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U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

**DOT HS 807 911
Final Report**

November 1991

Final Report of a 315° Moving Pole Barrier Impact Into a 1987 Volkswagen Golf 3-Door Hatchback in Support of Crash III Damage Algorithm Reformulation

Technical Report Documentation Page

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16. Abstract Three (3) 315° moving pole barrier impact tests were conducted for research and development in support of the crash III damage algorithm reformulation. These tests were conducted on a 1987 Volkswagen Golf 3-door hatchback, VIN 1VWFA9171HV073302, at the Transportation Research Center of Ohio. The following three tests were conducted on the vehicle:																							
<table border="1"> <thead> <tr> <th>TEST NO.</th> <th>DATE</th> <th>TIME</th> <th>SPEED (mph)</th> <th>MAXIMUM CUMULATIVE CRUSH (in.)</th> </tr> </thead> <tbody> <tr> <td>911010-1</td> <td>10/10/91</td> <td>1315</td> <td>15.9</td> <td>4.5</td> </tr> <tr> <td>911010-2</td> <td>10/10/91</td> <td>1410</td> <td>33.3</td> <td>17.9</td> </tr> <tr> <td>911010-3</td> <td>10/10/91</td> <td>1513</td> <td>33.1</td> <td>25.2</td> </tr> </tbody> </table>				TEST NO.	DATE	TIME	SPEED (mph)	MAXIMUM CUMULATIVE CRUSH (in.)	911010-1	10/10/91	1315	15.9	4.5	911010-2	10/10/91	1410	33.3	17.9	911010-3	10/10/91	1513	33.1	25.2
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911010-3	10/10/91	1513	33.1	25.2																			
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SECTION 1.0
PURPOSE AND TEST SUMMARY

The purpose of the three (3) 315° moving pole barrier impact tests was for research and development in support of the CRASH III damage algorithm reformulation.

The 1987 Volkswagen Golf was equipped with a 1.8 liter, 4-cylinder, transverse, gasoline engine with a 5-speed manual transmission. The test weight of the vehicle was 2145 pounds.

The moving pole barrier's actual weight was 3195 pounds. A steel cylinder 12 inches in diameter and 60 inches high was mounted vertically on the front of the moving barrier. The moving pole barrier was intended to impact the left side of the vehicle at an angle of 315°. The initial impact point was 20.4 inches rearward of the front wheel centerline.

The impacted vehicle was instrumented with six (6) accelerometers to measure vehicle X-axis and Y-axis acceleration.

The moving pole barrier was instrumented with two (2) accelerometers to measure X-axis and Y-axis acceleration.

The crash test event was recorded by two (2) high-speed motion picture cameras.

SECTION 2.0

VEHICLE INFORMATION

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Volkswagen of America, Inc.

MAKE/MODEL: Volkswagen/Golf GL

VIN: 1VWFA9171HV073302

BODY STYLE: 5-door hatchback

MODEL YEAR: 1987

COLOR: Blue

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 1.8 liter

TRANSMISSION DATA: 5 SPEED, X MANUAL, AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 10/04/91

ODOMETER READING: 25,322.0

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING Yes
POWER BRAKES Yes
POWER SEATS No
POWER WINDOWS No
TINTED GLASS Yes
RADIO No
CLOCK Yes
OTHER None

AUTOMATIC TRANSMISSION No
AUTOMATIC SPEED CONTROL No
TILTING STEERING WHEEL No
TELESCOPING STEERING WHEEL No
AIR CONDITIONING Yes
ANTI-SKID BRAKE No
REAR WINDOW DEFROSTER Yes

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Volkswagen of America, Inc.

DATE OF MANUFACTURE: 06/87

VIN: 1VWFA9171HV073302

GVWR: 3175 LBS

GAWR: FRONT: 1800 LBS., REAR: 1540 LBS.

TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Michelin MXL 175/70R13

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 29 PSI
REAR: 35 PSI

SPARE TIRE (MFR., LINE, SIZE): Michelin (Temporary) 105/70R14

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS:

MAXIMUM WIDTH: 65.2 INCHES

WHEELBASE: 97.5 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA:

The label was located in the right rear door opening.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P175/70R13

RECOMMENDED COLD TIRE PRESSURE: FRONT: 29 PSI; REAR: 25 PSI

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR 5 TOTAL

VEHICLE CAPACITY WEIGHT: 900 LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 24.8; RF 24.9; LR 24.4; RR 24.5

PRE-TEST ATTITUDE: LF 24.5; RF 24.5; LR 24.3; RR 24.4

TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	652 LBS.	RIGHT REAR	421 LBS.
LEFT FRONT	657 LBS.	LEFT REAR	408 LBS.
TOTAL FRONT WEIGHT	1309 LBS.	(61.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	829 LBS.	(38.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 2138 LBS.			

VEHICLE'S TARGET TEST WEIGHT:

TARGET TEST WEIGHT = _____ LBS. *

WEIGHT OF TEST VEHICLE:

RIGHT FRONT	658 LBS.	RIGHT REAR	422 LBS.
LEFT FRONT	630 LBS.	LEFT REAR	435 LBS.
TOTAL FRONT WEIGHT	1288 LBS.	(60.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	857 LBS.	(40.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT 2145 LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE: 0 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 39.0 INCHES REARWARD OF FRONT WHEEL CENTERLINE

*There was no target test weight established for this vehicle. The test weight was the weight of the vehicle as delivered plus instrumentation.

SIDE CRUSH MEASUREMENTS AT VEHICLE MAXIMUM WIDTH HEIGHT

LOCATION	Y 0		1		2		3		4		5		6		7		8	
	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X
PRE-TEST	12.0	74.6	10.1	48.0	12.7	21.1	15.8	20.2	18.9	19.6	21.8	19.0	24.8	18.5	27.9	18.0	30.9	17.9
POST-TEST 1	13.3	74.1	11.0	48.0	14.0	20.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 2	11.2	62.1	13.6	35.6	21.4	9.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 3	12.0	58.2	15.9	31.9	25.2	6.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOCATION	9		10		11		12		13		14		15		16		17	
	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
PRE-TEST	34.0	17.5	37.1	17.2	40.2	17.2	43.2	16.7	46.3	16.9	49.4	16.5	52.5	16.6	55.6	16.4	58.6	16.4
POST-TEST 1	NA	NA	37.8	17.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	56.4	16.5	60.1	18.9
POST-TEST 2	NA	NA	15.8	10.8	48.8	11.2	51.6	11.8	54.9	12.1	58.1	12.2	61.2	12.8	64.2	13.5	72.0	16.2
POST-TEST 3	NA	NA	49.1	10.2	52.1	10.9	55.1	11.8	58.1	12.2	61.2	12.6	64.2	13.3	66.9	14.1	76.2	19.1
LOCATION	18		19		20		21		22		23		24		25		26	
	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
PRE-TEST	61.6	16.1	64.6	16.2	67.7	16.2	70.8	16.1	73.8	16.1	76.6	16.1	79.6	15.9	82.7	15.9	85.6	15.8
POST-TEST 1	63.0	20.0	65.9	20.4	68.8	20.4	71.6	20.4	75.3	20.1	78.0	19.5	81.0	19.0	83.6	18.4	86.4	17.9
POST-TEST 2	75.6	18.8	75.2	21.4	76.3	23.9	78.4	26.2	81.6	28.2	83.1	29.6	84.7	30.6	89.1	31.4	91.8	31.9
POST-TEST 3	77.8	21.8	78.5	24.6	80.1	27.1	81.3	29.3	83.1	31.1	86.1	32.4	89.0	33.4	91.0	34.9	93.6	35.6

All measurements are in inches. Column readings are three inches apart beginning on the right front corner and continuing counterclockwise around the perimeter of the vehicle ending at the right rear corner. All X-axis measurements taken from a reference plane 165 inches from and parallel to the rear bumper. All Y-axis measurements taken from a reference plane 48 inches from and parallel to the vehicle longitudinal centerline.

SIDE CRUSH MEASUREMENTS AT VEHICLE MAXIMUM WIDTH HEIGHT

LOCATION	27	28	29	30	31	32	33	34	35
	X	Y	X	Y	X	Y	X	Y	X
PRE-TEST	88.6	15.8	91.6	15.8	94.6	15.8	97.5	15.8	100.4
POST-TEST 1	89.1	17.5	92.1	17.0	95.2	16.4	97.9	16.2	NA
POST-TEST 2	93.4	32.2	96.8	31.8	99.1	30.6	NA	NA	NA
POST-TEST 3	95.9	36.0	98.8	36.4	102.3	36.5	104.6	40.8	106.0
LOCATION	36	37	38	39	40	41	42	43	44
	X	Y	X	Y	X	Y	X	Y	X
PRE-TEST	115.6	16.0	118.7	16.1	121.8	16.1	124.8	16.1	127.8
POST-TEST 1	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 2	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 3	115.1	28.4	116.6	26.0	118.8	23.9	120.3	21.5	122.1
LOCATION	45	46	47	48	49	50	51	52	
	X	Y	X	Y	X	Y	X	Y	
PRE-TEST	142.9	16.9	145.9	17.2	148.9	17.4	152.2	17.9	155.2
POST-TEST 1	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 2	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 3	NA	NA	NA	NA	NA	NA	NA	NA	NA

All measurements are in inches. Column readings are three inches apart beginning on the right front corner and continuing counterclockwise around the perimeter of the vehicle ending at the right rear corner. All X-axis measurements taken from a reference plane 165 inches from and parallel to the rear bumper. All Y-axis measurements taken from a reference plane 48 inches from and parallel to the vehicle longitudinal centerline.

SIDE CRUSH MEASUREMENTS AT VEHICLE SILL HEIGHT

LOCATION	0	1	2	3	4	5	6	7	8
	X	Y	X	Y	X	Y	X	Y	X
PRE-TEST	97.5	17.8	100.4	18.2	103.4	18.1	106.4	18.1	109.5
POST-TEST 1	NA	NA	NA	NA	NA	NA	NA	NA	NA
POST-TEST 2	102.6	29.0	105.6	26.0	105.7	21.8	109.6	19.8	112.0
POST-TEST 3	111.8	34.9	111.4	32.0	108.0	28.2	108.9	24.8	109.6

LOCATION	9
	X
PRE-TEST	124.8
POST-TEST 1	NA
POST-TEST 2	NA
POST-TEST 3	NA

All measurements are in inches. Column readings are three inches apart from front to rear on vehicle.
 All X-axis measurements taken from a reference plane 165 inches from and parallel to the rear bumper.
 All Y-axis measurements taken from a reference plane 48 inches from and parallel to the vehicle longitudinal centerline.

TEST NOTES

For test number 911010-2 the post-test profile crush measurements at the vehicle maximum width height conclude with point number 29 which is the last point at the trailing edge of the left front door. The left rear door striker/latch mechanism failed during the second impact allowing the door to protrude outward from the vehicle. It was felt that measurements taken from the left rear door surface would not accurately represent the vehicle crush profile. Thus the crush profile plot from point number 29 to point 50 does not represent the actual vehicle profile but is merely a straight line connecting the two points. Due to the lack of a complete vehicle profile for this test the length of damage surface line "FL" was constructed parallel to a reference line connecting point number 11 and point number 50 on the vehicle profile. The actual damage length "FL" was defined as the distance from point number 11 to the intersection of the reference line with a line running perpendicular to the reference line and passing through point number 29.

SECTION 3.0

TEST 911010-1 SUMMARY

TEST CONDITIONS

TEST NUMBER: 911010-1

DATE OF TEST: 10/10/91

TIME OF TEST: 1315

AMBIENT TEMPERATURE AT IMPACT AREA: 57° F

INTENDED MOVING BARRIER VELOCITY: 16.0 MPH

ACTUAL MOVING BARRIER VELOCITY: 15.9 MPH

SUBJECT VEHICLE DATA

LENGTH OF DIRECT CONTACT DAMAGE: 32.0

MAXIMUM CUMULATIVE CRUSH

AT VEHICLE MAXIMUM WIDTH HEIGHT: 4.5

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

VEHICLE CRUSH

TEST NO. 911010-1

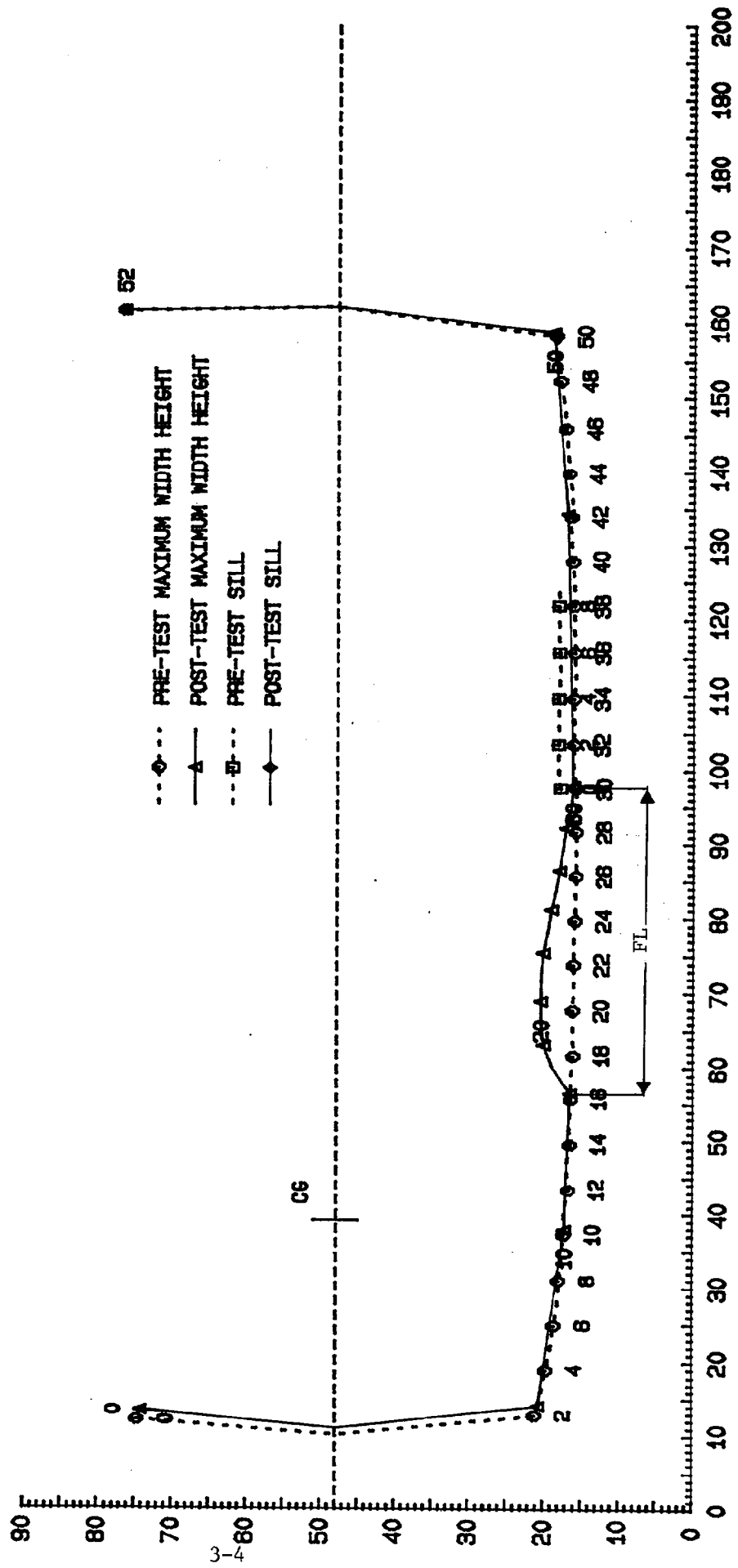
FL	<u>41.8</u>
C1	<u>0.0</u>
C2	<u>1.5</u>
C3	<u>3.0</u>
C4	<u>4.4</u>
C5	<u>4.1</u>
C6	<u>0.0</u>

NOTES: FL is total length of damage surface
C1 through C6 are spaced equally apart
Measurements taken at vehicle maximum width height
All distance measurements are in inches.

DETERMINATION OF VEHICLE CRUSH:

A reference line (line FL on crush profile) was constructed connecting the end points of the vehicle's damaged surface. Six equally spaced points were defined along the reference line and labeled C1 through C6 with the rearmost point of the damaged surface defined as C1 and the forwardmost point defined as C6. The actual crush distance is a measurement taken perpendicular to and from the reference line at each point (C1 through C6) to the vehicle's damaged surface.

TEST 1 -- VEHICLE CRUSH PROFILE



VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 911010-1

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G	MSEC	MAX G	MSEC
1	RIGHT FRONT SILL	106.2	-24.4	11.8				
	LONGITUDINAL				0.6	183.6	2.1	42.9
	LATERAL				2.0	185.3	9.0	36.1
	RESULTANT				9.1	36.1		
2	RIGHT REAR SILL	64.0	-24.4	11.2				
	LONGITUDINAL				0.5	326.9	2.3	98.9
	LATERAL				1.7	213.8	6.4	50.1
	RESULTANT				6.6	50.0		
3	VEHICLE CENTER OF GRAVITY	82.8	0.0	14.9				
	PARALLEL TO IMPACT				1.6	224.0	6.7	49.9
	PERPENDICULAR TO IMPACT				1.5	60.5	4.4	37.1

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 911010-1

No. LOCATION	X*	Y*	Z*	POSITIVE	MAX G	Negative	MAX G
				DIRECTION		DIRECTION	
					MSEC		MSEC
1 MOVING BARRIER	75.2	0.0	12.3				
CENTER OF GRAVITY							
LONGITUDINAL				0.5	185.4	3.4	71.9
LATERAL				0.9	226.5	1.7	70.1
RESULTANT				3.7	71.6		

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM BARRIER'S REAR SURFACE
Y: + LEFTWARD FROM BARRIER'S LONGITUDINAL CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TEST NO. 911010-1
CAMERA INFORMATION

CAMERA NUMBER	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Overhead wide	Photosonic 1B	13	540	Impact overall
2	Overhead tight	Photosonic 1B	25	488	Impact close-up

SECTION 4.0

TEST 911010-2 SUMMARY

TEST CONDITIONS

TEST NUMBER: 911010-2

DATE OF TEST: 10/10/91

TIME OF TEST: 1410

AMBIENT TEMPERATURE AT IMPACT AREA: 57° F

INTENDED MOVING BARRIER VELOCITY: 33.0 MPH

ACTUAL MOVING BARRIER VELOCITY: 33.3 MPH

SUBJECT VEHICLE DATA

LENGTH OF DIRECT CONTACT DAMAGE: 47.5

MAXIMUM CUMULATIVE CRUSH

AT VEHICLE MAXIMUM WIDTH HEIGHT: 17.9

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

VEHICLE CRUSH

TEST NO. 911010-2

FL	<u>52.1</u>	*
C1	<u>15.8</u>	
C2	<u>17.5</u>	
C3	<u>13.0</u>	
C4	<u>2.8</u>	
C5	<u>0.6</u>	
C6	<u>0.0</u>	

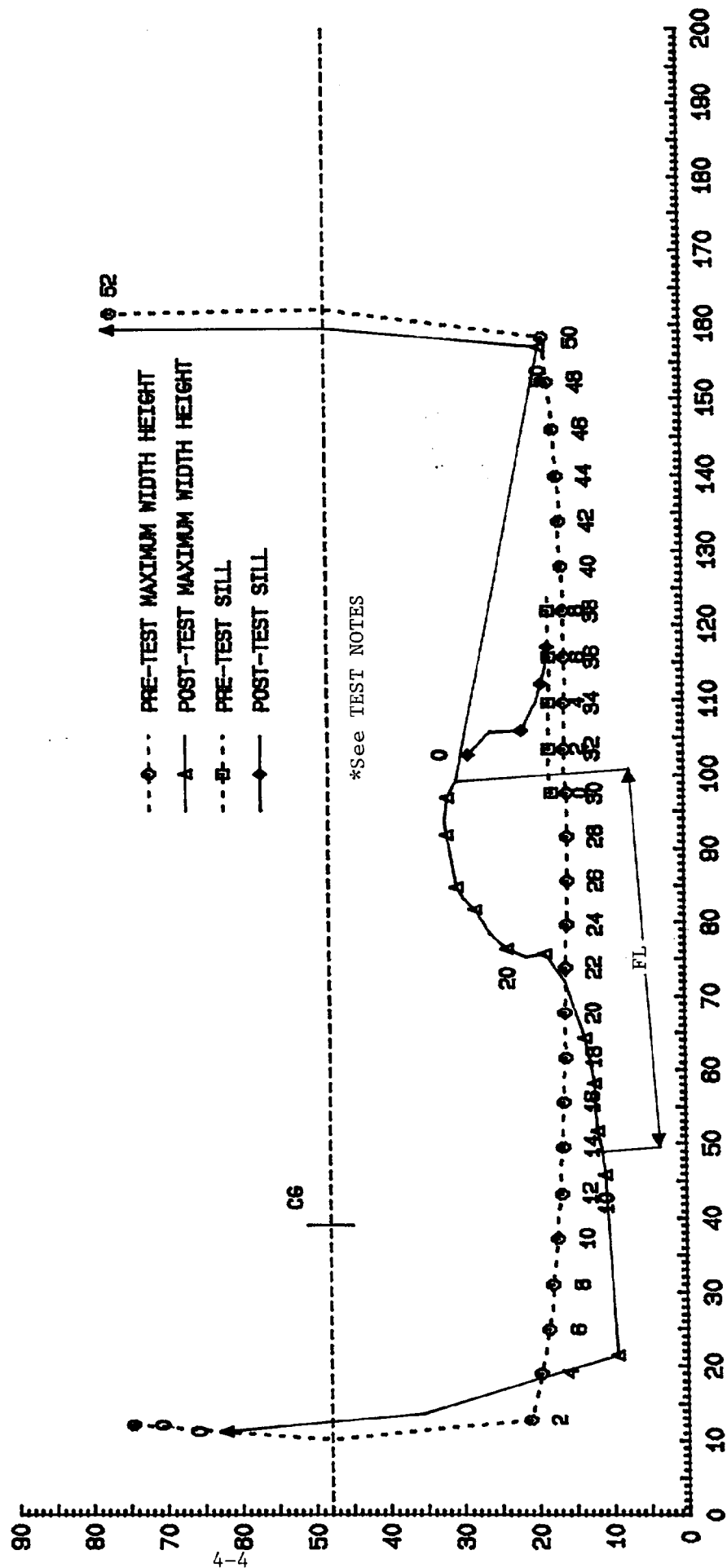
NOTES: FL is total length of damage surface
C1 through C6 are spaced equally apart
Measurements taken at vehicle maximum width height
All distance measurements are in inches.

DETERMINATION OF VEHICLE CRUSH:

A reference line (line FL on crush profile) was constructed connecting the end points of the vehicle's damaged surface. Six equally spaced points were defined along the reference line and labeled C1 through C6 with the rearmost point of the damaged surface defined as C1 and the forwardmost point defined as C6. The actual crush distance is a measurement taken perpendicular to and from the reference line at each point (C1 through C6) to the vehicle's damaged surface.

*See TEST NOTES

TEST 2 - VEHICLE CRUSH PROFILE



VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 911010-2

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G	MSEC	MAX G	MSEC
1	RIGHT FRONT SILL	106.2	-24.4	11.8				
	LONGITUDINAL				1.0	296.6	9.6	84.3
	LATERAL				2.4	53.8	20.2	14.0
	RESULTANT				20.7	14.0		
2	RIGHT REAR SILL	64.0	-24.4	11.2				
	LONGITUDINAL				1.9	94.3	10.2	84.1
	LATERAL				2.1	204.9	19.7	31.0
	RESULTANT				19.7	31.0		
3	VEHICLE CENTER OF GRAVITY	82.8	0.0	14.9				
	PARALLEL TO IMPACT				4.2	95.5	26.2	29.8
	PERPENDICULAR TO IMPACT				10.3	41.5	16.3	9.9

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 911010-2

No.	LOCATION	X*	Y*	Z*	POSITIVE			NEGATIVE		
					DIRECTION			DIRECTION		
					MAX G	MSEC		MAX G	MSEC	
1	MOVING BARRIER	75.2	0.0	12.3						
	CENTER OF GRAVITY									
	LONGITUDINAL				0.3	308.9		9.3	83.9	
	LATERAL				3.5	78.8		6.0	108.4	
	RESULTANT				9.6	83.9				

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM BARRIER'S REAR SURFACE
Y: + LEFTWARD FROM BARRIER'S LONGITUDINAL CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TEST NO. 911010-2
CAMERA INFORMATION

CAMERA NUMBER	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Overhead wide	Photosonic 1B	13	500	Impact overall
2	Overhead tight	Photosonic 1B	25	485	Impact close-up

SECTION 5.0

TEST 911010-3 SUMMARY

TEST CONDITIONS

TEST NUMBER: 911010-3

DATE OF TEST: 10/10/91

TIME OF TEST: 1513

AMBIENT TEMPERATURE AT IMPACT AREA: 57° F

INTENDED MOVING BARRIER VELOCITY: 33.0 MPH

ACTUAL MOVING BARRIER VELOCITY: 33.1 MPH

SUBJECT VEHICLE DATA

LENGTH OF DIRECT CONTACT DAMAGE: 55.0

MAXIMUM CUMULATIVE CRUSH

AT VEHICLE MAXIMUM WIDTH HEIGHT: 25.2

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

VEHICLE CRUSH

TEST NO. 911010-3

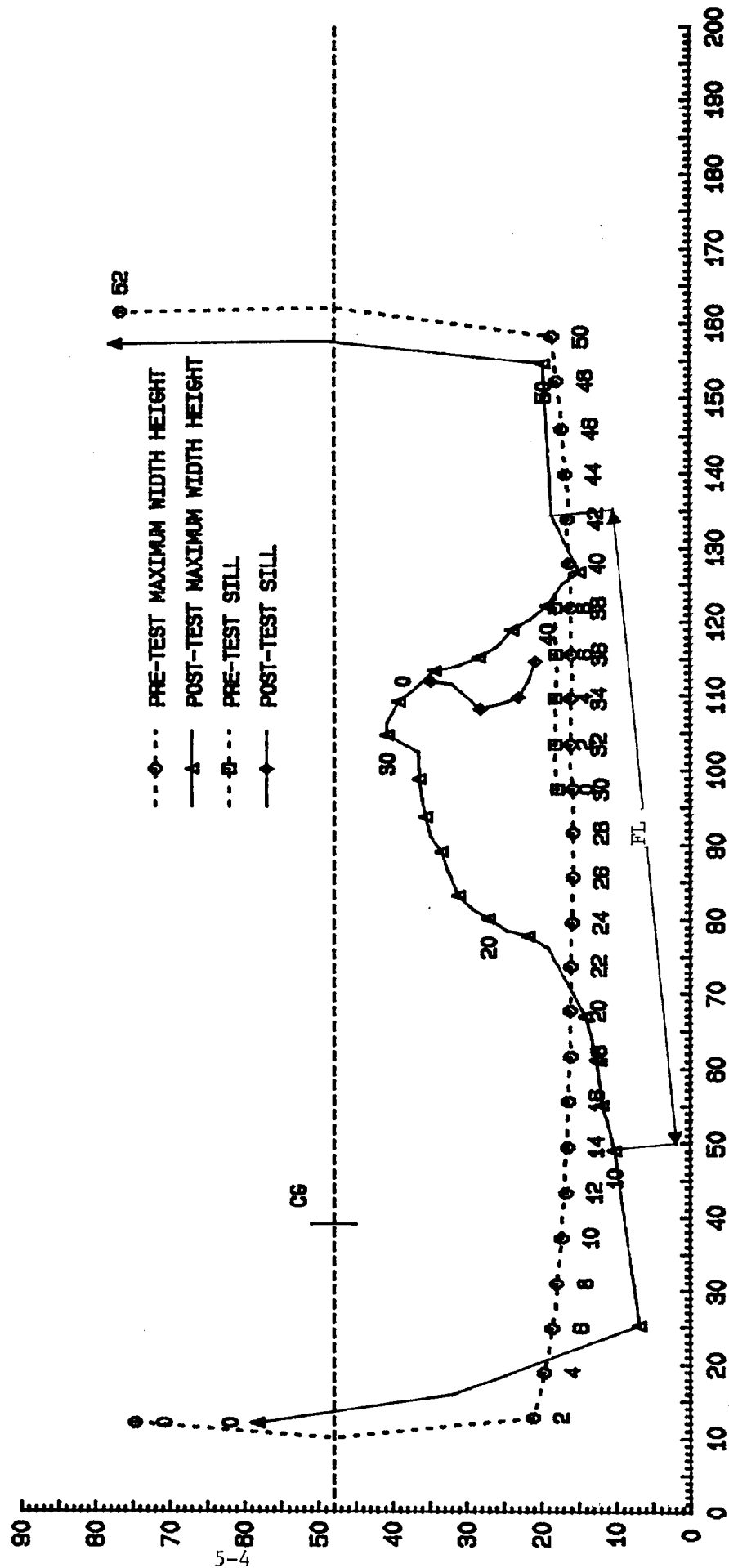
FL	<u>85.4</u>
C1	<u>0.0</u>
C2	<u>10.0</u>
C3	<u>21.2</u>
C4	<u>15.3</u>
C5	<u>1.8</u>
C6	<u>0.0</u>

NOTES: FL is total length of damage surface
C1 through C6 are spaced equally apart
Measurements taken at vehicle maximum width height
All distance measurements are in inches.

DETERMINATION OF VEHICLE CRUSH:

A reference line (line FL on crush profile) was constructed connecting the end points of the vehicle's damaged surface. Six equally spaced points were defined along the reference line and labeled C1 through C6 with the rearmost point of the damaged surface defined as C1 and the forwardmost point defined as C6. The actual crush distance is a measurement taken perpendicular to and from the reference line at each point (C1 through C6) to the vehicle's damaged surface.

TEST 3 - VEHICLE CRUSH PROFILE



VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 911010-3

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G	MSEC	MAX G	MSEC
1	RIGHT FRONT SILL	106.2	-24.4	11.8				
	LONGITUDINAL				7.2	24.5	21.1	38.5
	LATERAL				6.1	43.4	41.7	39.0
	RESULTANT				46.6	38.9		
2	RIGHT REAR SILL	64.0	-24.4	11.2				
	LONGITUDINAL				6.4	7.8	14.6	19.8
	LATERAL				23.7	24.5	51.6	9.4
	RESULTANT				51.7	9.4		
3	VEHICLE CENTER OF GRAVITY	82.8	0.0	14.9				
	PARALLEL TO IMPACT				11.7	25.0	58.5	7.0
	PERPENDICULAR TO IMPACT				32.8	12.5	38.1	5.0

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 911010-3

No. LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
				MAX G	MSEC	MAX G	MSEC
1 MOVING BARRIER	75.2	0.0	12.3				
CENTER OF GRAVITY							
LONGITUDINAL				1.0	136.4	16.0	36.0
LATERAL				6.1	17.9	11.5	42.9
RESULTANT				17.1	42.5		

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM BARRIER'S REAR SURFACE
Y: + LEFTWARD FROM BARRIER'S LONGITUDINAL CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TEST NO. 911010-3
CAMERA INFORMATION

CAMERA NUMBER	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Overhead wide	Photosonic 1B	13	500	Impact overall
2	Overhead tight	Photosonic 1B	25	490	Impact close-up

APPENDIX A

PHOTOGRAPHS

TEST NO. 911010-1
LIST OF PHOTOGRAPHS

1. PRE-TEST MOVING BARRIER FRONT VIEW
2. PRE-TEST MOVING BARRIER RIGHT FRONT VIEW
3. PRE-TEST FRONT VIEW
4. POST-TEST FRONT VIEW
5. POST-TEST LEFT SIDE VIEW
6. PRE-TEST LEFT REAR THREE-QUARTER - VIEW 1
7. PRE-TEST LEFT REAR THREE-QUARTER - VIEW 2
8. POST-TEST LEFT REAR THREE-QUARTER VIEW
9. PRE-TEST LEFT FRONT THREE-QUARTER - VIEW 1
10. PRE-TEST LEFT FRONT THREE-QUARTER - VIEW 2
11. POST-TEST LEFT FRONT THREE-QUARTER VIEW
12. PRE-TEST RIGHT SIDE VIEW
13. POST-TEST RIGHT SIDE VIEW
14. PRE-TEST REAR VIEW
15. POST-TEST REAR VIEW

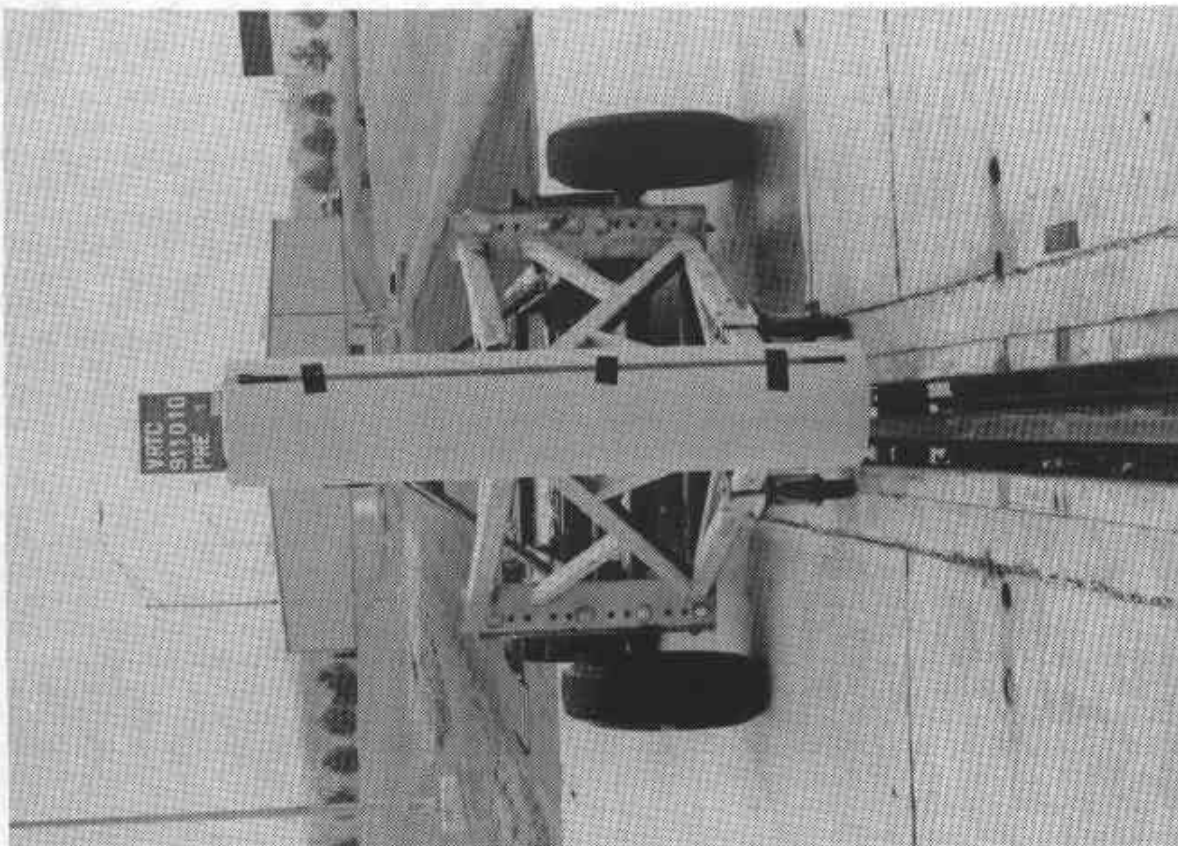


Figure A-1. PRE-TEST MOVING BARRIER FRONT VIEW



Figure A-2. PRE-TEST MOVING BARRIER RIGHT FRONT VIEW



Figure A-3. PRE-TEST FRONT VIEW



Figure A-4. POST-TEST FRONT VIEW



Figure A-5. POST-TEST LEFT SIDE VIEW



Figure A-6. PRE-TEST LEFT REAR THREE-QUARTER - VIEW 1



Figure A-7. PRE-TEST LEFT REAR THREE-QUARTER - VIEW 2



Figure A-8. POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-9. PRE-TEST LEFT FRONT THREE-QUARTER - VIEW 1



Figure A-10. PRE-TEST LEFT FRONT THREE-QUARTER - VIEW 2



Figure A-11. POST-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-12. PRE-TEST RIGHT SIDE VIEW



Figure A-13. POST-TEST RIGHT SIDE VIEW



Figure A-14. PRE-TEST REAR VIEW



Figure A-15. POST-TEST REAR VIEW

TEST NO. 911010-3
LIST OF PHOTOGRAPHS

1. POST-TEST FRONT VIEW
2. POST-TEST LEFT SIDE VIEW
3. POST-TEST LEFT REAR THREE-QUARTER VIEW
4. POST-TEST LEFT FRONT THREE-QUARTER VIEW
5. POST-TEST RIGHT SIDE VIEW
6. POST-TEST REAR VIEW



Figure A-1. POST-TEST FRONT VIEW



Figure A-2. POST-TEST LEFT SIDE VIEW



Figure A-3. POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-4. POST-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-5. POST-TEST RIGHT SIDE VIEW



Figure A-6. POST-TEST REAR VIEW

TEST NO. 911010-2
LIST OF PHOTOGRAPHS

1. POST-TEST FRONT VIEW
2. POST-TEST LEFT SIDE VIEW
3. POST-TEST LEFT REAR THREE-QUARTER VIEW
4. POST-TEST LEFT FRONT THREE-QUARTER VIEW
5. POST-TEST RIGHT SIDE VIEW
6. POST-TEST REAR VIEW



Figure A-1. POST-TEST FRONT VIEW



Figure A-2. POST-TEST LEFT SIDE VIEW



Figure A-3. POST-TEST LEFT REAR THREE-QUARTER VIEW



Figure A-4. POST-TEST LEFT FRONT THREE-QUARTER VIEW



Figure A-5. POST-TEST RIGHT SIDE VIEW



Figure A-6. POST-TEST REAR VIEW

APPENDIX B

DATA PLOTS

DATA PLOTS

TEST NO. 911010-1

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 RFSX61

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2.11e 42.88, 0.56 e 183.63

60.00

45.00

30.00

15.00

0.00

ACCELERATION (G)

3-B

-15.00

-30.00

-45.00

-60.00

-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 BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT FRONT DOOR SILL X-AXIS ACCELERATION

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 RFSXV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -1.64 180.00 , 0.01 31.63

40.00

30.00

20.00

10.00

0.00

B-4

10.00

20.00

30.00

40.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

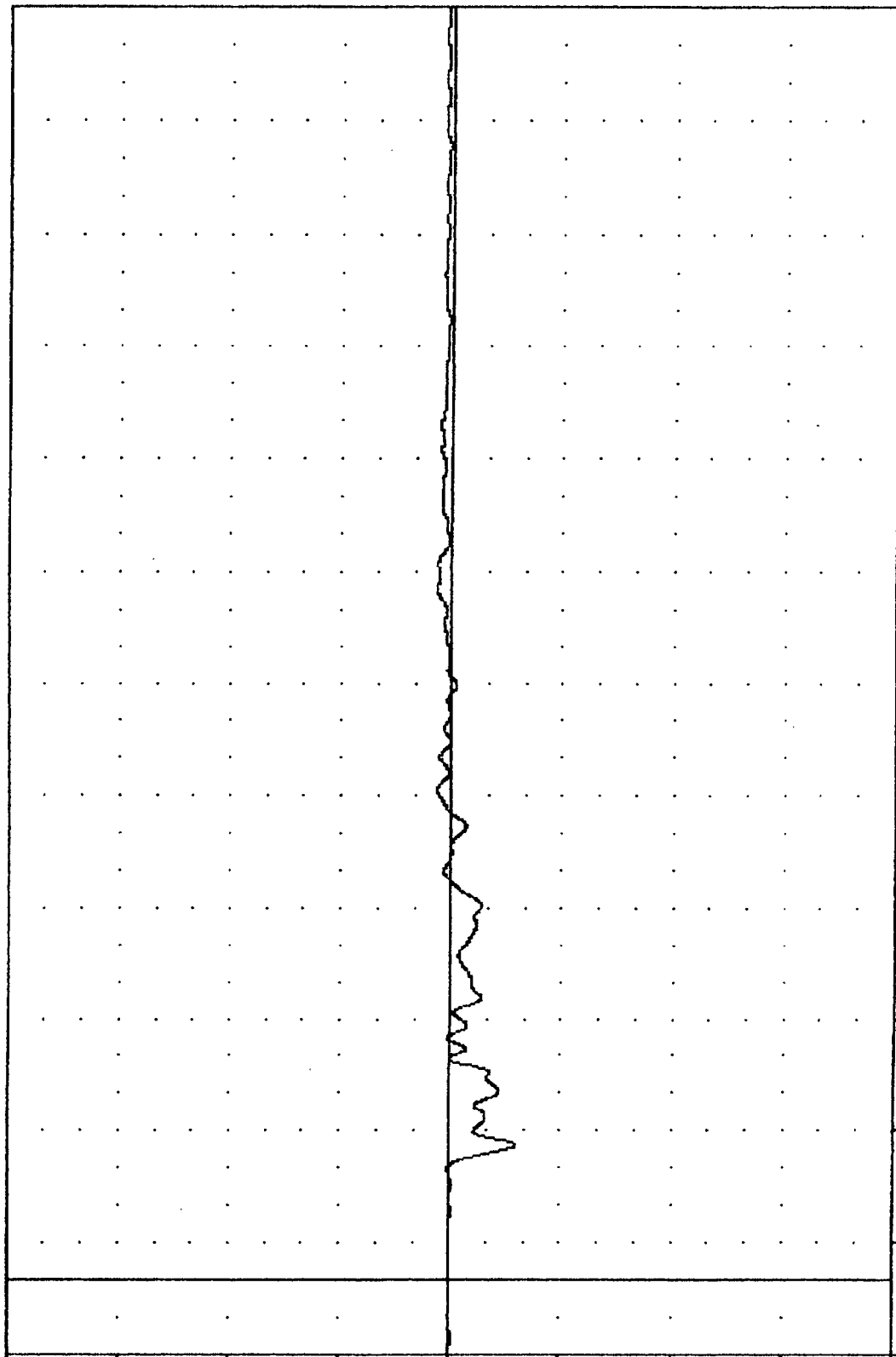
340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT FRONT DOOR SILL X-AXIS VELOCITY

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 RFSYG1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -8.98 36.13, 2.00 185.25

ACCELERATION (G)



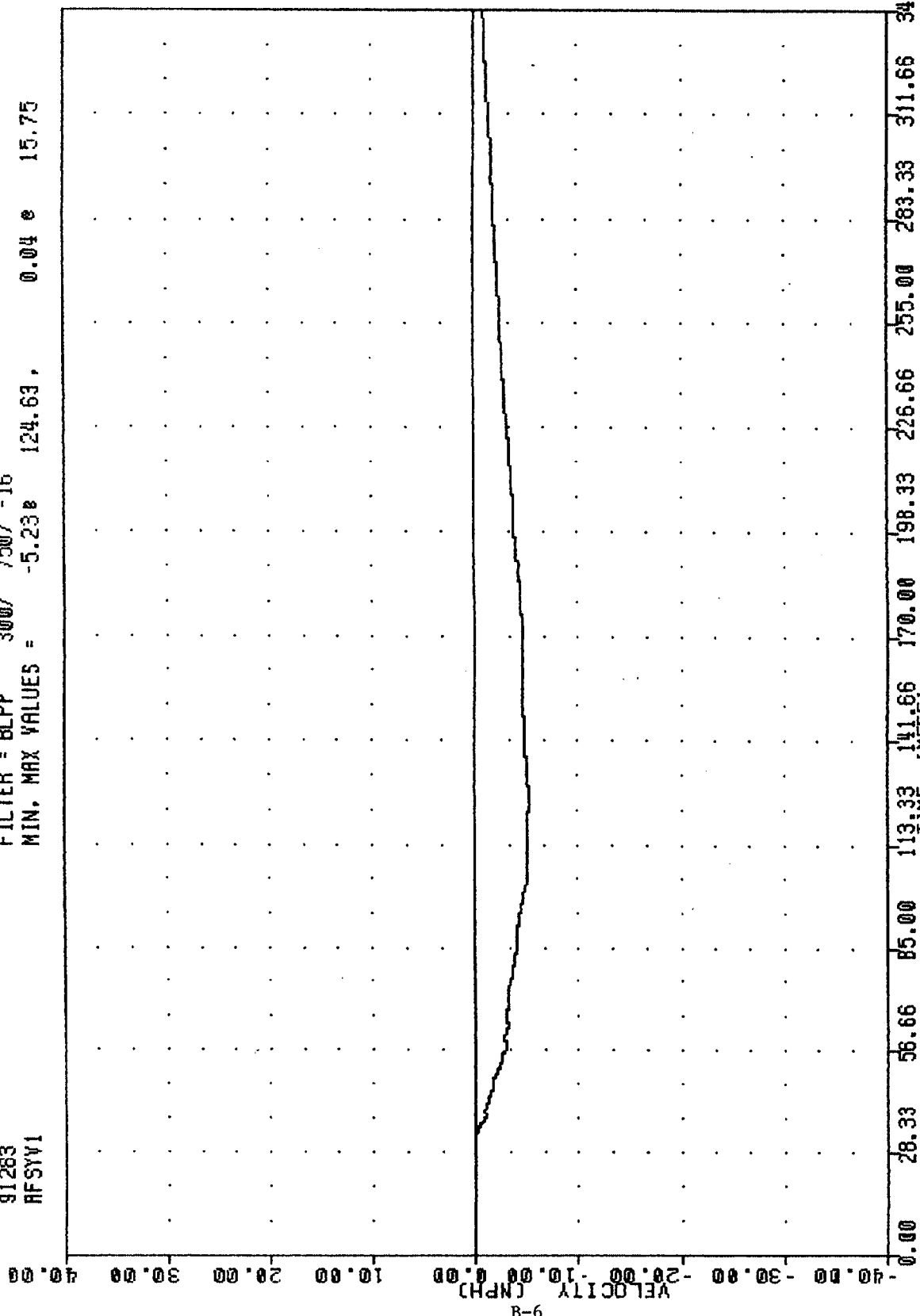
B-5

-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 BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT FRONT DOOR SILL Y-AXIS ACCELERATION

TRC , 911010-1
 CASH III DAMAGE ALGORITHM
 91283
 RFSYV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -5.23 e 124.63, 0.04 e 15.75

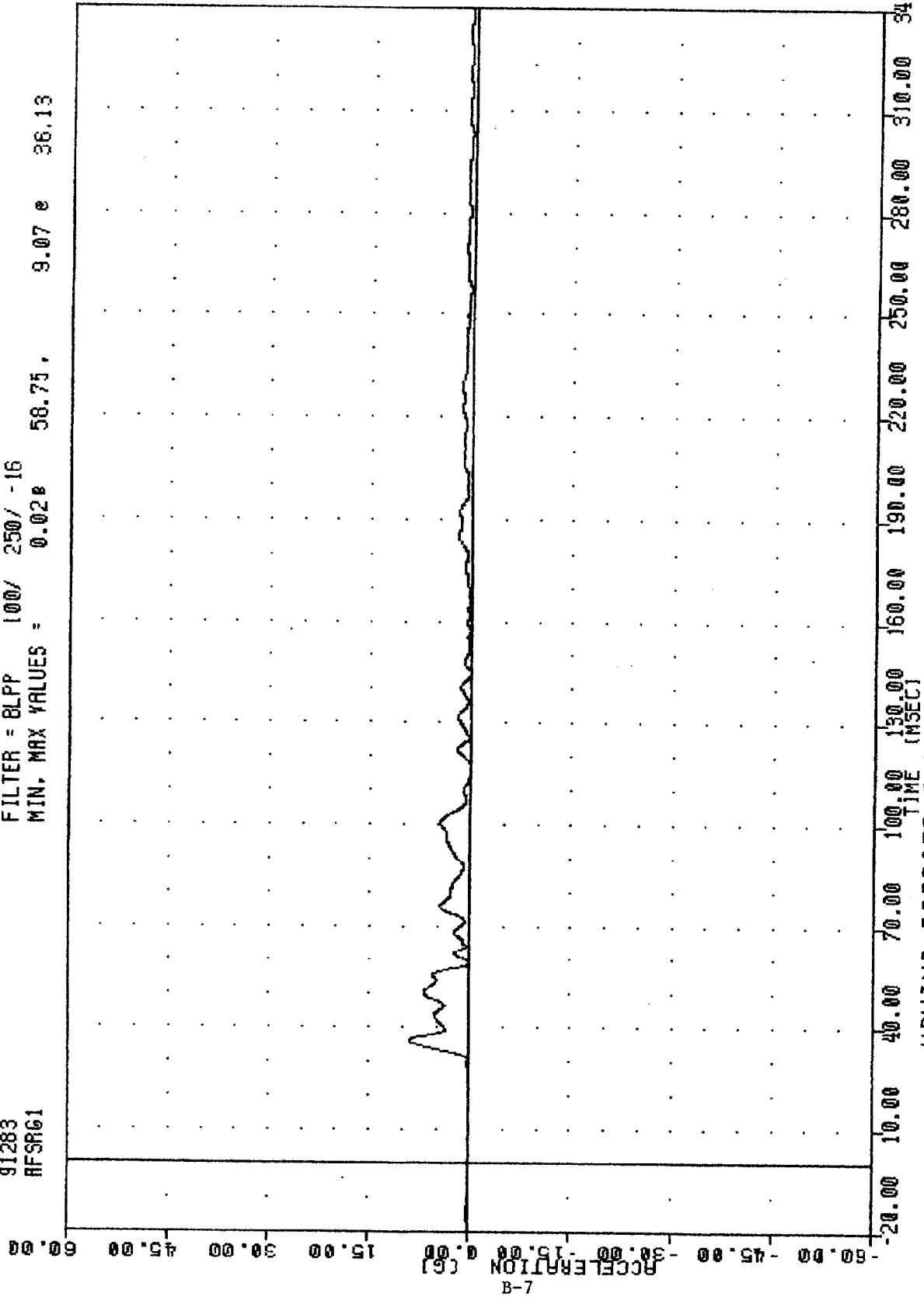


B-6

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT FRONT DOOR SILL Y-AXIS VELOCITY

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 RFSRG1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.028 58.75, 9.07 e 36.13

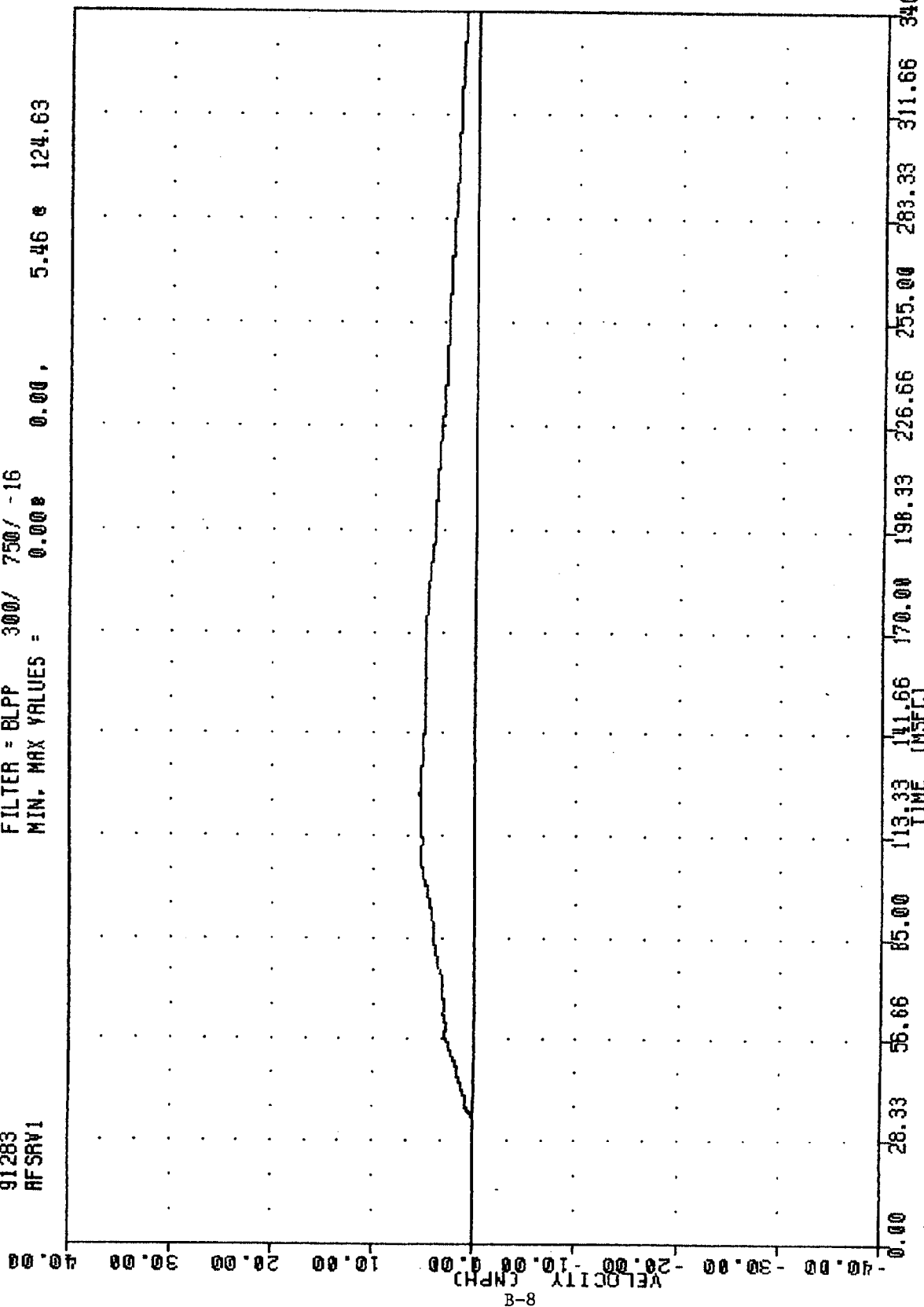


B-7

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT FRONT DOOR SILL RESULTANT ACCELERATION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 RFSRV1

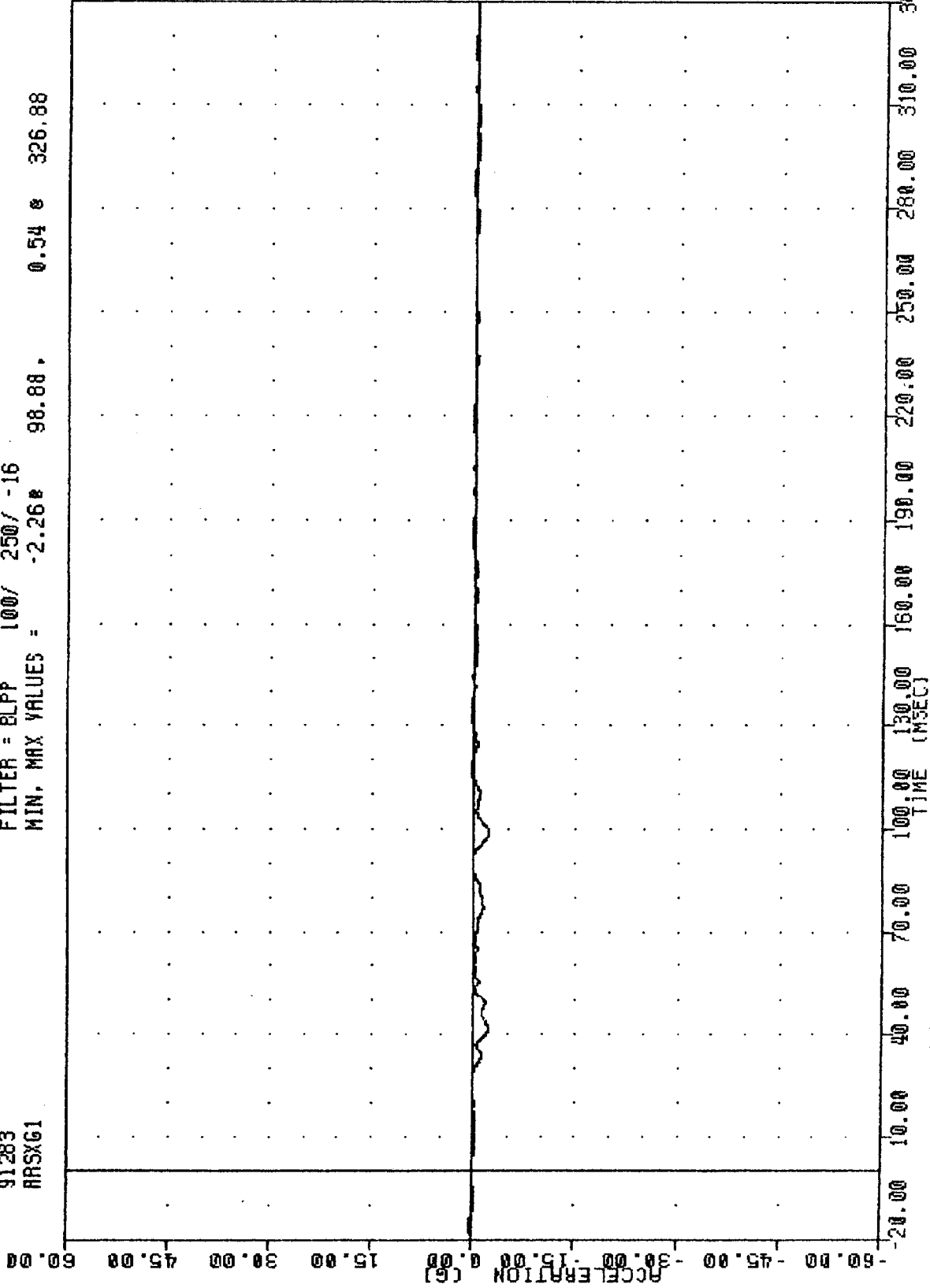
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.00 5.46 124.63



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT FRONT DOOR SILL RESULTANT VELOCITY

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 ARSXG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2.26 98.88 0.54 326.88



B-9

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT REAR DOOR SILL X-AXIS ACCELERATION

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 ARSXV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -1.51e 113.63, 0.01 e 4.25

40.00

30.00

20.00

10.00

0.00

B-10

-10.00

-20.00

-30.00

-40.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

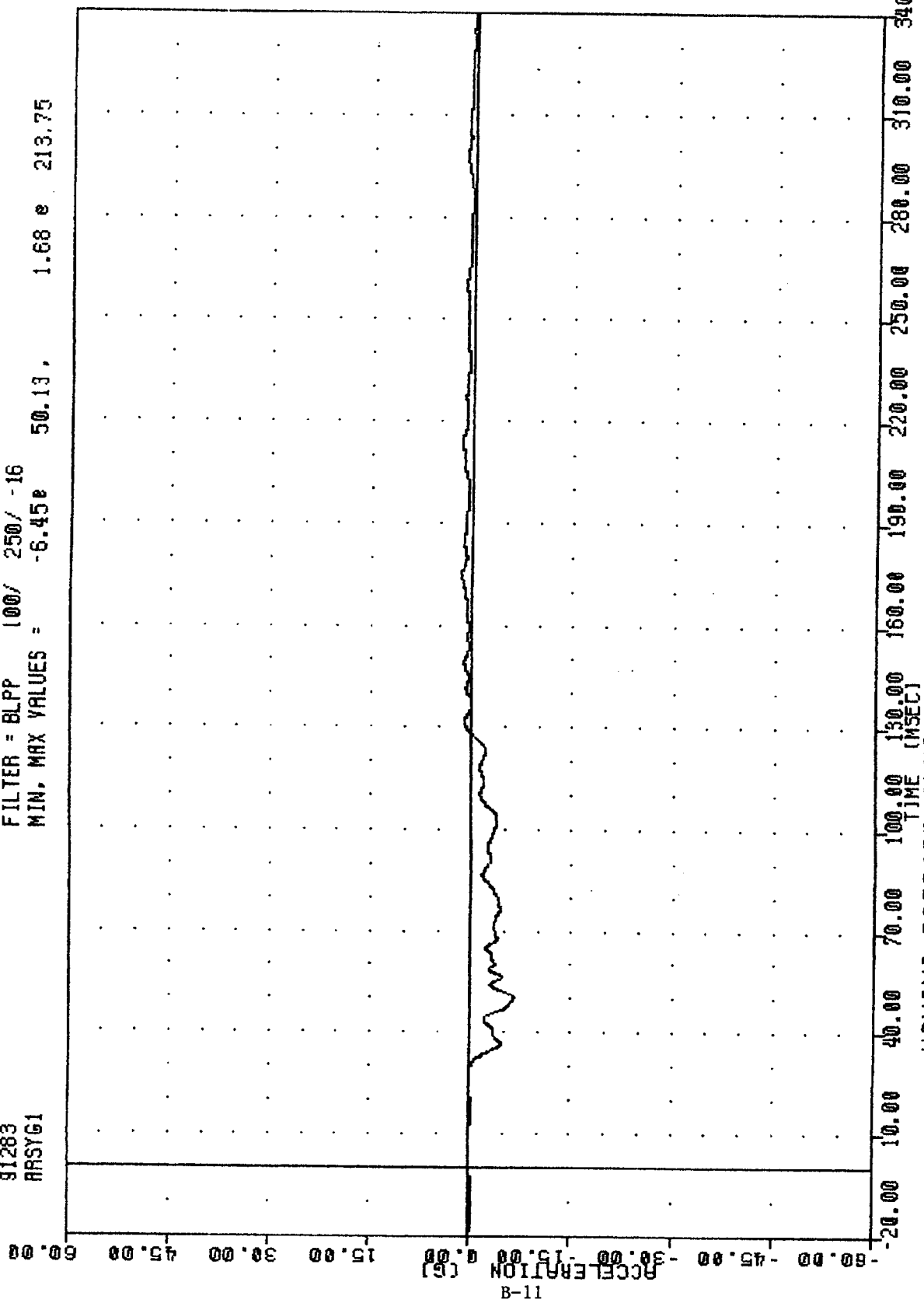
340.00

TIME (MSEC)

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT REAR DOOR SILL X-AXIS VELOCITY

TRC , 911010-1
CRASH III DAMAGE ALGORITHM
91283
RRSYG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -6.45e 50.13, 1.68 e 213.75

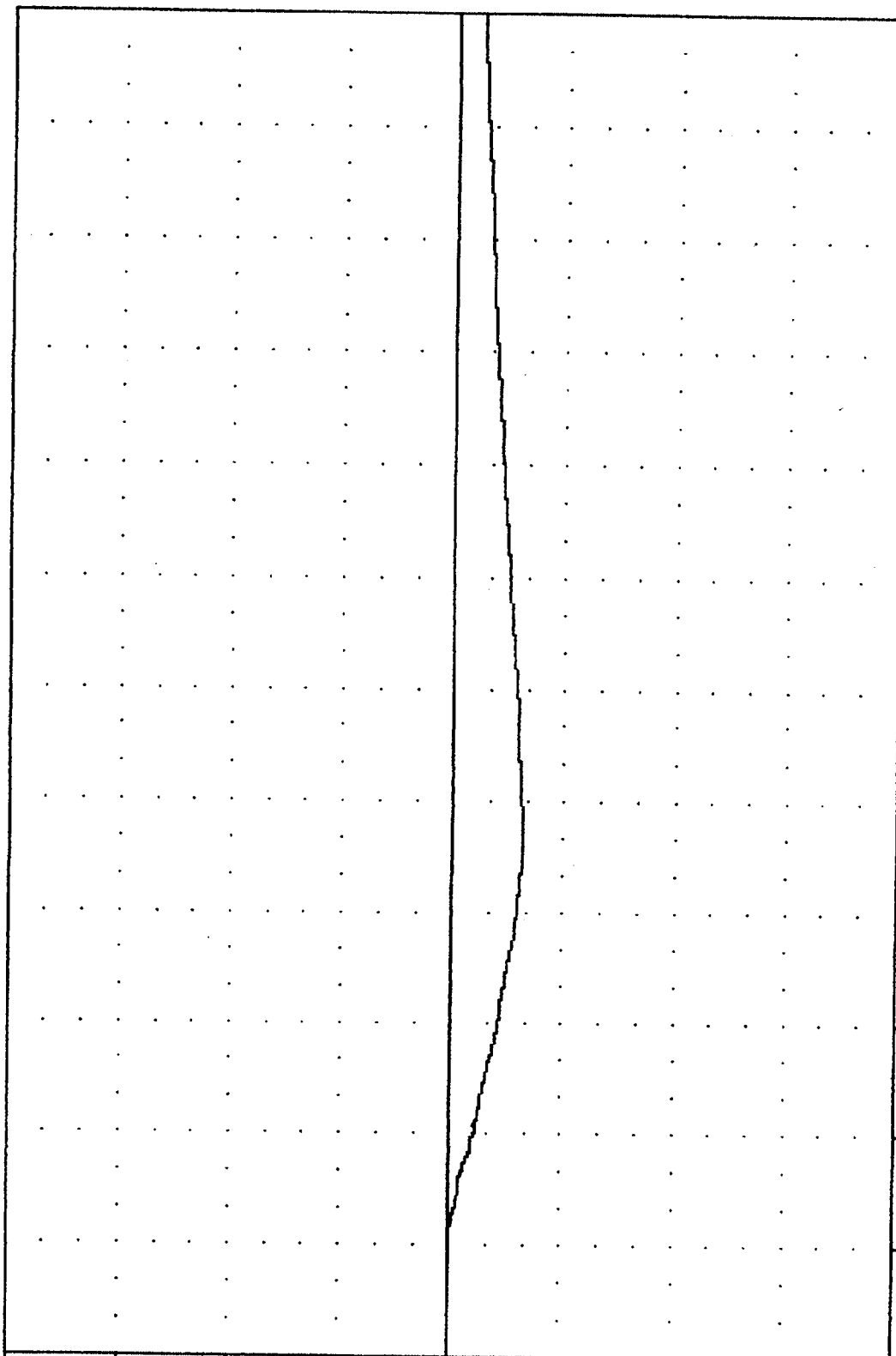


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
RIGHT REAR DOOR SILL Y-AXIS ACCELERATION

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 ARSYV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -6.33 127.38 0.02 9.88

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

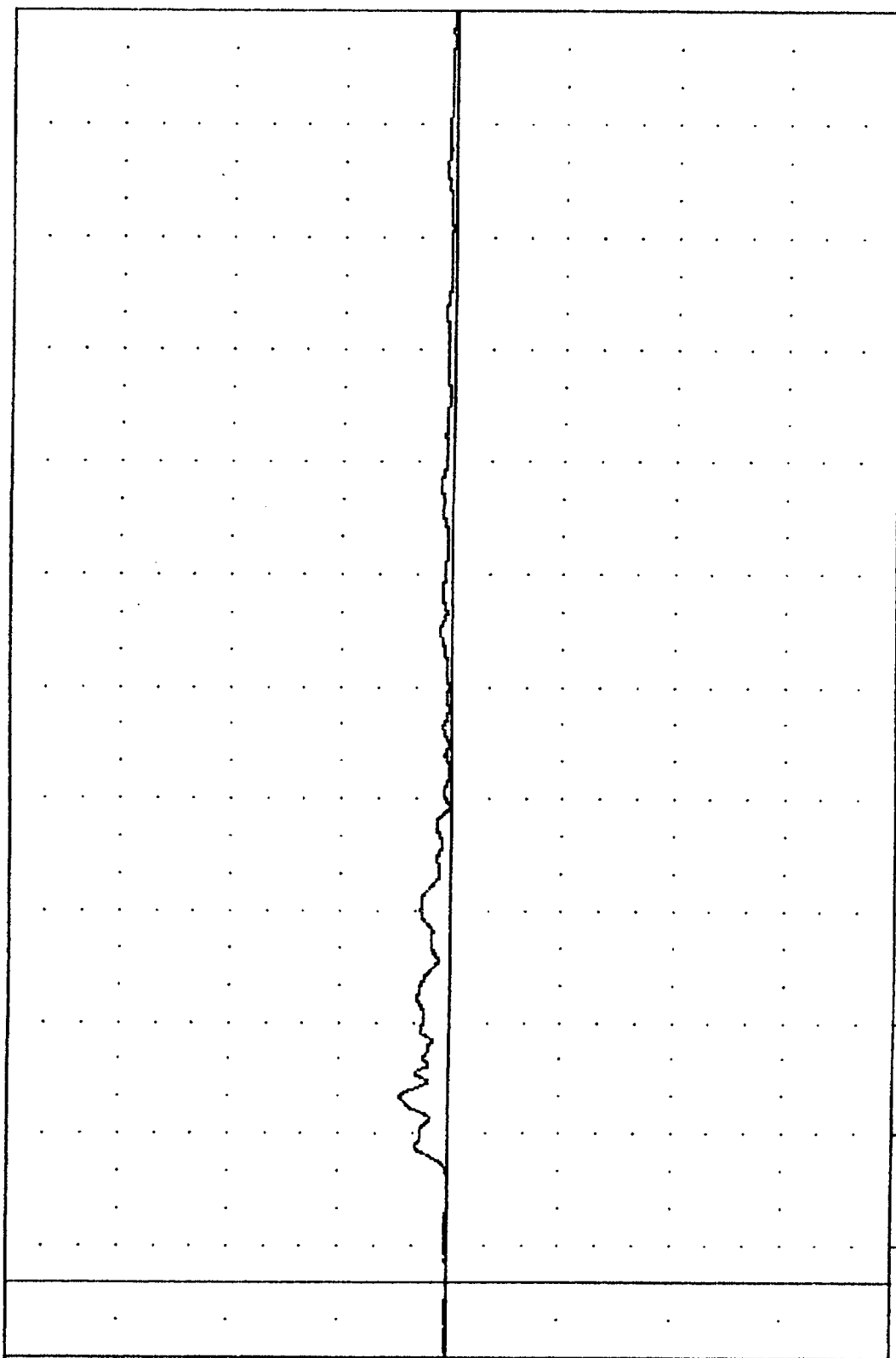


0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00
 TIME (MSEC)
 MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT REAR DOOR SILL Y-AXIS VELOCITY

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 ARSRG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.01e -1.13, 6.63 e 50.00

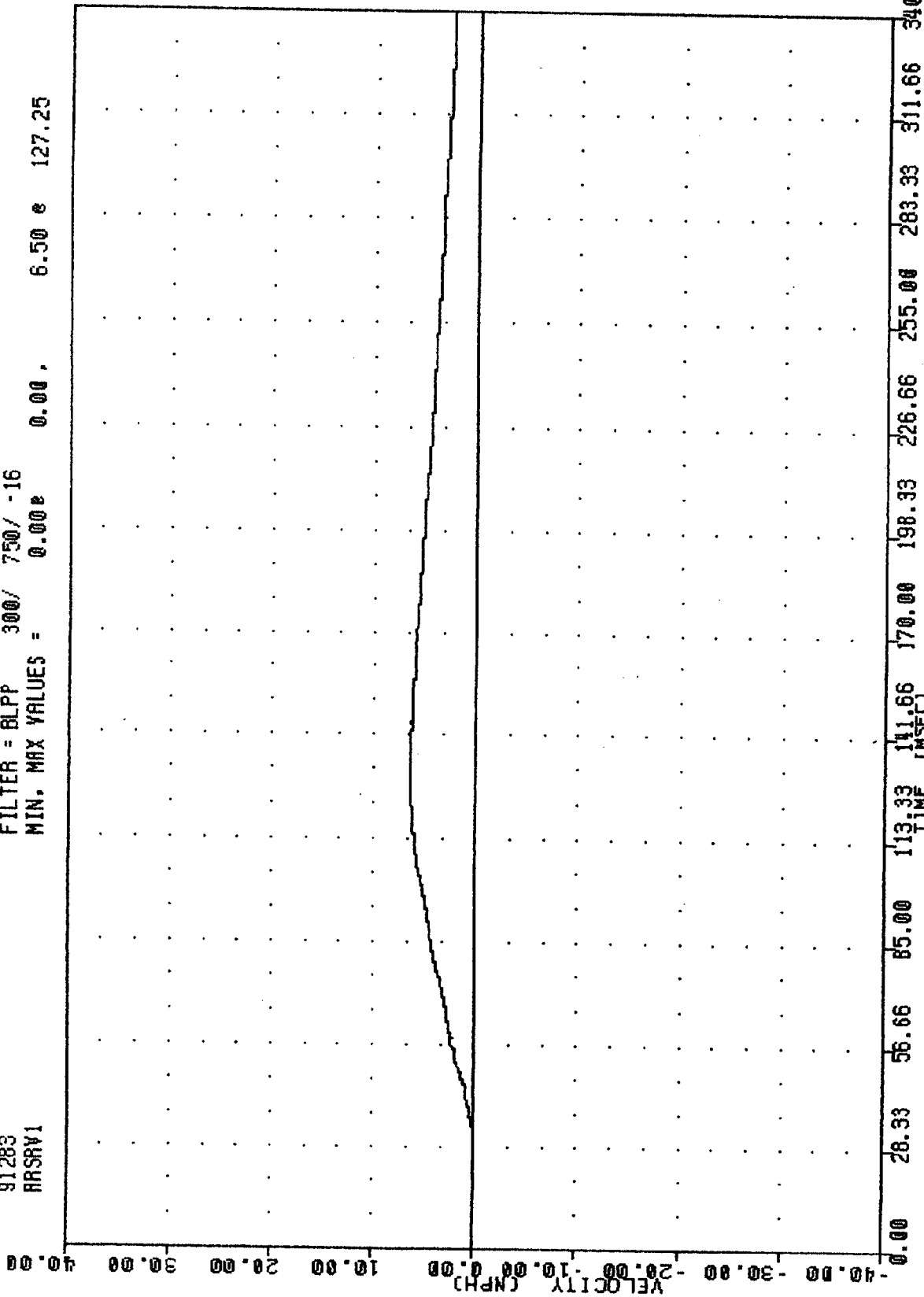
ACCELERATION (G)



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT REAR DOOR SILL RESULTANT ACCELERATION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 ARSRV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.00, 6.50 e 127.25



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 RIGHT REAR DOOR SILL RESULTANT VELOCITY

TRC , 911010-1
CRASH III DAMAGE ALGORITHM

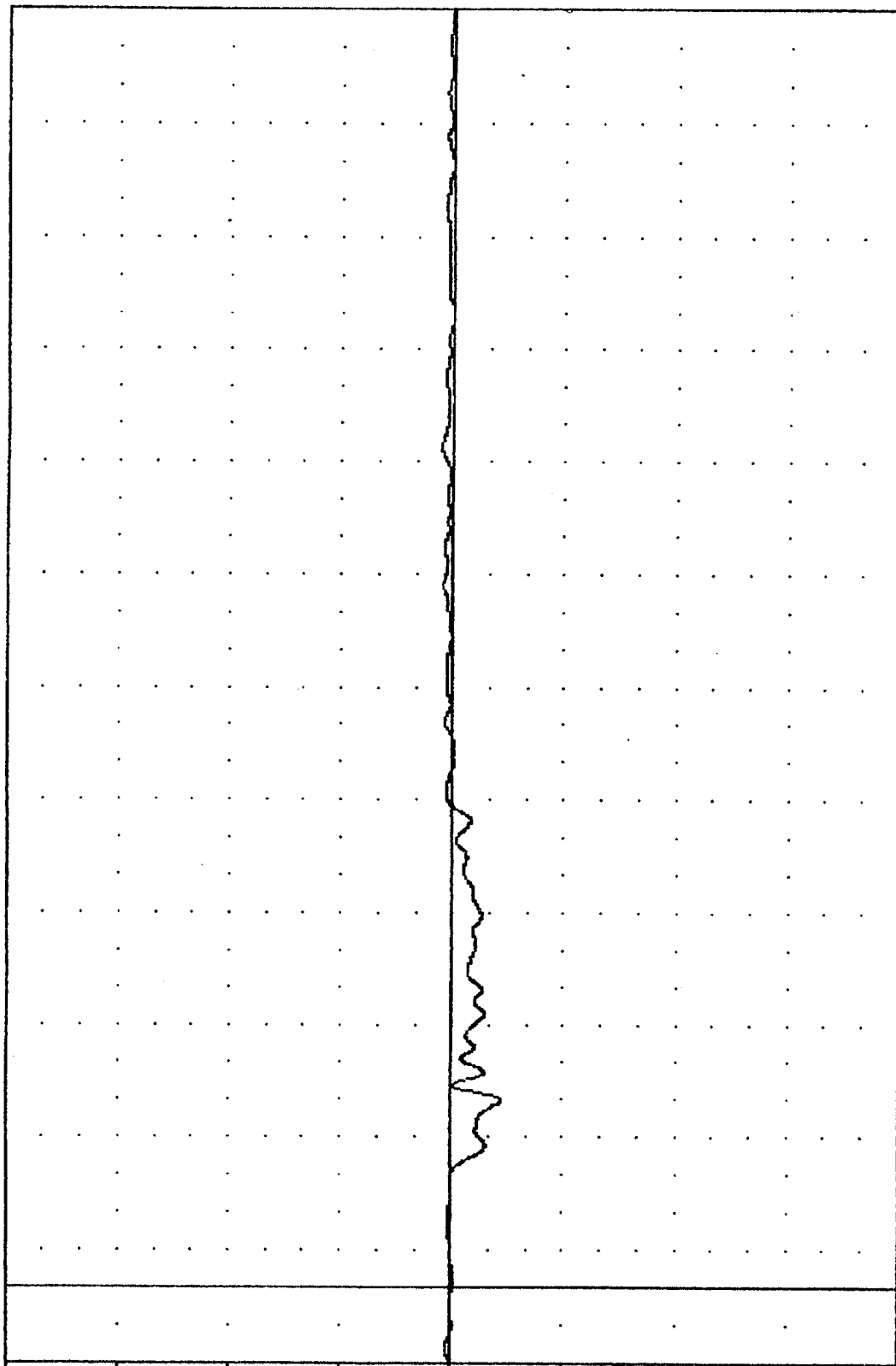
91283
VCCXG1

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -6.74e 49.88, 1.60 e 224.00

ACCELERATION (G)

B-15



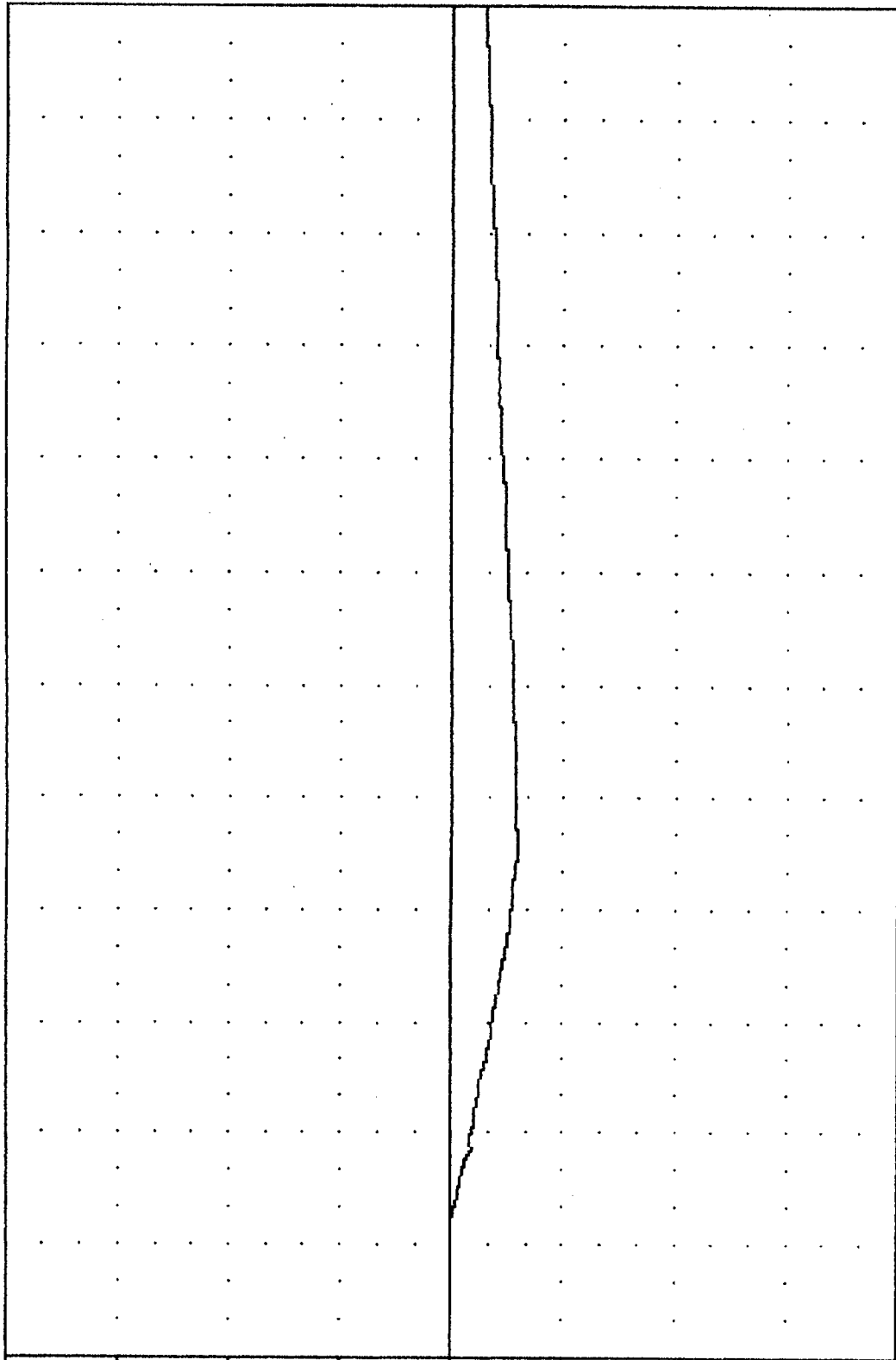
MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
VEHICLE CG ACCELERATION PARALLEL TO IMPACT DIRECTION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 VCGXV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -5.86 127.00 0.07 31.75

VELOCITY (MPH)

B-16

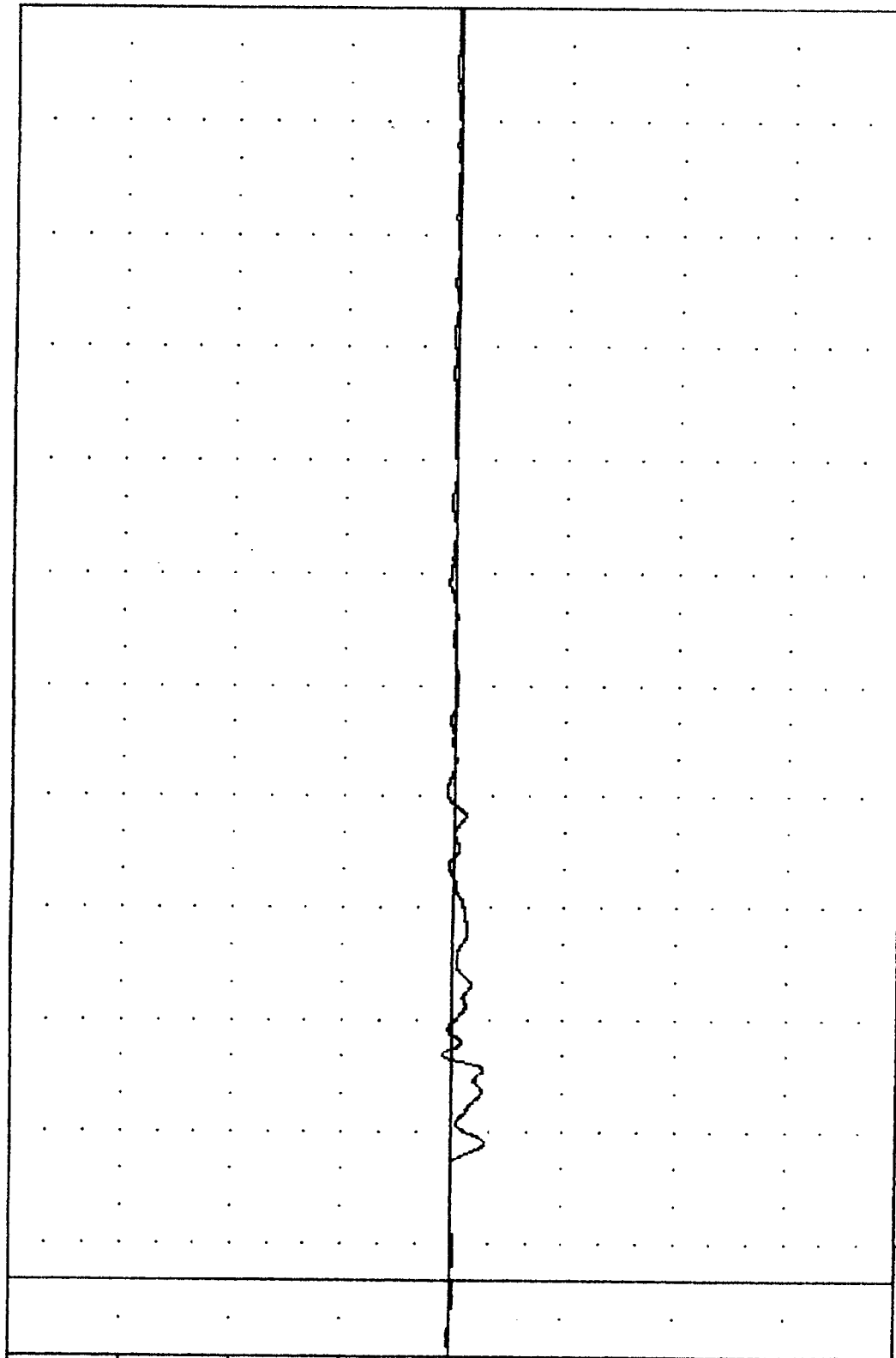


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 VEHICLE CG VELOCITY PARALLEL TO IMPACT DIRECTION

TRC .911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 YCGYG1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -4.408 37.13, 1.47 e 60.50

ACCELERATION (G)

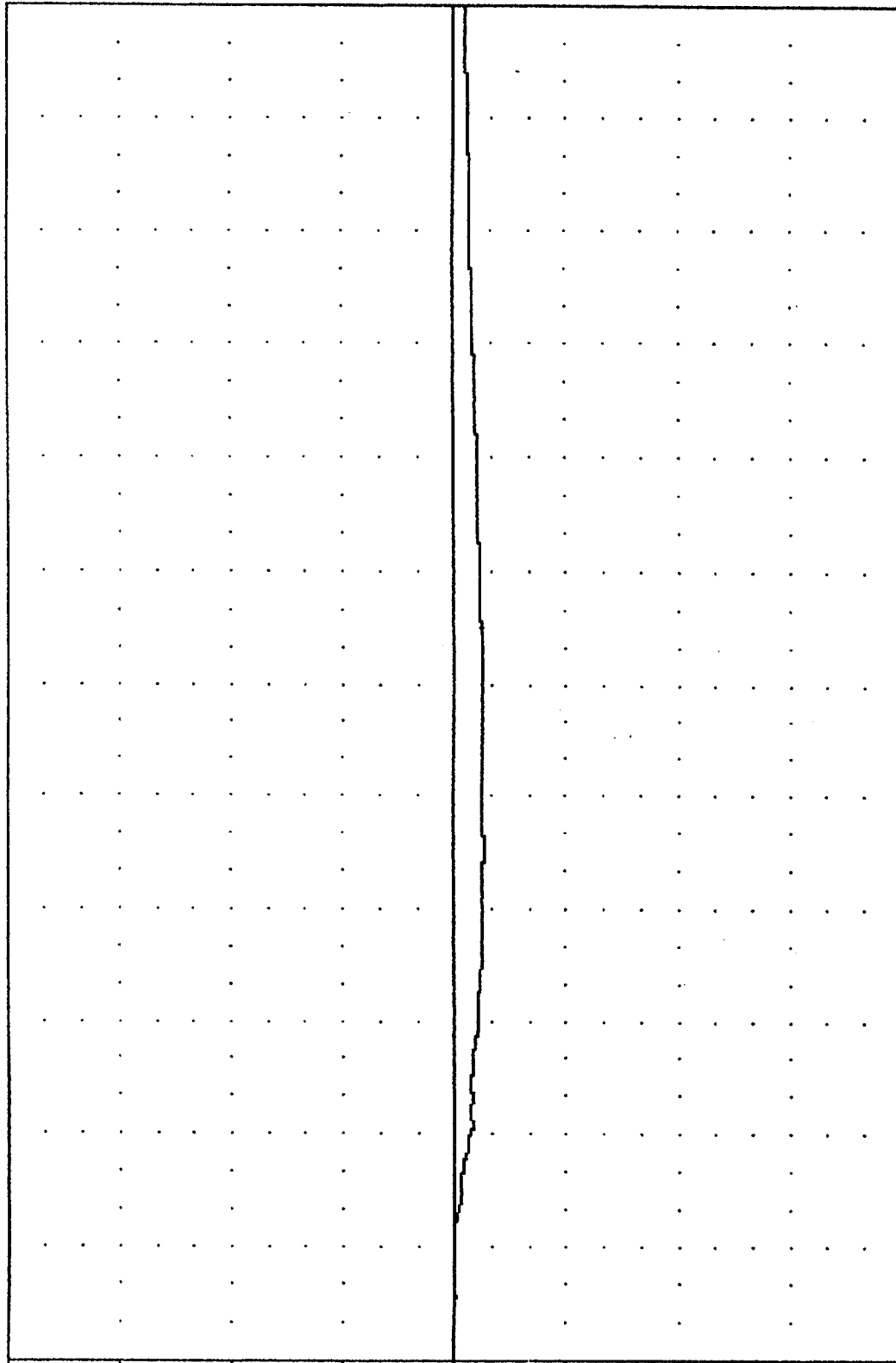


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 VEHICLE CG ACCELERATION PERPENDICULAR TO IMPACT DIRECTION

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 YCGV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -2.69 126.88, 0.00 4.25

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

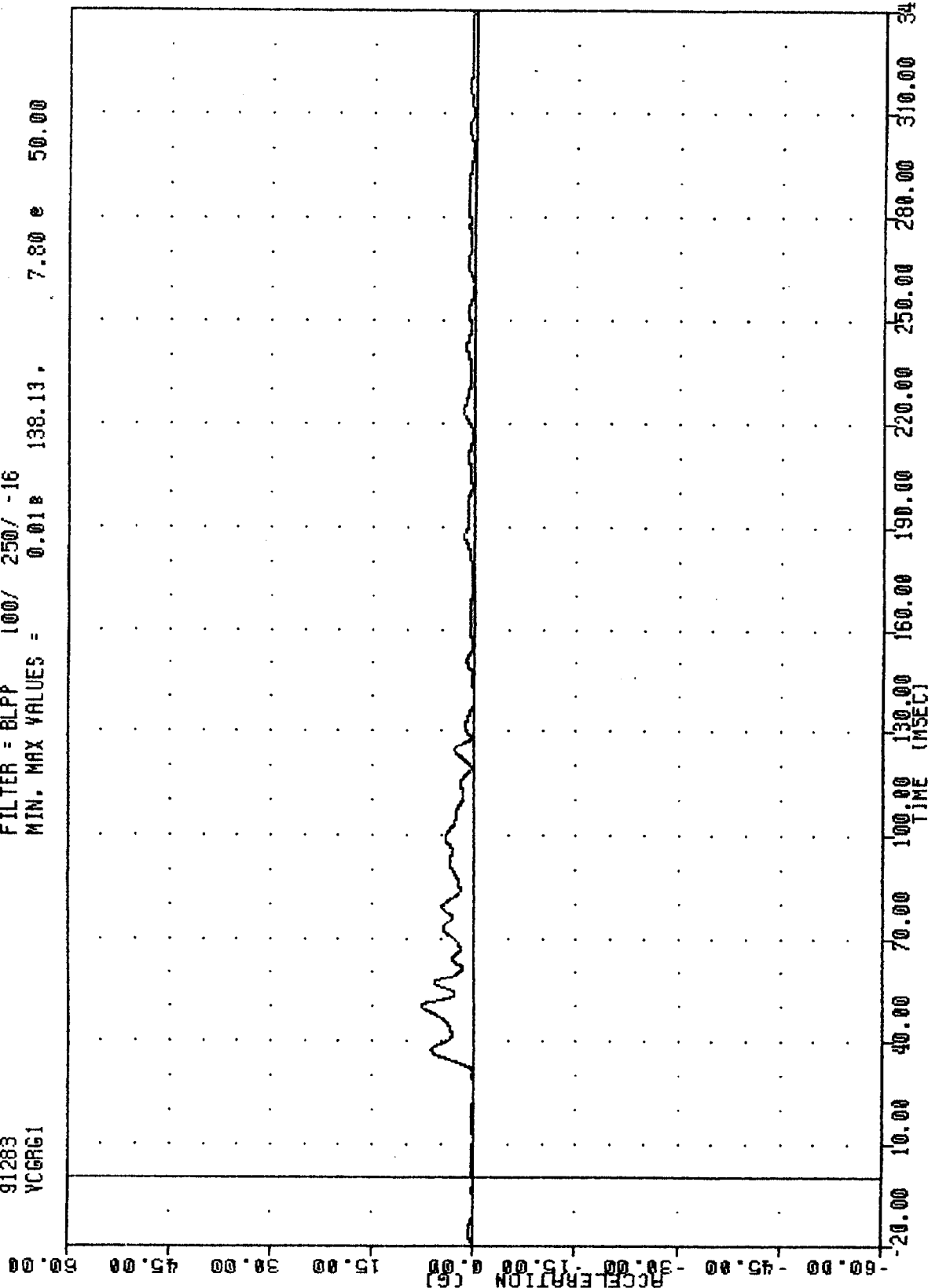


0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 VEHICLE CG VELOCITY PERPENDICULAR TO IMPACT DIRECTION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 YCGRG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.018 138.13, 7.80 e 50.00

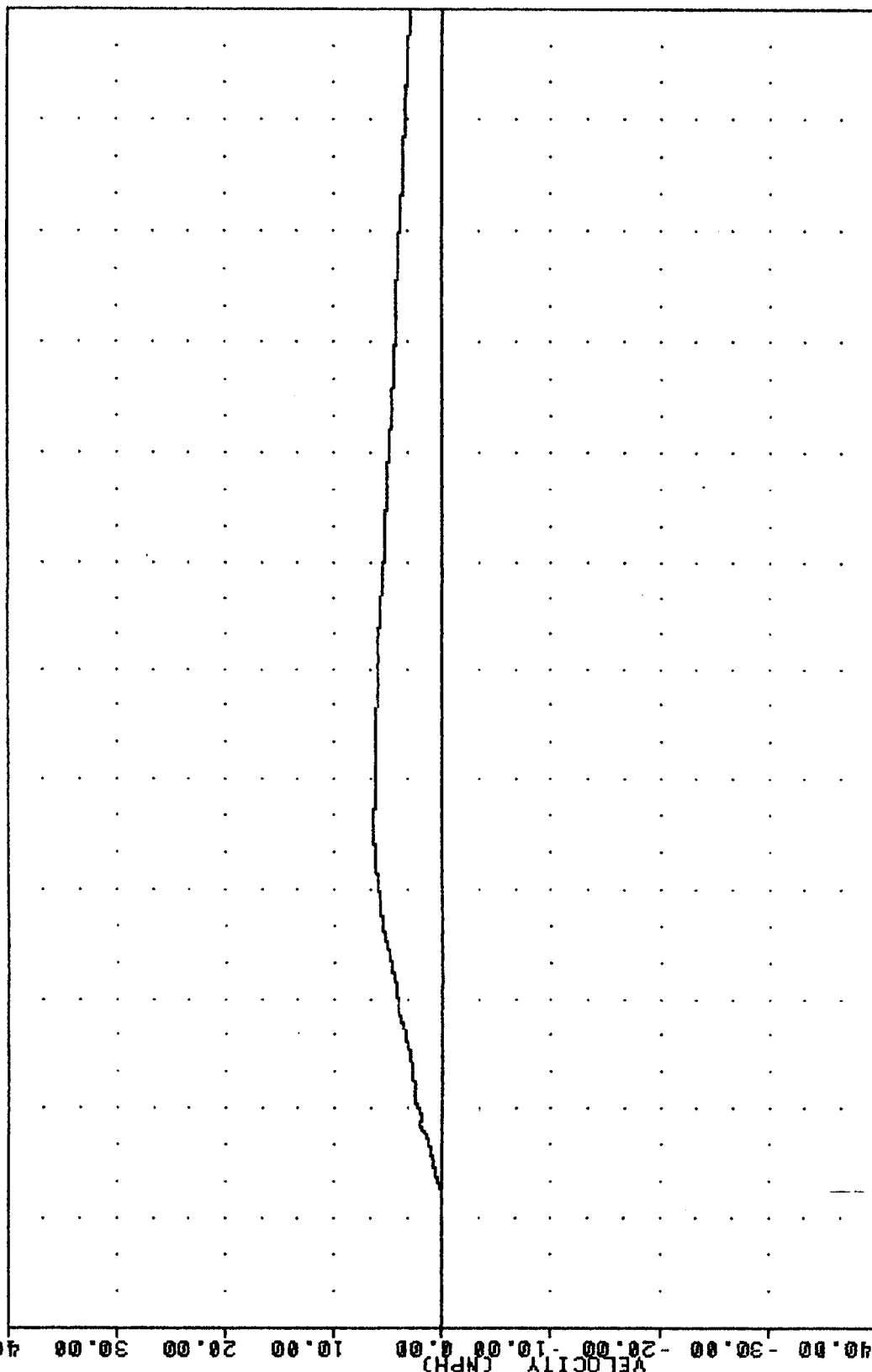


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 VEHICLE CG RESULTANT ACCELERATION

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 VCGRV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00 6.44 e 127.00

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



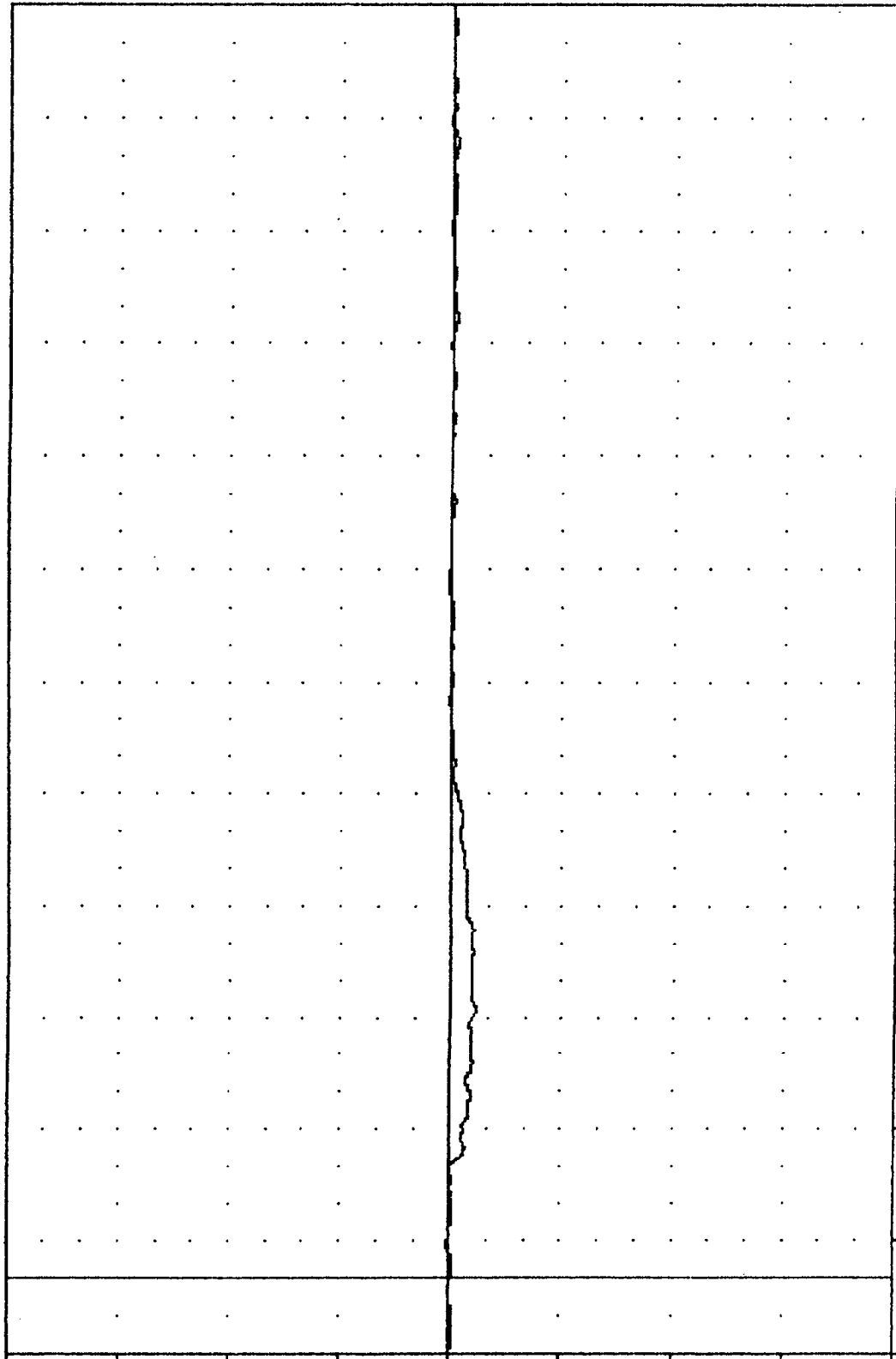
0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00
 TIME (MSEC)

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 VEHICLE CG RESULTANT VELOCITY

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 BC6XG2

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -3.35e 71.88, 0.46 e 185.38

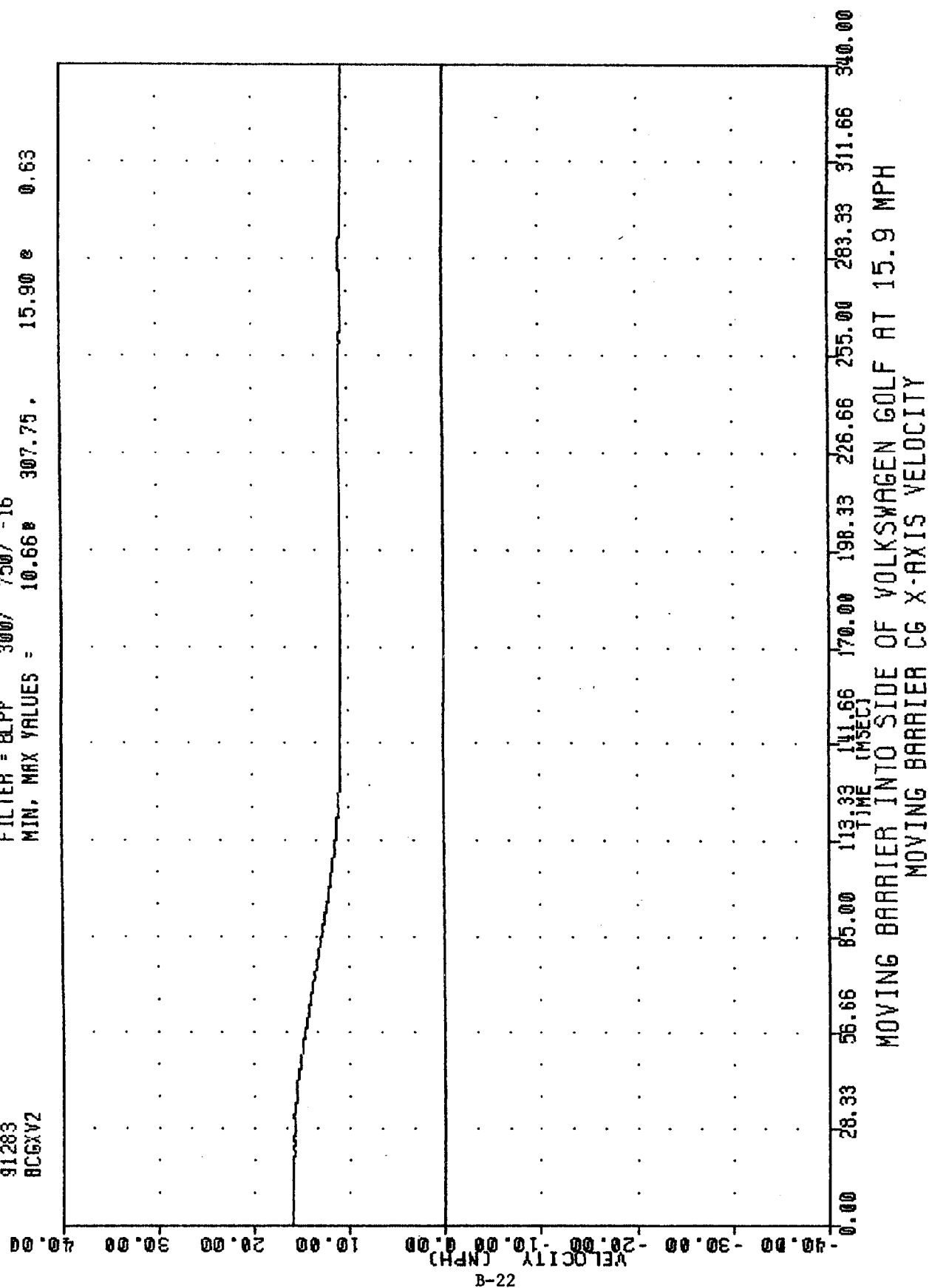
ACCELERATION (G)



-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
 TIME (MSEC)
 MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 MOVING BARRIER CG X-AXIS ACCELERATION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 BDCXV2

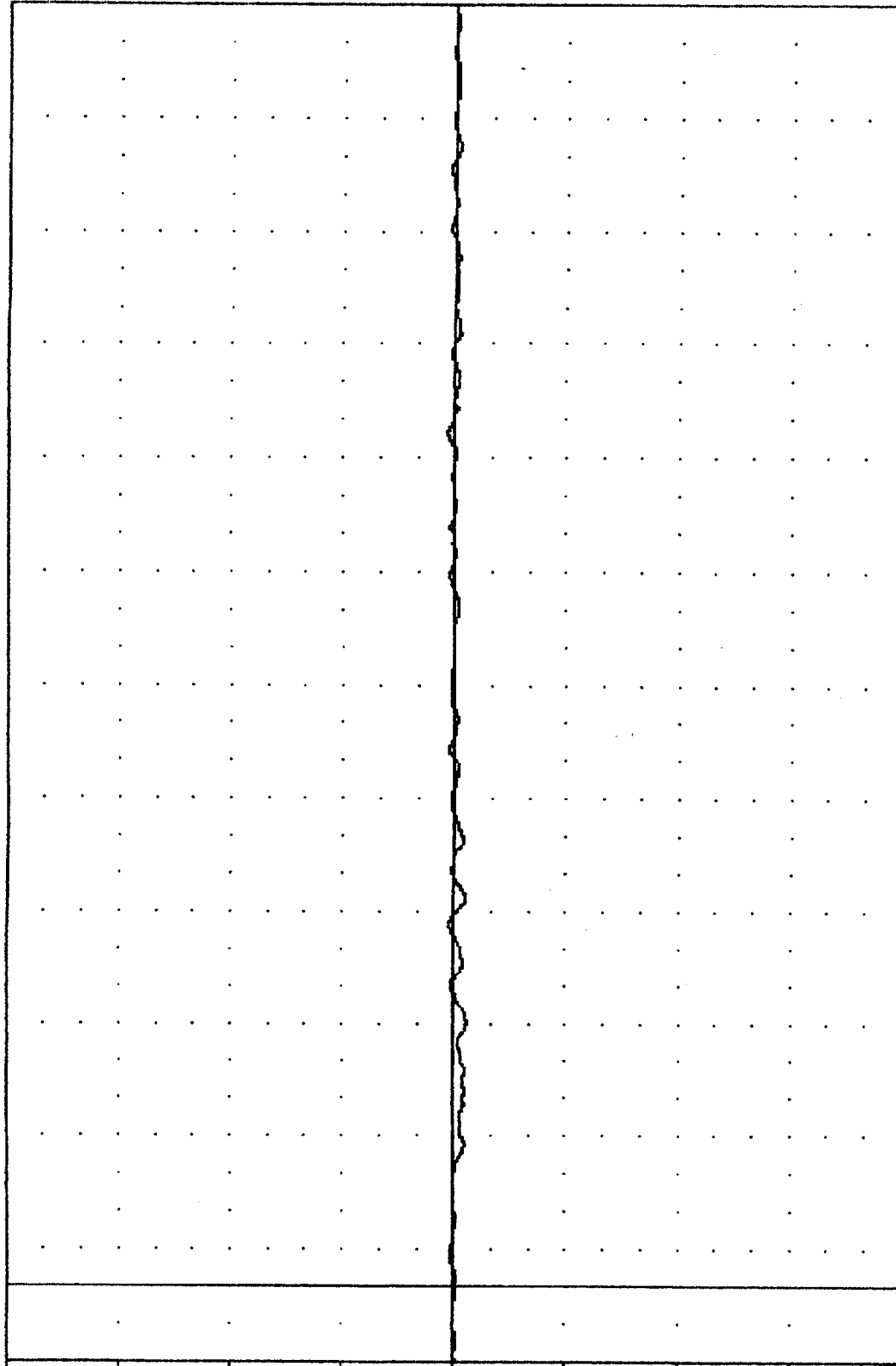
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 10.66 307.75 15.90 0.63



TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 BCGYG2

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -1.71e 70.13, 0.94 e 226.50

ACCELERATION (G)
 60.00
 45.00
 30.00
 15.00
 0.00
 -15.00
 -30.00
 -45.00
 -60.00



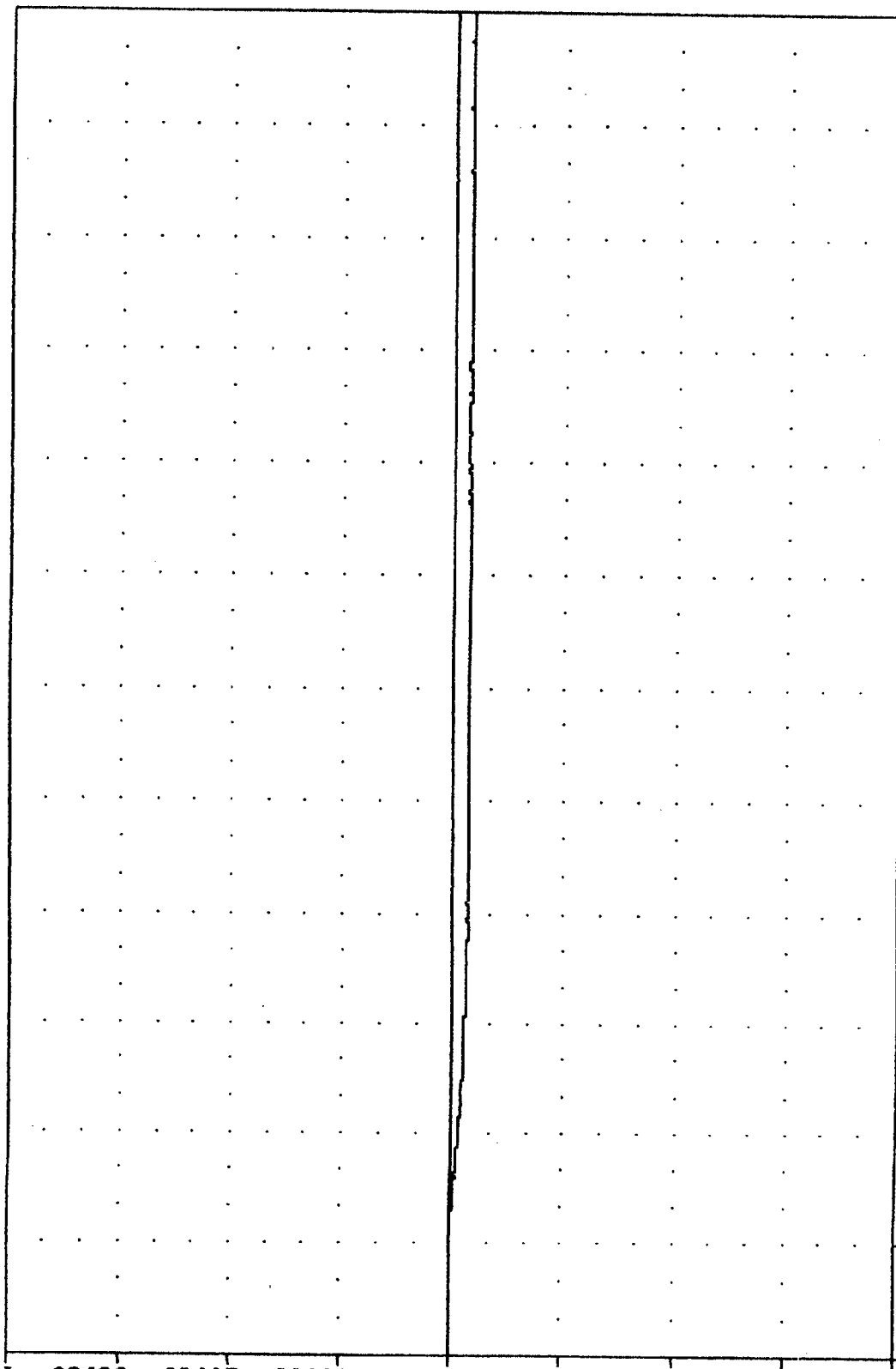
MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 MOVING BARRIER CG Y-AXIS ACCELERATION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 BCGYV2

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -1.528 279.13, 0.05 30.75

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

B-24

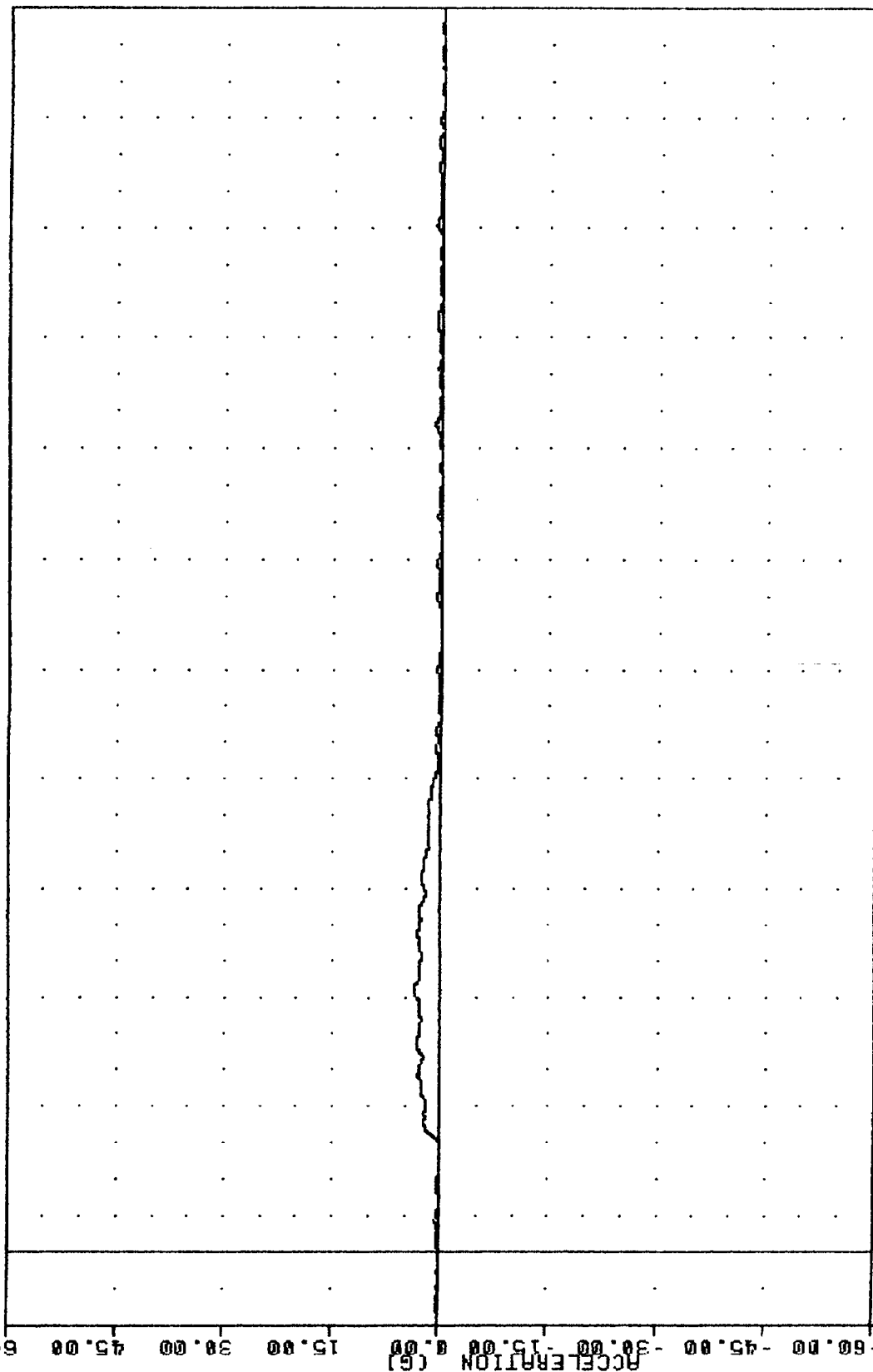


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 MOVING BARRIER CG Y-AXIS VELOCITY

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 BCGRG2

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.01e 171.38. 3.67 e 71.63

60.00



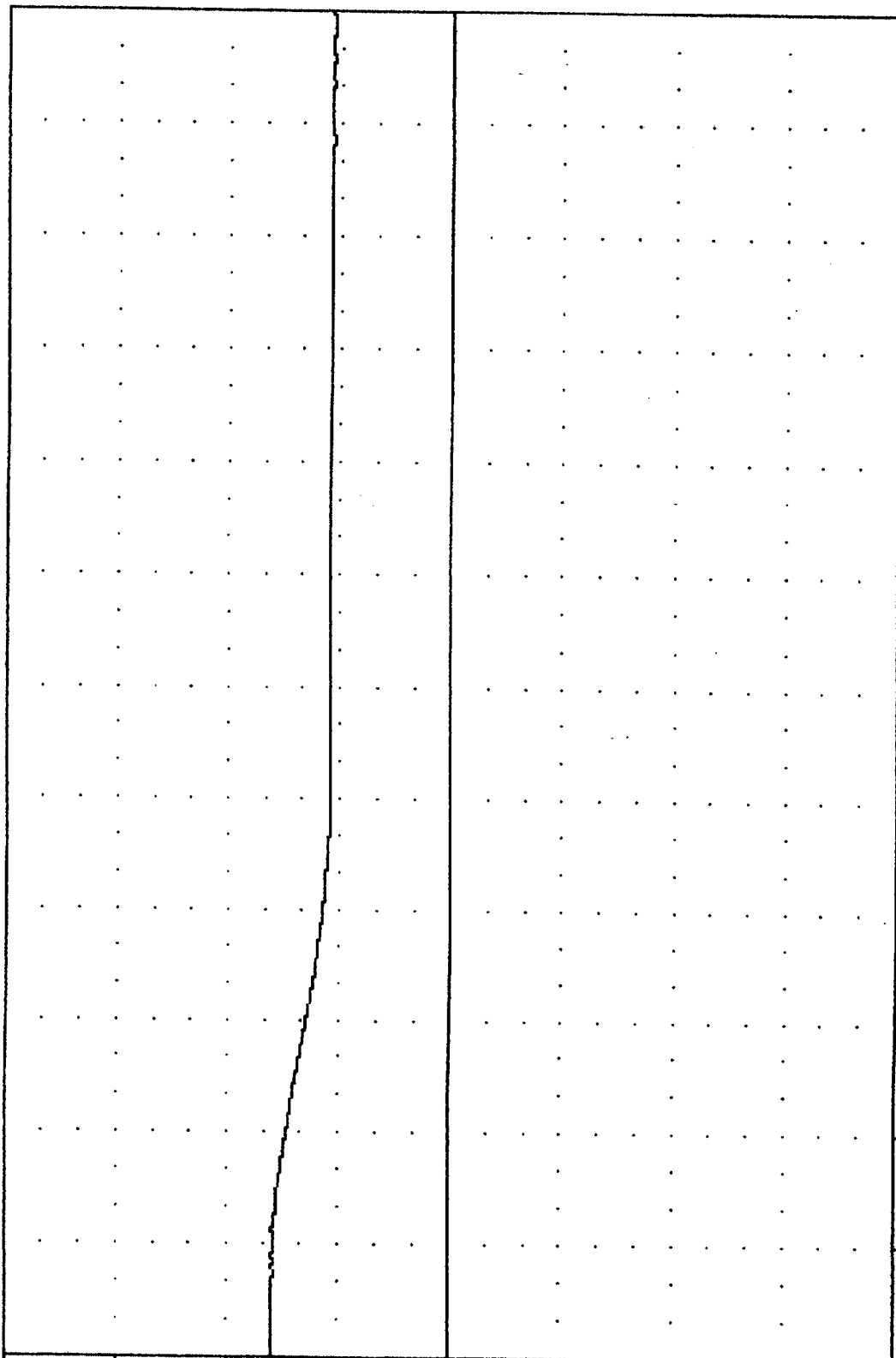
B-25

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 MOVING BARRIER CG RESULTANT ACCELERATION

TRC , 911010-1
 CRASH III DAMAGE ALGORITHM
 91283
 BCGRY2

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 10.75e 338.00, 15.90 e 0.63

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



0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

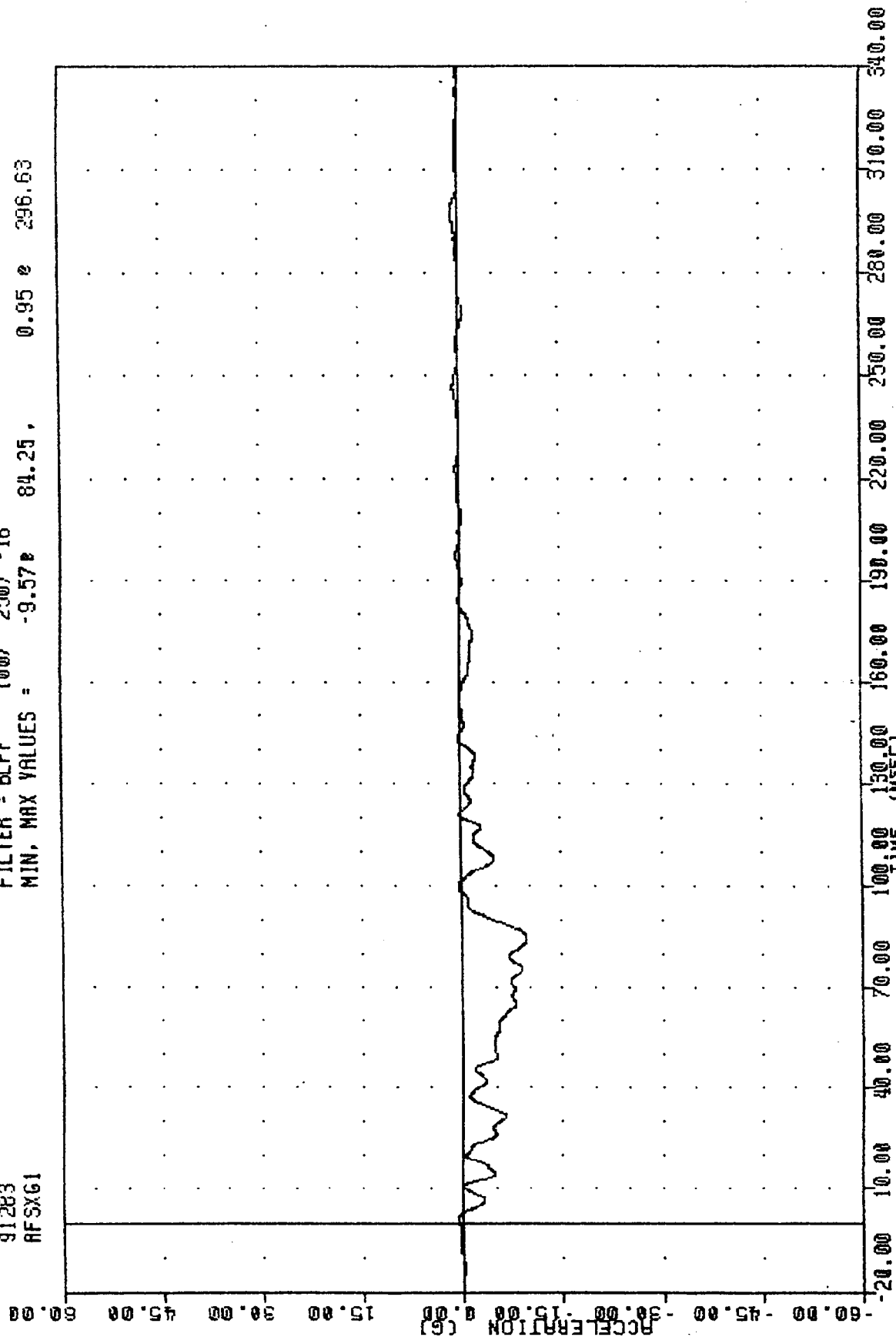
MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 15.9 MPH
 MOVING BARRIER CG RESULTANT VELOCITY

DATA PLOTS

TEST NO. 911010-2

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 RFSX61

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -9.57 84.25, 0.95 296.63



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT FRONT DOOR SILL X-AXIS ACCELERATION

TRC .911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 RFSXV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -11.51 181.75 0.07 3.25

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

-40.00

VELOCITY (MPH)

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

TIME (MSEC)

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH

RIGHT FRONT DOOR SILL X-AXIS VELOCITY

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

0.00

28.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

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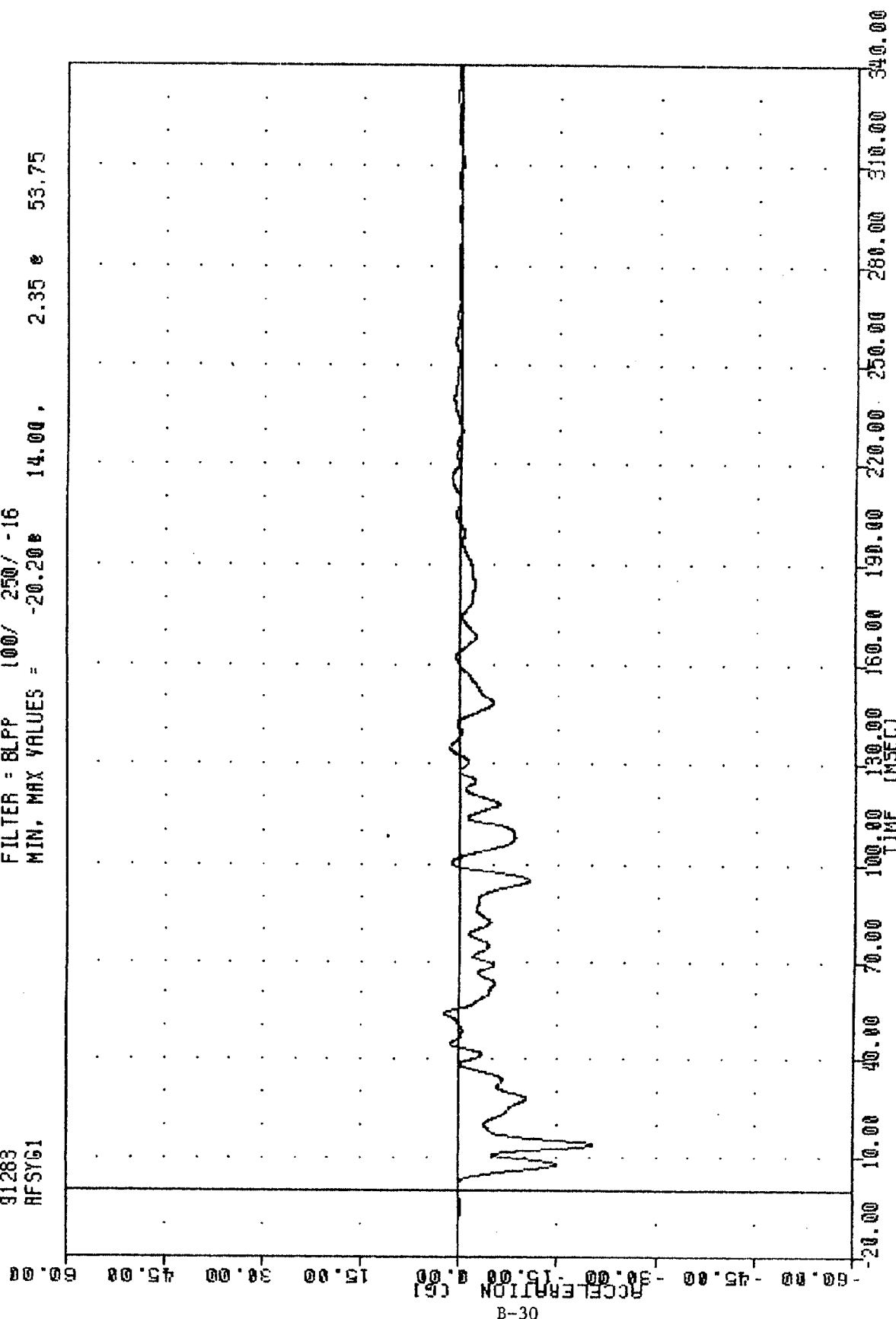
283.33

311.66

340.00

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 RFSYG1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -20.20 14.00, 2.35 53.75



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT FRONT DOOR SILL Y-AXIS ACCELERATION

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 RFSYV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -13.79e 201.00 , 0.00 e 0.00

40.00

30.00

20.00

10.00

0.00

-10.00

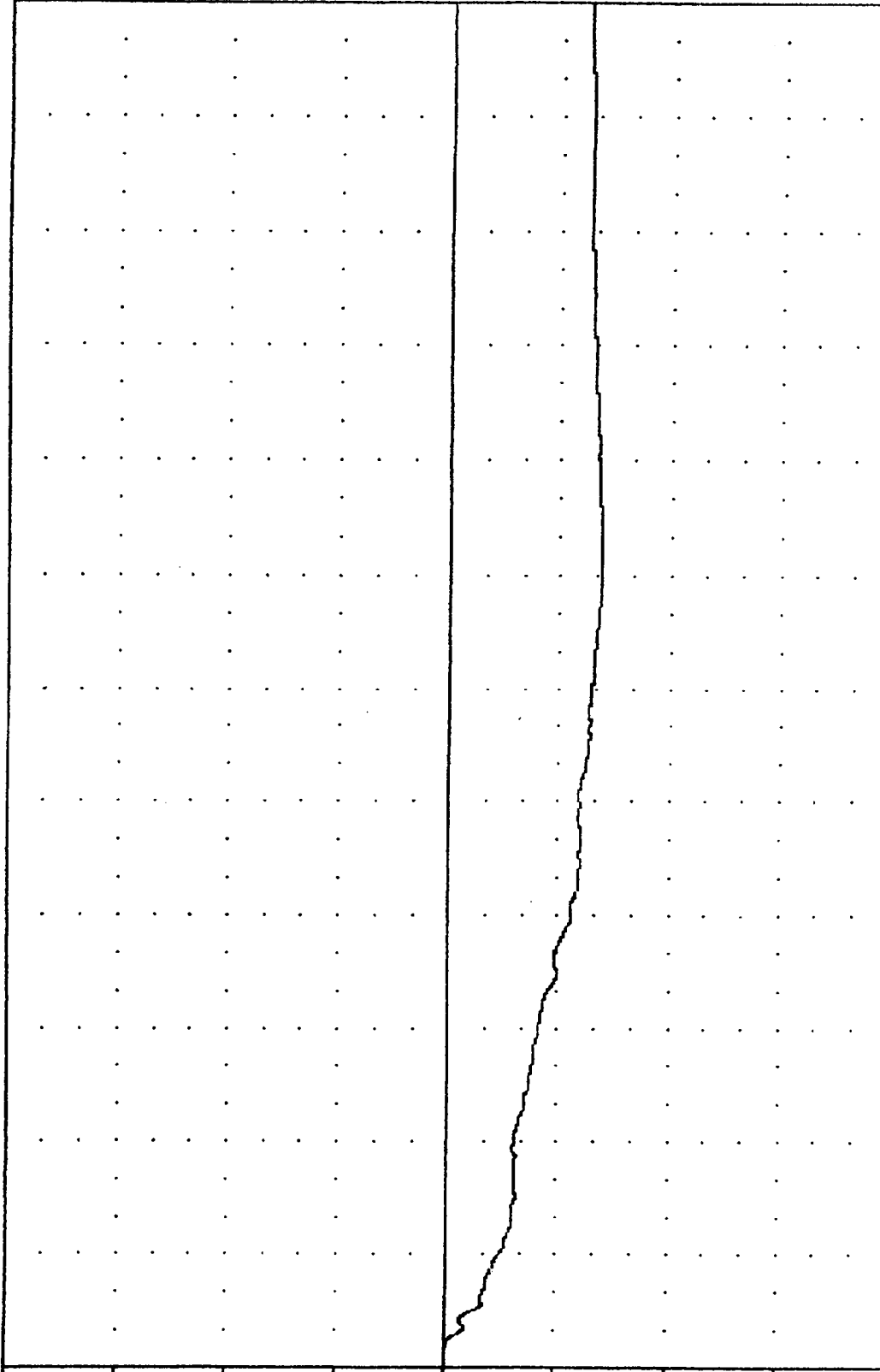
-20.00

-30.00

-40.00

VELOCITY (MPH)

B-31



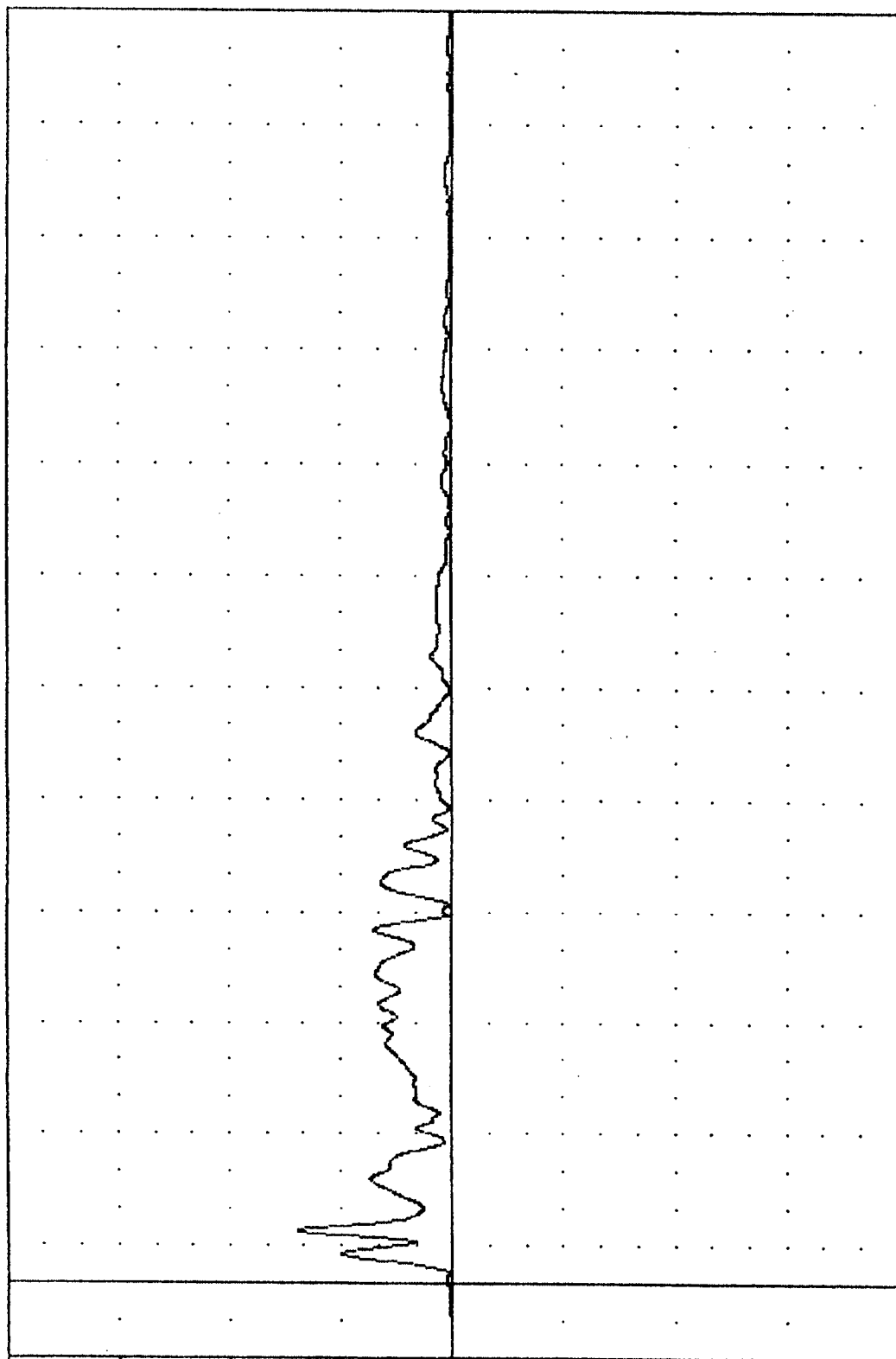
0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00
 TIME (msec)

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT FRONT DOOR SILL Y-AXIS VELOCITY

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 RFSRG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.058 -20.00, 20.72 e 14.00

ACCELERATION (G)



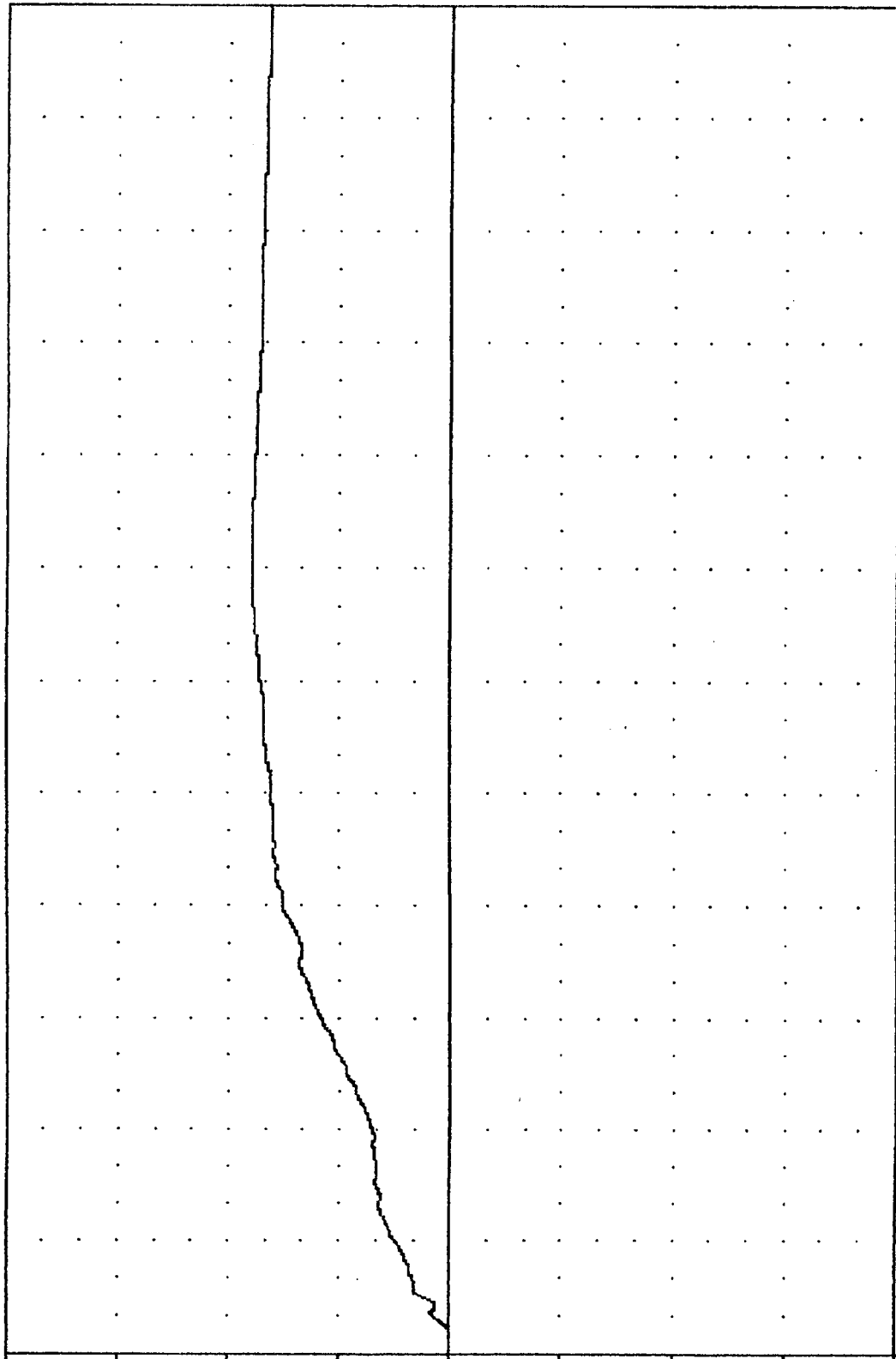
B-32

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT FRONT DOOR SILL RESULTANT ACCELERATION

TRC 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 RFSRV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.00 0.00 17.90 195.88

VELOCITY (MPH)

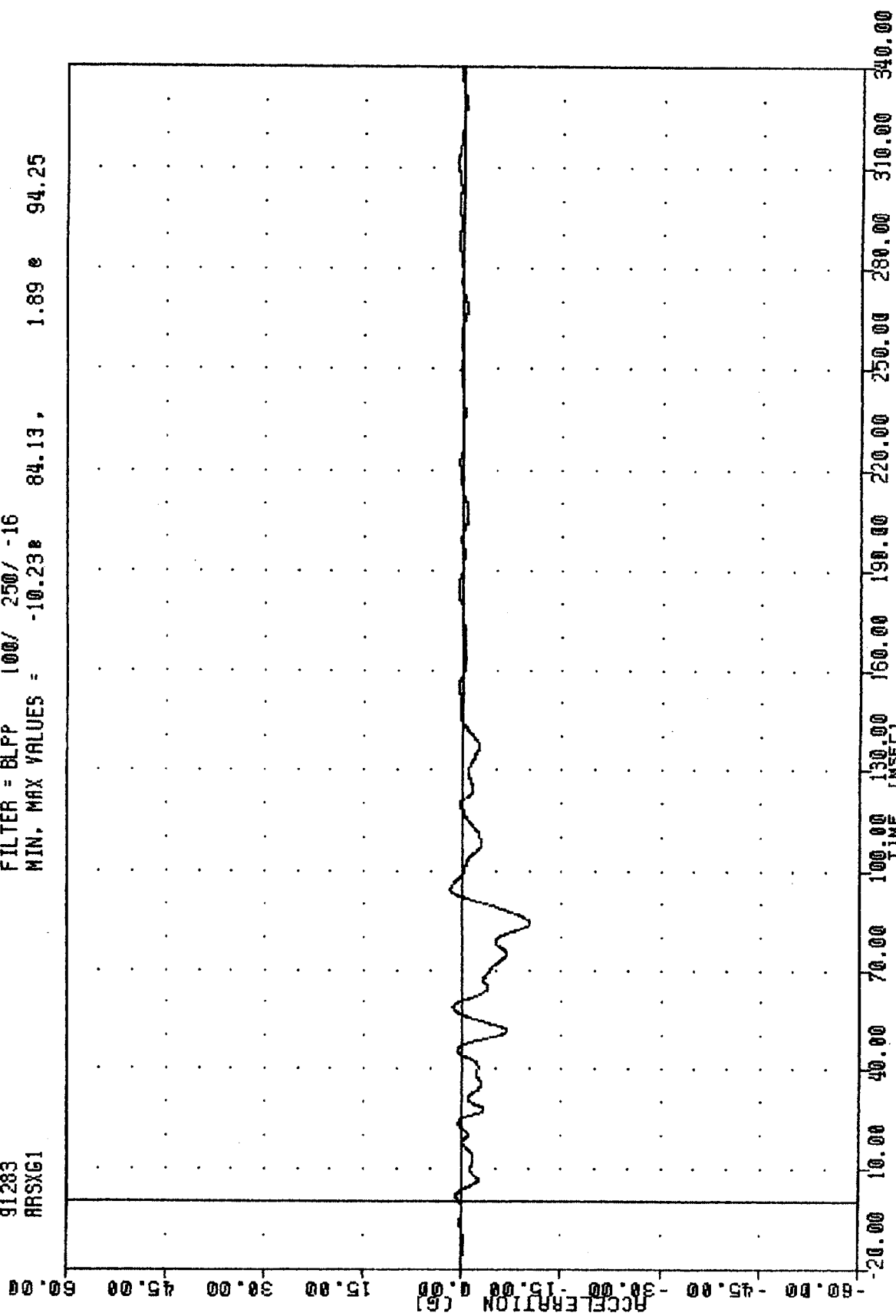


B-33

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT FRONT DOOR SILL RESULTANT VELOCITY

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 ARSXG1

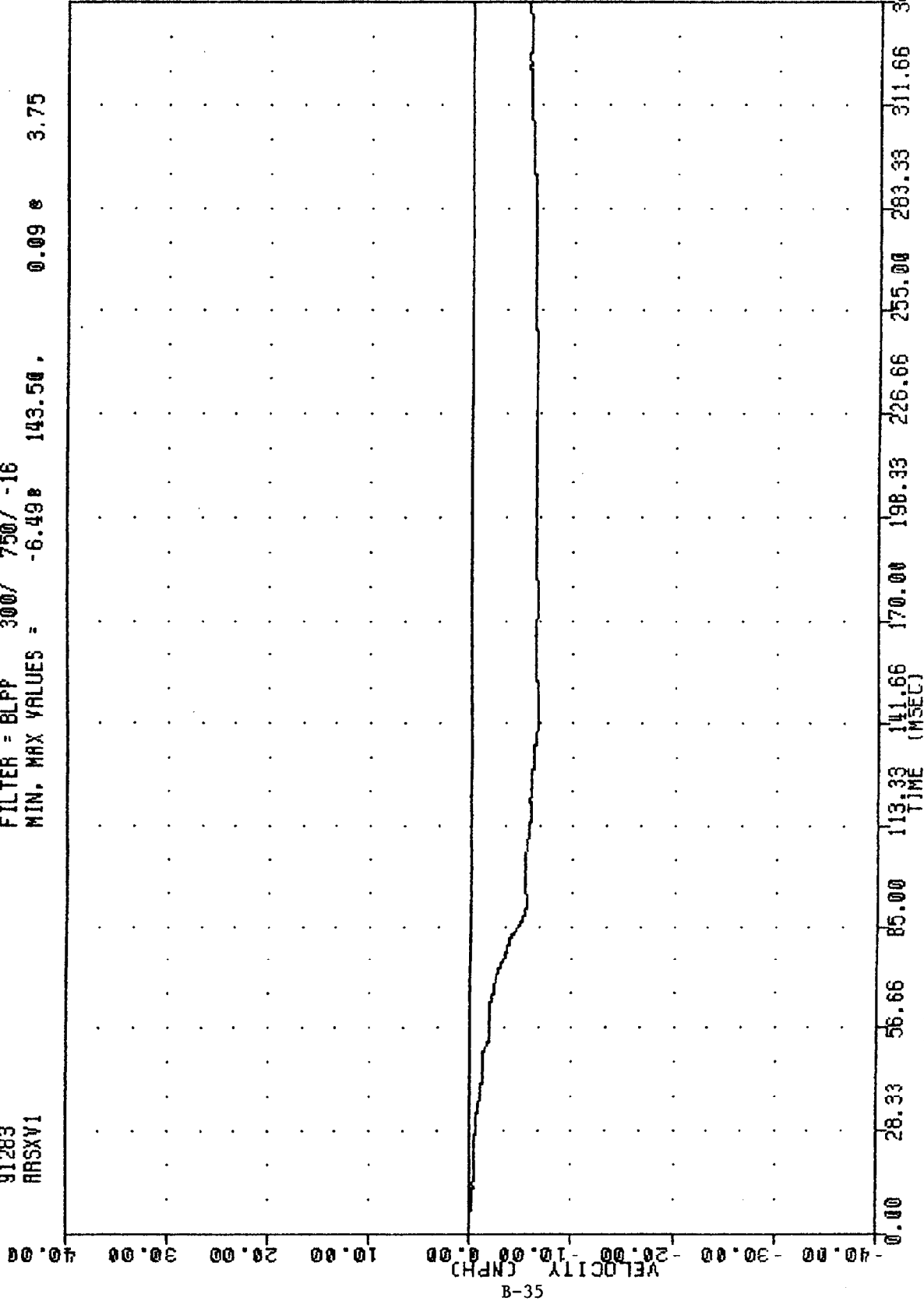
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -10.23 84.13, 1.89 e 94.25



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT REAR DOOR SILL X-AXIS ACCELERATION

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 ARSXV1

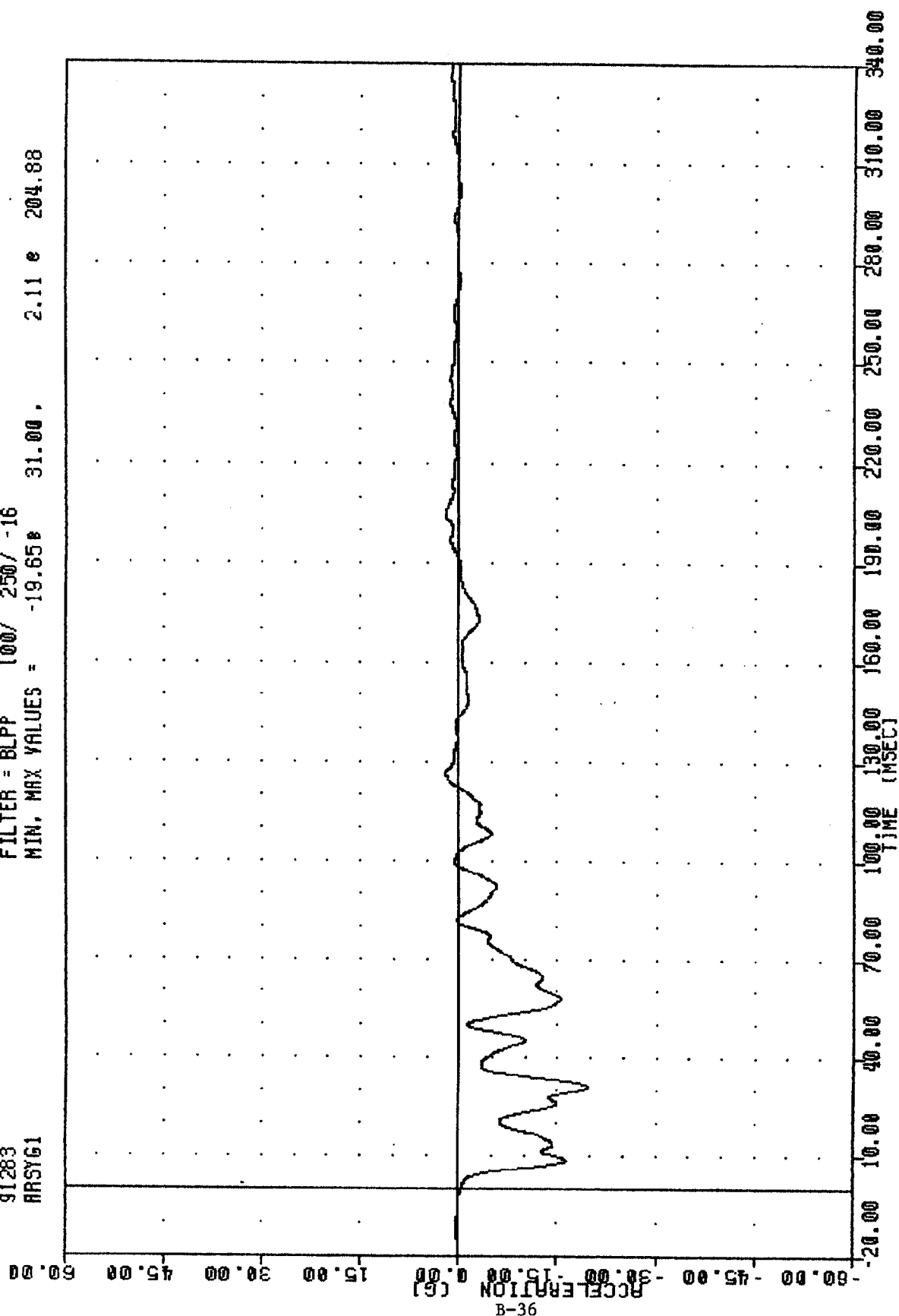
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -6.49 143.50 0.09 3.75



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT REAR DOOR SILL X-AXIS VELOCITY

TRC
CRASH III DAMAGE ALGORITHM
91283
ARSYG1

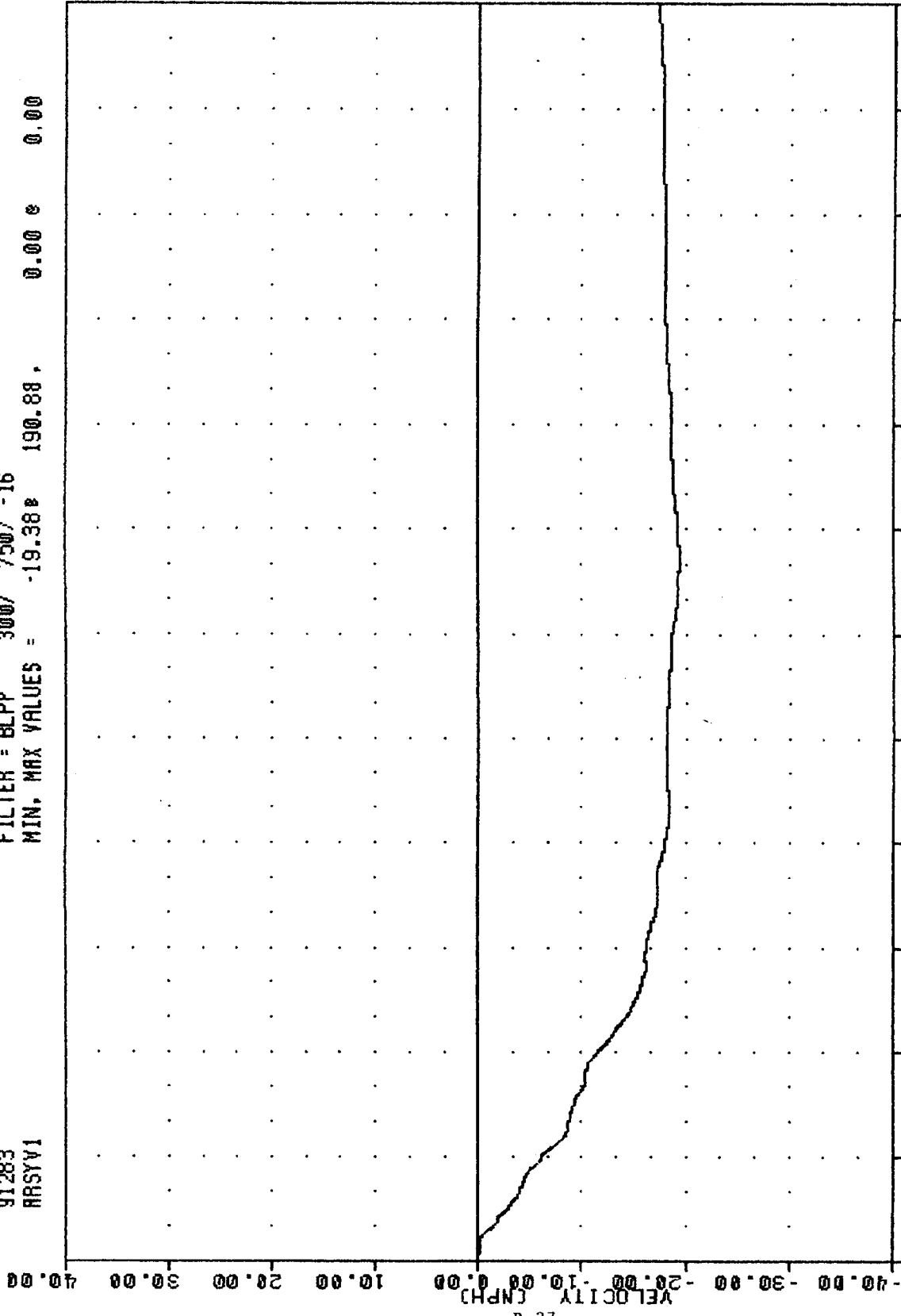
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -19.65 31.00 2.11 e 204.88



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
RIGHT REAR DOOR SILL Y-AXIS ACCELERATION

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 ARSYV1

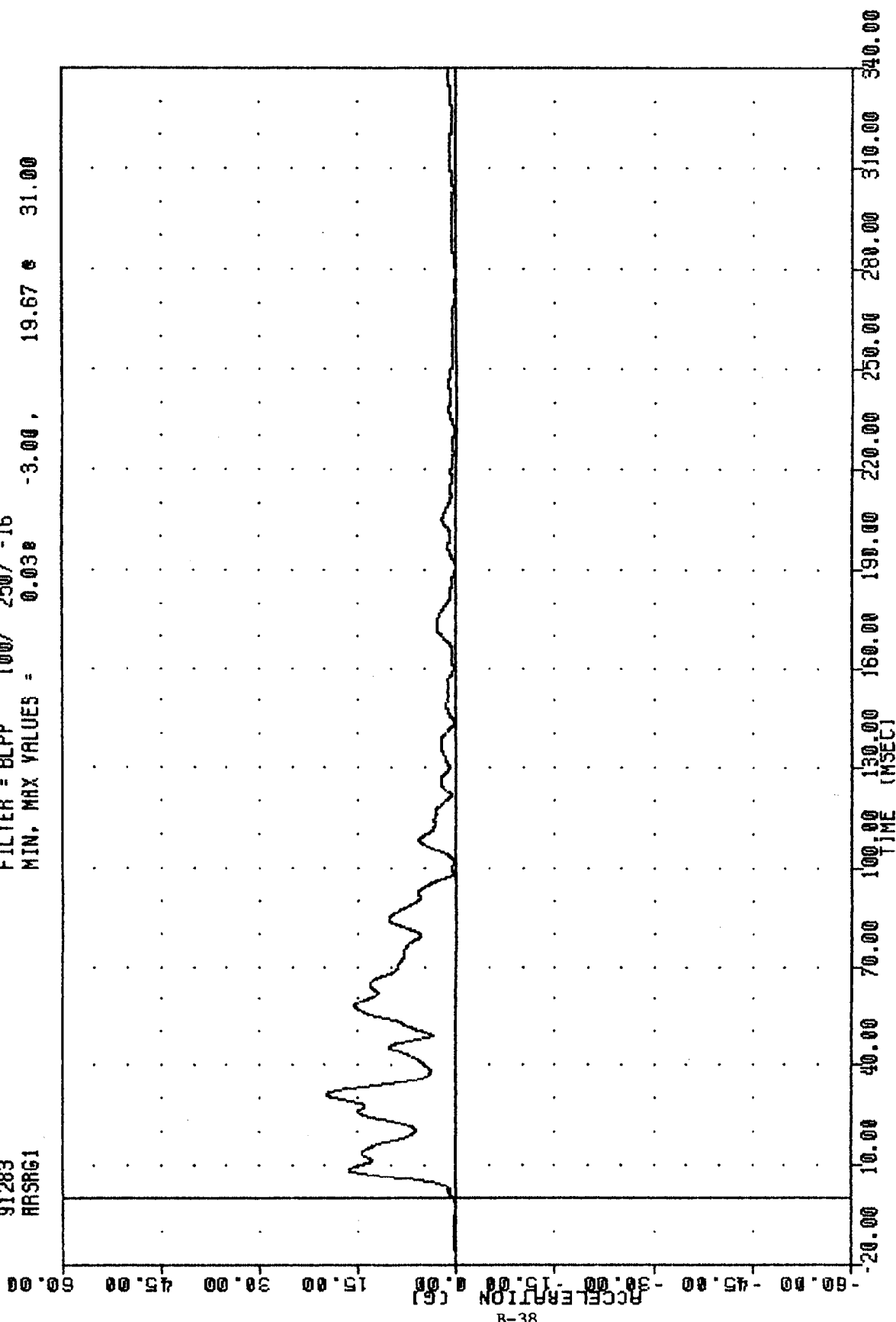
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -19.38 190.88, 0.00 0.00



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT REAR DOOR SILL Y-AXIS VELOCITY

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 ARSRG1

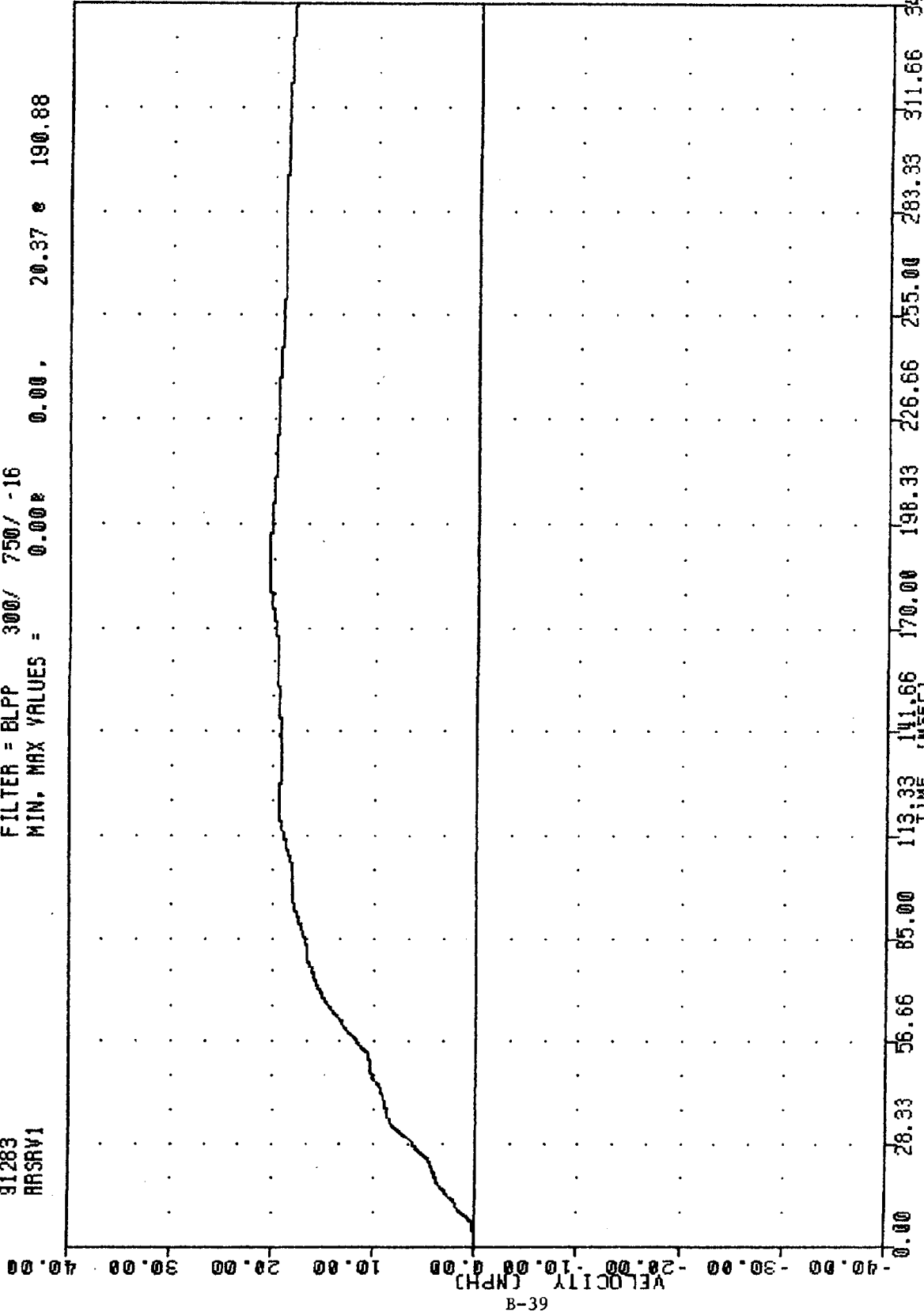
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.038 -3.00, 19.67 @ 31.00



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT REAR DOOR SILL RESULTANT ACCELERATION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 ARSRV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00 20.37 e 190.88



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 RIGHT REAR DOOR SILL RESULTANT VELOCITY

TRC
CRASH III DAMAGE ALGORITHM
91283
VCCXG1

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -26.17 29.75 4.19 e 95.50

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45.00

30.00

15.00

0.00

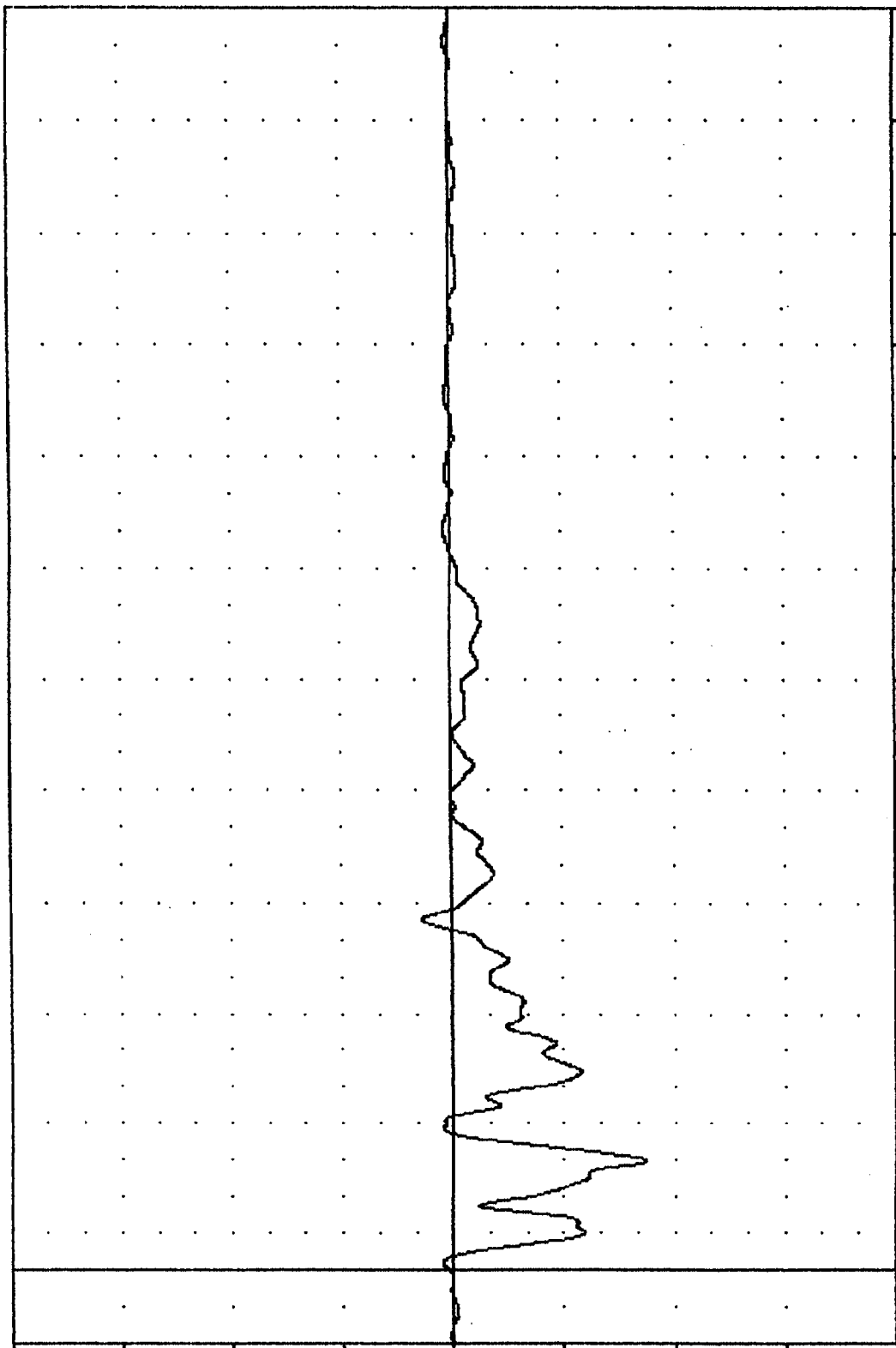
15.00

30.00

45.00

60.00

B-40

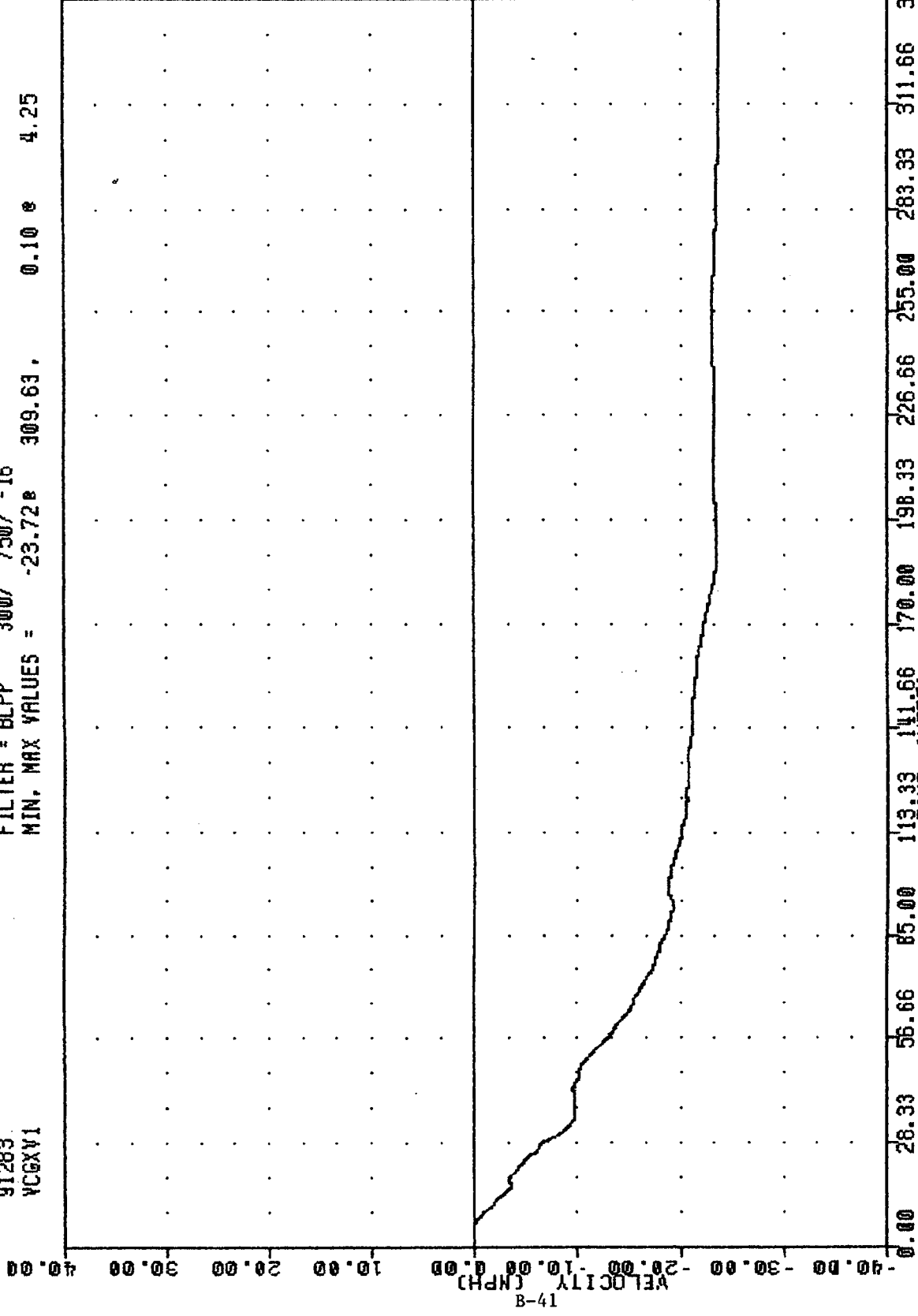


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
VEHICLE CG ACCELERATION PARALLEL TO IMPACT DIRECTION

TRC '911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 VCGXV1

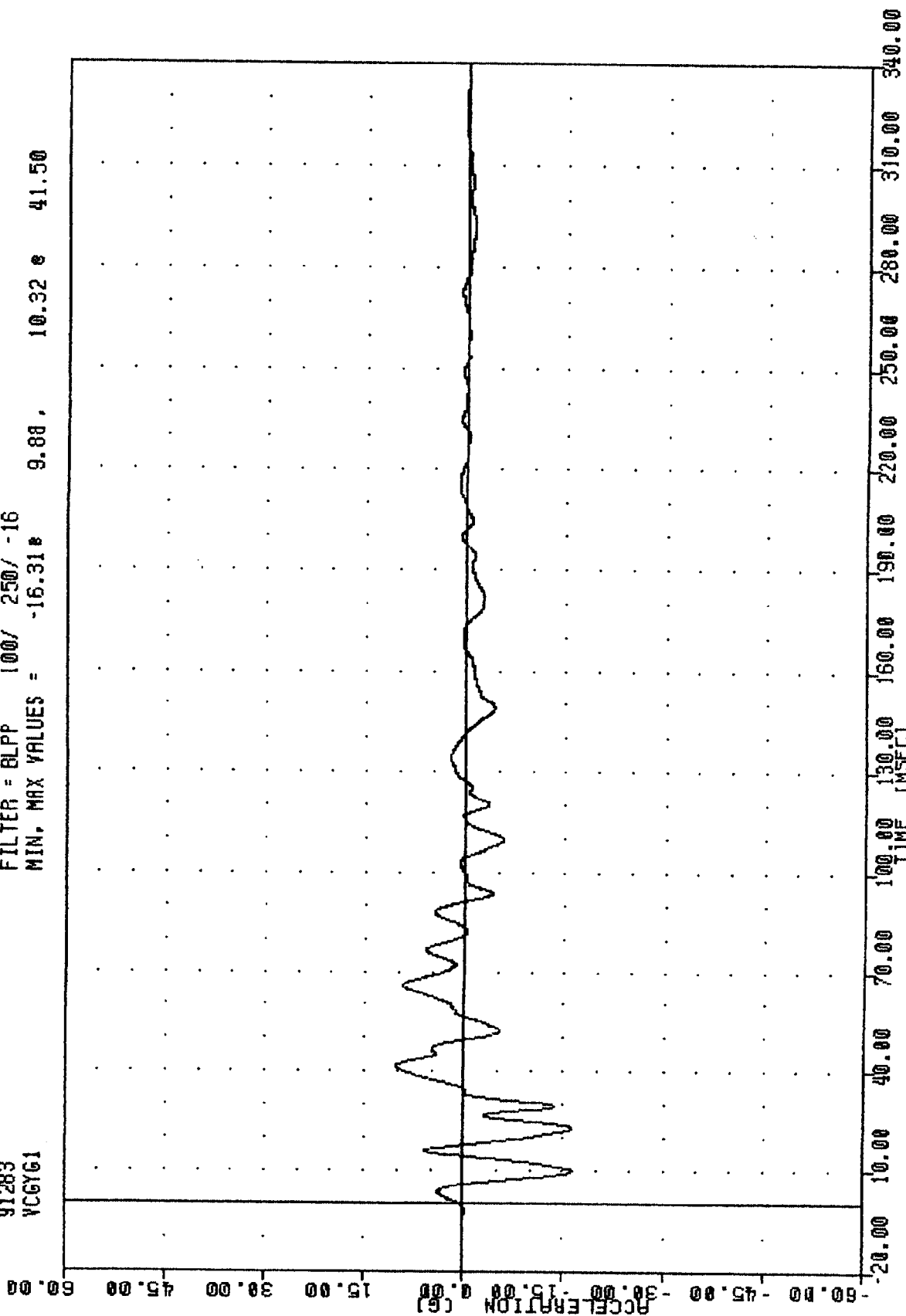
FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -23.728 309.63 0.10 4.25



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 VEHICLE CG VELOCITY PARALLEL TO IMPACT DIRECTION

TRC 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 VCGY61

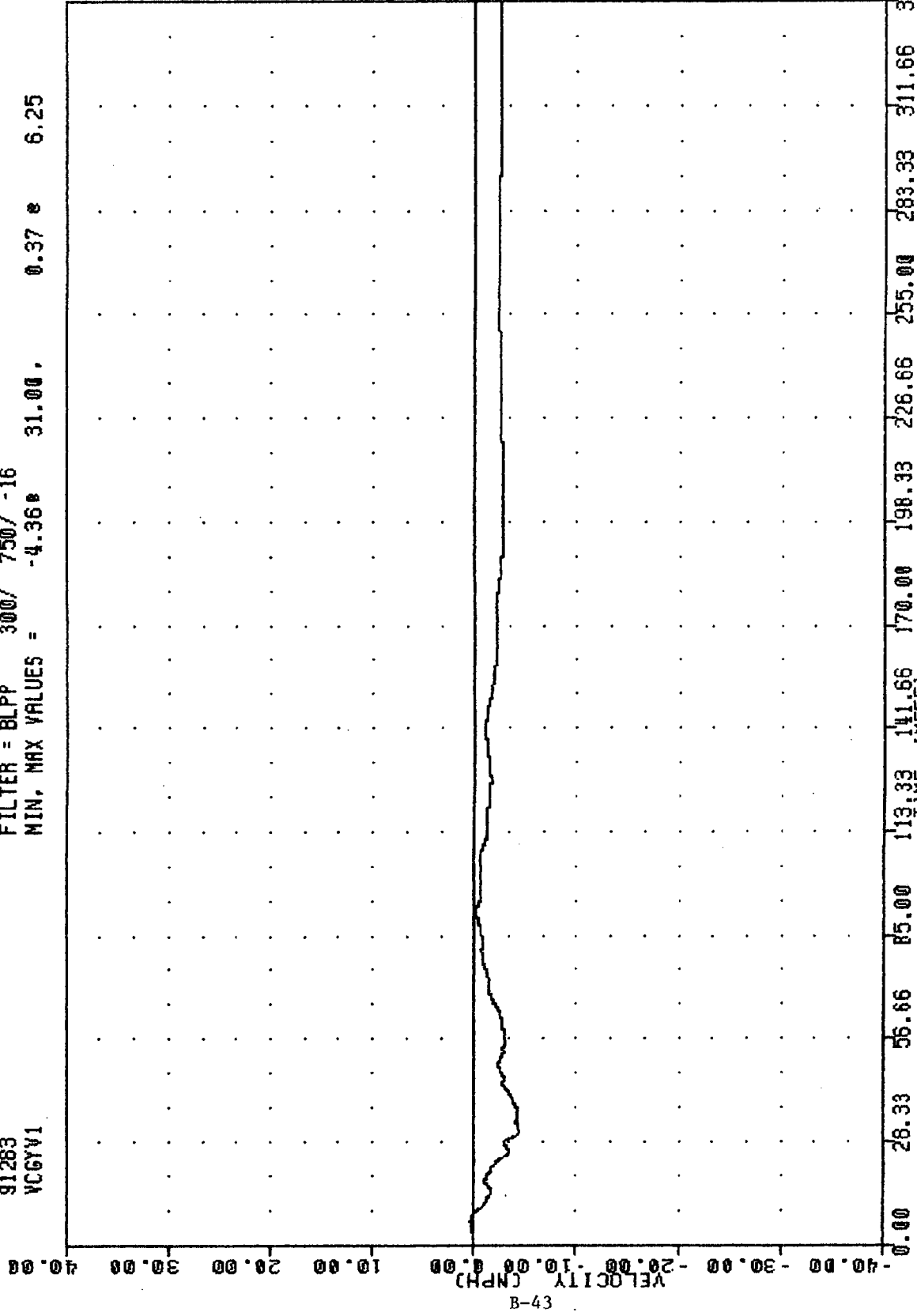
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -16.31 9.88, 10.32 41.50



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 VEHICLE CG ACCELERATION PERPENDICULAR TO IMPACT DIRECTION

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 VCGV1

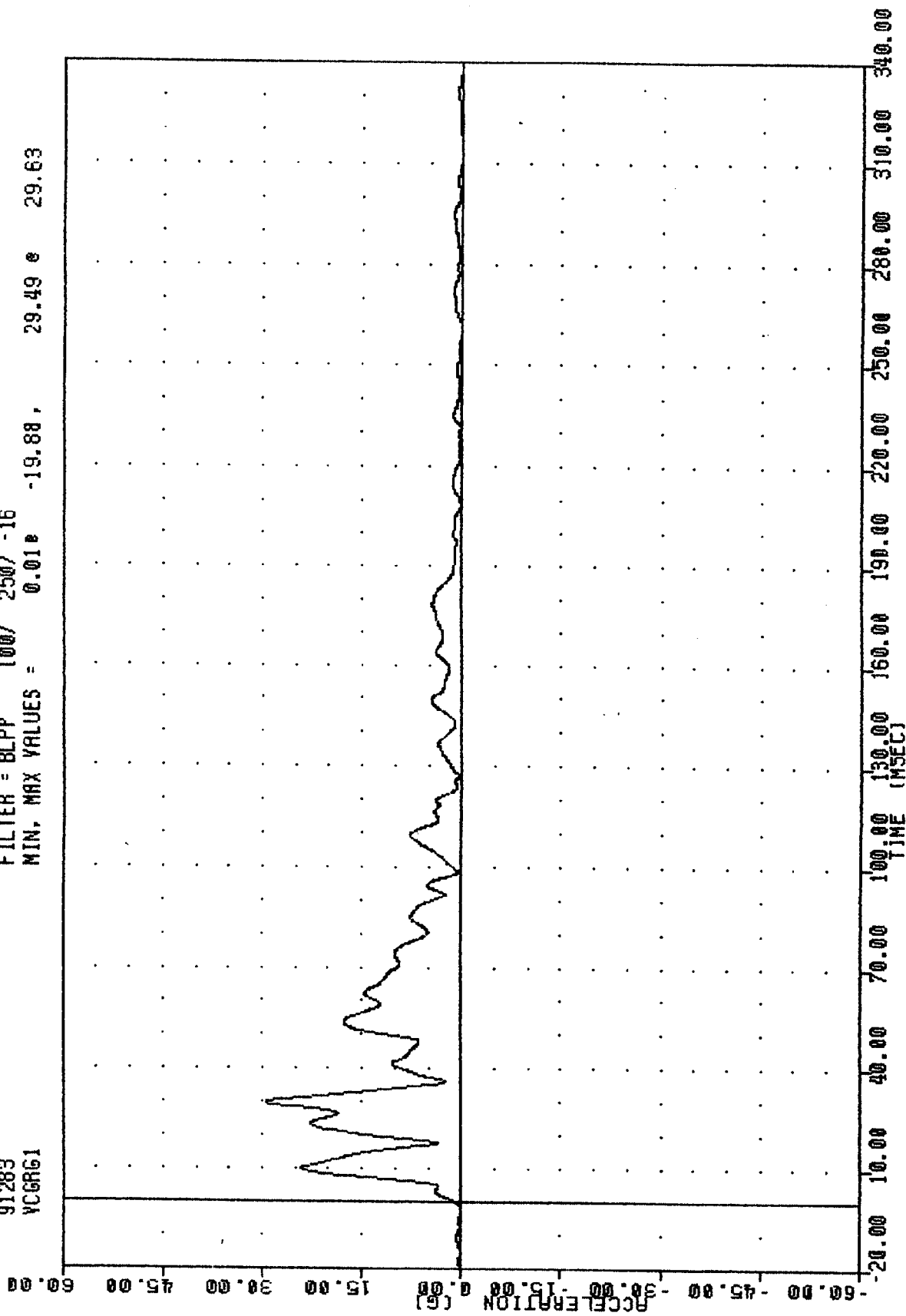
FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -4.36* 31.00, 0.37 * 6.25



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 VEHICLE CG VELOCITY PERPENDICULAR TO IMPACT DIRECTION

TRC '911010-2
CRASH III DAMAGE ALGORITHM
91283
VCGRG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = 0.01e -19.88 , 29.49 e 29.63

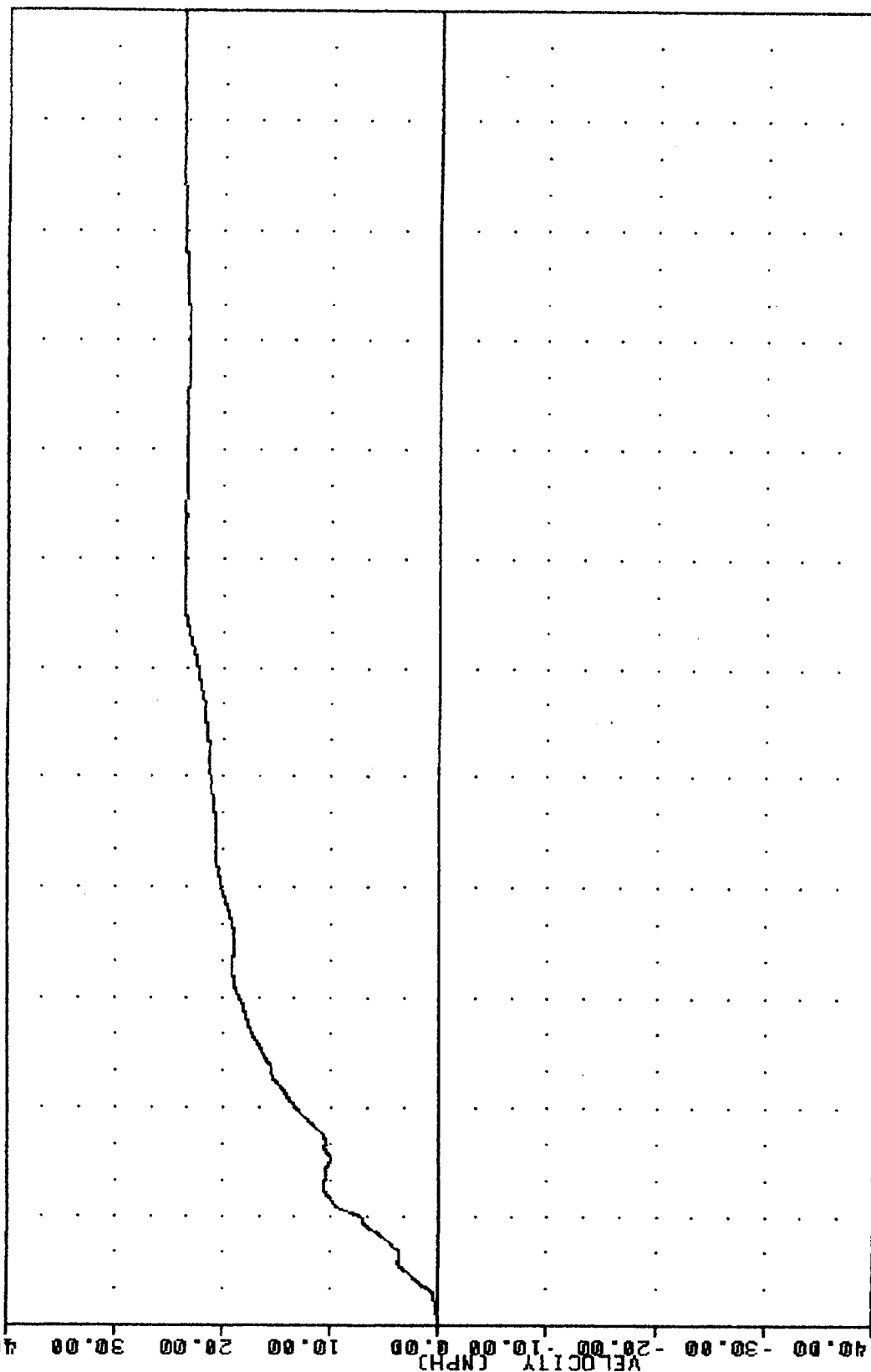


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
VEHICLE CG RESULTANT ACCELERATION

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 YCGRV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00e 0.00, 23.86 e 309.63

40.00



B-45

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 VEHICLE CG RESULTANT VELOCITY

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 BCGXG2

FILTER = 8LPP 100/ 250/ -16
 MIN. MAX VALUES = -9.26 83.88 0.66 -18.50

60.00

45.00

30.00

15.00

0.00

-15.00

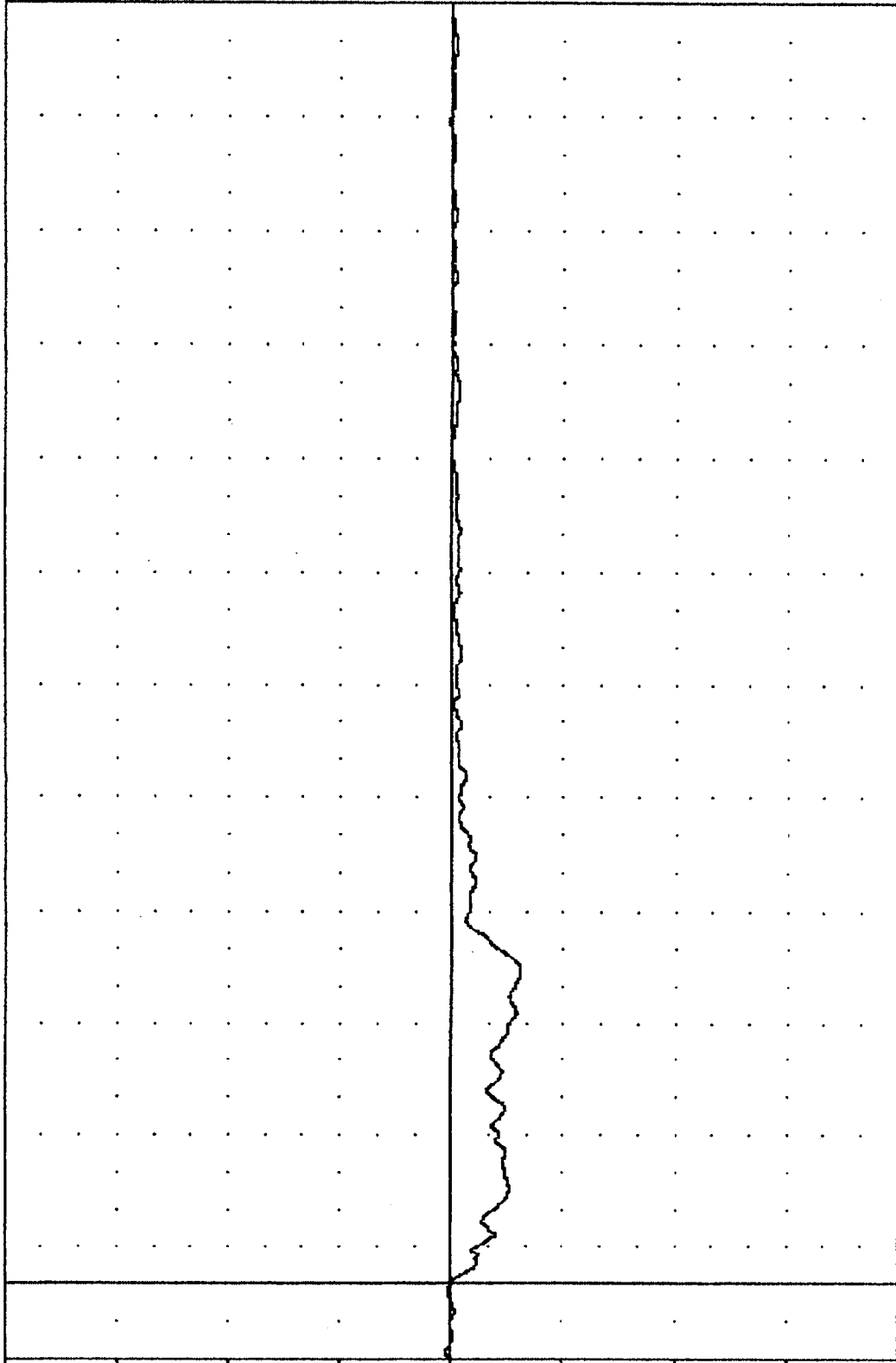
-30.00

-45.00

-60.00

ACCELERATION [G]

B-46

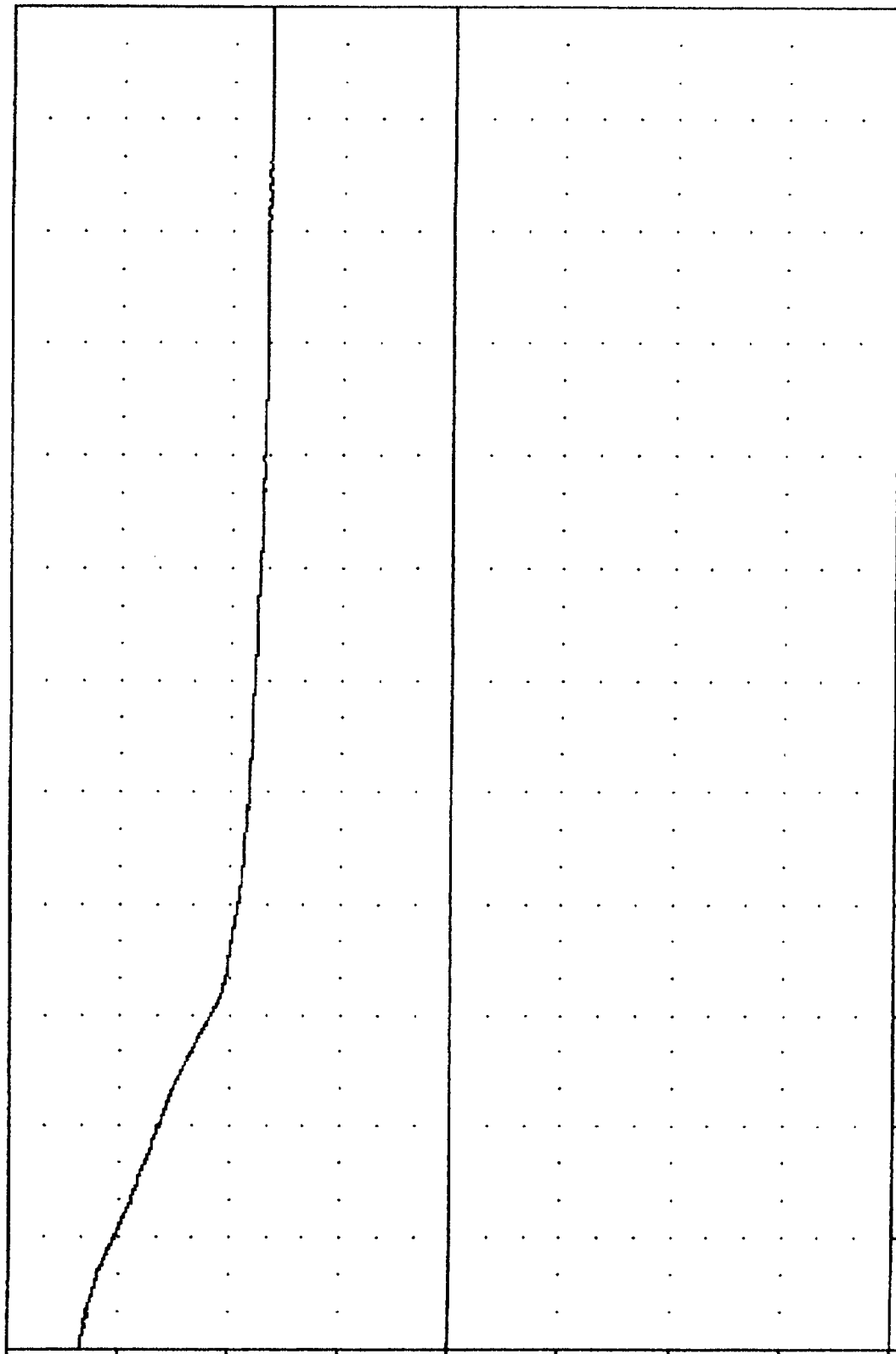


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 MOVING BARRIER CG X-AXIS ACCELERATION

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 BCGXV2

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 16.56 337.75 , 33.33 1.63

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



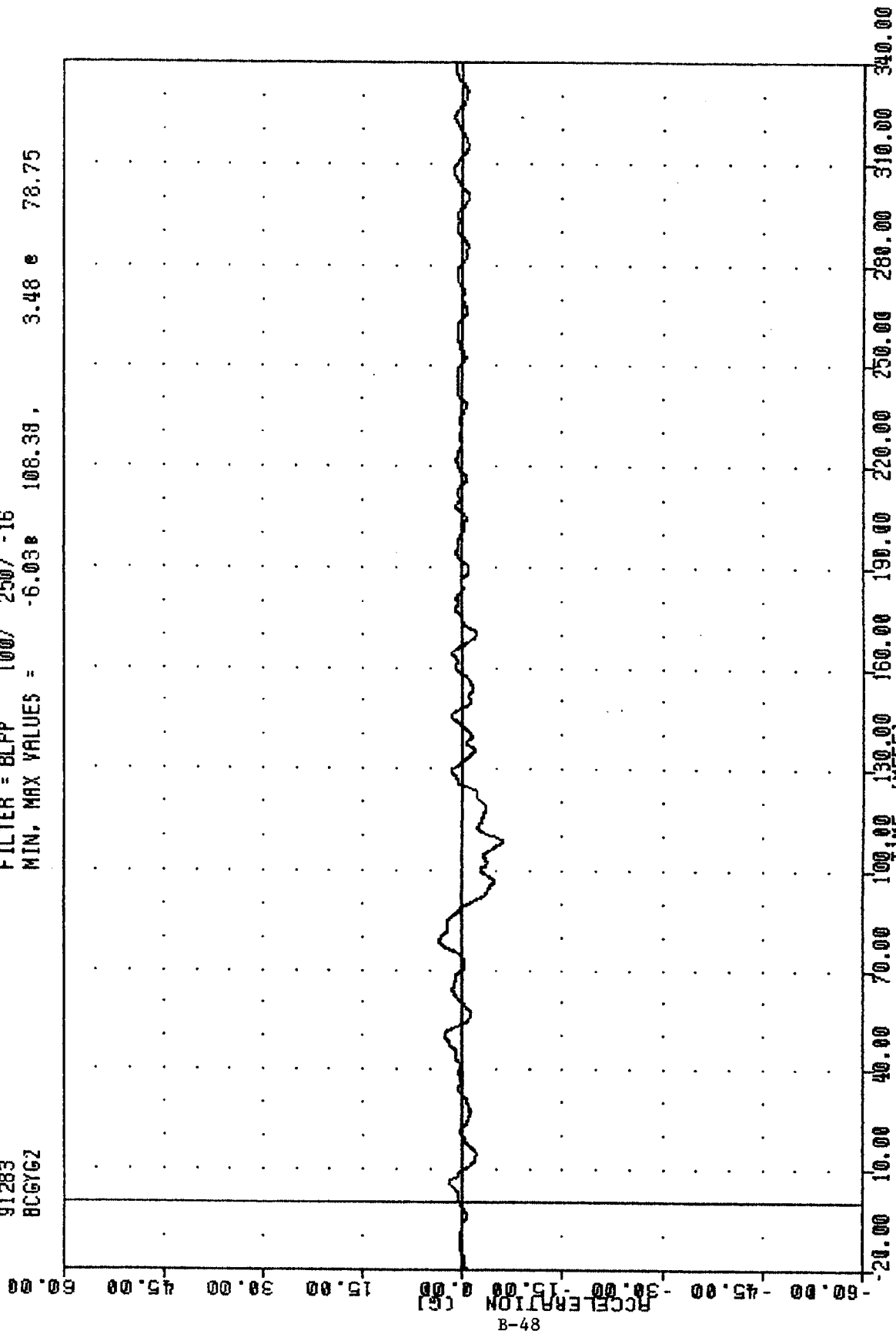
B-47

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH

MOVING BARRIER CG X-AXIS VELOCITY

TRC , 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 BC6Y62

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -6.03e 108.38 , 3.48 e 78.75

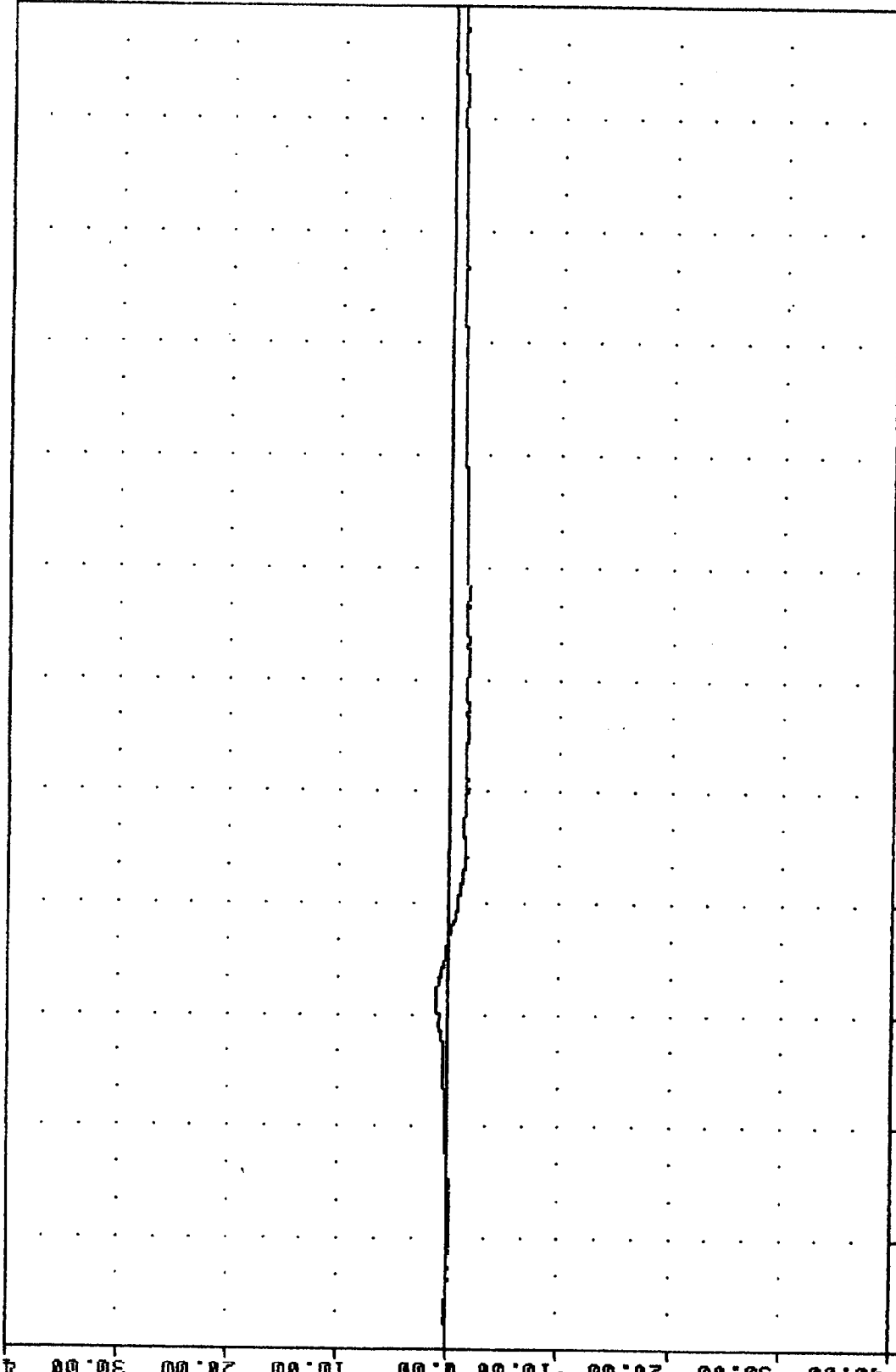


TRC . 911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 BCGYV2

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -1.70E 171.63, 1.12 E 89.63

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

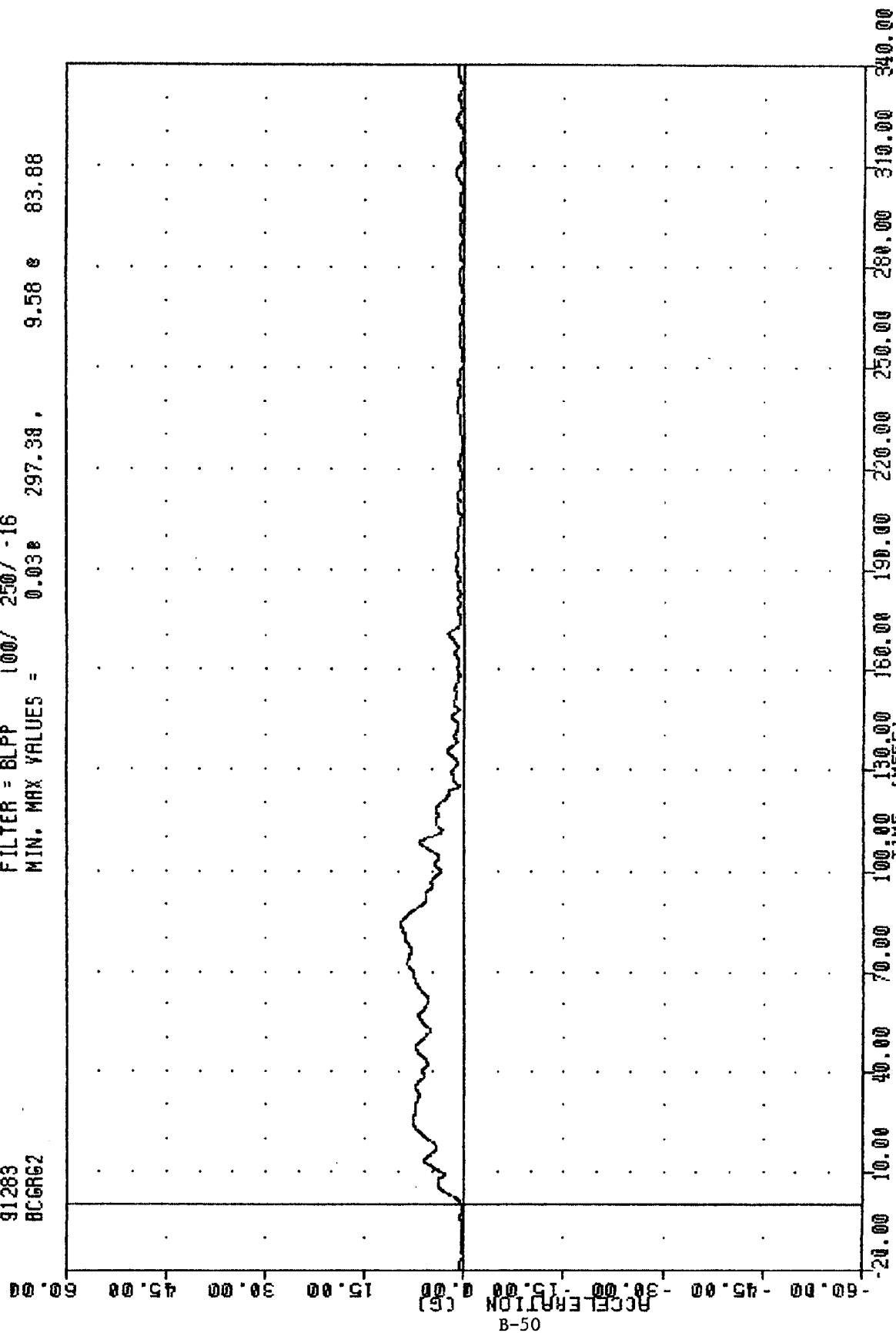
B-49



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 MOVING BARRIER CG Y-AXIS VELOCITY

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 BCGR62

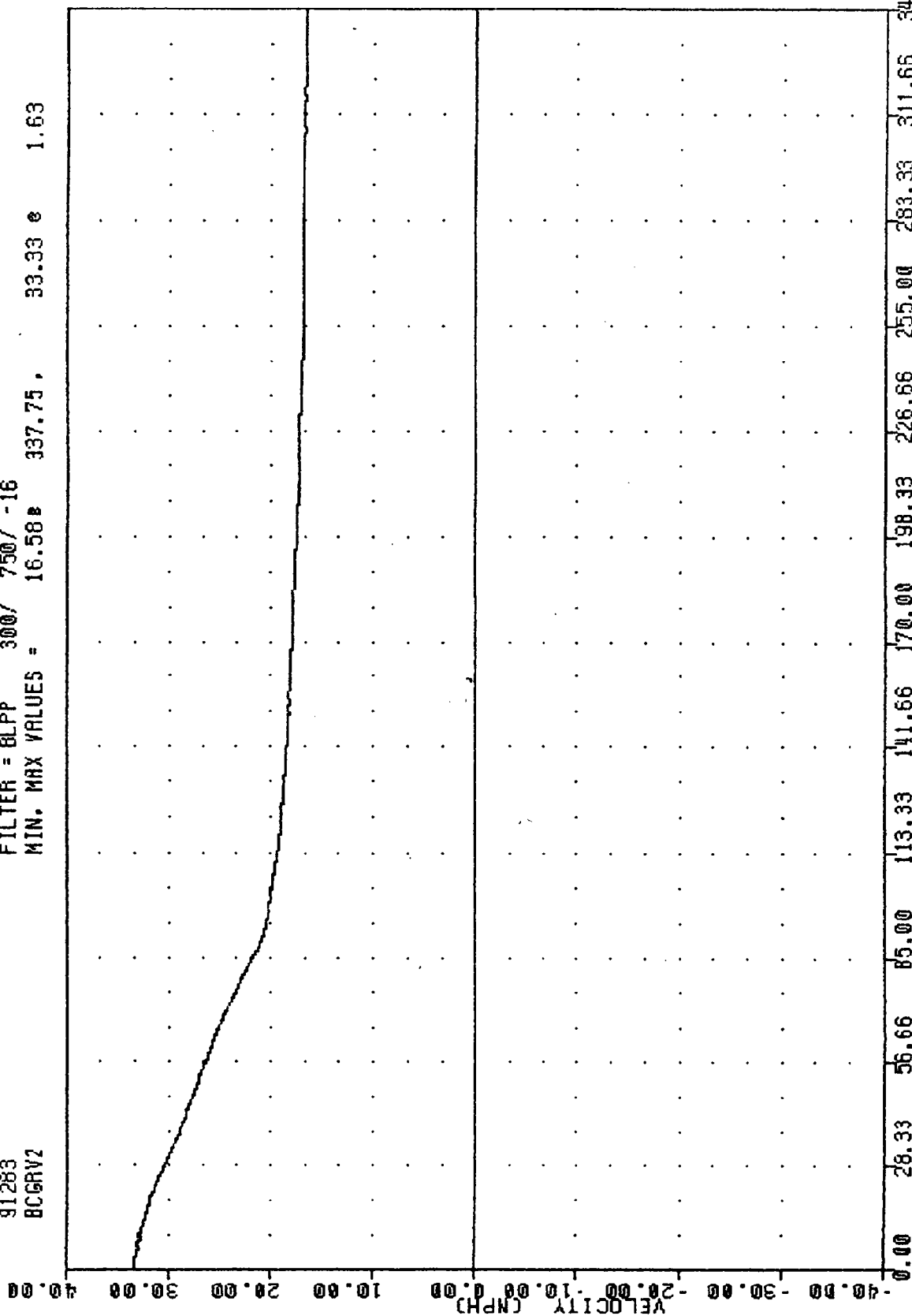
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.03e 297.38 , 9.58 e 83.88



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 MOVING BARRIER CG RESULTANT ACCELERATION

TRC .911010-2
 CRASH III DAMAGE ALGORITHM
 91283
 BCGRV2

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 16.58 337.75 , 33.33 1.63



B-51

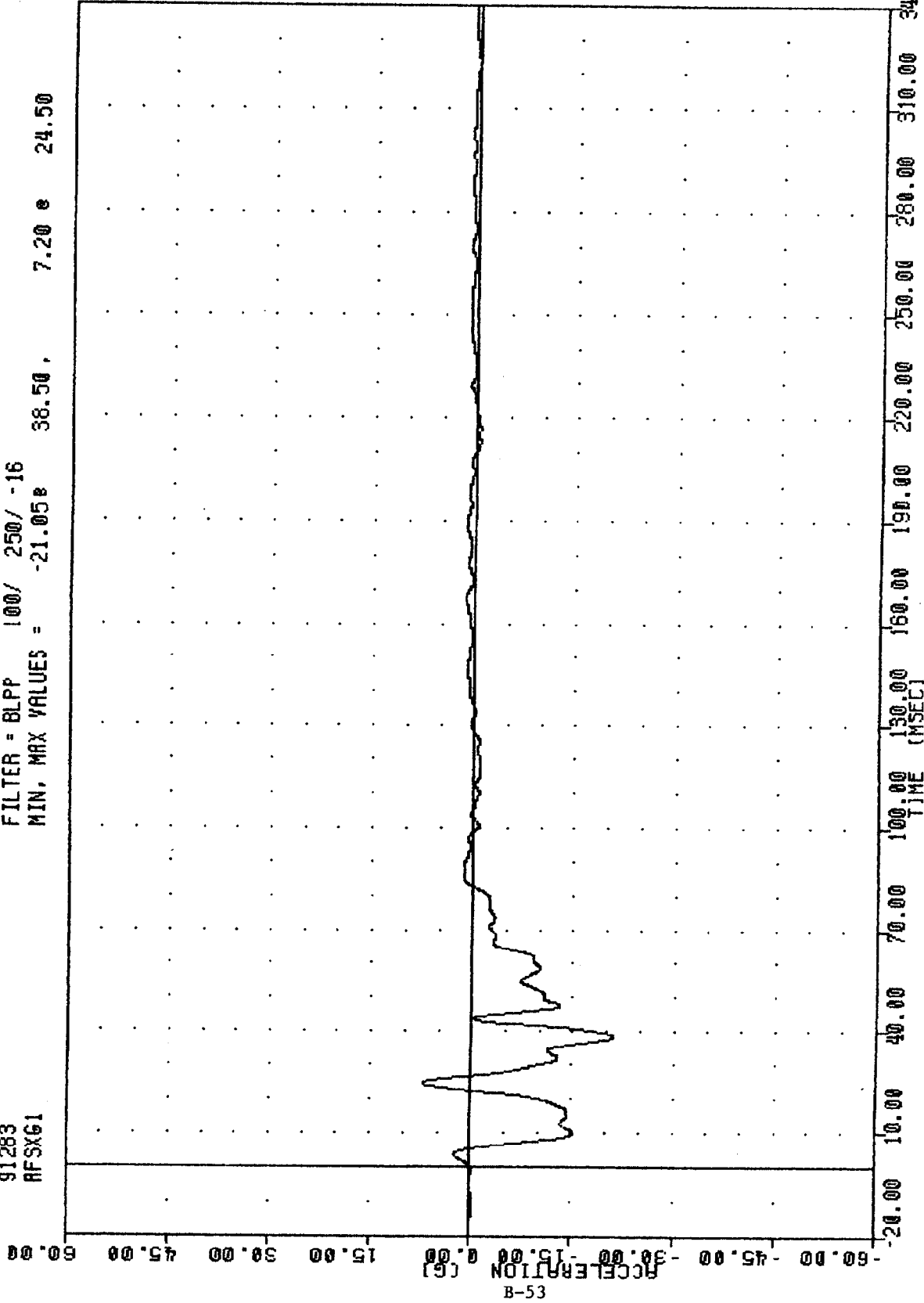
MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.3 MPH
 MOVING BARRIER CG RESULTANT VELOCITY

DATA PLOTS

TEST NO. 911010-3

TRC , 911010-3
CRASH III DAMAGE ALGORITHM
91283
RFSXG1

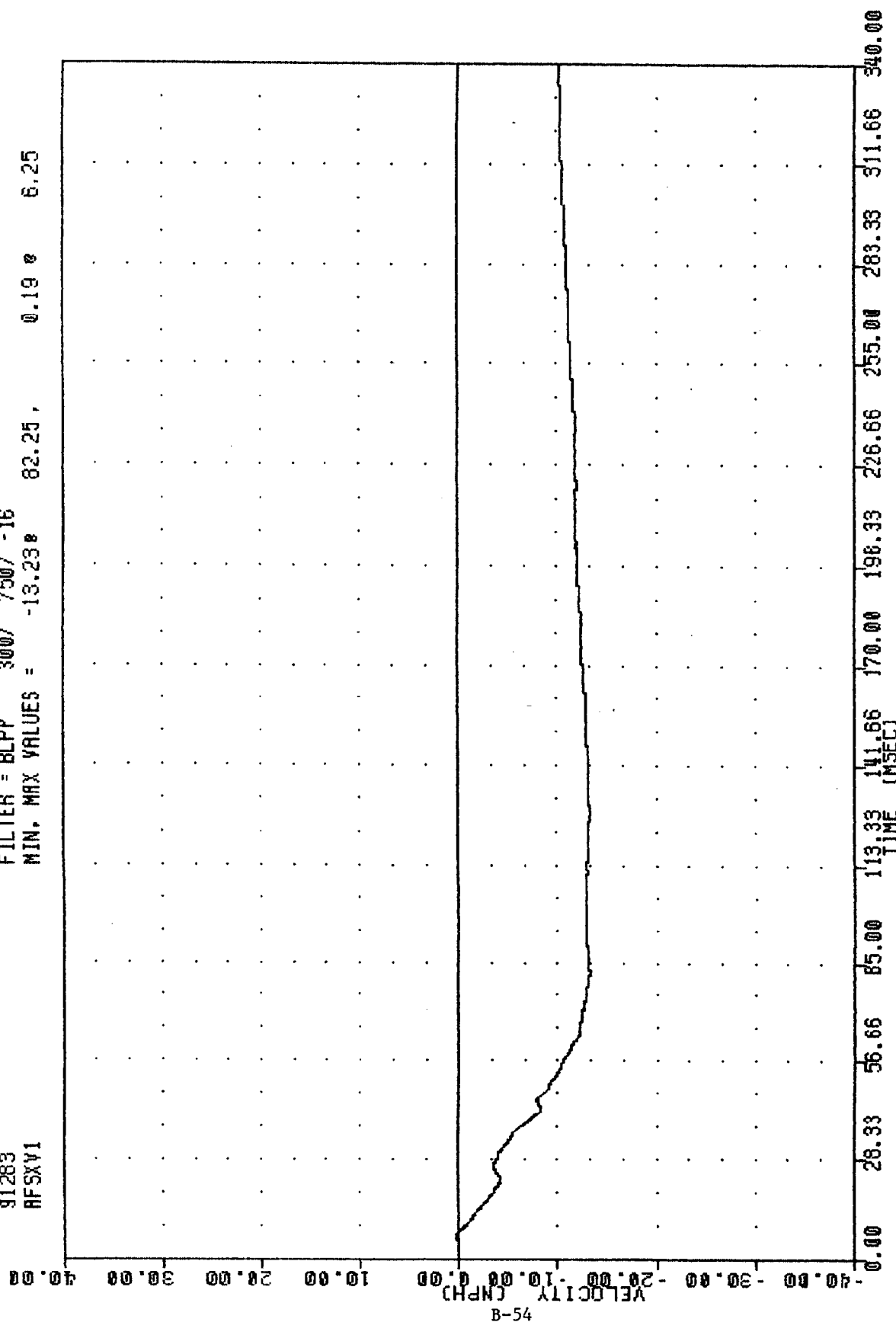
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -21.05e 38.50, 7.20 e 24.50



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
RIGHT FRONT DOOR SILL X-AXIS ACCELERATION

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 RFSXV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -13.23 82.25 , 0.19 6.25

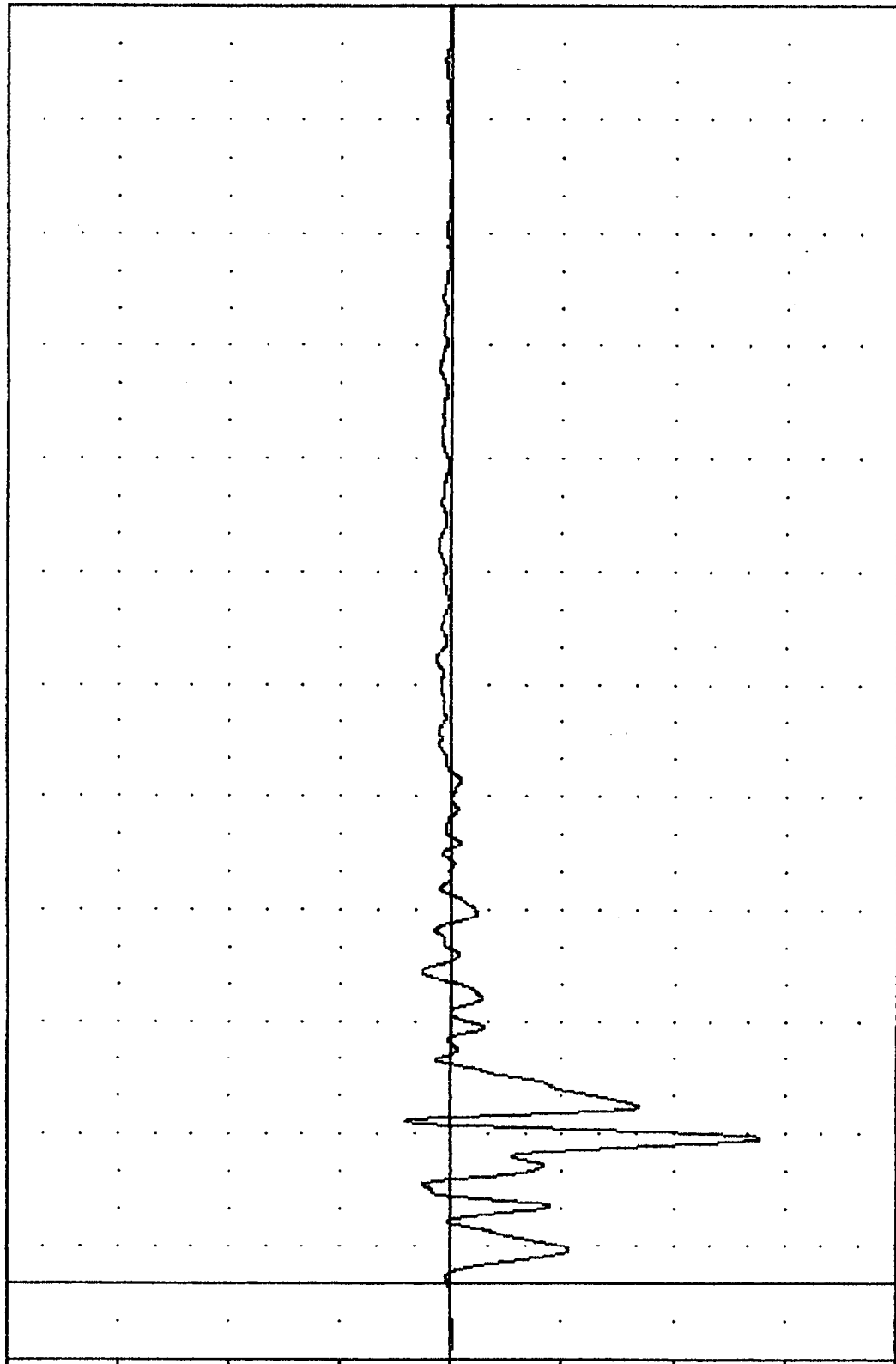


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT FRONT DOOR SILL X-AXIS VELOCITY

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 RFSYG1

FILTER = BLPP 100/ 250/ -18
 MIN. MAX VALUES = -41.718 39.00, 6.09 43.38

ACCELERATION (G)



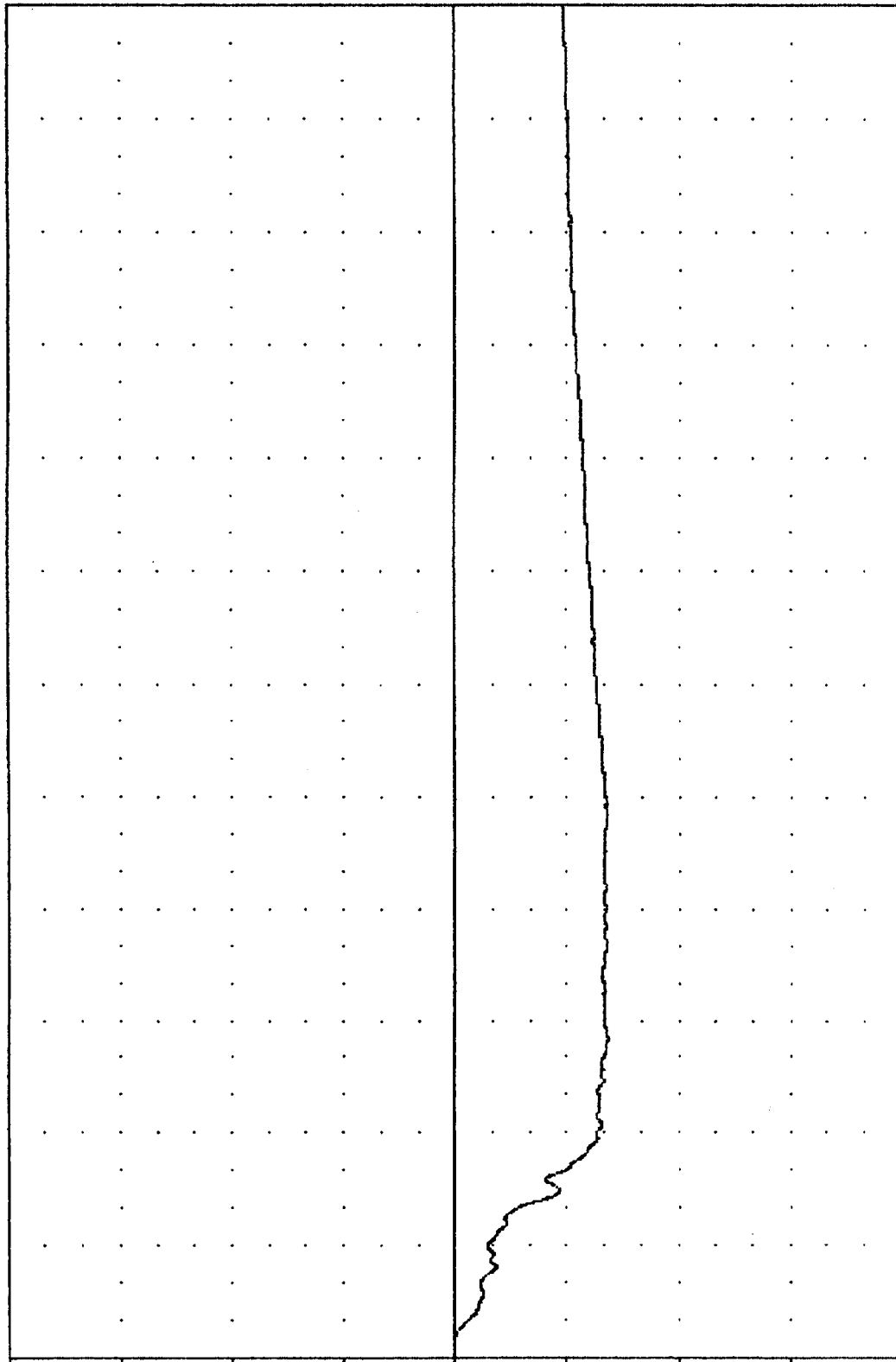
B-55

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT FRONT DOOR SILL Y-AXIS ACCELERATION

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 RFSYV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -13.63 80.38 , 0.03 3.75

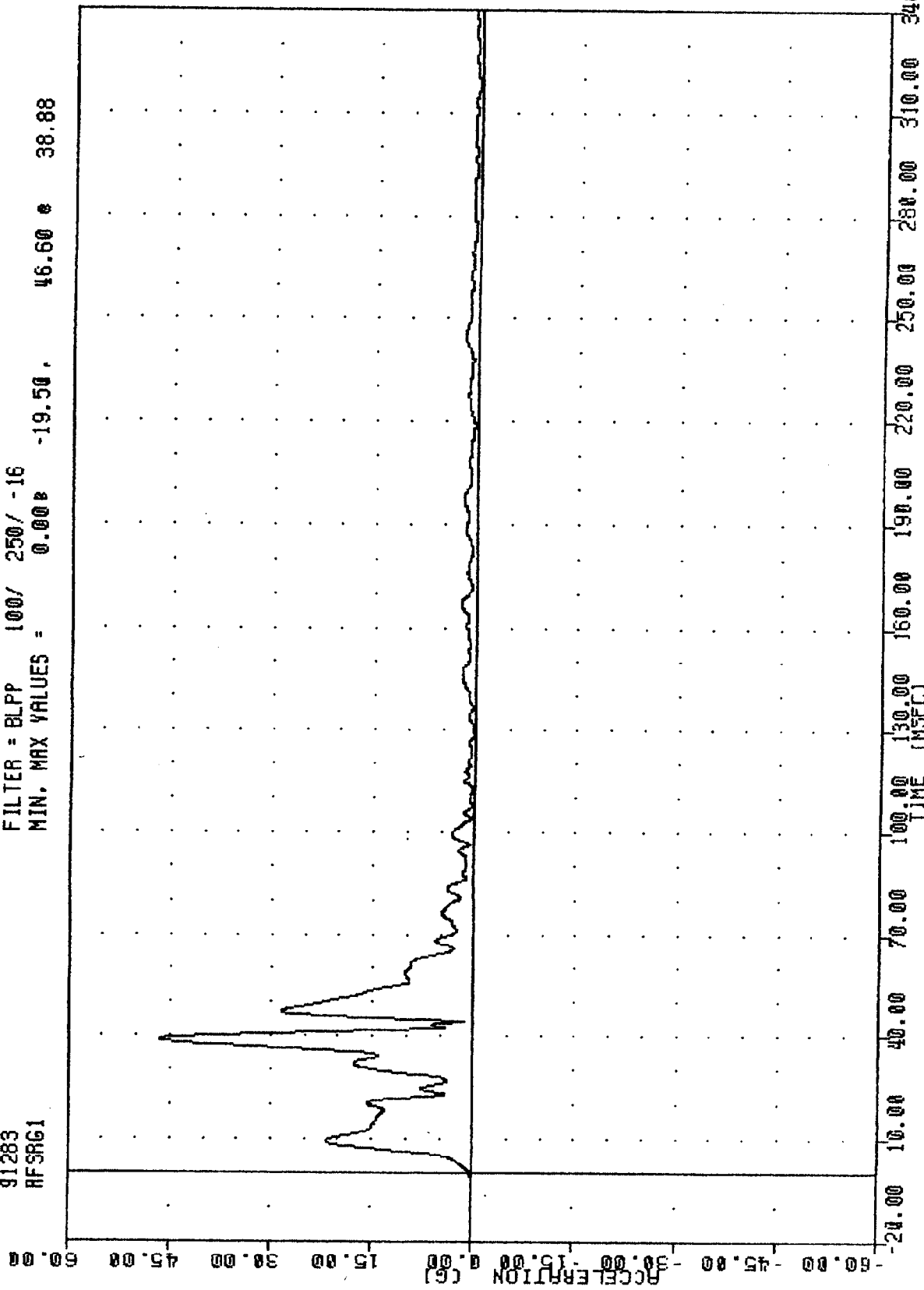
VELOCITY (MPH)



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT FRONT DOOR SILL Y-AXIS VELOCITY

TRC 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 RFSRG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = 0.00 46.60 38.88
 -19.50



B-57

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT FRONT DOOR SILL RESULTANT ACCELERATION

TRC .911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 AFSRV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = 0.00 0.00 18.95 81.13

VELOCITY (MPH)

40.00

30.00

20.00

10.00

0.00

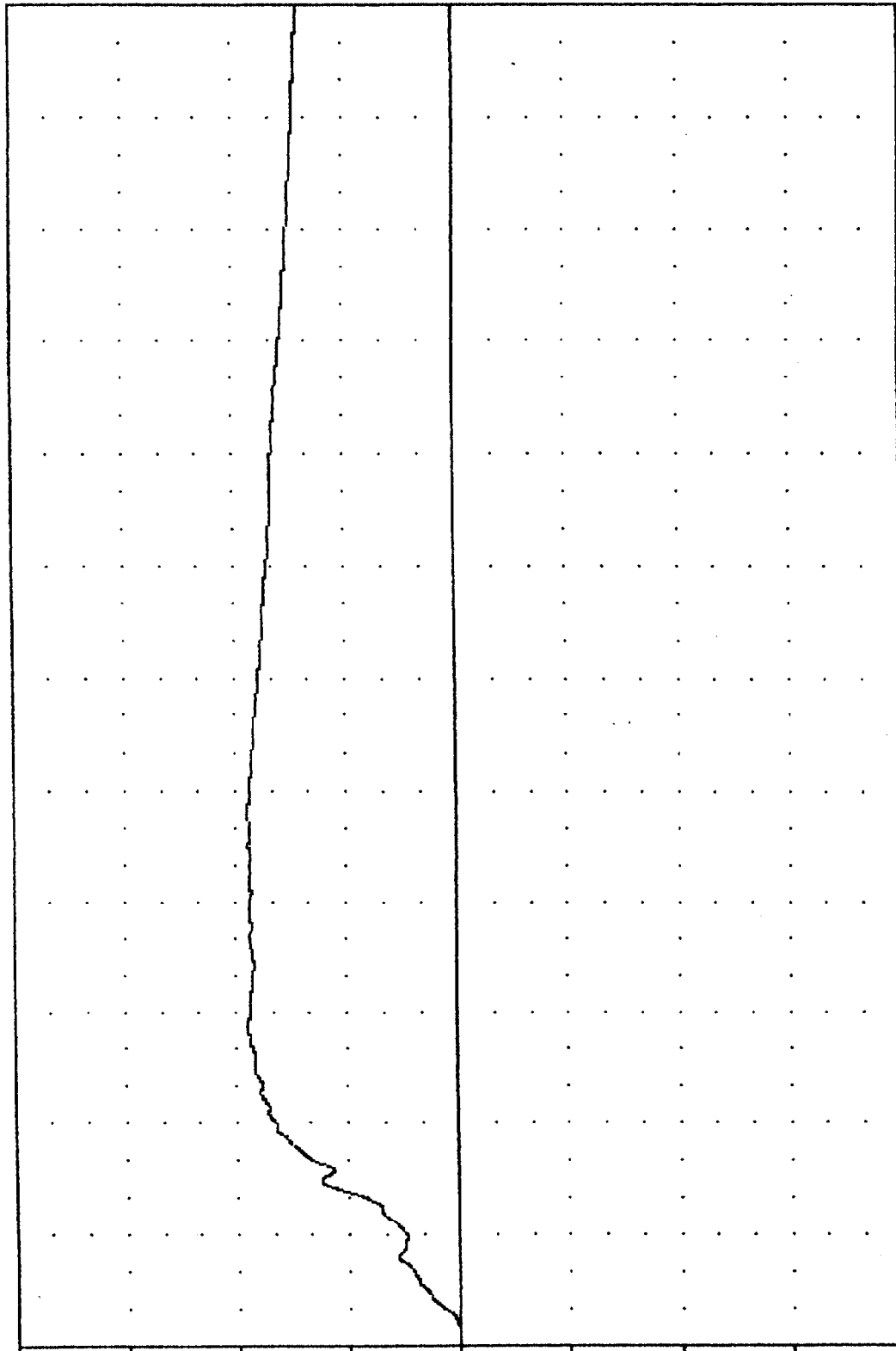
-10.00

-20.00

-30.00

-40.00

B-58



0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00

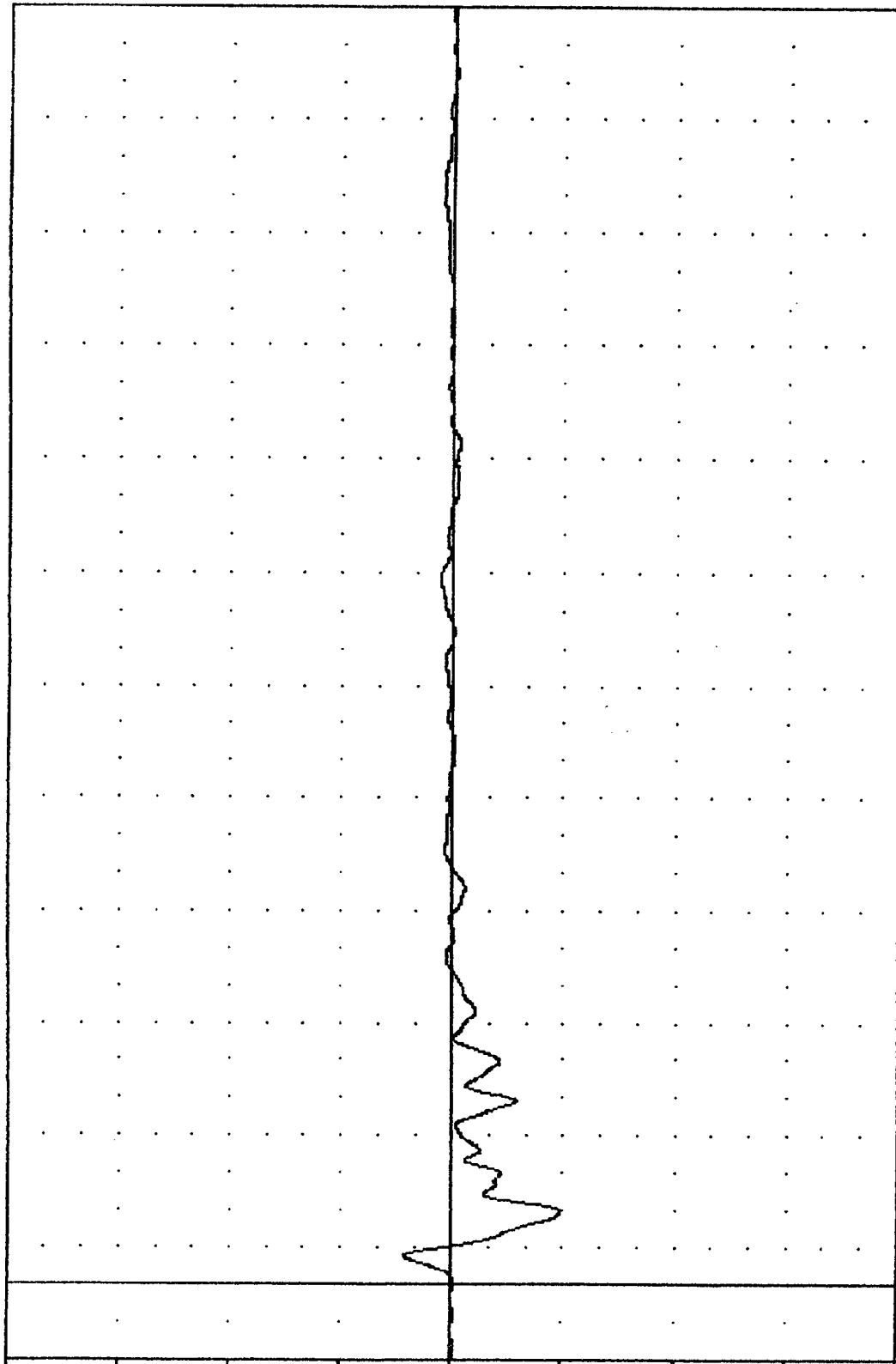
TIME (MSEC)

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT FRONT DOOR SILL RESULTANT VELOCITY

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 ARSXG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -14.61e 19.75, 6.35 e 7.75

ACCELERATION (G)
 -60.00
 -45.00
 -30.00
 -15.00
 0.00
 15.00
 30.00
 45.00
 60.00



B-59

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT REAR DOOR SILL X-AXIS ACCELERATION

TRC ,911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 RRSXV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -6.59e 111.75, 0.64 e 9.25

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0.00

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40.00

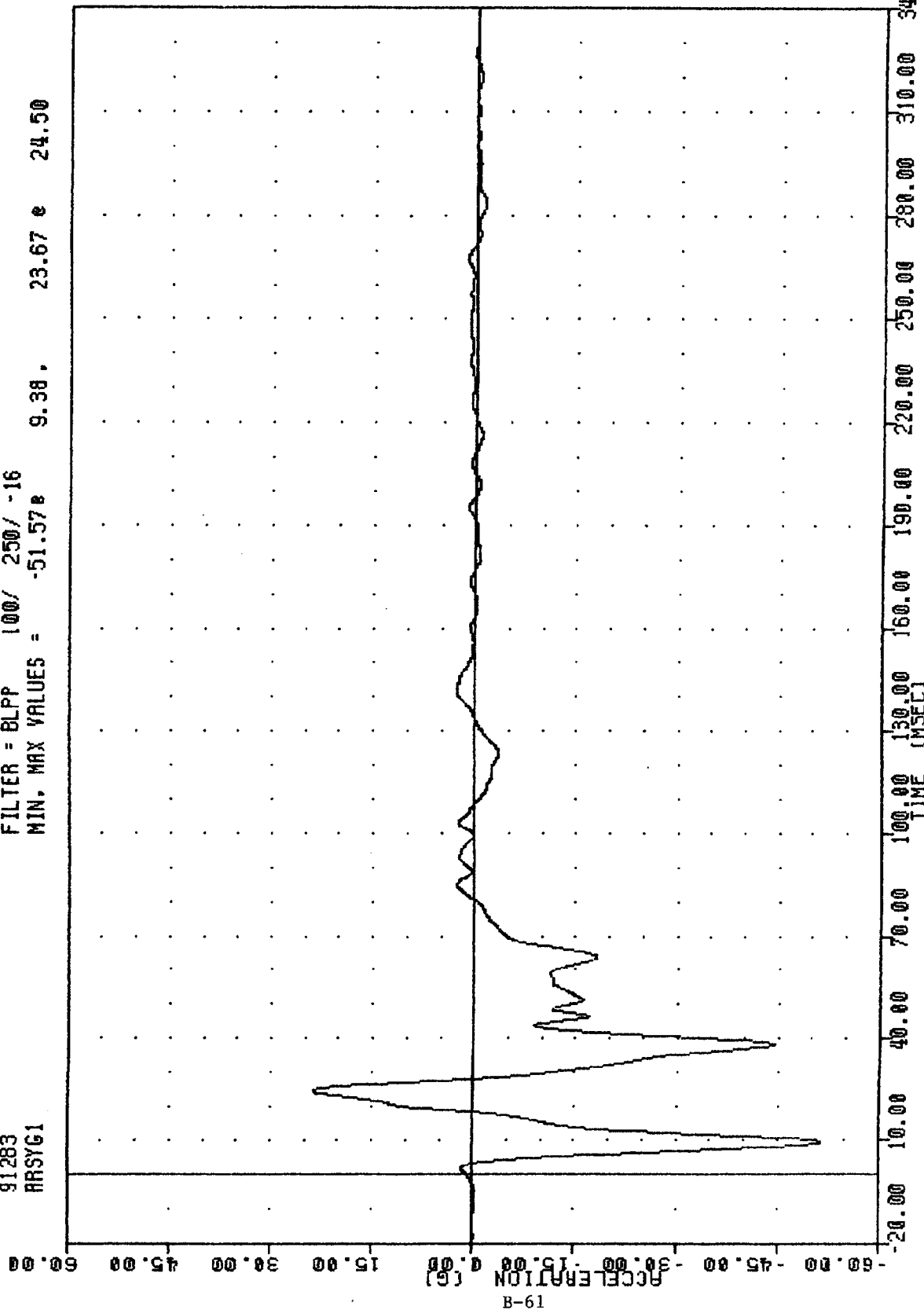
0.00

10.00

20.00

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 ARSYG1

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -51.57 9.38 23.67 24.50



B-61

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT REAR DOOR SILL Y-AXIS ACCELERATION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 ARSYV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -20.94 133.88 0.05 e 4.25

40.00

30.00

20.00

10.00

0.00

-10.00

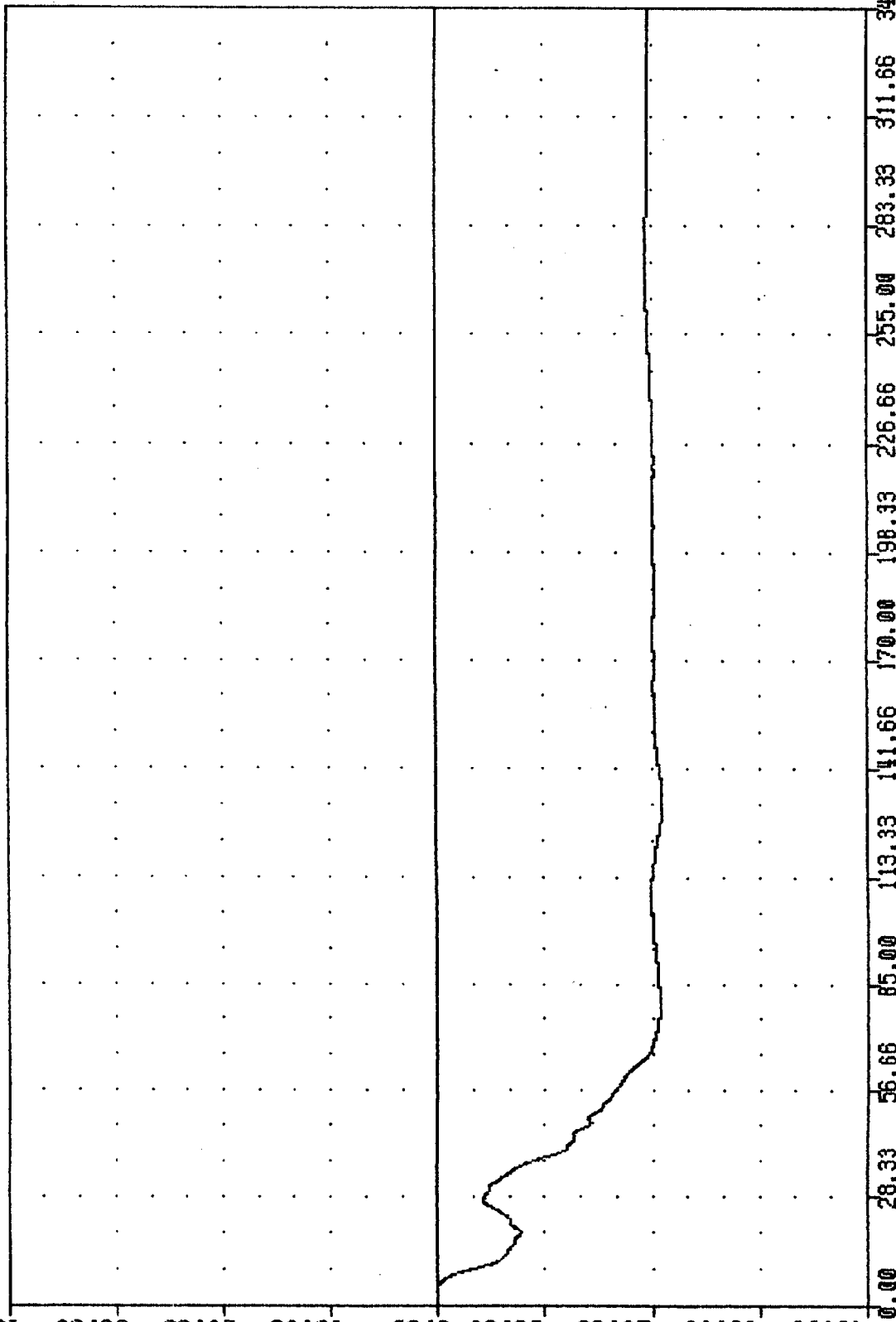
-20.00

-30.00

-40.00

VELOCITY (MPH)

B-62

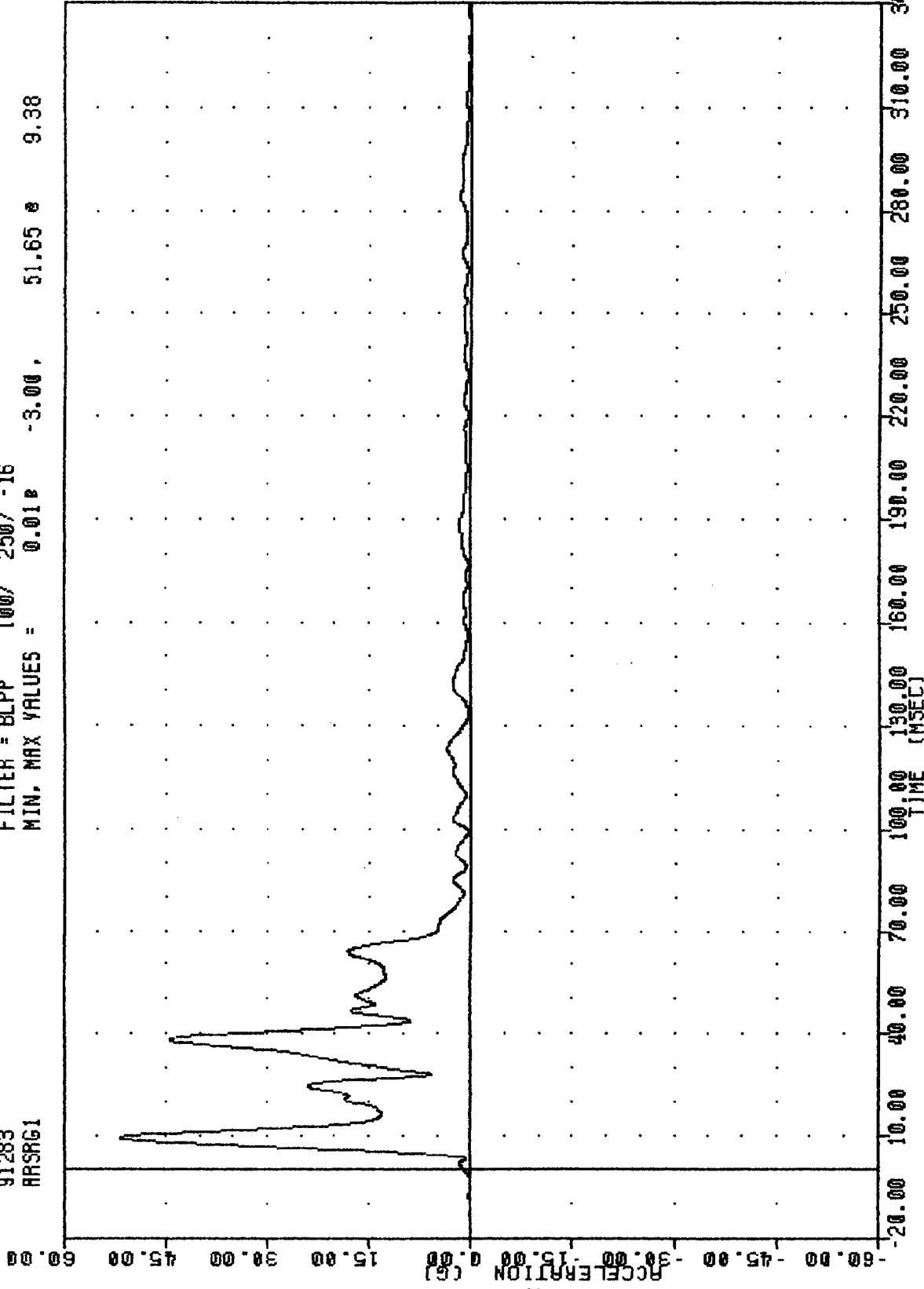


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 RIGHT REAR DOOR SILL Y-AXIS VELOCITY

TRC
CRASH III DAMAGE ALGORITHM
91283
RRSRG1

911010-3

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = 0.012 -3.00 51.65 9.38



B-63

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
RIGHT REAR DOOR SILL RESULTANT ACCELERATION

TRC 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 ARSRV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.00 21.86 133.75

VELOCITY (MPH)

40.00

30.00

20.00

10.00

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

-350.00

-360.00

-370.00

-380.00

-390.00

-400.00

-410.00

-420.00

-430.00

-440.00

-450.00

-460.00

-470.00

-480.00

-490.00

-500.00

-510.00

-520.00

-530.00

-540.00

-550.00

-560.00

-570.00

-580.00

-590.00

-600.00

-610.00

-620.00

-630.00

-640.00

-650.00

-660.00

-670.00

-680.00

-690.00

-700.00

-710.00

-720.00

-730.00

-740.00

-750.00

-760.00

-770.00

-780.00

-790.00

-800.00

-810.00

-820.00

-830.00

-840.00

-850.00

-860.00

-870.00

-880.00

-890.00

-900.00

-910.00

-920.00

-930.00

-940.00

-950.00

-960.00

-970.00

-980.00

-990.00

-1000.00

-1010.00

-1020.00

-1030.00

-1040.00

-1050.00

-1060.00

-1070.00

-1080.00

-1090.00

-1100.00

-1110.00

-1120.00

-1130.00

-1140.00

-1150.00

-1160.00

-1170.00

-1180.00

-1190.00

-1200.00

-1210.00

-1220.00

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-1460.00

-1470.00

-1480.00

-1490.00

-1500.00

-1510.00

-1520.00

-1530.00

-1540.00

-1550.00

-1560.00

-1570.00

-1580.00

-1590.00

-1600.00

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-1620.00

-1630.00

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-1680.00

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-1800.00

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-1900.00

-1910.00

-1920.00

-1930.00

-1940.00

-1950.00

-1960.00

-1970.00

-1980.00

-1990.00

-2000.00

-2010.00

-2020.00

-2030.00

-2040.00

-2050.00

-2060.00

-2070.00

-2080.00

-2090.00

-2100.00

-2110.00

-2120.00

-2130.00

-2140.00

-2150.00

-2160.00

-2170.00

-2180.00

-2190.00

-2200.00

-2210.00

-2220.00

-2230.00

-2240.00

-2250.00

-2260.00

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-2280.00

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-2770.00

-2780.00

-2790.00

-2800.00

-2810.00

-2820.00

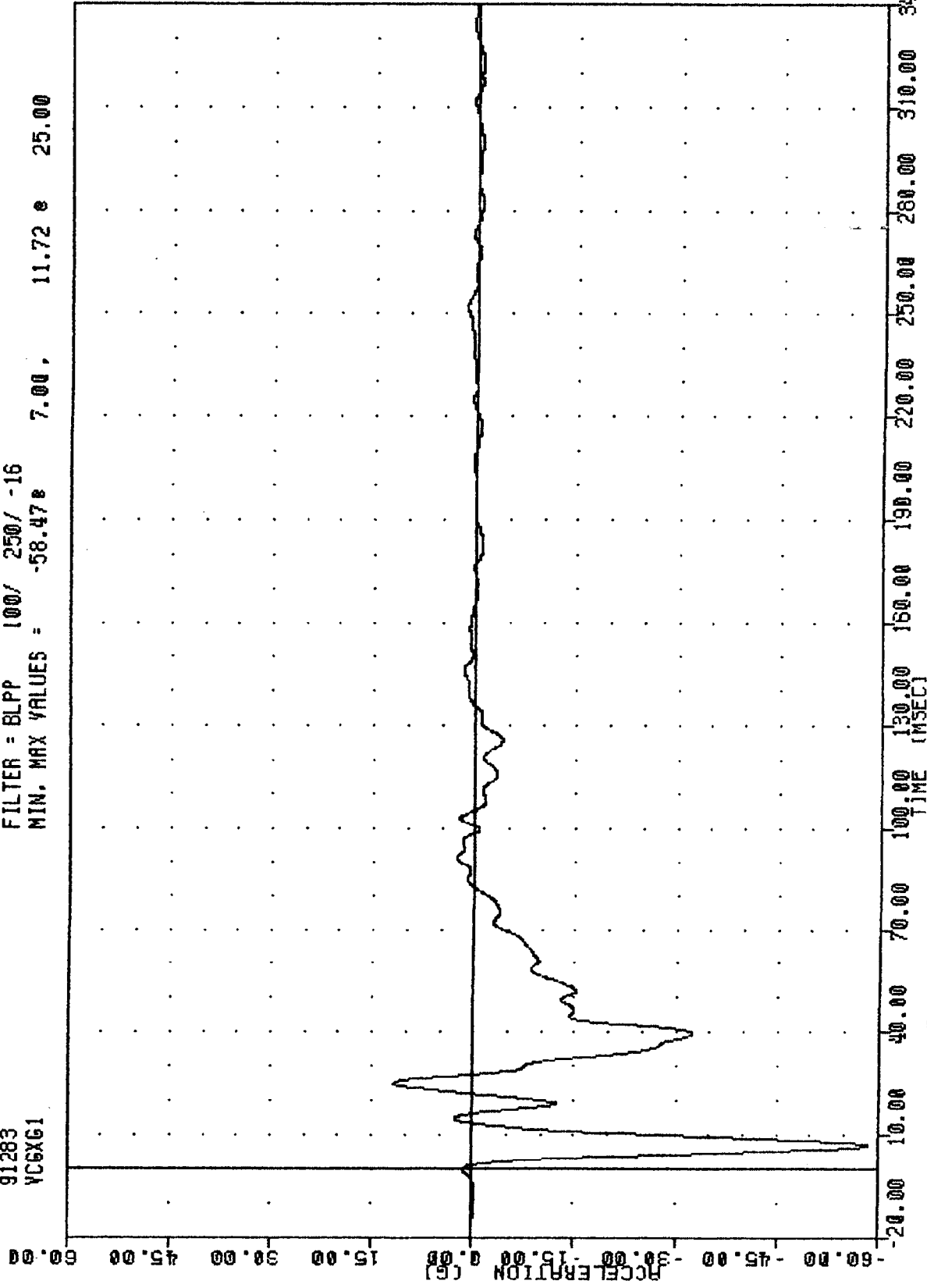
-2830.00

-2840.00

-2850.00

TRC , 911010-3
CRASH III DAMAGE ALGORITHM
91283
VC6XG1

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -58.47e 7.00 11.72 e 25.00



B-65

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
VEHICLE CG ACCELERATION PARALLEL TO IMPACT DIRECTION

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 YC6XV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = -22.10* 135.50 , 0.00 e 0.00

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

-40.00

VELOCITY (MPH)

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

350.00

360.00

370.00

380.00

390.00

400.00

410.00

420.00

430.00

440.00

450.00

460.00

470.00

480.00

490.00

500.00

510.00

520.00

530.00

540.00

550.00

560.00

570.00

580.00

590.00

600.00

610.00

620.00

630.00

640.00

650.00

660.00

670.00

680.00

690.00

700.00

710.00

720.00

730.00

740.00

750.00

760.00

770.00

780.00

790.00

800.00

810.00

820.00

830.00

840.00

850.00

860.00

870.00

880.00

890.00

900.00

910.00

920.00

930.00

940.00

950.00

960.00

970.00

980.00

990.00

1000.00

1010.00

1020.00

1030.00

1040.00

1050.00

1060.00

1070.00

1080.00

1090.00

1100.00

1110.00

1120.00

1130.00

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1190.00

1200.00

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1600.00

1610.00

1620.00

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1640.00

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1660.00

1670.00

1680.00

1690.00

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1780.00

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1880.00

1890.00

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1940.00

1950.00

1960.00

1970.00

1980.00

1990.00

2000.00

2010.00

2020.00

2030.00

2040.00

2050.00

2060.00

2070.00

2080.00

2090.00

2100.00

2110.00

2120.00

2130.00

2140.00

2150.00

2160.00

2170.00

2180.00

2190.00

2200.00

2210.00

2220.00

2230.00

2240.00

2250.00

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2570.00

2580.00

2590.00

2600.00

2610.00

2620.00

2630.00

2640.00

2650.00

2660.00

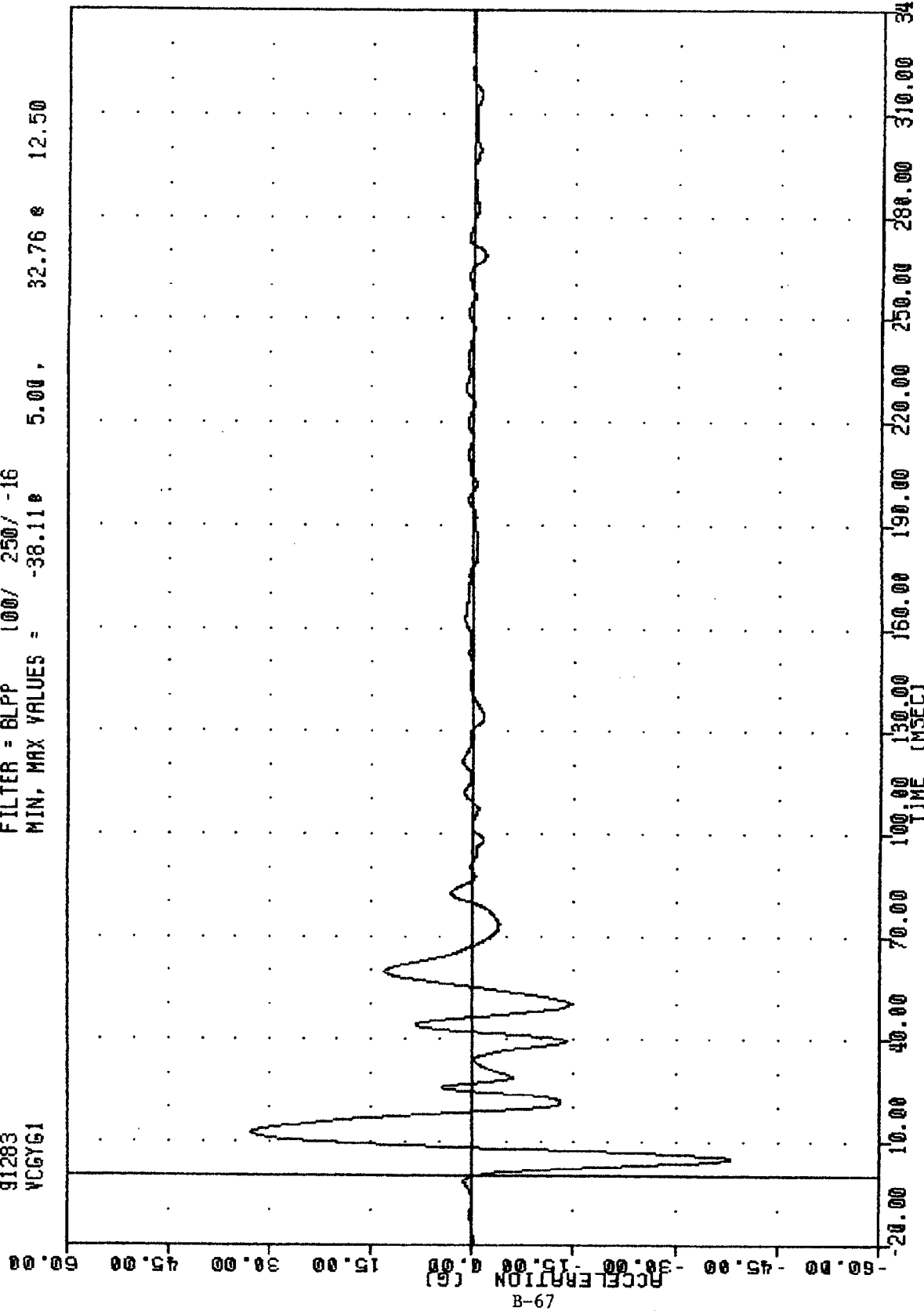
2670.00

2680.00

2690.00

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 VCGYG1

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -38.11 5.00, 32.76 12.50

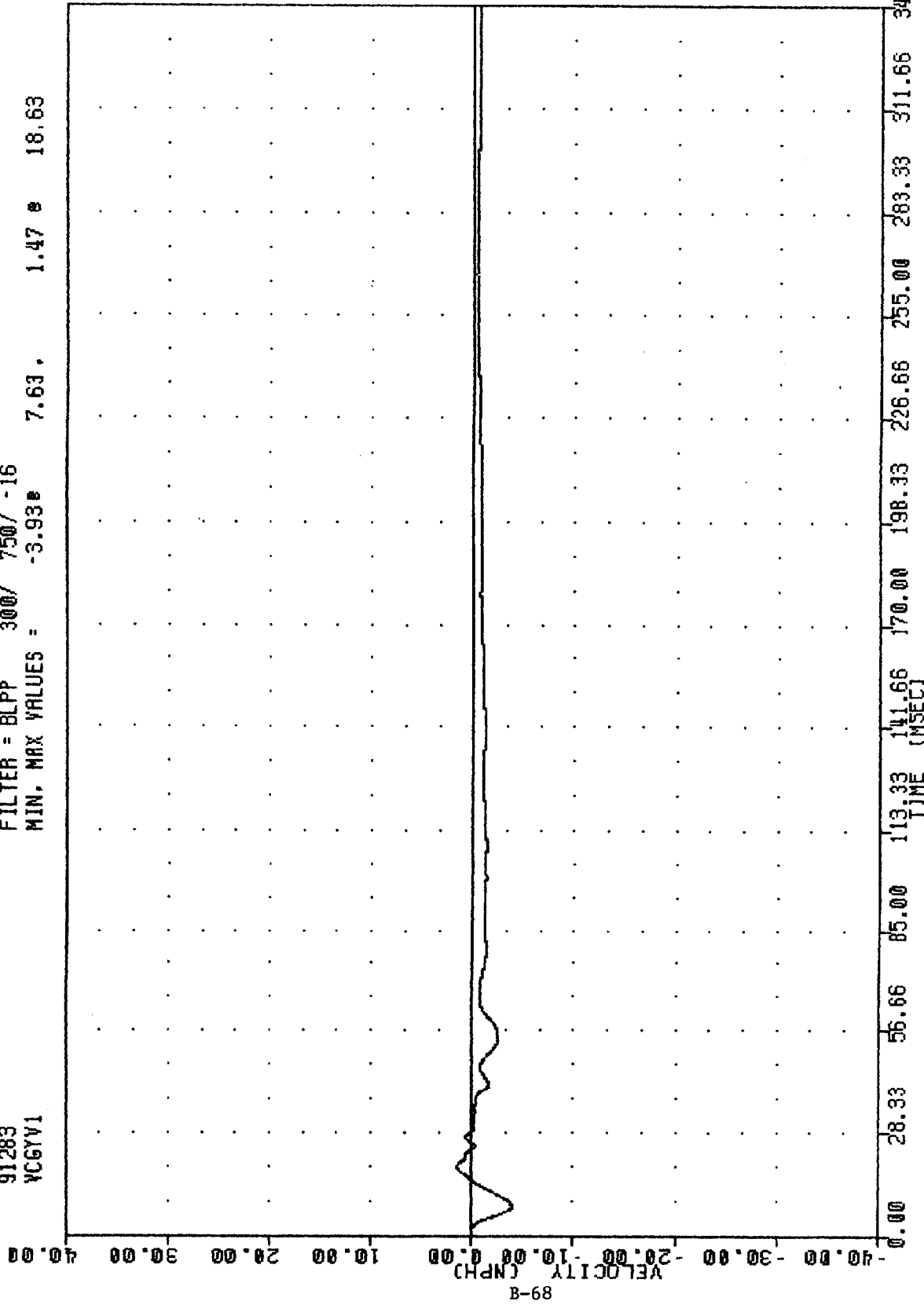


B-67

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 VEHICLE CG ACCELERATION PERPENDICULAR TO IMPACT DIRECTION

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 VCGYV1

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -3.93 7.63, 1.47 18.63



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 VEHICLE CG VELOCITY PERPENDICULAR TO IMPACT DIRECTION

TRC
CRASH III DAMAGE ALGORITHM
91283
VCGRG1

911010-3

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = 0.02 63.69 6.38

60.00

45.00

30.00

15.00

0.00

-15.00

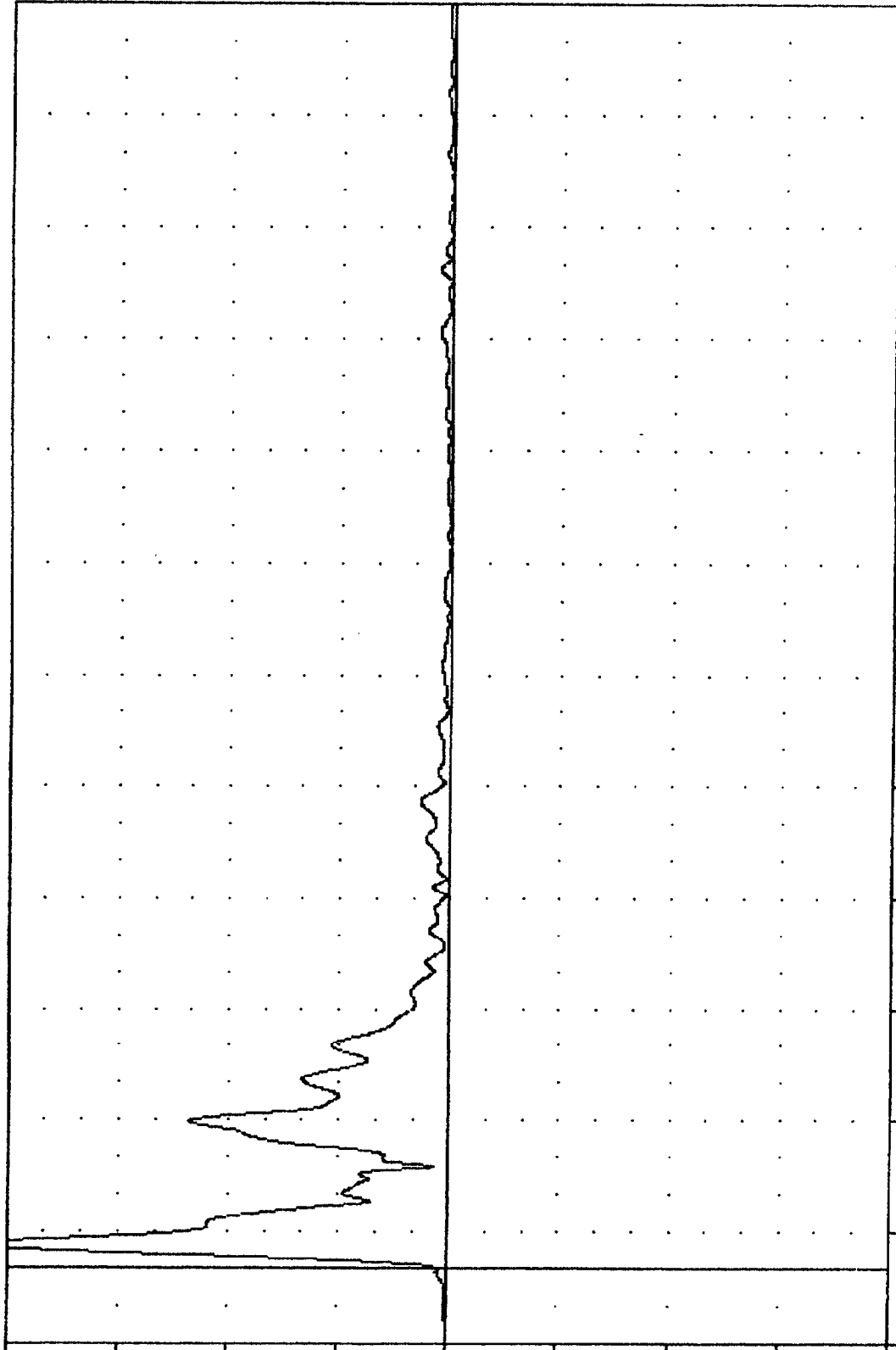
-30.00

-45.00

-60.00

B-69

ACCELERATION (G)

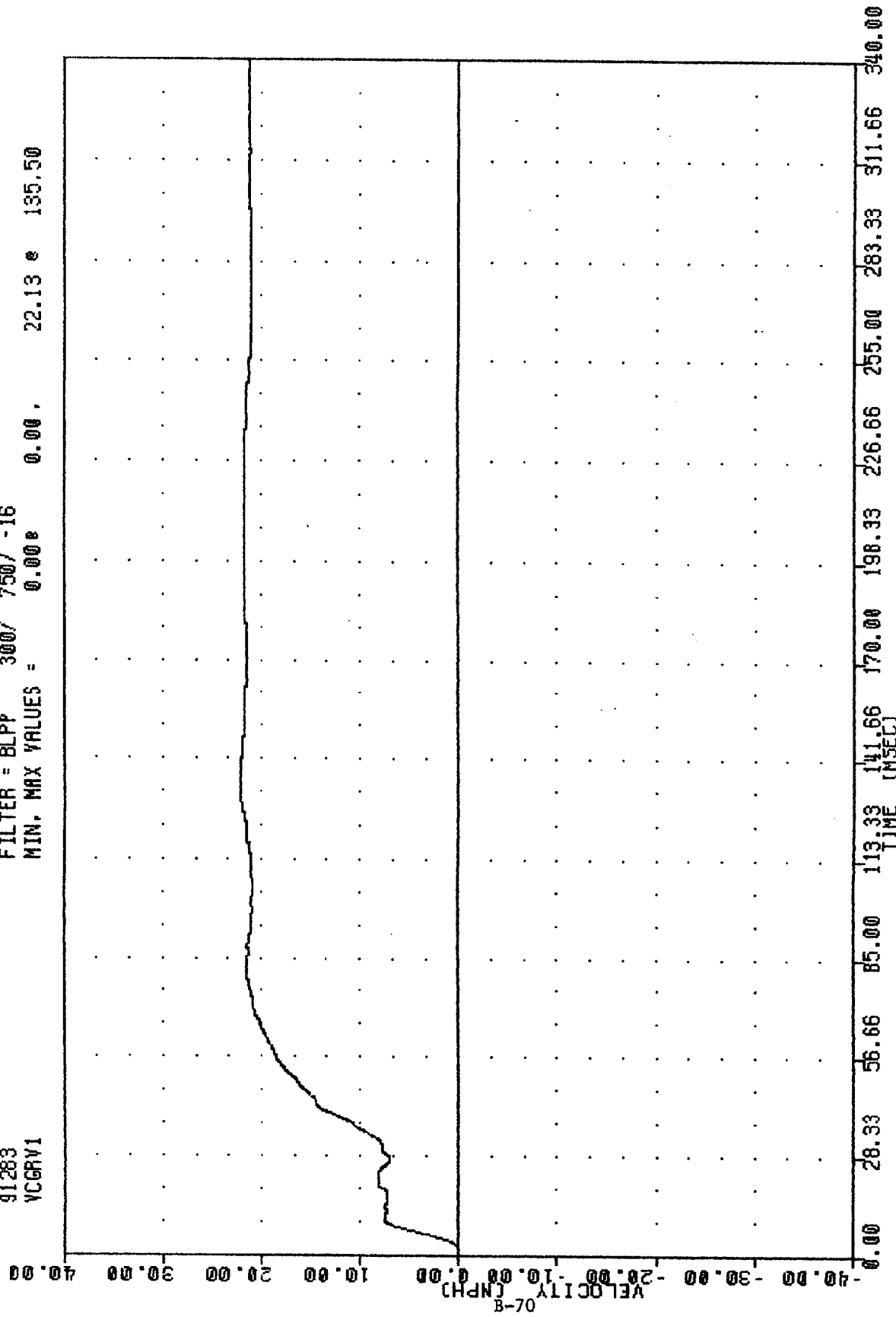


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH

VEHICLE CG RESULTANT ACCELERATION

TRC 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 VCGRV1

FILTER = BLPP 300/ 750/ -16
 MIN. MAX VALUES = 0.00 0.00 22.13 e 135.50

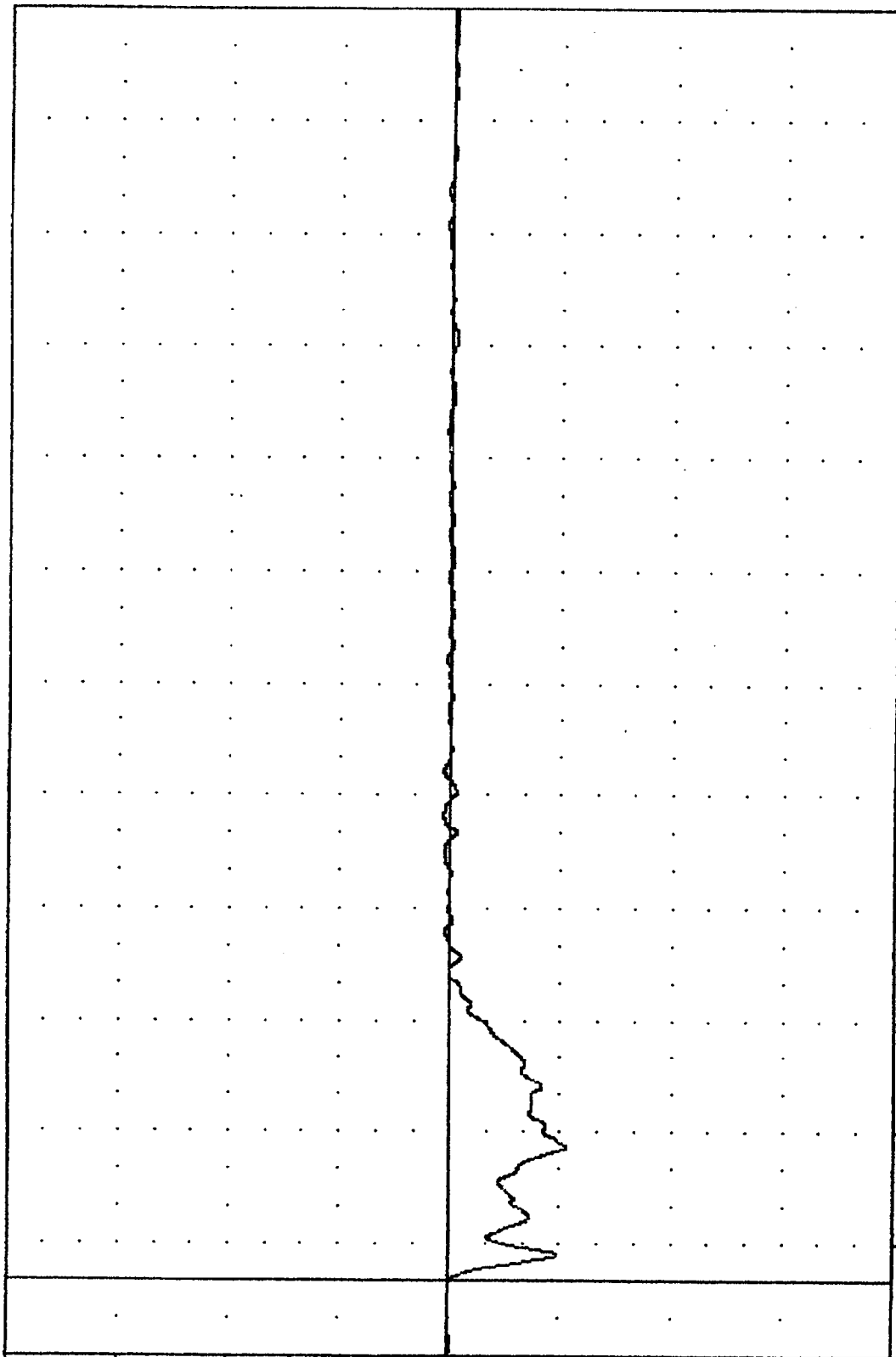


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 VEHICLE CG RESULTANT VELOCITY

TRC . 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 BCCXG2

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -15.98e 36.00, 0.96 e 136.38

ACCELERATION (G)
 60.00
 45.00
 30.00
 15.00
 0.00
 -15.00
 -30.00
 -45.00
 -60.00



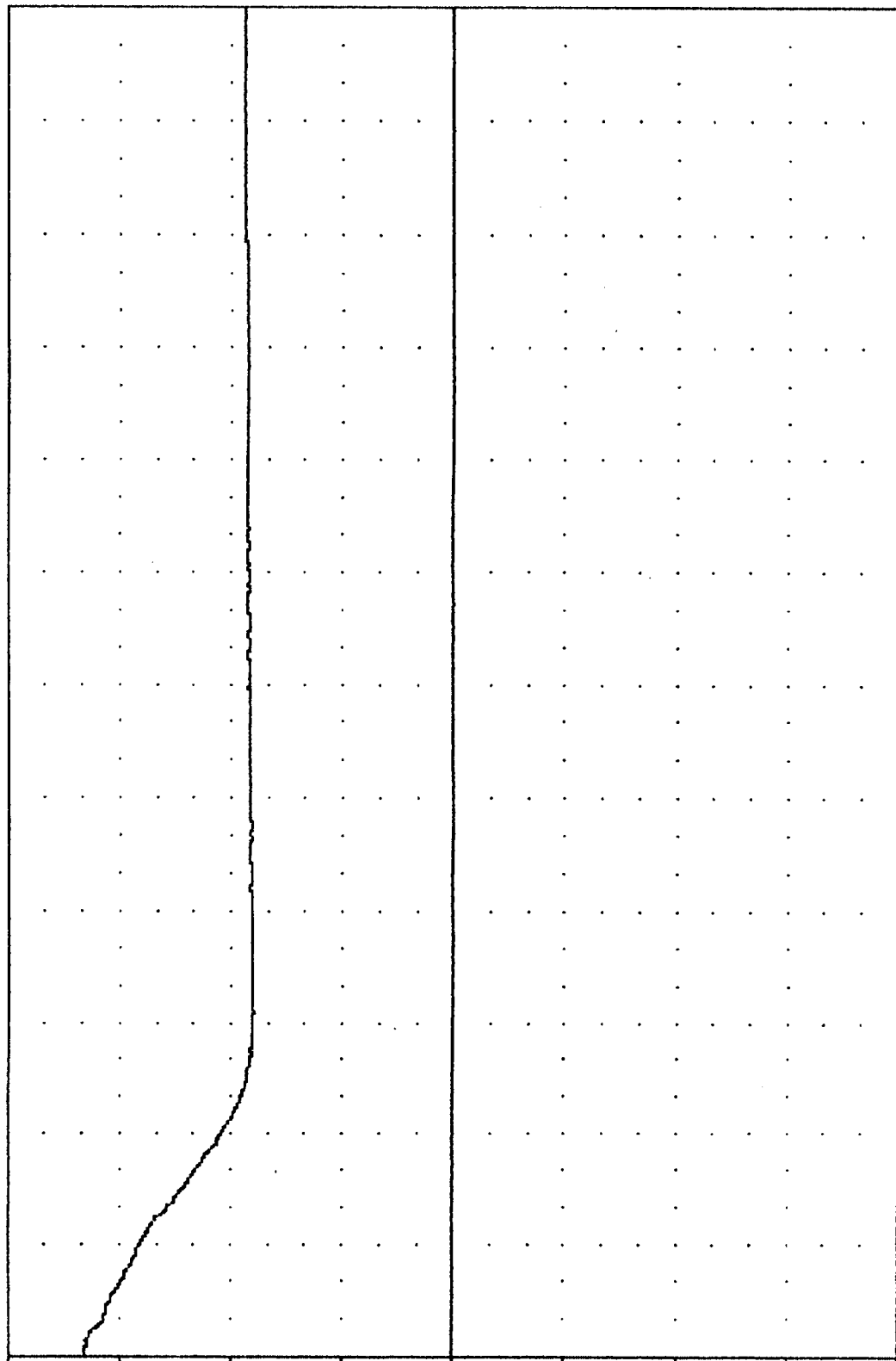
-20.00 10.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 MOVING BARRIER CG X-AXIS ACCELERATION

TRC
CRASH III DAMAGE ALGORITHM
91283
BCGXV2

FILTER = BLPP 300/ 750/ -16
MIN, MAX VALUES = 17.97 87.63 33.10 0.75

VELOCITY (MPH)

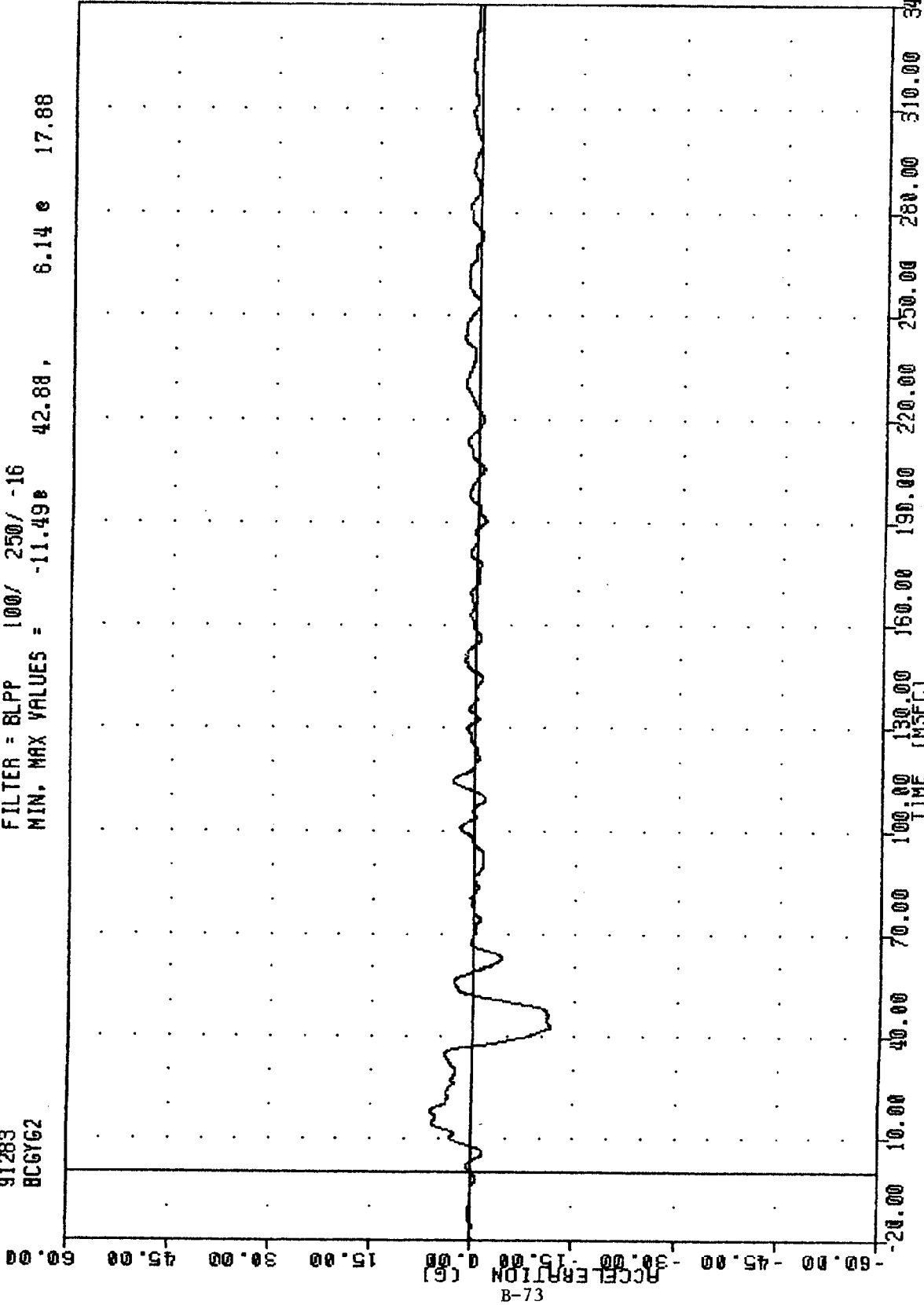


0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
MOVING BARRIER CG X-AXIS VELOCITY

TRC
 CRASH III DAMAGE ALGORITHM
 91283
 BCGY62

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -11.49 42.88 6.14 17.88

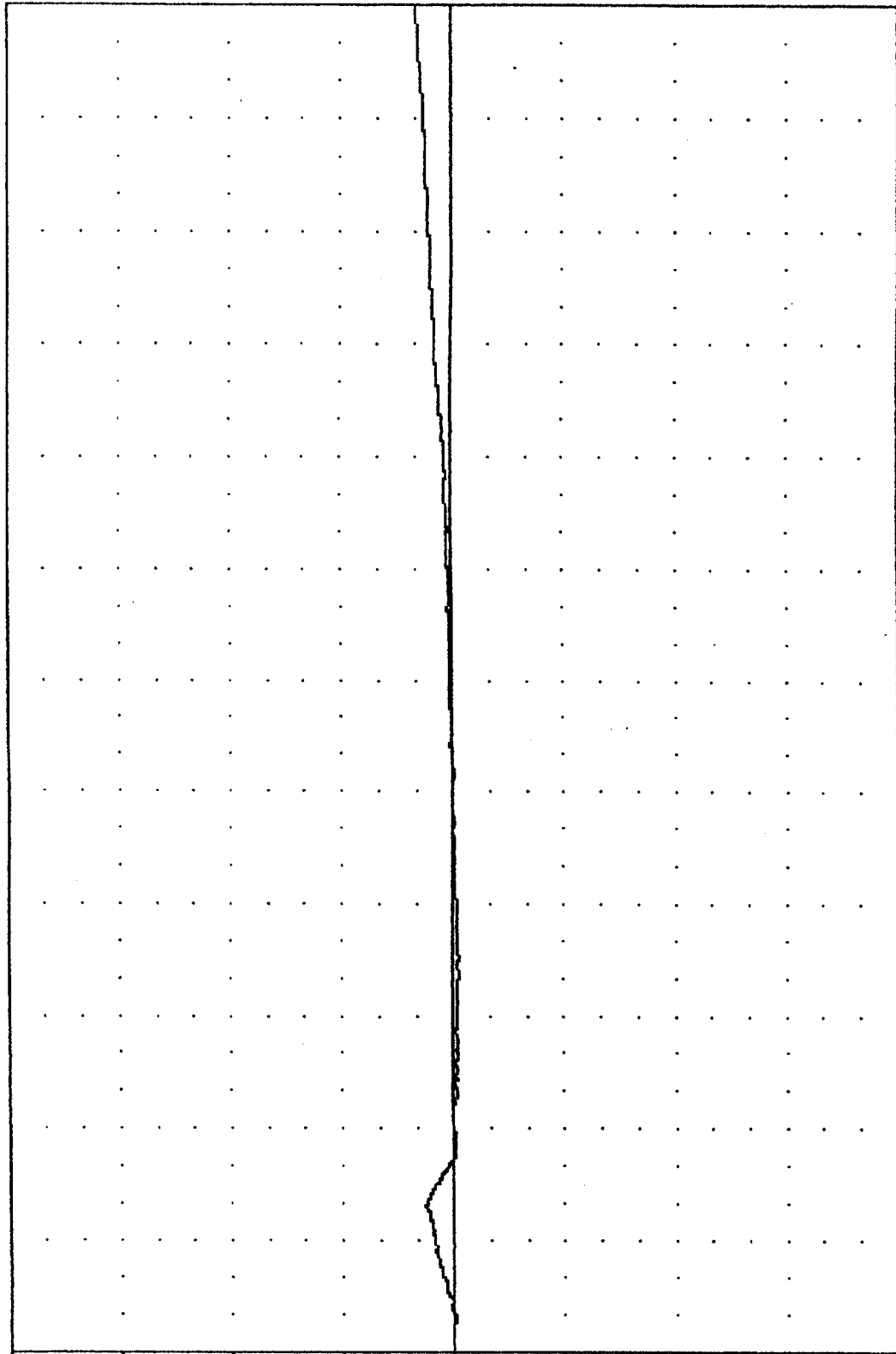


MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 MOVING BARRIER CG Y-AXIS ACCELERATION

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 BCGYV2

FILTER = BLPP 300/ 750/ -16
 MIN, MAX VALUES = -0.54 99.38 , 3.21 340.00

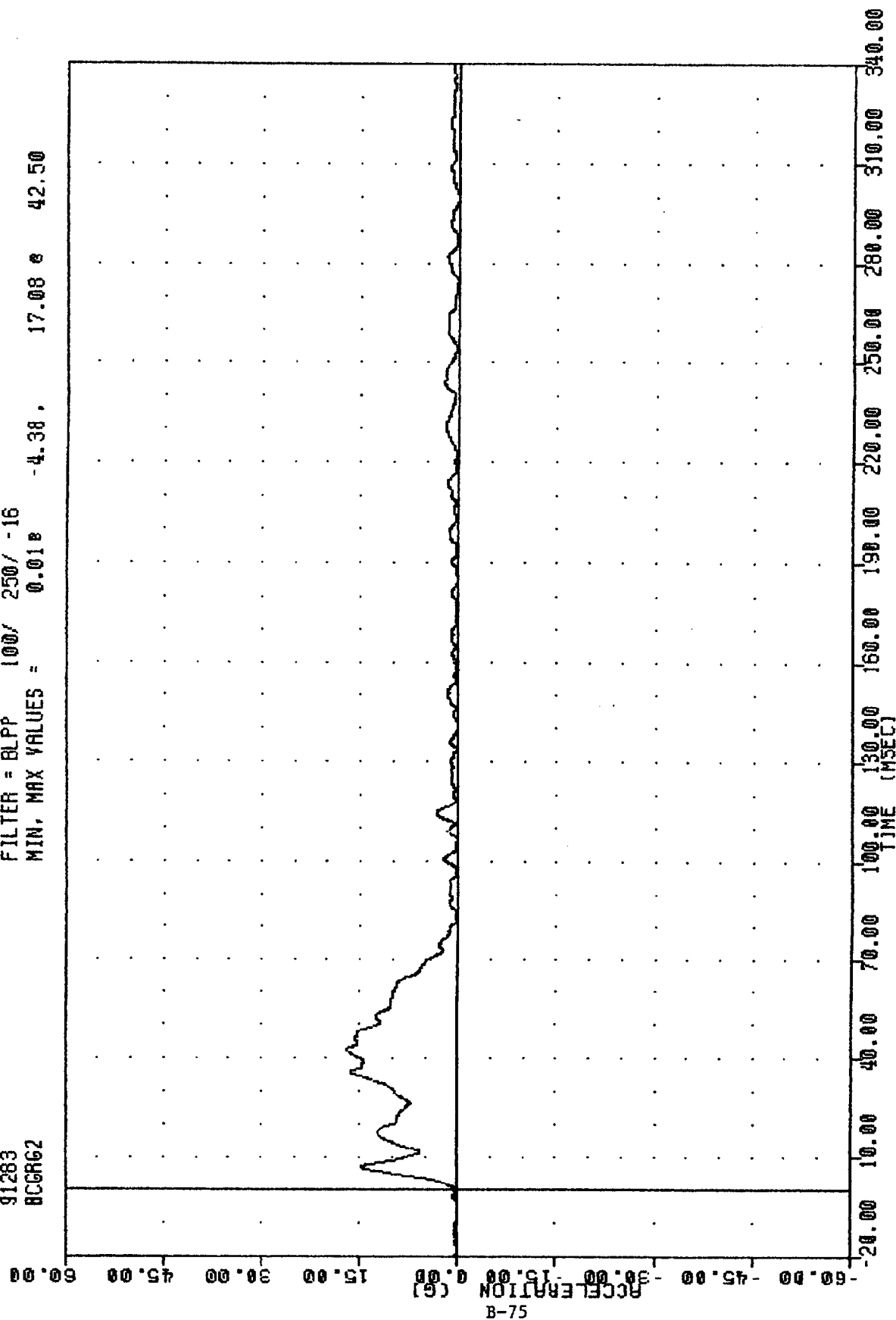
VELOCITY (MPH)



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 MOVING BARRIER CG Y-AXIS VELOCITY

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM
 91283
 BCGR62

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = 0.018 -4.38, 17.08 e 42.50



MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 MOVING BARRIER CG RESULTANT ACCELERATION

TRC , 911010-3
 CRASH III DAMAGE ALGORITHM

91283

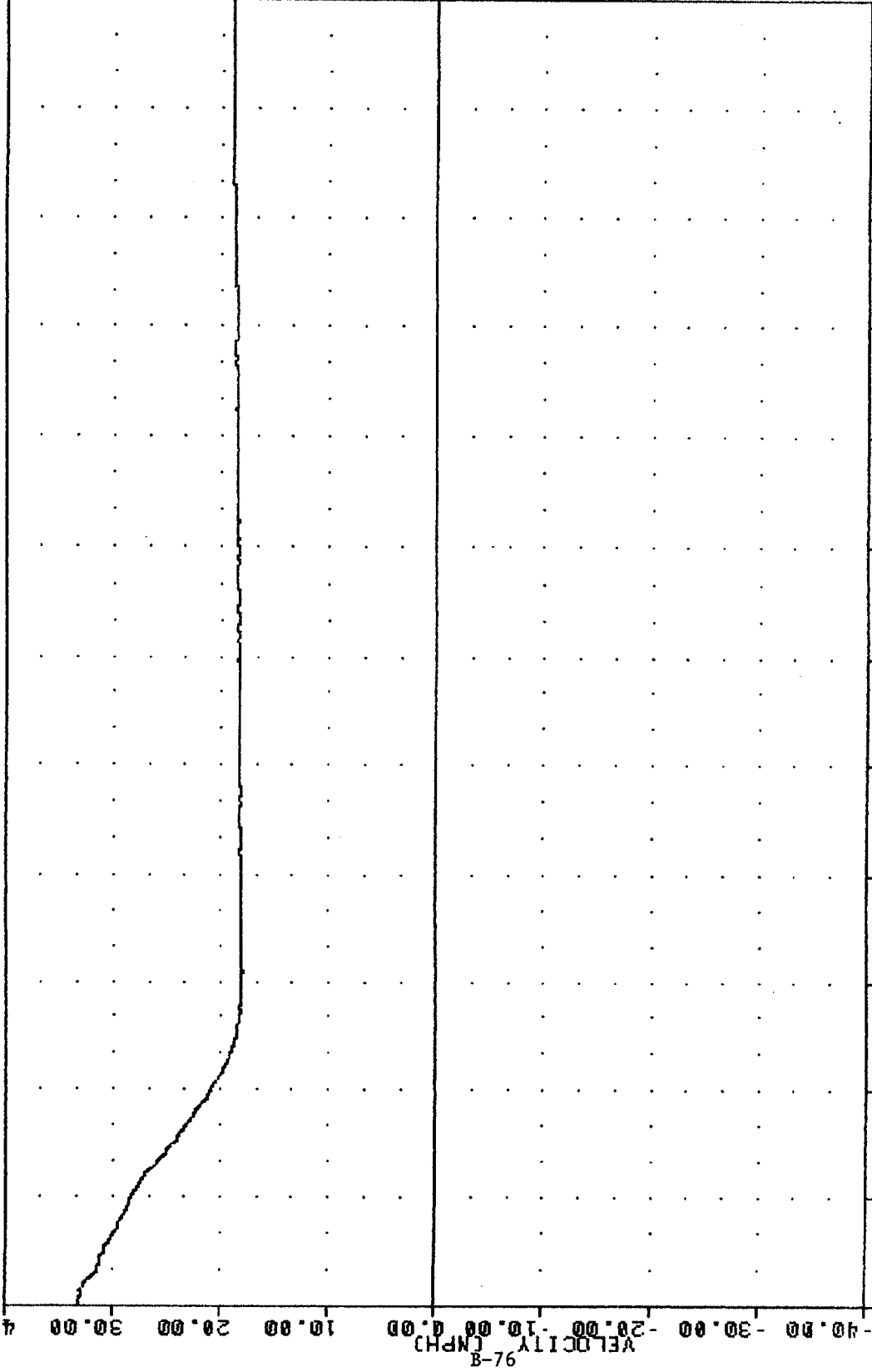
BCGRV2

FILTER = BLPP 300/ 750/ -16

MIN. MAX VALUES = 17.97 87.63

33.10 e 0.75

40.00



0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00

MOVING BARRIER INTO SIDE OF VOLKSWAGEN GOLF AT 33.1 MPH
 MOVING BARRIER CG RESULTANT VELOCITY

APPENDIX C

MISCELLANEOUS TEST INFORMATION

VEHICLE ACCELEROMETER INFORMATION

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	RIGHT FRONT SILL	X	ENDEVCO	7264	CJ37H	REAR
	RIGHT FRONT SILL	Y	ENDEVCO	7264	CF27H	LEFT
2	RIGHT REAR SILL	X	ENDEVCO	7264	CW06H	REAR
	RIGHT REAR SILL	Y	ENDEVCO	7264	DK59J	LEFT
3	VEHICLE C.G.	X	ENDEVCO	7264	CJ76H	REAR
	VEHICLE C.G.	Y	ENDEVCO	7264	CK56H	RIGHT

MOVING BARRIER ACCELEROMETER INFORMATION

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	MOVING BARRIER					
	CENTER OF GRAVITY	X	ENDEVCO	7264	BY94J	FRONT
	MOVING BARRIER					
	CENTER OF GRAVITY	Y	ENDEVCO	7264	CH97H	LEFT

SIGN CONVENTION

ALL DUMMY, BARRIER AND VEHICLE CHANNELS:

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