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Final Report

Reducing Heavy Truck Aggressiveness  
Moving Heavy Truck into a 1987 Ford  
Taurus 4-Door Sedan at 80.5 KPH

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16. Abstract  This test report documents a crash test that was conducted for research and development in support of reducing heavy truck aggressiveness. This test was conducted with a 1987 Ford Taurus 4-door sedan, VIN 1FABP52U5HA241503, at the Transportation Research Center Inc. on January 19, 1993. The test vehicle was impacted on the front left corner of the vehicle by the heavy truck. The struck vehicle contained ten (10) accelerometers and one instrumented Hybrid III driver dummy.					
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## METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures		Approximate Conversions from Metric Measures	
When You Know	Multiply by	When You Know	Multiply by
Symbol	To Find	Symbol	To Find
<b>LENGTH</b>			
inches	2.5	millimeters	0.04
feet	30	centimeters	0.4
yards	0.9	meters	3.3
miles	1.6	kilometers	1.1
			0.6
<b>AREA</b>			
square inches	6.5	square centimeters	0.16
square feet	0.09	square meters	1.2
square yards	0.8	square kilometers	0.4
square miles	2.6	hectares (10,000 m <sup>2</sup> )	2.5
acres	0.4		
<b>MASS (weight)</b>			
ounces	28	grams	0.035
pounds	0.45	kilograms	2.2
short tons (2000 lb)	0.9	tonnes (1000 kg)	1.1
<b>VOLUME</b>			
teaspoons	5	milliliters	0.03
tablespoons	15	liters	2.1
fluid ounces	30	liters	1.06
cups	0.24	liters	0.26
pints	0.47	cubic meters	35
quarts	0.95	cubic meters	1.3
gallons	3.8		
cubic feet	0.03		
cubic yards	0.76		
<b>TEMPERATURE (exact)</b>			
Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	9/5 (then add 32)
°F		°C	

\* 1 m = 2.54 exactly. For other exact conversions and more detailed tables, see NIS Misc. Publ. 748, Units of Weights and Measures, Price \$2.25, SD Catalog No. C13,10248.

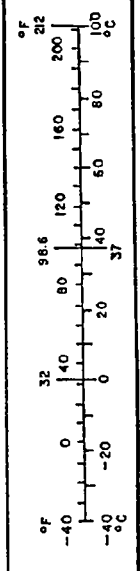


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## SECTION 1.0

### PURPOSE AND TEST SUMMARY

This test was conducted as research in support of reducing heavy truck aggressiveness. This test was conducted on January 19, 1993.

The stationary vehicle, a 1987 Ford Taurus 4-door sedan, was equipped with a 3.0 liter, 6-cylinder, transverse gasoline engine and a 4-speed automatic transmission. The test weight of the vehicle was 1579 kg. The vehicle was instrumented with eight (8) longitudinal axis accelerometers, one (1) lateral axis accelerometer, one (1) vertical axis accelerometer and two (2) seat belt force load cells. One (1) Part 572E dummy was seated in the left front outboard seating position according to the dummy placement procedure specified in Appendix B and Optional Appendix C of Laboratory Procedure TP-208-08. The dummy was instrumented in the head, chest, and pelvis with longitudinal, lateral, and vertical accelerometers. The dummy was also instrumented with a 6-axis neck load cell, two (2) femur load cells, and a chest deflection potentiometer.

The stationary vehicle was impacted in the left front at 0 degrees by a moving heavy truck at 80.5 kph. The intended impact engagement was the left front corner of the car with the left front corner of the truck.

The moving heavy truck's test weight was 11,426 kg. The truck was equipped with a lowered and curved bumper of 60 psi energy absorbing honeycomb. The truck was instrumented with two (2) longitudinal and vertical axis accelerometers and one (1) vertical axis accelerometer.

The dummy's head injury criterion, HIC, was 810. The dummy's chest deceleration with 3 milliseconds minimum duration was 44.0 g. The dummy's maximum left and right femur forces were 2073 N and 8385 N, respectively.

The vehicle, dummy, and heavy truck data were multiplexed and recorded on a 14-channel analog tape deck. The analog data was digitally sampled at 8000 samples per second. The data was digitally filtered as per SAE J211 OCT88.

The test was filmed by one (1) real-time panning motion picture camera and five (5) high-speed motion picture cameras operating at approximately 500 frames per second.

Section 2.0 contains the vehicle, dummy, truck, and test data. Appendix A contains the pre- and post-test still photographs. Appendix B contains the final test data plots. Appendix C contains miscellaneous test information.

SECTION 2.0

VEHICLE, DUMMY, TRUCK AND TEST DATA

TEST ANOMALIES

Anomalous data spikes were recorded throughout the crash test event from the following channels:

Driver neck Y-axis moment, NEKYM1

Driver chest deflection, CSTXD1,

Driver left femur force, LFMF1

Driver right femur force, RFMF1

The left brake caliper X-axis acceleration, BCLXG1, data cable was cut by the vehicle's crush at 85 milliseconds.

The left brake caliper X-axis velocity calculation, BCLXV1, was affected by the above anomaly.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Heavy Truck into Stationary Vehicle

TEST DATE: 01/19/93 TEST TIME: 1059 AMBIENT TEMP. (°C): -3

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1987/Ford/Taurus/4-door sedan

VEHICLE TEST WEIGHT (KG): 1579

IMPACT ANGLE (DEG)\*: 0

IMPACT VELOCITY (KPH)\*\*: PRIMARY = 80.5 SECONDARY = 80.5

MAXIMUM STATIC CRUSH (MM): 986

DUMMY: Driver #048

TYPE: Part 572E

LOCATION: Left front

RESTRAINT: 3-point unbelt

NUMBER OF DATA CHANNELS: 35

NUMBER OF CAMERAS: HIGH-SPEED 5 REAL-TIME 1

\*With respect to tow track centerline.

\*\*Speed trap measurement ( $\pm$  .08 kph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Company

MAKE/MODEL: Ford/Taurus

VIN: 1FABP52U5HA241503

BODY STYLE: 4-door sedan

MODEL YEAR: 1987

COLOR: Gray

ENGINE DATA: TYPE: transverse CYLINDERS: 6 DISPLACEMENT: 3.0 liters

TRANSMISSION DATA: 4 SPEED, \_\_\_MANUAL, X AUTOMATIC, X FWD, \_\_\_RWD, \_\_\_4WD

DATE VEHICLE RECEIVED: NA

ODOMETER READING: 37,839

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Ford Motor Company

DATE OF MANUFACTURE: 04/87 VIN: 1FABP52U5HA241503

GVWR: 4595 LBS

GAWR: FRONT: 2507 LBS., REAR: 2133 LBS.

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Front: General, Ameritech, P185/75R14  
Rear: Goodyear, Invicta, P205/70R14

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

SPARE TIRE (MFR., LINE, SIZE): Firestone, Temporary, T135/80D14

TYPE OF SEATS: FRONT: Bucket  
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 1690 MILLIMETERS

WHEELBASE: 2667 MILLIMETERS

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located on the right rear door.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: Front: P195/70R14 Rear: P205/70R14

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

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 150 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE: LF 685; RF 693; LR 610; RR 615

PRE-TEST ATTITUDE: LF 680; RF 688; LR 602; RR 610

POST-TEST ATTITUDE: LF NA; RF 670; LR 555; RR 627

TABLE 2 TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	440 KG	RIGHT REAR	250 KG
LEFT FRONT	480 KG	LEFT REAR	219 KG
TOTAL FRONT WEIGHT	920 KG	(66.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	469 KG	(33.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1389 KG		
TARGET TEST WEIGHT	1581 KG*		

WEIGHT OF TEST VEHICLE:

RIGHT FRONT	459 KG	RIGHT REAR	330 KG
LEFT FRONT	485 KG	LEFT REAR	305 KG
TOTAL FRONT WEIGHT	944 KG	(59.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	635 KG	(40.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1579 KG	(0.1% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: None

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 1072 MILLIMETERS REARWARD OF FRONT WHEEL CENTERLINE

\*The target test weight was established during Test 920507.

TABLE 3 TRUCK INFORMATION

WEIGHT DISTRIBUTION

FRONT: 3783 KG

REAR: 7643 KG

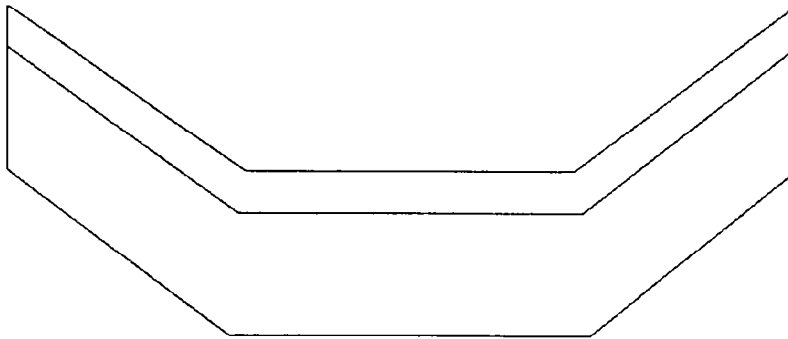
AXLE SPACING

FRONT: 3835 MM

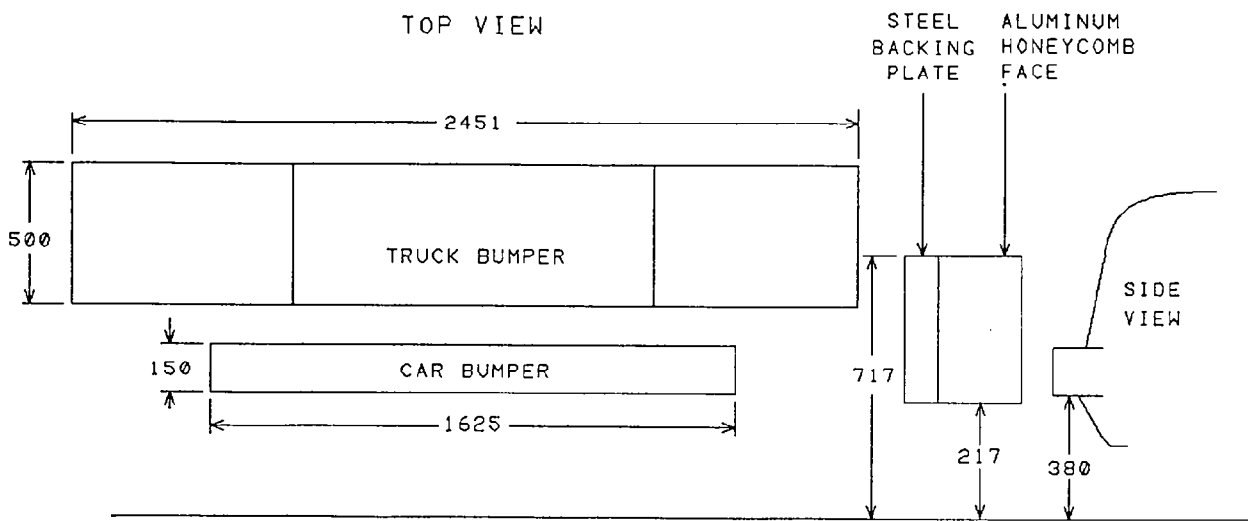
REAR: 1308 MM

DISTANCE OF C.G. BEHIND FRONT AXLE: 3003 MM

BUMPER DESCRIPTION: Modified, lowered, and curved bumper with a 60 psi aluminum honeycomb face.



TOP VIEW



FRONT VIEW

TABLE 4 POST-IMPACT DATA

TEST NUMBER: 930119

TEST DATE: 01/19/93

TEST TIME: 1059

TEST TYPE: Heavy Truck into Stationary Vehicle

IMPACT ANGLE: 0

AMBIENT TEMPERATURE AT IMPACT AREA: -3° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 21° C

IMPACT VELOCITY: PRIMARY = 80.5 KPH  
SECONDARY = 80.5 KPH

(SPECIFIED RANGE = 79.7 TO 81.3 KPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 381 MM

EXITING VELOCITY TRAP = 51 MM

TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN MILLIMETERS):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 4620; C NA ; R NA

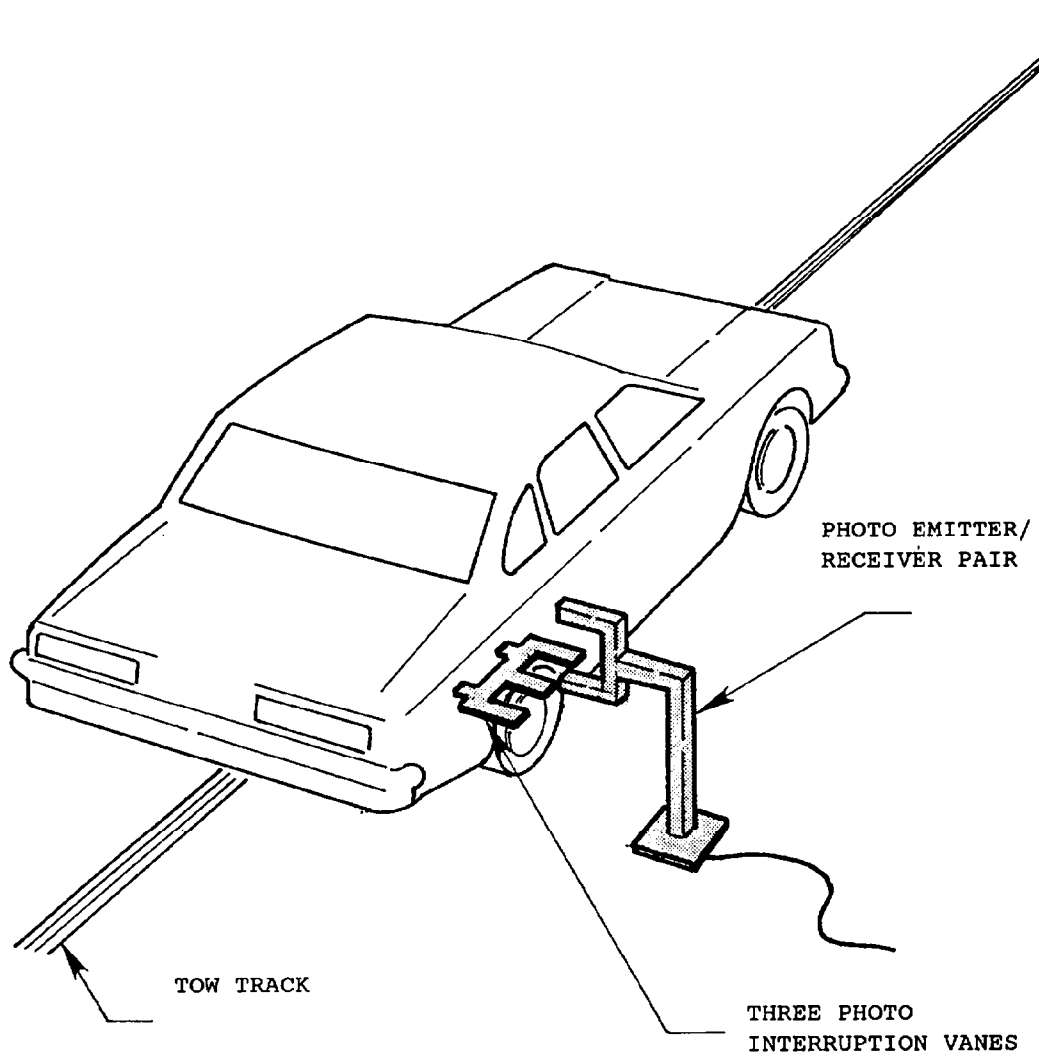
POST-TEST: L 3634; C NA ; R NA

TOTAL CRUSH: L 986; C NA ; R NA

AVERAGE CRUSH: NA

\*The front bumper beam shattered on impact, obliterating most of the measurement points.

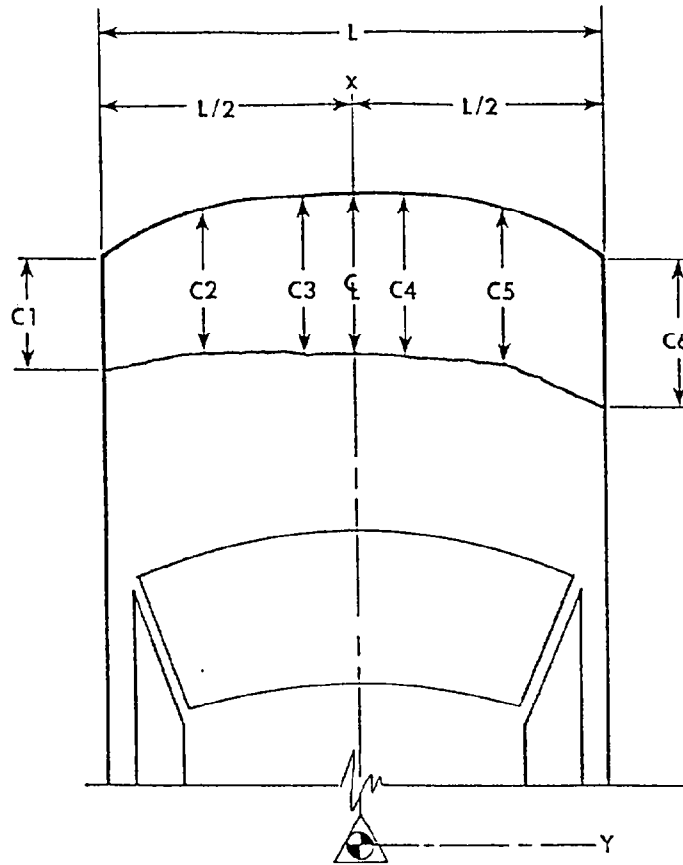
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane clears emitter/receiver 51 millimeters before impact.

The vanes have 305 millimeter spacing.

FIGURE 2 VEHICLE CRUSH



NOTES:  $L$  is pre-test length of contact surface.  
 $C1$  through  $C6$  are spaced equally apart.  
 $CL$  is vehicle centerline.  
 All measurements are in millimeters.

Vehicle Ford Taurus

	PRE-TEST		POST-TEST		CRUSH
$L$	<u>1570</u>				
$C1$	<u>4620</u>	$C1$	<u>3634</u>	$C1$	<u>986</u>
$C2$	<u>4730</u>	$C2$	<u>NA</u>	$C2$	<u>NA*</u>
$C3$	<u>4770</u>	$C3$	<u>3797</u>	$C3$	<u>973</u>
$C4$	<u>4771</u>	$C4$	<u>NA</u>	$C4$	<u>NA*</u>
$C5$	<u>4730</u>	$C5$	<u>NA</u>	$C5$	<u>NA*</u>
$C6$	<u>4630</u>	$C6$	<u>NA</u>	$C6$	<u>NA*</u>
$CL$	<u>4771</u>	$CL$	<u>NA</u>	$CL$	<u>NA*</u>

\*The front bumper beam shattered on impact, obliterating most of the measurement points.

FIGURE 3

PRE-TEST AND POST-TEST MEASUREMENT POINTS

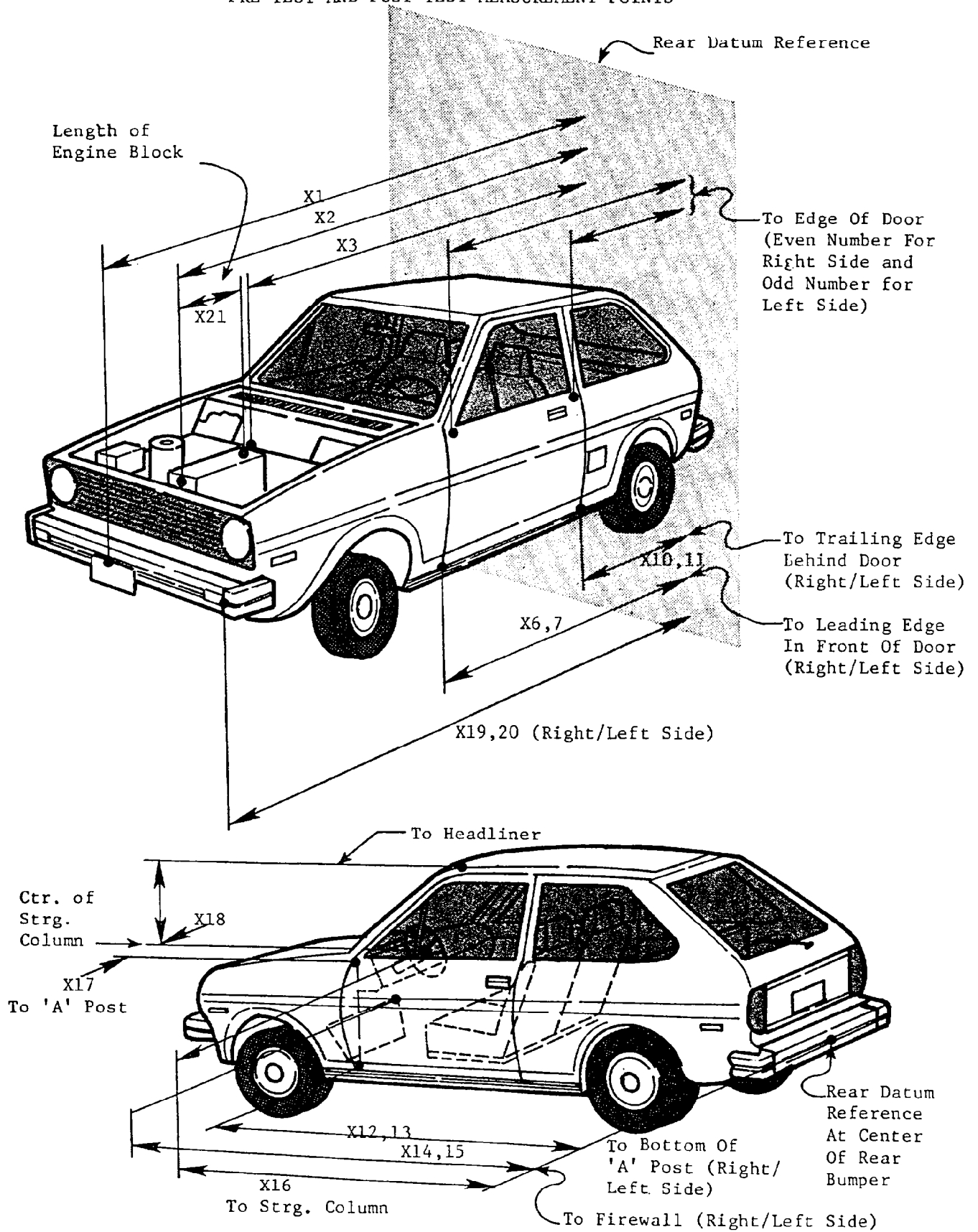


TABLE 5 IMPACTED VEHICLE MEASUREMENTS

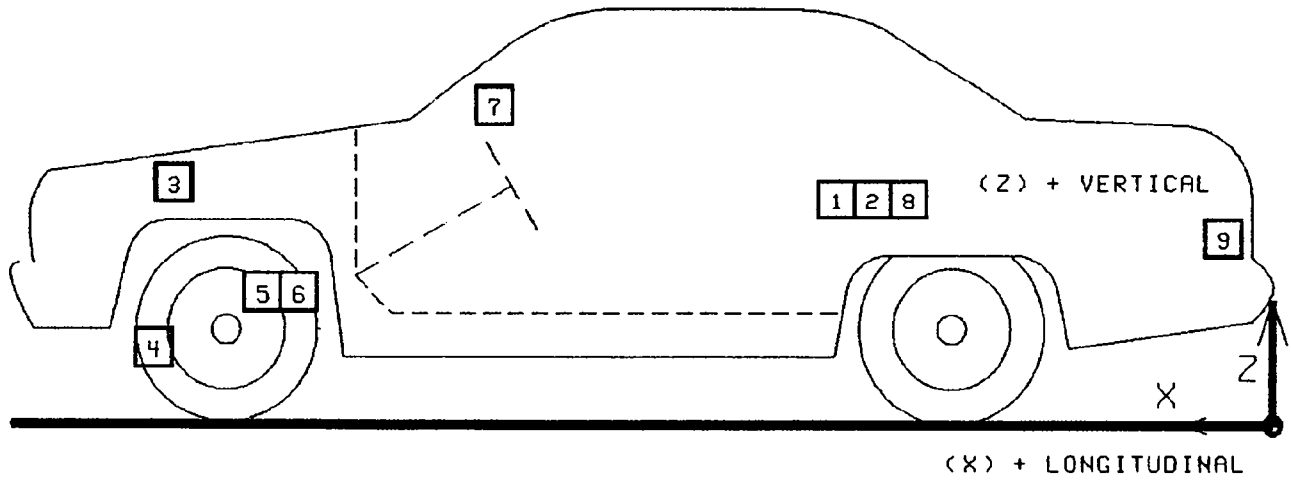
VEHICLE MAKE/MODEL: Ford/Taurus TEST NUMBER: 930119

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	4771	NA	NA
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	4178	3774	404
X3	REAR SURFACE OF VEHICLE TO FIREWALL	3613	3159	454
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	3298	3320	-22
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	3290	3237	53
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	3230	3234	-4
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	3240	3204	36
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	2220	2240	-20
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	2218	2230	-12
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	2210	2210	0
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	2210	2174	36
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	3229	3237	-8
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	3236	3098	138
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	3560	NA	NA
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	3550	3011	539
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	2850	2296	554
X17	CENTER OF STEERING COLUMN TO "A" POST	275	531	-256
X18	CENTER OF STEERING COLUMN TO HEADLINER	434	455	-21
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	4630	NA	NA
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	4620	3634	986
X21	LENGTH OF ENGINE BLOCK	440	440	0

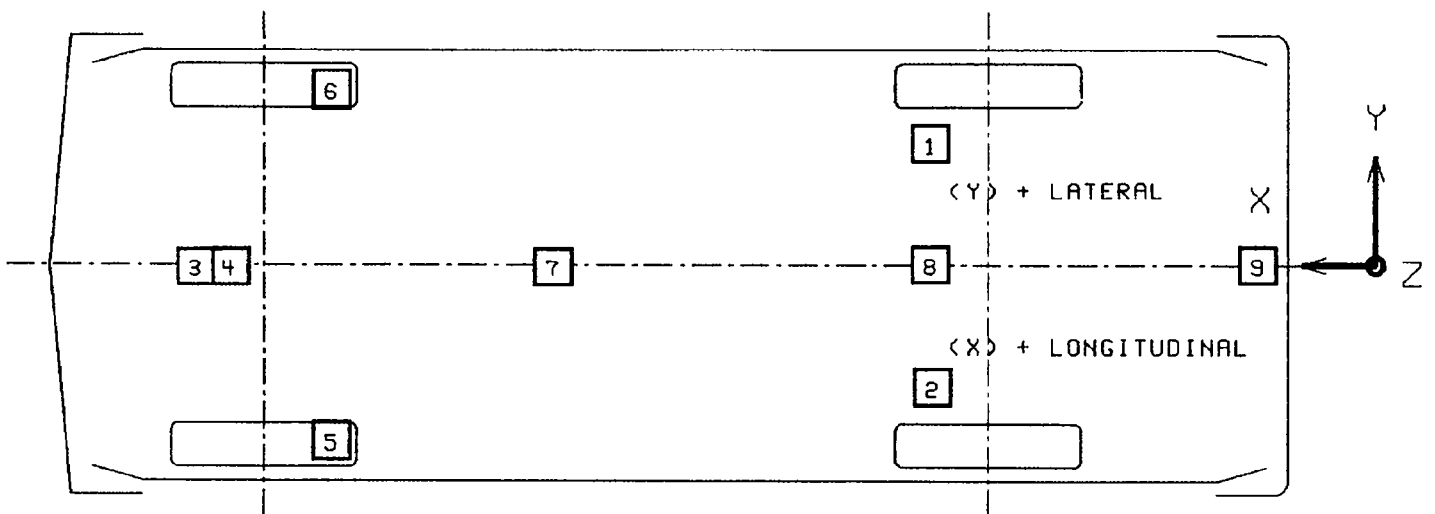
ALL MEASUREMENTS ARE IN MILLIMETERS

FIGURE 4

VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 6

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 930119

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G	MSEC	MAX G	MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	1852	610	370	1.9	278.3	28.4	88.4
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	1862	-610	370	1.6	260.0	23.4	67.1
3	ENGINE TOP LONGITUDINAL	4231	-145	742	4.5	85.5	42.7	65.0
4	ENGINE BOTTOM LONGITUDINAL	4000	41	171	5.4	128.5	50.4	49.6
5	RIGHT BRAKE CALIPER LONGITUDINAL	3900	-685	318	6.6	181.8	38.7	86.5
6	LEFT BRAKE CALIPER LONGITUDINAL	3900	685	295	---	---	Y	---
7	INSTRUMENT PANEL CENTER LONGITUDINAL	3231	30	950	43.4	129.1	82.5	91.5
8	CENTER OF GRAVITY LONGITUDINAL	2926	0	300	8.2	150.3	41.9	65.1
	LATERAL				19.2	151.6	22.3	95.3
	VERTICAL				41.0	73.3	72.6	68.3
	RESULTANT				74.5	68.3		

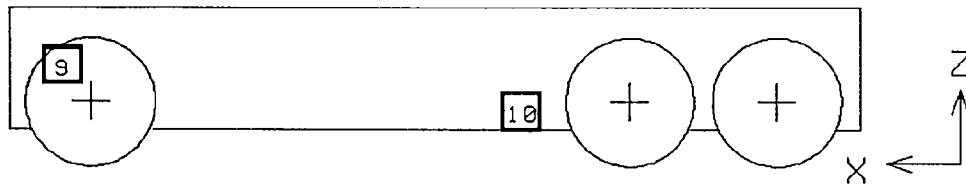
\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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

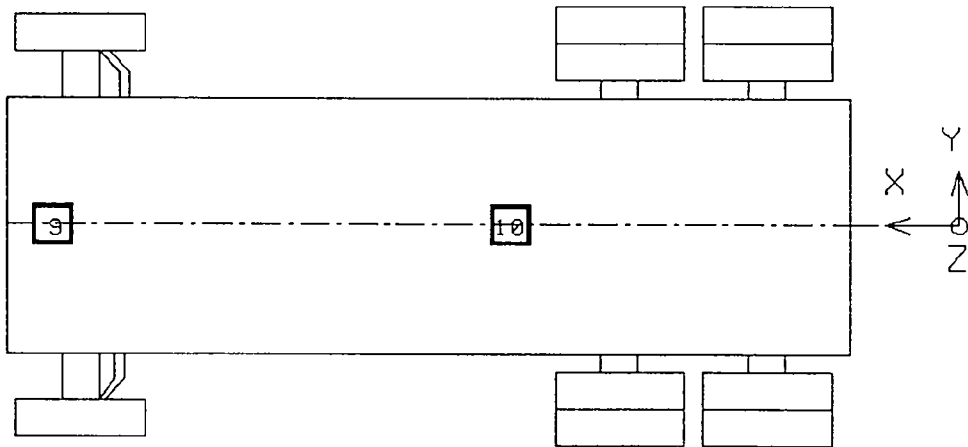
Y See TEST ANOMALIES

FIGURE 5

HEAVY TRUCK ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 7

HEAVY TRUCK ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 930119

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
				MAX G	MSEC	MAX G	MSEC
9 FRONT FRAME	6160	0	658				
CROSSMEMBER							
LONGITUDINAL				4.2	49.3	8.9	43.1
LATERAL				4.8	48.3	8.9	65.4
VERTICAL				3.8	98.5	3.9	43.6
RESULTANT				10.1	43.0		
10 CENTER OF GRAVITY	2527	0	1050				
LONGITUDINAL				1.7	51.0	6.2	45.4
LATERAL				2.2	283.9	3.2	74.5

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

REFERENCE: X: + FORWARD FROM TRAILING EDGE OF TRUCK  
 Y: + LEFT FROM TRUCK CENTERLINE  
 Z: + UP FROM GROUND LEVEL

TABLE 8

## DUMMY DATA SUMMARY

TEST NUMBER 930119

	DRIVER DUMMY			
	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
<b>HEAD ACCELERATION (g)</b>				
LONGITUDINAL	18.7	123.8	144.8	100.8
LATERAL	4.4	211.3	109.2	100.6
VERTICAL	12.9	160.4	73.3	100.9
RESULTANT	192.1	100.8		
HIC	810 FROM 97.4 TO 125.0			
<b>NECK FORCE (N)</b>				
LONGITUDINAL	940.5	109.5	261.7	100.8
LATERAL	666.8	119.5	1375.1	100.6
VERTICAL	2608.6	100.5	769.6	118.6
RESULTANT	2908.0	100.5		
<b>NECK MOMENT (N-M)</b>				
ABOUT X	17.5	119.5	116.5	104.8
ABOUT Y	31.2	174.8 Y	43.1	110.3 Y
ABOUT Z	7.9	207.6	58.7	121.1
RESULTANT	117.6	104.8		
<b>CHEST ACCELERATION (g)</b>				
LONGITUDINAL	3.8	336.5	48.4	102.6
LATERAL	6.3	74.0	21.4	104.5
VERTICAL	10.9	128.9	11.1	90.6
RESULTANT	51.2	102.8		
3 MSEC	44.0			
<b>CHEST DEFLECTION (mm)</b>				
LONGITUDINAL	0.1	2.4 Y	22.1	98.3 Y
<b>PELVIS ACCELERATION (g)</b>				
LONGITUDINAL	9.7	100.5	60.3	72.9
LATERAL	15.2	73.5	33.9	101.8
VERTICAL	22.8	101.6	8.4	319.0
RESULTANT	62.4	72.9		

TABLE 8

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 930119

DRIVER DUMMY

SN: 048

POSITIVE		NEGATIVE	
DIRECTION		DIRECTION	
MAX	MSEC	MAX	MSEC

---

FEMUR LOAD (N)

LEFT	1124.0	156.8Y	2073.3	80.0 Y
RIGHT	3112.7	100.8Y	8385.3	72.5 Y

---

POSITIVE DIRECTION

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

NEGATIVE DIRECTION

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

Y See TEST ANOMALIES



#### DUMMY KINEMATIC SUMMARY

The dummy translated forward and to the left at impact. The dummy's head impacted the steering wheel rim. The dummy's head, hands, forearms, and knees then impacted the instrument panel. The dummy rebounded into the seat. The dummy came to rest against the seat back and against the driver's side door panel. The dummy's legs were pinned against the seat by the instrument panel.

**FIGURE 6 DUMMY AND SEAT POSITIONING DATA**

**PRE-IMPACT DATA:**

MAKE/MODEL: Ford/Taurus  
 BODY STYLE: 4-door sedan MODEL YEAR: 1987  
 COLOR: Gray

**DATA FROM CERTIFICATION LABEL:**

VEHICLE MANUFACTURER: Ford Motor Company  
 DATE OF MANUFACTURE: 04/87 VIN: 1FABP52U5HA241503  
 GVWR: 4595 LBS.; GAWR: FRONT = 2507 LBS.; REAR = 2133 LBS.

**POST-IMPACT DATA:**

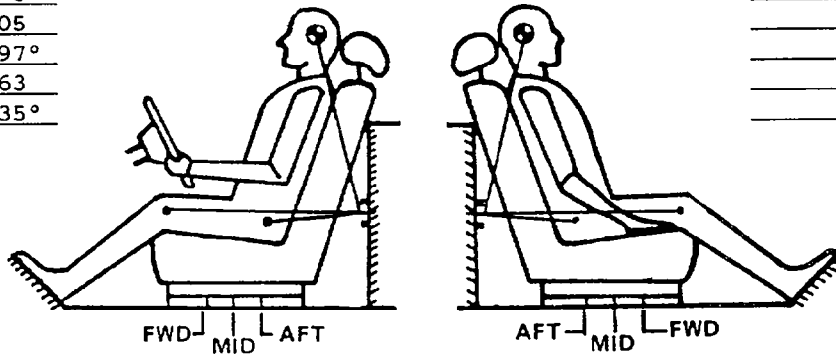
DATE OF TEST: 01/19/93 TIME: 1059 TEMPERATURE: -3° C  
 IMPACT VELOCITY: PRIMARY = 80.5 KPH SECONDARY = 80.5 KPH  
 REQUIRED IMPACT VELOCITY RANGE: 70.7 TO 81.3 KPH  
 SEAT TYPE: Bucket ADJUSTER TYPE: Manual  
 FRONT SEAT BACK TYPE: Reclining  
 TECHNICIANS: K. Watkins, J. Taylor

DRIVER DUMMY # 048 TYPE: HIII

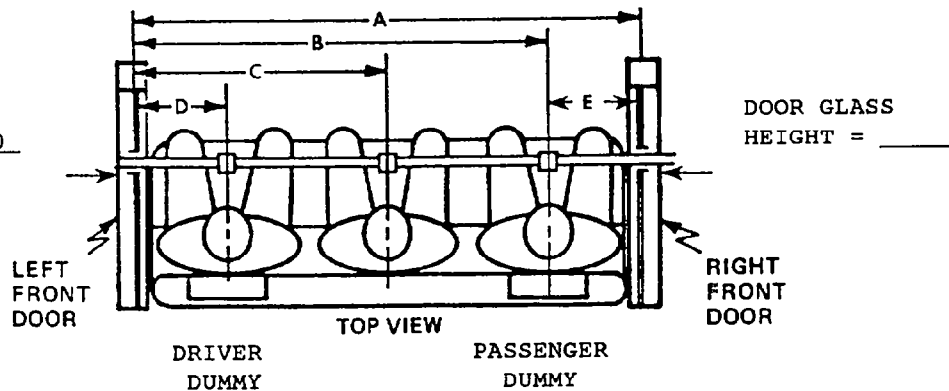
PASSENGER DUMMY # NA TYPE: \_\_\_\_\_

HEAD 477  
 TARGET 5°  
 KNEE 605  
 JOINT 97°  
 APPROX- 263  
 IMATE 135°  
 "H"  
 POINT

\_\_\_\_\_ HEAD  
 \_\_\_\_\_ TARGET  
 \_\_\_\_\_ KNEE  
 \_\_\_\_\_ JOINT  
 \_\_\_\_\_ APPROX-  
 \_\_\_\_\_ IMATE  
 \_\_\_\_\_ "H"  
 \_\_\_\_\_ POINT



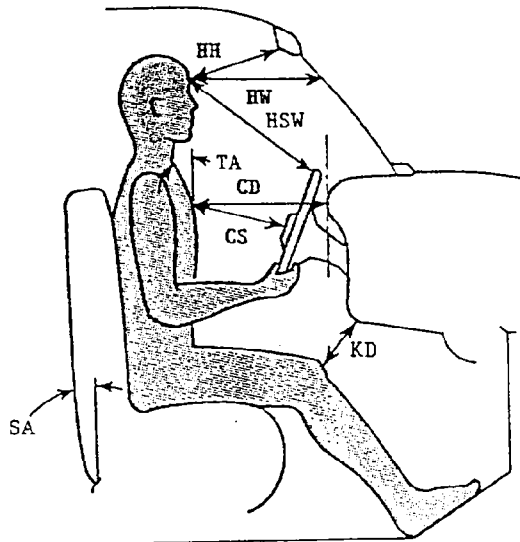
A = 1452  
 B = NA  
 C = NA  
 D = 355  
 E = NA  
 DOOR GLASS  
 HEIGHT = 210



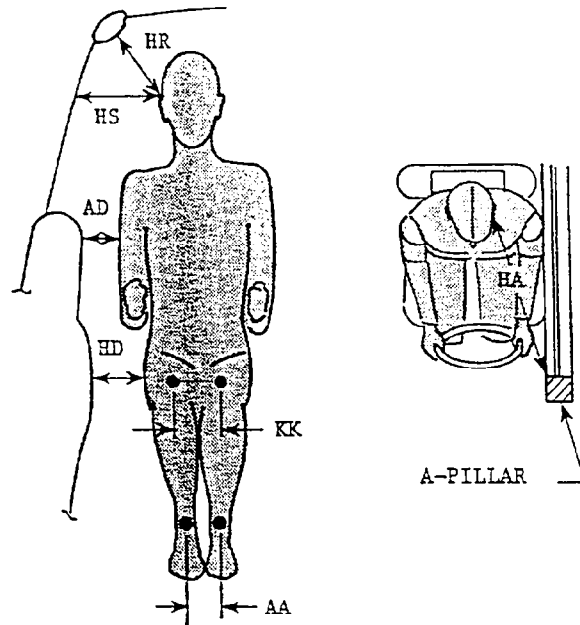
ALL ANGLES ARE RELATIVE TO VERTICAL PLANE THROUGH DOOR STRIKER.  
 ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 7 DUMMY IN VEHICLE POSITIONING DATA

	DRIVER	PASSENGER
	048	NA
HH	370	
HW	560	
CD	564	
CS	360	
KDL	135	
KDR	139	
TA	20°	
SA	26°	
HSW	493	



	DRIVER	PASSENGER
	048	NA
HR	174	
HS	272	
AD	113	
HD	200	
KK	205	
AA	260	
HA	533	

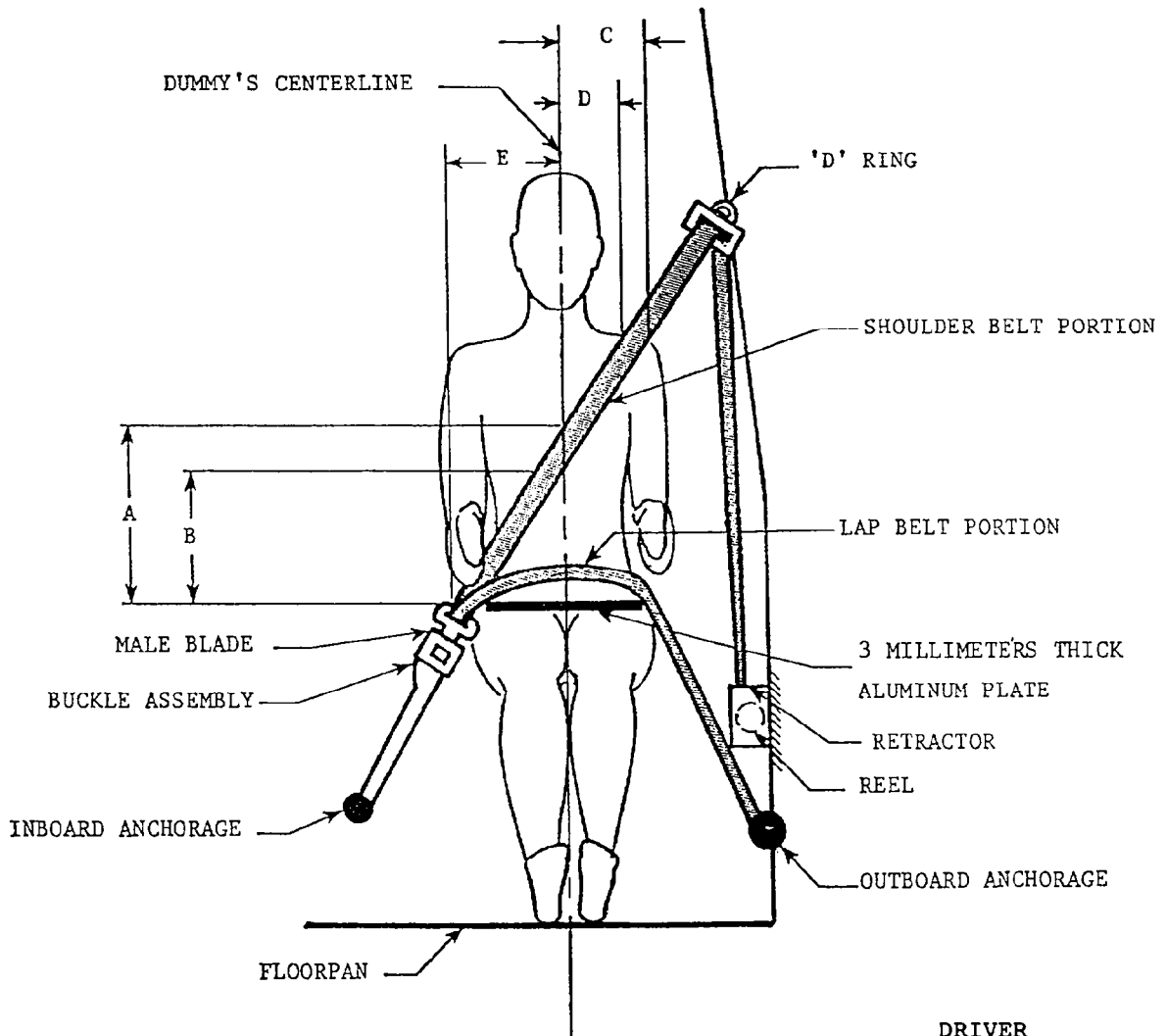


KNEE OUTER CLEVIS TO OUTER CLEVIS SPACING:  
 DRIVER = 270  
 PELVIS ANGLE:  
 DRIVER = 23°

- |                                |   |
|--------------------------------|---|
| HH = HEAD TO WINDSHIELD HEADER | HR = HEAD C.G. TARGET TO SIDE ROOF HEADER |
| HW = HEAD TO WINDSHIELD        | HS = HEAD C.G. TARGET TO SIDE WINDOW      |
| CD = CHEST TO DASH             | AD = ARM TO DOOR                          |
| CS = CHEST TO STEERING WHEEL   | HD = HIP TO DOOR                          |
| KD = KNEE TO DASH              | KK = KNEE TO KNEE                         |
| TA = TORSO ANGLE               | AA = ANKLE TO ANKLE                       |
| SA = SEAT BACK ANGLE           | HA = HEAD C.G. TARGET TO A-PILLAR         |
| HSW = HEAD TO STEERING WHEEL   |   |

TORSO AND SEAT BACK ANGLES ARE RELATIVE TO VERTICAL.  
 ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

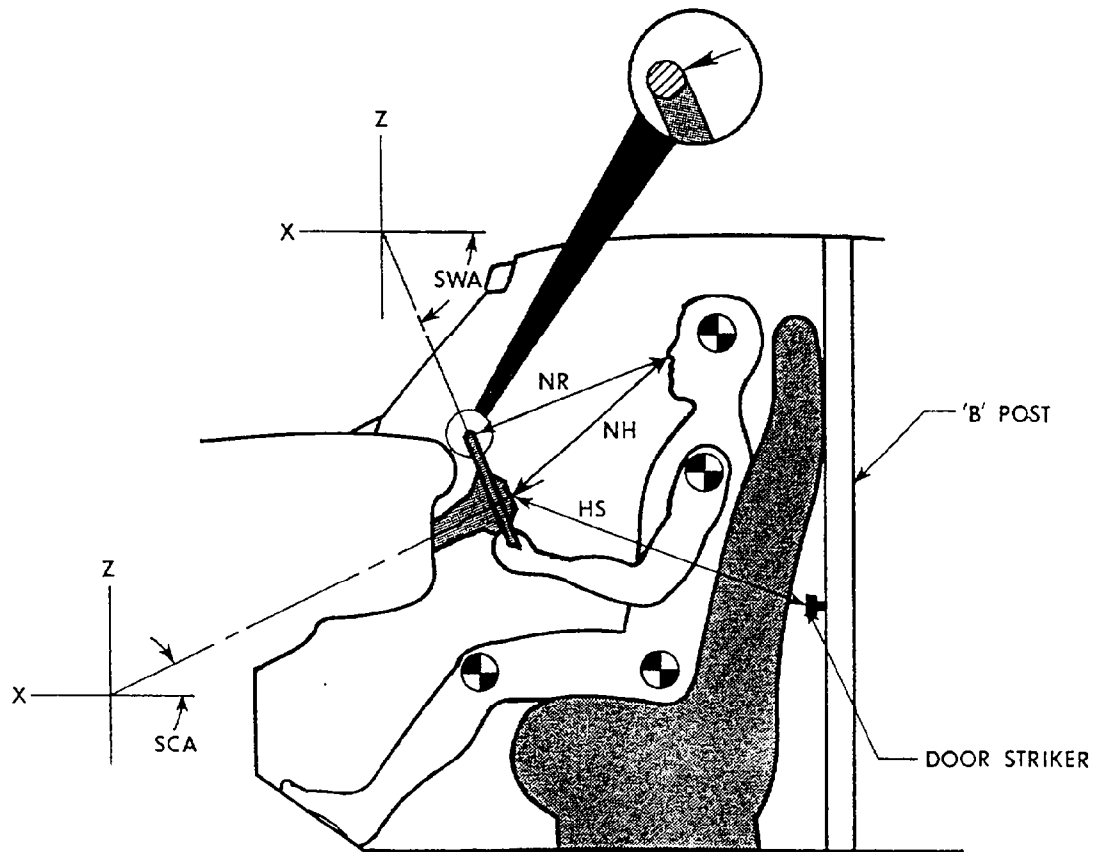
**FIGURE 8 SEAT BELT POSITIONING DATA**



	DRIVER DUMMY
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	370
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	290
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	70
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	15
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	245

ALL MEASUREMENTS ARE IN MILLIMETERS.

**FIGURE 9 DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSEMBLY DATA**



POSITION OF STEERING COLUMN TILTING AND TELESCOPING ADJUSTMENTS, IF ANY:  
The steering column was placed in the third position from the top.

**MEASUREMENTS**

NR	- DISTANCE FROM TIP OF DUMMY'S NOSE TO TOP REAR SURFACE OF STEERING WHEEL RIM.	452
NH	- DISTANCE FROM TIP OF DUMMY'S NOSE TO CENTER OF STEERING COLUMN HUB.	452
HS	- DISTANCE FROM CENTER OF STEERING COLUMN HUB TO THE FORWARD SURFACE OF THE DOOR LOCK STRIKER PIN.	575
SCA	- ANGLE OF STEERING COLUMN RELATIVE TO THE HORIZONTAL X AXIS	25°
SWA	- ANGLE OF STEERING WHEEL RELATIVE TO THE HORIZONTAL X AXIS	65°

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10

CAMERA POSITIONS

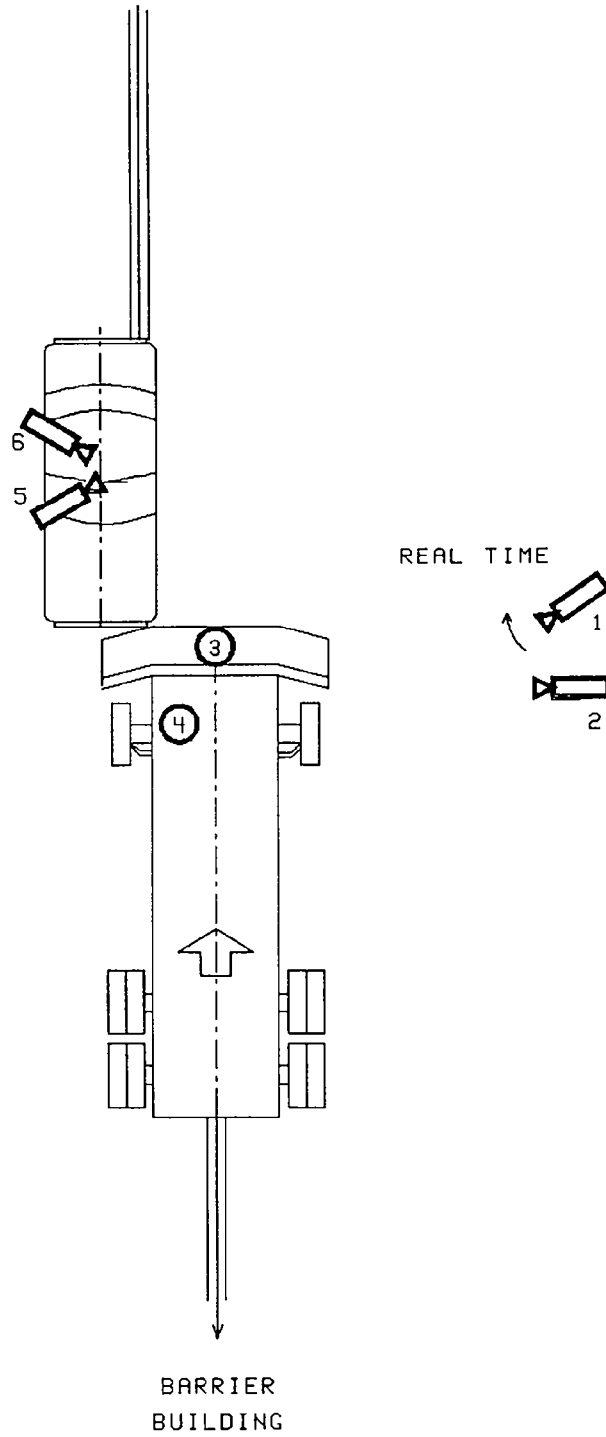


TABLE 10 MOTION PICTURE CAMERA INFORMATION

<u>CAMERA NO.</u>	<u>LOCATION</u>	<u>TYPE</u>	<u>LENS (mm)</u>	<u>SPEED (fps)</u>	<u>PURPOSE OF CAMERA DATA</u>
1	Right panning	Bolex	13	24	Real-time documentation
2	Right wide	Photosonic	13	488	Vehicle dynamics
3	Overhead wide	Photosonic	8.5	498	Vehicle dynamics
4	Onboard truck	Photosonic	8	505	Dummy kinematics
5	Onboard car front	Photosonic	8	500	Dummy kinematics
6	Onboard car rear	Photosonic	8	498	Dummy kinematics

APPENDIX A

PHOTOGRAPHS



Figure A-1. PRE-TEST FRONT VIEW



Figure A-2. POST-TEST FRONT VIEW

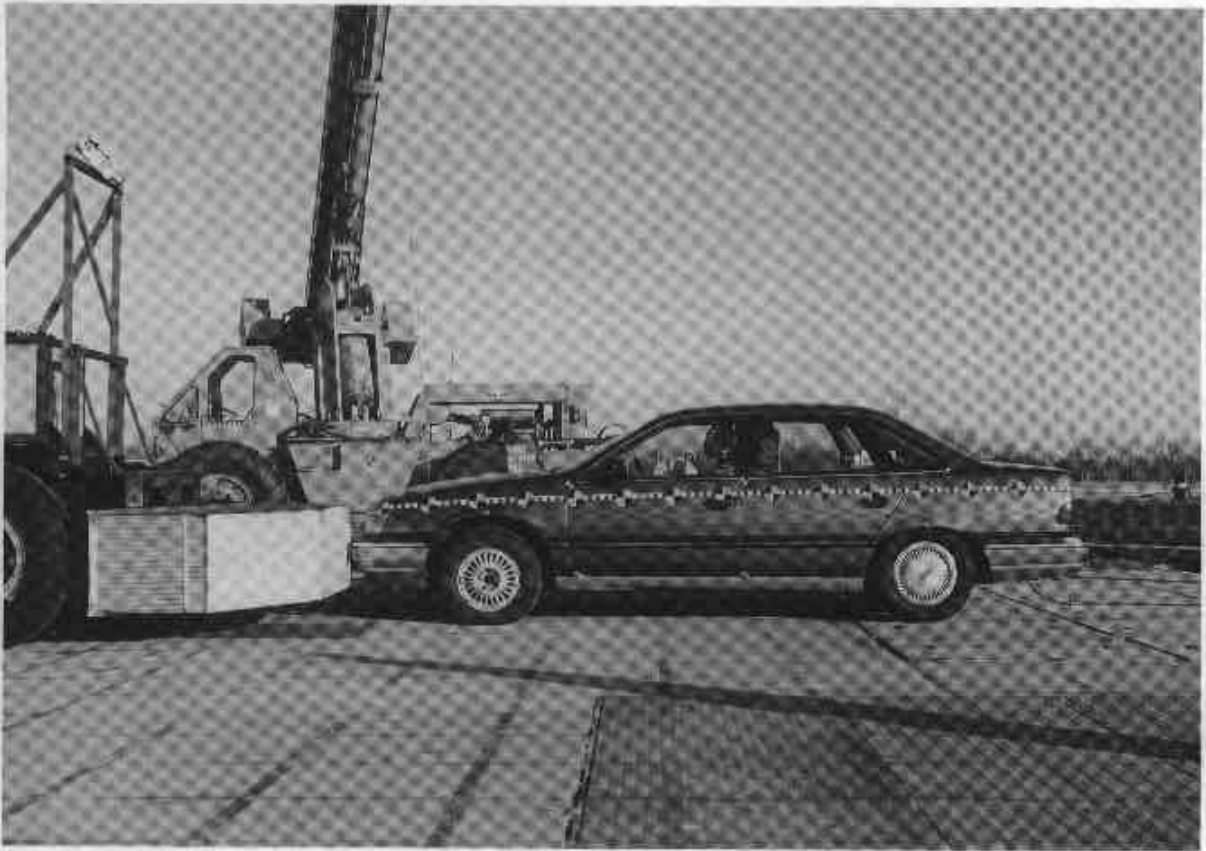


Figure A-3. PRE-TEST LEFT SIDE VIEW



Figure A-4. POST-TEST LEFT SIDE VIEW

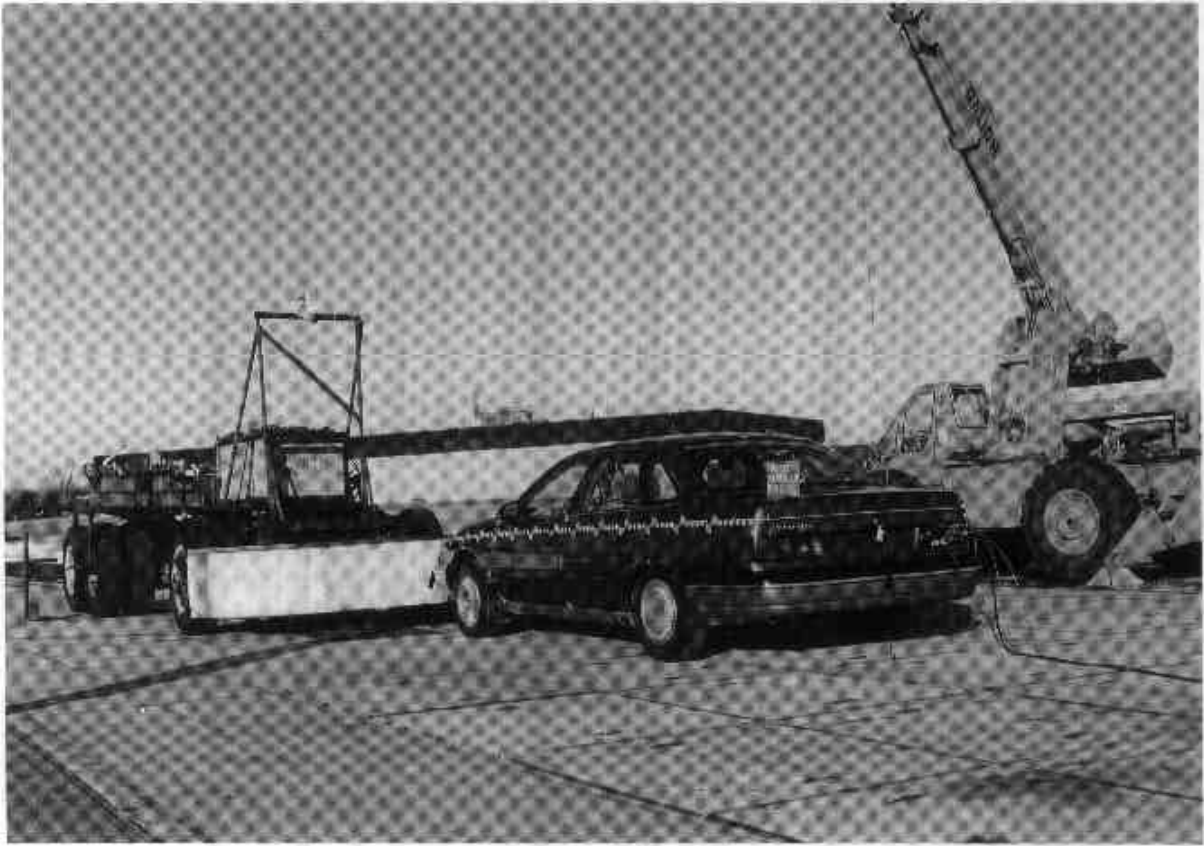


Figure A-5. PRE-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-6. POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-7. PRE-TEST REAR VIEW



Figure A-8. POST-TEST REAR VIEW



Figure A-9. PRE-TEST RIGHT SIDE VIEW



Figure A-10. POST-TEST RIGHT SIDE VIEW



Figure A-11. PRE-TEST RIGHT FRONT THREE-QUARTER VIEW



Figure A-12. POST-TEST RIGHT FRONT THREE-QUARTER VIEW

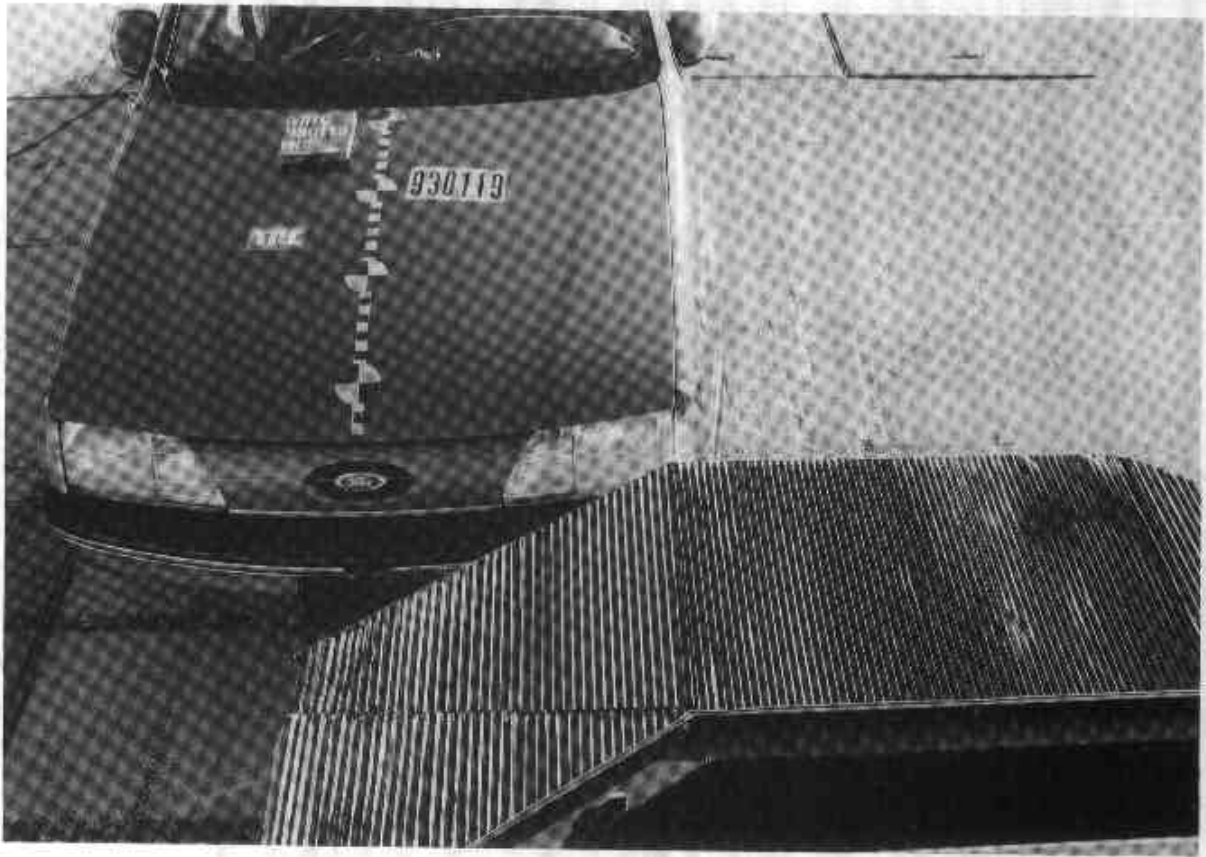


Figure A-13. PRE-TEST BUMPER ENGAGEMENT VIEW



Figure A-14. PRE-TEST ENGINE COMPARTMENT VIEW



Figure A-15. PRE-TEST WINDSHIELD VIEW



Figure A-16. POST-TEST WINDSHIELD VIEW



Figure A-17. POST-TEST FRONT UNDERBODY VIEW

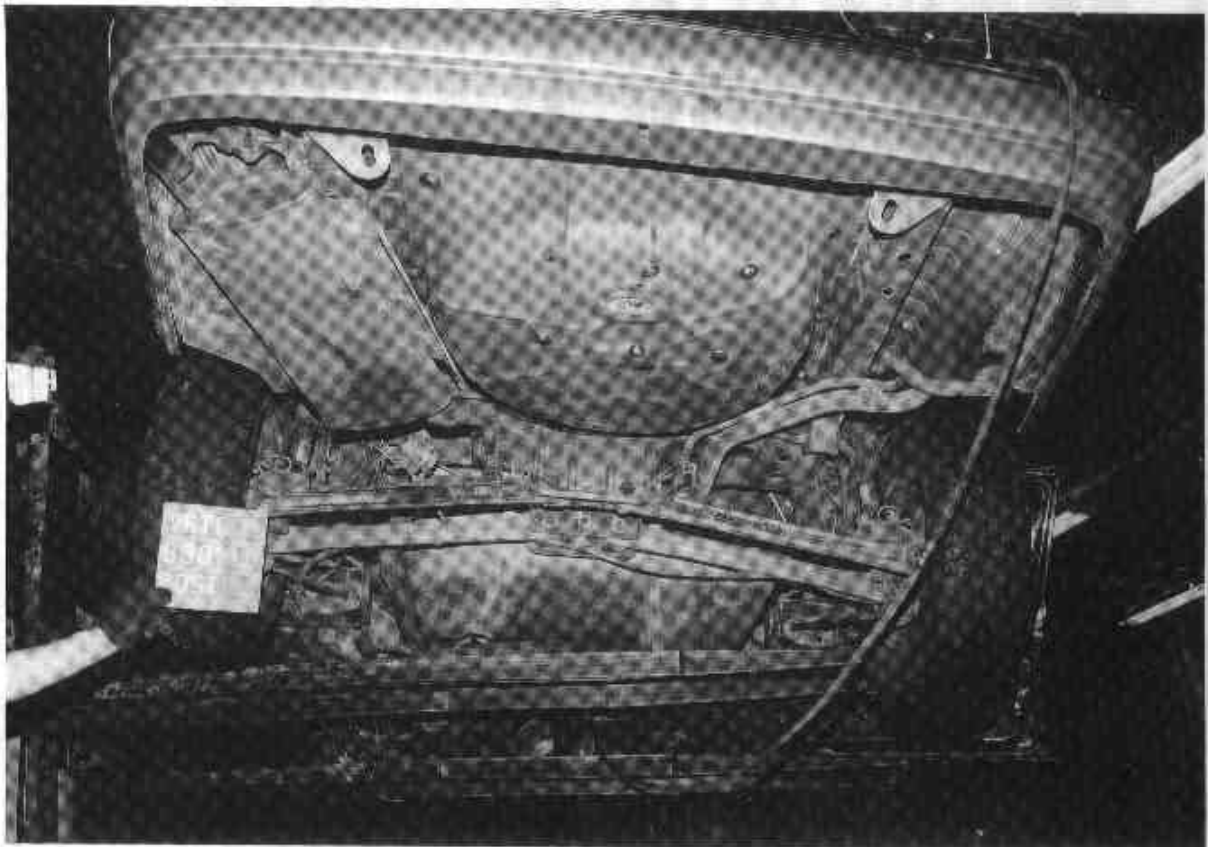


Figure A-18. POST-TEST REAR UNDERBODY VIEW

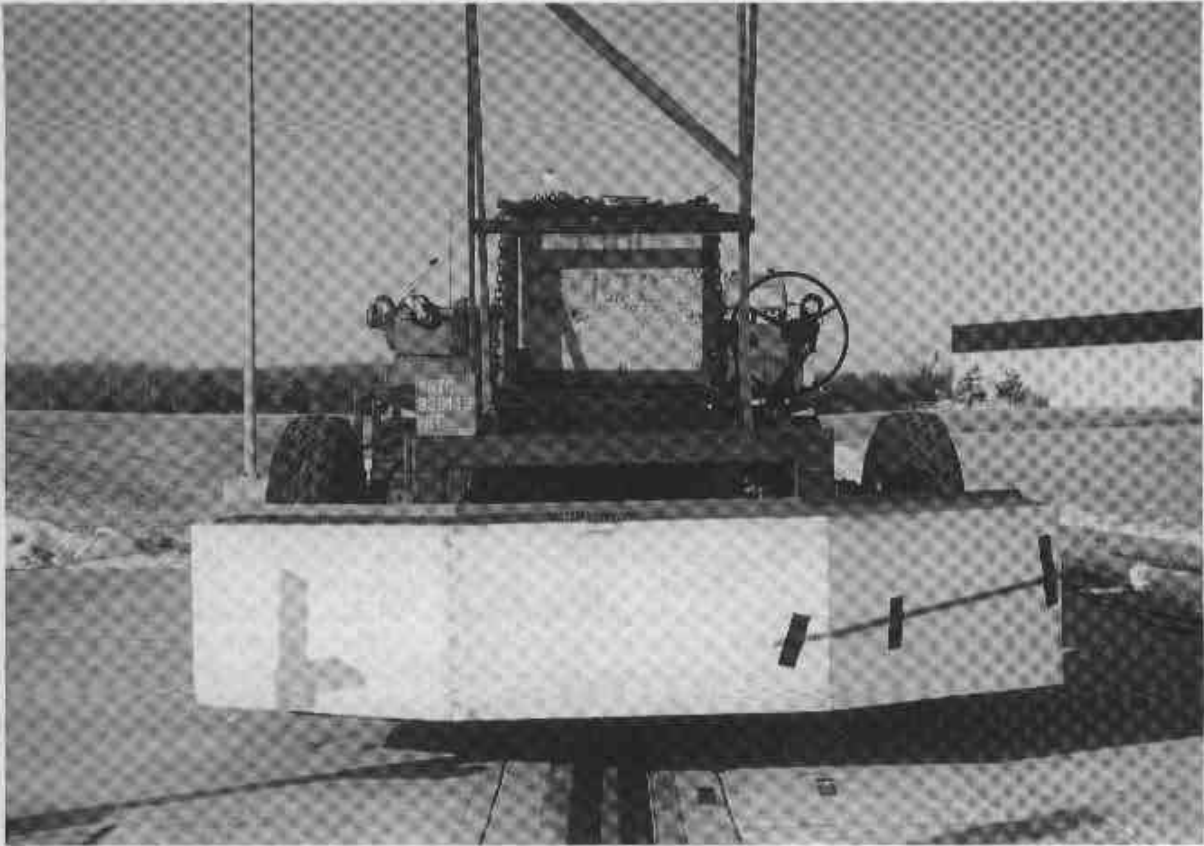


Figure A-19. PRE-TEST TRUCK FRONT VIEW

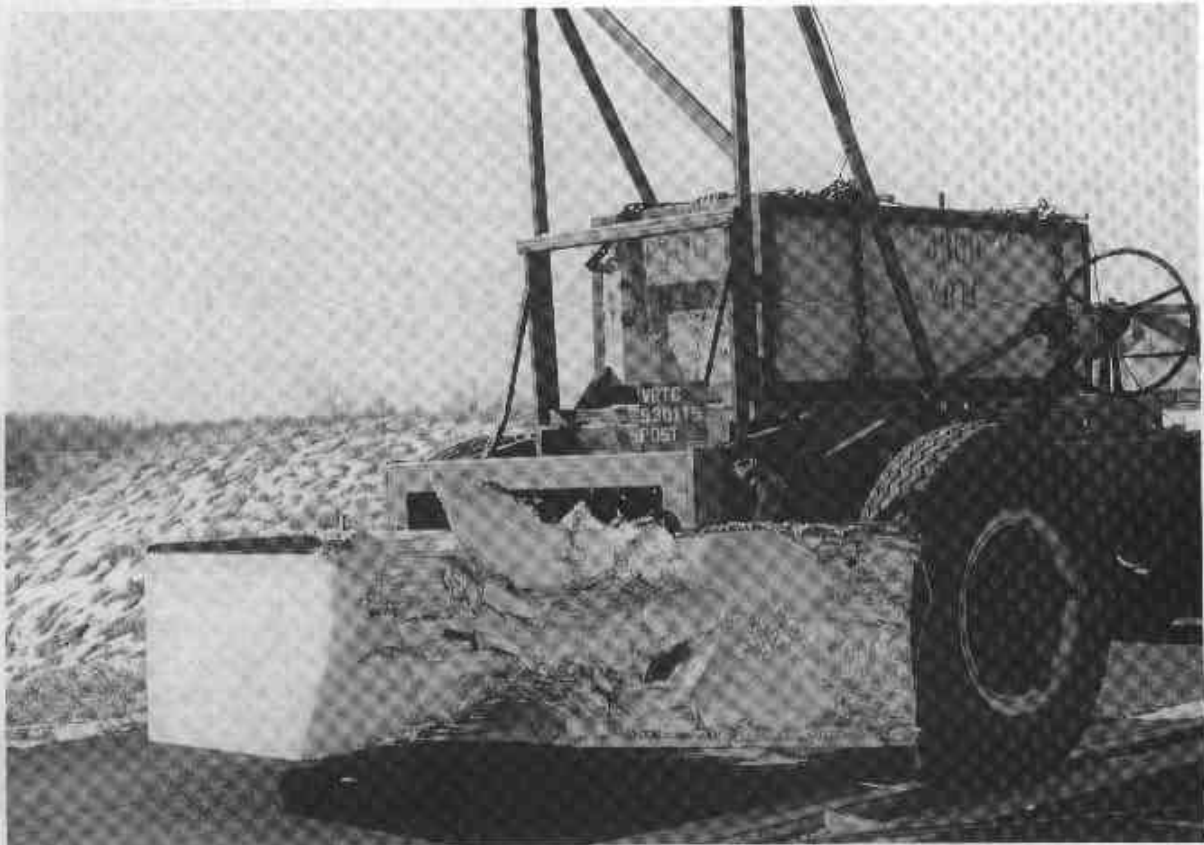


Figure A-20. POST-TEST TRUCK DAMAGE VIEW

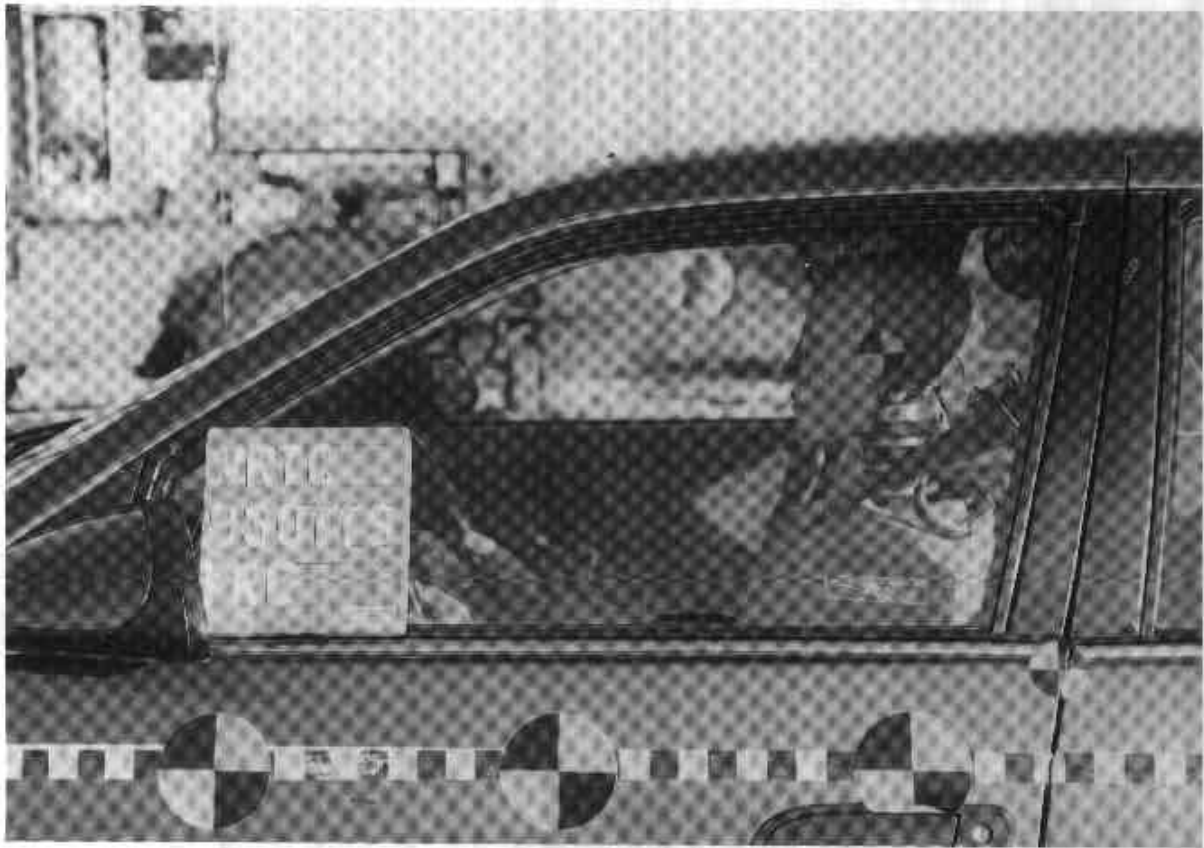


Figure A-21. PRE-TEST DUMMY VIEW



Figure A-22. POST-TEST DUMMY VIEW

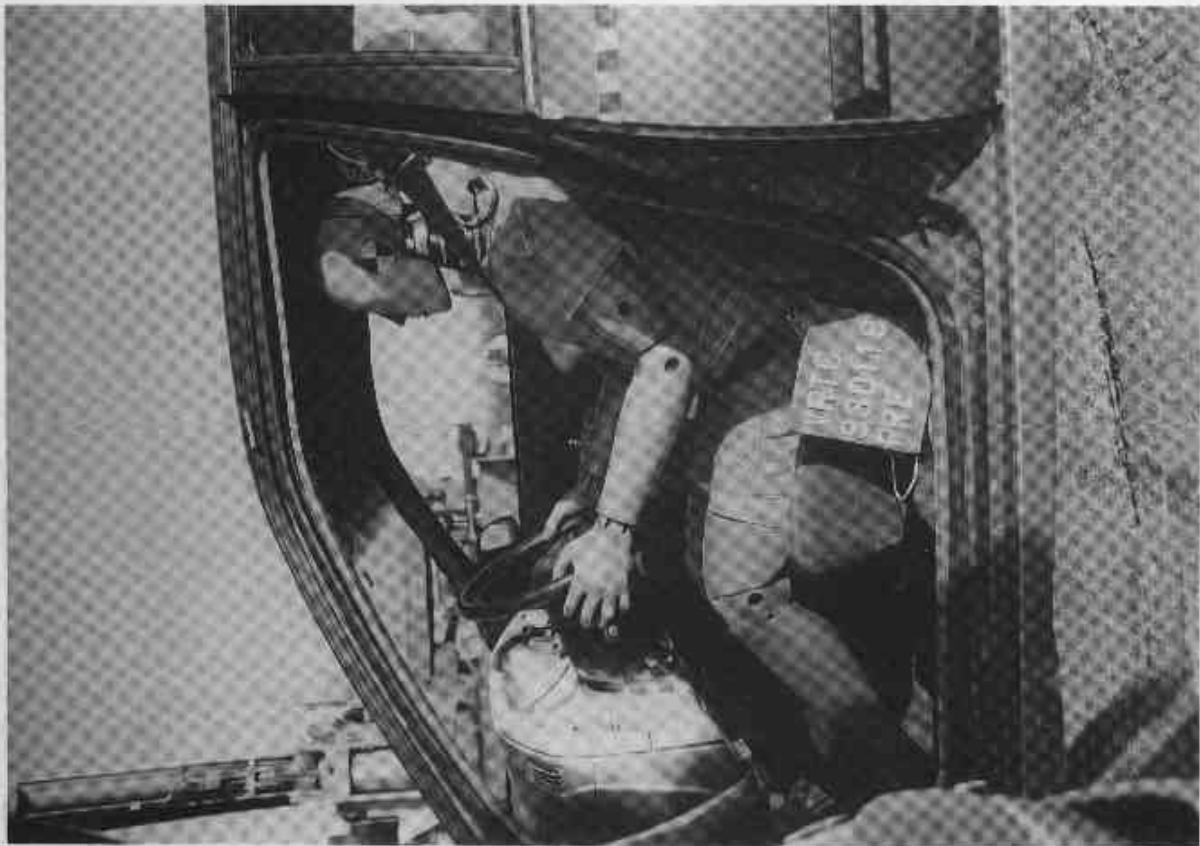


Figure A-23. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 1



Figure A-24. PRE-TEST VEHICLE INTERIOR AND DUMMY - VIEW 2

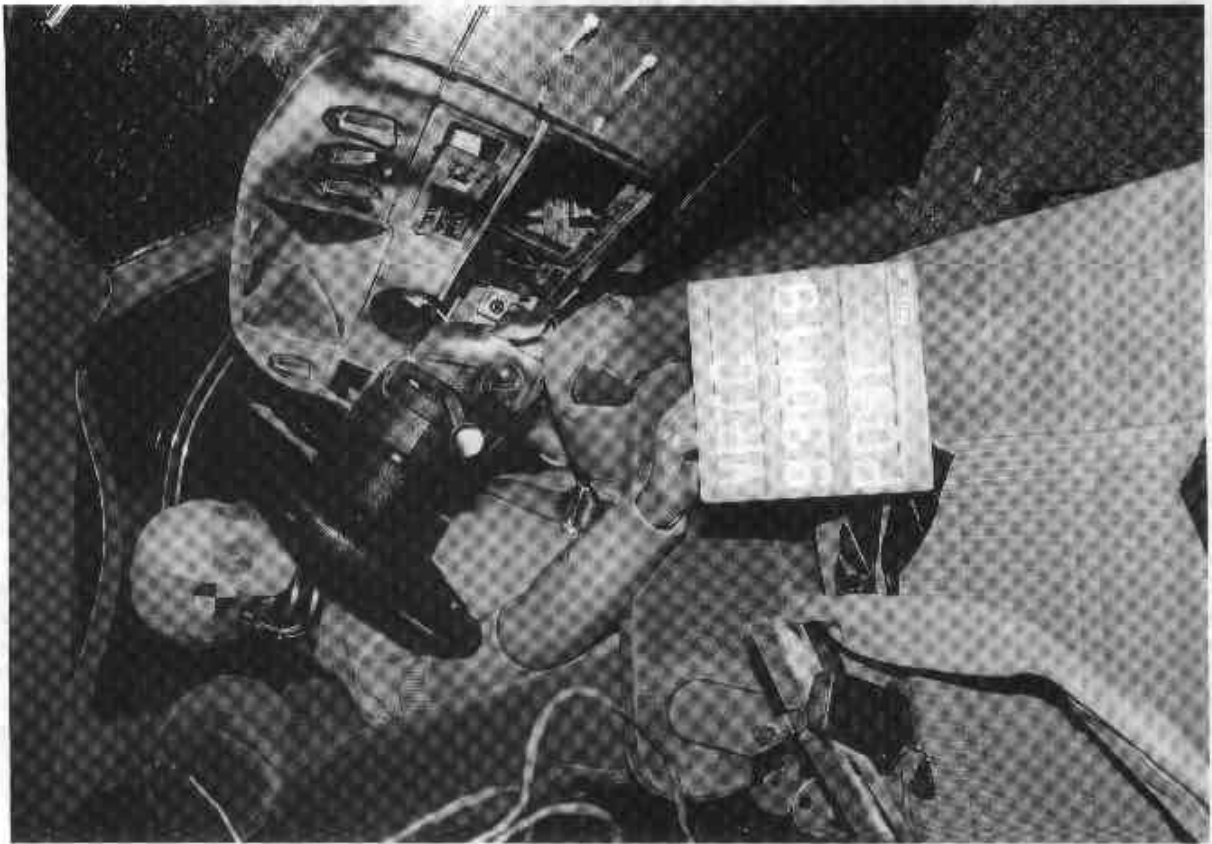


Figure A-25. POST-TEST VEHICLE INTERIOR AND DUMMY VIEW



Figure A-26. POST-TEST DUMMY HEAD CONTACT - VIEW 1



Figure A-27. POST-TEST DUMMY HEAD CONTACT - VIEW 2



Figure A-28. POST-TEST DUMMY HEAD CONTACT - VIEW 3



Figure A-29. POST-TEST DUMMY KNEE CONTACT - VIEW 1



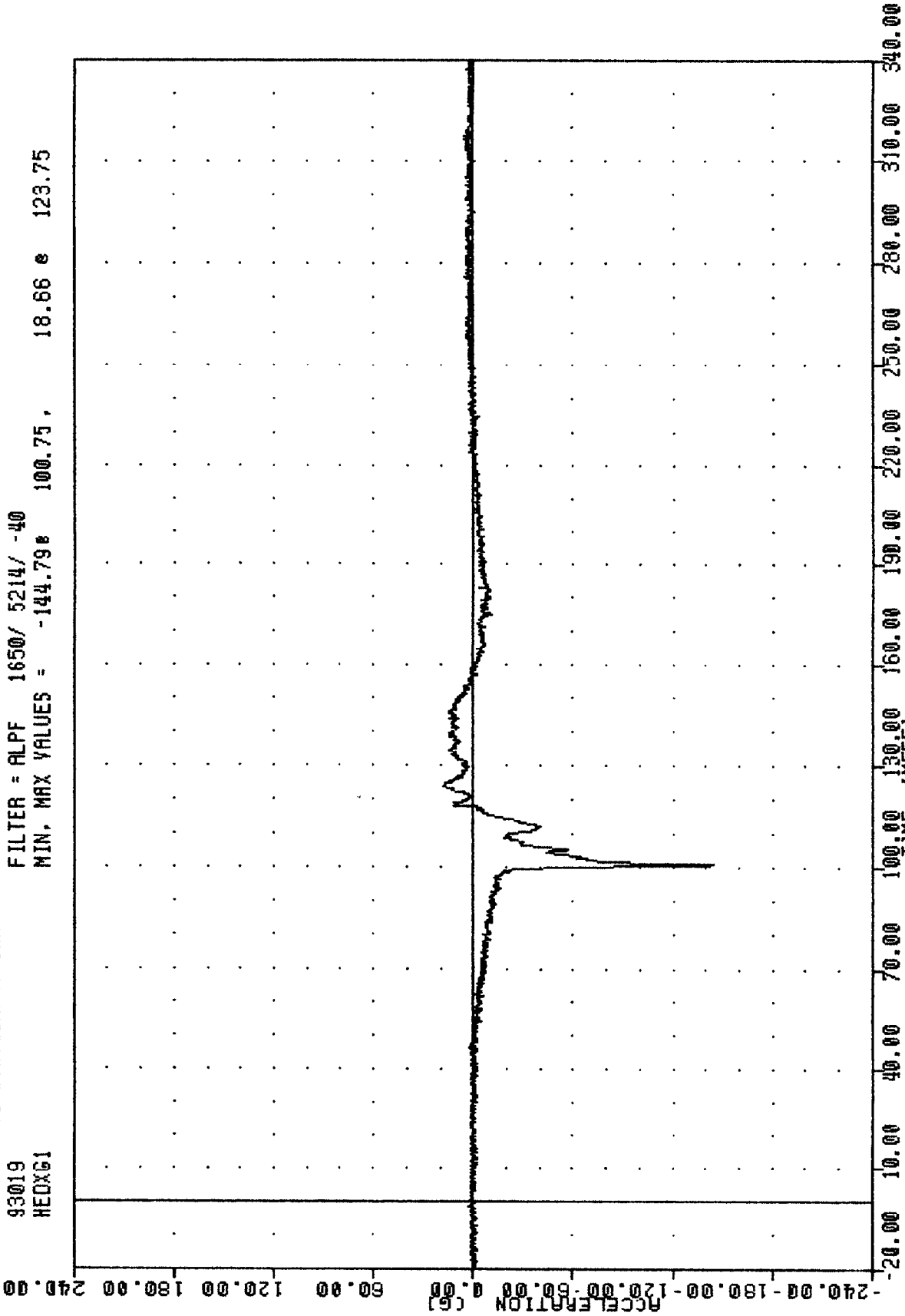
Figure A-30. POST-TEST DUMMY KNEE CONTACT - VIEW 2

APPENDIX B

DATA PLOTS

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEXG1

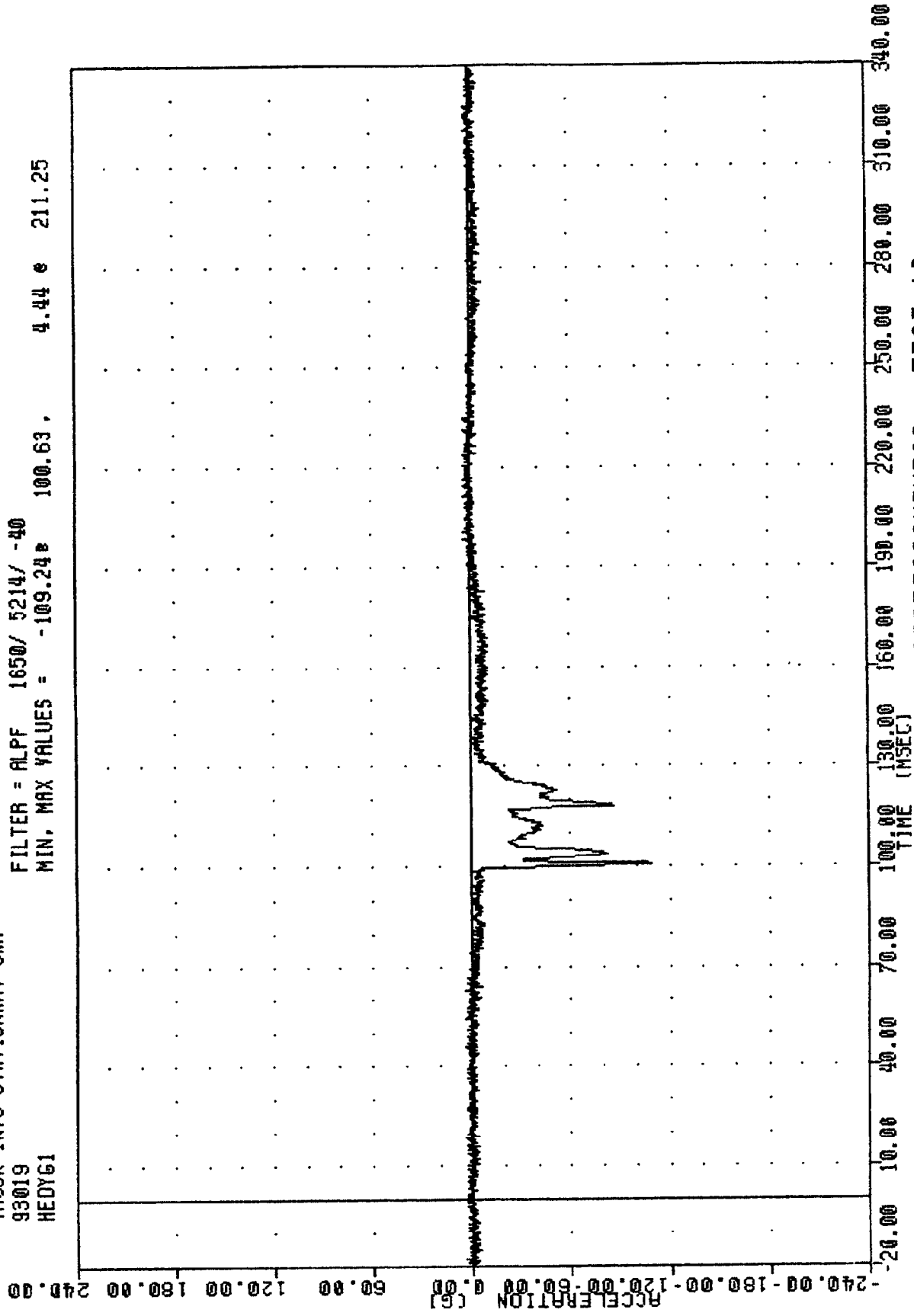
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -144.79 100.75 , 18.66 e 123.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEDYG1

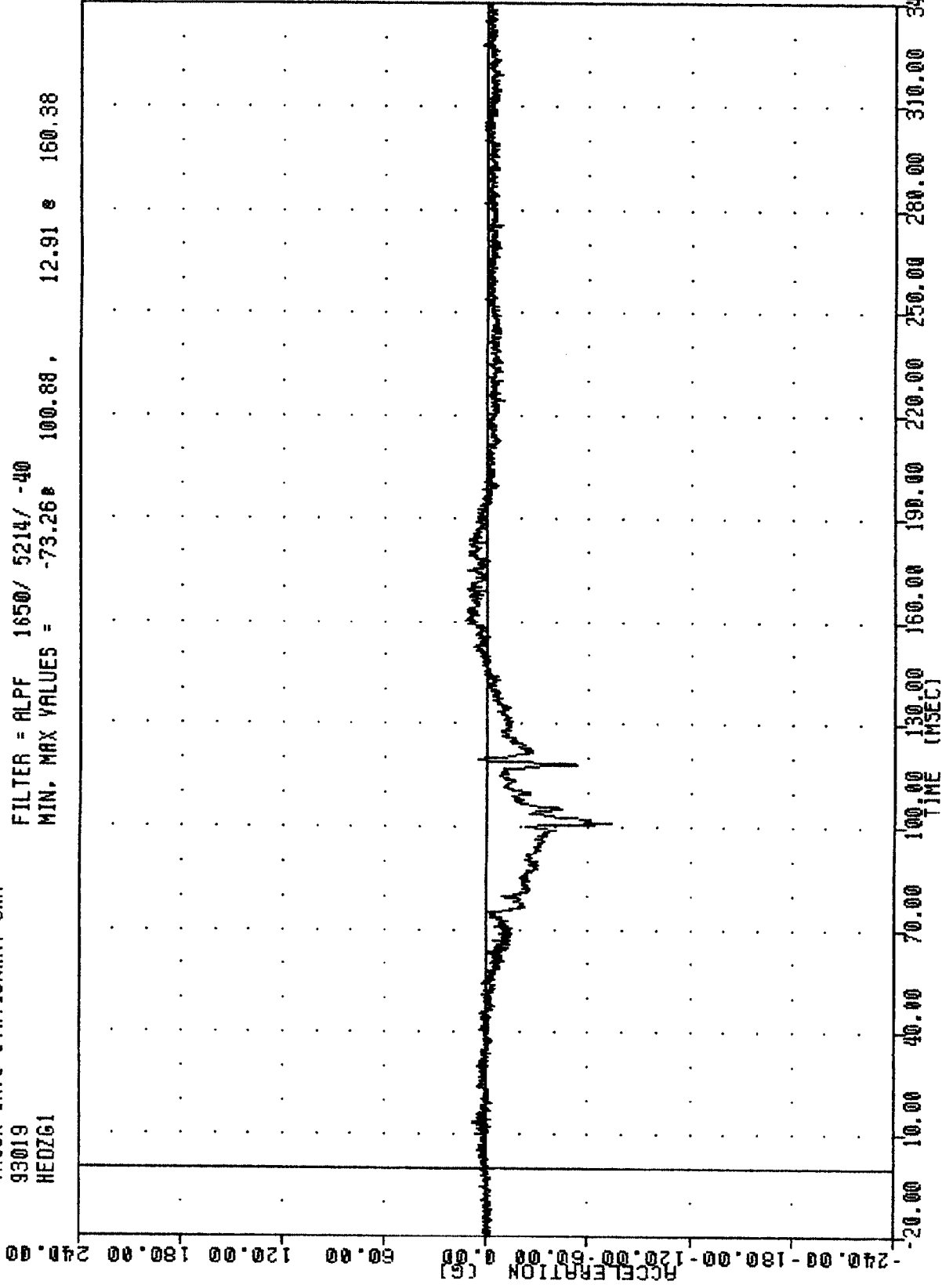
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -109.24 100.63, 4.44 e 211.25



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD Y-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEDZG1

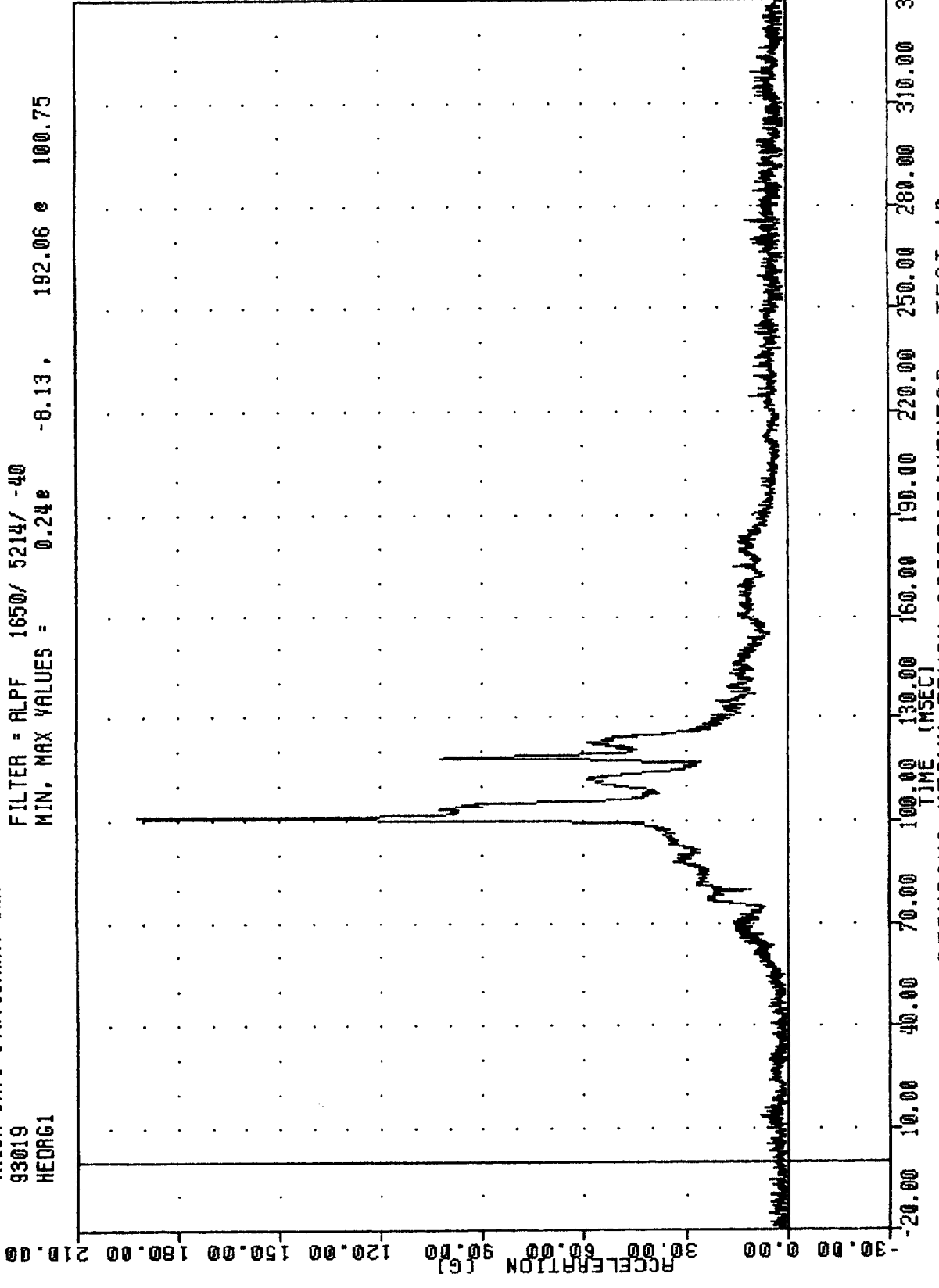
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -73.26# 100.88 , 12.91 e 160.38



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD Z-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEDRG1

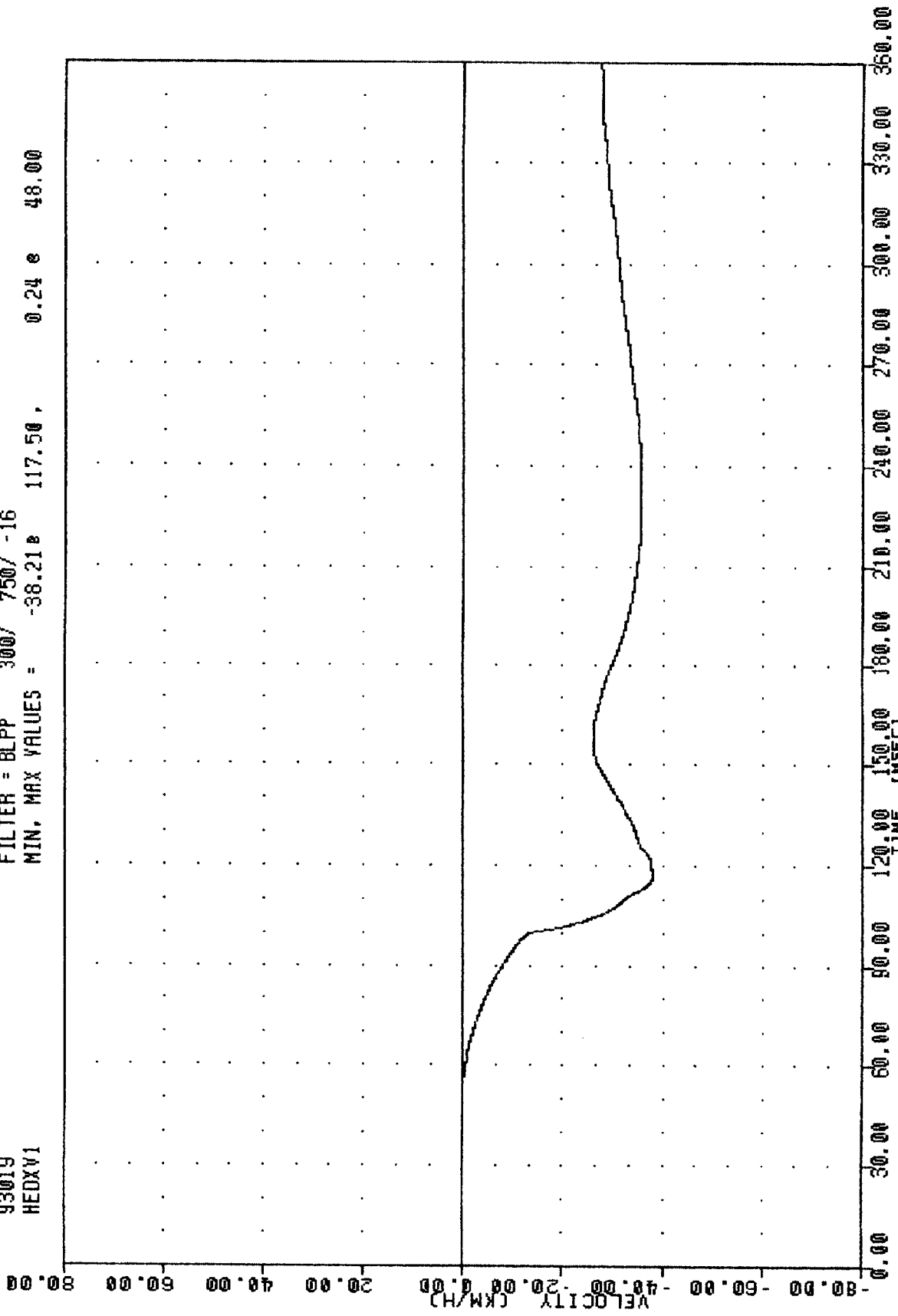
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = 0.24e -8.13 , 192.06 e 100.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD RESULTANT ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEDXV1

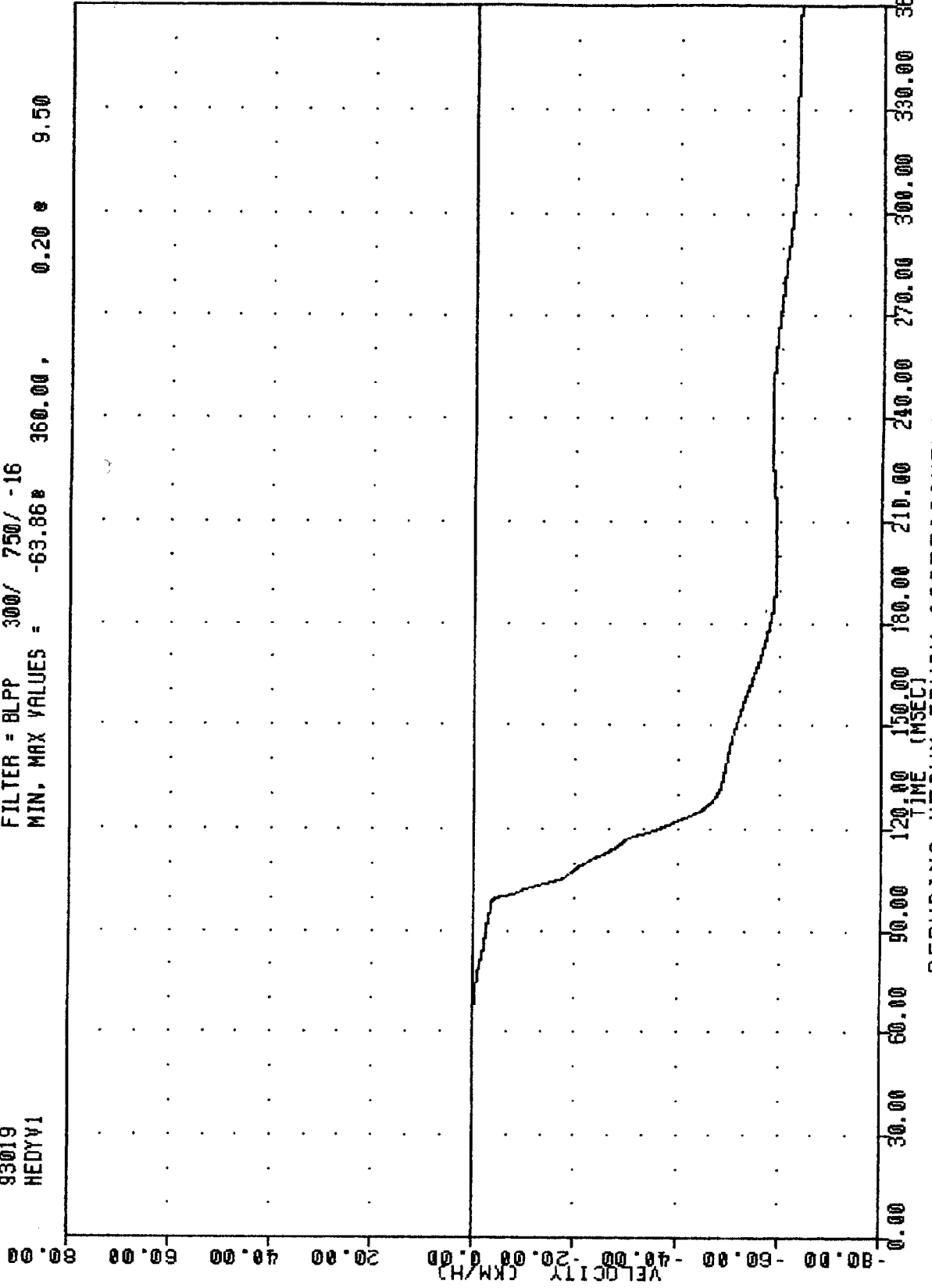
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -38.21 e 117.50 , 0.24 e 48.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEDYV1

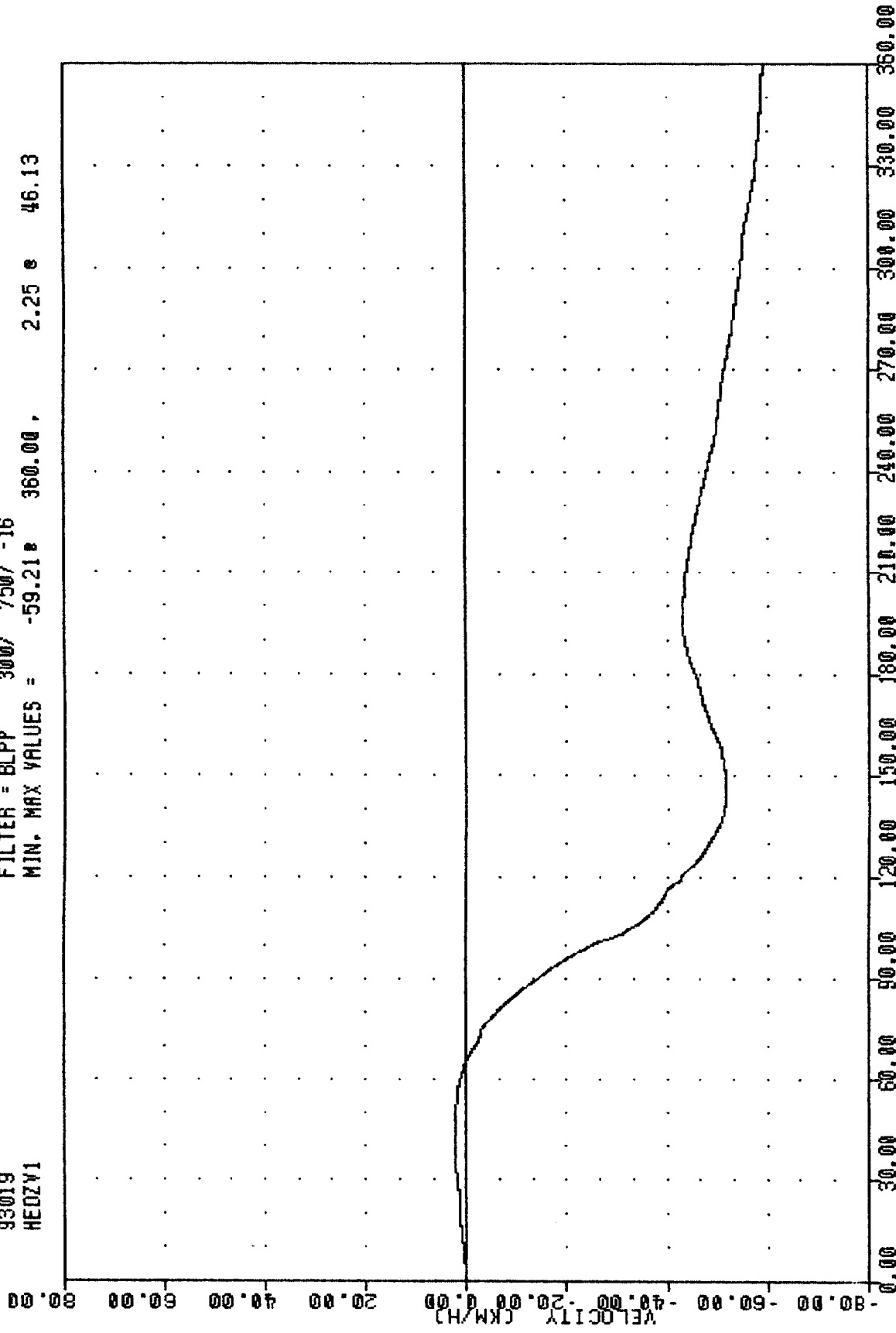
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -63.86\* 360.00, 0.20 \* 9.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD Y-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
HEDZV1

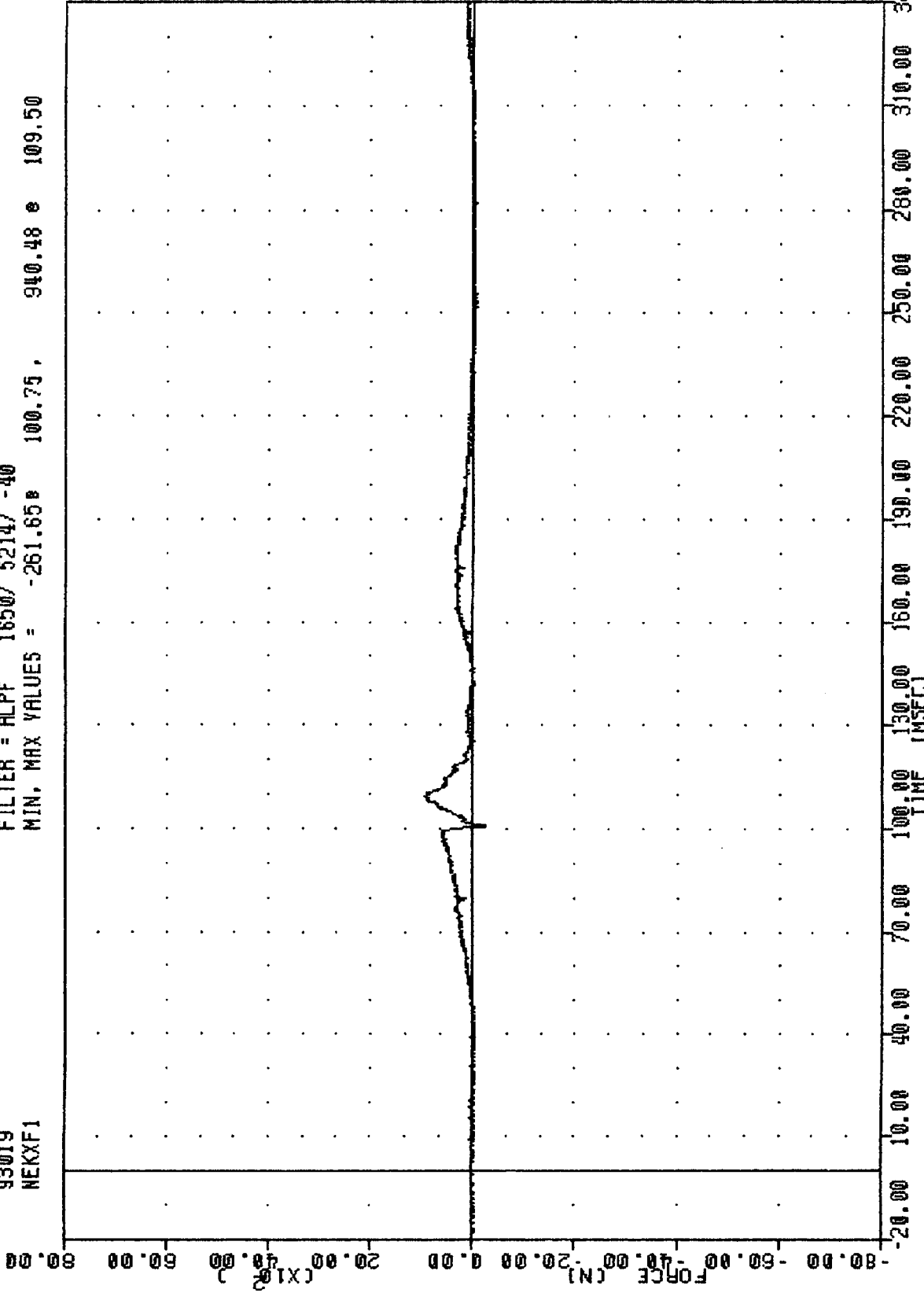
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -59.21 e 360.00 , 2.25 e 46.13



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER HEAD Z-AXIS VELOCITY

TRC  
930119  
TRUCK INTO STATIONARY CAR  
93019  
NEKXF1

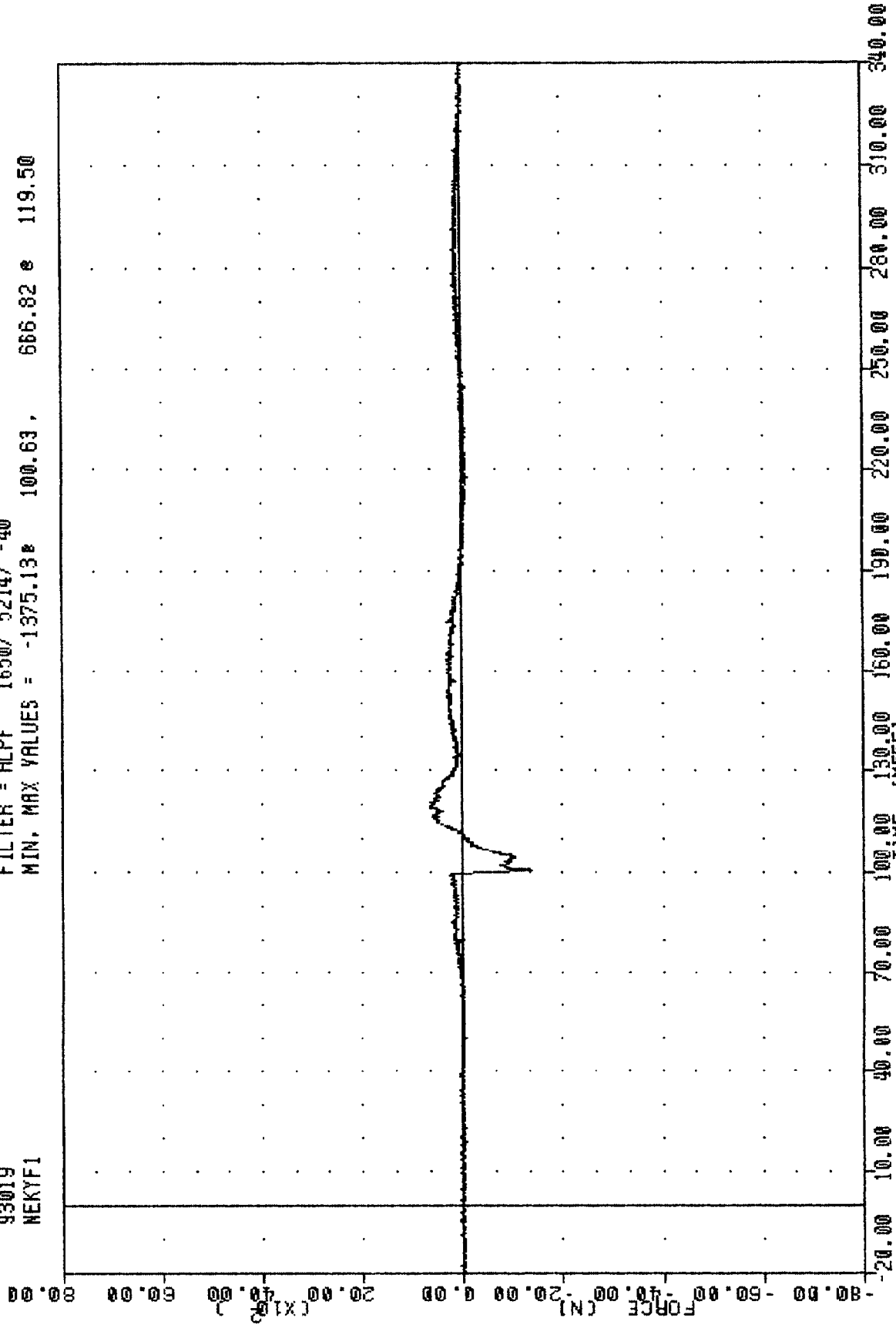
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -261.65 B 100.75 , 940.48 e 109.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER NECK X-AXIS SHEAR FORCE

TRC  
930119  
TRUCK INTO STATIONARY CAR  
93019  
NEKYF1

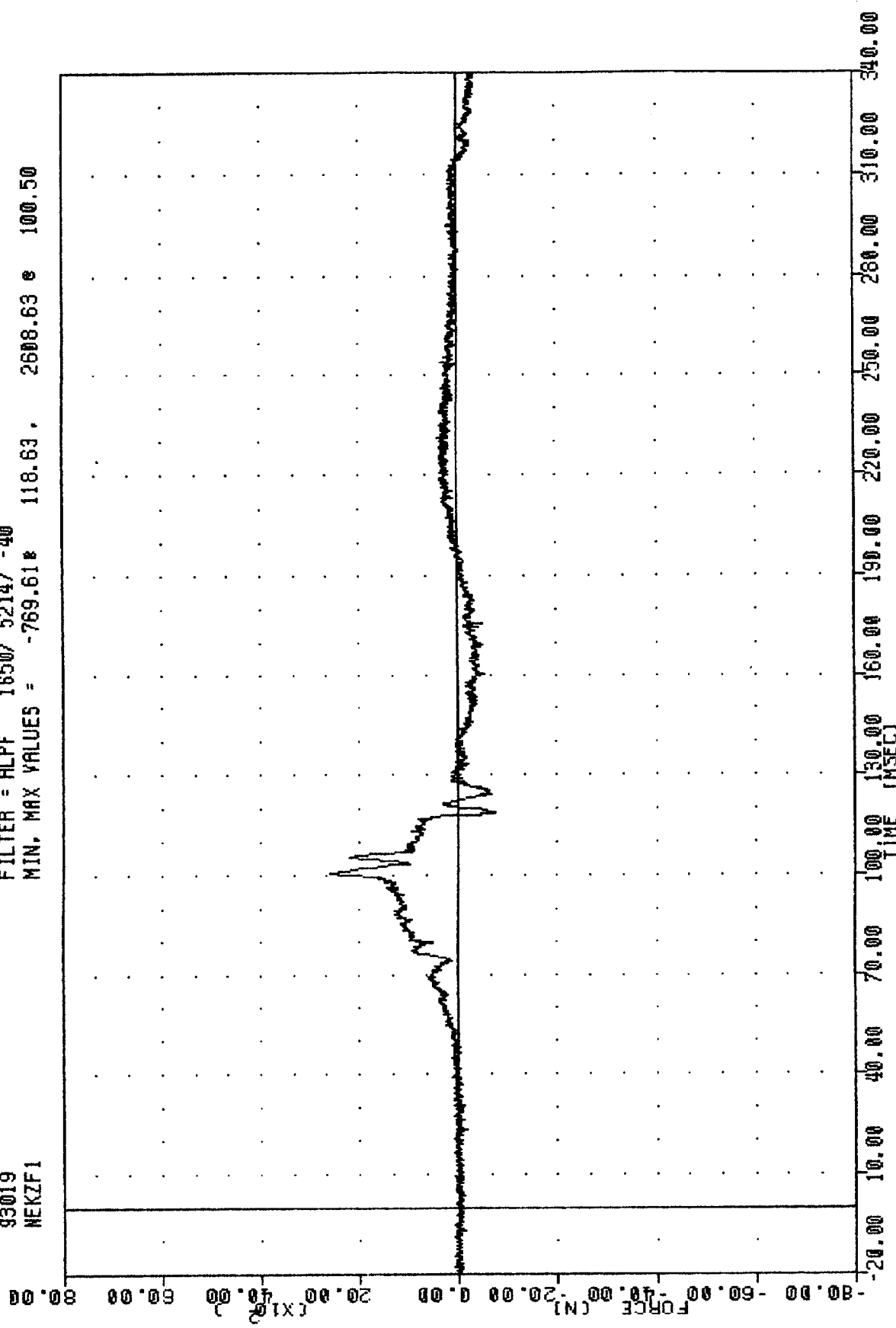
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -1375.13 100.63, 666.82 119.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER NECK Y-AXIS SHEAR FORCE

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
NEKZF1

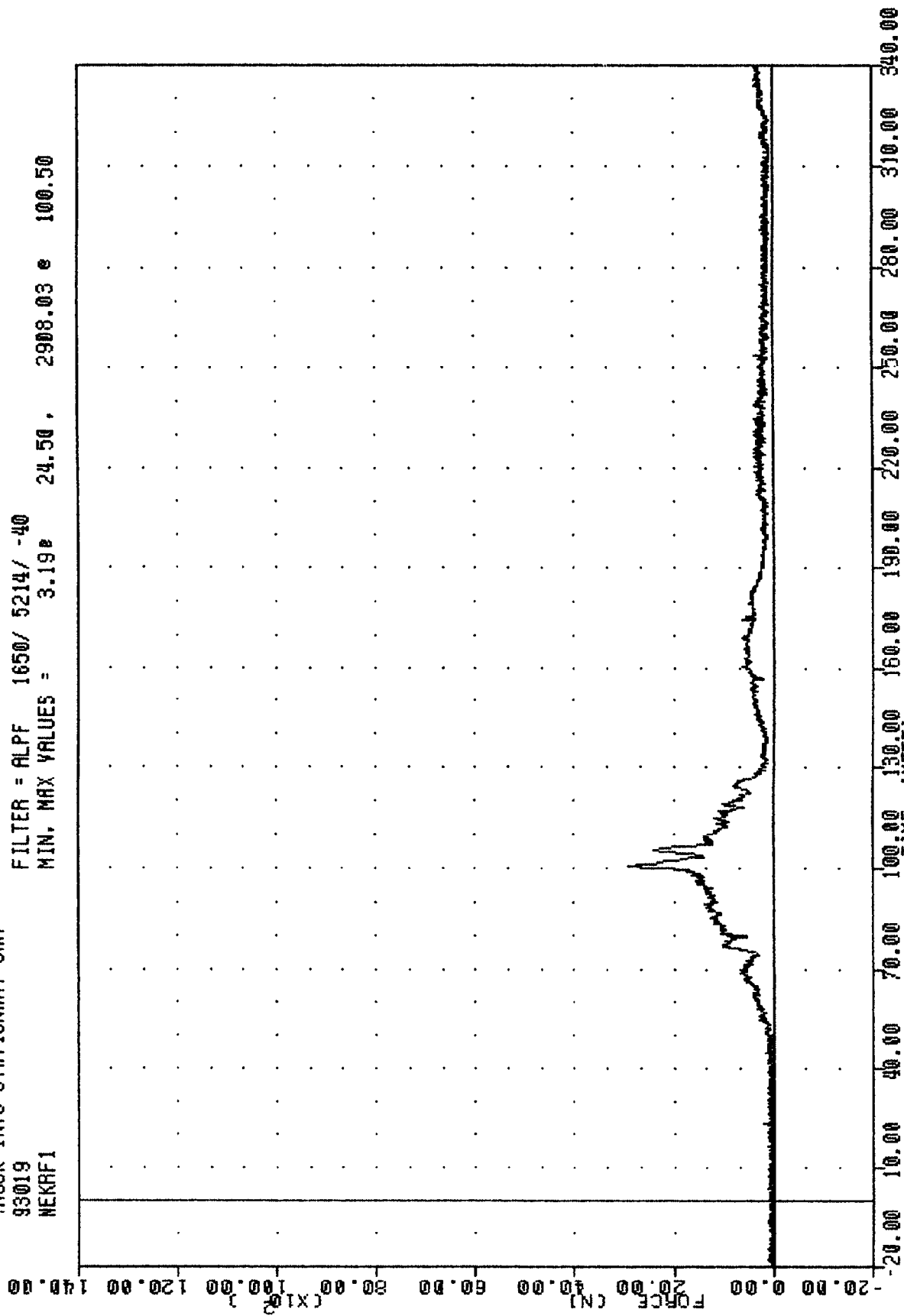
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -769.61# 118.63, 2608.63 # 100.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER NECK Z-AXIS AXIAL FORCE

TRC  
TRUCK INTO STATIONARY CAR  
93019  
NEKRF1

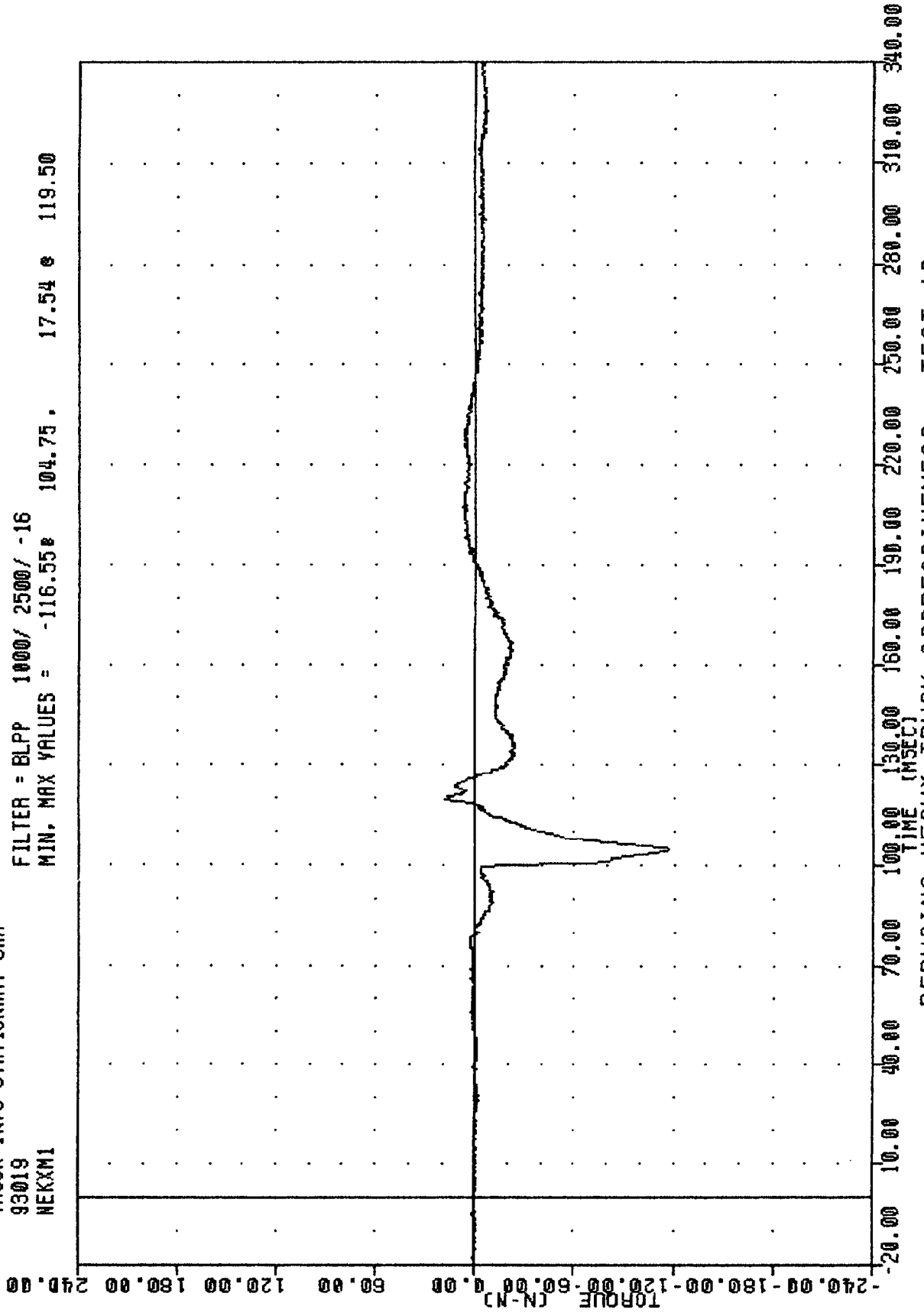
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 3.19e 24.50 , 2908.03 e 100.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER NECK RESULTANT FORCE

TRC  
TRUCK INTO STATIONARY CAR  
93019  
WEKXMI

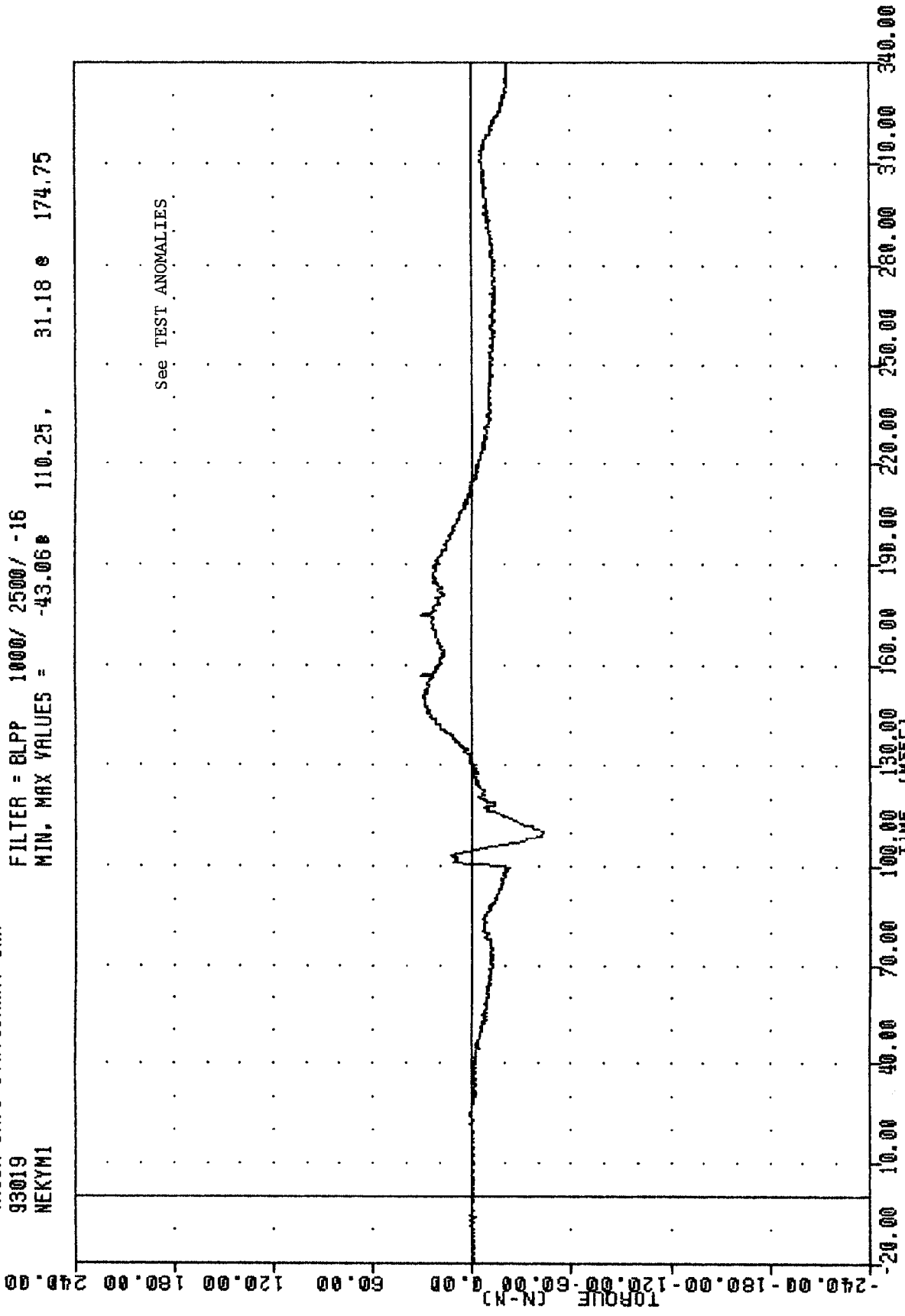
FILTER = BLPP 1000/ 2500/ -16  
MIN, MAX VALUES = -116.55e 104.75, 17.54 e 119.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER NECK MOMENT ABOUT X AXIS

TAC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 MEKYM1

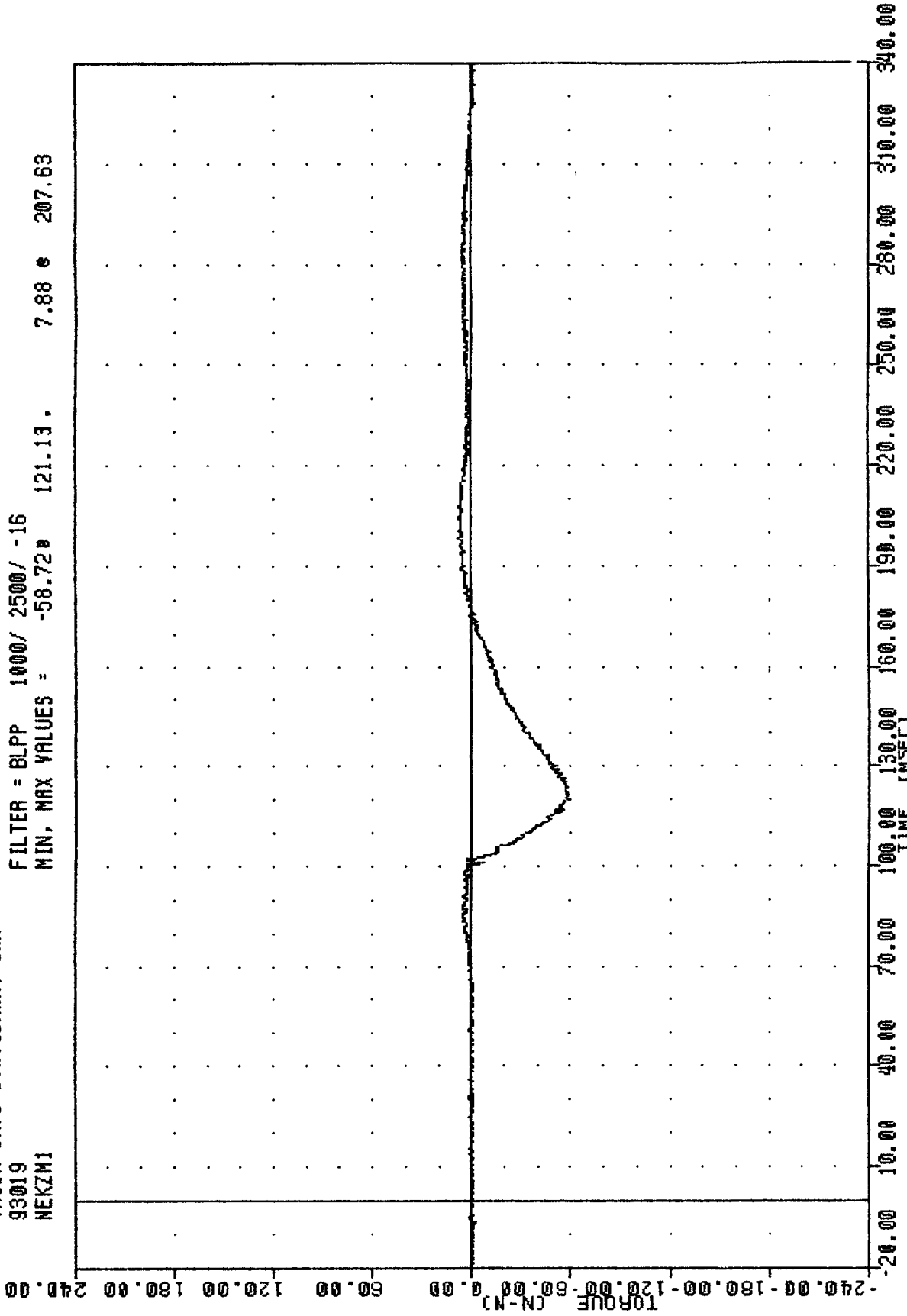
FILTER = BLPP 1000/ 2500/ -16  
 MIN. MAX VALUES = -43.06 110.25, 31.18 174.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 DRIVER NECK MOMENT ABOUT Y AXIS

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
NEKZM1

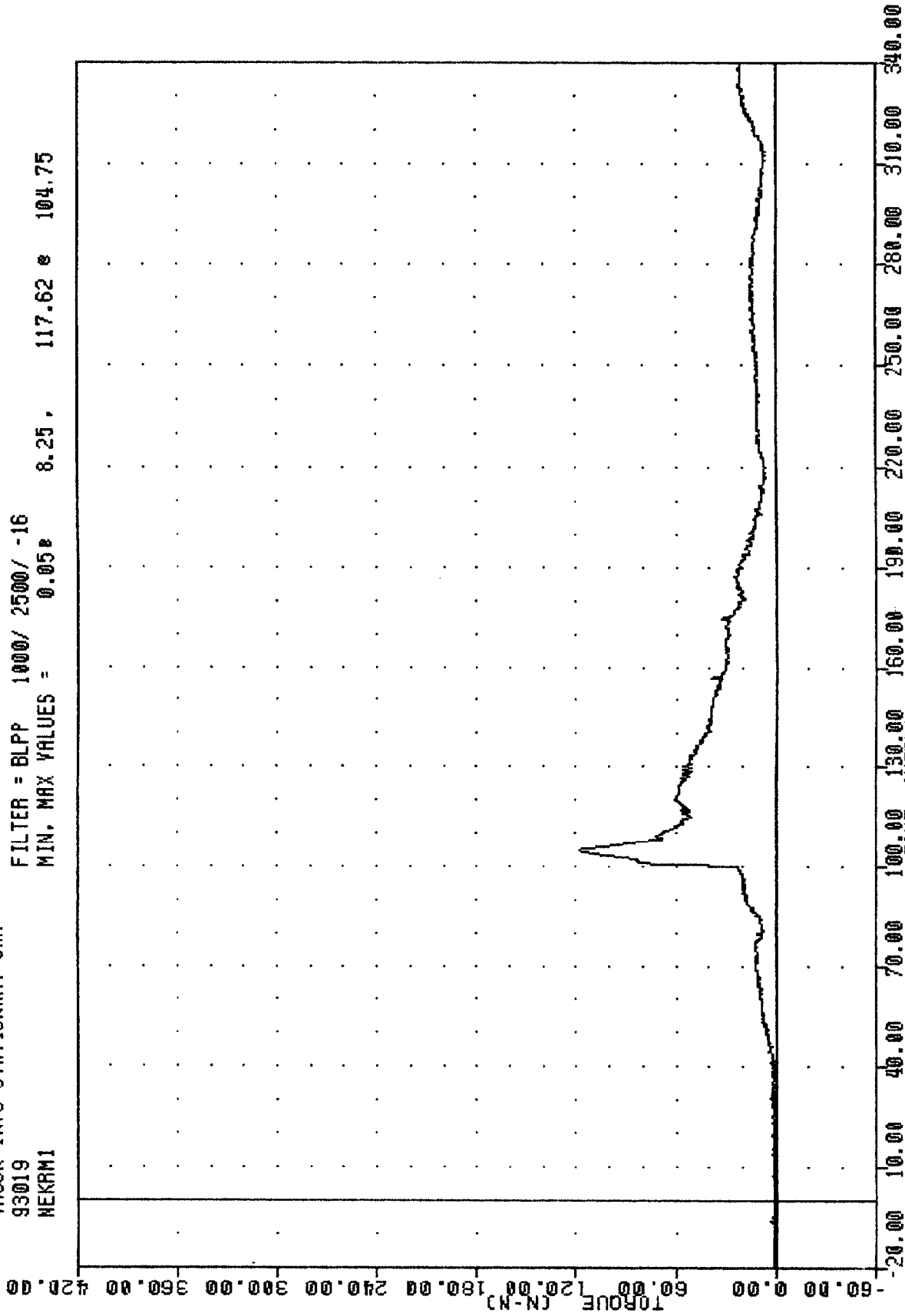
FILTER = BLPP 1000/ 2500/ -16  
MIN, MAX VALUES = -58.72 121.13, 7.88 e 207.63



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER NECK MOMENT ABOUT Z AXIS

TRC .930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 MEKAMI

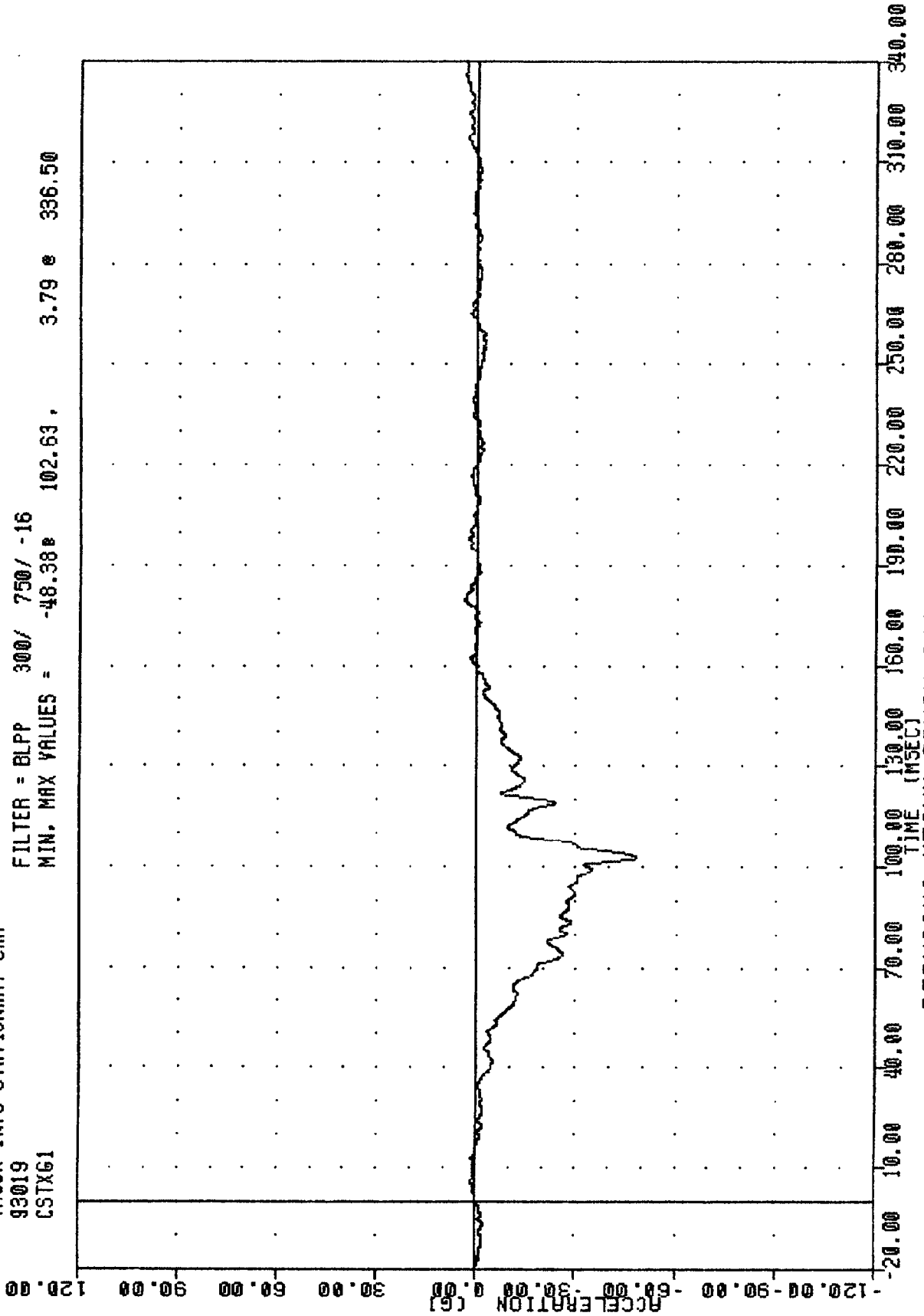
FILTER = BLPP 1000/ 2500/ -16  
 MIN. MAX VALUES = 0.05e 8.25, 117.62 e 104.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 DRIVER NECK MOMENT RESULTANT

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTX61

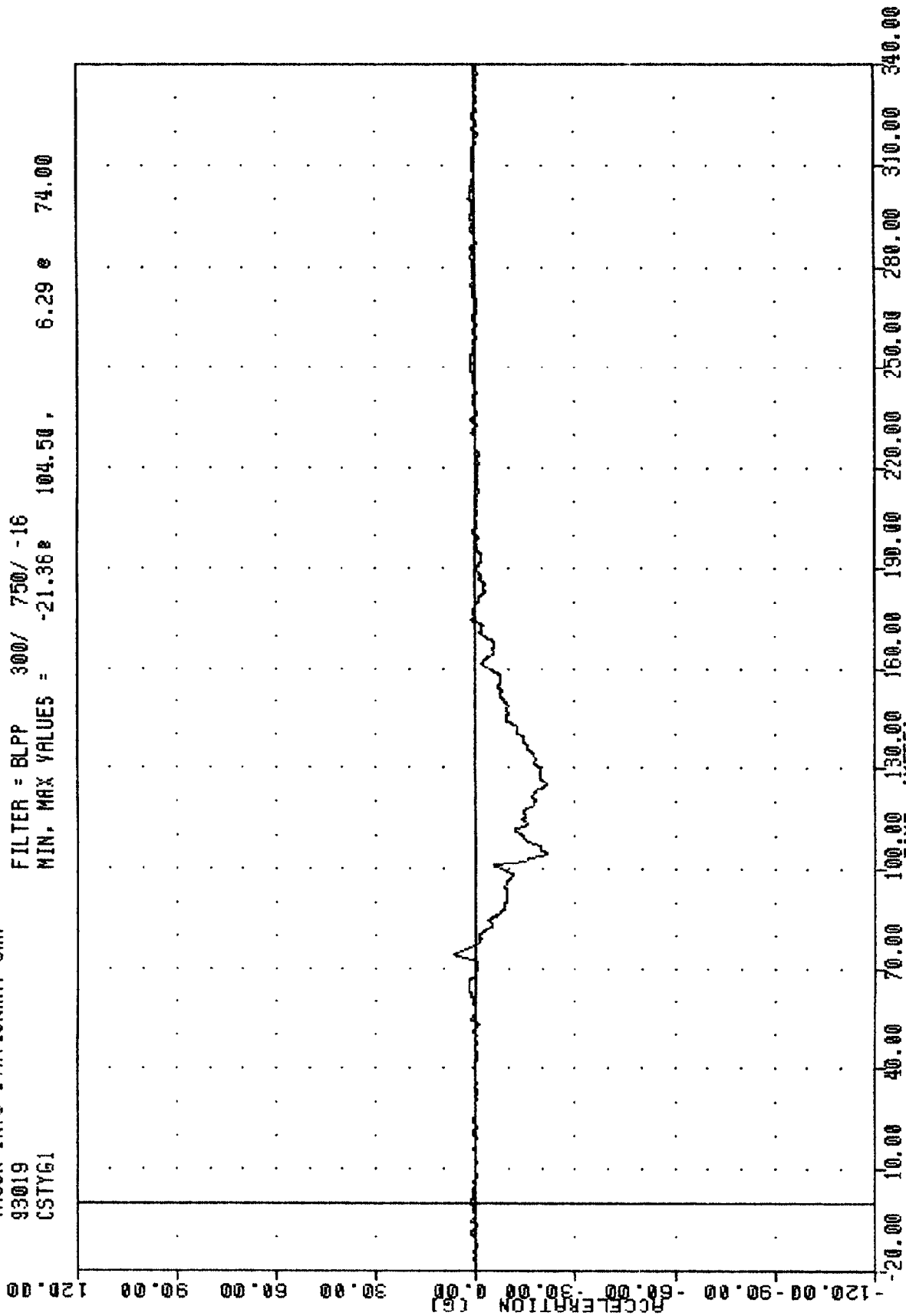
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -48.38 102.63, 3.79 336.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST X-AXIS ACCELERATION

TRC . 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTY61

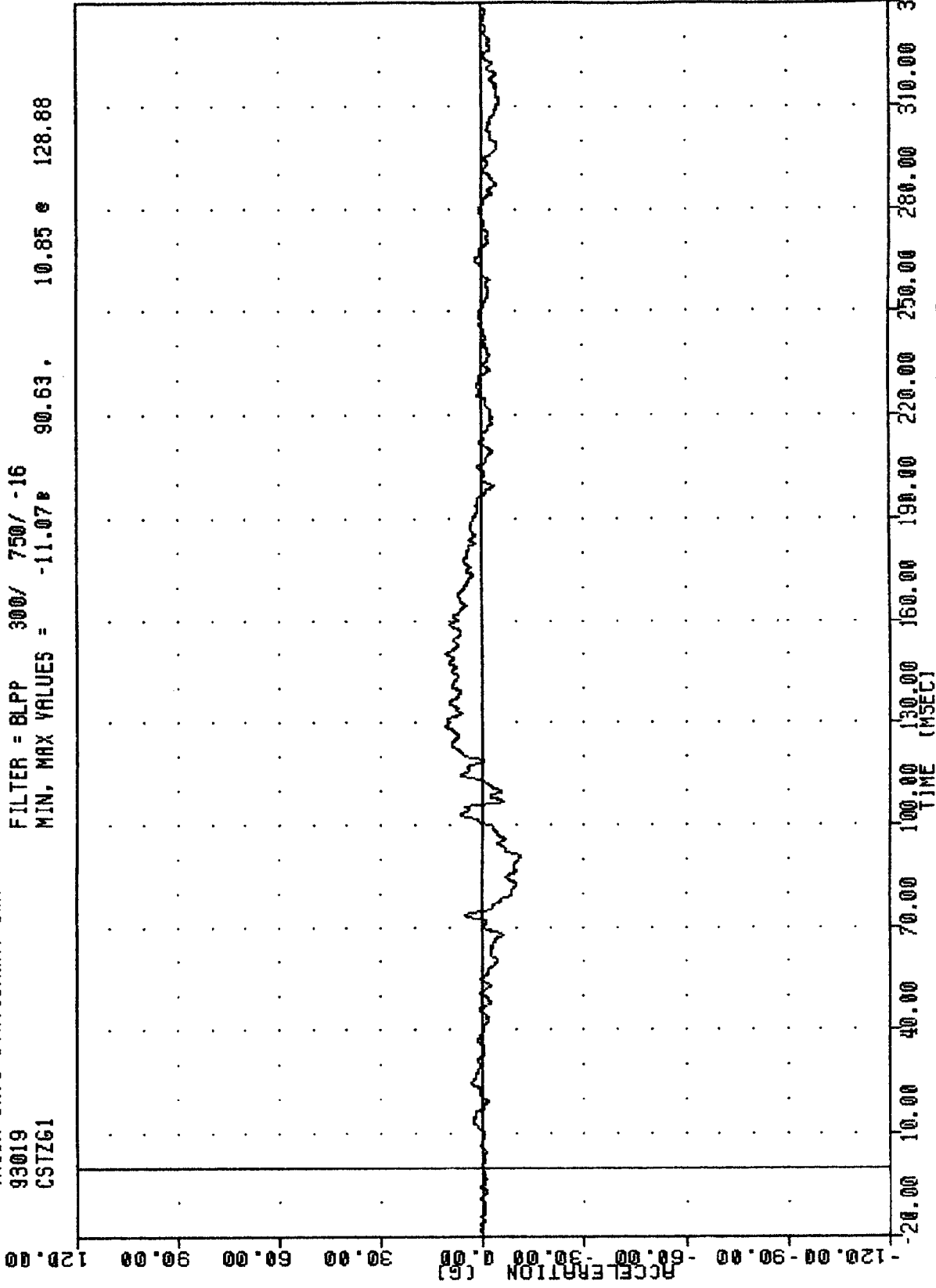
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -21.36e 104.50 , 6.29 e 74.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST Y-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTZG1

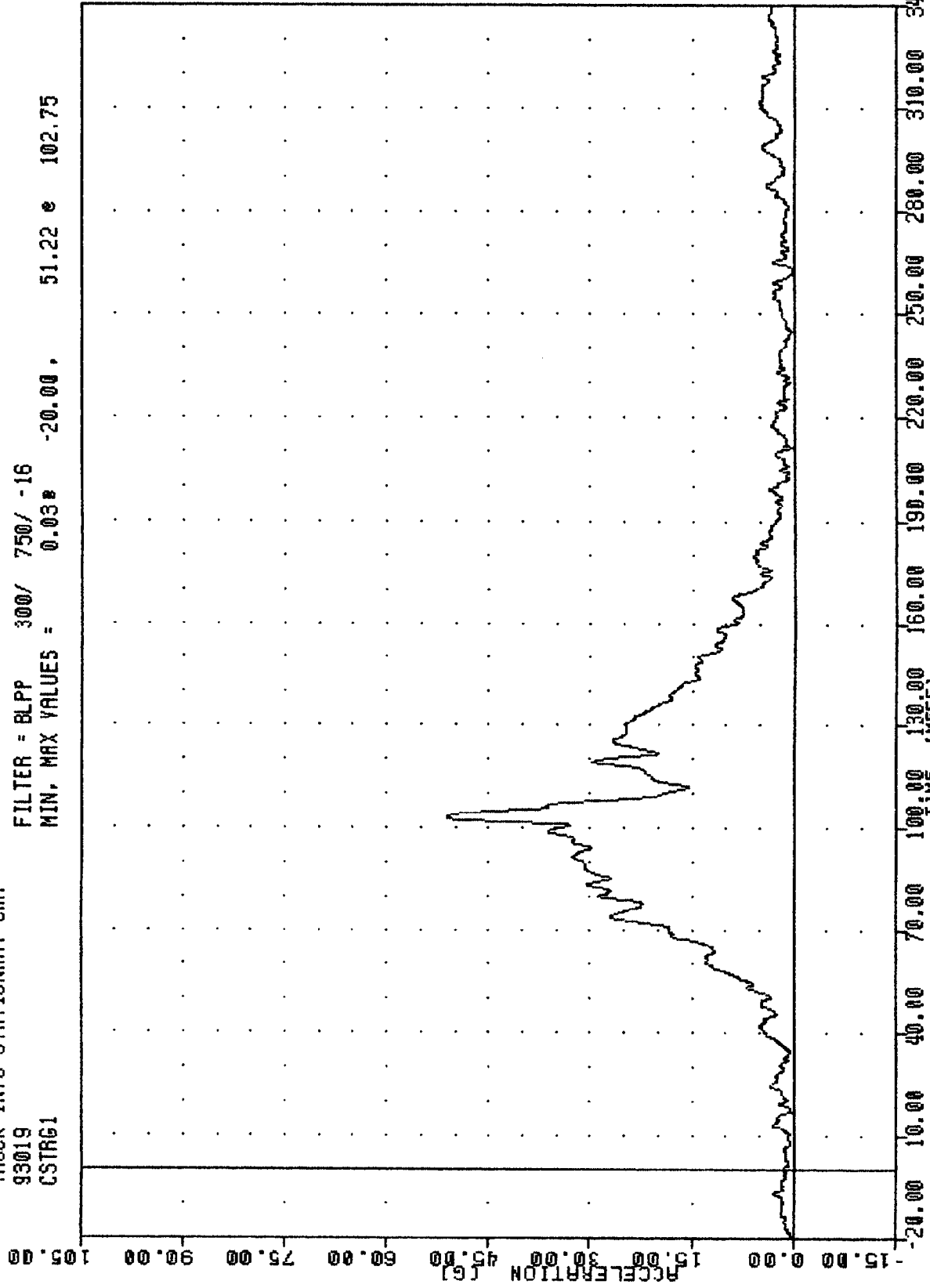
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -11.07 90.63 10.85 128.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST Z-AXIS ACCELERATION

TAC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTRG1

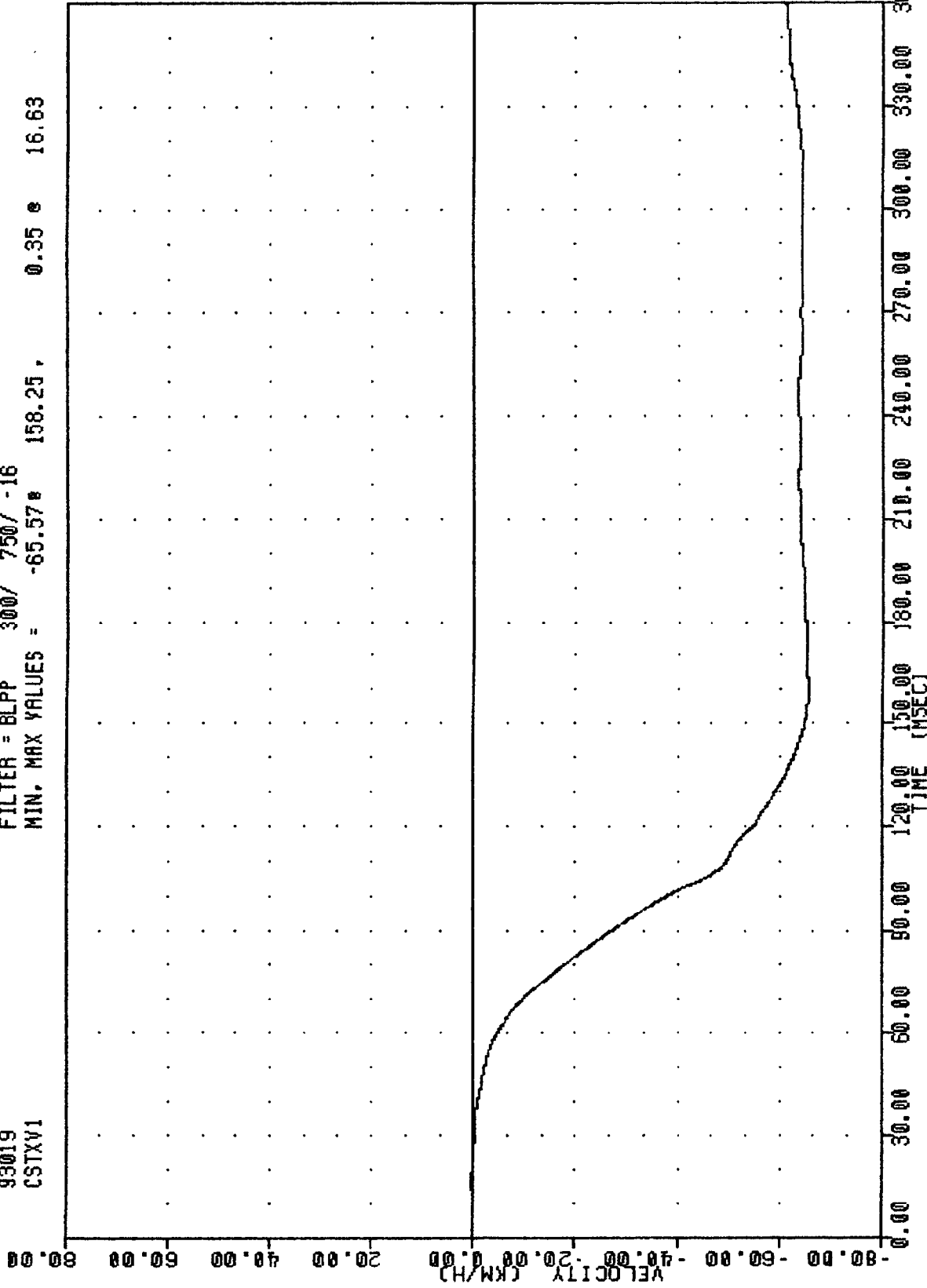
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = 0.03 e -20.00 , 51.22 e 102.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST RESULTANT ACCELERATION

TAC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTXV1

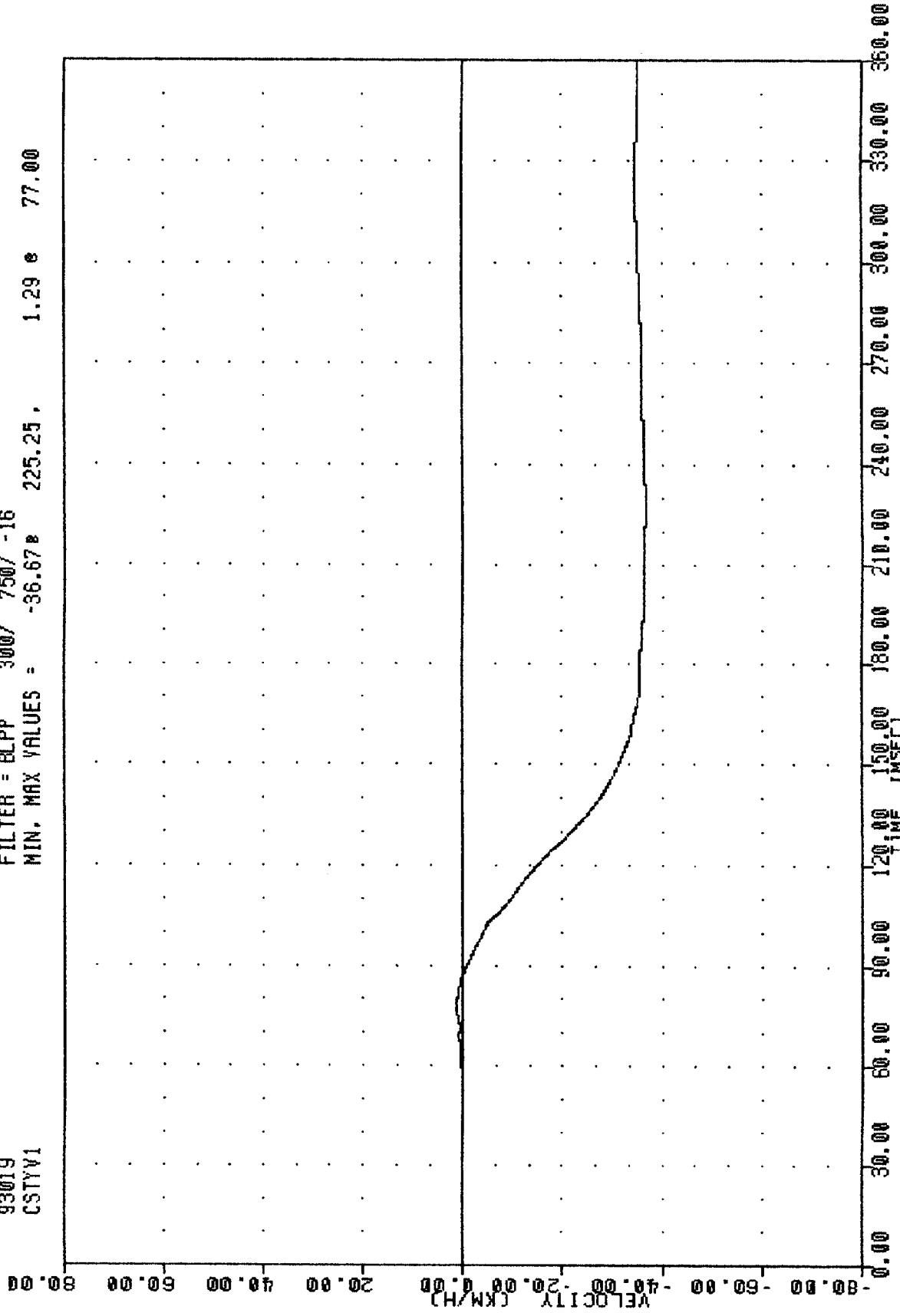
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -65.57# 158.25 , 0.35 e 16.63



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTYV1

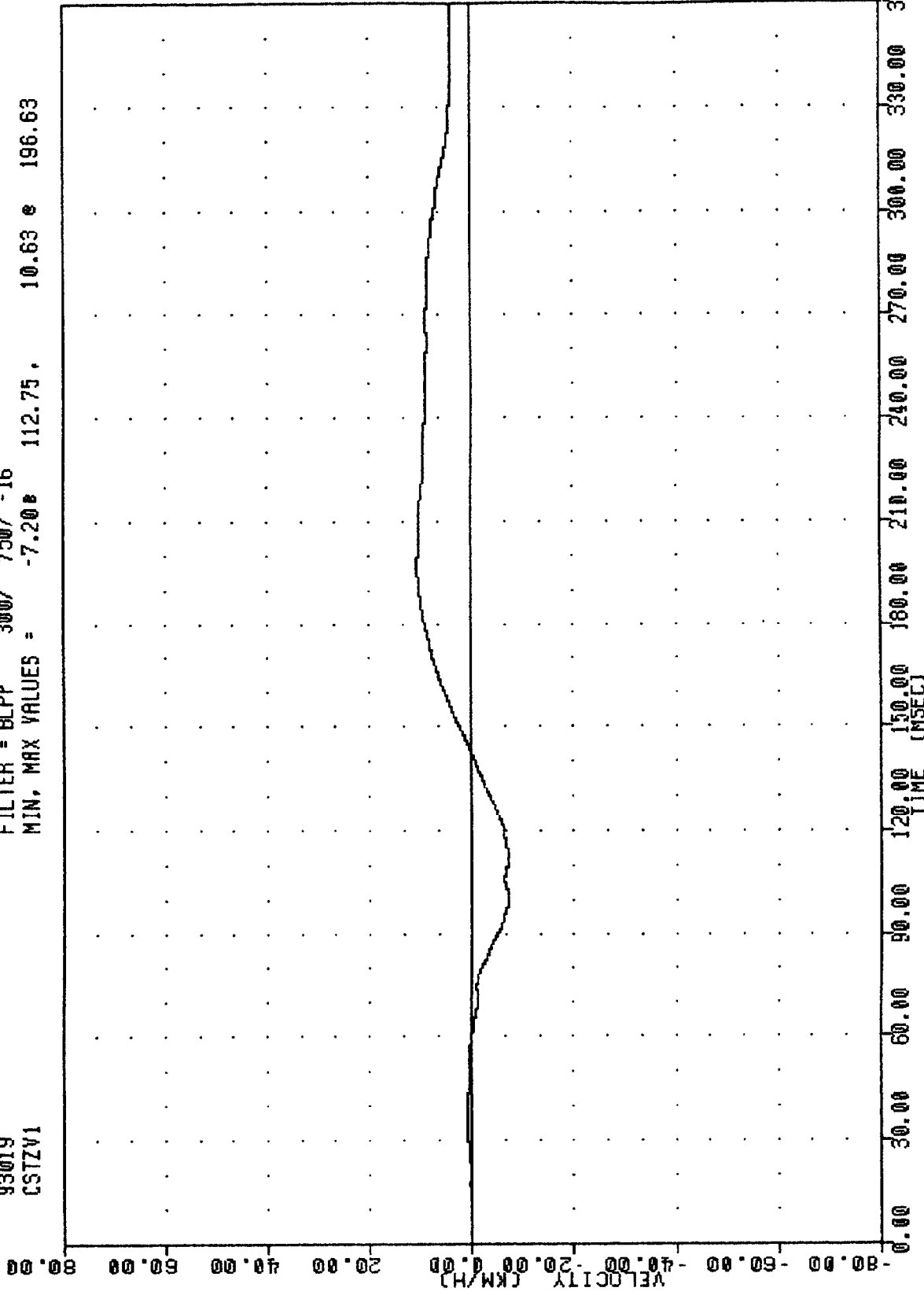
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -36.67 225.25, 1.29 77.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST Y-AXIS VELOCITY

TRC . 930119  
TRUCK INTO STATIONARY CAR  
93019  
CSTZV1

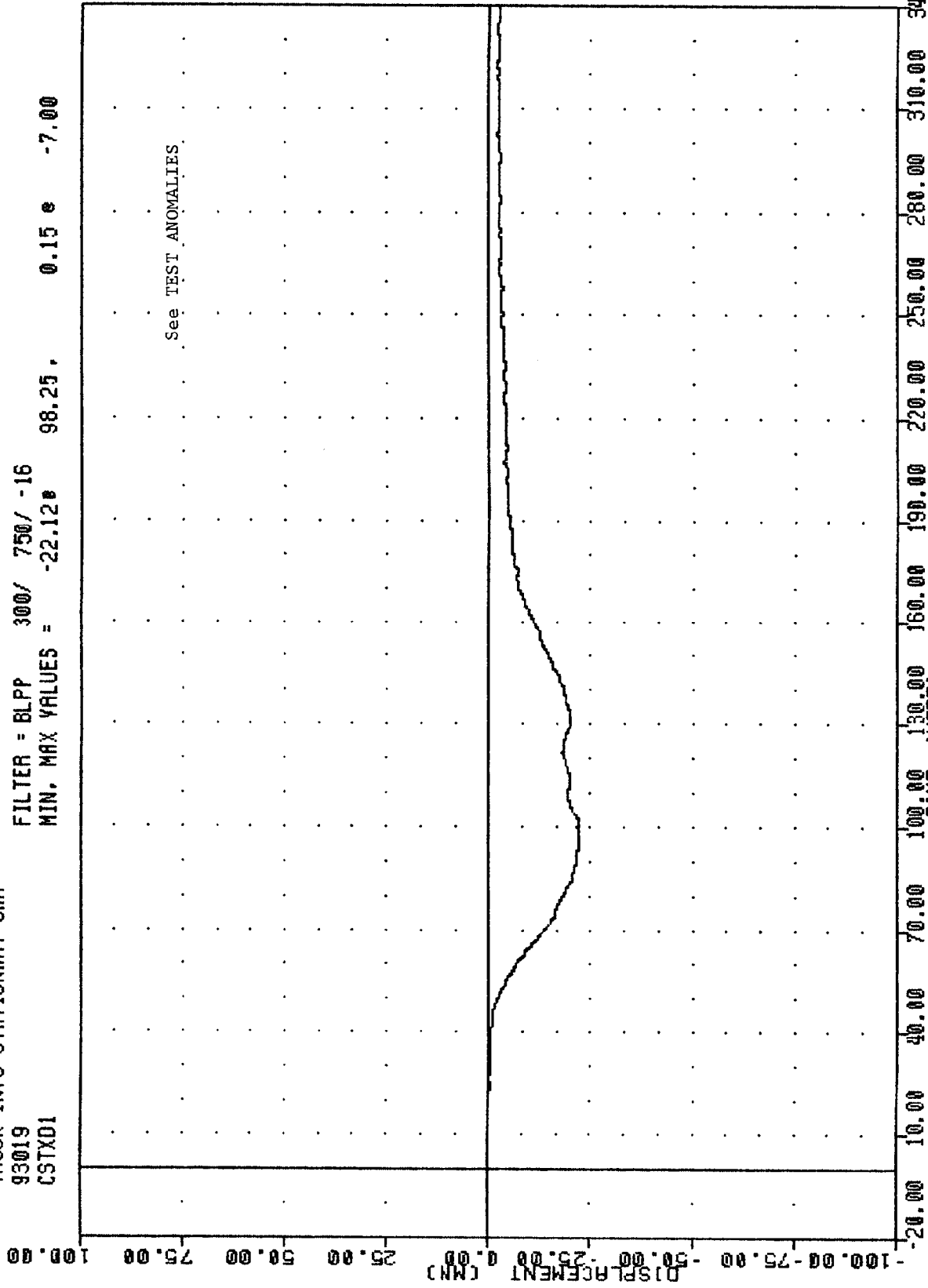
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -7.20 e 112.75 . 10.63 e 196.63



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER CHEST Z-AXIS VELOCITY

TRC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 CSTXD1

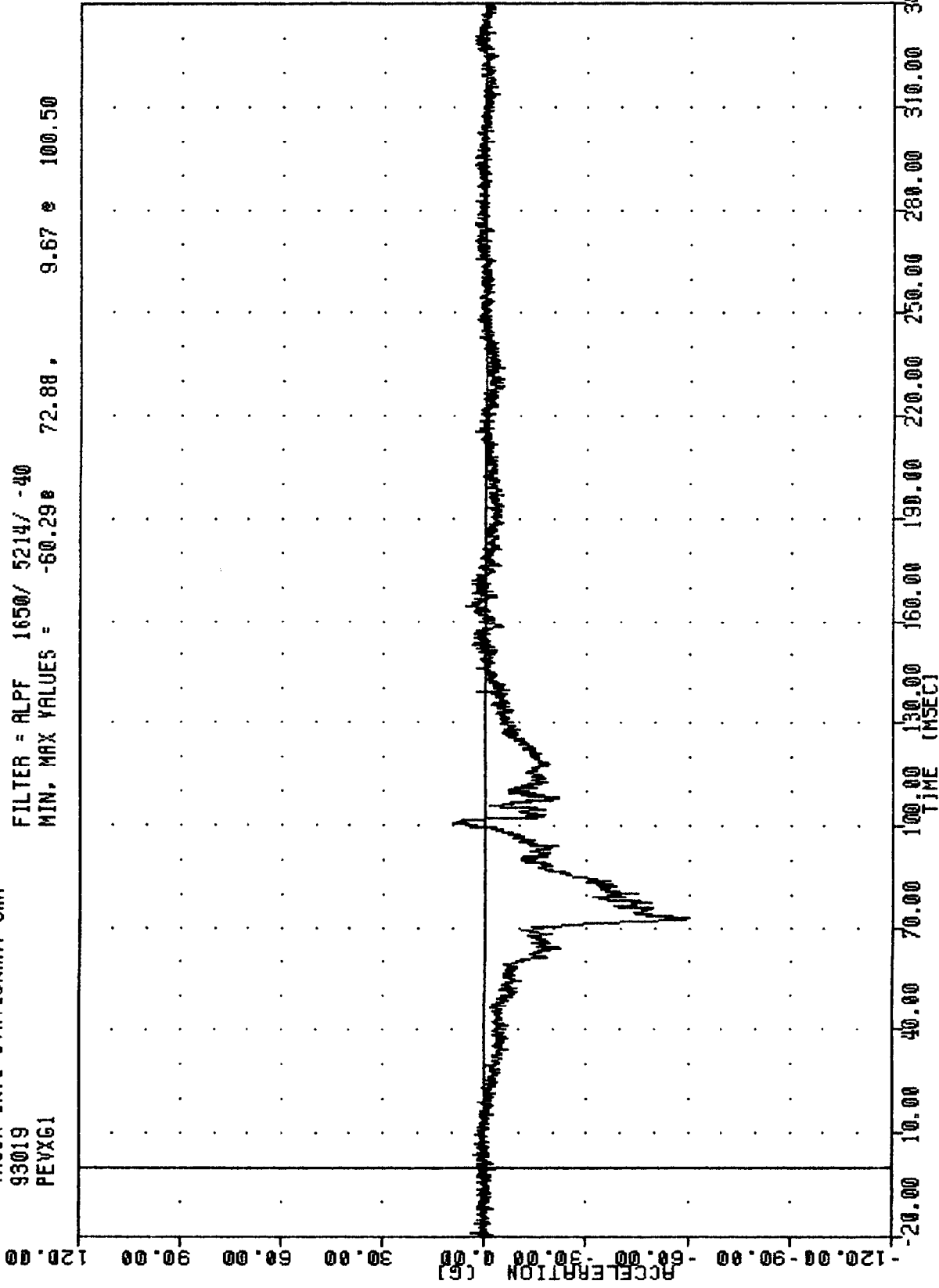
FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = -22.12 98.25 0.15 -7.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 DRIVER CHEST DEFLECTION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVXG1

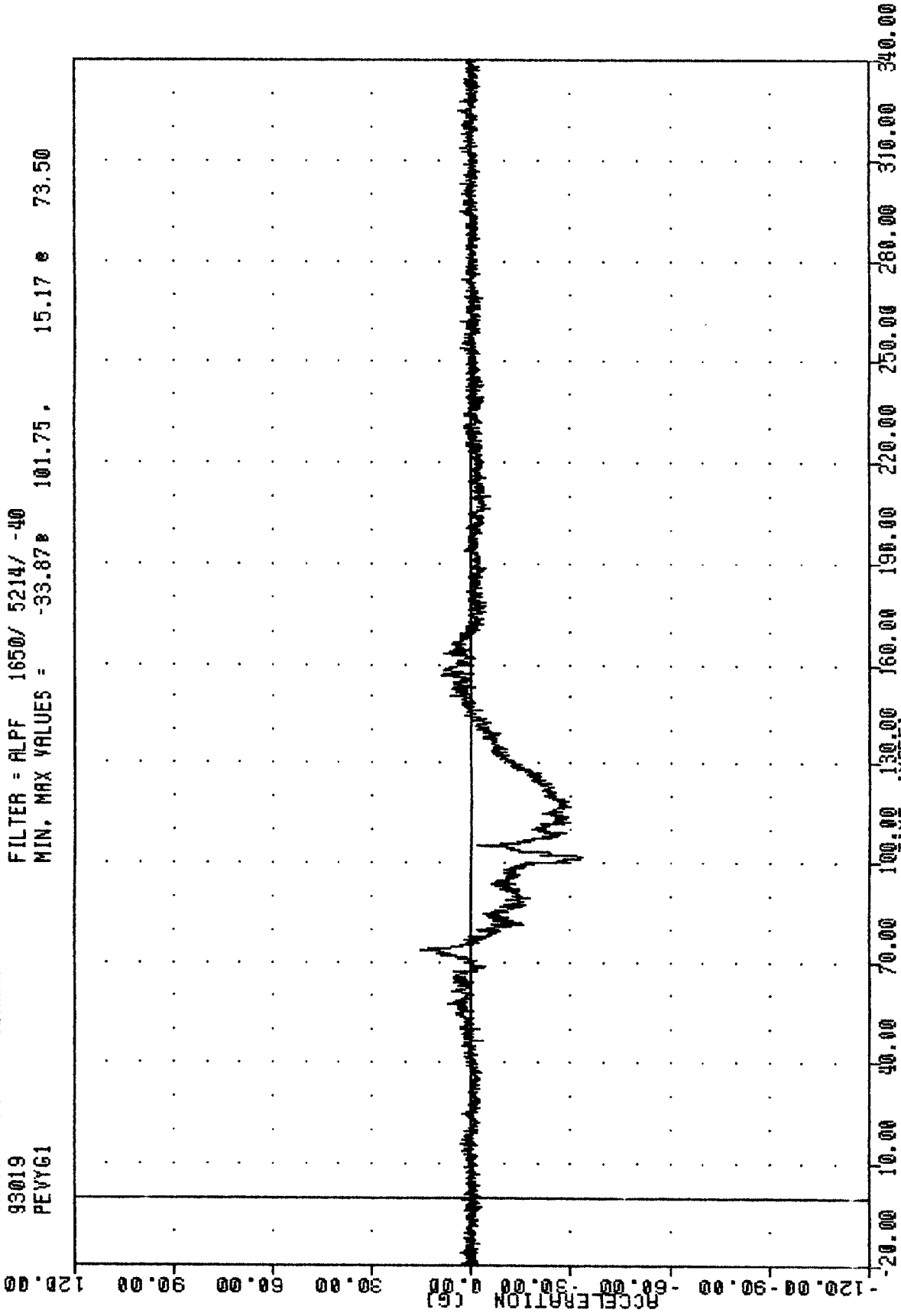
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -60.29e 72.88 , 9.67 e 100.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVYG1

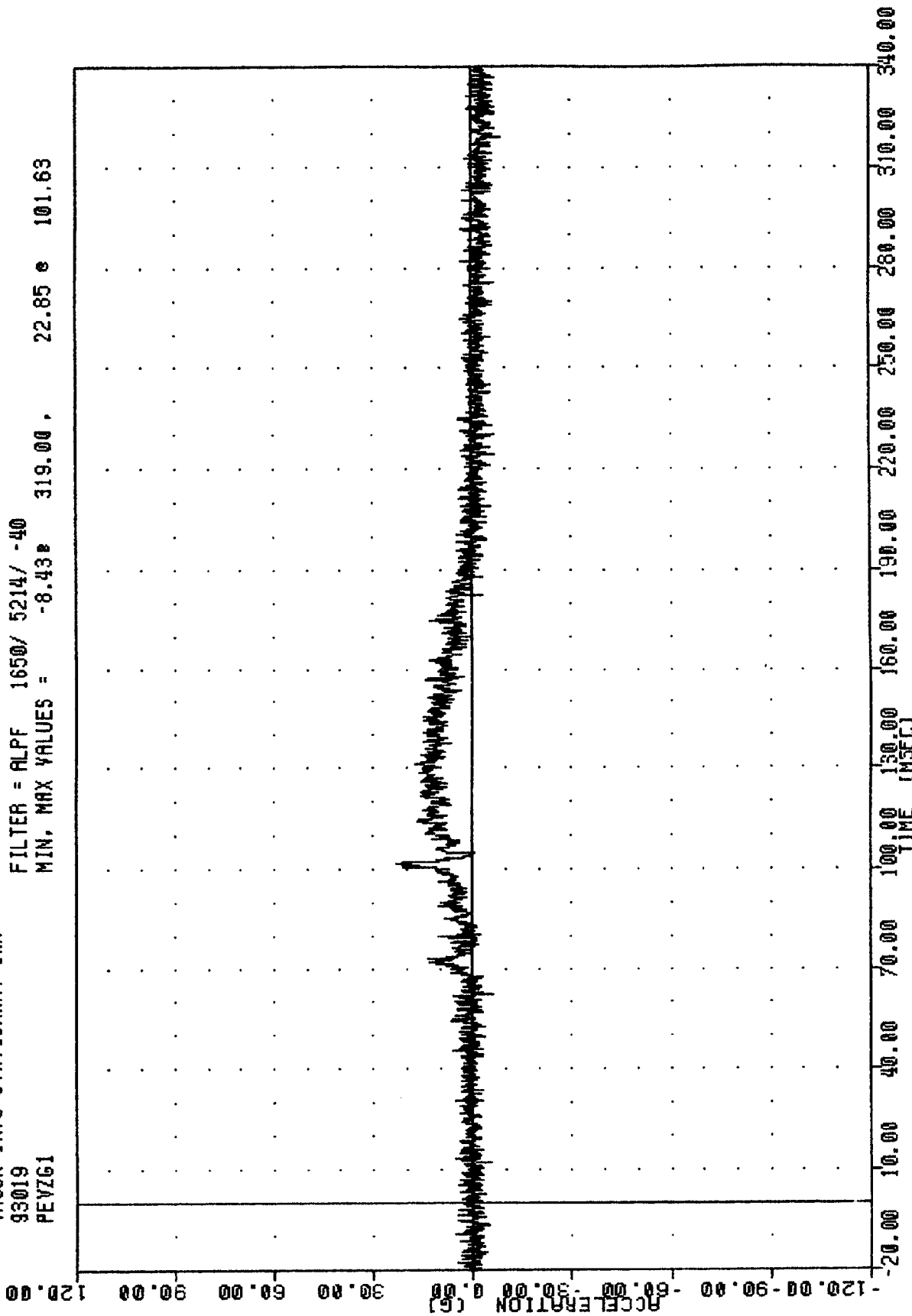
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -93.87 101.75, 15.17 e 73.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS Y-AXIS ACCELERATION

TRC .930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVZ61

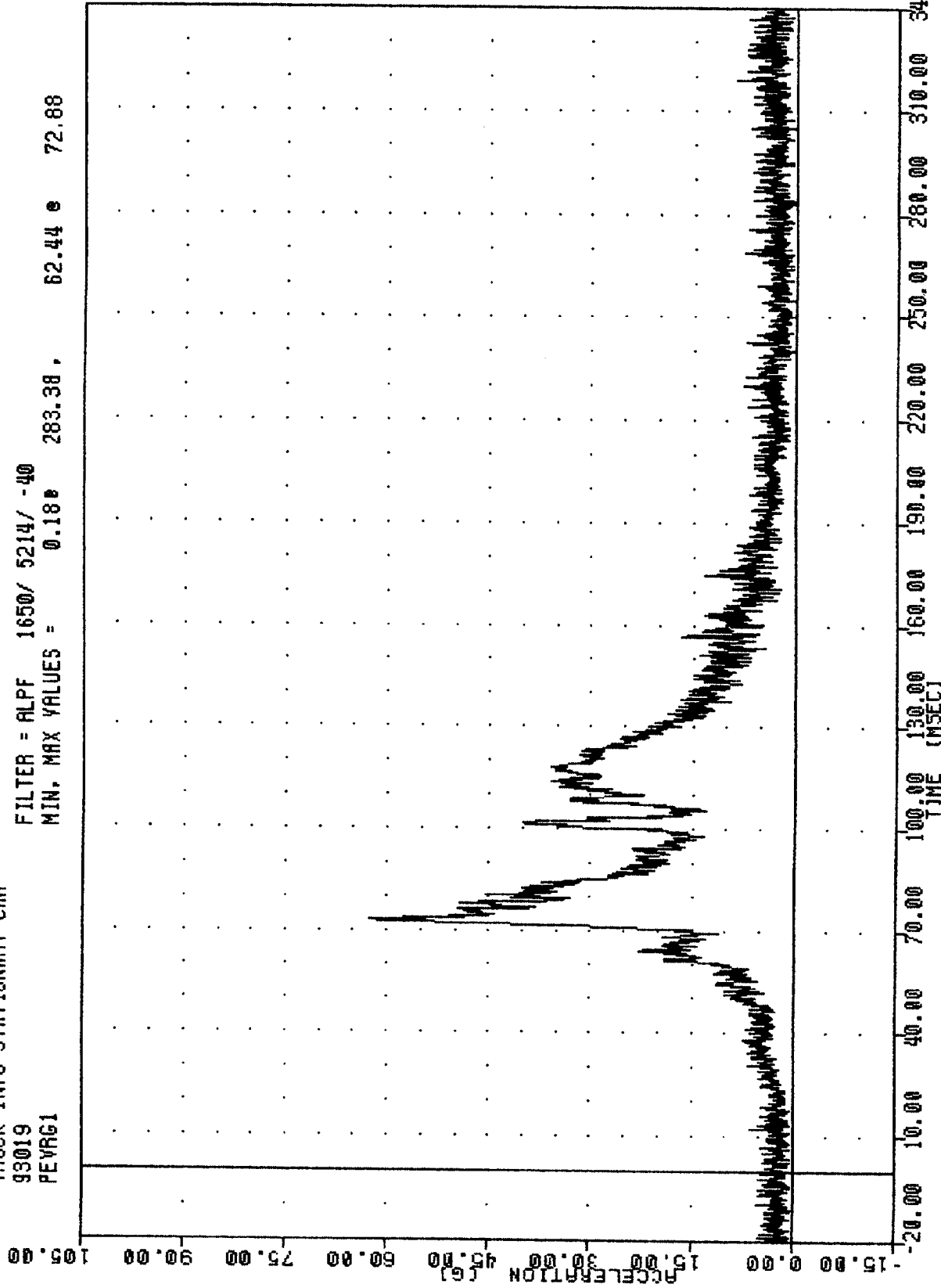
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -8.43 319.00, 22.85 101.63



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS Z-AXIS ACCELERATION

TRC .930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVRG1

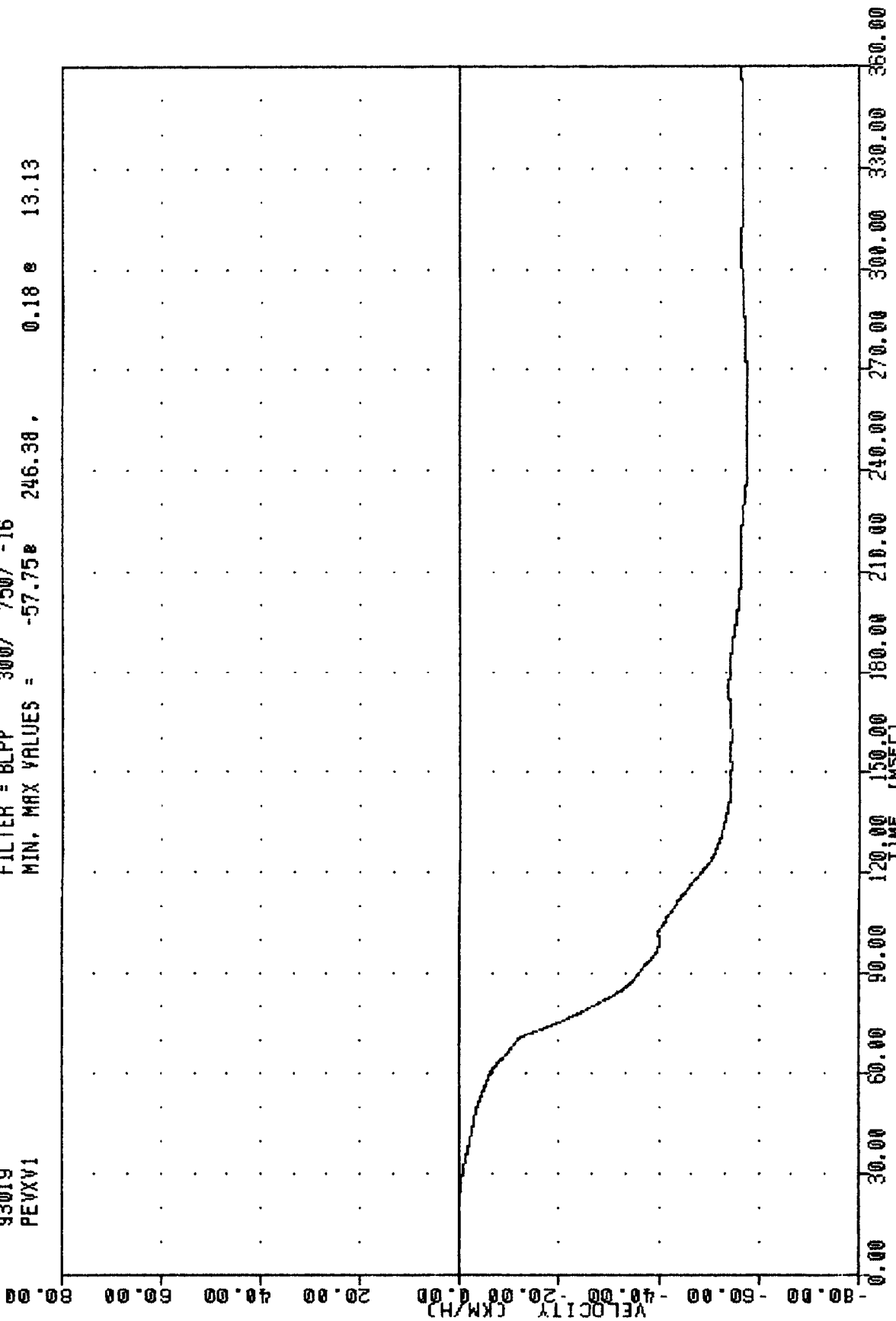
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.188 283.38 , 62.44 e 72.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS RESULTANT ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVXV1

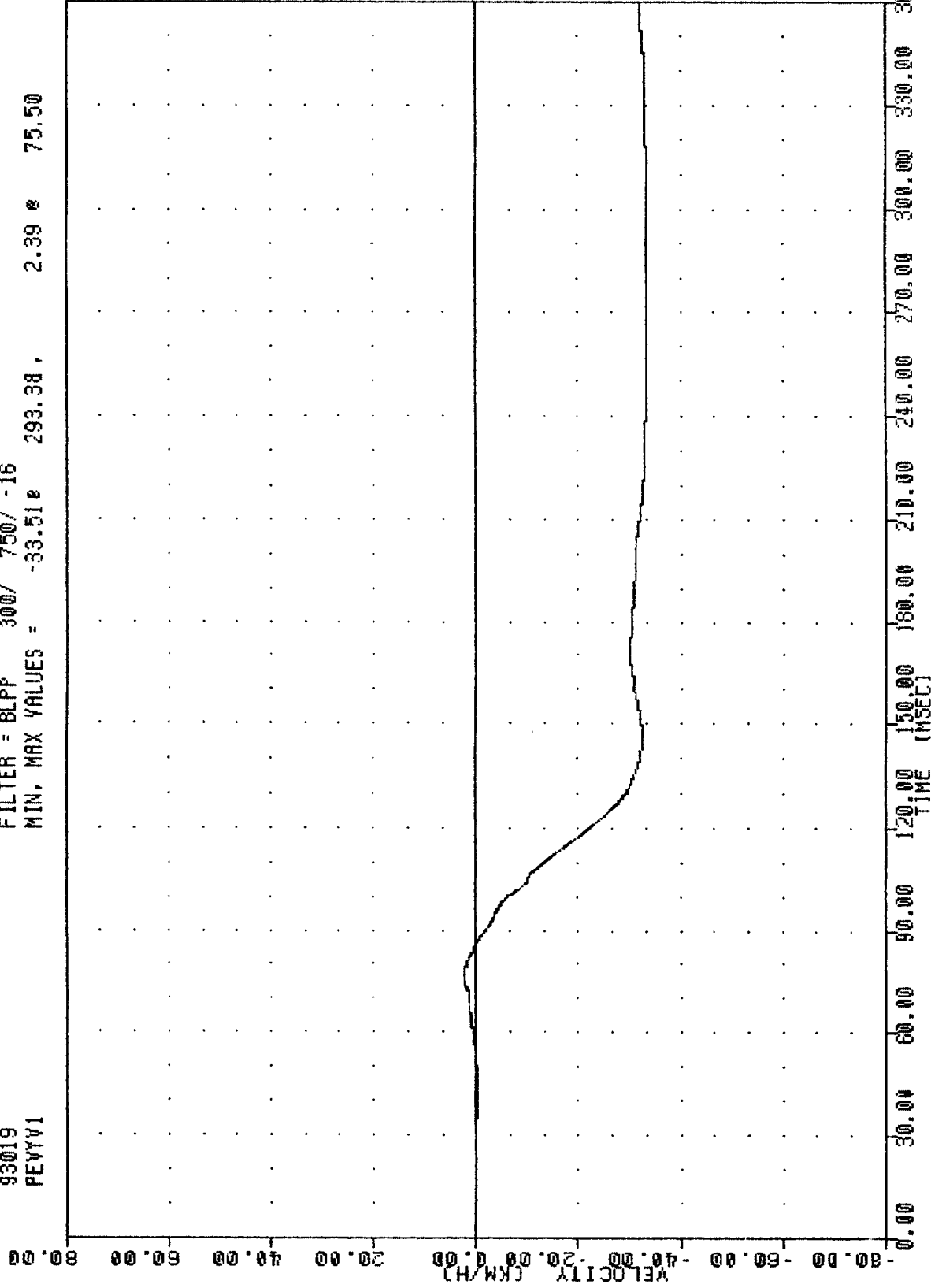
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -57.75 246.38 , 0.18 13.13



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS X-AXIS VELOCITY

TRC . 930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVYV1

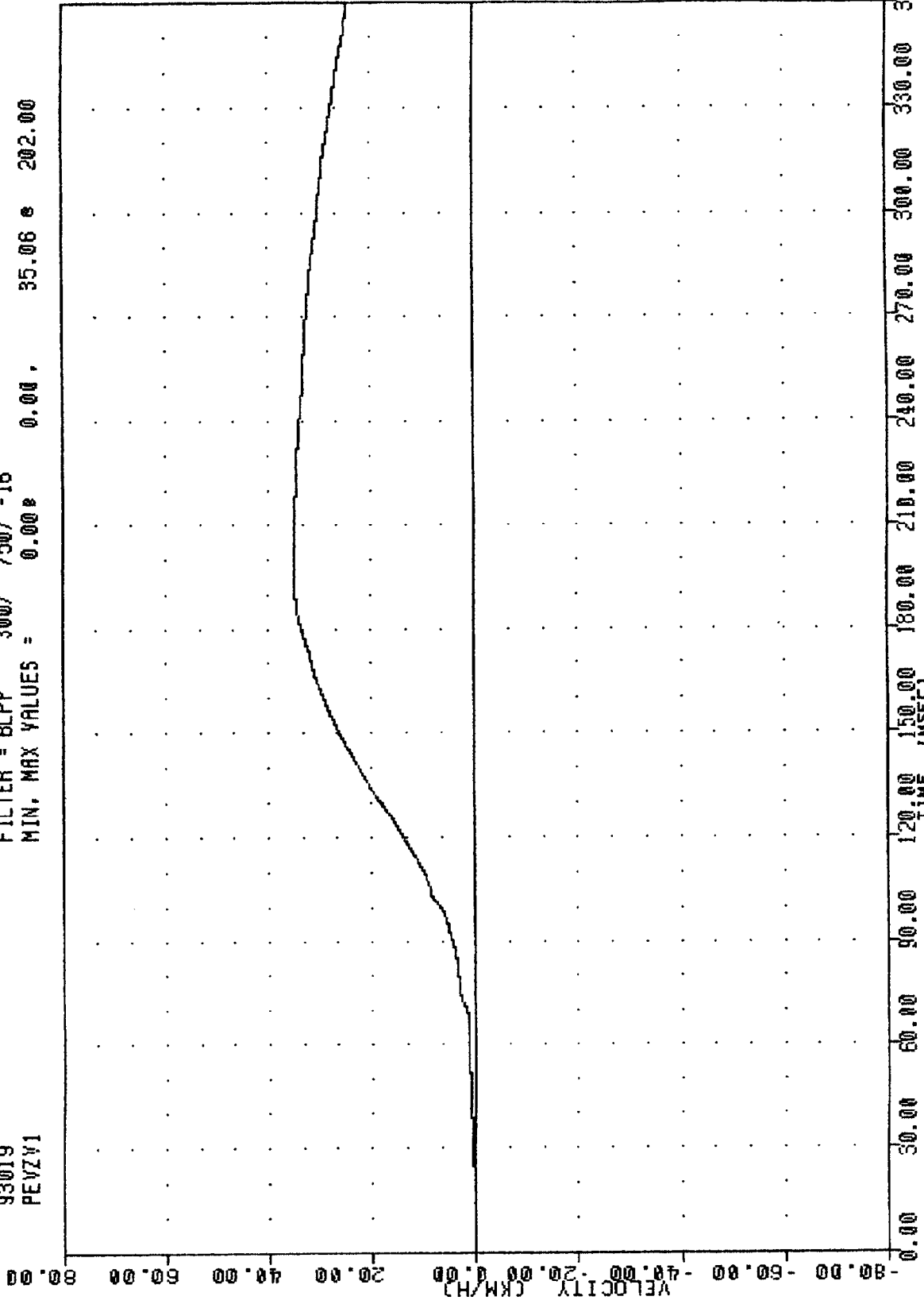
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -33.510 293.38 2.39 75.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS Y-AXIS VELOCITY

TRC 930119  
TRUCK INTO STATIONARY CAR  
93019  
PEVZY1

FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = 0.00 0.00 35.06 e 202.00

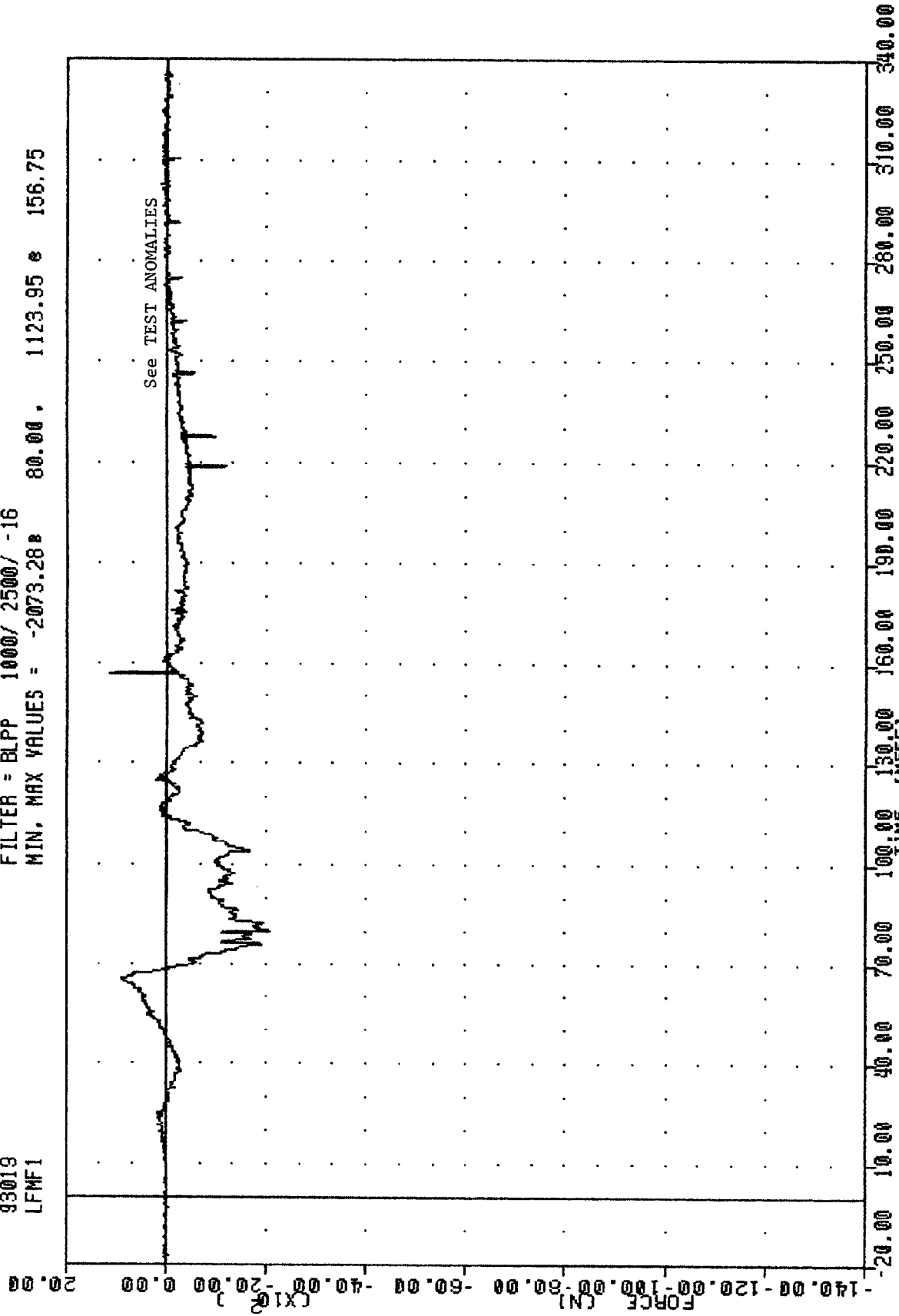


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER PELVIS Z-AXIS VELOCITY

TRC  
TRUCK INTO STATIONARY CAR  
93019  
LFMF1

930119

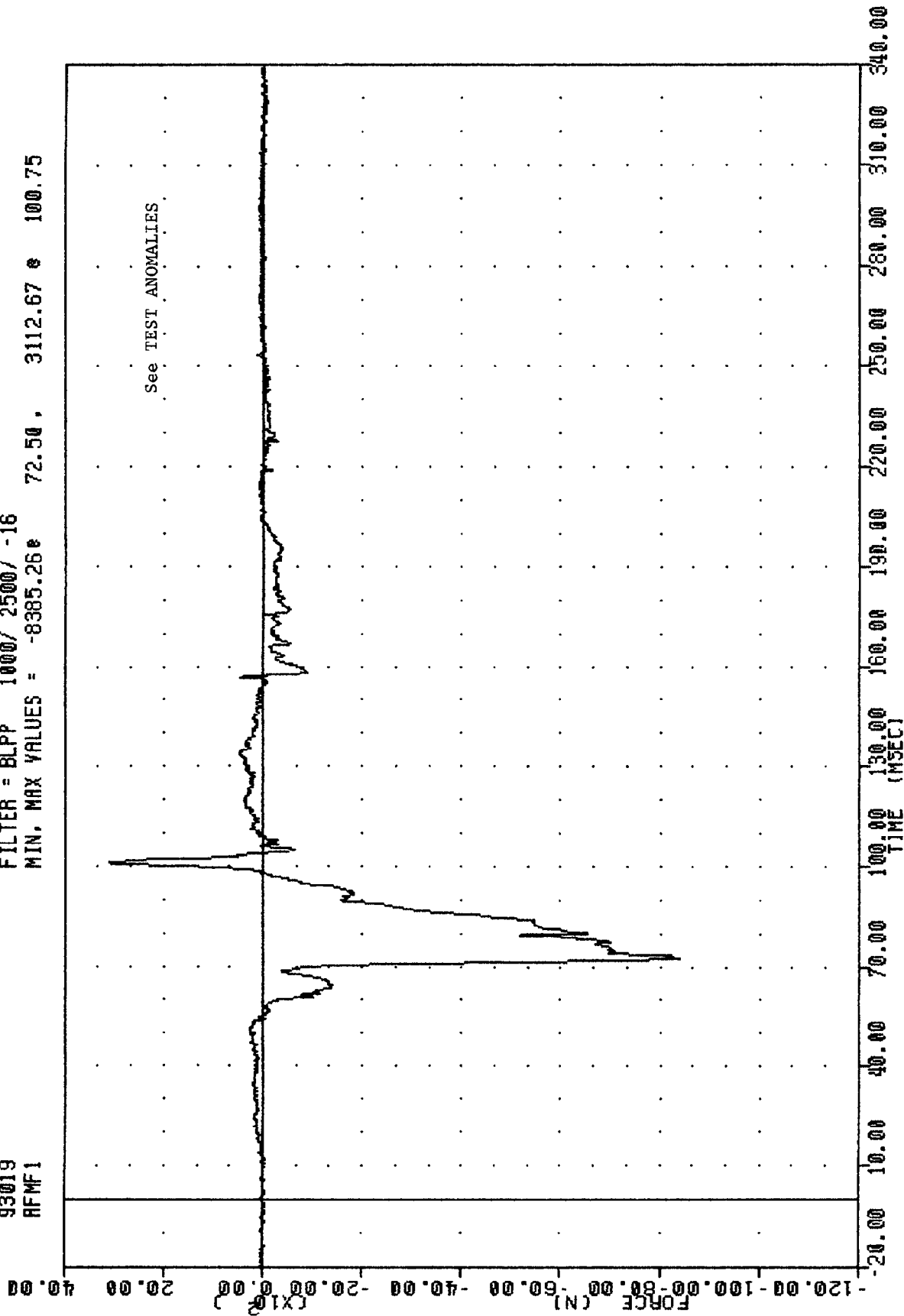
FILTER = BLPP 1000/ 2500/ -16  
MIN, MAX VALUES = -2073.28 80.00, 1123.95 156.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER LEFT FEMUR FORCE

TRC . 930119  
TRUCK INTO STATIONARY CAR  
93019  
RFMF1

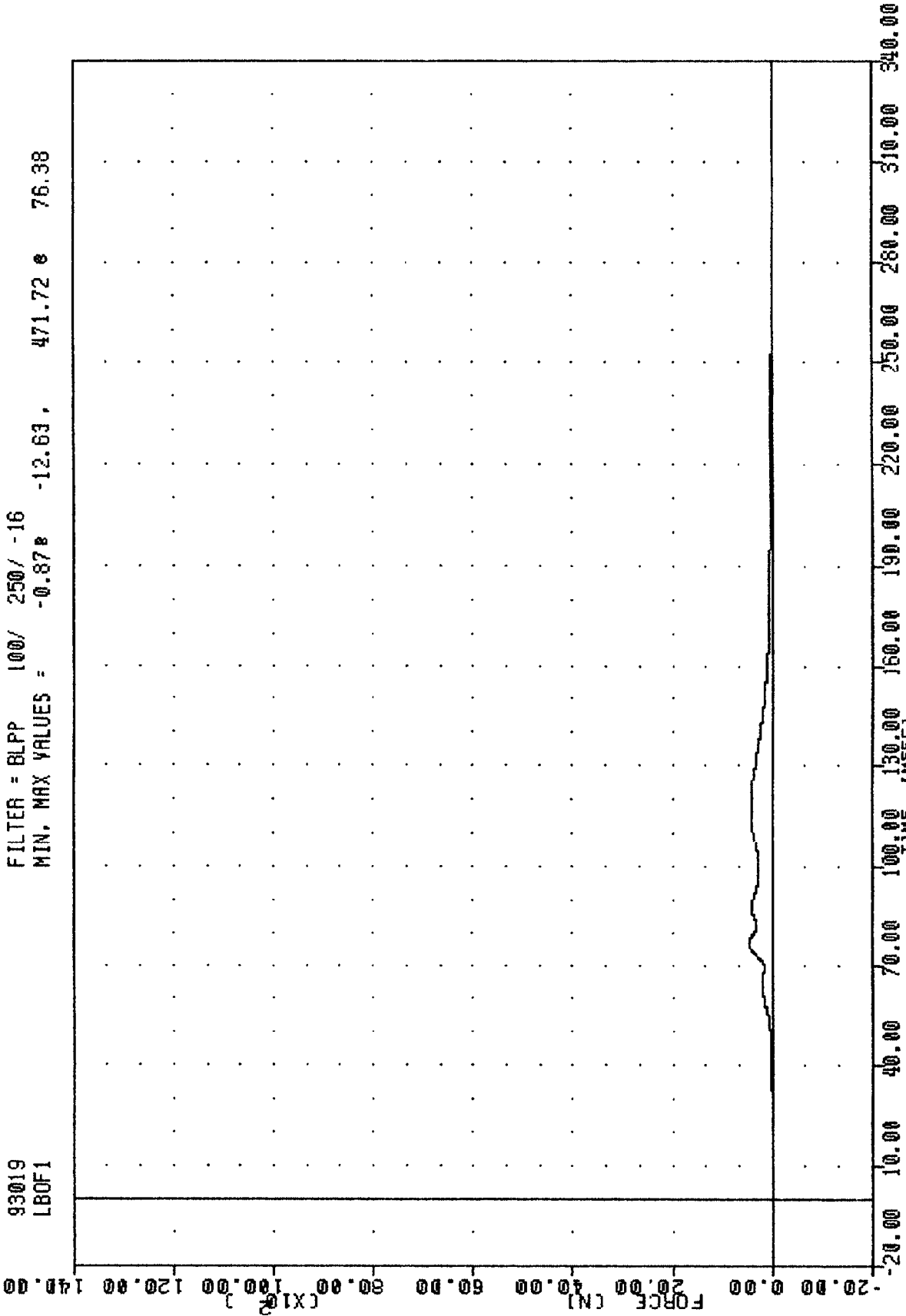
FILTER = BLPP 1000/ 2500/ -16  
MIN. MAX VALUES = -8385.26 3112.67 100.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER RIGHT FEMUR FORCE

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
LBOF1

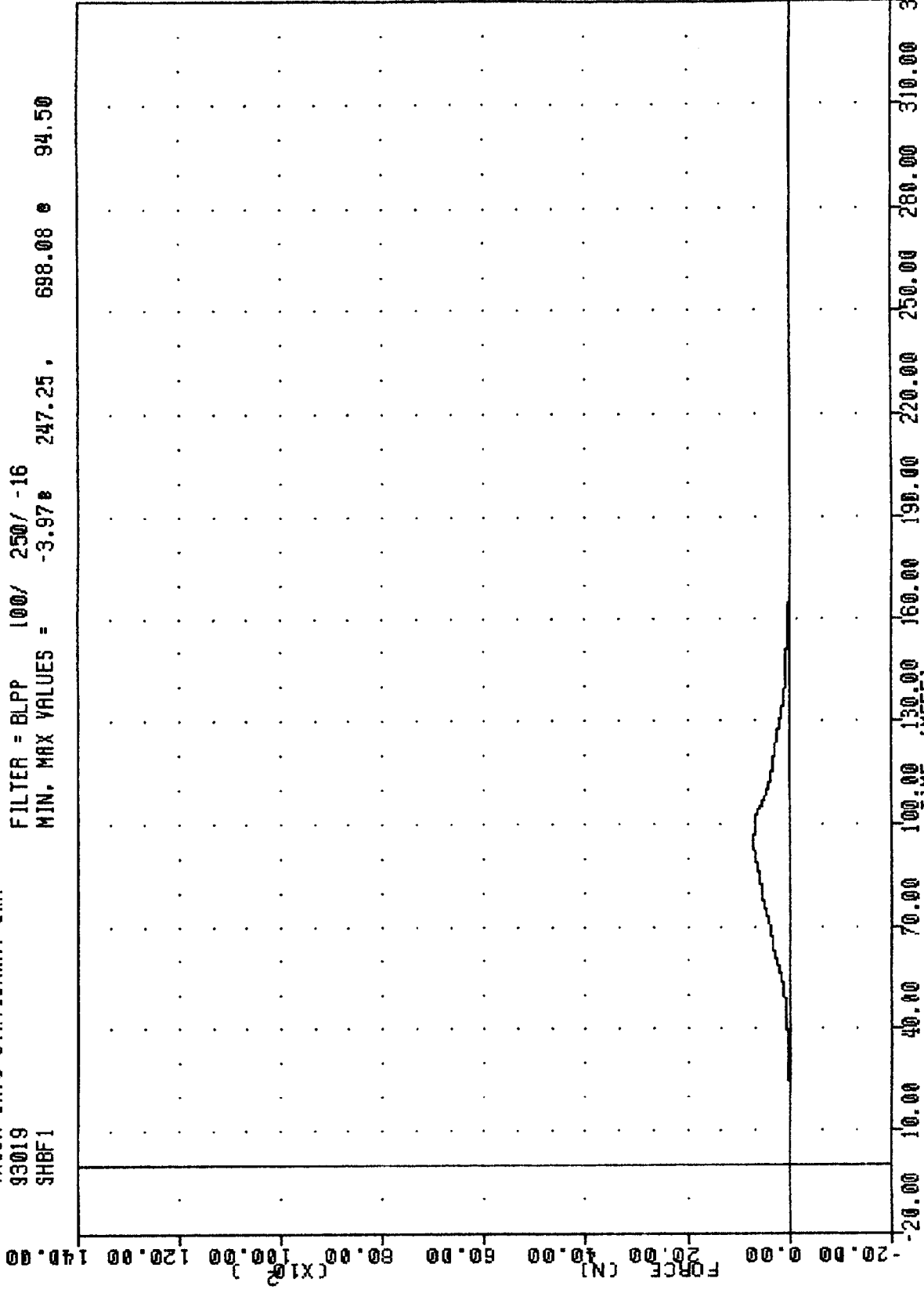
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -0.87\* 471.72 \* 76.38  
-12.63 ,



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
DRIVER LAP BELT OUTBOARD FORCE

TRC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 SHBF1

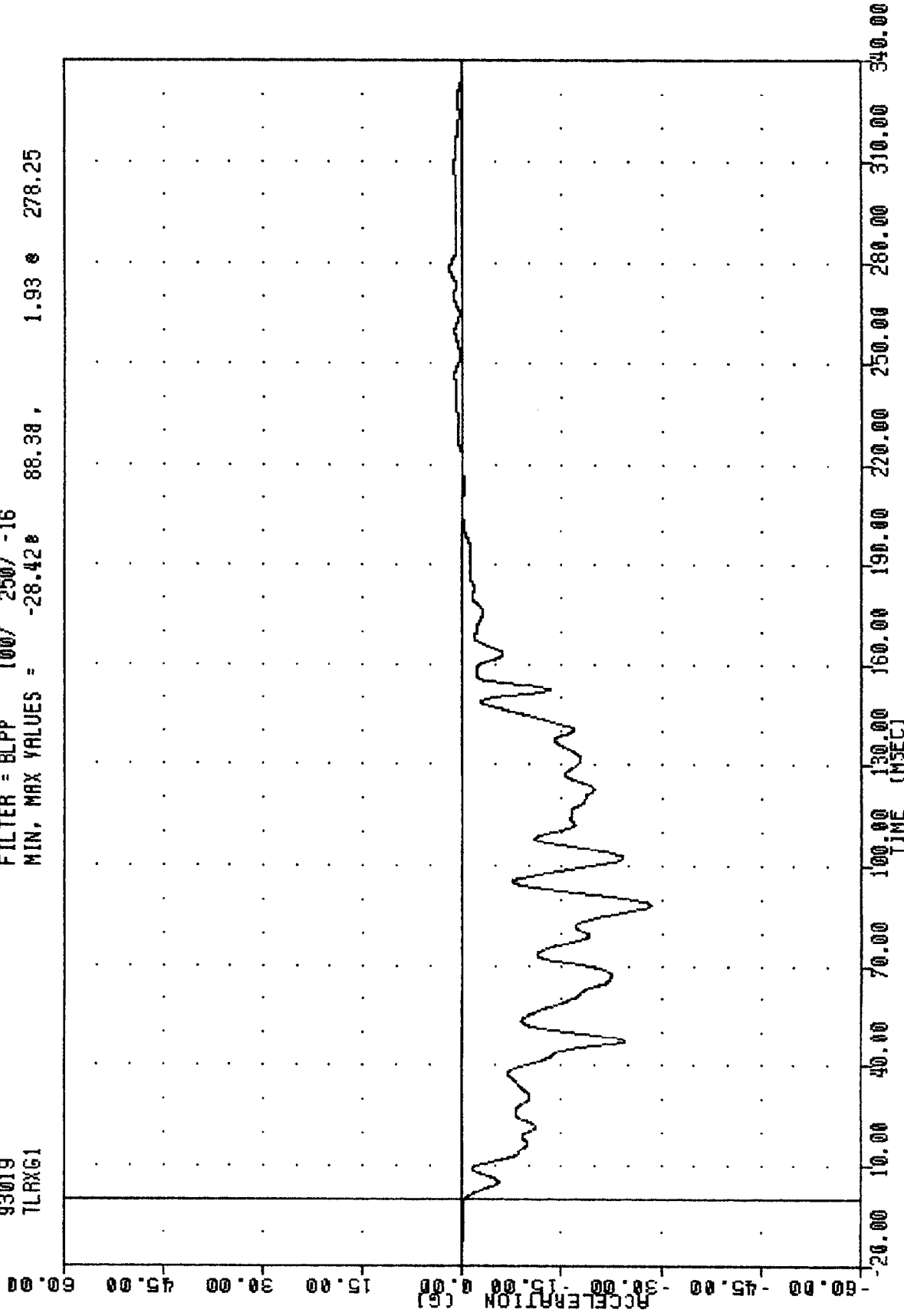
FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -3.97\* 247.25 , 698.08 e 94.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 DRIVER SHOULDER BELT FORCE

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
TLRX61

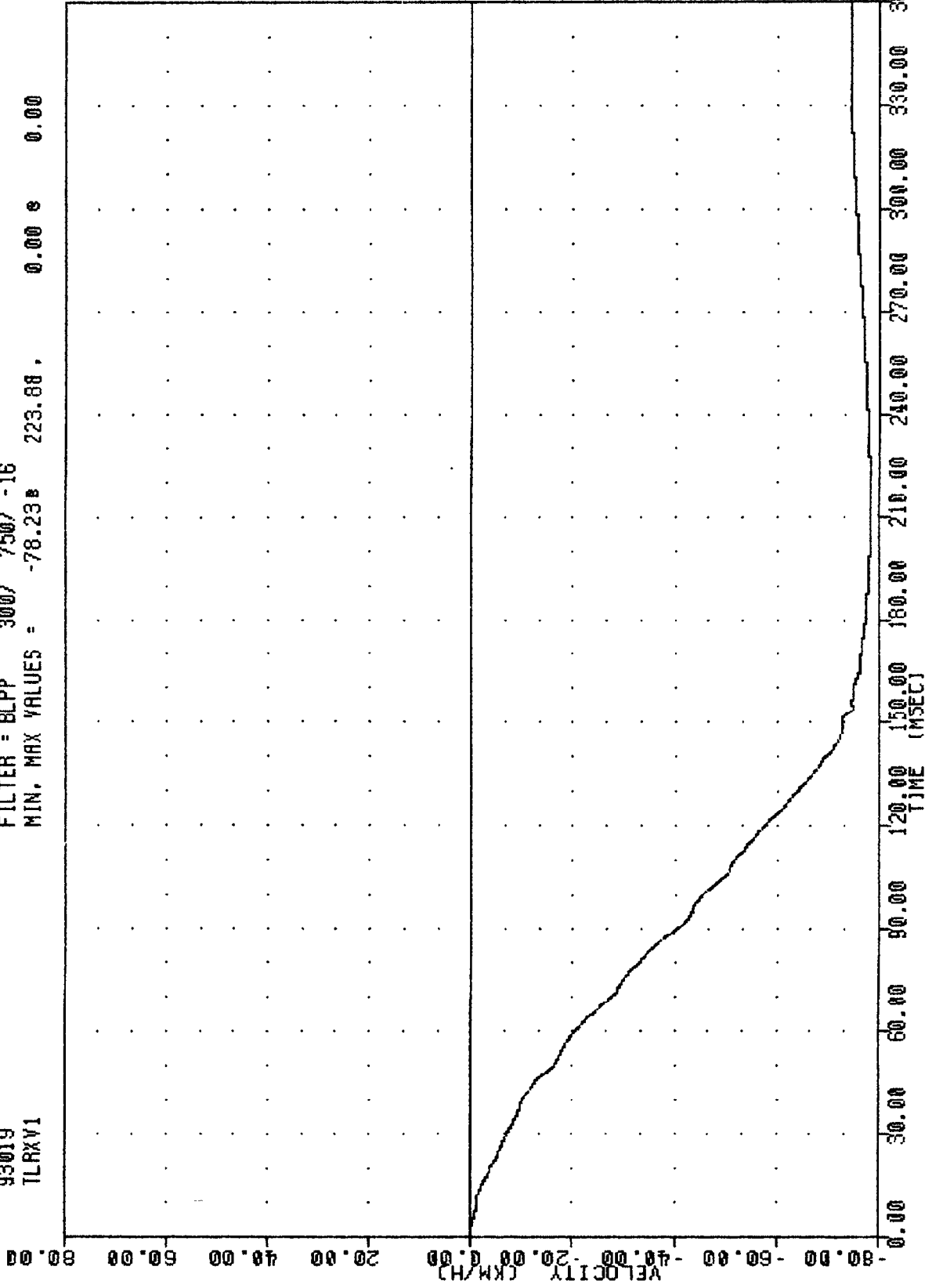
FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -28.420 88.38 , 1.93 278.25



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
LEFT REAR SEAT X-AXIS ACCELERATION

TRC \* 930119  
TRUCK INTO STATIONARY CAR  
93019  
TLRXV1

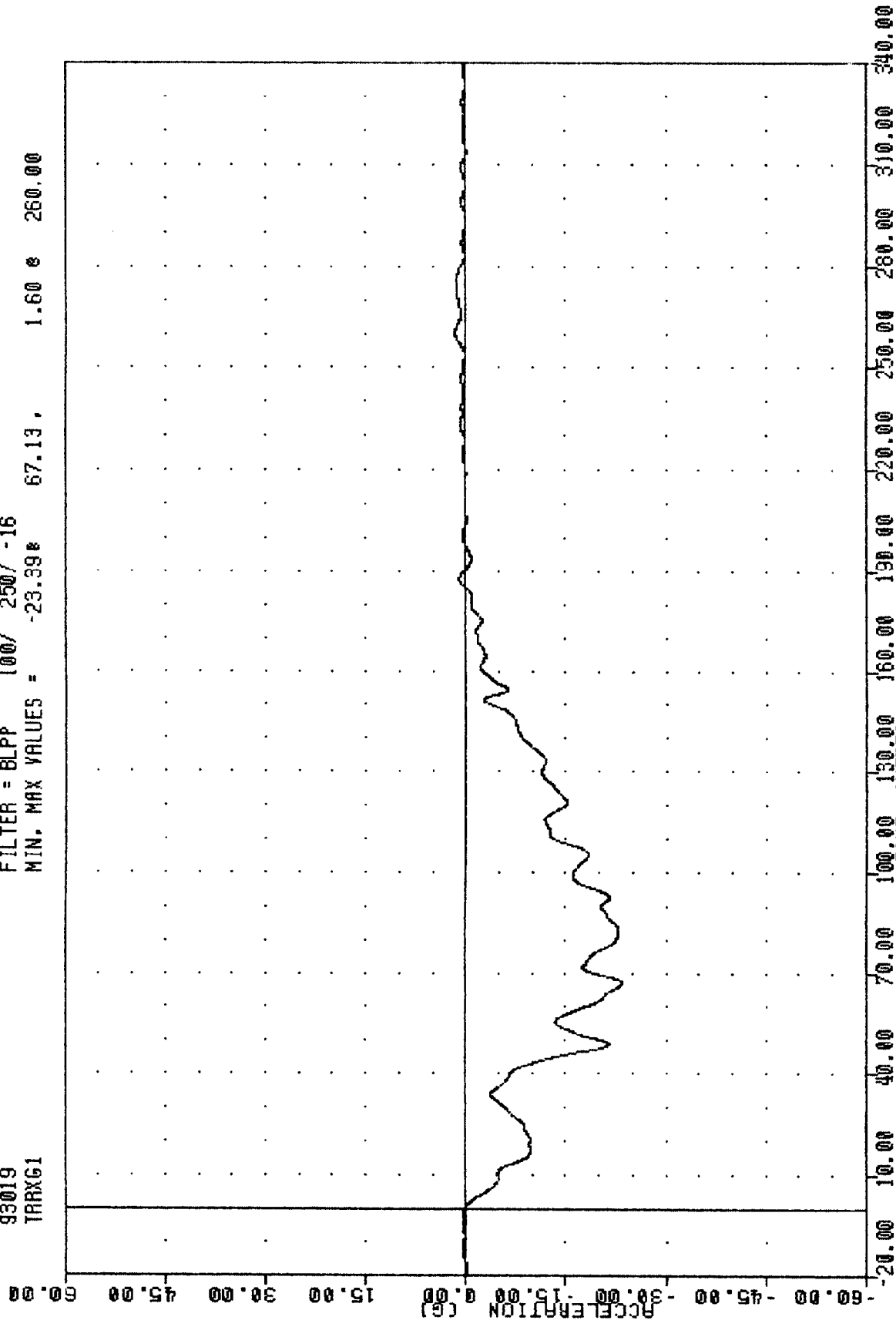
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -78.23 223.88 0.00 s 0.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
LEFT REAR SEAT X-AXIS VELOCITY

TRC 930119  
TRUCK INTO STATIONARY CAR  
93019  
TRXG1

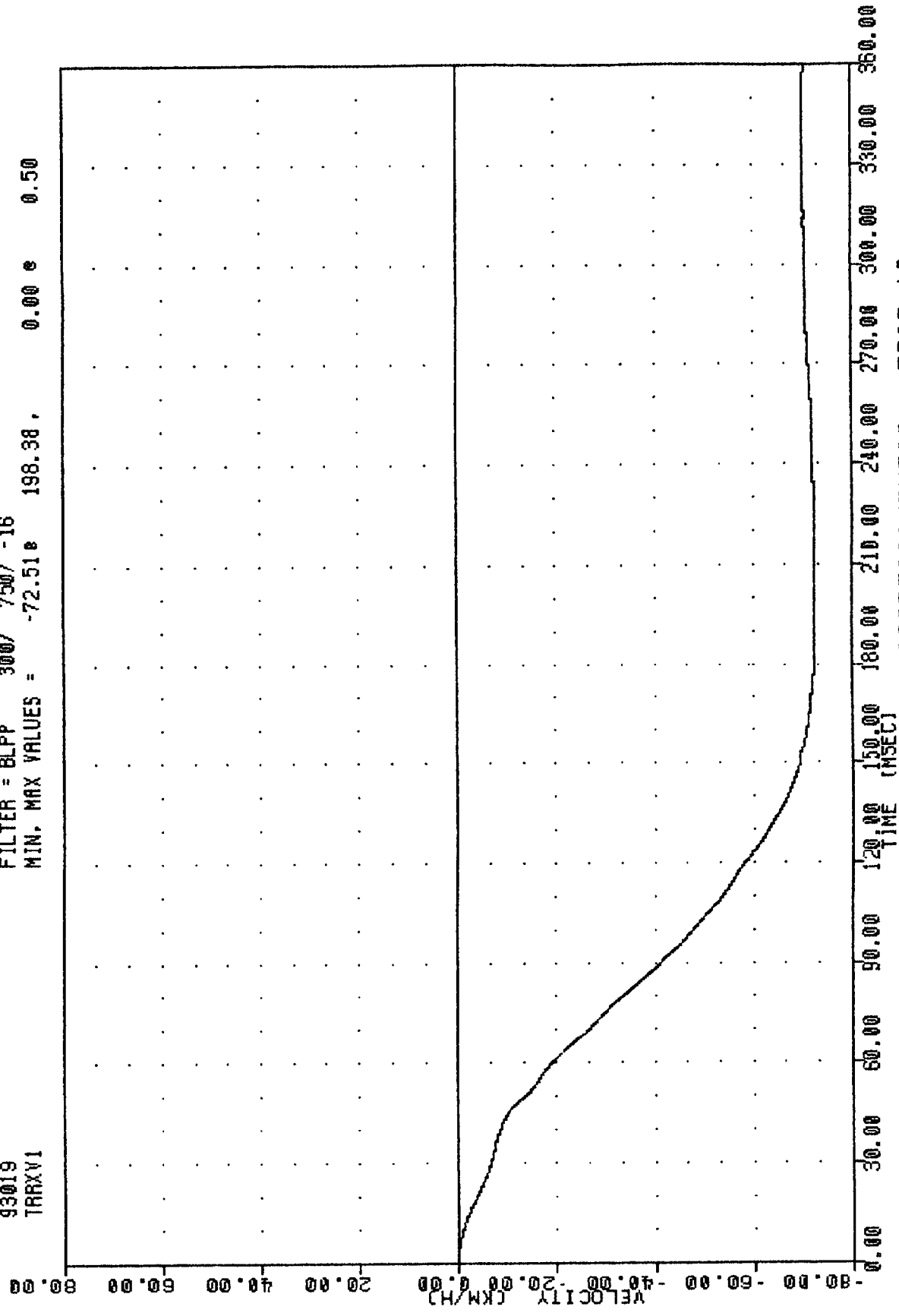
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -23.99# 67.13, 1.60 e 260.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
RIGHT REAR SEAT X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
TRRXV1

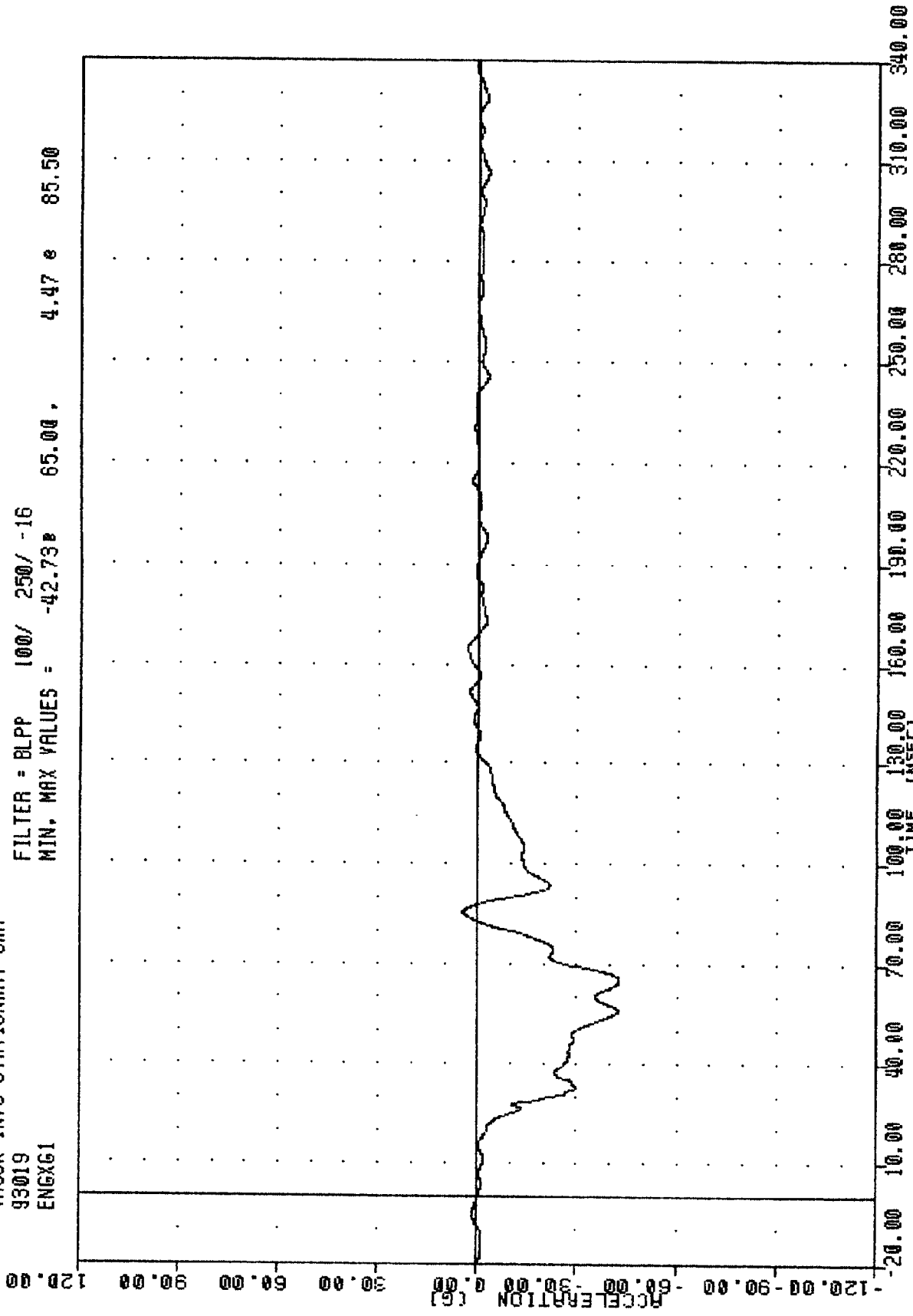
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -72.51e 198.38 , 0.00 e 0.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
RIGHT REAR SEAT X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
ENGXG1

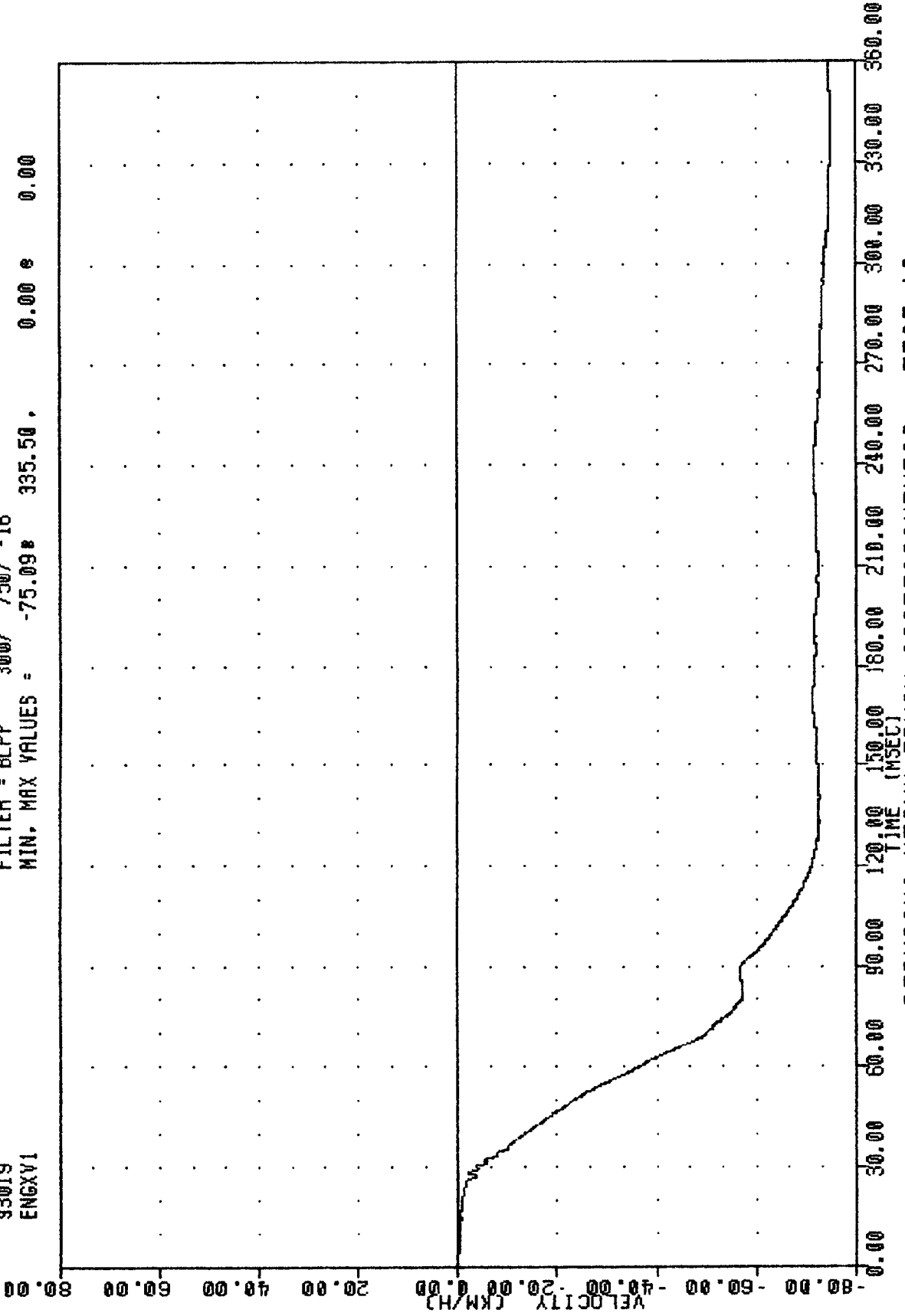
FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -42.73 65.00 4.47 e 85.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
ENGINE TOP X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
ENGV1

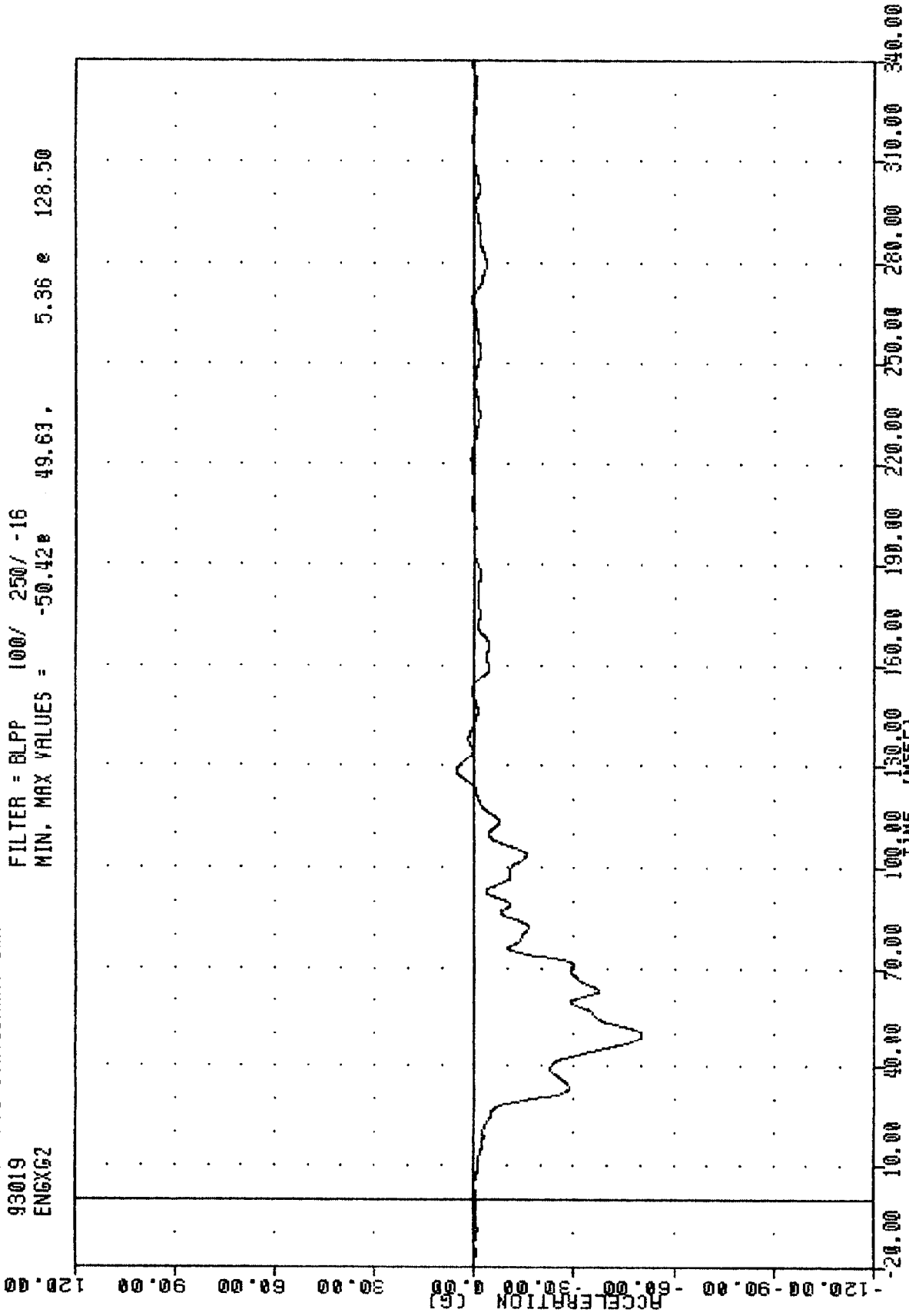
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -75.09\* 335.50 , 0.00 \* 0.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
ENGINE TOP X-AXIS VELOCITY

TRC  
930119  
TRUCK INTO STATIONARY CAR  
93019  
ENGX62

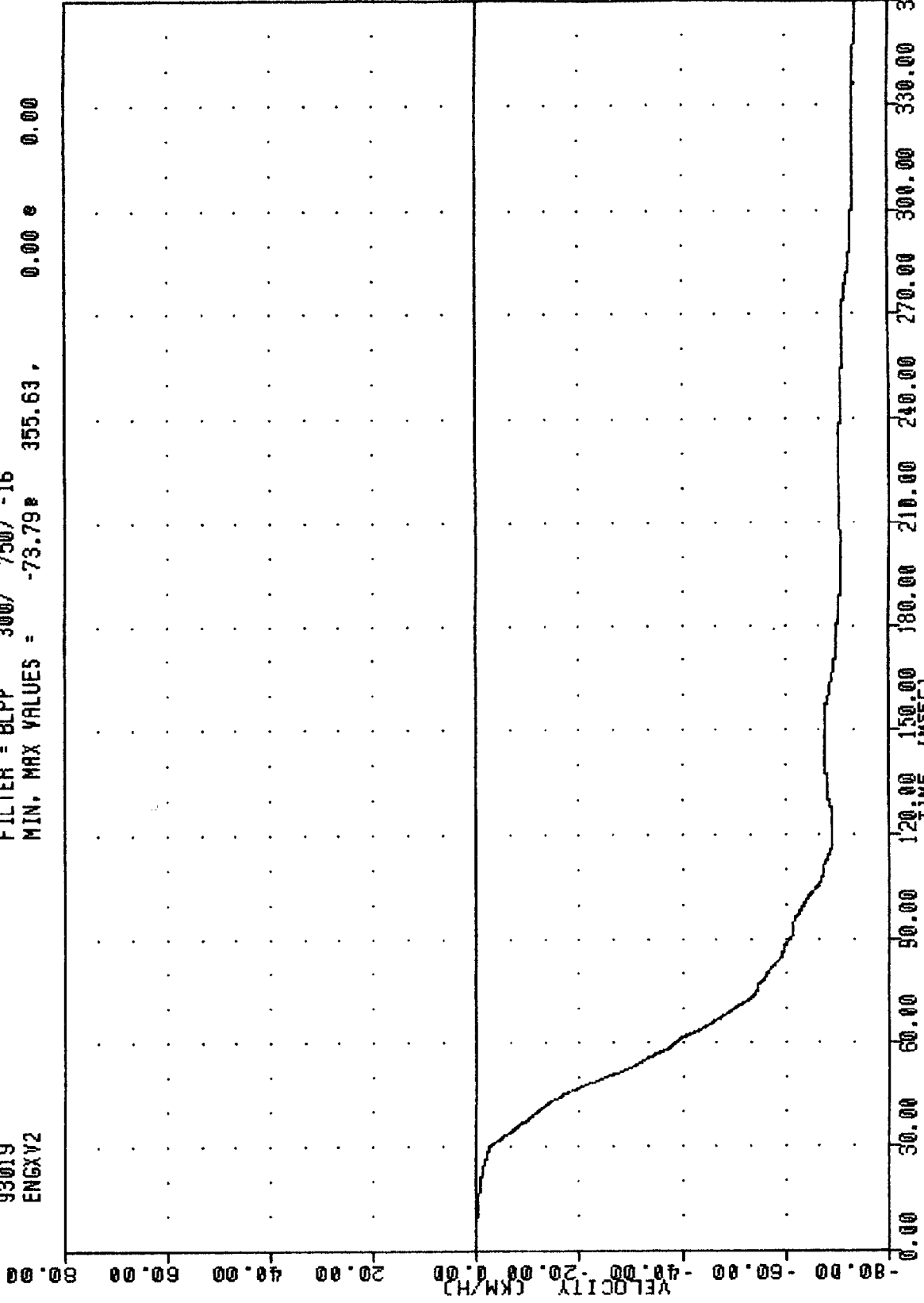
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -50.42 e 49.63 . 5.36 e 128.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
ENGINE BOTTOM X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
ENGV2

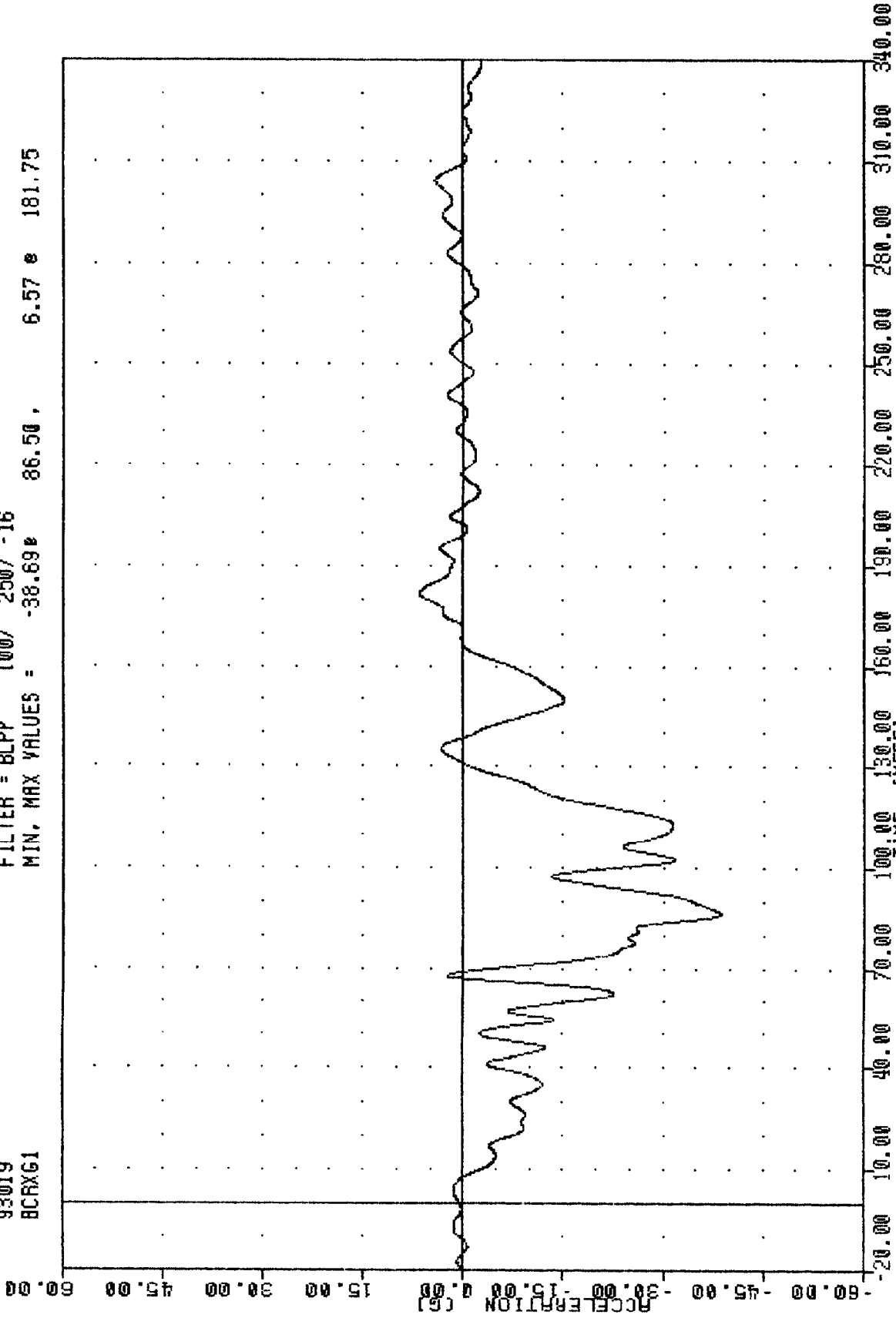
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -73.79 355.63 , 0.00 e 0.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
ENGINE BOTTOM X-AXIS VELOCITY

TRC .930119  
TRUCK INTO STATIONARY CAR  
93019  
BCRXG1

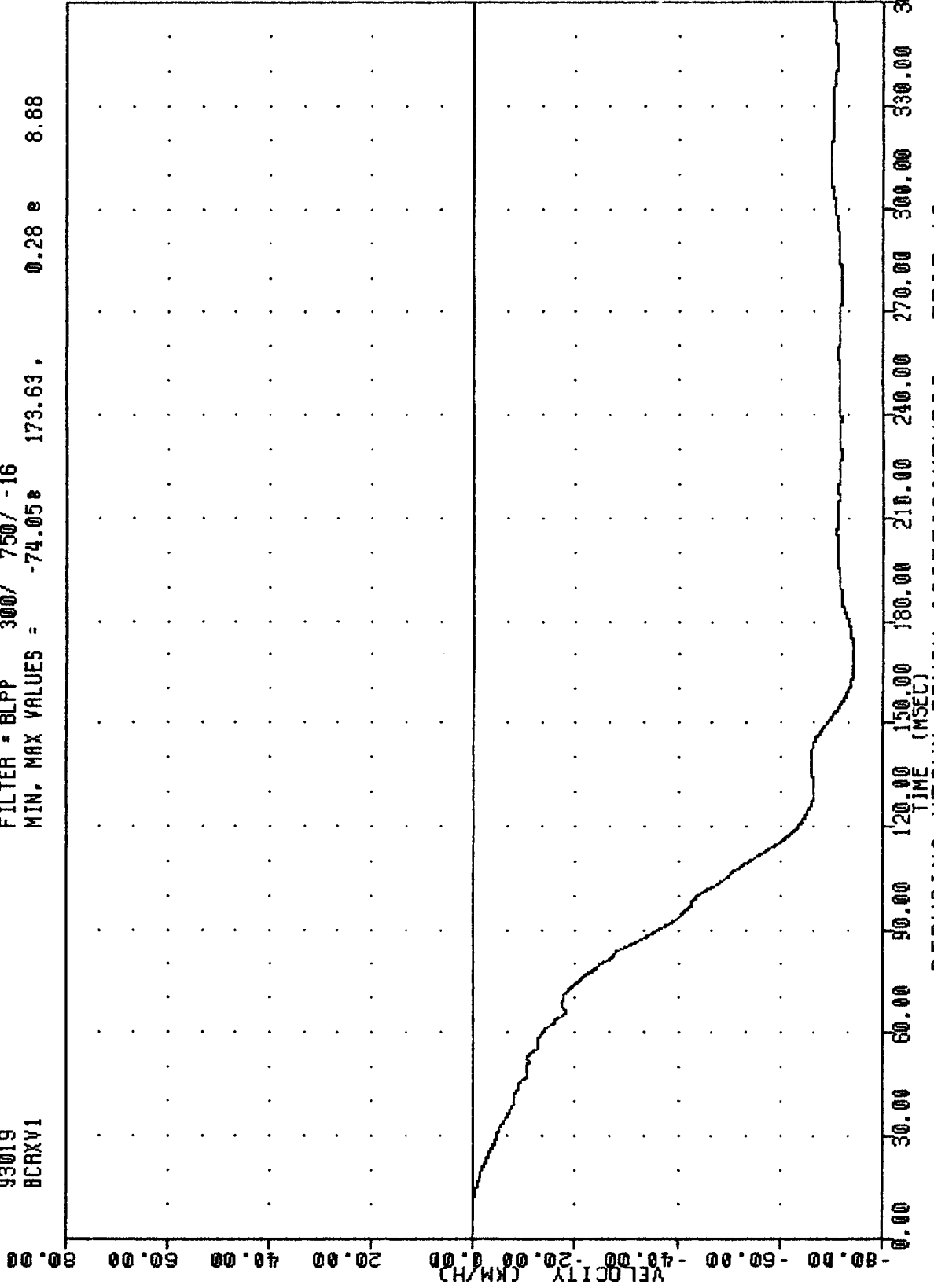
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -36.69 86.50 6.57 e 181.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
BCRXV1

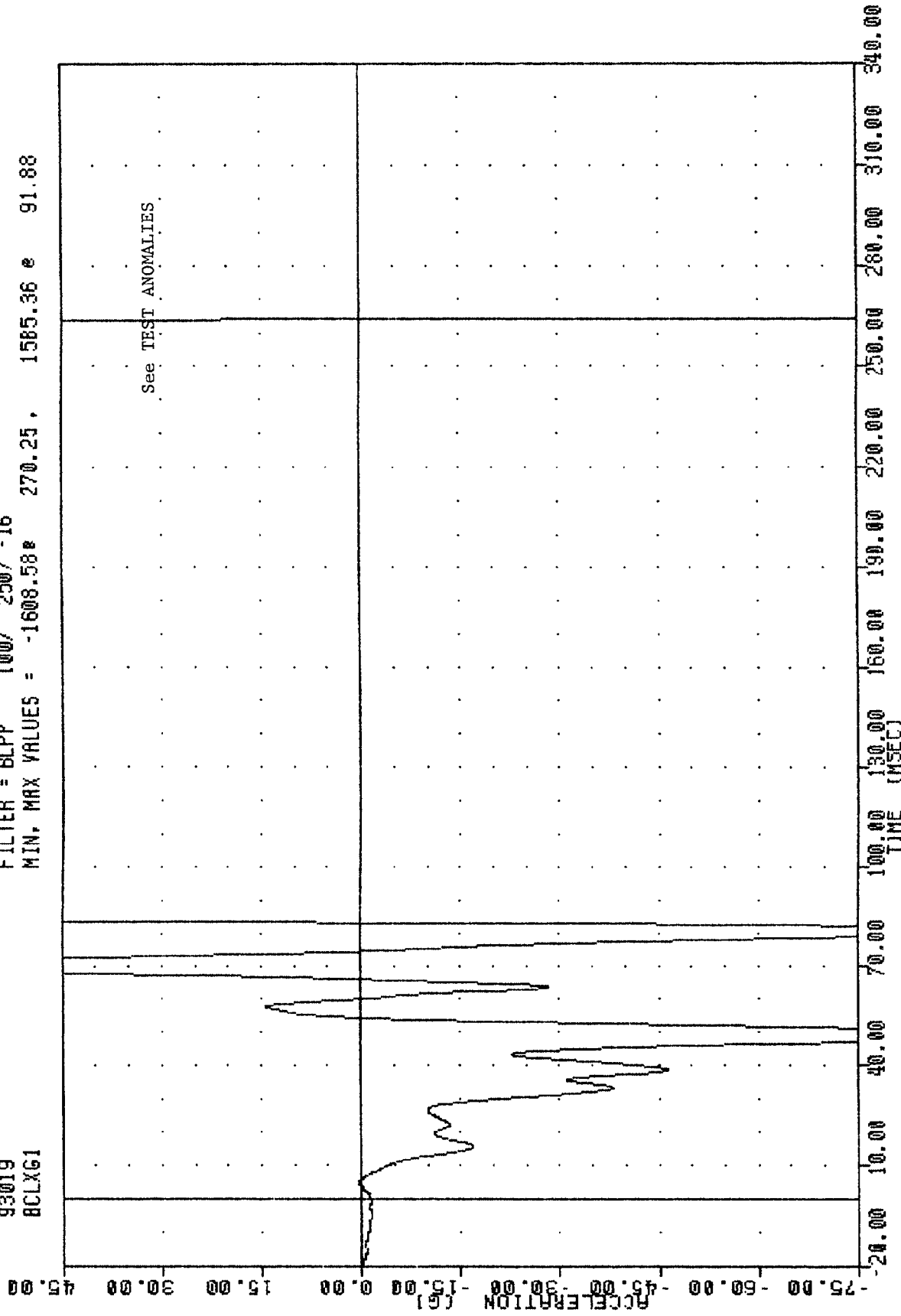
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -74.05 173.63, 0.28 e 8.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
RIGHT BRAKE CALIPER X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
BCLXG1

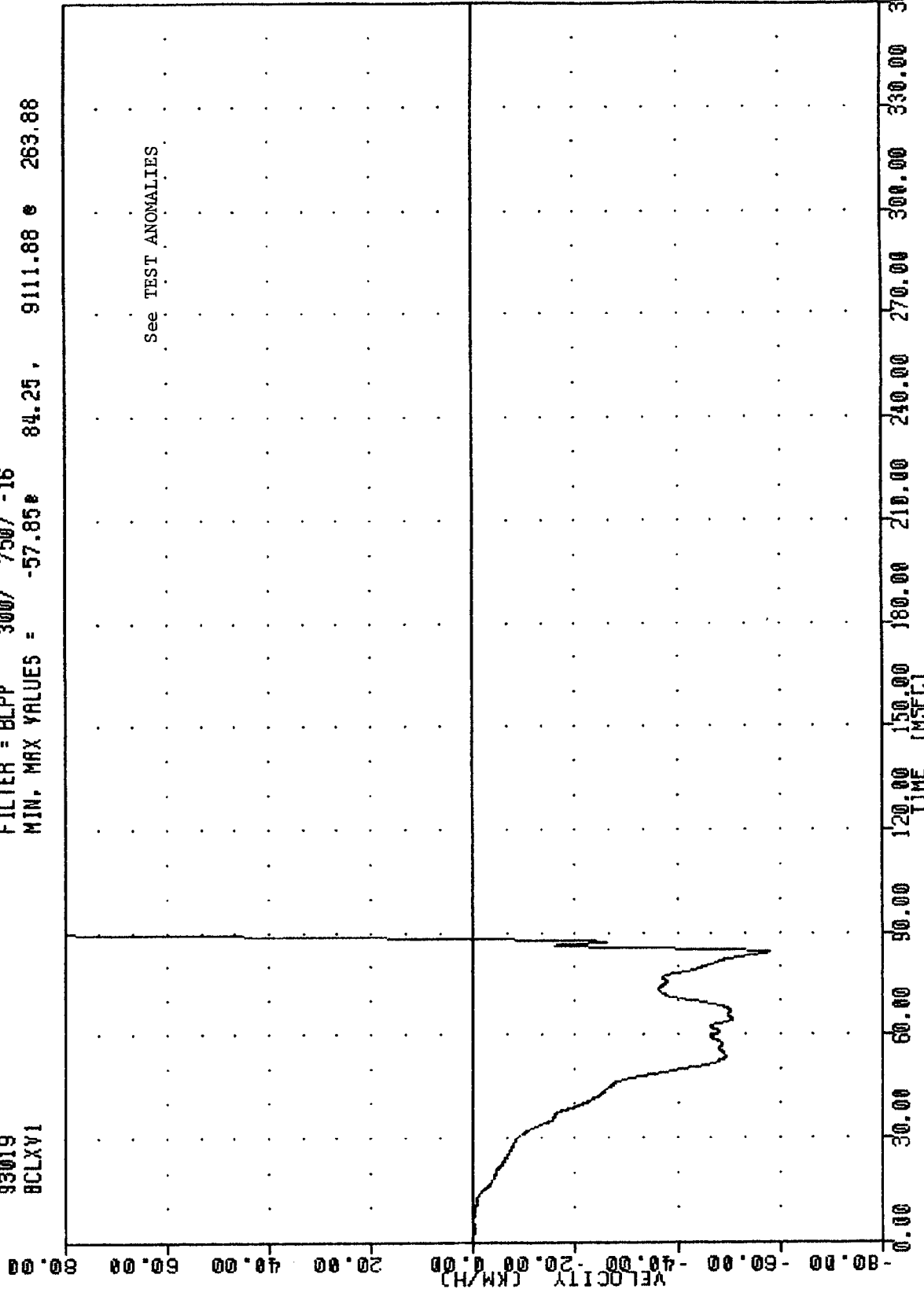
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -1608.58 e 270.25 , 1585.36 e 91.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
LEFT BRAKE CALIPER X-AXIS ACCELERATION

TRC . 930119  
TRUCK INTO STATIONARY CAR  
93019  
BCLXY1

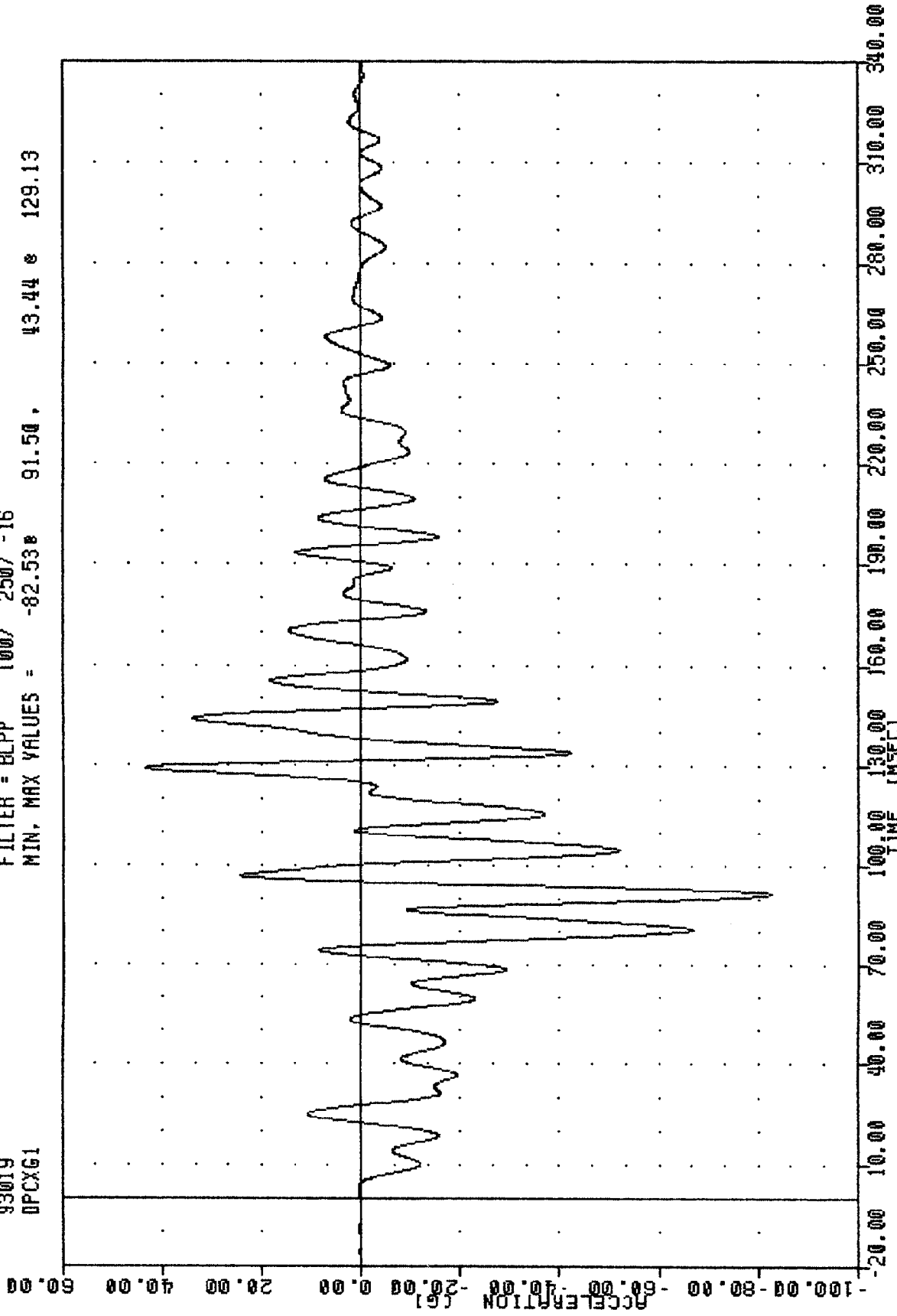
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -57.85 e 84.25 , 9111.88 e 263.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
LEFT BRAKE CALIPER X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
0PCXG1

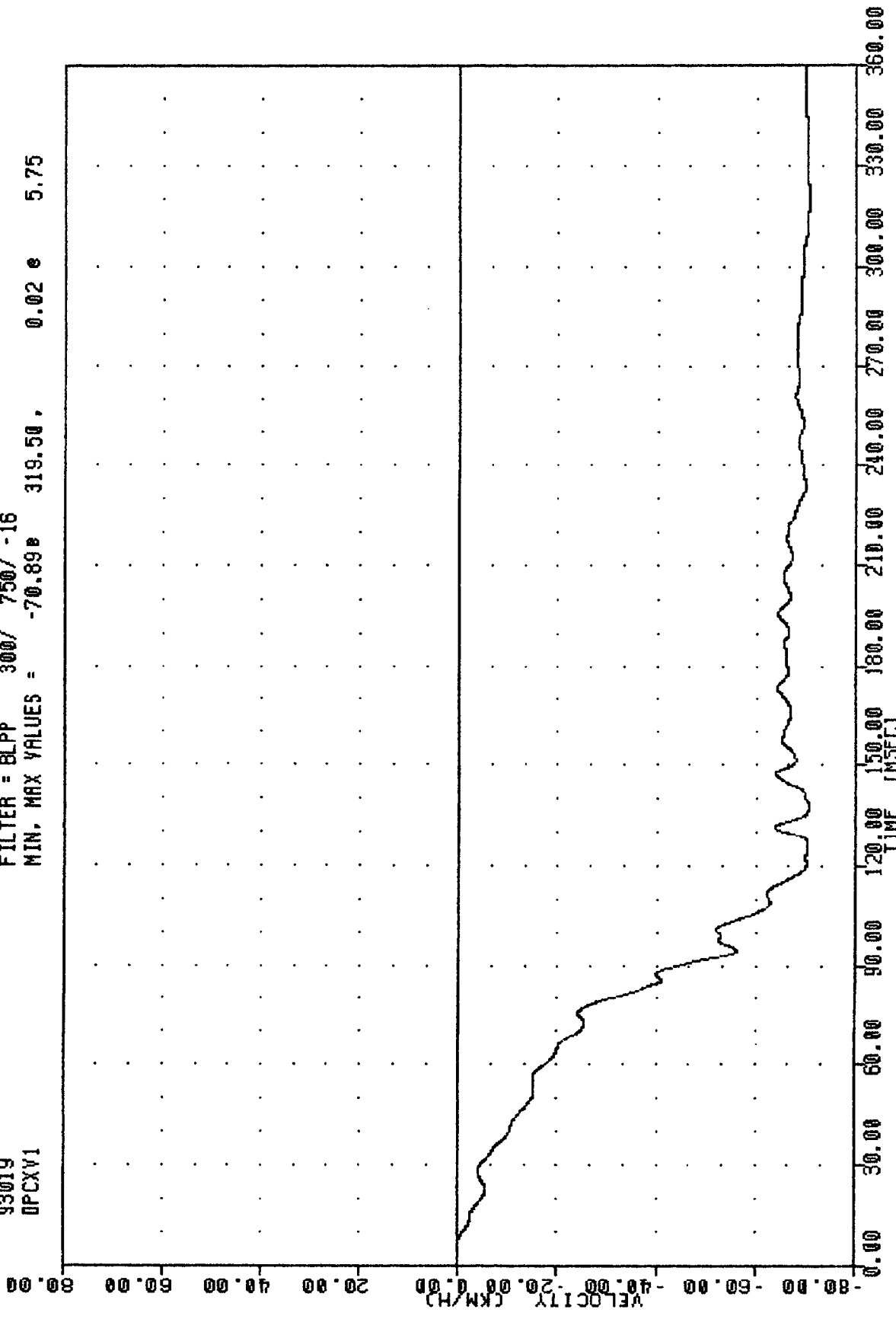
FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -82.53 91.50 , 43.44 129.13



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
DPCXV1

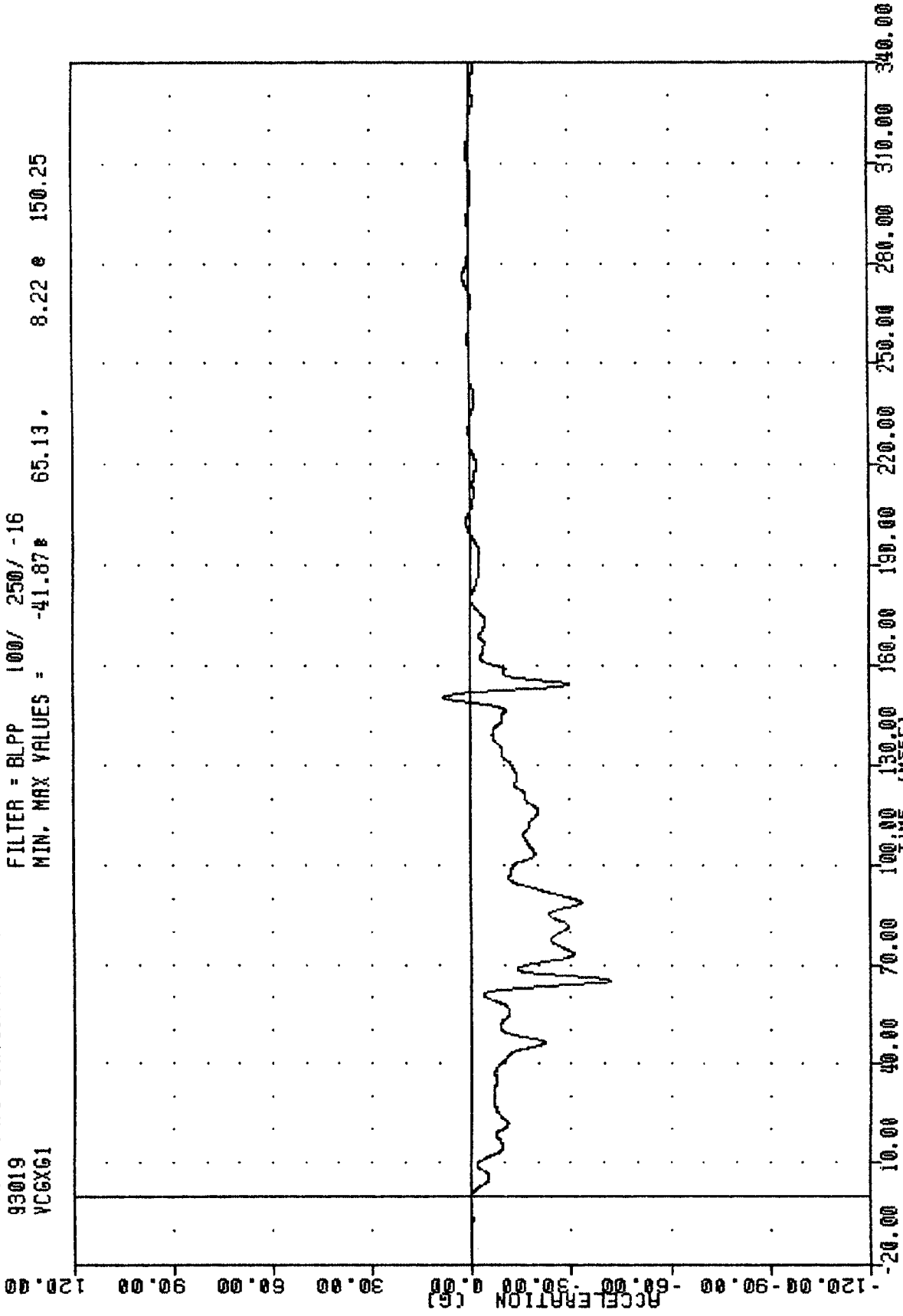
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -70.89 e 319.50 , 0.02 e 5.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
INSTRUMENT PANEL CENTER X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
VC6XG1

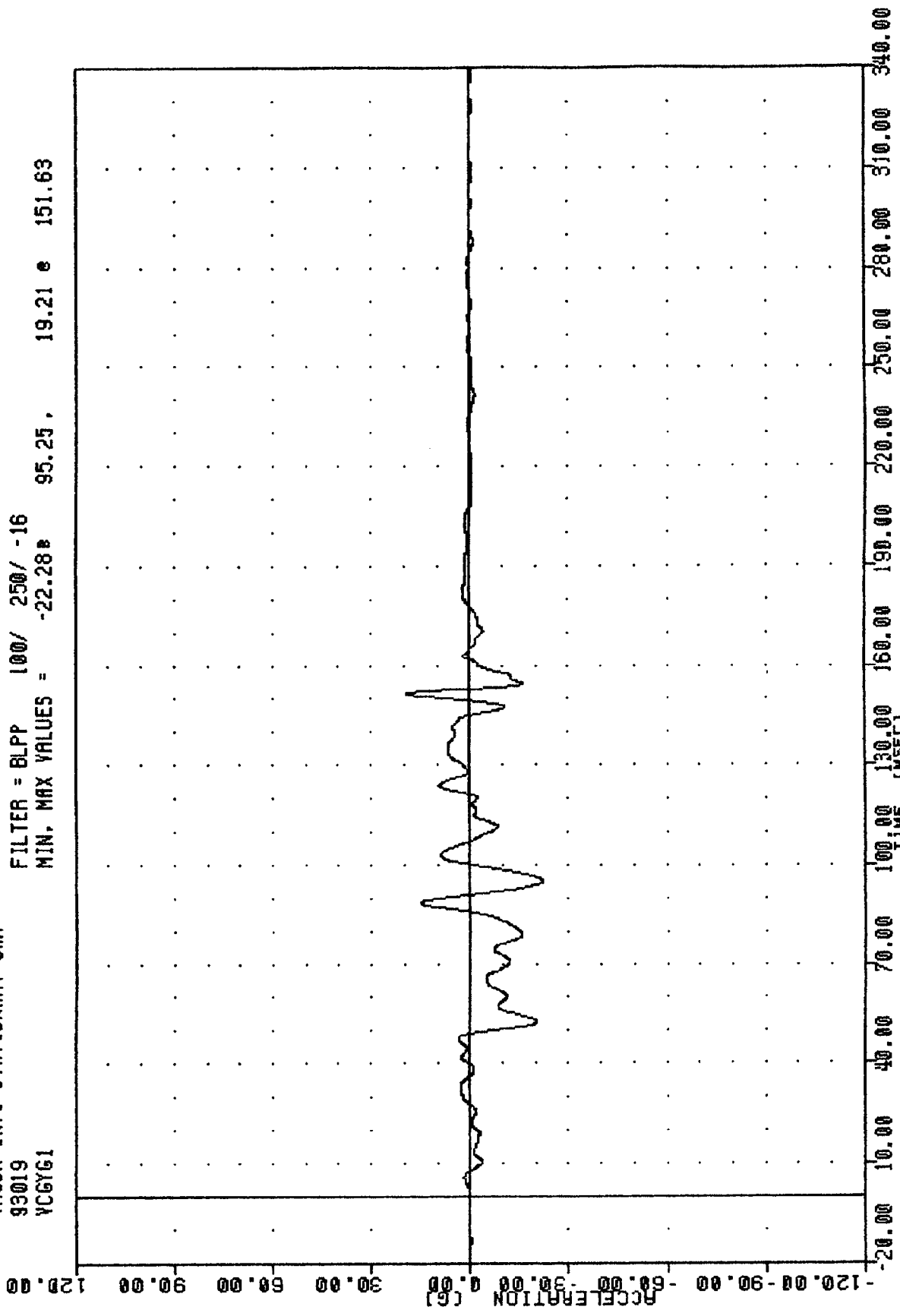
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -41.87 65.13 8.22 e 150.25



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
CAR CENTER OF GRAVITY X-AXIS ACCELERATION

TRC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 YCGYG1

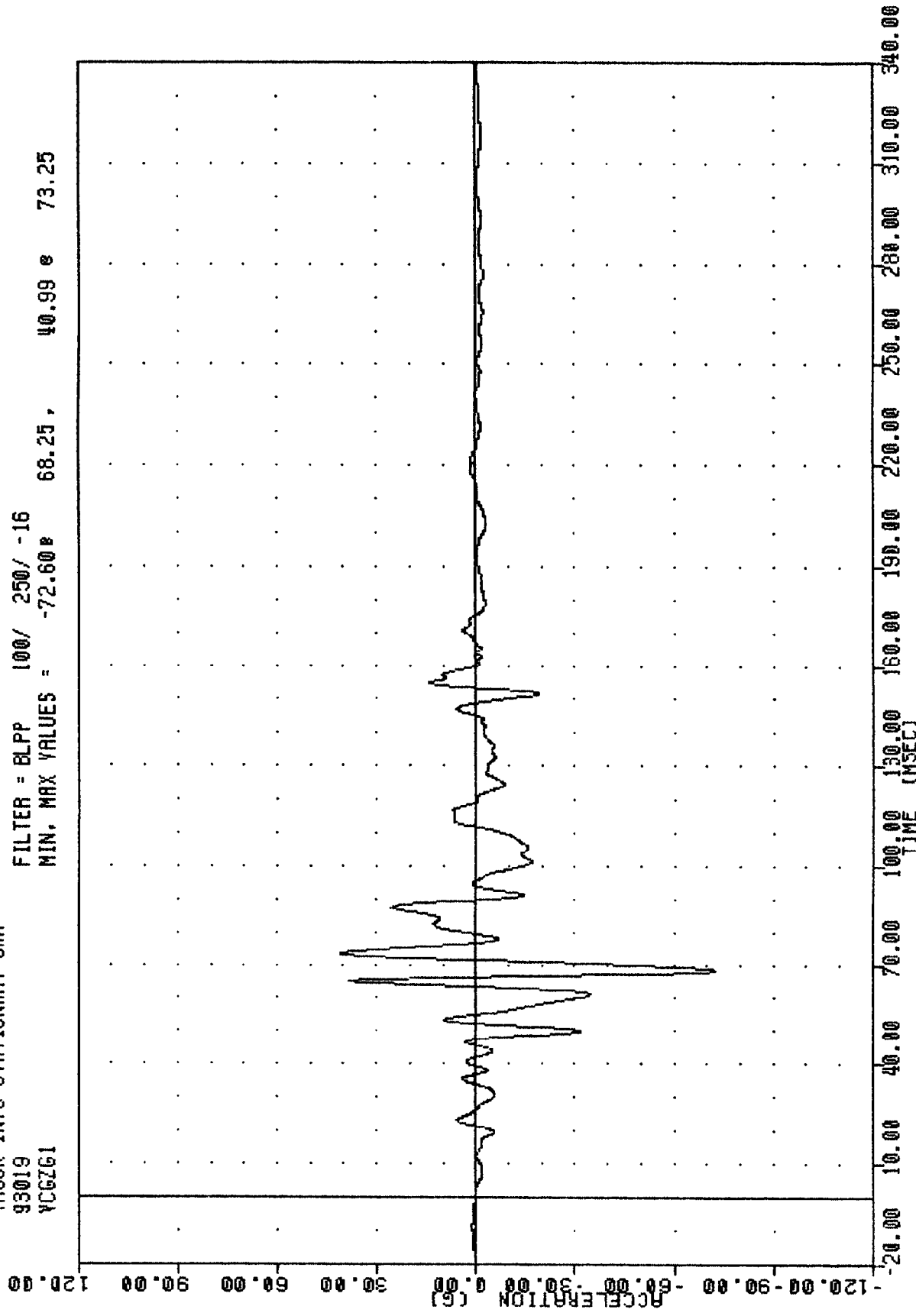
FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = -22.28 95.25 , 19.21 e 151.63



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 CAR CENTER OF GRAVITY Y-AXIS ACCELERATION

TRC  
\* 930119  
TRUCK INTO STATIONARY CAR  
93019  
YCGZG1

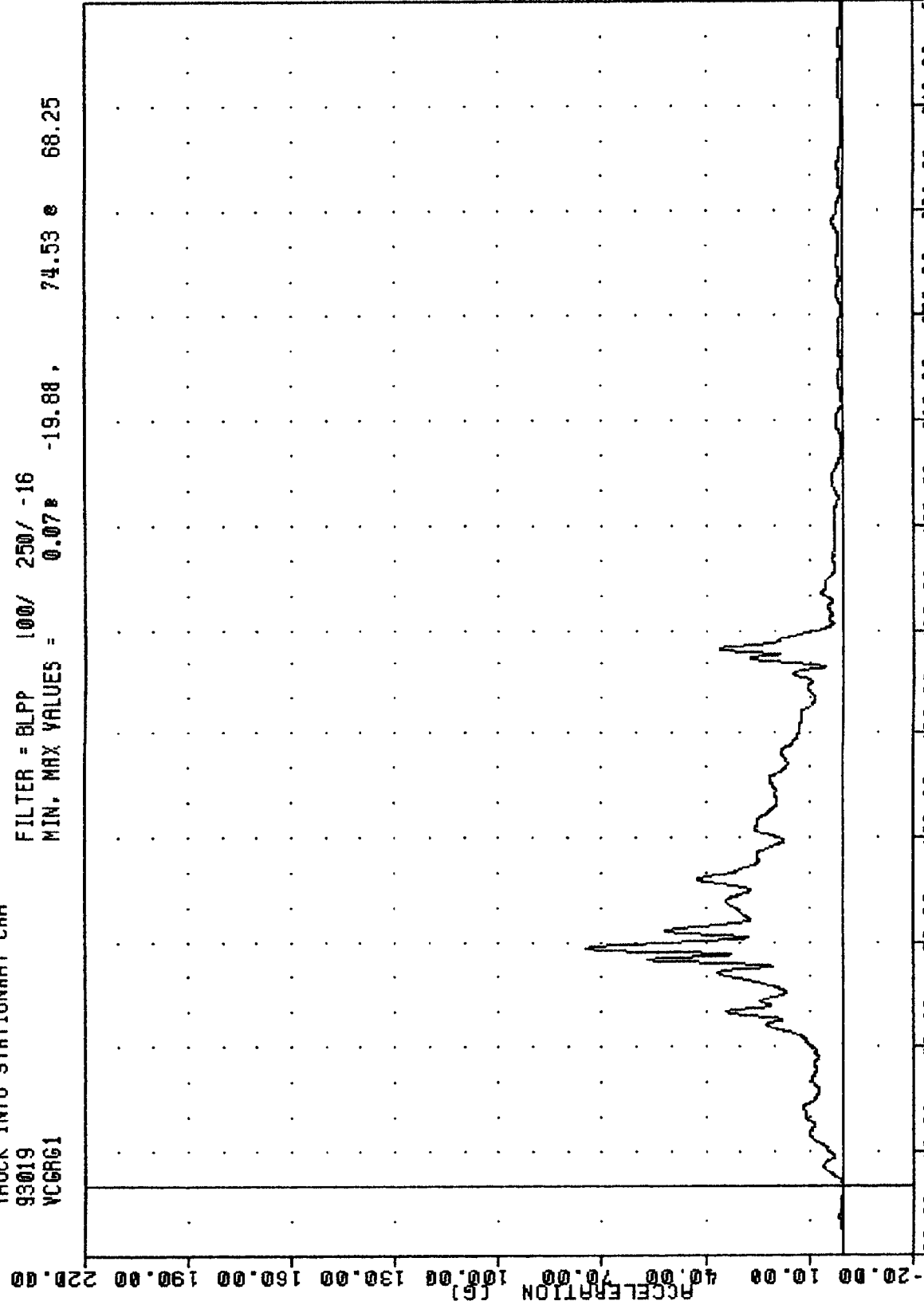
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -72.60 68.25 , 40.99 e 73.25



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
CAR CENTER OF GRAVITY Z-AXIS ACCELERATION

TRC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 VCGRG1

FILTER = BLPP 100/ 250/ -16  
 MIN. MAX VALUES = 0.07 e -19.88 , 74.53 e 68.25



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00  
 TIME (MSEC)  
 REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 CAR CENTER OF GRAVITY RESULTANT ACCELERATION

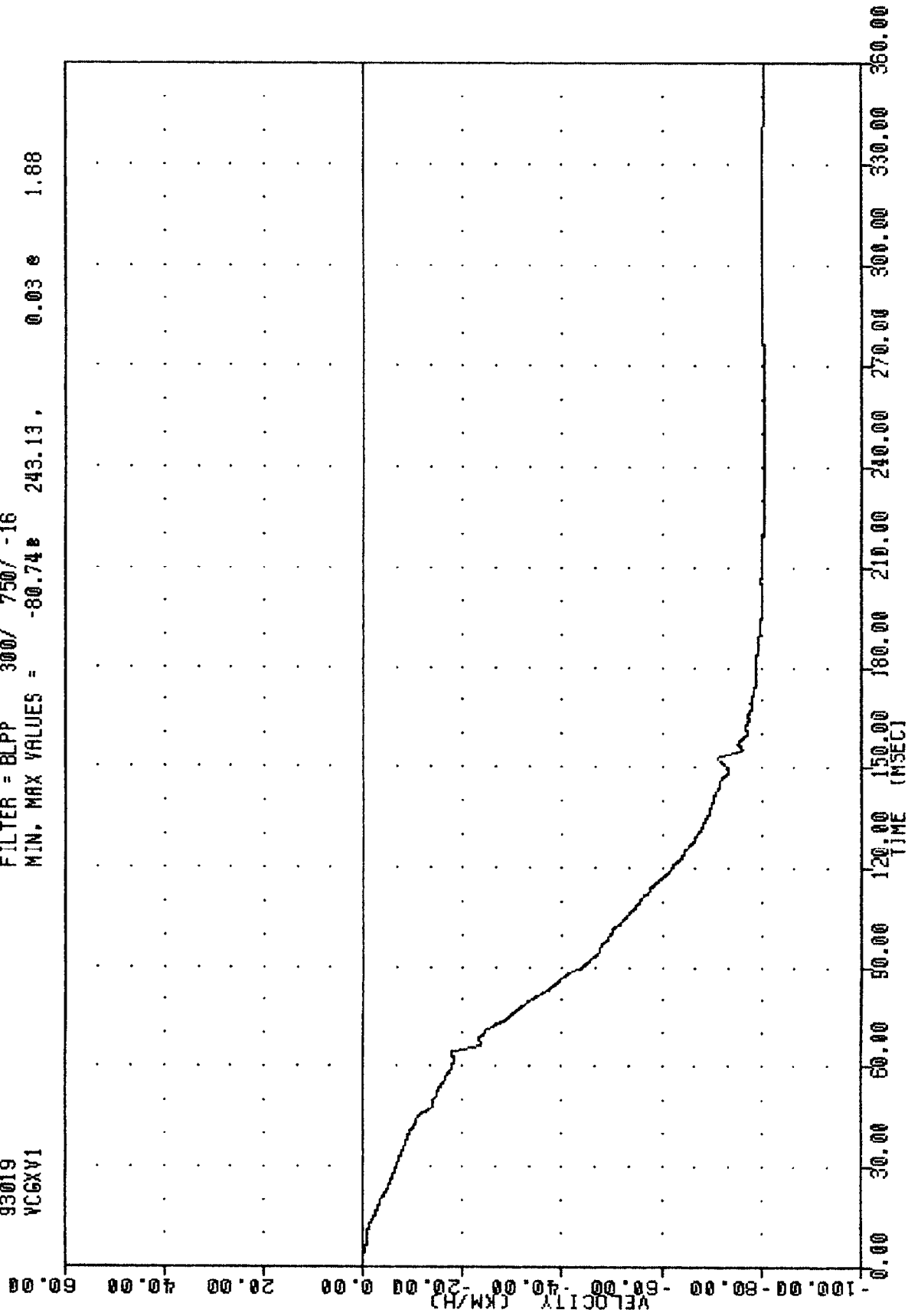
TRC  
93019  
VC6XV1

930119

TRUCK INTO STATIONARY CAR

FILTER = BLPP 300/ 750/ -16

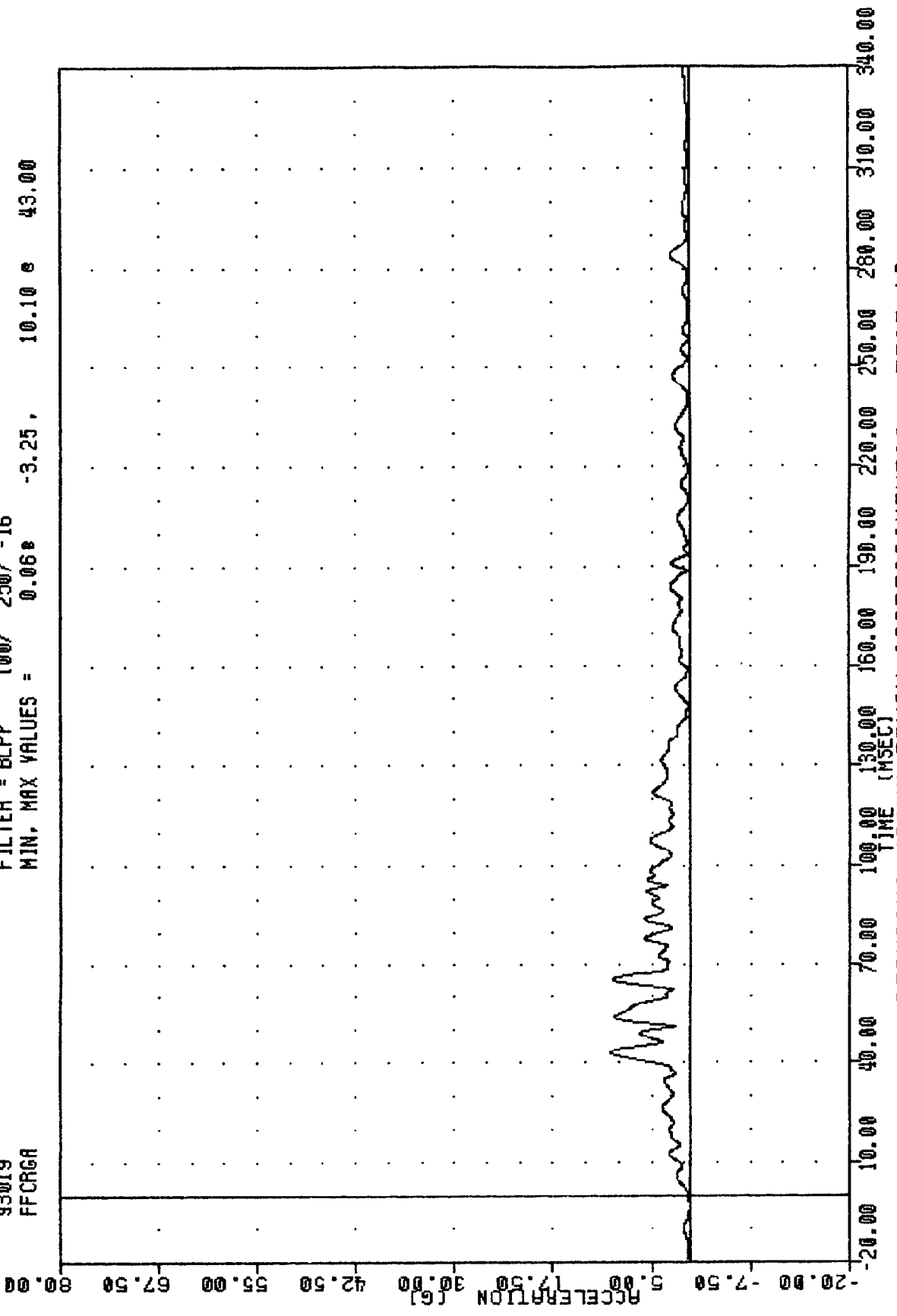
MIN. MAX VALUES = -80.74 243.13, 0.03 1.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
CAR CENTER OF GRAVITY X-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
FFCRGA

FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = 0.068 -3.25, 10.10 43.00

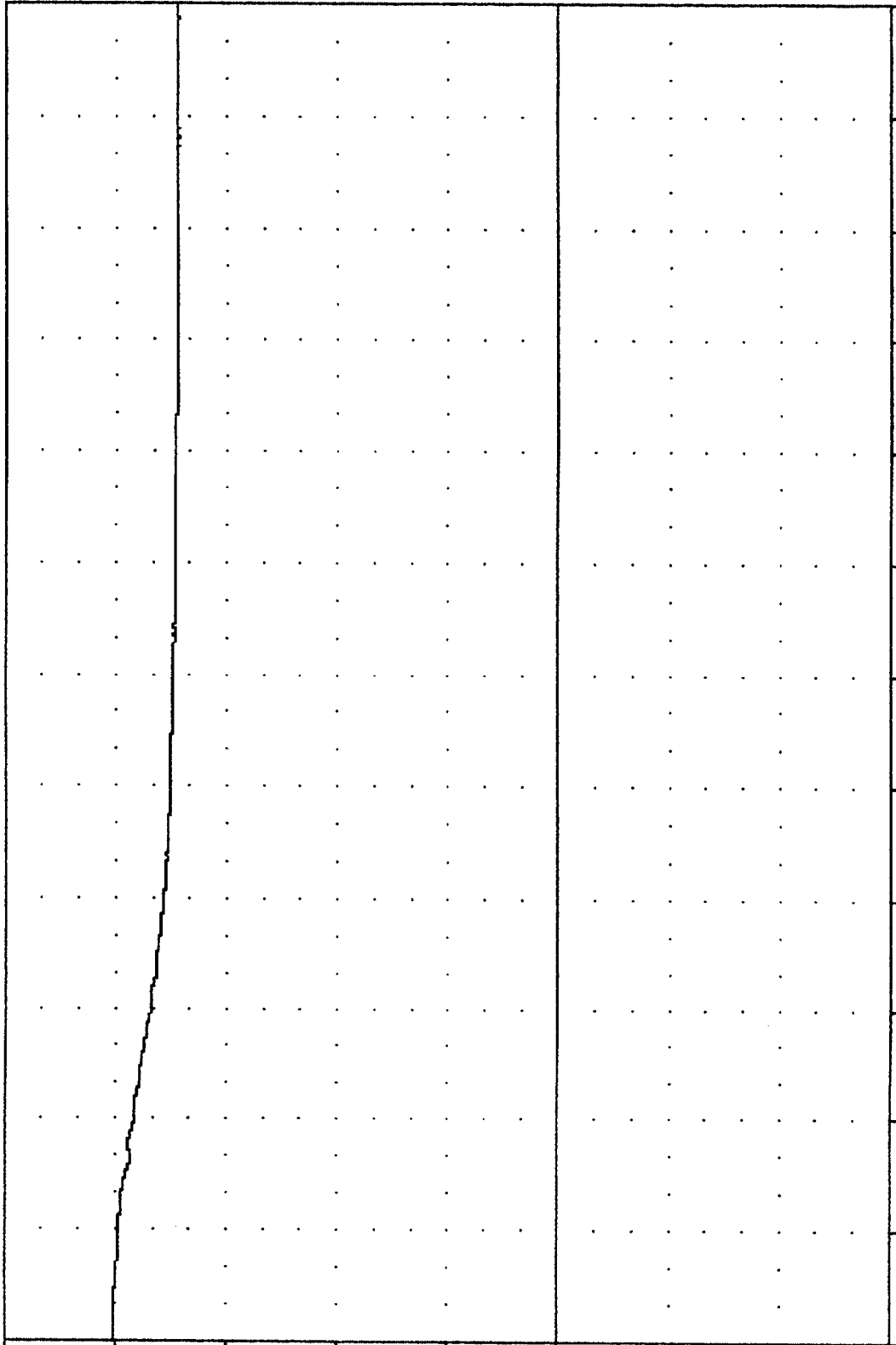


REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK FRONT FRAME CROSSMEMBER RESULTANT ACCELERATION

TRC . 930119  
TRUCK INTO STATIONARY CAR  
93019  
VCGXVA

FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = 68.66 324.63 , 80.50 0.88

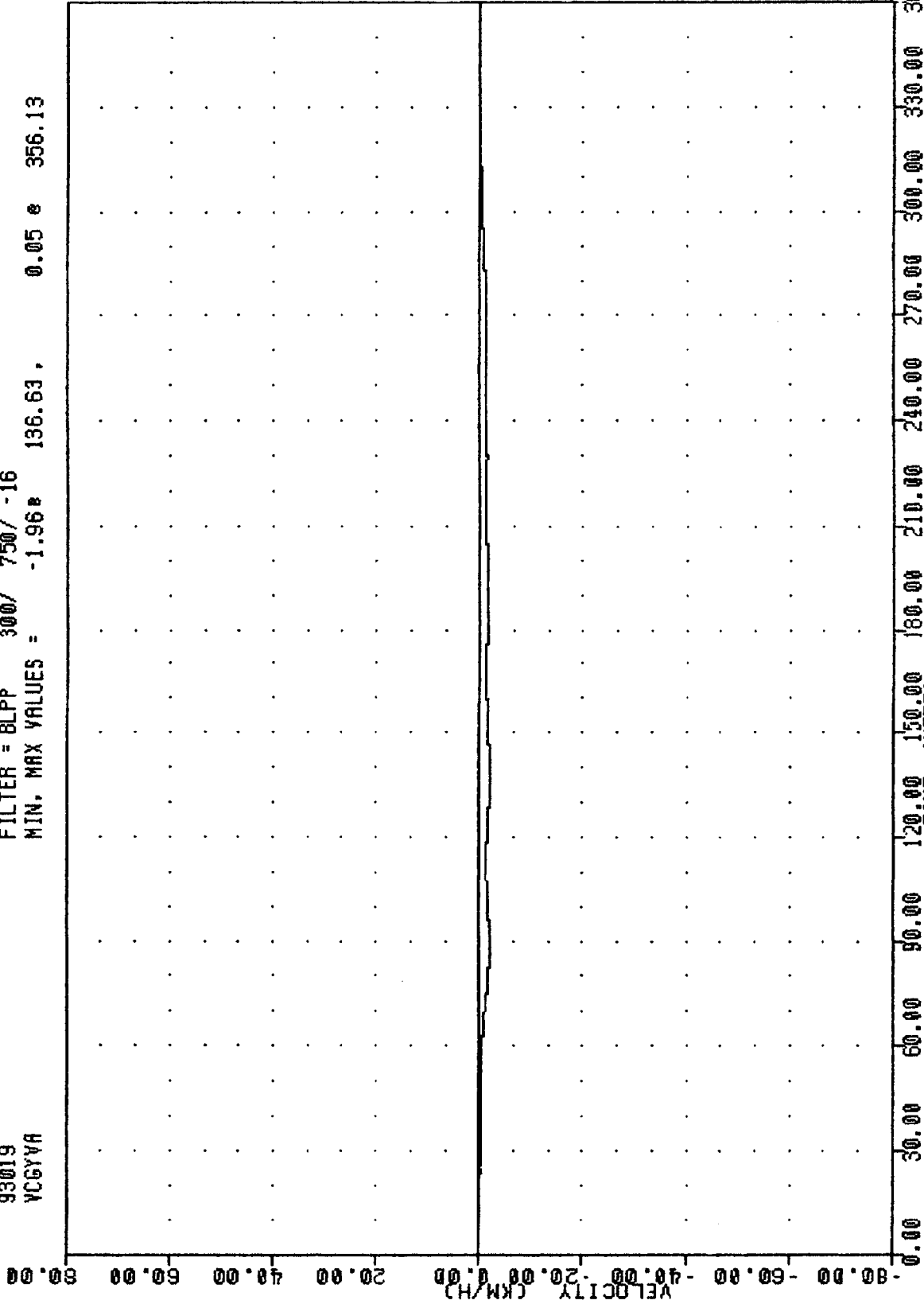
VELOCITY (KM/H)



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK CENTER OF GRAVITY X-AXIS VELOCITY

TRC . 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 VCGYVA

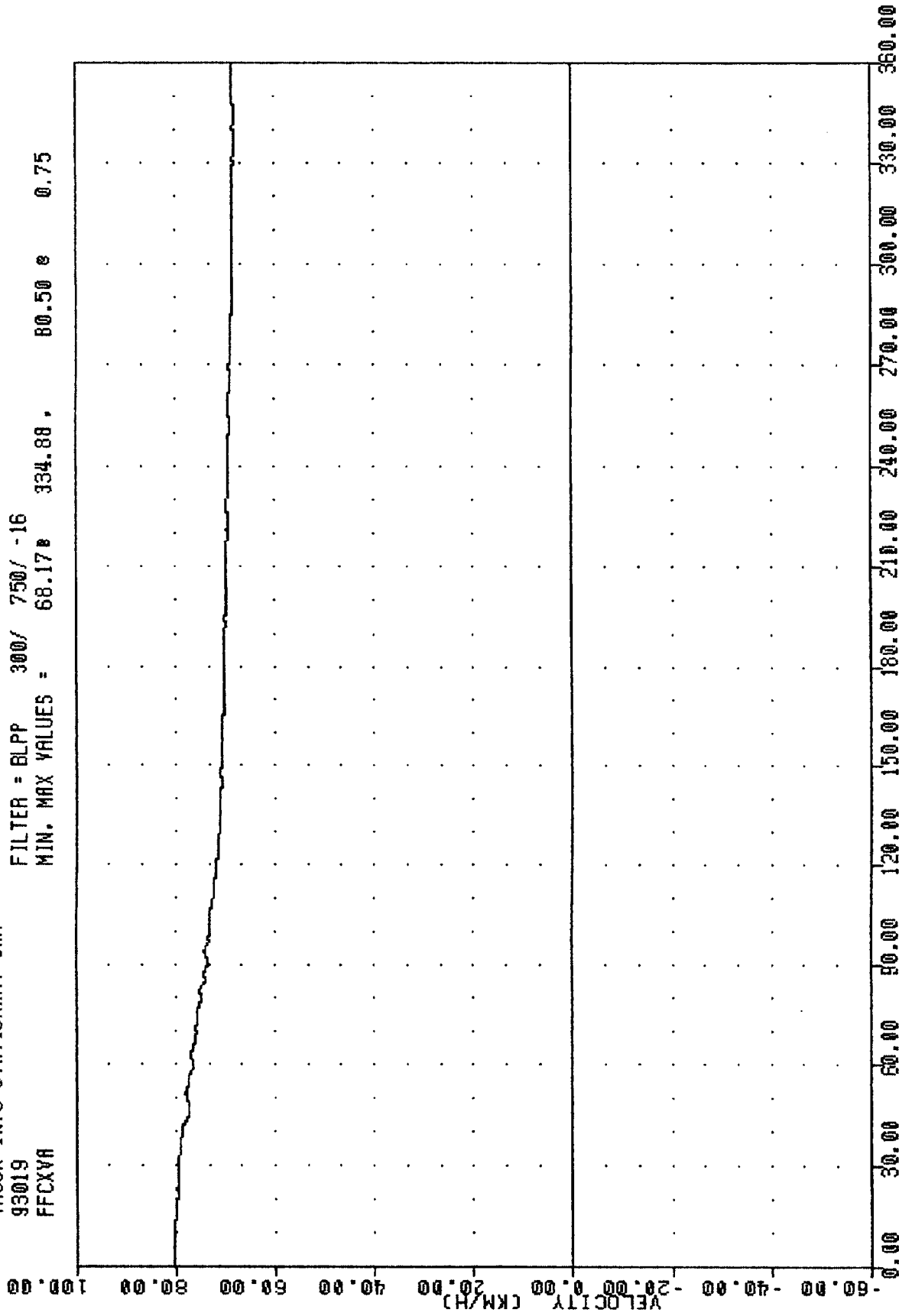
FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = -1.96\* 136.63, 0.05 e 356.13



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 TRUCK CENTER OF GRAVITY Y-AXIS VELOCITY

TRC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 FFCXVA

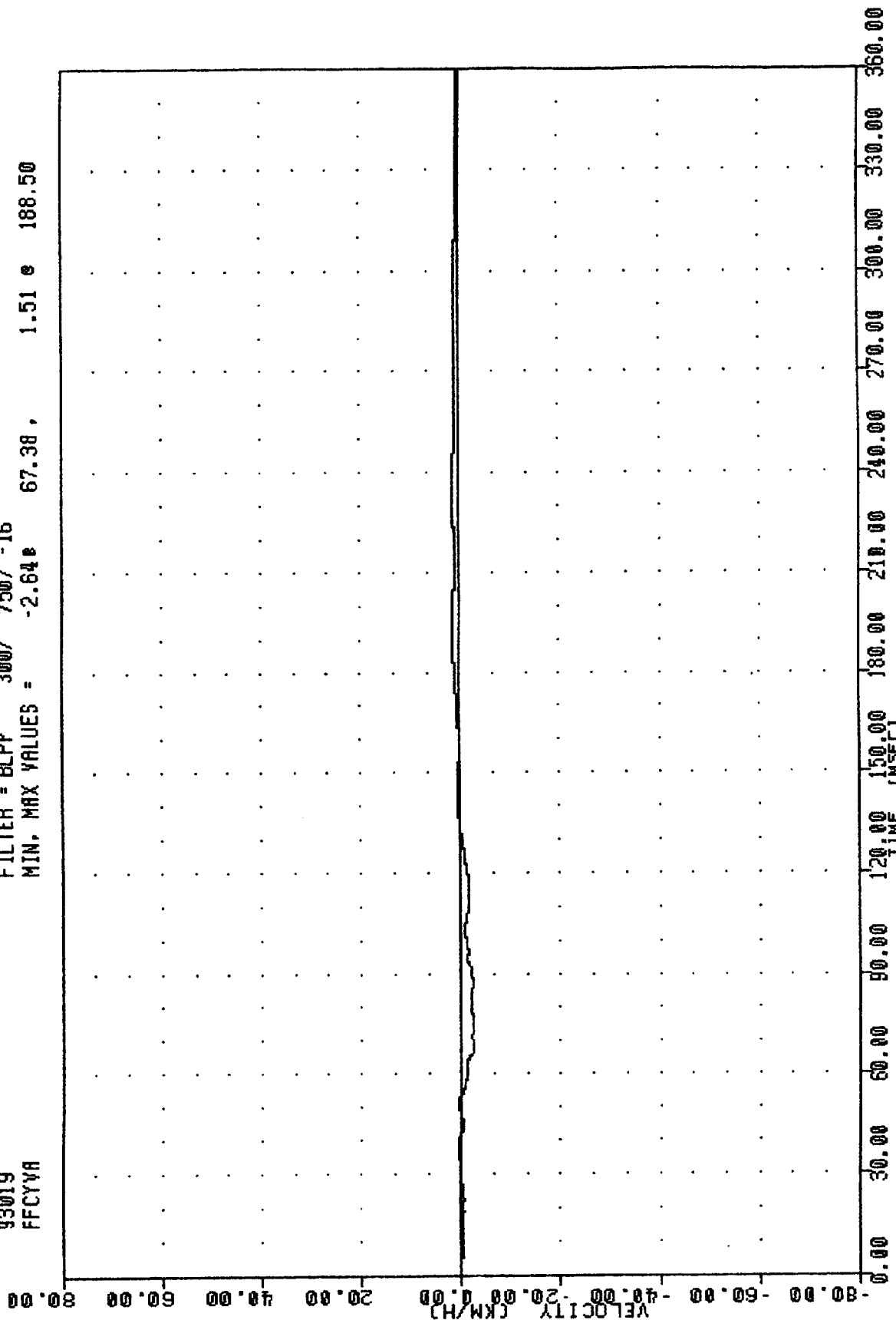
FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = 68.17 334.88 , 80.50 e 0.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 TRUCK FRONT FRAME CROSSMEMBER X-AXIS VELOCITY

TRC , 930119  
 TRUCK INTO STATIONARY CAR  
 93019  
 FFCYVA

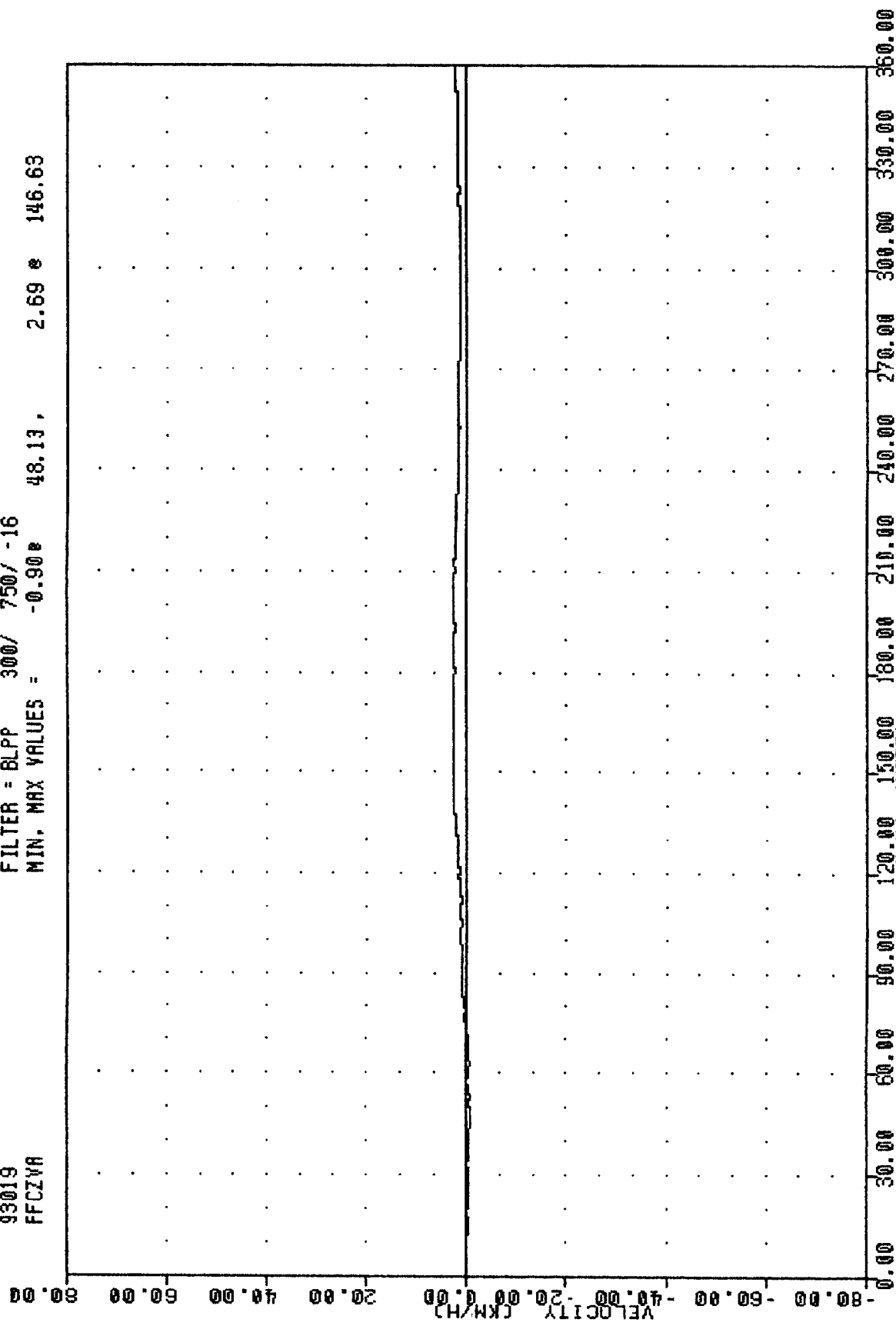
FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = -2.64 67.38 , 1.51 188.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
 TRUCK FRONT FRAME CROSSMEMBER Y-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
FFCZVA

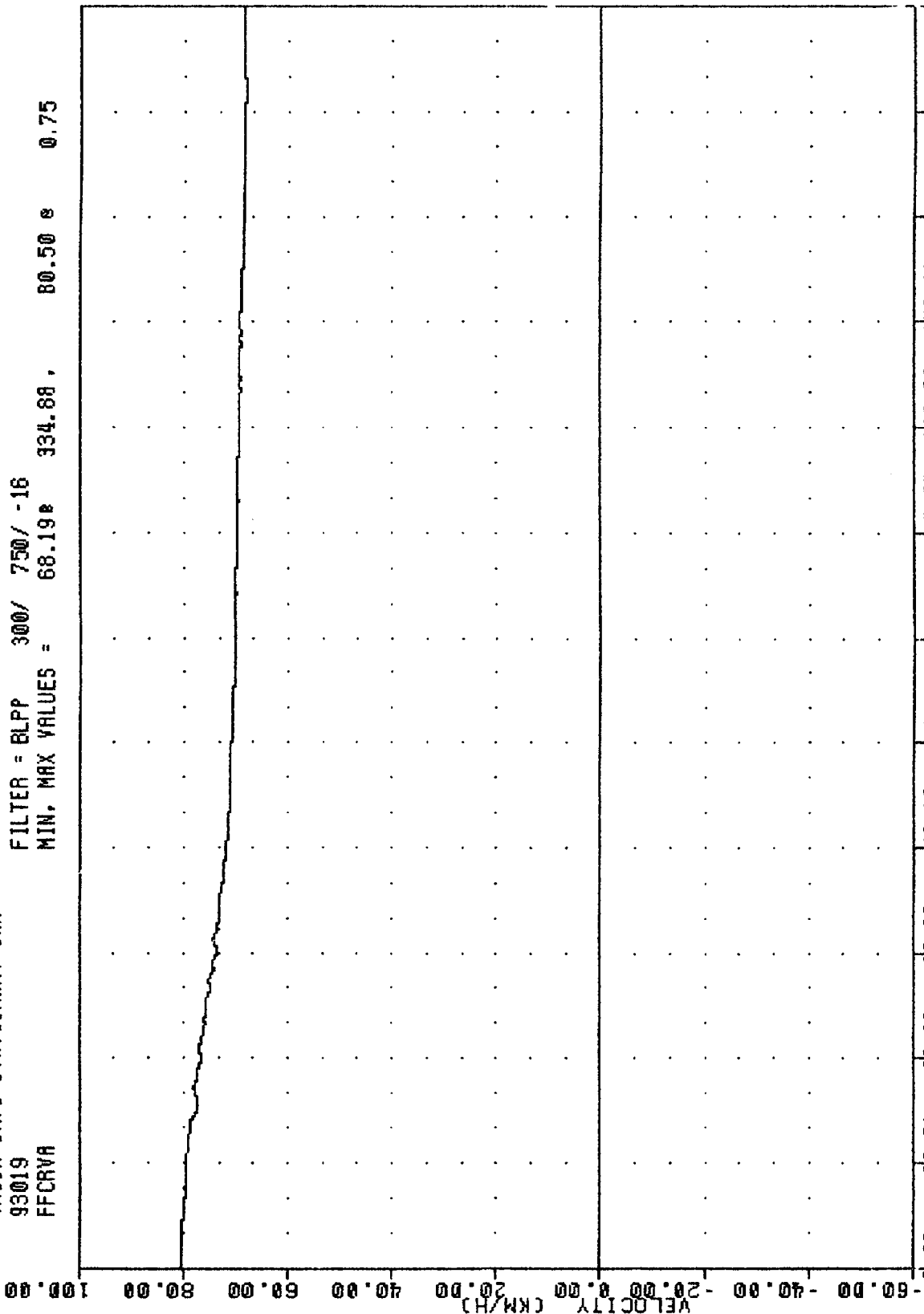
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -0.90e 48.13 , 2.69 e 146.63



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
FFCRVA

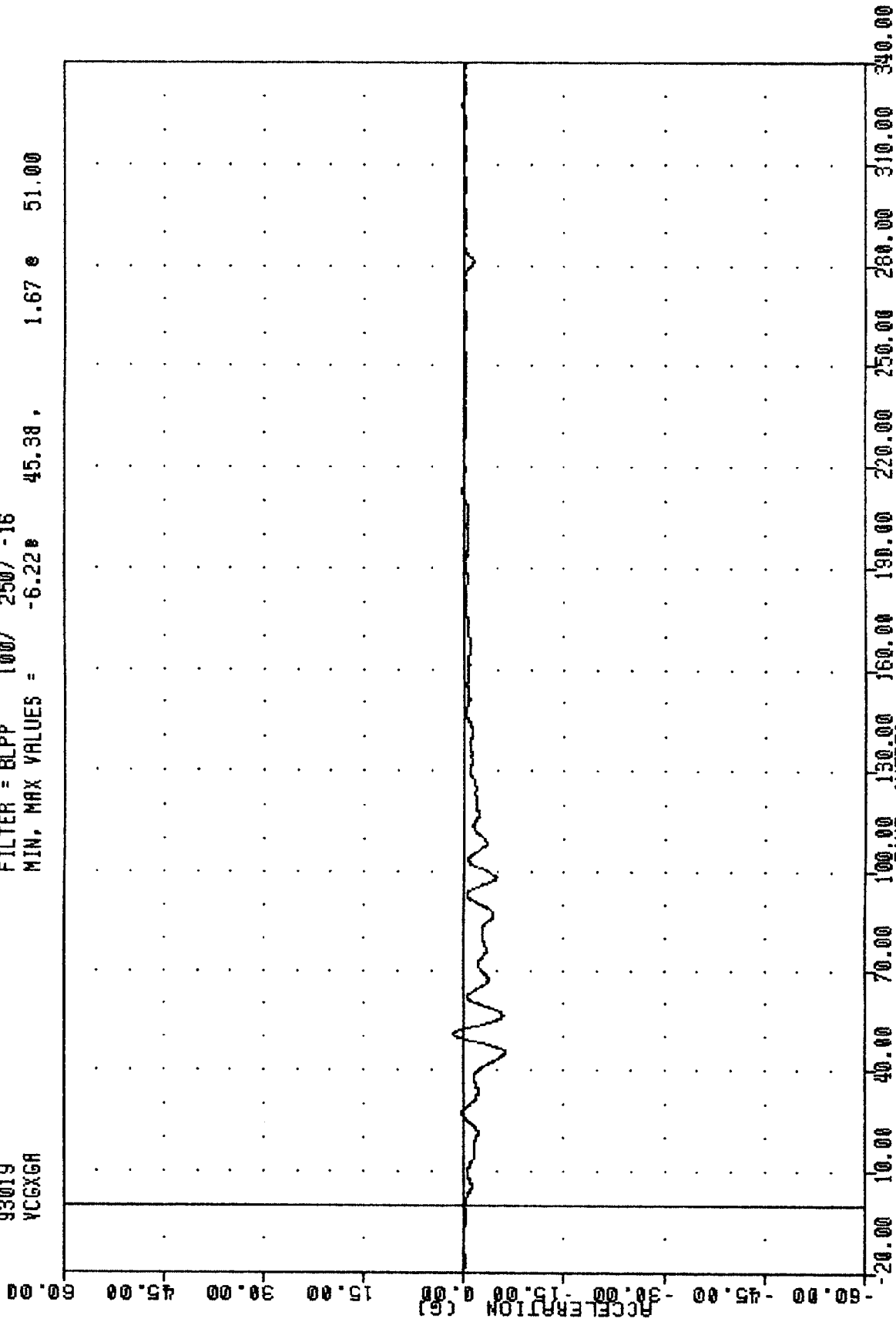
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = 68.19 334.88, 80.50 0.75



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 12  
TRUCK FRONT FRAME CROSSMEMBER VELOCITY RESULTANT

TRC .930119  
TRUCK INTO STATIONARY CAR  
93019  
YCGXGA

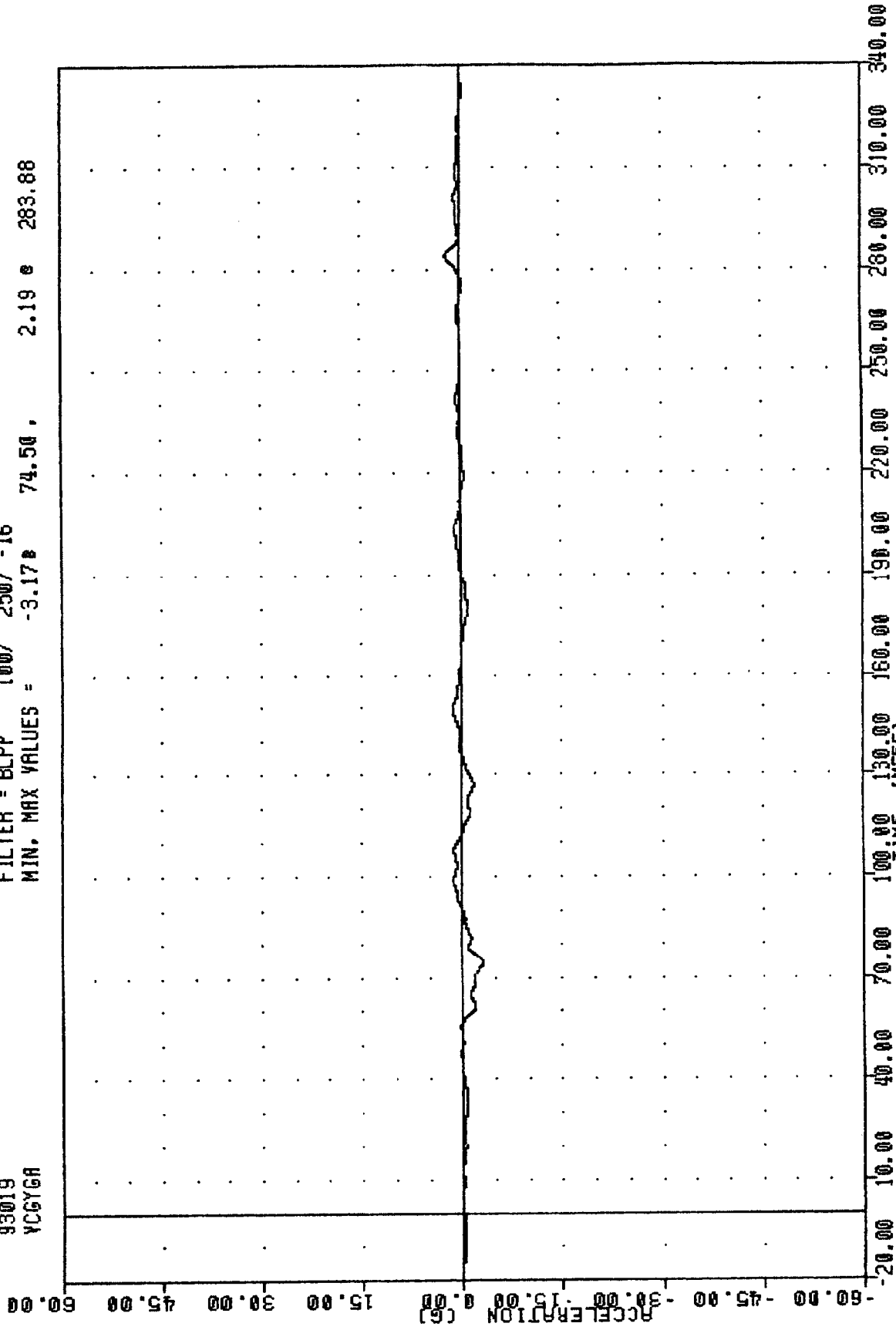
FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -6.22 45.38 1.67 51.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK CENTER OF GRAVITY X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
YCCYGA

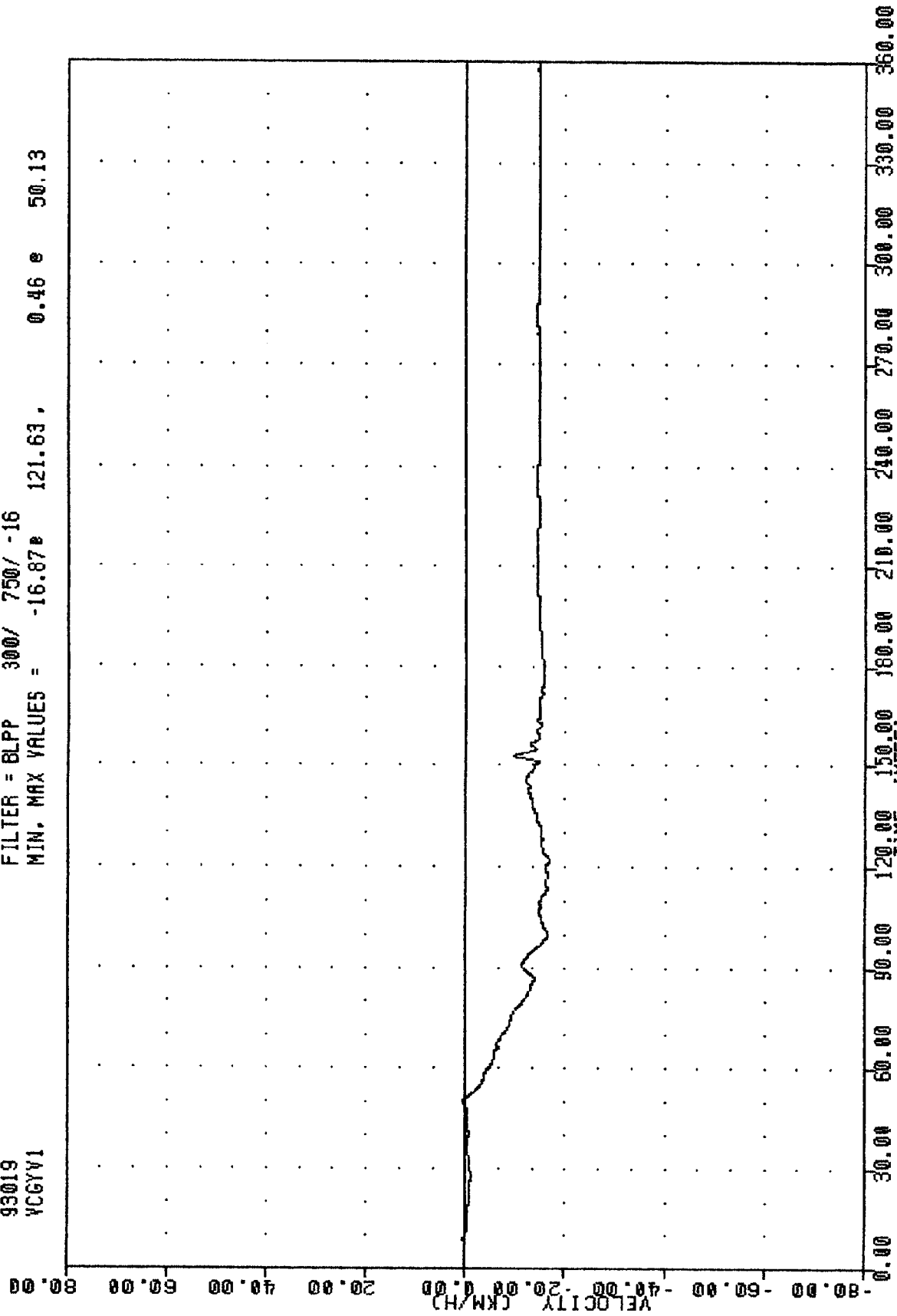
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -3.17 74.50 2.19 e 283.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK CENTER OF GRAVITY Y-AXIS ACCELERATION

TRC  
TRUCK INTO STATIONARY CAR  
93019  
YCGYV1

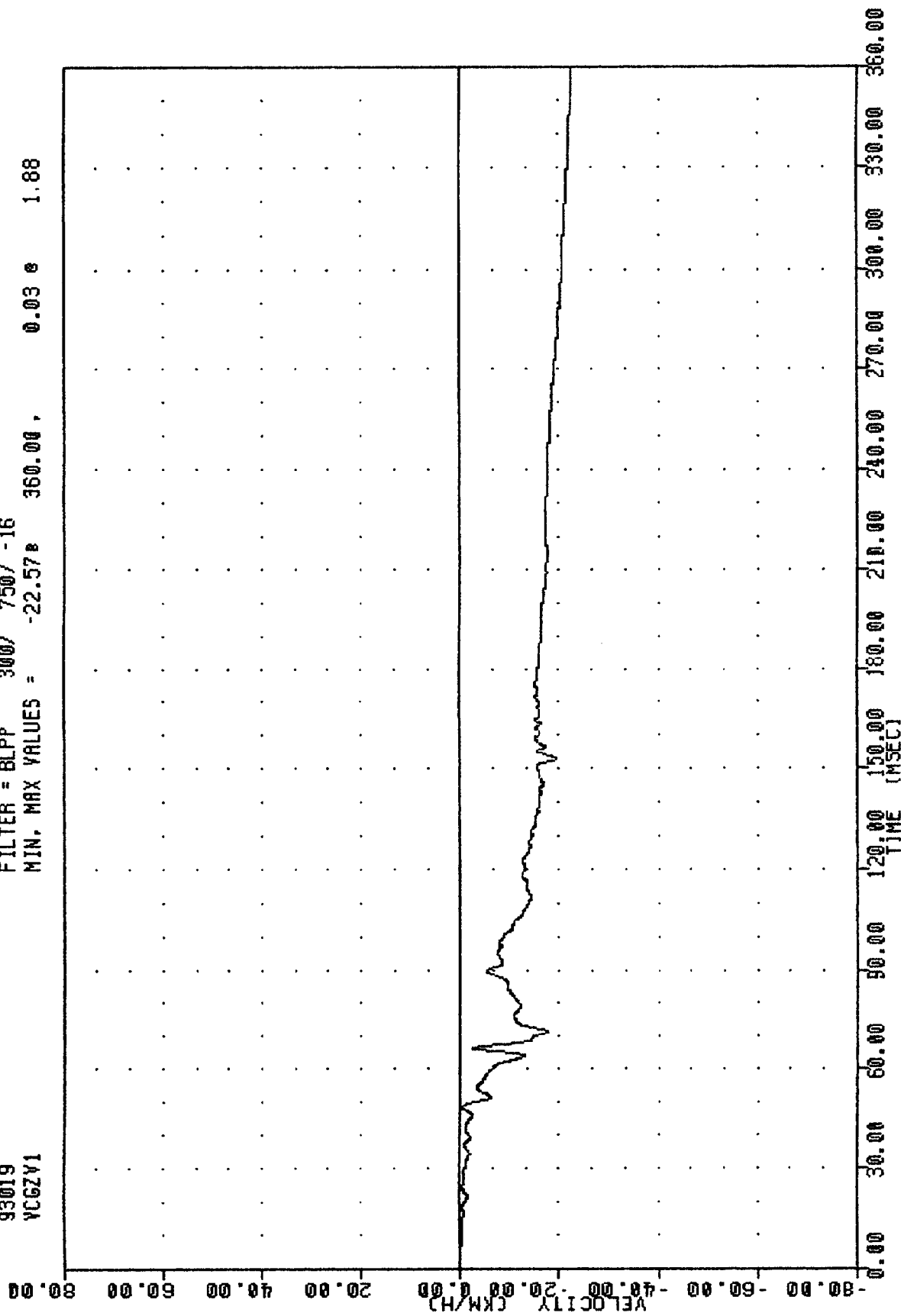
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -16.87e 121.63, 0.46 e 50.13



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
CAR CENTER OF GRAVITY Y-AXIS VELOCITY

TAC 930119  
TRUCK INTO STATIONARY CAR  
93019  
YCCZV1

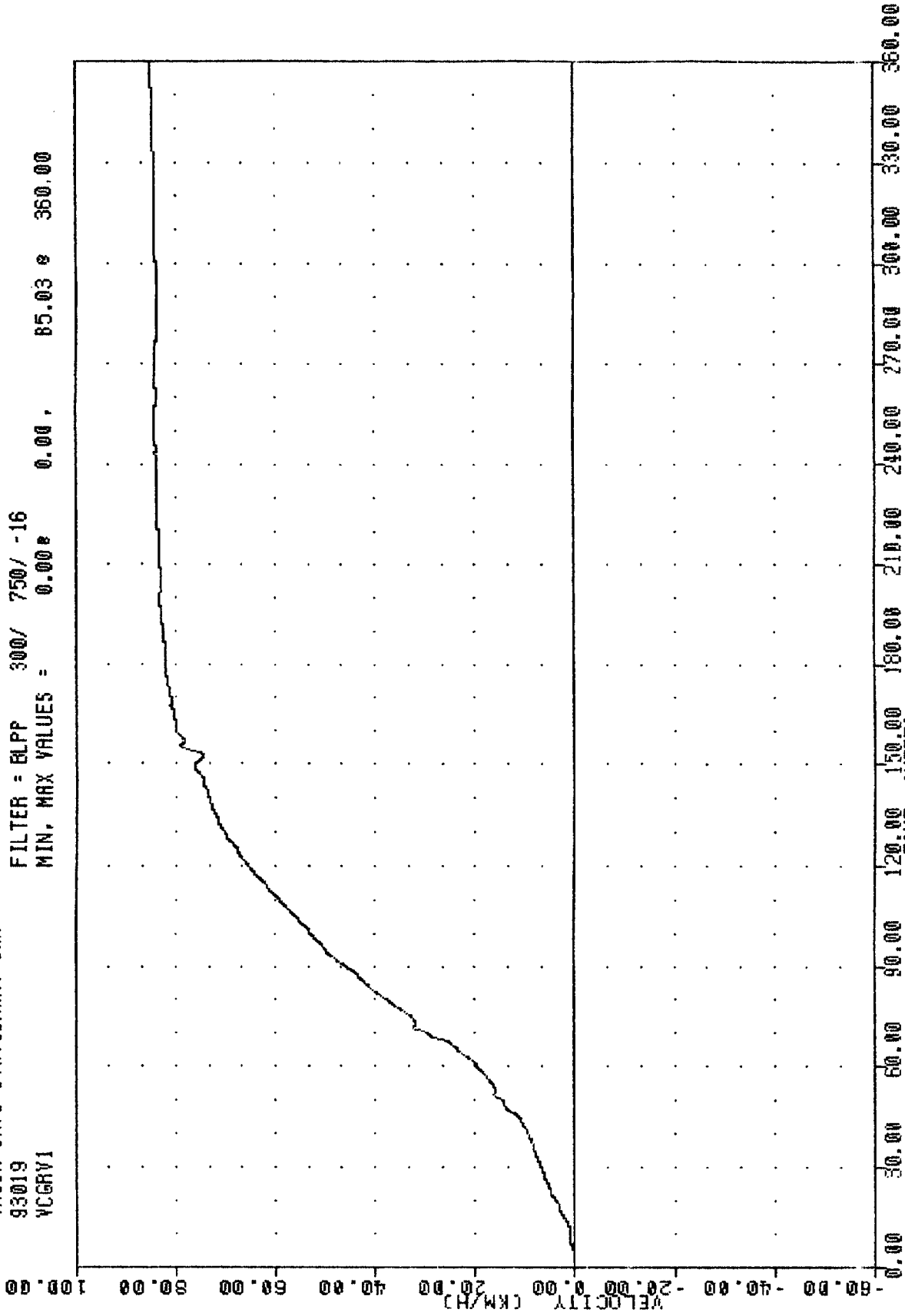
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -22.57 360.00 0.03 e 1.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
CAR CENTER OF GRAVITY Z-AXIS VELOCITY

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
VCGRY1

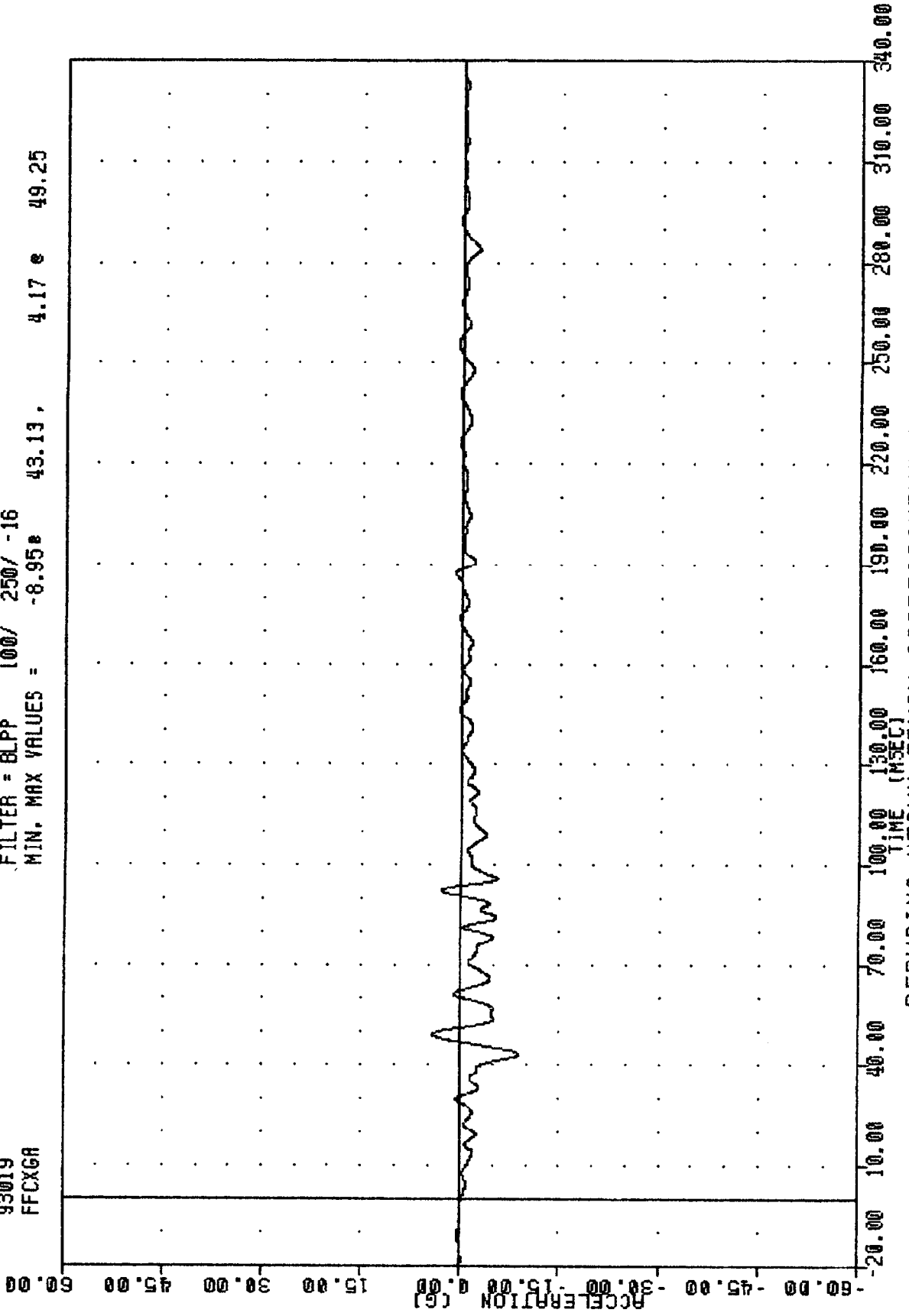
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = 0.00, 85.03 @ 360.00



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
CAR CENTER OF GRAVITY VELOCITY RESULTANT

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
FFCXGR

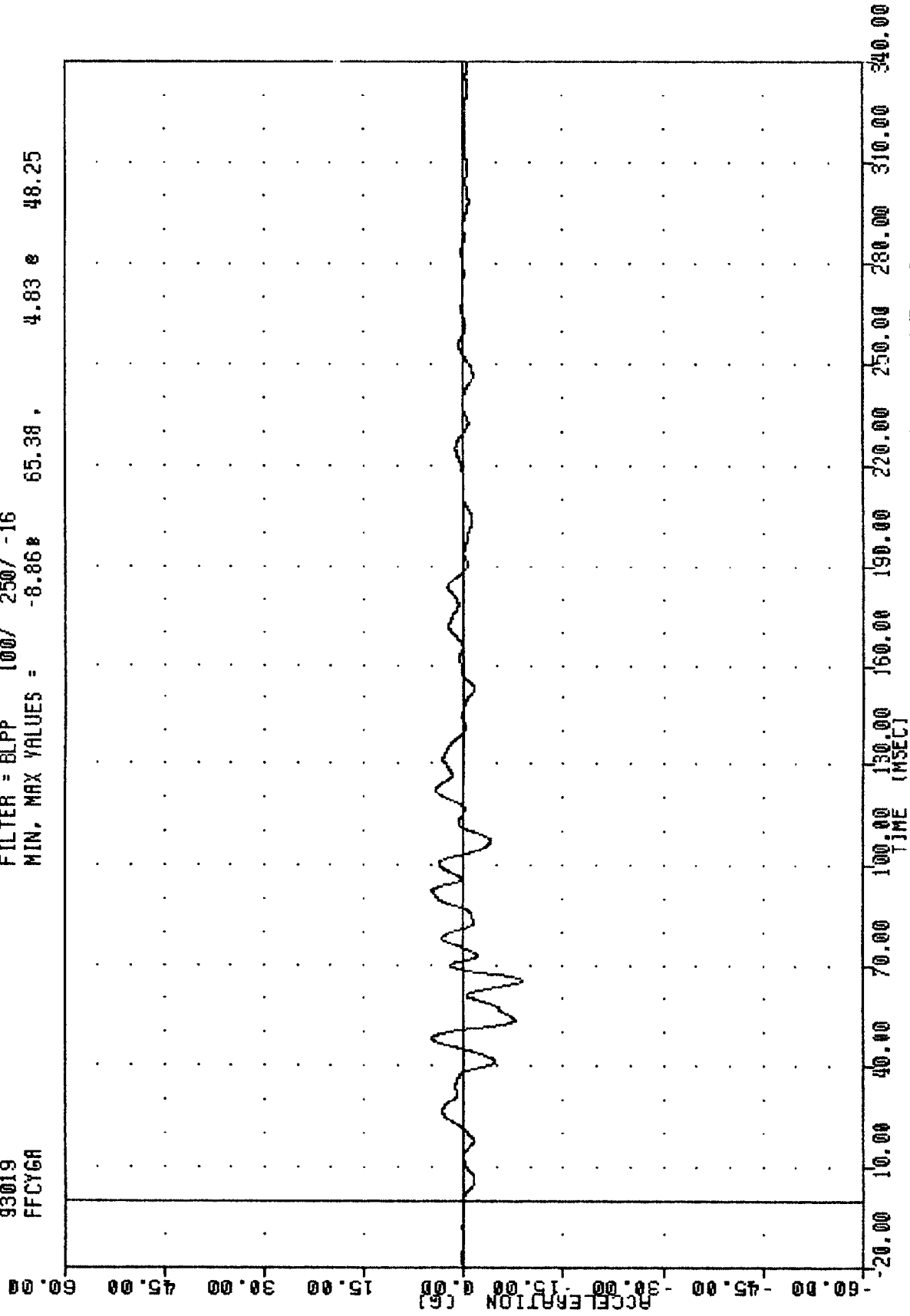
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -8.95e 43.13 , 4.17 e 49.25



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK FRONT FRAME CROSSMEMBER X-AXIS ACCELERATION

TRC , 930119  
TRUCK INTO STATIONARY CAR  
93019  
FFCYGA

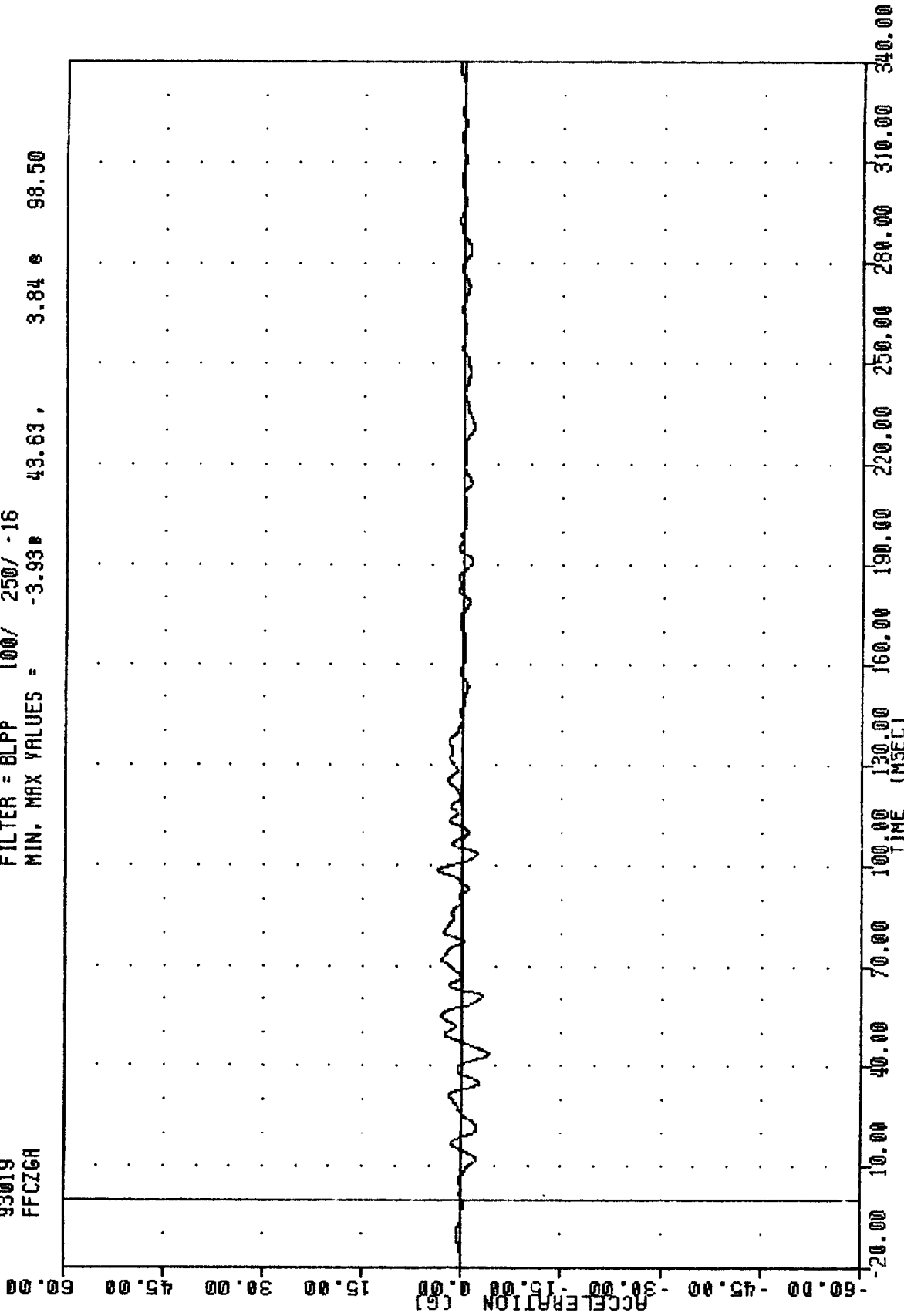
FILTER = BLPP 100/ 250/ -16  
MIN, MAX VALUES = -8.86 65.38 , 4.83 48.25



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK FRONT FRAME CROSSMEMBER Y-AXIS ACCELERATION

TRC  
930119  
TRUCK INTO STATIONARY CAR  
93019  
FFCZGA

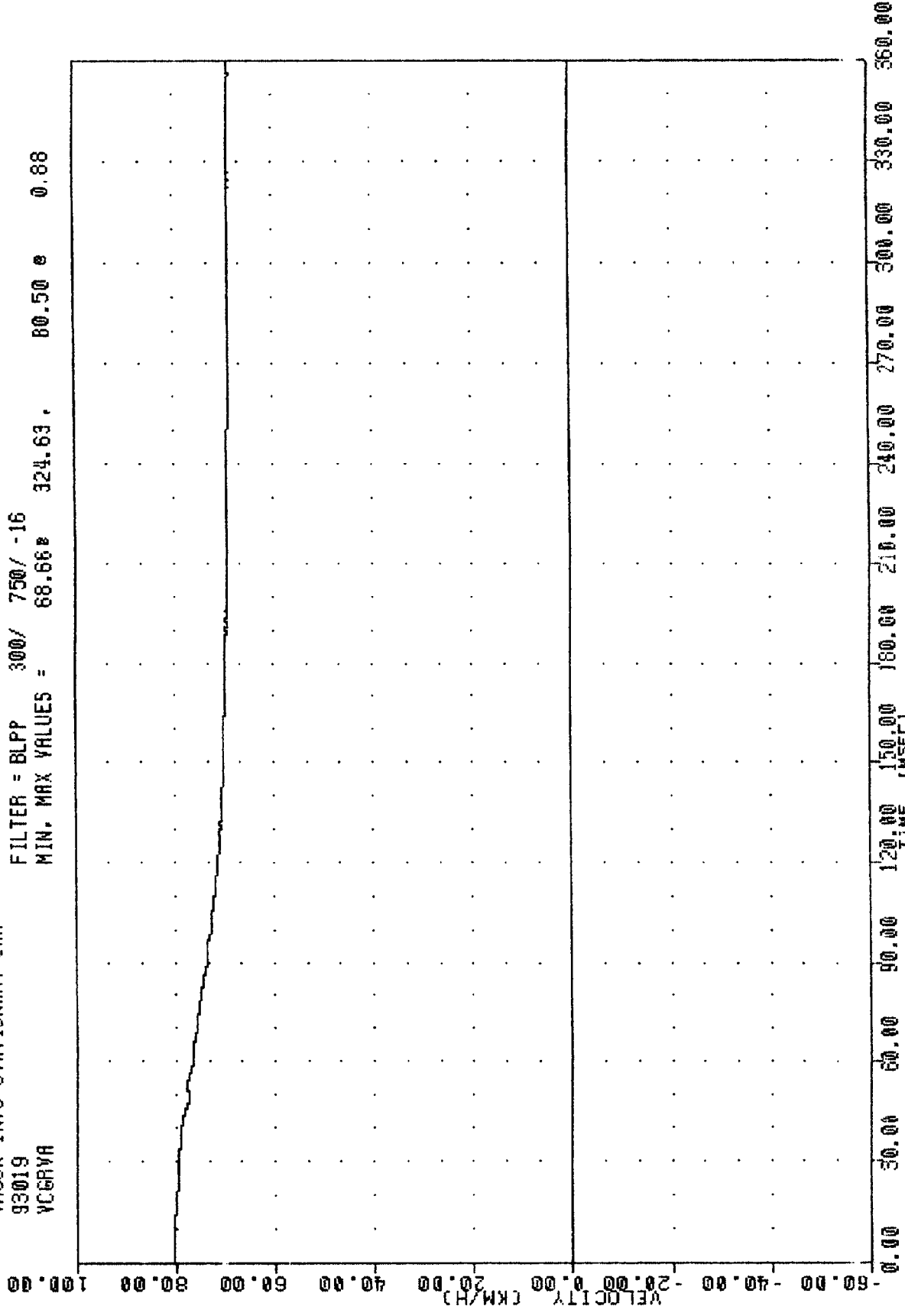
FILTER = BLPP 100/ 250/ -16  
MIN. MAX VALUES = -3.93 43.63, 3.84 98.50



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK FRONT FRAME CROSSMEMBER Z-AXIS ACCELERATION

TRC  
930119  
TRUCK INTO STATIONARY CAR  
93019  
VCGRVA

FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = 68.66 324.63 80.50 0.88



REDUCING HEAVY TRUCK AGGRESSIVENESS - TEST 10  
TRUCK CENTER OF GRAVITY VELOCITY RESULTANT

APPENDIX C

DUMMY CERTIFICATION

TRANSPORTATION RESEARCH CENTER OF OHIO  
HYBRID III EXTERNAL DIMENSIONS  
HUMANOID 048

13-JAN-93

TRC                      48C6ED1                      572E SN048 EXT. DIMENSION CAL06

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
TEMPERATURE			21.1 DEG. C
RELATIVE HUMIDITY			37.0 %
LOCATION FOR CHEST CIRCUMFERENCE (AA)		429- 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		226- 231 MM	229. MM
CHEST CIRCUMFERENCE	(Y)	970-1001 MM	986. MM
WAIST CIRCUMFERENCE	(Z)	836- 866 MM	851. MM
CHEST DEPTH	(D)	213- 229 MM	218. MM
H-POINT HEIGHT	(C)	84- 89 MM	86. MM
H-POINT FROM SEATBACK	(D)	135- 140 MM	137. MM
SKULL CAP TO BACKLINE	(H)	41- 46 MM	43. MM
TOTAL SITTING HEIGHT	(A)	879- 889 MM	884. MM
THIGH CLEARANCE	(F)	140- 155 MM	155. MM
BUTTOCK KNEE LENGTH	(K)	579- 605 MM	597. MM
BUTTOCK POPLITEAL LENGTH	(N)	452- 478 MM	470. MM
POPLITEAL HEIGHT	(L)	429- 455 MM	432. MM
KNEE PIVOT HEIGHT	(M)	485- 500 MM	493. MM
FOOT LENGTH	(P)	252- 267 MM	259. MM
FOOT BREADTH	(W)	91- 107 MM	99. MM
SHOULDER PIVOT FROM BACKLINE	(E)	84- 94 MM	91. MM
SHOULDER BREADTH	(V)	422- 437 MM	427. MM
SHOULDER PIVOT HEIGHT	(B)	506- 521 MM	511. MM
ELBOW REST HEIGHT	(J)	191- 211 MM	202. MM
SHOULDER-ELBOW LENGTH	(I)	330- 345 MM	343. MM
BACK OF ELBOW TO WRIST PIVOT	(G)	290- 305 MM	295. MM

TEST MEETS SPECIFICATIONS

TECHNICIAN *Pete Font*

TRANSPORTATION RESEARCH CENTER OF OHIO

HEAD DROP TEST

HYBRID III

15-JAN-93

TRC

48C6HD1

572E SN48 HEAD DROP CAL 06

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	37.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	261.28 G
PEAK LATERAL ACCELERATION	15 G MAX	-7.04 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

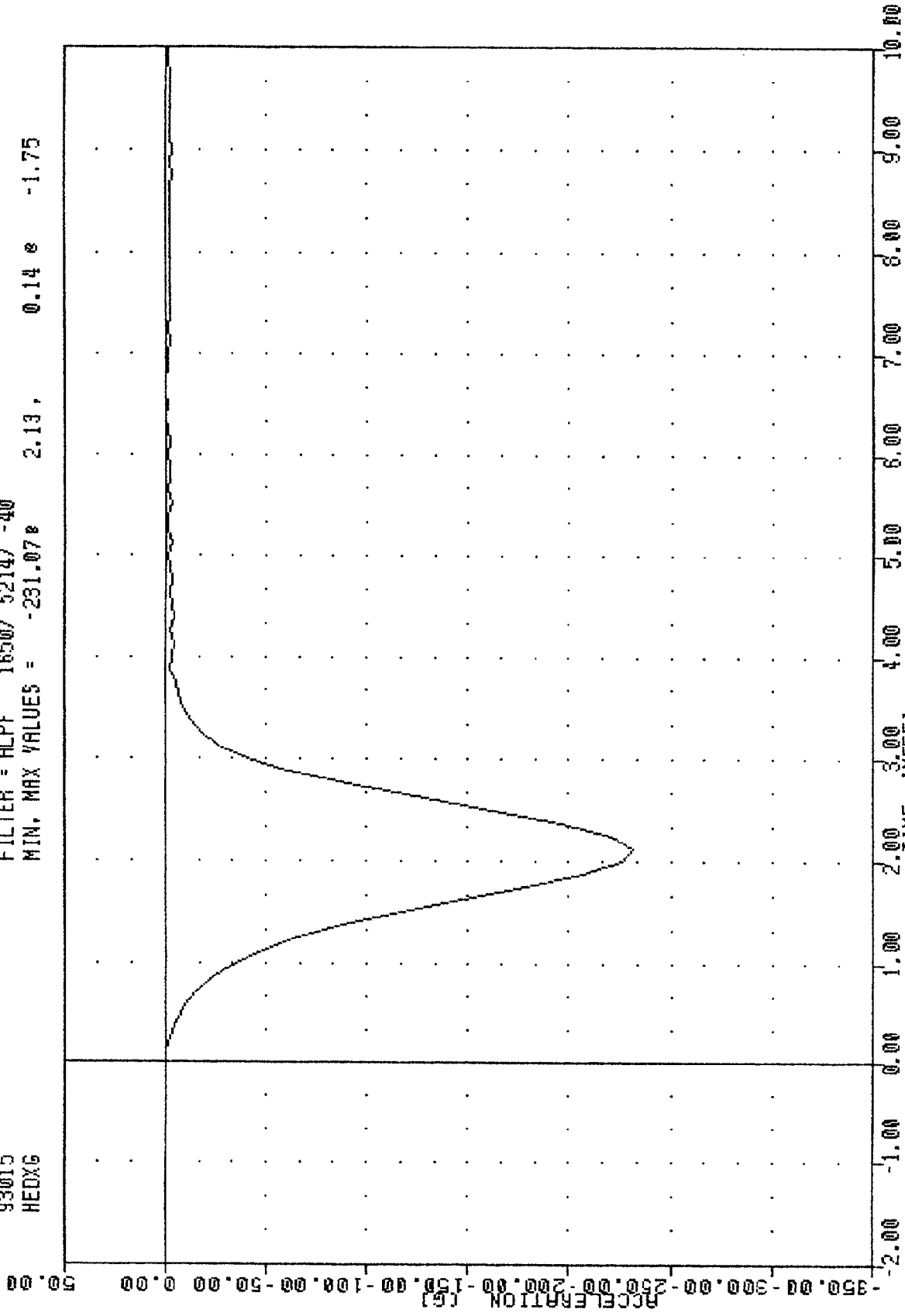
TEST MEETS SPECIFICATIONS

TECHNICIAN

*Steve Font*

TFC  
572E SN48 HEAD DROP CAL 06  
93015  
HEDX6

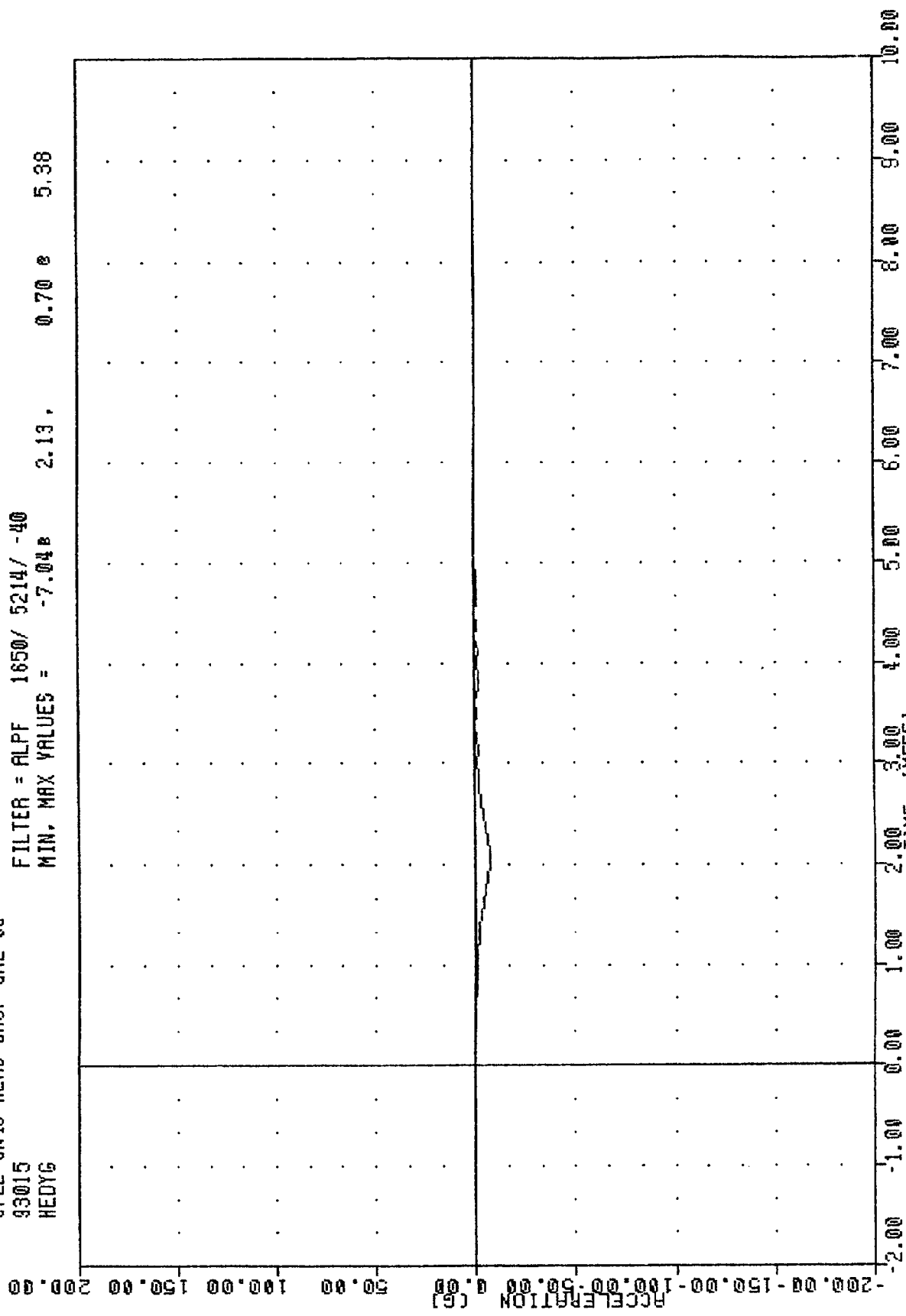
FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -231.07% 2.13, 0.14 e -1.75



PART 572-E HYBRID III HEAD CALIBRATION  
HEAD ACCELERATION X AXIS

TRC , 48C6HD1  
 572E SN48 HEAD DROP CAL 06  
 93015  
 HEDYG

FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = -7.04B 2.13, 0.70 e 5.38

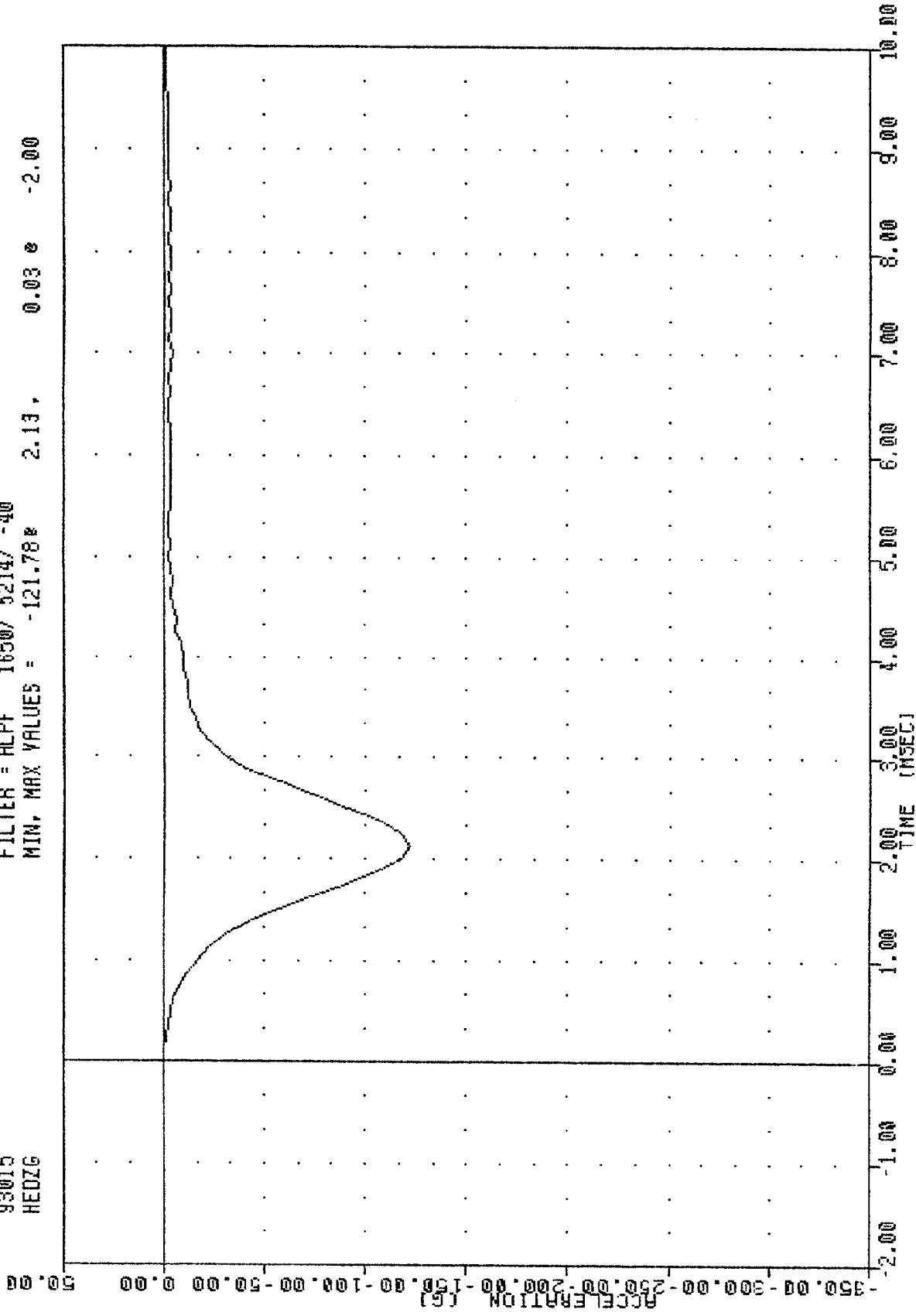


PART 572-E HYBRID III HEAD CALIBRATION  
 HEAD ACCELERATION Y AXIS

TRC  
572E SN46 HEAD DROP CAL 06  
93015  
HEDZG

48C6HD1

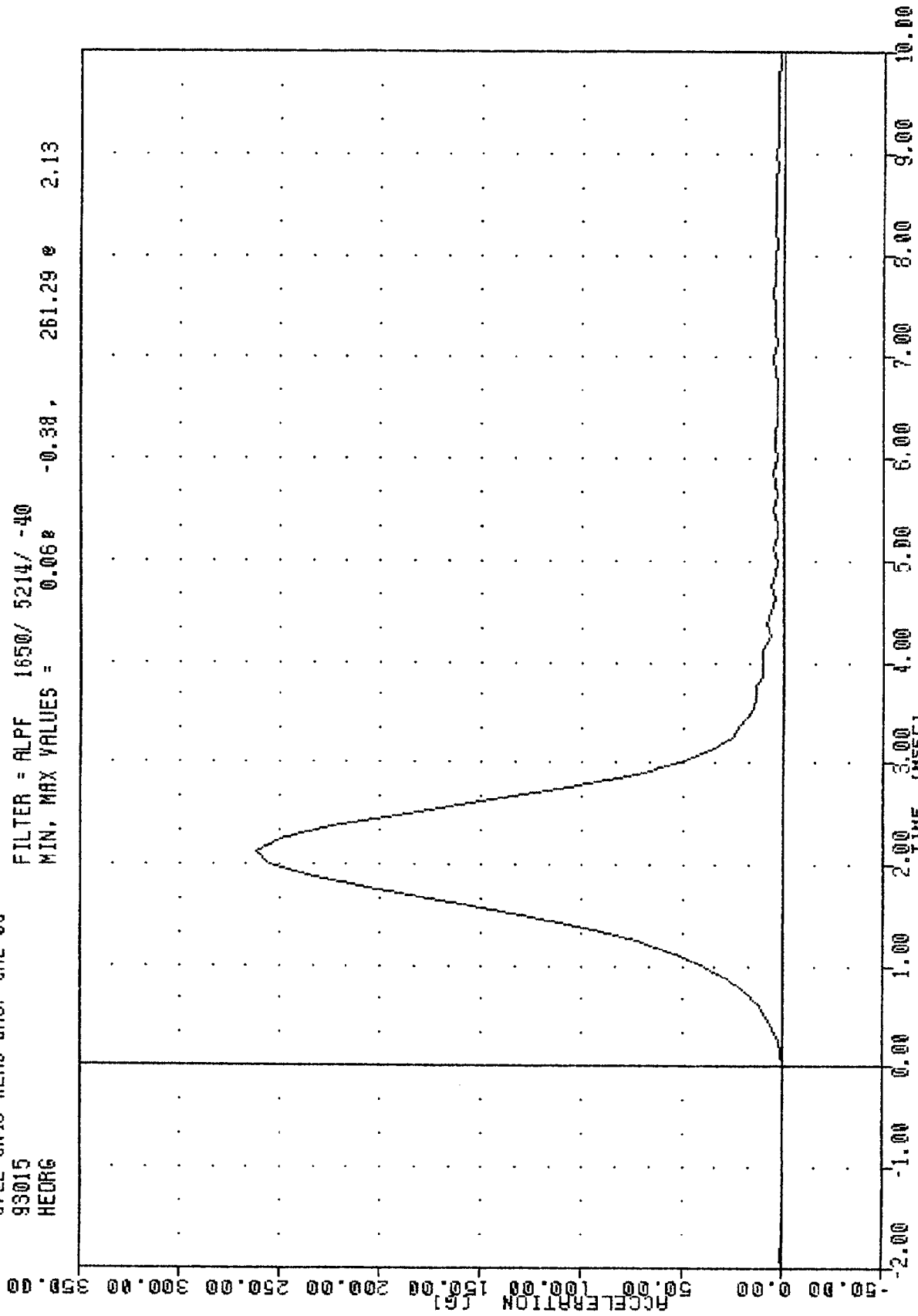
FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -121.78% 2.13, 0.03 % -2.00



PART 572-E HYBRID III HEAD CALIBRATION  
HEAD ACCELERATION Z AXIS

TRC , 48C6HD1  
572E SN48 HEAD DROP CAL 06  
93015  
HEADG

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = 0.06e -0.38, 261.29 e 2.13



PART 572-E HYBRID III HEAD CALIBRATION  
HEAD RESULTANT ACCELERATION

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK FLEXION TEST

HYBRID III

15-JAN-92

6 AXIS NECK TRANSDUCER  
TRC 48C6NF1

572E SN48 NECK FLEXION CAL06

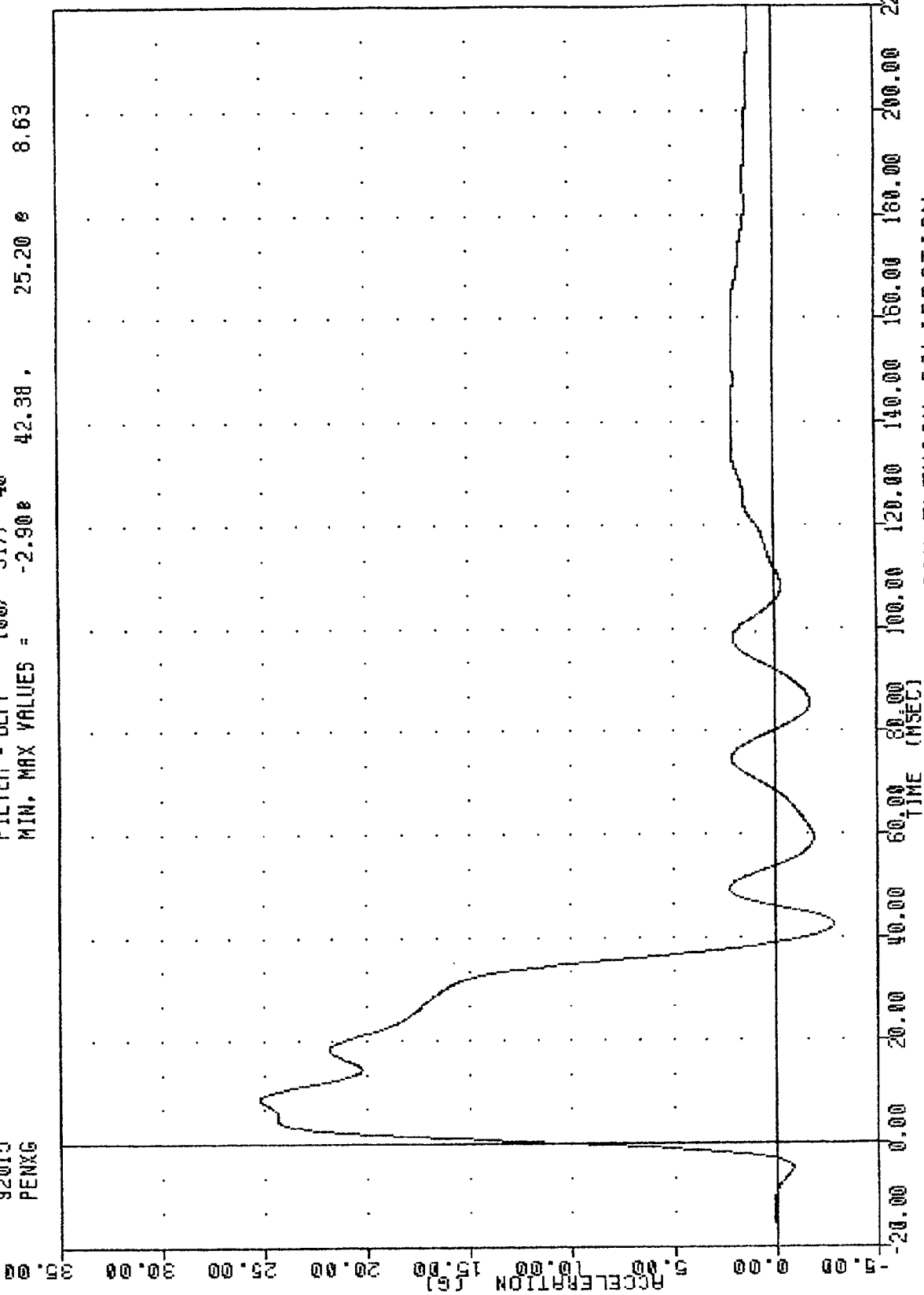
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	40.0 %
IMPACT VELOCITY	6.89 - 7.13 M/SEC	7.03 M/SEC
PENDULUM DECELERATION	10 MS   22.50 - 27.50 G	24.56 G
	20 MS   17.60 - 22.60 G	21.22 G
	30 MS   12.50 - 18.50 G	16.32 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	16.27 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	36.50 MS
D PLANE ROTATION	MAX   64 - 78 DEG.	73.43 DEG.
	TIME   57 - 64 MS	60.38 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX   88.2 - 108.5 NM	94.91 NM
	TIME   47 - 58 MS	50.38 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	116.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	99.13 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN *Pete Faust*

TRC , 48C6NF1  
572E SN48 NECK FLEXION CAL06  
92015  
PENXG

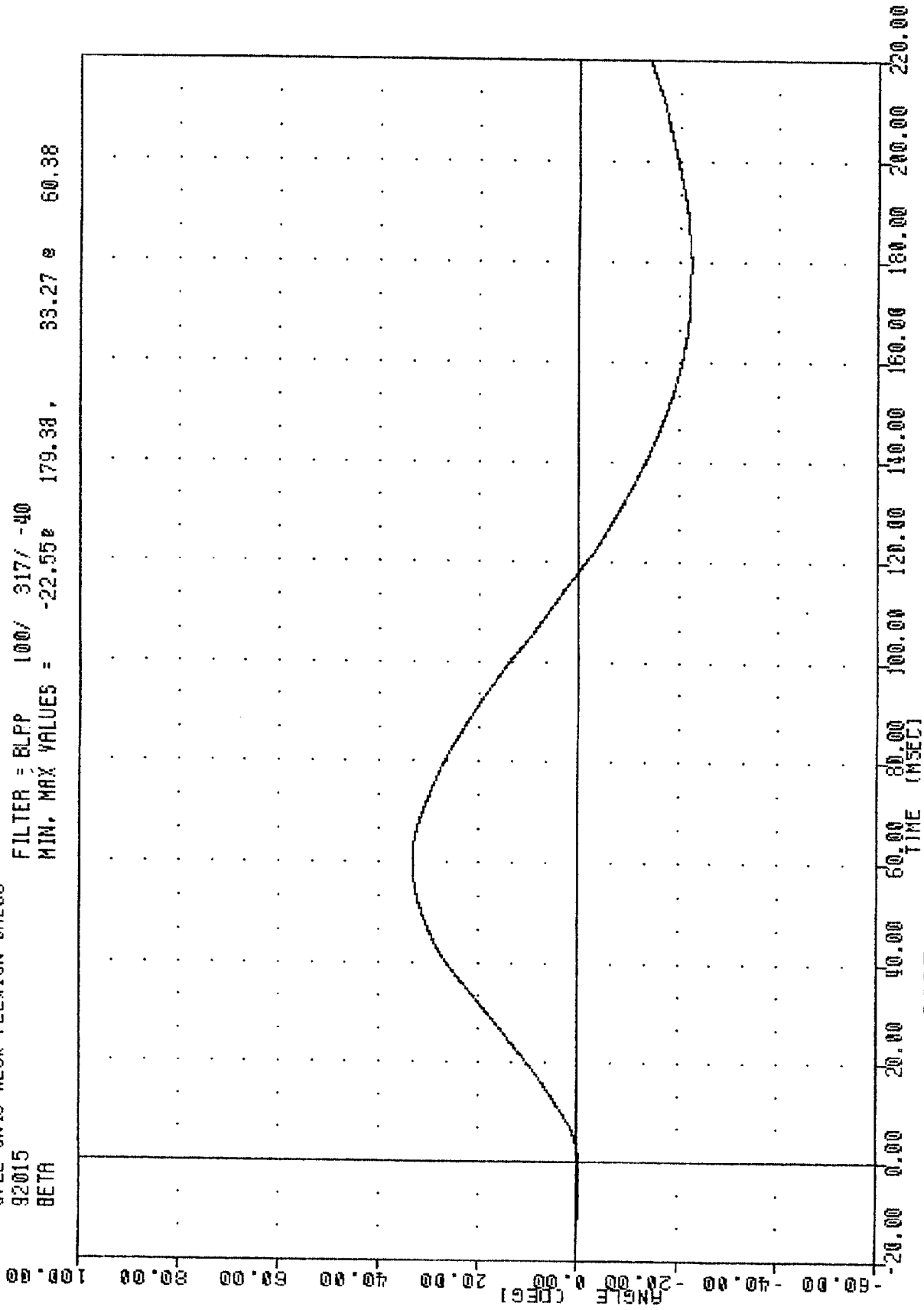
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -2.90e 25.20 e 8.63



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
PENDULUM DECELERATION

TRC , 48C6NF1  
572E SN48 NECK FLEXION CAL06  
92015  
BETA

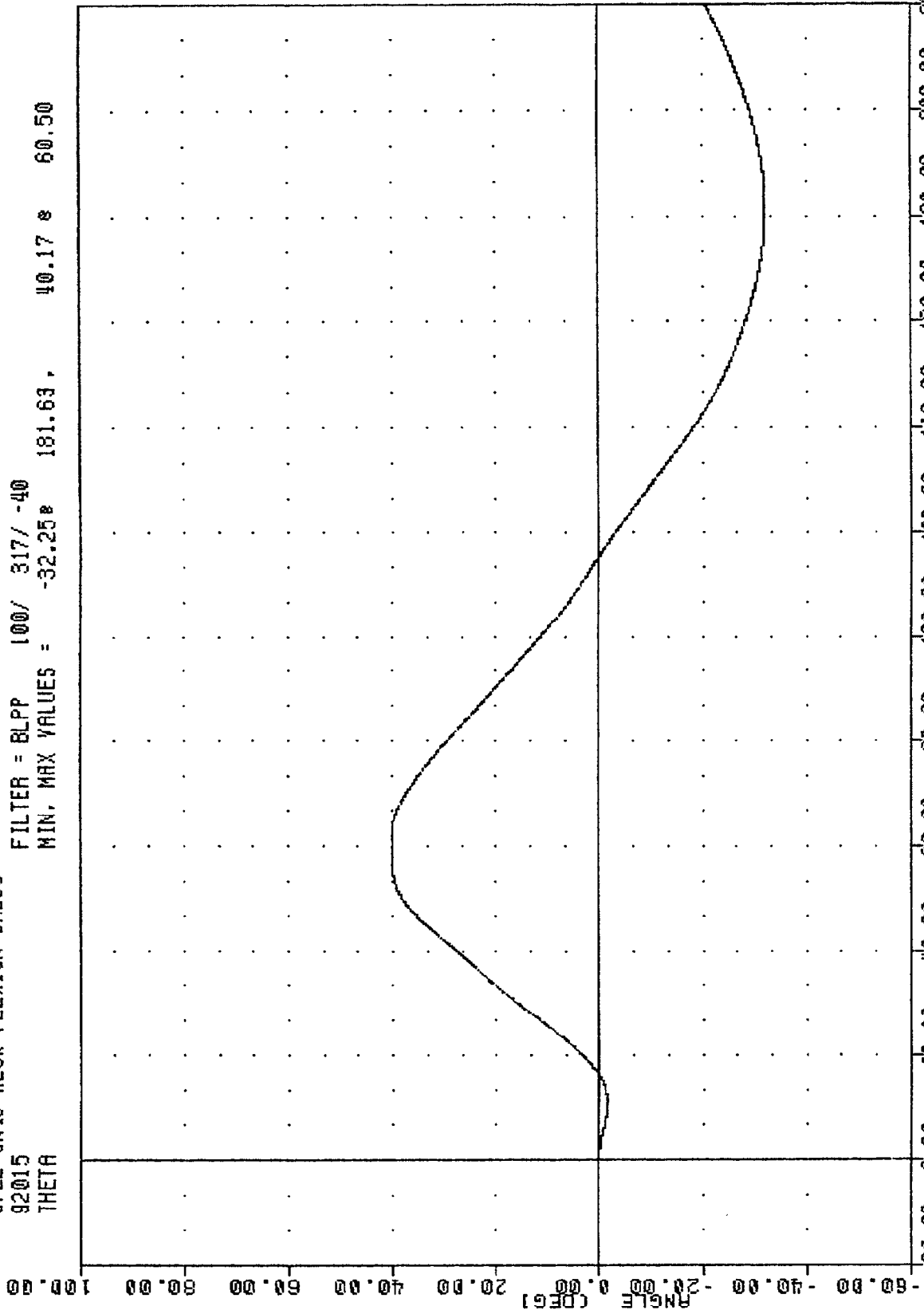
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -22.55e 179.38 , 33.27 e 60.38



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
ROTATION ABOUT BASE OF NECK

TRC . 48C6NF1  
572E SN48 NECK FLEXION CAL06  
92015  
THETA

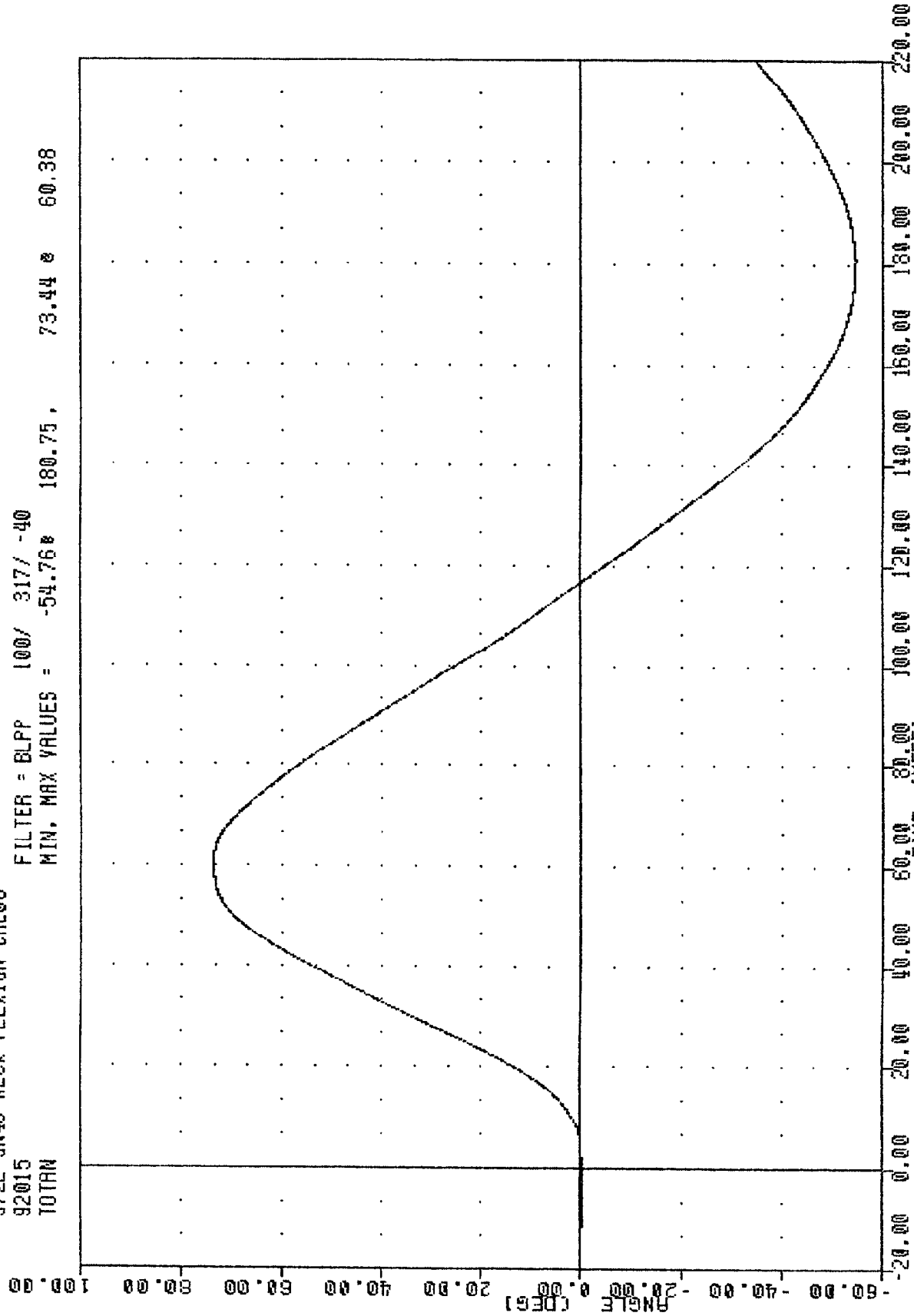
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -32.25e 181.63, 40.17 e 60.50



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
ROTATION ABOUT OCCIPITAL CONDYLE

TRC , 48C6NF1  
 572E SN48 NECK FLEXION CAL06  
 92015  
 TOTAN

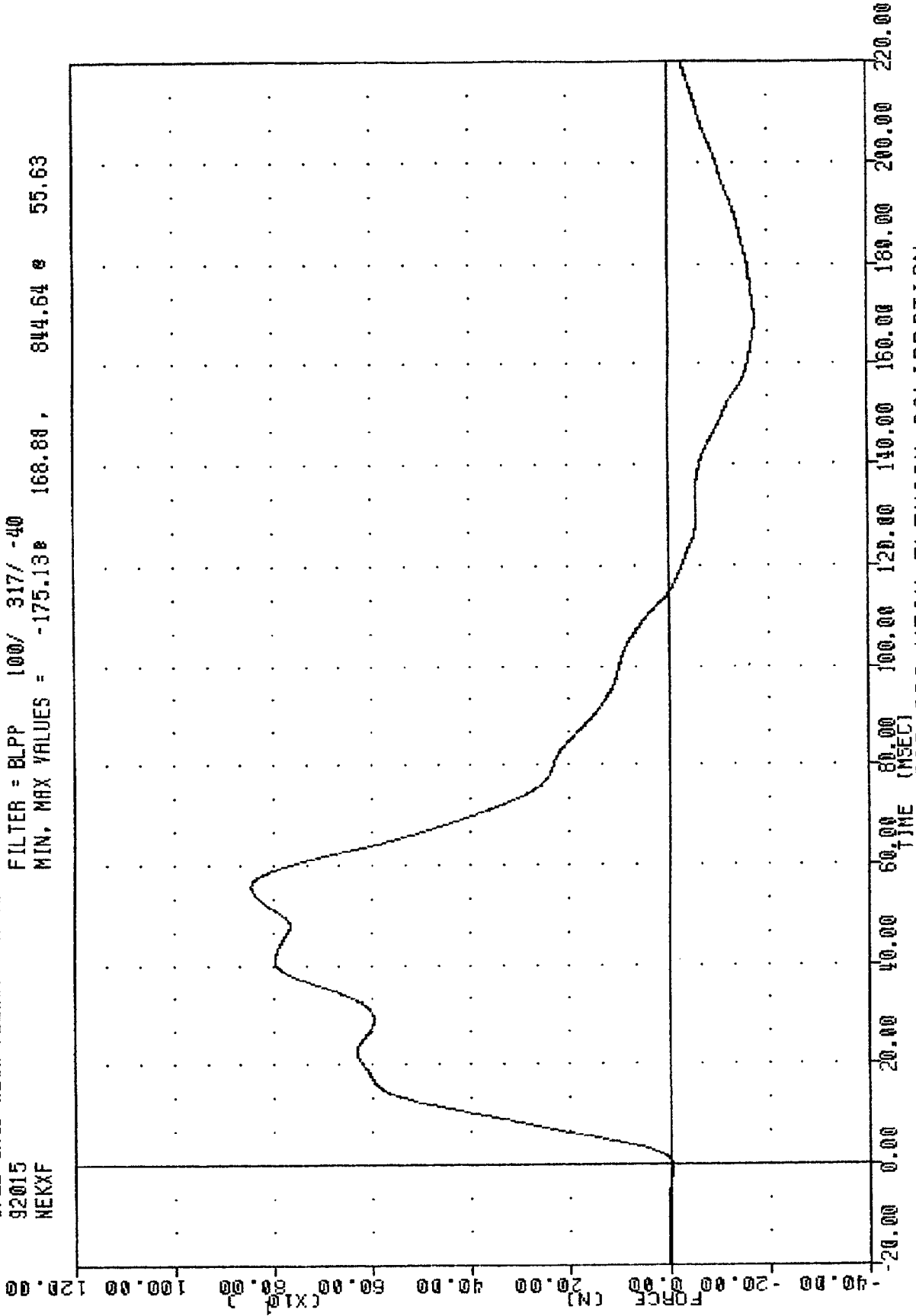
FILTER = BLPP 100/ 317/ -40  
 MIN. MAX VALUES = -54.76 180.75 , 73.44 60.38



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
 TOTAL ROTATION

TRC , 48C6NF1  
572E SN48 NECK FLEXION CAL06  
92015  
NEKXF

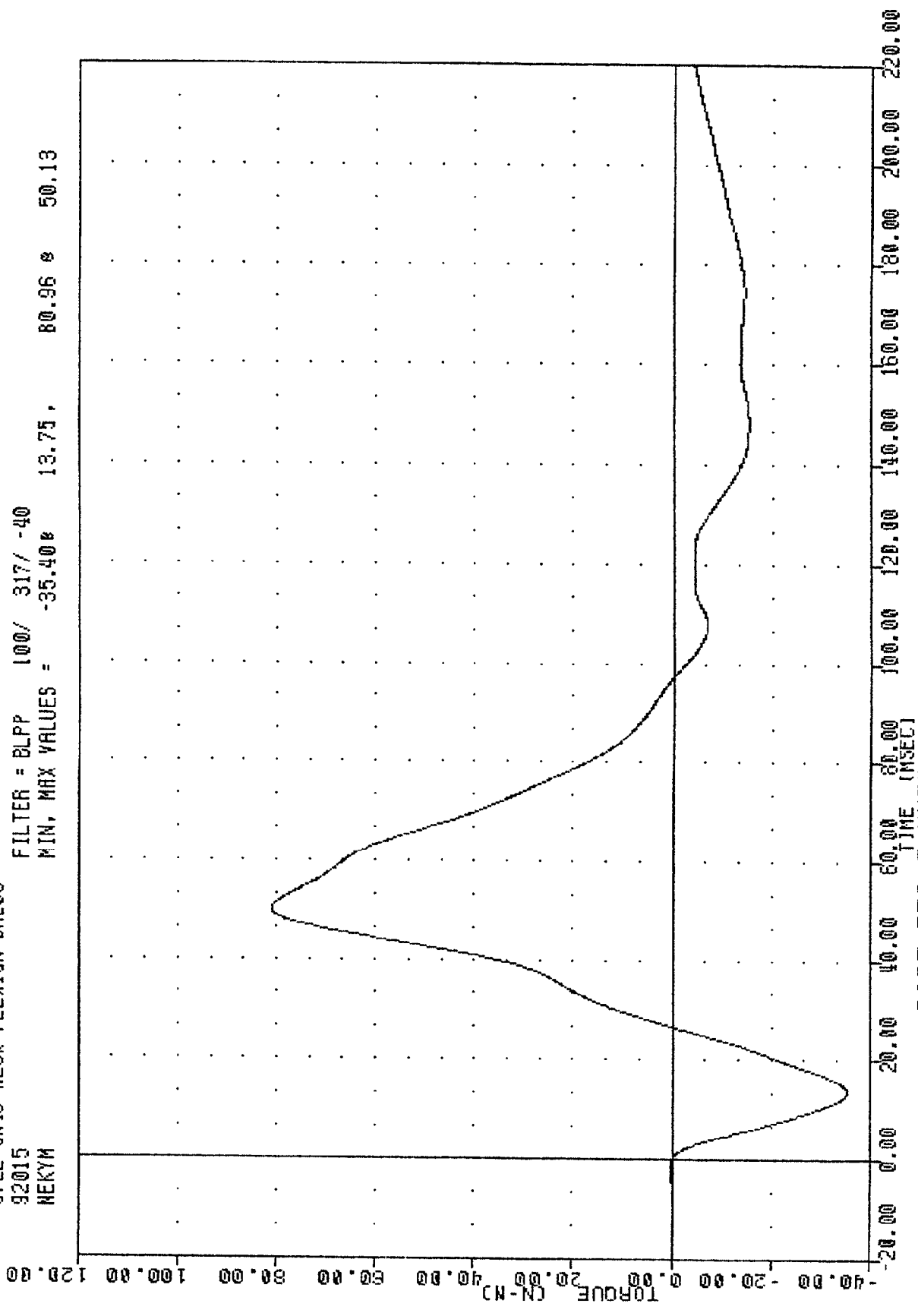
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -175.13e 168.88 , 844.64 e 55.63



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
NECK FORCE X AXIS

TRC , 4808NF1  
572E SN48 NECK FLEXION CAL06  
92015  
NEKYM

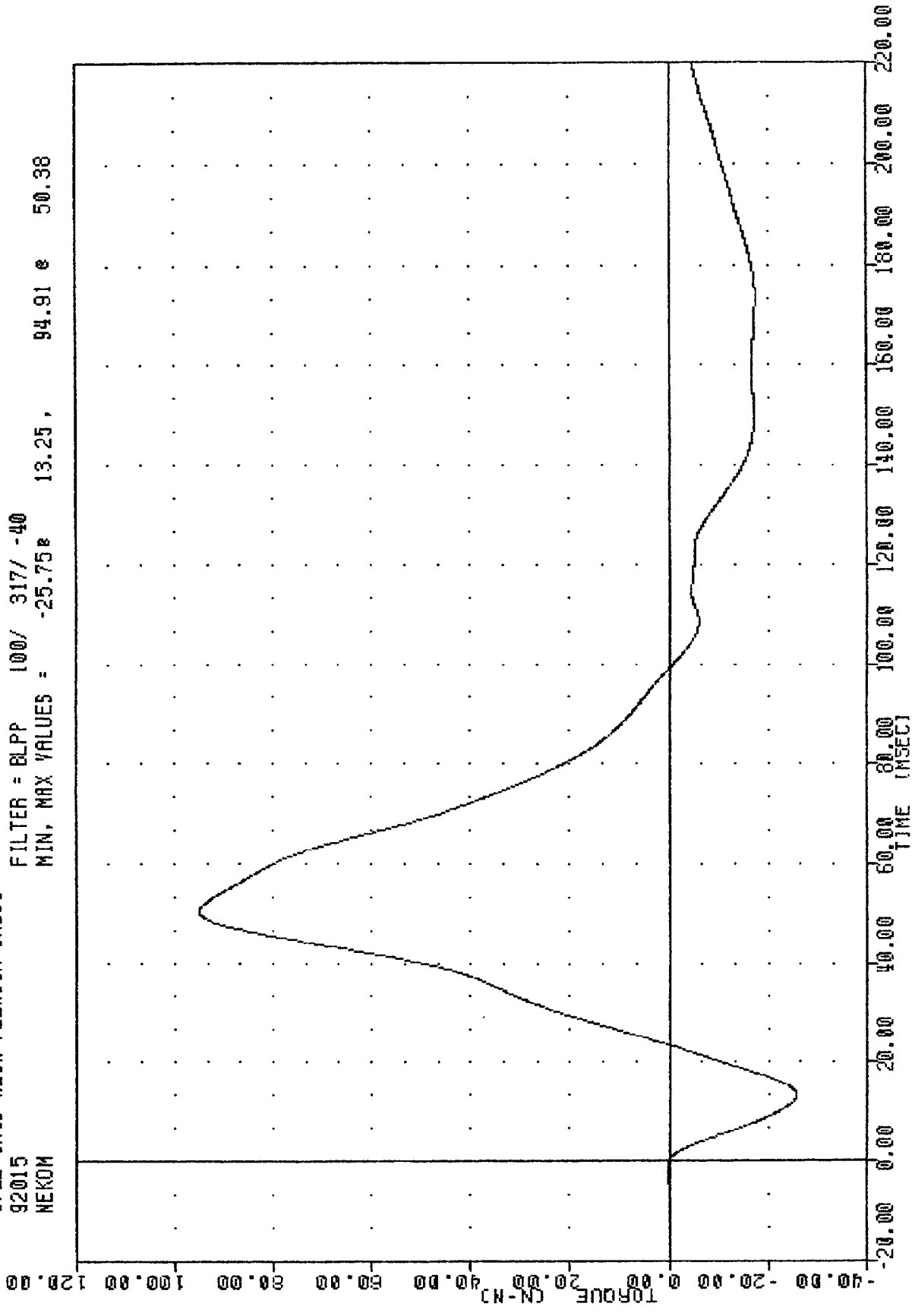
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -35.40% 13.75, 80.96 % 50.13



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
NECK MOMENT Y AXIS

TRC , 48C6NF1  
572E SN48 NECK FLEXION CAL06  
92015  
NEKOM

FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -25.75e 13.25, 94.91 e 50.38



PART 572-E HYBRID III NECK FLEXION CALIBRATION  
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRANSPORTATION RESEARCH CENTER OF OHIO

NECK EXTENSION TEST

HYBRID III

15-JAN-93

6 AXIS NECK TRANSDUCER  
TRC 48C6NE1

572E SN48 NECK EXT. CAL06

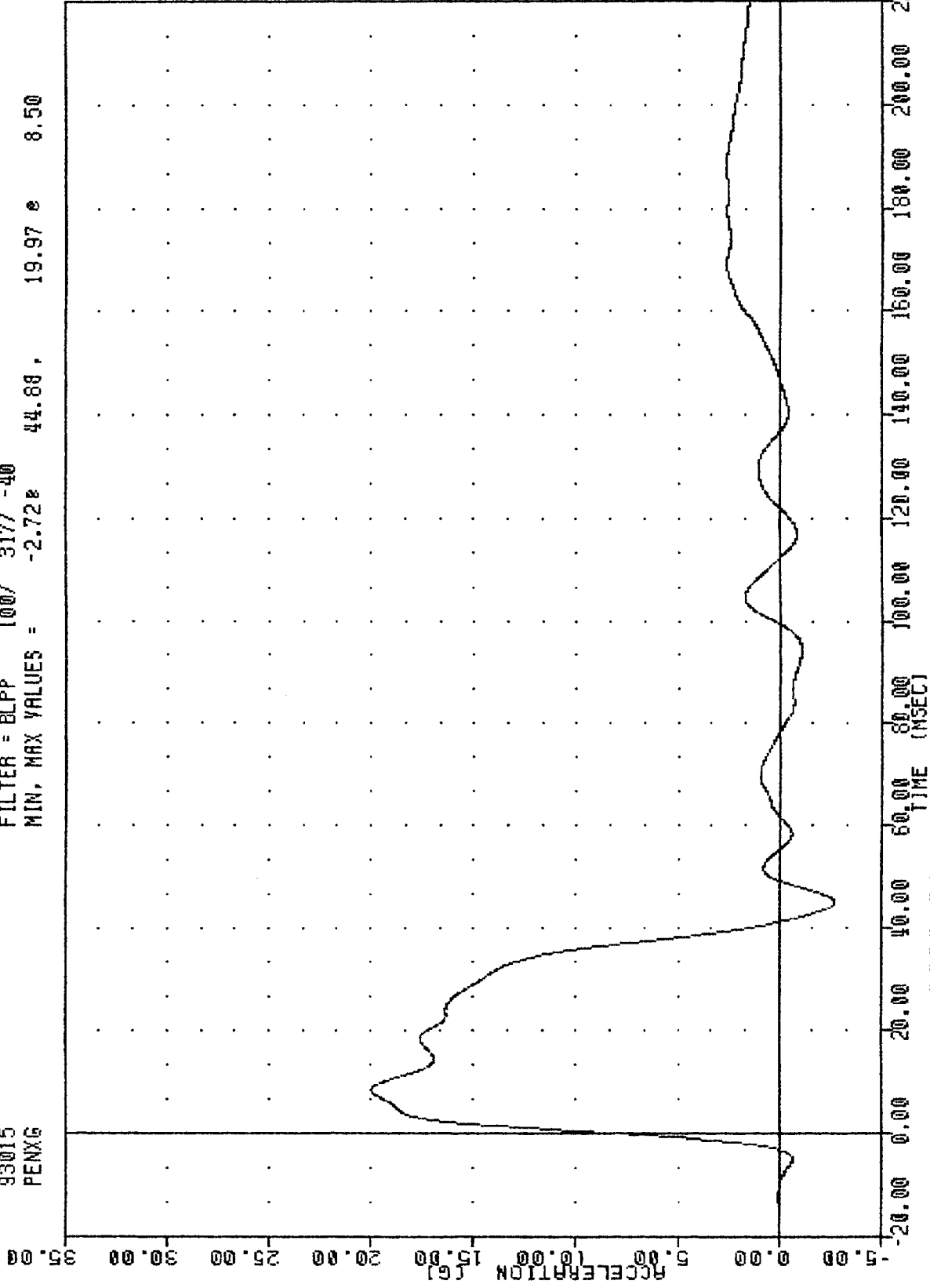
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	40.0 %
IMPACT VELOCITY	5.95 - 6.19 M/SEC	6.05 M/SEC
PENDULUM DECELERATION	10 MS   17.20 - 21.20 G	19.41 G
	20 MS   14.00 - 19.00 G	17.26 G
	30 MS   11.00 - 16.00 G	14.63 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	14.58 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	38.00 MS
D PLANE ROTATION	MAX   81 - 106 DEG. TIME   72 - 82 MS	102.30 DEG. 74.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN   -80.0/-52.9 NM TIME   65 - 79 MS	-73.49 NM 69.13 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	157.50 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	144.88 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN *[Signature]*

TRC , 48C6NE1  
572E SN48 NECK EXT. CAL06  
93015  
PENXG

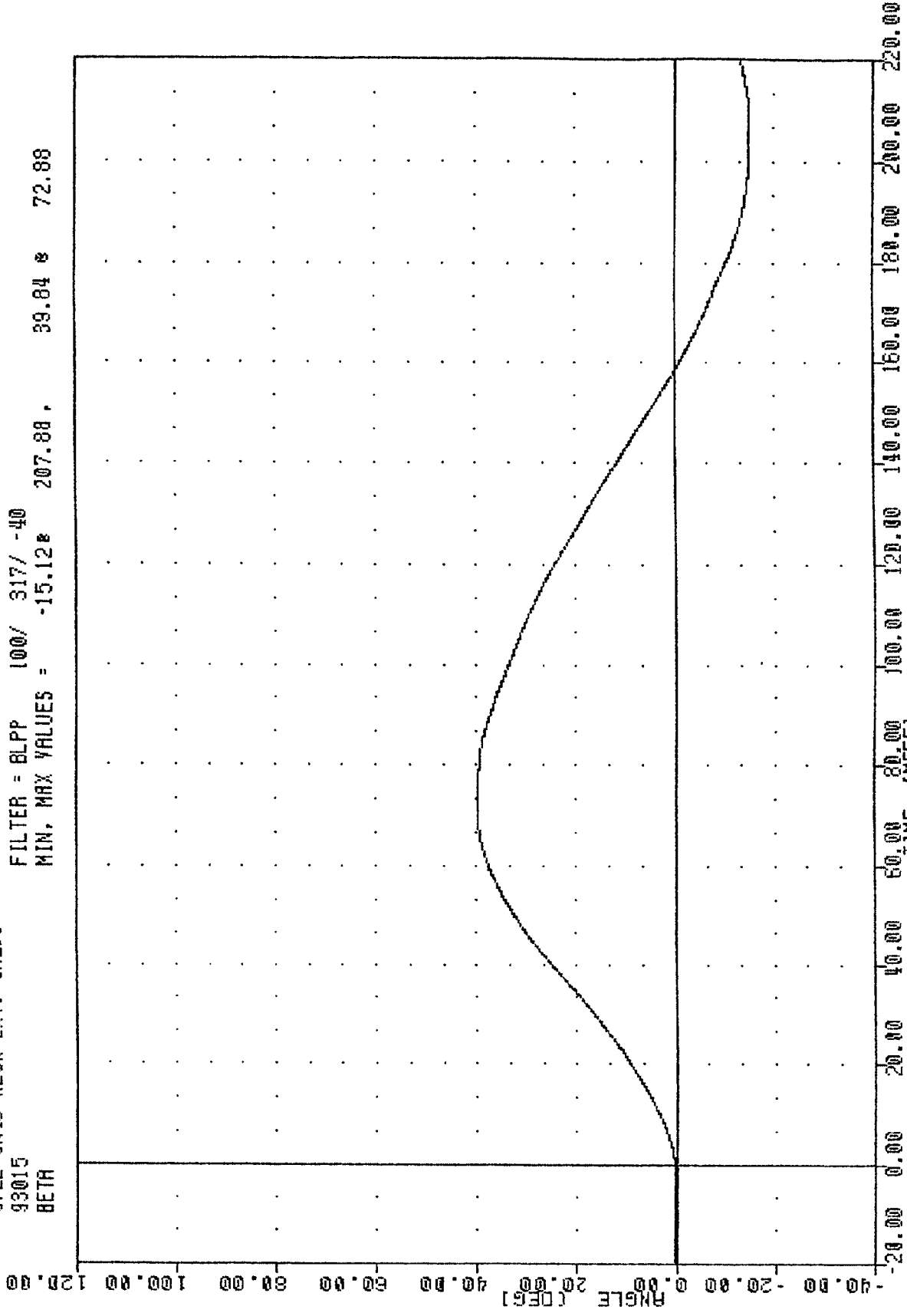
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -2.72e 44.88 , 19.97 e 8.50



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
PENDULUM DECELERATION

TRC 48C6NE1  
572E SN40 NECK EXT. CAL06  
93015  
BETA

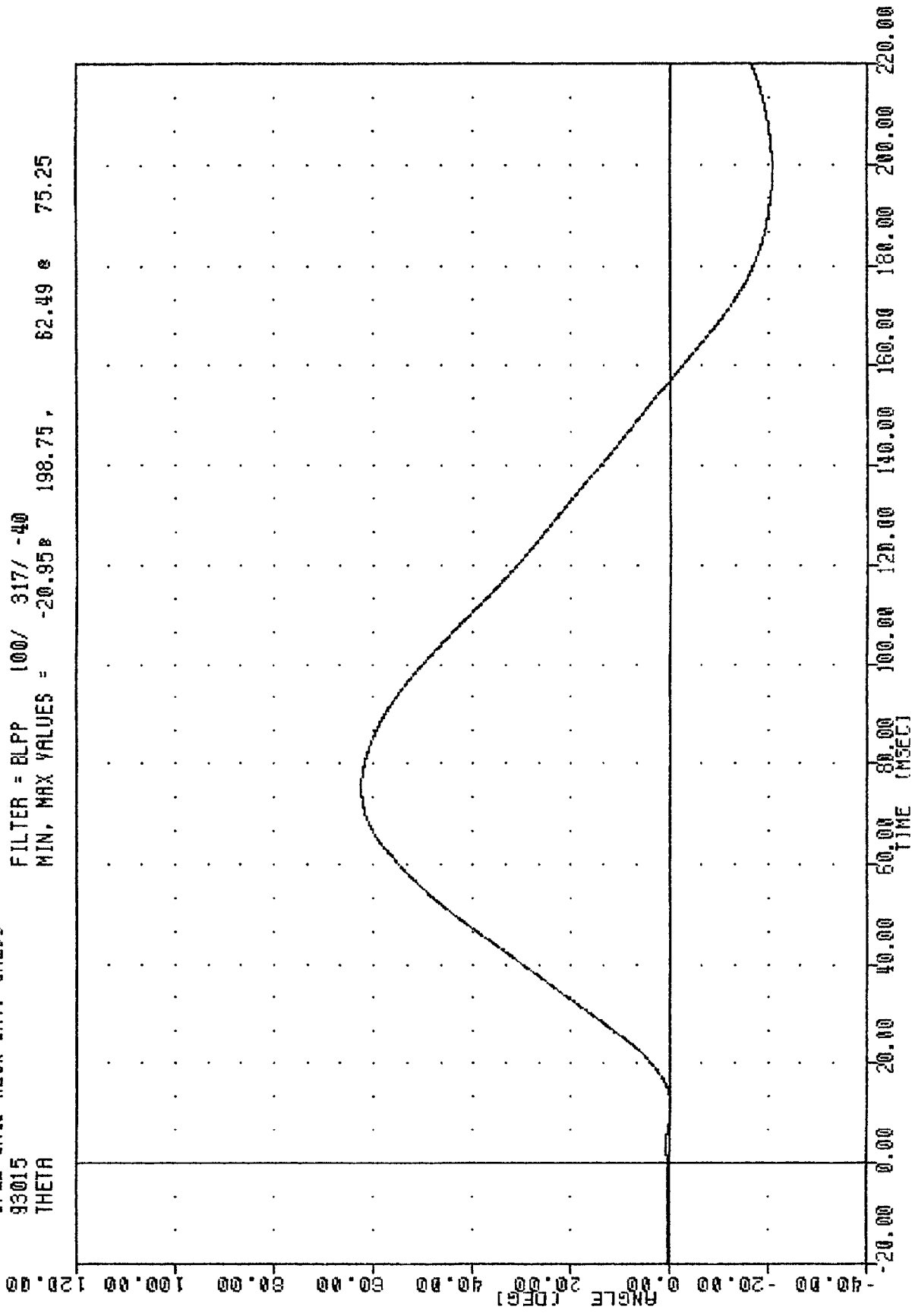
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -15.12e 207.88, 39.84 e 72.88



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
ROTATION ABOUT BASE OF NECK

TRC , 48C6NE1  
572E SN48 NECK EXT. CALD6  
93015  
THETA

FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -20.95 198.75, 62.49 75.25

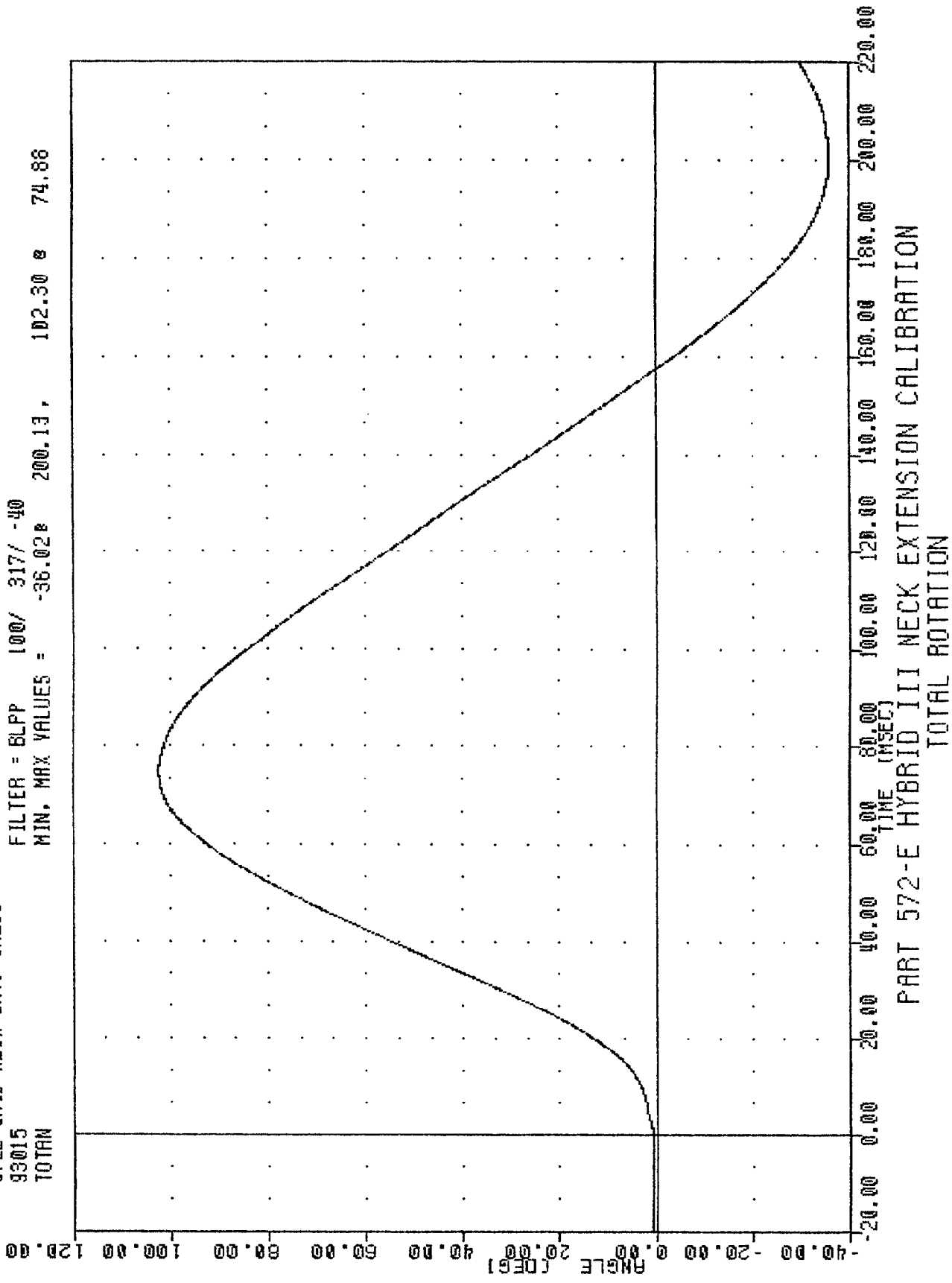


PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
ROTATION ABOUT OCCIPITAL CONDYLE

TRC  
572E SN48 NECK EXT. CALDG  
93015  
TOTAL

4808NE1

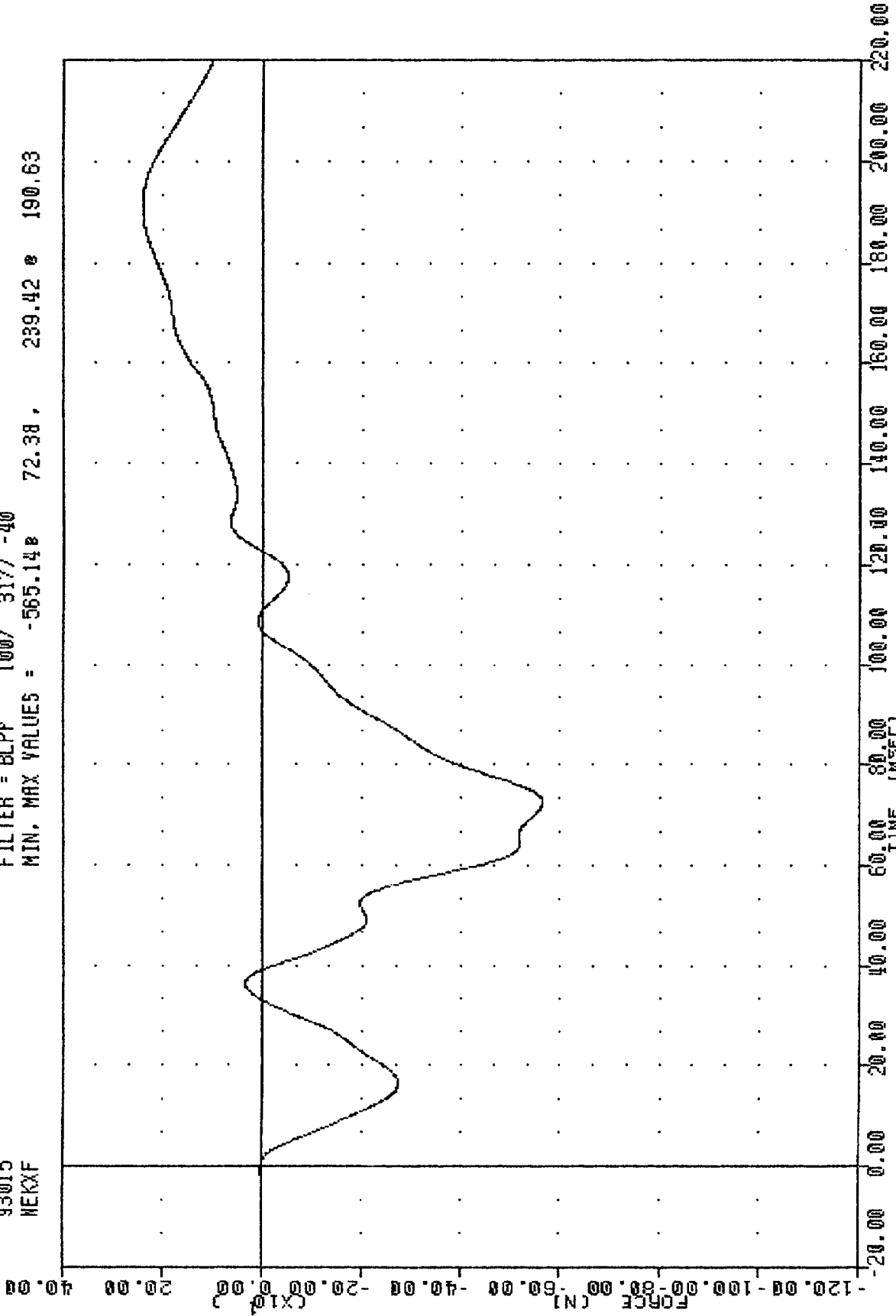
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -36.028 200.13 102.30 74.88



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
TOTAL ROTATION

TRC , 48C6NE1  
572E SN48 NECK EXT. CALD6  
93015  
MEKXF

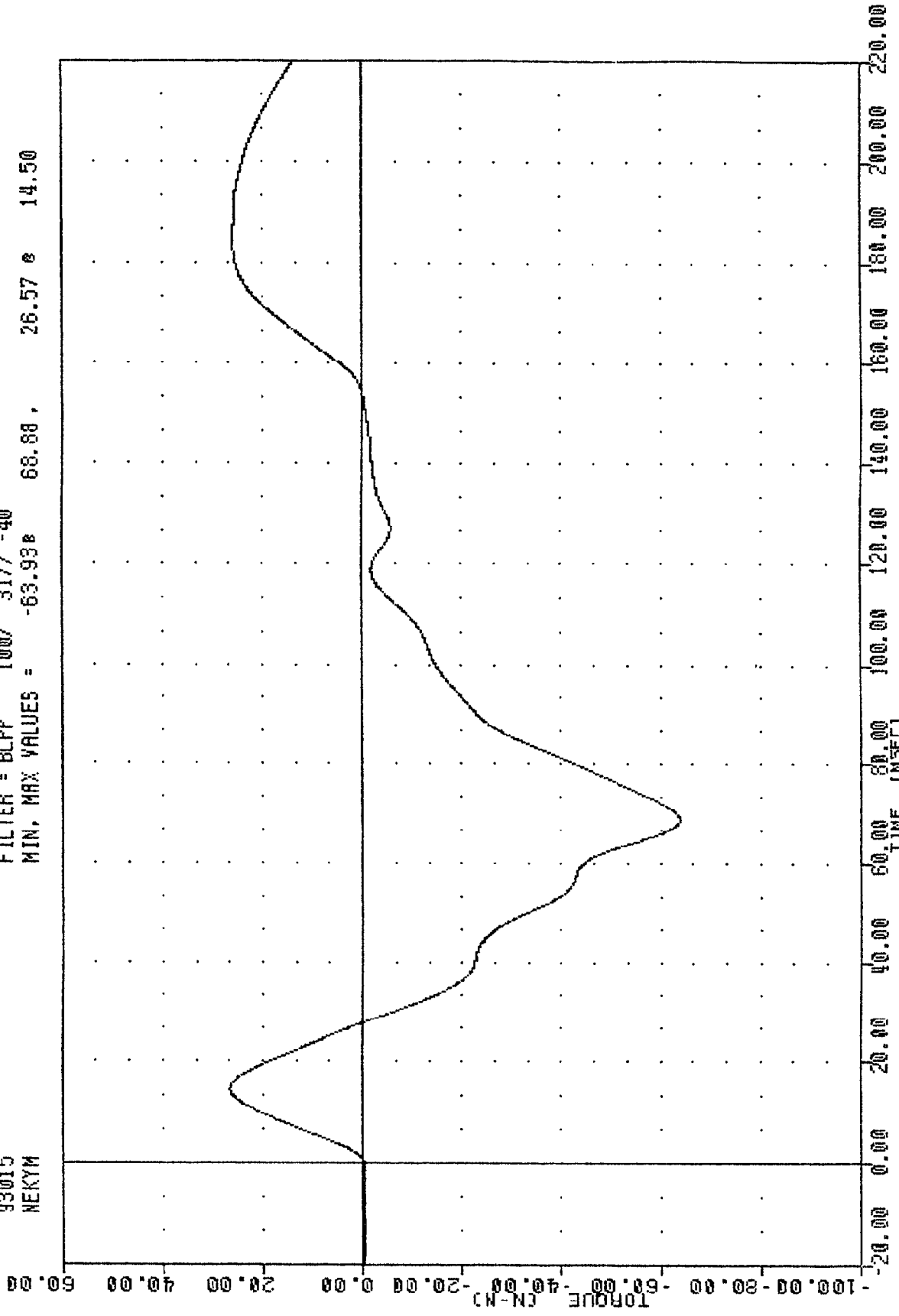
FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -565.14 72.38 , 239.42 190.63



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
NECK FORCE X AXIS

TRC  
572E SN48 NECK EXT. CAL06  
93015  
NEKYM

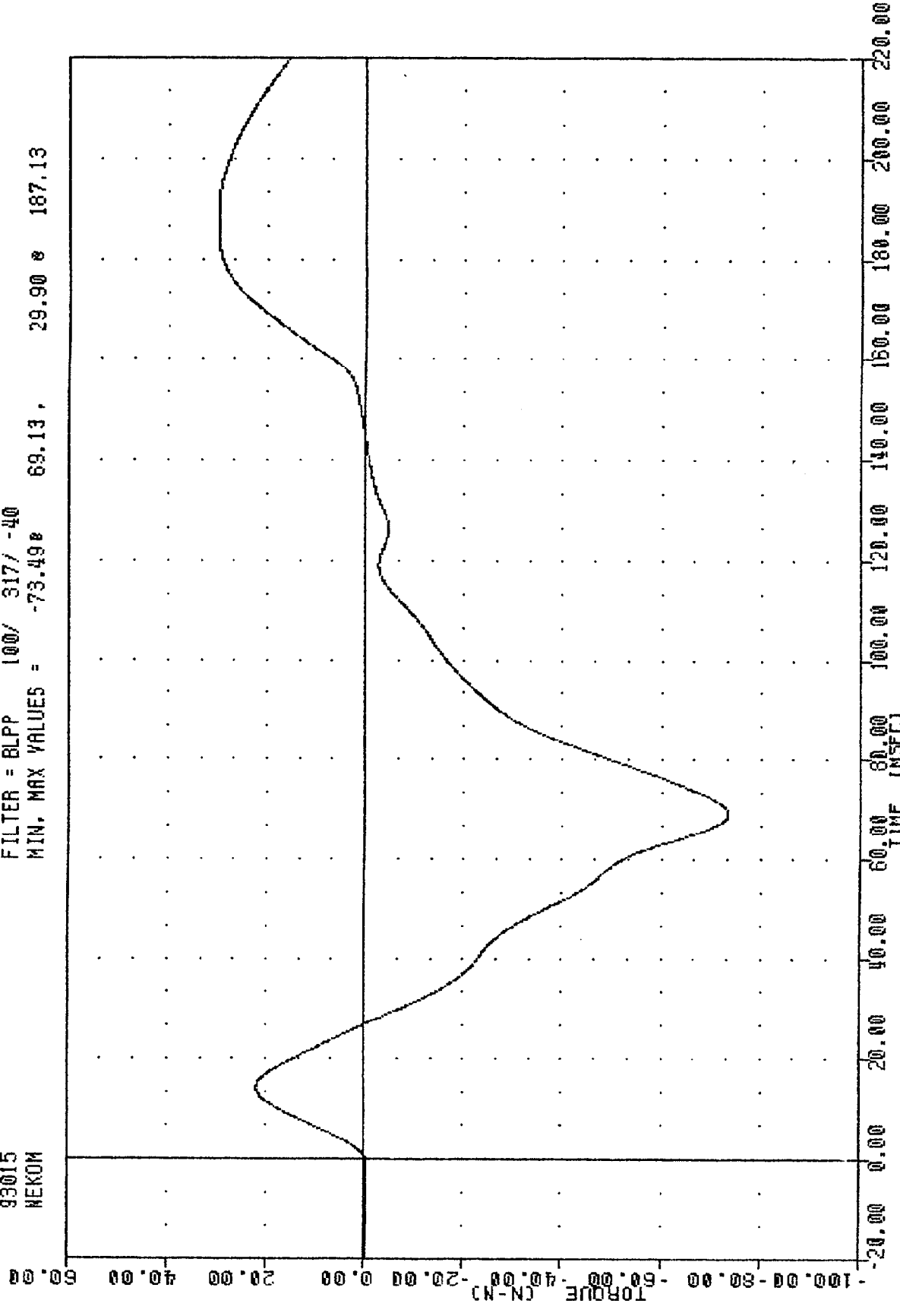
FILTER = BLPP 100/ 317/ -40  
MIN, MAX VALUES = -63.93B 68.98 , 26.57 e 14.50



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
NECK MOMENT Y AXIS

TRC  
572E SN48 NECK EXT. CAL06  
93015  
NEKOM

FILTER = BLPP 100/ 317/ -40  
MIN. MAX VALUES = -73.49 29.90 69.13 187.13



PART 572-E HYBRID III NECK EXTENSION CALIBRATION  
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRANSPORTATION RESEARCH CENTER OF OHIO

THORAX IMPACT TEST

HYBRID III

15-JAN-93

TRC

48C6TH1

572E SN48 H.S.THORAX CAL06

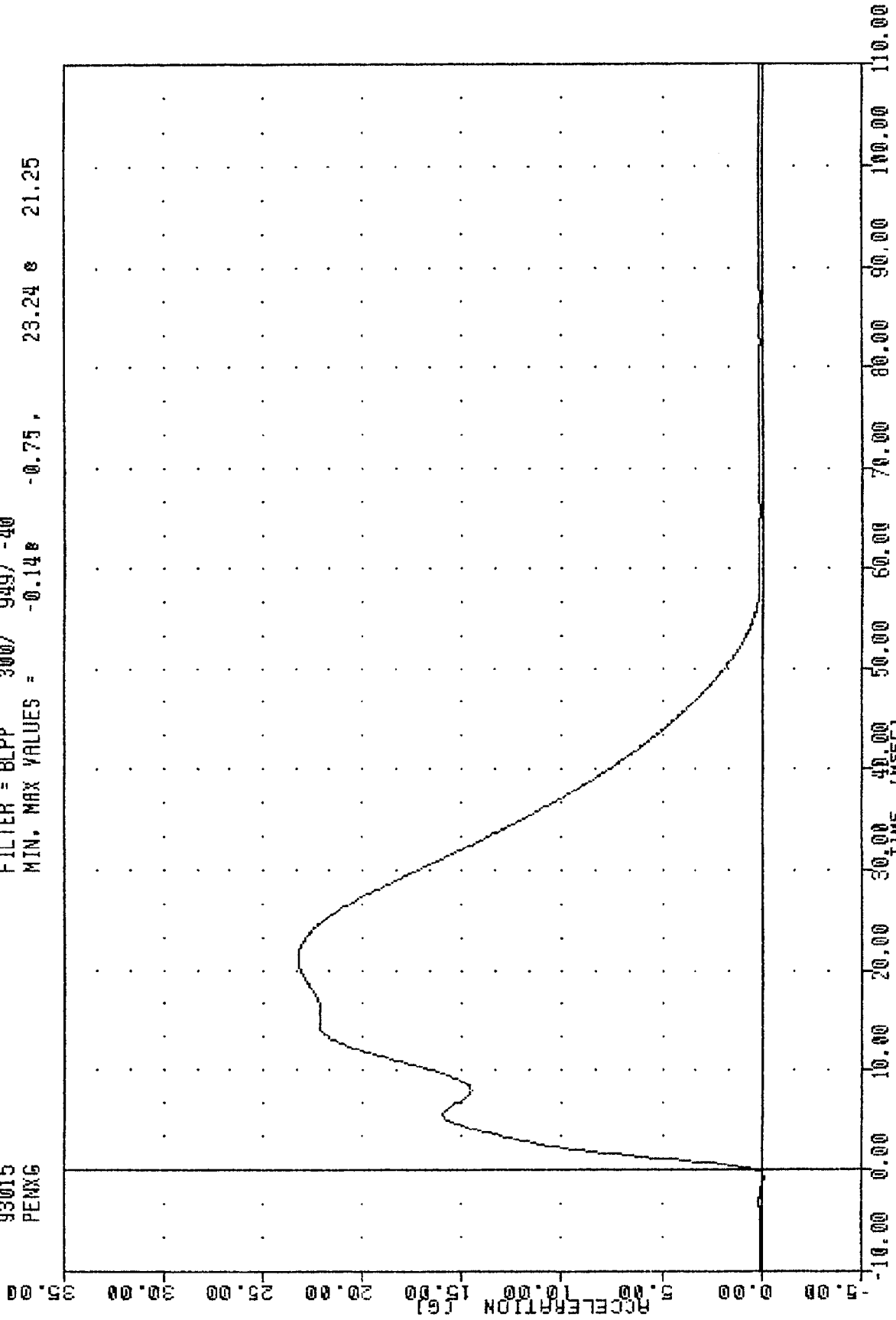
HIGH SPEED TEST		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	39.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/SEC	6.68 M/SEC
MAXIMUM DEFLECTION	63.5 - 72.6 MM	71.3 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5324. N
INTERNAL HYSTERESIS	69% - 85%	70.6%

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Faust

TRC  
572E SN48 H.S. THORAX CAL06  
93015  
PENX6

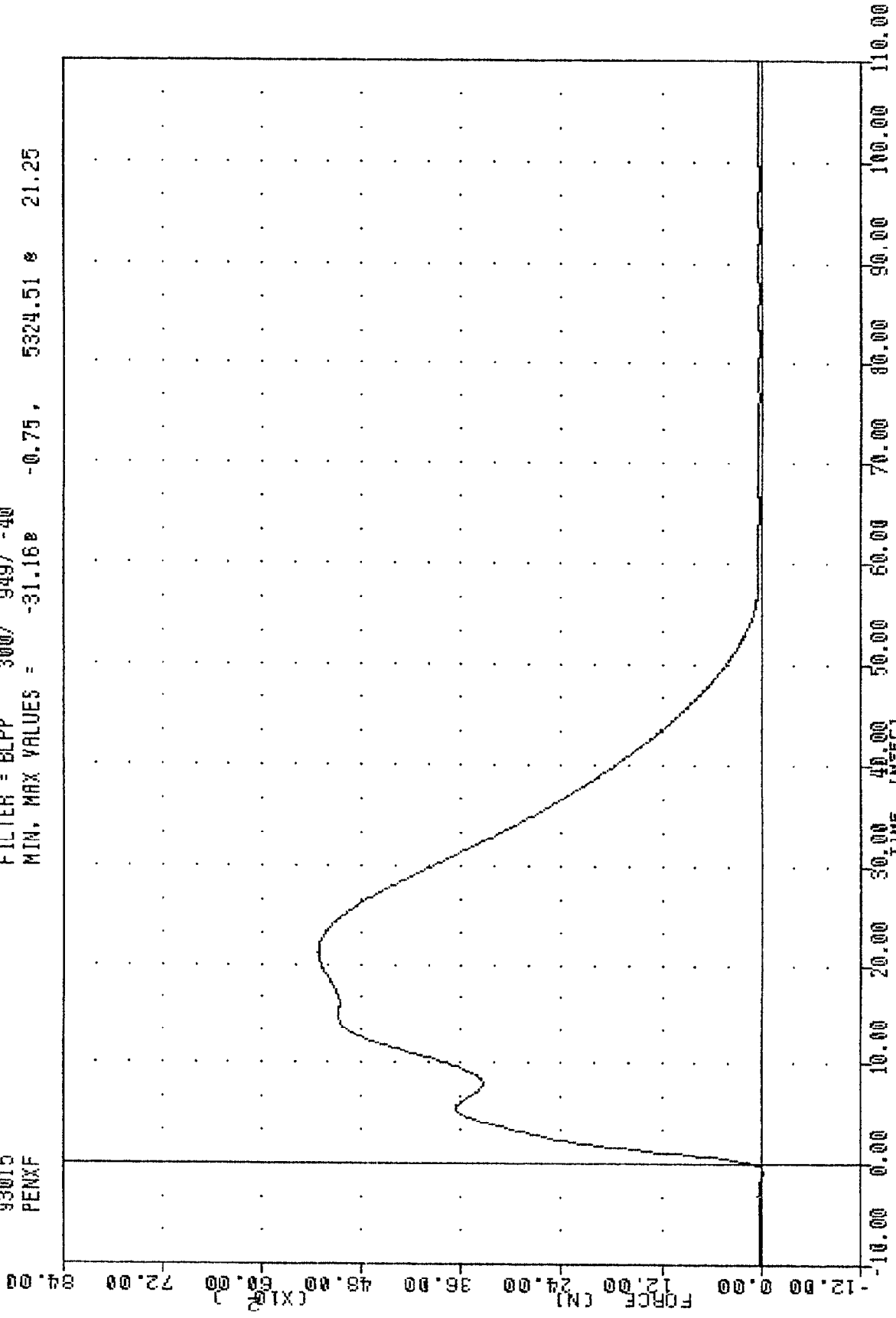
FILTER = BLPP 300/ 949/ -40  
MIN. MAX VALUES = -0.14 23.24 21.25



PART 572-E HYBRID III THORAX CALIBRATION  
PENDULUM DECELERATION

TRC  
572E SN49 H.S. THORAX CAL06  
93015  
PENXF

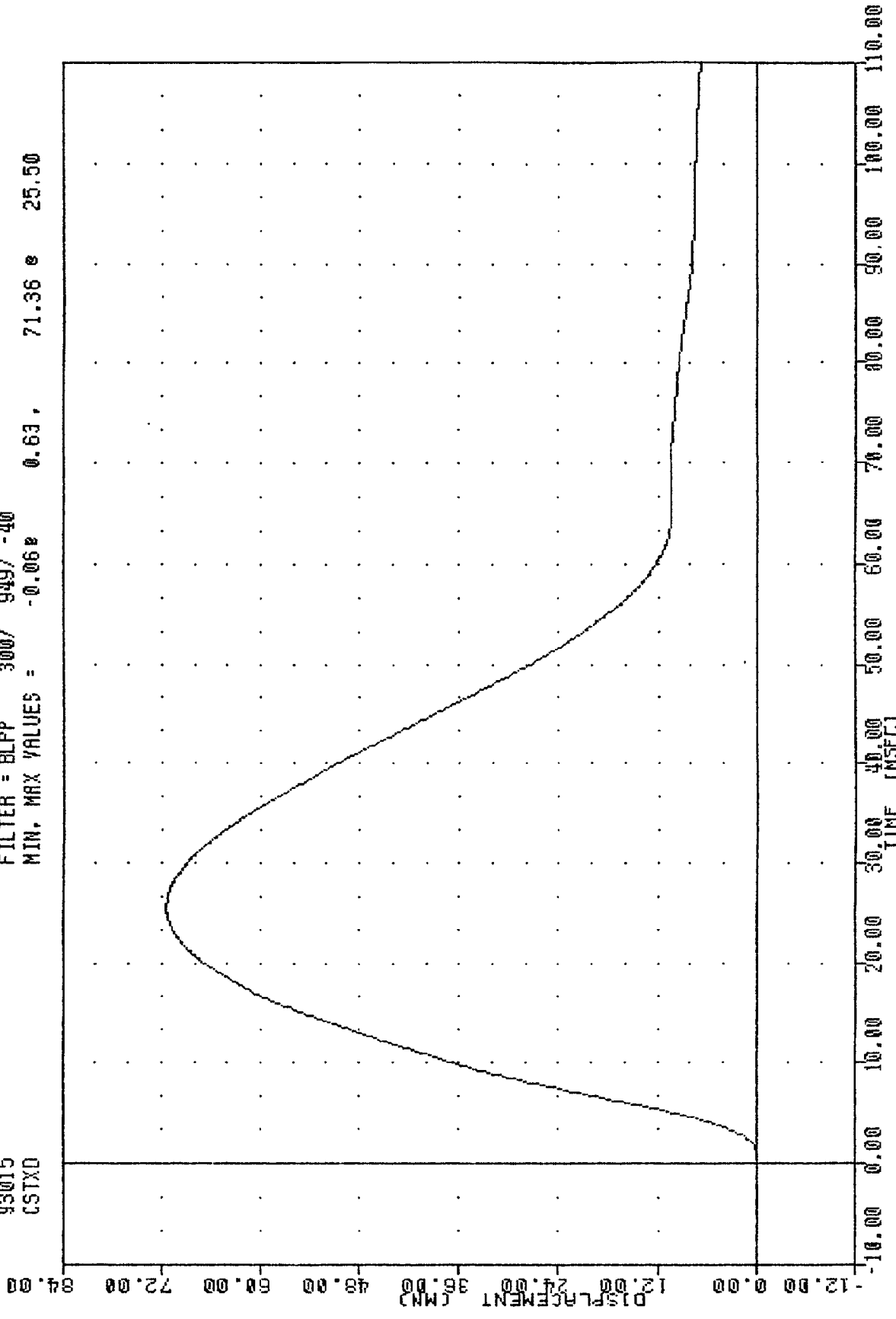
4806TH1  
FILTER = BLPP 300/ 949/ -40  
MIN. MAX VALUES = -31.16B -0.75, 5324.51 \* 21.25



PART 572-E HYBRID III THORAX CALIBRATION  
PENDULUM FORCE

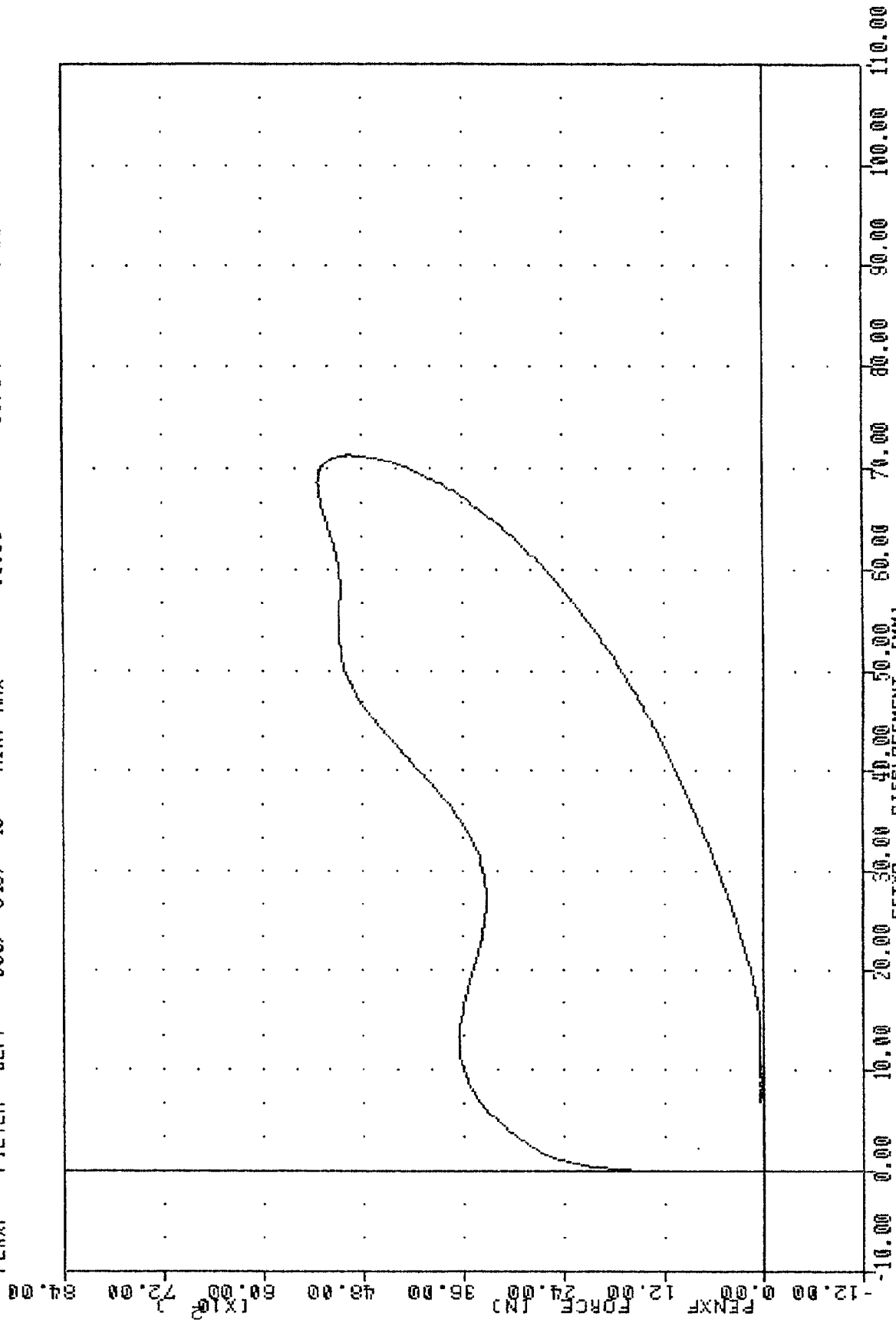
TRC  
572E SM48 H.S. THORAX CAL06  
93015  
CSTXD

FILTER = BLPP 300/ 949/ -40  
MIN. MAX VALUES = -0.06 e 71.36 e 25.50



PART 572-E HYBRID III THORAX CALIBRATION  
STERNUM DISPLACEMENT

TBC 4806TH1 572E SN48 H.S. THORAX CAL06 93015  
 CSTXD FILTER = BLPP 300/ 949/ -40 MIN, MAX = -0.06 8 25.50  
 PENXF FILTER = BLPP 300/ 949/ -40 MIN, MAX = -31.16 0 21.25



PART 572-E HYBRID III THORAX CALIBRATION  
 CHEST DISPLACEMENT VS PENDULUM FORCE

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

13-JAN-93

RIGHT KNEE

TRC

48C6RK1

572E SN48 RIGHT KNEE CAL 06

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	37.0 %
PROBE VELOCITY	2.07 - 2.13 M/SEC	2.09 M/SEC
PEAK KNEE IMPACT FORCE	4714-5783 N	5208.7 N
PROBE WEIGHT	5.0 KG	

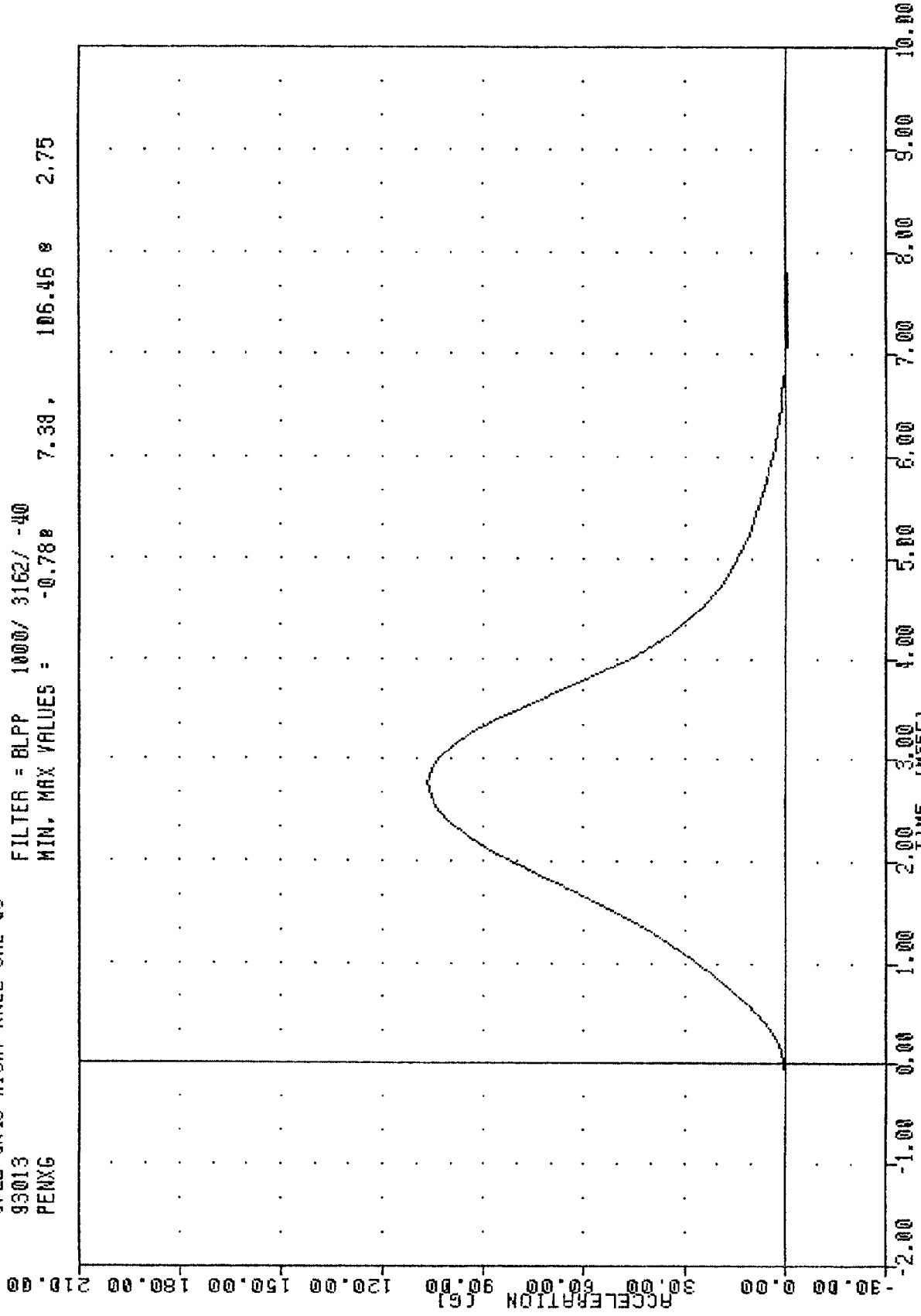
TEST MEETS SPECIFICATIONS

TECHNICIAN

*John Ford*

TRC  
 572E SN48 RIGHT KNEE CAL 06  
 93013  
 PENXG

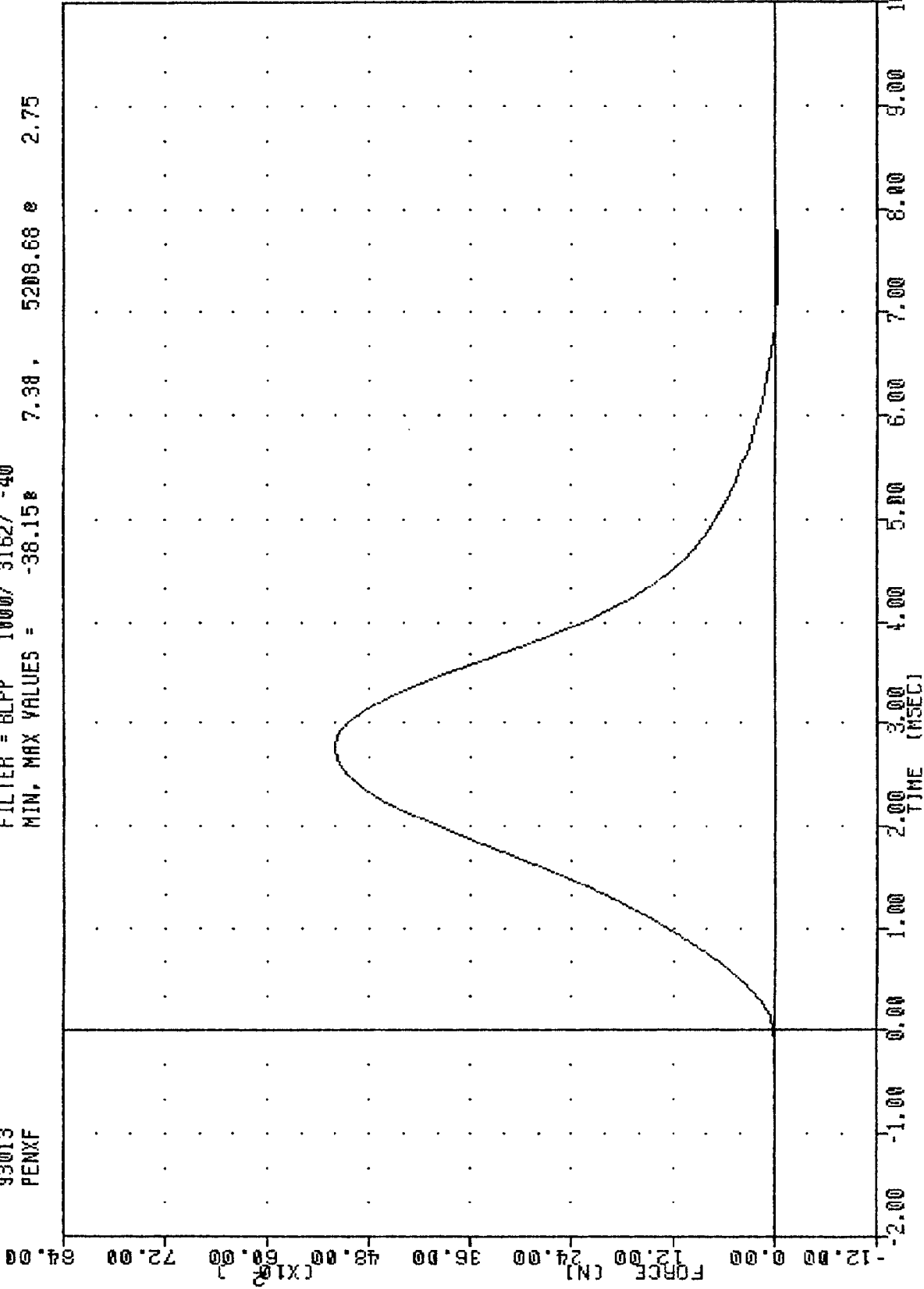
FILTER = BLPP 1000/ 3162/ -40  
 MIN, MAX VALUES = -0.78g 7.38g 106.46g 2.75



PART 572-E HYBRID III RIGHT KNEE CALIBRATION  
 PENDULUM DECELERATION (5 KG PEND.)

TRC , 48CBKJ  
572E SN46 RIGHT KNEE CAL 06  
93013  
PENXF

FILTER = BLPP 1000/ 3162/ -40  
MIN, MAX VALUES = -36.15 7.38, 5208.68 2.75



PART 572-E HYBRID III RIGHT KNEE CALIBRATION  
PENDULUM FORCE (5 KG PEND.)

TRANSPORTATION RESEARCH CENTER OF OHIO

KNEE IMPACT TEST

HYBRID III

13-JAN-93

LEFT KNEE

TRC

48C6LK1

572E SN48 LEFT KNEE CAL06

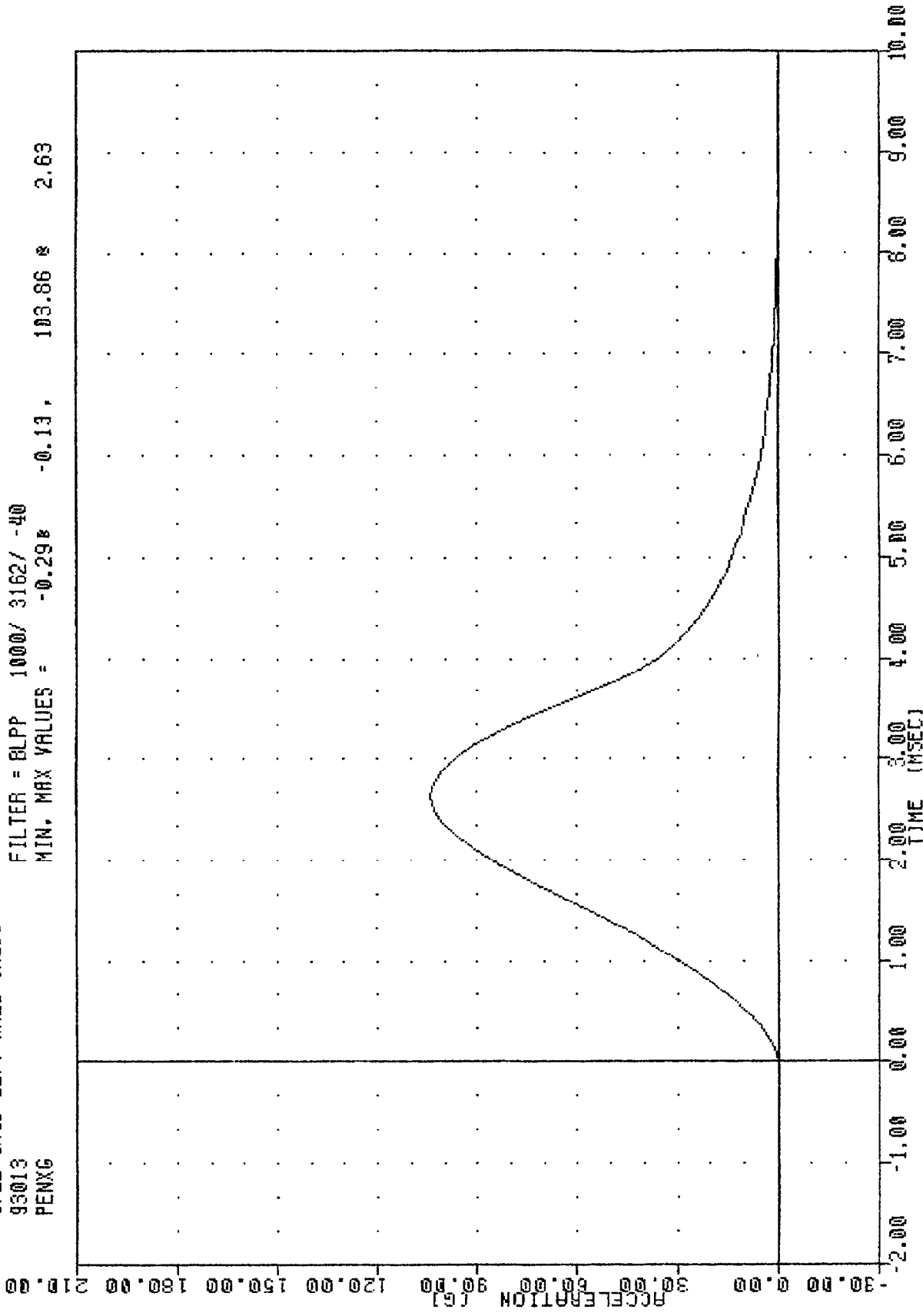
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10% - 70%	37.0 %
PROBE VELOCITY	2.07 - 2.13 M/SEC	2.08 M/SEC
PEAK KNEE IMPACT FORCE	4714-5783 N	5081.9 N
PROBE WEIGHT	5.0 KG	

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Fount

TRC , 4806LK1  
572E SN48 LEFT KNEE CALD6  
93013  
PENXG

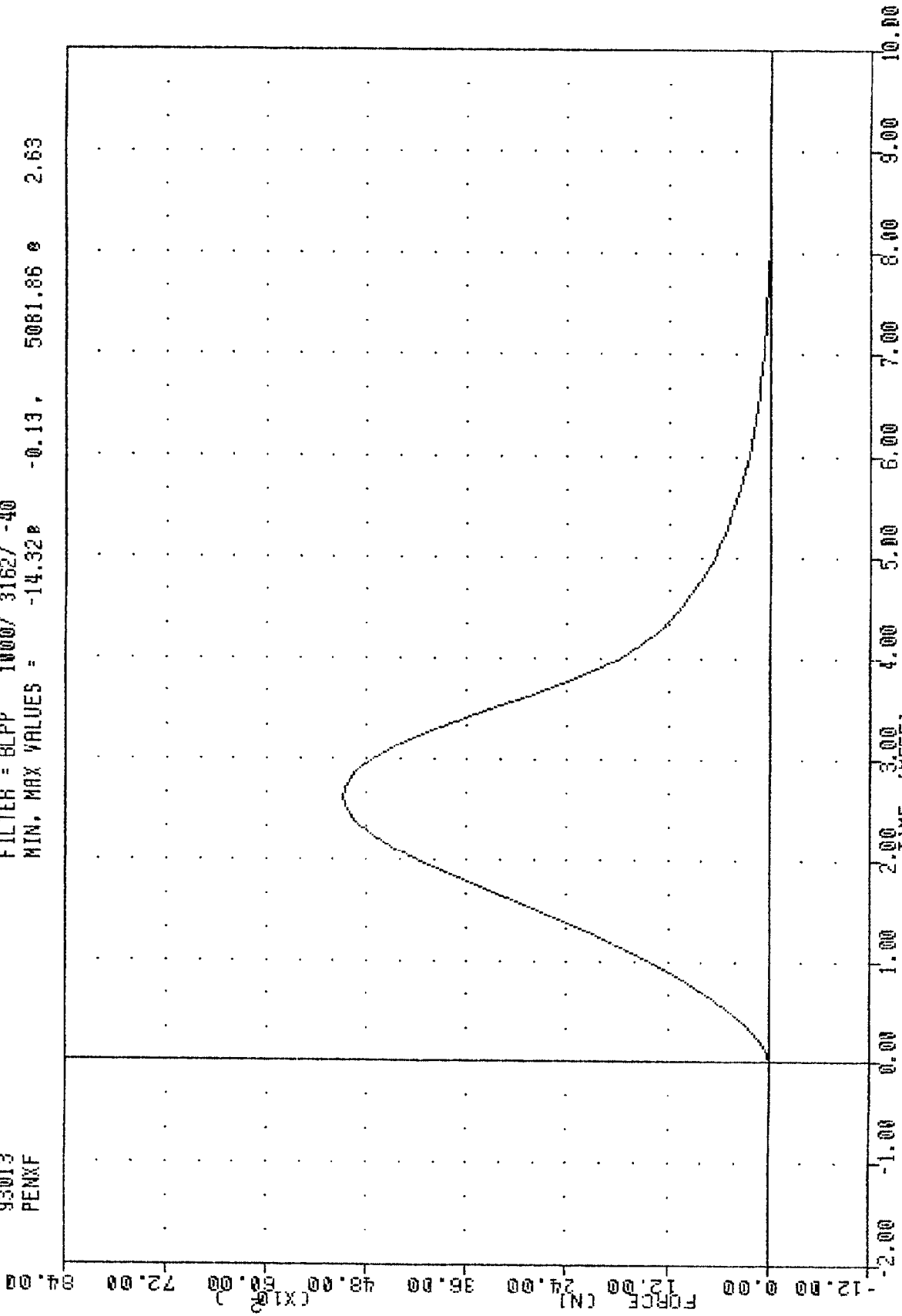
FILTER = BLPP 1000/ 3162/ -40  
MIN. MAX VALUES = -0.29% -0.13, 103.86 % 2.63



PART 572-E HYBRID III LEFT KNEE CALIBRATION  
PENDULUM DECELERATION (5 KG PEND.)

TRC  
572E SN48 LEFT KNEE CAL06  
93013  
PENXF

FILTER = BLPP 1000/ 3162/ -40  
MIN. MAX VALUES = -0.13, 5081.86 @ 2.63



PART 572-E HYBRID III LEFT KNEE CALIBRATION  
PENDULUM FORCE (5 KG PEND.)

APPENDIX D

MISCELLANEOUS TEST INFORMATION

VEHICLE INSTRUMENTATION INFORMATION

TEST NO. 930119

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	LEFT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	2264	BA46	REAR
2	RIGHT REAR SEAT					
	CROSSMEMBER LONGITUDINAL	X	ENDEVCO	2264	A031	REAR
3	ENGINE TOP LONGITUDINAL	X	ENDEVCO	2264	AR24	FRONT
4	ENGINE BOTTOM LONGITUDINAL	X	ENDEVCO	2264	BB67	REAR
5	RIGHT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	2264	AS76	FRONT
6	LEFT BRAKE CALIPER					
	LONGITUDINAL	X	ENDEVCO	2264	AS29	REAR
7	INSTRUMENT PANEL CENTER					
	LONGITUDINAL	X	ENDEVCO	2264	AK03	FRONT
	LAP BELT OUTBOARD FORCE		LEBOW	3419	127	TENSION
	SHOULDER BELT OUTBOARD FORCE		LEBOW	3419	571	TENSION
8	VEHICLE CENTER OF GRAVITY					
	LONGITUDINAL	X	ENDEVCO	2264	AS53	FRONT
	LATERAL	Y	ENDEVCO	7264	AS70	LEFT
	VERTICAL	Z	ENDEVCO	2264	AS03	UP

HEAVY TRUCK ACCELEROMETER INFORMATION

TEST NO. 930119

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
9	FRONT FRAME CROSSMEMBER	X	ENDEVCO	7264	DA94H	FRONT
		Y	ENDEVCO	7264	BY88J	LEFT
		Z	ENDEVCO	7264	CW83H	UP
10	TRUCK CENTER OF GRAVITY	X	ENDEVCO	7264	CJ66H	REAR
		Y	ENDEVCO	7264	CJ16H	LEFT

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MFR. & S/N: HUMANOID/048

SEATING POSITION: DRIVER

LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
HEAD ACCELERATION	X	ENDEVCO	7264	EH78J	REAR
HEAD ACCELERATION	Y	ENDEVCO	7264	DH37J	LEFT
HEAD ACCELERATION	Z	ENDEVCO	7264	DD17J	UP
NECK FORCE	X	DENTON	1716	0106	*
NECK FORCE	Y	DENTON	1716	0106	*
NECK FORCE	Z	DENTON	1716	0106	*
NECK MOMENT	X	DENTON	1716	0106	*
NECK MOMENT	Y	DENTON	1716	0106	*
NECK MOMENT	Z	DENTON	1716	0106	*
CHEST ACCELERATION	X	ENDEVCO	7264	EH92J	FRONT
CHEST ACCELERATION	Y	ENDEVCO	7264	CC24H	LEFT
CHEST ACCELERATION	Z	ENDEVCO	7264	FG28J	UP
CHEST DEFLECTION	X	VERNITECH	81422A	9041	OUTWARD
PELVIS ACCELERATION	X	ENDEVCO	7264	BC75J	REAR
PELVIS ACCELERATION	Y	ENDEVCO	7264	FC43J	LEFT
PELVIS ACCELERATION	Z	ENDEVCO	7264	AP87	UP
LEFT FEMUR FORCE		GSE	2435	726	TENSION
RIGHT FEMUR FORCE		GSE	2430	756	TENSION

\*See SIGN CONVENTION sheet for positive sensing orientation of neck load channels.

SIGN CONVENTION  
NHTSA DATA TAPE REFERENCE GUIDE

ACCELEROMETERS:

+X: FORWARD  
+Y: LEFTWARD  
+Z: UPWARD

POTENTIOMETERS:

+CHEST LONGITUDINAL DEFLECTION: OUTWARD  
+CHEST LATERAL DEFLECTION: LEFTWARD  
+SEAT BELT DISPLACEMENT: OUTWARD  
+SEAT BELT EXTENSION: ELONGATION  
+KNEE SLIDER DISPLACEMENT: DISTANCE BETWEEN FEMUR  
AND TIBIA INCREASED  
(IN RELATION TO A  
SEATED DUMMY)

LOAD CELLS:

+FEMUR FORCE: TENSION  
+SEAT BELT FORCE: TENSION  
+BARRIER FORCE: TENSION

NECK LOAD CELLS:

+X FORCE: HEAD PUSHED FORWARD  
+Y FORCE: HEAD PUSHED LEFTWARD  
+Z FORCE: HEAD PULLED UPWARD (TENSION ON NECK)  
+X MOMENT: RIGHT EAR ROTATING TOWARD RIGHT SHOULDER  
+Y MOMENT: CHIN ROTATING TOWARD CHEST  
+Z MOMENT: CHIN ROTATING TOWARD LEFT SHOULDER

TIBIA LOAD CELLS:

+X FORCE: TENSION  
+Y FORCE: TENSION  
+Z FORCE: TENSION  
+X MOMENT: BOTTOM OF TIBIA MOVING LEFTWARD  
+Y MOMENT: BOTTOM OF TIBIA MOVING REARWARD