

TAPE
V1289

CONTRACT: ~~89-X-07444~~
88-X-07288

TEST NO. 890530
FOR SRL / '89 Nissan St. Reg Bed
Pickup

TEST DATE: May 30 '89

VEHICLE AND DUMMY KINEMATICS
IN A CONTROLLED ROLLOVER CRASH
1989 NISSAN STANDARD REGULAR BED PICKUP

PREPARED BY:

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

TEST REPORT

MAY - JUNE, 1989

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

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
	(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
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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	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 degrees add 32)	Fahrenheit	°F
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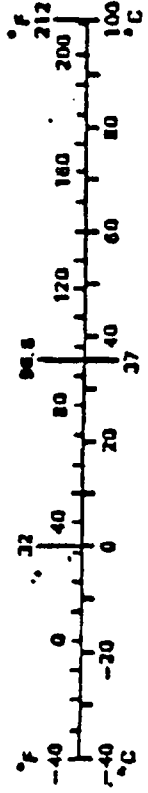


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SECTION 1.0
PURPOSE AND TEST PROCEDURE

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

This test was conducted by placing a 1989 Nissan Standard Regular Bed Pickup on the NHTSA rollover cart at an angle of 30° above the horizontal, crabbing the rollover cart 45°, towing the rollover cart to 30 mph, and releasing the test vehicle. The test vehicle contained an instrumented Part 572E dummy restrained by a production 3-point unbelt.

SECTION 2.0
SUMMARY OF ROLLOVER CRASH TEST

A 1989 Nissan Standard Regular Bed Pickup containing one Part 572E instrumented test dummy was placed upon the rollover test device at 30 degrees above the horizontal and was released when the device had reached 30 mph. The device was attached to the tow cable of the drive system and crabbed 45° clockwise. After the vehicle had been released the device was brought to a stop with an auxiliary brake system. After release the vehicle impacted the ground on its left side. The vehicle made one-half roll and came to rest on its roof. The rollover crash test was conducted by the Transportation Research Center of Ohio in East Liberty, Ohio on May 30, 1989. Pre-test and post-test photographs of the test vehicle, dummy and device are shown in Appendix A.

The Part 572E 50th percentile adult male anthropomorphic test device (ATD) was placed in the driver'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 34 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 890530

VEHICLE ROLL CART DATA SUMMARY

No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	SEC	MAX	SEC
1 CENTER OF GRAVITY (g)				
LONGITUDINAL	14.8	1.9	5.9	1.3
LATERAL	5.8	0.3	13.9	0.1
VERTICAL	8.4	1.3	9.3	1.4
RESULTANT	16.5	1.9		
2 PLATFORM DISPLACEMENT (in)				
LEFT SIDE	24.2	2.2	0.1	0.5
RIGHT SIDE	24.6	1.5	0.1	0.5
3 VEHICLE/ROLL CART SEPARATION TIMES:				
			UPPER SWITCH:	1.0 SEC
			LOWER SWITCH:	1.6 SEC

REFERENCE: X: + FORWARD FROM REAR BUMPER
 Y: + LEFTWARD FROM VEHICLE CENTERLINE
 Z: + UPWARD FROM GROUND LEVEL
 DISPLACEMENT: + OUTWARD

FINAL RESTING PLACES OF PARTS AND CAR

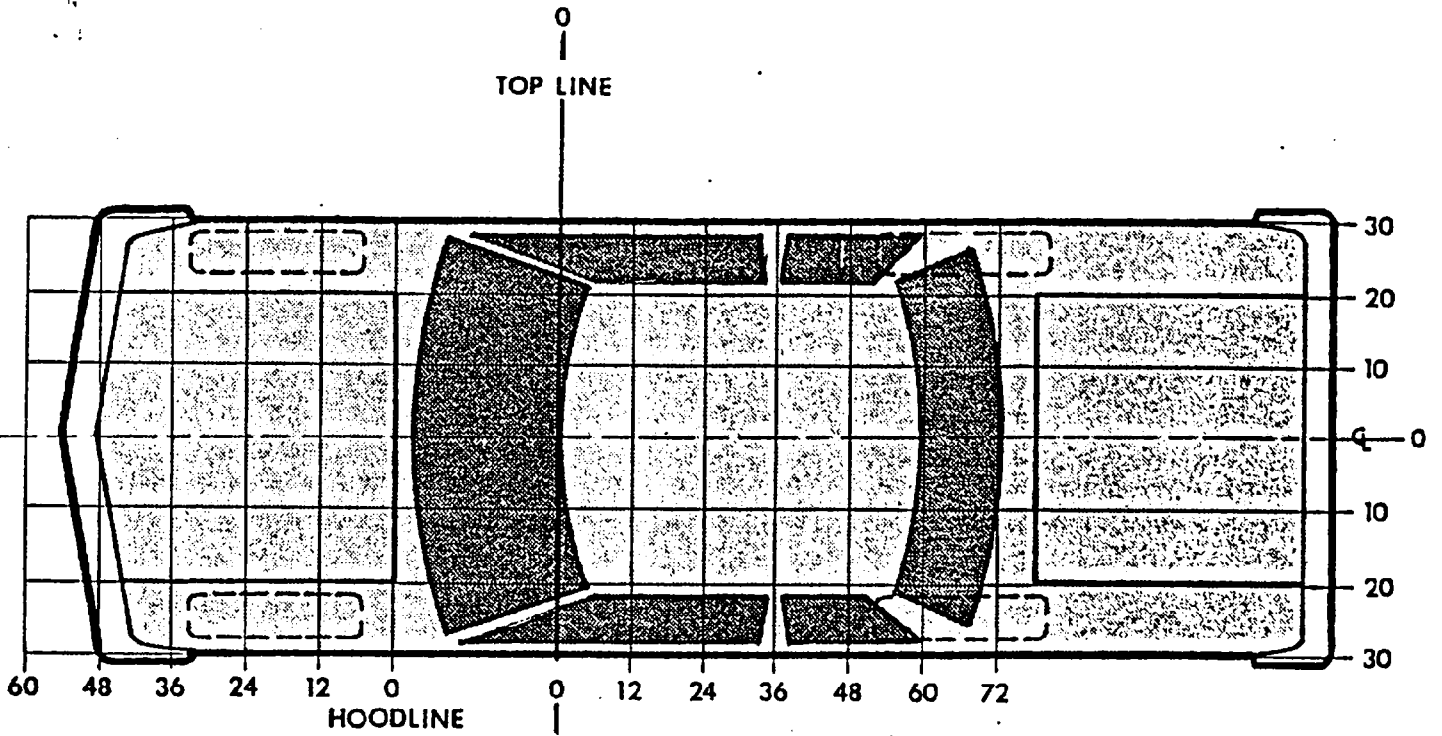
<u>DESCRIPTION OF PART</u>	<u>X DISTANCE, FT*</u>	<u>Y DISTANCE, FT*</u>
1989 Nissan Standard	122.5	4.5
Rear Glass Moulding	79.5	0.0

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

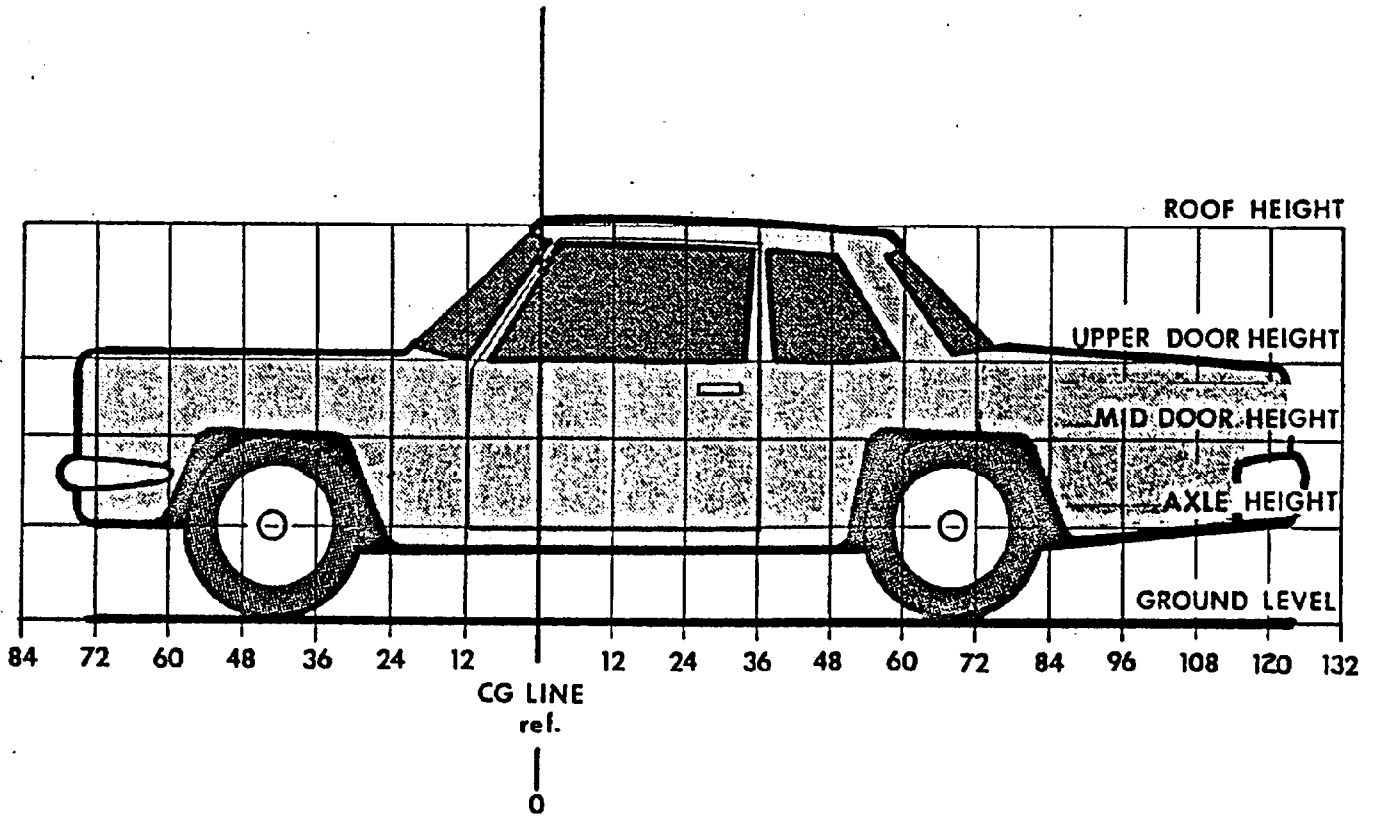
VEHICLE INTERIOR MEASUREMENTS

<u>DESCRIPTION</u>	<u>PRE</u>	<u>POST</u>	<u>DIFF</u>
Floor board to top of left "A" post	39.9	32.1	7.8
Floor board to top of right "A" post	40.4	31.0	9.4
Door sill to top of left "B" post	41.4	35.4	6.0
Door sill to top of right "B" post	41.8	37.8	4.0
Door sill to top of left door opening	43.2	33.1	10.1
Door sill to top of right door opening	42.2	30.2	12.0
Floor tunnel to windshield header	35.6	25.3	10.3
Floor tunnel to center of roof	39.1	24.0	15.1
Rear of floor tunnel to roof	41.1	28.6	12.5
Maximum width at "B" post	59.2	59.0	0.2
Maximum width at "A" post	54.2	55.0	-0.8
Maximum width at top of door opening	46.9	46.5	0.4

ALL MEASUREMENTS ARE IN INCHES .



HOOD AND ROOF STATIC CRUSH LOCATIONS



LEFT AND RIGHT SIDE STATIC CRUSH LOCATIONS

VEHICLE HOOD EXTERIOR PROFILES
ZERO DISTANCE AT VEHICLE HOOD CENTERLINE*

LOCATION	30	20	10	0	10	20	30
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)							
Trailing edge of cowl at centerline	X	41.5	41.9	42.4	42.2	41.9	X
Trailing edge of cowl + 12 inches	X	39.9	40.6	40.6	40.6	40.4	X
Trailing edge of cowl + 24 inches	X	38.1	38.2	38.2	38.4	38.1	X
Trailing edge of cowl + 36 inches	X	X	X	X	X	X	X
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE***)							
Trailing edge of cowl at centerline	X	42.1	41.6	41.4	40.9	40.0	X
Trailing edge of cowl + 12 inches	X	40.6	40.2	39.6	38.8	37.5	X
Trailing edge of cowl + 24 inches	X	38.8	38.3	37.4	36.2	35.1	X
Trailing edge of cowl + 36 inches	X	X	X	X	X	X	X
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

		STATIC CRUSH (IN.)					
Trailing edge of cowl at centerline	X	0.6	-0.3	-1.0	-1.3	-1.9	X
Trailing edge of cowl + 12 inches	X	0.7	-0.4	-1.0	-1.8	-2.9	X
Trailing edge of cowl + 24 inches	X	0.7	0.1	-0.8	-1.2	-3.0	X
Trailing edge of cowl + 36 inches	X	X	X	X	X	X	X
Trailing edge of cowl + 42 inches	X	X	X	X	X	X	X

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

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

+ Static crush means vehicle structure is bowed upward.

- Static crush means vehicle structure is crushed.

VEHICLE ROOF EXTERIOR PROFILES
ZERO DISTANCE AT VEHICLE ROOF CENTERLINE*

LOCATION	20	10	0	10	20
PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Longitudinal Center of Gravity	X	X	X	X	X
Longitudinal Center of Gravity + 12	61.6	62.5	62.3	61.9	61.1
Longitudinal Center of Gravity + 24	61.4	61.9	61.8	61.8	61.1
Longitudinal Center of Gravity + 36	60.0	60.9	61.1	60.9	60.1
Longitudinal Center of Gravity + 48	X	X	X	X	X
Longitudinal Center of Gravity + 60	X	X	X	X	X

POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)					
Longitudinal Center of Gravity	X	X	X	X	X
Longitudinal Center of Gravity + 12	51.2	50.6	49.7	48.0	51.5
Longitudinal Center of Gravity + 24	50.8	50.2	47.5	50.7	51.0
Longitudinal Center of Gravity + 36	49.8	48.5	49.4	48.5	47.2
Longitudinal Center of Gravity + 48	X	X	X	X	X
Longitudinal Center of Gravity + 60	X	X	X	X	X

STATIC CRUSH (IN)					
Longitudinal Center of Gravity	X	X	X	X	X
Longitudinal Center of Gravity + 12	-10.4	-11.9	-12.6	-13.9	-9.6
Longitudinal Center of Gravity + 24	-10.6	-11.7	-14.3	-11.1	-11.1
Longitudinal Center of Gravity + 36	-10.2	-12.4	-11.7	-12.4	-12.9
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
<u>PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>																
Roof Height	61.0	X	X	X	X	X	23.6	23.4	23.2	X	X	X	X	X	X	X
Upper Door	40.5	X	18.1	17.5	17.1	17.1	16.9	16.9	16.9	17.1	17.1	17.1	17.2	17.5	X	X
Mid Door	27.6	X	X	X	15.4	15.4	15.4	15.4	15.4	15.4	15.5	X	X	15.9	X	X
Axle Height	14.2	X	X	X	X	18.3	18.1	18.2	18.5	18.2	X	X	X	X	X	X
<u>POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>																
Roof Height	61.0	X	X	X	X	X	26.2	27.2	30.0	X	X	X	X	X	X	X
Upper Door	40.5	X	20.1	19.5	18.4	19.0	17.0	15.7	17.4	13.8	14.9	15.5	16.0	16.7	X	X
Mid Door	27.6	X	X	X	15.9	15.2	14.8	14.7	15.4	15.1	15.4	X	X	15.9	X	X
Axle Height	14.2	X	X	X	X	19.2	19.0	19.0	19.2	18.6	X	X	X	X	X	X
<u>STATIC CRUSH (IN)</u>																
Roof Height	61.0	X	X	X	X	X	4.6	3.8	6.8	X	X	X	X	X	X	X
Upper Door	40.5	X	2.0	2.0	1.3	1.9	0.1	-1.2	0.5	-3.1	-2.2	-1.6	-1.2	-0.8	X	X
Mid Door	27.6	X	X	X	0.5	-0.2	-0.6	-0.7	0.0	-0.4	-0.1	X	X	0.0	X	X
Axle Height	14.2	X	X	X	X	0.9	0.9	0.8	0.7	0.4	X	X	X	X	X	X

* Center of gravity is located 52.0 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 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
Roof Height	61.0	X	X	X	X	X	23.6	23.4	23.2	X	X	X	X	X	X	X
Upper Door	40.5	X	18.1	17.5	17.1	17.1	16.9	16.9	16.9	16.9	17.1	17.1	17.1	17.2	17.5	X
Mid Door	27.6	X	X	X	15.4	15.4	15.4	15.4	15.4	15.4	15.5	X	X	15.9	X	X
Axle Height	14.2	X	X	X	X	18.3	18.1	18.2	18.5	18.2	X	X	X	X	X	X
<u>PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>																
Roof Height	61.0	X	X	X	X	X	28.2	27.2	30.0	X	X	X	X	X	X	X
Upper Door	40.5	X	20.1	19.5	18.4	19.0	17.0	15.7	17.4	13.8	14.9	15.5	16.0	16.7	X	X
Mid Door	27.6	X	X	X	15.9	15.2	14.8	14.7	15.4	15.1	15.4	X	X	15.9	X	X
Axle Height	14.2	X	X	X	X	19.2	19.0	19.0	19.2	18.6	X	X	X	X	X	X
<u>POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)</u>																
Roof Height	61.0	X	X	X	X	X	4.6	3.8	6.8	X	X	X	X	X	X	X
Upper Door	40.5	X	2.0	2.0	1.3	1.9	0.1	-1.2	0.5	-3.1	-2.2	-1.6	-1.2	-0.8	X	X
Mid Door	27.6	X	X	X	0.5	-0.2	-0.6	-0.7	0.0	-0.4	-0.1	X	X	0.0	X	X
Axle Height	14.2	X	X	X	X	0.9	0.9	0.8	0.7	0.4	X	X	X	X	X	X
<u>STATIC CRUSH (IN)</u>																
Roof Height	61.0	X	X	X	X	X	4.6	3.8	6.8	X	X	X	X	X	X	X
Upper Door	40.5	X	2.0	2.0	1.3	1.9	0.1	-1.2	0.5	-3.1	-2.2	-1.6	-1.2	-0.8	X	X
Mid Door	27.6	X	X	X	0.5	-0.2	-0.6	-0.7	0.0	-0.4	-0.1	X	X	0.0	X	X
Axle Height	14.2	X	X	X	X	0.9	0.9	0.8	0.7	0.4	X	X	X	X	X	X

* Center of gravity is located 52.0 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.

TEST ANOMALIES

The Driver Shoulder Belt Displacement, SHBD1, potentiometer did not record data during test, cause unknown.

SECTION 3.0

GENERAL TEST AND VEHICLE PARAMETER DATA

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

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Nissan Motor Company, Ltd.

MAKE/MODEL: Nissan

VIN: 1N6ND11SXKC366837

BODY STYLE: Standard Pickup

MODEL YEAR: 1989

NHTSA NO.:

COLOR: Vail white

ENGINE DATA: TYPE: Inline CYLINDERS: 4 DISPLACEMENT: 145.8 CID

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

DATE VEHICLE RECEIVED: 5/27/89

ODOMETER READING: 54.7

DEALER'S NAME AND ADDRESS: NA

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	No	ANTI-SKID BRAKE	No
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: *

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

VEHICLE MANUFACTURED BY: Nissan Motor Company, Ltd.

DATE OF MANUFACTURE: 4/8/89

GVWR: 4400 LBS

GAWR: FRONT 2200 LBS.,

REAR 2544 LBS.

*The vehicle did not contain the rear bumper.

TEST VEHICLE INFORMATION CONT'D

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 26 psi; REAR 35 psi

RECOMMENDED TIRE SIZE: P195/75R14 LOAD RANGE B. C. D.

TIRES ON VEHICLE (MFR., LINE, SIZE): Firestone WR-12 P195/75R14MS

IS SPARE TIRE A "SPACE SAVER": Yes

IS SPARE TIRE STANDARD EQUIPMENT: Yes

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

TYPE OF FRONT SEAT BACKS: Non-adjustable

*NUMBER OF OCCUPANTS FRONT REAR TOTAL

*CARGO LOAD LBS. *TOTAL LBS.

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

RIGHT FRONT 769 lbs. RIGHT REAR 612 lbs.

LEFT FRONT 771 lbs. LEFT REAR 545 lbs.

TOTAL FRONT WEIGHT 1540 lbs. (57.1% OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1157 lbs. (42.9% OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 2697 lbs.

CALCULATION FOR TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT

UDW = UNLOADED DELIVERED WEIGHT (2697 LBS)

VCW = VEHICLE CAPACITY WEIGHT (LBS)*

DSC = DESIGNATED SEATING CAPACITY ()*

RCLW = 300 LBS*

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

= 2697 + 300 + 167 LBS

TARGET TEST WEIGHT = 3164 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 300 LBS. CARGO:

RIGHT FRONT	787 lbs.	RIGHT REAR	796 lbs.
LEFT FRONT	821 lbs.	LEFT REAR	760 lbs.
TOTAL FRONT WEIGHT	1608 lbs.	(50.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1556 lbs.	(49.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3164 lbs.		

WEIGHT OF BALLAST SECURED IN VEHICLE BEHIND EACH FRONT SEAT: 50 LBS.

COMPONENTS REMOVED TO MEET TARGET WEIGHT: None

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	LF 29.6	;RF 28.9	;LR 31.5	;RR 30.9
PRE-TEST ATTITUDE:	LF 28.8	;RF 20.3	;LR 29.8	;RR 29.2
POST-TEST ATTITUDE:	LF 30.6	;RF 26.4	;LR 28.8	;RR 29.8

WHEELBASE: 104.5 INCHES

CG = 52.0 INCHES REARWARD OF FRONT WHEEL CENTERLINE

VEHICLE REBOUND AND CRUSH (ALL DIMENSIONS IN INCHES):

OVERALL LENGTH OF TEST VEHICLE:	PRE-TEST:	L 172.2	;C 174.6	;R 172.4
	POST-TEST:	L 173.5	;C 175.2	;R 173.2
TOTAL CRUSH:	L	-1.3	;C -0.6	;R -0.8

TEST CONDITIONS

TEST NUMBER: 890530
DATE OF TEST: 5/30/89 TIME OF TEST: 1700
WIND VELOCITY: NA HUMIDITY: NA
AMBIENT TEMPERATURE AT IMPACT AREA: 86°F
TEMPERATURE IN OCCUPANT COMPARTMENT: 80°F
DRIVER DUMMY TEMPERATURE: 72°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3164	3164
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:					
SERIAL NO:		Part 572E			
INSTRUMENTATION:		177			
HEAD ACCEL.:		3			
NECK L.C.'C.:		6			
CHEST ACCEL.:		3			
PELVIS ACCEL.:		3			
CHEST DISPLACEMENT		1			
POTENTIOMETER:					
RESTRAINT SYSTEM:		3-point unbelt			

REMARKS:

*AS MEASURED CLOCKWISE FROM THE DIRECTION OF TRAVEL.

**AS MEASURED FROM THE HORIZONTAL.

TEST NUMBER 890530

VEHICLE DATA SUMMARY

No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	SEC	MAX	SEC
1 SHOULDER BELT DISPLACEMENT (in) LONGITUDINAL	0.0	0.0 Y	0.0	0.0 Y
2 CENTER OF GRAVITY (g)				
LONGITUDINAL	4.8	1.6	11.0	1.5
LATERAL	12.9	1.5	8.7	1.5
VERTICAL	17.9	1.5	16.5	1.5
RESULTANT	19.0	1.5		
3 CENTER OF GRAVITY (deg/sec) ANGULAR VELOCITY				
ROLL (about the X AXIS)	89.4	2.6	408.7	1.6
PITCH (about the Y AXIS)	116.9	1.5	117.8	1.6
YAW (about the Z AXIS)	56.9	1.5	37.1	1.6
4 LEFT FRONT SUSPENSION (in) VERTICAL	2.0	1.6	3.1	1.6
5 RIGHT FRONT SUSPENSION (in) VERTICAL	0.3	0.8	6.2	1.7
6 LEFT REAR SUSPENSION (in) VERTICAL	1.2	1.7	5.7	1.5
7 RIGHT REAR SUSPENSION (in) VERTICAL	0.4	0.8	4.9	1.8

REFERENCE: X: + FORWARD FROM REAR BUMPER
 Y: + LEFTWARD FROM VEHICLE CENTERLINE
 Z: + UPWARD FROM GROUND LEVEL
 ROLL: + TO RIGHT
 PITCH: + NOSE DOWNWARD
 YAW: + COUNTER CLOCKWISE
 DISPLACEMENT: + OUTWARD

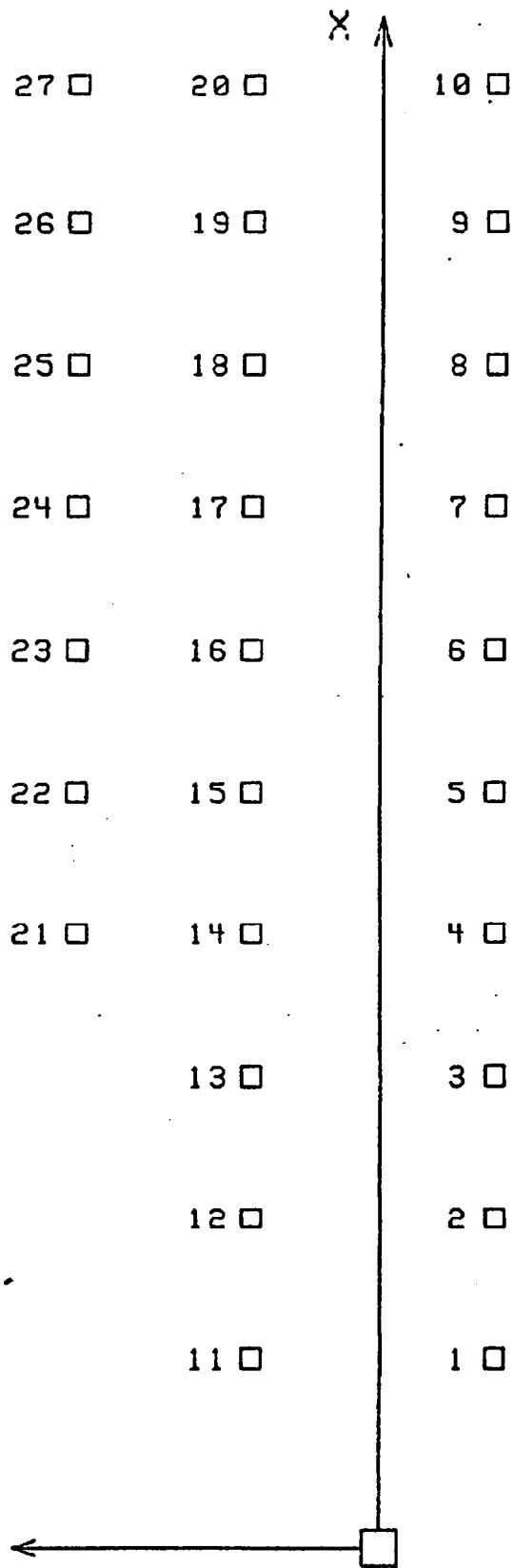
γ See TEST ANOMALIES

IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: 1989 Nissan Standard Bed Pickup Truck TEST NUMBER: 890530

DIMENSIONS IN INCHES

NO.	TYPE OF MEASUREMENT	DIMENSIONS IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	174.6	175.2	-0.6
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	157.8	156.5	1.3
X3	REAR SURFACE OF VEHICLE TO FIREWALL	136.8	135.2	1.6
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	127.8	124.8	3.0
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	127.8	126.8	1.0
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	126.2	125.8	-0.4
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	126.4	126.5	-0.1
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	82.5	79.2	3.3
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	82.5	81.0	1.5
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	81.6	81.2	0.4
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	81.5	81.8	-0.3
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	125.4	124.6	0.8
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	125.1	125.5	-0.4
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	137.4	134.5	2.9
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	137.2	135.2	2.0
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	109.6	114.9	-5.3
X17	CENTER OF STEERING COLUMN TO "A" POST	12.7	14.5	-1.8
X18	CENTER OF STEERING COLUMN TO HEADLINING	17.8	9.9	7.9
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	172.4	173.2	-0.8
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	172.2	173.5	-1.3
X21	LENGTH OF ENGINE BLOCK	19.5	19.5	0.0



STADIA POLE LAYOUT AND NUMBERING SYSTEM

STADIA POLE LOCATIONS

<u>POLE NO.</u>	<u>X DISTANCE, FT. *</u>	<u>Y DISTANCE, FT. *</u>
1	38.0	-6.0
2	46.0	-6.0
3	54.0	-6.0
4	62.0	-6.0
5	70.0	-6.0
6	78.0	-6.0
7	86.0	-6.0
8	94.0	-6.0
9	102.0	-6.0
10	110.0	-6.0
11	38.0	8.0
12	46.0	8.0
13	54.0	8.0
14	62.0	8.0
15	70.0	8.0
16	78.0	8.0
17	86.0	8.0
18	94.0	8.0
19	102.0	8.0
20	110.0	8.0
21	62.0	18.0
22	70.0	18.0
23	78.0	18.0
24	86.0	18.0
25	94.0	18.0
26	102.0	18.0
27	110.0	18.0

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

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right panning	Kodak	25	24	Real Time Documentation
2	Right wide	Photosonic 1B	25	495	Vehicle Kinematics
3	Right angle	Photosonic 1B	25	485	Vehicle Kinematics
4	Front wide	Photosonic 1B	25	500	Vehicle Kinematics
5	Onboard - floor	Photosonic 1B	8	493	Dummy Kinematics
6	Onboard - rear	Photosonic 1B	8	500	Dummy Kinematics
7	Documentary	Beaulieu	12-120	24	Pre-test & Post-test Documentation

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	X* (ft.)	Y* (ft.)	Z* (ft.)
2	144.8	-297.0	3.6
3	202.2	-121.9	4.9
4	260.2	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 #177	PASSENGER *
Head	<u>Left side headliner and roof</u>	<u>NA</u>
Chest	<u>Left door panel</u>	<u>NA</u>
Abdomen	<u>None</u>	<u>NA</u>
Left knee	<u>None</u>	<u>NA</u>
Right knee	<u>None</u>	<u>NA</u>

DOOR OPENING:

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

SEAT MOVEMENT:

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

GLAZING DAMAGE:

Rear window glass was shattered upon impact. The windshield was cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

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

DUMMY KINEMATIC SUMMARY

Driver Dummy

Upon the vehicle's impact with the ground, the driver dummy's head struck the left side headliner and the roof and the dummy's left side of the upper torso impacted the left door panel. As the vehicle rolled onto its roof, the dummy's head remained in contact with the roof and the dummy's upper torso remained near the left door. The vehicle came to rest on its top with the driver dummy's head resting against the roof and the dummy's torso restrained by the three-point unbelt.

DUMMY DATA SUMMARY

TEST NUMBER 890530

DRIVER DUMMY

SN: 115

	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	SEC	MAX	SEC
HEAD ACCELERATION (g)				
LONGITUDINAL	7.3	1.5	24.3	1.5
LATERAL	13.9	1.5	50.1	1.5
VERTICAL	7.0	1.5	31.3	1.6
RESULTANT	54.2	1.5		
HIC	155.7 FROM 1448 TO 1459			
NECK FORCES (lbs)				
LONGITUDINAL	66.1	0.0	362.5	1.5
LATERAL	51.2	0.0	244.6	1.5
VERTICAL	68.2	1.5	1156.8	2.7
NECK MOMENT (ft-lbs)				
ABOUT LONG.	38.1	1.7	104.5	1.5
ABOUT LATERAL	45.1	2.7	21.3	1.5
ABOUT VERTICAL	32.0	1.5	9.2	1.6
CHEST ACCELERATION (g)				
LONGITUDINAL	5.9	1.6	13.5	1.5
LATERAL	5.0	1.8	15.0	1.5
VERTICAL	4.8	2.8	18.0	1.5
RESULTANT	19.4	1.5		
3 MSEC	17.0 FROM 1526 TO 1529			
CHEST DISPLACEMENT (in)				
LONGITUDINAL	0.1	2.7	0.1	1.5
PELVIS ACCELERATION (g)				
LONGITUDINAL	6.2	1.6	18.6	1.5
LATERAL	6.7	2.0	14.6	1.6
VERTICAL	3.7	1.6	15.0	1.5
RESULTANT	18.9	1.5		

See Appendix D for sign convention.

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, 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 fixed. The dummy was positioned in the seat using NHTSA's Notice #45 seating procedure. The H-point location of seat was obtained by using the SAE J826 H-point machine as specified in the Notice #45. The driver dummy was restrained with a three-point unbelt.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

MFR./MAKE/MODEL: Nissan Pick-up Truck

SEAT TYPE: X Bench
 _____ Bucket
 _____ Split bench

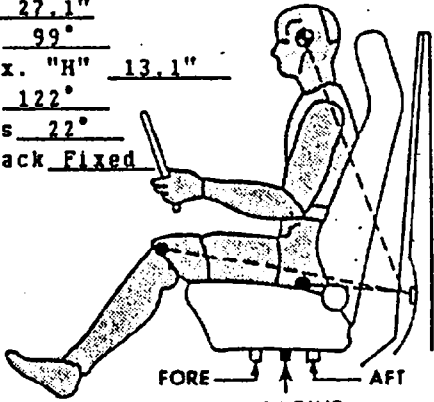
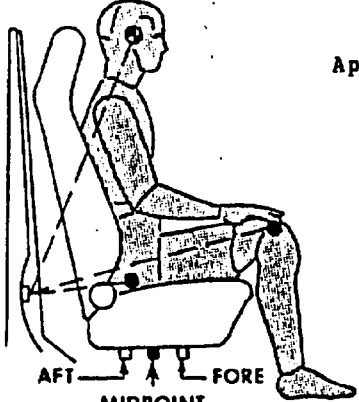
ADJUSTER TYPE: X Manual
 _____ Power
 _____ Non-adjustable

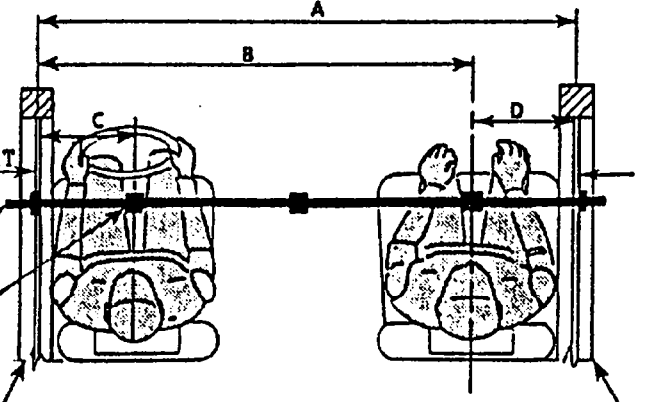
BUCKET SEAT BACK TYPE: X Non-adjustable
 _____ Adjustable reclining

TECHNICIANS:
 1. D. Carpenter
 2. B. Fishbaugh
 3. B. Miller
 4. _____

POSITIONING DATE: 5/30/89

AMBIENT TEMP. 86°F TIME: 1320

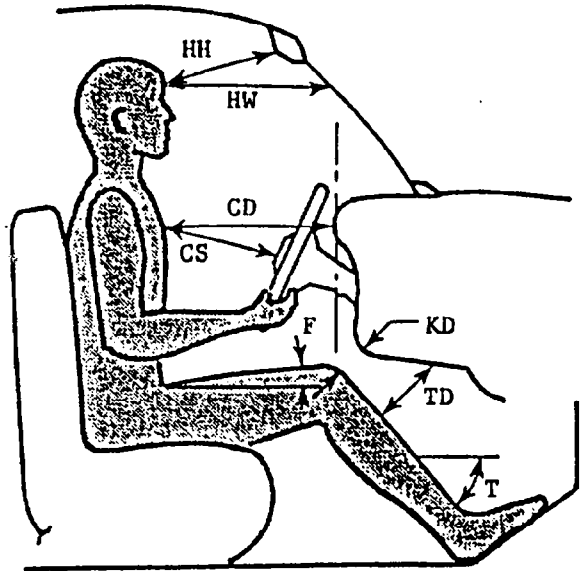
<p>DRIVER DUMMY #177 TYPE <u>HIII</u></p> <p>Head <u>21.1"</u> Target <u>26°</u> Knee <u>27.1"</u> Joint <u>99°</u> Approx. "H" <u>13.1"</u> Point <u>122°</u> Pelvis <u>22°</u> Seatback <u>Fixed</u></p>  <p style="text-align: center;">FORE AFT MIDPOINT</p>	<p>PASSENGER DUMMY #NA</p> <p>Head _____ Target _____ Knee _____ Joint _____ Approx. "H" _____ Point _____ Pelvis _____ Seatback _____</p>  <p style="text-align: center;">AFT FORE MIDPOINT</p>
---	--

<p>A = <u>55.1"</u> B = <u>NA</u> C = <u>13.2</u> D = <u>NA</u> DOOR GLASS HEIGHT <u>8.5"</u> LATERAL BAR ADJUSTABLE POINTER</p>	 <p style="text-align: center;">LEFT FRONT DOOR DRIVER DUMMY PASSENGER DUMMY RIGHT FRONT DOOR</p>	<p>DOOR GLASS HEIGHT <u>NA</u></p>
--	--	------------------------------------

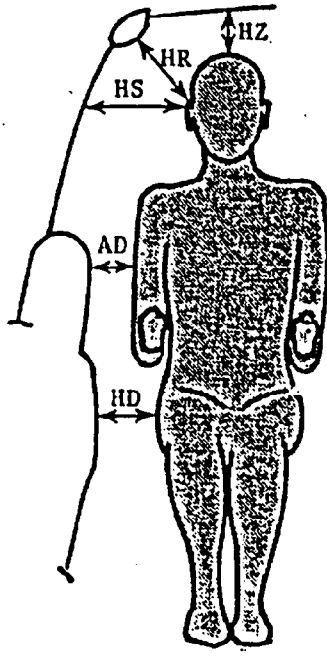
*Dummy measurements are referenced to top of striker bolt and all angles are referenced to vertical.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

	DRIVER	PASSENGER
	177	NA
HH	14.6	
HW	21.8	
CD	21.8	
CS	11.2	
KDL	5.9	
KDR	6.4	
FL	18°	
FR	15°	
TDL	4.8	
TDR	4.9	
TL	34°	
TR	36°	



	DRIVER	PASSENGER
HR	8.7	
HS	10.5	
AD	3.4	
HD	6.2	
HZ	5.2	



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

APPENDIX A
PHOTOGRAPHS

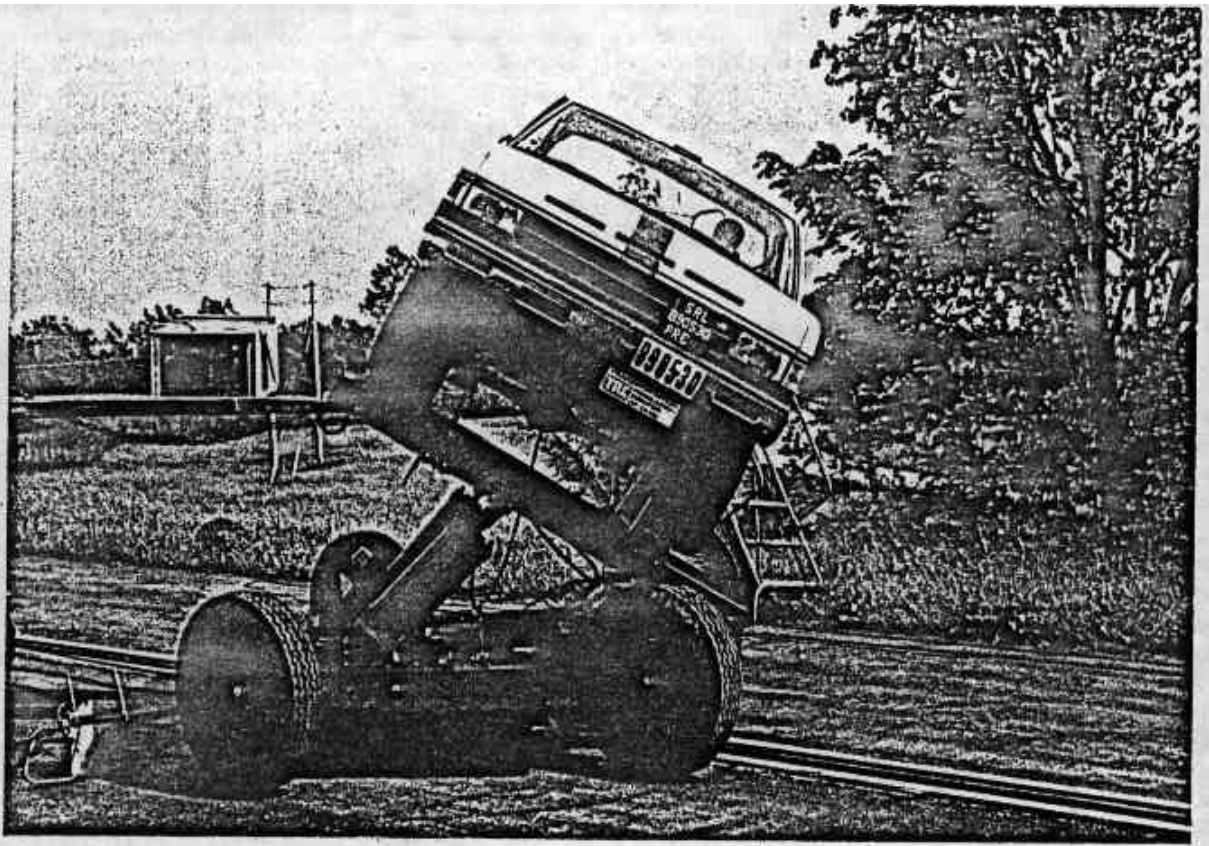


Figure A-1. PRE-TEST OVERALL FRONT VIEW



Figure A-2. PRE-TEST OVERALL LEFT VIEW



Figure A-3. PRE-TEST OVERALL REAR VIEW



Figure A-4. PRE-TEST OVERALL RIGHT VIEW



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

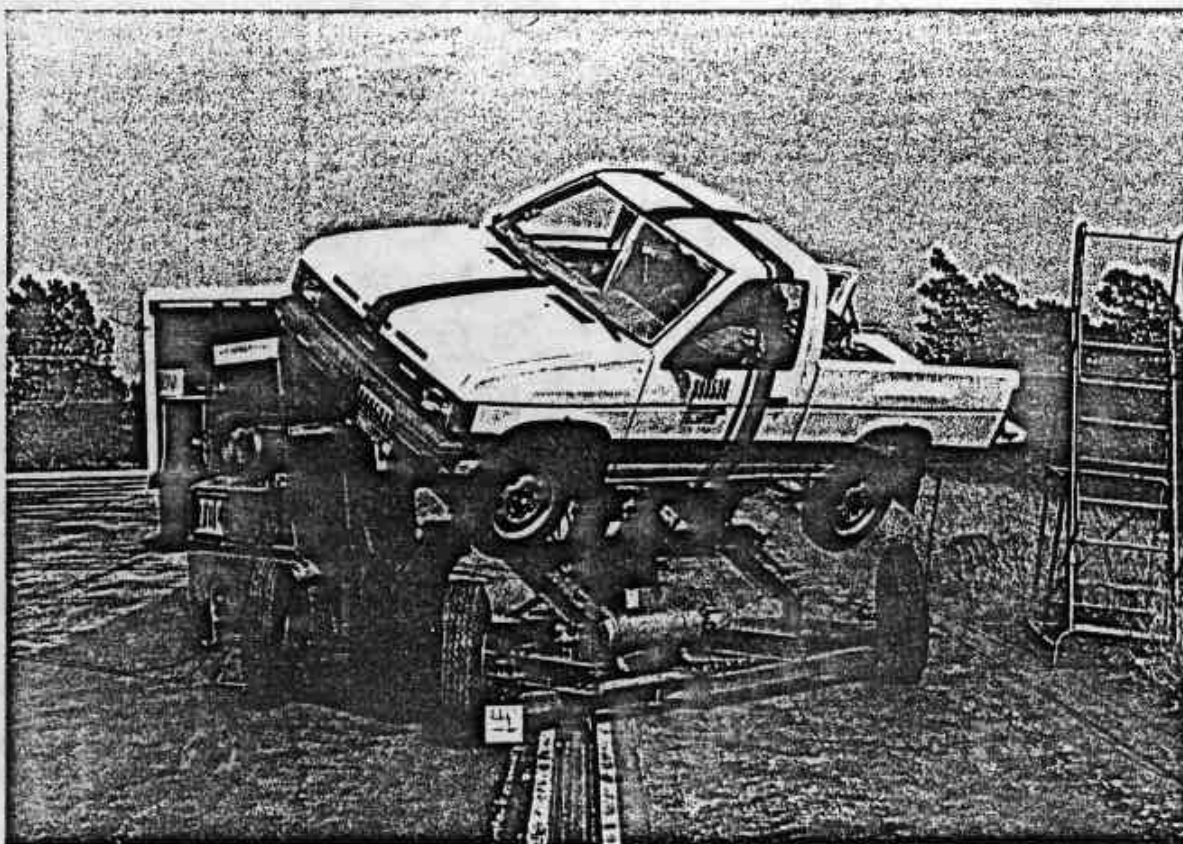


Figure A-6. PRE-TEST LEFT FRONT VIEW



Figure A-7. PRE-TEST DRIVER DUMMY - VIEW 1

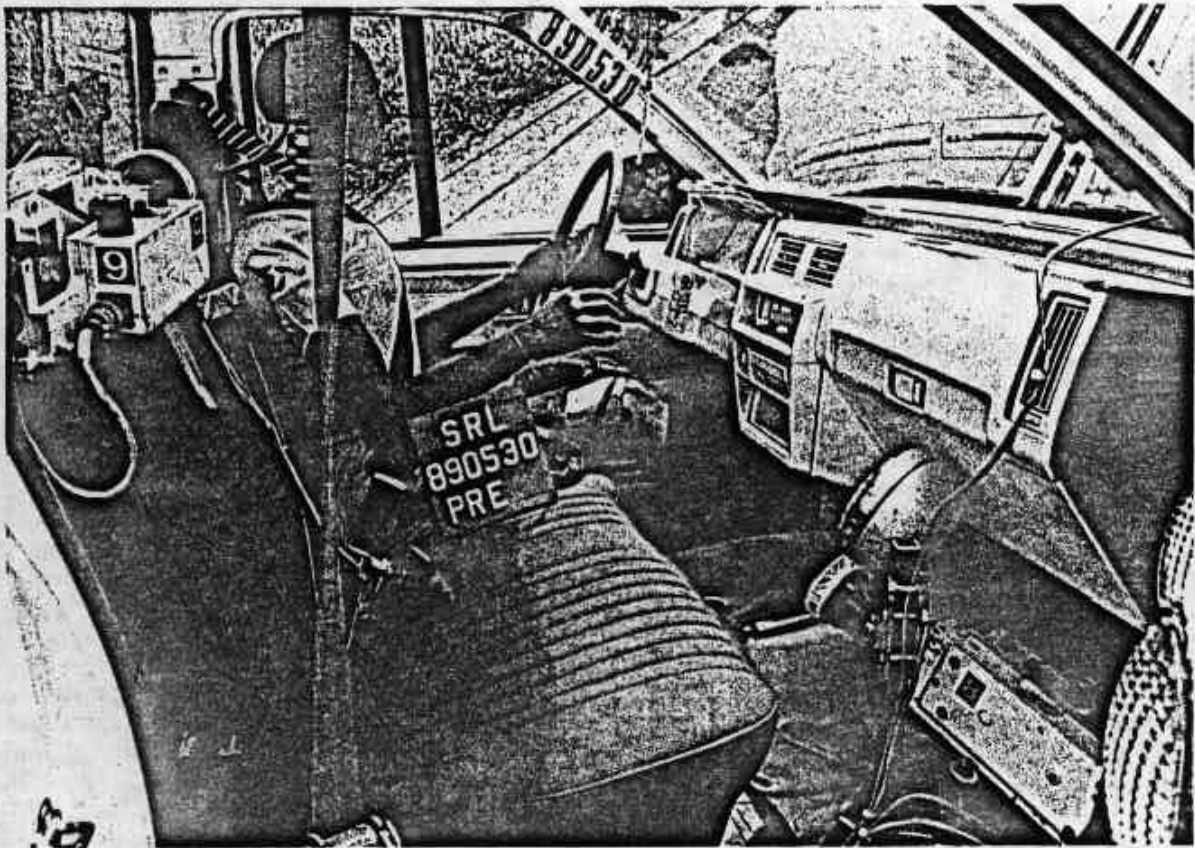


Figure A-8. PRE-TEST DRIVER DUMMY - VIEW 2



Figure A-9. PRE-TEST LEFT FRONT SUSPENSION STRING POTENTIOMETER - VIEW 1



Figure A-10. PRE-TEST LEFT FRONT SUSPENSION STRING POTENTIOMETER - VIEW 2

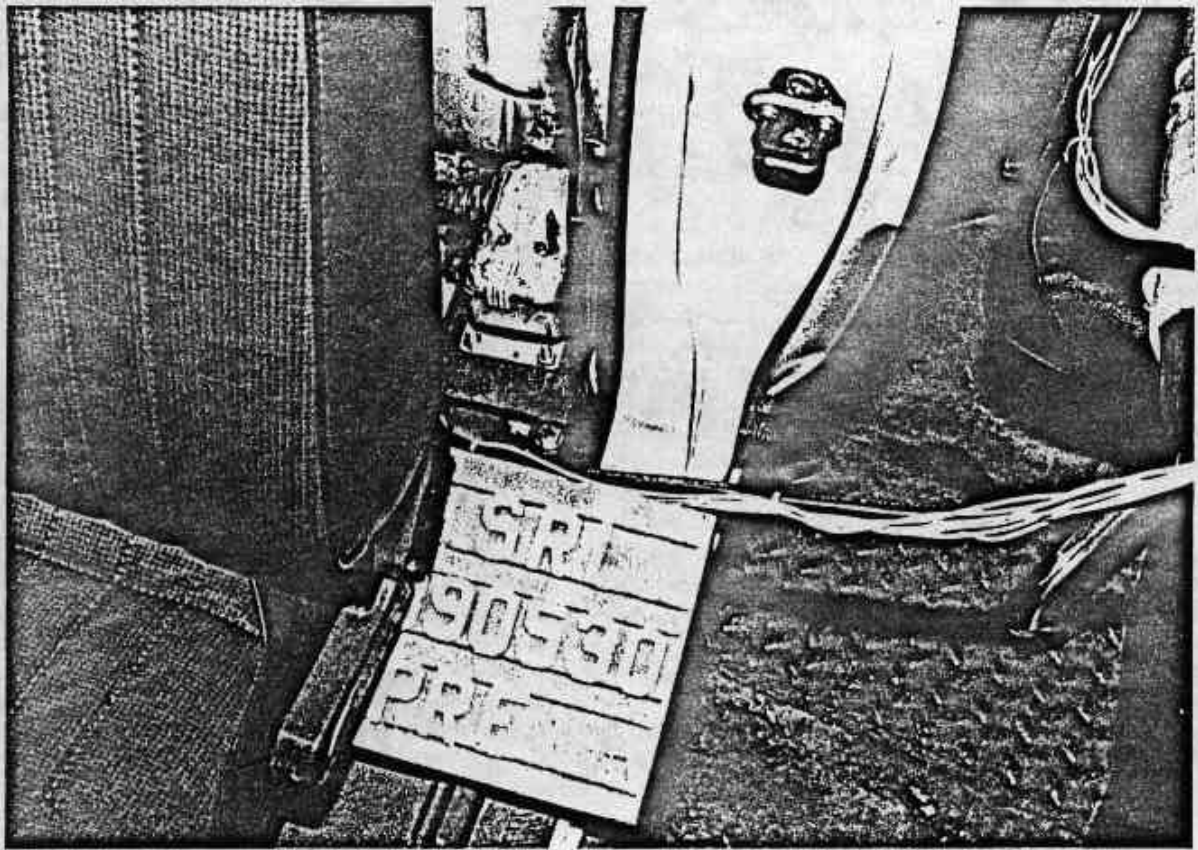


Figure A-17. PRE-TEST LEFT REAR SEAT SUSPENSION STRING POTENTIOMETER VIEW

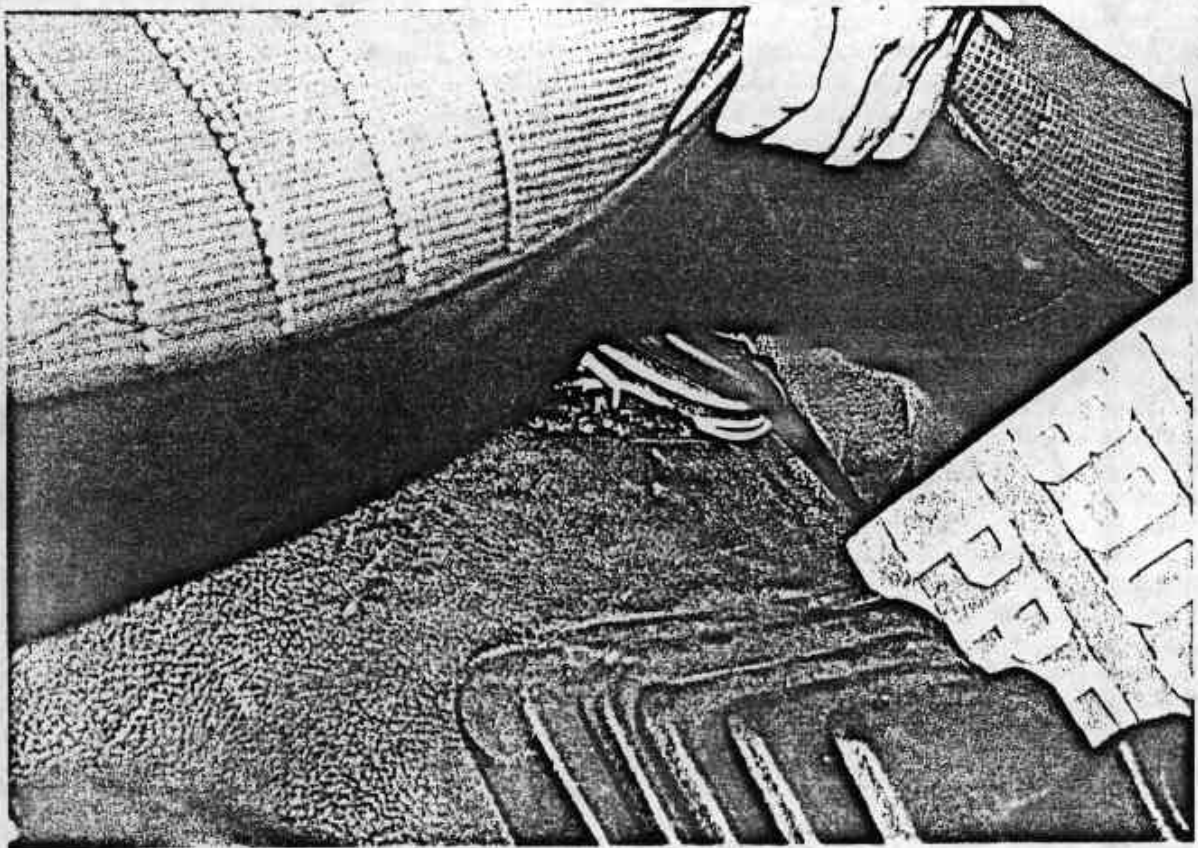


Figure A-18. PRE-TEST VEHICLE CENTER OF GRAVITY ACCELEROMETER PLACEMENT VIEW

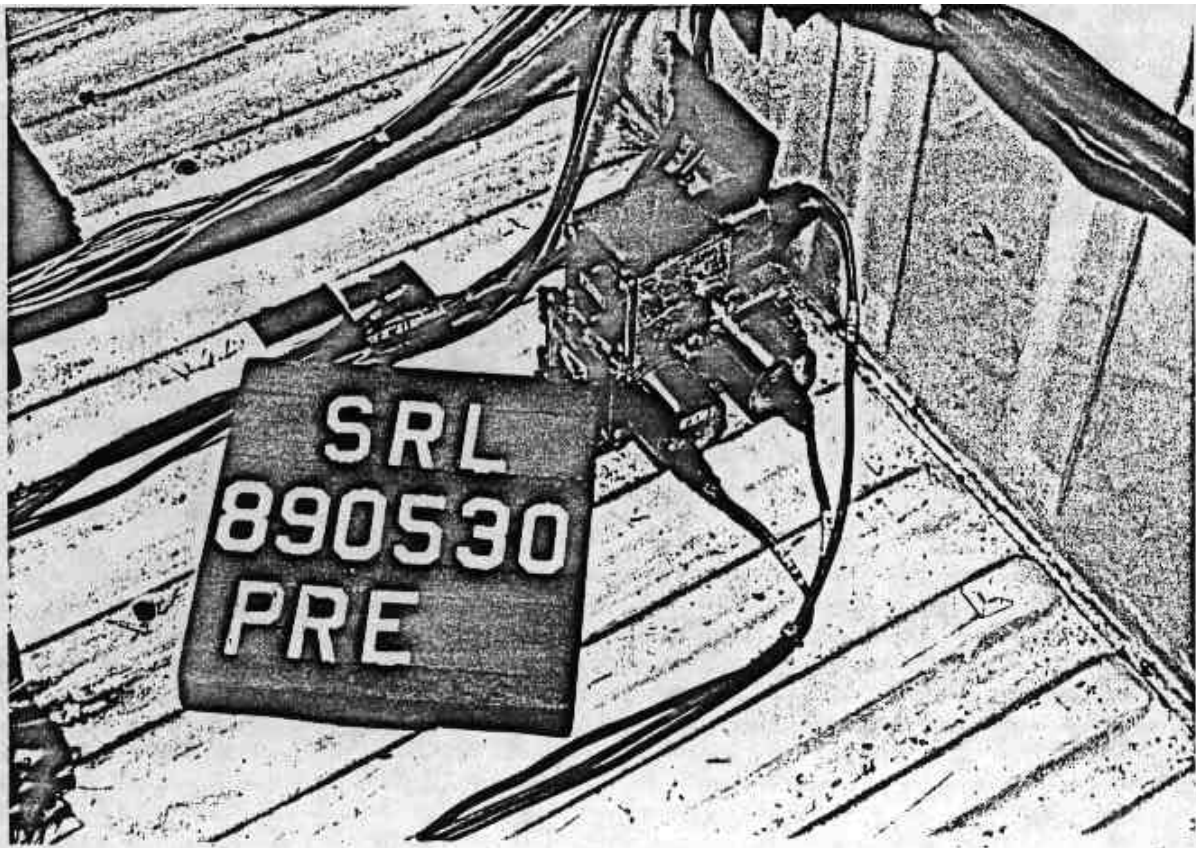


Figure A-19. PRE-TEST GRYO PLACEMENT VIEW

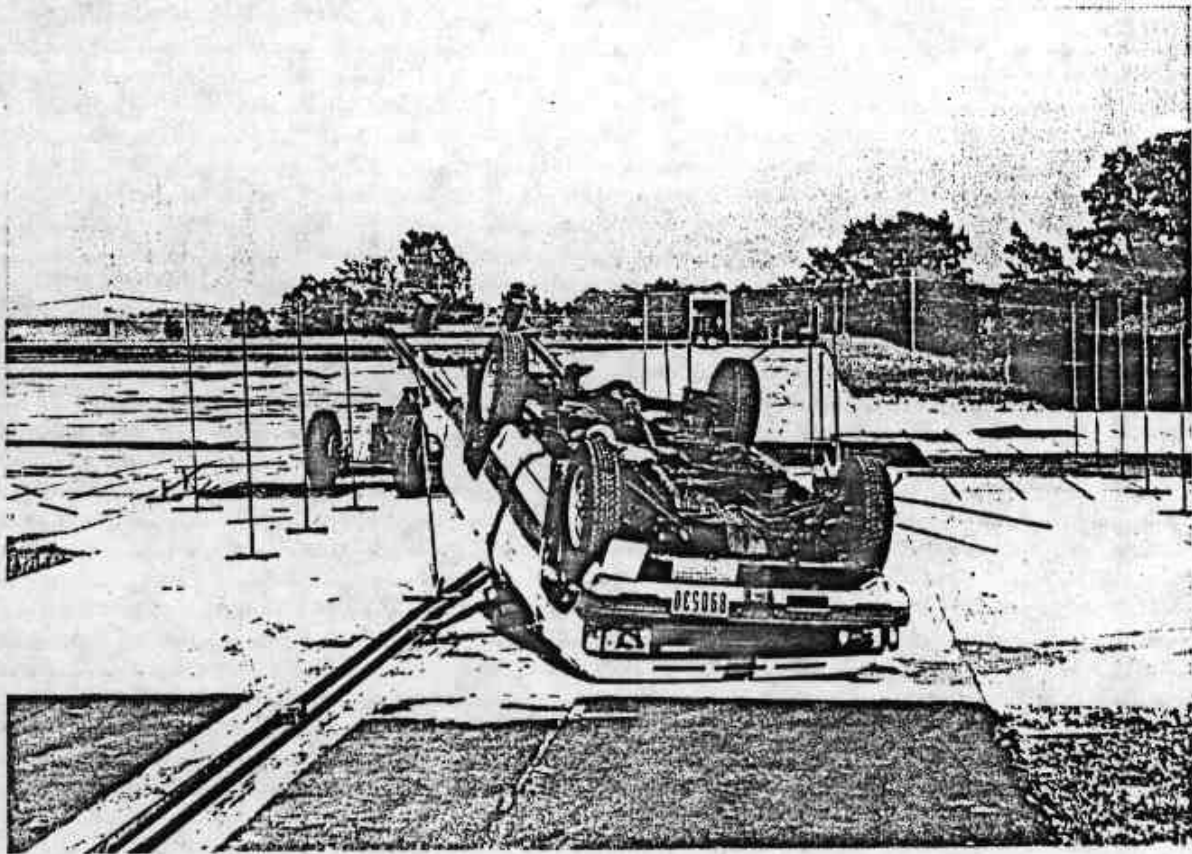


Figure A-20. POST-TEST OVERALL FRONT - VIEW 1



Figure A-21. POST-TEST OVERALL FRONT - VIEW 2

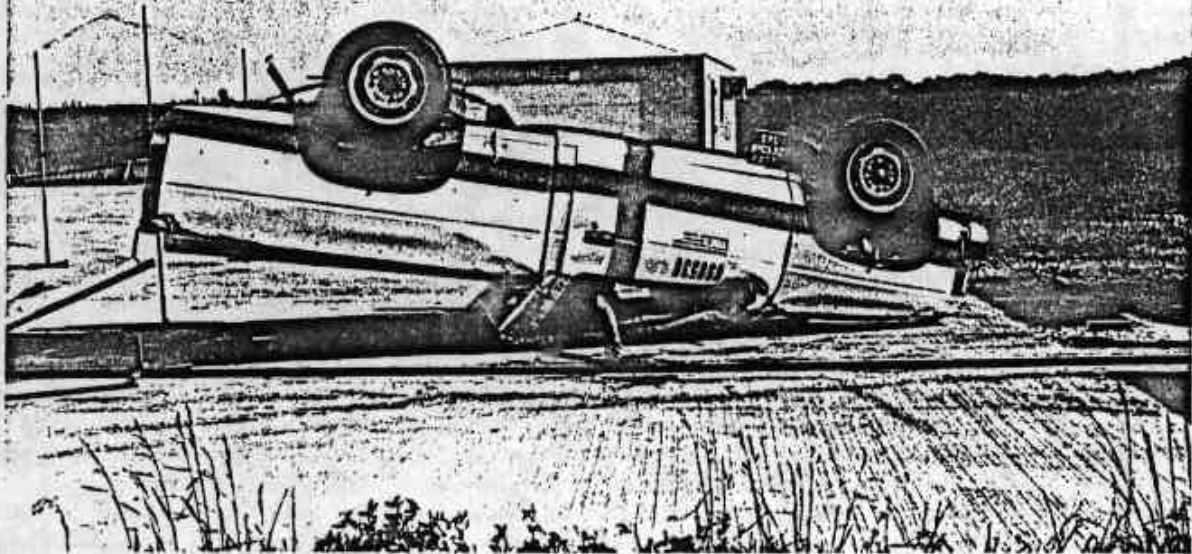


Figure A-22. POST-TEST OVERALL LEFT - VIEW 1

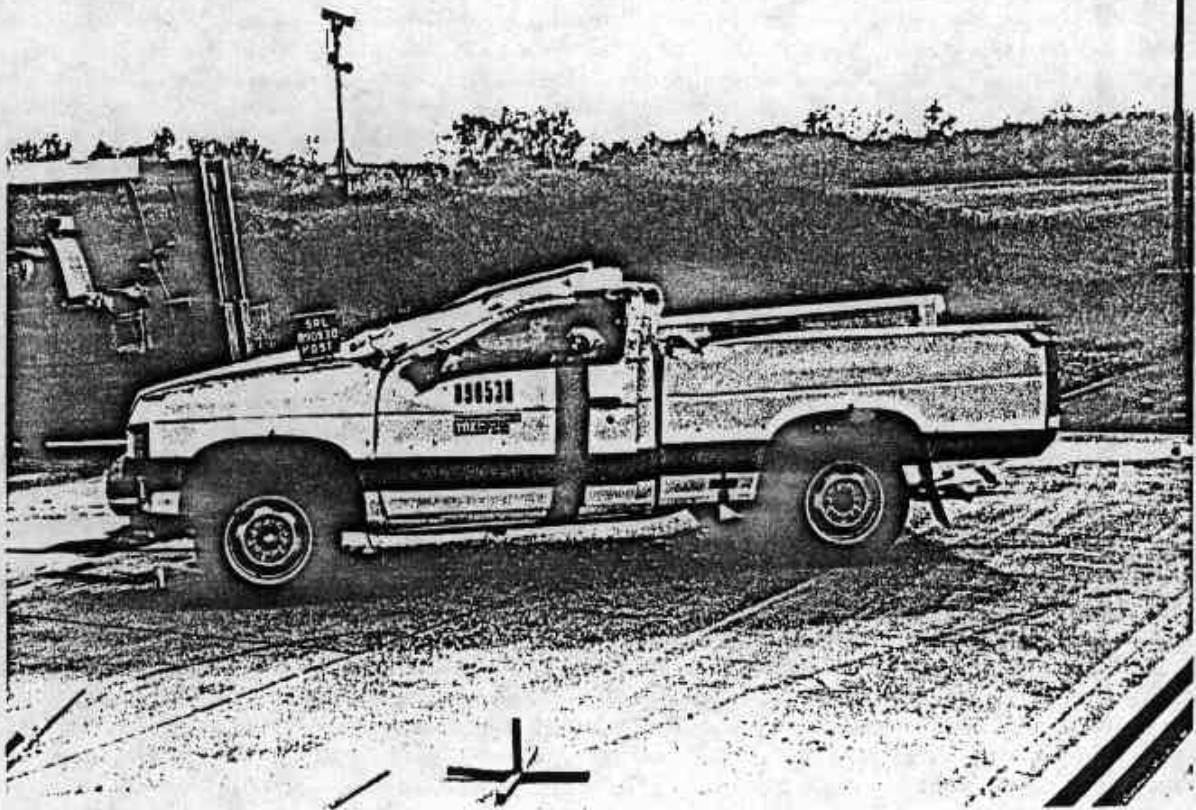


Figure A-23. POST-TEST OVERALL LEFT - VIEW 2

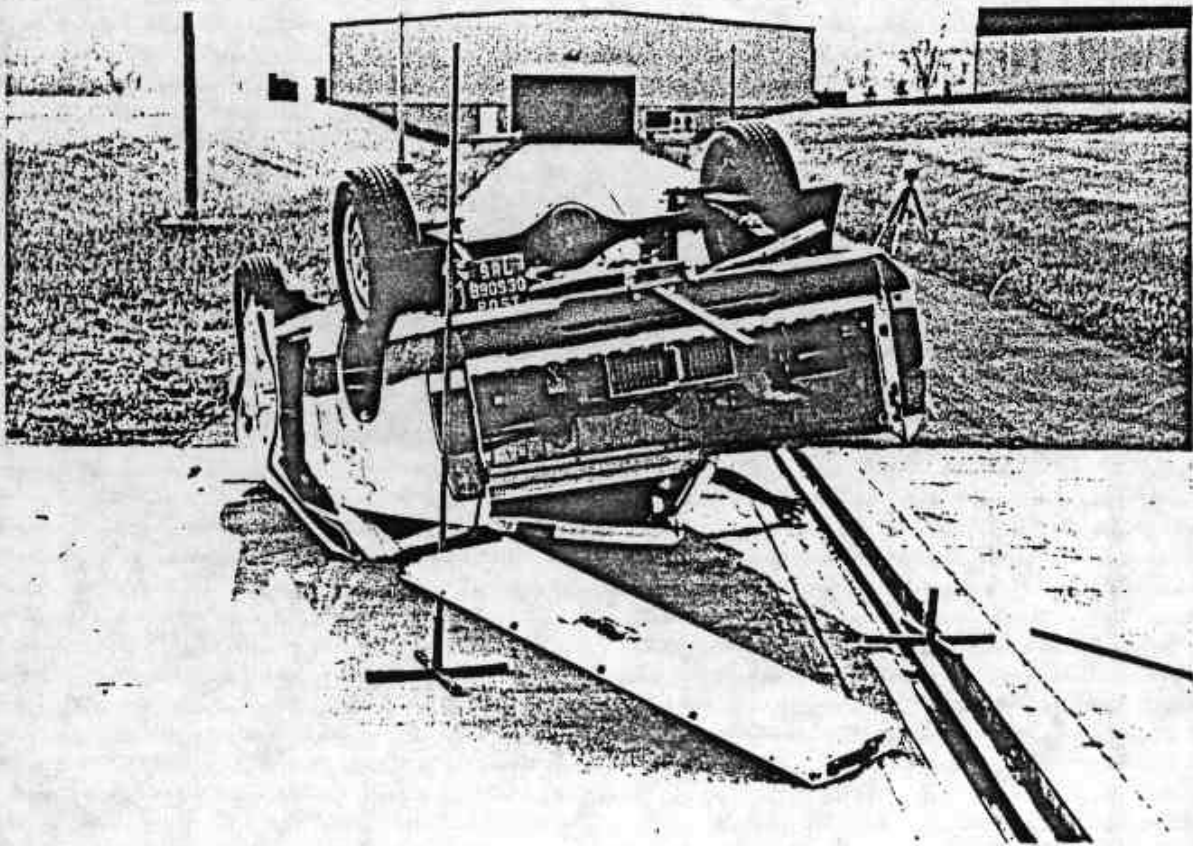


Figure A-24. POST-TEST OVERALL REAR - VIEW 1

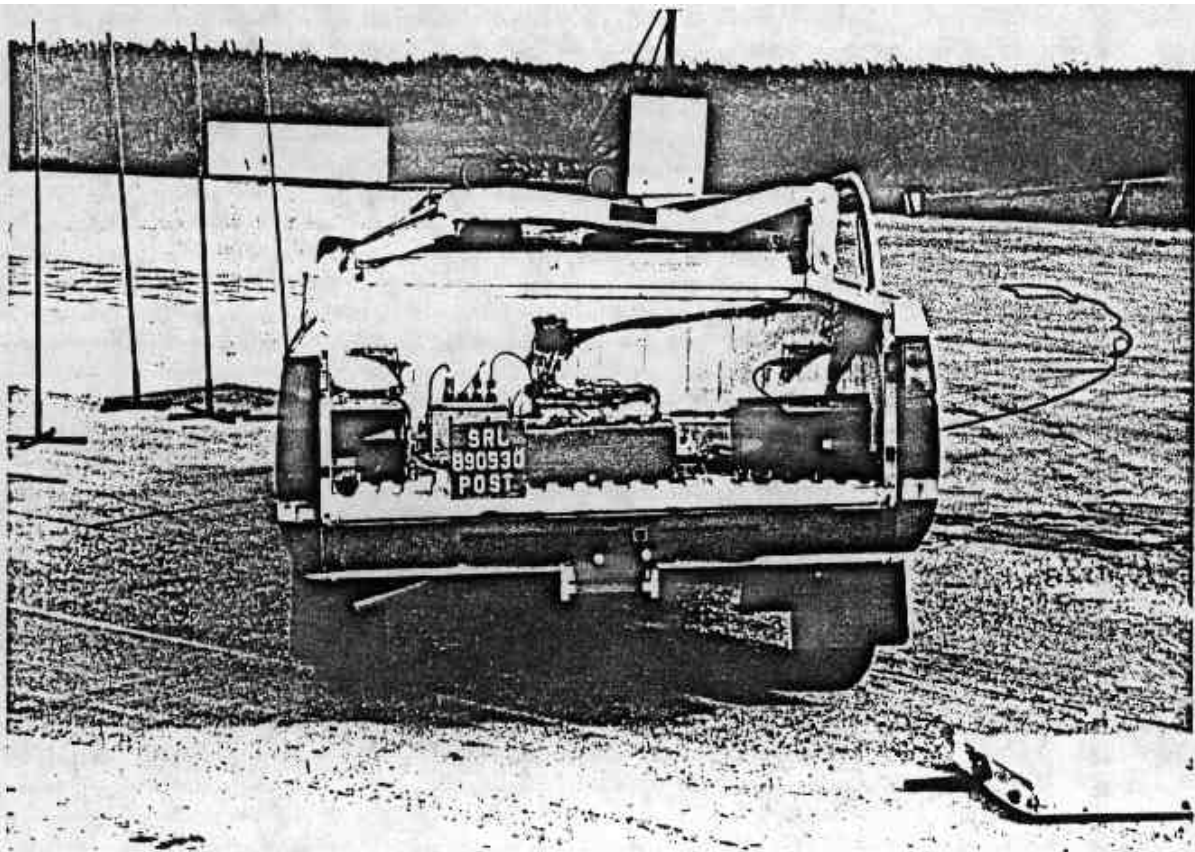


Figure A-25. POST-TEST OVERALL REAR - VIEW 2

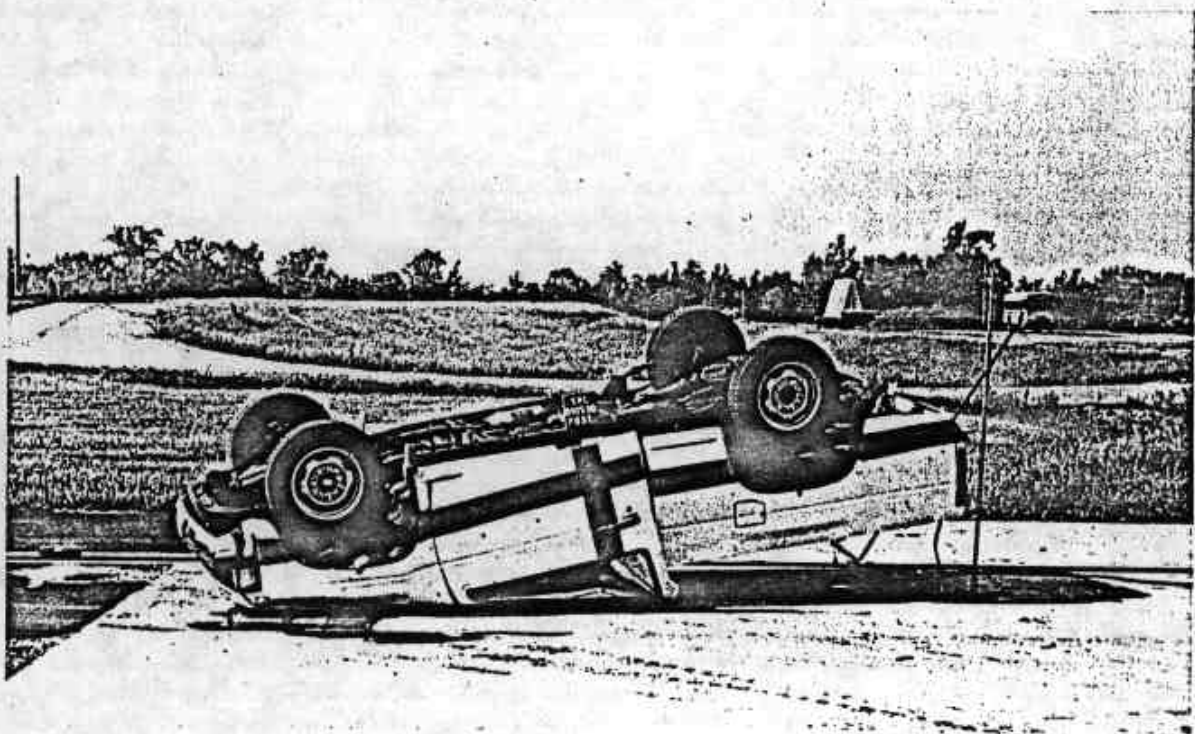


Figure A-26. POST-TEST OVERALL RIGHT - VIEW 1

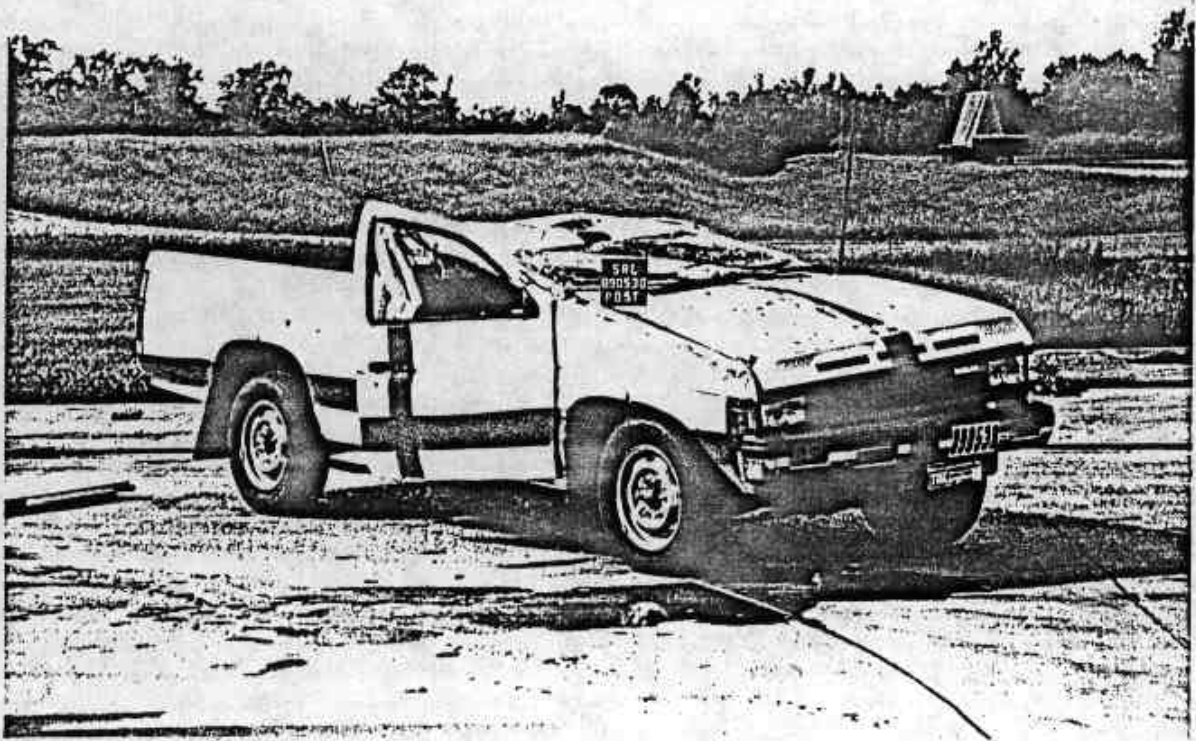


Figure A-27. POST-TEST OVERALL RIGHT - VIEW 2



Figure A-28. POST-TEST DUMMY AND VEHICLE - VIEW 1

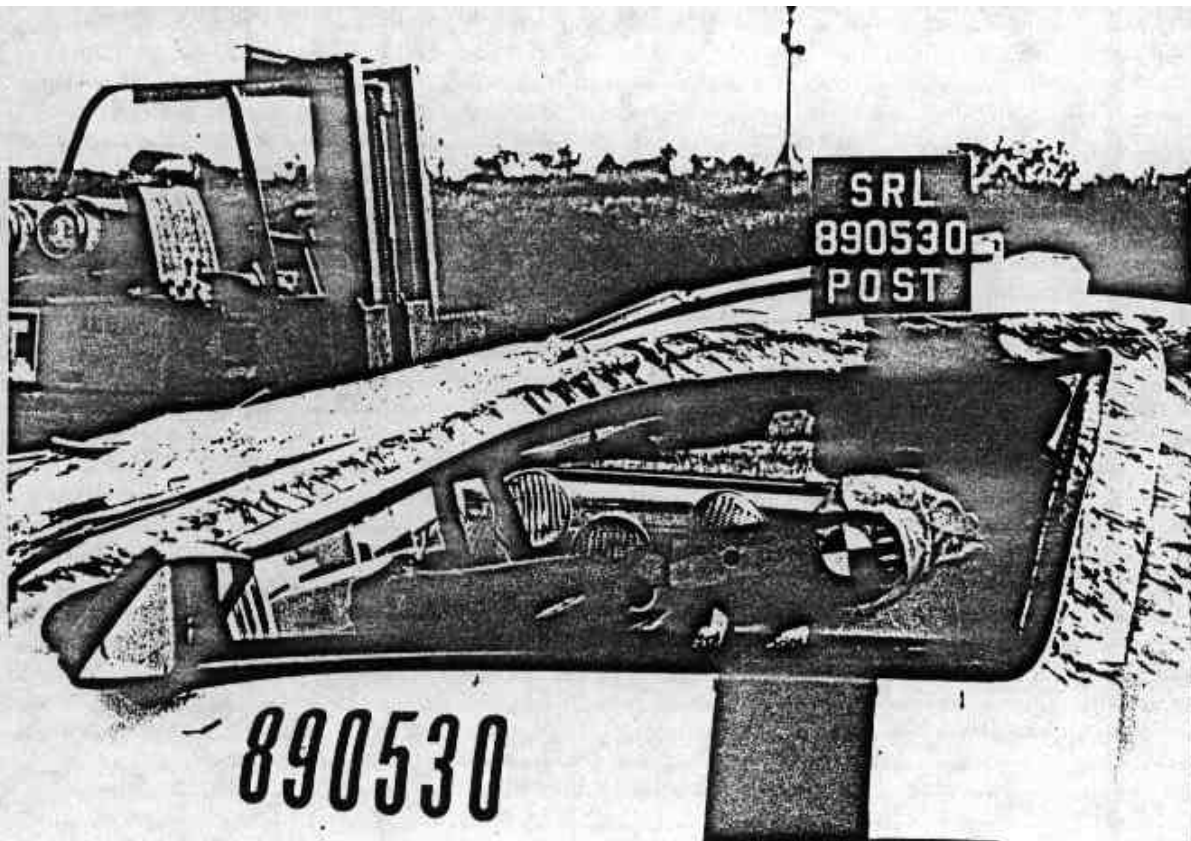


Figure A-29. POST-TEST DUMMY AND VEHICLE - VIEW 2

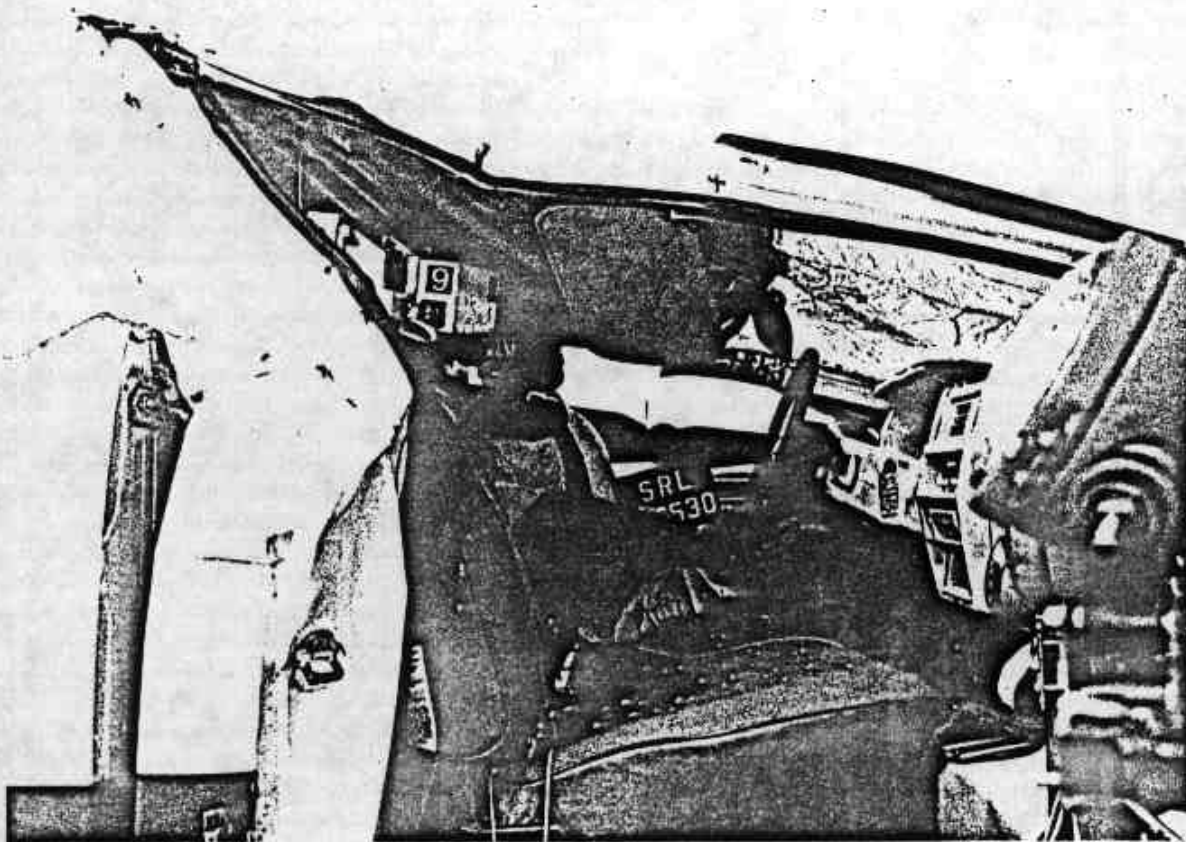


Figure A-30. POST-TEST DUMMY AND VEHICLE - VIEW 3

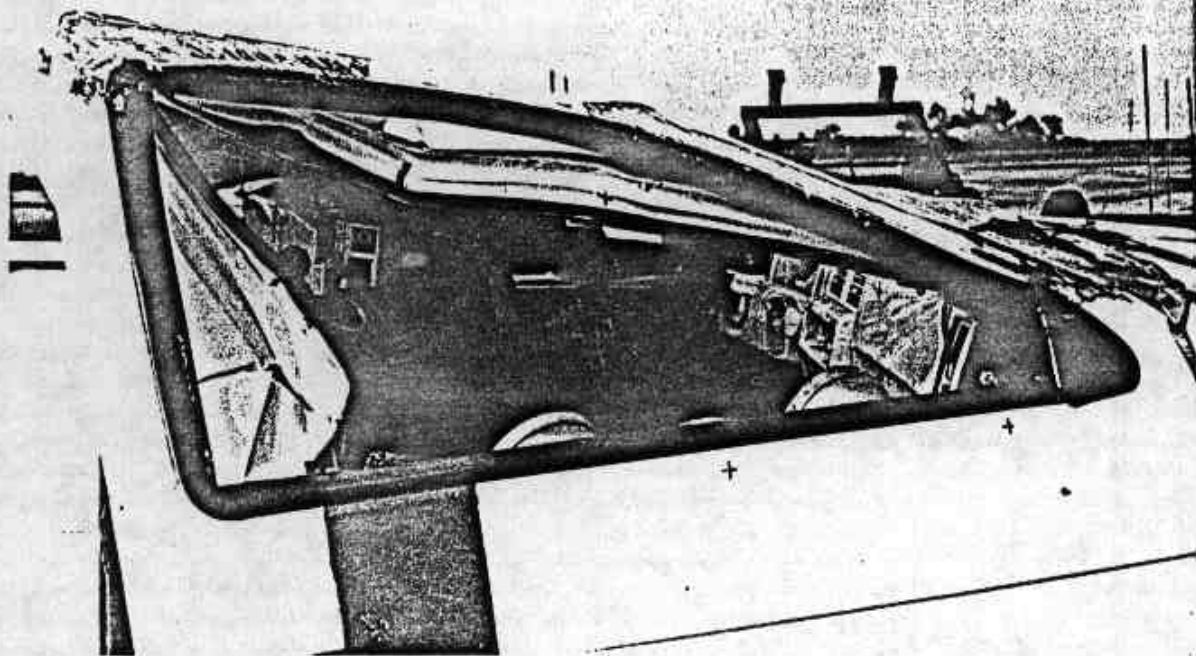


Figure A-31. POST-TEST RIGHT WINDOW CLOSE-UP VIEW

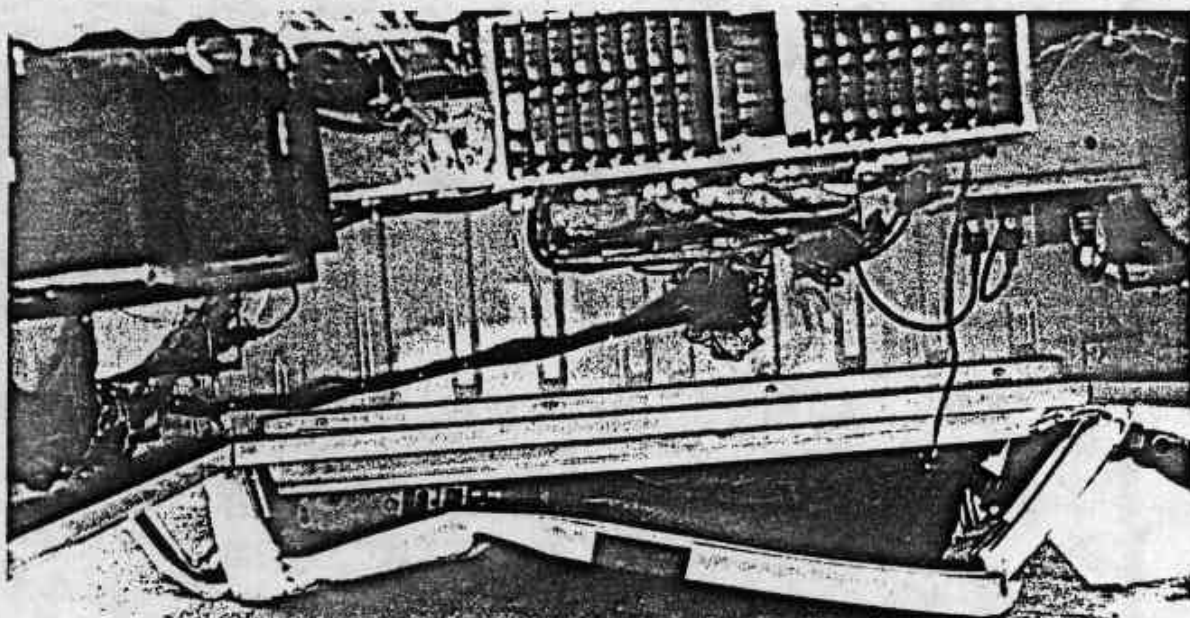


Figure A-32. POST-TEST REAR WINDOW CLOSE-UP VIEW

IPMD VEHICLE DATA SHEET

Filled Out By: Bob Dotson

Date: 5/18/89

Checked By: _____

Date: _____

VEHICLE DATA

Vehicle Make and Model (written out): Nissan Pickup

NHTSA ID Code (7 Characters): _____ / Model Year (2 digits): _____

Vehicle Make (2 Characters):

- | | | |
|-------------------|-----------------|-----------------|
| 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): _____

Body Style (2 Characters): P U

- | | |
|-----------------------|-------------------|
| 2C - 2 Door Coupe | SW - Stationwagon |
| 2S - 2 Door Seden | PU - Pickup Truck |
| 3H - 3 Door Hatchback | TR - Truck |
| 4S - 4 Door Sedan | VN - Van |
| 5H - 5 Door Hatchback | BU - Bus |
| OH - Other: _____ | MP - Multipurpose |
| | UT - Utility |

VIN Number (20 Characters): 1 N 6 N D 1 1 S X K C 3 6 6 8 3 7

Odometer Reading: 57.4

Thousands of Miles: .0574

Overall Length: 174.0

(in) x 25.4 =: 4419.6 (mm)

Wheelbase: 104.5

(in) x 25.4 =: 2654.3 (mm)

Front Track: 54.9

(in) x 25.4 =: 1394.5 (mm)

Rear Track: 54.6

(in) x 25.4 =: 1386.8 (mm)

Roof Height: 61.4

(in) x 25.4 =: 1559.6 (mm)

IPMD VEHICLE DATA SHEET

G.V.W.R.: 4400 (lbs) X 4.45 -: 19580 (N)
FRONT G.A.W.R.: 2200 (lbs) x 4.45 -: 9790 (N)
REAR G.A.W.R.: 2544 (lbs) x 4.45 -: 11321 (N)

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

Weight on RF Tire: 770 (lbs) x 4/45 -: 3427 (N)
Weight on LF Tire: 816 (lbs) x 4/45 -: 3631 (N)
Weight on LR Tire: 768 (lbs) x 4/45 -: 3418 (N)
Weight on RR Tire: 802 (lbs) x 4/45 -: 3569 (N)
Vehicle Test Weight: 3156 (lbs) x 4/45 -: 14044 (N)

Lateral and Longitudinal Center of Gravity Location

From Front Axle: 52.0 (in) x 25.4 -: 1320.55 (mm)
From Center Line: -0.1 (in) x 25.4 -: -2.5 (mm)
Engine Displacement: 146.3 (cu in) x 0.0164 -: 2.4 (l)

Engine Type (2 Characters): L4

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

Engine Location (1 Character): F

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 with 50th percentile dummy

IPMD VEHICLE DATA SHEET

FRONT SUSPENSION

Suspension Number (4 digits): _____

Front/Rear Flag (1 Character): F

Axle Type (1 Character): I

I - Independant 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	I - Twin I Beam
O - Other: _____	

Spring Type (2 Characters): TB

CO - Coil	TB - Torsion Bar
LL - Longitudinal Leaf	TL - Transverse Leaf
OT - Other: <u>A</u>	

Brake Type (2 Characters): _____

DI - Disk	LT - Leading-Trailer Shoe
DS - Duo-Servo Shoe	
OT - Other: <u>DI</u>	

Suspension Modified N

N - No Y - Yes

Suspension Modification

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

1 - _____

2 - _____

IPMD VEHICLE DATA SHEET

FRONT SUSPENSION

Tire Manufacturer (10 Characters): Firestone

Tire Size Code (10 Characters): P195/75R14

Tire Construction (2 Characters): SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 5.0 (in) * 25.4 =: 127.0 (mm)

Axle Height: 11.9 (in) * 25.4 =: 302.3 (mm)

Tire Pressure: 26.0 (psi) *6.897 =: 179.3 (kpa)

IPMD VEHICLE DATA SHEET

REAR SUSPENSION

Suspension Number (4 digits): _____

Front/Rear Flag (1 Character): R

Axle Type (1 Character): S

I - Independant S - Solid

Suspension Type (1 Character): L

A - Unequal A Arm

L - Leaf

M - Multiple Link

Q - Torque Arm

S - Strut

O - Other: _____

T - Semi-Trailing Arm

W - Twist

4 - 4 Link

3 - 3 Link

Spring Type (2 Characters): LL

CO - Coil

LL - Longitudinal Leaf

OT - Other: _____

TB - Torsion Bar

TL - Transverse Leaf

Brake Type (2 Characters): DS

DI - Disk

DS - Duo-Servo Shoe

OT - Other: _____

LT - Leading-Trailer Shoe

Suspension Modified N

N - No

Y - Yes

Suspension Modification

R - Raised

S - Stiffened

O - Other

L - Lowered

W - Widened

1 - _____

2 - _____

IPMD VEHICLE DATA SHEET

REAR SUSPENSION

Tire Manufacturer (10 Characters): Firestone

Tire Size Code (10 Characters): P195/75R14

Tire Construction (2 Characters): SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 5.0 (in) * 25.4 =: 127.0 (mm)

Axle Height: 11.8 (in) * 25.4 =: 299.7 (mm)

Tire Pressure: 34.0 (psi) * 6.897 =: 234.0 (kpa)

IPMD MEASURED DATA

IPMD Calibration Check (no vehicle)

<u>Applied Weight (lbs)</u>	<u>Schaevitz Output (Volts)</u>
0	<u>0.121</u>
+100	<u>1.040</u>
+200	<u>1.930</u>
0	<u>0.121</u>
-100	<u>-0.802</u>
-200	<u>-1.700</u>
0	<u>0.122</u>

C.G. HEIGHT

<u>Applied Weight (lbs)</u>	<u>Schaevitz Output (Volts)</u>	<u>Resultant Longitudinal Movement (mv)</u>
0	<u>0.101</u>	<u>2.461</u>
+100	<u>0.723</u>	<u>2.608</u>
+200	<u>1.346</u>	<u>2.755</u>
0	<u>0.144</u>	<u>2.496</u>
-100	<u>-0.515</u>	<u>2.343</u>
-200	<u>-1.176</u>	<u>2.094</u>
0	<u>0.094</u>	<u>2.467</u>

Calculated C.G. Height (in): 23.0

Pitch Inertia:

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>407</u>	<u>0.288</u>	<u>0.355</u>
2	<u>402</u>	<u>0.280</u>	<u>0.363</u>
3	<u>404</u>	<u>0.293</u>	<u>0.360</u>

Pitch Inertia (ft. lb. sec²): 1963.373

IPMD MEASURED DATA

Roll Inertia:

Distance between ramps (in): 46.0

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Amplitude (mv)</u>
1	<u>2.38</u>	<u>0.275</u>	<u>0.590</u>
2	<u>2.39</u>	<u>0.235</u>	<u>0.565</u>
3	<u>2.41</u>	<u>0.240</u>	<u>0.605</u>

Roll Inertia (ft. lb. sec²): 336.301

Yaw Inertia:

Distance between ramps (in): 46.0

String Pot Offset from platform center (in): 730

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Amplitude (mv)</u>
1	<u>2,417.220</u>	<u>0.150</u>	<u>0.558</u>
1	<u>2,417.220</u>	<u>0.148</u>	<u>0.595</u>
1	<u>2,387.140</u>	<u>0.137</u>	<u>0.628</u>

Yaw Inertia (ft. lb. sec²): 1986.074

IPMD VEHICLE DATA SHEET

Filled Out By: B. Dotson

Date: 6/6/89

Checked By: _____

Date: _____

VEHICLE DATA

Vehicle Make and Model (written out): Nissan Pickup

NHTSA ID Code (7 Characters): _____ / Model Year (2 digits): 8 9

Vehicle Make (2 Characters):

- | | | |
|-------------------|-----------------|-----------------|
| 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): _____

Body Style (2 Characters): P U

- | | |
|-----------------------|-------------------|
| 2C - 2 Door Coupe | SW - Stationwagon |
| 2S - 2 Door Seden | PU - Pickup Truck |
| 3H - 3 Door Hatchback | TR - Truck |
| 4S - 4 Door Sedan | VN - Van |
| 5H - 5 Door Hatchback | BU - Bus |
| OH - Other: _____ | MP - Multipurpose |
| | UT - Utility |

VIN Number (20 Characters): 1 N 6 N D 1 1 S X K C 3 6 6 8 3 7

Odometer Reading: 60.0

Thousands of Miles: 0.060

Overall Length: 174.0

(in) x 25.4 -: 4419.6 (mm)

Wheelbase: 104.5

(in) x 25.4 -: 2654.3 (mm)

Front Track: 54.8

(in) x 25.4 -: 1391.5 (mm)

Rear Track: 54.6

(in) x 25.4 -: 1386.8 (mm)

Roof Height: 51.7

(in) x 25.4 -: 1313.2 (mm)

IPMD VEHICLE DATA SHEET

G.V.W.R.: 4400 (lbs) X 4.45 =: 19580 (N)
FRONT G.A.W.R.: 2200 (lbs) x 4.45 =: 9790 (N)
REAR G.A.W.R.: 2544 (lbs) x 4.45 =: 11321 (N)

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

Weight on RF Tire: 807 (lbs) x 4/45 =: 3591 (N)
Weight on LF Tire: 718 (lbs) x 4/45 =: 3195 (N)
Weight on LR Tire: 842 (lbs) x 4/45 =: 3747 (N)
Weight on RR Tire: 757 (lbs) x 4/45 =: 3369 (N)
Vehicle Test Weight: 3124 (lbs) x 4/45 =: 13902 (N)

Lateral and Longitudinal Center of Gravity Location

From Front Axle: 53.5 (in) x 25.4 =: 1358.6 (mm)
From Center Line: 0.04 (in) x 25.4 =: 1.0 (mm)
Engine Displacement: 146.3 (cu in) x 0.0164 =: 2.4 (l)

Engine Type (2 Characters): L4

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

Engine Location (1 Character): F

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): Post roll-over with 50th percentile dummy

IPMD VEHICLE DATA SHEET

FRONT SUSPENSION

Suspension Number (4 digits): _____

Front/Rear Flag (1 Character): F

Axle Type (1 Character): I

I - Independant 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	I - Twin I Beam
O - Other: _____	

Spring Type (2 Characters): TB

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

Brake Type (2 Characters): _____

DI - Disk	LT - Leading-Trailer Shoe
DS - Duo-Servo Shoe	
OT - Other: <u>DI</u>	

Suspension Modified N

N - No Y - Yes

Suspension Modification

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

1 - _____

2 - _____

IPMD VEHICLE DATA SHEET

FRONT SUSPENSION

Tire Manufacturer (10 Characters): Firestone

Tire Size Code (10 Characters): P195/75R14

Tire Construction (2 Characters): SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 5.0 (in) * 25.4 -: 127.0 (mm)

Axle Height: 11.9 (in) * 25.4 -: 302.3 (mm)

Tire Pressure: 26.0 (psi) *6.897 -: 179.3 (kpa)

IPMD VEHICLE DATA SHEET

REAR SUSPENSION

Suspension Number (4 digits): _____

Front/Rear Flag (1 Character): R

Axle Type (1 Character): S

I - Independant S - Solid

Suspension Type (1 Character): L

A - Unequal A Arm

L - Leaf

M - Multiple Link

Q - Torque Arm

S - Strut

O - Other: _____

T - Semi-Trailing Arm

W - Twist

4 - 4 Link

3 - 3 Link

Spring Type (2 Characters): LL

CO - Coil

LL - Longitudinal Leaf

OT - Other: _____

TB - Torsion Bar

TL - Transverse Leaf

Brake Type (2 Characters): DS

DI - Disk

DS - Duo-Servo Shoe

OT - Other: _____

LT - Leading-Trailer Shoe

Suspension Modified N

N - No

Y - Yes

Suspension Modification

R - Raised

S - Stiffened

O - Other

L - Lowered

W - Widened

1 - _____

2 - _____

IPMD VEHICLE DATA SHEET

REAR SUSPENSION

Tire Manufacturer (10 Characters):

Firestone

Tire Size Code (10 Characters):

P195/75R14

Tire Construction (2 Characters):

SB

BB - Bias Belted

GP - Glass Belted Radial

BP - Bias Ply

SB - Steel Belted Radial

OT - Other: _____

Tire Rim Width: 5.0

(in) * 25.4 =: 127.0 (mm)

Axle Height: 11.8

(in) * 25.4 =: 299.7 (mm)

Tire Pressure: 34.0

(psi) * 6.897 =: 234.5 (kpa)

IPMD MEASURED DATA

IPMD Galibration Check (no vehicle)

<u>Applied Weight (lbs)</u>	<u>Schaevitz Output (Volts)</u>
0	<u>0.294</u>
+100	<u>1.212</u>
+200	<u>2.095</u>
0	<u>-0.630</u>
-100	<u>-1.534</u>
-200	<u>0.294</u>
0	<u> </u>

C.G. HEIGHT

<u>Applied Weight (lbs)</u>	<u>Schaevitz Output (Volts)</u>	<u>Resultan Longitudinal Movement (mv)</u>
0	<u>0.072</u>	<u>2.636</u>
+100	<u>0.675</u>	<u>2.680</u>
+200	<u>1.273</u>	<u>2.752</u>
0	<u>0.076</u>	<u>2.638</u>
-100	<u>-0.526</u>	<u>2.592</u>
-200	<u>-1.138</u>	<u>2.515</u>
0	<u>0.062</u>	<u>2.626</u>

Calculated C.G. Height (in): 22.6

Pitch Inertia:

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Relative Motion Amplitude (mv)</u>
1	<u>3.90</u>	<u>0.298</u>	<u>0.143</u>
2	<u>3.95</u>	<u>0.298</u>	<u>0.150</u>
3	<u>3.95</u>	<u>0.315</u>	<u>0.150</u>

Pitch Inertia (ft. lb. sec²): 1890.953

IPMD MEASURED DATA

Roll Inertia:

Distance between ramps (in): 44

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Amplitude (mv)</u>
1	<u>2.35</u>	<u>0.260</u>	<u>0.223</u>
2	<u>2.33</u>	<u>0.250</u>	<u>0.223</u>
3	<u>2.33</u>	<u>0.265</u>	<u>0.218</u>

Roll Inertia (ft. lb. sec²): 328.818

Yaw Inertia:

Distance between ramps (in): 44

String Pot Offset from platform center (in): 74

<u>Run</u>	<u>Period (sec)</u>	<u>*Amplitude (mv)</u>	<u>Amplitude (mv)</u>
1	<u>2.37</u>	<u>168</u>	<u>210</u>
1	<u>2.35</u>	<u>180</u>	<u>238</u>
1	<u>2.38</u>	<u>155</u>	<u>190</u>

Yaw Inertia (ft. lb. sec²): 1901.289

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

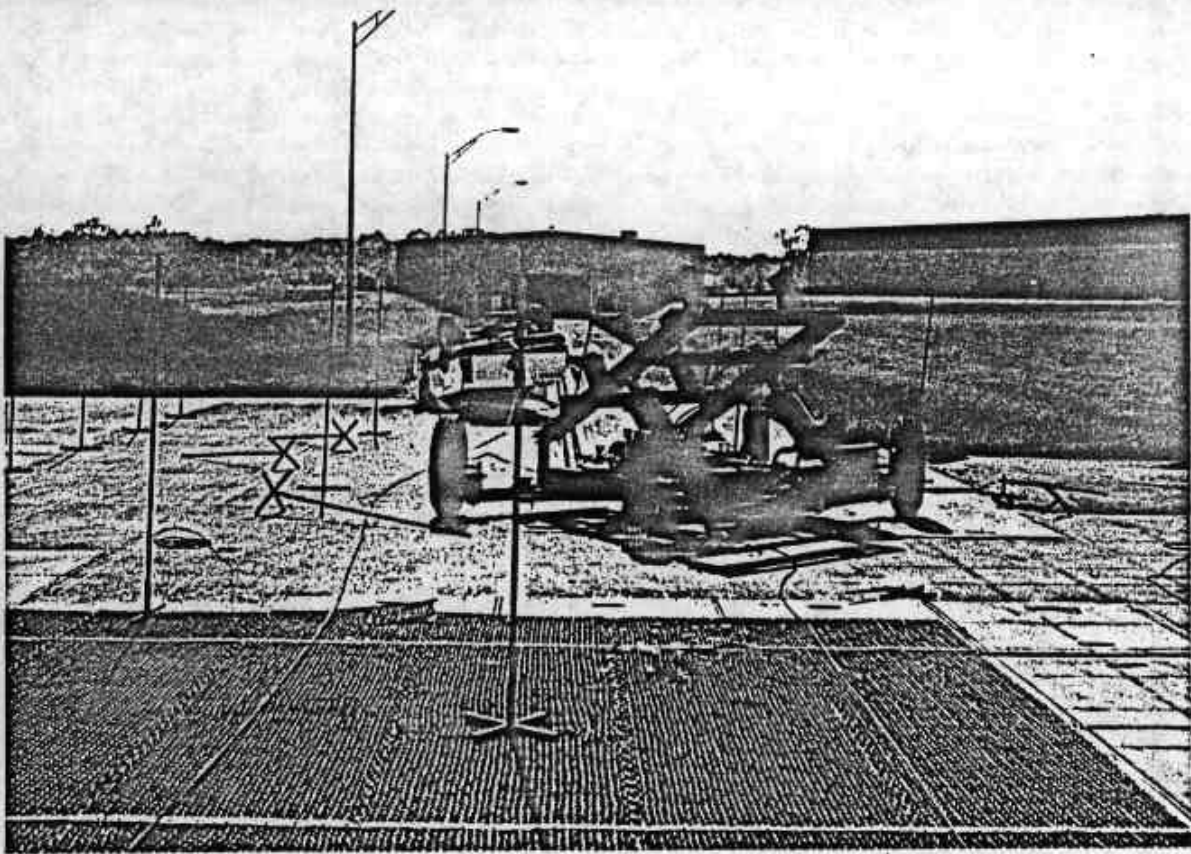


Figure A-33. POST-TEST RELATIONSHIP BETWEEN VEHICLE AND CART VIEW

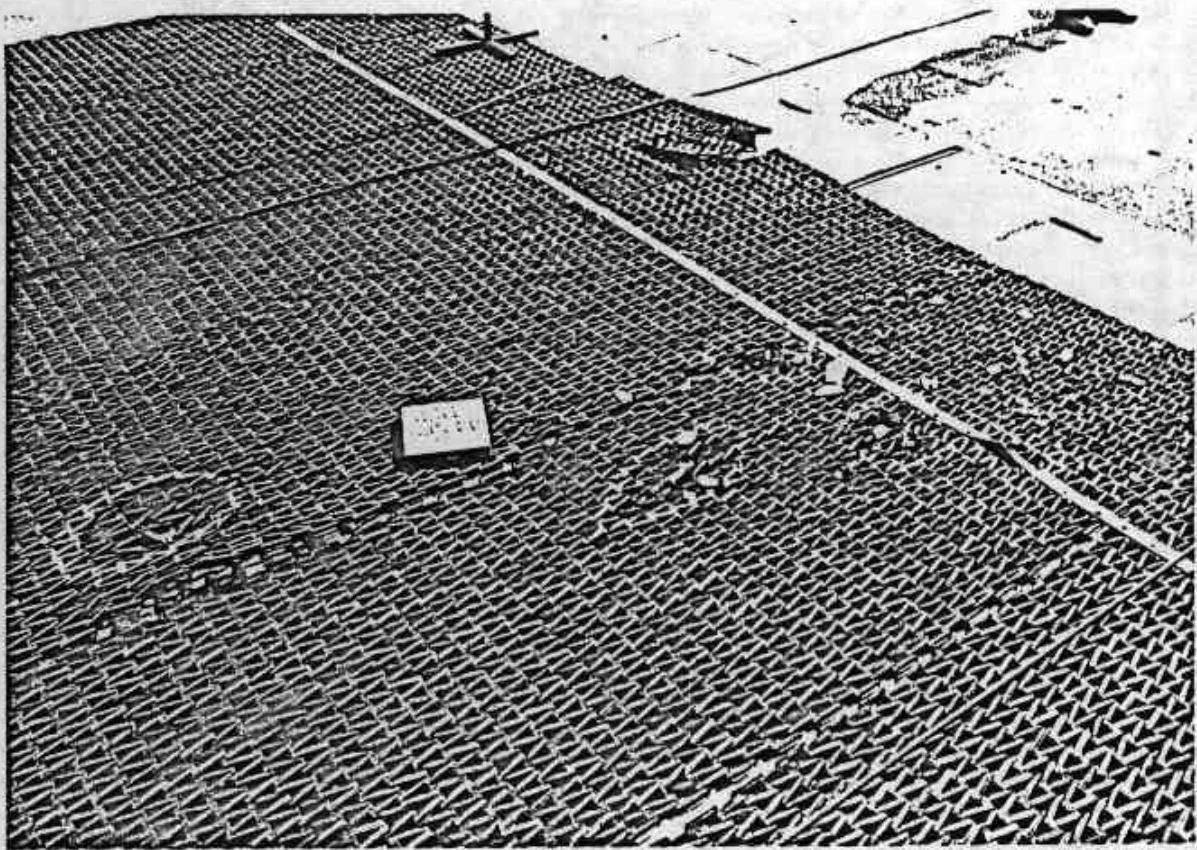
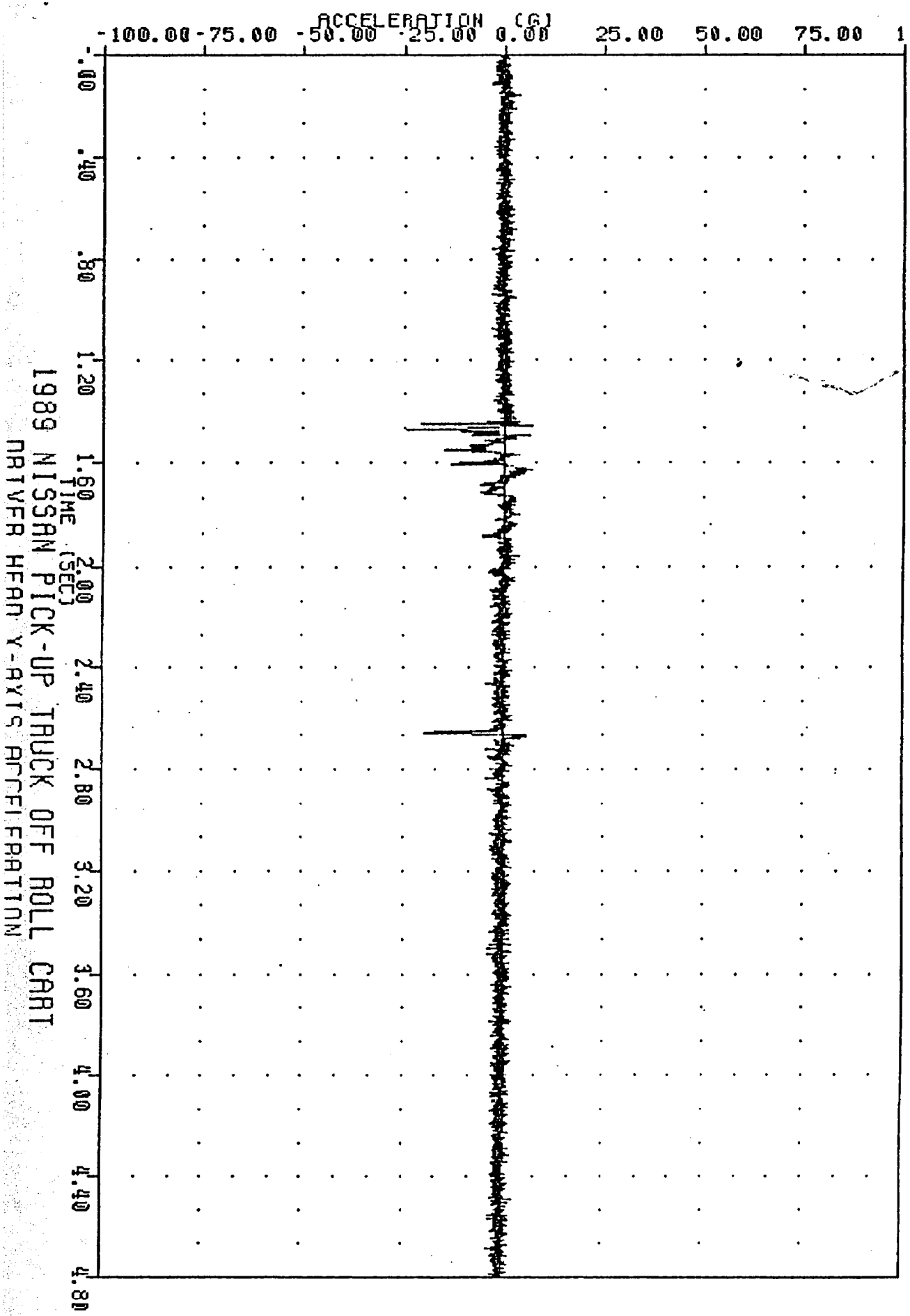


Figure A-34. POST-TEST IMPACT POINTS VIEW

APPENDIX B
DATA PLOT PRESENTATION

UUI/NH1SH
CONTROLLED ROLLOVER CRASH
89150
HEDXG1

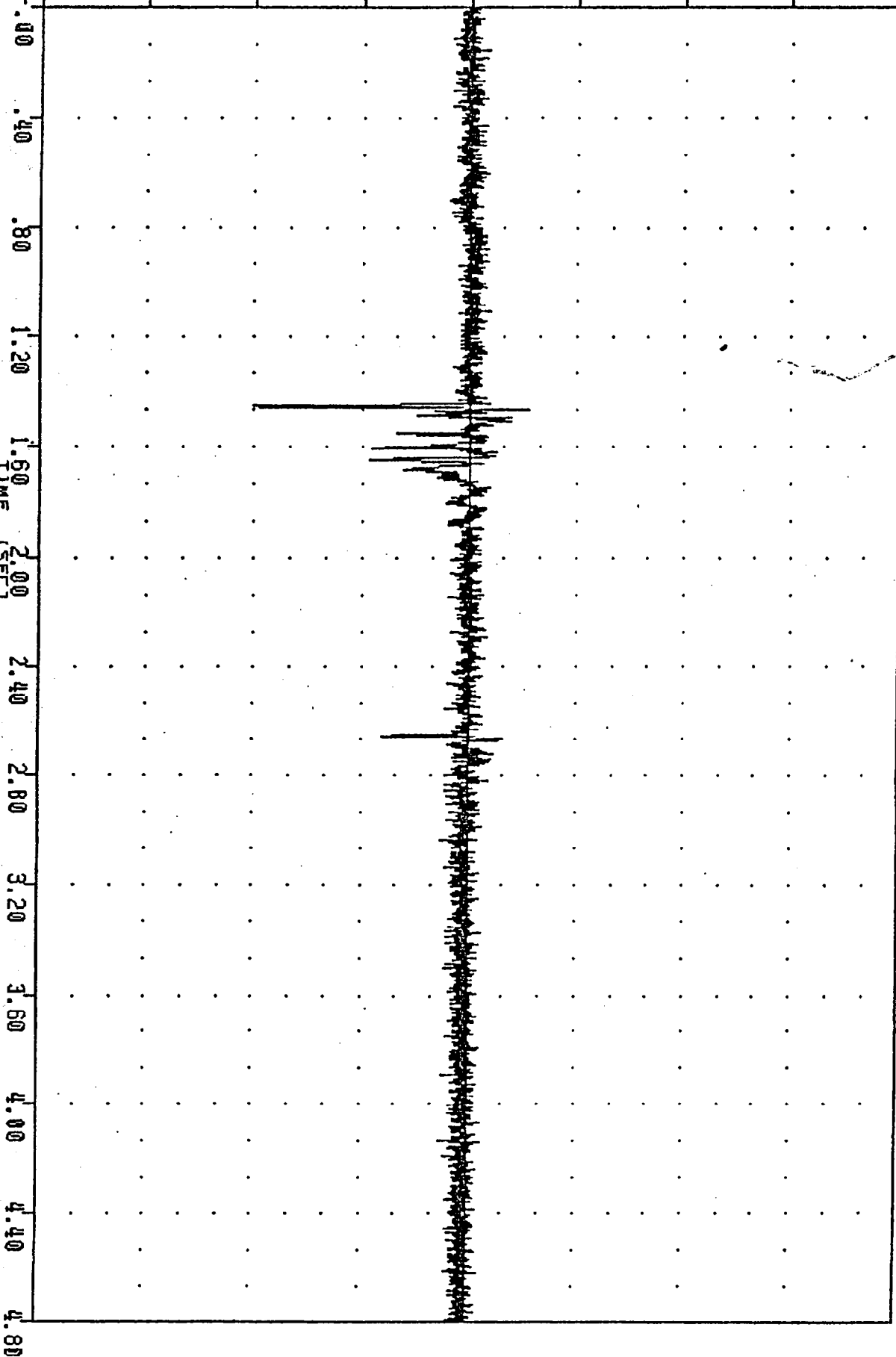
FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -24.31e 1.47, 7.26e 1.46



UJI/NHISH 890530
CONTROLLED ROLLOVER CRASH
89150
HEDYG1

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -50.14 g 1.45, 13.93 g 1.47

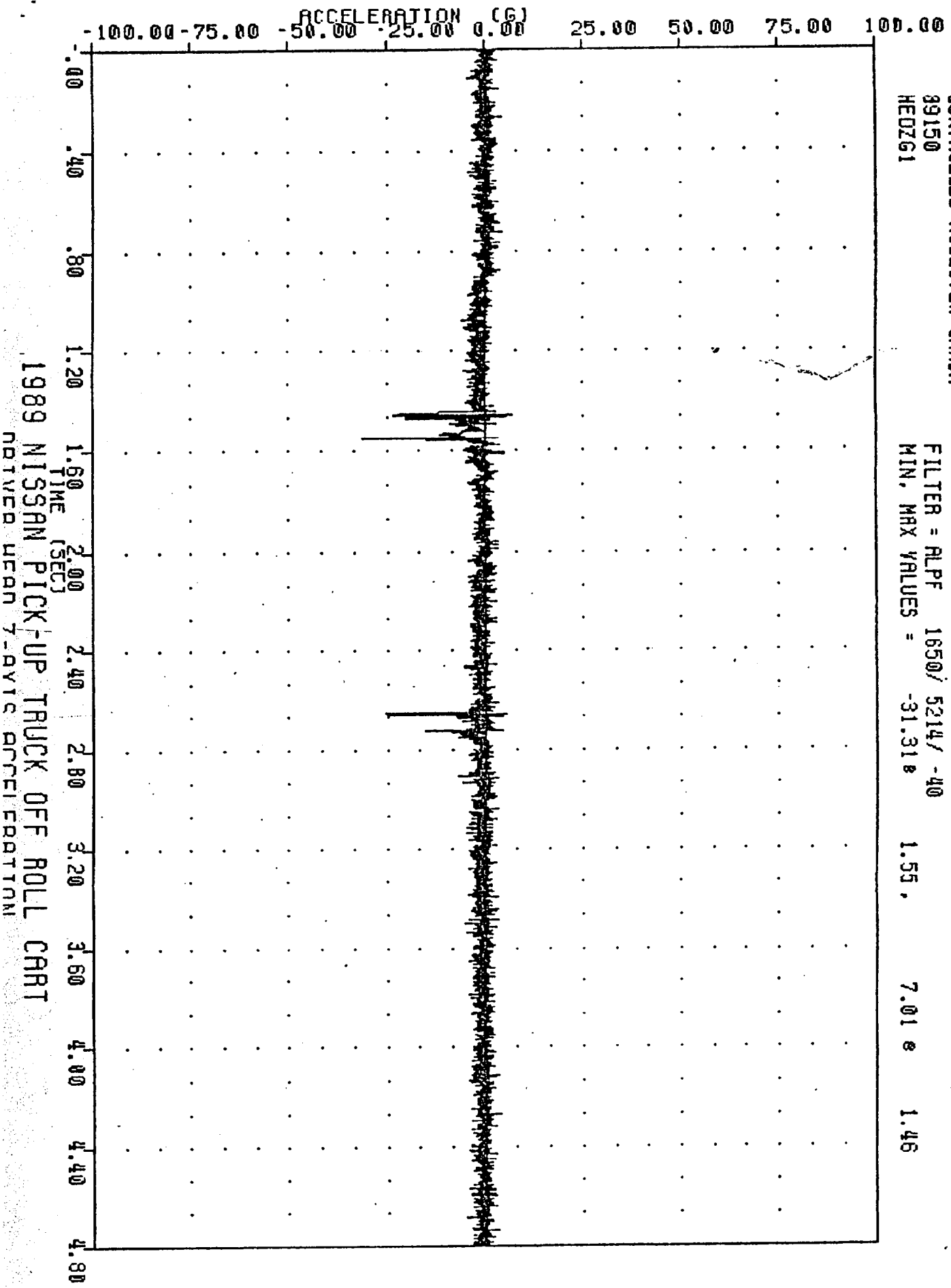
ACCELERATION (G) -100.00 -75.00 -50.00 -25.00 0.00 25.00 50.00 75.00 100.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
NRTWER HEARN Y-Axis ACCELERATION

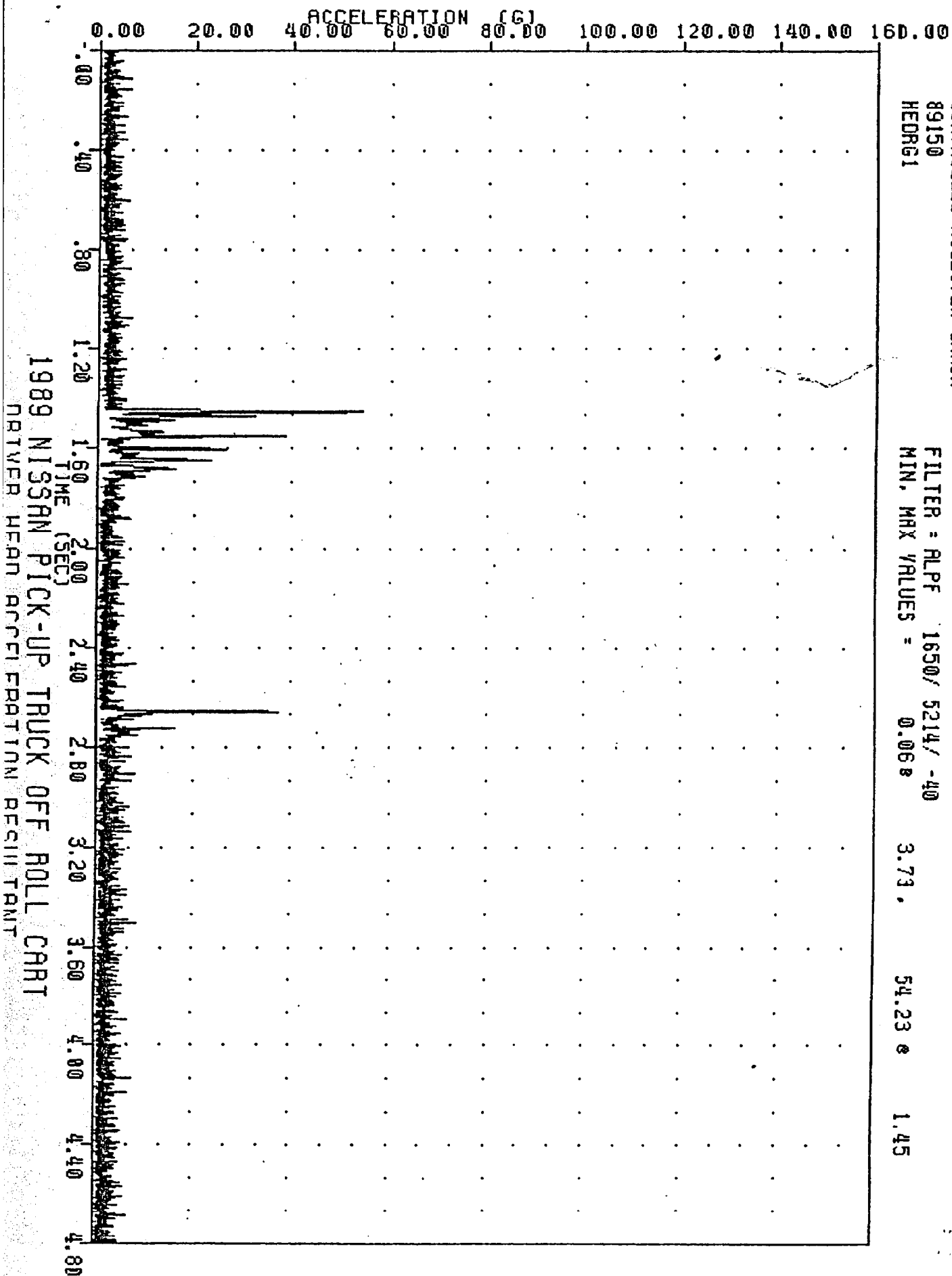
DOT/NH13H 890530
CONTROLLED ROLLOVER CRASH
89150
HE0261

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -31.31g 1.55g
7.01g 1.46g



DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
HEDRG1

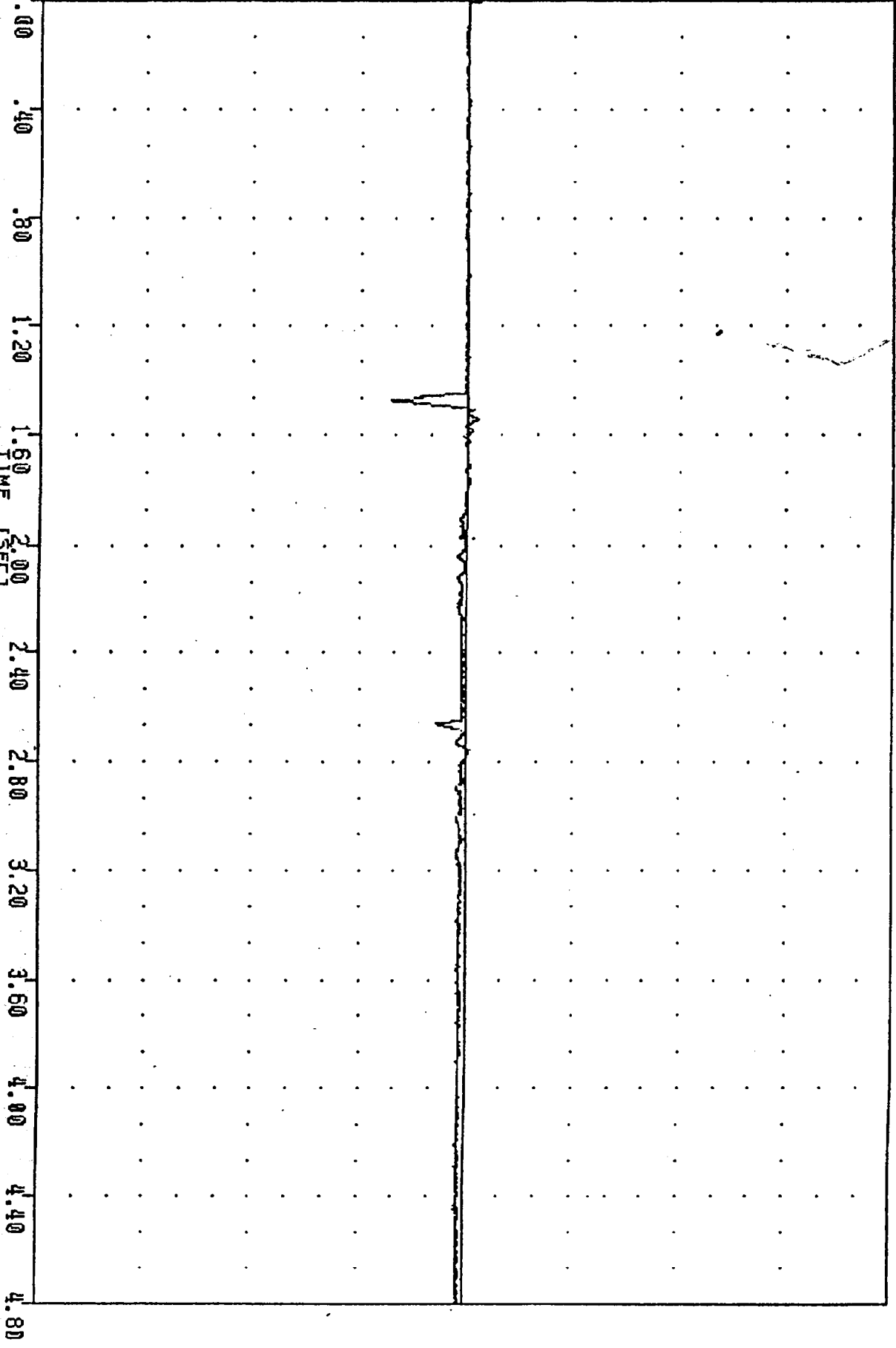
FILTER = ALPF 1650/5214/-40
MIN, MAX VALUES = 0.068 3.73 54.23 1.45



DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
HEKXF1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -362.48 1.47 66.03 0.00

FORCE (LB) (X10⁴)
-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00

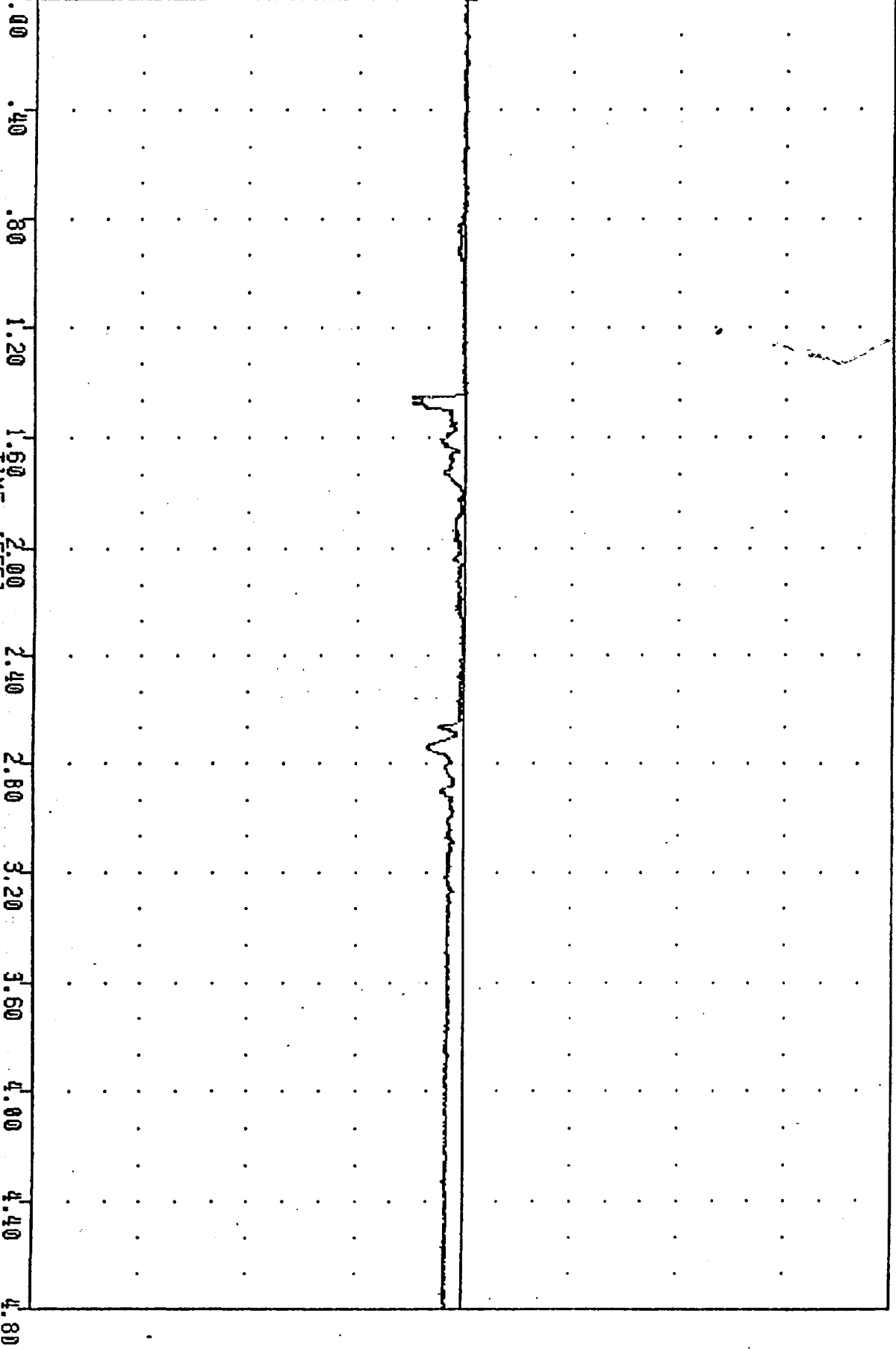


1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
DRIVER MERV CUFAR EMBCE (V AYTC)

DOT/NHTSA
 CONTROLLED ROLLOVER CRASH
 89150
 NEKYF1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -244.64 1.48
 51.18 0.00

FORCE (LB) (X10⁴)
 -200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
 DRIVER NECK SHEAR FORCE (N AYTS)

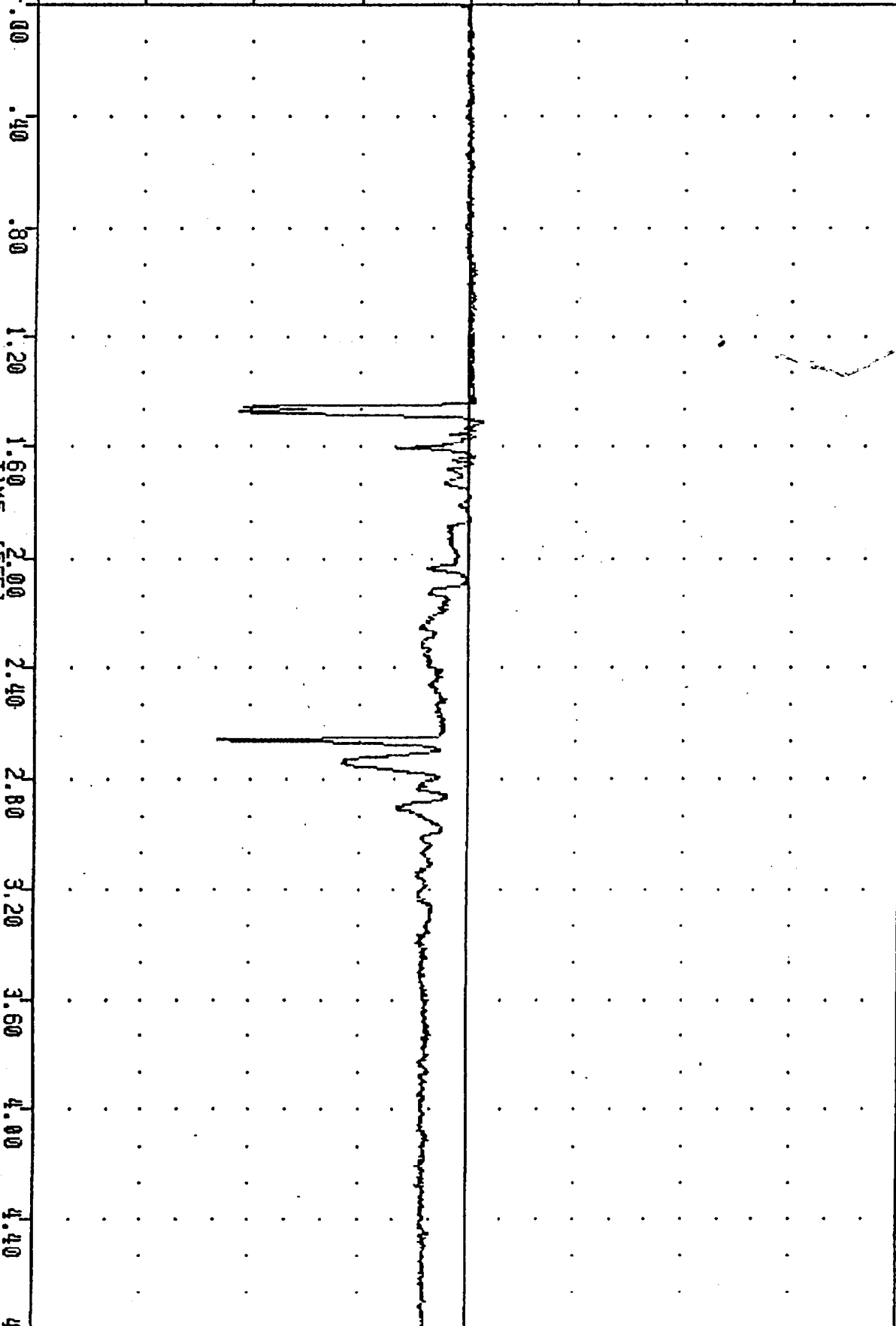
DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
NEKZF1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -1156.82#

2.68 . 68.19 # 1.51

FORCE (LB) (x10³)

-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00

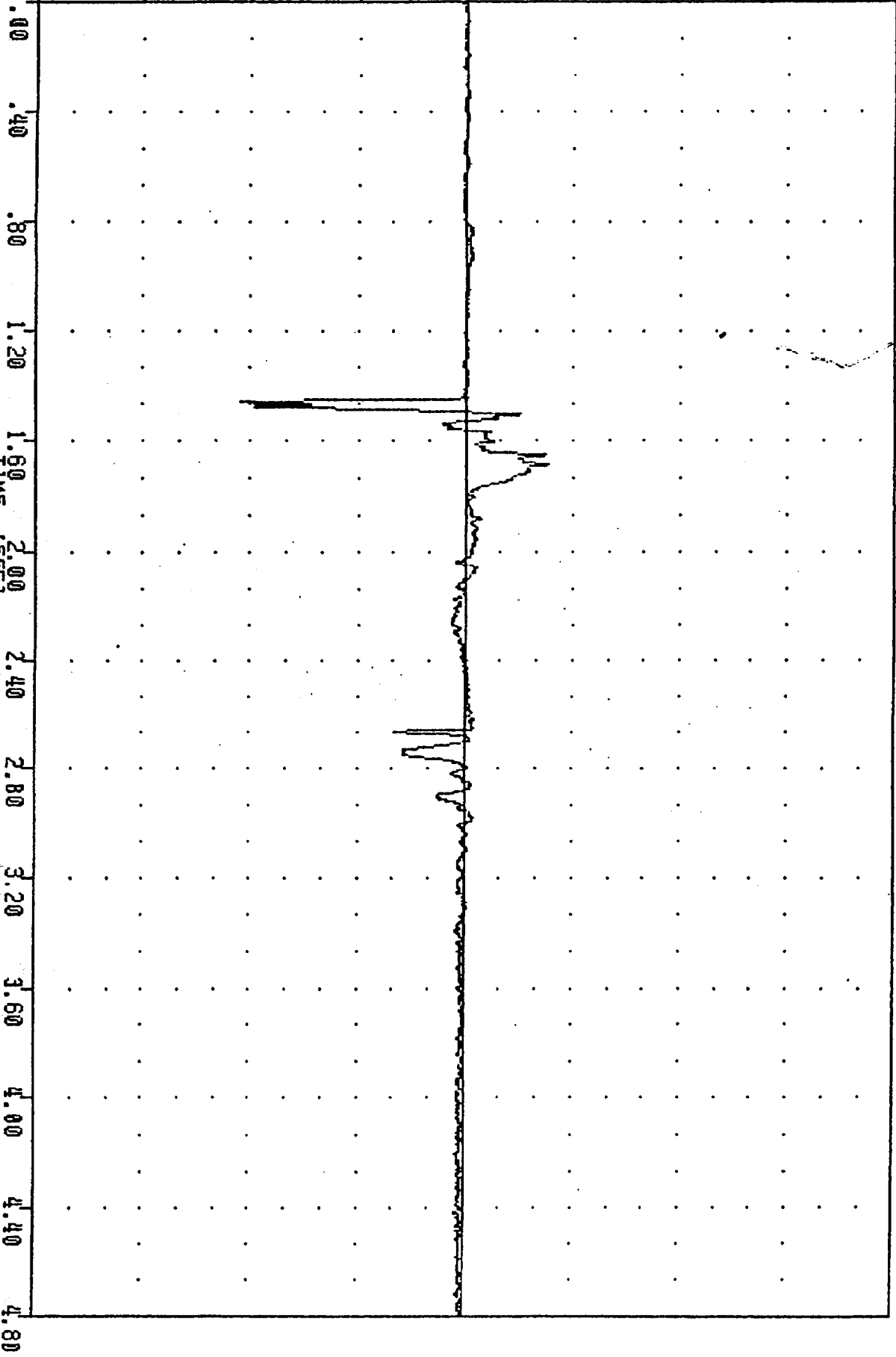


1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
DRIVER NEKZ AY1A1 FNRJF (7 AY1G1)

UUI/NH/ISH
CONTROLLED ROLLOVER CRASH
89150
NEKXMI

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -104.43e 1.46, 38.03e 1.69

TORQUE (LB-FT) -200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00

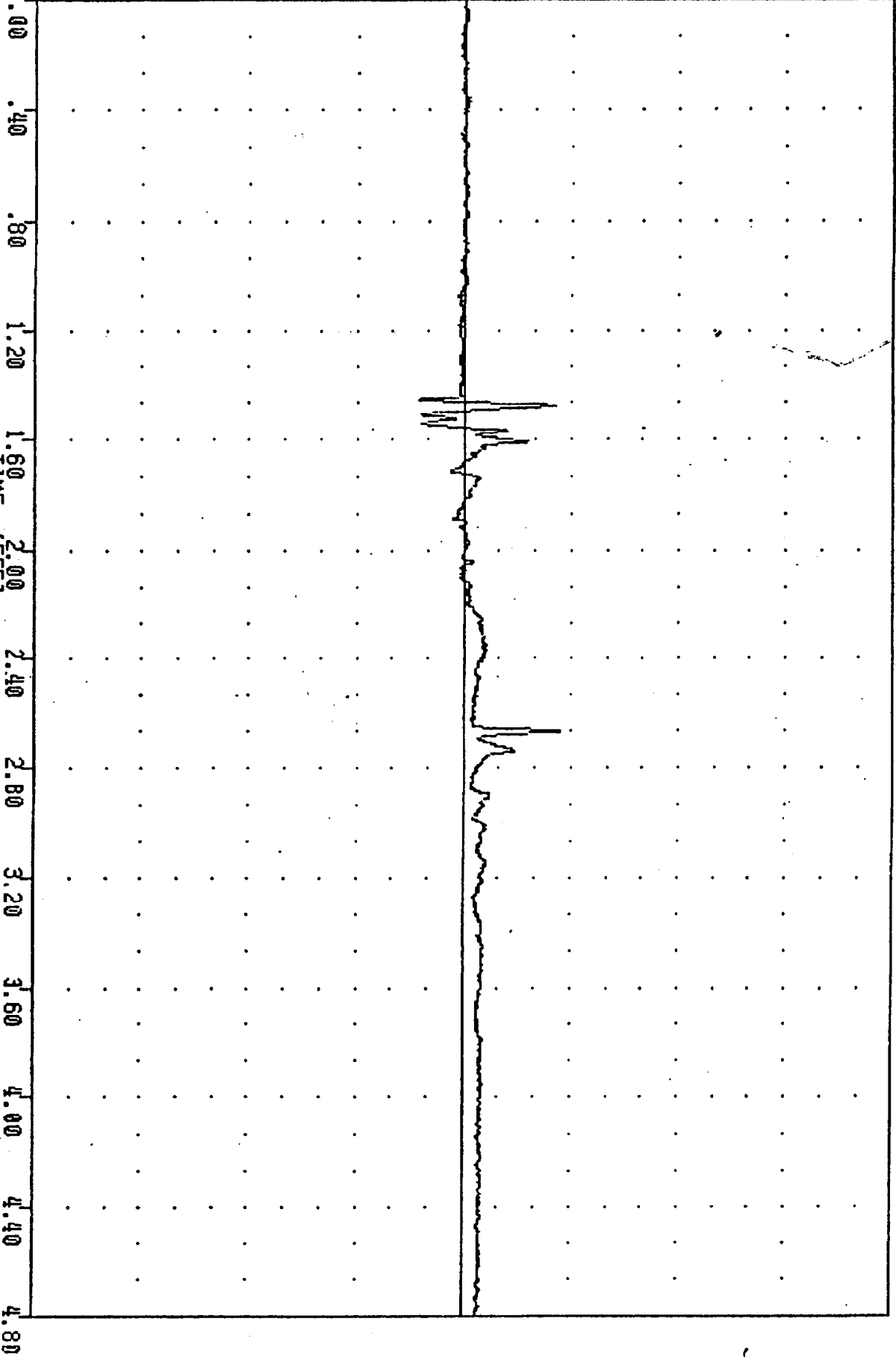


1989 NISSAN PICK-UP TRUCK OFF ROLL CART
NPTVCR NECV MNCMNT DDNLT V DVTIC

UJ1/NH15N
CONTROLLED ROLLOVER CRASH
89150
NEKYM1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -21.26 1.48, 45.07 2.67

TORQUE (LB-FT)
-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
DRIVER NECK MOMENT ARNIT Y AYTS

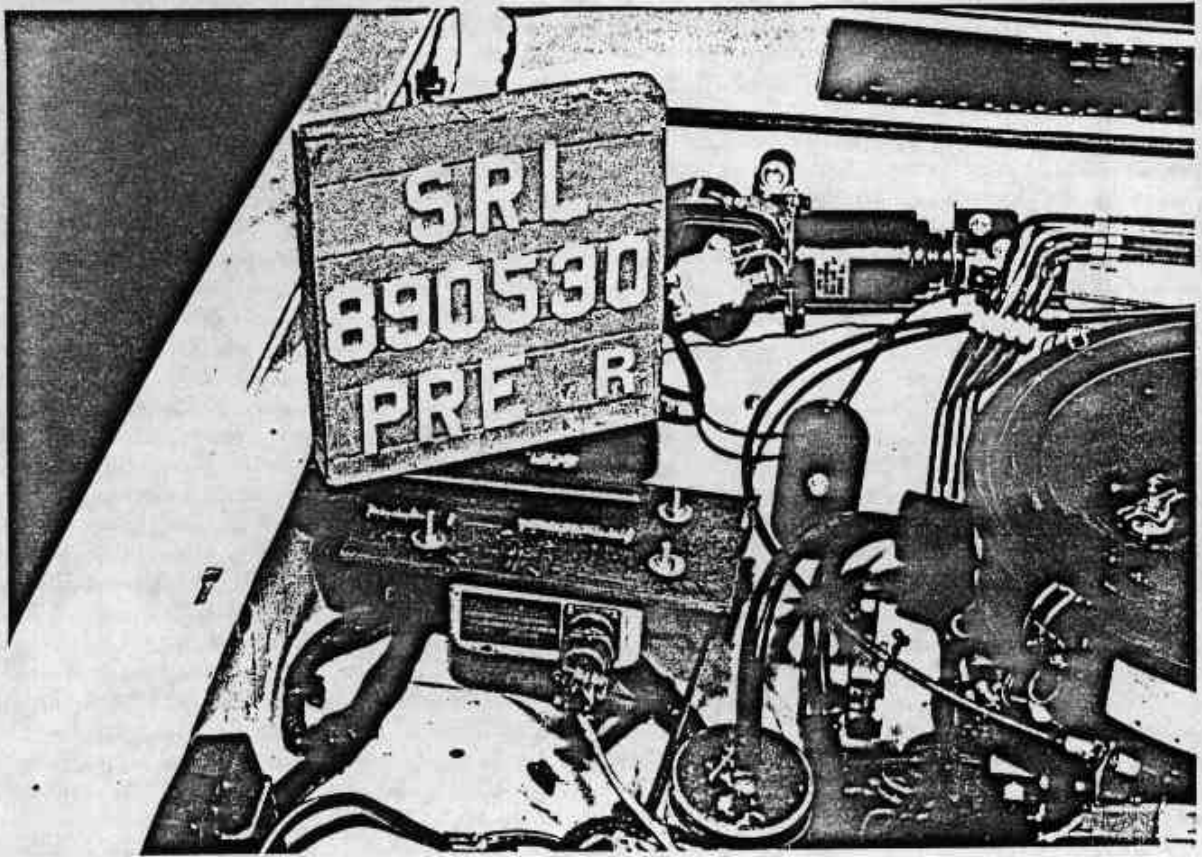


Figure A-11. PRE-TEST RIGHT FRONT SUSPENSION STRING POTENTIOMETER - VIEW 1



Figure A-12. PRE-TEST RIGHT FRONT SUSPENSION STRING POTENTIOMETER - VIEW 2



Figure A-13. PRE-TEST LEFT REAR SUSPENSION STRING POTENTIOMETER - VIEW 1

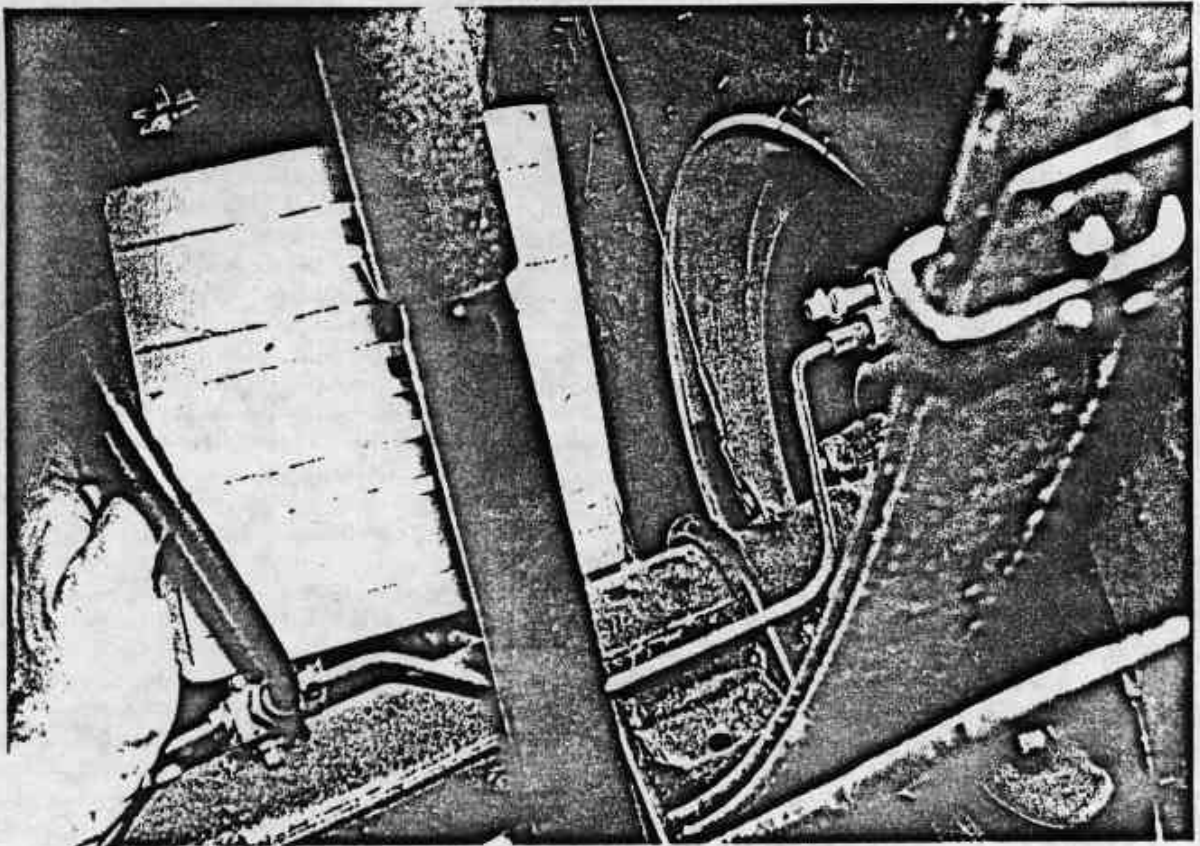


Figure A-14. PRE-TEST LEFT REAR SUSPENSION STRING POTENTIOMETER - VIEW 2

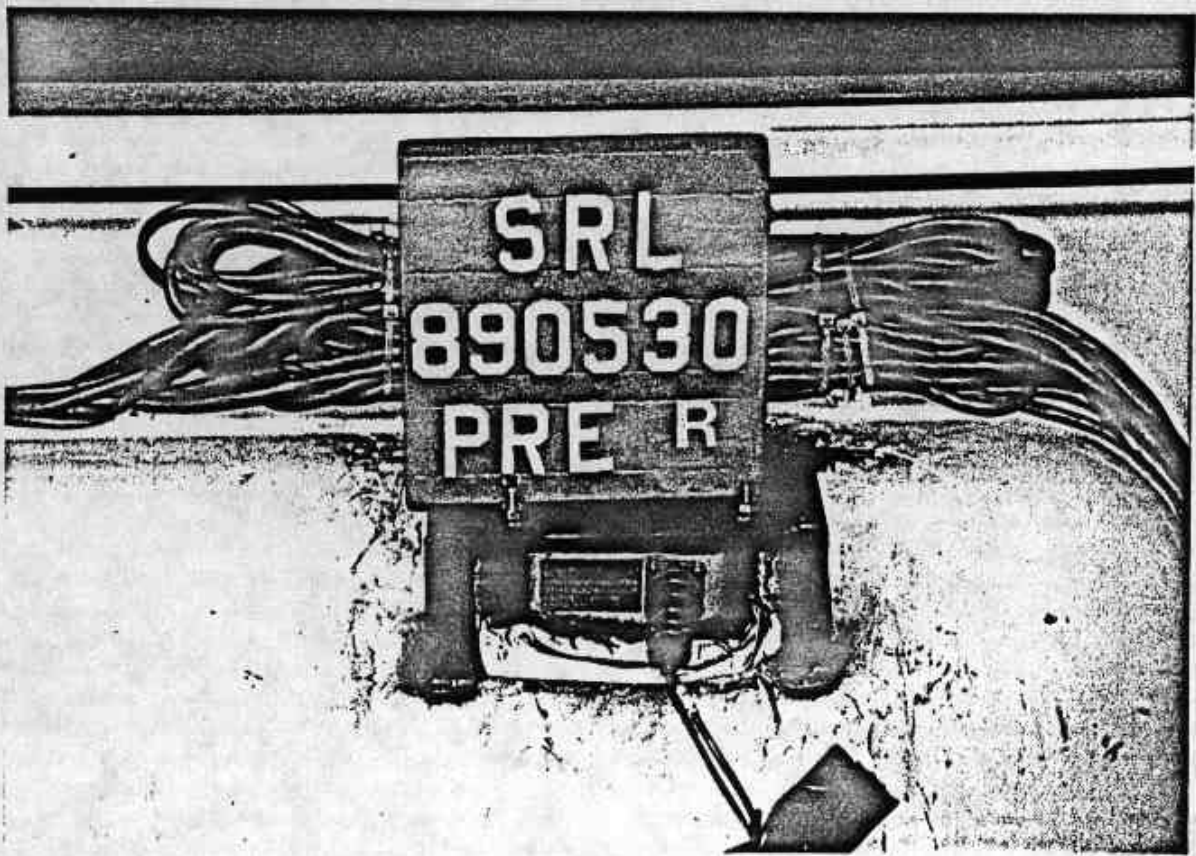


Figure A-15. PRE-TEST RIGHT REAR SUSPENSION STRING POTENTIOMETER - VIEW 1

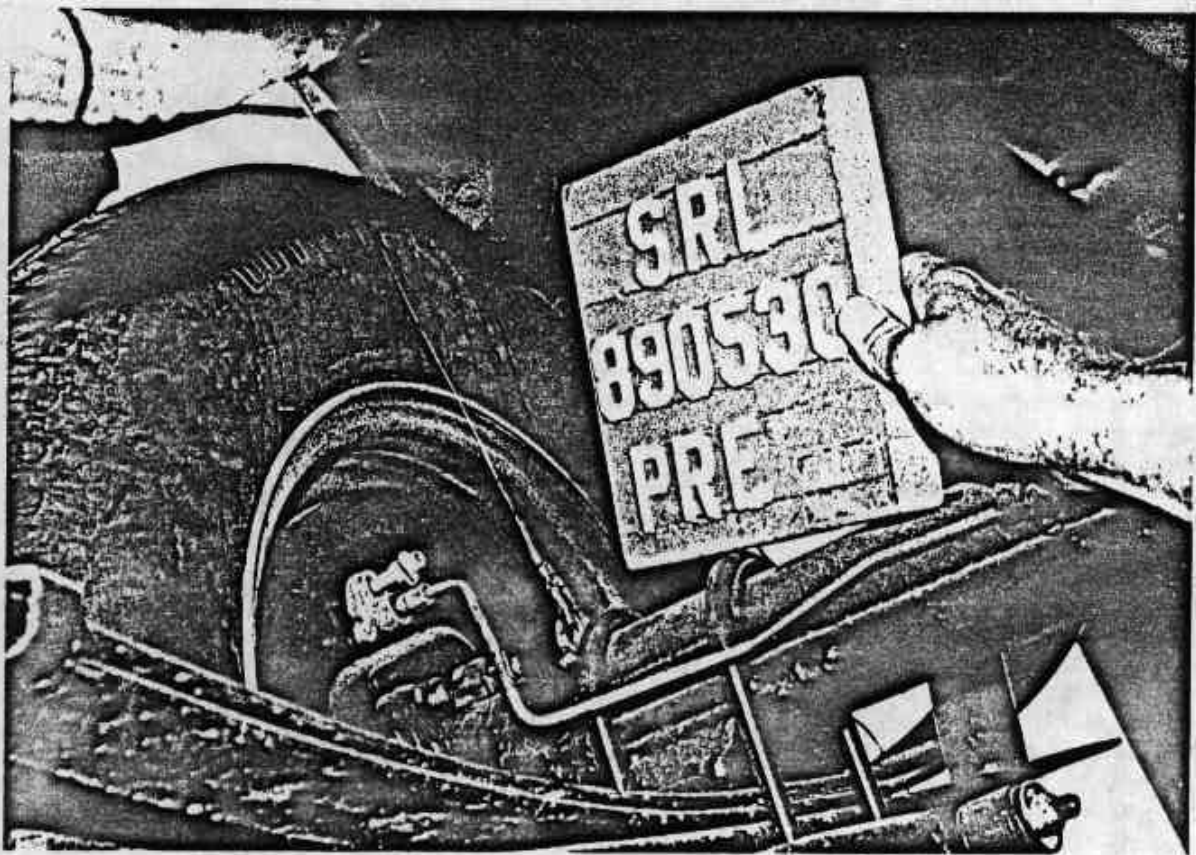
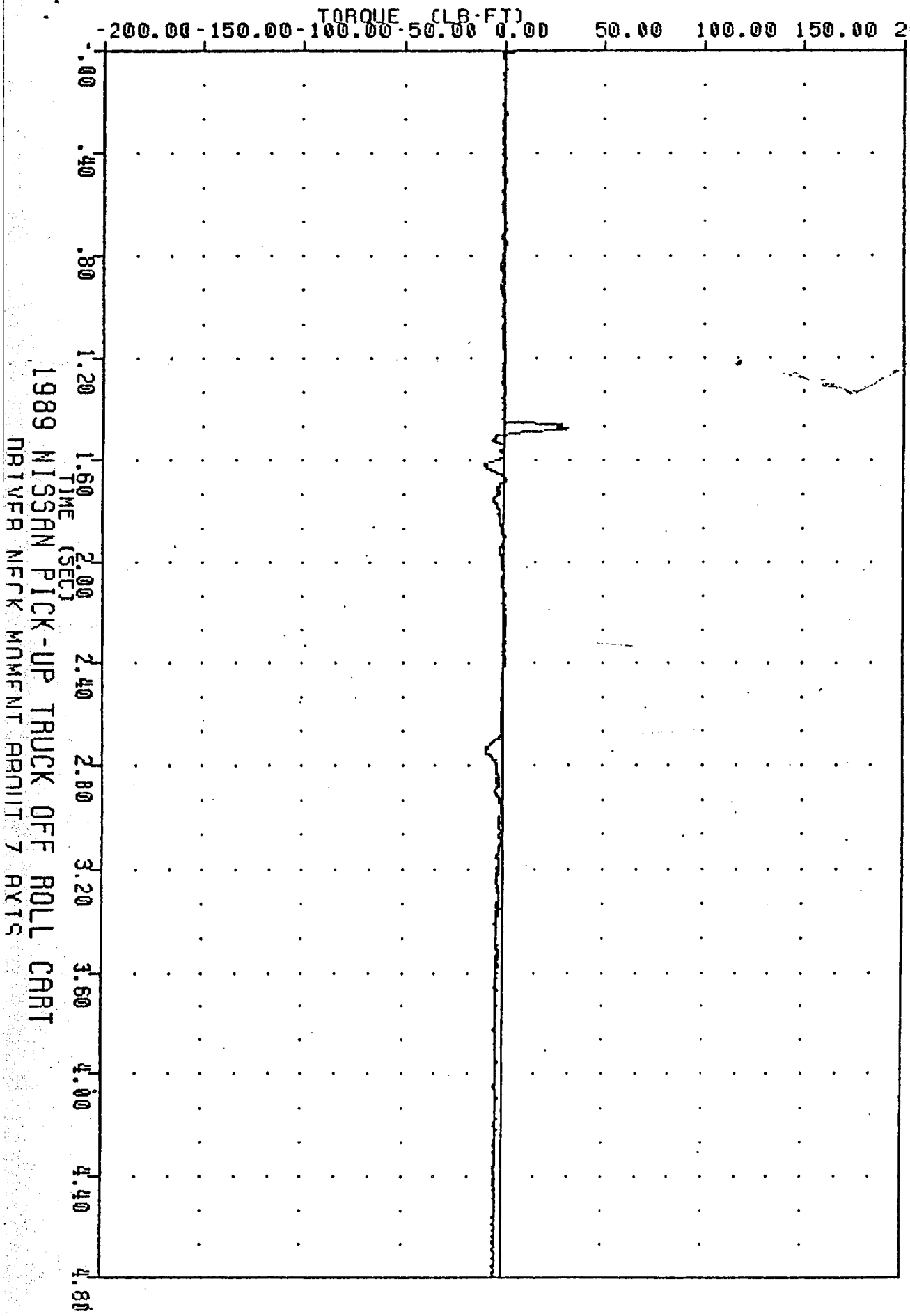


Figure A-16. PRE-TEST RIGHT REAR SUSPENSION STRING POTENTIOMETER - VIEW 2

UUI/NH/SH , 89053W
CONTROLLED ROLLOVER CRASH
89150
NEKZM1

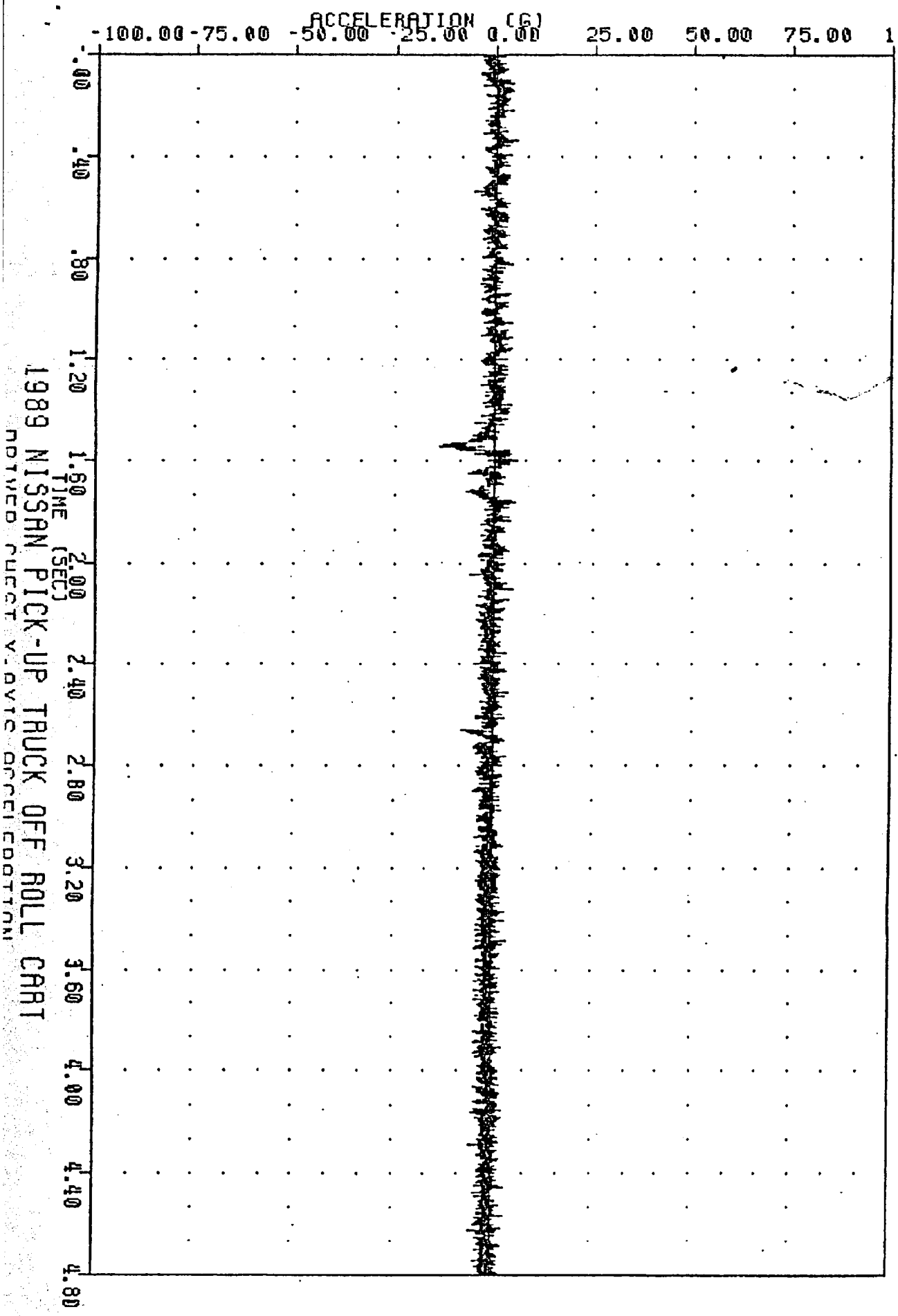
FILTER = BLPP 100/ 250/ -15
MIN, MAX VALUES = -9.16e 1.62, 31.95 e 1.48



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
DRIVER NECK MOMENT RPN117 7 RY15

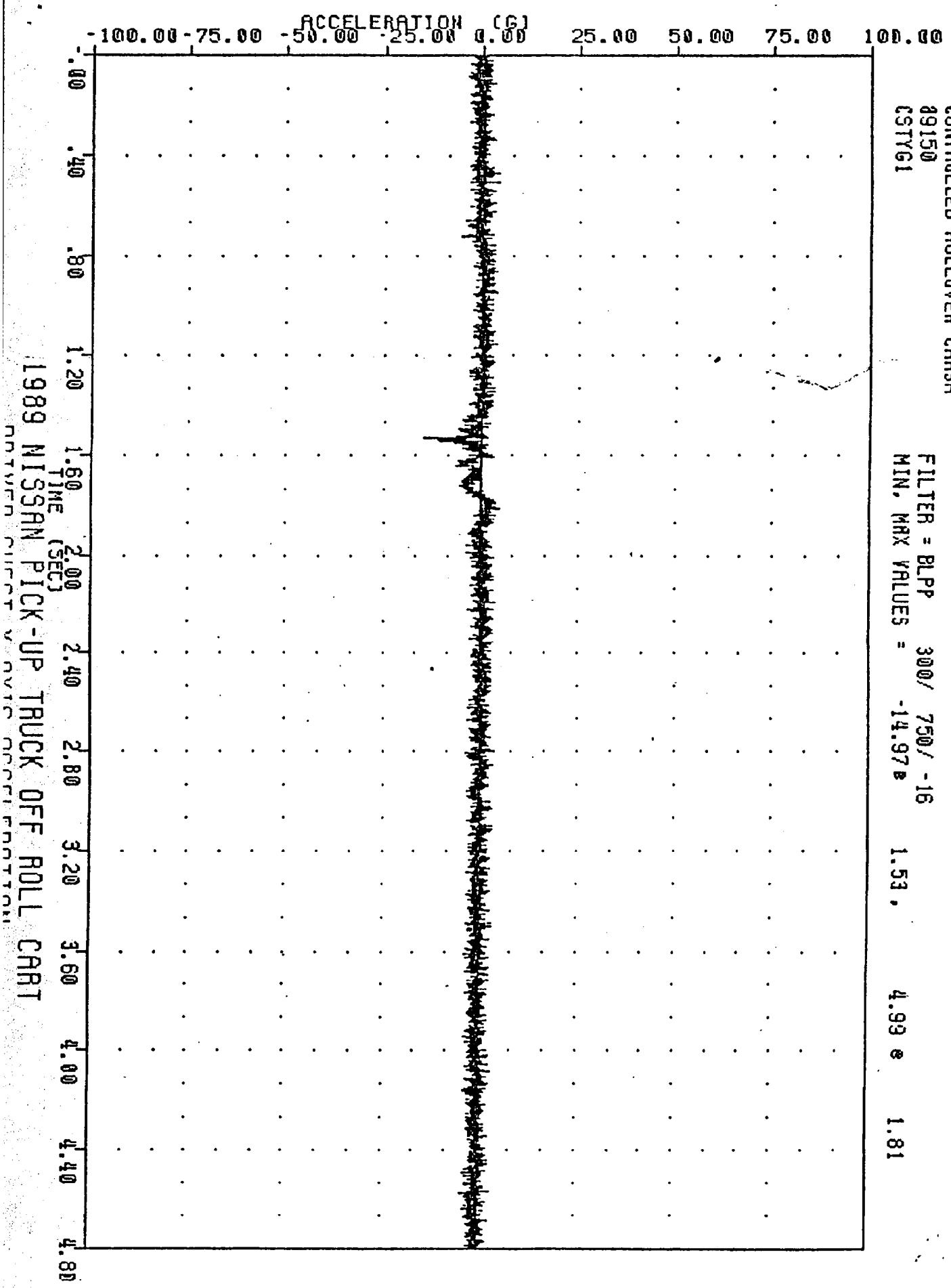
DOT/NTSR 890530
CONTROLLED ROLLOVER CRASH
89150
CSTXG1

FILTER = BLPP 300 / 750 / -16
MIN. MAX VALUES = -13.48 1.54 , 5.90 1.60



DOT/NHTSA , 890530
CONTROLLED ROLLOVER CRASH
89150
CSTYG1

FILTER = BLP 300/ 750/ -16
MIN, MAX VALUES = -14.97 1.53 , 4.99 1.81



1989 NISSAN PICK-UP TRUCK OFF ROLL CART

DATA FROM SUBJECT VEHICLE OCCUPIANT POSITION

DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
CSTZG1

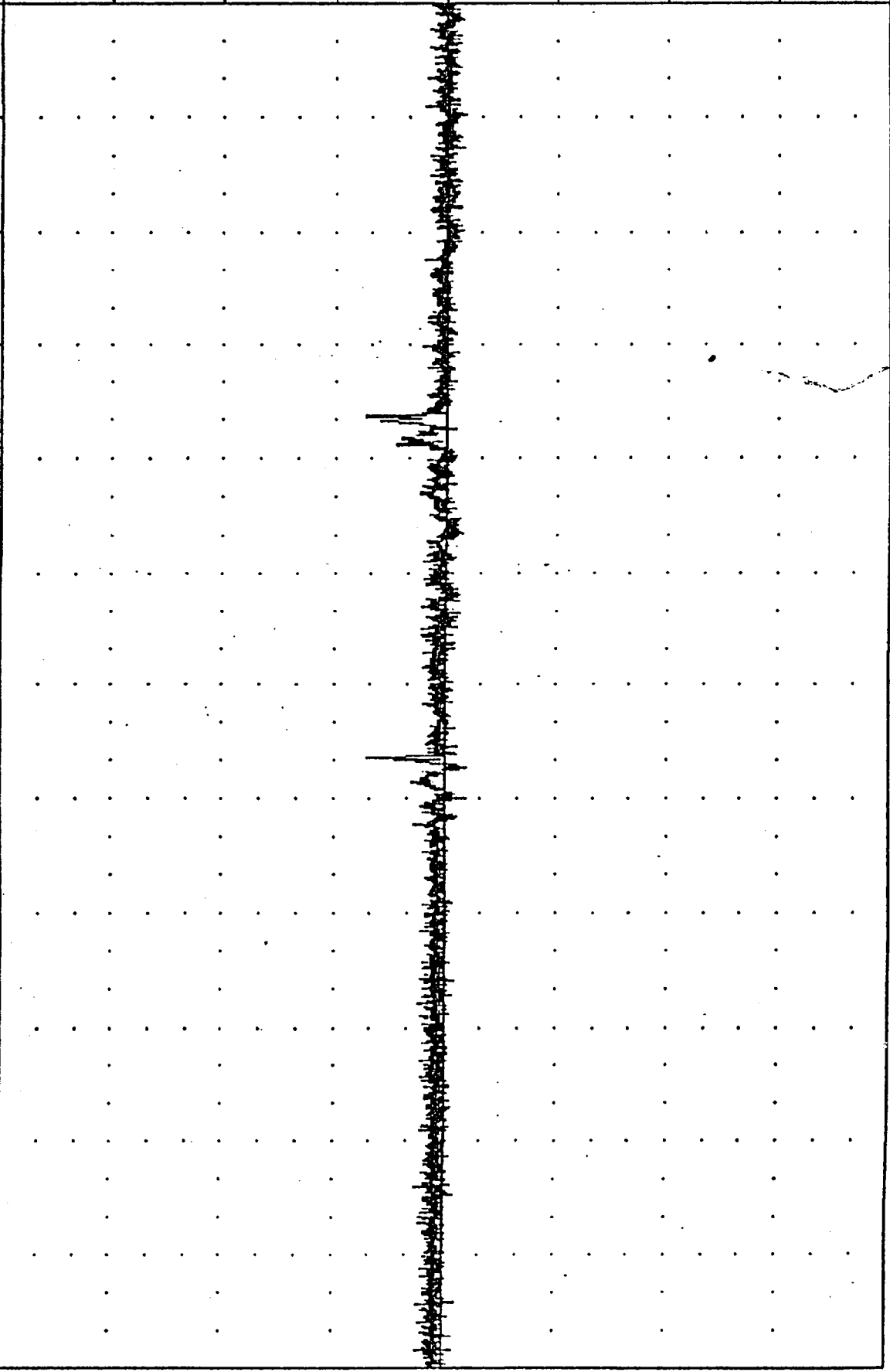
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -18.018

1.48 , 4.79 e 2.80

ACCELERATION (G)

-100.00 -75.00 -50.00 -25.00 0.00 25.00 50.00 75.00 100.00

.00 .40 .80 1.20 1.60 2.00 2.40 2.80 3.20 3.60 4.00 4.40 4.80



1989 NISSAN PICK-UP TRUCK OFF ROLL CART

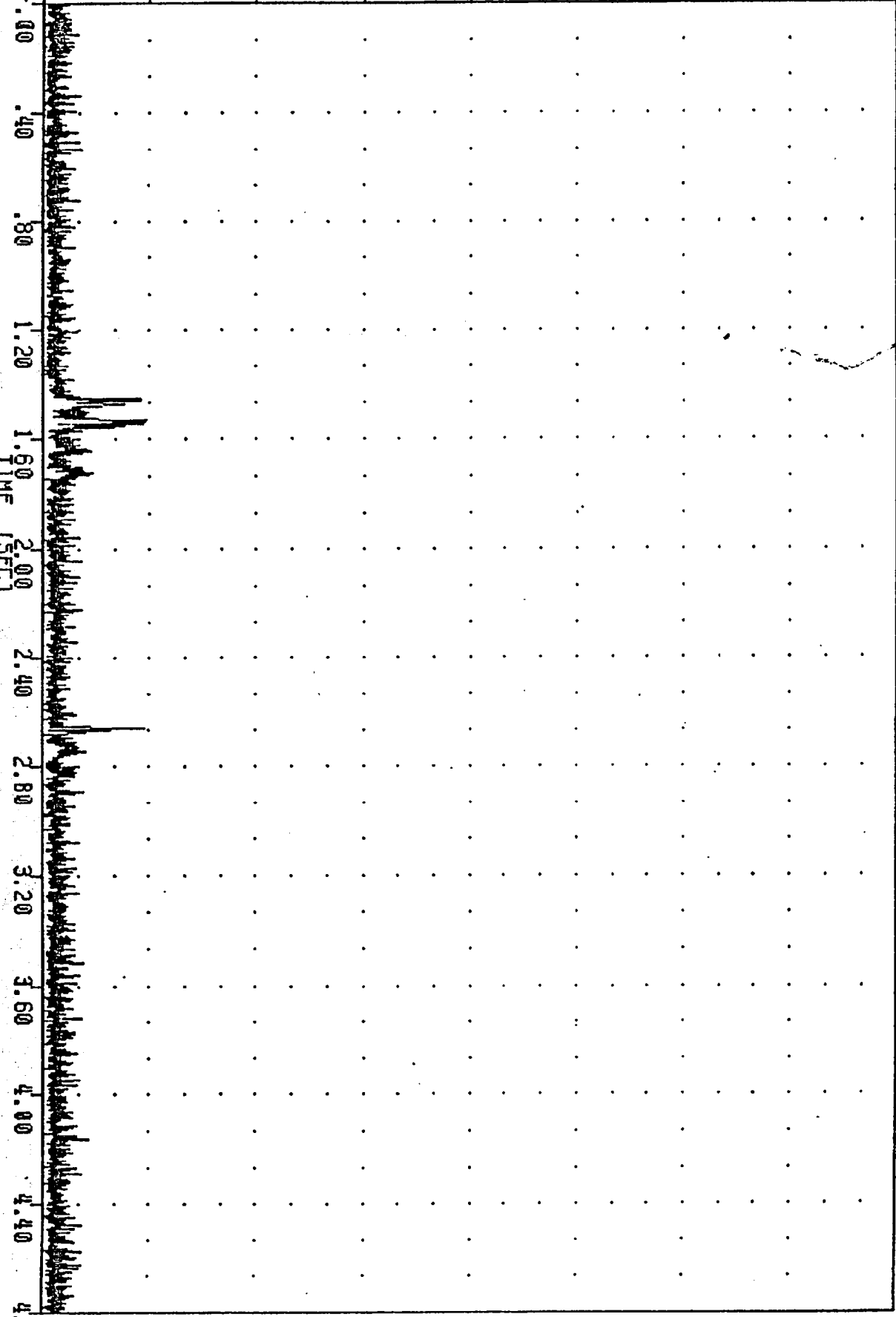
NOTED SUBJECT TRUCK OFF ROLL CART

DOT/NHTSA 890530
CONTROLLED ROLLOVER CRASH
89150
CSTRG1

FILTER = BLP 300 / 750 / -16
MIN. MAX VALUES = 0.12 1.86 19.43 1.53

ACCELERATION (G)

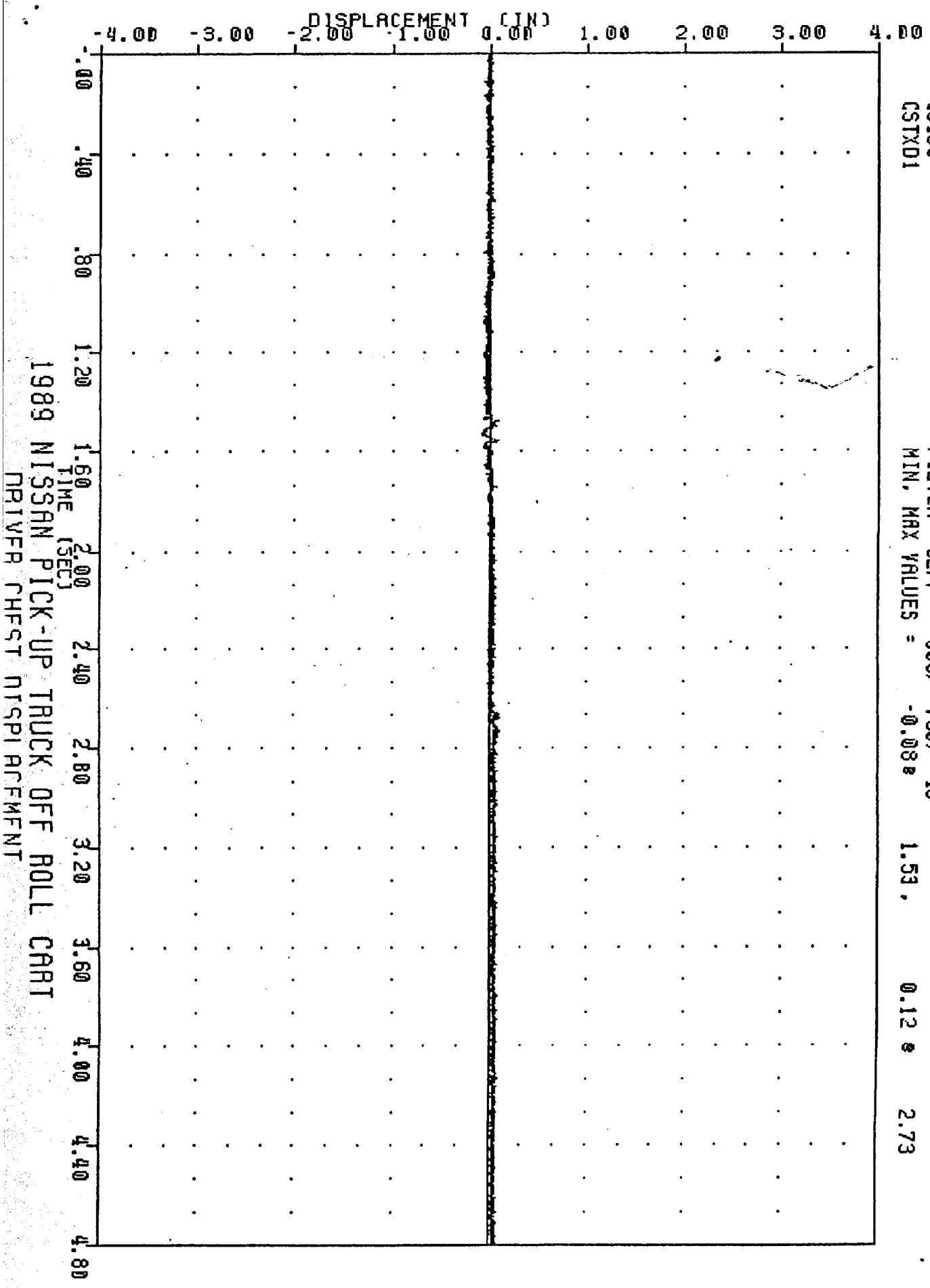
0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
DOT/NHTSA CONTROLLED ROLLOVER CRASH

DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
CSTXD1

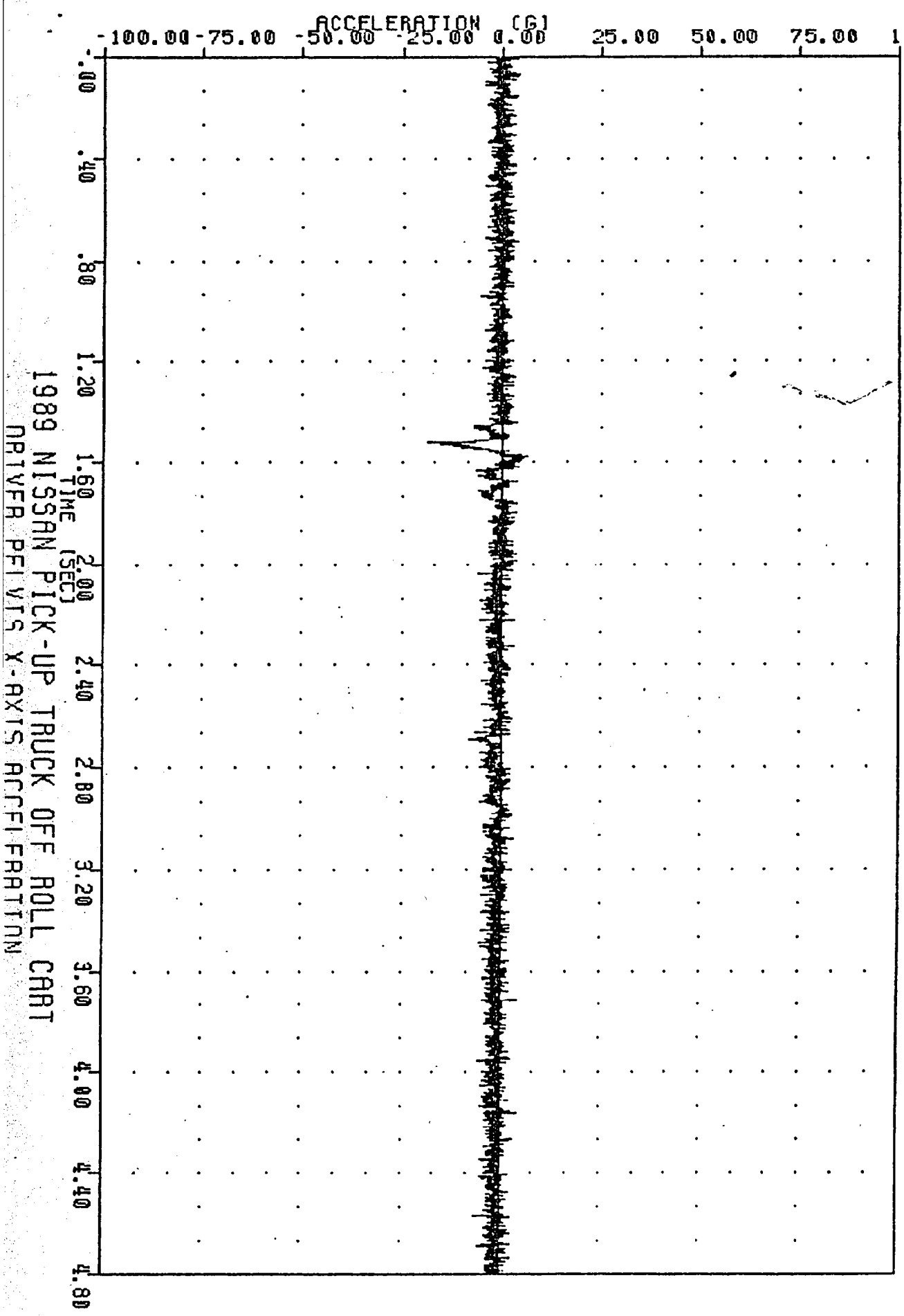
890530
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -0.08 1.53, 0.12 2.73



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
DRIVER CHEST NISSAN RCMFNT

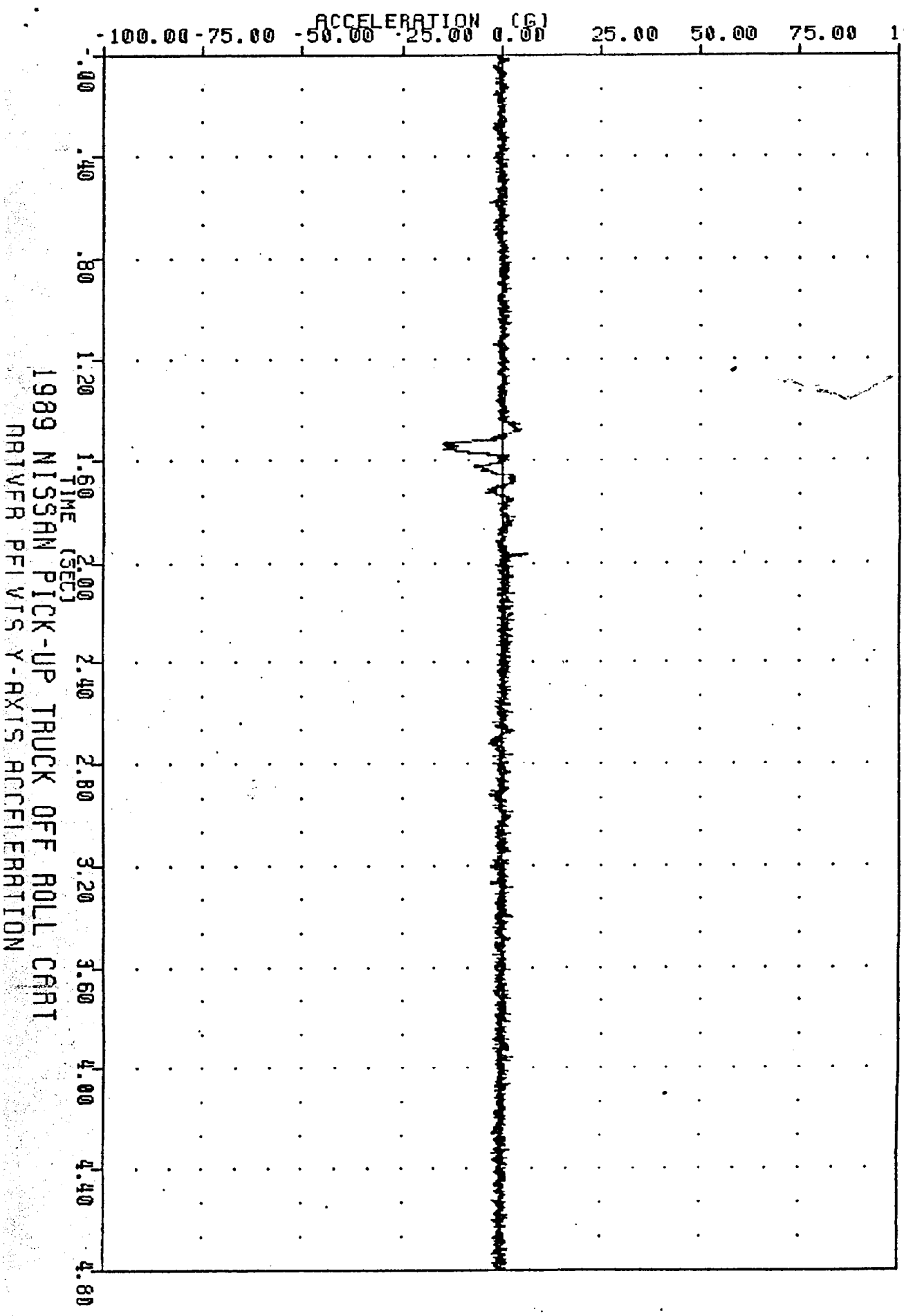
DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
PEYXG1

FILTER = BLPP 300/ .750/ -16
MIN, MAX VALUES = -18.59g 1.52g
6.24g 1.58g



DOT/NHTSA 890530
CONTROLLED ROLLOVER CRASH
89150
PEVYGI

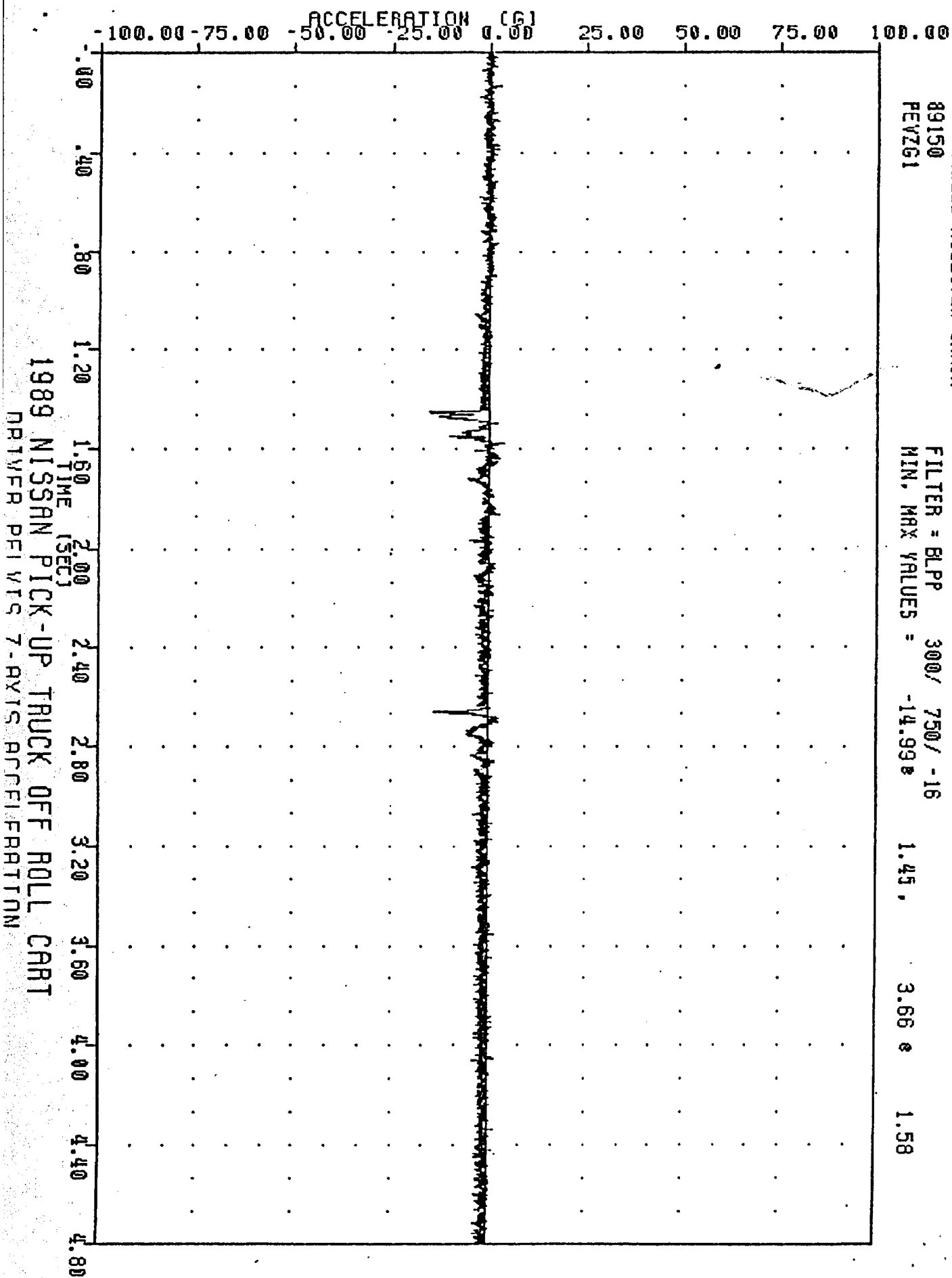
FILTER = BLPP 300/ 750/ -16
MIN. MAX VALUES = -14.64 e 1.56 , 6.73 e 1.97



DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
PEVZG1

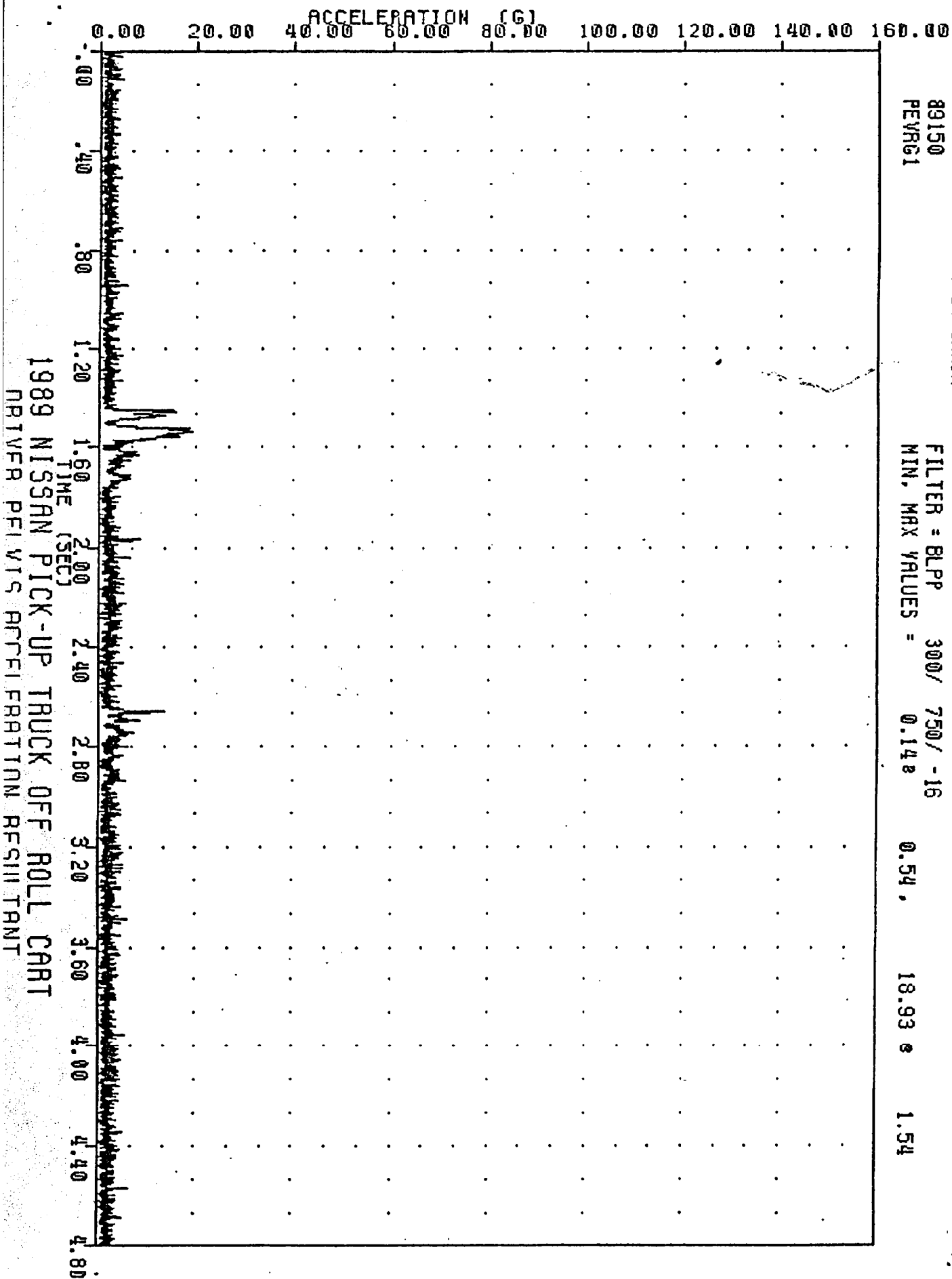
FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = -14.99 1.45

1.45 3.66 1.58



DOT/NHTSA 890530
CONTROLLED ROLLOVER CRASH
89150
PEVRG1

FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = 0.14 0.54 18.93 1.54



BU/NI 3M 89055w
CONTROLLED ROLLOVER CRASH
89150
RDKXY1

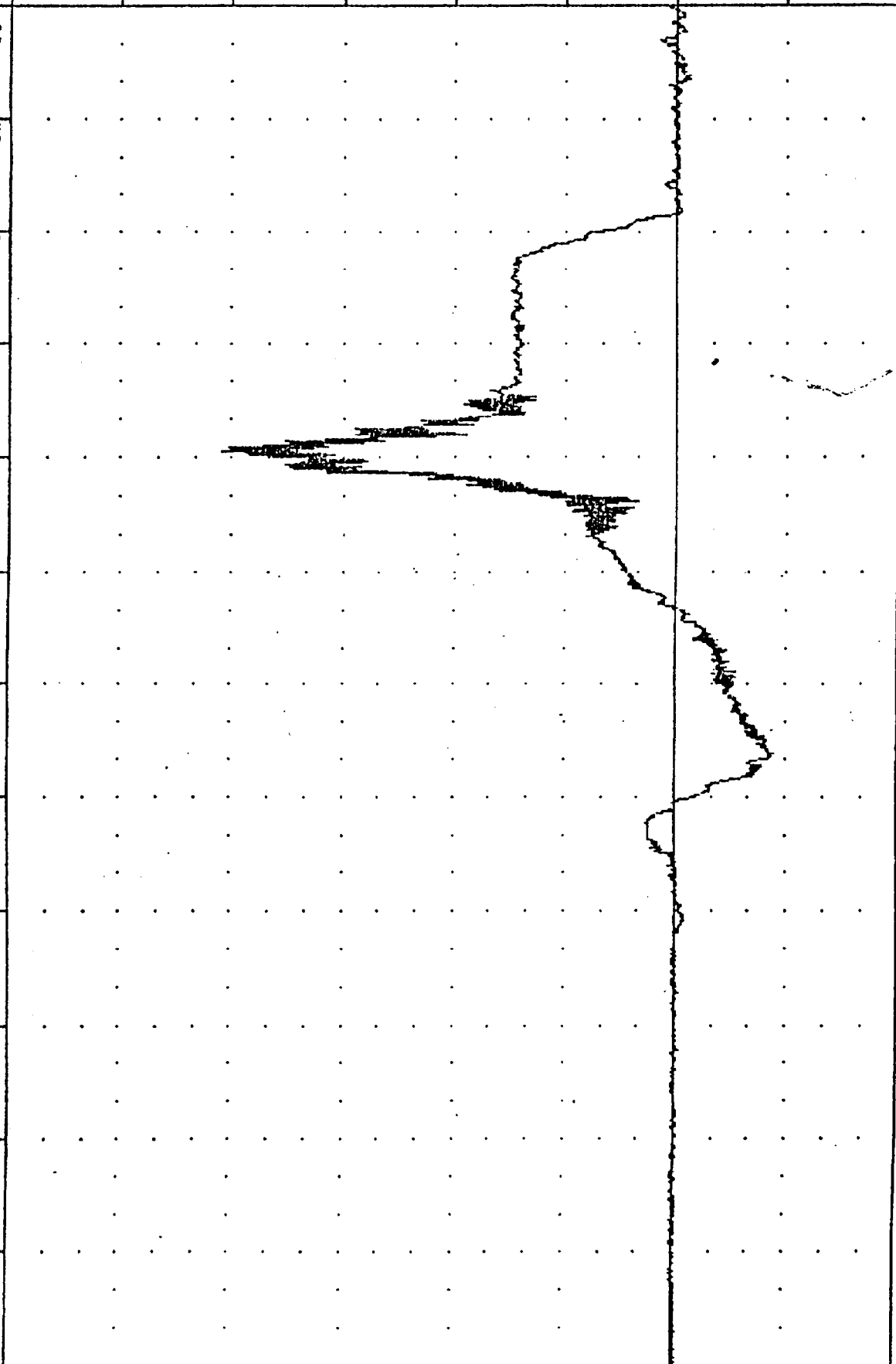
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -408.748

1.58

89.448

2.64

ANGULAR VEL (DEG/SEC) (X10⁴)

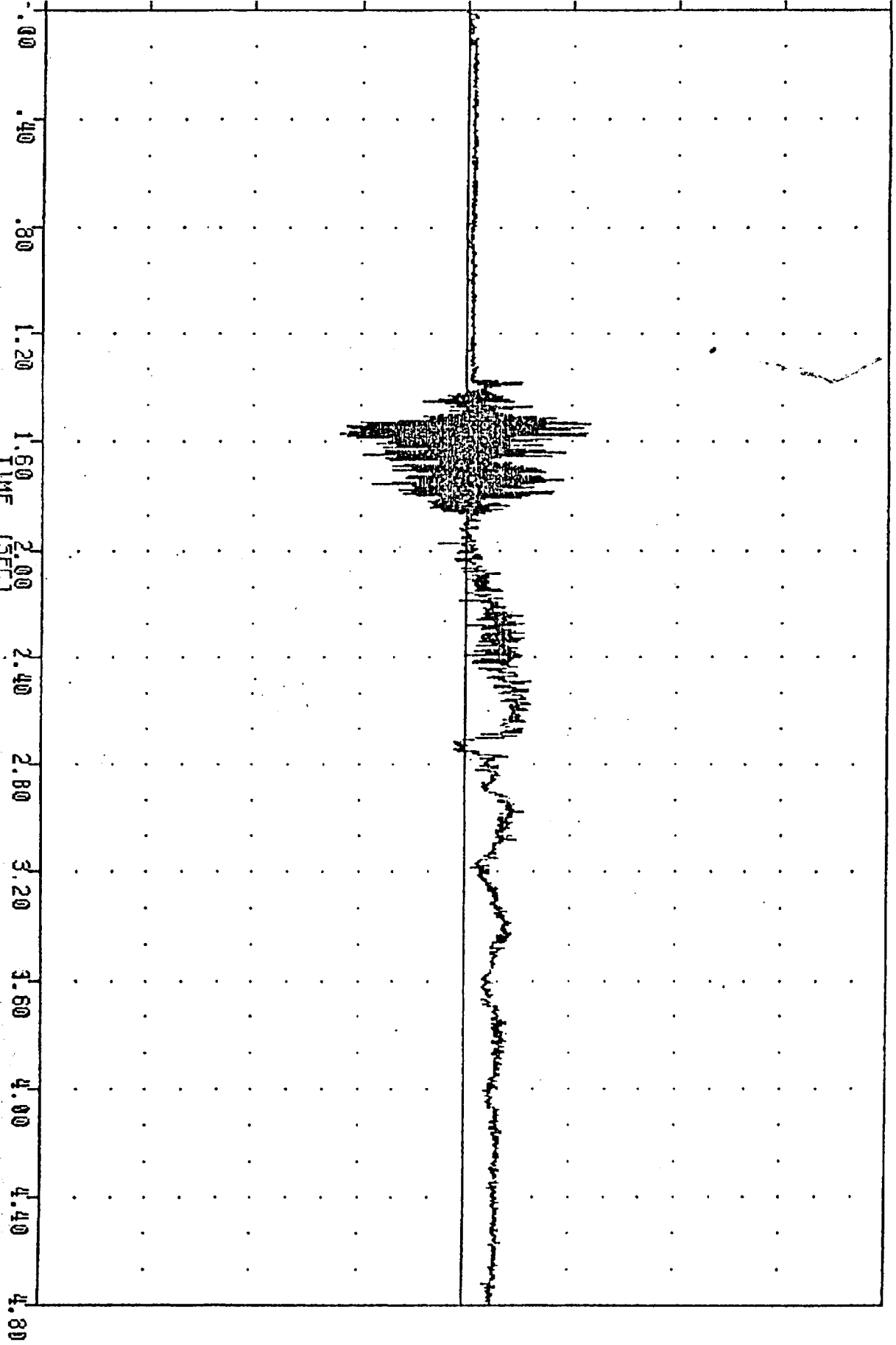


1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
VEHICLE ROLL RATE

LU1/NH15H
CONTROLLED ROLLOVER CRASH
89150
RDKYV1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -117.82 1.57, 116.93 1.54

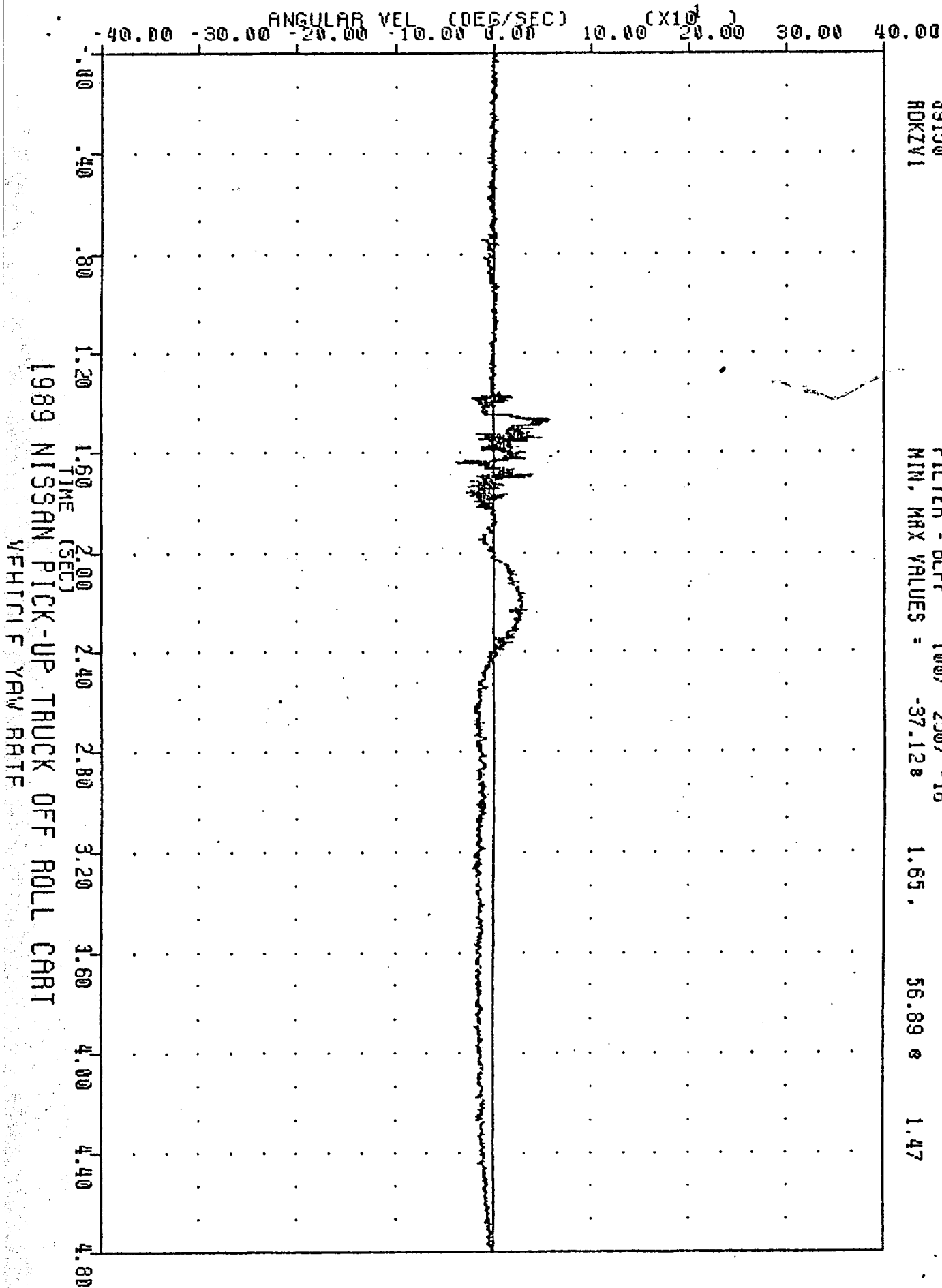
ANGULAR VEL (DEG/SEC) (X10¹)



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
VEHICLE PITCH RATE

DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
RDKZV1

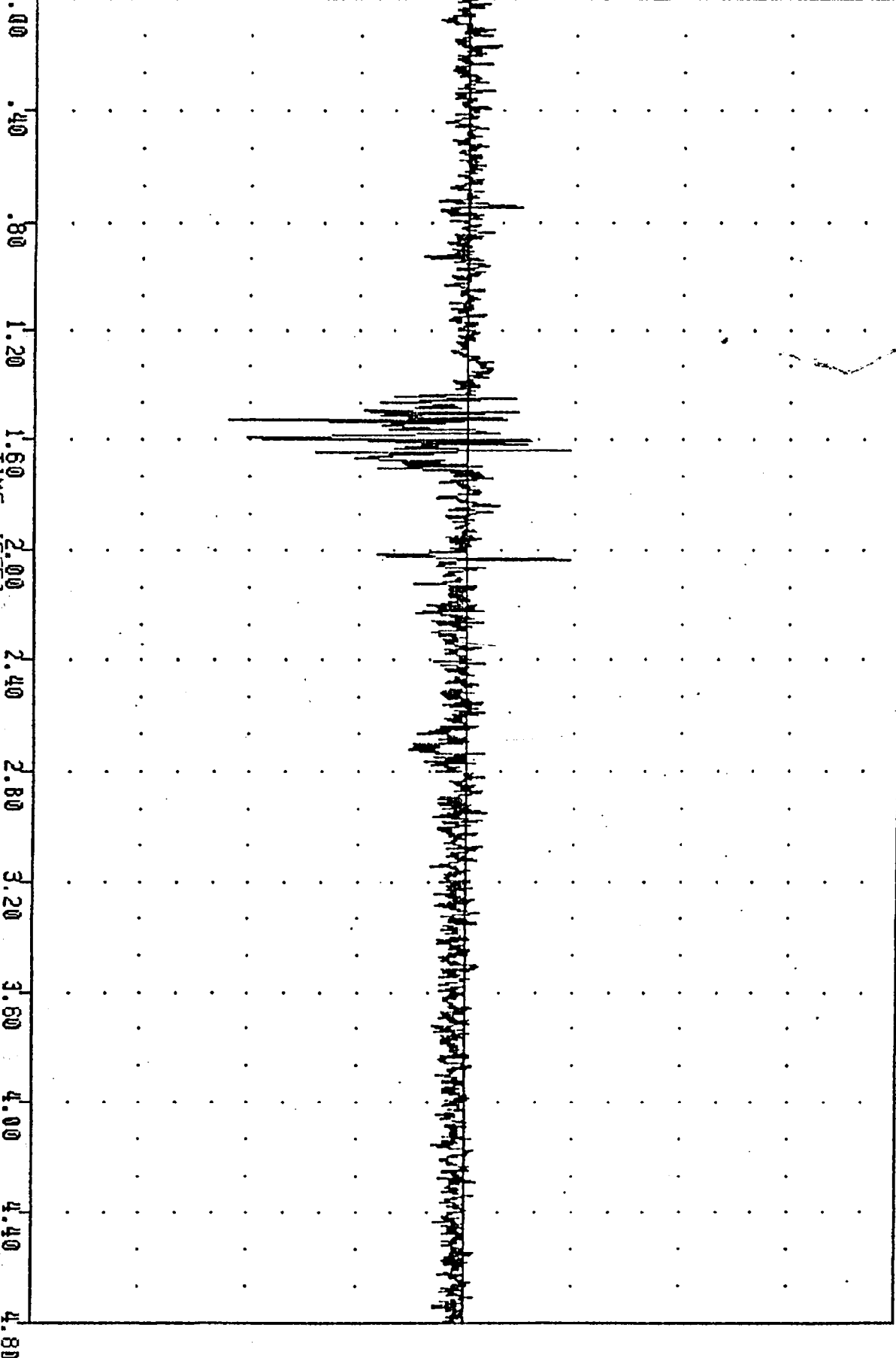
890530
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -37.12 1.65, 56.89 1.47



DOT/NHTSA 890530
CONTROLLED ROLLOVER CRASH
89150
VCGXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -10.97g 1.53, 4.78g 1.64

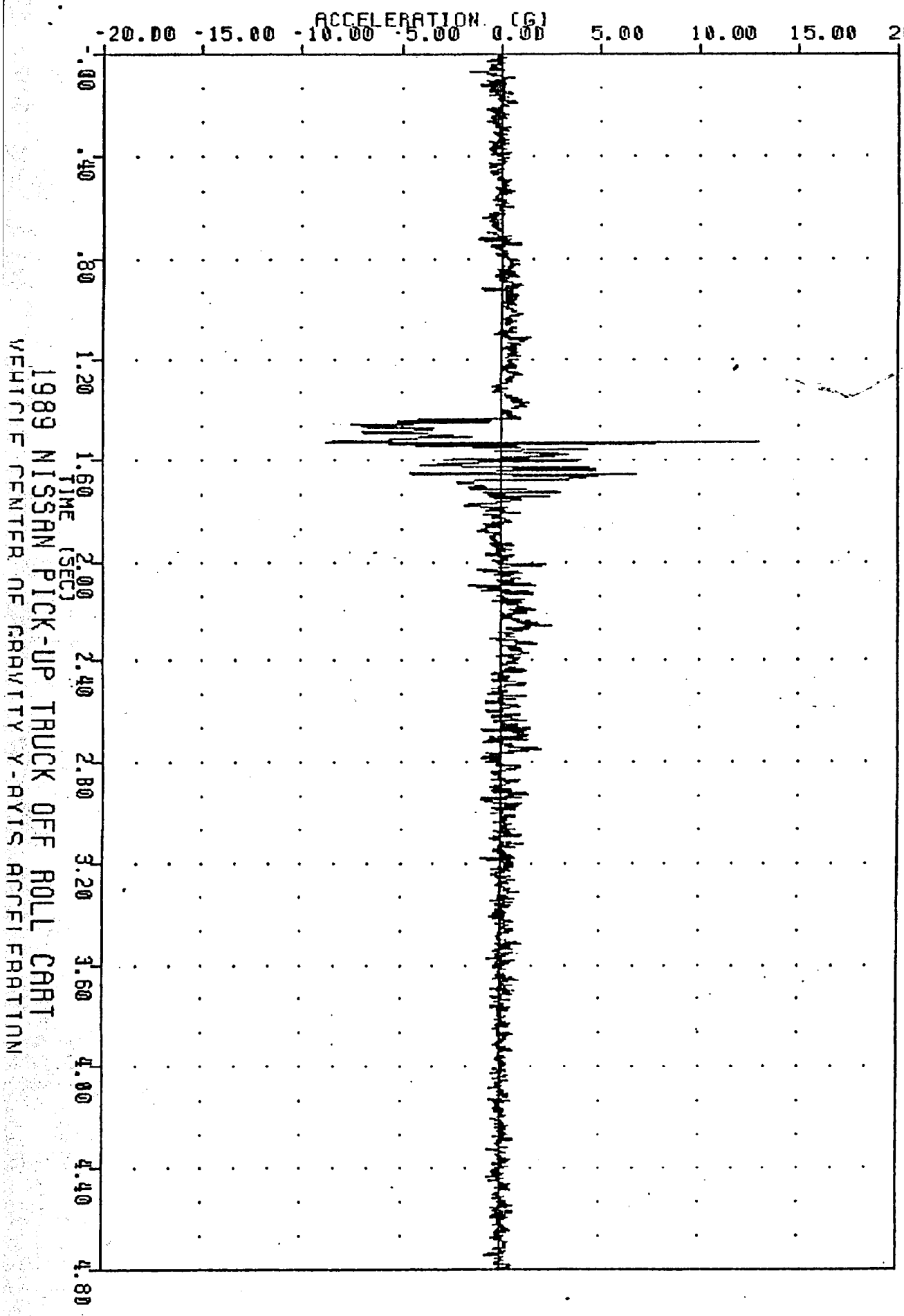
ACCELERATION (G) -20.00 -15.00 -10.00 -5.00 0.00 5.00 10.00 15.00 20.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
VEHICLE CENTER OF GRAVITY Y-AXIS ACCELERATION

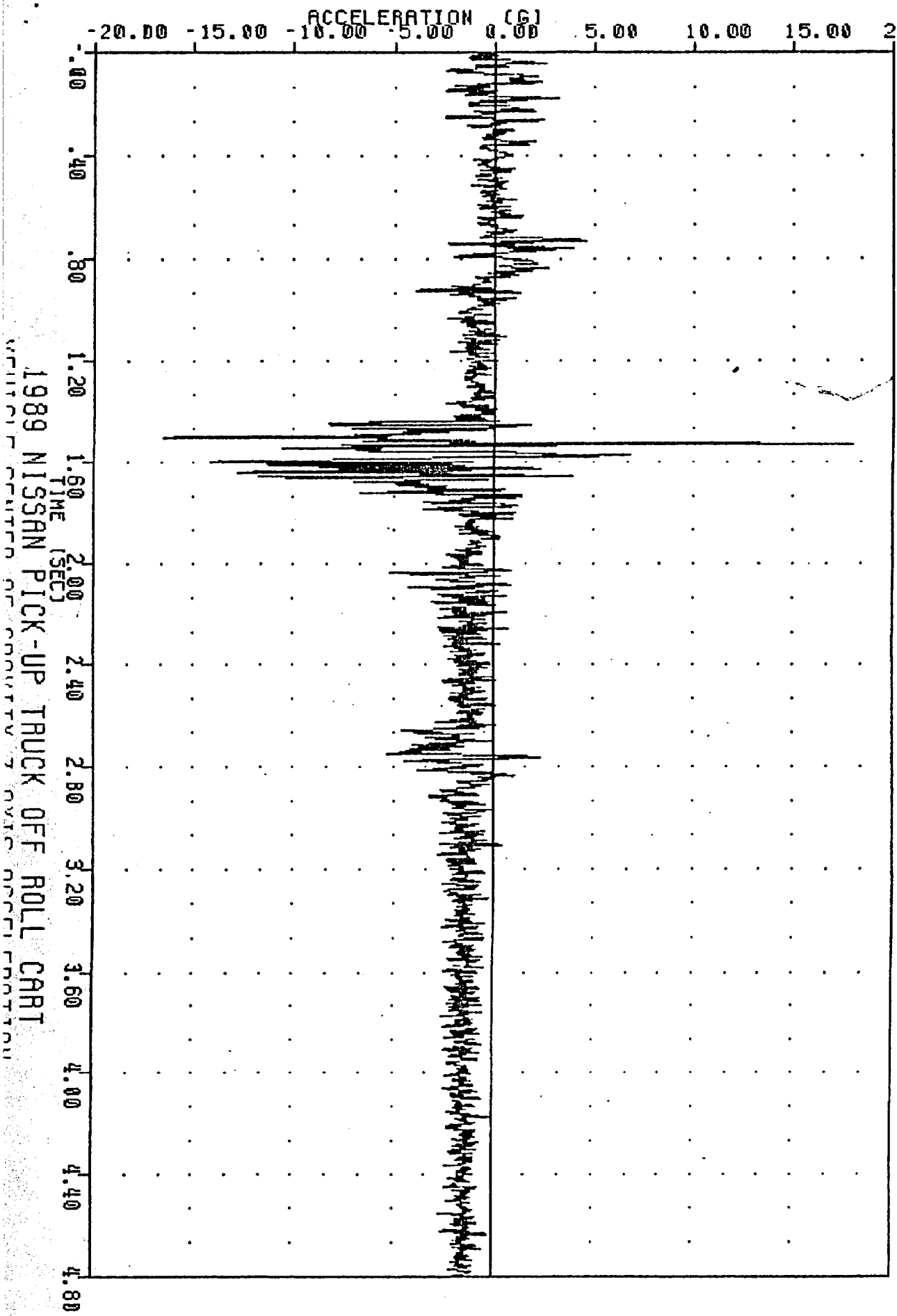
DOT/NHTSA , 890530
CONTROLLED ROLLOVER CRASH
89150
YCGY61

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -8.75g 1.53 , 12.94 g 1.53



DOT/NHTSA , 890530
CONTROLLED ROLLOVER CRASH
89150
NCGZG1

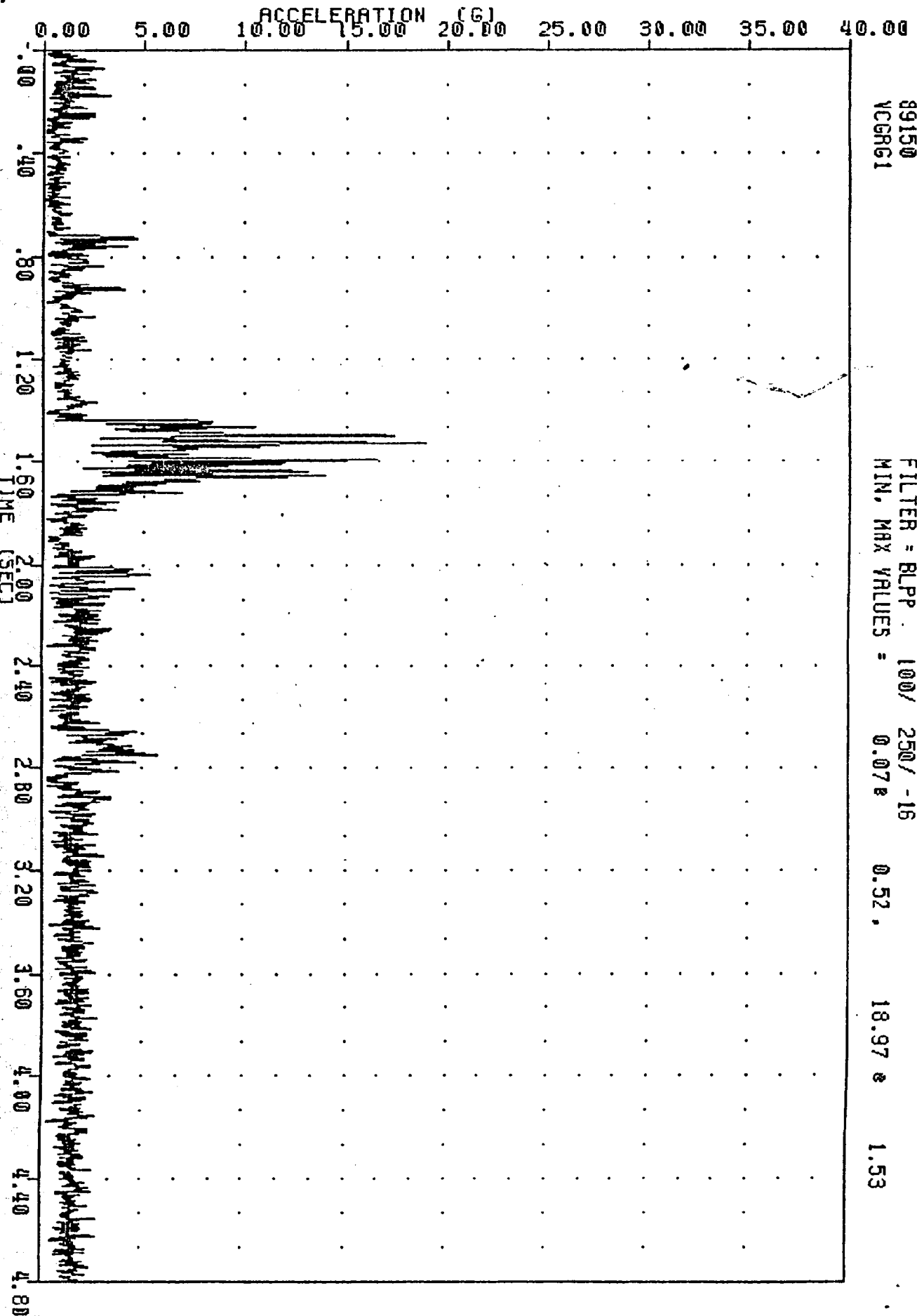
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -16.51g 1.50 , 17.90g 1.53



1989 NISSAN PICK-UP TRUCK OFF ROLL CART

DOT/NHTSA
CONTROLLED ROLLOVER CRASH
89150
VCRG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = 0.07g 0.52, 18.97g 1.53

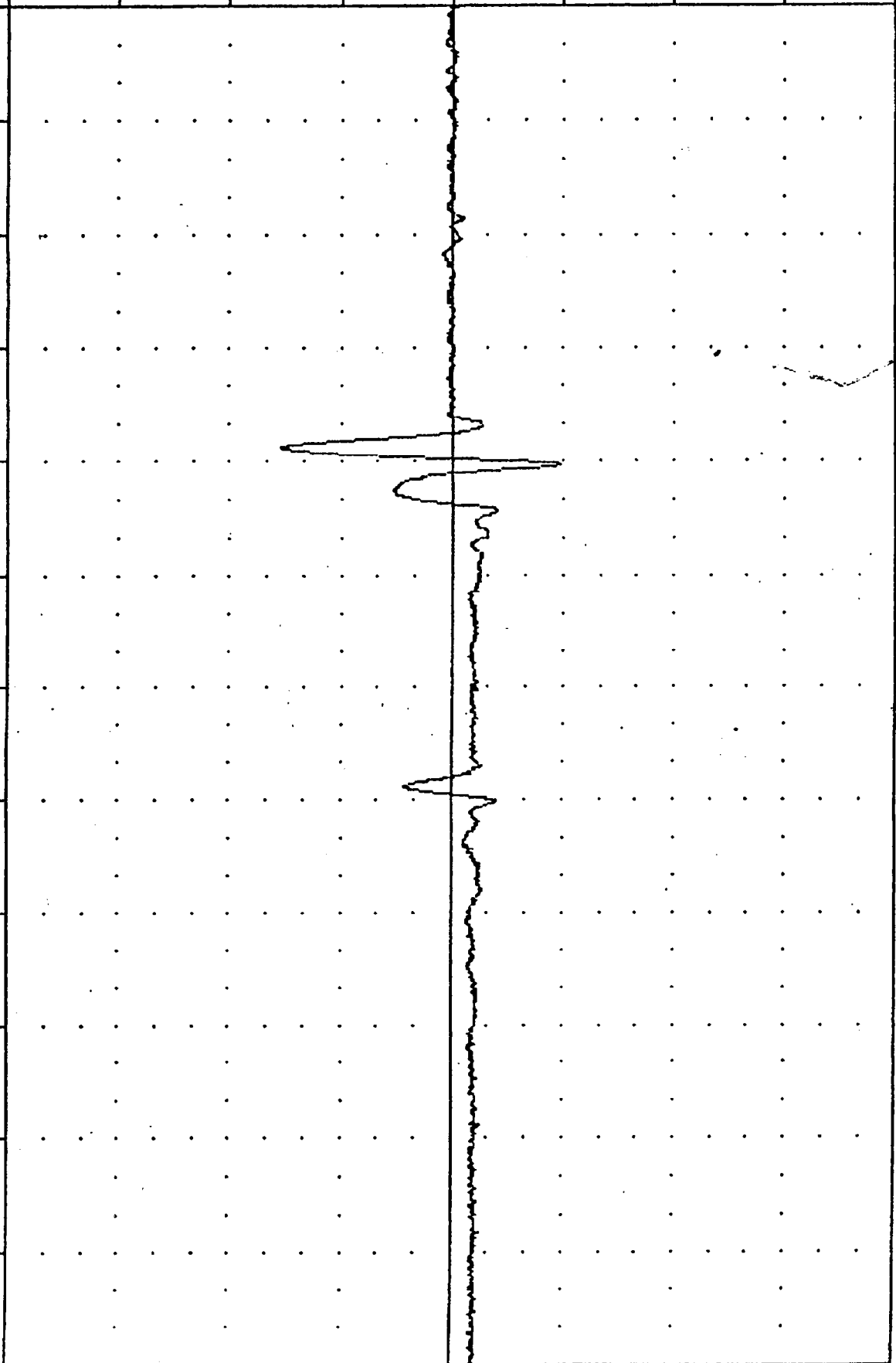


1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
VEHICLE CENTER OF GRAVITY ACCELERATION RESISTANT

UUI/NH15H 890530
CONTROLLED ROLLOVER CRASH
89150
SFLD1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -3.07 1.55, 1.98 1.61

DISPLACEMENT (IN)



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
VEHICLE LEFT FRONT DISPLACEMENT

DOT/NHTSR 890530
CONTROLLED ROLLOVER CRASH
89150
SFRD1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -6.19 1.63

0.32 0.76

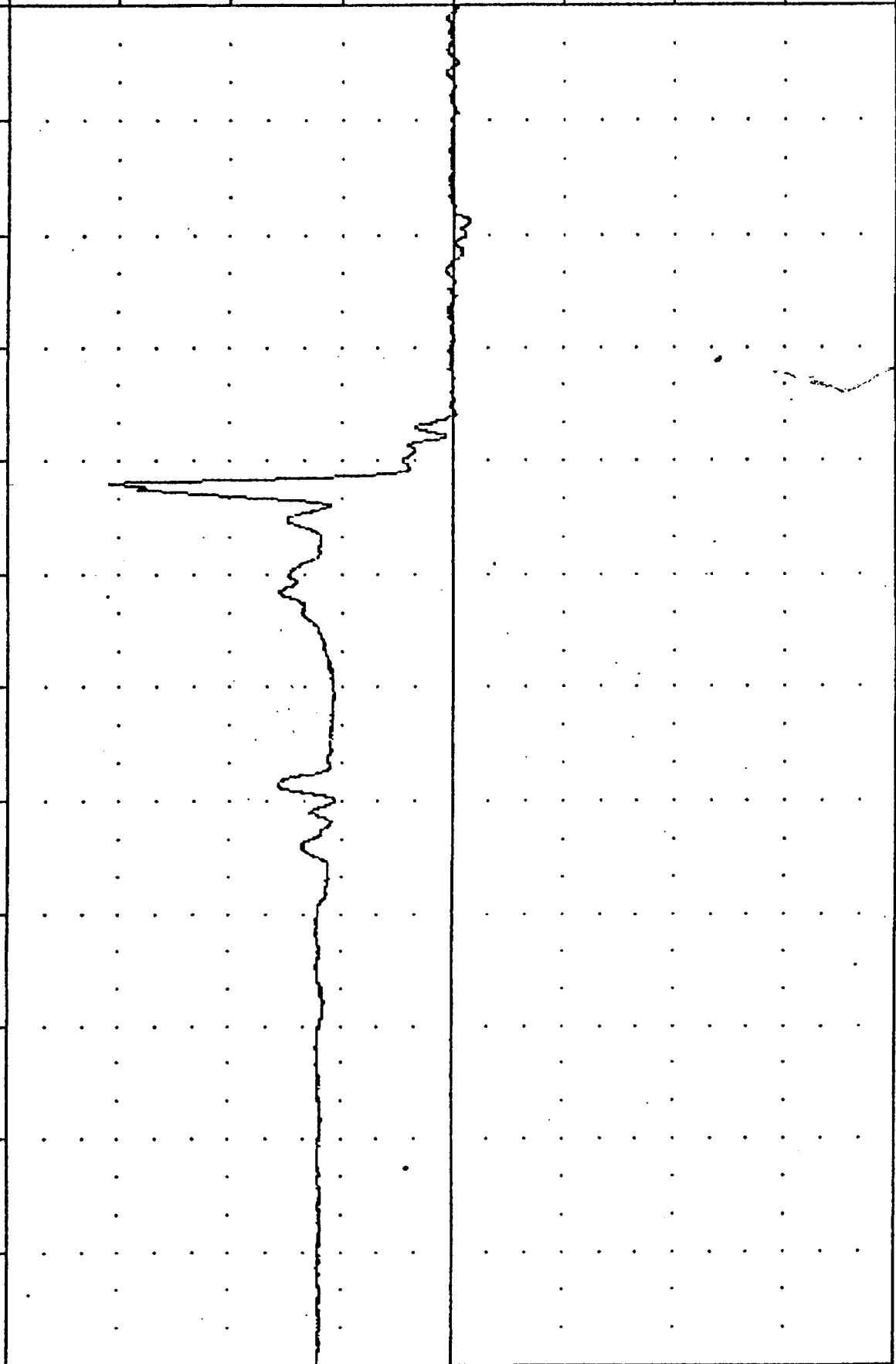
DISPLACEMENT (IN)

-8.00 -6.00 -4.00 -2.00 0.00 2.00 4.00 6.00 8.00

.00 .40 .80 1.20 1.60 2.00 2.40 2.80 3.20 3.60 4.00 4.40 4.80

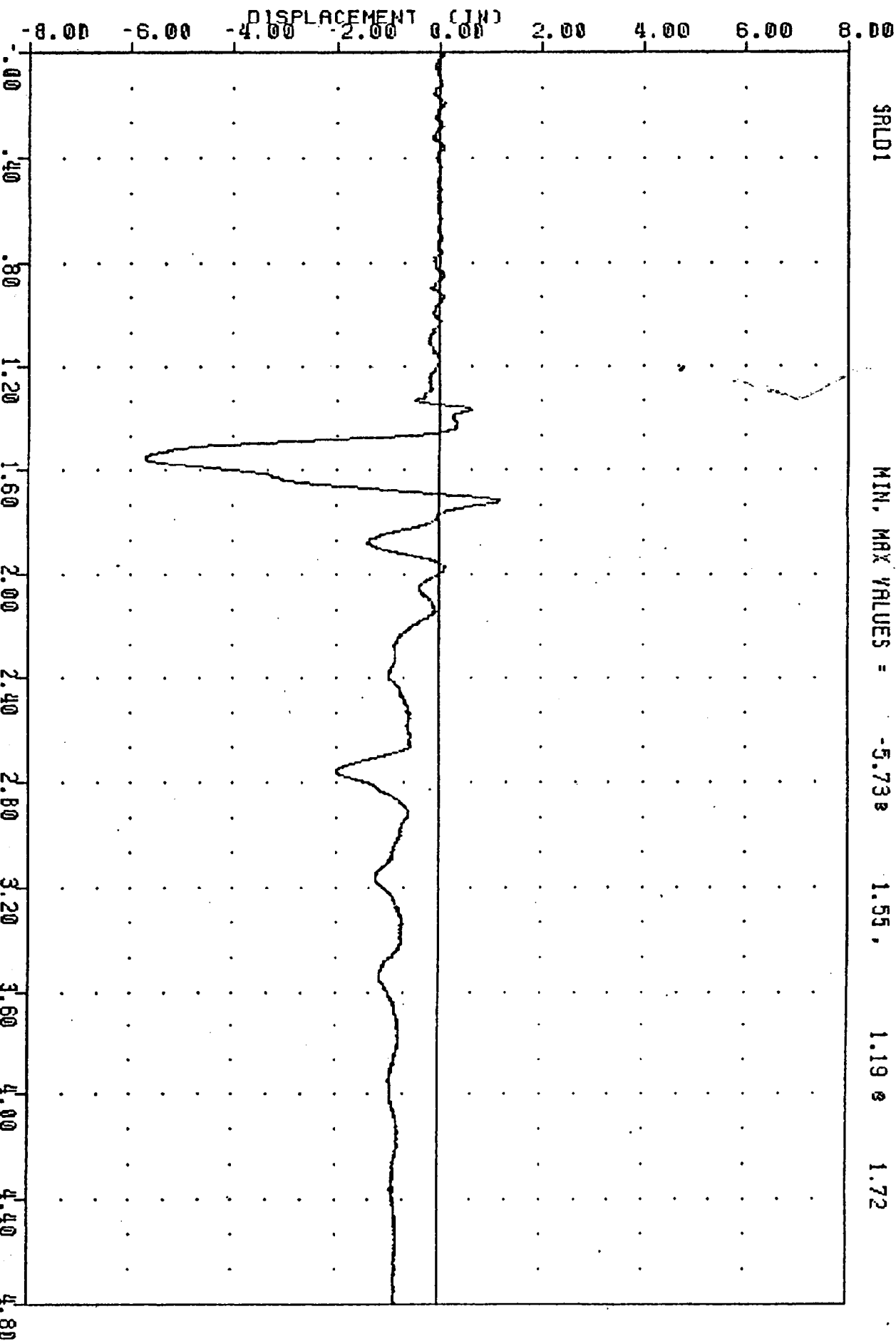
TIME (SEC)

1989 NISSAN PICK-UP TRUCK OFF ROLL CART
VEHICLE IDENTIFICATION NUMBER



DOT/NHTSA , 890530
CONTROLLED ROLLOVER CRASH
89150
9RLD1

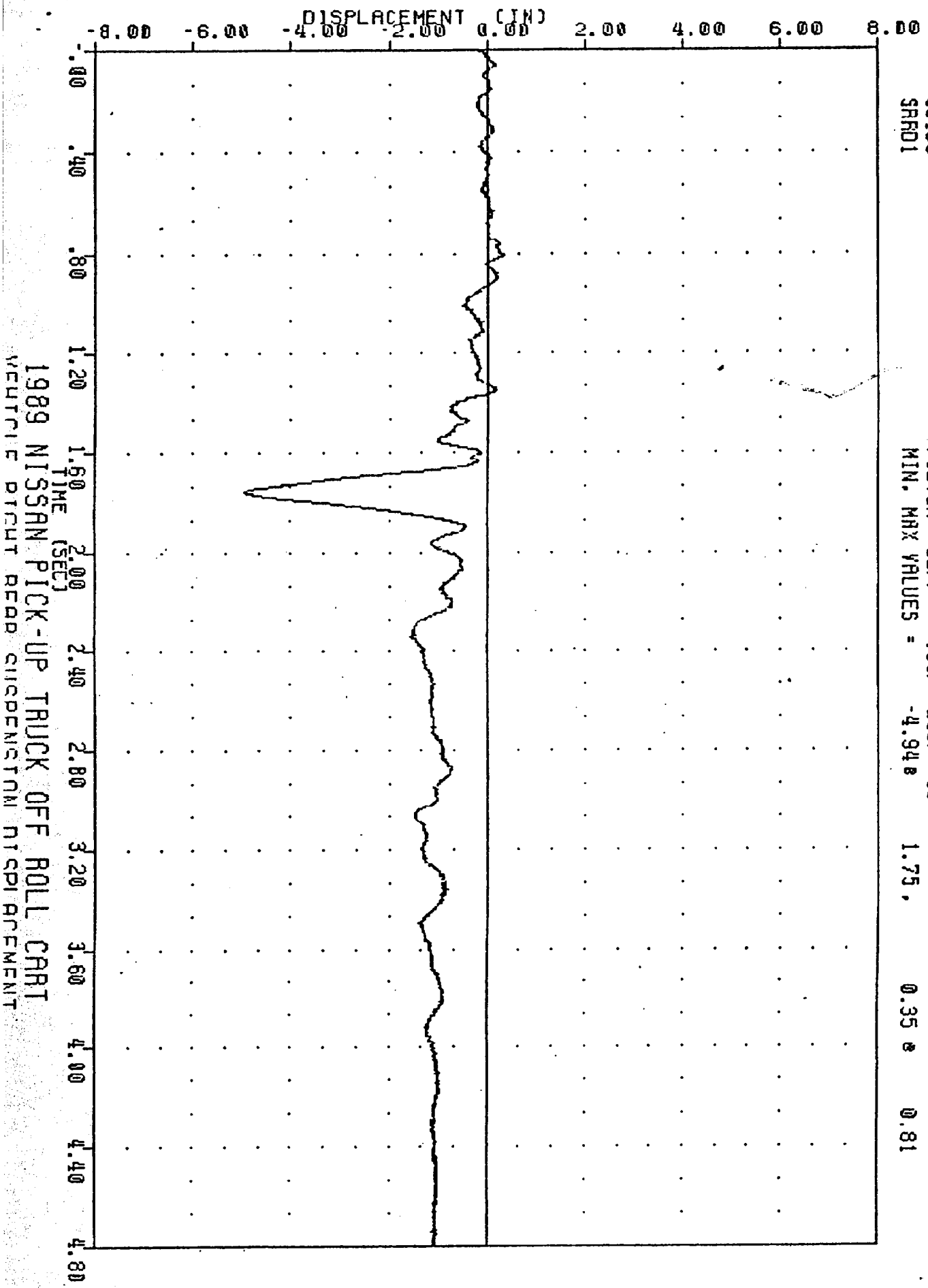
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -5.73 1.55 , 1.19 1.72



1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
VEHICLE LEFT REAR SUSPENSION DISPLACEMENT

U1/NH15H
CONTROLLED ROLLOVER CRASH
89150
SRFD1

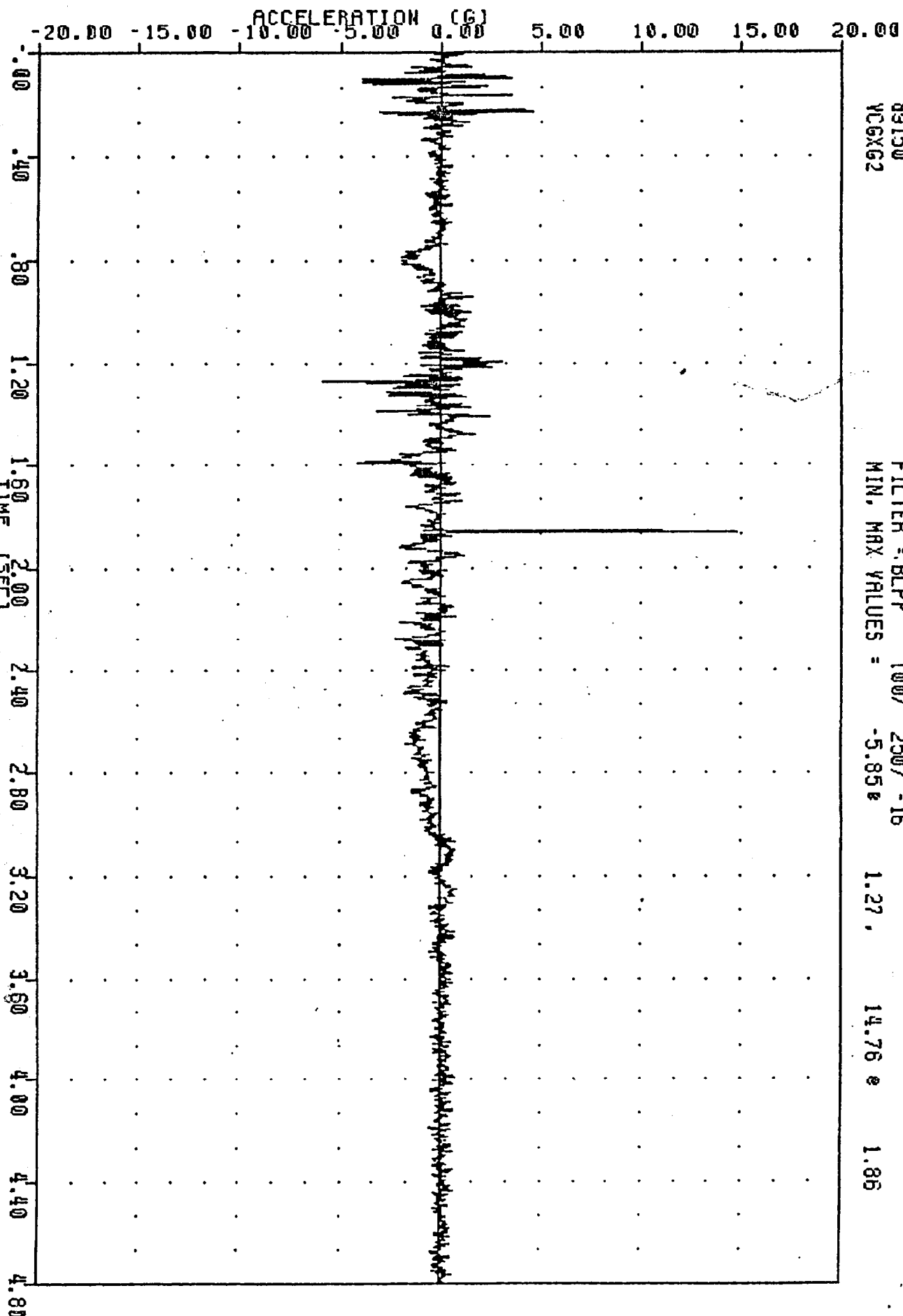
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -4.94 1.75, 0.35 0.81



1989 NISSAN PICK-UP TRUCK OFF ROLL CRASH
VEHICLE RIGID REAR SUSPENSION MISALIGNMENT

DOT/NHTSA 890530
CONTROLLED ROLLOVER CRASH
89150
WCGXG2

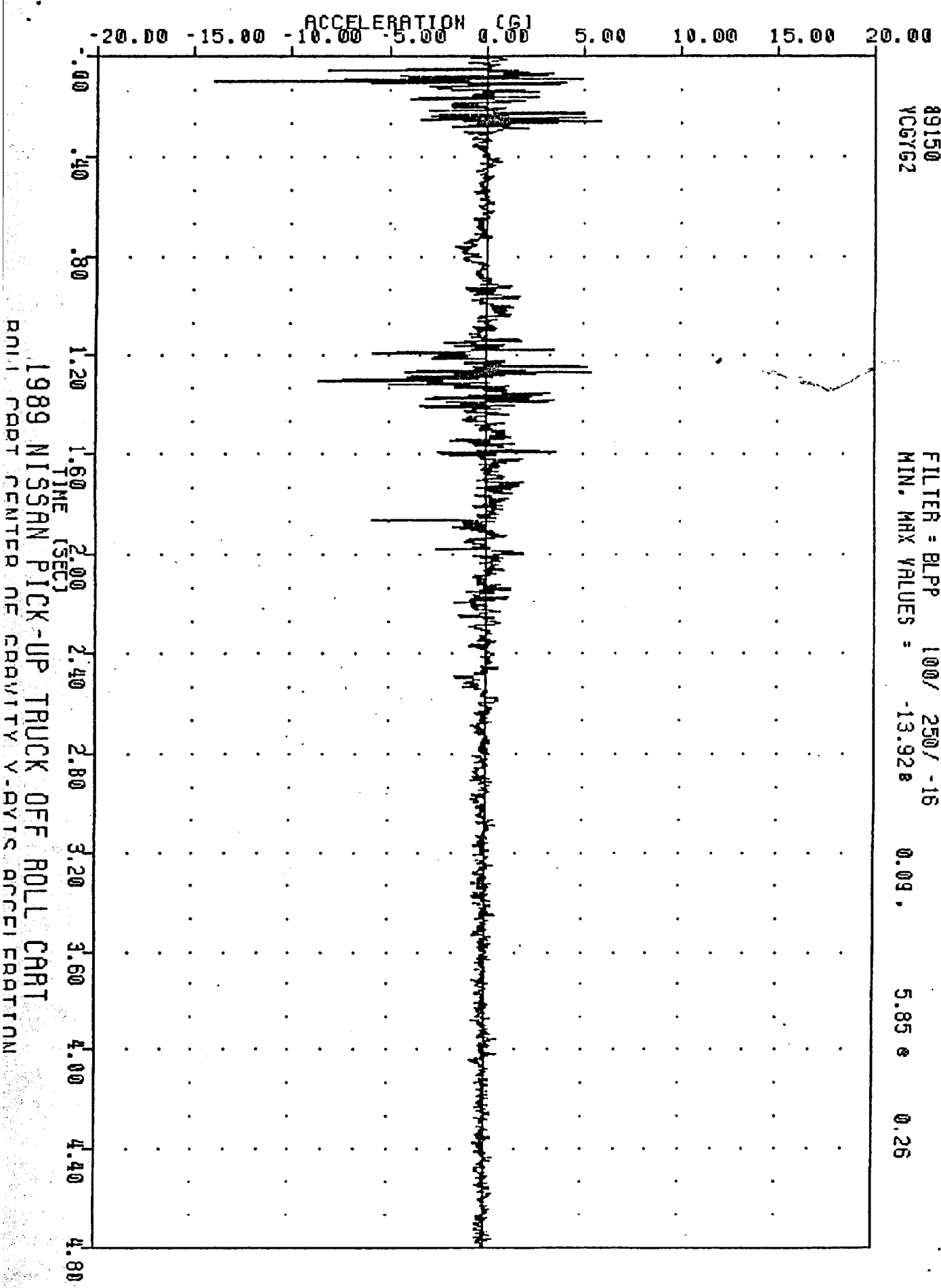
FILTER = BLP 100/ 250/ -16
MIN. MAX VALUES = -5.85 1.27 14.76 1.86



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
PULL POINT CENTER OF GRAVITY V. DIVE OFFSET POSITION

UJI/NHISH 890530
CONTROLLED ROLLOVER CRASH
89150
YCGYG2

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -13.92g 0.09g 5.85g 0.26



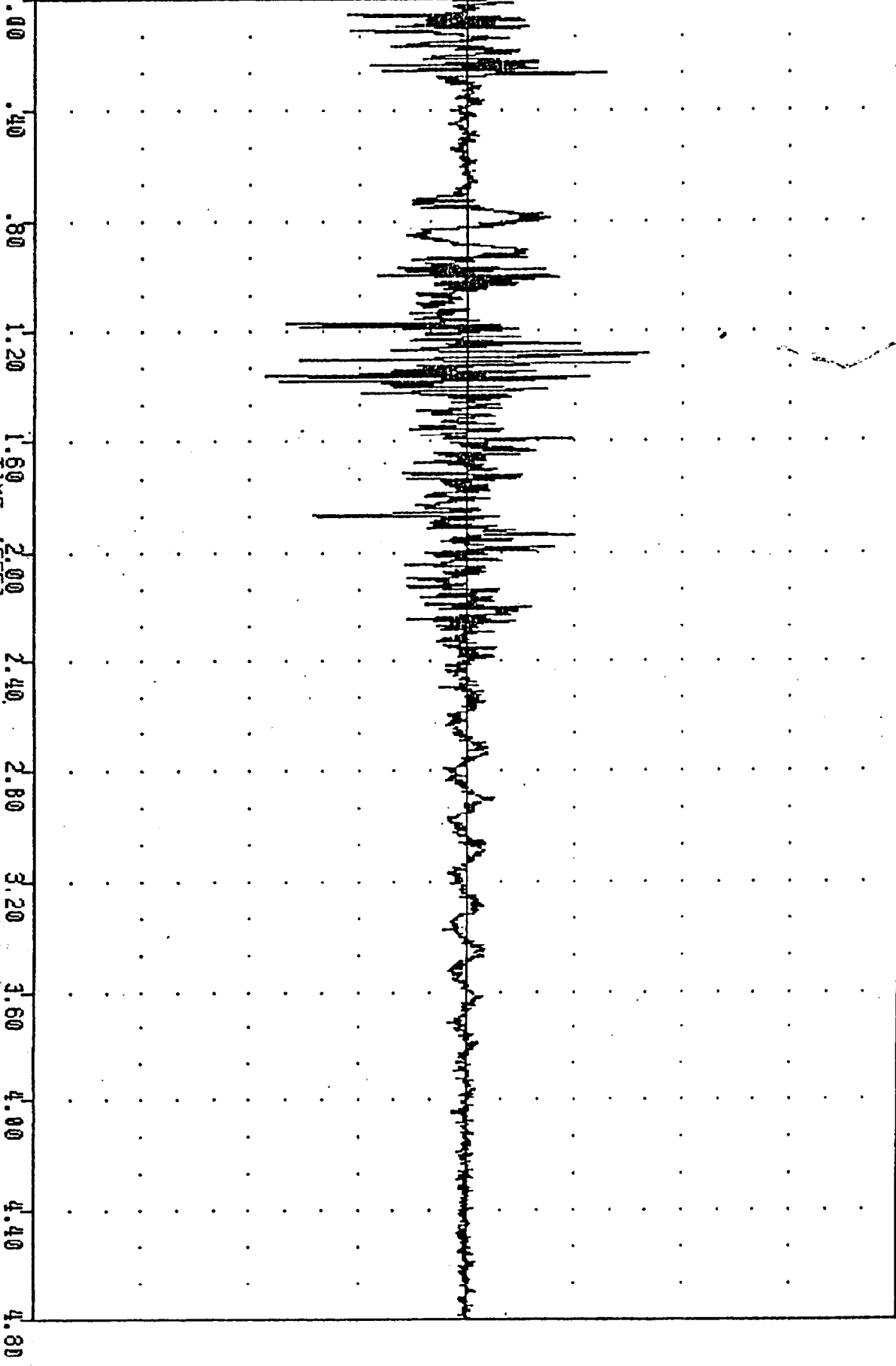
1989 NISSAN PICK-UP TRUCK OFF ROLL CART
RUL1 CABT CENTER NE GRAVITY V-RAYS ACCFI CRATRN

UUI/NHISH , 89053W
CONTROLLED ROLLOVER CRASH
89150
NCGZG2

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -9.30 * 1.36 , 8.36 * 1.28

ACCELERATION (G)

-20.00 -15.00 -10.00 -5.00 0.00 5.00 10.00 15.00 20.00



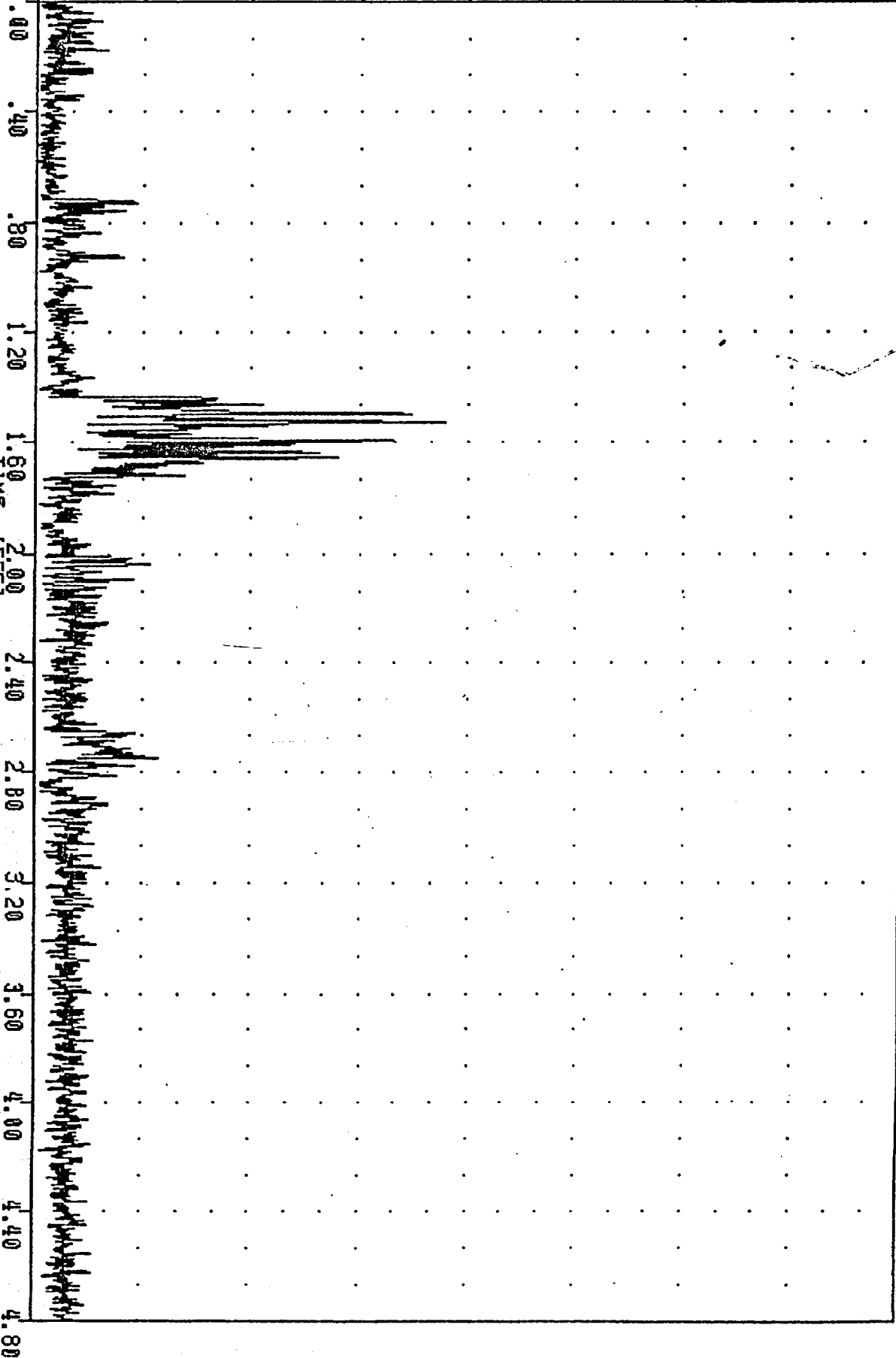
1989 NISSAN PICK-UP TRUCK OFF ROLL CART
PNT1 CABT CENTER OF GRAVITY 7-AXIS ACCFERRATION

UUI/NHISH 890530
CONTROLLED ROLLOVER CRASH
89150
YCGRG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = 0.07g 0.52, 18.97g 1.53

ACCELERATION (G)

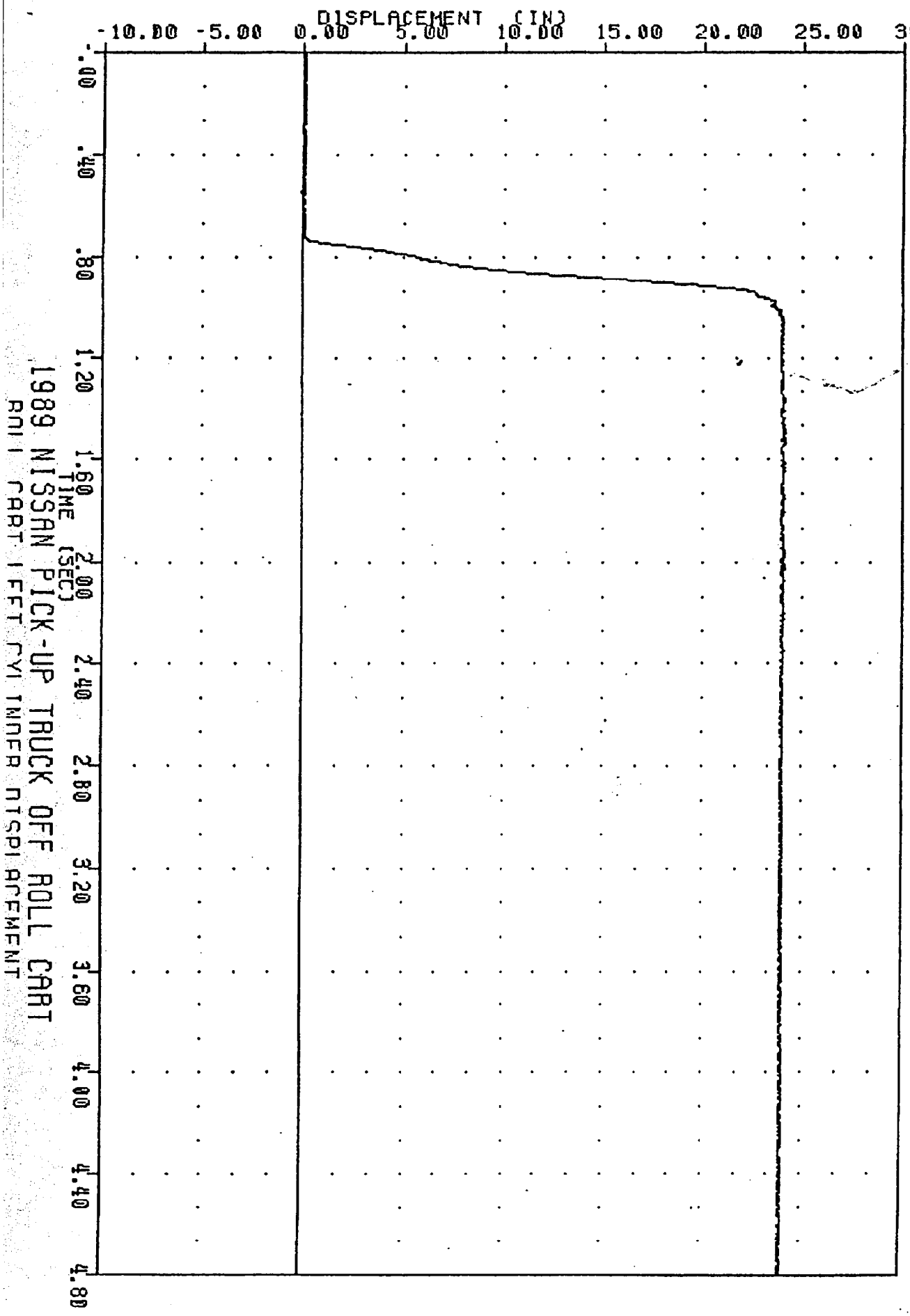
0.00 5.00 10.00 15.00 20.00 25.00 30.00 35.00 40.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
P011 CART CENTER OF GRAVITY ACCERATION RESULTANT

UJ1/NH1SH
 CONTROLLED ROLLOVER CRASH
 89150
 RCPDL

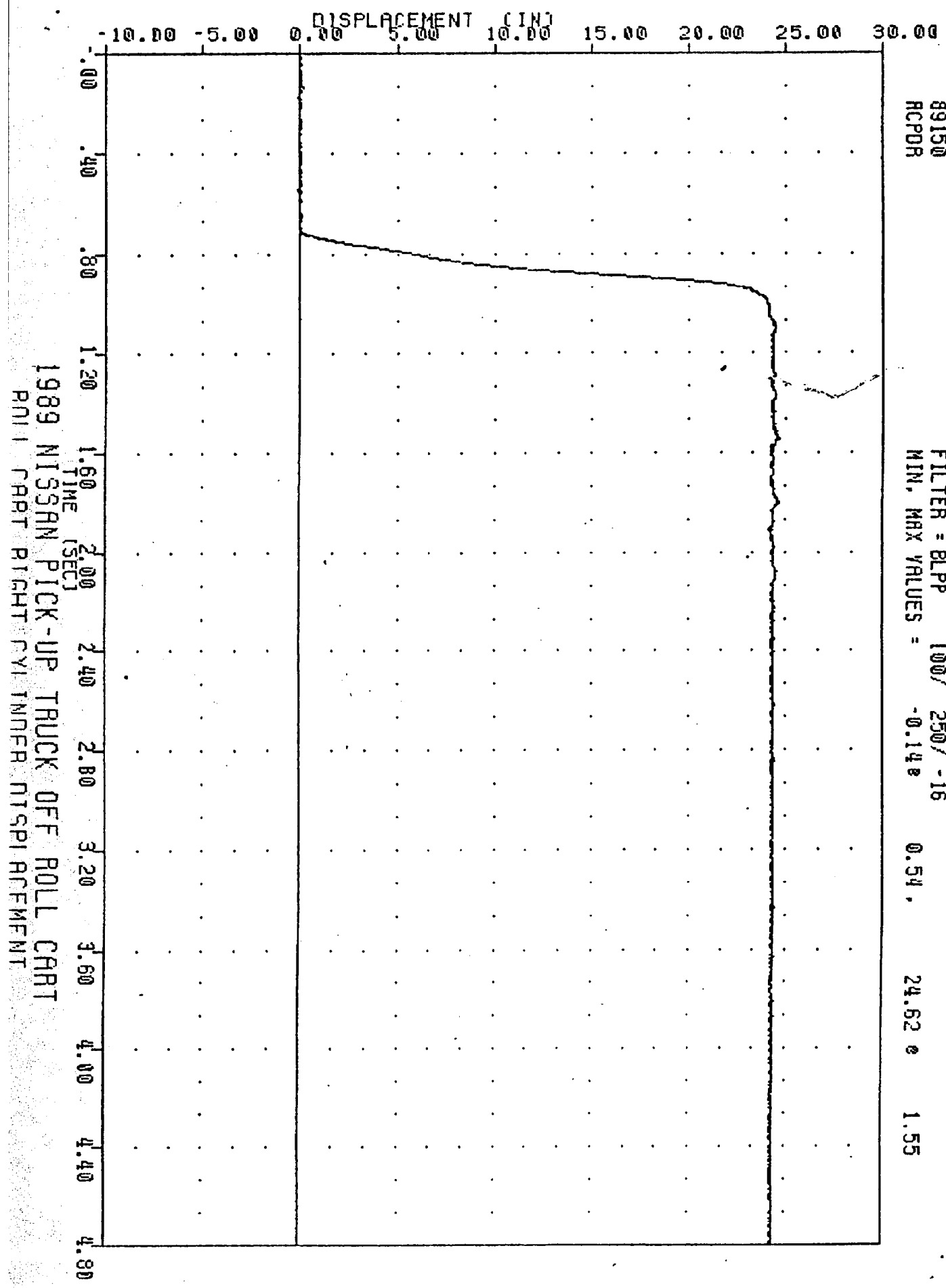
890530
 FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -0.11e 0.54, 24.17 e 2.20



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
 RMI1 CART LEFT TYMNER DISPLACEMENT

DU1/MHTSH
CONTROLLED ROLLOVER CRASH
89150
RCPDR

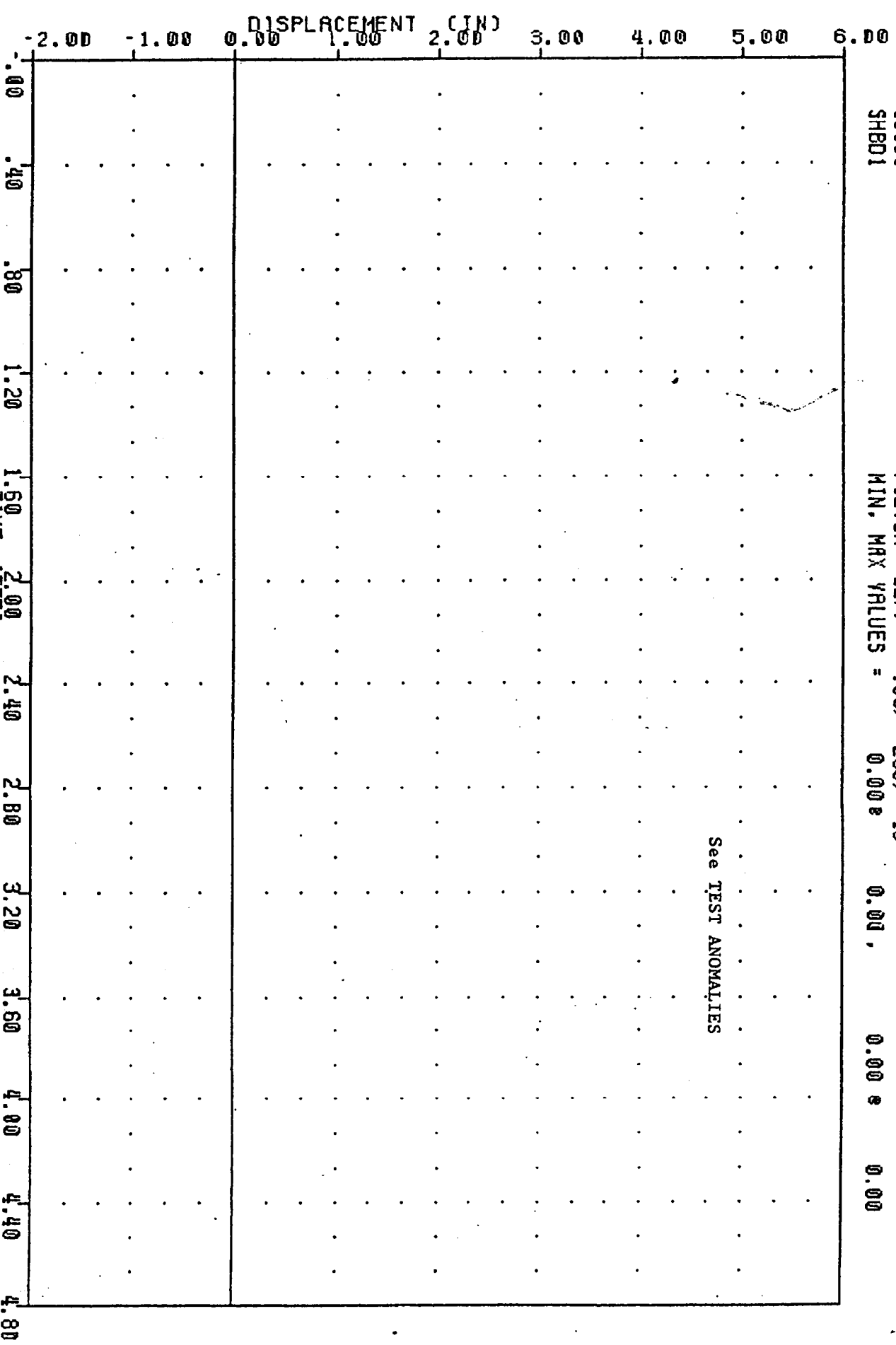
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -0.14e 0.54 , 24.62 e 1.55



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
RMI CRASH RIGHT CYLINDER MISALIGNMENT

DOT/NHTSA 890530
 CONTROLLED ROLLOVER CRASH
 89150
 SHBD1

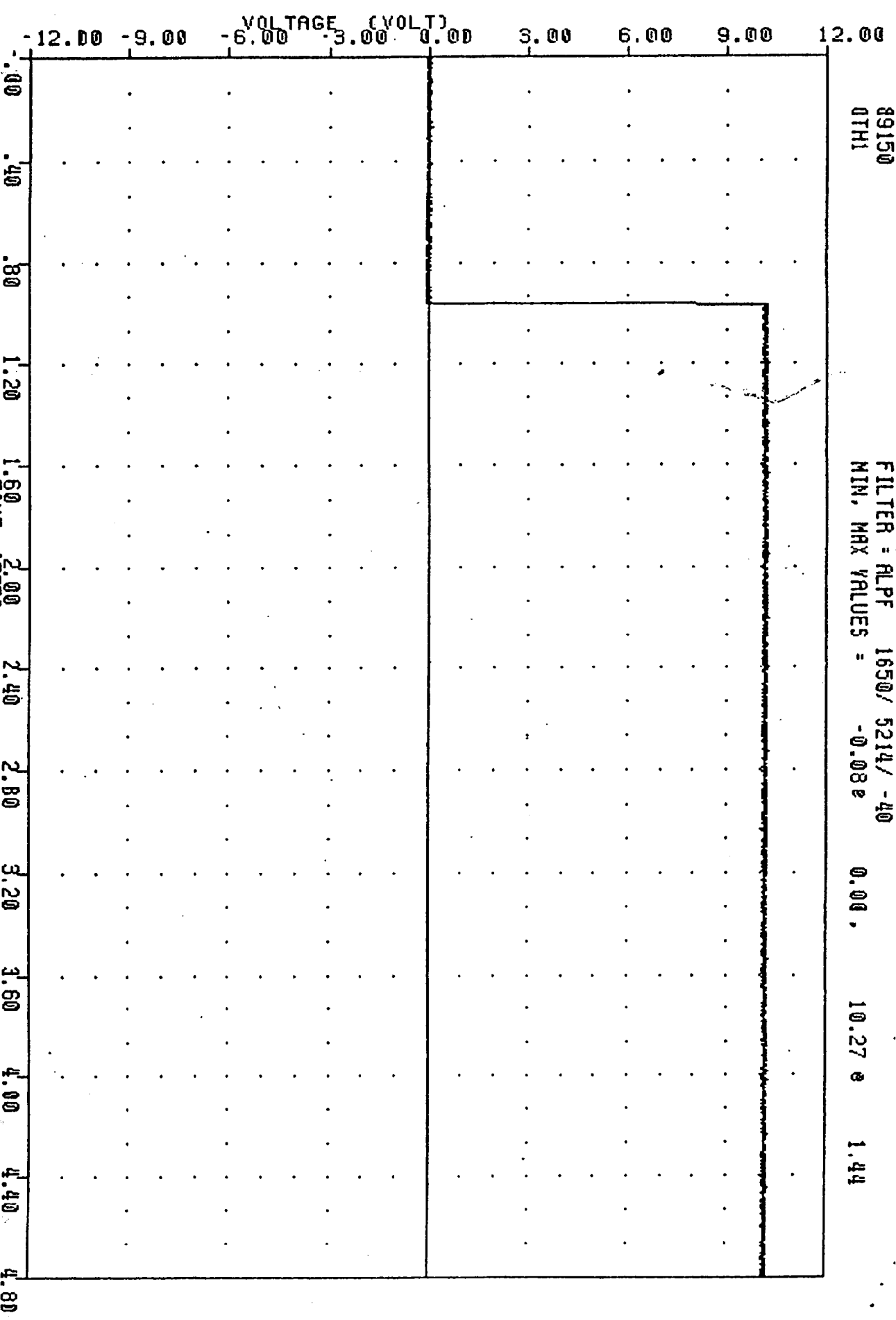
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.00 * 0.01 , 0.00 * 0.00



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
 DRIVER SEAT BELT DISPLACEMENT

UUI/NHISH
 CONTROLLED ROLLOVER CRASH
 89150
 DTH1

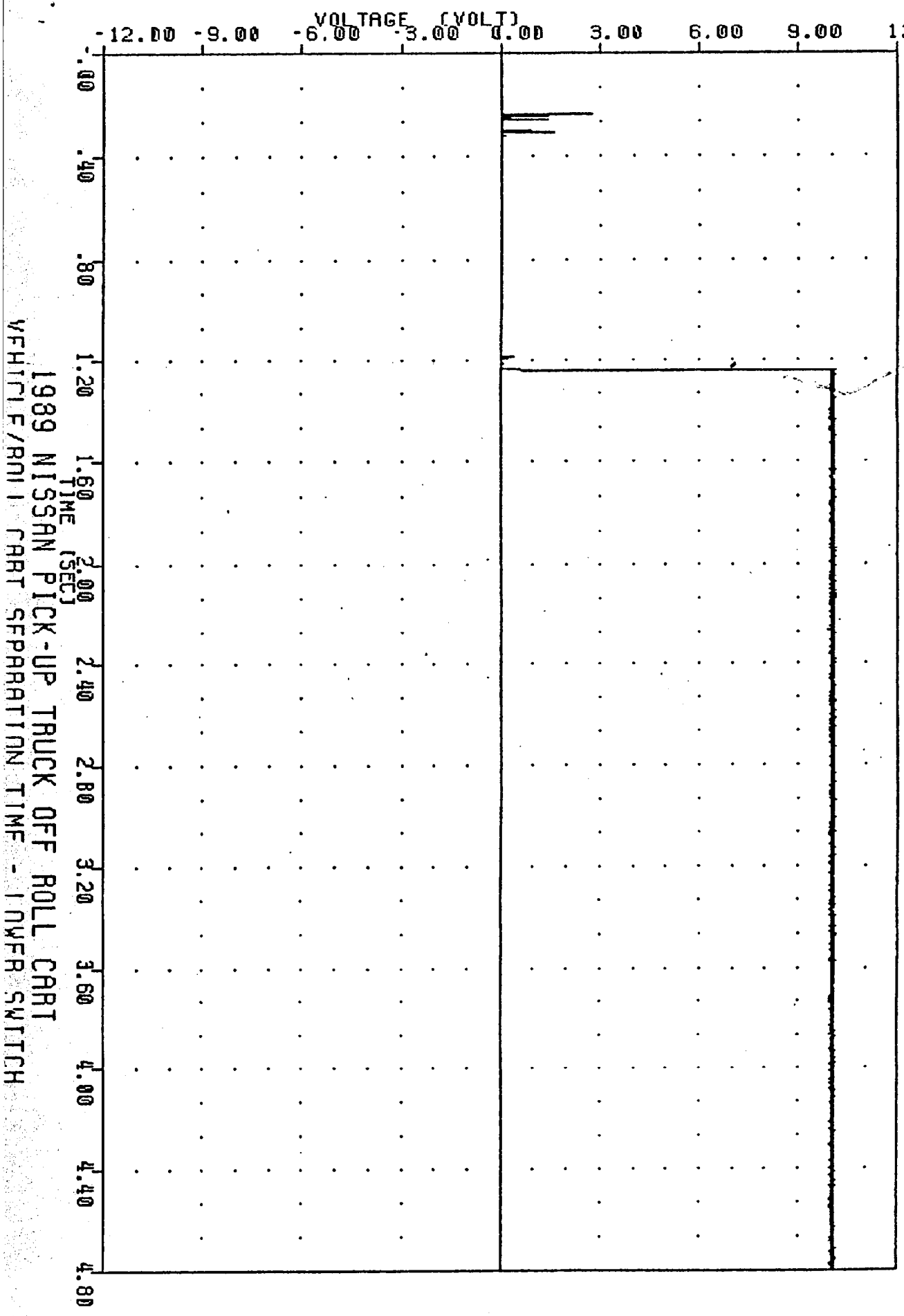
FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -0.08e 0.00, 10.27 e 1.44



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
 VEHICLE/ROLL CART SEPARATION TIME - HIPPER SWITCH

701/NH15H 89053W
 CONTROLLED ROLLOVER CRASH
 89150
 DTH2

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = 0.00 e 0.00 , 10.15 e 1.64



1989 NISSAN PICK-UP TRUCK OFF ROLL CART
 VEHICLE/RM11 CART SEPARATION TIME - LOWER SWITCH

APPENDIX C
DUMMY CERTIFICATION

INERTIA PARAMETERS DATA

APPENDIX D
MISCELLANEOUS TEST INFORMATION

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

22-May-89

LEFT KNEE
SRL 177C19LK1 572E SN177 L.KNEE 11LB CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	53.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.84 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1247.49 LBS
PROBE WEIGHT	11.0 LBS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN Chris Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

22-May-89

RIGHT KNEE
SRL 177C19RK1

572E SN177 R.KNEE 11LB CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	55.00 %
PROBE VELOCITY	6.8 - 7.0 FT/SEC	6.84 FT/SEC
PEAK KNEE IMPACT FORCE	1060 - 1300 LBS	1278.00 LBS
PROBE WEIGHT	11.0 LBS	

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Clas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

24-May-89

SRL

177C19TH1

572E SN177 H.S.THORAX CAL19

TEST PARAMETER	HIGH SPEED TEST	
	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	56.00 %
PENDULUM VELOCITY	21.6-22.4 FT/SEC	21.92 FT/SEC
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.64 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LBS	1219.9 LBS
INTERNAL HYSTERESIS	69% - 85%	72.1%

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Chas. Middleton

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

23-May-89

SRL

177C19NE1

572E SN177 NECK EXT. CAL19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	60.00 %
IMPACT VELOCITY	19.50-20.30 FT/SEC	19.67 FT/SEC
PENDULUM DECELERATION	10 MS 17.20 - 21.20 G	19.18 G
	20 MS 14.00 - 19.00 G	15.48 G
	30 MS 11.00 - 16.00 G	12.36 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	12.36 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	40.13 MS
D PLANE ROTATION	MAX 81 - 106 DEG. TIME 72 - 82 MS	89.82 DEG. 73.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN -59.0/-39.0 FT.LBS TIME 65 - 79 MS	-44.64 FT.LBS 70.08 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	152.13 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	134.63 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Ch. Middel

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

3 AXIS NECK TRANSDUCER

23-May-89

SRL 177C19NF1

572E SN177 NECK FLEXION CAL19

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	23.08 FT/SEC
PENDULUM DECELERATION	10 MS 22.50 - 27.50 G	22.52 G
	20 MS 17.60 - 22.60 G	18.21 G
	30 MS 12.50 - 18.50 G	15.81 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.77 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	38.88 MS
D PLANE ROTATION	MAX 64 - 78 DEG.	68.45 DEG.
	TIME 57 - 64 MS	58.38 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX 65 - 80 FT.LBS	70.04 FT.LBS
	TIME 47 - 58 MS	52.25 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	113.00 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	98.13 MS

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN *Chas. Middleton*

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

26-May-89

SRL

177C19HD1

572E SN177 HEAD DROP CAL 19

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEQ. F	72.00 DEQ. F
RELATIVE HUMIDITY	10% - 70%	70.00 %
PEAK RESULTANT ACCELERATION	225 - 275 G	236.75 G
PEAK LATERAL ACCELERATION	15 G MAX	5.34 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY COMPONENT MEETS SPECIFICATIONS

TECHNICIAN

Chas Middle

TRANSPORTATION RESEARCH CENTER OF OHIO
 HYBRID III EXTERNAL DIMENSIONS
 177 ALDERSON

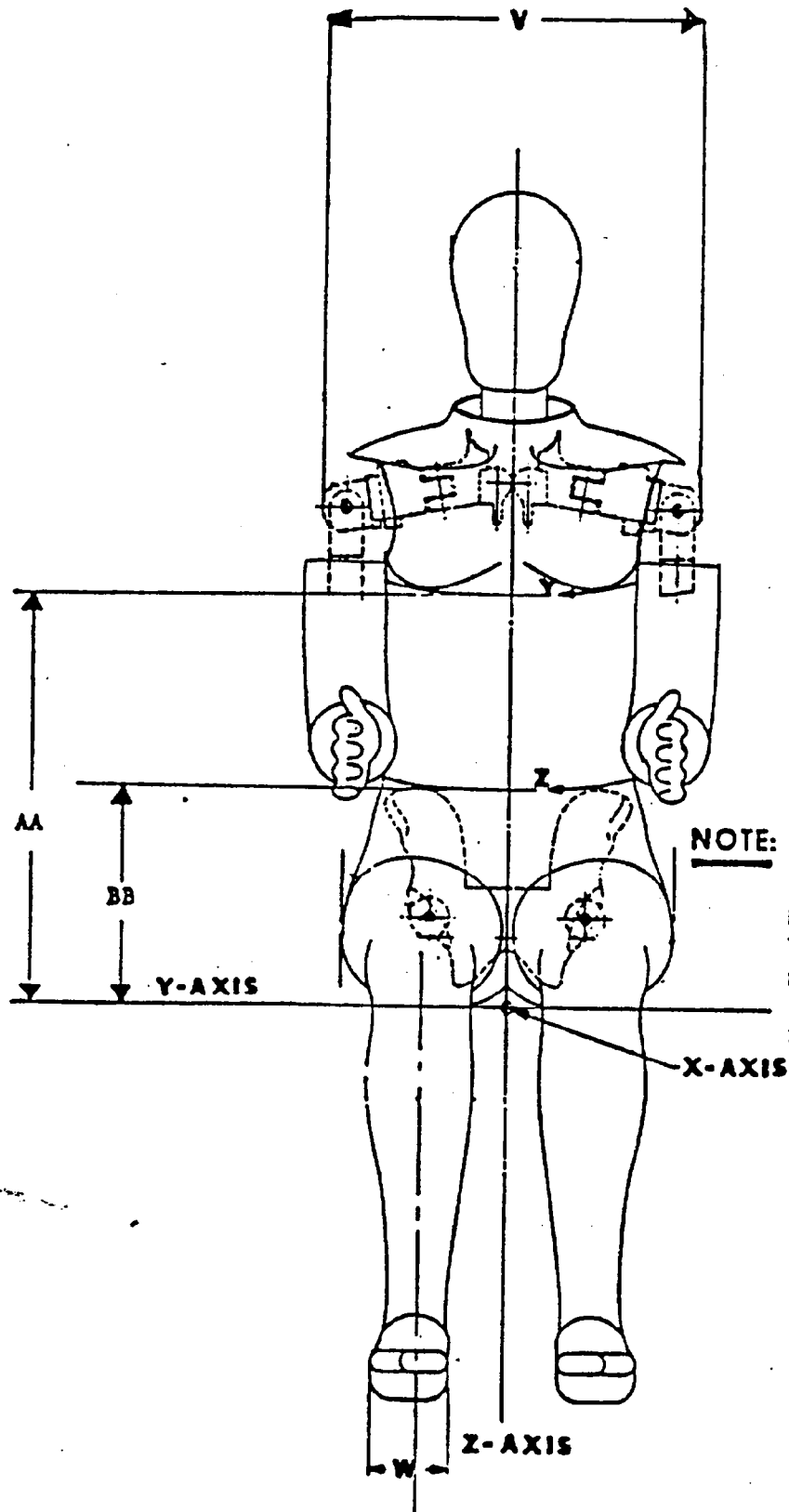
22-MAY-89

SRL 177C19ED1 572E SN177 EXT. DIMENSION CAL19

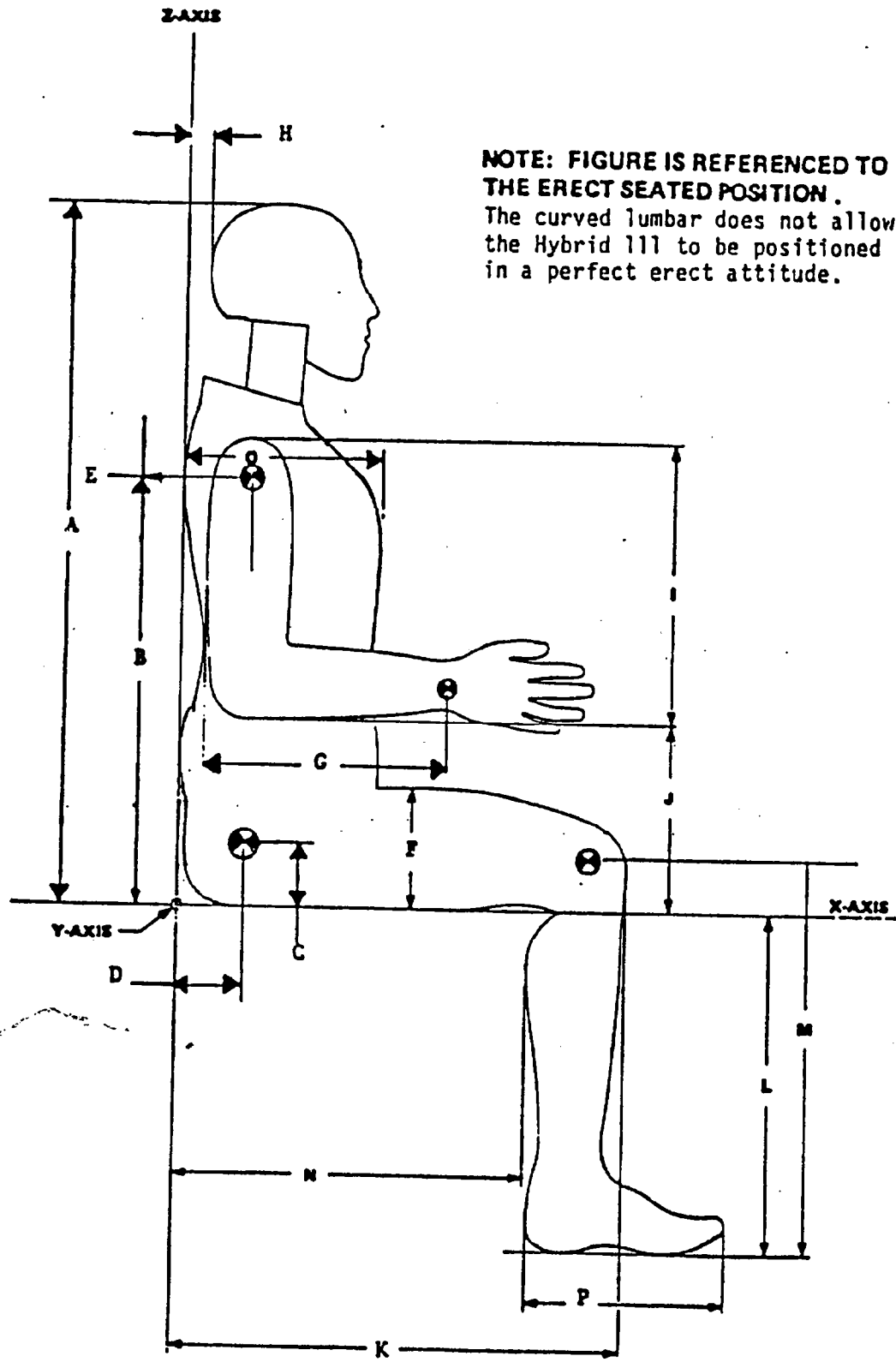
TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			72.0 DEG. F
RELATIVE HUMIDITY			53.0 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)		16.9-17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)		8.9- 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE (Y)		38.2-39.4 IN	38.3 IN
WAIST CIRCUMFERENCE (Z)		32.9-34.1 IN	33.5 IN
CHEST DEPTH (O)		8.4- 9.0 IN	8.6 IN
H-POINT HEIGHT (C)		3.3- 3.5 IN	3.5 IN
H-POINT FROM SEATBACK (D)		5.3- 5.5 IN	5.5 IN
SKULL CAP TO BACKLINE (H)		1.6- 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT (A)		34.6-35.0 IN	34.6 IN
THIGH CLEARANCE (F)		5.5- 6.1 IN	5.7 IN
BUTTOCK KNEE LENGTH (K)		22.8-23.8 IN	22.9 IN
BUTTOCK POPLITEAL LENGTH (N)		17.8-18.8 IN	18.6 IN
POPLITEAL HEIGHT (L)		16.9-17.9 IN	17.2 IN
KNEE PIVOT HEIGHT (M)		19.1-19.7 IN	19.5 IN
FOOT LENGTH (P)		9.9-10.5 IN	10.4 IN
FOOT BREADTH (W)		3.6- 4.2 IN	4.1 IN
SHOULDER PIVOT FROM BACKLINE (E)		3.3- 3.7 IN	3.7 IN
SHOULDER BREADTH (V)		16.6-17.2 IN	16.9 IN
SHOULDER PIVOT HEIGHT (B)		19.9-20.5 IN	20.0 IN
ELBOW REST HEIGHT (J)		7.5- 8.3 IN	8.0 IN
SHOULDER-ELBOW LENGTH (I)		13.0-13.6 IN	13.3 IN
BACK OF ELBOW TO WRIST PIVOT (G)		11.4-12.0 IN	11.5 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Char. Middel



HYBRID III Exterior Body Dimensions - Front View



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

HYBRID III Exterior Body Dimensions - Side View

HYBRID III EXTERIOR DIMENSIONS

Dimensional Symbol	Description	Spec Dimension	Dummy Dimension S/N: 177
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.