

VEHICLE AND OCCUPANT ROLLOVER DYNAMICS
IN A CONTROLLED ROLLOVER CRASH
1988 DODGE RAM PICKUP TRUCK

PREPARED BY:
THE TRANSPORTATION RESEARCH CENTER OF OHIO
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AUGUST - SEPTEMBER, 1990
TEST REPORT

PREPARED FOR:
SYSTEMS RESEARCH LABORATORIES, INC.
2800 INDIAN RIPPLE ROAD
DAYTON, OHIO 45440

V 1521

ERRATA (as of Nov 93) Test Number 900827

1. The following channel on the Sign Convention Sheet at the end of Appendix D should read:

Neck Load Cells: +Y Force: Head Pushed Leftward

2. All neck load cell moments should be labeled lb-ft, instead of lb-in, including:

Dummy Data Summary Sheet, page 4-5.

Plots, Appendix B

Driver Neck Moment About X Axis

Driver Neck Moment About Y Axis

Driver Neck Moment About Z Axis

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.

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

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

VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
in ³	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 ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³

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

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

VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
mL	milliliters	0.06	cubic inches	in ³
L	liters	2.1	pinta	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³

TEMPERATURE (exact)				
°C	degrees Celsius	9/5 (then degrees add 32)	degrees Fahrenheit	°F

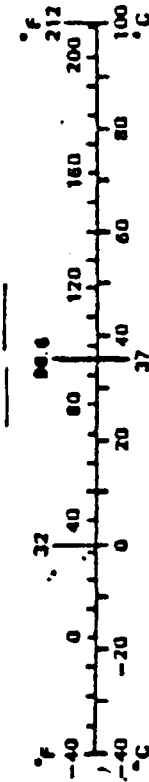


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SECTION 1.0

PURPOSE AND TEST SUMMARY

This rollover crash test has the main objective to investigate both vehicle and occupant dynamics during automobile rollover crashes.

This test was conducted with a 1988 Dodge Ram Pickup Truck on the NHTSA rollover cart moving at 30 mph, releasing the vehicle with it's roll axis perpendicular to the direction of rollover cart motion, and first contacting the vehicle's passenger side. The test vehicle contained an instrumented Part 572E dummy restrained with a three-point unbelt.

SECTION 2.0

SUMMARY OF ROLLOVER CRASH TEST

A 1988 Dodge Ram pickup truck containing a one Part 572E instrumented test dummy was placed upon the rollover test device. The rollover test device was attached to the tow cable of the drive system and towed to 30 mph. 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 right side. The vehicle made one complete roll and came to rest on its wheels. This rollover crash test was conducted by the Transportation Research Center of Ohio in East Liberty, Ohio on August 27, 1990.

The Part 572E 50th percentile adult male anthropomorphic test device (dummy) was placed in the driver's designated seating position according to the seating procedure in FMVSS 208 Notice 60. The dummy was instrumented with head, chest, and pelvis triaxial accelerometers, a six-axis neck load cell, and a chest displacement potentiometer. The crash event was recorded by thirty-four channels of data on one 14-track tape drive. The analog data was digitally sampled at 8000 samples per second. The data digitally was filtered per SAE J211 OCT88.

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

Section 1.0 contains the purpose and test summary. Section 2.0 contains a summary of the rollover crash test. Section 3.0 contains the general test and vehicle parameter data. Section 4.0 contains the occupant information. Appendix A contains the pre-test and post-test still photographs. Appendix B contains the final data plots. Appendix C contains miscellaneous information.

ROLLOVER CART INSTRUMENTATION LOCATIONS AND DATA SUMMARY

TEST NUMBER 900827

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX	SEC	MAX	SEC
1	CENTER OF GRAVITY	39.2	-3.5	8.2				
	ACCELERATION (g)							
	LONGITUDINAL				2.1	0.1	14.5	0.1
	LATERAL				10.6	0.1	1.1	1.0
	VERTICAL				18.6	0.1	1.9	0.1
	RESULTANT				25.4	0.1		
2	PLATFORM DISPLACEMENT	68.4	27.0	27.5				
	(in)							
	LEFT SIDE				21.9	0.7	0.1	0.0
	RIGHT SIDE				21.7	1.9	0.1	0.1
3	VEHICLE/ROLLOVER CART							
	SEPARATION TIMES (sec)							
	UPPER SWITCH				0.4			
	LOWER SWITCH				0.3			

* ALL MEASUREMENTS OF INSTRUMENTATION LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM ROLLOVER CART
Y: + LEFTWARD FROM ROLLOVER CART CENTERLINE
Z: + UPWARD FROM THE GROUND LEVEL
DISPLACEMENT: + OUTWARD

FINAL RESTING PLACE OF PARTS, VEHICLE AND CART

<u>DESCRIPTION OF PART</u>	<u>X, DISTANCE *</u>	<u>Y, DISTANCE *</u>
Rear window molding	63.0	0.0
Right side mirror	89.6	15.8

DESCRIPTION OF VEHICLE

Left rear corner	83.6	0.7
Right rear corner	87.4	-2.6
Left front corner	92.8	11.9
Right front corner	96.9	8.8

DESCRIPTION OF CART

Left rear corner	47.7	7.4
Right rear corner	47.6	-2.0
Left front corner	54.0	6.8
Right front corner	50.4	-5.4

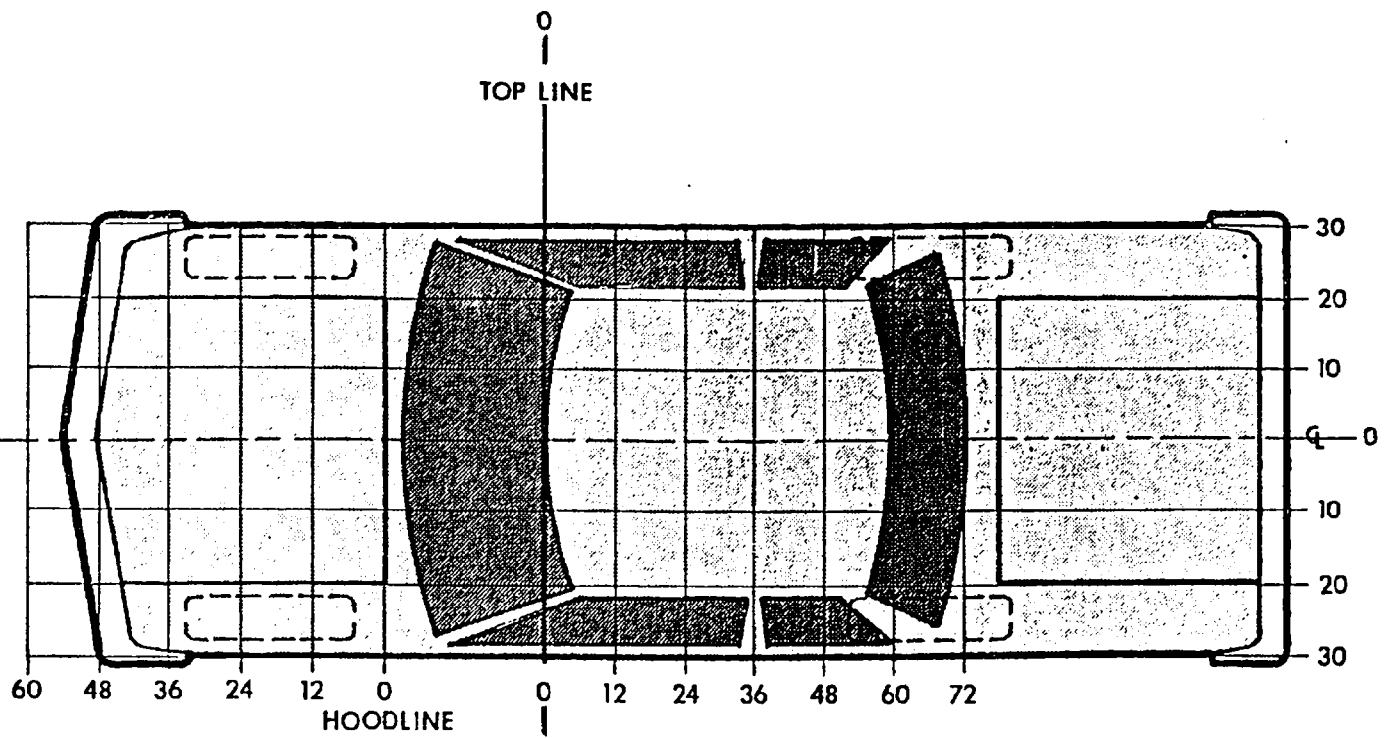
*REFERENCE: +X: FORWARD FROM RELEASE BLOCK
 +Y: LEFTWARD FROM CENTER RELEASE BLOCK

ALL MEASUREMENTS ARE IN FEET.

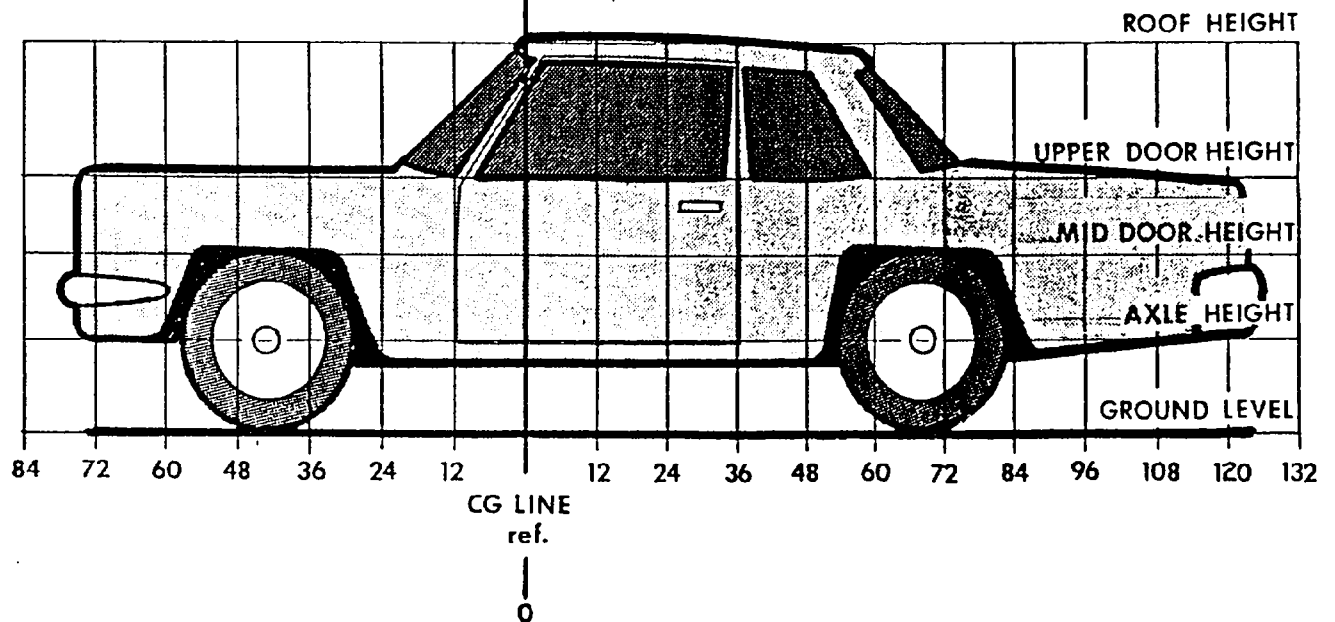
VEHICLE INTERIOR MEASUREMENTS

<u>DESCRIPTION</u>	<u>PRE</u>	<u>POST</u>	<u>DIFF</u>
Floor board to top of left "A" post	41.5	32.1	9.4
Floor board to top of right "A" post	41.0	32.2	8.8
Door sill to top of left "B" post	42.2	33.2	9.0
Door sill to top of right "B" post	42.3	35.8	6.5
Door sill to top of left door opening	42.2	31.4	10.8
Door sill to top of right door opening	42.0	33.6	8.4
Floor tunnel to windshield header	37.4	30.5	6.9
Floor tunnel to center of roof	38.2	30.5	7.7
Rear of floor tunnel to roof	41.9	30.1	11.8
Maximum width at "B" post	55.8	56.2	-0.4
Maximum width at "A" post	53.3	53.0	0.3
Maximum width at top of door opening	41.0	45.2	-4.2

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
<u>PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>							
Trailing edge of cowl at centerline	X	40.3	40.5	41.4	41.0	40.5	X
Trailing edge of cowl + 12 inches***	X	39.0	39.7	39.5	39.8	39.5	X
Trailing edge of cowl + 24 inches	X	37.8	38.2	38.4	38.2	38.0	X
Trailing edge of cowl + 36 inches	X	35.5	36.0	36.0	36.0	35.5	X
Trailing edge of cowl + 48 inches	X	X	X	X	X	X	X
<u>POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>							
Trailing edge of cowl at centerline	X	36.0	37.9	38.4	38.8	38.4	X
Trailing edge of cowl + 12 inches	X	35.2	36.9	37.3	37.8	37.4	X
Trailing edge of cowl + 24 inches	X	33.9	35.2	36.0	36.6	36.5	X
Trailing edge of cowl + 36 inches	X	31.7	32.9	33.8	34.5	34.9	X
Trailing edge of cowl + 48 inches	X	X	X	X	X	X	X
<u>STATIC CRUSH (IN)</u>							
Trailing edge of cowl at centerline	X	-4.3	-2.6	-3.0	-2.2	-2.1	X
Trailing edge of cowl + 12 inches	X	-3.8	-2.8	-2.2	-2.0	-2.1	X
Trailing edge of cowl + 24 inches	X	-3.9	-3.0	-2.4	-1.6	-1.5	X
Trailing edge of cowl + 36 inches	X	-3.8	-3.1	-2.2	-1.5	-0.6	X
Trailing edge of cowl + 48 inches	X	X	X	X	X	X	X

* Column readings are left to right from left to right on vehicle.

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

***Longitudinal distance from trailing edge of cowl at centerline forward to measurement plane.

+ 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
<u>PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>					
Longitudinal Center of Gravity	X	X	58.2	X	X
Longitudinal Center of Gravity + 12 inches***	59.0	59.9	60.0	59.9	59.1
Longitudinal Center of Gravity + 24 inches	59.1	59.9	60.0	60.1	59.1
Longitudinal Center of Gravity + 36 inches	X	X	X	X	X
Longitudinal Center of Gravity + 48 inches	X	X	X	X	X
Longitudinal Center of Gravity + 60 inches	X	X	X	X	X
<u>POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>					
Longitudinal Center of Gravity	X	X	45.2	X	X
Longitudinal Center of Gravity + 12 inches	45.0	44.9	45.4	46.0	46.6
Longitudinal Center of Gravity + 24 inches	43.5	44.1	45.2	45.2	45.5
Longitudinal Center of Gravity + 36 inches	X	X	X	X	X
Longitudinal Center of Gravity + 48 inches	X	X	X	X	X
Longitudinal Center of Gravity + 60 inches	X	X	X	X	X
<u>STATIC CRUSH (IN)</u>					
Longitudinal Center of Gravity	X	X	-13.0	X	X
Longitudinal Center of Gravity + 12 inches	-14.0	-15.0	-14.6	-13.9	-12.5
Longitudinal Center of Gravity + 24 inches	-15.6	-15.8	-14.8	-14.9	-13.6
Longitudinal Center of Gravity + 36 inches	X	X	X	X	X
Longitudinal Center of Gravity + 48 inches	X	X	X	X	X
Longitudinal Center of Gravity + 60 inches	X	X	X	X	X

* Column readings are left to right from left to right on vehicle.

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

*** Longitudinal distance from center of gravity rearward to measurement plane.

+ 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	59.6	X	X	X	X	X	24.0	24.2	24.5	X	X	X	X	X	X	X
Upper Door	37.0	19.0	18.5	18.0	17.3	17.0	16.8	16.5	17.1	17.0	16.5	16.2	16.0	16.8	X	X
Mid Door	26.2	17.6	X	X	16.2	16.0	16.1	16.0	16.1	15.8	X	X	16.2	16.1	X	X
Axle Height	12.8	X	X	X	18.0	18.0	17.6	17.8	17.5	17.5	X	X	X	X	X	X

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

Roof Height	59.6	X	X	X	X	X	34.3	35.1	37.8	X	X	X	X	X	X	X
Upper Door	37.0	23.4	22.6	21.9	21.2	20.4	17.9	17.5	19.2	19.9	19.4	20.2	19.6	19.8	19.8	X
Mid Door	26.2	18.8	X	X	17.8	16.1	15.4	15.8	17.2	17.6	16.9	X	X	17.4	17.4	X
Axle Height	12.8	X	X	X	18.2	17.9	17.8	17.8	17.5	17.5	X	X	X	X	X	X

STATIC CRUSH (IN)

Roof Height	59.6	X	X	X	X	X	10.3	10.9	13.3	X	X	X	X	X	X	X
Upper Door	37.0	4.4	4.1	3.9	3.9	3.4	1.1	0.7	2.7	2.8	2.4	3.7	3.4	3.8	3.0	X
Mid Door	26.2	1.2	X	X	1.6	0.1	-0.7	-0.2	1.2	1.5	1.1	X	X	1.2	1.3	X
Axle Height	12.8	X	X	X	0.2	-0.1	0.2	0.0	0.0	0.0	X	X	X	X	X	X

* Center of gravity is located 53.0 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	57.6	X	X	X	X	X	23.9	24.1	24.0	X	X	X	X	X	X	X
Upper Door	37.0	19.0	18.6	17.6	17.0	17.0	16.2	16.2	16.2	16.6	16.8	16.8	16.8	16.8	16.8	X
Mid Door	26.2	17.8	X	X	16.4	16.0	15.8	15.5	15.6	15.8	15.9	X	X	15.9	16.2	X
Axle Height	12.8	X	X	X	18.0	18.0	17.5	17.8	17.5	17.8	X	X	X	X	X	X

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

Roof Height	57.6	X	X	X	X	X	20.0	18.4	17.4	X	X	X	X	X	X	X
Upper Door	37.0	17.2	16.2	15.4	14.2	11.8	9.1	6.8	7.6	15.1	15.9	15.5	15.5	15.2	15.0	X
Mid Door	26.2	17.0	X	X	14.5	13.1	11.4	9.6	12.4	15.1	14.9	X	X	14.8	15.0	X
Axle Height	12.8	X	X	X	19.9	19.4	18.8	18.8	17.8	18.4	X	X	X	X	X	X

STATIC CRUSH (IN)

Roof Height	57.6	X	X	X	X	X	-3.9	-5.7	-6.6	X	X	X	X	X	X	X
Upper Door	37.0	-1.8	-2.4	-2.2	-2.8	-5.2	-7.1	-9.4	-8.6	-1.5	-0.9	-1.3	-1.3	-1.6	-1.8	X
Mid Door	26.2	-0.8	X	X	-1.9	-2.9	-4.4	-5.9	-3.2	-0.7	1.0	X	X	-1.1	-1.2	X
Axle Height	12.8	X	X	X	1.9	1.4	1.3	1.0	0.3	0.6	X	X	X	X	X	X

* Center of gravity is located 53.0 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.

IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Dodge Ram

TEST NUMBER: 900827

NO.	TYPE OF MEASUREMENT	ALL MEASUREMENTS ARE IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	182.0	181.5	0.5
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	161.5	161.5	0.0
X3	REAR SURFACE OF VEHICLE TO FIREWALL	142.0	141.6	0.4
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	131.2	131.6	-0.4
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	130.9	129.8	1.1
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	131.1	131.4	-0.3
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	131.2	130.4	0.8
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	91.2	92.0	-0.8
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	90.9	90.9	0.0
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	91.2	91.5	-0.3
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	91.0	90.5	0.5
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	129.8	130.0	-0.2
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	129.6	129.4	0.2
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	140.5	140.9	-0.4
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	140.2	139.5	0.7
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	113.5	111.8	1.7
X17	CENTER OF STEERING COLUMN TO "A" POST	15.0	6.8	8.2
X18	CENTER OF STEERING COLUMN TO HEADLINER	18.0	5.6	12.4
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	180.0	179.4	0.6
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	180.0	180.0	0.0
X21	LENGTH OF ENGINE BLOCK	18.0	18.0	0.0

TEST ANOMALIES

The driver's neck axial force Z axis, NEKZF1, data exceeded the channel's full scale at 0.99 seconds, also the data was questionable between 2.35 and 2.45 seconds.

The driver's neck moment about Y axis, NEKYM1, data exceeded the channels' full scale at 1.0 seconds.

EVENT TIMES

TEST DATE: 08/27/90

EVENT DESCRIPTION	TIME, SEC.
CONTACT RELEASE BLOCK	0.0
START COLLECTING DATA	-0.7
STOP COLLECTING DATA	5.8
ZERO TIME FOR DATA	0.0
STROBE LIGHTS FLASH	0.0
CAMERA L E D GOES OFF	0.0*
PIN RELEASES (ROLLOVER CART)	-0.429**
CYLINDERS START (ROLLOVER CART)	0.15

*Locate frame where event LED stripe ends. Put projector into reverse mode and go backwards 4 frames. This frame is time-zero for the data.

**Release time as setup on rollover cart control panel and as setup by position of rollover cart cycle start switch and release block. Cycle start switch was 20 feet in front of release block.

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: Mitsubishi Motor Corporation

MAKE/MODEL: Dodge Ram

VIN: JB7FL24DXJP014121

BODY STYLE: Pickup truck

MODEL YEAR: 1988

NHTSA NO.: NA

COLOR: Red

ENGINE DATA: TYPE: inline CYLINDERS: 4 DISPLACEMENT: 2.0 liter

TRANSMISSION DATA: 3 SPEED, MANUAL, X AUTOMATIC, FWD, X RWD, 4WD

DATE VEHICLE RECEIVED: 8/15/90

ODOMETER READING: 45,367

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	Yes
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	No
RADIO	Yes	ANTI-SKID BRAKE	Yes
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER	None		

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
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: Good

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Mitsubishi Motor Corporation

DATE OF MANUFACTURE: 7/87

VIN: JB7FL24DXJP014121

GVWR: 4165 LBS

GAWR: FRONT: 2000 LBS., REAR: 2540 LBS.

TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Yokohama 85B steel P195/75R14

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 35 PSI
REAR: 35 PSI

SPARE TIRE (MFR., LINE, SIZE): Yokohama 85B steel P195/75R14

TYPE OF SEATS: FRONT: Bench
REAR: NA

TYPE OF FRONT SEAT BACKS: Non-adjustable

MAXIMUM WIDTH: 64.8 INCHES

WHEELBASE: 105.0 INCHES

LOCATION OF "RECOMMENDED TIRE PRESSURE" LABEL: ON THE LEFT B-PILLAR

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P195/75R14

RECOMMENDED COLD TIRE PRESSURE: FRONT: 26 PSI; REAR: 35 PSI

SEATING CAPACITY: ___FRONT ___REAR ___TOTAL*

CARGO LOAD: _____ LBS. VEHICLE CAPACITY WEIGHT: _____ LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE:	LF	28.6	;RF	28.1	;LR	30.8	;RR	30.5
FULLY LOADED ATTITUDE:	LF	28.6	;RF	28.2	;LR	29.5	;RR	29.1
PRE-TEST ATTITUDE:	LF	28.4	;RF	28.2	;LR	29.5	;RR	29.2
POST-TEST ATTITUDE:	LF	29.8	;RF	22.4	;LR	31.2	;RR	24.2

*VEHICLE DID NOT CONTAIN CAPACITY DATA.

TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE AS RECEIVED (EMPTY):

RIGHT FRONT	691 LBS.	RIGHT REAR	604 LBS.
LEFT FRONT	751 LBS.	LEFT REAR	599 LBS.
TOTAL FRONT WEIGHT	1442 LBS.	(54.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1203 LBS.	(45.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 2645 LBS.			

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT*

UDW = UNLOADED DELIVERED WEIGHT (2645 LBS)

VCW = VEHICLE CAPACITY WEIGHT (NA LBS)

DSC = DESIGNATED SEATING CAPACITY (NA)

$RCLW^* = VCW - 150 (DSC) = 300$

$TARGET\ TEST\ WEIGHT = UDW + RCLW^* + (NO.\ OF\ HYBRID\ III\ DUMMIES \times 167\ LBS/DUMMY)$

$TARGET\ TEST\ WEIGHT = 2645 + 300 + 167$

$TARGET\ TEST\ WEIGHT = 3112\ LBS$

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 299 LBS. OF CARGO WEIGHT:

RIGHT FRONT	722 LBS.	RIGHT REAR	781 LBS.
LEFT FRONT	802 LBS.	LEFT REAR	806 LBS.
TOTAL FRONT WEIGHT	1524 LBS.	(49.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1587 LBS.	(51.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3111 LBS.	(1 POUND UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 125 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 53.0 INCHES REARWARD OF FRONT WHEEL CENTERLINE

*Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

TEST CONDITIONS

TEST NUMBER: 900827

TEST DATE: 8/27/90

TEST TEMPERATURES:

IMPACT AREA: 88°F;

DRIVER DUMMY 78°F;

OCCUPANT COMPARTMENT 80°F

PASSENGER DUMMY: NA°F

VEHICLE AND ROLLOVER CART DATA

	ACTUAL	INTENDED
VEHICLE TEST WEIGHT (lbs.):	3111	3112
VEHICLE ORIENTATION (deg.): ROLL	30	30
IMPACT SIDE:	Right	Right
ROLL CART WEIGHT (lbs.):	3347	3347
ROLL CART CRABBED ANGLE (deg.):	0	0
ROLL CART VELOCITY (mph):	30	30

VEHICLE MEASUREMENTS

MAXIMUM LENGTH:	182.0	WHEELBASE:	105.0
MAXIMUM WIDTH:	64.8	TOP WIDTH:	49.9
C.G. REARWARD OF FRONT WHEEL CENTERLINE:	53.0		
C.G. HEIGHT ABOVE GROUND LEVEL:	21.5		

VEHICLE TEST CONDITIONS

LEFT FRONT:	DOOR - LOCKED	WINDOW - UP
LEFT REAR:	DOOR - NA	WINDOW - NA
RIGHT FRONT:	DOOR - UNLOCKED	WINDOW - UP
RIGHT REAR:	DOOR - NA	WINDOW - NA
EMERGENCY BRAKE:	OFF	TRANSMISSION: NEUTRAL
HEADRESTS:	DRIVER - NON-ADJUSTABLE	PASSENGER - NON-ADJUSTABLE
TIRE PRESSURE:	FRONT - 26 PSI;	REAR - 35 PSI

DUMMY INFORMATION

TYPE:	Part 572E
POSITION:	Driver
SERIAL NO.:	907
INSTRUMENTATION:	
HEAD ACCELEROMETERS:	3
NECK LOAD CELLS:	6
CHEST ACCELEROMETERS:	3
CHEST DISPLACEMENT	
POTENTIOMETER:	1
PELVIS ACCELEROMETERS:	3
RIB DISPLACEMENT	
POTENTIOMETER:	--
RESTRAINT SYSTEM:	Three-point unbelt

REMARKS:

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

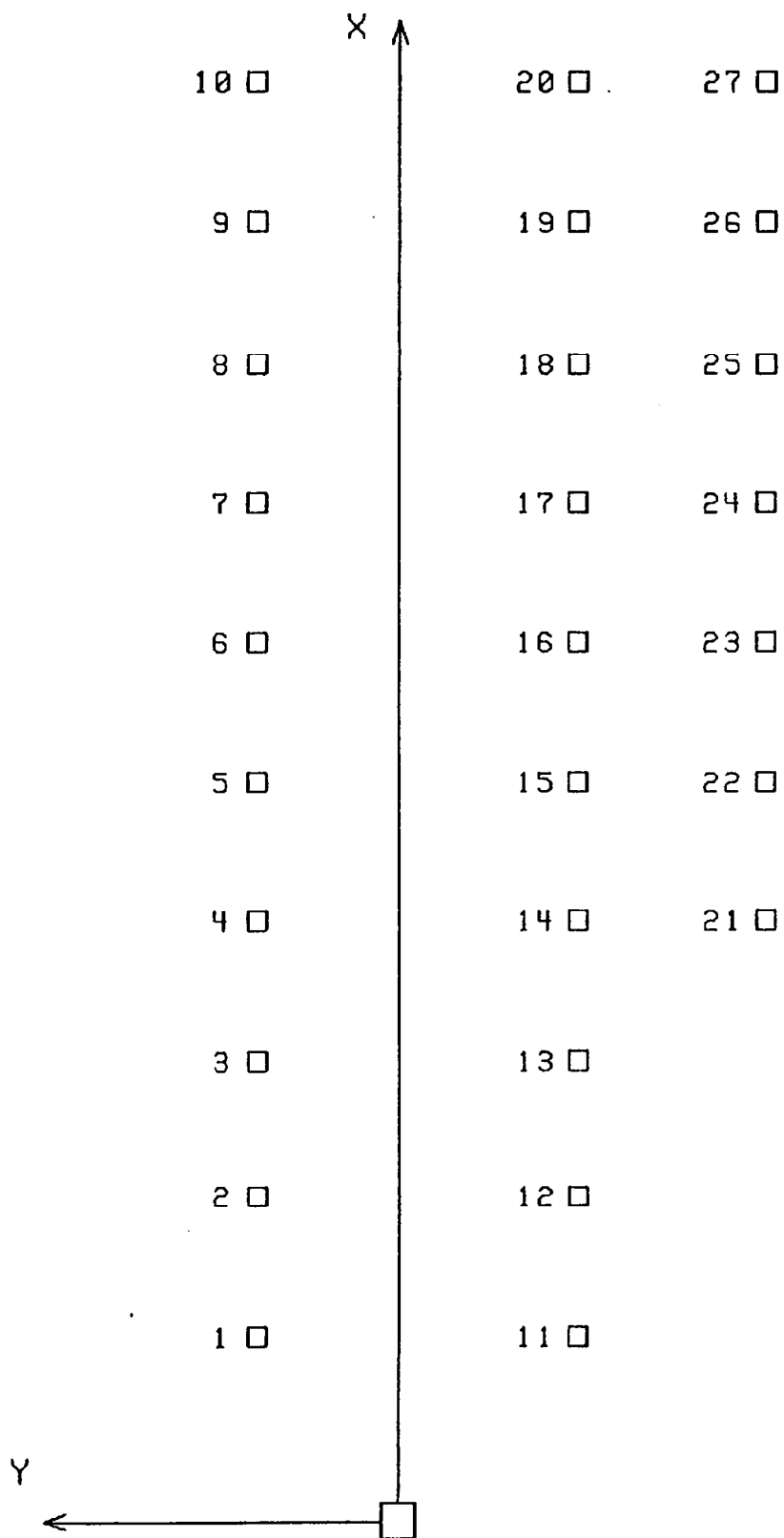
VEHICLE INSTRUMENTATION LOCATIONS AND DATA SUMMARY

TEST NUMBER 900827

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX	SEC	MAX	SEC
1	CENTER OF GRAVITY	89.8	0.0	22.5				
	ACCELERATION (g)							
	LONGITUDINAL				12.6	1.0	10.0	0.9
	LATERAL				36.0	1.8	33.0	1.8
	VERTICAL				24.9	1.8	18.9	0.9
	RESULTANT				37.9	1.8		
2	CENTER OF GRAVITY	91.5	0.0	21.2				
	ANGULAR VELOCITY (deg/sec)							
	ROLL (X-AXIS)				623.2	1.0	458.5	1.8
	PITCH (Y-AXIS)				105.0	1.8	195.7	1.8
	YAW (Z-AXIS)				120.3	1.0	164.5	1.8
3	LEFT FRONT SUSPENSION	152.8	20.5	36.0				
	DISPLACEMENT (in)							
	VERTICAL				0.5	1.2	2.8	1.0
4	RIGHT FRONT SUSPENSION	153.0	-21.5	35.5				
	DISPLACEMENT (in)							
	VERTICAL				0.8	1.0	4.9	1.8
5	LEFT REAR SUSPENSION	46.5	22.5	35.2				
	DISPLACEMENT (in)							
	VERTICAL				0.2	0.2	3.8	1.1
6	RIGHT REAR SUSPENSION	46.0	-22.5	35.0				
	DISPLACEMENT (in)							
	VERTICAL				5.7	3.7	8.7	1.8
7	SHOULDER BELT	87.1	26.0	16.0				
	DISPLACEMENT (in)							
	DRIVER				0.8	1.0	1.5	1.8

* ALL MEASUREMENTS OF INSTRUMENTATION LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM VEHICLE'S REAR BUMPER
Y: + LEFTWARD FROM VEHICLE'S CENTERLINE
Z: + UPWARD FROM GROUND LEVEL
ROLL: + TO RIGHT
PITCH: + FRONT DOWNWARD
YAW: + COUNTERCLOCKWISE
DISPLACEMENT: + OUTWARD



STADIA POLE LAYOUT AND NUMBERING SYSTEM

STADIA POLE LOCATIONS

<u>POLE NO.</u>	<u>X DISTANCE, *</u>	<u>Y DISTANCE, *</u>
1	35.0	8.0
2	43.0	8.0
3	51.0	8.0
4	59.0	8.0
5	67.0	8.0
6	75.0	8.0
7	83.0	8.0
8	91.0	8.0
9	99.0	8.0
10	107.0	8.0
11	35.0	-10.0
12	43.0	-10.0
13	51.0	-10.0
14	59.0	-10.0
15	67.0	-10.0
16	75.0	-10.0
17	83.0	-10.0
18	91.0	-10.0
19	99.0	-10.0
20	107.0	-10.0
21	59.0	-20.0
22	67.0	-20.0
23	75.0	-20.0
24	83.0	-20.0
25	91.0	-20.0
26	99.0	-20.0
27	107.0	-20.0

*REFERENCE: +X: FORWARD FROM RELEASE BLOCK

+Y: LEFTWARD FROM CENTER RELEASE BLOCK

ALL MEASUREMENTS ARE IN FEET.

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Panning	Kodak	25	24	Real-time documentation
2	Left	Photosonic 1B	13	500	Vehicle dynamics
3	Right	Photosonic 1B	13	500	Vehicle dynamics
4	Left angle	Photosonic 1B	25	500	Vehicle dynamics
5	Downstream	Photosonic 1B	50	498	Vehicle dynamics
6	Overhead	Photosonic 1B	8	500	Dummy kinematics
7	Onboard - front	Photosonic 1B	8	500	Dummy kinematics
8	Documentary	Beaulieu	16-105	24	Pre & post-test documentation

HIGH SPEED CAMERA LOCATION

OFFBOARD

CAMERA NO.	X*	Y*	Z*
2	56.1	72.1	3.5
3	96.0	-195.1	5.7
4	248.1	124.5	3.9
5	210.9	0.0	2.8

*Reference:

+X: Forward from release block
+Y: Leftward from the centerline of the release block
+Z: Upward from the ground level

ONBOARD

CAMERA NO.	X**	Y**	Z**
7	2.6	-1.3	0.7

**Reference:

+X: Forward from the C.G. of vehicle
+Y: Leftward from centerline of vehicle
+Z: Upward from floor of vehicle

ALL MEASUREMENTS ARE IN FEET.

SECTION 4.0

OCCUPANT INFORMATION

POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #907	PASSENGER #NA
HEAD	<u>Roof</u>	<u>NA</u>
CHEST	<u>Left front door</u>	<u>NA</u>
ABDOMEN	<u>None</u>	<u>NA</u>
LEFT KNEE	<u>Left front door</u>	<u>NA</u>
RIGHT KNEE	<u>Steering column</u>	<u>NA</u>

DOOR OPENING:

	LEFT	RIGHT
FRONT	<u>Easy</u>	<u>Easy</u>
REAR	<u>None</u>	<u>None</u>

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	<u>None</u>	<u>None</u>
REAR	<u>NA</u>	<u>NA</u>

GLAZING DAMAGE:

Upon impact the entire windshield was cracked. The
entire left, right and rear glasses were shattered
upon impact.

OTHER NOTABLE IMPACT EFFECTS:

The right front and rear tires were flattened upon
impact.

DUMMY KINEMATIC SUMMARY

Driver Dummy

Upon the vehicle's impact with the ground, the driver dummy's head struck, and remained against, the roof. As the vehicle rolled one full roll, the chest and left leg contacted the left front door and the right knee contacted the steering column. After the rollover the vehicle came to rest on its tires with the driver's dummy's right arm resting against the seat. The dummy was restrained with a three-point unbelt.

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. The temperature was controlled to the last minute before launching of the vehicle.

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, and six (6) load cells in the neck. 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 non-adjustable. The dummy was positioned in the seat using NHTSA's Notice #60 seating procedure. The H-point location of the seat was obtained by using the SAE J211OCT88 H-point machine as specified in the Notice #60. The driver dummy was restrained with a three-point unbelt.

DUMMY DATA SUMMARY

TEST NUMBER 900827

DRIVER DUMMY

SN: 907

POSITIVE DIRECTION		NEGATIVE DIRECTION	
MAX	SEC	MAX	SEC

HEAD ACCELERATION (g)

LONGITUDINAL	174.6	1.0	114.9	1.0
LATERAL	86.6	1.0	68.6	1.0
VERTICAL	84.7	1.0	250.2	1.0
RESULTANT	276.7	1.0		
HIC 36 MSEC	3014.8 FROM 0.987 TO 0.992			

NECK FORCES (lbs)

LONGITUDINAL	366.9	1.9	2421.3	1.9
LATERAL	667.8	1.0	109.2	1.9
VERTICAL	835.8	1.0Y	2644.6	1.0 Y

NECK MOMENT (in-lbs)

ABOUT LONG.	158.8	1.0	126.9	1.1
ABOUT LATERAL	24.8	1.9	375.8	1.0
ABOUT VERTICAL	64.6	1.1Y	62.4	1.0 Y

CHEST ACCELERATION (g)

LONGITUDINAL	38.9	1.0	58.9	1.0
LATERAL	20.4	1.0	24.7	1.9
VERTICAL	47.1	1.8	313.4	1.0
RESULTANT	313.5	1.0		
3 MSEC	101.2 FROM 0.999 TO 1.002			

CHEST DISPLACEMENT (in)

LONGITUDINAL	0.6	1.0	0.5	1.0
--------------	-----	-----	-----	-----

PELVIS ACCELERATION (g)

LONGITUDINAL	21.2	1.0	22.2	1.1
LATERAL	10.2	1.8	10.9	1.1
VERTICAL	22.3	1.0	67.7	1.0
RESULTANT	68.3	1.0		

POSITIVE DIRECTION

LONGITUDINAL: FORWARD
LATERAL: LEFTWARD
VERTICAL: UPWARD

NEGATIVE DIRECTION

LONGITUDINAL: REARWARD
LATERAL: RIGHTWARD
VERTICAL: DOWNWARD

See APPENDIX D for neck load cell polarities.

Y See TEST ANOMALIES

DUMMY IN-VEHICLE POSITION RECORDING SHEET

MFR./MAKE/MODEL: Dodge Ram Pickup

SEAT TYPE: X Bench

ADJUSTER TYPE: X Manual

 Bucket

 Power

 Split bench

 Non-adjustable

STEERING COLUMN: X Non-adjustable

TECHNICIANS:

BUCKET SEATBACK TYPE: X Non-adjustable

1. R. Benavides

 Adjustable reclining

2. R. Cribley

POSITIONING DATE: 8/27/90

3.

AMBIENT TEMP. 88° F TIME: 1130

4.

DRIVER DUMMY* # 907 TYPE: HIII

Head 21.2"

Target 8°

Knee 21.8"

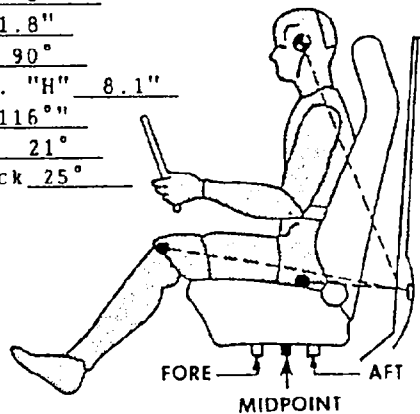
Joint 90°

Approx. "H" 8.1"

Point 116°

Pelvis 21°

Seatback 25°



PASSENGER DUMMY* # NA TYPE:

Head

Target

Knee

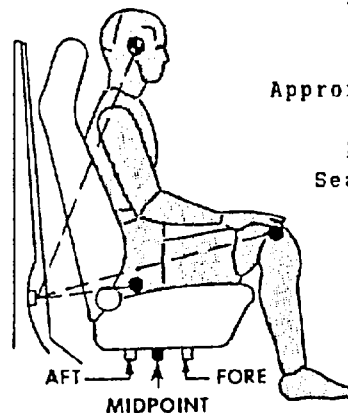
Joint

Approx. "H"

Point

Pelvis

Seatback



A = 54.0"

B = NA

C = 12.9"

D = NA

DOOR GLASS
HEIGHT = 10.6"

LATERAL BAR

ADJUSTABLE
POINTER

LEFT
FRONT
DOOR

DRIVER
DUMMY

PASSENGER
DUMMY

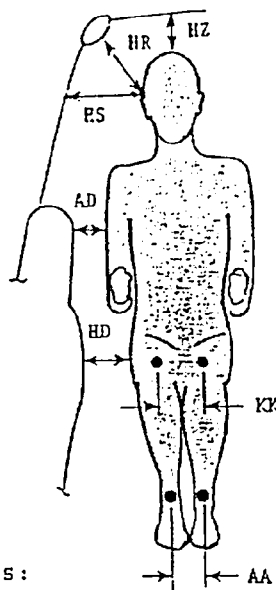
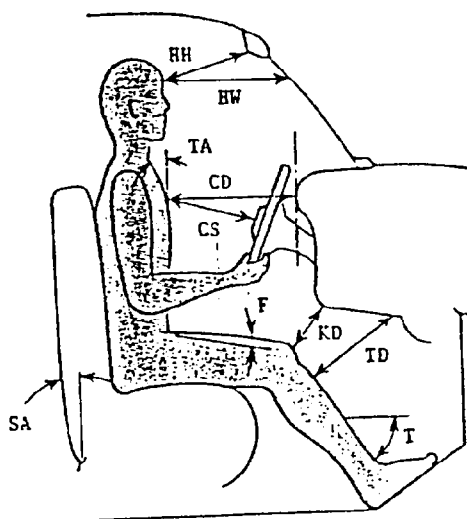
DOOR GLASS
HEIGHT = NA

RIGHT
FRONT
DOOR

*Dummy measurements are referenced to top of striker bolt and all angles are referenced to vertical.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER	PASSENGER
HH	16.5	NA
HW	22.4	NA
CD	22.8	NA
CS	11.0	NA
KDL	5.8	NA
KDR	6.2	NA
TA	18°	NA
SA	14°	NA
HA	20.2	NA
FL	15°	NA
FR	15°	NA
TDL	4.1	NA
TDR	6.8	NA
TL	38°	NA
TR	39°	NA
HZ	4.9	NA
HR	7.6	NA
HS	9.1	NA
AD	4.6	NA
HD	6.2	NA
KK	9.0	NA
AA	10.0	NA



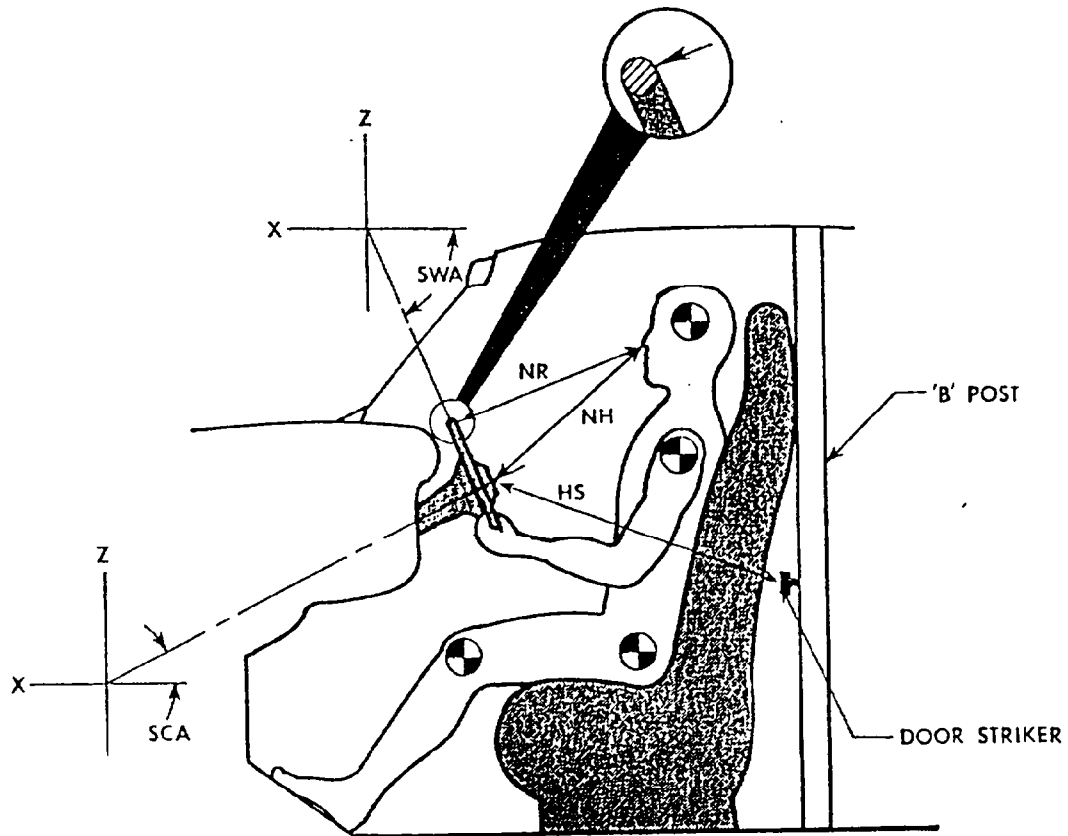
Knee outer clevis to outer clevis:
Driver = 10.6" Passenger = NA

HH = Head to Windshield Header
HW = Head to Windshield
CD = Chest to Dash
CS = Chest to Steering Wheel
KD = Knee to Dash
TA = Torso Angle
SA = Seat Back Angle
HA = Head to A-Pillar
FL = Femur Left
FR = Femur Right
TDL = Tibia Dash Left

TDR = Tibia Dash Right
TL = Tibia Left
TR = Tibia Right
HZ = Head to Roof
HR = Head to Side Roof
HS = Head to Side Window
AD = Arm to Door
HD = Hip to Door
KK = Knee to Knee
AA = Ankle to Ankle

Torso and seat back angles are relative to vertical.
Femur and tibia angles are relative to horizontal.
ALL DISTANCE MEASUREMENTS ARE IN INCHES.

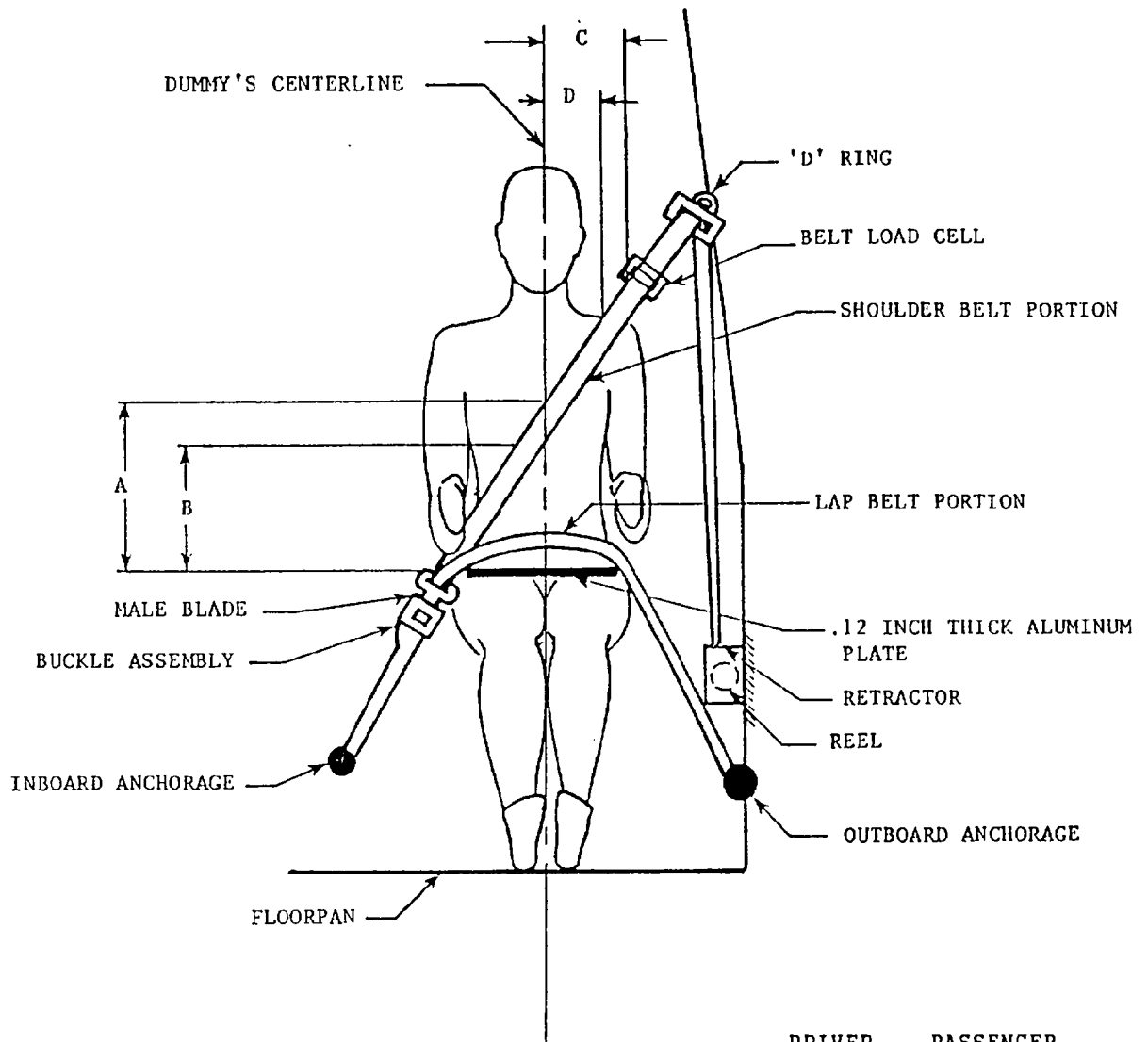
DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY:
Non-adjustable

MEASUREMENTS		
NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	15.8
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	15.3
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	22.1
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	27°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	63°
ALL DISTANCE MEASUREMENTS ARE IN INCHES.		

SEAT BELT POSITIONING DATA



	DRIVER DUMMY	PASSENGER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	10.5	NA
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	7.0	NA
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	5.2	NA
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	3.0	NA

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

APPENDIX A

PHOTOGRAPHS

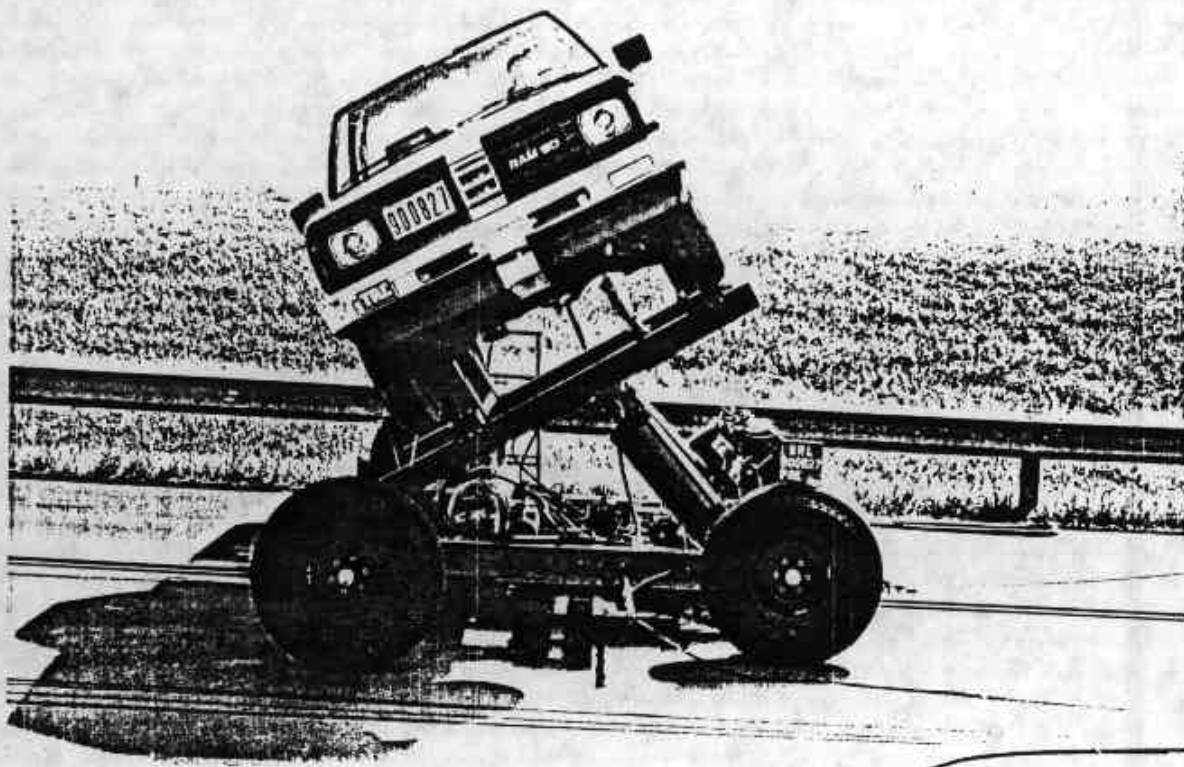


Figure A-1. PRE-TEST FRONT VIEW

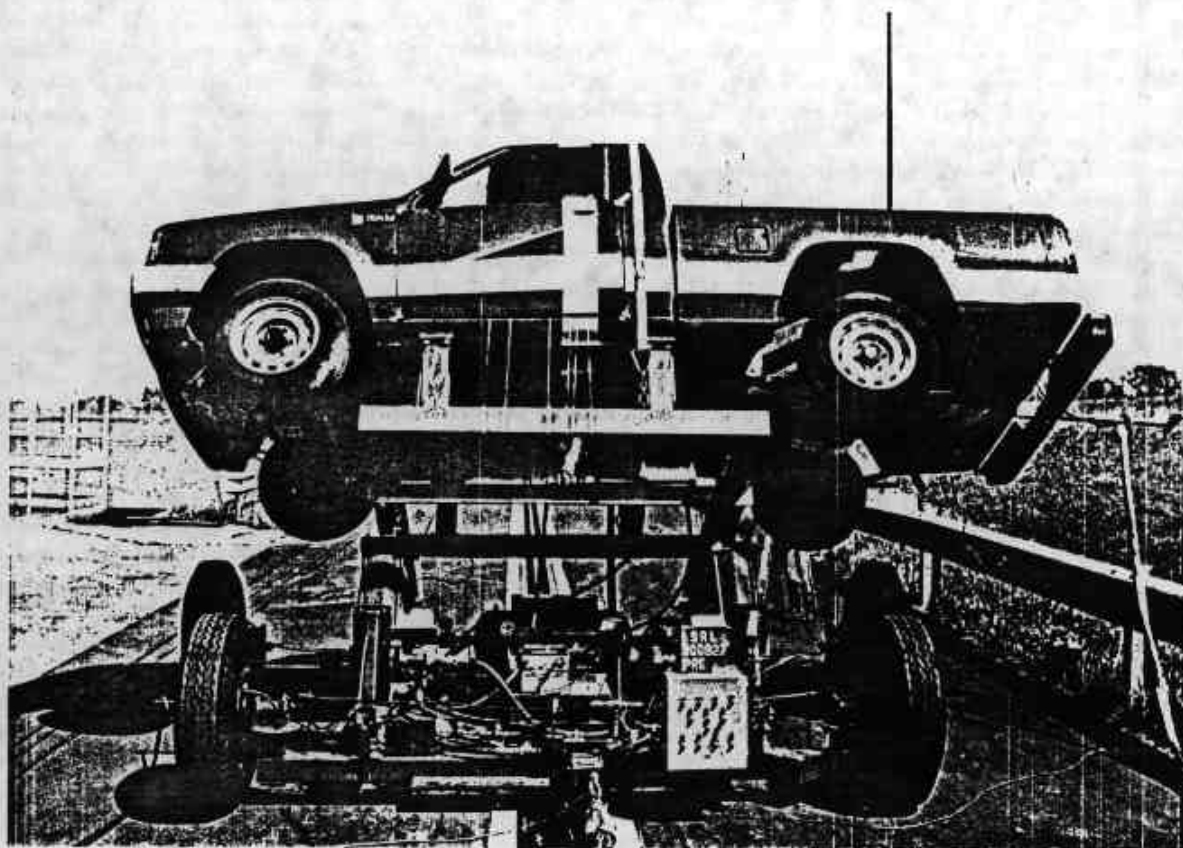


Figure A-2. PRE-TEST LEFT SIDE VIEW

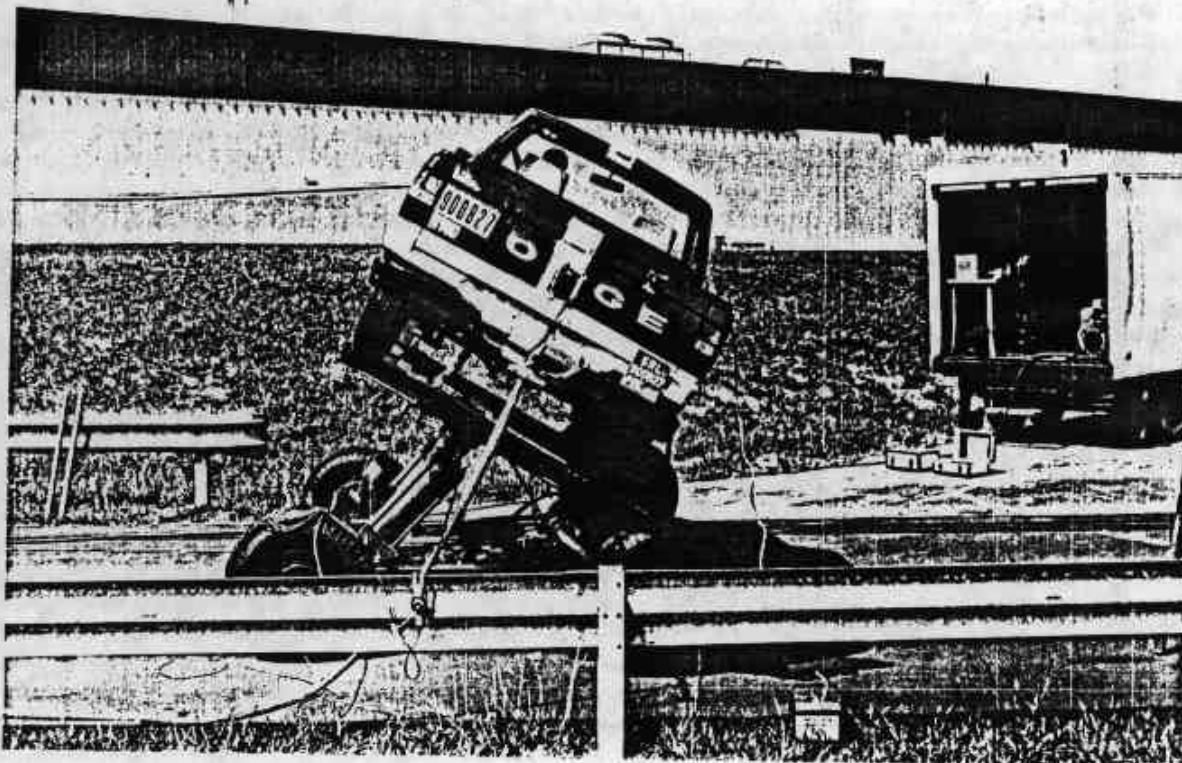


Figure A-3. PRE-TEST REAR VIEW

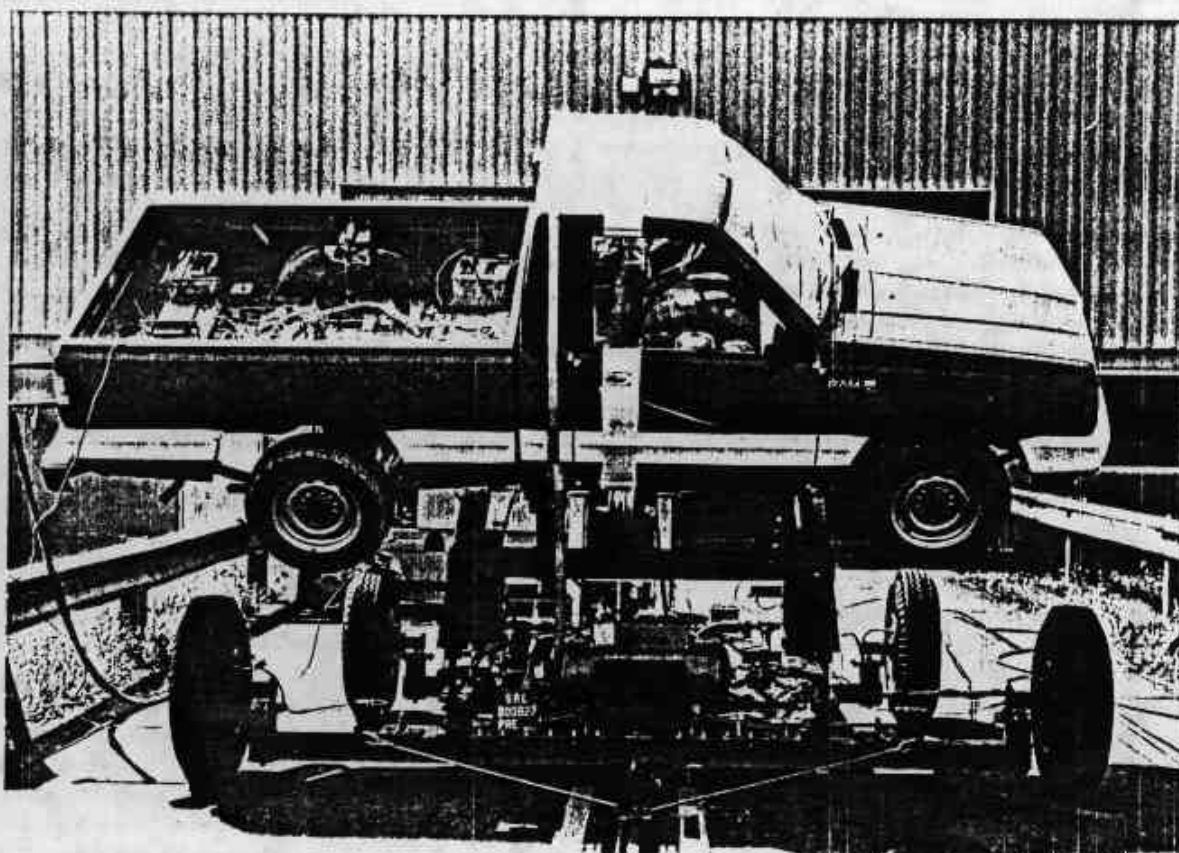


Figure A-4. PRE-TEST RIGHT SIDE VIEW



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

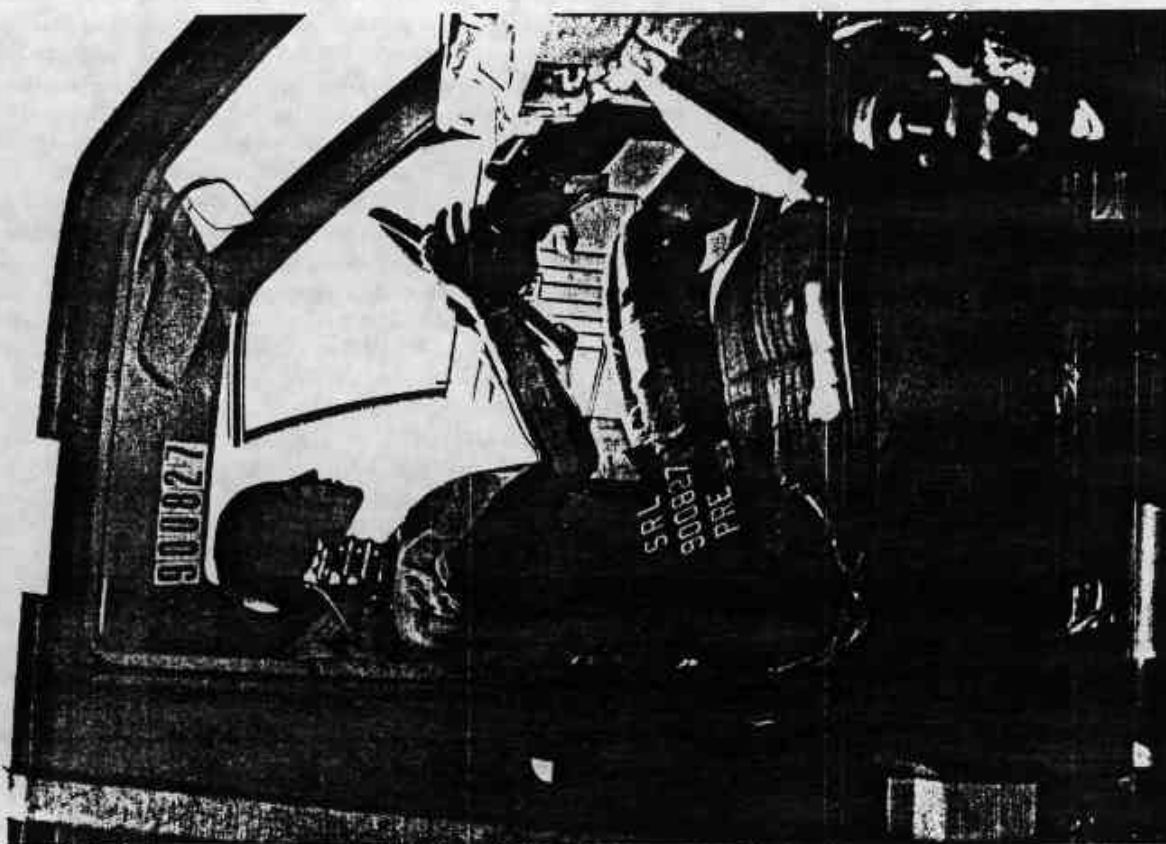


Figure A-6. PRE-TEST DRIVER DUMMY - VIEW 1

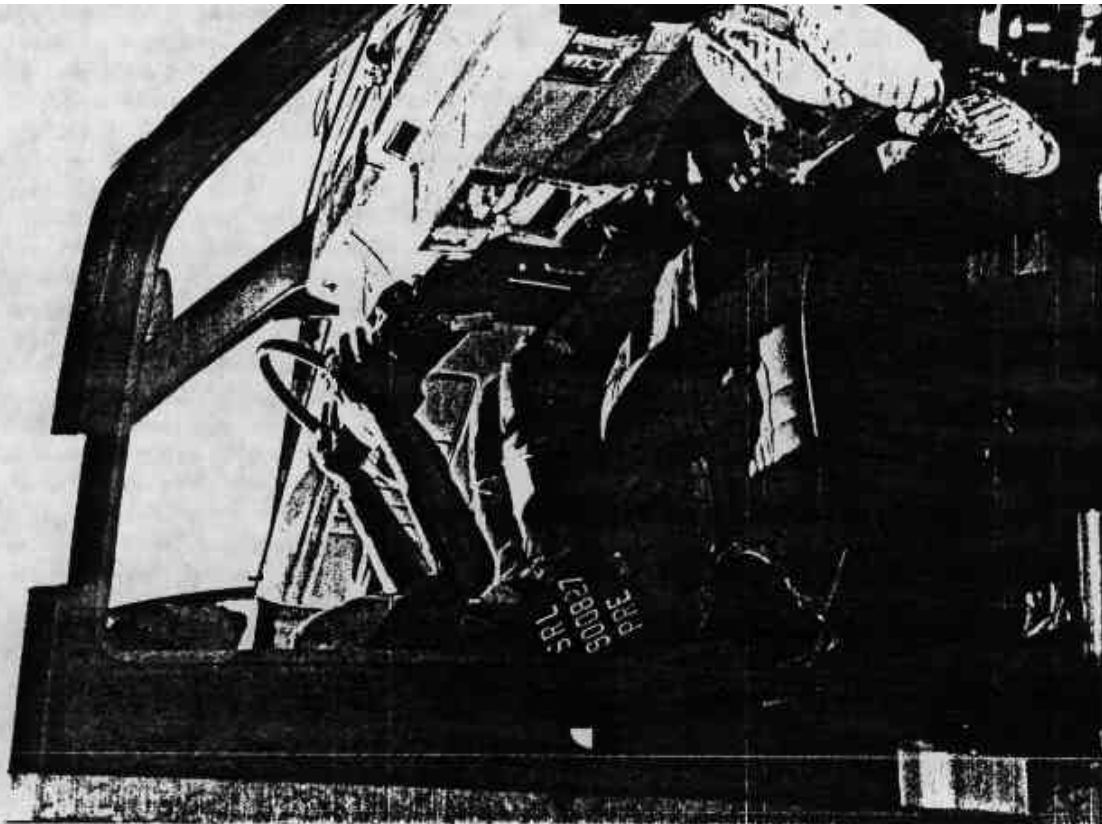


Figure A-7. PRE-TEST DRIVER DUMMY - VIEW 2

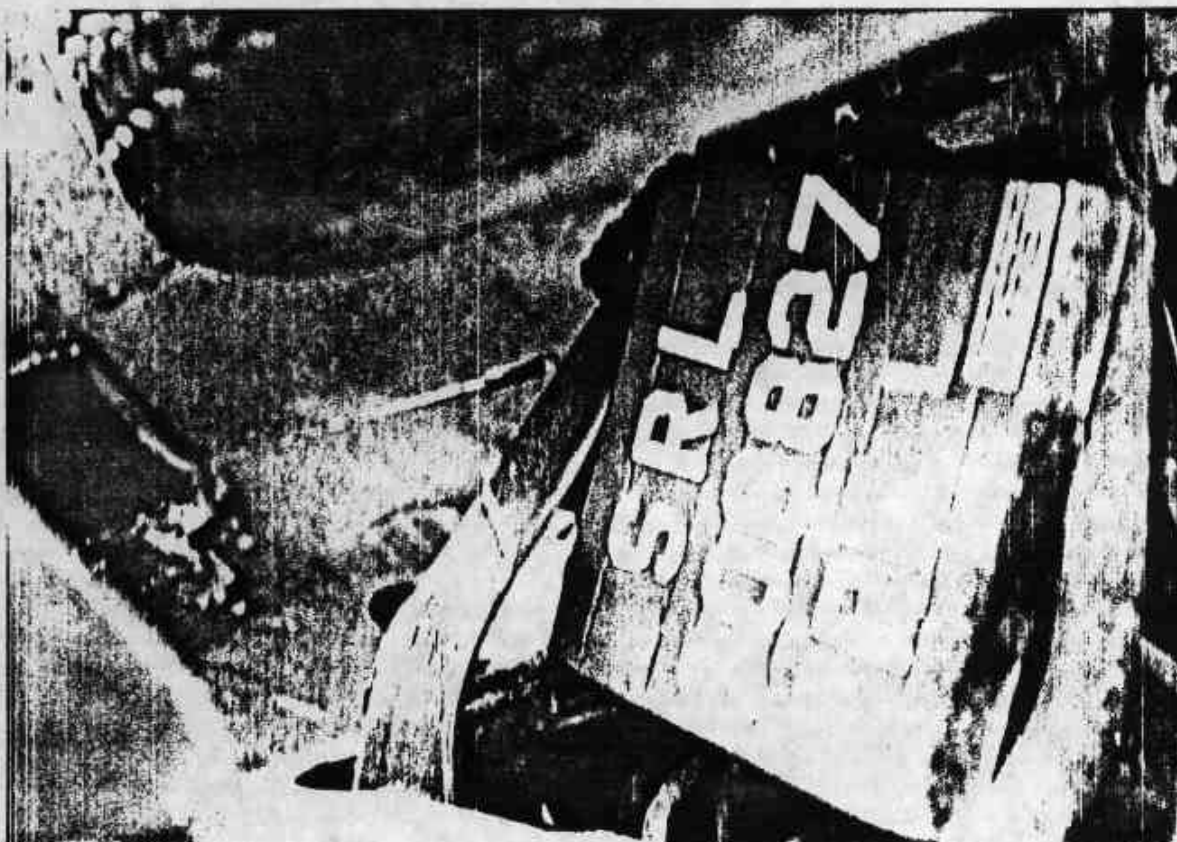


Figure A-8. PRE-TEST LEFT FRONT SUSPENSION STRING POTENTIOMETER



Figure A-9. PRE-TEST RIGHT FRONT SUSPENSION STRING POTENTIOMETER

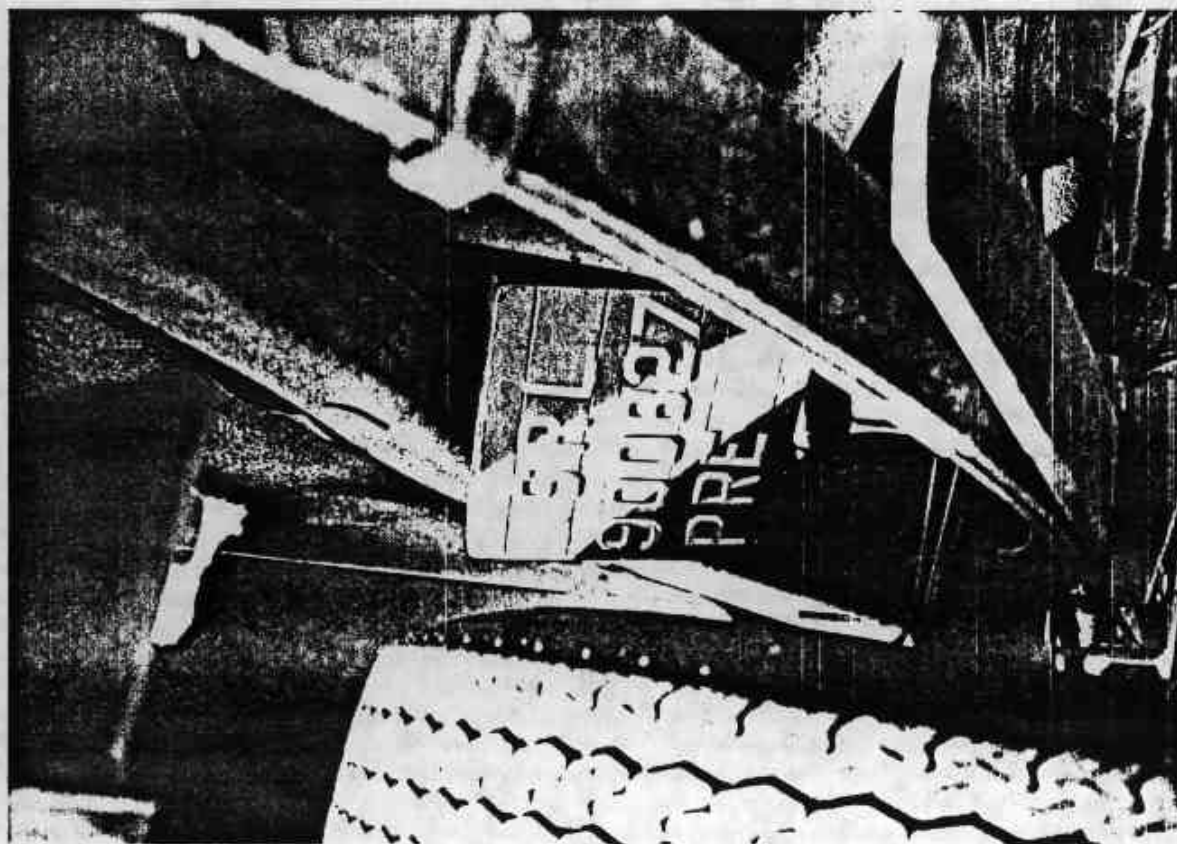


Figure A-10. PRE-TEST LEFT REAR SUSPENSION STRING POTENTIOMETER - VIEW 1



Figure A-11. PRE-TEST LEFT REAR SUSPENSION STRING POTENTIOMETER - VIEW 2



Figure A-12. PRE-TEST RIGHT REAR SUSPENSION STRING POTENTIOMETER - VIEW 1



Figure A-13. PRE-TEST RIGHT REAR SUSPENSION STRING POTENTIOMETER - VIEW 2

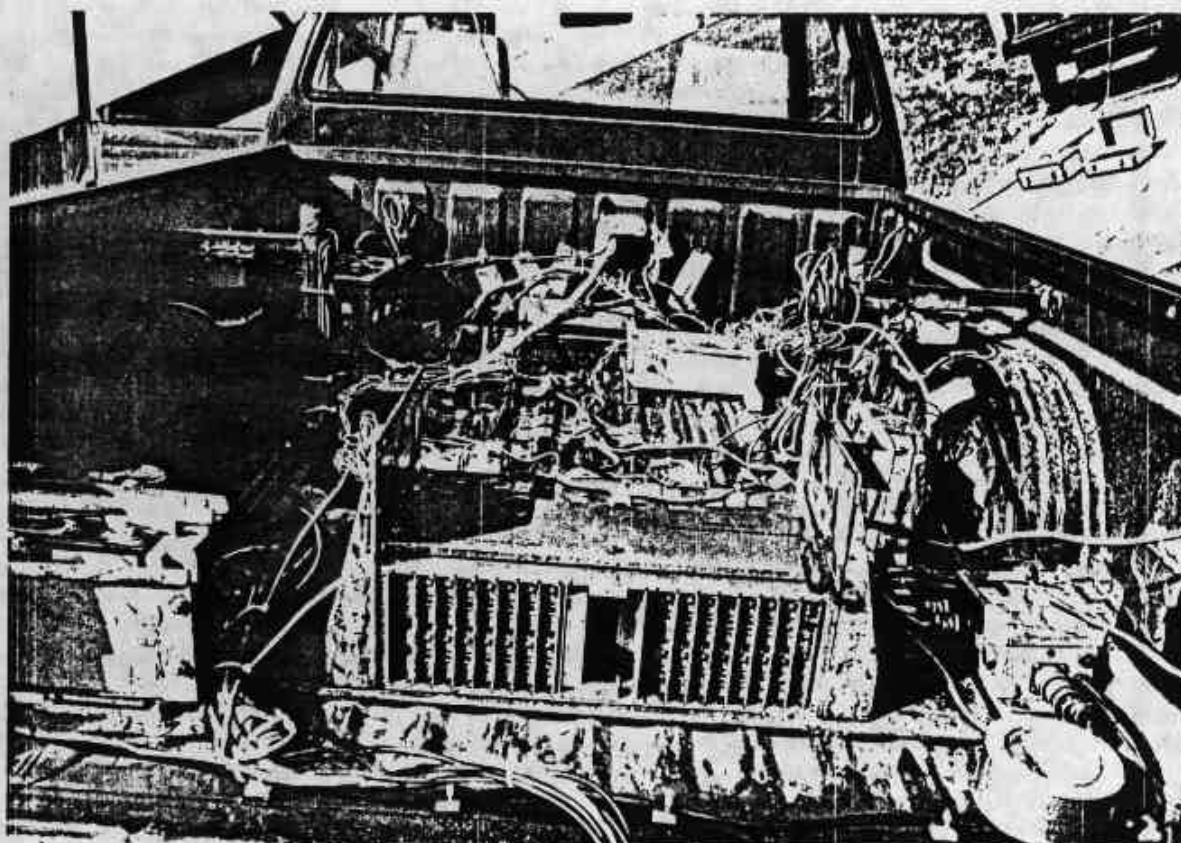


Figure A-14. PRE-TEST VEHICLE INSTRUMENTATION AND BALLAST LOCATION

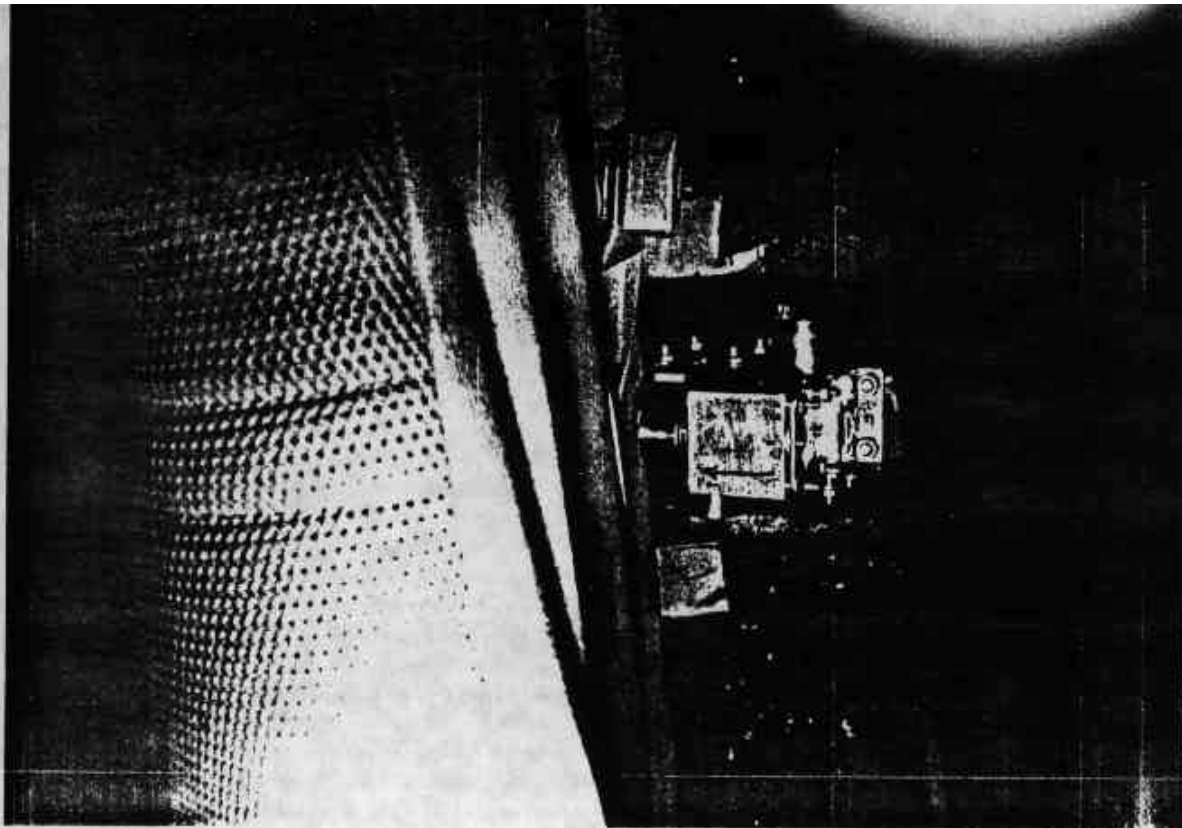


Figure A-15. PRE-TEST GYROSCOPE PLACEMENT VIEW



Figure A-16. POST-TEST FRONT VIEW

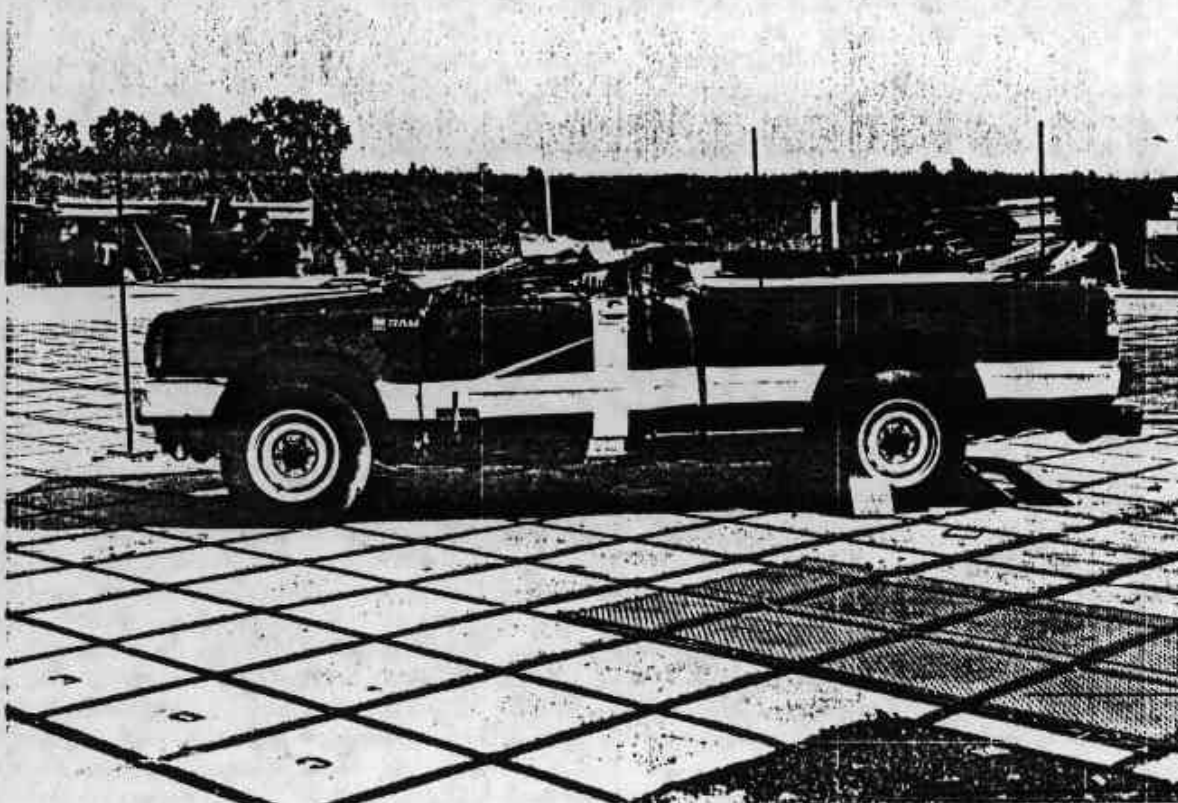


Figure A-17. POST-TEST LEFT SIDE VIEW



Figure A-18. POST-TEST REAR VIEW

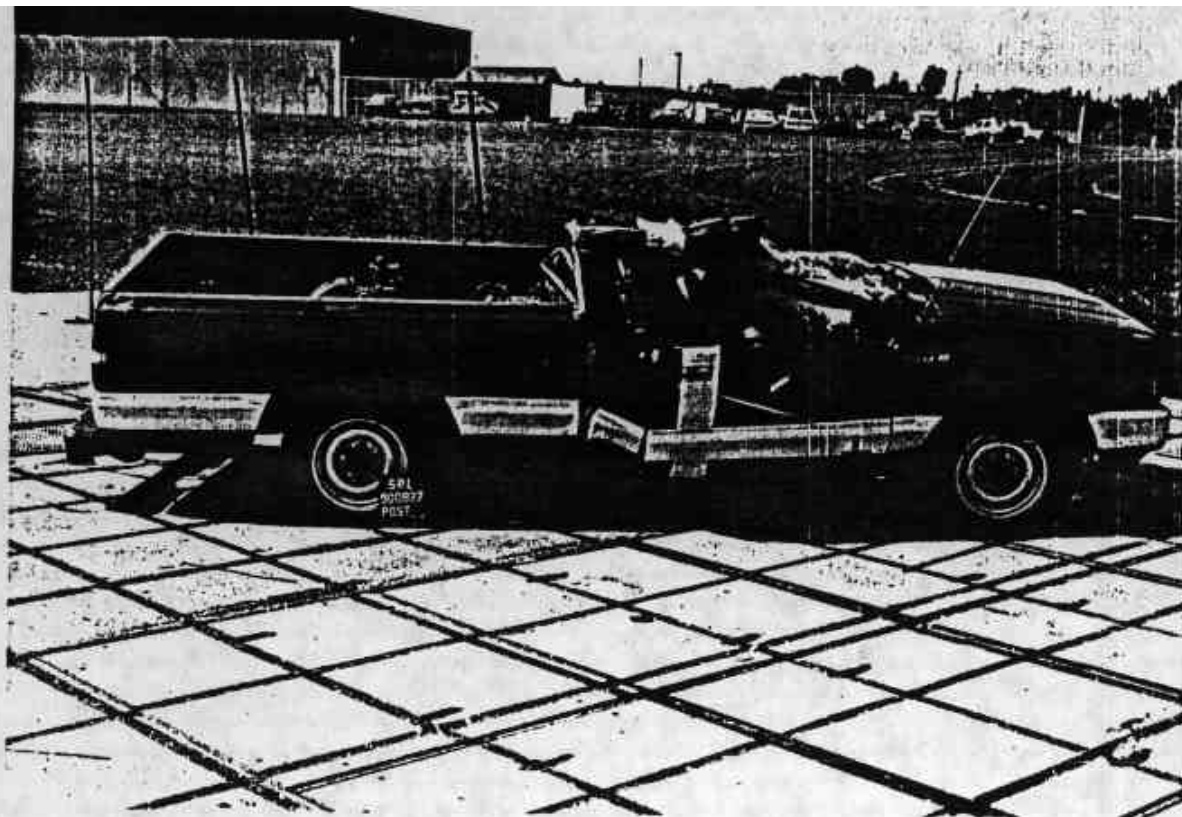


Figure A-19. POST-TEST RIGHT SIDE VIEW

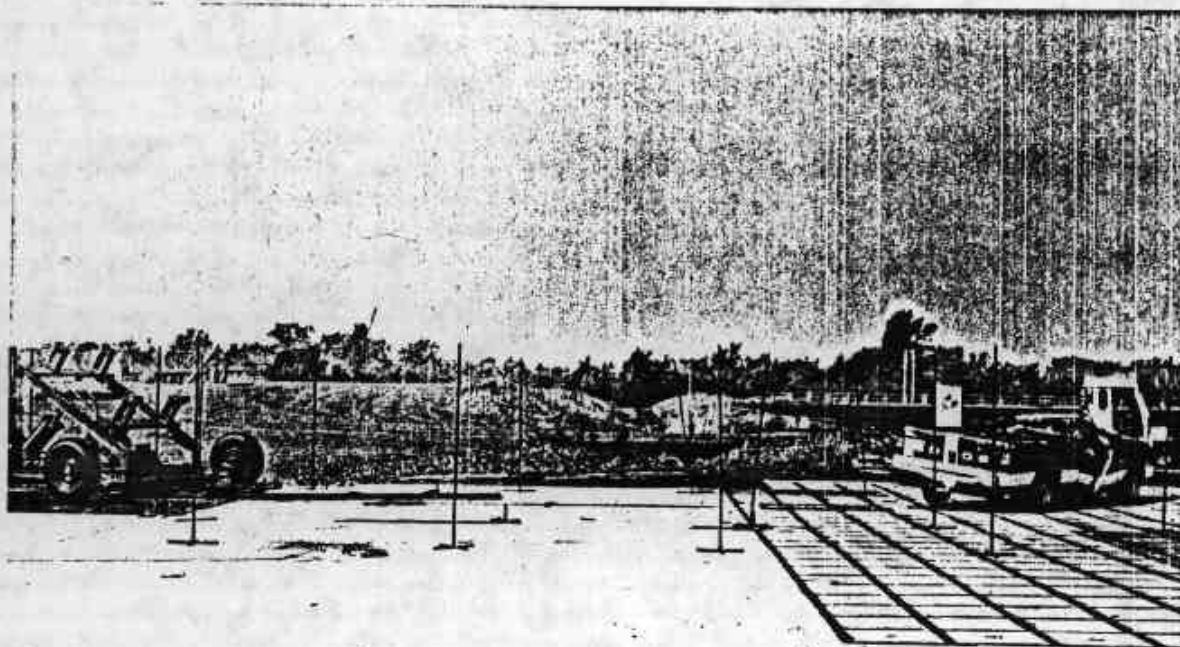


Figure A-20. POST-TEST VEHICLE ROOF DAMAGE VIEW



Figure A-21. POST-TEST DUMMY AND VEHICLE - VIEW 1



Figure A-22. POST-TEST DUMMY AND VEHICLE - VIEW 2

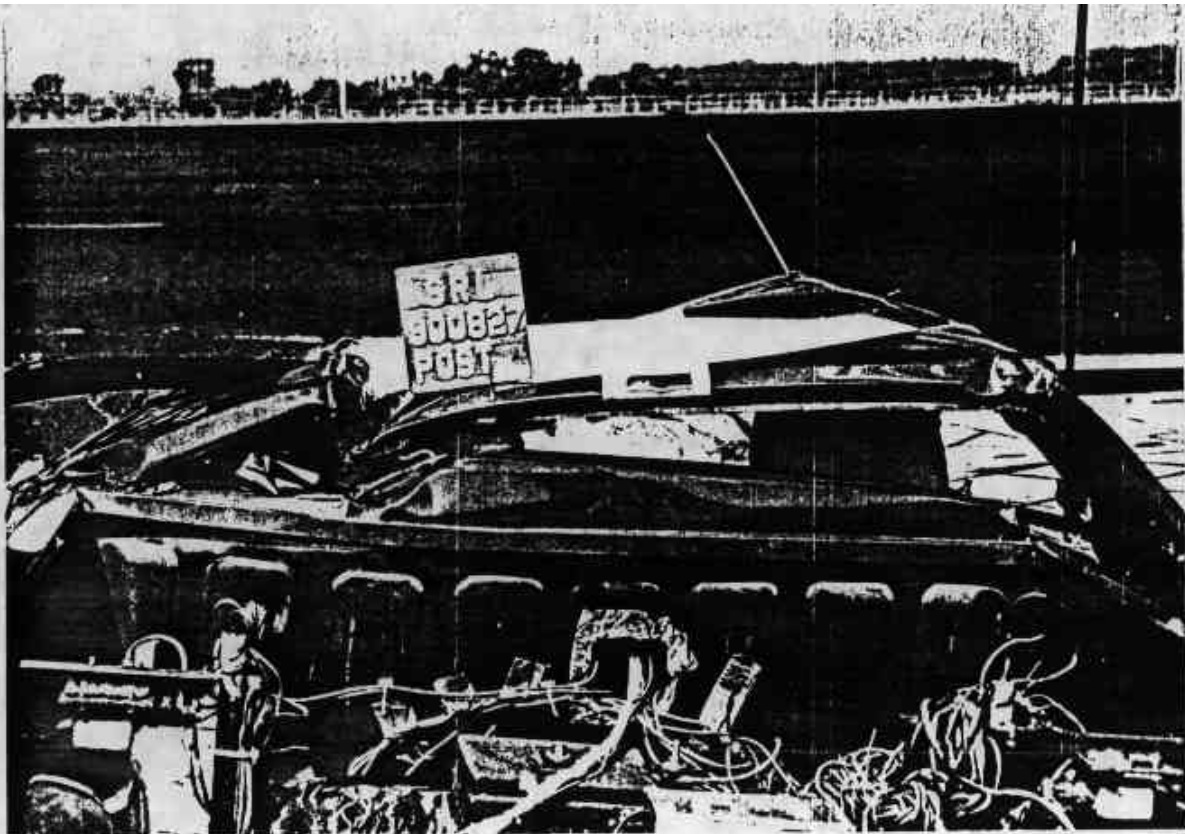


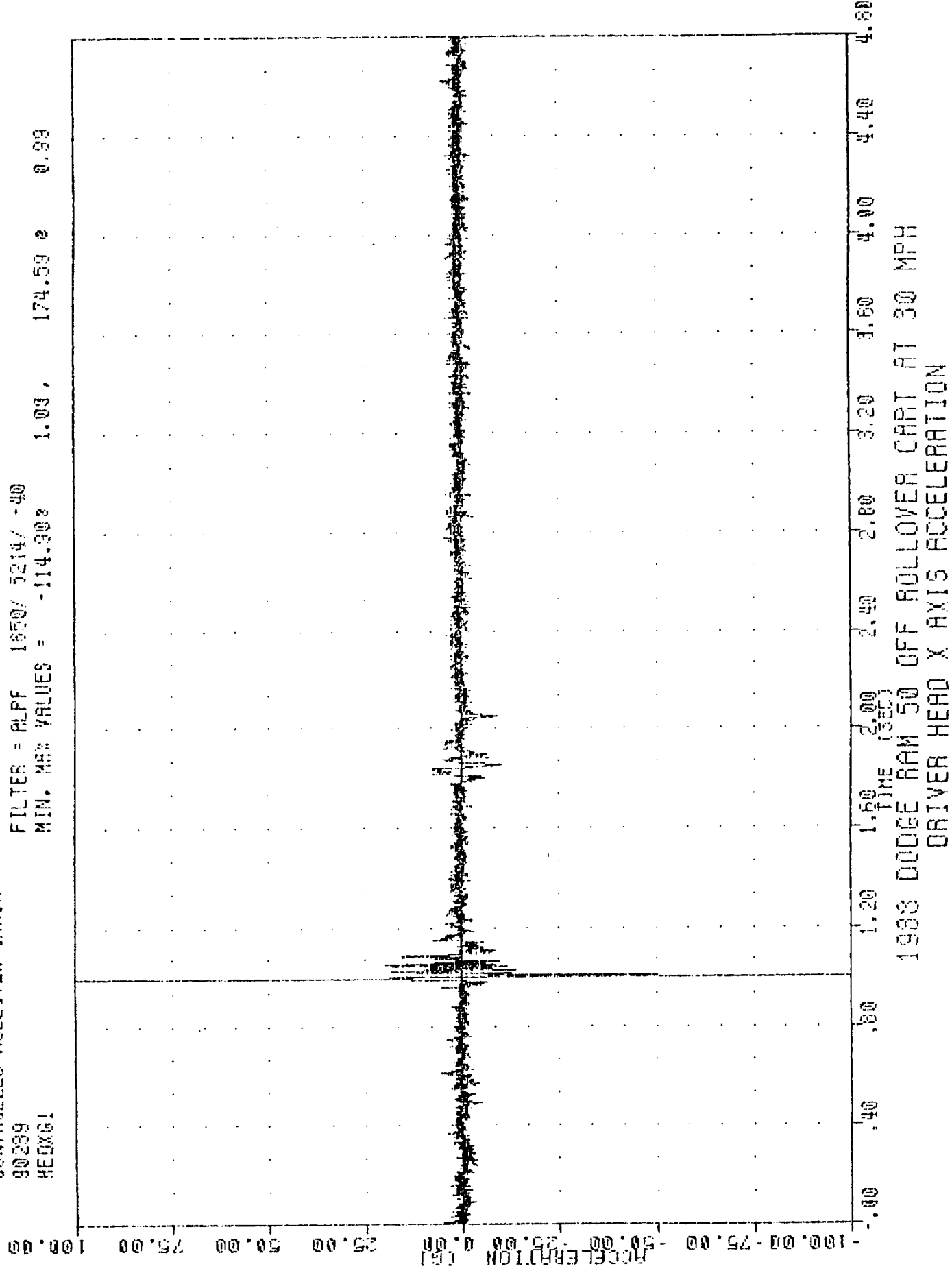
Figure A-23. POST-TEST VEHICLE ROOF DAMAGE VIEW

APPENDIX B

DATA PLOTS

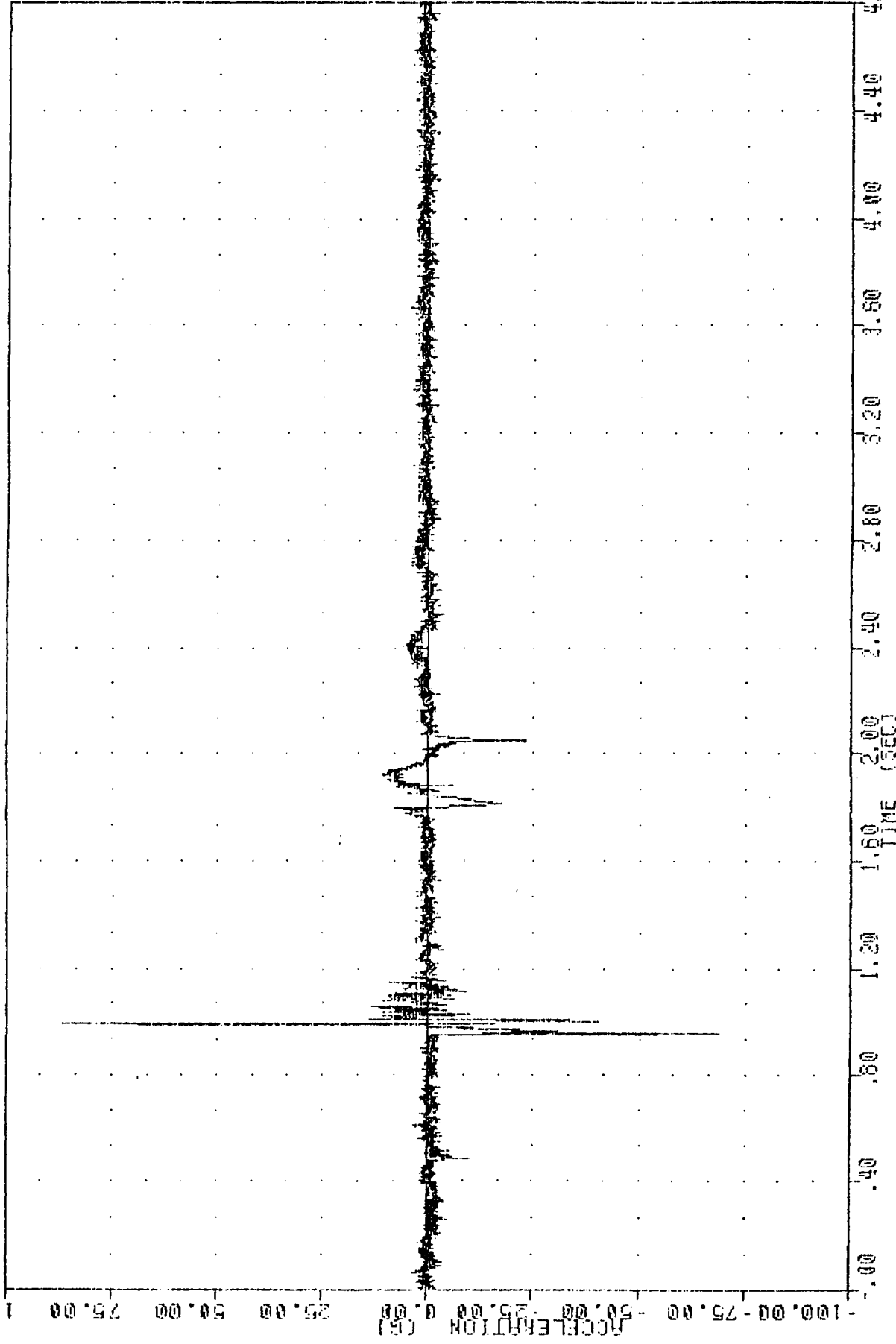
bu1 NH10m 1, 0000L
CONTROLLED ROLLOVER CRASH
90239
HEXG1

FILTER = RLFF 1850/ 5214/ -40
MIN. MAX VALUES = -114.302 1.03, 174.59 e 0.99



CONTROLLED ROLLOVER CRASH
90239
HEADY61

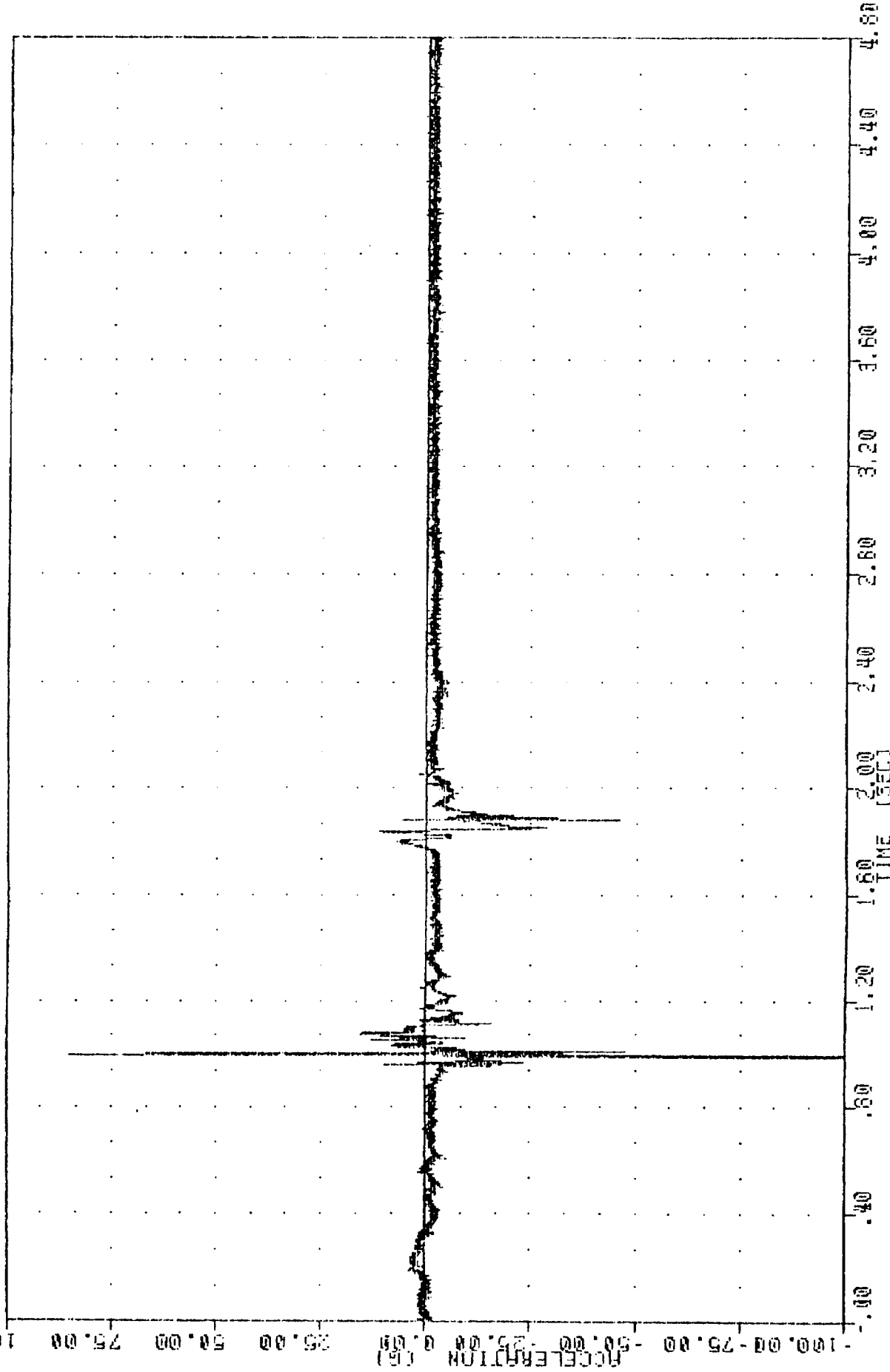
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -88.598 0.95 88.57 0.99



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
DRIVER HEAD Y AXIS ACCELERATION

501 NH/001 1,000L
CONTROLLED ROLLOVER CRASH
90239
HEDZG1

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -250.190 0.99, 84.72 0.99



601 NH101 1.0002L
CONTROLLED ROLLOVER CRASH

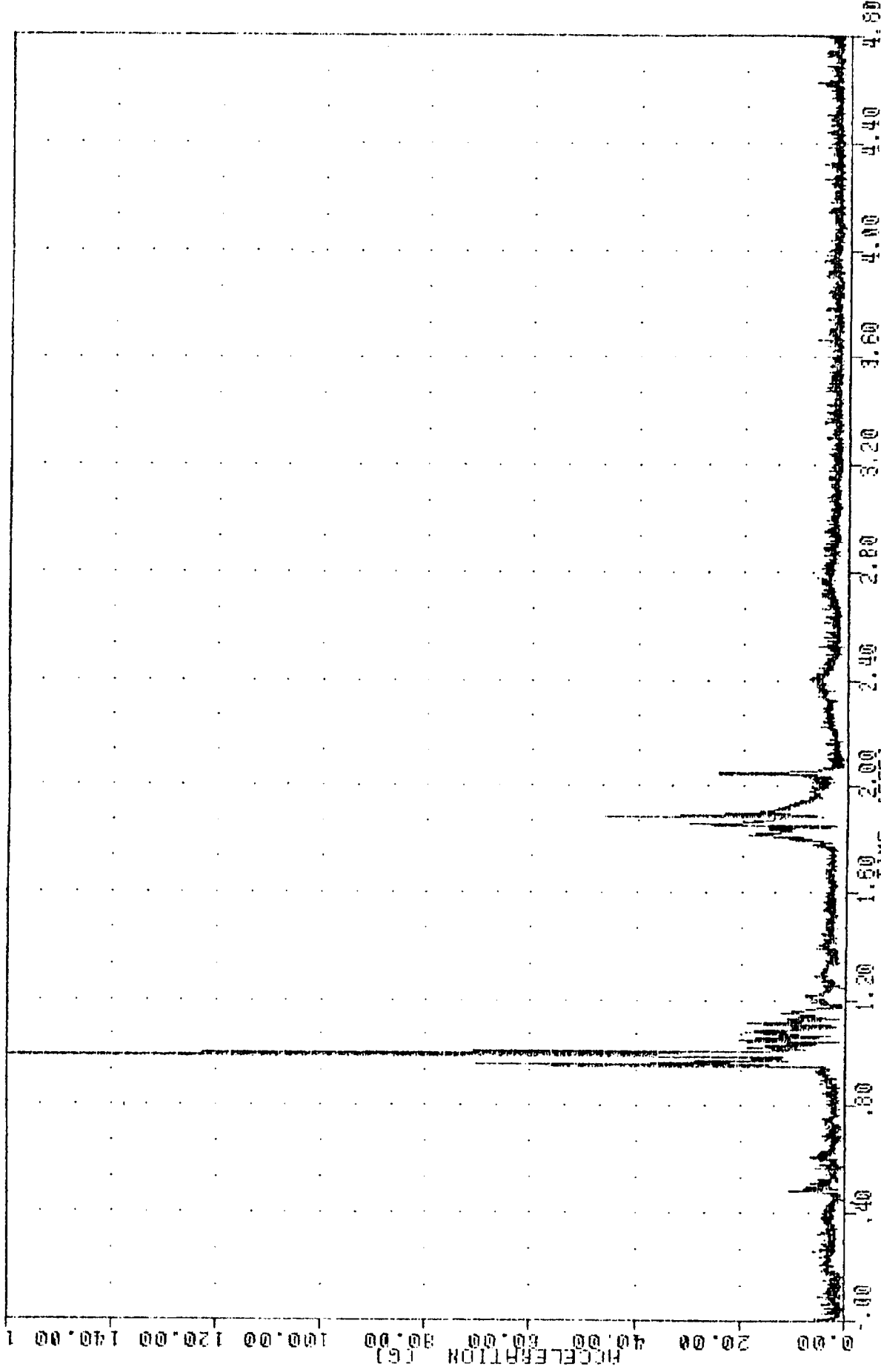
30239

HEADG1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 0.17%

0.13. 276.72 0 0.99

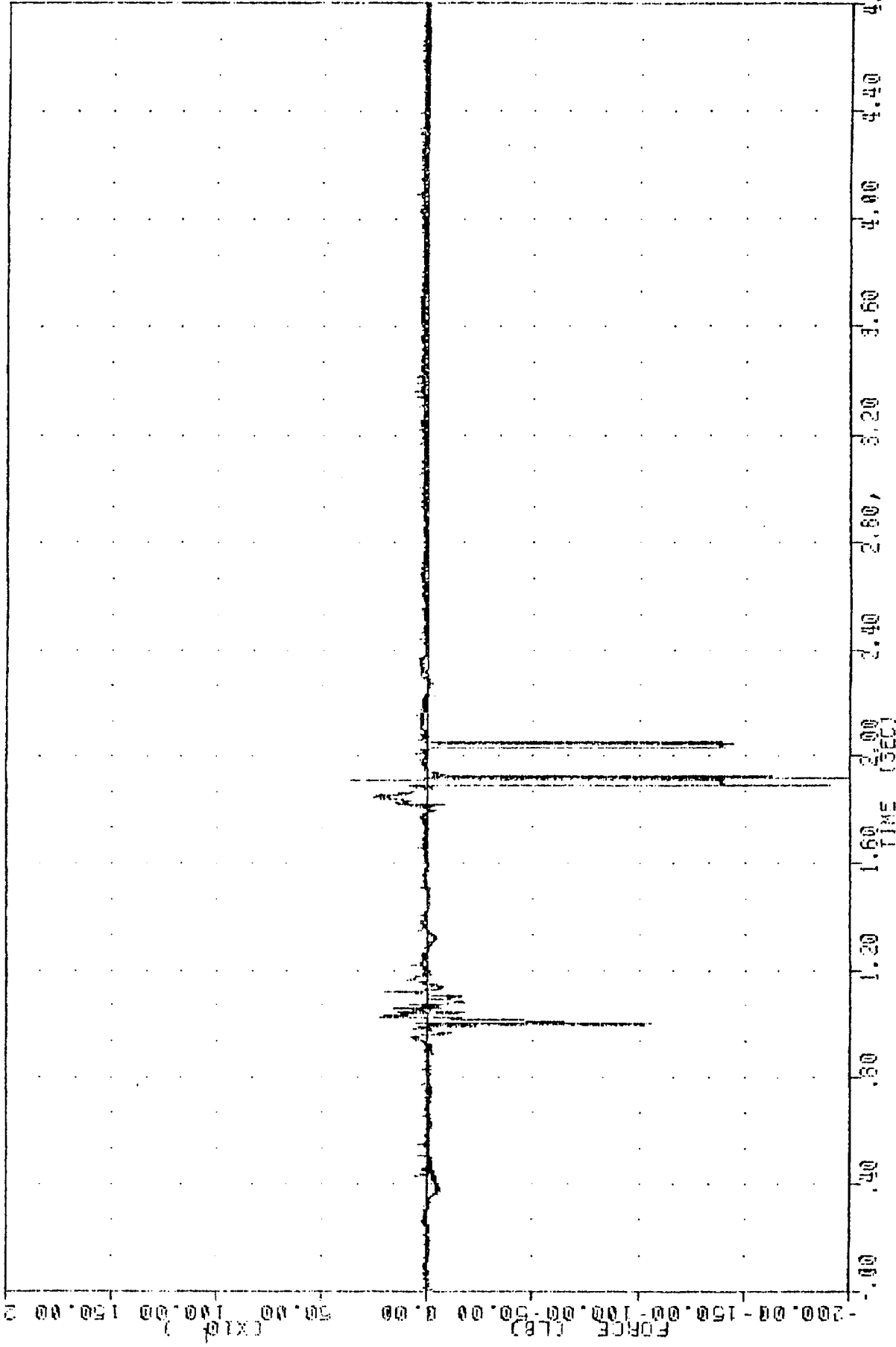


1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH

DRIVER HEAD RESULTANT ACCELERATION

1000 MPH
 CONTROLLED ROLLOVER CRASH
 90239
 NEXFI

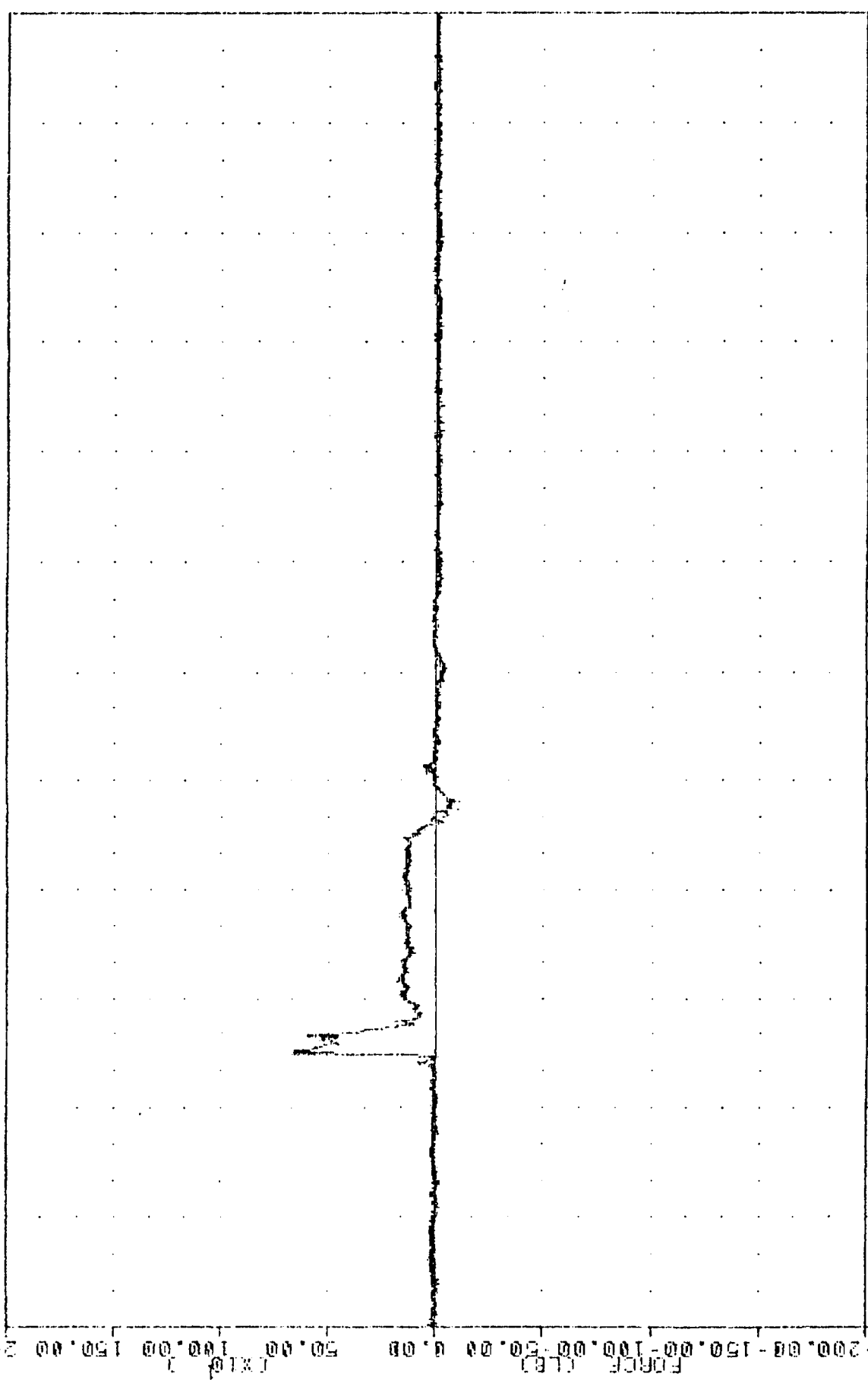
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -2421.27 1.92, 366.90 1.91



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
 DRIVER NECK SHEAR FORCE X AXIS

001 000000
 CONTROLLED ROLLOVER CRASH
 90239
 MEKYP1

FILTER = ALPF 1850/ 5214/ -40
 MIN. MAX VALUES = -109.158 1.93 887.76 0 0.99



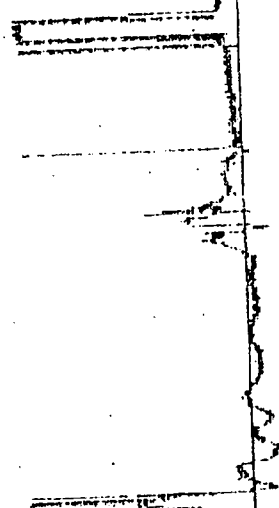
1988 DODGE RAM 50 OFF ROLLOVER CRASH AT 30 MPH
 DRIVER NECK SHEAR FORCE Y AXIS

1000 MILLION
 CONTROLLED ROLLOVER CRASH
 90239
 NEKZF1

FILTER = ALPF 1050/ 5214/ -40
 MIN, MAX VALUES = -2844.53% 0.99, 835.80% 1.02

200.00 150.00 100.00 50.00 0.00 -50.00 -100.00 -150.00 -200.00
 FORCE (LB)

See TEST ANOMALIES



4.00 3.60 3.20 2.80 2.40 2.00 1.60 1.20 .80 .40 0.00
 TIME (SEC)

1988 DODGE RAM 50 OFF ROLLOVER CRASH AT 30 MPH
 DRIVER NECK AXIAL FORCE Z AXIS

1001 NHTSA 1, 30000,
CONTROLLED ROLLOVER CRASH

90239

NEKTH1

FILTER = BLP (00) 250/-16

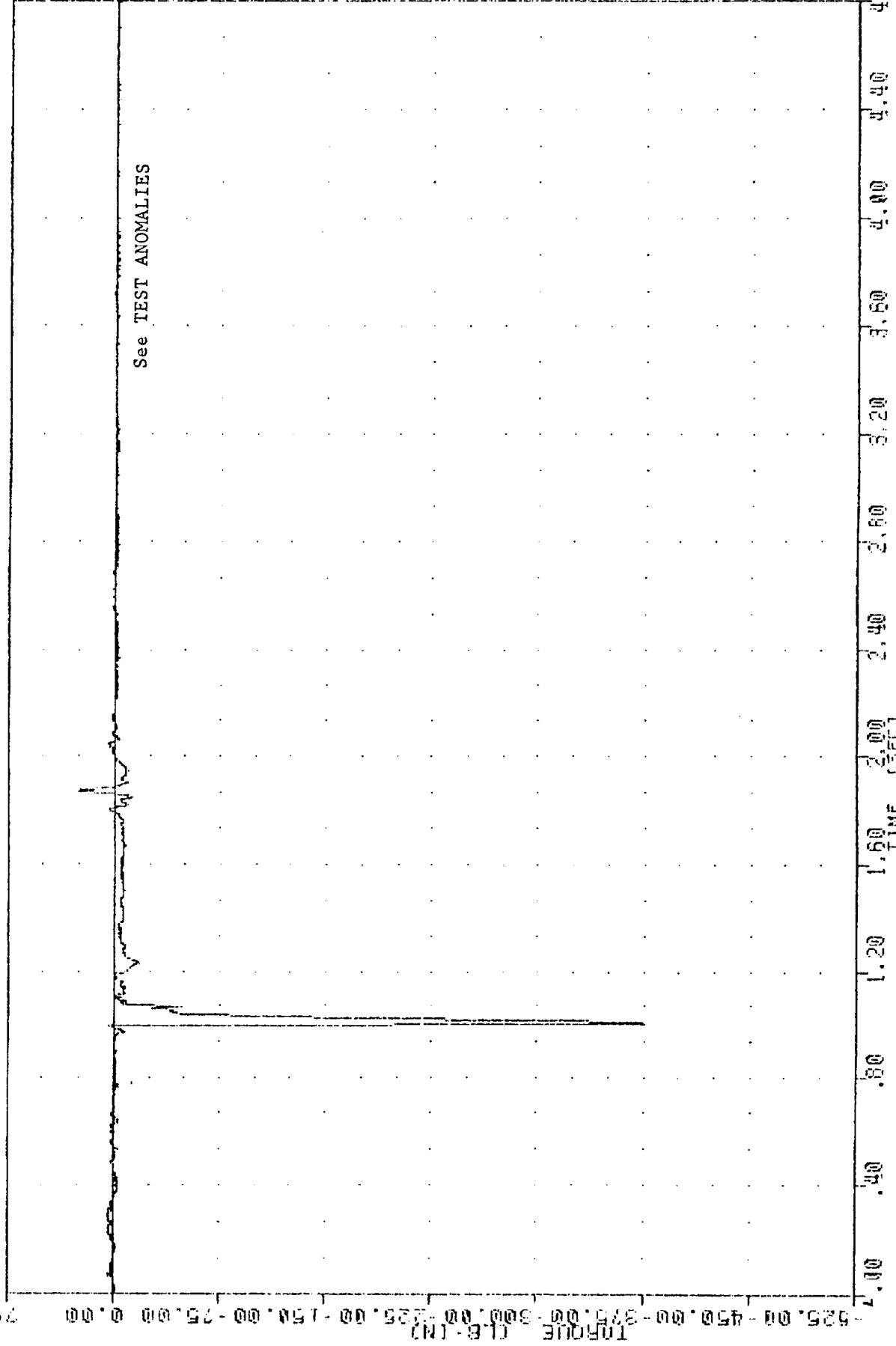
MIN. MAX VALUES = -375.842

1.00

24.77 2

1.37

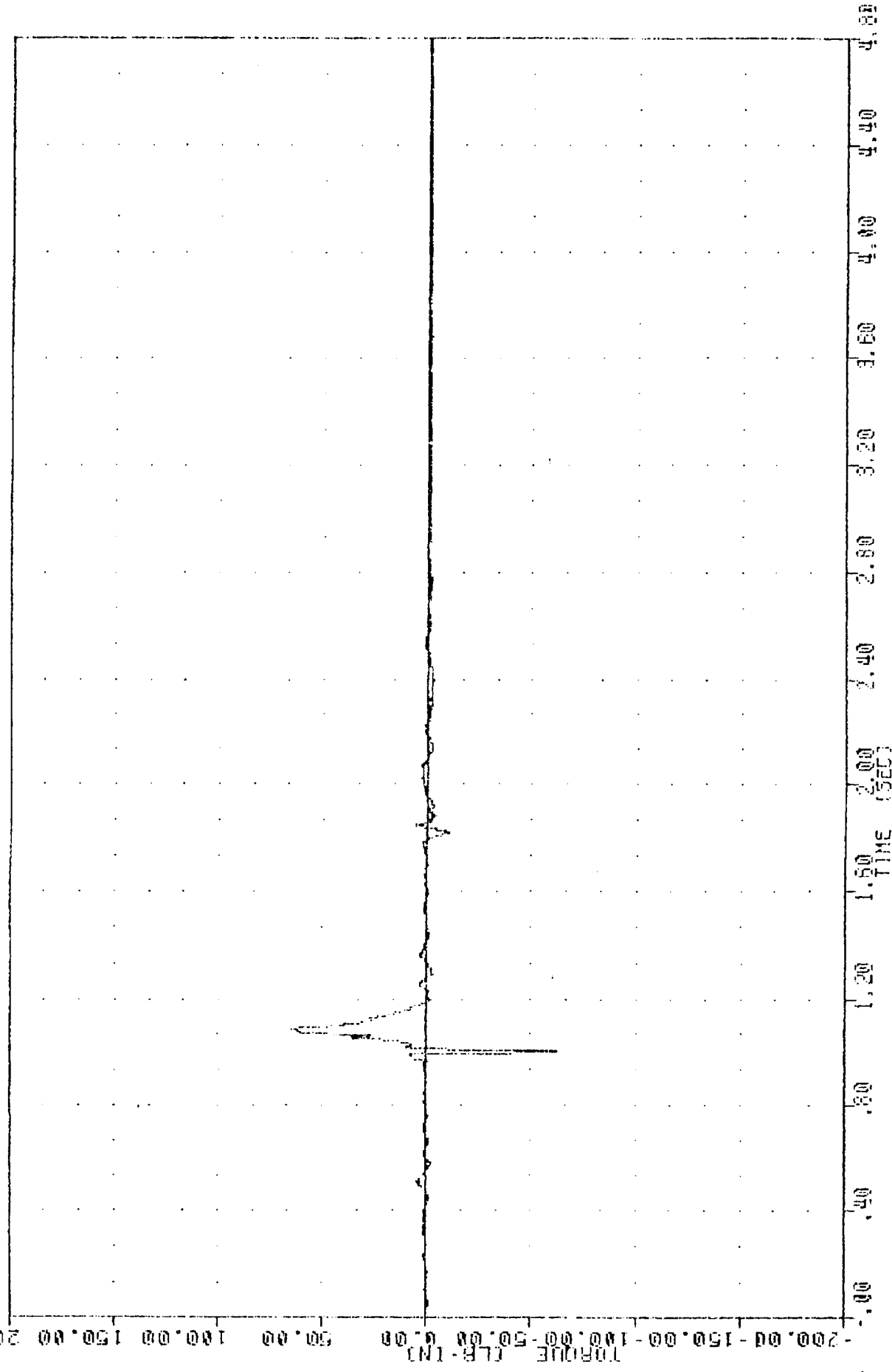
75.00



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
DRIVER NECK MOMENT ABOUT Y AXIS

L. N. H. L. 1000
 CONTROLLED ROLLOVER CRASH
 90239
 HEKZM1

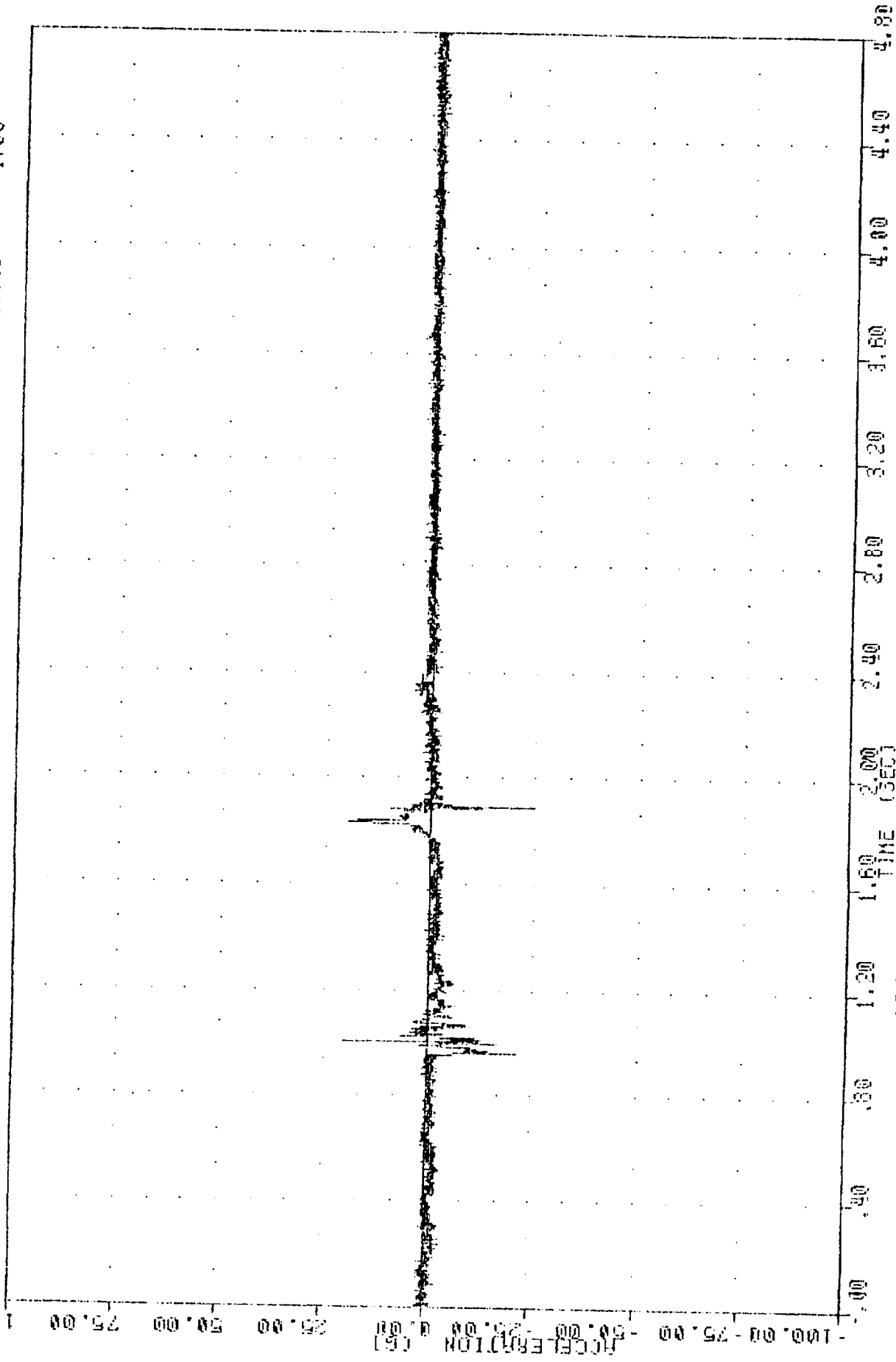
FILTER = ELPP 100/ 250/ -15
 MIN, MAX VALUES = -62.35 1.00 84.65 1.00



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
 DRIVER NECK MOMENT ABOUT Z AXIS

100.00
 CONTROLLED ROLLOVER CRASH
 90239
 CSTY61

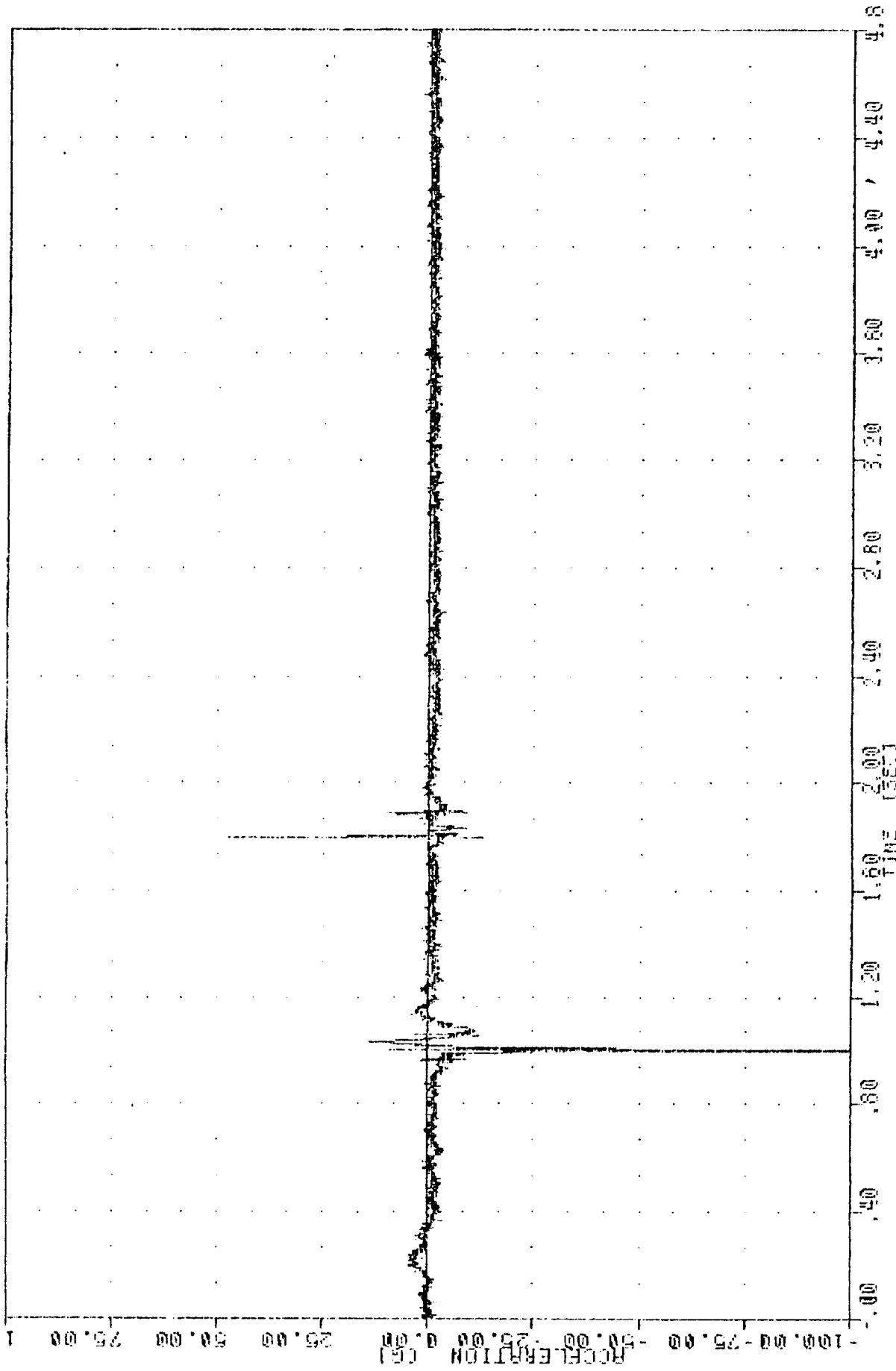
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -24.702 1.89 20.40 2 1.00



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
 DRIVER CHEST Y AXIS ACCELERATION

100 NH 10000
 CONTROLLED ROLLOVER CRASH
 90239
 CST161

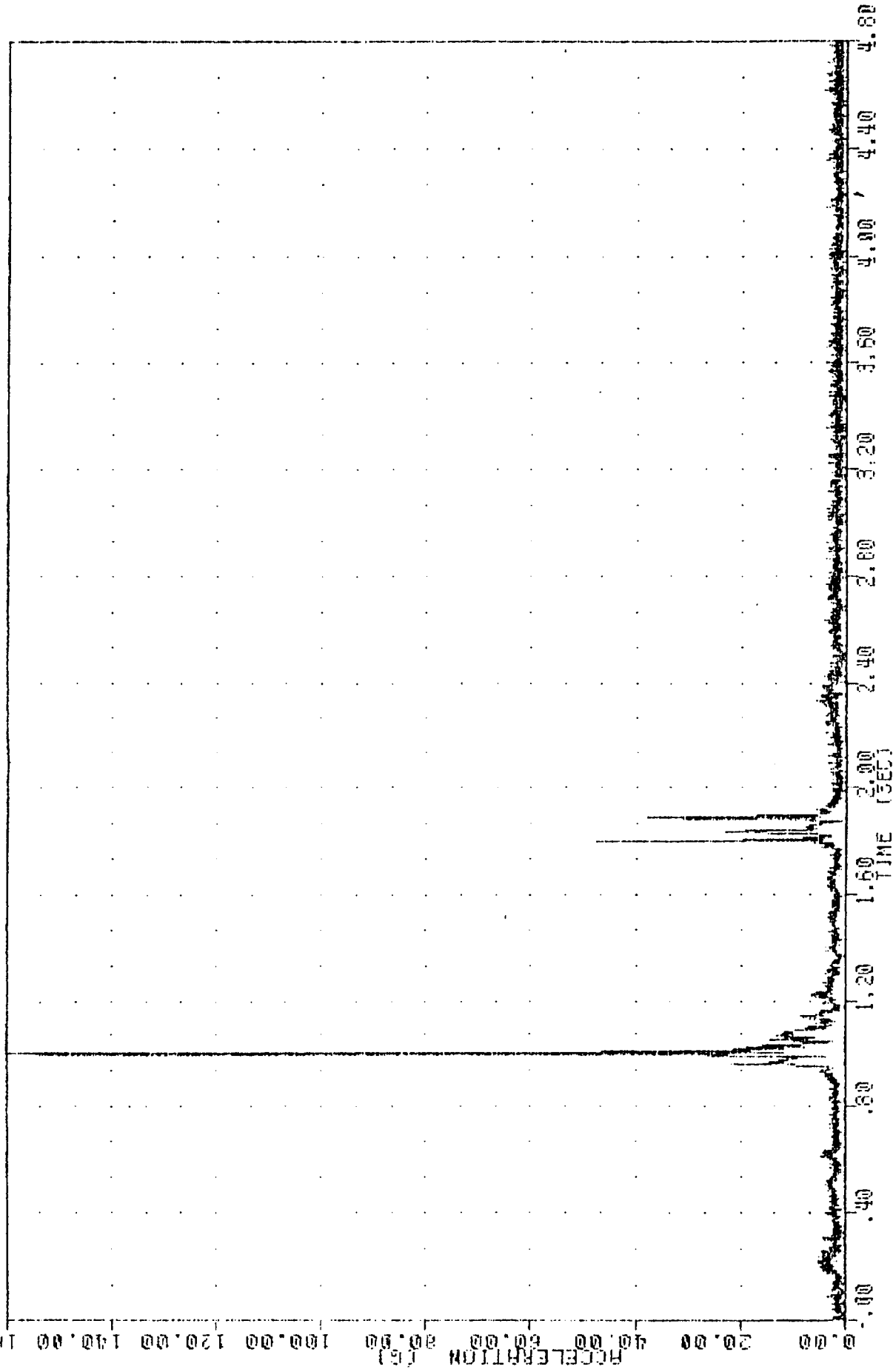
FILTER = 8LPP 300/ 750/ -16
 MIN. MAX VALUES = -313.390 1.00 47.09 1.00



1988 DODGE RAM 50 OFF ROLLOVER CHART AT 30 MPH
 DRIVER CHEST Z AXIS ACCELERATION

LOW MEAN 0.0000L
CONTROLLED ROLLOVER CRASH
30239
CTRL

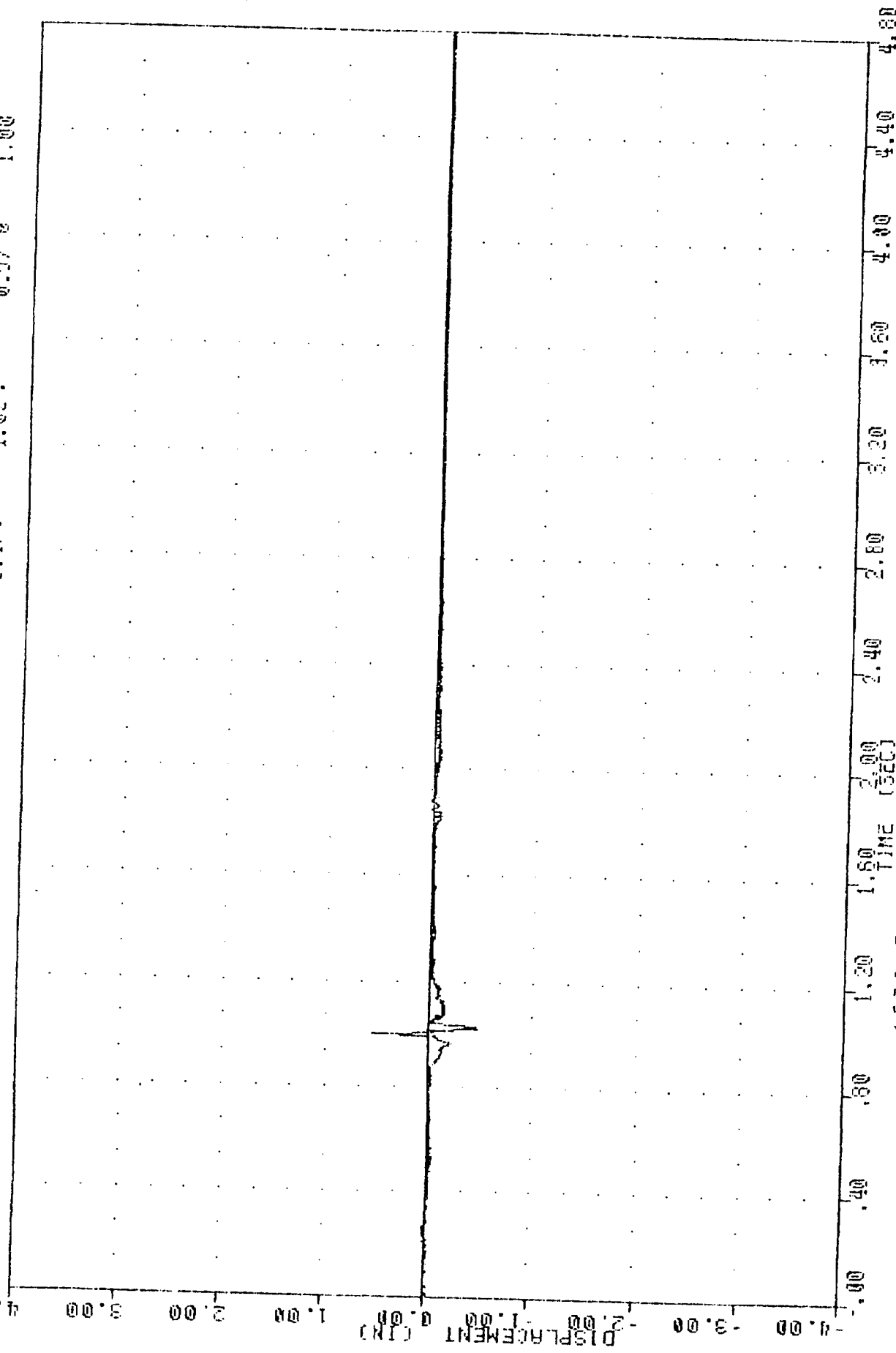
FILTER = BLPP 3000/ 7500/ -16
MIN. MAX VALUES = 0.05% 3.03, 313.50 % 1.00



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
DRIVER CHEST RESULTANT ACCELERATION

Lab. No. 1008L
CONTROLLED ROLLOVER CRASH
90239
CSTVD1

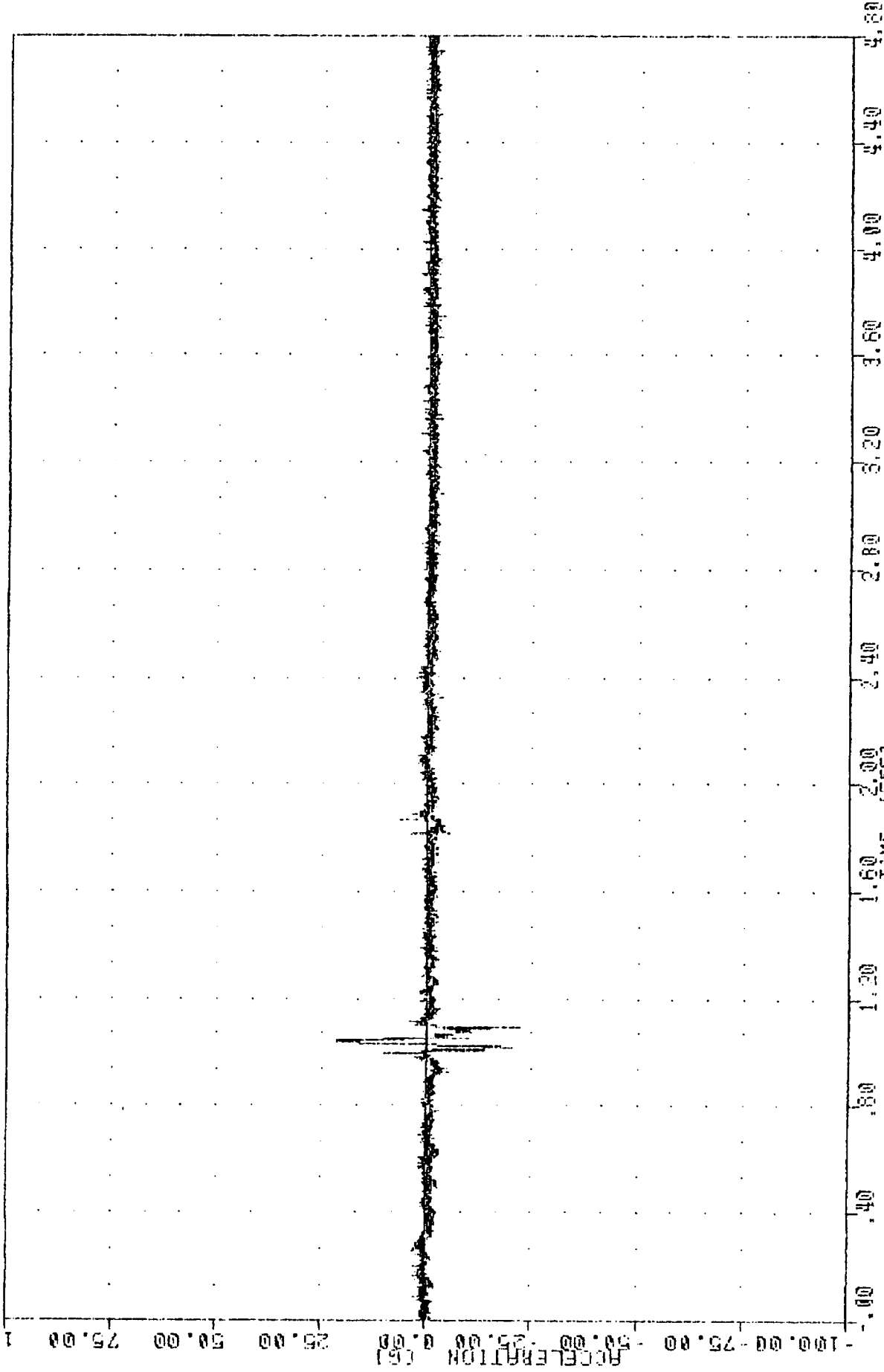
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -0.472 1.02 0.572 1.00



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
DRIVER CHEST X AXIS DISPLACEMENT

601 MPH 1.00000
 CONTROLLED ROLLOVER CRASH
 90239
 PEVXG1

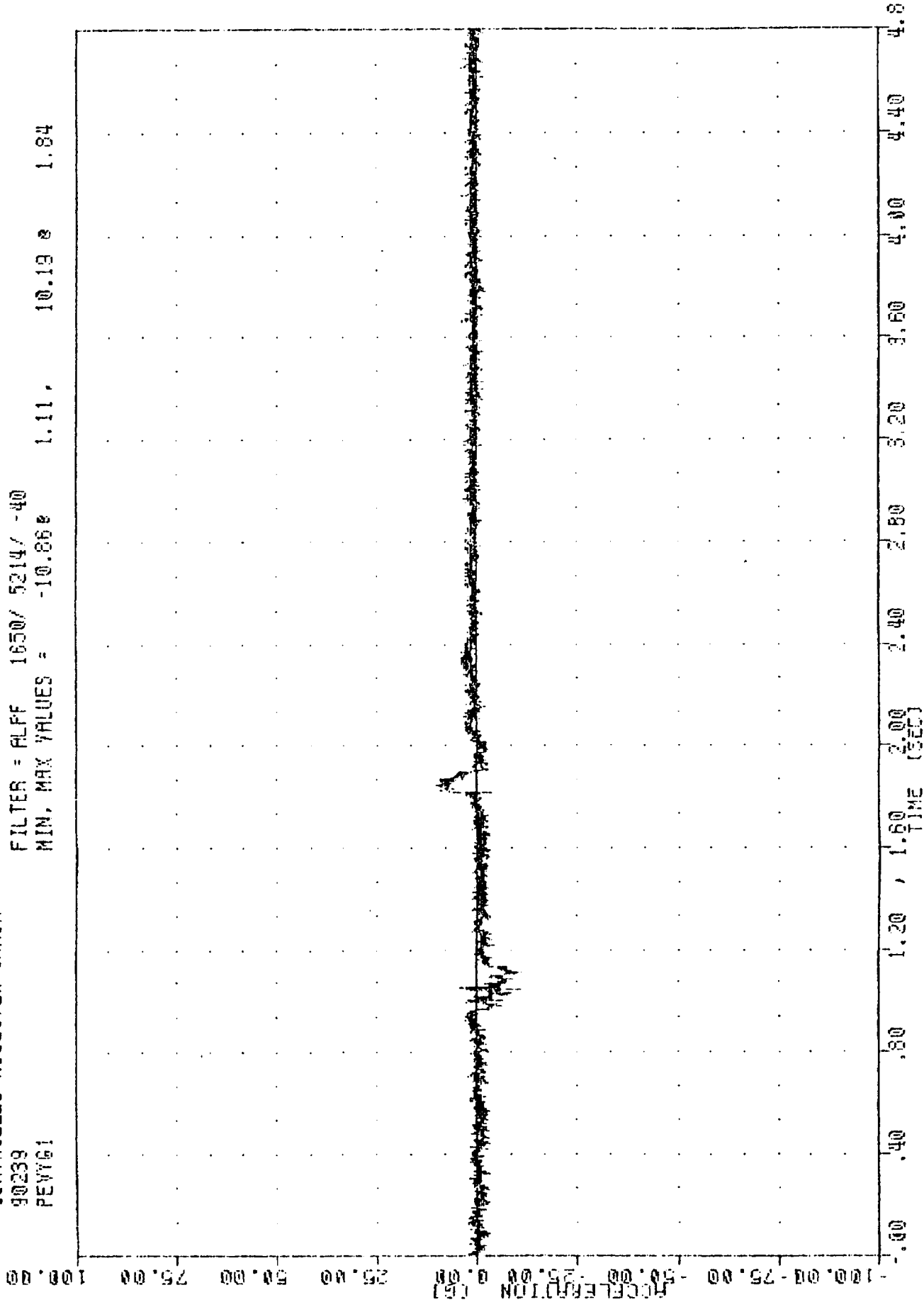
FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = 1.00 21.22 0 1.04



1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
 DRIVER PELVIS X AXIS ACCELERATION

600 NH100 1.3000L
CONTROLLED ROLLOVER CRASH
90239
PEV61

FILTER = ALFF 1650/ 5214/ -40
MIN, MAX VALUES = -10.868 1.11, 10.13 8 1.84

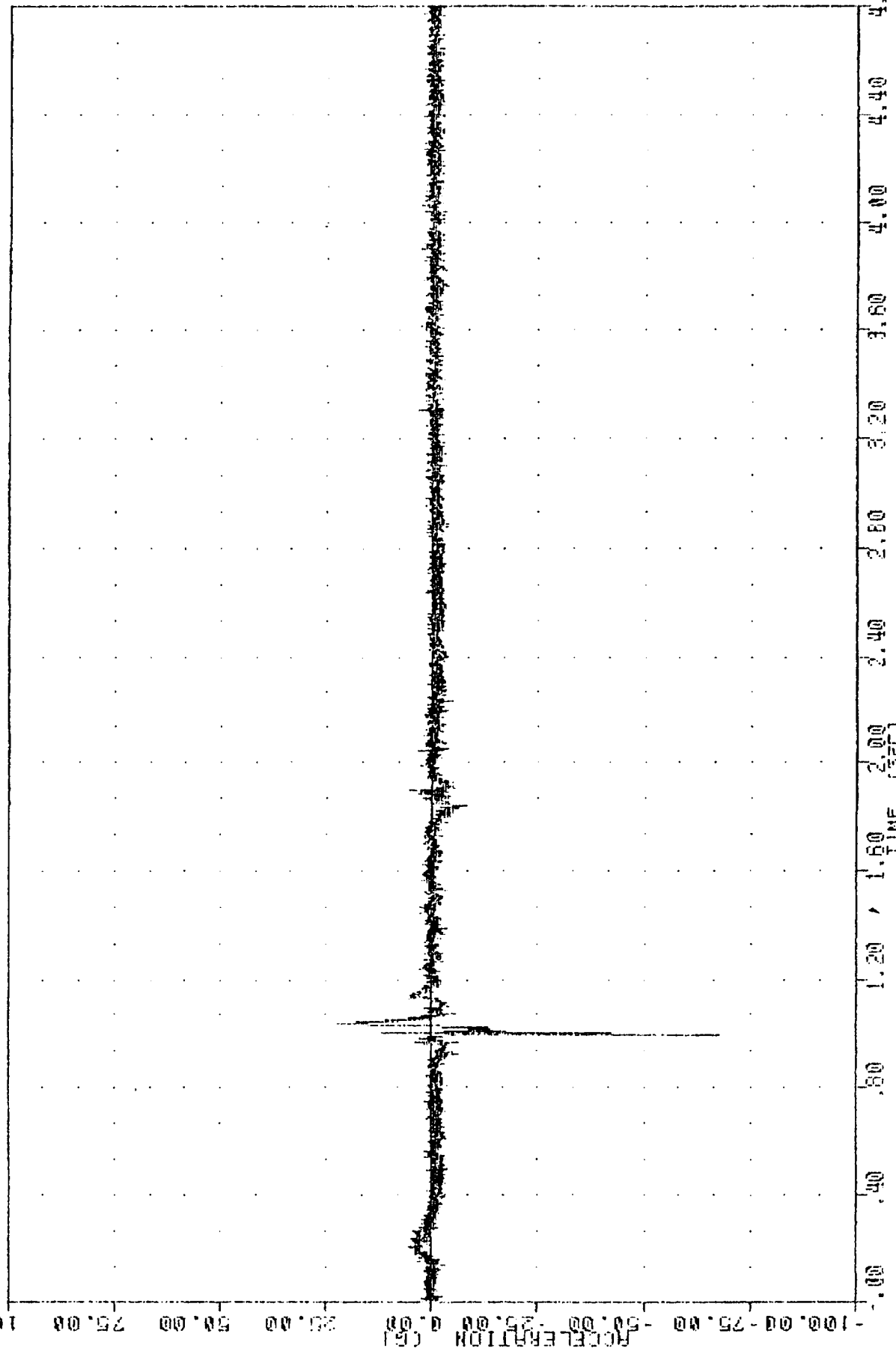


1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
DRIVER PELVIS Y AXIS ACCELERATION

```

FILTER = HUFF      1850/ 5214/ -40
MIN. MAX VALUES = -67.882      0.99      22.26      1.04

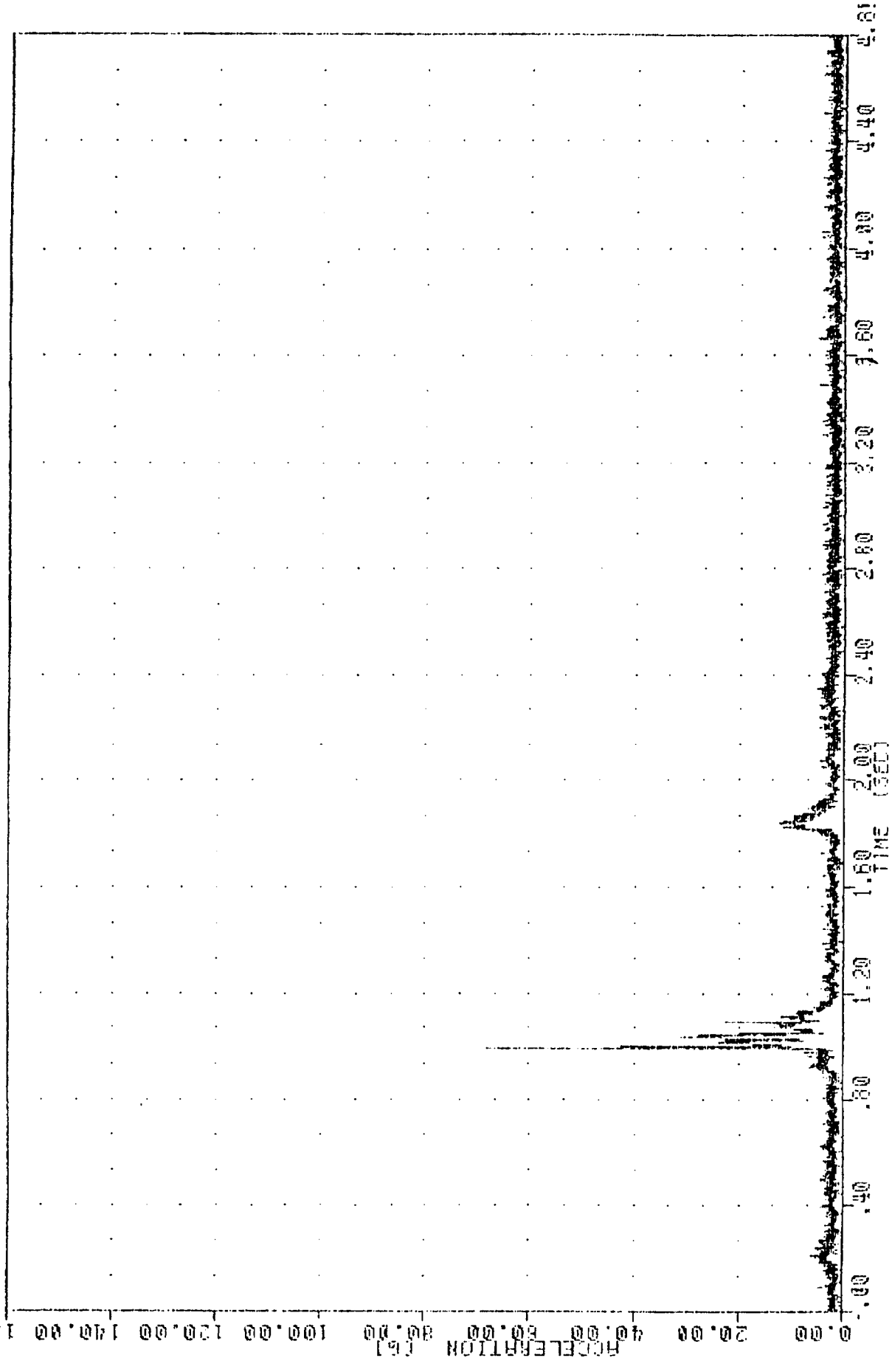
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1988 DODGE RAM 50 OFF ROLLOVER CART AT 30 MPH
DRIVER PELVIS Z AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH
90239
PEVR61

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.10 68.29 0.99



1988 DODGE RAM 50 OFF ROLLOVER CRASH AT 30 MPH
DRIVER PELVIS RESULTANT ACCELERATION