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V 1267

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

PREPARED BY:

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

TEST REPORT

AUGUST - SEPTEMBER, 1988

PREPARED FOR:

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

NOTICE

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
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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	0.4	hectares	ha

MASS (weight)

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

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
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Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
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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 m²)

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	pints	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 add 32)	degrees Fahrenheit	°F
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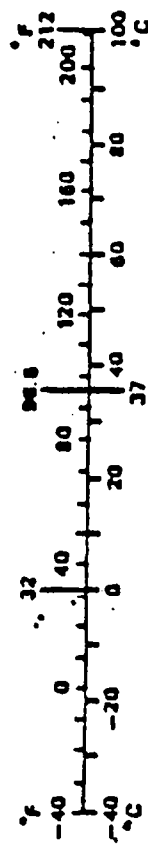
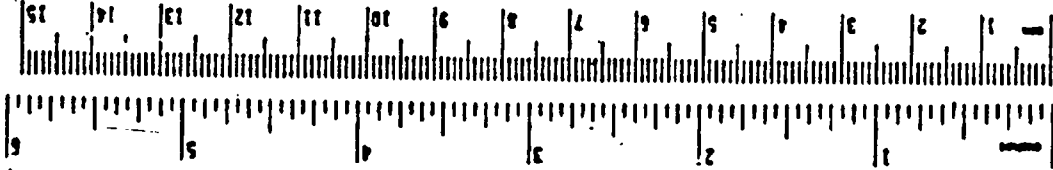


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SECTION 1.0
PURPOSE AND TEST PROCEDURE

This rollover crash test is the fourth 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 Chevrolet 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. X

No belt!
per photos.

re-belted

SECTION 2.0
SUMMARY OF ROLLOVER CRASH TEST

A 1988 Chevrolet 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 four tires. The rollover crash test was conducted by the Transportation Research Center of Ohio in East Liberty, Ohio on August 17, 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 passenger's 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 880817

ROLL CART DATA SUMMARY

No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX G SEC		MAX G SEC	
1 CENTER OF GRAVITY				
ACCELERATION (g)				
LONGITUDINAL	17.7	0.2	5.2	0.1
LATERAL	12.7	0.1	7.0	0.2
VERTICAL	24.3	0.2	7.8	0.2
RESULTANT	30.3	0.2		
2 PLATFORM DISPLACEMENT				
(in)				
LEFT SIDE	24.1	1.6	0.2	0.0
RIGHT SIDE	24.8	1.4	0.1	0.7
VEHICLE/ROLL CART SEPARATION TIMES			UPPER SWITCH: 0.8 SEC	
			LOWER SWITCH: 1.2 SEC	

	POSITIVE DIRECTION	NEGATIVE DIRECTION
LONGITUDINAL:	FORWARD	REARWARD
LATERAL:	LEFTWARD	RIGHTWARD
VERTICAL:	UPWARD	DOWNWARD
DISPLACEMENT:	OUTWARD	INWARD

FINAL RESTING PLACES OF PARTS AND CAR

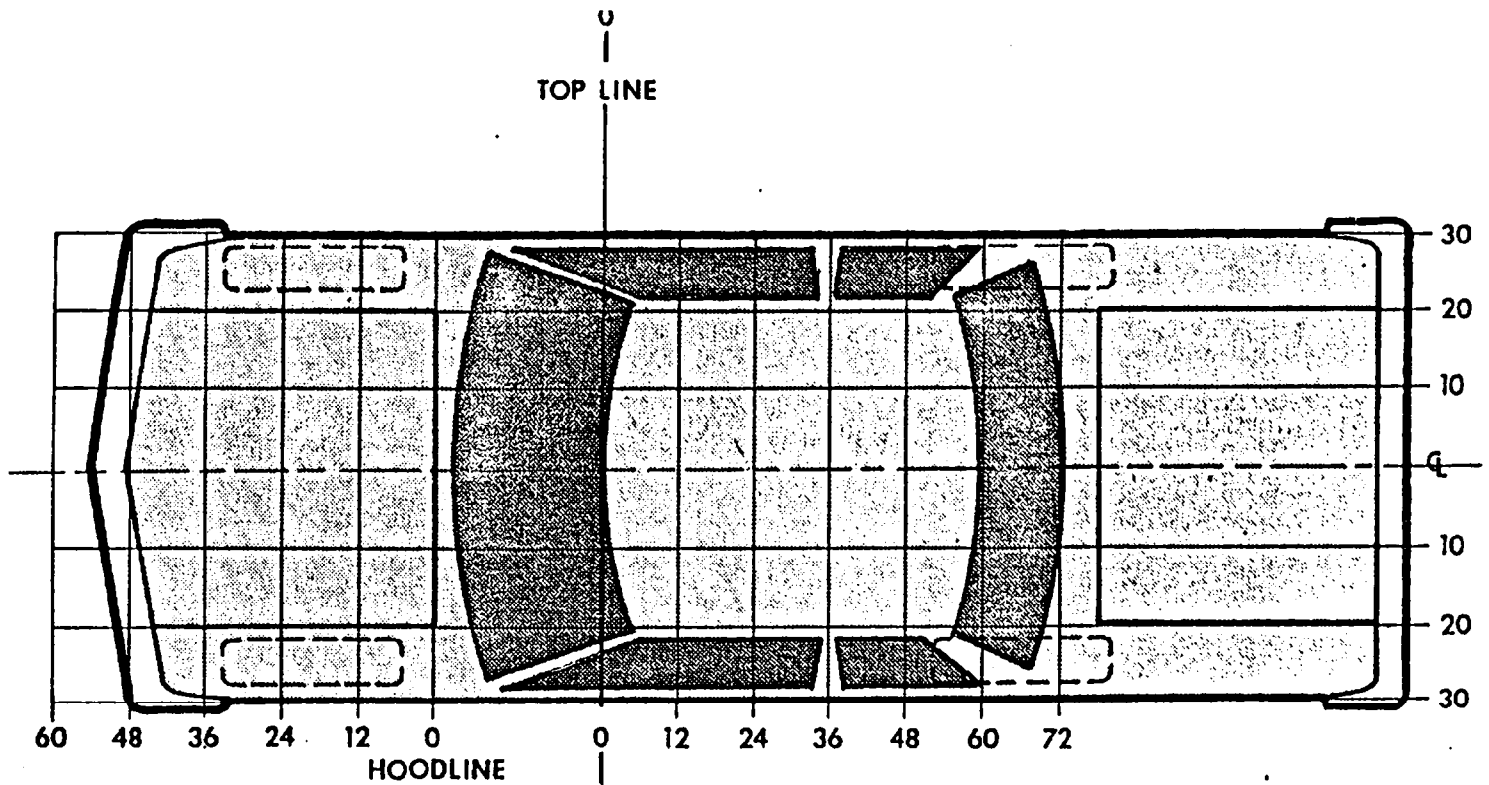
<u>DESCRIPTION OF PART</u>	<u>X DISTANCE, FT*</u>	<u>Y DISTANCE, FT*</u>
1988 Chevrolet Standard Regular Bed Pickup	189.1	-1.3

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

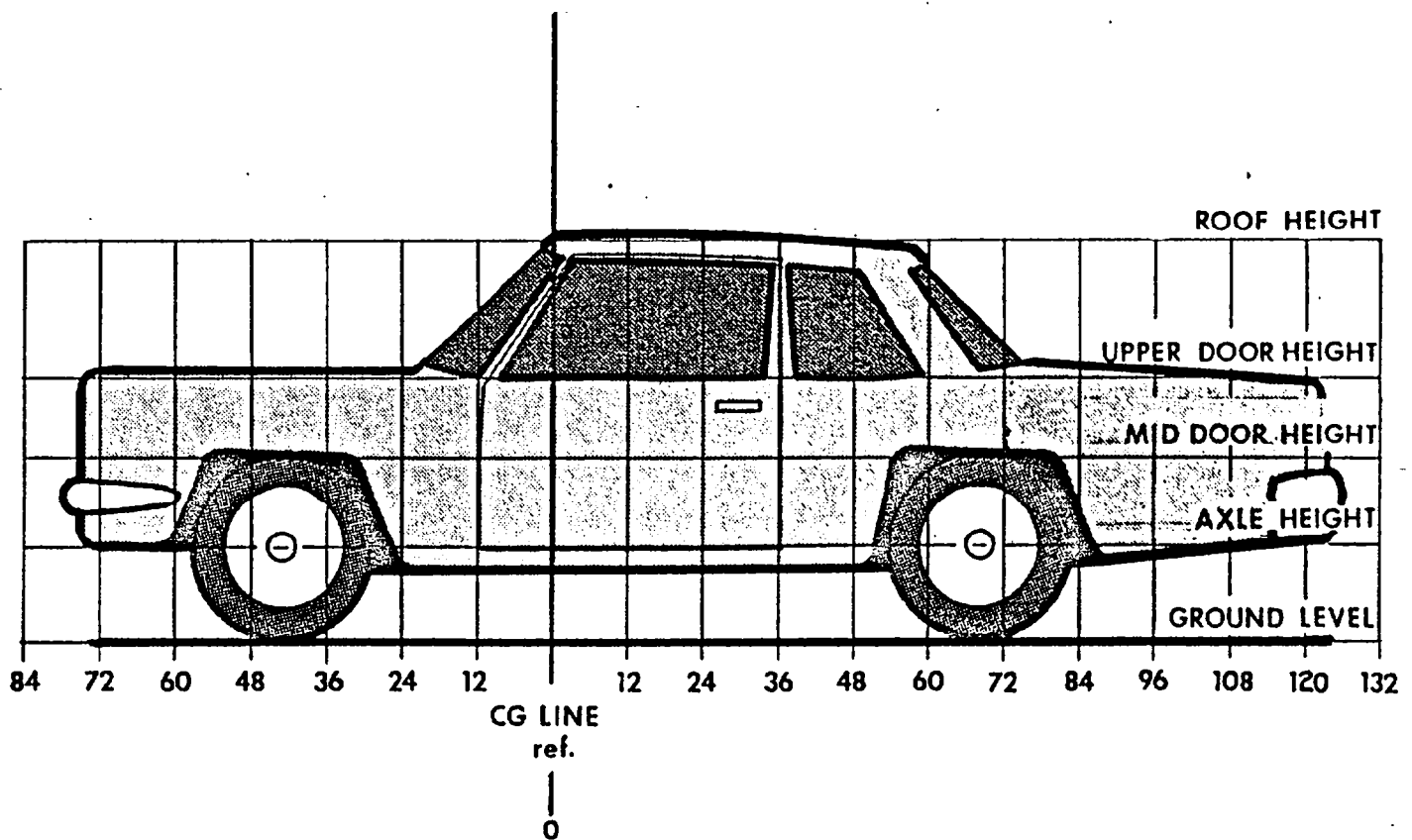
VEHICLE INTERIOR MEASUREMENTS

<u>DESCRIPTION</u>	<u>PRE</u>	<u>POST</u>	<u>DIFF</u>
Floor board to top of left "A" post	43.1	39.1	4.0
Floor board to top of right "A" post	44.0	39.0	5.0
Door sill to top of left "B" post	46.6	44.3	2.3
Door sill to top of right "B" post	46.6	46.7	-0.1
Door sill to top of left door opening	45.1	38.2	6.9
Door sill to top of right door opening	45.1	44.1	1.0
Floor tunnel to windshield header	39.2	36.1	3.1
Floor tunnel to center of roof	42.2	40.2	2.0
Rear of floor tunnel to roof	43.4	42.3	1.1
Maximum width at "B" post	50.2	63.5	-13.3
Maximum width at "A" post	50.2	60.2	-10.0
Maximum width at top of door opening	51.9	52.5	-0.6

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	45.8	46.8	47.1	47.2	47.0	46.5	45.4
Trailing edge of cowl + 12 inches	44.5	45.2	45.8	45.9	45.6	44.9	44.1
Trailing edge of cowl + 24 inches	42.8	43.6	44.0	44.1	43.9	43.2	42.3
Trailing edge of cowl + 36 inches	40.6	41.5	41.9	42.2	41.8	41.1	40.1
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	45.2	46.4	46.9	46.9	47.0	46.6	45.7
Trailing edge of cowl + 12 inches	43.9	45.1	45.5	45.9	45.6	44.8	44.1
Trailing edge of cowl + 24 inches	42.2	43.4	43.8	44.2	43.8	42.9	42.8
Trailing edge of cowl + 36 inches	40.1	41.1	41.5	41.7	41.0	40.2	39.2
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

Trailing edge of cowl at centerline	-0.6	-0.4	-0.2	-0.3	0.0	0.1	0.3
Trailing edge of cowl + 12 inches	-0.6	-0.1	-0.3	0.0	0.0	-0.1	0.0
Trailing edge of cowl + 24 inches	-0.4	-0.2	-0.2	0.1	-0.1	-0.3	0.5
Trailing edge of cowl + 36 inches	-0.5	-0.4	-0.4	0.5	-0.8	-0.9	-0.9
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	68.5	69.0	69.0	68.8	68.4
Longitudinal Center of Gravity + 12	68.8	69.2	69.2	69.0	68.6
Longitudinal Center of Gravity + 24	X	X	X	X	X
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	64.9	65.5	65.8	66.9	65.8
Longitudinal Center of Gravity + 12	66.5	66.2	67.4	67.9	67.6
Longitudinal Center of Gravity + 24	X	X	X	X	X
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	-3.6	-3.5	-3.2	-1.9	-2.6
Longitudinal Center of Gravity + 12	-2.3	-3.0	-1.8	-1.1	-1.0
Longitudinal Center of Gravity + 24	X	X	X	X	X
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	69.2	X	X	X	X	X	21.0	21.0	20.6	X	X	X	X	X	X	X
Upper Door	43.2	X	14.4	13.6	13.0	12.5	12.1	11.9	11.8	11.4	11.2	11.2	11.2	11.2	11.5	X
Mid Door	29.9	12.8	X	X	10.8	10.5	10.2	10.1	10.1	10.1	10.1	9.8	X	X	10.8	X
Axle Height	17.0	X	X	X	X	11.9	11.9	11.9	12.0	12.0	12.1	X	X	X	X	X

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

Roof Height	69.2	X	X	X	X	X	21.0	20.9	20.6	X	X	X	X	X	X	X
Upper Door	43.2	X	15.0	13.7	12.9	12.5	11.1	10.8	10.8	11.1	11.0	11.0	11.0	11.2	11.2	X
Mid Door	29.9	12.5	X	X	10.7	10.4	10.1	9.9	9.8	10.0	10.0	9.6	X	X	10.8	X
Axle Height	17.0	X	X	X	X	12.3	12.2	12.3	13.3	12.2	12.4	X	X	X	X	X

STATIC CRUSH (IN)

Roof Height	69.2	X	X	X	X	X	0.0	0.1	0.0	X	X	X	X	X	X	X
Upper Door	43.2	X	-0.6	-0.1	0.1	0.0	1.0	1.1	1.0	0.3	0.2	0.2	0.2	0.0	0.3	X
Mid Door	29.9	0.3	X	X	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.2	X	X	0.0	X
Axle Height	17.0	X	X	X	X	-0.4	-0.3	-0.4	-1.3	-0.2	-0.3	X	X	X	X	X

* Center of gravity is located 53.9 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
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PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)

Roof Height	69.2	X	X	X	X	X	19.6	19.3	18.8		X	X	X	X	X	X
Upper Door	43.2	X	13.4	12.5	11.9	11.5	11.1	10.9	10.7	10.7	10.7	10.7	10.8	10.9	11.0	X
Mid Door	29.9	X	X	X	10.0	9.6	9.4	9.2	9.2	9.4	9.5	9.6	X	X	10.4	X
Axle Height	17.0	X	X	X	X	11.4	11.4	11.5	11.5	11.5	12.0	X	X	X	X	X

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

Roof Height	69.2	X	X	X	X	X	21.6	20.3	20.5	X	X	X	X	X	X	X
Upper Door	43.2	X	14.8	13.2	12.4	13.6	12.4	11.3	11.5	11.9	12.0	12.1	12.2	12.5	12.6	X
Mid Door	29.9	X	X	X	10.8	9.8	9.6	9.7	9.8	10.2	10.4	10.2	X	X	11.6	X
Axle Height	17.0	X	X	X	X	11.8	12.4	11.4	11.5	12.2	12.5	X	X	X	X	X

STATIC CRUSH (IN)

Roof Height	69.2	X	X	X	X	X	3.0	1.0	1.7	X	X	X	X	X	X	X
Upper Door	43.2	X	1.4	0.7	0.5	2.1	1.3	0.4	0.8	1.2	2.7	1.4	1.4	1.6	1.6	X
Mid Door	29.9	X	X	X	0.8	0.2	0.2	0.5	0.4	0.8	0.7	0.6	X	X	1.2	X
Axle Height	17.0	X	X	X	X	0.4	1.0	-0.1	0.0	0.7	0.5	X	X	X	X	X

* Center of gravity is located 53.9 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 vehicle left rear suspension string potentiometer, SRLD1, data was lost after 3.5 seconds.

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: General Motors Corporation

MAKE/MODEL: Chevrolet/Cheyenne

VIN: 1GCDC14Z0JZ279664

BODY STYLE: Pickup

MODEL YEAR: 1988

NHTSA NO.:

COLOR: Maroon

ENGINE DATA: TYPE: Inline CYLINDERS: 6 DISPLACEMENT: 4.3 liter

TRANSMISSION DATA: 5 SPEED, X MANUAL, AUTOMATIC, FWD, X RWD, 4WD

DATE VEHICLE RECEIVED: 7/16/88

ODOMETER READING: 91

DEALER'S NAME AND ADDRESS:

ACCESSORIES:

POWER STEERING	Yes	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	Yes	AIR CONDITIONING	No
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER	None		

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: **

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

VEHICLE MANUFACTURED BY: General Motors Corporation

DATE OF MANUFACTURE: 5/88

GVWR: 5600 LBS

GAWR: FRONT 2950 LBS.,

REAR 3404 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. The top edge of the glazing was strengthened with a molded channel incorporating a small steel rod. The side edges of the glazing were bonded to a molded T-shaped edge that moved up and down inside the modified window channel, allowing full window function. During impact the plastic acts as a stretchable barrier that prevents ejection while also limiting head and neck loading.

**The vehicle came to TRC without rear bumper.

TEST VEHICLE INFORMATION CONT'D

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 32 psi; REAR 35 psi

RECOMMENDED TIRE SIZE: P225/75R15 LOAD RANGE X B C D

TIRES ON VEHICLE (MFR., LINE, SIZE): Uniroyal Tiger Paw P225/75R15

IS SPARE TIRE A "SPACE SAVER": No

IS SPARE TIRE STANDARD EQUIPMENT: Yes

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

TYPE OF FRONT SEAT BACKS: NA

*NUMBER OF OCCUPANTS FRONT REAR TOTAL

*CARGO LOAD LBS. *TOTAL LBS.

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

RIGHT FRONT 1060 lbs. RIGHT REAR 845 lbs.

LEFT FRONT 1001 lbs. LEFT REAR 755 lbs.

TOTAL FRONT WEIGHT 2061 lbs. (56.3% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1600 lbs. (43.7% OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 3661 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (3661 LBS)

VCW = VEHICLE CAPACITY WEIGHT (LBS)*

DSC = DESIGNATED SEATING CAPACITY ()*

RCLW = 300 LBS*

TARGET TEST WEIGHT = UDW + RCLW + (1 DUMMY X 164 LBS/DUMMY)

= 3661 + 300 + 167 LBS

TARGET TEST WEIGHT = 4128 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 290 LBS. CARGO

RIGHT FRONT	1149 lbs.	RIGHT REAR	996 lbs.
LEFT FRONT	1087 lbs.	LEFT REAR	886 lbs.
TOTAL FRONT WEIGHT	2236 lbs.	(54.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1882 lbs.	(45.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	4118 lbs.	(0.2% UNDER TARGET WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE BED AREA: 150 LBS.

COMPONENTS REMOVED TO MEET TARGET WEIGHT: None

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	LF 32.6	;RF 32.8	;LR 35.0	;RR 34.2
PRE-TEST ATTITUDE:	LF 32.4	;RF 32.0	;LR 34.0	;RR 33.1
POST-TEST ATTITUDE:	LF 32.1	;RF 31.9	;LR 33.9	;RR 33.2

WHEELBASE: 118.0 INCHES

CG = 53.9 INCHES REARWARD OF FRONT WHEEL CENTERLINE

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST:	L 186.5	;C 193.9	;R 186.5
	POST-TEST:	L 186.2	;C 194.0	;R 186.2
	TOTAL CRUSH:	L 0.3	;C -0.1	;R 0.3

TEST CONDITIONS

TEST NUMBER: 880817

DATE OF TEST: 8/17/88

TIME OF TEST: 1110

WIND VELOCITY: 6-7 mph @ 306°NW

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 90°F

TEMPERATURE IN OCCUPANT COMPARTMENT: 83°F

DRIVER DUMMY TEMPERATURE: 80°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	4118	4128
VEHICLE ORIENTATION (deg.) YAW*	45	45
VEHICLE ORIENTATION (deg.) ROLL**	30	30
VEHICLE VELOCITY (mph)	30	30

DUMMIES

	DRIVER	MIDDLE PASSENGER	RT. FRONT PASSENGER	LEFT REAR PASSENGER	RT. REAR PASSENGER
TYPE:	Part 572E				
SERIAL NO:	192				
INSTRUMENTATION:					
HEAD ACCEL.:	3				
NECK L.C.'C.:	6				
CHEST ACCEL.:	3				
PELVIS ACCEL.:	3				
CHEST DISPLACEMENT	1				
POTENTIOMETER:					
RESTRAINT SYSTEM:	Unrestrained				

REMARKS:

*AS MEASURED CLOCKWISE FROM THE DIRECTION OF TRAVEL.

**AS MEASURED FROM THE HORIZONTAL.

VEHICLE DATA SUMMARY

No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX G SEC		MAX G SEC	
2 CENTER OF GRAVITY				
ACCELERATION (g)				
LONGITUDINAL	6.1	3.6	10.3	3.1
LATERAL	9.0	3.1	6.9	3.6
VERTICAL	17.4	1.5	26.6	1.5
RESULTANT	26.7	1.5		
3 CENTER OF GRAVITY				
ANGULAR VELOCITY				
ROLL (X-AXIS)	150.3	5.2	292.4	1.5
PITCH (Y-AXIS)	248.5	3.6	200.2	3.6
YAW (Z-AXIS)	84.2	3.6	125.2	3.6
4 LEFT FRONT SUSPENSION				
DISPLACEMENT (in)				
VERTICAL	0.7	3.1	11.3	3.6
DISPLACEMENT				
VERTICAL	0.4	0.5	11.0	5.3
6 LEFT REAR SUSPENSION				
DISPLACEMENT (in)				
VERTICAL	---	--- Y	---	--- Y
7 RIGHT REAR SUSPENSION				
DISPLACEMENT (in)				
VERTICAL	2.2	0.7	8.4	5.2

	POSITIVE DIRECTION	NEGATIVE DIRECTION
LONGITUDINAL:	FORWARD	REARWARD
LATERAL:	LEFTWARD	RIGHTWARD
VERTICAL:	UPWARD	DOWNWARD
ROLL:	TO RIGHT	TO LEFT
PITCH:	NOSE DOWNWARD	NOSE UPWARD
YAW:	COUNTER CLOCKWISE	CLOCKWISE
DISPLACEMENT:	OUTWARD	INWARD

Y See TEST ANOMALIES

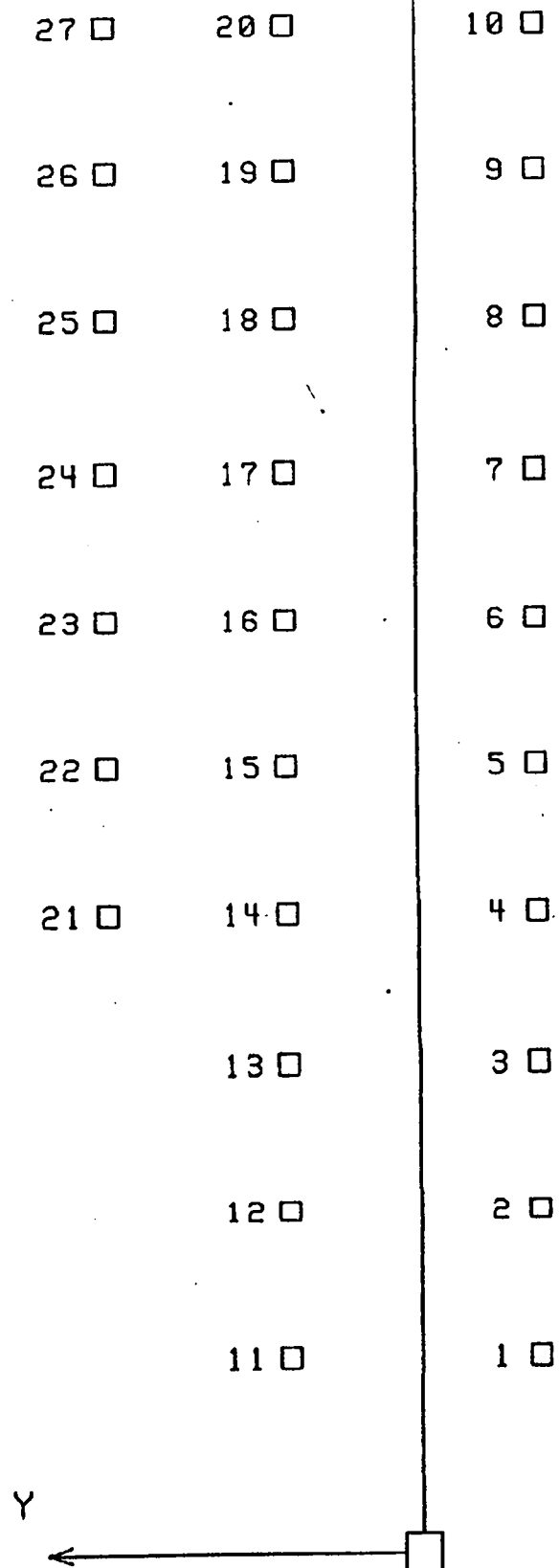
IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: 1988 CHEVROLET PICK-UP TRUCK

TEST NUMBER: 880817

DIMENSIONS IN INCHES

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	193.9	194.0	-0.1
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	158.8	159.1	-0.3
X3	REAR SURFACE OF VEHICLE TO FIREWALL	145.4	145.1	0.3
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	137.5	136.2	1.3
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	137.1	136.6	0.5
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	134.9	134.0	0.9
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	134.4	134.5	-0.1
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	89.2	88.1	1.1
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	88.8	88.5	0.3
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	88.4	87.5	0.9
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	88.0	88.2	-0.2
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	133.8	133.8	0.0
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	133.8	133.8	0.0
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	146.4	145.6	0.8
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	146.2	146.0	0.2
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	115.0	115.2	-0.2
X17	CENTER OF STEERING COLUMN TO "A" POST	15.1	15.0	0.1
X18	CENTER OF STEERING COLUMN TO HEADLINING	18.4	14.0	4.4
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	186.5	186.2	0.3
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	186.5	186.2	0.3
X21	LENGTH OF ENGINE BLOCK	15.0	15.0	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	16	24	Real Time Documentation
2	Right wide	Photosonic 1B	25	500	Vehicle Kinematics
3	Right angle	Photosonic 1B	25	498	Vehicle Kinematics
4	Front wide	Photosonic 1B	25	498	Vehicle Kinematics
5	Onboard - floor	Photosonic 1B	8	500	Dummy Kinematics
7	Documentary	Beaulieu	16-105	24	Pre-test & Post-test Documentation

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	X* (ft.)	Y* (ft.)	Z* (ft.)
2	54.8	-297.0	3.6
3	122.6	-221.2	4.9
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	PASSENGER #192
Head	<u>NA</u>	<u>Roof, seatback, window and door sill</u>
Chest	<u>NA</u>	<u>Steering wheel</u>
Abdomen	<u>NA</u>	<u>None</u>
Left knee	<u>NA</u>	<u>Knee blocker</u>
Right knee	<u>NA</u>	<u>Right door</u>

DOOR OPENING:

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

SEAT MOVEMENT:

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

GLAZING DAMAGE:

The windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

The left and right window was cracked upon impact.

REAR SUSPENSION

Suspension Number (4 digits):

R192

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):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 35.0(psi) * 6.897 =: 241.4 (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	1.706	
+100	4.3	1.976	
+200	8.7	2.426	
0	0.4	1.811	
-100	4.1	1.459	
-200	8.6	1.045	
0	0.1	1.705	

Calculated C.G. Height (in): 27.6

Pitch Inertia:

<u>Run</u>	<u>Period(sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	4.85	210	483
2	4.87	208	484
3	4.88	201	471

Pitch Inertia (ft·lb·sec²): 2615.4

Roll Inertia:

Distance between ramps (in): 53.6

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	2.76	205	464
2	2.76	206	454
3	2.76	207	460

Roll Inertia (ft·lb·sec²): 513.7

IPMD MEASURED DATA

Yaw Inertia:

Distance between ramps (in): 53.6String Pot Offset from platform center (in): 73.0

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.81</u>	<u>133.</u>	<u>296</u>
2	<u>2.80</u>	<u>128</u>	<u>293</u>
3	<u>2.81</u>	<u>129</u>	<u>306</u>

Yaw Inertia (ft·lb·sec²): 2782.5

Version 2 -- June-25, 1987

Filled Out By: B. Dotson Date: 8/29/88Checked By: Chrstos Date: 9/9/88VEHICLE DATAVehicle ID Code (7 characters): V88-192AVehicle Model Year (2 digits): 88Vehicle Make (2 characters): 01

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		

Vehicle Model (2 characters - see appendix B): 22Body 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 G C D C 1 4 Z 0 J I 2 7 9 6 6 4 _ _ _Odometer Reading: 99.9 Thousands of Miles: 0.0Wheelbase: 117.5 (in) x 25.4 -: 2984.5 (mm)Front Track: 63.4 (in) x 25.4 -: 1610.4 (mm)Rear Track: 65.6 (in) x 25.4 -: 1666.2 (mm)Roof Height: 68.2 (in) x 25.4 -: 1732.3 (mm)

G.V.W.R.: 5600 (lbs) x 4.45 =: 24920.0 (N)
Front G.A.W.R.: 2950 (lbs) x 4.45 =: 13127.5 (N)
Rear G.A.W.R.: 3404 (lbs) x 4.45 =: 15147.8 (N)

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

Weight on RF Tire: 1122 (lbs) x 4.45 =: 4992.9 (N)
Weight on LF Tire: 1126 (lbs) x 4.45 =: 5010.7 (N)
Weight on LR Tire: 954 (lbs) x 4.45 =: 4245.3 (N)
Weight on RR Tire: 890 (lbs) x 4.45 =: 3960.5 (N)
Vehicle Test Weight: 4092 (lbs) x 4.45 =: 18209.4 (N)

Lateral and Longitudinal Center of Gravity Location

From Front Axle: 53.0 (in) x 25.4 =: 1346.2 (mm)
From Center Line: -0.5 (in) x 25.4 =: -12.7 (mm)
Engine Displacement: 262.0 (cu in) x 0.0164 =: 4.3 (l)

Engine Type (2 characters):

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

V6

Engine Location (1 character):

F - Front M - Mid R - Rear

E

Engine Orientation (1 character):

L - Longitudinal T - Transverse

L

Transmission Type:

M - Manual A - Automatic

M

Drive Axle (1 character):

F - Front R - Rear
4 - Four Wheel Drive

R

Vehicle Comments (30 characters):

Post-rollover tested
with driver

FRONT SUSPENSIONSuspension Number (4 digits): F192Front/Rear Flag (1 character): FAxle Type (1 character) I
I - Independent S - SolidSuspension 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): CO
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
N - No Y - YesSuspension Modification
R - Raised L - Lowered
S - Stiffened W - Widened
O - Other1 - _____
2 - _____

FRONT SUSPENSION

Tire Manufacturer (10 characters):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 32.0(psi) * 6.897 =: 220.7 (kpa)

REAR SUSPENSIONSuspension Number (4 digits): R192Front/Rear Flag (1 character): RAxle 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):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 35.0(psi) * 6.897 =: 241.4 (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	1.905	
+100	3.9	2.122	
+200	7.8	2.358	
0	-0.1	1.960	
-100	3.9	1.733	
-200	7.9	1.464	
0	0.0	1.907	

Calculated C.G. Height (in): 26.6

Pitch Inertia:

<u>Run</u>	<u>Period(sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	4.71	250	452
2	4.71	253	455
3	4.71	252	451

Pitch Inertia (ft·lb·sec²): 2648.8

Roll Inertia:

Distance between ramps (in): 53.7

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	2.73	219	522
2	2.72	217	507
3	2.73	219	521

Roll Inertia (ft·lb·sec²): 538.8

IPMD MEASURED DATA

Yaw Inertia:

Distance between ramps (in): 53.7String Pot Offset from platform center (in): 73.5

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.76</u>	<u>129</u>	<u>268</u>
2	<u>2.76</u>	<u>127</u>	<u>262</u>
3	<u>2.76</u>	<u>117</u>	<u>235</u>

Yaw Inertia (ft·lb·sec²): 2678.8

14-SEP-00 16.20

CONTROLLED KULLUVER GRAM

880817

DOT/NHIL
88230

0.00 mph

		Min value	Max value	Data Units	Filter
1	HEDXG2	-23.548 e	28.608 e	g	ALPF 1650/ 5214/ -40
2	HEDYG2	-18.239 e	41.366 e	g	ALPF 1650/ 5214/ -40
3	HEDYG2	-21.358 e	16.343 e	g	ALPF 1650/ 5214/ -40
4	NEKXF2	3.022	60.492 e	lb	BLPP 100/ 250/ -16
5	NEKXF2	1.357	131.401 e	lb	BLPP 100/ 250/ -16
6	NEKZF2	3.026	105.486 e	lb	BLPP 100/ 250/ -16
7	NEKXM2	1.419	311.065 e	lb-in	BLPP 100/ 250/ -16
8	NEKXM2	3.022	202.516 e	lb-in	BLPP 100/ 250/ -16
9	NEKZM2	1.558	183.497 e	lb-in	BLPP 100/ 250/ -16
10	CSTXG2	3.699	6.087 e	g	BLPP 300/ 750/ -16
11	CSTYG2	1.363	16.084 e	g	BLPP 300/ 750/ -16
12	CSTYG2	1.382	12.470 e	g	BLPP 300/ 750/ -16
13	CSTXD2	3.736	0.343 e	in	BLPP 300/ 750/ -16
14	PEVXG2	3.702	7.077 e	g	BLPP 300/ 750/ -16
15	PEVYG2	1.491	15.252 e	g	BLPP 300/ 750/ -16
16	PEVZG2	1.232	6.004 e	g	BLPP 300/ 750/ -16
17	VCXGQ1	3.081	6.120 e	g	BLPP 100/ 250/ -16
18	VCXGQ1	3.617	9.048 e	g	BLPP 100/ 250/ -16
19	VCQZG1	1.534	17.388 e	g	BLPP 100/ 250/ -16
20	RDXXV1	1.490	150.319 e	deg/sec	BLPP 100/ 250/ -16
21	RDXYV1	3.603	248.458 e	deg/sec	BLPP 100/ 250/ -16
22	RDKZV1	3.629	84.237 e	deg/sec	BLPP 100/ 250/ -16
23	SFLD1	3.605	0.656 e	in	BLPP 100/ 250/ -16
24	SFRD1	5.281	0.365 e	in	BLPP 100/ 250/ -16
25	SRLD1	3.780	5.522 e	in	BLPP 100/ 250/ -16
26	SRRD1	5.217	2.205 e	in	BLPP 100/ 250/ -16
27	VCXGQ2	0.129	17.705 e	g	BLPP 100/ 250/ -16
28	VCYGQ2	0.172	12.726 e	g	BLPP 100/ 250/ -16
29	VCQZG2	0.206	24.317 e	g	BLPP 100/ 250/ -16
30	RCPDL	0.033	24.136 e	in	BLPP 100/ 250/ -16
31	RCPDR	-0.686	24.827 e	in	BLPP 100/ 250/ -16
32	OTH1	-0.147 e	10.259 e	volt	ALPF 1650/ 5214/ -40
33	OTH2	-1.396	10.281 e	volt	ALPF 1650/ 5214/ -40
34	HEDRG2	0.088 e	46.474 e	g	BLPP 300/ 750/ -16
35	CSTRG2	0.016	25.439 e	g	BLPP 300/ 750/ -16
36	PEVRG2	0.088 e	19.931 e	g	BLPP 300/ 750/ -16
37	VCGRG1	-0.863	26.737 e	g	BLPP 100/ 250/ -16
38	VCGRG2	-1.355	30.342 e	g	BLPP 100/ 250/ -16

SIGN CONVENTION

Compression on barrier face load cells is positive.

Compression on femur load cells is positive.

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

DUMMY DATA SUMMARY

TEST NUMBER 880817

RIGHT FRONT PASSENGER DUMMY

SN: 192

POSITIVE DIRECTION		NEGATIVE DIRECTION	
MAX	SEC	MAX	SEC

HEAD ACCELERATION (g)

LONGITUDINAL	28.6	1.5	23.5	3.2
LATERAL	41.4	3.2	18.2	1.5
VERTICAL	16.3	1.4	21.4	3.0
RESULTANT	46.5	3.2		
HIC	54.5 FROM 3244 TO 3250 MSEC			

NECK FORCE (lbs)

LONGITUDINAL	60.5	5.6	81.6	3.1
LATERAL	131.4	4.4	127.5	1.4
VERTICAL	105.5	3.8	591.1	3.0

NECK MOMENT (ft-lbs)

ABOUT LONGITUD.	25.8	3.3	13.1	1.4
ABOUT LATERAL	16.8	5.7	35.6	3.0
ABOUT VERTICAL	15.2	1.4	13.1	1.6

CHEST ACCELERATION (g)

LONGITUDINAL	6.1	3.2	13.9	3.7
LATERAL	16.1	3.7	24.9	1.4
VERTICAL	12.5	3.7	9.3	1.4
RESULTANT	25.4	1.4		
3 MSEC CLIP	9.5			

CHEST DISPLACEMENT (in)

LONGITUDINAL	0.3	1.5	0.2	3.7
--------------	-----	-----	-----	-----

PELVIS ACCELERATION (g)

LONGITUDINAL	7.1	3.2	13.4	3.7
LATERAL	15.3	3.7	9.6	1.5
VERTICAL	6.0	3.7	7.6	1.2
RESULTANT	19.9	3.7		

POSITIVE DIRECTION

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

NEGATIVE DIRECTION

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

SEE APPEND D FOR NECK LOAD CELL POLARITIES

DUMMY KINEMATIC SUMMARY

Passenger Dummy

Upon the vehicle's impact with the ground, the passenger dummy's head struck the roof, the knees impacted the knee blocker, the right door sill and the right window sill. As the vehicle rolled onto its roof, the dummy's head remained in contact with the roof. As the vehicle continued to roll, the dummy rebounded rightward in the passenger's seat and down into the seat as the vehicle rolled onto its wheels. The vehicle came to rest on its four tires with the passenger dummy resting against the roof and the dummy's head was resting on the passenger seatback and the left knee on the seat and the right knee on top of the left knee. The passenger dummy was not restrained.

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 passenger's seat was positioned in the mid-adjustment notch of the seat track. The seat back angle was fixed. The driver dummy was unrestrained.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

MFR./MAKE/MODEL: Chevrolet Pickup

SEAT TYPE: X Bench
 ___ Bucket
 ___ Split bench

ADJUSTER TYPE: X Manual
 ___ Power
 ___ Fixed

TECHNICIANS:

BUCKET SEAT BACK TYPE: X Fixed
 ___ Adjustable reclining

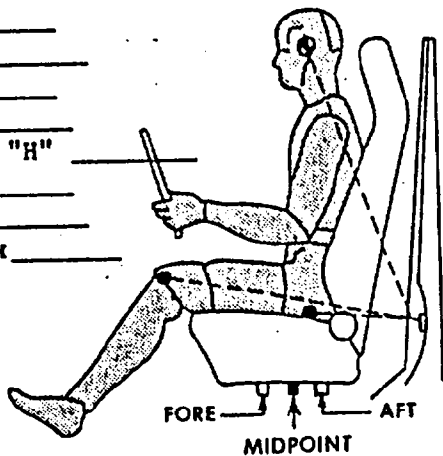
1. N. Kinney
2. S. Ericksen
3. B. Miller
4. _____

POSITIONING DATE: 8/17/88

AMBIENT TEMP. 70° F TIME: 0700

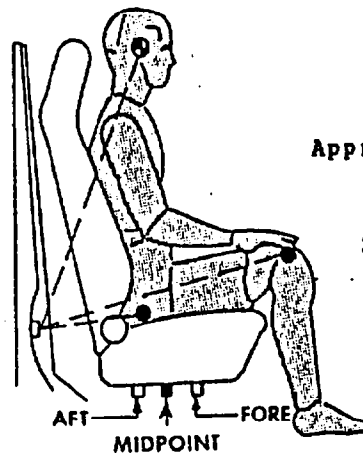
DRIVER DUMMY #NA

Head _____
 Target _____
 Knee _____
 Joint _____
 Approx. "H" _____
 Point _____
 Pelvis _____
 Seatback _____



PASSENGER DUMMY #192

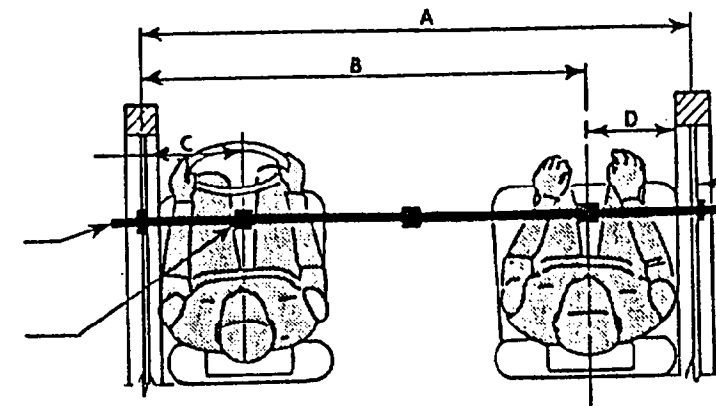
Head 30°
 Target 26.2"
 Knee 95°
 Joint 29.1"
 Approx. "H" 105°
 Point 13.8"
 Pelvis NA
 Seatback NA°



A = 63.6"
 B = 47.5"
 C = NA
 D = 16.1"

LATERAL BAR

ADJUSTABLE
 POINTER



DOOR 11.6"
 GLASS
 HEIGHT

LEFT
 FRONT
 DOOR

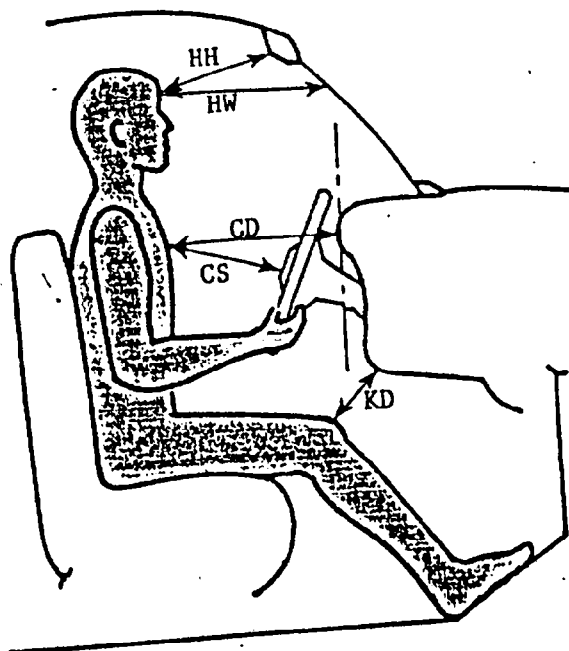
DRIVER
 DUMMY #NA

PASSENGER
 DUMMY #192

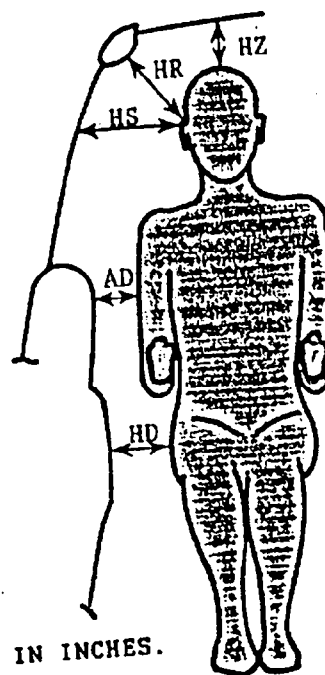
RIGHT
 FRONT
 DOOR

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER	PASSENGER
	NA	192
HH		17.6
HW		21.9
CD		26.5
CS		NA
KDL		6.8
KDR		6.4



	DRIVER	PASSENGER
	NA	192
HR		8.8
HS		11.9
AD		7.1
HD		7.8
HZ		5.1



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

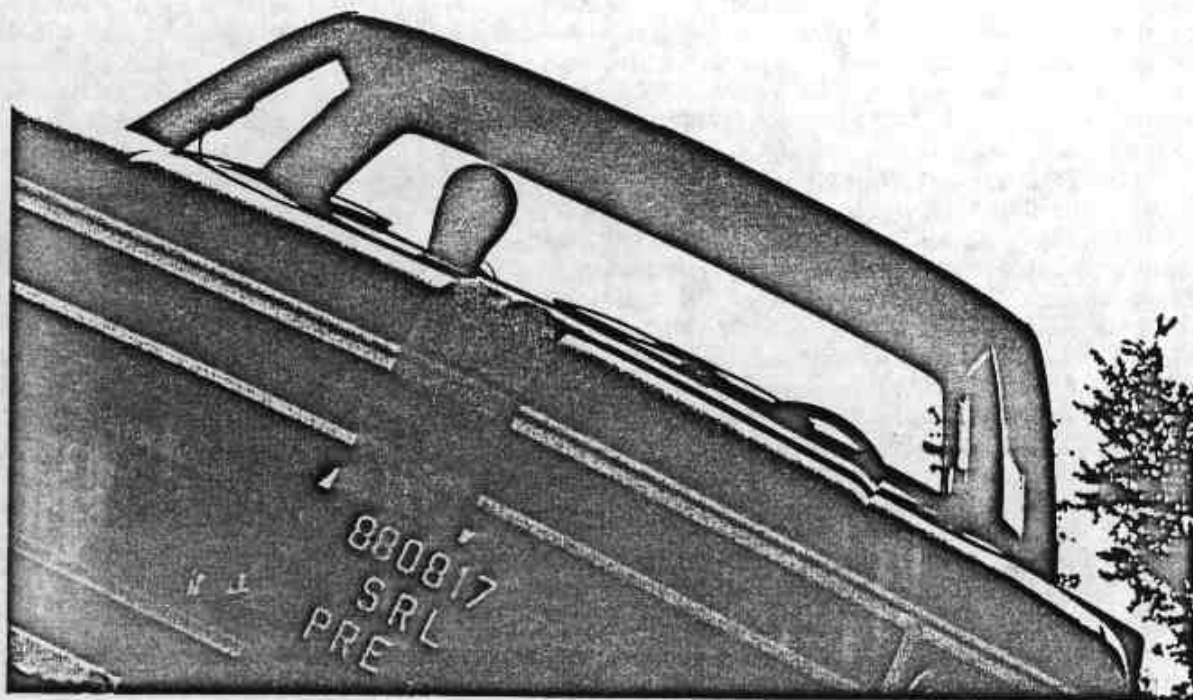


Figure A-4. PRE-TEST CLOSE-UP FRONT VIEW



Figure A-5. PRE-TEST RIGHT FRONT PASSENGER DUMMY - VIEW 1

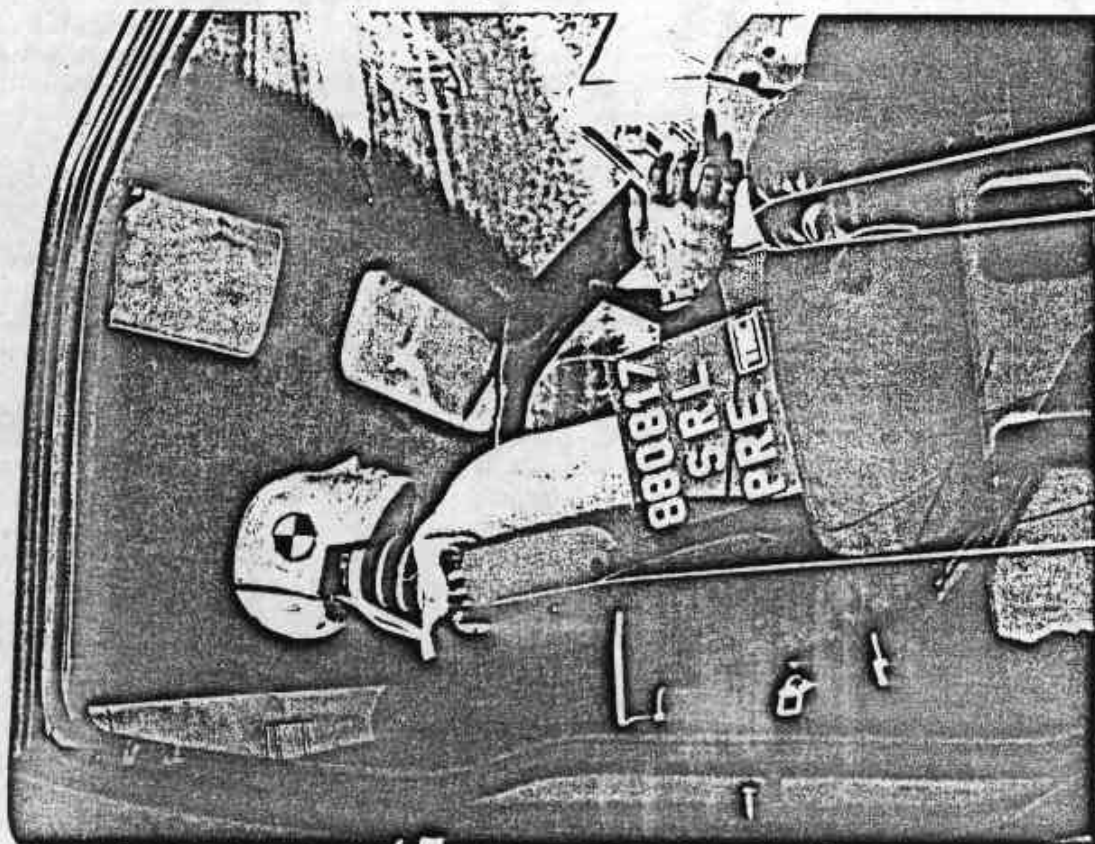


Figure A-6. PRE-TEST RIGHT FRONT PASSENGER DUMMY - VIEW 2

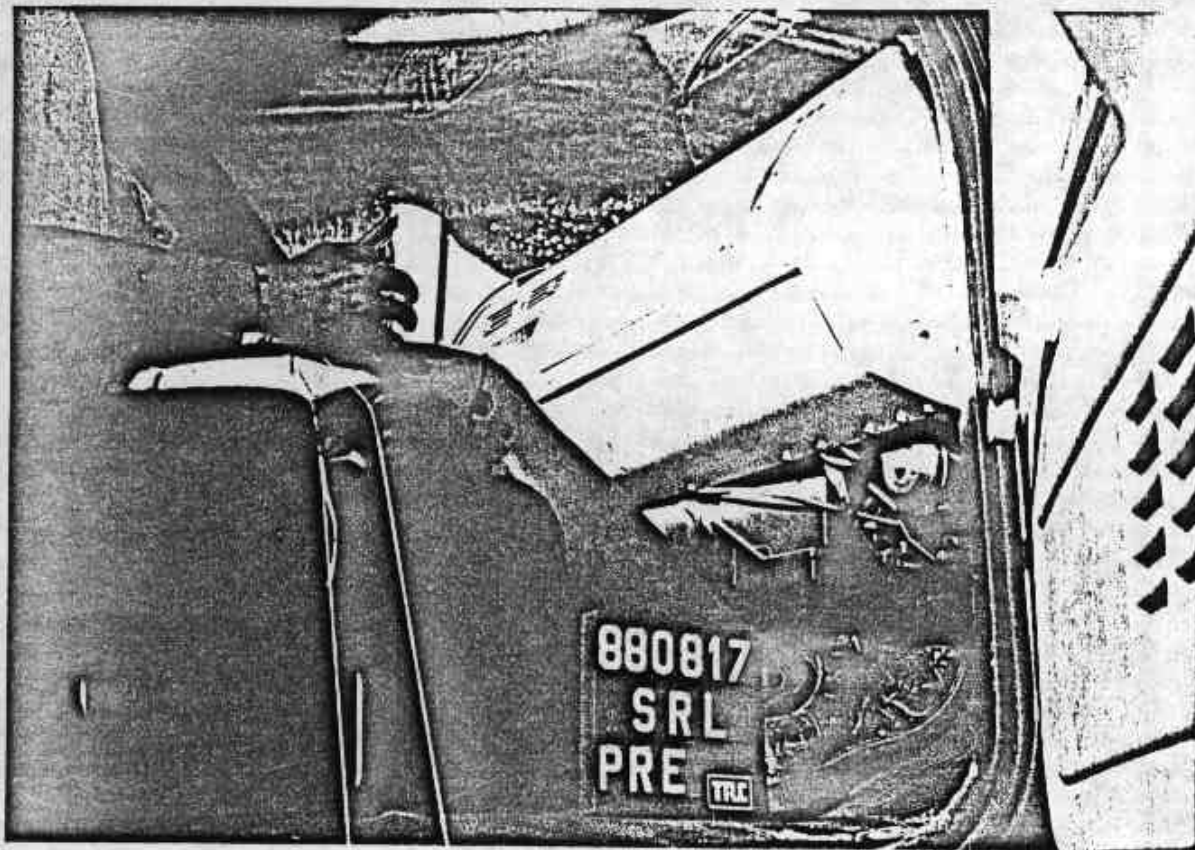


Figure A-7. PRE-TEST RIGHT FRONT PASSENGER DUMMY - VIEW 3

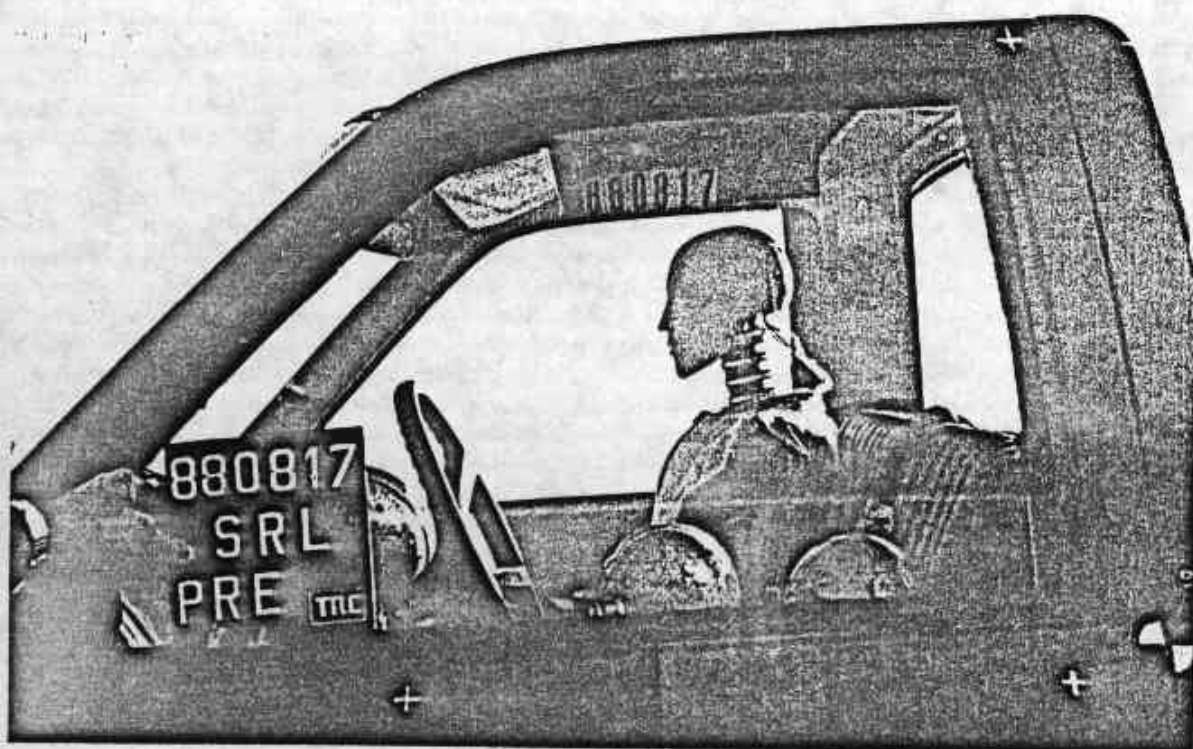


Figure A-8. PRE-TEST RIGHT FRONT PASSENGER DUMMY - VIEW 4

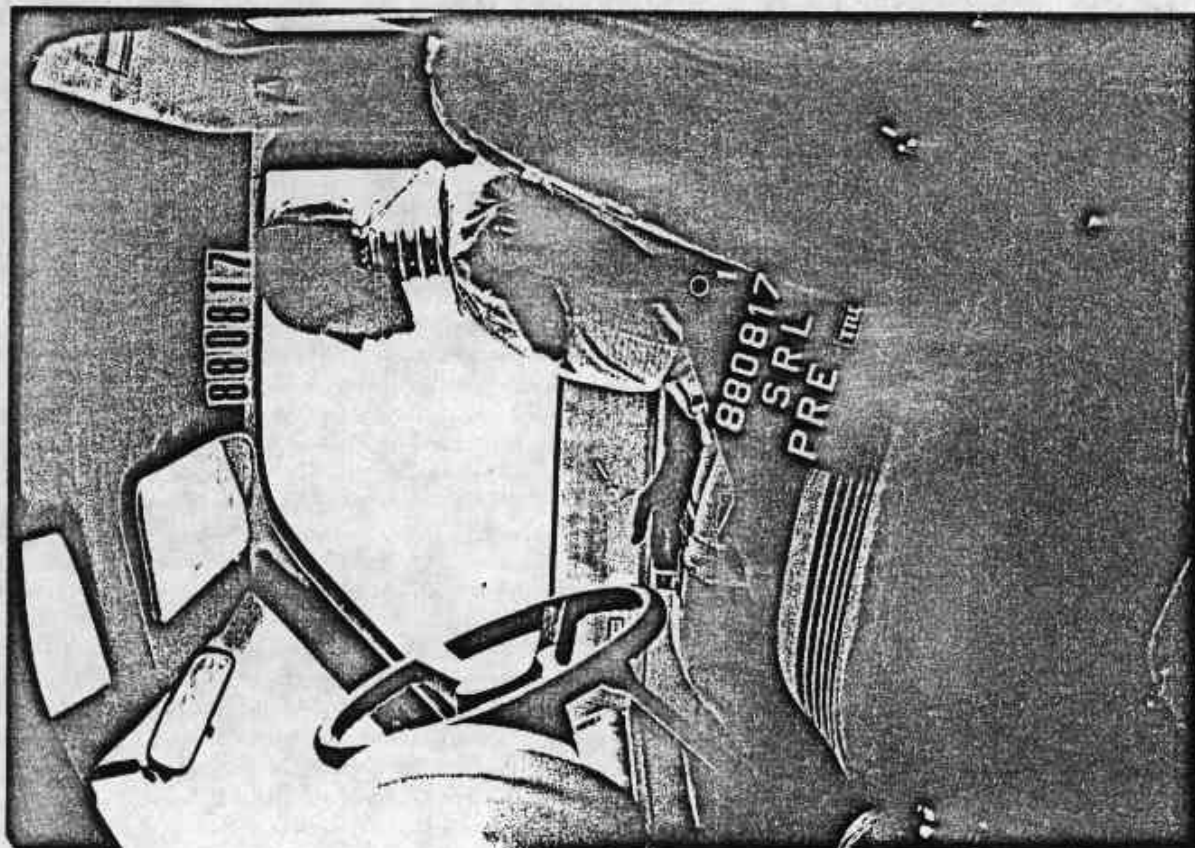


Figure A-9. PRE-TEST RIGHT FRONT PASSENGER DUMMY - VIEW 5



Figure A-10. POST-TEST OVERALL FRONT VIEW

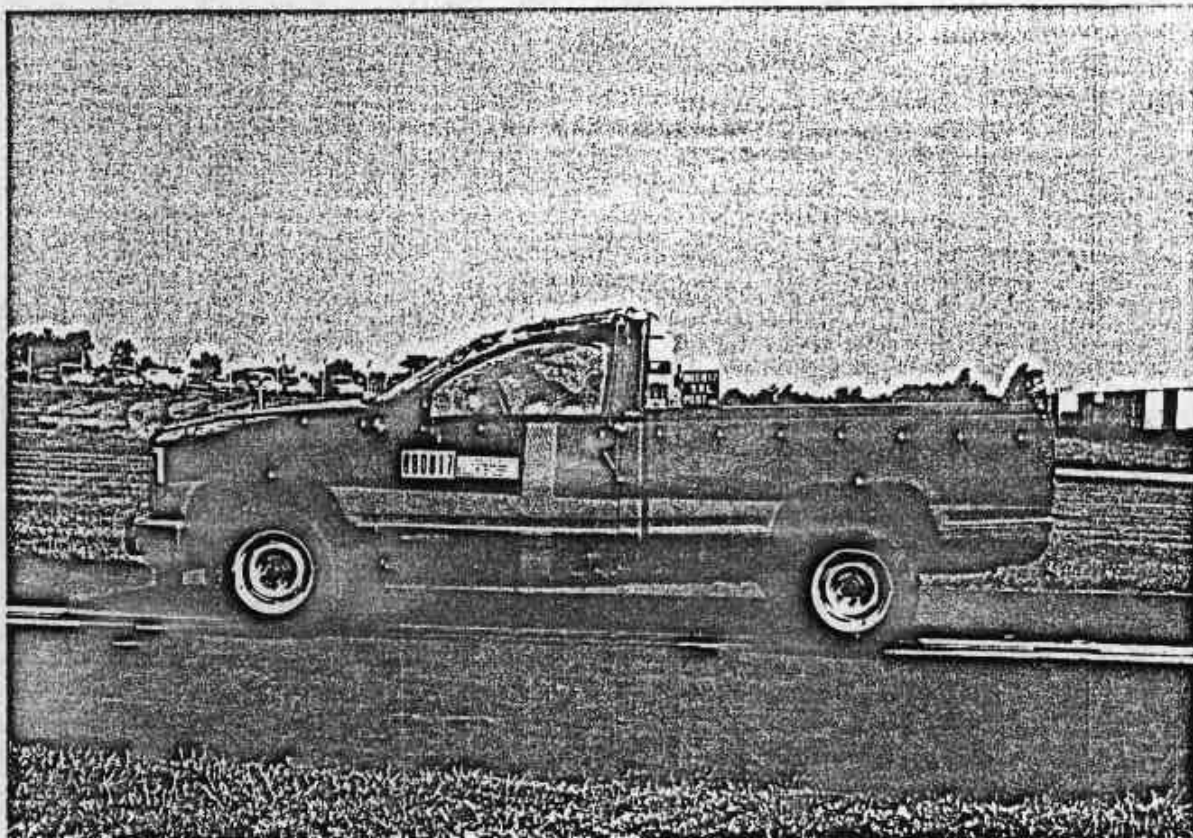


Figure A-11. POST-TEST OVERALL LEFT SIDE VIEW



Figure A-12. POST-TEST OVERALL REAR VIEW

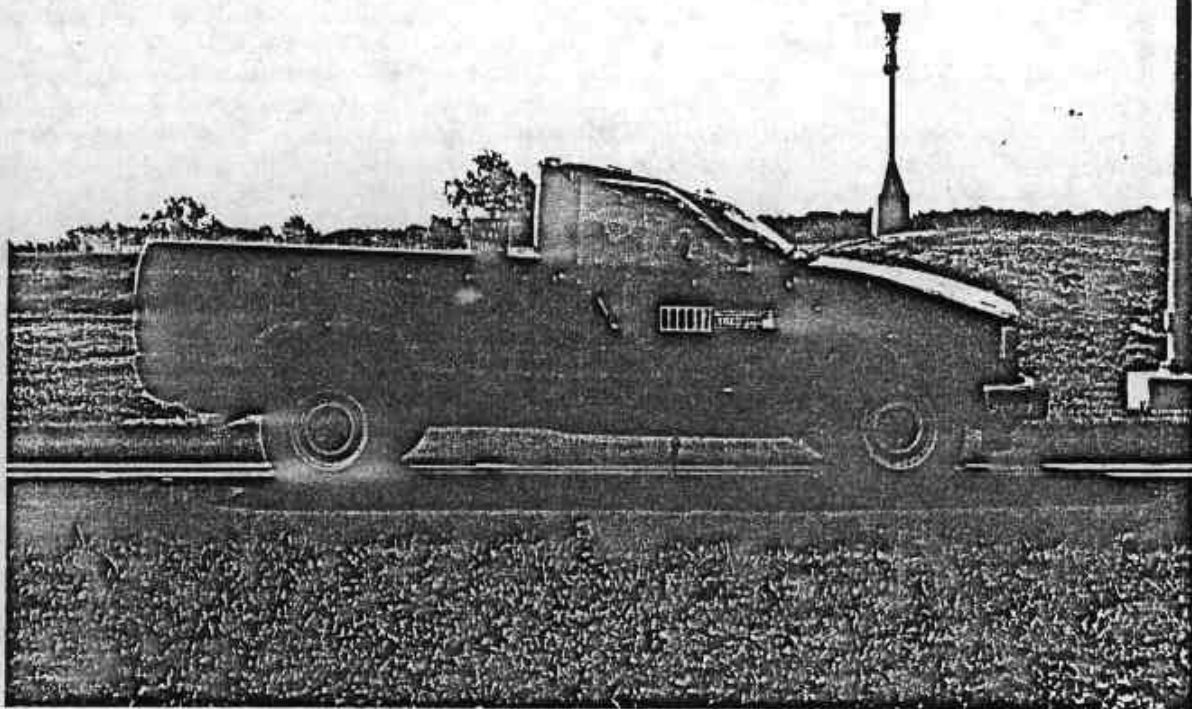


Figure A-13. POST-TEST OVERALL RIGHT SIDE VIEW

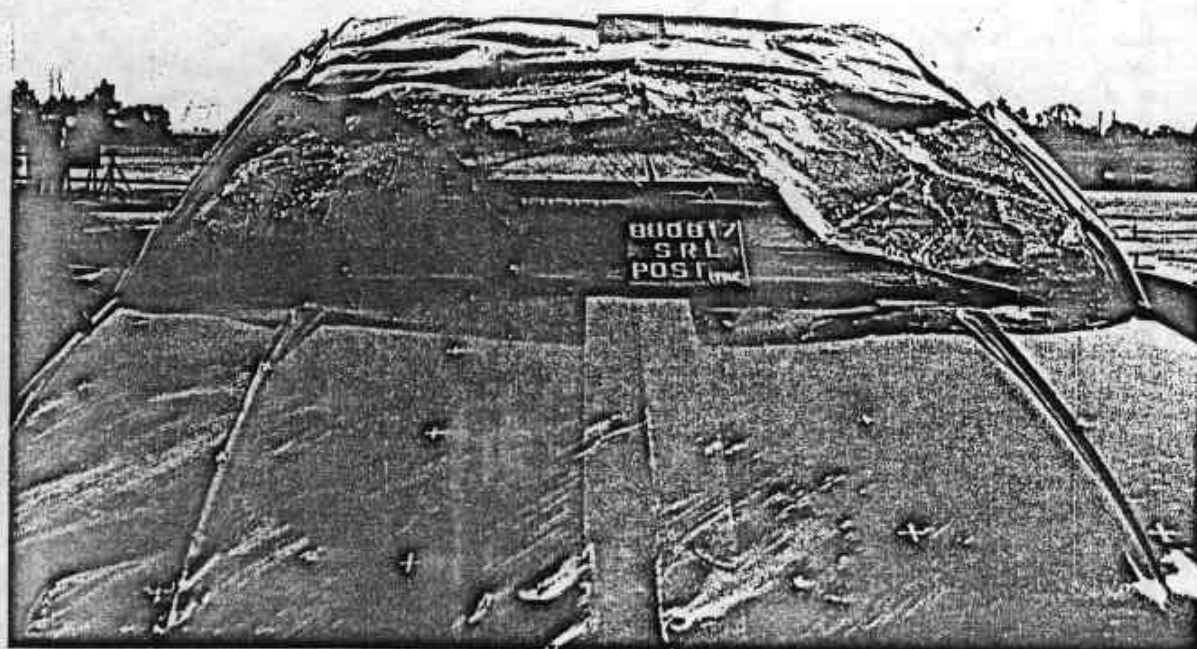


Figure A-14. POST-TEST FRONT CLOSE-UP VIEW



Figure A-15. POST-TEST RIGHT FRONT PASSENGER DUMMY VIEW

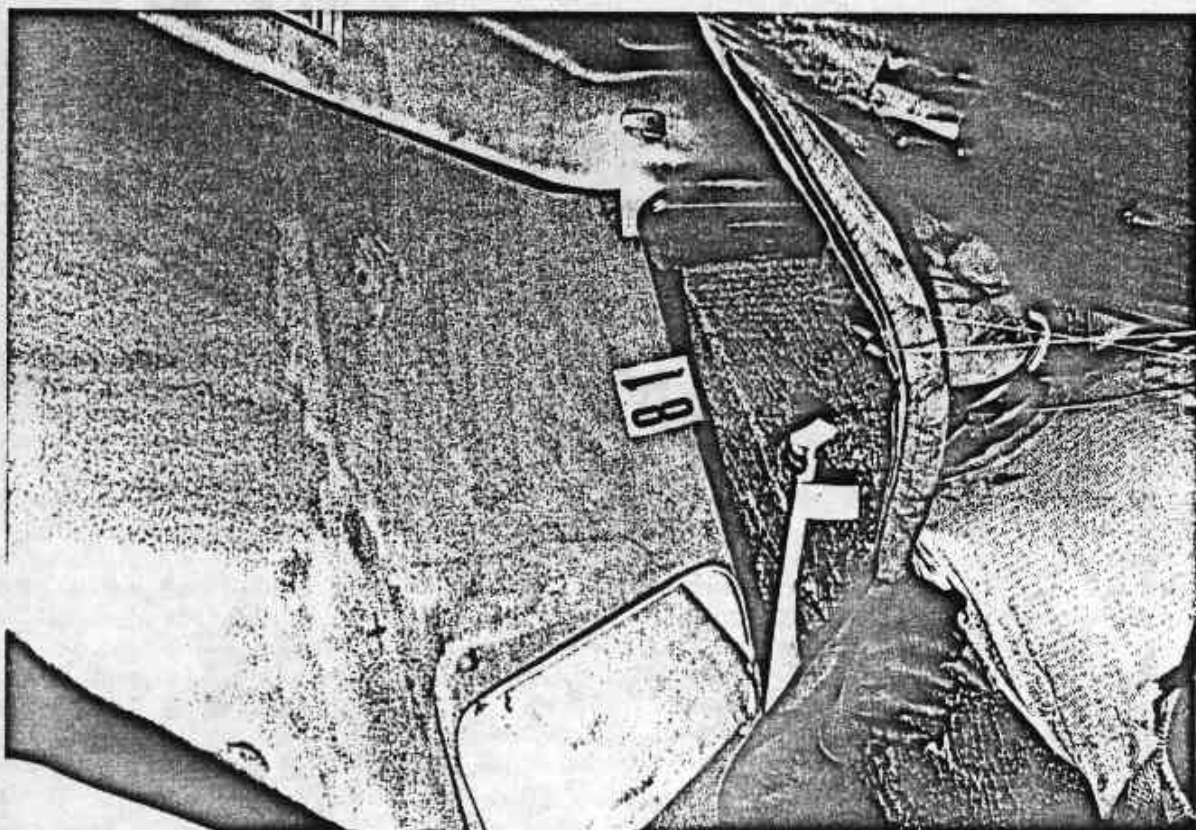


Figure A-16. POST-TEST RIGHT FRONT PASSENGER DUMMY CLOSE-UP - VIEW 1



Figure A-17. POST-TEST RIGHT FRONT PASSENGER DUMMY CLOSE-UP - VIEW 2

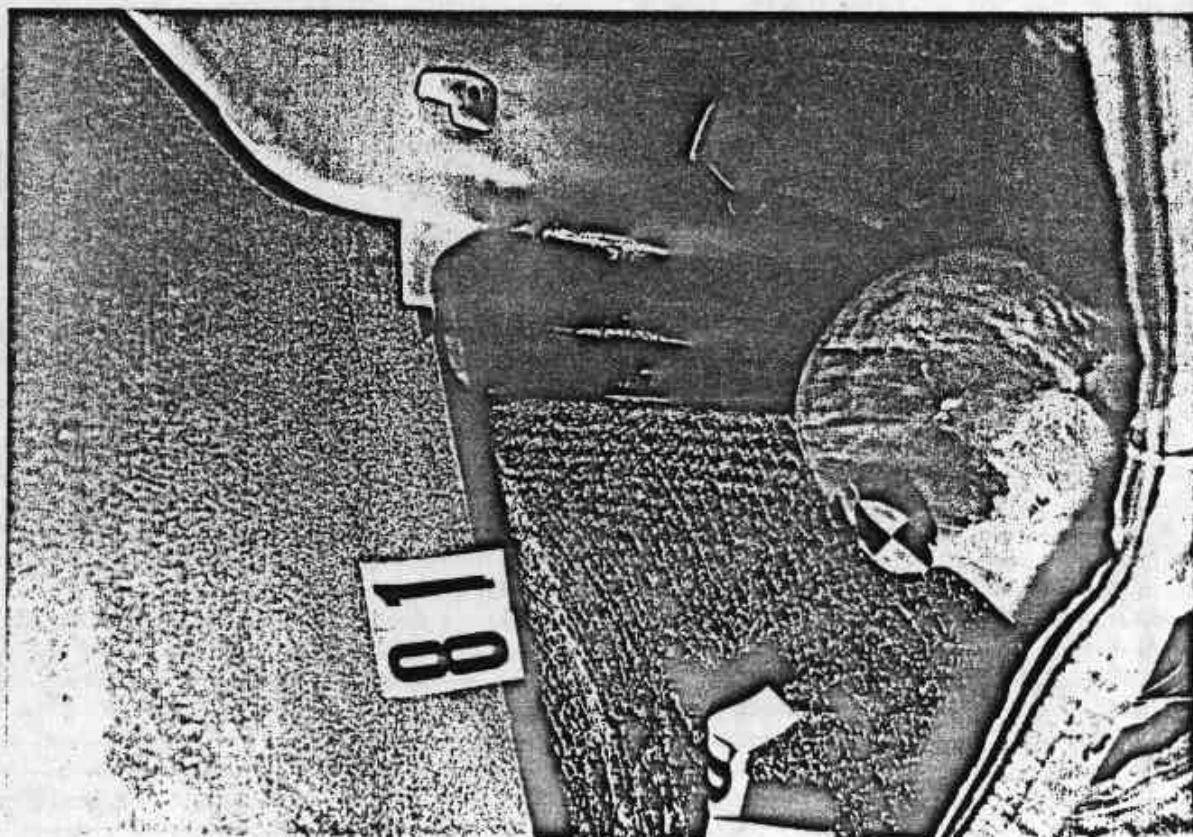


Figure A-18. POST-TEST RIGHT FRONT PASSENGER DUMMY CLOSE-UP - VIEW 3



Figure A-19. POST-TEST RIGHT FRONT DOOR VIEW

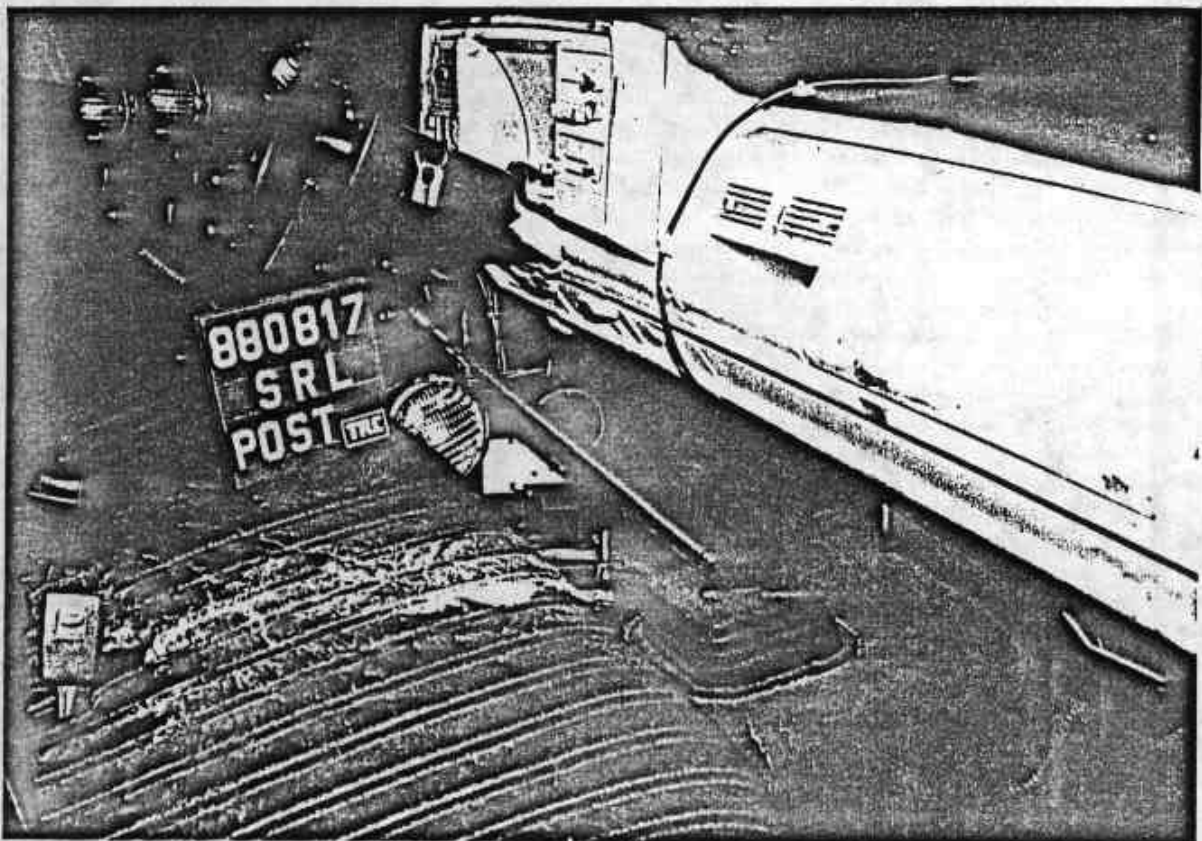
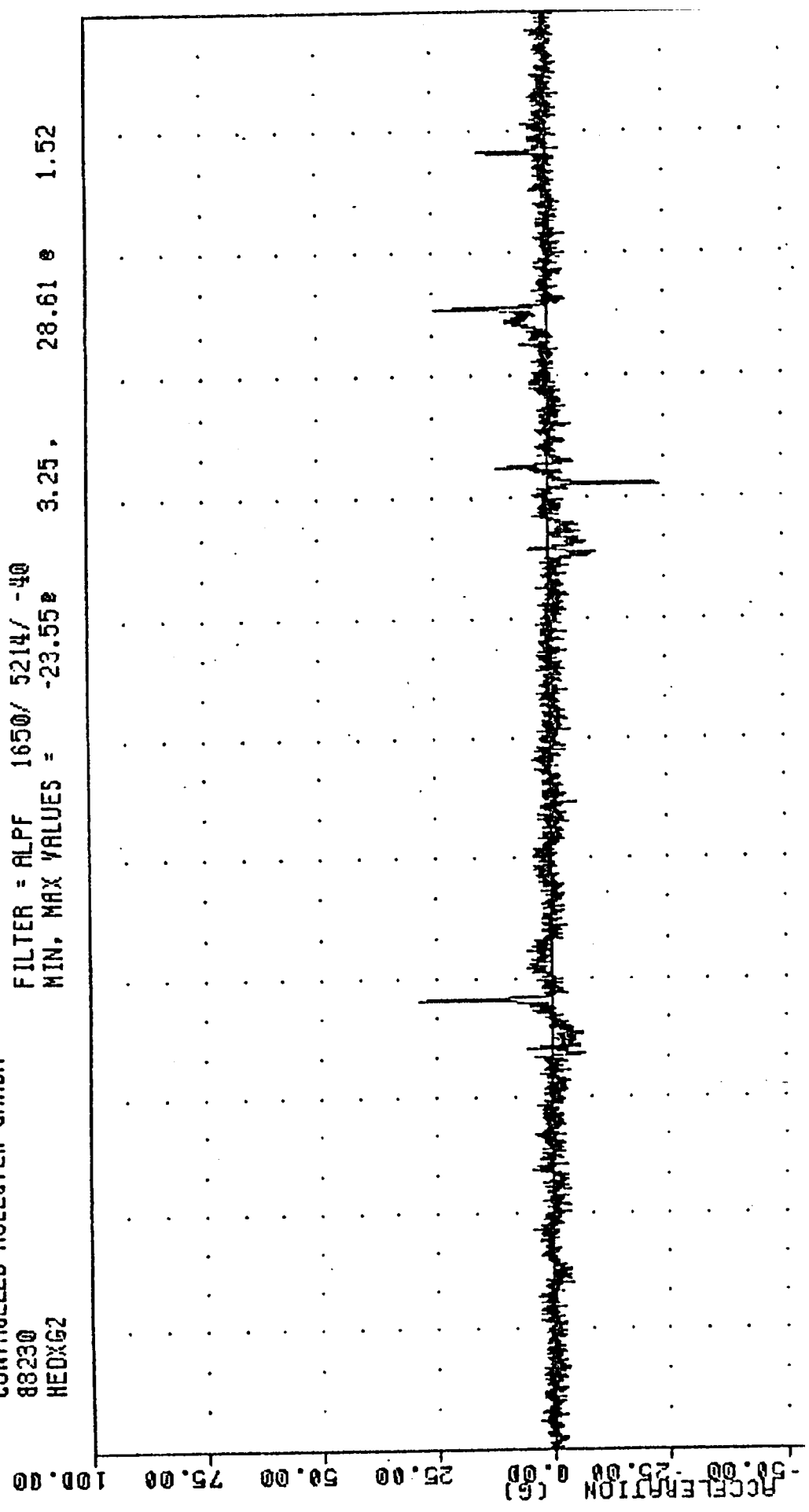


Figure A-20. POST-TEST DUMMY CONTACT VIEW

APPENDIX B
DATA PLOT PRESENTATION

JUL/NHTSA, 880817
CONTROLLED ROLLOVER CRASH
88230
HEDXG2

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -23.55 3.25, 28.61 1.52



UNINHULLED HULLOVER CHRS5H

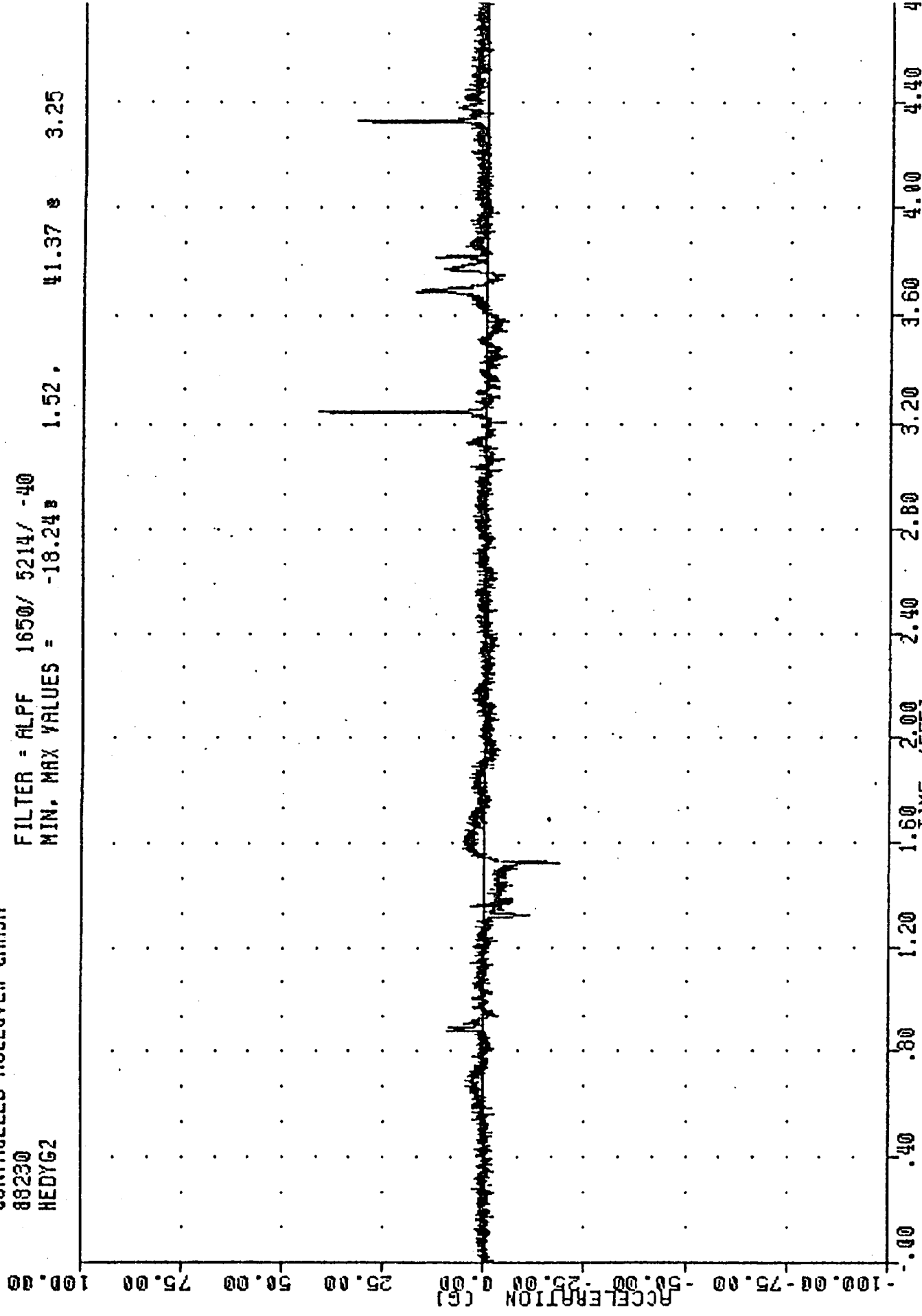
88230

HEDYG2

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -18.24 1.52

41.37 3.25



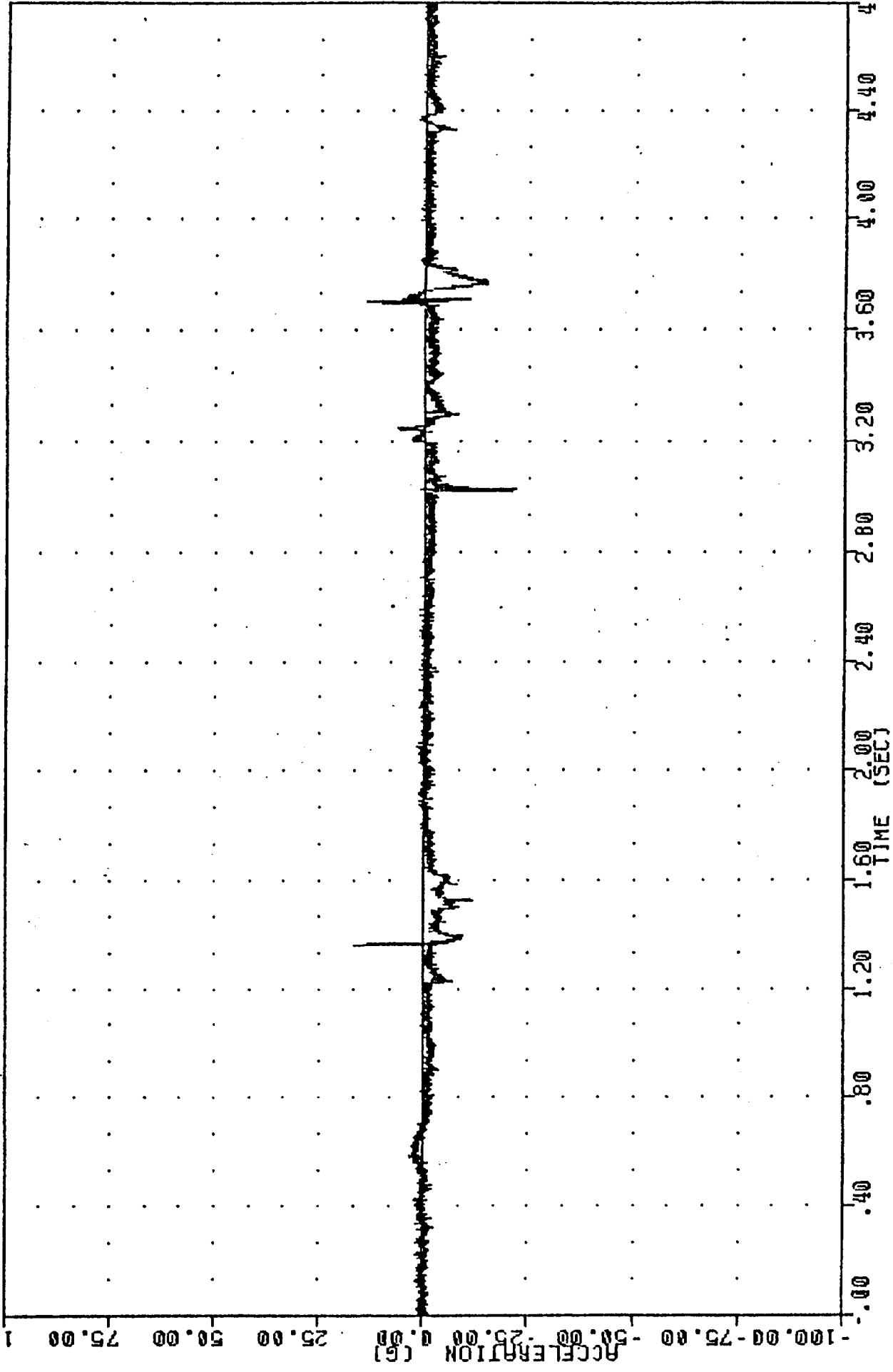
CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER HEAD Y AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

86230
HE0ZG2

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -21.36 3.02 16.34 1.36



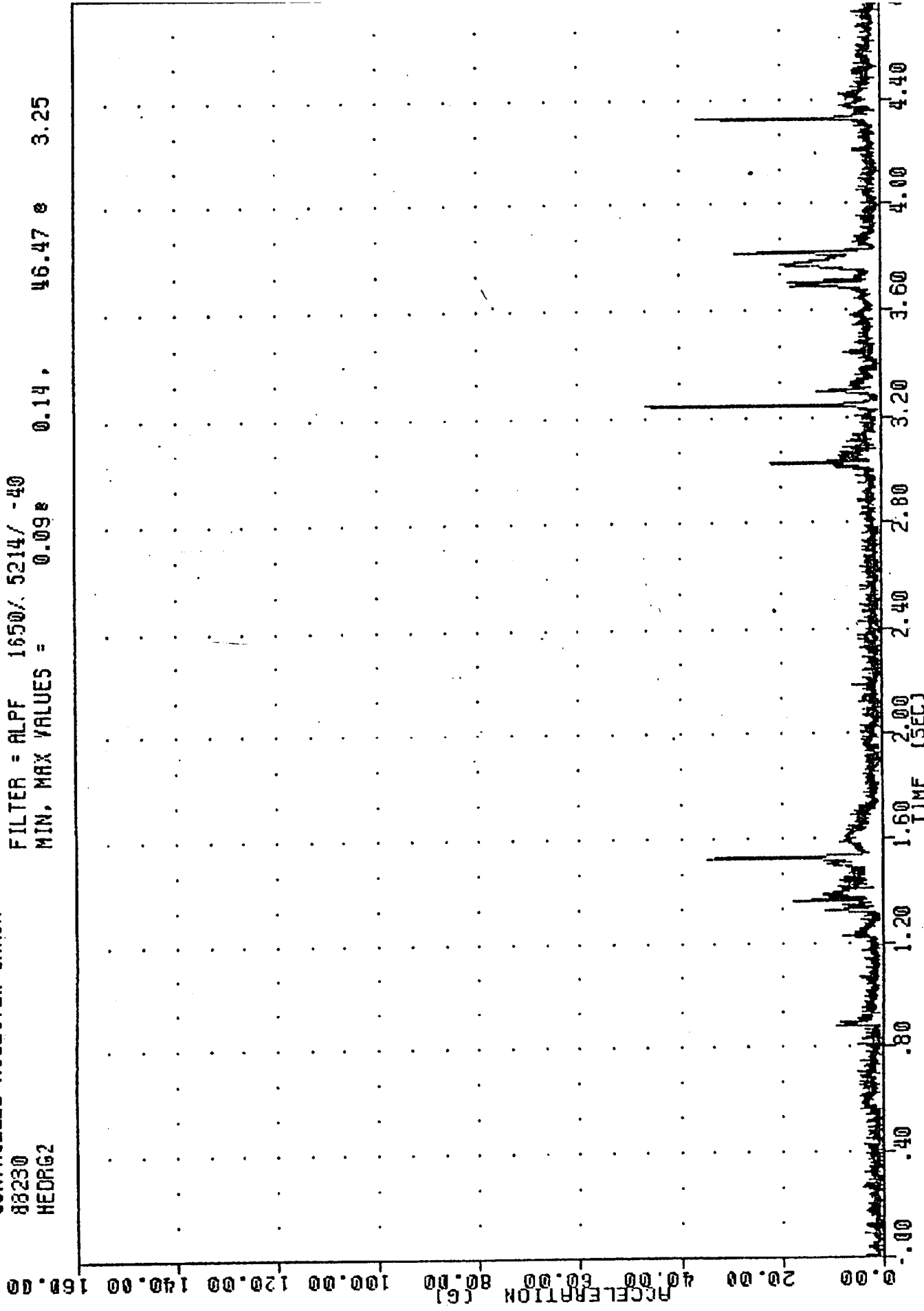
CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER HEAD Z AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230
HEDRG2

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = 0.09 0.14 ,

46.47 3.25



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER HEAD ACCELERATION RESULTANT

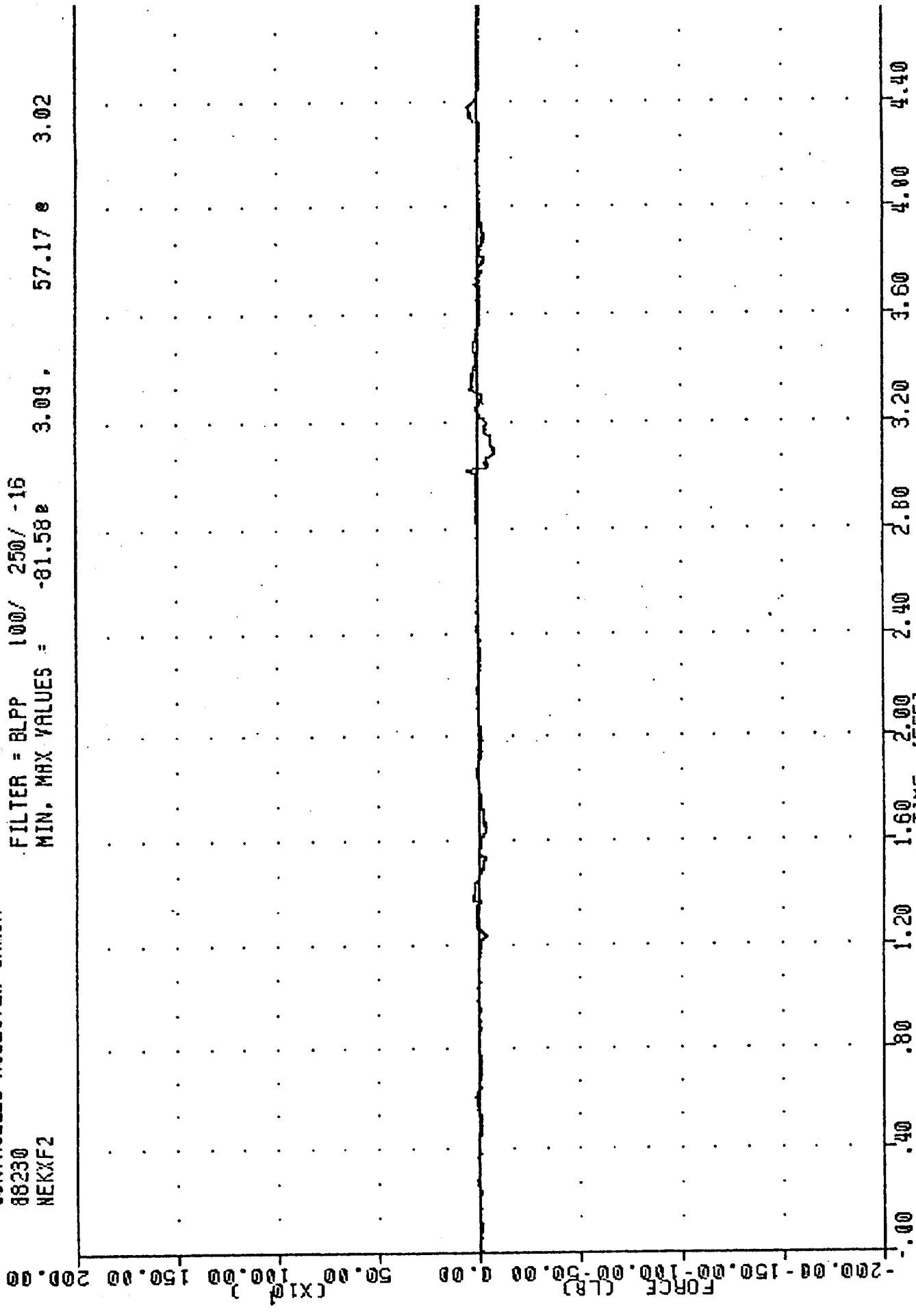
CONTROLLED ROLLOVER CRASH

88230

HEKXF2

FILTER = BLPP 100/ 250/ -16

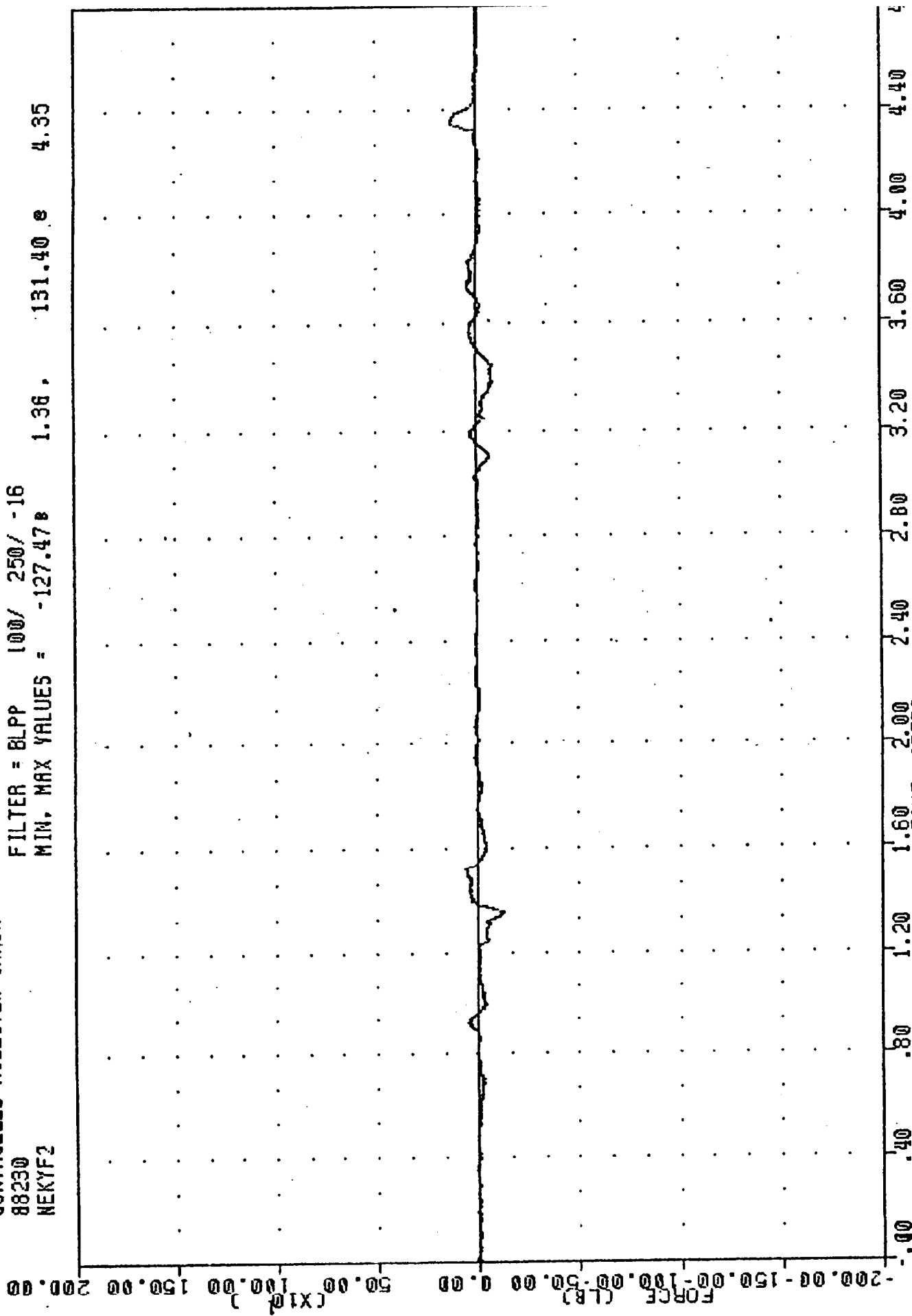
MIN. MAX VALUES = -81.58e 3.09. 57.17 e 3.02



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER NECK SHEAR FORCE X AXIS

CONTROLLED ROLLOVER CRASH
88230
NEKYF2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -127.478 1.36 131.40 4.35

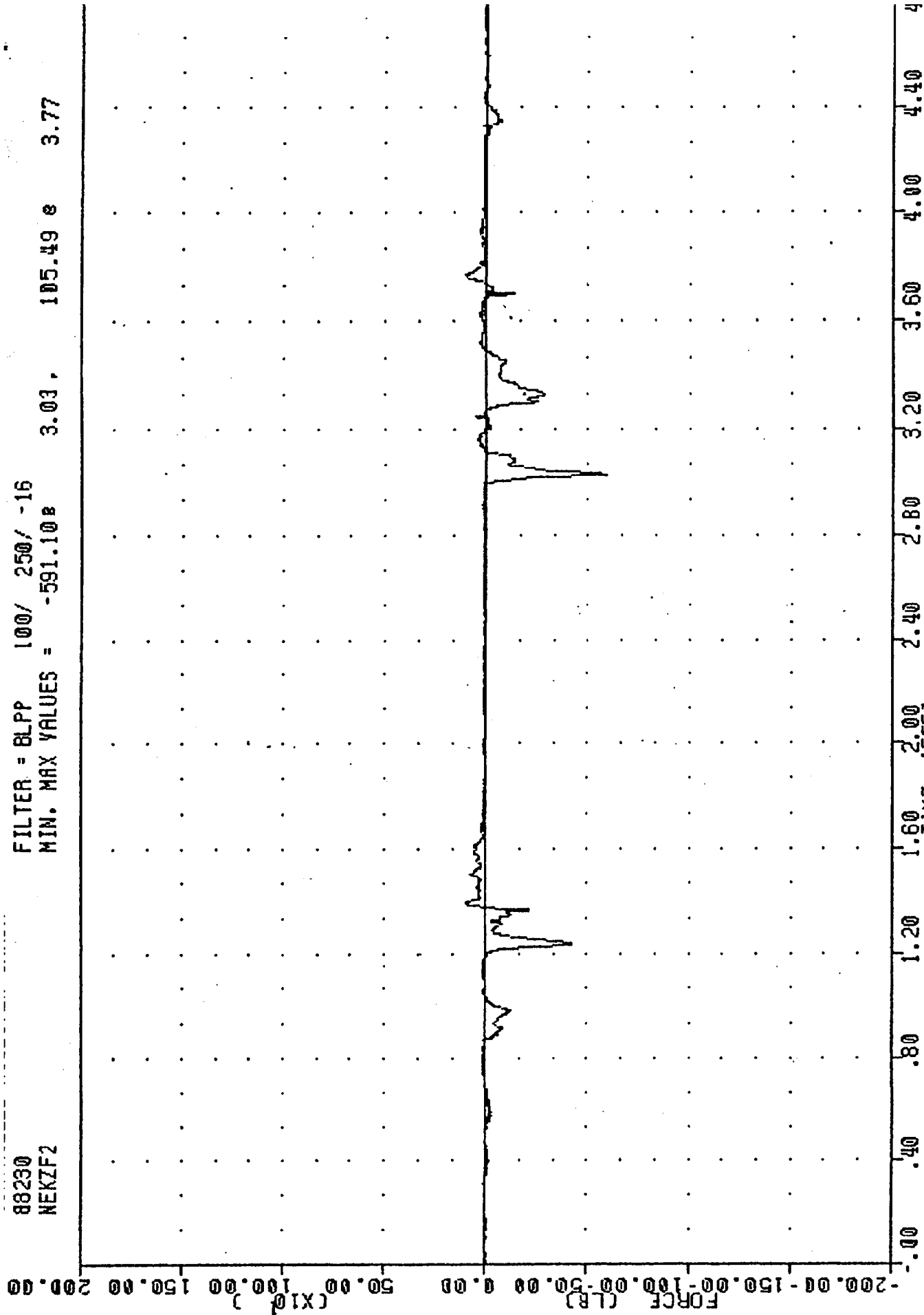


CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER NECK SHEAR FORCE Y AXIS

88230
NEKZF2

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -591.10 3.03

105.49 3.77



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER NECK AXIAL FORCE Z AXIS

CONTINUED HULLOVER CRASH

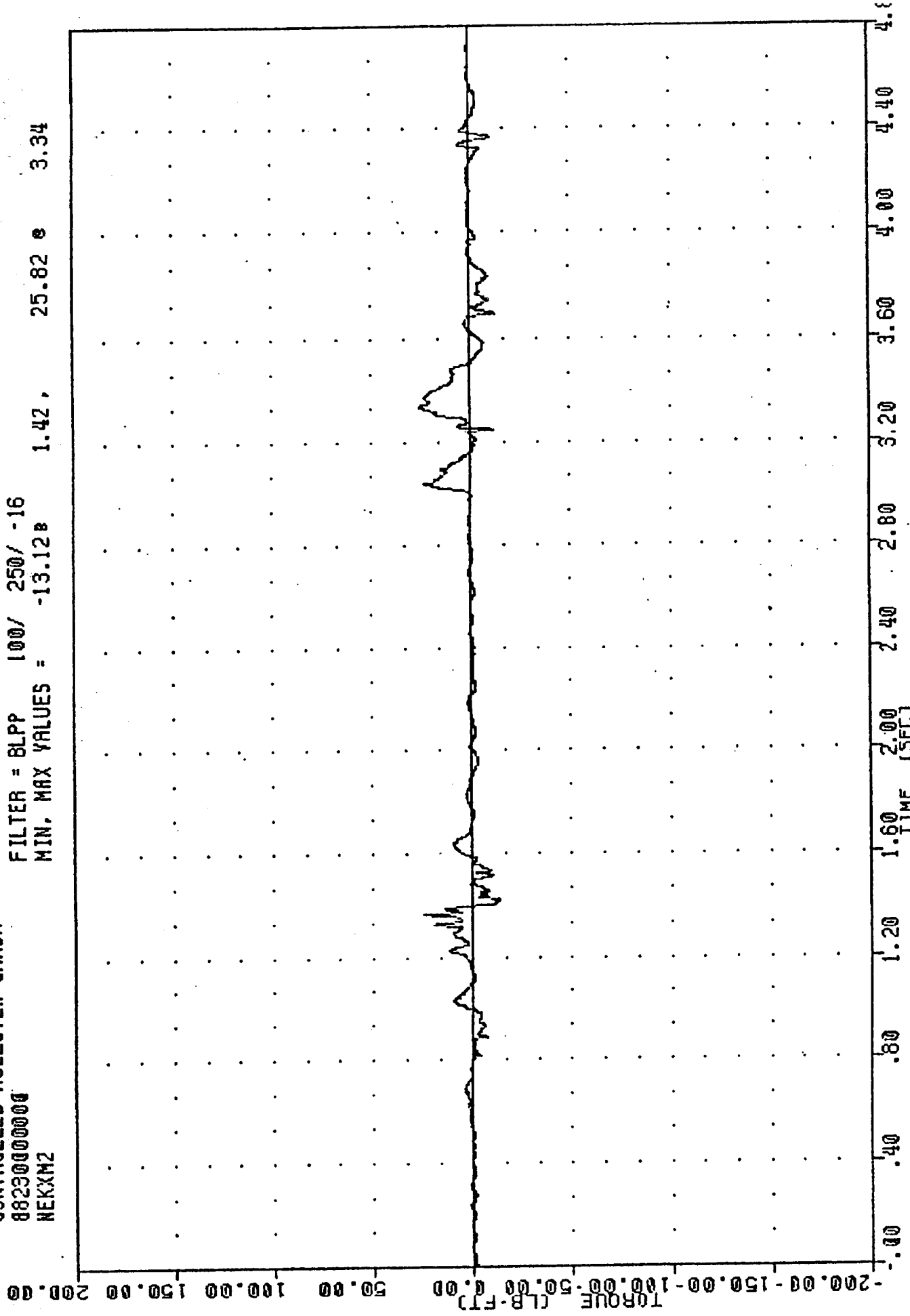
882300000000

NEKXN2

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -13.128

1.42, 25.82 3.34



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER NECK MOMENT ABOUT X AXIS

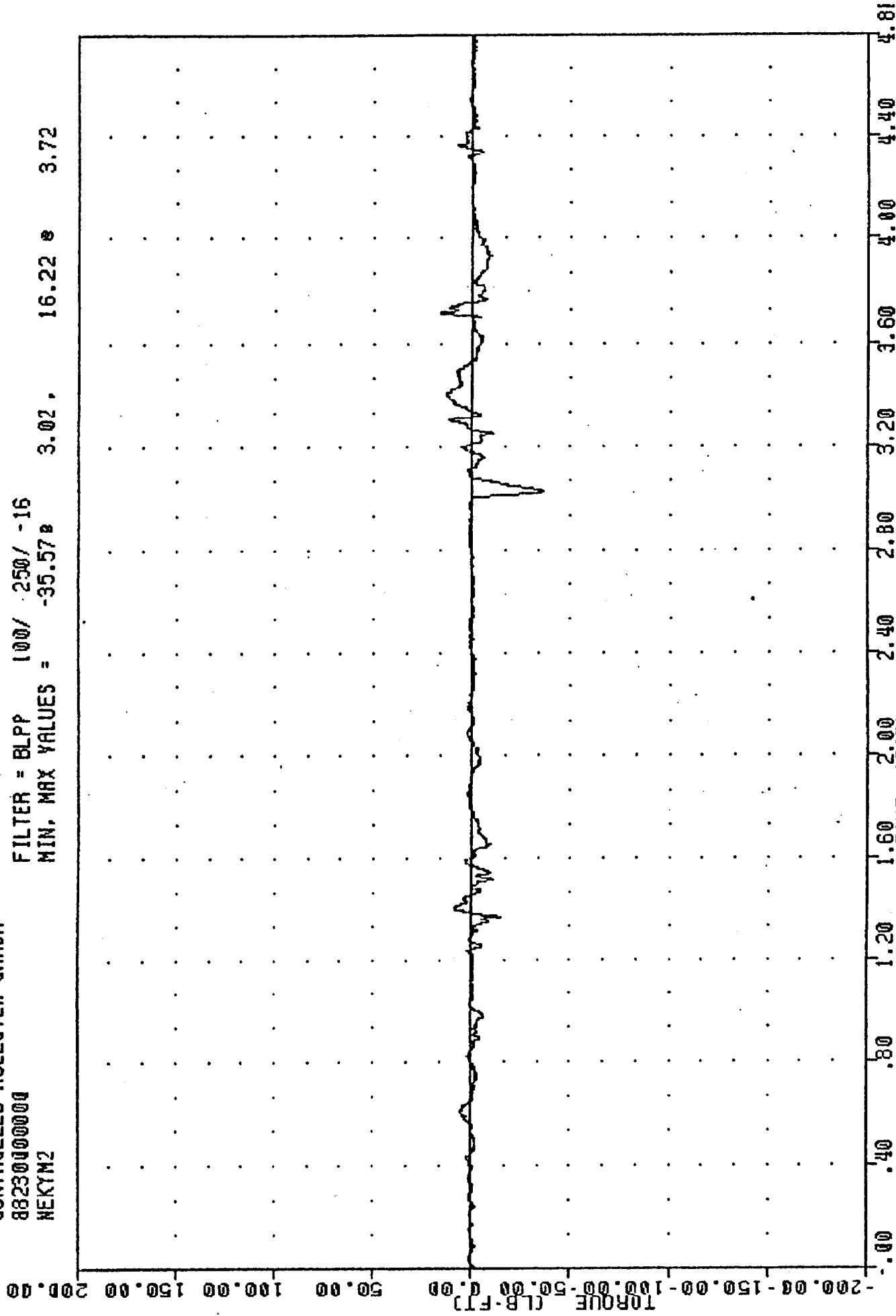
CONTROLLED ROLLOVER CRASH

882301000000

HEKYM2

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -35.57 3.02 16.22 3.72



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y AXIS

CONTROLLED ROLLOVER CRASH
88230
CSTXG2

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -13.69 3.70

6.09 3.20

3.70

3.20

100.00

75.00

50.00

25.00

ACCELERATION (G)

-25.00

-50.00

-75.00

-100.00

0.00

.40

.80

1.20

1.60

2.00

2.40

2.80

3.20

3.60

4.00

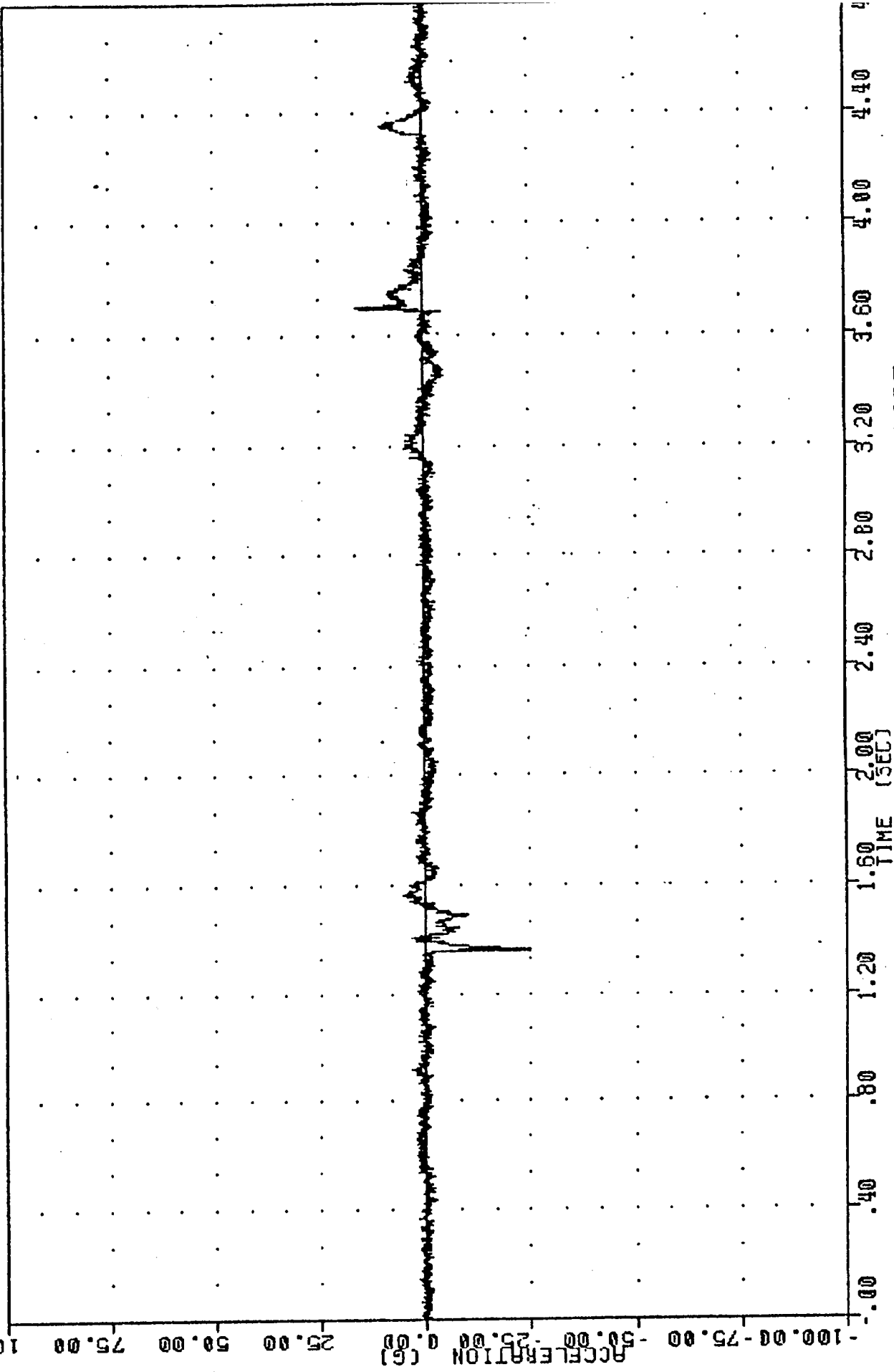
4.40

4.80

CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER CHEST X AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH
88230
CSTYG2

FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -24.94 1.36 16.08 3.70



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER CHEST Y AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

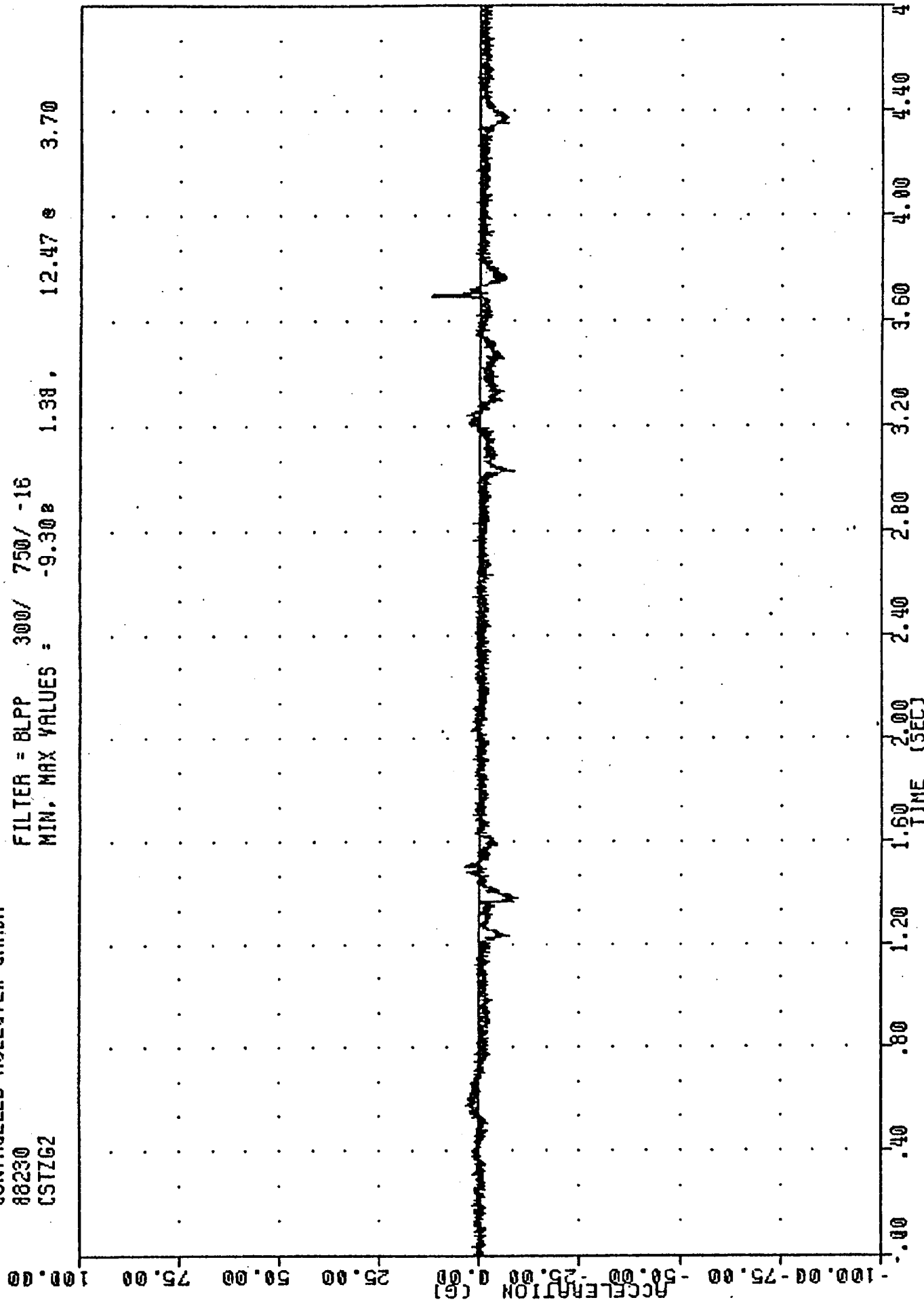
88230

CSTZG2

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -9.30g 1.38g

12.47 g 3.70



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER CHEST Z AXIS ACCELERATION

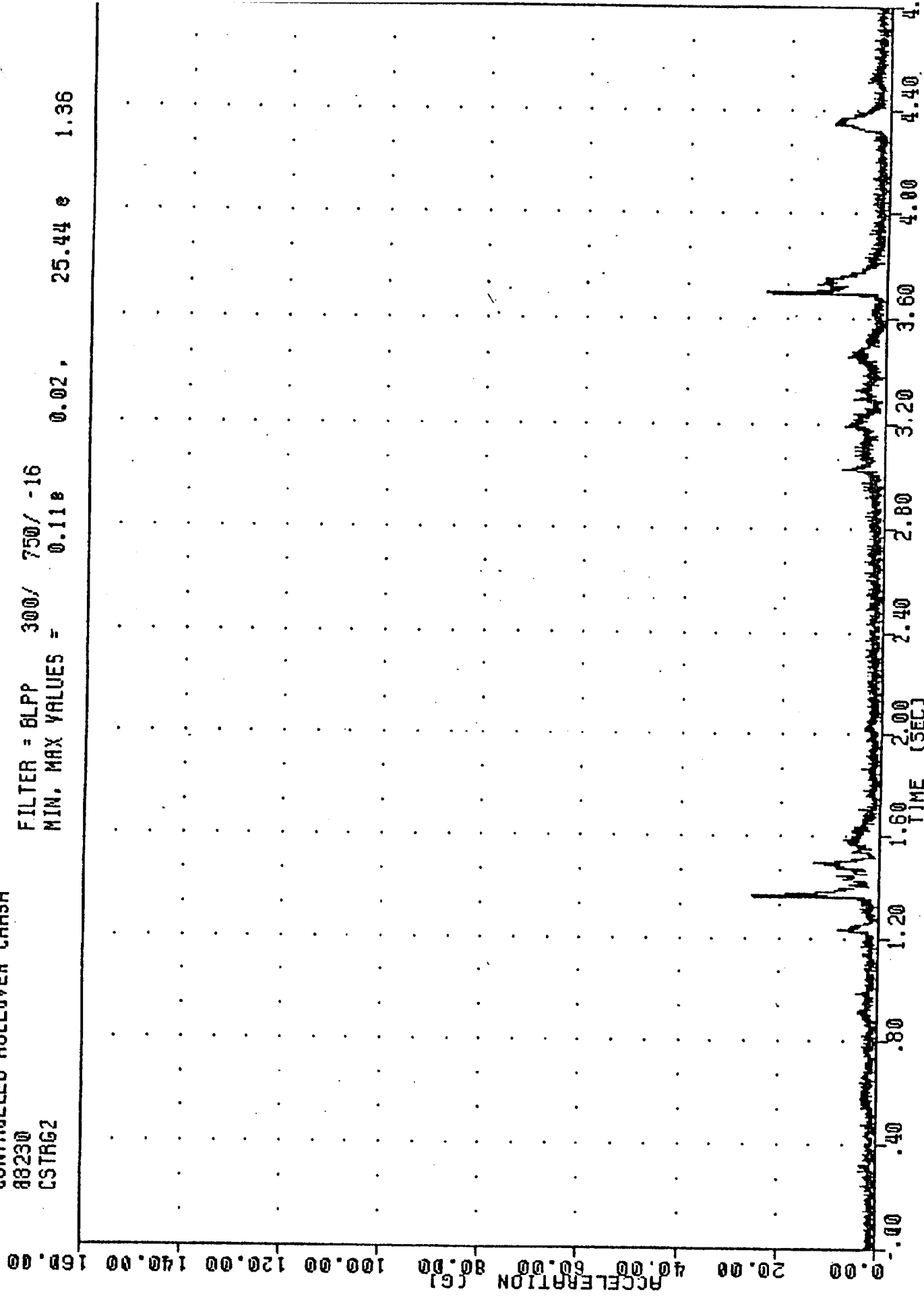
CONTROLLED HULLOVER CRASH

88230

CSTRG2

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = 0.11g 0.02, 25.44 g 1.36



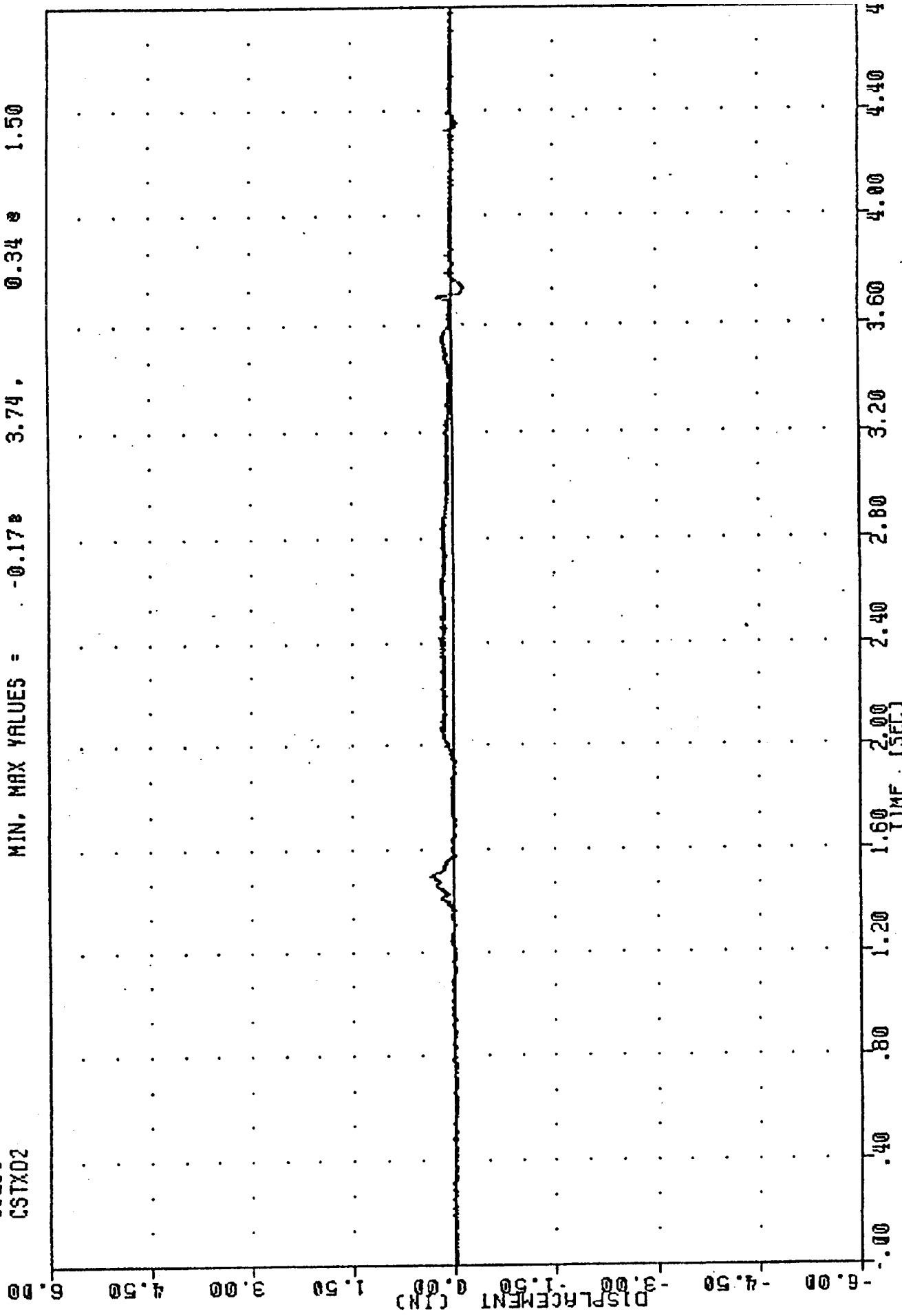
CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER CHEST ACCELERATION RESULTANT

CONTROLLED ROLLOVER CRASH

88230
CSTXD2

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -0.17 3.74 0.34 1.50



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER CHEST X AXIS DISPLACEMENT

CONTROLLED ROLLOVER CRASH

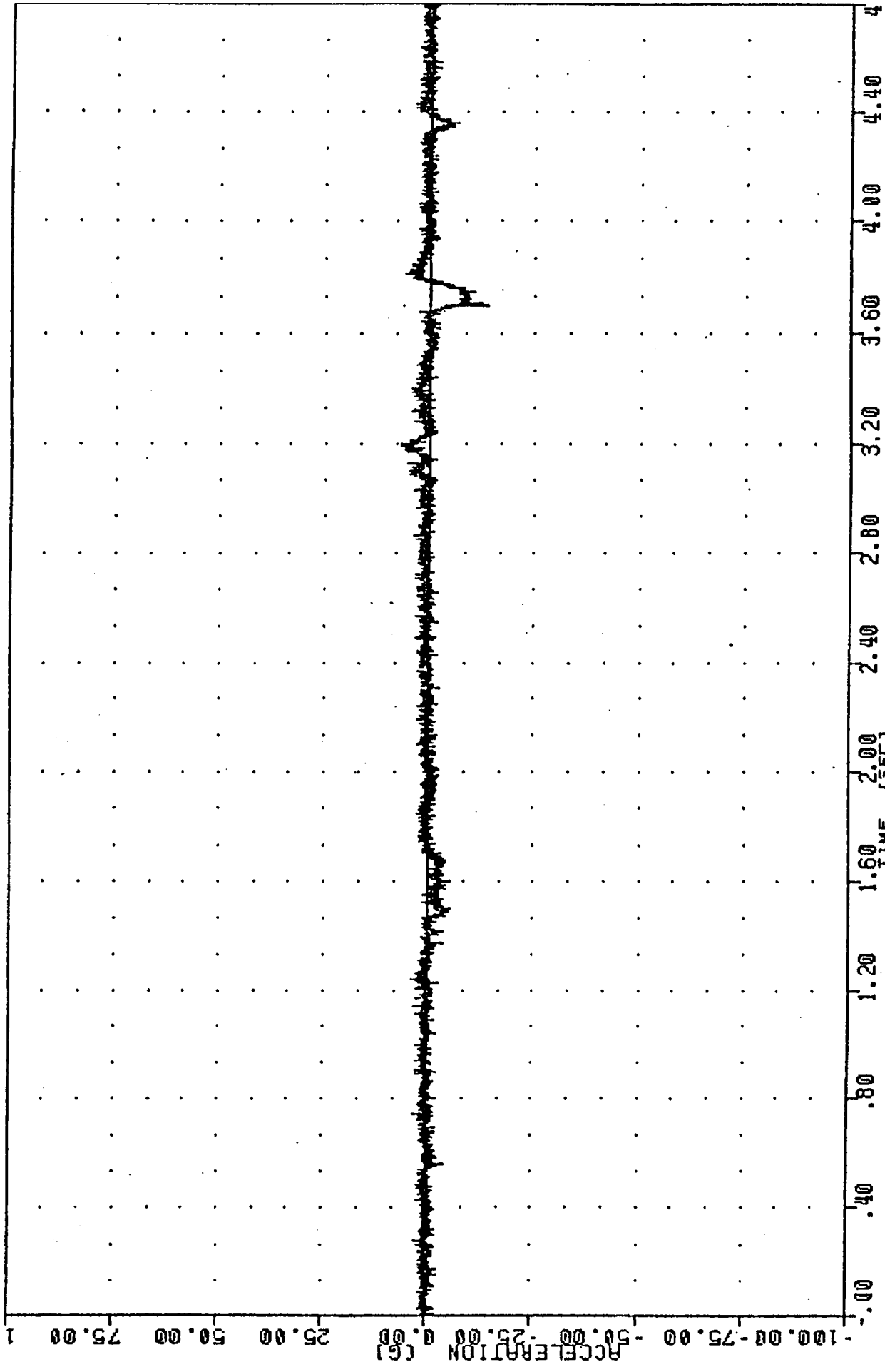
88230

PEVXG2

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = -13.40 3.70

7.08 3.20



CHEVROLET PICKUP OFF ROLL CART

RIGHT FRONT PASSENGER PELVIS X AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230

PEYVG2

FILTER = BLPP 300/ 750/ -16

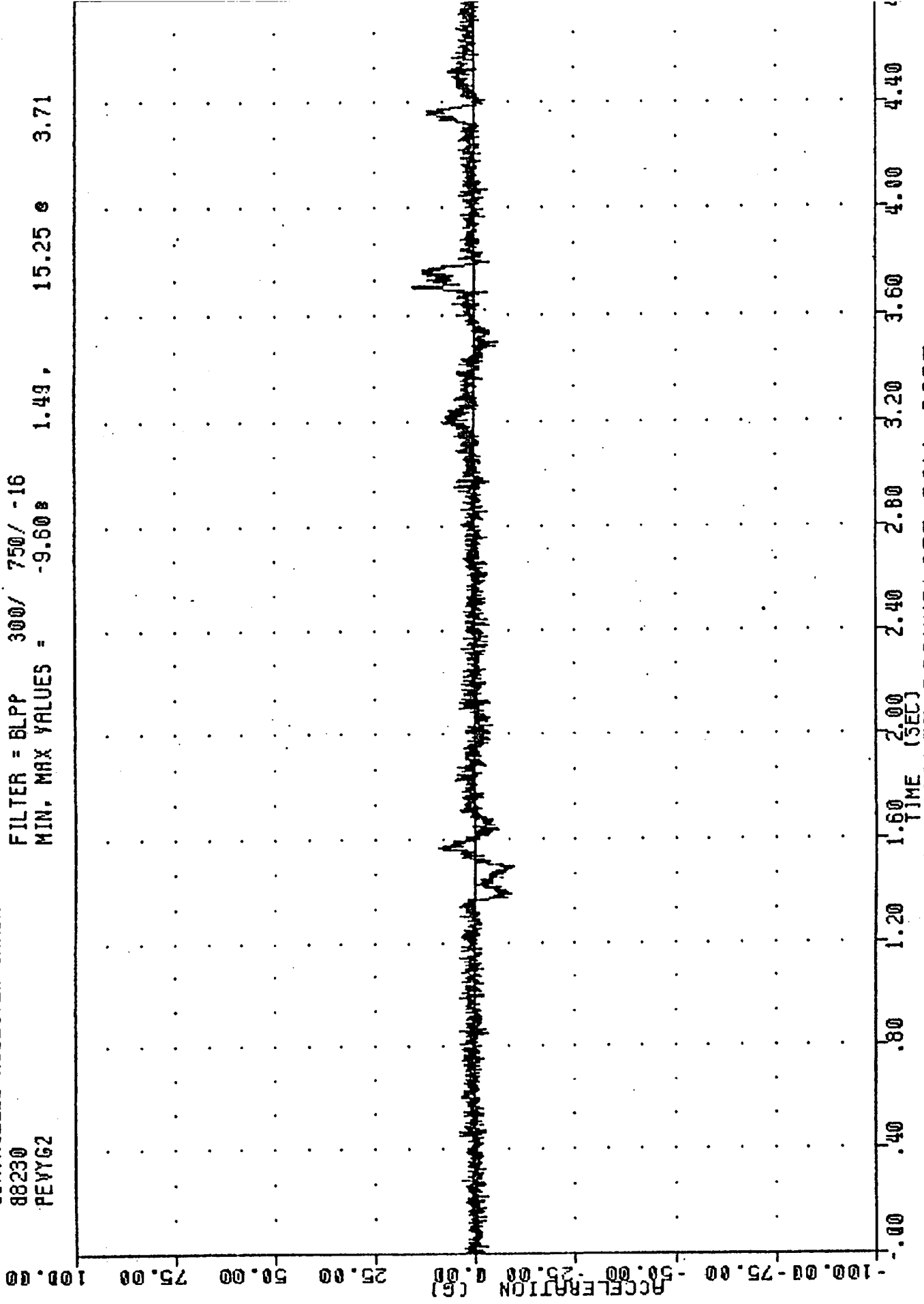
MIN. MAX VALUES =

-9.60g

1.49,

15.25 g

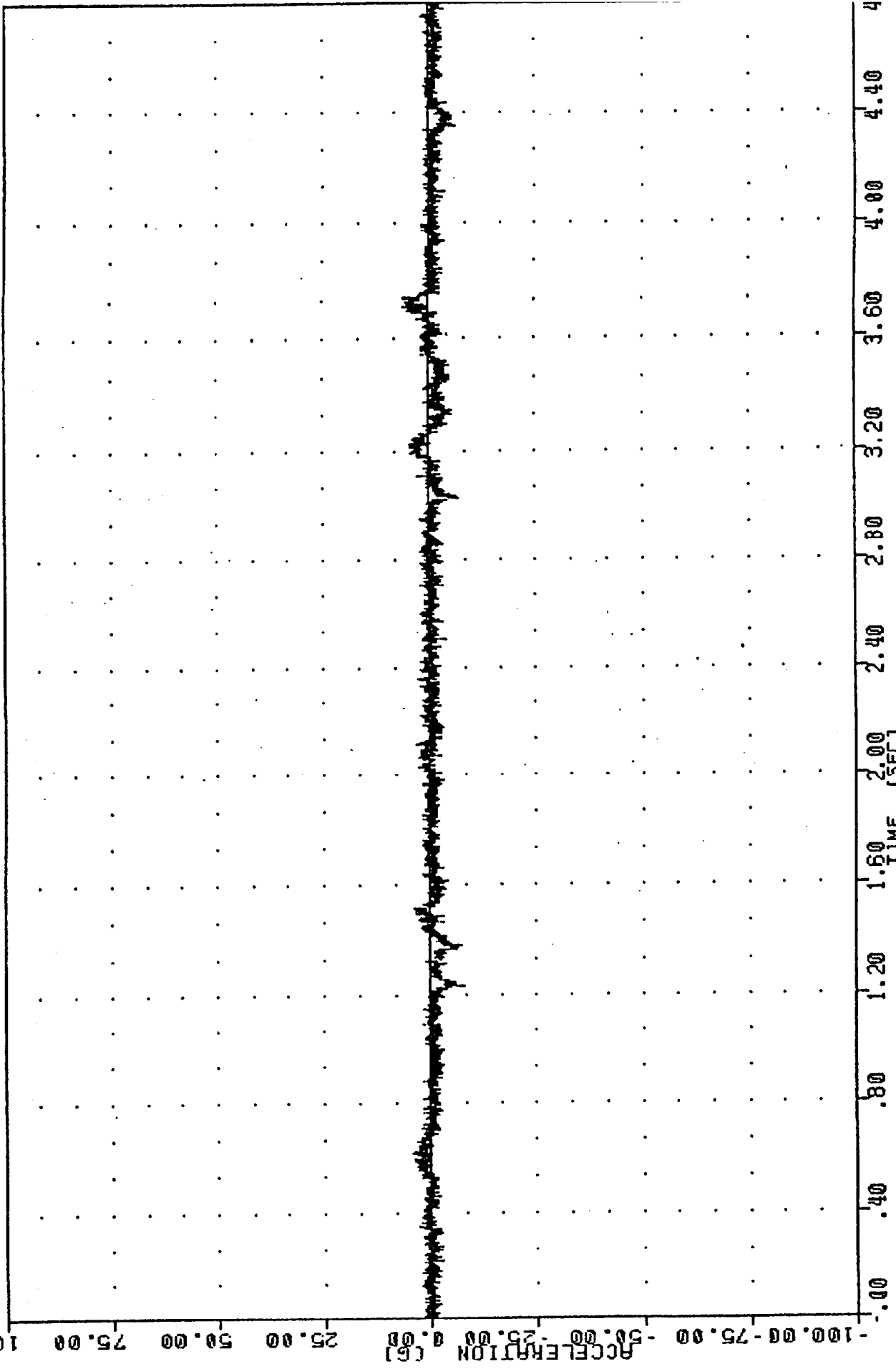
3.71



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER PELVIS Y AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH
88230
PEVZG2

FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -7.62 1.23 6.00 3.71



CHEVROLET PICKUP OFF ROLL CART
RIGHT FRONT PASSENGER PELVIS Z AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230

PEVRG2

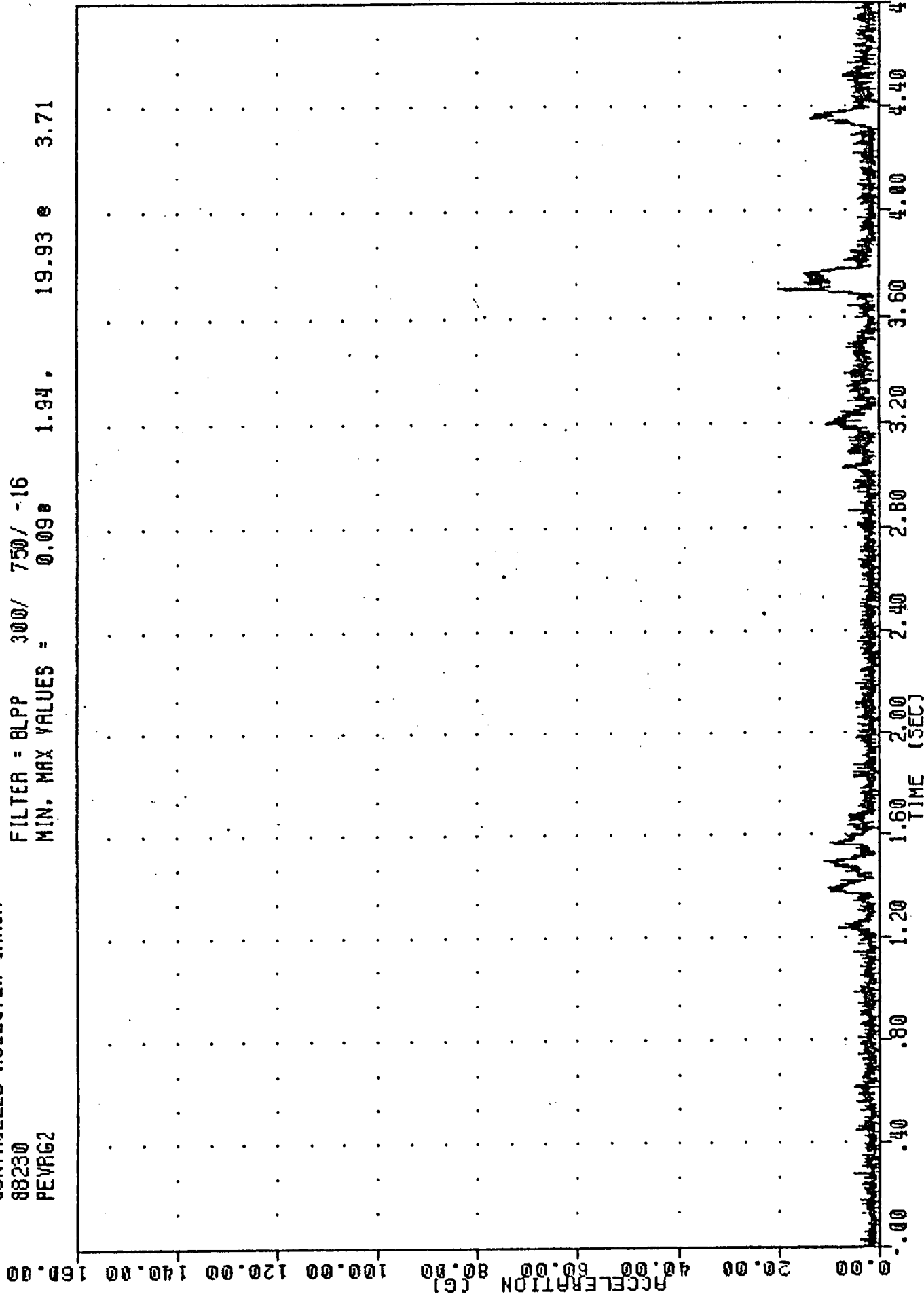
FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = 0.098

1.94.

19.93 e

3.71



CHEVROLET PICKUP OFF ROLL CART

RIGHT FRONT PASSENGER PELVIS ACCELERATION RESULTANT

CONTROLLED ROLLOVER CRASH

88230

YCGXG1

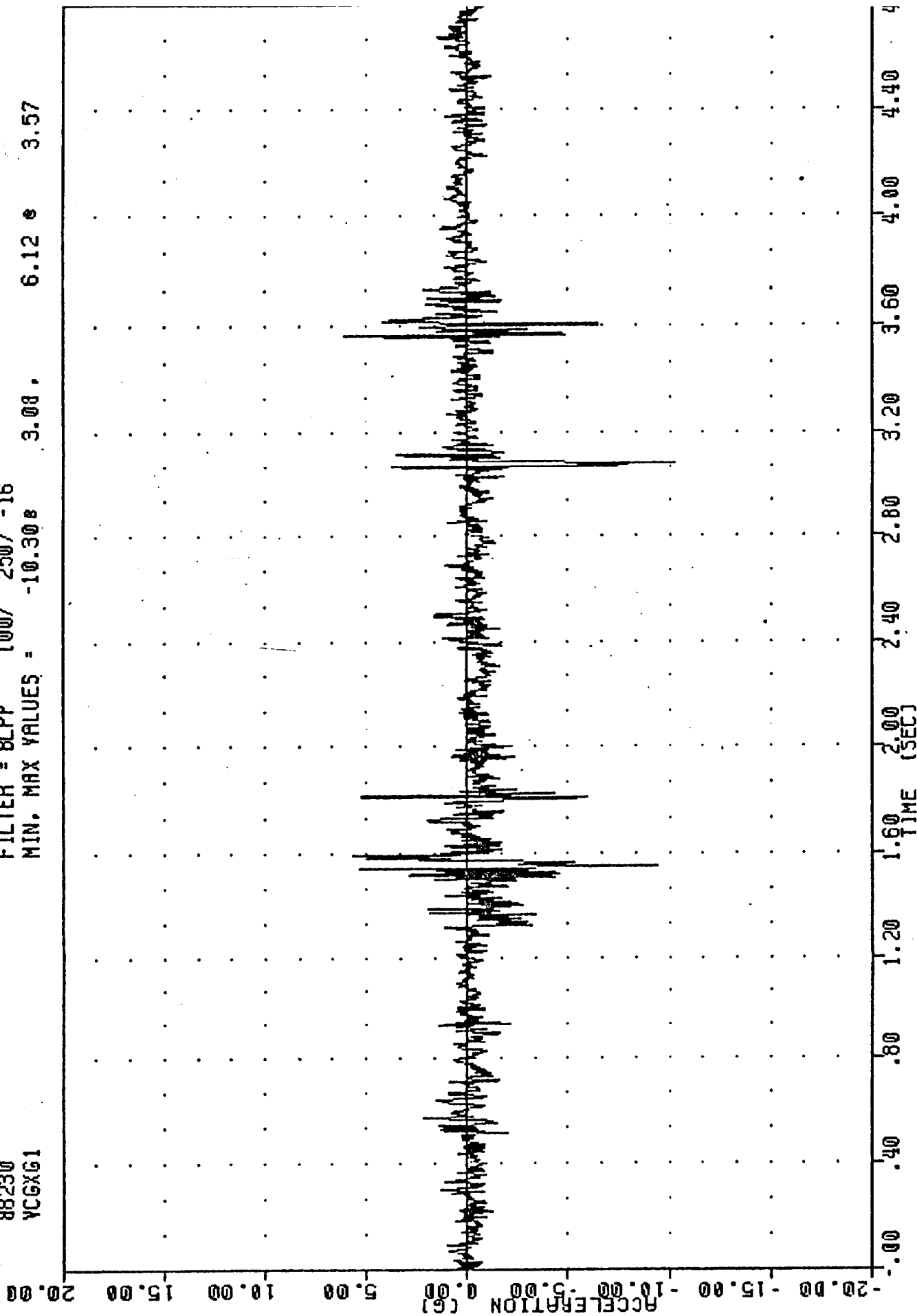
FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -10.30g

3.08

6.12

3.57



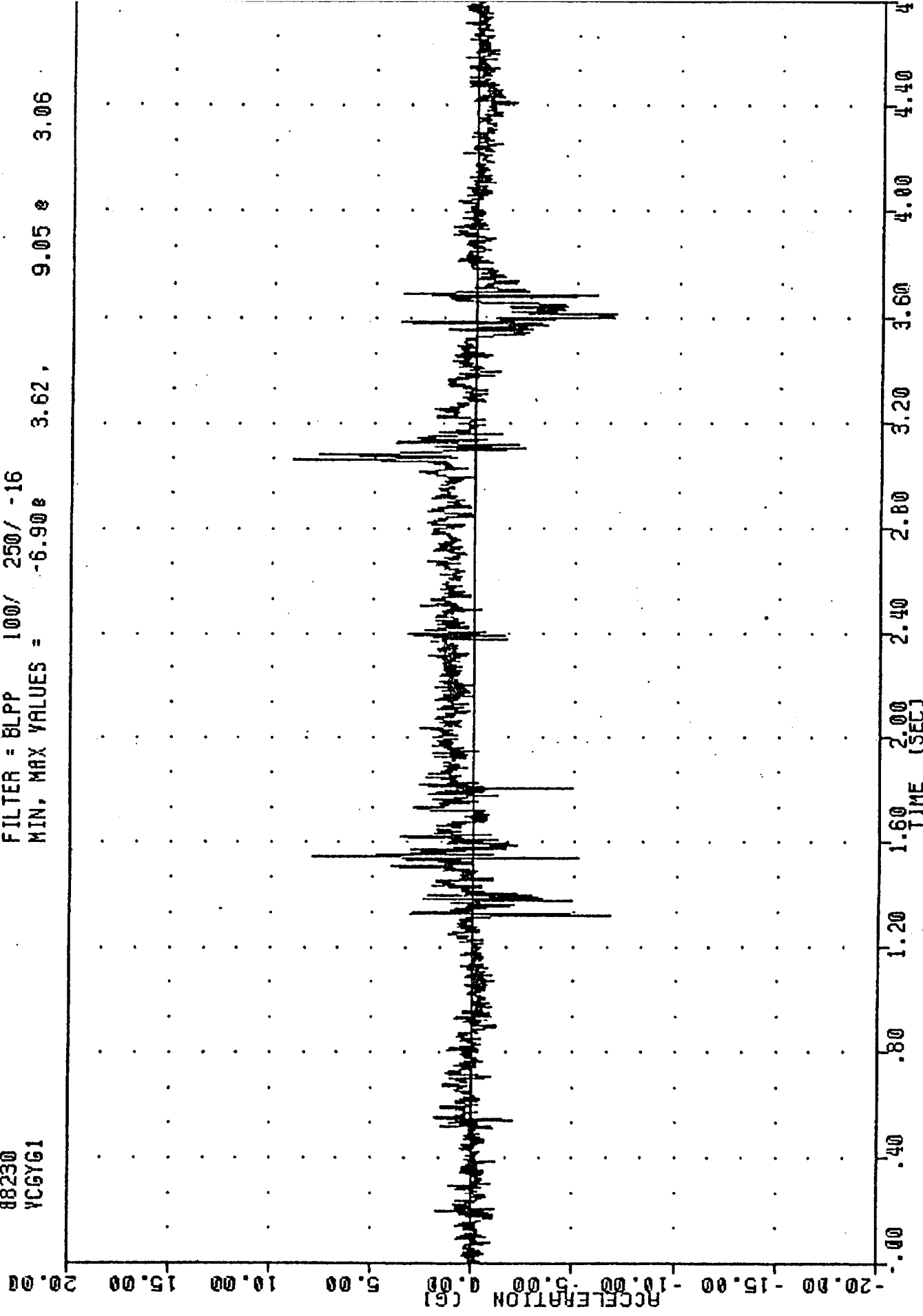
CHEVROLET PICKUP OFF ROLL CART
VEHICLE CENTER OF GRAVITY X AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230
YCGYG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -6.90e

3.62, 9.05 e 3.06



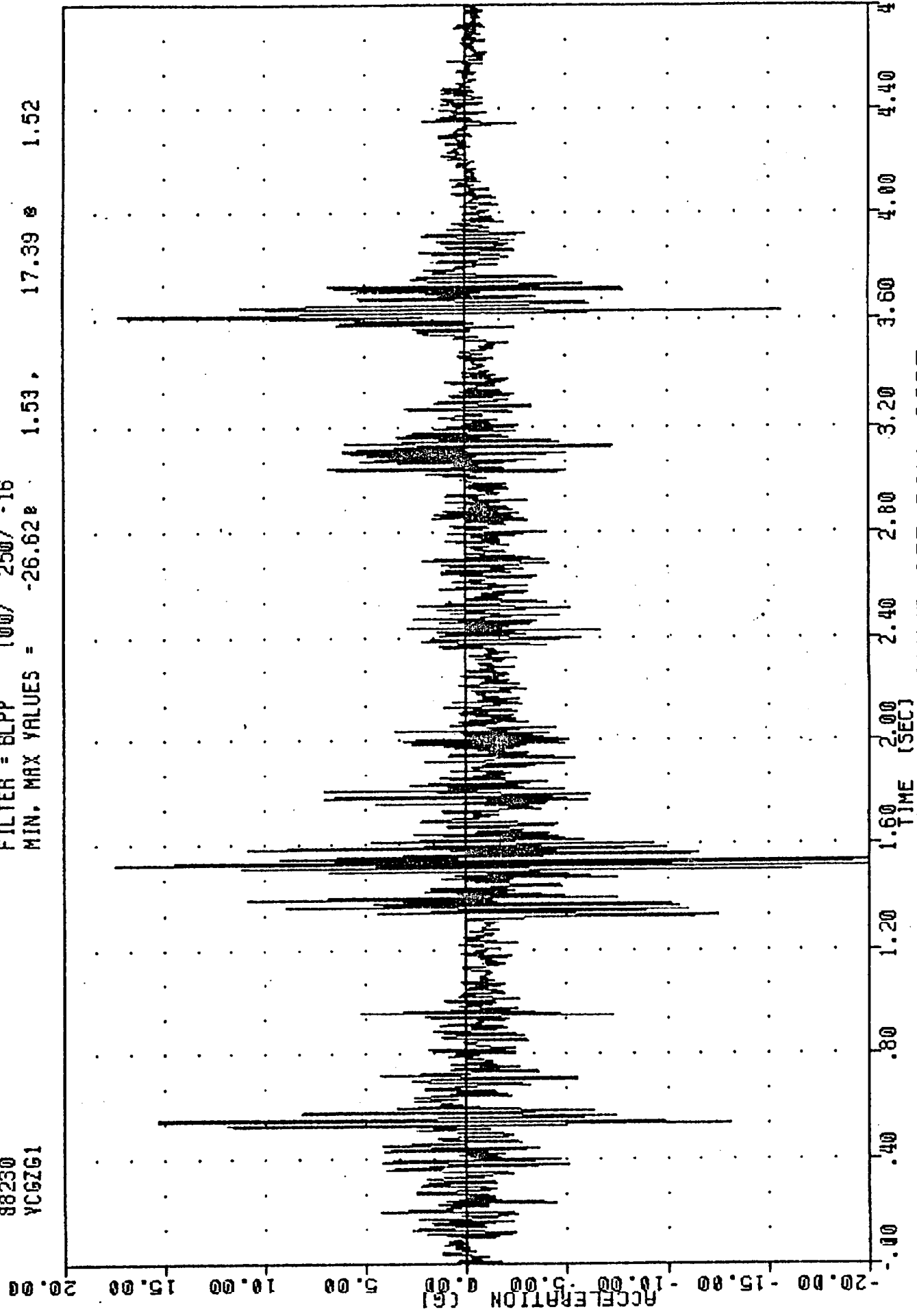
CHEVROLET PICKUP OFF ROLL CART
VEHICLE CENTER OF GRAVITY Y AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230
YC6Z61

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -26.62e 1.53,

17.39 s 1.52



CHEVROLET PICKUP OFF ROLL CART
VEHICLE CENTER OF GRAVITY Z AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230

YCGRG1

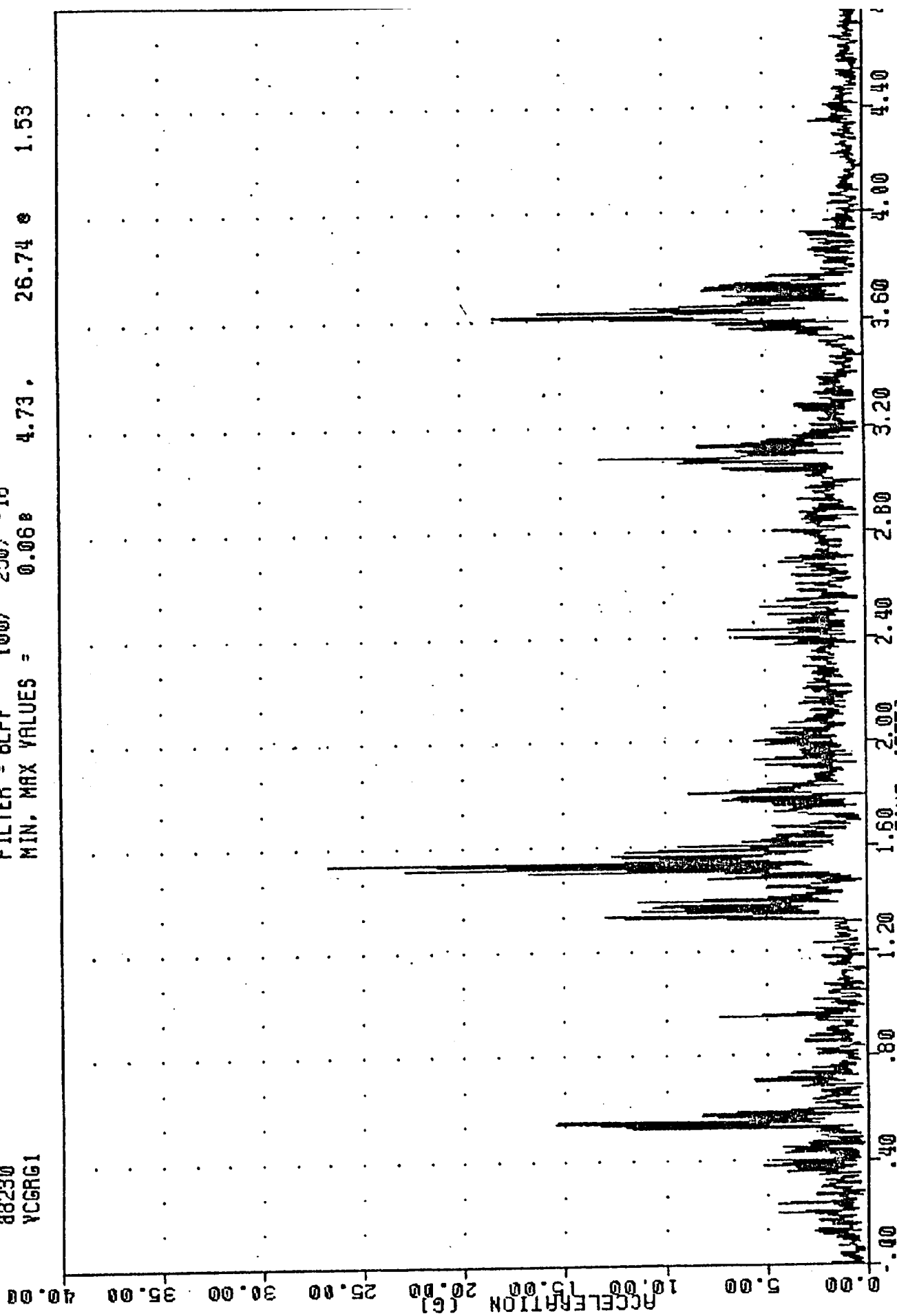
FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = 0.068

4.73.

26.74

1.53

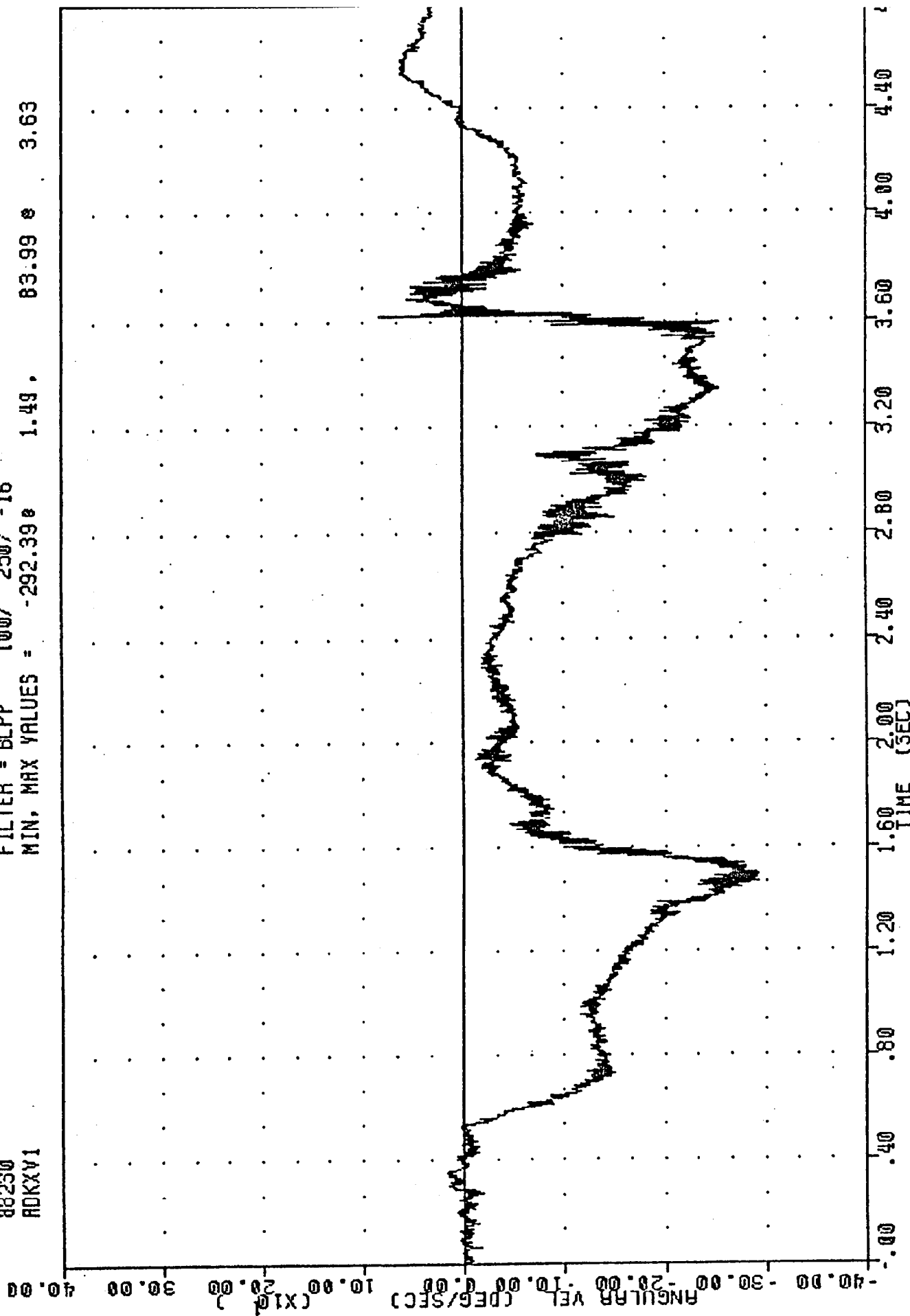


CHEVROLET PICKUP OFF ROLL CART

VEHICLE CENTER OF GRAVITY ACCELERATION RESULTANT

JULI/NHISH • 88081/
CONTROLLED ROLLOVER CRASH
88230
ADKXV1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -292.39 1.49 83.99 3.63

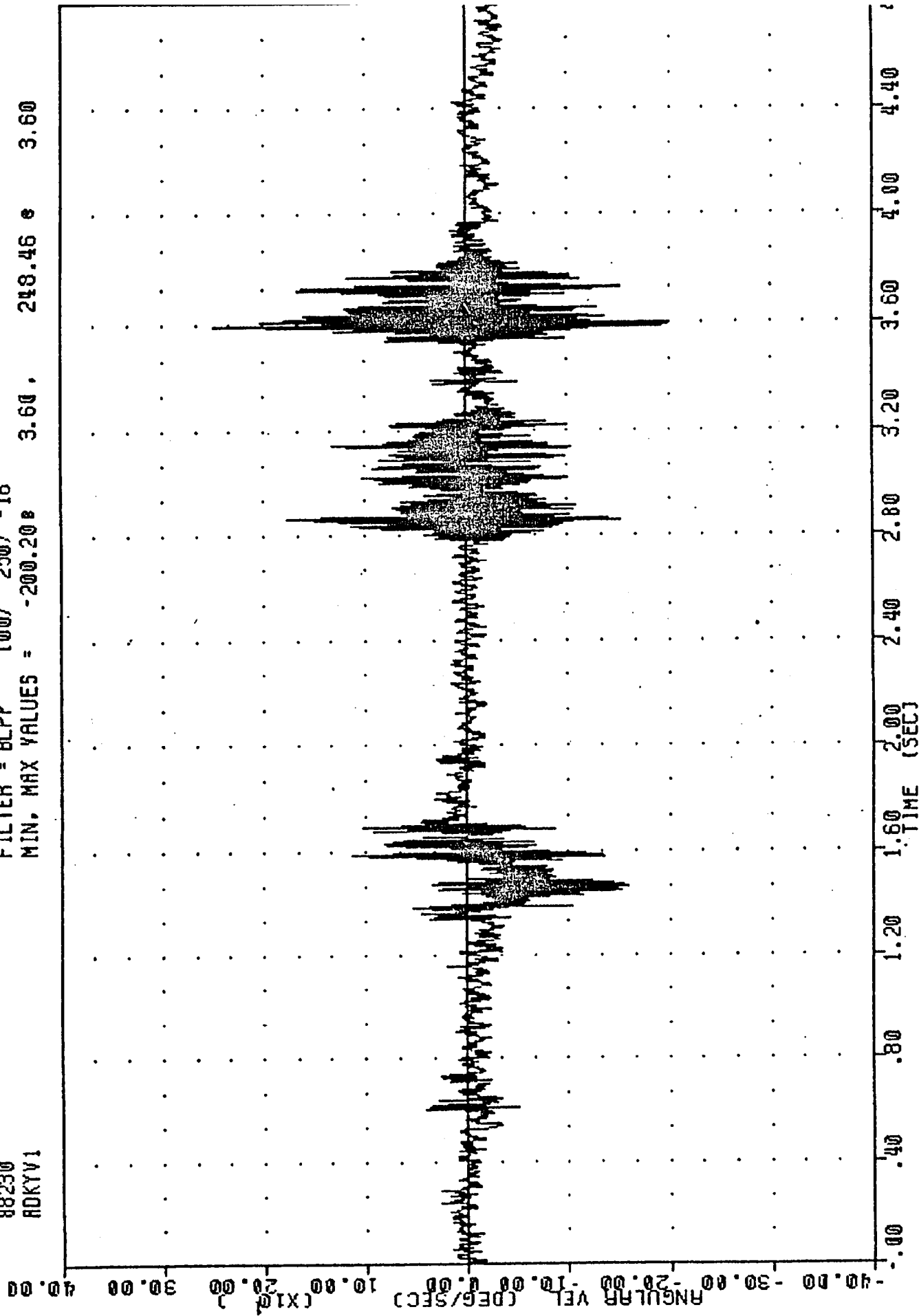


CHEVROLET PICKUP OFF ROLL CART
VEHICLE ROLL RATE

CONTROLLED ROLLOVER CRASH
88230
ADKYV1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -200.20 3.60

248.46 3.60

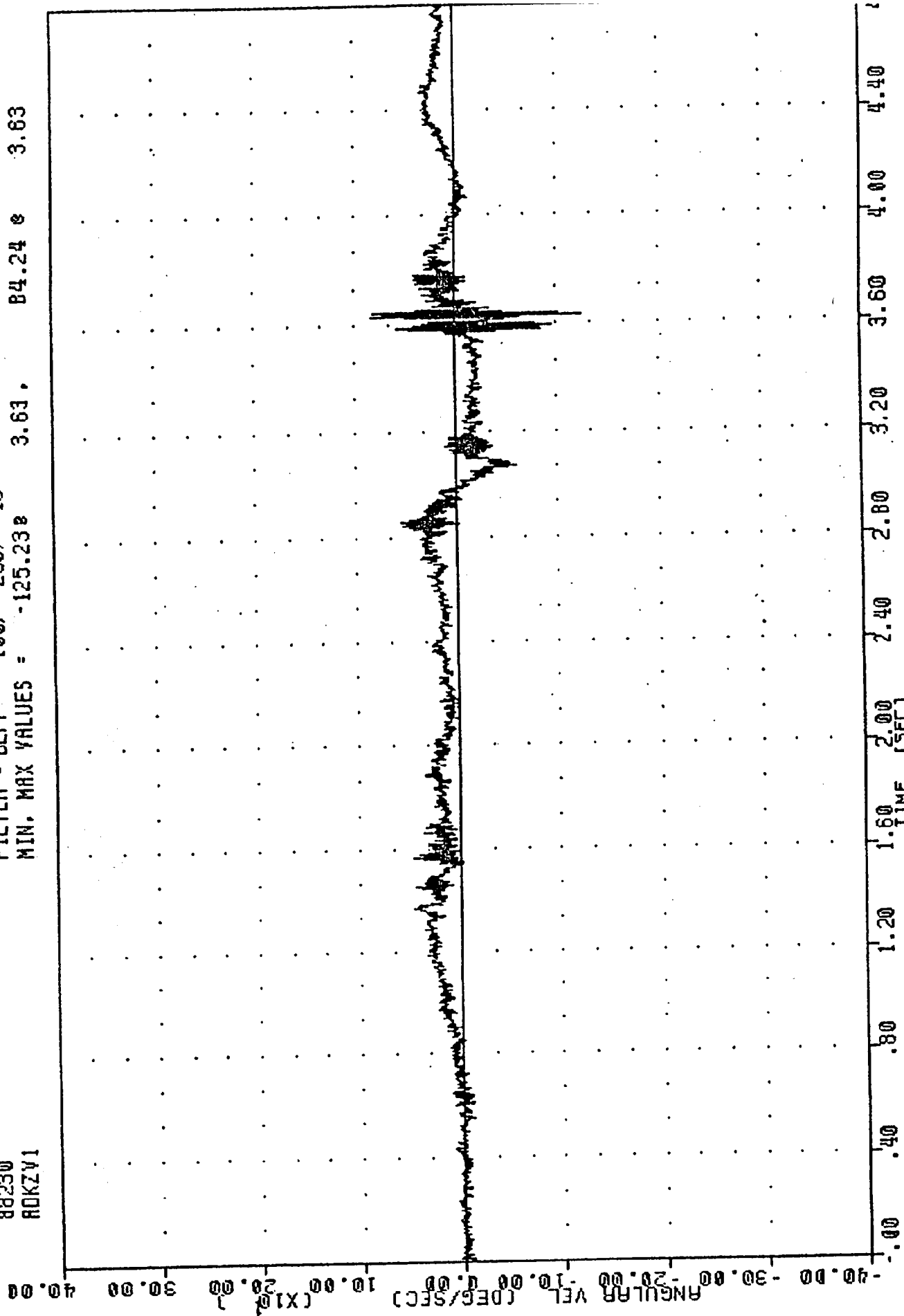


CHEVROLET PICKUP OFF ROLL CART
VEHICLE PITCH RATE

CONTROLLED POLLUTION UNIT
88230
R0KZY1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -125.23 3.63

B4.24 3.63



CHEVROLET PICKUP OFF ROLL CART
VEHICLE YAW RATE

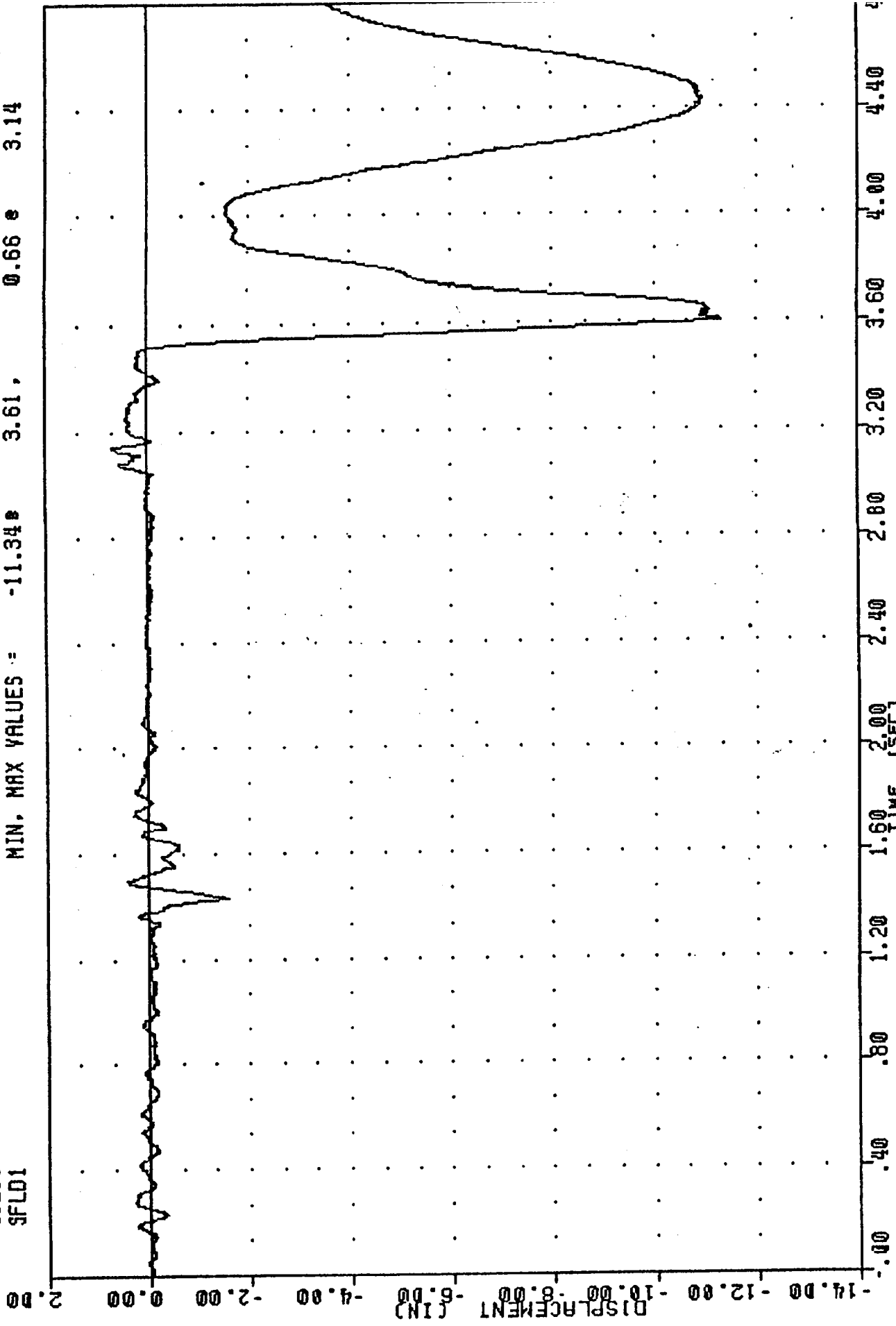
CONTROLLED ROLLOVER CRASH

88230

SFLD1

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -11.34 3.61, 0.66 3.14

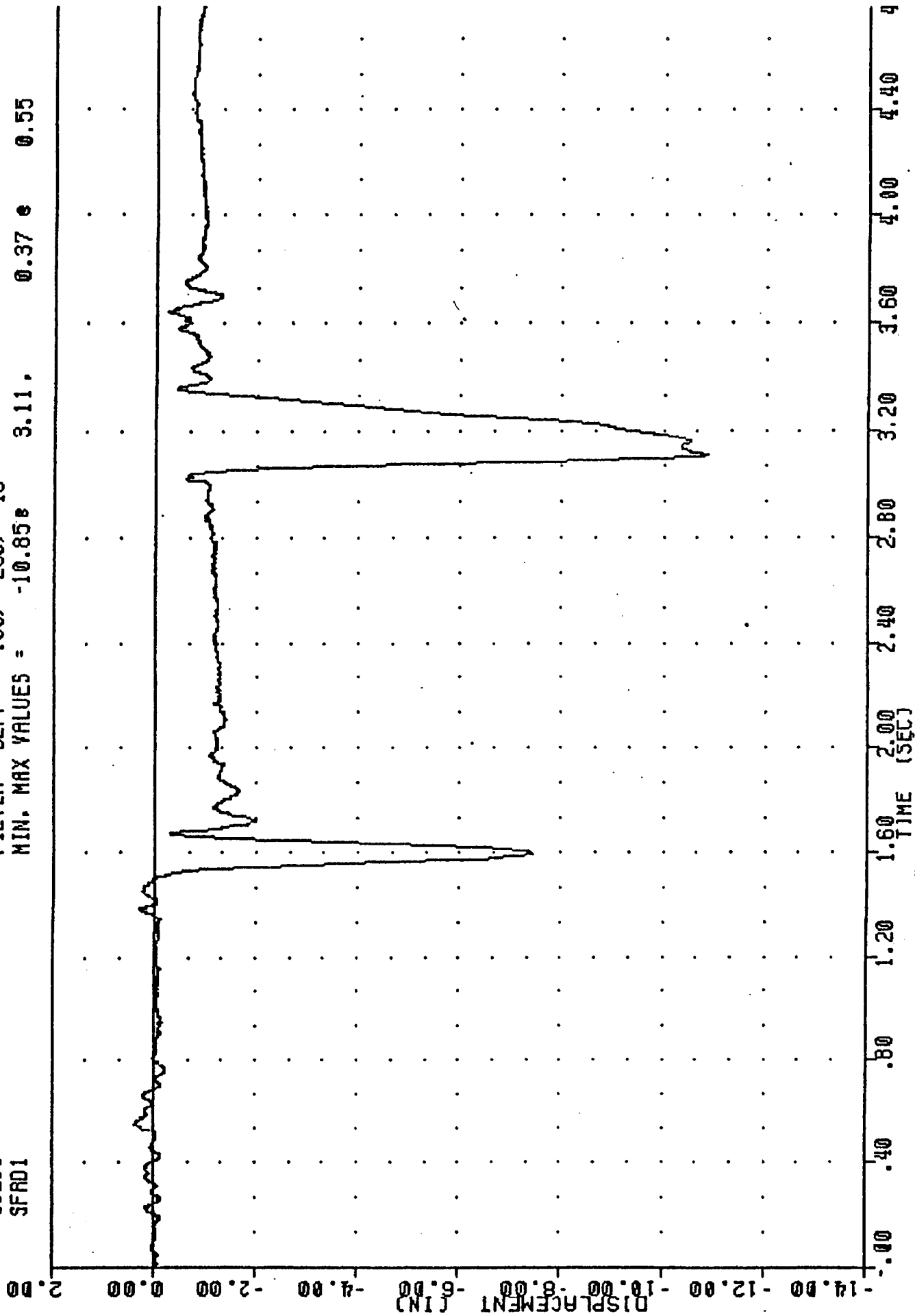


CHEVROLET PICKUP OFF ROLL CART
VEHICLE LEFT FRONT SUSPENSION DISPLACEMENT

CONTROLLED ROLLOVER CRASH
88230
SFRD1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -10.85 3.11

0.37 0.55



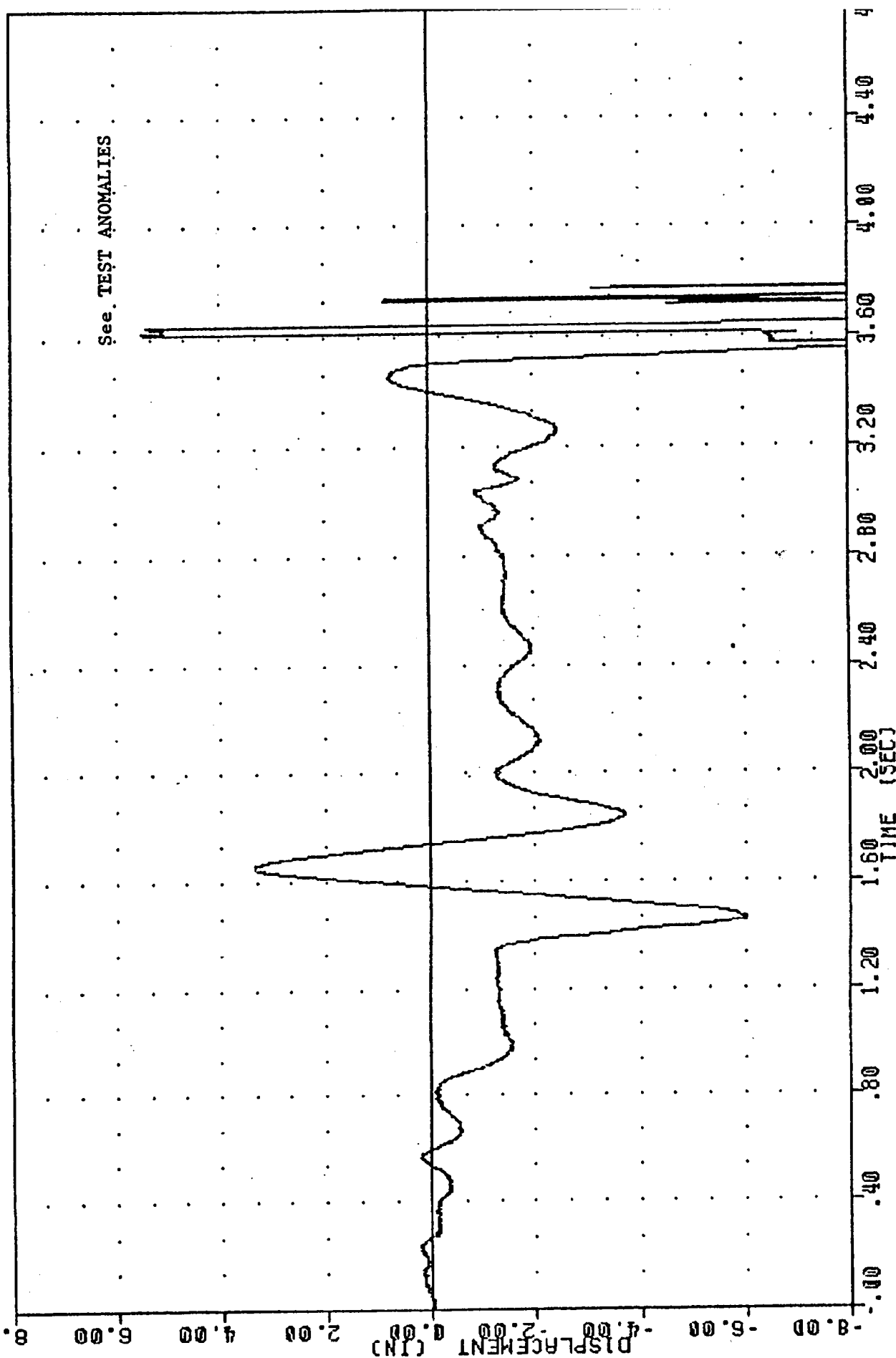
CHEVROLET PICKUP OFF ROLL CART
VEHICLE RIGHT FRONT SUSPENSION DISPLACEMENT

CONTROLLED ROLLOVER CRASH

88230
SRLO1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -18.29 3.78

5.47 3.62



CHEVROLET PICKUP OFF ROLL CART
VEHICLE LEFT REAR SUSPENSION DISPLACEMENT

CONTROLLED HULLOVEN CAMION

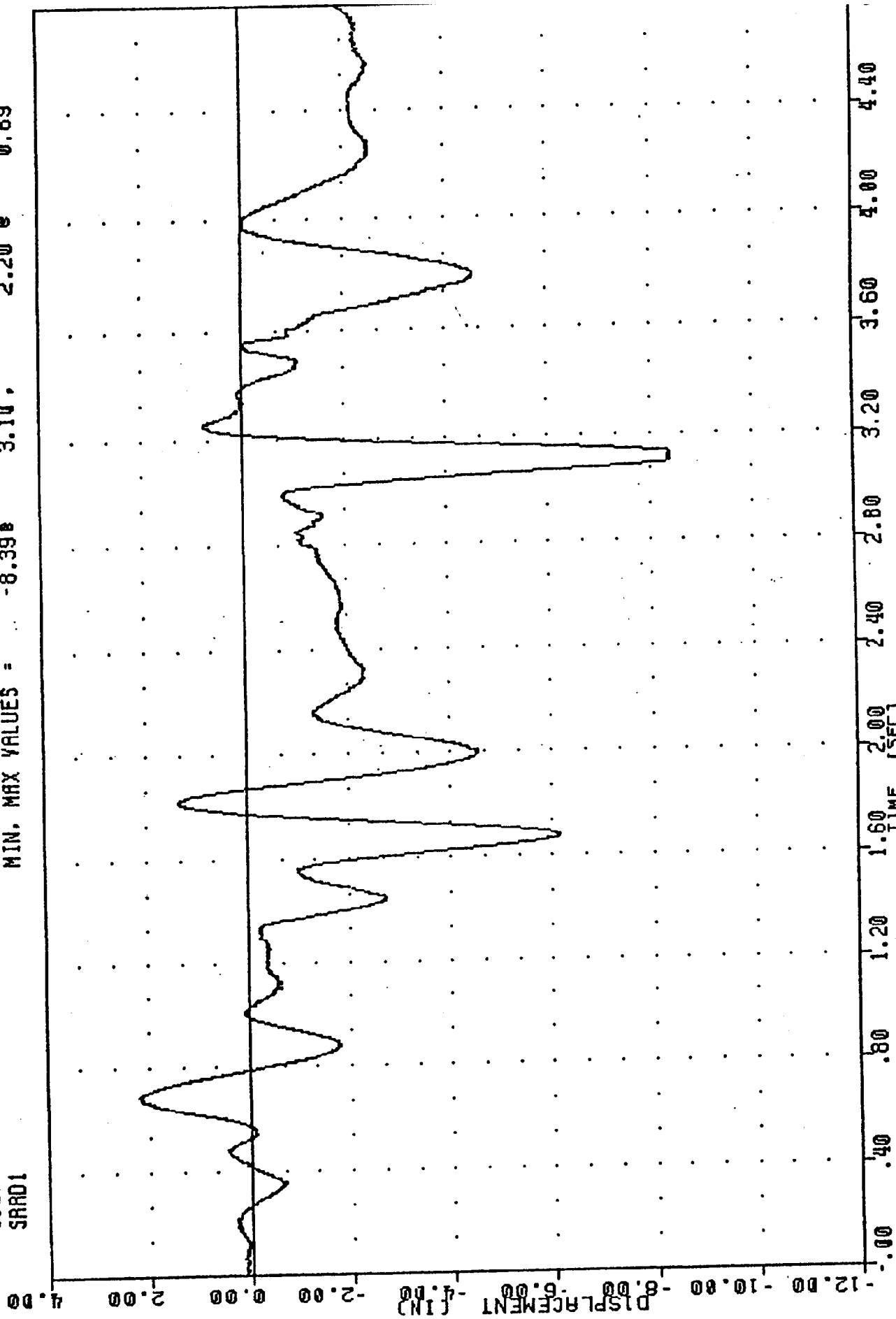
88230

SRAD1

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -8.39 8

3.10 2.20 0.69

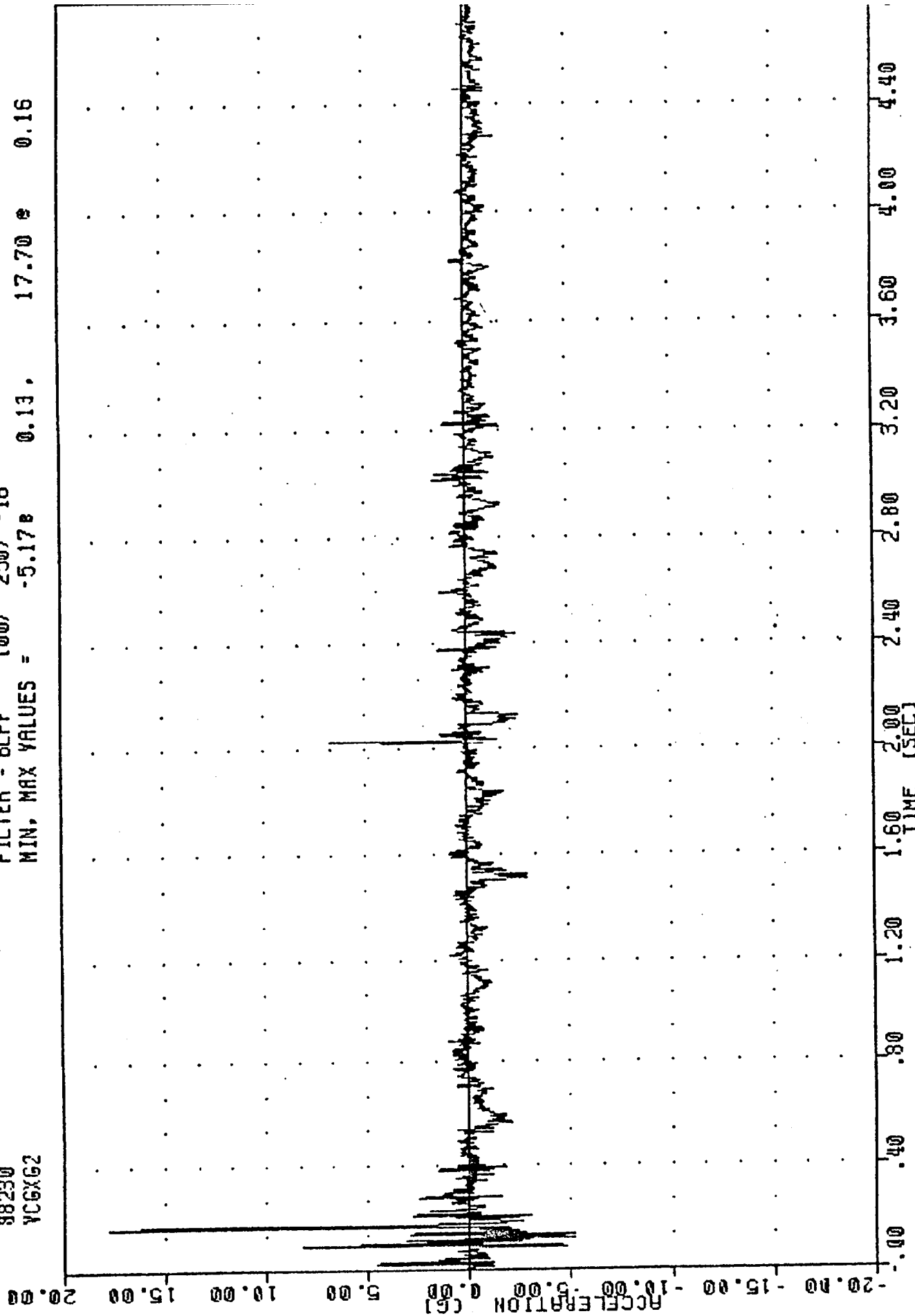


CHEVROLET PICKUP OFF ROLL CART
VEHICLE RIGHT REAR SUSPENSION DISPLACEMENT

UNFILTERED ROLL OVER (MINI)
88230
YCGX62

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -5.17 0.13

17.70 0.16

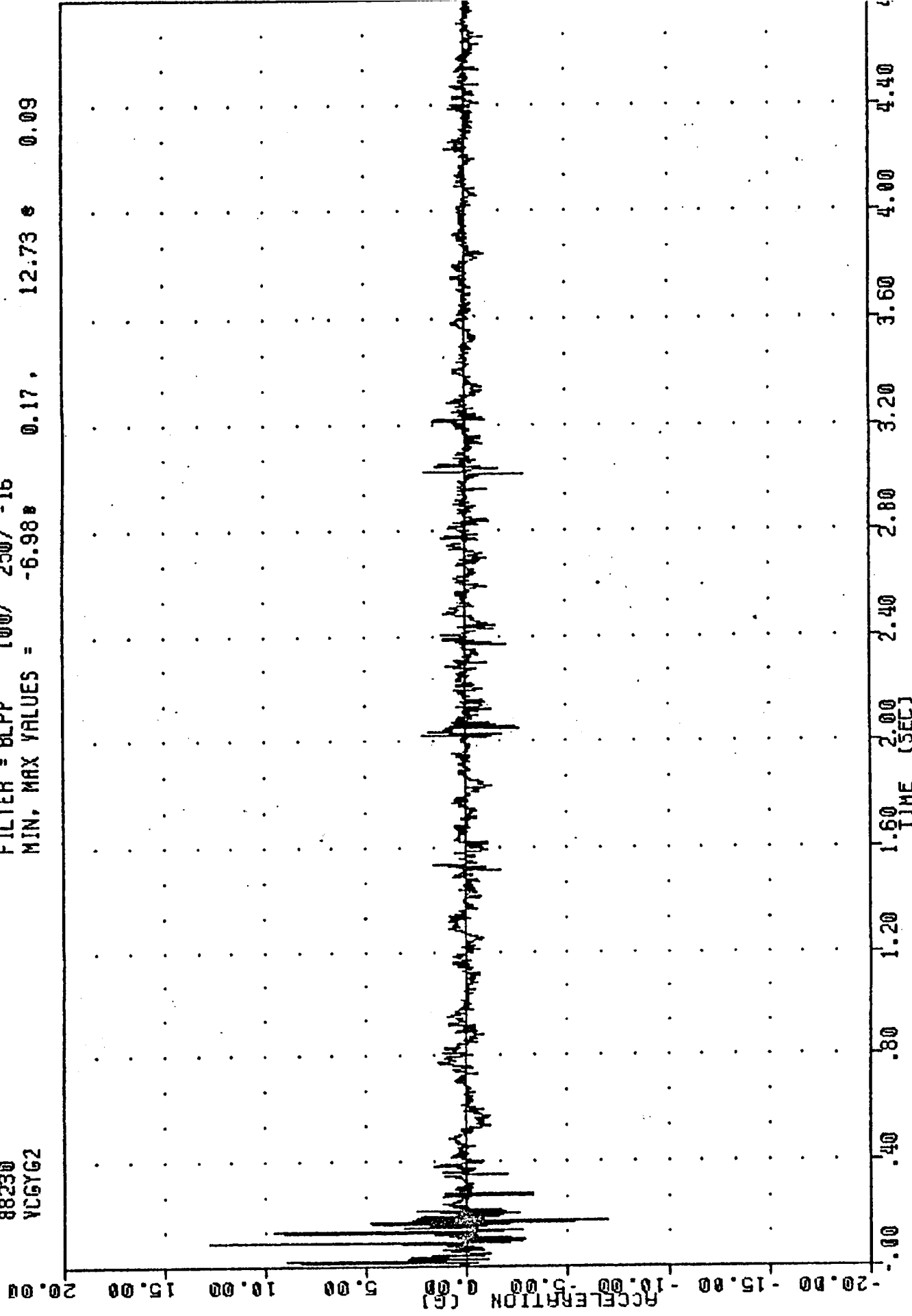


CHEVROLET PICKUP OFF ROLL CART
ROLLOVER CART CENTER OF GRAVITY X AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH
88230
VCGYG2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -6.98 0.17,

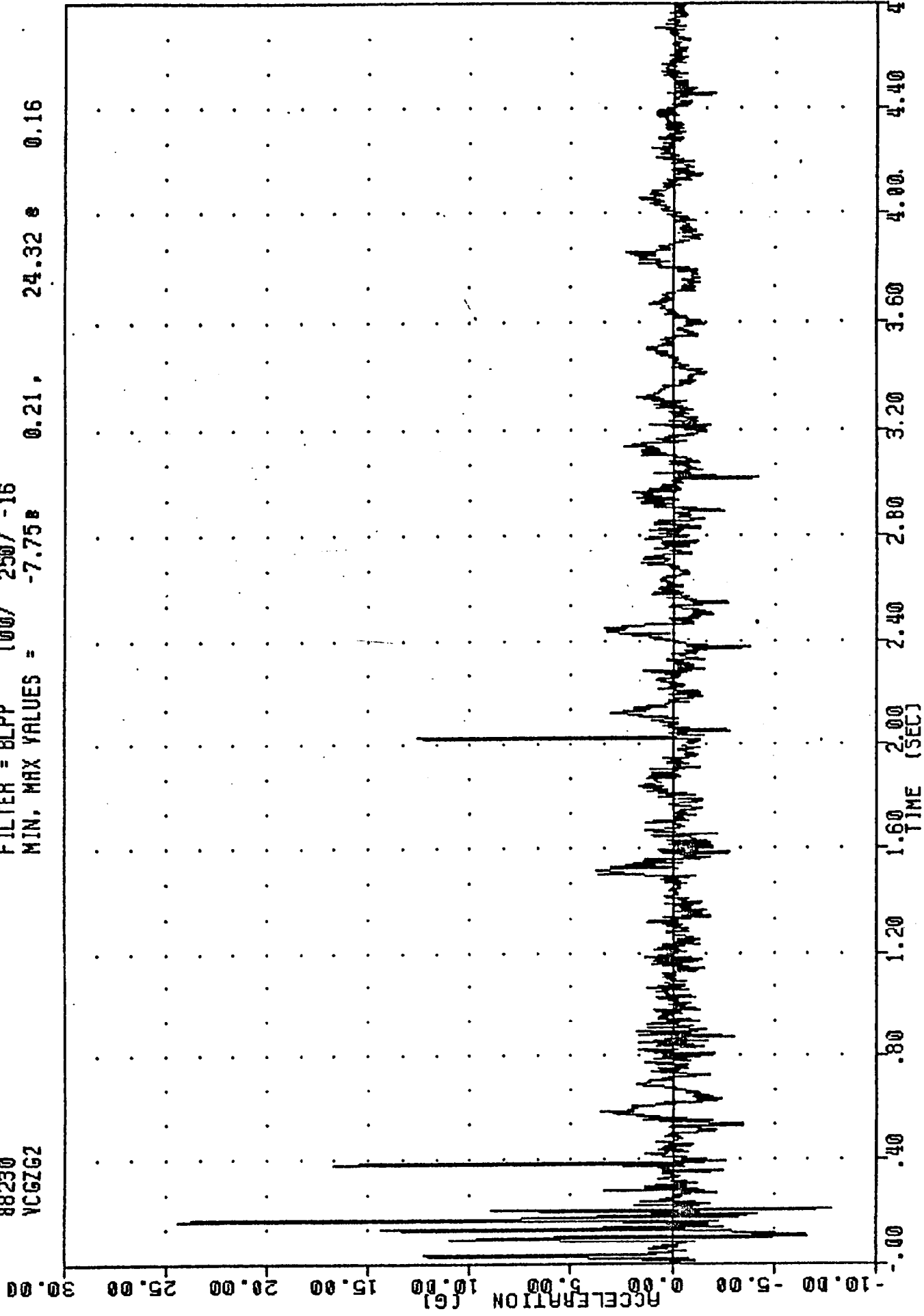
12.73 0.09



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

CONTROLLED ROLLOVER CRASH
88230
VCGZG2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -7.75 0.21, 24.32 0.16

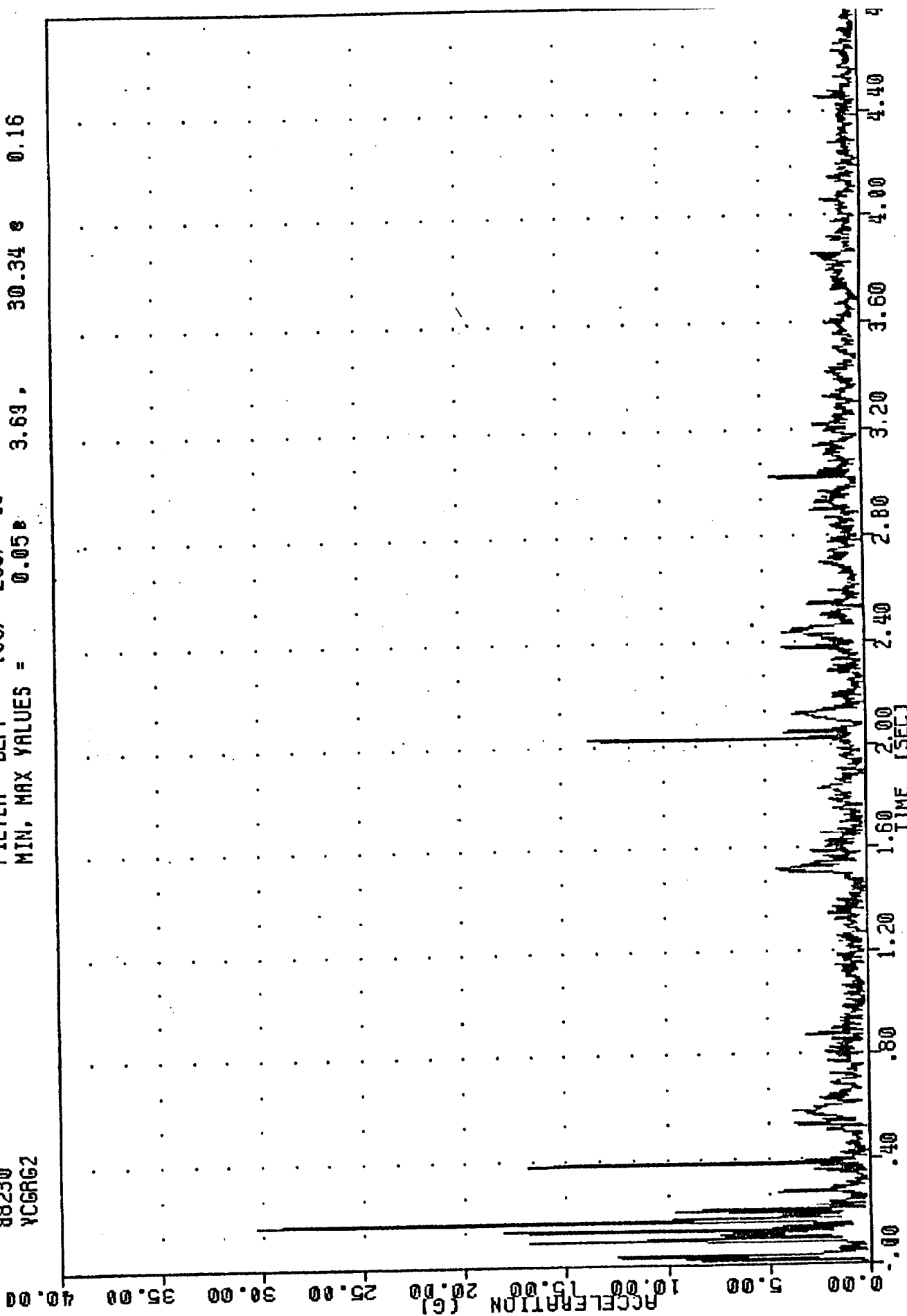


CHEVROLET PICKUP OFF ROLL CART
ROLLOVER CART CENTER OF GRAVITY Z AXIS ACCELERATION

CONTROLLED ROLLOVER CRASH

88230
YCGRG2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = 0.05 3.63, 30.34 0.16



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

CONTROLLED ROLLOVER CRASH

88230

ACPOL

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -0.18 0.03

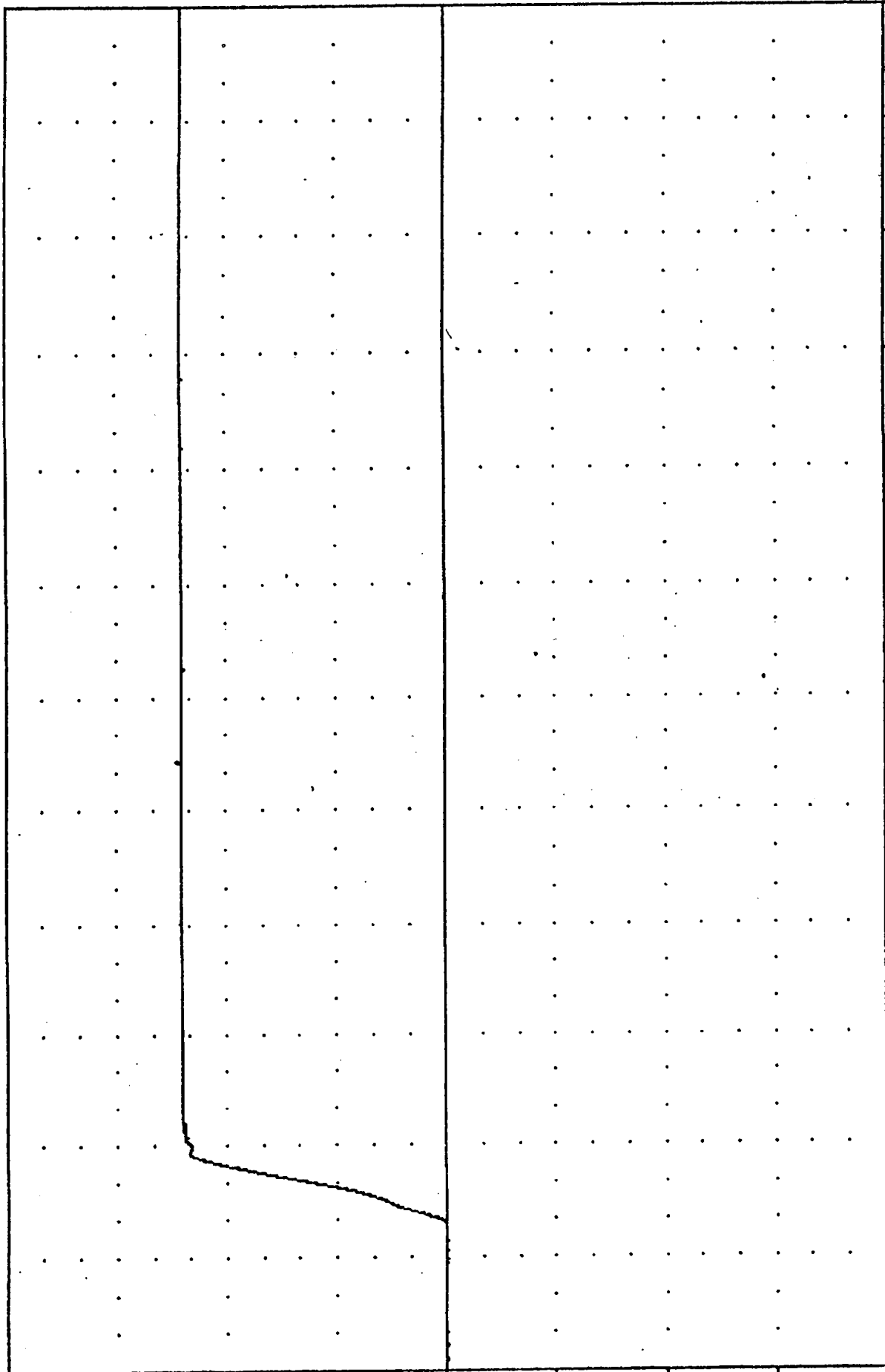
24.14 1.60

0.03

24.14

1.60

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



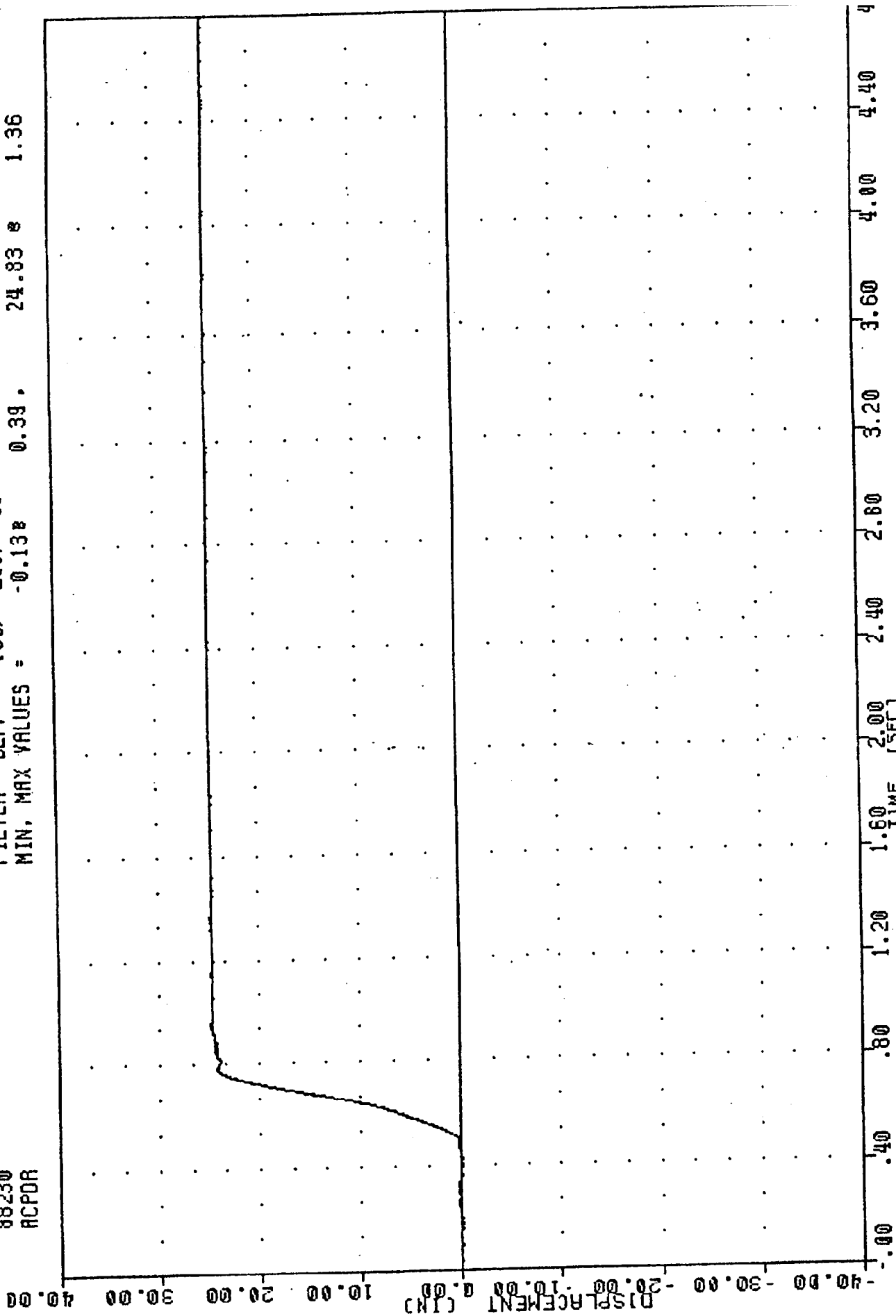
TIME (SEC) 0.00 0.40 0.80 1.20 1.60 2.00 2.40 2.80 3.20 3.60 4.00 4.40 4.80

CHEVROLET PICKUP OFF ROLL CART
ROLLOVER CART PLATFORM DISPLACEMENT - LEFT SIDE

CONTROLLED ROLLOVER CRASH

88230
RCPOR

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -0.13 0.39 24.83 1.36



CHEVROLET PICKUP OFF ROLL CART
ROLLOVER CART PLATFORM DISPLACEMENT - RIGHT SIDE

CONTROLLED ROLLOVER CRASH

88230

QTH1

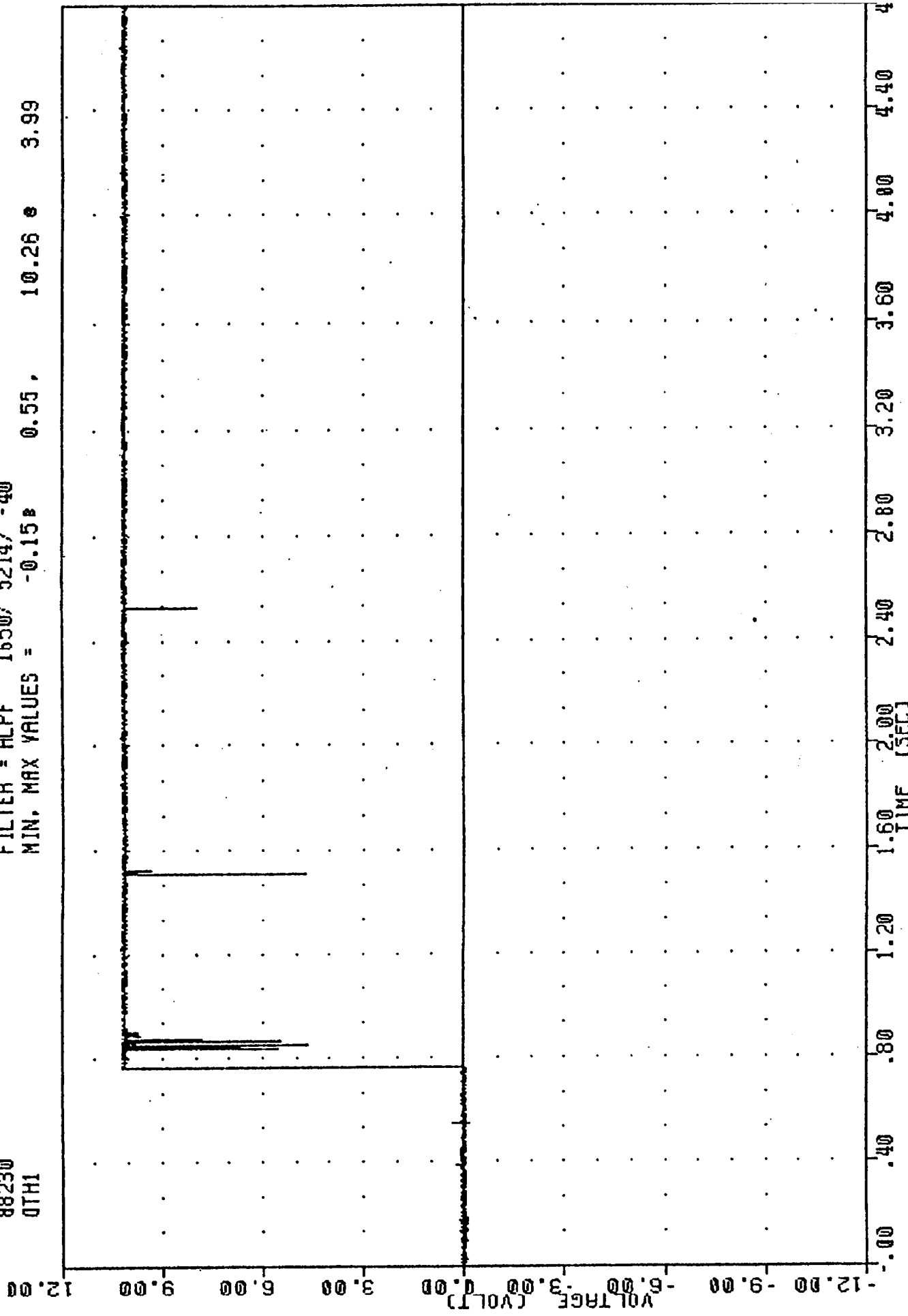
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.15B

0.55,

10.26 e

3.99



CHEVROLET PICKUP OFF ROLL CART

VEHICLE/ROLL CART SEPARATION TIME - UPPER SWITCH

CONTROLLED ROLLOVER CRASH

88230

QTH2

FILTER = ALPF 1650/ 5214/ -40

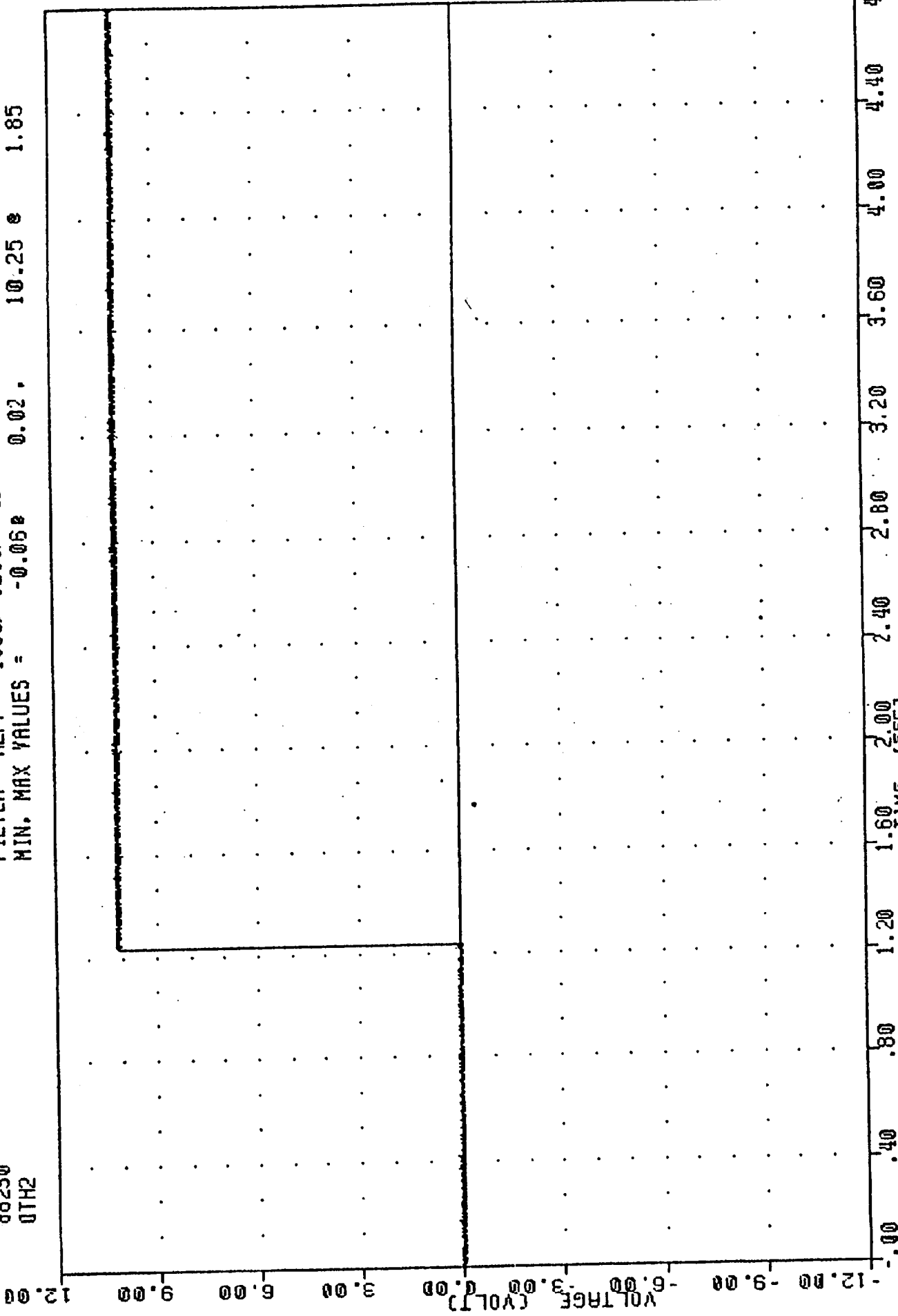
MIN. MAX VALUES =

-0.052

0.02 .

10.25 s

1.85



APPENDIX C
DUMMY CERTIFICATION

HYBRID III EXTERNAL DIMENSIONS
192 ALDERSON

10-AUG-88

SRL	192C2ED1	572E SN192 EXT.DIMENSION CAL02
TEST PARAMETER	(DIMEN.)	SPECIFICATION TEST RESULTS
TEMPERATURE		72.0 DEG. F
RELATIVE HUMIDITY		62.0 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)		16.9-17.1 IN 17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)		8.9- 9.1 IN 9.0 IN
CHEST CIRCUMFERENCE (Y)		38.2-39.4 IN 38.4 IN
WAIST CIRCUMFERENCE (Z)		32.9-34.1 IN 33.4 IN
CHEST DEPTH (O)		8.4- 9.0 IN 8.8 IN
H-POINT HEIGHT (C)		3.3- 3.5 IN 3.4 IN
H-POINT FROM SEATBACK (D)		5.3- 5.5 IN 5.4 IN
SKULL CAP TO BACKLINE (H)		1.6- 1.8 IN 1.7 IN
TOTAL SITTING HEIGHT (A)		34.6-35.0 IN 34.7 IN
THIGH CLEARANCE (F)		5.5- 6.1 IN 5.8 IN
BUTTOCK KNEE LENGTH (K)		22.8-23.8 IN 23.3 IN
BUTTOCK POPLITEAL LENGTH (N)		17.8-18.8 IN 18.3 IN
POPLITEAL HEIGHT (L)		16.9-17.9 IN 17.3 IN
KNEE PIVOT HEIGHT (M)		19.1-19.7 IN 19.2 IN
FOOT LENGTH (P)		9.9-10.5 IN 10.2 IN
FOOT BREADTH (W)		3.6- 4.2 IN 4.0 IN
SHOULDER PIVOT FROM BACKLINE (E)		3.3- 3.7 IN 3.5 IN
SHOULDER BREADTH (V)		16.6-17.2 IN 16.8 IN
SHOULDER PIVOT HEIGHT (B)		19.9-20.5 IN 20.3 IN
ELBOW REST HEIGHT (J)		7.5- 8.3 IN 8.2 IN
SHOULDER-ELBOW LENGTH (I)		13.0-13.6 IN 13.1 IN
BACK OF ELBOW TO WRIST PIVOT (G)		11.4-12.0 IN 11.5 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

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.

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

6 AXIS NECK TRANSDUCER

11-Aug-88

SRL

192C2NF1

572E SN192 NECK FLEXION CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	60.00 %
IMPACT VELOCITY	22.6-23.4 FT/SEC	23.30 FT/SEC
PENDULUM DECELERATION	10 MS 22.50 - 27.50 G	22.66 G
	20 MS 17.60 - 22.60 G	18.30 G
	30 MS 12.50 - 18.50 G	15.44 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.36 G
DECELERATION-TIME CURVE IDECAY TIME TO 5 G	34 - 42 MS	38.88 MS
D PLANE	MAX 64 - 78 DEG.	65.01 DEG.
ROTATION	TIME 57 - 64 MS	57.38 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX 65 - 80 FT.LBS	78.22 FT.LBS
	TIME 47 - 58 MS	51.00 MS
ROTATION ANGLE-TIME CURVE IDECAY TIME TO ZERO	113 - 128 MS	114.88 MS
POSITIVE MOMENT-TIME CURVE IDECAY TIME TO ZERO	97 - 107 MS	93.00 MS **

*** TEST DOES NOT MEET SPECIFICATIONS ***

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

10-Aug-88

SRL

192C2HD1

572E SN192 HEAD DROP CAL 2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	60.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	258.68 G
PEAK LATERAL ACCELERATION	15 G MAX	1.26 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

6 AXIS NECK TRANSDUCER

11-Aug-88

SRL 192C2NE1

572E SN192 NECK EXTENSION CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	62.00 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.51 FT/SEC
PENDULUM	10 MS 17.20 - 21.20 G	17.60 G
DECELERATION	20 MS 14.00 - 19.00 G	14.02 G
	30 MS 11.00 - 16.00 G	11.85 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	11.81 G
DECELERATION-TIME CURVE		
DECAY TIME TO 5 G	38 - 46 MS	46.00 MS
D PLANE	MAX 81 - 106 DEG.	86.02 DEG.
ROTATION	TIME 72 - 82 MS	79.63 MS
MOMENT ABOUT OCCIPITAL	MIN -59.0/-39.0 FT.LBS	-48.64 FT.LBS
CONDYLE	TIME 65 - 79 MS	71.25 MS
ROTATION ANGLE-TIME CURVE		
DECAY TIME TO ZERO	147 - 174 MS	159.63 MS
NEGATIVE MOMENT-TIME CURVE		
DECAY TIME TO ZERO	120 - 148 MS	124.50 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

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THORAX IMPACT TEST

HYBRID III

11-AUG-88

SRL

192C2TH1

572E SN192 H.S. THORAX CAL2

TEST PARAMETER	HIGH SPEED TEST	
	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	62.00 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.98 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.73 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1209.4 LBS
INTERNAL HYSTERESIS	69% - 85%	75.9%

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

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KNEE IMPACT TEST

HYBRID III

10-Aug-88

LEFT
SRLKNEE
192C2LK1

572E SN192 L.KNEE 11LB CAL 2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	60.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.87 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1217.27 LBS
PROBE WEIGHT	11.0 LBS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Chris Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

RIGHT
SRL

KNEE
192C2RK1

572E SN192 R

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

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

APPENDIX D
MISCELLANEOUS TEST INFORMATION

IPMD VEHICLE DATA SHEET

Page 1

Version 2 -- June-25, 1987

Filled Out By: B. Dotson Date: 8/15/88Checked By: Chrstos Date: 9/9/88VEHICLE DATAVehicle ID Code (7 characters): V88-192BVehicle Model Year (2 digits): 88Vehicle Make (2 characters): 01

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		

Vehicle Model (2 characters - see appendix B): 22Body 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 G C D C 1 4 Z 0 J Z 2 7 9 6 6 4 _ _ _Odometer Reading: 94.9 Thousands of Miles: 0.0Wheelbase: 117.5 (in) x 25.4 -: 2984.5 (mm)Front Track: 63.7 (in) x 25.4 -: 1618.0 (mm)Rear Track: 64.8 (in) x 25.4 -: 1645.9 (mm)Roof Height: 69.5 (in) x 25.4 -: 1765.3 (mm)

G.V.W.R.: 5600 (lbs) x 4.45 =: 24920.0 (N)
Front G.A.W.R.: 2950 (lbs) x 4.45 =: 13127.5 (N)
Rear G.A.W.R.: 3404 (lbs) x 4.45 =: 15147.8 (N)

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

Weight on RF Tire: 1097 (lbs) x 4.45 =: 4881.6 (N)
Weight on LF Tire: 1128 (lbs) x 4.45 =: 5019.6 (N)
Weight on LR Tire: 944 (lbs) x 4.45 =: 4200.8 (N)
Weight on RR Tire: 918 (lbs) x 4.45 =: 4085.1 (N)
Vehicle Test Weight: 4087 (lbs) x 4.45 =: 18187.2 (N)

Lateral and Longitudinal Center of Gravity Location

From Front Axle: 53.5 (in) x 25.4 =: 1358.9 (mm)
From Center Line: -0.4 (in) x 25.4 =: -10.2 (mm)

Engine Displacement: 262 (cu in) x 0.0164 =: 4.3 (l)

Engine Type (2 characters):

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

Engine Location (1 character):

F - Front M - Mid R - Rear

Engine Orientation (1 character):

L - Longitudinal T - Transverse

Transmission Type:

M - Manual A - Automatic

Drive Axle (1 character):

F - Front R - Rear
4 - Four Wheel Drive

Vehicle Comments (30 characters):

Pre-rollover

Tested with driver

IPMD VEHICLE DATA SHEET

FRONT SUSPENSION

Suspension Number (4 digits):

Front/Rear Flag (1 character):

Axle Type (1 character)

I - Independent S - Solid

Suspension Type (1 character):

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):

CO - Coil	TB - Torsion Bar
LL - Longitudinal Leaf	TL - Transverse Leaf
OT - Other: _____	

Brake Type (2 characters):

DI - Disk	LT - Leading-Trailing Shoe
DS - Duo-Servo Shoe	
OT - Other: _____	

Suspension Modified

N - No Y - Yes

Suspension Modification

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

1 -
2 -

FRONT SUSPENSION

Tire Manufacturer (10 characters):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 32.0(psi) * 6.897 =: 220.7 (kpa)

REAR SUSPENSION

Suspension Number (4 digits):

R192

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):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 35.0(psi) * 6.897 =: 241.4 (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	1.706	
+100	4.3	1.976	
+200	8.7	2.426	
0	0.4	1.811	
-100	4.1	1.459	
-200	8.6	1.045	
0	0.1	1.705	

Calculated C.G. Height (in): 27.6

Pitch Inertia:

<u>Run</u>	<u>Period(sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	4.85	210	483
2	4.87	208	484
3	4.88	201	471

Pitch Inertia (ft·lb·sec²): 2615.4

Roll Inertia:

Distance between ramps (in): 53.6

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	2.76	205	464
2	2.76	206	454
3	2.76	207	460

Roll Inertia (ft·lb·sec²): 513.7

IPMD MEASURED DATA

Yaw Inertia:

Distance between ramps (in): 53.6String Pot Offset from platform center (in): 73.0

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.81</u>	<u>133</u>	<u>296</u>
2	<u>2.80</u>	<u>128</u>	<u>293</u>
3	<u>2.81</u>	<u>129</u>	<u>306</u>

Yaw Inertia (ft·lb·sec²): 2782.5

IPMD VEHICLE DATA SHEET

Page 1

Version 2 -- June-25, 1987

Filled Out By: B. Dotson Date: 8/29/88Checked By: Chrstos Date: 9/9/88VEHICLE DATAVehicle ID Code (7 characters): V88-192AVehicle Model Year (2 digits): 88Vehicle Make (2 characters): 01

11 - American	02 - Ford	64 - Nissan
12 - Audi	40 - GMC	48 - Odyssey
53 - Batttronics	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: _____		

Vehicle Model (2 characters - see appendix B): 22Body 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 G C D C 1 4 Z 0 J I 2 7 9 6 6 4 _ _ _Odometer Reading: 99.9 Thousands of Miles: 0.0Wheelbase: 117.5 (in) x 25.4 -: 2984.5 (mm)Front Track: 63.4 (in) x 25.4 -: 1610.4 (mm)Rear Track: 65.6 (in) x 25.4 -: 1666.2 (mm)Roof Height: 68.2 (in) x 25.4 -: 1732.3 (mm)

G.V.W.R.: 5600 (lbs) x 4.45 =: 24920.0 (N)
Front G.A.W.R.: 2950 (lbs) x 4.45 =: 13127.5 (N)
Rear G.A.W.R.: 3404 (lbs) x 4.45 =: 15147.8 (N)

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

Weight on RF Tire: 1122 (lbs) x 4.45 =: 4992.9 (N)
Weight on LF Tire: 1126 (lbs) x 4.45 =: 5010.7 (N)
Weight on LR Tire: 954 (lbs) x 4.45 =: 4245.3 (N)
Weight on RR Tire: 890 (lbs) x 4.45 =: 3960.5 (N)
Vehicle Test Weight: 4092 (lbs) x 4.45 =: 18209.4 (N)

Lateral and Longitudinal Center of Gravity Location

From Front Axle: 53.0 (in) x 25.4 =: 1346.2 (mm)
From Center Line: -0.5 (in) x 25.4 =: -12.7 (mm)
Engine Displacement: 262.0 (cu in) x 0.0164 =: 4.3 (l)

Engine Type (2 characters):

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

V6

Engine Location (1 character):

F - Front M - Mid R - Rear

E

Engine Orientation (1 character):

L - Longitudinal T - Transverse

L

Transmission Type:

M - Manual A - Automatic

M

Drive Axle (1 character):

F - Front R - Rear
4 - Four Wheel Drive

R

Vehicle Comments (30 characters):

Post-rollover tested
with driver

FRONT SUSPENSIONSuspension Number (4 digits): F192Front/Rear Flag (1 character): FAxle Type (1 character) I
I - Independent S - SolidSuspension 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): CO

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
N - No Y - Yes

Suspension Modification

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

1 - _____
2 - _____

FRONT SUSPENSION

Tire Manufacturer (10 characters):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 32.0(psi) * 6.897 =: 220.7 (kpa)

REAR SUSPENSION

Suspension Number (4 digits):

R192

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):

Uniroyal

Tire Size Code (10 characters):

P225/75R15

Tire Construction (2 characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 6.0(in) * 25.4 =: 152.4 (mm)Axle Height: 13.2(in) * 25.4 =: 335.3 (mm)Tire Pressure: 35.0(psi) * 6.897 =: 241.4 (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>1.905</u>	
+100	<u>3.9</u>	<u>2.122</u>	
+200	<u>7.8</u>	<u>2.358</u>	
0	<u>-0.1</u>	<u>1.960</u>	
-100	<u>3.9</u>	<u>1.733</u>	
-200	<u>7.9</u>	<u>1.464</u>	
0	<u>0.0</u>	<u>1.907</u>	

Calculated C.G. Height (in): 26.6

Pitch Inertia:

<u>Run</u>	<u>Period(sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>4.71</u>	<u>250</u>	<u>452</u>
2	<u>4.71</u>	<u>253</u>	<u>455</u>
3	<u>4.71</u>	<u>252</u>	<u>451</u>

Pitch Inertia (ft·lb·sec²): 2648.8

Roll Inertia:

Distance between ramps (in): 53.7

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.73</u>	<u>219</u>	<u>522</u>
2	<u>2.72</u>	<u>217</u>	<u>507</u>
3	<u>2.73</u>	<u>219</u>	<u>521</u>

Roll Inertia (ft·lb·sec²): 538.8

IPMD MEASURED DATA

Yaw Inertia:

Distance between ramps (in): 53.7String Pot Offset from platform center (in): 73.5

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>2.76</u>	<u>129</u>	<u>268</u>
2	<u>2.76</u>	<u>127</u>	<u>262</u>
3	<u>2.76</u>	<u>117</u>	<u>235</u>

Yaw Inertia (ft·lb·sec²): 2678.8

88230

0.00 mph

	Min value	Max value	Data Units	Filter
1	HEDYG2	-23.548 e	3.246	ALPF 1650/ 5214/ -40
2	HEDYG2	-18.239 e	1.524	ALPF 1650/ 5214/ -40
3	HEDYG2	-21.358 e	3.022	ALPF 1650/ 5214/ -40
4	NEKXF2	-81.985 e	3.087	BLPP 100/ 250/ -16
5	NEKXF2	-127.475 e	1.357	BLPP 100/ 250/ -16
6	NEKXF2	-591.099 e	3.026	BLPP 100/ 250/ -16
7	NEKXF2	-158.122 e	1.419	BLPP 100/ 250/ -16
8	NEKXF2	-428.565 e	3.022	BLPP 100/ 250/ -16
9	NEKXF2	-157.889 e	1.558	BLPP 100/ 250/ -16
10	CSTYG2	-13.888 e	3.699	BLPP 300/ 750/ -16
11	CSTYG2	-24.944 e	1.363	BLPP 300/ 750/ -16
12	CSTYG2	-9.304 e	1.382	BLPP 300/ 750/ -16
13	CSTYG2	-0.171 e	3.736	BLPP 300/ 750/ -16
14	PEVYG2	-13.401 e	3.702	BLPP 300/ 750/ -16
15	PEVYG2	-9.596 e	1.491	BLPP 300/ 750/ -16
16	PEVYG2	-7.622 e	1.232	BLPP 300/ 750/ -16
17	VCGYG1	-10.305 e	3.081	BLPP 100/ 250/ -16
18	VCGYG1	-6.897 e	3.617	BLPP 100/ 250/ -16
19	VCGYG1	-26.622 e	1.534	BLPP 100/ 250/ -16
20	RDXYV1	-292.393 e	1.490	BLPP 100/ 250/ -16
21	RDXYV1	-200.196 e	3.603	BLPP 100/ 250/ -16
22	RDXYV1	-125.234 e	3.629	BLPP 100/ 250/ -16
23	SFLD1	-11.343 e	3.605	BLPP 100/ 250/ -16
24	SFRD1	-11.005 e	5.281	BLPP 100/ 250/ -16
25	SRLD1	-18.285 e	3.780	BLPP 100/ 250/ -16
26	SRRD1	-8.412 e	5.217	BLPP 100/ 250/ -16
27	VCGYG2	-5.172 e	0.129	BLPP 100/ 250/ -16
28	VCGYG2	-6.980 e	0.172	BLPP 100/ 250/ -16
29	VCGYG2	-7.755 e	0.206	BLPP 100/ 250/ -16
30	RCPDL	-0.184 e	0.033	BLPP 100/ 250/ -16
31	RCPDR	-0.139 e	0.686	BLPP 100/ 250/ -16
32	OTH1	-0.147 e	0.548	BLPP 100/ 250/ -16
33	OTH2	-0.064 e	-1.396	ALPF 1650/ 5214/ -40
34	HEDRG2	0.088 e	0.137	ALPF 1650/ 5214/ -40
35	CSTRG2	0.108 e	0.016	ALPF 1650/ 5214/ -40
36	PEVRG2	0.088 e	1.943	BLPP 300/ 750/ -16
37	VCGRG1	0.024 e	-0.863	BLPP 300/ 750/ -16
38	VCGRG2	0.032 e	-1.355	BLPP 100/ 250/ -16

SIGN CONVENTION

Compression on barrier face load cells is positive.

Compression on femur load cells is positive.

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 ROTATING LEFTWARD