

DOT 683

SIDE PROTECTION IN 2-DOOR
AND 4-DOOR PRODUCTION VEHICLES

MDB-TO-CAR SIDE IMPACT TEST OF
A 26° CRABBED MOVING DEFORMABLE BARRIER
TO A 1981 FORD GRANADA
AT 33.5 MPH

PREPARED BY:
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FINAL REPORT
FEBRUARY 1984

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
400 SEVENTH STREET, S.W.
WASHINGTON, D.C. 20590

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1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle SIDE PROTECTION IN 2-DOOR AND 4-DOOR PRODUCTION VEHICLES MDB-TO-CAR SIDE IMPACT TEST OF A 26° CRABBED MOVING DEFORMABLE BARRIER TO A 1981 FORD GRANADA AT 33.5 MPH		5. Report Date FEBRUARY 1984	
		6. Performing Organization Code	
		8. Performing Organization Report No. 840113	
7. Author(s) J. Stultz, Project Engineer, TRCO		10. Work Unit No. (TRAIS)	
9. Performing Organization Name and Address Vehicle Research and Test Center St. Rt. 33, Logan County East Liberty, Ohio 43319		11. Contract or Grant No. DTNH22-82-A-08401	
		13. Type of Report and Period Covered FINAL REPORT January 1984	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, DC 20590		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract This test report documents one of a series of thirteen crash tests to evaluate side impact protection in various vehicle models. Testing was conducted on a 1981 Ford Granada 2-door Sedan at the TRCO Crash Test Facility, East Liberty, Ohio. The test vehicle was impacted on the left side by a moving deformable barrier, crabbled to 26°, at 33.5 mph. Occupant responses of two side impact dummies were measured. One dummy was located in the driver's designated seating position and one was located in the left rear seating position. The test date was January 13, 1984 and the ambient temperature was 31°F.			
17. Key Words Occupant Response Moving Barrier Crash Testing		18. Distribution Statement Available From: Technical Reference Division, National Highway Traffic Safety Administration Room 5108, Nassif Building 400 Seventh Street, S.W. Washington, DC 20590	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 171	22. Price

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 degrees add 32)	Fahrenheit	°F

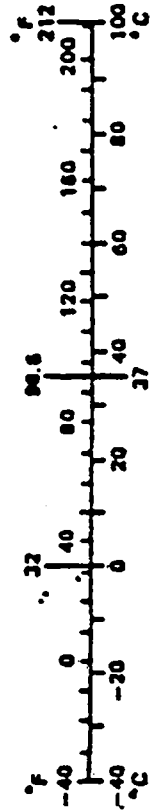


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SECTION 1.0

PURPOSE AND INTRODUCTION

PURPOSE

The main purpose of this test was to evaluate side impact protection in one of a fleet of 2-door and 4-door vehicles. The vehicle was tested using conditions not currently contained in a Federal Motor Vehicle Safety Standard.

INTRODUCTION

A stationary 1981 Ford Granada 2-door Sedan was impacted on the left side by a Moving Deformable Barrier (MDB) on January 13, 1984. The test was to simulate an intersection collision with the striking vehicle traveling at 30 mph and the struck vehicle traveling at 15 mph. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. The leading edge of contact 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 Ford Granada at 33.5 mph with the MDB's wheels crabbed clockwise to 26°. The actual test speed was 33.5 mph and the actual leading edge of contact was 38.5 inches forward of the midpoint of the Ford Granada's wheelbase.

The vehicle was a baseline model with no structural modification. The driver door and left rear door wall were unpadded.

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 Dummy Certification Data.

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: Ford Motor Company

MAKE/MODEL: Ford Granada

VIN: 1FABP26B1BG117143

BODY STYLE: 2-Door Sedan

MODEL YEAR: 1981

NHTSA NO.: R & D

COLOR: Medium Blue

ENGINE DATA: TYPE: Inline CYLINDERS: 6 DISPLACEMENT 200 CID

TRANSMISSION DATA: 3 Speed Automatic

DATE VEHICLE RECEIVED: 1/14/82

ODOMETER READING: 170

DEALER'S NAME AND ADDRESS: Bob Gillingham Ford Inc.
Parma, Ohio

ACCESSORIES:

POWER STEERING	Yes	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	No	AIR CONDITIONING	No
RADIO	No	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	Yes
OTHER			

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: New

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

VEHICLE MANUFACTURED BY: Ford Motor Company

DATE OF MANUFACTURE: 10/80

GVWR: 4184 LBS.,

GAWR: FRONT 2077 LBS., REAR 2125 LBS.

VEHICLE TIRE DATA

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

TIRES ON VEHICLE (MFGR. & LINE, SIZE): General Steel III Radial P175/75 R 14

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 MAXIMUM FLUIDS):

RIGHT FRONT	791	LBS.	RIGHT REAR	692	LBS.
LEFT FRONT	805	LBS.	LEFT REAR	634	LBS.
TOTAL FRONT WEIGHT	1596		LBS. (54.6 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1326		LBS. (45.4 % OF TOTAL VEHICLE WEIGHT)		
TOTAL DELIVERED WEIGHT	2922		LBS.		

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 25 1/4	;LF 25 3/16	;RR 24 5/16	;LR 24 1/2
PRE-TEST ATTITUDE:	RF 24 1/8	;LF 24 1/4	;RR 22 1/4	;LR 22 11/16
POST-TEST ATTITUDE:	RF 22 3/4	;LF 23 7/8	;RR 21 1/2	;LR 23

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 110 LBS. CARGO:

RIGHT FRONT	885	LBS.	RIGHT REAR	790	LBS.
LEFT FRONT	915	LBS.	LEFT REAR	790	LBS.
TOTAL FRONT WEIGHT	1800		LBS. (53.3 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1580		LBS. (46.7 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	3380		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: 4.0 GALLONS

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): No Owners Manual

DETAILS OF FUEL SYSTEM: DNA

ELECTRIC FUEL PUMP: No

FUEL INJECTION: No

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING?

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

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

RECOMMENDED TIRE SIZE: P175/75 R 14 LOAD RANGE X B, C,

VEHICLE CAPACITY: TYPES OF SEATS: Bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 3 FRONT

 3 REAR

CARGO LOAD 100 LBS. 6 TOTAL

TOTAL 1000 LBS.

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

TEST CONDITIONS

TEST NUMBER: 840113

DATE OF TEST: January 13, 1984

TIME OF TEST: 12:40

WIND VELOCITY: 3-6 mph 171° SSE

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 31° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 74° F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
VEHICLE TEST WEIGHT (LBS.)	3380	3370
MDB TEST WEIGHT (LBS.)	2990	3000
MDB VELOCITY (MPH)*	33.5	33.5
IMPACT POINT (INCHES)**	38.5	37

DUMMIES

	<u>DRIVER</u>	<u>MIDDLE PASSENGER</u>	<u>RT. FRONT PASSENGER</u>	<u>LEFT REAR PASSENGER</u>	<u>RT. REAR PASSENGER</u>
TYPE:	SID			SID	
SERIAL NO.:	06			U02	
INSTRUMENTATION:					
HEAD ACCEL.:	Yes			Yes	
CHEST ACCEL.:	Yes (Upper/Lower)			Yes (Upper/Lower)	
FEMUR L.C.'S:	No			No	
OTHER:	Pelvis/Ribs			Pelvis/Ribs	
RESTRAINT SYSTEM:	Both dummies were unrestrained				

* 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>Side Window, Window Sill</u>	<u>C-Pillar</u>
Chest	<u>Driver's Door Panel</u>	<u>Left Rear Side Wall</u>
Abdomen	<u>Driver's Door Panel</u>	<u>Left Rear Side Wall</u>
Left Knee	<u>Driver's Door Panel</u>	<u>Left Rear Side Wall</u>
Right Knee	<u>Left Knee</u>	<u>Left Knee</u>

DOOR OPENING:

	LEFT	RIGHT
Front	<u>Tools Required</u>	<u>Easy</u>
Rear	<u>DNA</u>	<u>DNA</u>

SEAT MOVEMENT:

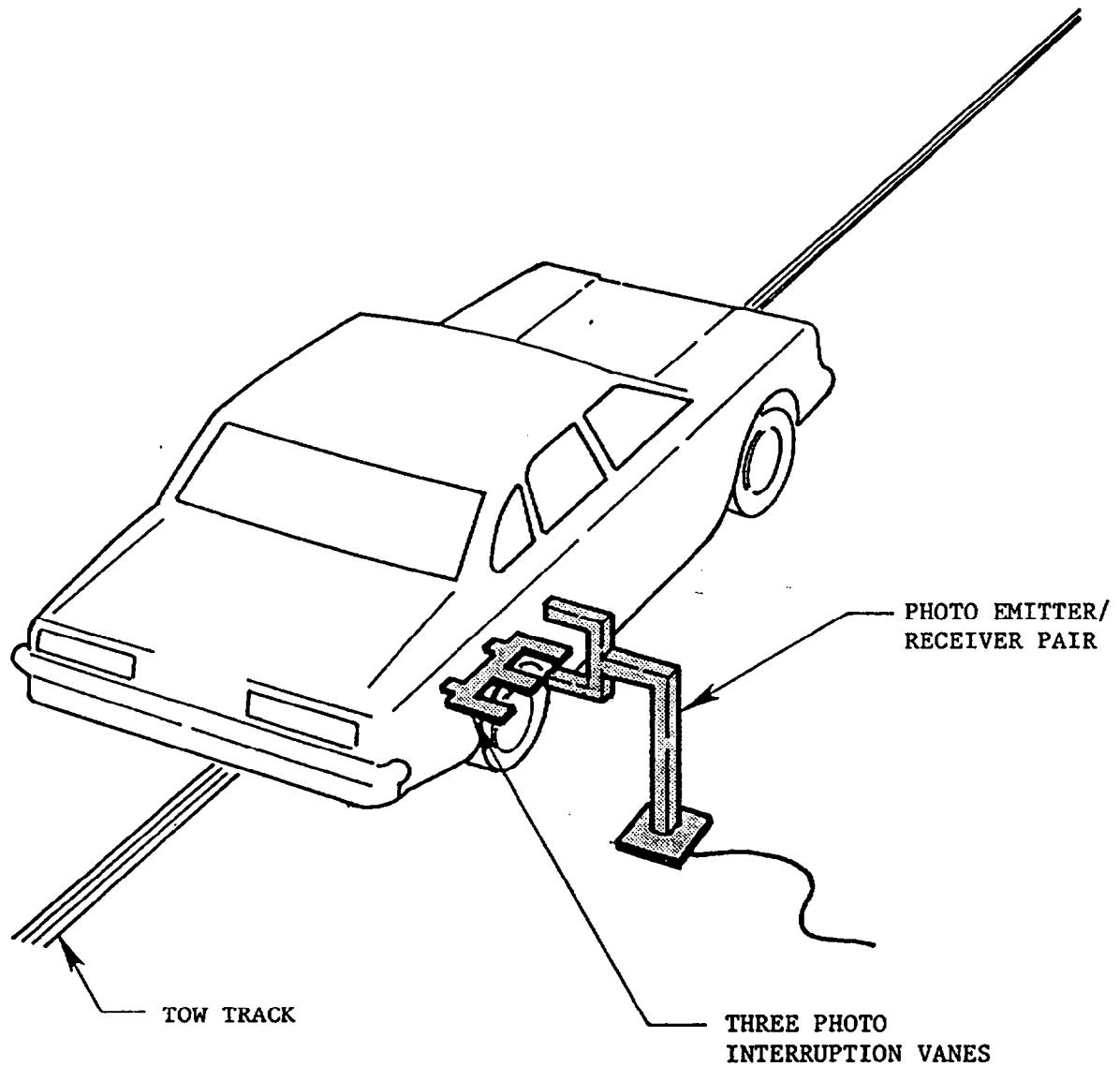
	SEAT BACK FAILURE	SEAT SHIFT
Front	<u>No</u>	<u>Yes</u>
Rear	<u>No</u>	<u>No</u>

GLAZING DAMAGE: Left side of windshield cracked, all left side windows
shattered, no backlight damage.

OTHER NOTABLE IMPACT EFFECTS:

Front bench seat buckled upward at vehicle centerline,
approximately 14 inches of intrusion at B-Pillar.

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane is located two inches before impact.

The vanes have one foot spacing.

VEHICLE TEST WEIGHT CALCULATION

Test Weight = Unloaded Delivered Weight +
 Number of Dummies X 174 lbs. +
 Cargo Weight
= 2922 + 2 X 174 + 100 lbs.
= 3370 lbs.

To achieve test weight, the exhaust system was removed and 4 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 Loadmeter.

TEST ANOMALIES

Cable separation occurred in data channel T12ZG1 - Driver Lower Spine Acceleration Z Axis. No peak levels or peak resultants are reported.

SECTION 3.0
DATA REQUIRED BY R&D

The following pages are included in this section:

1. Dummy temperature control and positioning data
2. Dummy kinematic summary
3. Vehicle crush data
4. Dummy and vehicle accelerometer location and data summary
5. High speed camera information
6. Transducer 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 behind steering column.
LOWER TORSO	Midsagittal plane is vertical and centered behind steering column.
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 floorpan 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: Ford Granada

FRONT SEAT TYPE: X BENCH
 BUCKET
 SPLIT BENCH

ADJUSTER TYPE: X MANUAL
 POWER

BUCKET SEAT BACK TYPE: FIXED
 ADJUSTABLE

TECHNICIANS:

1. J. Kokoruda

2. N. Echeverria

3. M. Garrison

POSITIONING DATE: 1/13/84

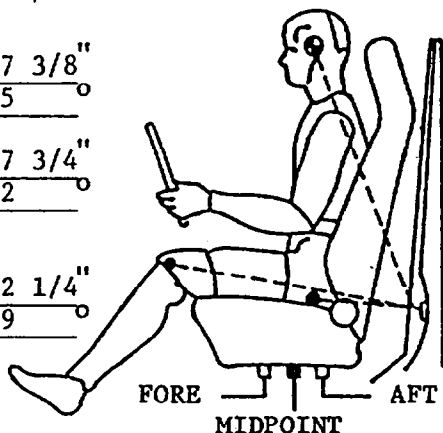
AMBIENT TEMP.: 71° F. TIME: 7:30

DRIVER DUMMY # 06

HEAD 27 3/8"
 TARGET* 35°

KNEE 37 3/4"
 JOINT 92°

APPROX.
 "H" 22 1/4"
 POINT 99°

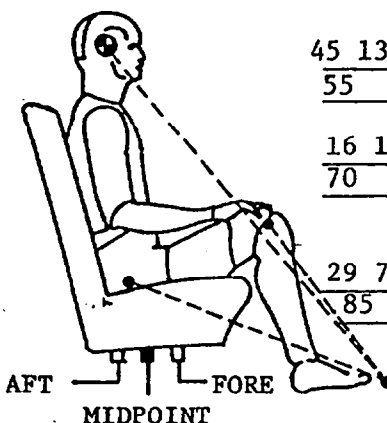


REAR PASSENGER DUMMY # U02

45 13/16" HEAD
55° TARGET**

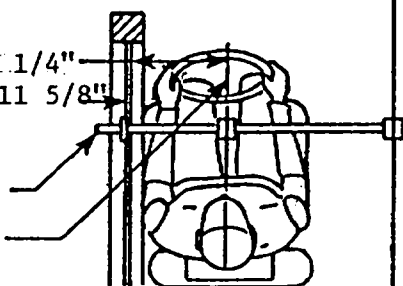
16 1/16" KNEE
70° JOINT

APPROX.
29 7/8" "H"
85° POINT



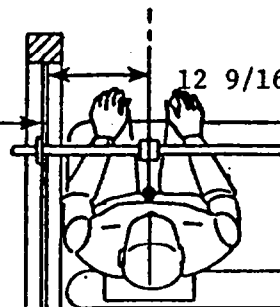
DOOR
 GLASS
 HEIGHT*** 12 1/4"
11 5/8"

LATERAL BAR
 ADJUSTABLE
 POINTER



DRIVER
 DUMMY #
 06

DOOR
 GLASS
 HEIGHT 12 9/16"

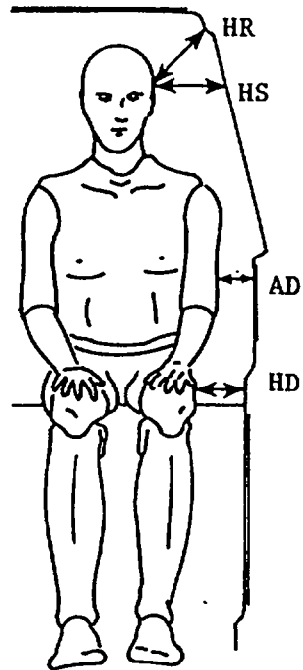


PASSENGER
 DUMMY #
 U02

*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.

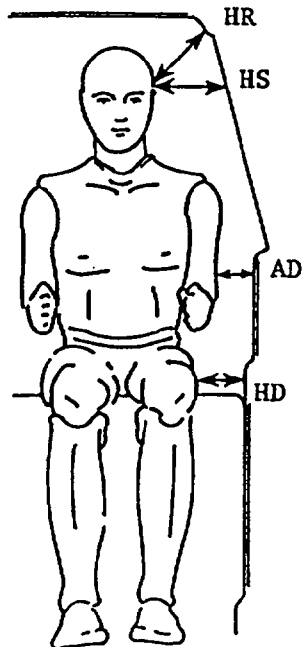
***Door glass height is equal on the right and left side of vehicle at dummy nose level.



DRIVER
06

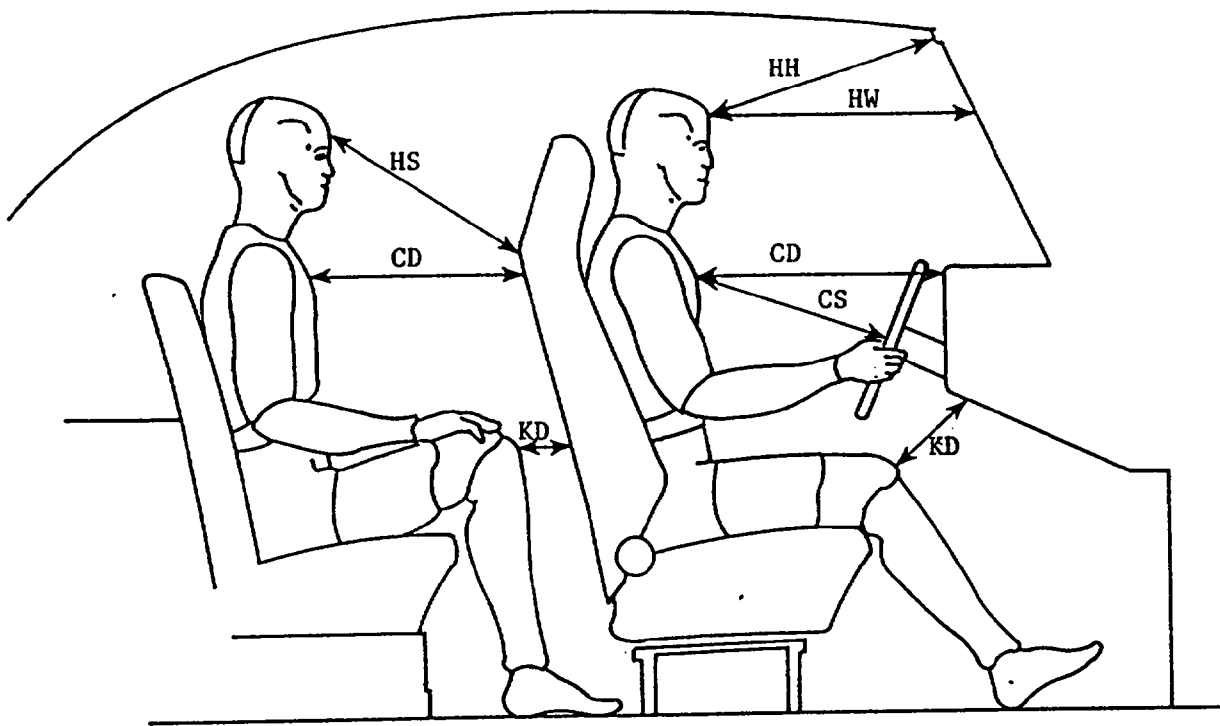
PASSENGER
U02

HR	6 3/8	6 7/8
HS	9 1/4	7 7/8
AD	4 3/4	5 7/8
HD	7 1/4	7



ALL MEASUREMENTS IN INCHES

DUMMY LATERAL CLEARANCE DIMENSIONS



DRIVER
06

PASSENGER
U02

HH	10	DNA
HW	16 1/4	DNA
HS	DNA	22 5/16
CD	18 3/8	19 15/16
CS	11 5/16	DNA
KDL	5 1/4	6 1/8
KDR	4 7/8	7

ALL MEASUREMENTS IN INCHES

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

DUMMY KINEMATIC SUMMARY

DRIVER

During impact, the dummy's torso contacted the driver's door and the head contacted the driver's side window and window sill. The dummy rebounded rearward across the front occupant compartment until it's buttocks and back struck the right front passenger's door. The dummy came to rest sitting upright in the right front seat and facing the driver's side and leaning against the right front door.

PASSENGER

During impact, the dummy's torso contacted the left rear side wall and the head contacted the left C-pillar. The dummy rebounded from the side wall and fell partially across the rear seat. Because the feet were trapped beneath the driver's seat and the rear seat had buckled upward at the vehicle centerline, the dummy came to rest laying partially across the rear seat with it's head at approximately the height of the top of the seat back.

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	10.3	X	X	17.3	17.3	17.3	17.2	17.3	17.3	17.3	17.3	17.6	17.5	17.6	17.7	X
H-Point	20.3	X	14.0	14.1	13.9	13.8	13.7	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	12.9
Mid Door***	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Window Sill	34.4	16.7	16.6	16.6	16.4	16.4	16.4	16.4	16.3	16.3	16.3	16.2	16.2	15.9	15.9	15.6
Window Top	52.1	X	X	X	X	X	X	24.1	23.6	23.6	23.6	23.5	23.4	23.3	23.4	23.6

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

Axle Height	10.3	X	X	28.3	32.0	31.3	30.4	29.8	28.8	28.9	27.0	26.3	25.0	23.6	23.3	X
H-Point	20.3	X	25.6	28.2	28.3	28.9	29.2	29.6	30.3	30.6	31.1	31.6	32.0	31.5	26.3	21.3
Mid Door***	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Window Sill	34.4	20.4	20.8	21.6	24.1	25.3	26.8	26.9	27.3	27.8	28.5	29.4	31.5	29.4	25.0	21.1
Window Top	52.1	X	X	X	X	X	X	29.3	28.8	28.4	28.3	28.1	27.8	27.6	27.3	27.1

STATIC CRUSH (IN)

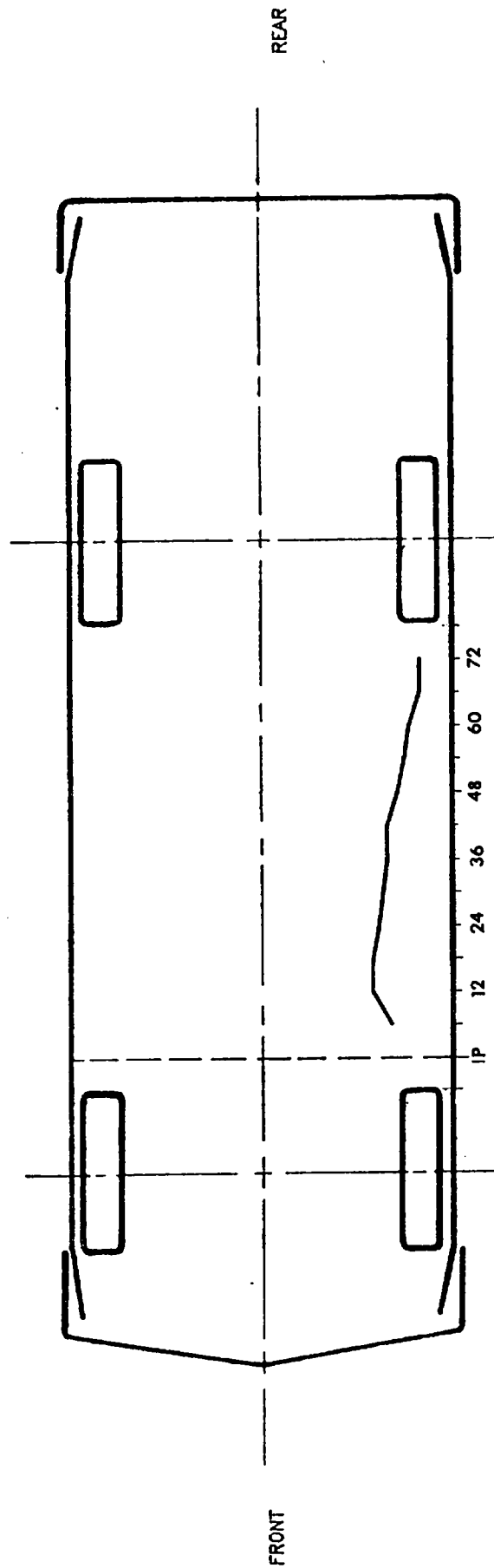
Axle Height	10.3	X	X	11.0	14.7	14.0	13.2	12.5	11.5	11.6	9.7	8.7	7.5	6.0	5.6	X
H-Point	20.3	X	11.6	14.1	14.4	15.1	15.5	16.0	16.7	17.0	17.5	18.0	18.4	17.9	12.7	8.4
Mid Door***	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Window Sill	34.4	3.7	4.2	5.0	7.7	8.9	10.4	10.5	11.0	11.5	12.2	13.2	15.3	13.5	9.1	5.5
Window Top	52.1	X	X	X	X	X	X	5.2	5.2	4.8	4.7	4.6	4.4	4.3	3.9	3.5

* 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.

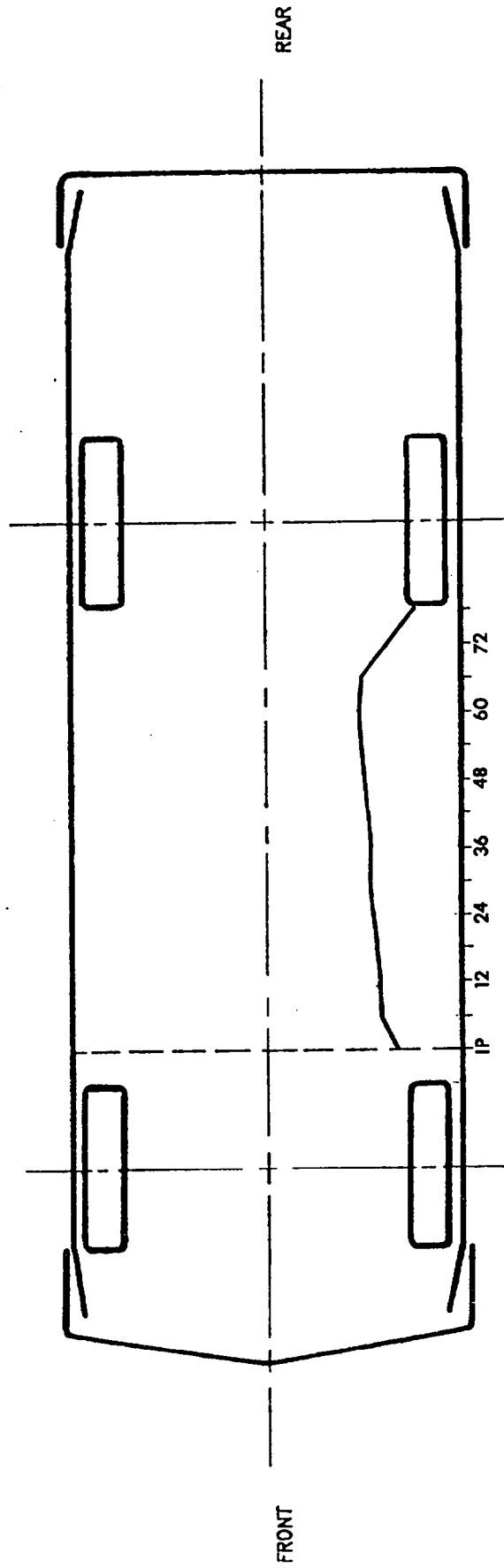
*** The Mid Door and H-Point heights are within two inches; only H-Point crush is reported.

VEHICLE EXTERIOR STATIC CRUSH PROFILE



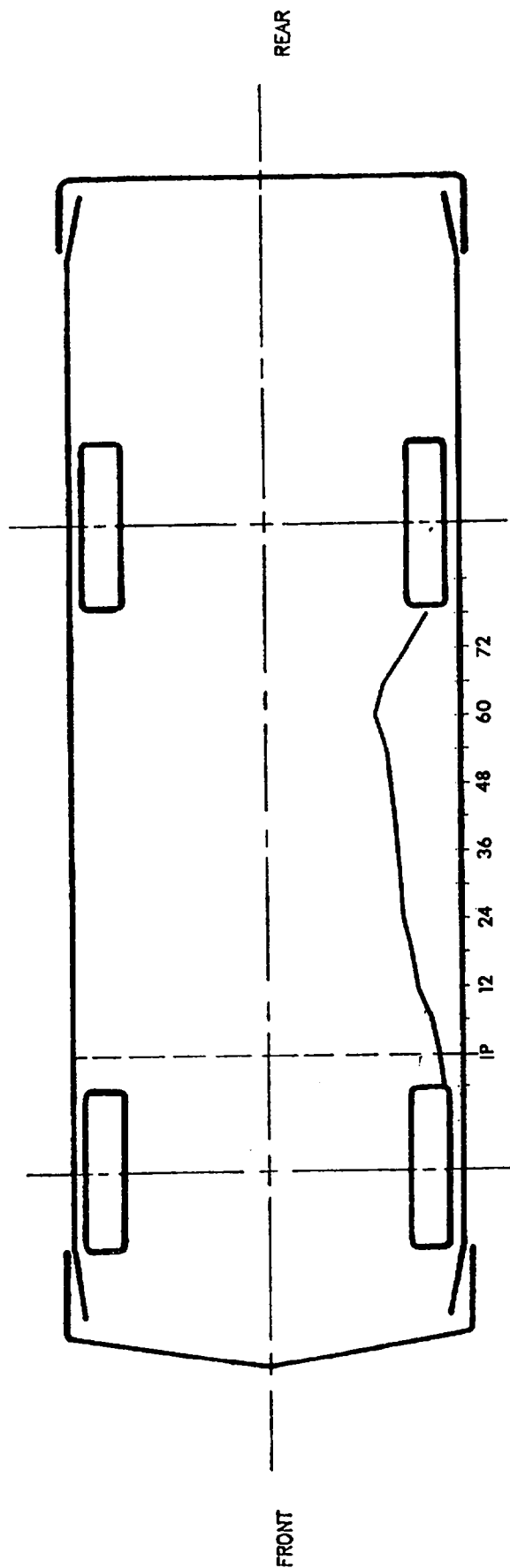
PROFILE LEVEL EQUALS AXLE HEIGHT
IP EQUALS PROJECTED IMPACT POINT

VEHICLE EXTERIOR STATIC CRUSH PROFILE



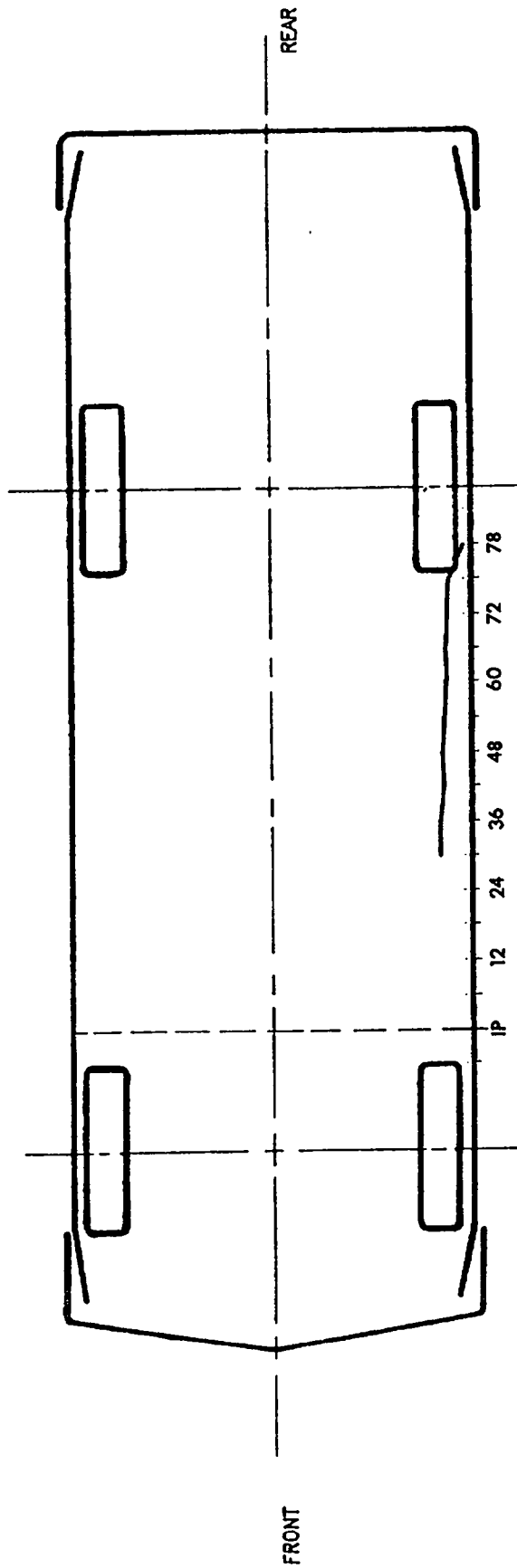
PROFILE LEVEL EQUALS H-POINT HEIGHT
IP EQUALS PROJECTED IMPACT POINT

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW SILL HEIGHT
 IP EQUALS PROJECTED IMPACT POINT

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW TOP HEIGHT
 IP EQUALS PROJECTED IMPACT POINT

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	7.82	65.13	39.48	105.13	10.03	51.13	17.58	82.50
LATERAL	38.25	53.50	18.07	40.25	125.15	65.50	13.25	45.38
VERTICAL	15.53	51.88	53.28	73.50	31.30	72.50	22.09	66.88
RESULTANT		53.50 @ 73.50				125.72 @ 65.50		
HIC	368.14	from 41.00 to 110.13			656.76	from 62.50 to 68.75		
CHEST ACCELERATION								
UPPER SPINE								
LONGITUDINAL	23.48	56.25	23.50	43.13	4.66	45.62	12.78	77.50
LATERAL (P)***	88.03	45.00	45.96	70.63	26.73	63.13	13.35	43.13
LATERAL (R)***	90.20	45.00	44.25	70.63	27.98	63.13	13.47	43.13
VERTICAL	11.60	34.38	11.06	44.38	10.52	38.13	17.03	57.50
RESULTANT (P)		90.45 @ 44.38				28.18 @ 63.13		
RESULTANT (R)		92.59 @ 44.38				29.37 @ 63.13		
DELTA V (MPH)****		24.4 @ 66.87 (P)				18.3 @ 141.88 (P)		
		25.6 @ 66.87 (R)				19.9 @ 142.50 (R)		
LOWER SPINE								
LONGITUDINAL	41.50	51.88	27.06	41.25	8.05	65.63	10.92	45.62
LATERAL (P)	115.28	40.00	16.44	68.75	42.44	43.75	13.38	76.25
LATERAL (R)	116.18	40.00	19.87	69.38	42.98	44.38	13.58	76.88
VERTICAL	---	--- Y	---	--- Y	10.43	38.13	9.33	83.12
RESULTANT (P)		--- @ --- Y				43.57 @ 44.38		
RESULTANT (R)		--- @ --- Y				44.10 @ 44.38		
DELTA V (MPH)		29.4 @ 57.50 (P)				17.8 @ 68.75 (P)		
		29.9 @ 58.13 (R)				17.9 @ 69.38 (R)		
LEFT UPPER RIB								
LATERAL (P)	72.11	40.00	24.81	83.75	36.39	58.13	2.47	168.75
LATERAL (R)	78.88	39.38	23.60	83.75	37.61	58.75	2.15	166.87
DELTA V (MPH)		24.1 @ 79.38 (P)				22.4 @ 158.13 (P)		
		24.0 @ 79.38 (R)				22.7 @ 159.38 (R)		
LEFT LOWER RIB								
LATERAL (P)	89.94	39.38	8.08	66.87	45.07	48.13	5.73	74.37
LATERAL (R)	97.18	39.38	7.73	178.75	47.87	48.75	7.15	74.37
DELTA V (MPH)		25.0 @ 86.88 (P)				21.2 @ 188.75 (P)		
		25.6 @ 87.50 (R)				23.0 @ 185.00 (R)		
PELVIS ACCELERATION								
LONGITUDINAL	10.65	44.88	65.61	71.88	13.22	70.38	82.27	38.88
LATERAL	194.01	34.63	25.69	46.25	123.29	40.00	19.93	65.63
VERTICAL	19.15	45.00	3.32	94.25	23.18	44.25	9.39	40.25
RESULTANT		195.42 @ 34.63				130.64 @ 39.63		
DELTA V (MPH)		28.5 @ 44.13				23.4 @ 53.25		

SIDE IMPACT DUMMY DATA SUMMARY CONTD

	DRIVER DUMMY				PASSENGER DUMMY			
	POSITIVE		NEGATIVE		POSITIVE		NEGATIVE	
	DIRECTION*		DIRECTION**		DIRECTION*		DIRECTION**	
	MAX	TIME	MAX	TIME	MAX	TIME	MAX	TIME
	(in)	(msec)	(in)	(msec)	(in)	(msec)	(in)	(msec)
RIB DEFLECTION †	0.07	179.25	1.72	119.00	0.05	37.88	0.99	78.63

* 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: Negative

† SEE TEST ANOMALIES

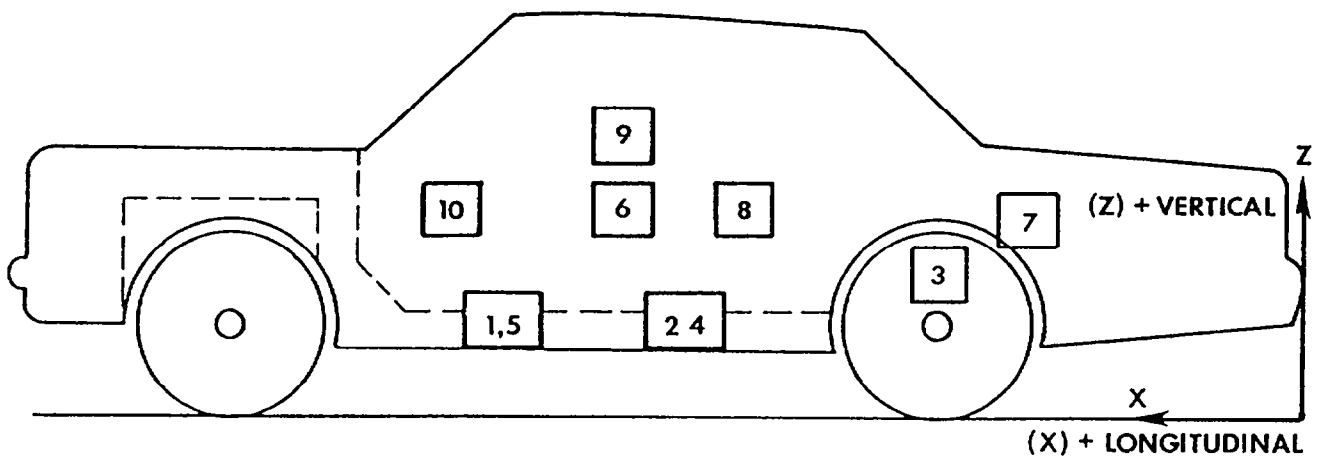
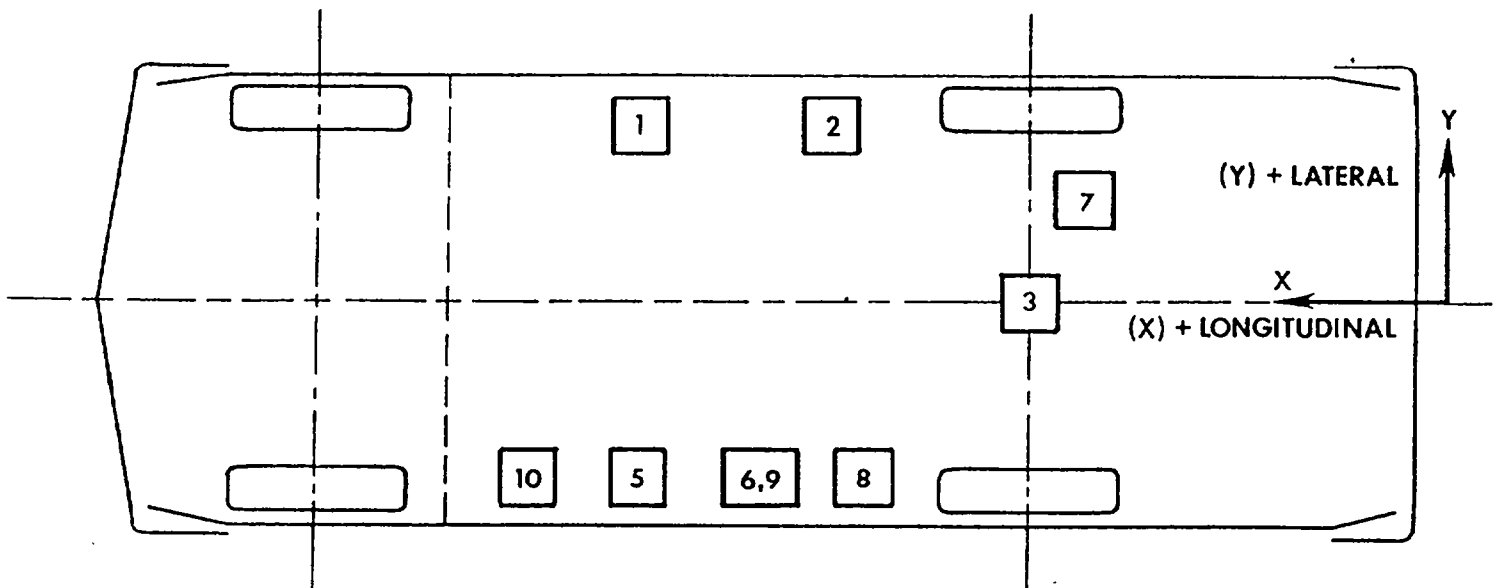
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	RIGHT SILL AT FRONT SEAT	117.0	25.9	11.4				
	(LONGITUDINAL)	$\Delta V = -0.1 \text{ mph @ } 140.00 \text{ msec}$			16.19	43.88	4.36	27.75
	(LATERAL)	$\Delta V = 14.7 \text{ mph @ } 140.00 \text{ msec}$			23.96	34.13	5.09	45.75
	(VERTICAL)				7.94	69.88	9.04	40.25
	(RESULTANT)					24.34 @ 34.25		
2	RIGHT SILL AT REAR SEAT	82.9	25.8	11.4				
	(LONGITUDINAL)	$\Delta V = 0.7 \text{ mph @ } 140.00 \text{ msec}$			25.47	67.25	4.83	27.50
	(LATERAL)	$\Delta V = 20.2 \text{ mph @ } 140.00 \text{ msec}$			18.19	15.25	10.79	66.38
	(VERTICAL)				10.63	26.00	5.80	51.50
	(RESULTANT)					28.05 @ 67.00		
3	REAR DECK OVER AXLE	48.9	-0.0	22.4				
	(LONGITUDINAL)	$\Delta V = -2.4 \text{ mph @ } 140.00 \text{ msec}$			3.15	32.50	4.20	89.88
	(LATERAL)	$\Delta V = 19.6 \text{ mph @ } 140.00 \text{ msec}$			12.92	38.75	1.84	318.63
	(VERTICAL)				8.45	32.75	12.34	44.25
	(RESULTANT)					17.68 @ 44.50		
4	LEFT SILL AT REAR SEAT	83.0	-26.2	11.3				
	(LATERAL)	$\Delta V = 5.5 \text{ mph @ } 26.75 \text{ msec}$			52.94	27.38	73.07	46.50
5	LEFT SILL AT FRONT SEAT	116.9	-26.1	11.3				
	(LATERAL)	$\Delta V = 16.3 \text{ mph @ } 43.63 \text{ msec}$			60.70	25.38	24.70	13.25
6	LEFT FRONT DOOR CENTERLINE	106.6	-28.2	20.7				
	(LATERAL)	$\Delta V = 21.2 \text{ mph @ } 15.25 \text{ msec}$			161.66	15.38	81.98	34.25
7	RIGHT REAR COMPARTMENT	34.48	20.8	22.4				
	(LONGITUDINAL)				2.49	47.88	4.35	11.75
8	MIDREAR OF LEFT FRONT DOOR	98.2	-28.3	23.5				
	(LATERAL)	$\Delta V = 23.6 \text{ mph @ } 22.38 \text{ msec}$			118.34	15.13	39.55	36.88
9	UPPER LEFT FRONT DOOR CENTERLINE	106.6	-28.3	29.3				
	(LATERAL)	$\Delta V = 28.0 \text{ mph @ } 26.38 \text{ msec}$			84.53	22.00	234.11	37.13
10	MIDFRONT OF LEFT FRONT DOOR	115.1	-28.4	24.1				
	(LATERAL)	$\Delta V = 13.6 \text{ mph @ } 14.88 \text{ msec}$			109.41	14.25	149.60	33.50

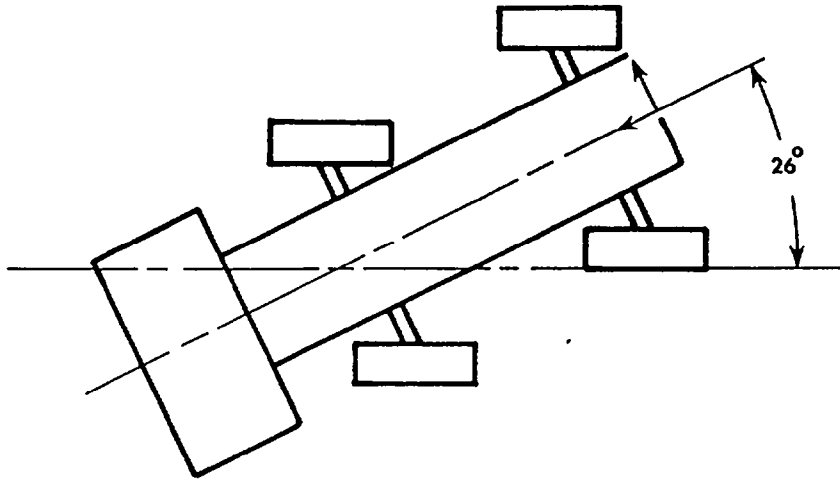
* Reference: X - Rear Bumper (+ Forward), Y - Vehicle Centerline (+ To Right),
Z - Ground Level (+ Up)

All measurements of accelerometer locations in inches.

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)	$\Delta V = -18.2 \text{ mph @ } 140.00 \text{ msec}$			0.64	324.50	14.39	41.13
	(LATERAL)	$\Delta V = -4.8 \text{ mph @ } 140.00 \text{ msec}$			0.77	56.00	7.76	31.88
	(VERTICAL)				17.96	58.00	11.13	49.50
	(RESULTANT)					19.96 @ 58.00		
2	FRONT FRAME MEMBER	130.3	0.0	11.3				
	(LONGITUDINAL)	$\Delta V = -18.8 \text{ mph @ } 140.00 \text{ msec}$			0.41	0.50	14.47	37.00
3	REAR FRAME MEMBER	23.3	0.0	11.5				
	(LONGITUDINAL)	$\Delta V = -17.0 \text{ mph @ } 140.00 \text{ msec}$			1.00	205.63	14.24	40.13

* 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.

HIGH SPEED CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Overhead	Photosonics 1B	8	487	Vehicle Dynamics
2	Overhead	Photosonics 1B	25	502	Close-up of impact point
3	Onboard MDB	Photosonics 1B	25	502	Close-up of impact point
4	Onboard MDB	Stalex	13	500	Driver kinematics
5	Ground level - right	Hyçam	25	520	Overall view
6	Ground level - left	Photosonics 1B	17	512	Overall view
7	Onboard vehicle	Photosonics 1B	8	805	Driver kinematics - front view
8	Onboard vehicle	Photosonics 1B	8	805	Driver kinematics
9	Onboard vehicle	Photosonics 1B	8	805	Passenger kinematics

NOTE: CAMERAS ARE NUMBERED ACCORDING TO SPLICING SEQUENCE OF FILM.
(24 fps) REAL TIME MOVIE FILM COVERAGE OF PRE-CRASH, POST-CRASH
AND CRASH EVENT SPLICED AT START AND END OF FILM.

LOCATIONS OF OFFBOARD HIGH SPEED CAMERAS

CAMERA NO.	X	Y	Z
1	0	0	25'
2	0	0	25'
5	24'10"	58'8"	45"
6	-20'11"	-13'3"	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	MFR.	DATE OF LAST CALIBRATION	SENSITIVITY	DESIRED FULL SCALE (ENGR. UNITS)
BCXG	Accel	4-202-0001	18845	Bell Howell	12/7/83	.237 MV/G	50 G
BCYG	Accel	4-202-0001	18858	Bell Howell	12/7/83	.240 MV/G	50 G
BCZG	Accel	4-202-0001	18857	Bell Howell	12/7/83	.240 MV/G	50 G
BFCXG	Accel	4-202-0001	18240	Bell Howell	12/7/83	.240 MV/G	50 G
BRCXG	Accel	4-202-0001	19022	Bell Howell	12/7/83	.222 MV/G	50 G

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

APPENDIX A
PHOTOGRAPHS

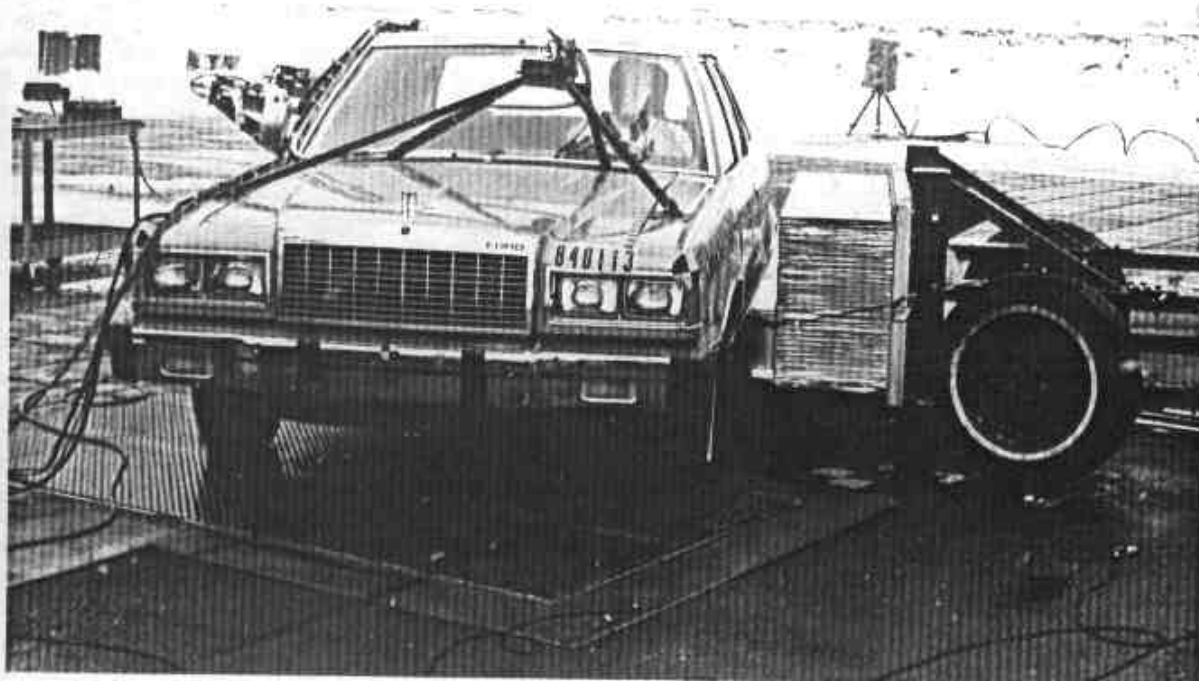


Figure A-1. PRE-TEST OVERALL - VIEW 1



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



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



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



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

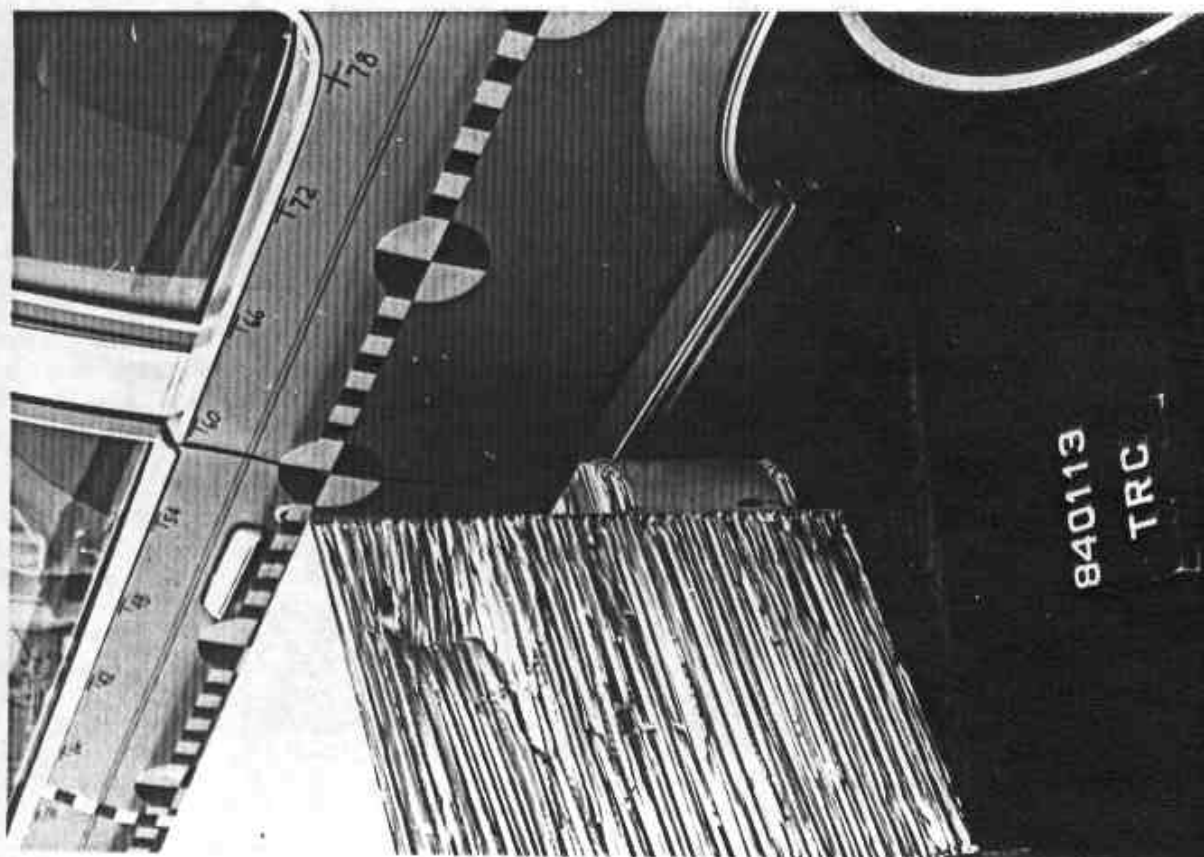


Figure A-6. PRE-TEST CLOSEUP - VIEW 2

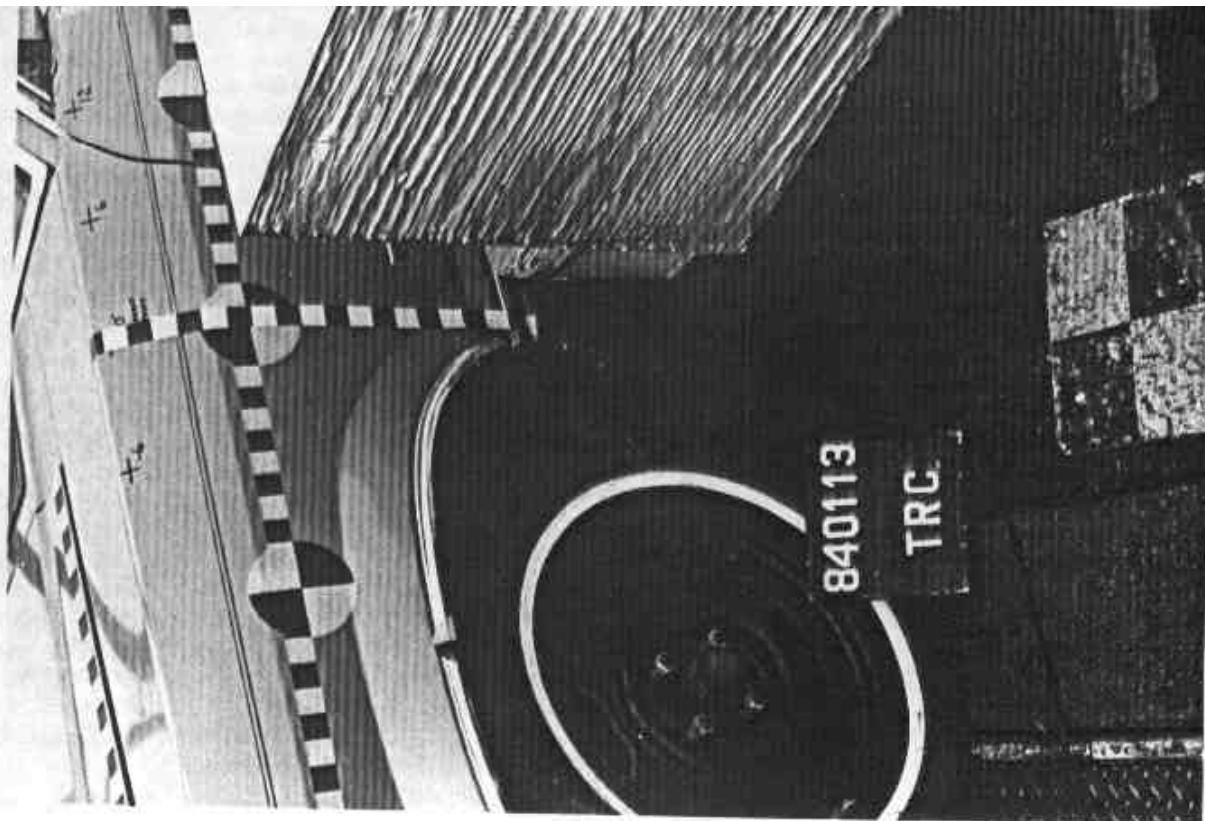


Figure A-7. PRE-TEST CLOSEUP - VIEW 3

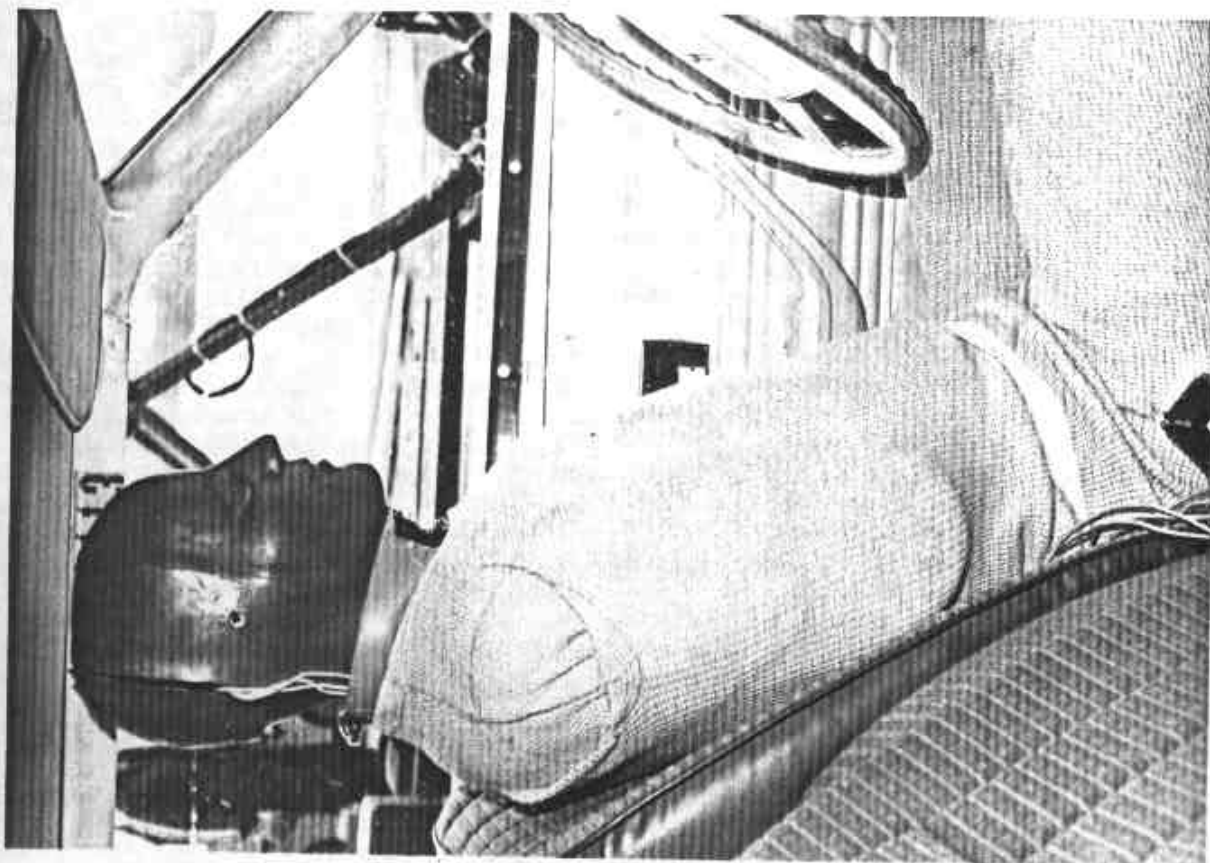


Figure A-8. PRE-TEST DRIVER DUMMY - VIEW 1

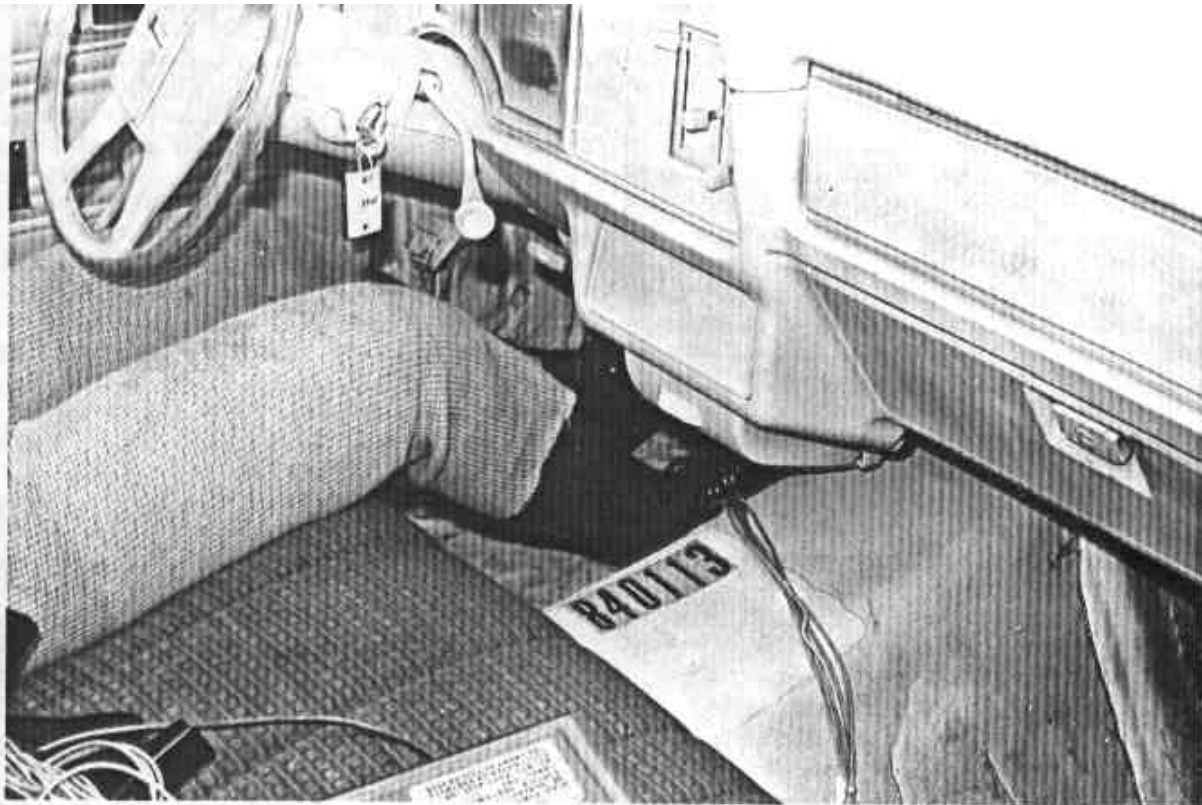


Figure A-9. PRE-TEST DRIVER DUMMY - VIEW 2



Figure A-10. PRE-TEST PASSENGER DUMMY - VIEW 1

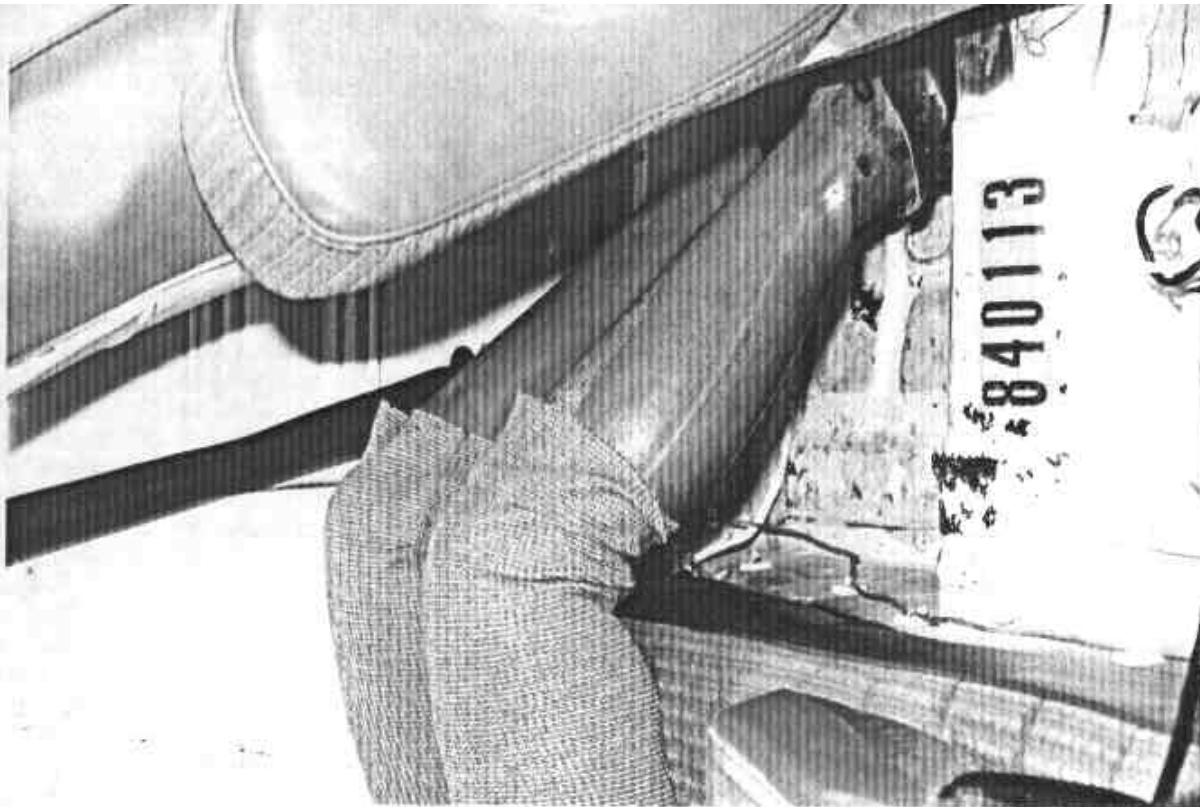


Figure A-11. PRE-TEST PASSENGER DUMMY - VIEW 2



Figure A-12. POST-TEST OVERALL - VIEW 1



Figure A-13. POST-TEST OVERALL - VIEW 2



Figure A-14. POST-TEST OVERALL - VIEW 3

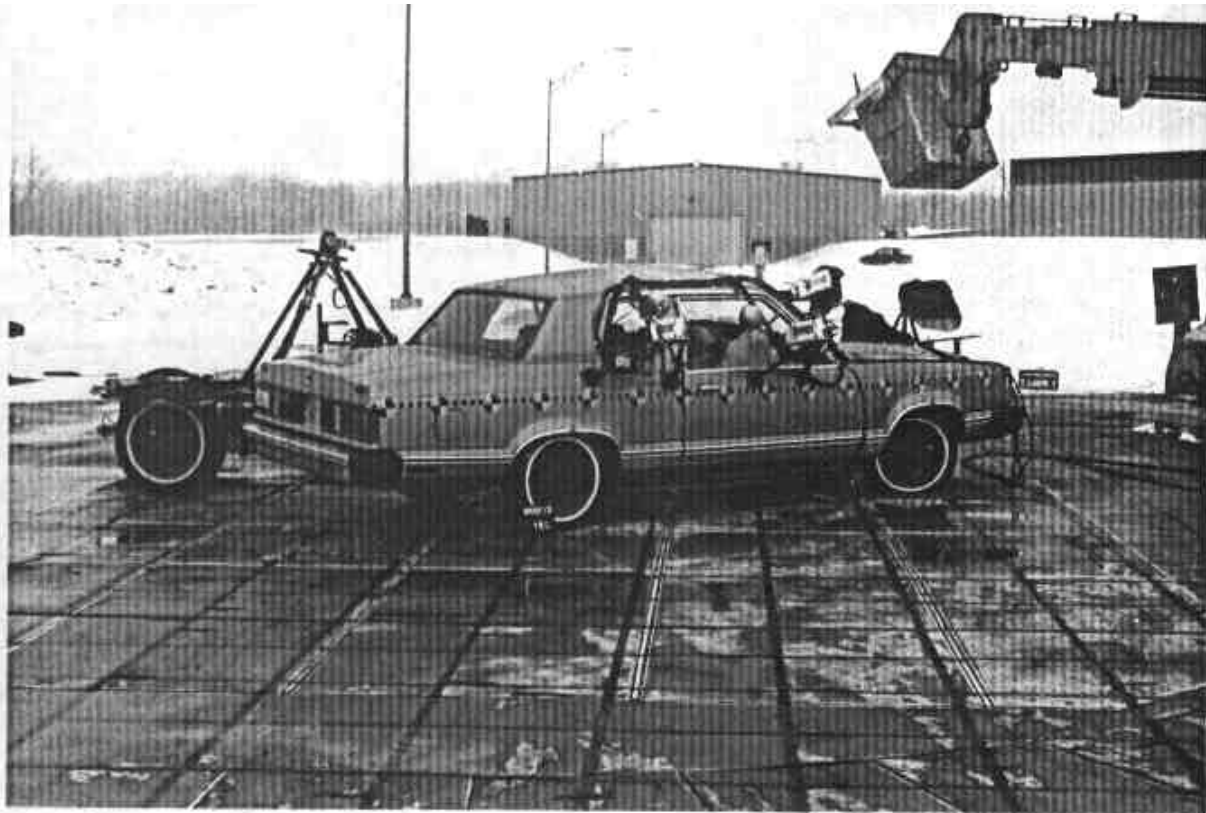


Figure A-15. POST-TEST OVERALL - VIEW 4

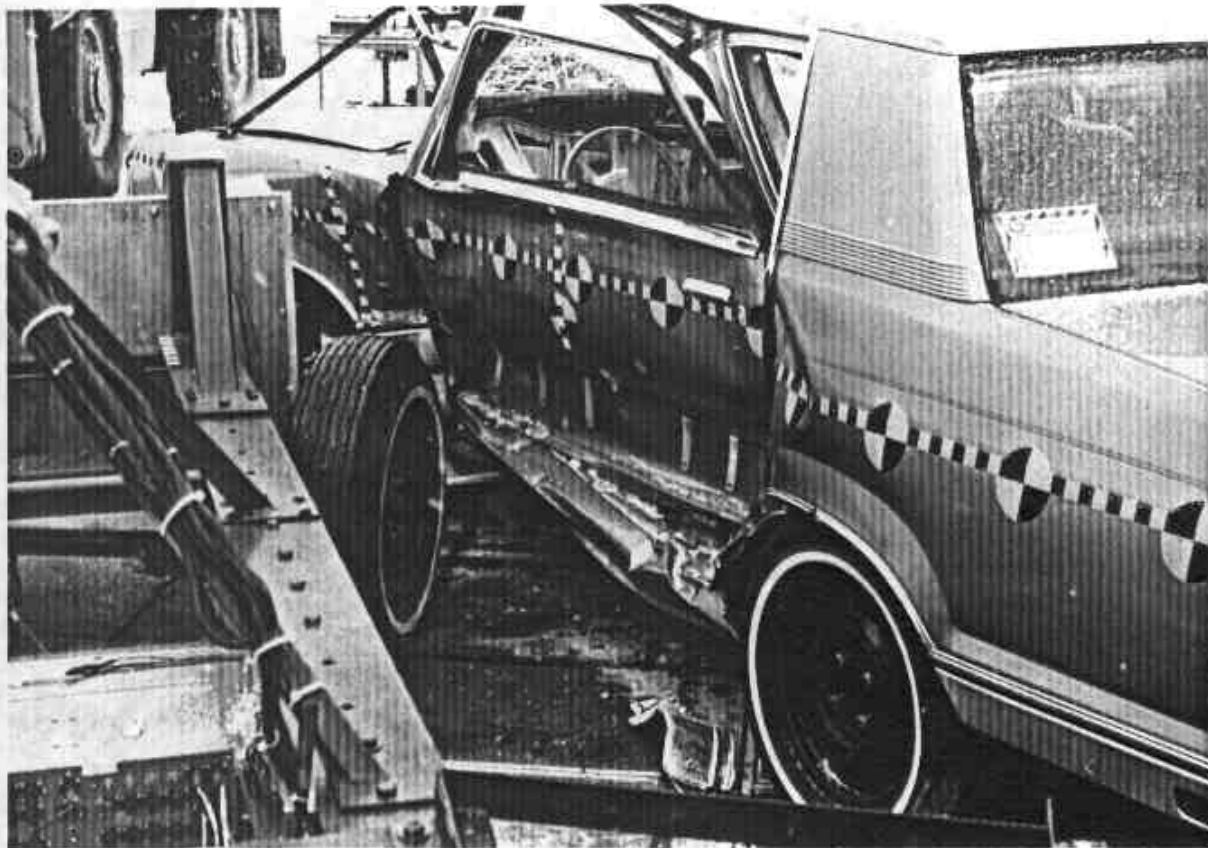


Figure A-16. POST-TEST CLOSEUP - VIEW 1

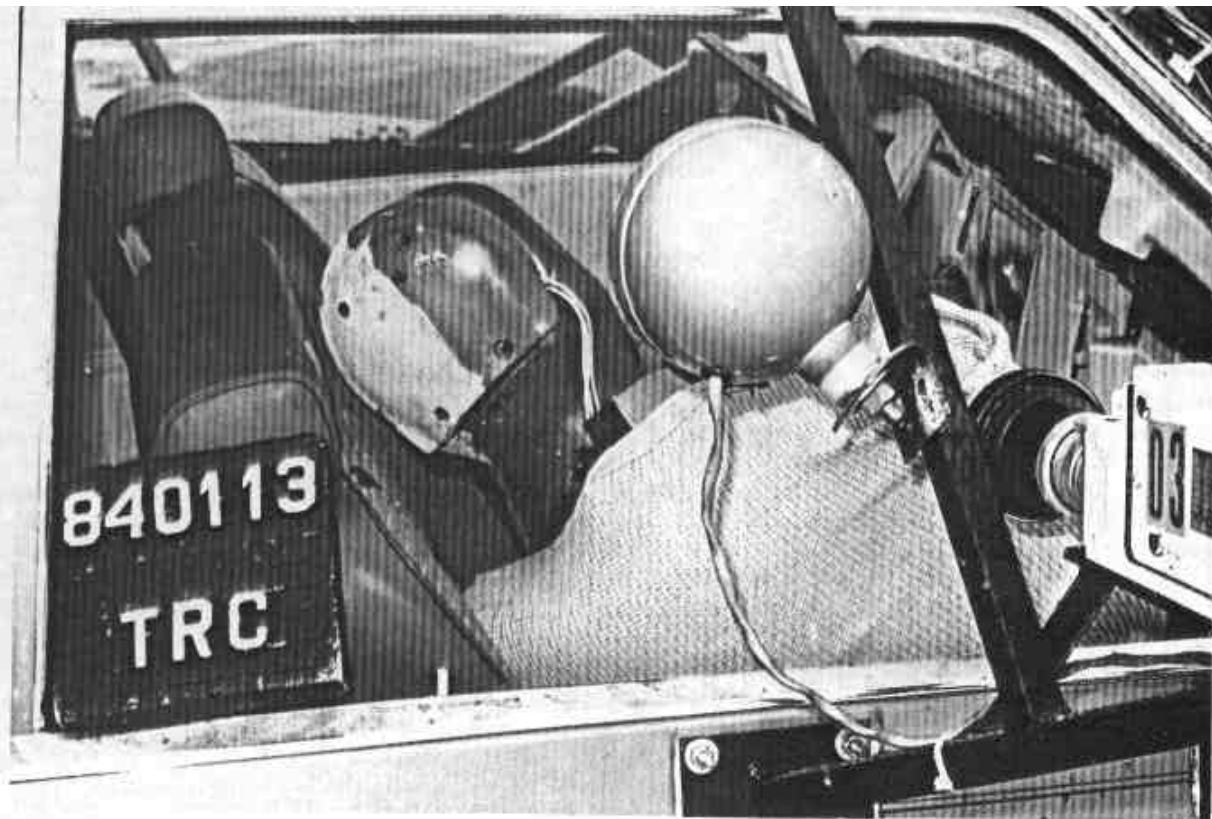


Figure A-17. POST-TEST DRIVER DUMMY - VIEW 1



Figure A-18. POST-TEST DRIVER DUMMY - VIEW 2

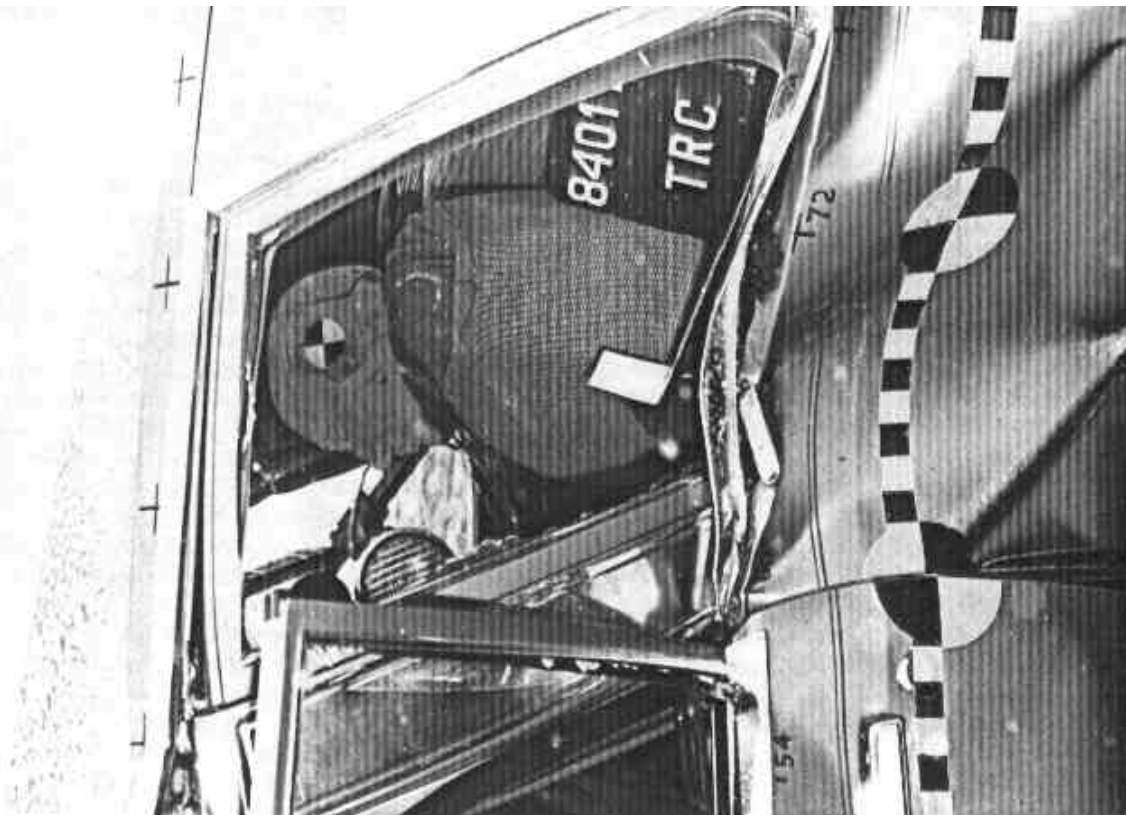


Figure A-19. POST-TEST PASSENGER DUMMY - VIEW 1



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



Figure A-21. POST-TEST VEHICLE DAMAGE - VIEW 1

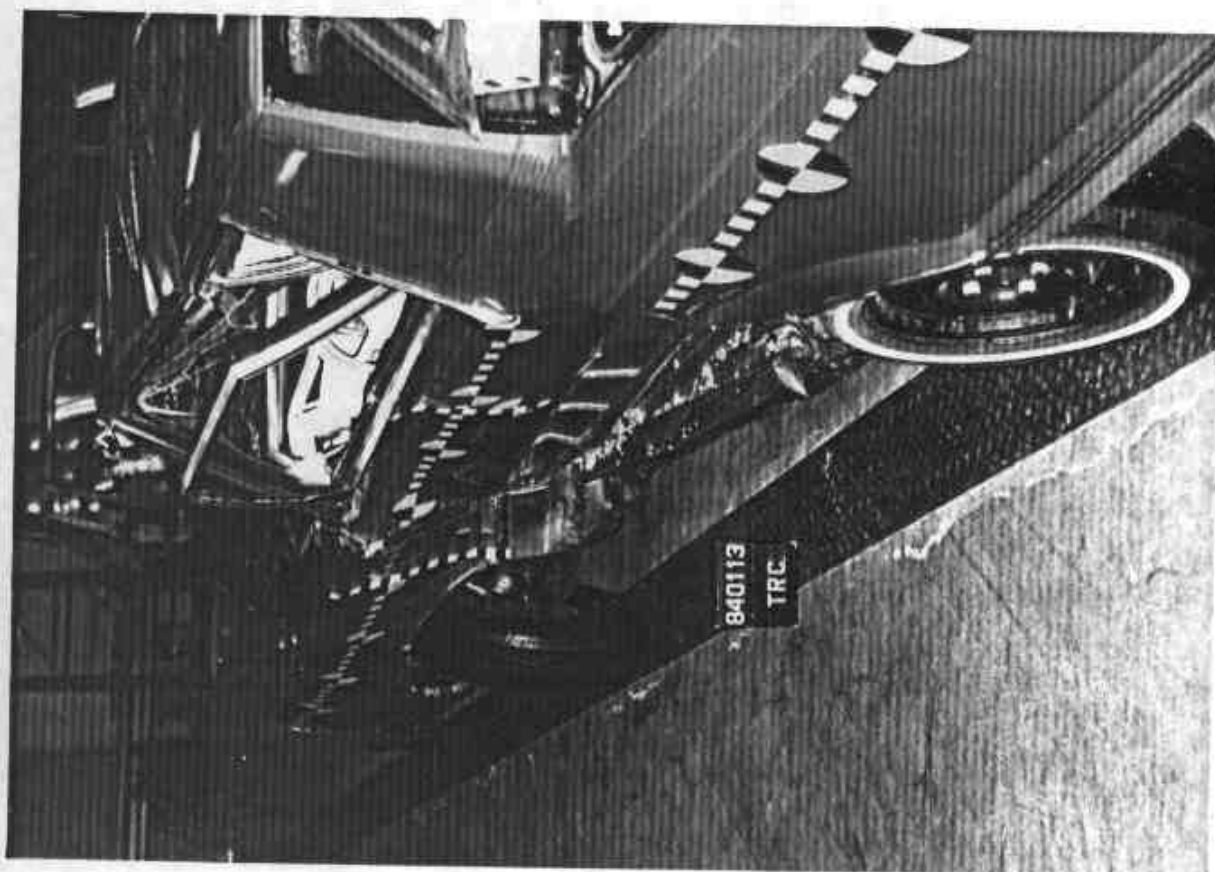


Figure A-22. POST-TEST VEHICLE DAMAGE - VIEW 2

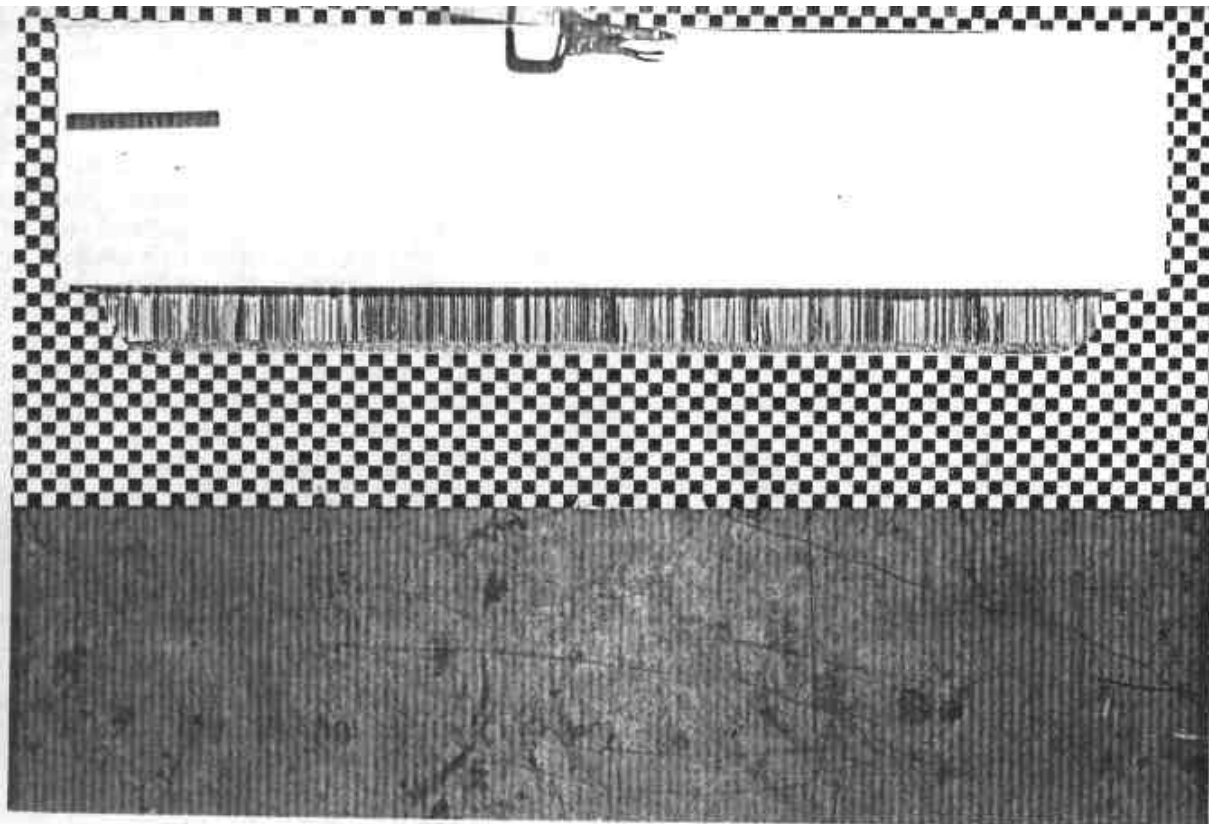


Figure A-23. PRE-TEST MDB FACE - VIEW 1

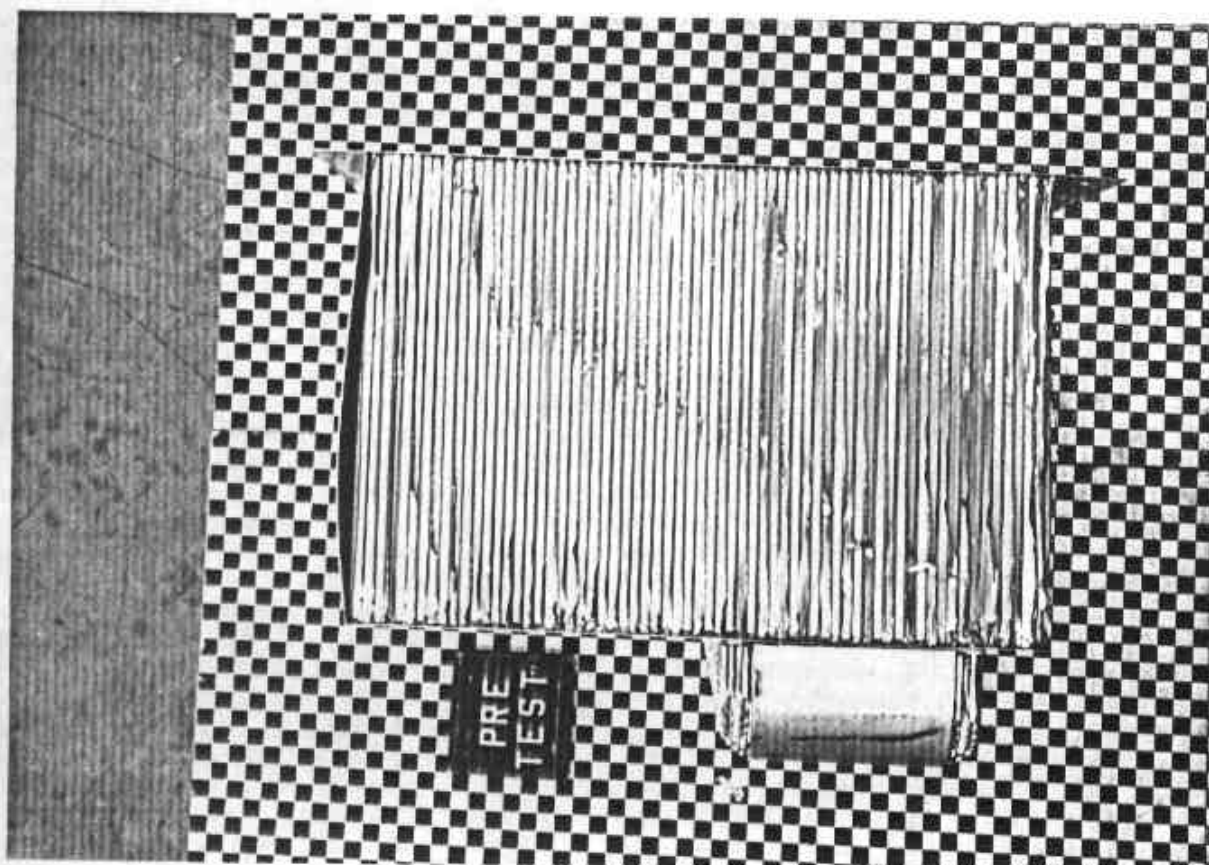


Figure A-24. PRE-TEST MDB FACE - VIEW 2

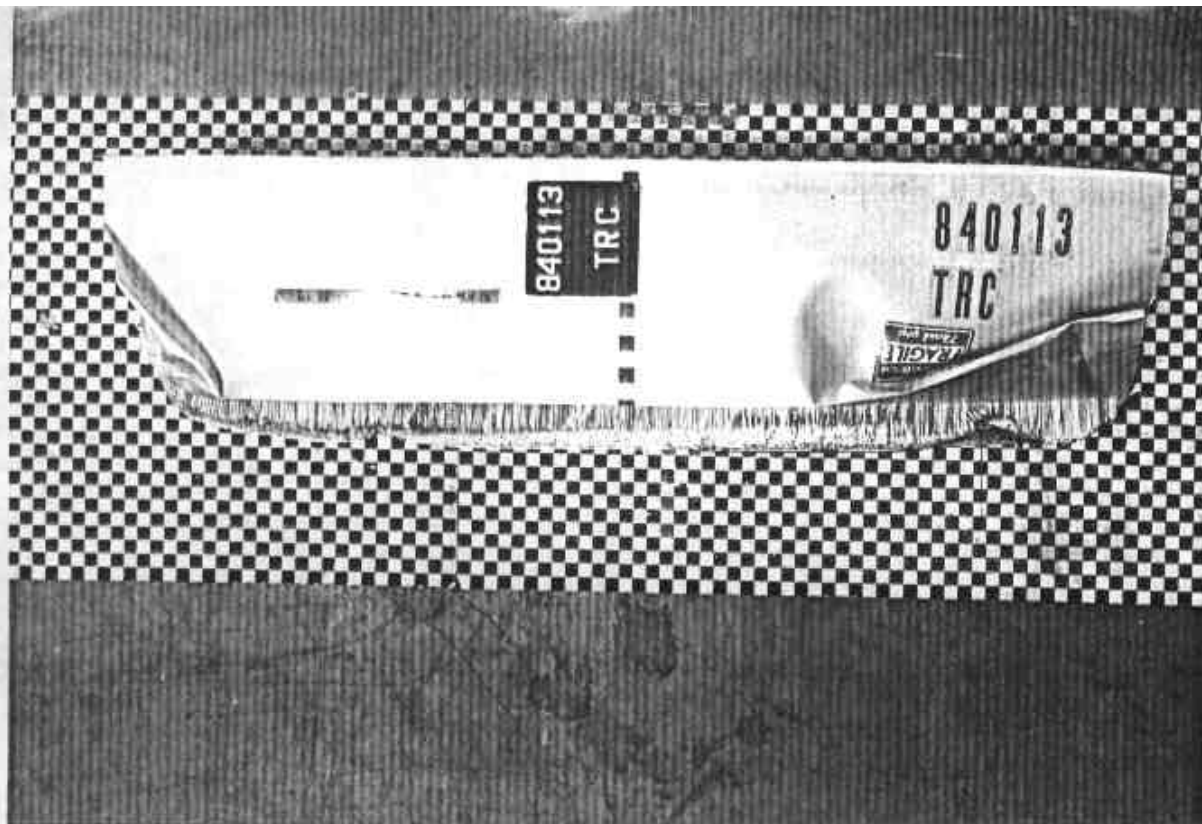


Figure A-25. POST-TEST MDB FACE - VIEW 1

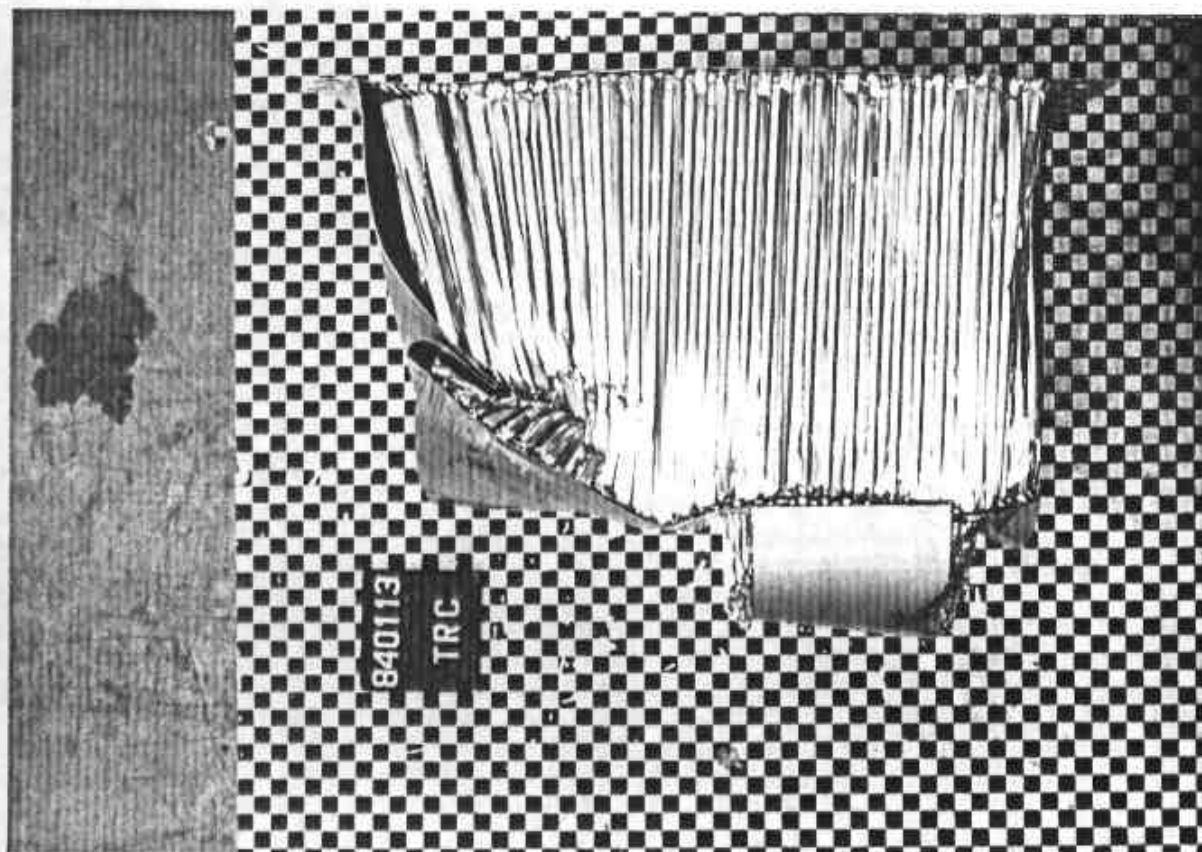
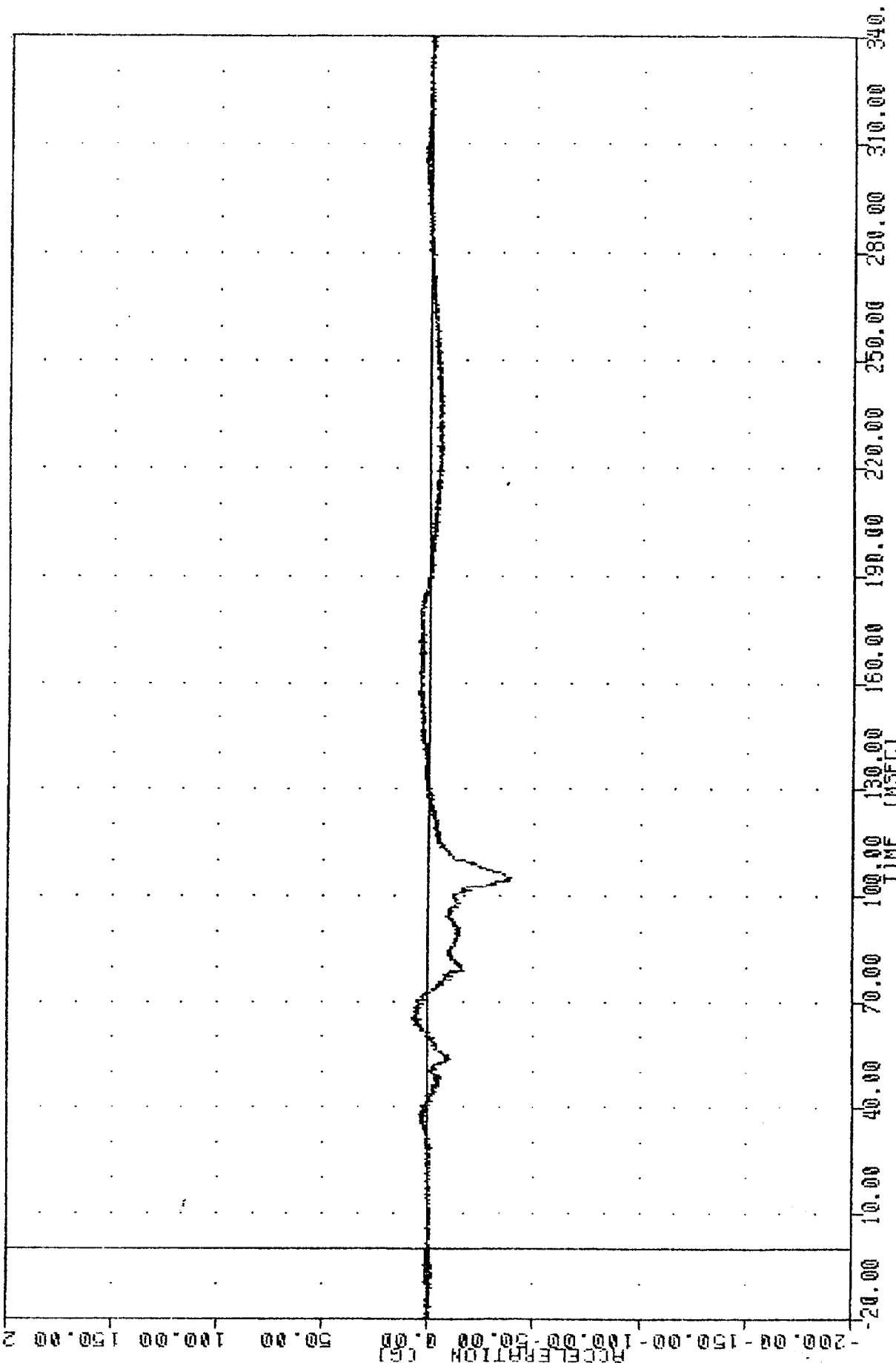


Figure A-26. POST-TEST MDB FACE - VIEW 2

APPENDIX B
DATA PLOT PRESENTATION

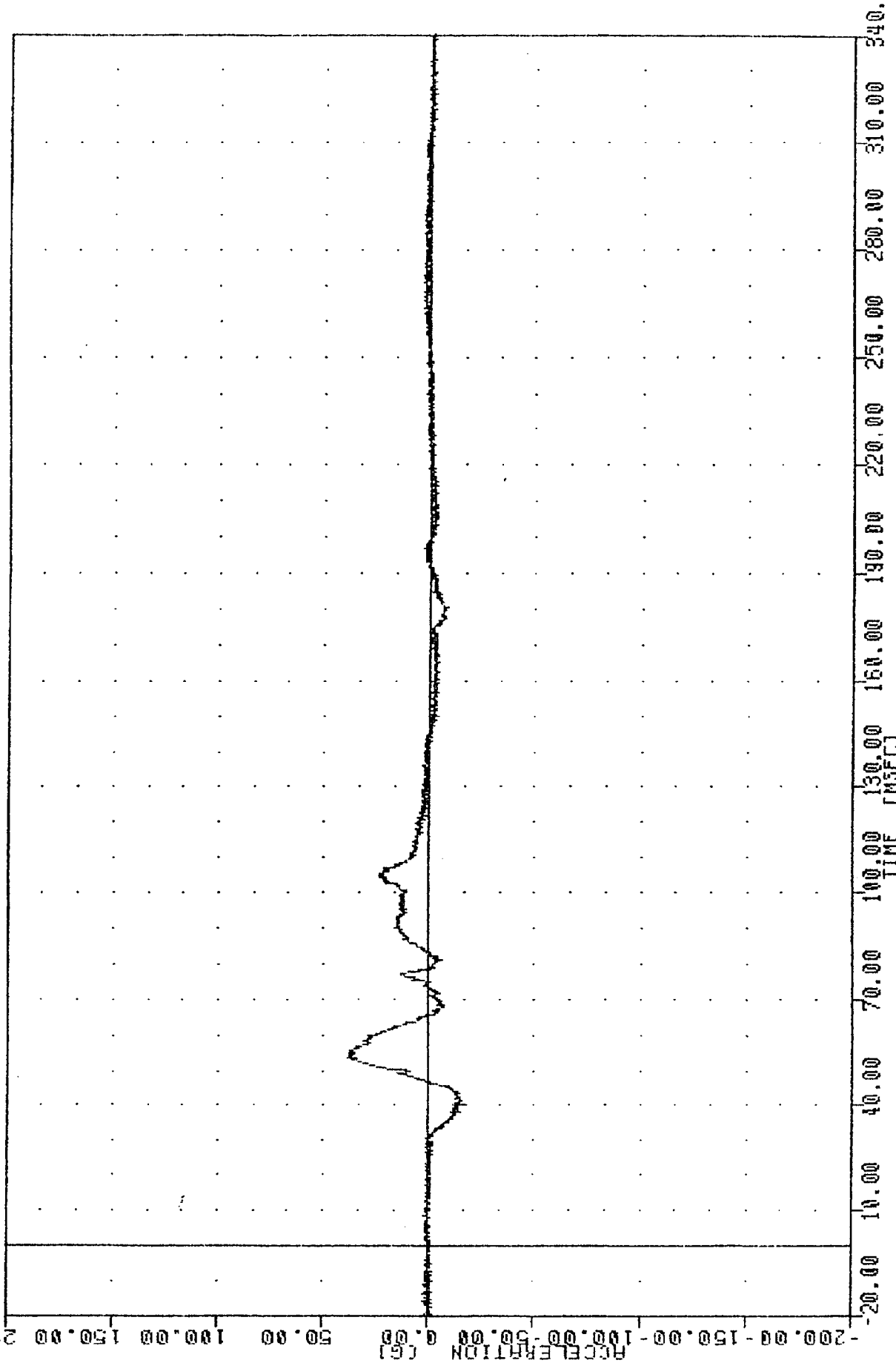
Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211, except that dummy thorax data were filtered using the HSRI filter.

INC 040113
 SIDE PROTECTION - 20R/40R
 84013000000
 HEDXG1
 FILTER = ALPF 1850/ 5217/ -40
 MIN, MAX VALUES = -39.48 105.13 7.82 65.13
 17 JAN 84 09:59:13



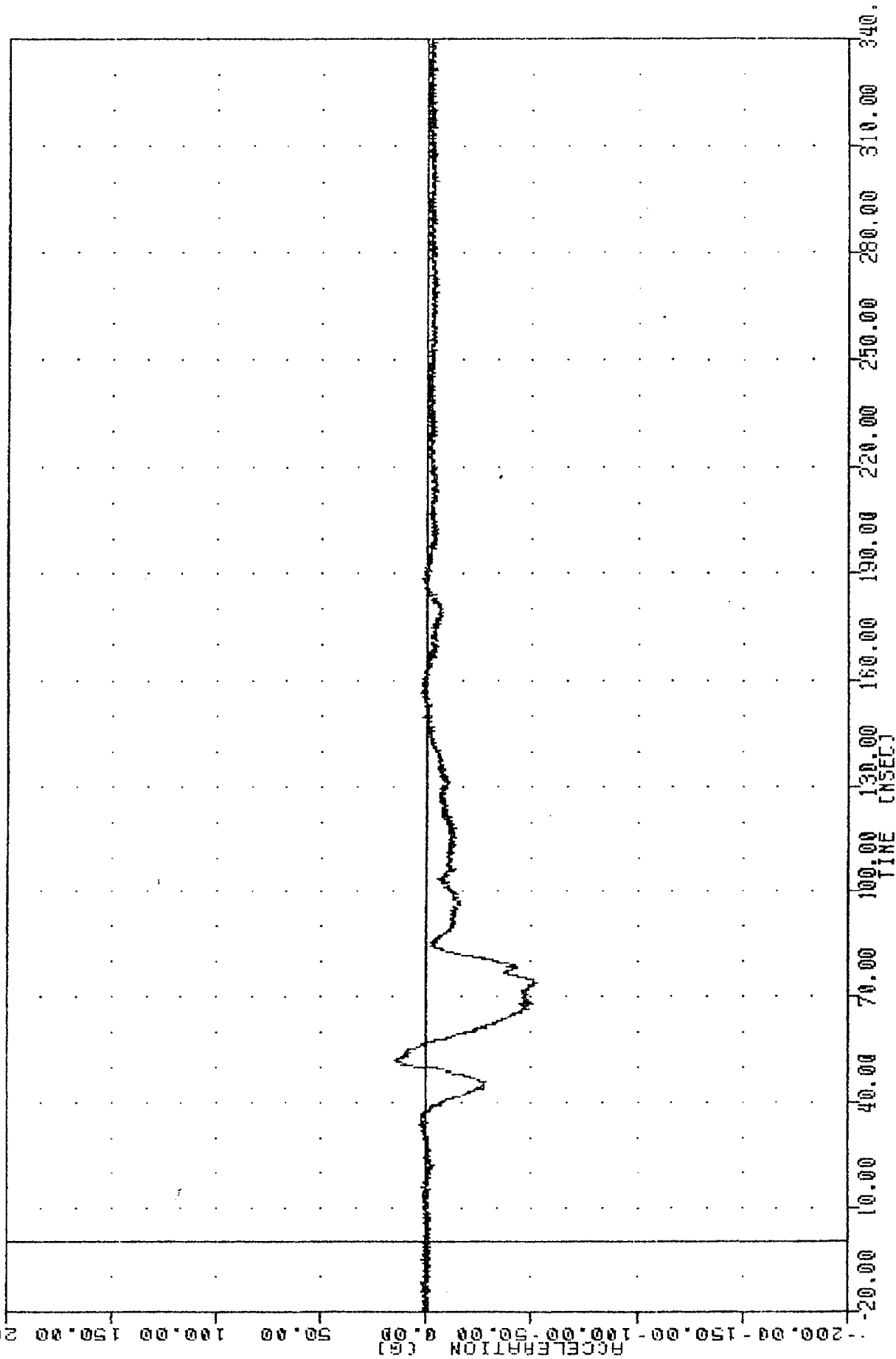
MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER HEAD ACCELERATION X AXIS

TIME 840113 PLOT DATE 17-JAN-84 09:59:13
 SIDE PROTECTION - 20R/4DR
 84013000000
 HEDY61
 FILTER = ALPF 1650/ 5217/ -40
 MIN, MAX VALUES = -18.07g 40.25g 38.25g 53.50



MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER HEAD ACCELERATION Y AXIS

TRC 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 HEDZ61
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES : -53.28g 73.50 , 15.53 g 51.88
 PLOT DATE 17-JAN-84 09:59:13

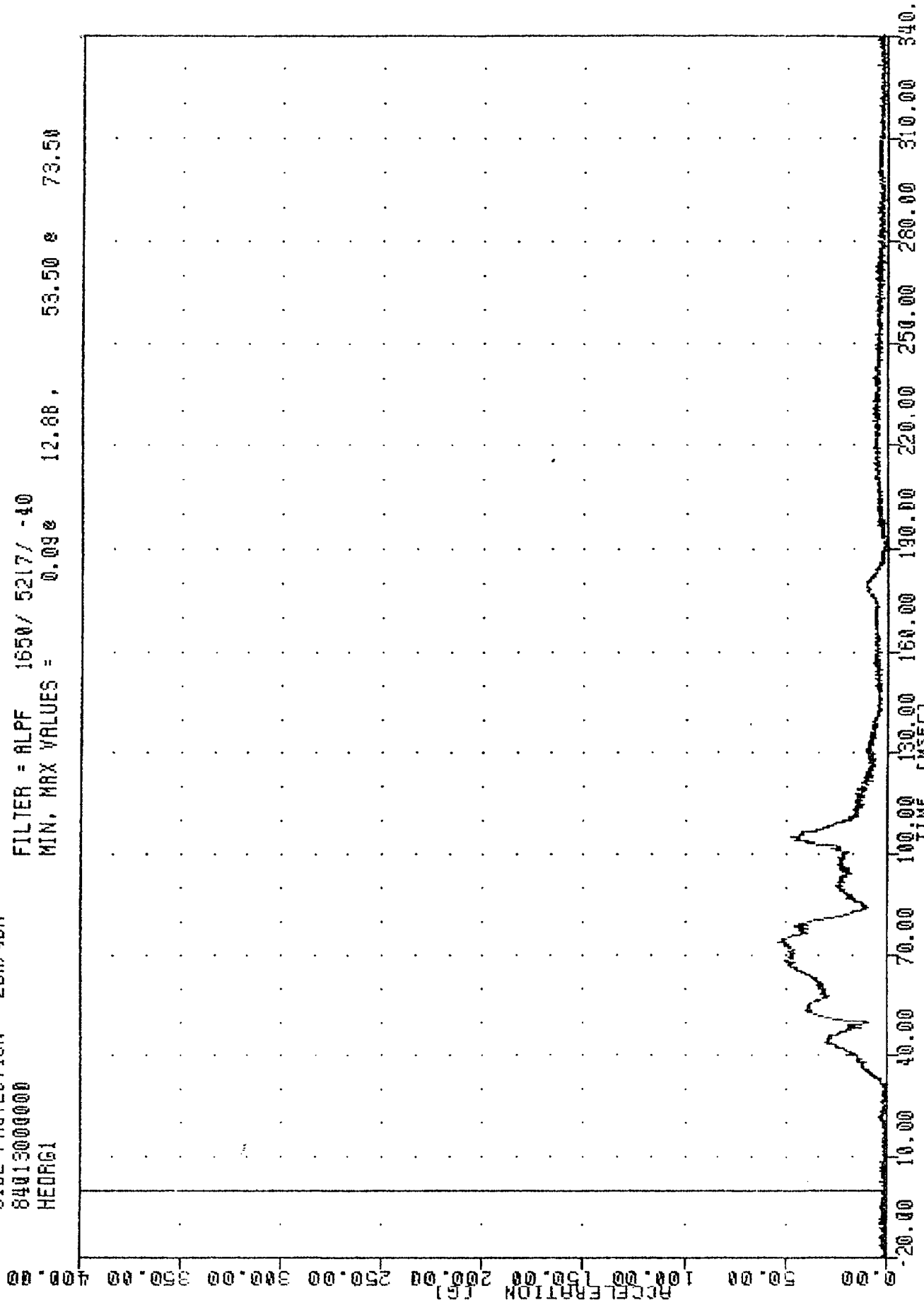


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER HEAD ACCELERATION Z AXIS

TRC
 SIDE PROTECTION - 20R/40R
 840130000000
 HEDRG1

PLOT DATE 17-JAN-84 09:59:13

FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = 0.090 12.08, 53.50 73.50

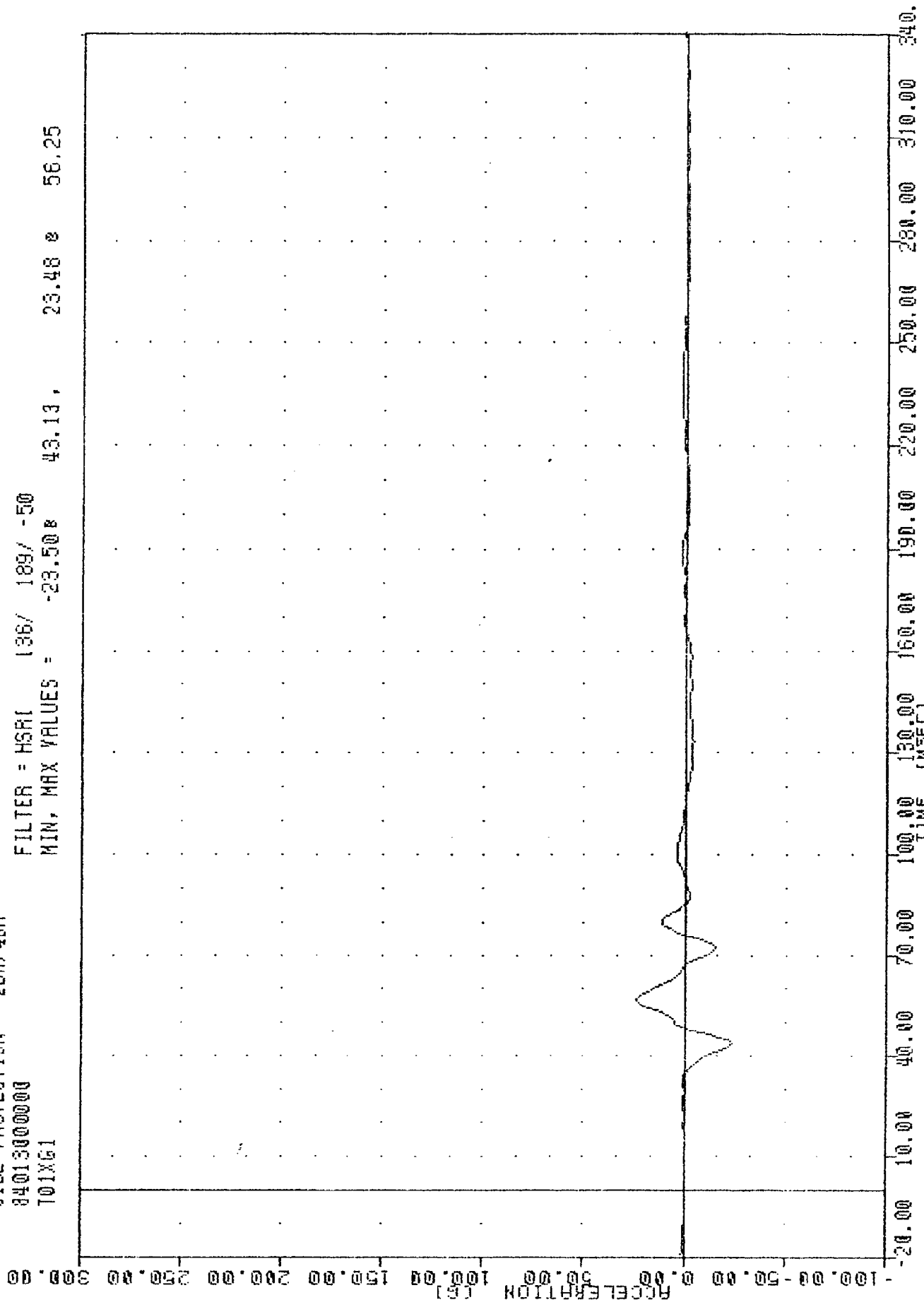


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER HEAD RESULTANT

TRC
 840130000000
 T01XG1
 SIDE PROTECTION - 20R/40R
 , 840113

PLOT DATE 17-JAN-84 09:59:58

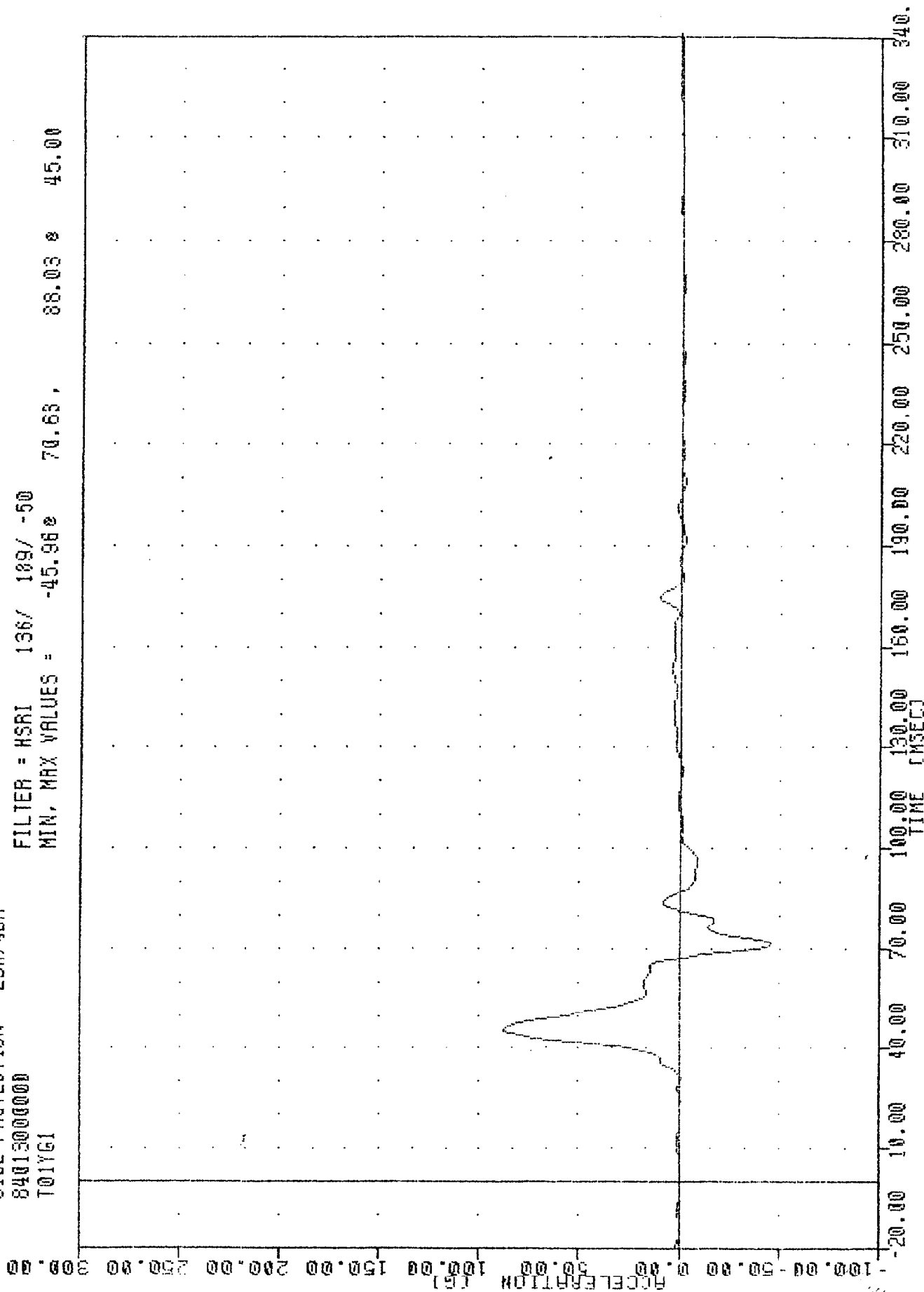
FILTER = HSRI 136/ 129/ -50
 MIN, MAX VALUES = -23.508 43.13, 23.48 8 56.25



THE 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T01Y61

PLOT DATE 17-JAN-84 09:59:58

FILTER = HSRI 136/ 109/ -50
 MIN, MAX VALUES = -45.96 70.63, 88.03 45.00

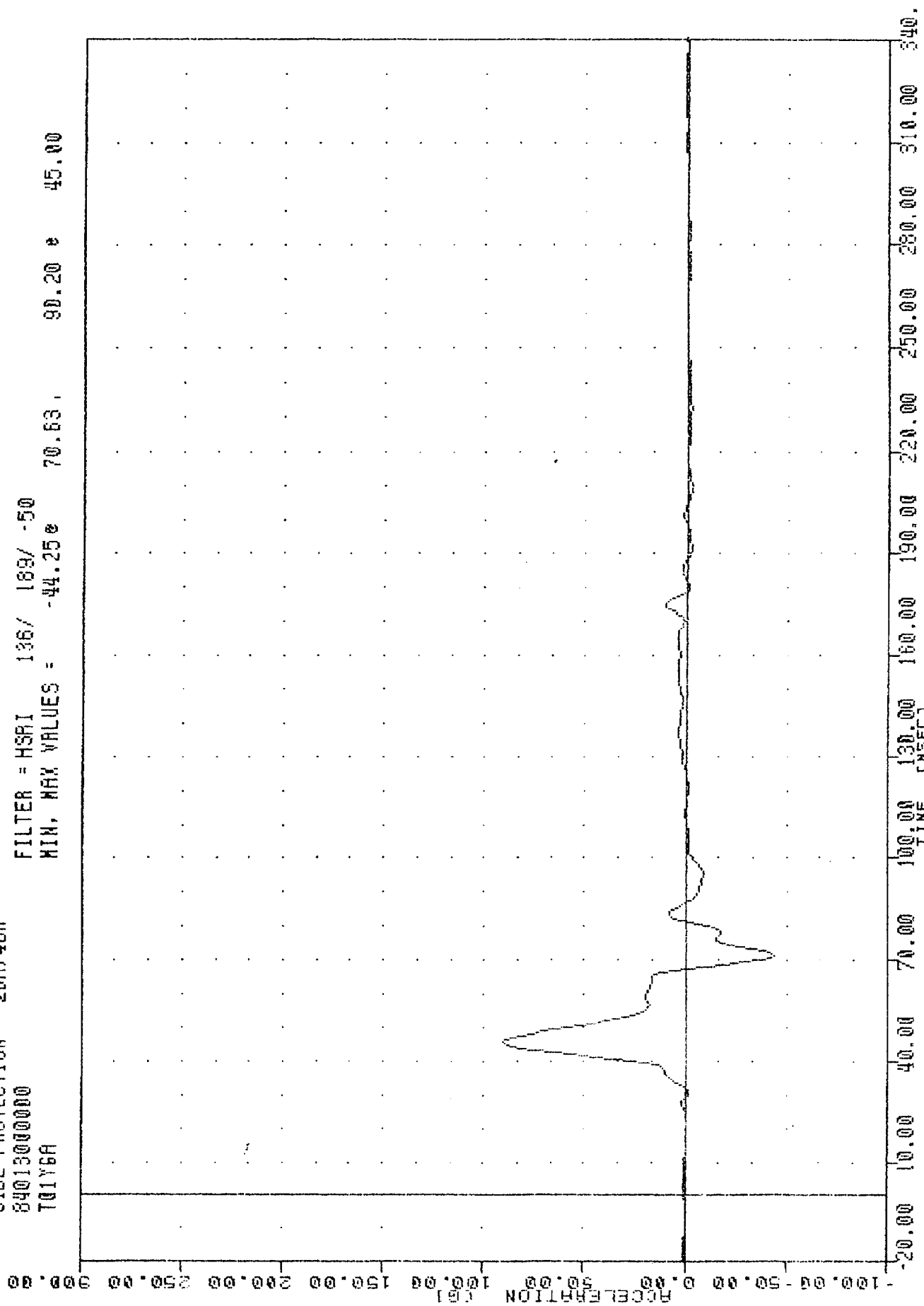


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER UPPER SPINE ACCELERATION Y AXIS

THC
SIDE PROTECTION - 2DR/4DR
840130000000
T01Y6A

840113
PLOT DATE 17-JAN-84 09:59:58

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -44.25 70.63, 90.20 45.00



PLUT DATE 17-JAN-84 09:59:58

IRL 840113
SIDE PROTECTION - 2DR/4DR

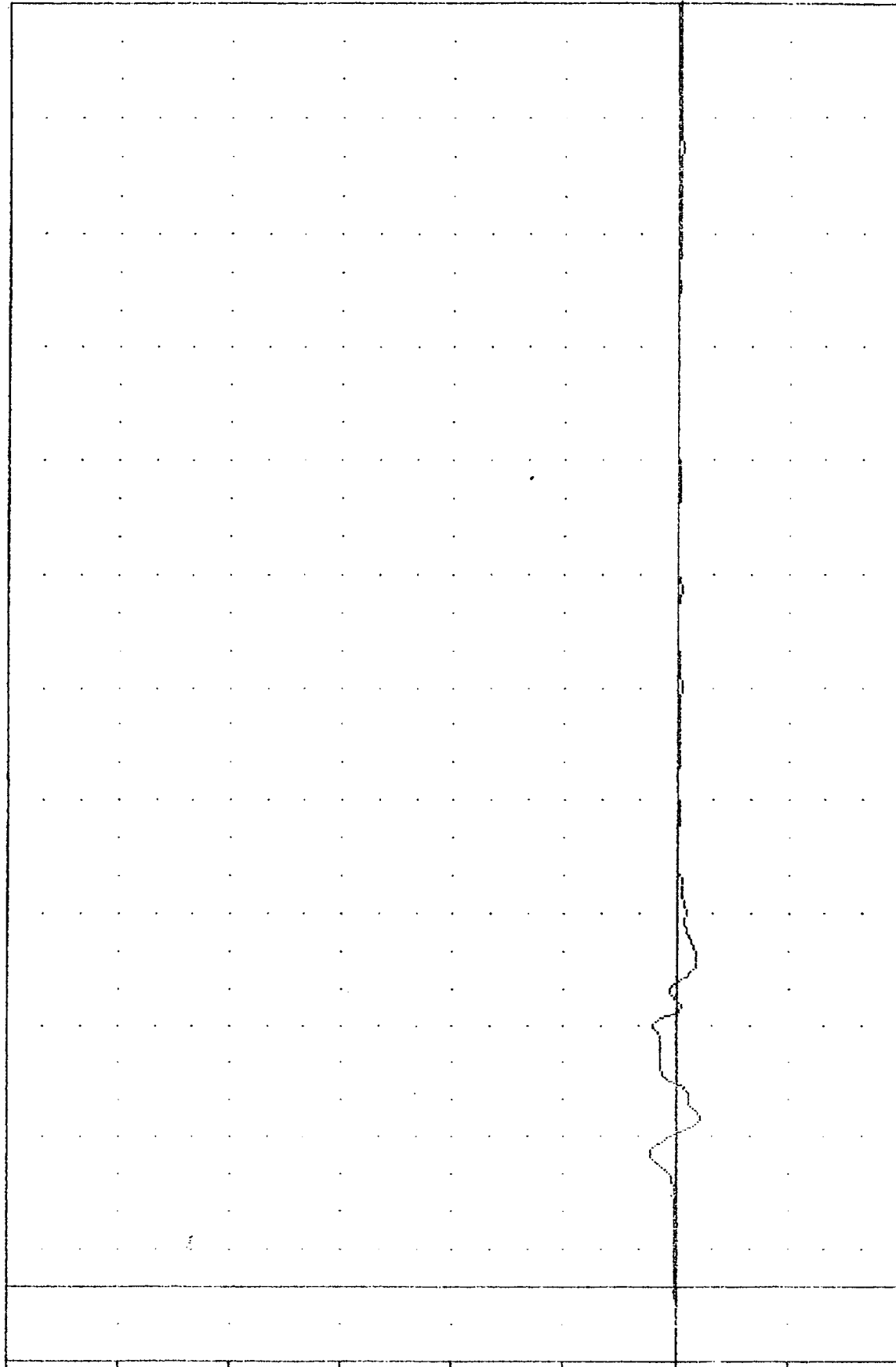
840130000000

701261

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -11.06e 44.38 , 11.60 e 34.38

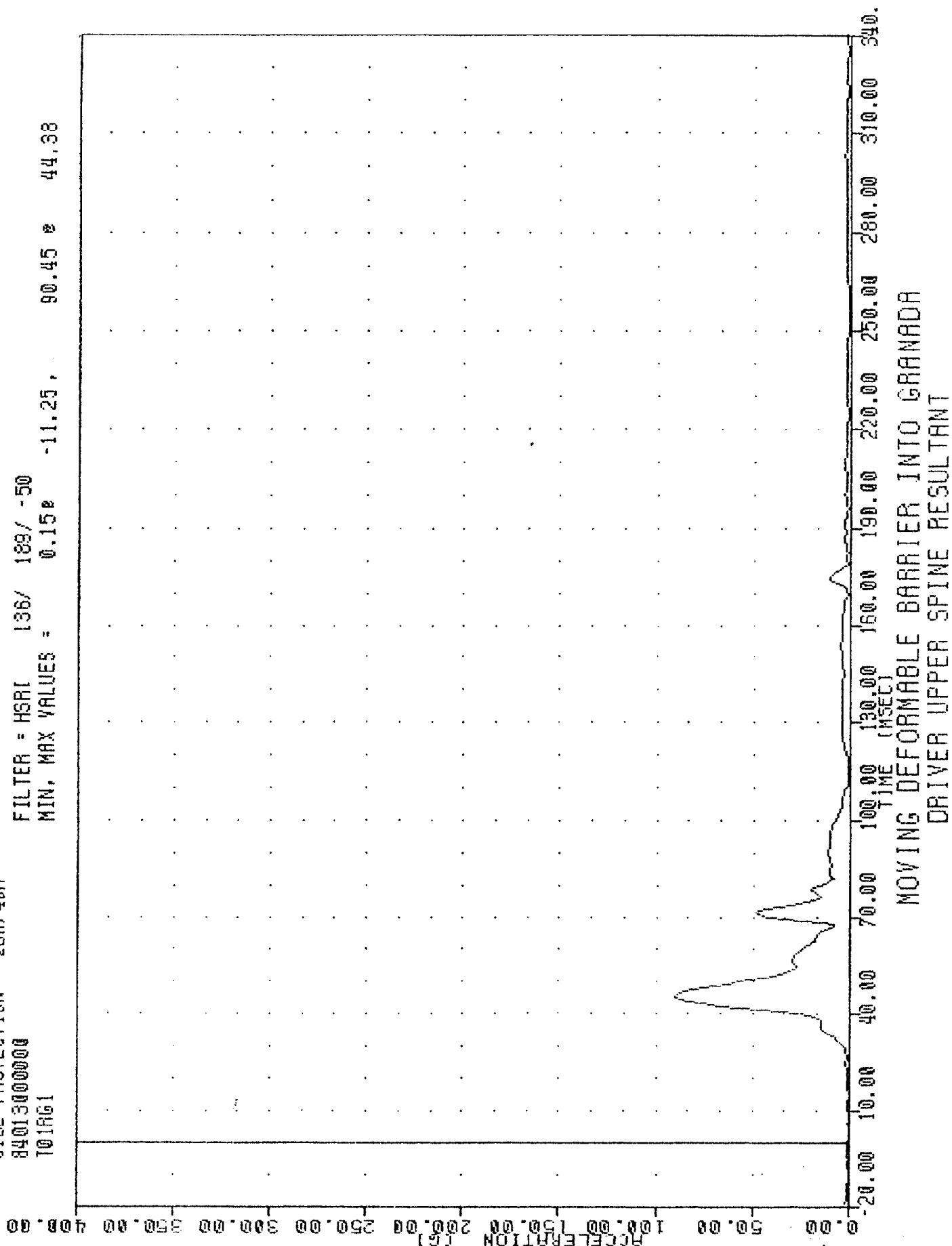
ACCELERATION (G)



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO GRANADA
DRIVER UPPER SPINE ACCELERATION Z AXIS

IRC 84013
 SIDE PROTECTION - 20R/40R
 84013000000
 101R61
 PLOT DATE 17-JAN-84 09:59:58
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = 0.15e -11.25, 90.45 e 44.38

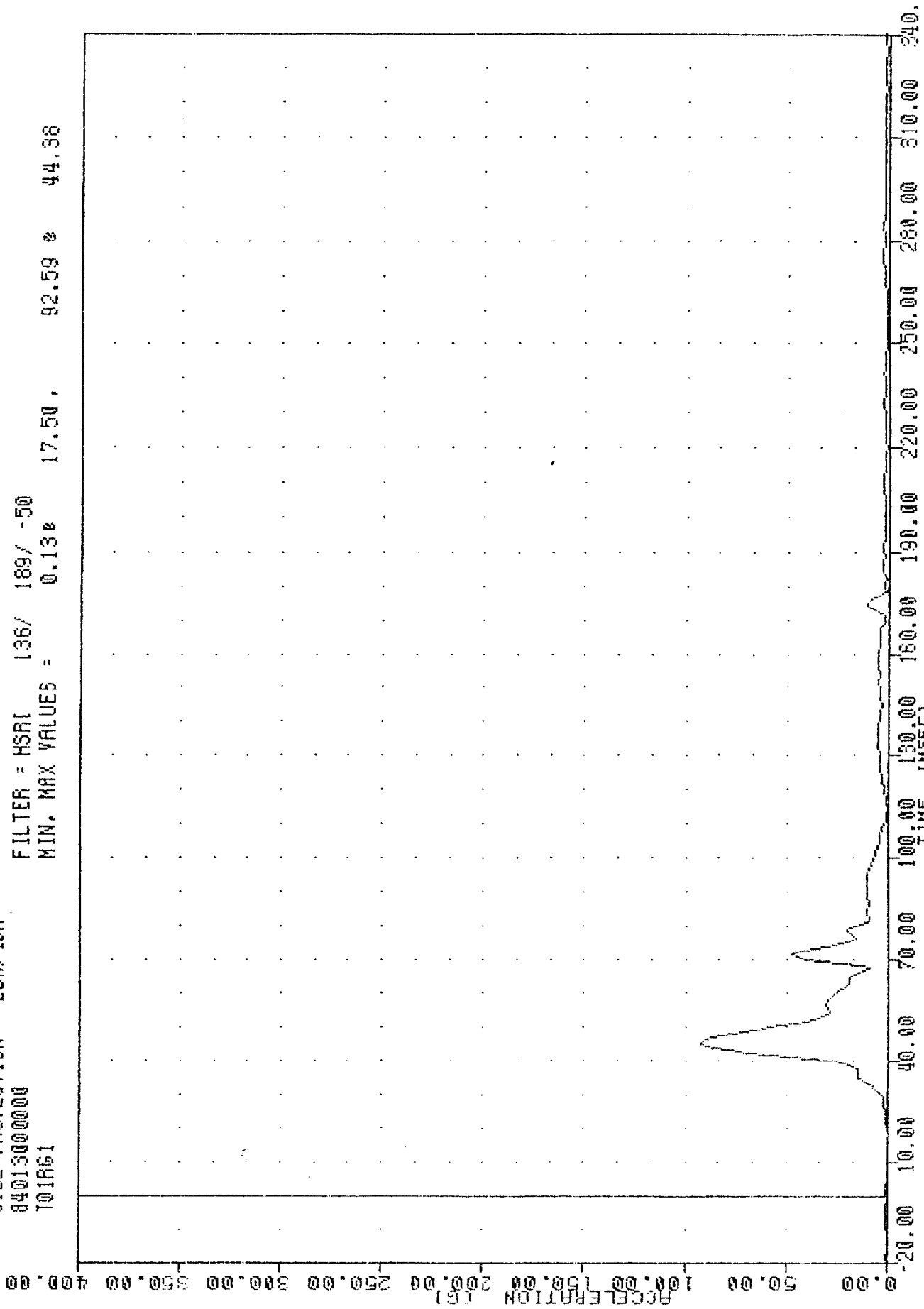


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER UPPER SPINE RESULTANT

TRC
 SIDE PROTECTION - 20R/40R
 84013000000
 101R61

PLUT DATE 17-JAN-84 10:00:58

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = 0.130 17.50, 92.59 44.38

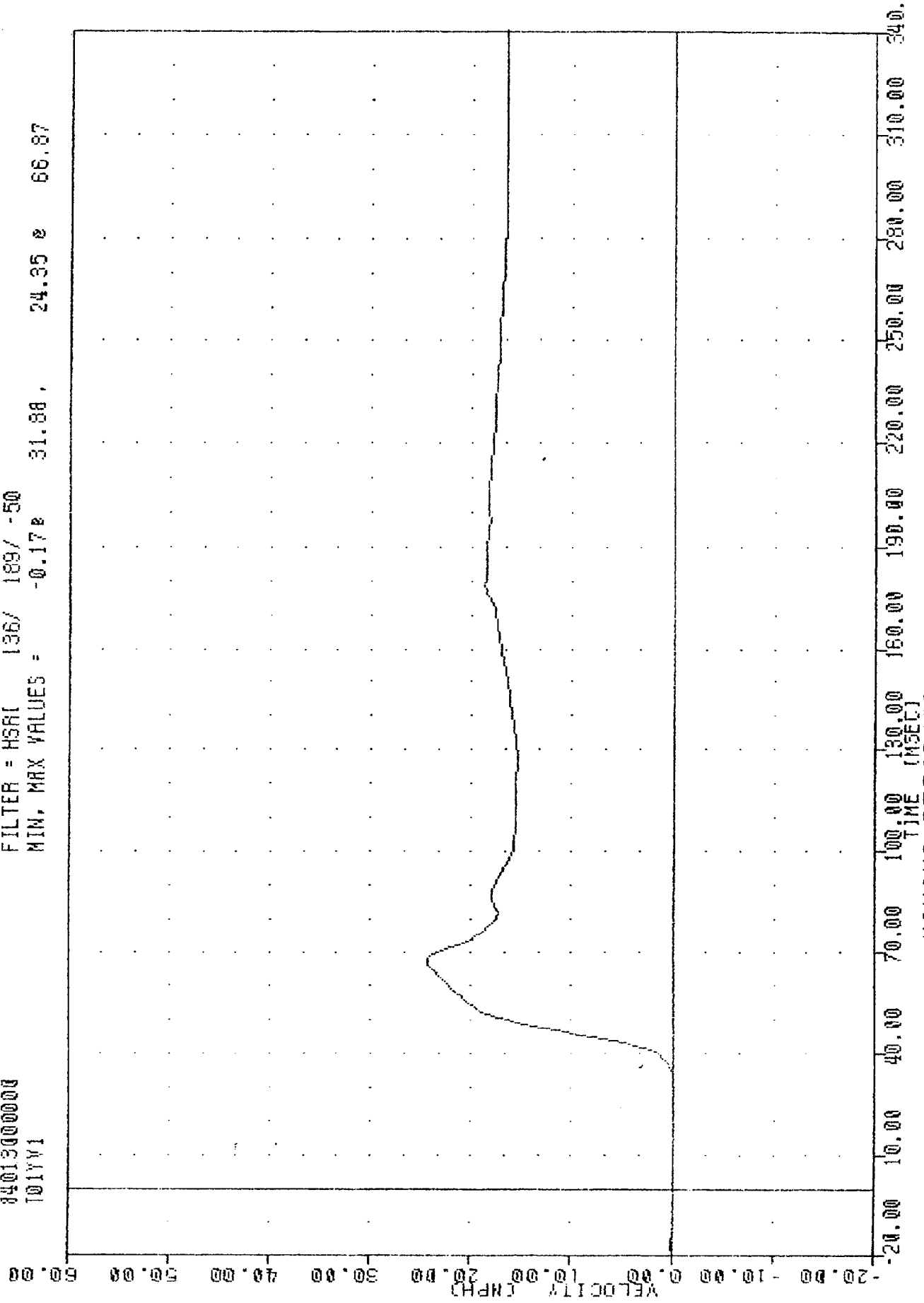


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER UPPER SPINE RESULTANT USING T01Y6A

PLUT DATE 17-JAN-84 10:01:22

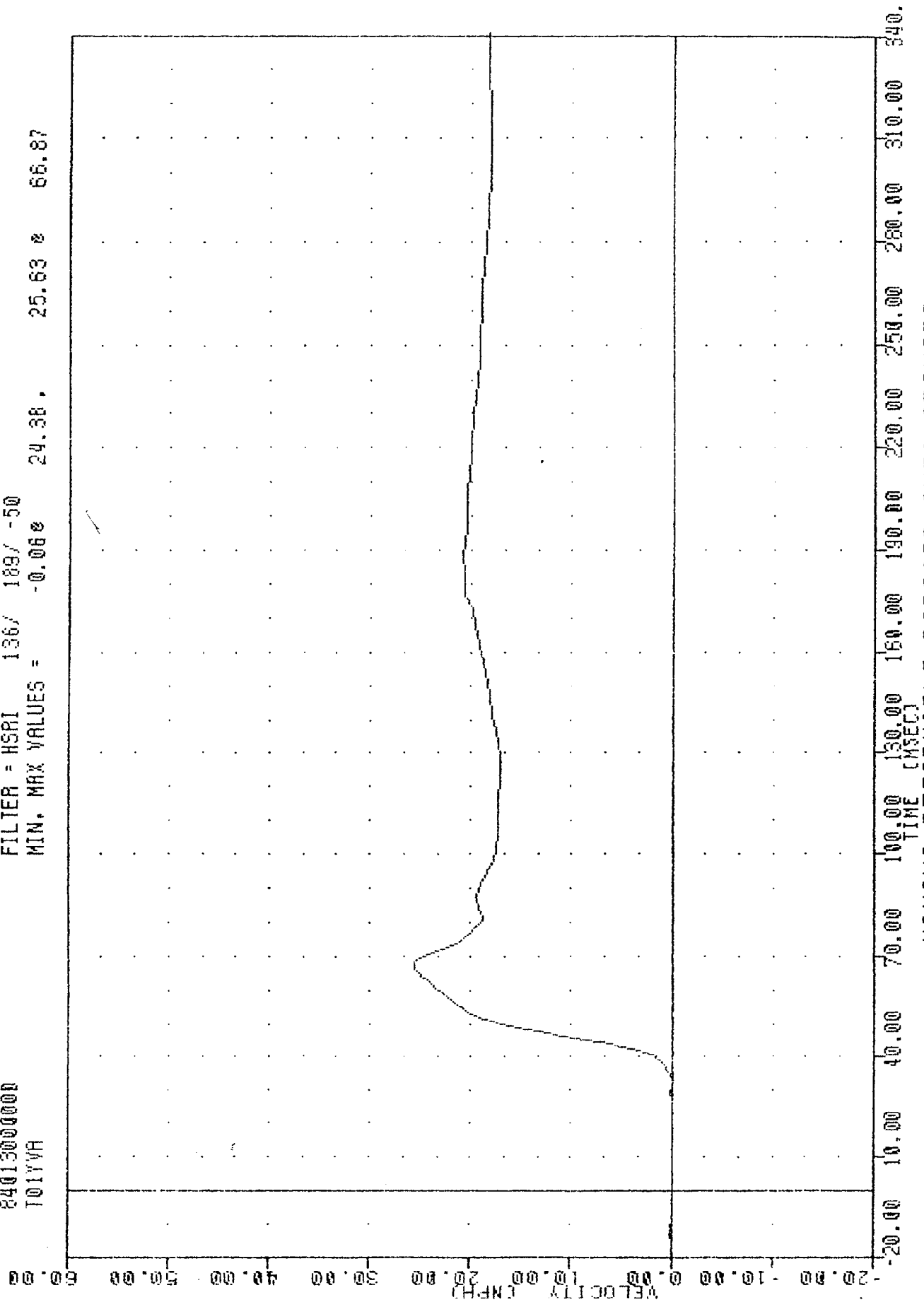
IRL 840113
SIDE PROTECTION - 2DR/4DR
84013000000
T01YV1

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -0.17e 31.88, 24.35 e 66.87



MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING T01YGI

TRC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T01YVA
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -0.068 25.63 24.38 66.87
 PLOT DATE 17 JAN 84 10:01:22

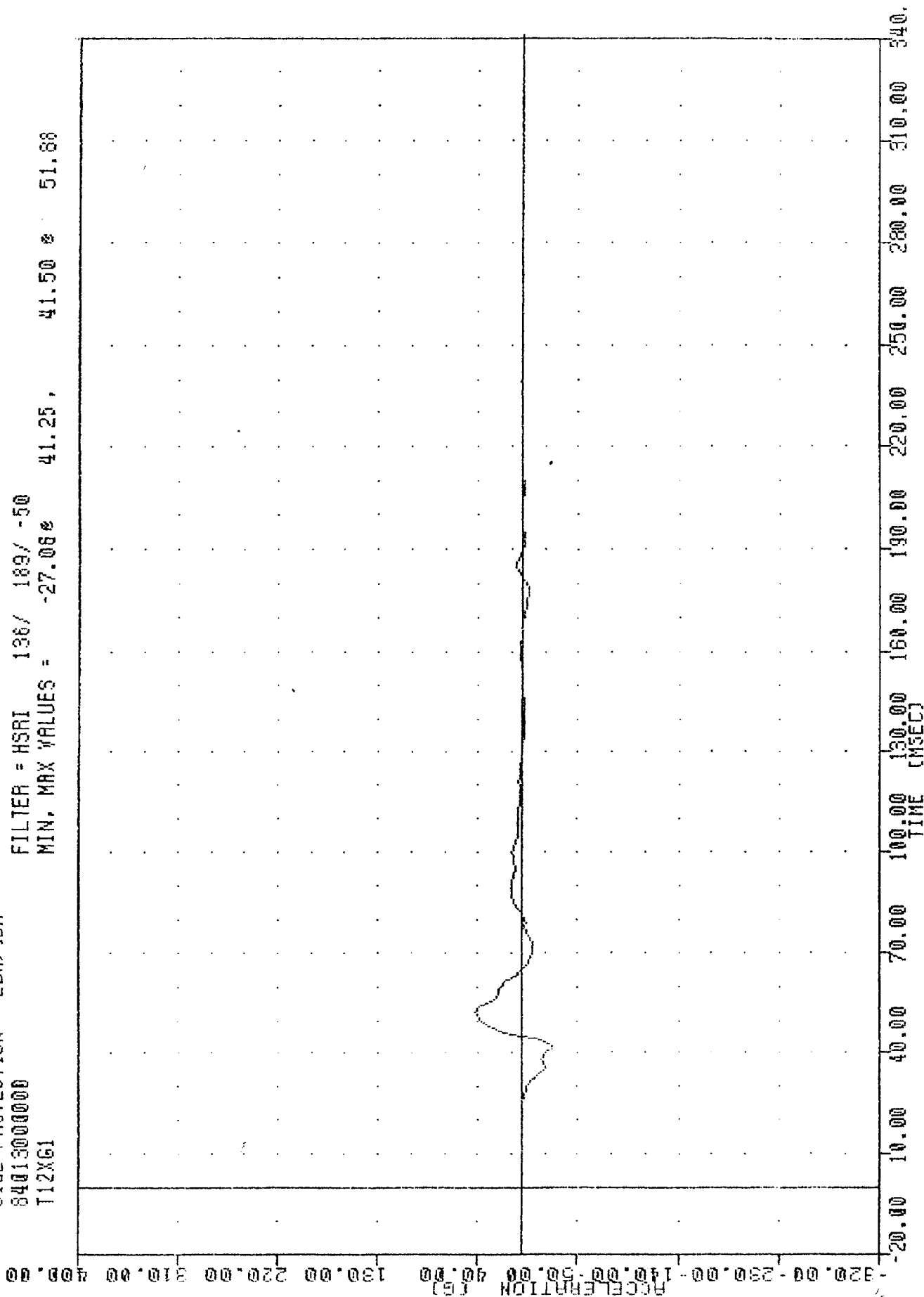


MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING T01Y6A

PLUT DATE 17-JAN-84 09:59:58

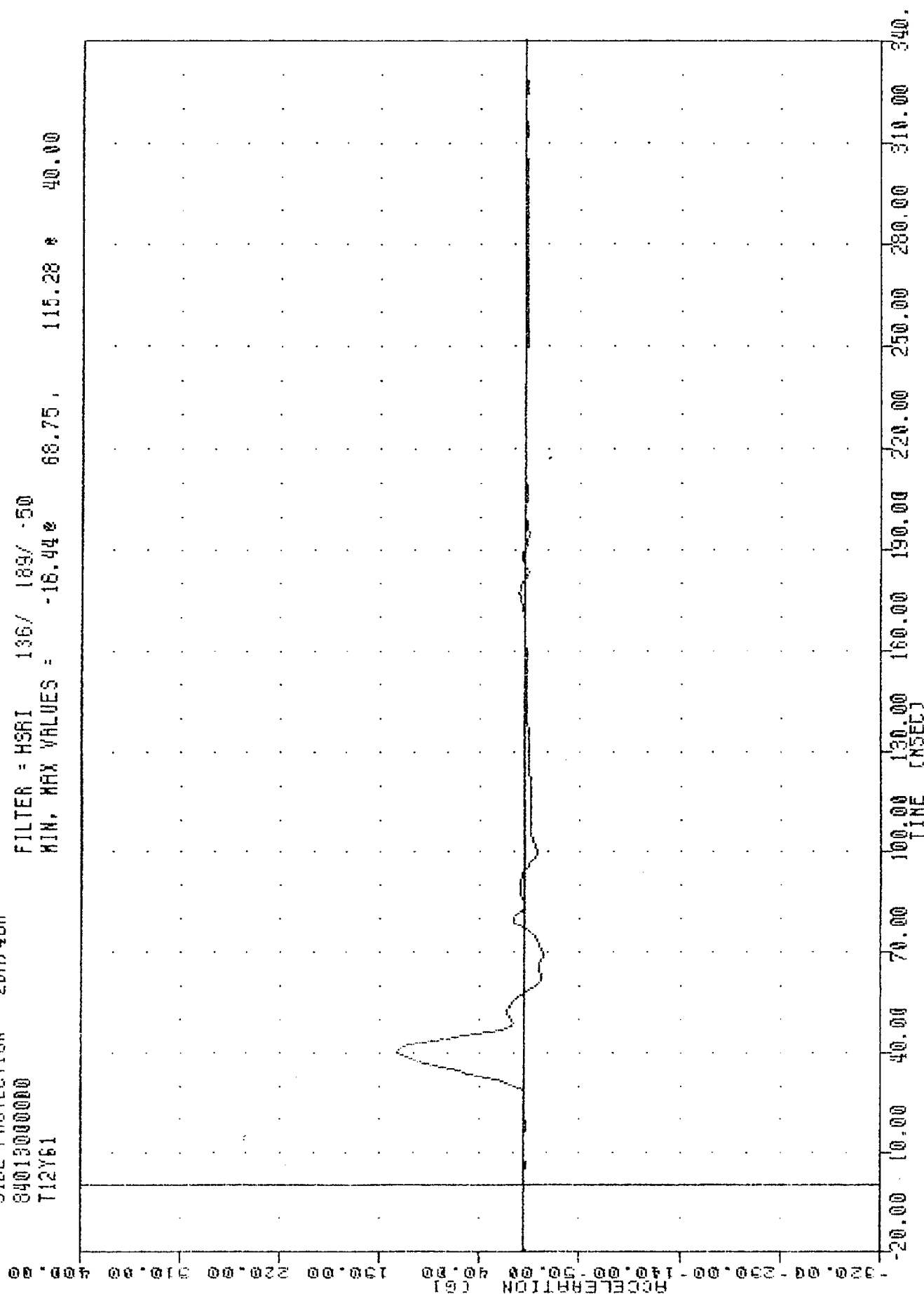
TRC 840113
SIDE PROTECTION - 20R/40R
84013000000
T12XG1

FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -27.06% 41.25, 41.50 % 51.88

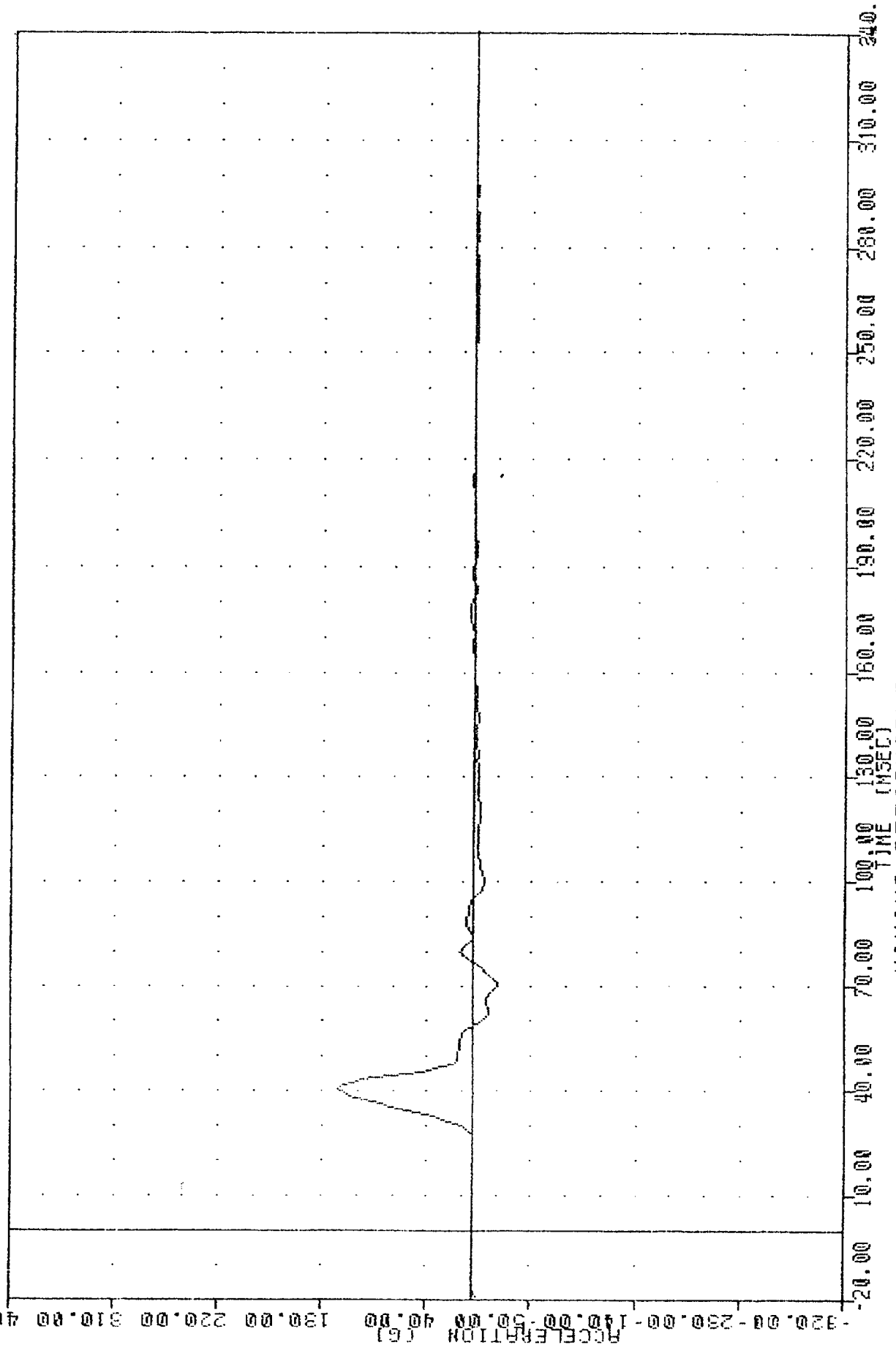


MOVING DEFORMABLE BARRIER INTO GRANADA
DRIVER LOWER SPINE ACCELERATION X AXIS

TAC 840113
 SIDE PROTECTION - 20A/40A
 84013000000
 T12Y61
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -16.44 68.75 115.28 * 40.00
 PLOT DATE 17-JAN-84 09:59:58



IRC 840113
 SIDE PROTECTION - 2DR/4DR
 840130000000
 112YGR
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -19.872 89.38 , 116.18 2 40.00
 PLOT DATE 17-JAN-84 09:59:58



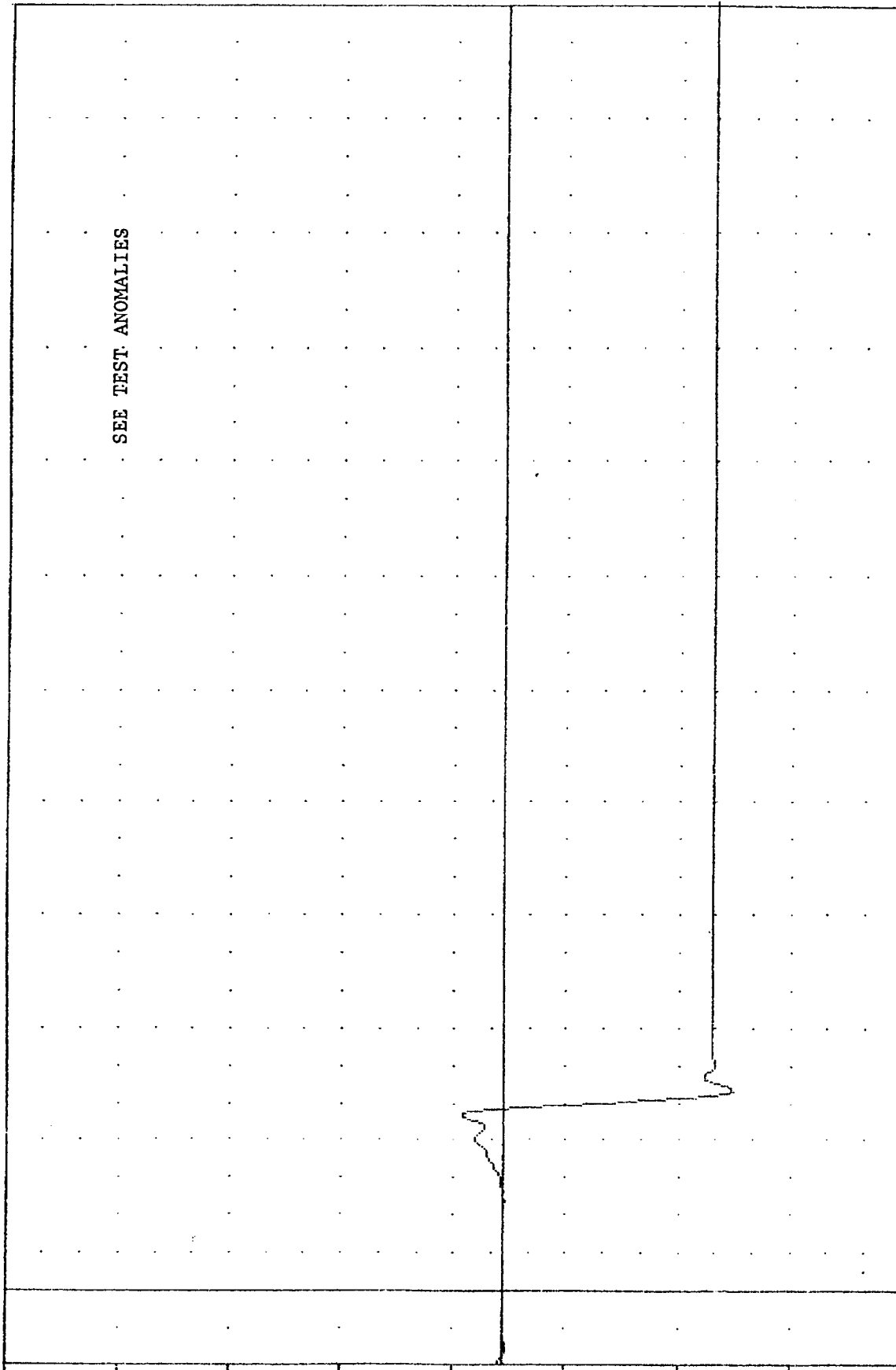
MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER LOWER SPINE ACCELERATION -2 Y AXIS

TRL 840113
 SIDE PROTECTION - 20R/4DR
 840130000000
 T12261

PLUT DATE 17-JAN-84 09:59:58

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -184.38 52.50, 33.01 45.62

ACCELERATION (G)



-320.00 -280.00 -240.00 -200.00 -160.00 -120.00 -80.00 -40.00 0.00 40.00 80.00 120.00 160.00 200.00 240.00 280.00 320.00 340.00

MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER LOWER SPINE ACCELERATION Z AXIS

THC 840113 17-JAN-84 09:59:58

SIDE PROTECTION - 20R/40R

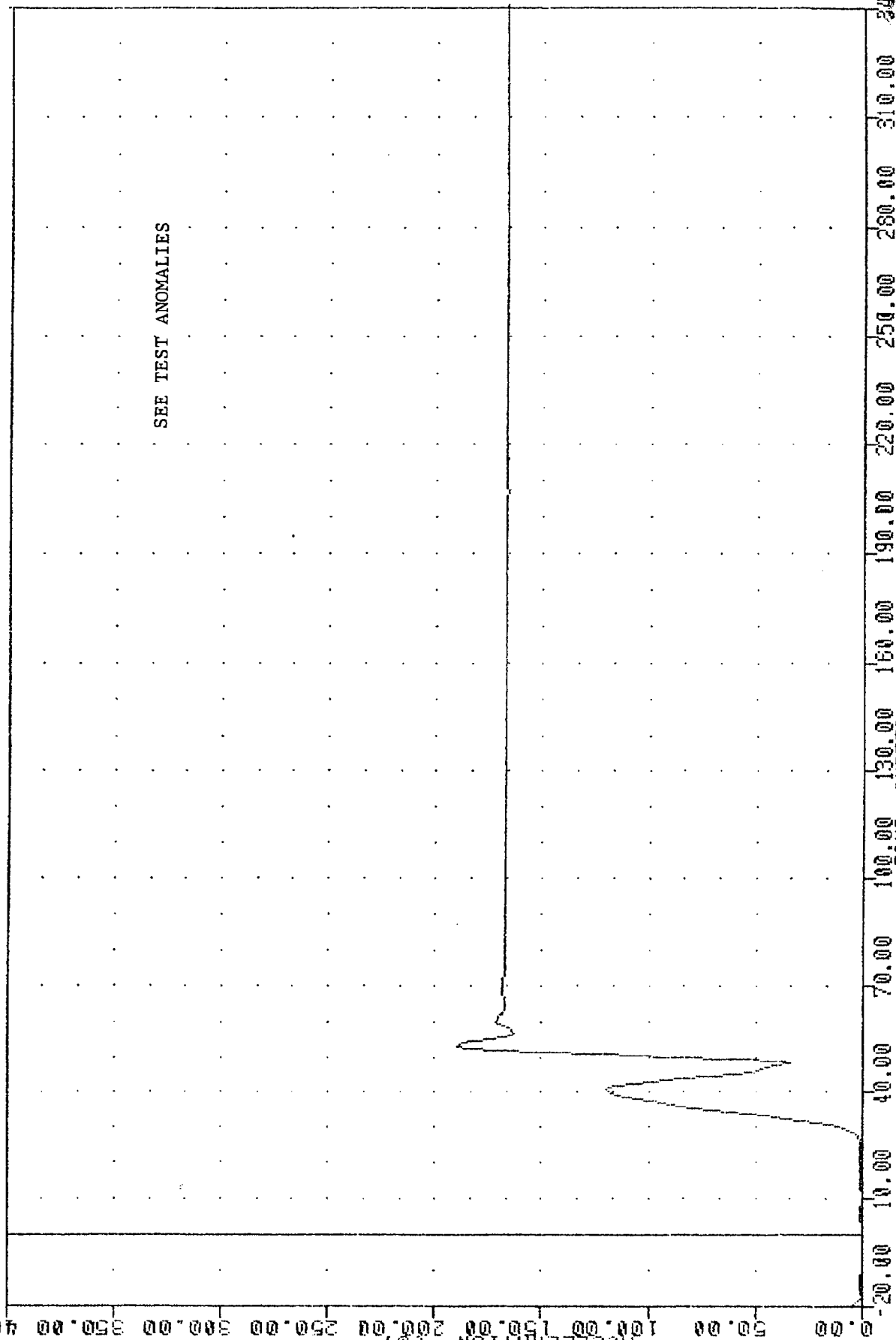
840130000000

T12RG1

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = 0.092 1.25, 189.40 52.50

ACCELERATION (G)

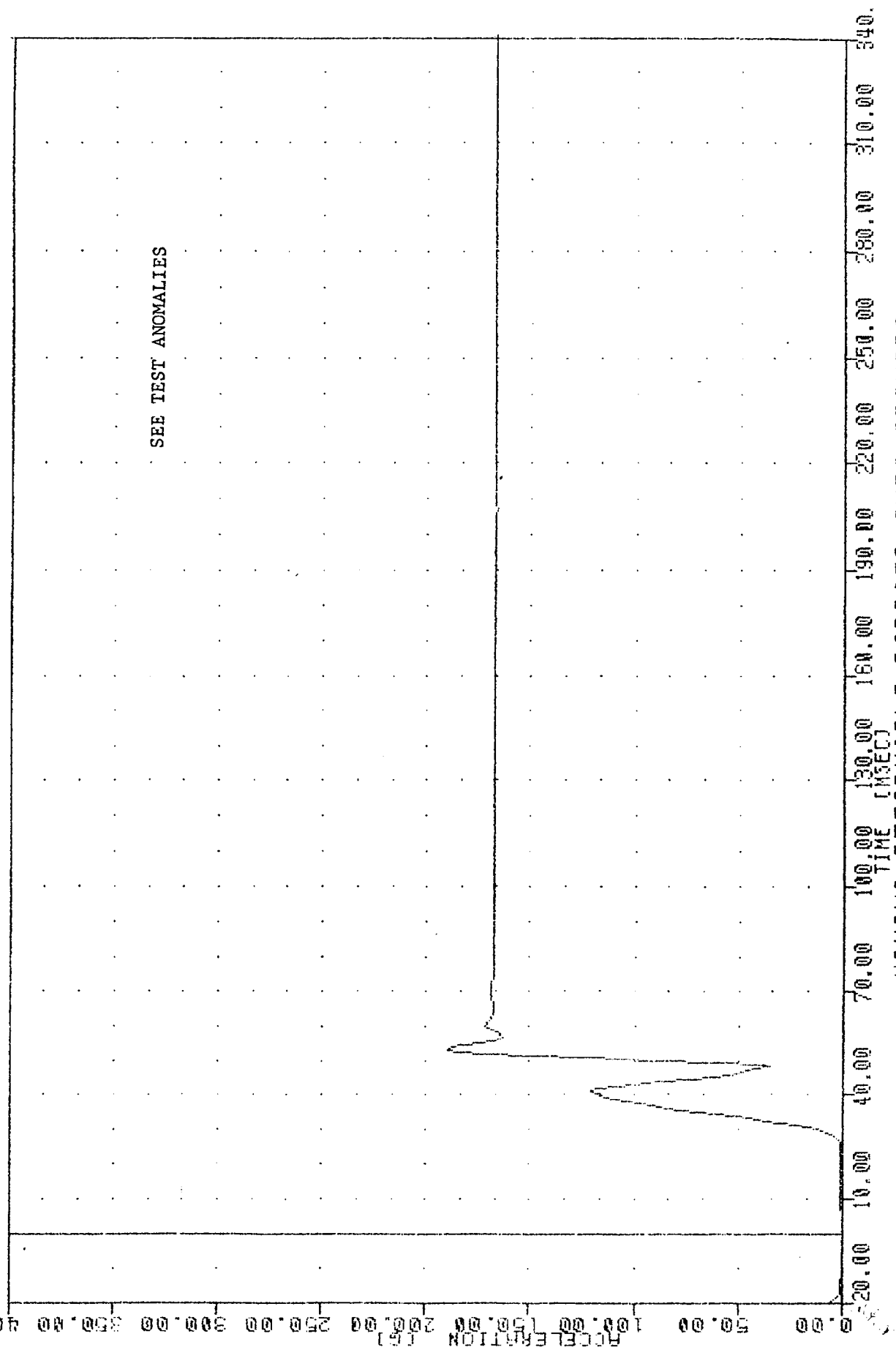


MOVING DEFORMABLE BARRIER INTO GRANADA
DRIVER LOWER SPINE RESULTANT

PLUT DATE 17-JAN-84 10:00:58

TRC 840J13
SIDE PROTECTION - 2DR/40R
840130000000
T12RG1

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = 0.118 0.63, 189.14 52.50

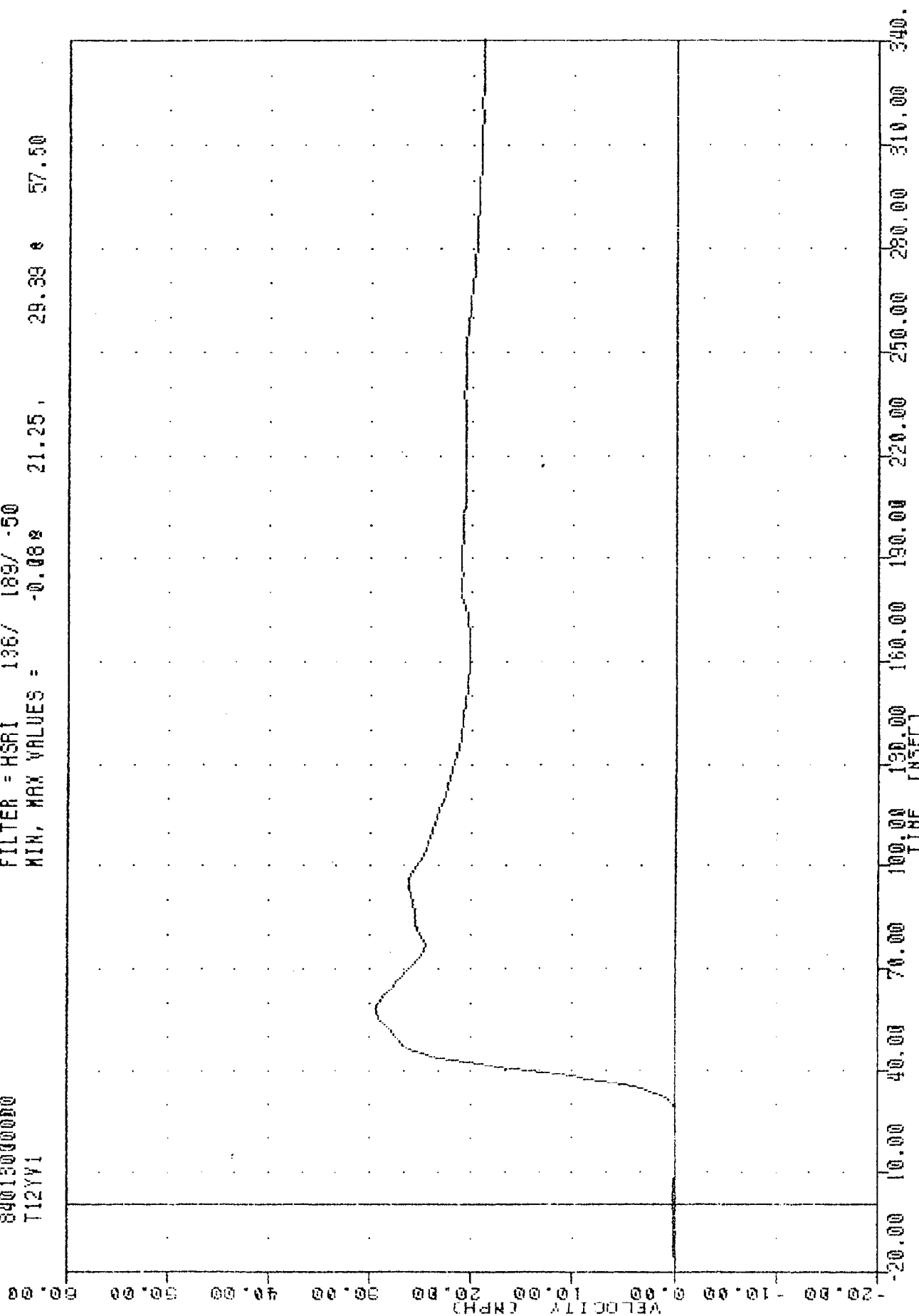


MOVING DEFORMABLE BARRIER INTO GRANADA
DRIVER LOWER SPINE RESULTANT USING T12YGA

TRC
 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T12YV1

PLOT DATE 17-JAN-84 10:01:22

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -0.088 21.25, 29.39 57.50

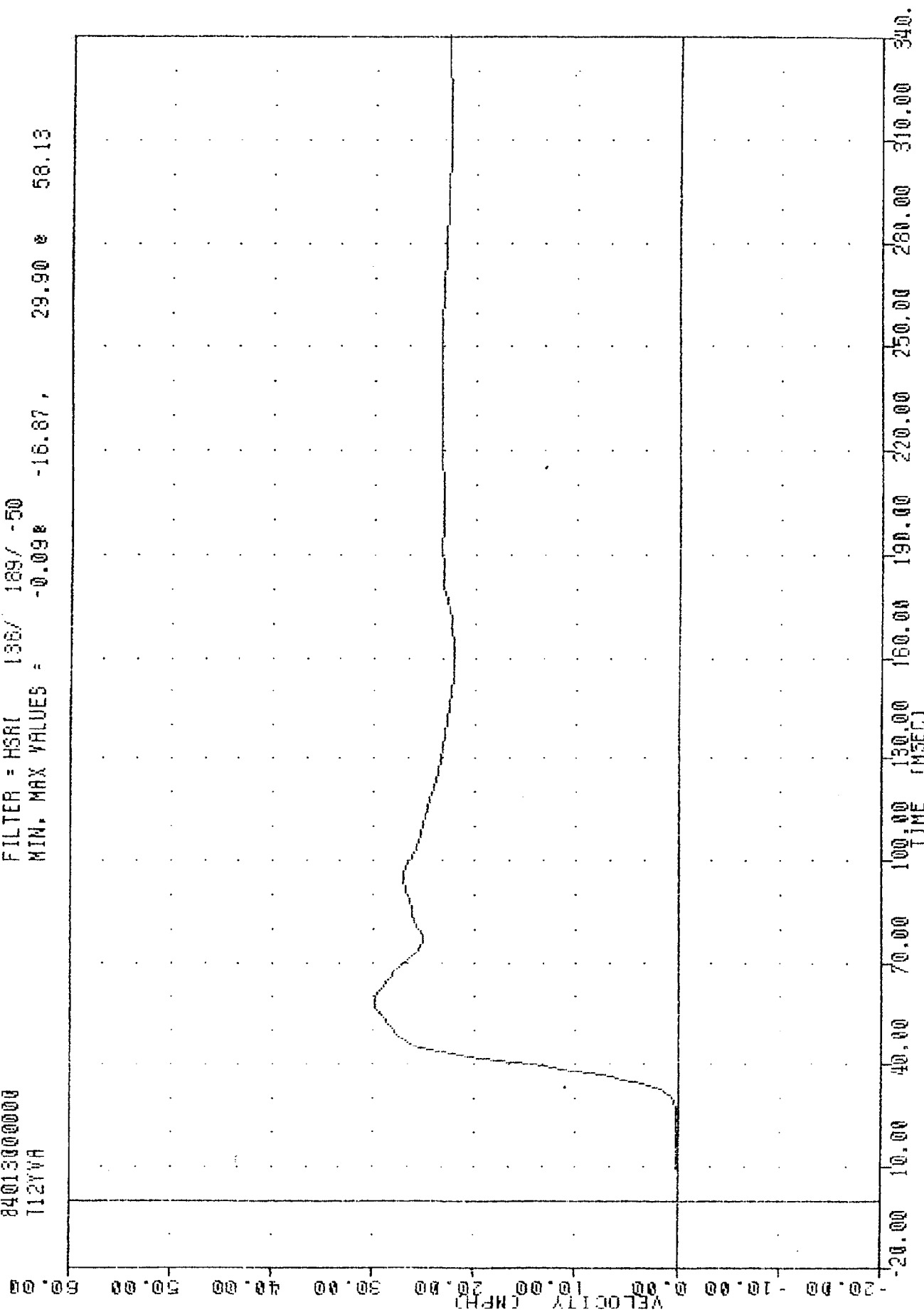


MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING T12YV1

TPL 840113
 SIDE PROTECTION - 2DR/4DR
 84013000000
 T12YVA

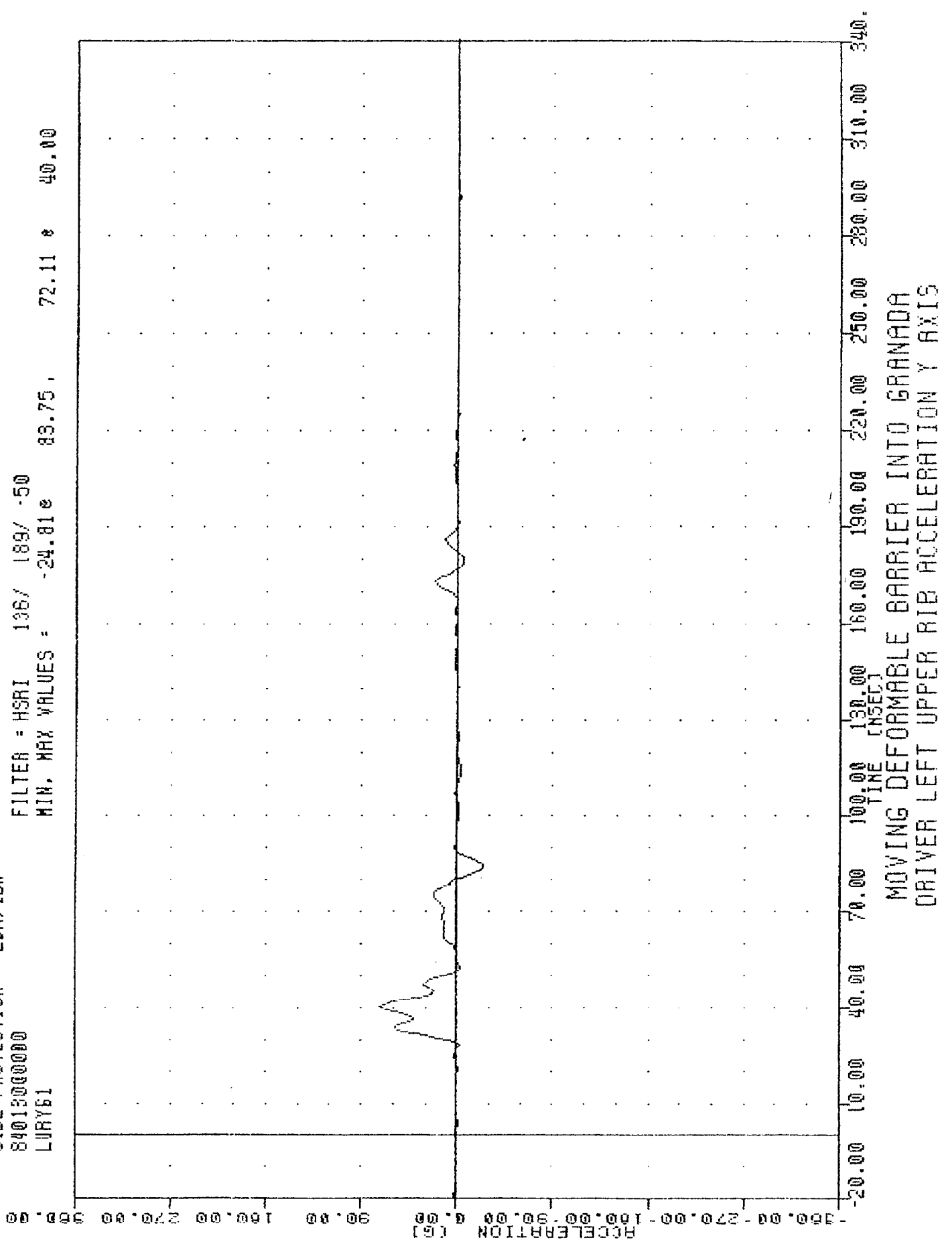
PLOT DATE 17-JAN-84 10:01:22

FILTER = HSRI 136/ 129/ -50
 MIN. MAX VALUES = -0.098 -15.87, 29.90 58.13

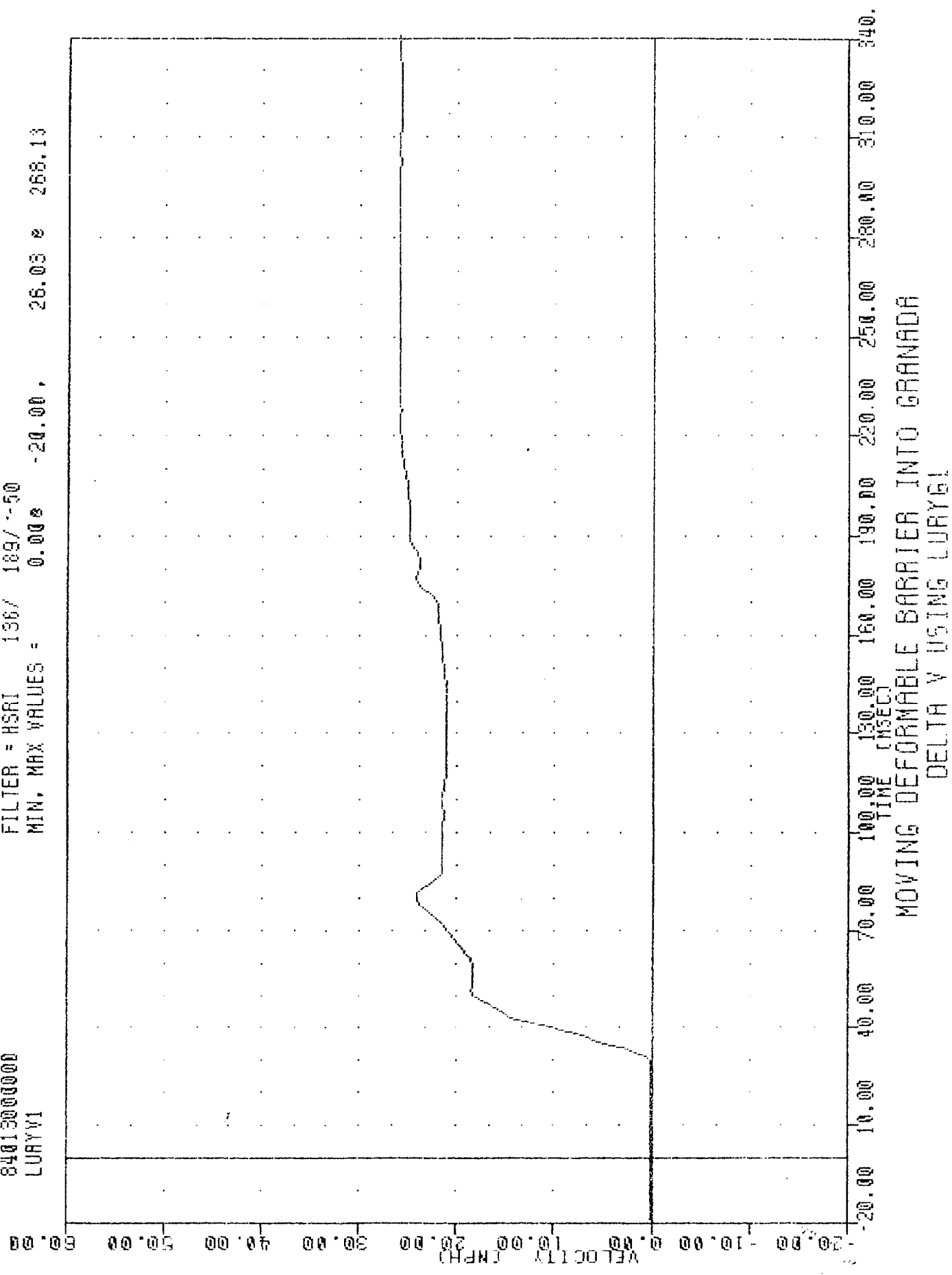


MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING T12YGA

THC 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 LURY61
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -24.81e 83.75 , 72.11 * 40.00
 PLUT DATE 17-JAN-84 09:59:58



TRL 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 LURYV1
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = 0.00s -20.00, 26.03 s 268.13
 PLOT DATE 17-JAN-84 10:01:22



TRC

840113

840113

840113

840113

840113

SIDE PROTECTION - 20R/40R

840130000000

LURTER

FILTER = HSRI 136/ 189/ 50

MIN, MAX VALUES = -23.80 83.75, 78.88 33.38

09:59:58

17-JAN-84

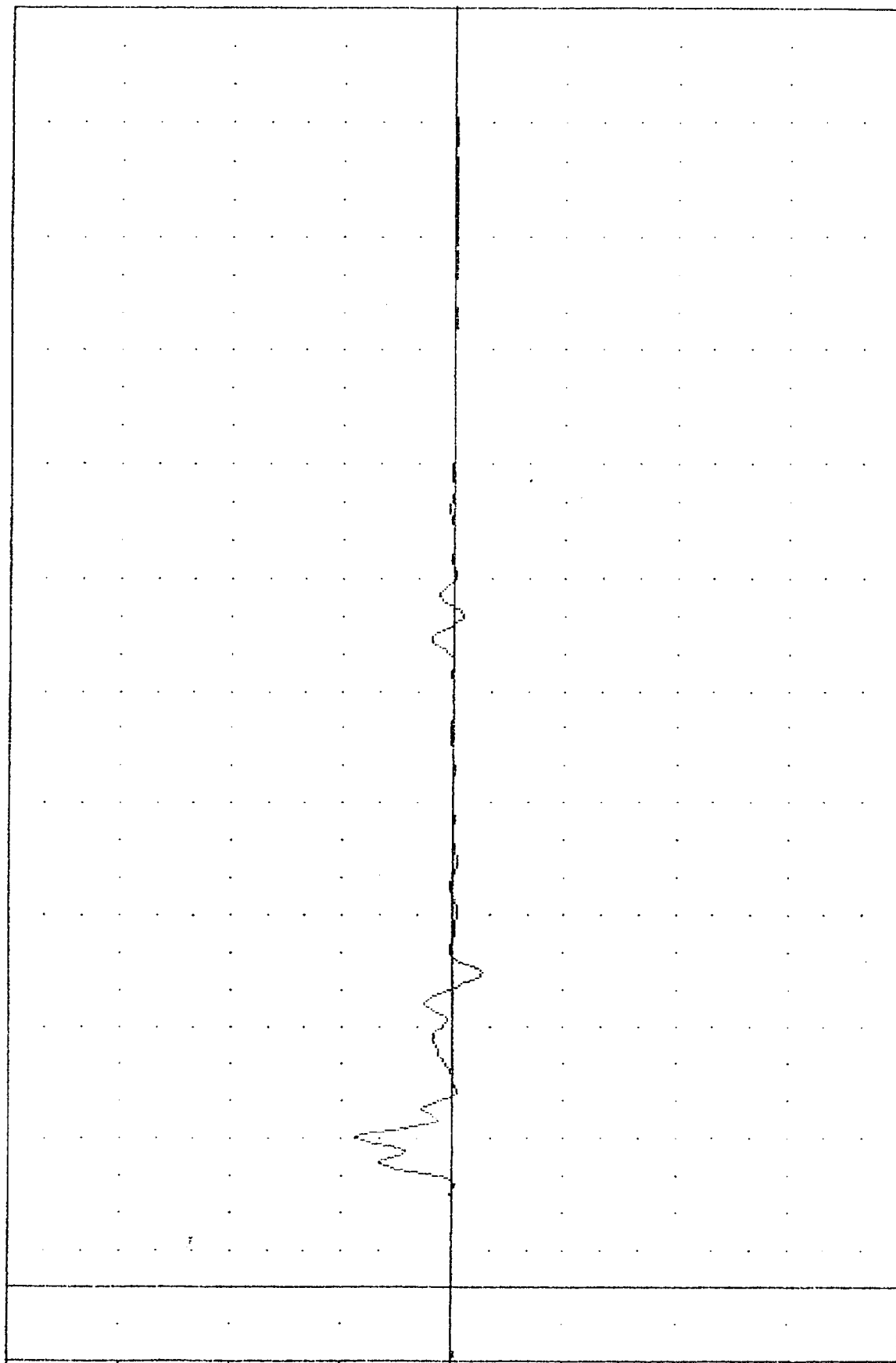
17-JAN-84

17-JAN-84

17-JAN-84

17-JAN-84

ACCELERATION (G)



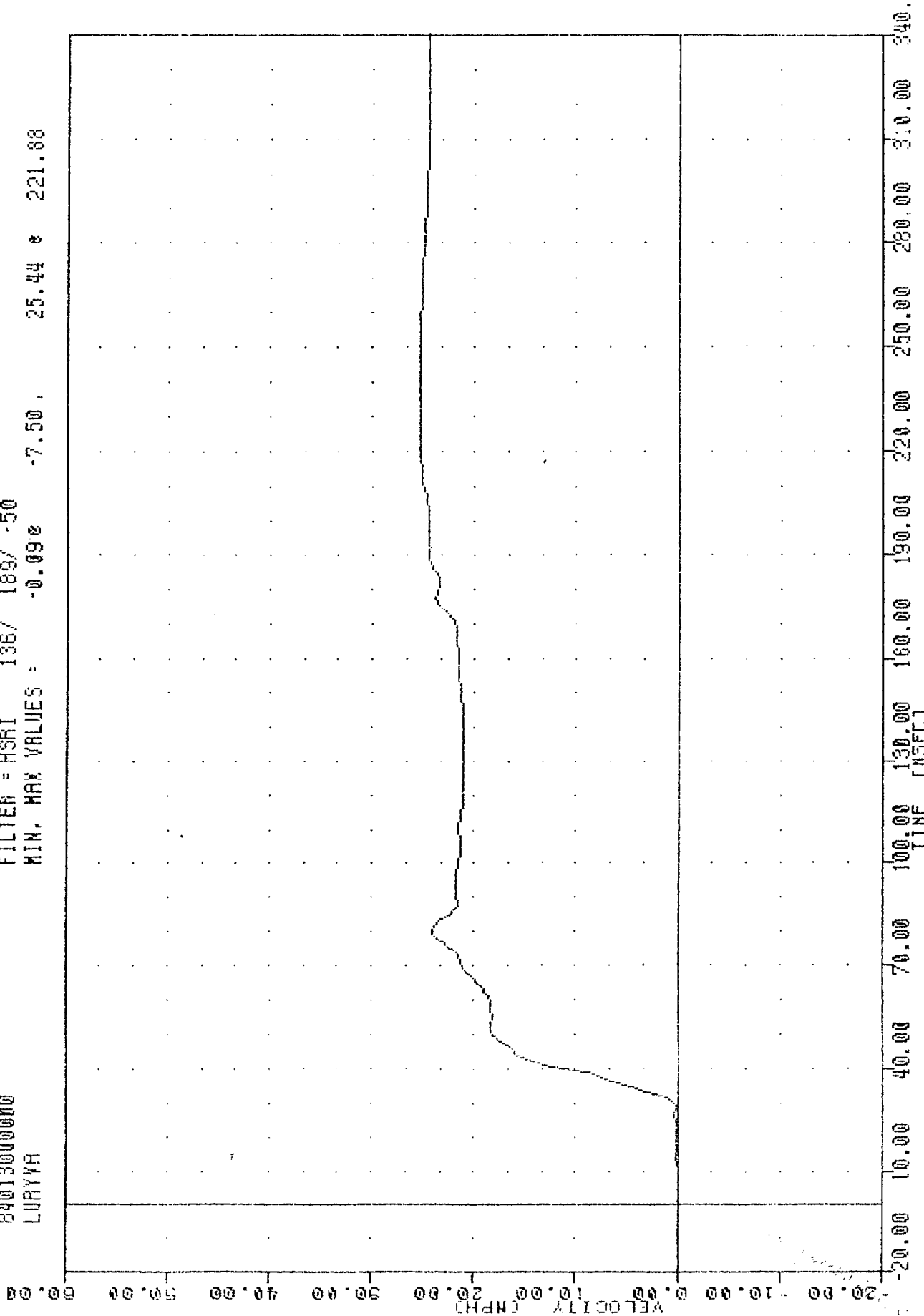
TIME (MSEC)

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

TRC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 LURYVA

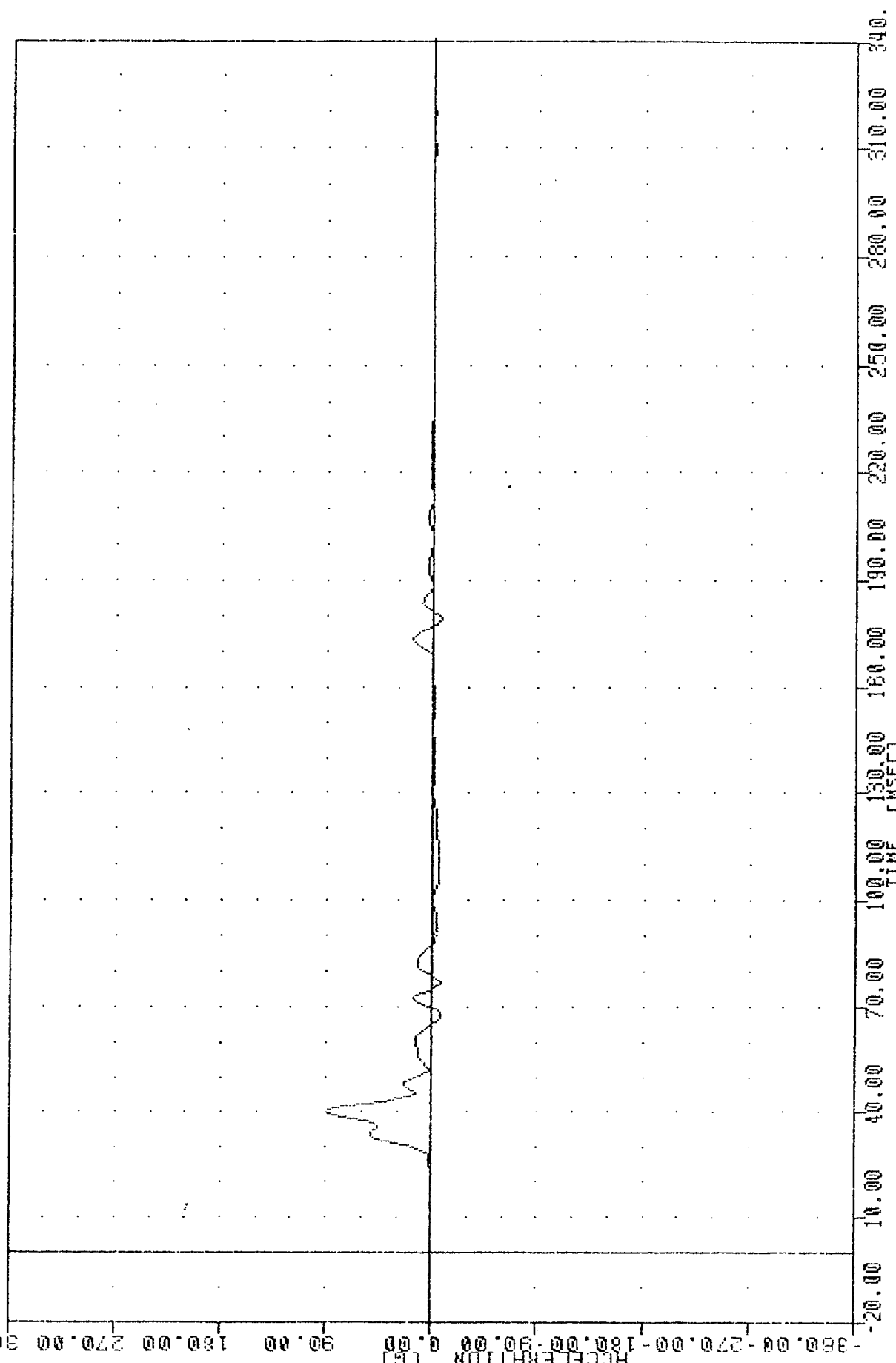
PLOT DATE 17-JAN-84 10:01:22

FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -0.09% -7.50, 25.44 & 221.88



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA Y USING LURYGA

TMC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 LLAGI
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -8.08 89.94 39.38
 09:59:58
 17-JAN-84



MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER LEFT LOWER RIB ACCELERATION Y AXIS

TRC 840113 17-JAN-84 10:01:22

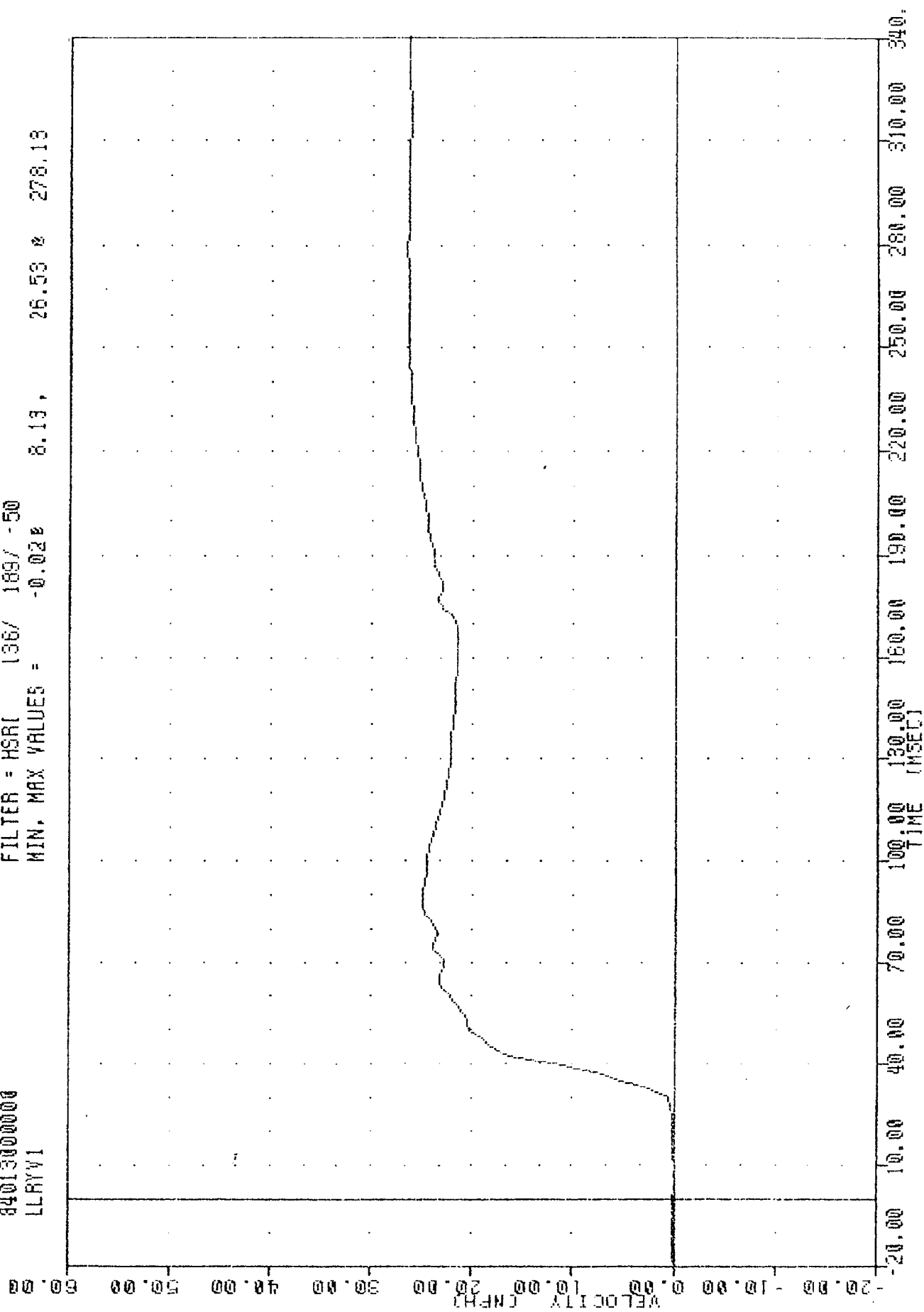
SIDE PROTECTION - 20R/40R

84013000000

LLRYV1

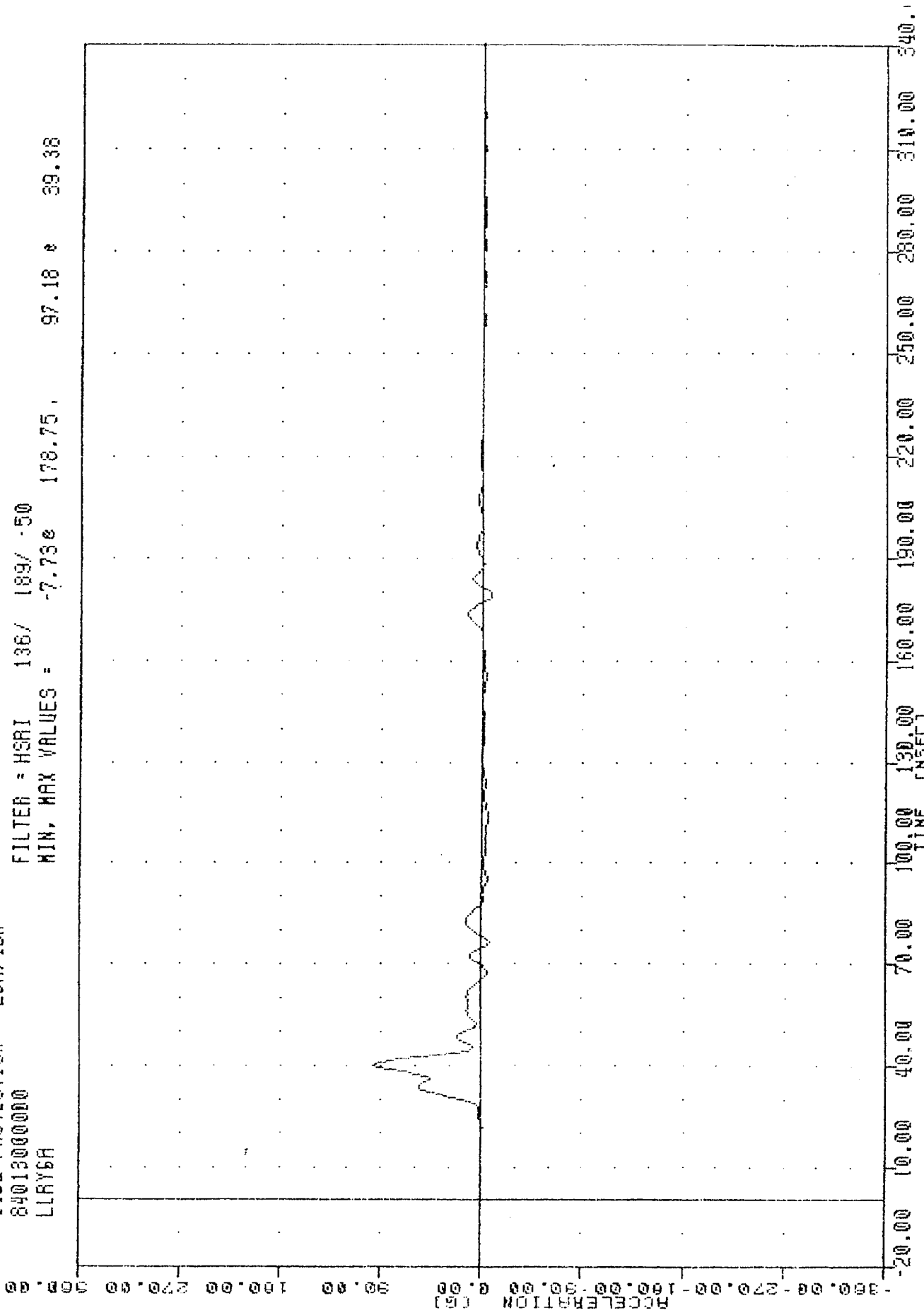
FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -0.028 8.13, 26.53 & 278.13



MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING LLRYG1

TRL 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 LLY6R
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -7.73e 178.75, 97.18 e 39.38
 PLOT DATE 17-JAN-84 09:59:58

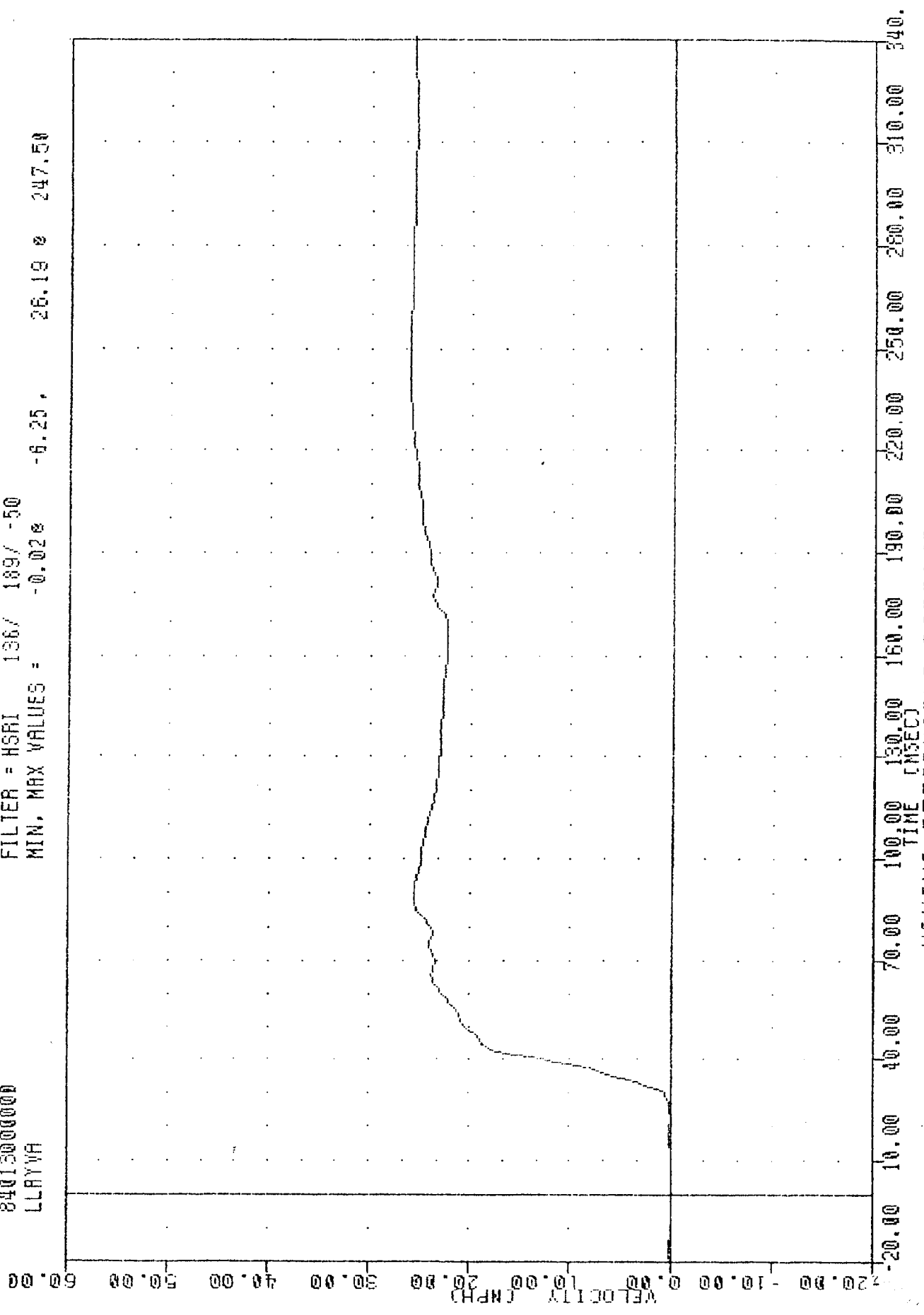


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER LEFT LOWER RIB ACCELERATION -2 Y AXIS

PLT DATE 17-JAN-84 10:01:22

FILE 840113
SIDE PROTECTION - 20R/40R
840130000000
LLRYVA

FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -0.028 -6.25 26.19 247.50



MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING LLRYVA

TRC

840113

PLUT DATE

17-JAN-84

09:59:13

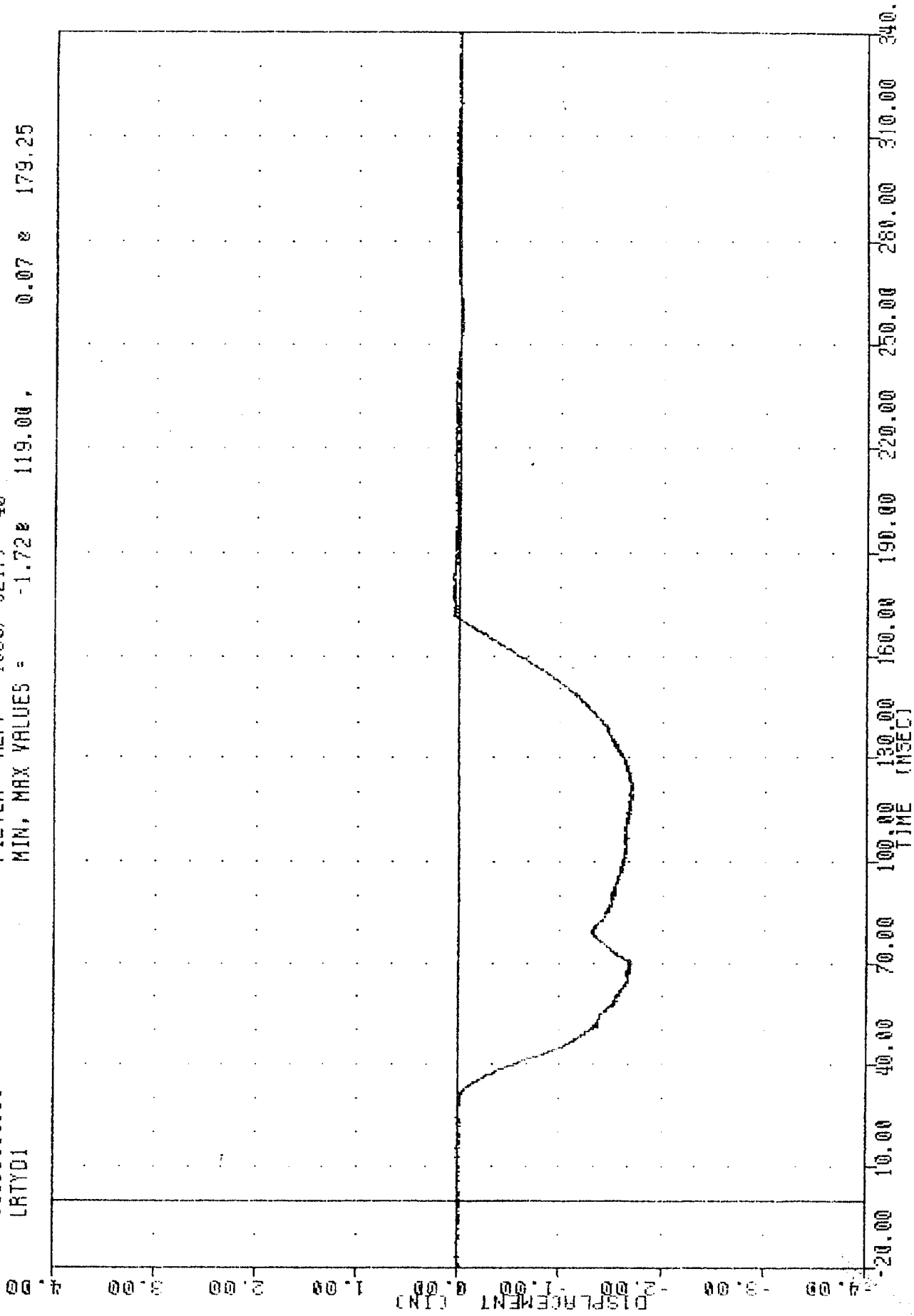
SIDE PROTECTION - 20R/40R

84013000000

FILTER = ALPF 1650/ 5217/ -40

LRTYD1

MIN, MAX VALUES = -1.72e 119.00 , 0.07 e 179.25



MOVING DEFORMABLE BARRIER INTO GRANADA
DRIVER LEFT RIB TO SPINE DISPLACEMENT INCHES

TRC

840113

17-JAN-84

08:59:13

SIDE PROTECTION - 20R/40R

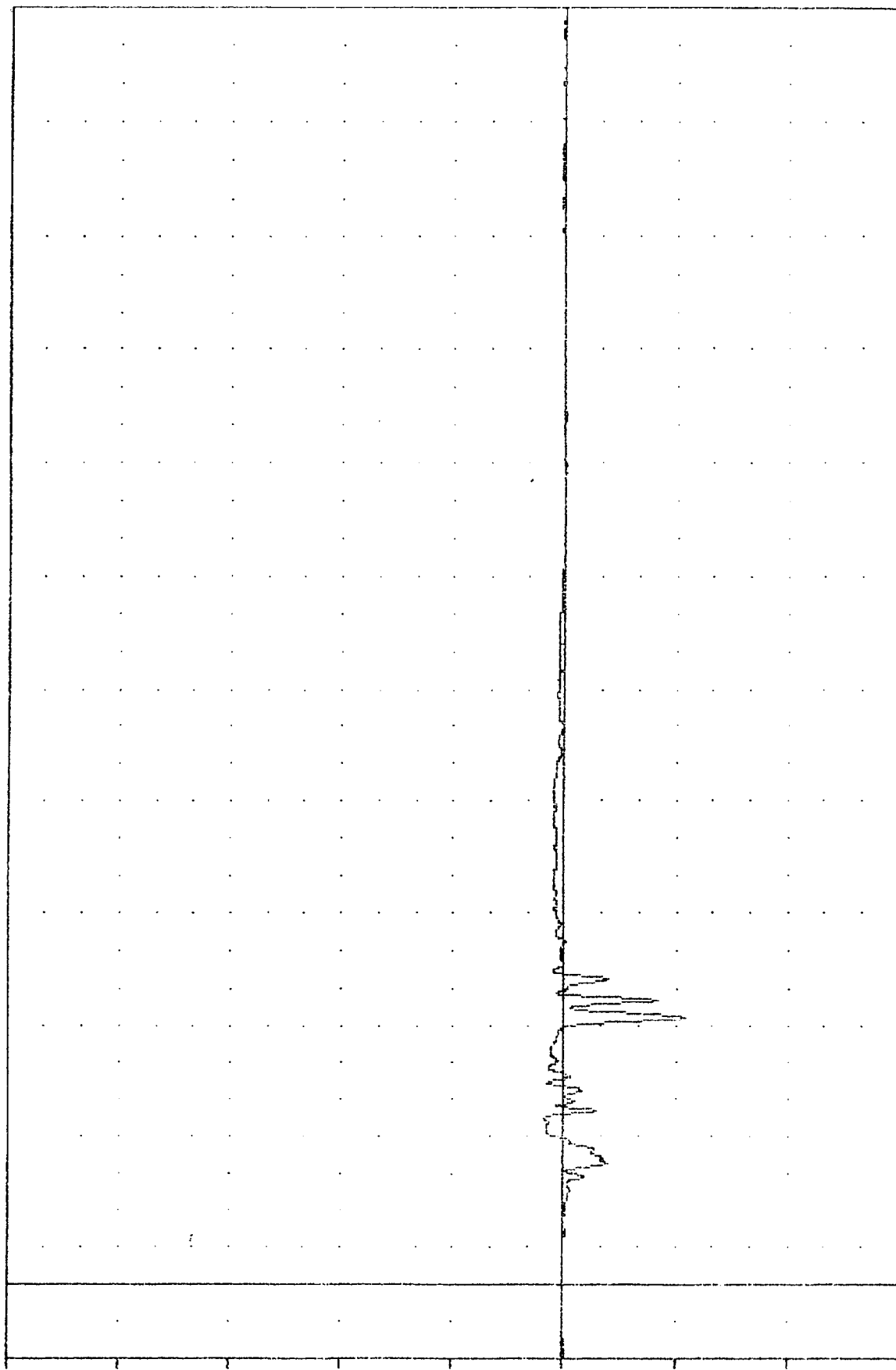
84013000000

PEVXG1

FILTER = BLPF 300/ 949/ -40

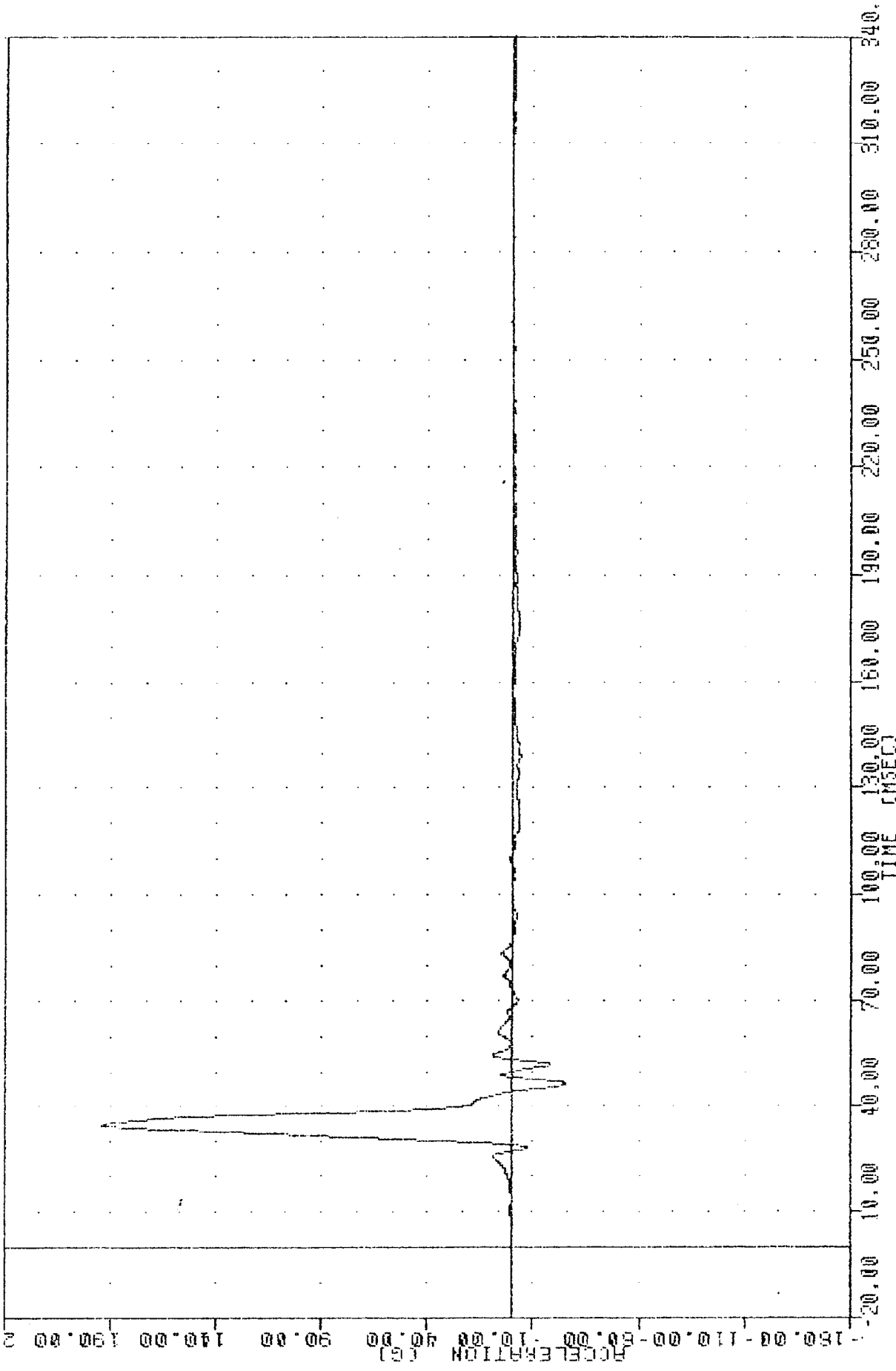
MIN, MAX VALUES = -65.61g 71.88, 10.65g 44.88

ACCELERATION (g)



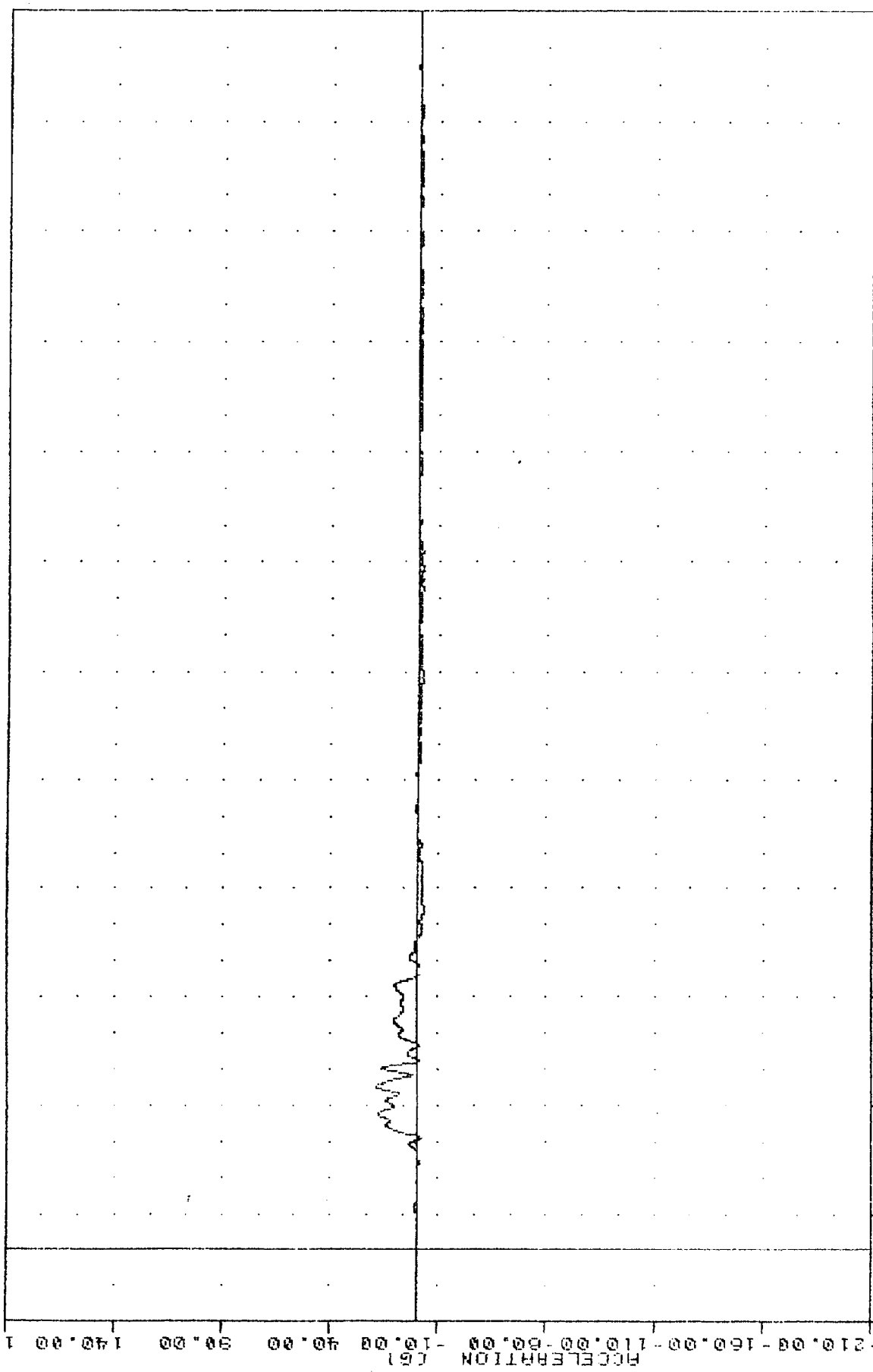
MOVING DEFORMABLE BARRIER INTO GRANADA
DRIVER PELVIS ACCELERATION X AXIS

INC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 PEVYGI
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -25.69e 46.25. 194.01 e 34.63
 17 JAN 84 09:59:13



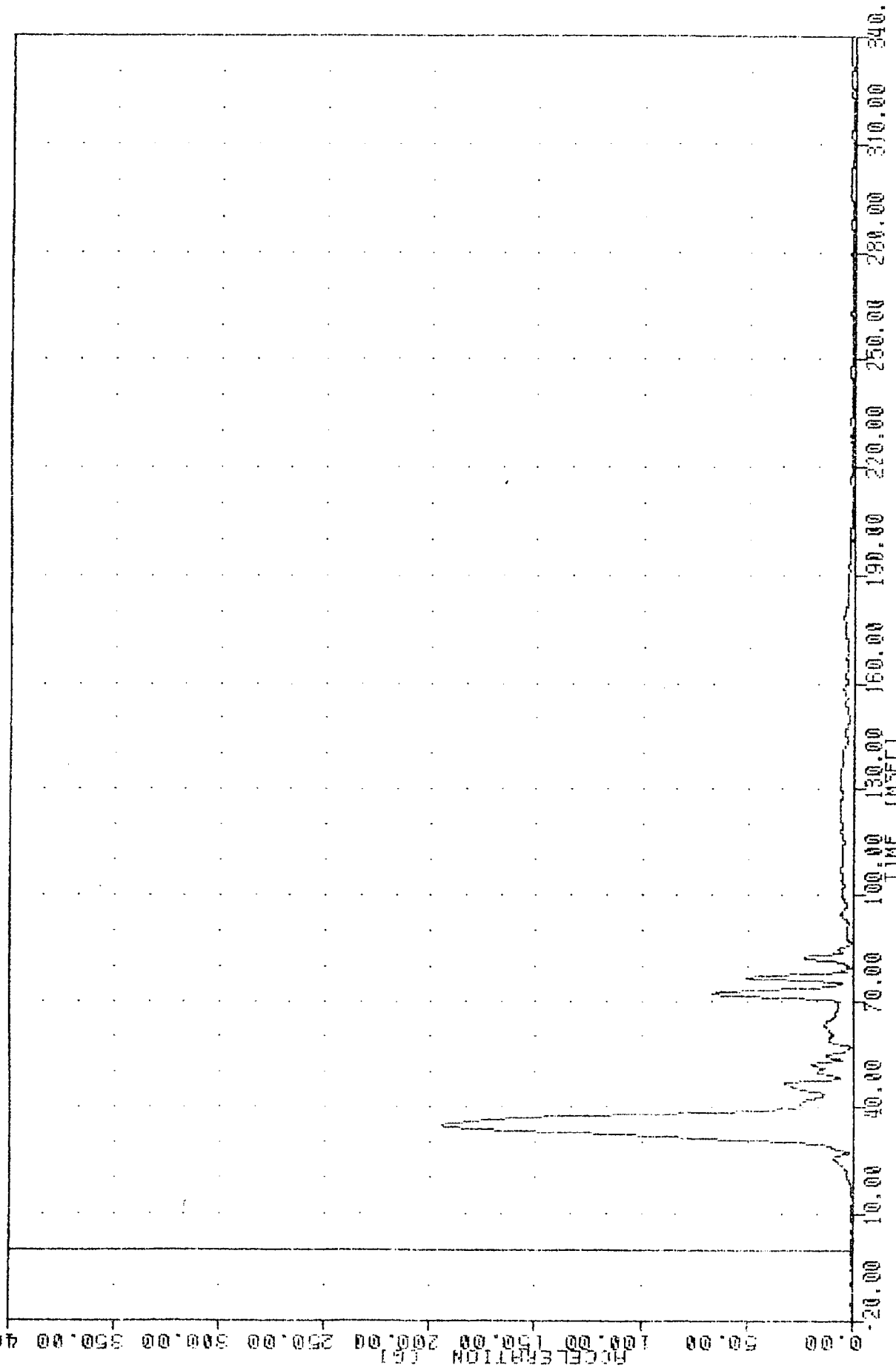
MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER PELVIS ACCELERATION Y AXIS

TMC 704013 17 JAN 84 08:38:43
 SIDE PROTECTION - 20R/4DR
 84013000000
 PEVZ51
 FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -8.328 94.25 19.15 45.00



-20.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00
 MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER PELVIS ACCELERATION Z AXIS

TPC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 PEVRG1
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = 0.04e -12.38, 195.42 e 34.63
 17-JAN-84 09:59:13

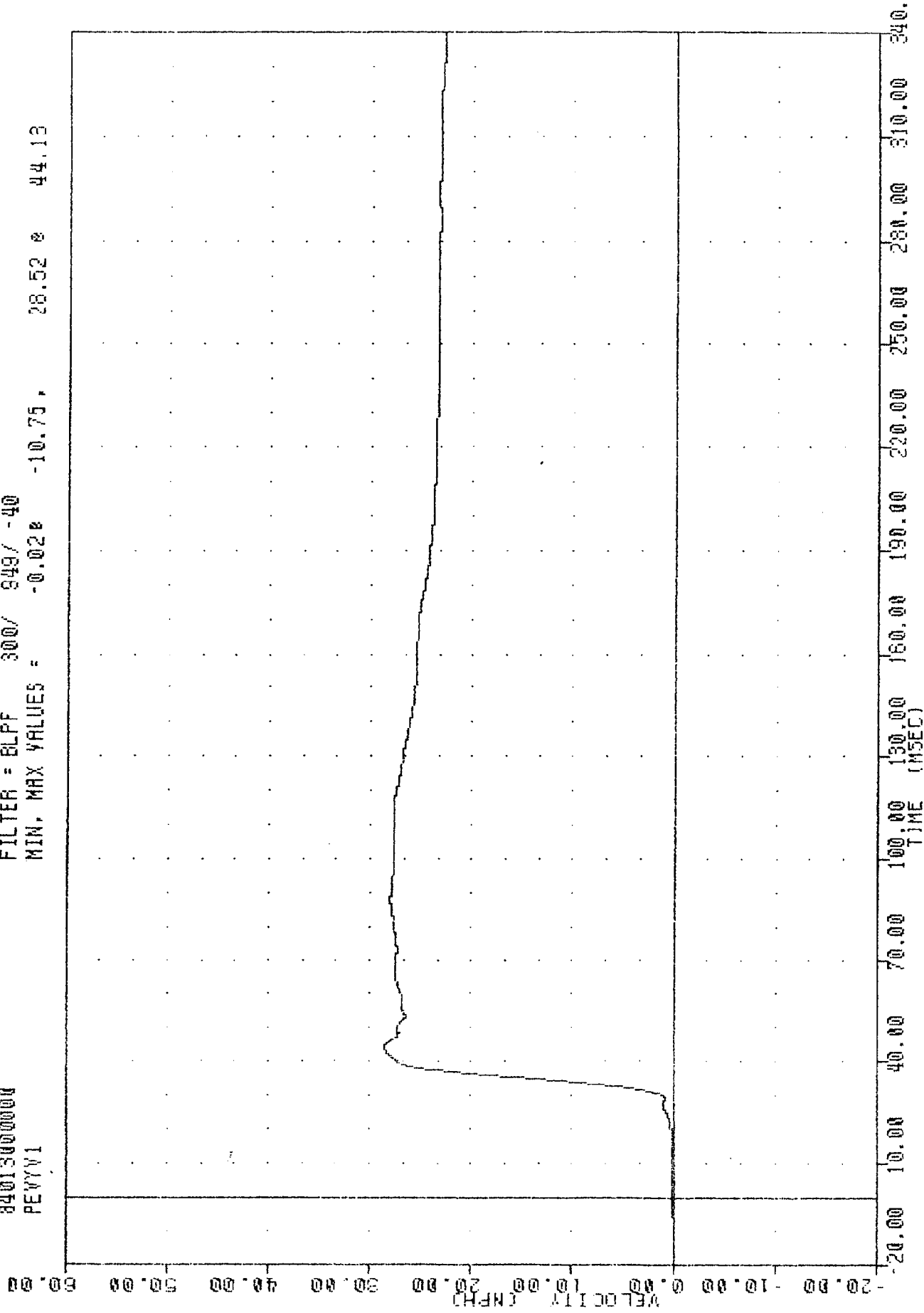


MOVING DEFORMABLE BARRIER INTO GRANADA
 DRIVER PELVIS RESULTANT

IRC
 840113
 SIDE PROTECTION - 2DR/4DR
 84013000000
 PEVYV1

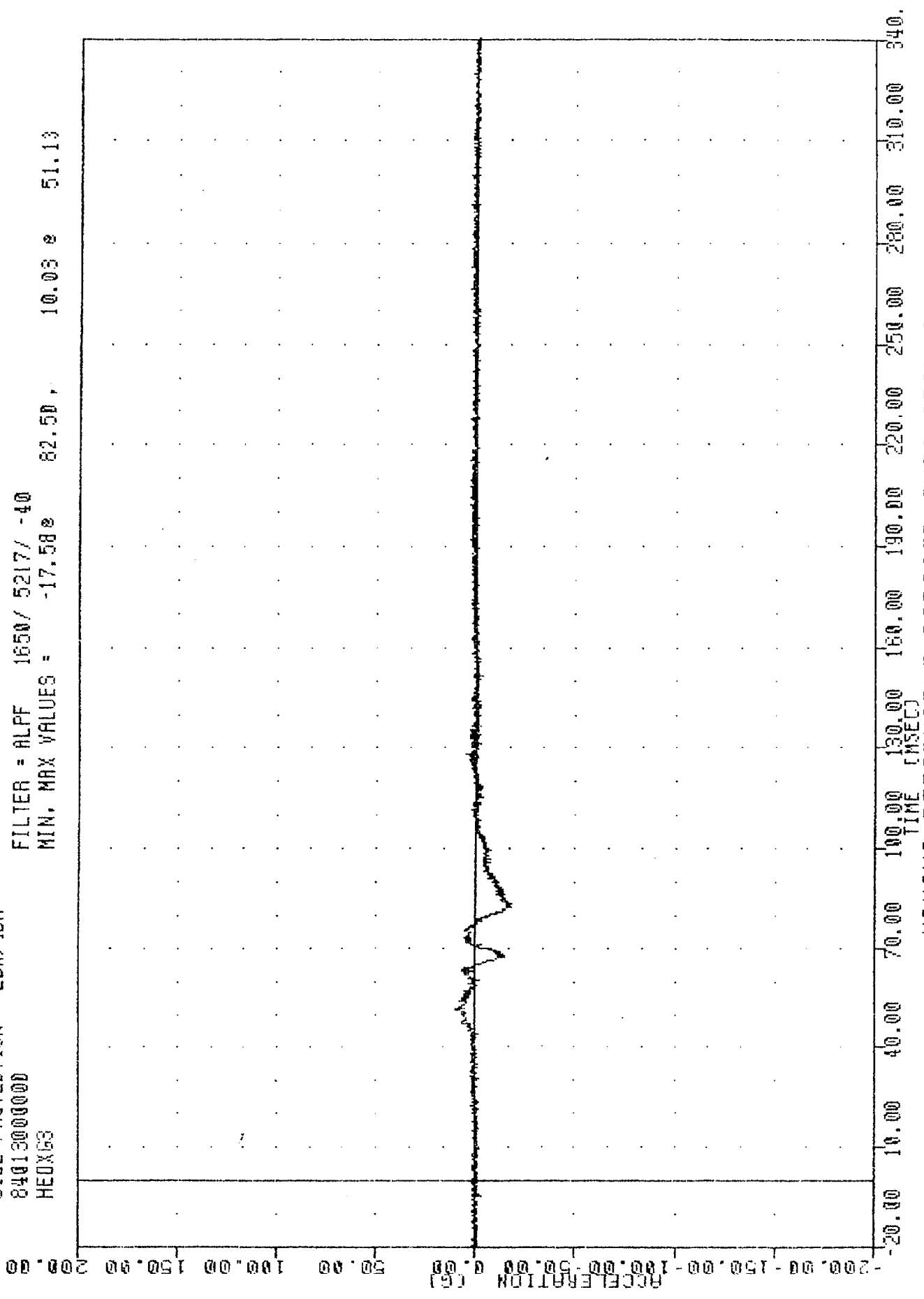
PLOT DATE 17-JAN-84 10:02:02

FILTER = BLPF 300/ 849/ -40
 MIN, MAX VALUES = -0.020 -10.75, 28.52 & 44.13



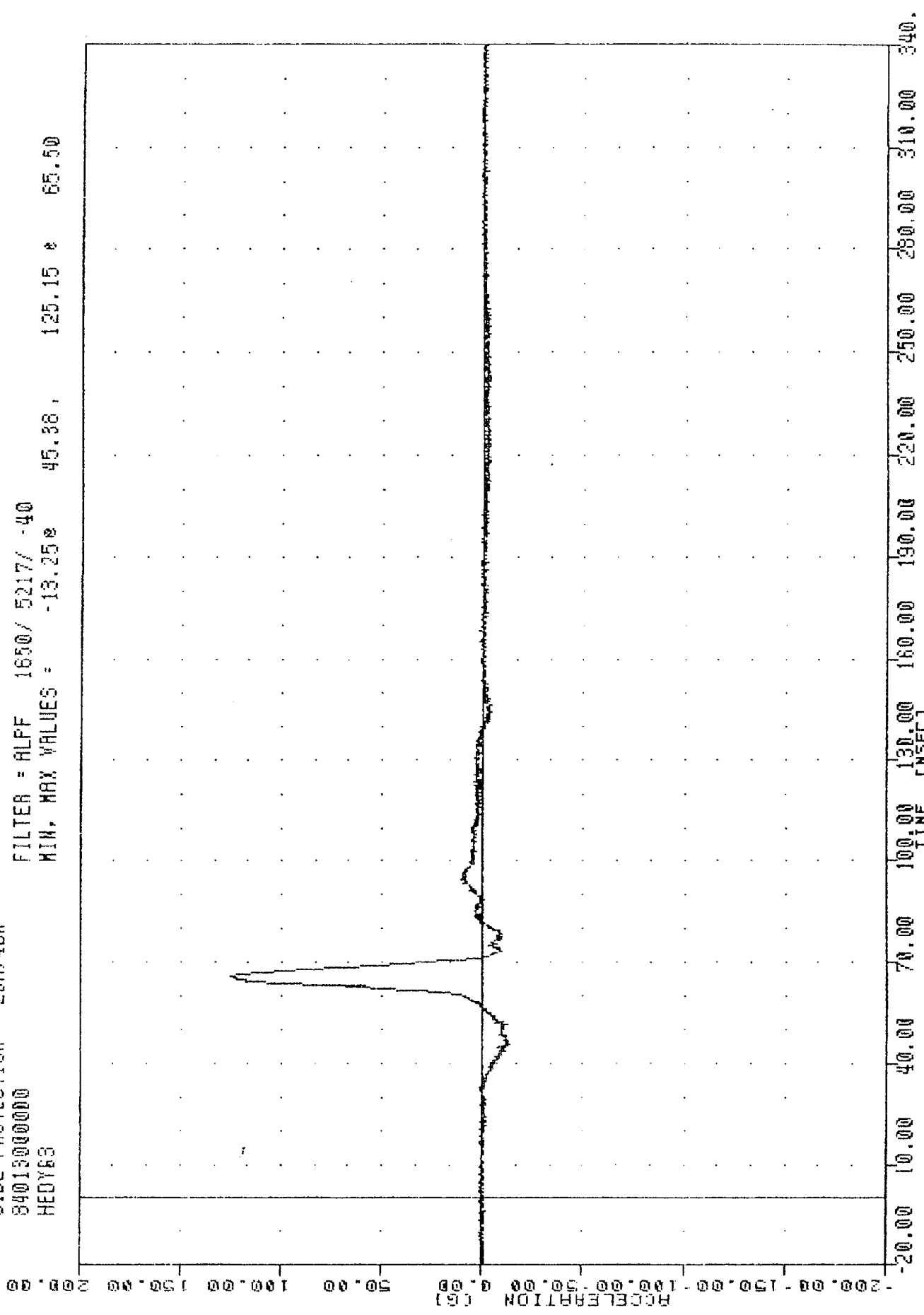
MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA W USING PEVY61

TRL 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 HEDXG3
 PLOT DATE 17-JAN-84 09:59:13
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -17.58g 82.50g 10.03g 51.13



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER HEAD ACCELERATION X AXIS

THC 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 HEDY63
 REUT DATE 17-JAN-84 09:59:13
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -13.25 45.38 125.15 65.50

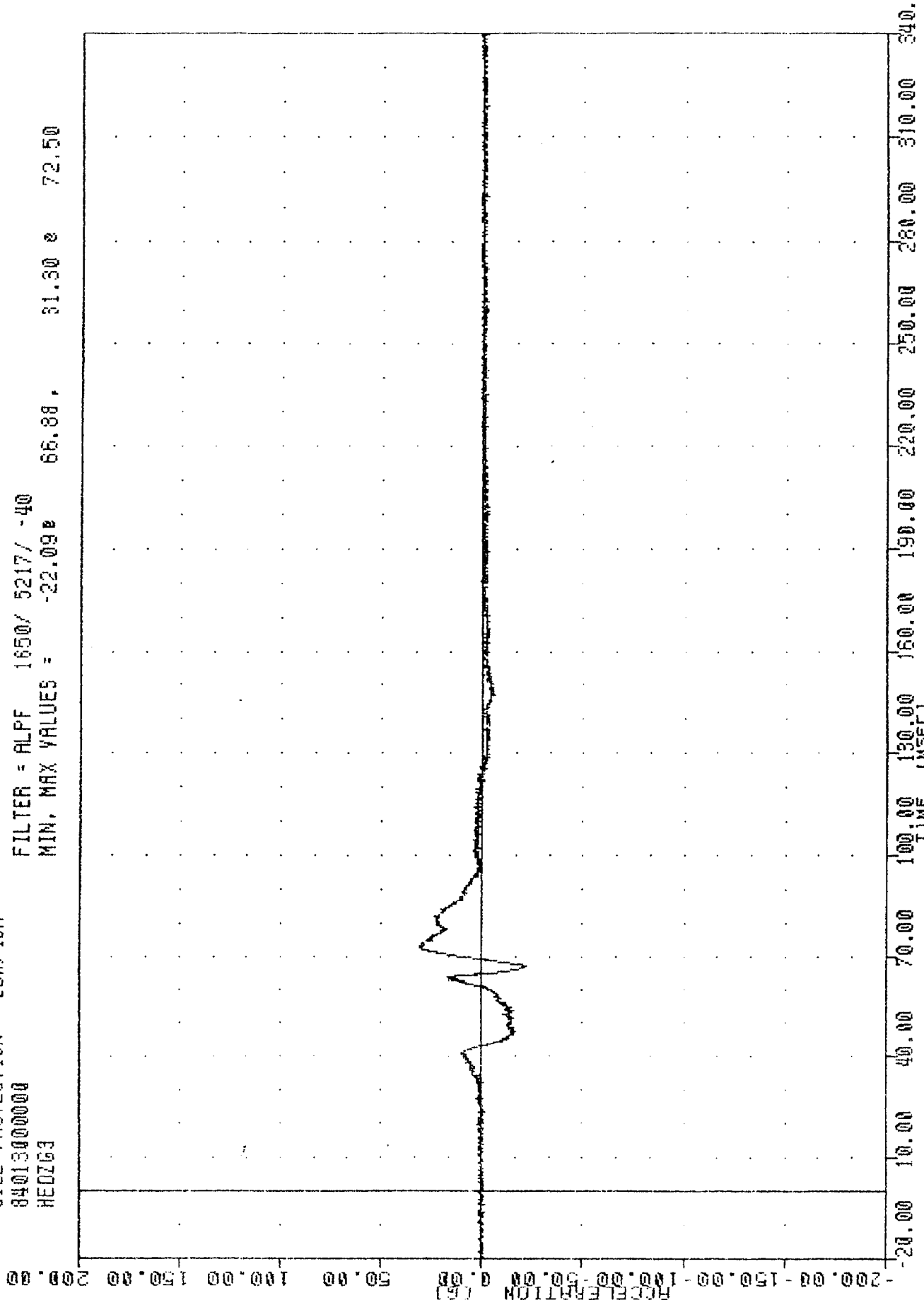


MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER HEAD ACCELERATION Y AXIS

TRC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 HEDZG3

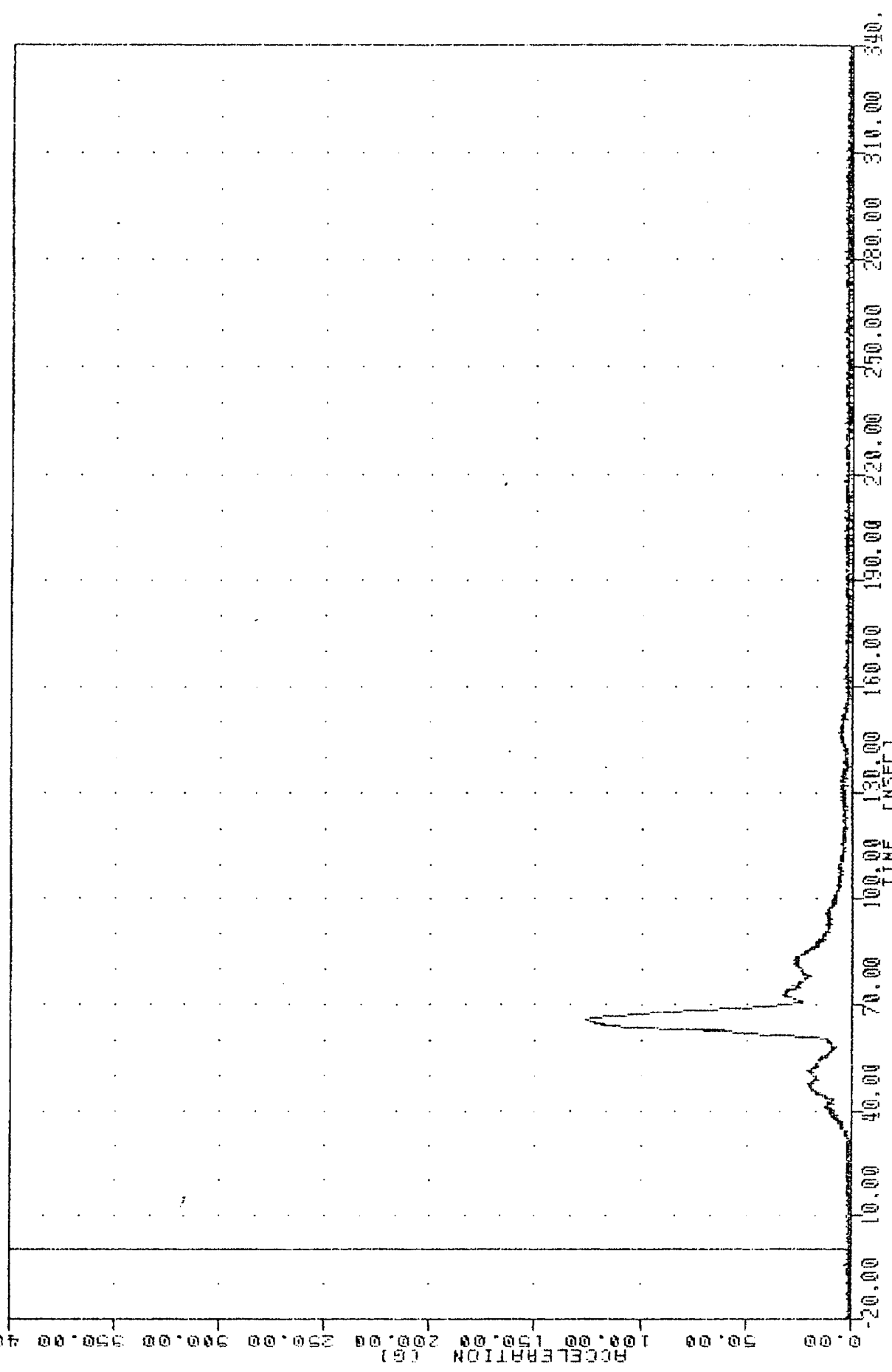
PLOT DATE 17-JAN-84 09:59:13

FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -22.09 66.88 31.30 72.50



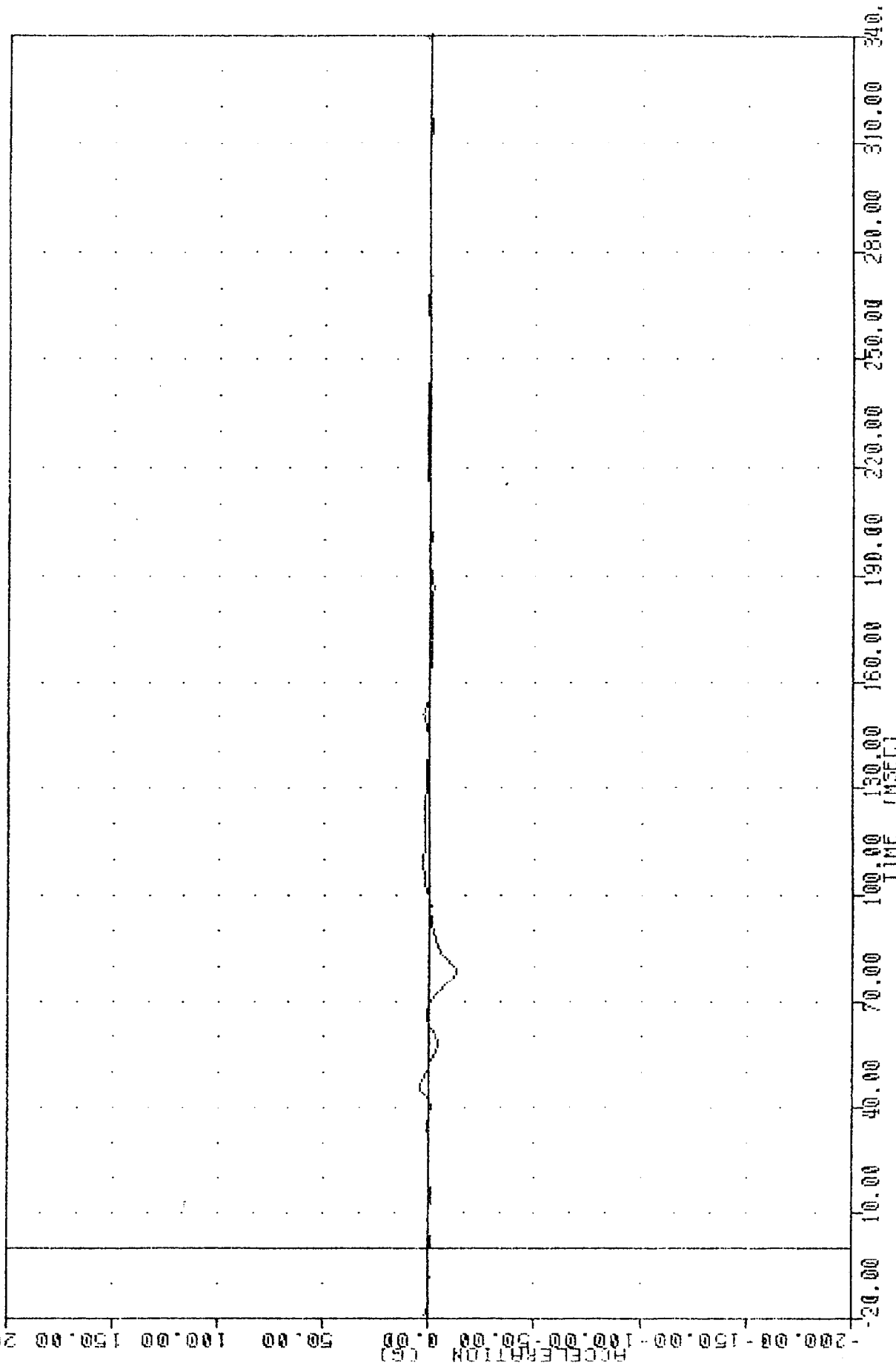
MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER HEAD ACCELERATION Z AXIS

FILE 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 HEDR63
 PRINT DATE 17-JAN-84 09:58:13
 FILTER = ALPF 1850/ 5217/ -40
 MIN. MAX VALUES = 0.14e -10.38. 125.72 e 65.50



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER HEAD RESULTANT

INC 840113 17 JAN 84 09:59:58
 SIDE PROTECTION - 20R/40R
 84013000000
 101XG3
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -12.78e 77.50. 4.86 e 45.62

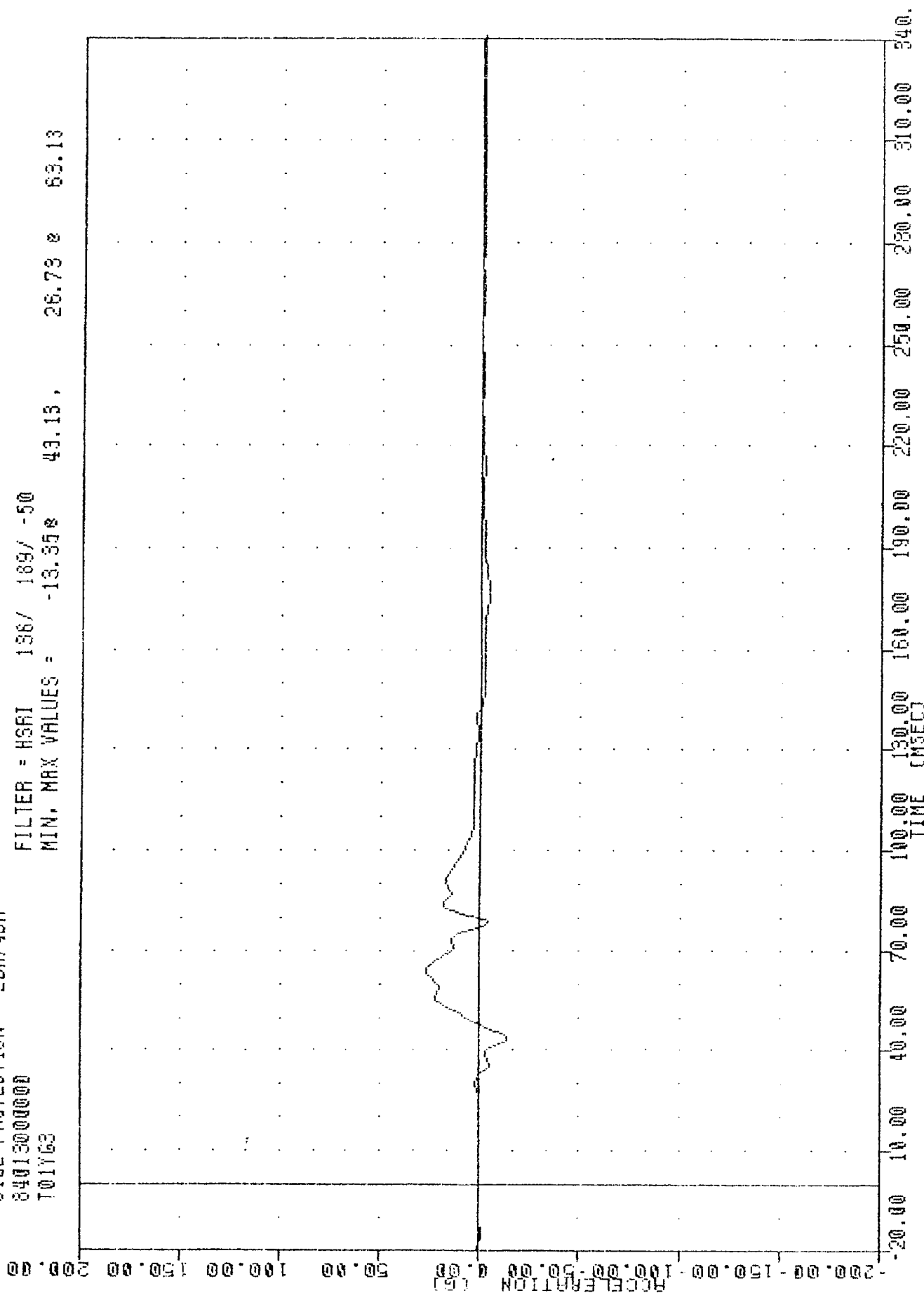


MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER UPPER SPINE ACCELERATION X AXIS

PLUT DATE 17-JAN-84 09:59:58

TRC 840113
SIDE PROTECTION - 20R/40R
840130000000
T01Y63

FILTER = HSRI 186/ 189/ -50
MIN. MAX VALUES = -13.358 43.13, 26.73 & 63.13

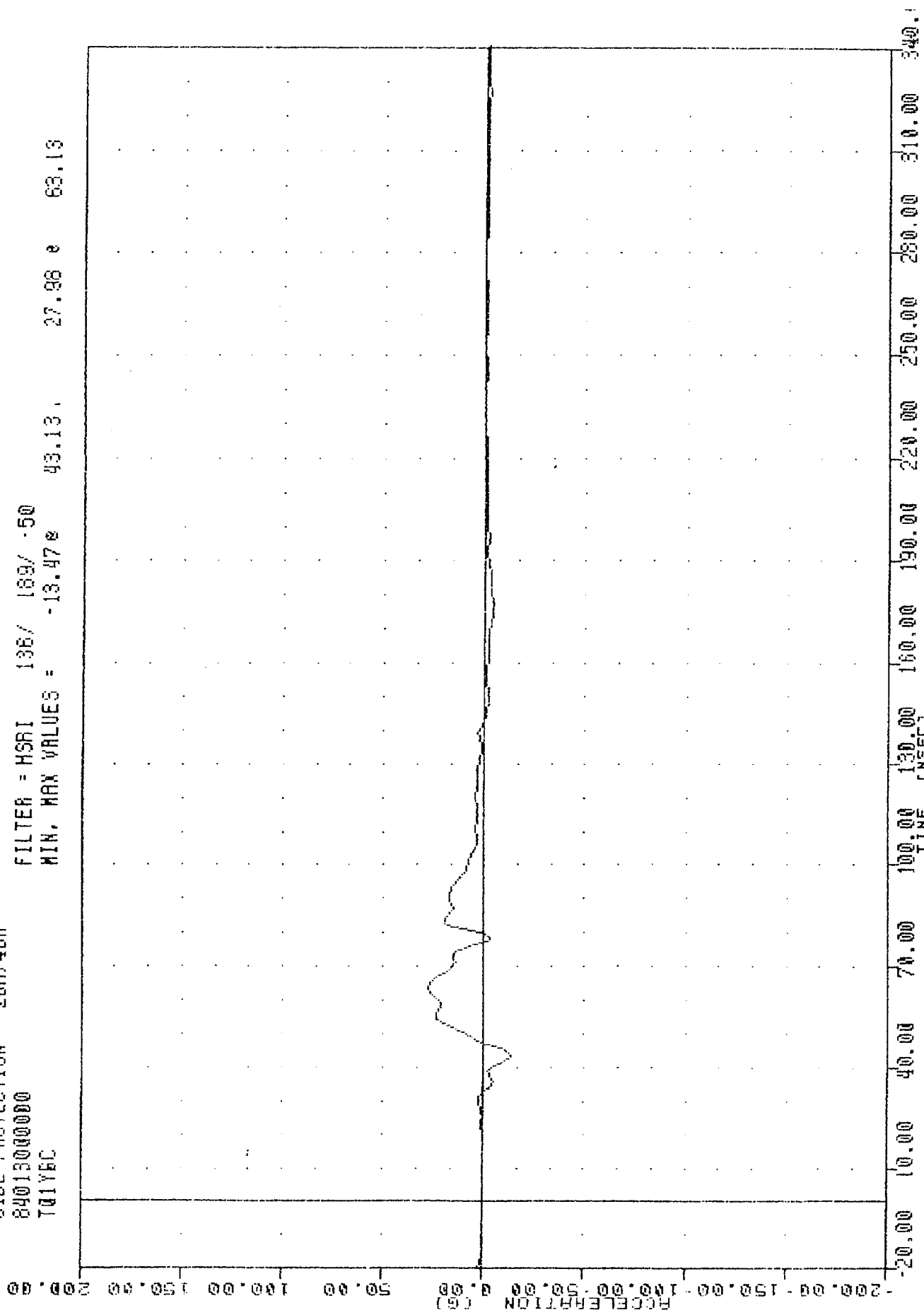


MOVING DEFORMABLE BARRIER INTO GRANADA
PASSENGER UPPER SPINE ACCELERATION Y AXIS

TBC
 , 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T01YEC

PLOT DATE 17-JAN-84 09:59:58

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -13.47% 43.13, 27.88 e 63.13

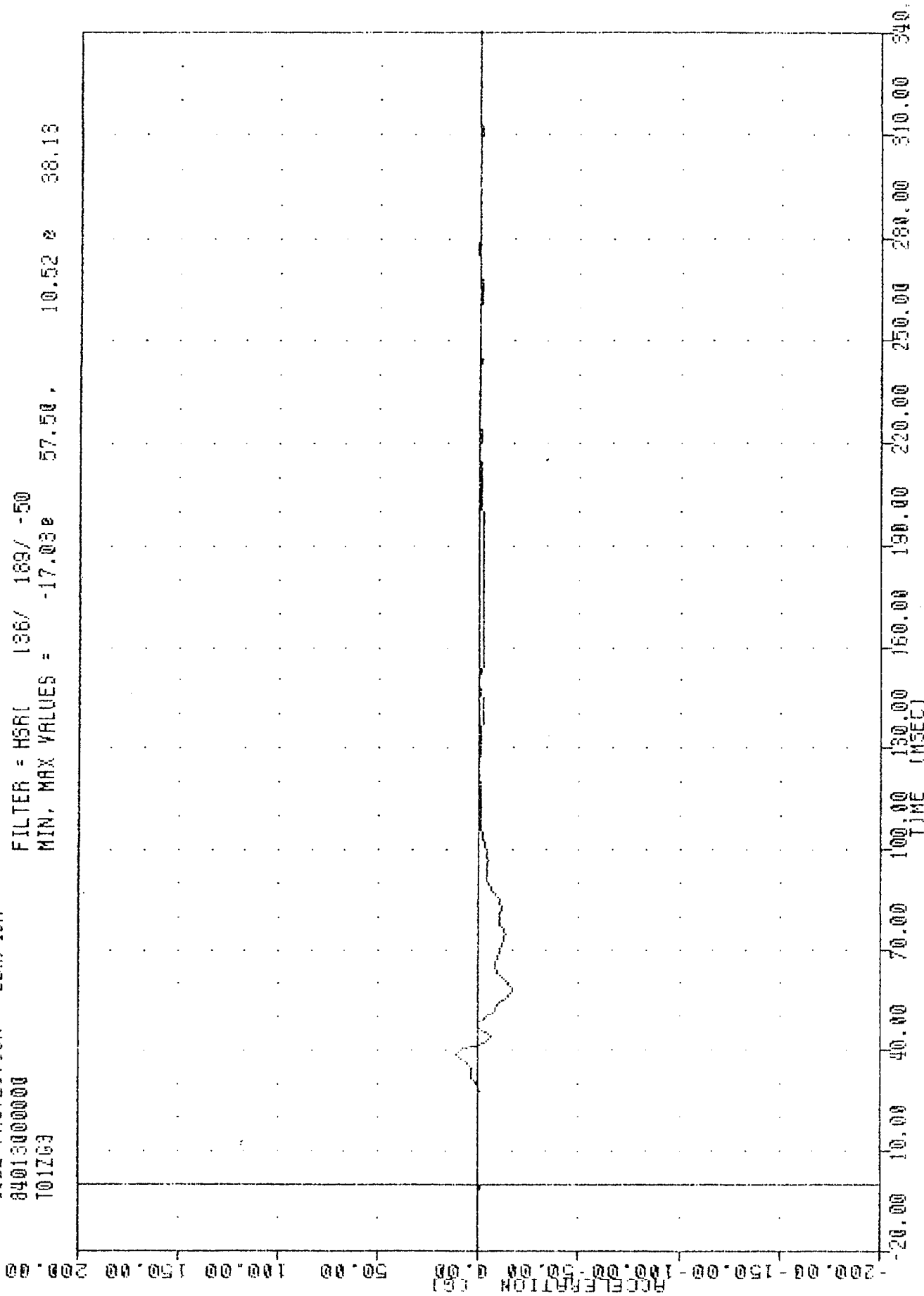


MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER UPPER SPINE ACCELERATION -2 Y AXIS

TRC
 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 T01Z63

PLOT DATE 17-JAN-84 09:59:58

FILTER = HSR1 136/ 169/ -50
 MIN, MAX VALUES = -17.03e 57.50, 10.52 e 38.13



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER UPPER SPINE ACCELERATION Z AXIS

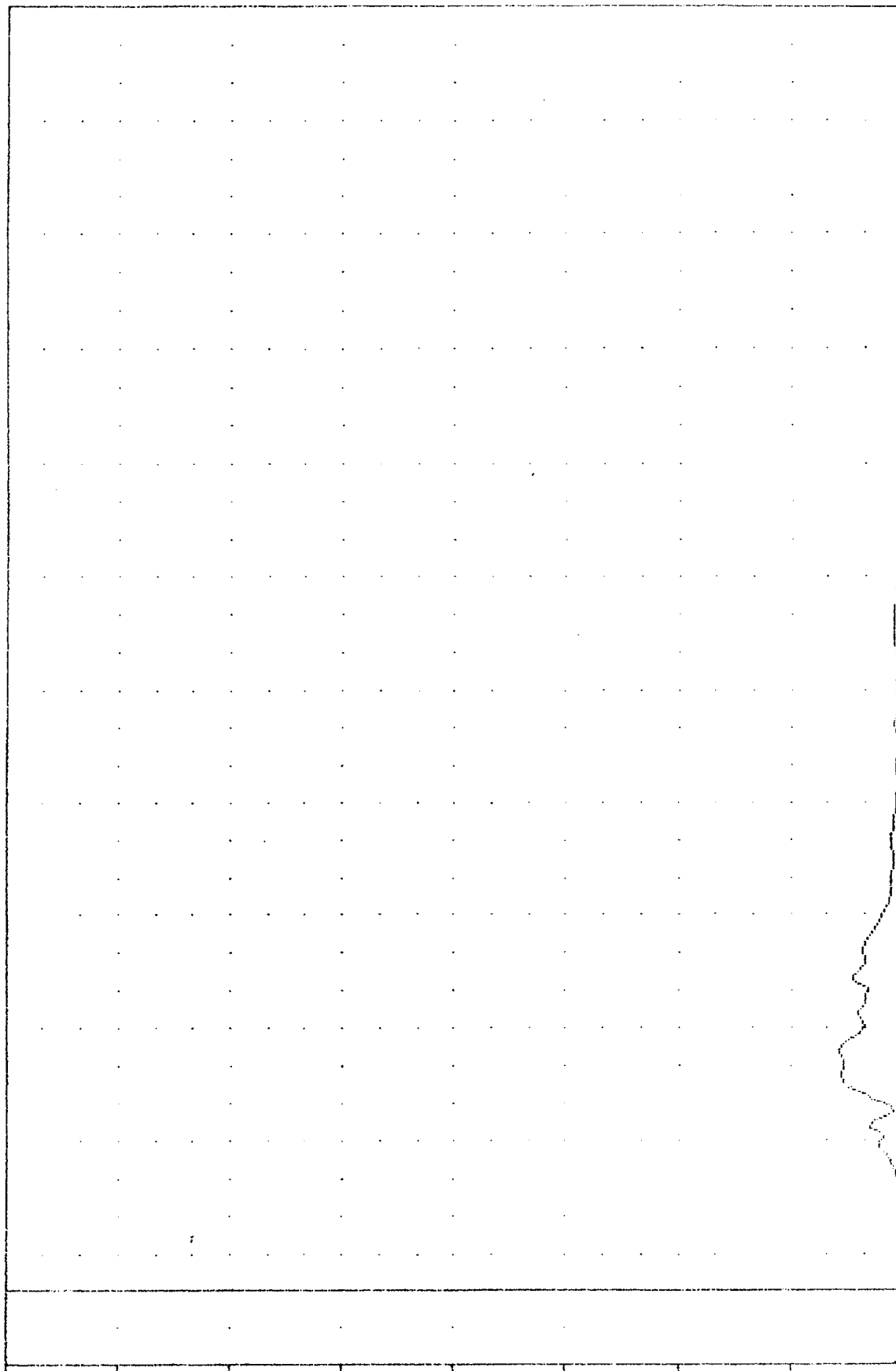
PLUT DATE 17-JAN-84 09:59:58

TAL 840113
SIDE PROTECTION - 20R/40R

FILTER = HSRI 136/ 189/ 50

MIN, MAX VALUES = 0.150 -6.25 28.18 e 63.13

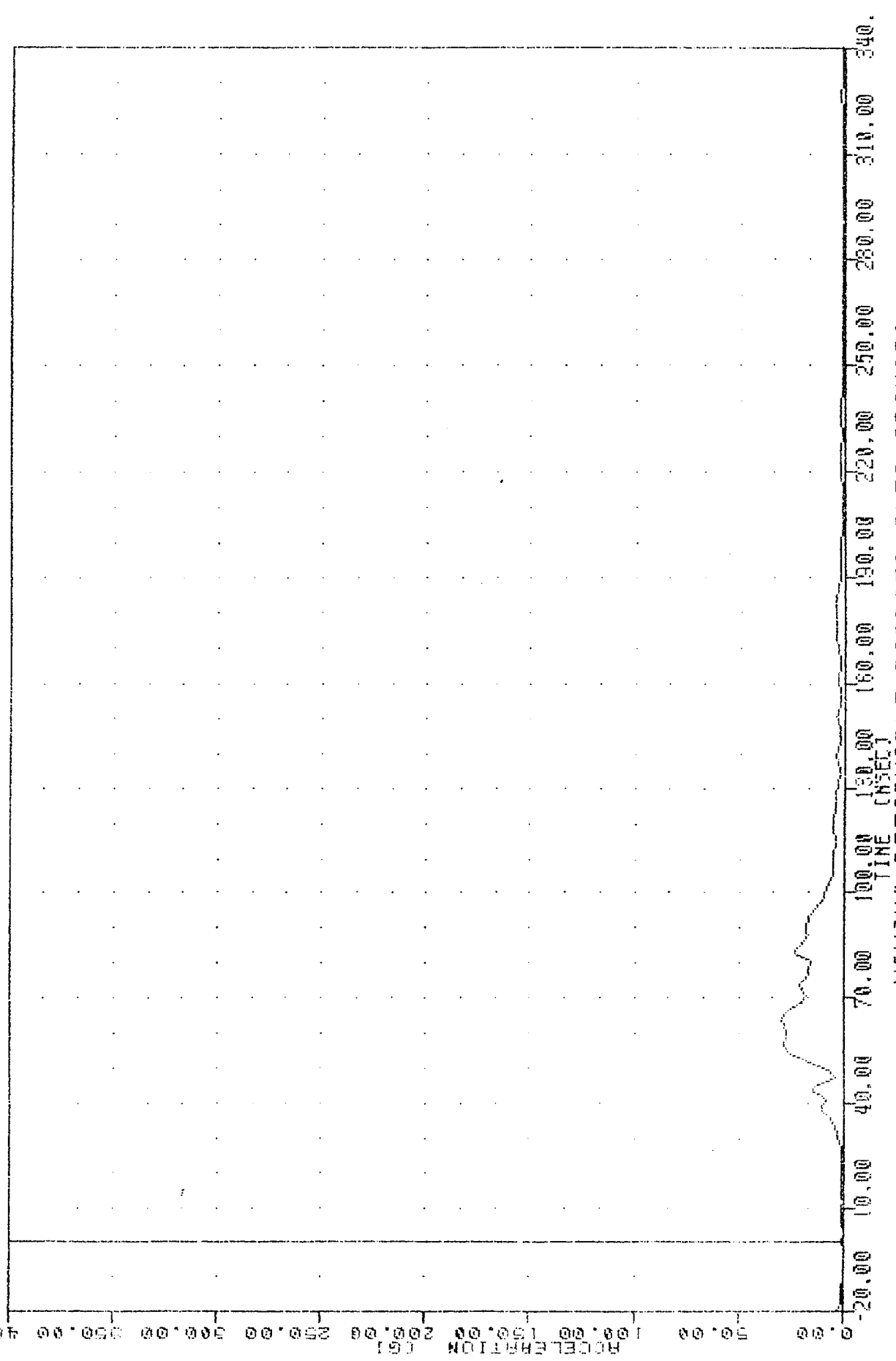
ACCELERATION (G)



-20.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

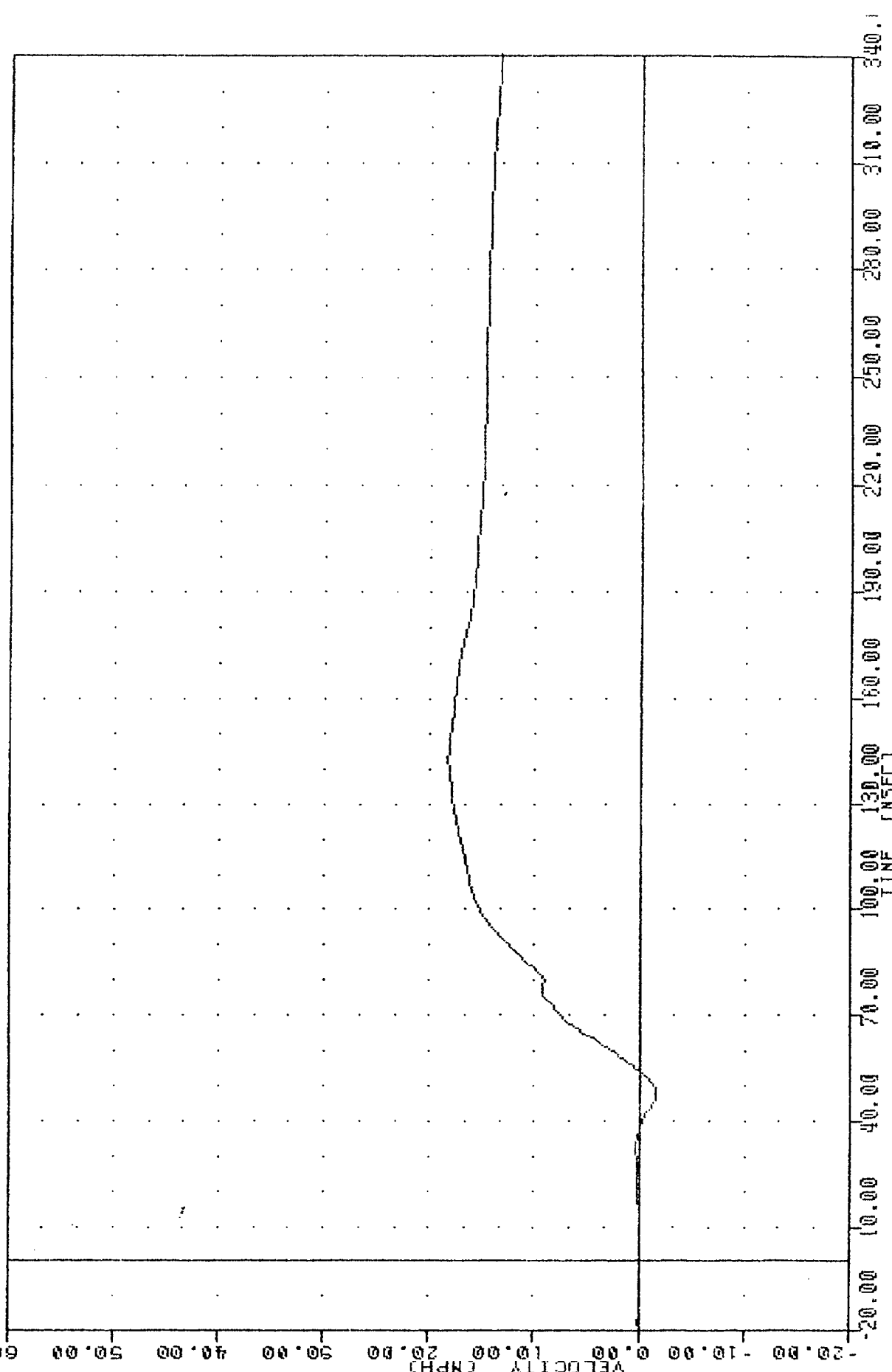
MOVING DEFORMABLE BARRIER INTO GRANADA
PASSENGER UPPER SPINE RESULTANT

TAC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T01R63
 FILTER = HSRI 136/ 189/ 50
 MIN. MAX VALUES = 0.192 -11.25, 29.37 & 63.13
 PLOT DATE 17-JAN-84 10:00:58



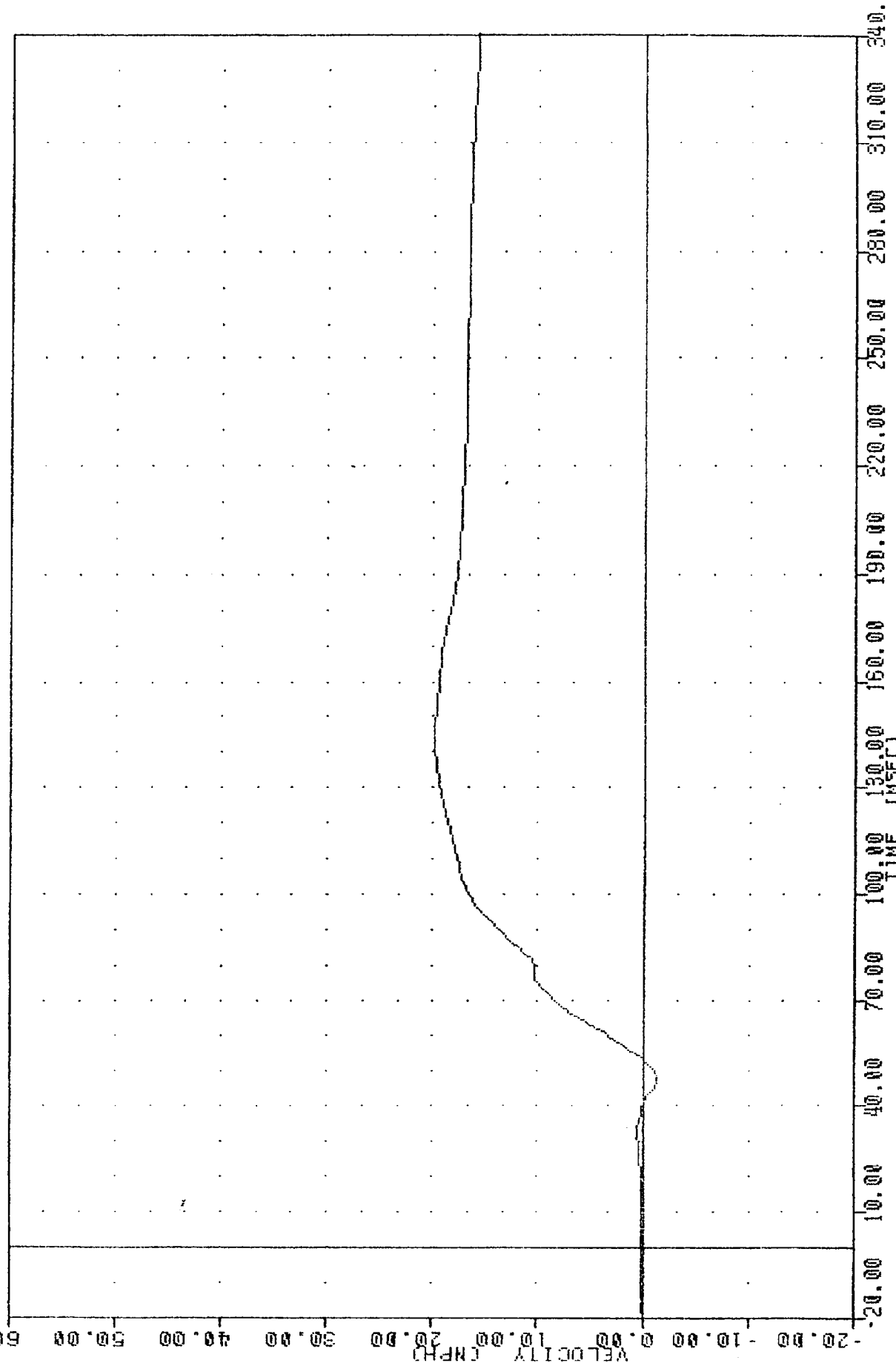
MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER UPPER SPINE RESULTANT USING T01YGC

TMC 840113 17 JAN 84 10:01:22
 SIDE PROTECTION - 20R/4DR
 8401300000
 T01Y43
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -1.66 46.88, 18.27 141.88



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING T01Y43

IRC 840113
 SIDE PROTECTION - 20A/40A
 84013000000
 T01YVC
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -1.388 46.88 19.91 142.50
 17-JUN-84 10:01:22

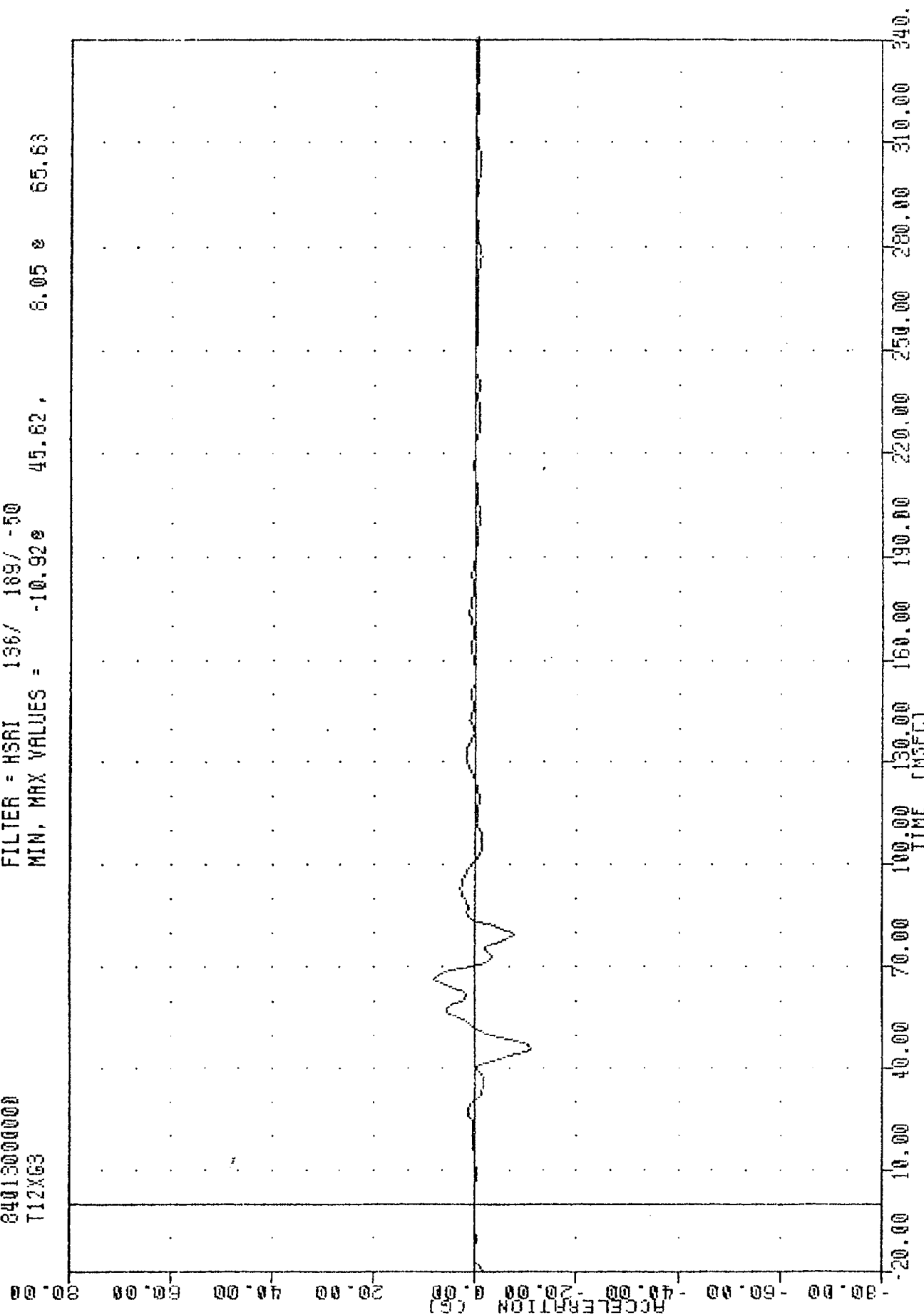


MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING T01YGC

THEC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T12XG3

PLOT DATE 17-JAN-84 09:59:58

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -10.92 45.62, 8.05 65.63



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LOWER SPINE ACCELERATION X AXIS

THC

840113

PLUT DATE

17-JAN-84

09:59:58

SIDE PROTECTION - 20R/4DR

84013000000

FILTER = HSRI 136/ 189/ -50

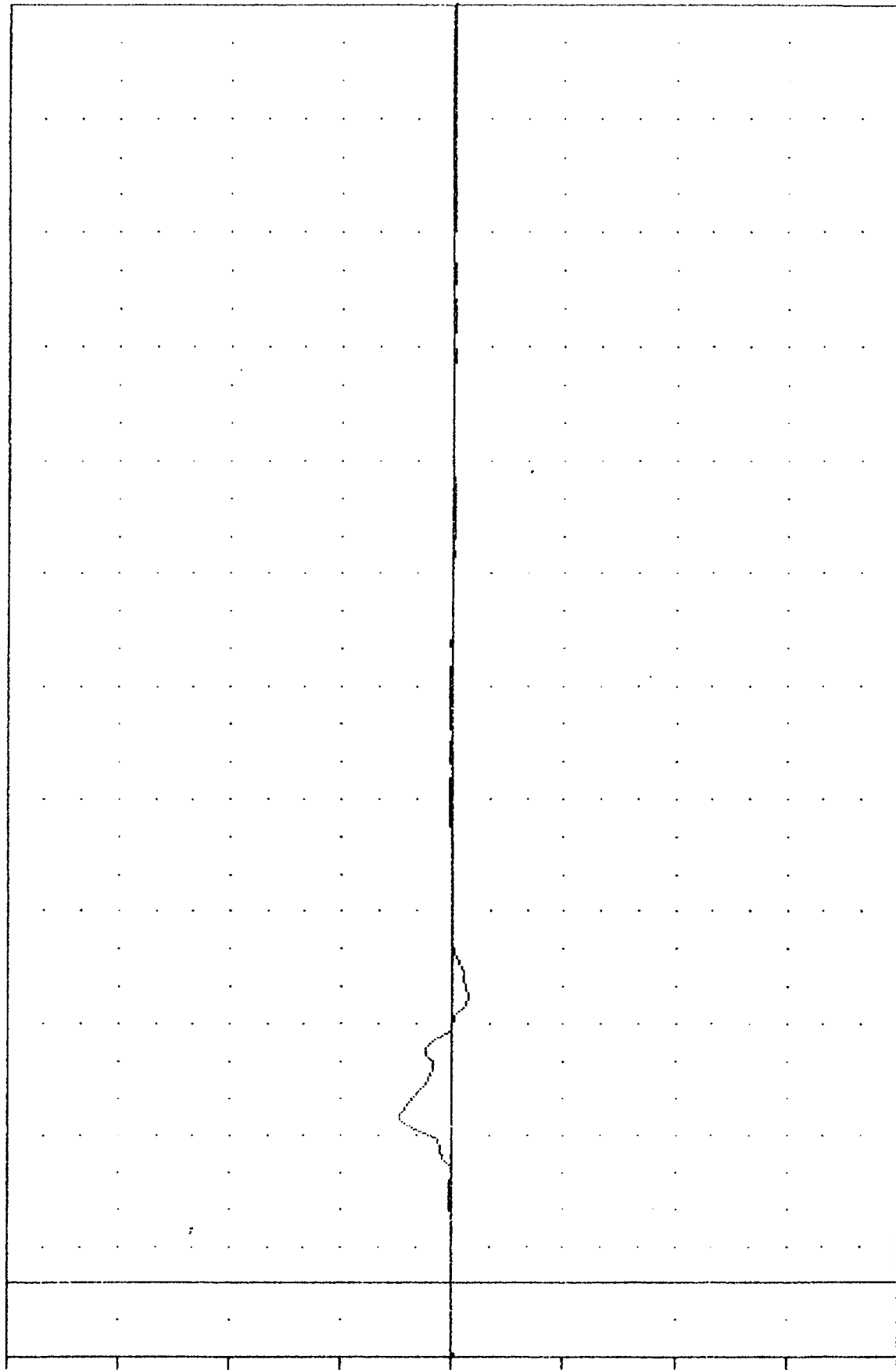
T12Y63

MIN, MAX VALUES = -13.380

42.44 e

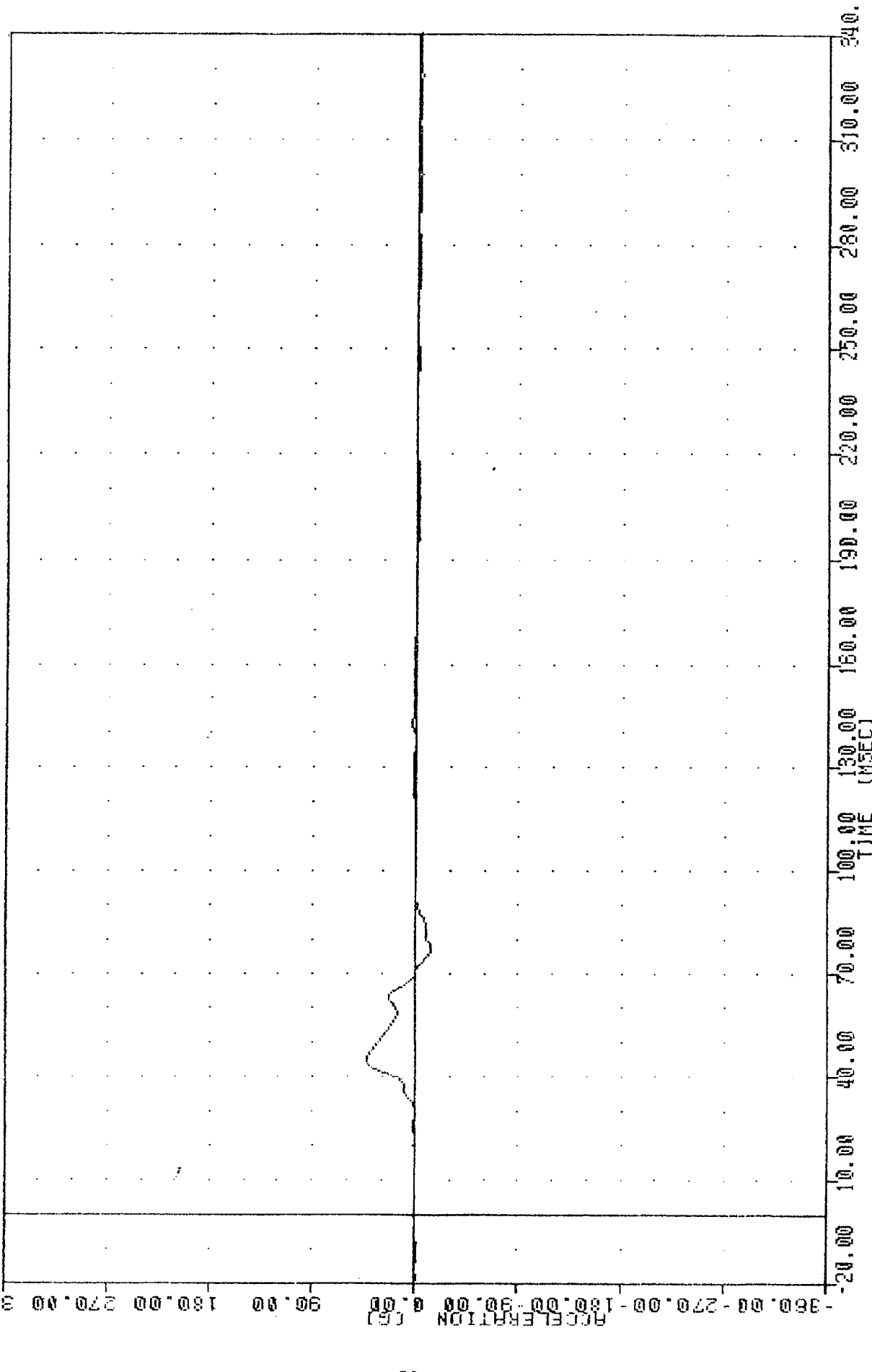
43.75

ACCELERATION (G)



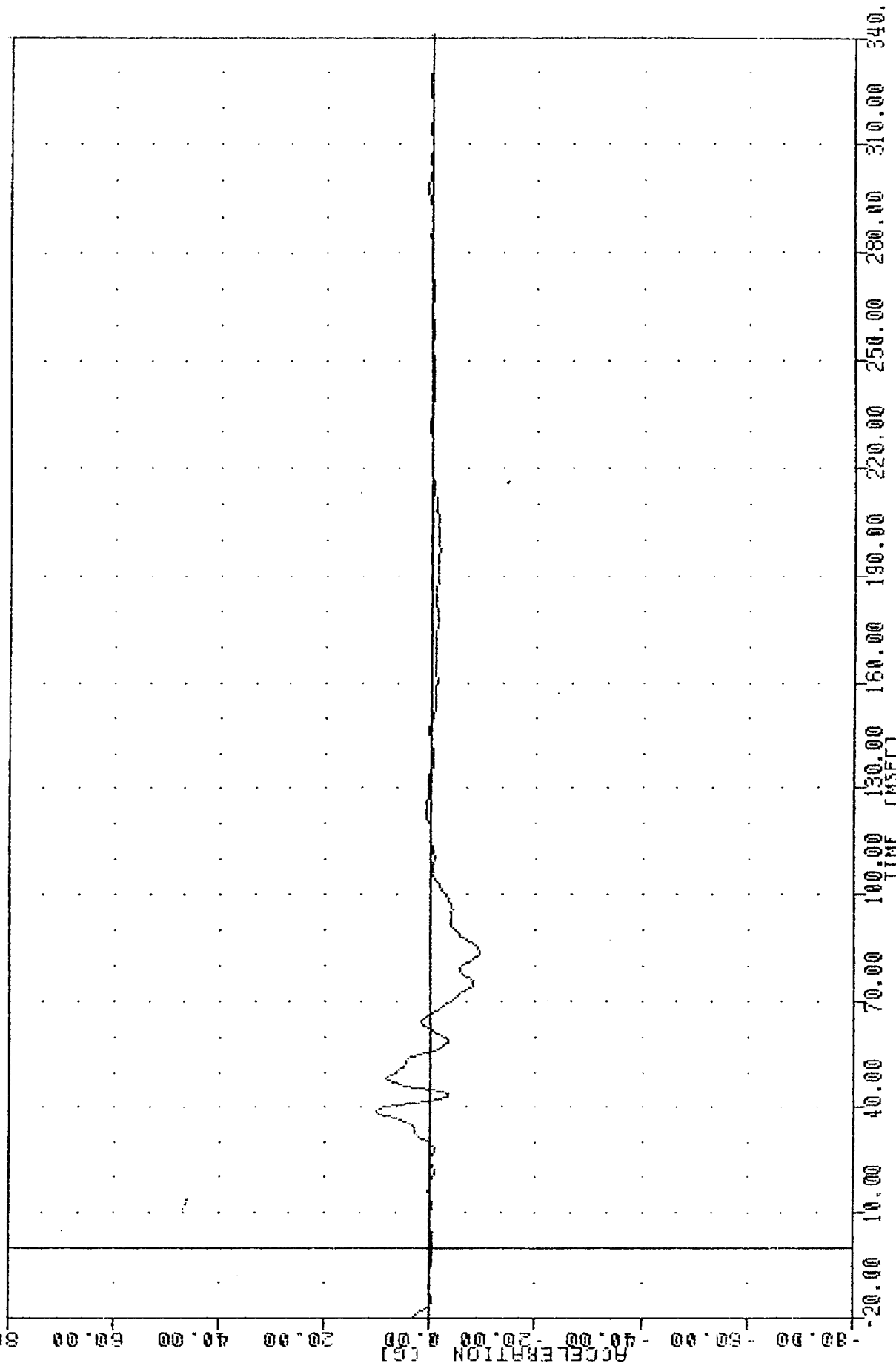
MOVING DEFORMABLE BARRIER INTO GRANADA
PASSENGER LOWER SPINE ACCELERATION Y AXIS

TMC 7:40 PM 17 JAN 84 09:58.00
 SIDE PROTECTION - 20R/40R
 84013000000
 T12YGC
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -13.58 76.88 42.98 44.38



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LOWER SPINE ACCELERATION +2 Y AXIS

TMC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T12ZG3
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -9.31e 83.12, 10.43 e 38.13
 PLOT DATE 17-JAN-84 09:59:58



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LOWER SPINE ACCELERATION Z AXIS

PLUT DATE 17-JUN-84 09:59:58

IRL 840113
SIDE PROTECTION - 20R/40R

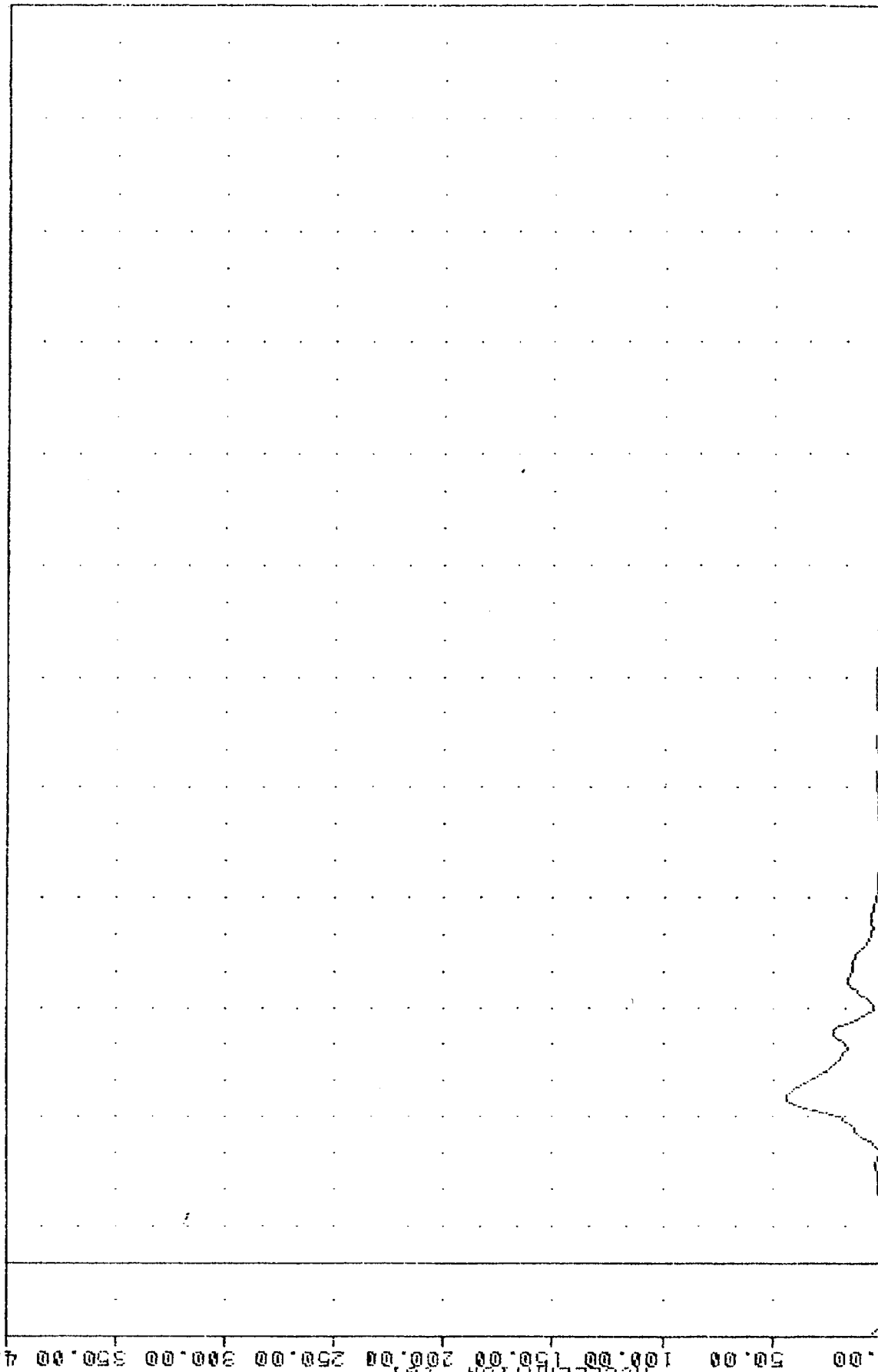
84013000000

T12RG3

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = 0.06e -6.88, 43.57 & 44.38

ACCELERATION (G)

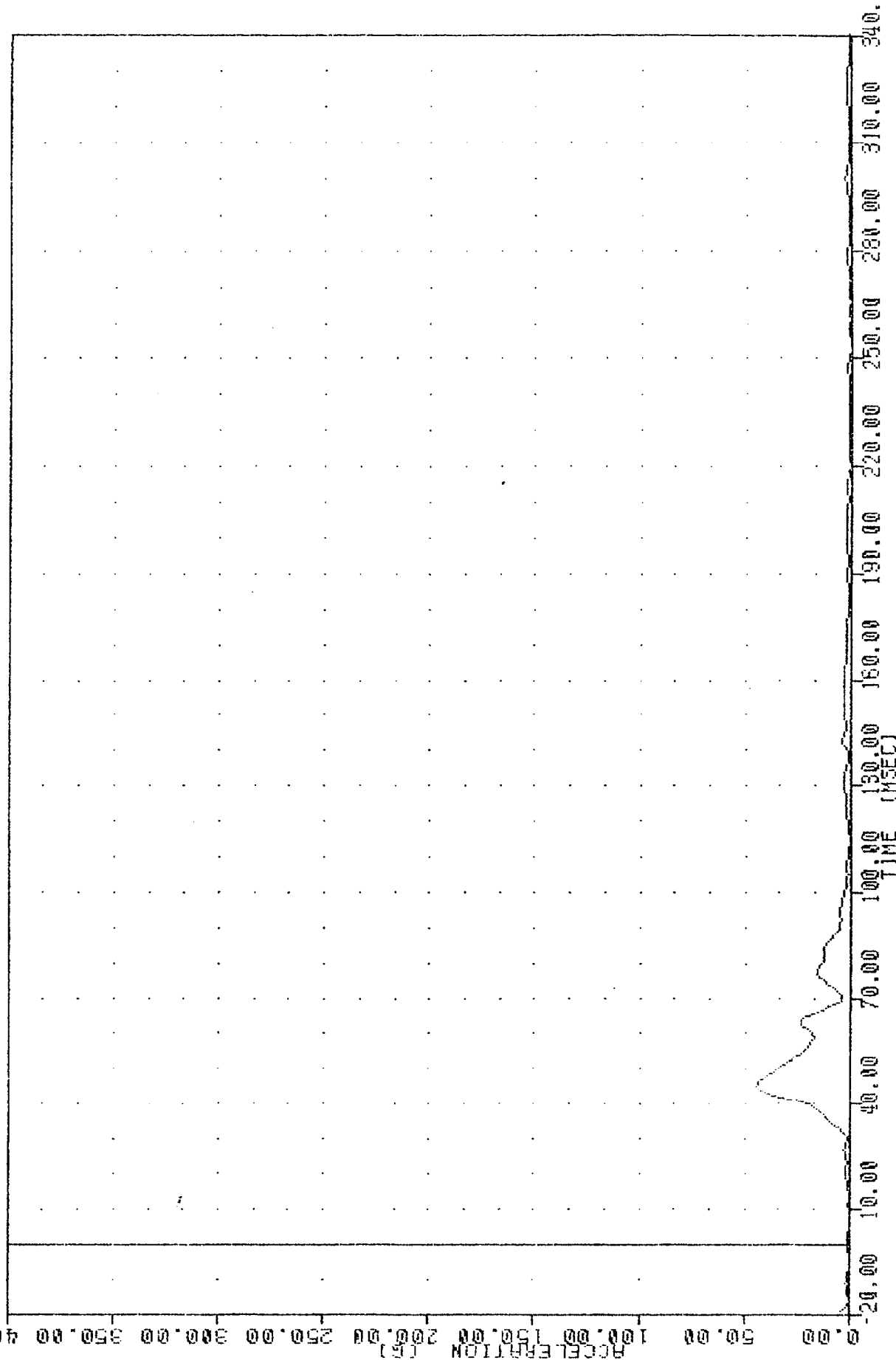


TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO GRANADA

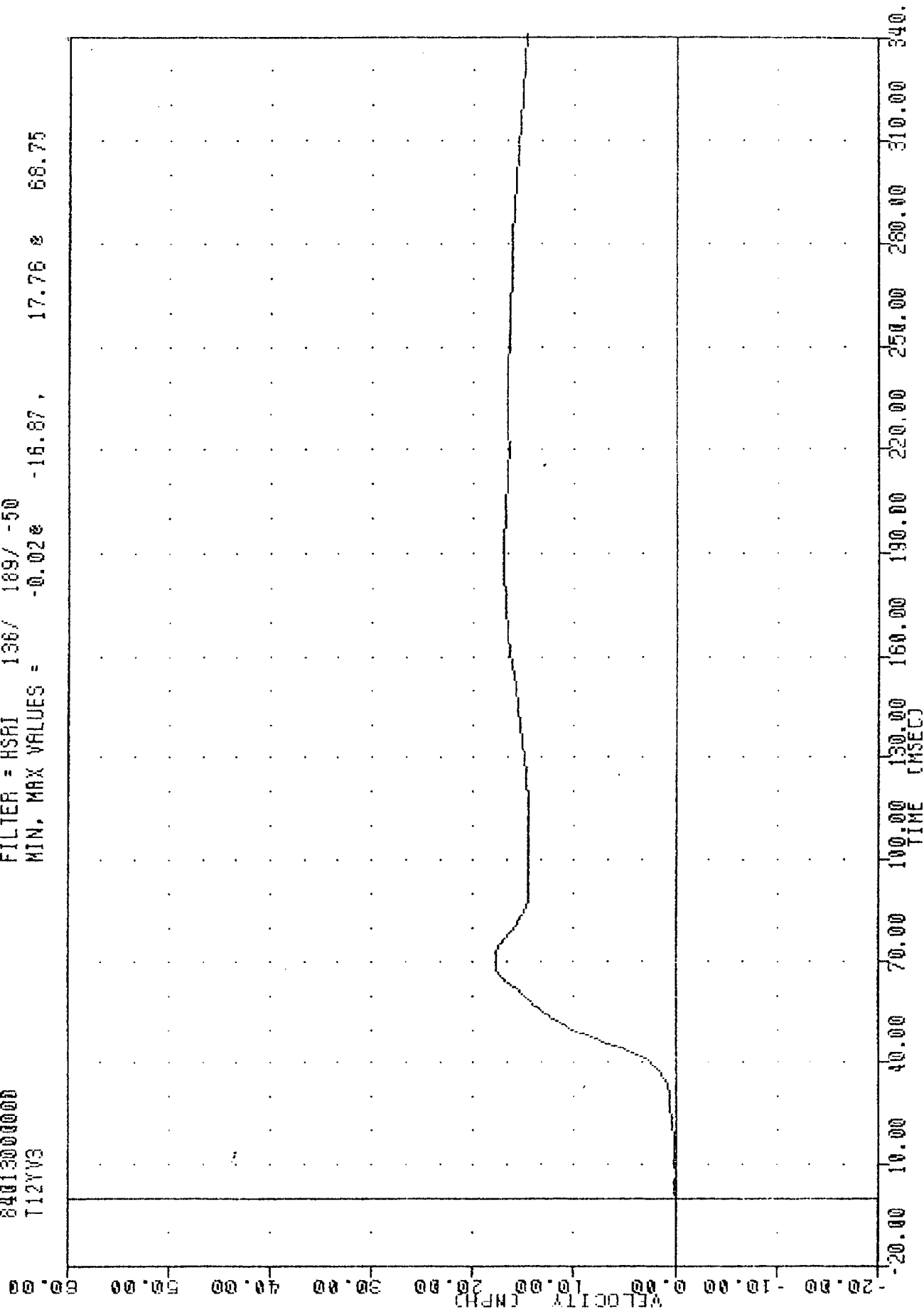
PASSENGER LOWER SPINE RESULTANT

TRL 840113 17-JUN-84 10:00:58
 SIDE PROTECTION - 2DR/40R
 84013000000
 T12R63
 FILTER = HSRL 136/ 189/ -50
 MIN. MAX VALUES = 0.08e -6.88, 44.10 e 44.38



MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LOWER SPINE RESULTANT USING T12Y6C

TRC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 T12YV3
 FILTER = HSRI 138/ 189/ -50
 MIN. MAX VALUES = -0.028 -16.87, 17.76 & 68.75
 PLOT DATE 17-JAN-84 10:01:22

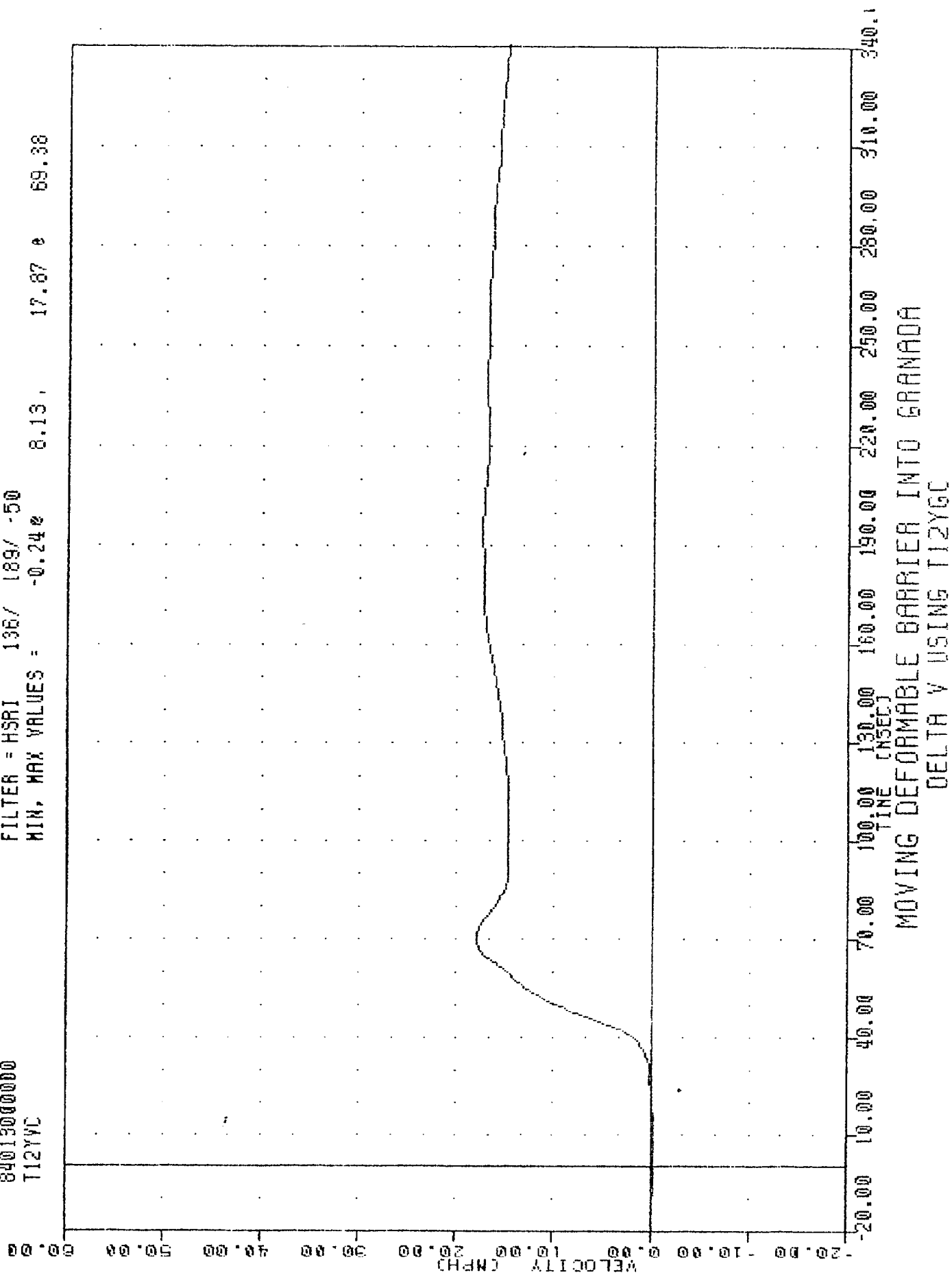


MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING T12Y63

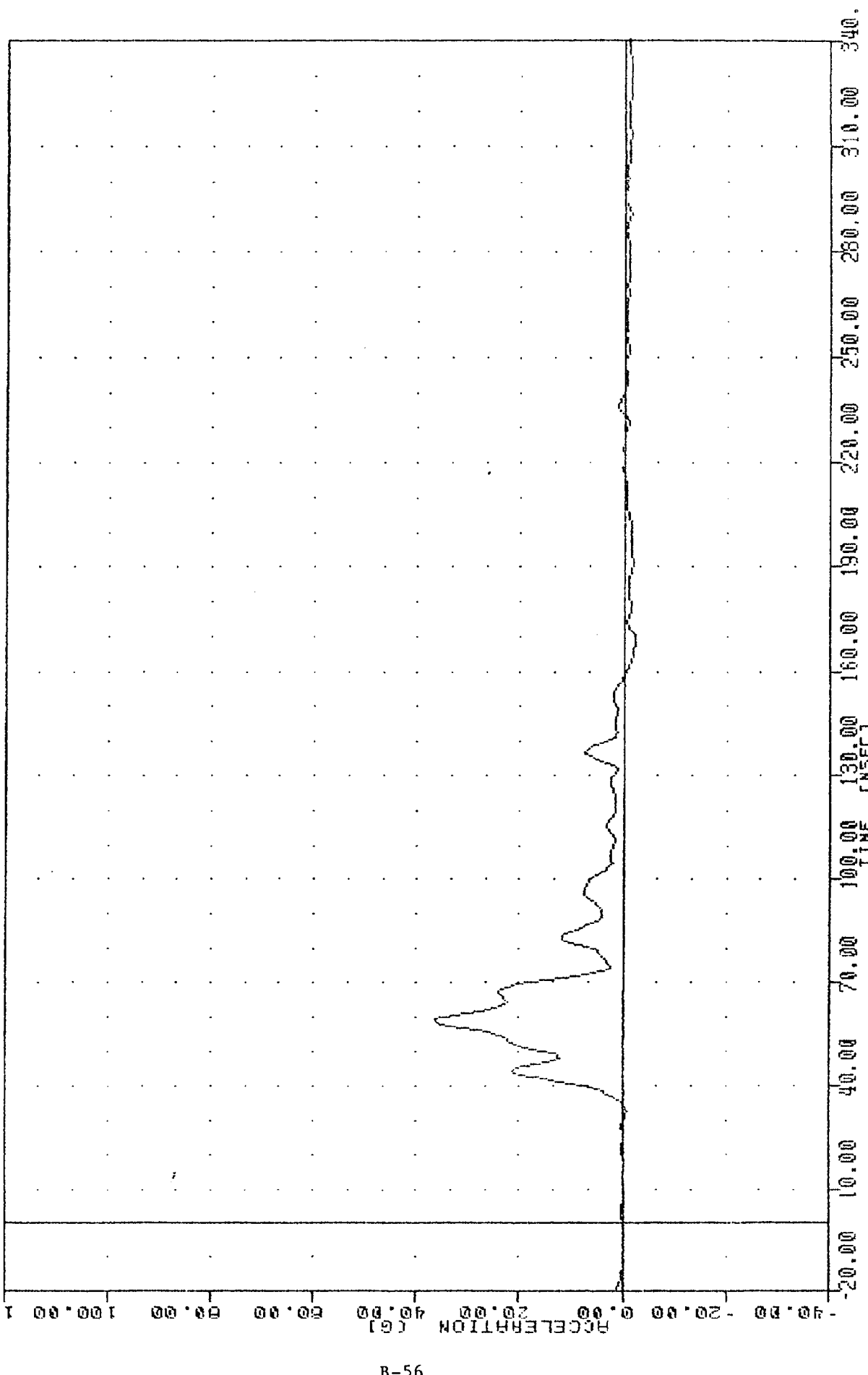
THC
 SIDE PROTECTION - 20R/40R
 84013000000
 T12YVC

PLUT DATE 17-JAN-84 10:01:22

FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -0.24e 8.13, 17.87 e 69.38



IHC 840113
 SIDE PROTECTION - 20R/40R
 640130000000
 LURY63
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -2.472 168.75, 36.39 & 56.13
 PLOT DATE 17-JAN-84 09:59:58

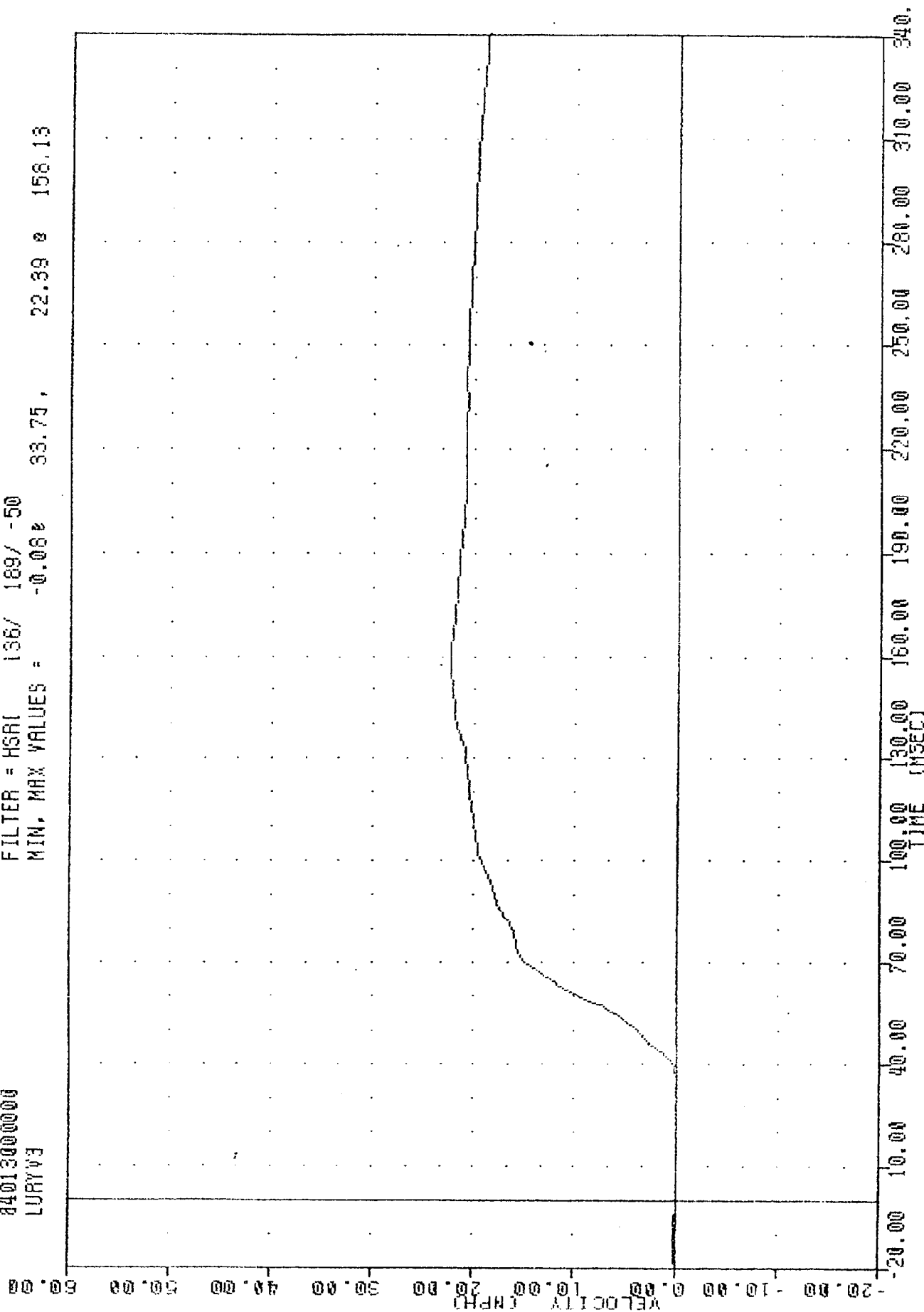


MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LEFT UPPER RIB ACCELERATION Y AXIS

PLUT DATE 17-JAN-84 10:01:22

IRC
840113
SIDE PROTECTION - 20R/4DR
840130000000
LURYVE

FILTER = HSR1 136/ 189/ -50
MIN. MAX VALUES = -0.06 33.75 22.39 8 156.13

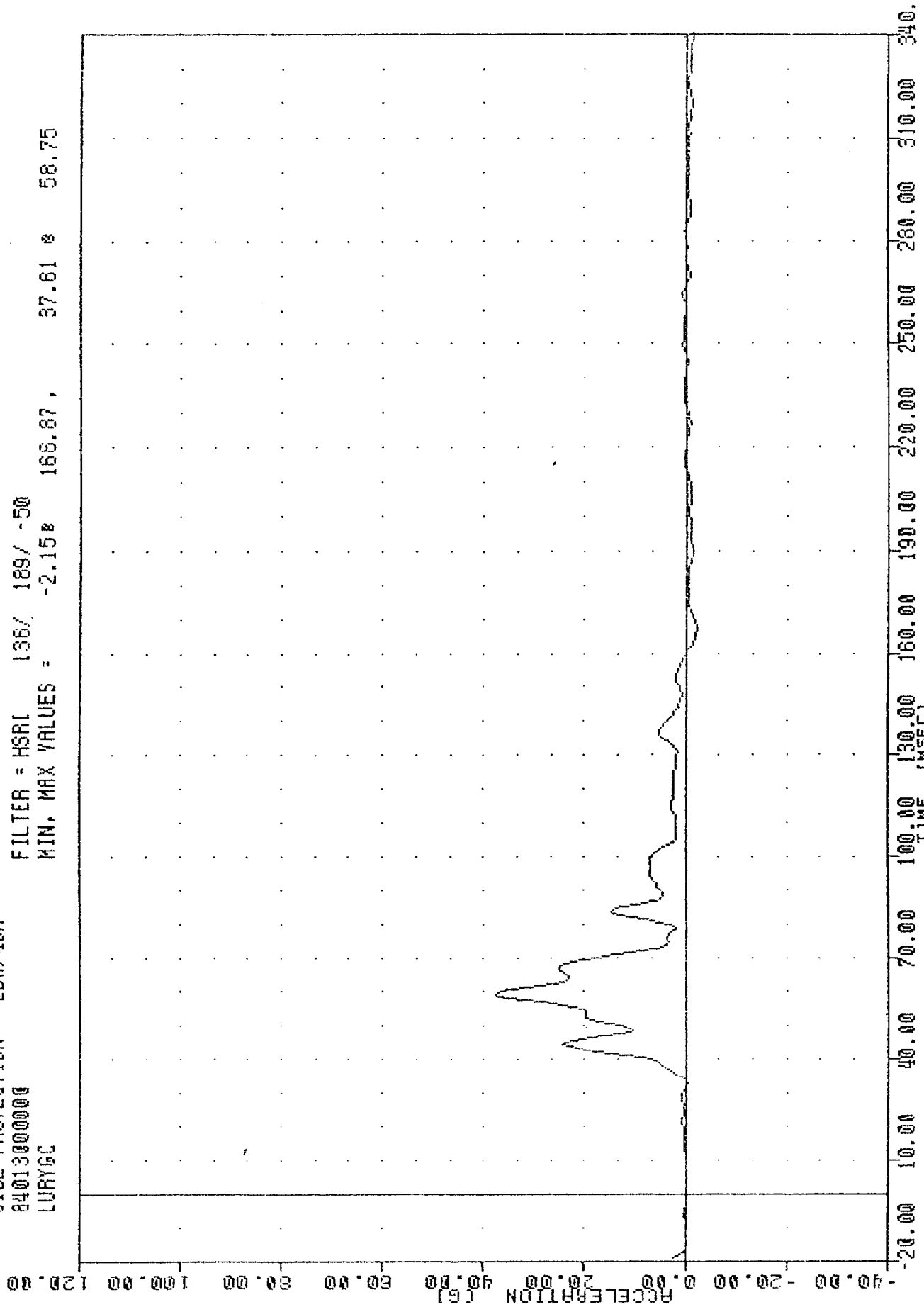


MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING LURYVE

PLUT DATE 17-JUN-84 08:59:58

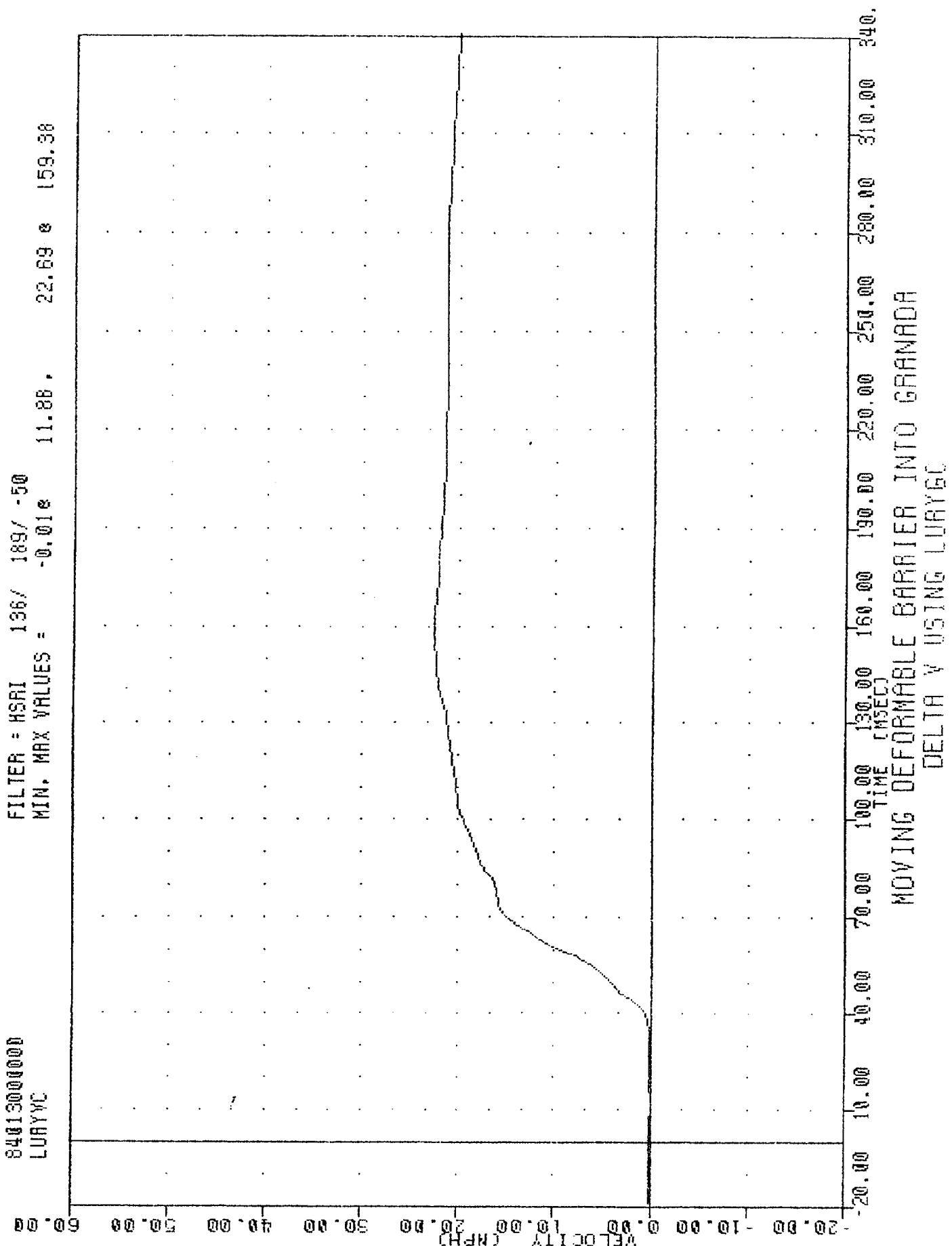
IRC
840113
SIDE PROTECTION - 20R/40R
84013000000
LURYGC

FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -2.15 168.87, 37.61 58.75

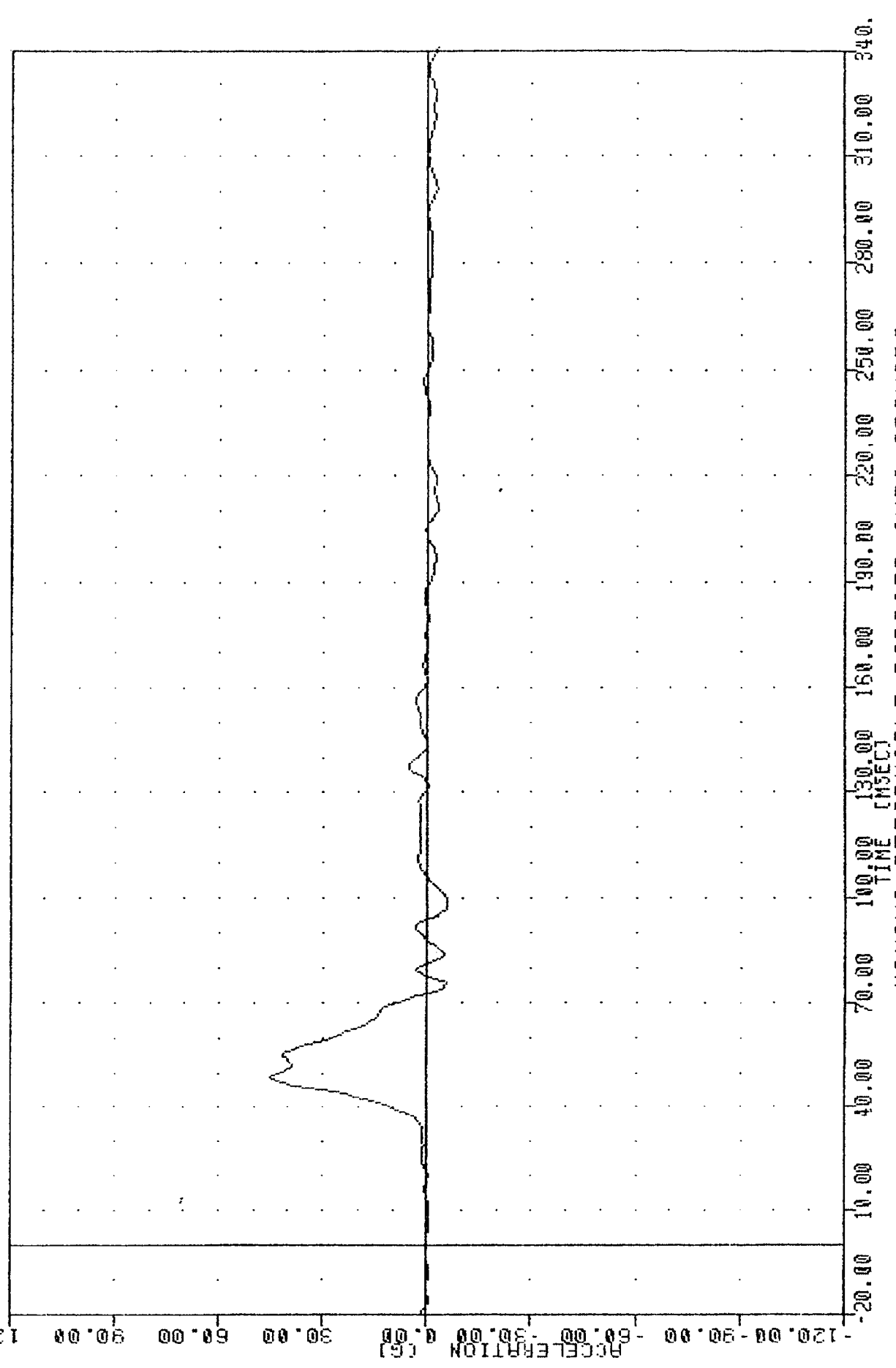


MOVING DEFORMABLE BARRIER INTO GRANADA
PASSENGER LEFT UPPER RIB ACCELERATION -2 Y AXIS

INC 840113 17 JAN 64 10:01:22
 SIDE PROTECTION - 20R/40R
 84013000000
 LURAYC
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -0.01e 11.88. 22.69 e 159.38

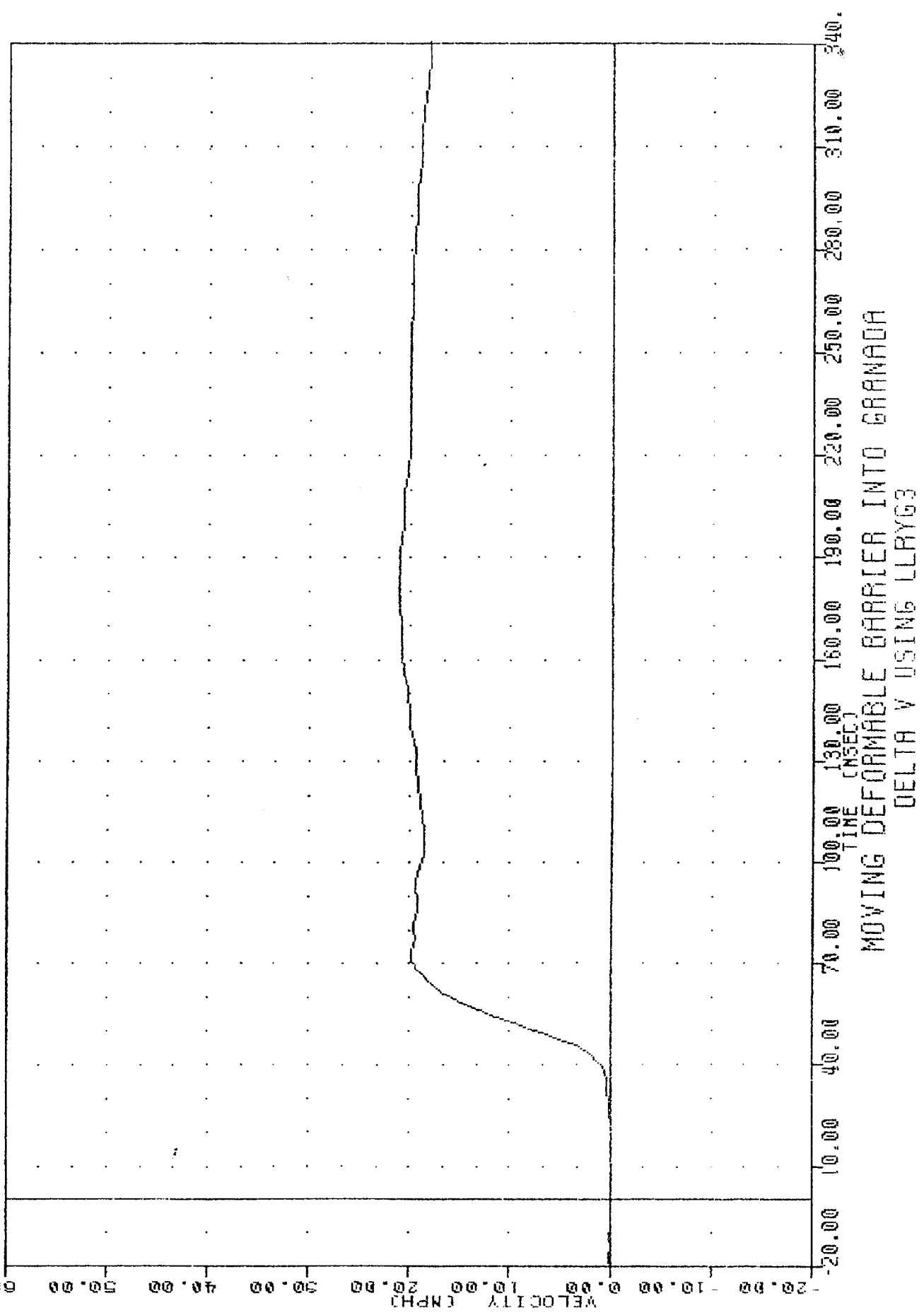


TPL 840113 17-JAN-84 08:59:58
 SIDE PROTECTION - 20R/40R
 84013000000
 LLRYG3
 FILTER = HSRI 136/ 189/ -50
 MIN. MAX VALUES = -5.73e 74.37, 45.07 e 48.13

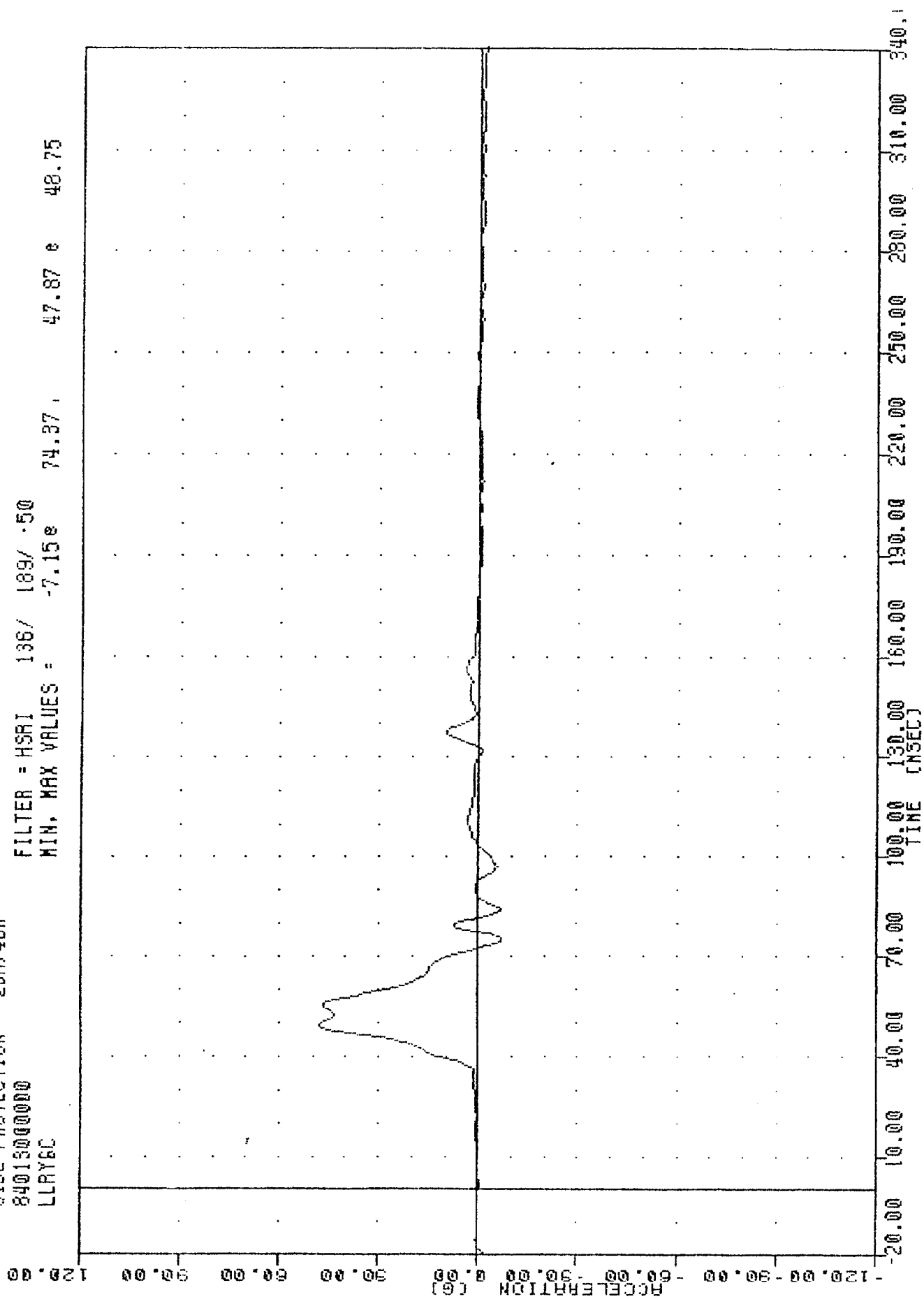


MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LEFT LOWER RIB ACCELERATION Y AXIS

INC 040113
 SIDE PROTECTION - 2DR/4DR
 84013000000
 LLRYV3
 FILTER = HSRI 136/ 189/ -50
 MIN, MAX VALUES = -0.058 12.50, 21.12 & 188.75
 PLOT DATE 17 JAN-84 10:01:22



FILE # 040113
 SIDE PROTECTION - 20R/40R
 84015000000
 LLY6C
 FILTER = HSRI 136/ 189/ .50
 MIN. MAX VALUES = -7.15e 74.37, 47.87 e 48.75
 PLOT DATE 17-JAN-84 09:59:58

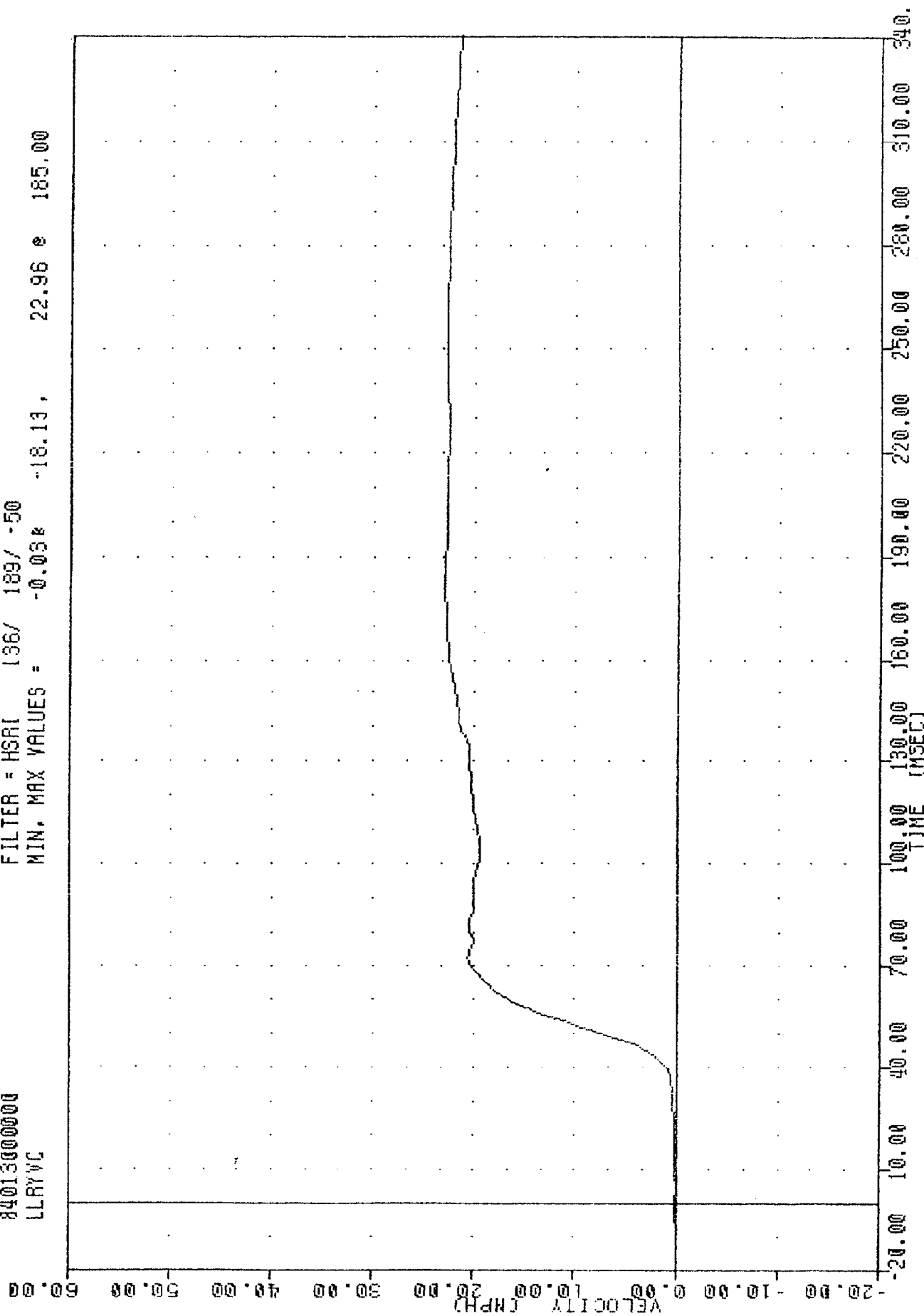


MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LEFT LOWER RIB ACCELERATION -2 Y AXIS

PLUT DATE 17-JAN-84 10:01:22

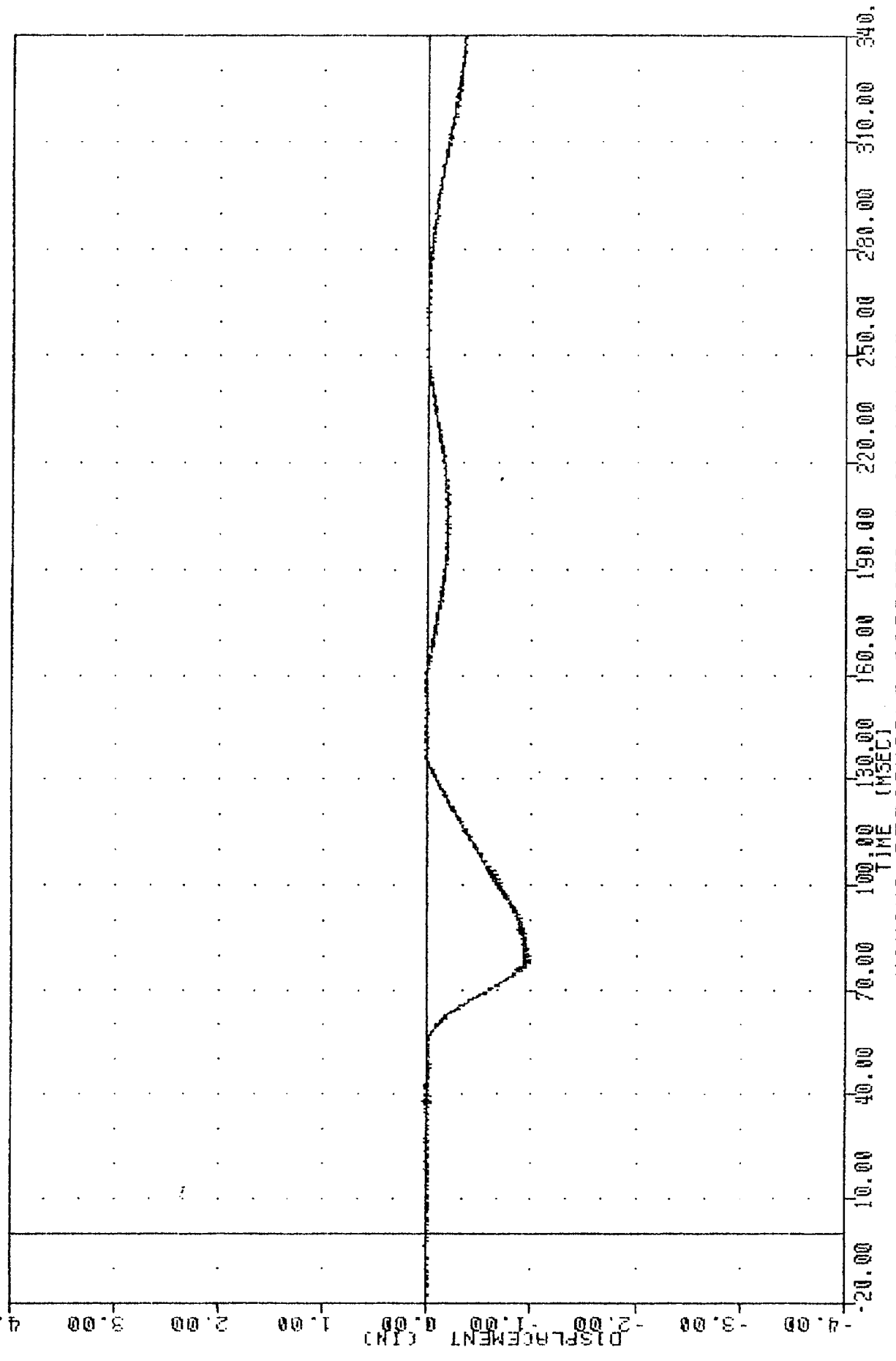
TRC 840113
SIDE PROTECTION - 20A/40A
84013000000
LLRYVC

FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -0.038 -18.13, 22.96 185.00



MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING LLRYGC

ILC 840113 17-JAN-84 10:02:15
 SIDE PROTECTION - 20R/40R
 84013000000
 LATY03
 FILTER = ALPF 1650/ 5217/ -40
 MIN. MAX VALUES = -0.99E 78.63, 0.05 E 37.88



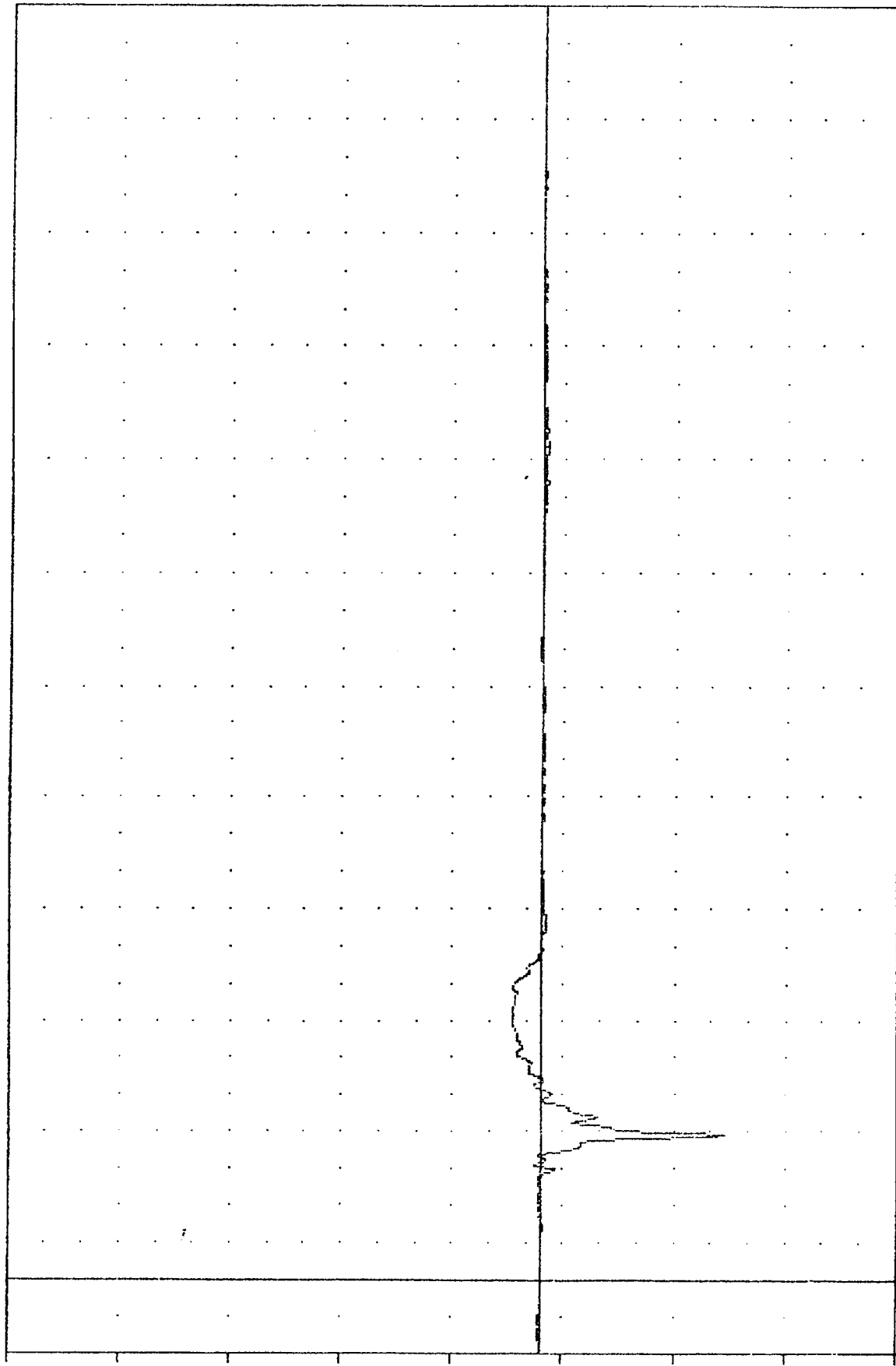
MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER LEFT RIB TO SPINE DISPLACEMENT INCHES

TRC
 SIDE PROTECTION - 20R/40R
 84013000000
 PEVXG3

PLOT DATE 17-JAN-84 10:02:15

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -82.27 38.88, 13.22 70.38

ACCELERATION (G)



TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER PELVIS ACCELERATION X AXIS

PLT DATE 17-JAN-84 10:02:15

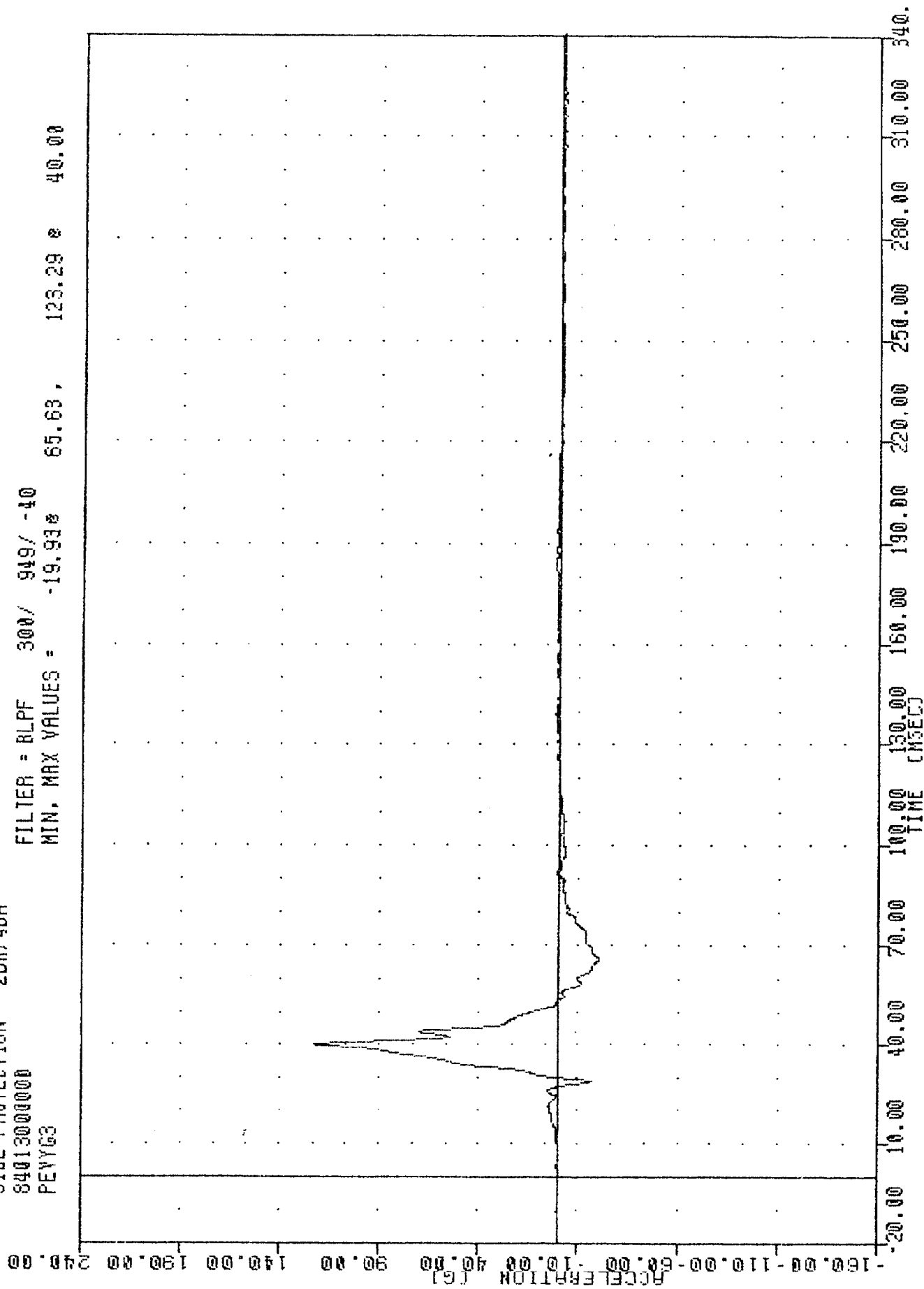
840113
SIDE PROTECTION - 2DR/4DR

840130000000

PEVY63

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -19.93 65.63, 123.29 40.00



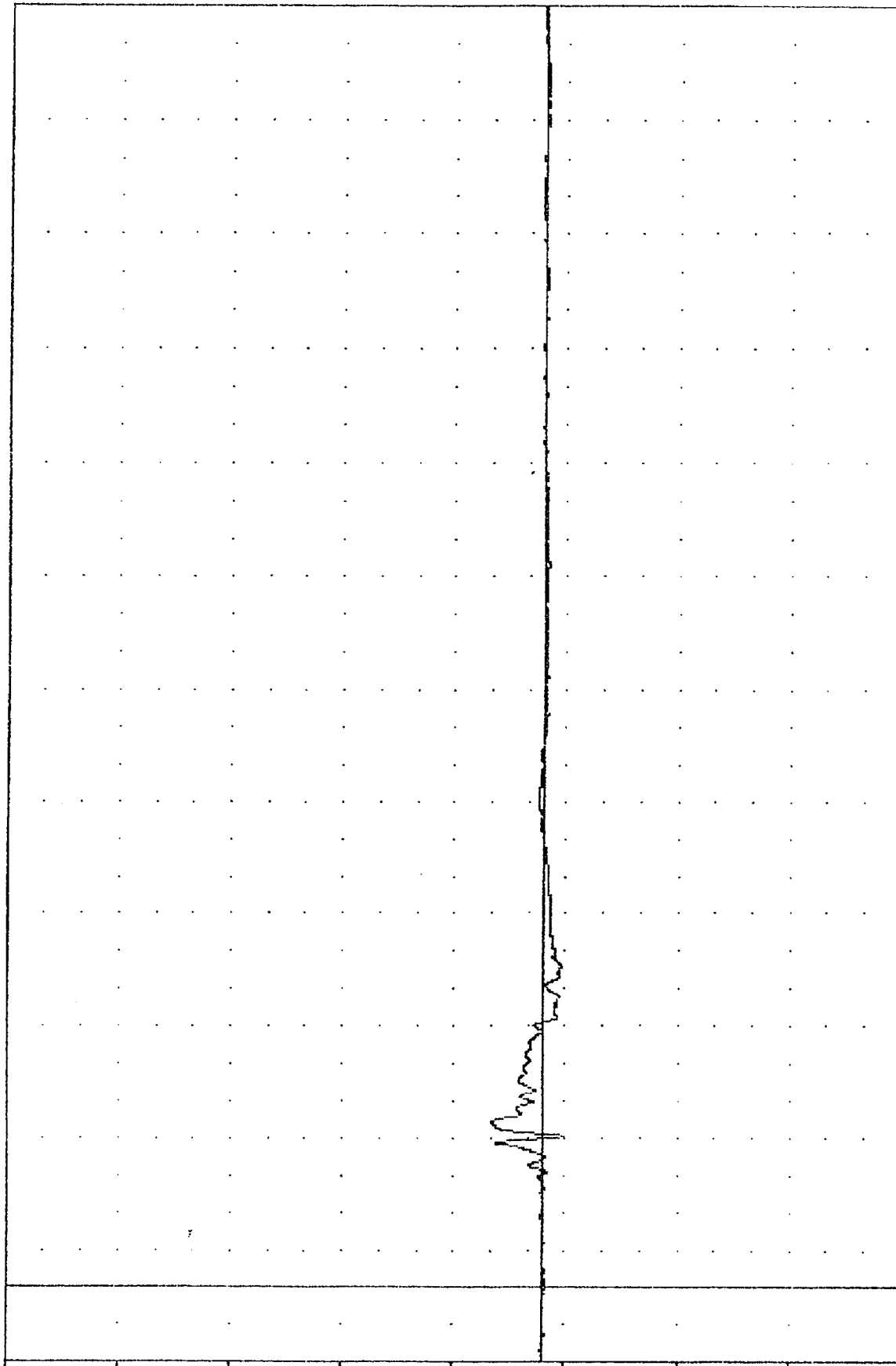
MOVING DEFORMABLE BARRIER INTO GRANADA
PASSENGER PELVIS ACCELERATION Y AXIS

THC
 SIDE PROTECTION - 20R/40R
 840130000000
 PEVZ63

840113
 17-JAN-84 10:02:15

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -9.39e 40.25, 23.18 e 44.25

ACCELERATION (G)
 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00



20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00 240.00 260.00 280.00 300.00 320.00 340.00

MOVING DEFORMABLE BARRIER INTO GRANADA
 PASSENGER PELVIS ACCELERATION Z AXIS

17-JAN-84 10:03:33

17-JAN-84 10:03:33

17-JAN-84 10:03:33

17-JAN-84 10:03:33

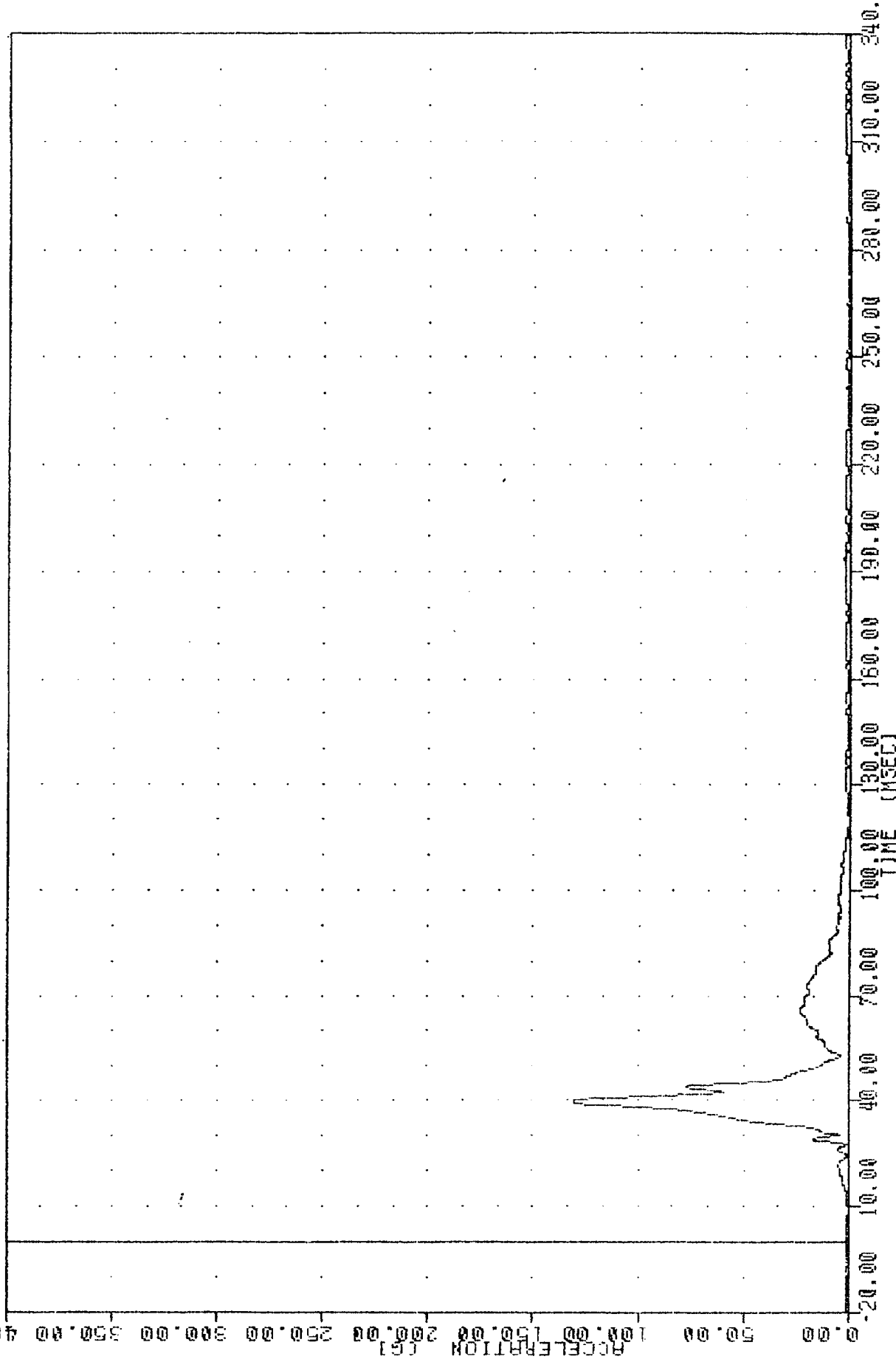
17-JAN-84 10:03:33

84013000000

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = 0.082 118.38 130.64 39.63

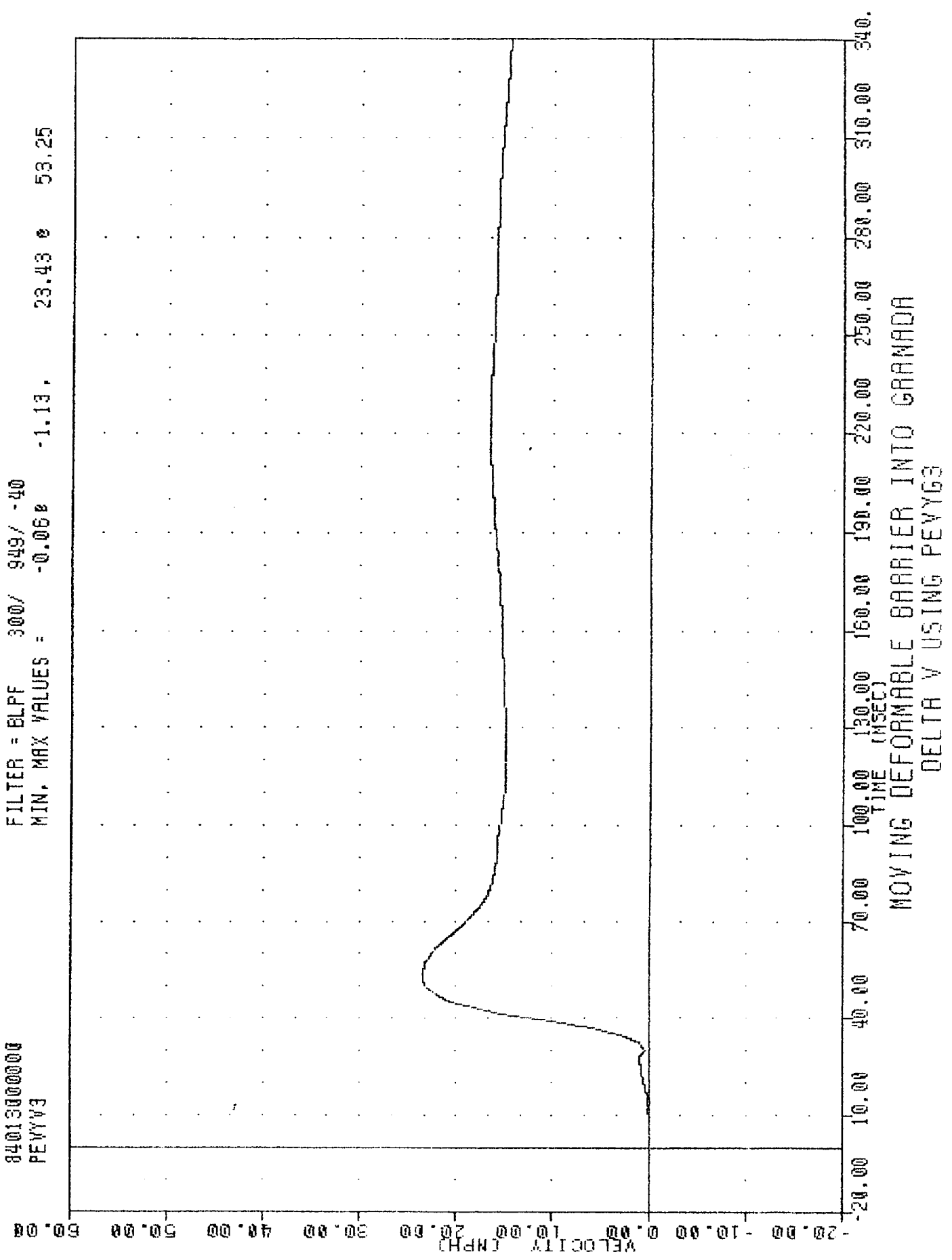
PEVAG3



MOVING DEFORMABLE BARRIER INTO GRANADA

PASSENGER PELVIS RESULTANT

FILE NO. 7040113
 SIDE PROTECTION - 20R/40R
 84013000000
 PEYV3
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -0.068 -1.13, 23.43 0 53.25
 PLOT DATE 17 JAN 84 10:04:04



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING PEYV3

TRC 840113 PLOT DATE 17-JAN-84 10:02:15

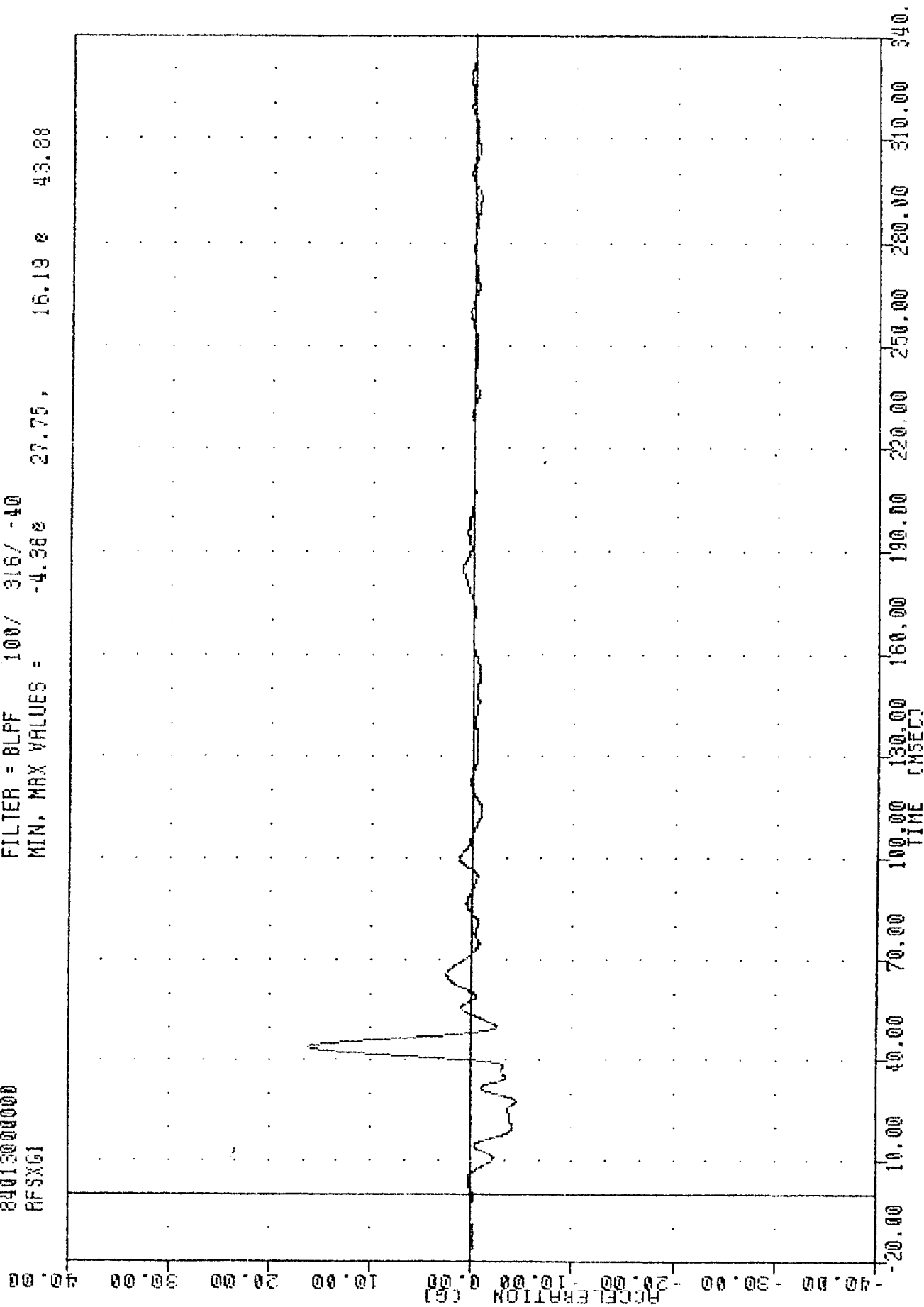
SIDE PROTECTION - 20R/40R

84013000000

RFSXG1

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -4.36e 27.75, 16.19 e 43.88

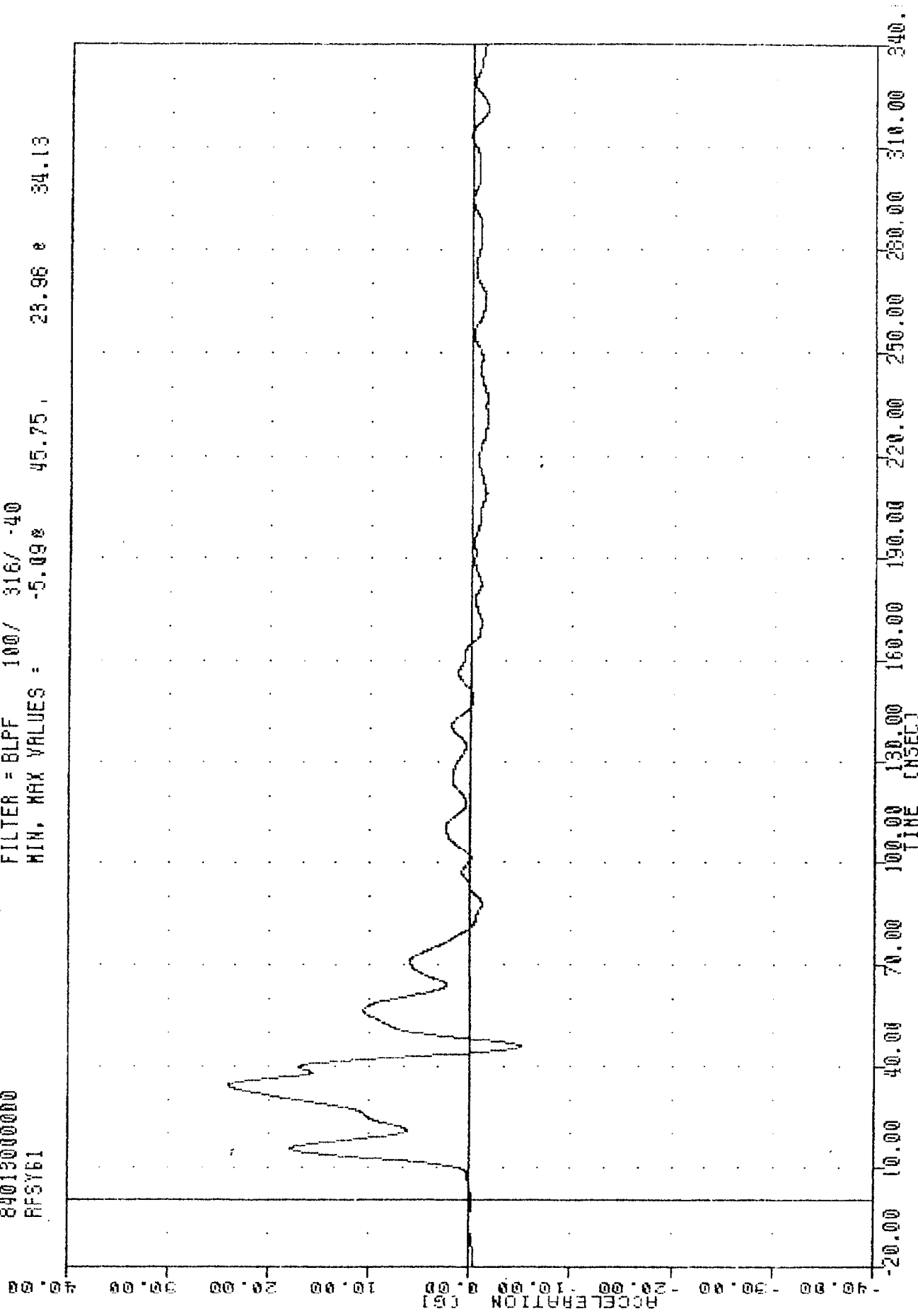


MOVING DEFORMABLE BARRIER INTO GRANADA
VEHICLE RIGHT FRONT SILL ACCELERATION X AXIS

THC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 RFSY61

PLUT DATE 17-JAN-84 10:02:15

FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -5.098 45.75 23.96 e 34.13

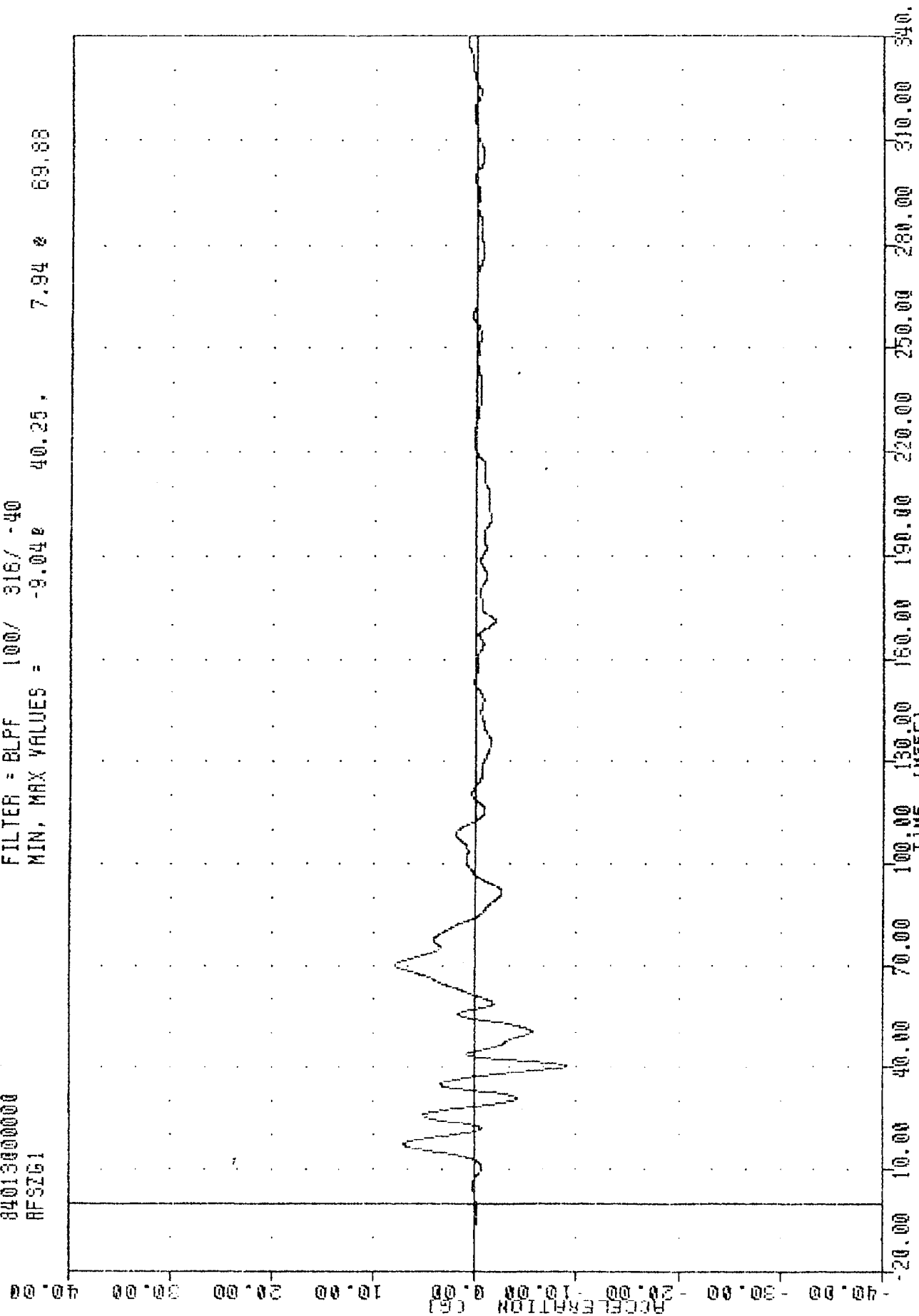


MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE RIGHT FRONT SILL ACCELERATION Y AXIS

TAC 840113
SIDE PROTECTION - 2DR/4DR
84013000000
AFSTG1

PLOT DATE 17-JAN-84 10:02:15

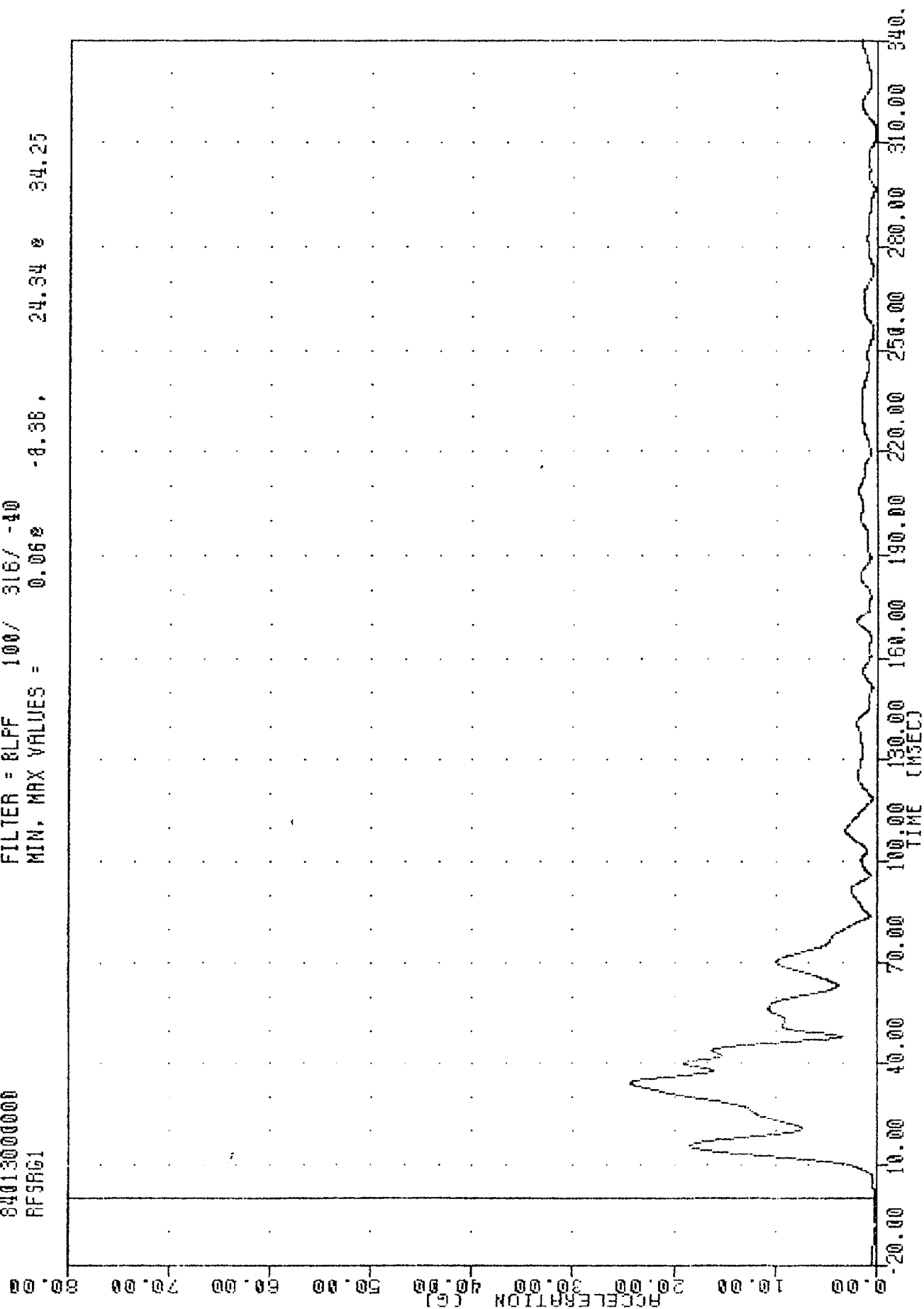
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -9.04e 40.25, 7.94 e 69.88



MOVING DEFORMABLE BARRIER INTO GRANADA
VEHICLE RIGHT FRONT SILL ACCELERATION Z AXIS

PLOT DATE 17-JAN-84 10:03:33

FILTER = BLFF	100/	316/	-40
MIN. MAX VALUES =	0.06e	-8.38,	24.34 e
			34.25



MOVING DEFORMABLE BARRIER INTO CANADA
VEHICLE RIGHT FRONT SILL RESULTANT

TRC

840113

PLUT DATE

17-JAN-84

10:04:04

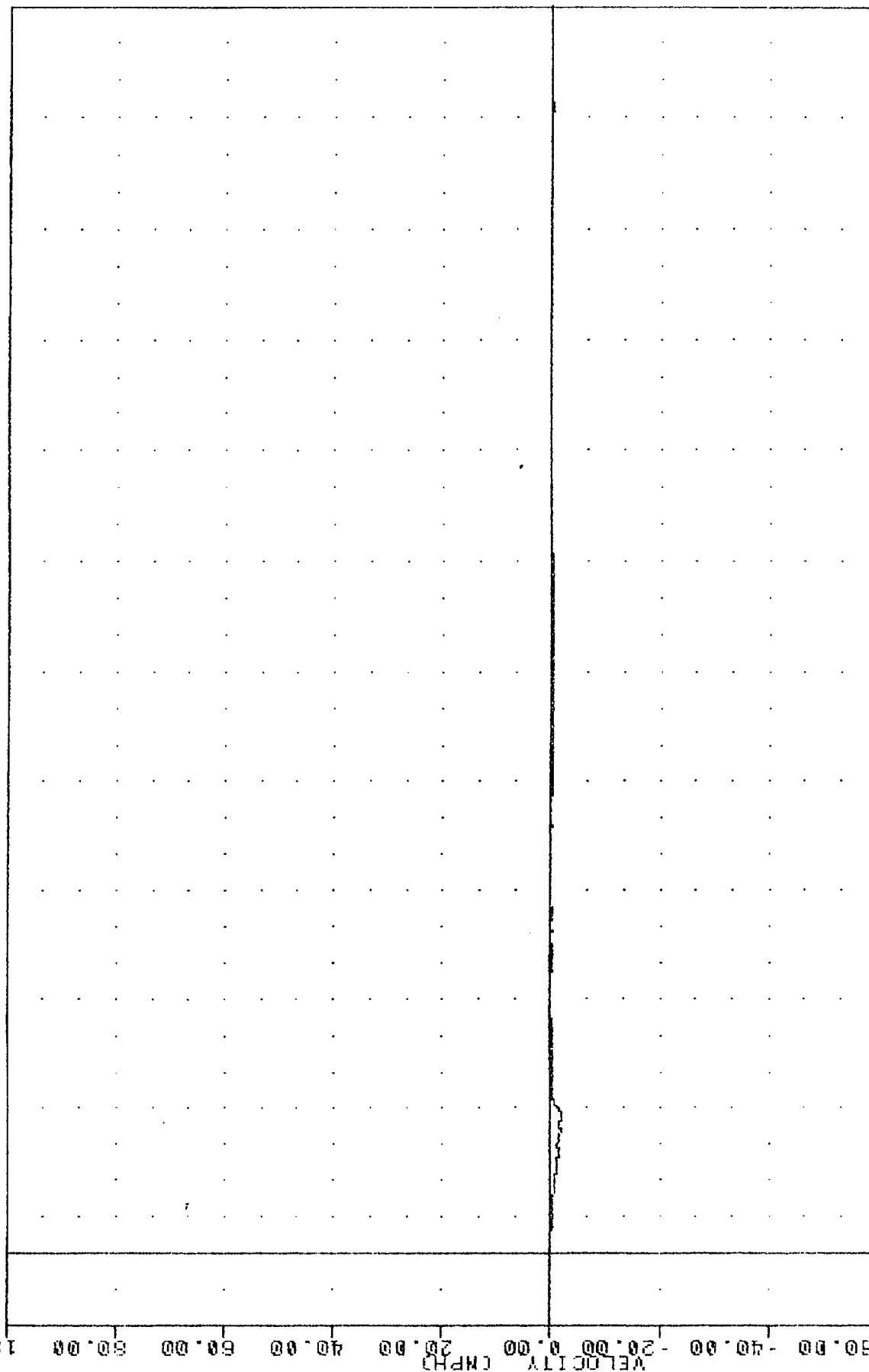
SIDE PROTECTION - 20R/40R

84013000000

RFSXV1

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -2.05% 38.13. 0.10% 104.38



TIME (msec)

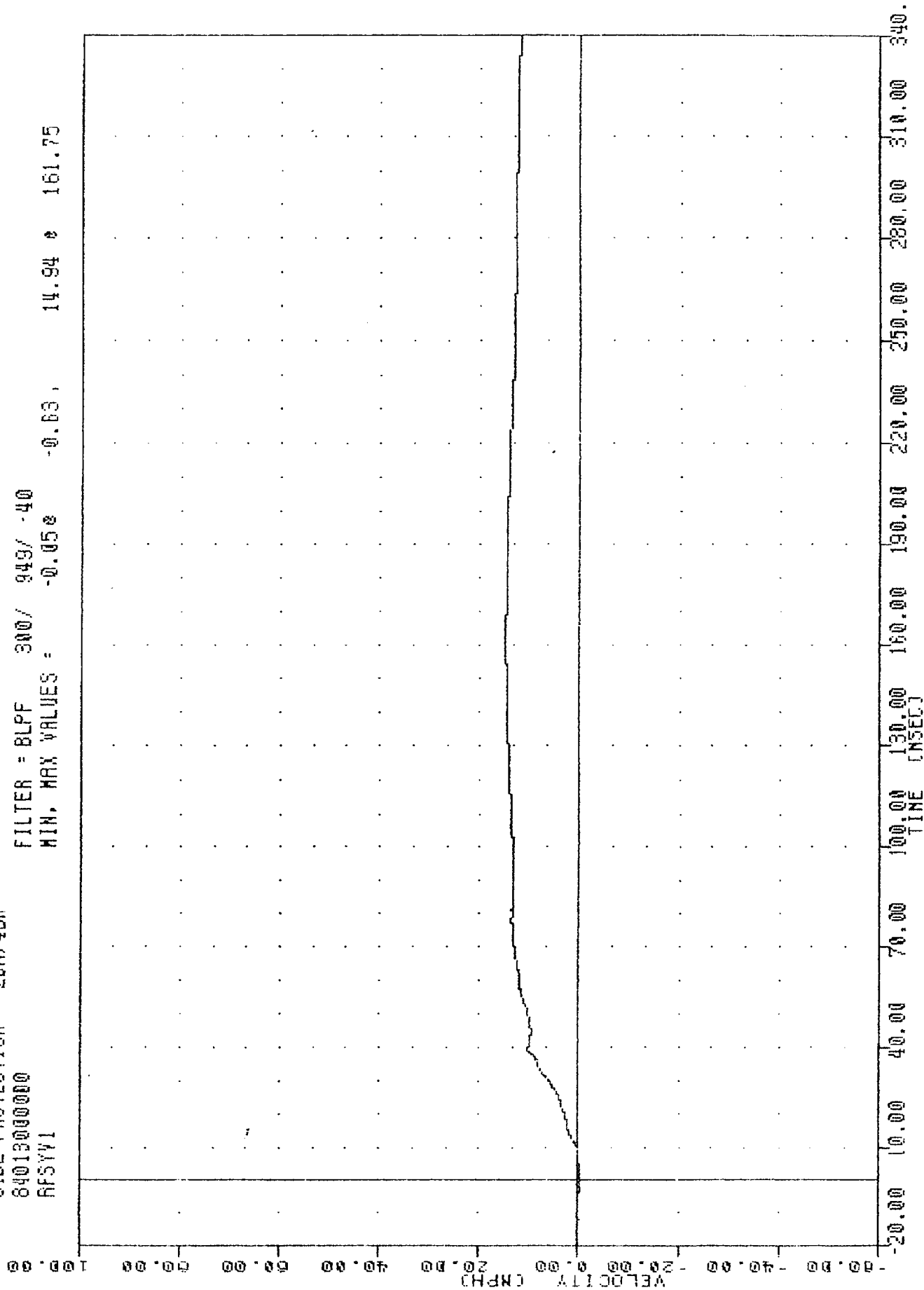
MOVING DEFORMABLE BARRIER INTO GRANADA

DELTA V USING RFSXG1

TAC 840113
 SIDE PROTECTION - 20A/4DA
 840130000000
 RFSYV1

PLUT DATE 17-JUN-84 10:04:04

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -0.050 -0.63, 14.94 161.75



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING RFSYGI

PLUT DATE 17-JAN-84 10:02:15

840113

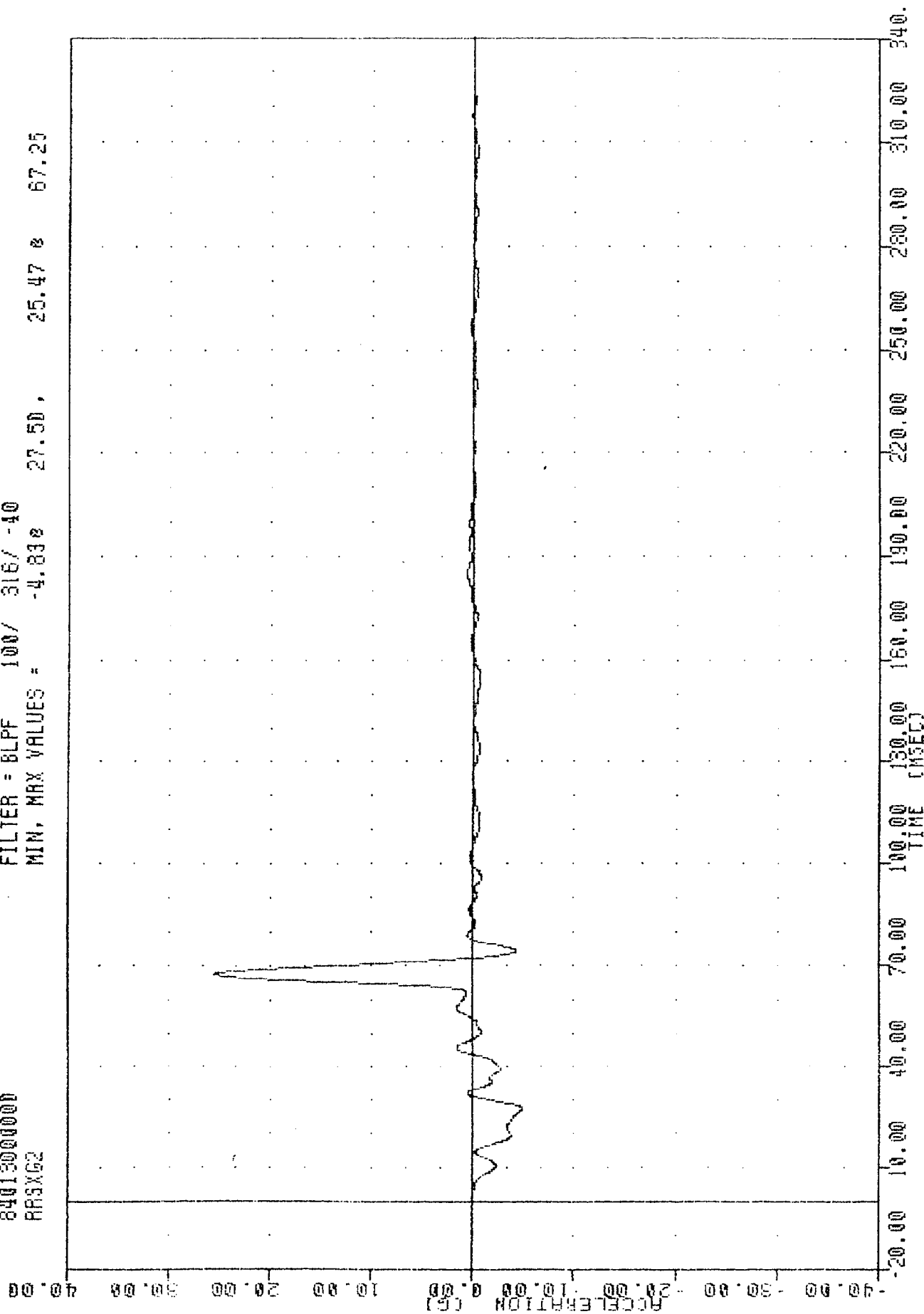
SIDE PROTECTION - 20R/40R

84013000000

RRSXG2

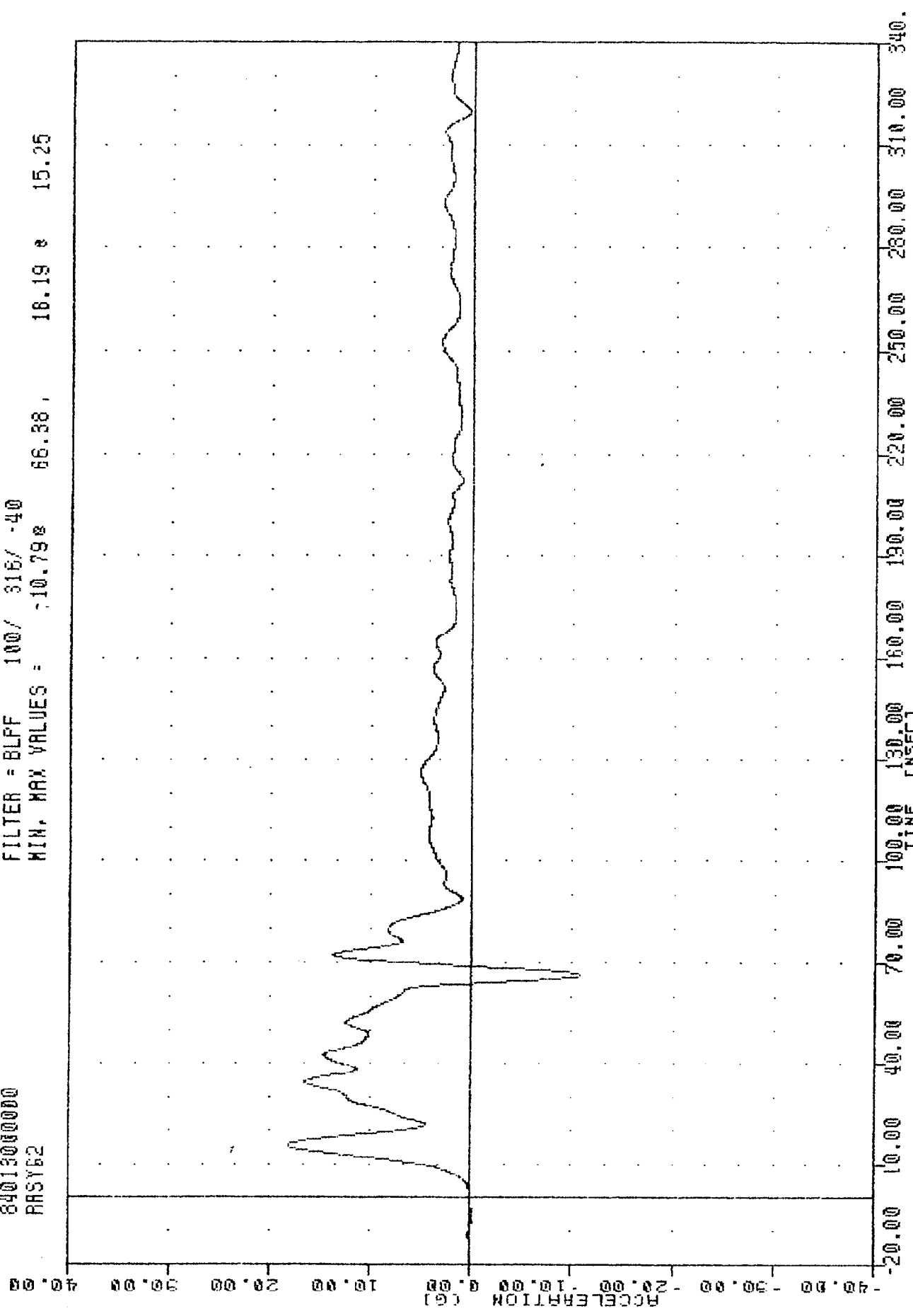
FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -4.838 27.50, 25.47 & 67.25



MOVING DEFORMABLE BARRIER INTO GRANADA
VEHICLE RIGHT REAR SILL ACCELERATION X AXIS

THC 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 RRSY62
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = 10.79% 66.38, 18.19 & 15.25
 PLOT DATE 17-JAN-84 10:02:15

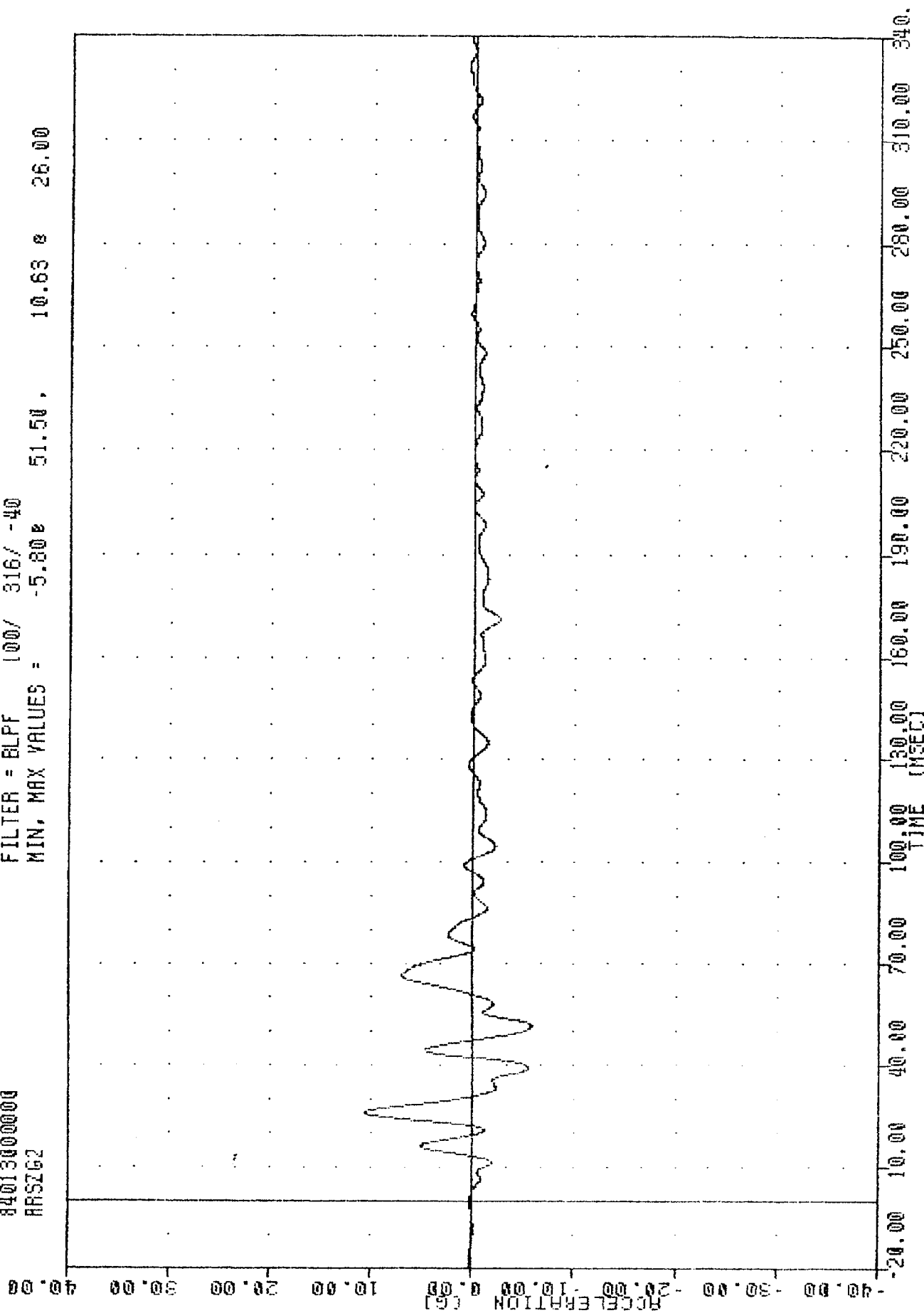


MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE RIGHT REAR SILL ACCELERATION Y AXIS

PLUT DATE 17-JAN-84 10:02:15

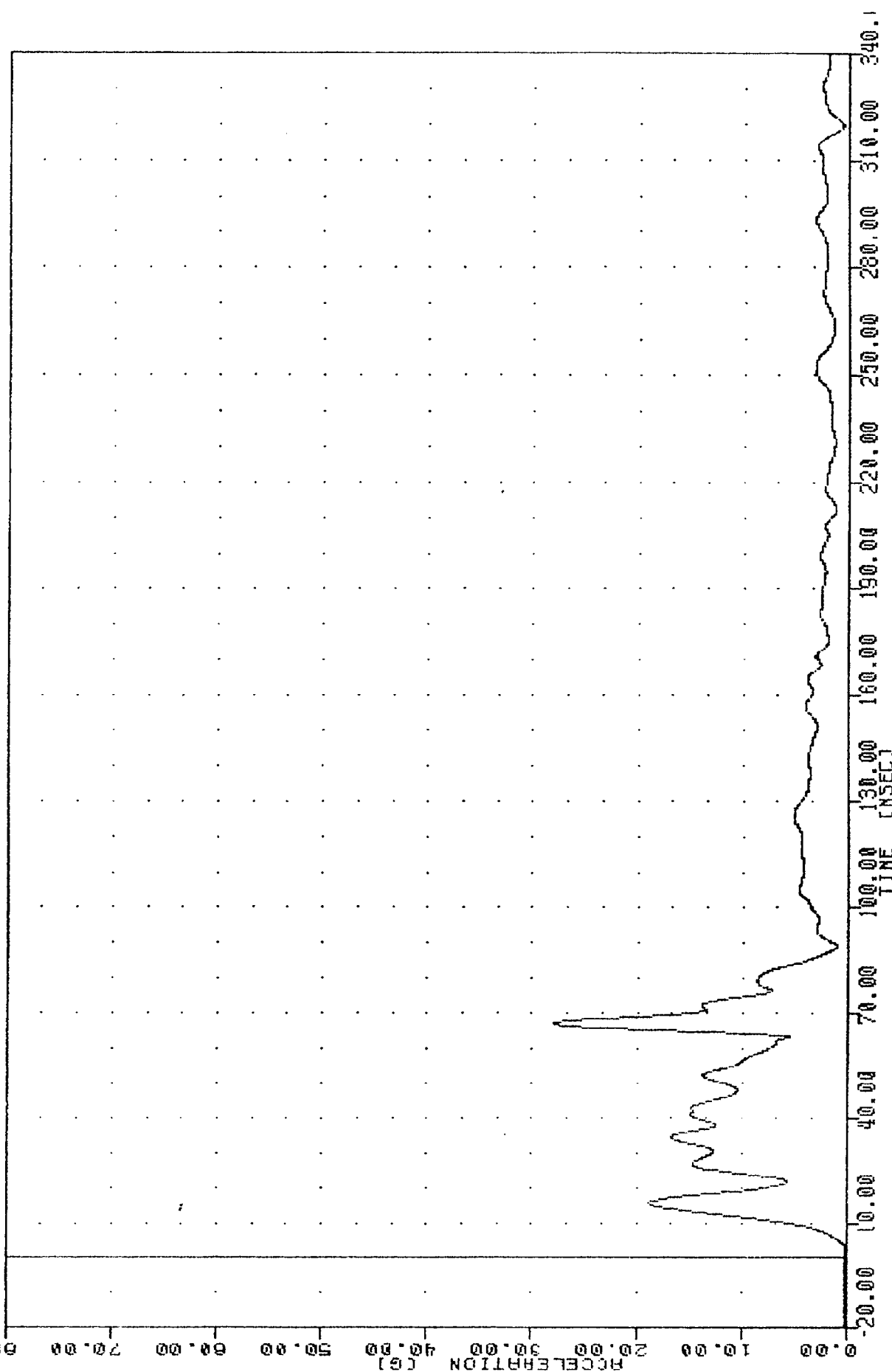
IRL 840113
SIDE PROTECTION - 20R/40R
840130000000
ARSZG2

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -5.80e 51.50, 10.63 e 26.00



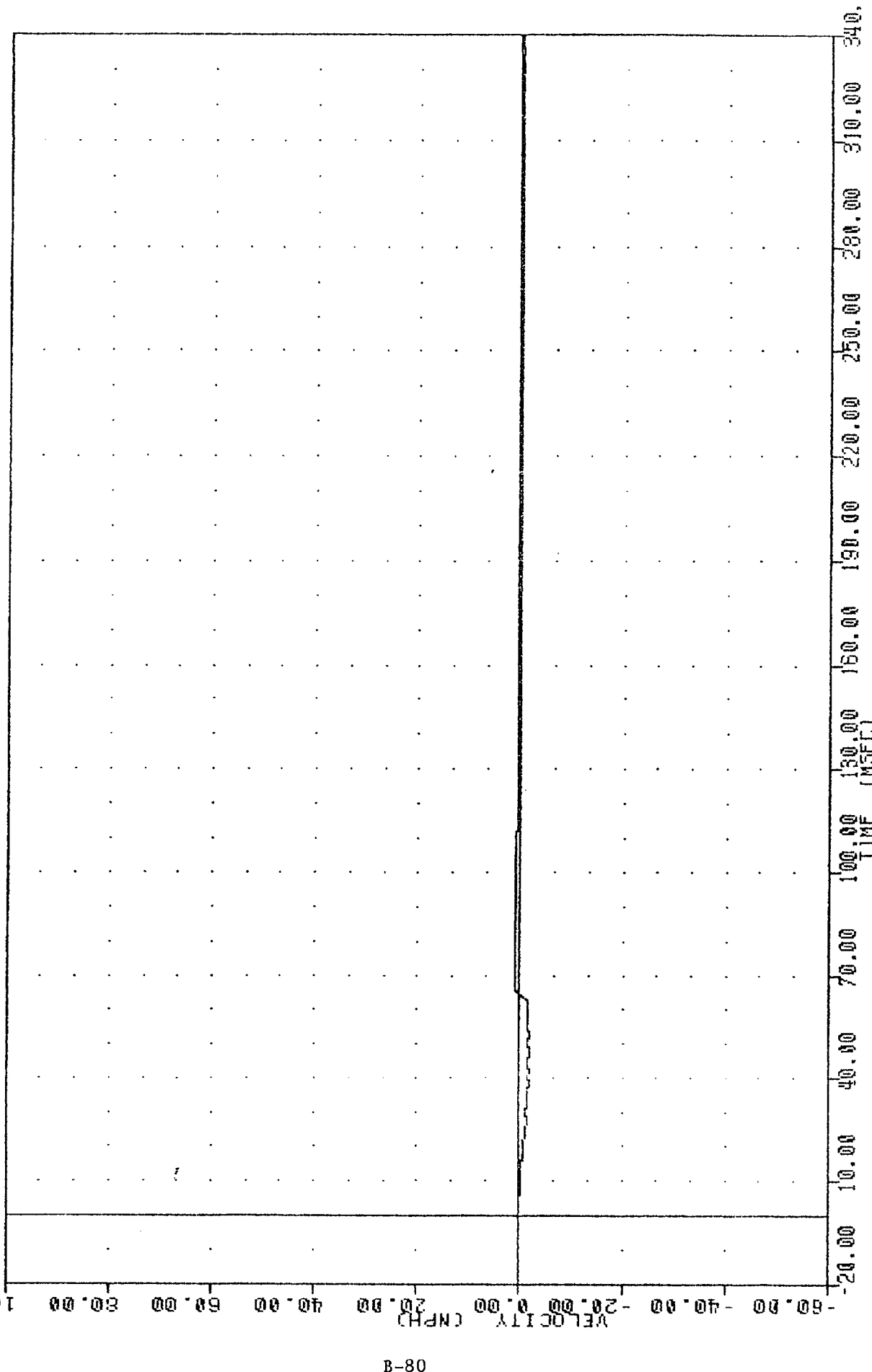
MOVING DEFORMABLE BARRIER INTO GRANADA
VEHICLE RIGHT REAR SILL ACCELERATION Z AXIS

INC 840113 17 JAN 84 10:03:33
 SIDE PROTECTION - 20R/40R
 8401300000
 RASR62
 FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = 0.080 -8.50, 28.05 67.00



MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE RIGHT REAR SILL RESULTANT

INC 840113
 SIDE PROTECTION - 20R/40R
 8401300000
 ARSXV2
 FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -1.87E 41.88, 1.05 E 70.38
 PLOT DATE 17-JAN-84 10:04:04



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING ARSXG2

TRC

840113

17-JAN-84

10:04:04

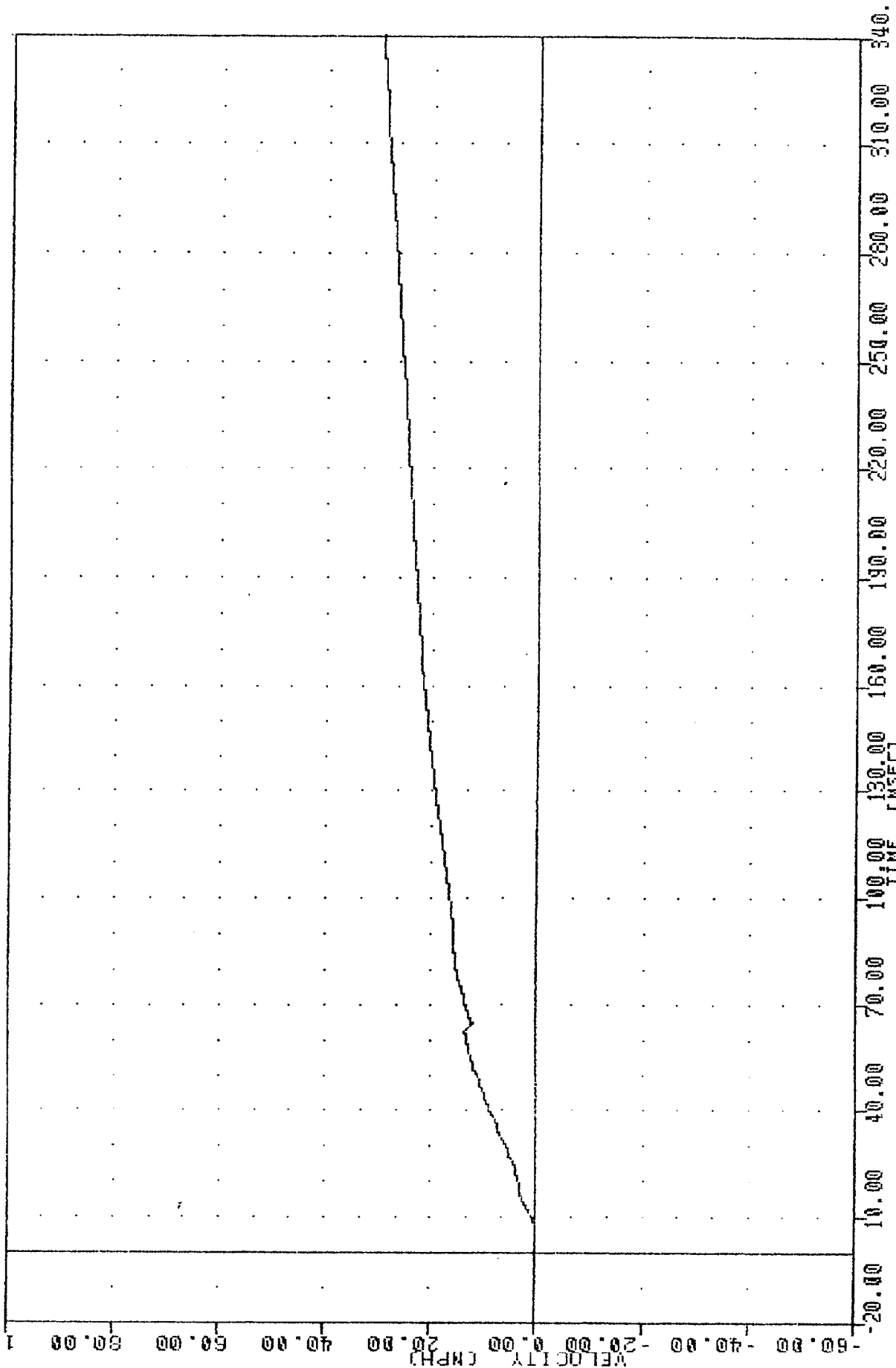
SIDE PROTECTION - 20R/40R

840130000000

RR3YV2

FILTER = 8LFF 300/ 919/ -40

MIN. MAX VALUES = 0.000 -20.00 , 29.92 @ 340.00



MOVING DEFORMABLE BARRIER INTO GRANADA

DELTA V USING ARSY62

TRC 840113 17-JAN-84 10:02:15

SIDE PROTECTION - 20R/40R

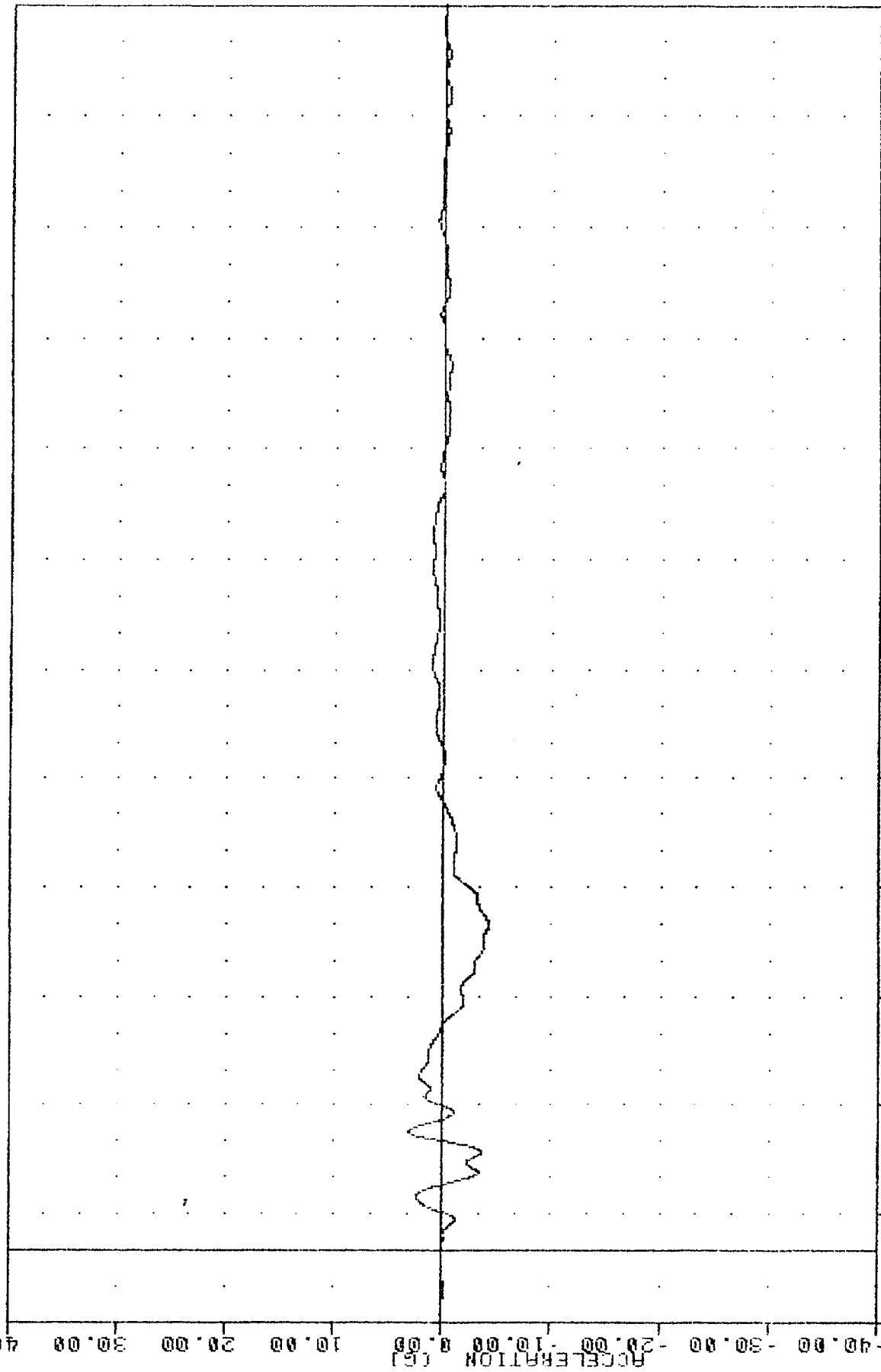
84013000000

ROKXG3

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -4.20e 89.88, 3.15 e 32.50

ACCELERATION (G)



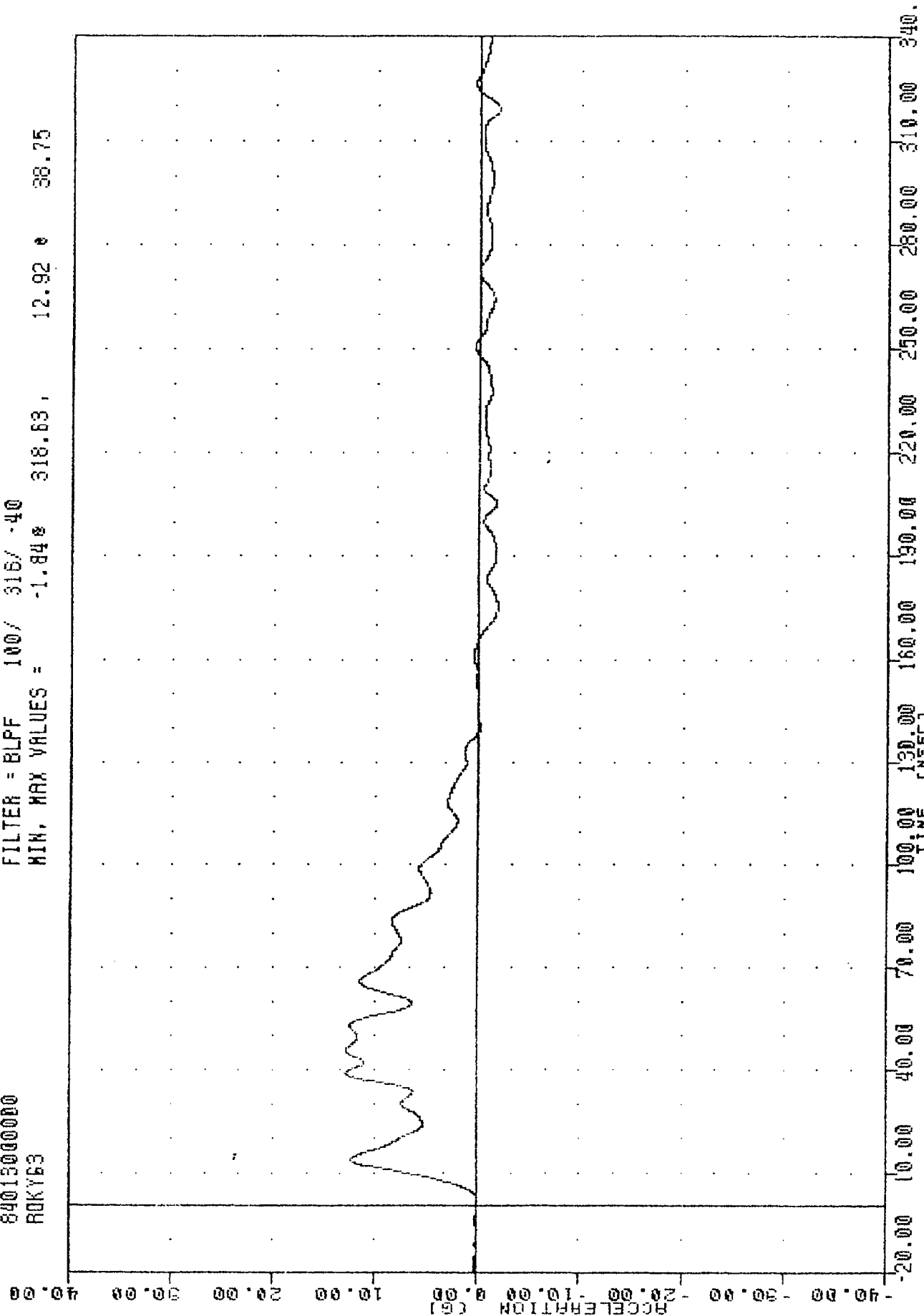
MOVING DEFORMABLE BARRIER INTO GRANADA

VEHICLE REAR DECK ACCELERATION X AXIS

THC
 SIDE PROTECTION - 20R/40R
 84013000000
 ROKY63

PLOT DATE 17-JAN-84 10:02:15

FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -1.848 318.63, 12.92 38.75

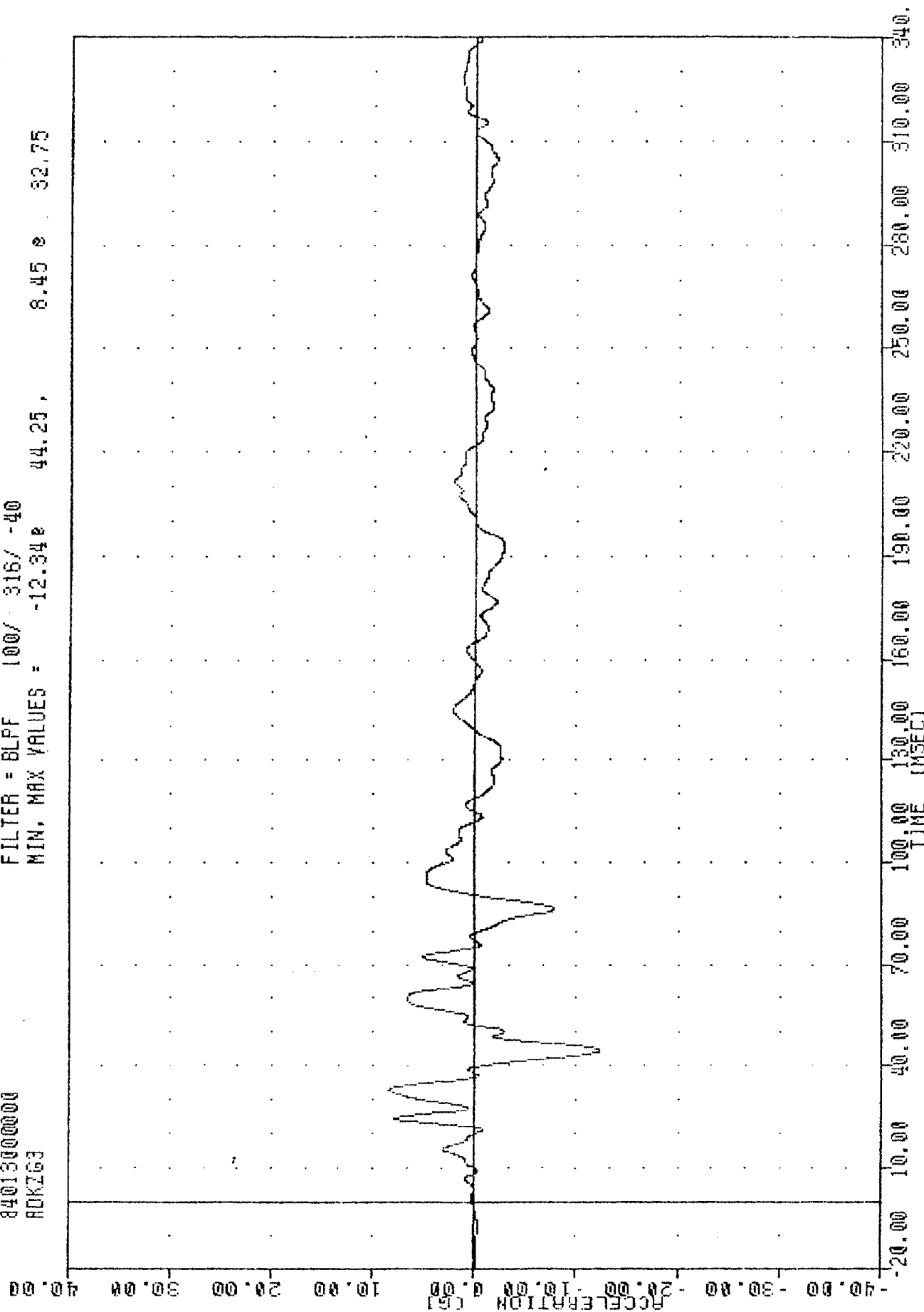


MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE REAR DECK ACCELERATION Y AXIS

PLT DATE 17-JAN-84 10:02:15

IRC 840113
SIDE PROTECTION - 20R/40R
840130000000
RDK163

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -12.34e 44.25, 8.45 e 32.75

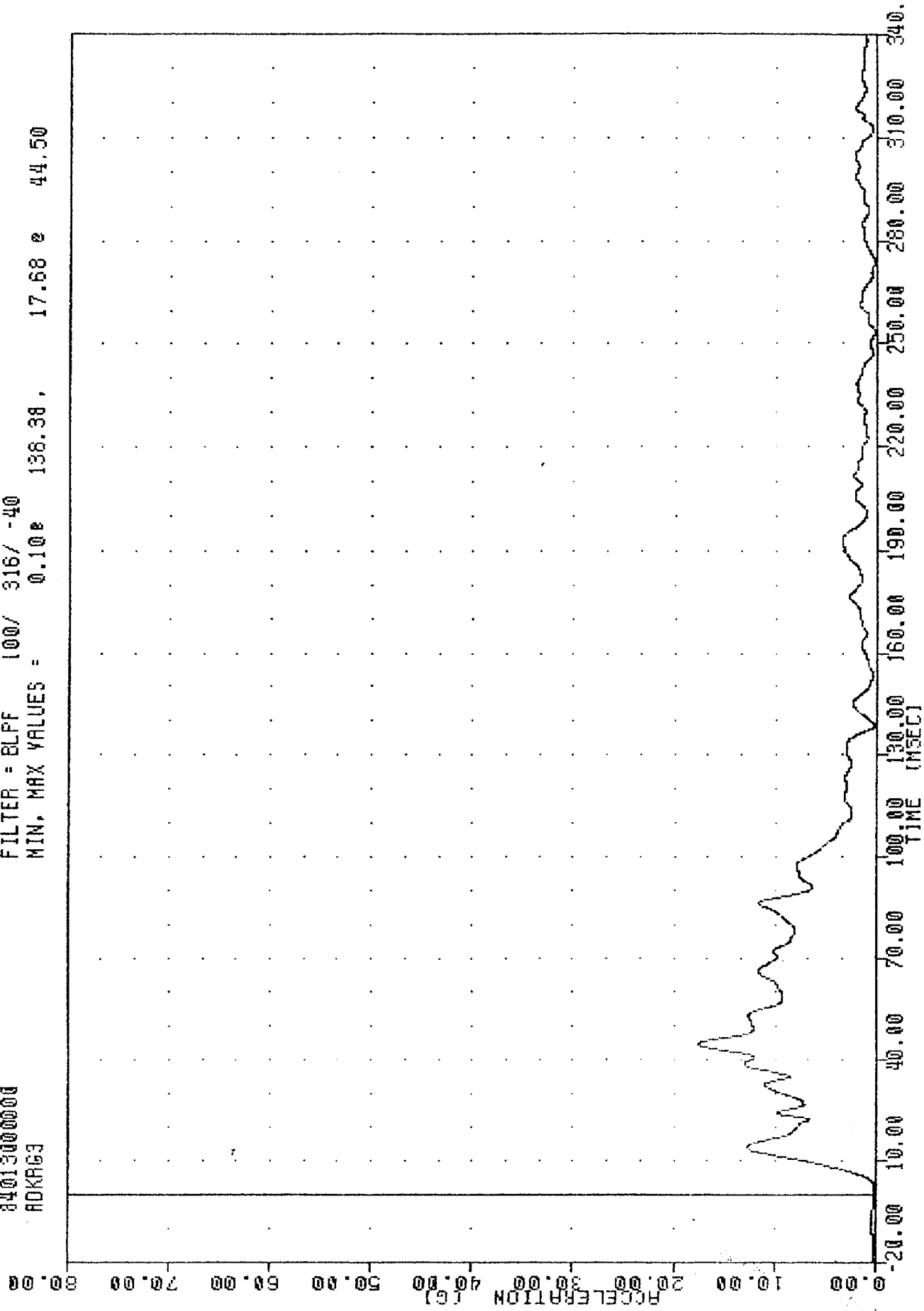


MOVING DEFORMABLE BARRIER INTO GRANADA
VEHICLE REAR DECK ACCELERATION Z AXIS

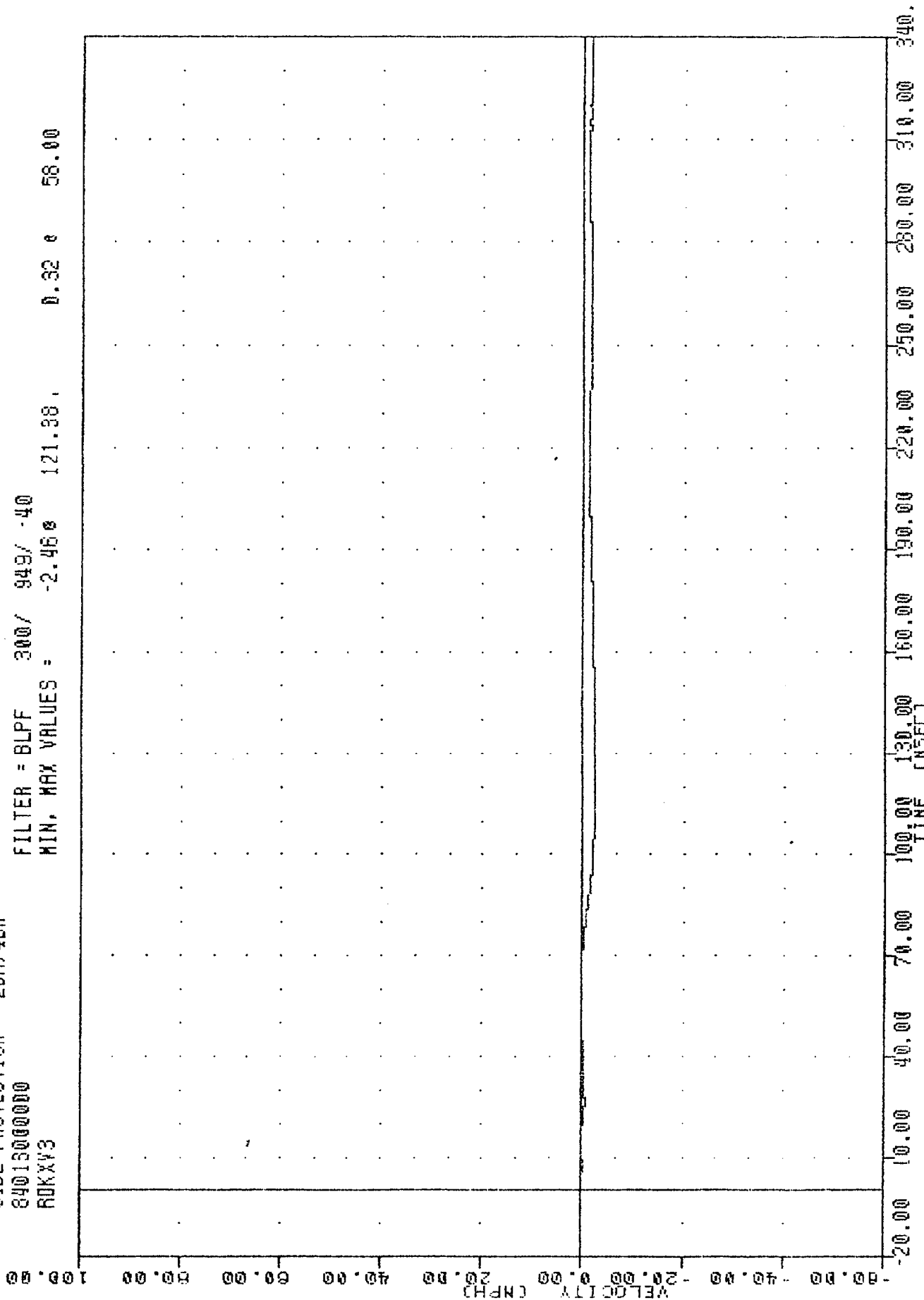
IRC 840113
SIDE PROTECTION - 2DR/4DR
84013000000
ADKRG3

PLOT DATE 17-JAN-84 10:03:53

FILTER = BLFF 100/ 316/ -40
MIN. MAX VALUES = 0.10e 138.38 , 17.68 e 44.50



TAC 840113 PLOT DATE 17 JAN 84 10:04:04
 SIDE PROTECTION - 20R/40R
 84015000000
 ROKXV3
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -2.46 121.38 0.32 58.00



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING ROKXG3

IRL 840113 17-JAN-84 10:04:04

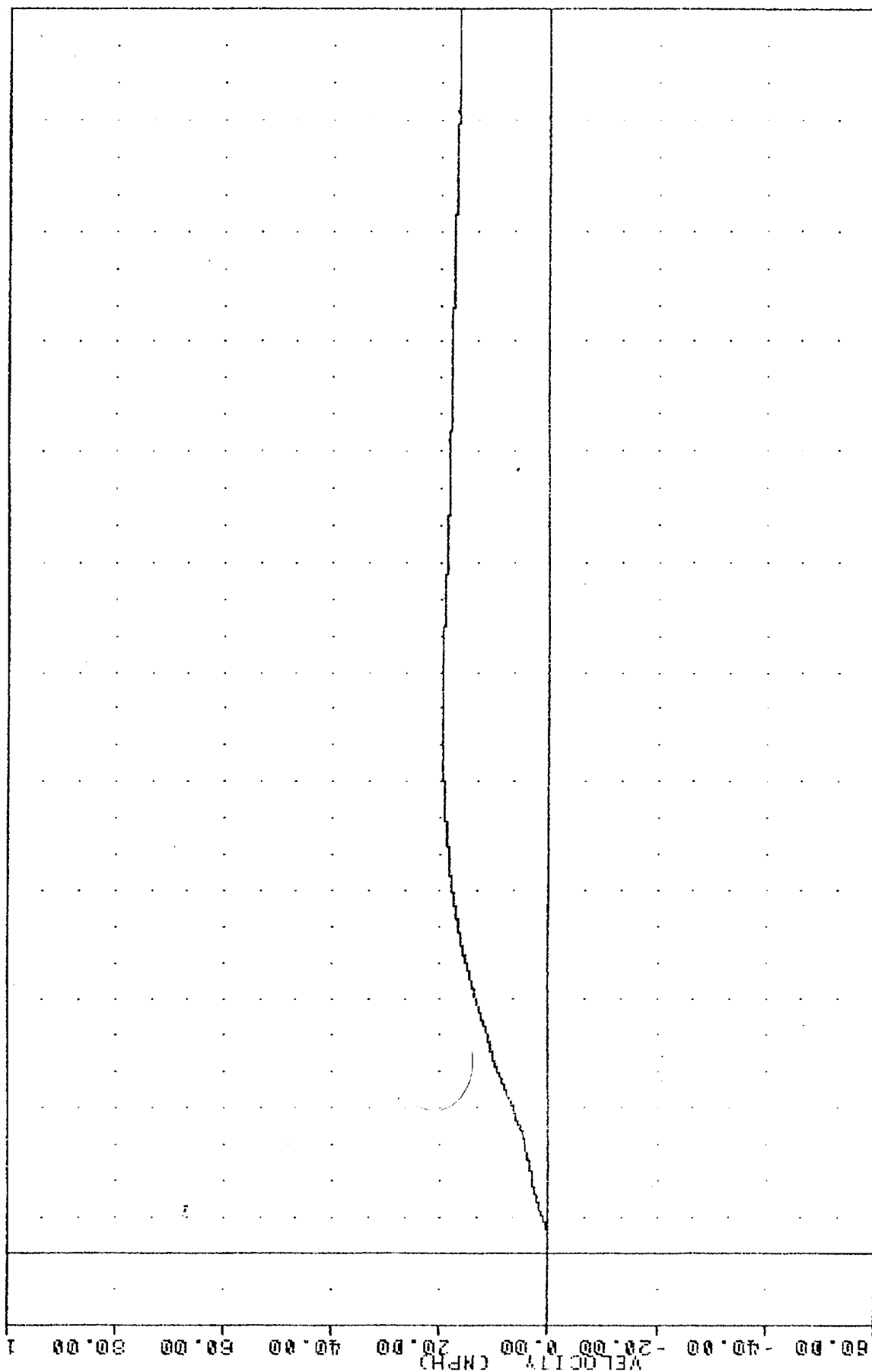
SIDE PROTECTION - 20R/40R

84013000000

ADKYG3

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 0.00e -20.00, 19.88 s 164.75

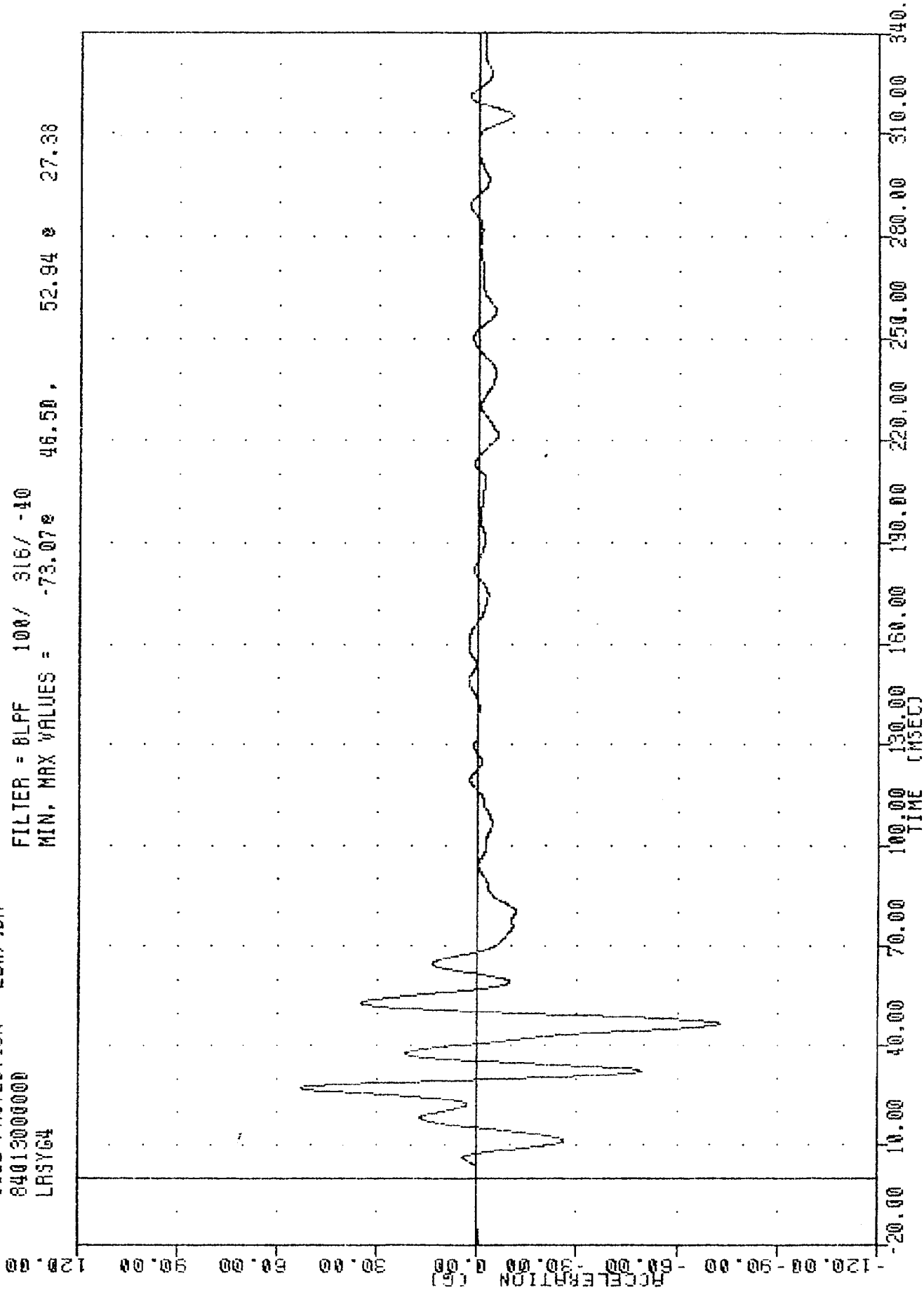


MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING ADKYG3

TRC 840113
SIDE PROTECTION - 2DR/4DR
84013000000
LRSY64

PLOT DATE 17-JAN-84 10:02:15

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -73.07e 46.50, 52.94 e 27.38



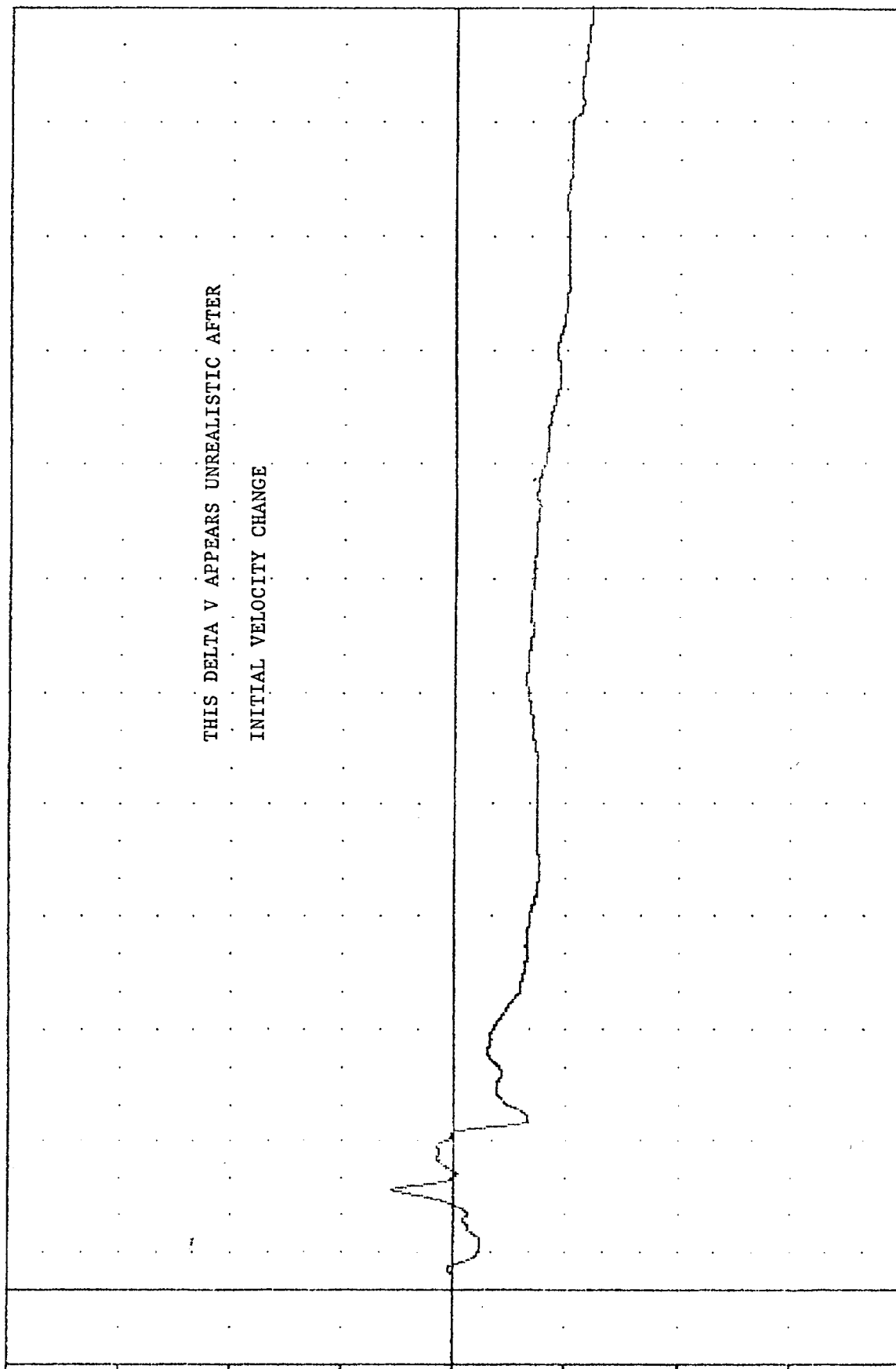
MOVING DEFORMABLE BARRIER INTO GRANADA
VEHICLE LEFT REAR SILL ACCELERATION Y AXIS

TRC 840113
SIDE PROTECTION - 2DR/4DR
84013000000
LRSYV4

PLUT DATE 17-JAN-84 10:04:04

FILTER = 8LPF 300/ 949/ -40
MIN. MAX VALUES = -12.068 340.00, 5.50 26.75

VELOCITY (IN/MS)



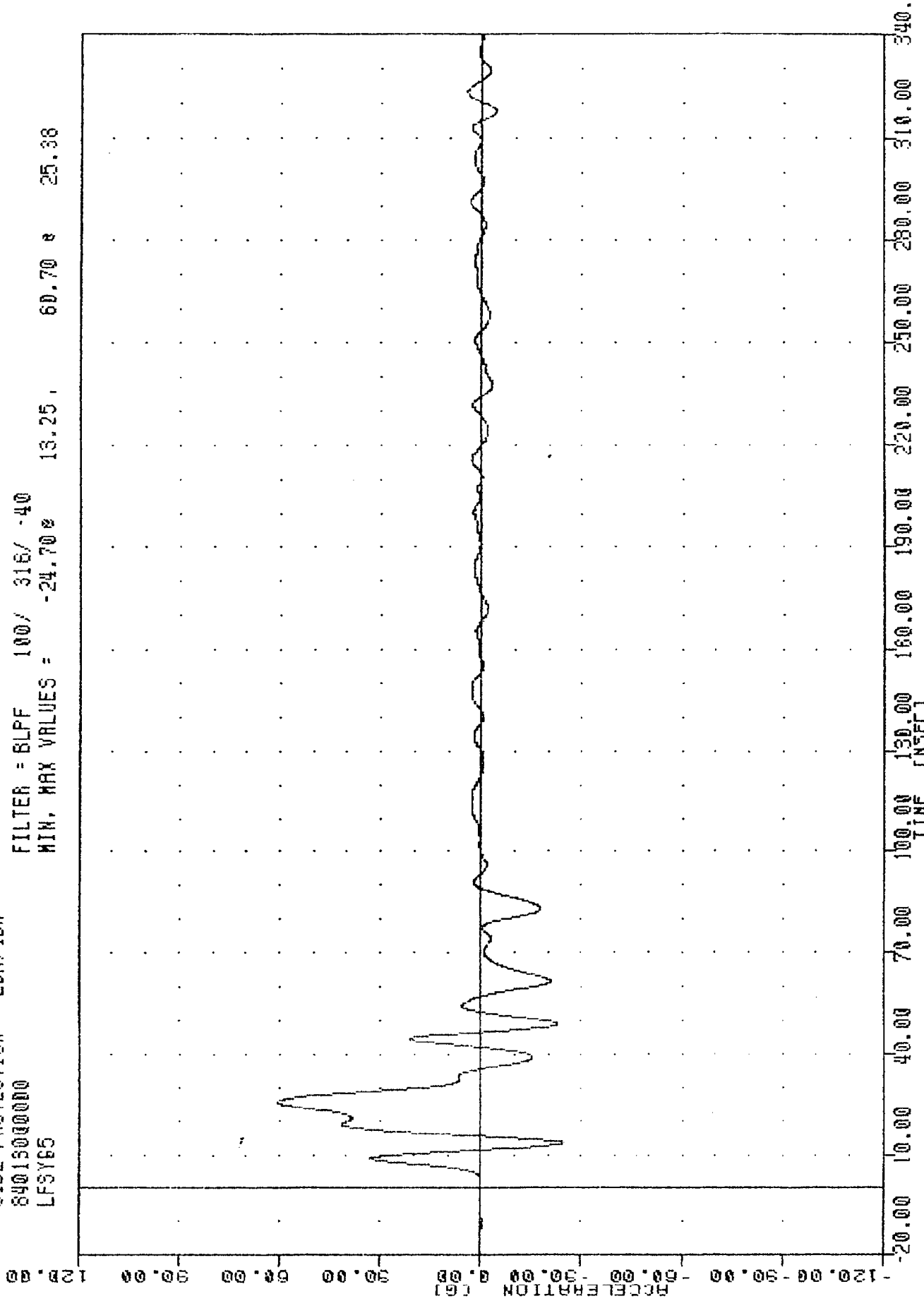
TIME (MSEC) 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING LRSY64

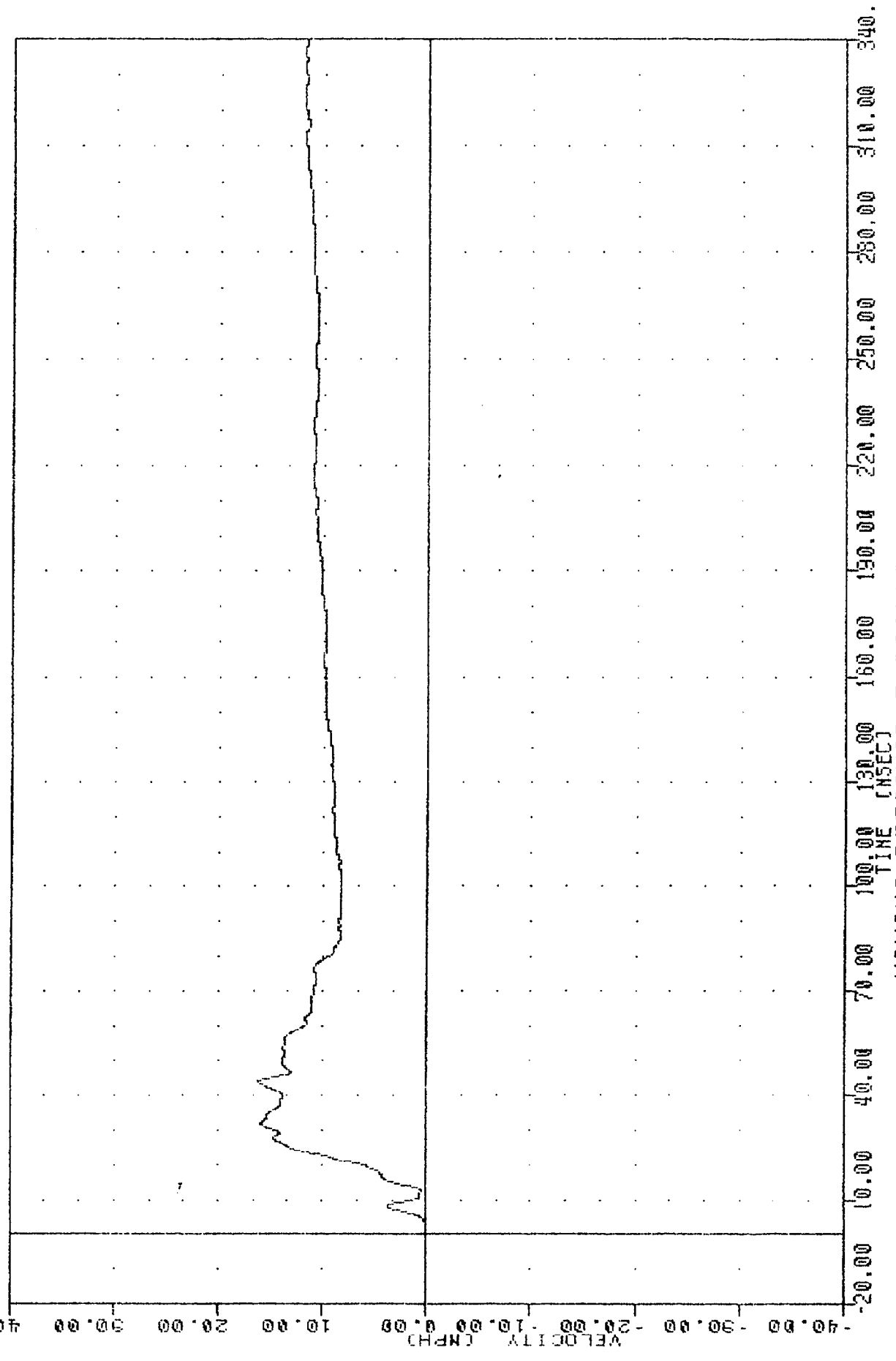
TAC
SIDE PROTECTION - 20R/4DR
84013000000
LFSYB5

PLOT DATE 17-JAN-84 10:02:15

FILTER = 6LPF 100/ 316/ -40
MIN. MAX VALUES = -24.70 13.25, 60.70 25.38



TAC 840113
 SIDE PROTECTION - 20R/40R
 840130000000
 LFSY65
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -0.030 -5.25 16.25 e 43.63
 PLOT DATE 17-JAN-84 10:04:04



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING LFSY65

TRC 840113 17-JAN-84 10:02:15

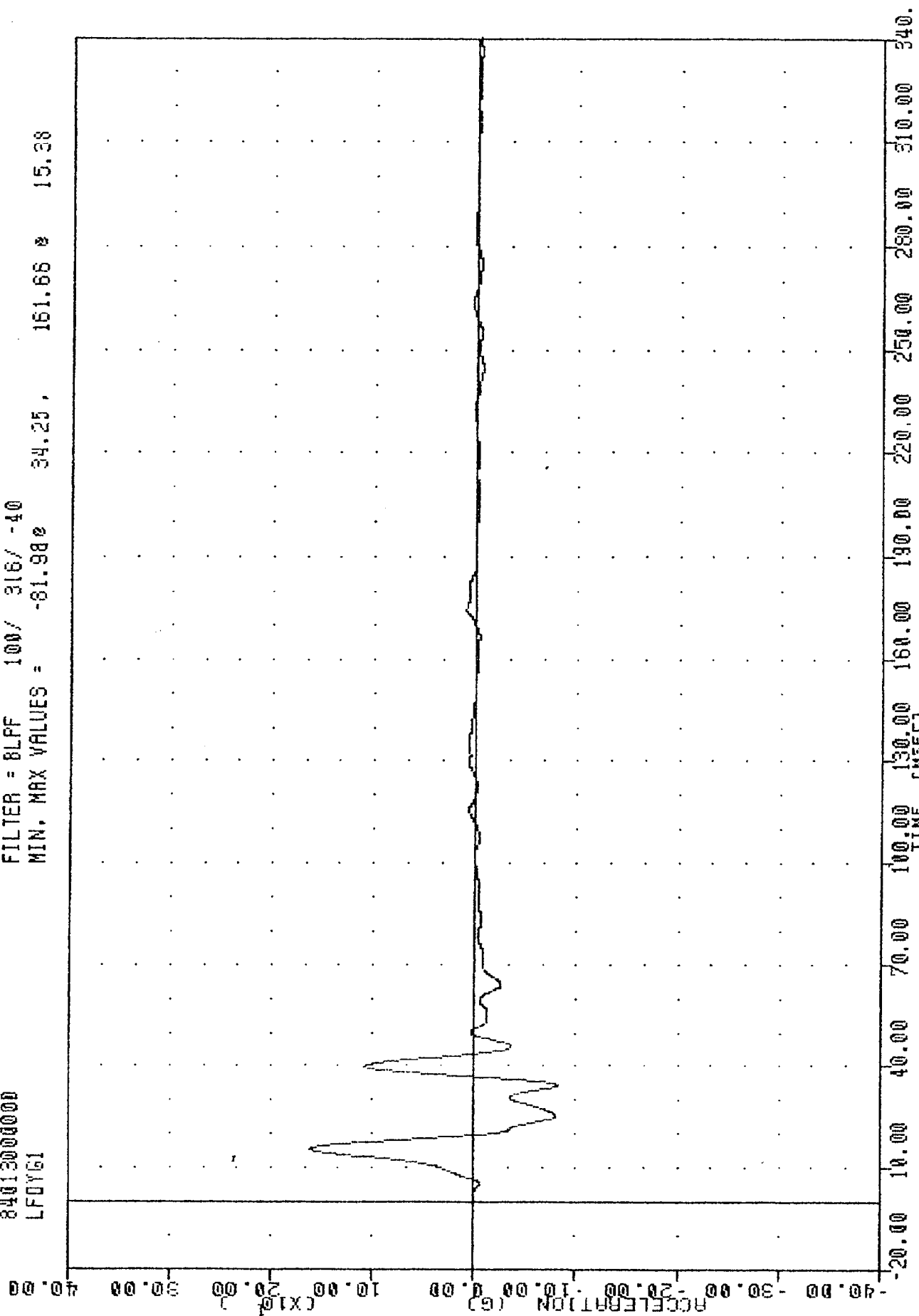
SIDE PROTECTION - 20R/40R

840130000000

LF0Y61

FILTER = 8LFF 100/ 316/ -40

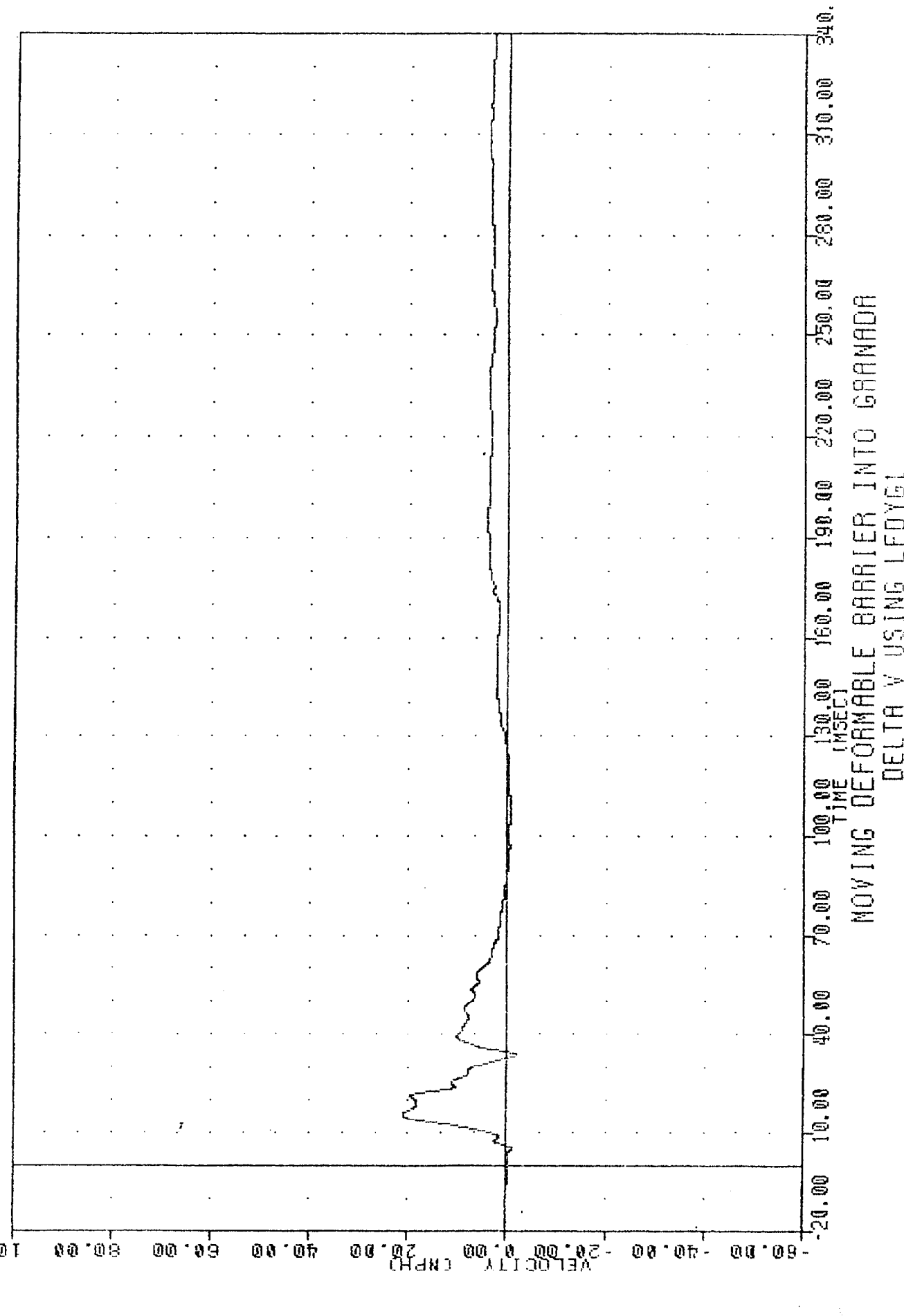
MIN. MAX VALUES = -81.980 34.25, 161.66 15.38



MOVING DEFORMABLE BARRIER INTO GRANADA

VEHICLE LEFT FRONT DOOR (POSITION 6) ACCELERATION Y AXIS

704013
 SIDE PROTECTION - 20R/40R
 04013000000
 LFDYV1
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -2.01e 33.75, 21.16 e 15.25
 17 JUN 04 10:04:04



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING LFDYGI

TRC , 840113

SIDE PROTECTION - 2DR/4DR

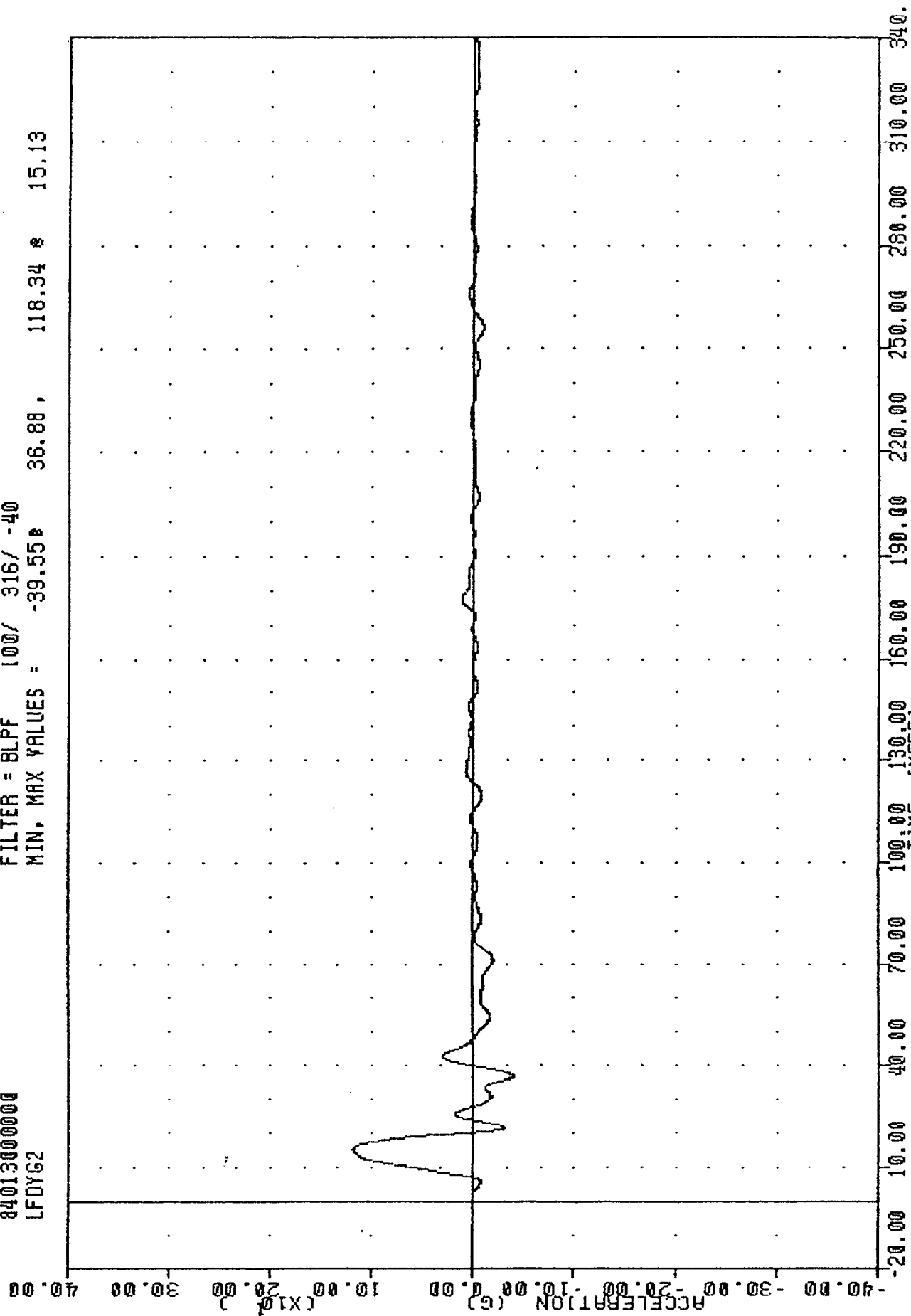
84013000000

LFDY62

PLOT DATE 20-JAN-84 13:59:27

FILTER = BLPF 100/ 316/ -40

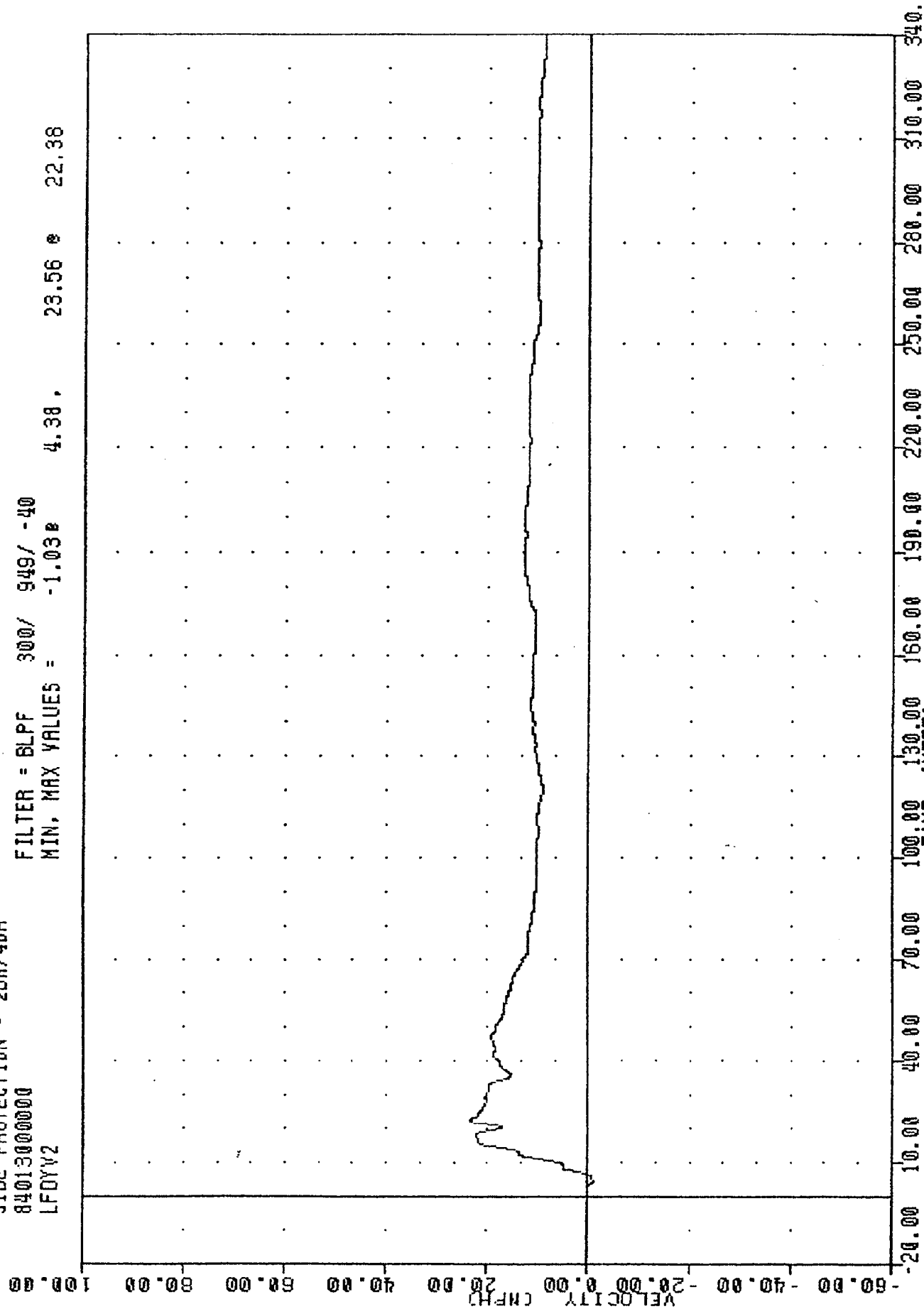
MIN, MAX VALUES = -39.55 36.88, 118.34 15.13



TRC , 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 LFOYV2

PLOT DATE 20-JAN-84 13:59:27

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -1.03 4.38 23.56 22.38

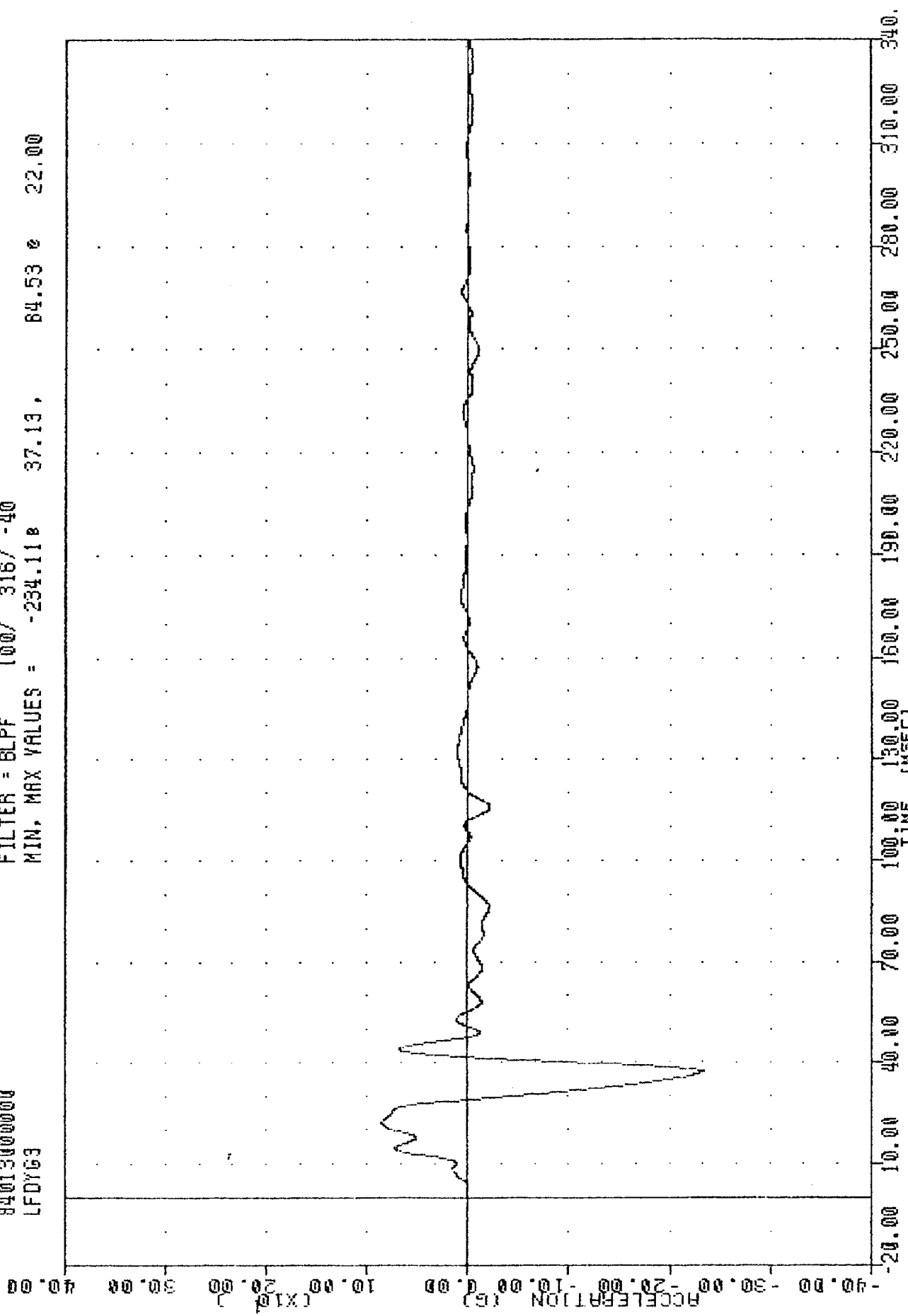


MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING IFNYG2

IRC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 LFDY63

PLOT DATE 17-JAN-84 10:02:15

FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -234.11e 37.13, 84.53 e 22.00

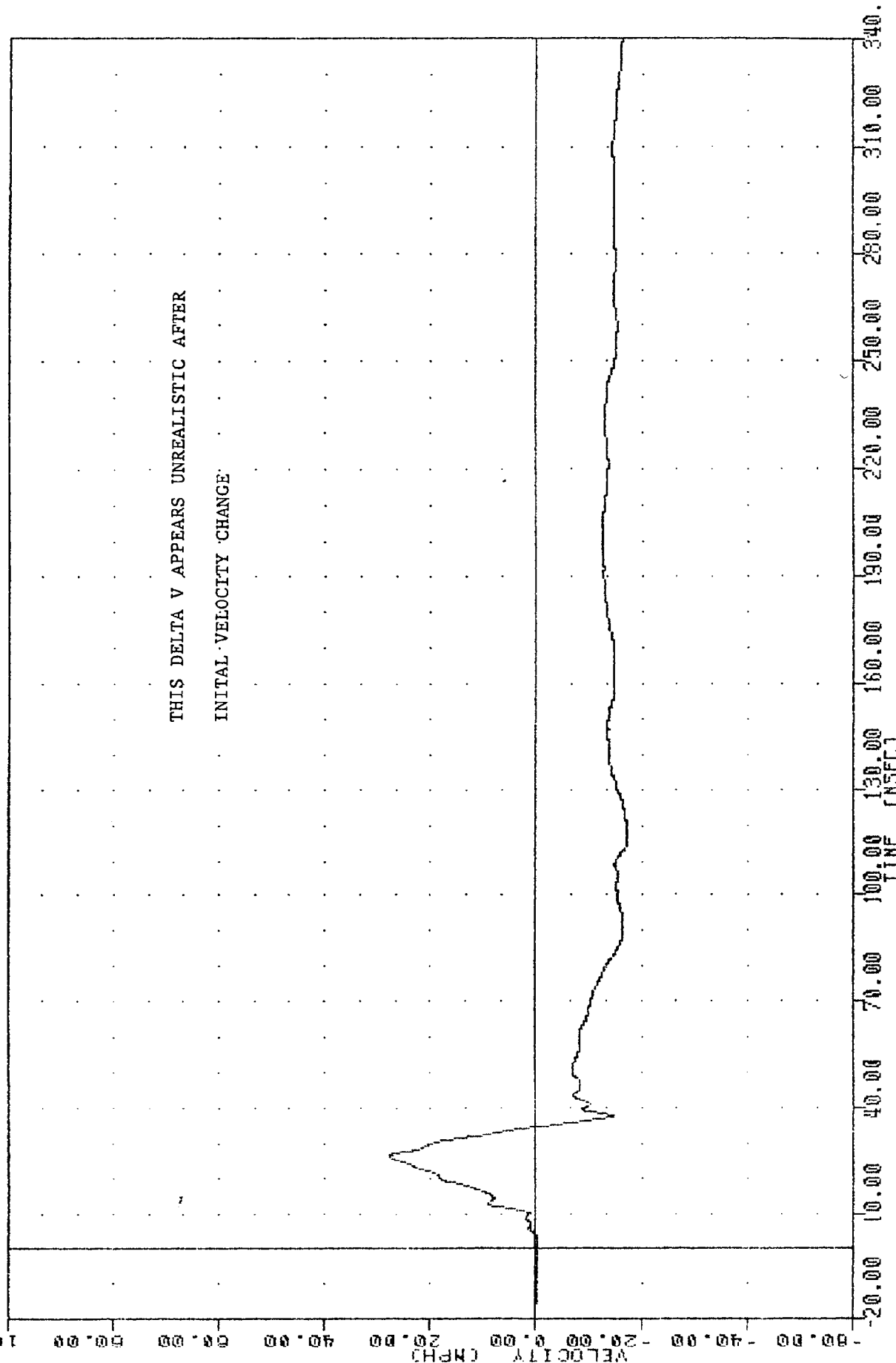


MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE LEFT FRONT DOOR (POSITION 9) ACCELERATION Y AXIS

THC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 LFOYV3

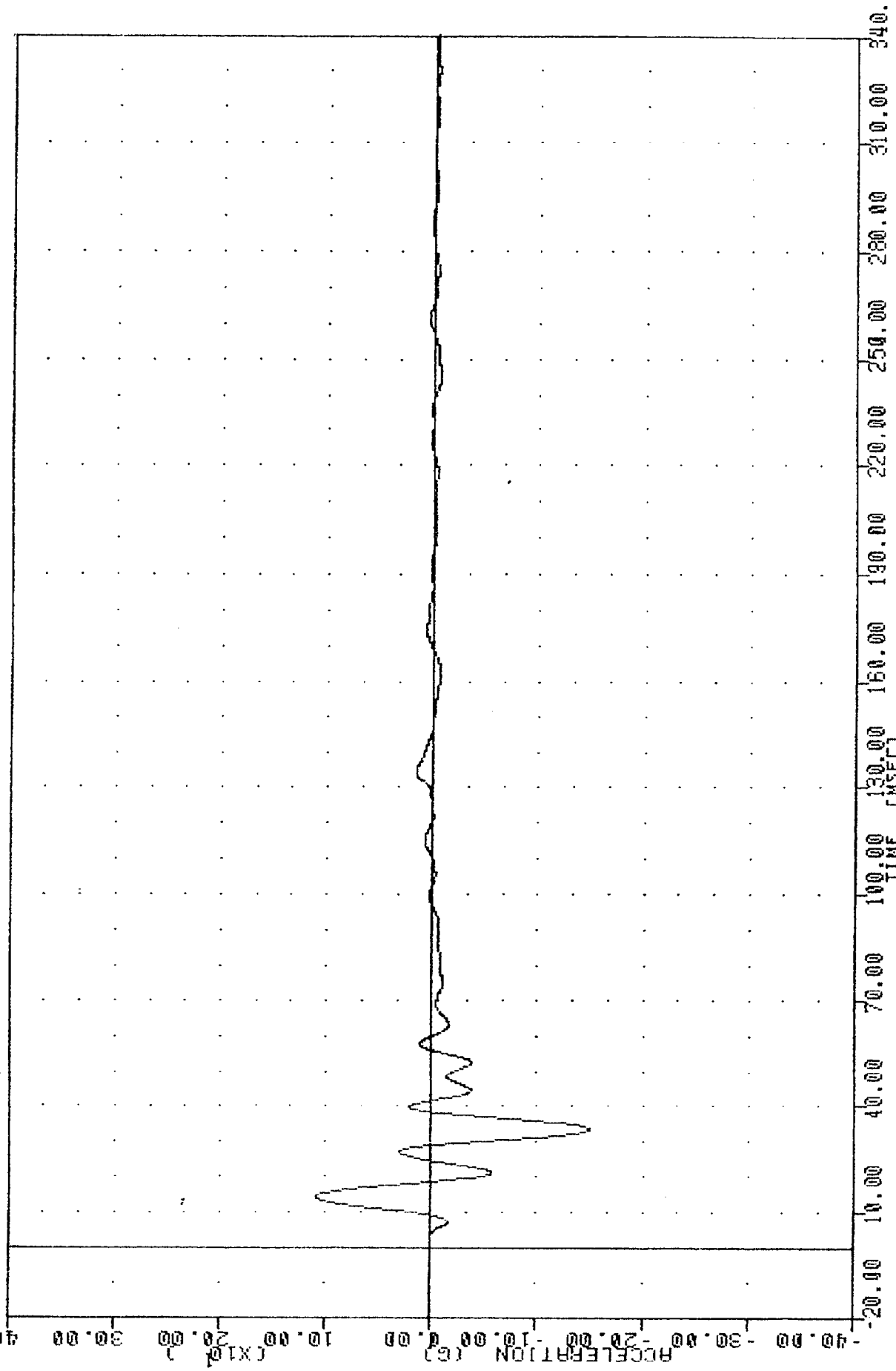
PLOT DATE 17-JAN-84 10:04:04

FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = -17.43e 119.83. 27.95 * 26.38



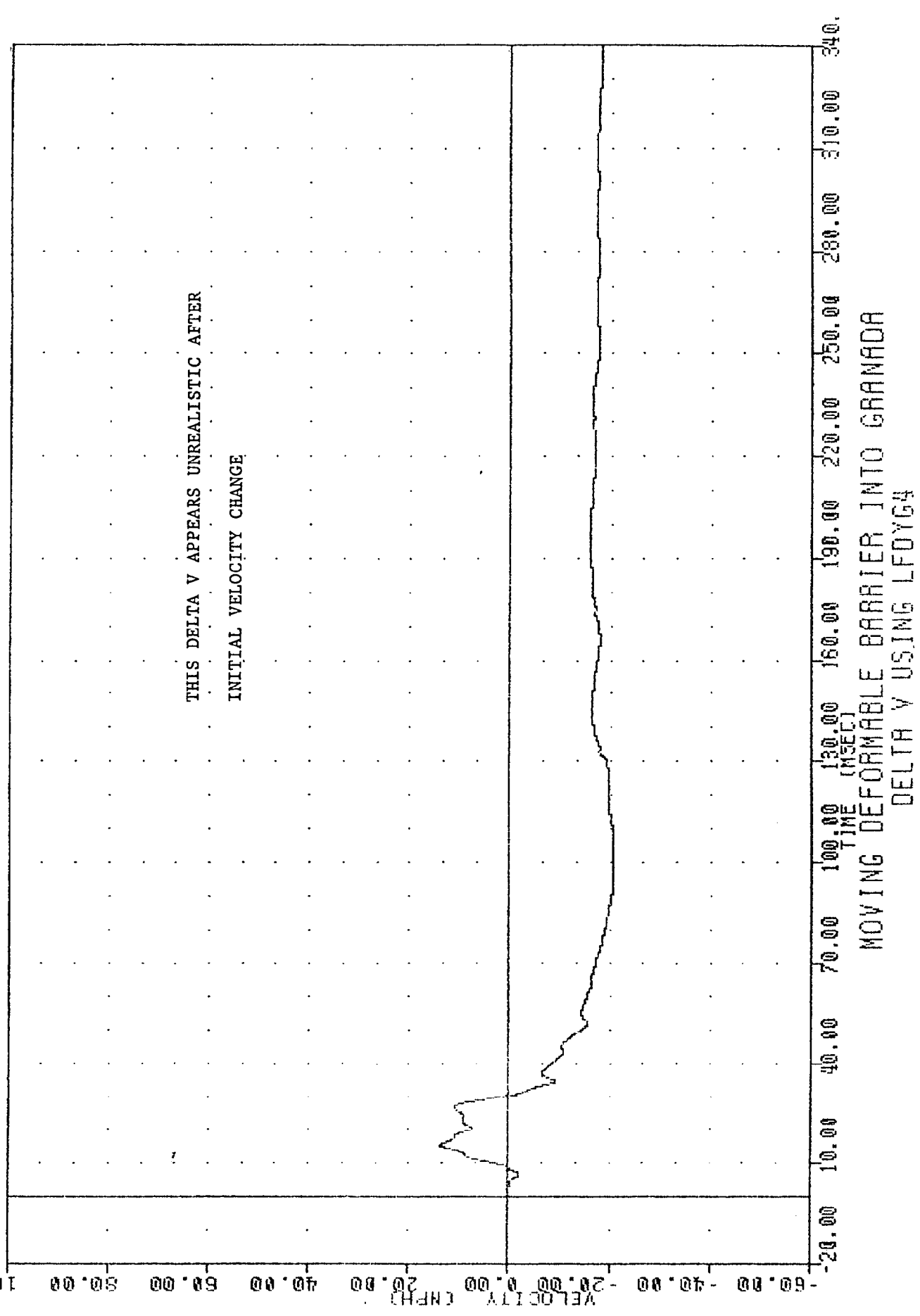
MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING LFOYV3

TRC 840113
 SIDE PROTECTION - 20R/4DR
 84013000000
 LFDY64
 FILTER = 8LPF 100/ 316/ -40
 MIN. MAX VALUES = -149.60e 33.50, 109.41 e 14.25
 PLOT DATE 17-JAN-84 10:02:15



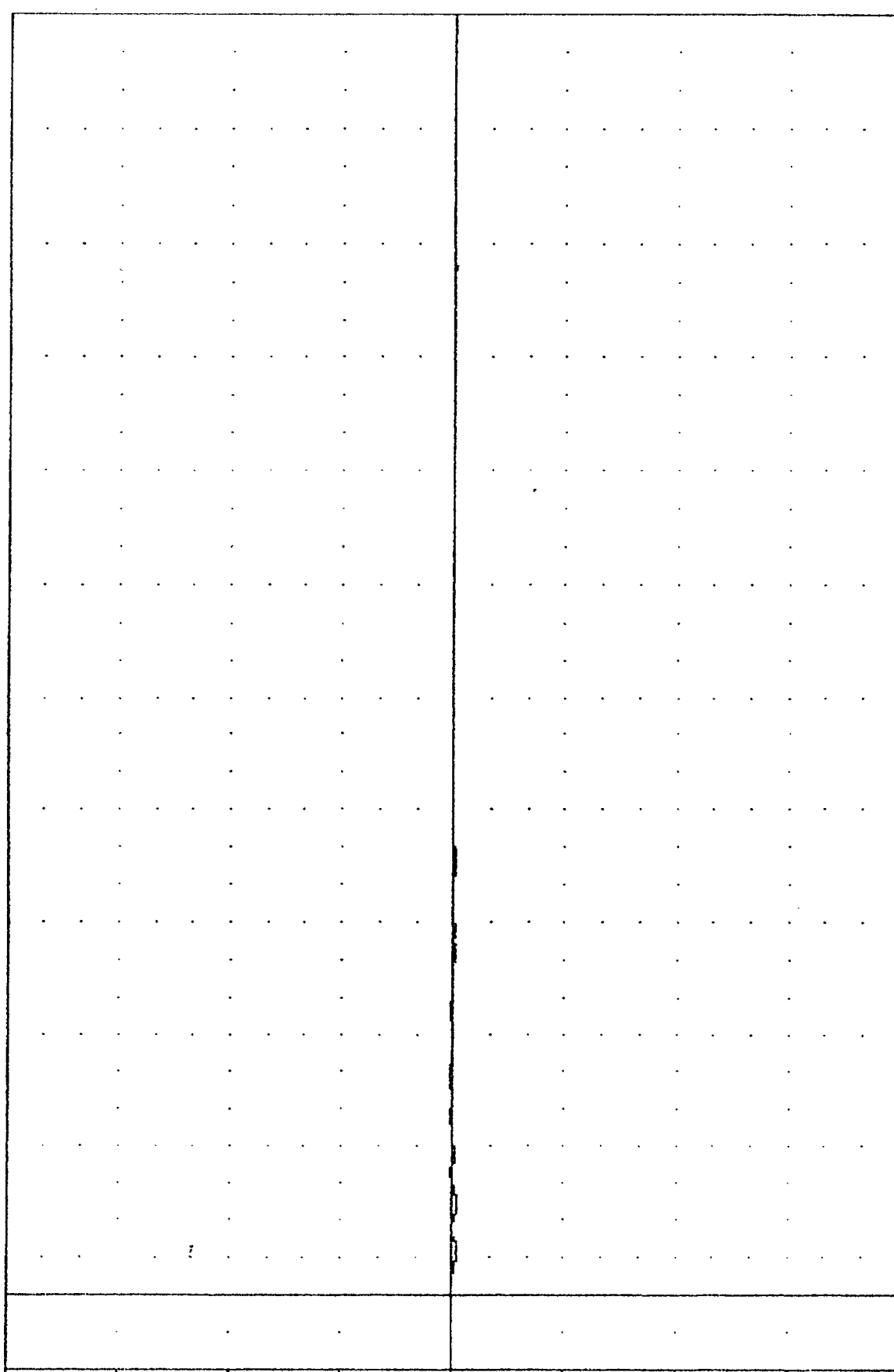
MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE LEFT FRONT DOOR (POSITION 10) ACCELERATION Y AXIS

TMC 840113 17 JAN 84 10:04:04
 SIDE PROTECTION - 20R/40R
 840130000000
 LFDYV4
 FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = -20.77 108.50 13.59 14.68



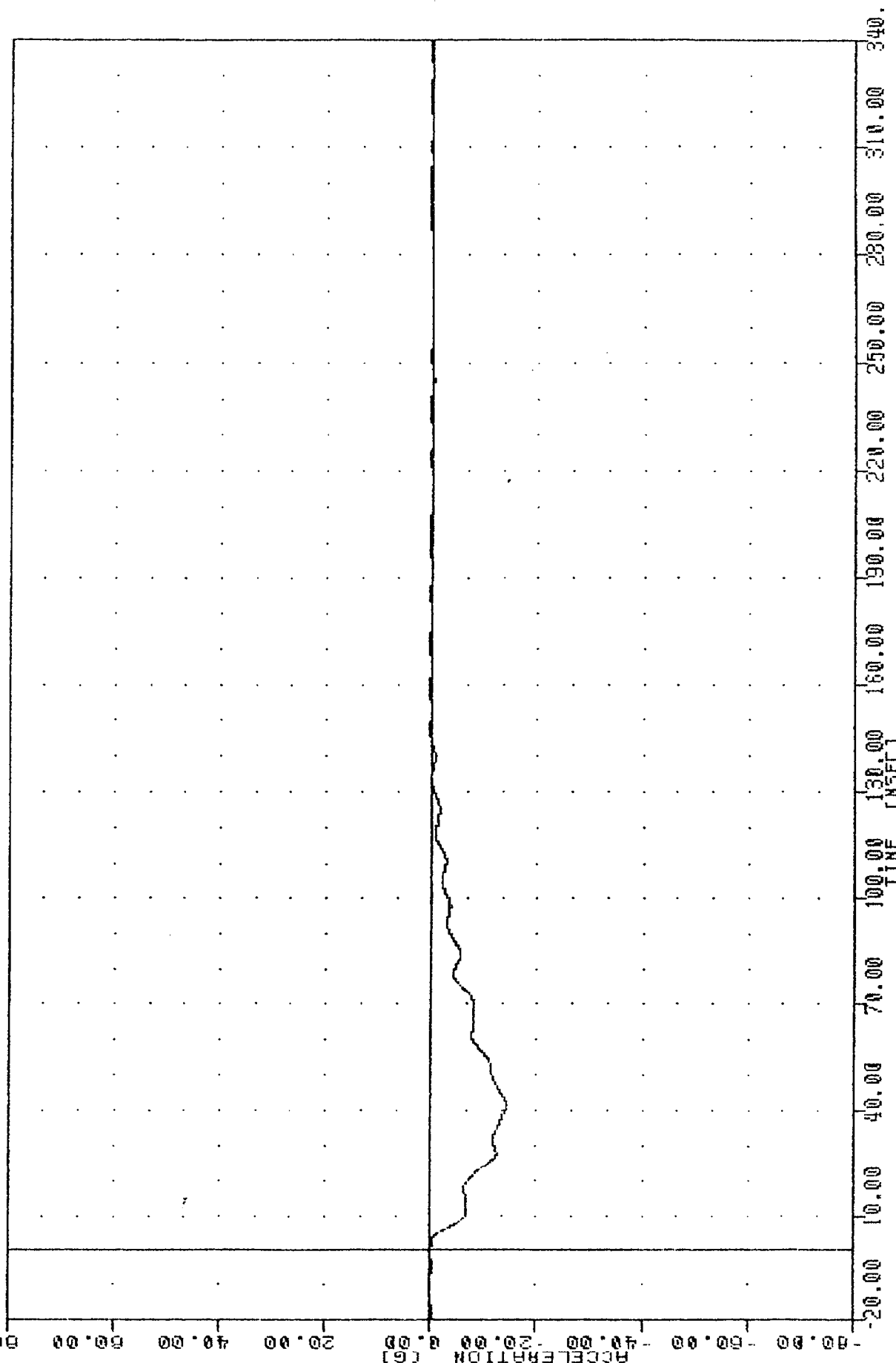
TMC
 SIDE PROTECTION - 20R/40R
 84013000000
 TFRXG?
 PLOT DATE 17 JAN 84 10:02:13
 FILTER = BLFF 100/ 316/ -40
 MIN. MAX VALUES = -4.35e 11.75, 2.49 e 47.88

ACCELERATION (G)
 (X10⁴)



-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 (MSEC)
 MOVING DEFORMABLE BARRIER INTO GRANADA
 VEHICLE TRUNK FLOOR RIGHT ACCELERATION X AXIS

TMC 840113 17 JAN 84 10:02:13
 SIDE PROTECTION - 20R/40R
 84013000000
 BCGX6
 FILTER = BLPF 100/ 316/ -40
 MIN, MAX VALUES = -14.39 41.13, 0.64 e 324.50



MOVING DEFORMABLE BARRIER INTO GRANADA
 BARRIER CENTER OF GRAVITY X AXIS

PLUT DATE 17-JAN-84 10:02:15

IRC 840113
SIDE PROTECTION - 20A/40A

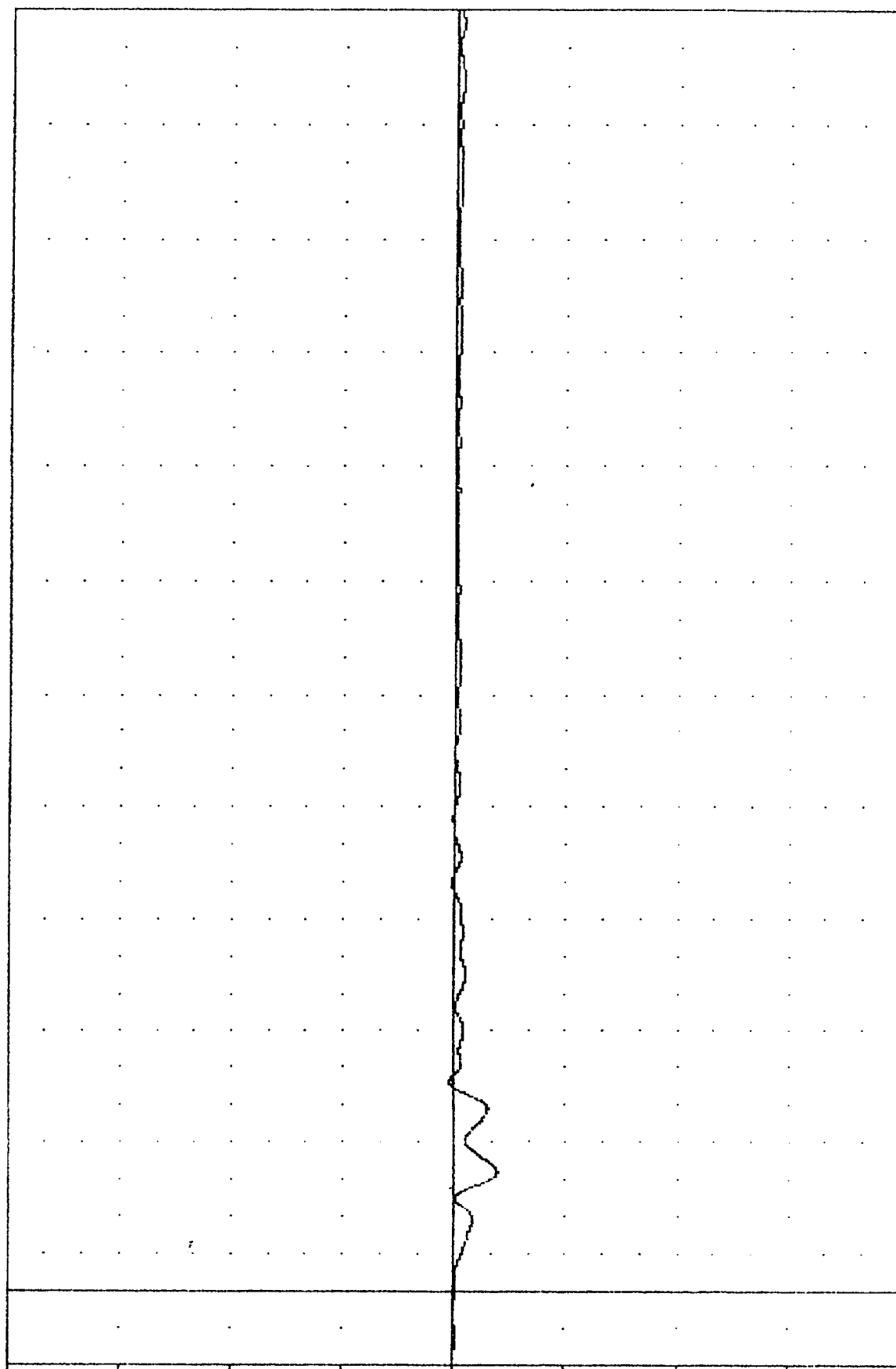
840130000000

BCGYG

FILTER = BLPF 100/ 316/ -40

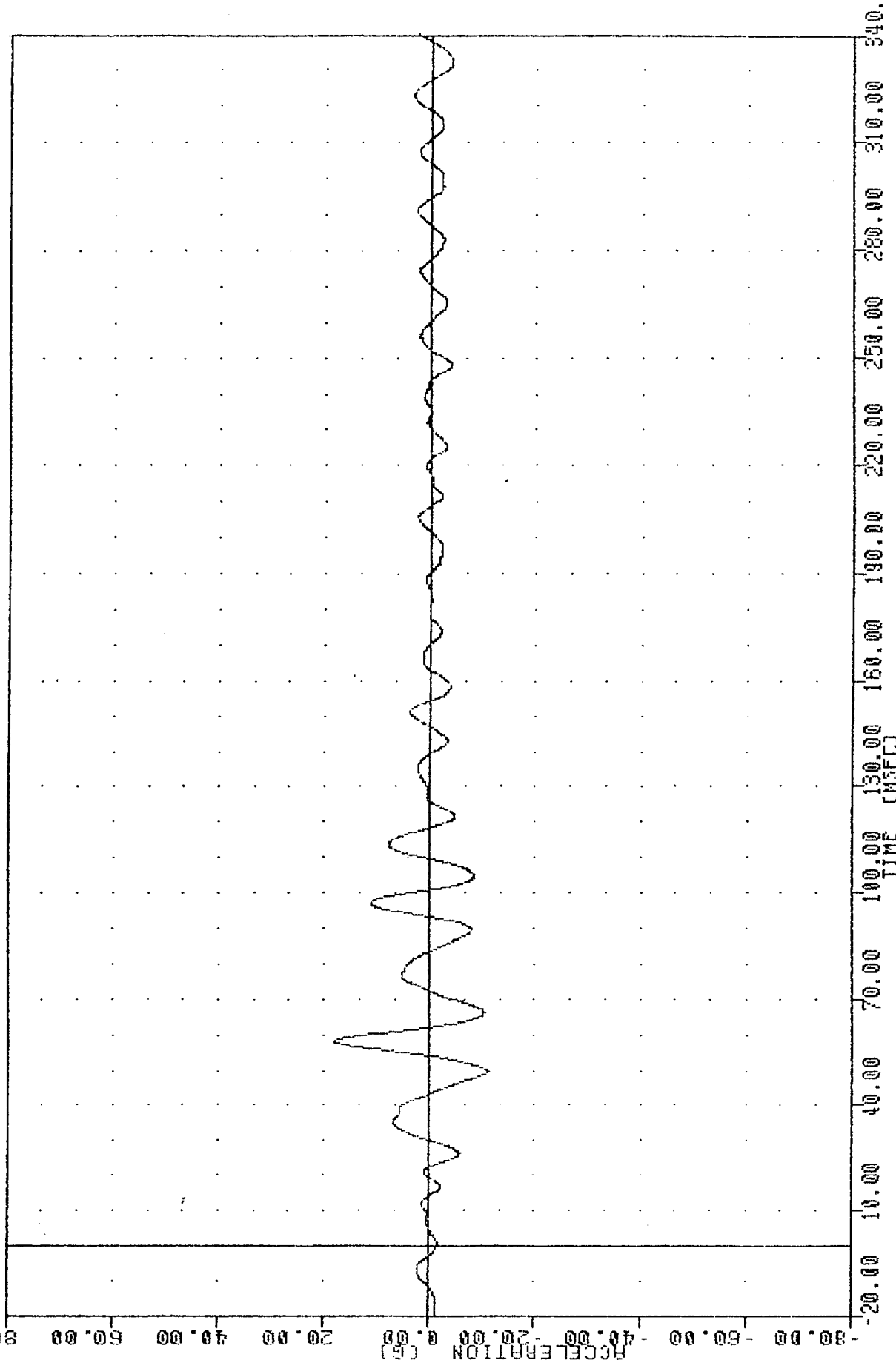
MIN. MAX VALUES = -7.76% 31.88, 0.77% 56.00

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO GRANADA
BARRIER CENTER OF GRAVITY Y AXIS

INC 840113 17 JAN 84 10:02:13
 SIDE PROTECTION - 2DR/4DR
 84013000000
 BCGZG
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -11.13e 49.50, 17.96 e 58.00

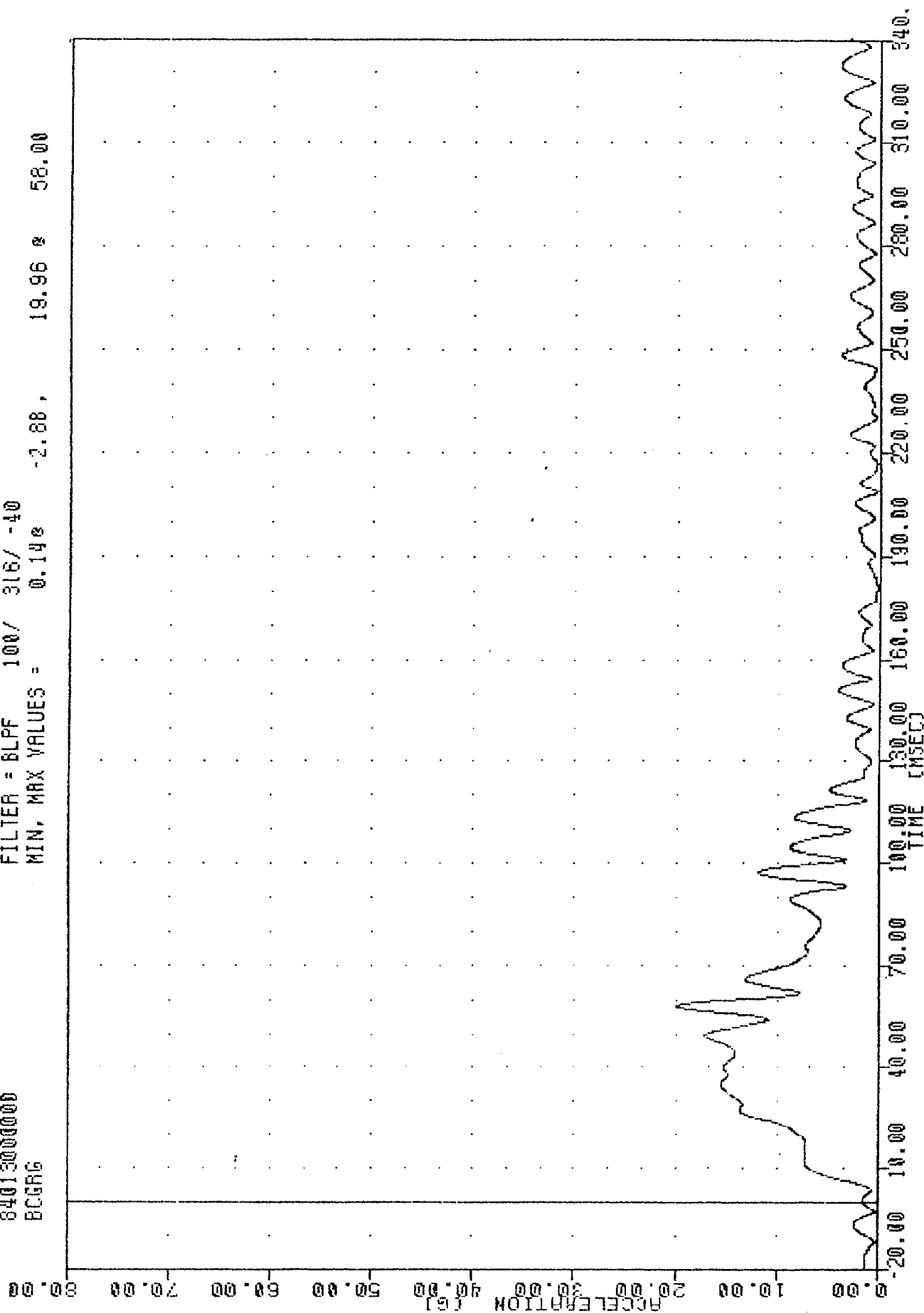


MOVING DEFORMABLE BARRIER INTO GRANADA
 BARRIER CENTER OF GRAVITY Z AXIS

TRC 840113
SIDE PROTECTION - 20A/40A
84013000000
BCGRG

PLUT DATE 17-JAN-84 10:03:33

FILTER = 8LPF 100/ 316/ -40
MIN. MAX VALUES = 0.148 -2.88 , 19.96 58.00



MOVING DEFORMABLE BARRIER INTO GRANADA
BARRIER CG RESULTANT

PLUT DATE 17-JAN-84 10:04:04

TRC 840113

SIDE PROTECTION - 20R/40R

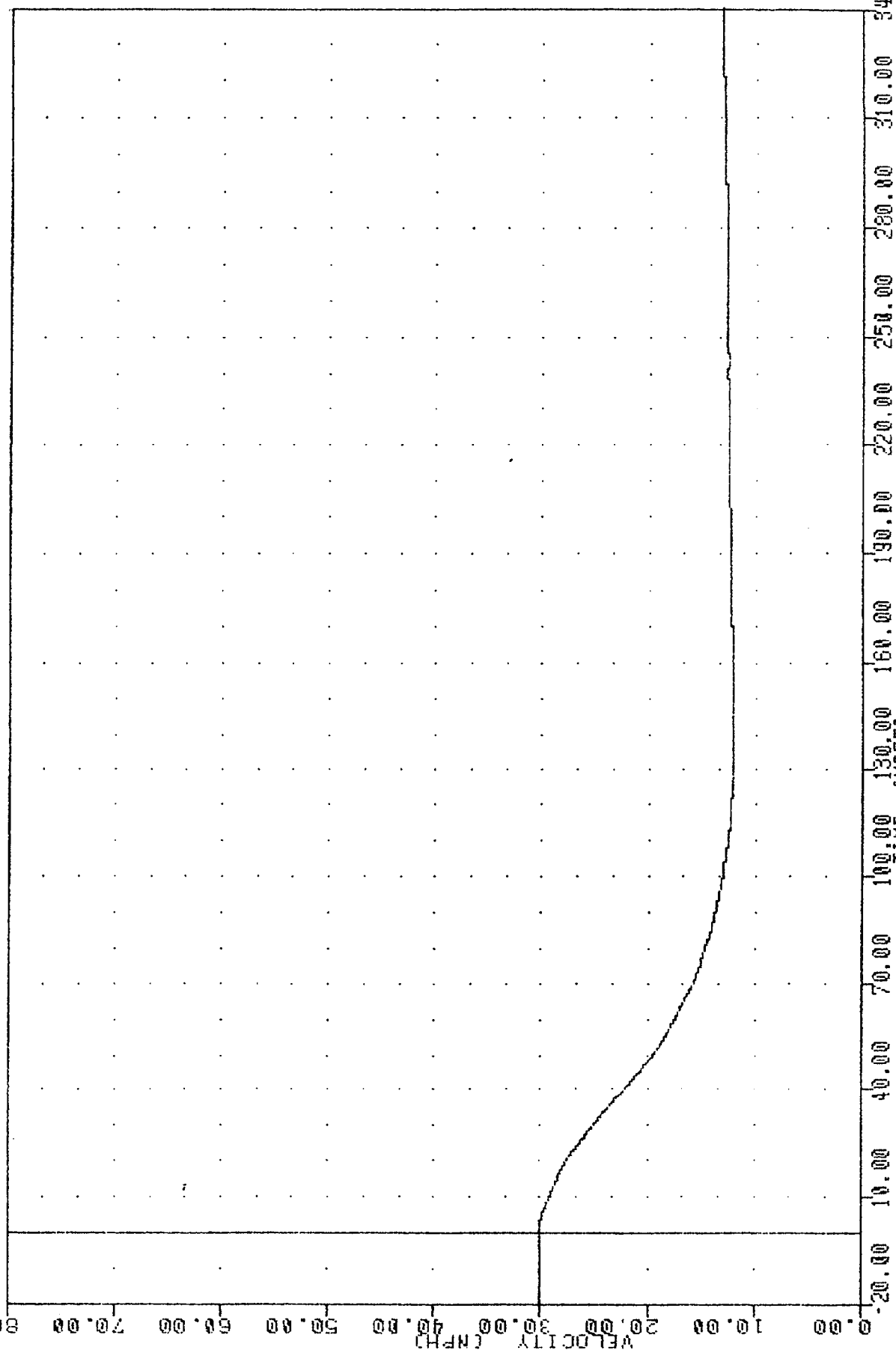
840130000000

BCGXY

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = 11.96 139.13, 30.10 340.15.13

VELOCITY (MPH)



MOVING DEFORMABLE BARRIER INTO GRANADA
DELTA V USING BCGX6

17 JAN 84 10:04:04

17 JAN 84

17 JAN 84

17 JAN 84

17 JAN 84

17 JAN 84

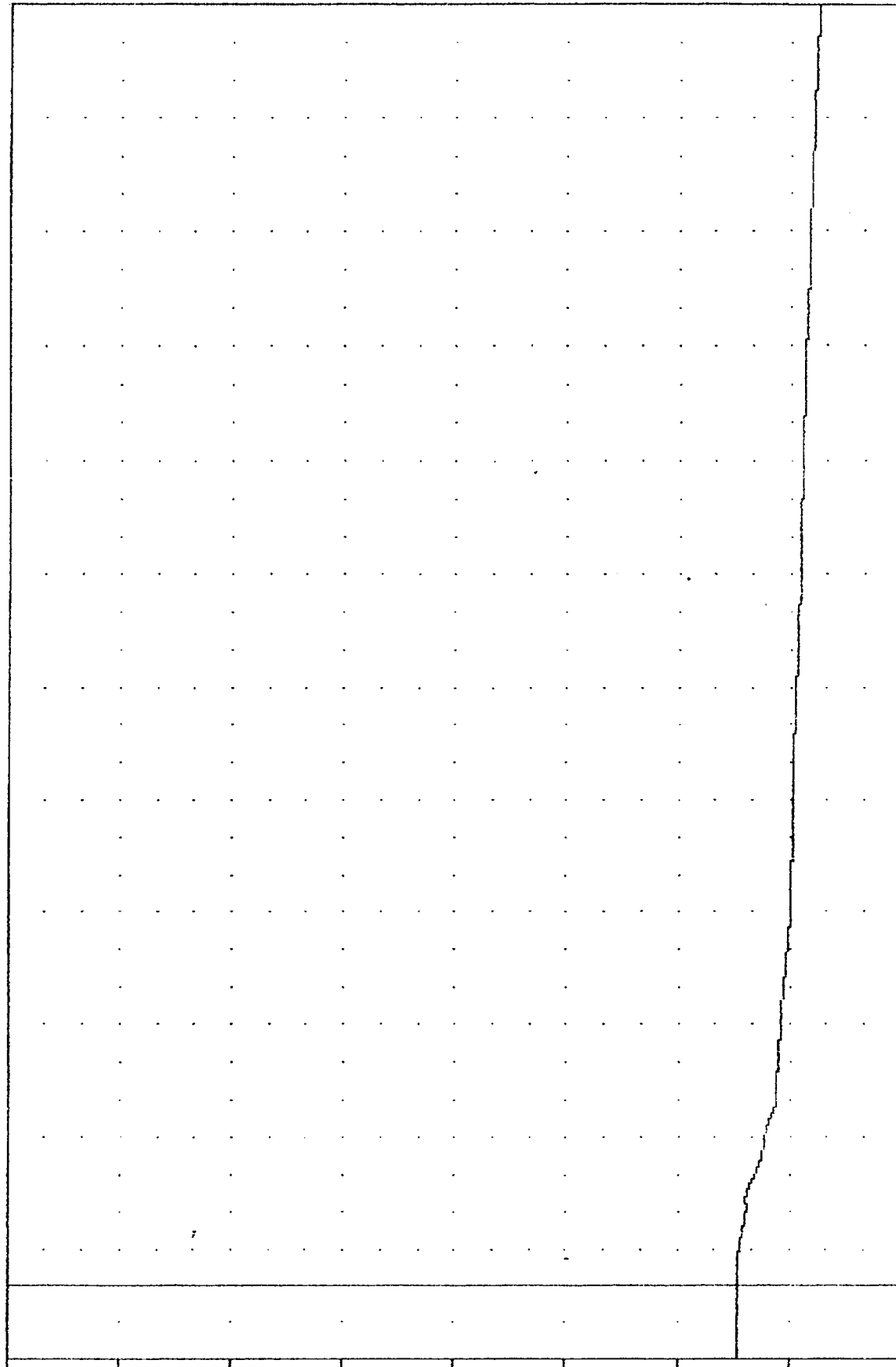
17 JAN 84

8401300000

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = 7.35e 340.00, 14.70 e -20.00

VELOCITY (MPH)



0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 -20.00

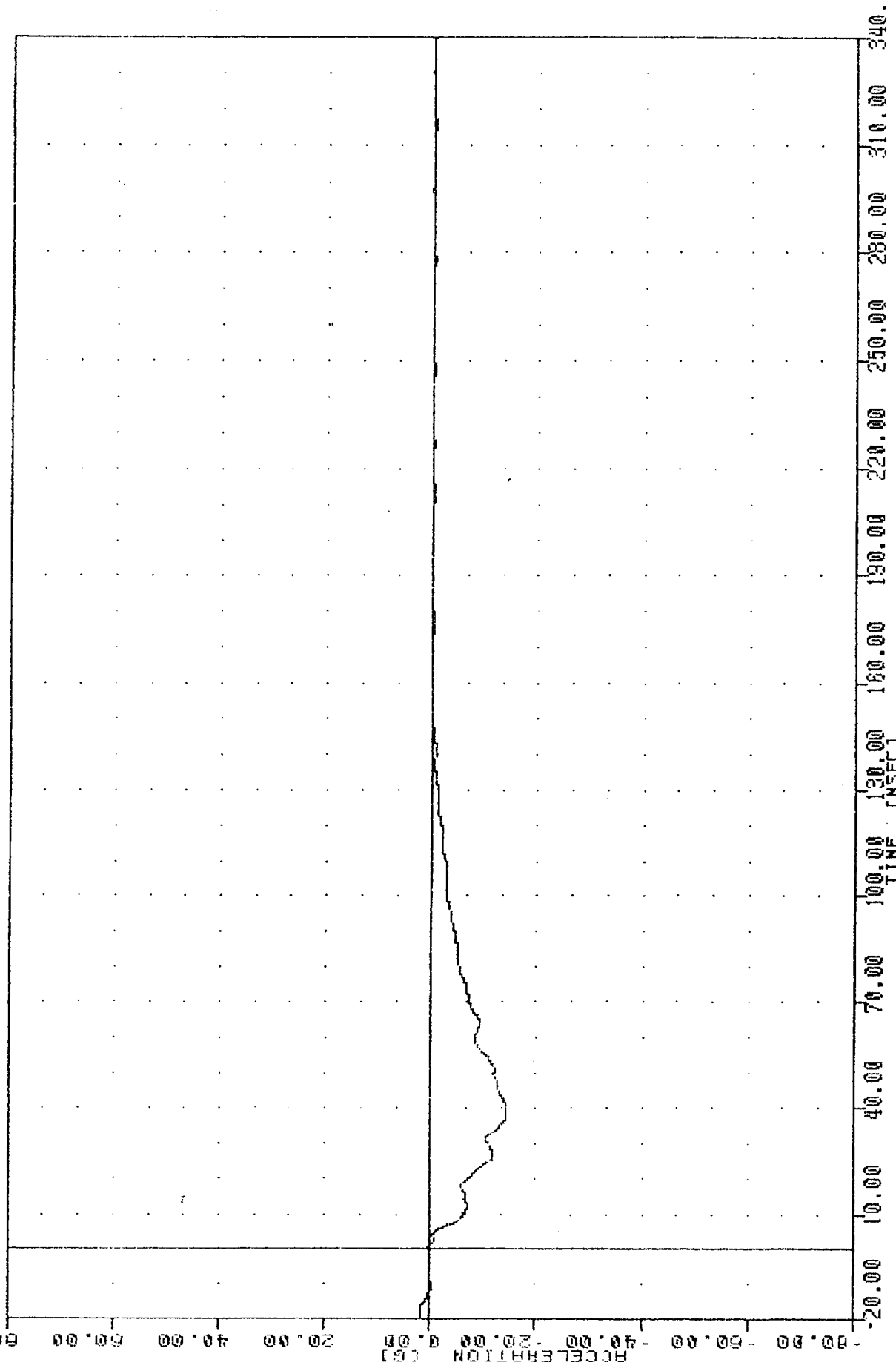
TIME (INSEC)

0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

MOVING DEFORMABLE BARRIER INTO GRANADA

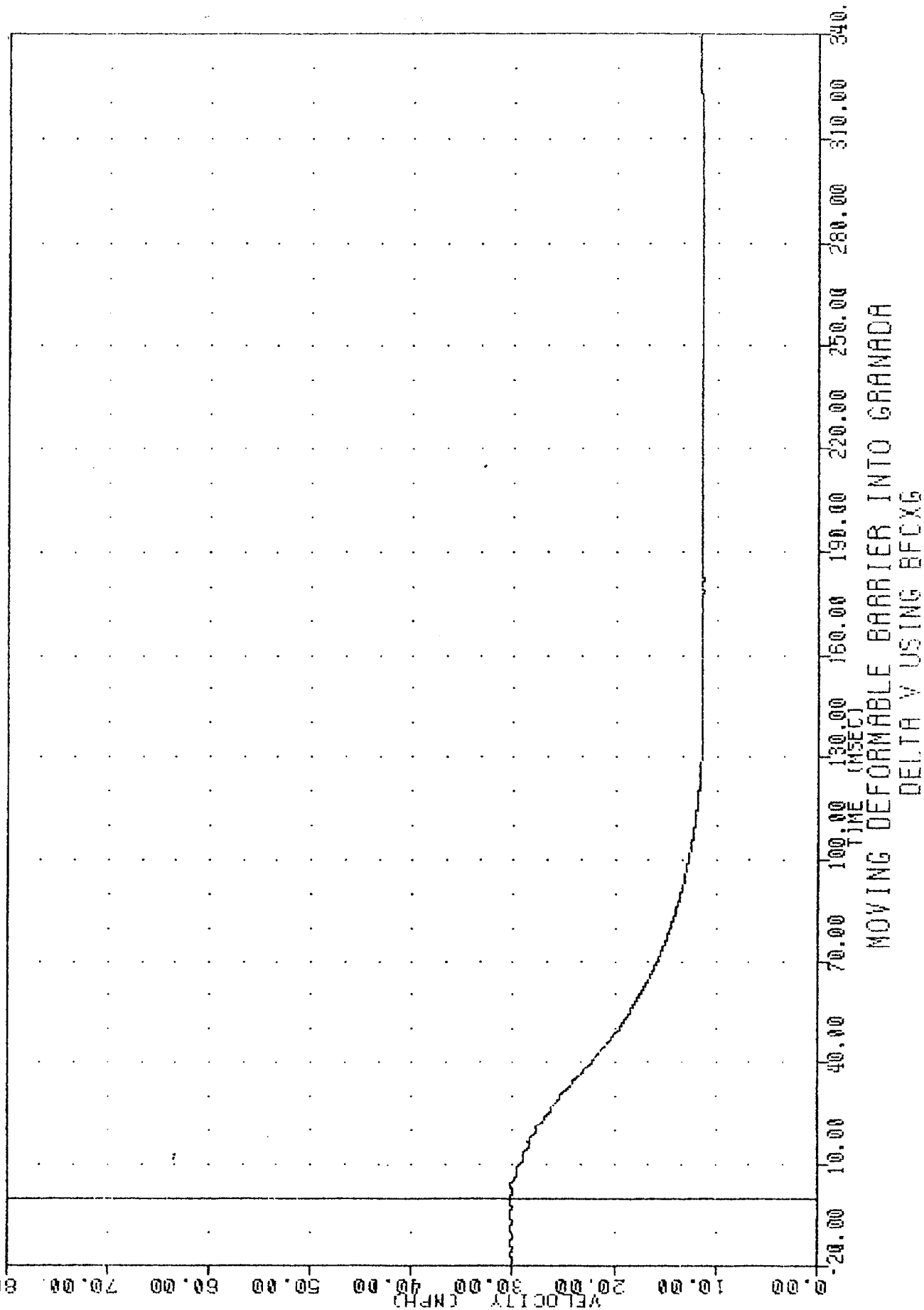
DELTA V USING BCGYG

TPL 840113 17-JAN-84 10:02:15
 SIDE PROTECTION - 20R/4DR
 84013000000
 BFCXB
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = -14.47% 37.00 1.89% -16.88

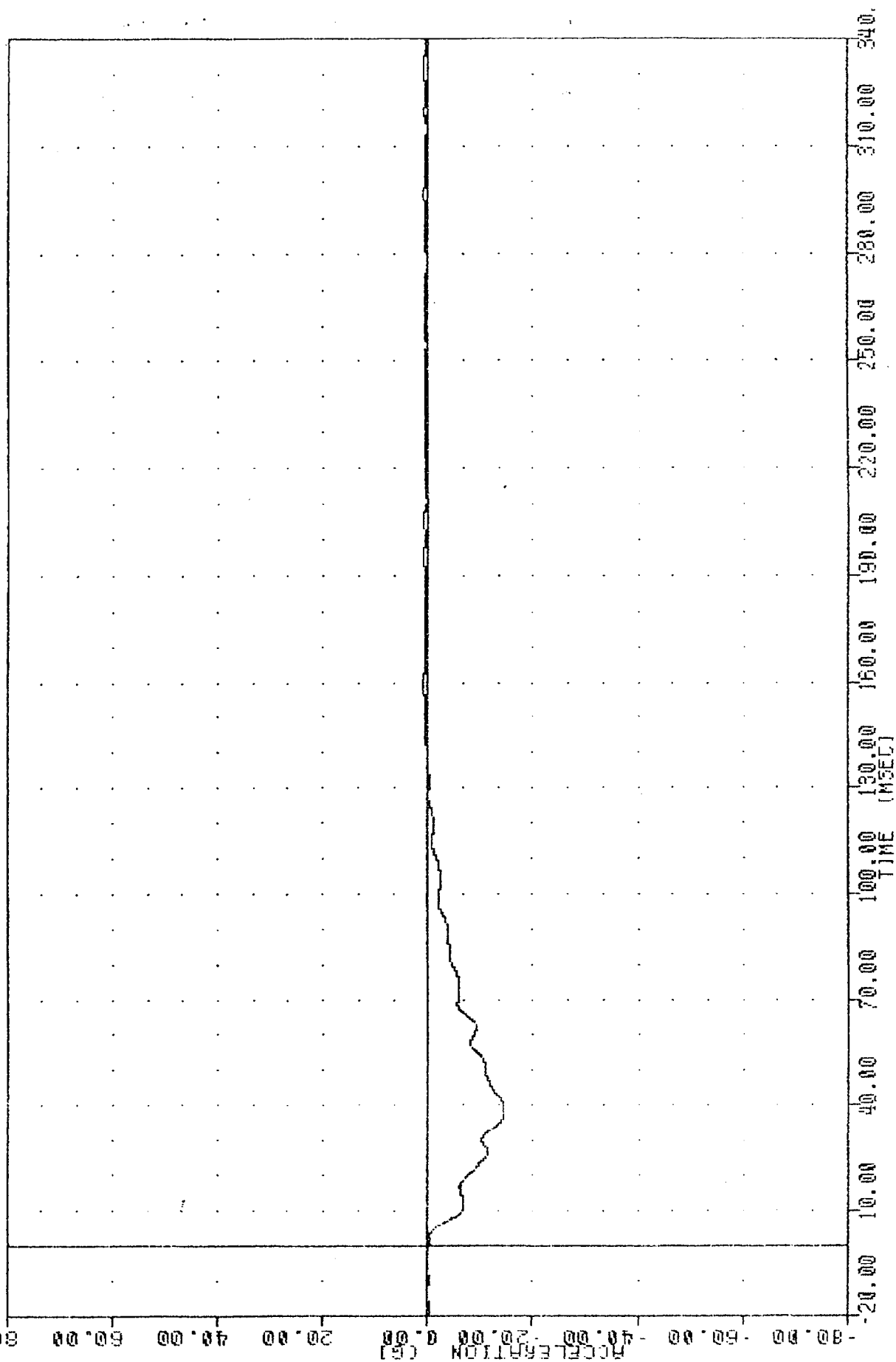


MOVING DEFORMABLE BARRIER INTO GRANADA
 BARRIER FRONT CROSSMEMBER ACCELERATION X AXIS

IRC 840113
 SIDE PROTECTION - 20R/40R
 84013000000
 BFCXV
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = 11.31e 181.88, 30.34 e 3.63
 PLUT DATE 17-JAN-84 10:04:04

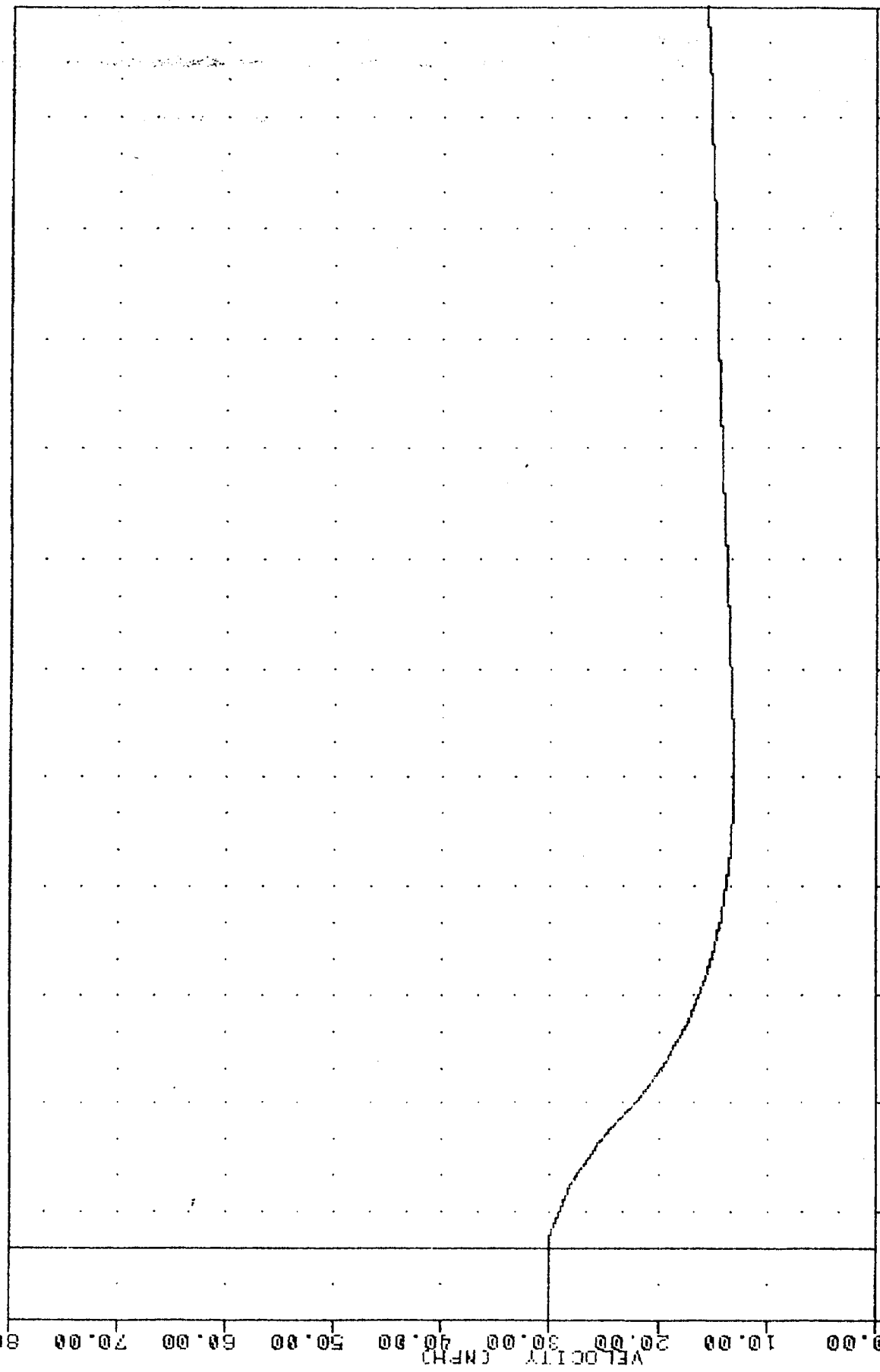


TRC 840113 17 JAN 84 10:02:13
 SIDE PROTECTION - 20R/40R
 840130000000
 BRXG
 FILTER = BLPF 100/ 315/ -40
 MIN, MAX VALUES = -14.24e 40.13, 1.00 e 205.63



MOVING DEFORMABLE BARRIER INTO GRANADA
 BARRIER REAR CROSSMEMBER ACCELERATION X AXIS

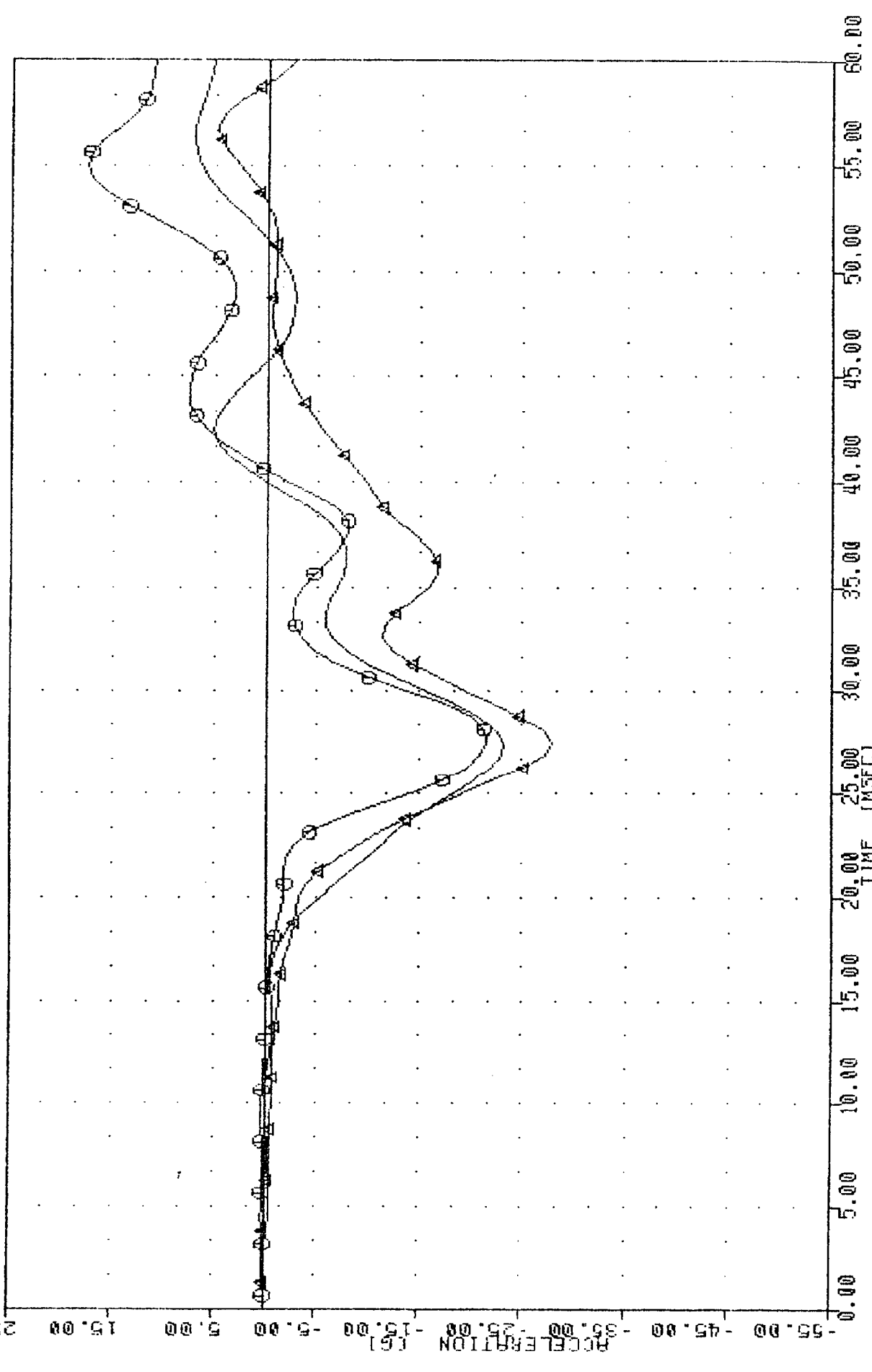
TMC 04013000000
 SIDE PROTECTION - 20R/40R
 84013000000
 BRCXW
 FILTER = BLPF 300/ 949/ -40
 MIN. MAX VALUES = 13.118 132.38, 30.10 30.15.38
 17 JAN 04 10:04.03



MOVING DEFORMABLE BARRIER INTO GRANADA
 DELTA V USING BRCXG

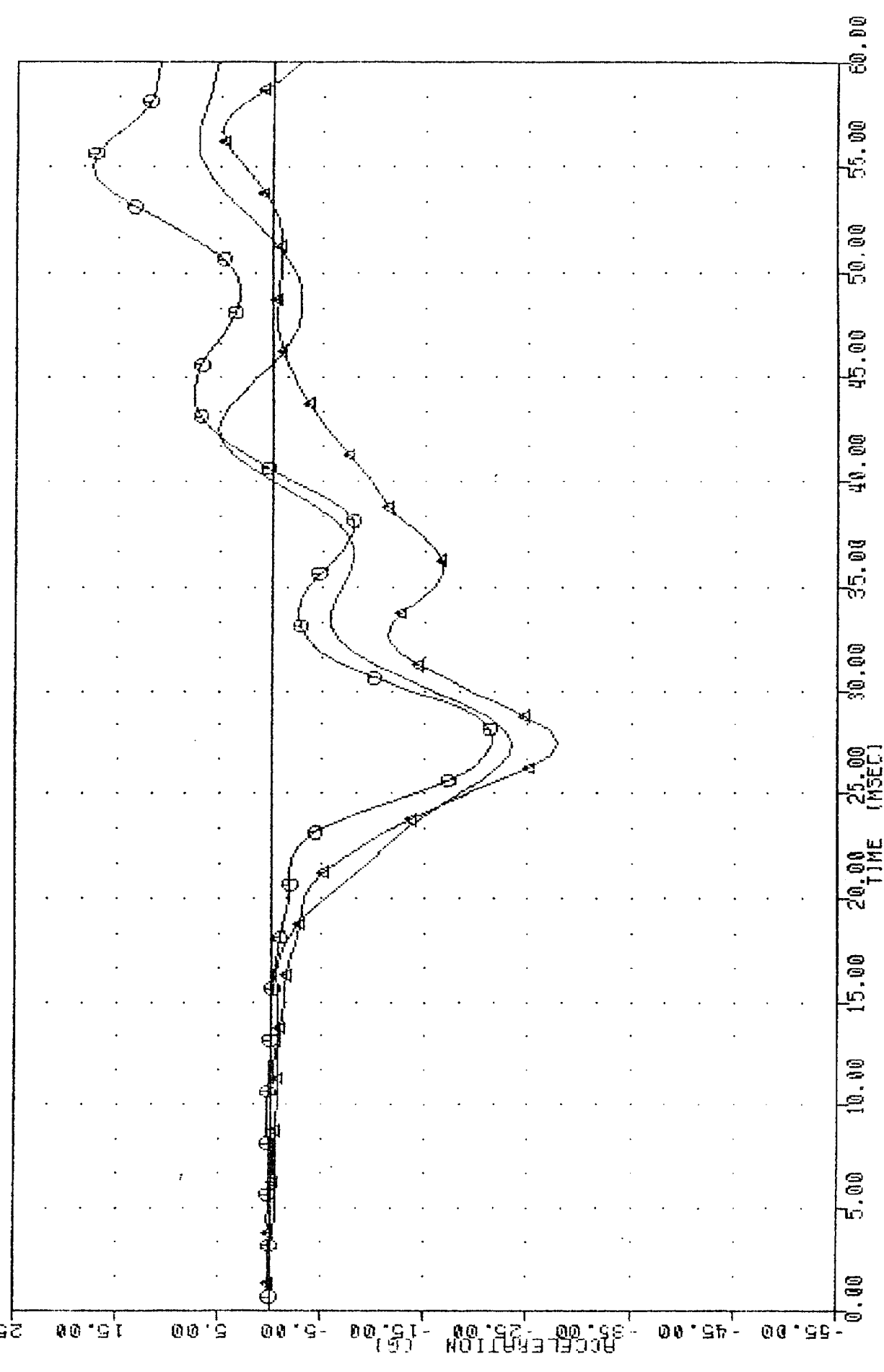
APPENDIX C
DUMMY CERTIFICATION

VMC SHEL1 3100684 STD THUMAX 5 BODY 318 CH1 84 84010 PLOT DATE 12-JAN-84 08:54:08
 T01Y61 FILTER : HSRI 136/ 189/ -50 MIN, MAX = -23.16 55.63
 MN-250 0 FILTER : HSRI 136/ 189/ -50 MIN, MAX = -21.58 54.38
 MN-250 A FILTER : HSRI 136/ 189/ -50 MIN, MAX = -27.91 56.25



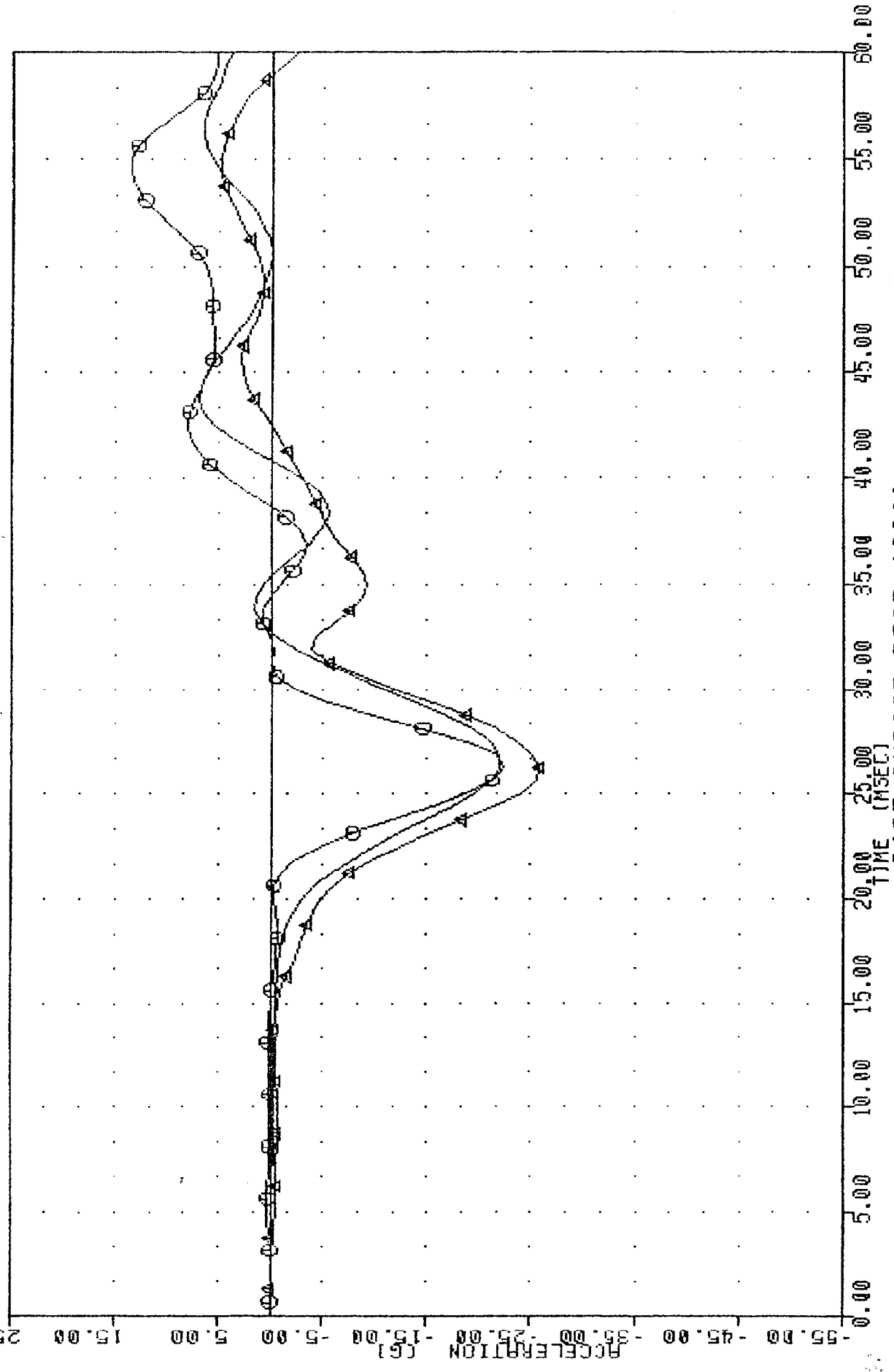
SIDE IMPACT TEST (006)
 UPPER SPINE ACCELERATION Y AXIS -1

VRIC SHL91
 TOLYGH
 MN-2SD
 MN-2SD
 S10 THORAX 5 BODY 318 CHL 84
 136/ 189/ -50
 136/ 189/ -50
 136/ 189/ -50
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 84010
 -23.37 g
 -21.53 g
 -27.91 g
 12-JAN-84
 26.87
 26.87
 26.87
 08:57:27
 7.13g
 17.54g
 4.78g
 55.63
 54.38
 56.25



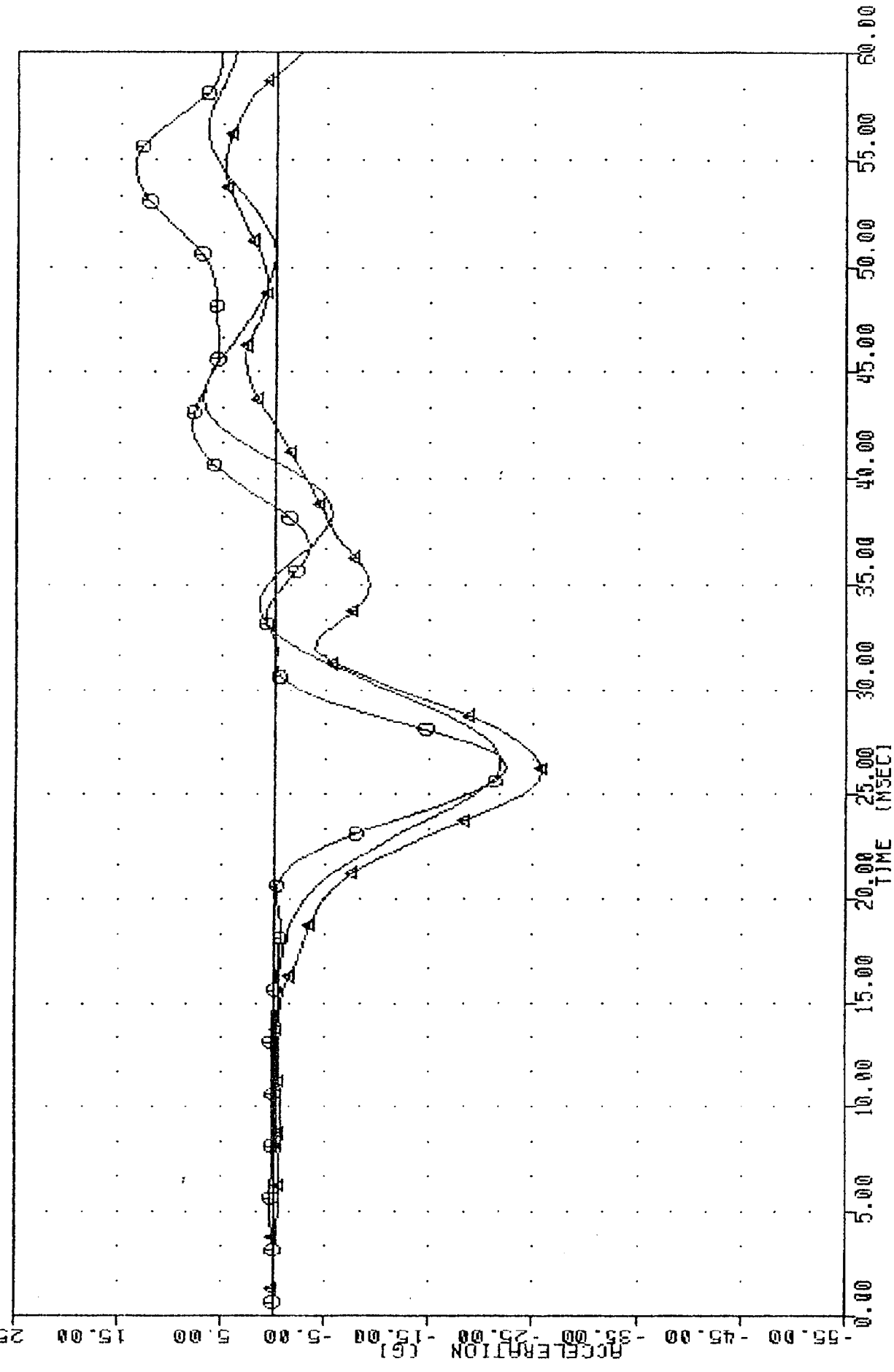
SIDE IMPACT TEST (006)
 UPPER SPINE ACCELERATION Y AXIS -A

VRIC SRL51
 T12YGI
 MN-2SD
 MN-2SD
 S10 THORAX 6 BODY 318 CHL 84
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 MIN, MAX =
 MIN, MAX =
 MIN, MAX =
 PLOT DATE 12-JAN-84 09:12:09
 25.63
 25.63
 25.63
 6.83e
 13.54e
 4.85e
 43.13
 53.75
 53.75



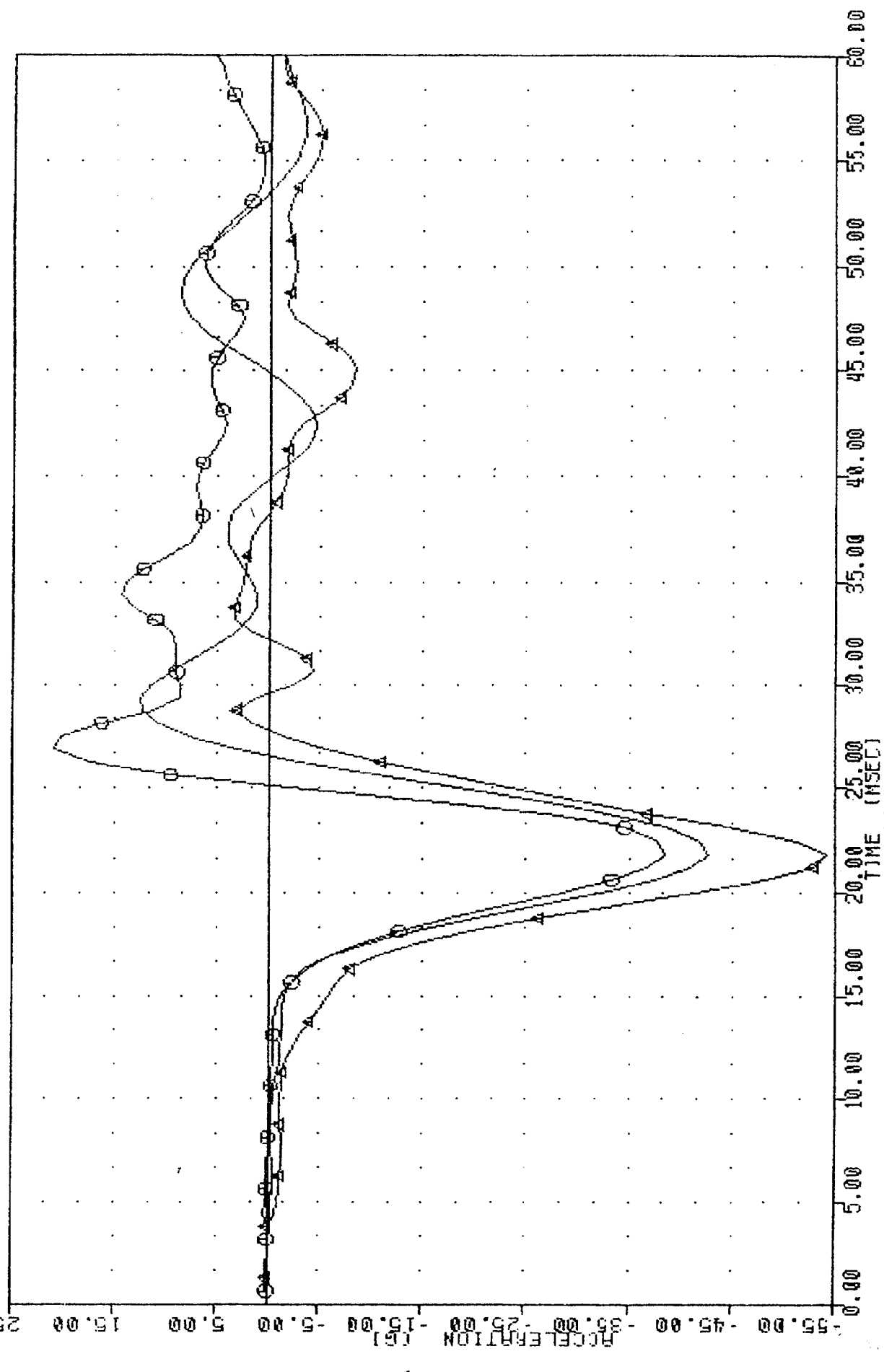
SIDE IMPACT TEST (0006)
 LOWER SPINE ACCELERATION Y AXIS -1

VHC SLB1, S100624 S10 THORAX 6 BODY 318 CAL 84 PLOT DATE 12-JAN-84 09:14:42
 T12YGA FILTER : HSRI 136/ 189/ -50 MIN. MAX = -21.84 6.86 43.13
 MN-2SD 0 FILTER : HSRI 136/ 189/ -50 MIN. MAX = -22.37 13.54 53.75
 MN-2SD 4 FILTER : HSRI 136/ 189/ -50 MIN. MAX = -25.84 4.85 53.75



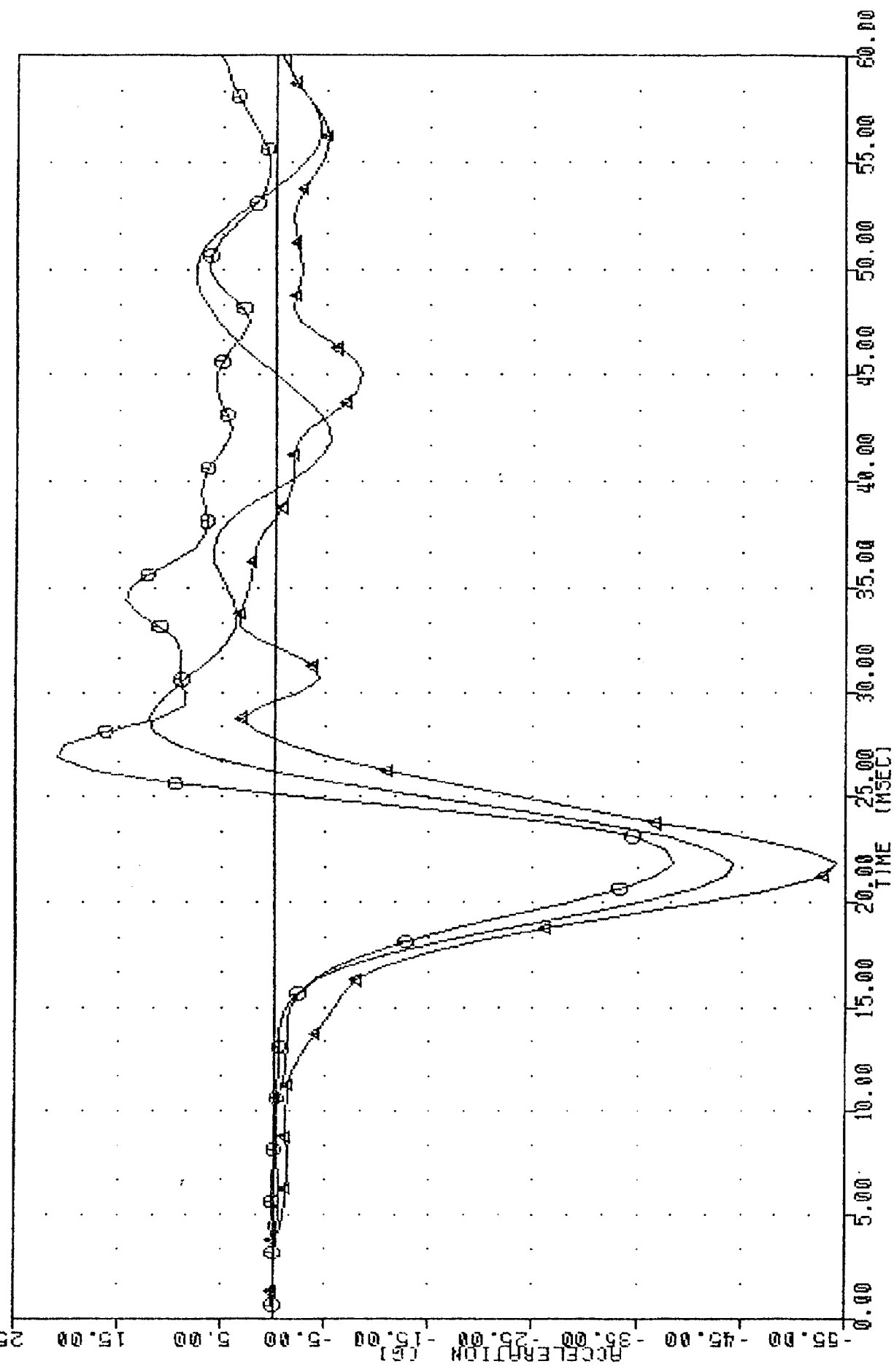
SIDE IMPACT TEST (006)
 LOWER SPINE ACCELERATION Y AXIS -A

WRTC SALS1 510 THORAX BODY 318 CHL 84 84010 09:03:57
 LURYGI FILTER = H3RI 136/ 189/ -50 MIN, MAX = -42.66 21.25
 MN-2SD FILTER = H3RI 136/ 189/ -50 MIN, MAX = -38.44 21.25
 MN-2SD FILTER = H3RI 136/ 189/ -50 MIN, MAX = -54.08 21.25



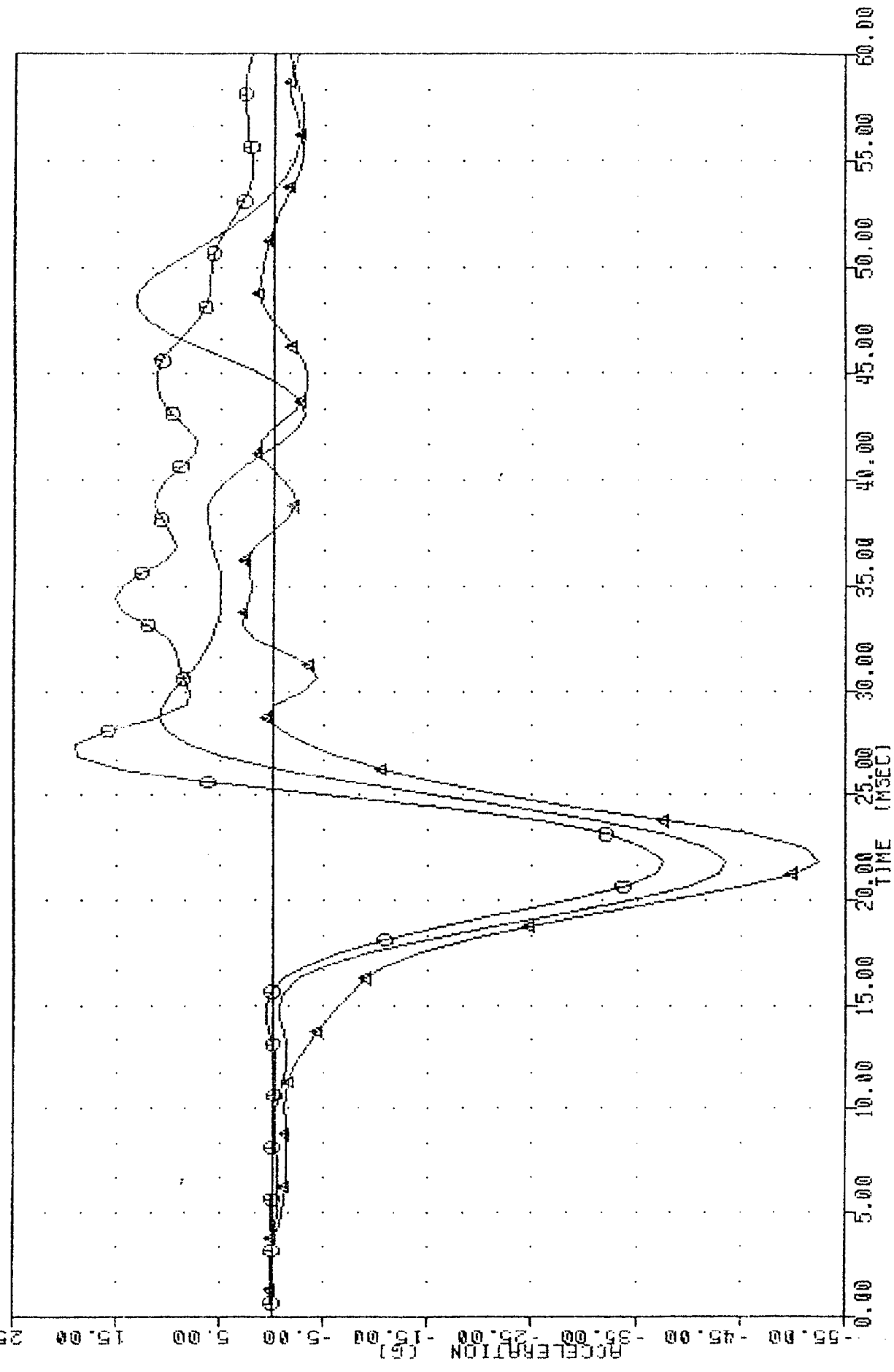
SIDE IMPACT TET (006)
 LEFT UPPER RIB ACCELERATION Y AXIS -1

VHC SRL91
 LUYGH
 MN-2SD
 3100684
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 510 THORAX BODY 318 CHL 84
 136/ 189/ -50
 136/ 189/ -50
 136/ 189/ -50
 84010
 -44.25
 -38.44
 -54.08
 21.25
 21.25
 21.25
 12-JAN-84
 09:07:21
 11.99
 20.92
 3.31
 28.13
 26.25
 33.13



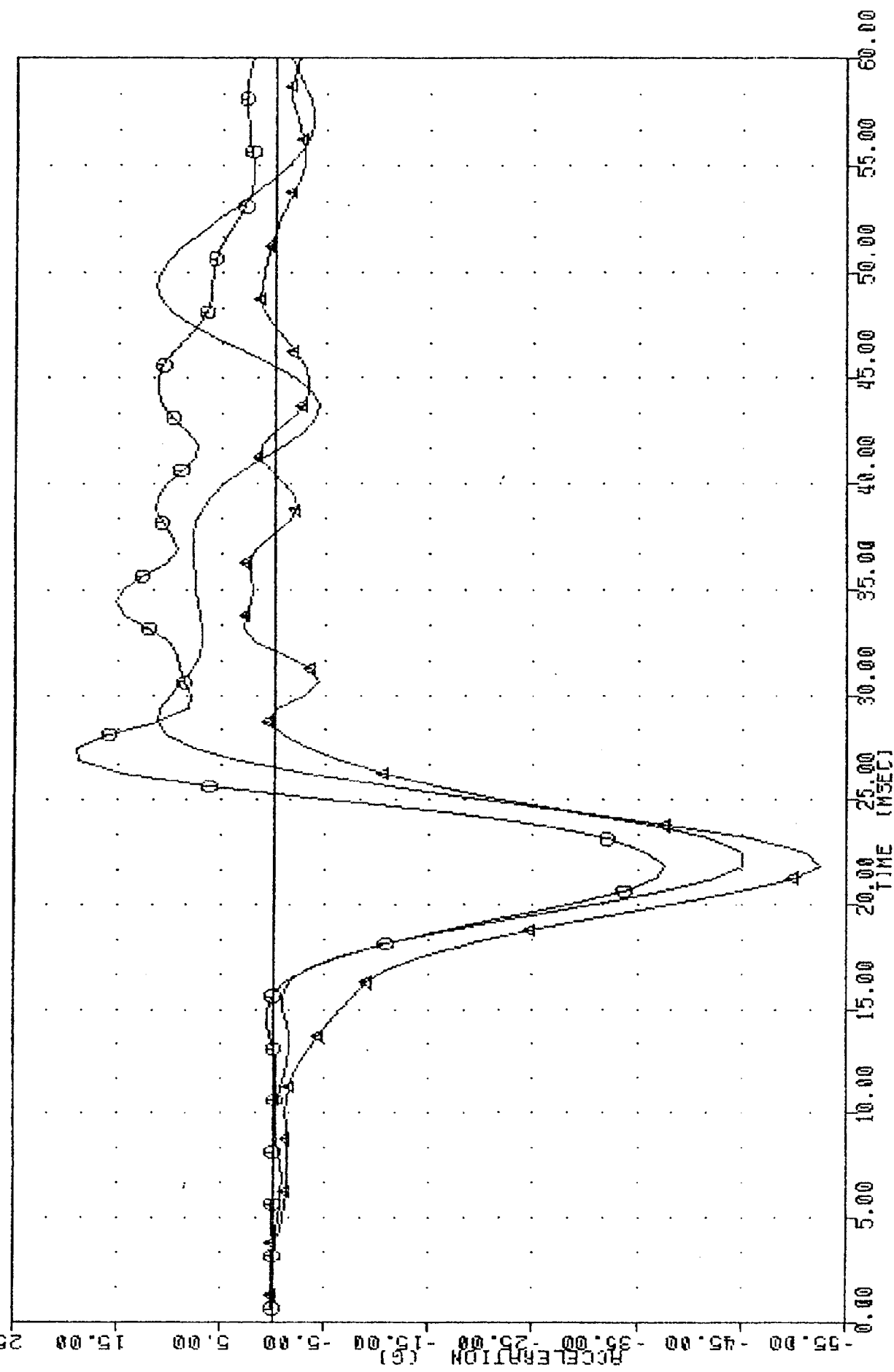
SIDE IMPACT TEST (006)
 LEFT UPPER RIB ACCELERATION Y AXIS -A

VPI 38131, S100684, S10 THORAX BODY 318 CHL 84, 84010, PLOT DATE 12-JAN-84, 08:59:15
 LAYGI, FILTER: H3RI, 136/ 189/ -50, MIN. MAX = -43.64, 21.25, 13.04, 47.50
 MN-280, FILTER: H3RI, 136/ 189/ -50, MIN. MAX = -37.88, 21.25, 19.00, 26.87
 MN-290, FILTER: H3RI, 136/ 189/ -50, MIN. MAX = -52.52, 21.25, 2.94, 32.50



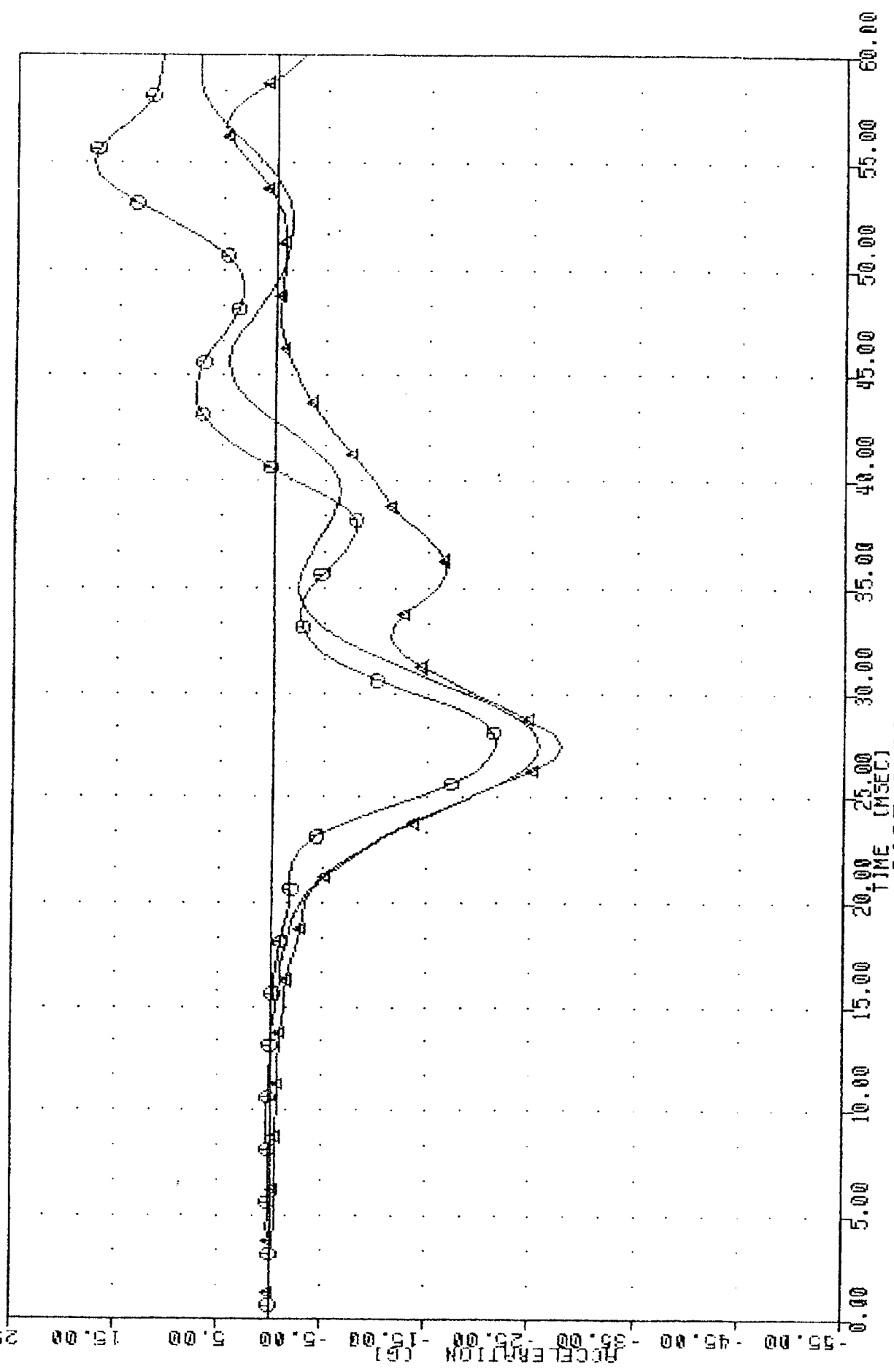
SIDE IMPACT TEST (006)
 LEFT LOWER RIB ACCELERATION Y AXIS -1

VRIC SHEL91, SIN0684, 510 THURX 5 BODY 318 CHL 84 84010 PLOT DATE 12-JAN-84 09:10:21
 LLYGA FILTER : HSRI 136/ 189/ -50 MIN, MAX = -45.11 21.25, 11.31 48.75
 MN-2SD 0 FILTER : HSRI 136/ 189/ -50 MIN, MAX = -37.66 21.25, 19.00 26.87
 MN-2SD 4 FILTER : HSRI 136/ 189/ -50 MIN, MAX = -52.52 21.25, 2.94 32.50



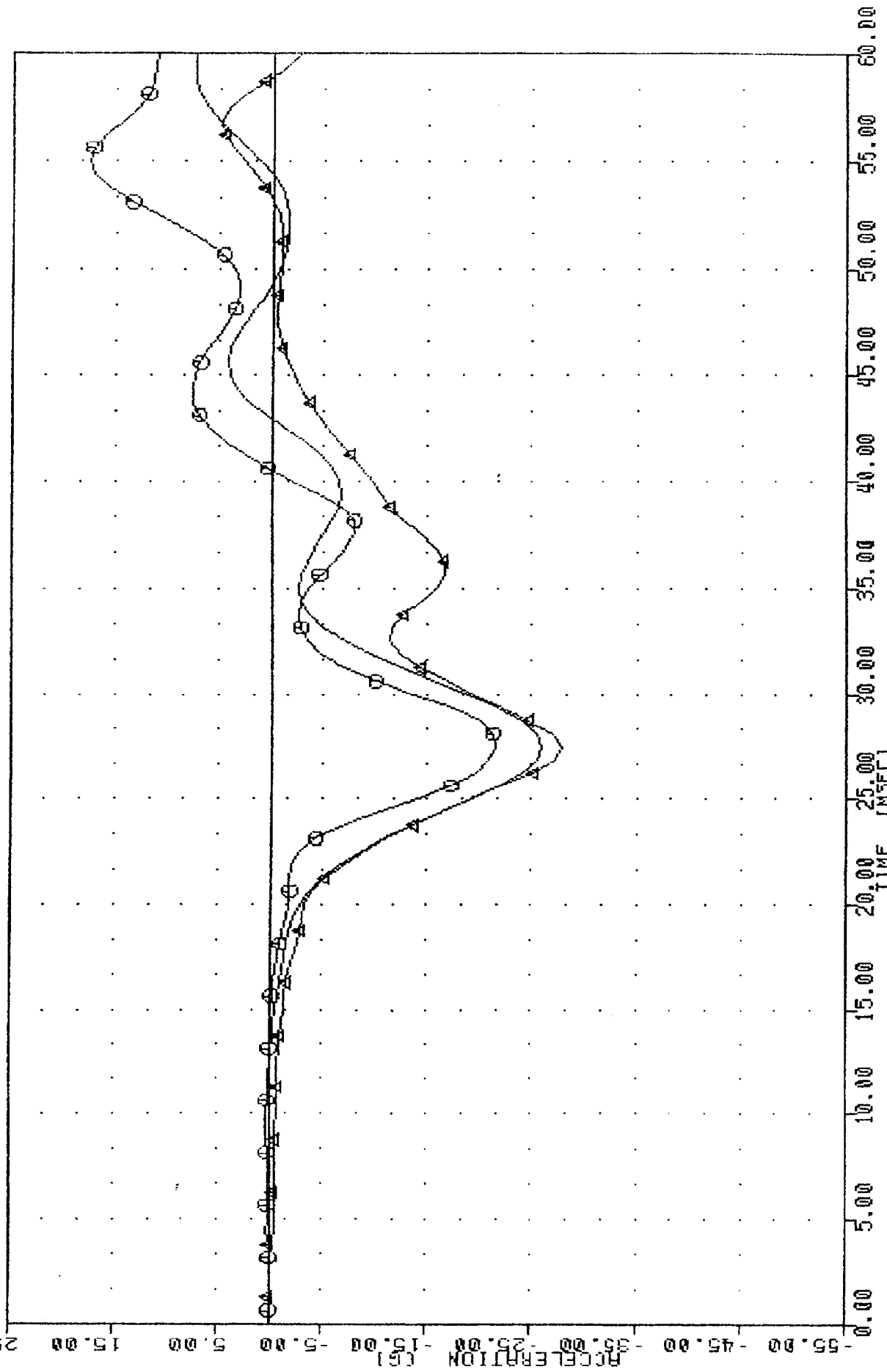
SIDE IMPACT TEST (006)
 LEFT LOWER RIB ACCELERATION Y AXIS - A

VRC SALS1
 TOYGI
 MN:2SD
 MN:2SD
 S10 THORAX UN2 BODY 830 CAL 85 84010
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 136/ 189/ -50
 136/ 189/ -50
 136/ 189/ -50
 MIN, MAX =
 MIN, MAX =
 MIN, MAX =
 -25.82
 -21.58
 -27.91
 26.87
 26.87
 26.87
 7.41
 17.54
 4.78
 08:58:17
 58.75
 54.38
 56.25



SIDE IMPACT TEST (U02)
 UPPER SPINE ACCELERATION Y AXIS -1

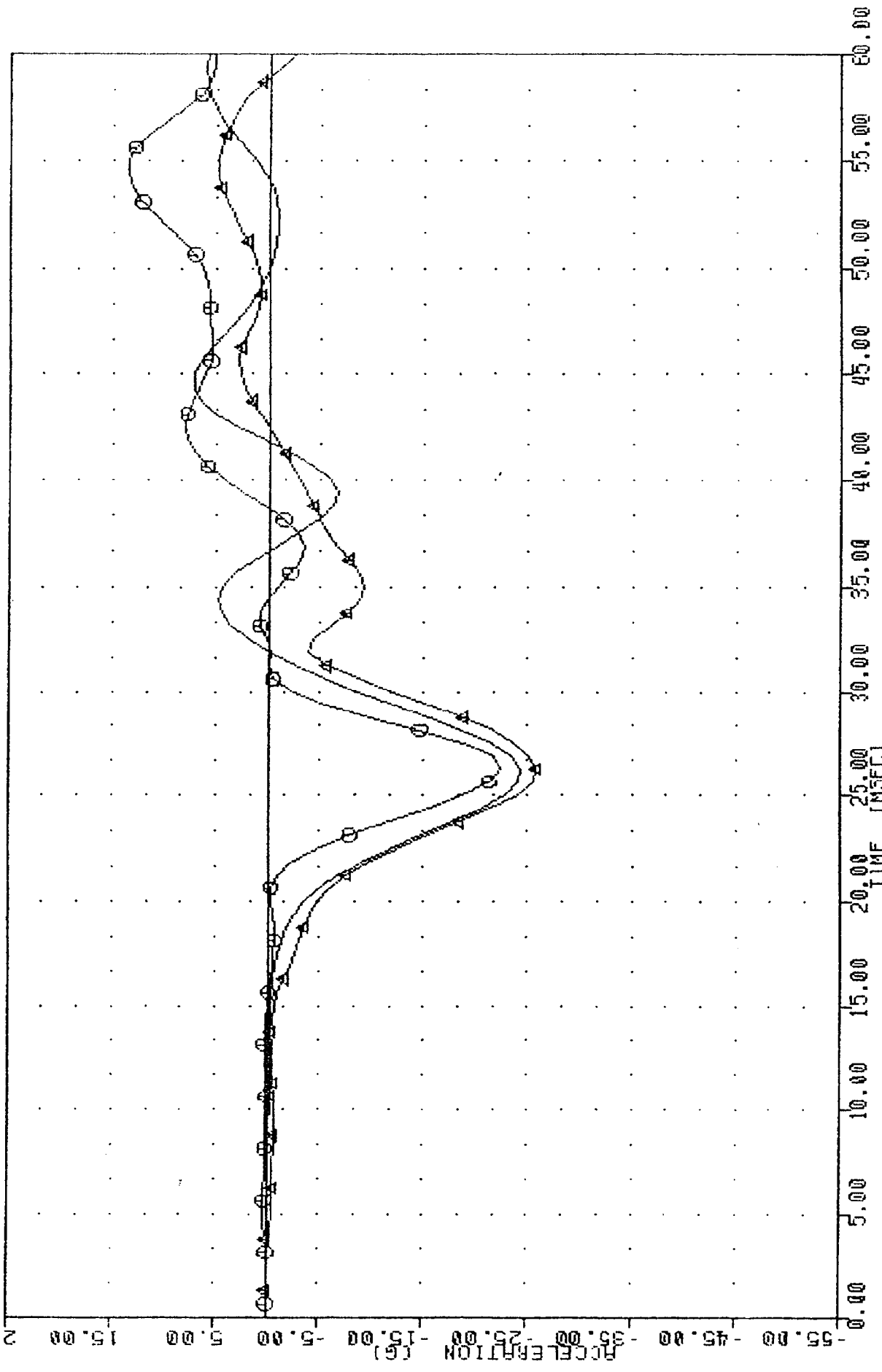
VRIC SRL91
 TOIYGA
 MN-250
 MN-250
 SID THORAX U02 800Y 830 CAL 85 84010
 136/ 189/ -50
 136/ 189/ -50
 136/ 189/ -50
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 MIN, MAX =
 MIN, MAX =
 MIN, MAX =
 PLOT DATE 12-JAN-84
 25.97 s
 -21.58 s
 -27.91 s
 09:38:14
 7.38 s
 17.54 s
 4.78 s
 56.75
 54.38
 56.25



SIDE IMPACT TEST (U02)

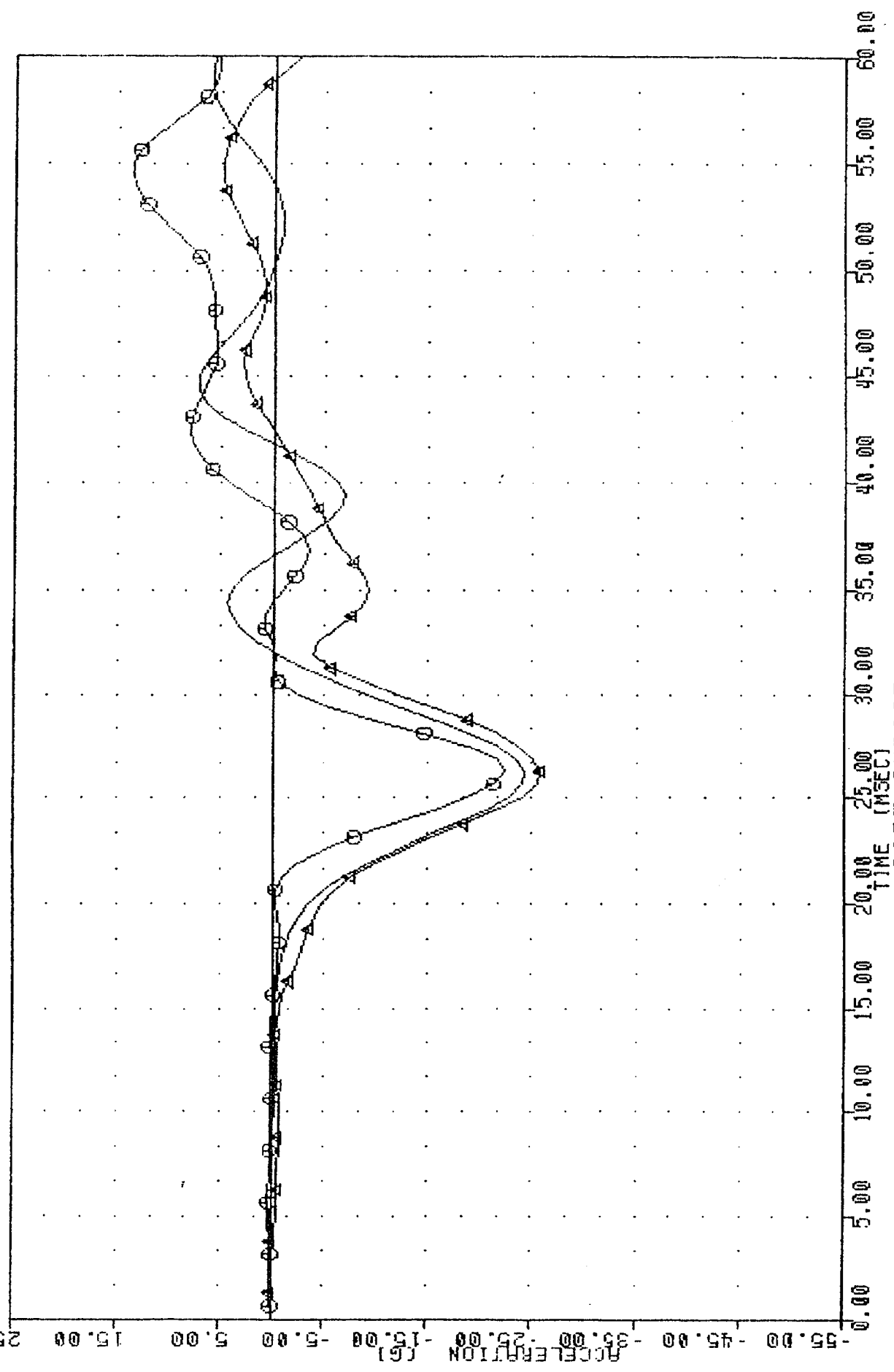
UPPER SPINE ACCELERATION Y AXIS -A

VMC SHL91, 3100280, STD THUMAX DWZ 800 830 CHL 85 840 ID, PLOT DATE 12-JAN-84, 09:11:04
 T12YGI, FILTER = HSRI, 136/ 189/ -50, MIN, MAX = -24.37, 7.16, 43.75
 MN-2SD, 0, FILTER = HSRI, 136/ 189/ -50, MIN, MAX = -22.37, 13.54, 53.75
 MN-2SD, A, FILTER = HSRI, 136/ 189/ -50, MIN, MAX = -25.84, 4.85, 53.75



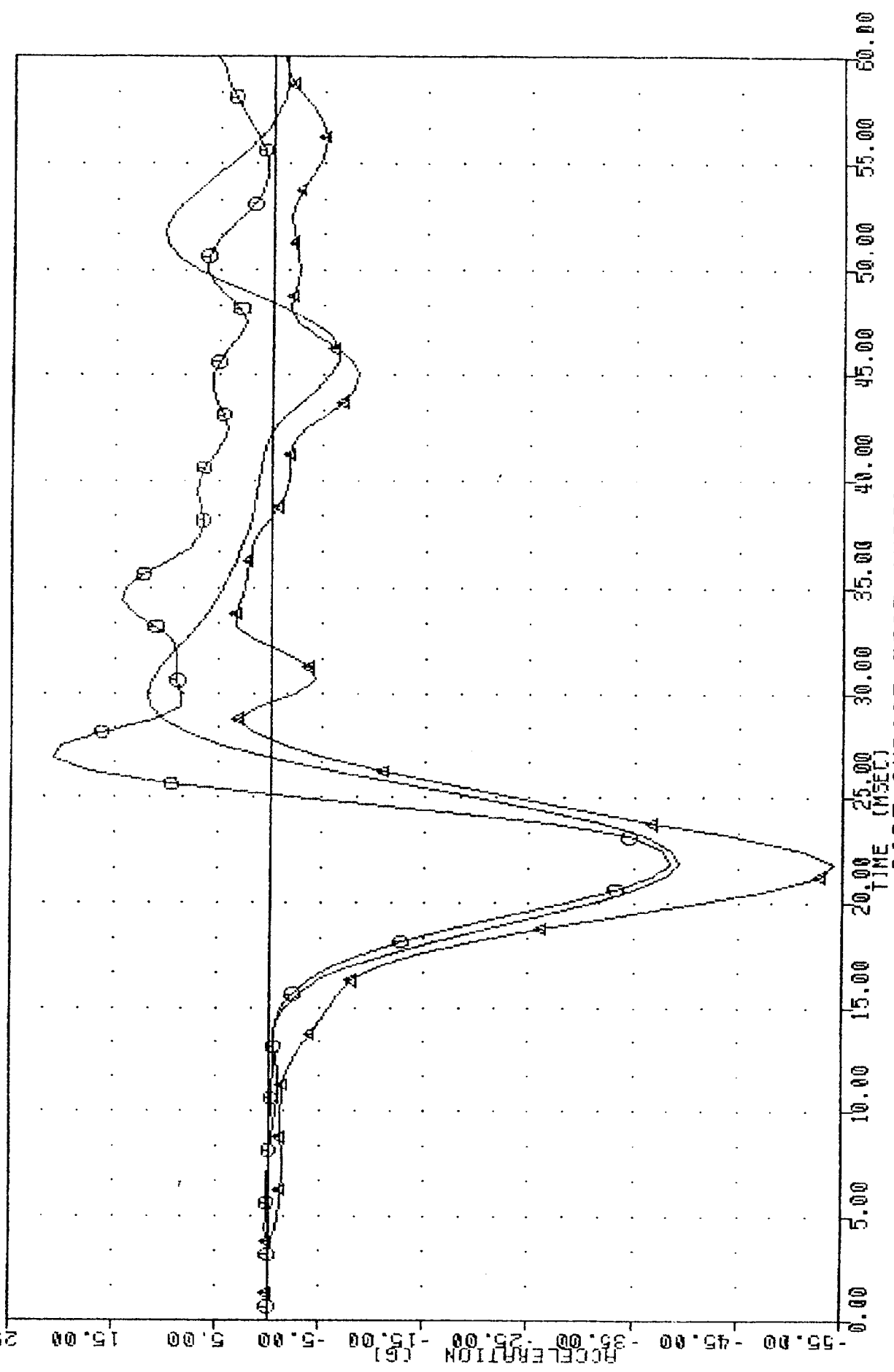
SIDE IMPACT TEST (U02)
 LOWER SPINE ACCELERATION Y AXIS -1

VRIC SALS1 310 THORAX U02 BODY 830 CHL 85 84010 PLOT DATE 12-JAN-84 09:14:03
 T12YGA FILTER = HSRI 136/ 189/ -50 MIN, MAX = -24.37 7.038 43.75
 MN-250 FILTER = HSRI 136/ 189/ -50 MIN, MAX = -22.37 13.54 53.75
 MN-250 FILTER = HSRI 136/ 189/ -50 MIN, MAX = -25.84 4.85 53.75



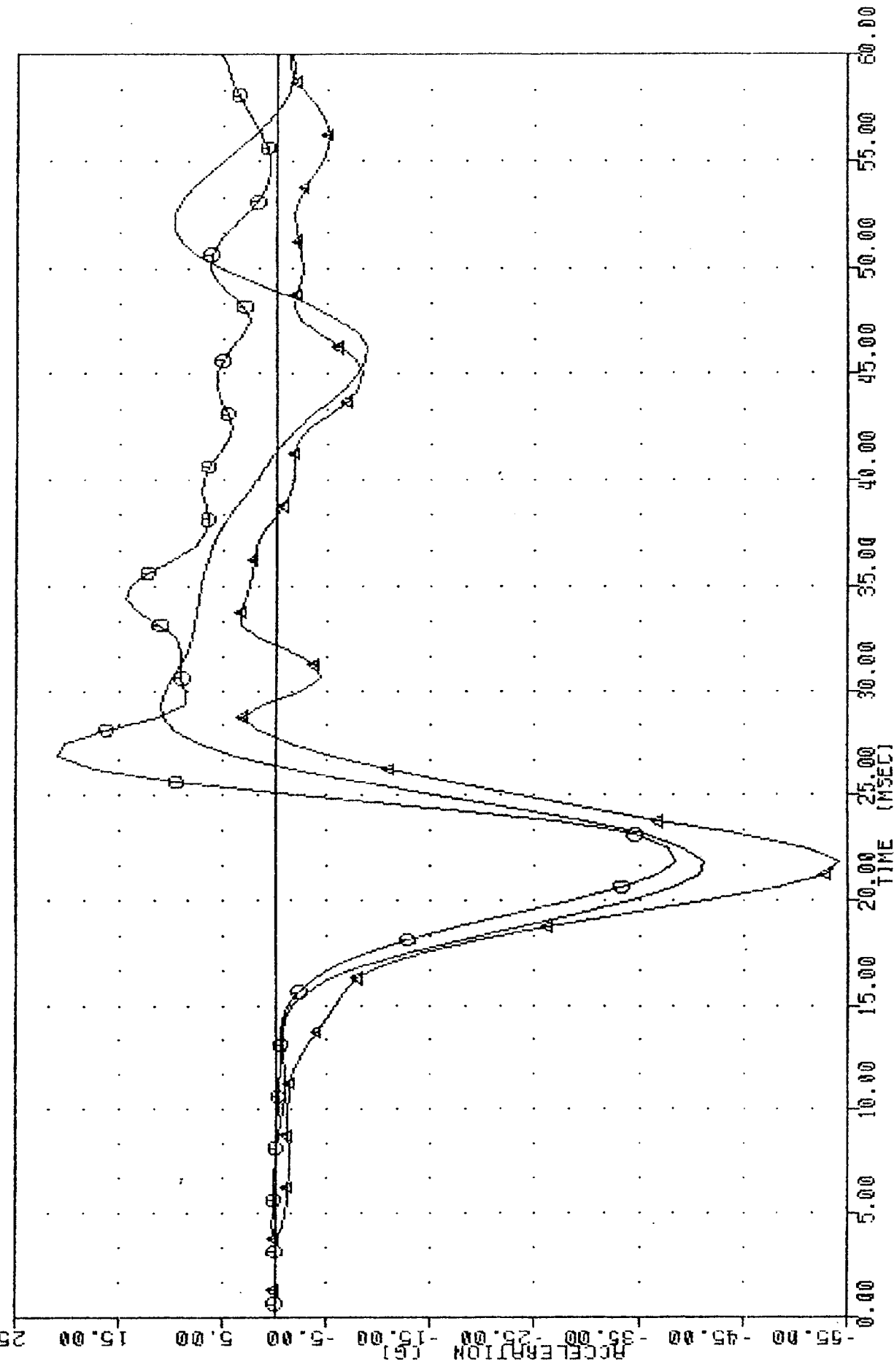
SIDE IMPACT TEST (U02)
 LOWER SPINE ACCELERATION Y AXIS -A

VRTIC SRL91
 LURY61
 MN-250
 MN-250
 STU0285
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 S10 THURAX UN2 BOUY 830 LAL 85 84010
 136/ 189/ -50 MIN, MAX = -38.32
 136/ 189/ -50 MIN, MAX = -38.44
 136/ 189/ -50 MIN, MAX = -54.08
 PLOT DATE 12-JAN-84 09:06:35
 21.25
 21.25
 21.25
 11.70
 20.92
 3.31
 29.38
 26.25
 33.13



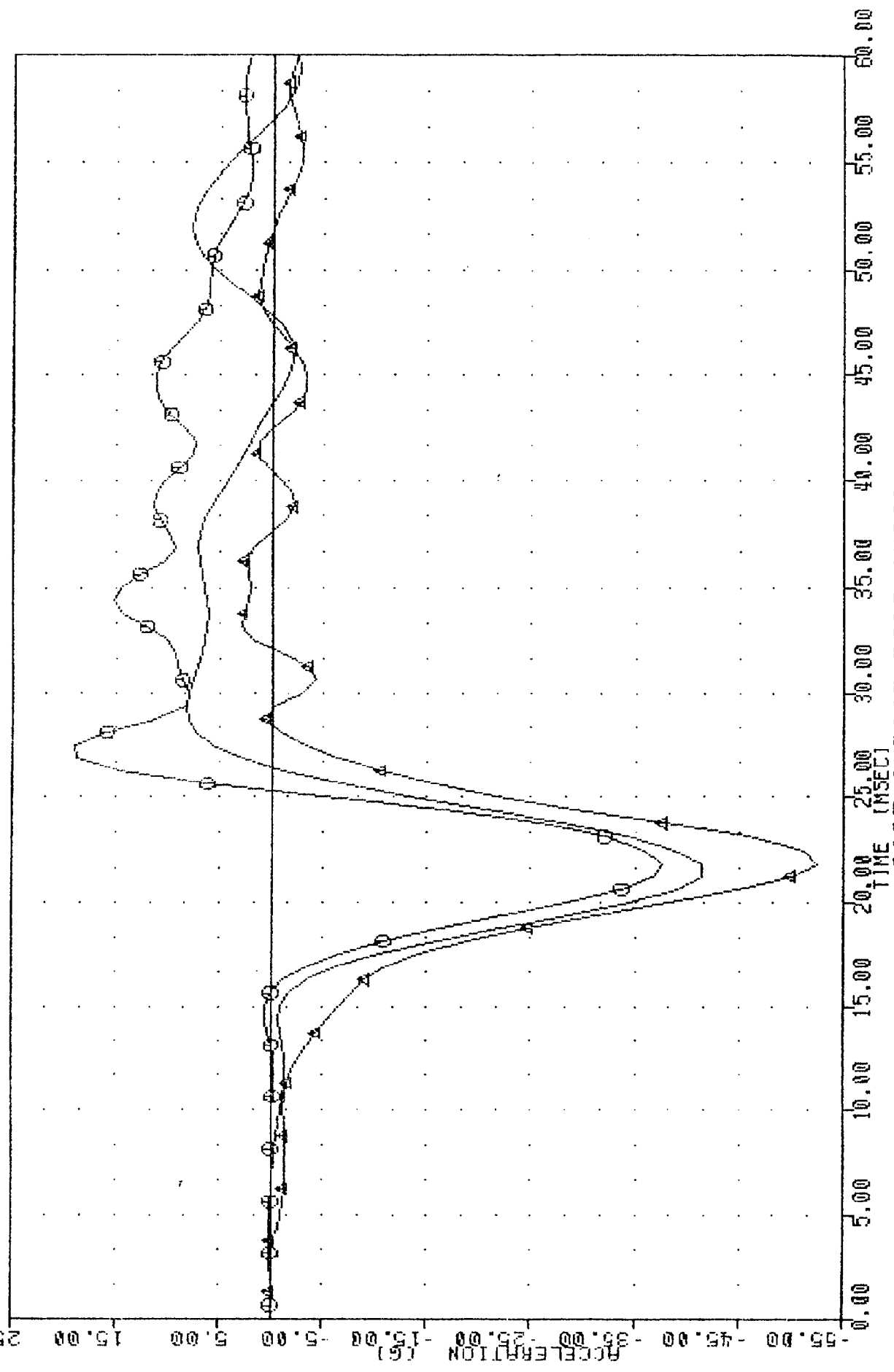
SIDE IMPACT TEST (U02)
 LEFT UPPER RIB ACCELERATION Y AXIS -1

VRIC SRL91
 LURYGR
 MN-2SD
 MN-2SD
 3100285
 FILTER : HSRI
 FILTER : HSRI
 FILTER : HSRI
 S10 THORAX U02 BODY 830 CAL 85 84010
 136/ 189/ -50 MIN. MAX =
 136/ 189/ -50 MIN. MAX =
 136/ 189/ -50 MIN. MAX =
 PLOT DATE 12-JAN-84 09:09:18
 -41.20
 -38.14
 -54.08
 10.89
 20.92
 3.31
 28.75
 26.25
 33.13



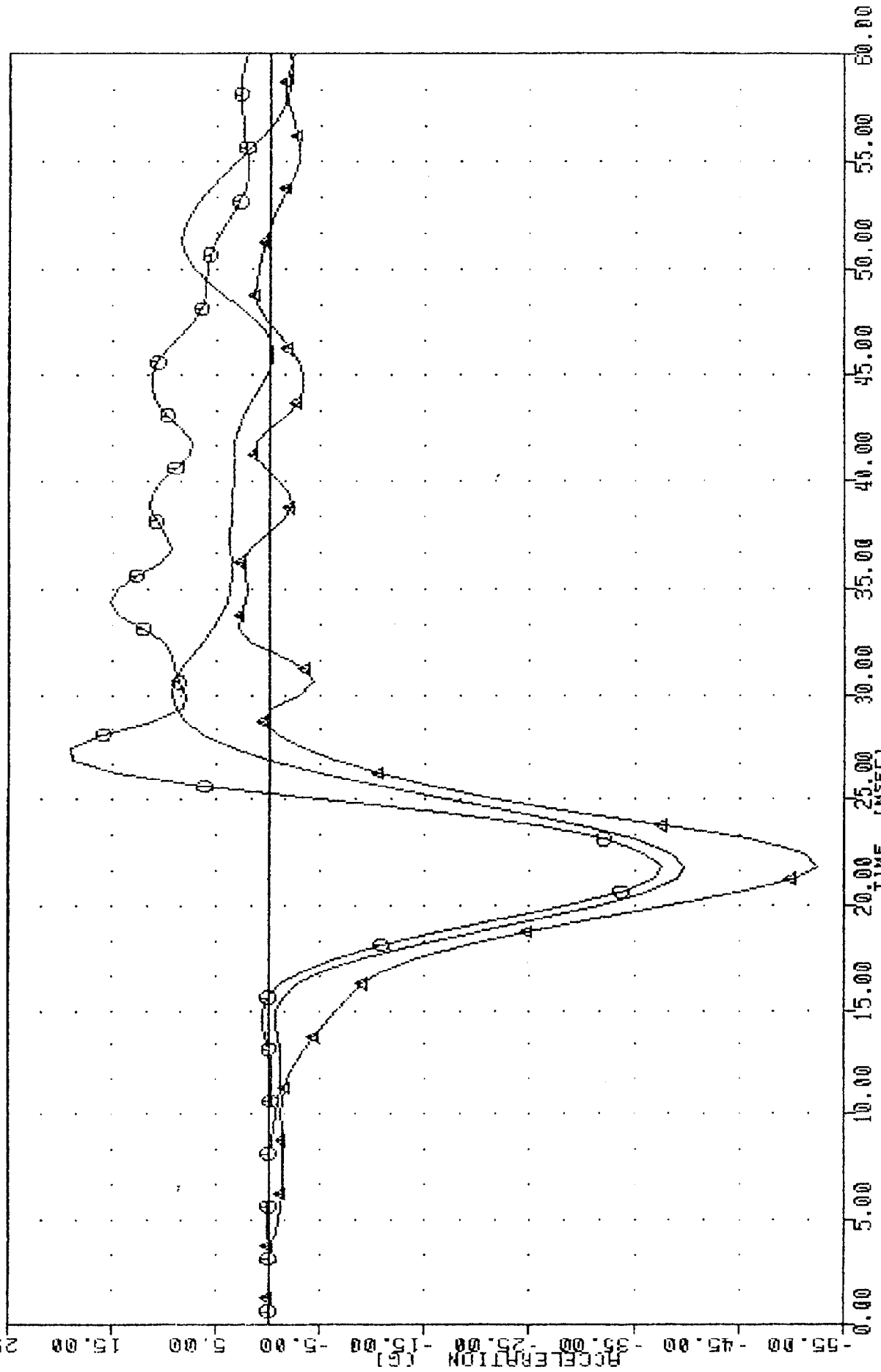
SIDE IMPACT TEST (U02)
 LEFT UPPER RIB ACCELERATION Y AXIS - A

WRTG 3RL91 310 THURAX UN2 BOUT 830 UHL 85 84010 09:00:21
 LLYGI FILTER : HSRI 136/ 189/ -50 MIN. MAX = -41.50 8.08 28.75
 MN-250 FILTER : HSRI 136/ 189/ -50 MIN. MAX = -37.68 19.00 26.87
 MN-250 FILTER : HSRI 136/ 189/ -50 MIN. MAX = -52.52 2.94 32.50



SIDE IMPACT TEST (U02)
 LEFT LOWER RIB ACCELERATION Y AXIS -1

VRIC SHL91 . S100285 S10 THURAX UN2 6007 830 CHL 85 84010 PLOT DATE 12-JAN-84 09:02:51
 LLA YGH FILTER = HSRI 136/ 189/ -50 MIN, MAX = -39.85 9.16 29.38
 MN-2SD 0 FILTER = HSRI 136/ 189/ -50 MIN, MAX = -37.96 19.00 26.87
 MN-2SD 4 FILTER = HSRI 136/ 189/ -50 MIN, MAX = -52.52 2.94 32.50



SIDE IMPACT TEST (U02)
 LEFT LOWER RIB ACCELERATION Y AXIS - A