EVALUATION OF NHTSA MODIFIED VOLKSWAGEN RABBITS

MDB-TO-CAR SIDE IMPACT TEST OF A 19° CRABBED MOVING DEFORMABLE BARRIER TO A 1976 VOLKSWAGEN RABBIT AT 34.4 MPH

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FINAL REPORT
NOVEMBER 1983

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16. Abstract

This test report documents one of a series of twelve crash tests to evaluate the NHTSA's Modified Volkswagen Rabbits. Testing was conducted on a 1976 Volkswagen Rabbit 2-door hatchback with structural modification designated as Optimized at the TRCO Crash Test Facility, East Liberty, Ohio. The test vehicle was impacted on the left side by a moving deformable barrier, crabbed to 19°, at 34.4 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 October 19, 1983 and the ambient temperature was 56°F.

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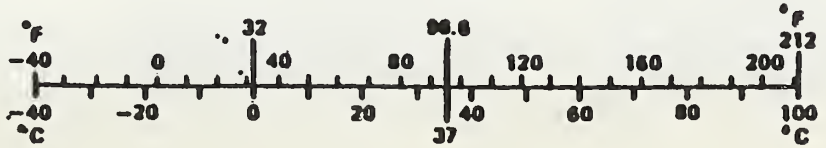
METRIC CONVERSION FACTORS

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	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	metric ton	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
in^3	cubic inches	16	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	degrees Fahrenheit	5/9 (after subtracting 32)	degrees Celsius	°C

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 (10 000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	metric ton (1000 kg)	1.1	short tons	
	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 NHTSA fleet of modified Volkswagen Rabbits with and without padding. The vehicle was tested using conditions not currently contained in a Federal Motor Vehicle Safety Standard.

INTRODUCTION

A stationary 1976 Volkswagen Rabbit 2-door hatchback was impacted on the left side by a Moving Deformable Barrier (MDB) on October 19, 1983. The test was to simulate an intersection collision with the striking vehicle traveling at 26 mph and the struck vehicle traveling at 13 mph. The orientation angle of the striking vehicle was 60^{o} 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 34.4 mph with the MDB's wheels crabbed clockwise to 19^{o}. The actual test speed was 34.4 mph and the actual impact point was 38.5 inches forward of the midpoint of the Volkswagen Rabbit's wheelbase.

The vehicle was structurally modified to the level designated "Optimized". The driver door and left rear occupant 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 and photographs describe the General Test and Vehicle Parameter Data.

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Volkswagenwerk AG

MAKE/MODEL: Volkswagen Rabbit VIN: 1763165017

BODY STYLE: 2-Door Hatchback MODEL YEAR: 1976

NHTSA NO.: R & D COLOR: Green

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 97 CID

TRANSMISSION DATA: 3 Speed Automatic

DATE VEHICLE RECEIVED: 10/3/83 ODOMETER READING: 35741

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

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? No - Structurally optimized modification
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: Volkswagenwerk AG

DATE OF MANUFACTURE: 3/76

GVWR: 2777 LBS.,

GAWR: FRONT 1609 LBS., REAR 1276 LBS.

VEHICLE TIRE DATA

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

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Front - Uniroyal Rallye 280 - 155SR13
Rear - Uniroyal Rallye 180 - 155SR13

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	620 LBS.	RIGHT REAR	350 LBS.
LEFT FRONT	650 LBS.	LEFT REAR	370 LBS.

TOTAL FRONT WEIGHT 1270 LBS. (63.8 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 720 LBS. (36.2 % OF TOTAL VEHICLE WEIGHT)

TOTAL DELIVERED WEIGHT 1990 LBS.

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 25 13/16	;LF 25 13/16	;RR 25 7/16	;LR 25 1/8
PRE-TEST ATTITUDE:	RF 24 3/8	;LF 24 3/8	;RR 22 7/8	;LR 22 7/8
POST-TEST ATTITUDE:	RF 22 1/8	;LF 24 7/8	;RR 23 7/8	;LR 24 1/8

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 147 LBS. CARGO:

RIGHT FRONT	675 LBS.	RIGHT REAR	535 LBS.
LEFT FRONT	745 LBS.	LEFT REAR	530 LBS.

TOTAL FRONT WEIGHT 1420 LBS. (57.1 % OF TOTAL VEHICLE WEIGHT)

TOTAL REAR WEIGHT 1065 LBS. (42.9 % OF TOTAL VEHICLE WEIGHT)

TOTAL TEST WEIGHT 2485 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*: 10.5 GALLONS

TEST VOLUME: 3.0 GALLONS

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

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 27 psi; REAR 27 psi

RECOMMENDED TIRE SIZE: 155 SR 13 LOAD RANGE X B, C,

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

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 2 FRONT
2 REAR
4 TOTAL

CARGO LOAD 142 LBS.

TOTAL 742 LBS.

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

TEST CONDITIONS

TEST NUMBER: 831019

DATE OF TEST: October 19, 1983 TIME OF TEST: 13:00

WIND VELOCITY: 4-8 mph 54° NE HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 56° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 68° F

SUBJECT VEHICLE DATA

	ACTUAL	INTENDED
VEHICLE TEST WEIGHT (LBS.)	2485	2480
MDB TEST WEIGHT (LBS.)	2990	3000
MDB VELOCITY (MPH)*	34.4	34.4
IMPACT POINT (INCHES)**	38.5	37

DUMMIES

	DRIVER	MIDDLE PASSENGER	RT. FRONT PASSENGER	LEFT REAR PASSENGER	RT. REAR PASSENGER
TYPE:	SID			SID	
SERIAL NO.:	06			UC2	
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 Volkswagen's wheelbase.

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #	PASSENGER #
Head	Side window	Side header, side window
Chest	Side wall	Side wall
Abdomen	Side wall	Side wall
Left Knee	Driver's door panel	Left quarter panel
Right Knee	Left knee	Left knee

DOOR OPENING:

	LEFT	RIGHT
Front	Tools required	Easy
Rear	DNA	DNA

SEAT MOVEMENT:

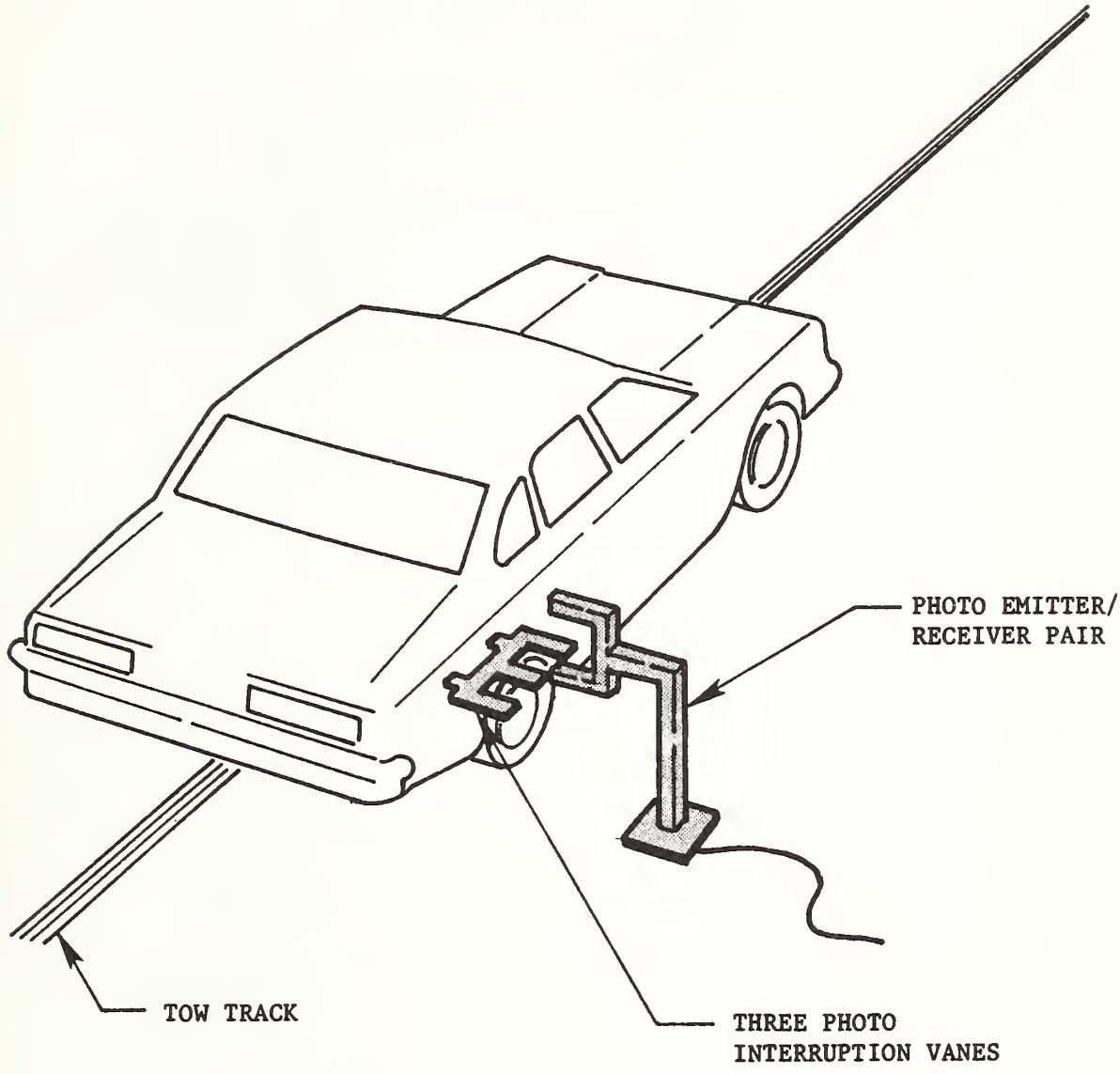
	SEAT BACK FAILURE	SEAT SHIFT
Front	No	Driver's seat separated from mounts
Rear	No	No

GLAZING DAMAGE:

Left side of windshield cracked, left side windows separated intact, no backlight damage.

OTHER NOTABLE IMPACT EFFECTS:

Driver's left leg severed at knee.



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
= 1990 + 2 X 174 + 142 lbs.
= 2480 lbs.

To achieve test weight, the exhaust system and battery were removed and 3 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.

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	REAR PASSENGER DSP
HEAD	Surface of transverse instrument mounting platform is as horizontal as possible without inducing torso movement & midsagittal plane falls in longitudinal plane.	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.	Placed against seat back. Midsagittal plane is vertical and contained in the same longitudinal plane as the driver's midsagittal plane.
LOWER TORSO	Midsagittal plane is vertical and centered on bucket seat.	Midsagittal plane is vertical and contained in the same longitudinal plane as the driver's midsagittal plane.
UPPER LEGS (thighs or femurs)	Placed against seat cushion. Planes defined by femur and tibia centerlines are as close as possible to vertical.	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.	Located so that planes defined by femur and tibia centerlines are as close as possible to vertical.
LOWER LEGS	Plane defined by femur and tibia centerlines are as close as possible to vertical longitudinal plane.	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.	Centerline falls in vertical longitudinal plane. Placed on floor as far forward as possible without front seat interference.
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.	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.

**Due to structural modifications, the left foot was turned inward.

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. J. Kokoruda
2. M. Garrison
3. N. Echeverria

POSITIONING DATE: 10-19-83

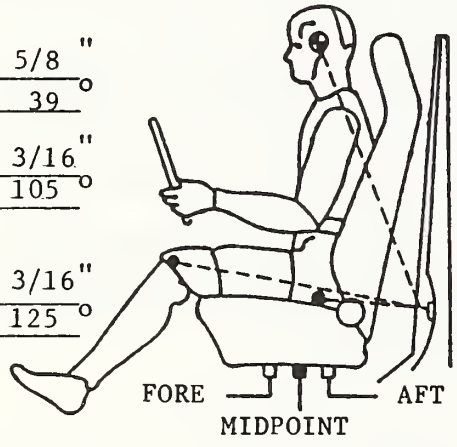
AMBIENT TEMP.: 66° F. TIME: 7:30

DRIVER DUMMY # 06

HEAD 22 5/8 "
TARGET* 39 °

KNEE 31 3/16 "
JOINT 105 °

APPROX.
"H" 18 3/16 "
POINT 125 °

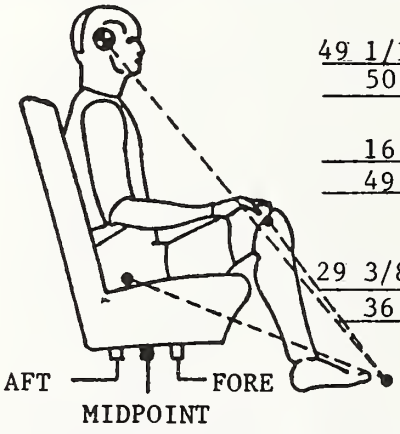


REAR PASSENGER DUMMY # U02

49 1/16 "HEAD
50 °TARGET**

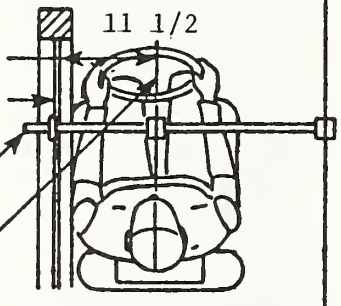
16 "KNEE
49 °JOINT

APPROX.
29 3/8 " "H"
36 °POINT †



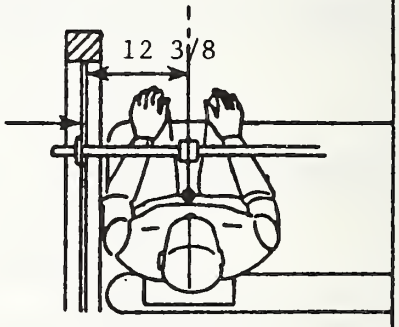
DOOR
GLASS
HEIGHT*** 9 1/2

LATERAL BAR
ADJUSTABLE
POINTER



DRIVER
DUMMY # 06

DOOR
GLASS
HEIGHT DNA



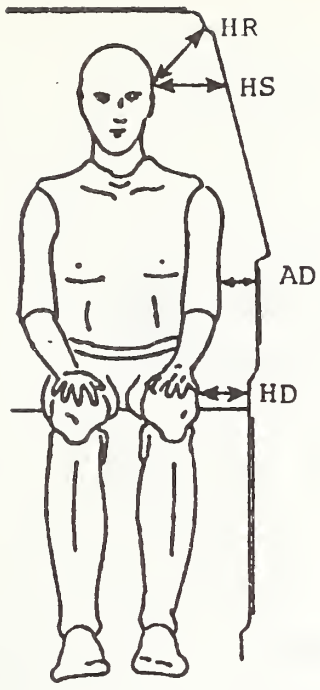
PASSENGER
DUMMY # U02

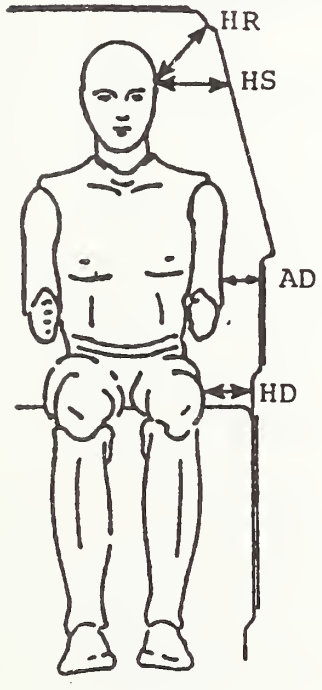
*All driver dummy dimensions referenced to top of striker bolt and all angles referenced to vertical.

**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.

† Due to structural modifications interference, the "H" point location was estimated

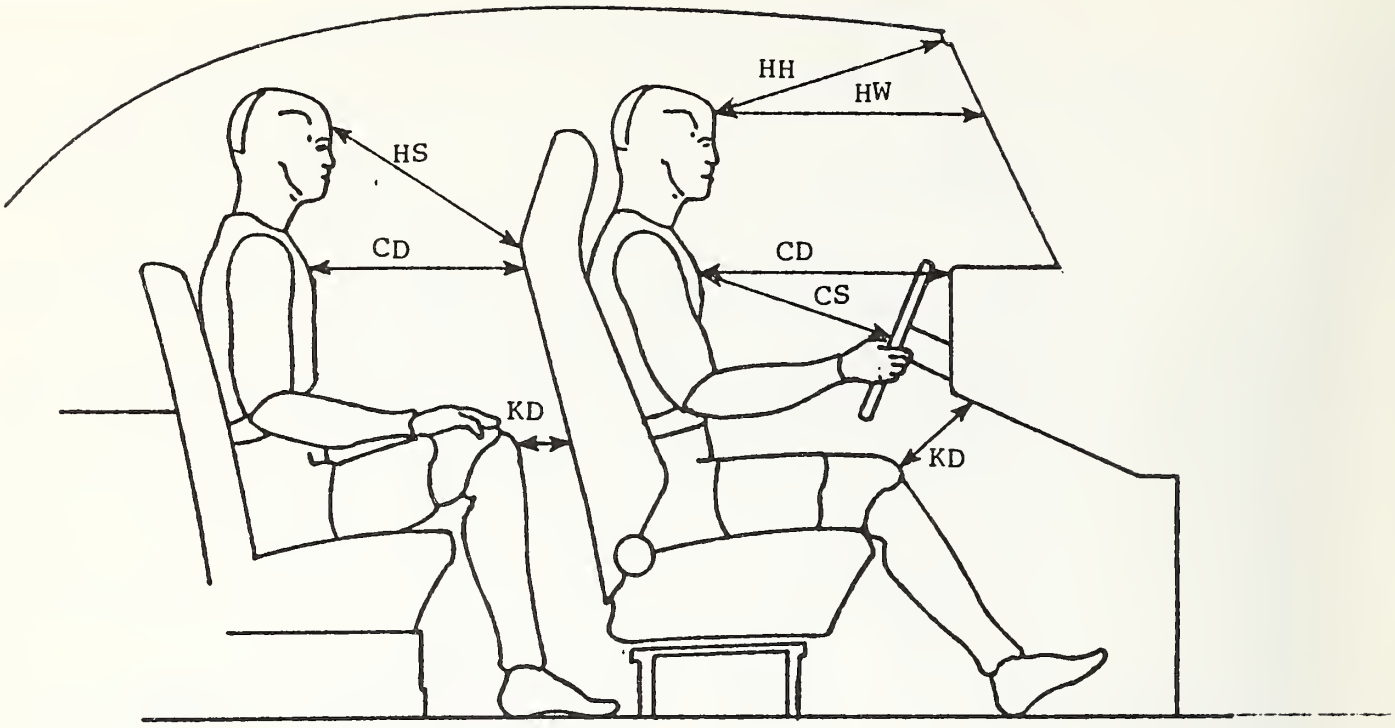




	DRIVER	PASSENGER
HR	5 1/16	8 11/16
HS	6 1/4	9 5/8
AD	3 3/4	4 1/2
HD	5 5/8	6 1/4

NOTE: ALL MEASUREMENTS IN INCHES

DUMMY LATERAL CLEARANCE DIMENSIONS



	06 DRIVER	U02 PASSENGER
HH	12 1/4	DNA
HW	16 3/4	DNA
HS	DNA	25 13/16
CD	20 3/16	19 1/2
CS	11 1/8	DNA
KDL	9 1/4	4 3/8
KDR	9 1/2	3 13/16

NOTE: ALL MEASUREMENTS IN INCHES

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

DRIVER

During impact, the dummy's torso contacted the driver's door and the head contacted the driver's side window. The dummy rebounded across the vehicle and it's buttocks passed through the front passenger's side window. The dummy came to rest laying across the front passenger's seat back with it's buttocks resting on the passenger's window sill.

PASSENGER

During impact, the dummy's torso contacted the left rear occupant side wall and the head contacted the side window and side header. The dummy rebounded across the vehicle with it's feet trapped beneath the driver's seat. It's head and left shoulder contacted the right rear side window sill. The dummy rebounded slowly and eventually came to rest with it's head resting on top of the right rear window sill.

VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

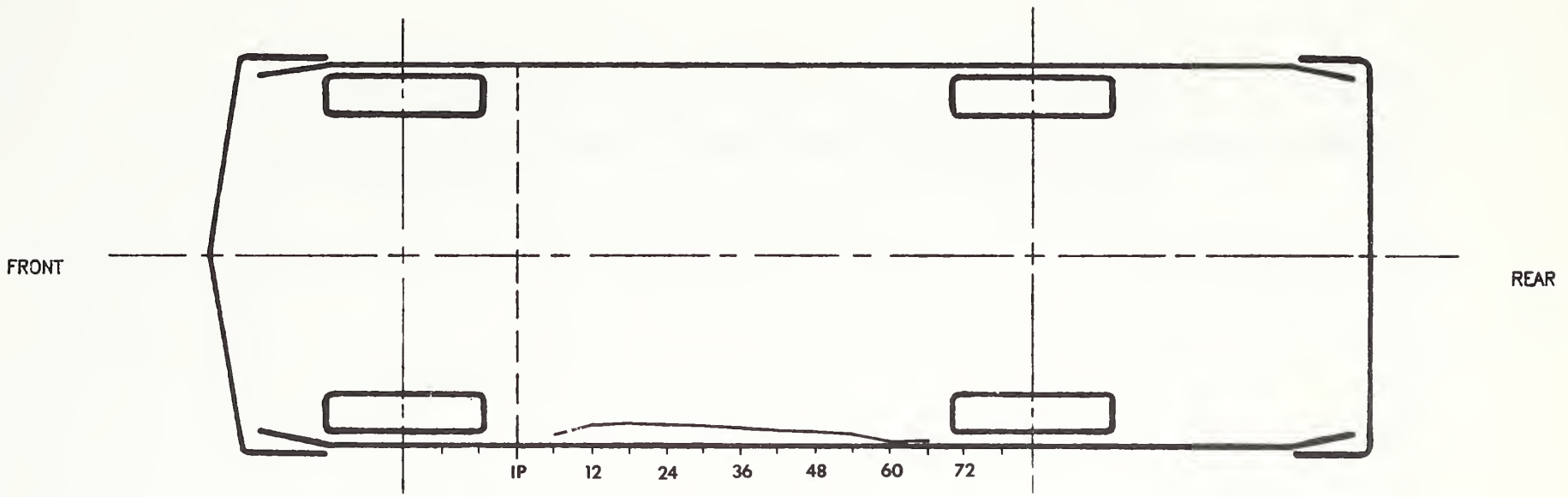
ZERO DISTANCE AT PROJECTED IMPACT POINT*

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	9.0	X	X	20.3	20.3	20.3	20.3	20.4	20.4	20.5	20.5	20.6	20.8	20.8	X	X
H-Point	16.0	X	X	18.0	18.1	18.0	18.0	18.1	18.1	18.2	18.3	18.4	18.4	18.5	17.4	X
Mid Door	22.5	16.3	17.8	17.7	17.8	17.8	17.8	17.8	17.8	17.9	17.9	18.0	18.1	18.1	18.3	16.8
Window Sill	33.0	19.9	19.5	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.4	19.5	19.5	19.6	19.8	19.9
Window Top	51.3	X	X	X	X	X	29.3	27.9	26.8	26.5	26.4	26.4	26.4	26.8	27.3	28.3
POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)																
Axle Height	9.0	X	X	21.9	23.8	23.6	23.4	23.3	23.1	22.8	22.6	22.2	21.3	20.9	X	X
H-Point	16.0	X	X	24.9	29.8	31.8	32.9	32.8	31.8	30.1	27.8	25.4	23.4	21.4	18.1	X
Mid Door	22.5	21.1	22.9	23.3	28.2	30.0	31.2	30.6	29.6	28.1	26.6	24.9	22.9	21.3	19.4	16.9
Window Sill	33.0	21.1	21.4	22.1	25.8	28.5	30.4	30.6	28.8	27.0	25.0	24.9	22.8	21.5	20.9	20.6
Window Top	51.3	X	X	X	X	X	31.5	30.1	28.9	28.6	28.6	28.4	28.3	28.4	28.9	29.8
STATIC CRUSH (IN)																
Axle Height	9.0	X	X	1.6	3.5	3.3	3.1	2.9	2.7	2.3	2.1	1.6	0.5	0.1	X	X
H-Point	16.0	X	X	6.9	11.7	13.8	14.9	14.7	13.7	11.9	9.5	7.0	5.0	2.9	0.7	X
Mid Door	22.5	4.8	5.1	5.6	10.4	12.2	13.4	12.8	11.8	10.2	8.7	6.9	4.8	3.2	1.1	0.1
Window Sill	33.0	1.2	1.9	2.8	6.5	9.2	11.1	11.3	9.5	7.7	5.6	5.4	3.3	1.9	1.1	0.7
Window Top	51.3	X	X	X	X	X	2.2	2.2	2.1	2.1	2.2	2.0	1.9	1.6	1.6	1.5

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

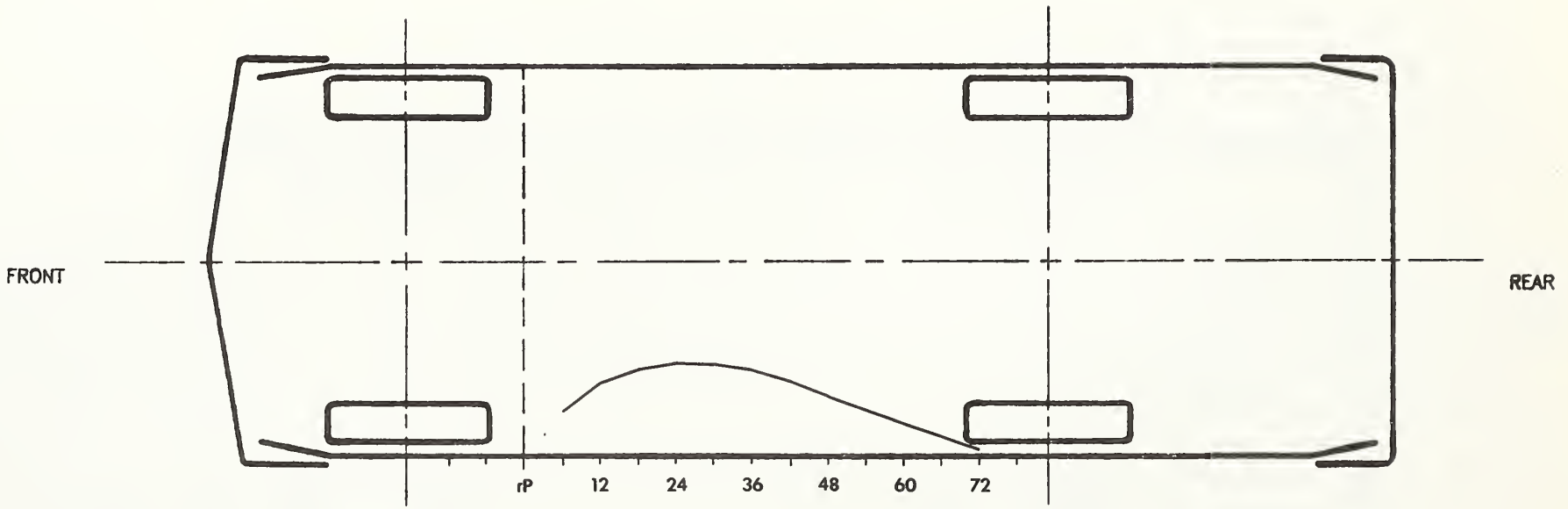
** Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

VEHICLE EXTERIOR STATIC CRUSH PROFILE



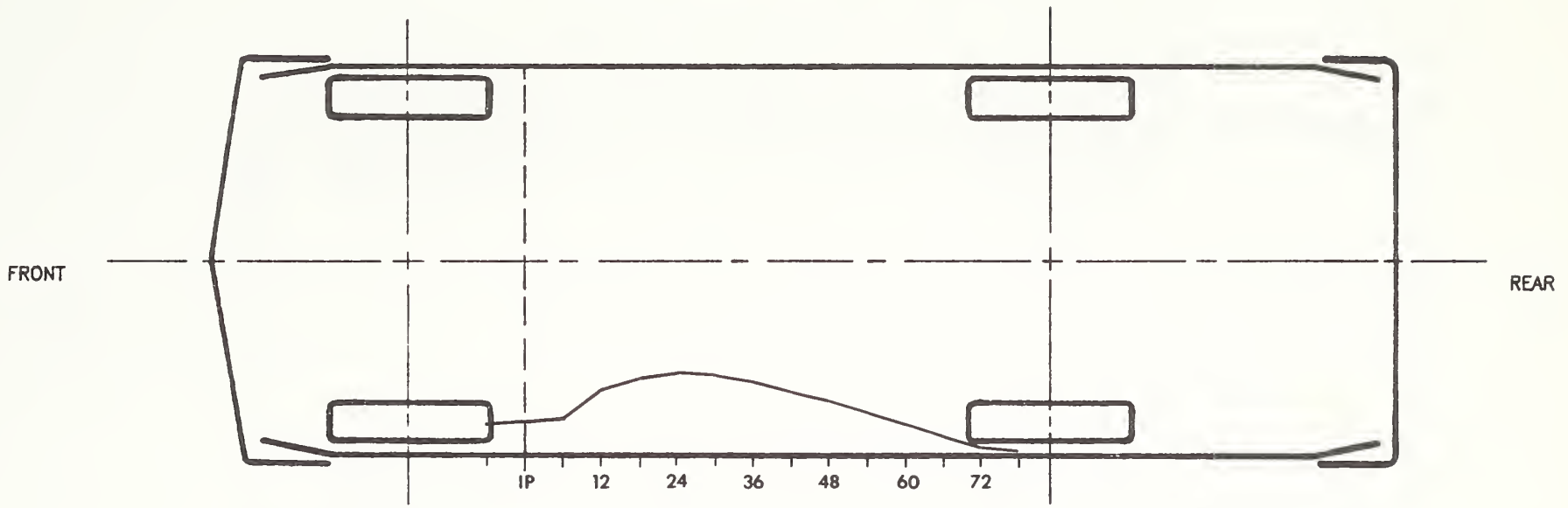
PROFILE LEVEL EQUALS AXLE HEIGHT
IP EQUALS PROJECTED IMPACT POINT

VEHICLE EXTERIOR STATIC CRUSH PROFILE



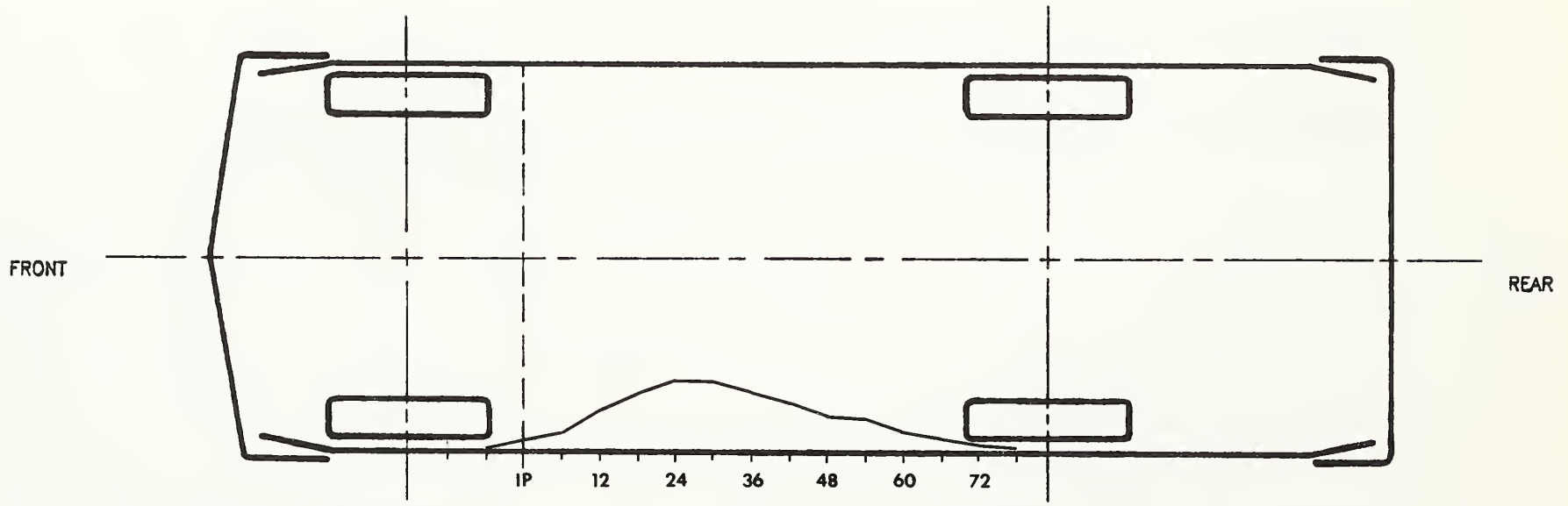
PROFILE LEVEL EQUALS H-POINT HEIGHT
IP EQUALS PROJECTED IMPACT POINT

VEHICLE EXTERIOR STATIC CRUSH PROFILE



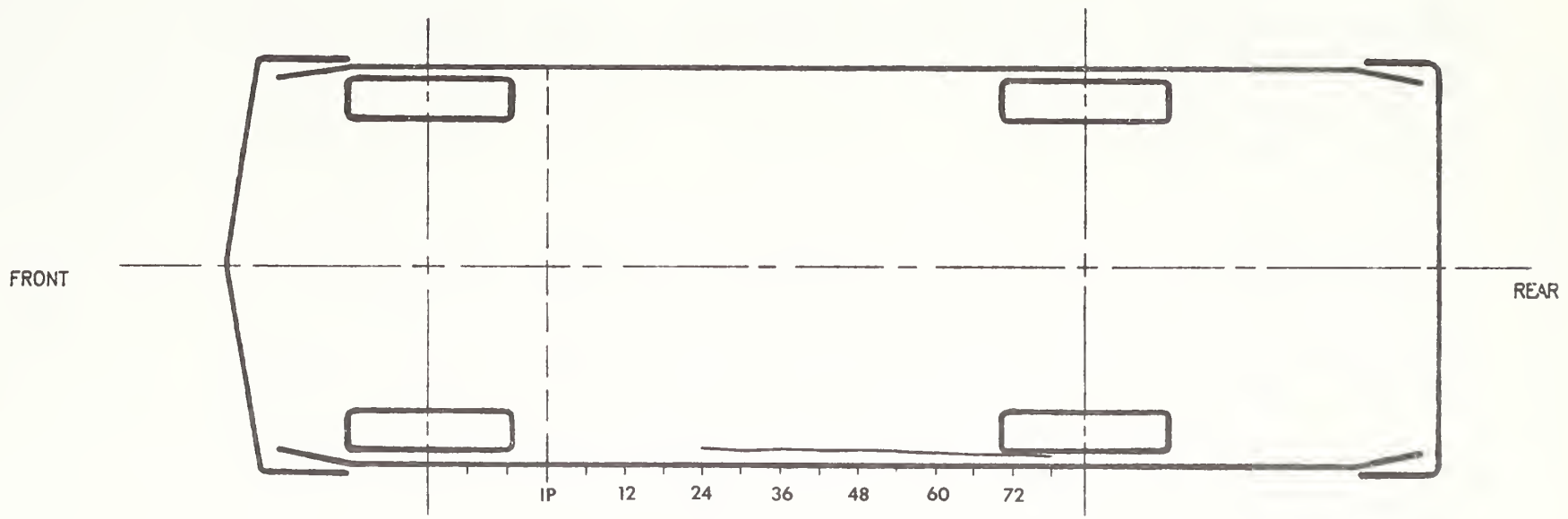
PROFILE LEVEL EQUALS MID-DOOR HEIGHT
IP EQUALS PROJECTED IMPACT POINT

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 DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
HEAD ACCELERATION								
LONGITUDINAL	9.14	66.50	21.02	89.50	12.38	113.13	33.71	86.50
LATERAL	47.57	81.25	14.31	65.00	78.33	86.50	12.39	168.00
VERTICAL	9.22	55.00	62.05	91.00	28.67	118.38	23.95	85.25
RESULTANT		67.15 à 89.88				87.90 à 86.50		
HIC	373.04	from 76.13 to 98.63			283.04	from 83.75 to 91.00		
CHEST ACCELERATION								
UPPER SPINE								
LONGITUDINAL	16.28	77.50	36.20	67.50	3.97	327.50	21.76	118.75
LATERAL (P)***	114.71	68.75	16.85	61.87	45.48	98.12	8.68	143.75
LATERAL (R)***	118.37	68.75	15.48	61.87	46.08	98.12	8.90	143.13
VERTICAL	11.07	53.12	25.71	66.25	8.12	81.25	10.17	121.25
RESULTANT (P)		120.91 à 68.13				48.42 à 98.75		
RESULTANT (R)		124.45 à 68.13				49.12 à 98.75		
DELTA V (MPH)****		21.6 à 84.38 (P)				19.2 à 124.38 (P)		
		22.9 à 84.38 (R)				19.5 à 124.38 (R)		
LOWER SPINE								
LONGITUDINAL	32.14	75.00	21.31	63.75	5.13	221.88	21.58	116.88
LATERAL (P)	105.09	65.63	37.40	87.50	33.93	97.50	8.16	138.13
LATERAL (R)	107.86	65.63	36.77	88.13	33.89	97.50	7.76	136.88
VERTICAL	15.34	70.63	6.59	103.13	8.51	95.63	7.41	121.25
RESULTANT (P)		106.47 à 65.63				35.72 à 96.88		
RESULTANT (R)		109.20 à 65.63				35.59 à 97.50		
DELTA V (MPH)		31.6 à 80.63 (P)				19.1 à 121.25 (P)		
		32.4 à 80.63 (R)				19.5 à 121.87 (R)		
LEFT UPPER RIB								
LATERAL (P)	143.32	63.13	11.78	68.13	50.58	103.13	11.32	169.38
LATERAL (R)	126.99	63.13	10.84	108.75	49.55	103.13	13.04	170.00
DELTA V (MPH)		25.7 à 98.13 (P)				22.0 à 181.25 (P)		
		24.8 à 99.38 (R)				22.0 à 180.62 (R)		
LEFT LOWER RIB								
LATERAL (P)	172.87	61.25	28.29	86.88	65.56	104.38	14.86	170.63
LATERAL (R)	158.98	61.25	30.03	86.88	65.96	104.38	15.04	98.75
DELTA V (MPH)		28.2 à 83.75 (P)				22.6 à 189.38 (P)		
		29.2 à 83.75 (R)				21.8 à 188.75 (R)		
PELVIS ACCELERATION								
LONGITUDINAL	10.70	66.50	46.23	60.13	5.70	137.88	72.33	67.38
LATERAL	137.82	52.88	16.51	45.13	45.61	94.25	28.47	66.88
VERTICAL	33.71	65.63	21.14	67.88	11.99	75.38	7.95	72.88
RESULTANT		139.46 à 52.88				76.58 à 67.38		
DELTA V (MPH)		30.0 à138.63				20.1 à 142.13		

SIDE IMPACT DUMMY DATA SUMMARY CONTD

	DRIVER DUMMY				PASSENGER DUMMY			
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX (in)	TIME (msec)	MAX (in)	TIME (msec)	MAX (in)	TIME (msec)	MAX (in)	TIME (msec)
RIB DEFLECTION †	0.10	267.88	1.80	127.75	0.06	168.50	1.60	119.25

* LONGITUDINAL:	FORWARD	**LONGITUDINAL:	REARWARD
LATERAL:	RIGHTWARD	LATERAL:	LEFTWARD
VERTICAL:	UPWARD	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

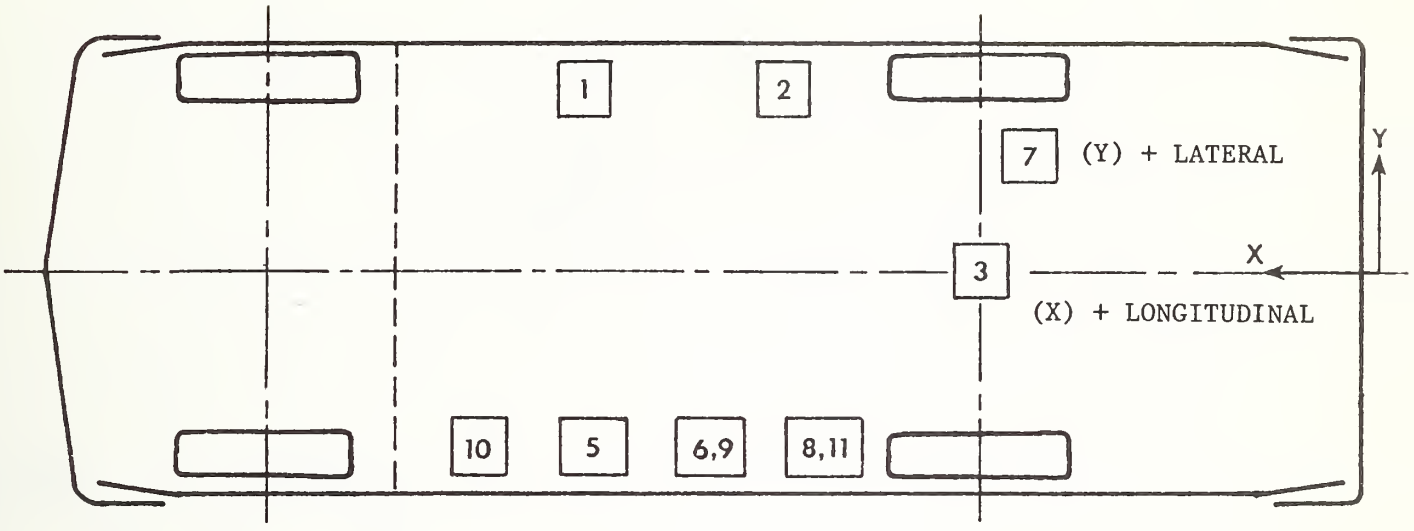
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

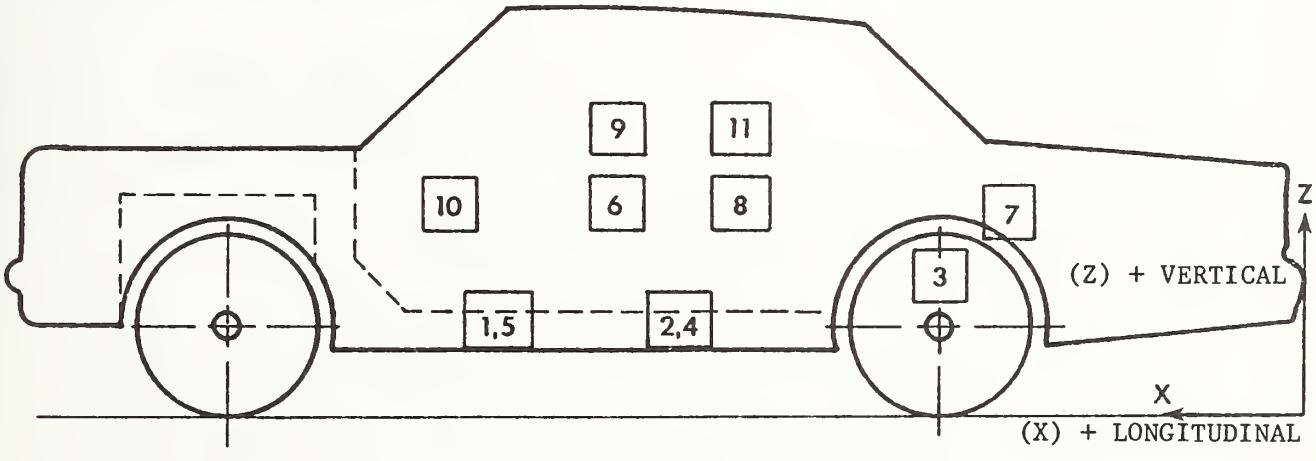
NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX (g)	POSITIVE DIRECTION TIME (msec)	NEGATIVE DIRECTION MAX (g)	NEGATIVE DIRECTION TIME (msec)
1	RIGHT SILL AT FRONT SEAT	83.3	23.0	9.5				
	(LONGITUDINAL)	ΔV = -7.7 mph à 130.00 msec			1.34	144.13	7.95	18.25
	(LATERAL)	ΔV = 12.6 mph à 130.00 msec			13.08	61.00	3.73	143.25
	(VERTICAL)				6.12	18.00	4.25	38.63
	(RESULTANT)					14.85 à 16.13		
2	RIGHT SILL AT REAR SEAT	61.3	23.5	8.0				
	(LONGITUDINAL)	ΔV = -6.4 mph à 130.00 msec			1.49	145.75	8.37	18.25
	(LATERAL)	ΔV = 16.3 mph à 130.00 msec			14.61	90.38	3.58	144.00
	(VERTICAL)				3.34	101.63	4.22	37.75
	(RESULTANT)					15.02 à 90.25		
3	REAR DECK OVER AXLE	32.0	0.0	6.6				
	(LONGITUDINAL)	ΔV = -7.7 mph à 130.00 msec			4.78	34.25	10.39	66.00
	(LATERAL)	ΔV = 20.3 mph à 130.00 msec			19.28	92.38	4.03	159.25
	(VERTICAL)				4.54	106.38	6.73	94.75
	(RESULTANT)					22.28 à 93.50		
4	LEFT SILL AT REAR SEAT	61.0	-23.0	8.6				
	(LATERAL)	ΔV = 13.8 mph à 130.00 msec			13.11	75.38	5.82	144.88
5	LEFT SILL AT FRONT SEAT	83.6	-23.5	9.3				
	(LATERAL)	ΔV = 4.8 mph à 130.00 msec			39.77	33.00	46.03	43.00
6	LEFT FRONT DOOR CENTERLINE	81.0	-25.4	23.1				
	(LATERAL)	ΔV = 21.5 mph à 36.25 msec			119.60	34.38	63.70	45.50
7	RIGHT REAR COMPARTMENT	31.0	15.4	13.9				
	(LONGITUDINAL)				2.16	147.25	9.27	18.38
8	MIDREAR OF LEFT FRONT DOOR	60.8	-25.5	23.4				
	(LATERAL)	ΔV = 28.7 mph à 71.88 msec			123.05	60.50	64.23	84.63
9	UPPER LEFT FRONT DOOR CENTERLINE	81.8	-26.0	32.2				
	(LATERAL)	ΔV = 24.5 mph à 46.88 msec			73.45	61.25	89.28	54.13
10	MIDFRONT OF LEFT FRONT DOOR	99.5	-25.5	21.8				
	(LATERAL)	ΔV = 21.8 mph à 29.38 msec			84.80	28.25	44.24	40.13
11	UPPER REAR OF LEFT FRONT DOOR	70.7	-25.5	32.2				
	(LATERAL)	ΔV = 23.3 mph à 79.63 msec			117.86	48.75	115.86	54.38

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

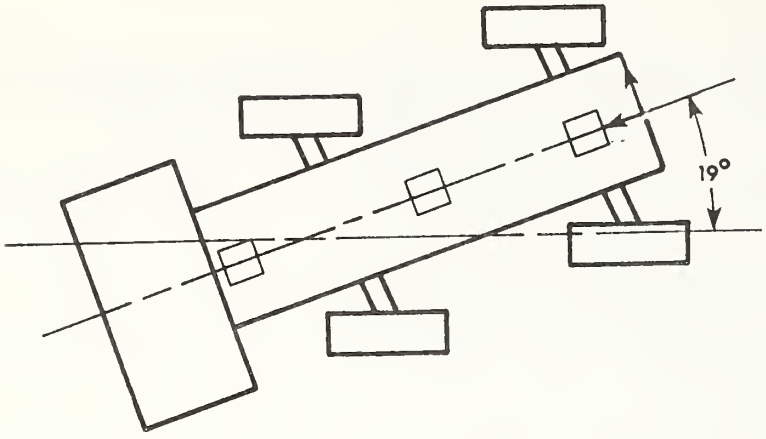
All measurements of accelerometer locations in inches.

VEHICLE ACCELEROMETER LOCATIONS





MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY



NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX (g)	POSITIVE DIRECTION TIME (msec)	NEGATIVE DIRECTION MAX (g)	NEGATIVE DIRECTION TIME (msec)
1	CENTER OF GRAVITY	74.5	0.0	11.5				
	(LONGITUDINAL)	Δ V = -15.1 mph à 130.00 msec			0.92	193.88	10.20	70.38
	(LATERAL)	Δ V = -1.7 mph à 130.00 msec			1.34	86.88	3.04	97.25
	(VERTICAL)				11.96	70.50	11.38	78.75
	(RESULTANT)					15.77 à 70.50		
2	FRONT FRAME MEMBER	130.3	0.0	11.3				
	(LONGITUDINAL)	Δ V = -16.0 mph à 130.00 msec			1.42	2.13	10.22	71.75
3	REAR FRAME MEMBER	23.3	0.0	11.5				
	(LONGITUDINAL)	Δ V = -14.3 mph à 130.00 msec			1.36	150.00	9.94	70.88

* 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	745	Vehicle Dynamics
2	Overhead	Photosonics 1B	25	750	Close-up of impact point
3	Onboard MDB	Photosonics 1B	25	505	Close-up of impact point
4	Onboard MDB	Stalex	13	1000	Driver kinematics
5	Ground level - right	Hycam	25	777	Overall view
6	Ground level - left	Photosonics 1B	17	797	Overall view
7	Onboard vehicle	Photosonics 1B	8	802	Driver kinematics - front view
8	Onboard vehicle	Photosonics 1B	8	812	Driver kinematics
9	Onboard vehicle	Photosonics 1B	8	797	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	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)
BCGXG	Accel	4-202-0001	18845	Bell Howell	8/9/83	.236 MV/G	50 G
BCGYG	Accel	4-202-0001	18858	Bell Howell	8/9/83	.2385 MV/G	50 G
BCGZG	Accel	4-202-0001	18857	Bell Howell	8/9/83	.2385 MV/G	50 G
BFCXG	Accel	4-202-0001	18240	Bell Howell	8/9/83	.2385 MV/G	50 G
BRCXG	Accel	4-202-0001	19022	Bell Howell	8/9/83	.221 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

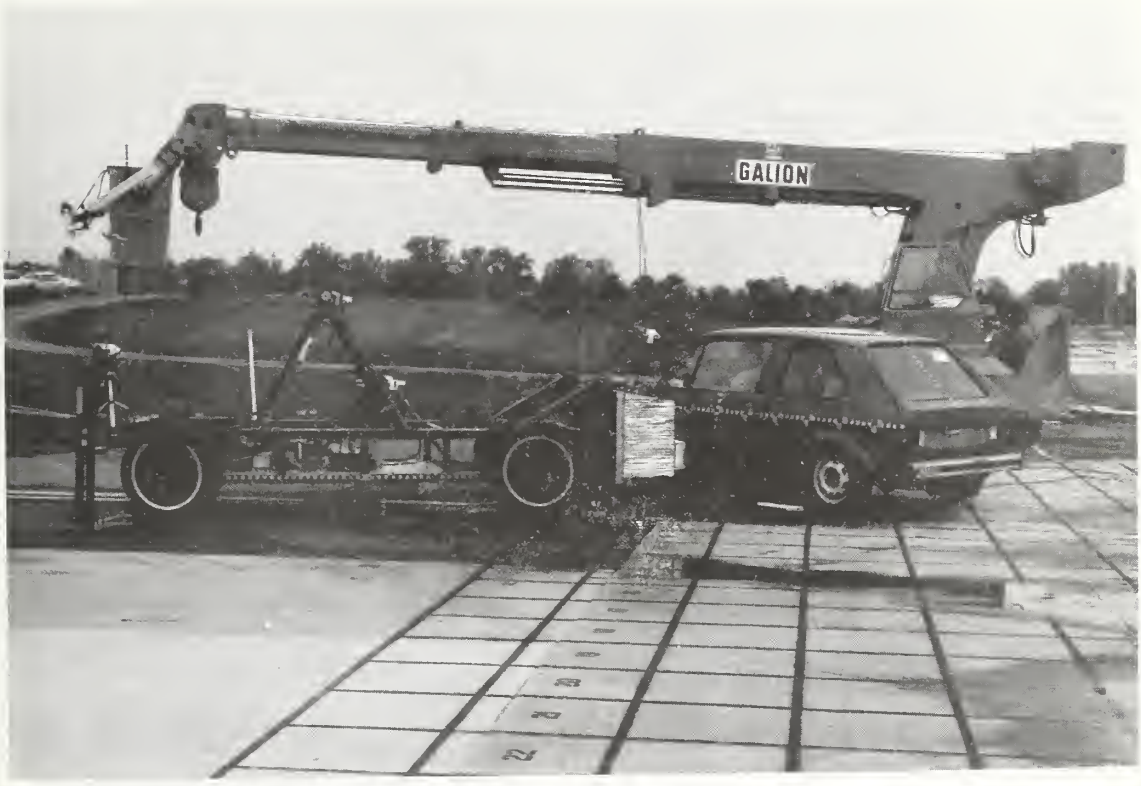


Figure A-3. PRE-TEST OVERALL - VIEW 3

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

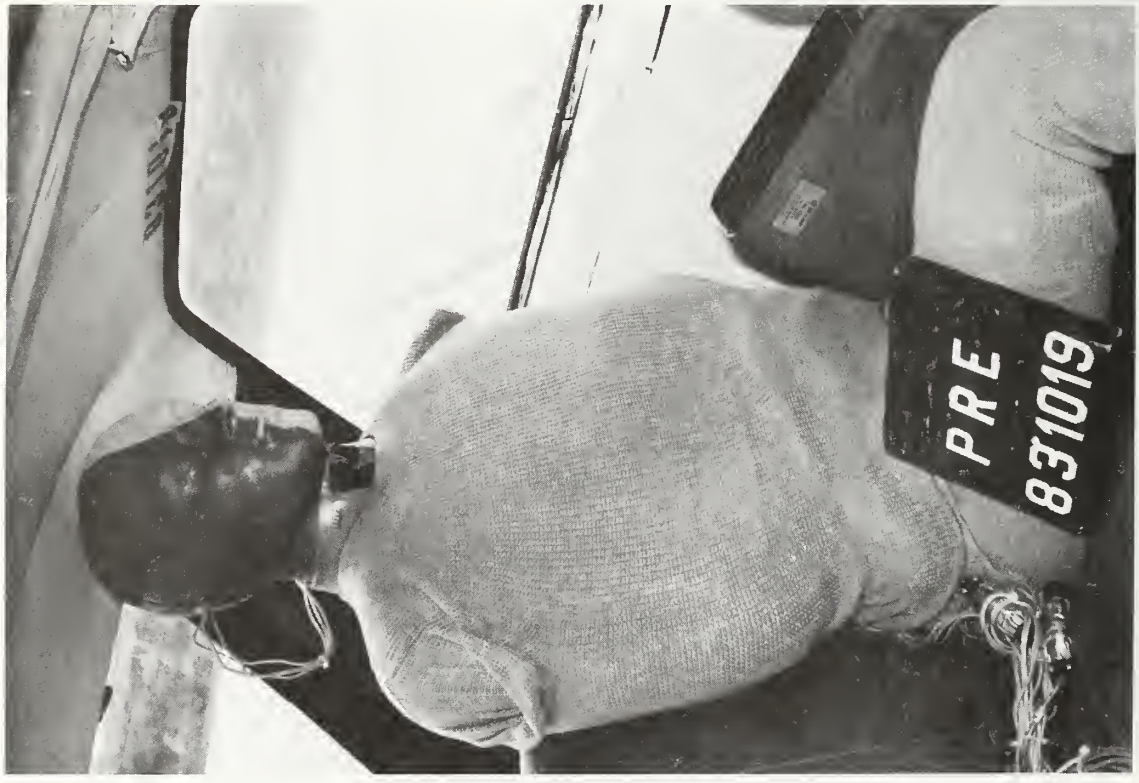


Figure A-10. PRE-TEST PASSENGER DUMMY - VIEW 1

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

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

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

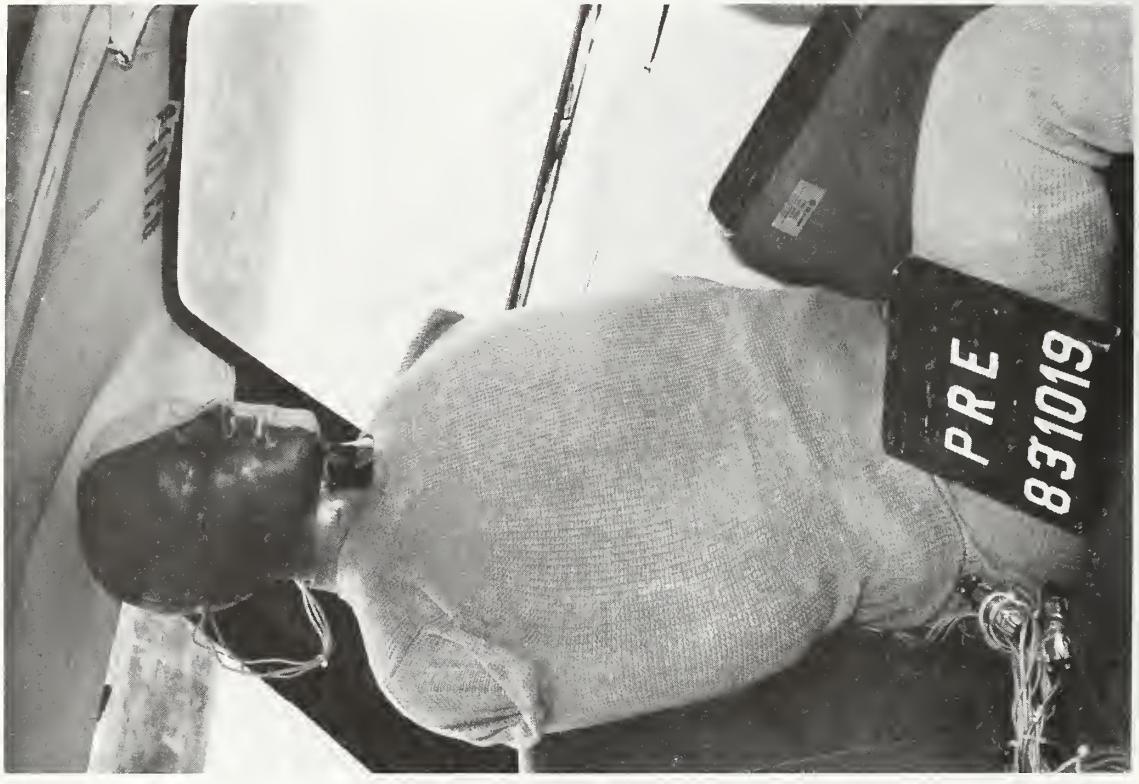


Figure A-10. PRE-TEST PASSENGER DUMMY - VIEW 1

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

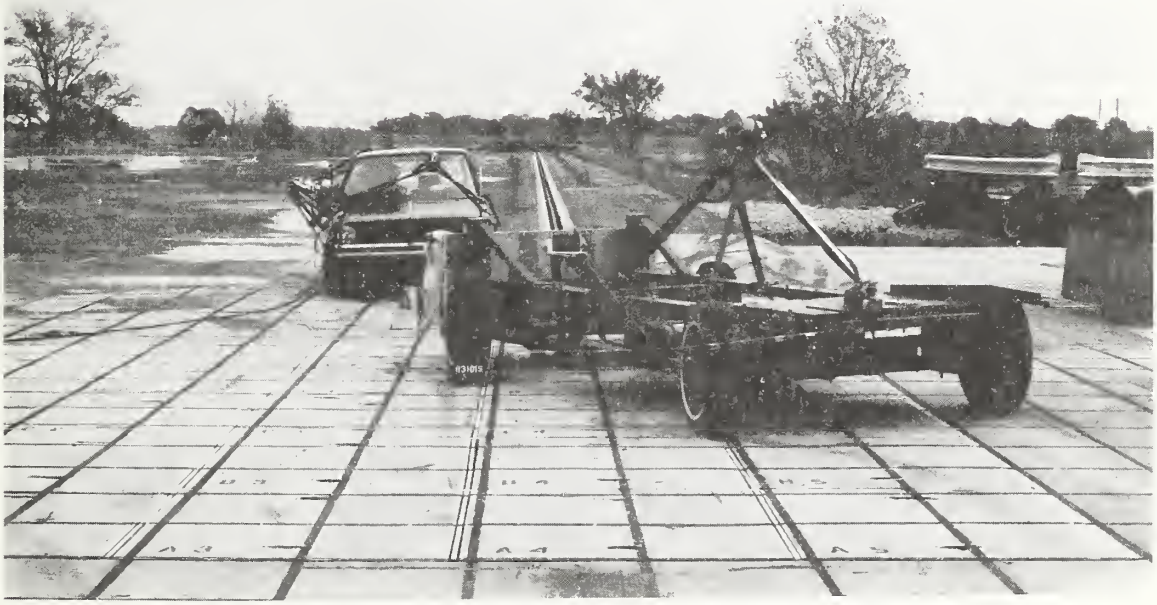


Figure A-12. POST-TEST OVERALL - VIEW 1

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

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

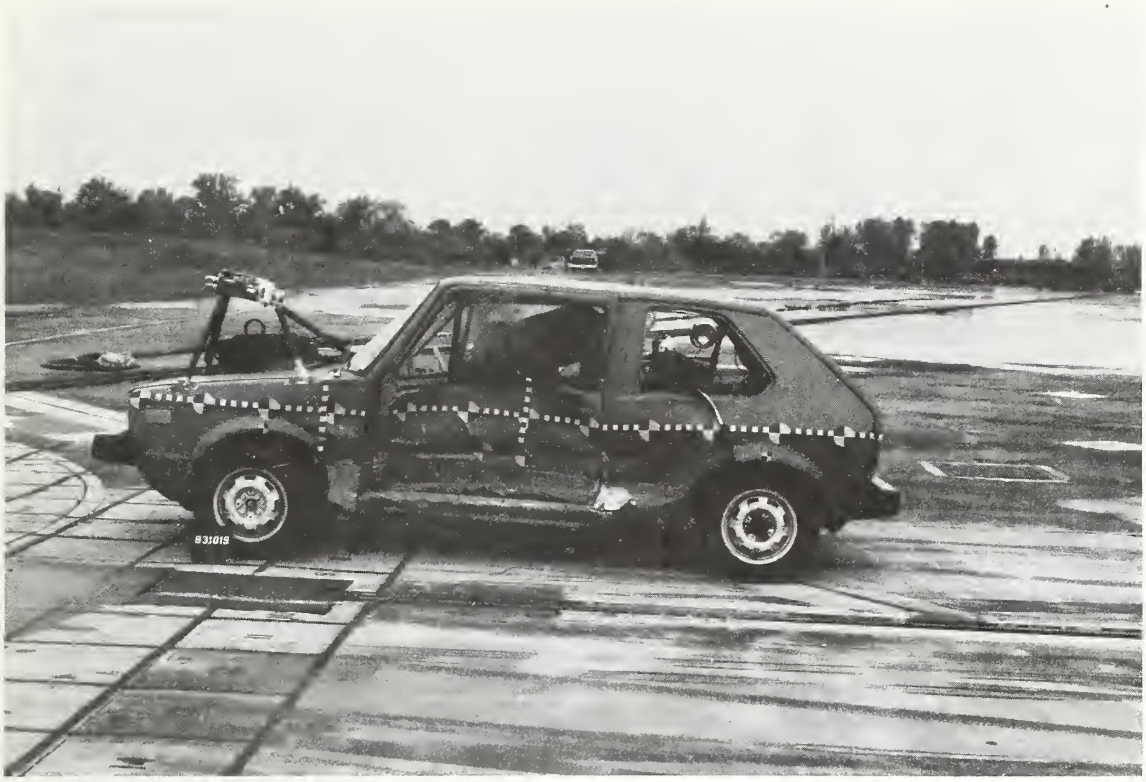


Figure A-15. POST-TEST OVERALL - VIEW 4

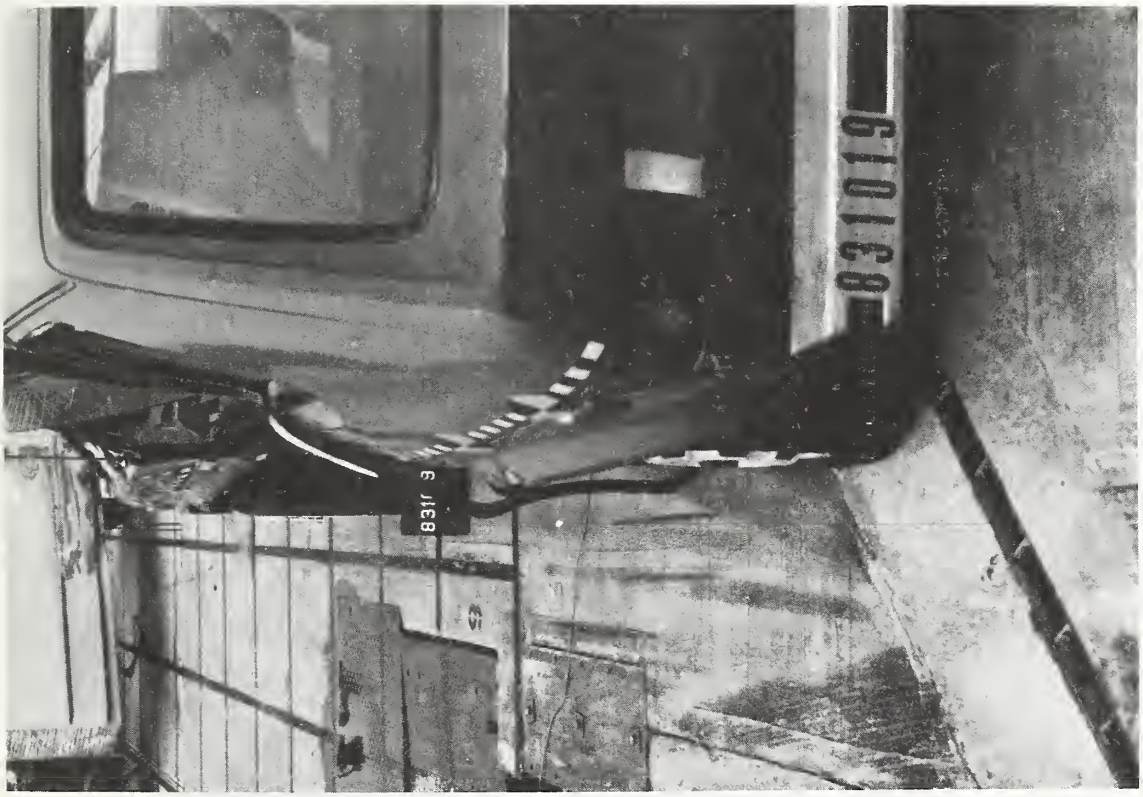


Figure A-16. POST-TEST CLOSEUP - VIEW 1

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

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

Figure A-19. POST-TEST DRIVER DUMMY - VIEW 3

Figure A-20. POST-TEST PASSENGER DUMMY - VIEW 1

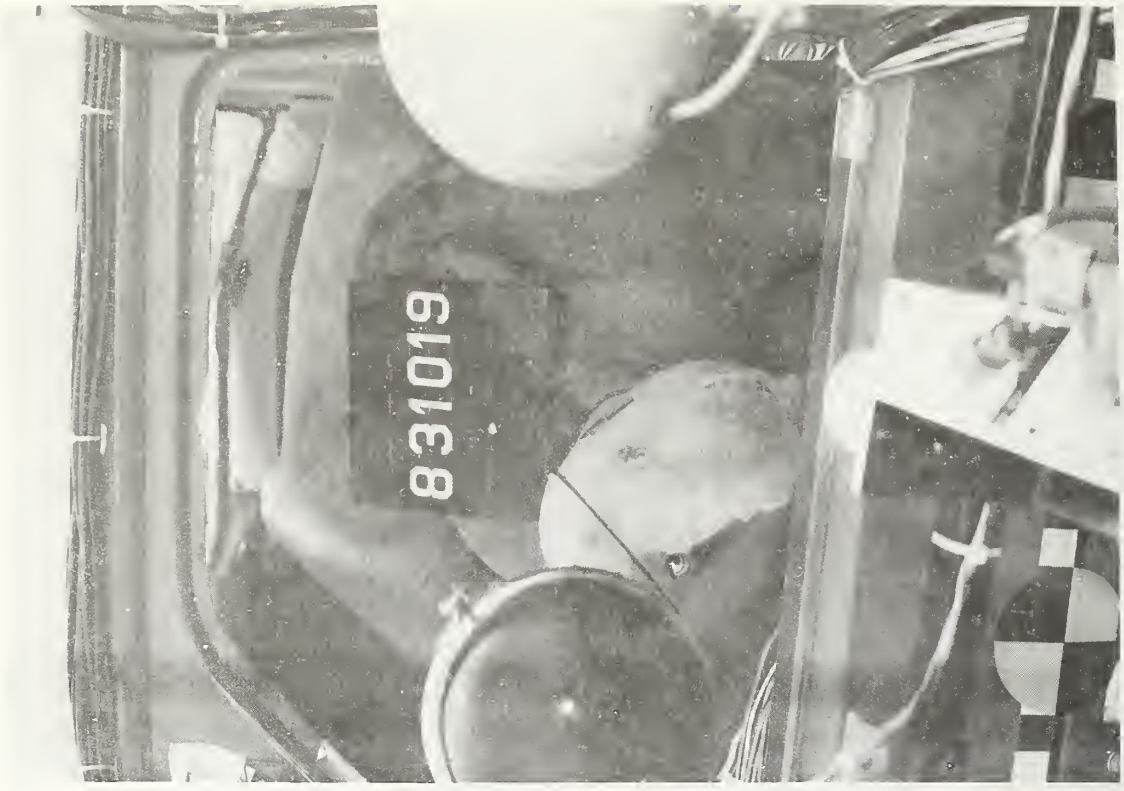


Figure A-21. POST-TEST PASSENGER DUMMY - VIEW 2

Figure A-22. POST-TEST PASSENGER DUMMY - VIEW 3

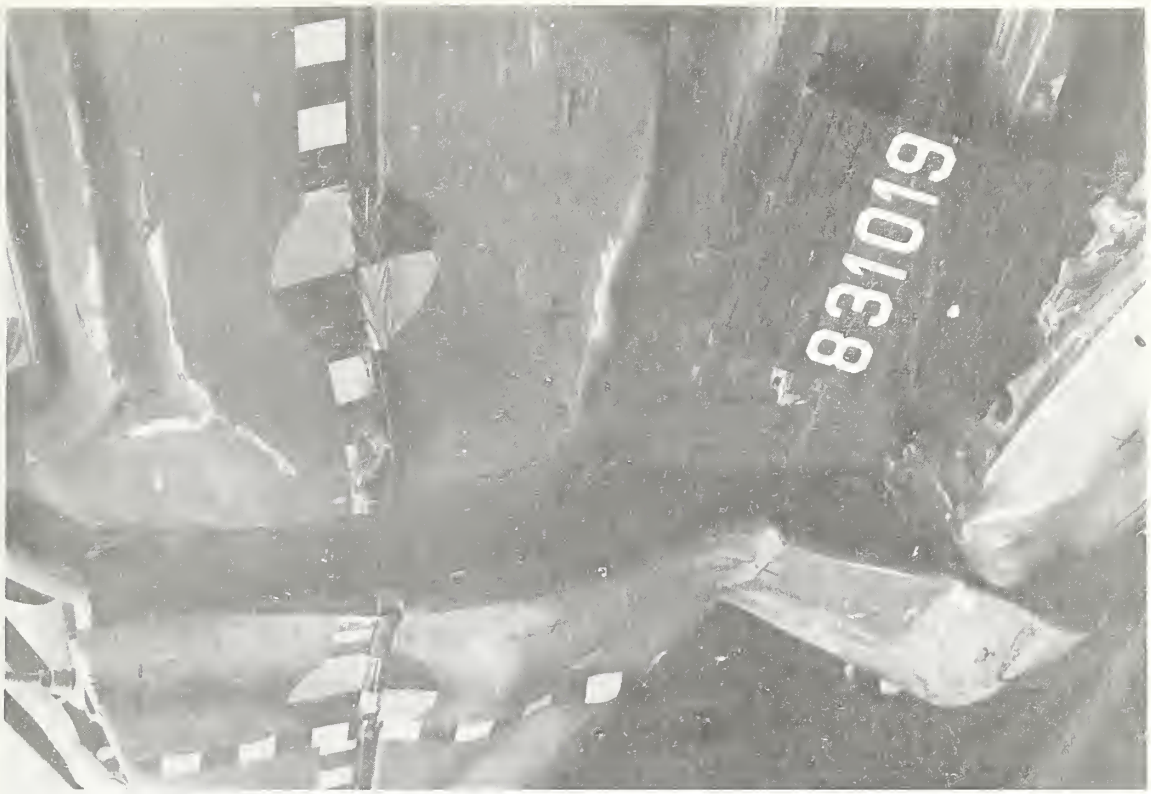


Figure A-23. POST-TEST VEHICLE DAMAGE - VIEW 1

Figure A-24. POST-TEST VEHICLE DAMAGE - VIEW 2

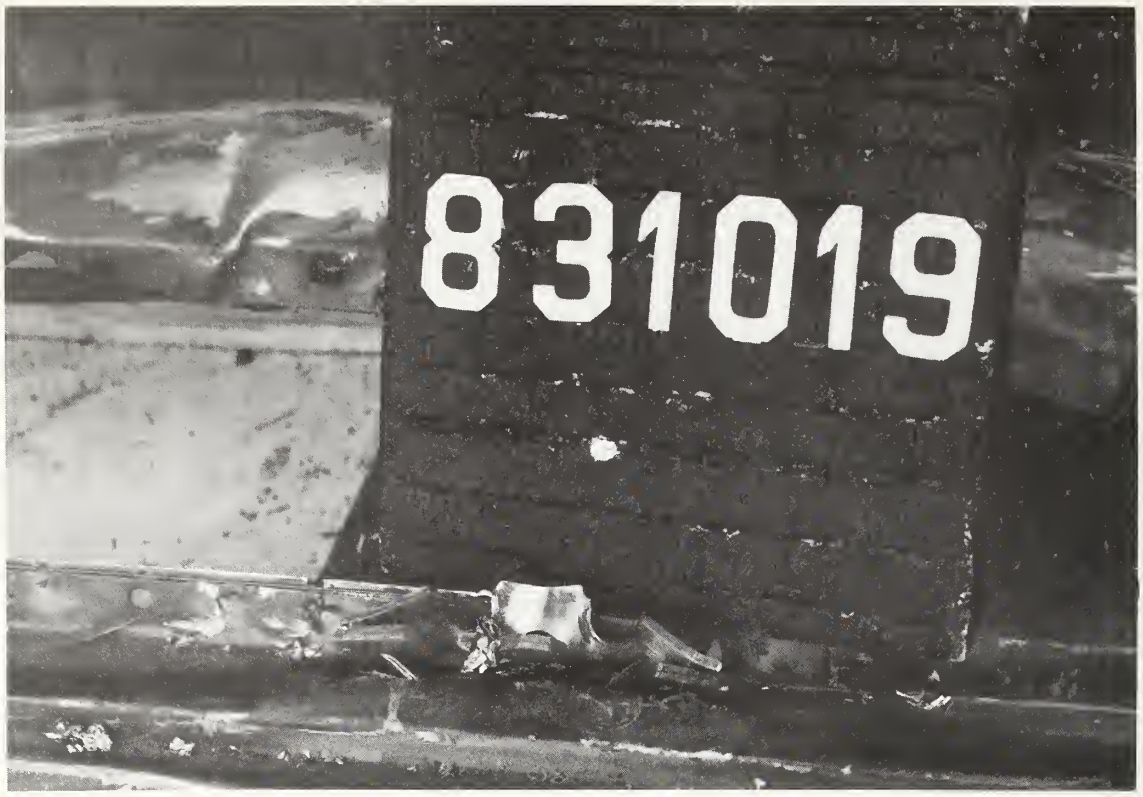


Figure A-25. POST-TEST VEHICLE DAMAGE - VIEW 3

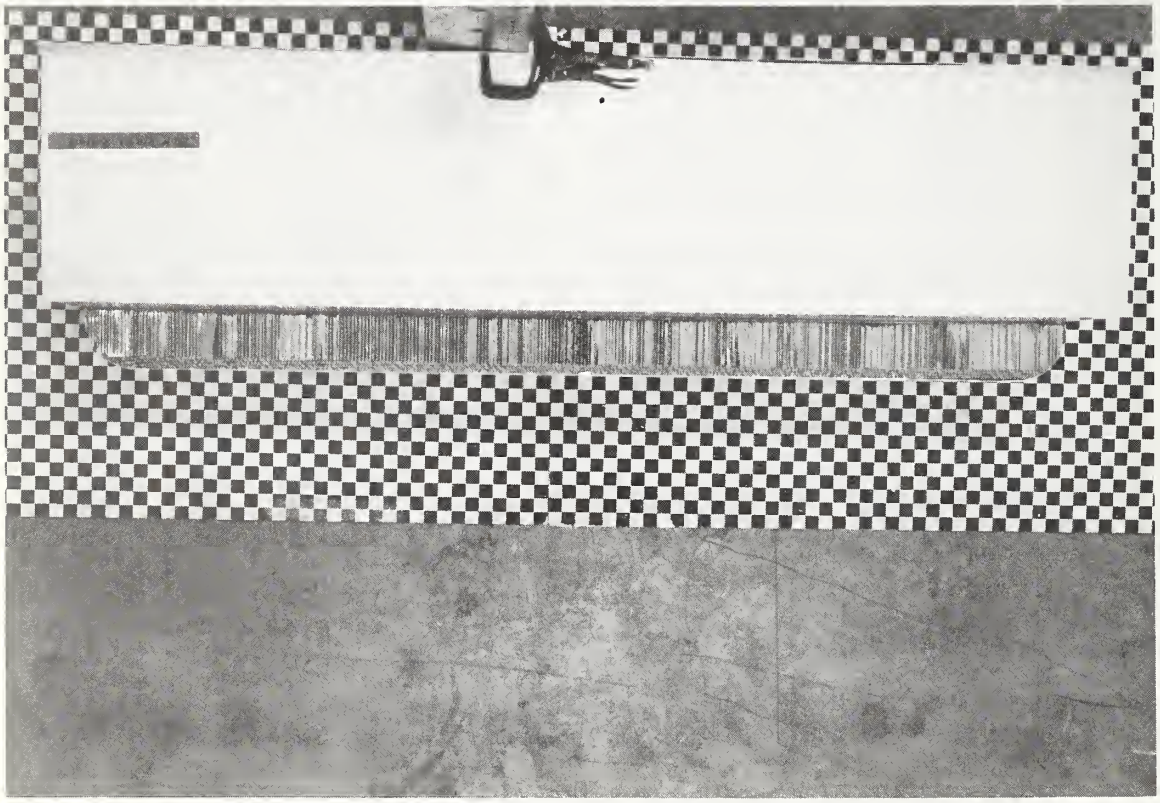


Figure A-26. PRE-TEST MDB FACE - VIEW 1

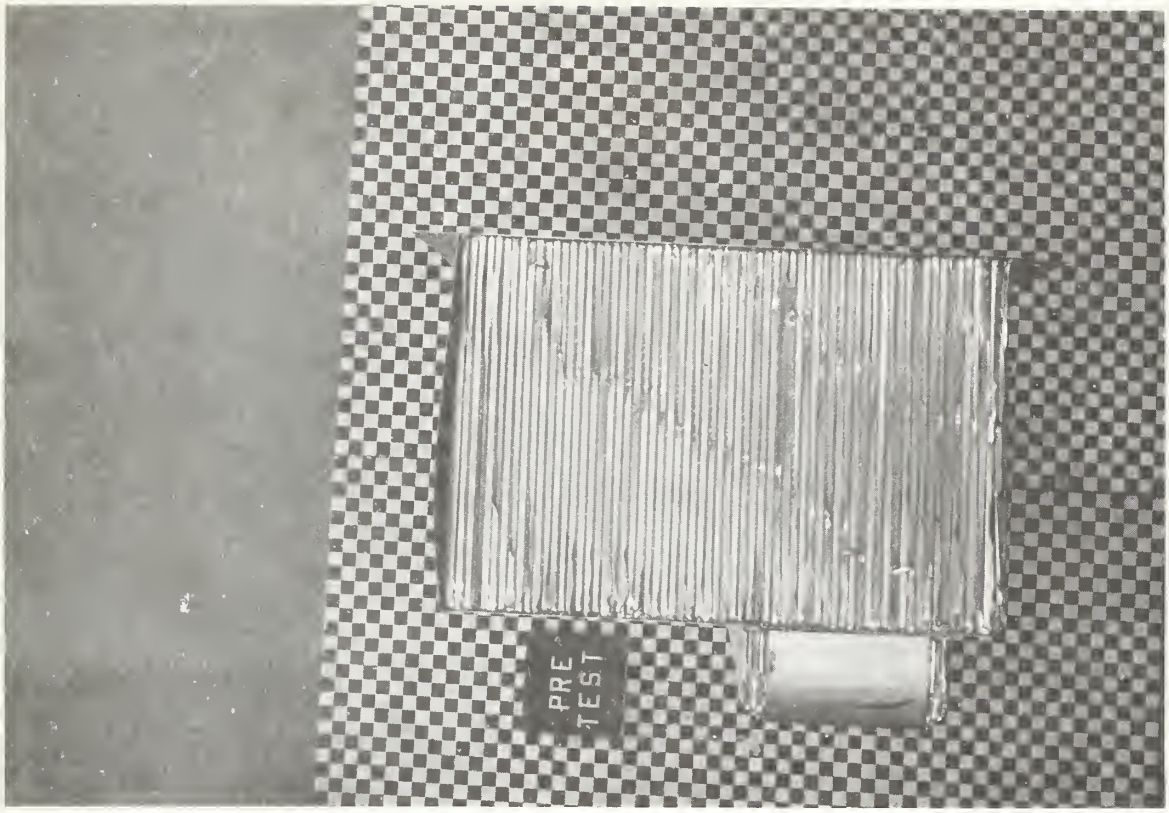


Figure A-27. PRE-TEST MDB FACE - VIEW 2

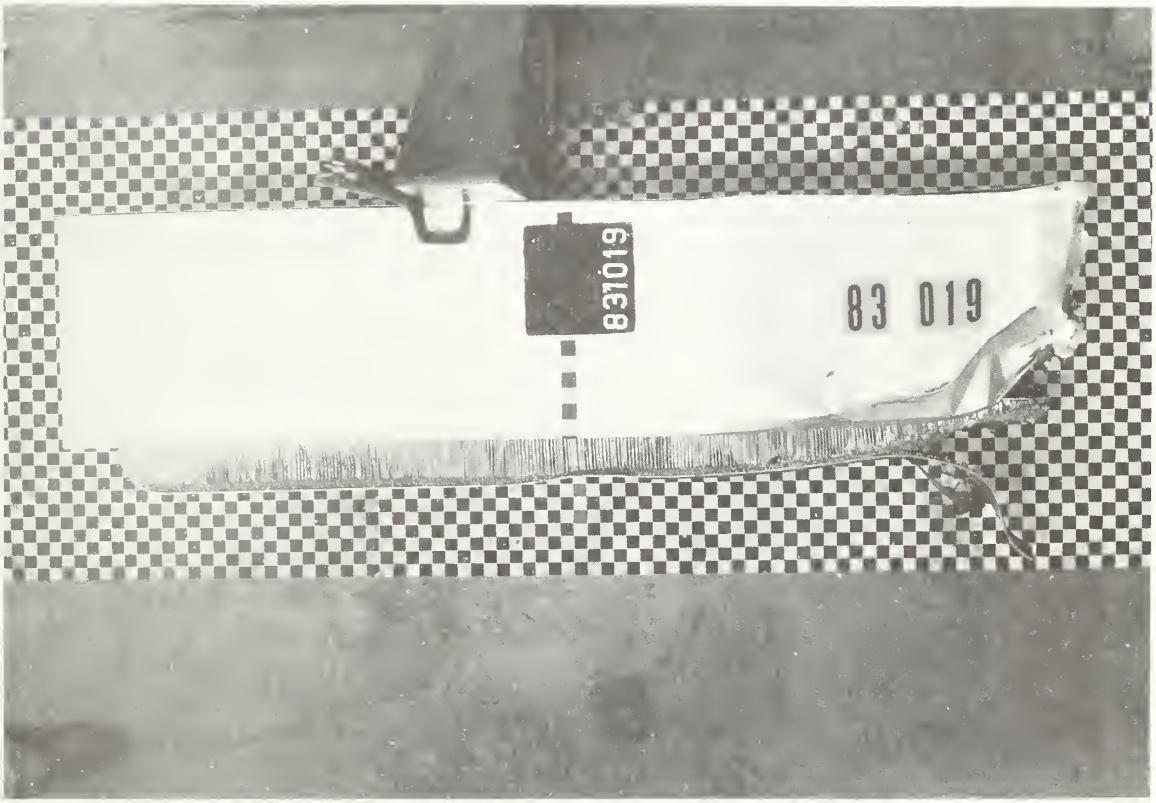


Figure A-28. POST-TEST MDB FACE - VIEW 1

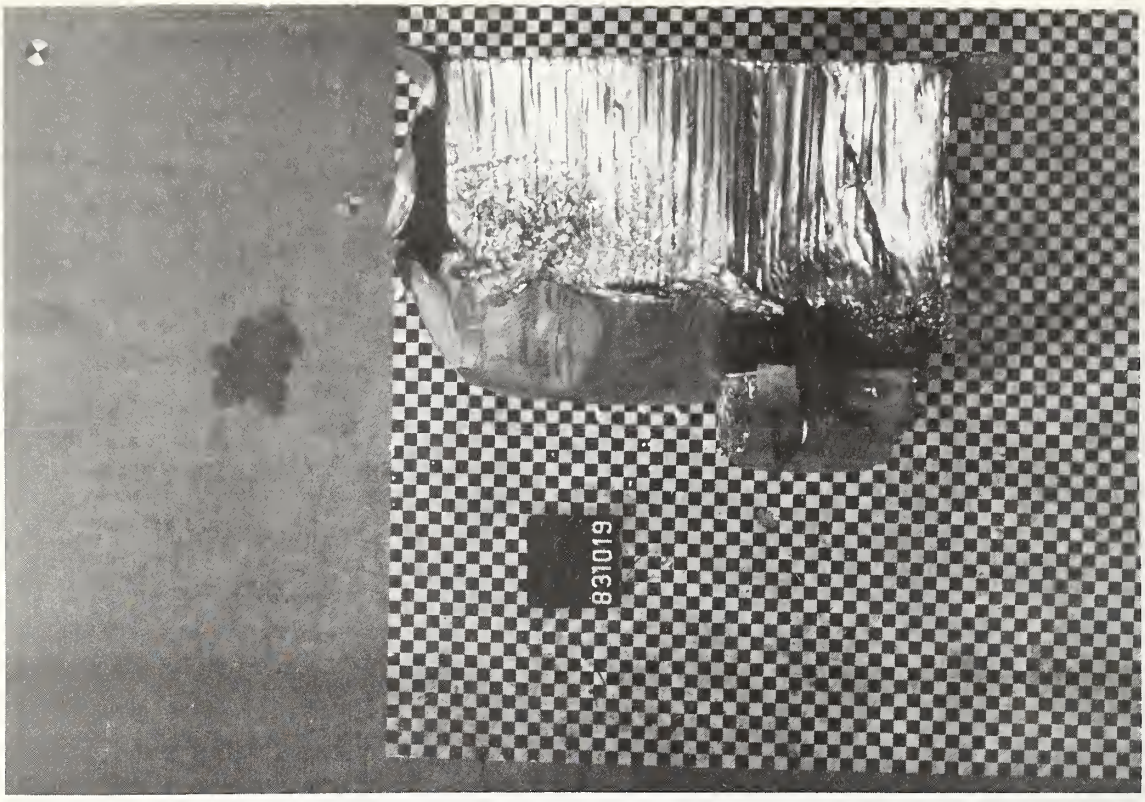
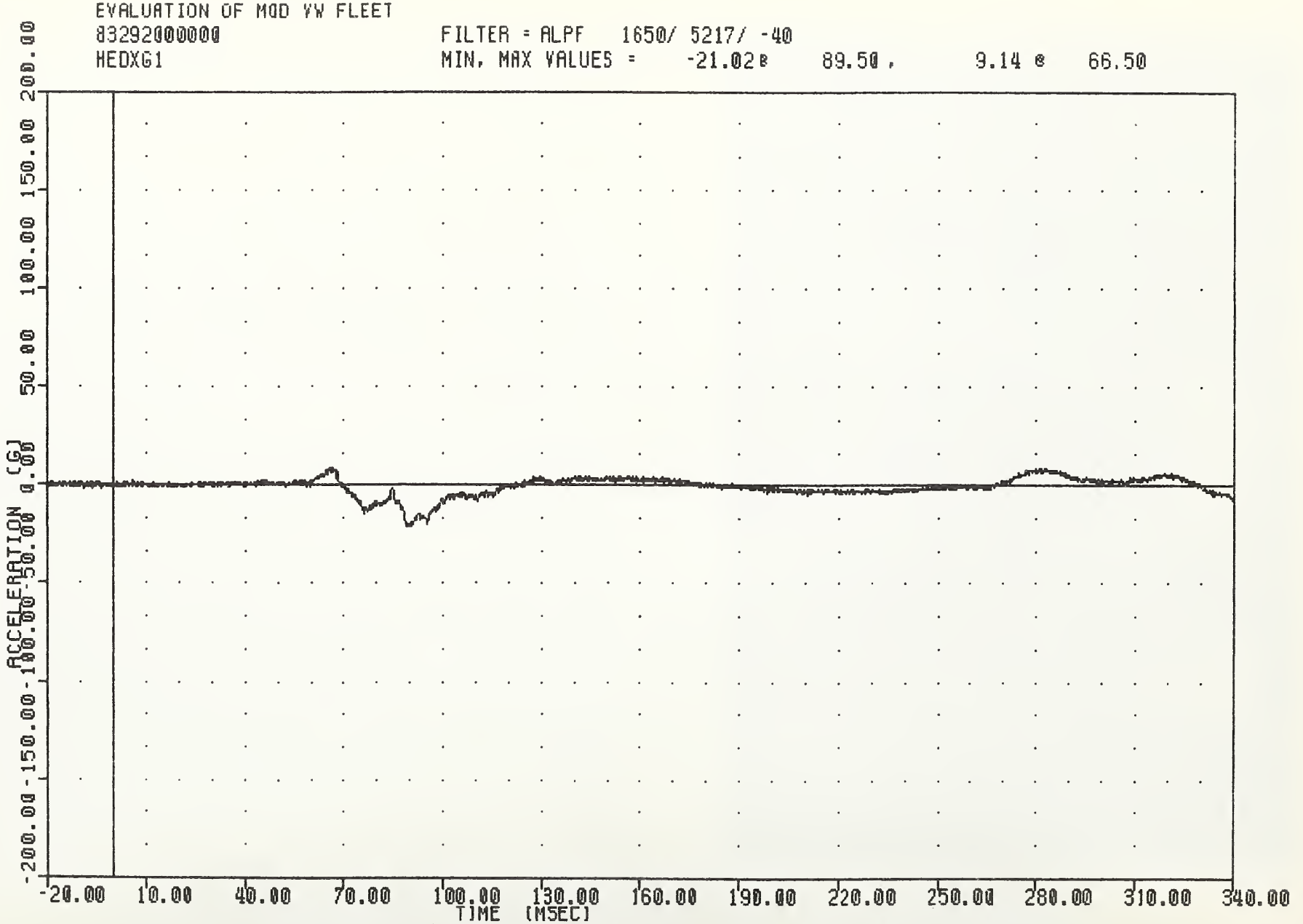


Figure A-29. POST-TEST MDB FACE - VIEW 2

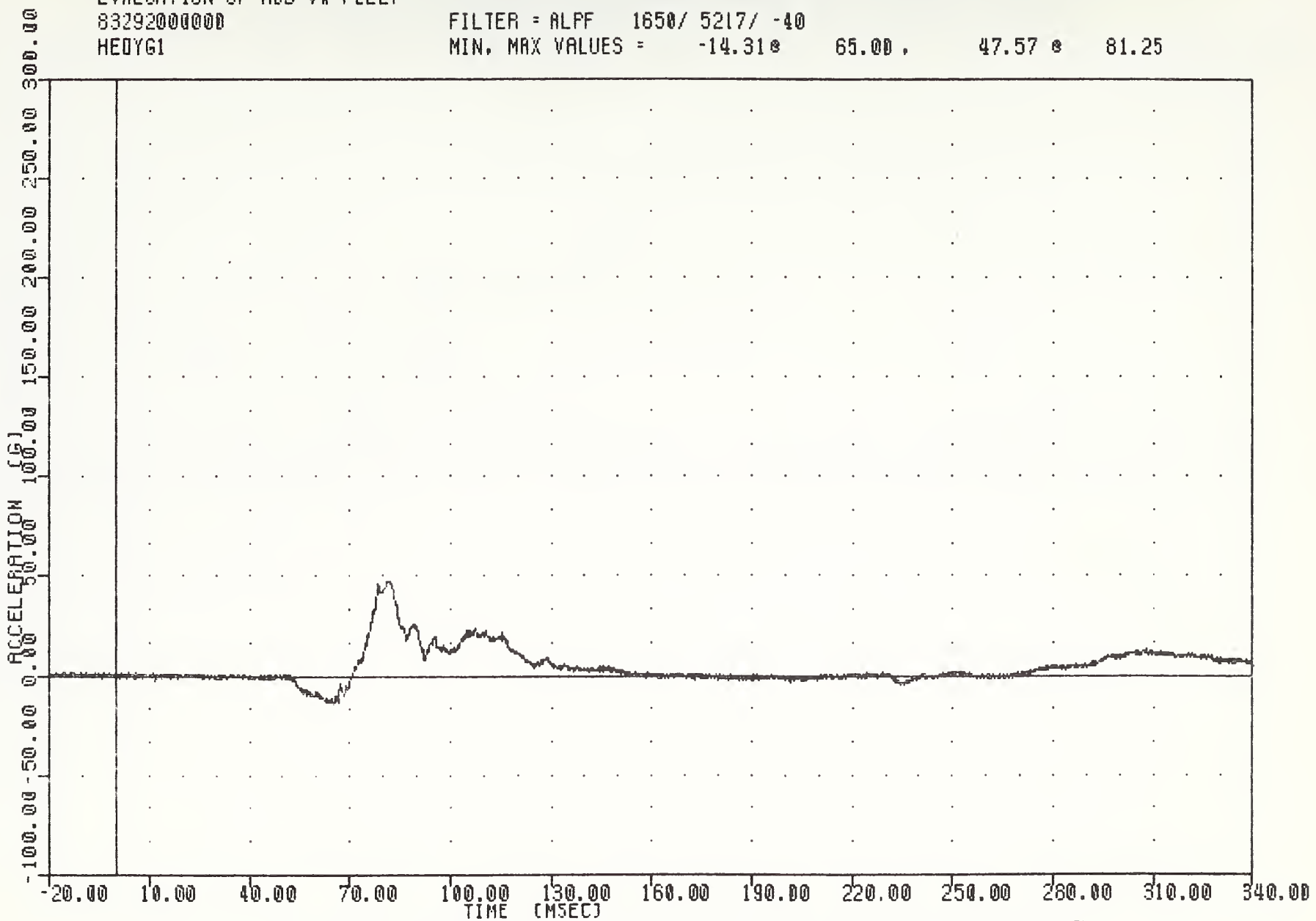
APPENDIX B

DATA PLOT PRESENTATION

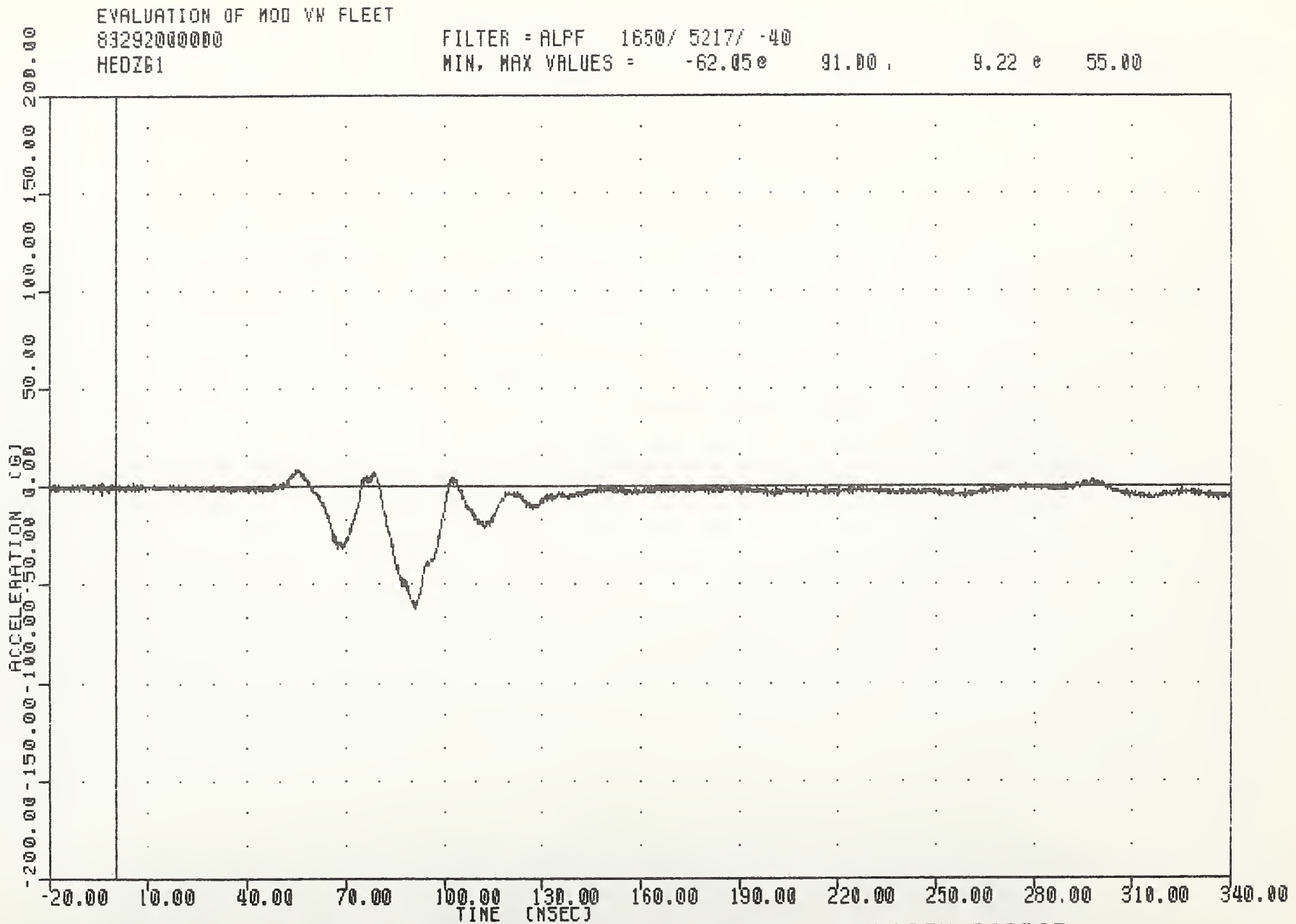
Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211, except that dummy thorax data were filtered using the HSRI filter.



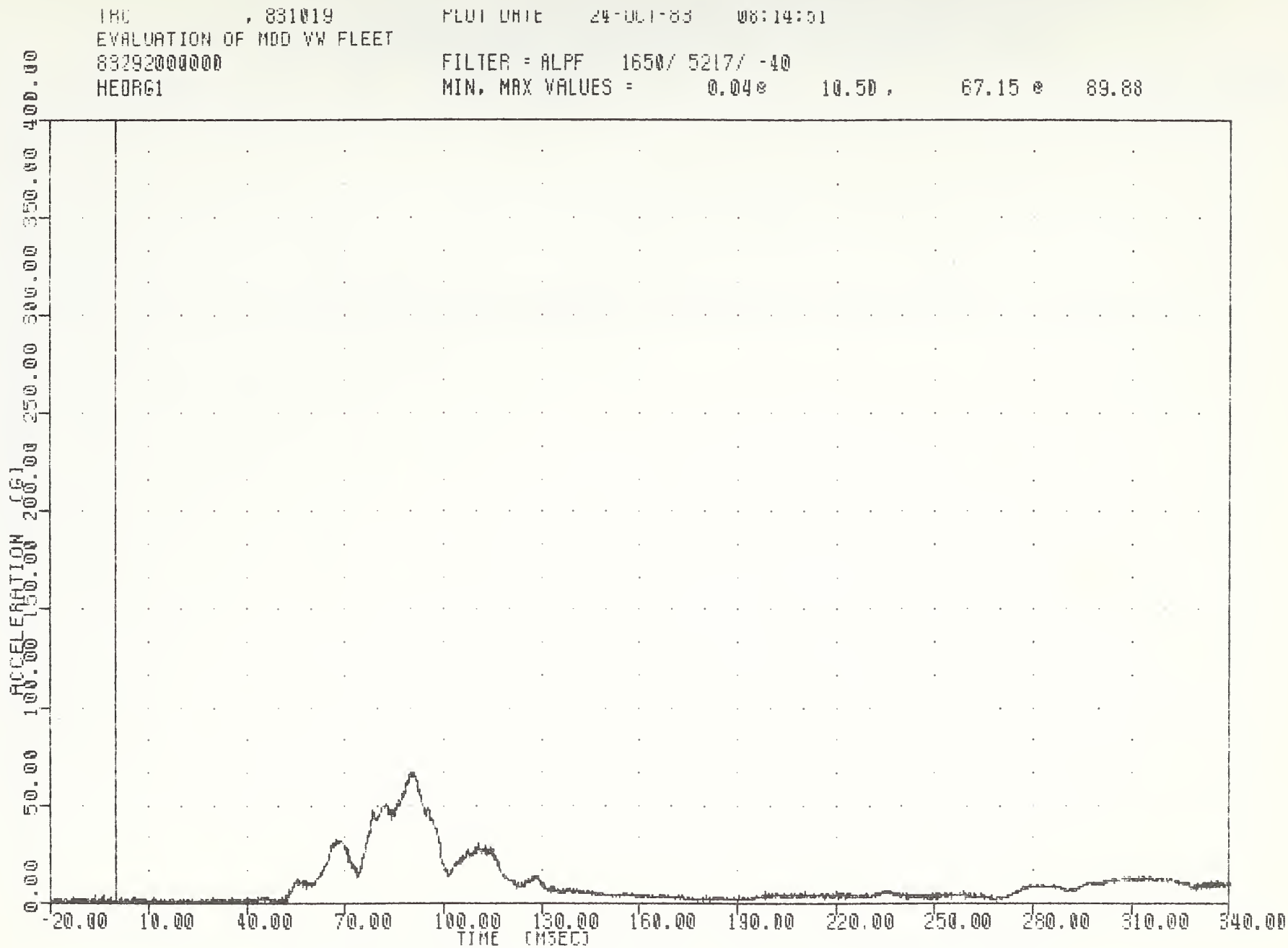
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD ACCELERATION X AXIS



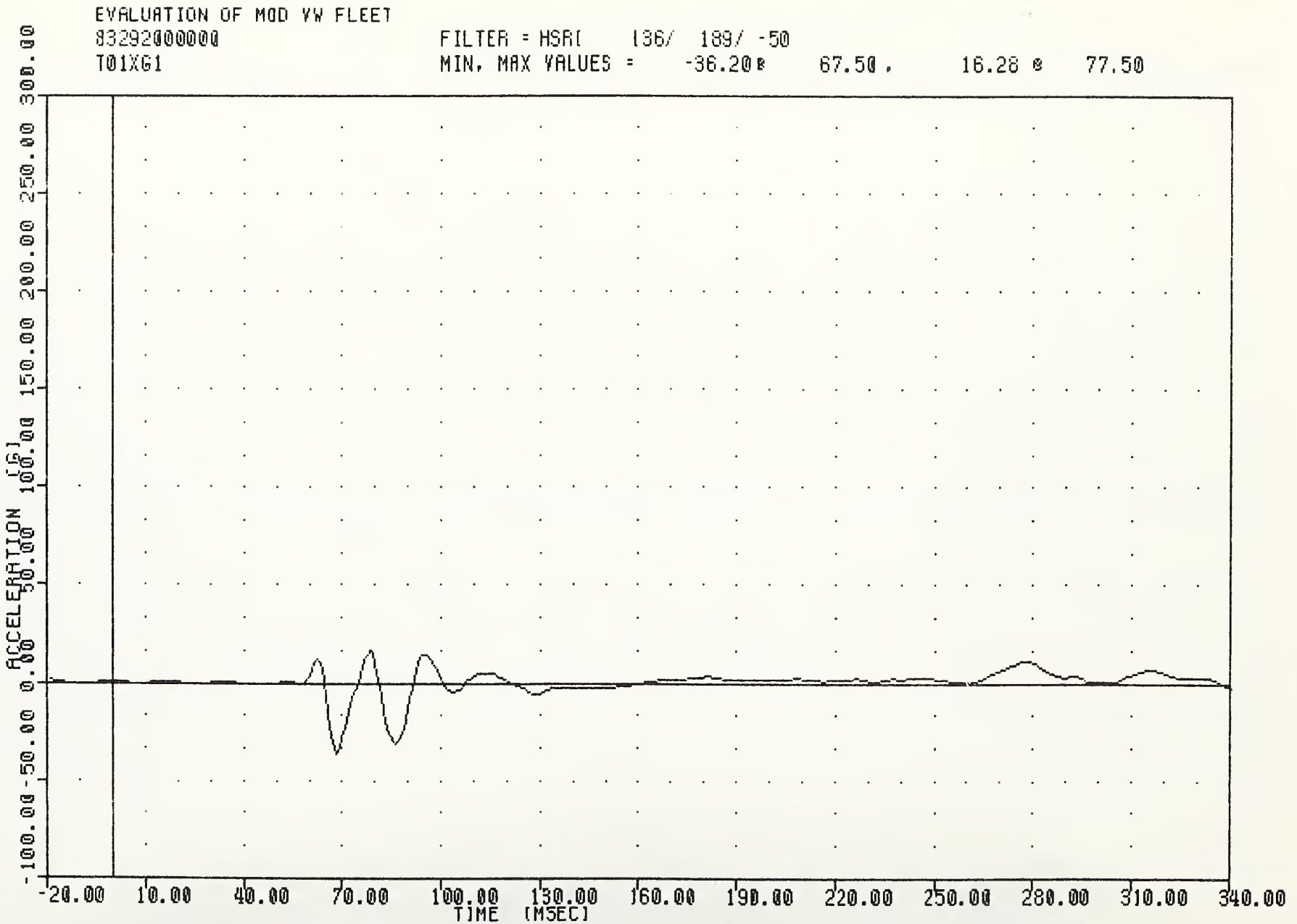
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD ACCELERATION Y AXIS



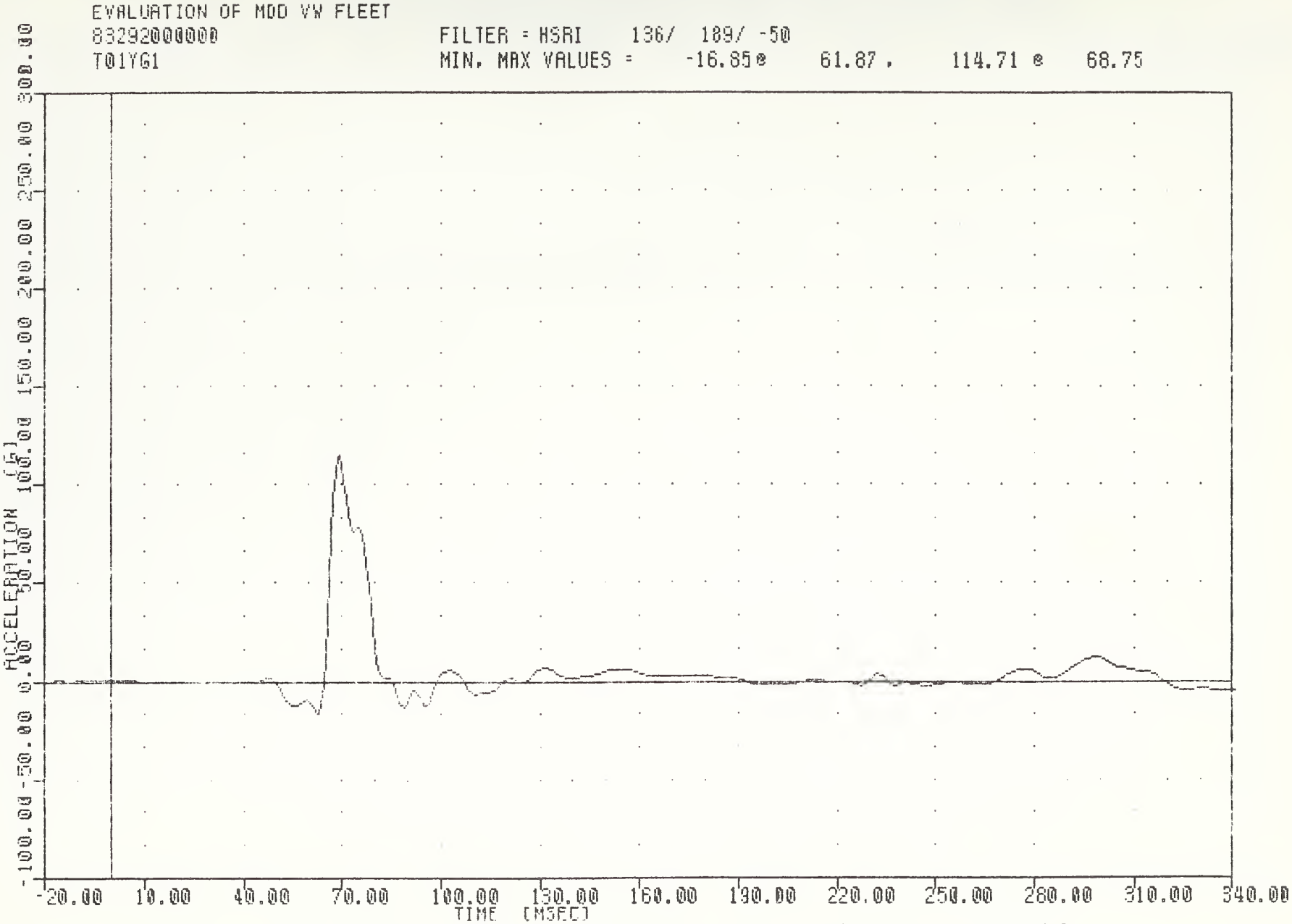
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD ACCELERATION Z AXIS



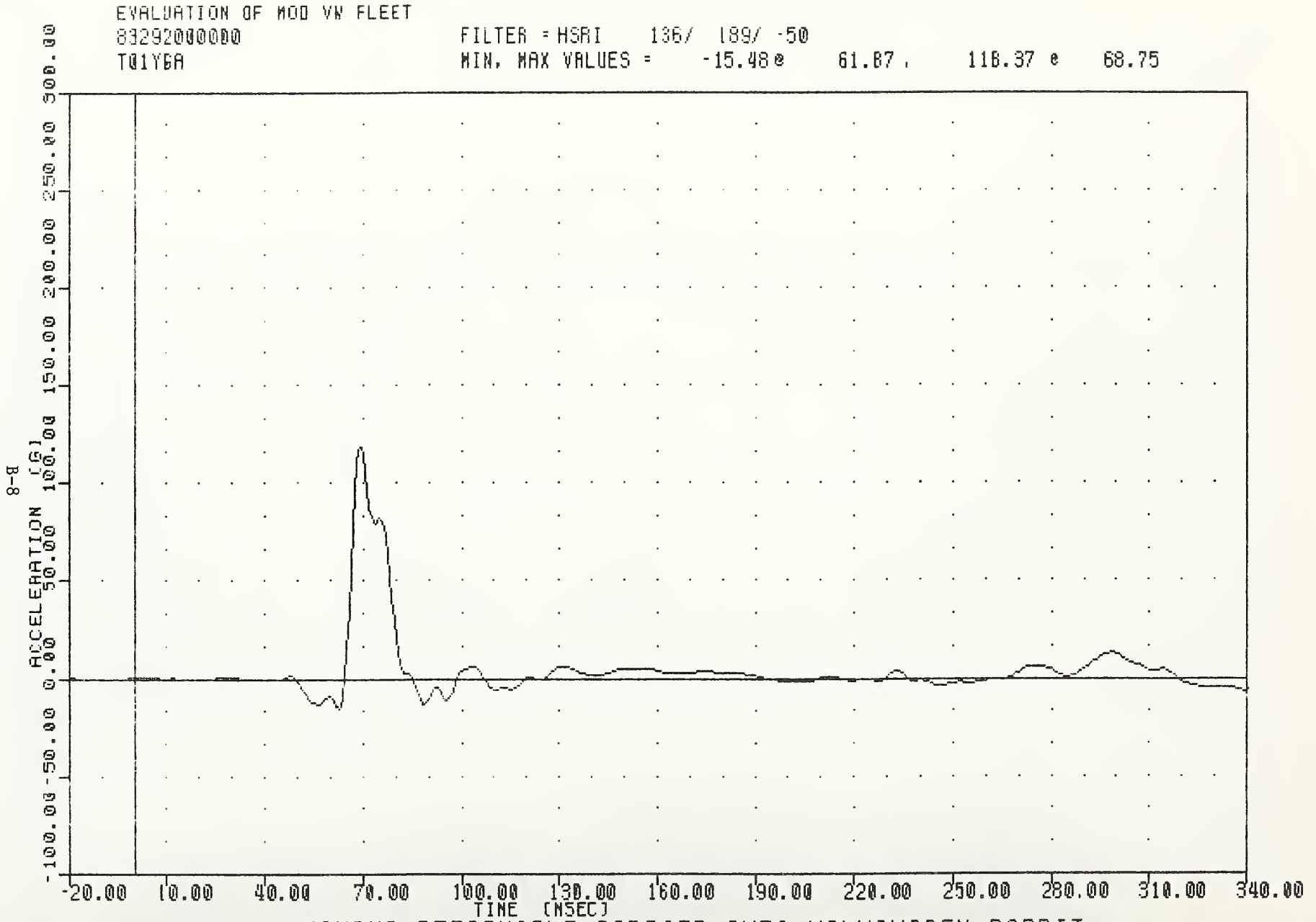
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER HEAD RESULTANT



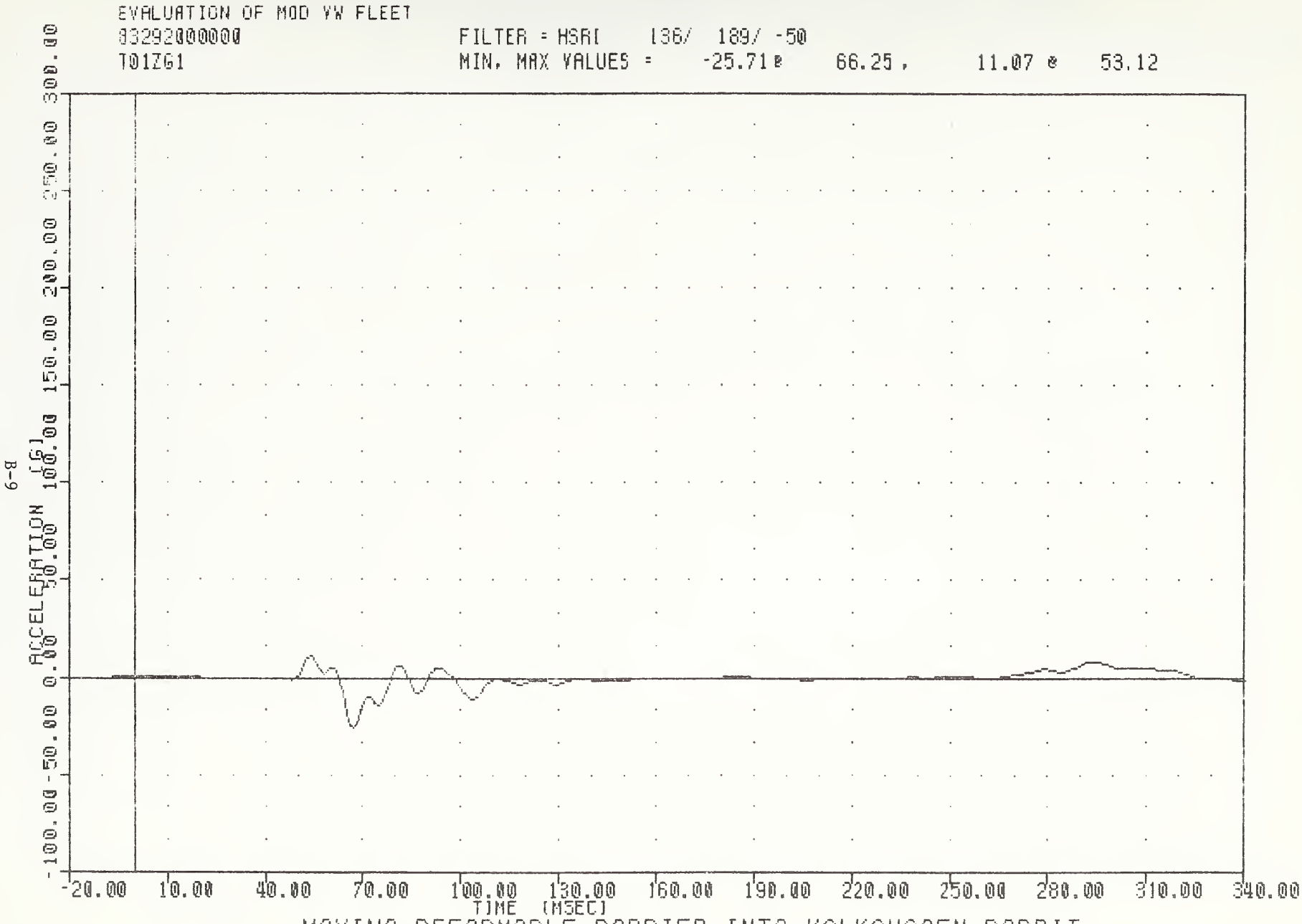
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE ACCELERATION X AXIS



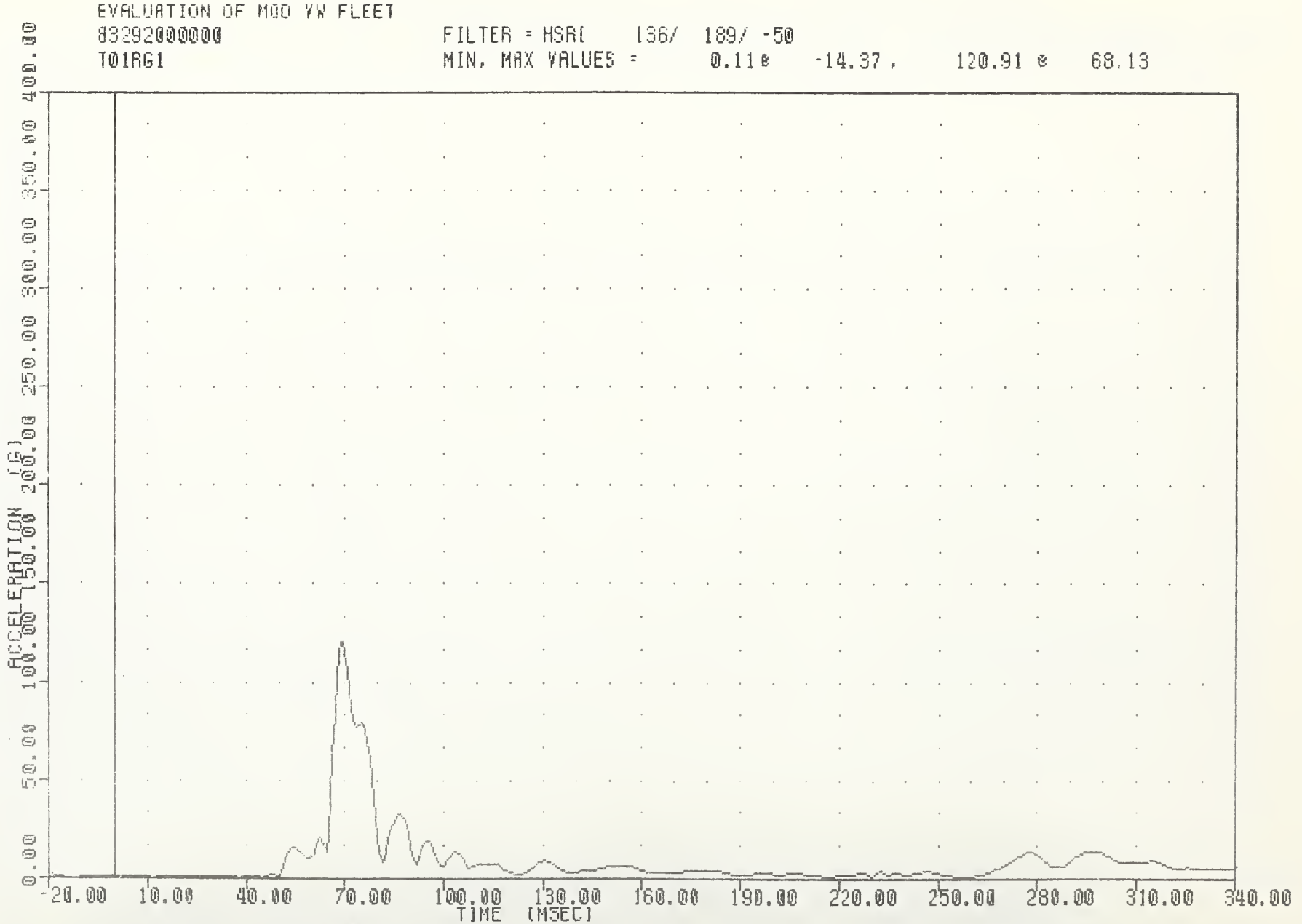
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE ACCELERATION Y AXIS



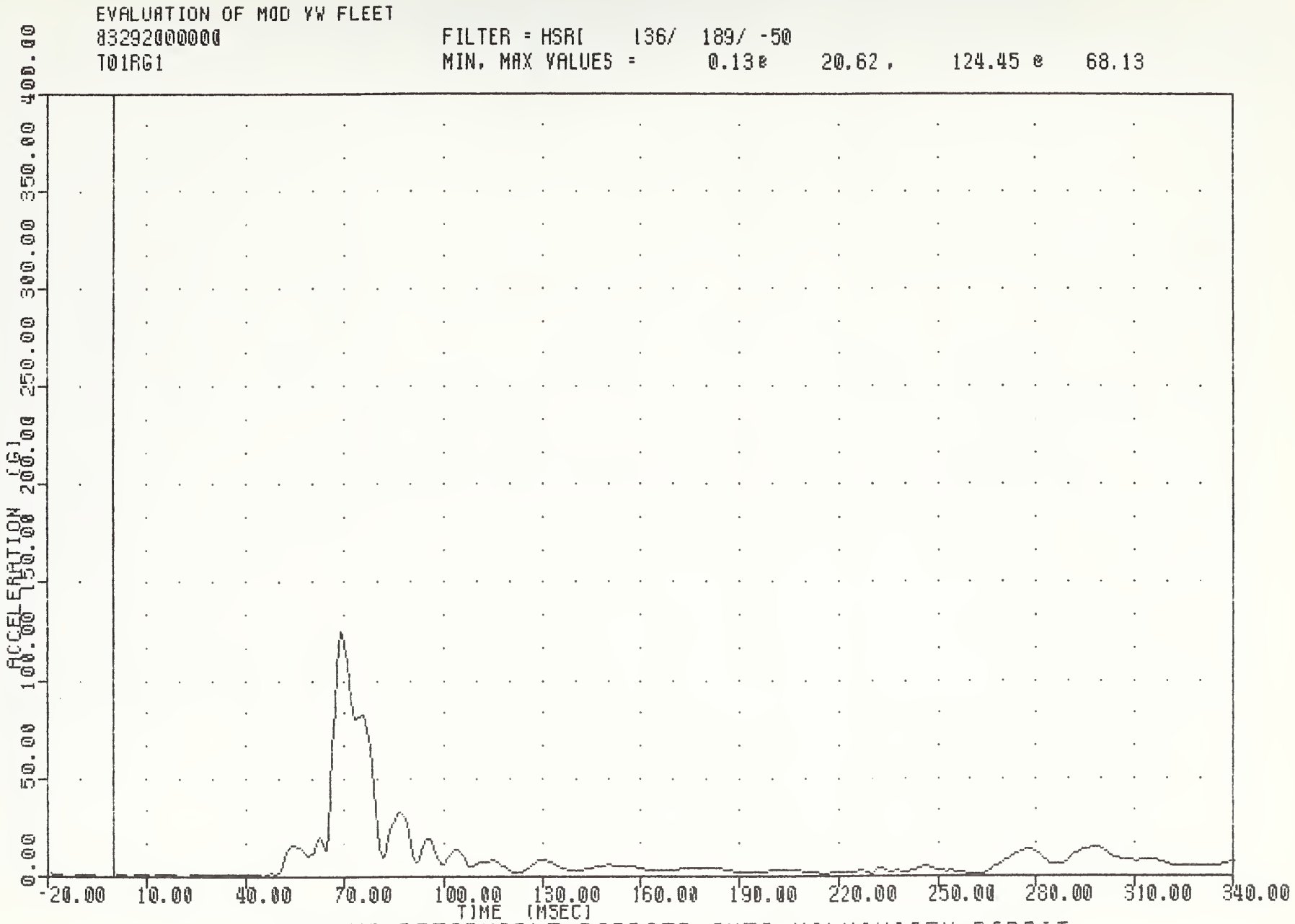
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE ACCELERATION -Z Y AXIS



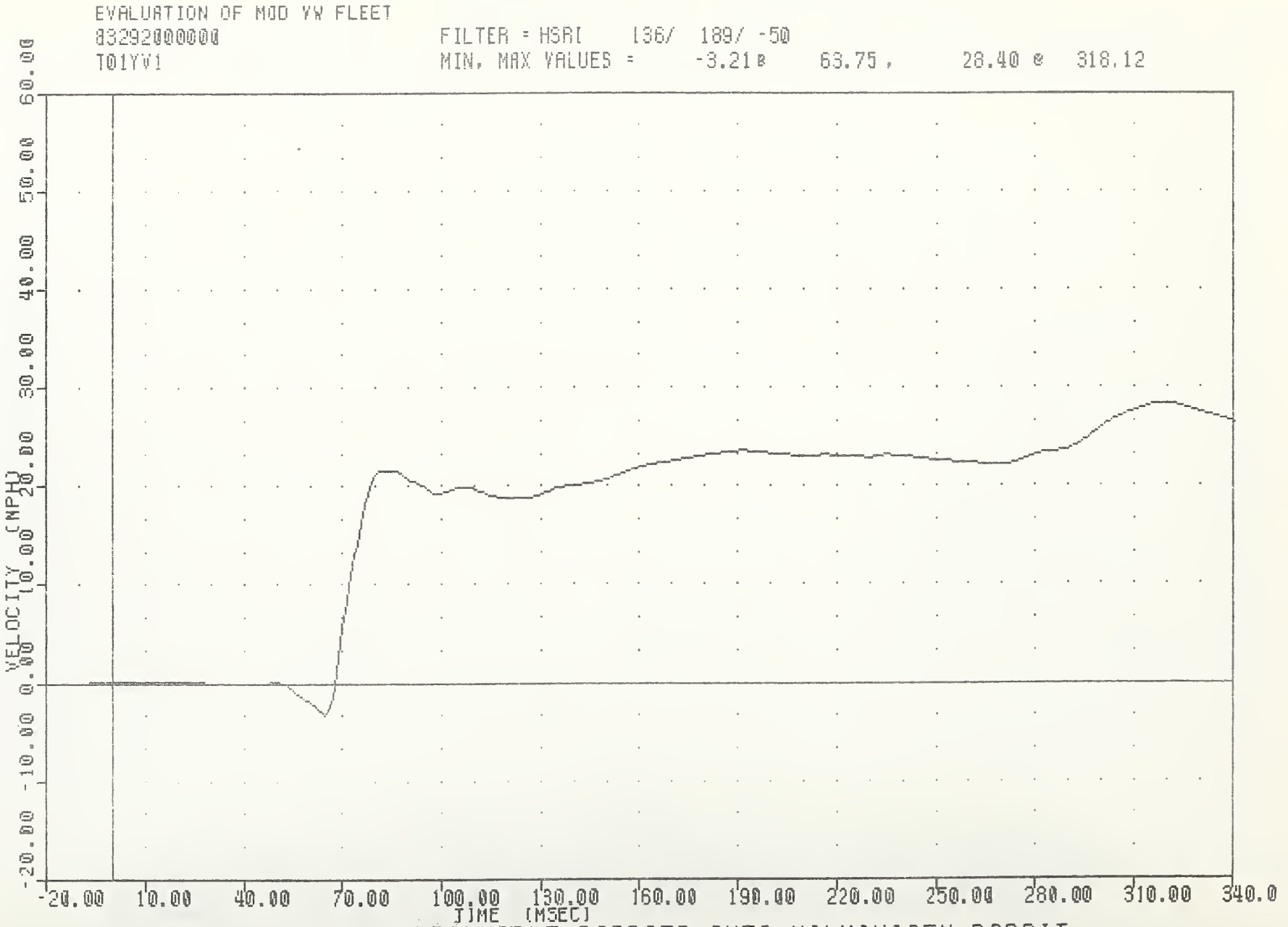
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE ACCELERATION Z AXIS



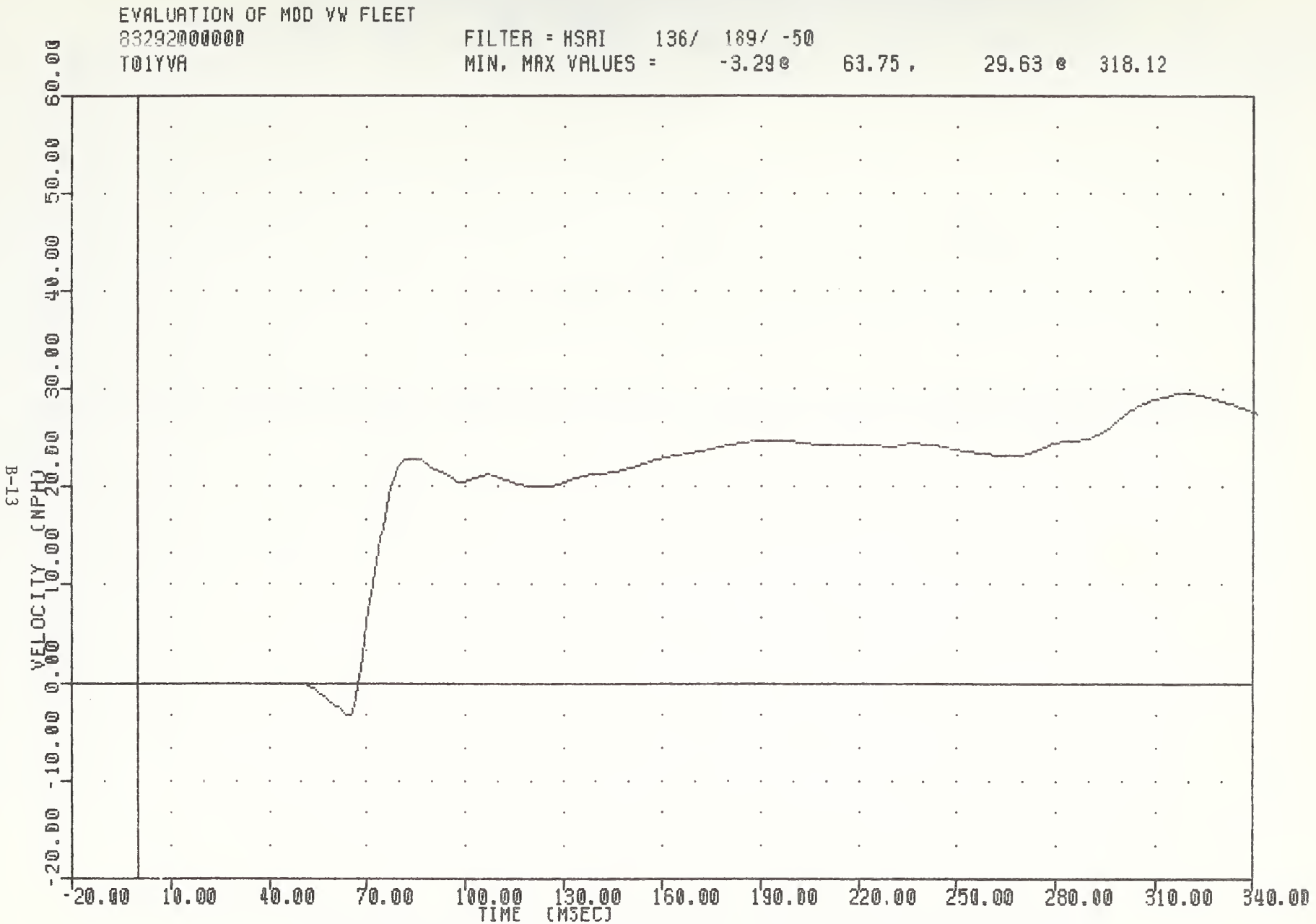
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE RESULTANT



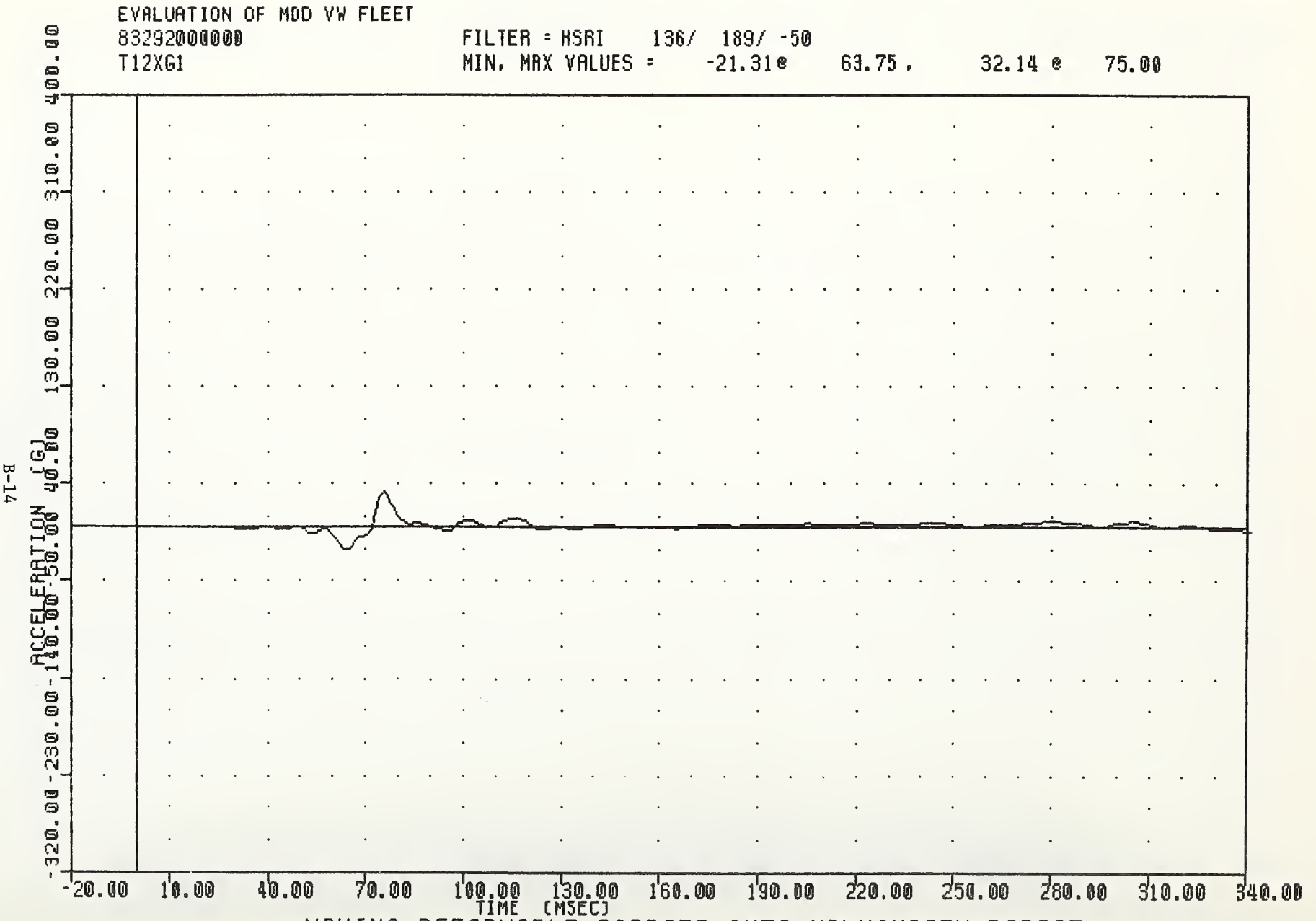
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER UPPER SPINE RESULTANT USING T01YGA



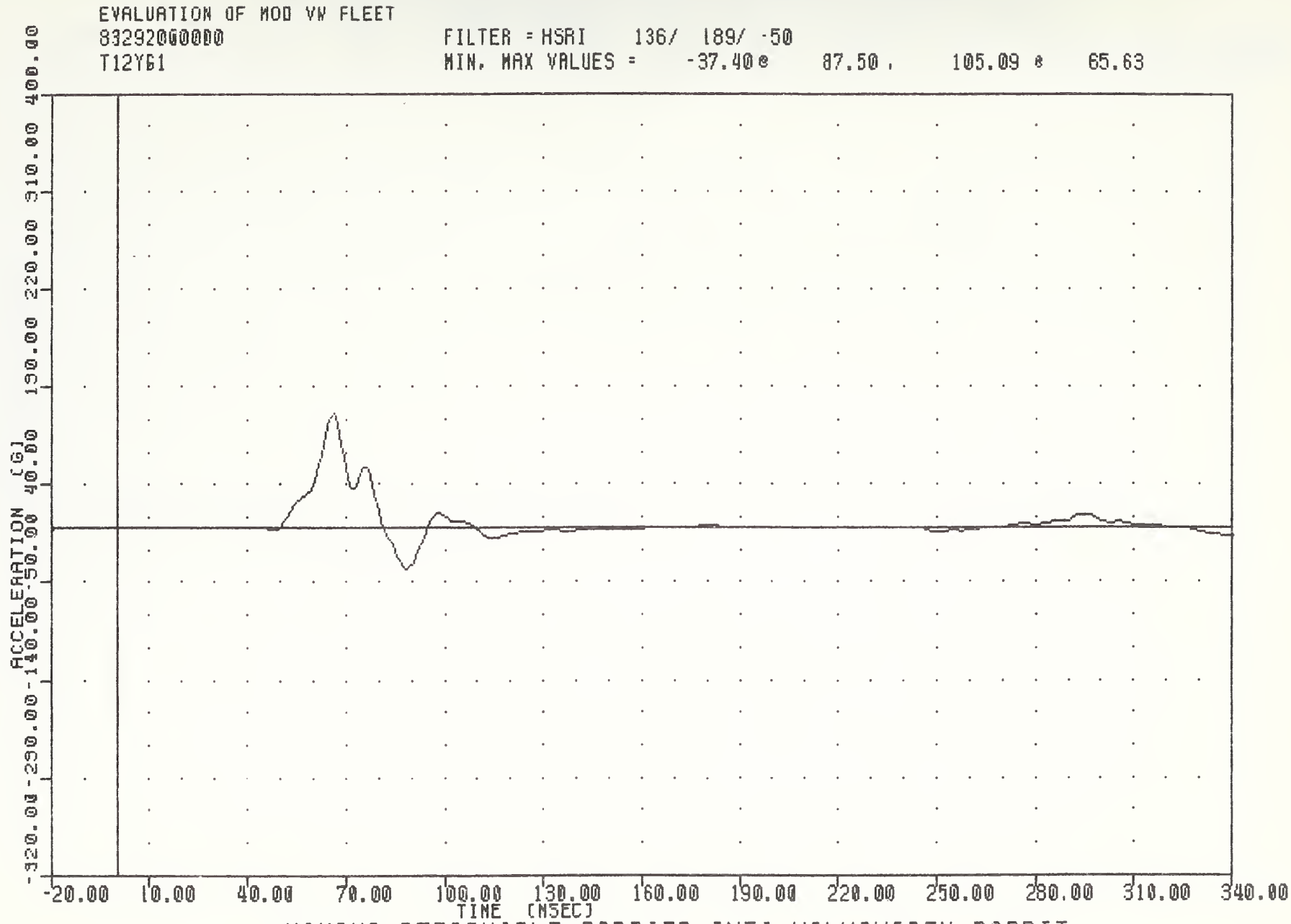
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T01YG1



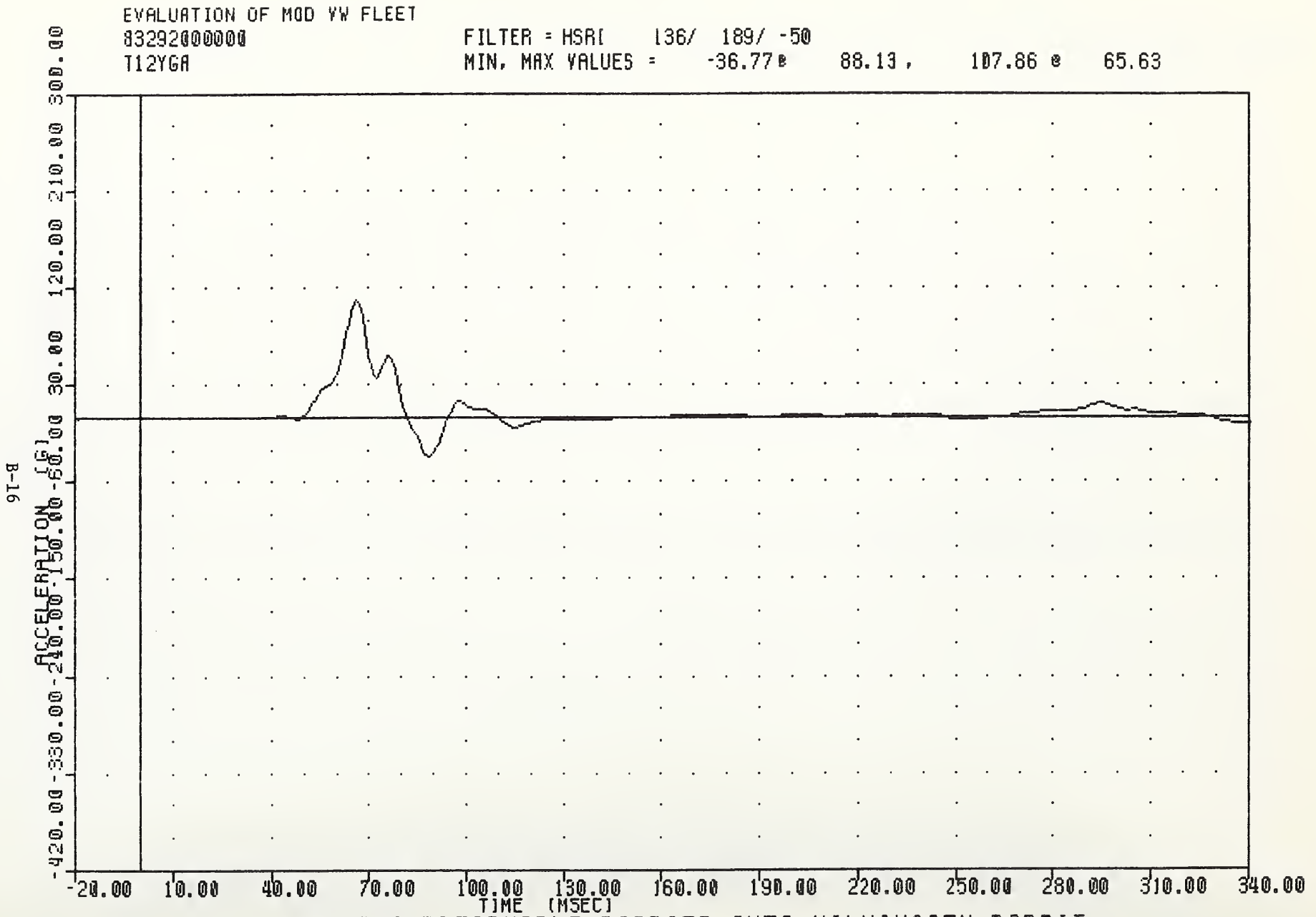
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T01YGA



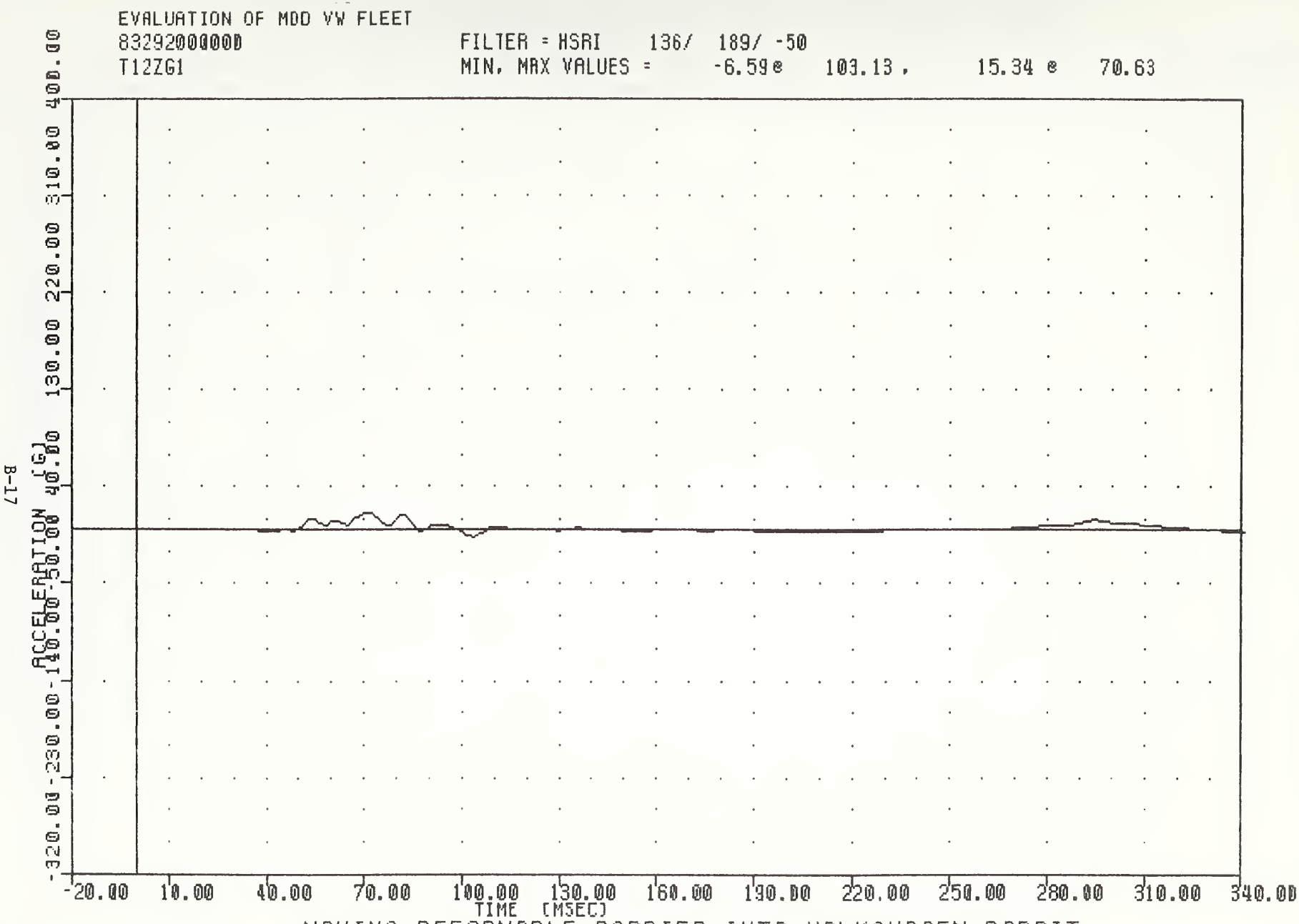
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE ACCELERATION X AXIS



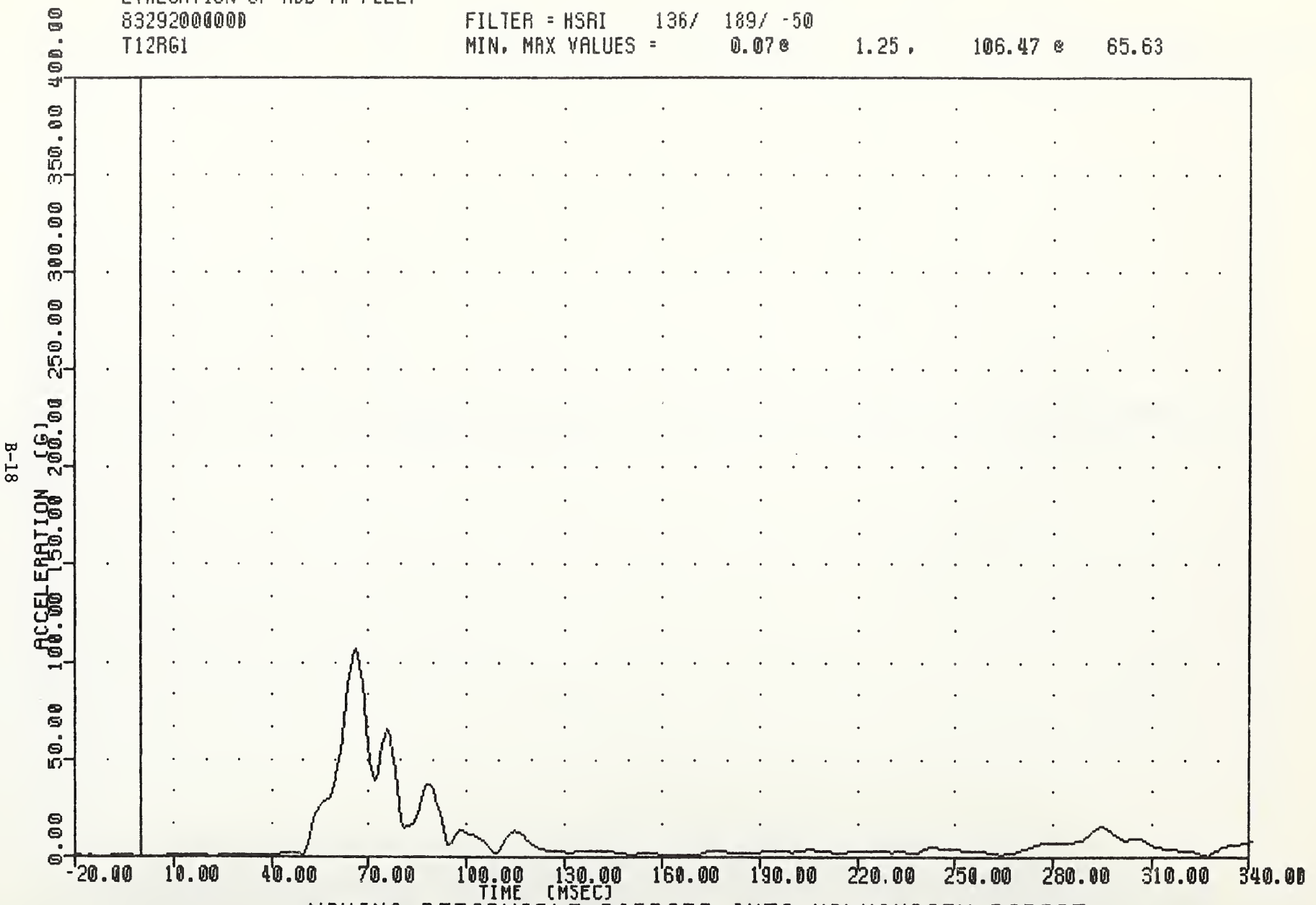
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE ACCELERATION Y AXIS



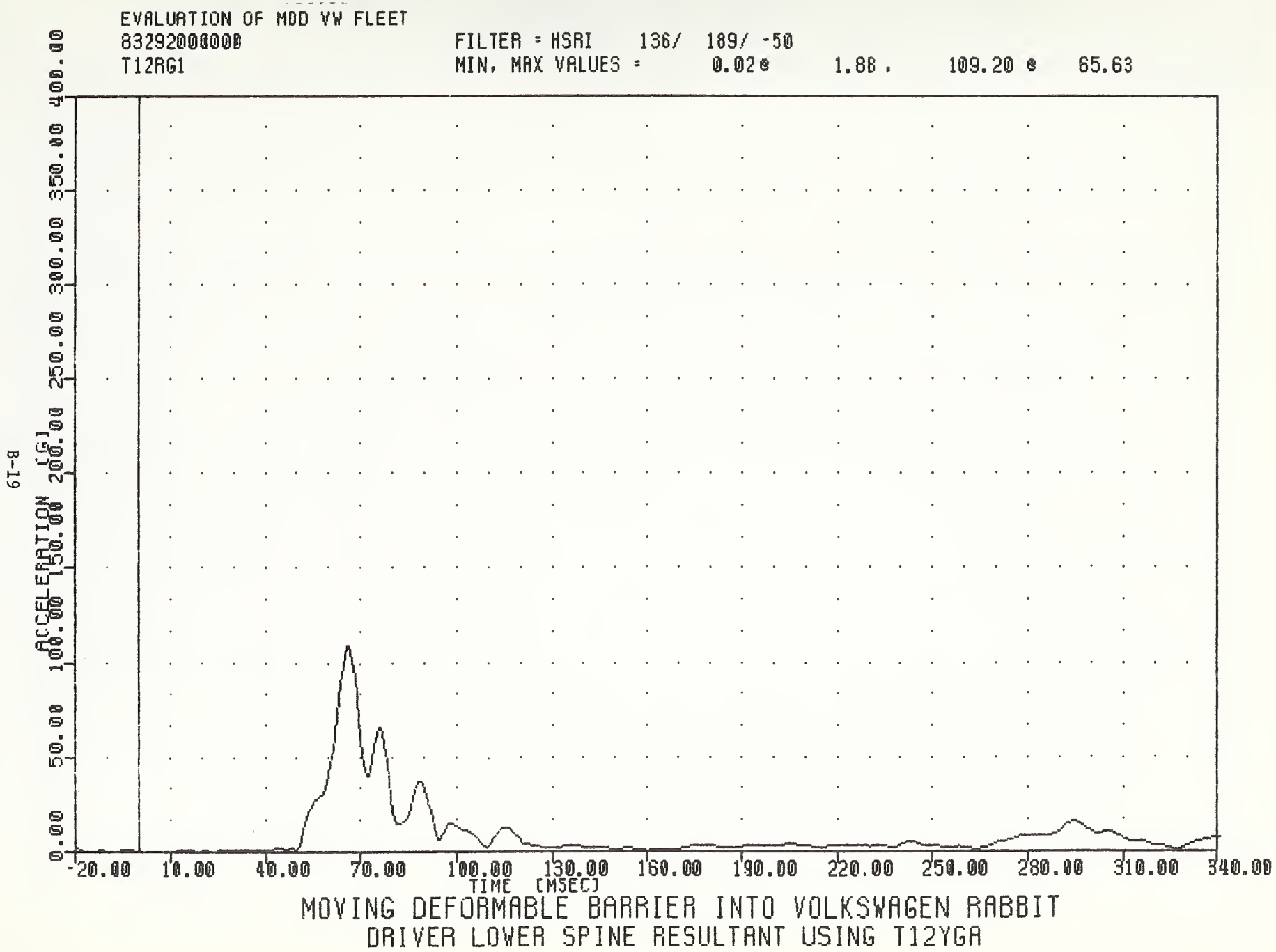
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE ACCELERATION -2 Y AXIS



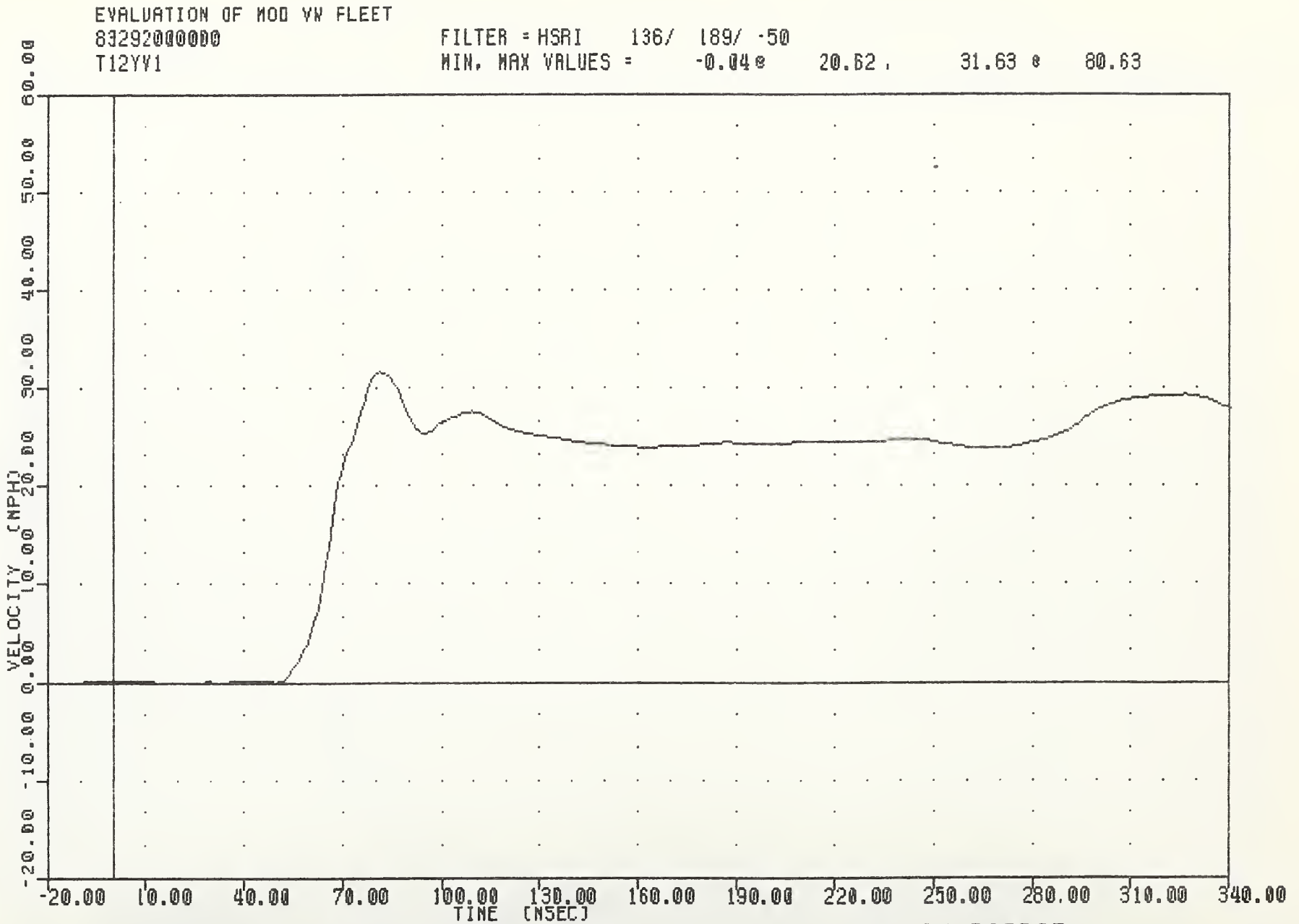
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE ACCELERATION Z AXIS



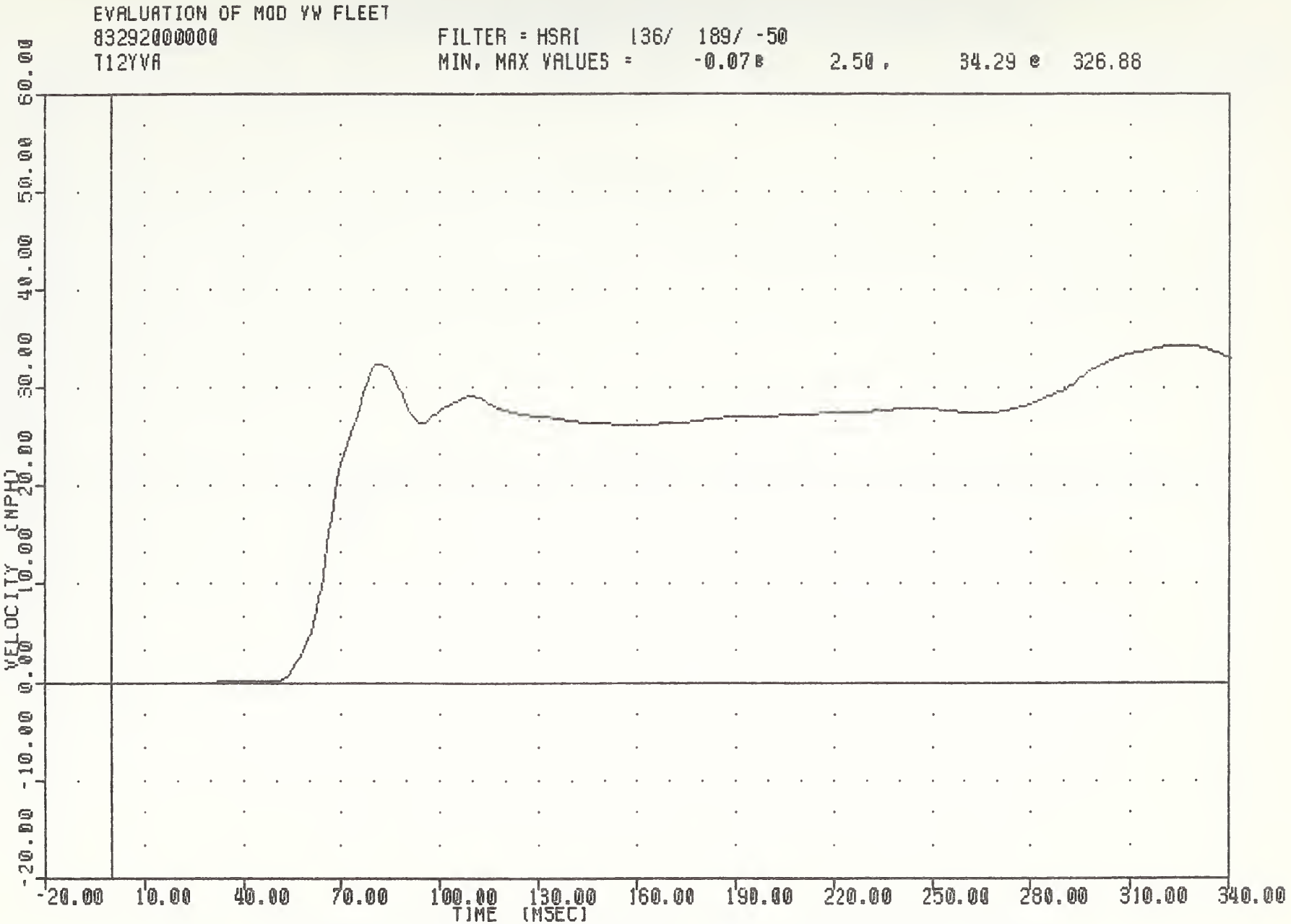
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE RESULTANT



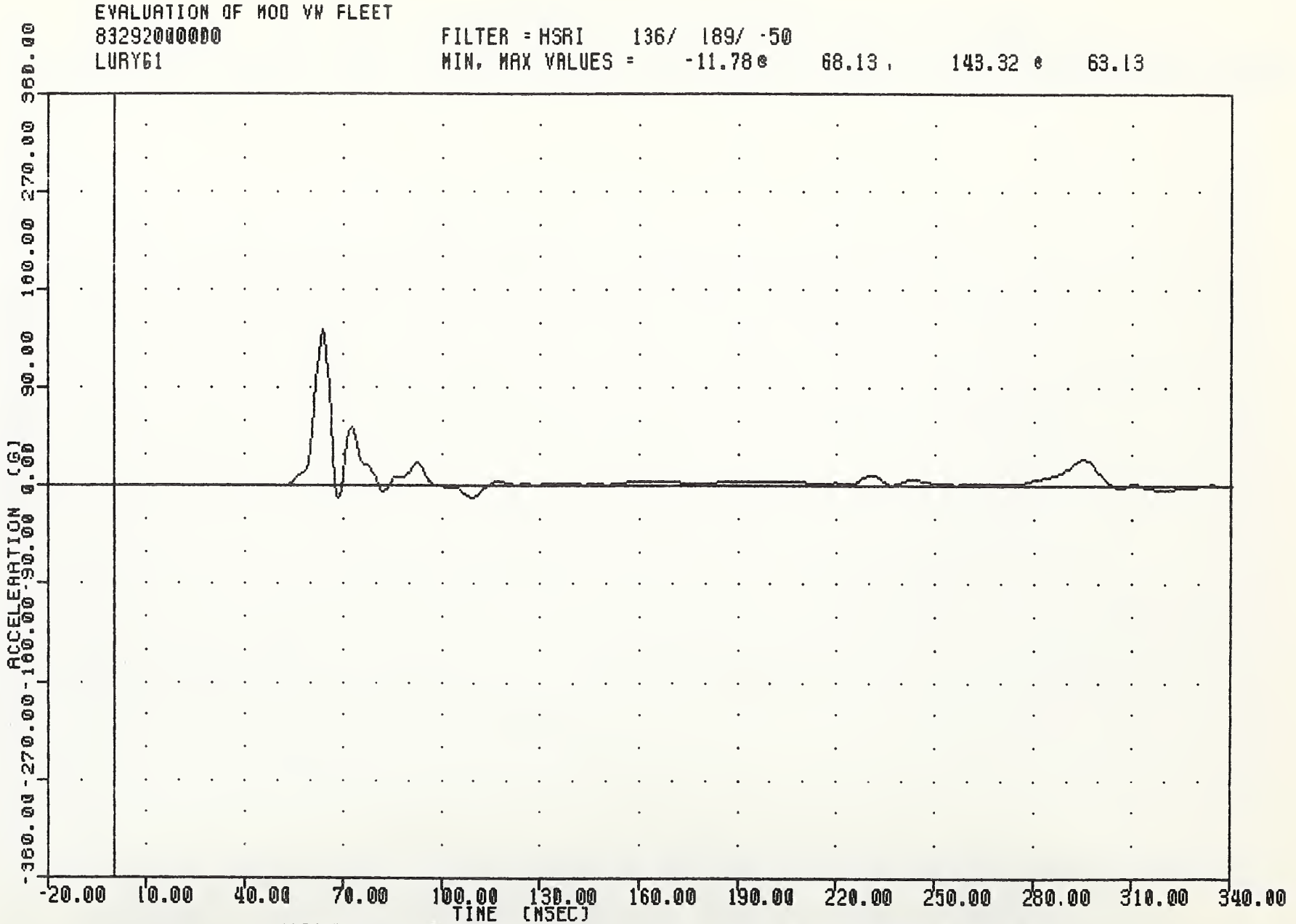
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LOWER SPINE RESULTANT USING T12YGA



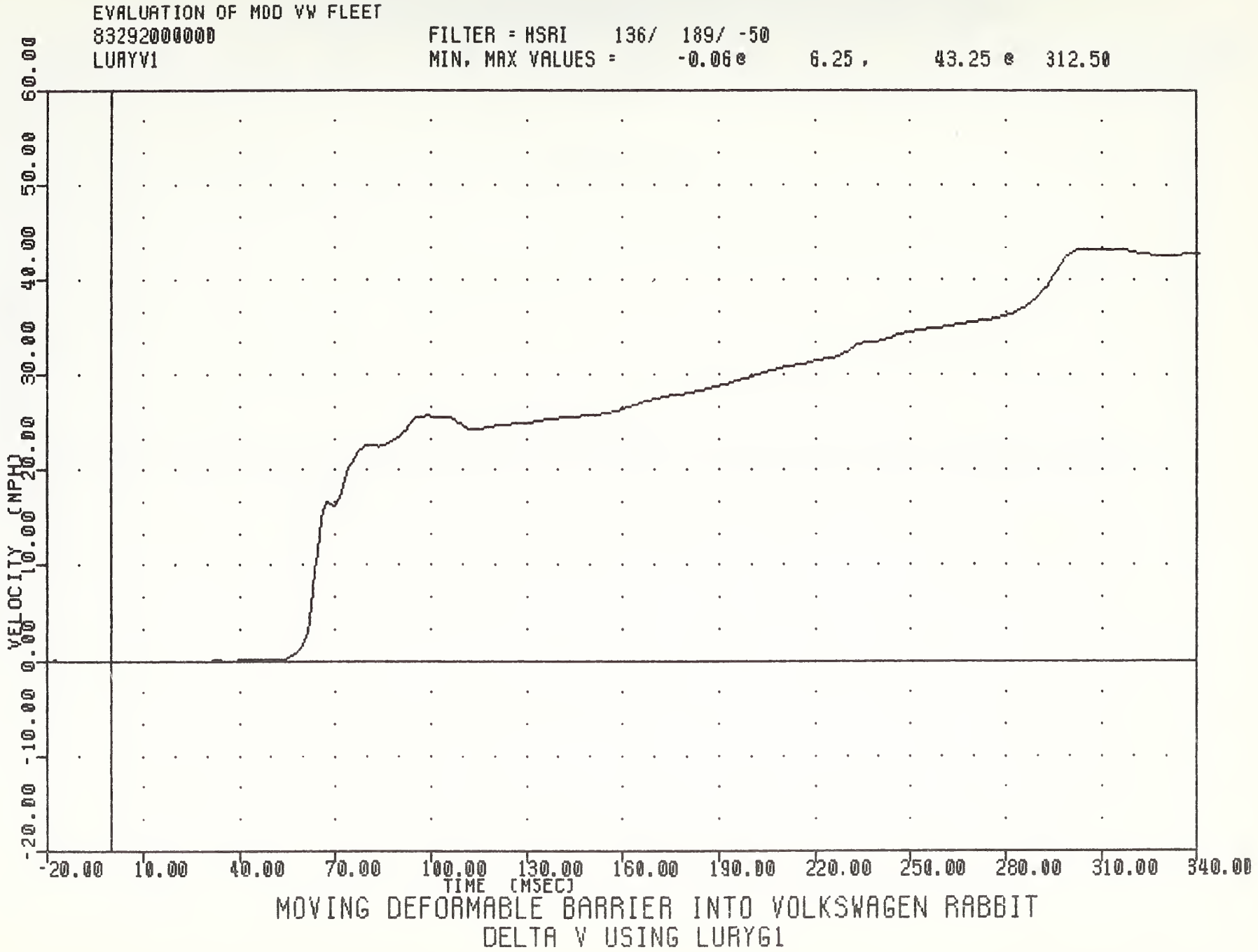
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T12YG1

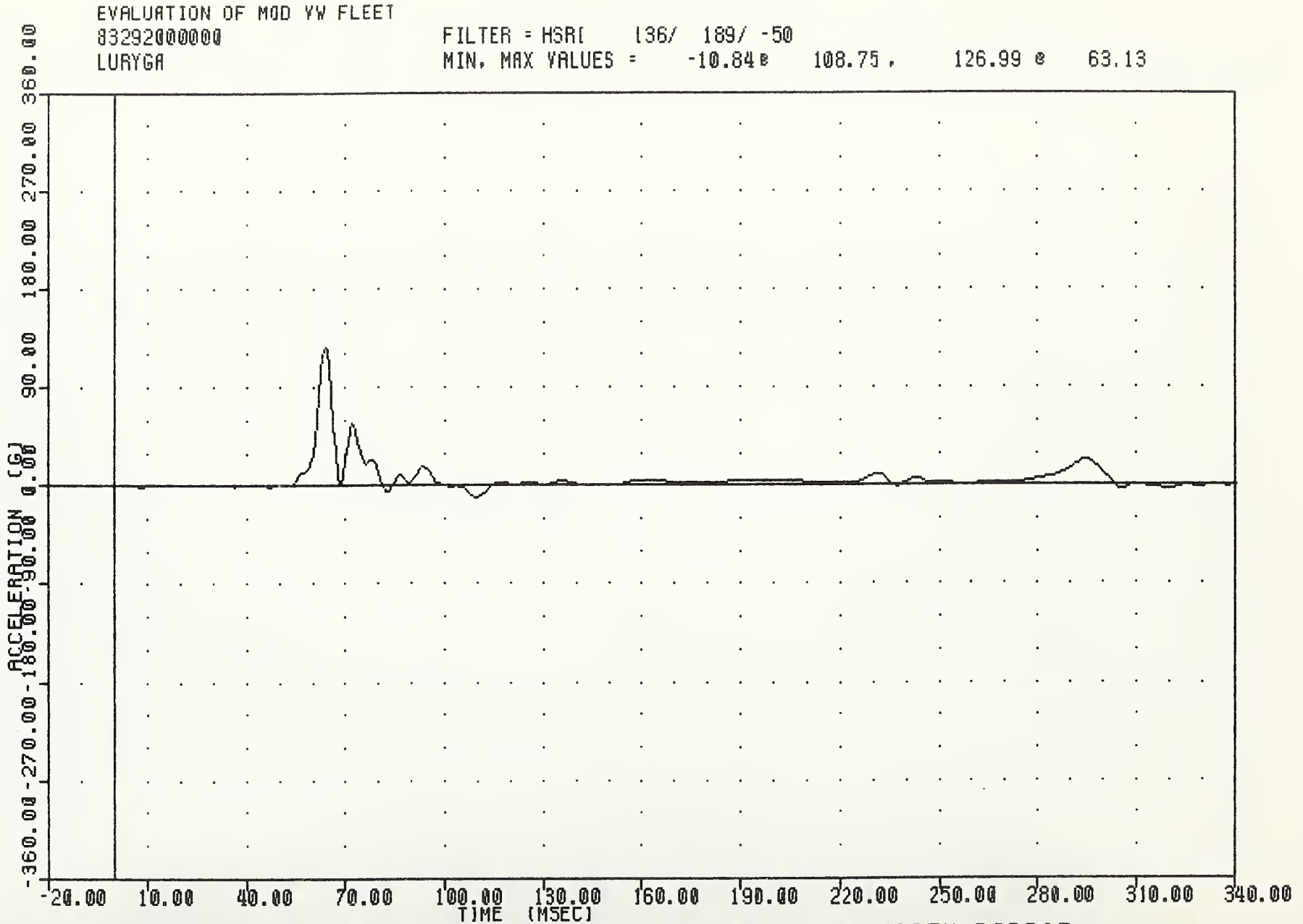


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T12YGA

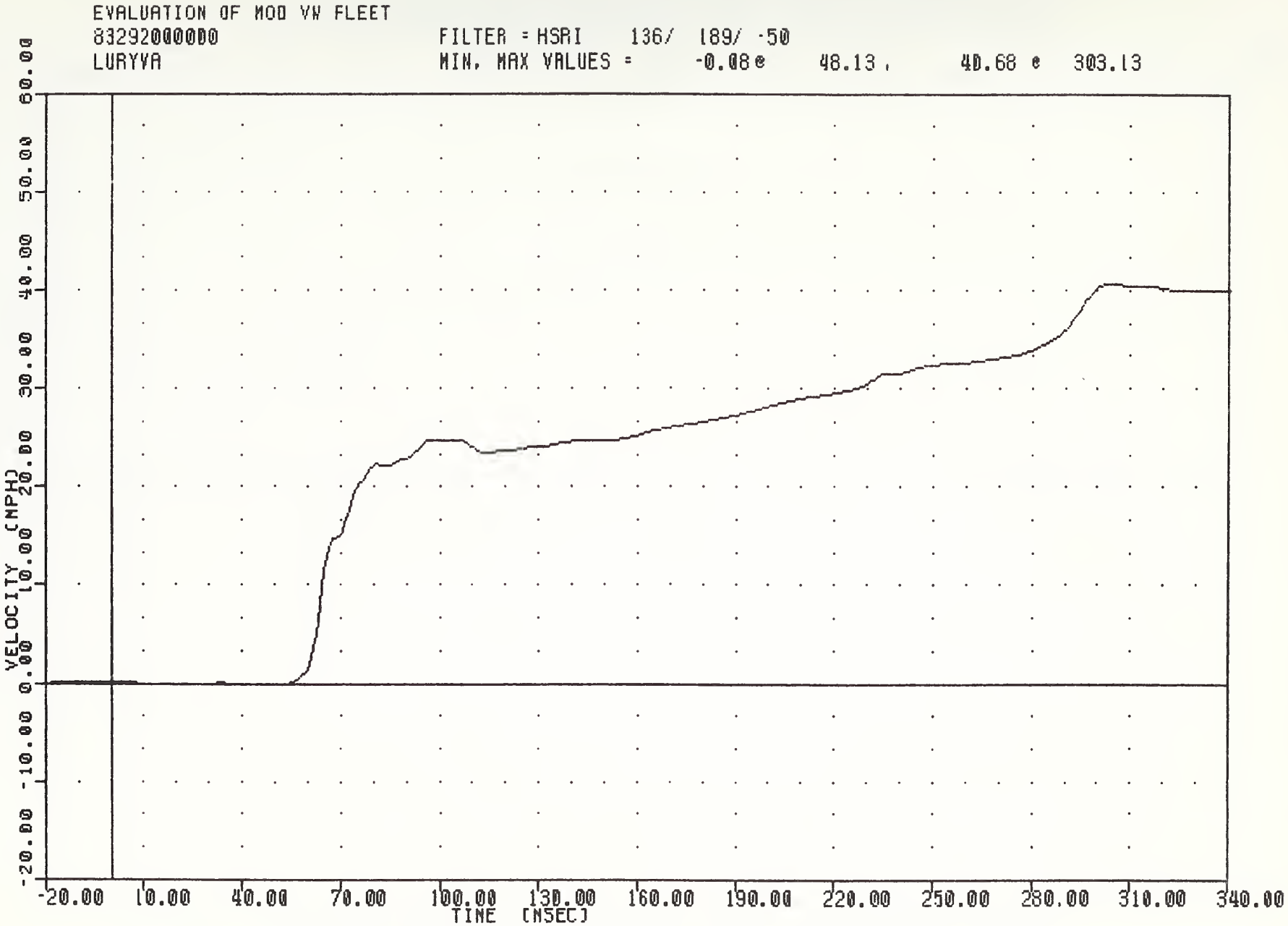


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LEFT UPPER RIB ACCELERATION Y AXIS

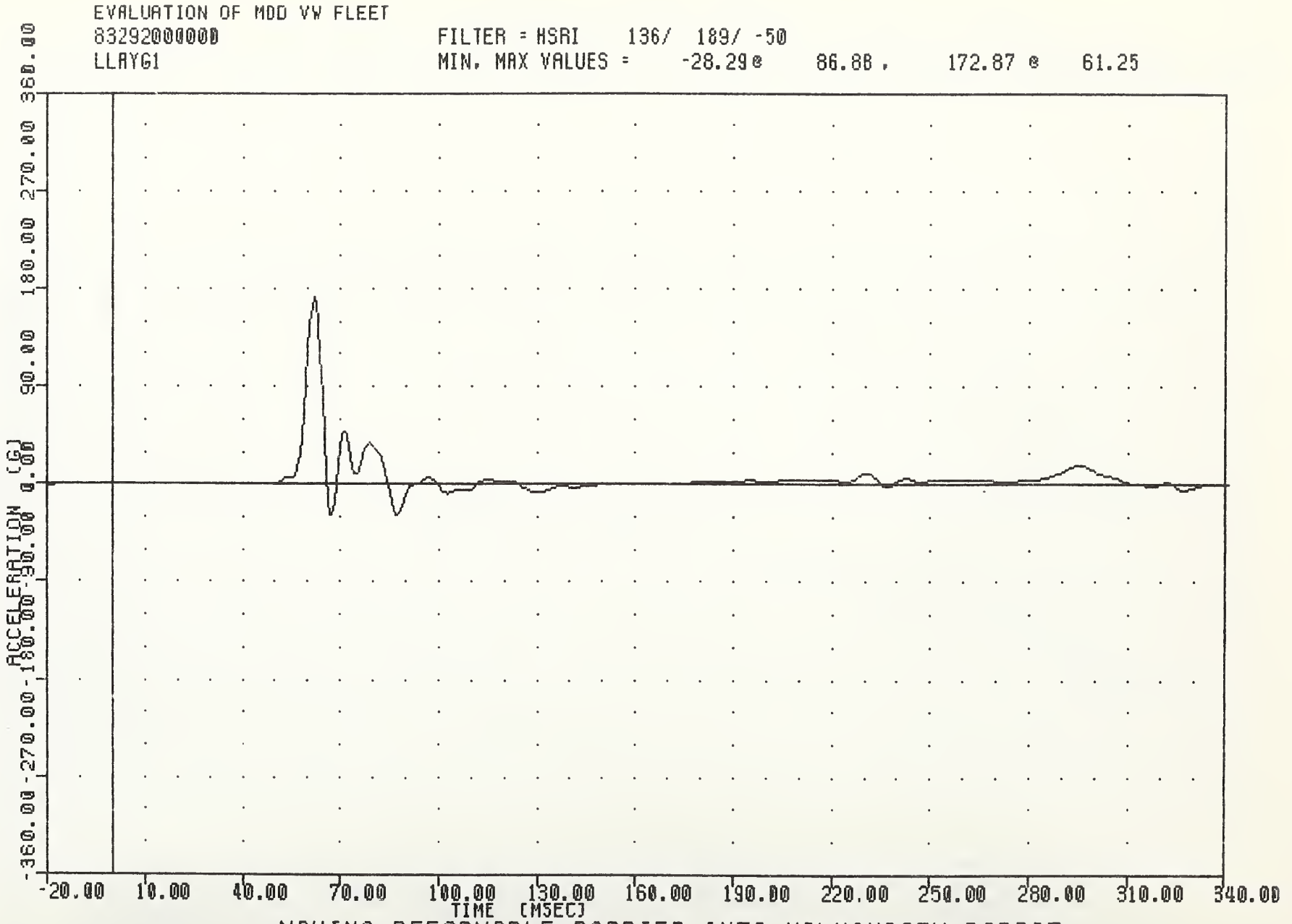

EVALUATION OF MOD VW FLEET
83292000000
LURYV1
FILTER = HSRI 136/ 189/ -50
MIN, MAX VELUES = -0.06 @ 6.25 , 43.25 @ 312.50
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-10.00
-20.00
VELOCITY (MPH)
-20.00
10.00
40.00
70.00
100.00
130.00
160.00
190.00
220.00
250.00
280.00
310.00
340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LURYG1



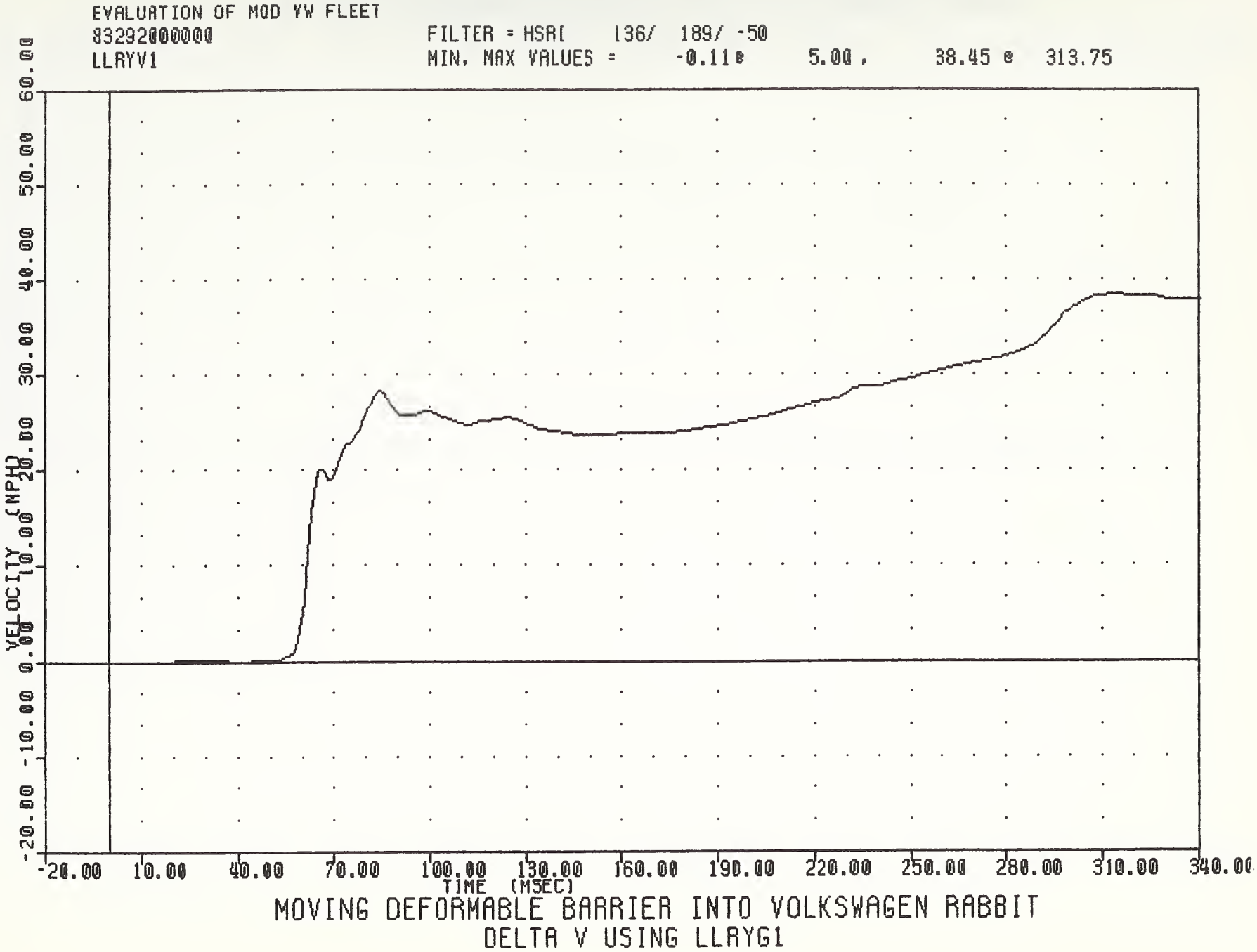
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LEFT UPPER RIB ACCELERATION -2 Y AXIS



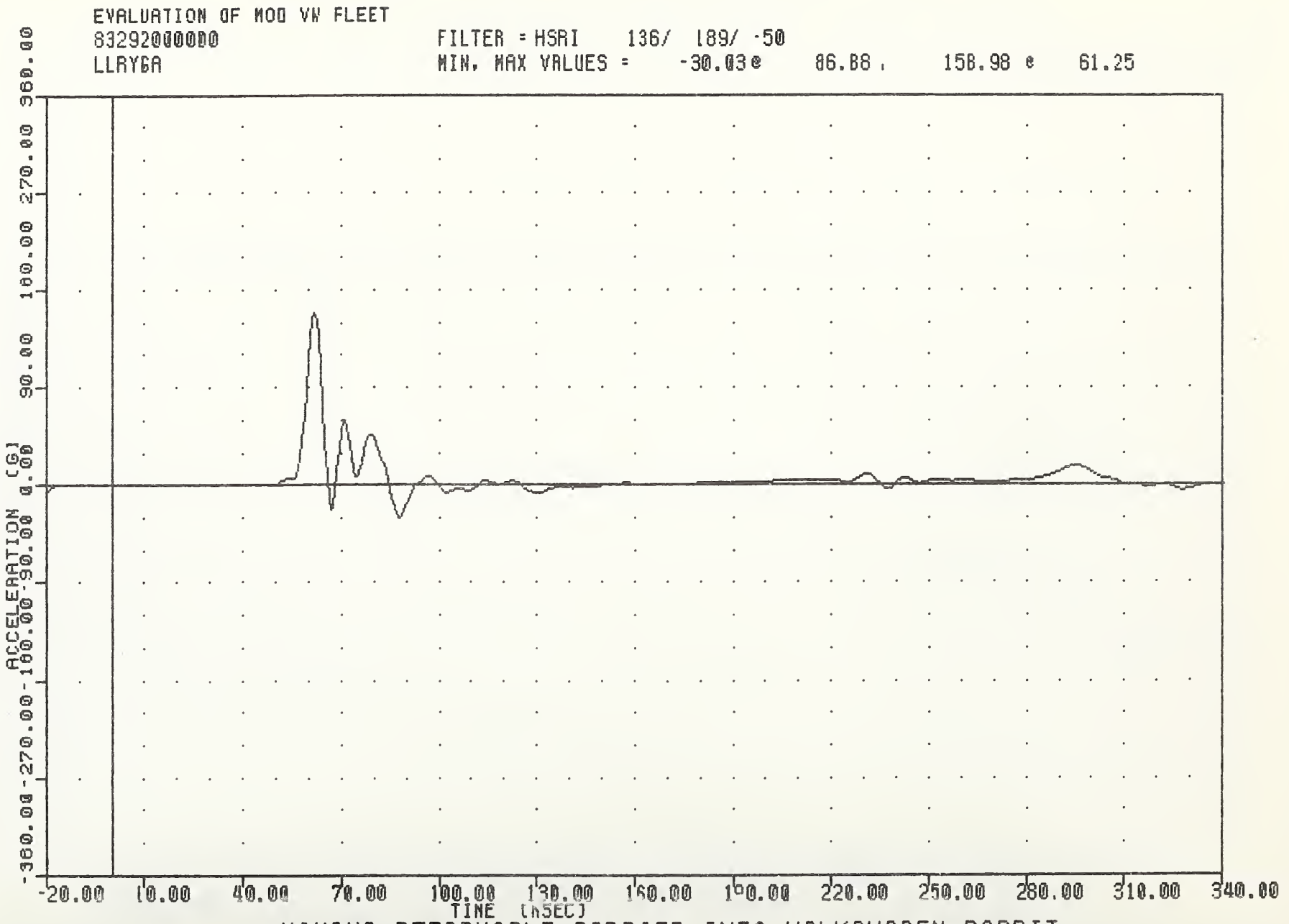
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LURYGA



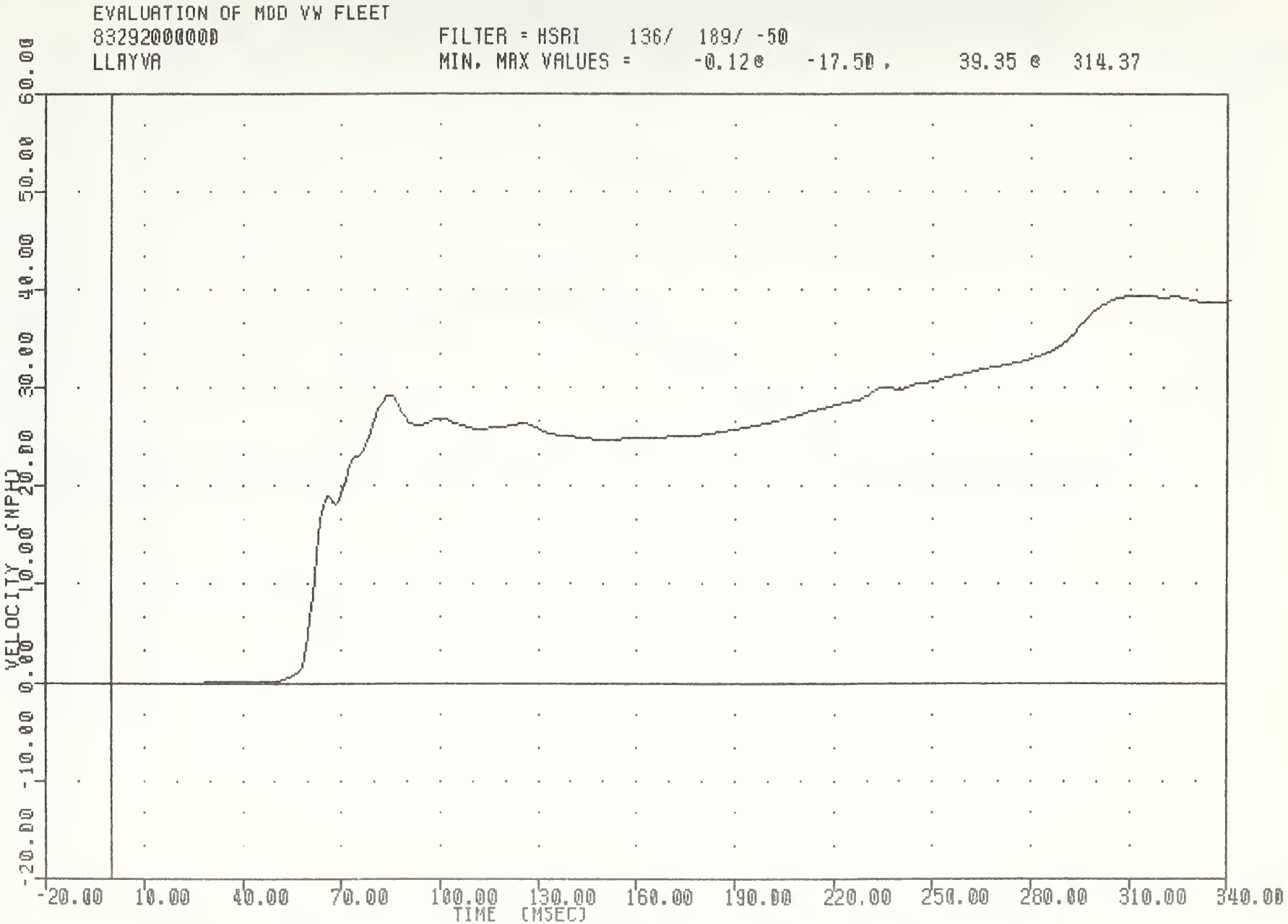
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LEFT LOWER RIB ACCELERATION Y AXIS



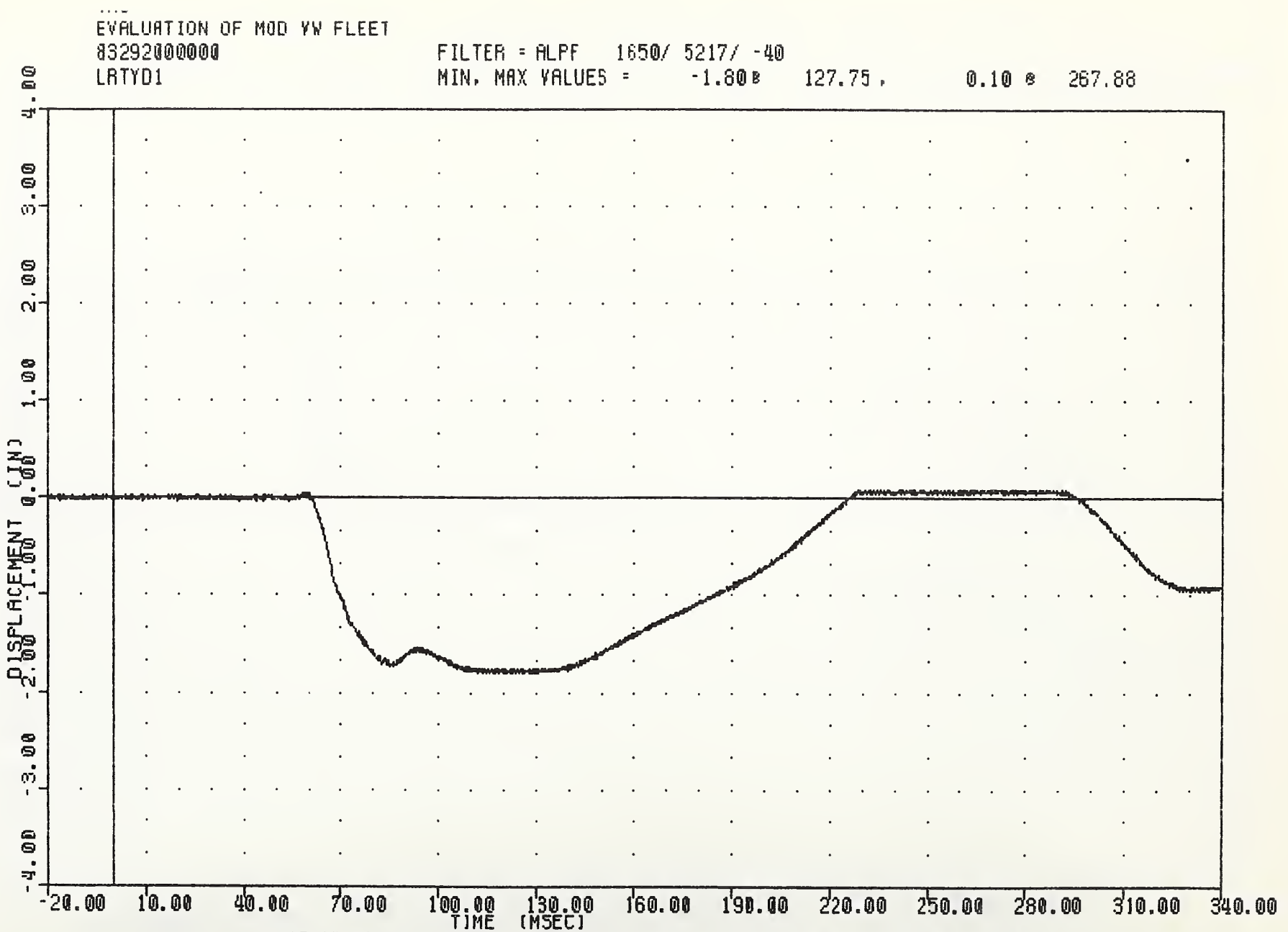
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LLRYG1



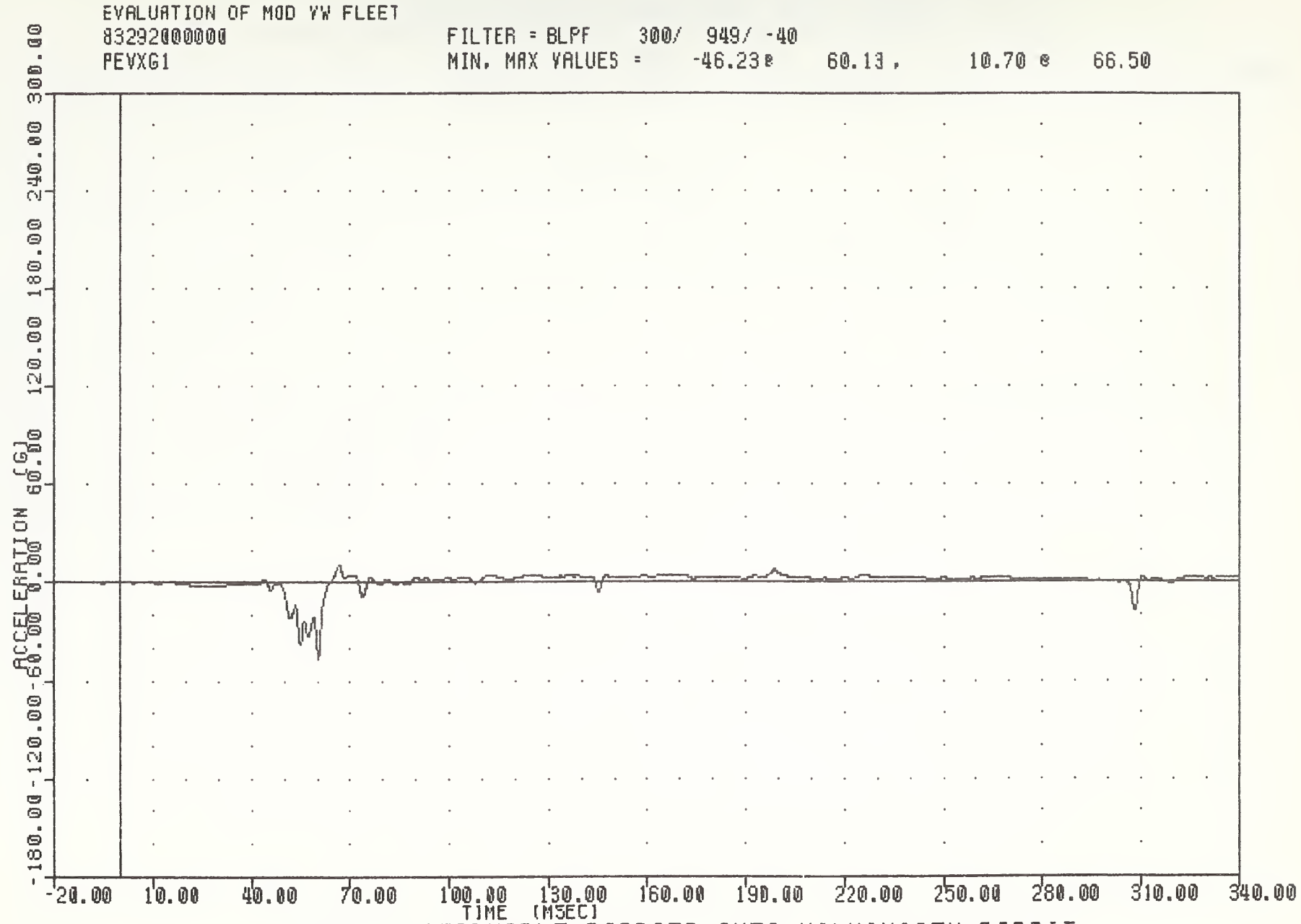
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LEFT LOWER RIB ACCELERATION -2 Y AXIS



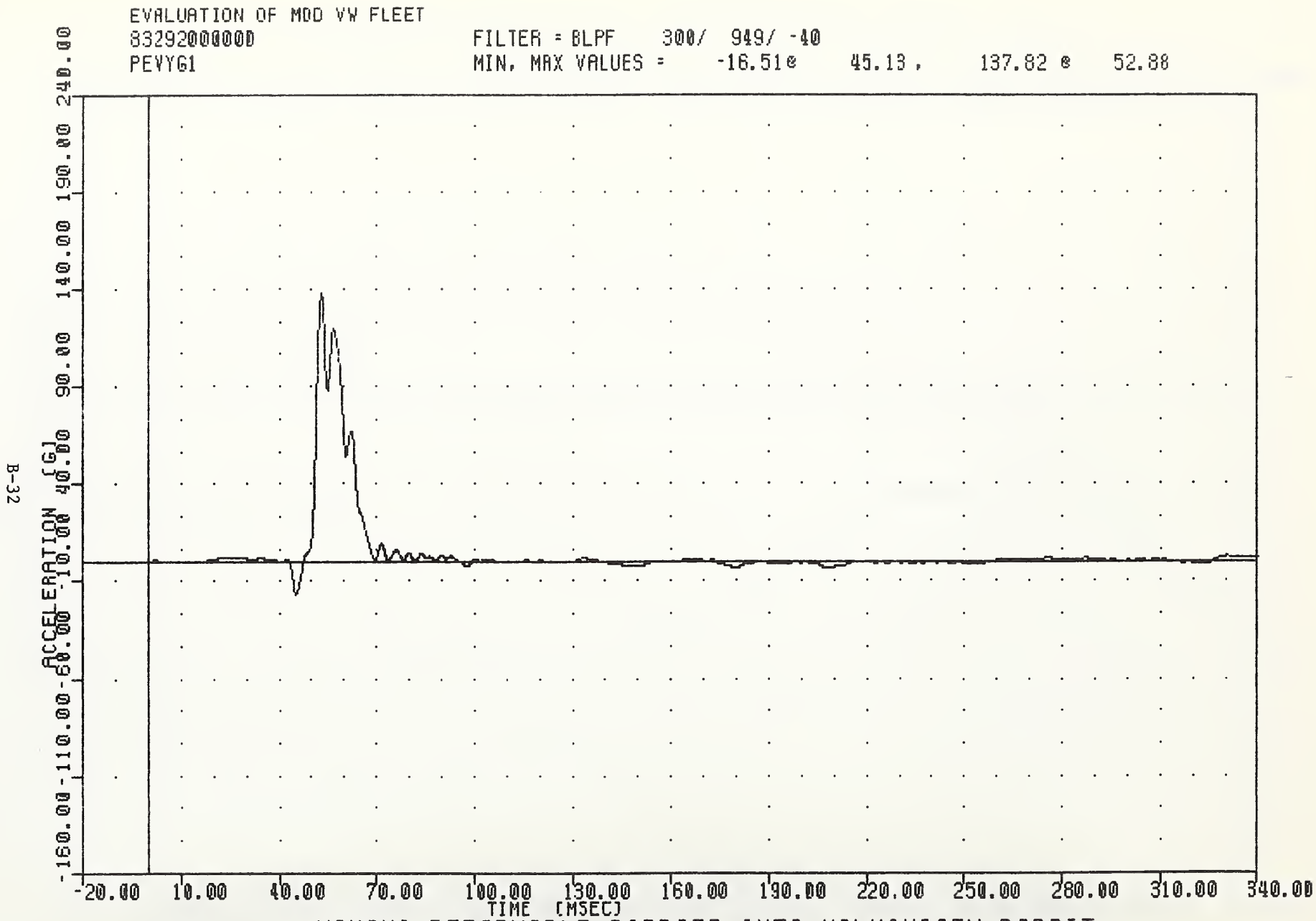
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LLRYGA



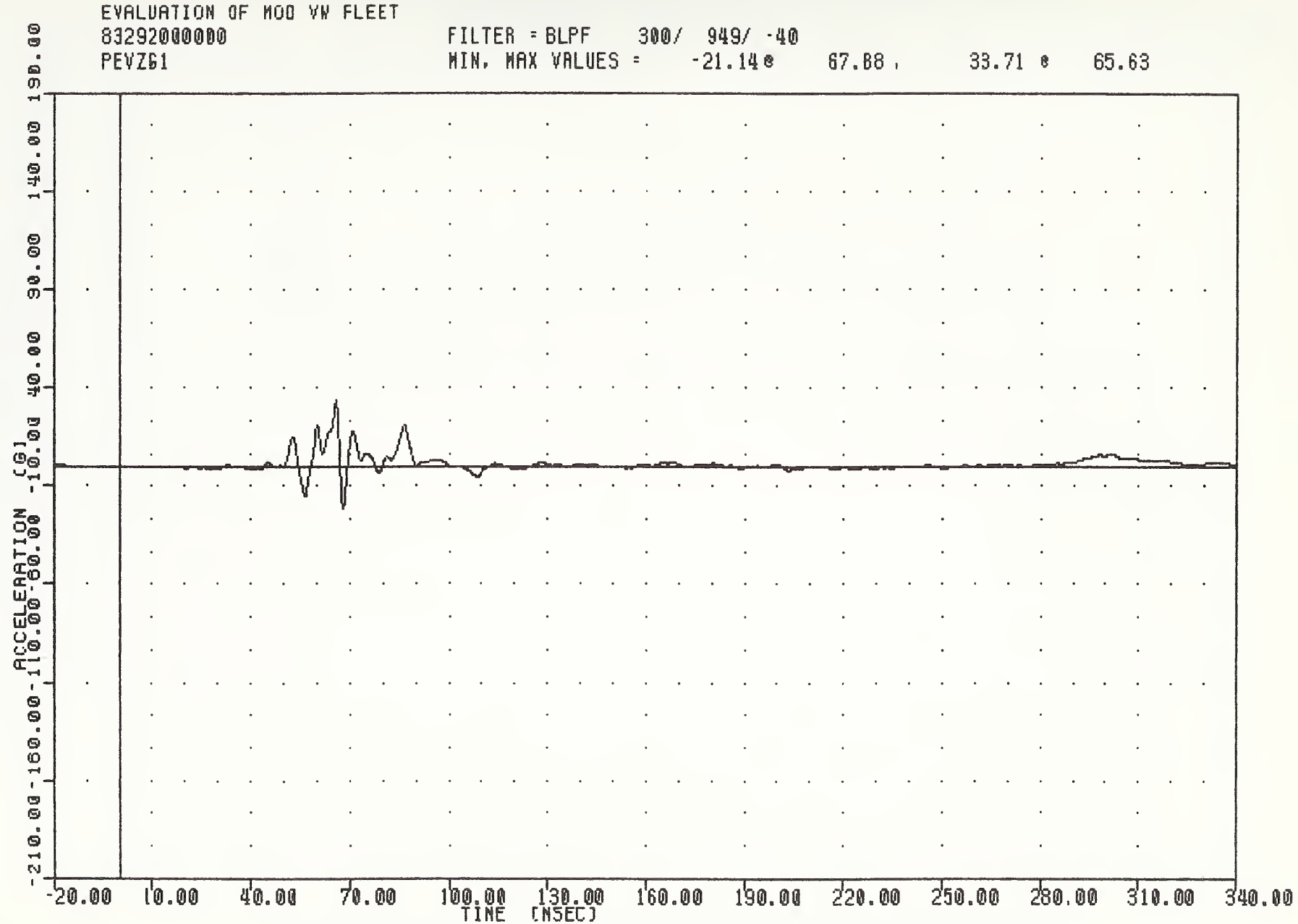
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER LEFT RIB TO SPINE DISPLACEMENT INCHES



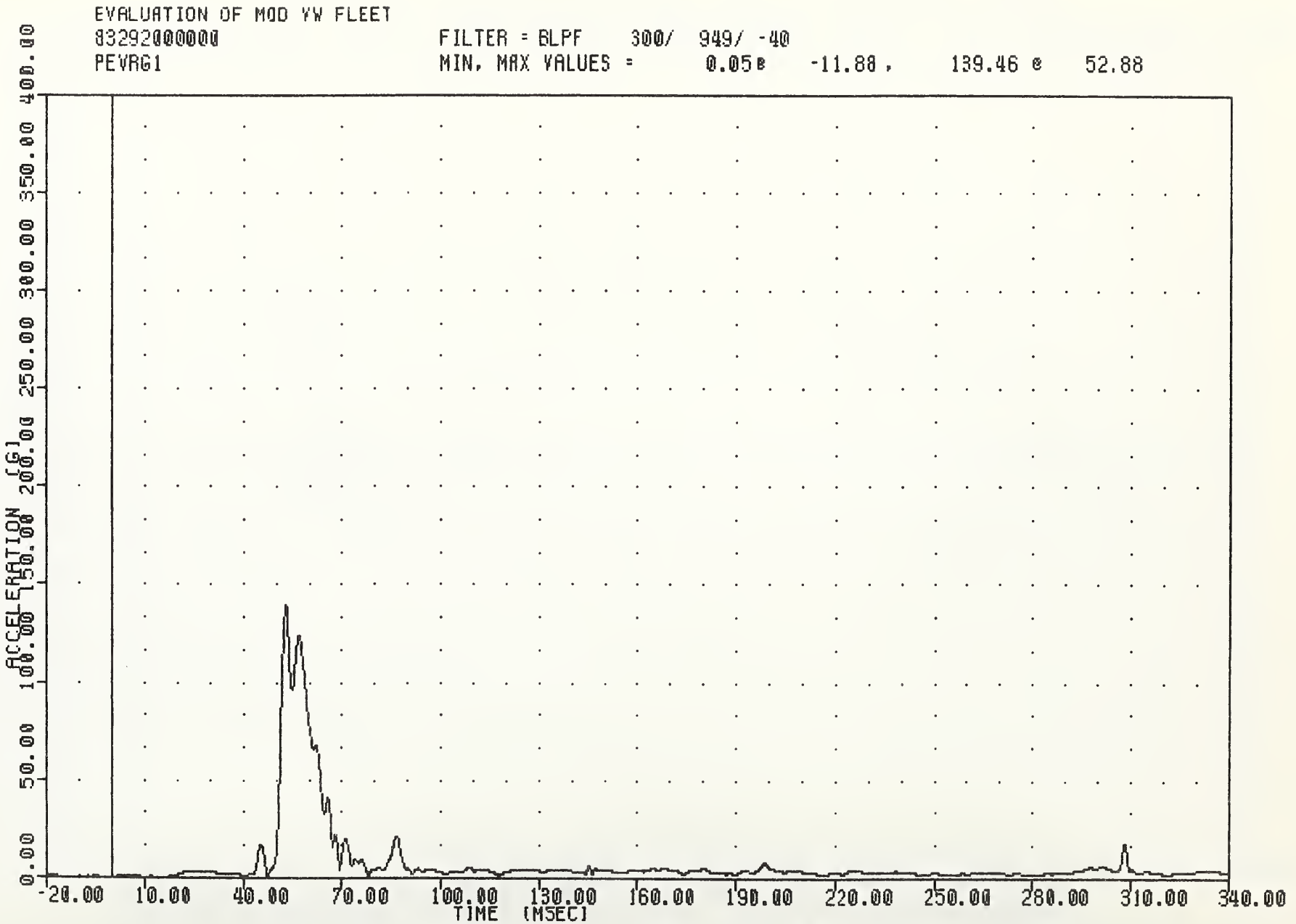
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS ACCELERATION X AXIS



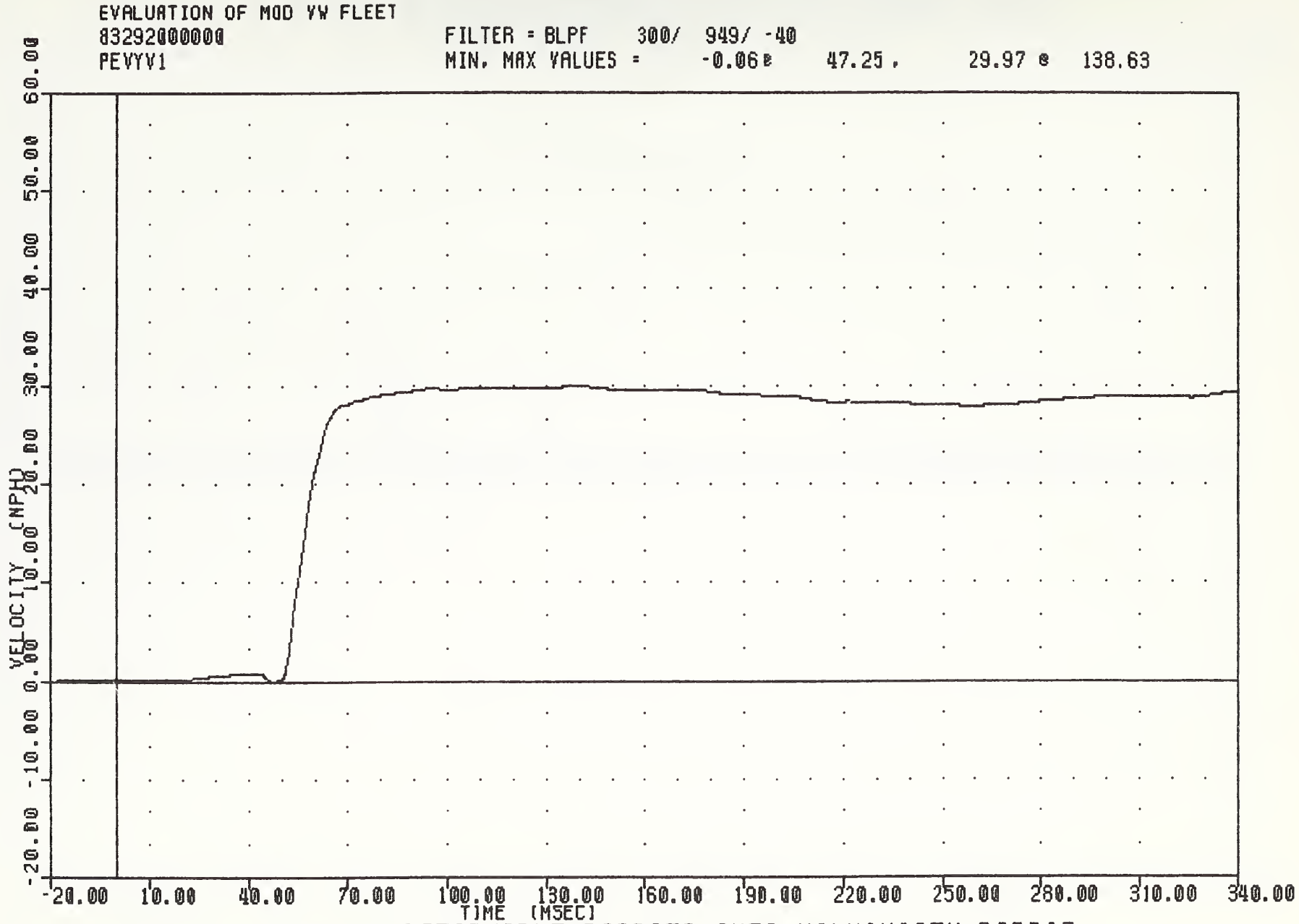
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS ACCELERATION Y AXIS



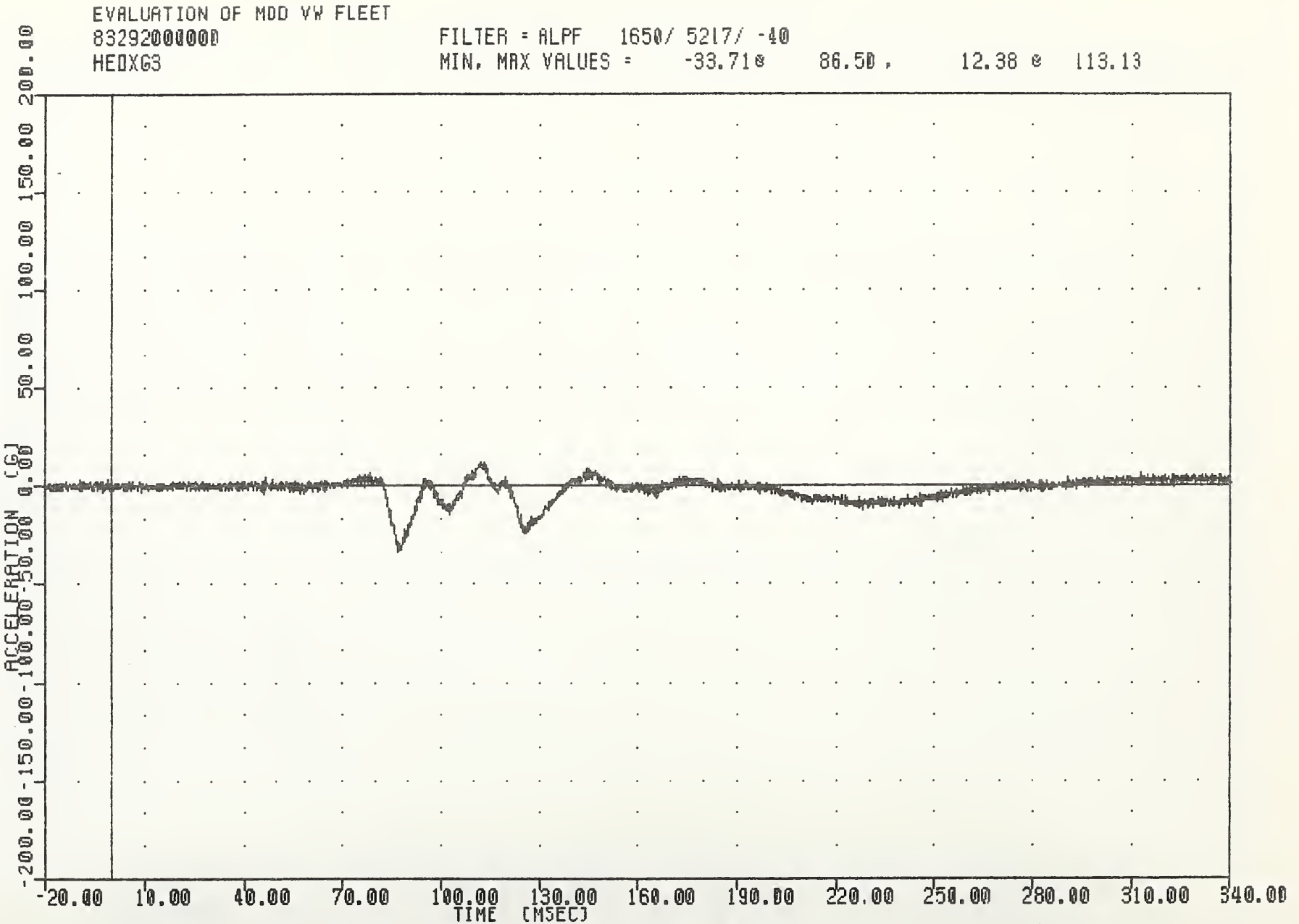
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS ACCELERATION Z AXIS



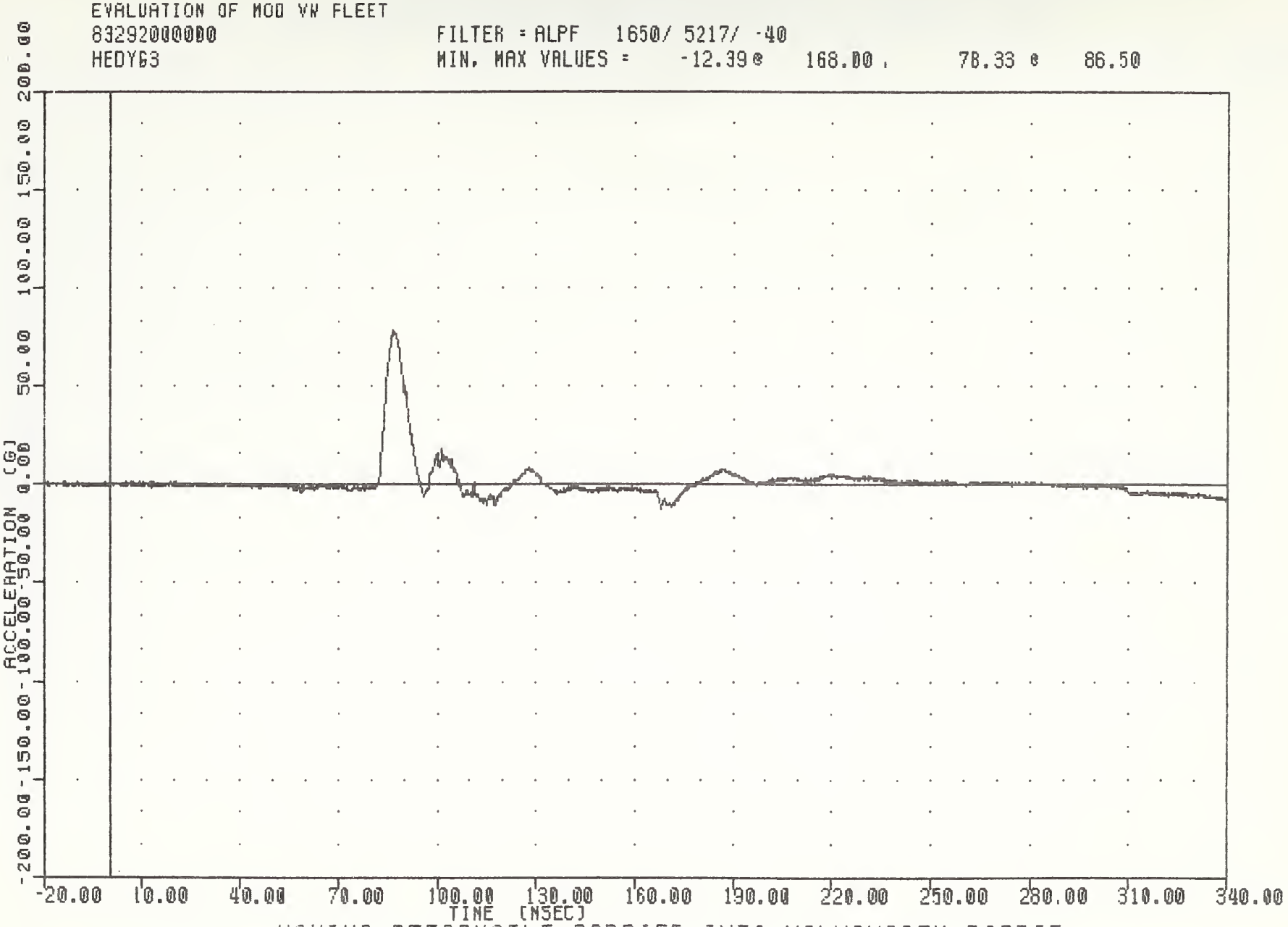
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DRIVER PELVIS RESULTANT



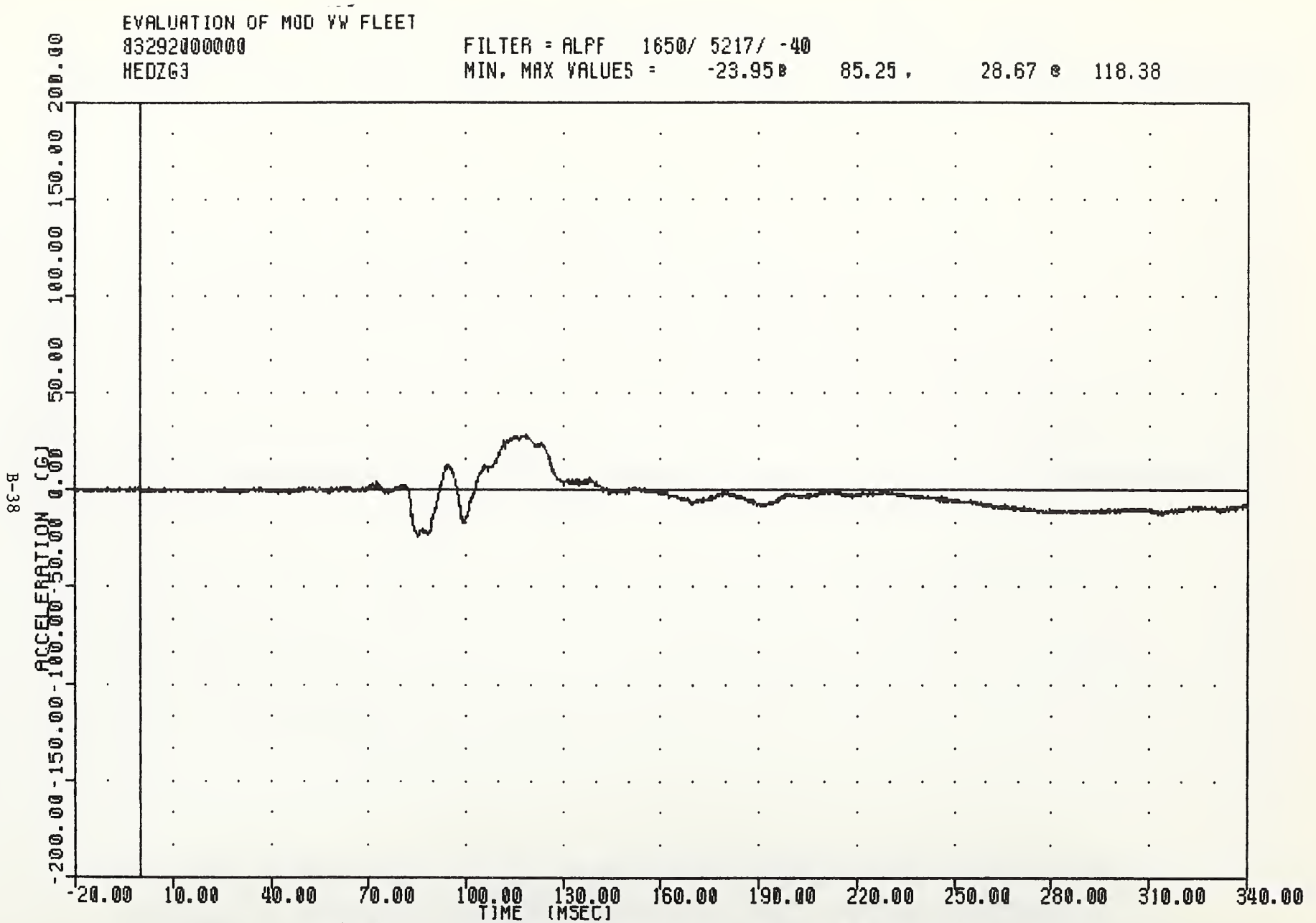
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING PEVYG1



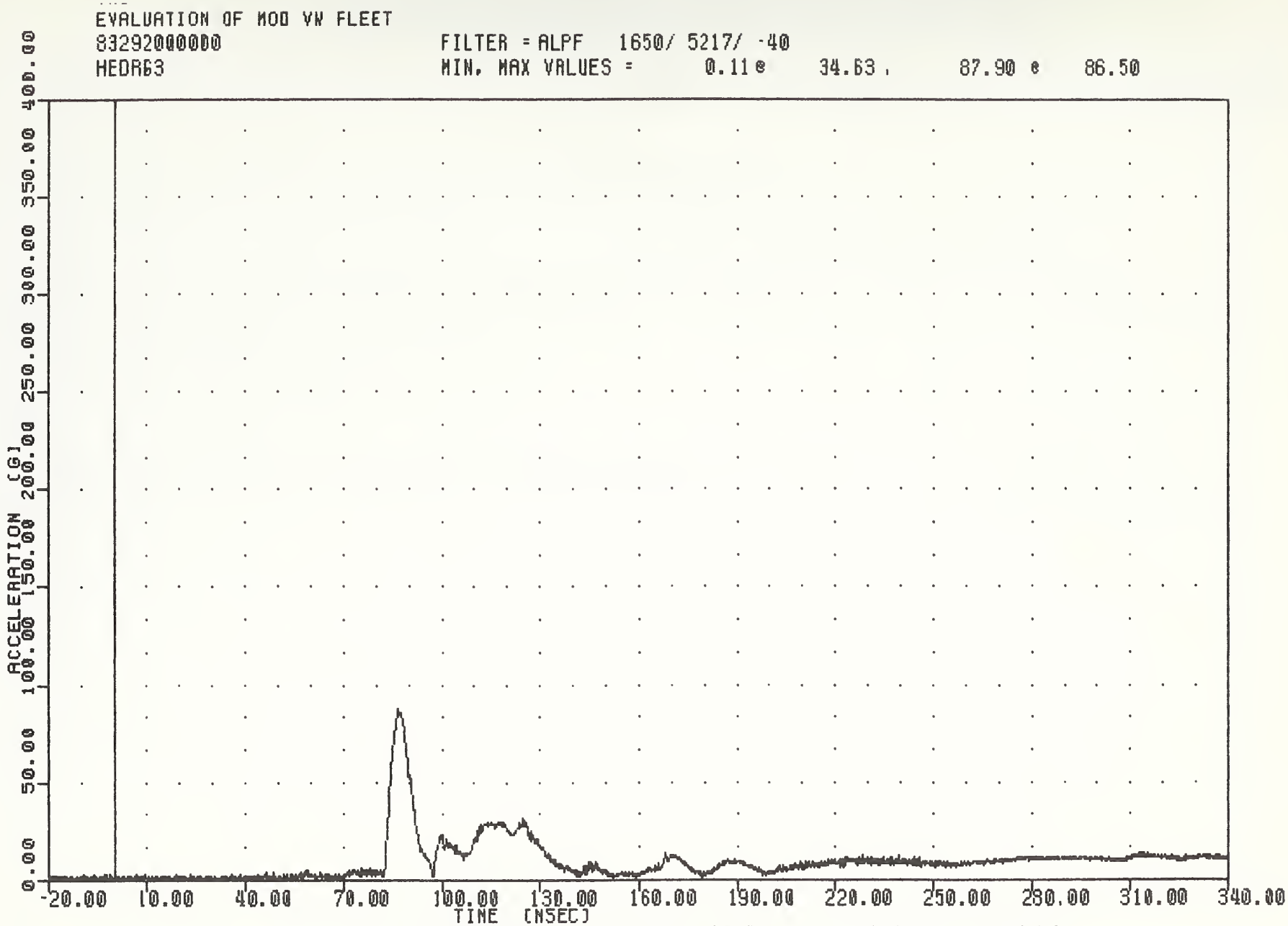
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER HEAD ACCELERATION X AXIS



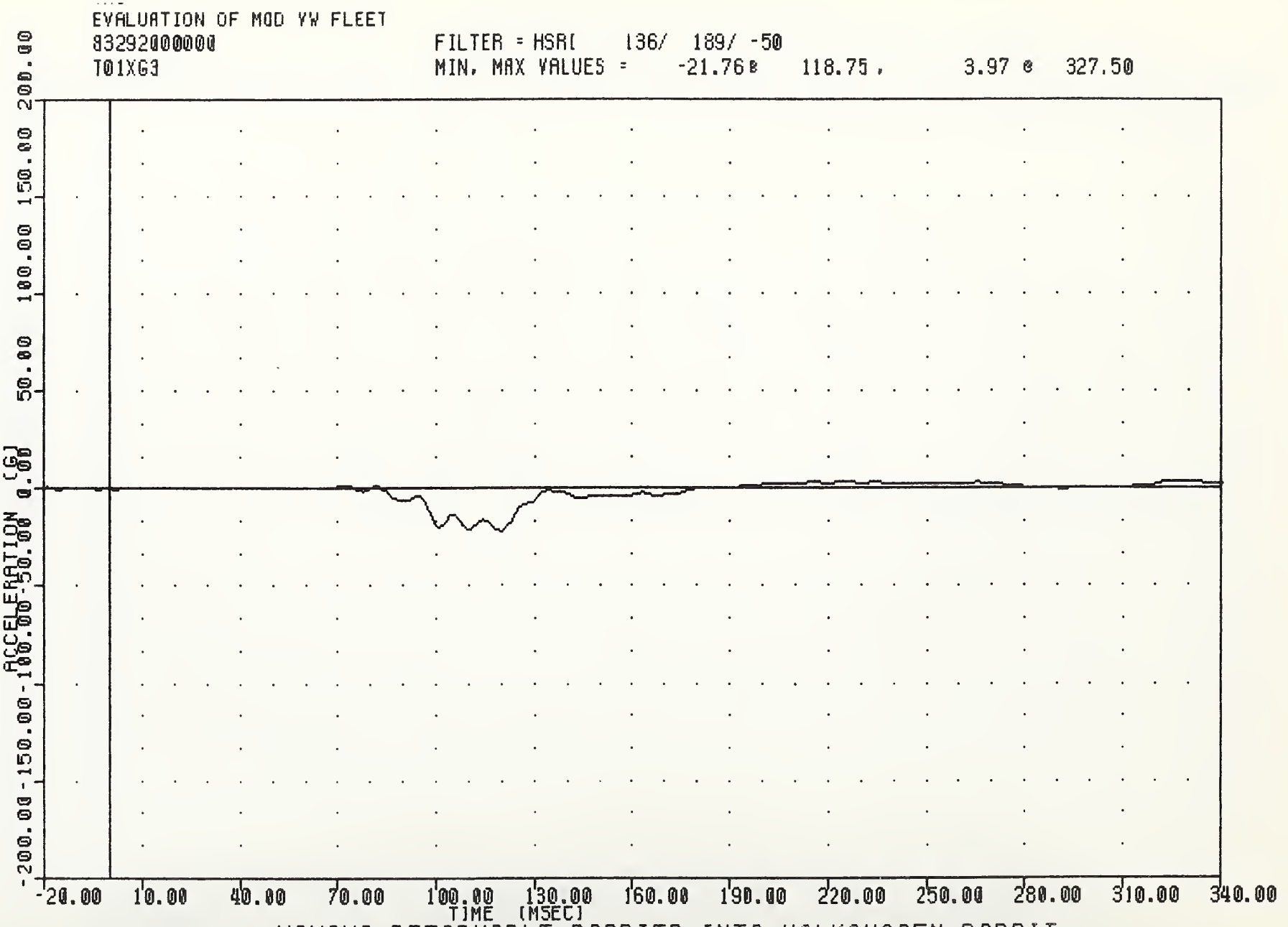
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER HEAD ACCELERATION Y AXIS



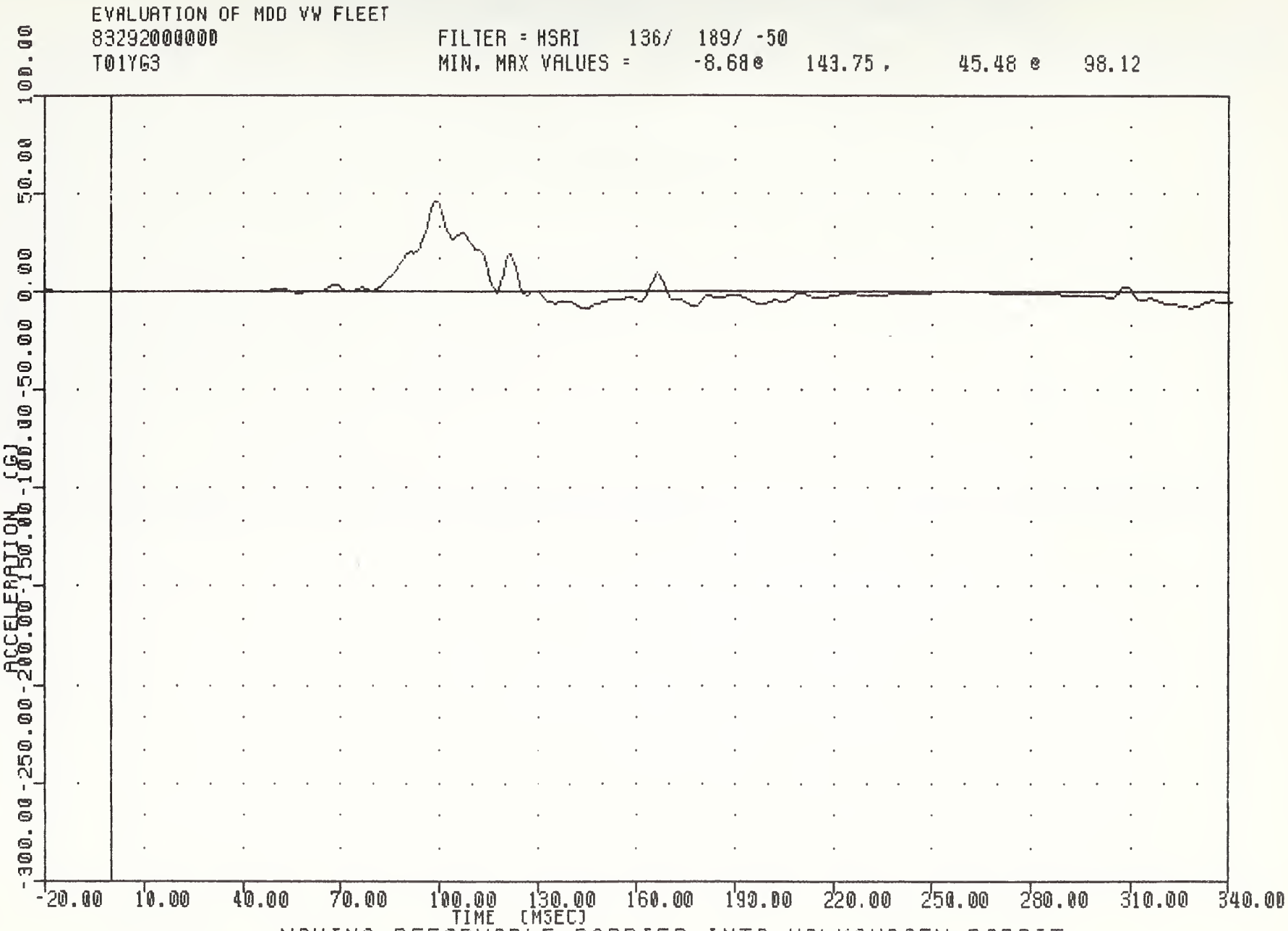
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER HEAD ACCELERATION Z AXIS



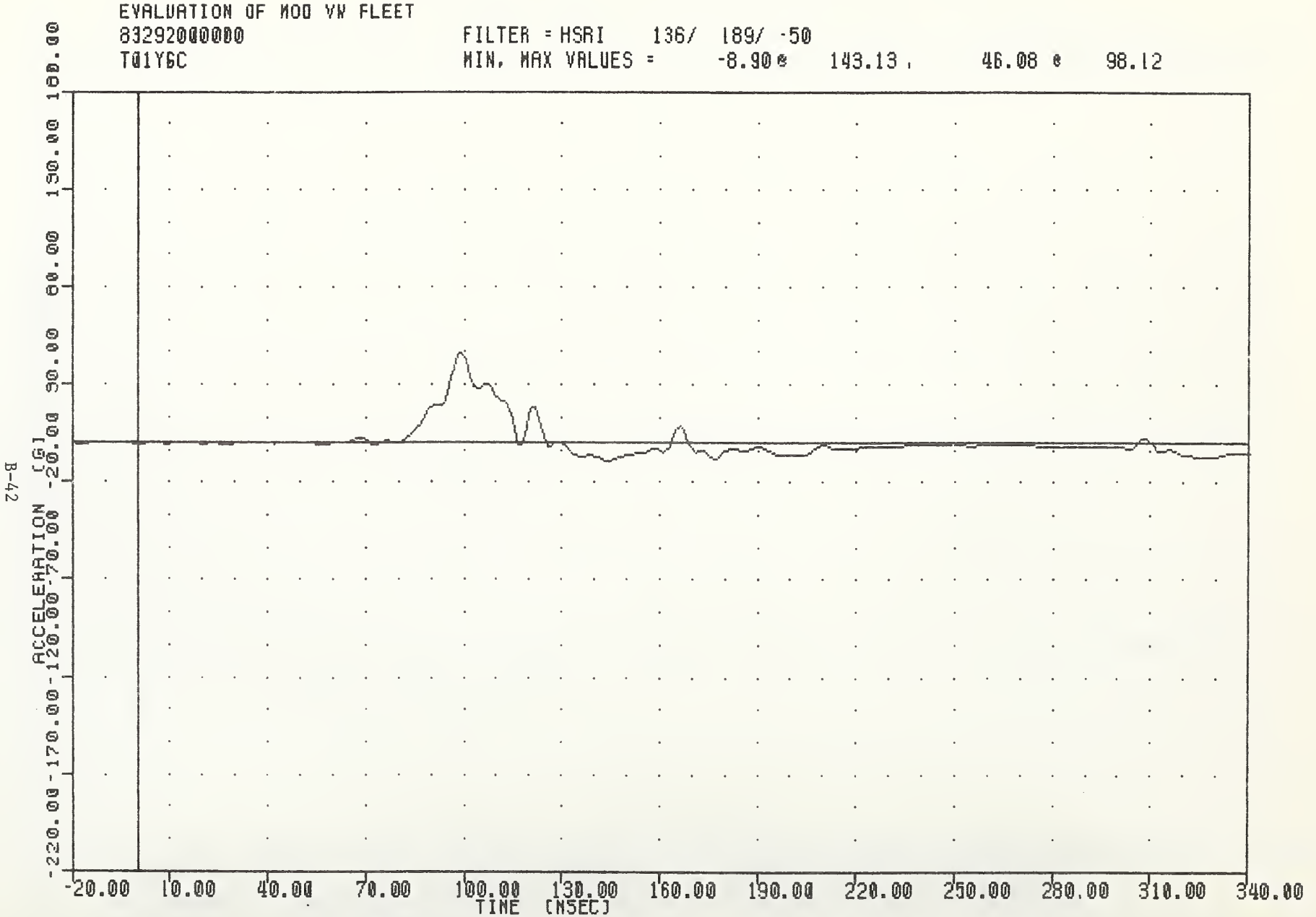
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER HEAD RESULTANT



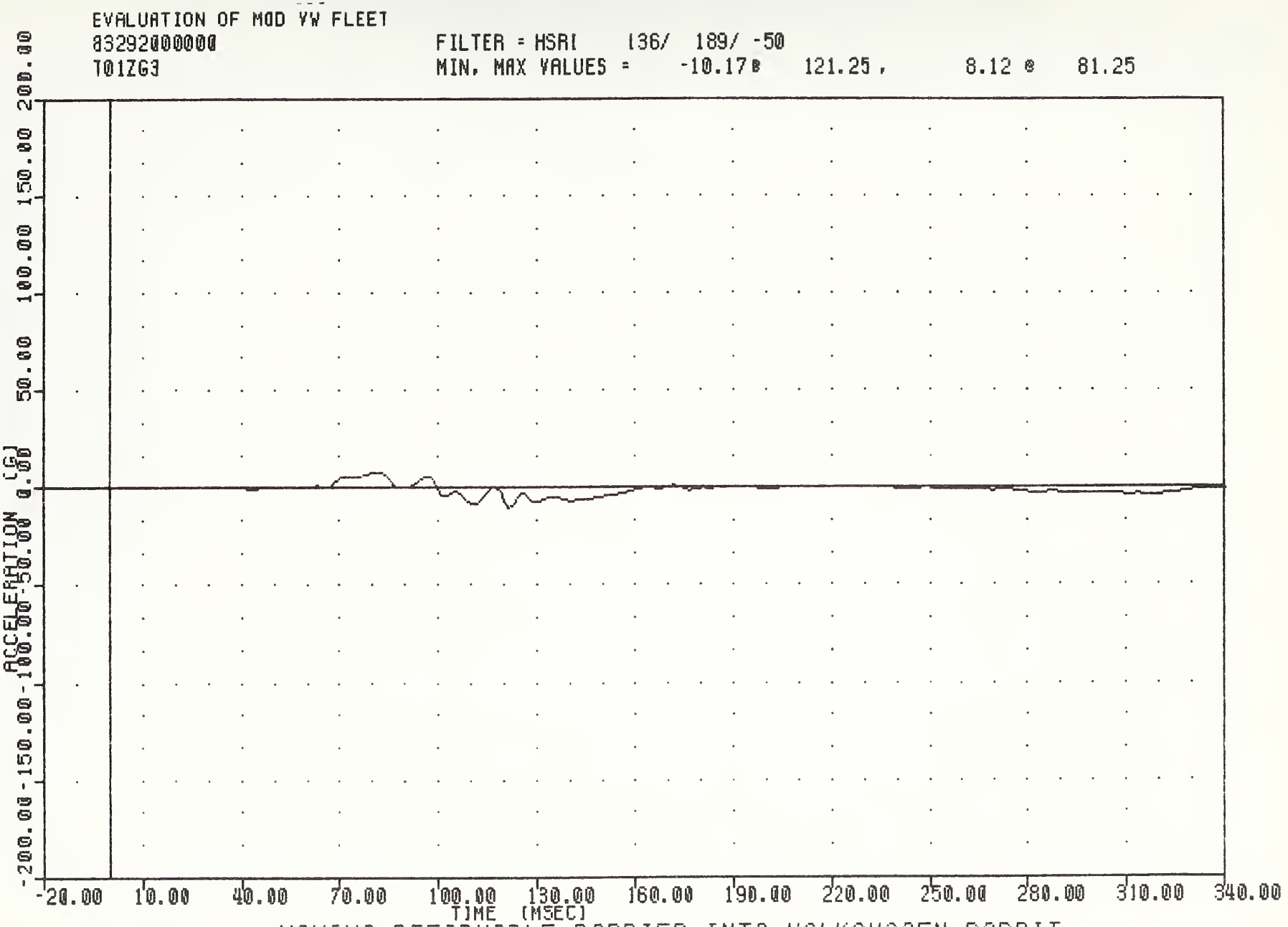
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE ACCELERATION X AXIS



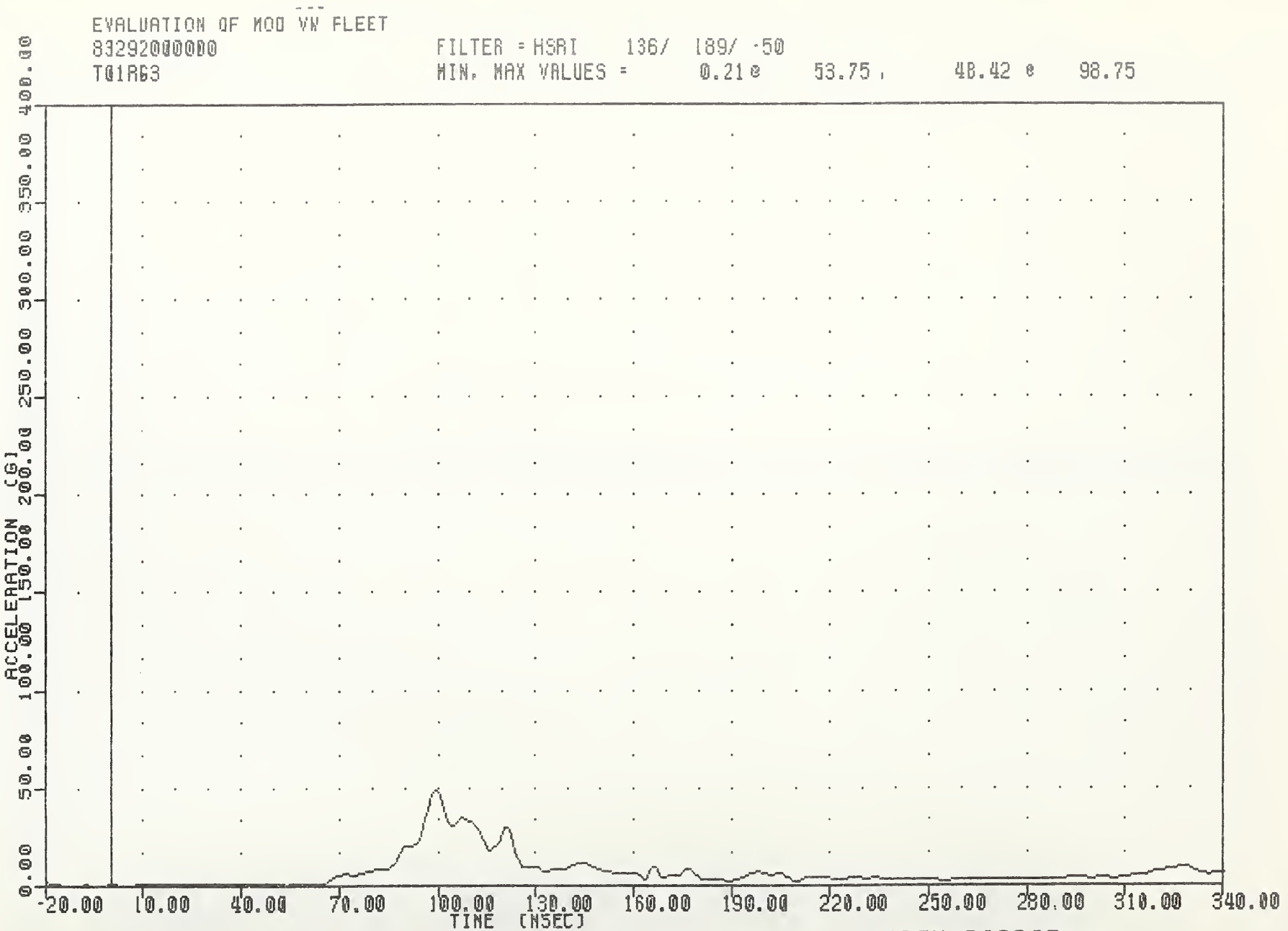
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE ACCELERATION Y AXIS



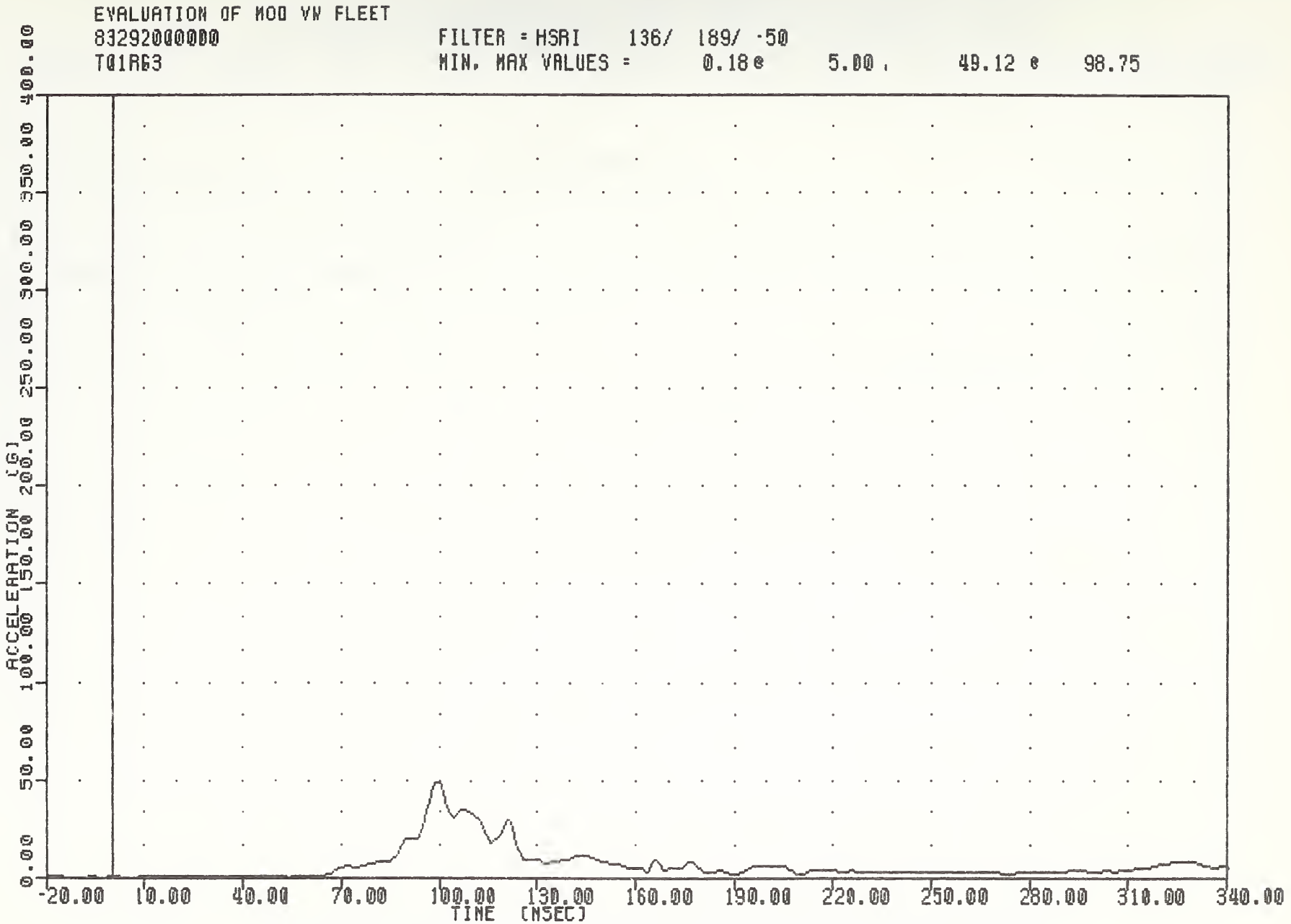
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE ACCELERATION -2 Y AXIS



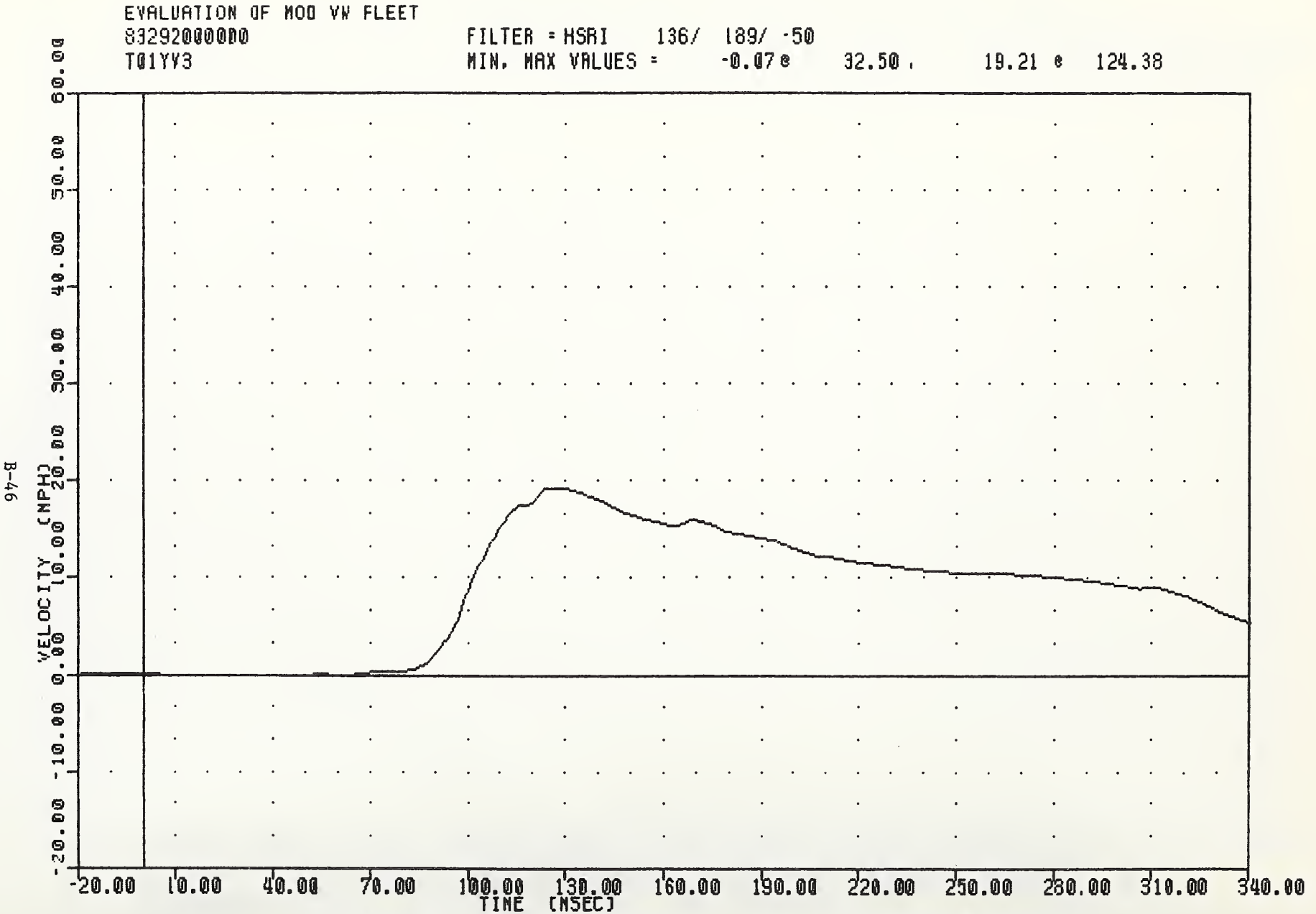
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE ACCELERATION Z AXIS



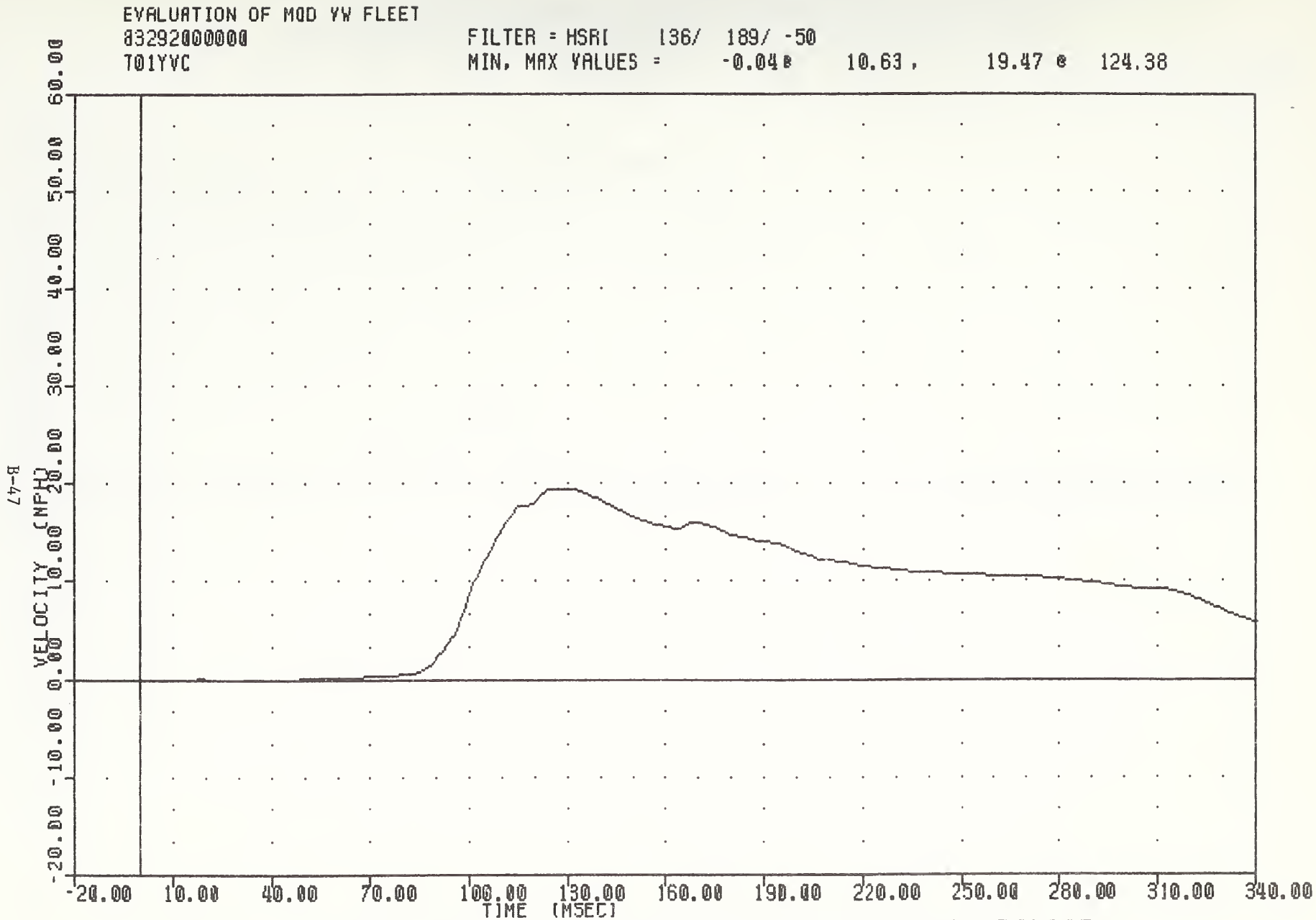
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE RESULTANT



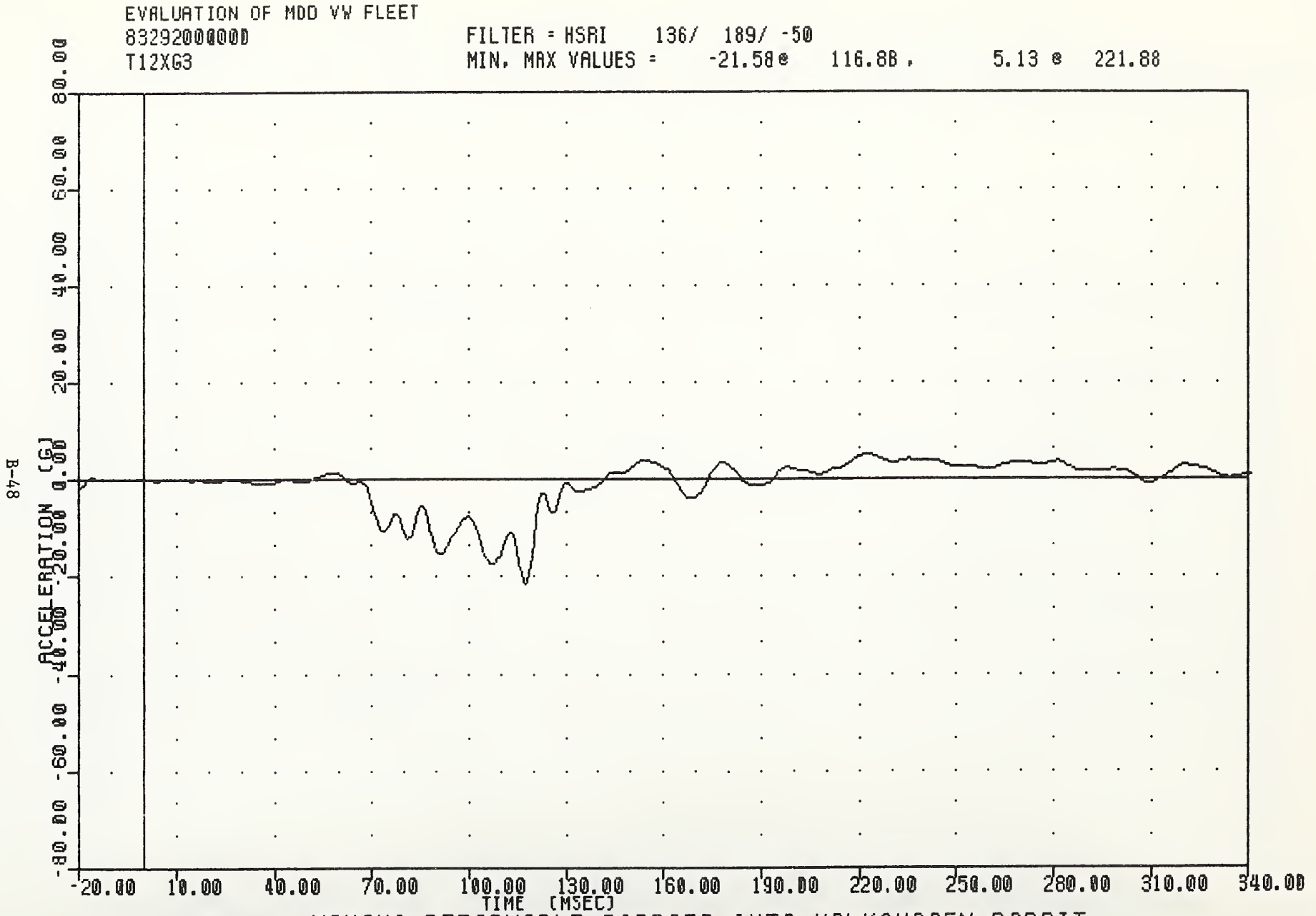
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER UPPER SPINE RESULTANT USING T01YGC



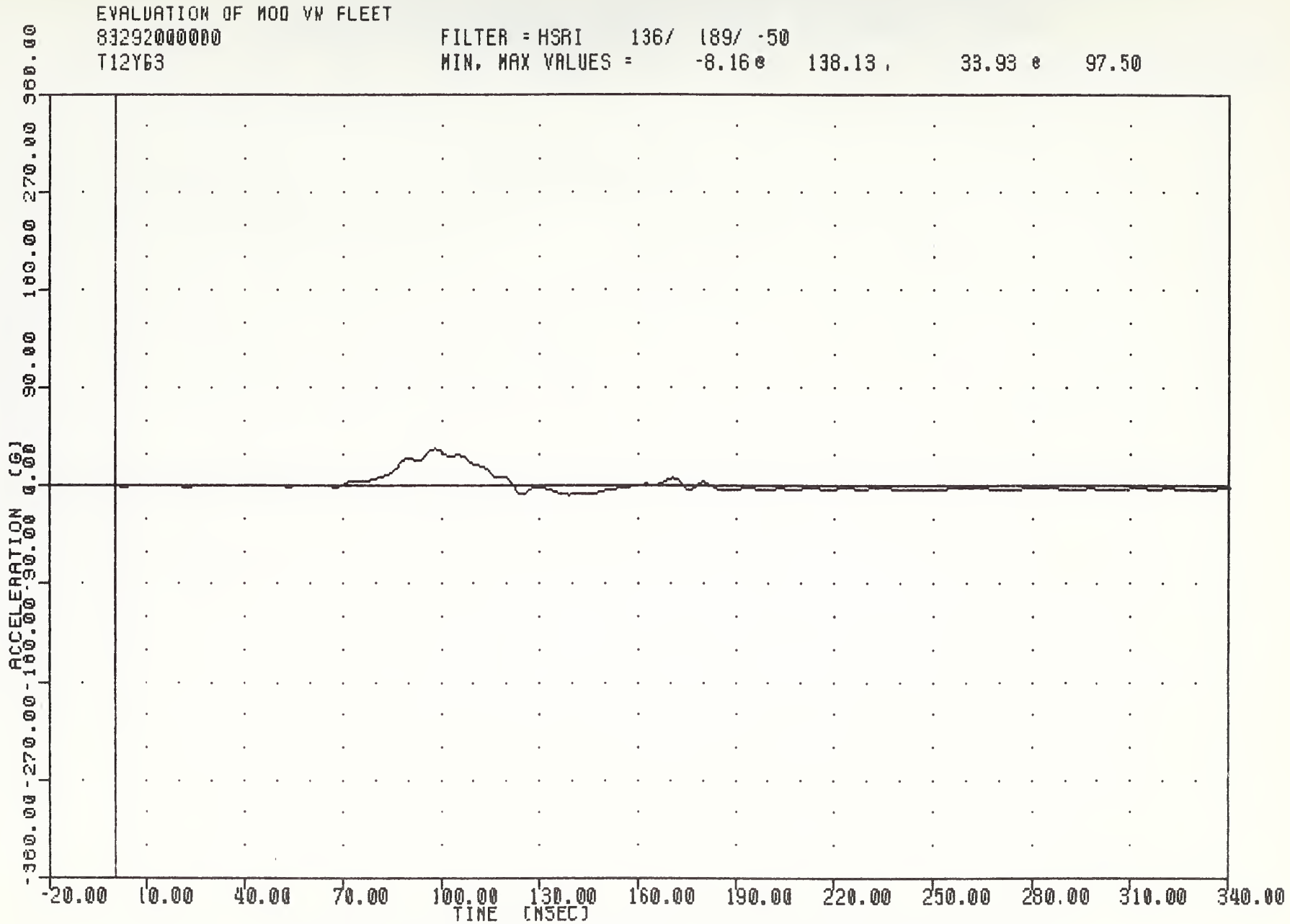
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T01YG3



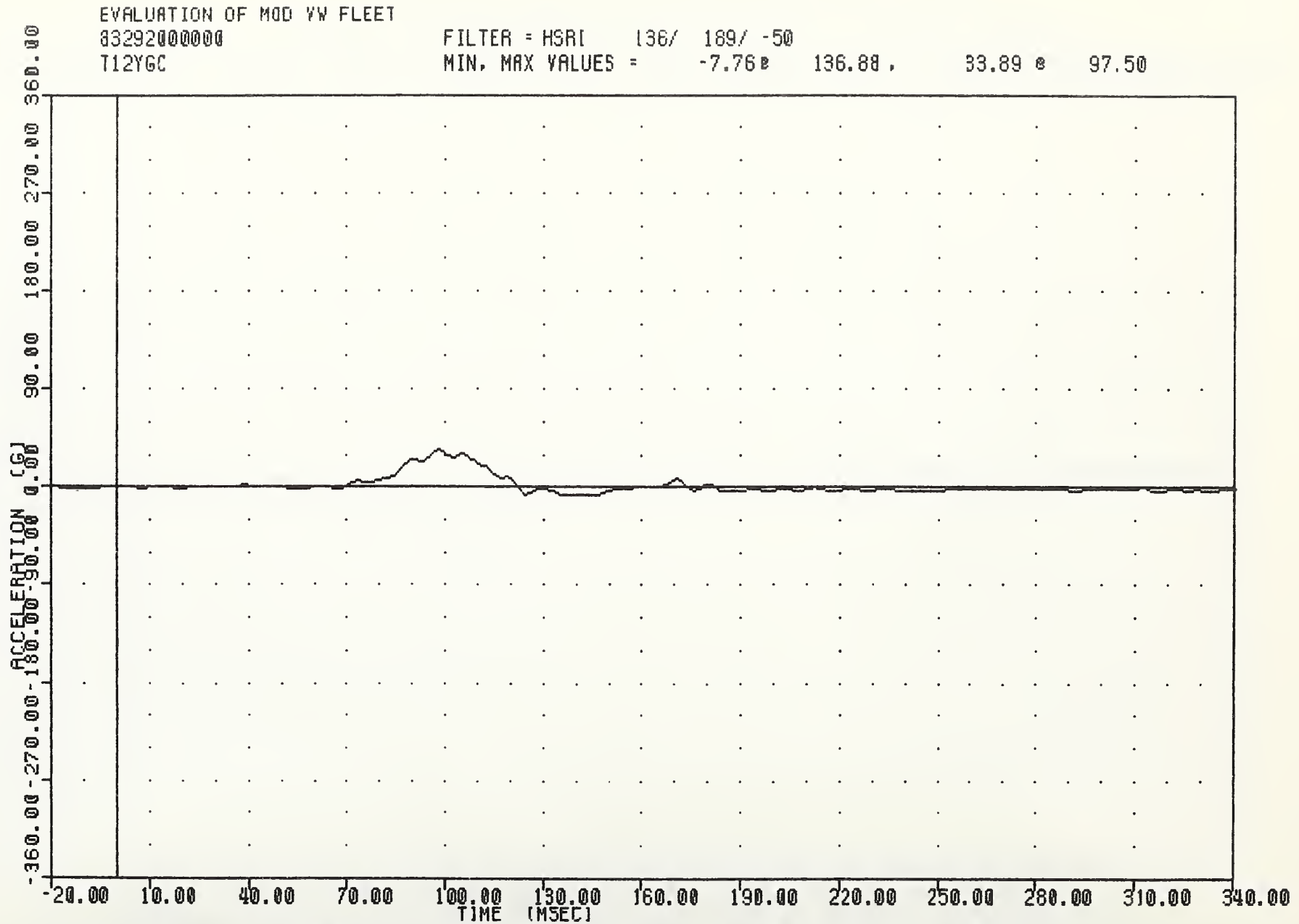
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T01YGC



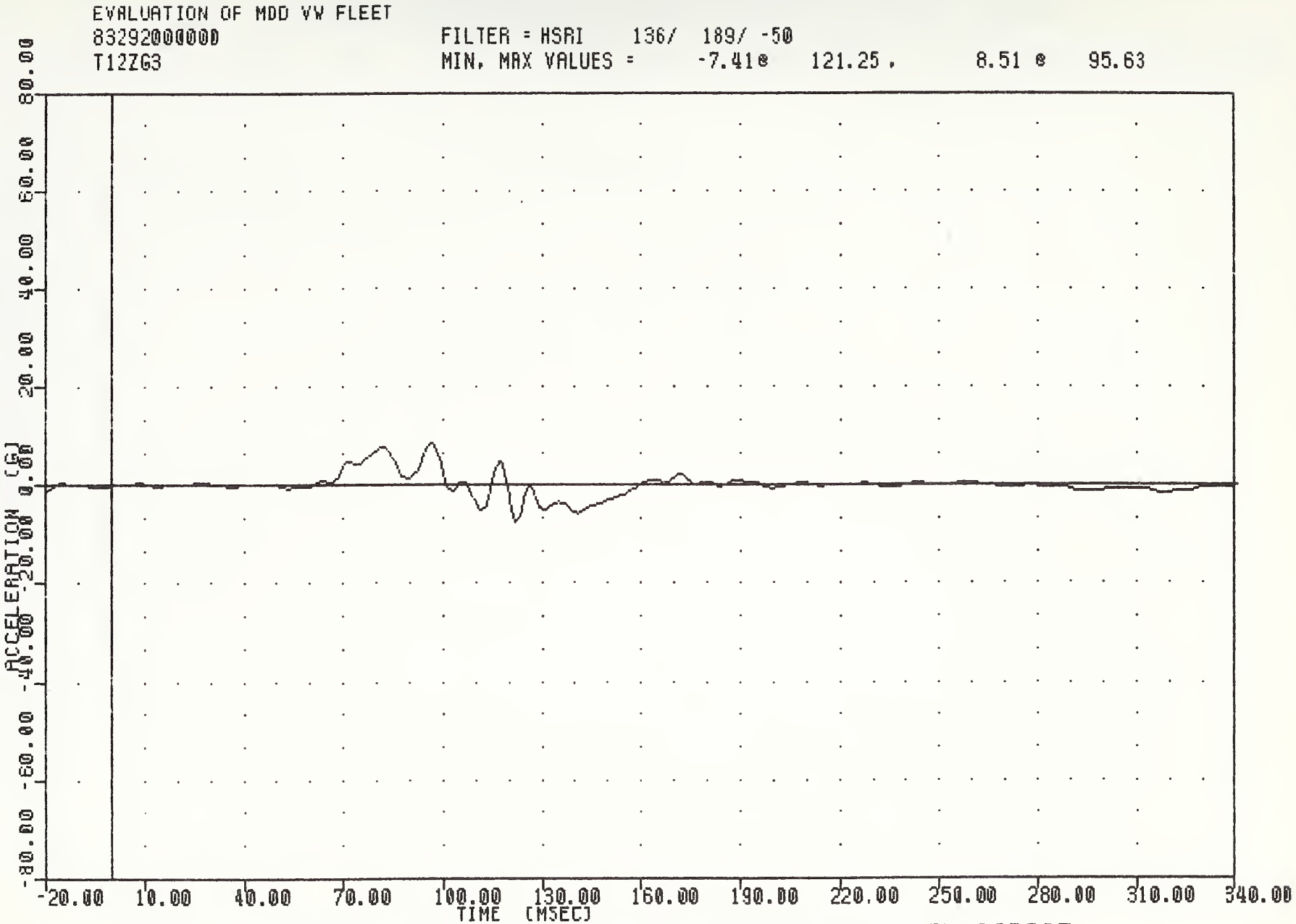
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE ACCELERATION X AXIS



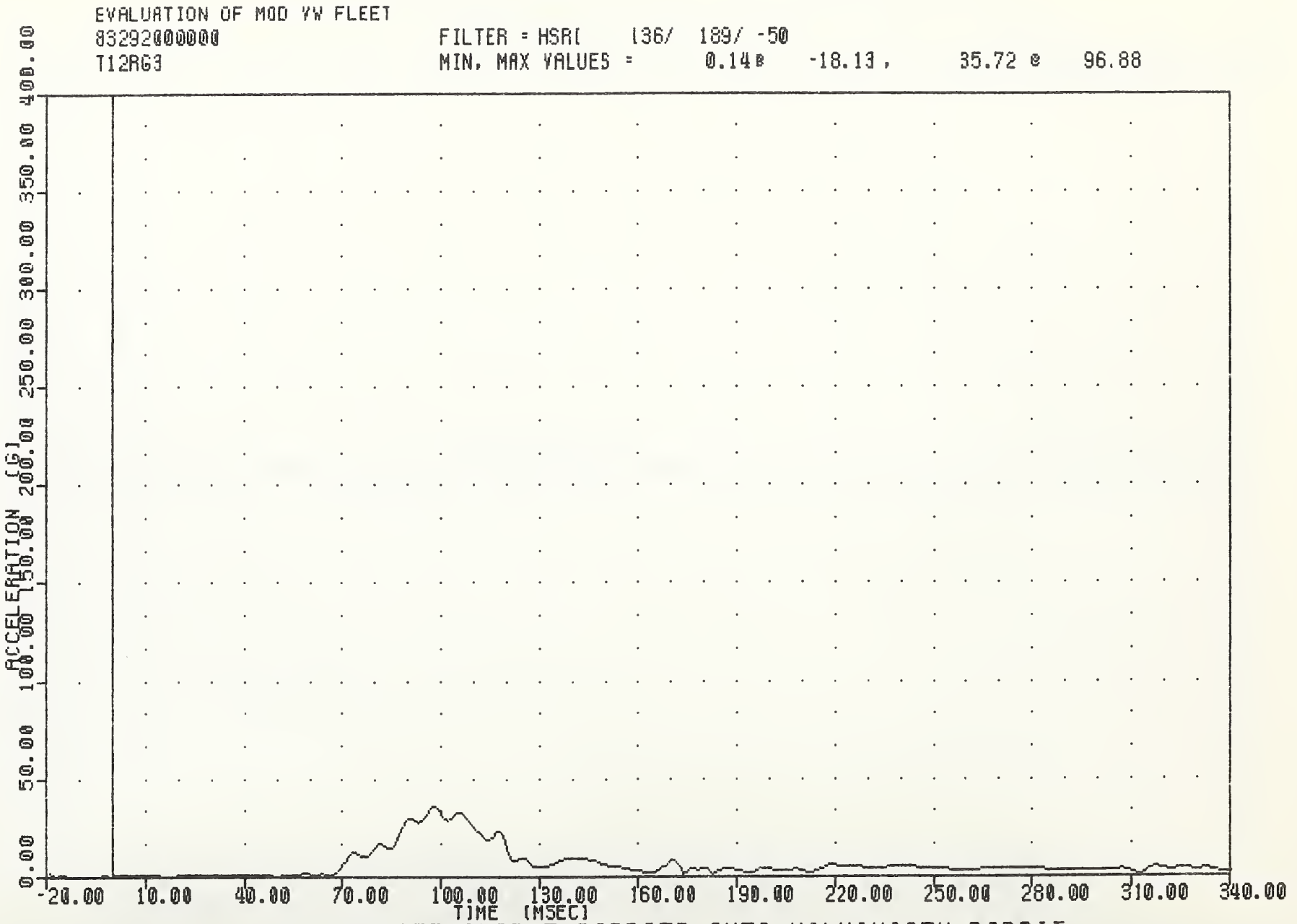
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE ACCELERATION Y AXIS



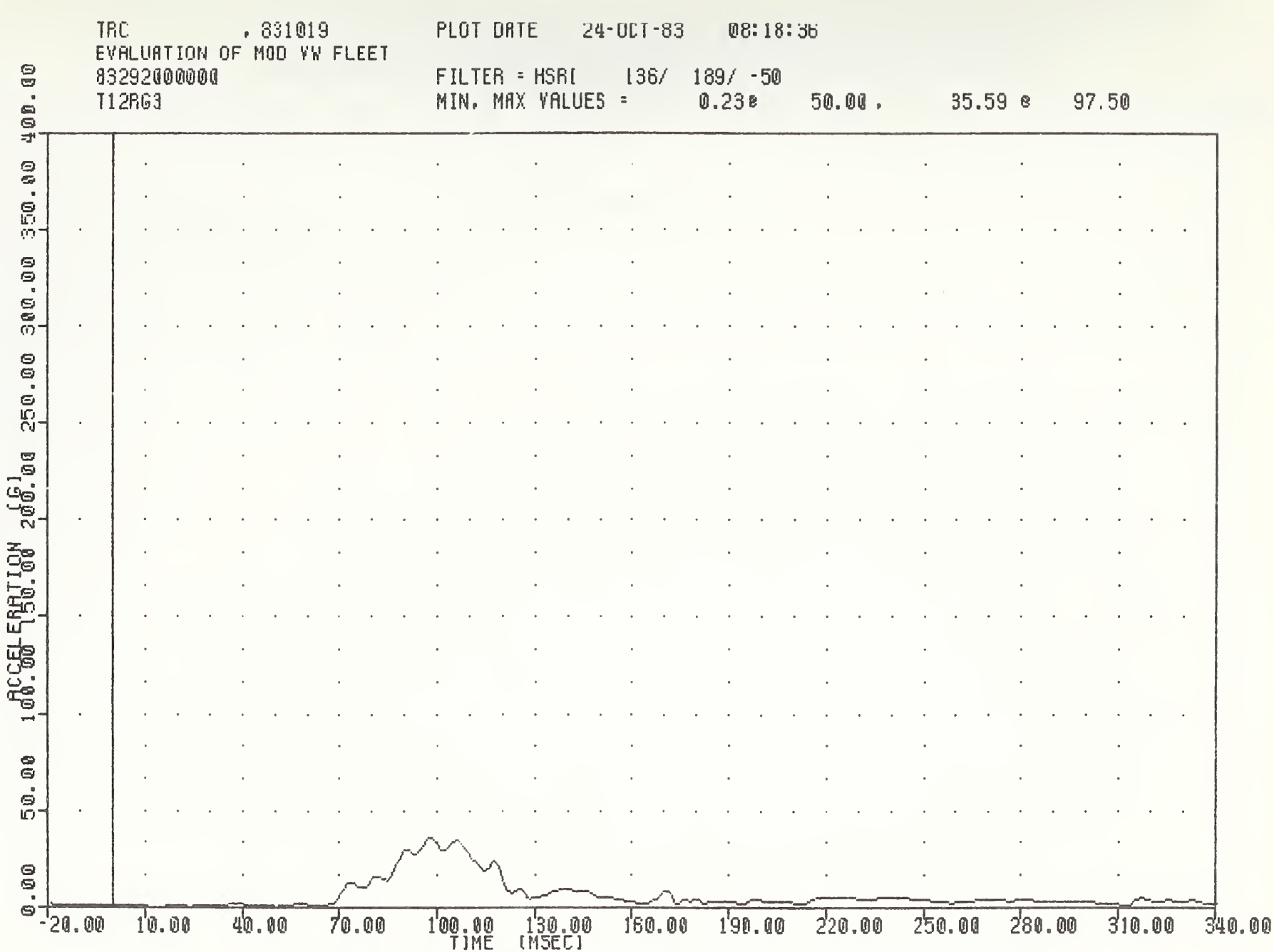
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE ACCELERATION -2 Y AXIS



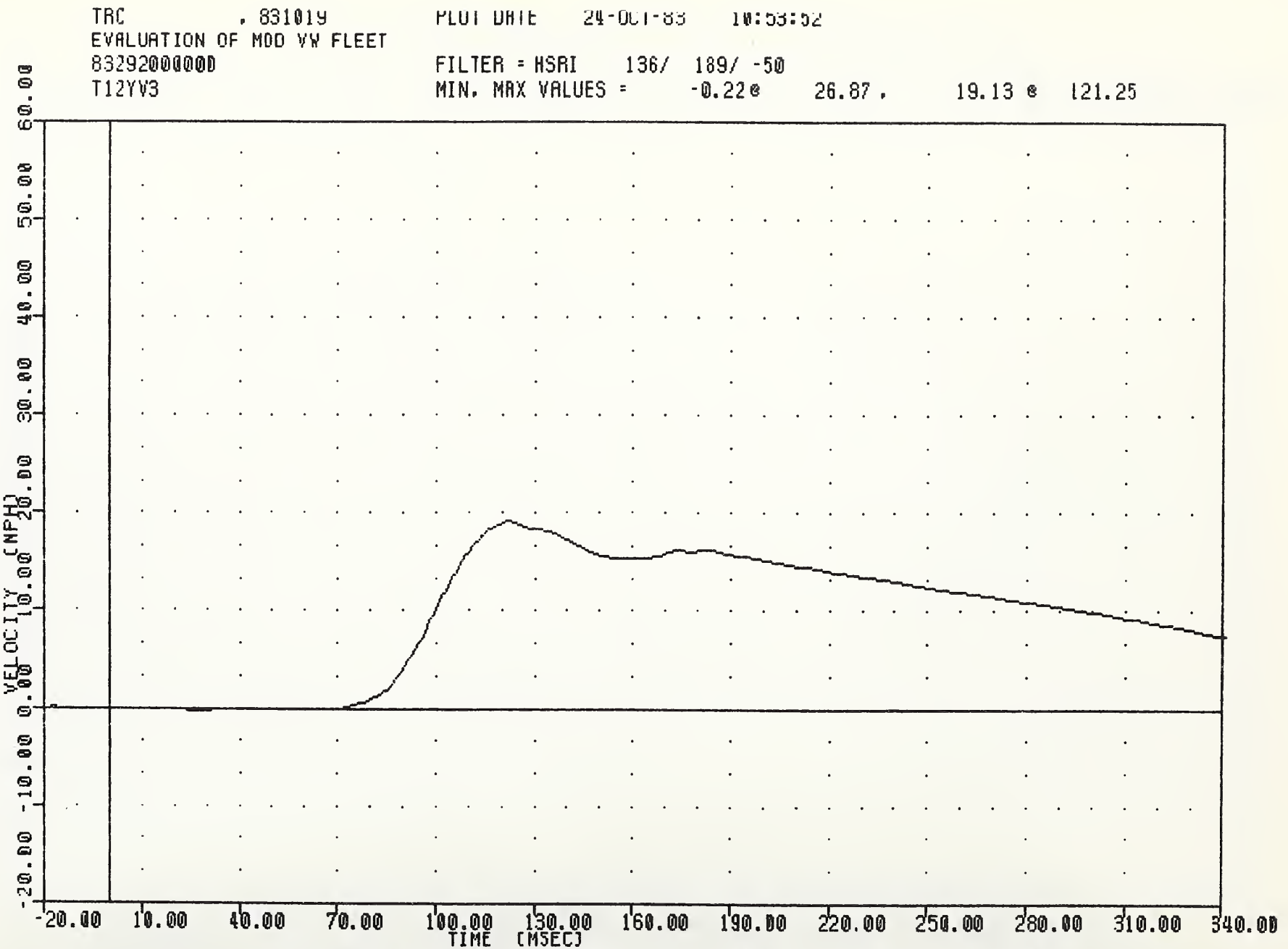
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE ACCELERATION Z AXIS



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LOWER SPINE RESULTANT



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



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T12YG3

TRC , 831019 PLOT DATE 24-OCT-83 10:53:52
EVALUATION OF MOD VW FLEET
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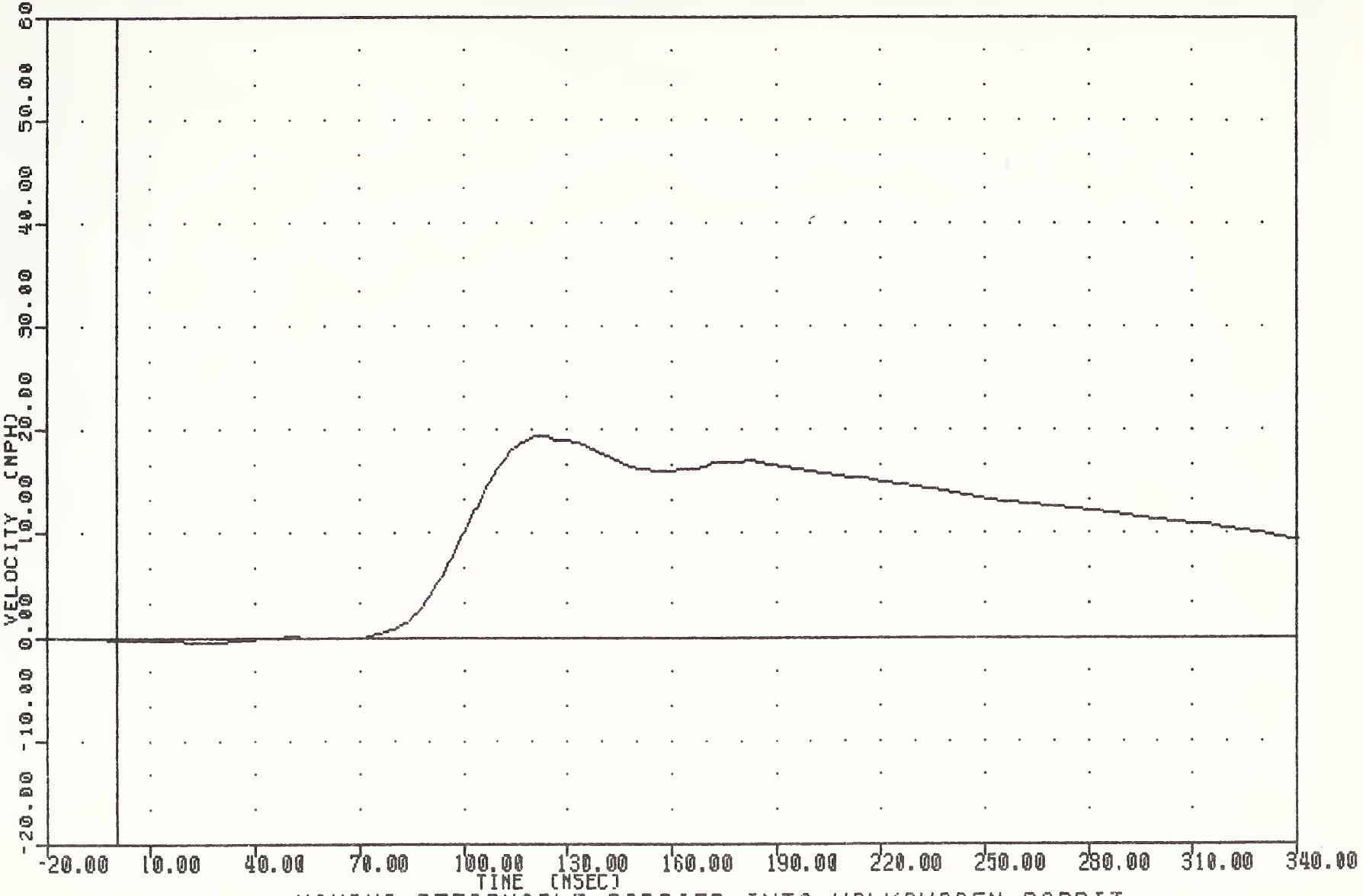
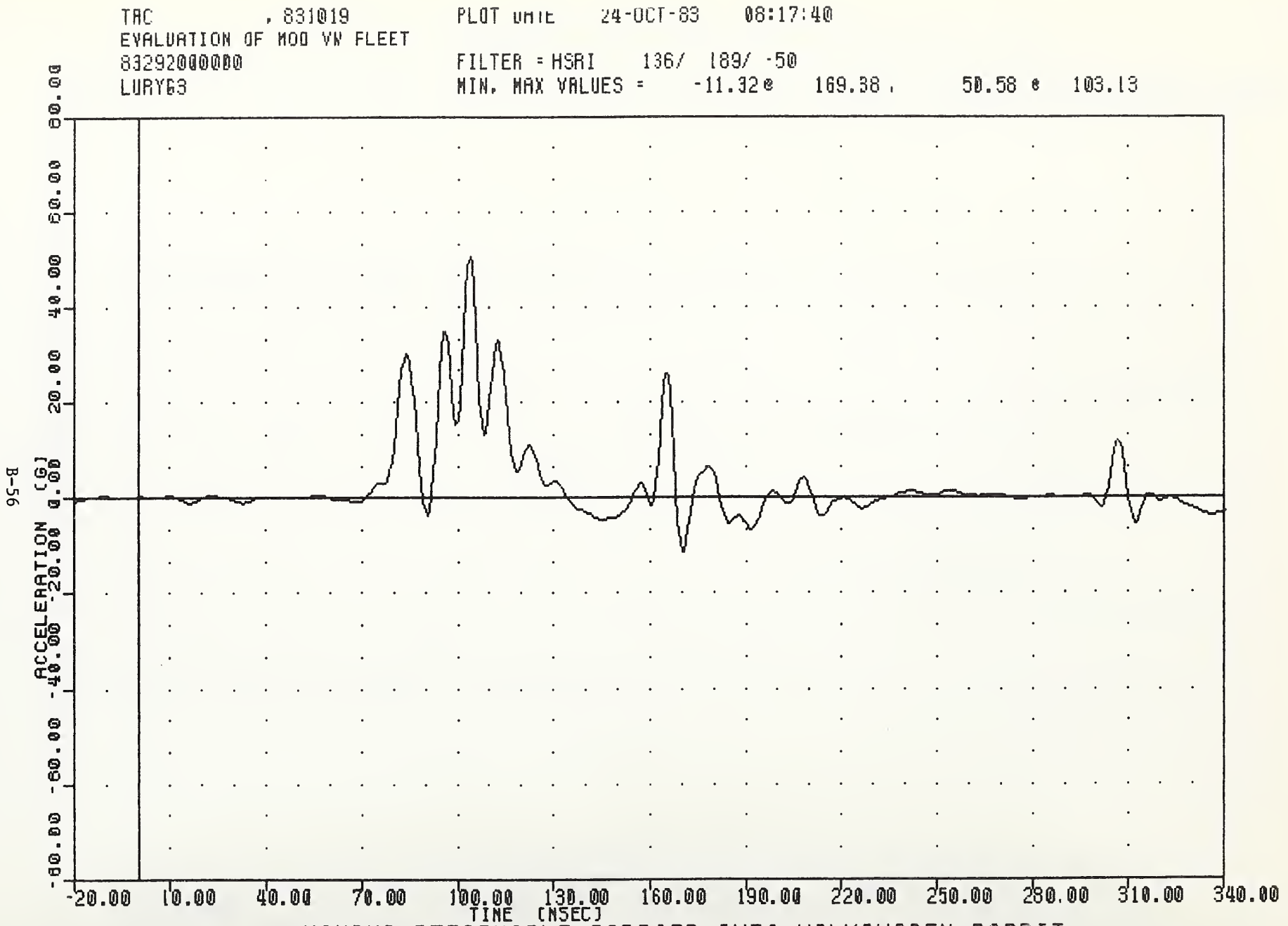
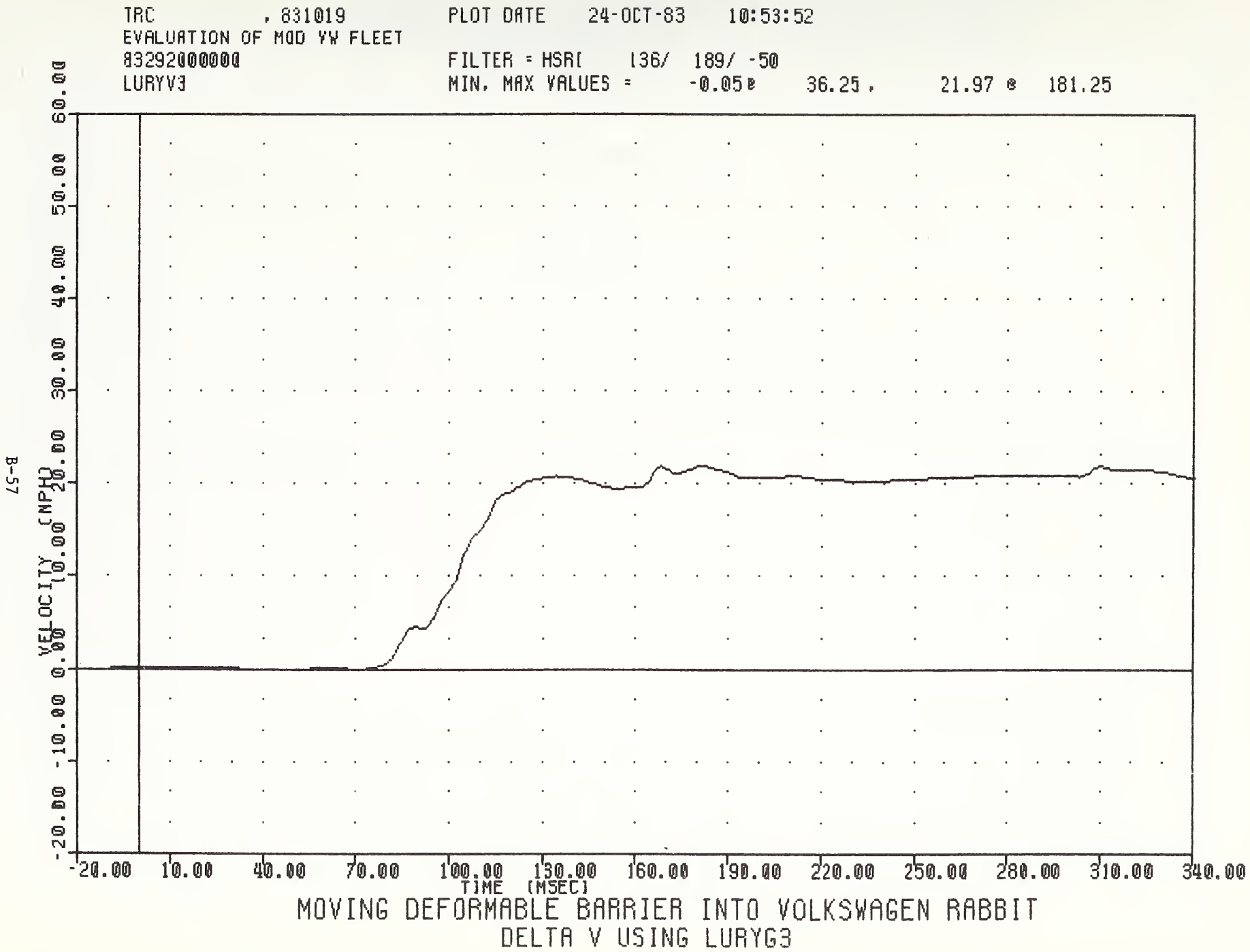
T12YVC MIN. MAX VALUES = -0.46 @ 27.50 , 19.51 @ 121.87



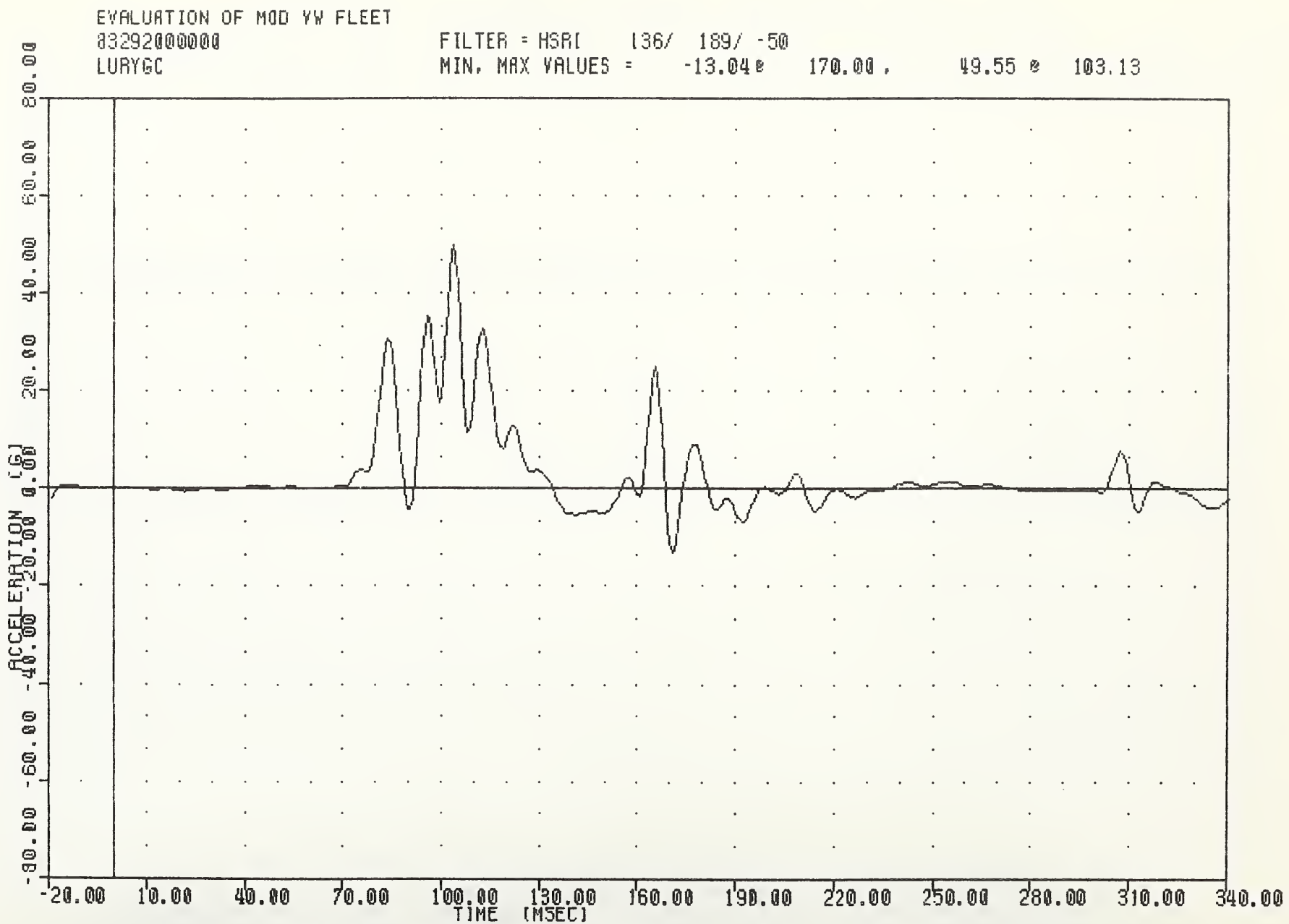
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING T12YGC



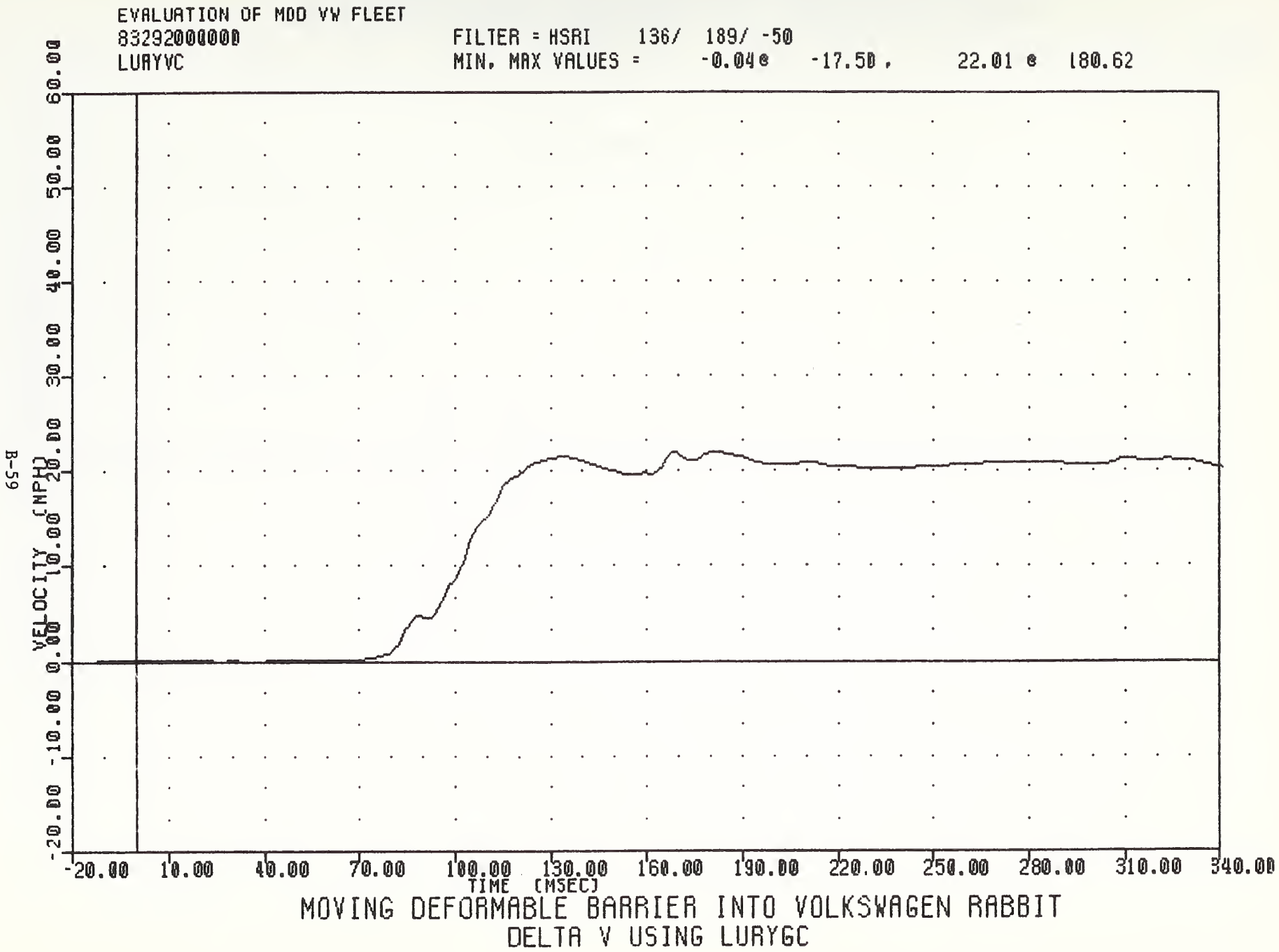
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT UPPER RIB ACCELERATION Y AXIS



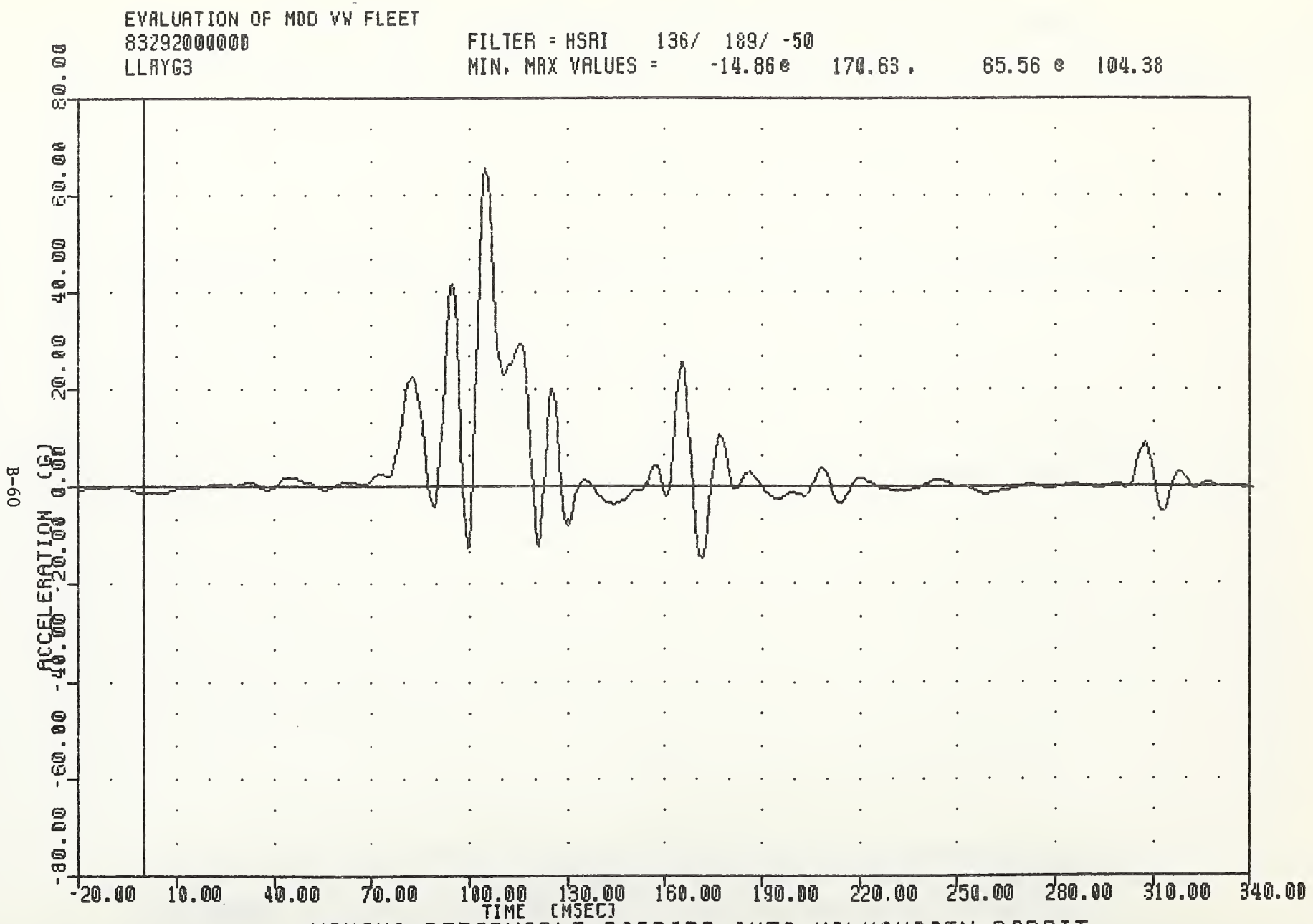
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LURYG3



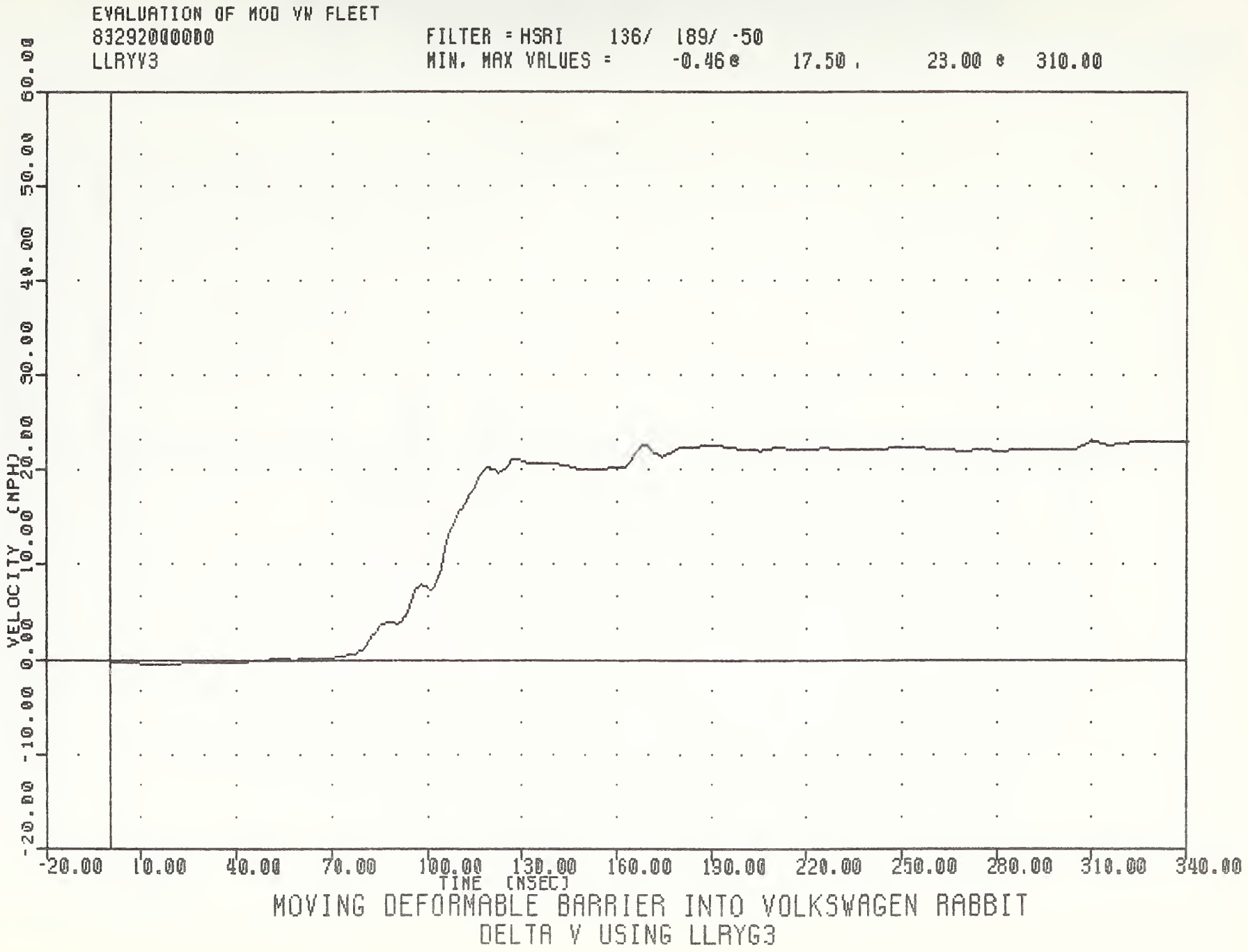
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT UPPER RIB ACCELERATION -2 Y AXIS



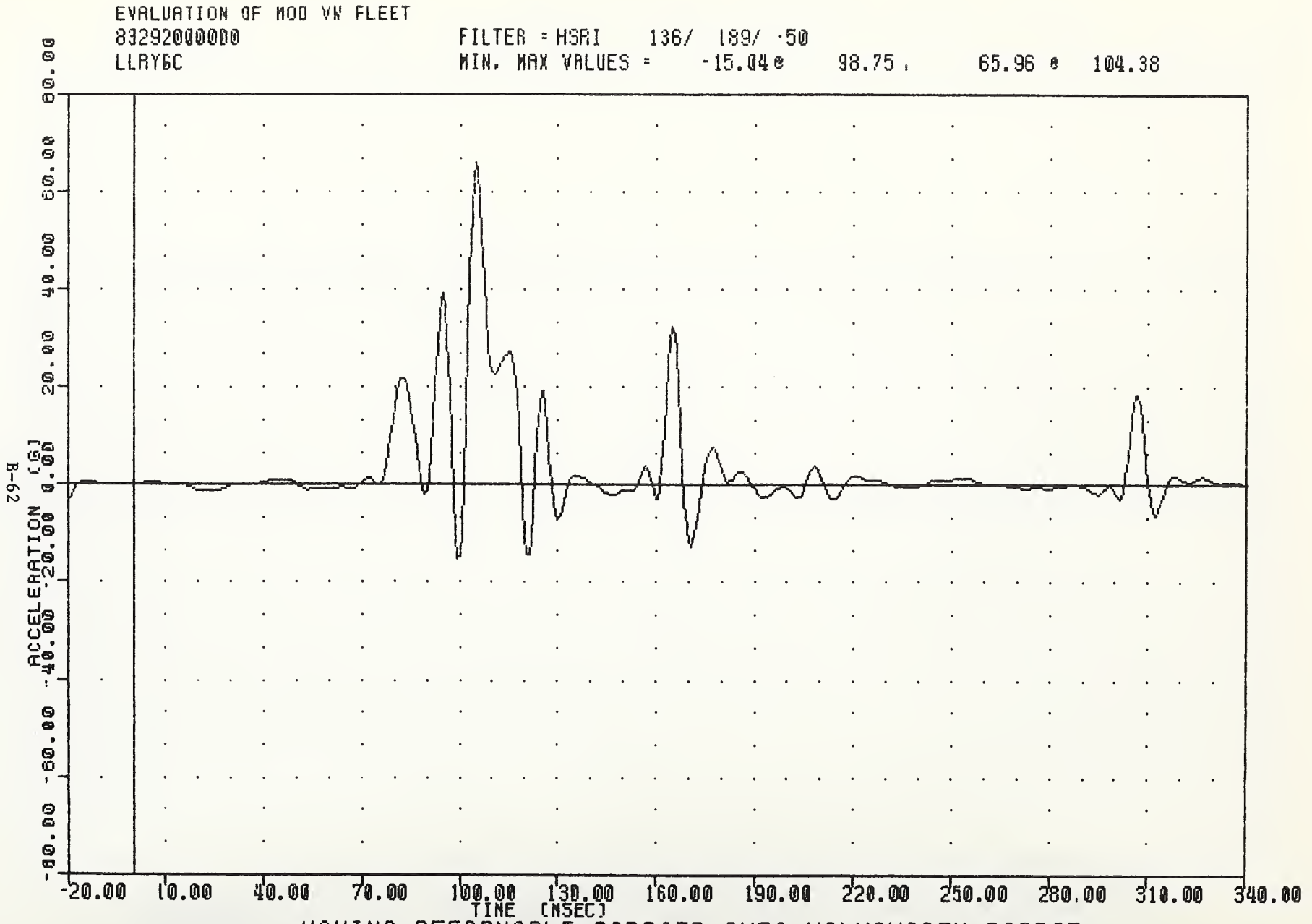
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LURYGC



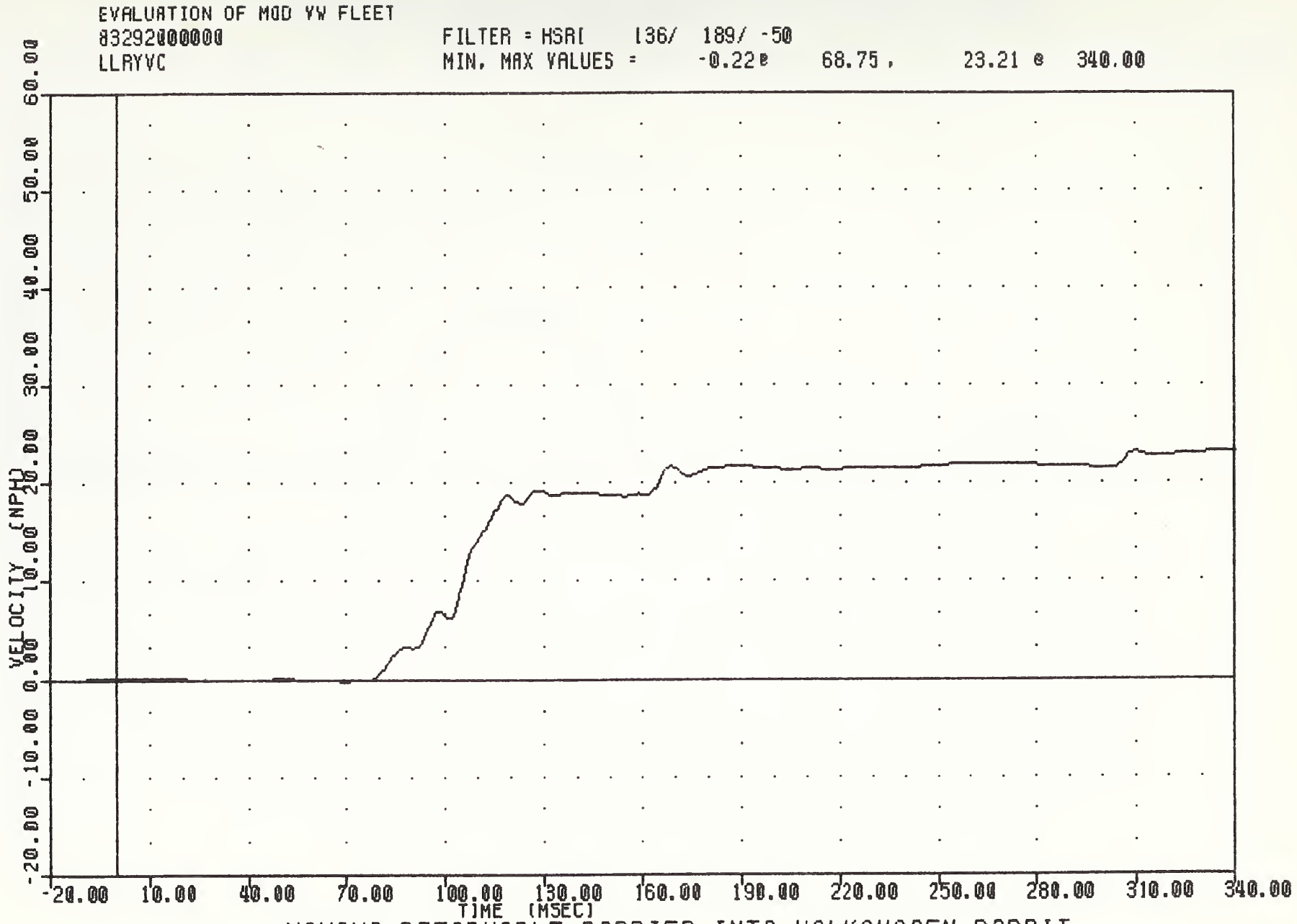
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT LOWER RIB ACCELERATION Y AXIS



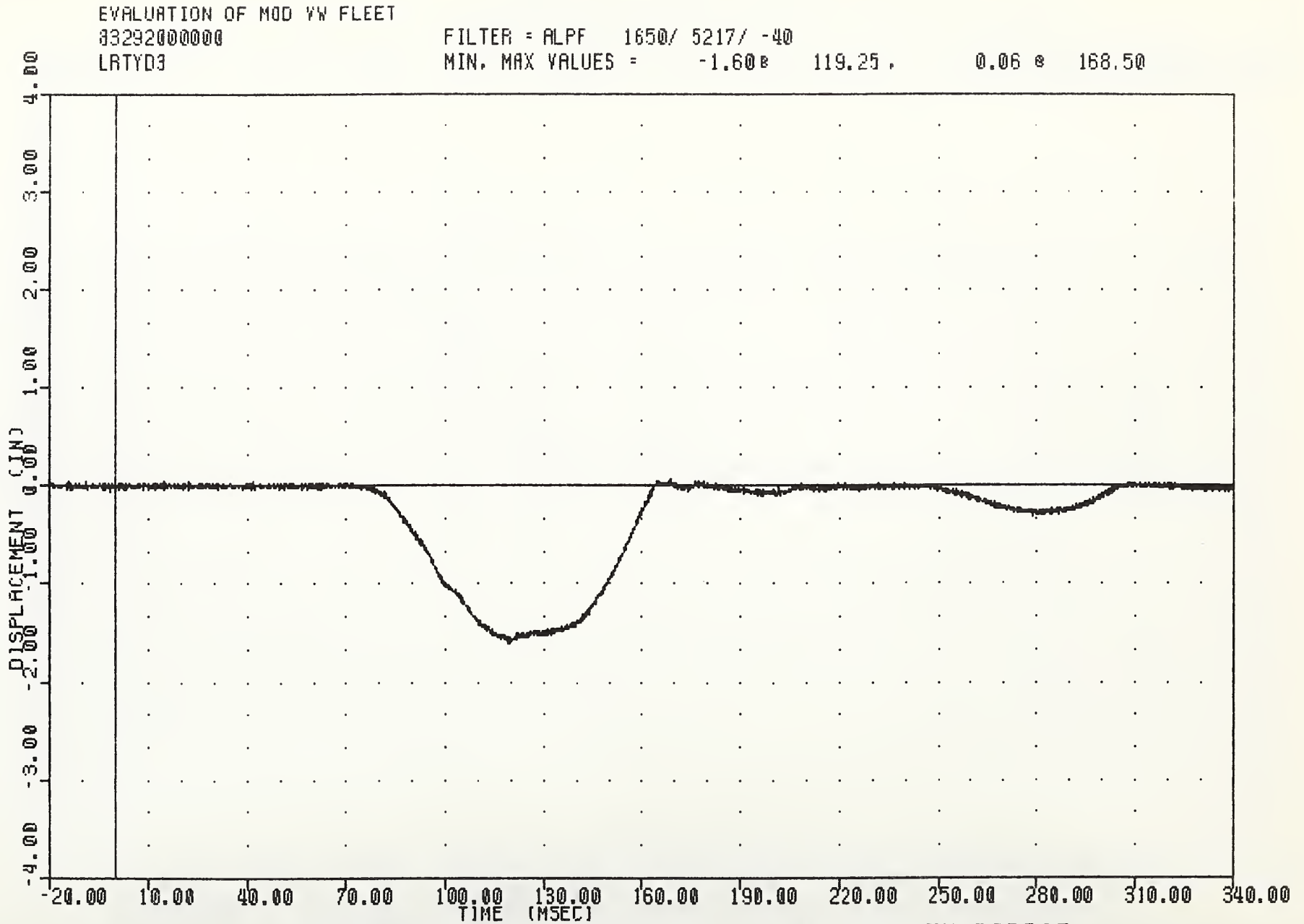
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LLRYG3



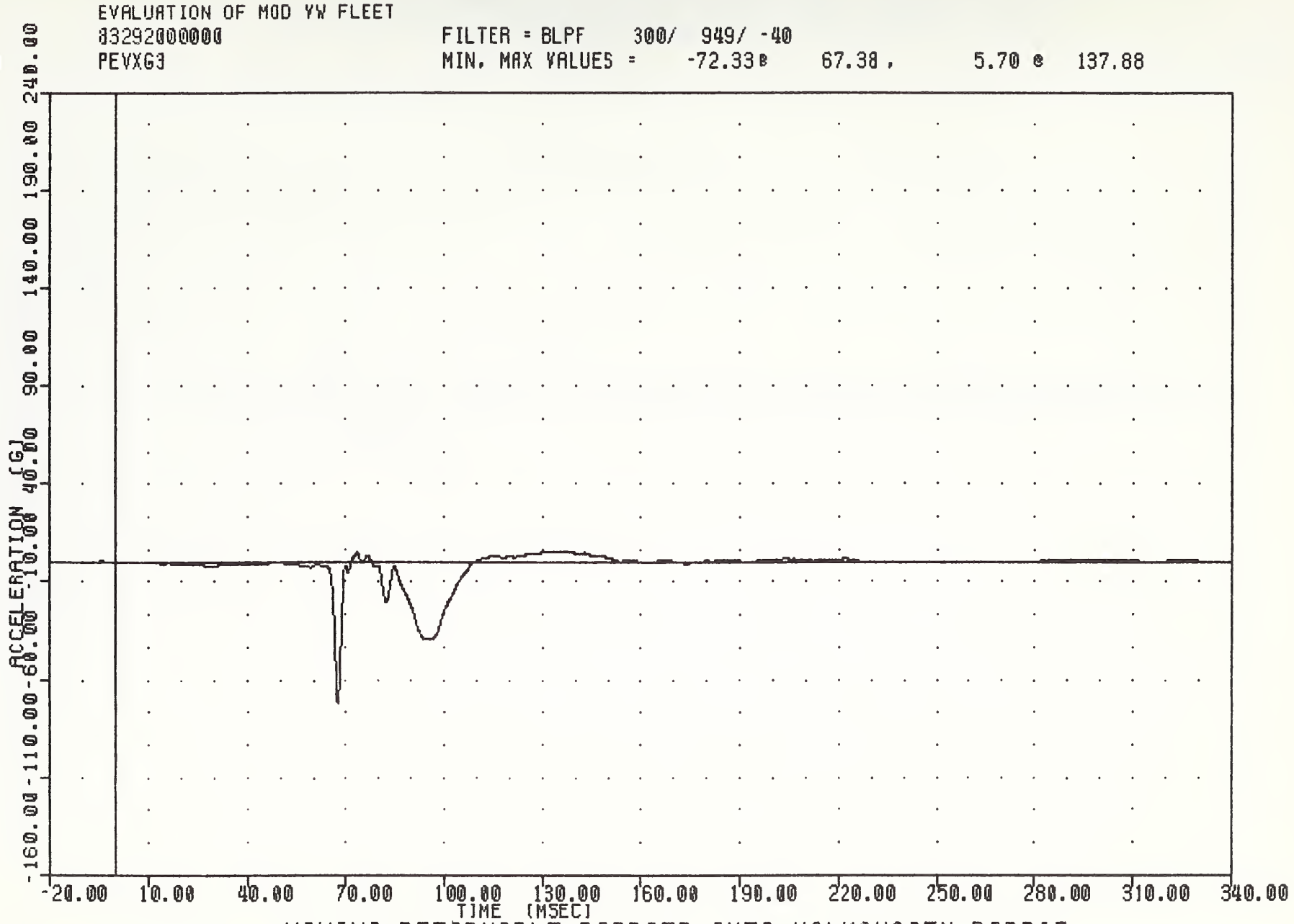
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT LOWER RIB ACCELERATION -2 Y AXIS



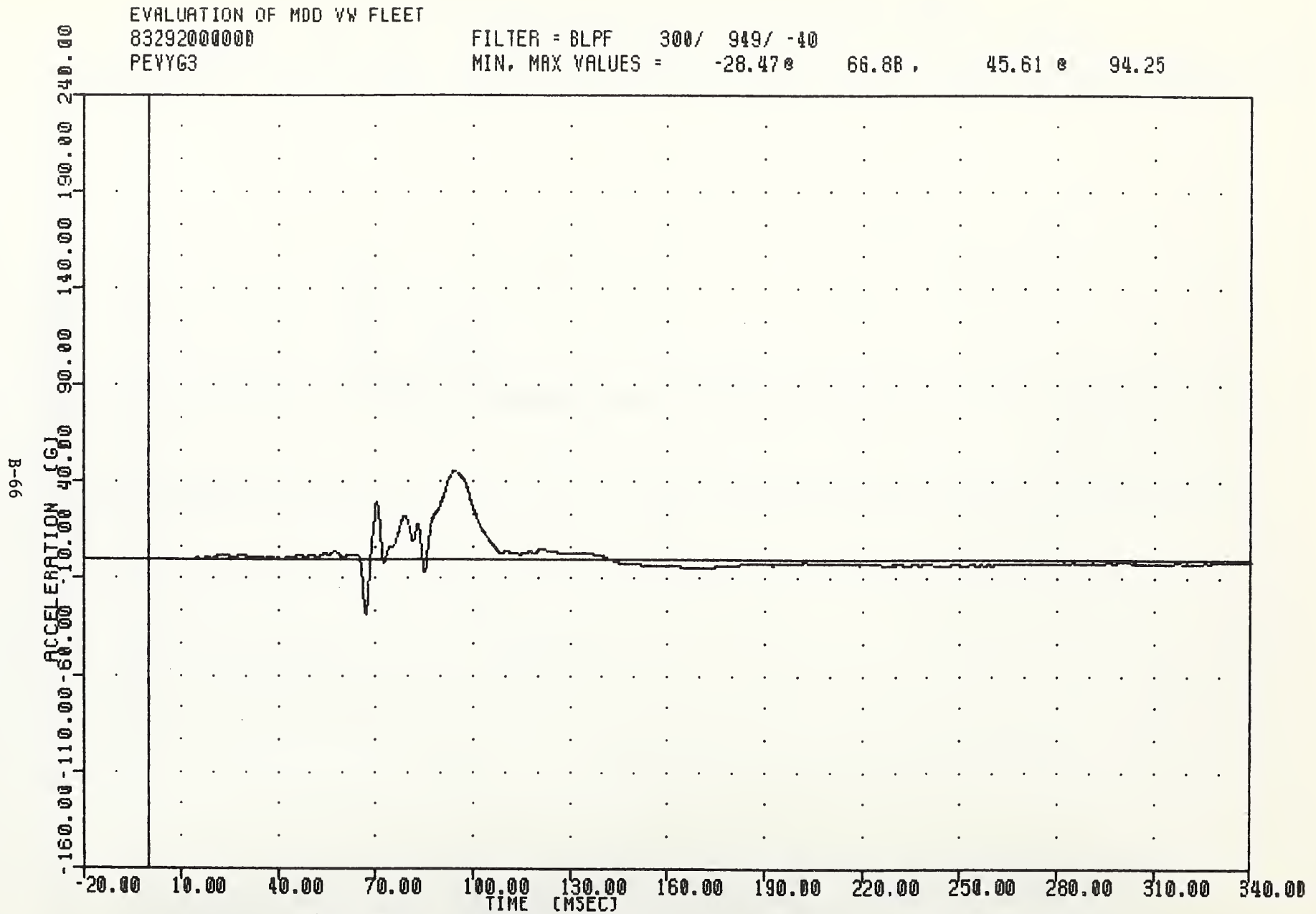
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LLRYGC



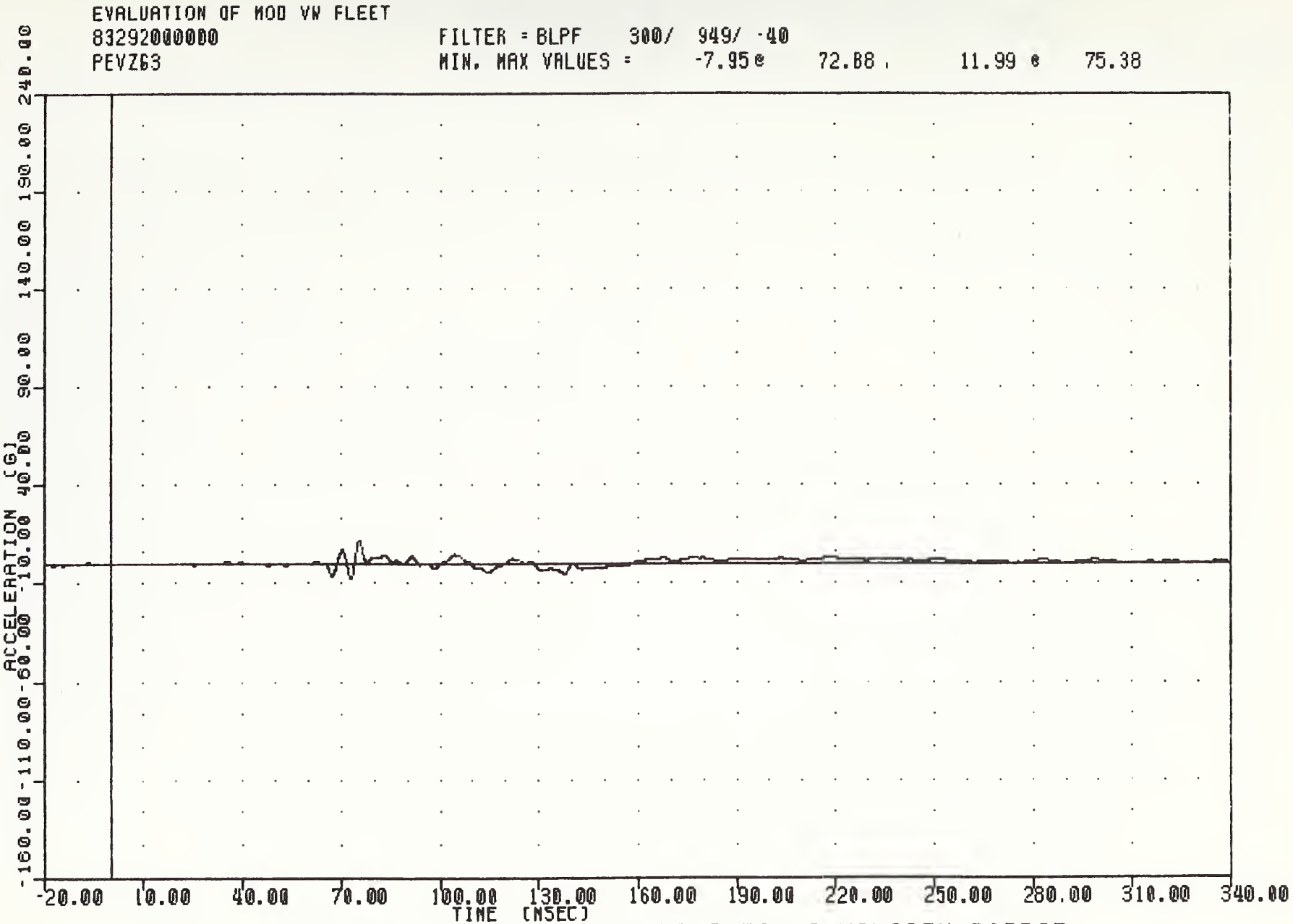
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER LEFT RIB TO SPINE DISPLACEMENT INCHES



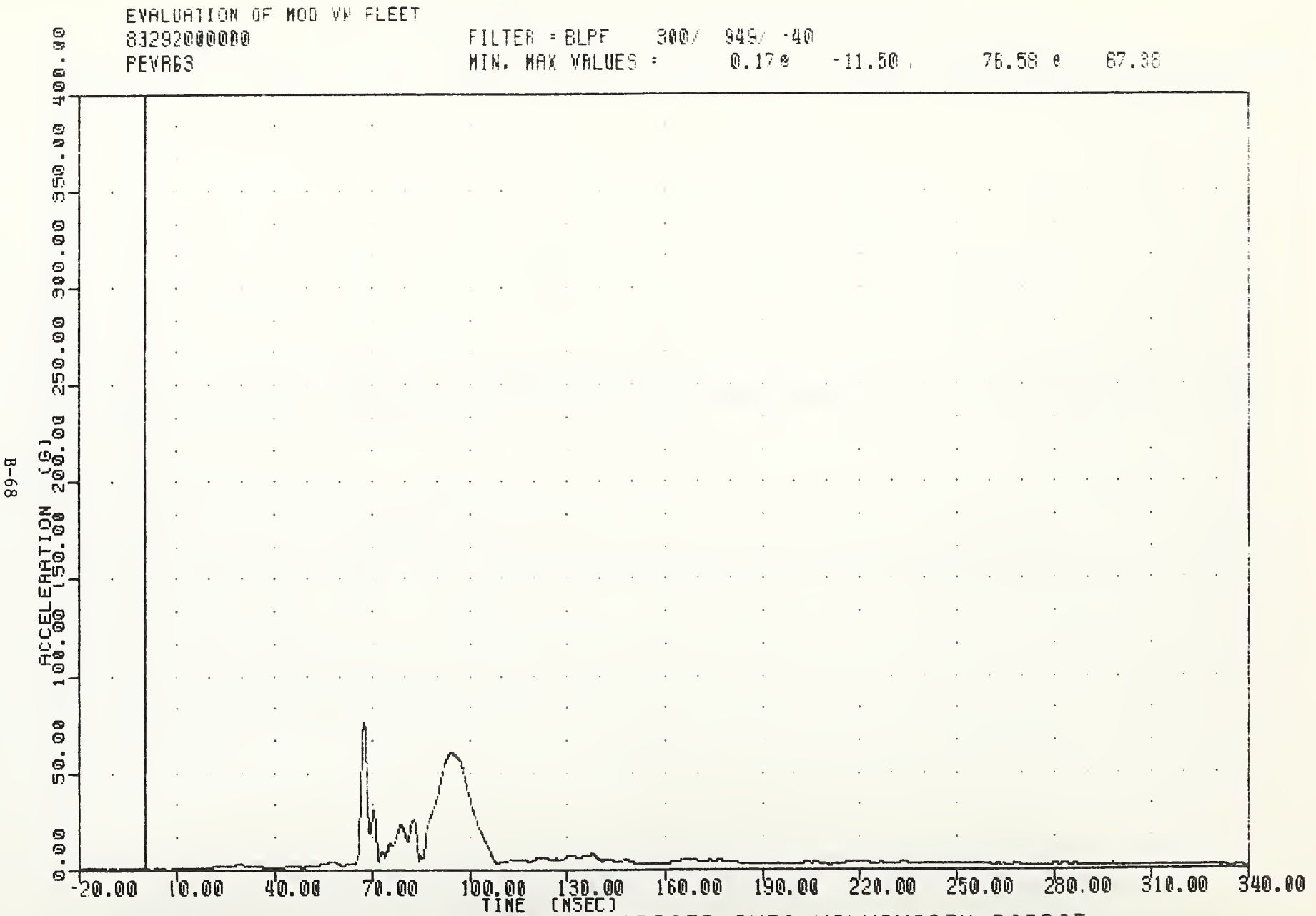
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS ACCELERATION X AXIS



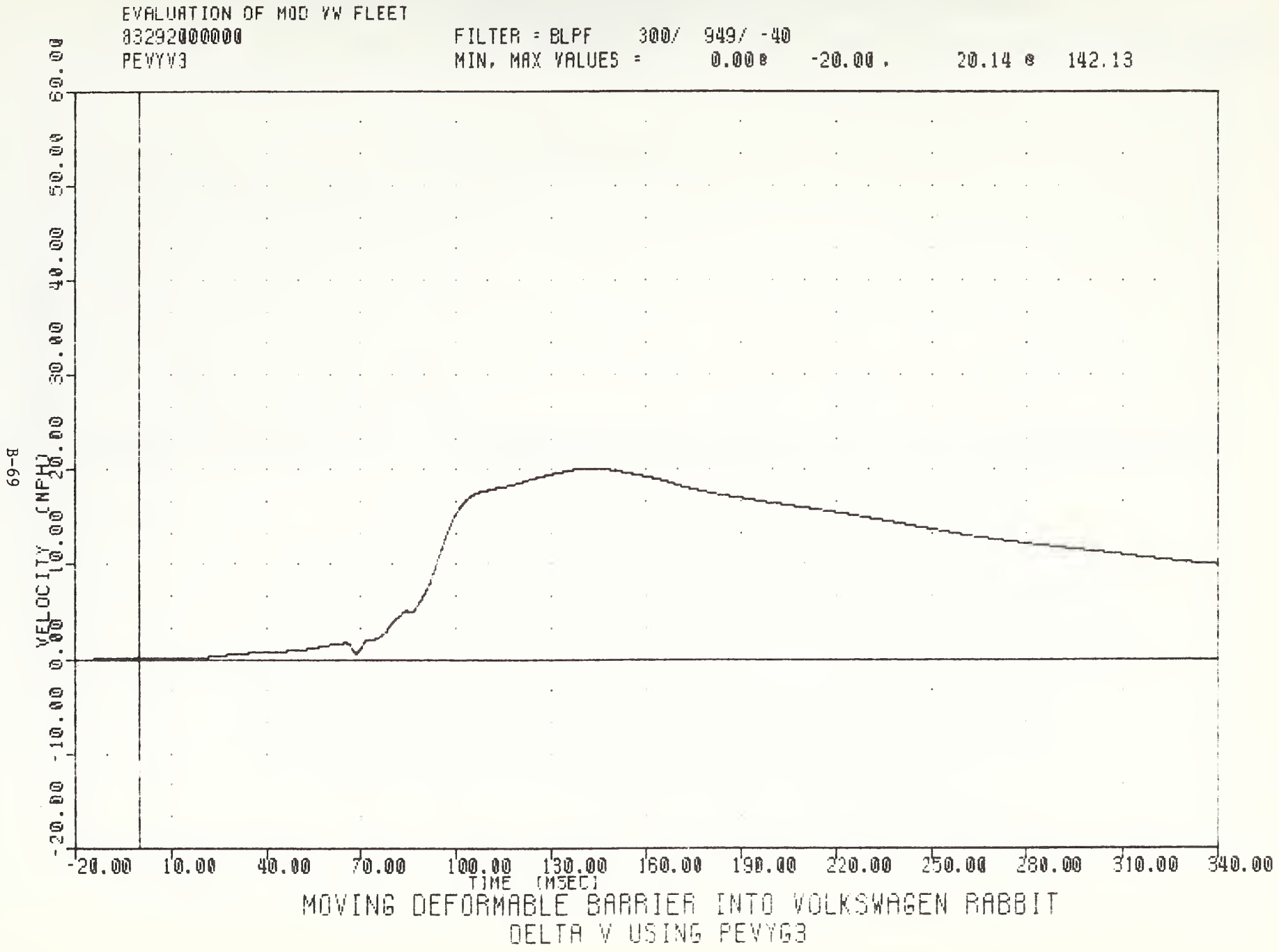
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS ACCLERATION Y AXIS



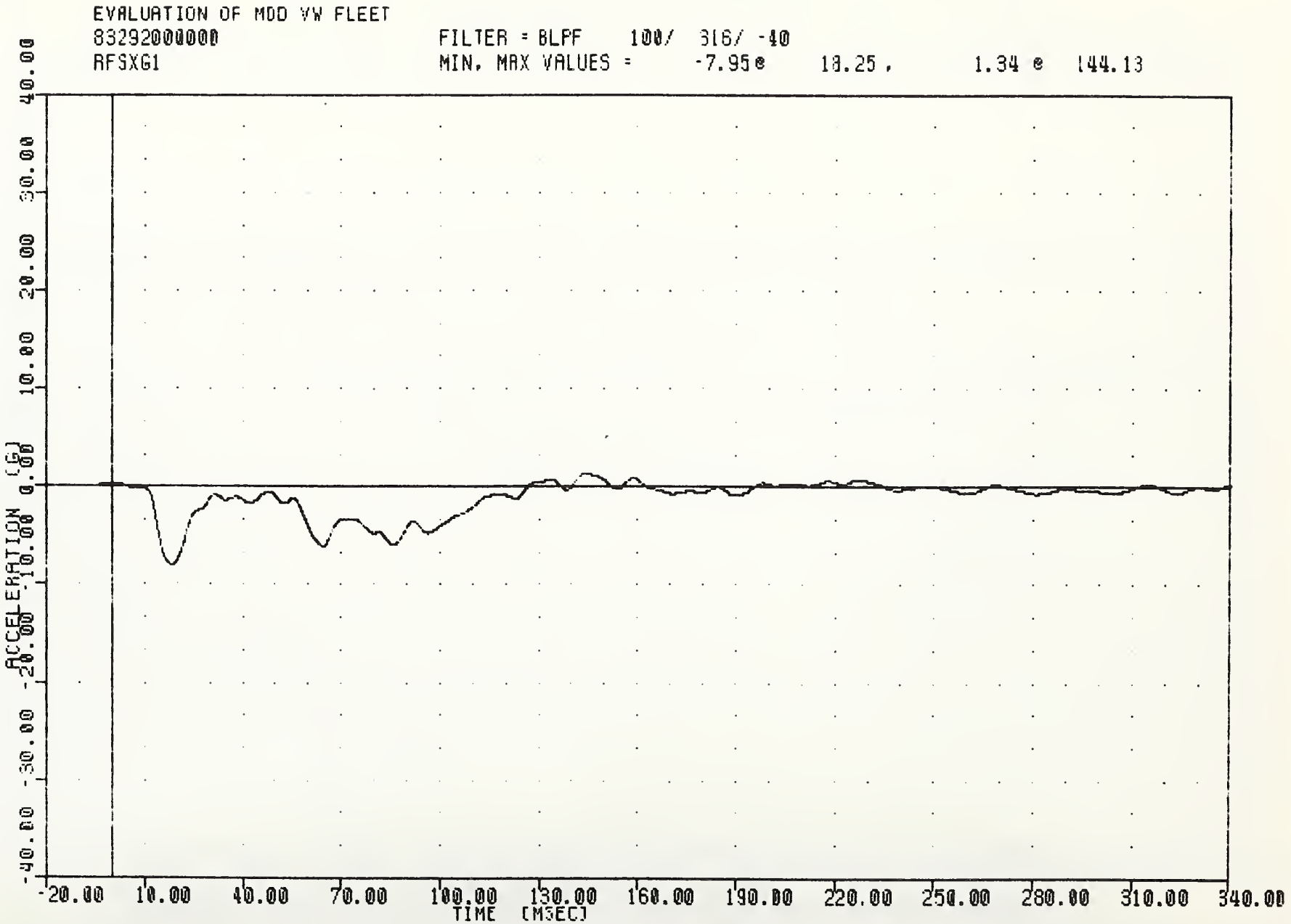
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS ACCELERATION Z AXIS



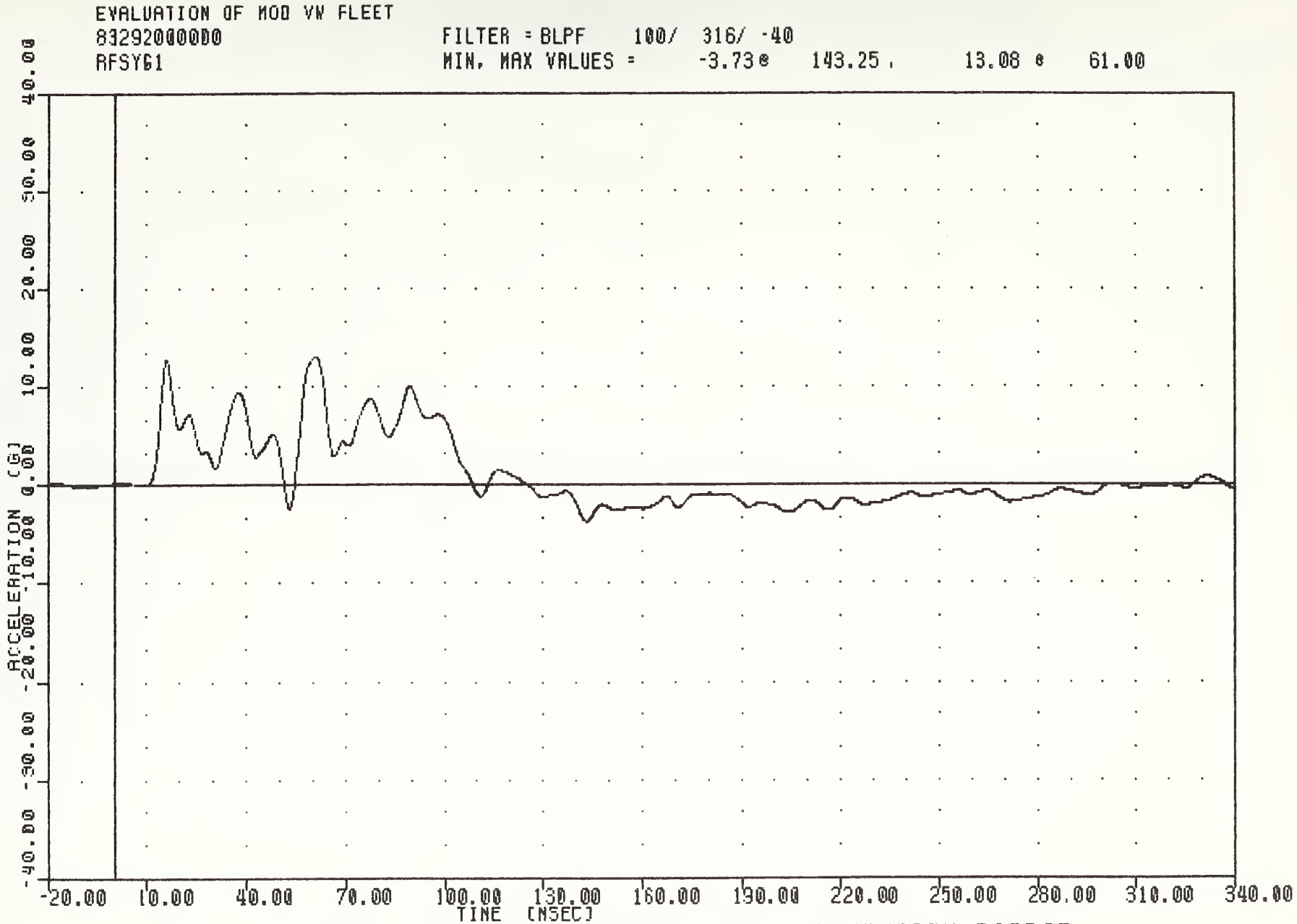
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
PASSENGER PELVIS RESULTANT



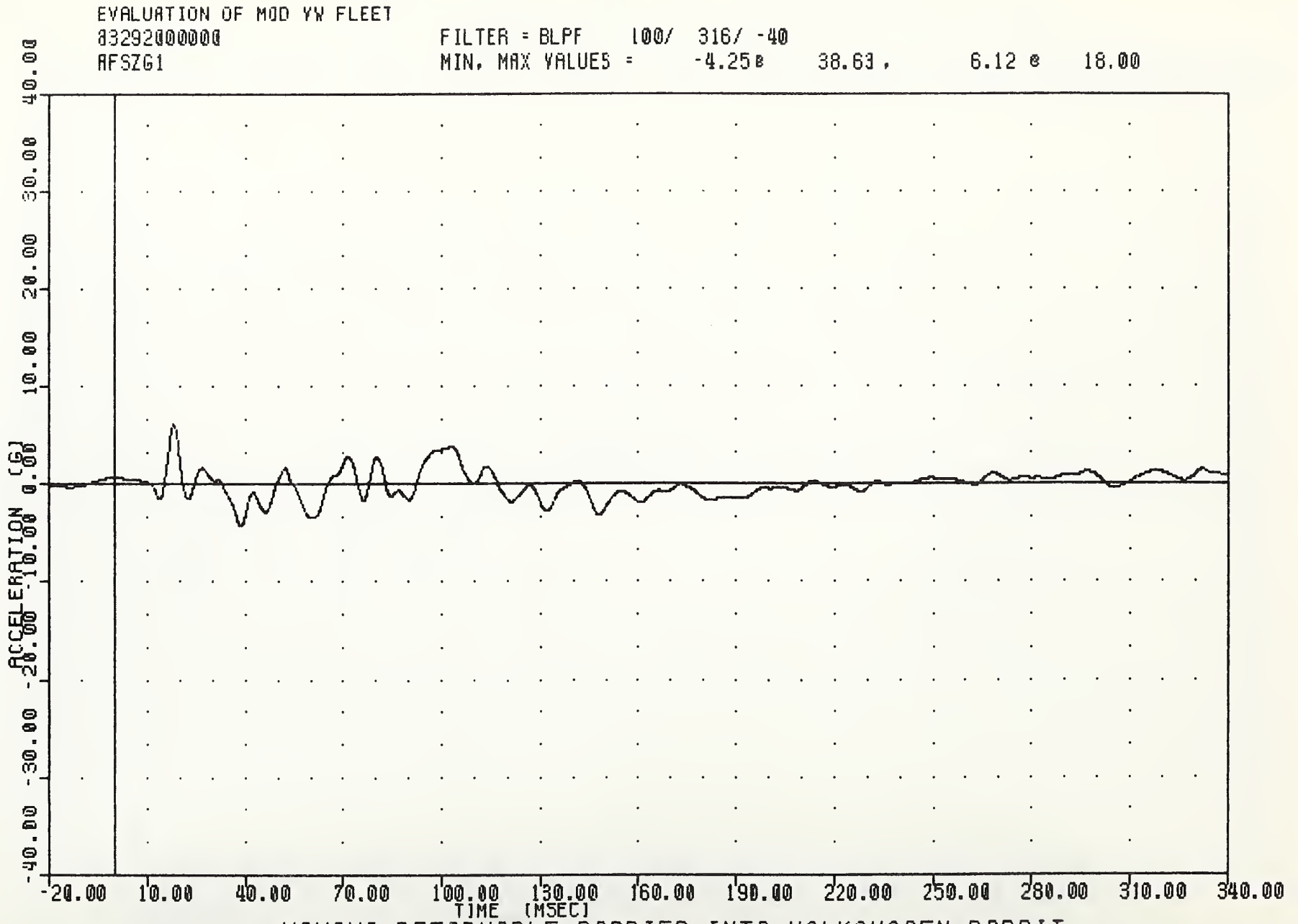
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING PEVYG3



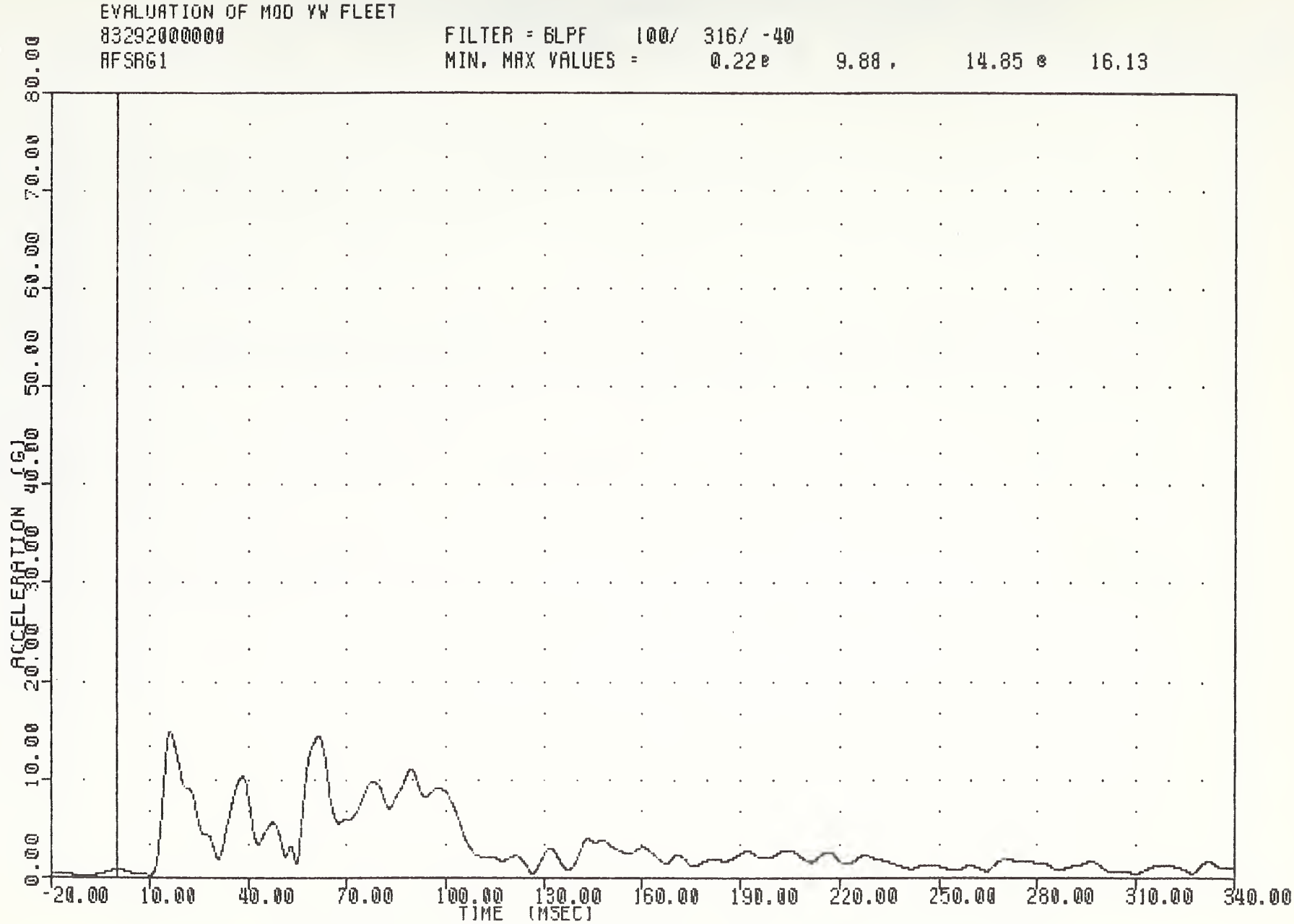
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL ACCELERATION X AXIS



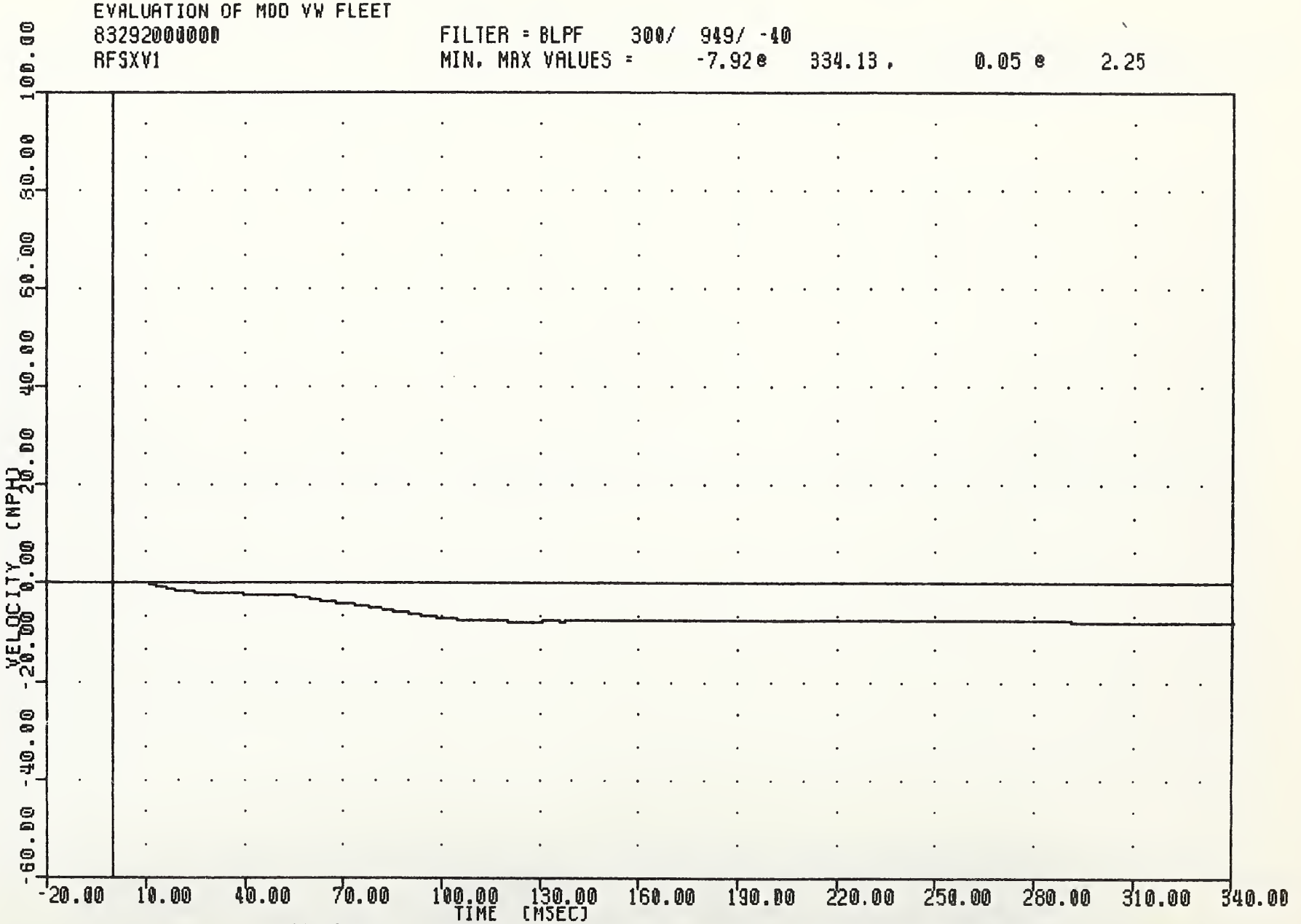
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL ACCELERATION Y AXIS



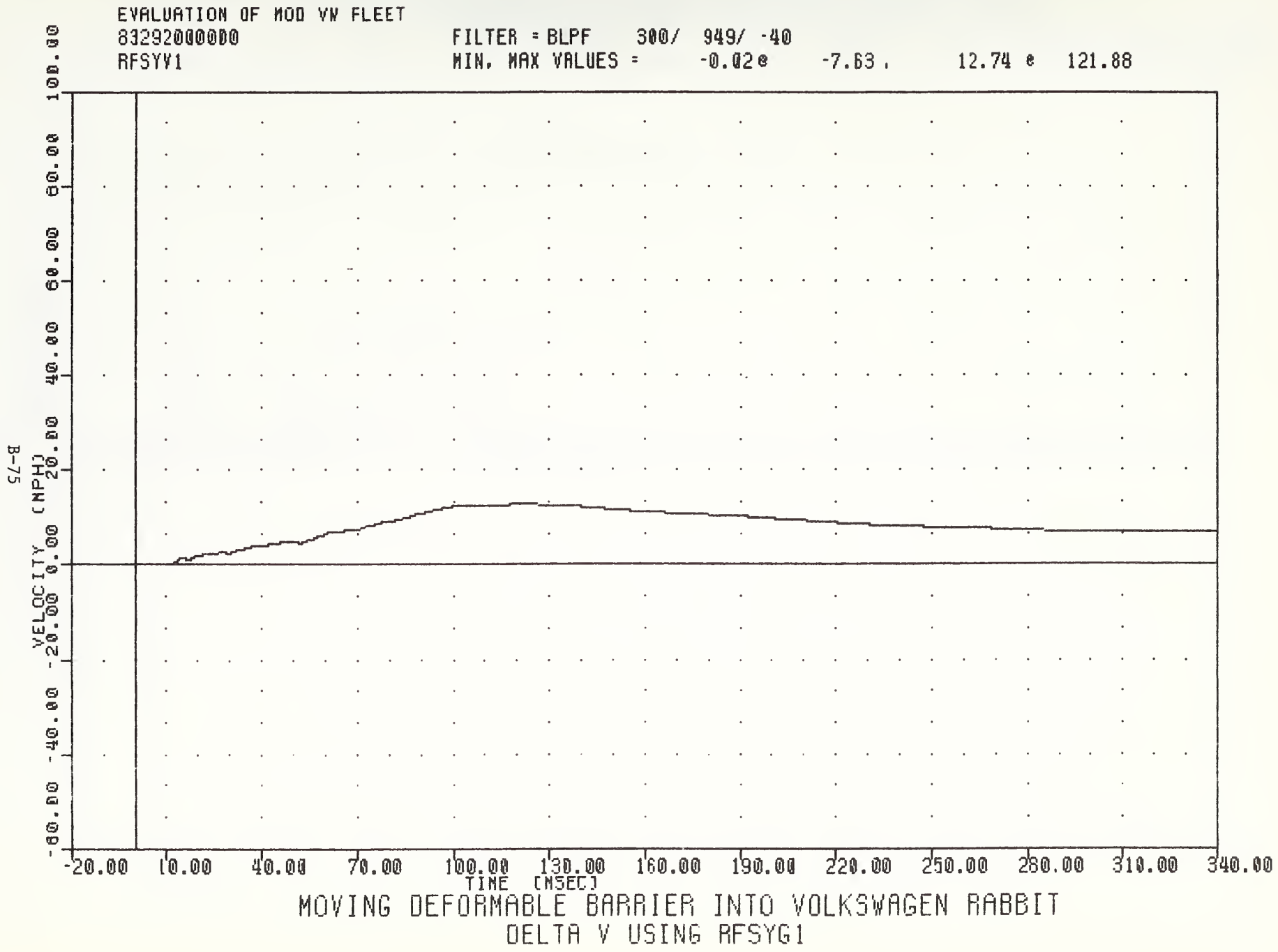
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL ACCELERATION Z AXIS



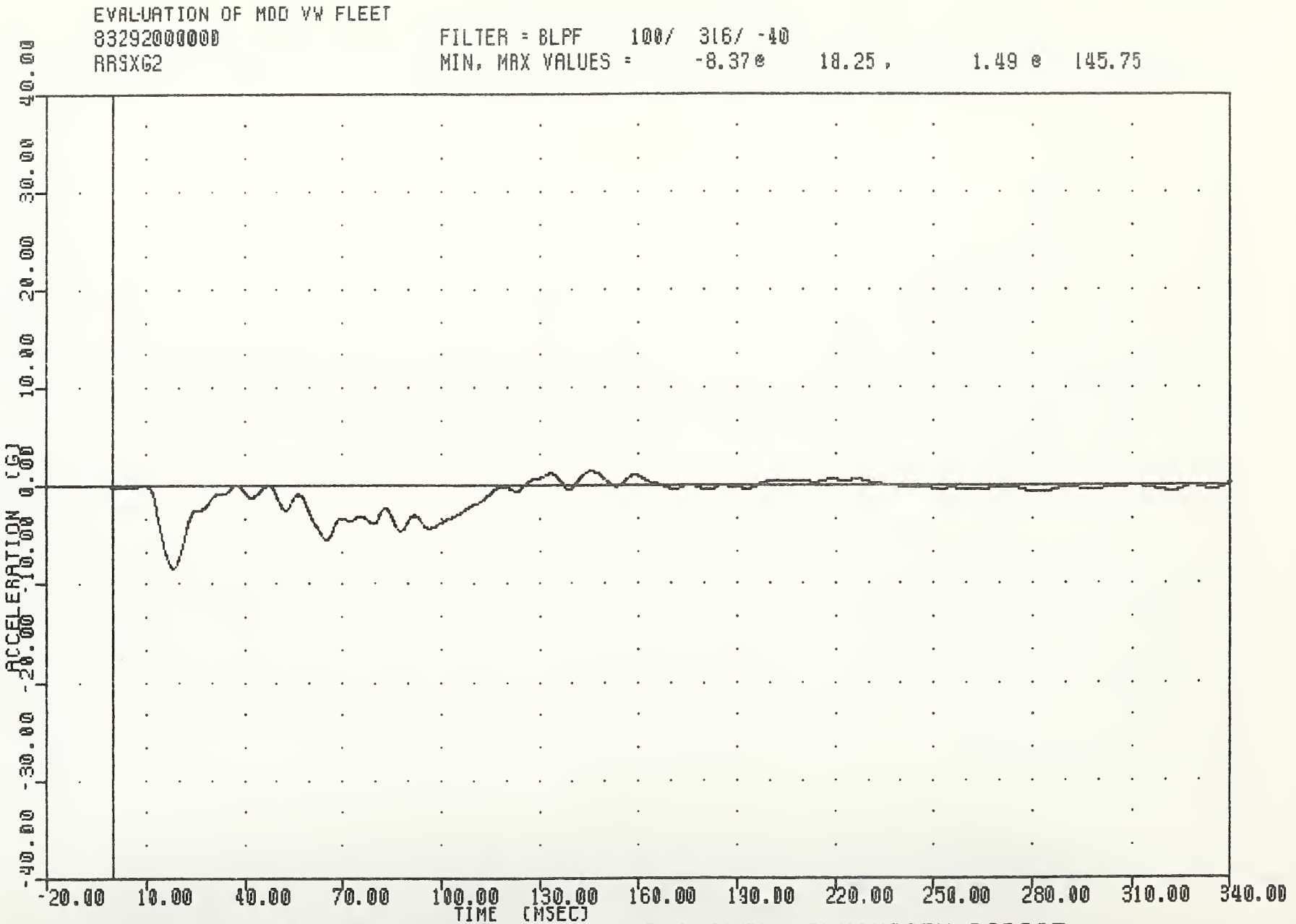
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT FRONT SILL RESULTANT



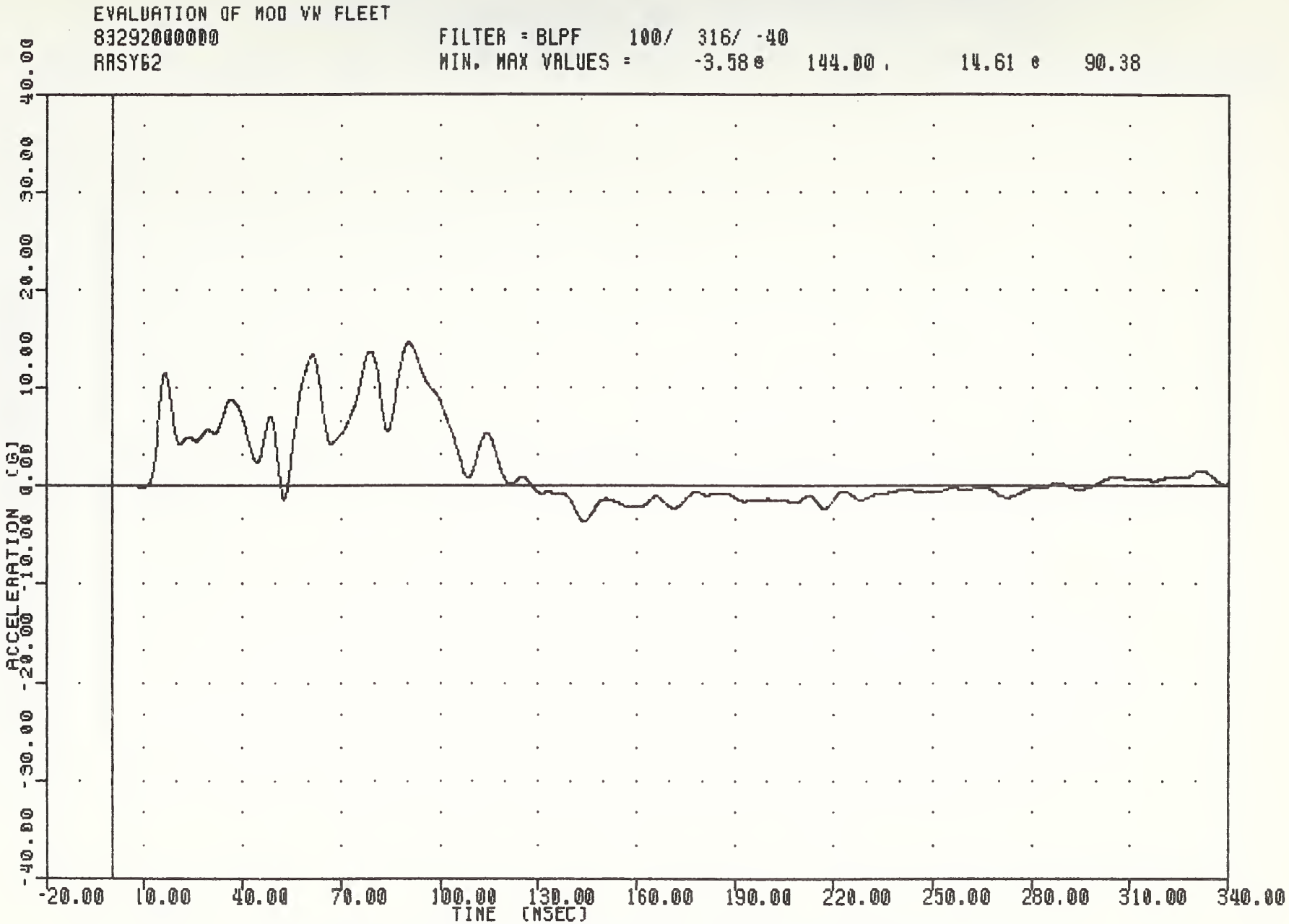
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RFSXG1



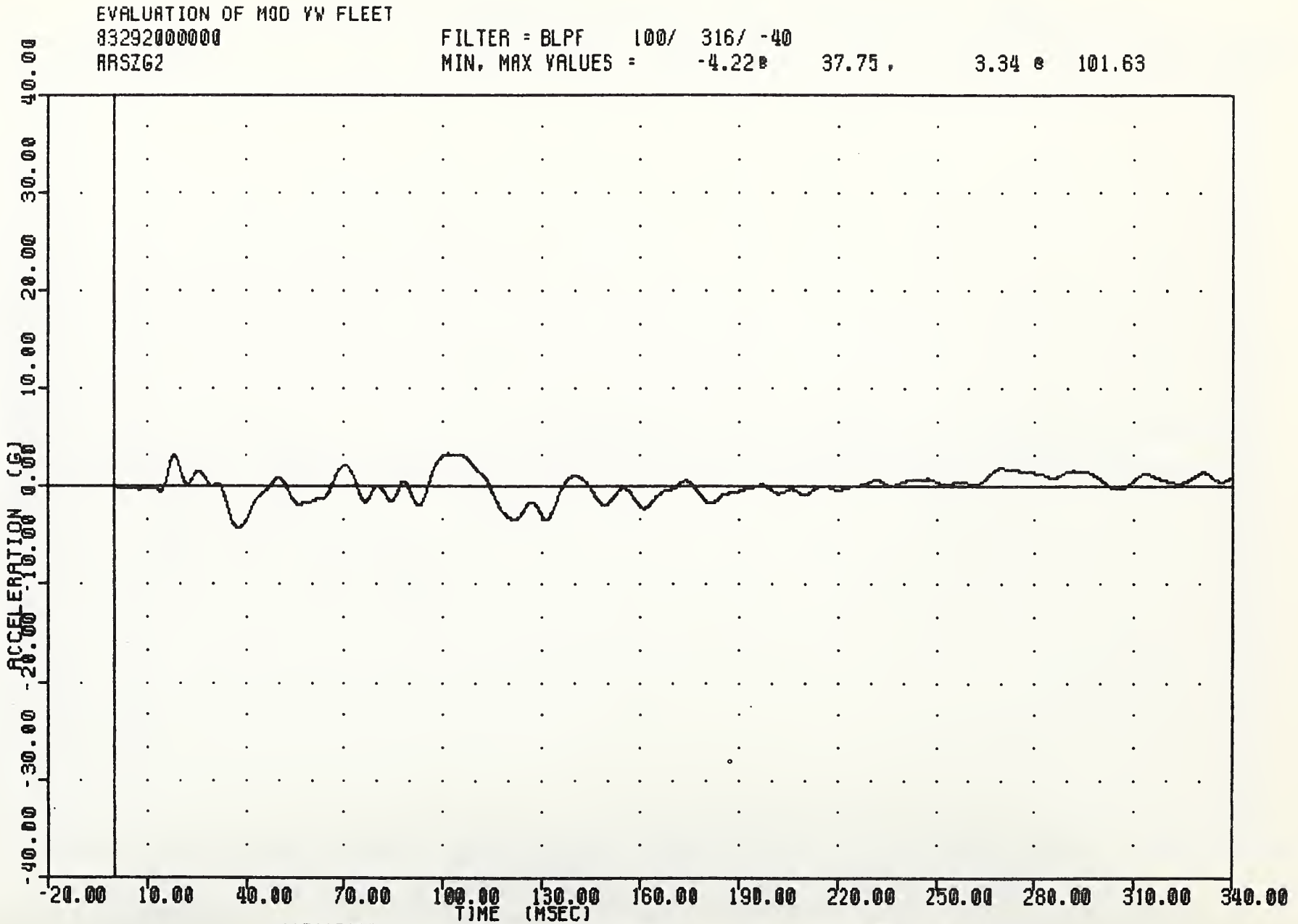
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RFSYG1



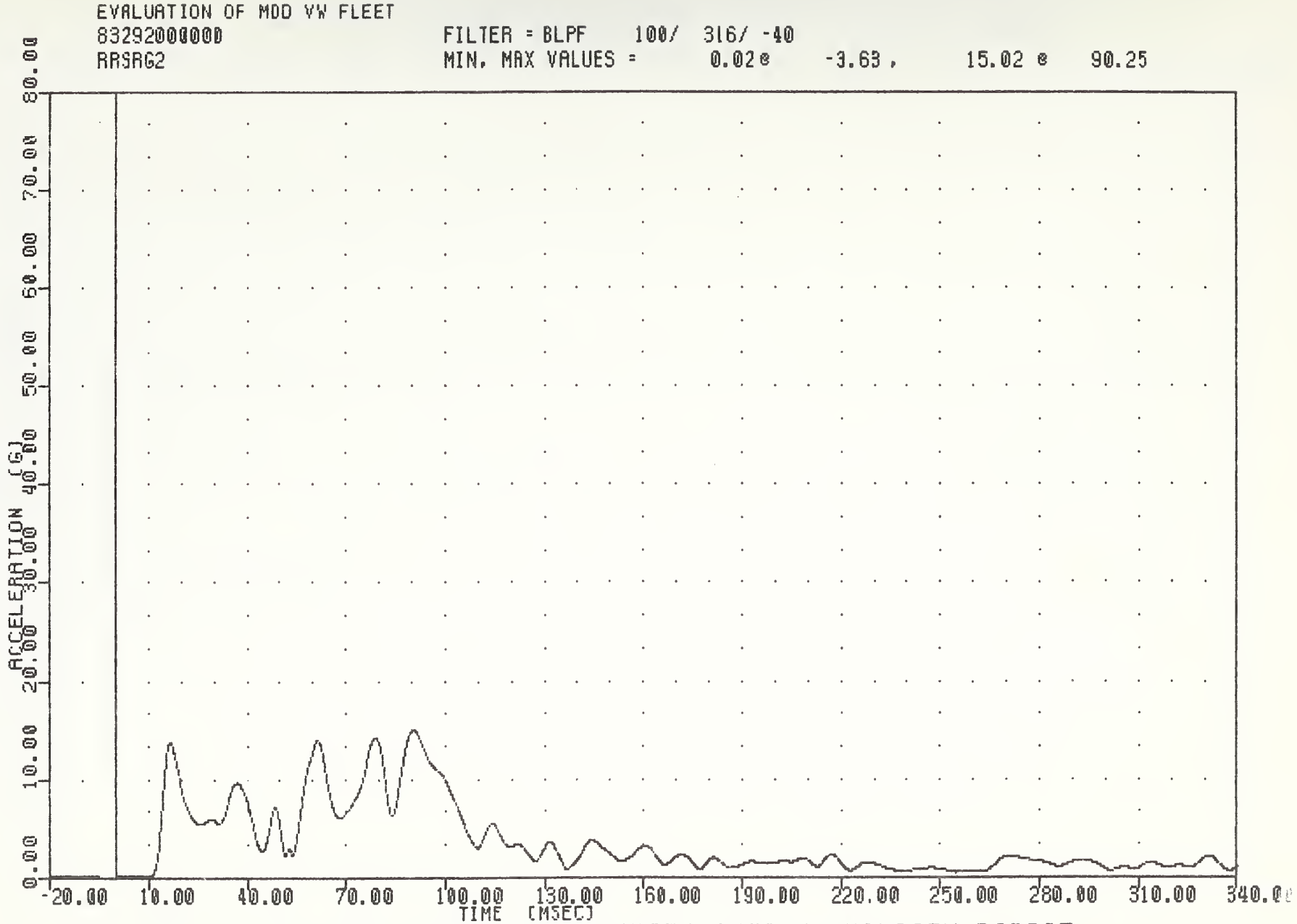
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL ACCELERATION X AXIS



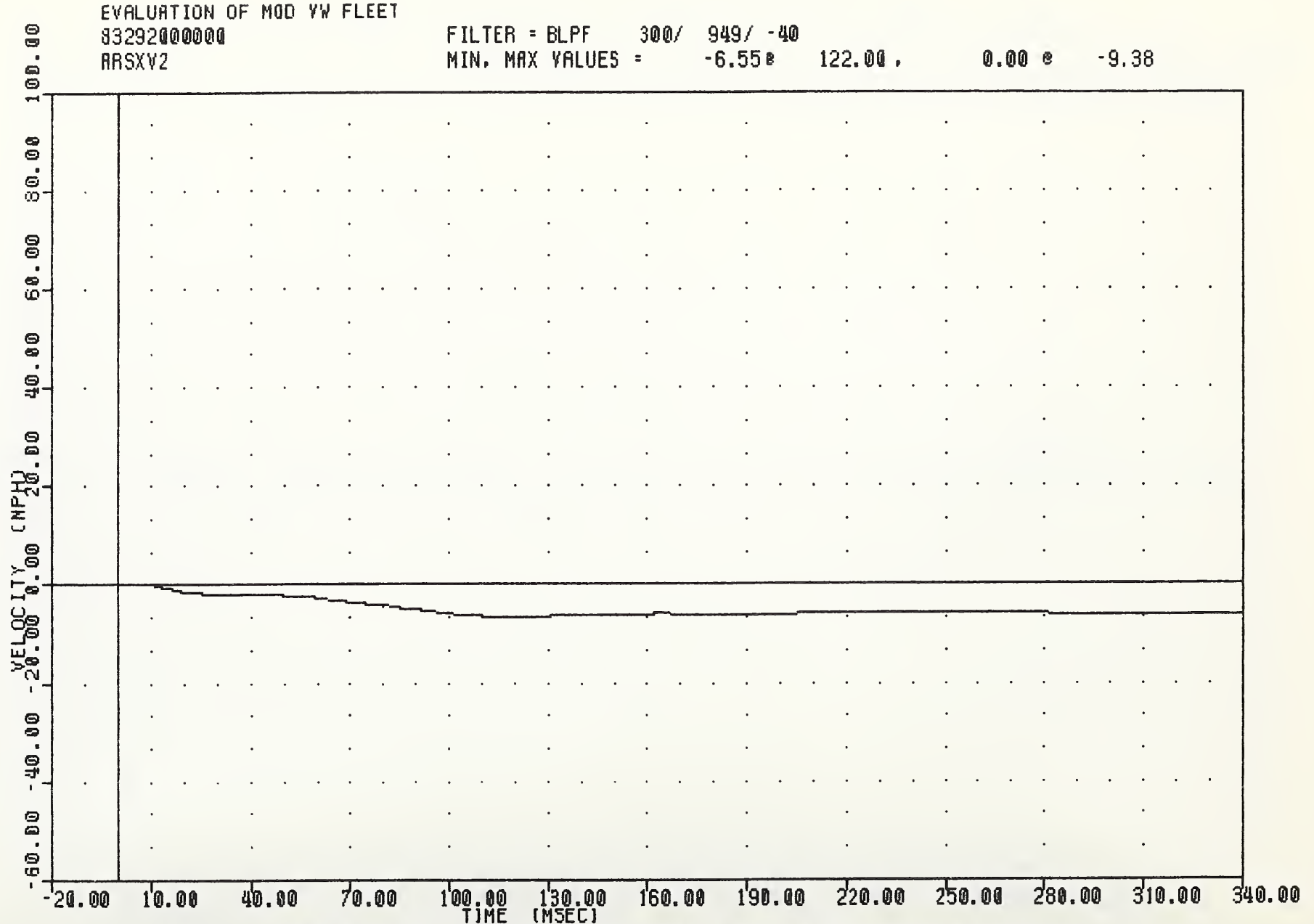
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL ACCELERATION Y AXIS



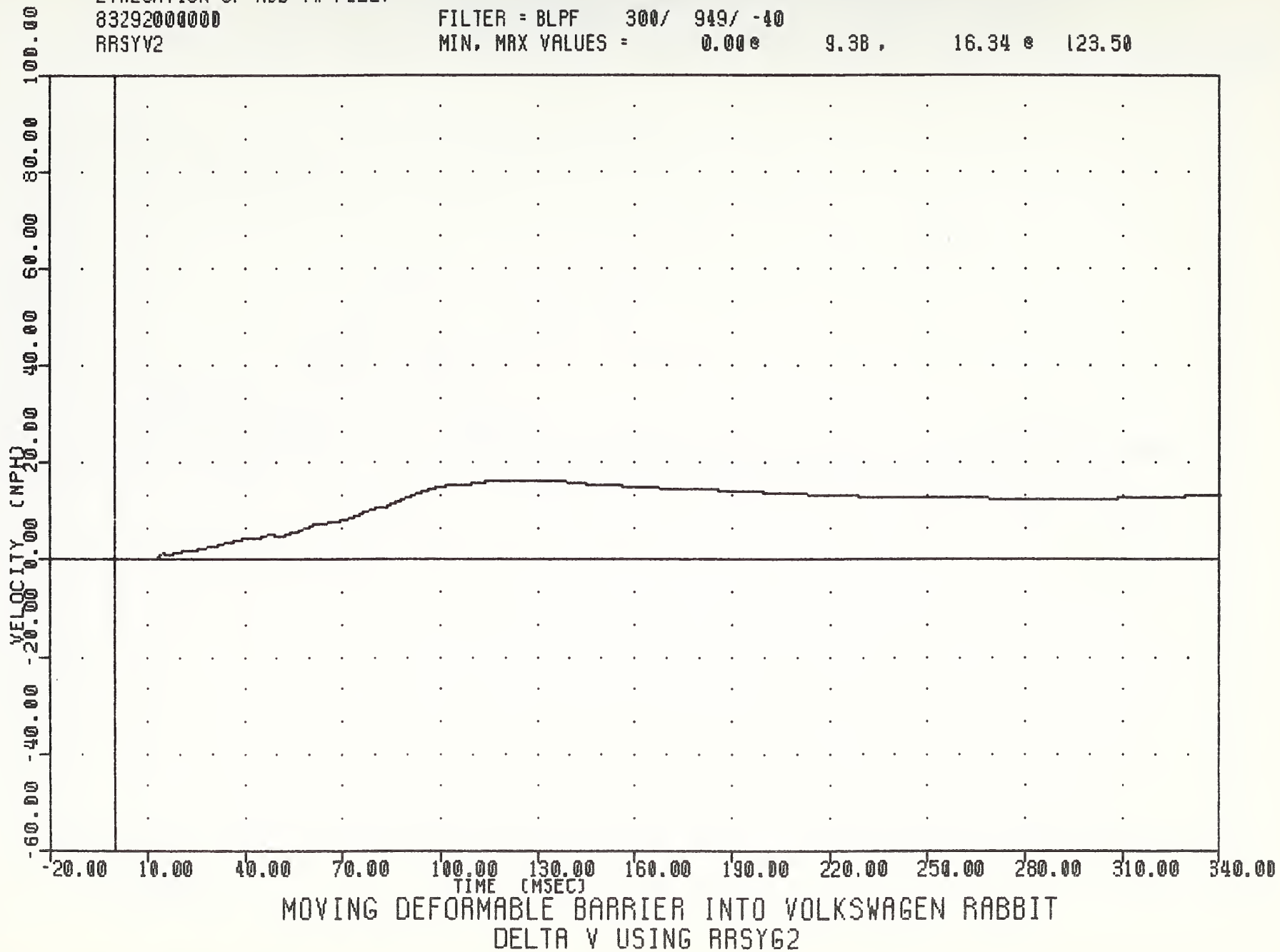
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL ACCELERATION Z AXIS



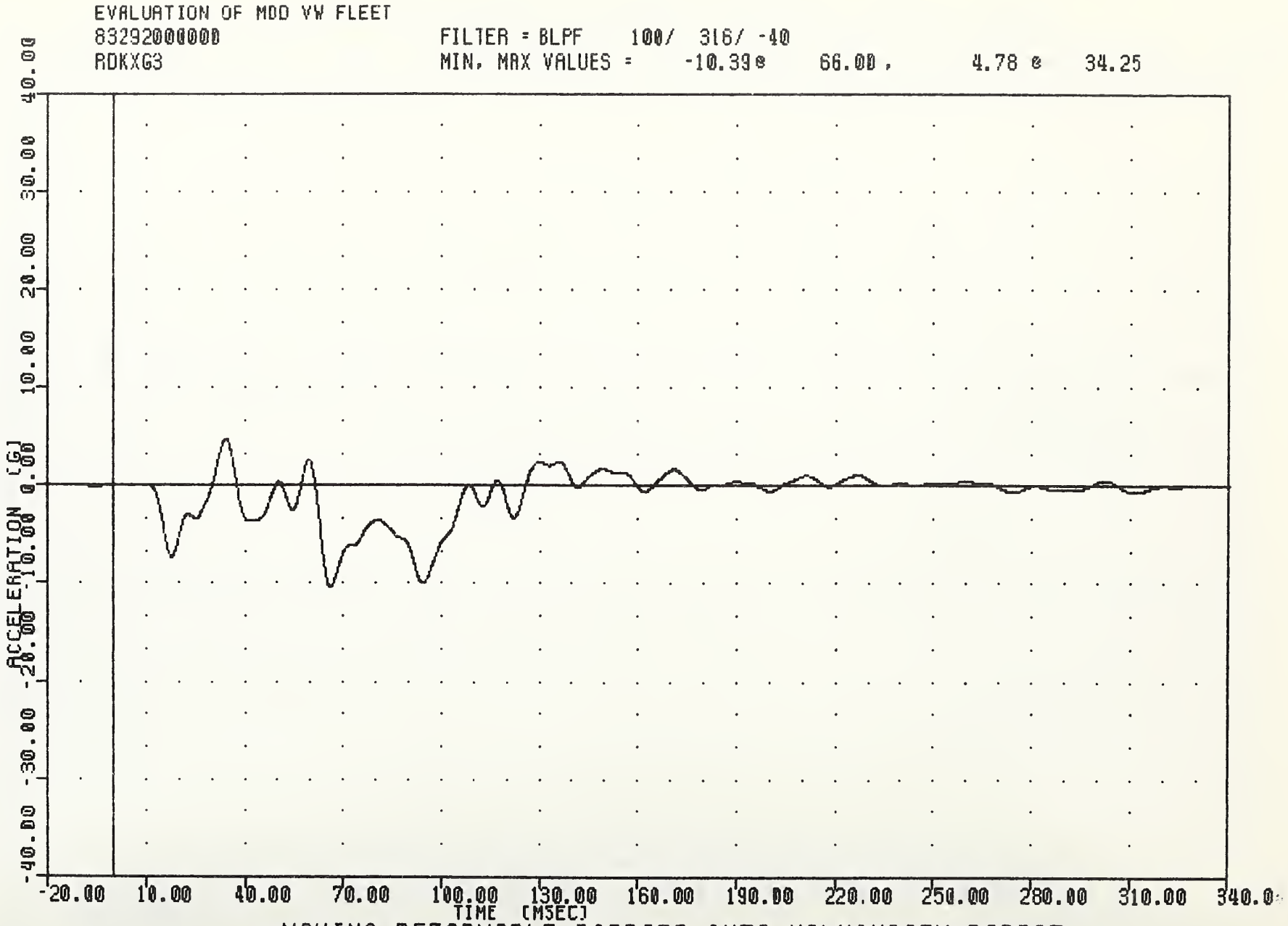
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE RIGHT REAR SILL RESULTANT



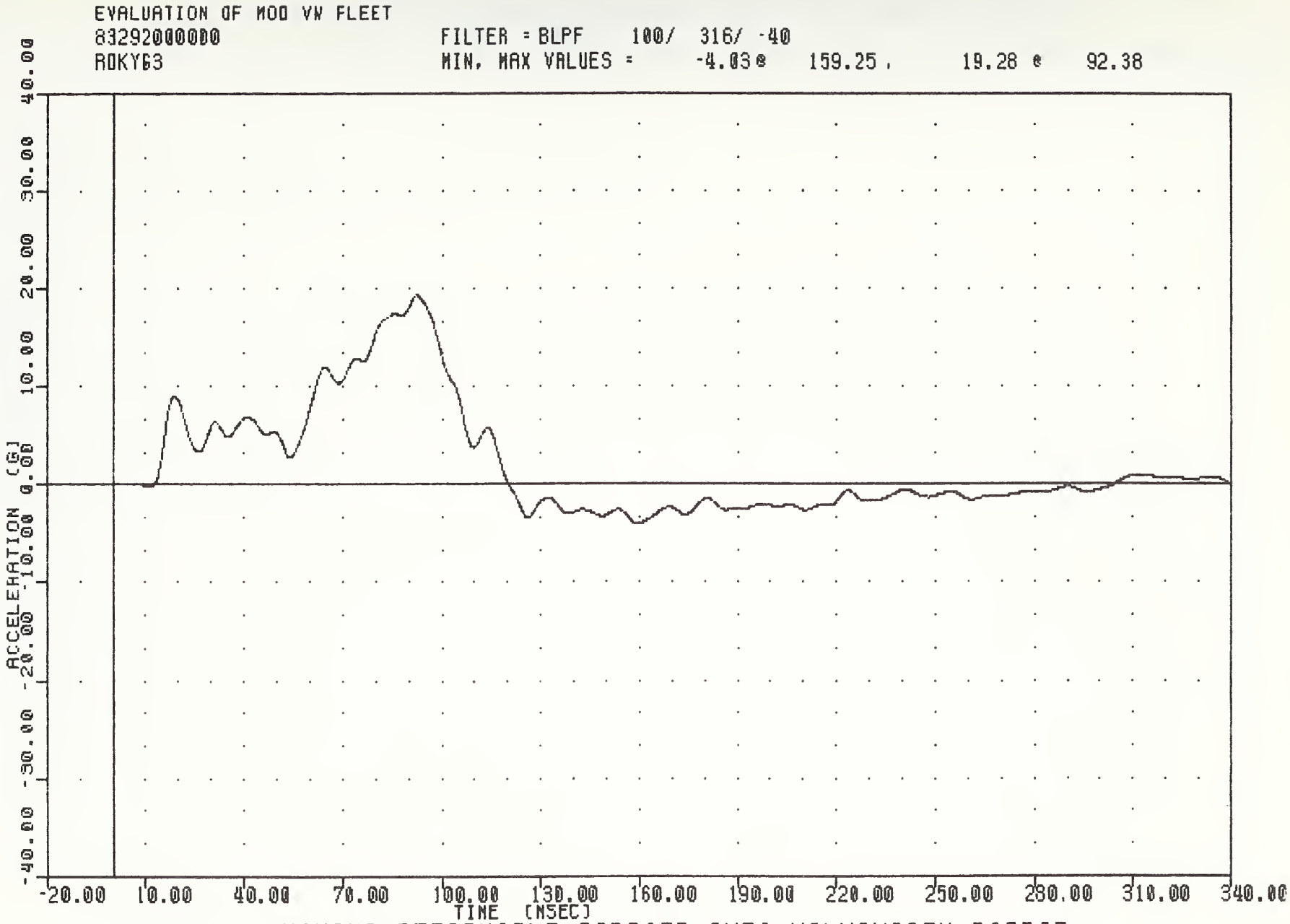
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RRSXG2



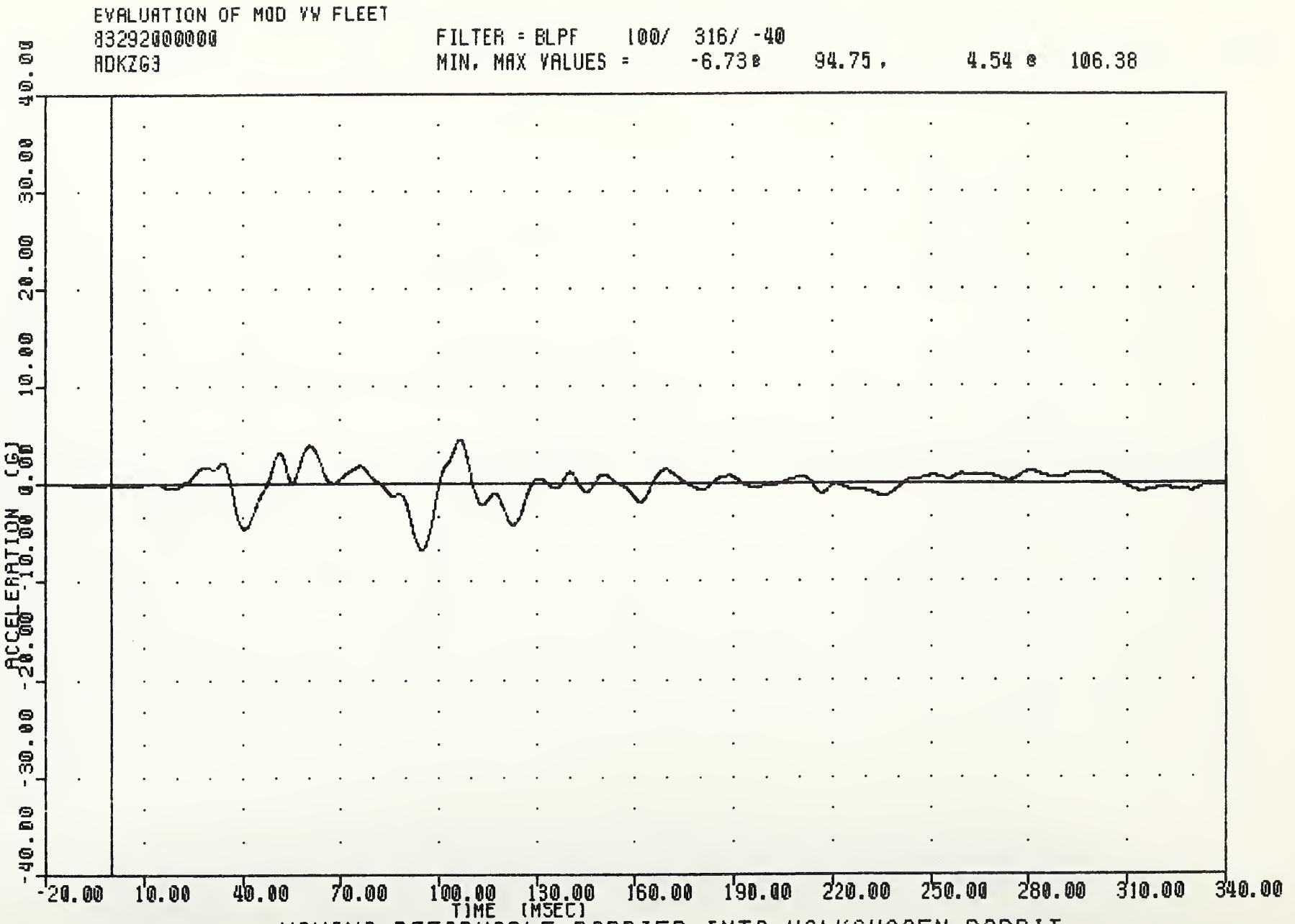
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RRSYG2



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

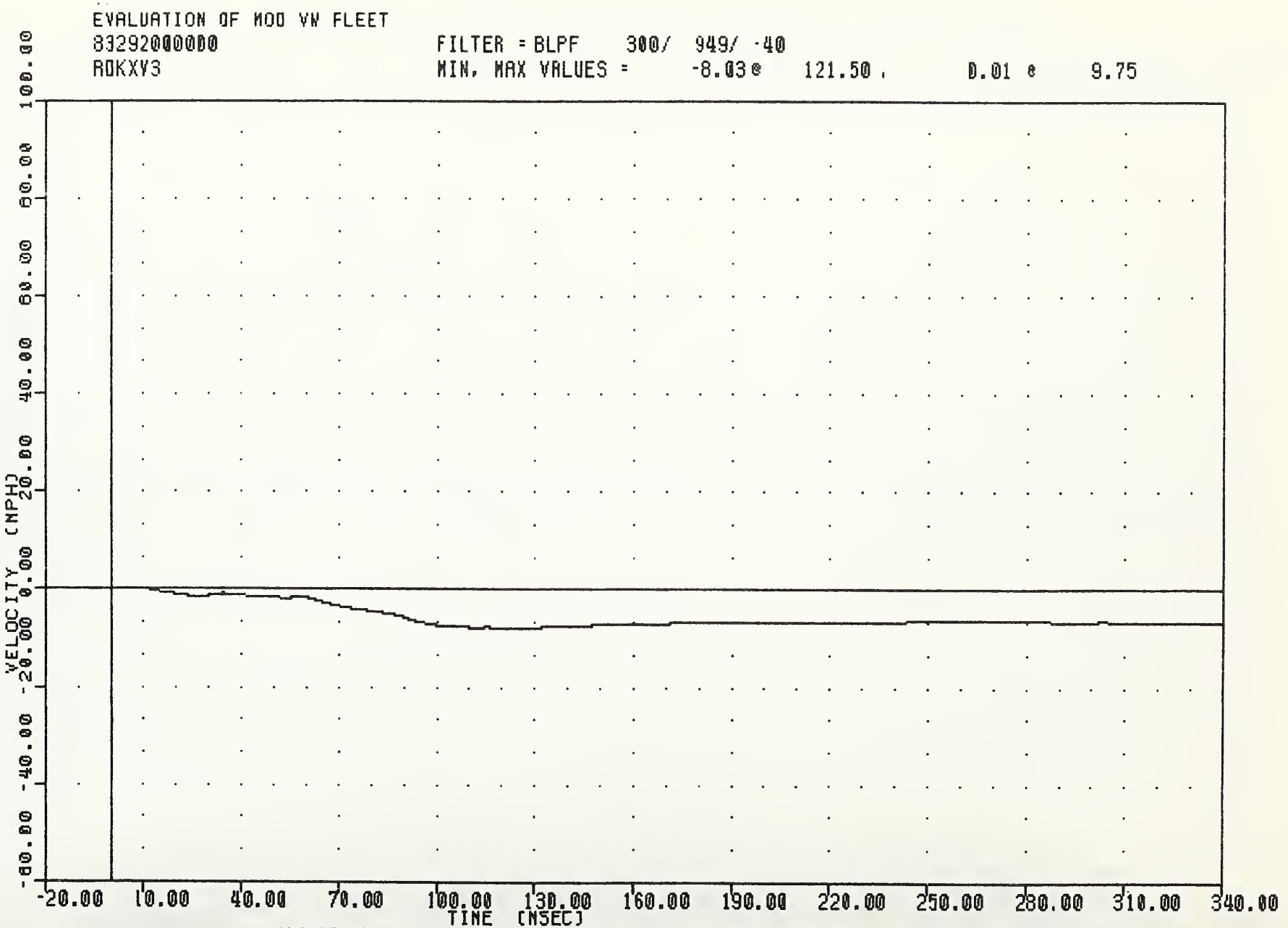


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE REAR DECK ACCELERATION Y AXIS

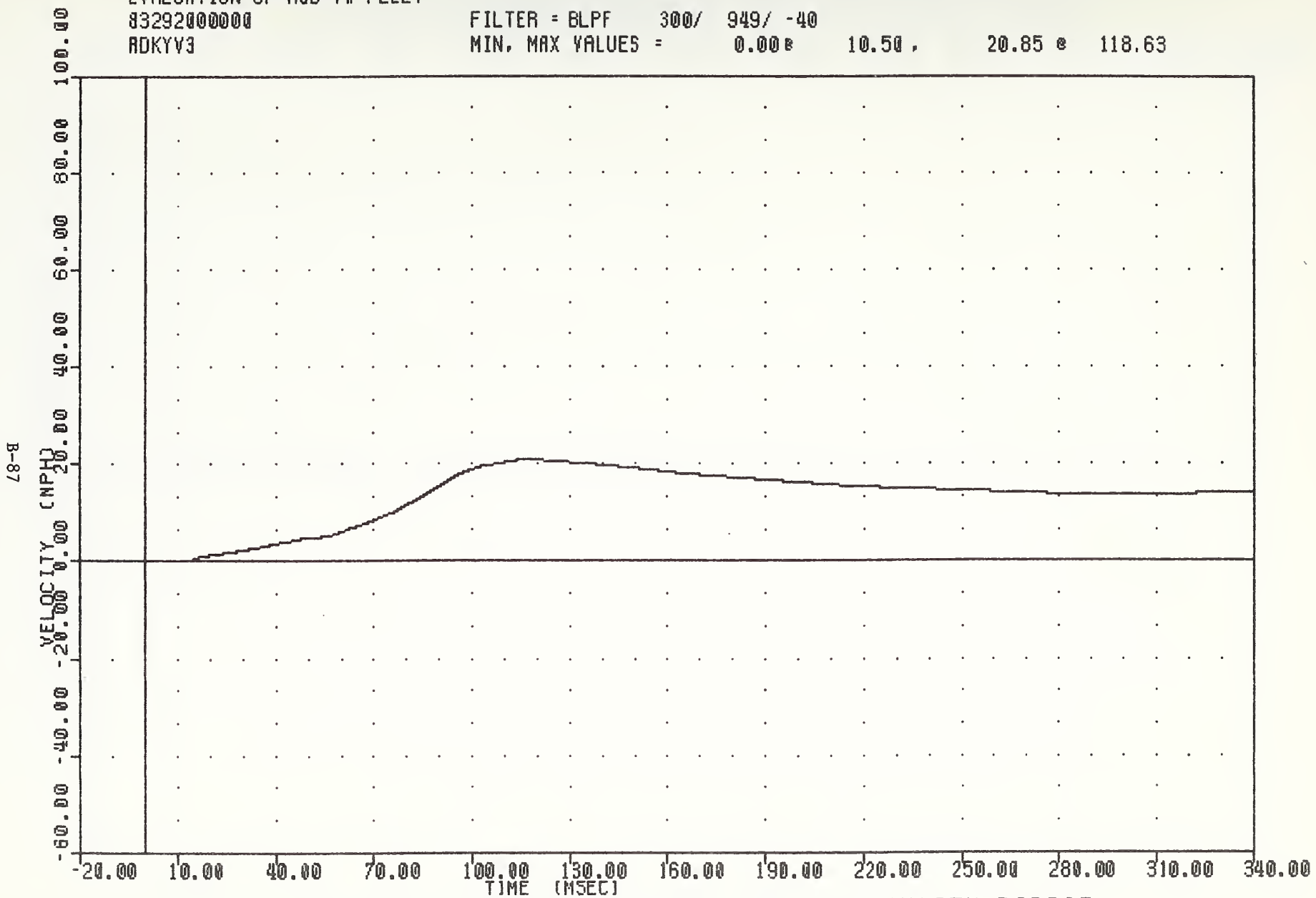


MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE REAR DECK ACCELERATION Z AXIS

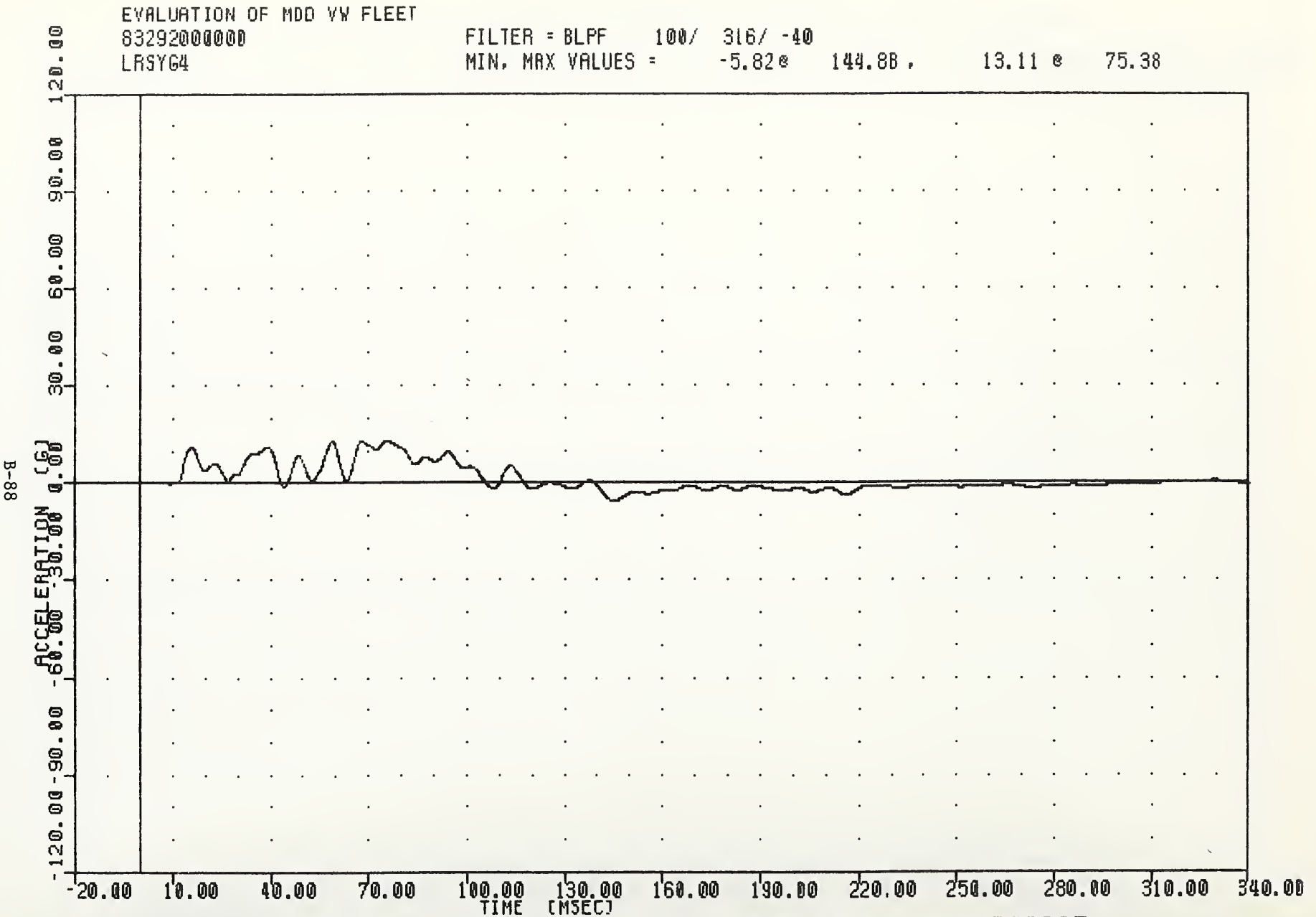
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE REAR DECK RESULTANT



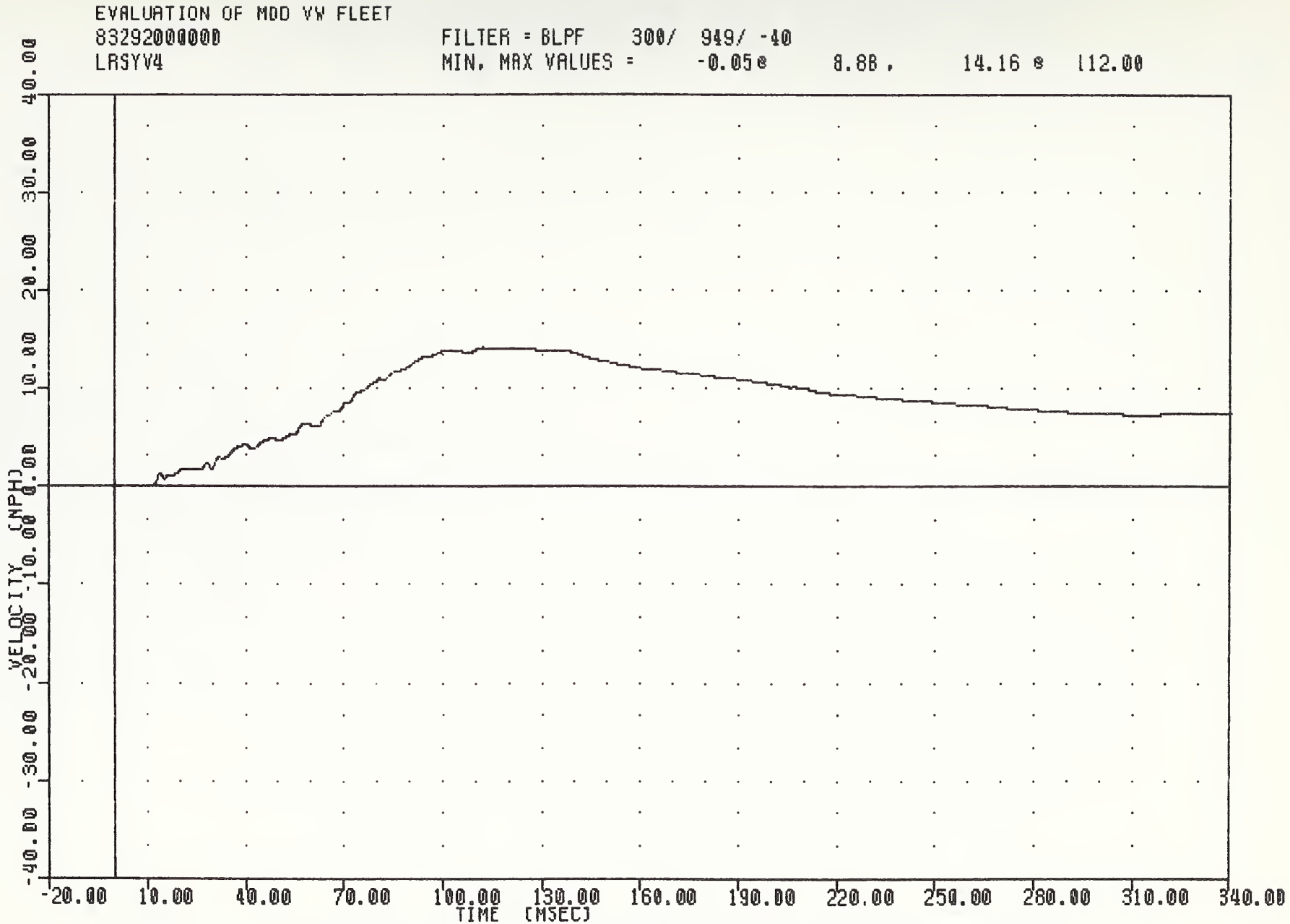
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RDKXG3



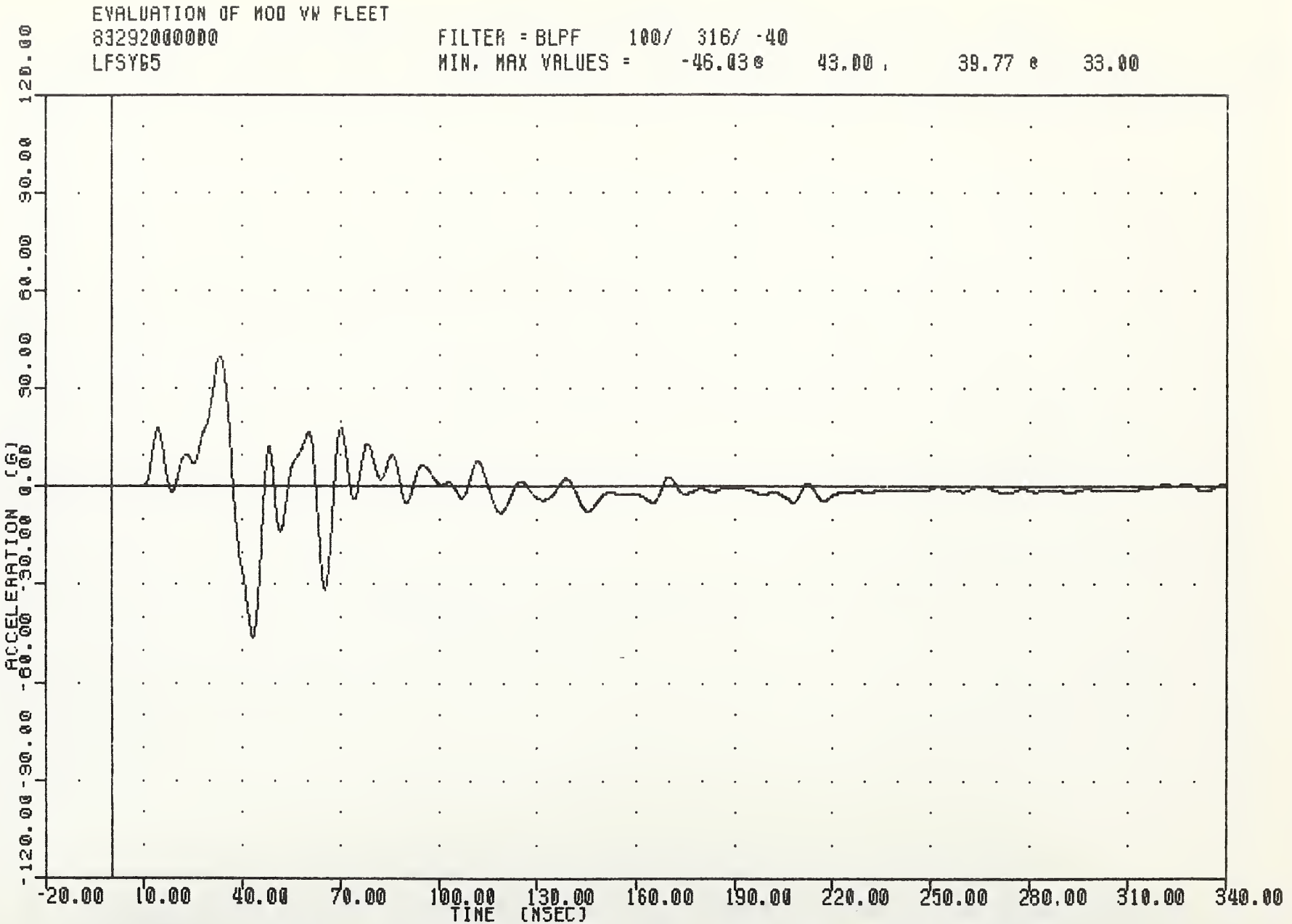
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING RDKYG3



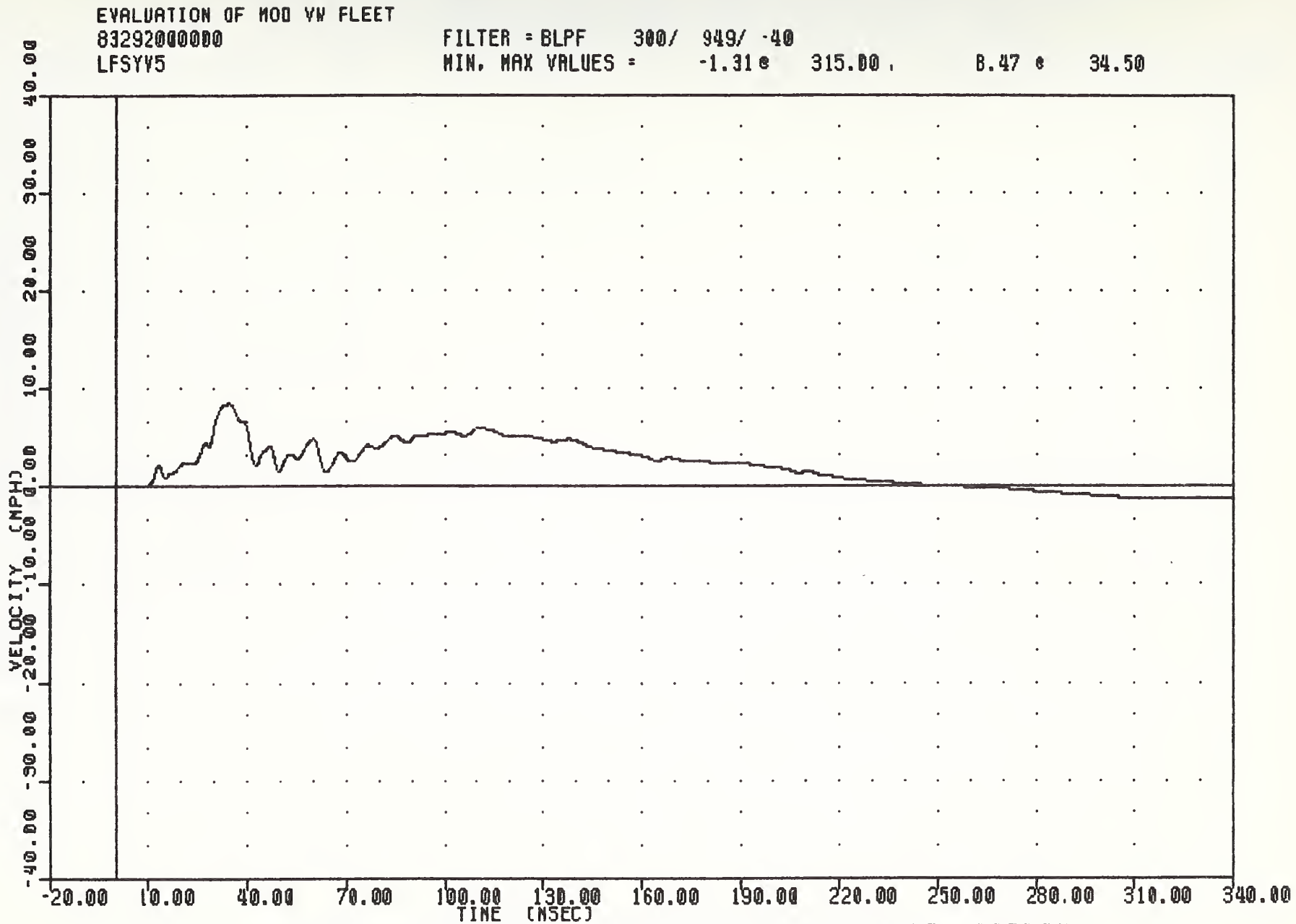
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT REAR SILL ACCELERATION Y AXIS



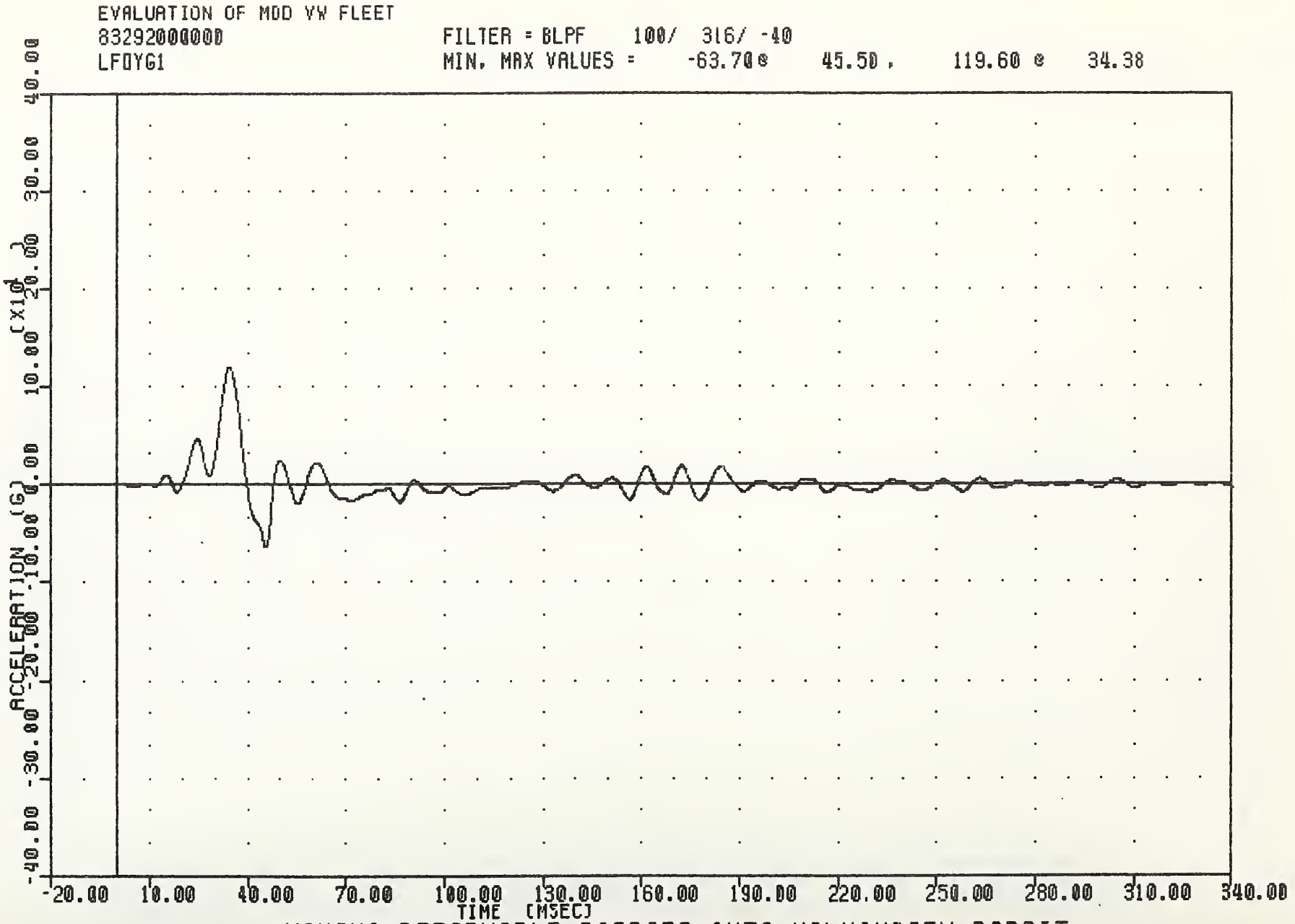
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LRSYG4



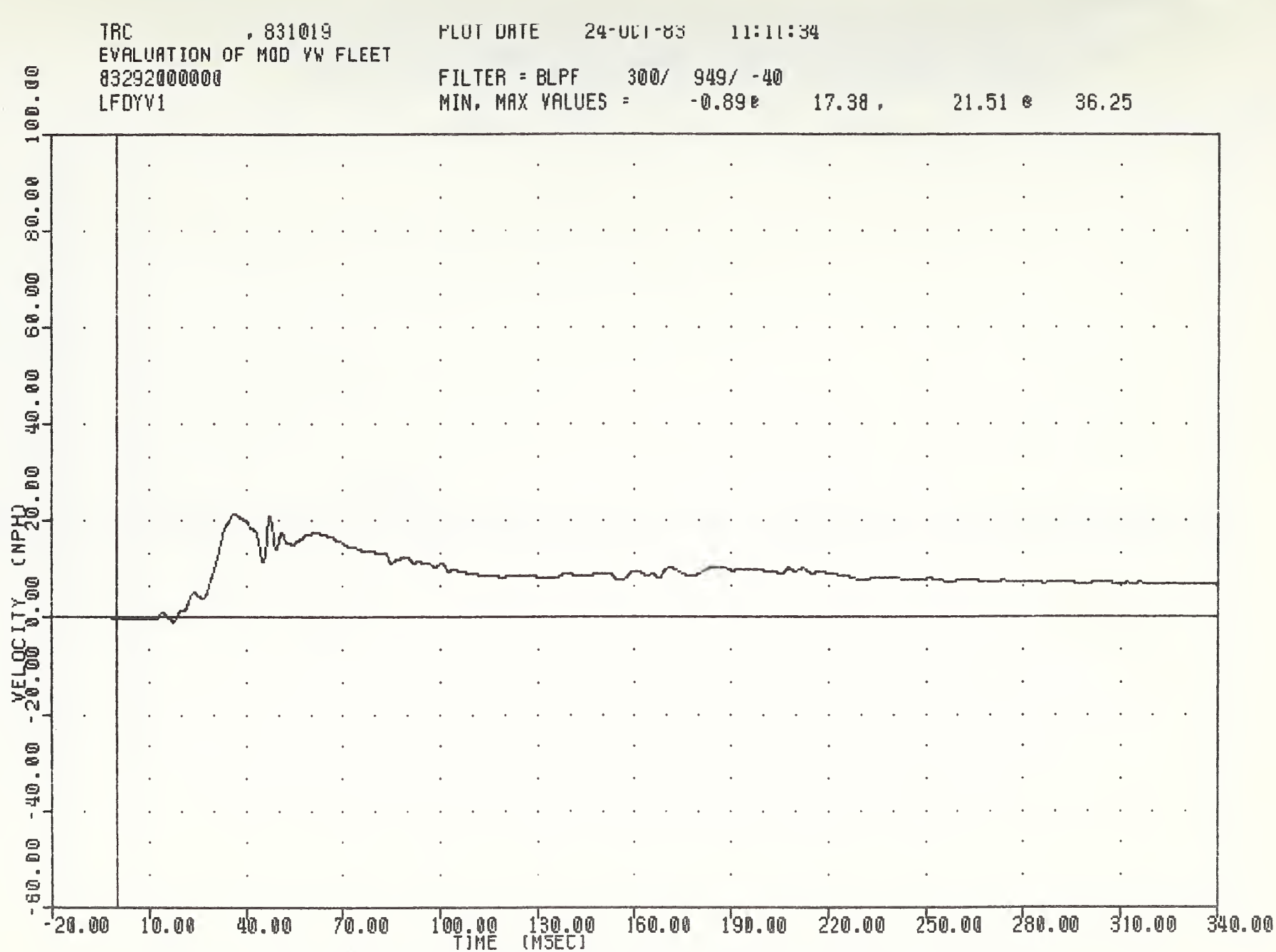
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT SILL ACCELERATION Y AXIS



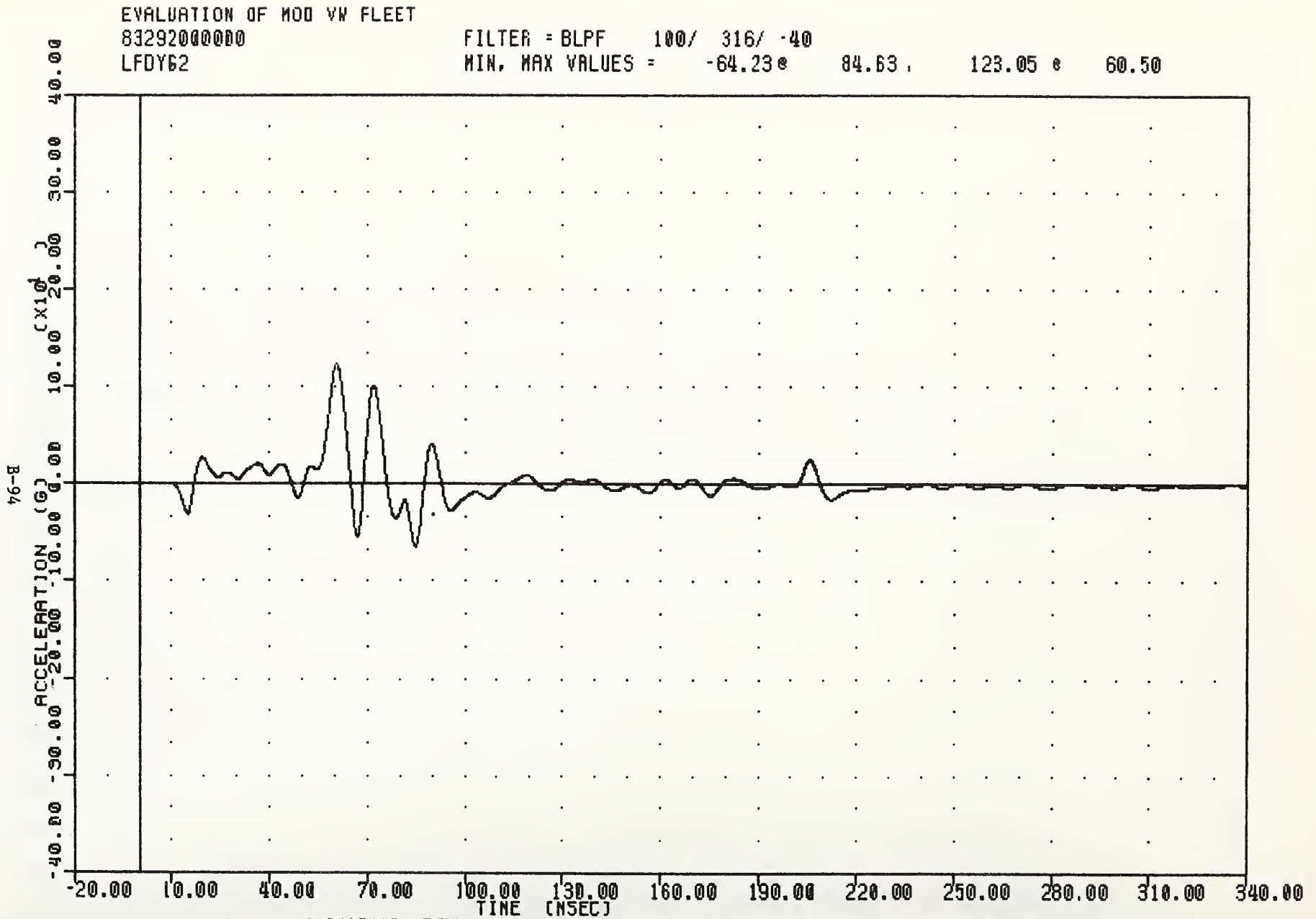
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFSYG5



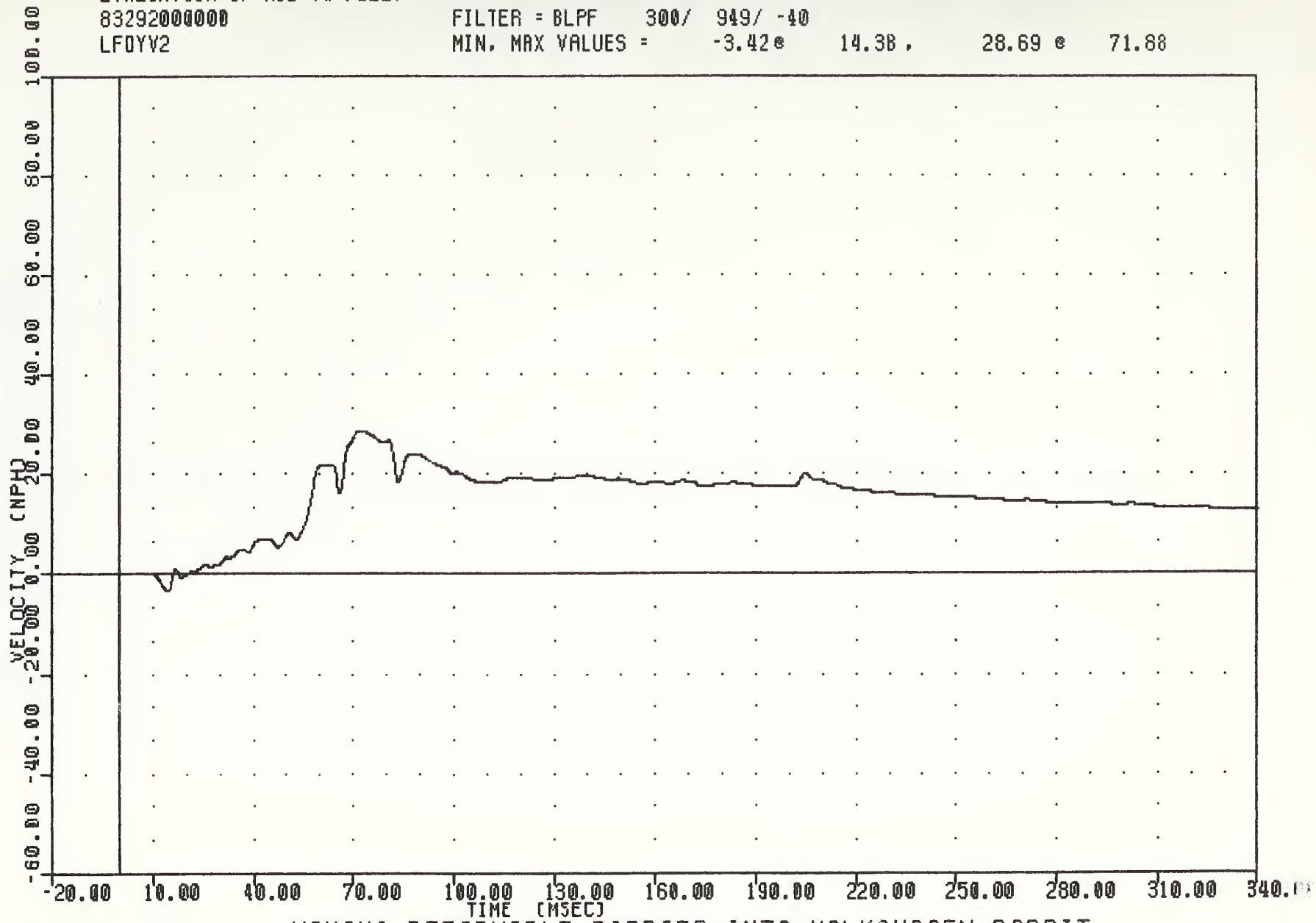
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 6) ACCELERATION Y AXIS



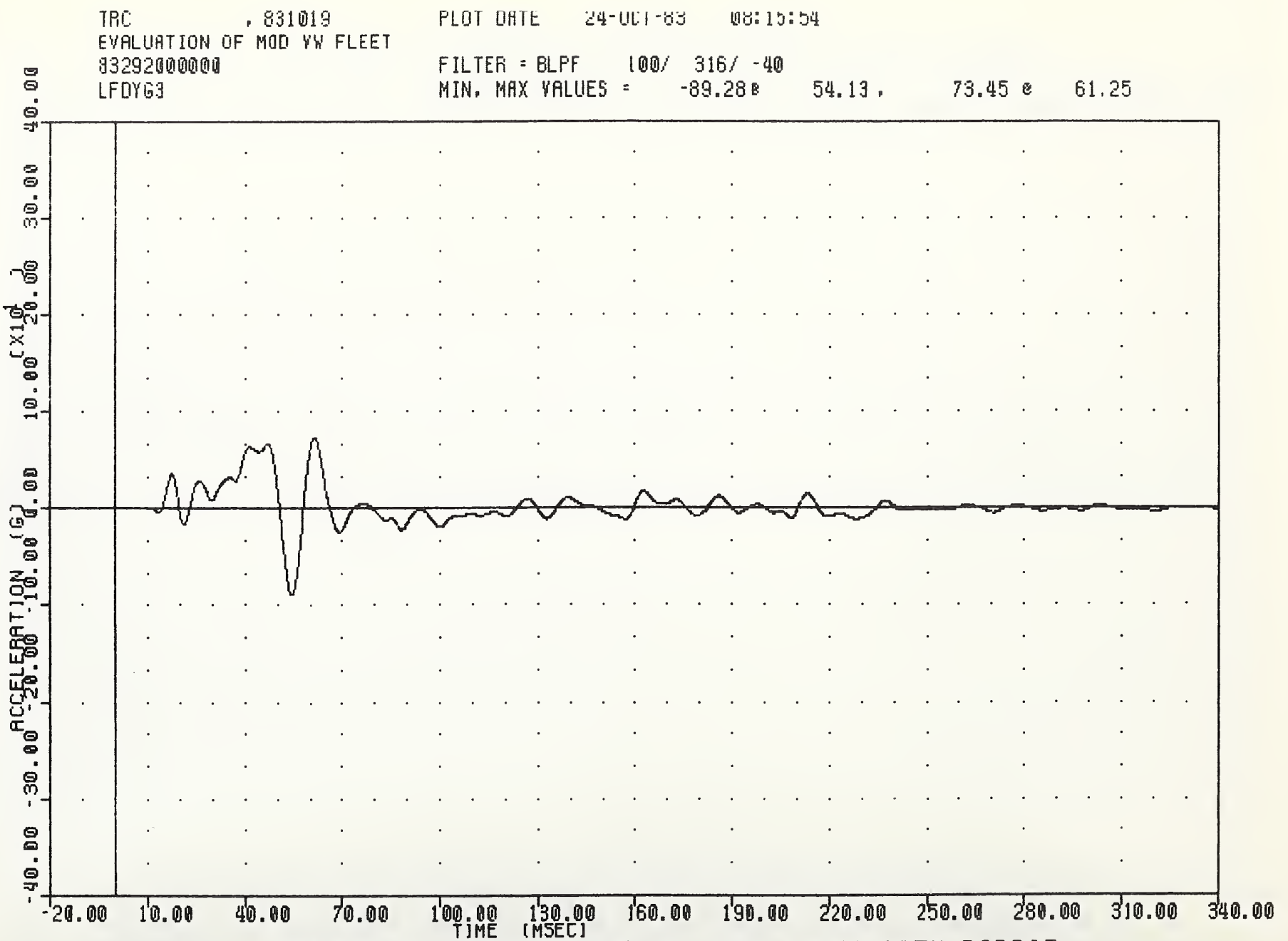
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYG1



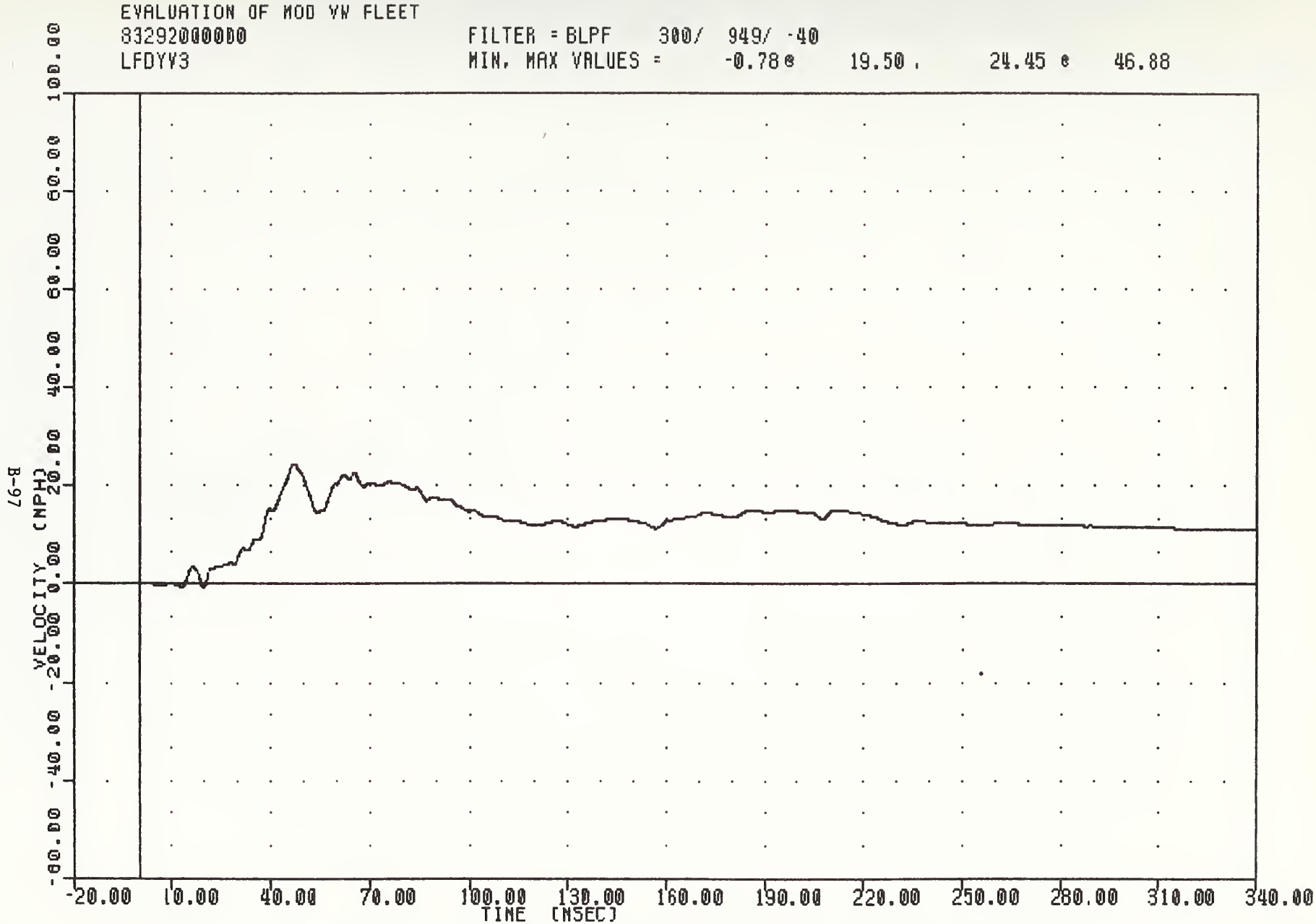
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 8) ACCELERATION Y AXIS



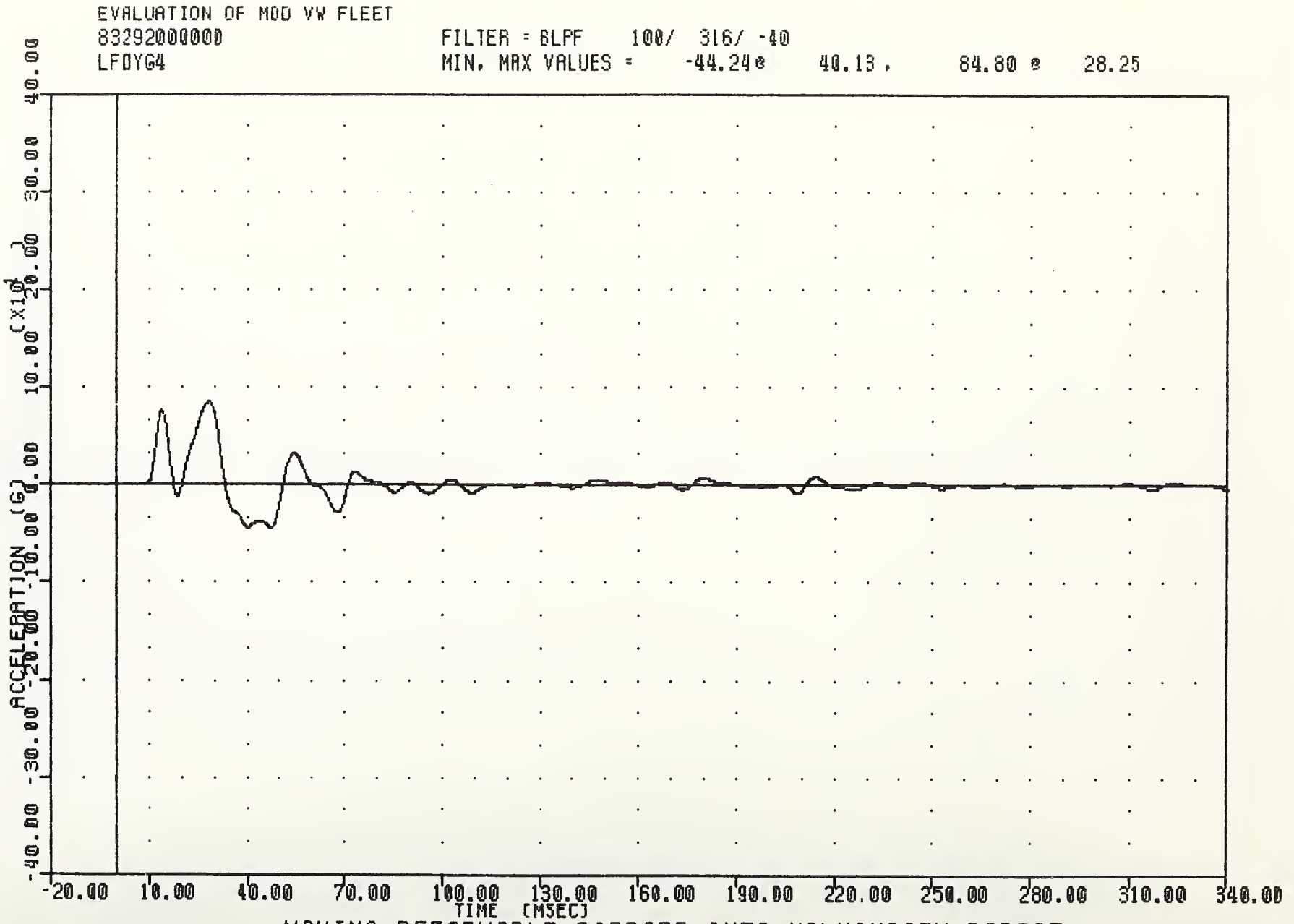
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYG2



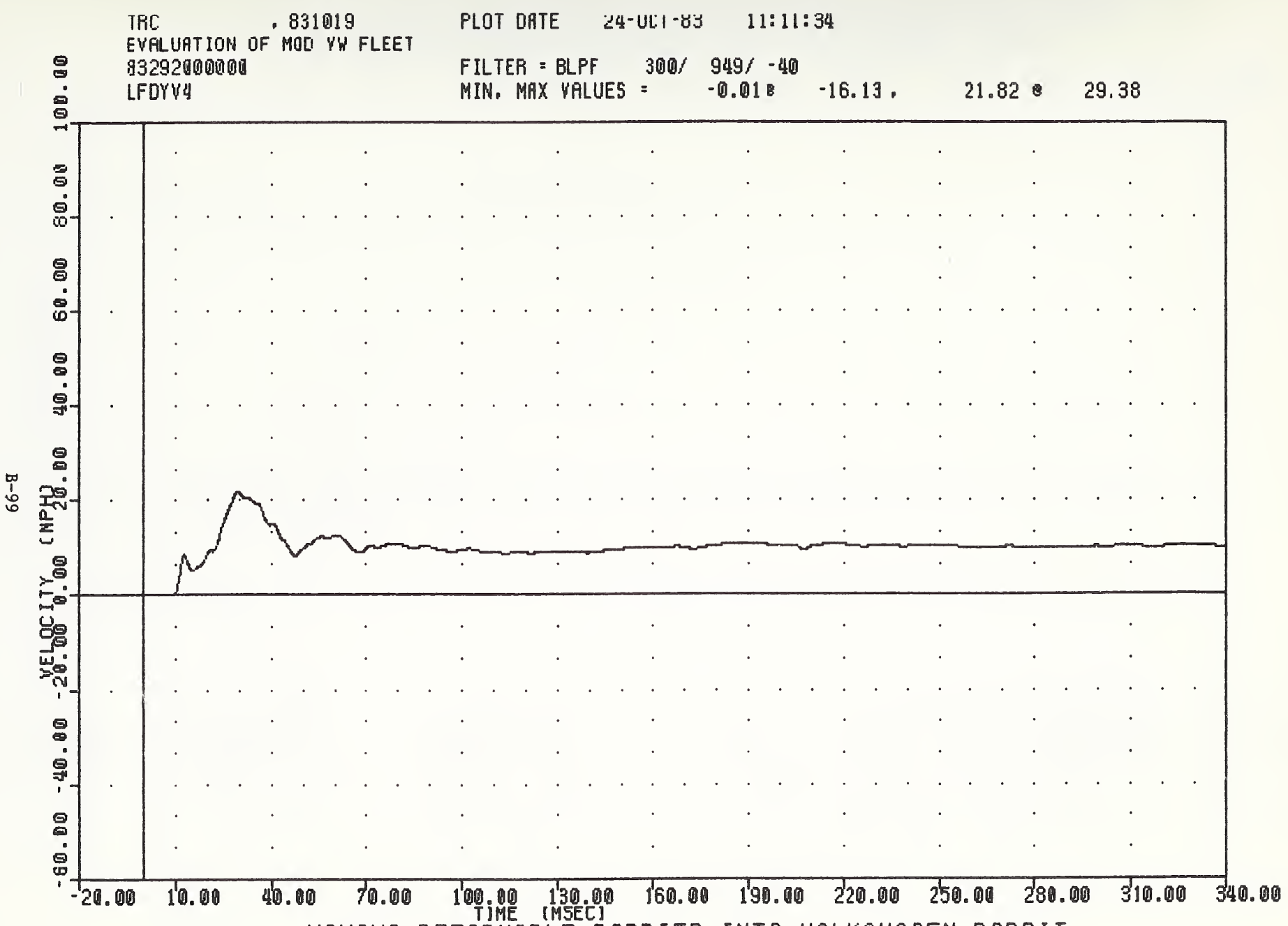
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 9) ACCELERATION Y AXIS



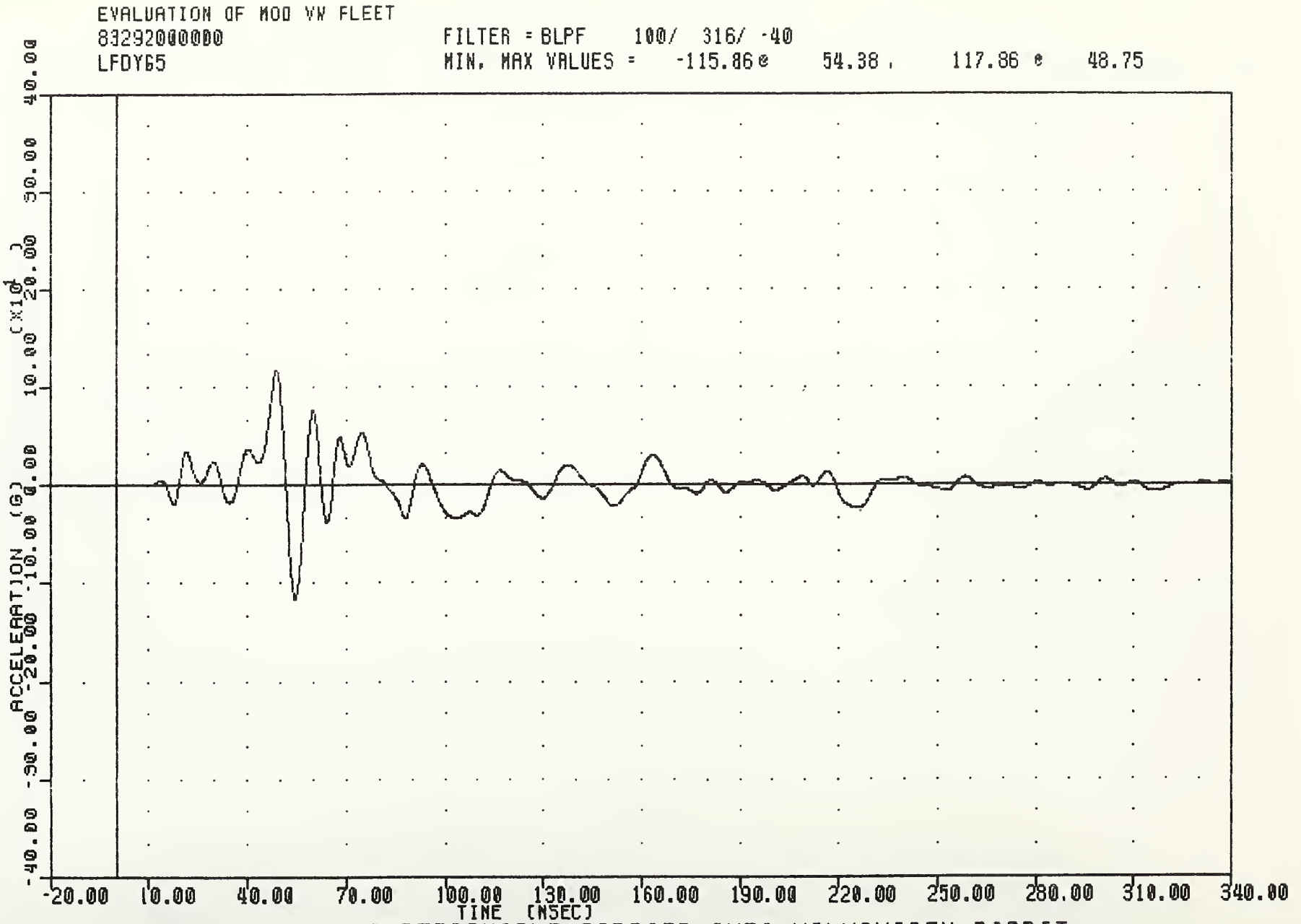
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYG3



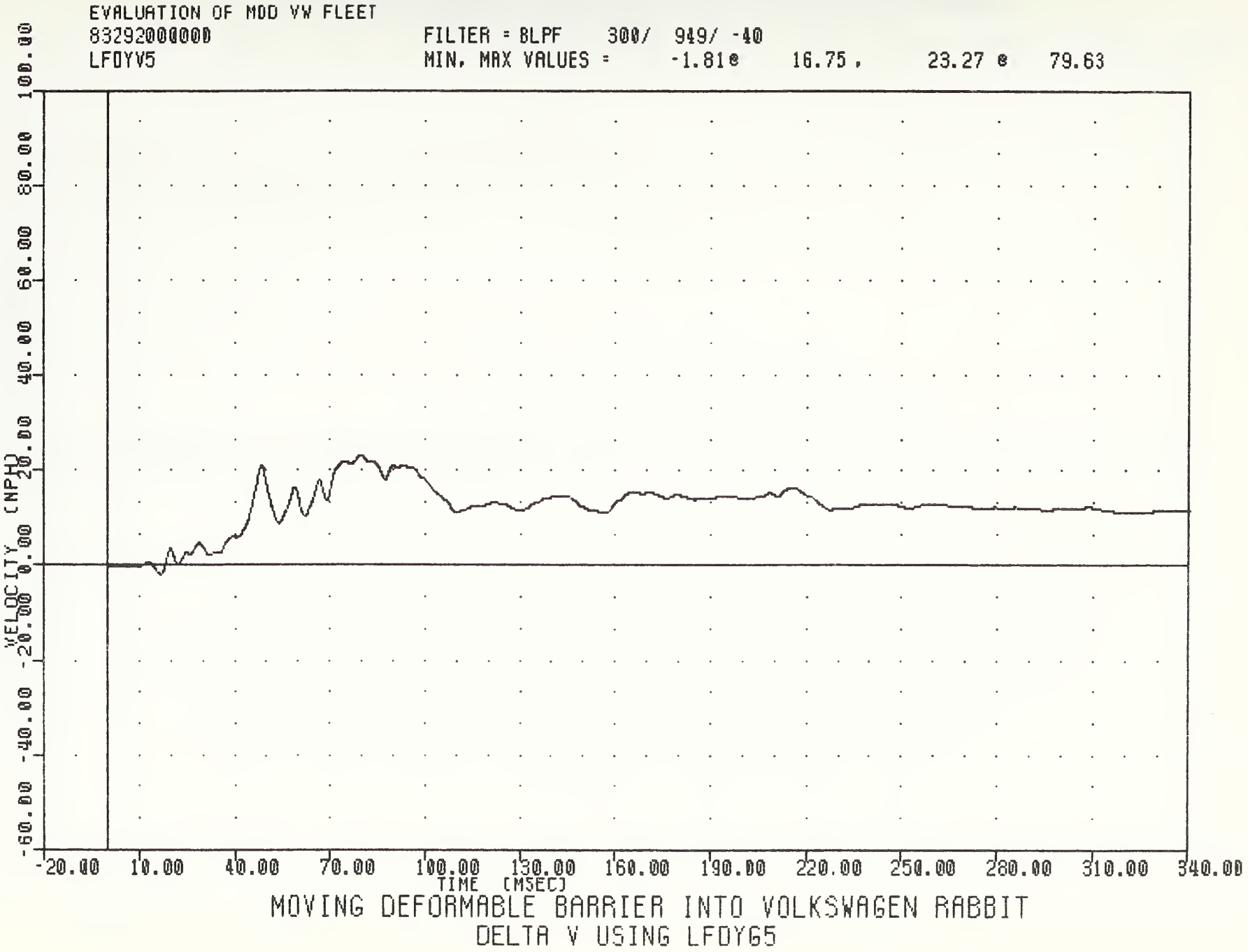
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 10) ACCELERATION Y AXIS



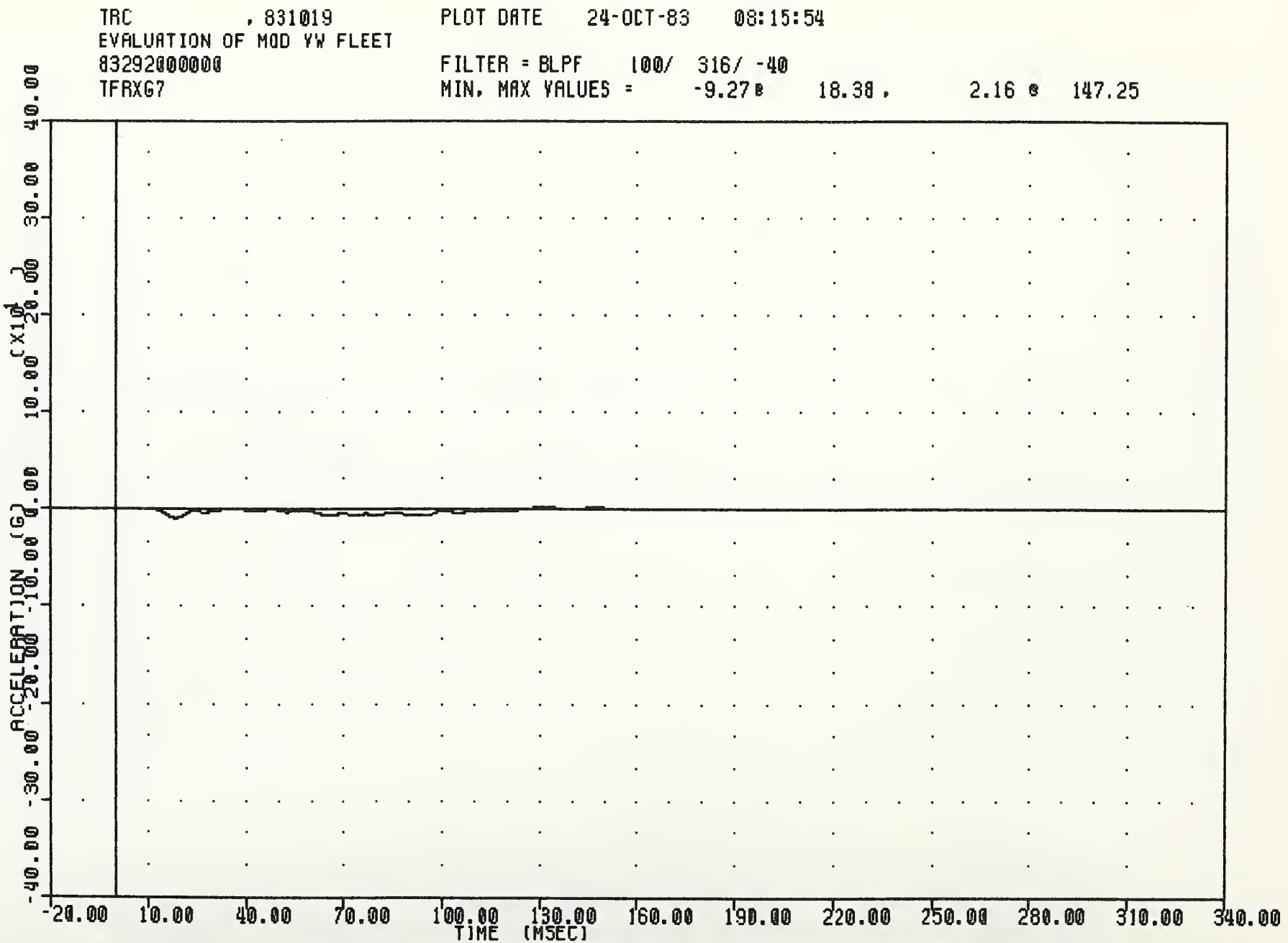
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYG4



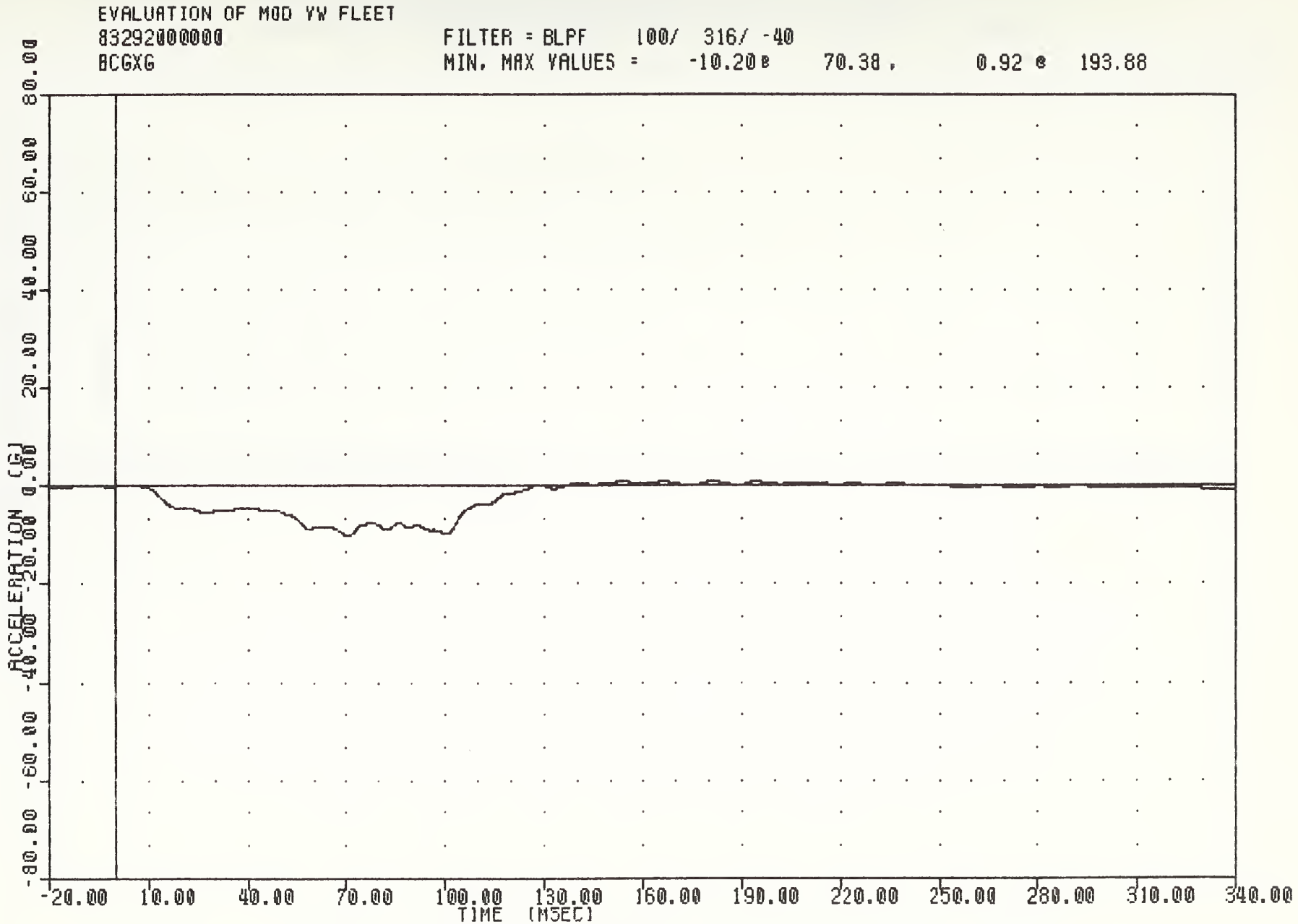
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE LEFT FRONT DOOR (POSITION 11) ACCELERATION Y AXIS



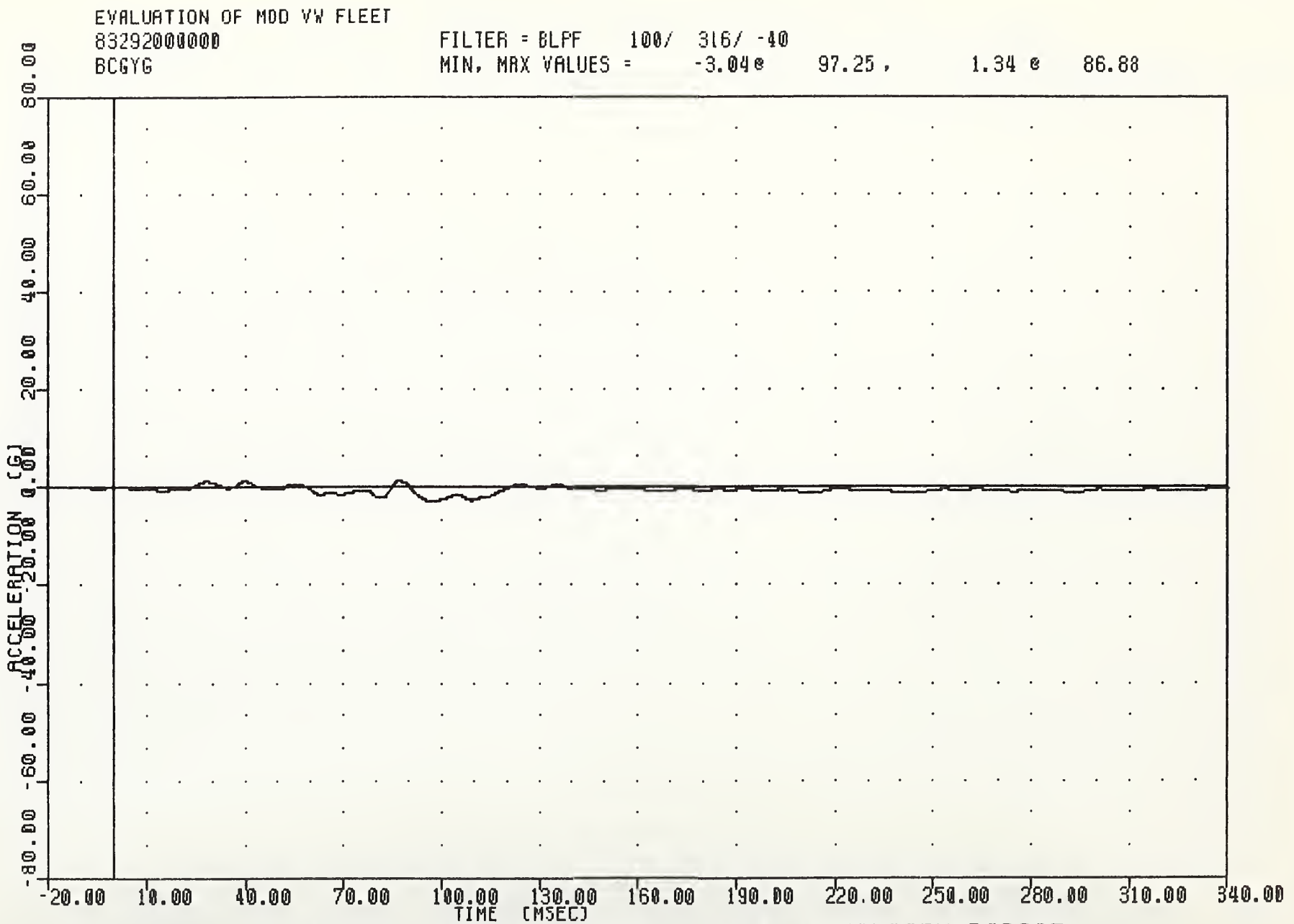
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING LFDYG5



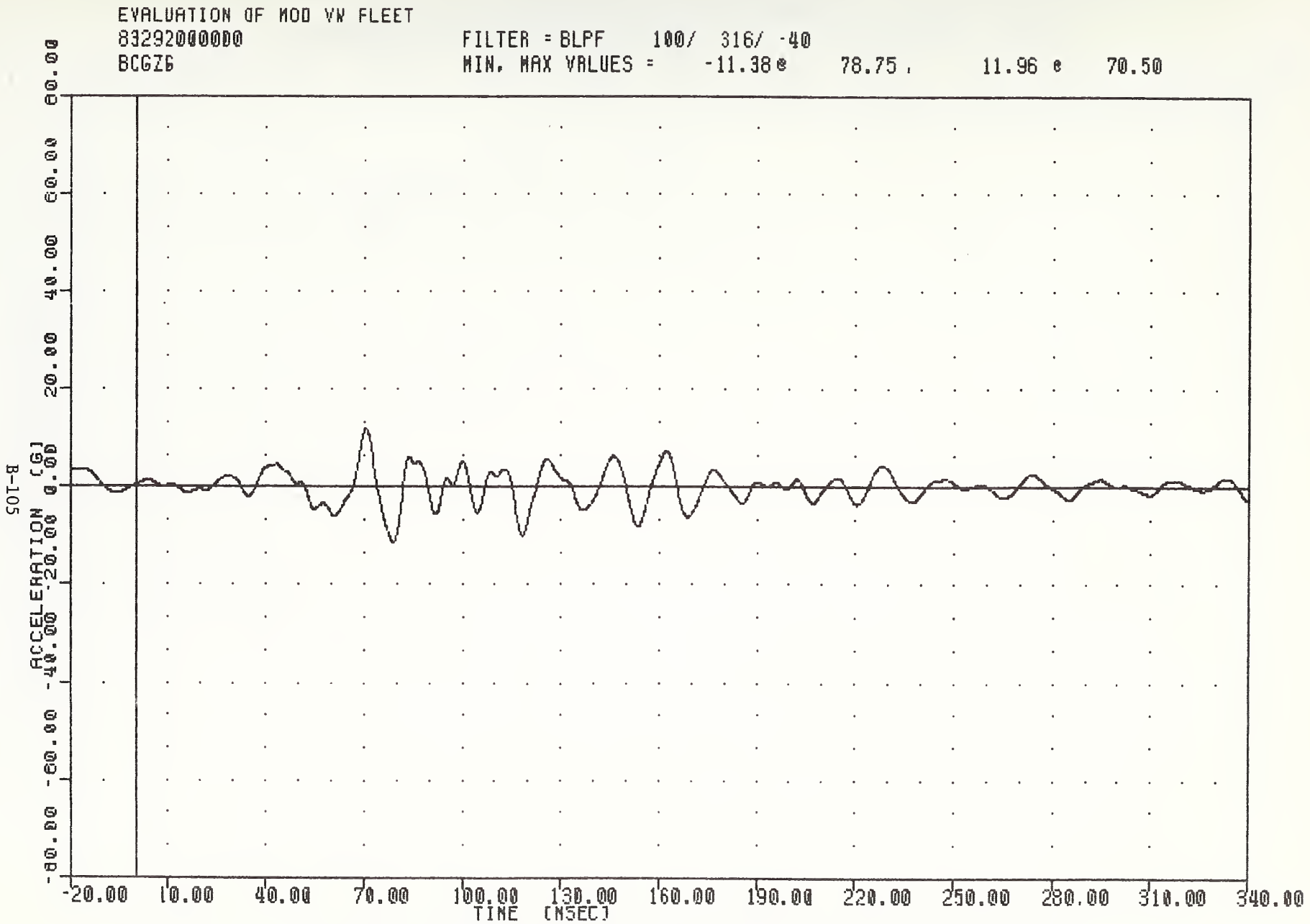
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
VEHICLE TRUNK FLOOR RIGHT ACCELERATION X AXIS



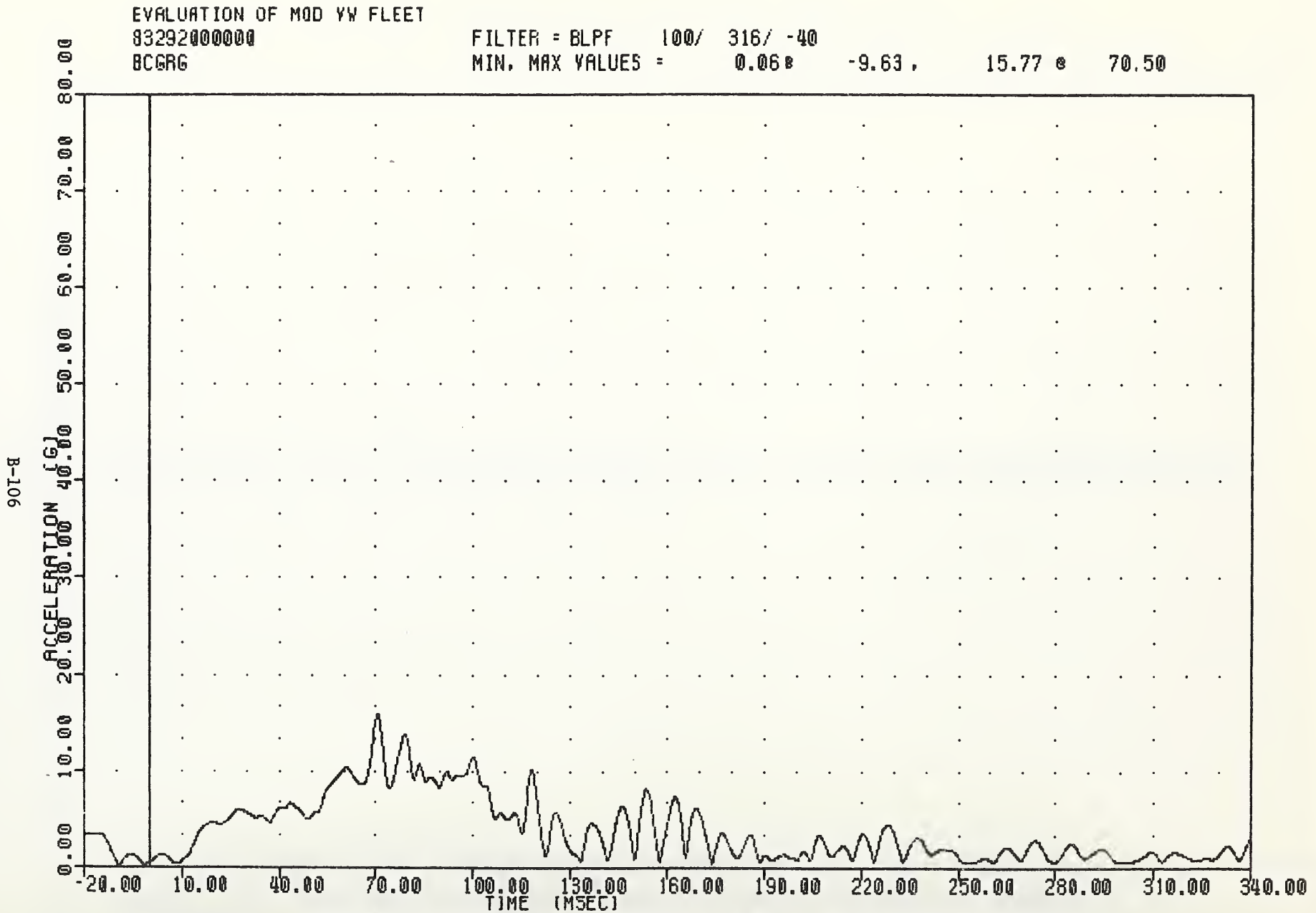
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER CENTER OF GRAVITY X AXIS



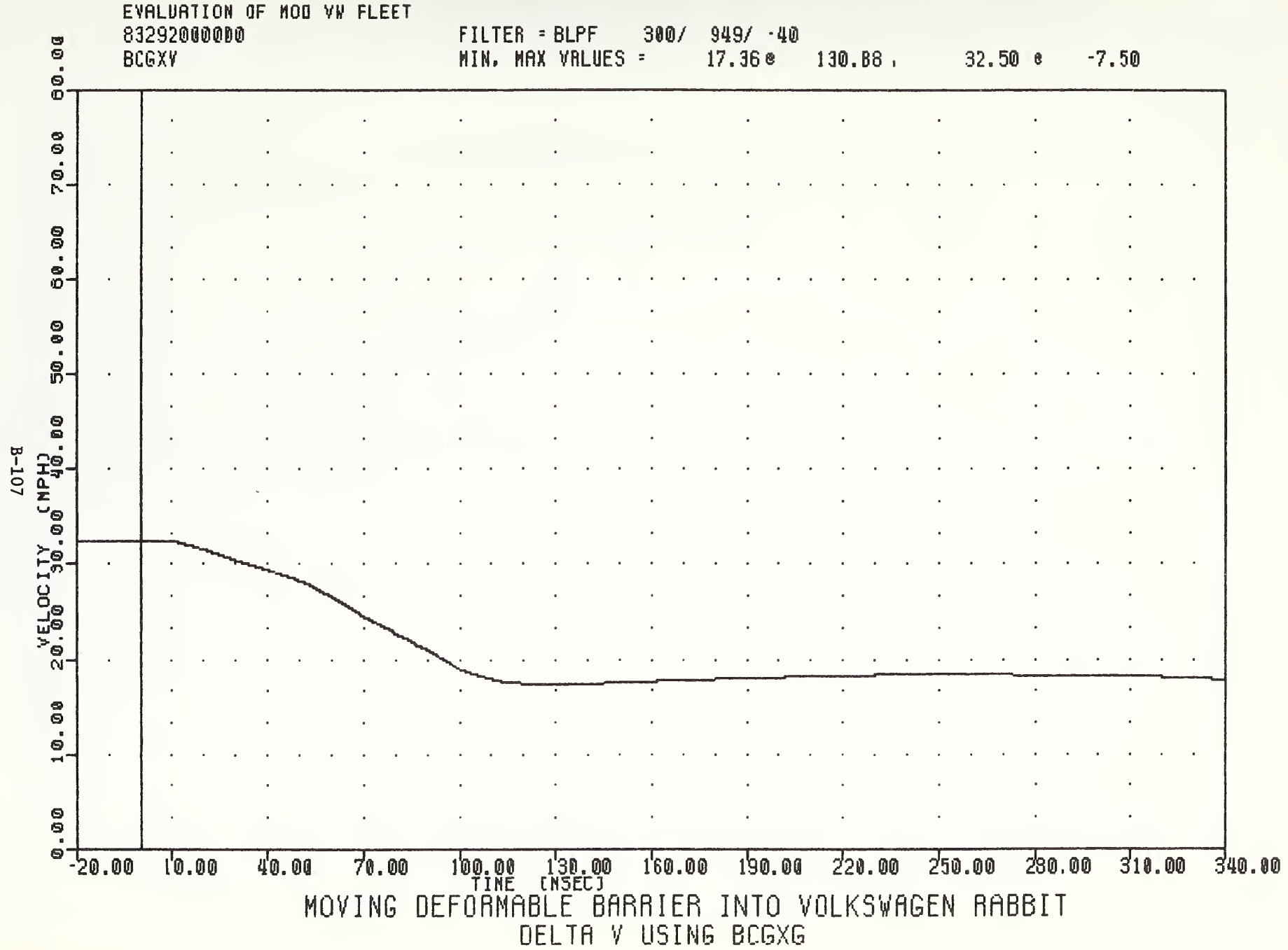
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER CENTER OF GRAVITY Y AXIS



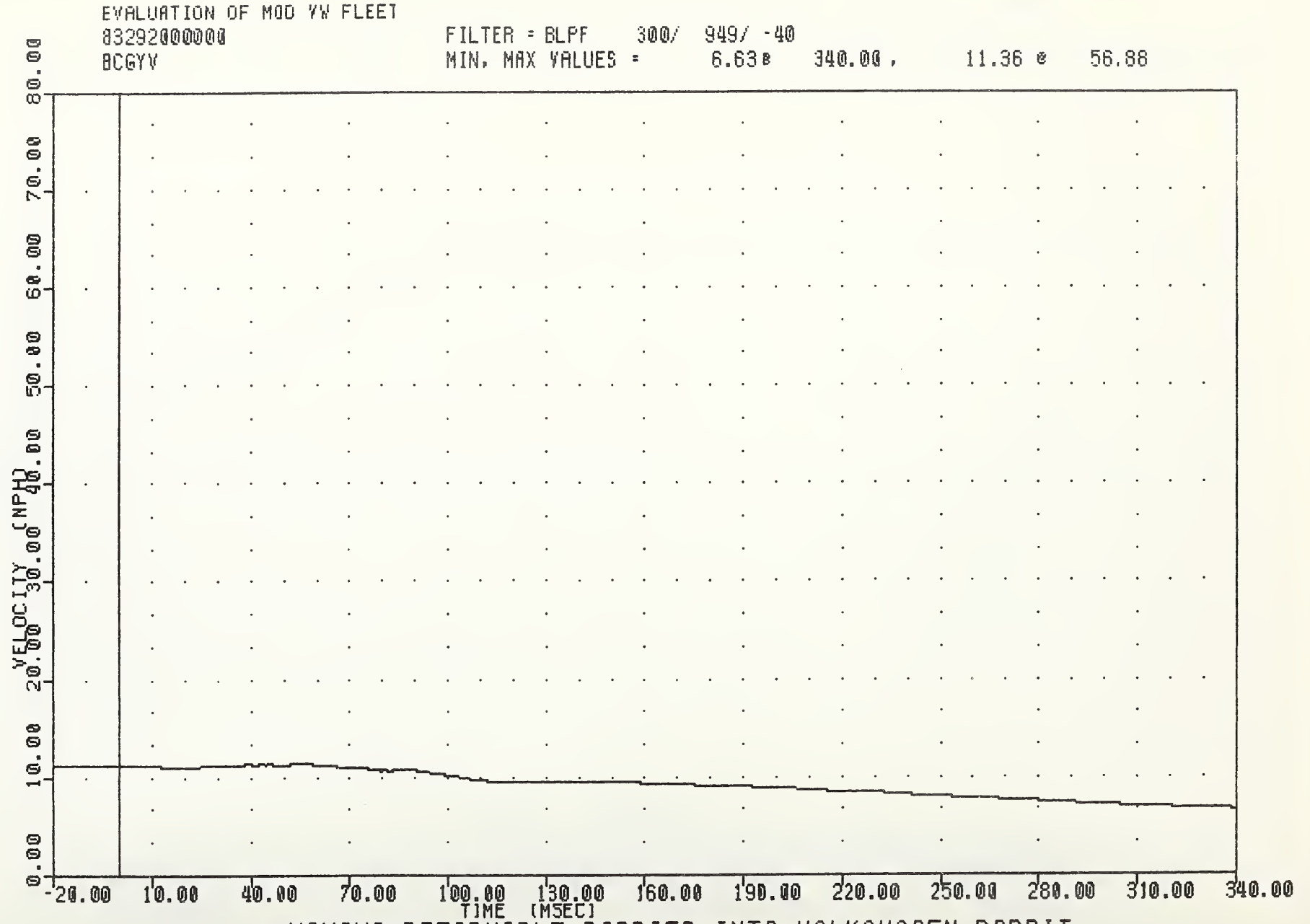
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER CENTER OF GRAVITY Z AXIS



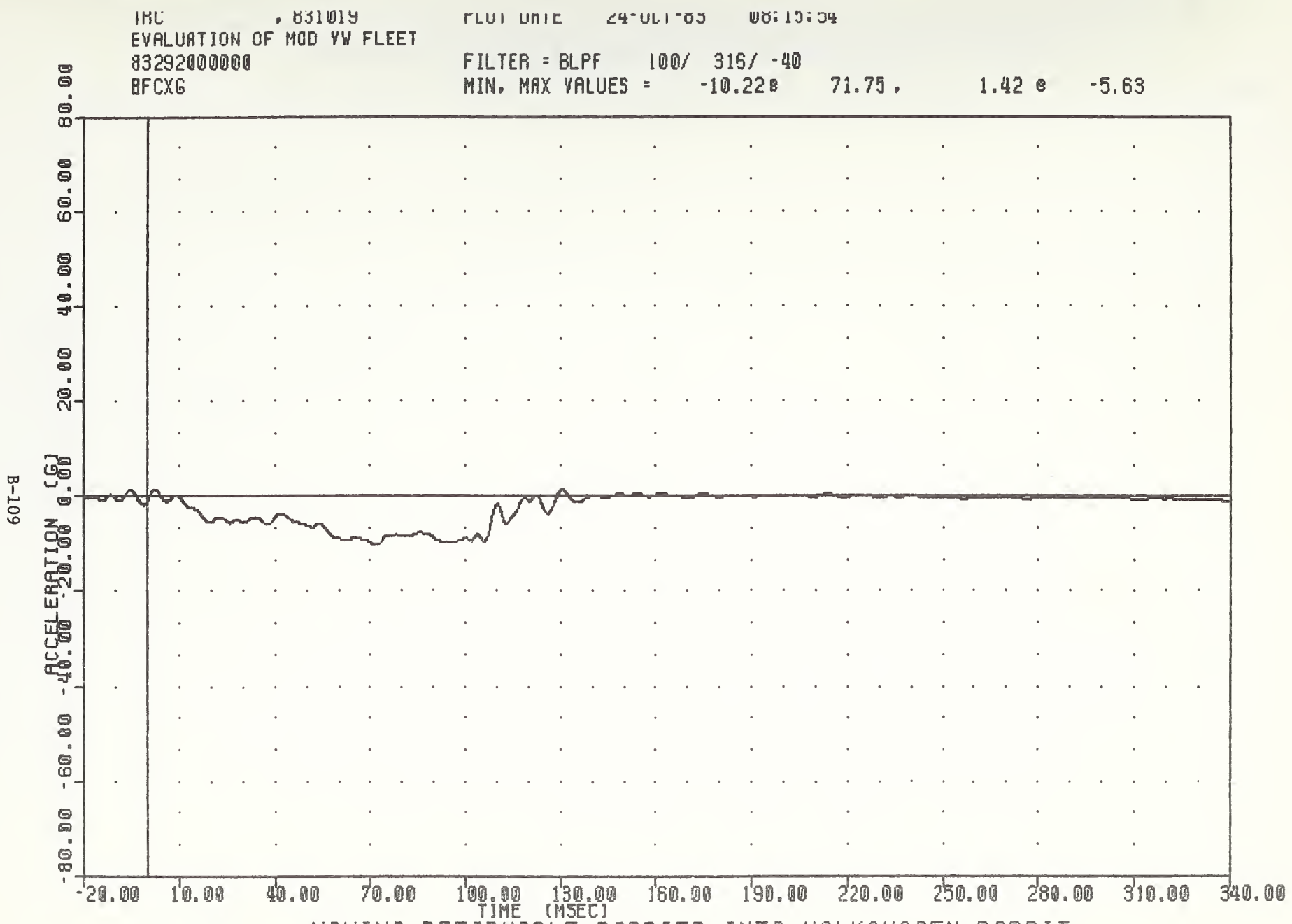
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER CG RESULTANT



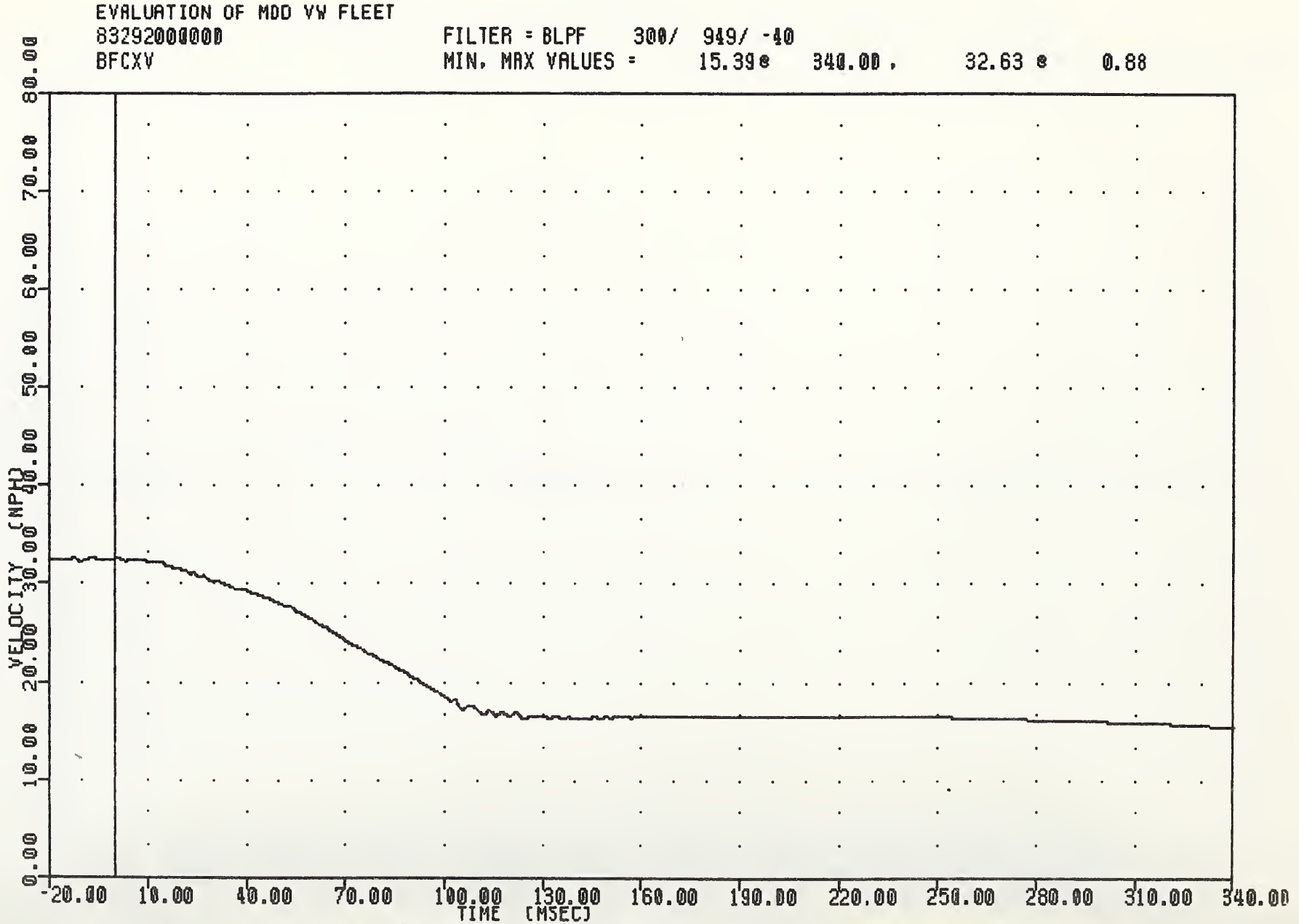
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING BCGXG



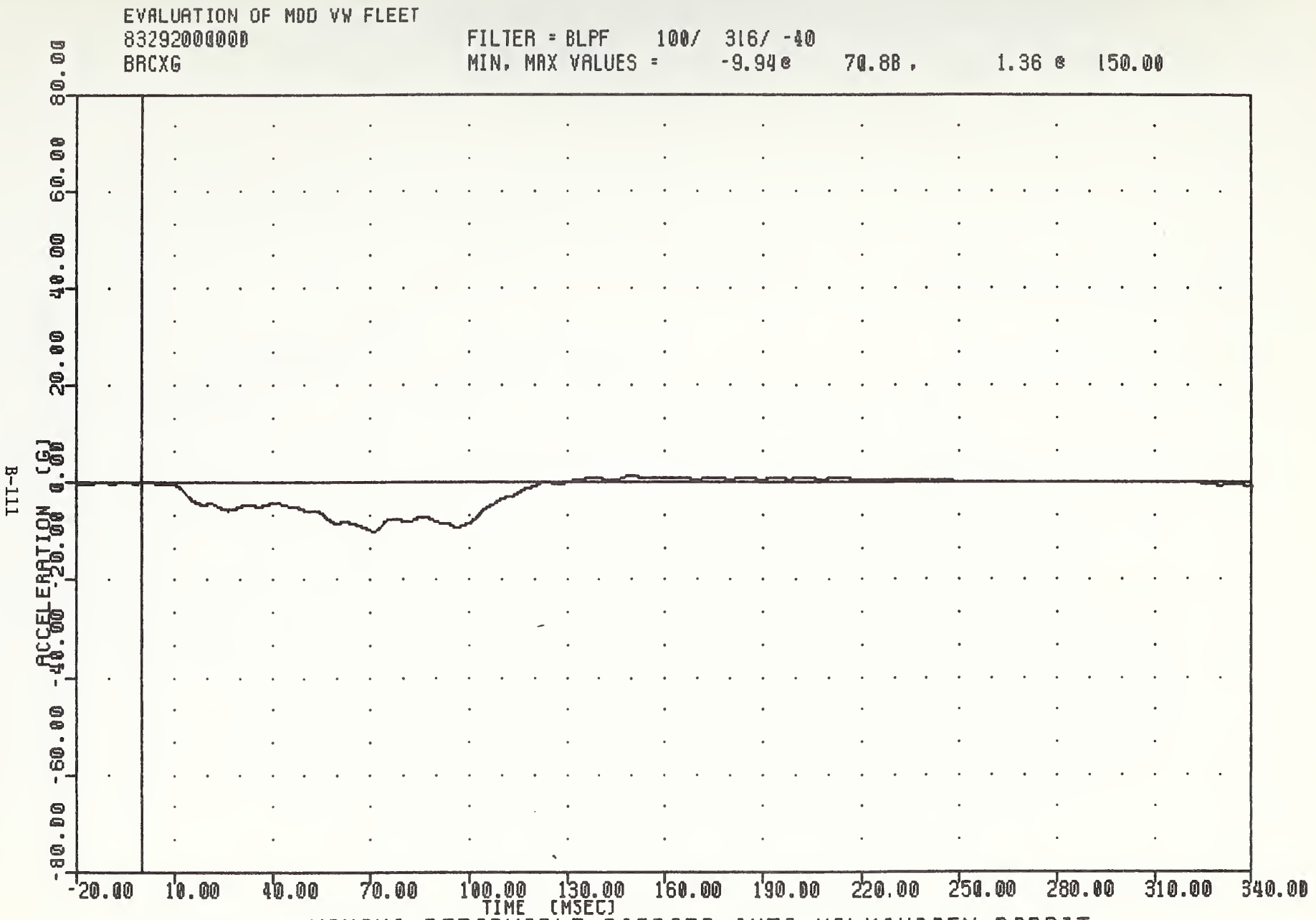
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING BCGYG



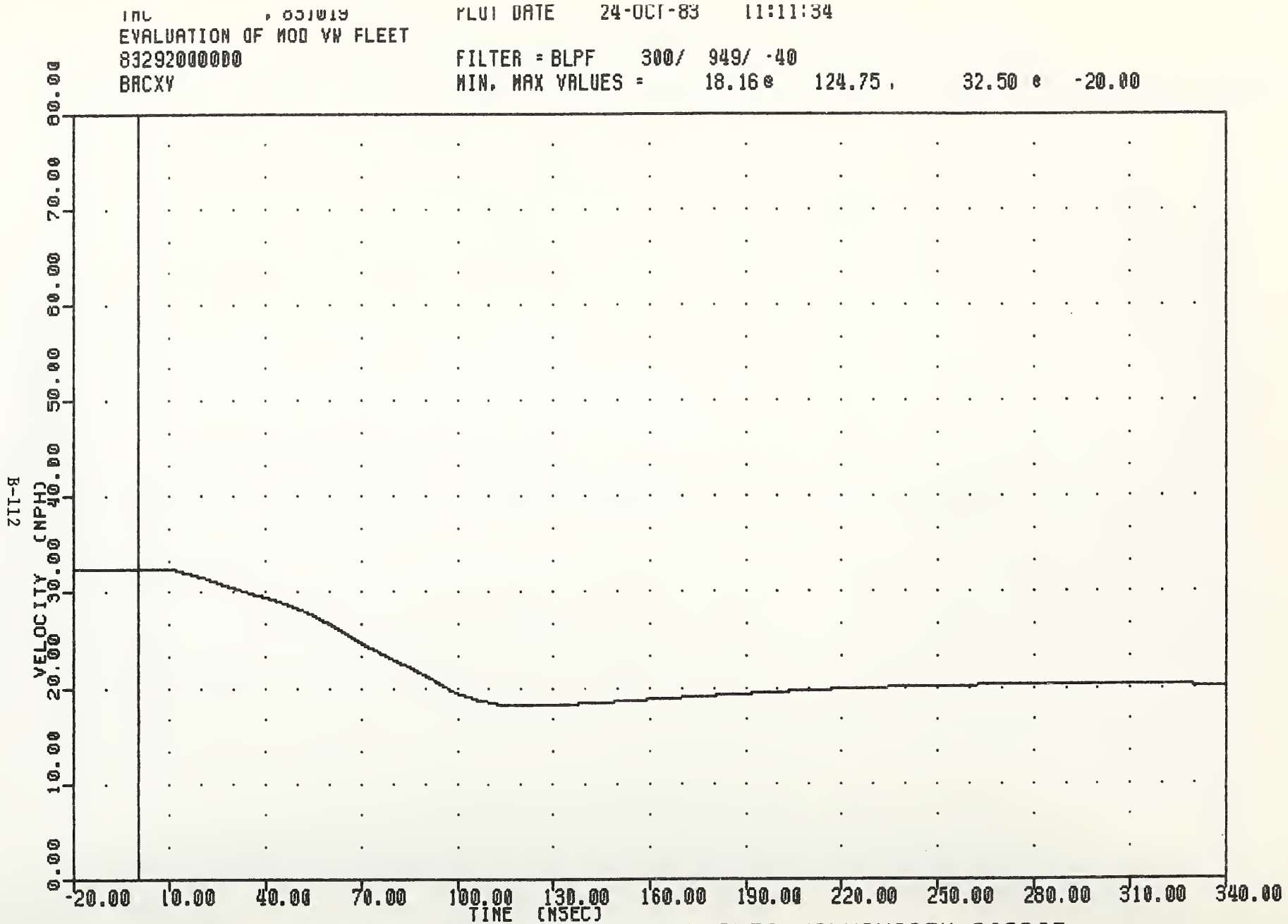
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER FRONT CROSSMEMBER ACCELERATION X AXIS



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING BFCXG



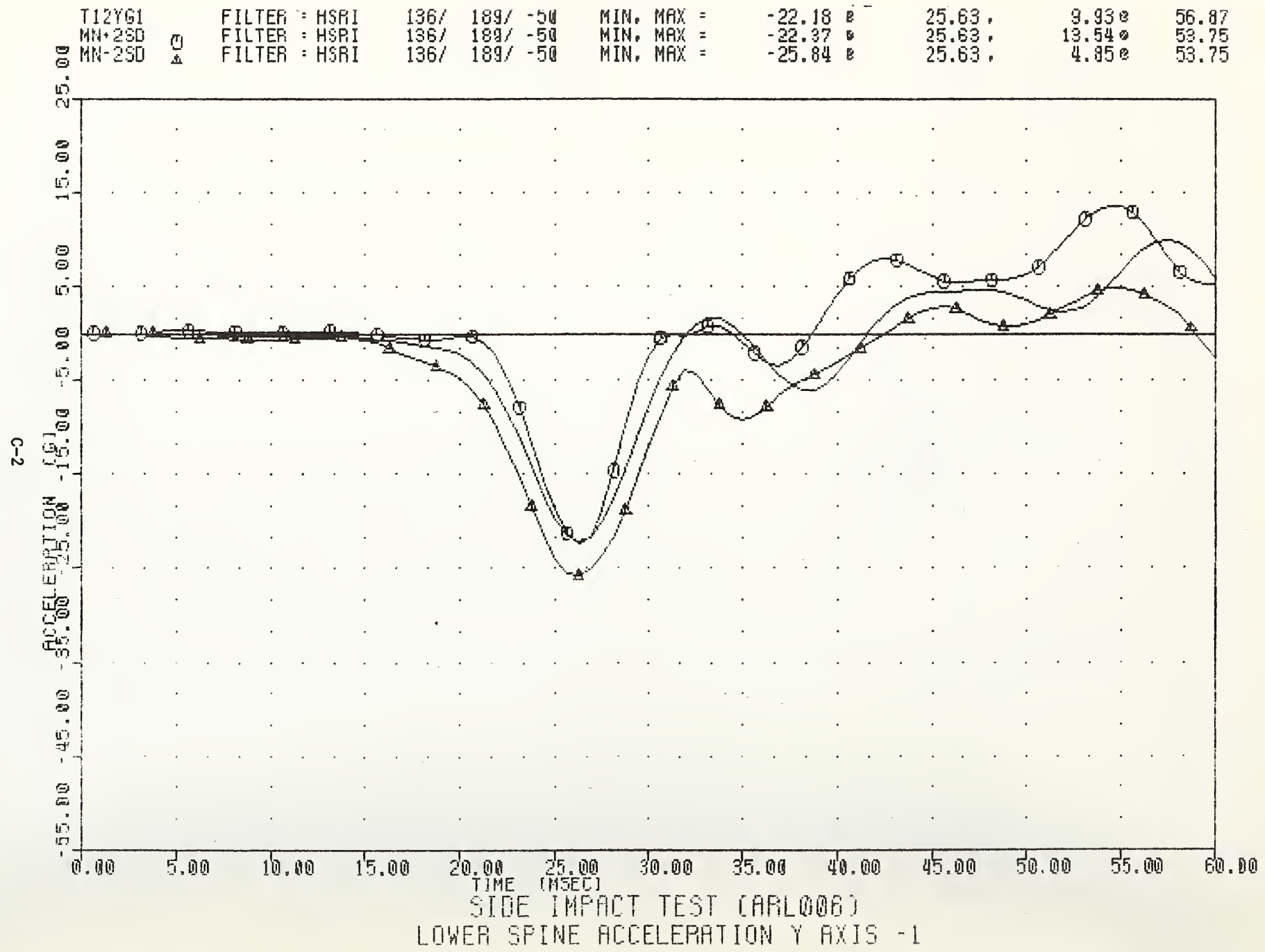
MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
BARRIER REAR CROSSMEMBER ACCELERATION X AXIS



MOVING DEFORMABLE BARRIER INTO VOLKSWAGEN RABBIT
DELTA V USING BRCXG

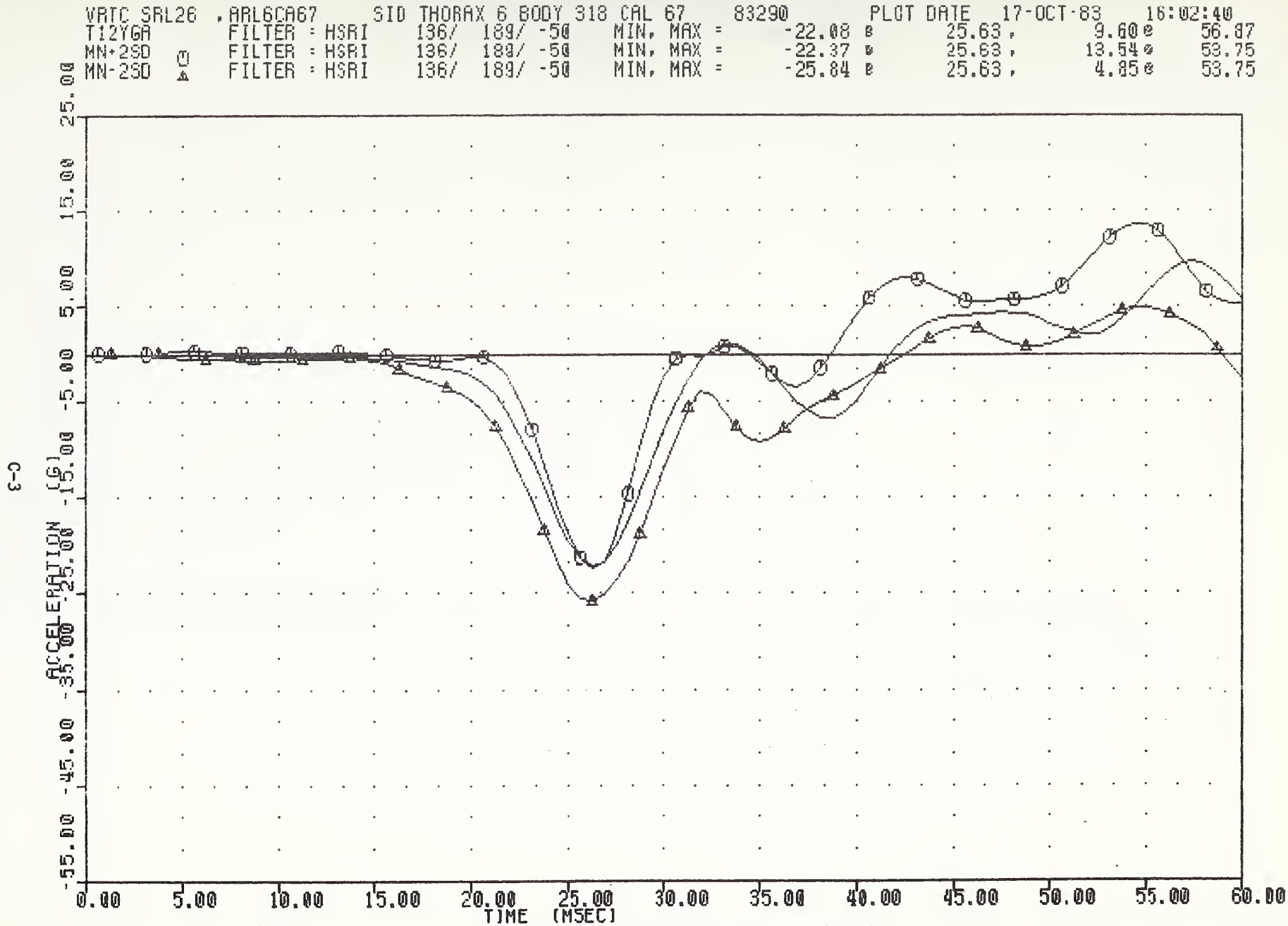
APPENDIX C

DUMMY CERTIFICATION



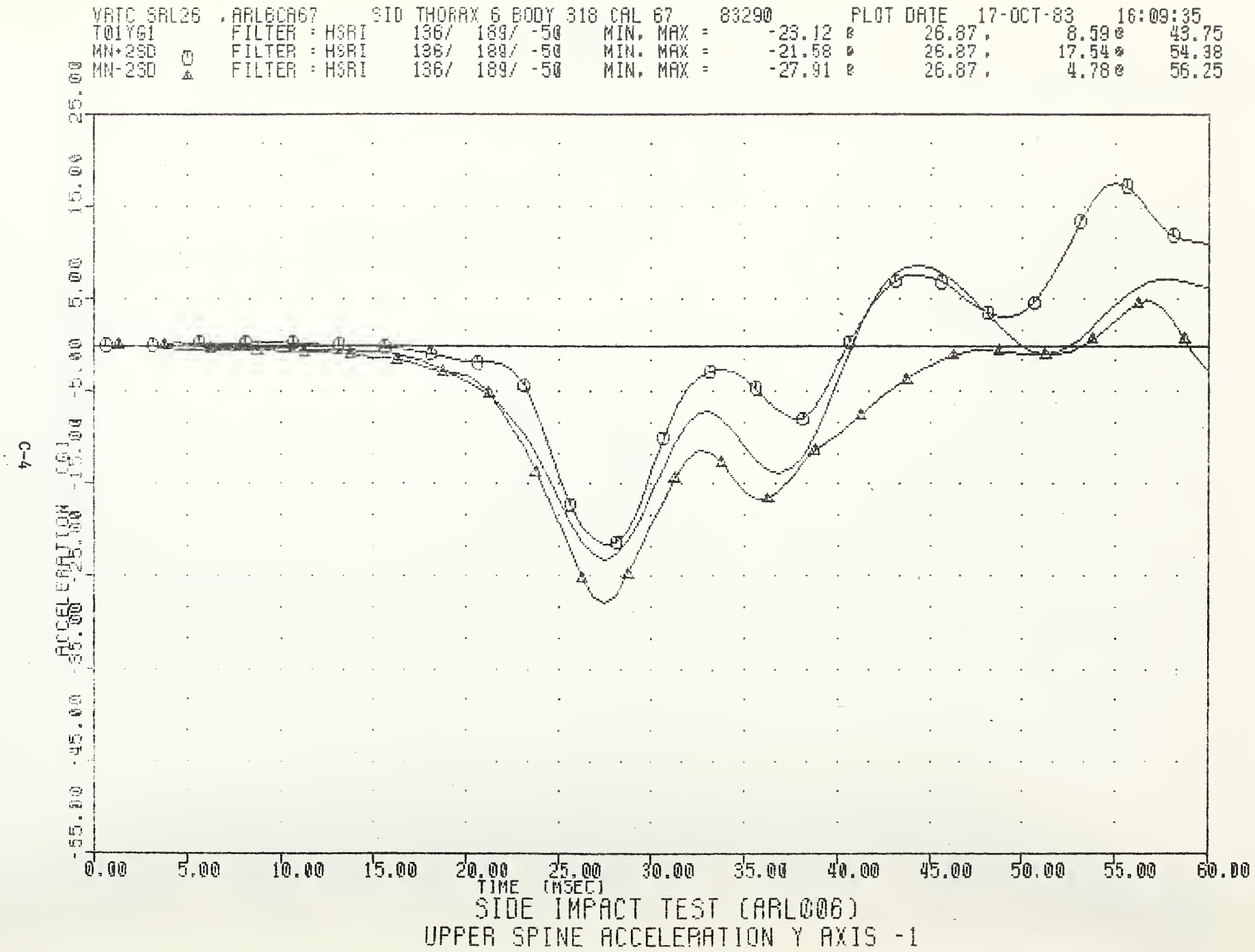
SIDE IMPACT TEST (ARL008)

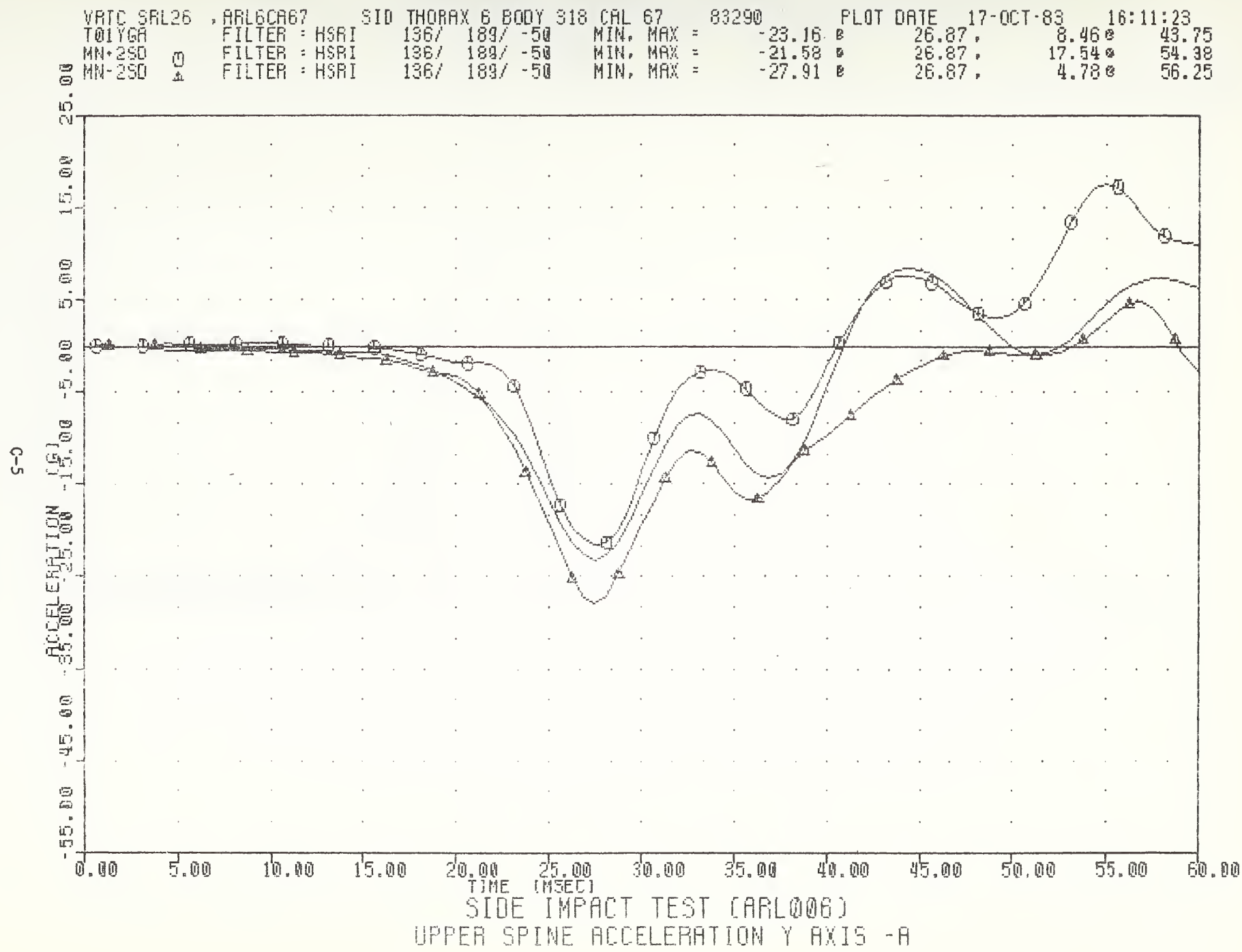
LOWER SPINE ACCELERATION Y AXIS -1

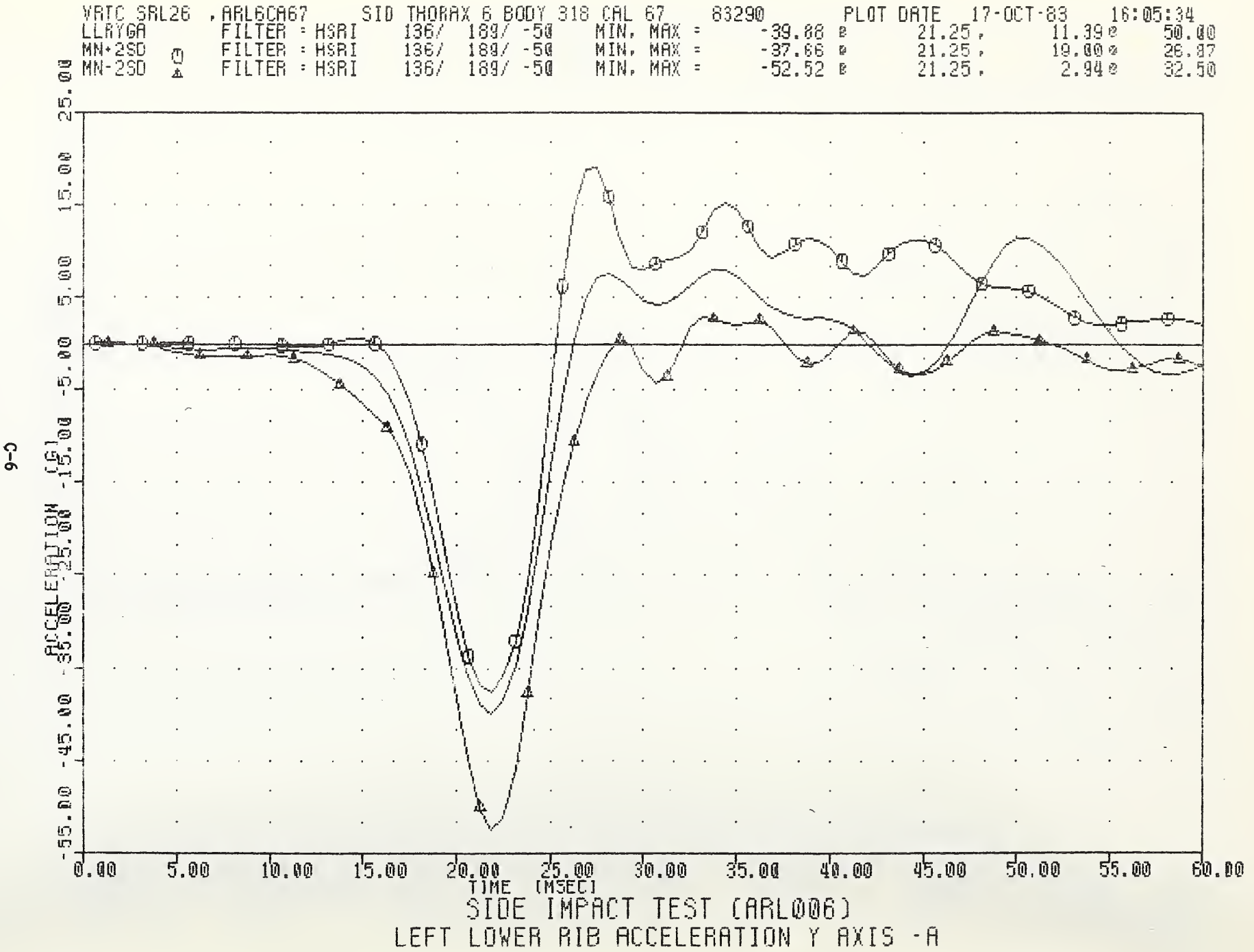


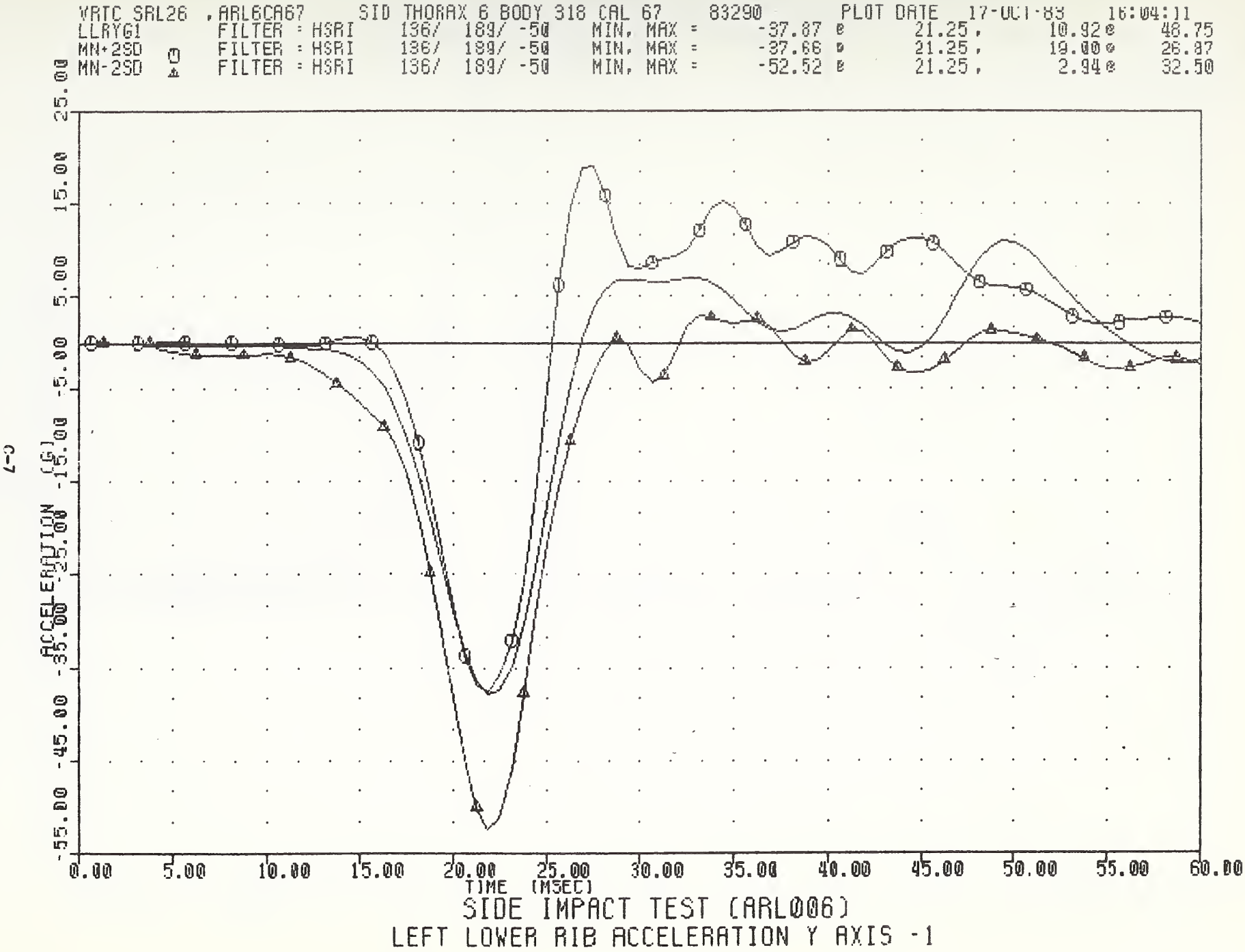
SIDE IMPACT TEST (ARL006)

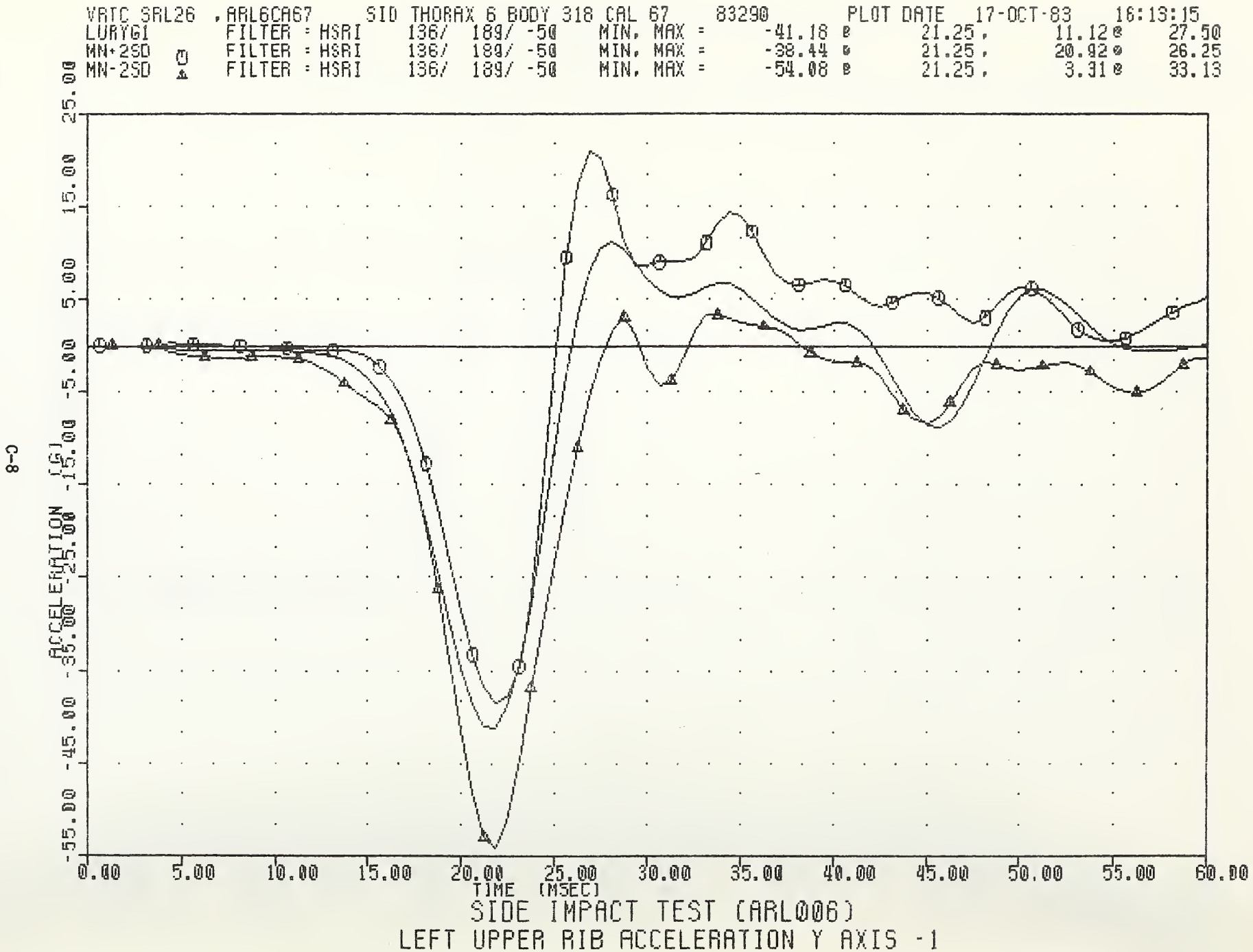
LOWER SPINE ACCELERATION Y AXIS -A


VRTC SRL26 , ARL6CA67 SID THORAX 6 BODY 318 CAL 67 83290 PLOT DATE 17-OCT-83 16:09:35
T01YG1 FILTER : HSRI 136/ 189/ -50 MIN, MAX = -23.12 @ 26.87 , 8.59 @ 43.75
MN+2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -21.58 @ 26.87 , 17.54 @ 54.38
MN-2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -27.91 @ 26.87 , 4.78 @ 56.25
ACCELERATION (G)
25.00
15.00
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARL006)
UPPER SPINE ACCELERATION Y AXIS -1


VRTC SRL26 ,ARL6CA67 SID THORAX 6 BODY 318 CAL 67 83290 PLOT DATE 17-OCT-83 16:11:23
T01YGA FILTER : HSRI 136/ 189/ -50 MIN, MAX = -23.16 @ 26.87 , 8.46 @ 43.75
MN+2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -21.58 @ 26.87 , 17.54 @ 54.38
MN-2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -27.91 @ 26.87 , 4.78 @ 56.25
ACCELERATION (G)
25.00
15.00
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARL006)
UPPER SPINE ACCELERATION Y AXIS -A

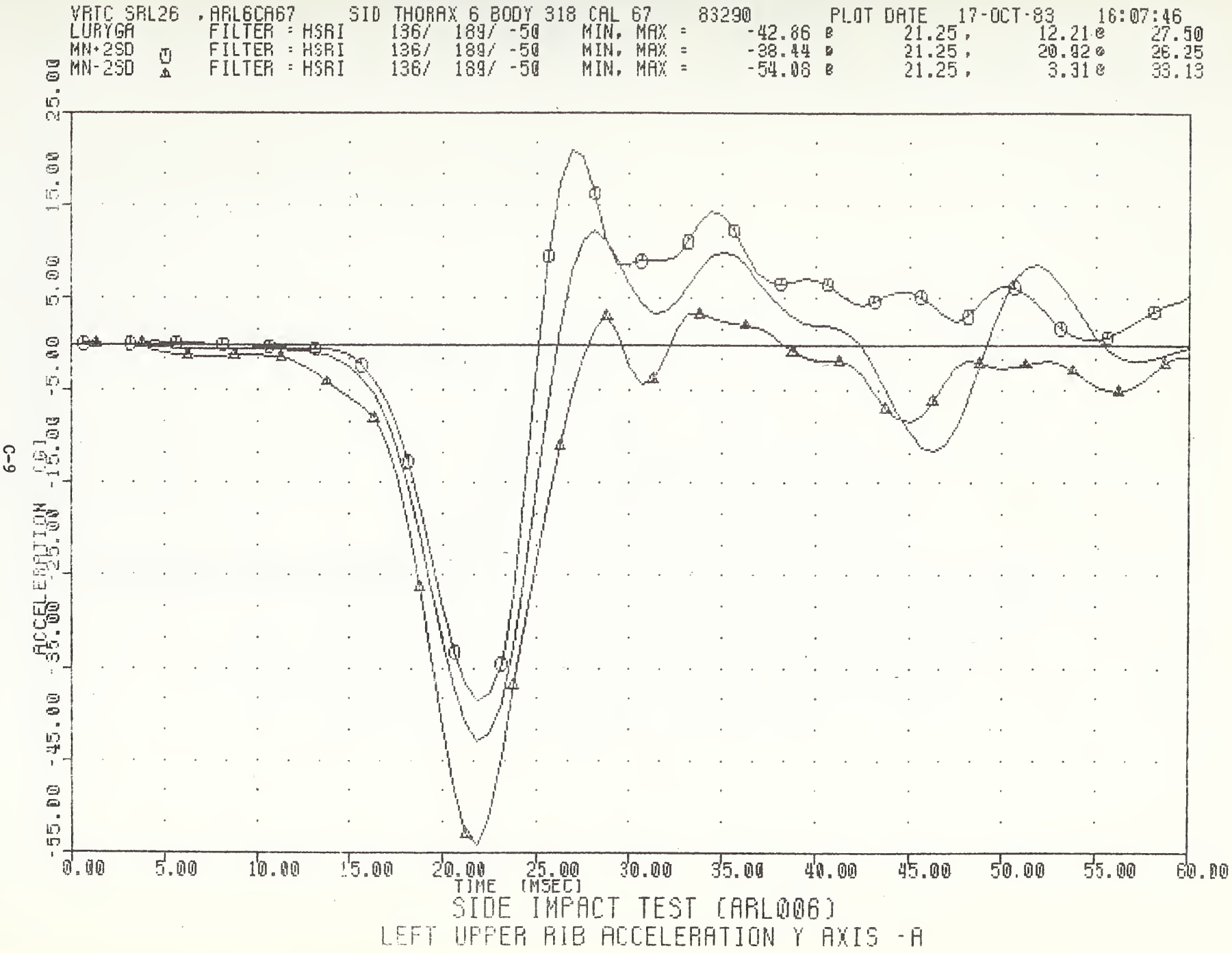

VRTC SRL26 , ARL6CA67 SID THORAX 6 BODY 318 CAL 67 83290 PLOT DATE 17-OCT-83 16:05:34
LLRYGA FILTER = HSRI 136/ 189/ -50 MIN, MAX = -39.88 @ 21.25 , 11.39 @ 50.00
MN+2SD FILTER = HSRI 136/ 189/ -50 MIN, MAX = -37.66 @ 21.25 , 19.00 @ 26.87
MN-2SD FILTER = HSRI 136/ 189/ -50 MIN, MAX = -52.52 @ 21.25 , 2.94 @ 32.50
ACCELERATION (G)
25.00
15.00
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARL006)
LEFT LOWER RIB ACCELERATION Y AXIS -A

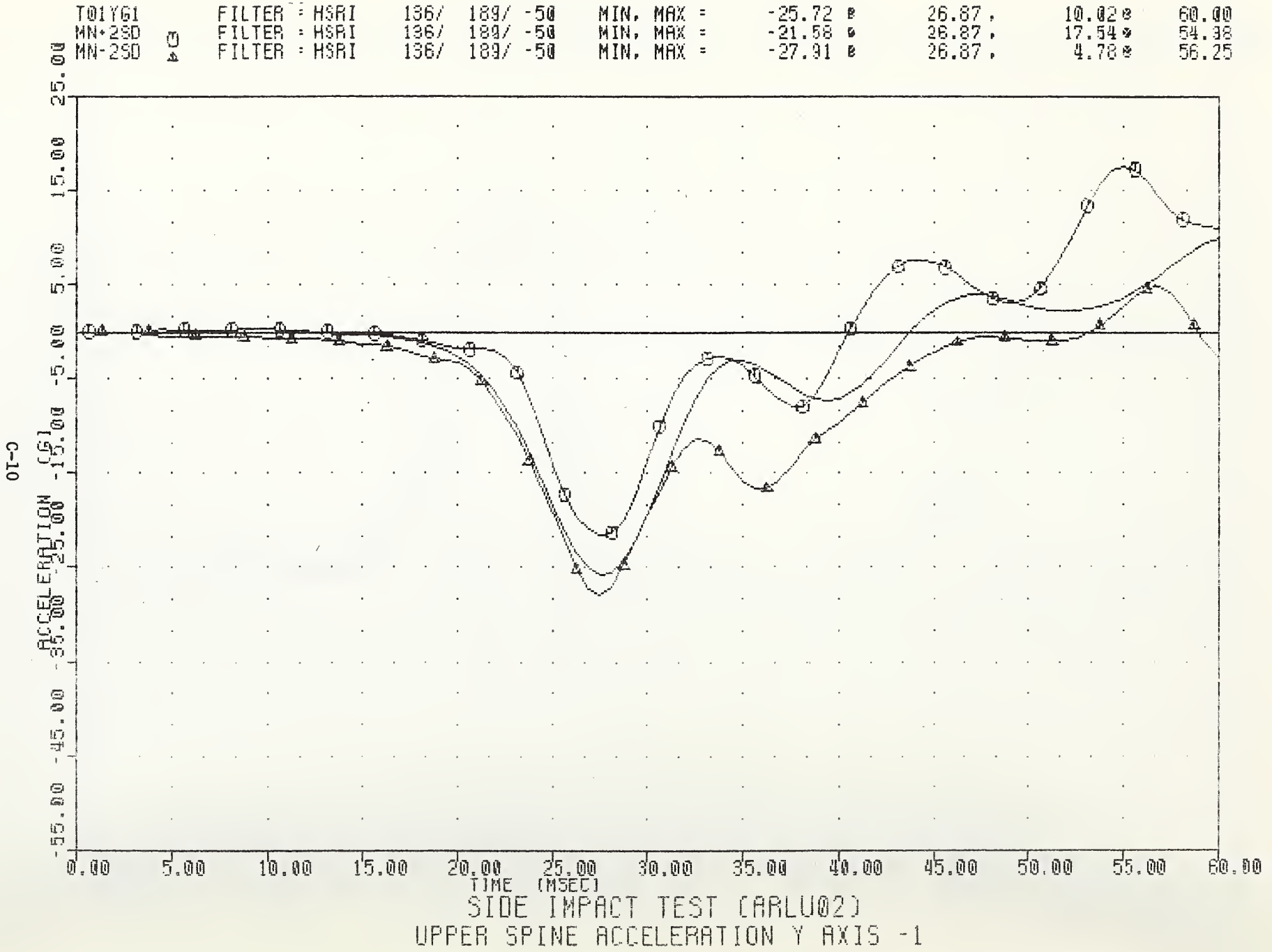

VRTC SRL26 ,ARL6CA67 SID THORAX 6 BODY 318 CAL 67 83290 PLOT DATE 17-OCT-83 16:04:11
LLRYG1 FILTER : HSRI 136/ 189/ -50 MIN, MAX = -37.87 @ 21.25 , 10.92 @ 48.75
MN+2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -37.66 @ 21.25 , 19.00 @ 26.87
MN-2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -52.52 @ 21.25 , 2.94 @ 32.50
ACCELERATION (G)
25.00
15.00
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARL006)
LEFT LOWER RIB ACCELERATION Y AXIS -1



SIDE IMPACT TEST (ARL006)

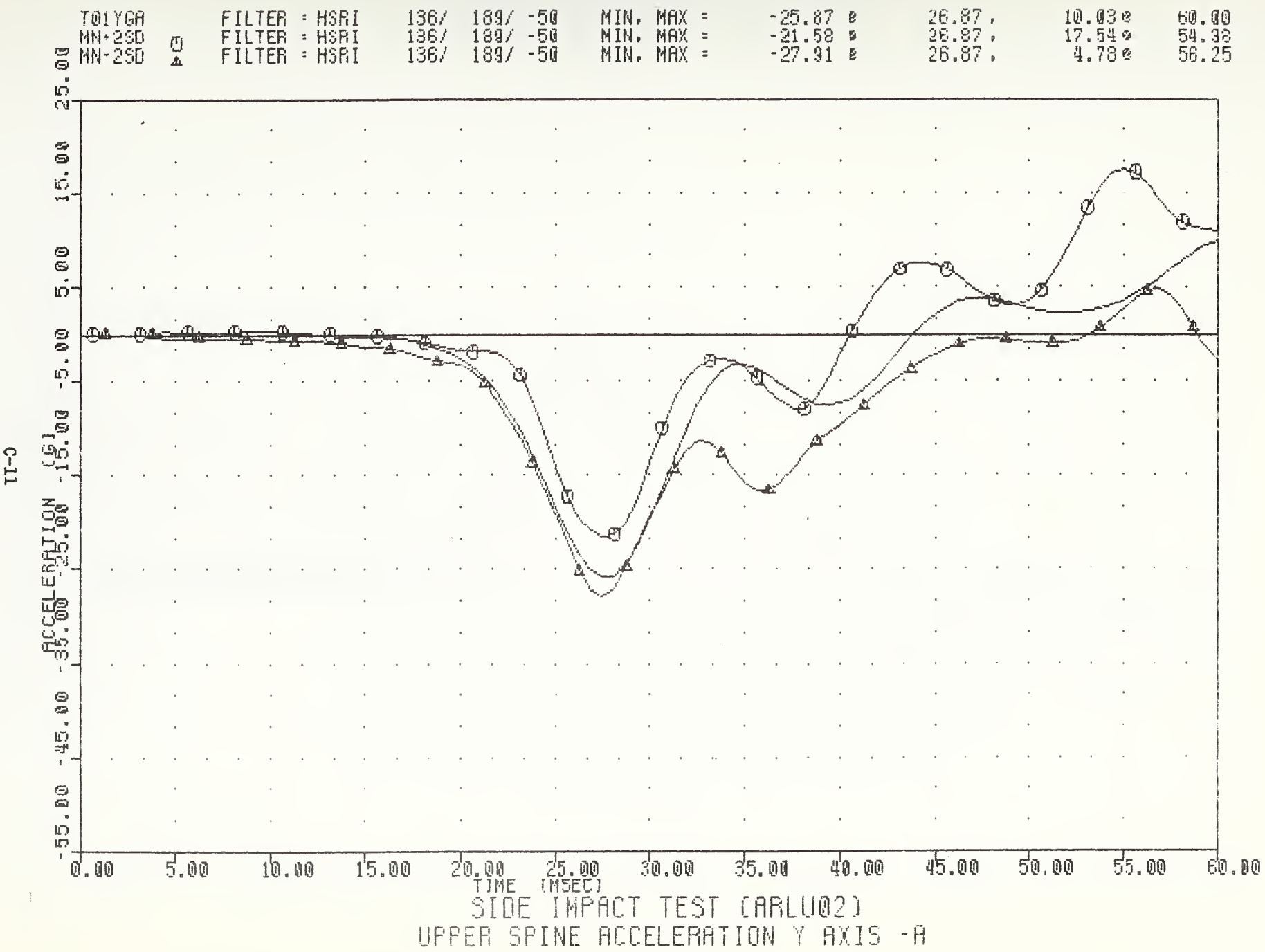
LEFT UPPER RIB ACCELERATION Y AXIS -1


VRTC SRL26 , ARL6CA67 SID THORAX 6 BODY 318 CAL 67 83290 PLOT DATE 17-OCT-83 16:07:46
LURYGA FILTER = HSRI 136/ 189/ -50 MIN, MAX = -42.86 @ 21.25 , 12.21 @ 27.50
MN+2SD FILTER = HSRI 136/ 189/ -50 MIN, MAX = -38.44 @ 21.25 , 20.82 @ 26.25
MN-2SD FILTER = HSRI 136/ 189/ -50 MIN, MAX = -54.06 @ 21.25 , 3.31 @ 33.13
ACCELERATION (G)
25.00
15.00
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARL006)
LEFT UPPER RIB ACCELERATION Y AXIS -A



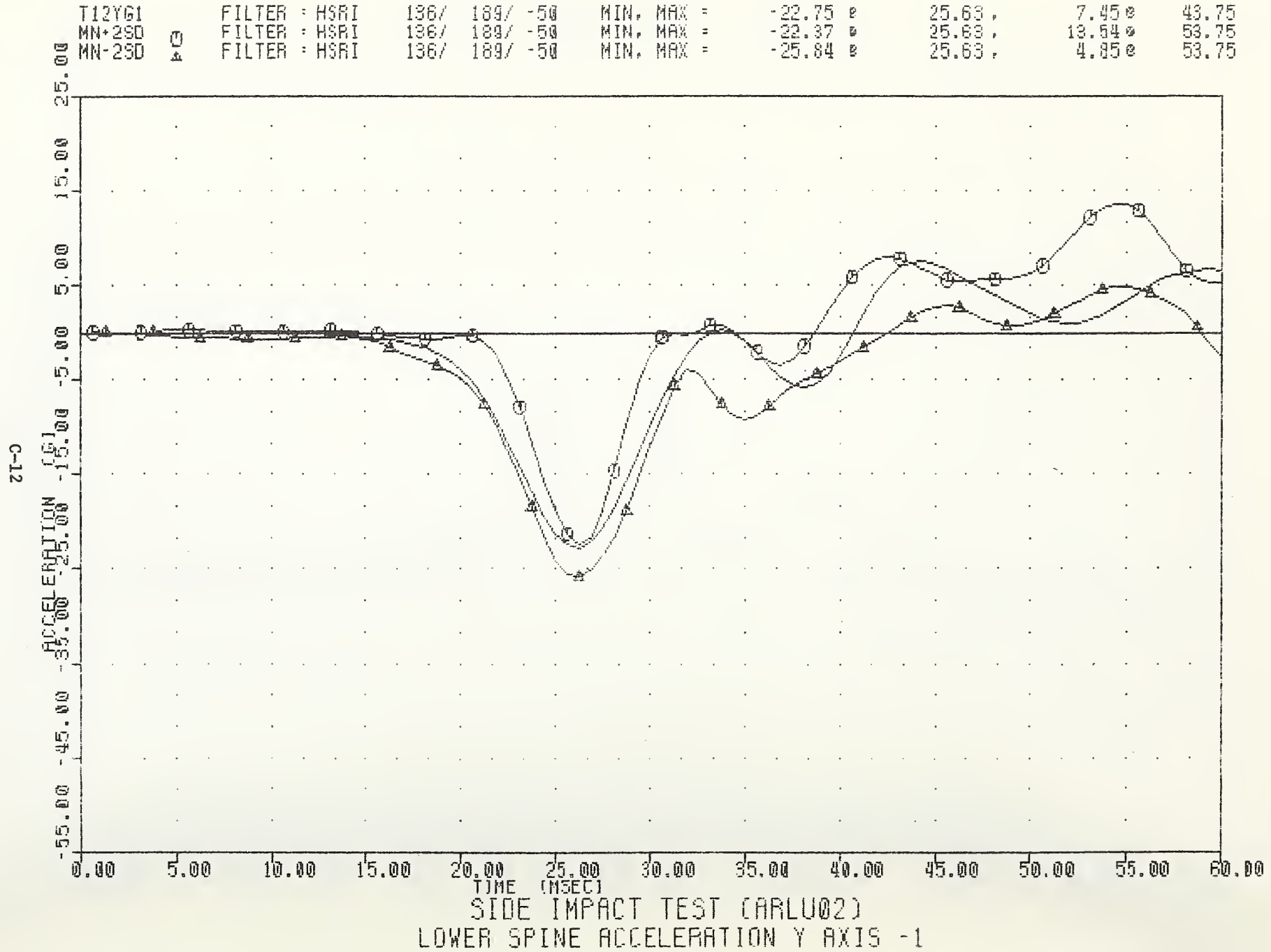
SIDE IMPACT TEST (ARLU02)

UPPER SPINE ACCELERATION Y AXIS -1



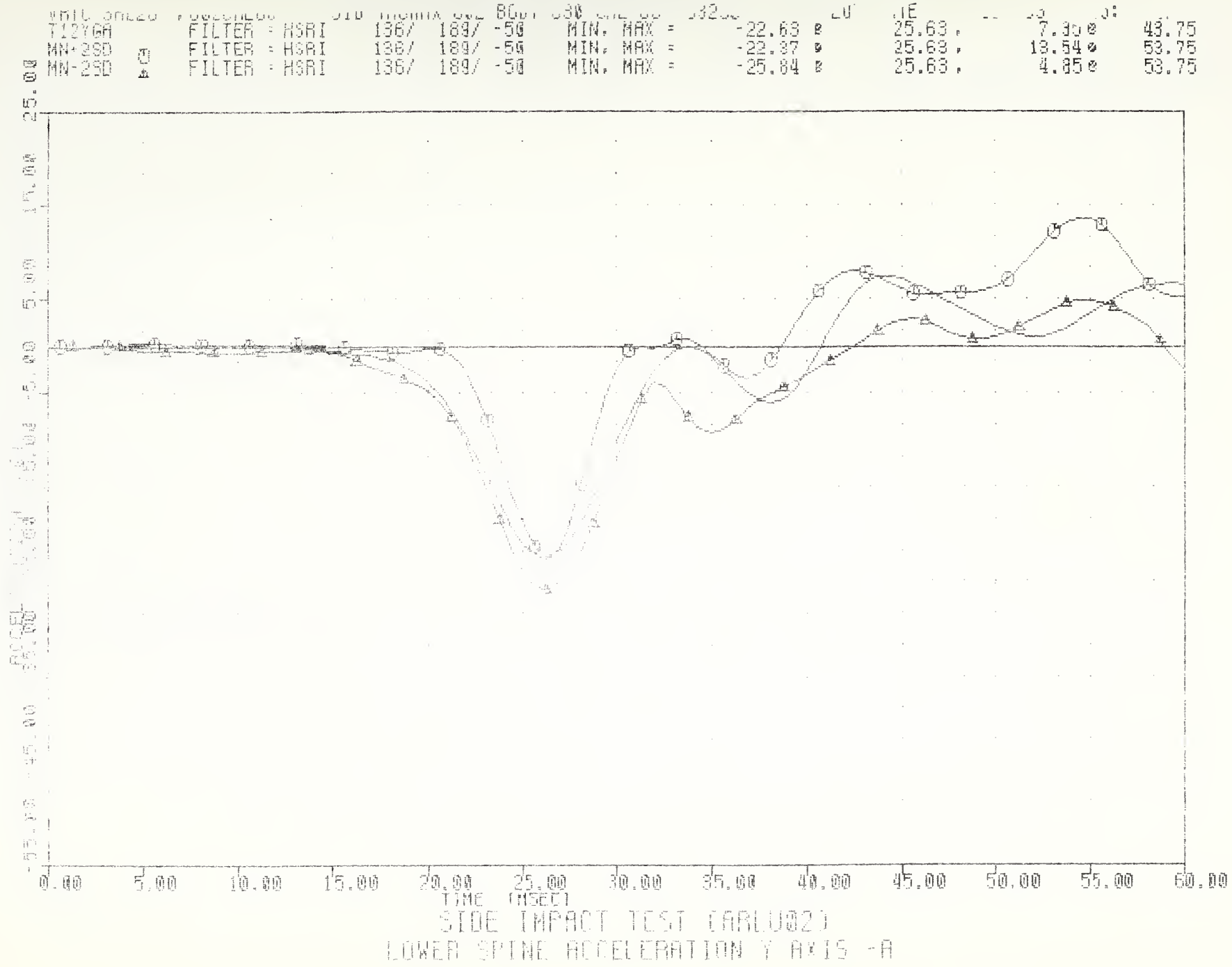
SIDE IMPACT TEST (ARLU02)

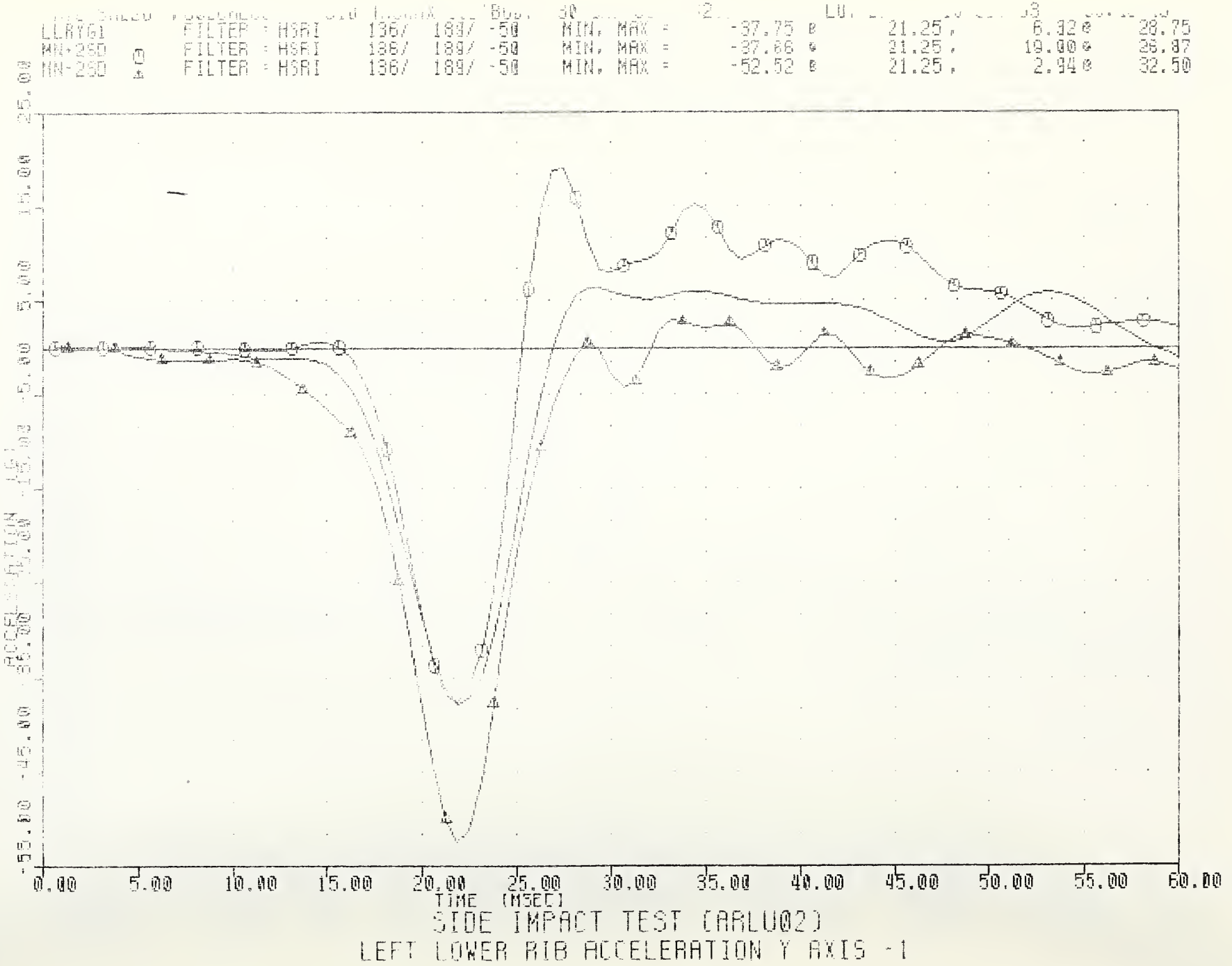
UPPER SPINE ACCELERATION Y AXIS -A



SIDE IMPACT TEST (ARLU02)

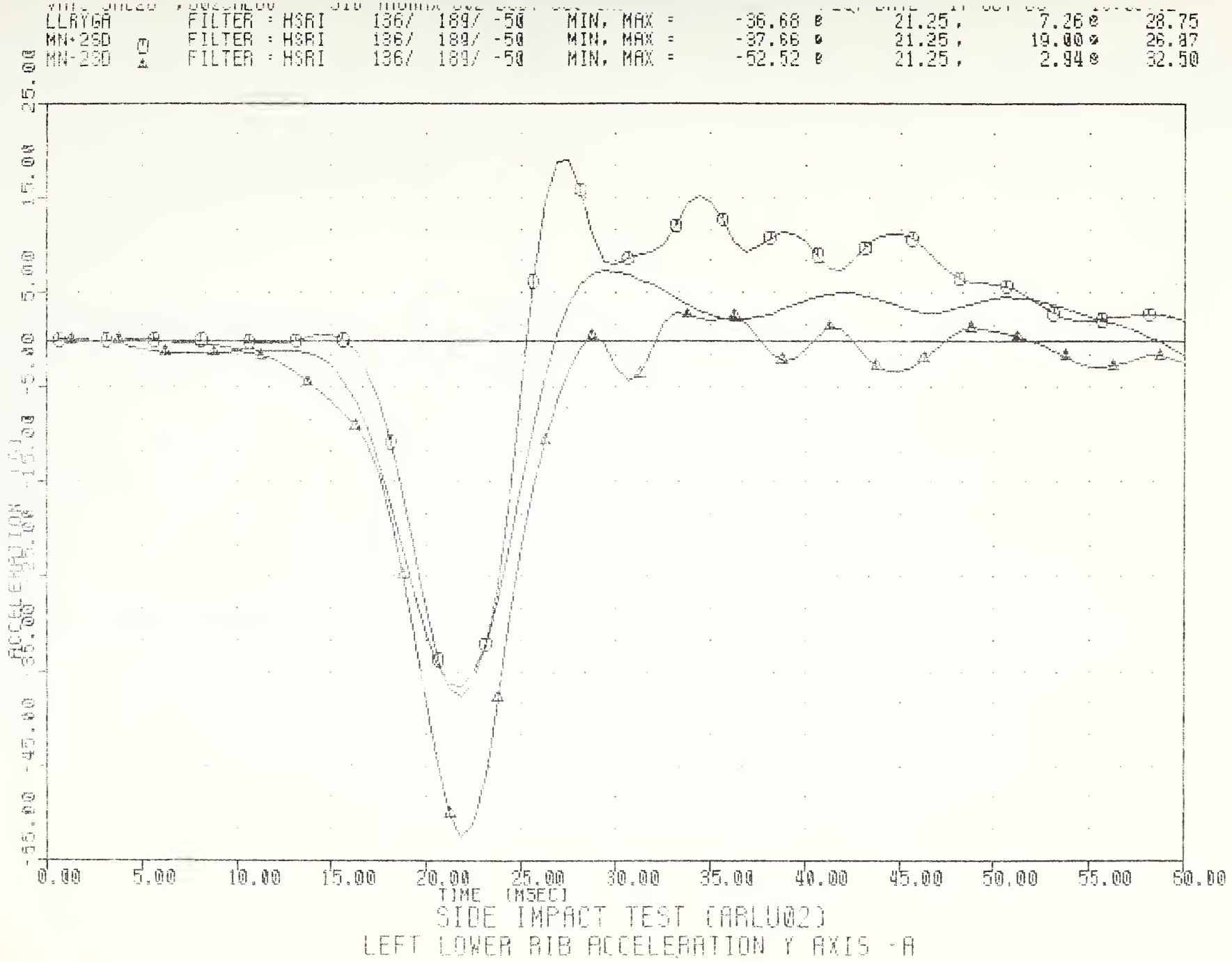
LOWER SPINE ACCELERATION Y AXIS -1

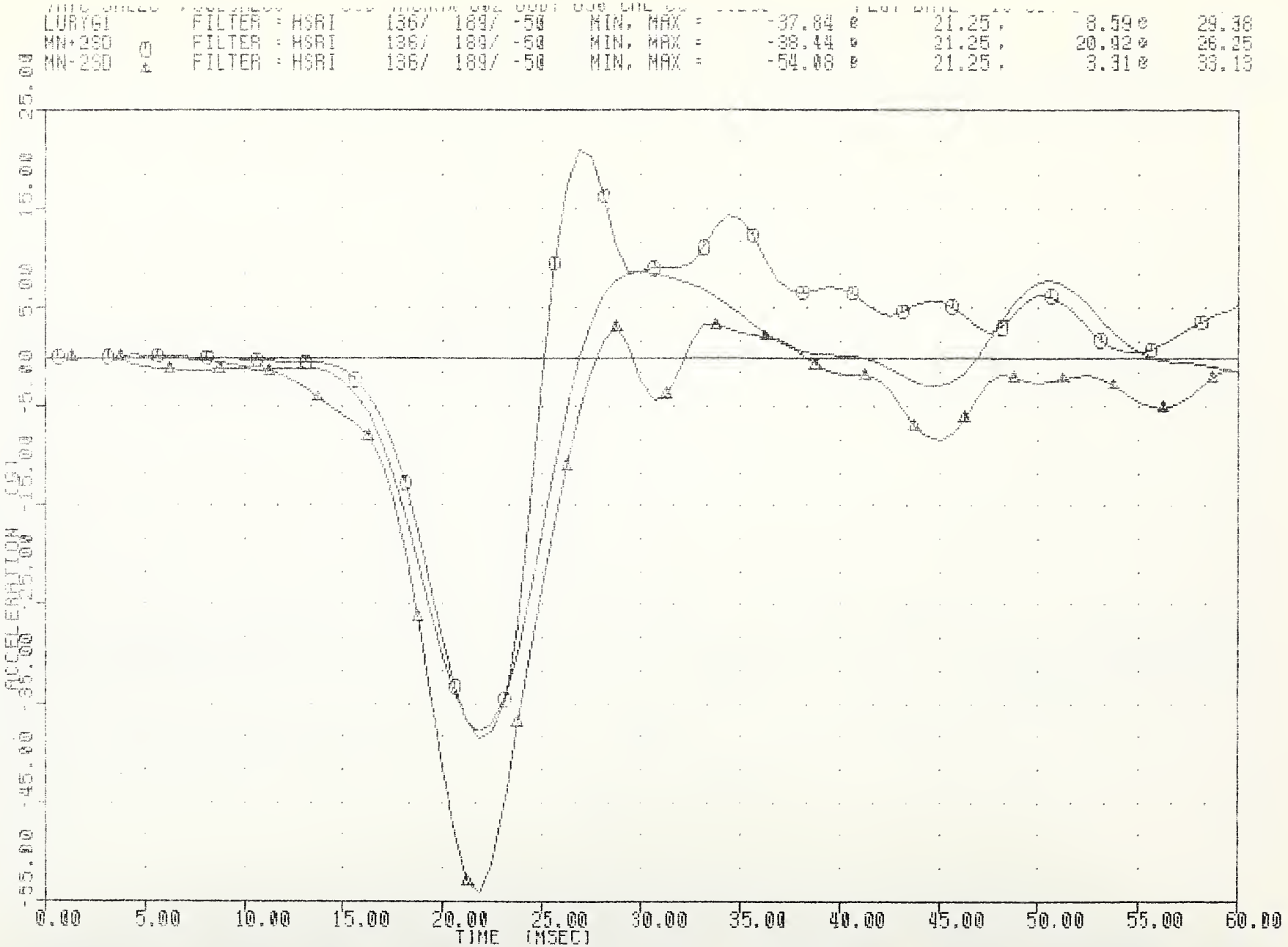

T12YGA FILTER = HSRI 136/ 189/ -50 MIN, MAX = -22.63 @ 25.63, 7.30 @ 43.75
MN+2SD FILTER = HSRI 136/ 189/ -50 MIN, MAX = -22.37 @ 25.63, 13.54 @ 53.75
MN-2SD FILTER = HSRI 136/ 189/ -50 MIN, MAX = -25.84 @ 25.63, 4.85 @ 53.75
25.00
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARLU02)
LOWER SPINE ACCELERATION Y AXIS -A



SIDE IMPACT TEST (ARLU02)

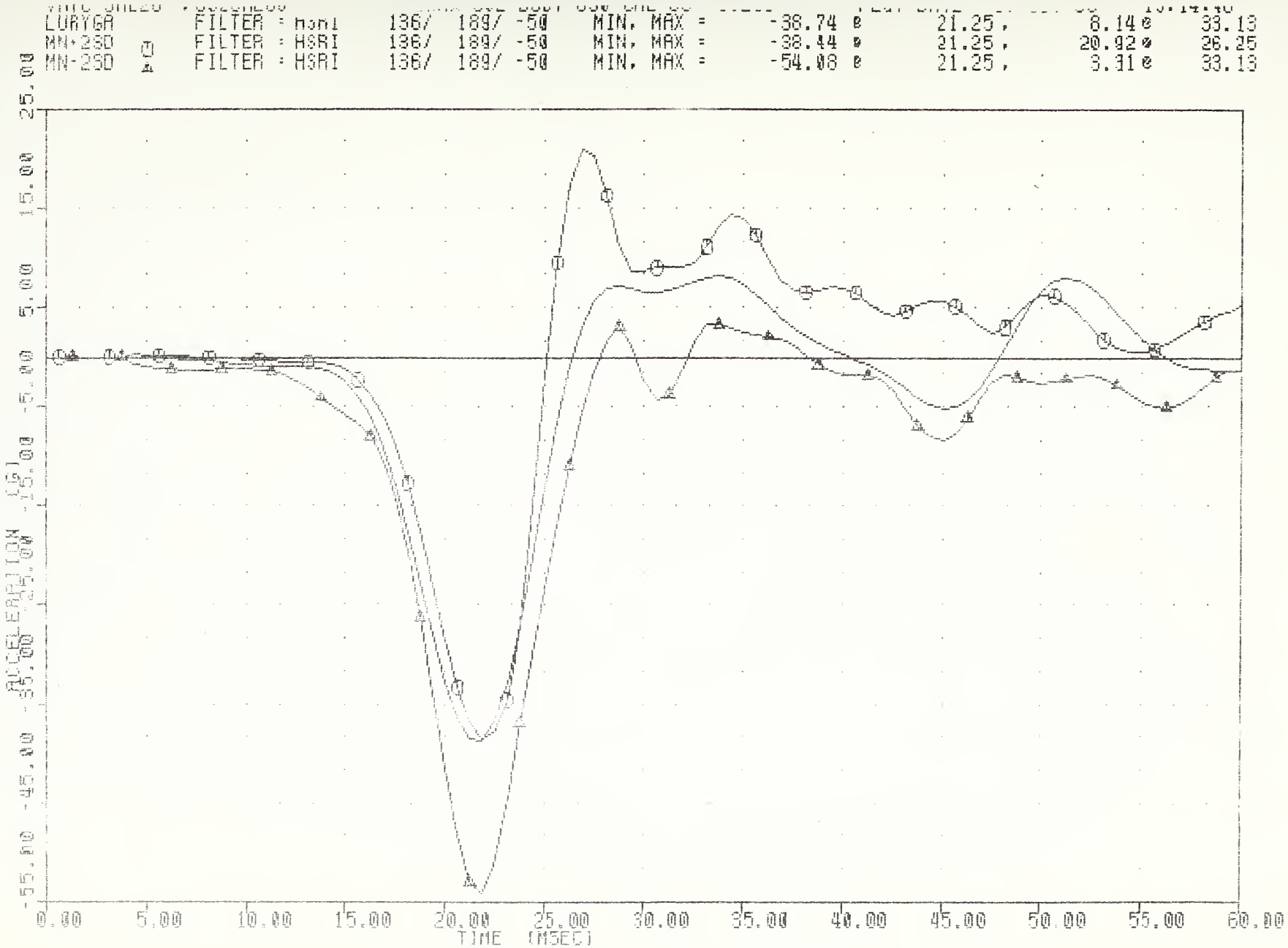
LEFT LOWER RIB ACCELERATION Y AXIS -1


LLRYGA FILTER : HSRI 136/ 189/ -50 MIN, MAX = -36.68 @ 21.25, 7.26 @ 28.75
MN+2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -37.66 @ 21.25, 19.00 @ 26.87
MN-2SD FILTER : HSRI 136/ 189/ -50 MIN, MAX = -52.52 @ 21.25, 2.94 @ 32.50
ACCELERATION (G)
25.00
15.00
5.00
-5.00
-15.00
-25.00
-35.00
-45.00
-55.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
40.00
45.00
50.00
55.00
60.00
TIME (MSEC)
SIDE IMPACT TEST (ARLU02)
LEFT LOWER RIB ACCELERATION Y AXIS -A



SIDE IMPACT TEST (ARLU02)

LEFT UPPER RIB ACCELERATION Y AXIS -1



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