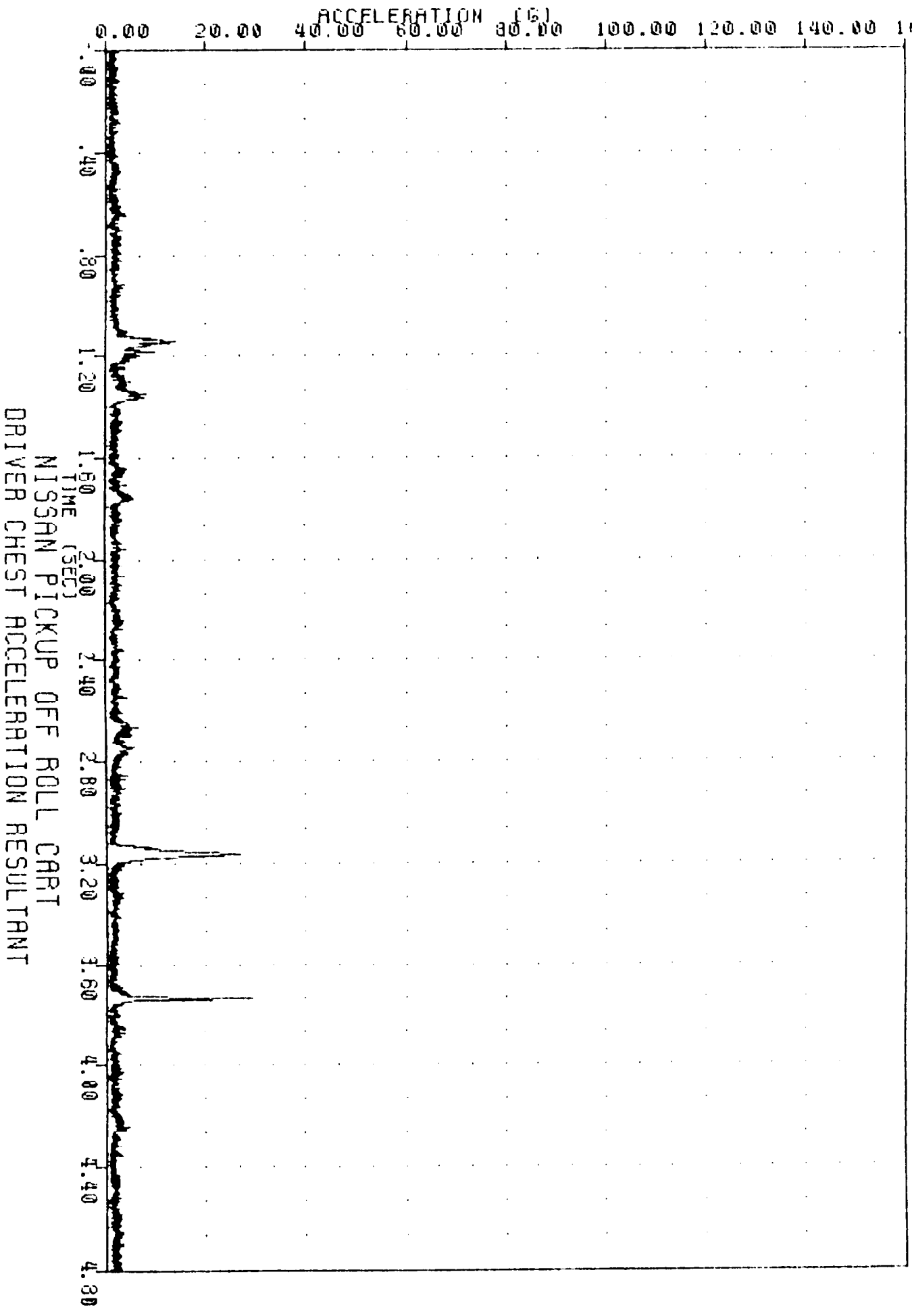
1.14 14.36 3.16



NISSAN PICKUP OFF ROLL CART  
DRIVER CHEST Z AXIS ACCELERATION

CONTROLLED ROLL-OVER CRASH  
38182  
CONTROL

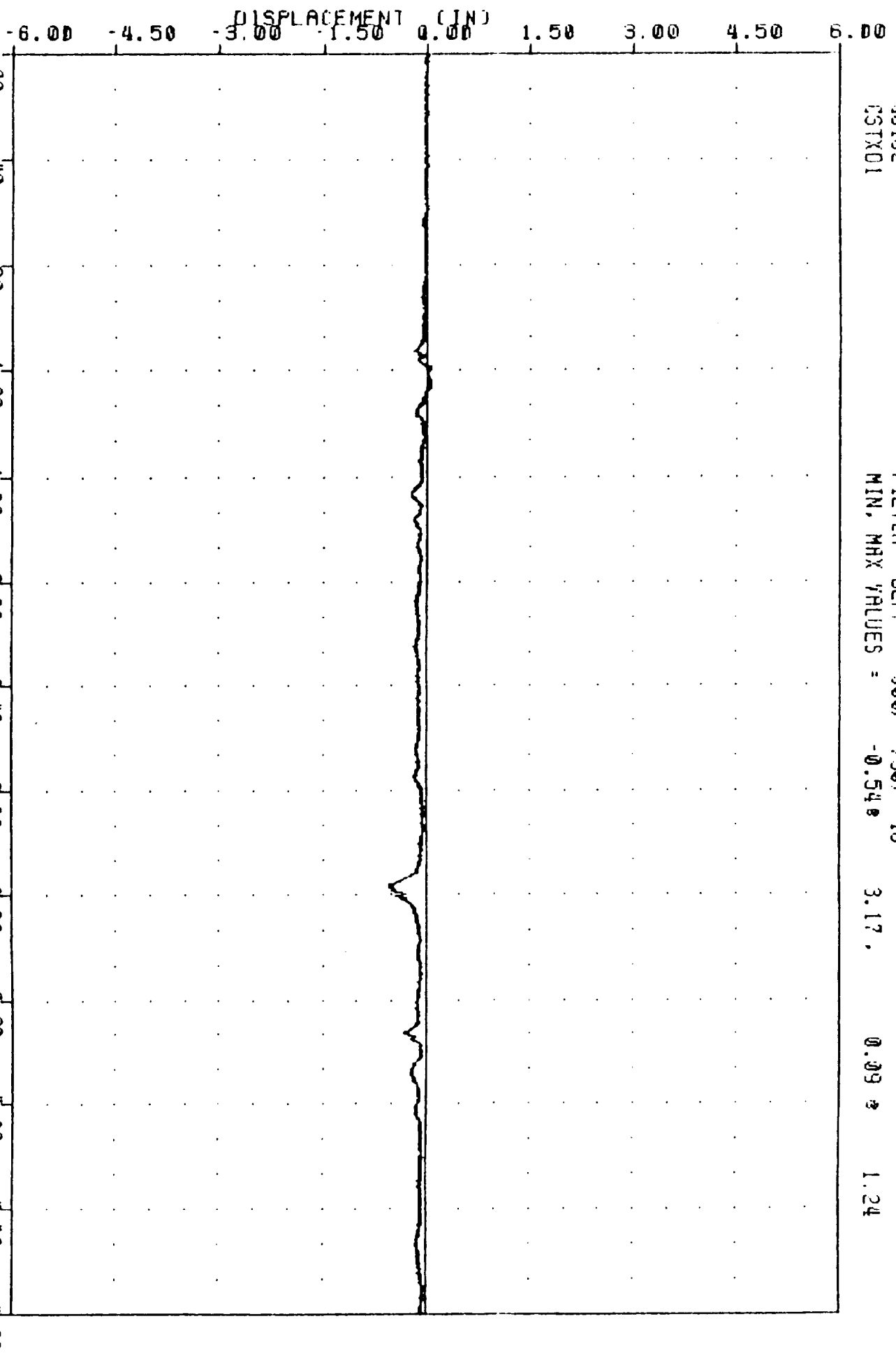
FILTER = 6LPP 300/ 750/ -16  
MIN. MAX VALUES = 0.09e 4.18, 29.00 e 3.73



DRIVER CHEST ACCELERATION RESULTANT  
NISSAN PICKUP OFF ROLL CART

380630  
CONTROLLED ROLLOVER CRASH  
38132  
CSTXD1

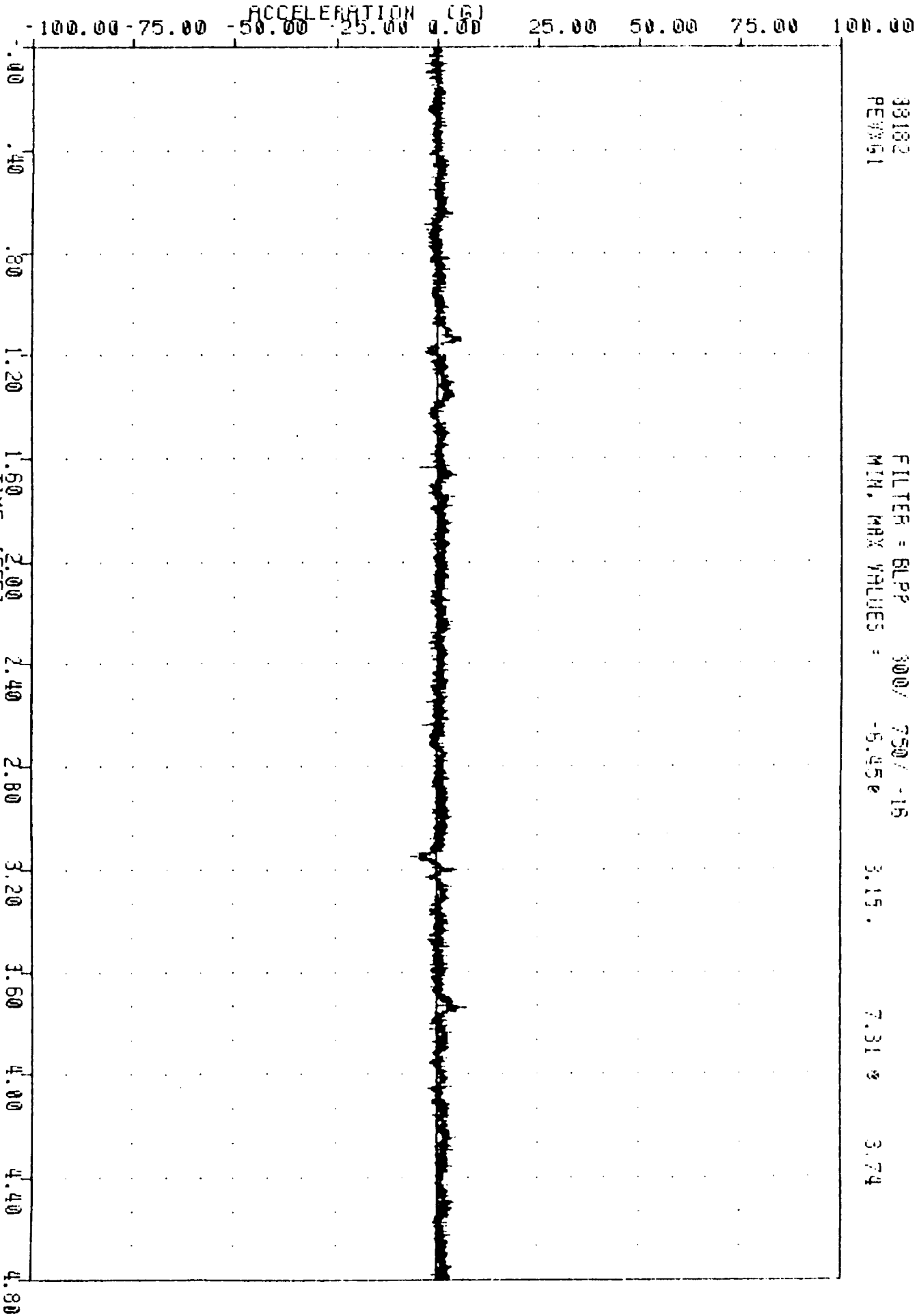
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -0.54 3.17 0.09 1.24



TIME (SEC)  
NISSAN PICKUP OFF ROLL CART  
DRIVER CHEST X AXIS DISPLACEMENT

CONTROLLED ROLLOVER CRASH  
33182  
PEV961

FILTER = 6LPP 300/ 750/ -18  
MIN, MAX VALUES = -5.45e 3.15  
7.31 3.74



NISSAN PICKUP OFF ROLL CART  
DRIVER PELVIS X AXIS ACCELERATION

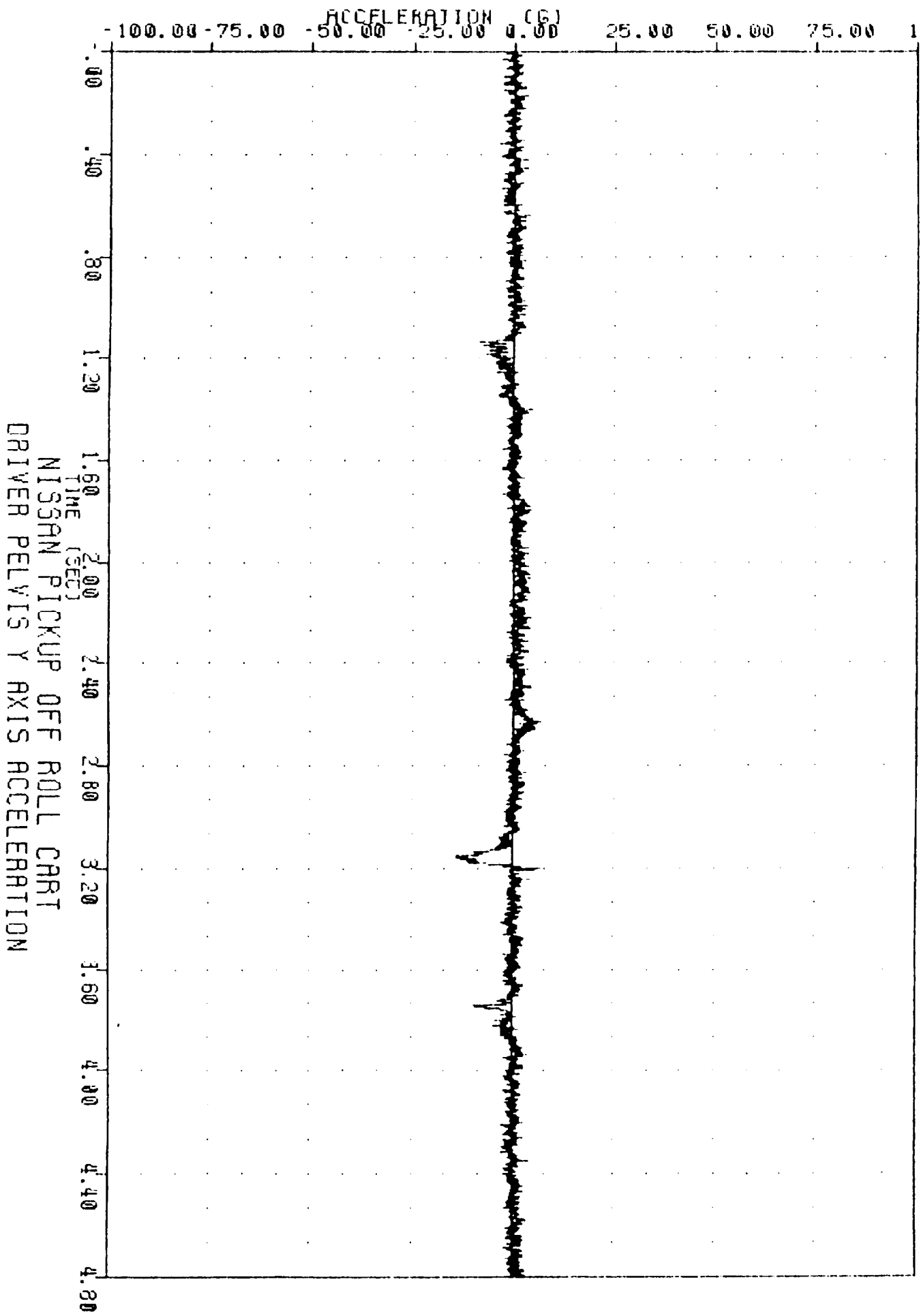
CONTROLLED ROLLOVER CRASH  
89182  
PEV761

FILTER = BLP 300/ 750/ -16  
MIN, MAX VALUES = -13.71e

3.15

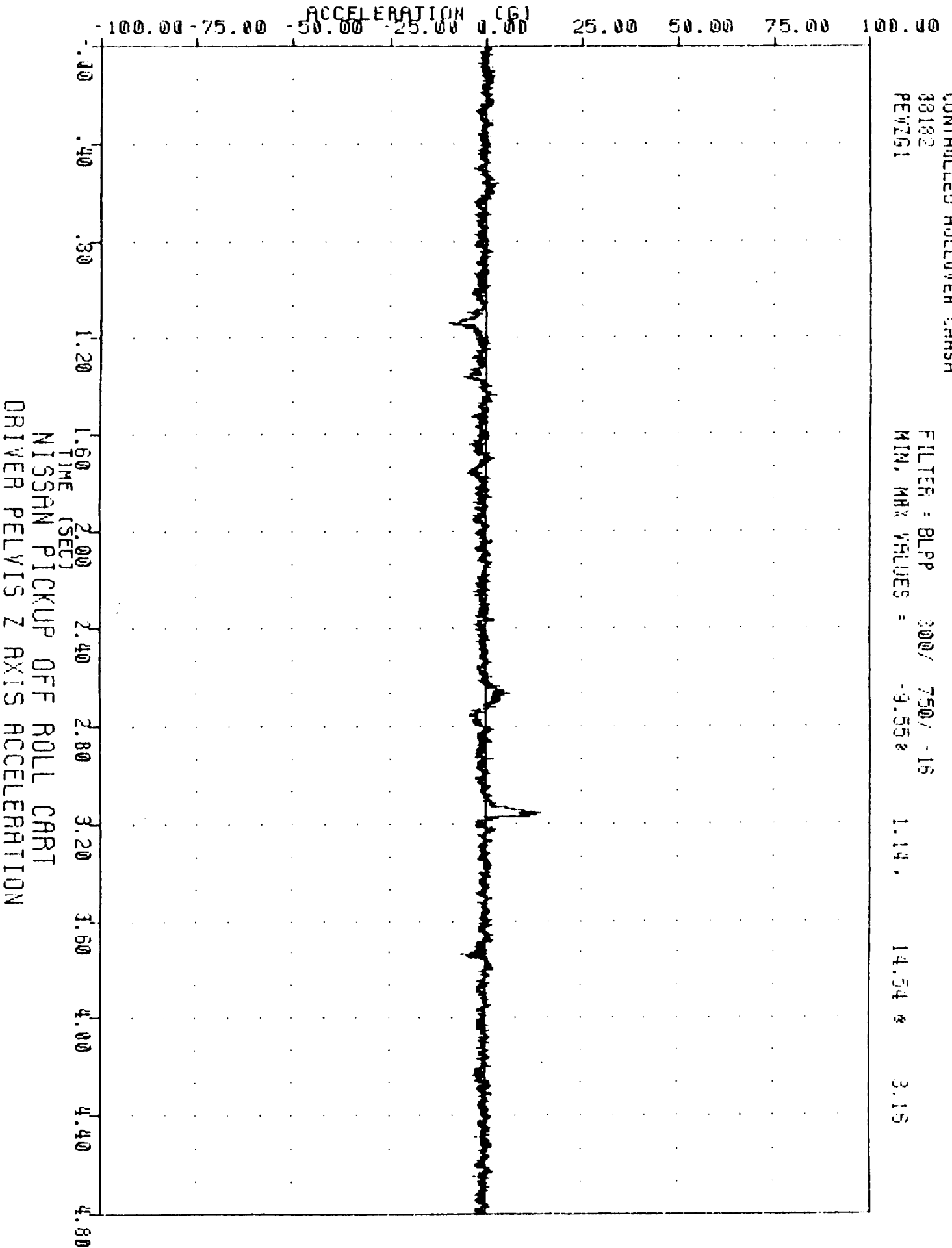
7.20

3.20



CONTROLLED ROLL-OVER CRASH  
38182  
REV161

380820  
FILTER = 8LPP 300/ 750/ -16  
MIN, MAX VALUES = -9.55g 1.14g 14.54g 3.15g



CONTROLLED FOLLOWER CRASH

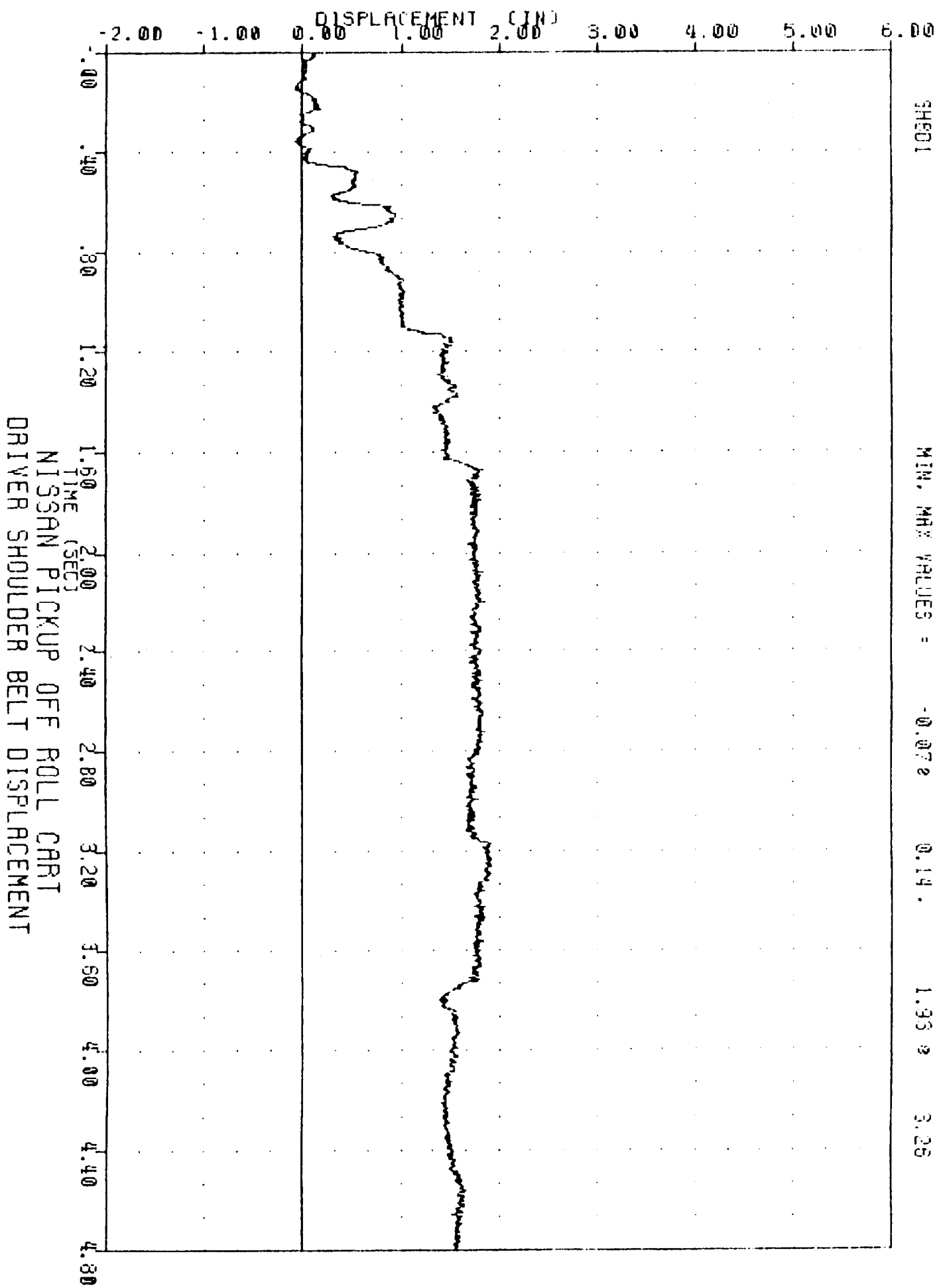
98182  
SHE01

FILTER = 8LPP 100% 250/-16  
MIN, MAX VALUES = -0.072 0.14

0.14

1.95

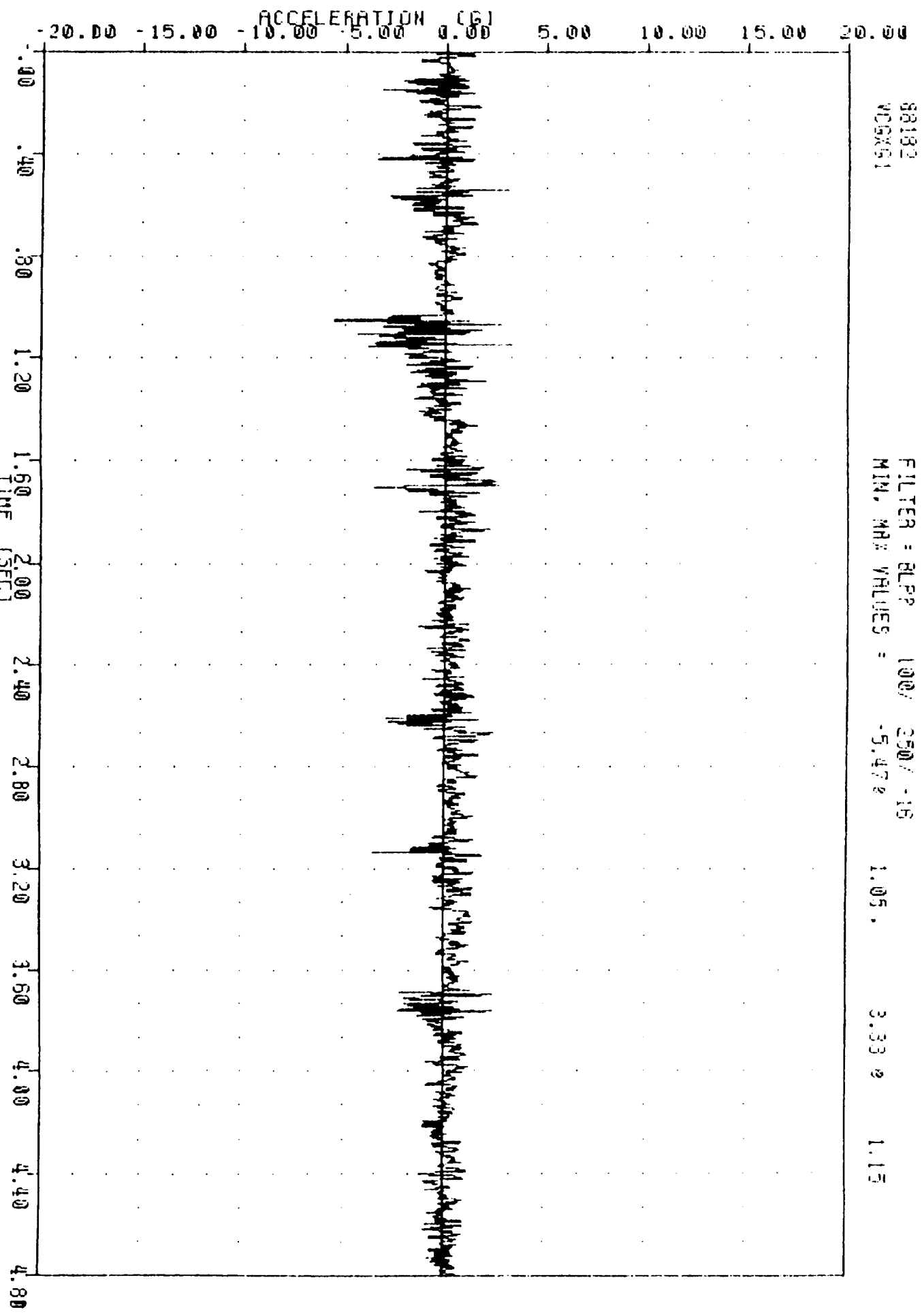
3.26



NISSAN PICKUP OFF ROLL CART  
DRIVER SHOULDER BELT DISPLACEMENT

FILE 1 000693  
CONTROLLED FOLLOWER CRASH  
88182  
W05X01

FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -5.472 1.05 3.33 2 1.15



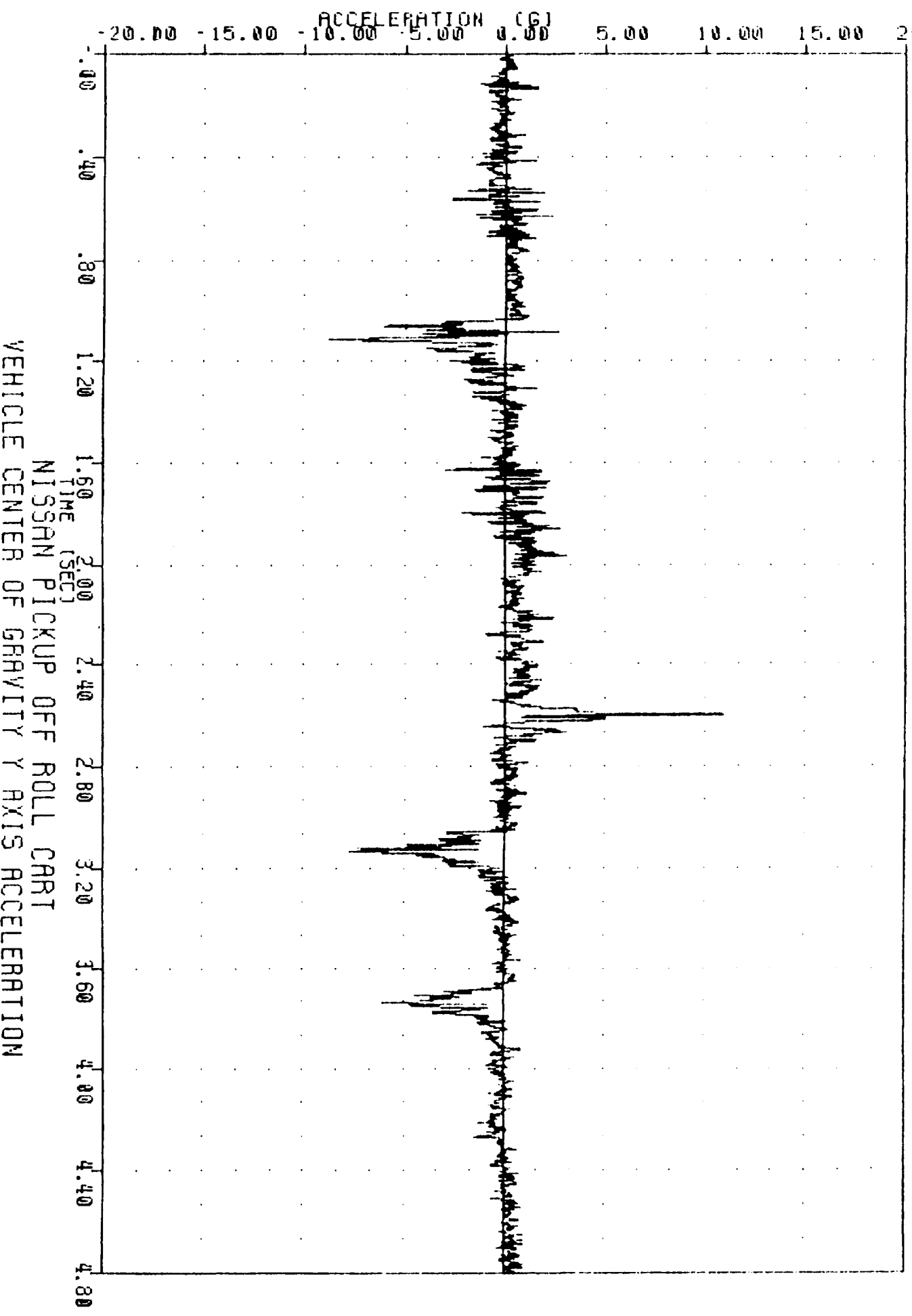
VEHICLE CENTER OF GRAVITY X AXIS ACCELERATION  
NISSAN PICKUP OFF ROLL CART

FILE 100063  
CONTROLLED ROLLOVER CRASH  
32182  
NOISE:

FILTER = 8L2P 100/ 250/ -16  
MIN, MAX VALUES = -8.73e

1.11.

10.95 e 2.50



ISL  
380535  
CONTROLLED ROLL-OVER CRASH  
38162  
W66761

FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -11.47g 1.12, 11.36g 2.61

