

SIDE IMPACT AGGRESSIVENESS
ATTRIBUTES

MDB-TO-CAR SIDE IMPACT TEST OF
A 19⁰ CRABBED MOVING DEFORMABLE BARRIER
TO A 1980 VOLKSWAGEN RABBIT
AT 46.2 MPH

PREPARED BY:
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FINAL REPORT
JANUARY 1985

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract This test report documents one of a series of twelve crash tests to evaluate the side impact aggressiveness attributes of various deformable barrier face configurations. The configurations to be used are designated as "Lowered Stiffness", "Altered Profile" and "Lowered Bumper". Testing was conducted on a 1980 Volkswagen Rabbit 2-door hatchback at the TRCO Crash Test Facility, East Liberty, Ohio. The test vehicle was impacted on the left side by a moving deformable barrier designated as "Lowered Bumper", crabbed to 19°, at 46.2 mph. Occupant responses of two side impact dummies and a 3 year old child dummy were measured. One dummy was located in the driver's designated seating position, one was located in the left rear passenger position and the child dummy was seated in a child restraint seat located in the right rear passenger position. The test date was December 4, 1984 and the ambient temperature was 30° F.			
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
acres	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	metric ton	t
	(2000 lb)			
VOLUME				
tsp	teaspoons	5	milliliters	ml.
Tbsp	tablespoons	15	milliliters	ml.
in ³	cubic inches	16	milliliters	ml.
fl oz	fluid ounces	30	milliliters	ml.
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares	2.5	acres	
	(10 000 m ²)			
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton	1.1	short tons	
	(1000 kg)			
VOLUME				
ml.	milliliters	0.03	fluid ounces	fl oz
ml.	milliliters	0.06	cubic inches	in ³
L	liters	2.1	pints	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	degrees Celsius	9/5 (then add 32)	degrees Fahrenheit	°F

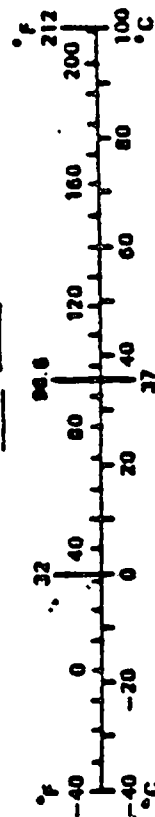


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SECTION 1.0
PURPOSE AND INTRODUCTION

PURPOSE

The main purpose of this test was to evaluate the side impact aggressiveness of a deformable barrier face designated as "Lowered Bumper". In all, there will be twelve crash tests involving deformable barrier faces designated as "Lowered Stiffness", "Altered Profile" and "Lowered Bumper". The vehicle was tested using conditions not currently contained in a Federal Motor Vehicle Safety Standard.

INTRODUCTION

A stationary 1980 Volkswagen Rabbit 2-door hatchback was impacted on the left side by a Moving Deformable Barrier (MDB) on December 4, 1984. The test was to simulate an intersection collision with the striking vehicle traveling at 35 mph and the struck vehicle traveling at 17.5 mph. The orientation angle of the striking vehicle was 60° counterclockwise with respect to the longitudinal axis of the struck vehicle. The impact point was to be 37 inches forward of the vehicle center of gravity which is defined by accident investigation to be the midpoint of the wheelbase.

To simulate this collision, the MDB was to be towed into the stationary Volkswagen Rabbit at 46.3 mph with the MDB's wheels crabbed clockwise to 19°. The actual test speed was 46.2 mph and the actual impact point was 38.5 inches forward of the midpoint of the Volkswagen Rabbit's wheelbase.

The vehicle was structurally unmodified, but contained additional padding in the driver's door, the left rear quarter panel and the left rear side header.

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains data required by R & D. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains Data Plots. Appendix C contains the Child Dummy Report.

SECTION 2.0
GENERAL TEST AND VEHICLE PARAMETER DATA

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

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Volkswagen of America, Inc.

MAKE/MODEL: Volkswagen Rabbit VIN: 17A0819179

BODY STYLE: 2-Door Hatchback MODEL YEAR: 1980

NHTSA NO.: R & D COLOR: White

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 1600 cc

TRANSMISSION DATA: 4 Speed Manual

DATE VEHICLE RECEIVED: 11/13/84 ODOMETER READING: 87911

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	No	AUTOMATIC TRANSMISSION	Yes
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	Yes
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	Yes
OTHER	Sun Roof		

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

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

VEHICLE MANUFACTURED BY: Volkswagen of America, Inc.

DATE OF MANUFACTURE: 12/79

GVWR: 2822 LBS.,

GAWR: FRONT 1609 LBS., REAR 1278 LBS.

VEHICLE TIRE DATA

RECOMMENDED COLD TIRE PRESSURE: FRONT 27 psi; REAR 31 psi

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Goodyear Arriva P 175/80 R 13

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? No

IS SPARE TIRE STANDARD EQUIPMENT? Yes

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

RIGHT FRONT	680	LBS.	RIGHT REAR	310	LBS.
LEFT FRONT	660	LBS.	LEFT REAR	350	LBS.
TOTAL FRONT WEIGHT	1340	LBS.	(67.0 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	660	LBS.	(33.0 % OF TOTAL VEHICLE WEIGHT)		
TOTAL DELIVERED WEIGHT	2000	LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 24 5/16	;LF 24 3/8	;RR 25 3/4	;LR 25 5/16
PRE-TEST ATTITUDE:	RF 24 3/4	;LF 24 1/8	;RR 22 1/2	;LR 22 3/4
POST-TEST ATTITUDE:	RF 24 5/16	;LF 24 15/16	;RR 22 5/16	;LR 23 5/16

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 171 LBS. CARGO:

RIGHT FRONT	675	LBS.	RIGHT REAR	590	LBS.
LEFT FRONT	665	LBS.	LEFT REAR	590	LBS.
TOTAL FRONT WEIGHT	1340	LBS.	(53.2 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1180	LBS.	(46.8 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	2520	LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.

TEST FLUID DATA

TEST FLUID TYPE: RED STODDARD SOLVENT #2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: NA GALLONS

TEST VOLUME: 5.0 GALLONS

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): 10.0 GALLONS

DETAILS OF FUEL SYSTEM: DNA

ELECTRIC FUEL PUMP: Yes

FUEL INJECTION: No

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? No

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

VEHICLE LOAD (UP TO CAPACITY): FRONT 27 psi; REAR 31 psi

RECOMMENDED TIRE SIZE: P 155 80 R 13 LOAD RANGE X B, C,

VEHICLE CAPACITY: TYPES OF SEATS: Front - Bucket
Rear - Bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 2 FRONT

CARGO LOAD 171 LBS. 2 REAR
4 TOTAL

TOTAL 771 LBS.

*WITH ENTIRE FUEL SYSTEM FILLED WITH FUEL TANK THROUGH CARBURETOR BOWL.

TEST CONDITIONS

TEST NUMBER: 841204

DATE OF TEST: December 4, 1984

TIME OF TEST: 13:45

WIND VELOCITY: 0-2 mph 234° SW

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 30° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 78° F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
VEHICLE TEST WEIGHT (LBS.)	2560	2564
MDB TEST WEIGHT (LBS.)	2990	3000
MDB VELOCITY (MPH.)*	46.2	46.3
IMPACT POINT (INCHES)**	38.5	37.0

DUMMIES

	<u>DRIVER</u>	<u>LEFT REAR PASSENGER</u>	<u>RT. REAR PASSENGER</u>
TYPE:	SID	SID	3 Year Old
SERIAL NO.:	06	U02	012
INSTRUMENTATION:			
HEAD ACCEL.:	Yes	Yes	Yes
CHEST ACCEL.:	Yes (Upper/Lower)	Yes (Upper/Lower)	Yes
FEMUR L.C.'S:	No	No	No
OTHER:	Pelvis/Ribs	Pelvis/Ribs	

RESTRAINT SYSTEM: Both SID dummies were unrestrained. The child dummy was restrained by a child seat, Century model 4200.

* As measured over final one foot of travel.

** As measured forward of the midpoint of the vehicle's wheelbase.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER 06	PASSENGER U02
Head	<u>Window Sill, Side Mirror, Sunroof Latch</u>	<u>Side Header, Roof</u>
Chest	<u>Inner Door Panel</u>	<u>Rear Quarter Panel</u>
Abdomen	<u>Inner Door Panel</u>	<u>Rear Quarter Panel</u>
Left Knee	<u>Inner Door Panel</u>	<u>Rear Quarter Panel</u>
Right Knee	<u>Left Knee</u>	<u>Left Knee</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Detached at A-Pillar</u>	<u>Easy</u>
Rear	<u>DNA</u>	<u>DNA</u>

SEAT MOVEMENT:

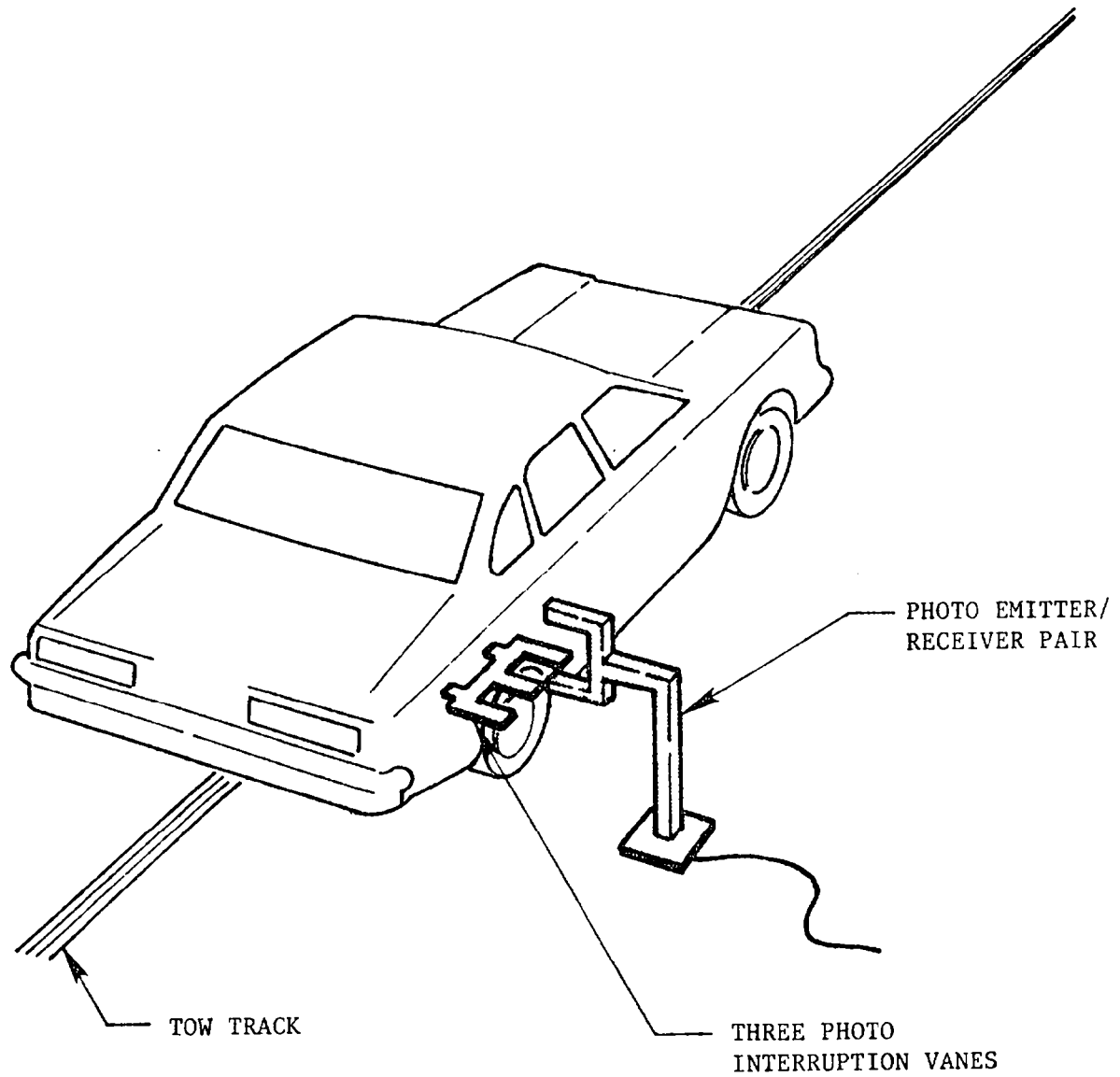
	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>No</u>	<u>Yes, passenger seat shifted backwards & rotated CCW</u>
Rear	<u>No</u>	<u>No</u>

GLAZING DAMAGE:

Windshield cracked.

OTHER NOTABLE IMPACT EFFECTS:

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane is located two inches before impact.
The vanes have one foot spacing.

VEHICLE TEST WEIGHT CALCULATION

$$\begin{aligned}\text{Test Weight} &= \text{Unloaded Delivered Weight}^* + \\ &\quad \text{Number of Dummies X 174 lbs. + Child Dummy +} \\ &\quad \text{Restraint Seat + Cargo Weight} \\ &= 2000 + 2 \times 174 + 32 + 13 + 171 \text{ lbs.} \\ &= 2564 \text{ lbs.}\end{aligned}$$

To achieve test weight, the exhaust system, starter, alternator, radiator, fan and hoses, windshield washer tank, battery and air conditioner pump were removed and 5.0 gallons of Stoddard Solvent were added in the fuel tank. The weight of the test vehicle was measured by placing each wheel on a Loadmeter Corporation Hiway Loadometer.

$$\begin{aligned}\text{*Unloaded Delivered Weight} &= \text{Measured Weight} + \text{Estimated 10 Gallons Fuel} \\ &= 1940 + 60 \text{ lbs.} \\ &= 2000 \text{ lbs.}\end{aligned}$$

TEST ANOMALIES

The accelerometer in the driver's lower spine, "Y" axis, T12YG1, had a crushed cable approximately 35 milliseconds after impact.

The driver's rib-to-spine displacement potentiometer, LRTYD1, broke 60 msec after impact.

Both left sill accelerometers should be disregarded. The left rear sill accelerometer, LRSYG4, had a crushed cable 60 msec into the test and the left front sill accelerometer, LFSYG5, had a cut cable 70 msec after time zero.

On the left front door there were problems with the following channels:

LFDYG2, Position 8, had a crushed cable from 45 to 50 msec after time zero.

LFDYG3, Position 9, had a cut cable 25 msec after time zero.

LFDYG4, Position 10, had a crushed cable 65 msec after time zero.

SECTION 3.0
DATA REQUIRED BY R & D

The following pages are included in this section:

1. Dummy temperature control and position data
2. Dummy kinematic summary
3. Vehicle crush data
4. Dummy and vehicle accelerometer location and data summary
5. High speed camera information

DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle was kept inside the temperature controlled crash test building until approximately 2 hours prior to the test. Temperature inside the vehicle and ambient temperature at the crash area were recorded. Dummy temperature while outside the crash test building was maintained portably until approximately 1 minute prior to the test.

The following table summarizes the steps taken to position the instrumented, calibrated dummies in the test vehicle.

DUMMY PLACEMENT AND POSITIONING

SIDE IMPACT DUMMY

DRIVER DSP

HEAD	Surface of transverse instrument mounting platform is as horizontal as possible without inducing torso movement & midsagittal plane falls in longitudinal plane.
UPPER TORSO	Placed against seat back. Midsagittal plane is vertical and centered on bucket seat.
LOWER TORSO	Midsagittal plane is vertical and centered on bucket seat.
UPPER LEGS (thighs or femurs)	Placed against seat cushion. Planes defined by femur and tibia centerlines are as close as possible to vertical.
KNEES	Knees set 14.5" apart between pivot bolt head outer surfaces. Outer surface of right knee pivot bolt is 8.6" from midsagittal plane of dummy. Outer surface of left knee pivot bolt is 5.9" from midsagittal plane of dummy.
LOWER LEGS	Plane defined by femur and tibia centerlines are as close as possible to vertical longitudinal plane.
RIGHT FOOT	Placed on undepressed accelerator pedal -- rearmost point of heel on floorplan in plane of pedal.
LEFT FOOT	Placed on toeboard -- rearmost point of heel on floorpan as close as possible to intersection of toeboard and floorpan. Centerline falls in vertical longitudinal plane.

REAR PASSENGER DSP

Surface of transverse instrument mounting platform is as horizontal as possible without inducing torso movement & midsagittal plane falls in longitudinal plane.
Placed against seat back. Midsagittal plane is vertical and contained in the same longitudinal plane as the driver's midsagittal plane.
Midsagittal plane is vertical and contained in the same longitudinal plane as the driver's midsagittal plane.
Placed against seat cushion. Planes defined by femur and tibia centerlines are as close as possible to vertical.
Located so that planes defined by femur and tibia centerlines are as close as possible to vertical.
Plane defined by femur and tibia centerlines are as close as possible to vertical longitudinal plane.
Centerline falls in vertical longitudinal plane. Placed on floor as far forward as possible without front seat interference.
Centerline falls in vertical longitudinal plane. Placed on floor as far forward as possible without front seat interference.

*NOTE: THE SIDE IMPACT DUMMY DOES NOT INCLUDE ARMS.

DUMMY IN-VEHICLE POSITION RECORDING SHEET

VEHICLE NHTSA NO. R & D

MFR./MAKE/MODEL: Volkswagen Rabbit

FRONT SEAT TYPE: BENCH
X BUCKET
 SPLIT BENCH

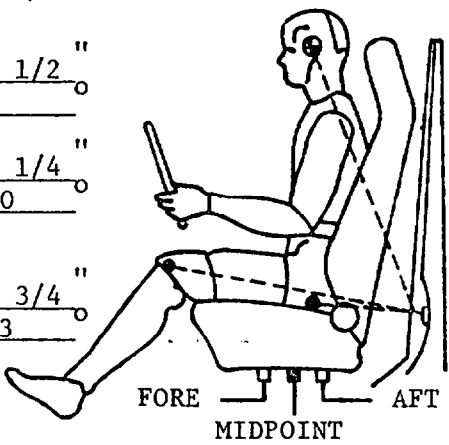
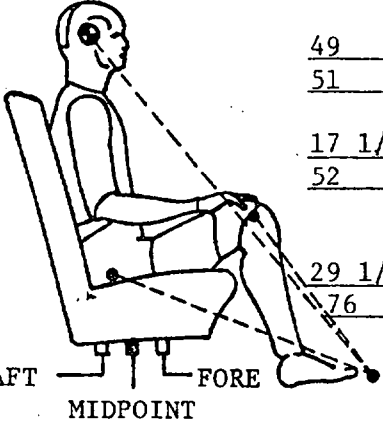
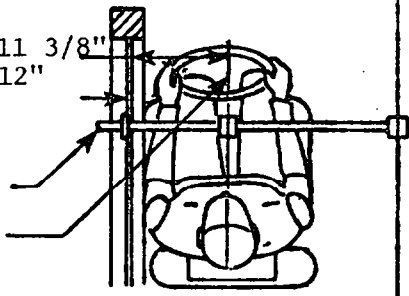
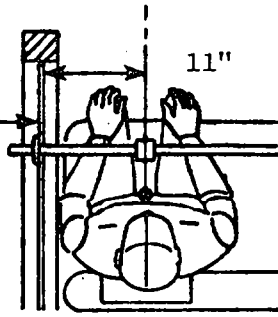
ADJUSTER TYPE: X MANUAL
 POWER

BUCKET SEAT BACK TYPE: FIXED
X ADJUSTABLE

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

POSITIONING DATE: 12/4/84

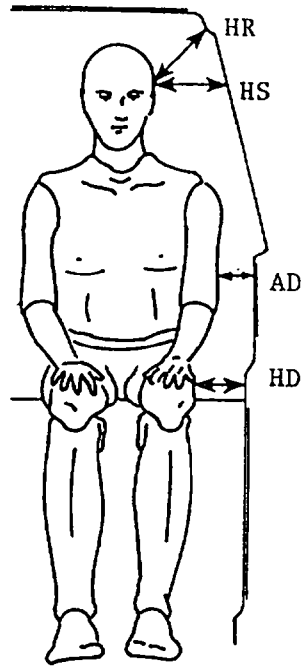
AMBIENT TEMP.: 70° F. TIME: 8:00

DRIVER DUMMY # 06  HEAD <u>22 1/2</u>" TARGET* <u>40</u>" KNEE <u>33 1/4</u>" JOINT <u>100</u>" APPROX. "H" <u>18 3/4</u>" POINT <u>113</u>" FORE MIDPOINT AFT	REAR PASSENGER DUMMY # U02  <u>49</u>" HEAD <u>51</u>" TARGET** <u>17 1/2</u>" KNEE <u>52</u>" JOINT APPROX. <u>29 1/4</u>" "H" <u>76</u>" POINT AFT MIDPOINT FORE
DOOR GLASS HEIGHT*** <u>11 3/8</u>" <u>12</u>"  LATERAL BAR ADJUSTABLE POINTER DRIVER DUMMY # 06	DOOR GLASS HEIGHT <u>11</u>"  DNA PASSENGER DUMMY # U02

*All driver dummy dimensions referenced to top of striker bolt and all angles referenced to vertical.

**All passenger dummy dimensions referenced to front seat back latch bolt with front seat in mid-position and all angles referenced to vertical.

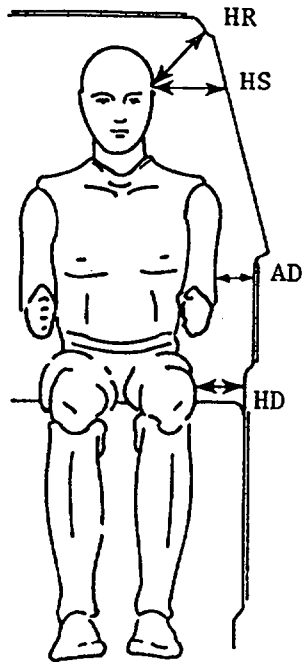
***Door glass height is equal on the right and left side of vehicle at dummy nose level.



DRIVER
06

PASSENGER
U02

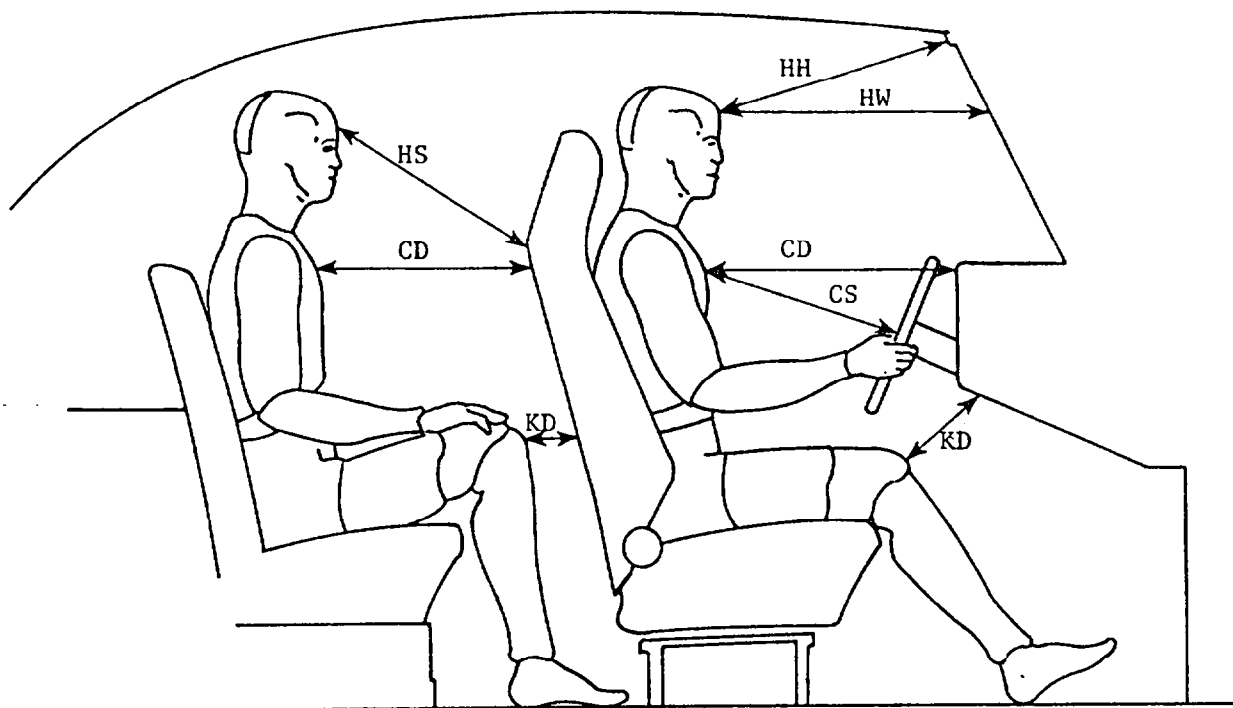
HR	5 3/4	5*
HS	8	8 1/4
AD	0	0*
HD	6 1/2	2 1/4*



ALL MEASUREMENTS IN INCHES

*Measurements were made from the dummy to the modified padding.

DUMMY LATERAL CLEARANCE DIMENSIONS



DRIVER

PASSENGER

06

U02

HH	11 3/8	DNA
HW	16	DNA
HS	DNA	24 1/16
CD	20 1/8	19 13/16
CS	12 1/8	DNA
KDL	3 1/8	5 5/8
KDR	4 1/8	6 1/8

ALL MEASUREMENTS IN INCHES

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

DUMMY KINEMATIC SUMMARY

DRIVER

During impact, the driver's thorax struck the side door inner panel as the head went through the driver's side window and hit the side mirror and window sill. As the dummy rebounded, the body lifted and rotated toward the left. The dummy's buttocks landed on the right front window sill as the head hit the latch on the sun roof. Leftward rotation continued as the dummy's head and shoulders went between the seat into the rear occupant area. Final resting position showed the driver in the front passenger's seat with the body twisted such that the head was between the two front seats.

PASSENGER

During impact, the dummy's thorax struck the left inner quarter panel and the head hit the side header. The passenger then struck the roof with the head. In the final resting position the dummy was leaning left with the head against the upper window frame.

VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

ZERO DISTANCE AT PROJECTED IMPACT POINT*

LOCATION	HEIGHT (in)	6	0	6	12	18	24	30	36	42	48	54	60	66	72	78
		PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)														
Axle Height	10.5	X	X	20.0	20.0	20.1	20.1	20.1	20.1	20.1	20.3	20.3	20.4	20.5	X	X
H-Point	20.8	X		17.0	17.8	17.9	17.9	17.9	18.0	18.0	18.0	18.1	18.1	18.3	18.0	X
Mid Door	24.0			16.5	17.8	17.6	17.6	17.6	17.6	17.6	17.6	17.8	17.8	17.9	18.0	X
Window Sill	35.0			19.9	19.5	19.4	19.3	19.3	19.1	19.1	19.3	19.3	19.5	19.5	19.8	19.4
Window Top	54.0	X	X	X	X	X	26.5	26.4	26.3	26.1	26.1	26.3	26.4	26.5	26.9	27.1

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

Axle Height	10.5	X	X	22.0	35.5	37.9	39.4	39.8	38.7	37.1	34.8	32.3	29.6	26.4	X	X
H-Point	20.8	X		21.8	22.1	33.2	37.1	38.4	36.9	35.8	34.3	32.6	***	28.7	26.1	23.5
Mid Door	24.0			20.5	22.0	21.6	32.0	35.9	37.3	36.3	35.2	34.1	32.5	***	28.4	25.9
Window Sill	35.0			21.9	21.9	22.1	28.5	32.3	33.0	34.4	32.5	31.6	31.0	***	28.6	25.9
Window Top	54.0	X	X	X	X	X	29.5	29.4	29.1	28.9	28.9	28.8	28.6	28.6	28.6	28.8

STATIC CRUSH (IN)

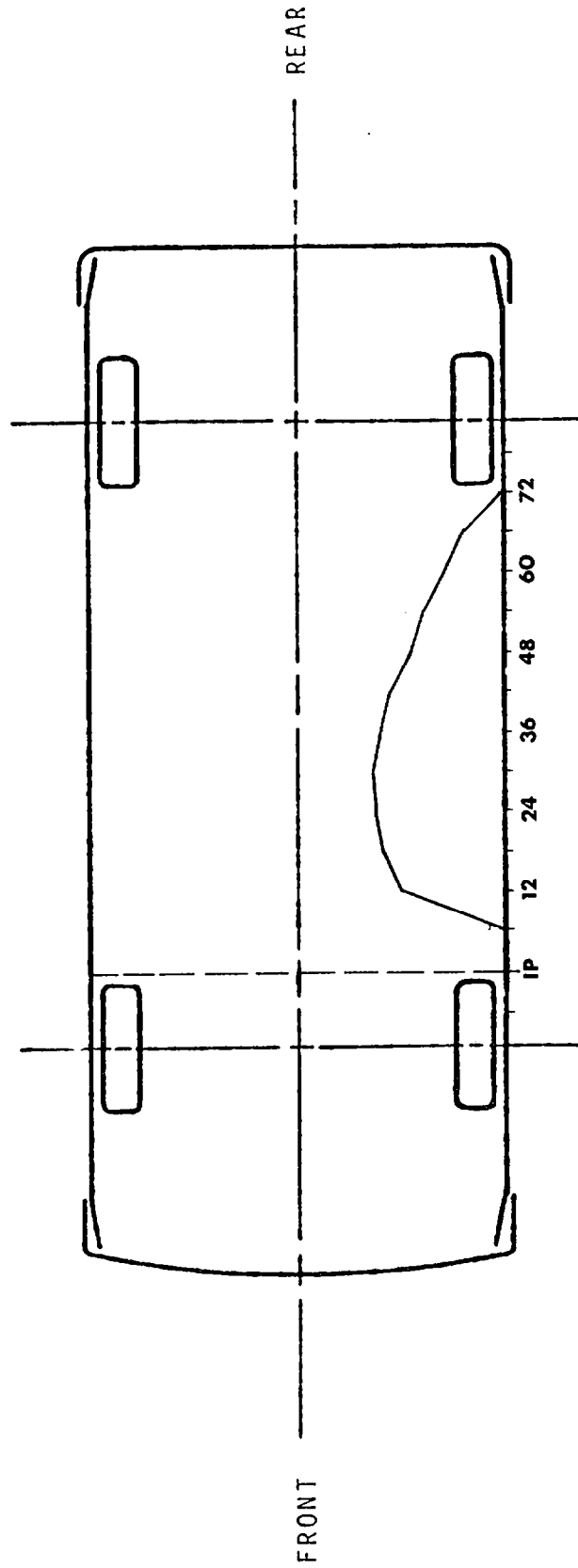
Axle Height	10.5	X	X	2.0	15.5	17.8	19.3	19.7	18.6	17.0	14.5	12.0	9.2	5.9	X	X
H-Point	20.8	X		4.8	4.3	15.3	19.2	20.5	19.0	17.8	16.3	14.6	***	10.6	7.8	5.5
Mid Door	24.0			4.0	4.2	4.0	14.4	18.3	19.7	17.6	16.5	14.9	***	10.6	8.0	5.5
Window Sill	35.0			2.0	2.4	2.7	9.2	13.0	14.2	15.1	13.4	12.5	11.7	***	9.1	6.4
Window Top	54.0	X	X	X	X	X	3.0	3.0	2.8	2.8	2.8	2.5	2.2	2.1	1.7	1.7

* Projected impact point is 37 inches forward of driver's side wheelbase midpoint. Column readings are front to rear from left to right.

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

*** Data point was not available following the test.

VEHICLE EXTERIOR STATIC CRUSH PROFILE

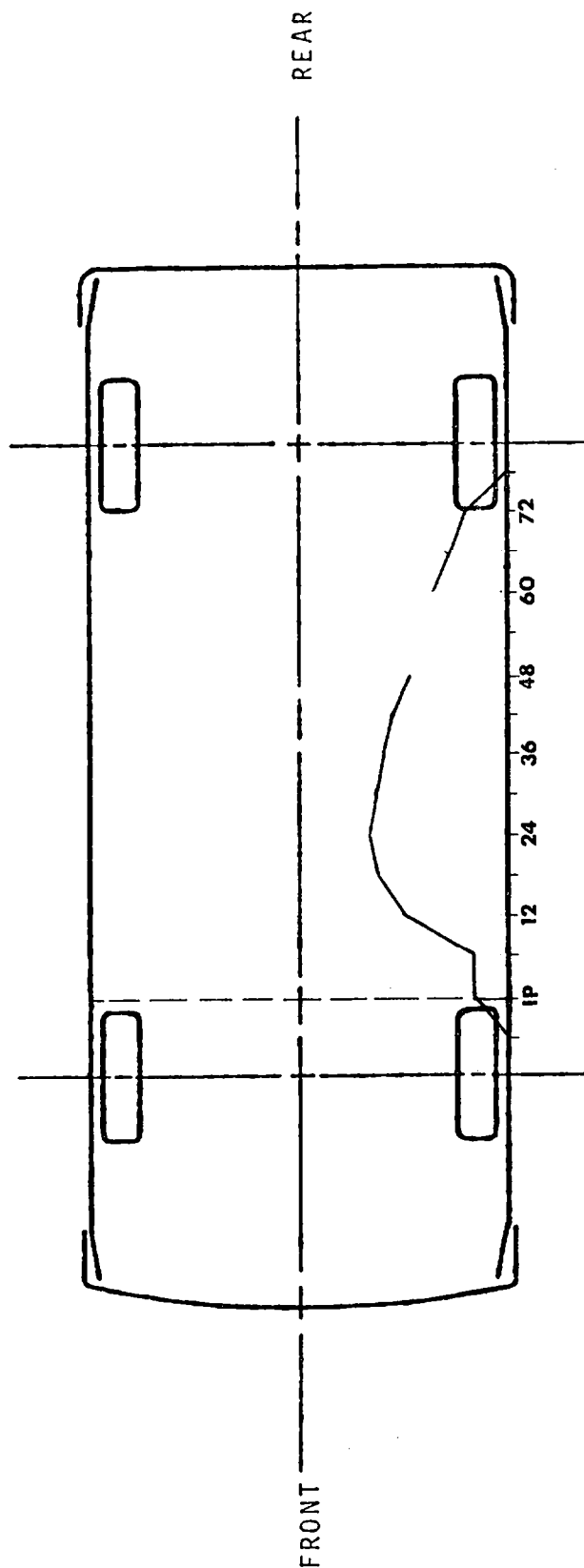


PROFILE LEVEL EQUALS AXLE HEIGHT
IP EQUALS PROJECTED IMPACT POINT

Width of Car = 63.4"
Length of Car = 154.8"

Maximum Crush = 19.7"
Approximate Length of Crush = 60"

VEHICLE EXTERIOR STATIC CRUSH PROFILE

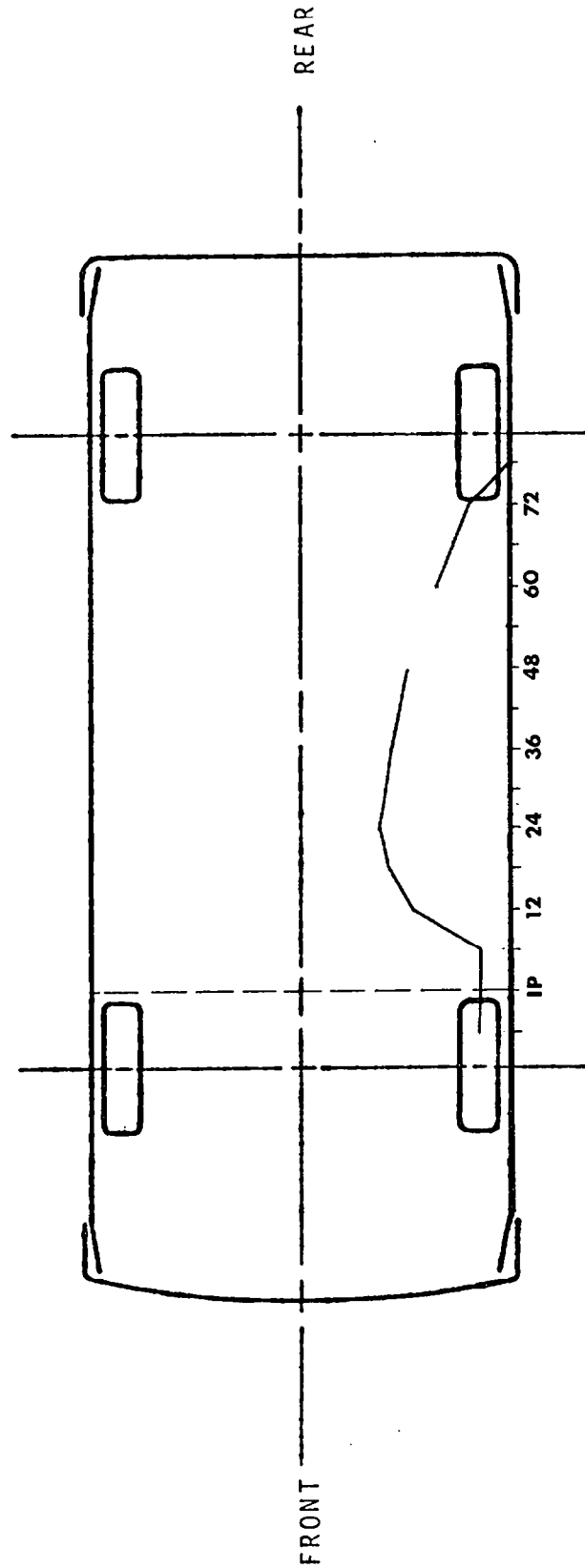


PROFILE LEVEL EQUALS H-POINT HEIGHT
IP EQUALS PROJECTED IMPACT POINT

Width of Car = 63.4"
Length of Car = 154.8"

Maximum Crush = 20.5"
Approximate Length of Crush = 72"

VEHICLE EXTERIOR STATIC CRUSH PROFILE

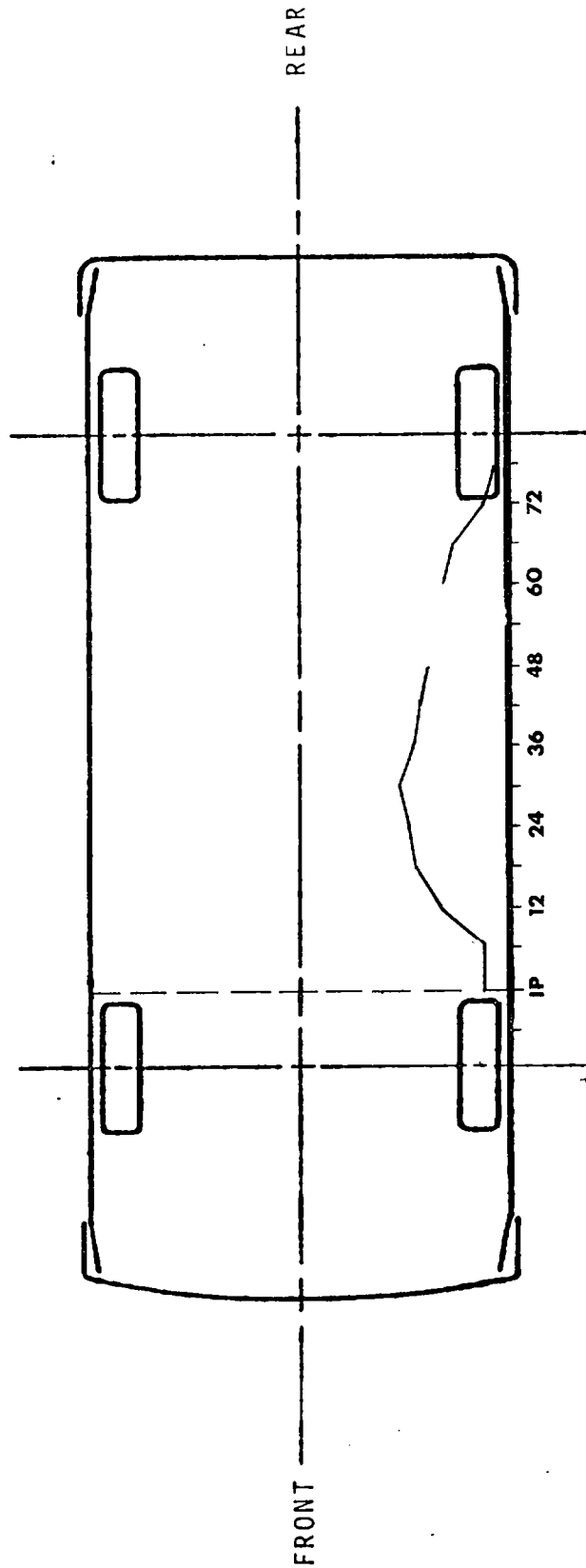


PROFILE LEVEL EQUALS MID-DOOR HEIGHT
IP EQUALS PROJECTED IMPACT POINT

Width of Car = 63.4"
Length of Car = 154.8"

Maximum Crush = 19.7"
Approximate Length of Crush = 78"

VEHICLE EXTERIOR STATIC CRUSH PROFILE

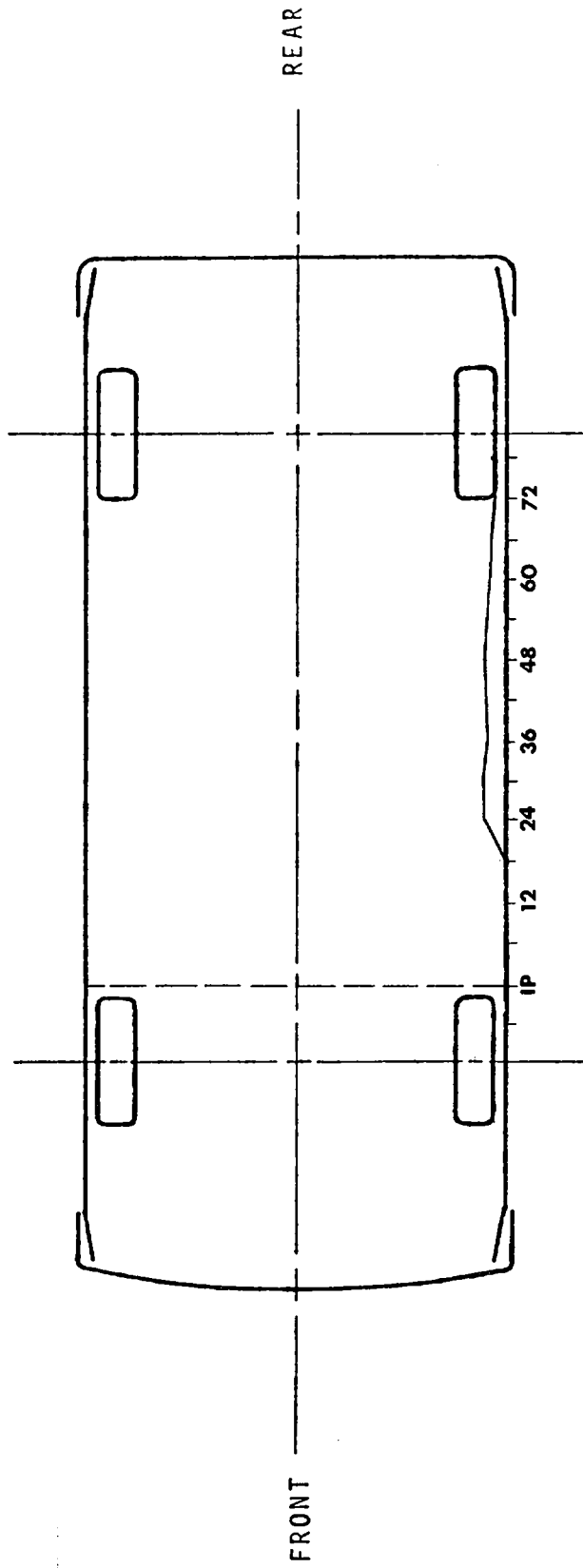


PROFILE LEVEL EQUALS WINDOW SILL HEIGHT
IP EQUALS PROJECTED IMPACT POINT

Width of Car = 63.4"
Length of Car = 154.8"

Maximum Crush = 15.1"
Approximate Length of Crush = 54"

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW TOP HEIGHT
IP EQUALS PROJECTED IMPACT POINT

Width of Car = 63.4"
Length of Car = 154.8"

Maximum Crush = 3.0
Approximate Length of Crush = 54"

SIDE IMPACT DUMMY DATA SUMMARY

	DRIVER DUMMY				PASSENGER DUMMY			
	POSITIVE		NEGATIVE		POSITIVE		NEGATIVE	
	DIRECTION*		DIRECTION**		DIRECTION*		DIRECTION**	
	MAX	TIME	MAX	TIME	MAX	TIME	MAX	TIME
	(g)	(msec)	(g)	(msec)	(g)	(msec)	(g)	(msec)
HEAD ACCELERATION								
LONGITUDINAL	53.39	186.75	72.74	90.25	22.13	98.63	45.04	87.25
LATERAL	54.14	60.88	13.93	76.50	78.60	75.50	21.31	103.38
VERTICAL	29.63	196.75	81.89	71.13	61.54	90.13	46.38	76.50
RESULTANT		84.65 @	71.13			93.48 @	75.50	
HIC	1440.95	from 57.13 to 102.38			745.93	from 71.63 to 94.75		
CHEST ACCELERATION								
UPPER SPINE								
LONGITUDINAL	19.02	78.75	27.85	70.00	3.04	71.88	65.68	84.38
LATERAL (P)***	124.64	52.50	45.78	68.13	75.33	77.50	1.59	83.13
LATERAL (R)***	129.13	52.50	44.71	68.13	78.68	78.13	0.54	83.75
VERTICAL	29.62	43.75	28.52	49.37	---	--- α	---	--- α
RESULTANT (P)		125.87 @	52.50			76.49 @	77.50	
RESULTANT (R)		130.32 @	52.50			80.14 @	78.13	
DELTA V (MPH)****		33.5 @	65.63 (P)			20.6 @	130.00 (P)	
		35.6 @	65.63 (R)			22.0 @	130.00 (R)	
LOWER SPINE								
LONGITUDINAL	37.21	63.75	46.16	44.38	33.97	91.25	46.38	71.88
LATERAL (P)	---	--- Y	---	--- Y	120.03	76.25	32.38	91.87
LATERAL (R)	159.92	48.75	31.08	68.13	122.91	76.25	33.65	91.87
VERTICAL	37.10	43.75	2.11	84.38	---	--- α	---	--- α
RESULTANT (P)		---	@ --- Y			123.78 @	76.25	
RESULTANT (R)		163.60 @	48.75			126.57 @	76.25	
DELTA V (MPH)		---	@ --- (P) Y			35.3 @	88.75 (P)	
		45.0 @	65.00 (R)			37.7 @	88.75 (R)	
LEFT UPPER RIB								
LATERAL (P)	80.31	38.75	9.26	91.87	128.52	79.38	8.93	92.50
LATERAL (R)	86.48	47.50	14.05	77.50	117.53	78.75	11.23	83.75
DELTA V (MPH)		35.1 @	75.63 (P)			36.4 @	127.50 (P)	
		36.1 @	75.63 (R)			32.8 @	128.13 (R)	
LEFT LOWER RIB								
LATERAL (P)	107.07	43.13	67.82	73.13	100.35	80.00	17.50	99.37
LATERAL (R)	98.96	43.13	63.37	73.13	88.59	72.50	15.59	85.63
DELTA V (MPH)		39.6 @	70.63 (P)			33.3 @	116.88 (P)	
		40.4 @	70.63 (R)			32.7 @	117.50 (R)	
PELVIS ACCELERATION								
LONGITUDINAL	22.52	51.50	131.95	48.88	13.26	112.25	68.89	73.13
LATERAL	201.72	45.00	14.58	33.38	89.40	72.38 °	23.77	53.38
VERTICAL	63.85	50.38	29.38	48.00	38.35	93.13	14.04	91.38
RESULTANT		204.41 @	45.13			114.38 @	72.88 °	
DELTA V (MPH)		39.8 @	69.25			35.5 @	107.25 °	

SIDE IMPACT DUMMY DATA SUMMARY CONTD

	<u>DRIVER DUMMY</u>				<u>PASSENGER DUMMY</u>			
	<u>POSITIVE</u> <u>DIRECTION*</u>		<u>NEGATIVE</u> <u>DIRECTION**</u>		<u>POSITIVE</u> <u>DIRECTION*</u>		<u>NEGATIVE</u> <u>DIRECTION**</u>	
	<u>MAX</u> <u>(in)</u>	<u>TIME</u> <u>(msec)</u>	<u>MAX</u> <u>(in)</u>	<u>TIME</u> <u>(msec)</u>	<u>MAX</u> <u>(in)</u>	<u>TIME</u> <u>(msec)</u>	<u>MAX</u> <u>(in)</u>	<u>TIME</u> <u>(msec)</u>
RIB DEFLECTION †	---	--- γ	---	--- γ	1.51	100.88	---	--- ε

* LONGITUDINAL: FORWARD
 LATERAL: RIGHTWARD
 VERTICAL: UPWARD

**LONGITUDINAL: REARWARD
 LATERAL: LEFTWARD
 VERTICAL: DOWNWARD

*** (P) = Primary Sensor, (R) = Redundant Sensor

**** For dummy channels, Delta V is the velocity change at the approximate time of separation from the contact area.

† Compression: Positive

α This channel was not used due to the use of a child dummy.

γ See TEST ANOMALIES

ο The CTM has judged that intermittent rattling has occurred in these channels and, therefore, the peak values reported are questionable as are applicable resultants and Delta V's.

ε There were no negative values in the time interval of interest.

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	RIGHT SILL AT FRONT SEAT	83.5	23.8	11.0				
	(LONGITUDINAL)	$\Delta V = -8.5 \text{ mph @ } 137.25 \text{ msec}$			3.37	92.38	11.78	69.00
	(LATERAL)	$\Delta V = 14.4 \text{ mph @ } 137.25 \text{ msec}$			20.72	74.63	5.61	54.88
	(VERTICAL)				---	---	---	---
	(RESULTANT)					21.76 @ 74.25		
2	RIGHT SILL AT REAR SEAT	61.6	23.8	9.0				
	(LONGITUDINAL)	$\Delta V = -5.8 \text{ mph @ } 137.25 \text{ msec}$			3.99	92.00	8.73	57.50
	(LATERAL)	$\Delta V = 21.6 \text{ mph @ } 137.25 \text{ msec}$			32.00	66.88	3.94	54.13
	(VERTICAL)				8.94	53.38	7.97	105.75
	(RESULTANT)					32.83 @ 67.13		
3	REAR DECK OVER AXLE	32.0	0.0	7.3				
	(LONGITUDINAL)	$\Delta V = -10.9 \text{ mph @ } 137.25 \text{ msec}$			16.84	88.88	44.01	79.75
	(LATERAL)	$\Delta V = 28.9 \text{ mph @ } 137.25 \text{ msec}$			39.46	78.25	6.23	110.25
	(VERTICAL)				---	---	---	---
	(RESULTANT)					58.88 @ 79.63		
4	LEFT SILL AT REAR SEAT	62.2	-23.9	9.4				
	(LATERAL)	$\Delta V = \text{---} \text{---} Y$			---	---	---	---
5	LEFT SILL AT FRONT SEAT	83.5	-23.9	10.1				
	(LATERAL)	$\Delta V = \text{---} \text{---} Y$			---	---	---	---
6	LEFT FRONT DOOR CENTERLINE	81.0	-26.5	23.3				
	(LATERAL)	$\Delta V = 27.5 \text{ mph @ } 31.50 \text{ msec}$			174.15	22.75	54.34	46.13
7	RIGHT REAR COMPARTMENT	31.0	15.2	14.8				
	(LONGITUDINAL)				5.07	92.75	12.64	53.25
8	MIDREAR OF LEFT FRONT DOOR	61.0	-26.5	23.0				
	(LATERAL)	$\Delta V = \text{---} @ \text{---} Y$			---	---	---	---
9	UPPER LEFT FRONT DOOR CENTERLINE	82.3	-26.1	32.1				
	(LATERAL)	$\Delta V = \text{---} \text{---} Y$			---	---	---	---
10	MIDFRONT OF LEFT FRONT DOOR	101.3	-26.3	22.4				
	(LATERAL)	$\Delta V = 19.6 \text{ mph @ } 20.50 \text{ msec}$			Y 135.01	13.88 Y	33.31	27.13 Y
11	UPPER REAR OF LEFT REAR DOOR	71.1	-26.1	32.0				
	(LATERAL)	$\Delta V = \text{---} \text{---} T$			150.16	35.00	340.51	43.50

* Reference: X - Rear Bumper (+ Forward), Y - Vehicle Centerline (+ To Right),
Z - Ground Level (+ Up)

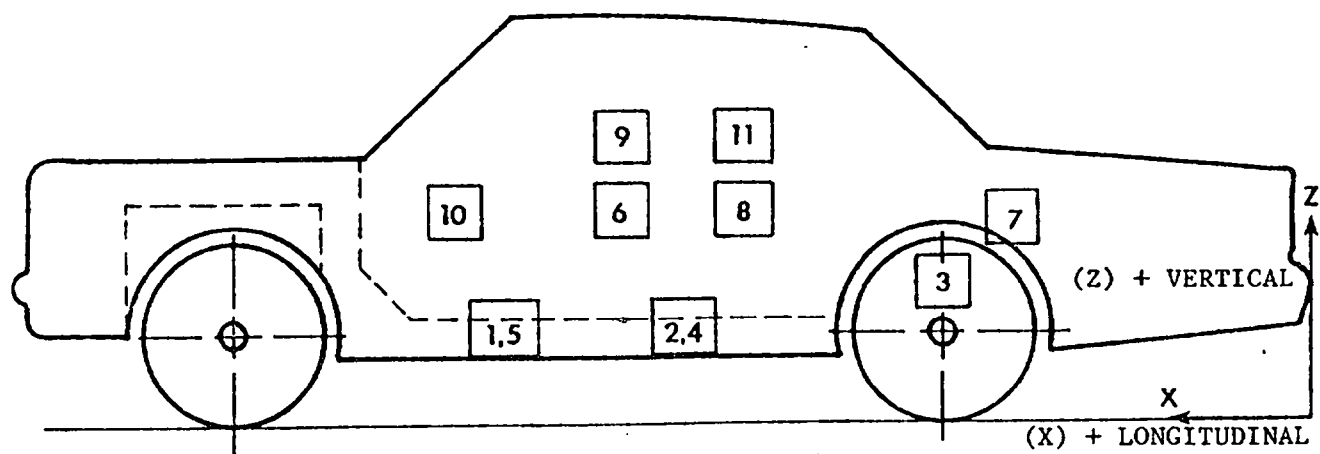
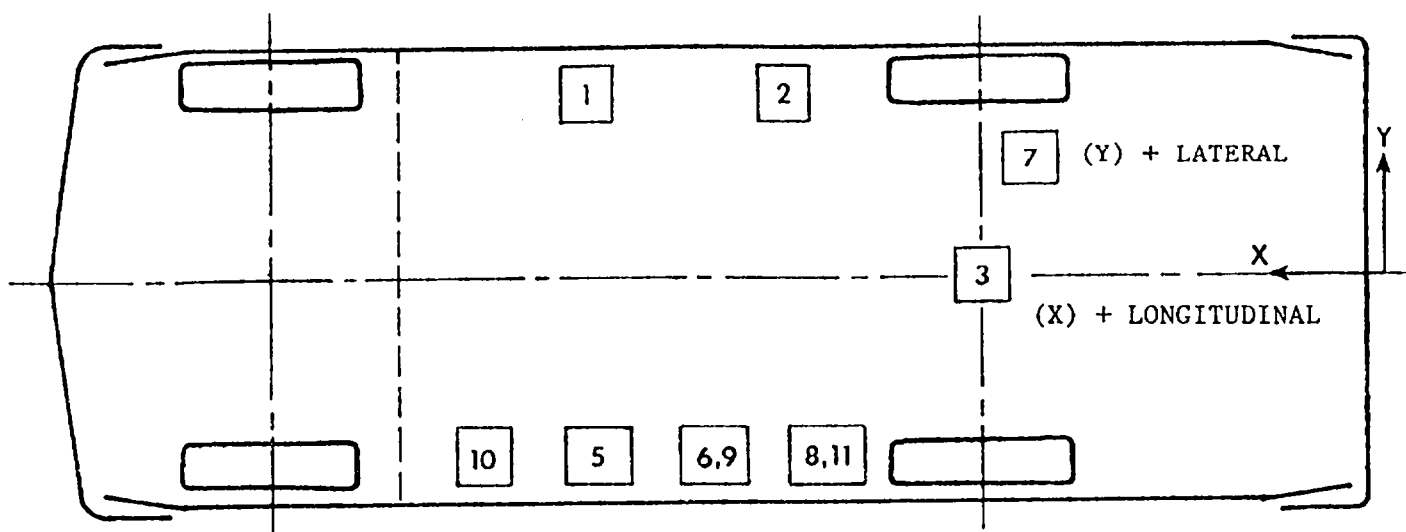
All measurements of accelerometer locations in inches.

α This channel was not used do to the use of a child dummy.

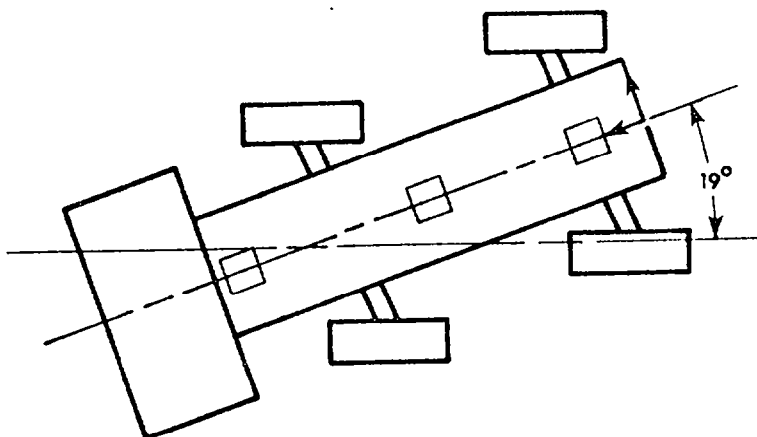
Y See TEST ANOMALIES

T This Delta V appears unrealistic.

VEHICLE ACCELEROMETER LOCATIONS



MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY



NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	CENTER OF GRAVITY	74.5	0.0	11.5				
	(LONGITUDINAL)	$\Delta V = -18.6 \text{ mph @ } 137.25 \text{ msec}$			6.06	23.13	17.81	75.50
	(LATERAL)	$\Delta V = -3.1 \text{ mph @ } 137.25 \text{ msec}$			1.64	39.13	4.68	85.63
	(VERTICAL)				25.26	34.00	14.58	38.63
	(RESULTANT)					26.76 @ 33.88		
2	FRONT FRAME MEMBER	130.3	0.0	11.3				
	(LONGITUDINAL)	$\Delta V = -20.0 \text{ mph @ } 137.25 \text{ msec}$			---	---x	16.67	74.63
3	REAR FRAME MEMBER	23.3	0.0	11.5				
	(LONGITUDINAL)	$\Delta V = -17.7 \text{ mph @ } 137.25 \text{ msec}$			0.80	125.50	15.17	55.38

* Reference: X - Rear Most Point of Frame (+ To Forward), Y - Barrier Centerline (+ To Right), Z - Ground Level (+ To Up)

All measurements of accelerometer locations in inches.

*There were no positive values in the time interval of interest.

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Overhead	Photosonic 1B	8	465	Vehicle dynamics
2	Overhead	Photosonic 1B	25	420	Closeup of impact point
3	Onboard MDB	Photosonic 1B	25	498	Closeup of impact point
4	Onboard MDB	Photosonic 1B	13	505	Driver kinematics
5	Ground level - right	Photosonic 1B	25	502	Overall view
6	Ground level - left	Photosonic 1B	17	505	Overall view
7	Onboard vehicle	Photosonic 1B	8	807	Driver kinematics - front view
8	Onboard vehicle	Photosonic 1B	8	812	Driver kinematics
9	Onboard vehicle	Photosonic 1B	8	815	Passenger kinematics

LOCATIONS OF OFFBOARD HIGH SPEED CAMERAS

CAMERA NO.	X	Y	Z
1	0	0	25'
2	0	0	25'
5	26'4"	60'	45"
6	-19'7"	-11'3"	45"

Origin of Coordinate System is Point of Impact

+X = Forward with Respect to Striking Vehicle's Velocity Vector
+Y = Rightward with Respect to Striking Vehicle's Velocity Vector
+Z = Upward with Respect to Striking Vehicle's Velocity Vector

NON-GOVERNMENT FURNISHED TRANSDUCER INFORMATION

PARAMETER BEING MEASURED	TYPE OF TRANSDUCER	MODEL NUMBER	SERIAL NUMBER	MFGR.	DATE OF LAST CALIBRATION	SENSITIVITY	DESIRED FULL SCALE (ENGR. UNITS)
BOGXG	Accel	4-202-0001	18845	Bell Howell	11/8/84	0.237 MV/G	50 G
BOGYG	Accel	4-202-0001	18858	Bell Howell	11/8/84	0.238 MV/G	50 G
BOGZG	Accel	4-202-0001	18857	Bell Howell	11/8/84	0.240 MV/G	50 G
BFCXG	Accel	4-202-0001	18240	Bell Howell	11/8/84	0.239 MV/G	50 G
BRCXG	Accel	4-202-0001	19022	Bell Howell	11/8/84	0.220 MV/G	50 G

All dummy and struck vehicle accelerometers were Government Furnished Equipment and were Endevco 2264 Accelerometers.

APPENDIX A
PHOTOGRAPHS



Figure A-1. PRE-TEST OVERALL - VIEW 1

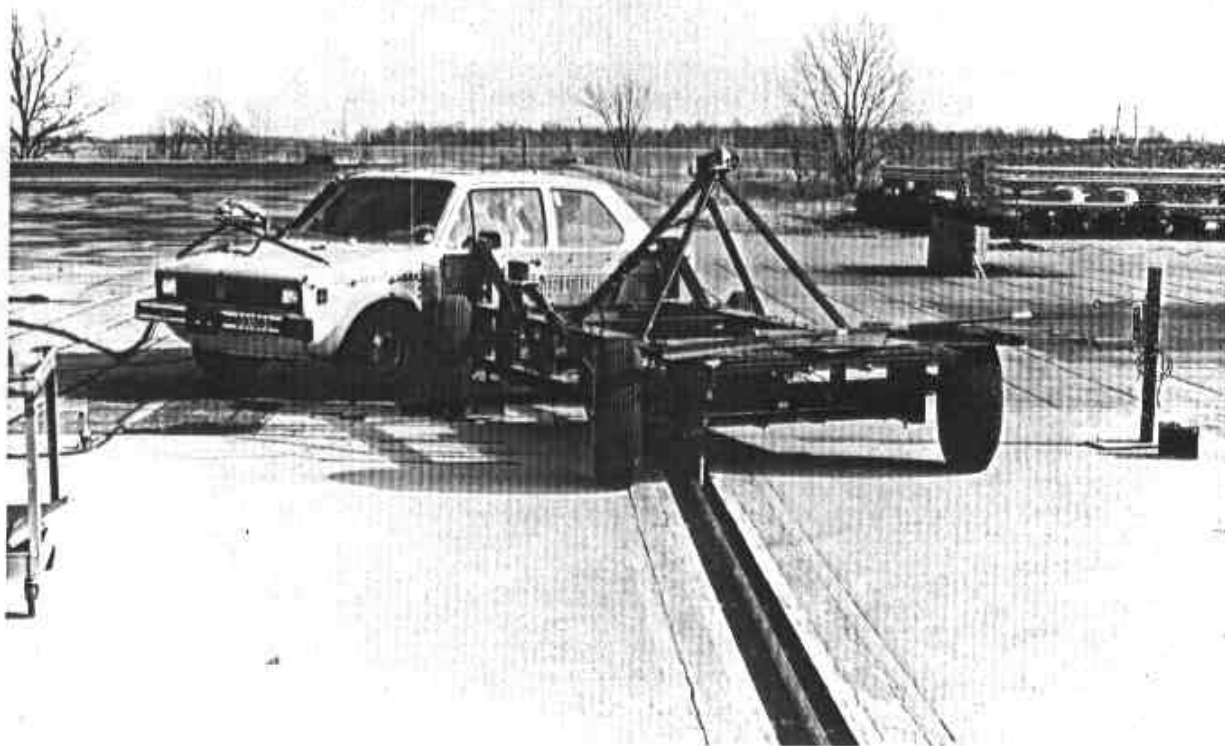


Figure A-2. PRE-TEST OVERALL - VIEW 2
A-2



Figure A-3. PRE-TEST OVERALL - VIEW 3



Figure A-4. PRE-TEST OVERALL - VIEW 4
A-3

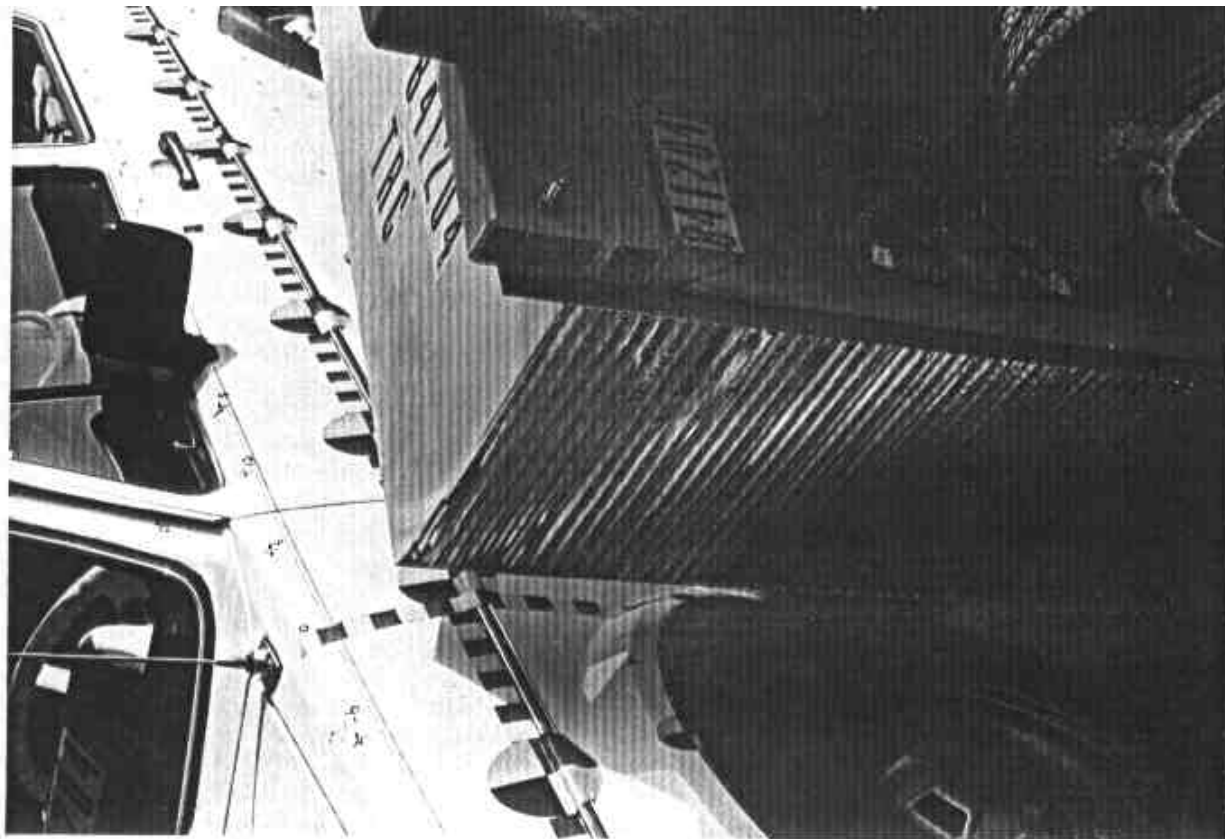


Figure A-5. PRE-TEST CLOSEUP - VIEW 1



Figure A-6. PRE-TEST CLOSEUP - VIEW 2
A-4

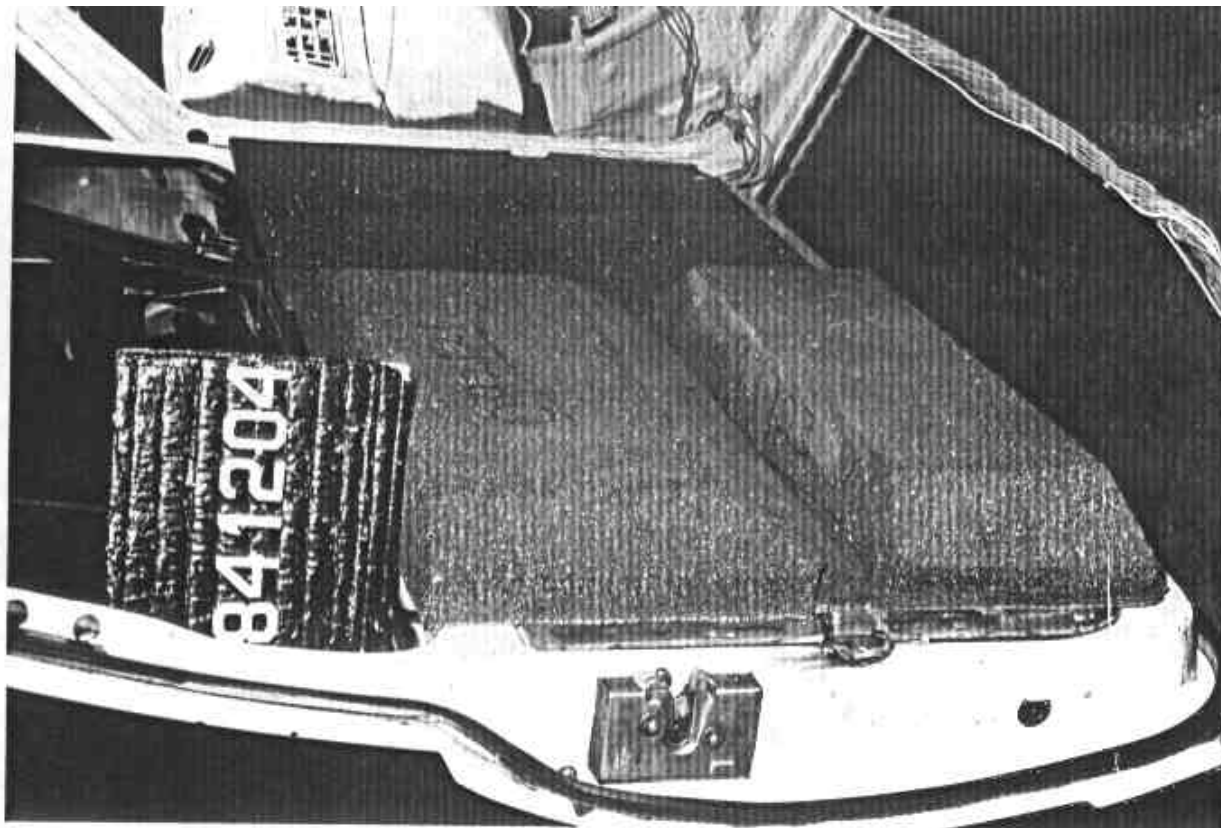


Figure A-7. PADDING MODIFICATIONS - DRIVER'S DOOR

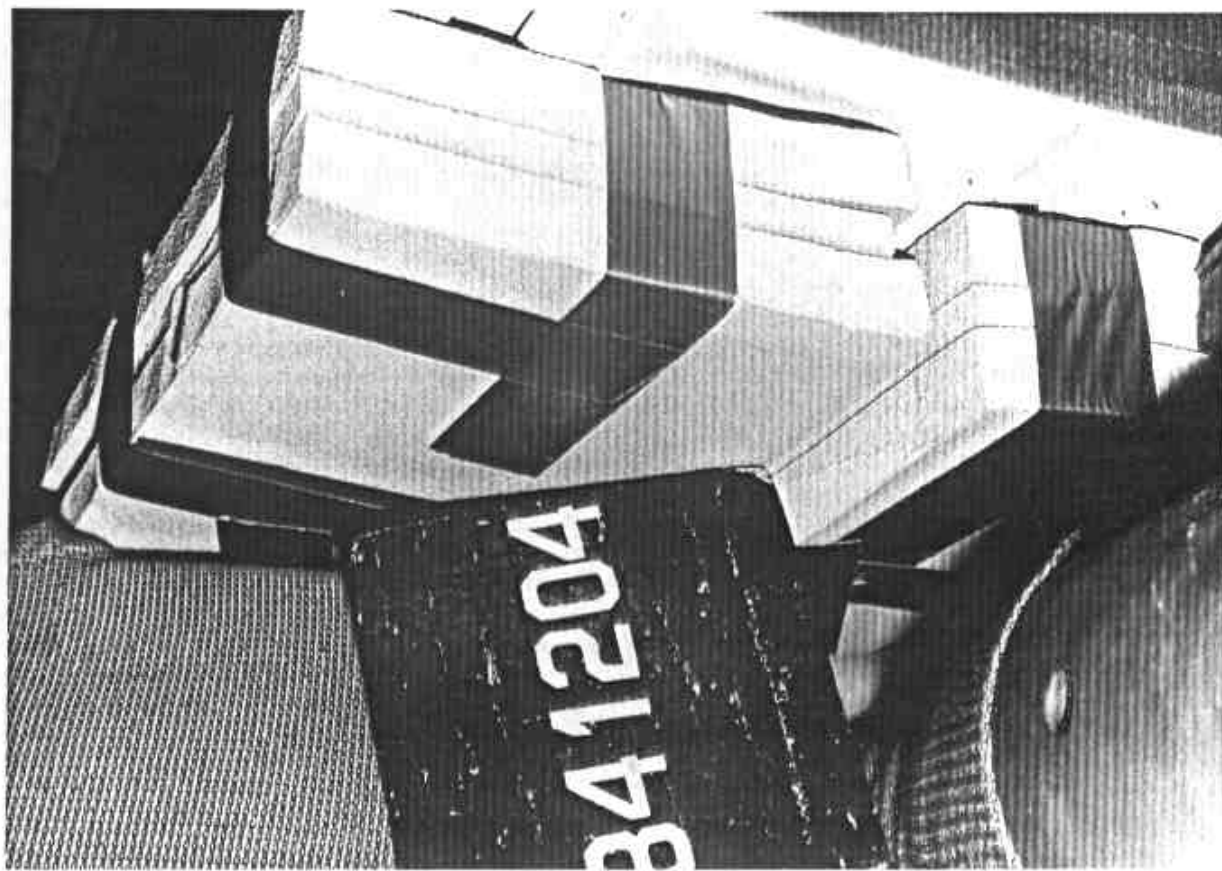


Figure A-8. PADDING MODIFICATIONS - PASSENGER'S QUARTER PANEL



Figure A-9. PRE-TEST DRIVER DUMMY - VIEW 1



Figure A-10. PRE-TEST DRIVER DUMMY - VIEW 2



Figure A-11. PRE-TEST PASSENGER DUMMY - VIEW 1

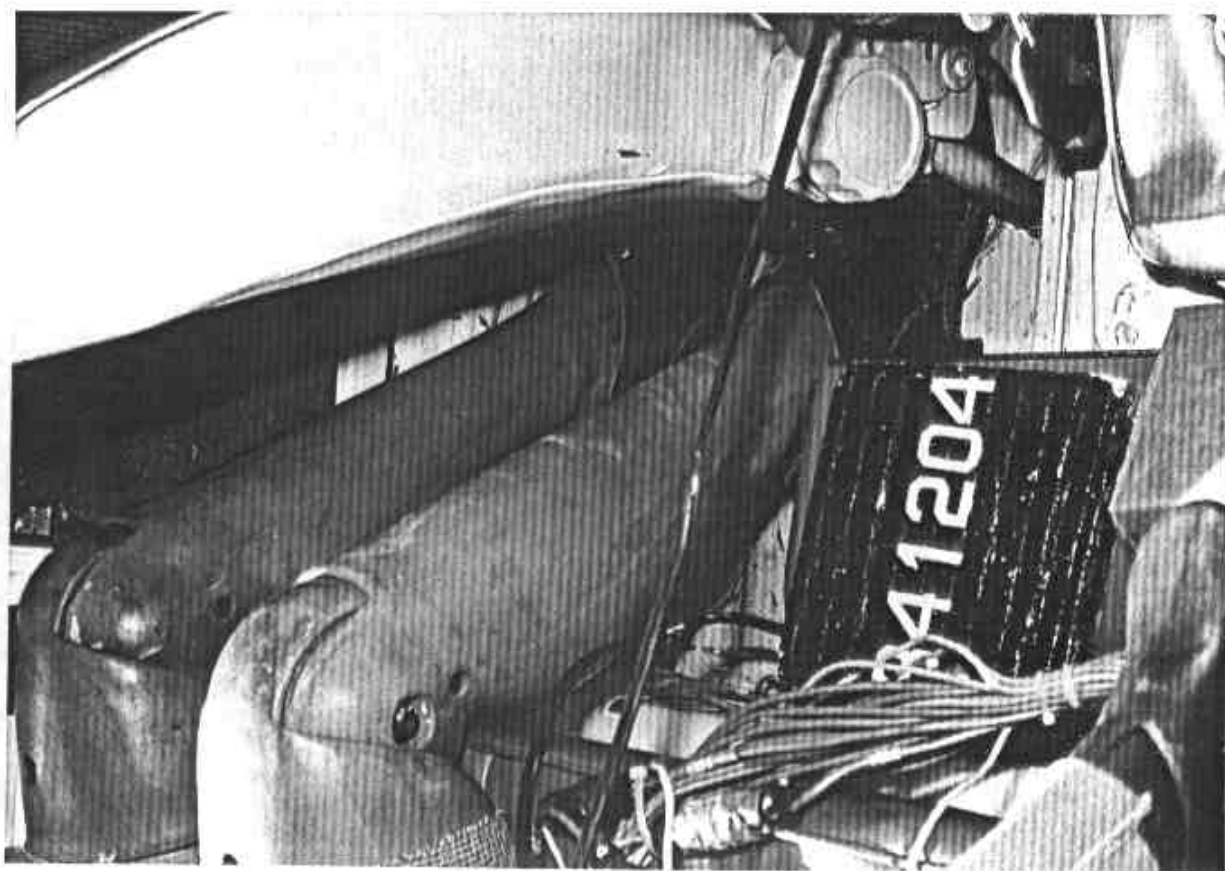


Figure A-12. PRE-TEST PASSENGER DUMMY - VIEW 2



Figure A-13. PRE-TEST DUMMIES OVERALL



Figure A-14. CRASH EVENT PHOTOGRAPH
A-8



Figure A-15. POST-TEST OVERALL - VIEW 1



Figure A-16. POST-TEST OVERALL - VIEW 2
A-9

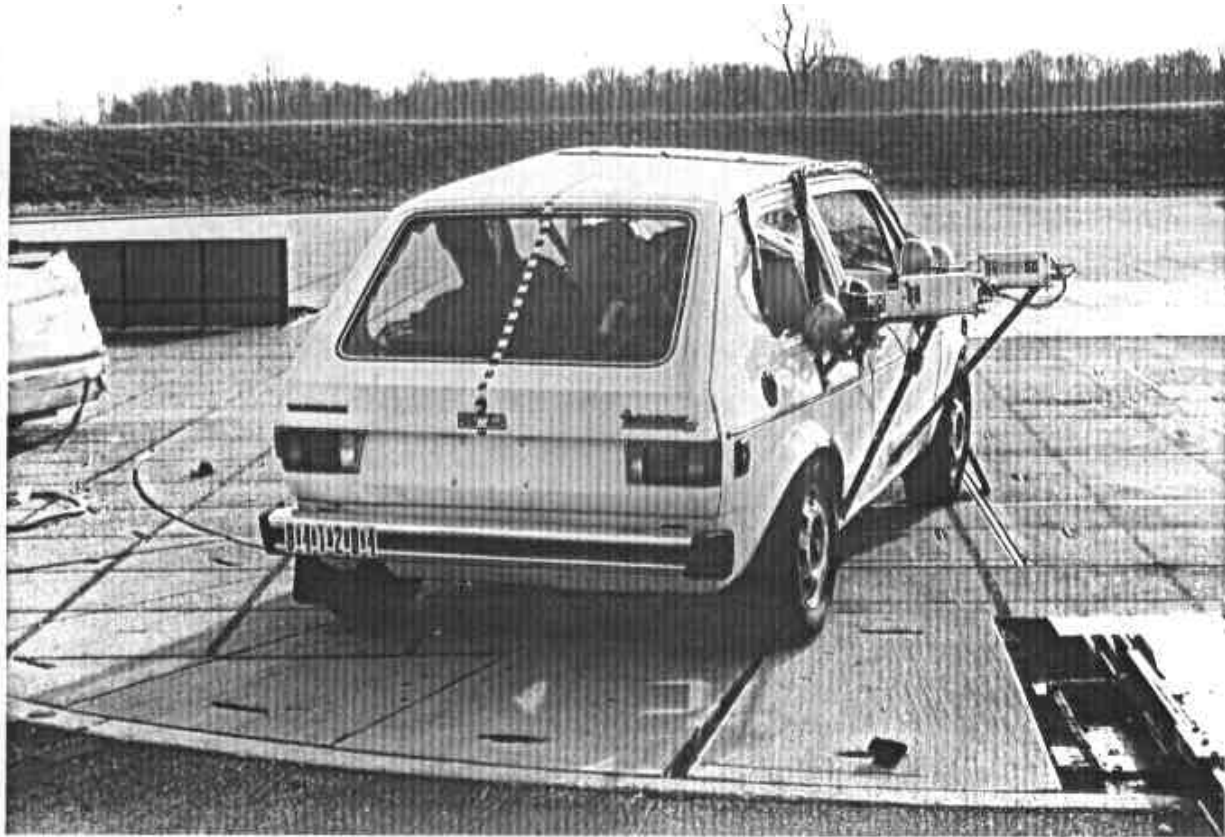


Figure A-17. POST-TEST OVERALL - VIEW 3

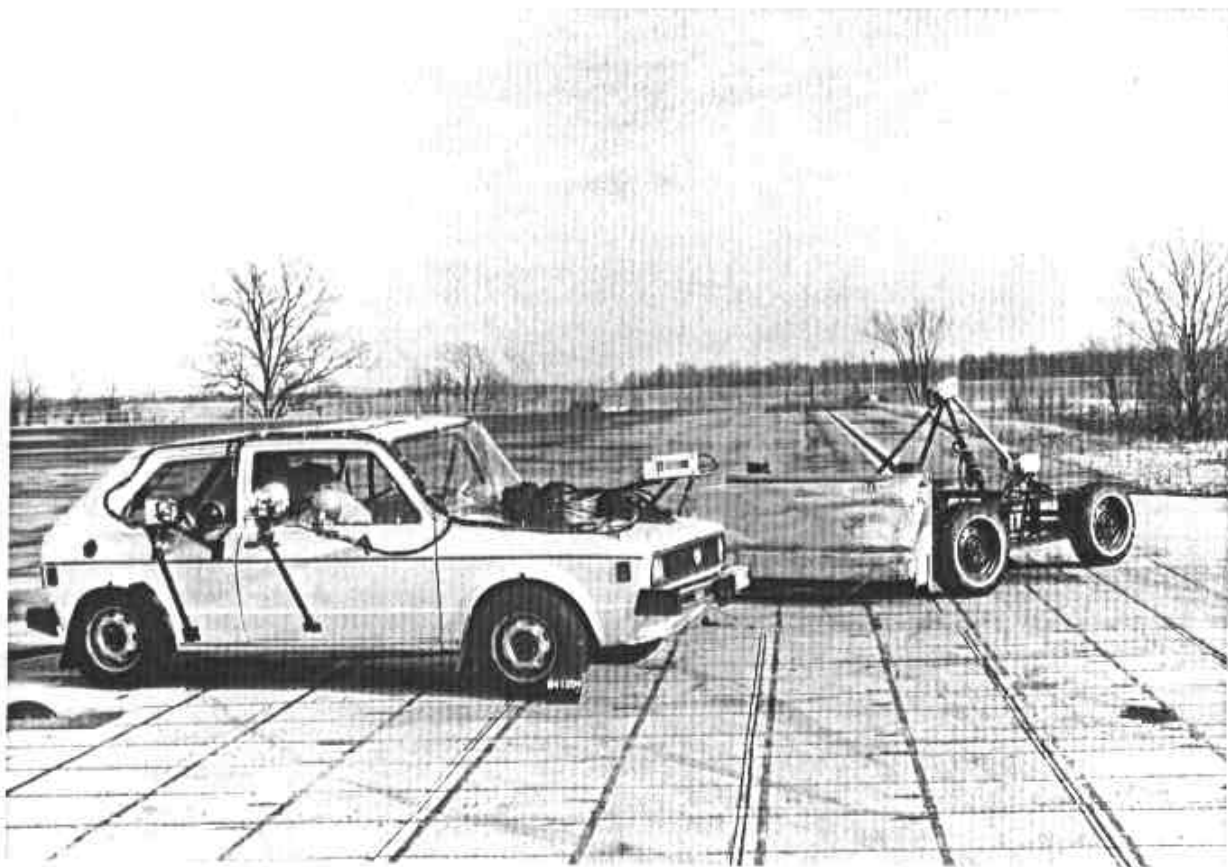


Figure A-18. POST-TEST OVERALL - VIEW 4
A-10



Figure A-19. POST-TEST DRIVER DUMMY - VIEW 1



Figure A-20. POST-TEST DRIVER DUMMY - VIEW 2



Figure A-21. POST-TEST DRIVER DUMMY -- VIEW 3



Figure A-22. POST-TEST PASSENGER DUMMY
A-12



Figure A-23. POST-TEST DUMMIES OVERALL

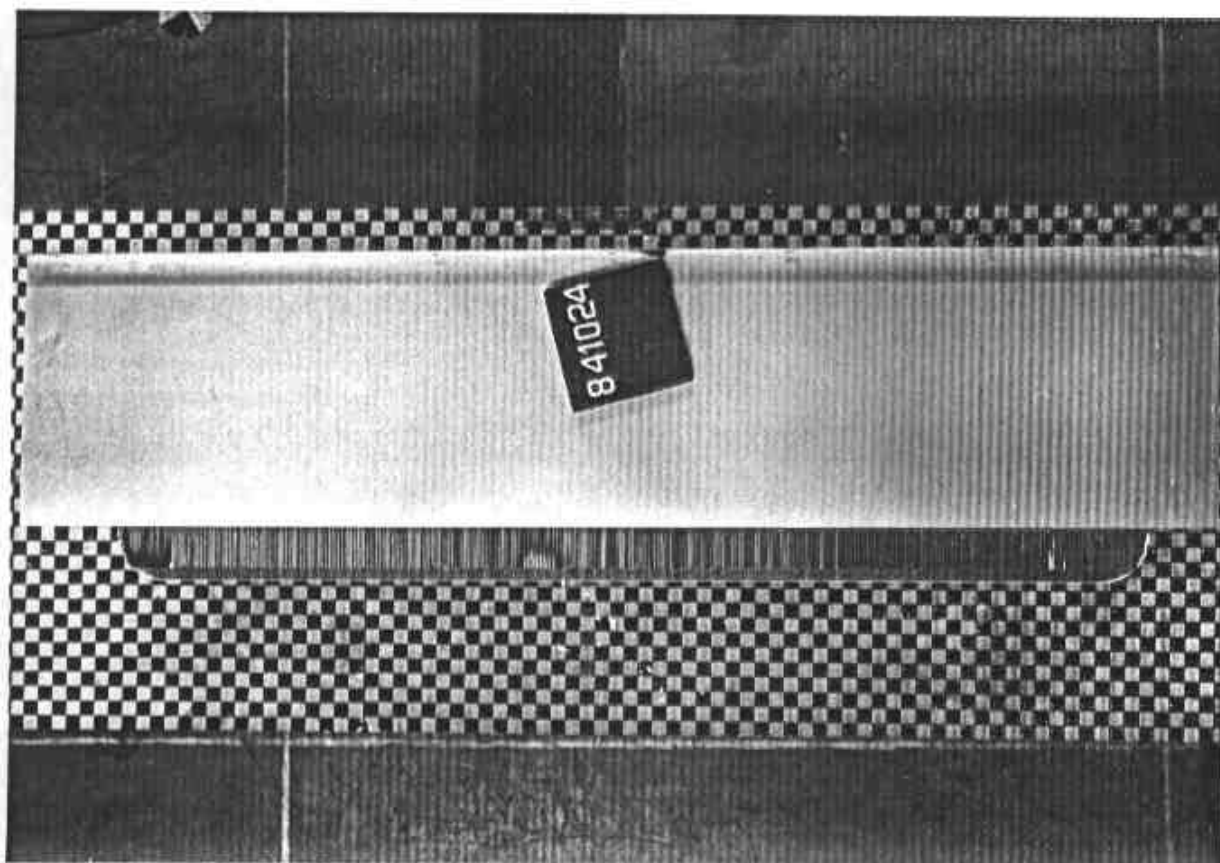


Figure A-24. PRE-TEST MDB FACE - VIEW 1
A-13

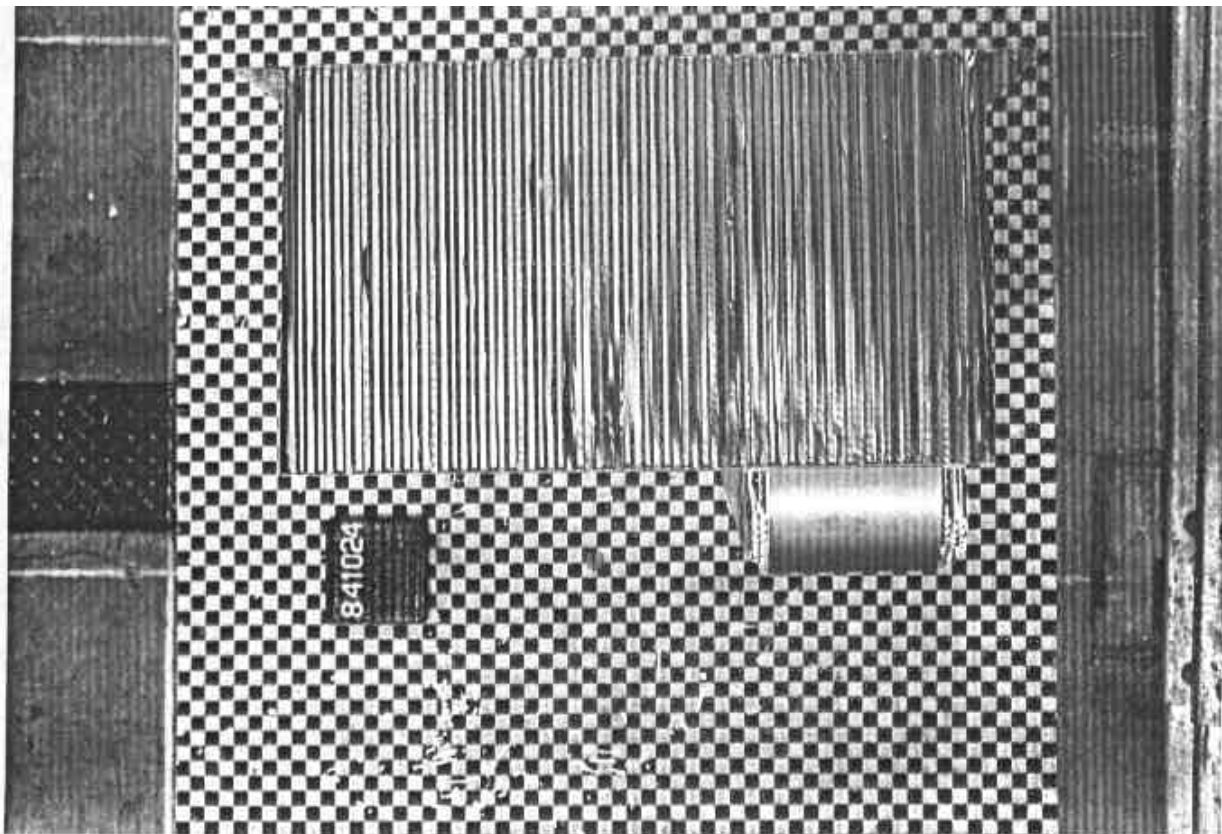


Figure A-25. PRE-TEST MDB FACE - VIEW 2

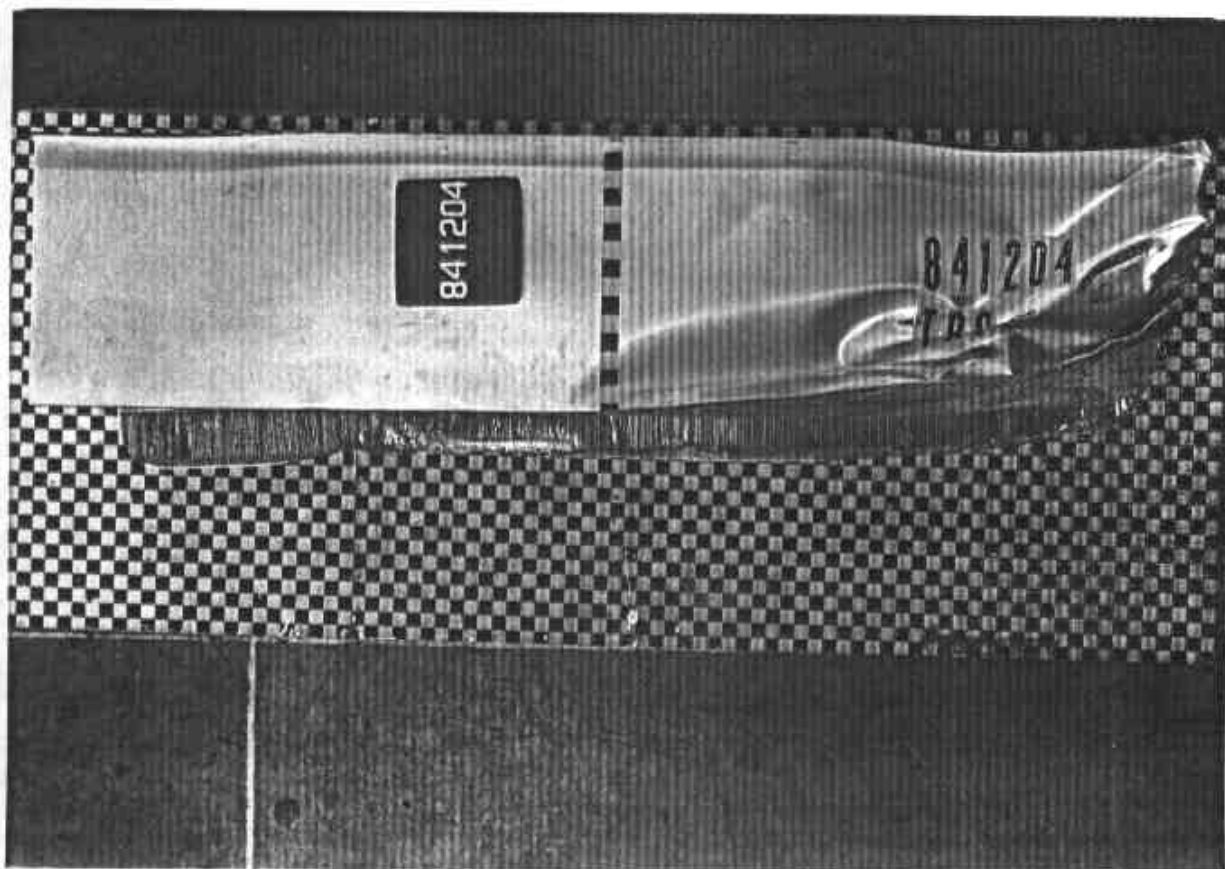


Figure A-26. POST-TEST MDB FACE - VIEW 1
A-14

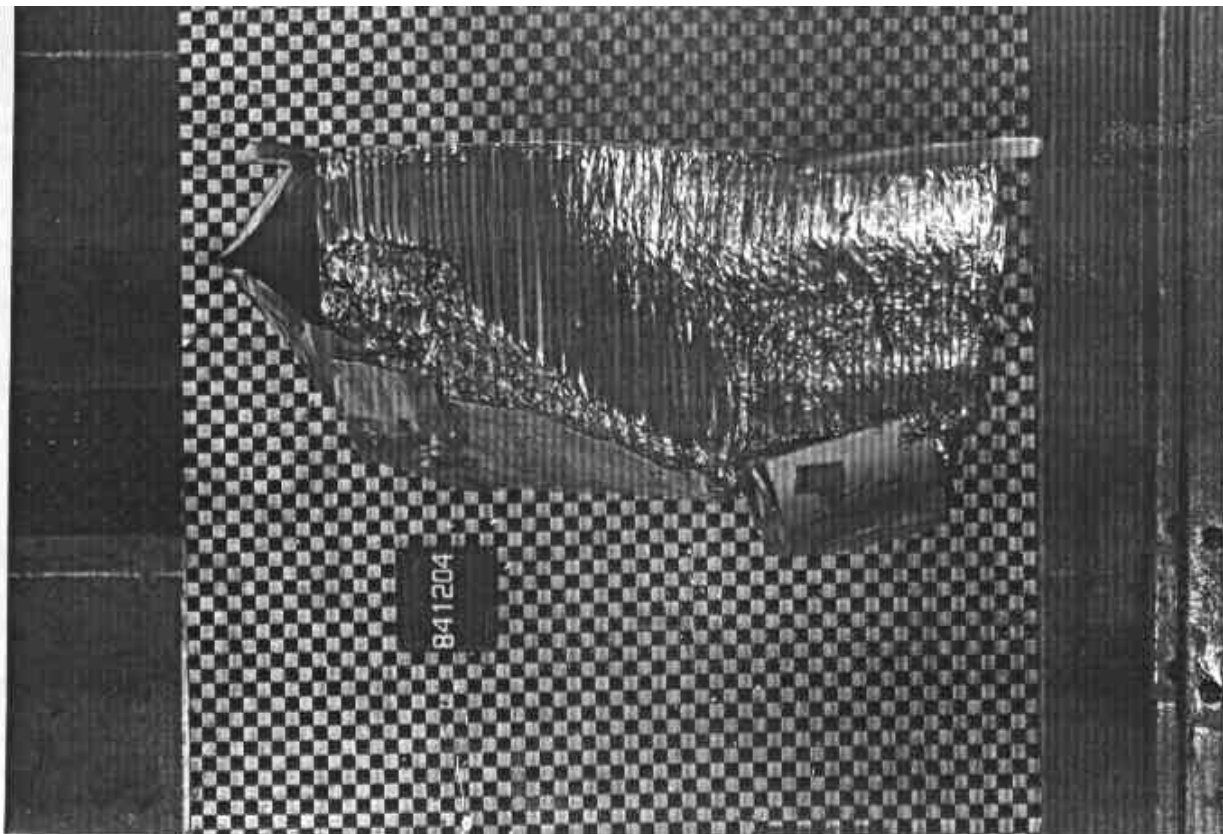


Figure A-27. POST-TEST MDB FACE - VIEW 2

APPENDIX B
DATA PLOT PRESENTATION

Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. The data was filtered according to SAE J211, except dummy thorax data which was filtered using the HSRI filter.

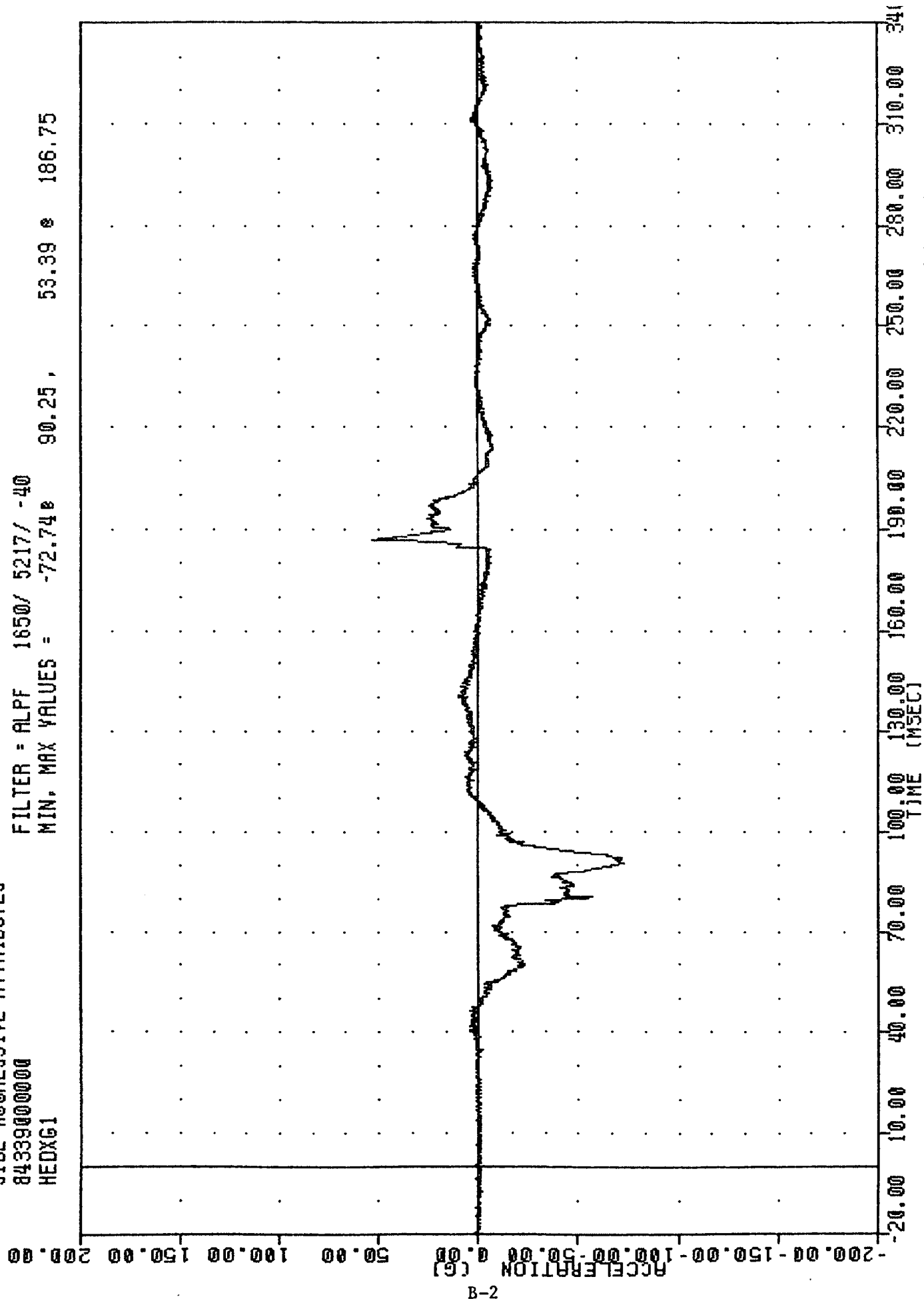
SIDE AGGRESSIVE ATTRIBUTES

84339000000

HDXG1

FILTER = ALPF 1650/ 5217/ -40

MIN. MAX VALUES = -72.74e 90.25, 53.39 e 186.75



B-2

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD ACCELERATION X AXIS

SIDE AGGRESSIVE ATTRIBUTES

84339000000

HE0Y61

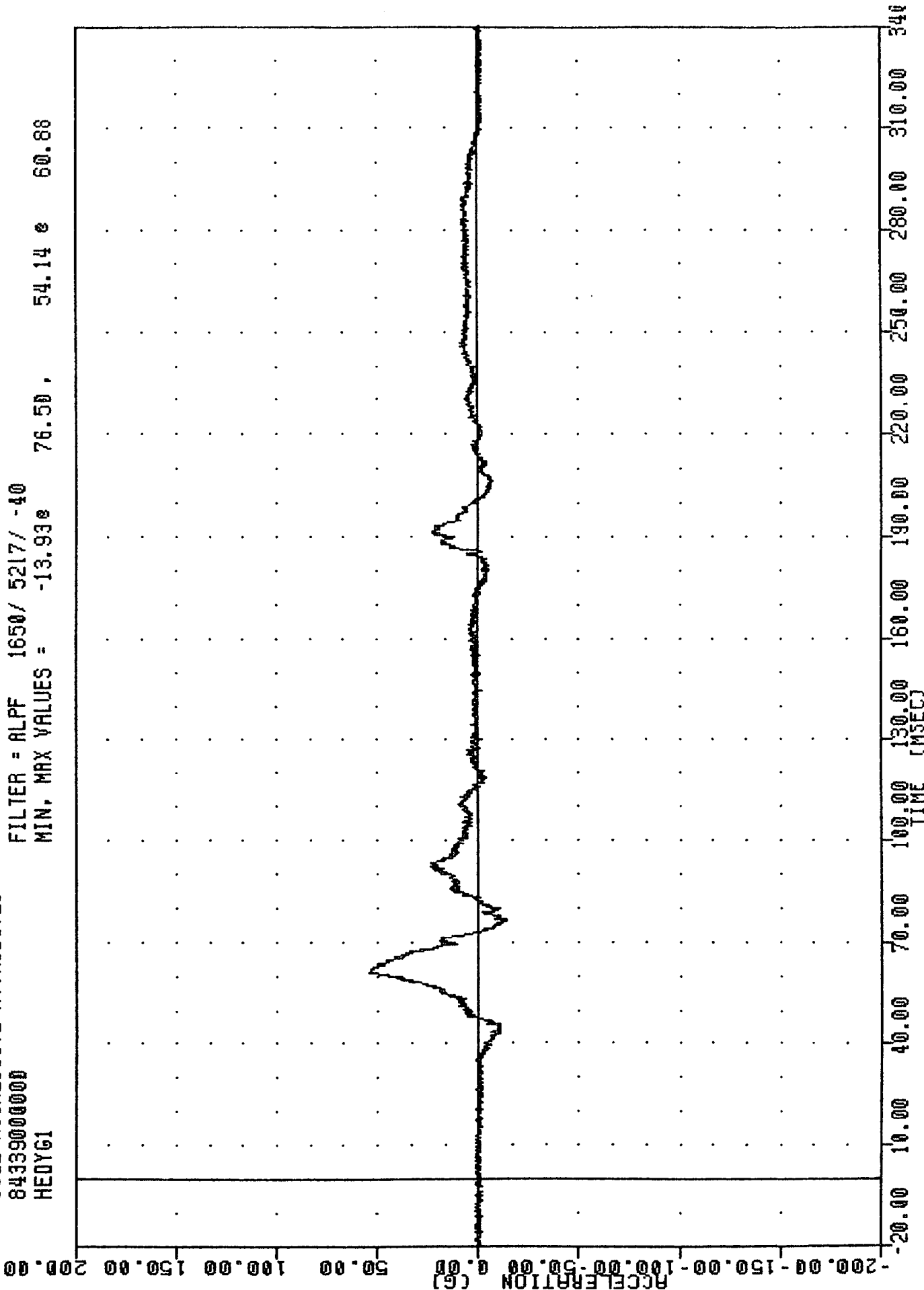
FILTER = ALPF 1650/ 5217/ -40

MIN, MAX VALUES = -13.93e

76.50 ,

54.14 e

60.88



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD ACCELERATION Y AXIS

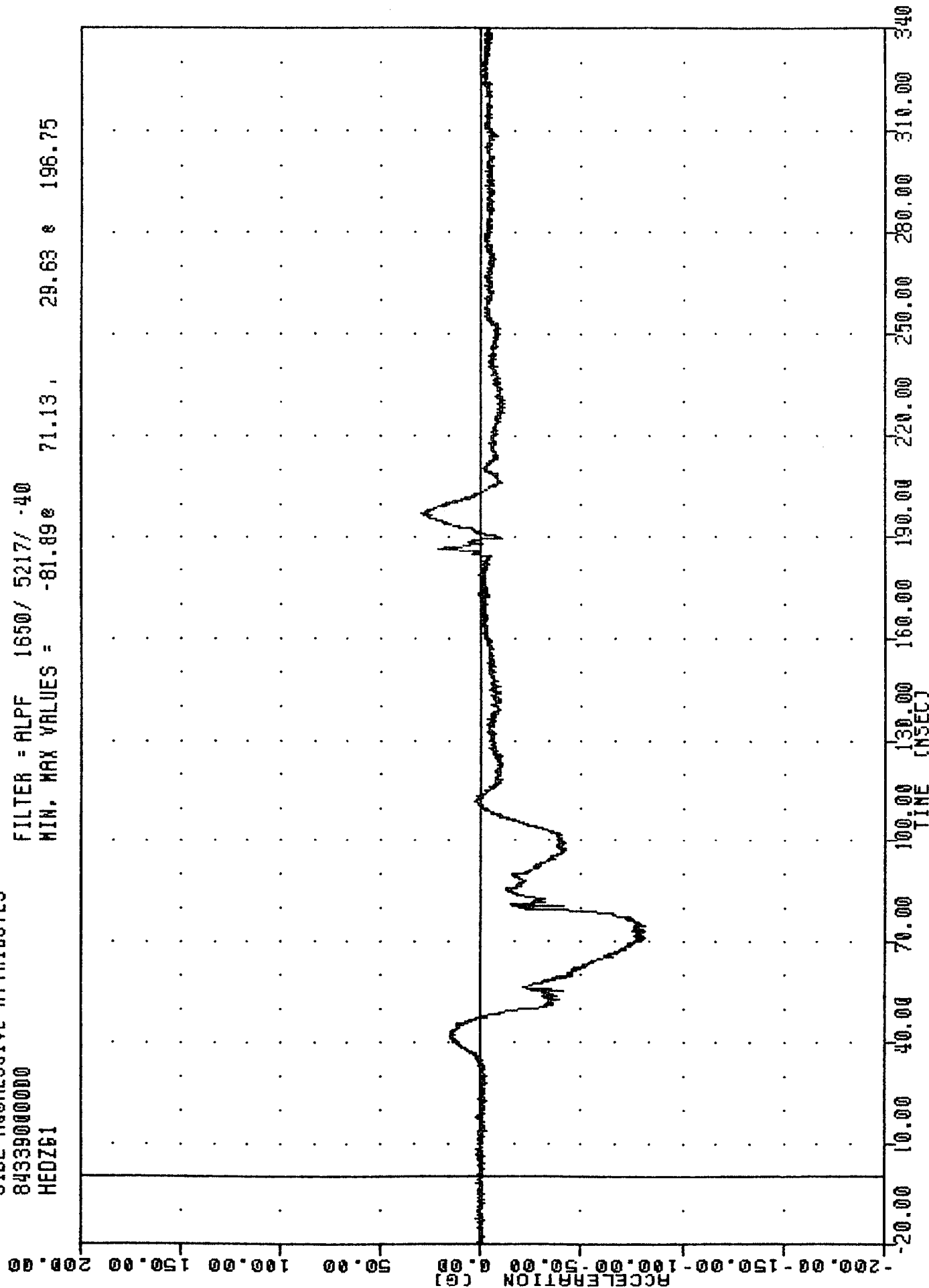
SIDE AGGRESSIVE ATTRIBUTES

84339000000

HEDZ61

FILTER = ALPF 1650/ 5217/ -40

MIN. MAX VALUES = -81.89e 71.13 , 29.63 e 196.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD ACCELERATION Z AXIS

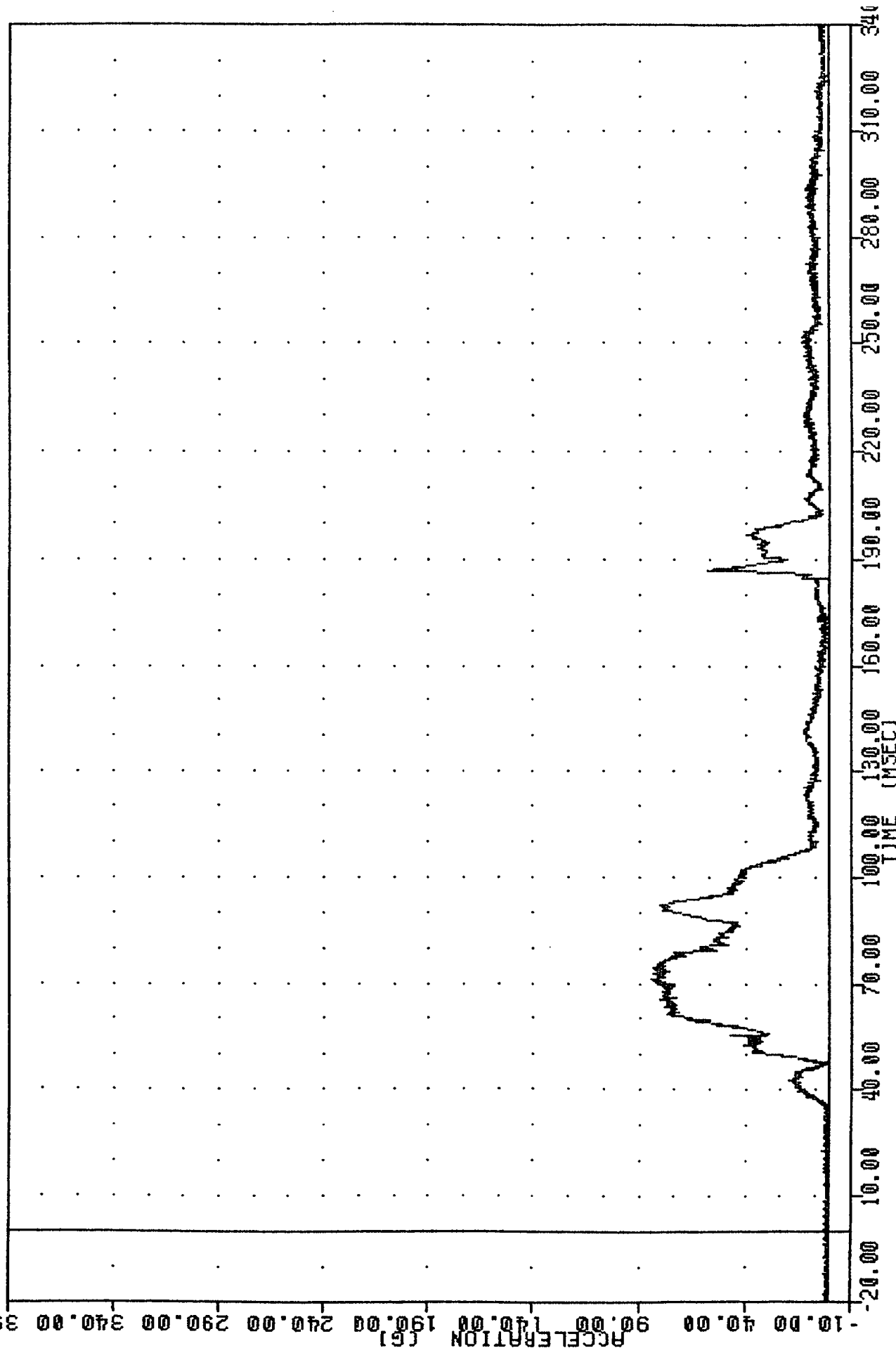
SIDE AGGRESSIVE ATTRIBUTES

84339000000

HEDRG1

FILTER = ALPF 1650/ 5217/ -40

MIN, MAX VALUES = 0.16g 3.75, 84.65g 71.13

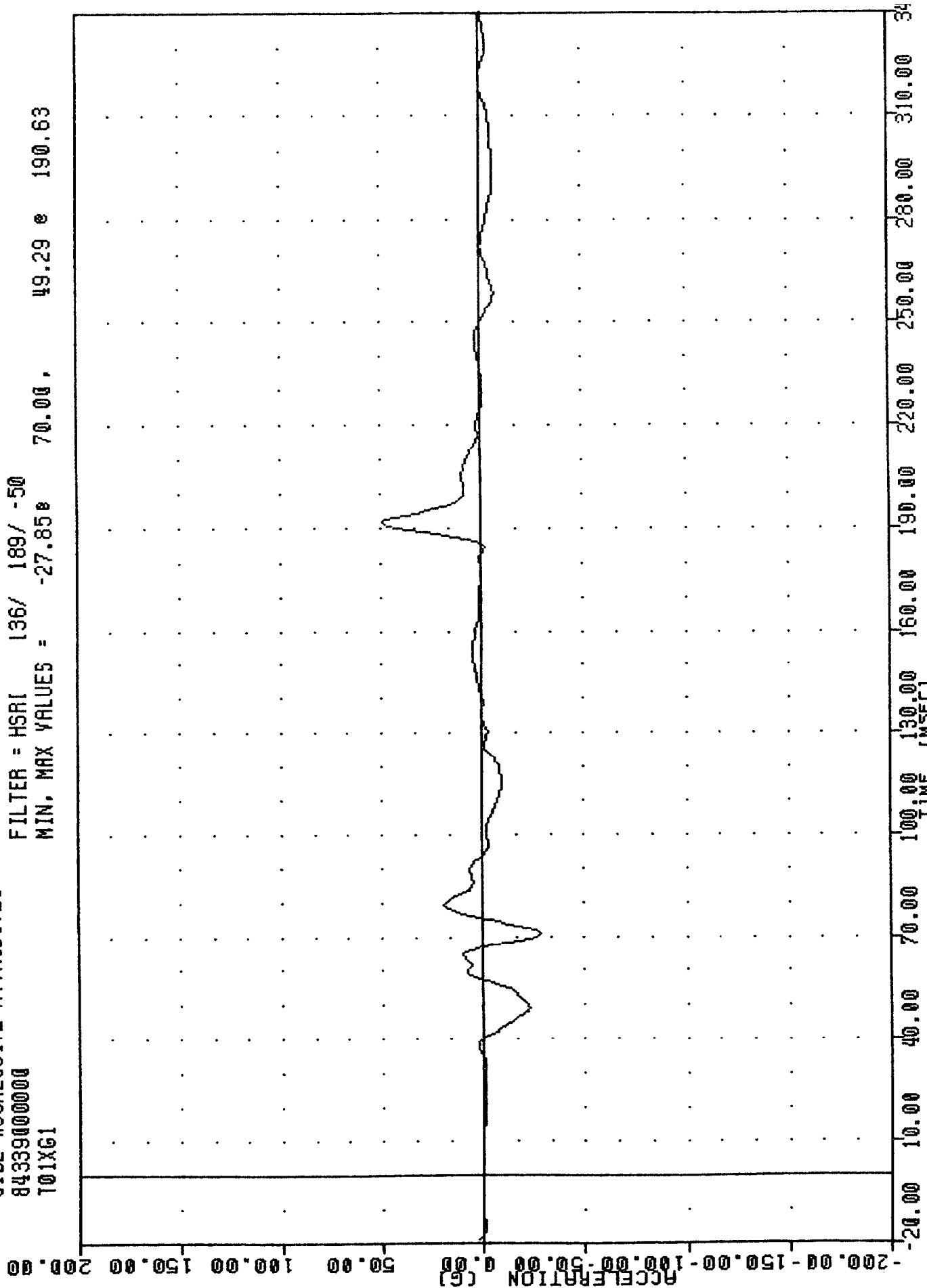


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD RESULTANT

IHC , 841204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T01XG1

PLU1 UNIE 12-UEL-04 12-03-03

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -27.85 70.00, 49.29 190.63

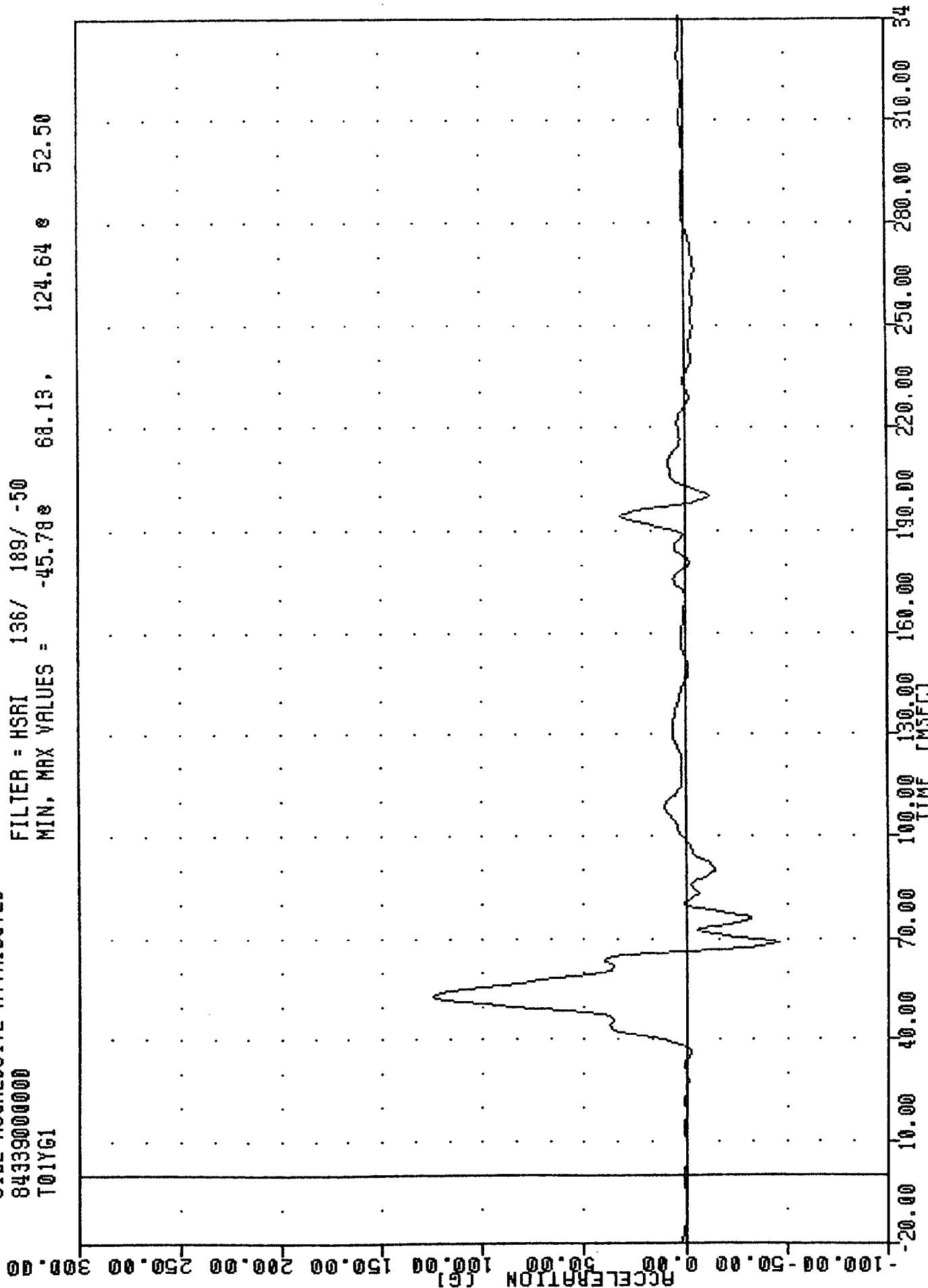


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER UPPER SPINE ACCELERATION X AXIS

INL 041204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T01Y61

FLUT UNIC 12 DEC 04 12:00:00

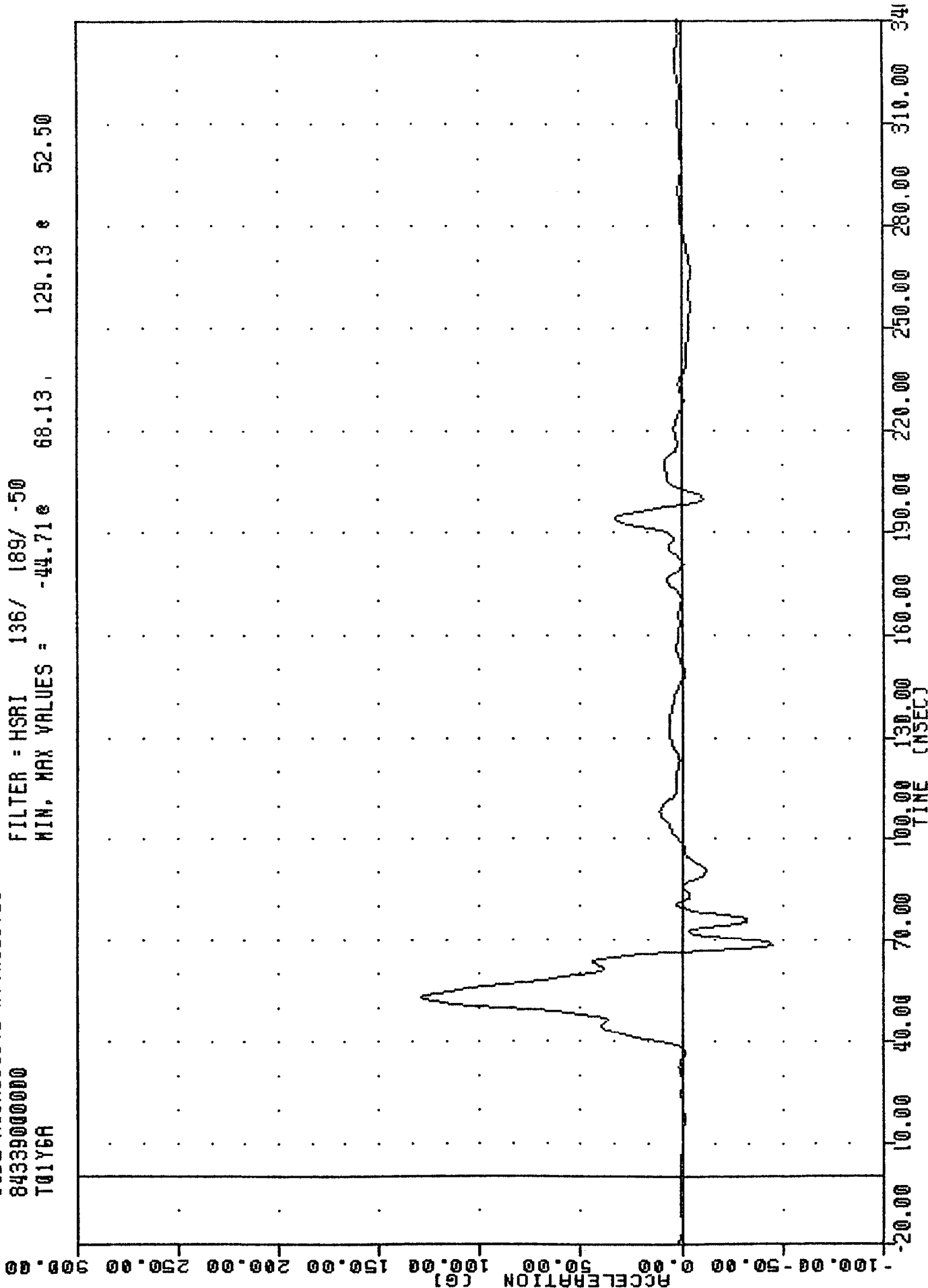
FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -45.78 68.13, 124.64 52.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER UPPER SPINE ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES
84339000000
T01Y6A

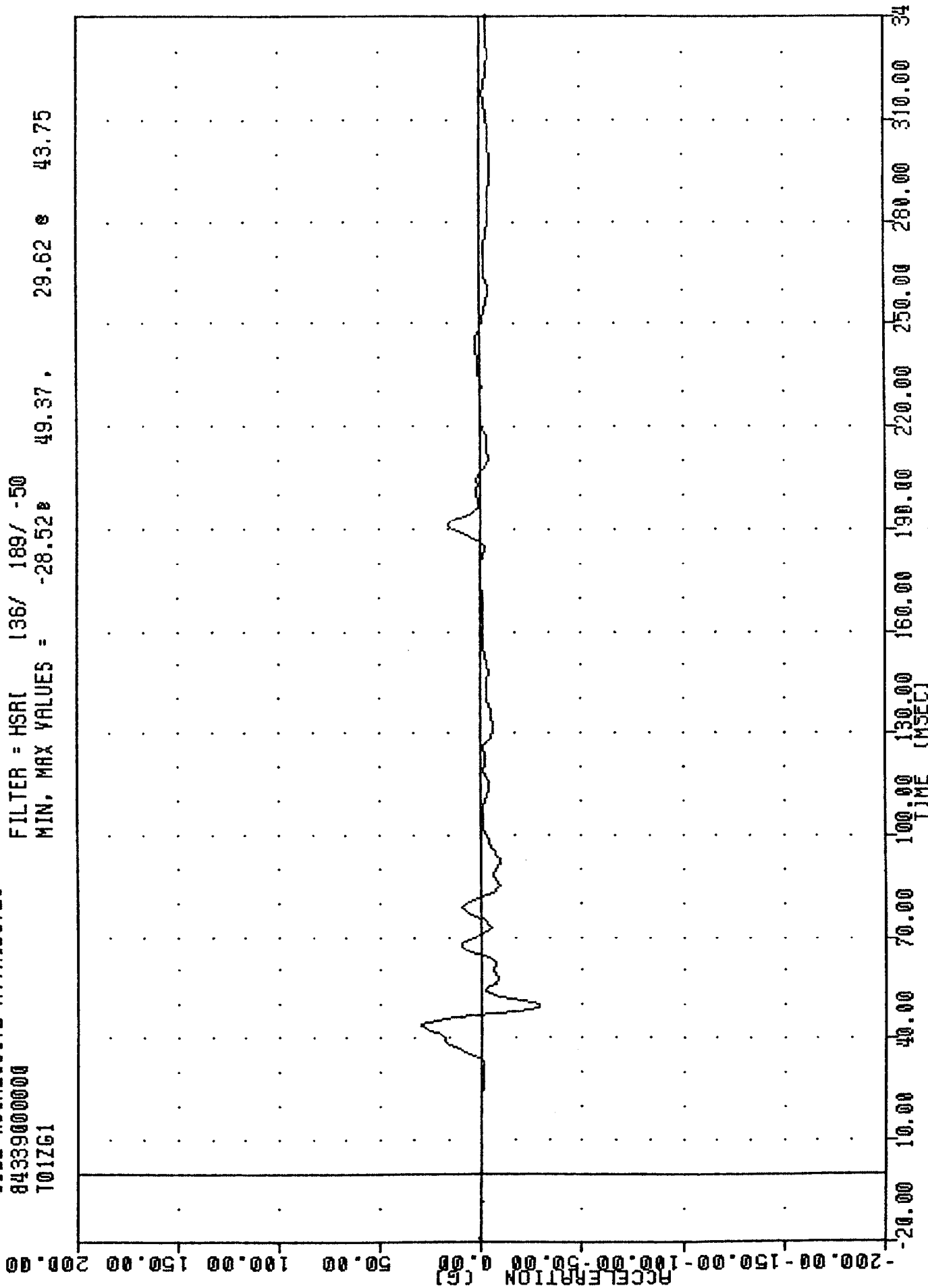
FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -44.71e 68.13 129.13 e 52.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE ACCELERATION -2 Y AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 101761

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -28.52 49.37



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER UPPER SPINE ACCELERATION Z AXIS

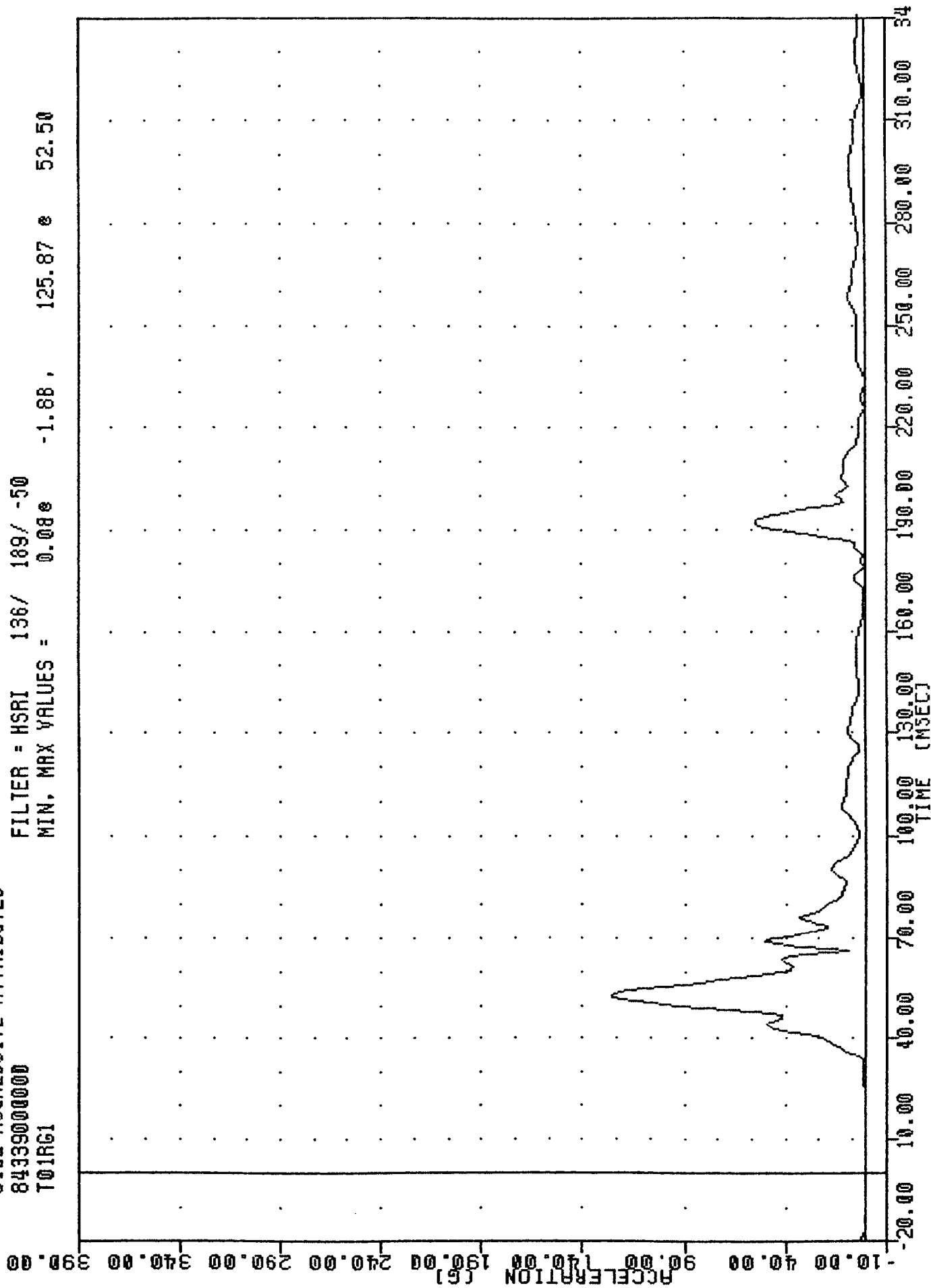
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T01RG1

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = 0.08e -1.88, 125.87 e 52.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE RESULTANT

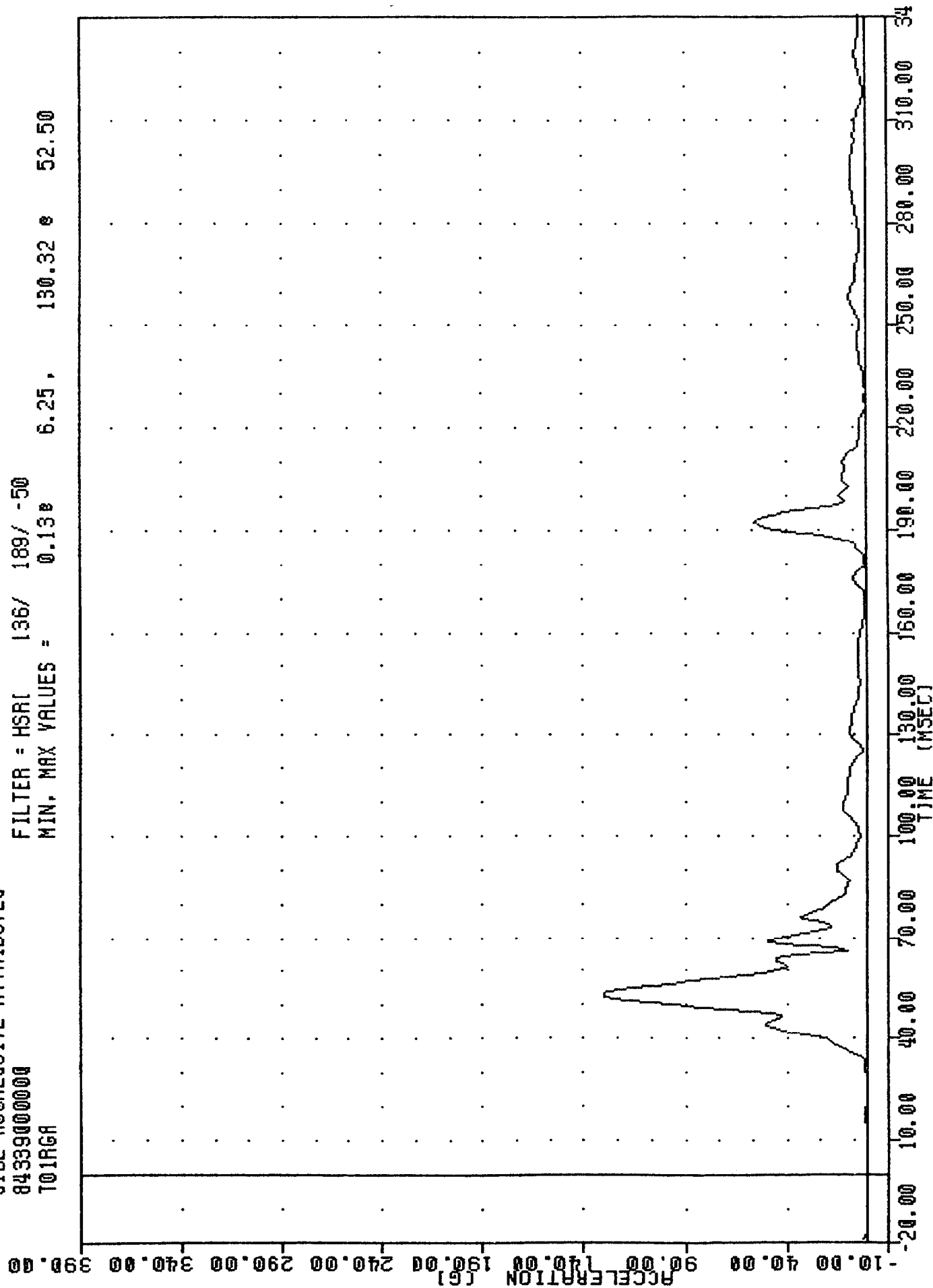
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T01RGA

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = 0.13e 6.25, 130.32 e 52.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE RESULTANT USING T01YGA

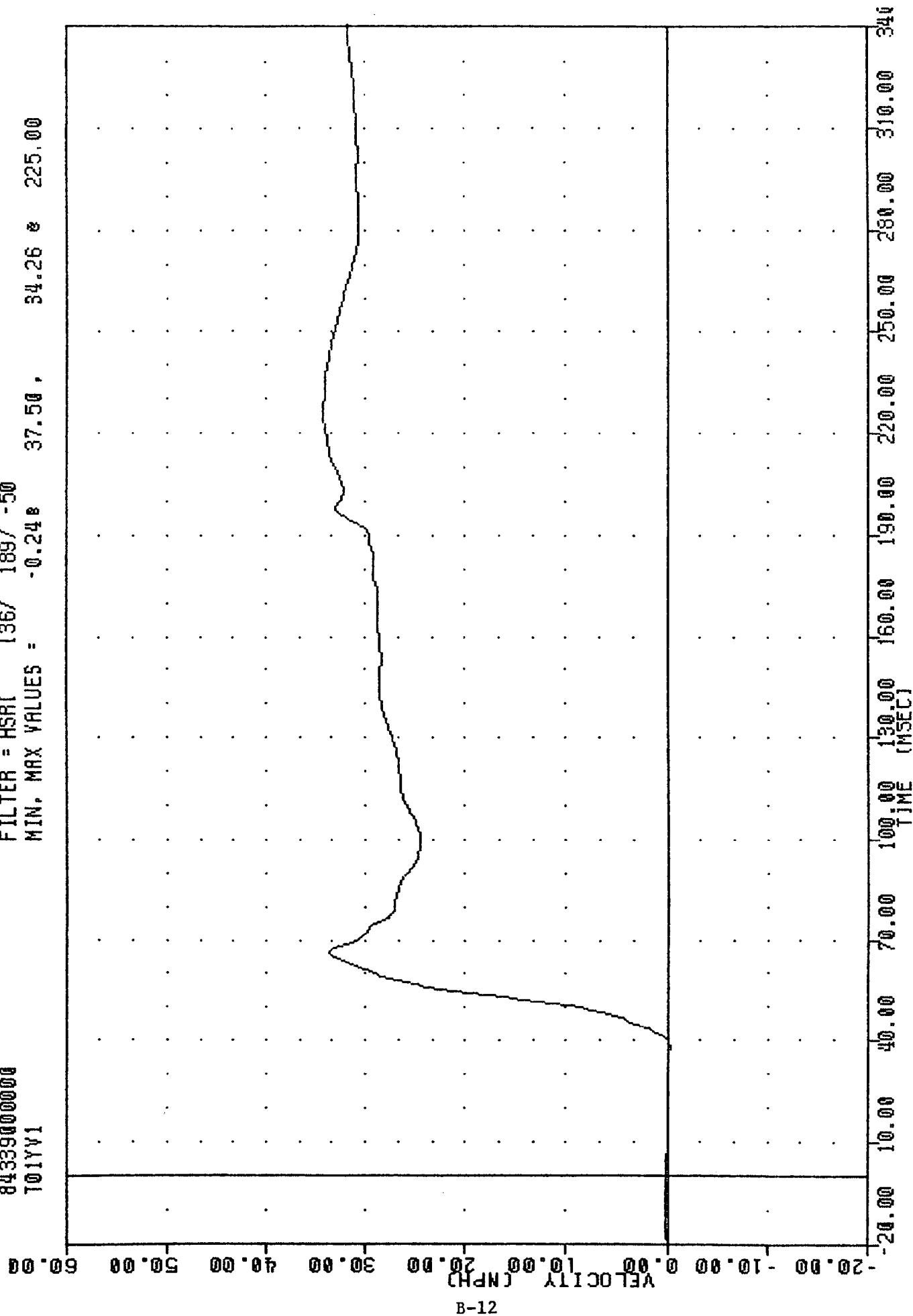
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T01YV1

FILTER = HSR(136/ 189/ -50

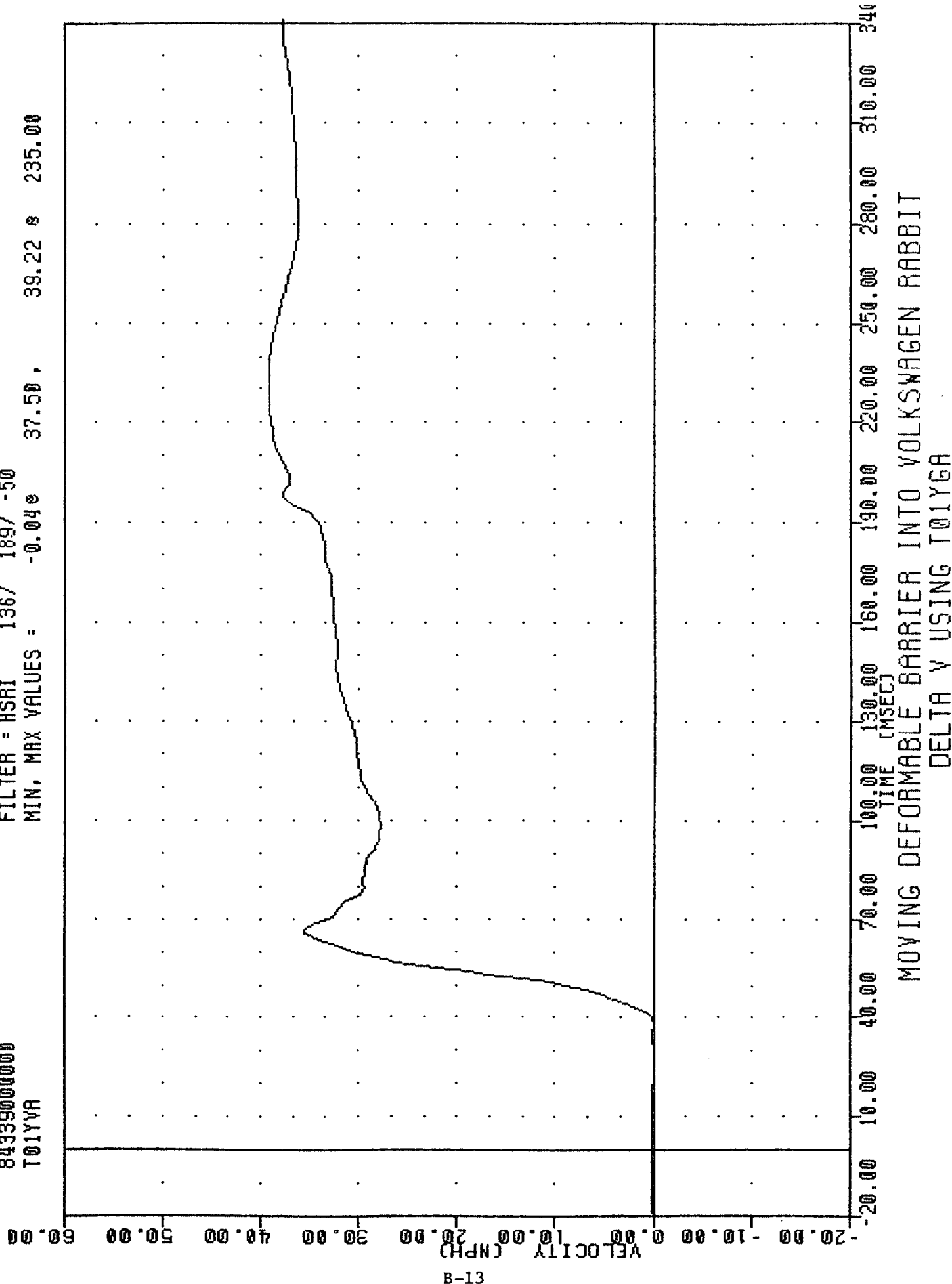
MIN. MAX VALUES = -0.24 37.50 , 34.26 & 225.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T01YGI

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T01YVA

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -0.040 37.50, 39.22 & 235.00



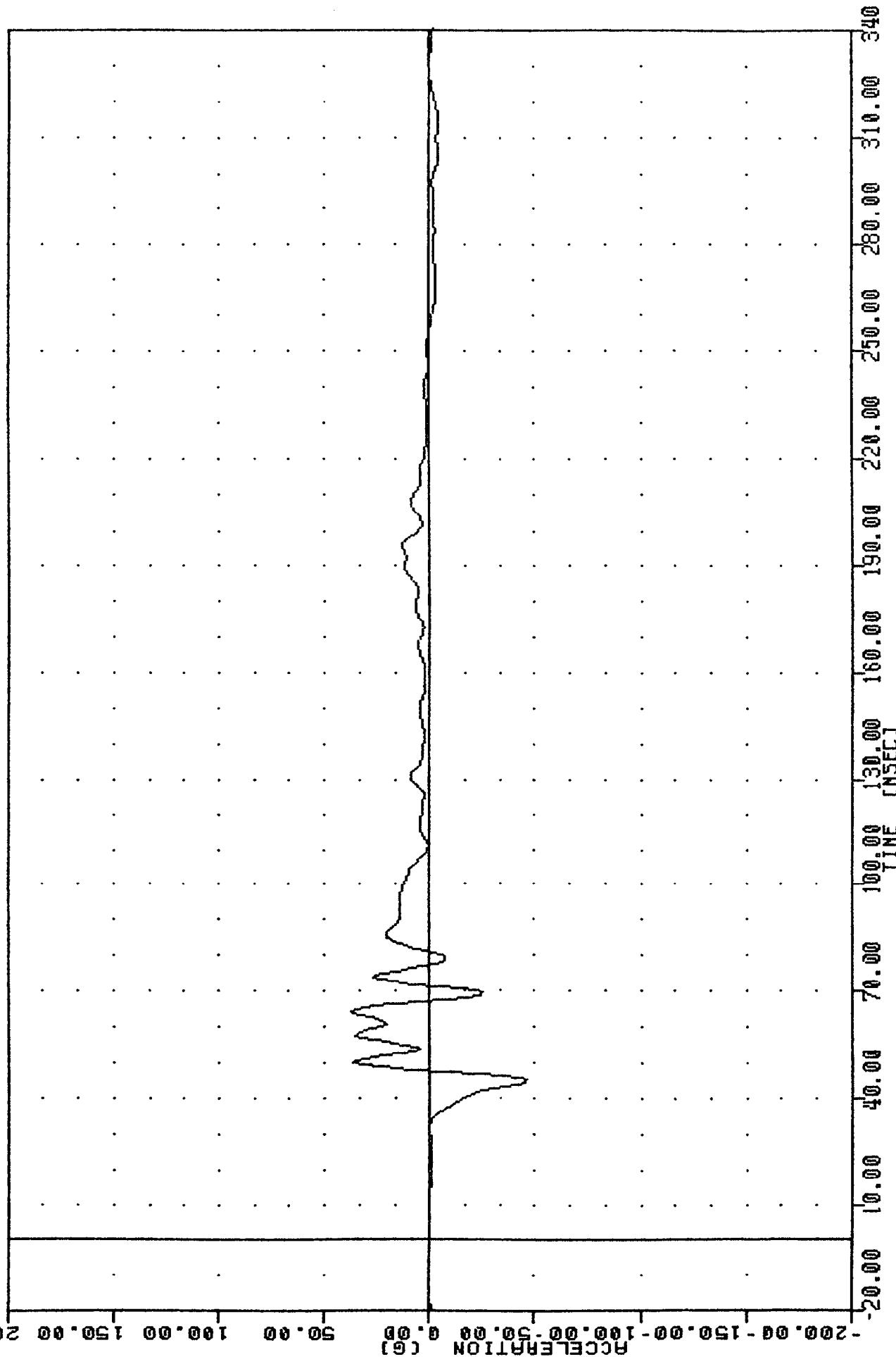
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING T01YGA

 SIDE AGGRESSIVE ATTRIBUTES

84339000000
 T12XE1

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -46.16 44.38

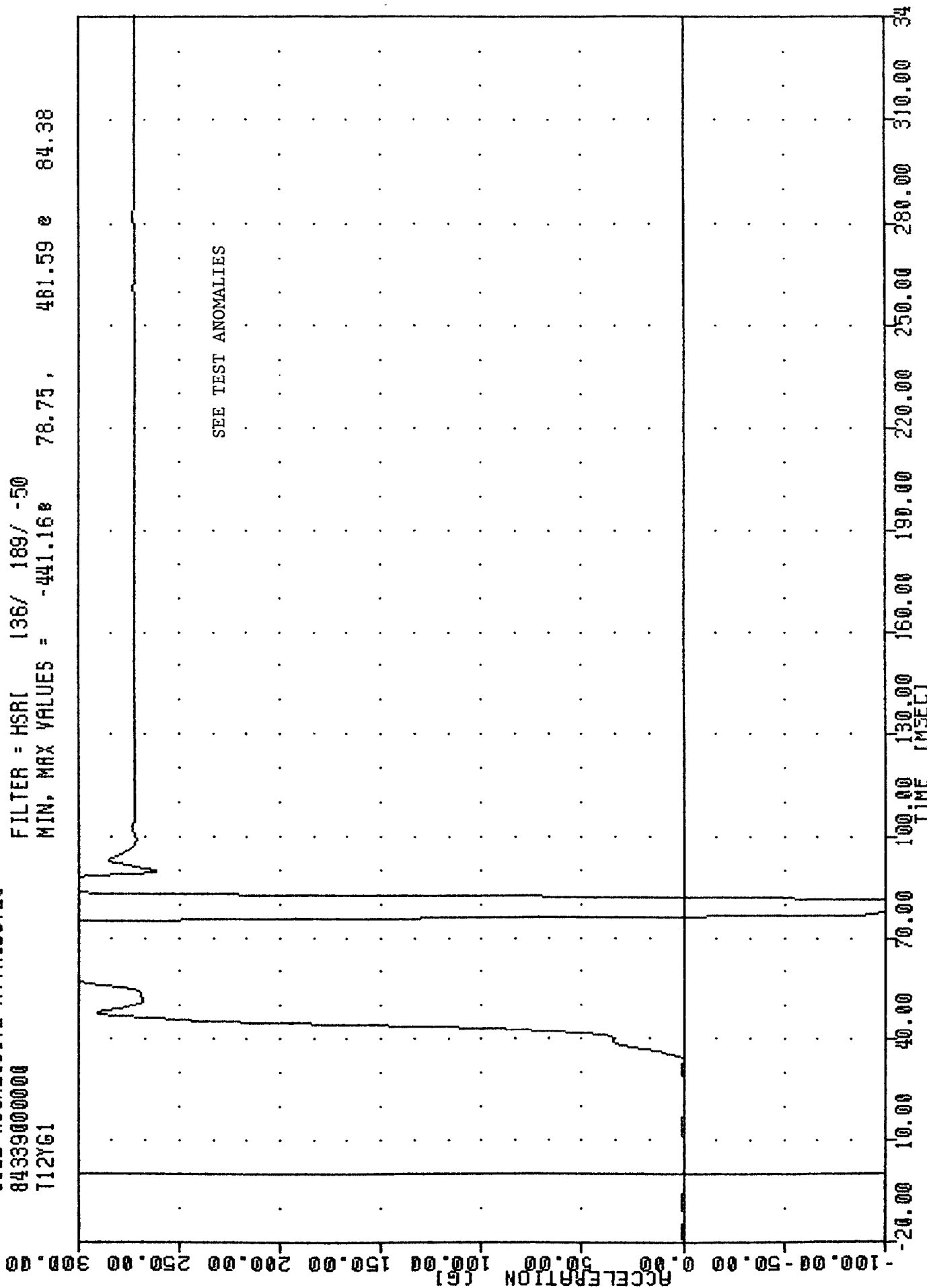
37.21 63.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LOWER SPINE ACCELERATION X AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T12YG1

FILTER = HSR1 136/ 189/ -50
 MIN, MAX VALUES = -441.168 78.75, 481.59 @ 84.38



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LOWER SPINE ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES

84339000000

T12YGA

FILTER = HSRI

136/ 189/ -50

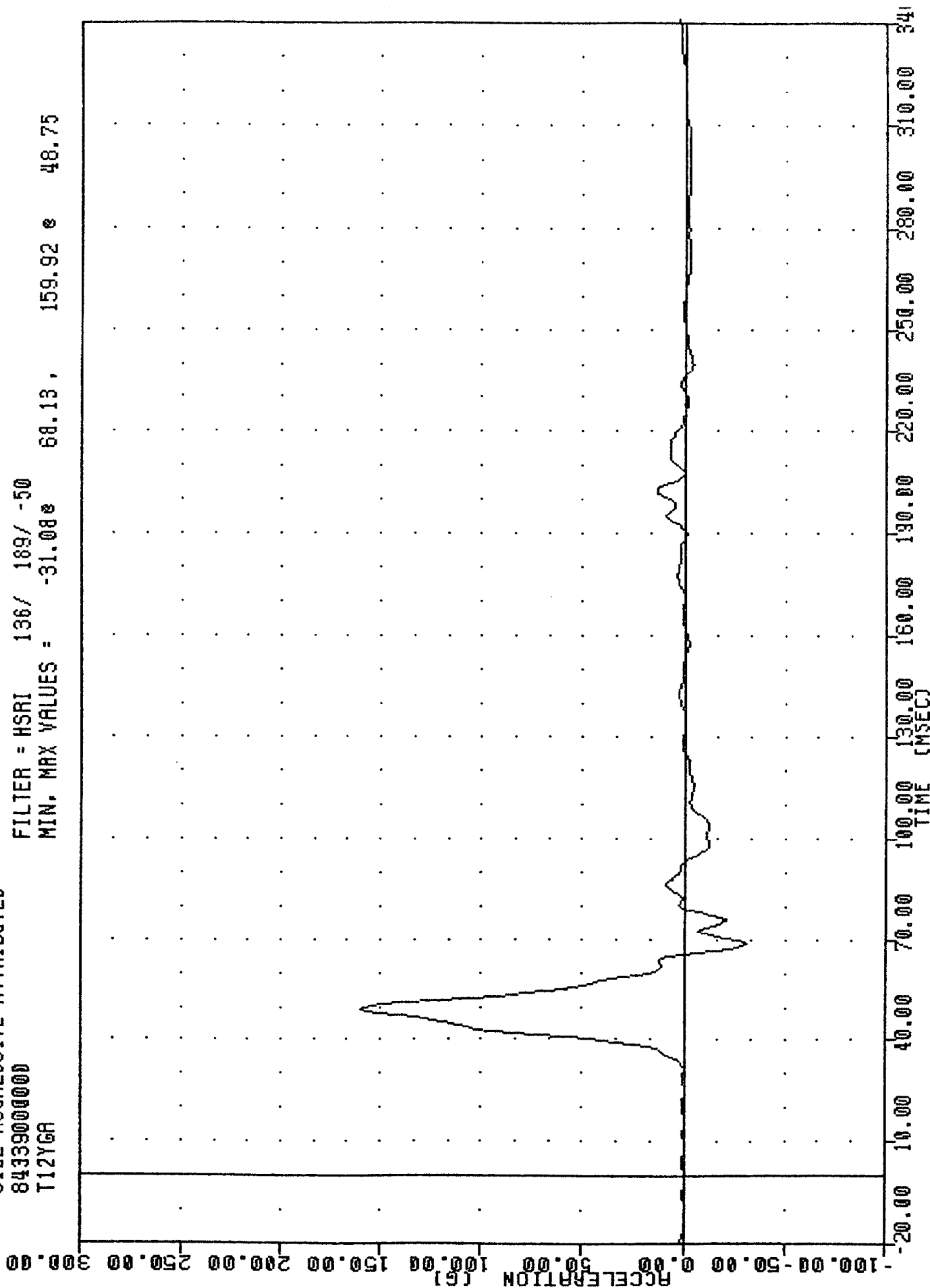
MIN, MAX VALUES =

-31.08e

68.13,

159.92 e

48.75



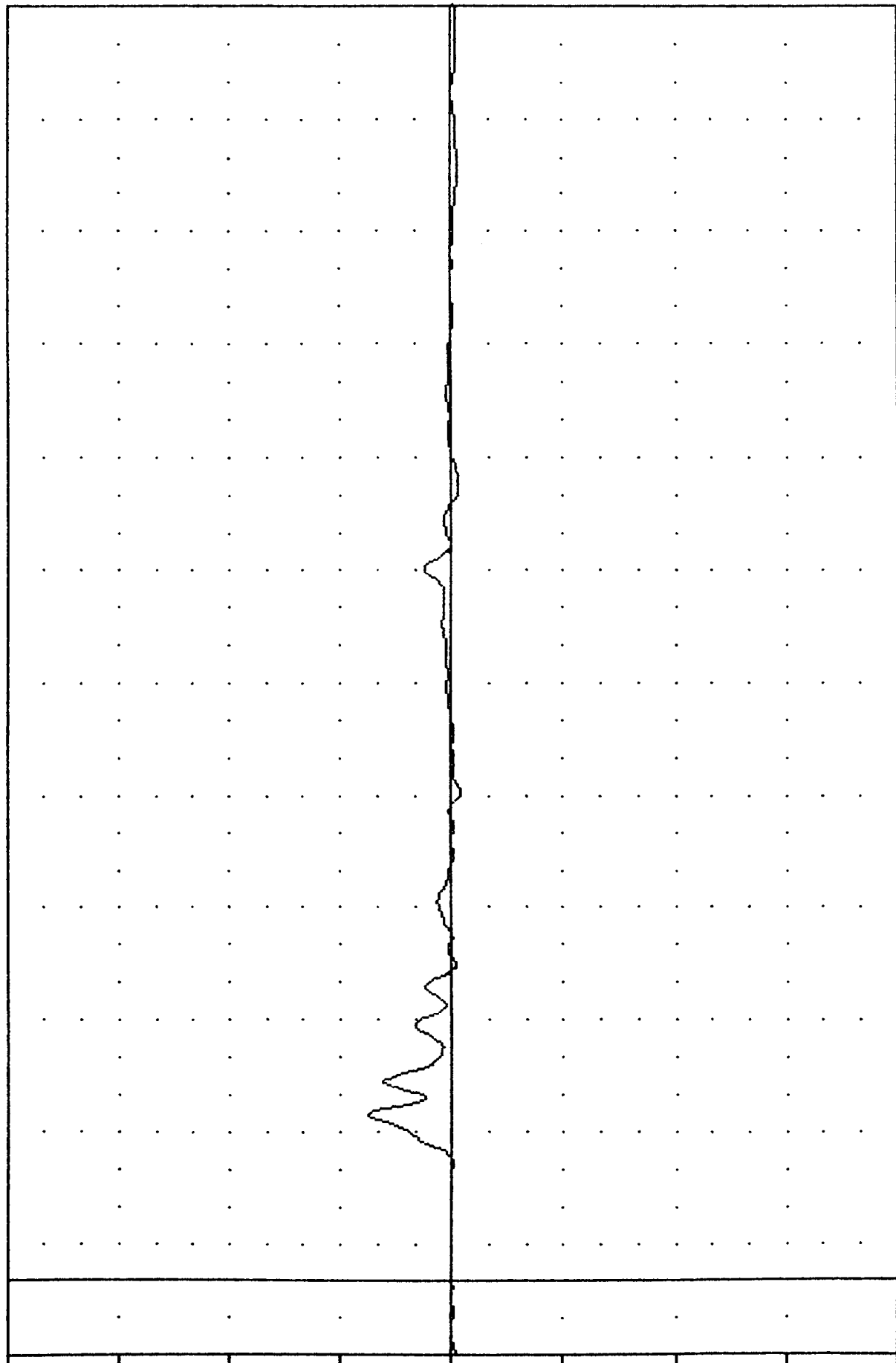
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE ACCELERATION -2 Y AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T12781

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -3.970 130.63 ,

37.10 0 43.75

ACCELERATION (G)



-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

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LOWER SPINE ACCELERATION Z AXIS

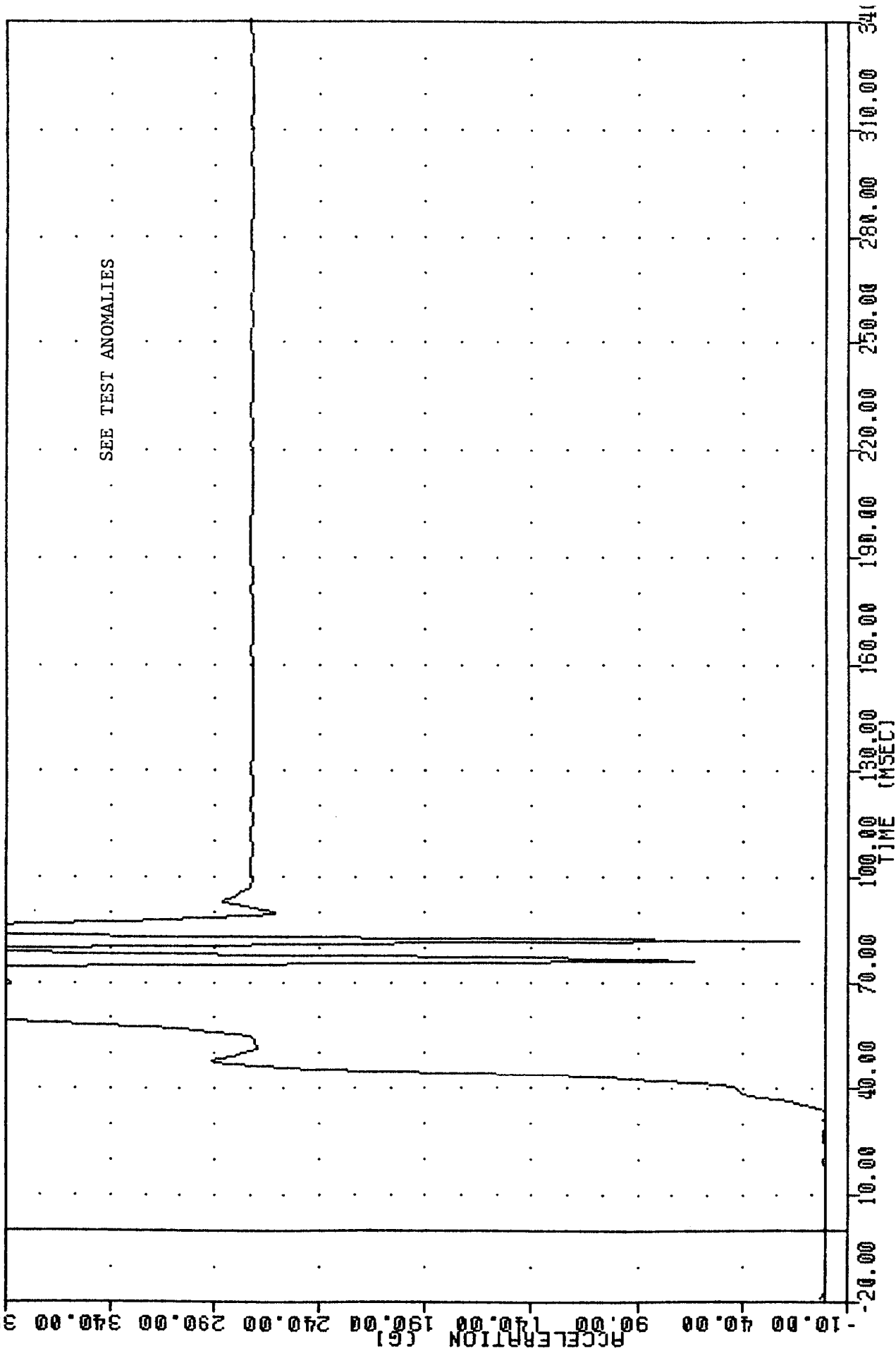
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T12RG1

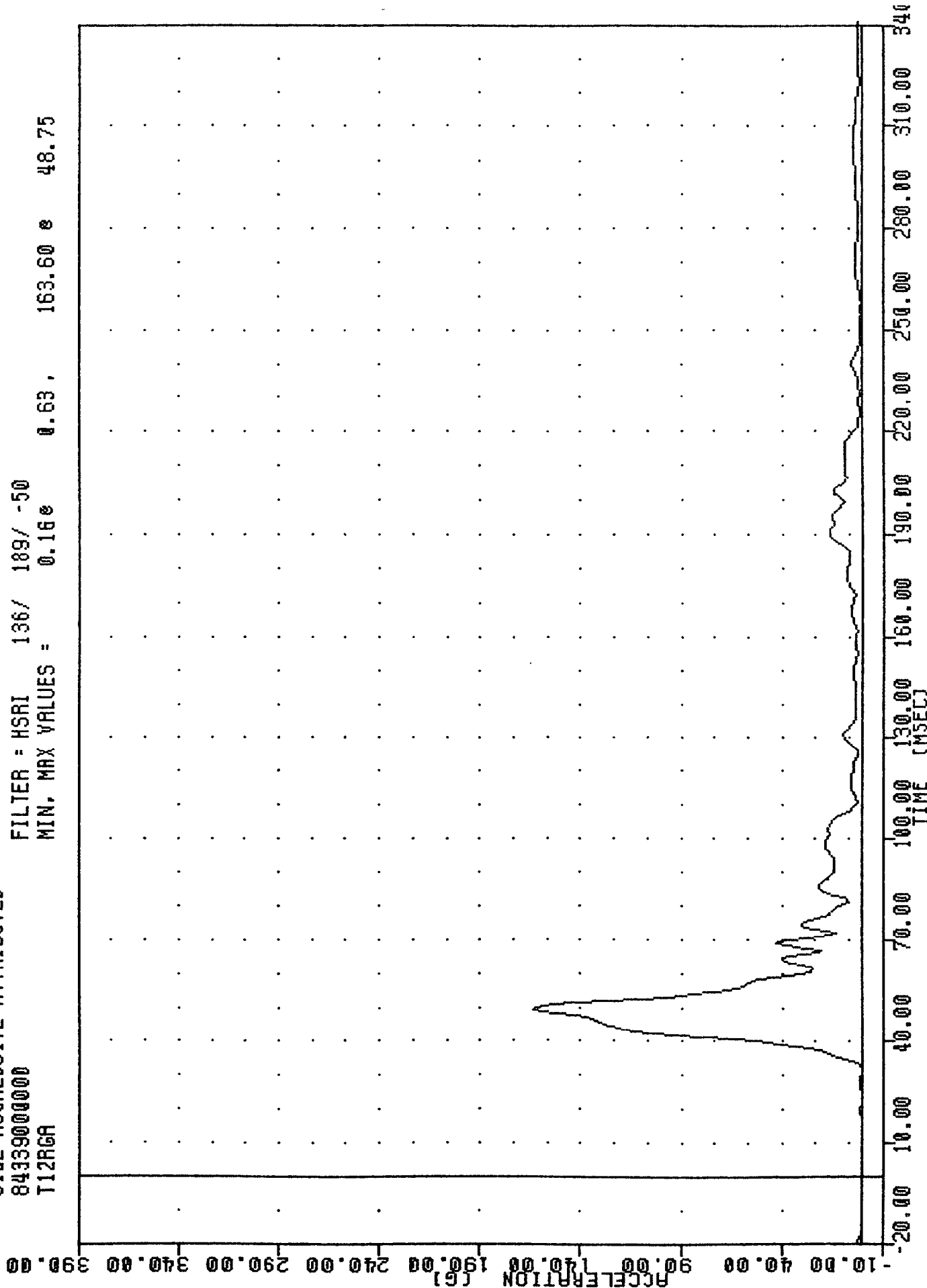
FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = 0.14v -11.88, 482.01 s 84.38



SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T12RGA

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = 0.16 0.63, 163.60 48.75



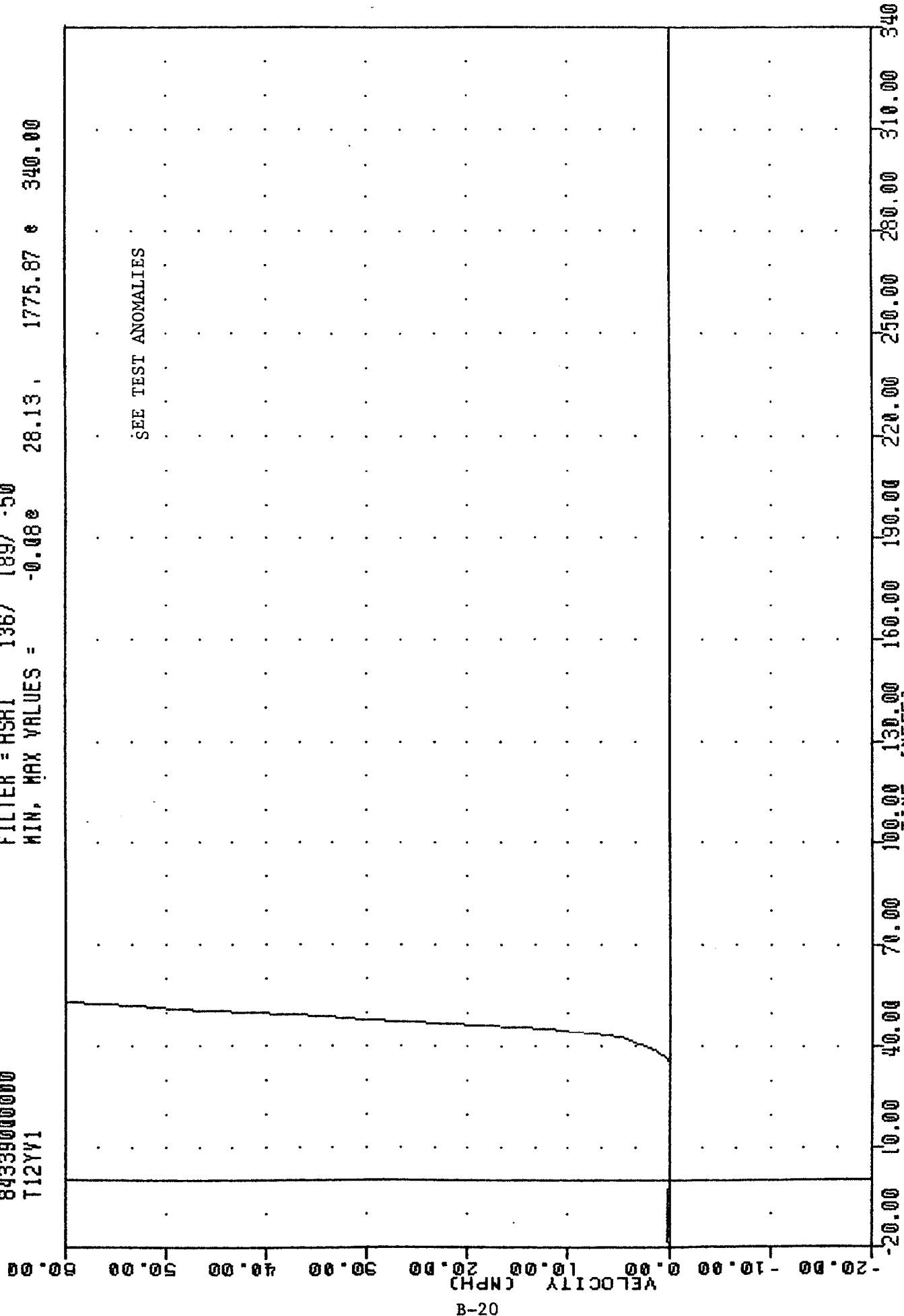
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LOWER SPINE RESULTANT USING T12YGA

INL 841204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T12YV1

PLU1 UNIE 12-UEL-04 12:04:39

FILTER = HSRI 136/ 189/ -50

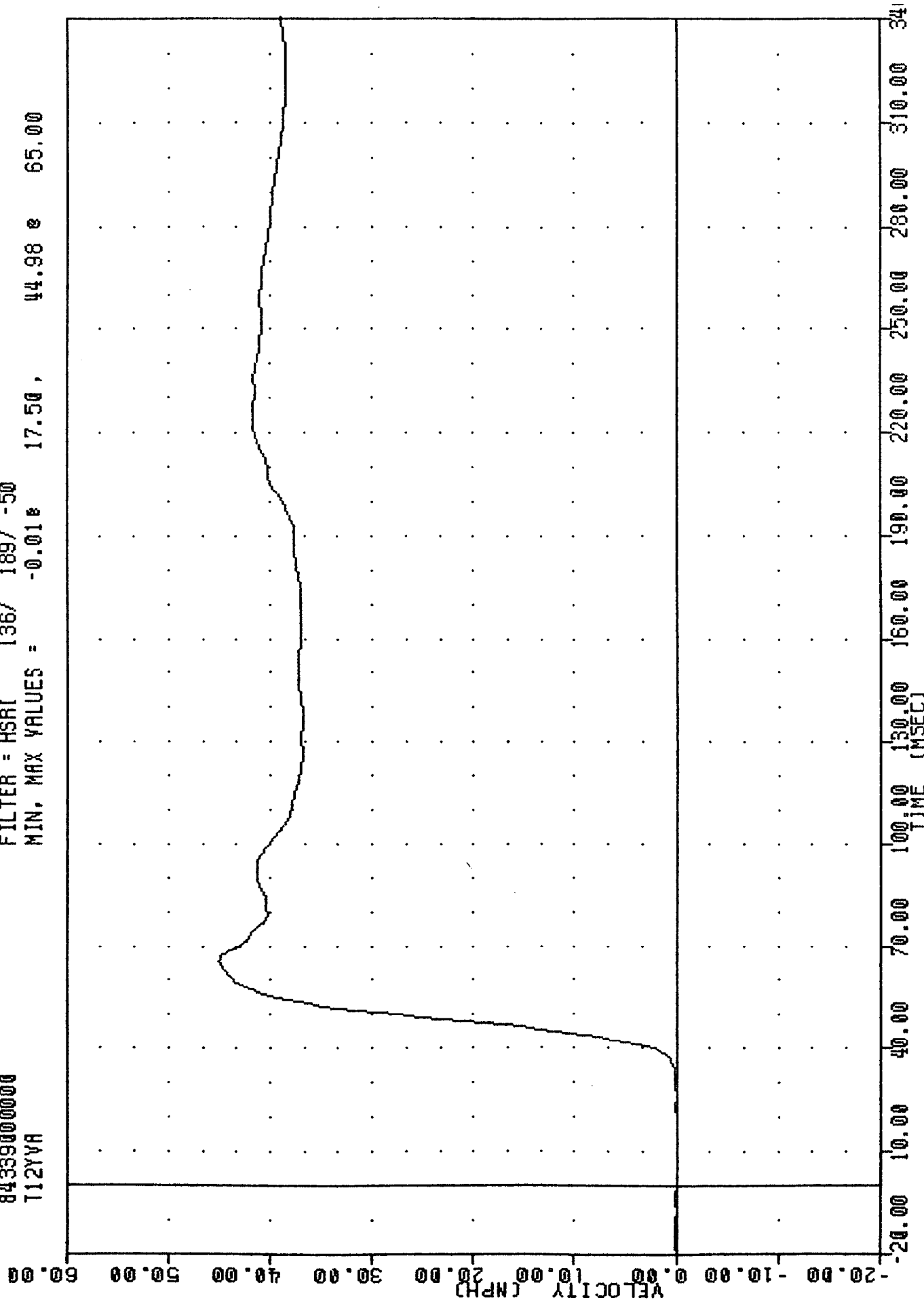
MIN. MAX VALUES = -0.08e 28.13 1775.87 e 340.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING T12YGI

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T12YVA

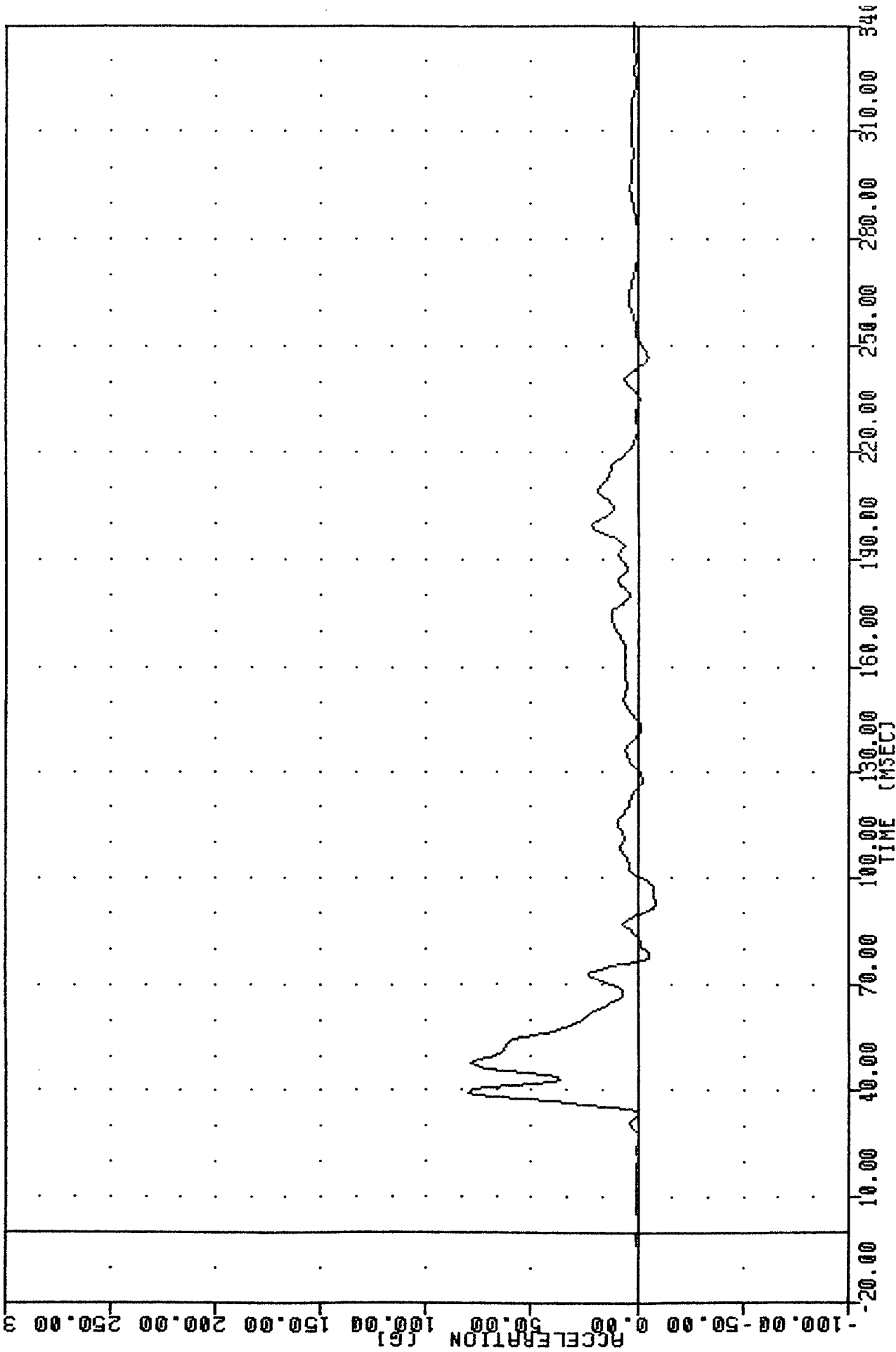
FILTER = HSR1 136/ 189/ -50
 MIN, MAX VALUES = -0.018 17.50, 44.98 & 65.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING T12YGA

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LURYG1

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -9.268 91.87 , 80.31 38.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LEFT UPPER RIB ACCELERATION Y AXIS

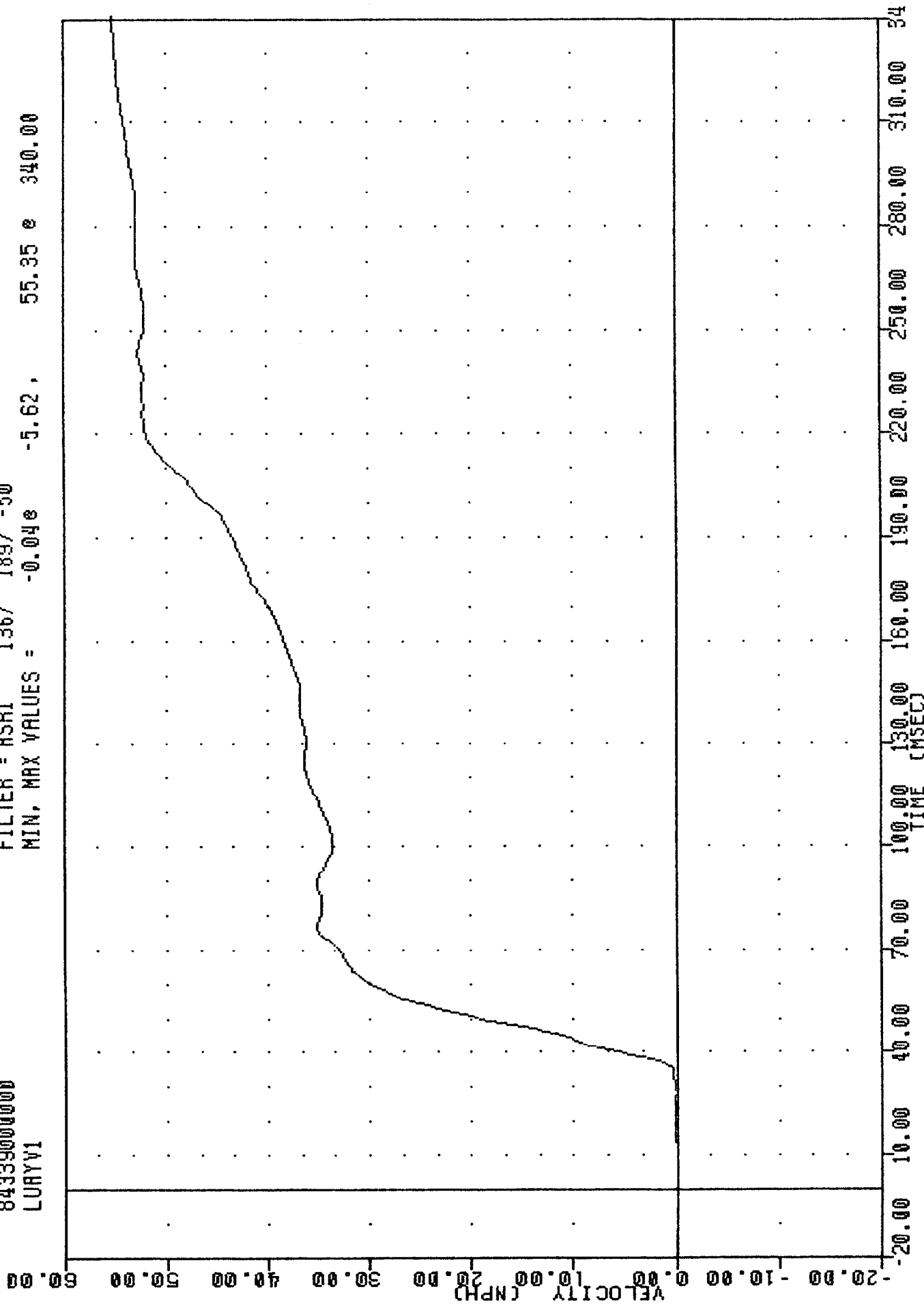
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LURYV1

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -0.048 -5.62, 55.35 @ 340.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LURYG1

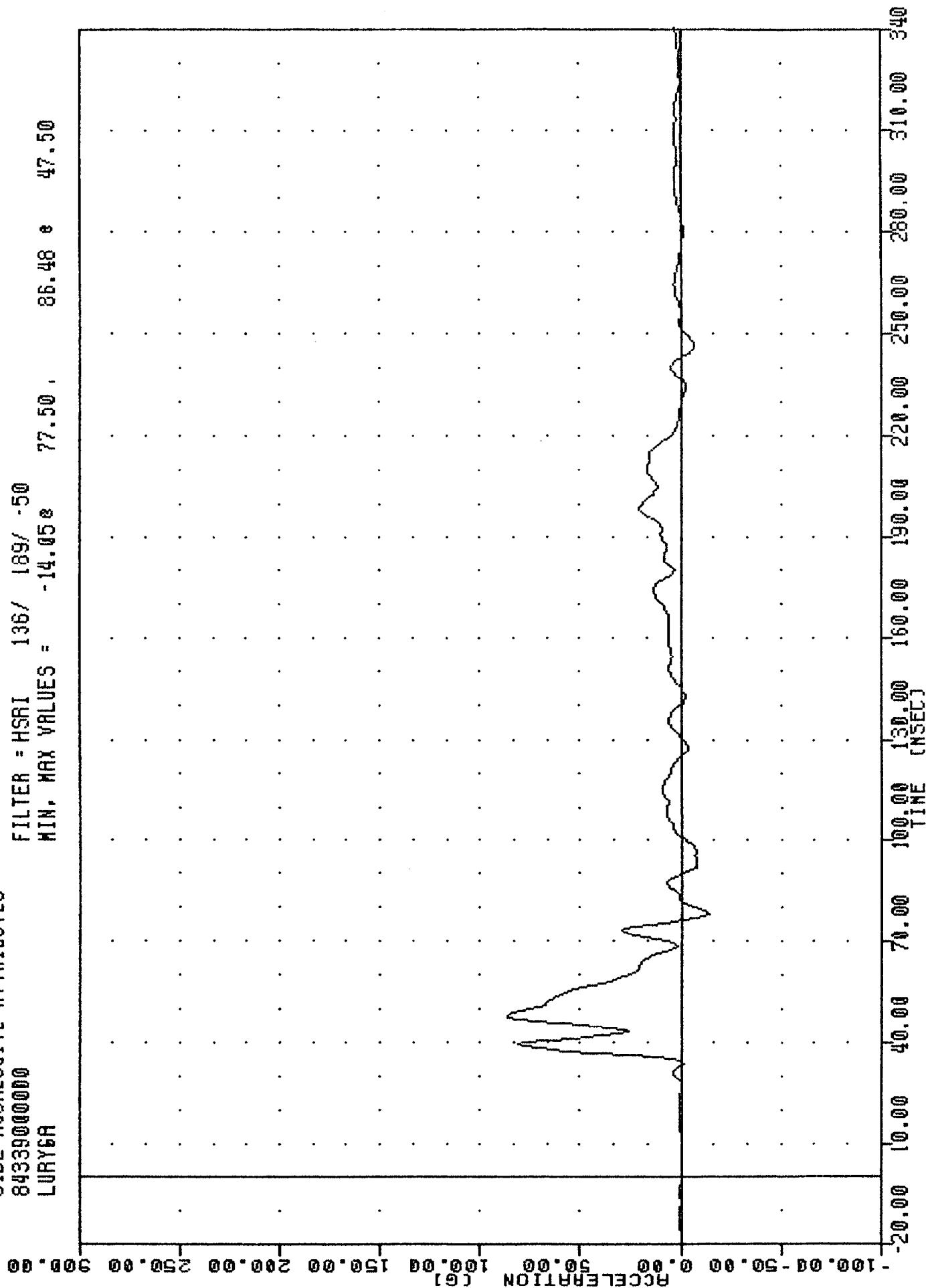
SIDE AGGRESSIVE ATTRIBUTES

843390000000

LURY6A

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -14.050 77.50 , 86.48 0 47.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LEFT UPPER RIB ACCELERATION -2 Y AXIS

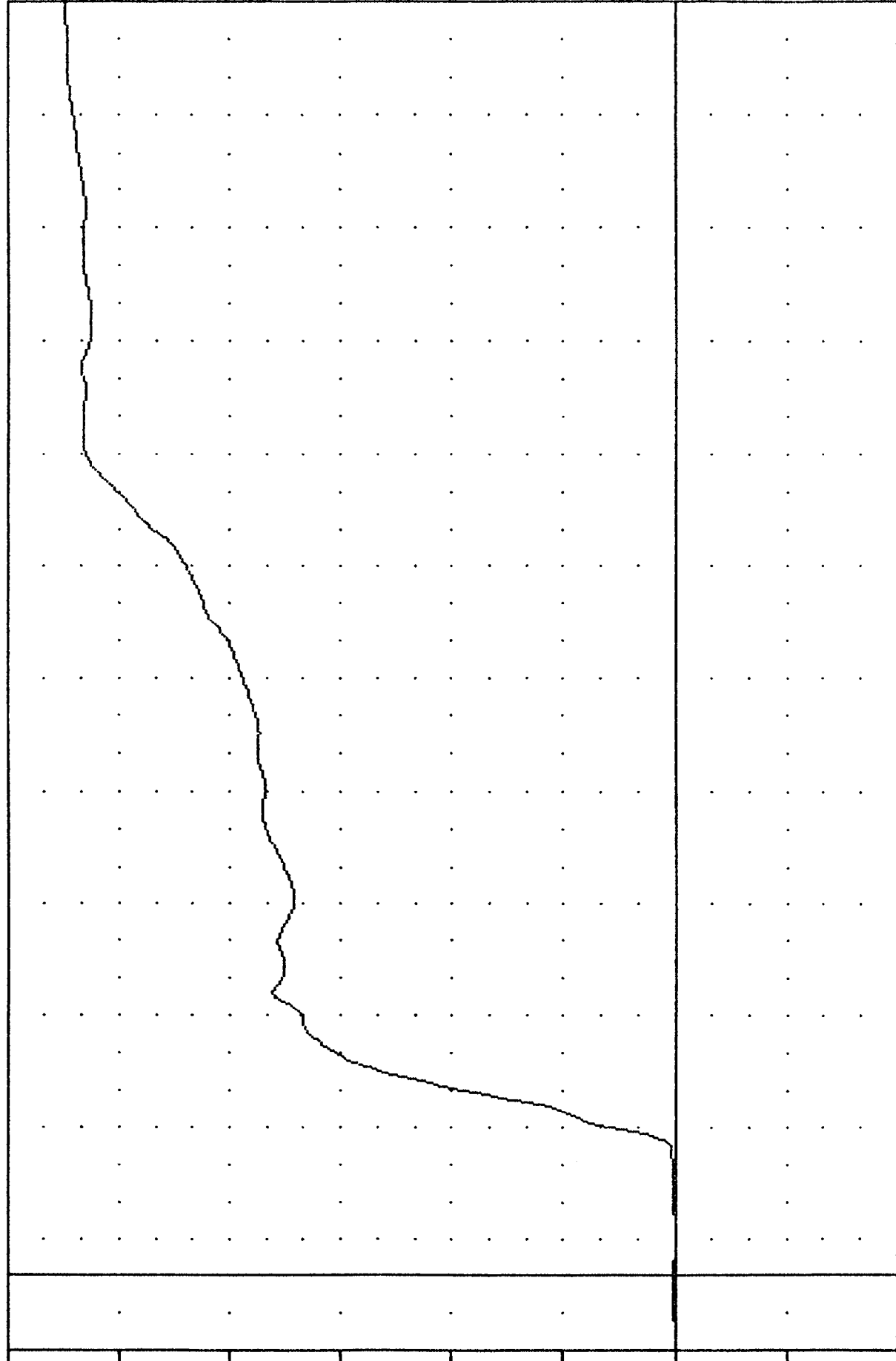
SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LURYVA

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -0.01e 11.88,

54.98 e 340.00

-20.00
 -10.00
 0.00
 10.00
 20.00
 30.00
 40.00
 50.00
 60.00
 VELOCITY (MPH)

B-25

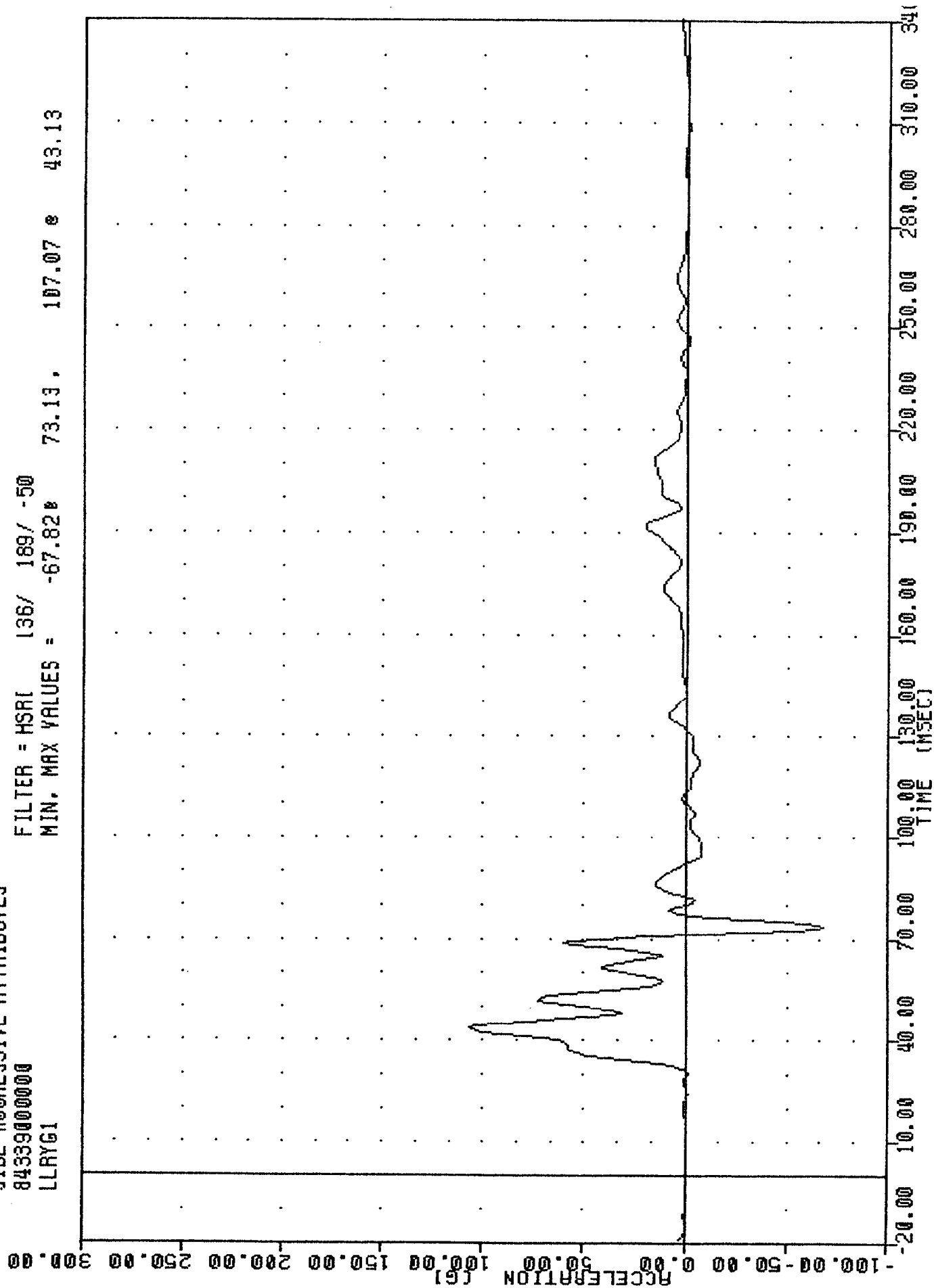


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
 TIME (NSEC)

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING LURYGA

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LLRYG1

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -67.82 73.13, 107.07 43.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LEFT LOWER RIB ACCELERATION Y AXIS

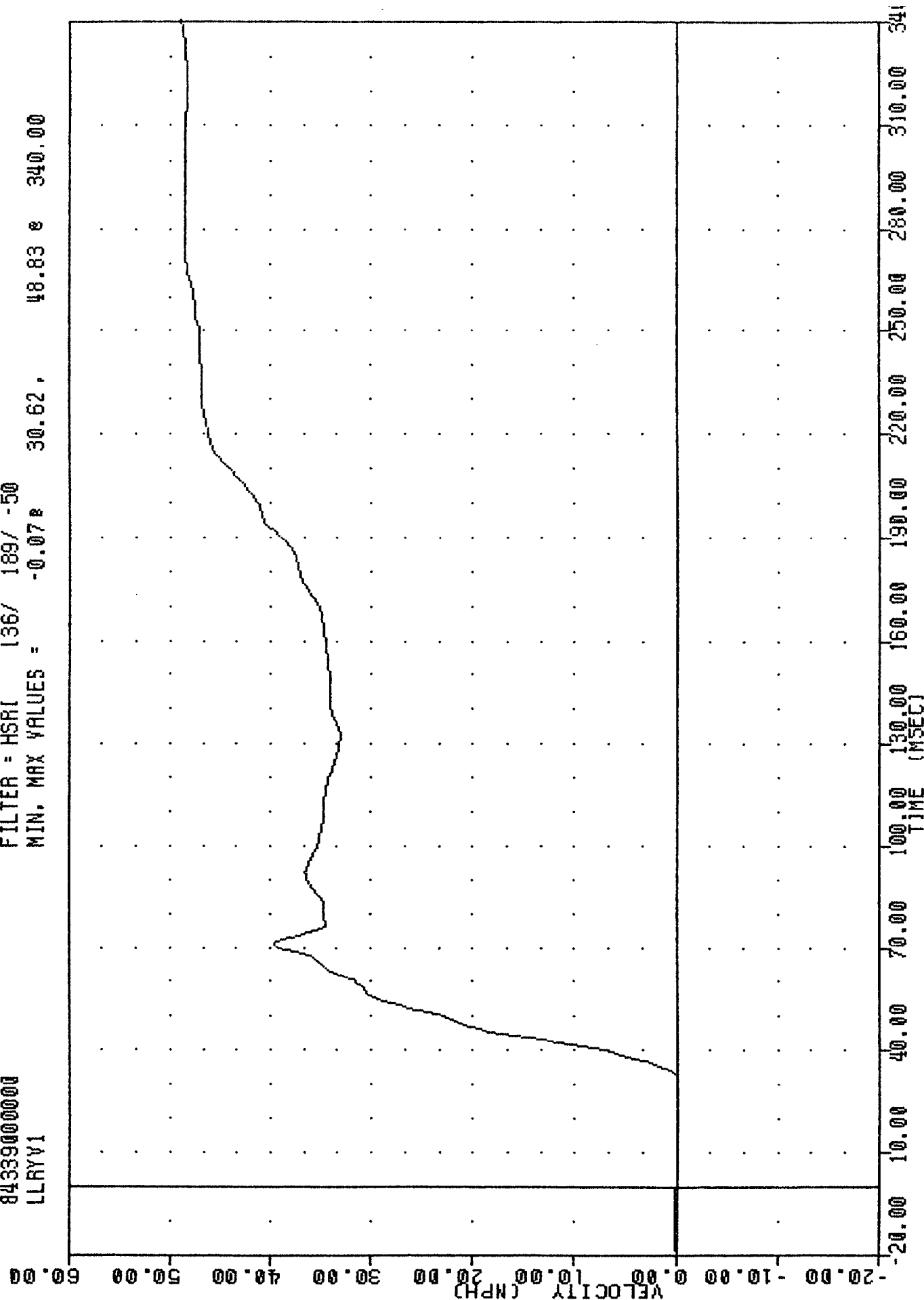
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LLRYV1

FILTER = HSRI 136/ 189/ -50

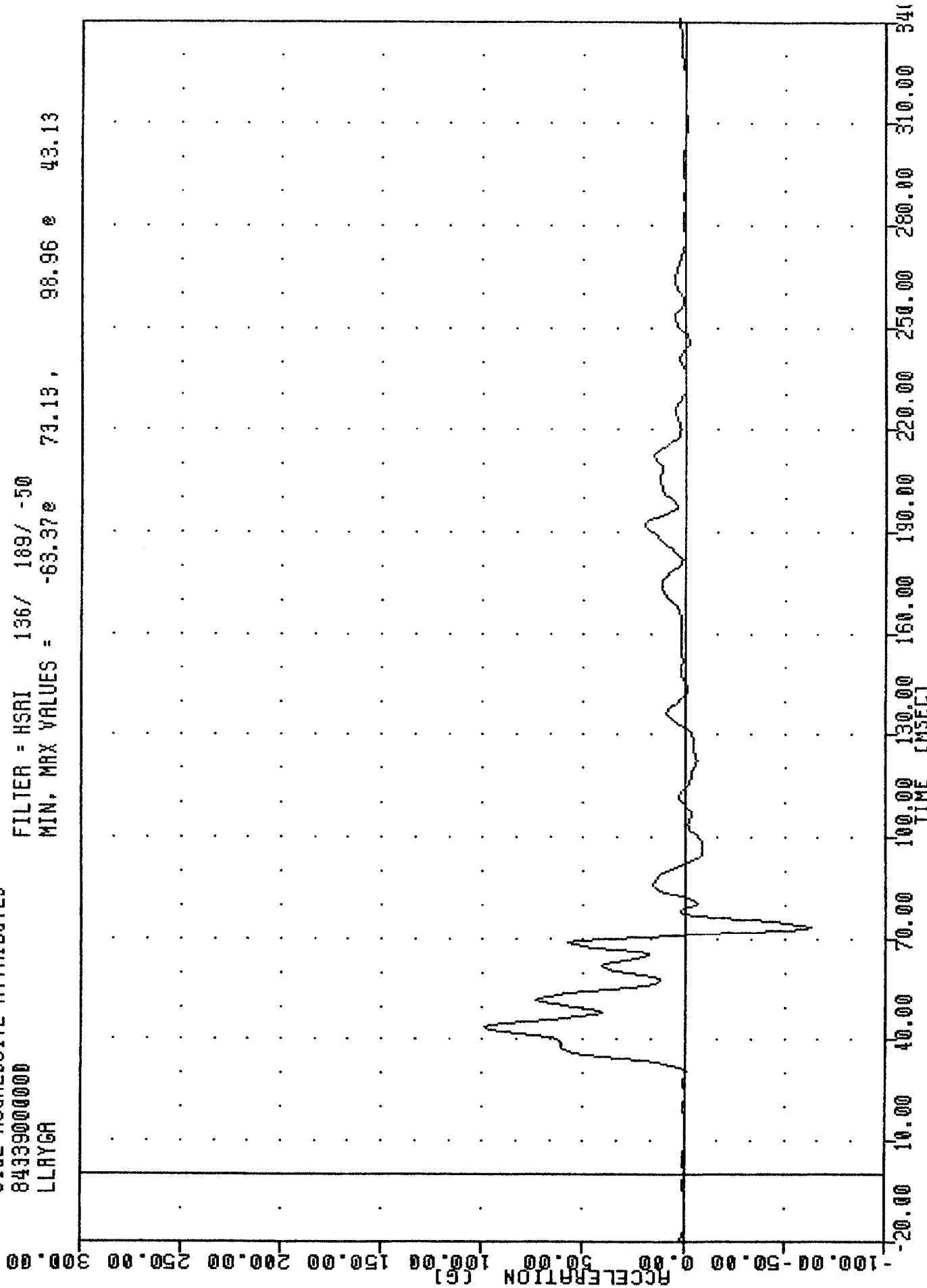
MIN, MAX VALUES = -0.078 30.62, 48.83 @ 340.00



SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LLAYGA

12.00.00 12.00.00 12.00.00

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -63.37e 73.13, 98.96 e 43.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER LEFT LOWER RIB ACCELERATION -2 Y AXIS

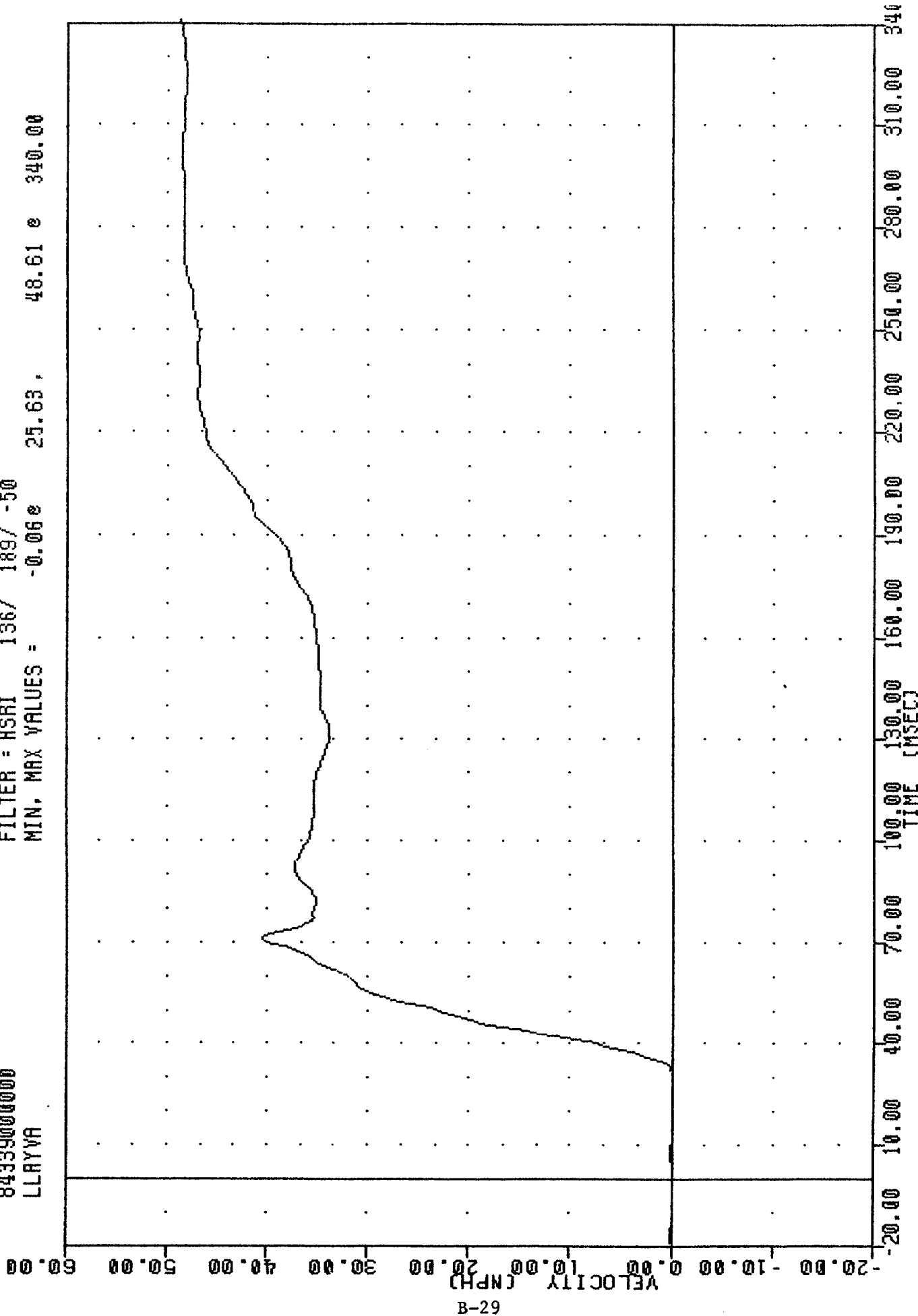
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LLRYVA

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.06e 25.63, 48.61 e 340.00



B-29

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LLRYGA

SIDE AGGRESSIVE ATTRIBUTES

84339000000

LRTYD1

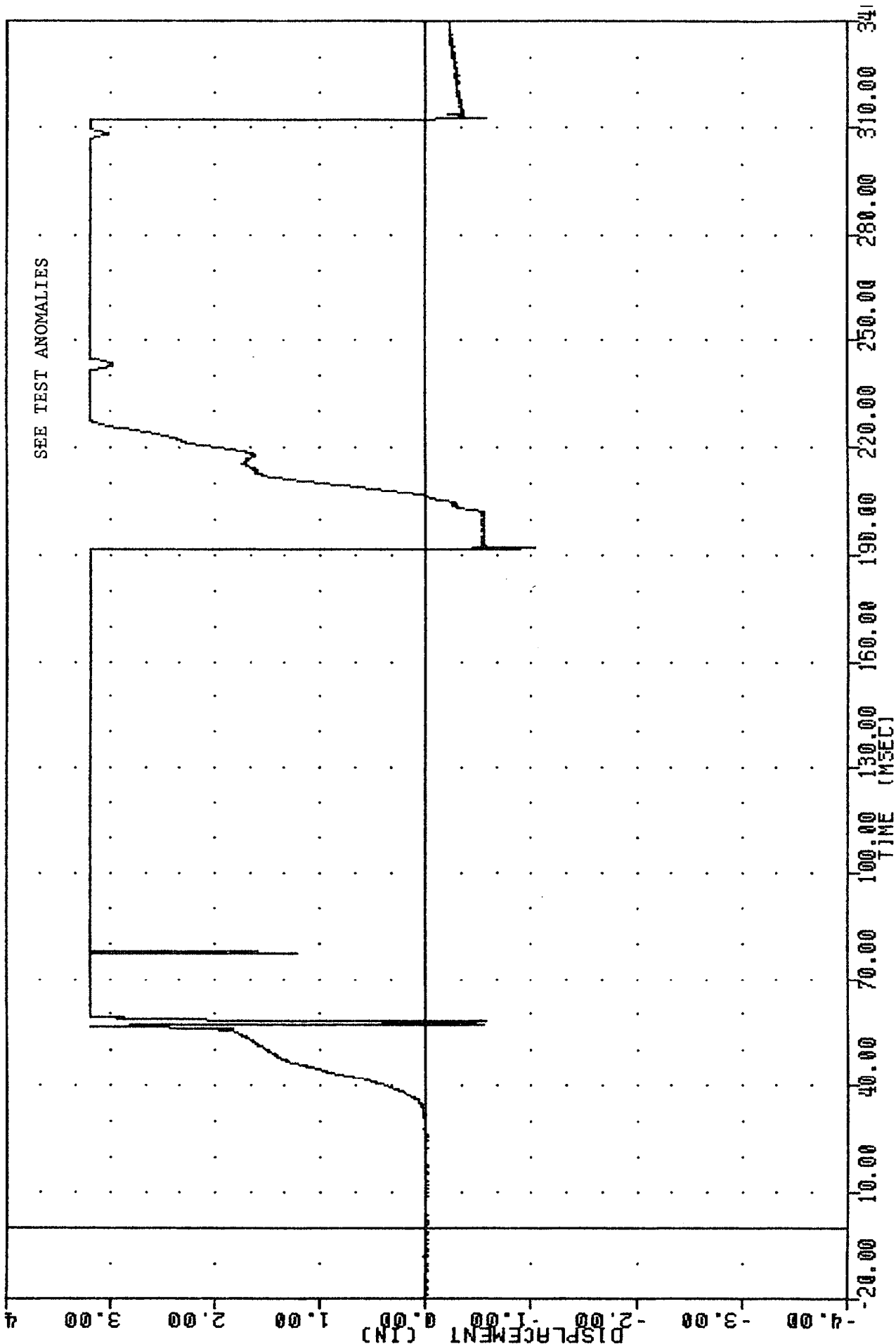
FILTER = ALPF 1650/ 5217/ -40

MIN, MAX VALUES = -1.048

191.75,

3.19 @

56.50



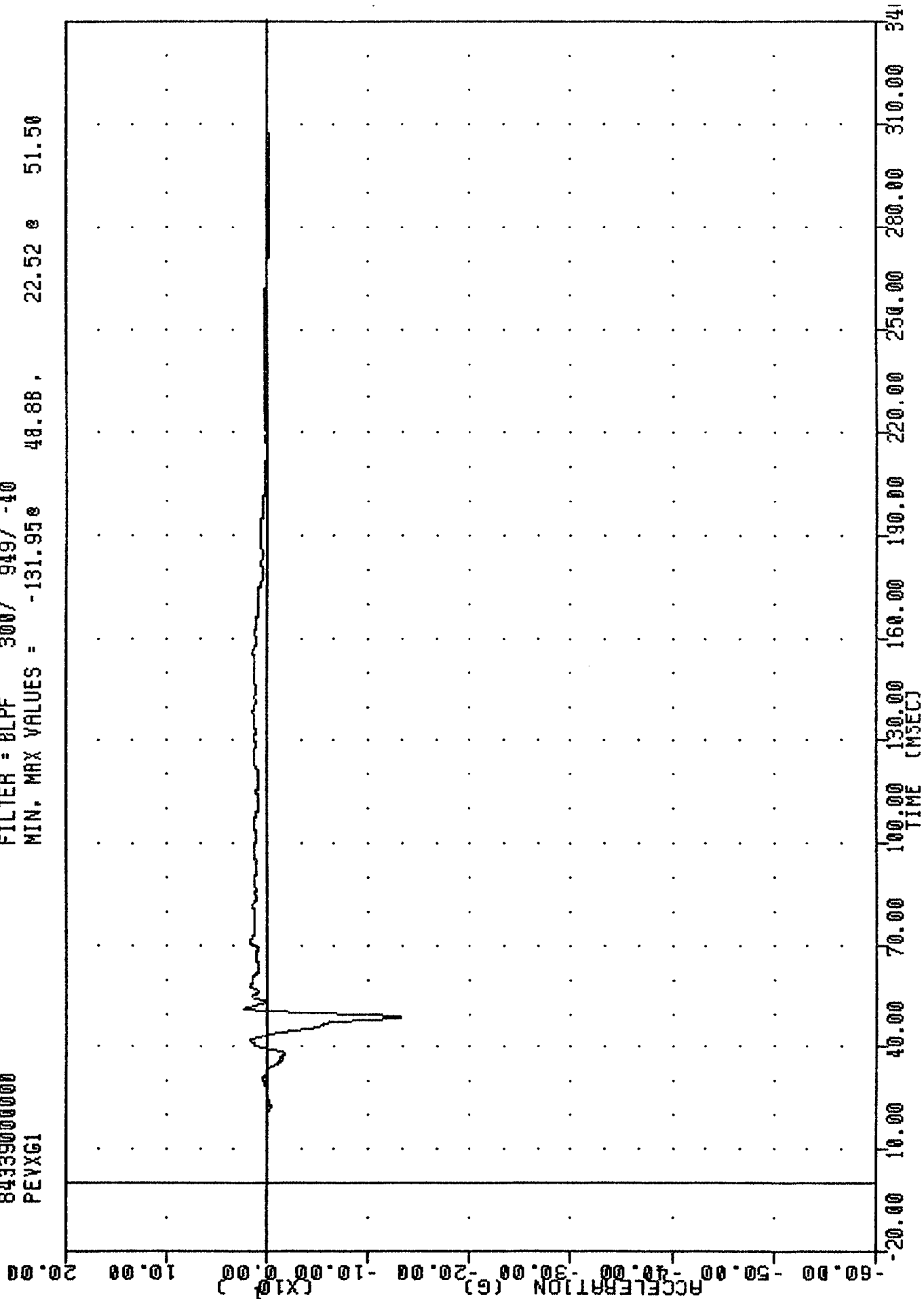
SIDE AGGRESSIVE ATTRIBUTES

84339000000

PEVXG1

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -131.95e 48.8B, 22.52 e 51.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS ACCELERATION X AXIS

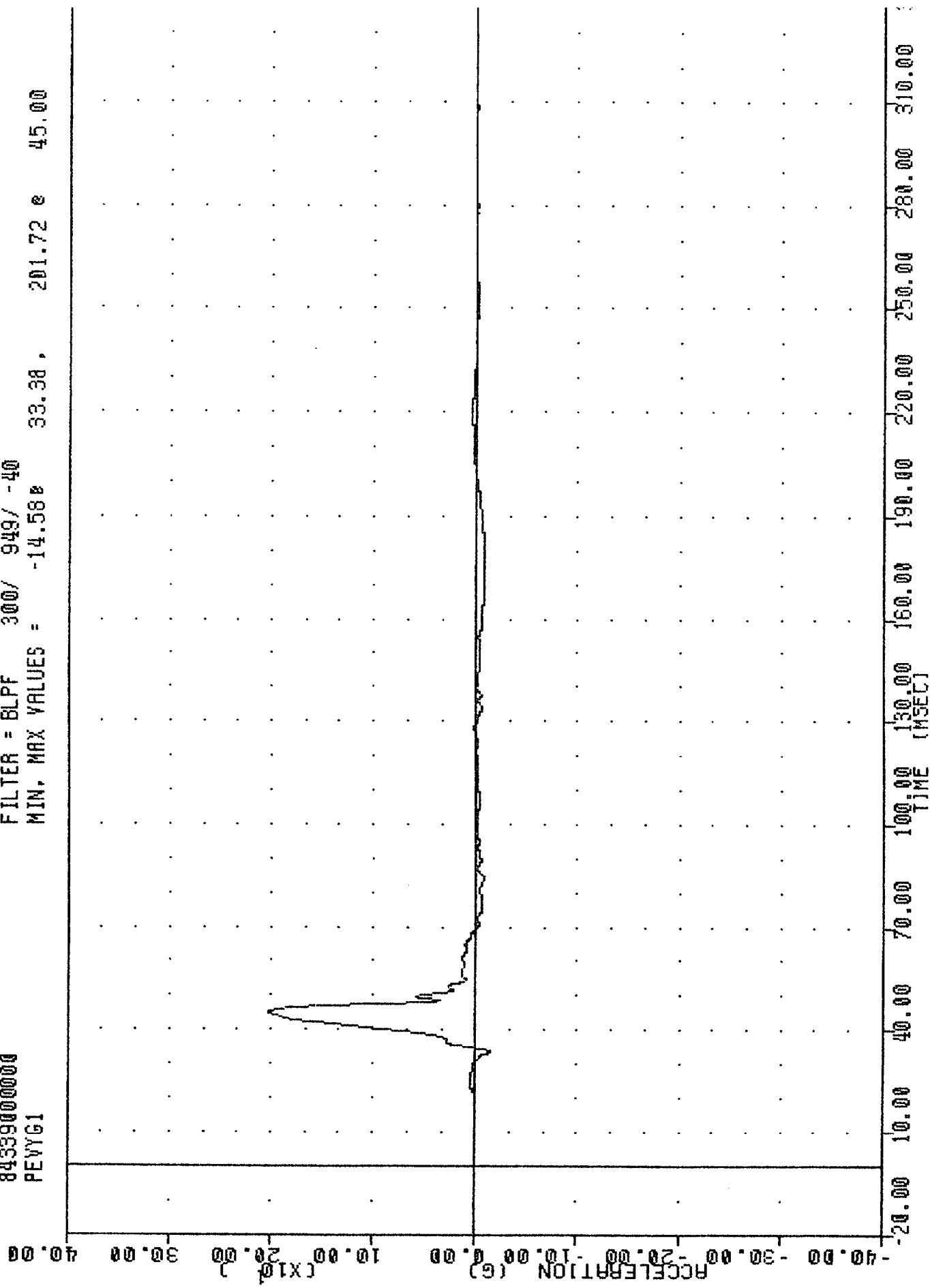
SIDE AGGRESSIVE ATTRIBUTES

84339000000

PEVYG1

FILTER = BLPF 300/ 949/ -40

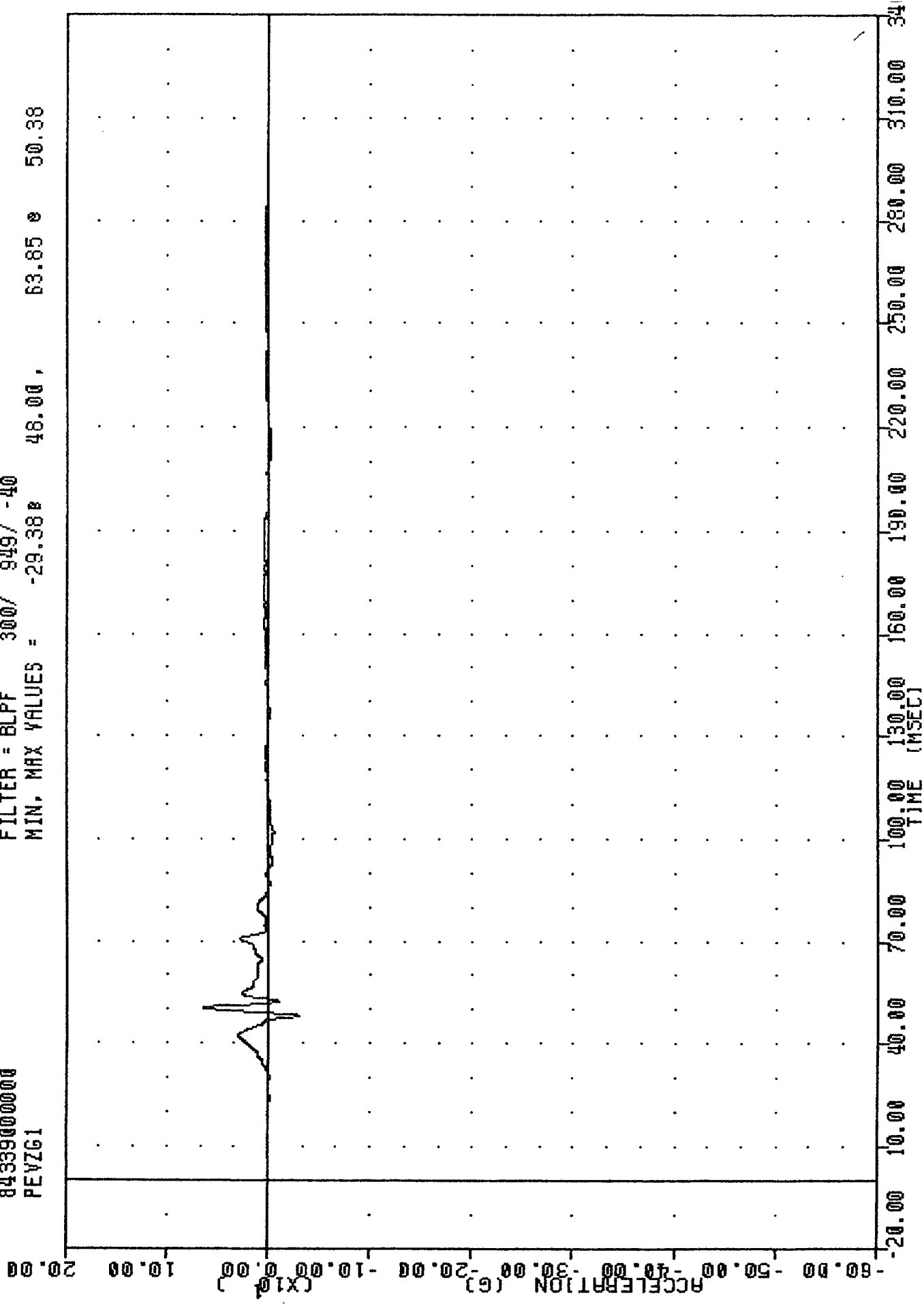
MIN, MAX VALUES = -14.580 33.30, 201.72 0 45.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 PEVZG1

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -29.38 48.00, 63.85 50.38



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DRIVER PELVIS ACCELERATION Z AXIS

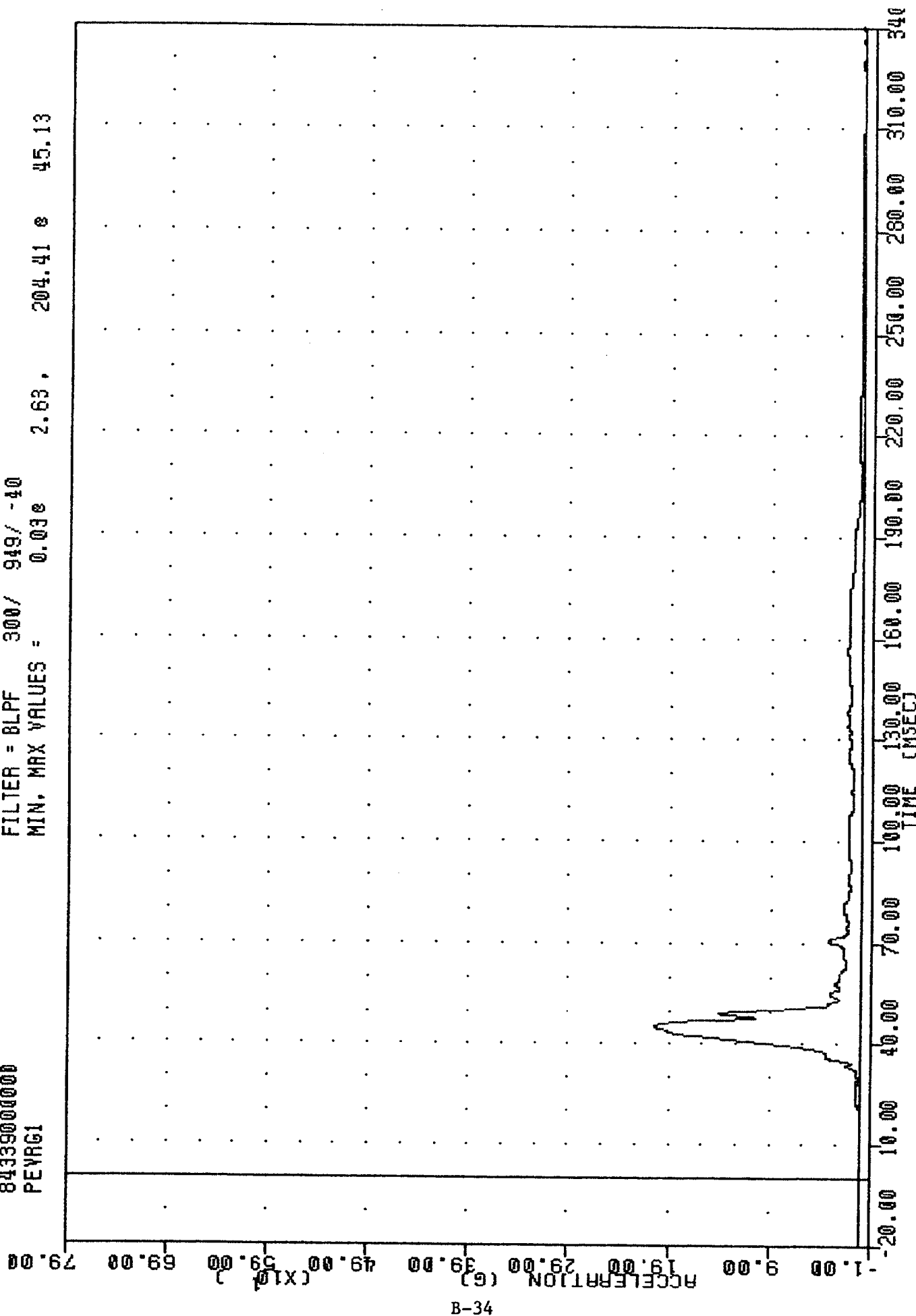
SIDE AGGRESSIVE ATTRIBUTES

84339000000

PEVRG1

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.030 2.63, 204.41 0 45.13



B-34

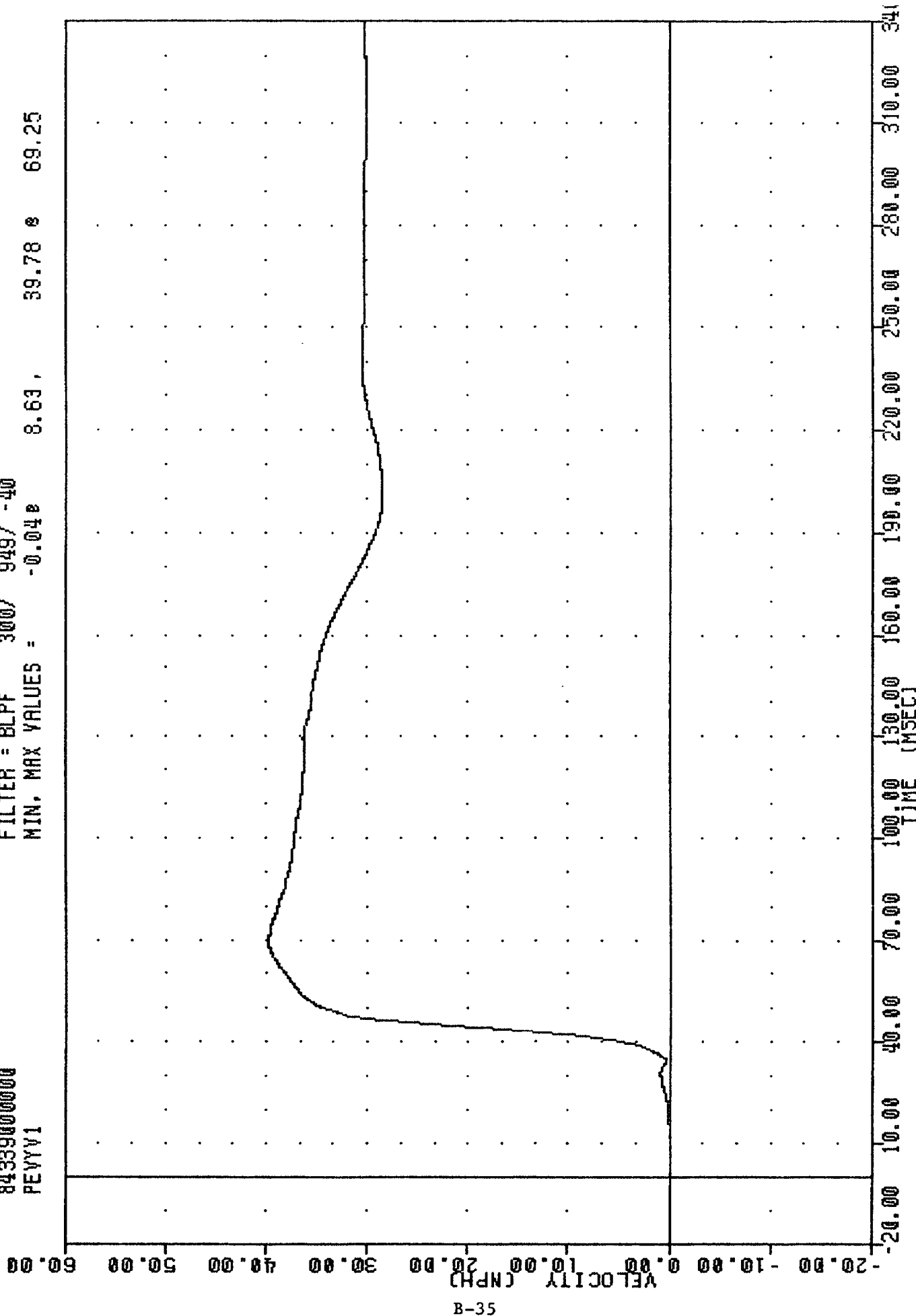
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS RESULTANT

INL 041204
SIDE AGGRESSIVE ATTRIBUTES
84339000000
PEVYV1

FLUT UNIC 12-DEC-04 12:09:20

FILTER = BLPF 300/ 949/ -40

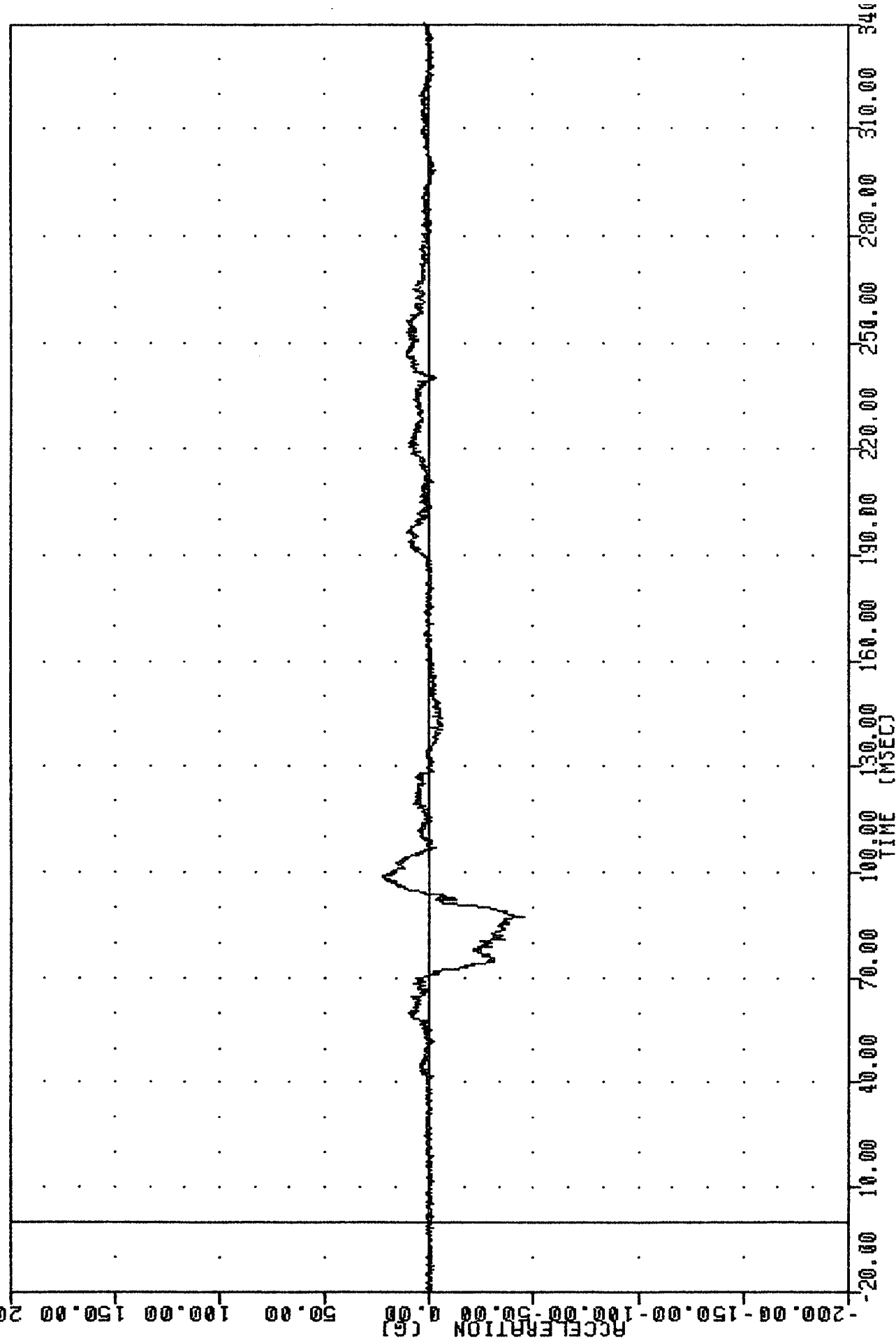
MIN. MAX VALUES = -0.048 8.63, 39.78 69.25



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING PEVYV1

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 HEDXG3

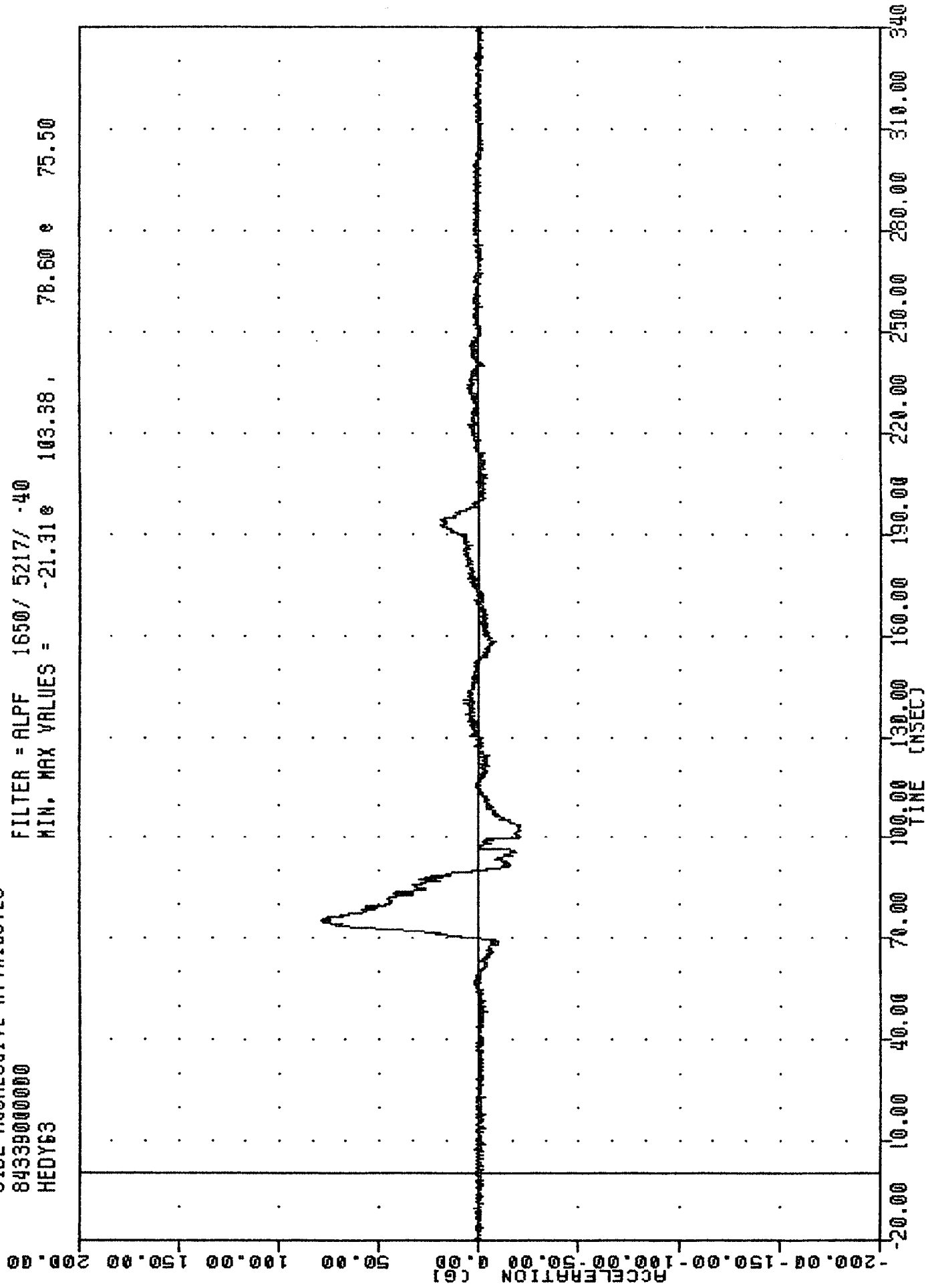
FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = -45.04e 87.25, 22.13 e 98.63



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 PASSENGER HEAD ACCELERATION X AXIS

... SIDE AGGRESSIVE ATTRIBUTES
84339000000
HEDY63

FILTER = ALPF 1650/ 5217/ -40
MIN. MAX VALUES = -21.31 103.38 78.60 75.50

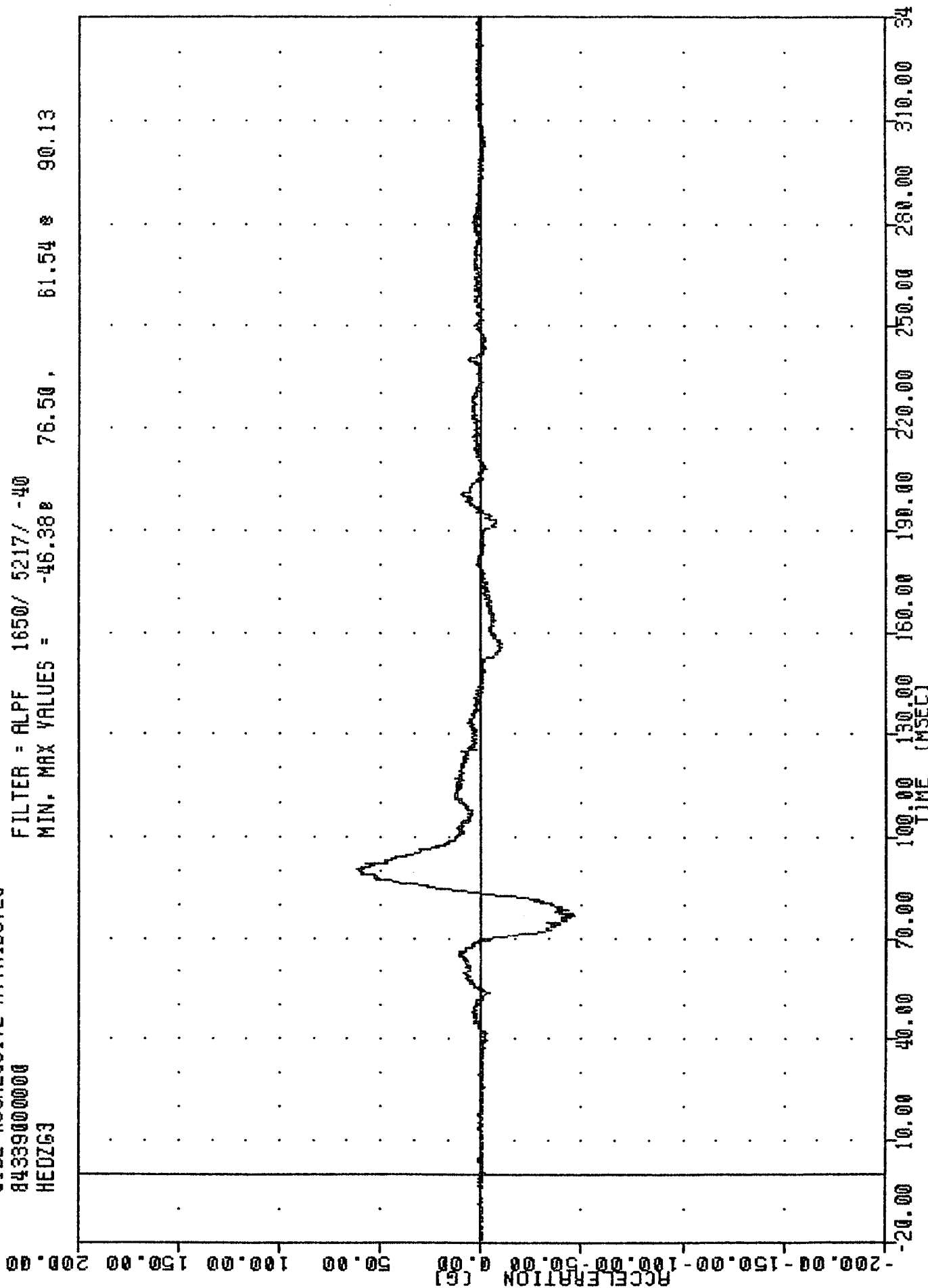


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER HEAD ACCELERATION Y AXIS

1110
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 HEAD263

1101 0011 12 000 03 12 000 11

FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -46.38 76.50 , 61.54 90.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 PASSENGER HEAD ACCELERATION Z AXIS

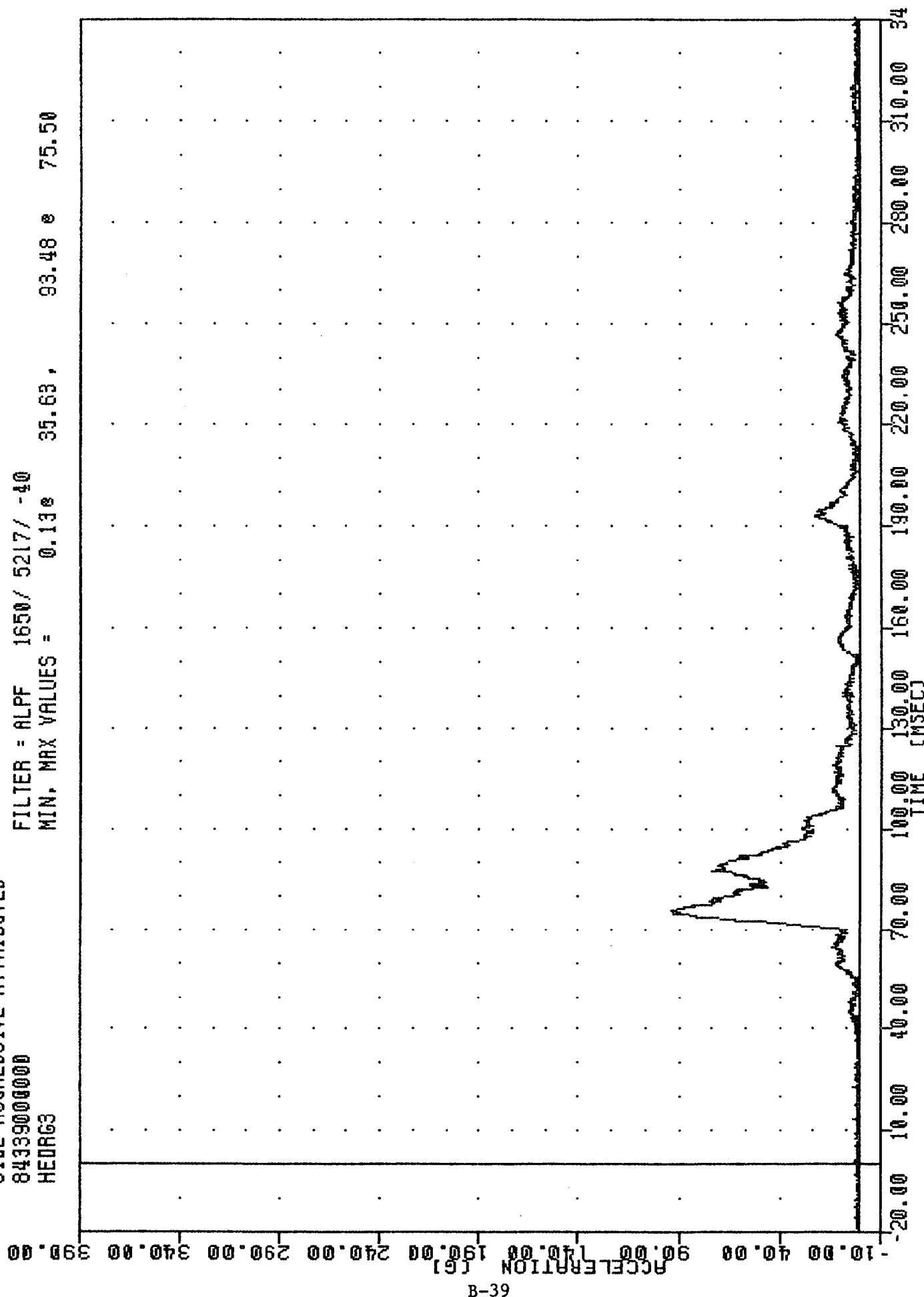
SIDE AGGRESSIVE ATTRIBUTES

84339000000

HEDRG3

FILTER = ALPF 1650 / 5217 / -40

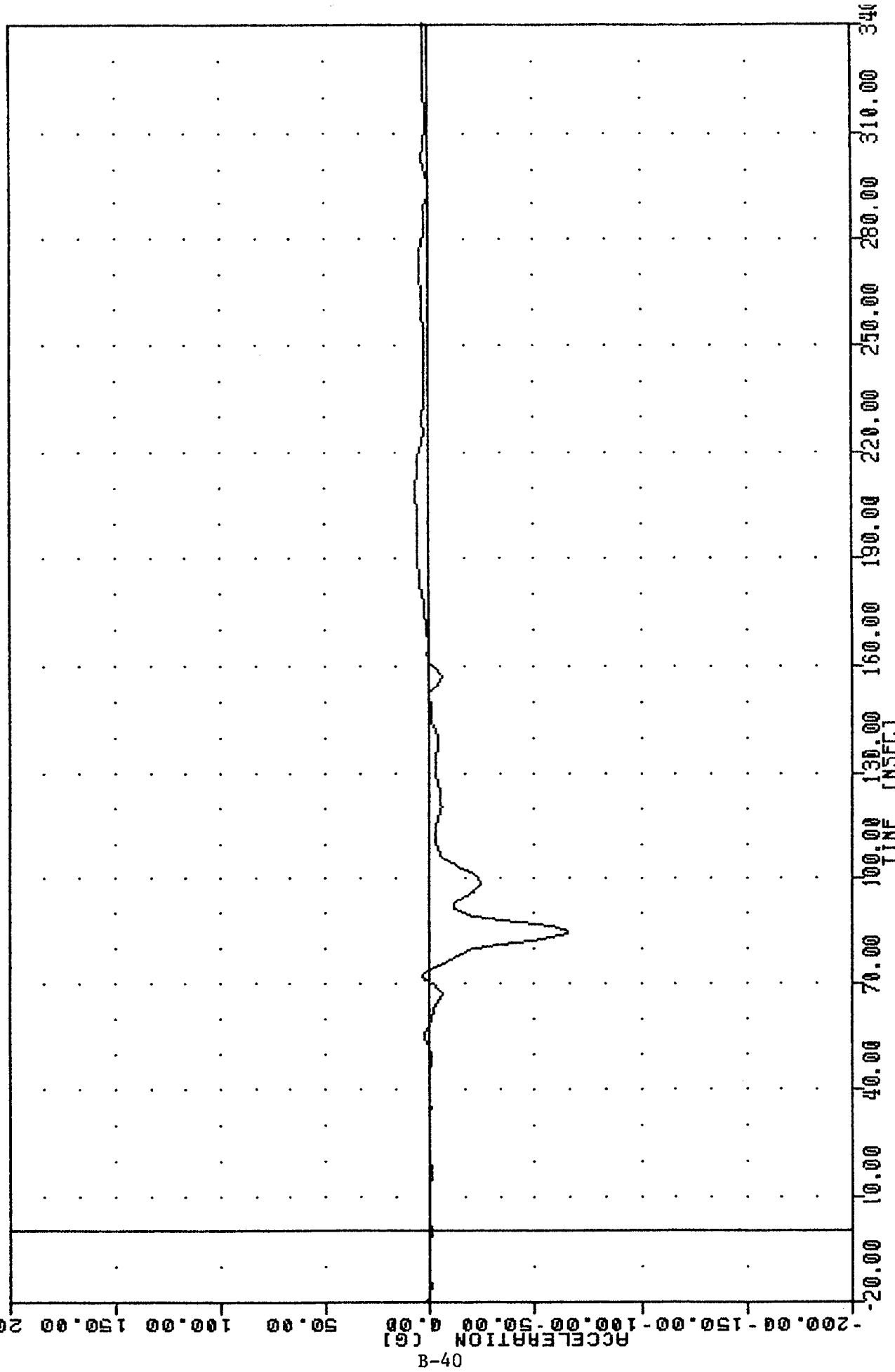
MIN. MAX VALUES = 0.13e 35.63, 93.48 e 75.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER HEAD RESULTANT

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T01X63

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = 84.38 , 6.92 e 208.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 PASSENGER UPPER SPINE ACCELERATION X AXIS

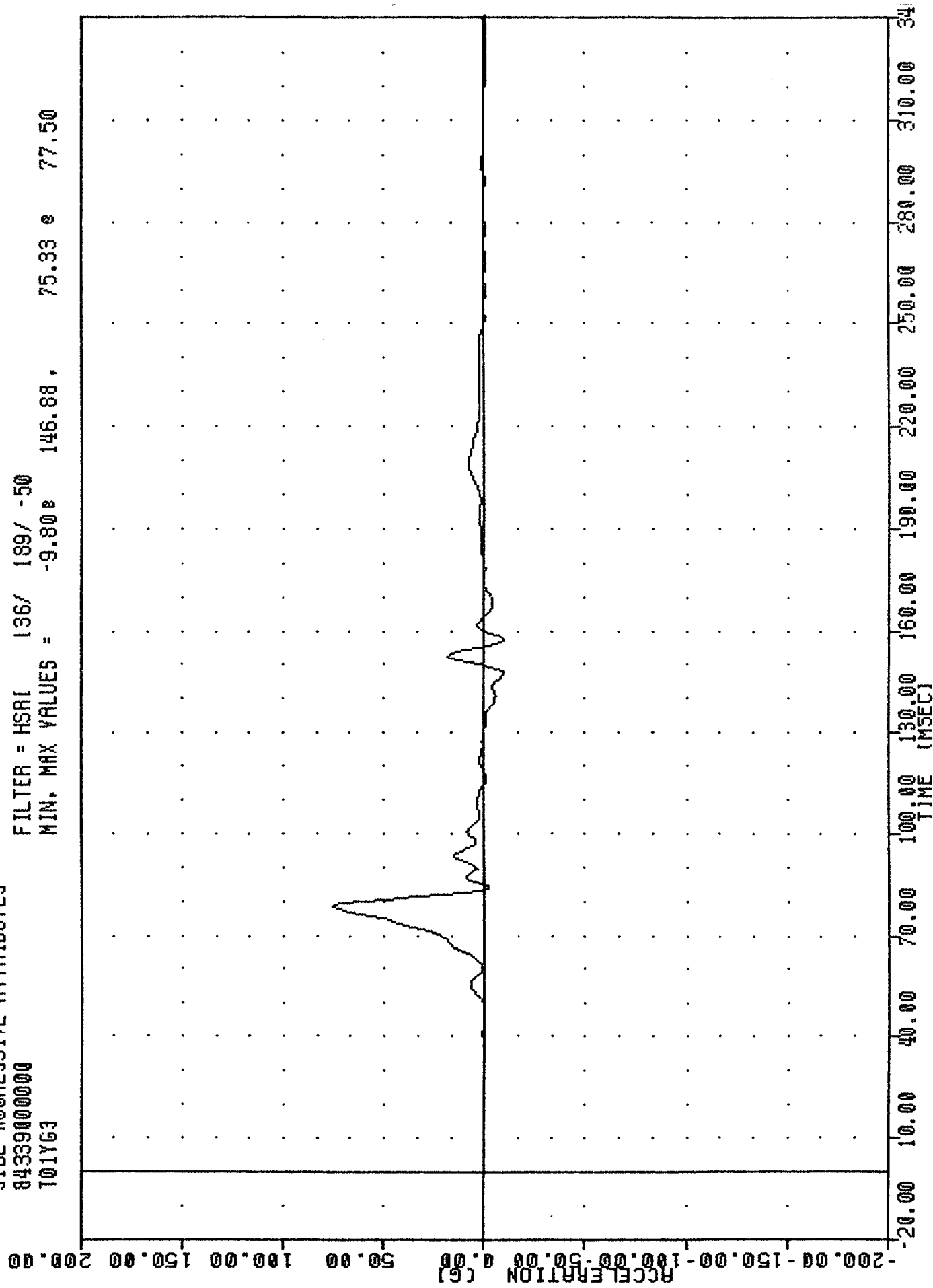
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T01Y63

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = -9.80e 146.88, 75.33 e 77.50

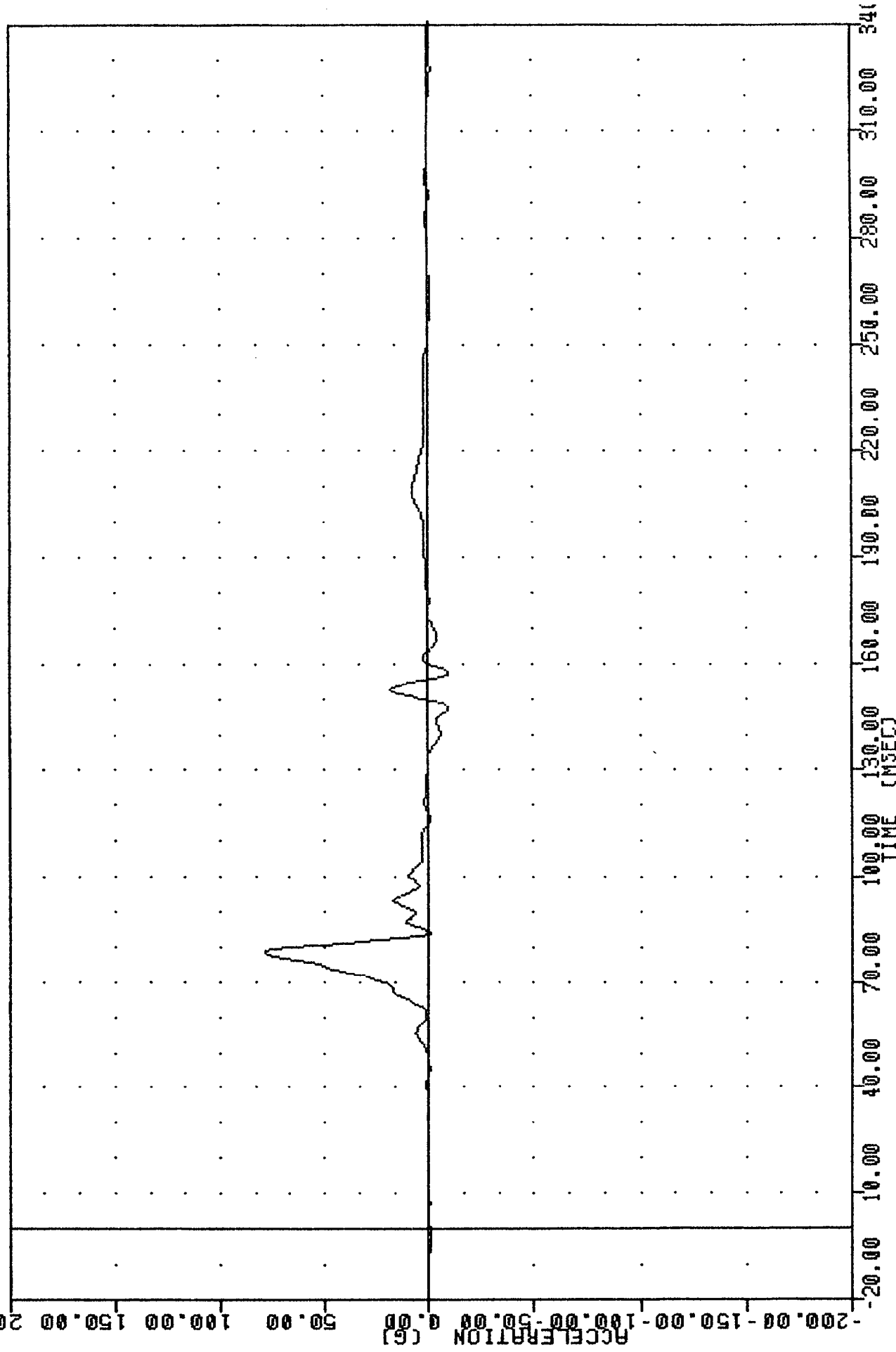


B-41

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T01YGC

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -9.76e 156.88, 78.68 e 78.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 PASSENGER UPPER SPINE ACCELERATION #2 Y AXIS

SIDE AGGRESSIVE ATTRIBUTES

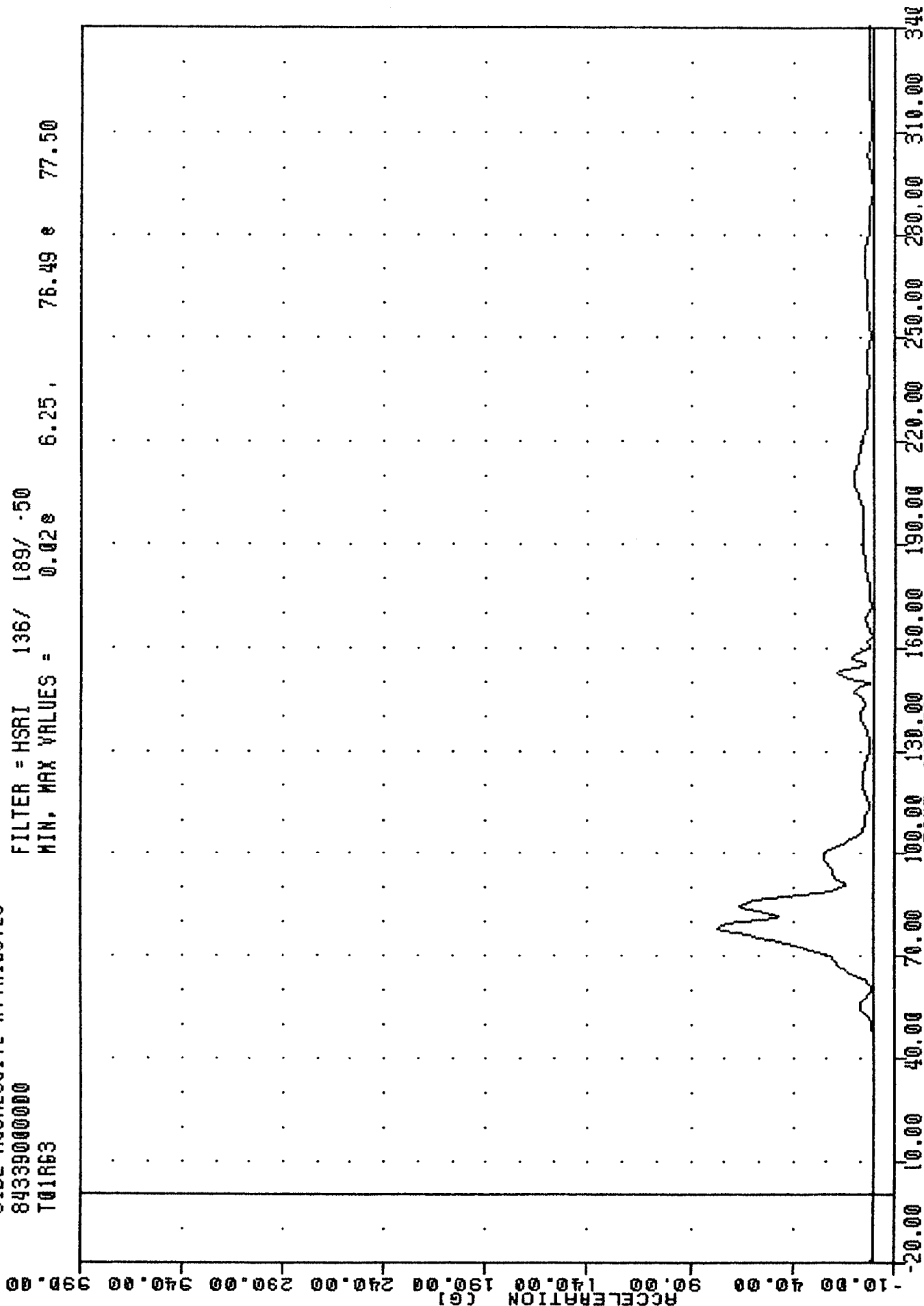
84339000000

T01R63

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = 0.02 s

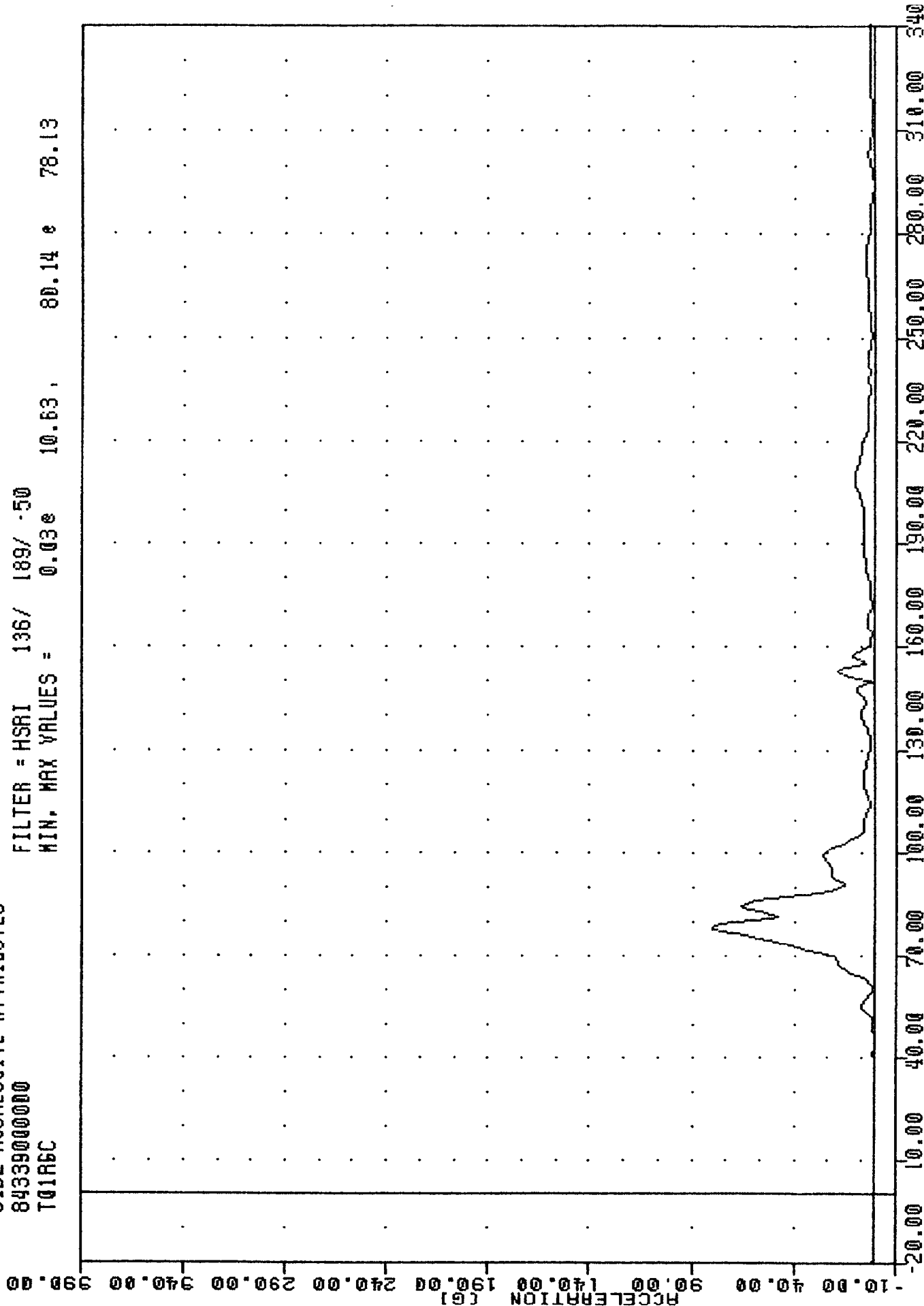
6.25 , 76.49 s 77.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE RESULTANT USING X AND Y

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 T01R6C

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = 0.03 80.14 78.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 PASSENGER UPPER SPINE RESULTANT USING T01XG3 AND T01Y6C

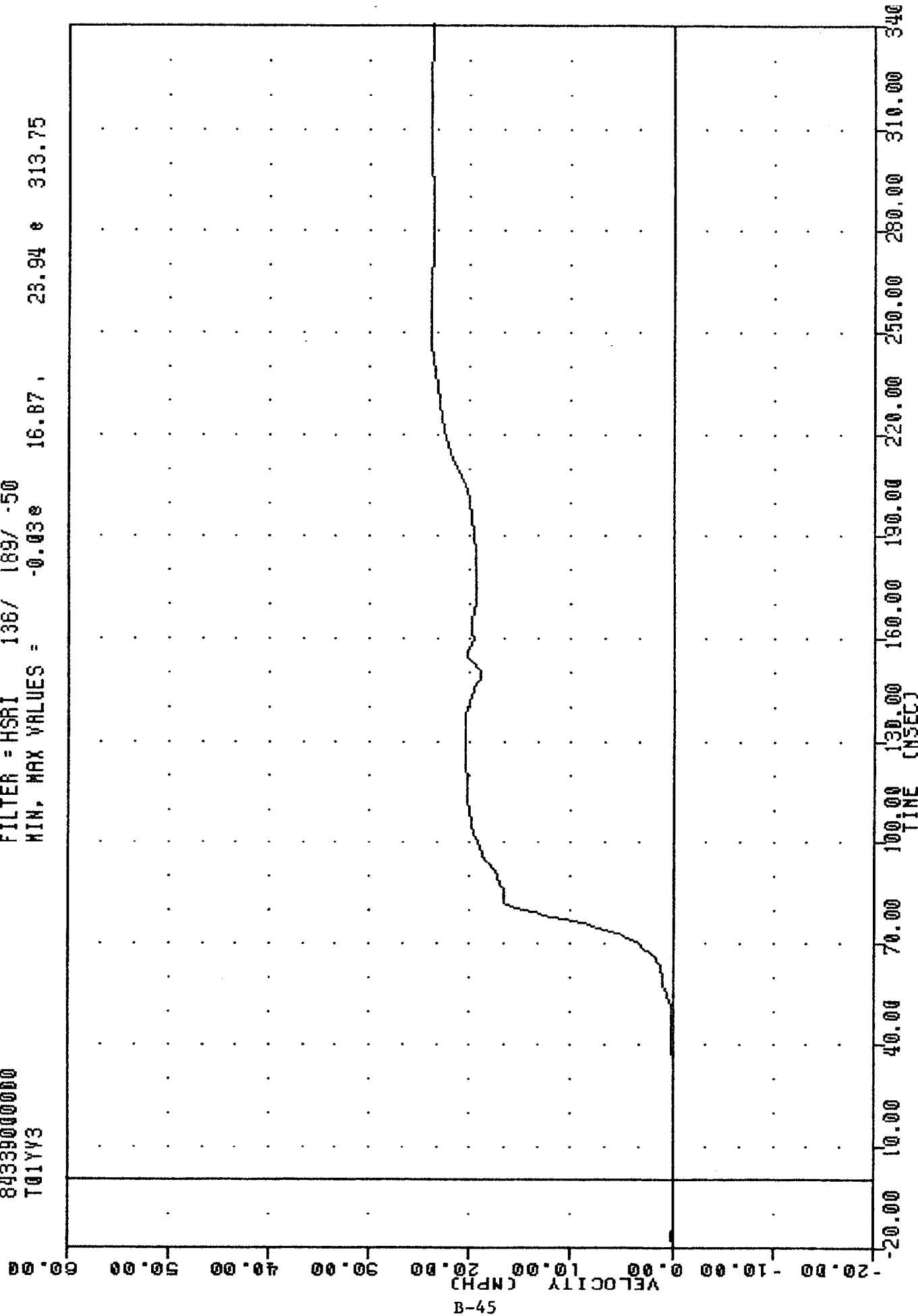
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T01YV3

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.03e 16.87 , 23.94 e 313.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T01YG3

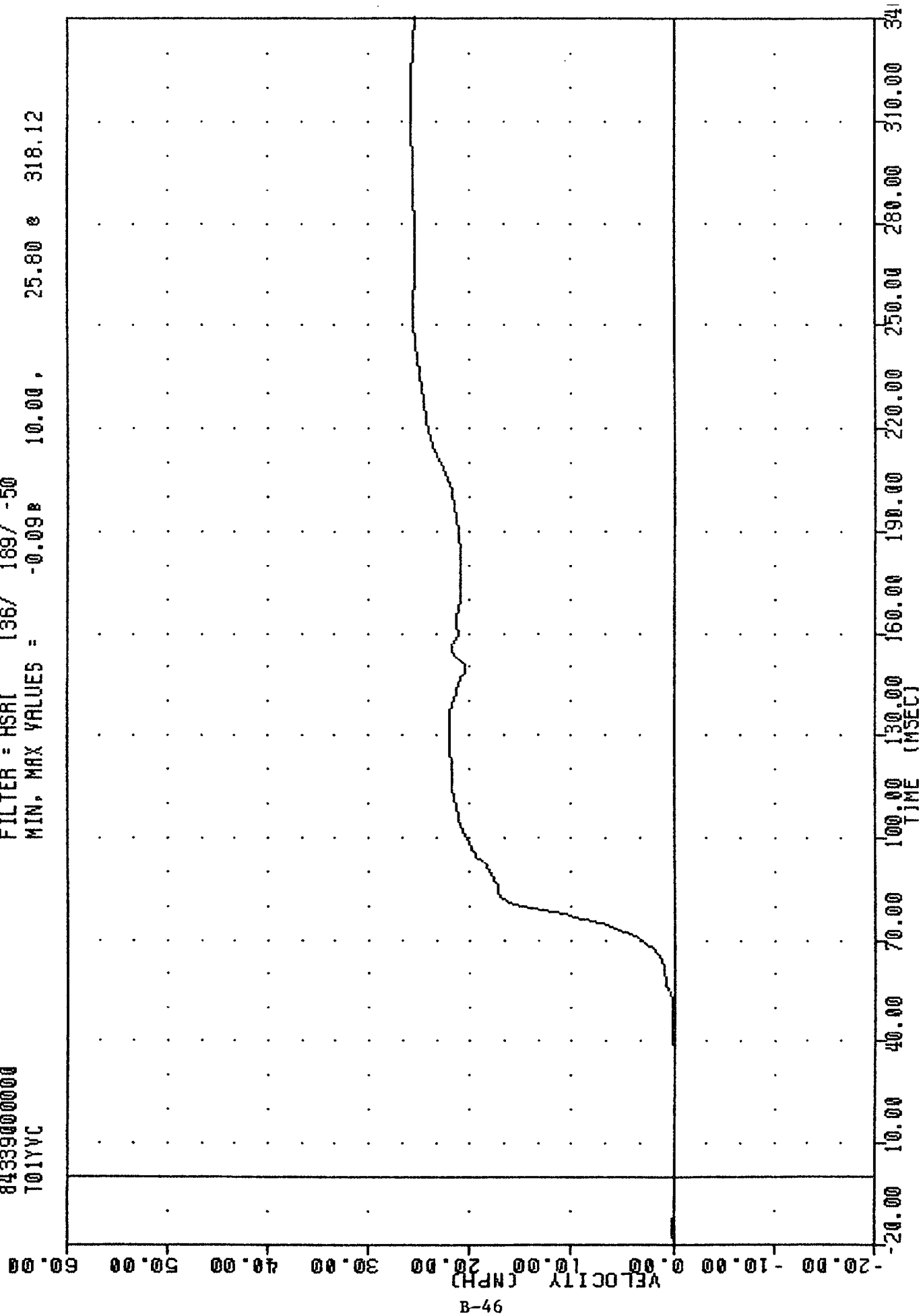
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T01YVC

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.098 10.00 , 25.80 @ 318.12



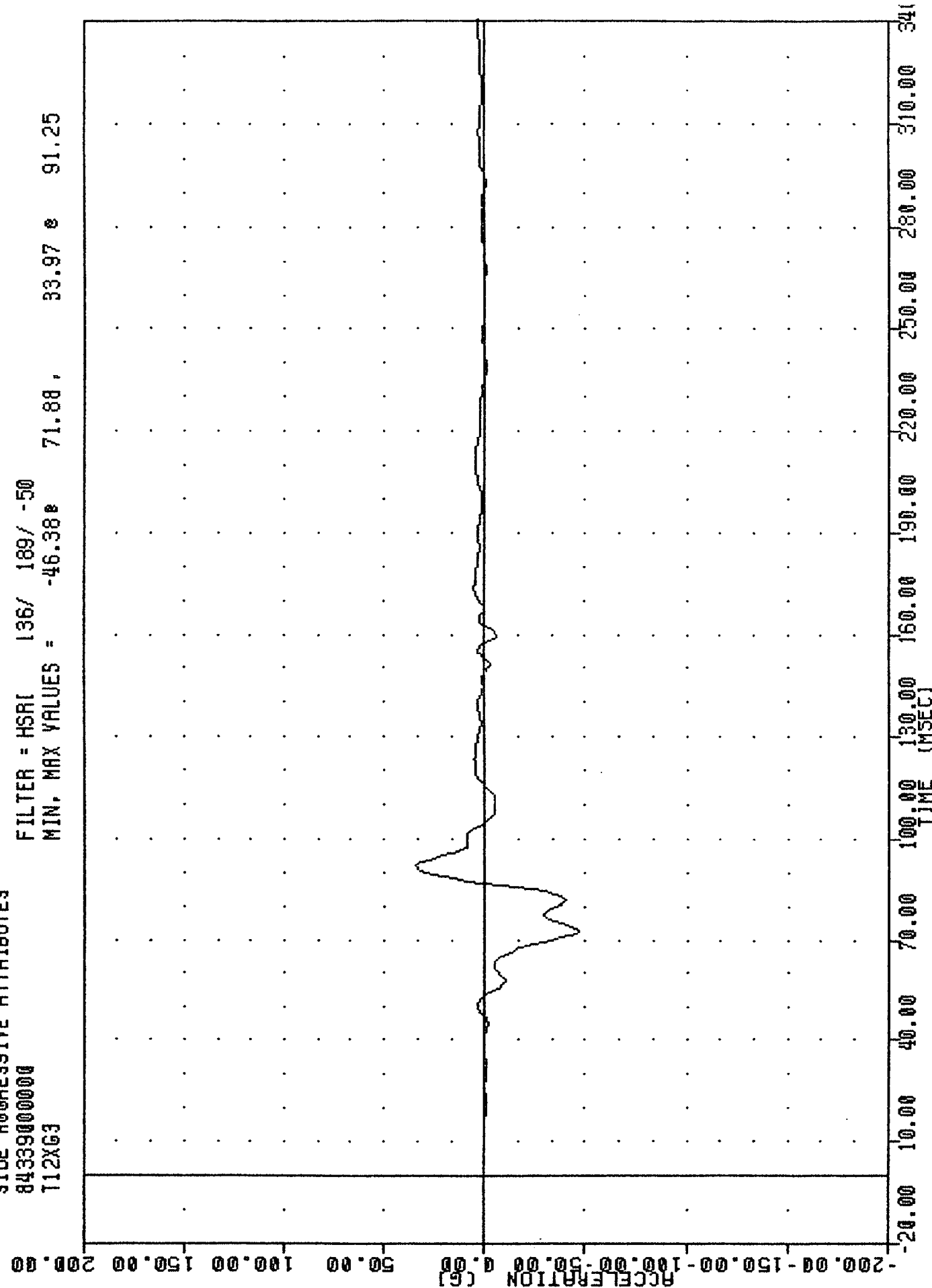
.....
 SIDE AGGRESSIVE ATTRIBUTES

84339000000

T12XG3

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -46.38e 71.88, 33.97 e 91.25



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 PASSENGER LOWER SPINE ACCELERATION X AXIS

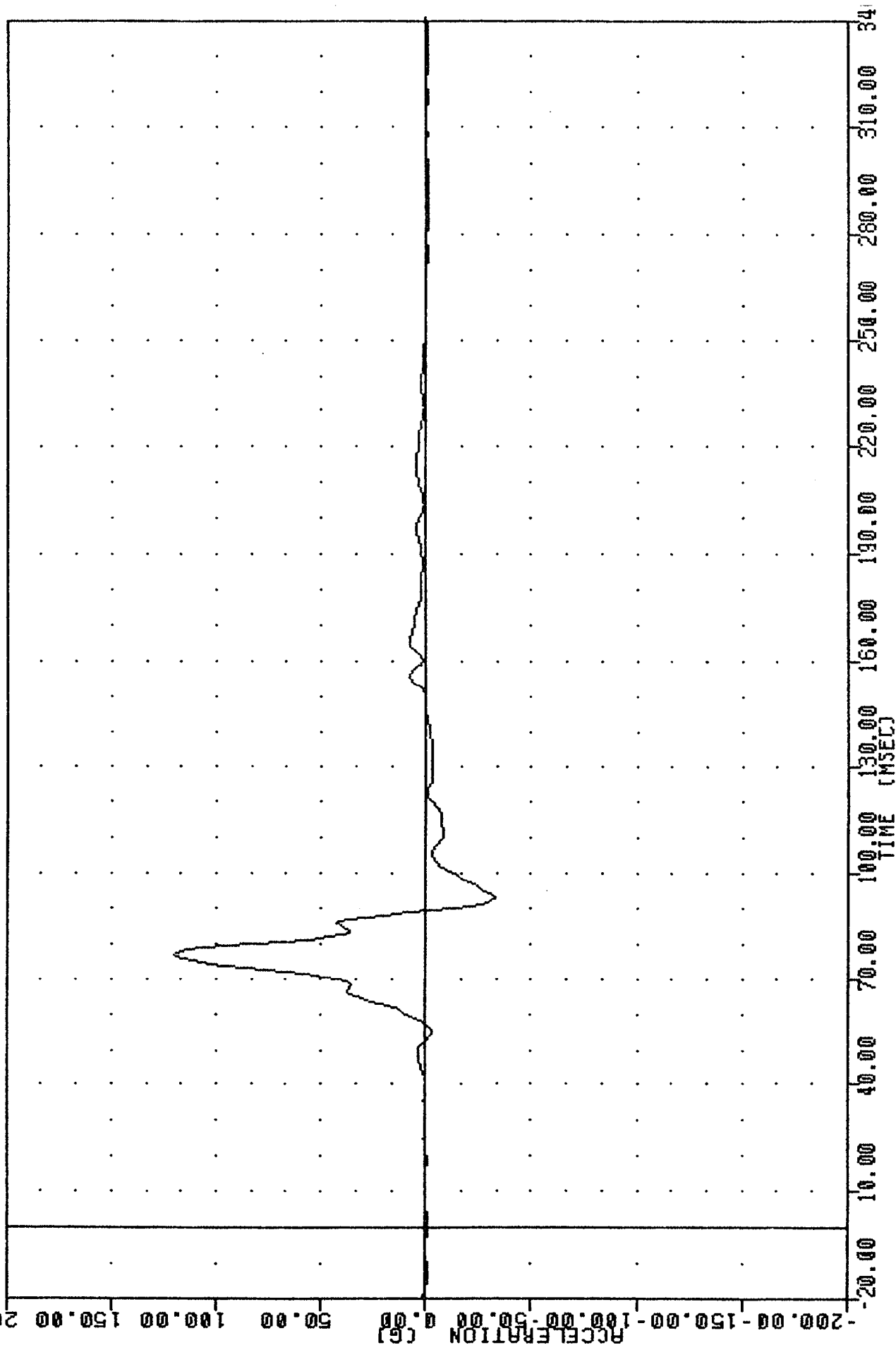
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T12Y63

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -32.38e 91.87, 120.03 e 76.25



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES

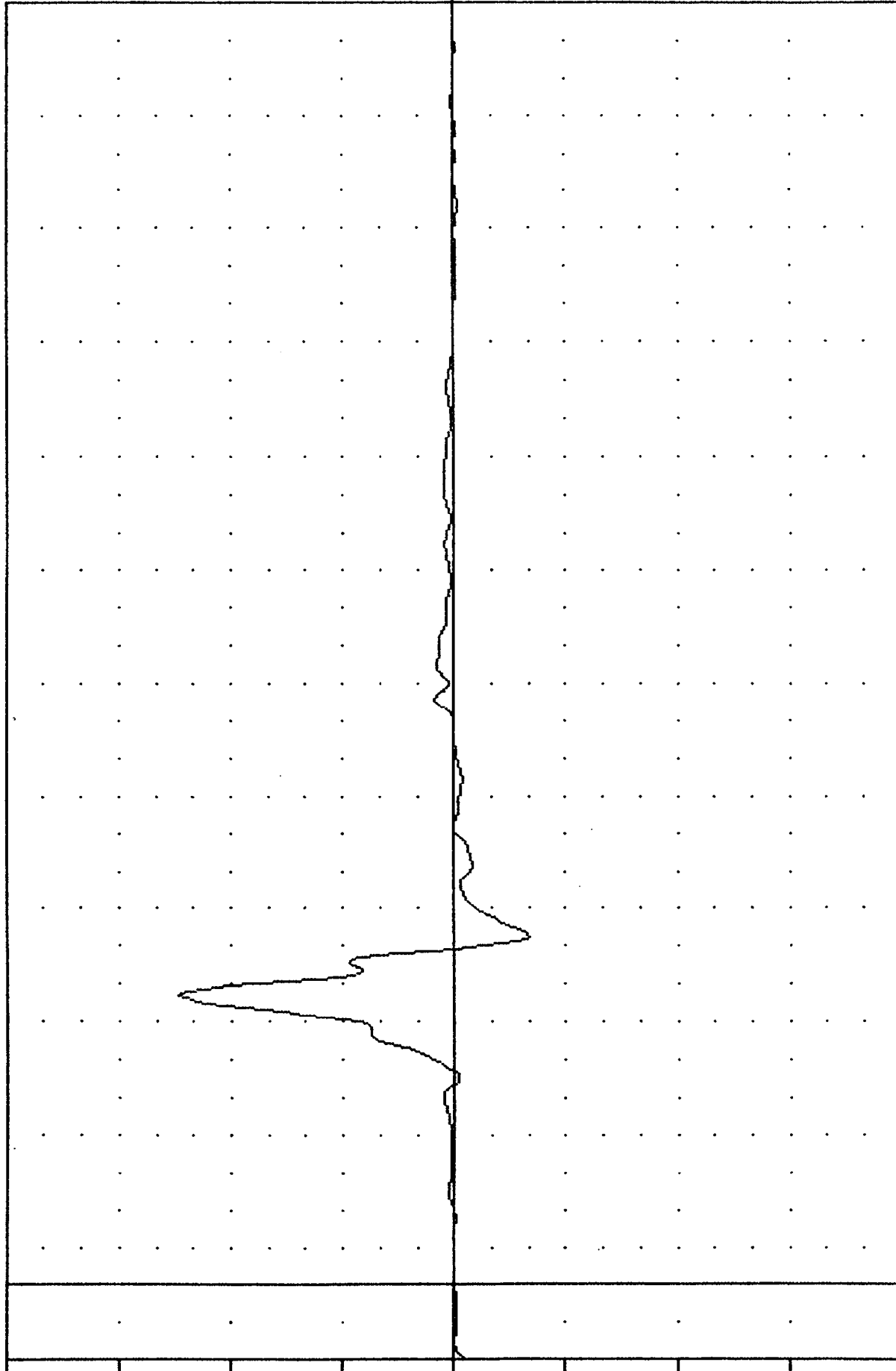
84339010000

T12Y6C

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -33.65 91.87 122.91 76.25

ACCELERATION (G)



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

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE ACCELERATION #2 Y AXIS

SIDE IMPRESSIVE MINIMUBLES

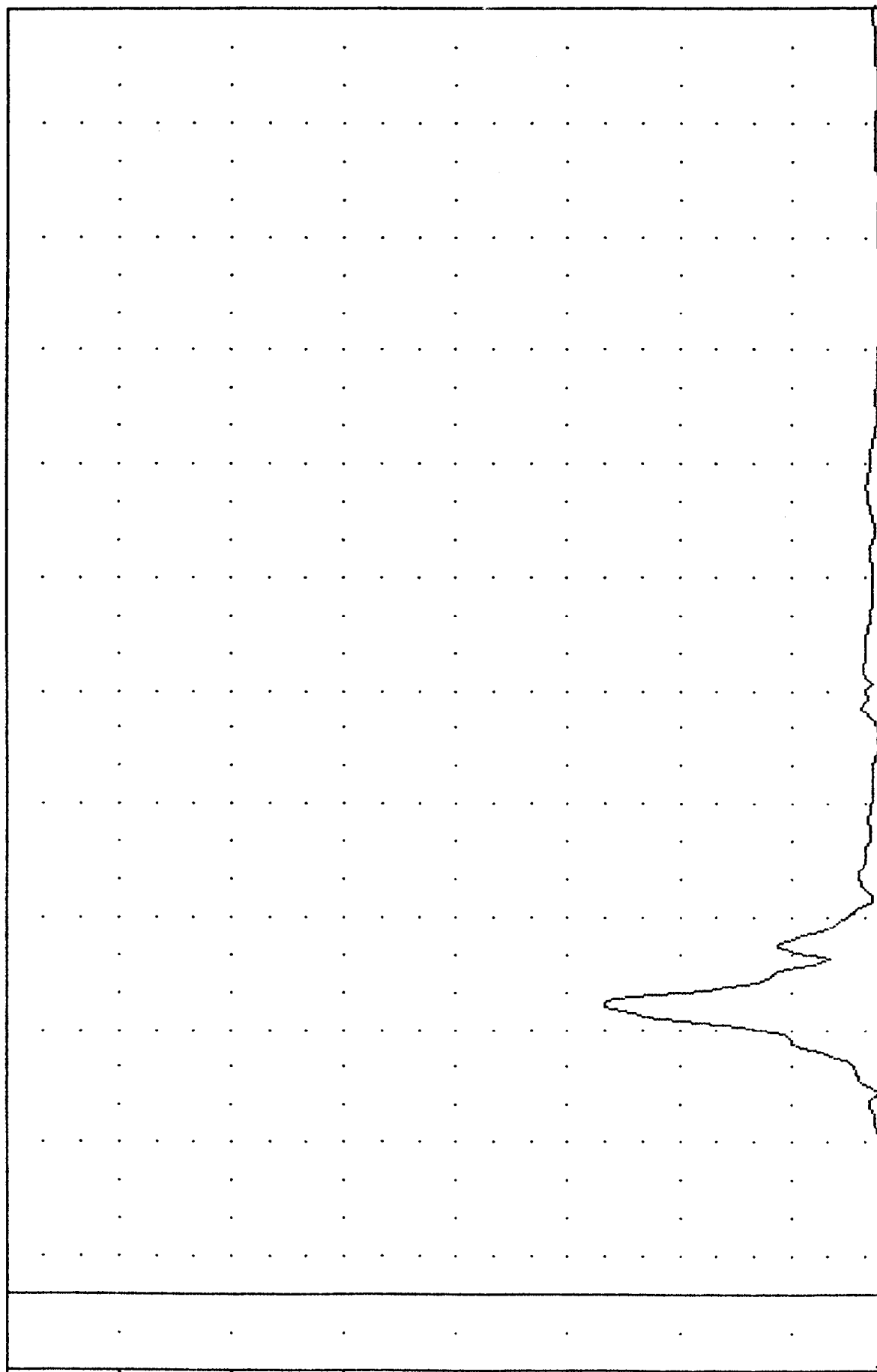
84339000000

T12R63

FILTER = HSR 136/ 189/ -50

MIN, MAX VALUES = 0.018 12.50, 123.78 76.25

ACCELERATION (G)



B-50

-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

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE RESULTANT USING X AND Y

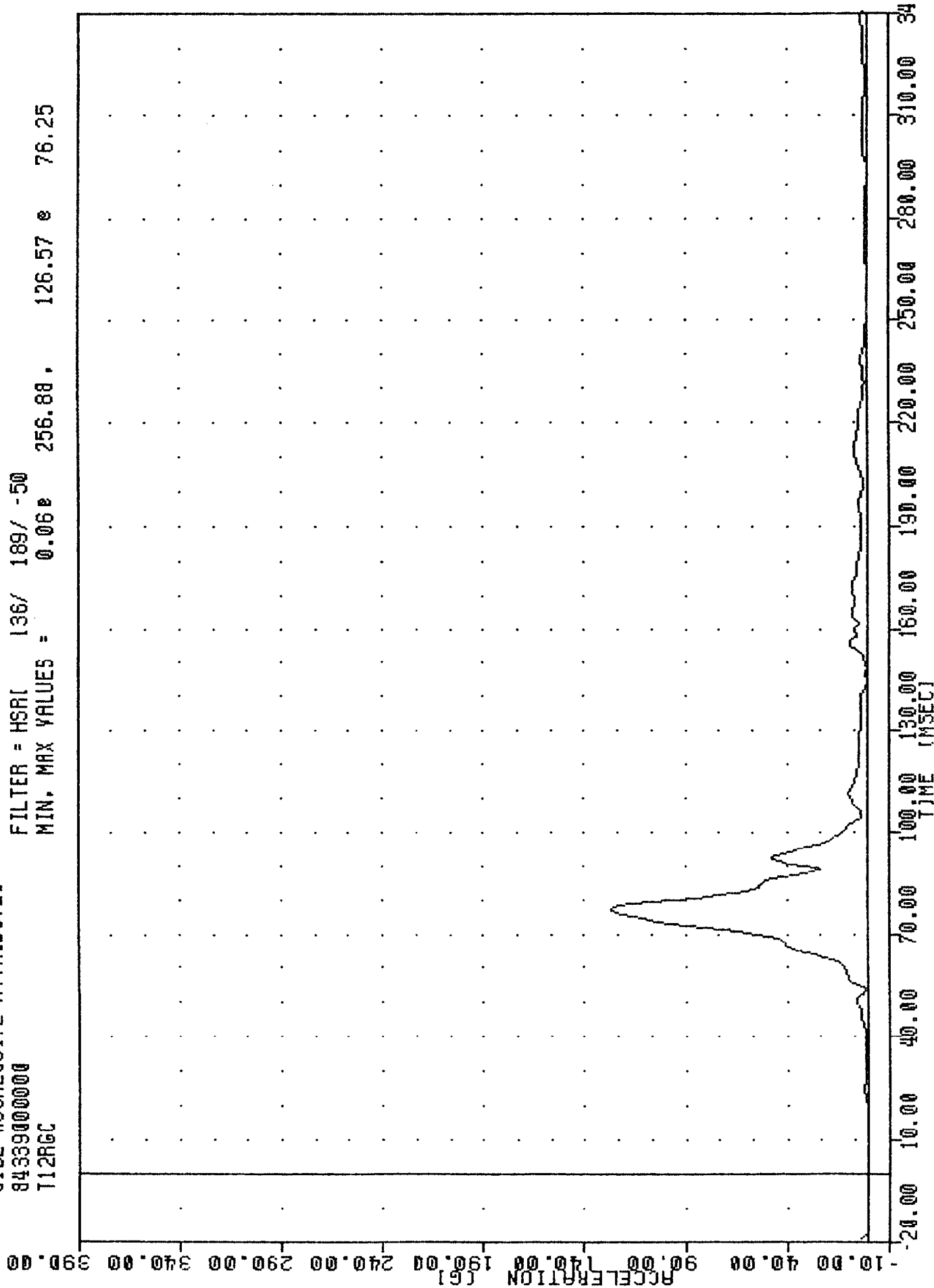
SIDE AGGRESSIVE ATTRIBUTES

84339000000

T12RGC

FILTER = HSR1 136/ 189/ -50

MIN. MAX VALUES = 0.06e 256.88. 126.57 e 76.25



B-51

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE RESULTANT USING T12XG3 AND T12YGC

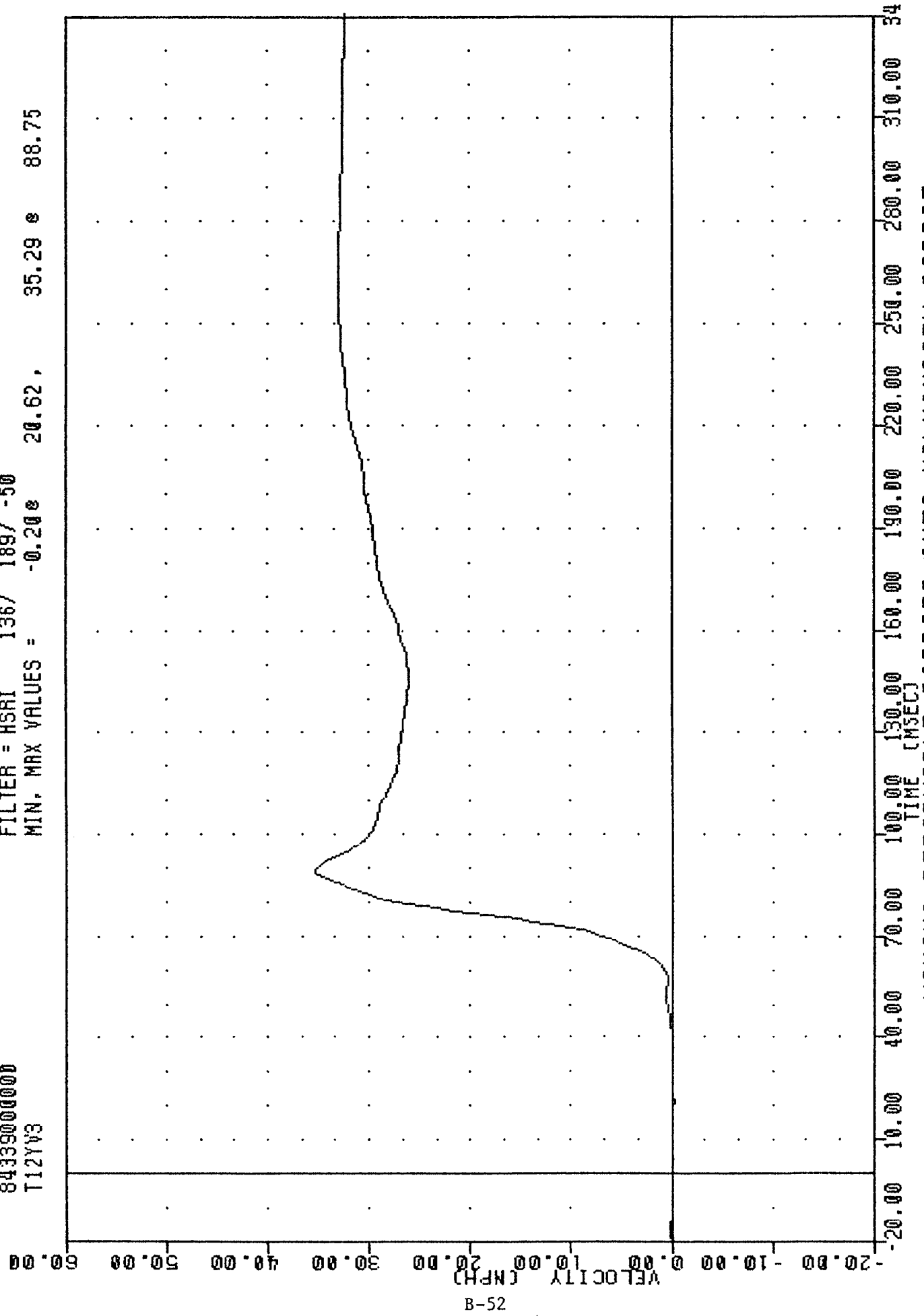
SIDE AGGRESSIVE ATTRIBUTES

843390000000

T12YV3

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.200 20.62 , 35.29 88.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T12Y63

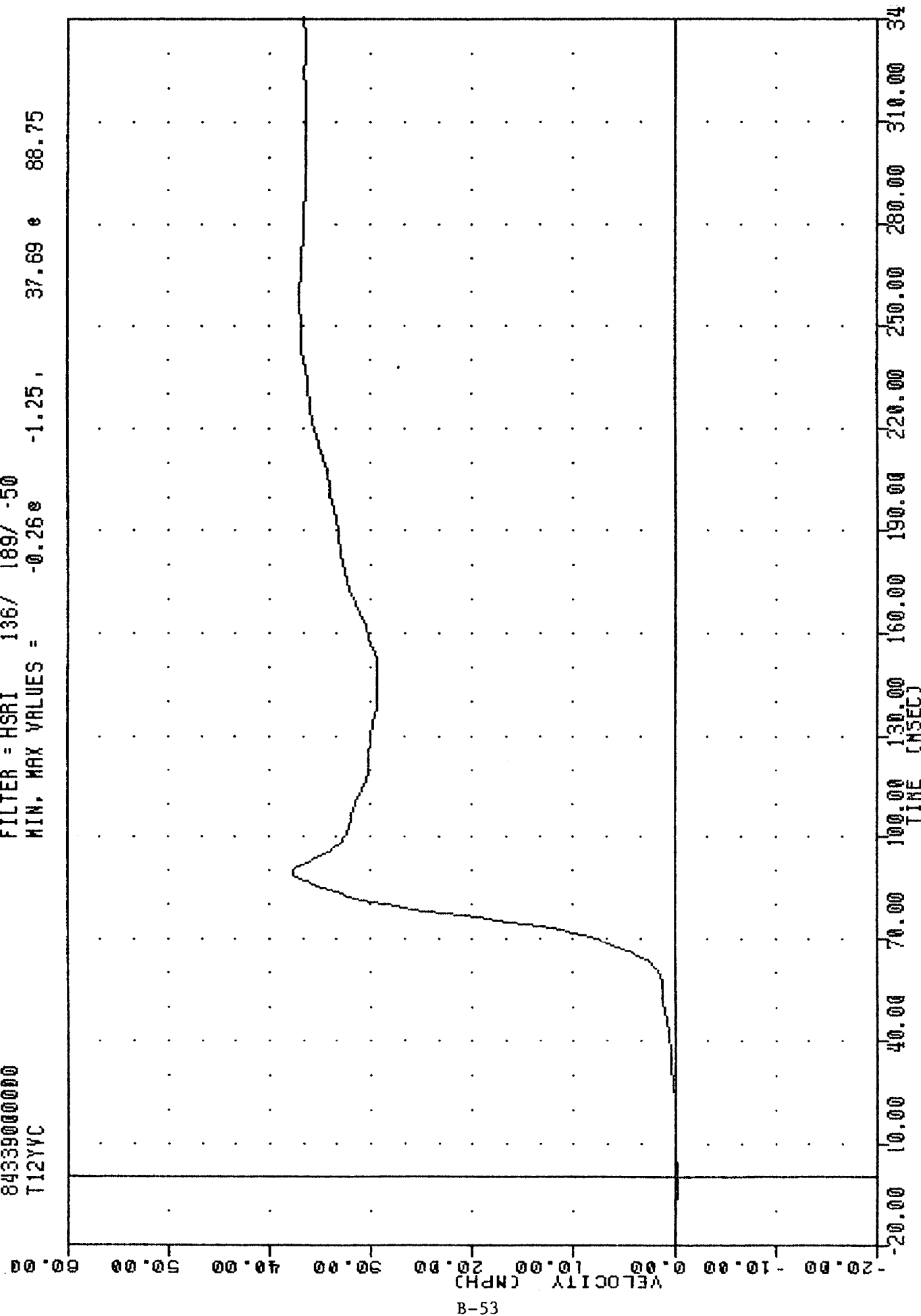
SIDE AGGRESSIVE ATTRIBUTES

843390000000

T12YVC

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -0.26 37.69 88.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT

DELTA V USING T12YGC

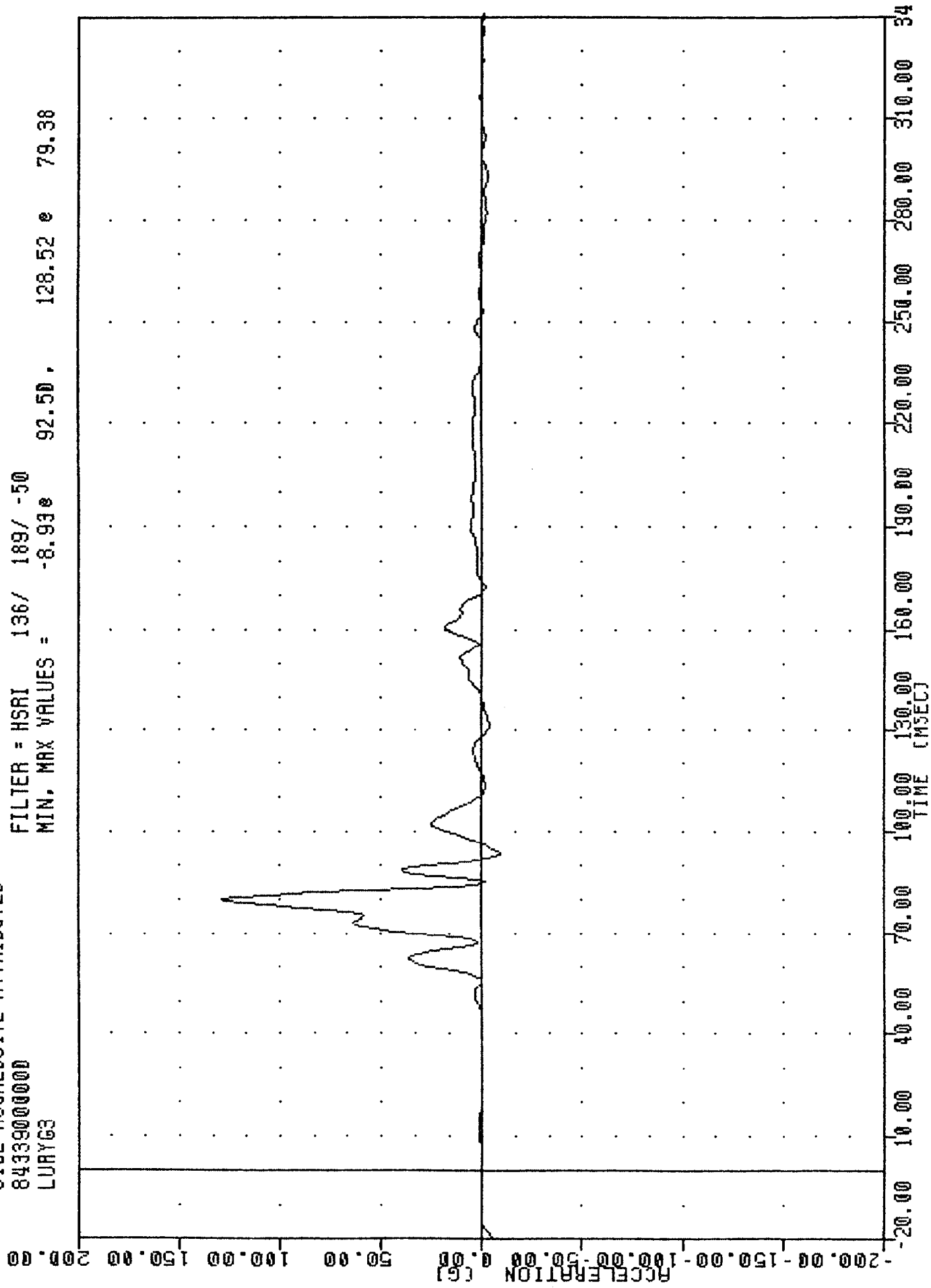
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LURY63

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -8.93 92.50 128.52 79.38



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT UPPER RIB ACCELERATION Y AXIS

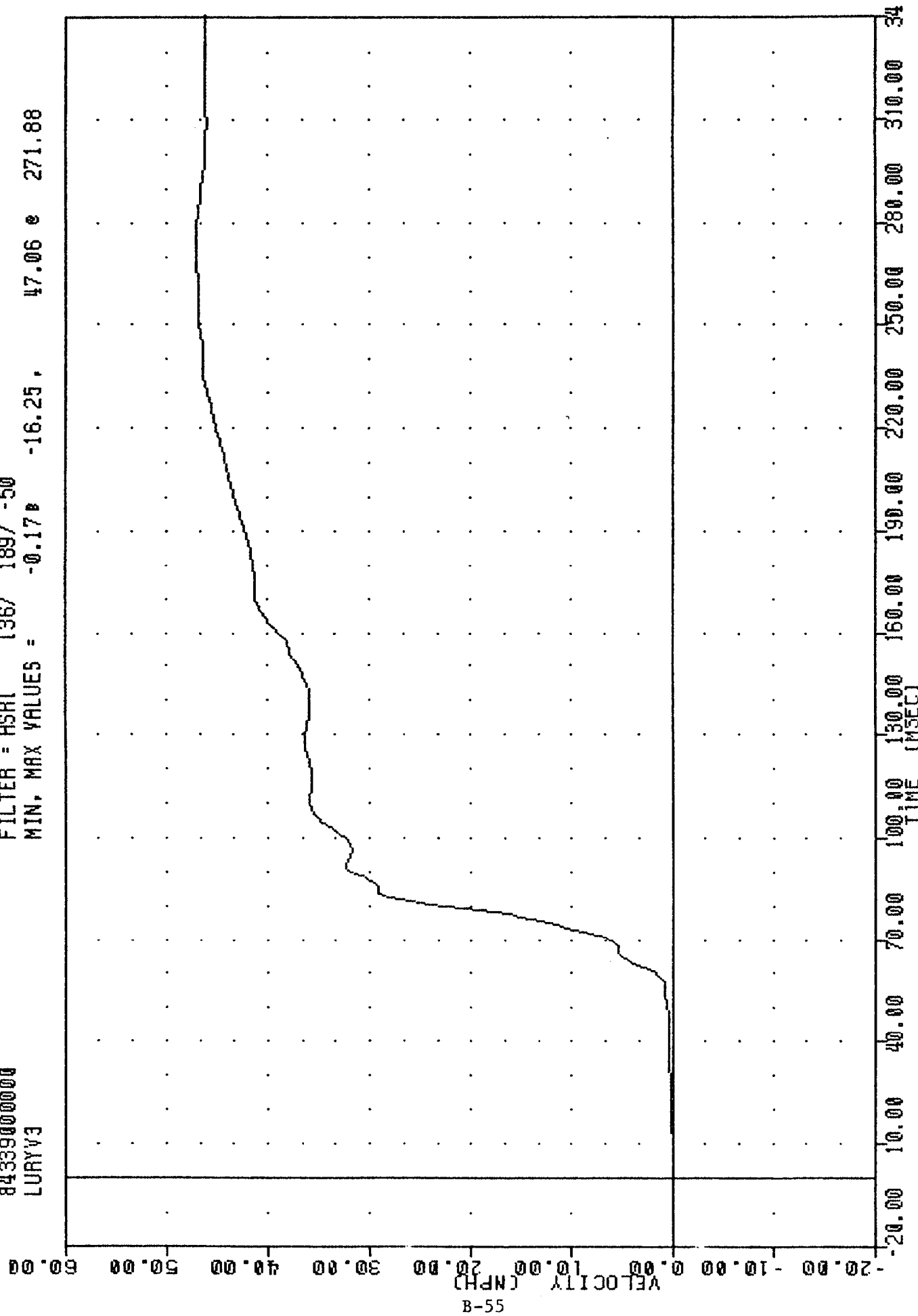
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LURYV3

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.17 47.06 271.88



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LURYG3

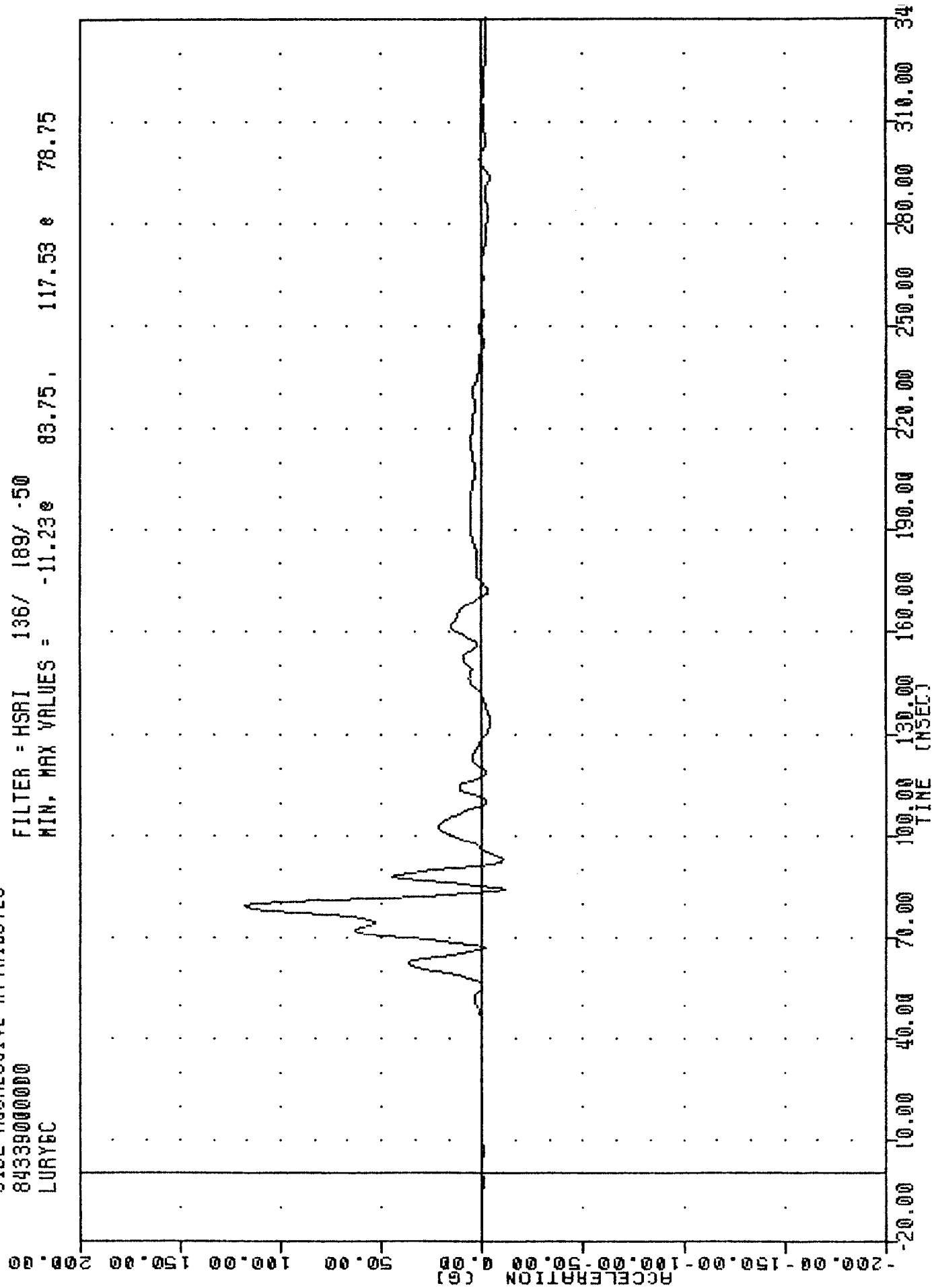
SIDE IMPRESSIVE MINIBUILD

84339000000

LURYEC

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -11.23e 83.75, 117.53 e 78.75



B-56

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT UPPER RIB ACCELERATION -2 Y AXIS

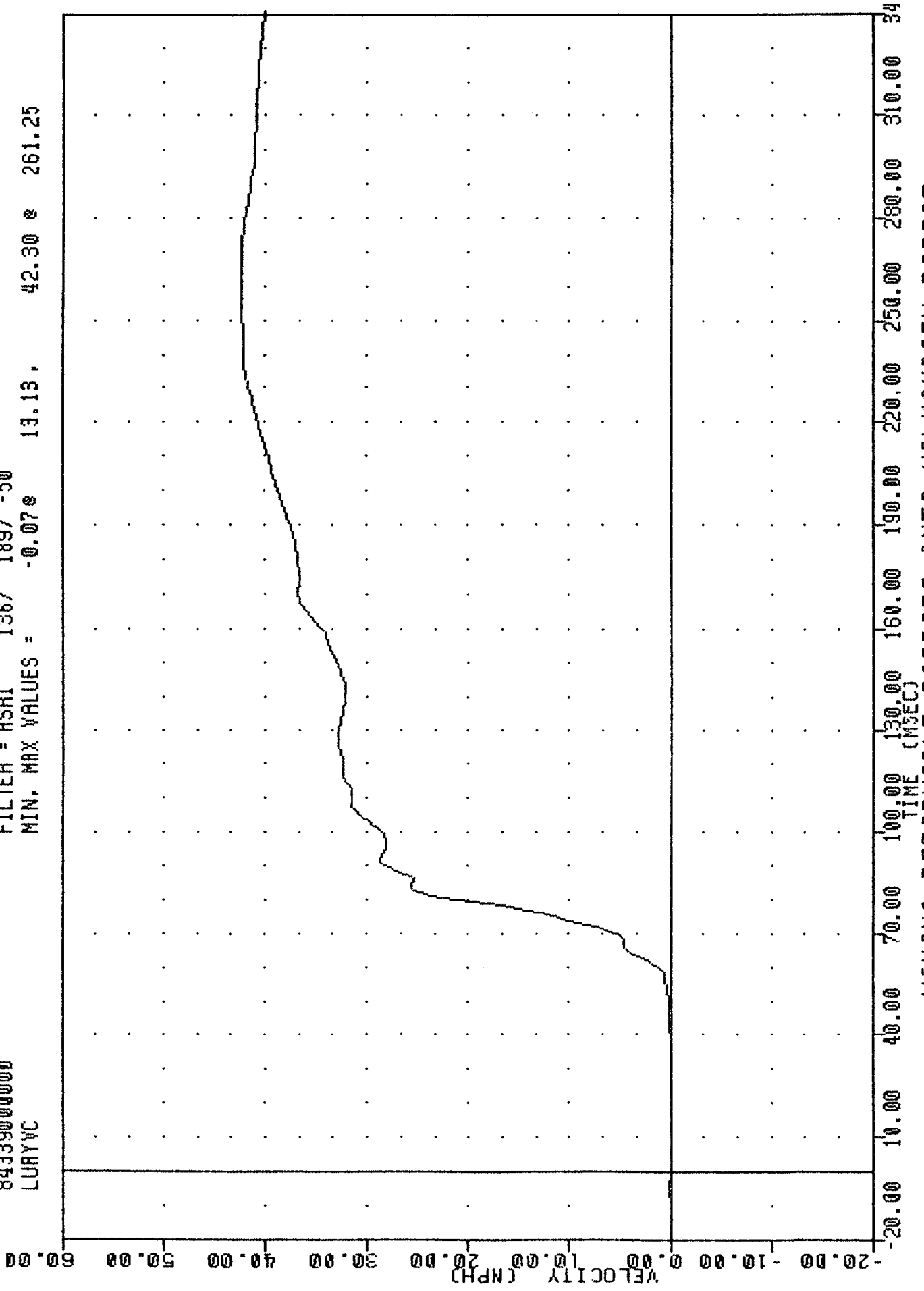
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LURYVC

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.07 13.13 42.30 261.25



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT

DELTA V USING LURYGC

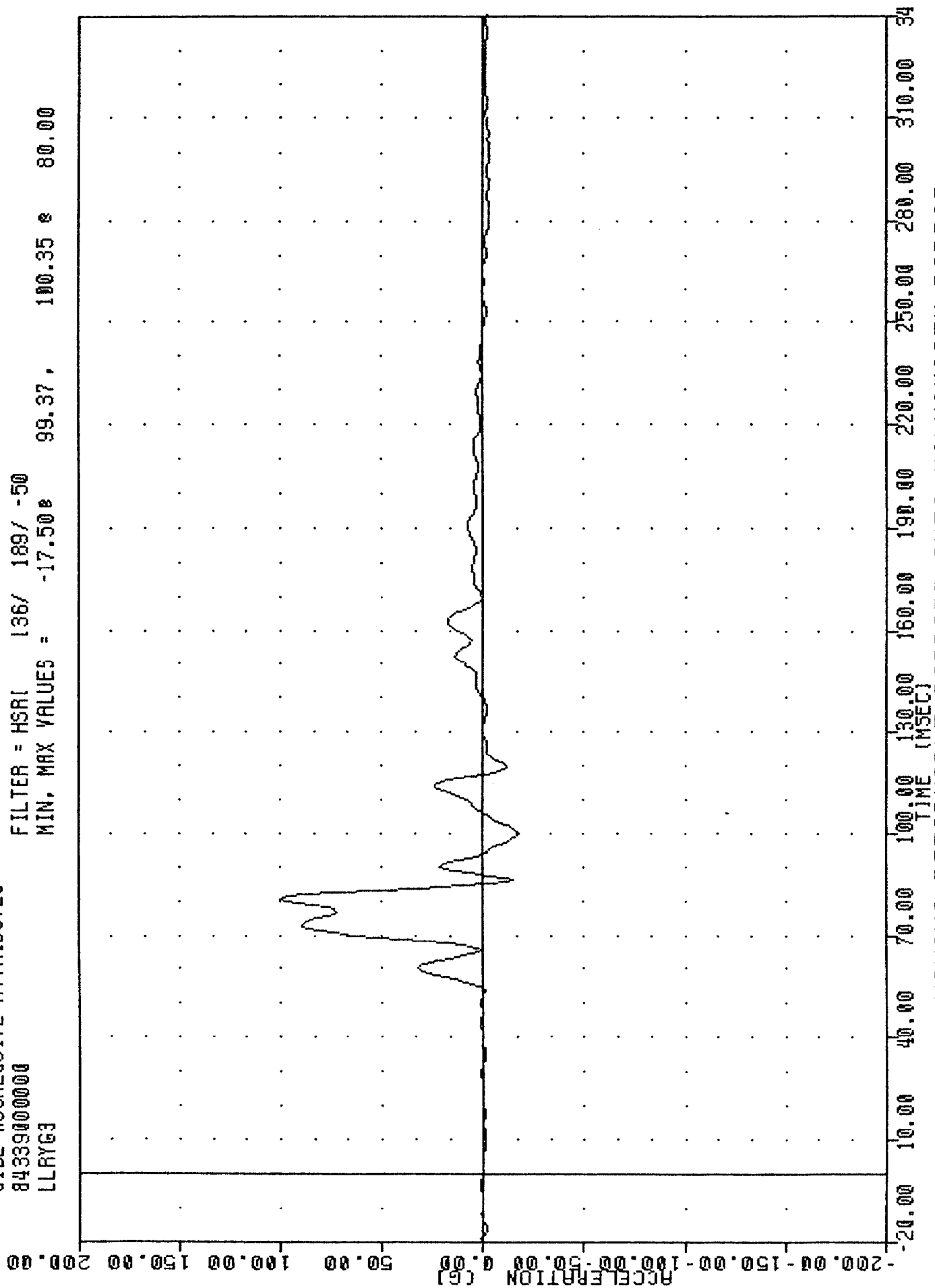
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LLRYG3

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -17.50e 99.37, 100.35 e 80.00



B-58

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT LOWER RIB ACCELERATION Y AXIS

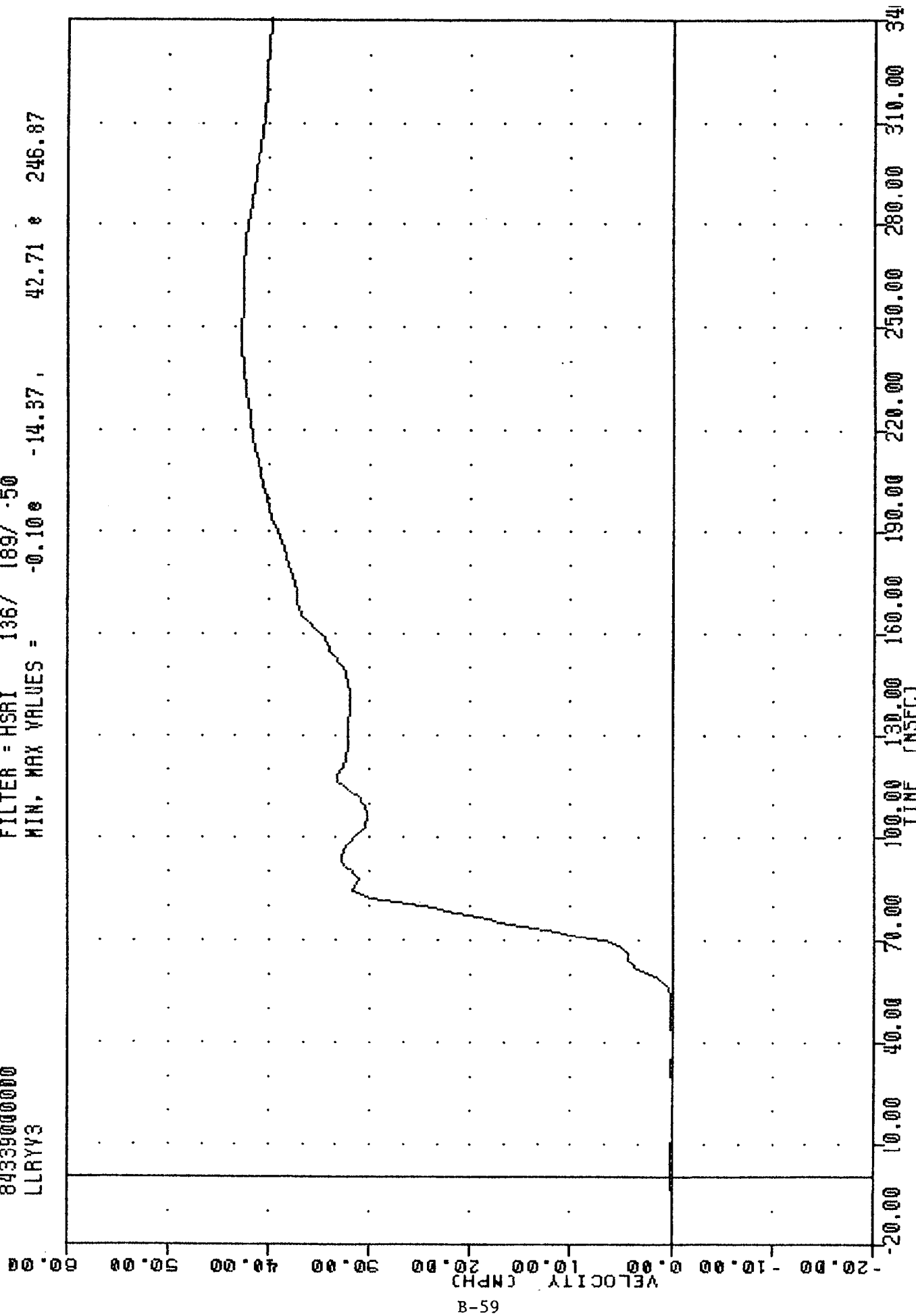
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LLRYV3

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -0.10e -14.37, 42.71 e 246.87



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT

DELTA V USING LLRYG3

SINE HARMONIC AMPLITUDES

84339000000

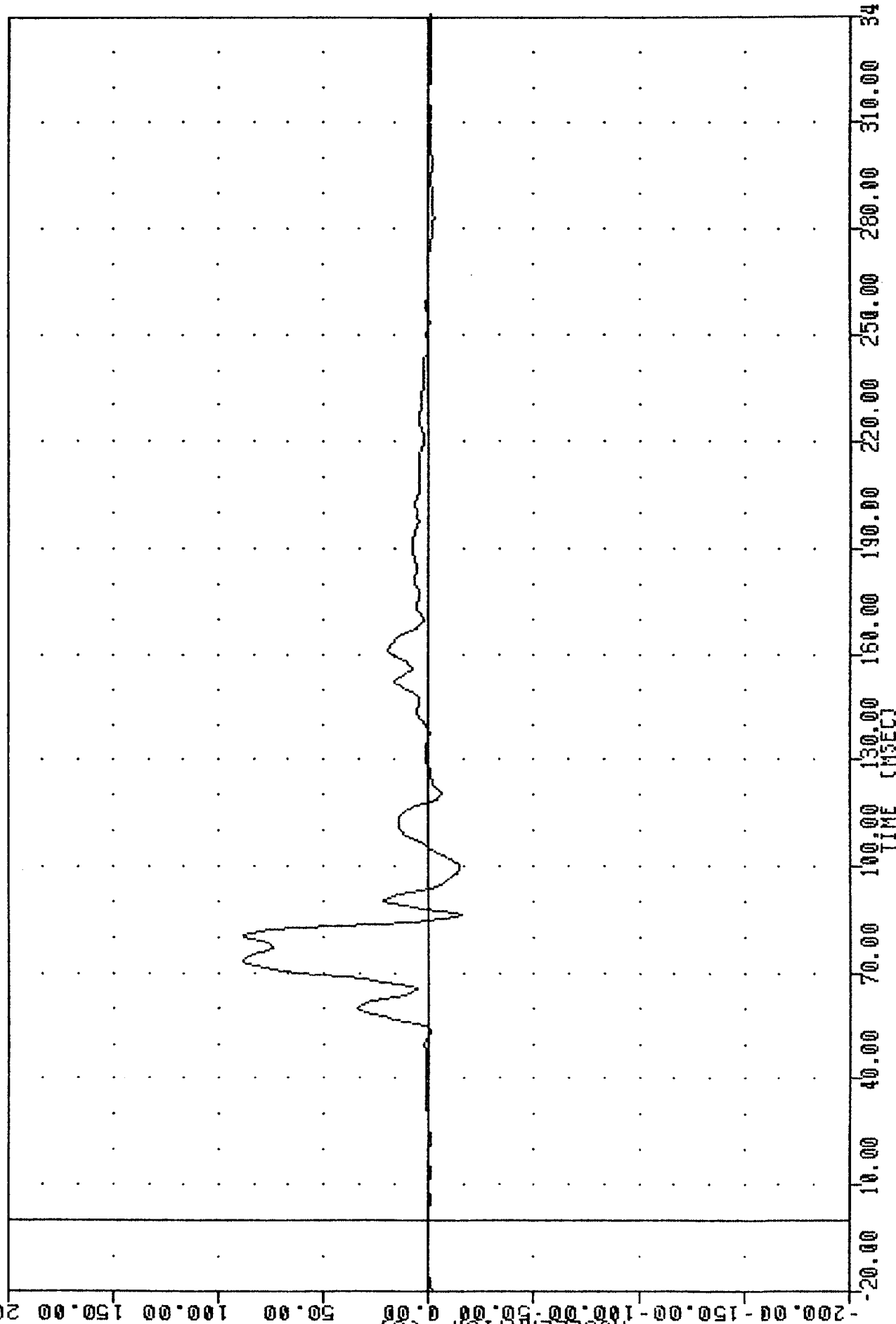
LLAYGC

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -15.59e 85.63 , 88.59 e 72.50

ACCELERATION (G)

B-60



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT LOWER RIB ACCELERATION #2 Y AXIS

84339000000

LLRYVC

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES =

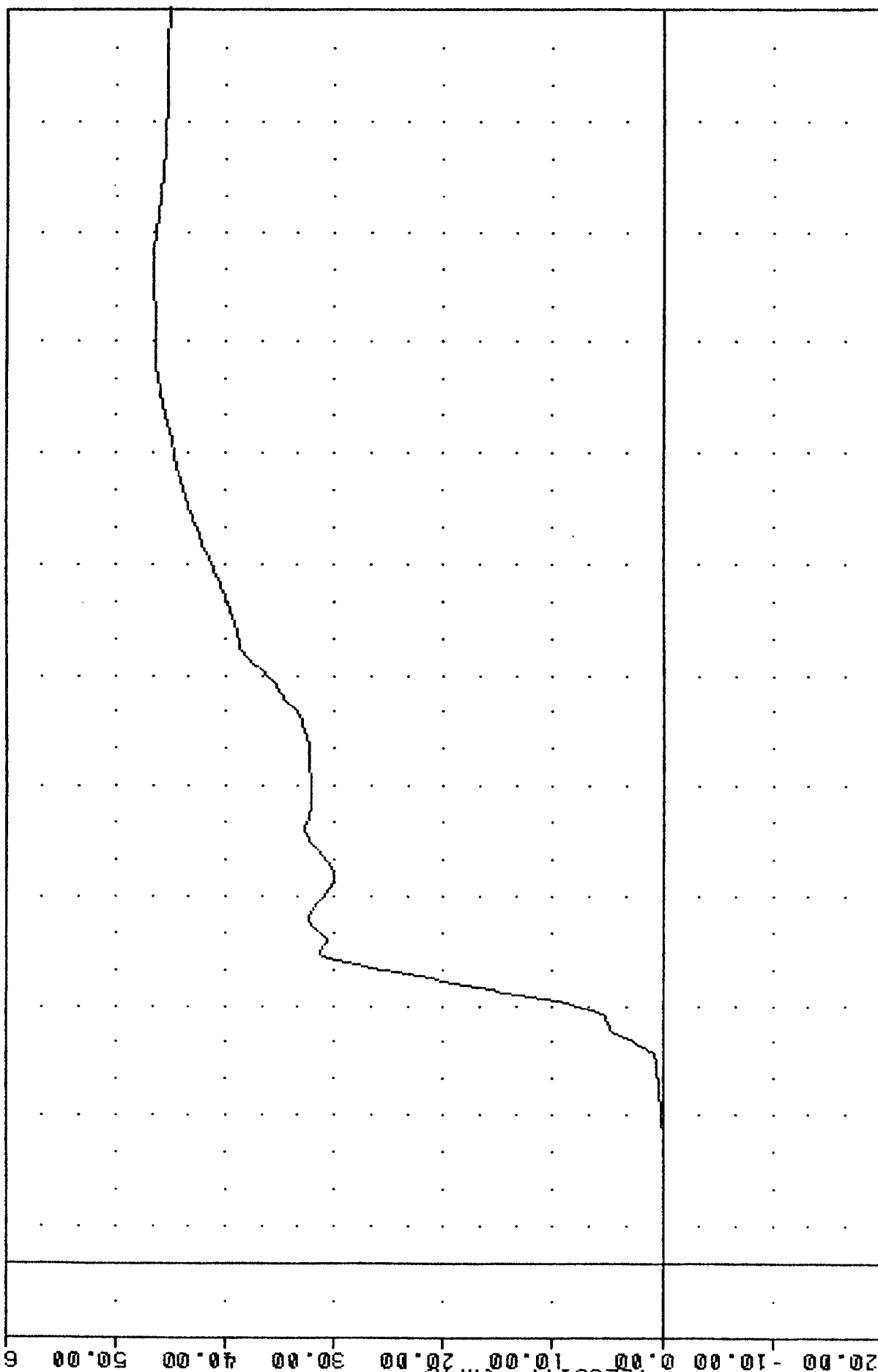
-0.15e

27.50,

46.53 @ 266.88

VELOCITY (MPH)

B-61



-20.00 10.00 20.00 30.00 40.00 50.00 60.00

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LLRYGC

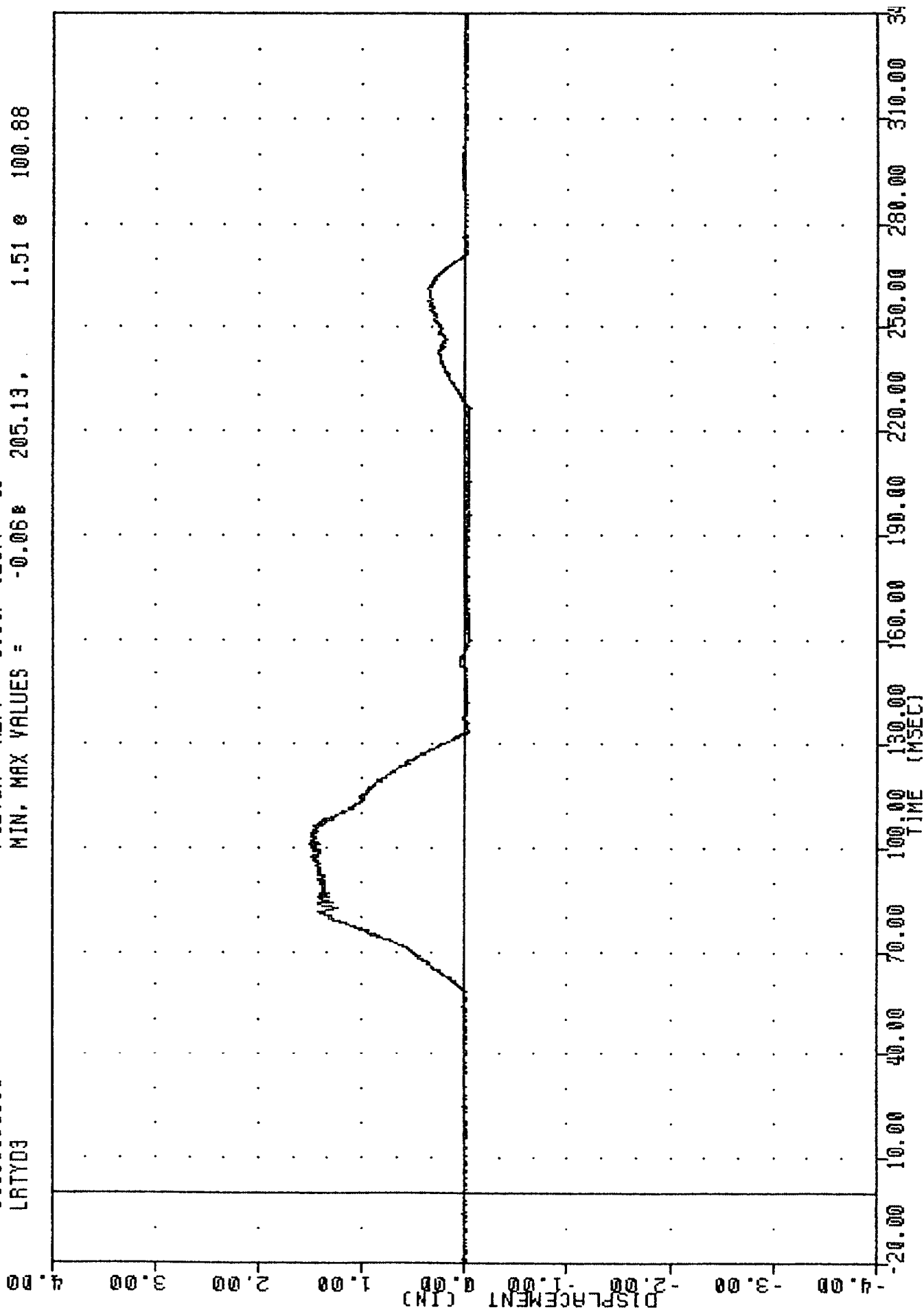
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LRTYD3

FILTER = ALPF 1650/ 5217/ -40

MIN, MAX VALUES = -0.068 205.13, 1.51 @ 100.88



B-62

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT RIB TO SPINE DISPLACEMENT INCHES

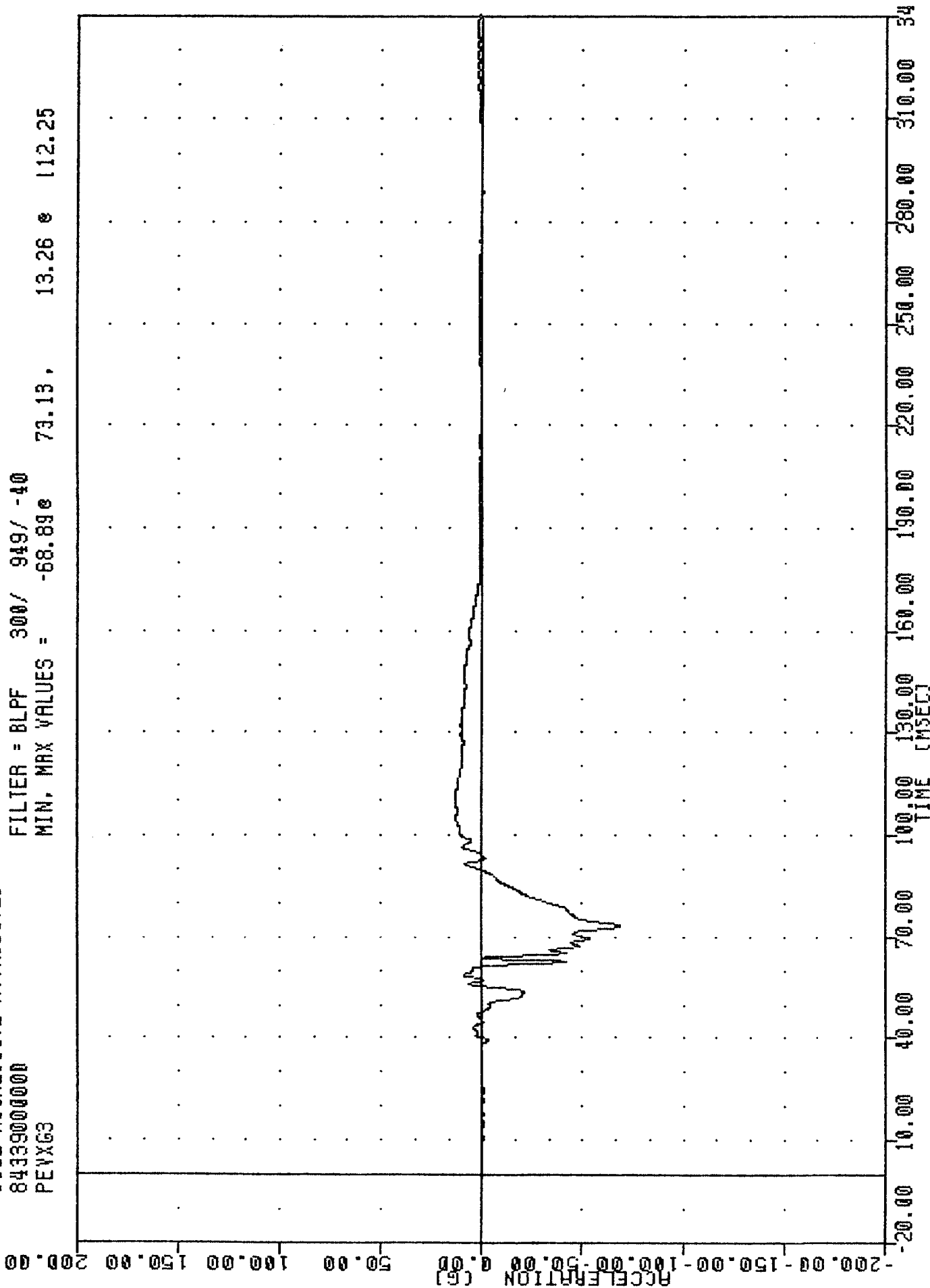
SIDE AGGRESSIVE ATTRIBUTES

84339000000

PEVXG3

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -68.89 73.13 13.26 112.25



B-63

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS ACCELERATION X AXIS

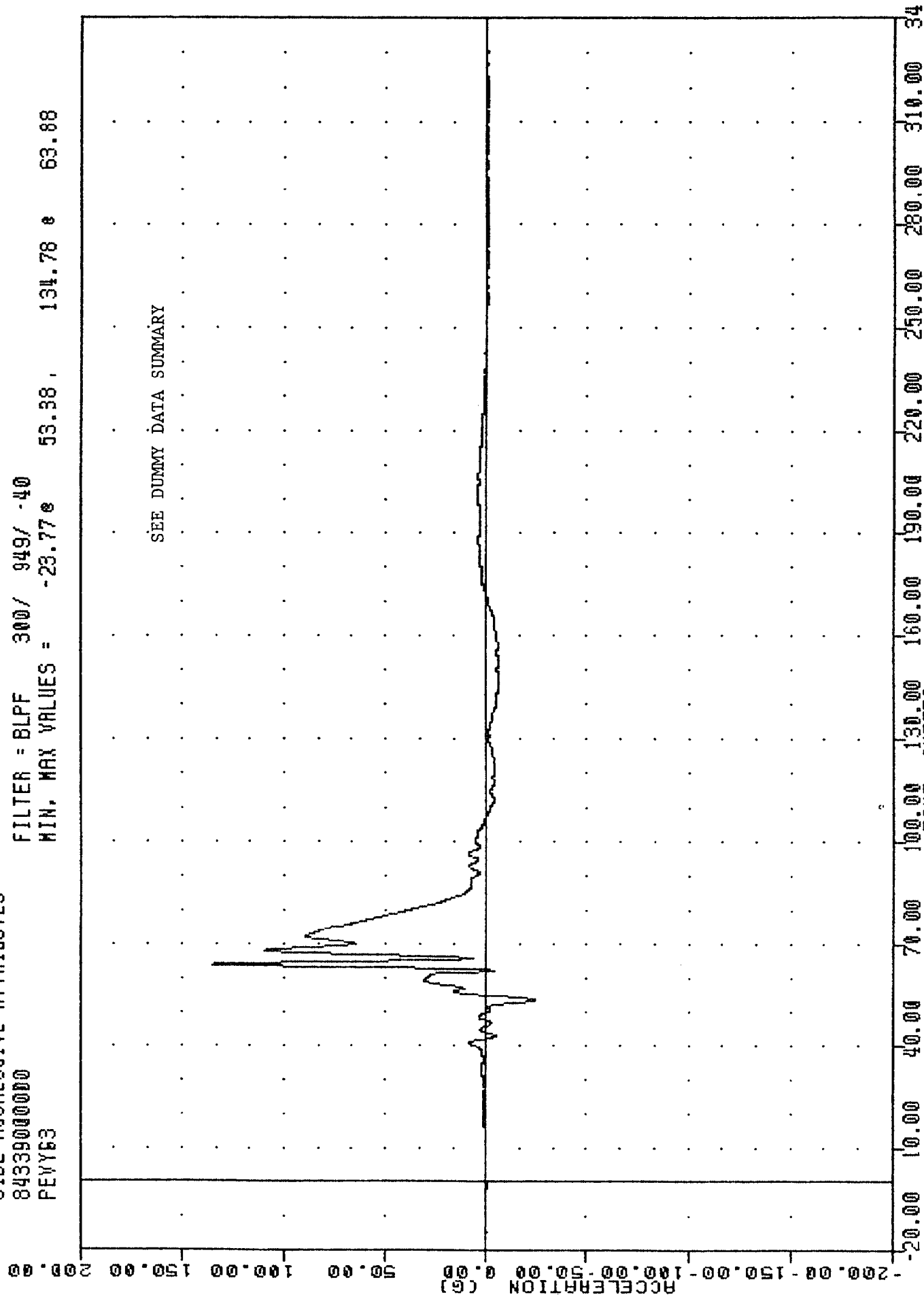
SIDE IMPRESSIVE HITIBUDIES

84339000000

PEVY63

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -23.77 53.38 134.78 63.88



B-64

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES

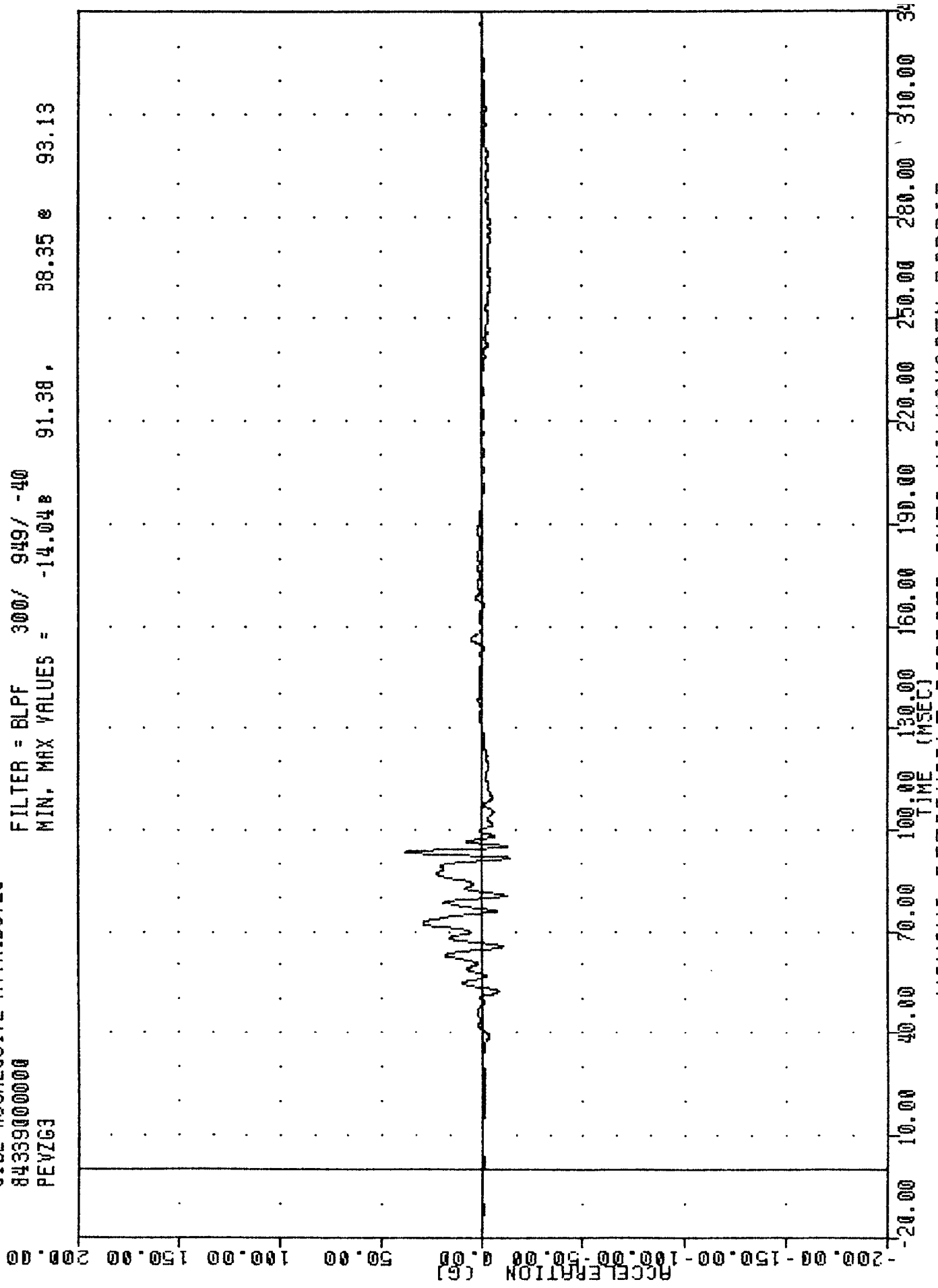
84339000000

PEVZG3

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -14.04 91.38

38.35 93.13



B-65

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS ACCELERATION Z AXIS

SIDE AGGRESSIVE ATTRIBUTES

84339000000

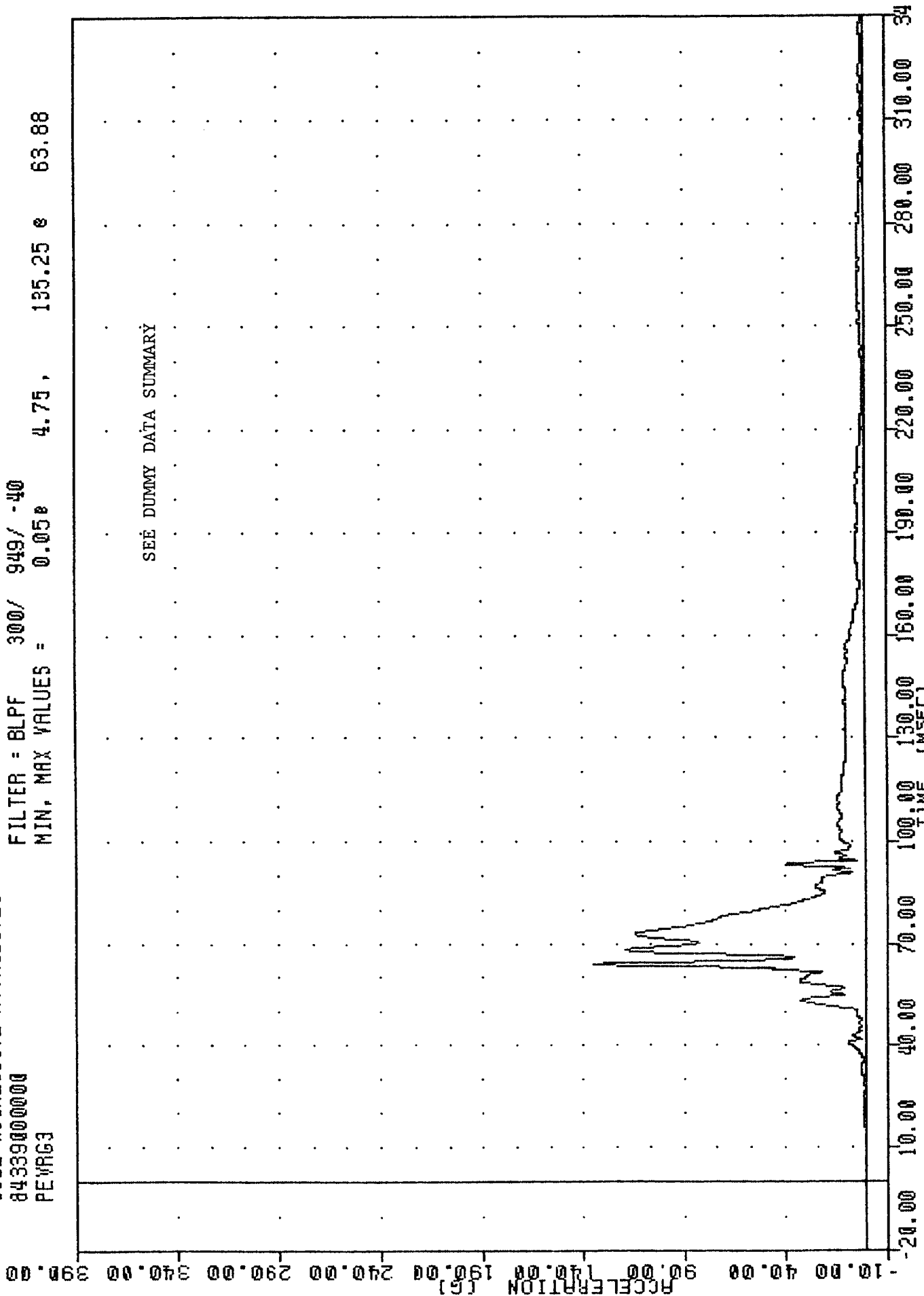
PEVRG3

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.050

4.75 , 135.25 @ 63.88

SEE DUMMY DATA SUMMARY



B-66

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS RESULTANT

SIDE AGGRESSIVE ATTRIBUTES

84339000000

PEVYV3

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -0.01e 0.00, 35.48 e 107.25

SEE DUMMY DATA SUMMARY

B-67

VELOCITY (MPH)

-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

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING PEVYV3

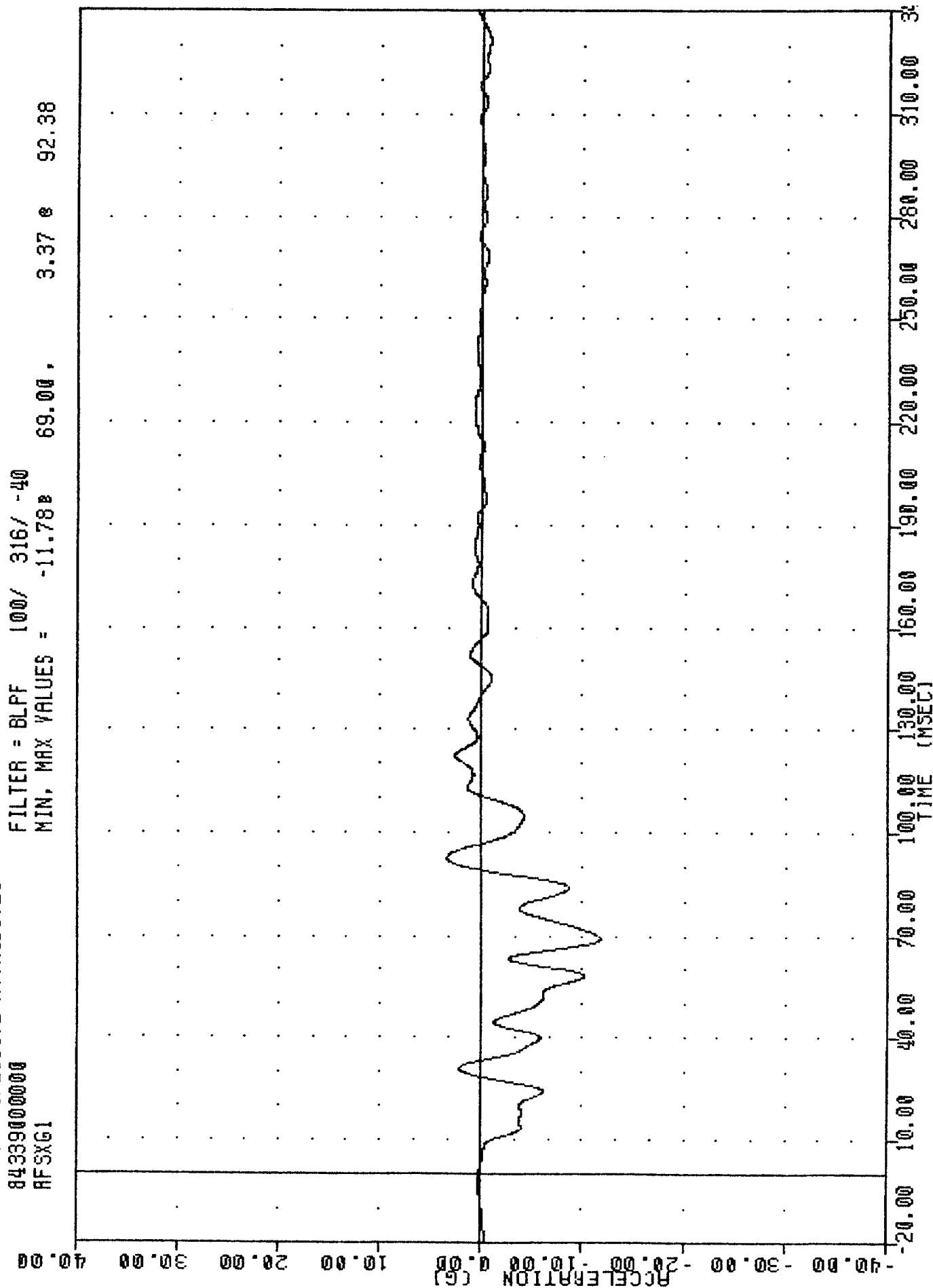
SIDE IMPRESSIVE ATTRIBUTES

84339000000

AFSG1

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -11.78 69.00, 3.37 92.38



B-68

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL ACCELERATION X AXIS

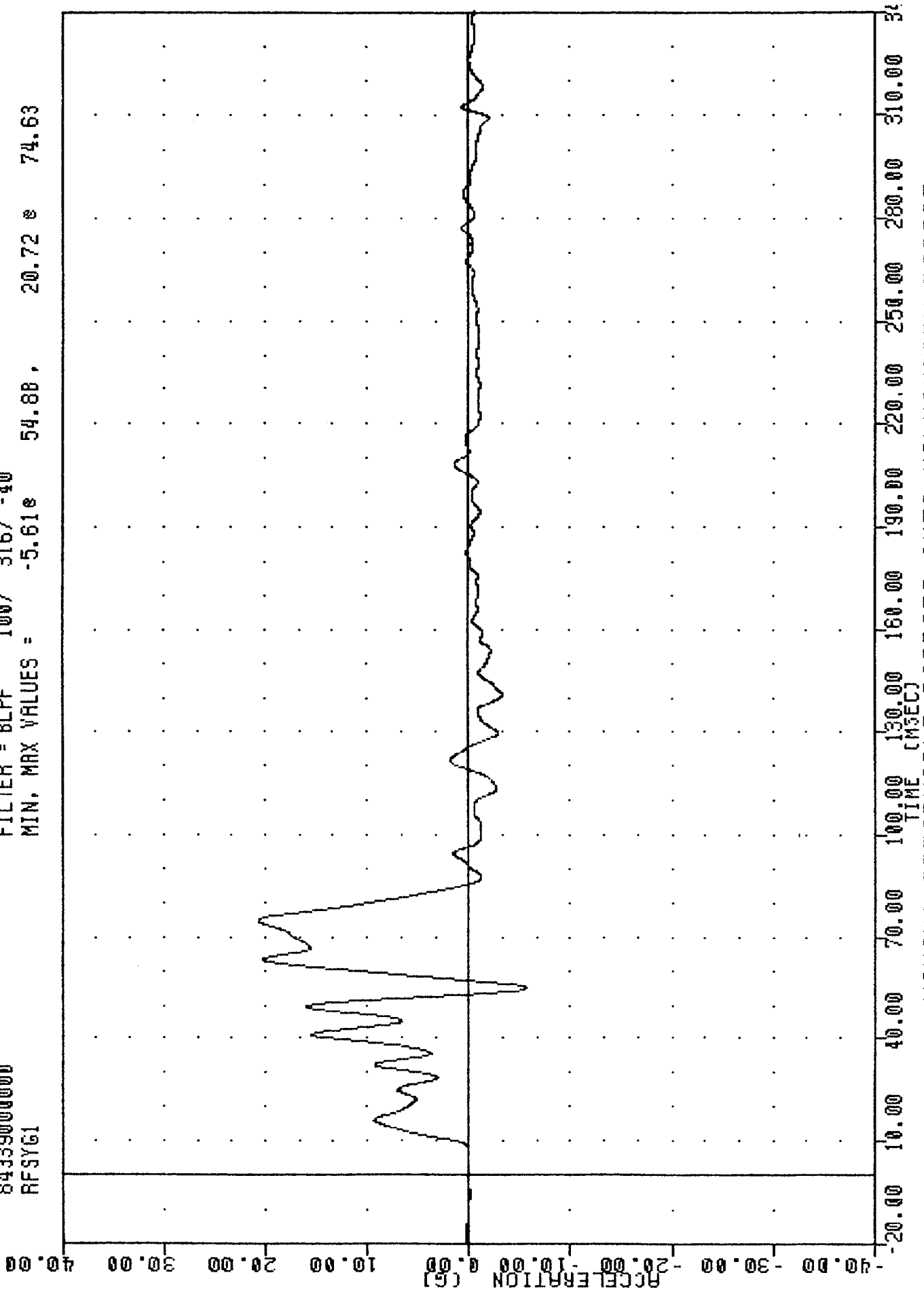
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RFSYG1

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -5.61s 54.88, 20.72 s 74.63



B-69

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES

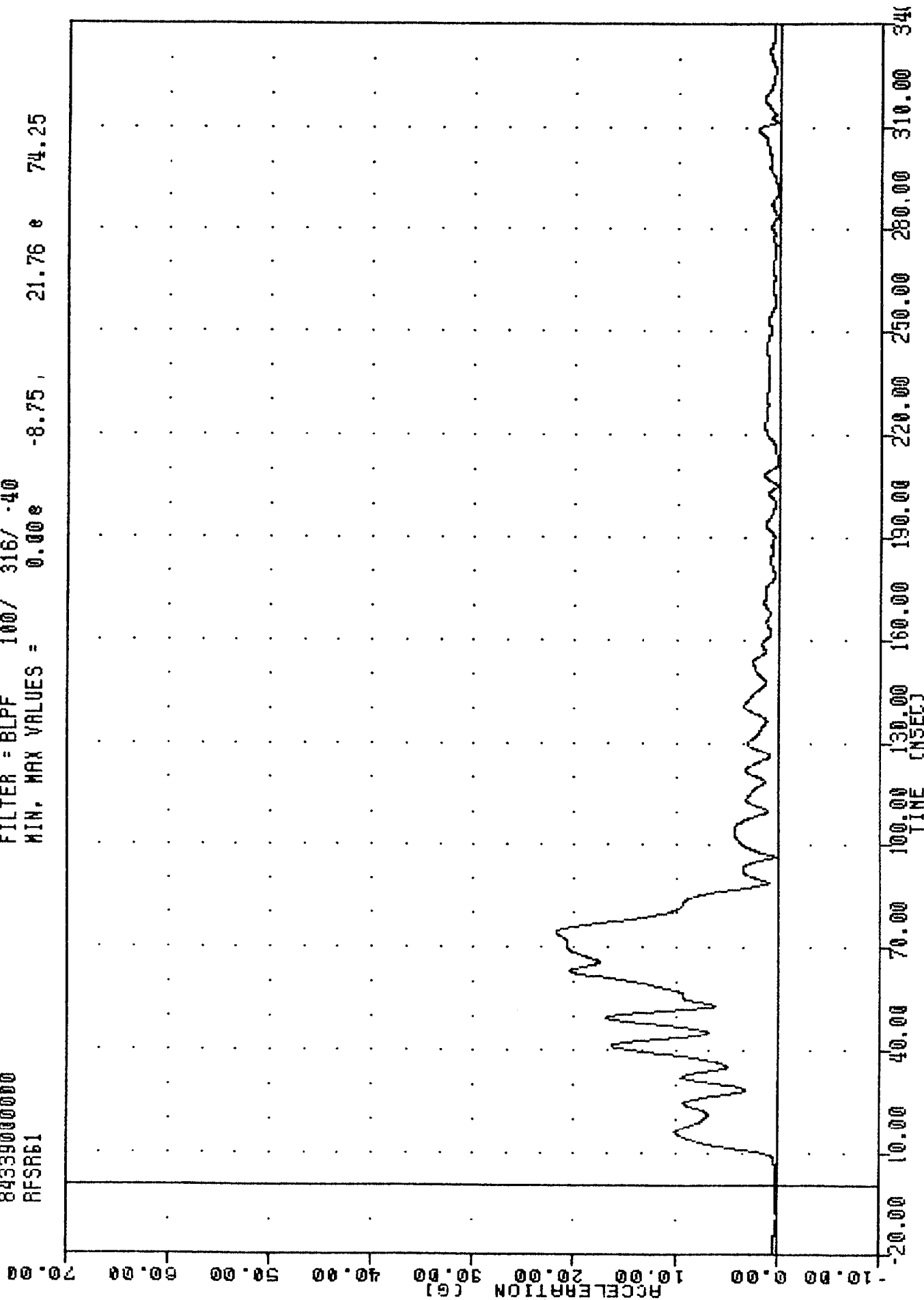
84339000000

RFSRB1

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = 0.00e

-8.75 , 21.76 e 74.25



B-70

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL RESULTANT USING X AND Y

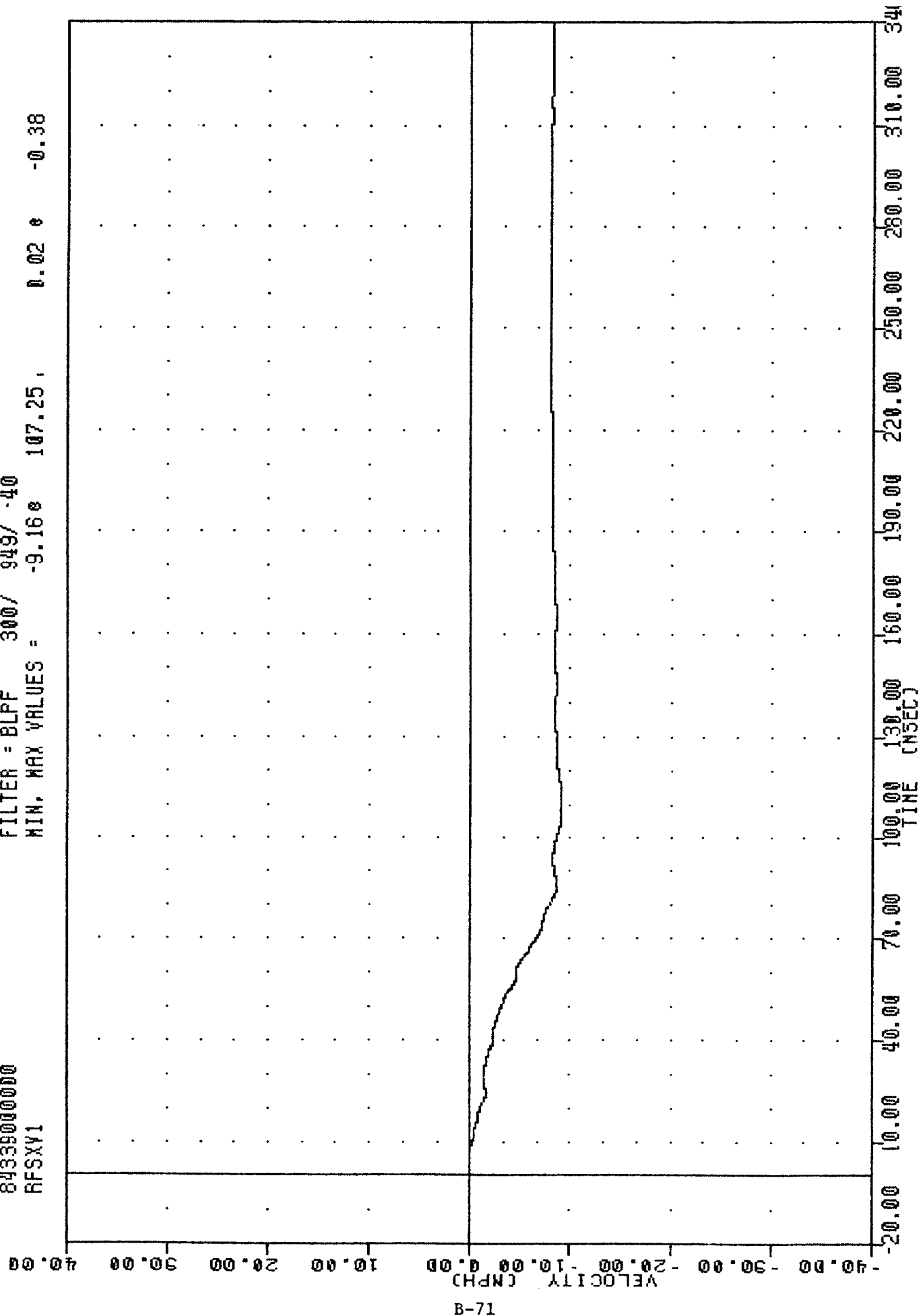
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RFSXY1

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -9.16e 107.25, 0.02 e -0.38



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RFSXG1

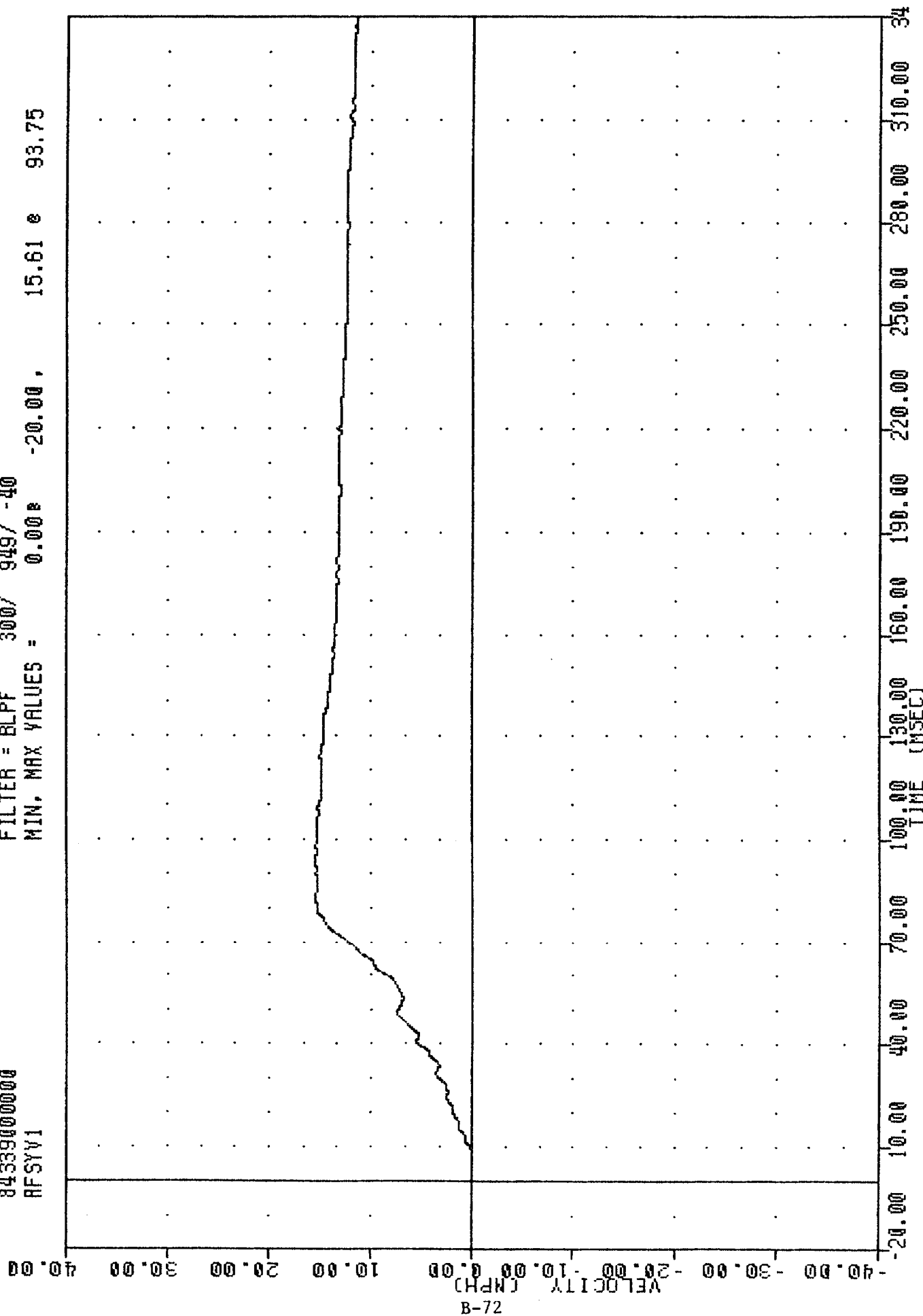
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RFSYV1

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.00 15.61 0 93.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RFSYGI

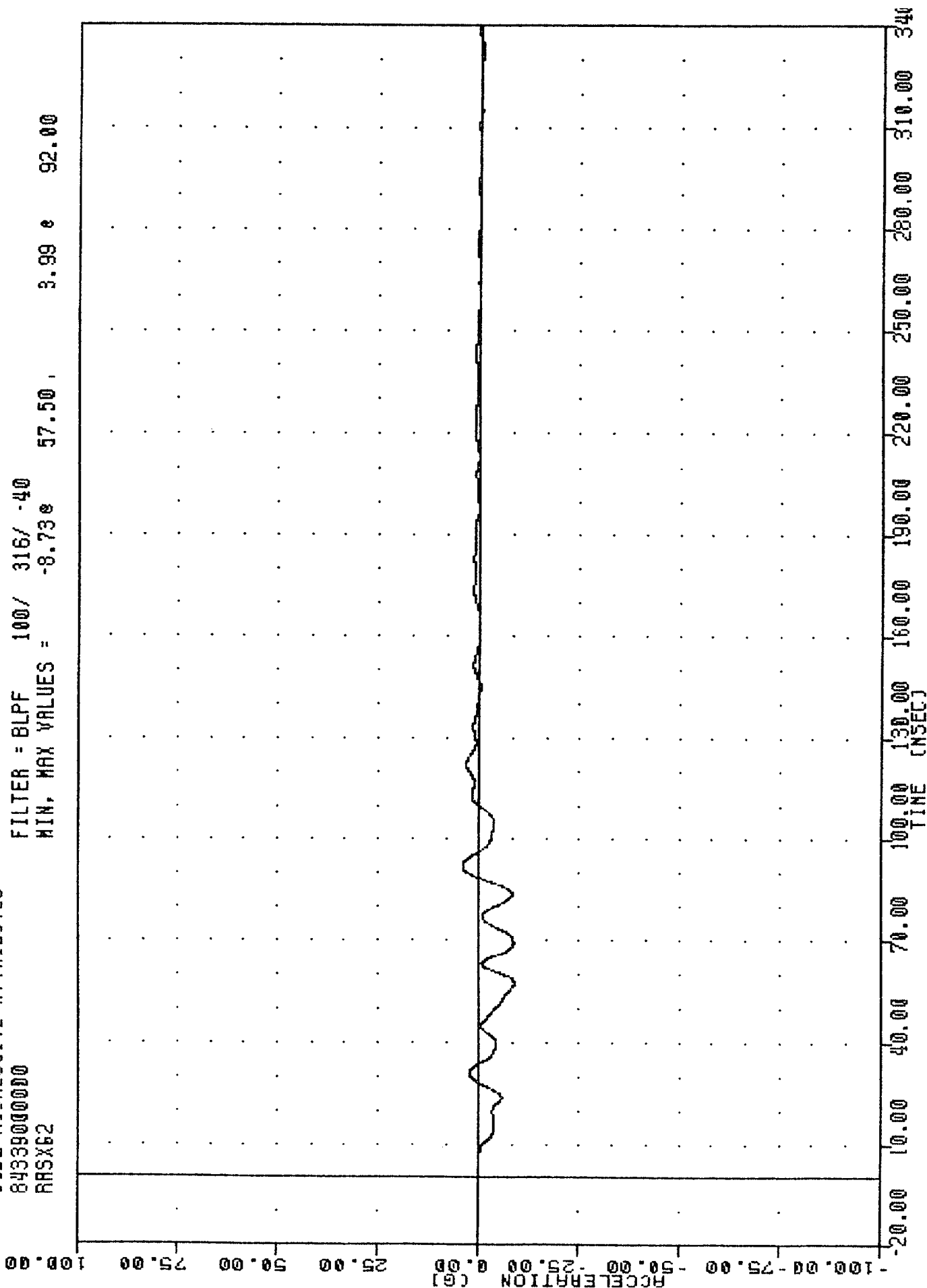
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RRSX62

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -8.73e 57.50, 3.99 e 92.00



B-73

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL ACCELERATION X AXIS

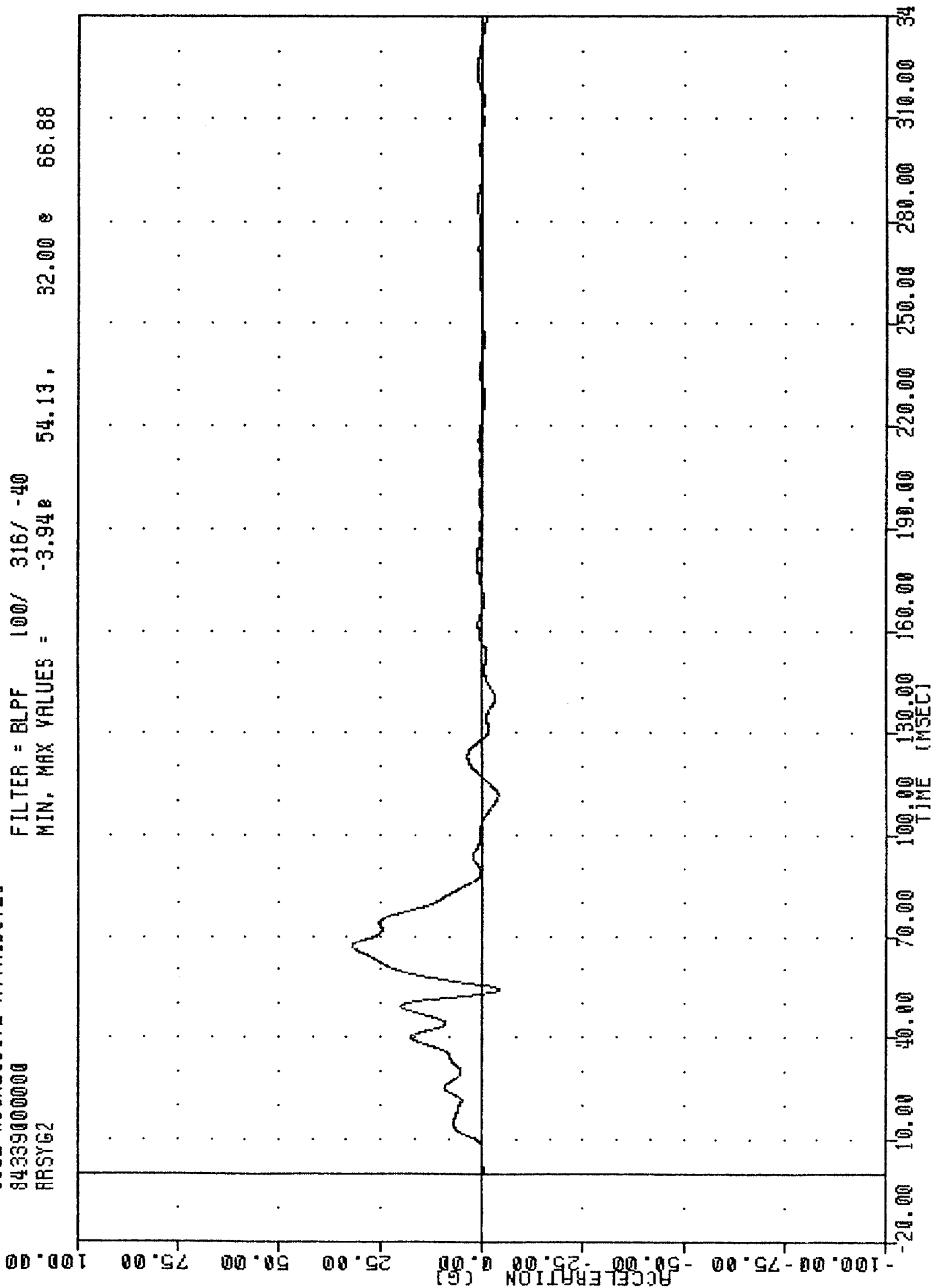
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RSYG2

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -3.94e 54.13, 32.00 e 66.88



B-74

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL ACCELERATION Y AXIS

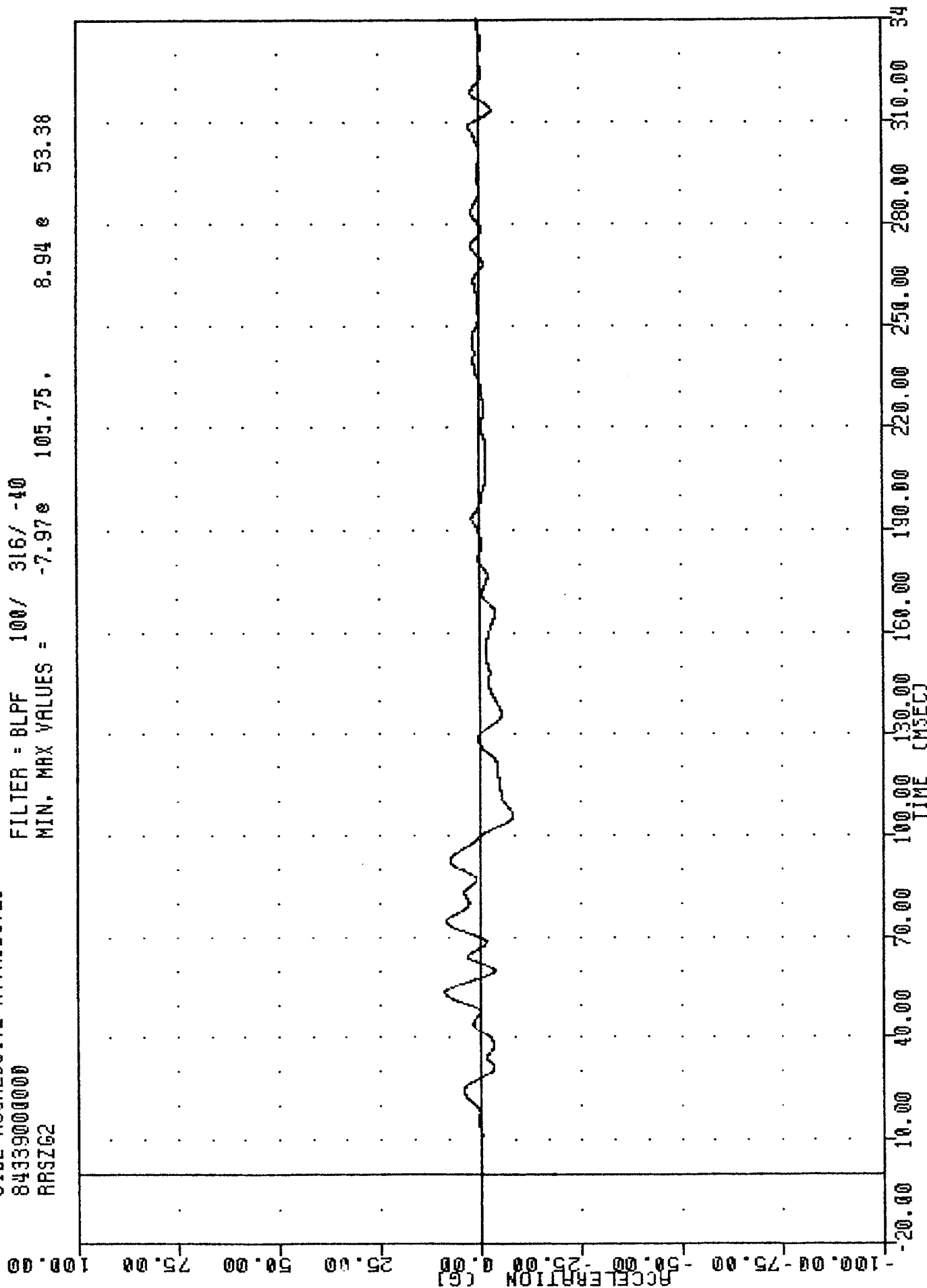
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RRSZG2

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -7.97e 105.75. 8.94 e 53.38



B-75

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL ACCELERATION Z AXIS

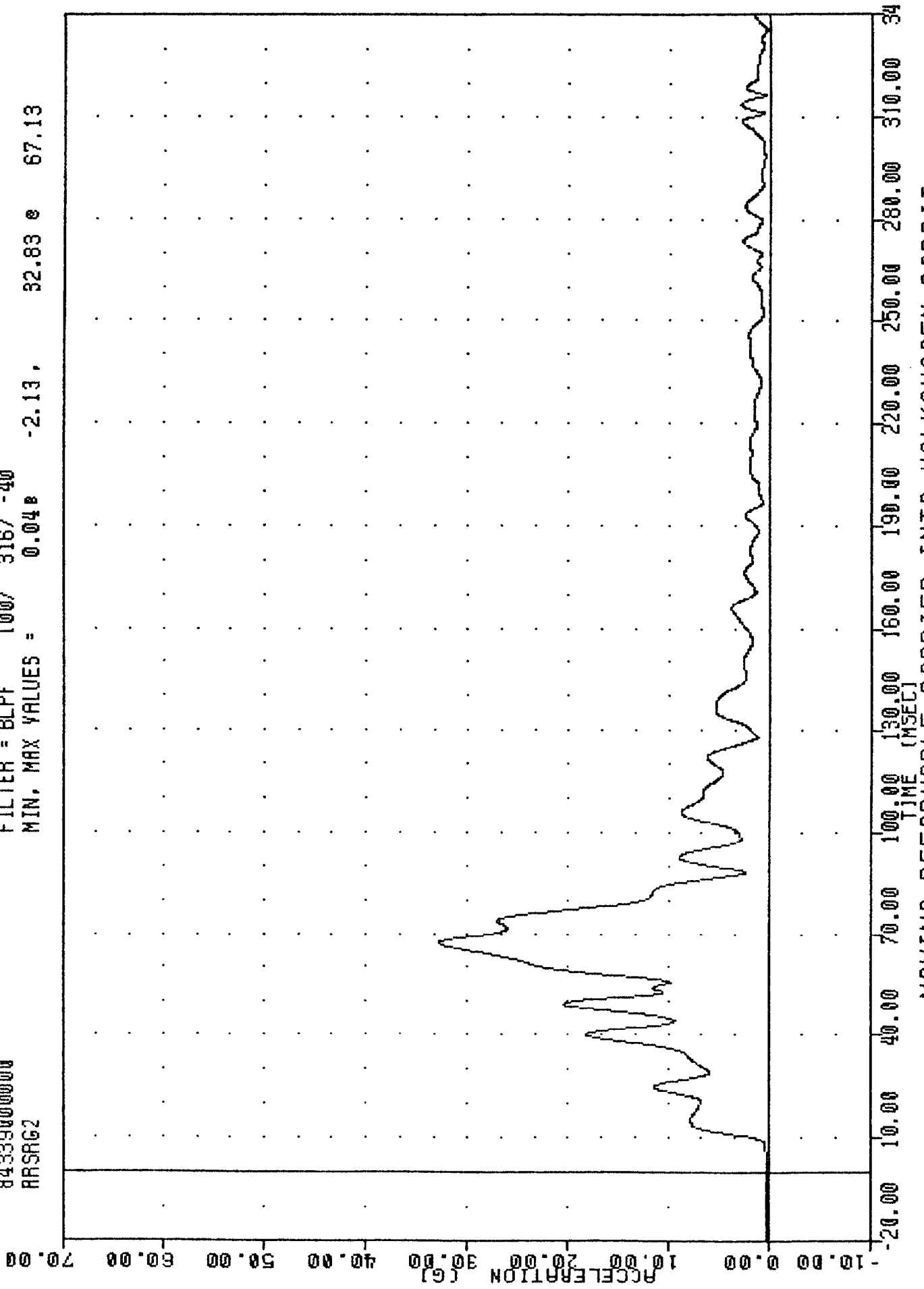
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RRSG2

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = 0.048 -2.13, 32.83 e 67.13



B-76

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL RESULTANT

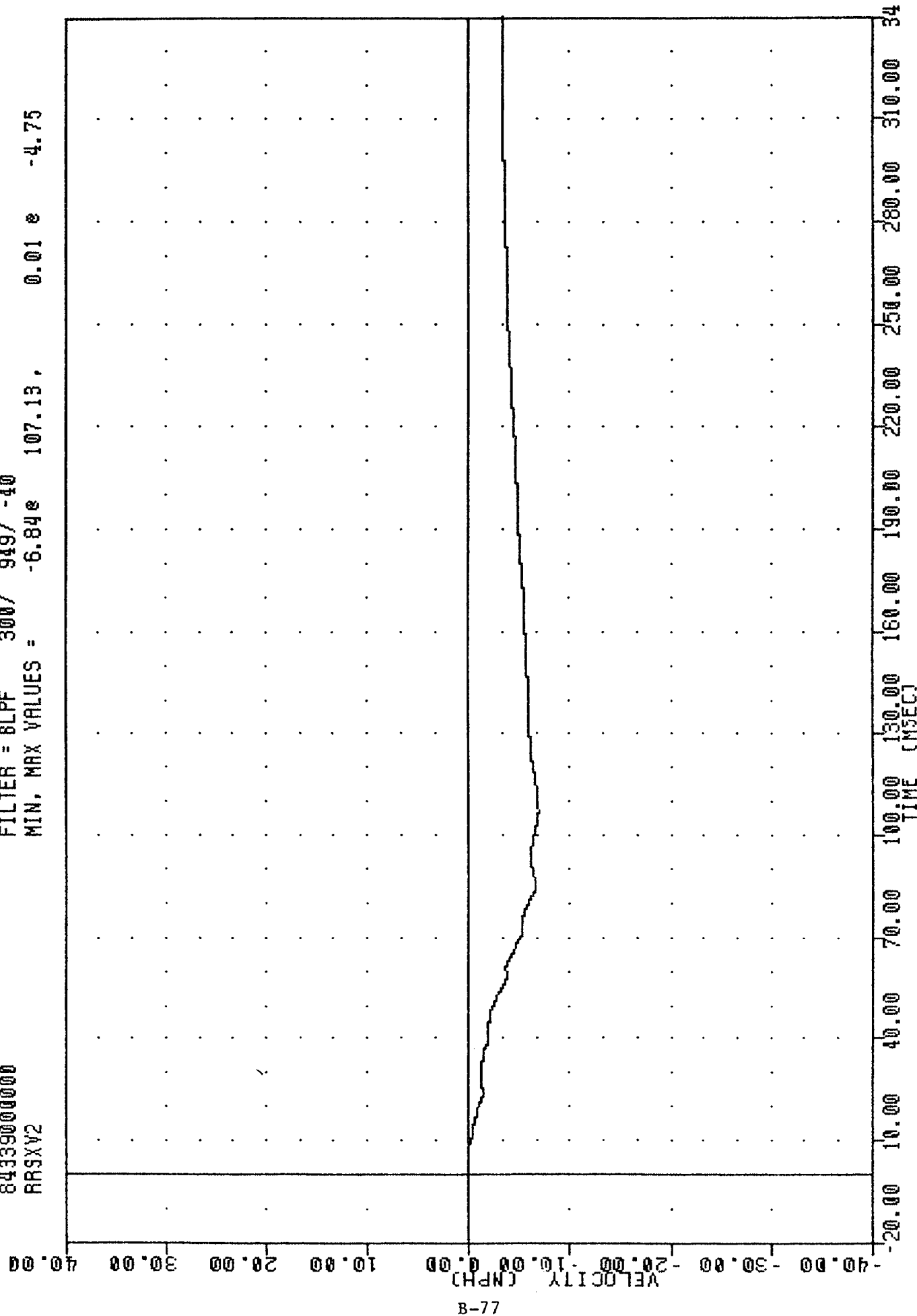
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RRSXV2

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -6.84e 107.13, 0.01 e -4.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING ARSXG2

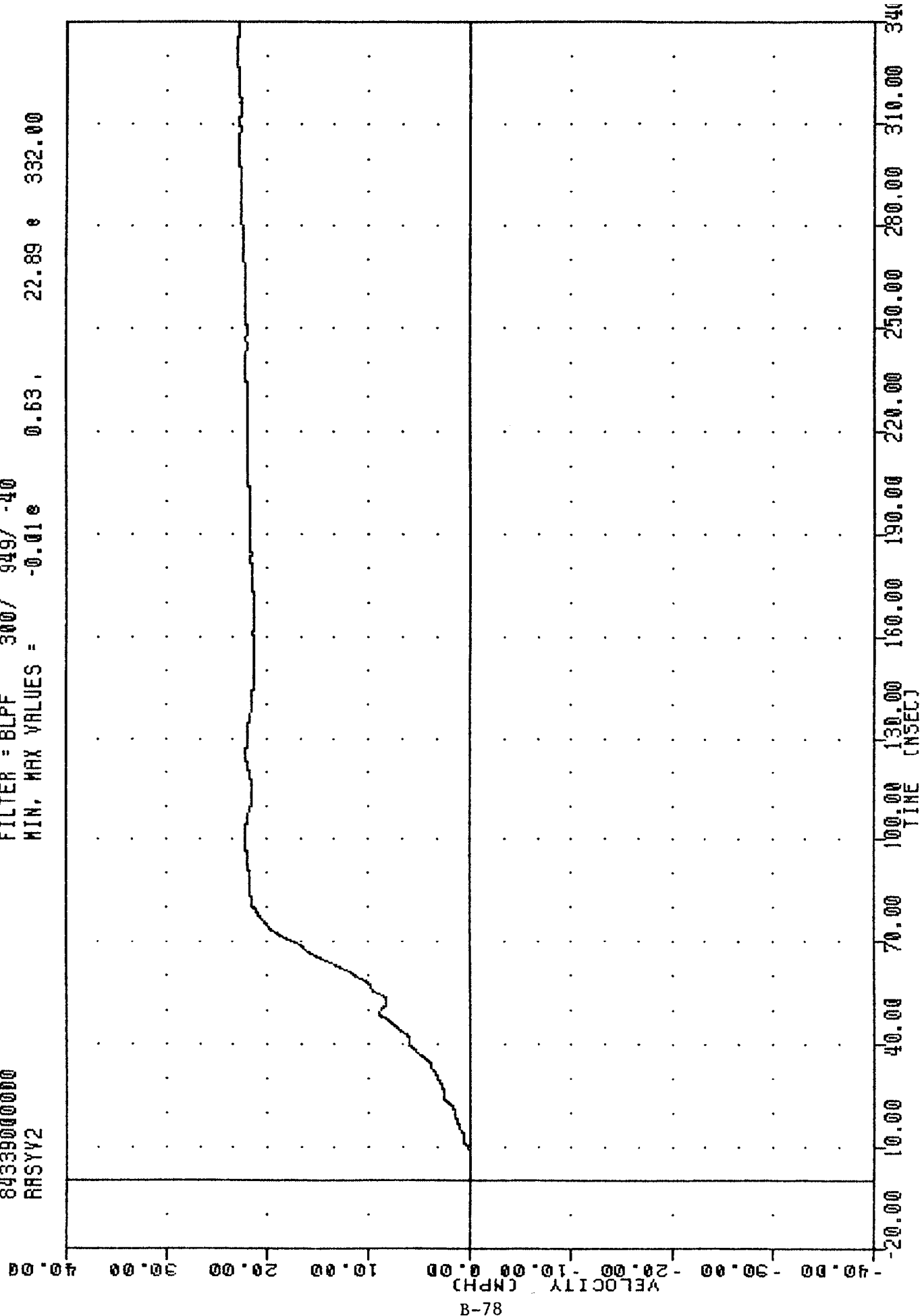
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RRSYV2

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -0.01e 0.63, 22.89 e 332.00



84-B

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RRSYG2

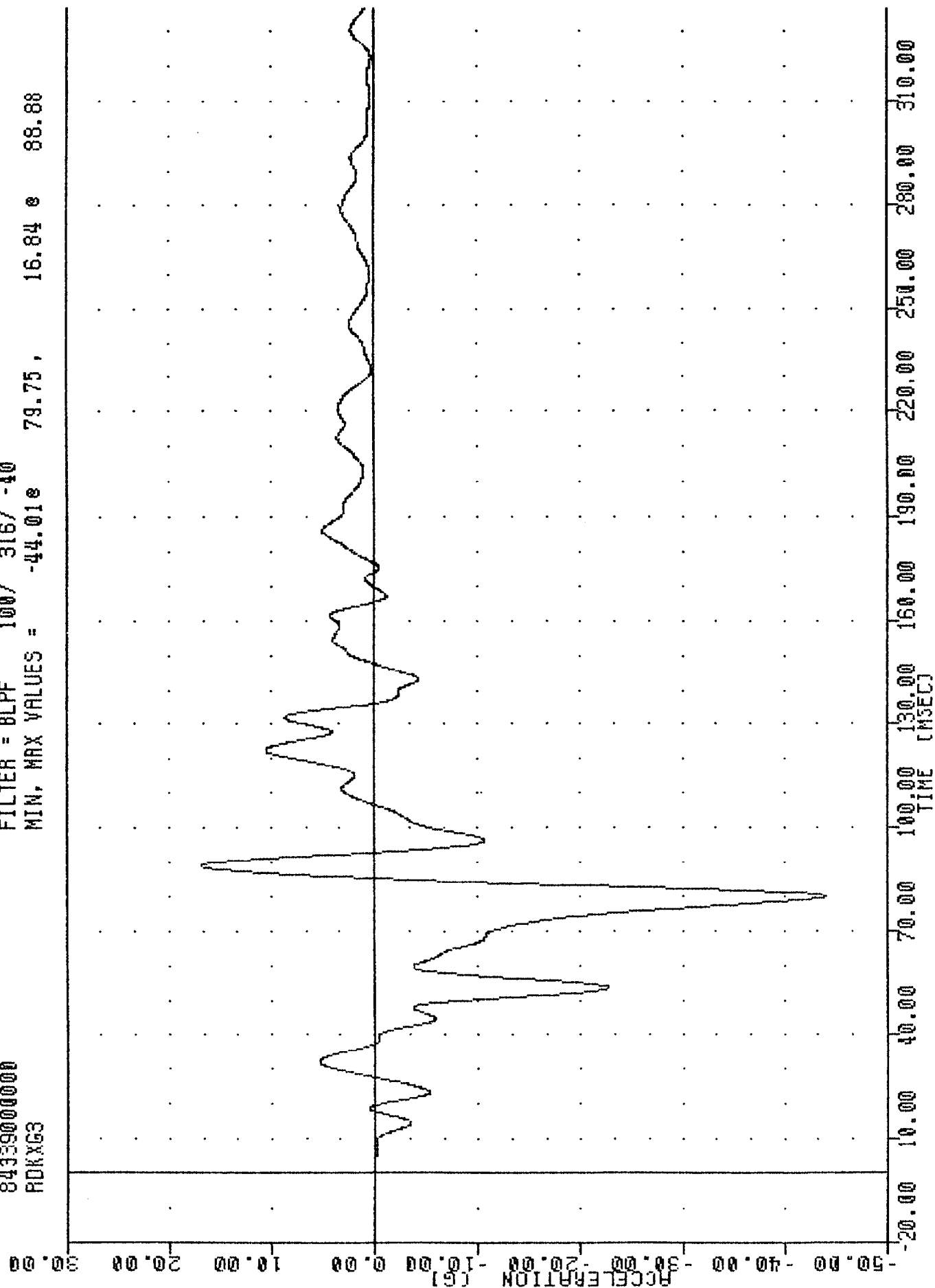
SUITE HGGHESIVE HIIHIBUIES

84339000000

RDKXG3

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -44.01e 79.75, 16.84 e 88.88



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE REAR DECK ACCELERATION X AXIS

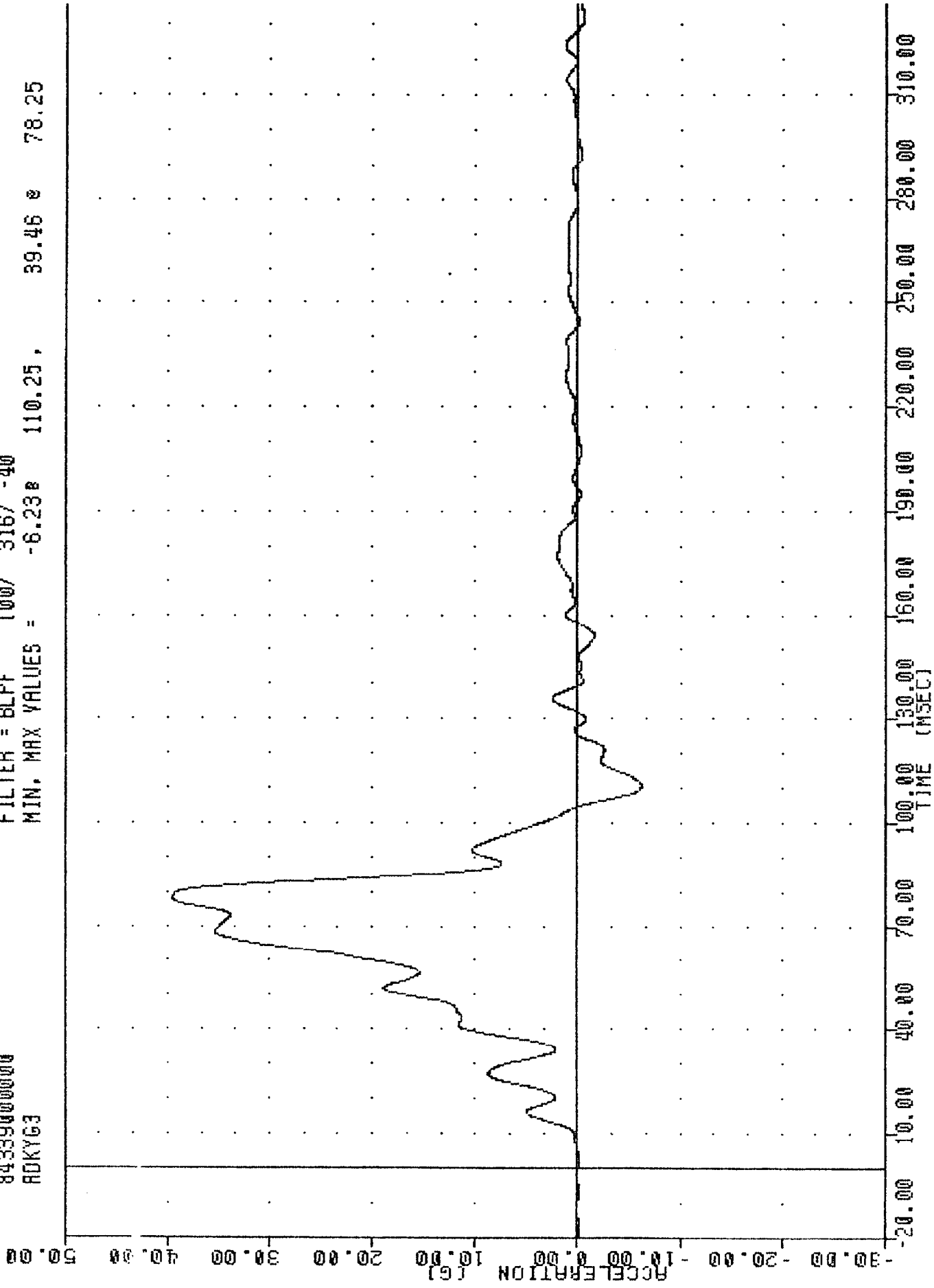
SIDE AGGRESSIVE ATTRIBUTES

84339000000

ADKYG3

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -6.23 110.25, 39.46 78.25



B-80

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE REAR DECK ACCELERATION Y AXIS

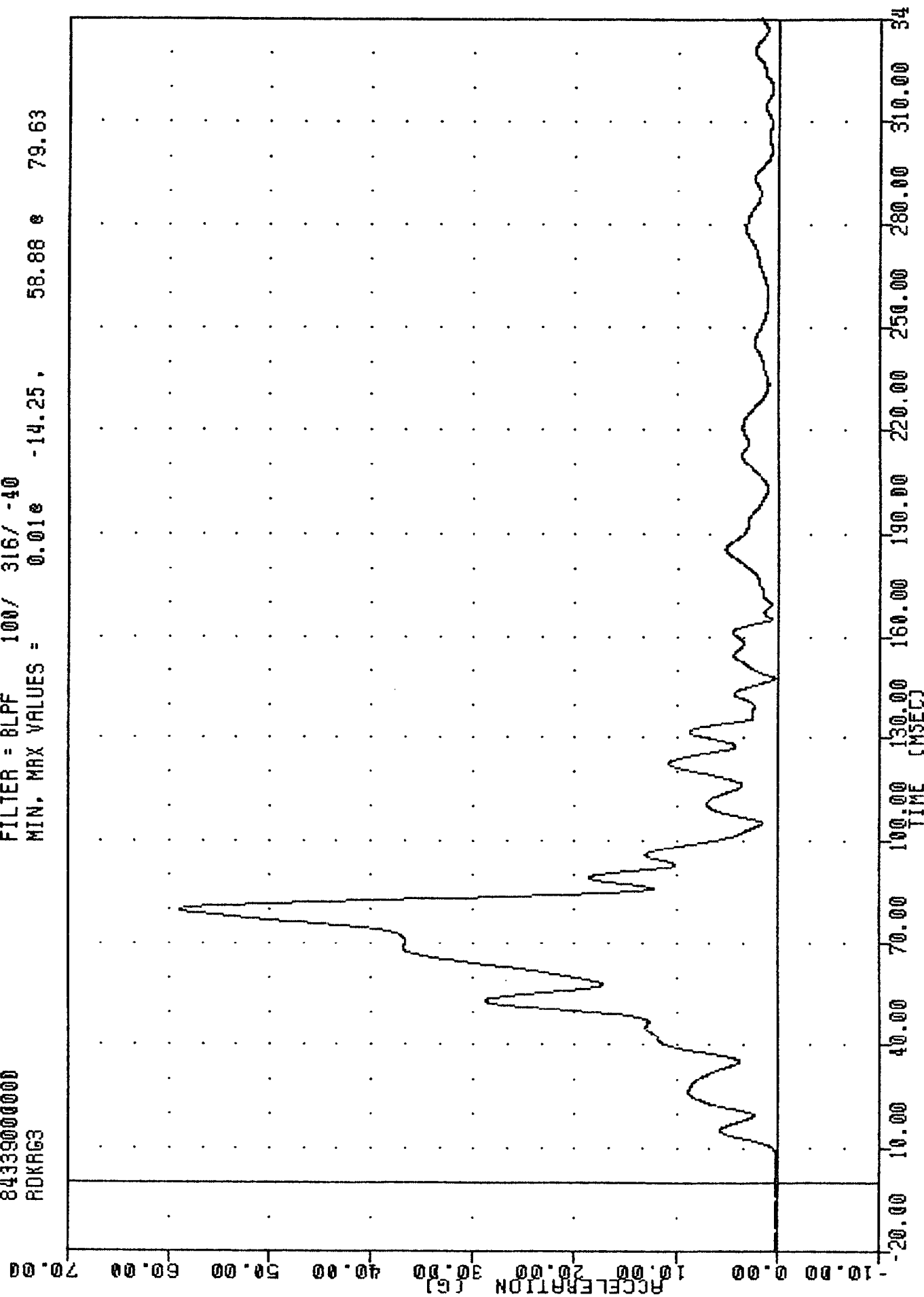
SIDE AGGRESSIVE ATTRIBUTES

84339000000

RDKRG3

FILTER = 8LPF 100/ 316/ -40

MIN. MAX VALUES = 0.01e -14.25, 58.88 e 79.63

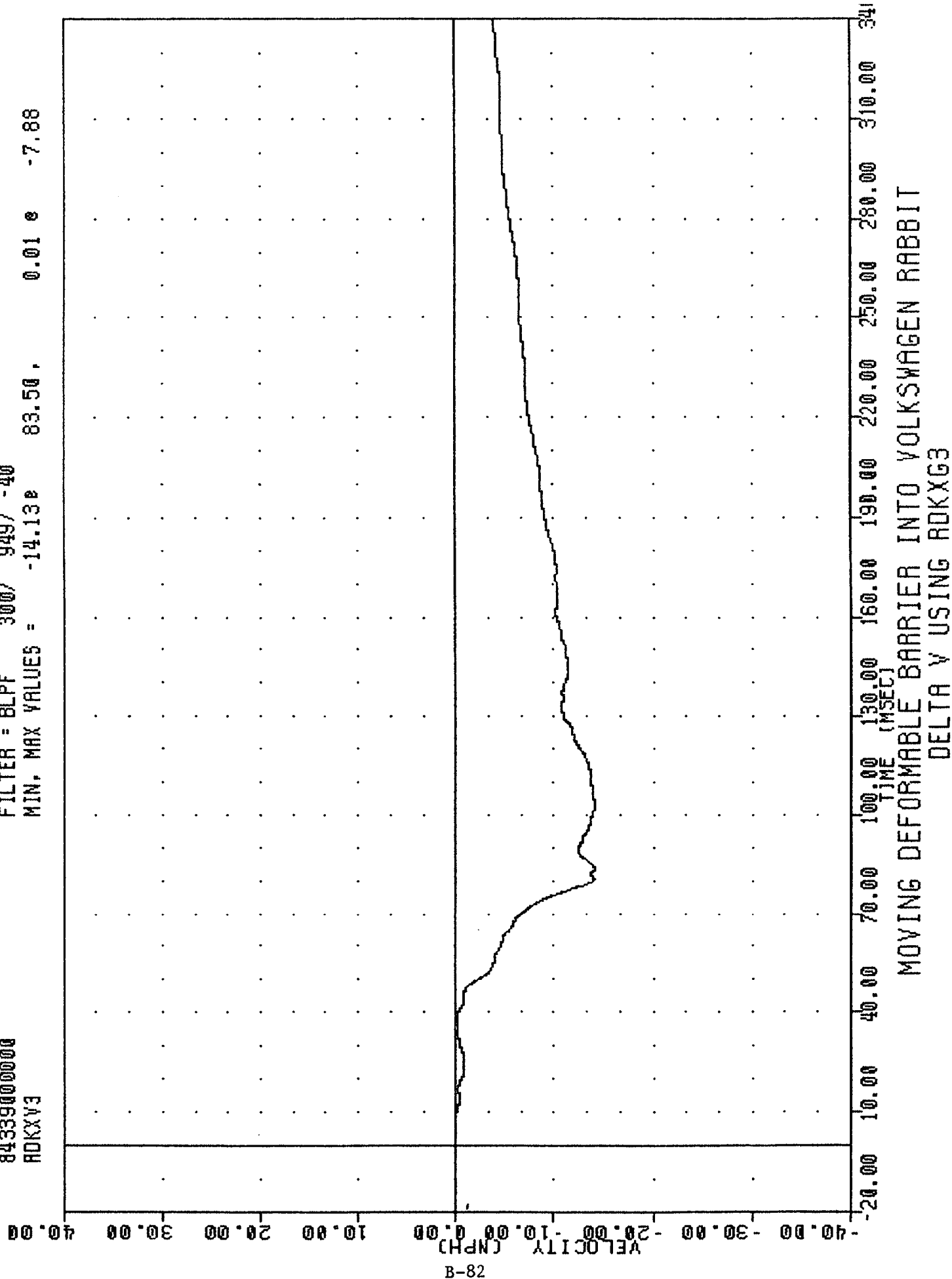


B-81

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE REAR DECK RESULTANT USING X AND Y

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 RDKXV3

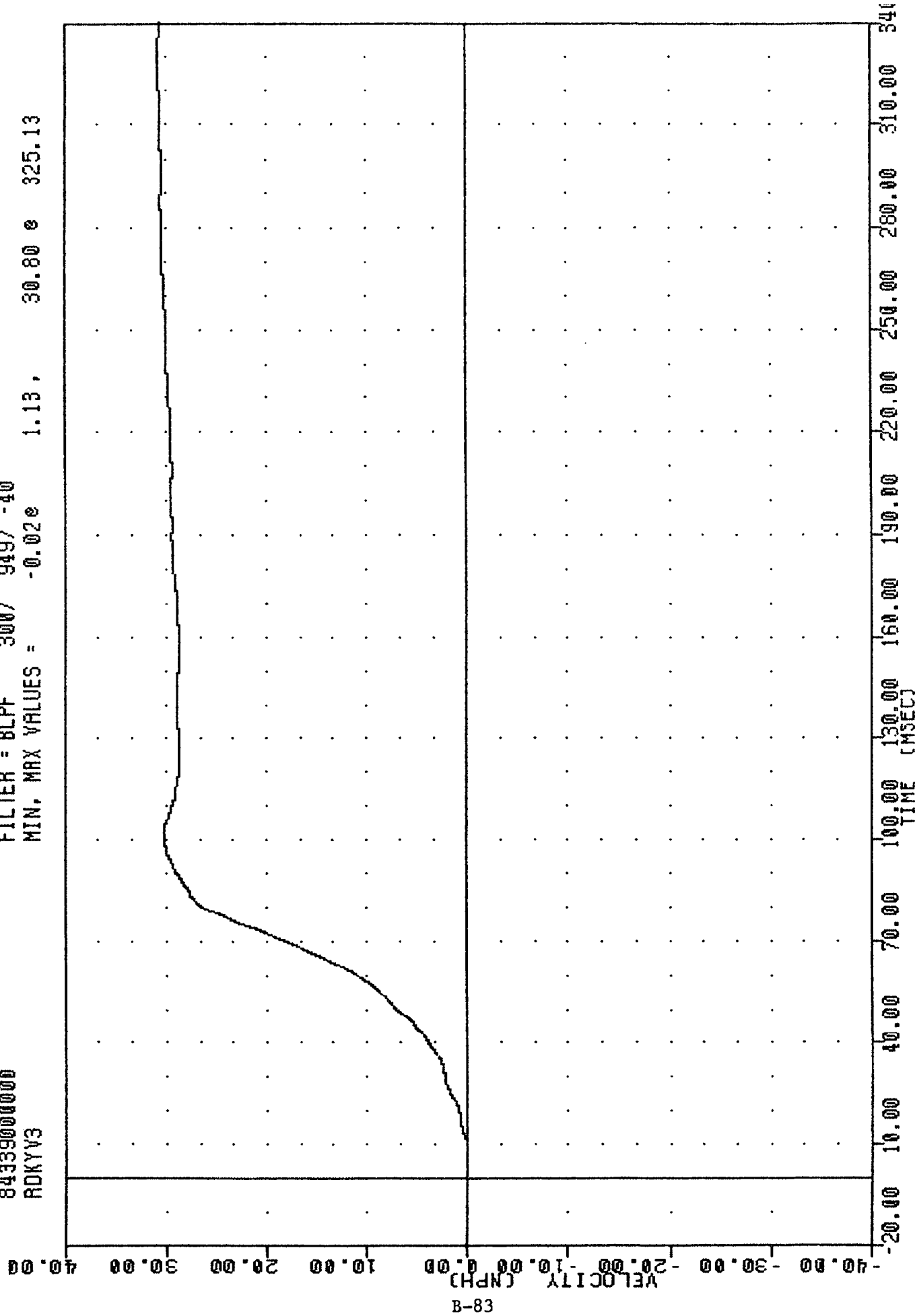
FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -14.130 83.50, 0.01 0 -7.88



SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 RDKYV3

1201 0010 44 000 03 40000000

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -0.020 1.13, 30.80 0 325.13



B-83

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING RDKY63

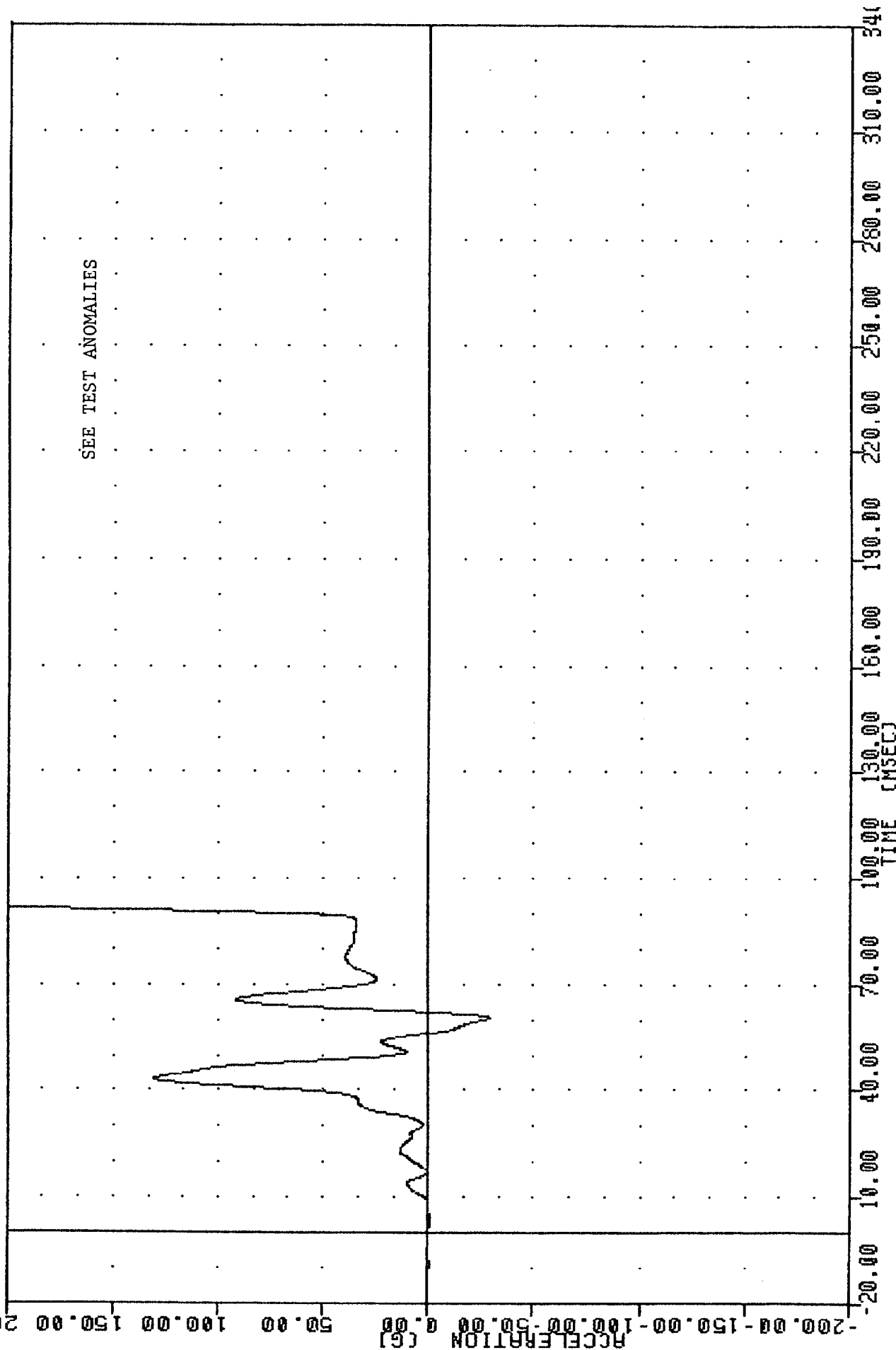
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LR5Y64

FILTER = 8LPF 100/ 316/ -40

MIN, MAX VALUES = -29.620 60.38, 529.15 0 95.88



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT REAR SILL ACCELERATION Y AXIS

IHC , 841204
SIDE AGGRESSIVE ATTRIBUTES
84339000000
LRSYV4

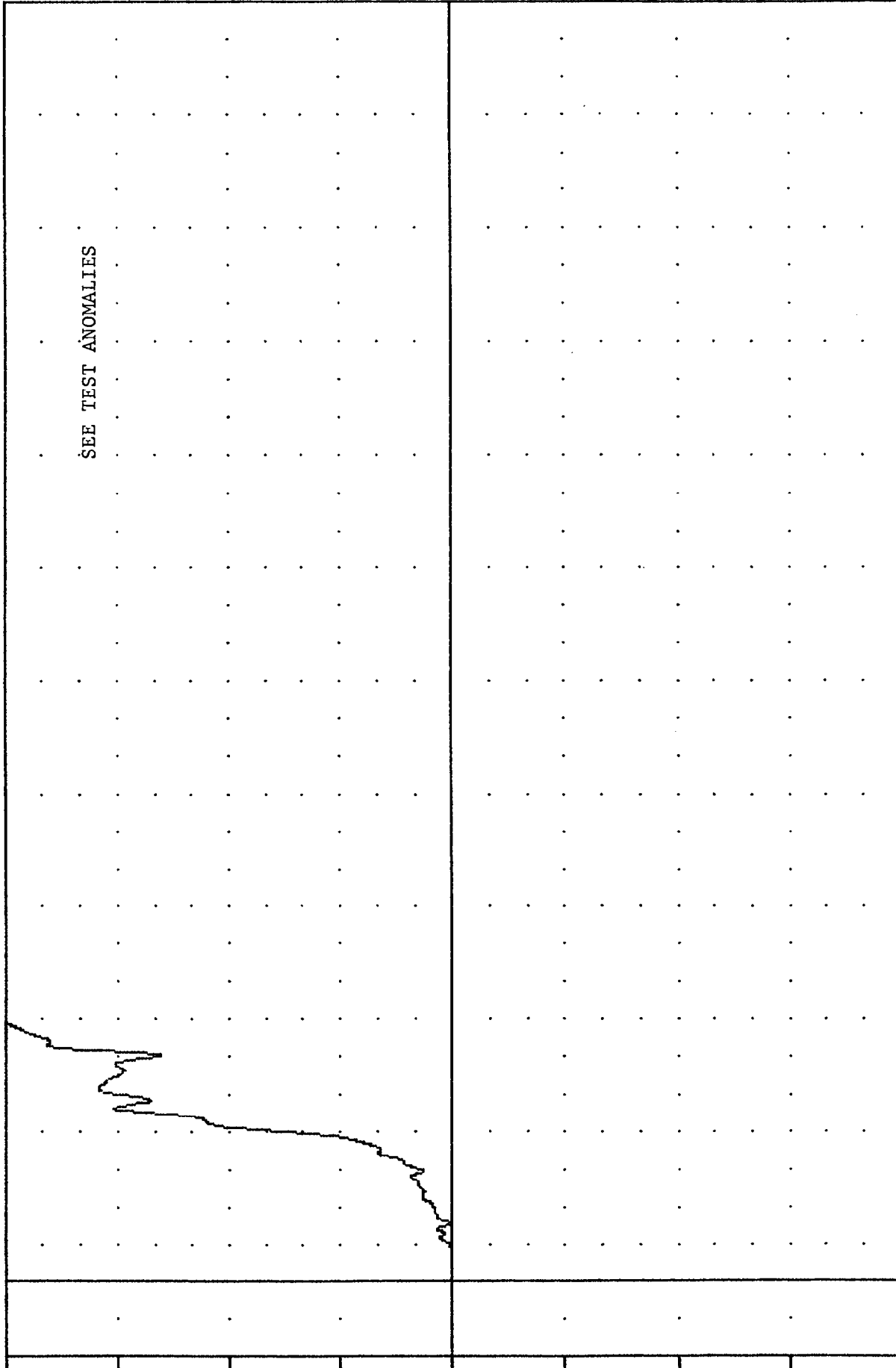
PLUI UMIE 12-UEL-84 13:W3:10

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -0.02e 8.13 , 2445.38 e 340.00

40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00

B-85



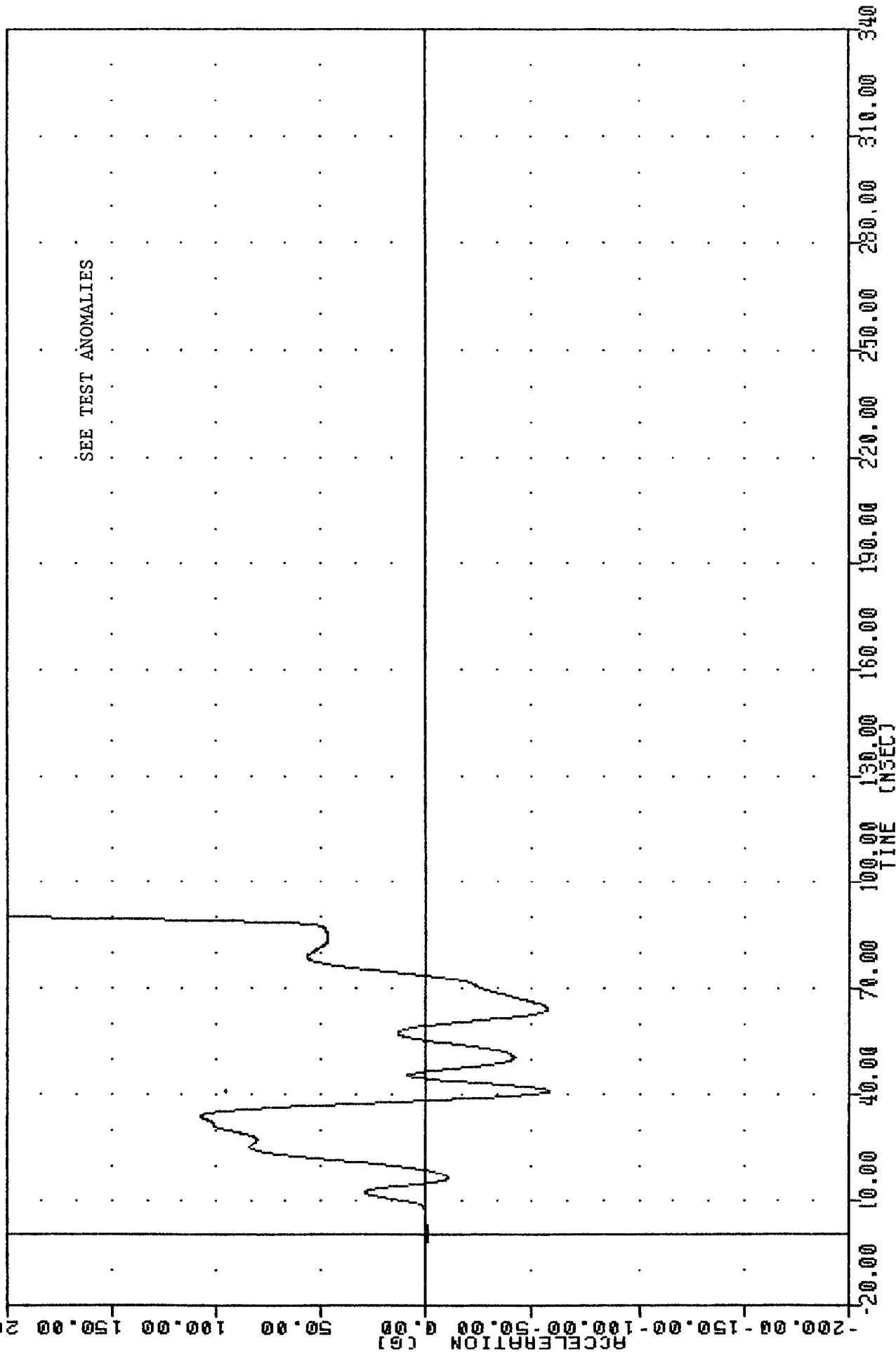
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340

TIME (NSEC)

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LRSYG4

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LFSY65

FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -58.11e 40.75 . 735.10 e 94.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 VEHICLE LEFT FRONT SILL ACCELERATION Y AXIS

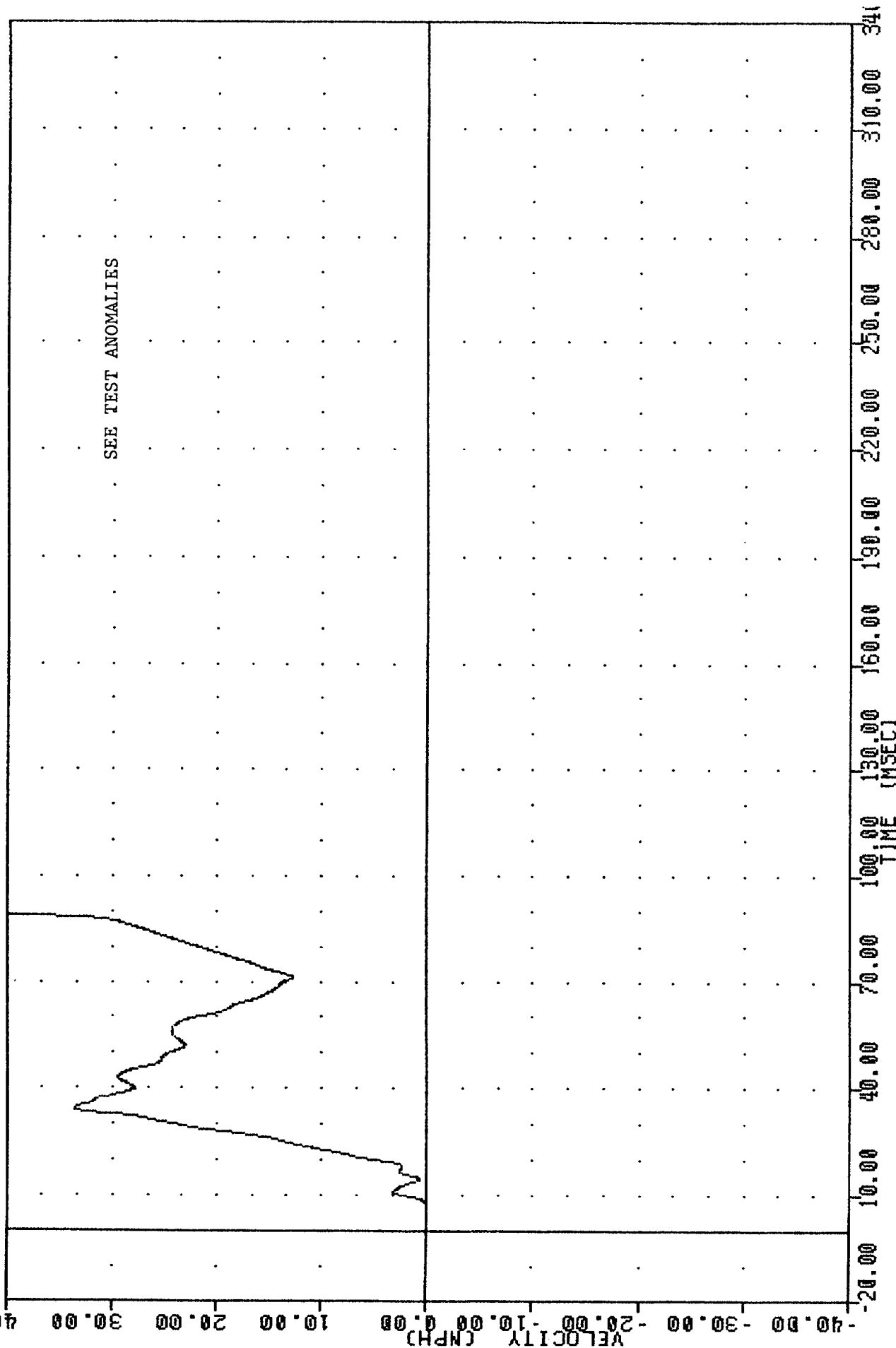
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFSYV5

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = 0.000 2.25, 3370.39 e 340.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFSYG5

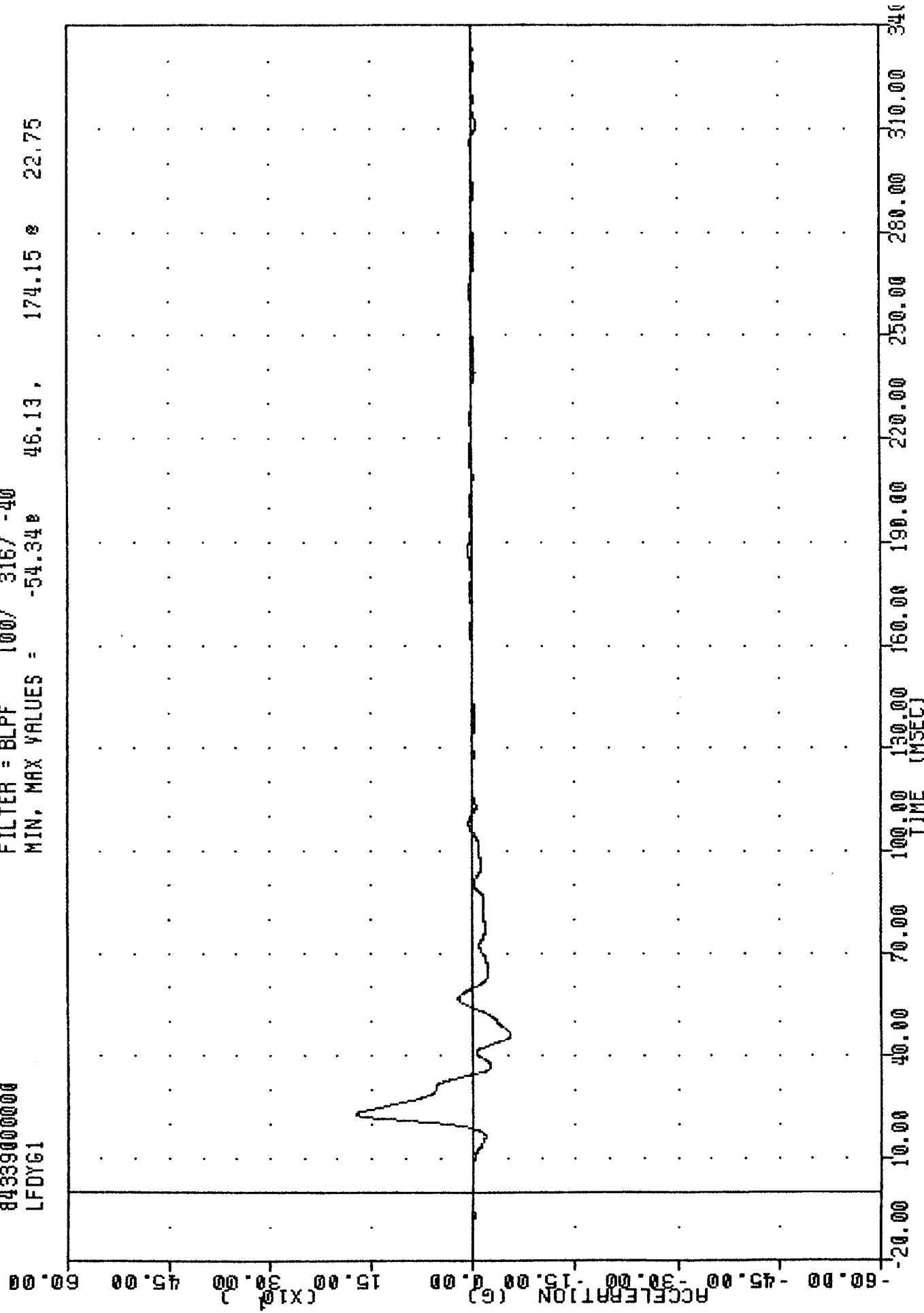
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFDYG1

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -54.34 46.13, 174.15 22.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 6) ACCELERATION Y AXIS

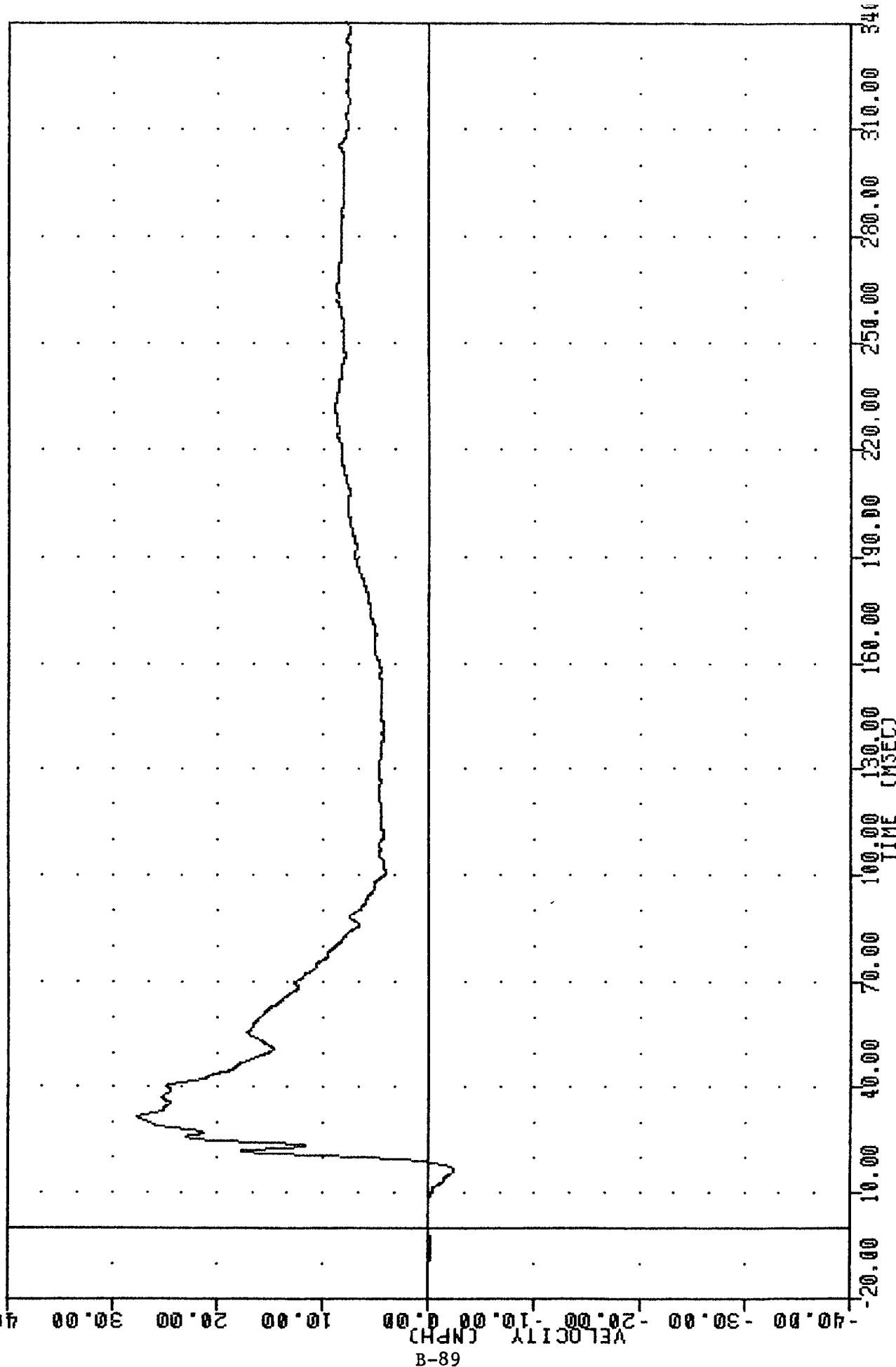
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFDYV1

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -2.31e 16.50, 27.54 e 31.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDY61

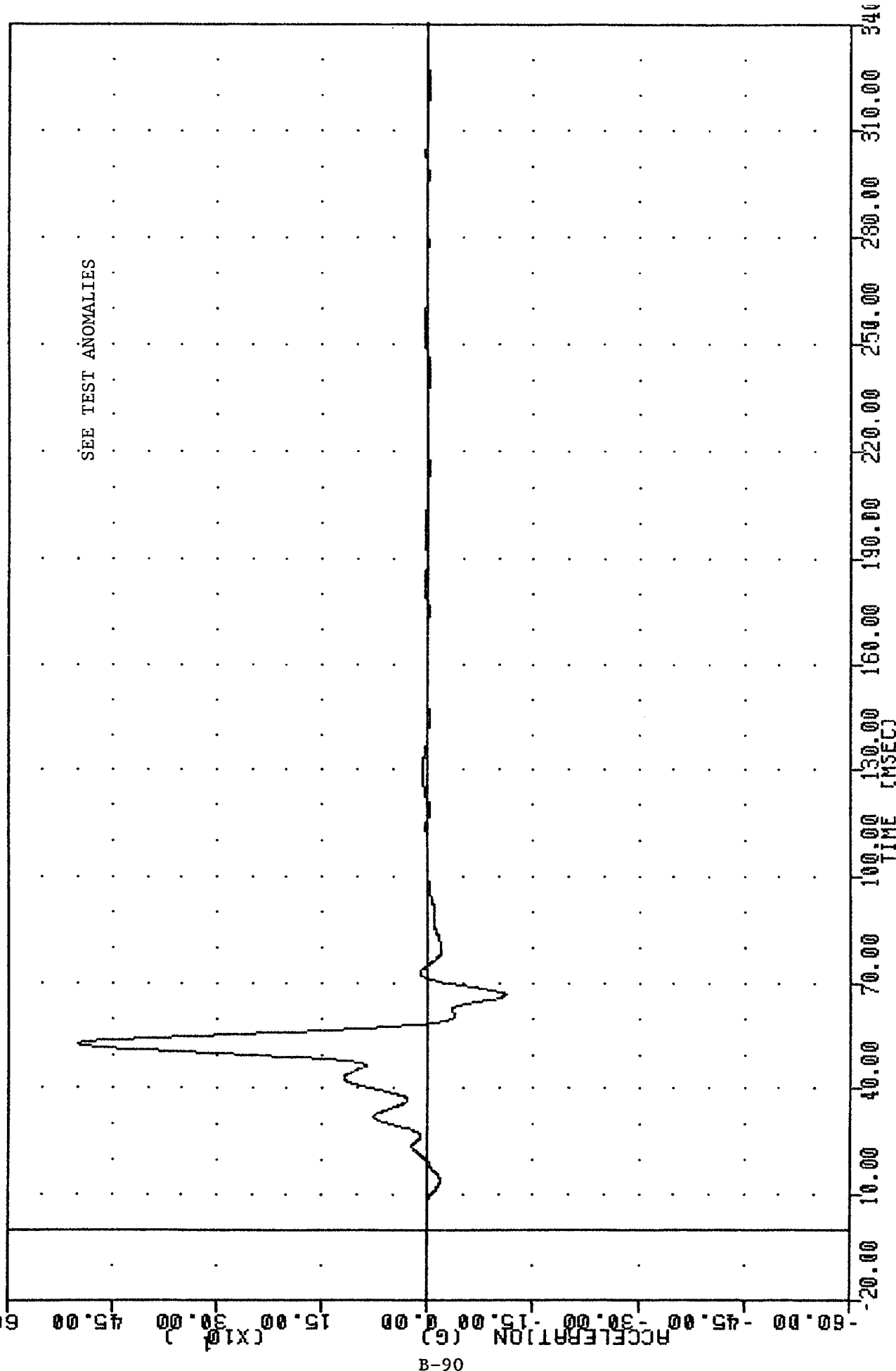
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFDYG2

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -108.98 66.38 , 499.76 52.75



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 8) ACCELERATION Y AXIS

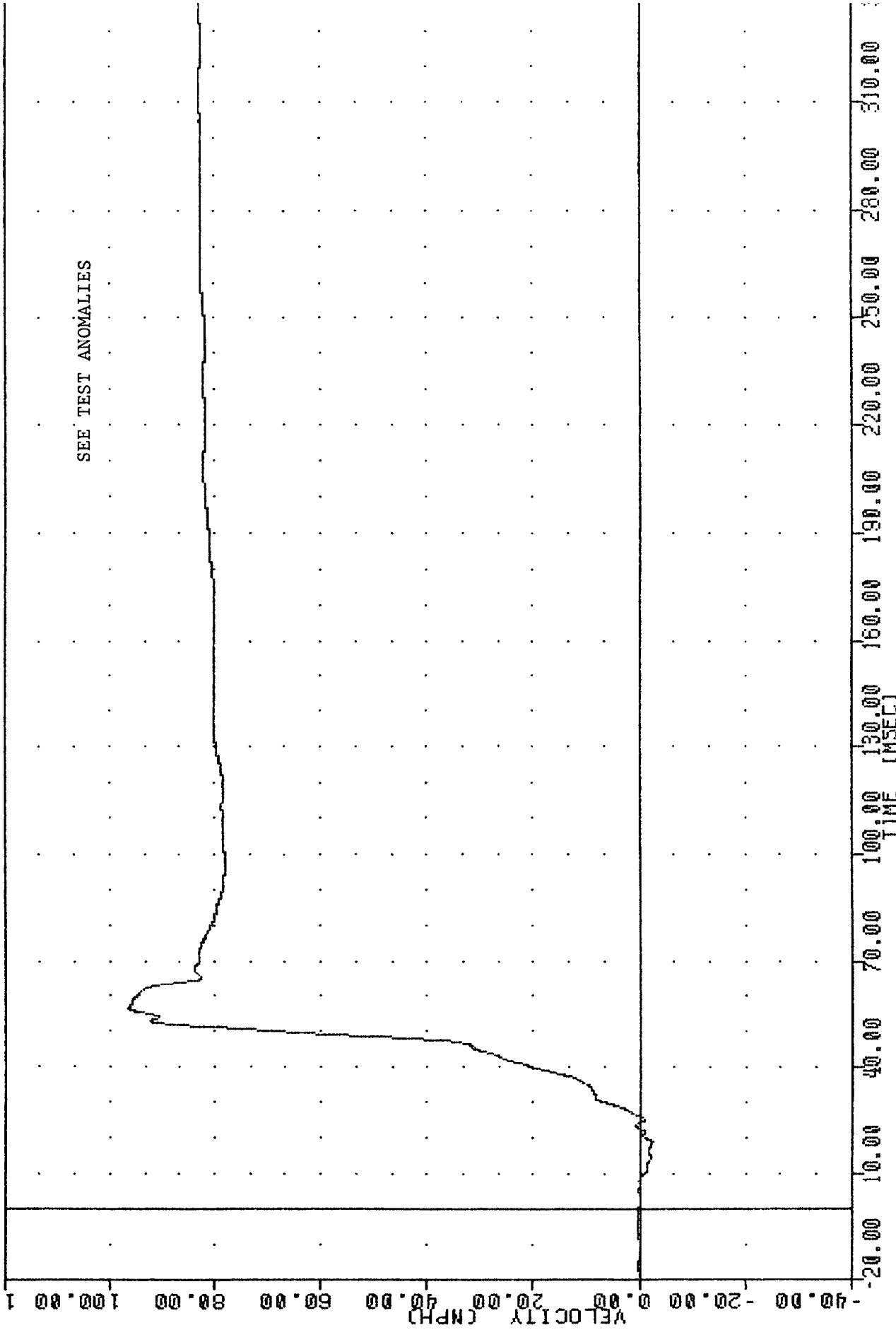
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFDYV2

FILTER = BLPF 300/ 949/ -40

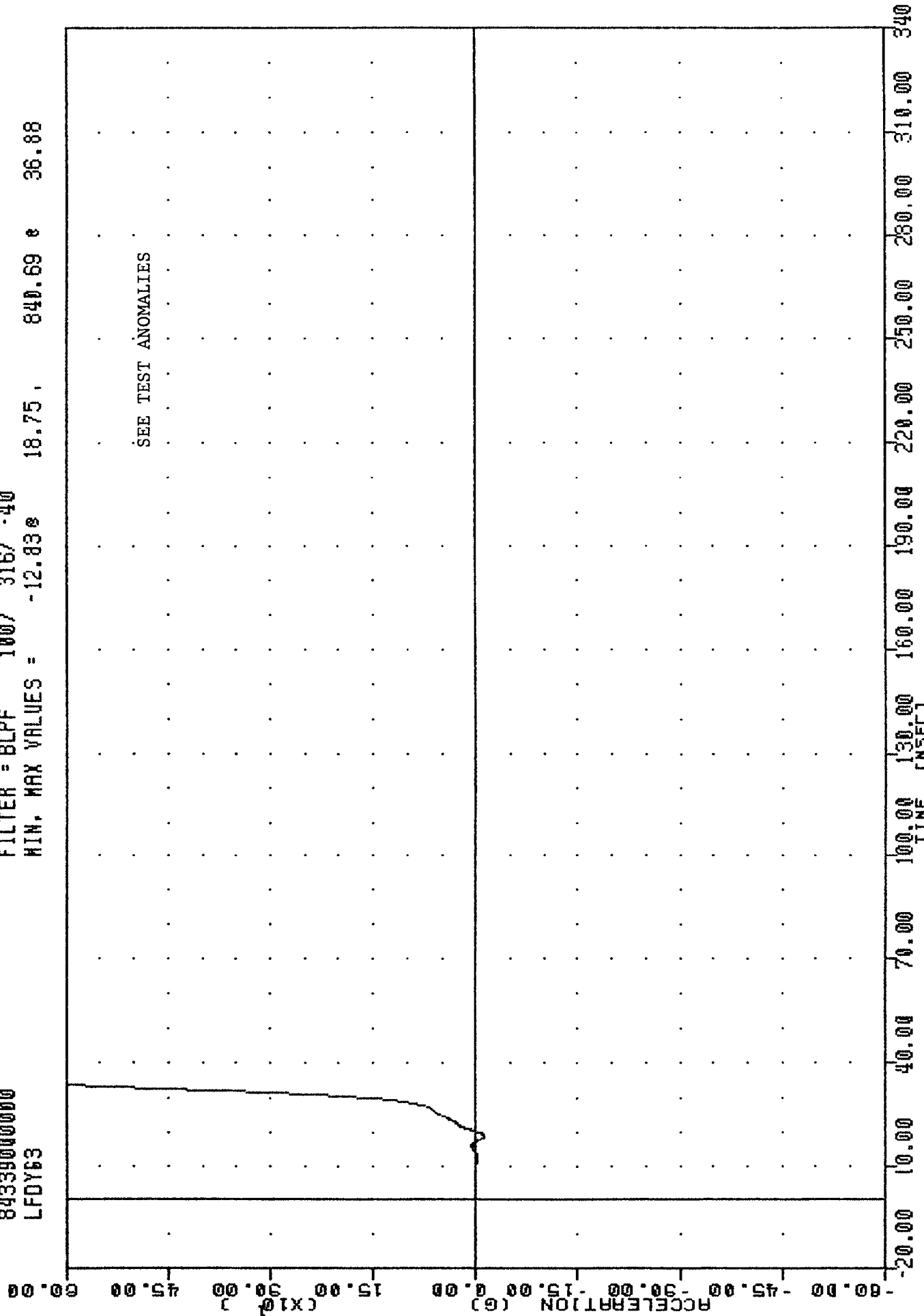
MIN. MAX VALUES = -2.56 18.75, 96.33 56.63



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYV2

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LFDY63

FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -12.83 18.75 840.69 36.88

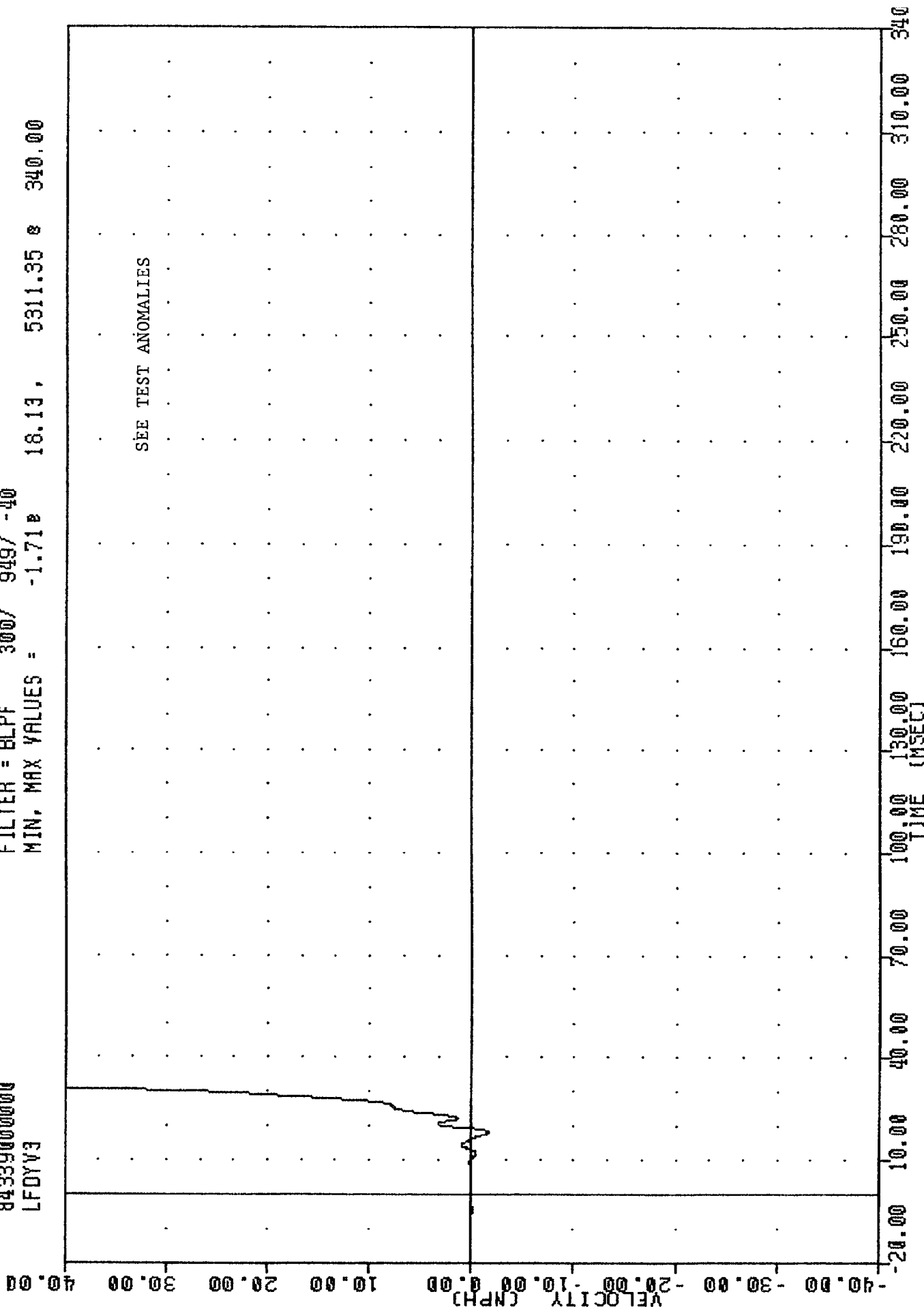


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 VEHICLE LEFT FRONT DOOR (POSITION 9) ACCELERATION Y AXIS

1110
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LFDYV3

1101 0011 12 000004 13 000010

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -1.71e 18.13, 5311.35 e 340.00



B-93

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING LFDYV3

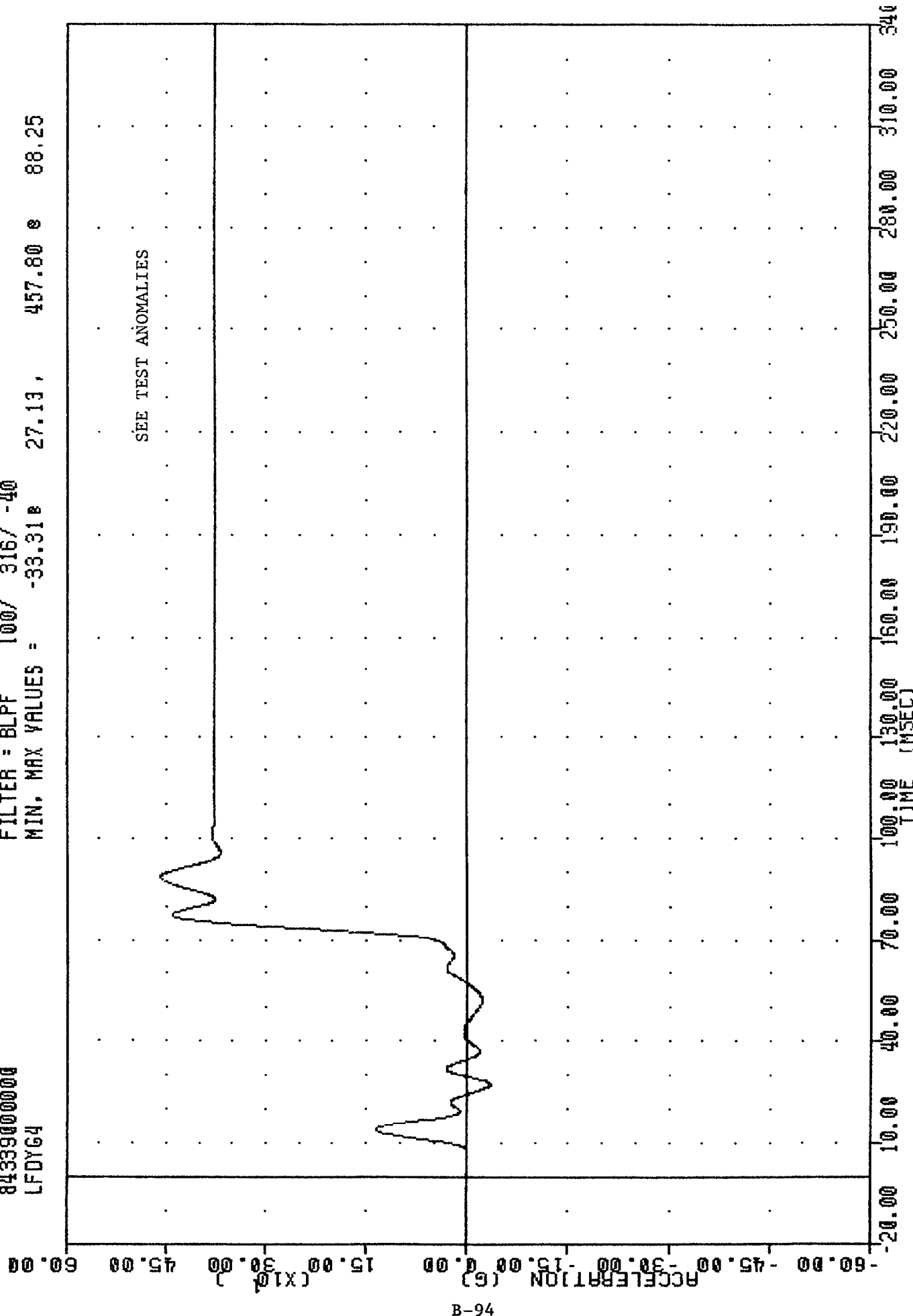
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFDY64

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -33.31e 27.13, 457.80 e 88.25



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 10) ACCELERATION Y AXIS

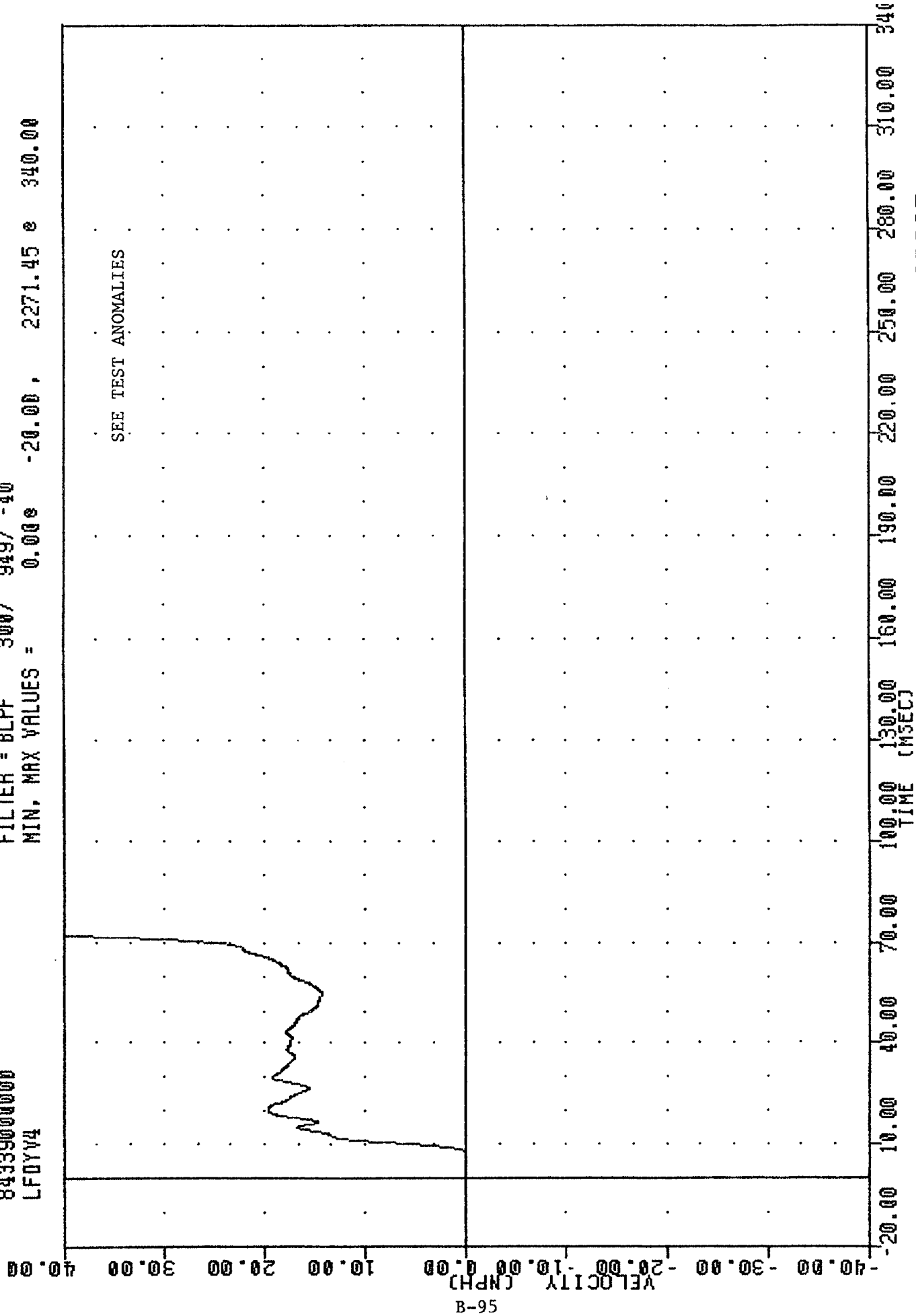
SIDE AGGRESSIVE ATTRIBUTES

84339000000

LFDYV4

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.000 -20.00, 2271.45 e 340.00



B-95

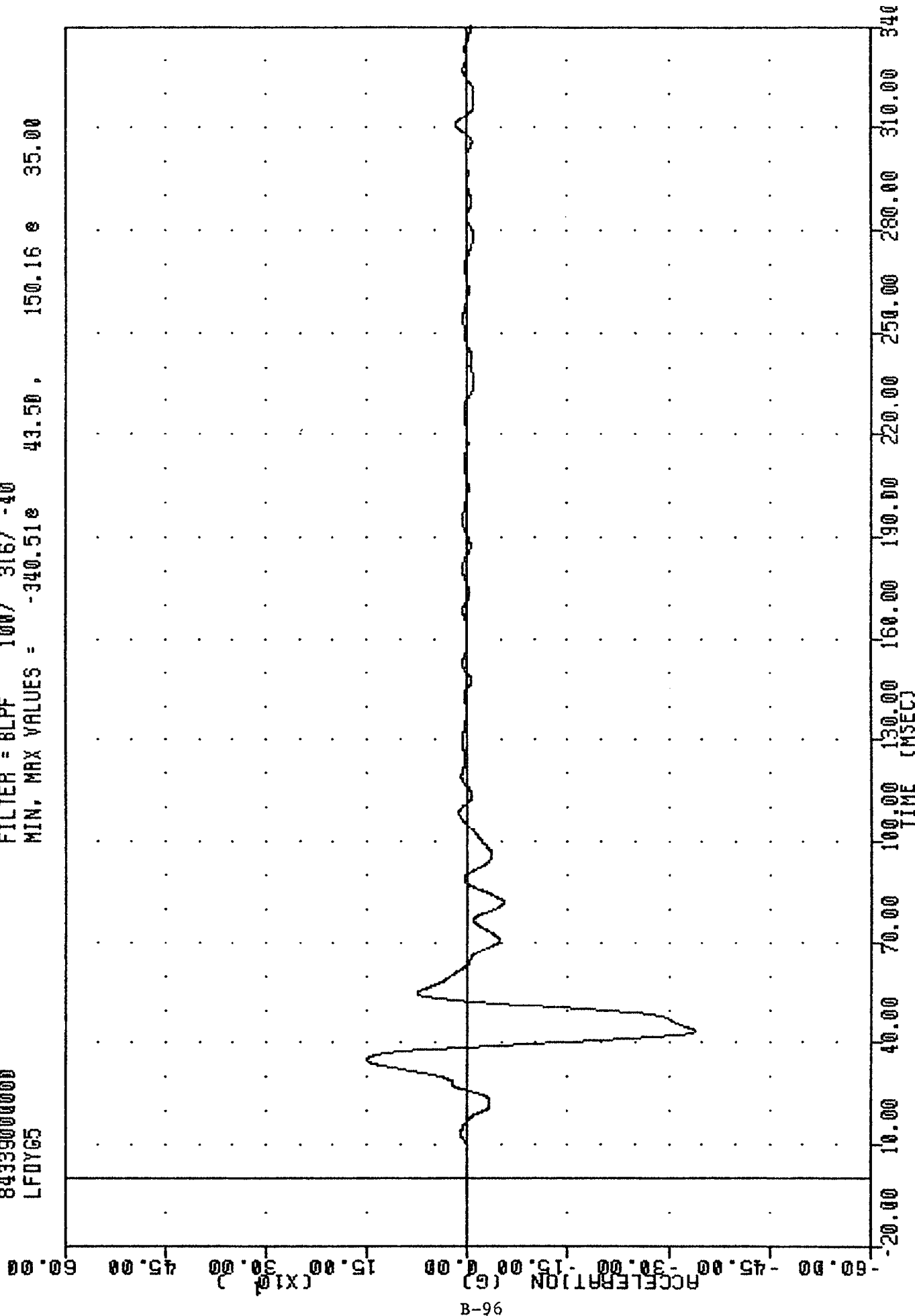
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYV4

INC 041204
SIDE AGGRESSIVE ATTRIBUTES
84339000000
LF0Y65

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FILTER = BLPF 100/ 316/ -40

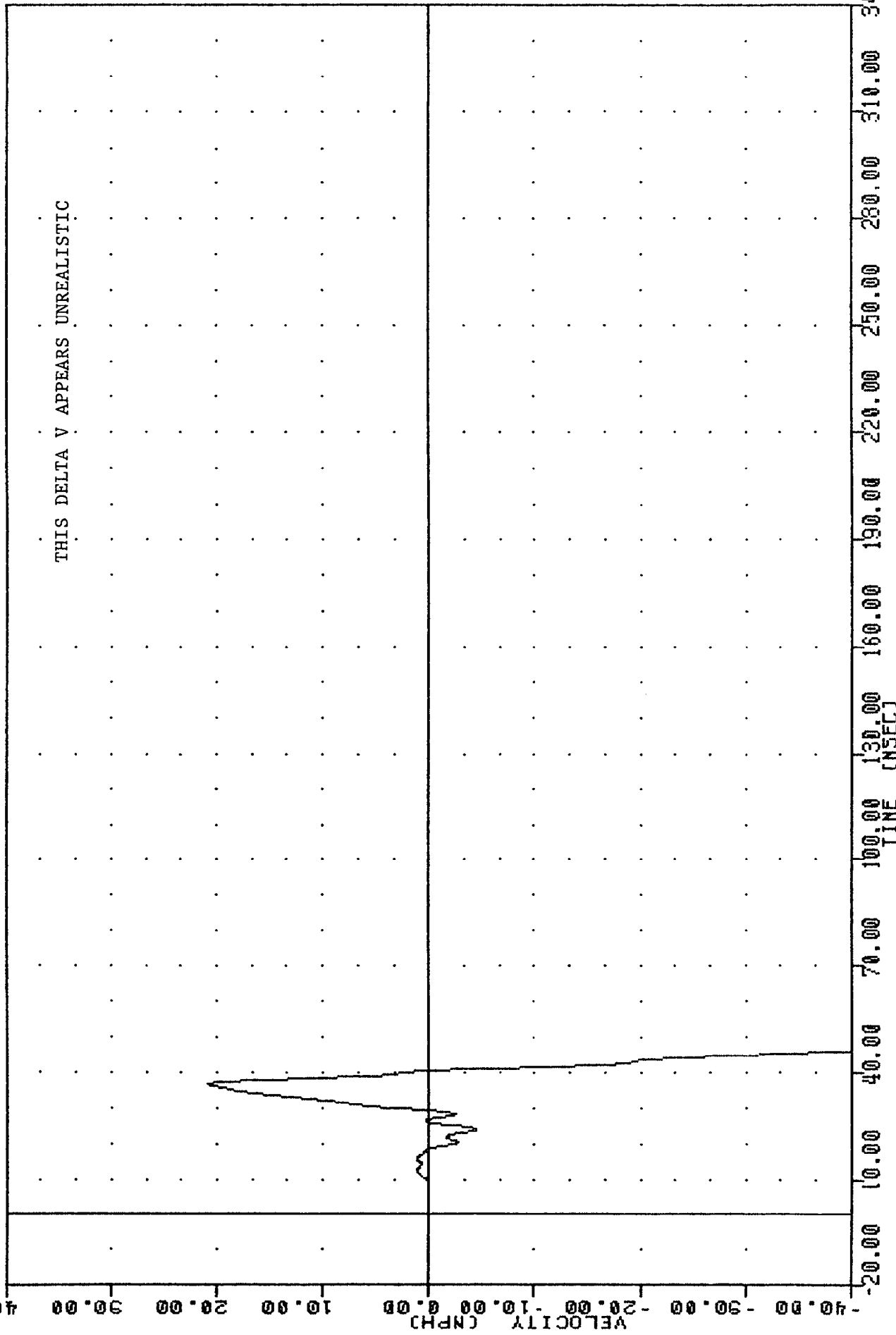
MIN, MAX VALUES = -340.51e 43.50, 150.16 e 35.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 11) ACCELERATION Y AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 LFDYV5

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -62.25 101.63 20.85 36.50



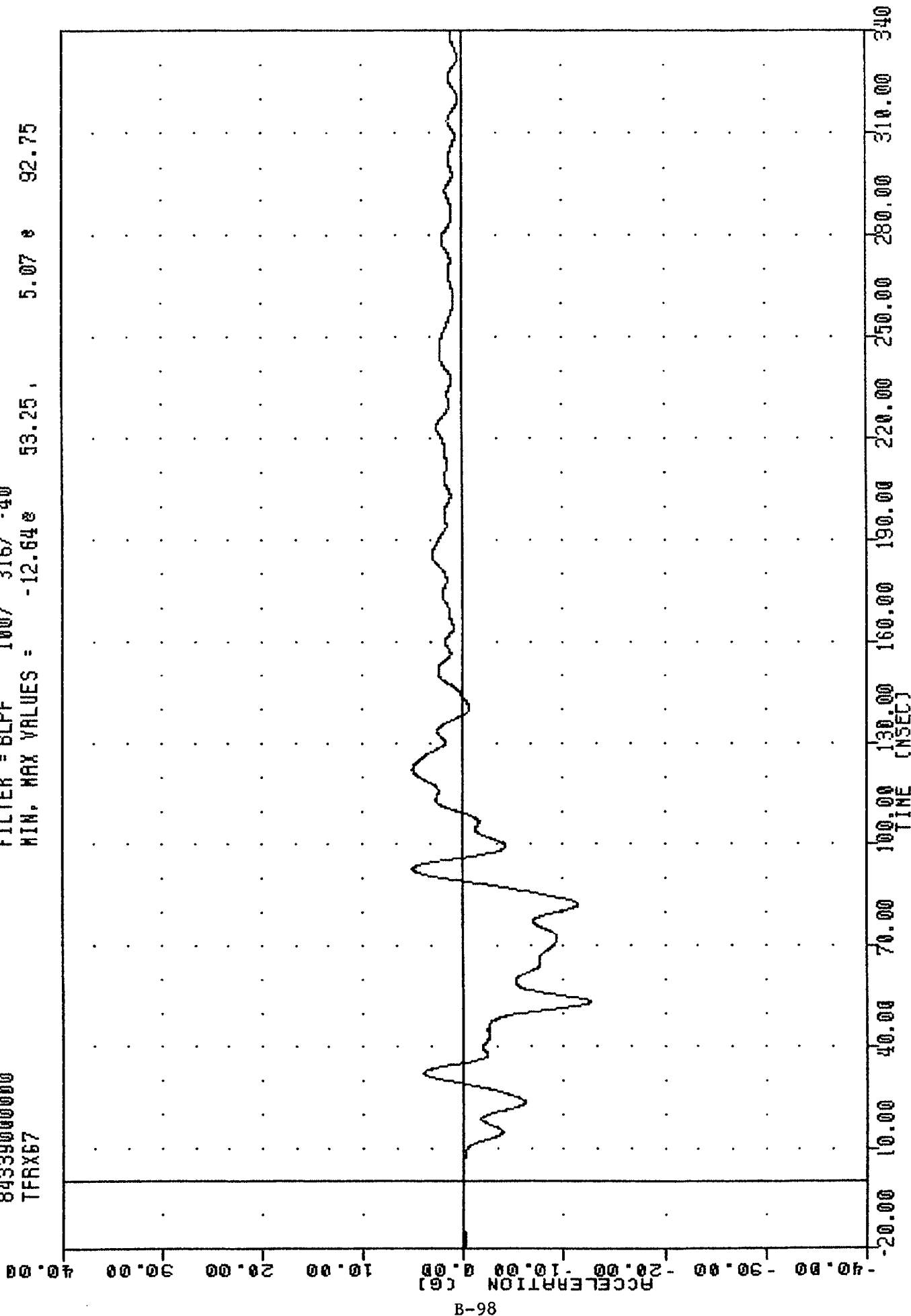
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING LFDYV5

TAC , 841204
SIDE AGGRESSIVE ATTRIBUTES
84339000000
TFRX67

PLU1 WHIE 12-DEC-84 12:59:43

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -12.64 53.25, 5.07 92.75



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

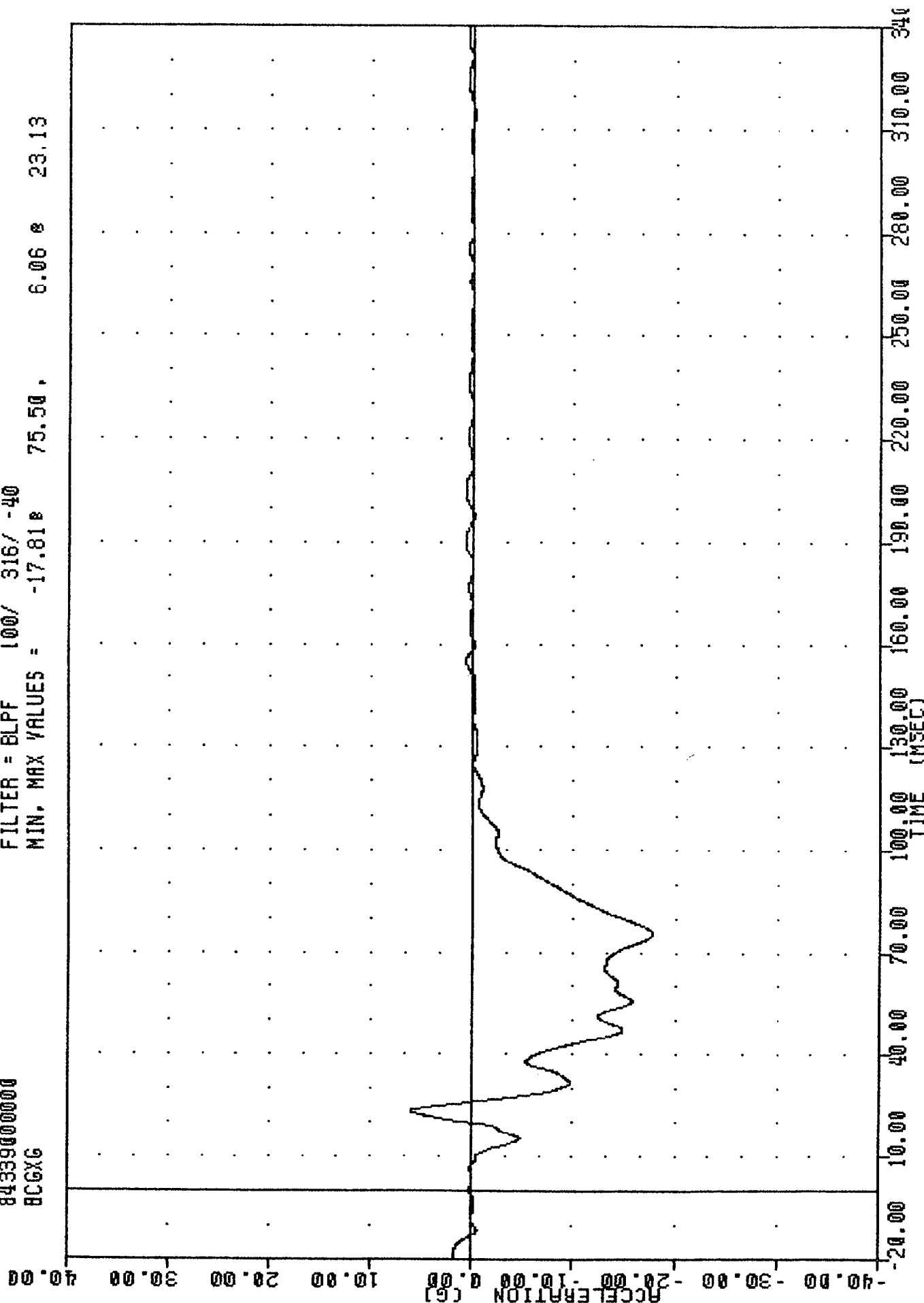
SIDE AGGRESSIVE ATTRIBUTES

84339000000

BCGXC

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -17.81 75.50, 6.06 23.13



B-99

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER CENTER OF GRAVITY X AXIS

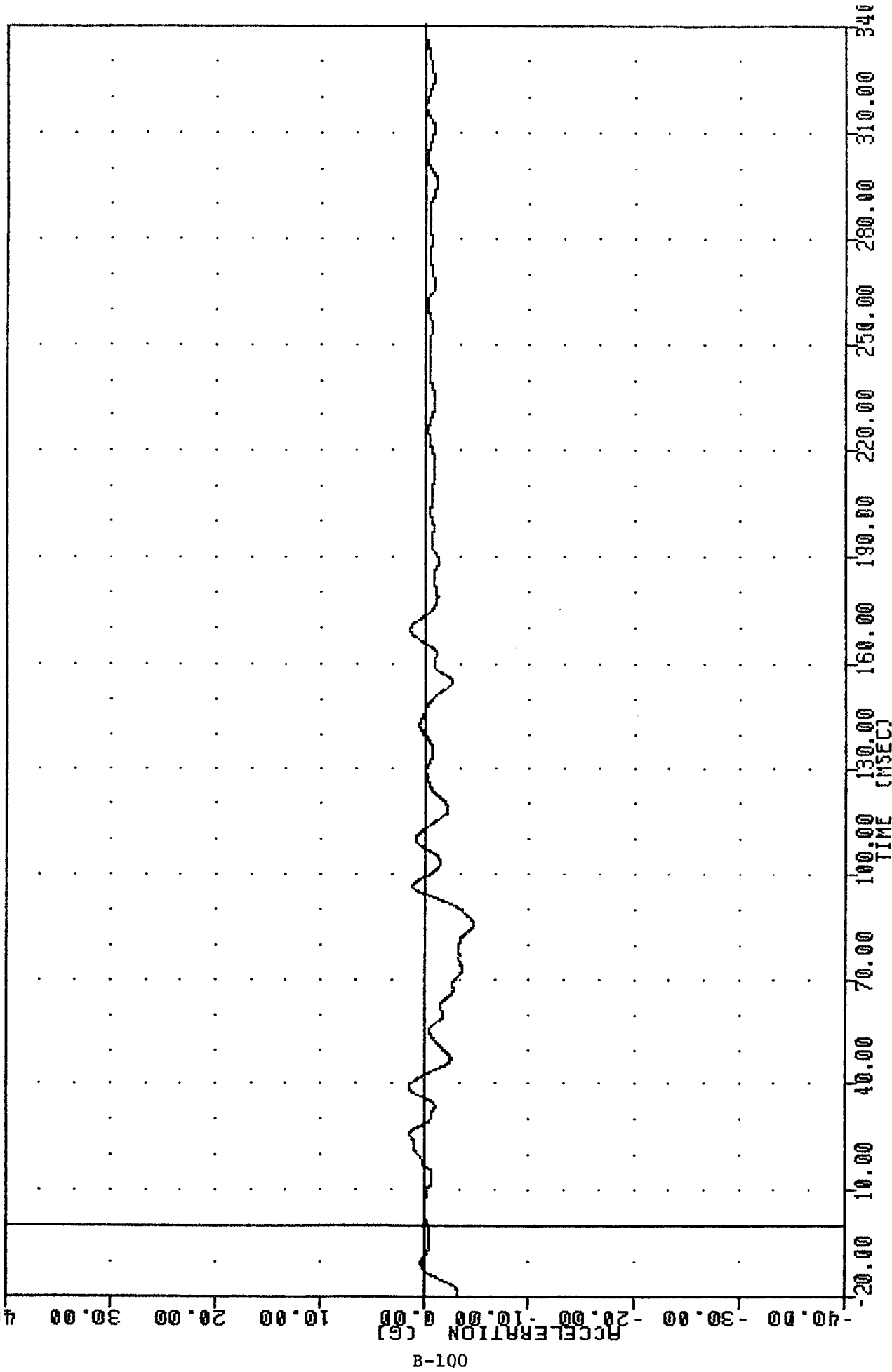
SIDE AGGRESSIVE ATTRIBUTES

84339000000

BCGYG

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -4.68e 85.63 , 1.64 e 39.13



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER CENTER OF GRAVITY Y AXIS

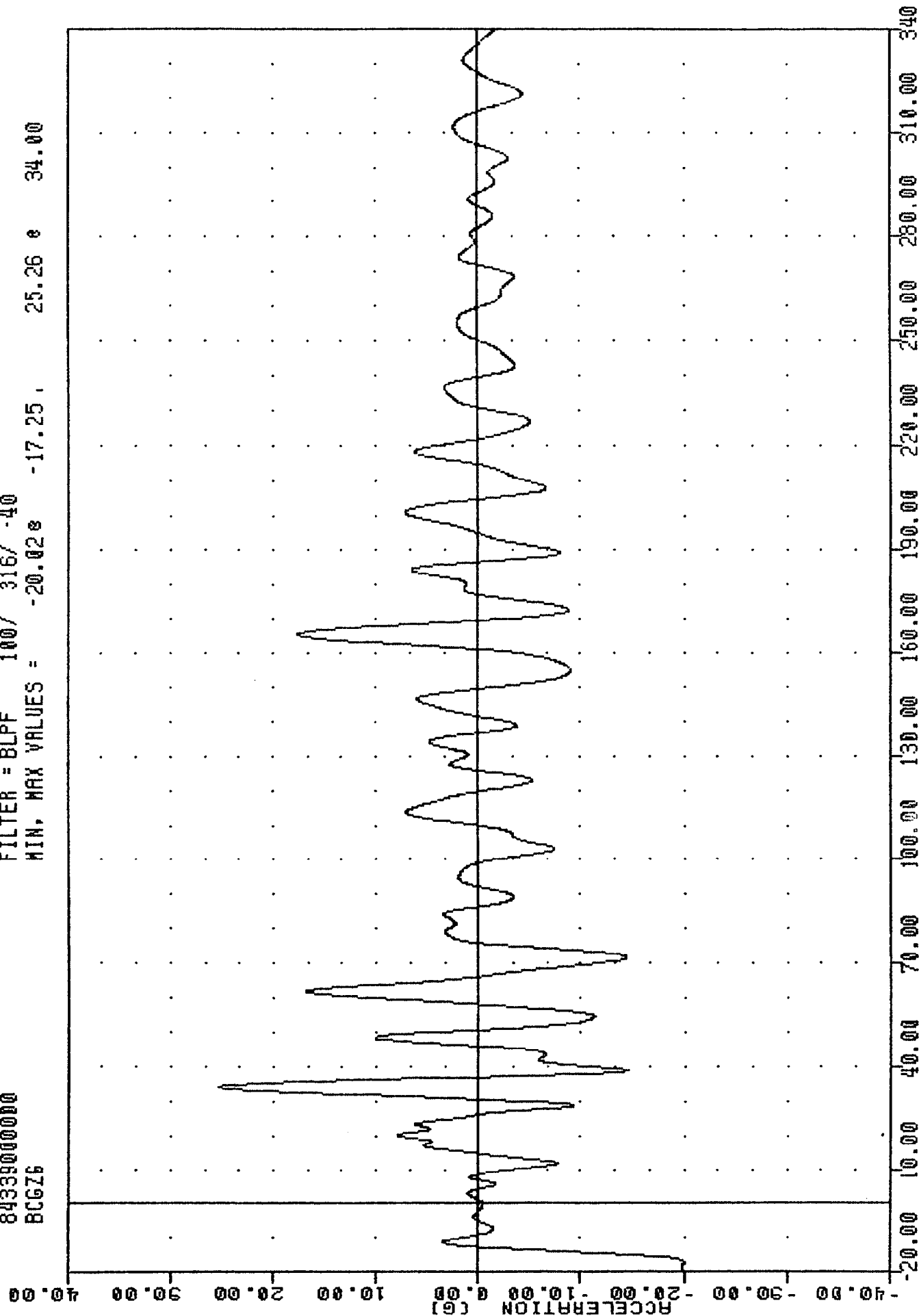
 SIDE AGGRESSIVE ATTRIBUTES

84339000000

BCGZ6

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -20.02g -17.25 , 25.26 g 34.00



B-101

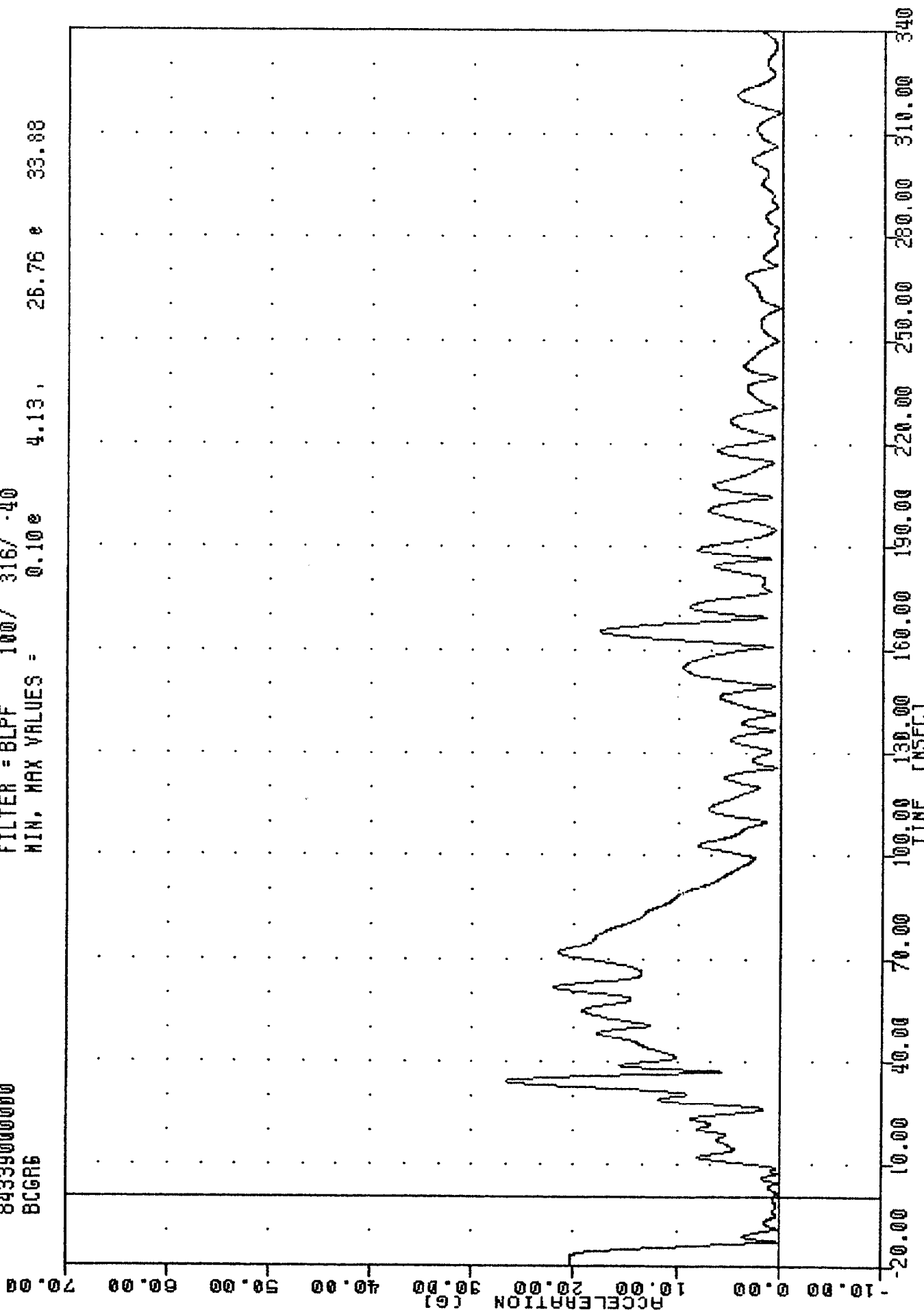
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 BARRIER CENTER OF GRAVITY Z AXIS

IML , 841204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 BCGR6

PLUT DATE 12-DEC-84 13:02:32

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = 0.10e 4.13, 26.76 e 33.88

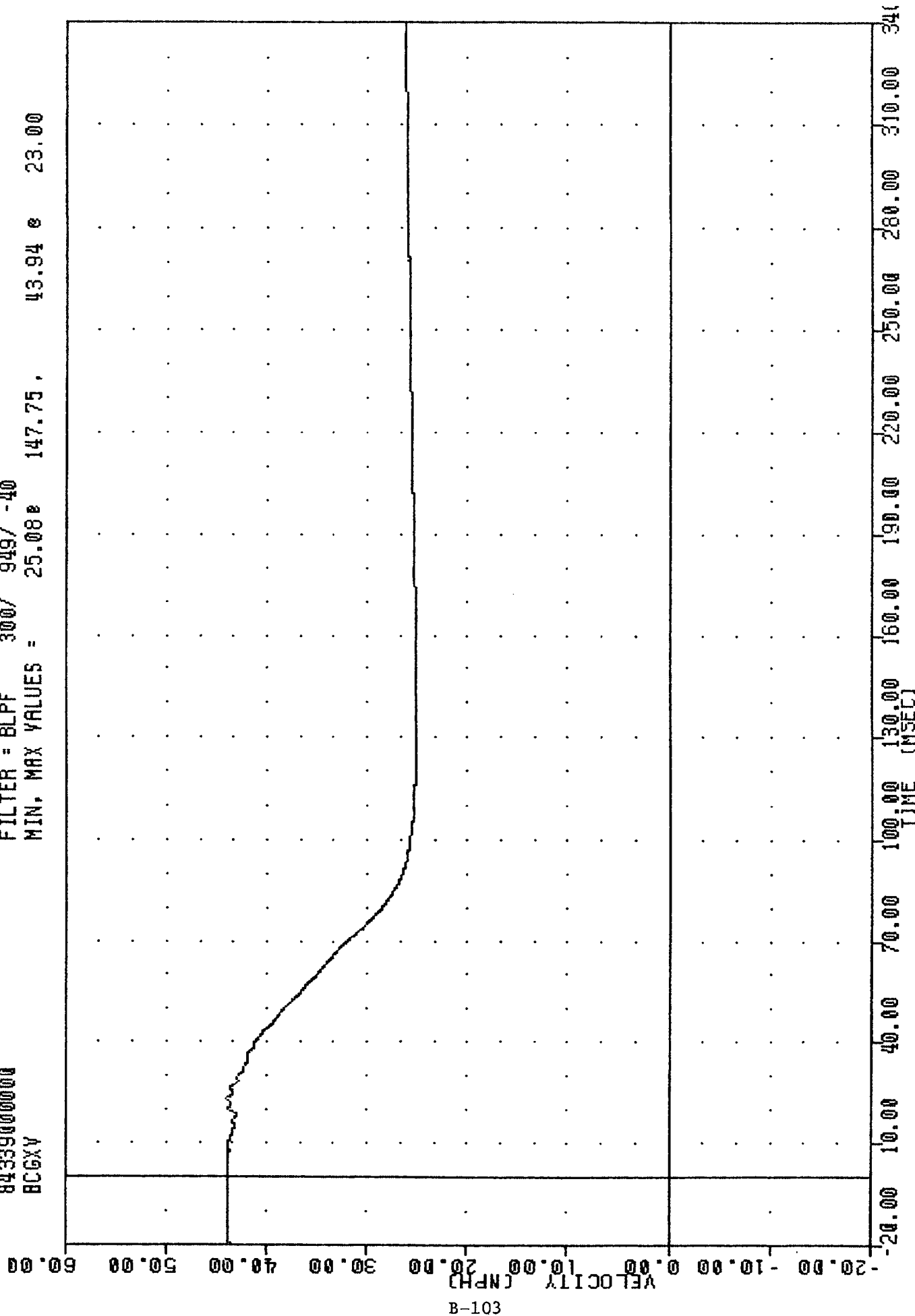


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 BARRIER CG RESULTANT

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 BCGXY

1 LUT UNIT 12 JUL 02 10:00:10

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = 25.08 147.75, 43.94 23.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA V USING BCGXG

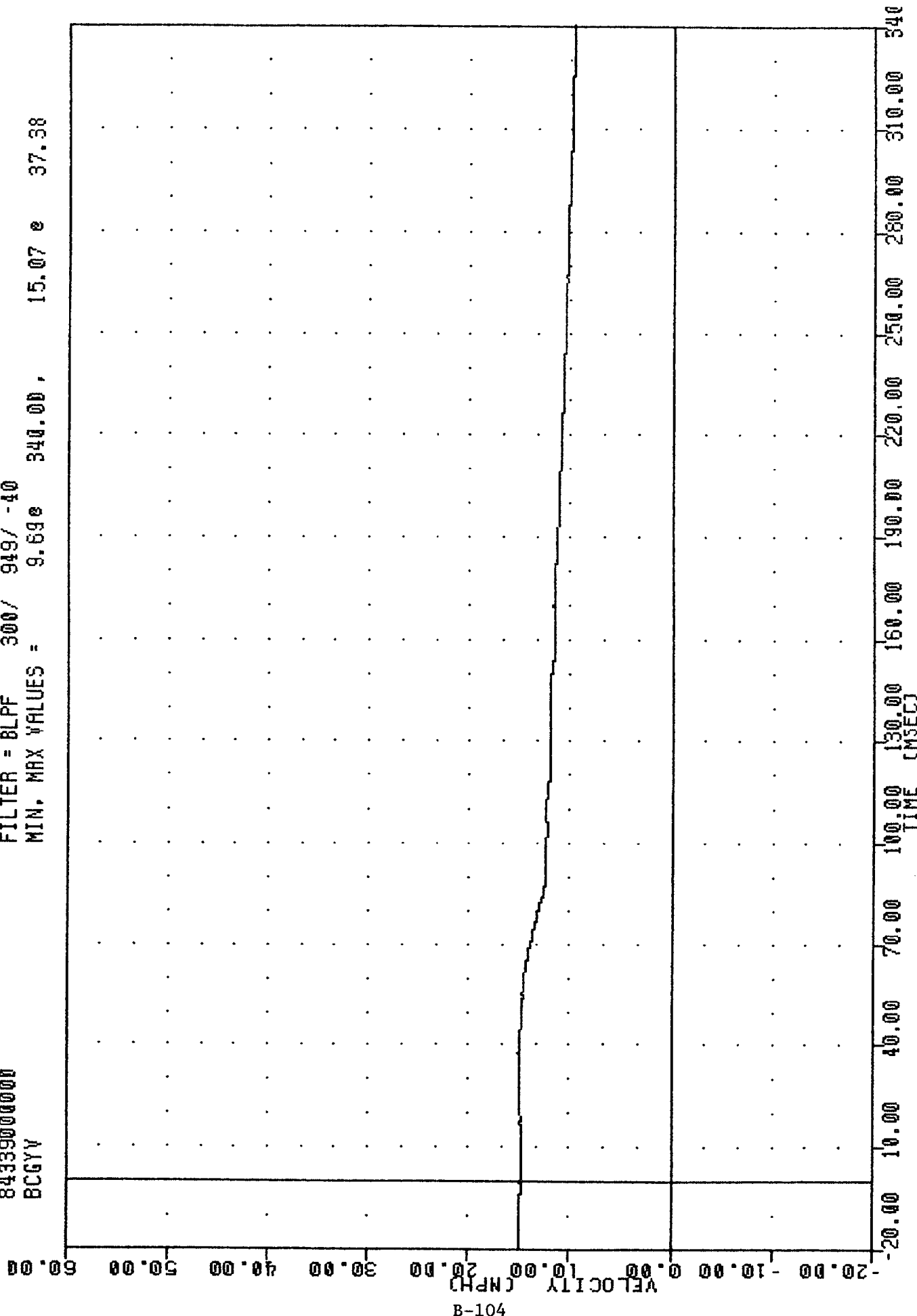
SIDE AGGRESSIVE ATTRIBUTES

84339000000

BCGYV

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 9.69e 340.00, 15.07 e 37.38

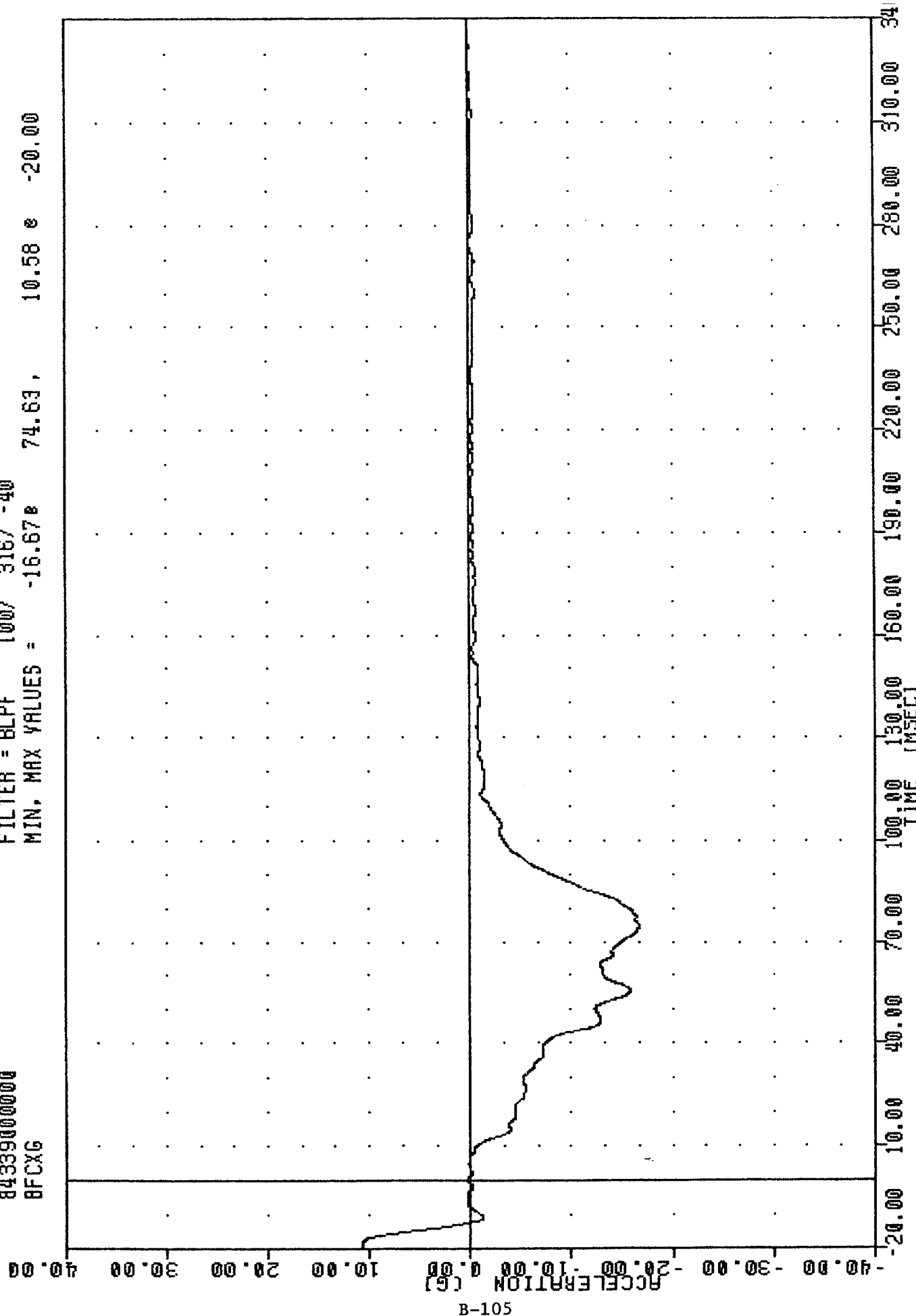


B-104

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING BCGYG

SIDE AGGRESSIVE ATTRIBUTES
84339000000
BFCXG

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -16.67e 74.63, 10.58 e -20.00

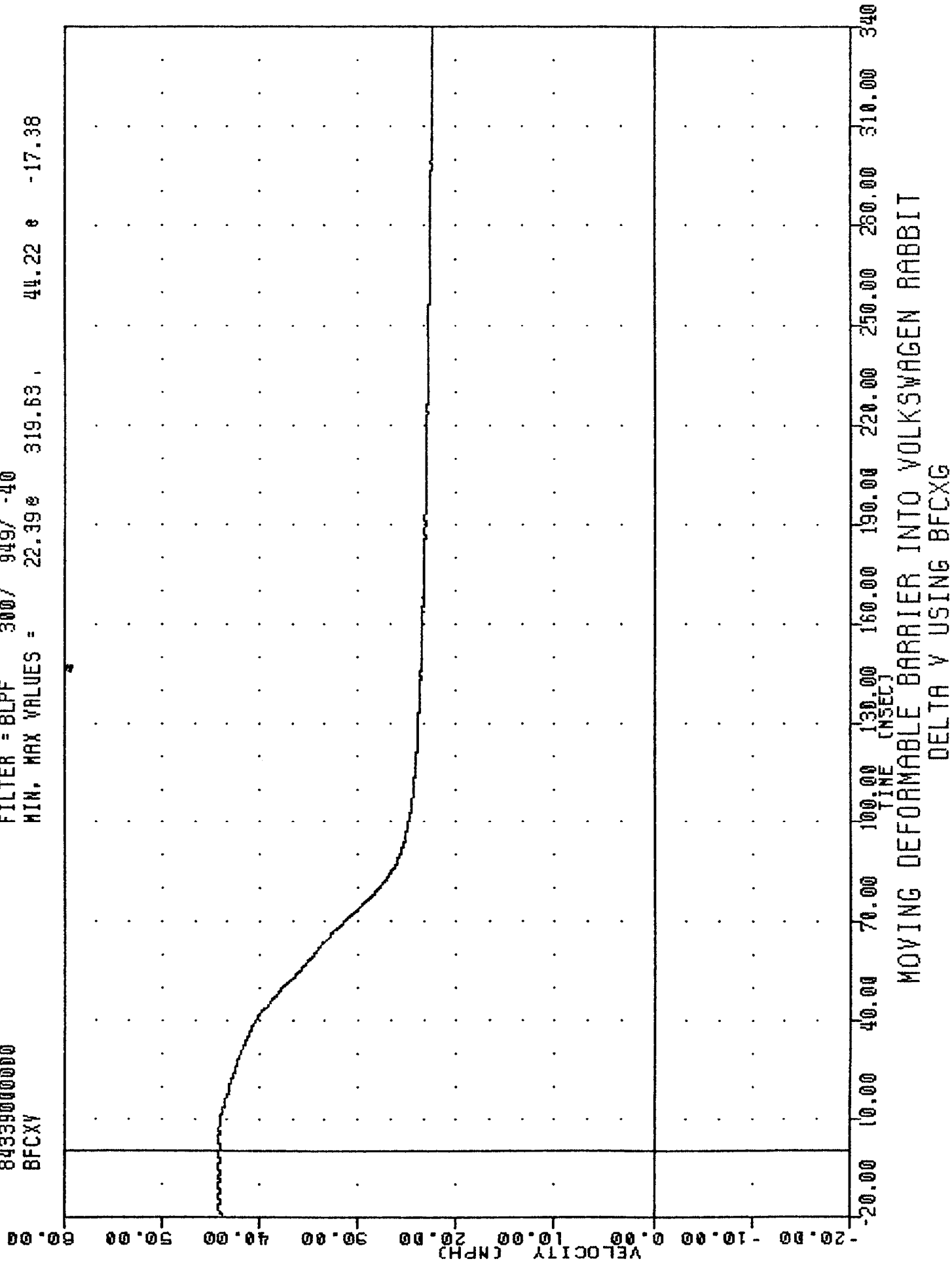


B-105

MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER FRONT CROSSMEMBER ACCELERATION X AXIS

SIDE AGGRESSIVE ATTRIBUTES
 843390000000
 BFCXY

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = 22.39 319.63, 44.22 0 -17.38

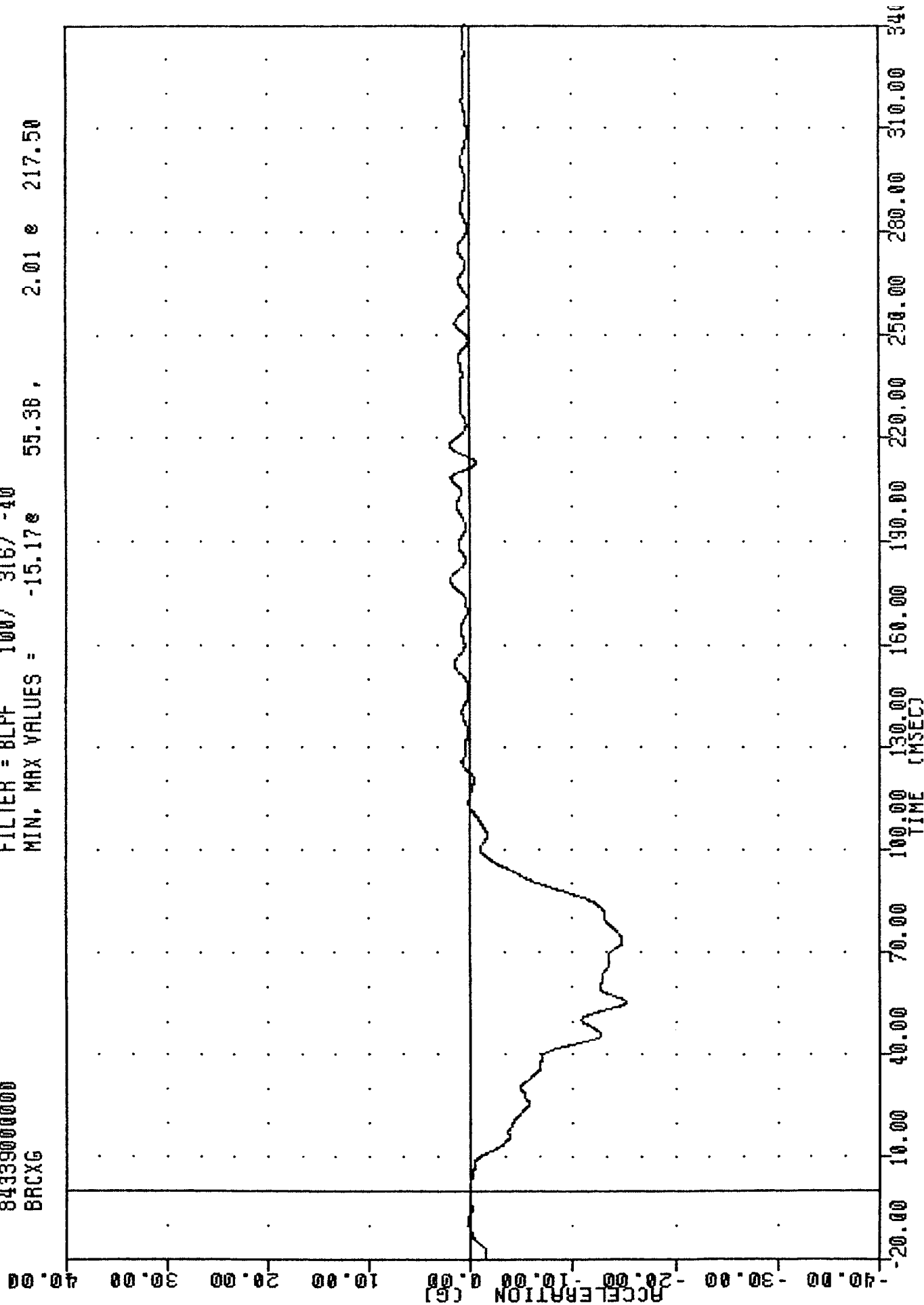


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 DELTA Y USING BFCXG

INL 041204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 BRCXG

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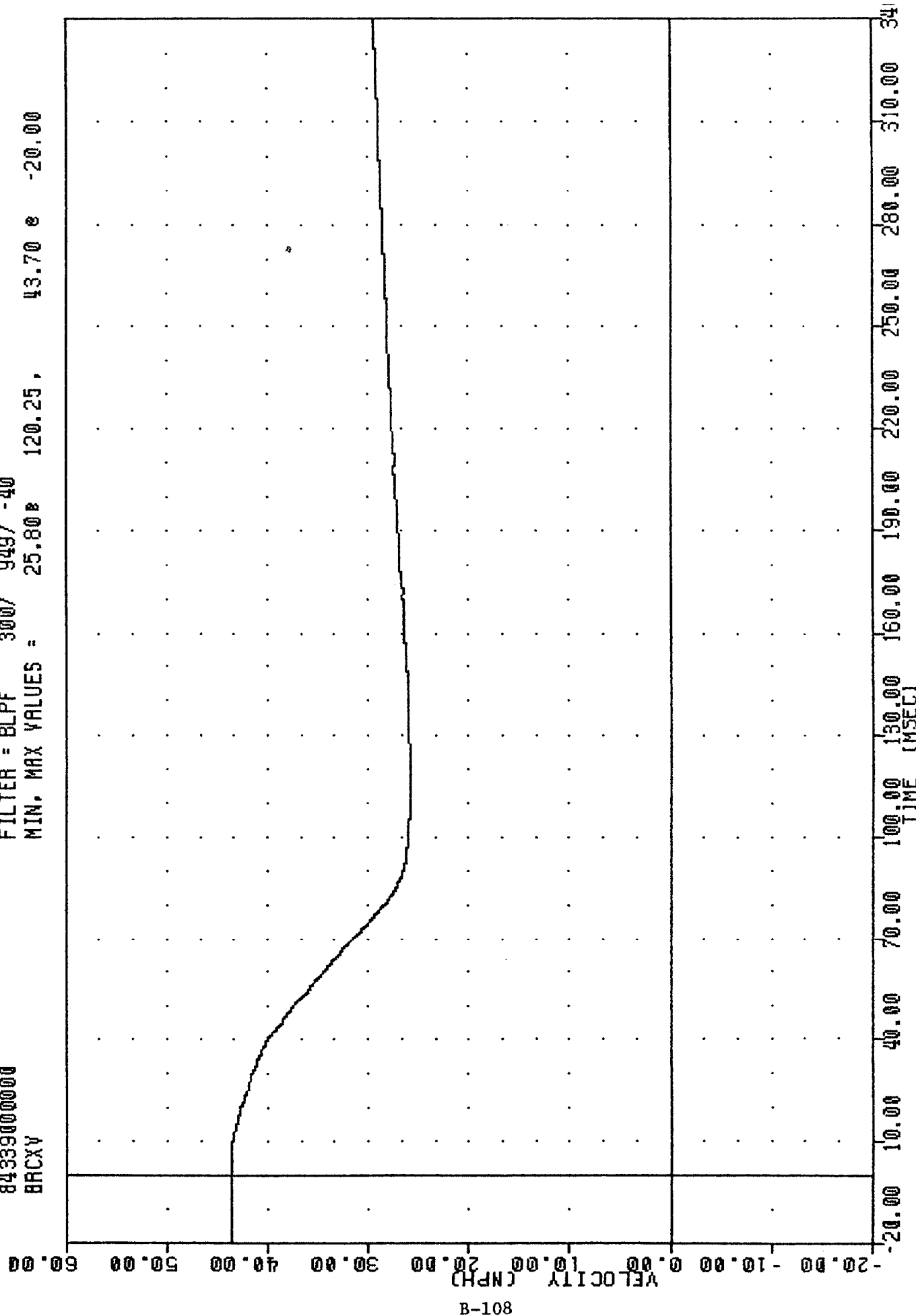
FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -15.17e 55.38, 2.01 e 217.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 BARRIER REAR CROSSMEMBER ACCELERATION X AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 BRCXY

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = 25.80 120.25, 43.70 310.00



APPENDIX C
CHILD DUMMY REPORT

PURPOSE

The purpose of this test was to gather further data about the retention of child seats when the vehicle seat belt holding the child seat enters the seat belt buckle at 90° instead of the intended 180° . Previous data was gathered using a Hyge Sled to simulate a frontal crash. This test impacted at 60° , simulating an impact at that angle.

INTRODUCTION

A Century child restraint seat, Model 4200, was used to hold a 3 year old child dummy in the right rear passenger position of a 1980 Volkswagen Rabbit 2-door hatchback. The belt used to secure the child seat to the vehicle seat was taken from the center occupant position of a 1980 Ford LTD.

The test vehicle was impacted on December 4, 1984 by a moving deformable barrier with a face designated as "Lowered Bumper". The velocity was 46.2 mph and the impact angle was 60° . The impact point was 38.5 inches forward of the vehicle wheelbase centerline. This test was conducted to assess occupant safety and seat belt reliability under the previously stated conditions.

BELT TEST SETUP AND RESULTS

Prior to testing, the belt used to secure the child seat to the vehicle seat was marked in 1 inch increments for a total of 9 inches. These marks were located on the unused portion of the belt, as shown in the pre-test child dummy photograph.

After the test 5 marks were outside of the buckle, for a total belt movement of 5 inches.

DUMMY KINEMATIC SUMMARY

CHILD

During impact, the child seat moved to the left. The child's head went beyond the seat boundaries, possibly striking the rear passenger. As the seat returned to it's original position, the child's head flew backwards, tilting the seat with him. The seat then rocked to and fro until it settled in it's original position.

CHILD DUMMY DATA SUMMARY

	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
HEAD ACCELERATION				
LONGITUDINAL	12.56	284.50	47.69	108.00 β
LATERAL	83.82	106.25 β	20.40	107.88 β
VERTICAL	24.52	131.00 β	70.24	107.63 β
RESULTANT		94.72 @ 106.25 β		
HIC		582.48 from 98.13 to 124.00 β		
CHEST ACCELERATION				
LONGITUDINAL	5.54	135.13	29.39	100.00
LATERAL	54.74	101.88	6.85	135.13
RESULTANT		60.41 @ 101.38		
DELTA V (MPH)		29.3 @ 134.00		

β Intermittent rattling has occurred at approximately 108 and 130 msec on these channels.

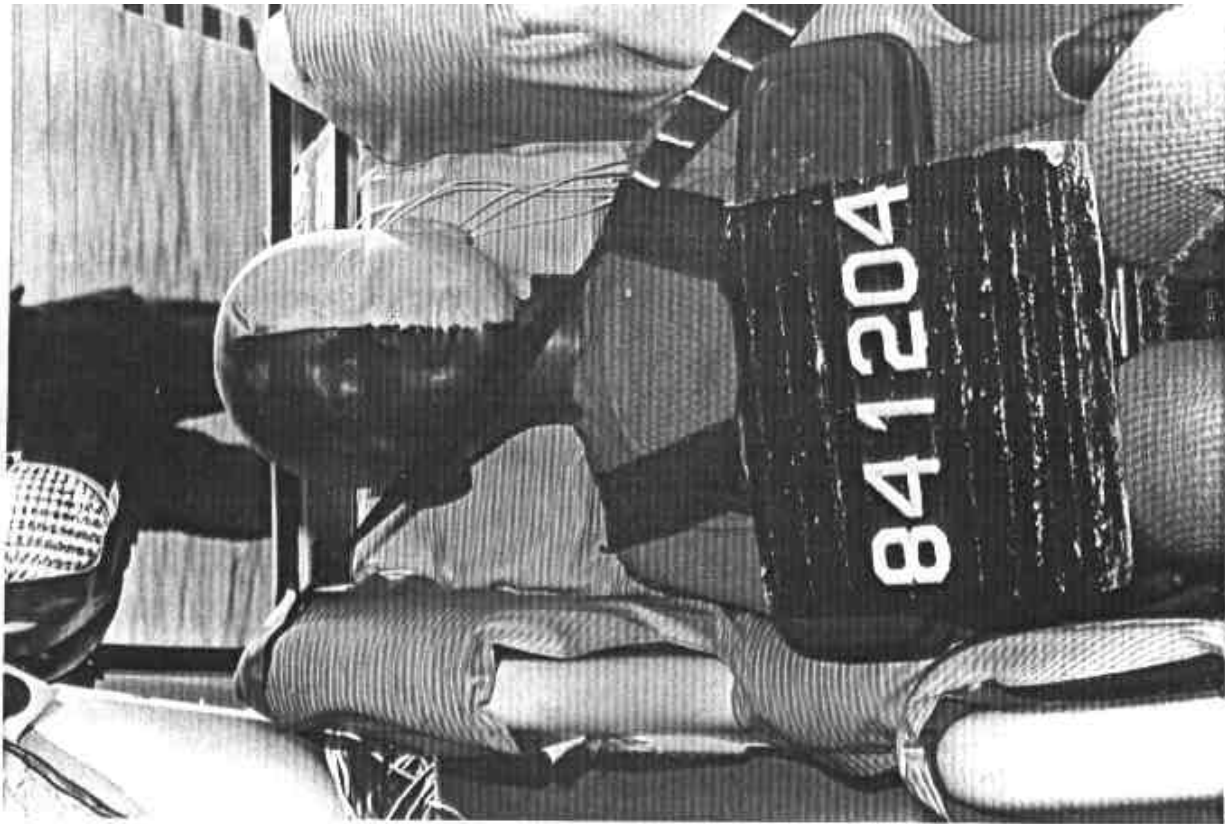


Figure C-1. PRE-TEST CHILD DUMMY

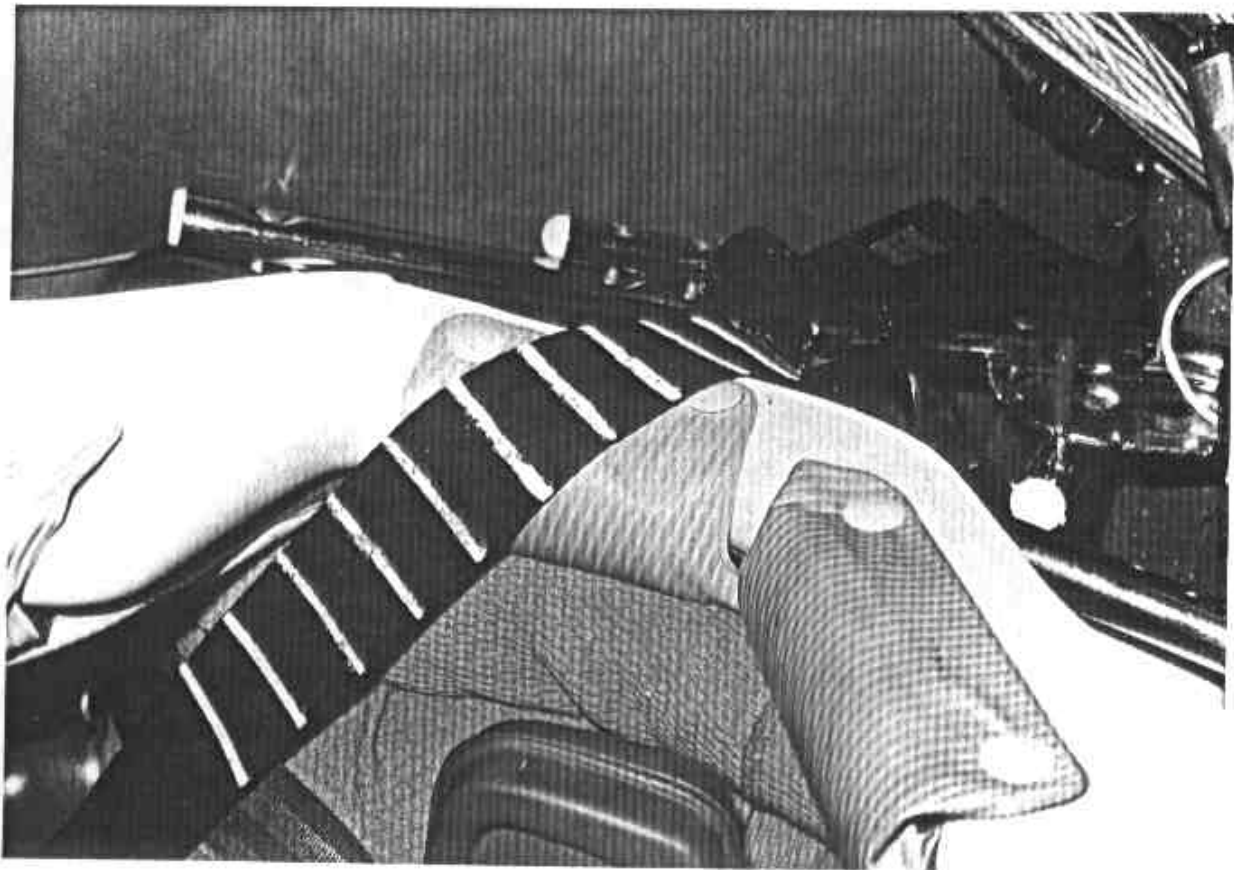


Figure C-2. PRE-TEST RESTRAINT BELT - VIEW 1

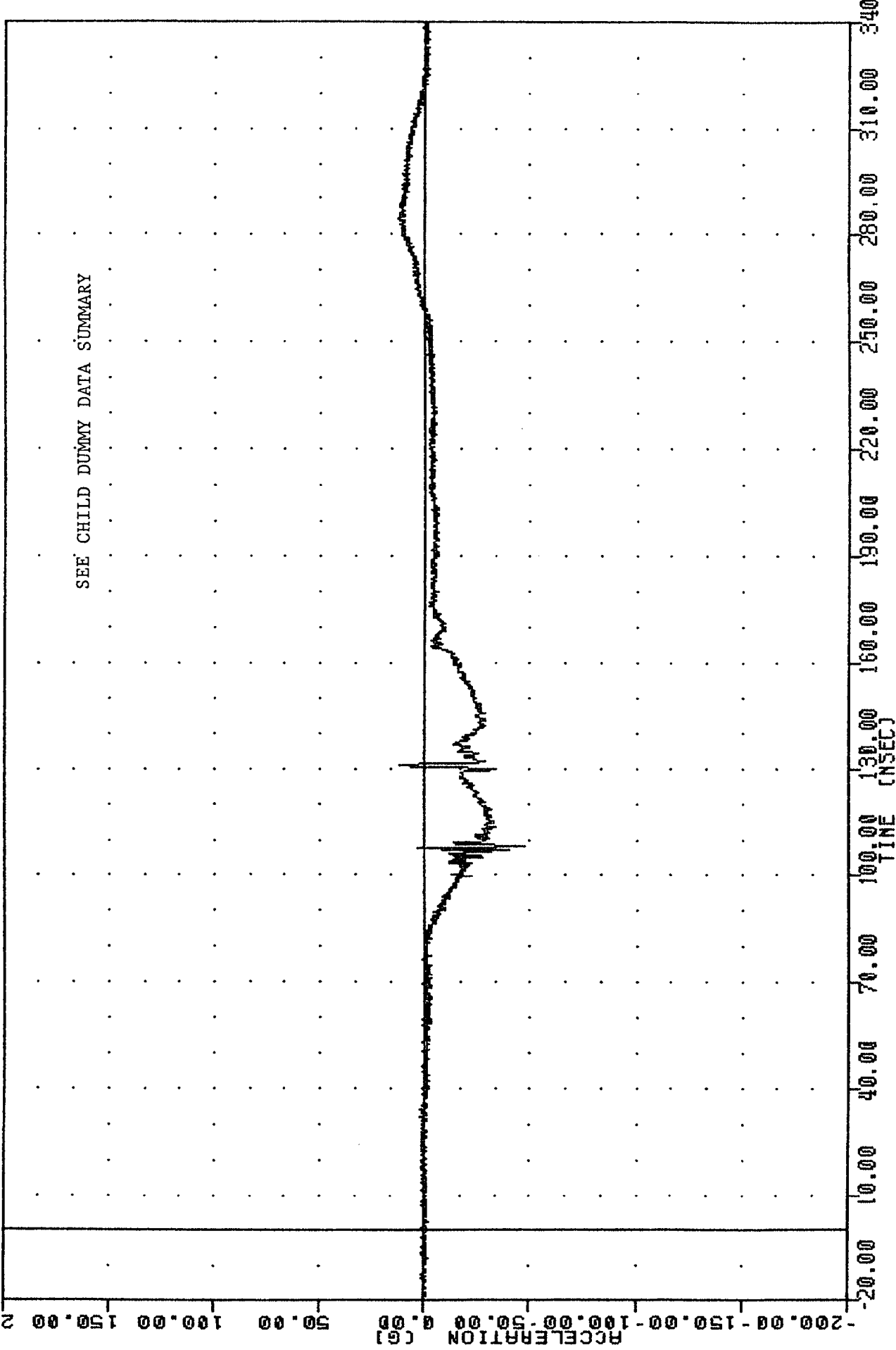


Figure C-3. PRE-TEST RESTRAINT BELT - VIEW 2

1110
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 HEDX65

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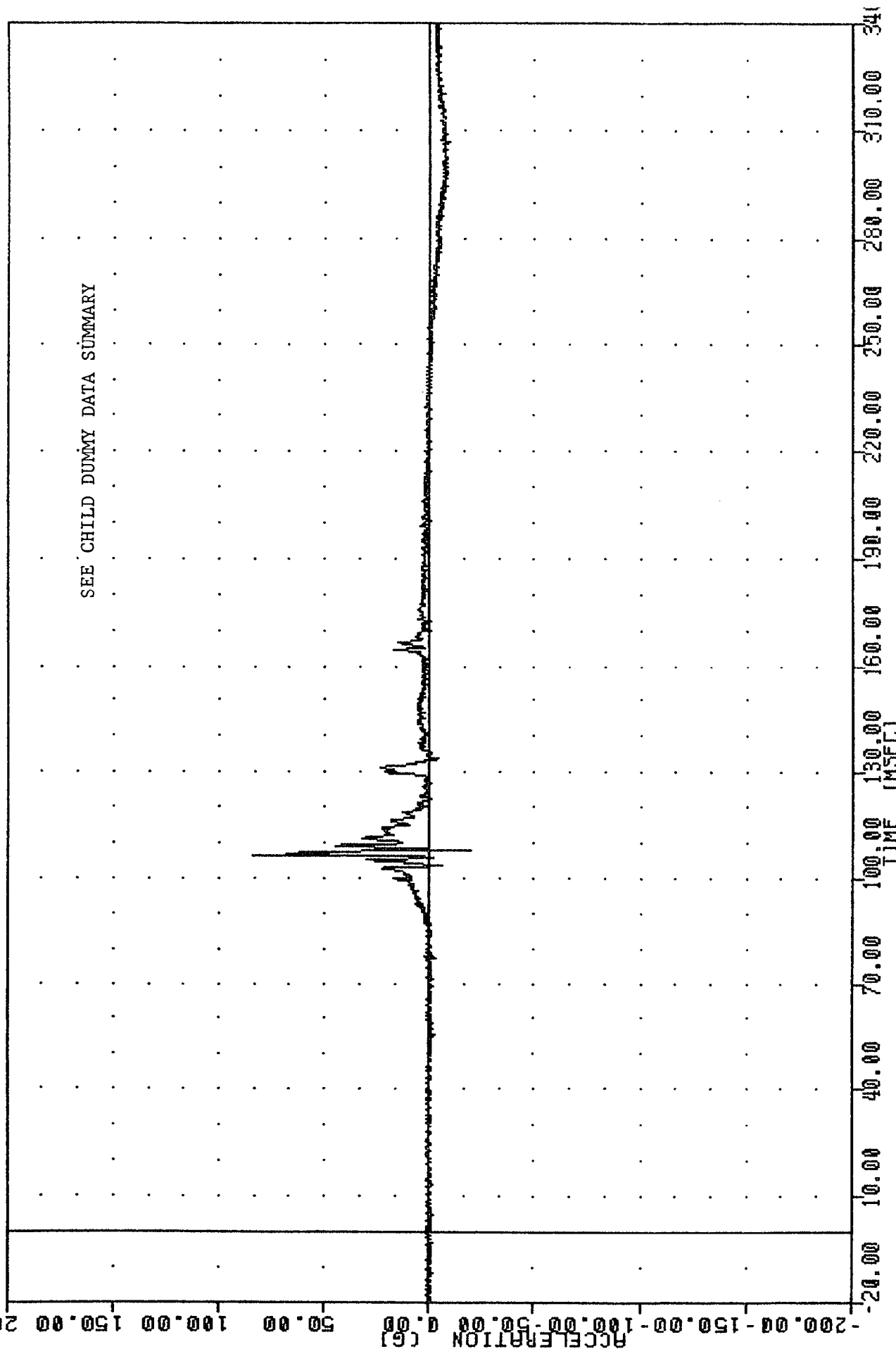
FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -47.698 108.00 , 12.56 284.50



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 CHILD HEAD ACCELERATION X AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 HEDYG5

FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = -20.408 107.88, 83.82 @ 106.25

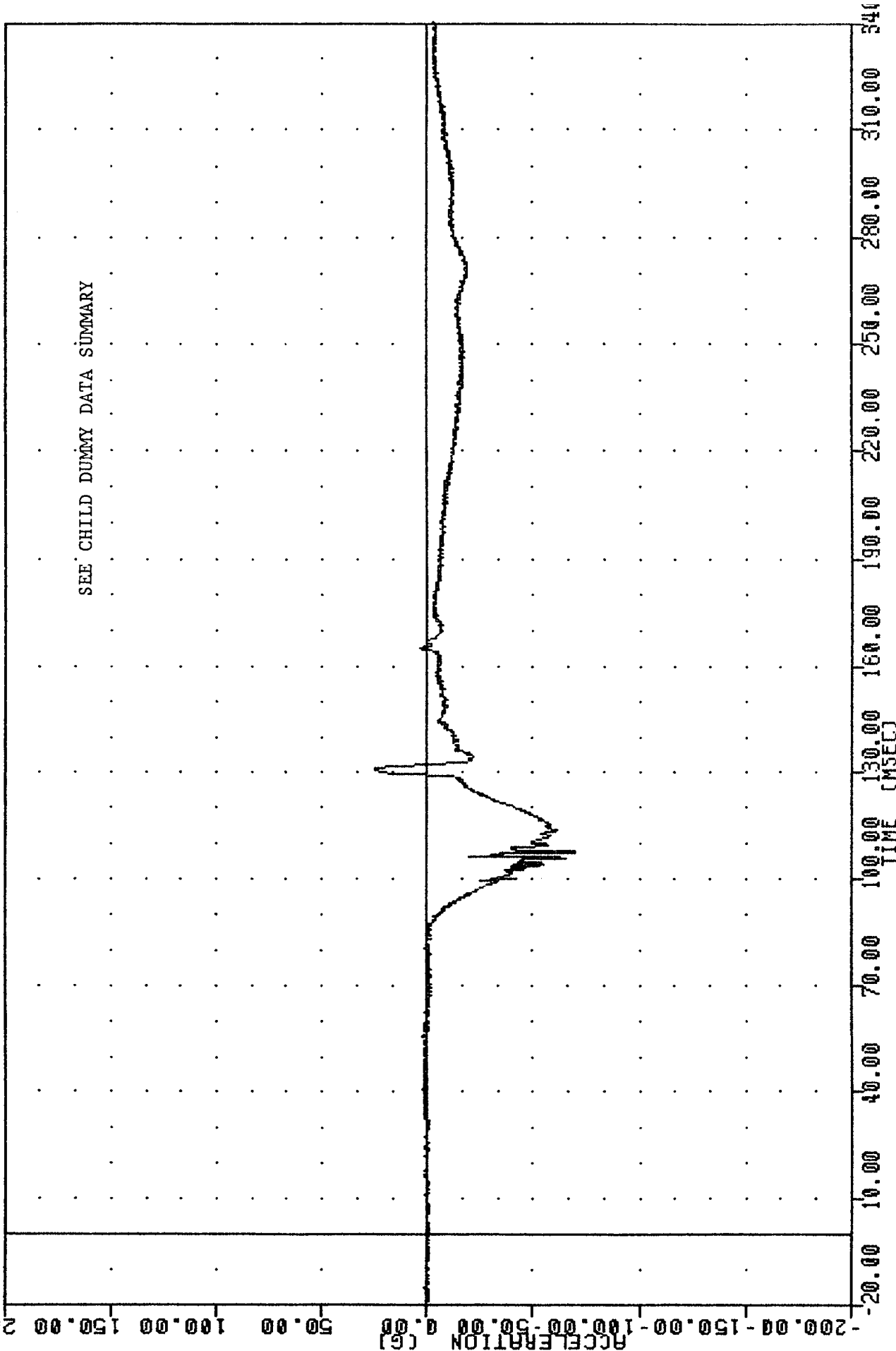


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 CHILD HEAD ACCELERATION Y AXIS

INQ 041204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 HEADZG5

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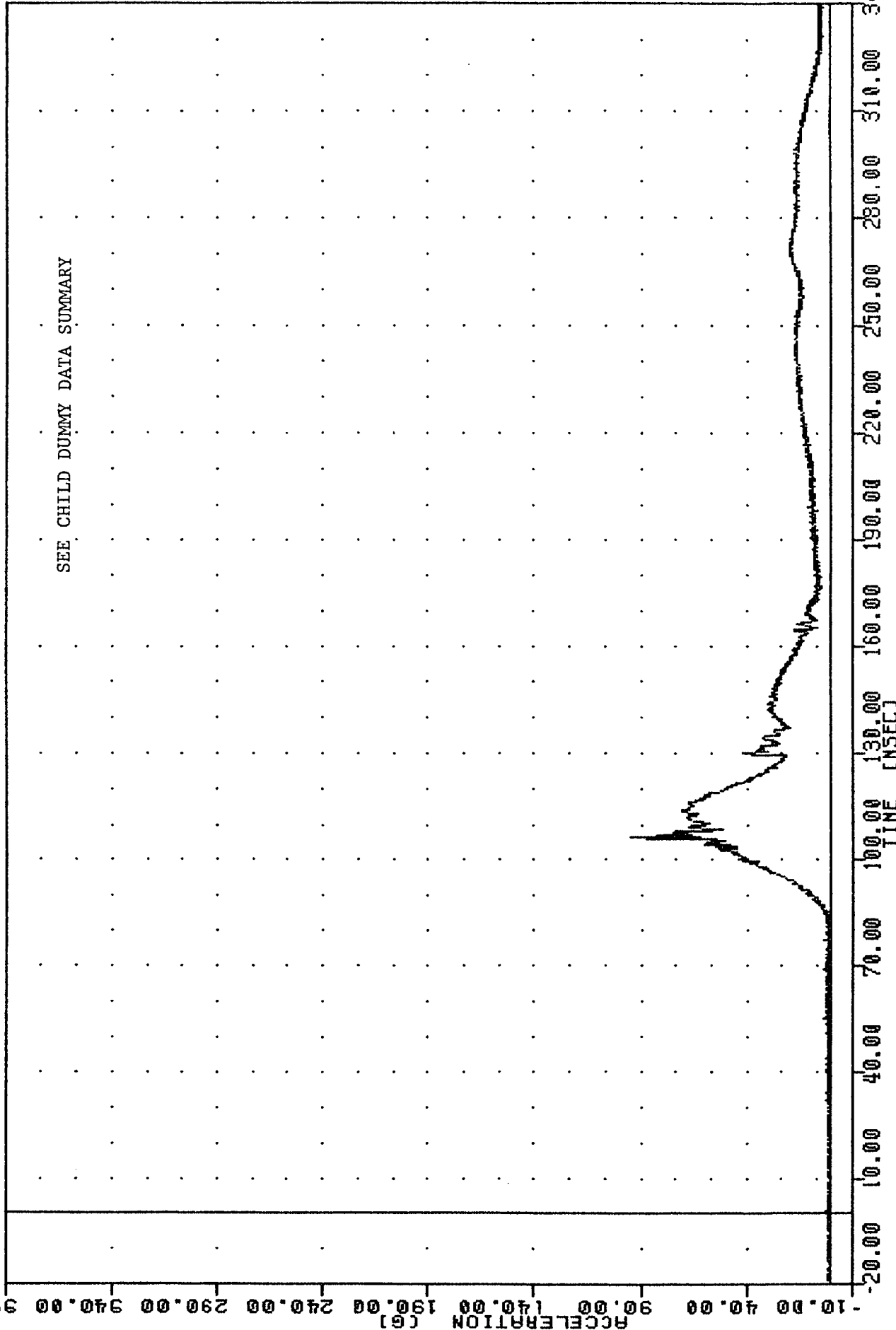
FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -70.24e 107.63, 24.52 e 131.00



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 CHILD HEAD ACCELERATION Z AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 HEDR65

FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = 0.088 1.88 94.72 e 106.25

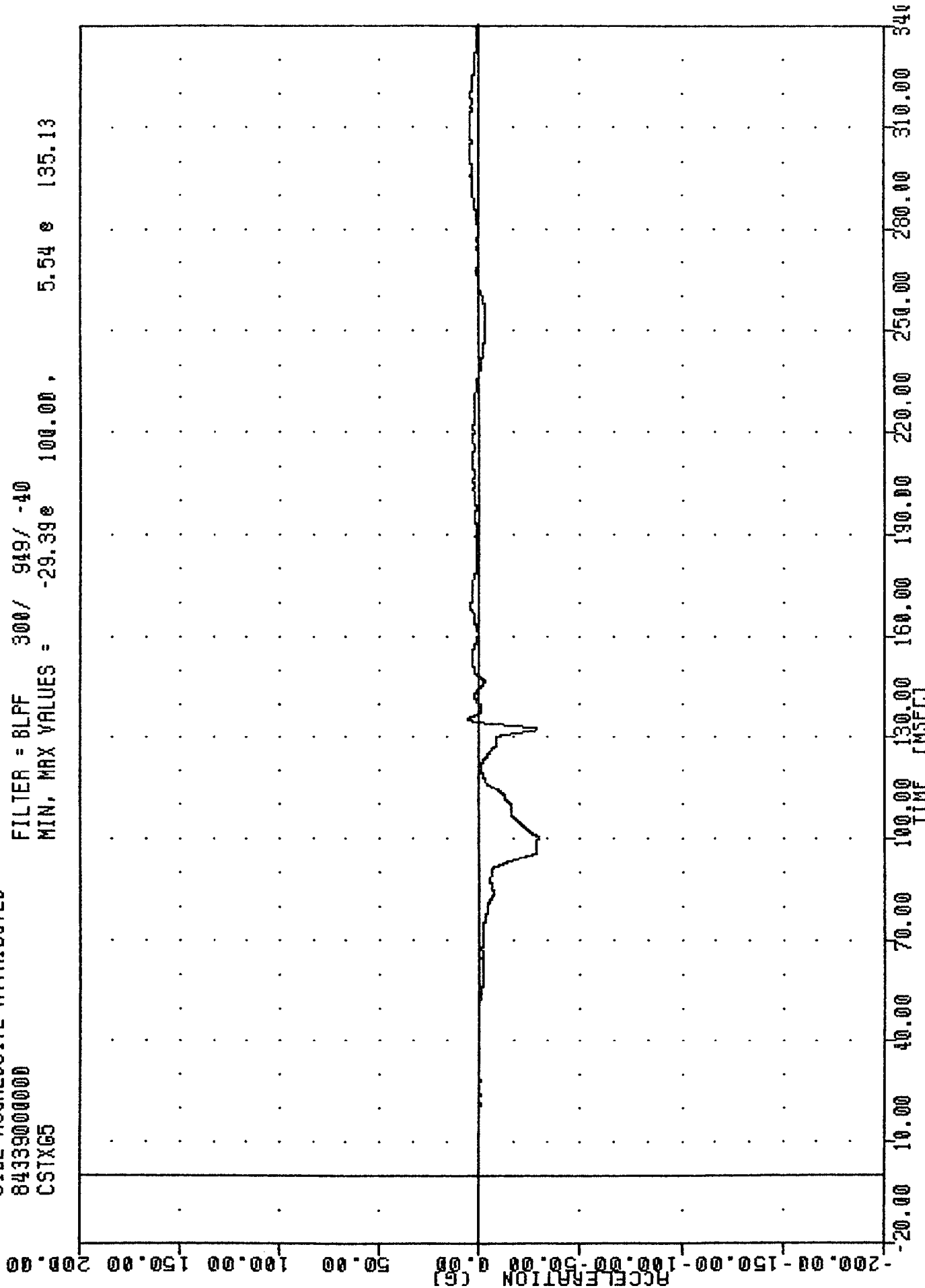


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 CHILD HEAD RESULTANT

INQ 041204
 SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 CSTXG5

FLUT UNIC 12-DEC-04 12:39:43

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -29.39e 100.00, 5.54 e 135.13

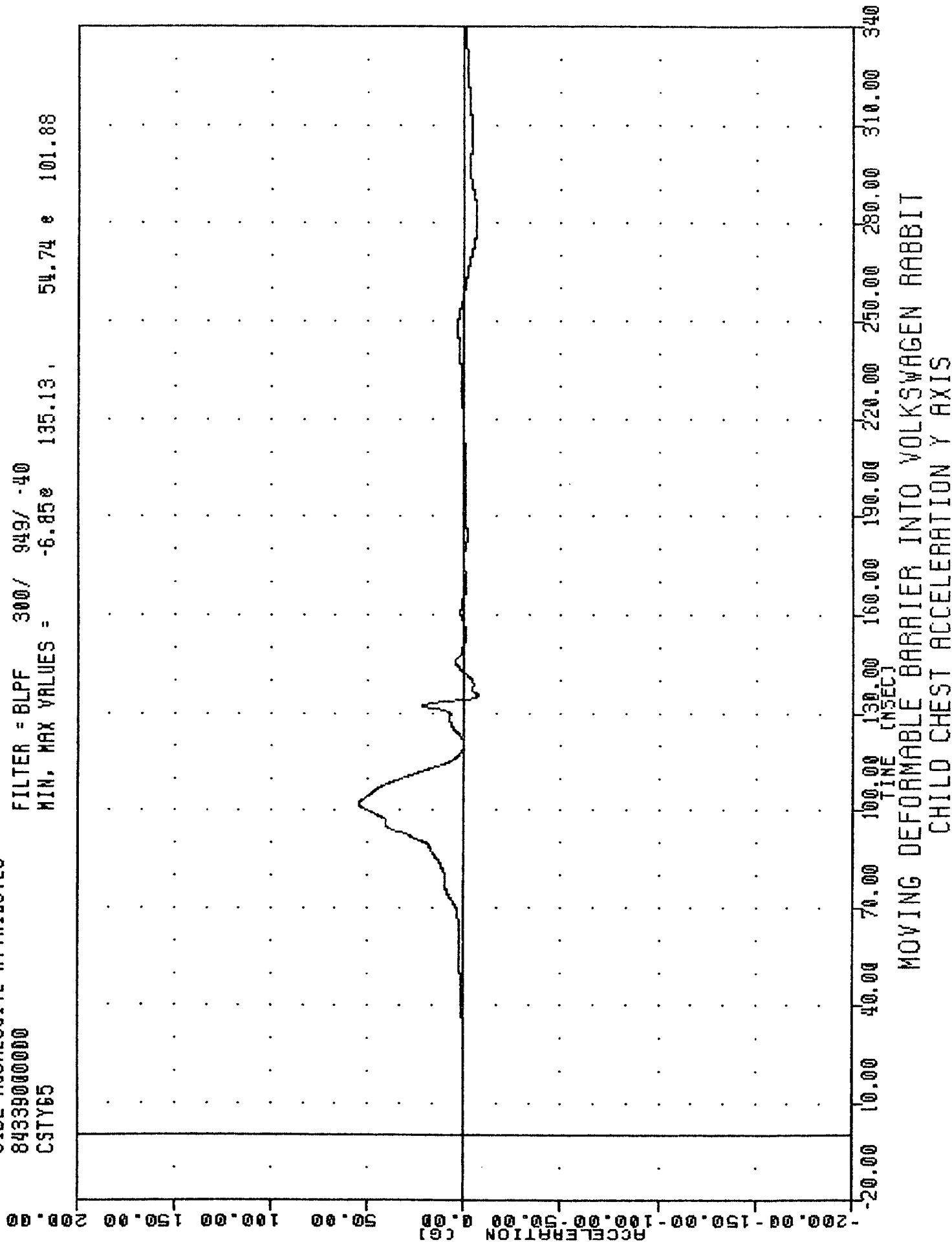


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
 CHILD CHEST ACCELERATION X AXIS

SIDE AGGRESSIVE ATTRIBUTES
 84339000000
 CSTY65

FLAT UNID 12 JUL 70 12:00:40

FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -6.85e 135.13, 54.74 e 101.88



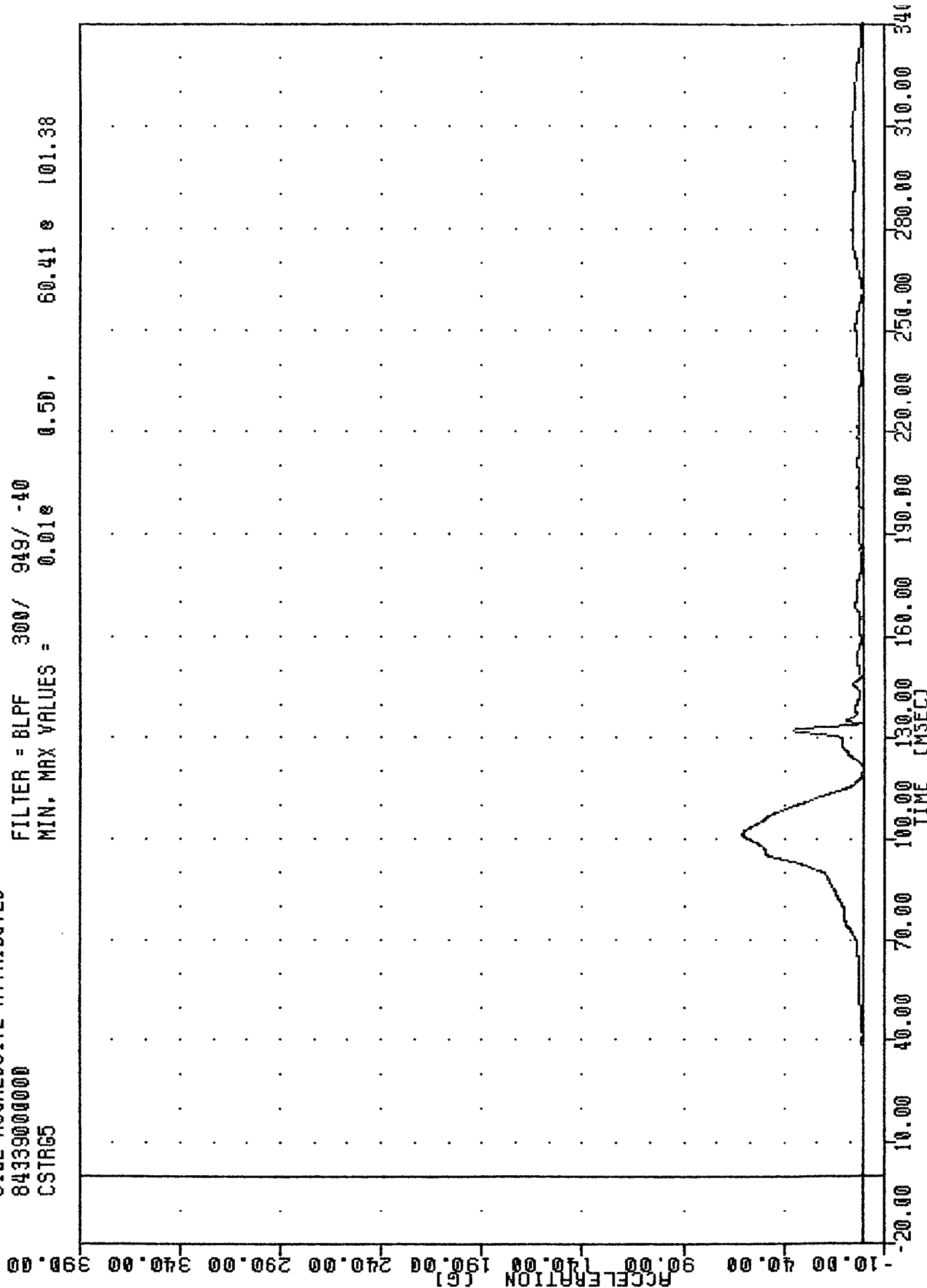
SIDE AGGRESSIVE ATTRIBUTES

84339000000

CSTRG5

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.01e 0.50, 60.41 e 101.38

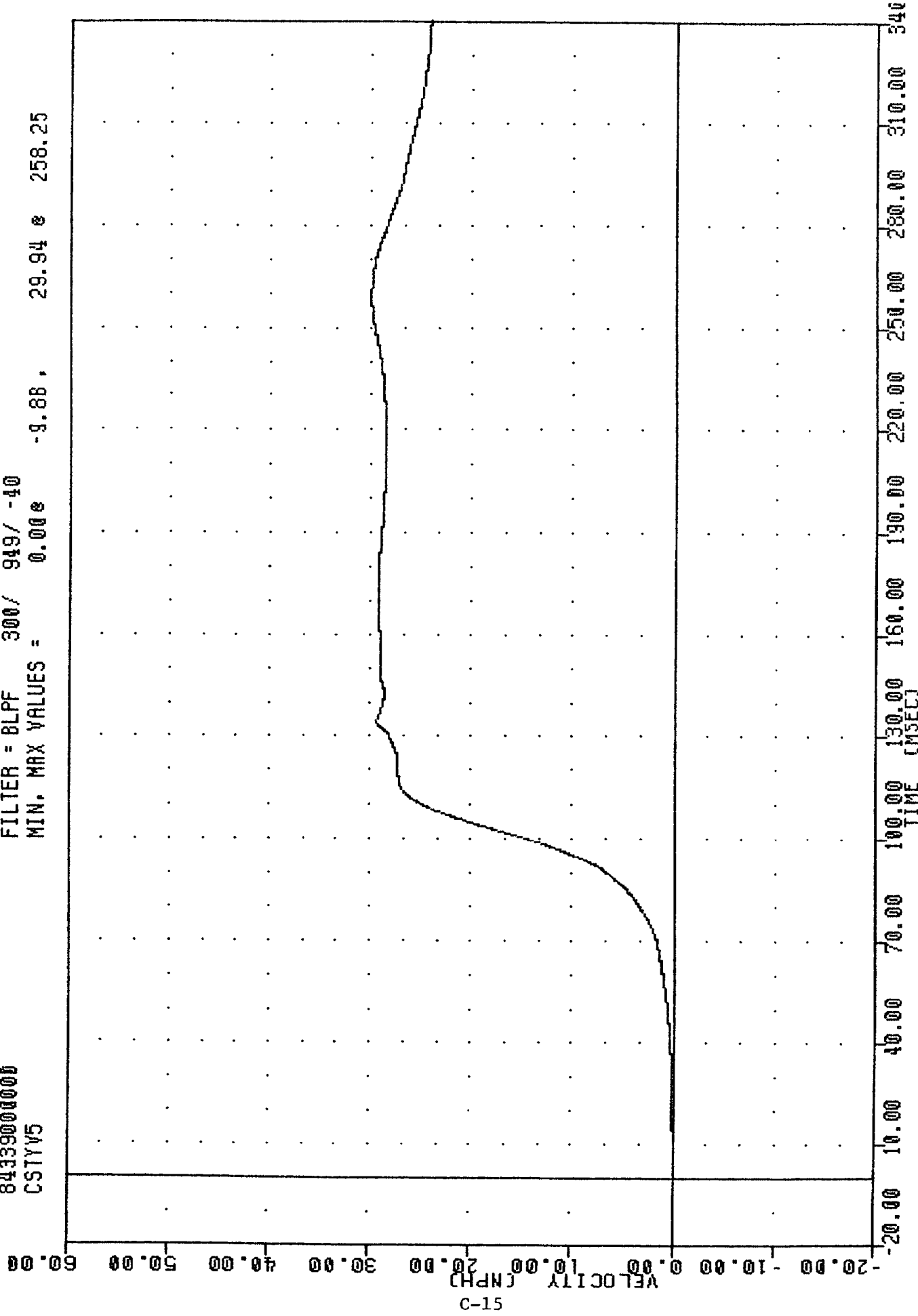


1113
SIDE AGGRESSIVE ATTRIBUTES
84339000000
CSTYV5

1 LOT UNIL 12 DEC 04 10:00:10

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = 0.000 -9.88, 29.94 @ 258.25



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING CSTYG5