

VEHICLE RESEARCH AND TEST CENTER
FRONTAL BARRIER IMPACTS
IN SUPPORT OF CRASH III
DAMAGE ALGORITHM REFORMULATION

1985 PONTIAC GRAND AM
2-DOOR COUPE
TRC TEST NO. 881017-1
TRC TEST NO. 881017-2
TRC TEST NO. 881017-3
TRC TEST NO. 881017-4
TRC TEST NO. 881017-5

PREPARED BY:
VEHICLE RESEARCH AND TEST CENTER
U.S. RT. 33, LOGAN COUNTY
EAST LIBERTY, OHIO 43319

OCTOBER - NOVEMBER, 1988

FINAL REPORT

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

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16. Abstract Five 0° flat frontal barrier impact tests were conducted for research and development in support of the crash III damage algorithm reformulation. These tests were conducted on a 1985 Pontiac Grand AM 2-door coupe, VIN 1G2NE27UXFC748567, at the Transportation Research Center of Ohio. The following five tests were conducted on one vehicle:																																	
<table border="1"> <thead> <tr> <th>TEST NO.</th> <th>DATE</th> <th>TIME</th> <th>SPEED (mph)</th> <th>AVERAGE CUMULATIVE CRUSH</th> </tr> </thead> <tbody> <tr> <td>881017-1</td> <td>10/17/88</td> <td>1020</td> <td>10.0</td> <td>3.9</td> </tr> <tr> <td>881017-2</td> <td>10/17/88</td> <td>1100</td> <td>20.0</td> <td>12.0</td> </tr> <tr> <td>881017-3</td> <td>10/17/88</td> <td>1130</td> <td>20.0</td> <td>21.6</td> </tr> <tr> <td>881017-4</td> <td>10/17/88</td> <td>1320</td> <td>18.8</td> <td>24.1</td> </tr> <tr> <td>881017-5</td> <td>10/17/88</td> <td>1435</td> <td>30.6</td> <td>36.8</td> </tr> </tbody> </table>				TEST NO.	DATE	TIME	SPEED (mph)	AVERAGE CUMULATIVE CRUSH	881017-1	10/17/88	1020	10.0	3.9	881017-2	10/17/88	1100	20.0	12.0	881017-3	10/17/88	1130	20.0	21.6	881017-4	10/17/88	1320	18.8	24.1	881017-5	10/17/88	1435	30.6	36.8
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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

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

TEMPERATURE (exact)		
°F	degrees Fahrenheit	5/9 (after subtracting 32)
°C	degrees Celsius	

Approximate Conversions From Metric Measures

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

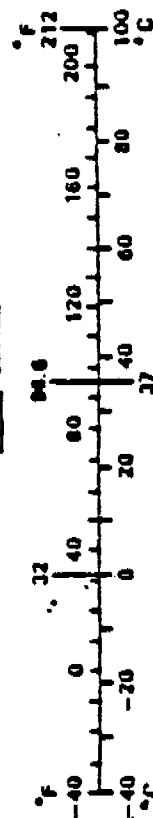


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SECTION 1.0
PURPOSE AND TEST SUMMARY

The purpose of the five 0° frontal barrier impact tests was for research and development in support of the CRASH III damage algorithm reformulation.

The 1985 Pontiac Grand AM was equipped with a 2.5 liter, 4-cylinder, transverse, gas engine with a 3-speed automatic transmission. The intended total test weight of the vehicle was 2990 pounds. The actual weight was 2998 pounds, including 210 pounds of steel plate ballast secured in the trunk area.

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

SECTION 2.0
VEHICLE INFORMATION

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: General Motor Corporation VIN: 1G2NE27UXFC748567

MAKE/MODEL: Pontiac Grand AM

MODEL YEAR: 1985

BODY STYLE: 2-door coupe

COLOR: white

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: 2.5 liter

X GAS, DIESEL, TURBOCHARGE

TRANSMISSION DATA: 3 SPEED, MANUAL, X AUTOMATIC, X FWD, RWD, 4WD

DATE VEHICLE RECEIVED: 10/7/88

ODOMETER READING: 7855.0

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

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

VEHICLE MANUFACTURED BY: General Motor Corporation

DATE OF MANUFACTURE: 3/85

GVWR: 3052 LBS.

GAWR: FRONT 1964 LBS.; REAR 1563 LBS.

The front of the vehicle was supported by a dolly.

TEST VEHICLE INFORMATION, CONT'D

WHEELBASE: 103.5

MAXIMUM WIDTH: 67.5

WEIGHT OF TEST VEHICLE WITH REQUIRED OCCUPANTS AND LUGGAGE:

RIGHT FRONT	1200 LBS.	RIGHT REAR	305 LBS.
LEFT FRONT	1190 LBS.	LEFT REAR	303 LBS.
TOTAL FRONT WEIGHT	2390 LBS.	(79.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	608 LBS.	(20.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	2998 LBS.		

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 210 LBS.

VEHICLE TIRE DATA:

TIRES ON VEHICLE (MFR. & LINE, SIZE): Firestone Supreme P185/80R13

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

SIDEWALL PLY RATING: 1 ply

BIAS PLY, BELTED OR RADIAL? Radial

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes

VEHICLE ATTITUDES:

DELIVERED:	LF: 27.2;	RF: 27.5;	LR: 30.2;	RR: 30.5
PRE-TEST:	LF: 27.4;	RF: 27.6;	LR: 29.1;	RR: 29.4
POST-TEST:	LF: 27.1;	RF: 27.6;	LR: 28.5;	RR: 29.8

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

TEST ANOMALIES

Noise in the form of spikes was observed in the plots for the contact switches OTH1, OTH2, OTH3, OTH4, OTH5. * The switches were used to record the time of vehicle contact with the wall, as well as the time of vehicle separation from the barrier wall. The switches were damaged by the crush of the vehicle's bumper against the rigid barrier. The switches were replaced following each test which contained spikes. This is not the standard use of such switches.

*CONTACT SWITCH MNEMONICS:

OTH1 Vehicle contact switch - Left
OTH2 Vehicle contact switch - Center
OTH3 Vehicle contact switch - Right
OTH4 Barrier contact switch - Left
OTH5 Barrier contact switch - Right

SECTION 3.0

TEST #881017-1 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 881017-1

DATE OF TEST: 10/17/88

TIME OF TEST: 1020

AMBIENT TEMPERATURE AT IMPACT AREA: 72° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u>	<u>INTENDED</u>
	2998	2990
TEST WEIGHT (lbs.)		
VEHICLE ORIENTATION (deg.)	0	0
VEHICLE VELOCITY (mph.)	10.0	10.0
MAXIMUM CRUSH (in.)	6.1	
AVERAGE CRUSH = $\frac{C1+C6+C2+C3+C4+C5}{5}$ (in.)	3.9	

TEST NUMBER 881017-1

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G MSEC		MAX G MSEC	
1	VEHICLE FRONT FRAME RAIL FRONT LONGITUDINAL	161.4	18.0	28.1	1.1	133.6	13.9	40.0
2	VEHICLE HOOD LATCH CROSSMEMBER LONGITUDINAL	168.9	2.5	28.2	10.2	60.5	63.6	36.5
3	VEHICLE LEFT FENDER WELL INSIDE LONGITUDINAL	156.5	27.6	26.0	1.4	166.5	10.5	75.9
4	VEHICLE SUSPENSION LONGITUDINAL	141.5	-19.3	34.5	2.3	211.0	10.9	76.8
5	VEHICLE REAR DECK PRIMARY LONGITUDINAL	52.0	0.0	17.4	0.5	264.6	9.0	76.1
6	VEHICLE REAR DECK REDUNDANT LONGITUDINAL	52.0	1.2	17.4	0.4	3.8	9.3	72.5

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

TEST #881017-1

AIRBAG SENSOR LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X	Y	Z	SWITCH CLOSURE TIME, (MSEC)
3	VEHICLE LEFT FENDER WELL INSIDE SENSOR #1	158.0	26.5	24.5	No indication of closure
3	VEHICLE LEFT FENDER WELL INSIDE SENSOR #2	154.0	25.8	24.2	No indication of closure

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

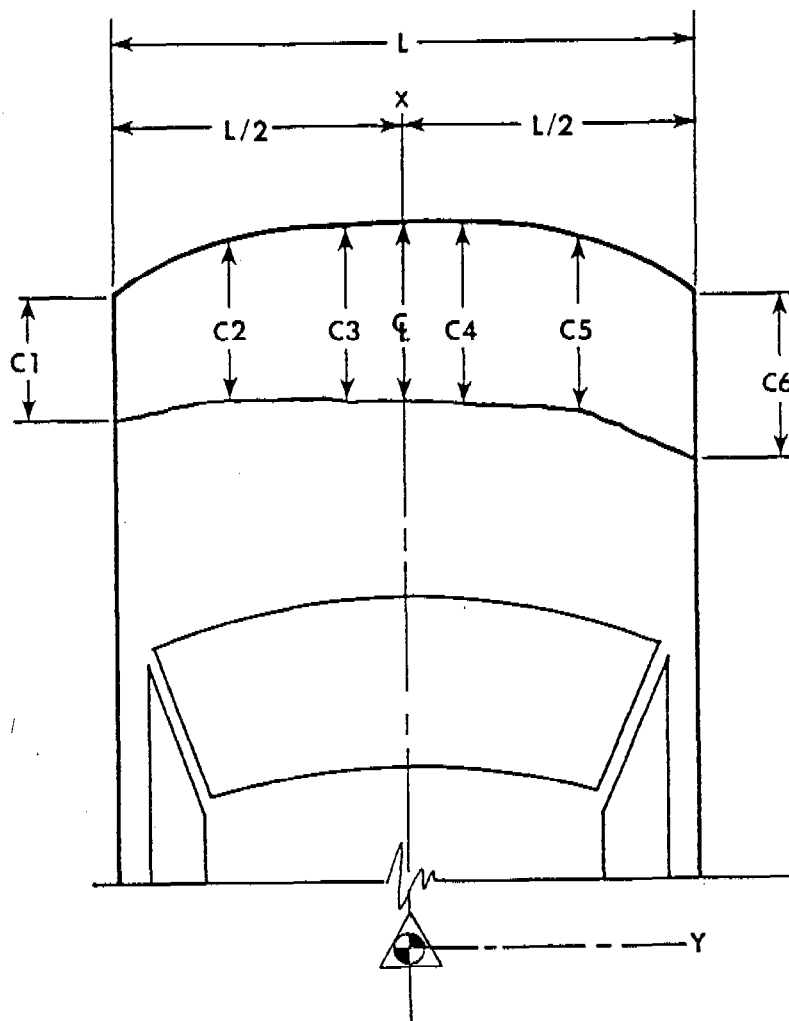
SENSOR #1 TECHNAR, MODEL S6009D001, S/N 27701-3

SENSOR #2 BREED, Model #F134, S/N 7950

CONTACT SWITCH LOCATIONS AND DATA SUMMARY

LOCATION	SEPARATION TIME (MSEC)
VEHICLE CONTACT SWITCH - LEFT	126.2γ
VEHICLE CONTACT SWITCH - CENTER	118.2
VEHICLE CONTACT SWITCH - RIGHT	144.0
BARRIER CONTACT SWITCH - LEFT	140.0
BARRIER CONTACT SWITCH - RIGHT	141.5

γ See TEST ANOMALIES



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

Vehicle 1985 Pontiac Grand AM Test #881017-1

	PRE-TEST	POST-TEST	CRUSH
L	<u>58.0</u>		
$C1$	<u>172.0</u>	$C1$ <u>170.5</u>	$C1$ <u>1.5</u>
$C2$	<u>174.9</u>	$C2$ <u>171.1</u>	$C2$ <u>3.9</u>
$C3$	<u>176.4</u>	$C3$ <u>170.7</u>	$C3$ <u>5.7</u>
$C4$	<u>176.2</u>	$C4$ <u>170.5</u>	$C4$ <u>5.7</u>
$C5$	<u>174.2</u>	$C5$ <u>171.1</u>	$C5$ <u>3.1</u>
$C6$	<u>171.3</u>	$C6$ <u>170.5</u>	$C6$ <u>0.8</u>
CL	<u>176.9</u>	CL <u>170.8</u>	CL <u>6.1</u>

TEST #881017-1

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right side wide	Photosonic 1B	25	500	Impact overall
2	Right side tight	Photosonic 1B	50	501	Impact closeup

SECTION 4.0

TEST #881017-2 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 881017-2

DATE OF TEST: 10/7/88

TIME OF TEST: 1100

AMBIENT TEMPERATURE AT IMPACT AREA: 72° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u> 2998	<u>INTENDED</u> 2990
TEST WEIGHT (lbs.)		
VEHICLE ORIENTATION (deg.)	0	0
VEHICLE VELOCITY (mph.)	20.0	20.0
MAXIMUM CUMULATIVE CRUSH (in.)	16.1	
AVERAGE CUMULATIVE CRUSH $\frac{\{C1+C6+C2+C3+C4+C5\}}{5}$ (in.)	12.0	

VEHICLE ATTITUDES:

POST-TEST: LF: 28.9; RF: 31.1; LR: 28.0; RR: 28.0

TEST NUMBER 881017-2

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G MSEC		MAX G MSEC	
1	VEHICLE FRONT FRAME RAIL FRONT LONGITUDINAL	161.4	18.0	23.1	7.3	13.8	77.8	29.1
2	VEHICLE HOOD LATCH CROSSMEMBER LONGITUDINAL	169.9	2.5	28.2	39.4	16.6	197.6	5.5
3	VEHICLE LEFT FENDER WELL INSIDE LONGITUDINAL	156.5	27.6	26.0	2.7	116.9	50.3	29.3
4	VEHICLE SUSPENSION LONGITUDINAL	141.5	-19.3	34.5	9.0	20.5	42.4	33.5
5	VEHICLE REAR DECK PRIMARY LONGITUDINAL	52.0	0.0	17.4	2.7	87.4	20.3	12.6
6	VEHICLE REAR DECK REDUNDANT LONGITUDINAL	52.0	1.2	17.4	2.9	87.1	20.7	12.5

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

TEST #881017-2

AIRBAG SENSOR LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X	Y	Z	SWITCH CLOSURE TIME, (MSEC)
3	VEHICLE LEFT FENDER WELL INSIDE SENSOR #1	158.0	26.5	24.5	16.2
3	VEHICLE LEFT FENDER WELL INSIDE SENSOR #2	154.0	25.8	24.2	32.6

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

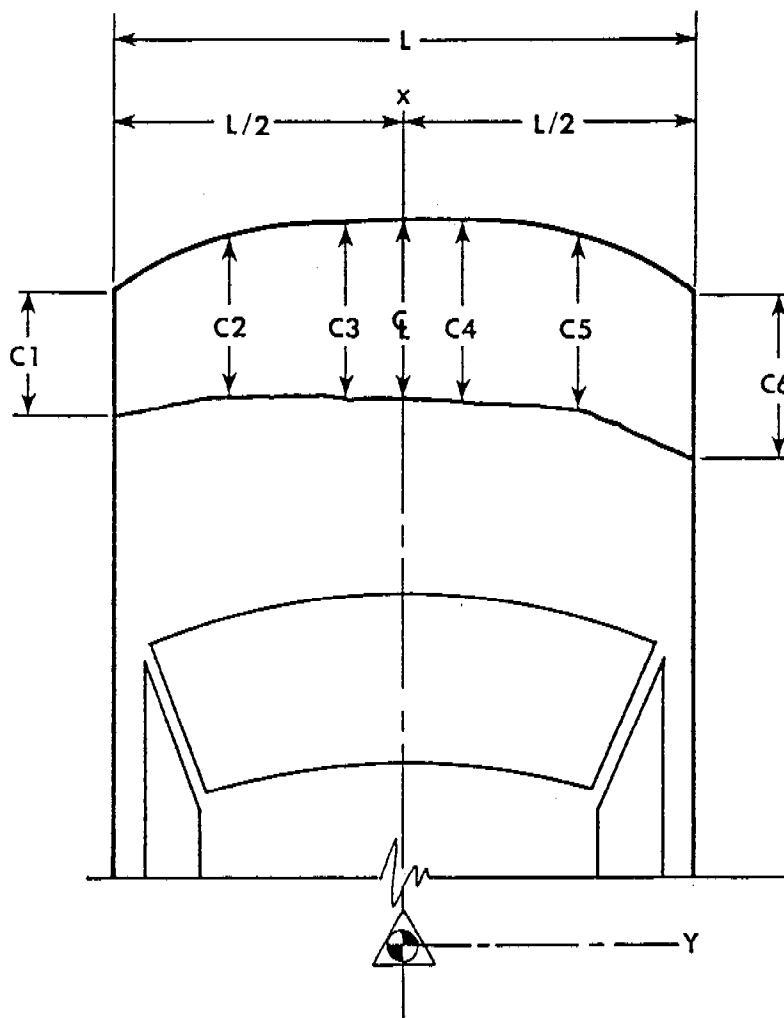
SENSOR #1 TECHNAR, MODEL S6009D001, S/N 27701-3

SENSOR #2 BREED, Model #F134, S/N 7950

CONTACT SWITCH LOCATIONS AND DATA SUMMARY

LOCATION	SEPARATION TIME (MSEC)
VEHICLE CONTACT SWITCH - LEFT	118.2 Y
VEHICLE CONTACT SWITCH - CENTER	--- Y
VEHICLE CONTACT SWITCH - RIGHT	119.0
BARRIER CONTACT SWITCH - LEFT	119.0
BARRIER CONTACT SWITCH - RIGHT	101.0

Y See TEST ANOMALIES



NOTE: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL is taken at centerline of vehicle.
 All measurements are in inches.

Vehicle 1985 Pontiac Grand AM - Test #881017-2

PRE-TEST*		POST-TEST	CUMULATIVE CRUSH
L	<u>58.0</u>		
C1	<u>172.0</u>	C1 <u>164.9</u>	C1 <u>7.1</u>
C2	<u>174.9</u>	C2 <u>163.1</u>	C2 <u>11.8</u>
C3	<u>176.4</u>	C3 <u>161.9</u>	C3 <u>14.5</u>
C4	<u>176.2</u>	C4 <u>161.8</u>	C4 <u>14.4</u>
C5	<u>174.2</u>	C5 <u>162.4</u>	C5 <u>11.8</u>
C6	<u>171.3</u>	C6 <u>163.2</u>	C6 <u>8.1</u>
CL	<u>176.9</u>	CL <u>160.8</u>	CL <u>16.1</u>

*Pre-test measurements taken from test #881017-1.

TEST #881017-2

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right side wide	Photosonic 1B	25	501	Impact overall
2	Right side tight	Photosonic 1B	50	499	Impact closeup

SECTION 5.0

TEST #881017-3 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 881017-3

DATE OF TEST: 10/17/88

TIME OF TEST: 1130

AMBIENT TEMPERATURE AT IMPACT AREA: 72° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u> 2998	<u>INTENDED</u> 2990
TEST WEIGHT (lbs.)		
VEHICLE ORIENTATION (deg.)	0	0
VEHICLE VELOCITY (mph.)	20.0	20.0
MAXIMUM CUMULATIVE CRUSH (in.)	20.9	
AVERAGE CUMULATIVE CRUSH $\frac{C1+C6+C2+C3+C4+C5}{2}$ (in.)	21.6	

VEHICLE ATTITUDES:

POST-TEST: LF: 29.7; RF: 34.6; LR: 27.4; RR: 27.5

TEST NUMBER 881017-3

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX	G MSEC	MAX	G MSEC
5	VEHICLE REAR DECK PRIMARY LONGITUDINAL	52.0	0.0	17.4	2.0	111.5	25.4	40.1
6	VEHICLE REAR DECK REDUNDANT LONGITUDINAL	52.0	1.2	17.4	2.0	112.0	25.2	40.3

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

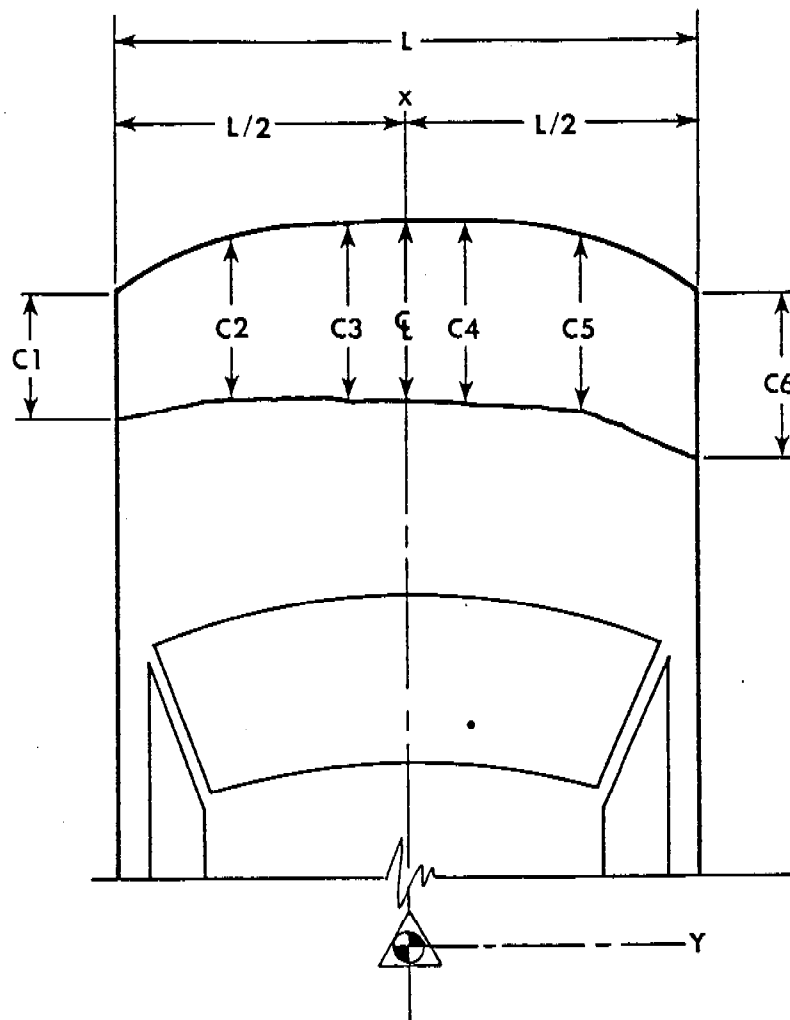
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TEST #881017-3

CONTACT SWITCH LOCATIONS AND DATA SUMMARY

LOCATION	SEPARATION TIME (MSEC)
VEHICLE CONTACT SWITCH - LEFT	146.0 Y
VEHICLE CONTACT SWITCH - CENTER	--- Y
VEHICLE CONTACT SWITCH - RIGHT	123.8
BARRIER CONTACT SWITCH - LEFT	121.1
BARRIER CONTACT SWITCH - RIGHT	111.2

Y See TEST ANOMALIES



NOTE: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL is taken at centerline of vehicle.
 All measurements are in inches.

Vehicle 1985 Pontic Grand AM - Test #881017-3

PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L <u>58.0</u>		
C1 <u>172.0</u>	C1 <u>159.6</u>	C1 <u>12.4</u>
C2 <u>174.9</u>	C2 <u>156.1</u>	C2 <u>18.8</u>
C3 <u>176.4</u>	C3 <u>155.6</u>	C3 <u>20.8</u>
C4 <u>176.2</u>	C4 <u>155.4</u>	C4 <u>20.8</u>
C5 <u>174.2</u>	C5 <u>156.1</u>	C5 <u>18.1</u>
C6 <u>171.3</u>	C6 <u>155.6</u>	C6 <u>15.7</u>
CL <u>176.9</u>	CL <u>156.0</u>	CL <u>20.9</u>

*Pre-test measurements taken from test #881017-1.

TEST #881017-3

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right side wide	Photosonic 1B	25	498	Impact overall
2	Right side tight	Photosonic 1B	50	500	Impact closeup

SECTION 6.0

TEST #881017-4 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 881017-4

DATE OF TEST: 10/17/88

TIME OF TEST: 1320

AMBIENT TEMPERATURE AT IMPACT AREA: 72° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u> 2998	<u>INTENDED</u> 2990
TEST WEIGHT (lbs.)		
VEHICLE ORIENTATION (deg.)	0	0
VEHICLE VELOCITY (mph.)	18.8	18.4
MAXIMUM CUMULATIVE CRUSH (in.)	27.7	
AVERAGE CUMULATIVE CRUSH $\frac{C1+C6+C2+C3+C4+C5}{2}$ (in.)	24.1	

VEHICLE ATTITUDES:

POST-TEST: LF: 30.9; RF: 36.9; LR: 27.5; RR: 27.6

TEST NUMBER 881017-4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G MSEC		MAX G MSEC	
5	VEHICLE REAR DECK PRIMARY LONGITUDINAL	52.0	0.0	17.4	2.7	104.6	27.9	39.6
6	VEHICLE REAR DECK REDUNDANT LONGITUDINAL	52.0	1.2	17.4	2.6	104.8	28.5	38.0

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

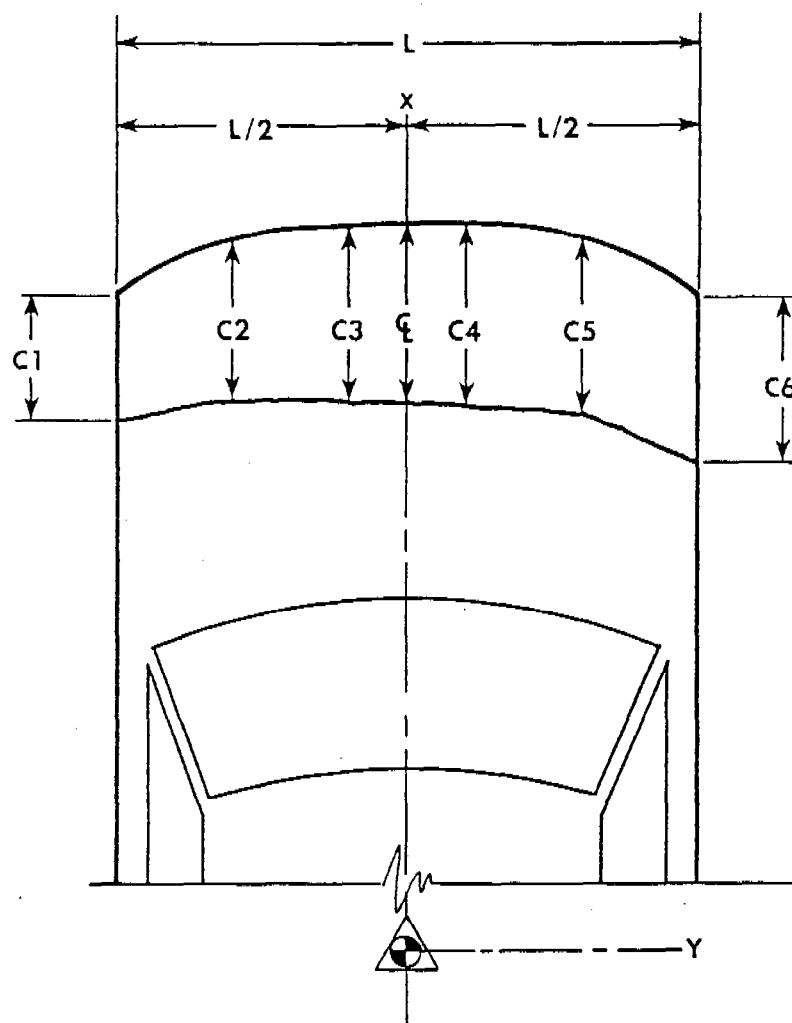
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TEST #881017-4

CONTACT SWITCH LOCATIONS AND DATA SUMMARY

LOCATION	SEPARATION TIME (MSEC)
VEHICLE CONTACT SWITCH - LEFT	105.0 Y
VEHICLE CONTACT SWITCH - CENTER	35.0
VEHICLE CONTACT SWITCH - RIGHT	85.0 Y
BARRIER CONTACT SWITCH - LEFT	133.5
BARRIER CONTACT SWITCH - RIGHT	77.2

YSee TEST ANOMALIES



NOTE: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL is taken at centerline of vehicle.
 All measurements are in inches.

Vehicle 1985 Pontiac Grand AM - Test #881017-4

PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L <u>58.0</u>		
C1 <u>172.0</u>	C1 <u>**148.8</u>	C1 <u>23.2</u>
C2 <u>174.9</u>	C2 <u>151.1</u>	C2 <u>23.8</u>
C3 <u>176.4</u>	C3 <u>151.0</u>	C3 <u>25.4</u>
C4 <u>176.2</u>	C4 <u>150.5</u>	C4 <u>25.7</u>
C5 <u>174.2</u>	C5 <u>150.8</u>	C5 <u>23.4</u>
C6 <u>171.3</u>	C6 <u>150.0</u>	C6 <u>21.3</u>
CL <u>176.9</u>	CL <u>149.2</u>	CL <u>27.7</u>

*Pre-test measurements taken from test #881017-1.

** This measurement was taken with the left front bumper plastic fascia removed, since it was bulging outward 6.2 inches from the bumper structure at location C1. Prior to removing this portion of the fascia, the C1 measurement was 155.0 inches.

TEST #881017-4

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right side wide	Photosonic 1B	25	498	Impact overall
2	Right side tight	Photosonic 1B	50	499	Impact closeup

SECTION 7.0

TEST #881017-5 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 881017-5

DATE OF TEST: 10/17/88

TIME OF TEST: 1435

AMBIENT TEMPERATURE AT IMPACT AREA: 72° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u> 2998	<u>INTENDED</u> 2990
TEST WEIGHT (lbs.)		
VEHICLE ORIENTATION (deg.)	0	0
VEHICLE VELOCITY (mph.)	30.6	30.0
MAXIMUM CUMULATIVE CRUSH (in.)	39.5	
AVERAGE CUMULATIVE CRUSH $\frac{C1+C6+C2+C3+C4+C5}{2}$ (in.)	36.8	

VEHICLE ATTITUDES:

POST-TEST: LF: 32.5; RF: 41.0; LR: 26.6; RR: 26.4

TEST NUMBER 891017-5

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G	MSEC	MAX G	MSEC
5	VEHICLE REAR DECK PRIMARY LONGITUDINAL	52.0	0.0	17.4	3.0	296.8	36.3	39.1
6	VEHICLE REAR DECK REDUNDANT LONGITUDINAL	52.0	1.2	17.4	2.3	297.9	37.0	39.3

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

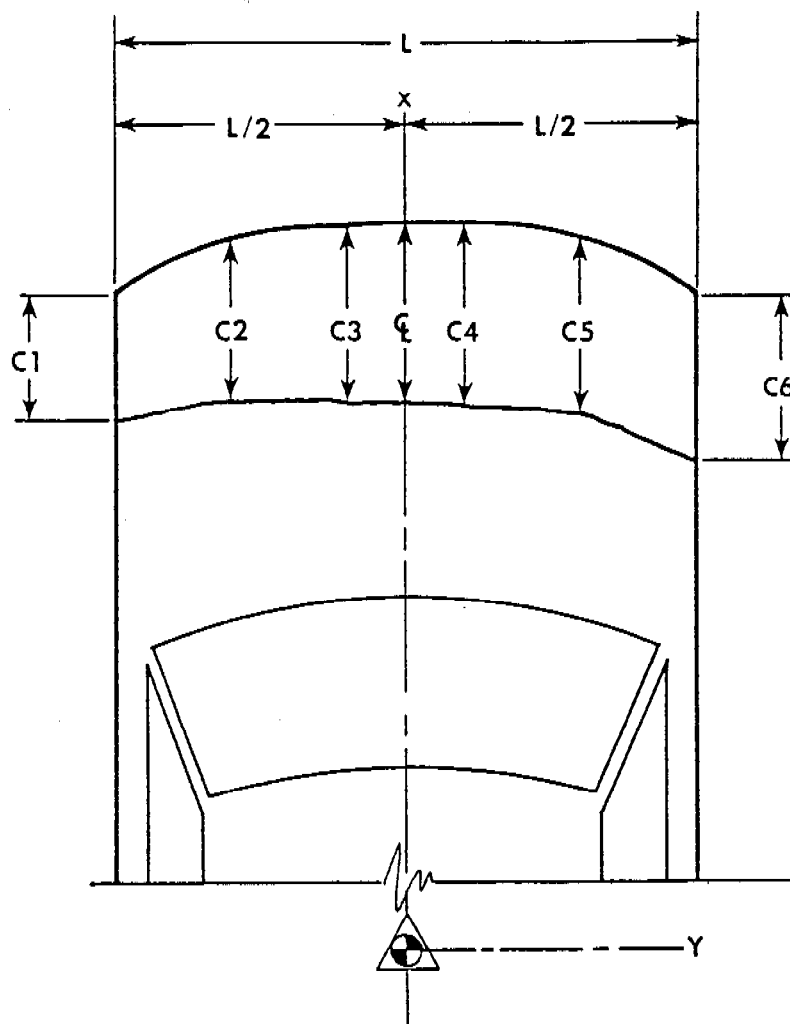
REFERENCE: X: + FORWARD FROM REAR BUMPER
Y: + LEFTWARD FROM VEHICLE CENTERLINE
Z: + UPWARD FROM GROUND LEVEL

TEST #881017-5

CONTACT SWITCH LOCATIONS AND DATA SUMMARY

LOCATION	SEPARATION TIME (MSEC)
VEHICLE CONTACT SWITCH - LEFT	132.8
VEHICLE CONTACT SWITCH - CENTER	80.5 Y
VEHICLE CONTACT SWITCH - RIGHT	120.5 Y
BARRIER CONTACT SWITCH - LEFT	152.0 Y
BARRIER CONTACT SWITCH - RIGHT	62.1 Y

Y See TEST ANOMALIES



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

Vehicle 1985 Pontiac Grand AM - Test #881017-5

PRE-TEST*		POST-TEST	CUMULATIVE CRUSH
L	<u>58.0</u>		
$C1$	<u>172.0</u>	$C1$ <u>132.5</u>	$C1$ <u>39.5</u>
$C2$	<u>174.9</u>	$C2$ <u>137.5</u>	$C2$ <u>37.4</u>
$C3$	<u>176.4</u>	$C3$ <u>138.8</u>	$C3$ <u>37.6</u>
$C4$	<u>176.2</u>	$C4$ <u>138.6</u>	$C4$ <u>37.6</u>
$C5$	<u>174.2</u>	$C5$ <u>139.0</u>	$C5$ <u>35.2</u>
$C6$	<u>171.3</u>	$C6$ <u>138.8</u>	$C6$ <u>32.5</u>
CL	<u>176.9</u>	CL <u>137.5</u>	CL <u>39.4</u>

*Pre-test measurements taken from test #881017-1.

TEST #881017-5

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right side wide	Photosonic 1B	25	500	Impact overall
2	Right side tight	Photosonic 1B	50	500	Impact closeup

APPENDIX A
PHOTOGRAPHS

TEST #881017-1
LIST OF PHOTOGRAPHS

1. PRE-TEST OVERALL LEFT SIDE VIEW
2. POST-TEST OVERALL LEFT SIDE VIEW
3. PRE-TEST OVERALL RIGHT SIDE VIEW
4. POST-TEST OVERALL RIGHT SIDE VIEW
5. PRE-TEST OVERALL FRONT VIEW
6. POST-TEST OVERALL FRONT VIEW
7. PRE-TEST OVERALL REAR VIEW
8. POST-TEST OVERALL REAR VIEW
9. PRE-TEST LEFT FRONT VIEW
10. POST-TEST LEFT FRONT VIEW
11. PRE-TEST RIGHT FRONT VIEW
12. POST-TEST RIGHT FRONT VIEW
13. PRE-TEST BARRIER CONTACT SWITCH
14. PRE-TEST BARRIER CONTACT SWITCH

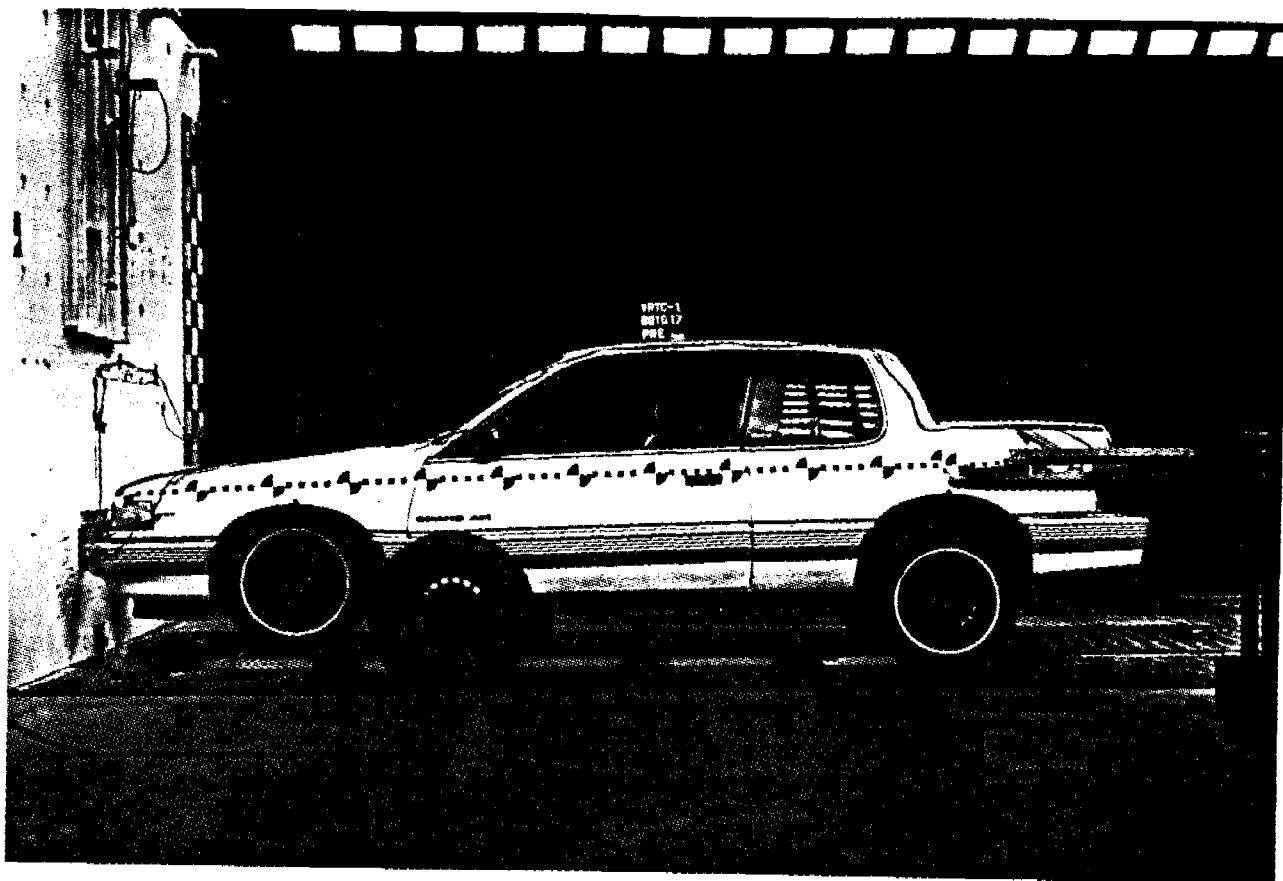


Figure A-1. PRE-TEST OVERALL LEFT SIDE VIEW

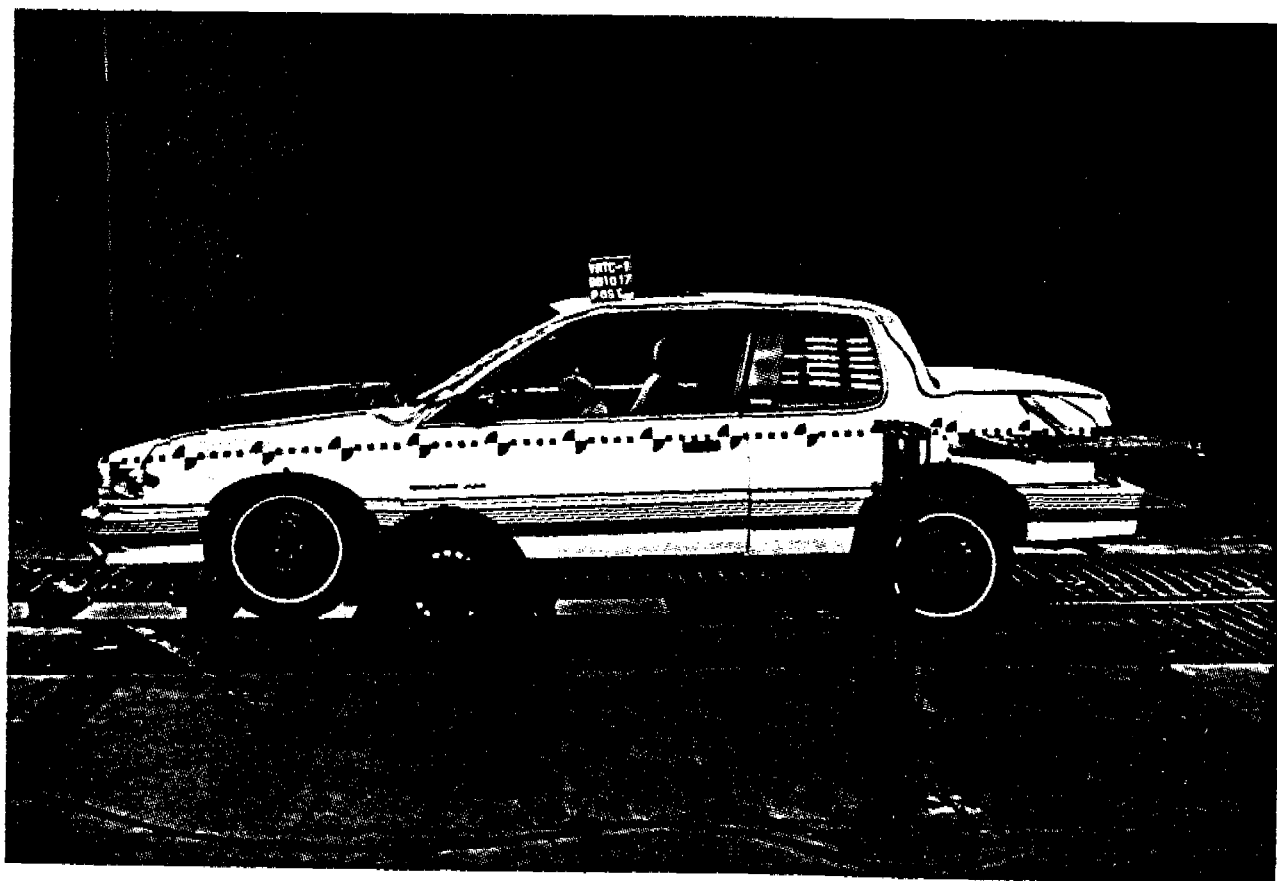


Figure A-2. POST-TEST OVERALL LEFT SIDE VIEW



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

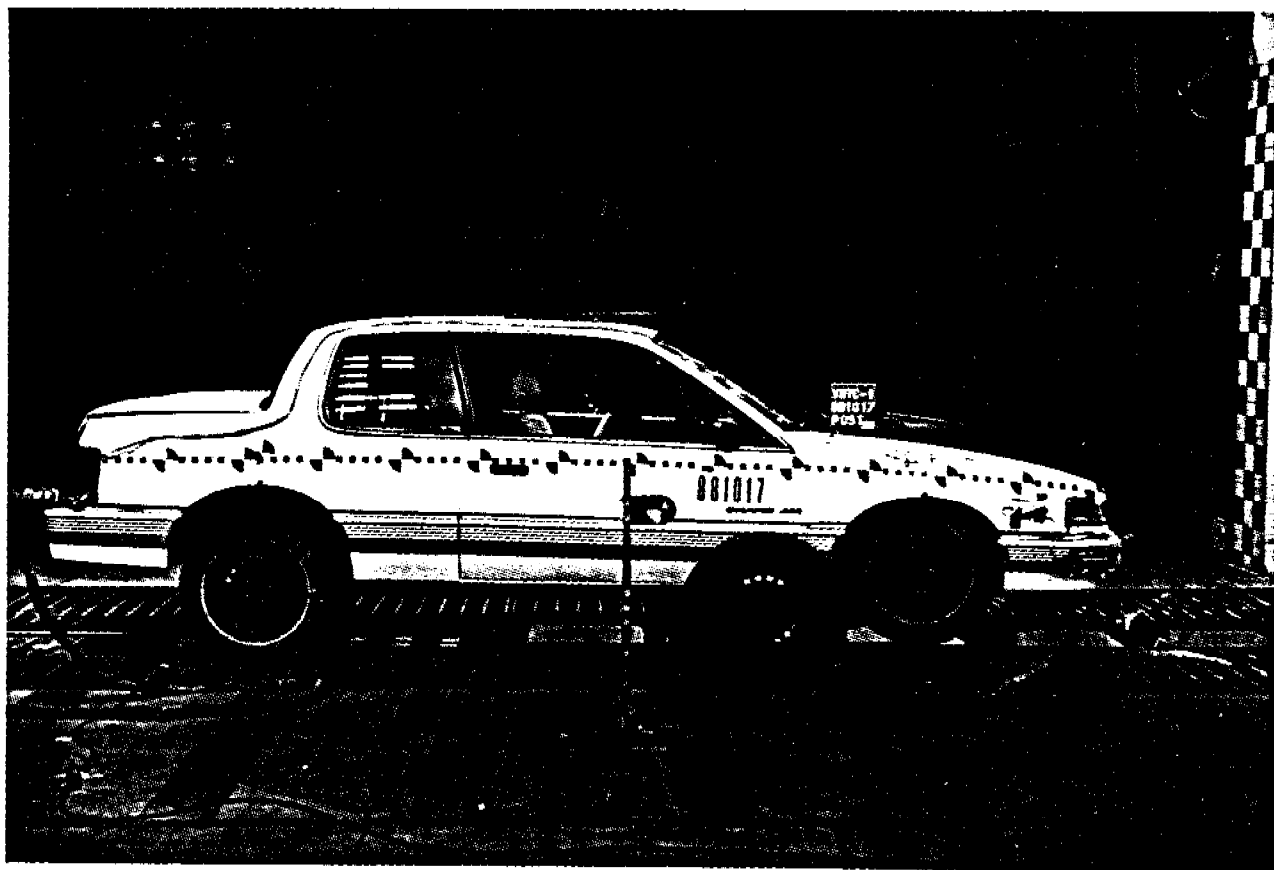


Figure A-4. POST-TEST OVERALL RIGHT SIDE VIEW



Figure A-5. PRE-TEST OVERALL FRONT VIEW

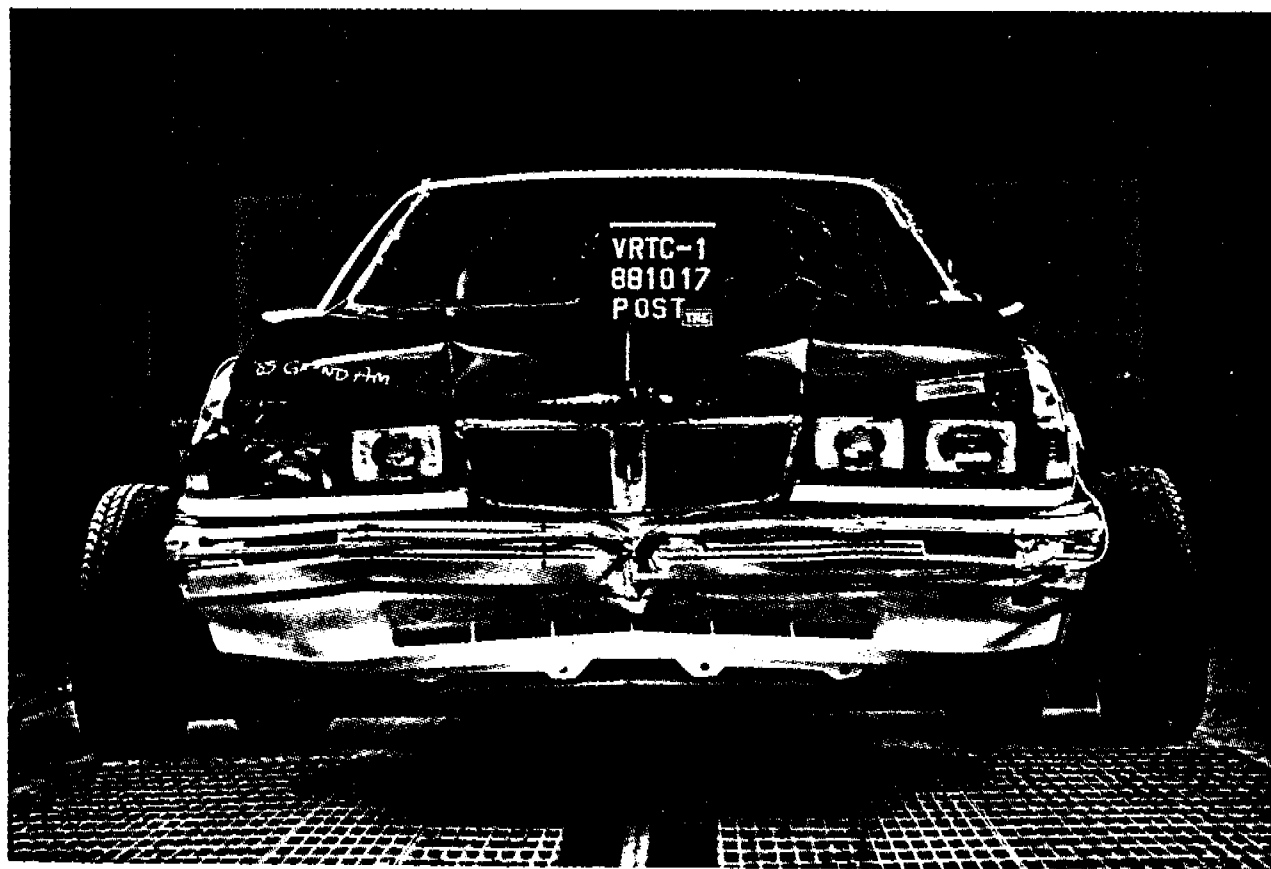


Figure A-6. POST-TEST OVERALL FRONT VIEW

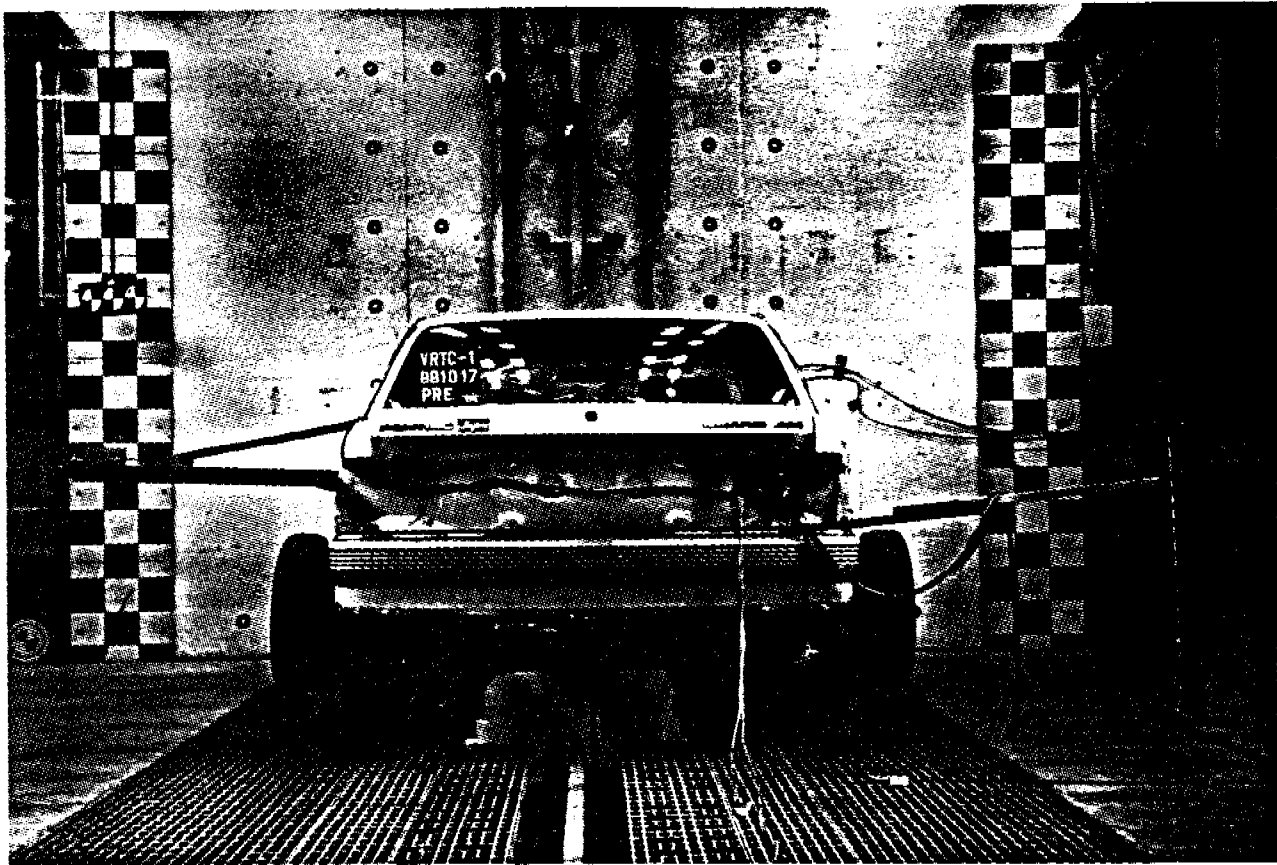


Figure A-7. PRE-TEST OVERALL REAR VIEW

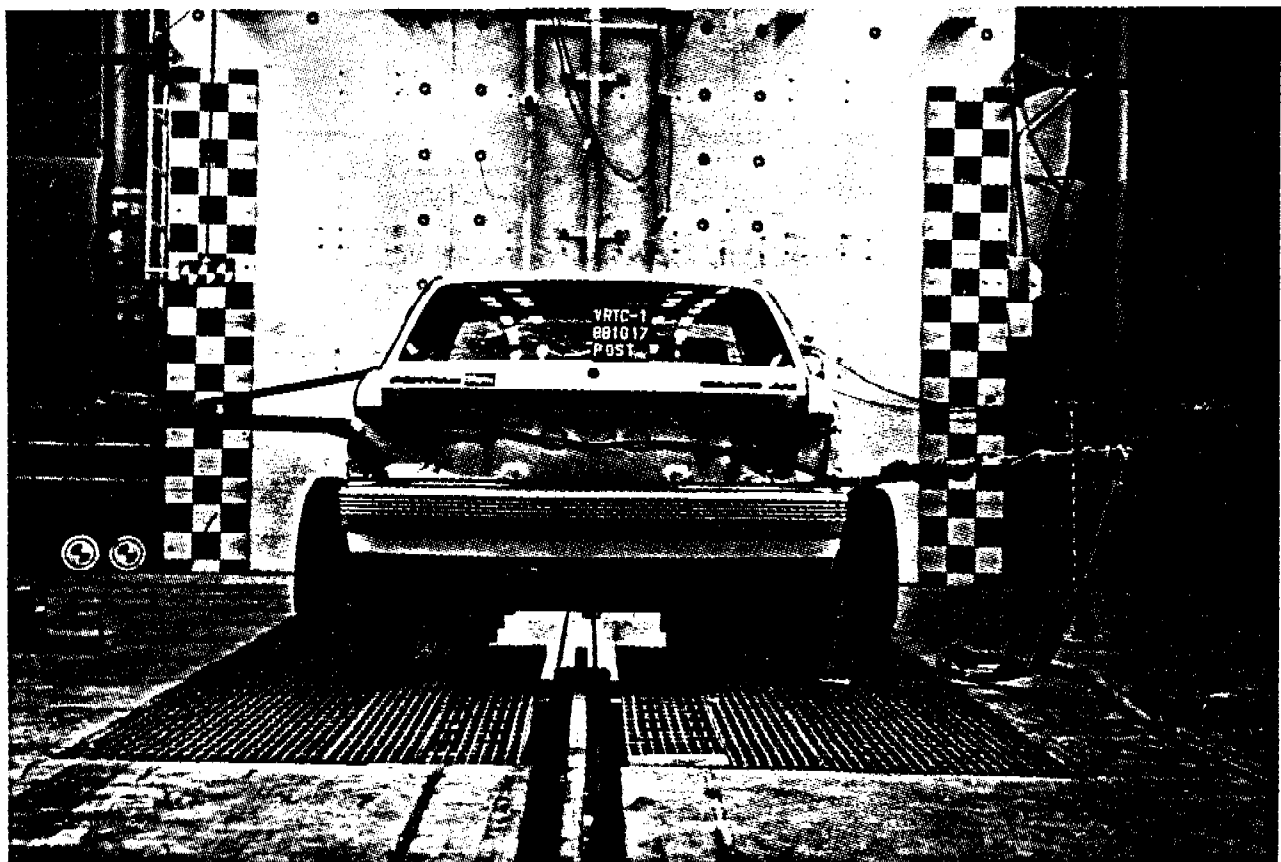


Figure A-8. POST-TEST OVERALL REAR VIEW

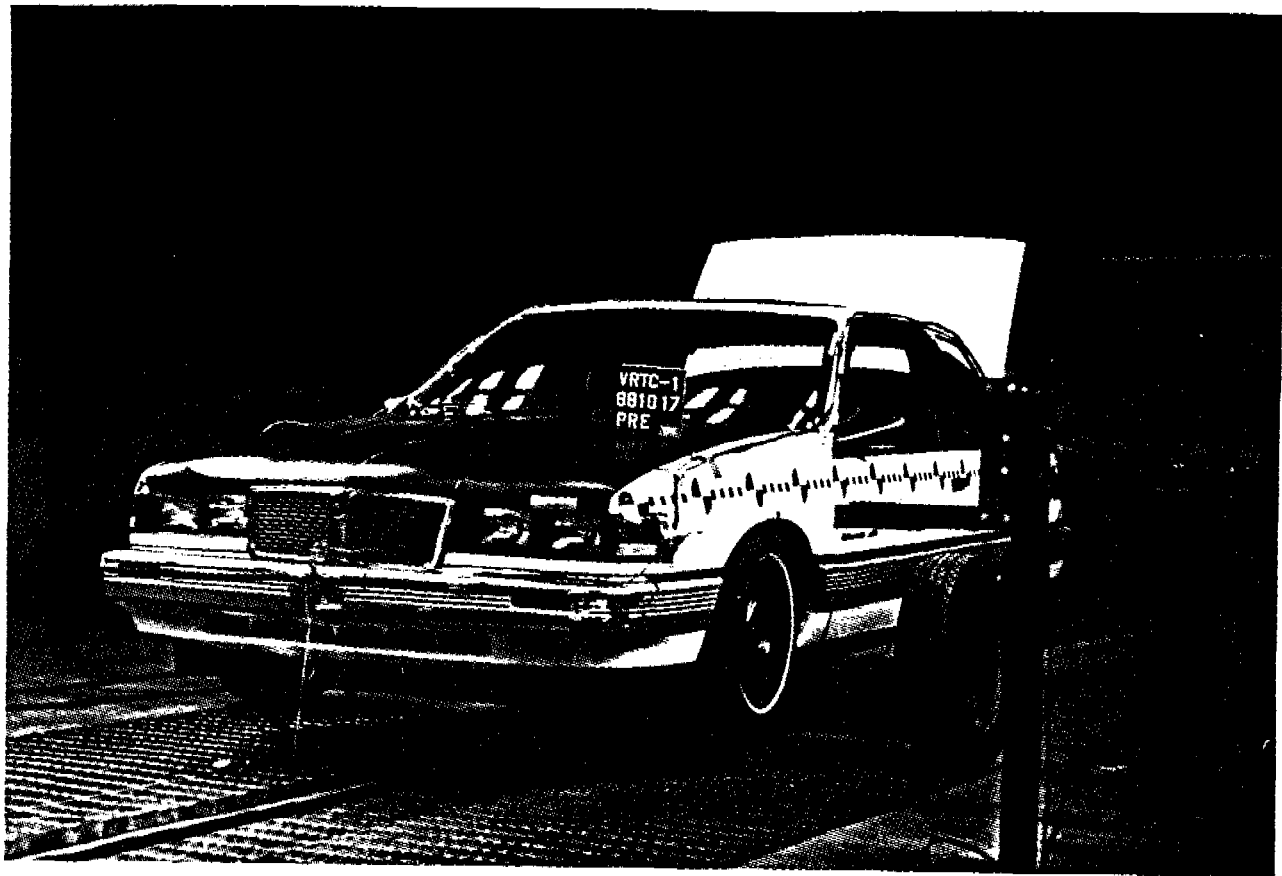


Figure A-9. PRE-TEST LEFT FRONT VIEW

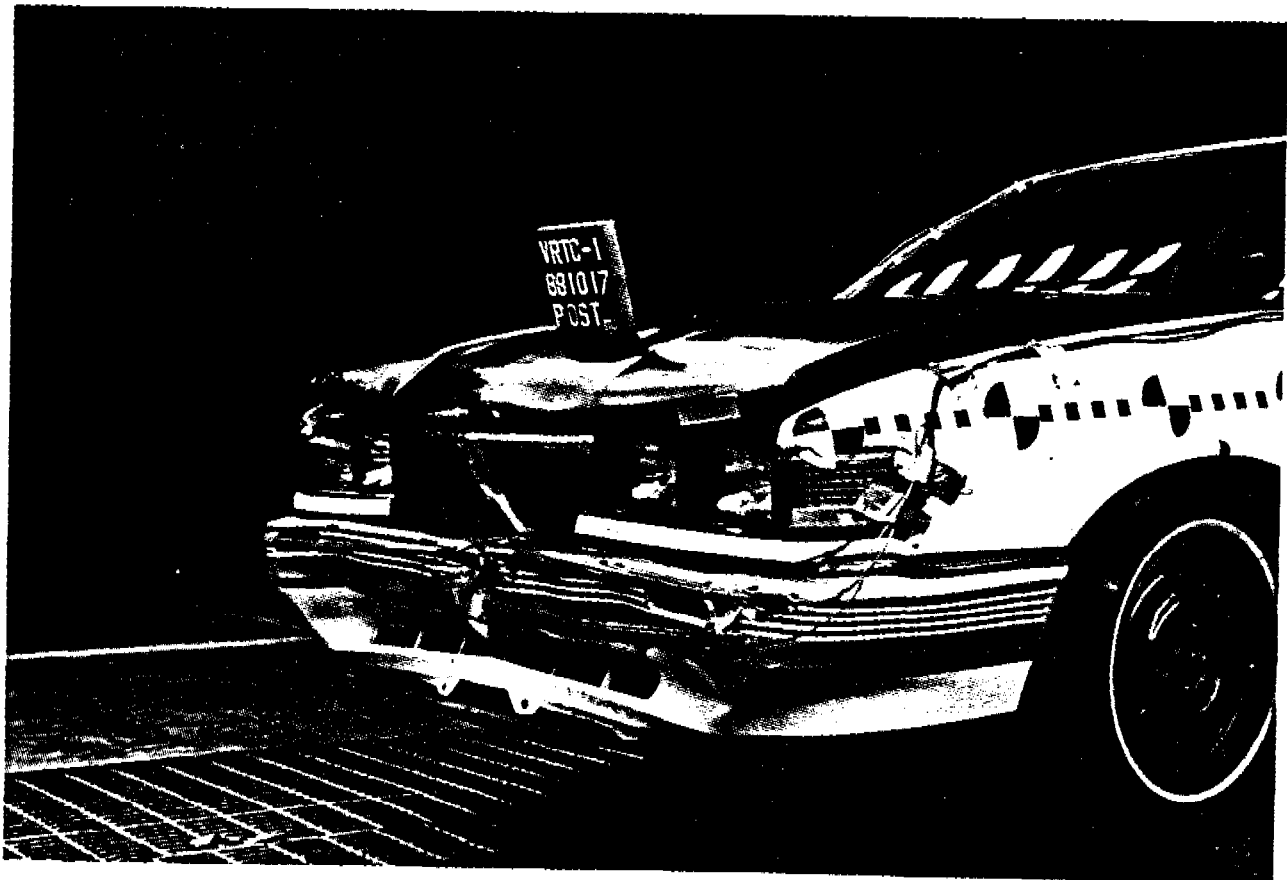


Figure A-10. POST-TEST LEFT FRONT VIEW



Figure A-11. PRE-TEST RIGHT FRONT VIEW

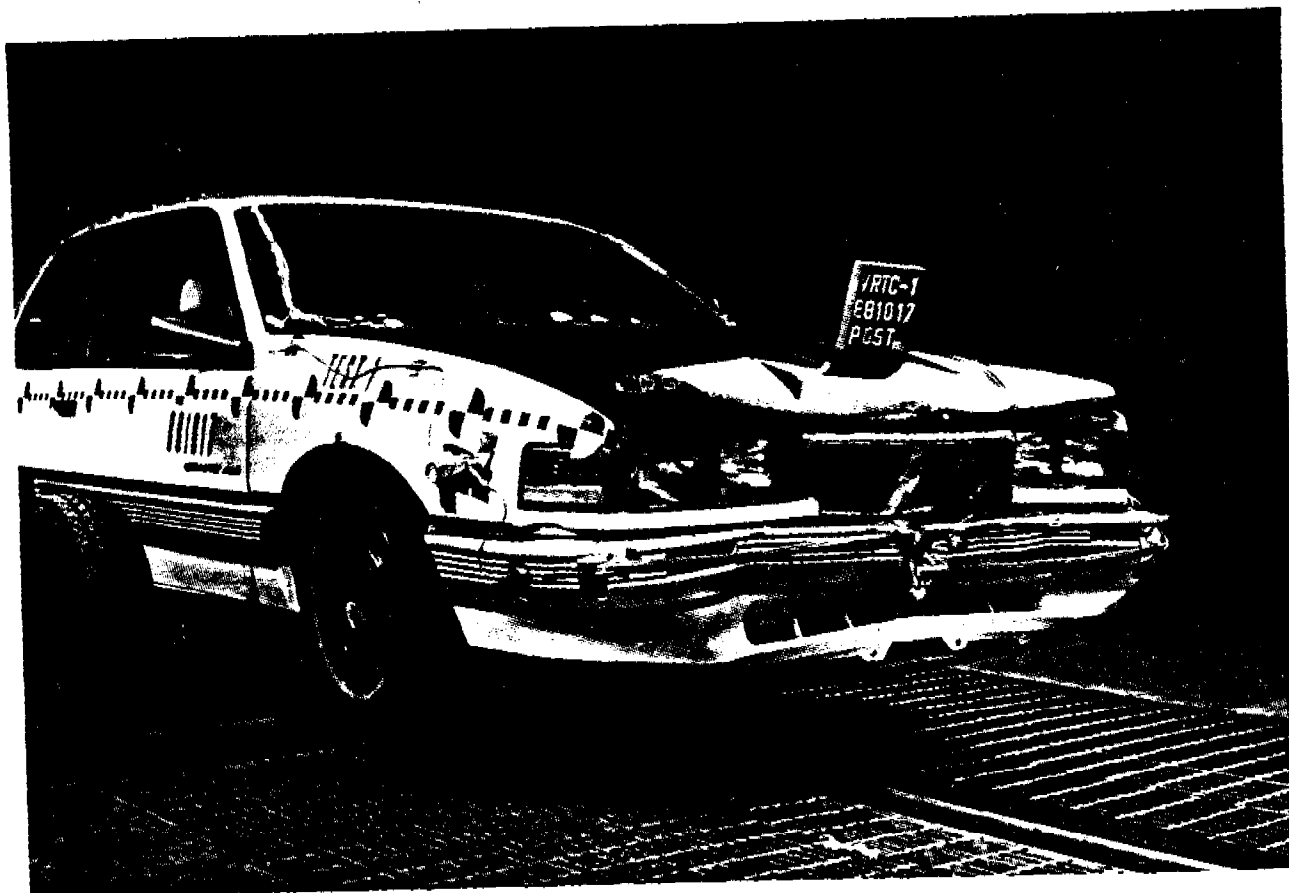


Figure A-12. POST-TEST RIGHT FRONT VIEW

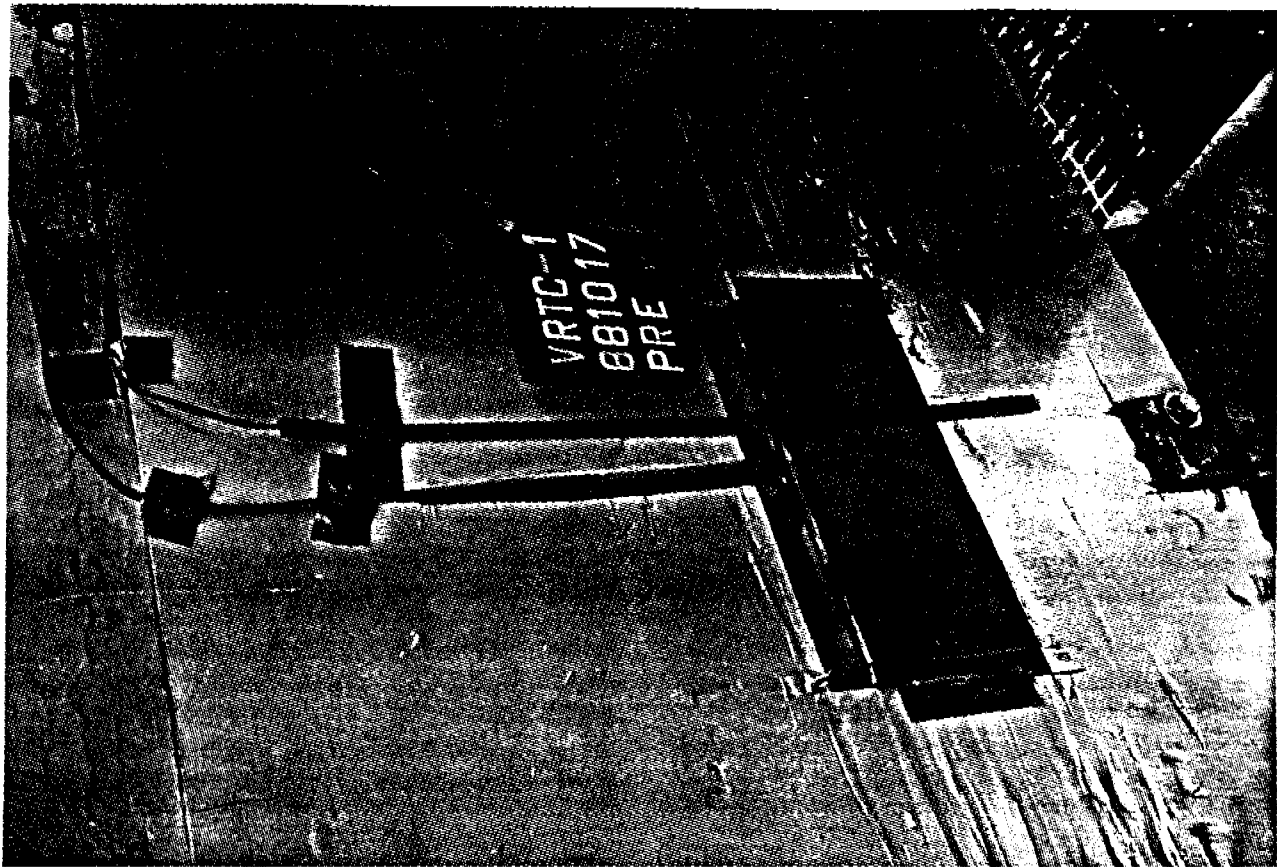


Figure A-13. PRE-TEST BARRIER CONTACT SWITCH

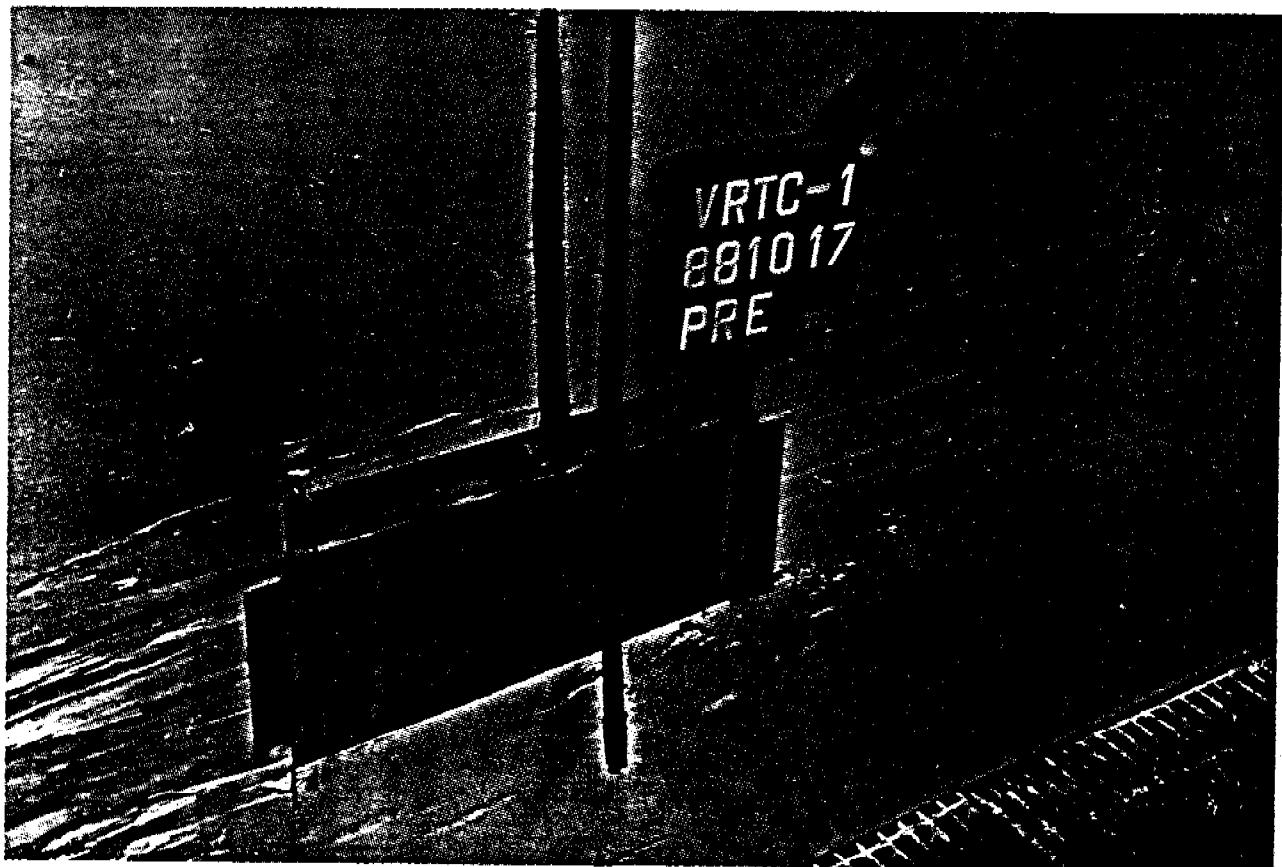


Figure A-14. PRE-TEST BARRIER CONTACT SWITCH

TEST #881017-2
LIST OF PHOTOGRAPHS

15. POST-TEST OVERALL LEFT SIDE VIEW
16. POST-TEST OVERALL RIGHT SIDE VIEW
17. POST-TEST OVERALL FRONT VIEW
18. POST-TEST OVERALL REAR VIEW
19. POST-TEST LEFT FRONT VIEW
20. POST-TEST RIGHT FRONT VIEW

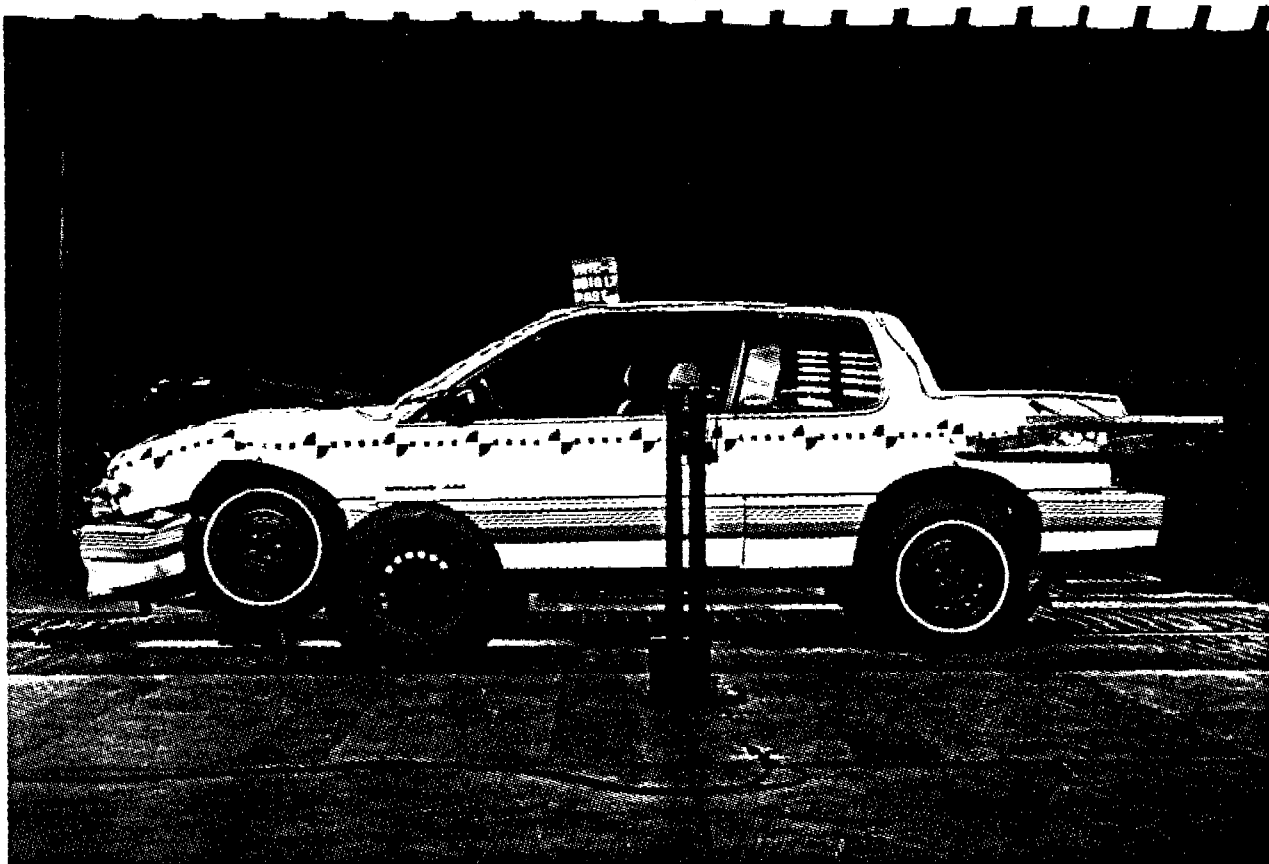


Figure A-15. POST-TEST OVERALL LEFT SIDE VIEW

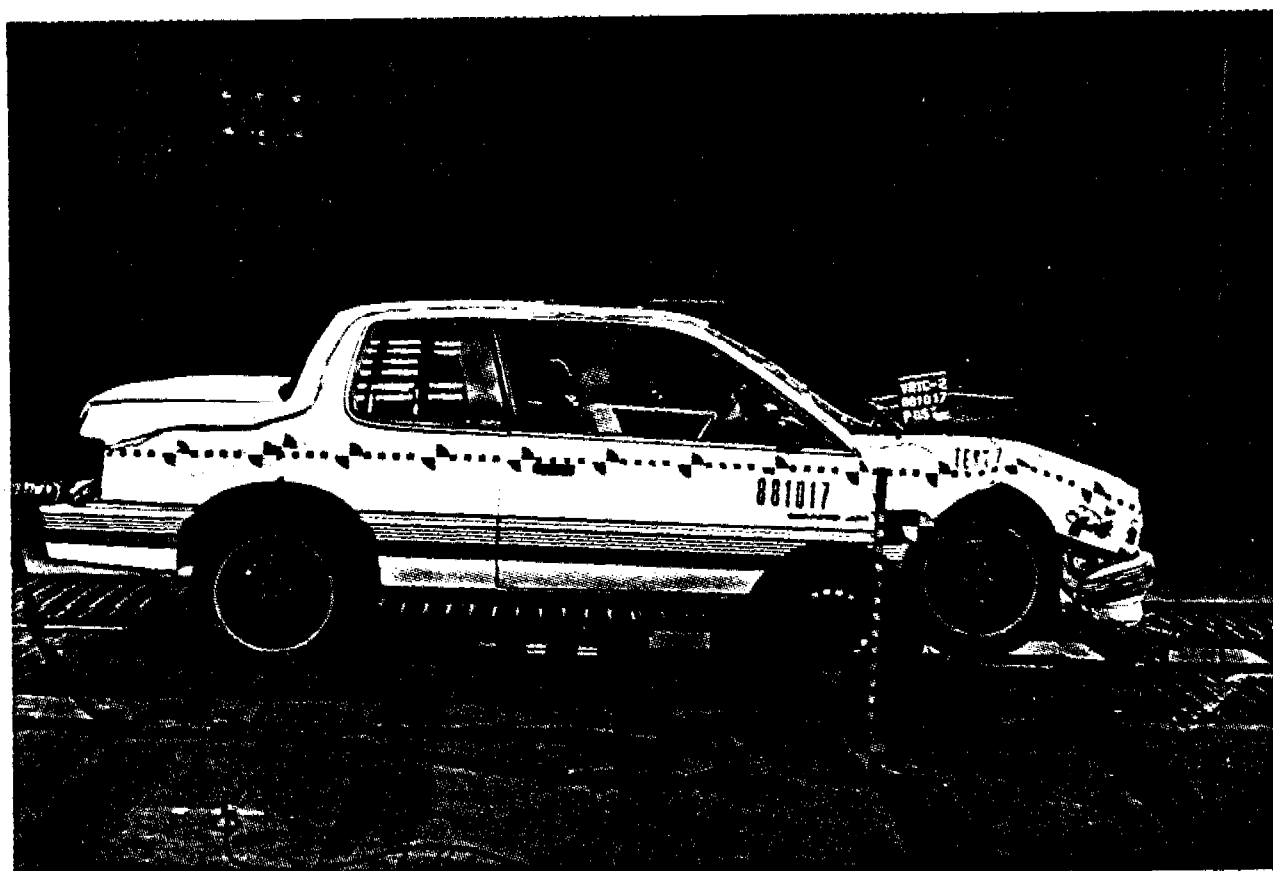


Figure A-16. POST-TEST OVERALL RIGHT SIDE VIEW

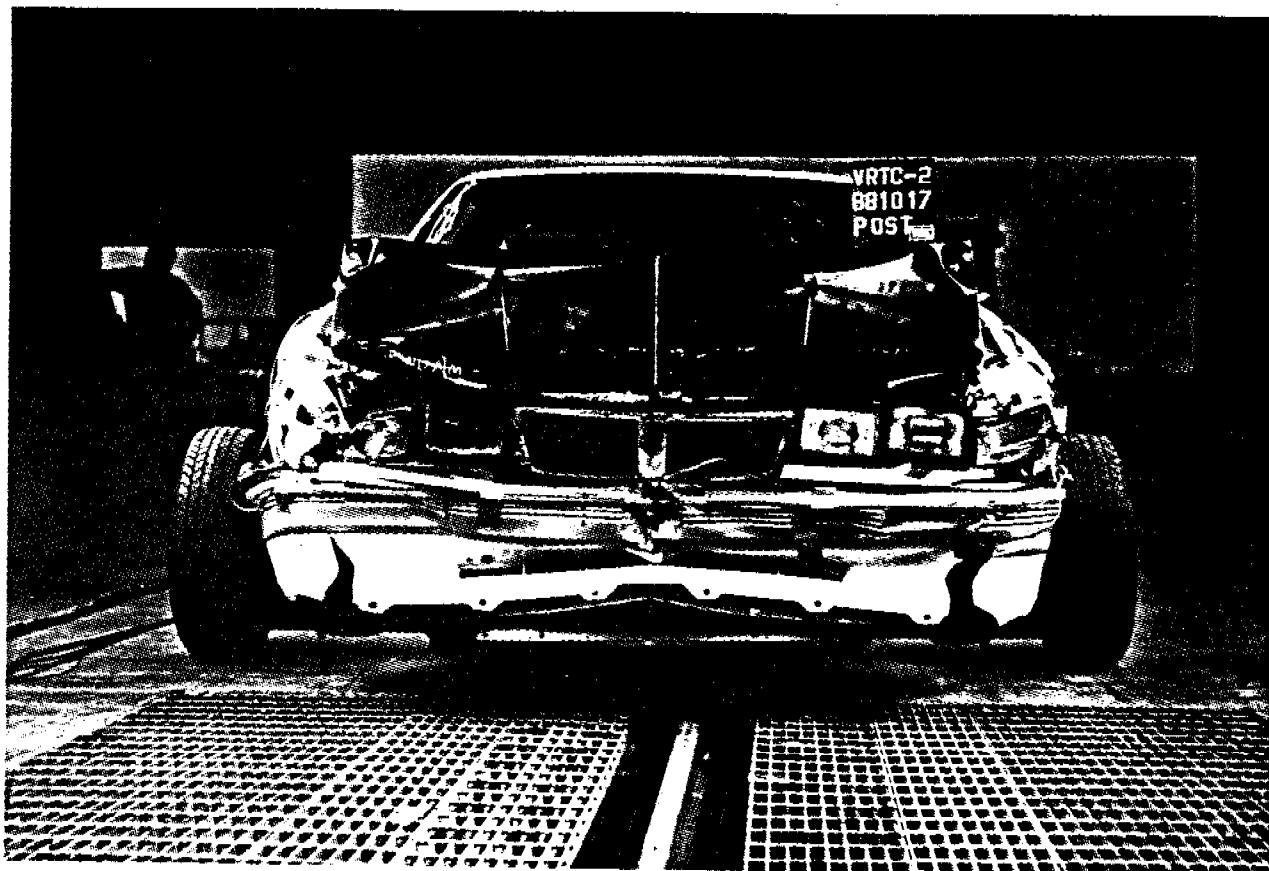


Figure A-17. POST-TEST OVERALL FRONT VIEW

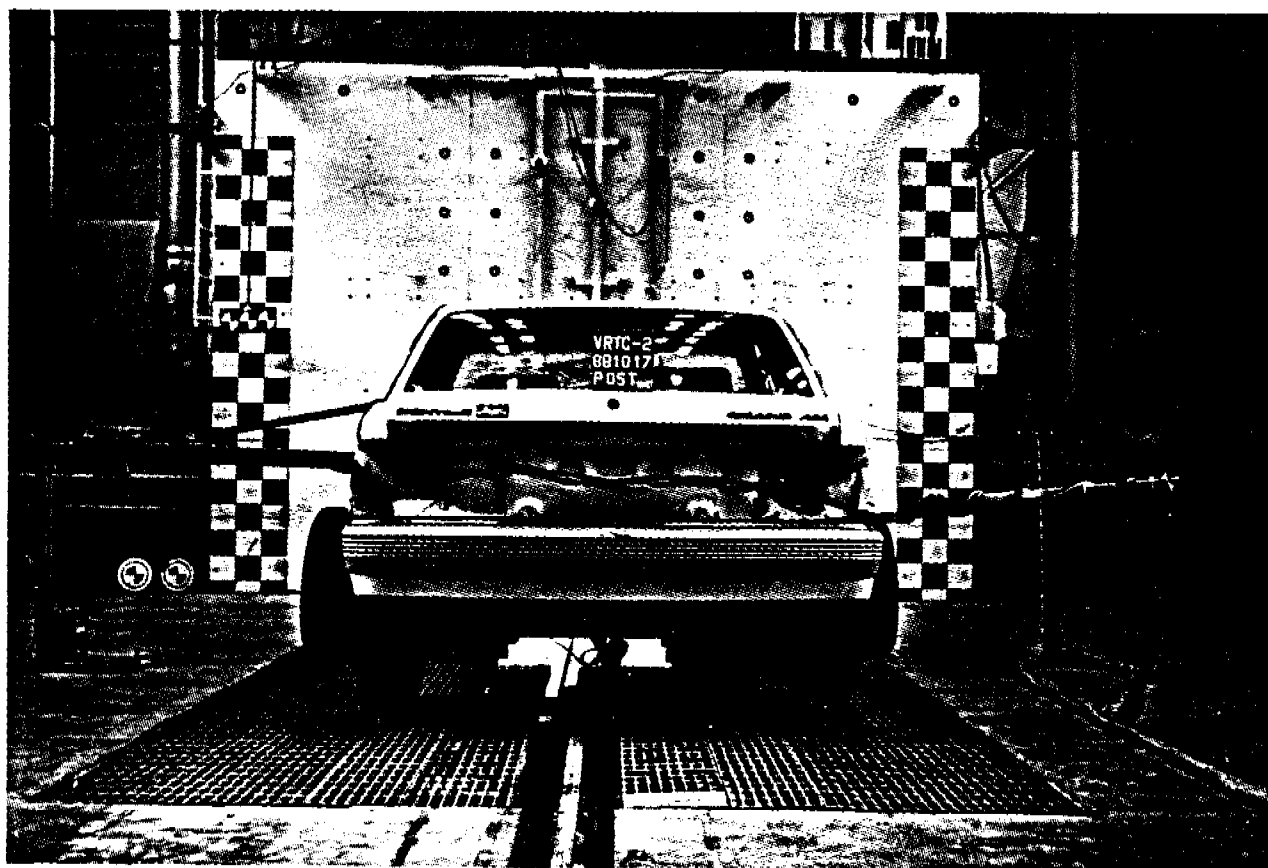


Figure A-18. POST-TEST OVERALL REAR VIEW

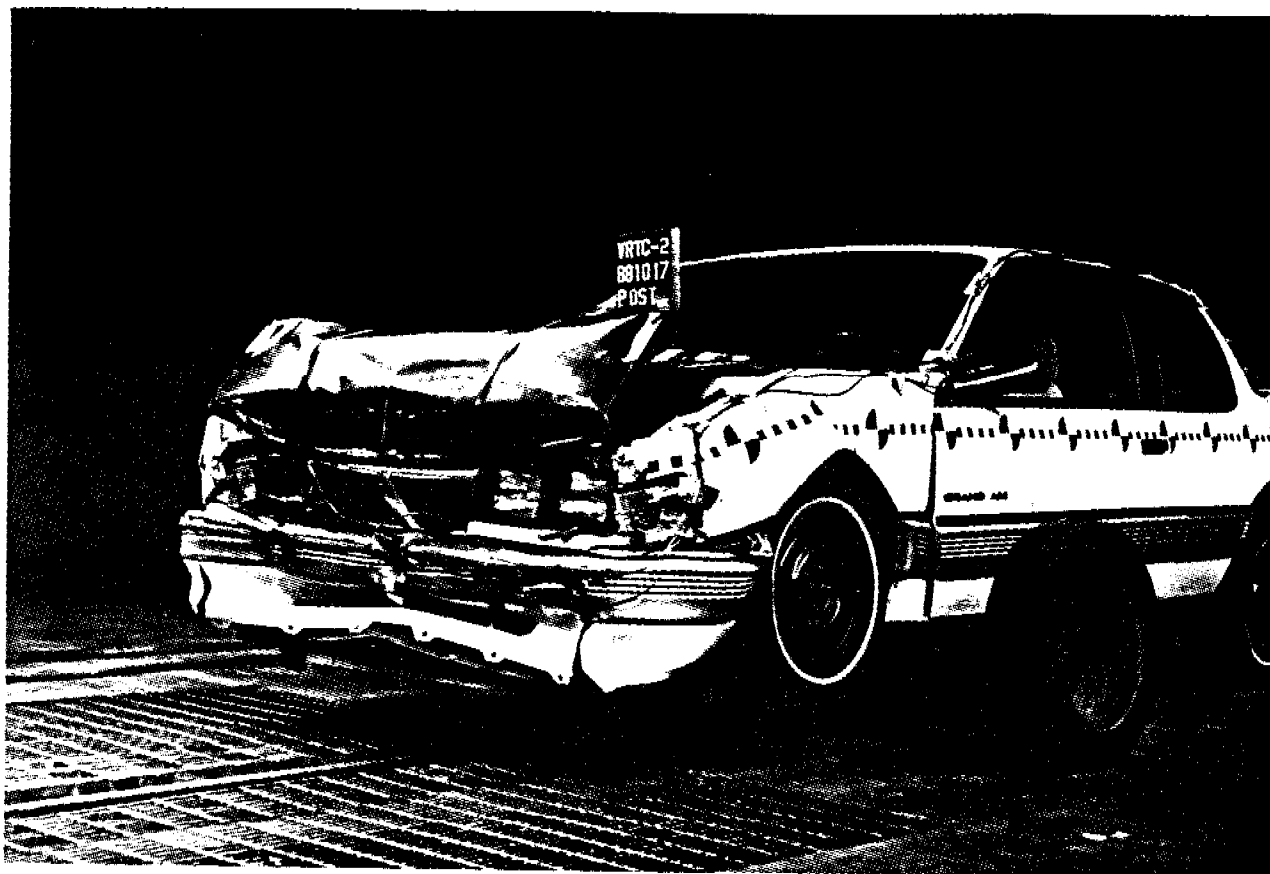


Figure A-19. POST-TEST LEFT FRONT VIEW



Figure A-20. POST-TEST RIGHT FRONT VIEW

TEST #881017-3
LIST OF PHOTOGRAPHS

21. POST-TEST OVERALL LEFT SIDE VIEW
22. POST-TEST OVERALL RIGHT SIDE VIEW
23. POST-TEST OVERALL FRONT VIEW
24. POST-TEST OVERALL REAR VIEW
25. POST-TEST LEFT FRONT VIEW
26. POST-TEST RIGHT FRONT VIEW
27. POST-TEST VEHICLE CLOSE-UP - VIEW 1
28. POST-TEST VEHICLE CLOSE-UP - VIEW 2
29. POST-TEST VEHICLE CLOSE-UP - VIEW 3
30. POST-TEST VEHICLE CLOSE-UP - VIEW 4

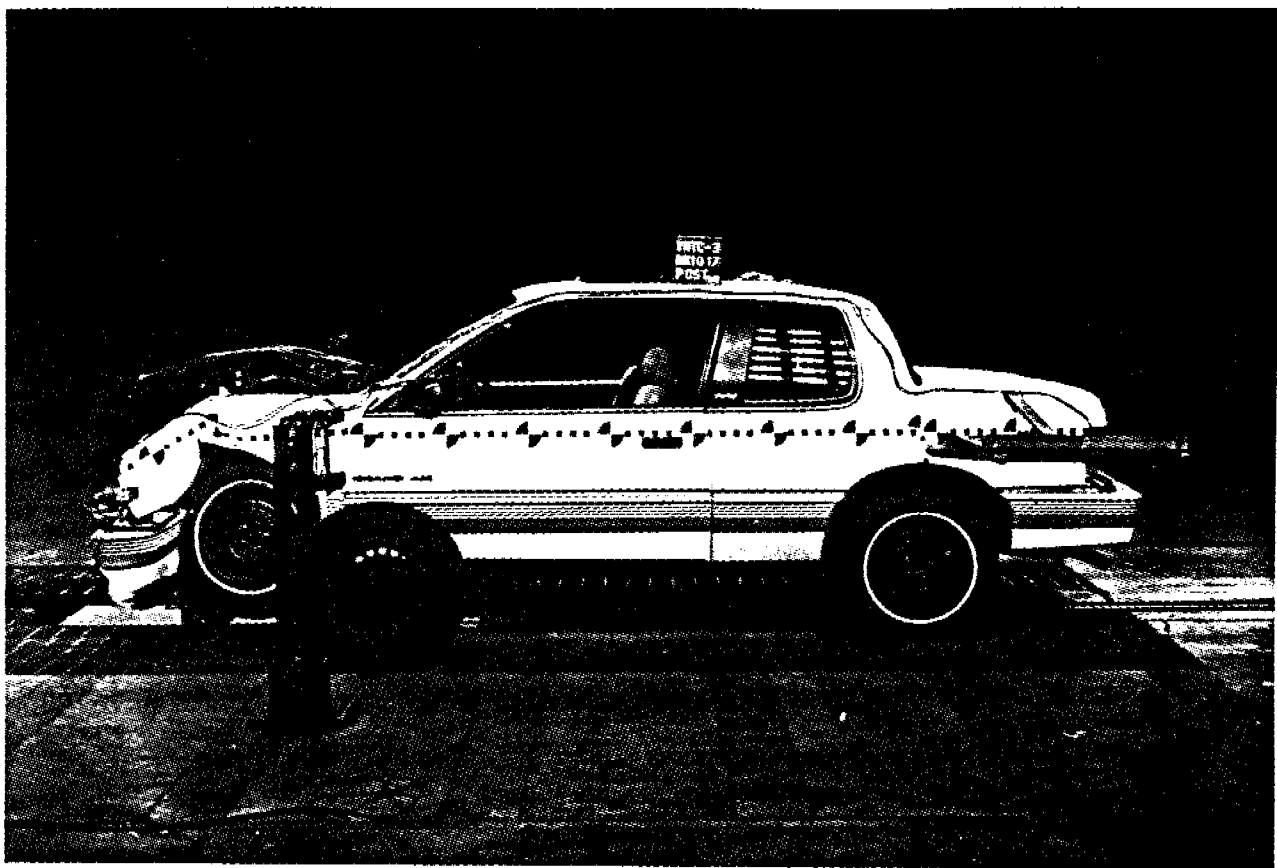


Figure A-21. POST-TEST OVERALL LEFT SIDE VIEW

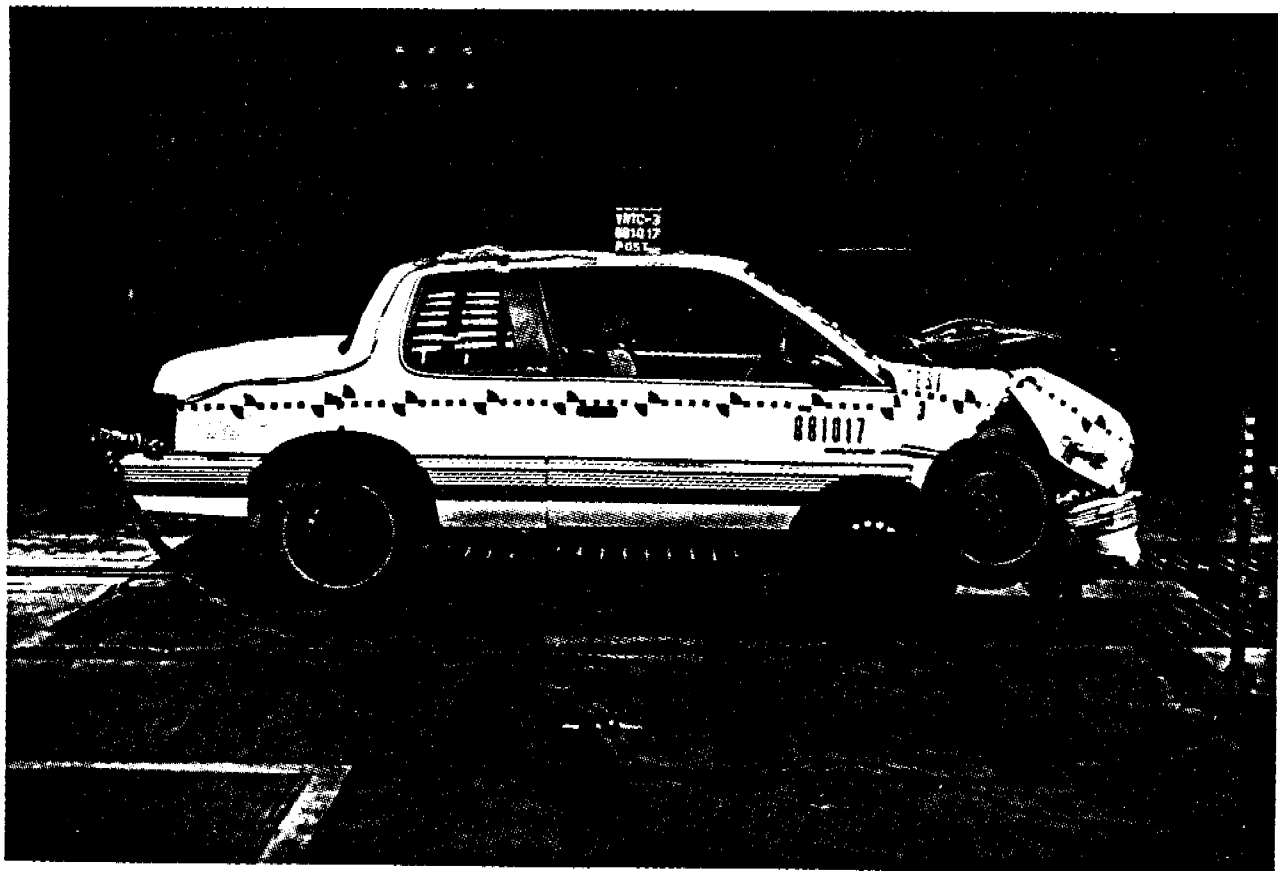


Figure A-22. POST-TEST OVERALL RIGHT SIDE VIEW

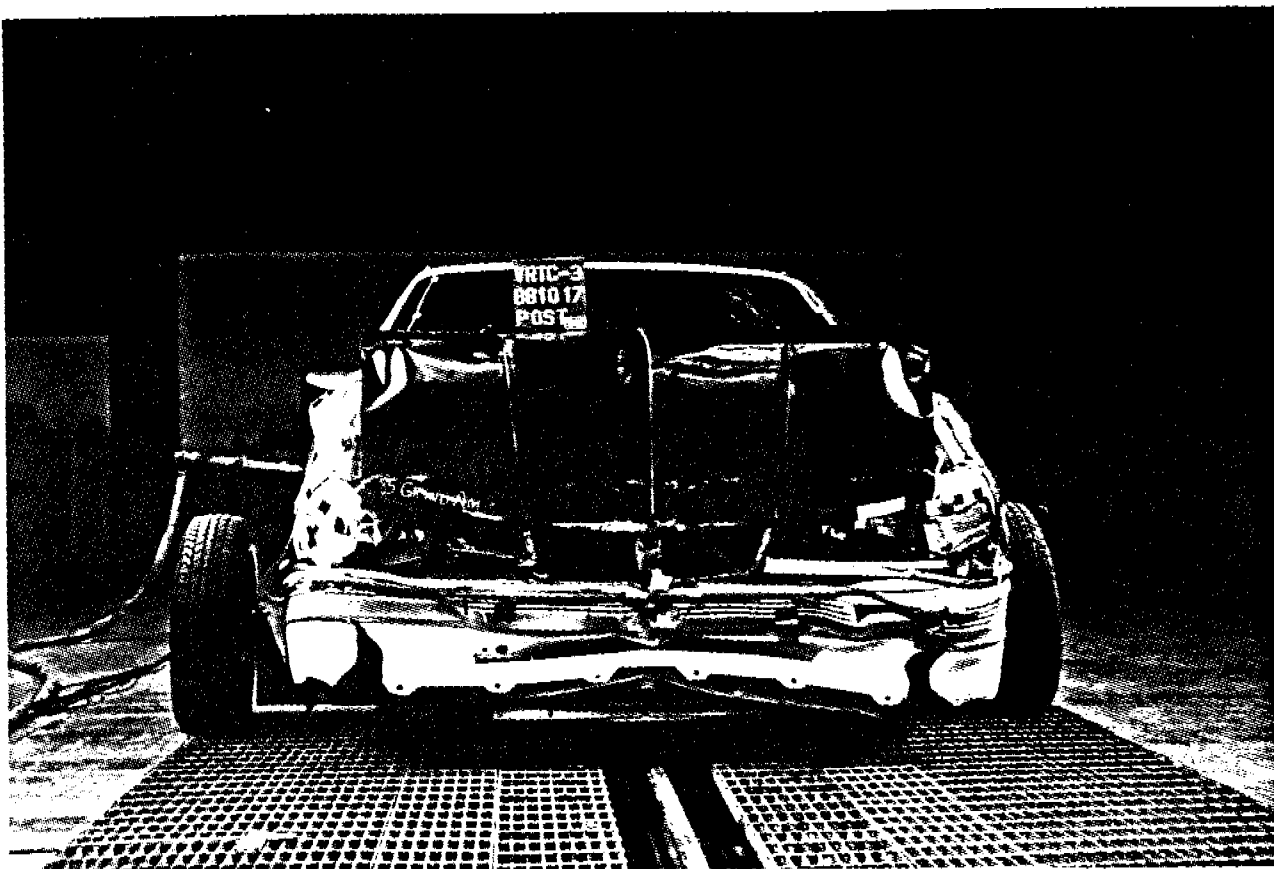


Figure A-23. POST-TEST OVERALL FRONT VIEW

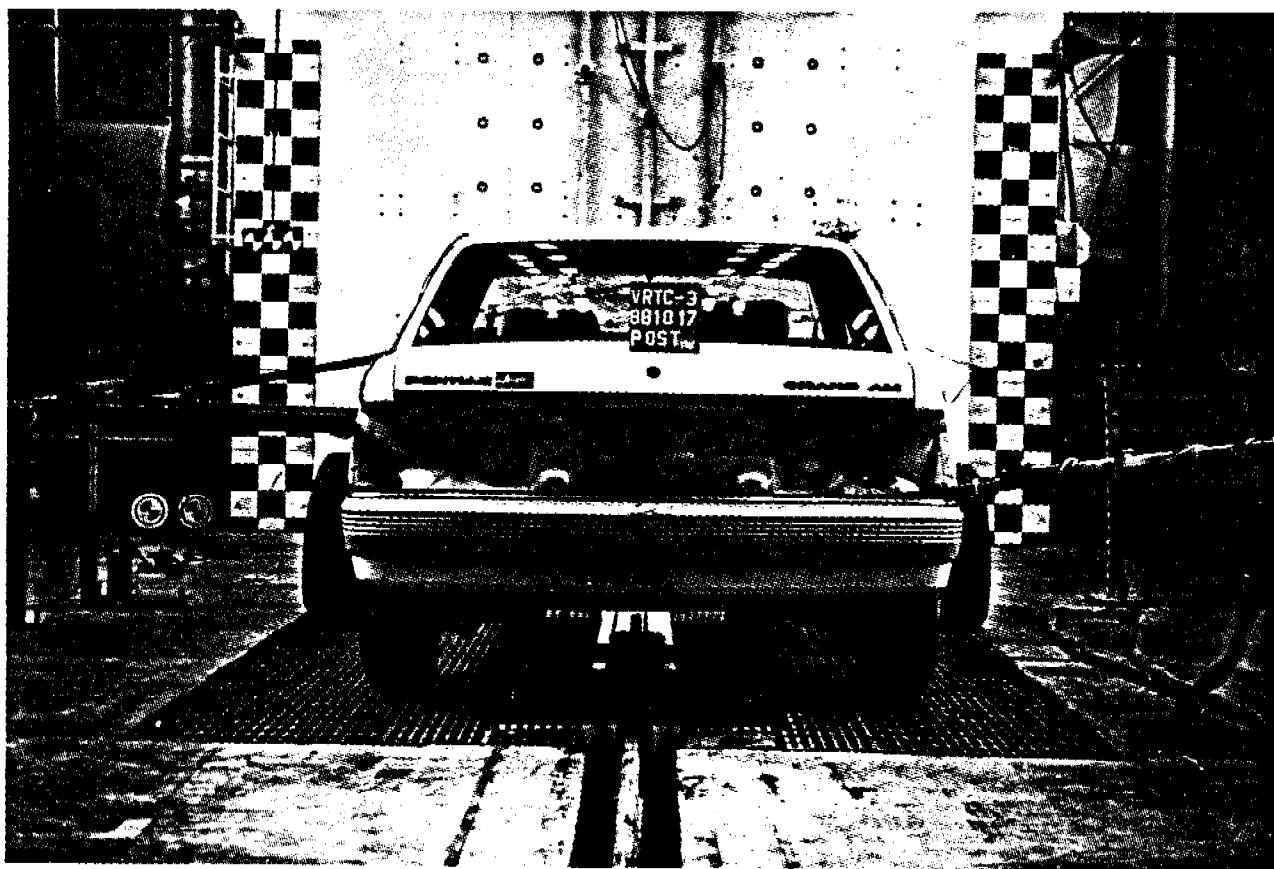


Figure A-24. POST-TEST OVERALL REAR VIEW

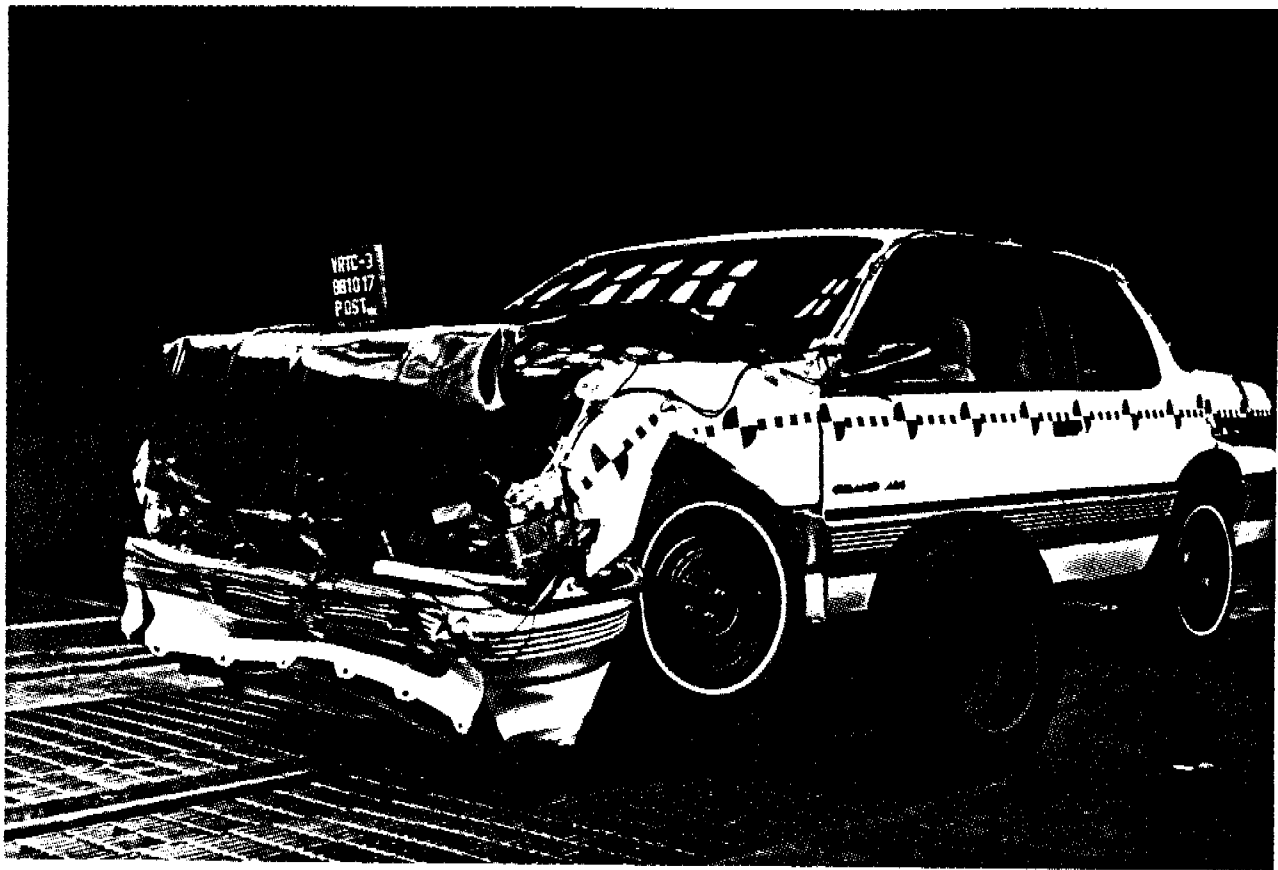


Figure A-25. POST-TEST LEFT FRONT VIEW



Figure A-26. POST-TEST RIGHT FRONT VIEW

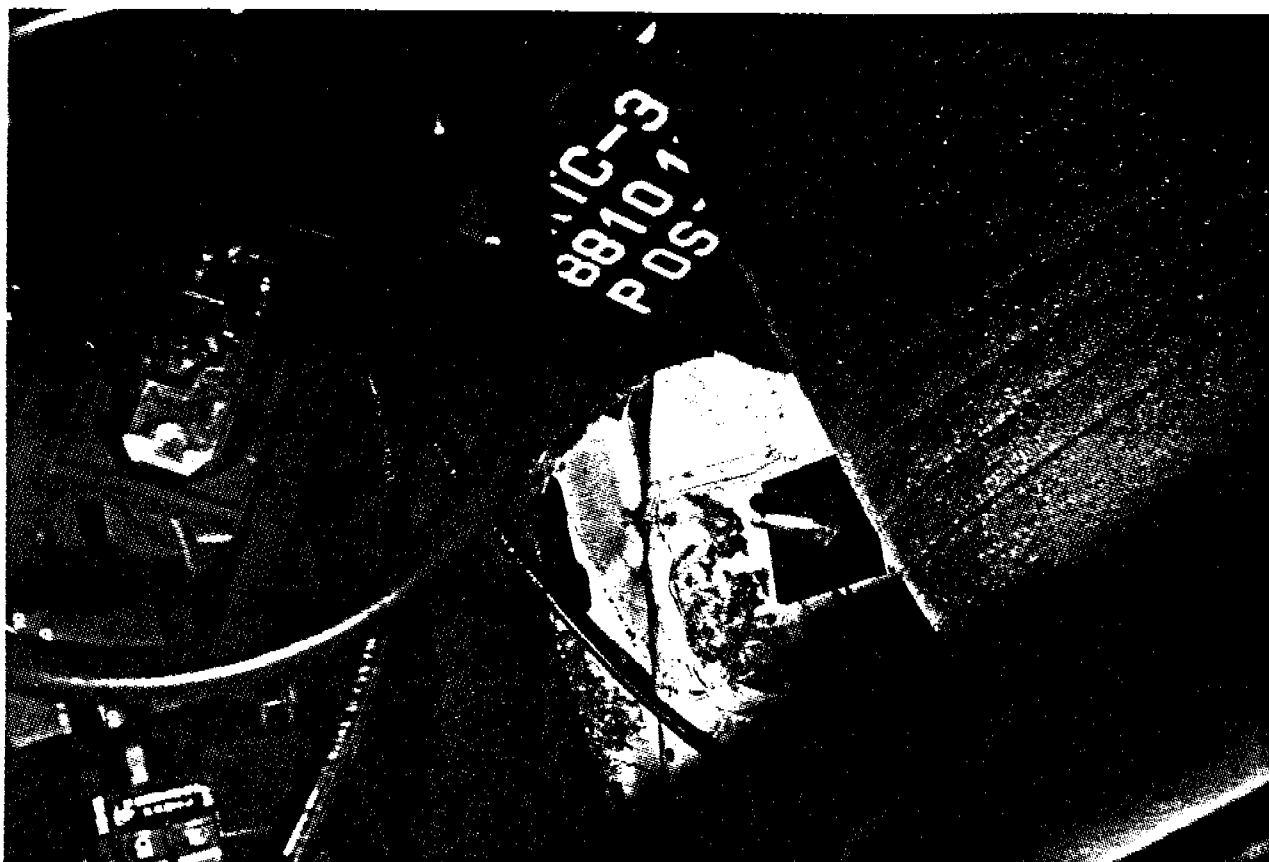


Figure A-27. POST-TEST VEHICLE CLOSE-UP - VIEW 1

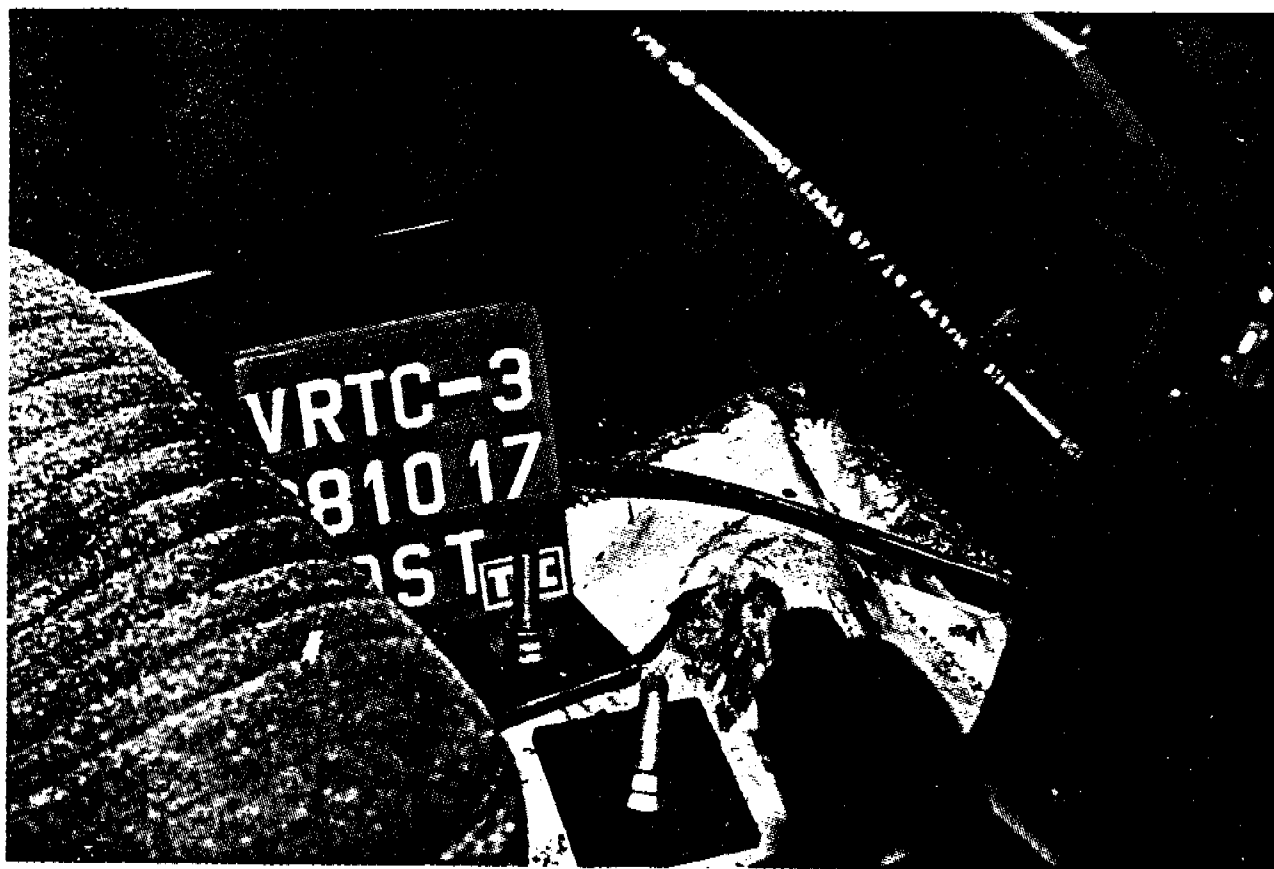


Figure A-28. POST-TEST VEHICLE CLOSE-UP - VIEW 2



Figure A-29. POST-TEST VEHICLE CLOSE-UP - VIEW 3



Figure A-30. POST-TEST VEHICLE CLOSE-UP - VIEW 4

TEST #881017-4
LIST OF PHOTOGRAPHS

31. POST-TEST OVERALL LEFT SIDE VIEW
32. POST-TEST OVERALL RIGHT SIDE VIEW
33. POST-TEST OVERALL FRONT VIEW
34. POST-TEST OVERALL REAR VIEW
35. POST-TEST LEFT FRONT VIEW
36. POST-TEST RIGHT FRONT VIEW
37. POST-TEST VEHICLE CLOSE-UP - VIEW 1
38. POST-TEST VEHICLE CLOSE-UP - VIEW 2

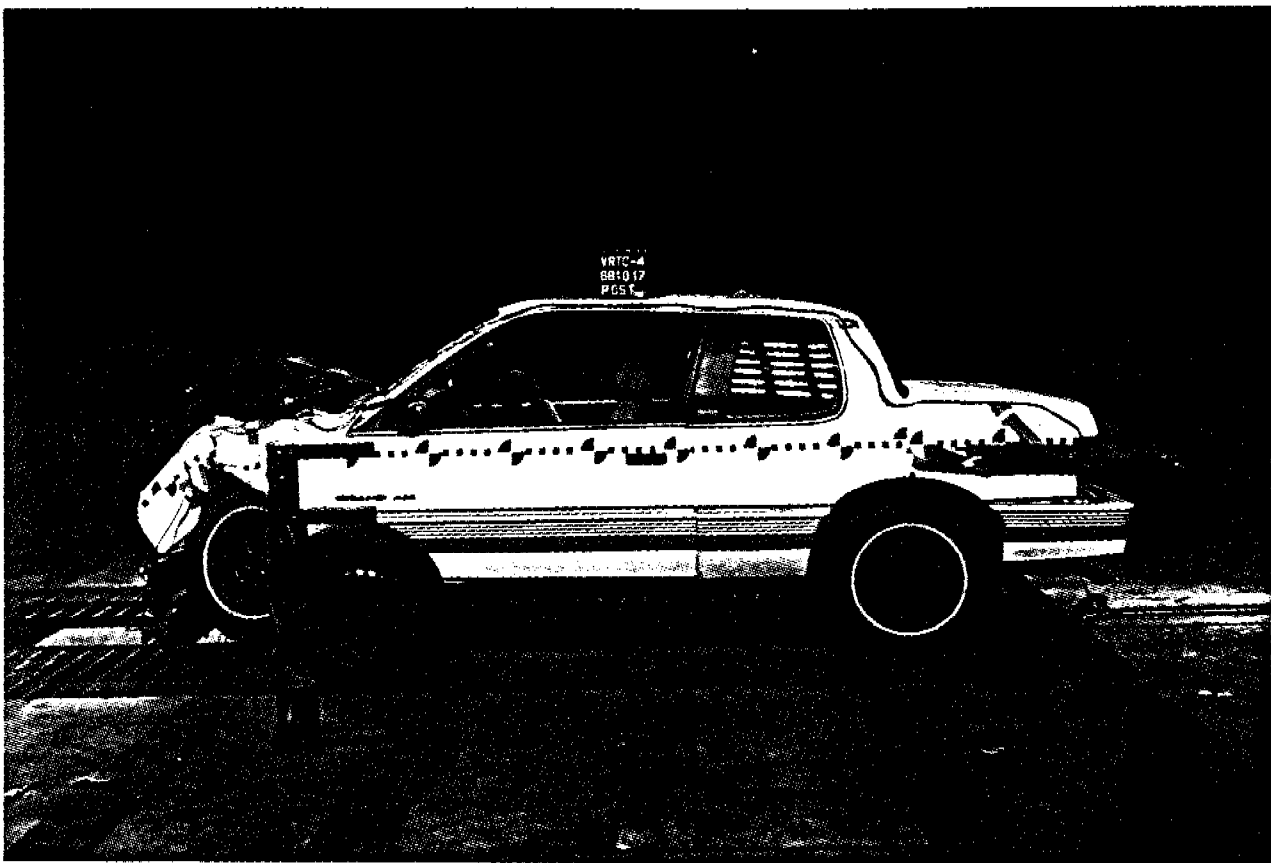


Figure A-31. POST-TEST OVERALL LEFT SIDE VIEW

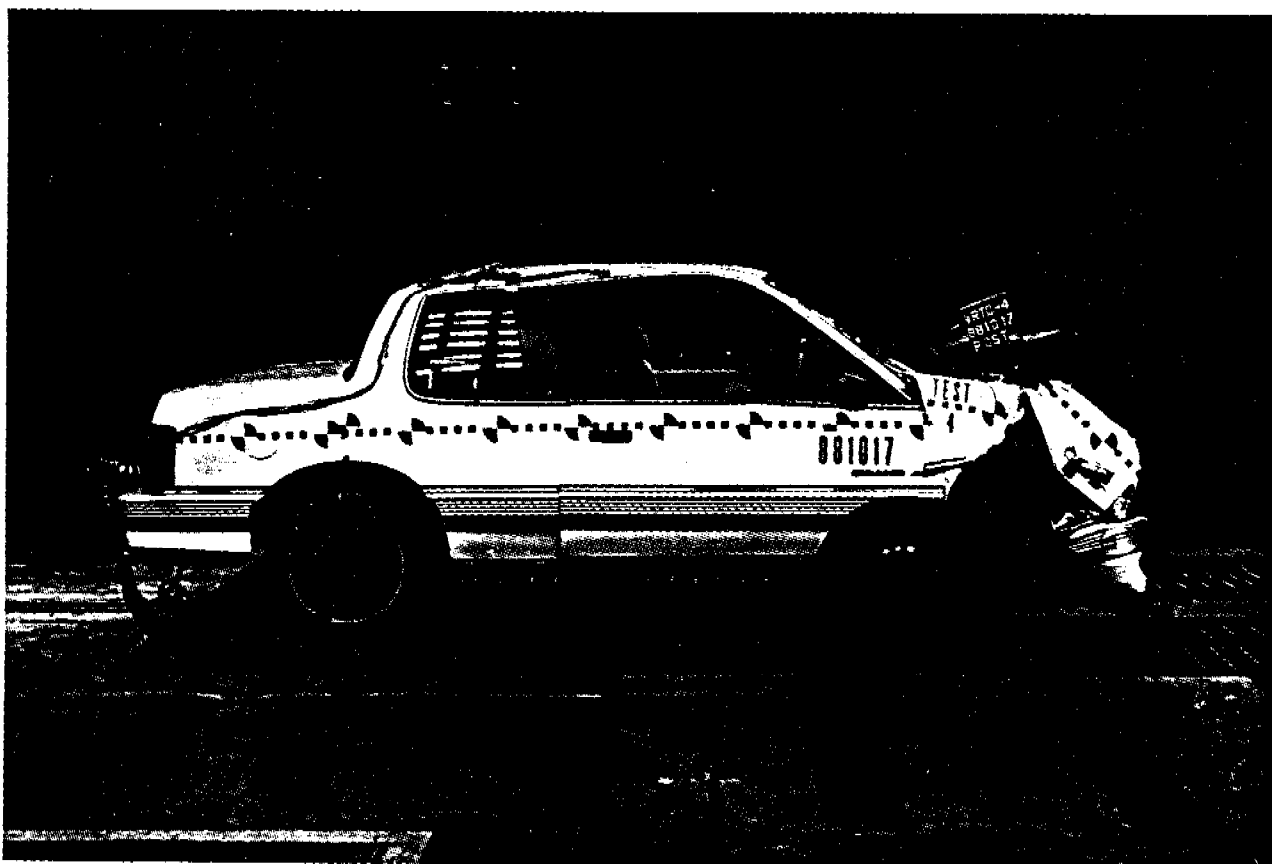


Figure A-32. POST-TEST OVERALL RIGHT SIDE VIEW



Figure A-33. POST-TEST OVERALL FRONT VIEW

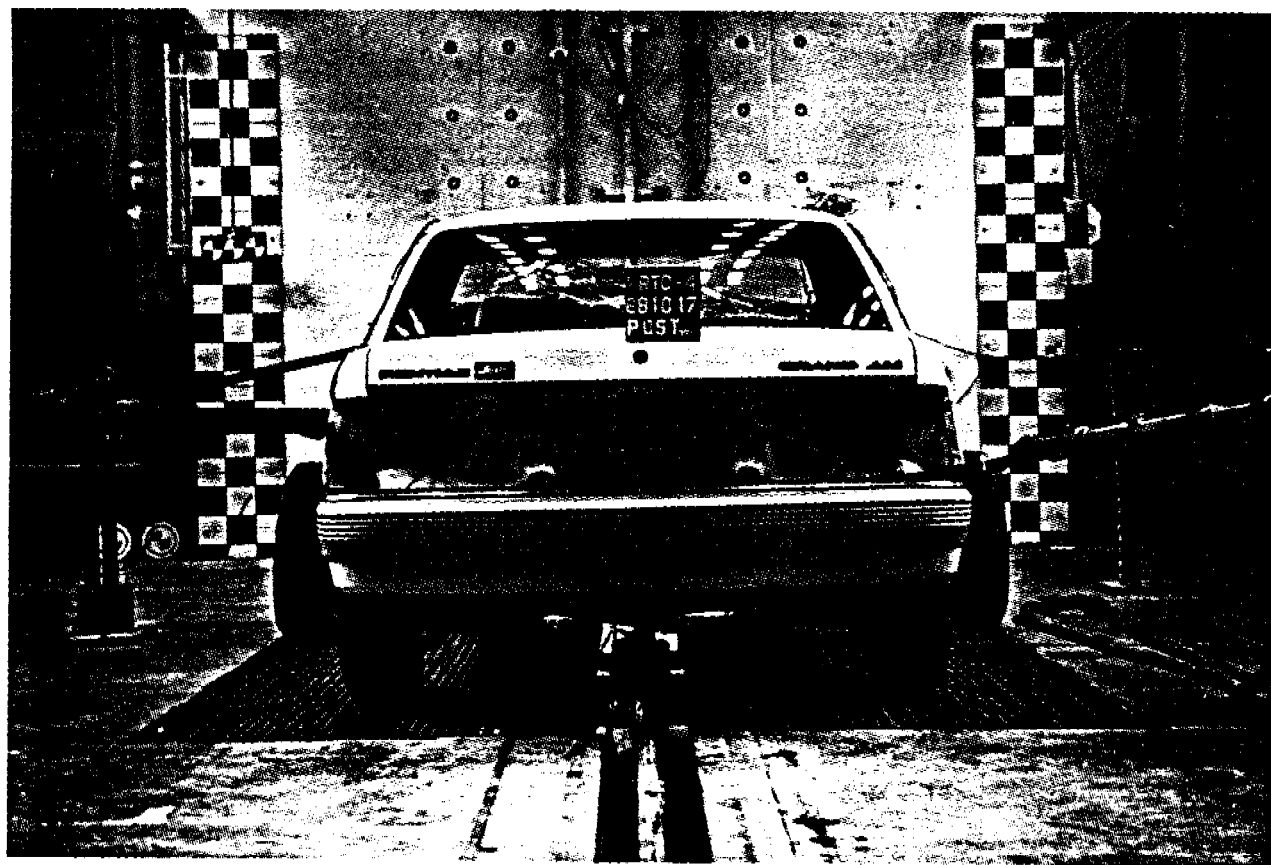


Figure A-34. POST-TEST OVERALL REAR VIEW

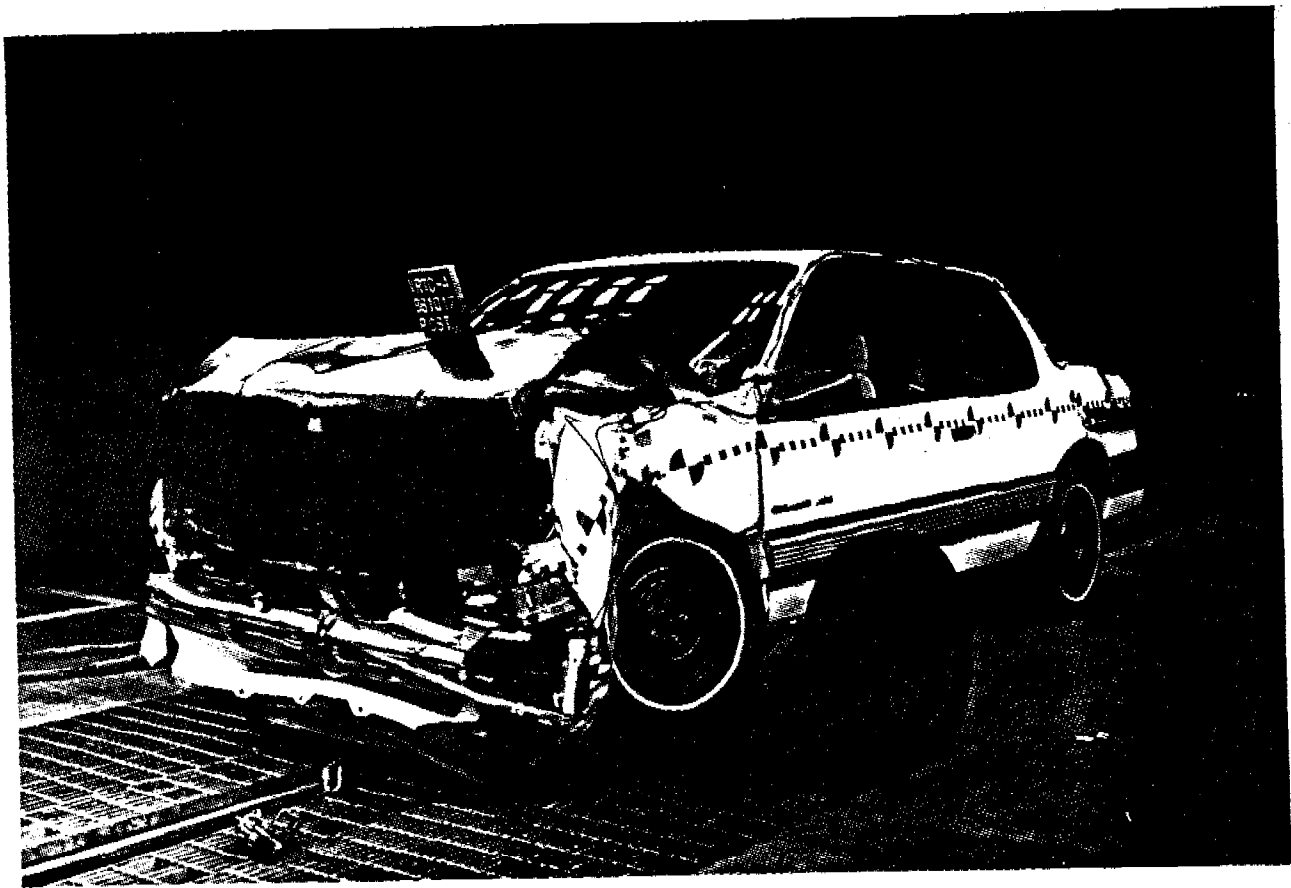


Figure A-35. POST-TEST LEFT FRONT VIEW

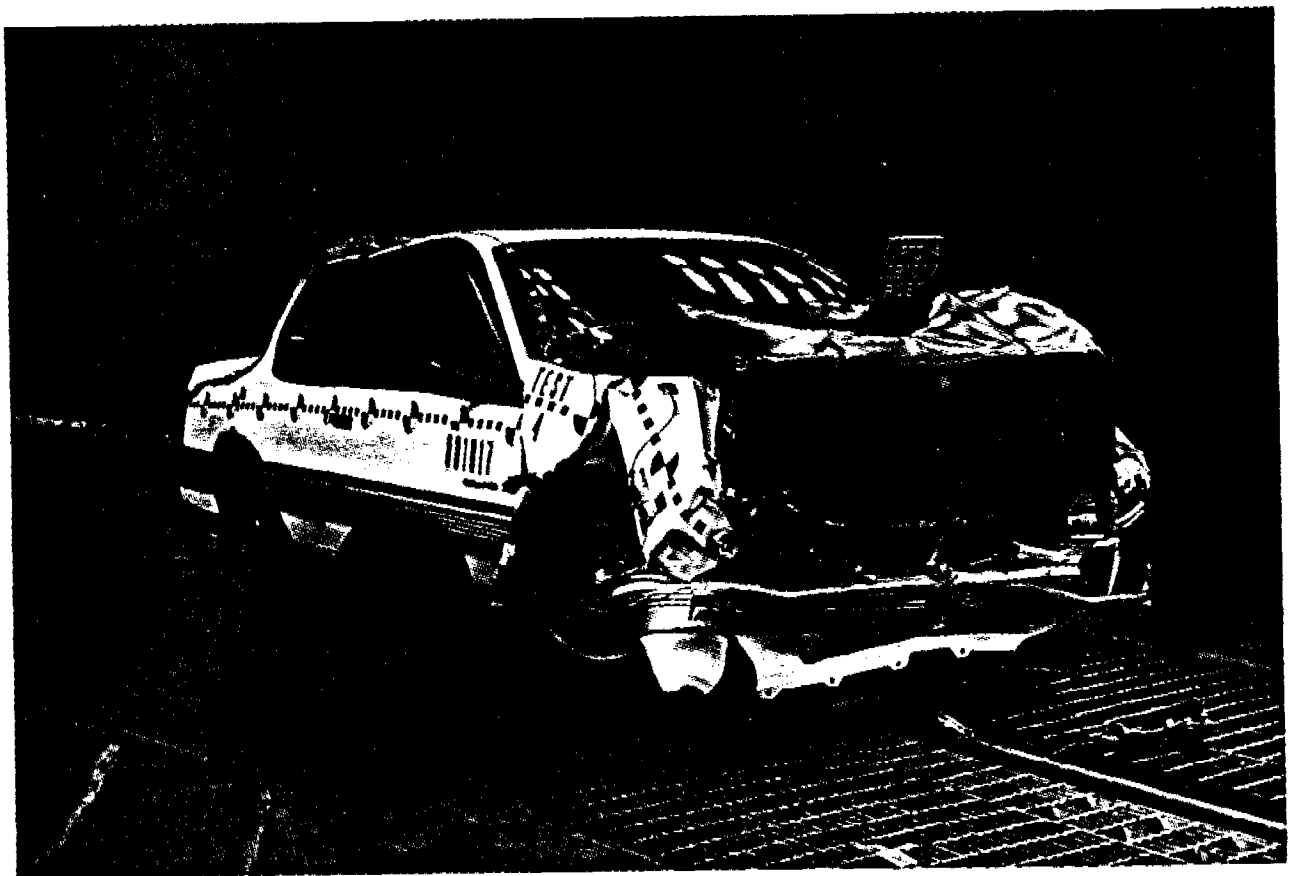


Figure A-36. POST-TEST RIGHT FRONT VIEW

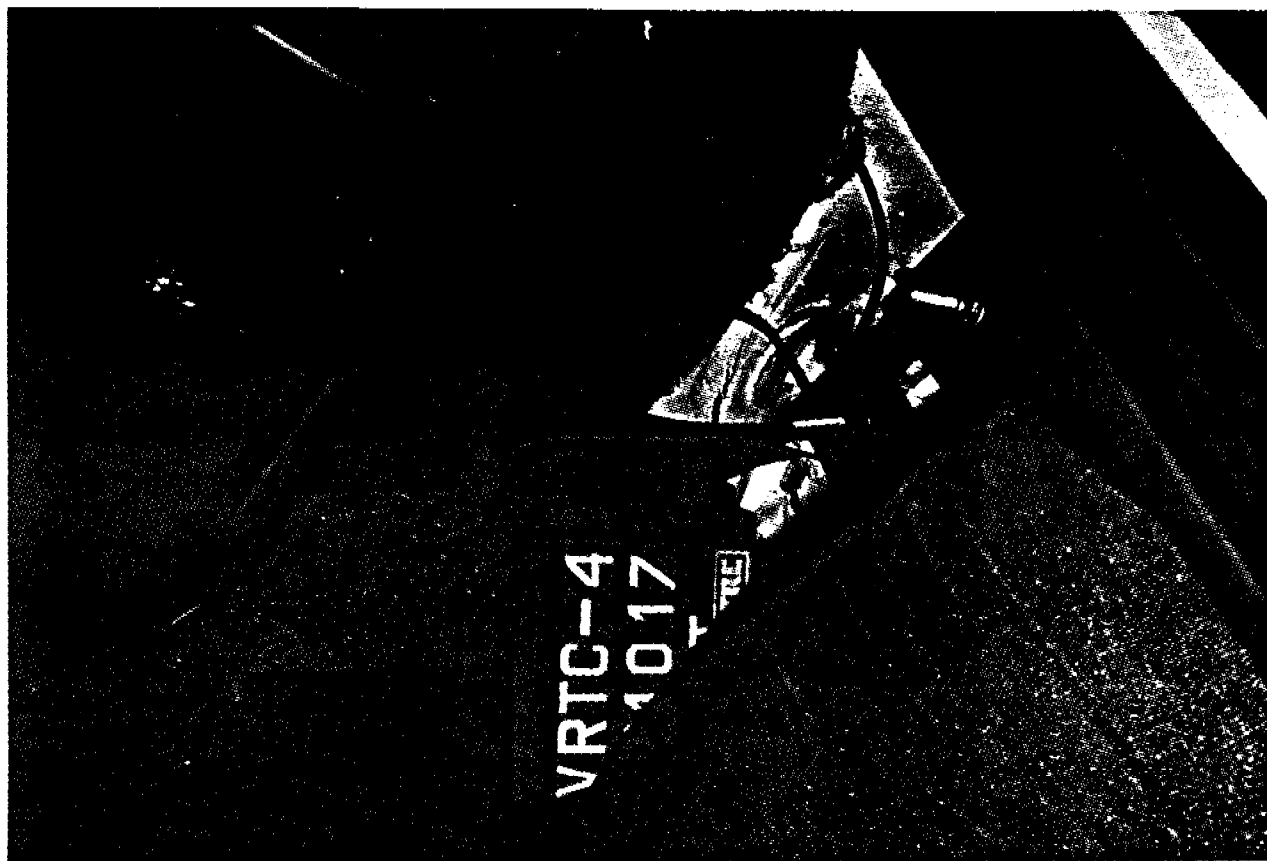


Figure A-37. POST-TEST VEHICLE CLOSEUP - VIEW 1



Figure A-38. POST-TEST VEHICLE CLOSEUP - VIEW 2

TEST #881017-5
LIST OF PHOTOGRAPHS

- 39. POST-TEST OVERALL LEFT SIDE VIEW
- 40. POST-TEST OVERALL RIGHT SIDE VIEW
- 41. POST-TEST OVERALL FRONT VIEW
- 42. POST-TEST OVERALL REAR VIEW
- 43. POST-TEST LEFT FRONT VIEW
- 44. POST-TEST RIGHT FRONT VIEW
- 45. POST-TEST BARRIER CONTACT SWITCH
- 46. POST-TEST VEHICLE CLOSEUP - VIEW 1
- 47. POST-TEST VEHICLE CLOSEUP - VIEW 2

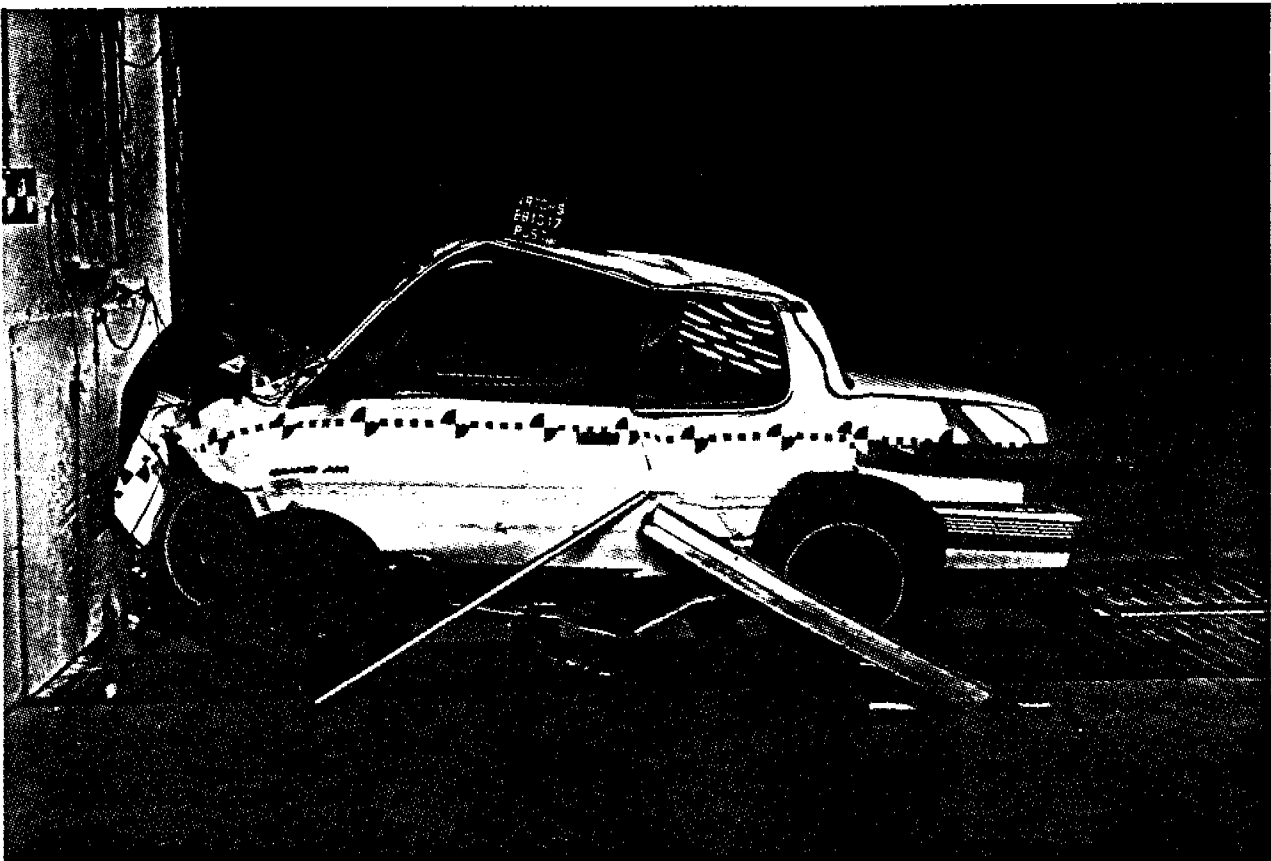


Figure A-39. POST-TEST OVERALL LEFT SIDE VIEW

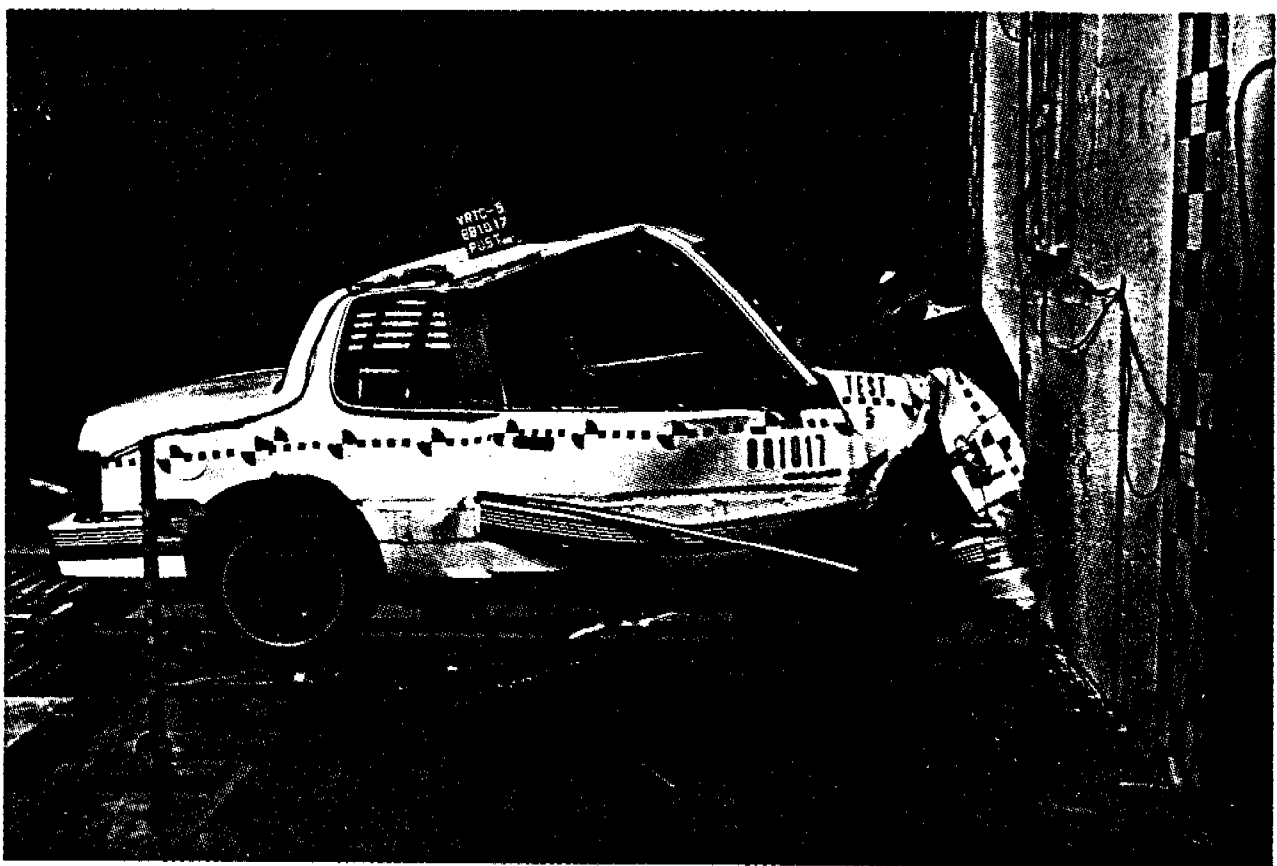


Figure A-40. POST-TEST OVERALL RIGHT SIDE VIEW



Figure A-41. POST-TEST OVERALL FRONT VIEW

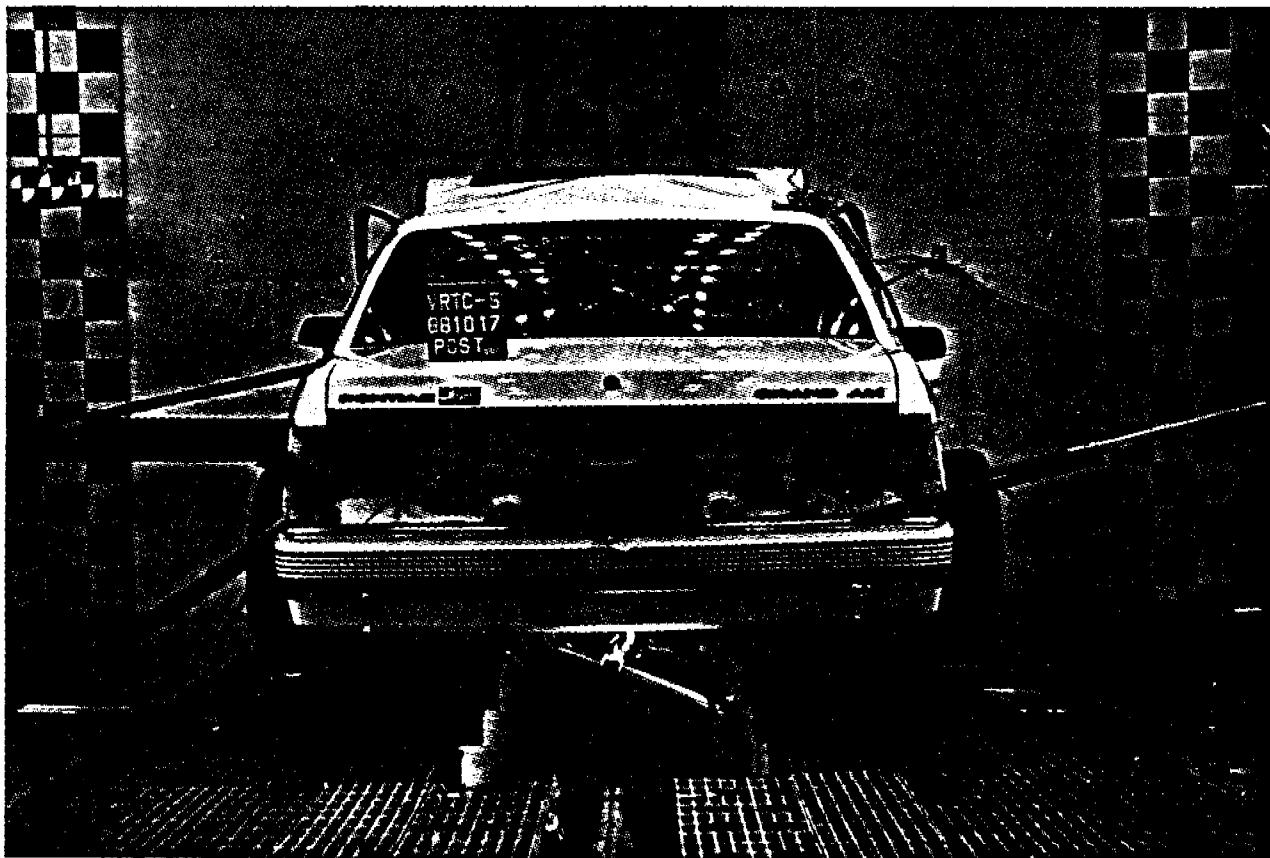


Figure A-42. POST-TEST OVERALL REAR VIEW

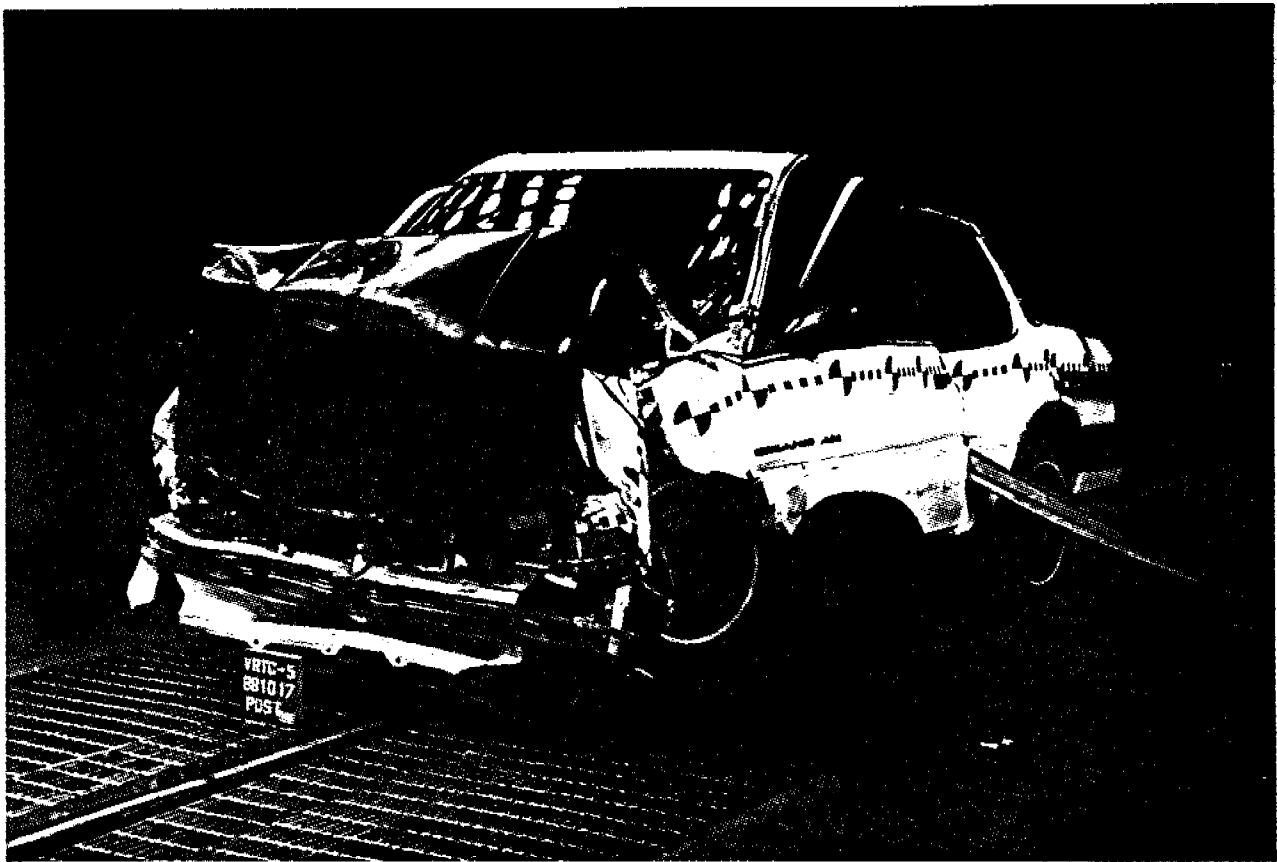


Figure A-43. POST-TEST LEFT FRONT VIEW



Figure A-44. POST-TEST RIGHT FRONT VIEW

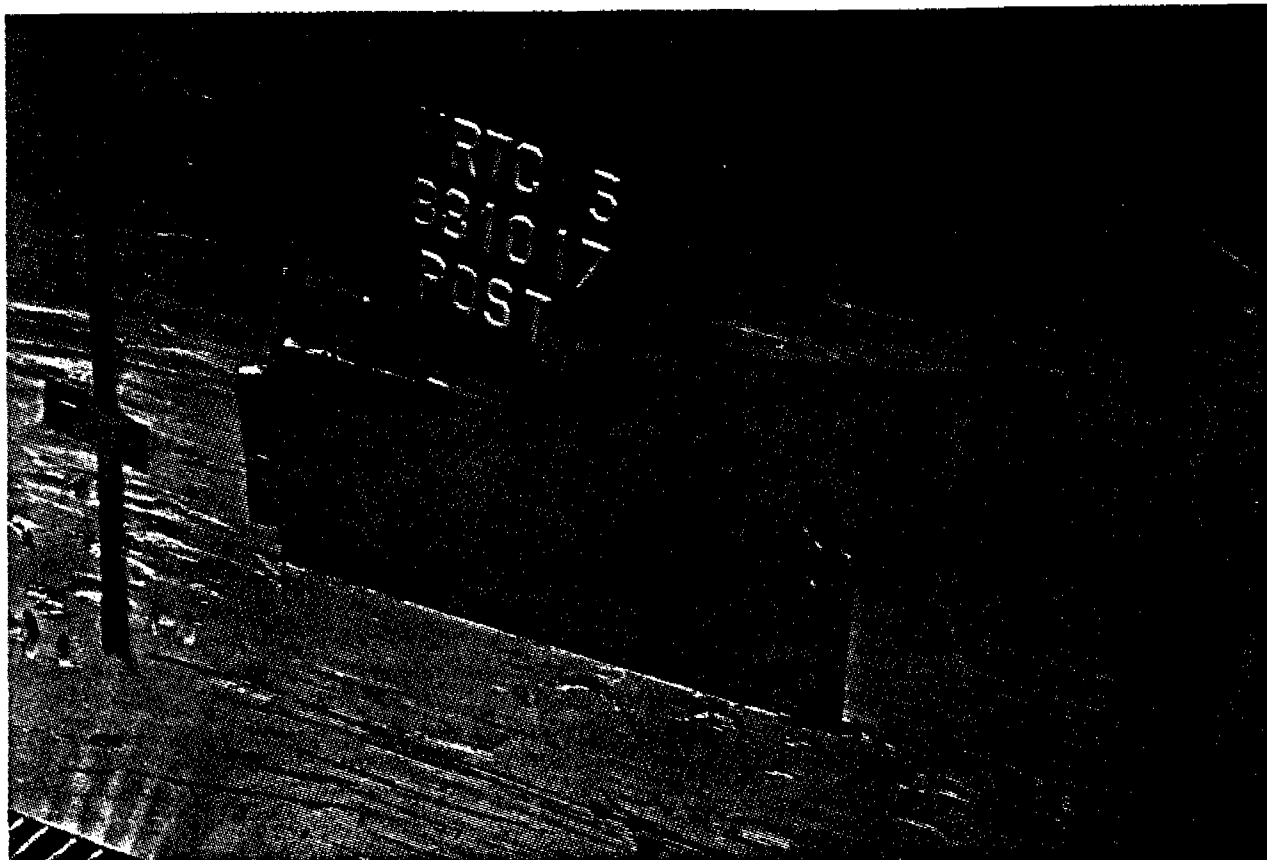


Figure A-45. POST-TEST BARRIER CONTACT SWITCH

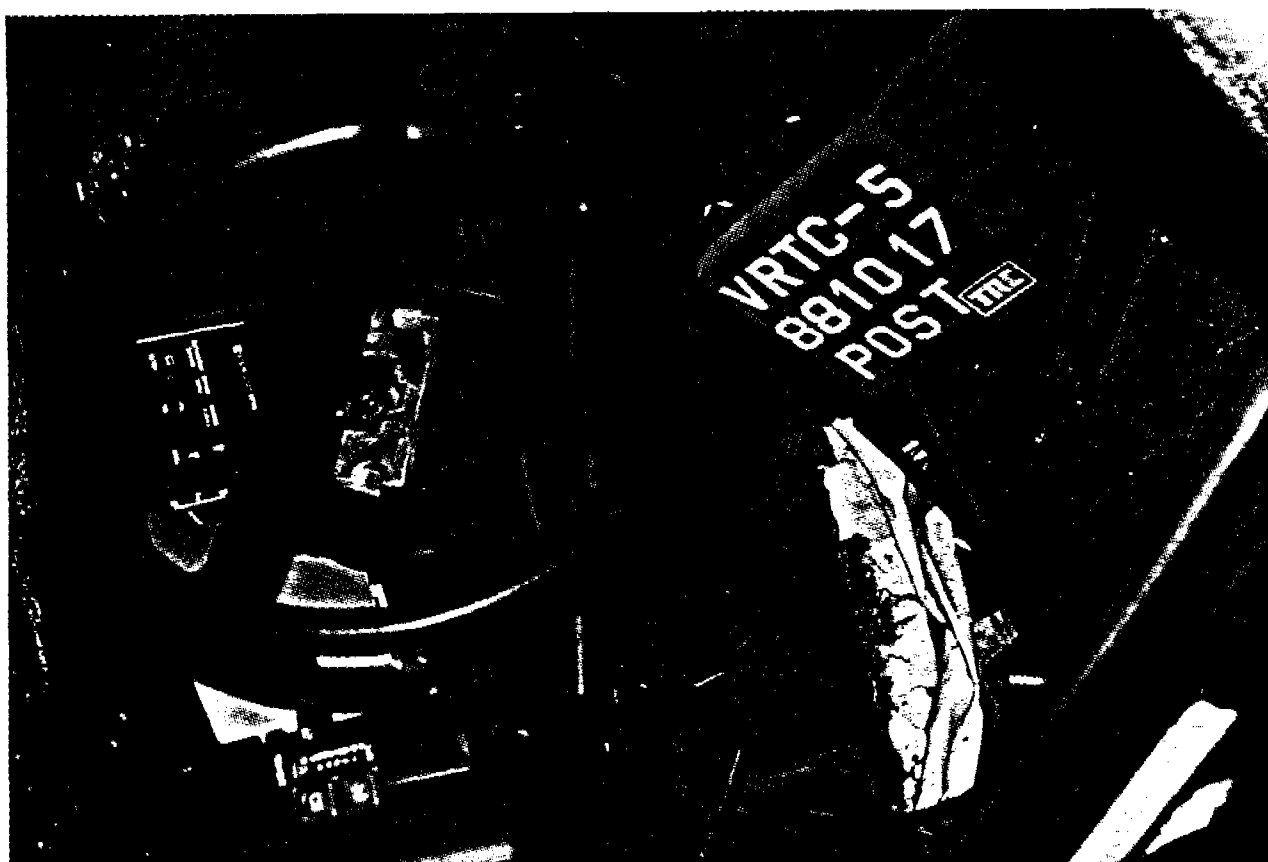


Figure A-46. POST-TEST VEHICLE CLOSEUP - VIEW 1

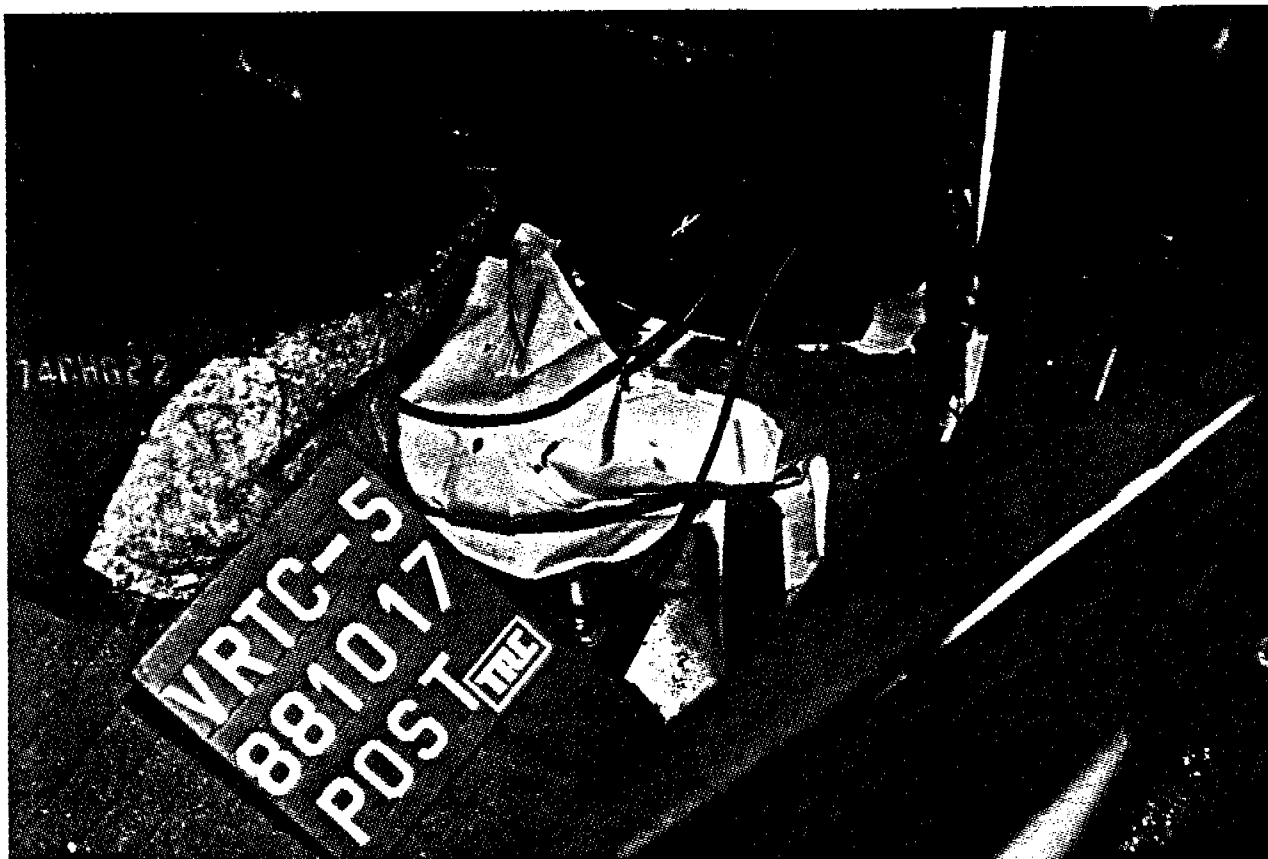


Figure A-47. POST-TEST VEHICLE CLOSEUP - VIEW 2

APPENDIX B
DATA PLOTS

VRTC-1 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

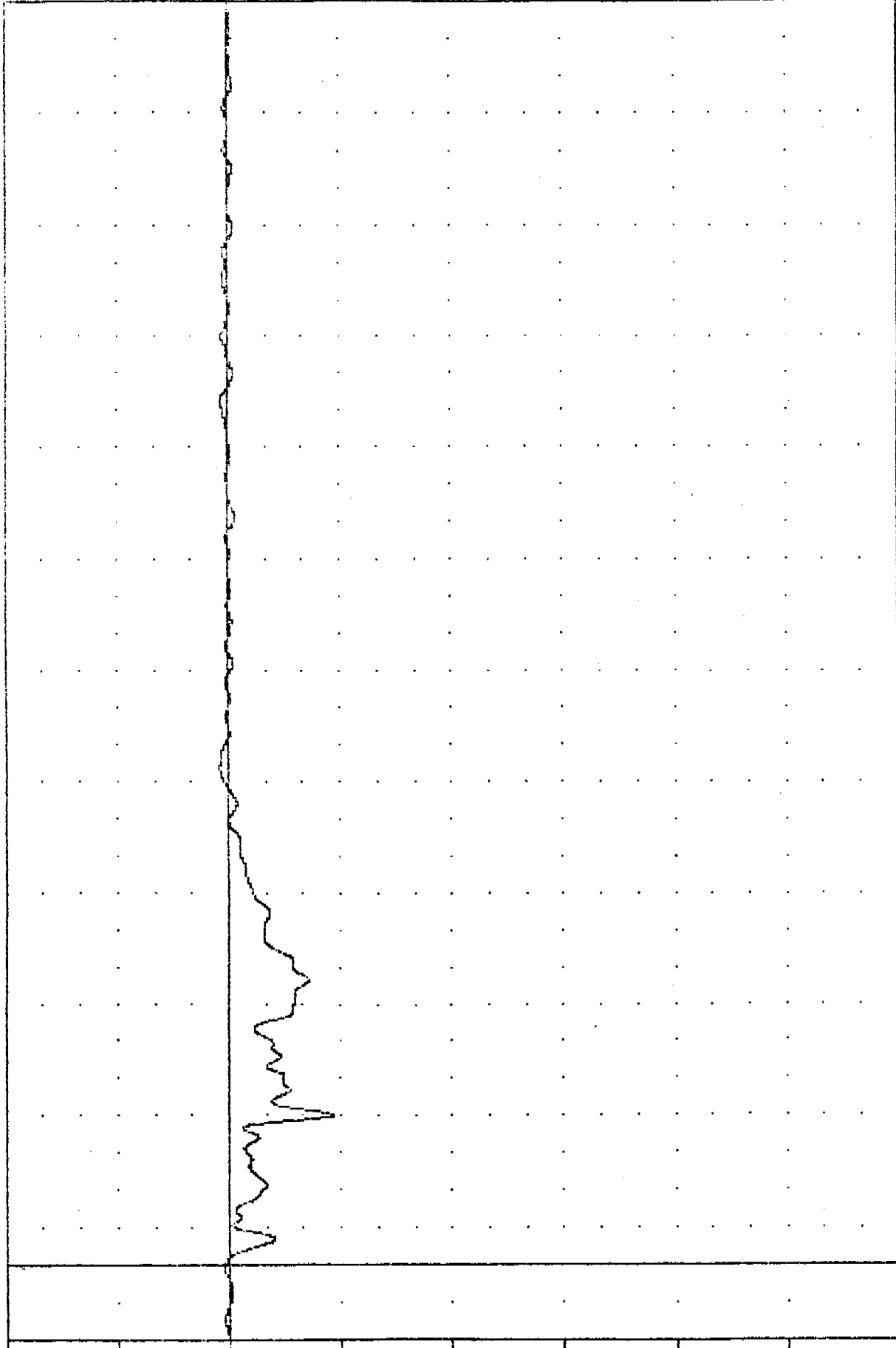
FILTER = BLPP 100/ 250/ -16

FFRXG

MIN. MAX VALUES = -13.94e

30.00 , 1.12 e 133.63

ACCELERATION (G)



TIME (msec)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
VEHICLE LEFT FRAME RAIL FRONT X AXIS ACCELERATION

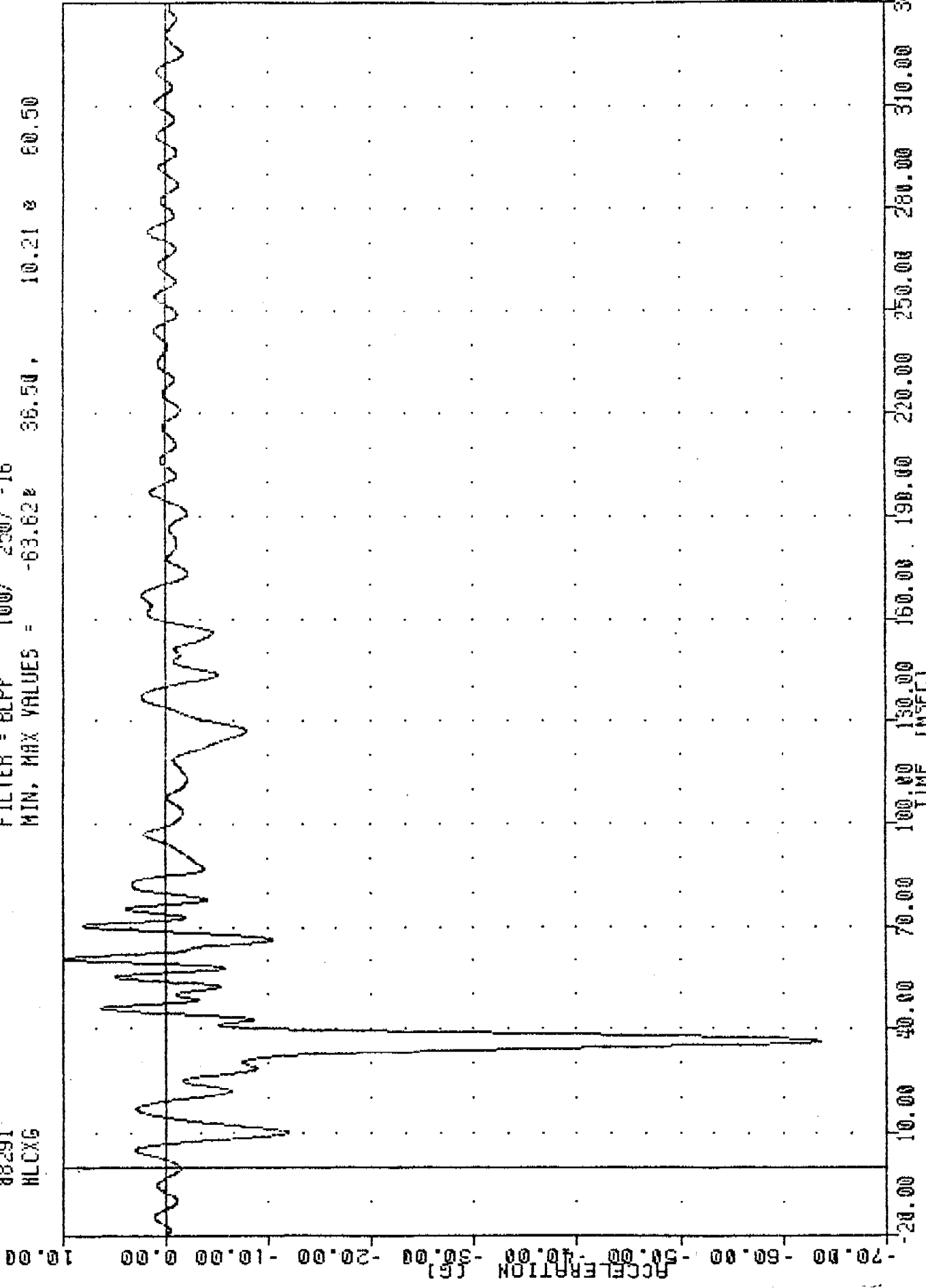
VRTC-1 , 881017
DAMAGE ALGORITHM REFORMULATION

88291

HLCXG

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -63.62 36.50, 10.21 60.50



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
VEHICLE HOOD LATCH CROSSMEMBER X AXIS ACCELERATION

VRIC-1 , 881017

DAMAGE ALGORITHM REFORMULATION

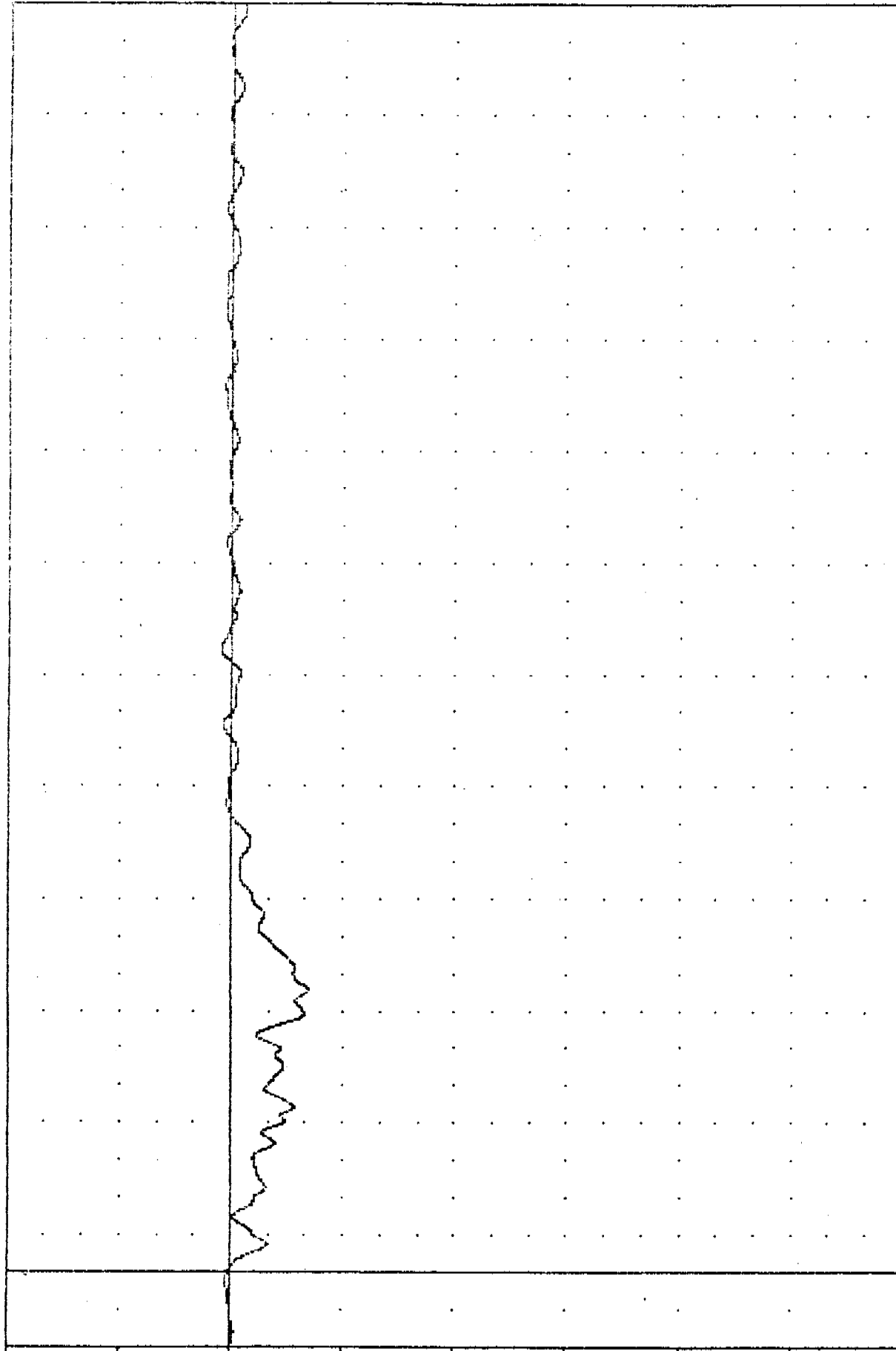
88291

FILXG

FILTER = BLPF 100/ 350/ -16

MIN. MAX VALUES = -10.46% 75.80, 1.96 & 166.50

ACCELERATION (G)



TIME (msec)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
VEHICLE LEFT FENDER WELL INSIDE X AXIS ACCELERATION

VID-1
DAMAGE ALGORITHM REFORMULATION

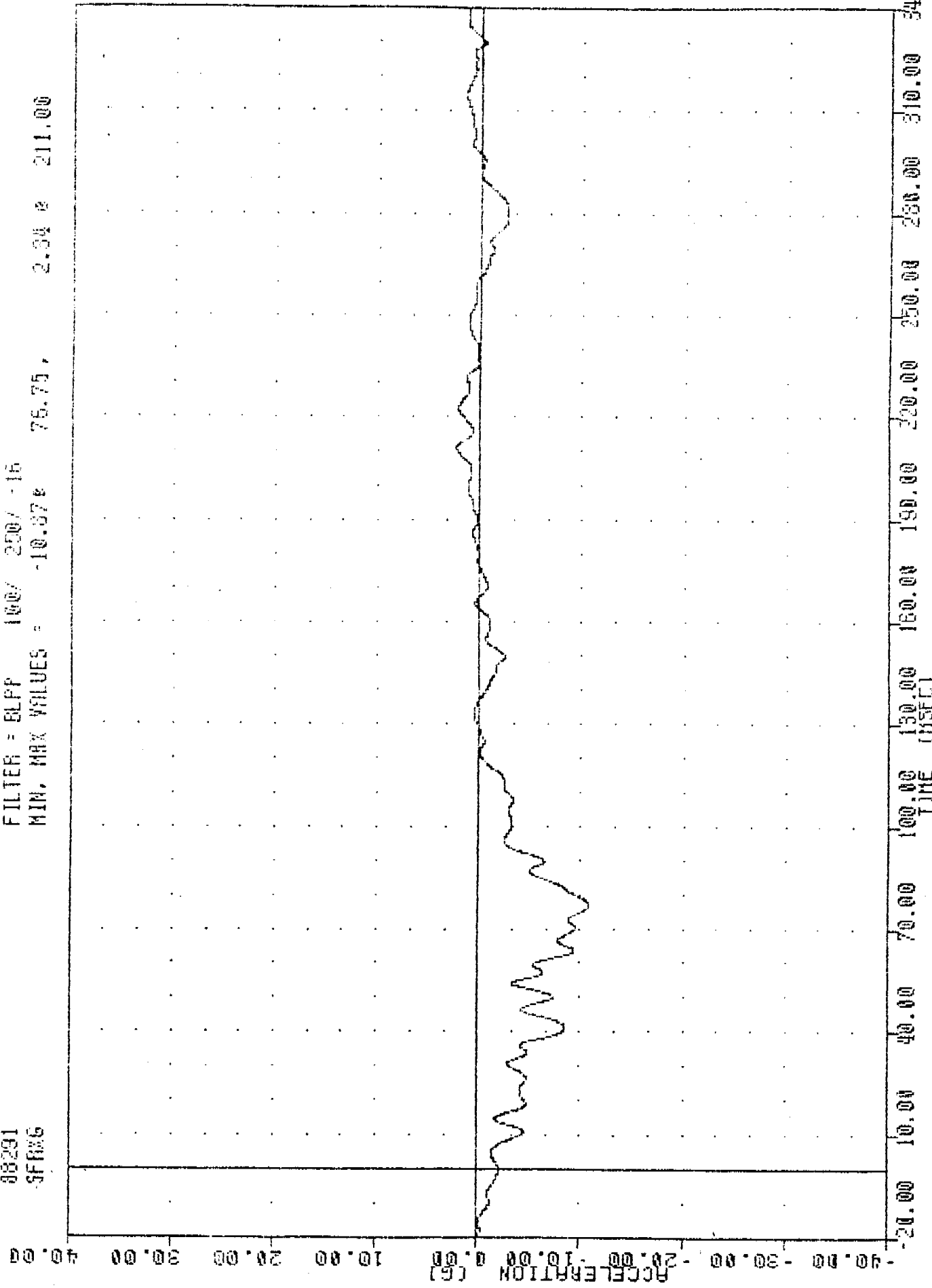
88291

SFRAG

881017

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -10.37e 75.75, 2.34 e 211.00



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
VEHICLE SUSPENSION FRONT RIGHT X AXIS ACCELERATION

VRTO-1 661017

DAMAGE ALGORITHM REFORMULATION

88291

ROKXG1

FILTER = BLFF 1307 2507 -15

MIN. MAX VALUES = -9.000

70.13,

0.43 2 254.63

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

-40.00

-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

INSECT

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE REAR DECK X AXIS ACCELERATION

WATC-1 . 881017
DAMAGE ALGORITHM REFORMULATION

88291

ADKXVI

FILTER = ELPP 100/ 250/ -16

MIN. MAX VALUES =

-2.346

214.68,

10.01 0

2.63

25.00

20.00

15.00

10.00

5.00

0.00

-5.00

-10.00

-15.00

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)

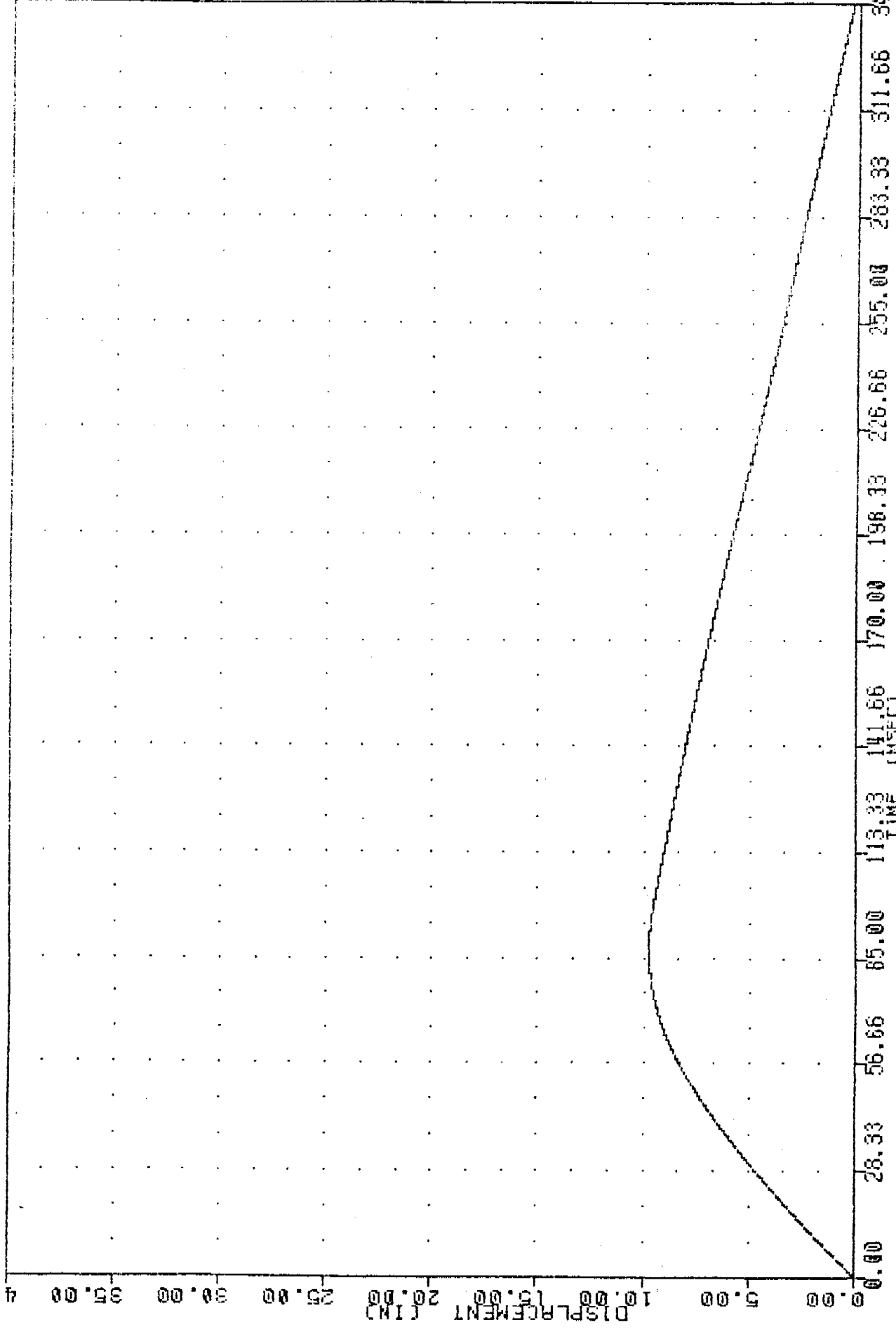
VELOCITY (MPH)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE REAR DECK X AXIS VELOCITY

VRIC-1
 DAMAGE ALGORITHM REFORMULATION

88291
 ADKXD1
 FILTER = ELFF 100/ 250/ -16
 MIN, MAX VALUES = 0.000 0.00 0.74 0 06.50



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
 VEHICLE REAR DECK X AXIS DISPLACEMENT

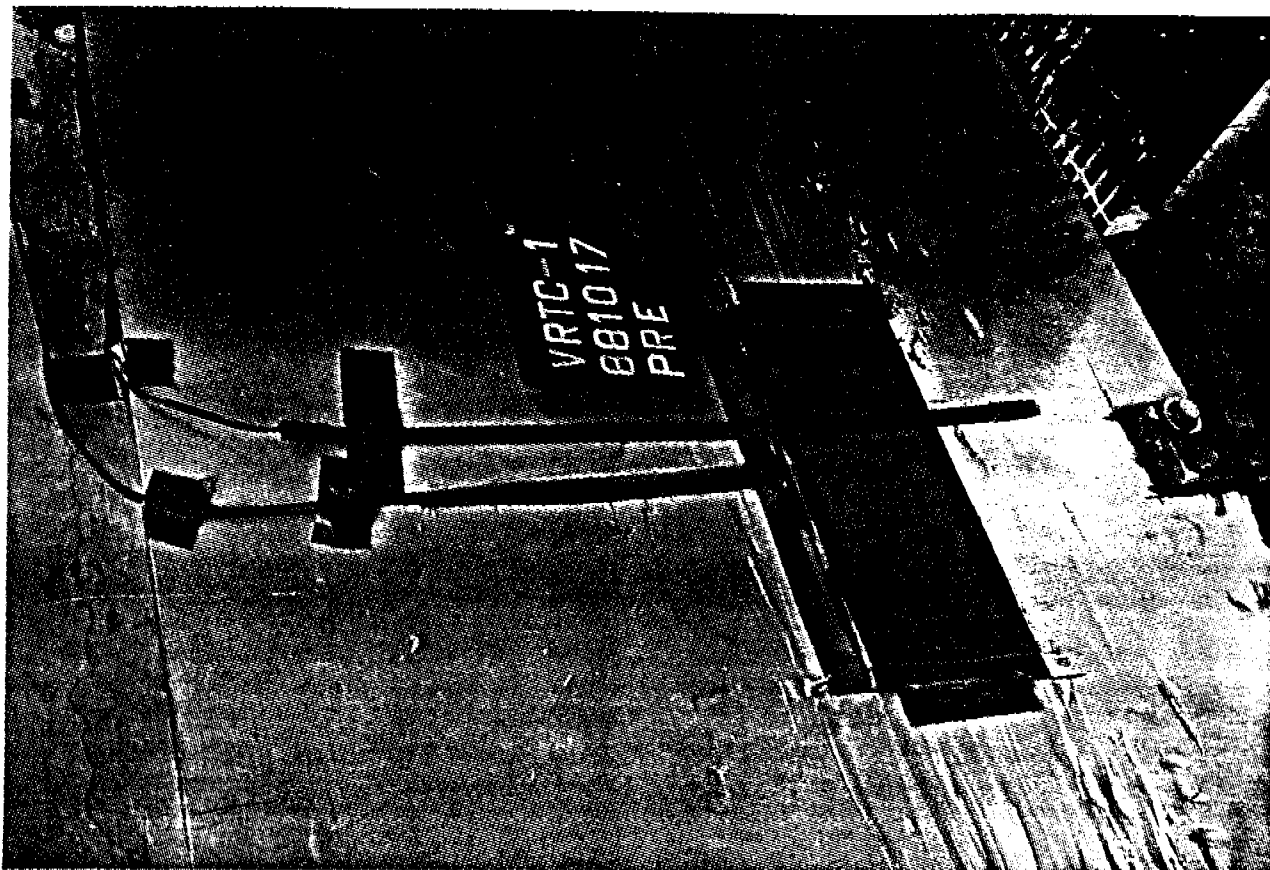


Figure A-13. PRE-TEST BARRIER CONTACT SWITCH

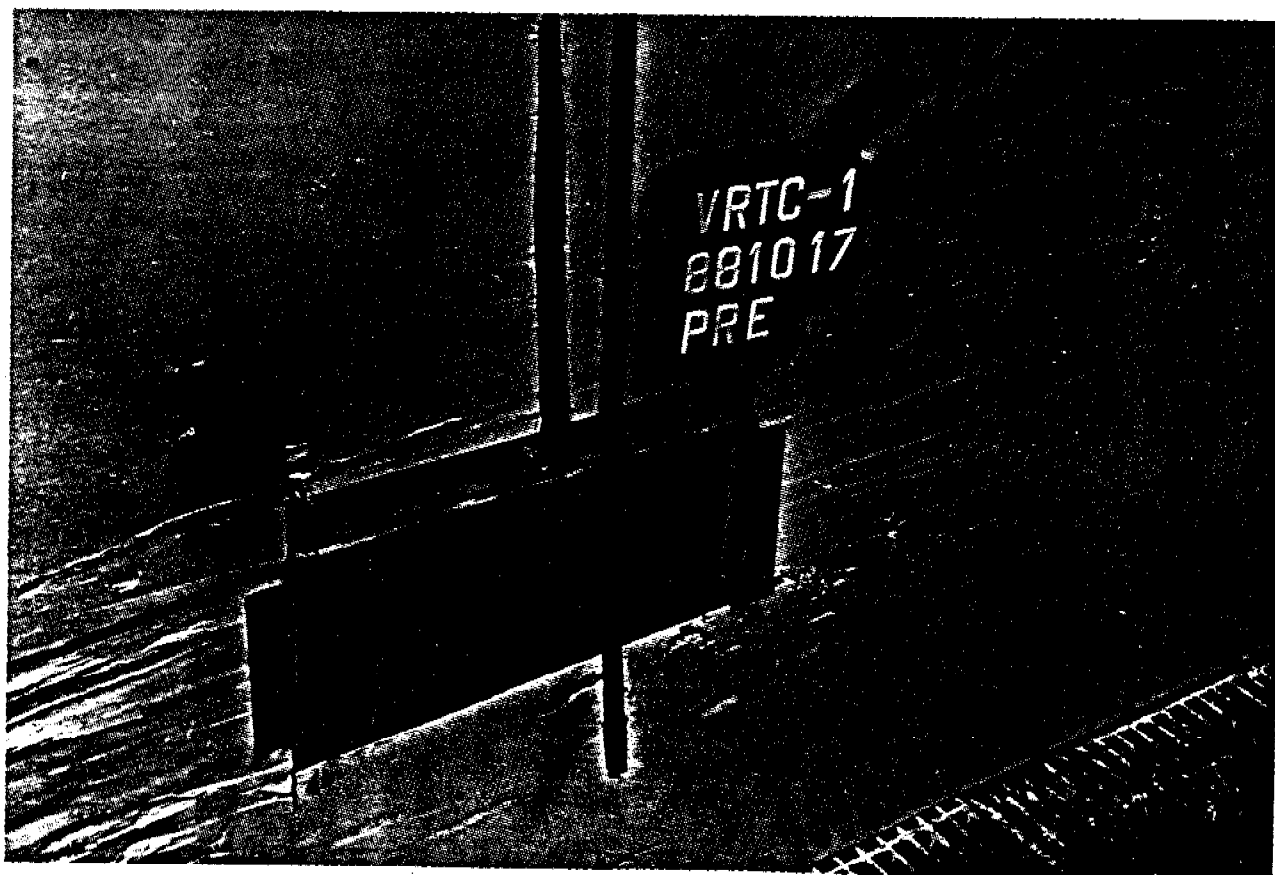


Figure A-14. PRE-TEST BARRIER CONTACT SWITCH

TEST #881017-2
LIST OF PHOTOGRAPHS

15. POST-TEST OVERALL LEFT SIDE VIEW
16. POST-TEST OVERALL RIGHT SIDE VIEW
17. POST-TEST OVERALL FRONT VIEW
18. POST-TEST OVERALL REAR VIEW
19. POST-TEST LEFT FRONT VIEW
20. POST-TEST RIGHT FRONT VIEW



Figure A-15. POST-TEST OVERALL LEFT SIDE VIEW

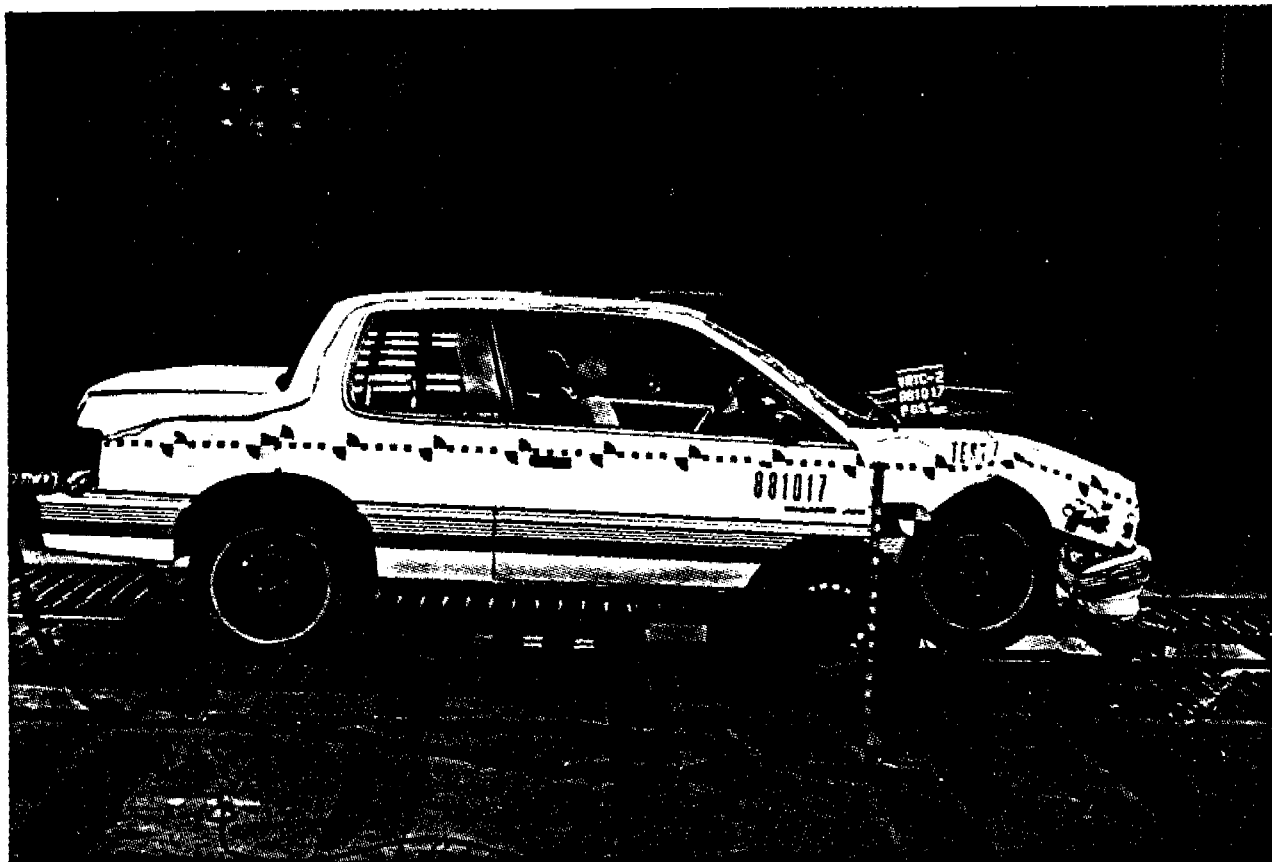


Figure A-16. POST-TEST OVERALL RIGHT SIDE VIEW

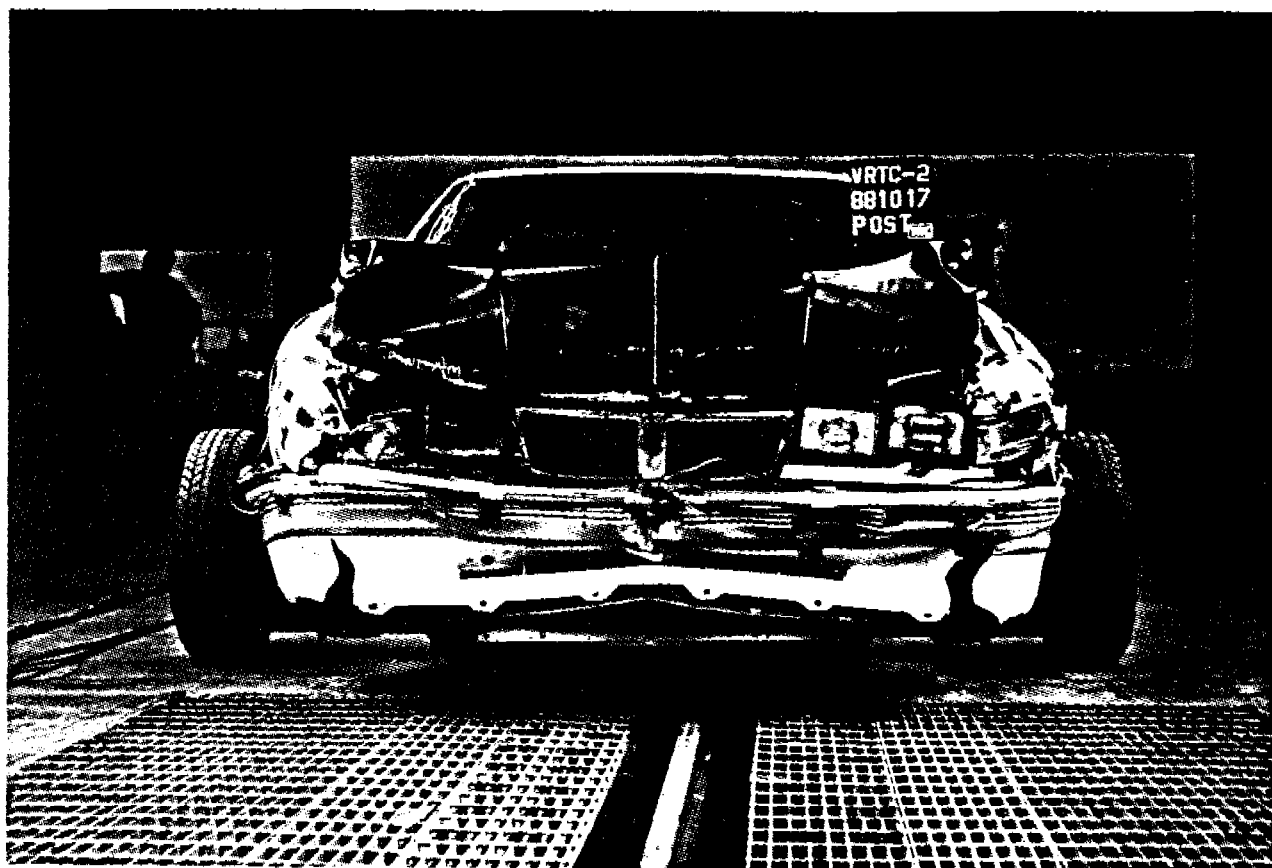


Figure A-17. POST-TEST OVERALL FRONT VIEW

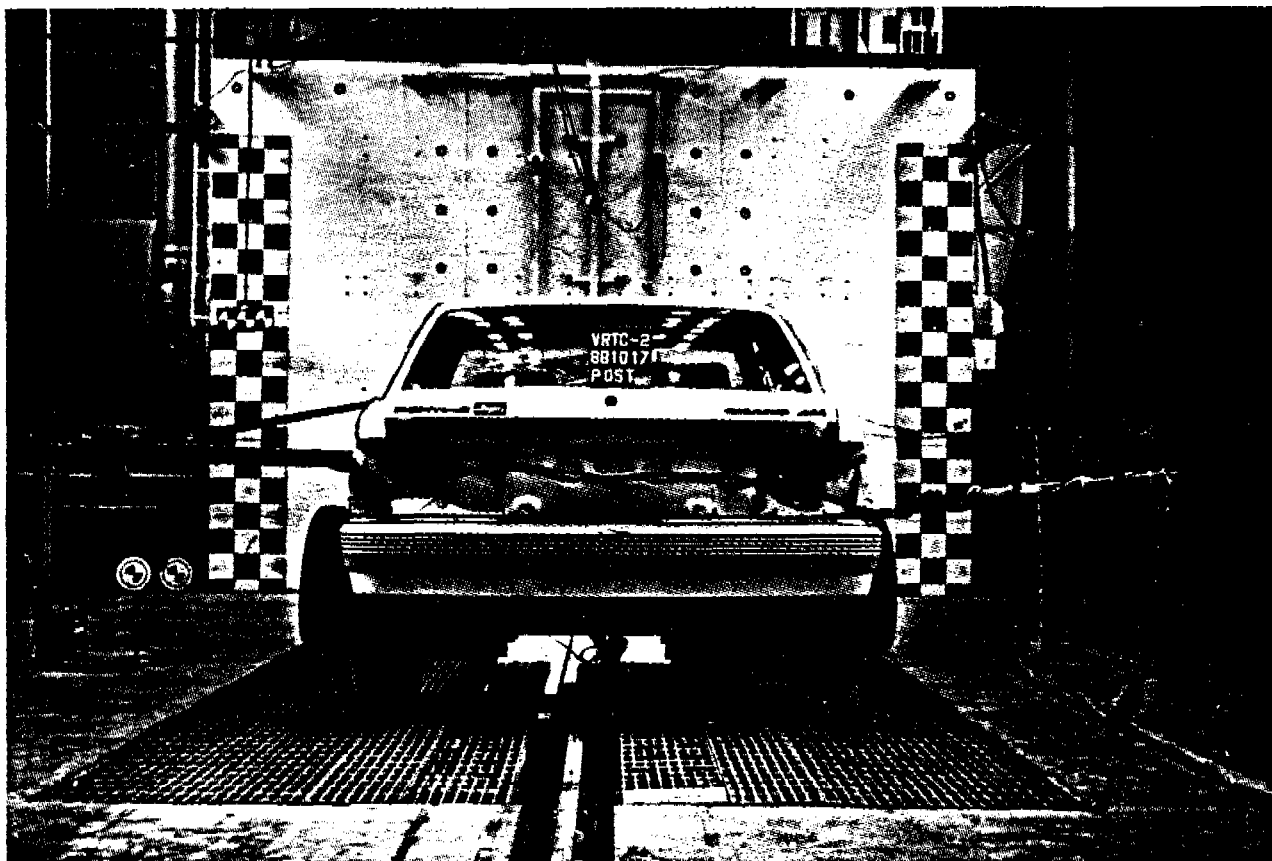


Figure A-18. POST-TEST OVERALL REAR VIEW

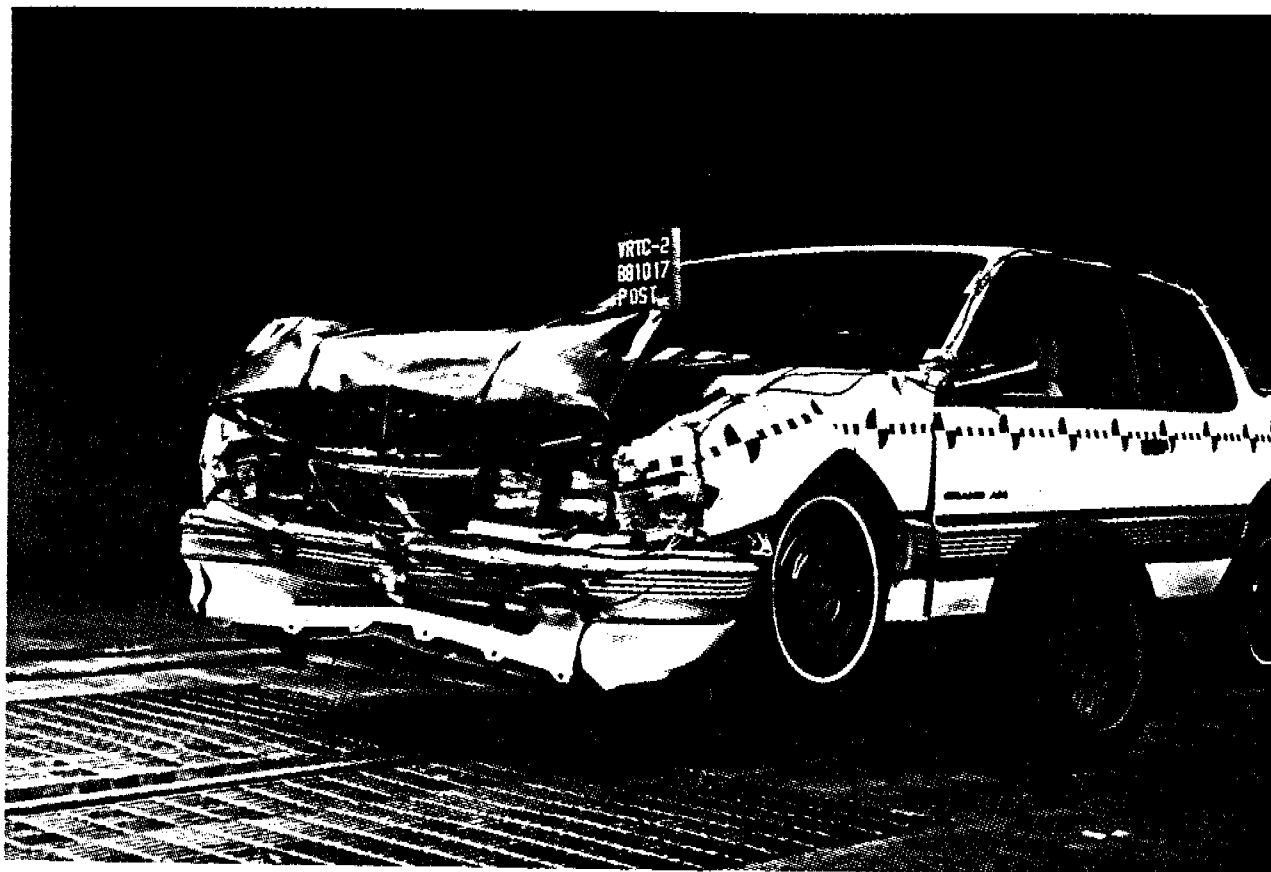


Figure A-19. POST-TEST LEFT FRONT VIEW



Figure A-20. POST-TEST RIGHT FRONT VIEW

TEST #881017-3
LIST OF PHOTOGRAPHS

21. POST-TEST OVERALL LEFT SIDE VIEW
22. POST-TEST OVERALL RIGHT SIDE VIEW
23. POST-TEST OVERALL FRONT VIEW
24. POST-TEST OVERALL REAR VIEW
25. POST-TEST LEFT FRONT VIEW
26. POST-TEST RIGHT FRONT VIEW
27. POST-TEST VEHICLE CLOSE-UP - VIEW 1
28. POST-TEST VEHICLE CLOSE-UP - VIEW 2
29. POST-TEST VEHICLE CLOSE-UP - VIEW 3
30. POST-TEST VEHICLE CLOSE-UP - VIEW 4

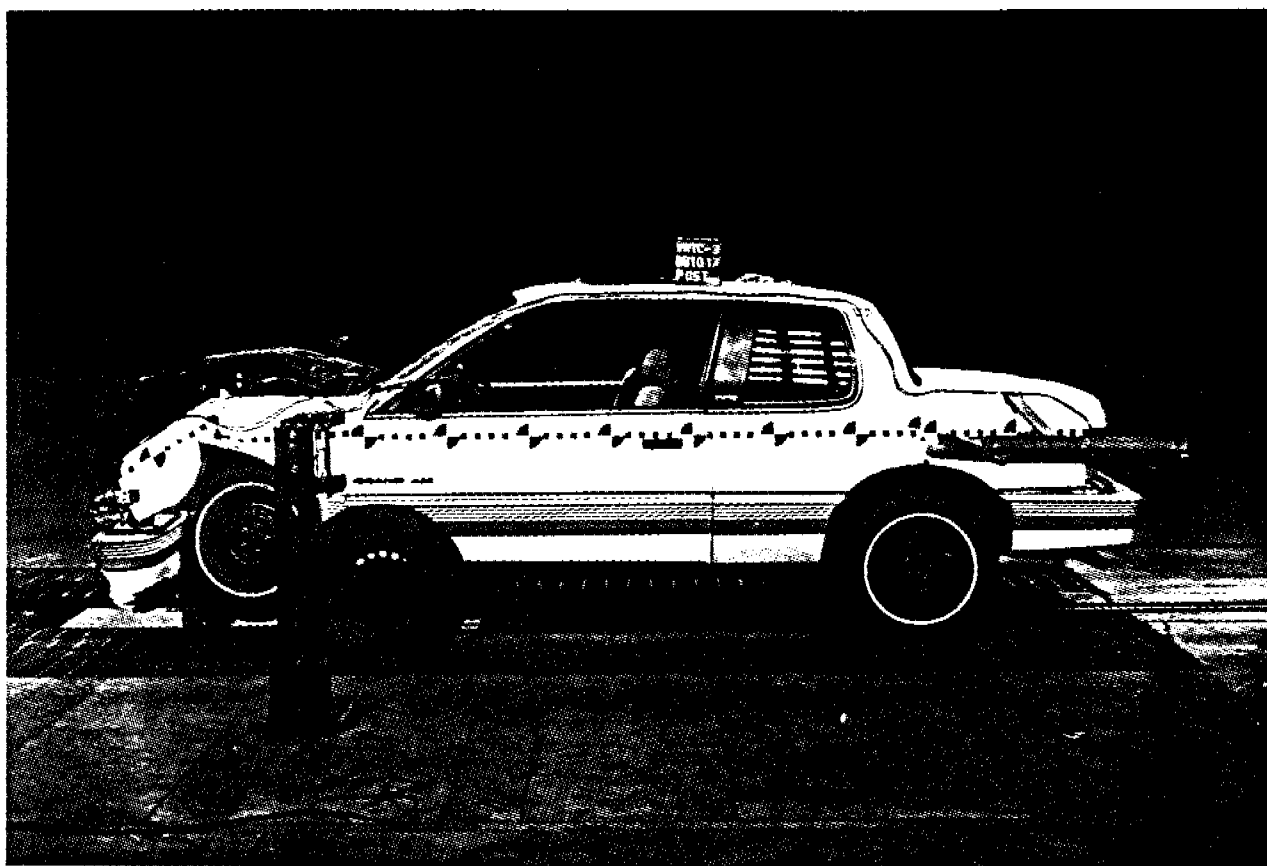


Figure A-21. POST-TEST OVERALL LEFT SIDE VIEW

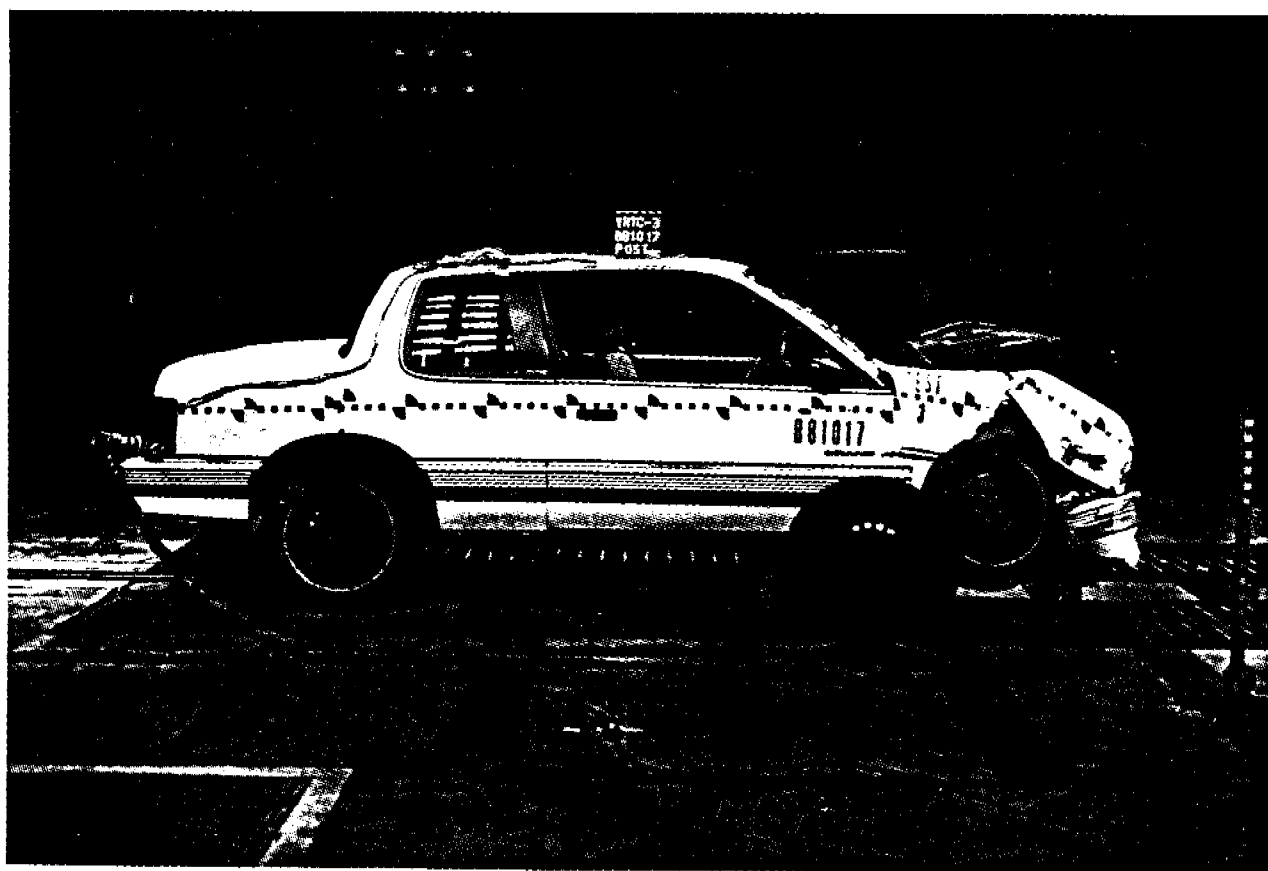


Figure A-22. POST-TEST OVERALL RIGHT SIDE VIEW

88291

ADKXGR

88291

FILTER = BLPP

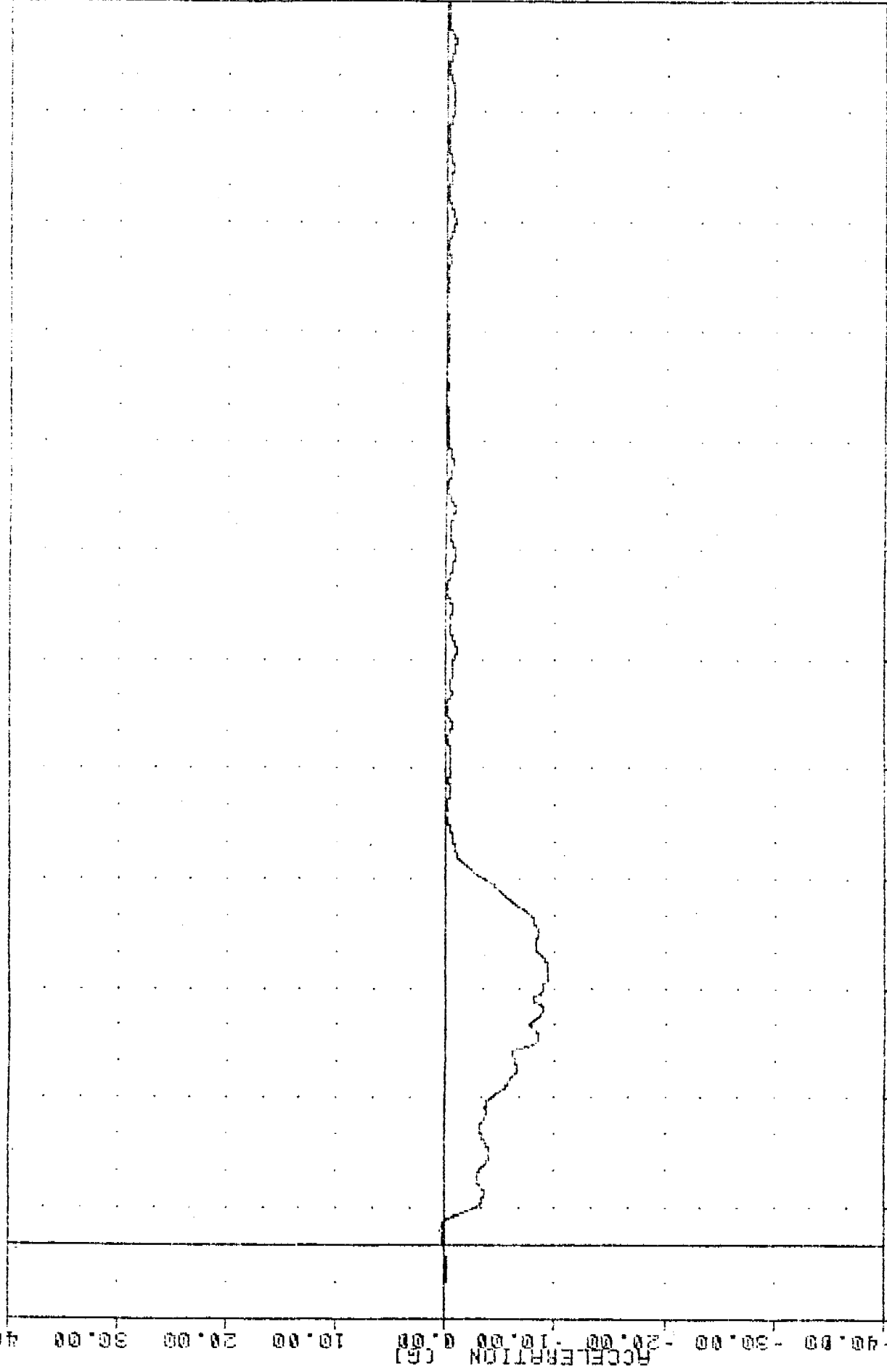
1007 2007 15

MIN. MAX VALUES =

72.50

0.00

3.75



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE REAR DECK X AXIS REDUNDANT ACCELERATION

VRIC-1 , 881017
DAMAGE ALGORITHM REFORMULATION

88291

ADKXWH

FILTER - BLPP 100/ 050/ 115

MIN. MAX VALUES = -4.002 340.00, 10.00 6.19

25.00

20.00

15.00

10.00

5.00

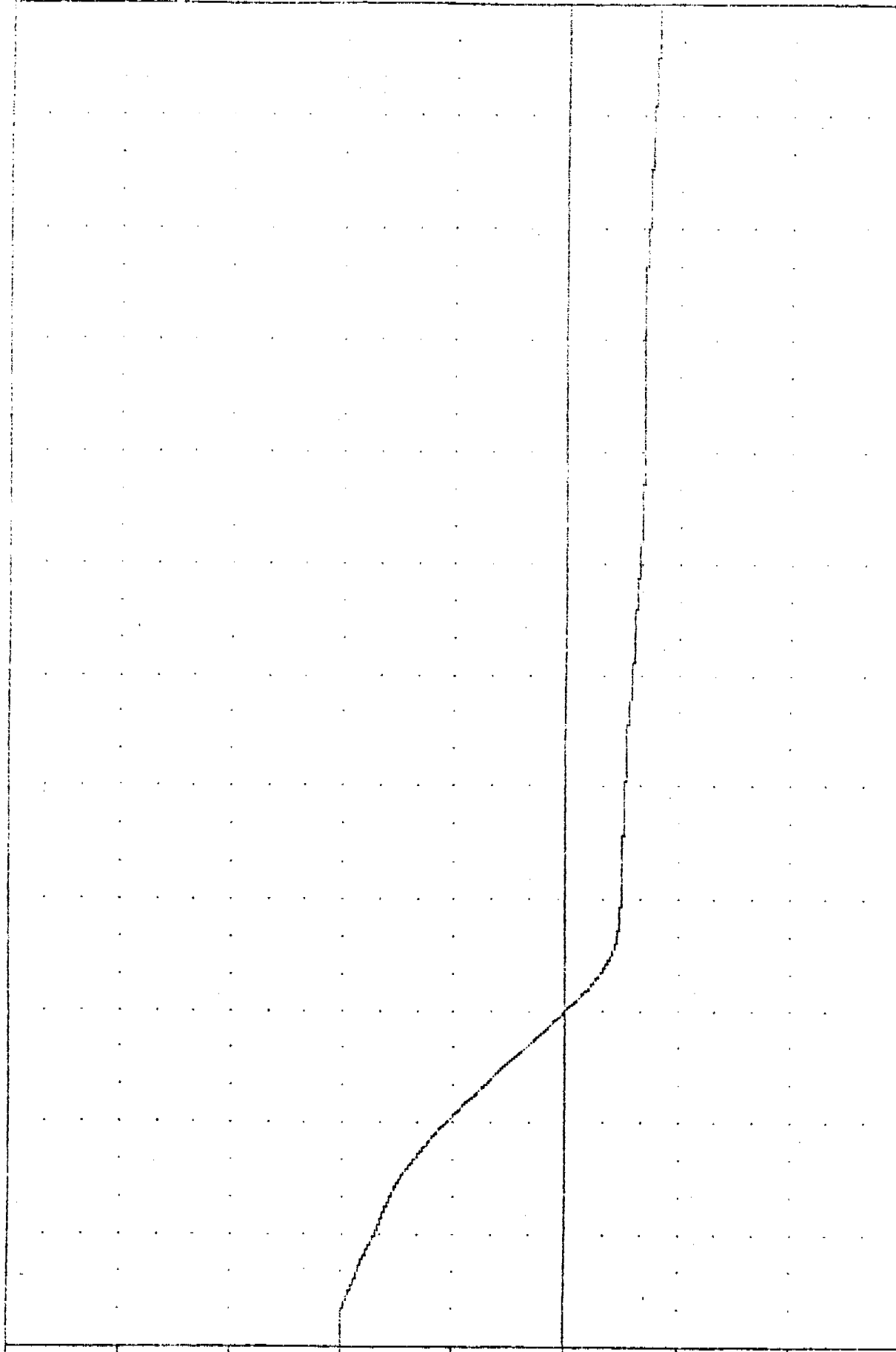
0.00

-5.00

-10.00

-15.00

VELOCITY (MPH)



0.00

25.00

50.00

75.00

100.00

125.00

150.00

170.00

195.00

220.00

245.00

270.00

295.00

320.00

340.00

TIME (SECT)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE REAR DECK X AXIS VELOCITY REDUNDANT

DATE - 1 881017
DAMAGE ALGORITHM REFORMULATION

88291
ADKXDA

FILTER = BLPP 100/ 250/ 10

MIN, MAX VALUES = -4.50E 150.00, 9.78E 35.00

40.00

35.00

30.00

25.00

20.00

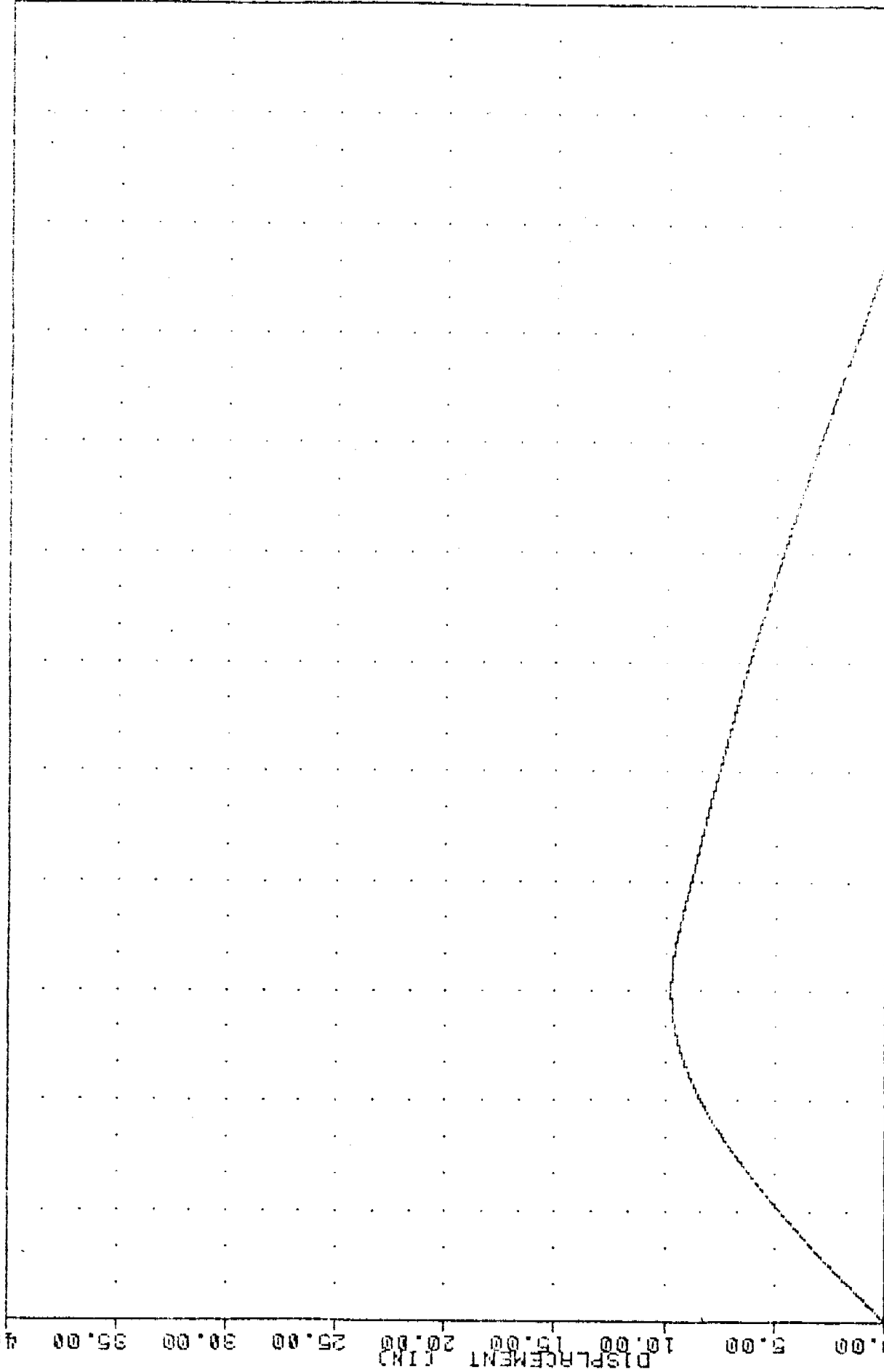
15.00

10.00

5.00

0.00

DISPLACEMENT (IN)



0.00

28.33

35.00

65.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

TIME (SECT)

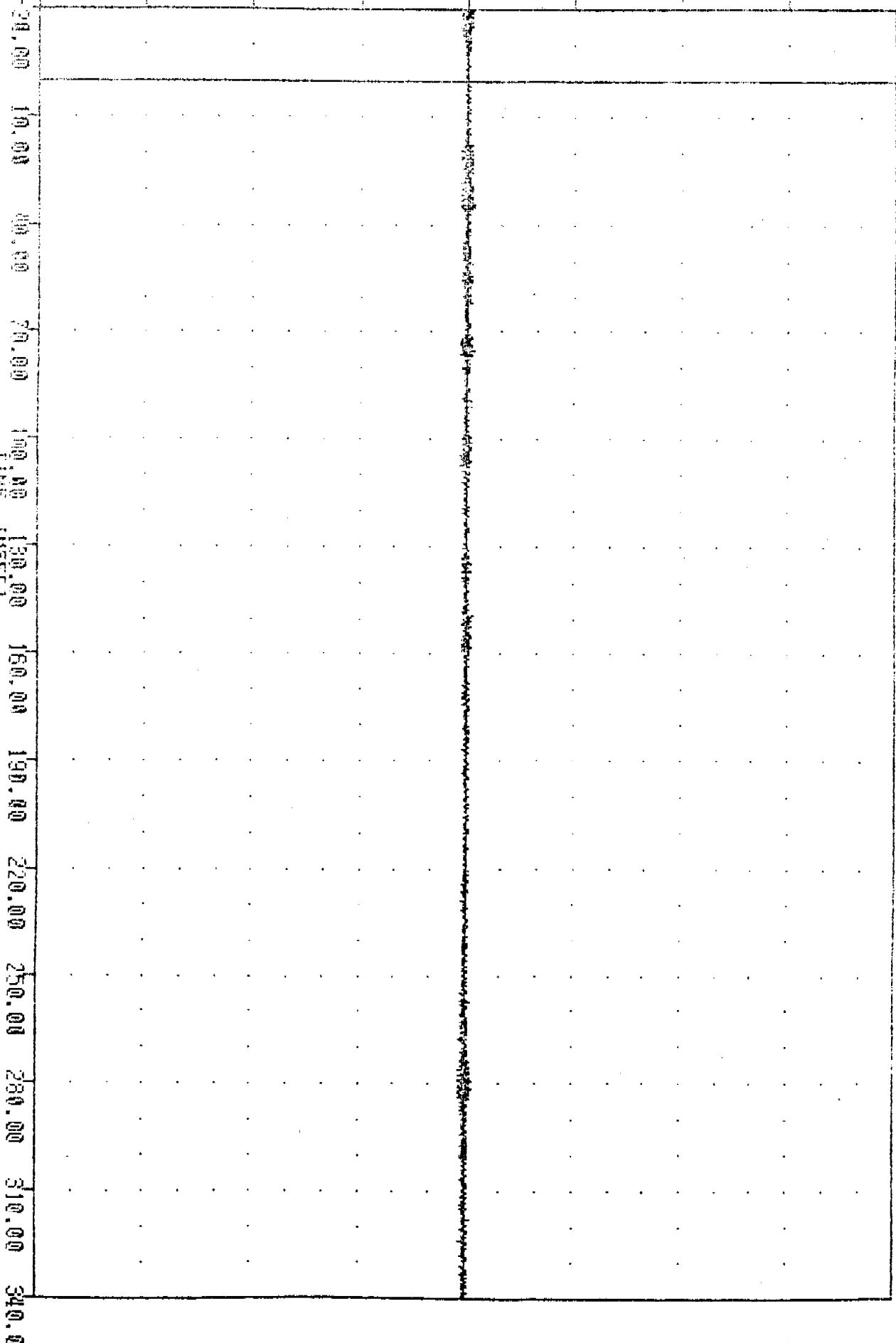
1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE REAR DECK X AXIS DISPLACEMENT REDUNDANT

FILED:1 001017
 NUMBER ALLOCATION REFORMATION

08291
 FILED
 FILTER = ALFF 1650/ 5214/ -90
 MIN, MAX VALUES = -0.17e 31.00, 0.17 e 74.88

VOLTAGE (VOLTS)
 10.00 7.50 5.00 2.50 0.00 2.50 5.00 7.50 10.00



1985 CONTINUED GROUND ON INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
 VEHICLE LEFT FENDER WELL INSIDE SENSOR -1

WRTC-1, 881017

DAMAGE ALGORITHM REFORMULATION

90291

FILS2

FILTER = RUFF 1650 5000/40

NIN, MAX VALUES = 8.000

27.75,

9.07 e

22.13

10.00

7.50

5.00

2.50

0.00

-2.50

-5.00

-7.50

-10.00

-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE LEFT FENDER WRT INFLATOR SENSOR 23

VRTO-1 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

UTH1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.23 8.61

0.60 137.10

12.00

9.00

6.00

3.00

0.00

-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)

See TEST ANOMALIES

-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
VEHICLE CONTACT SWITCH - LEFT

VRIC-1 001017

DAMAGE ALGORITHM REFORMULATION

03291

0TH2

FILTER = HLPF 1650/ 52147 -48

MIN. MAX VALUES = -10.00F 1.00F

0.30E 117.63

12.00

9.00

6.00

3.00

0.00

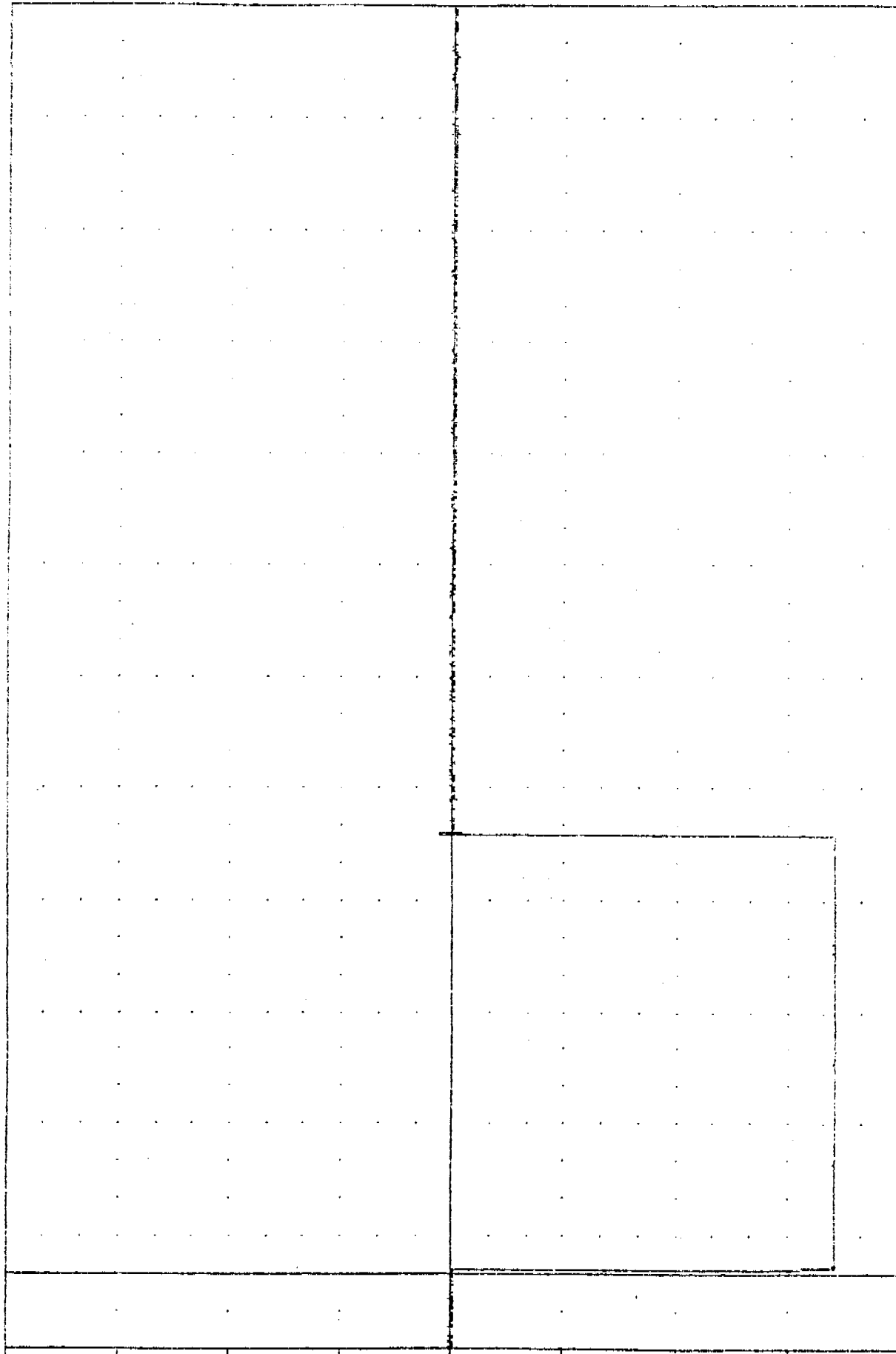
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLTS)



-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE CONTACT SWITCH - CENTER

ARTC-1 .881617

DAMAGE ALGORITHM REFORMULATION

88291

0TH3

FILTER = ALLP 1650/ 5214/ -40

MIN, MAX VALUES = -10.858

0.25, 0.34 @ 144.13

12.00

9.00

6.00

3.00

0.00

-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLTS)

-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST

VEHICLE CONTACT SWITCH - RIGHT

VR10-1 , 881017
DAMAGE ALGORITHM REFORMULATION

88291

0TH3

FILTER = ALFF 1850/ 5214/ -43

MIN. MAX VALUES = -10.216

13.80,

0.46 8

141.50

12.00

9.00

6.00

3.00

0.00

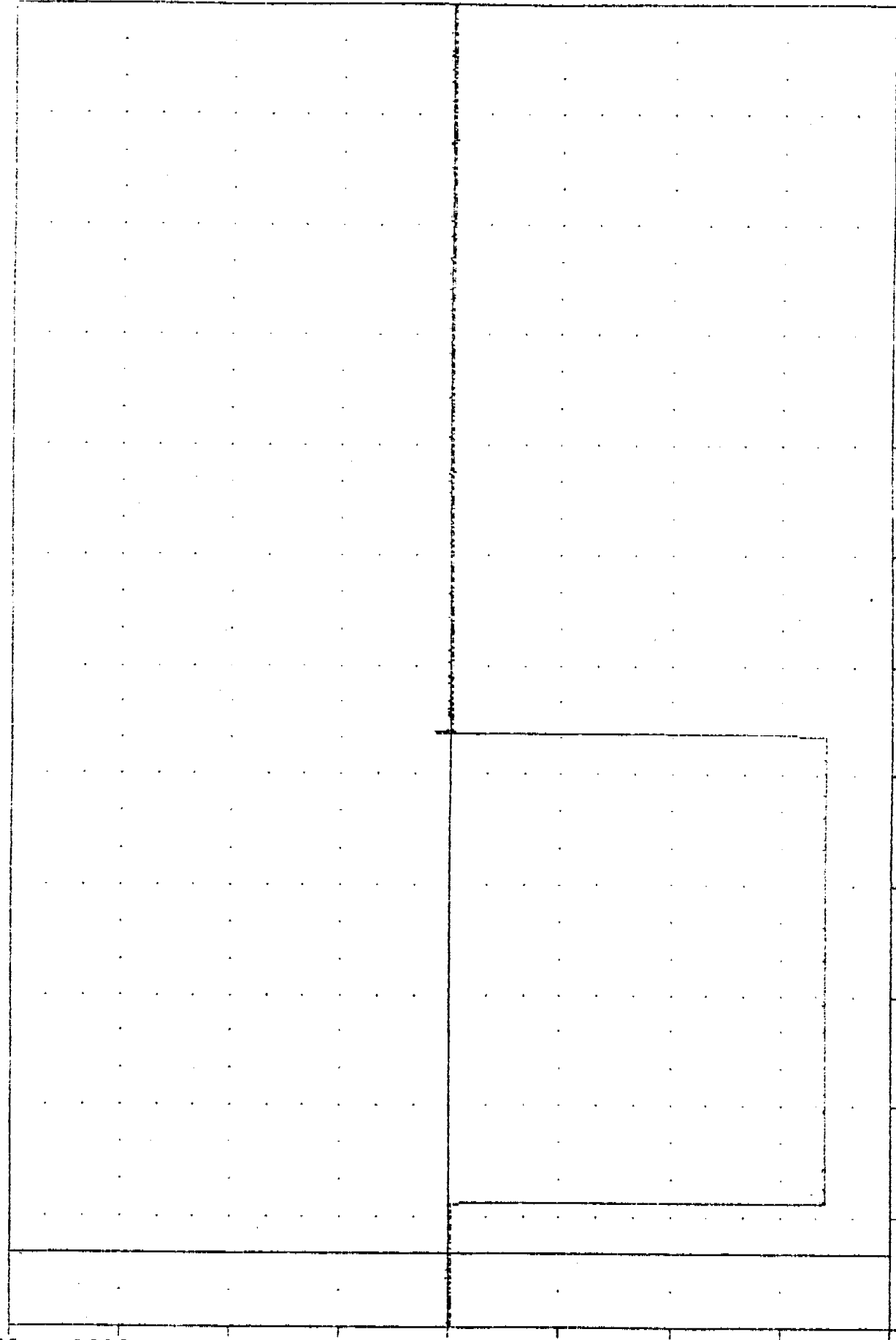
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLTS)



TIME (MSEC)

-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

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 10 MPH FIRST TEST
BARRIER CONTACT SWITCH - LEFT

VRIC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

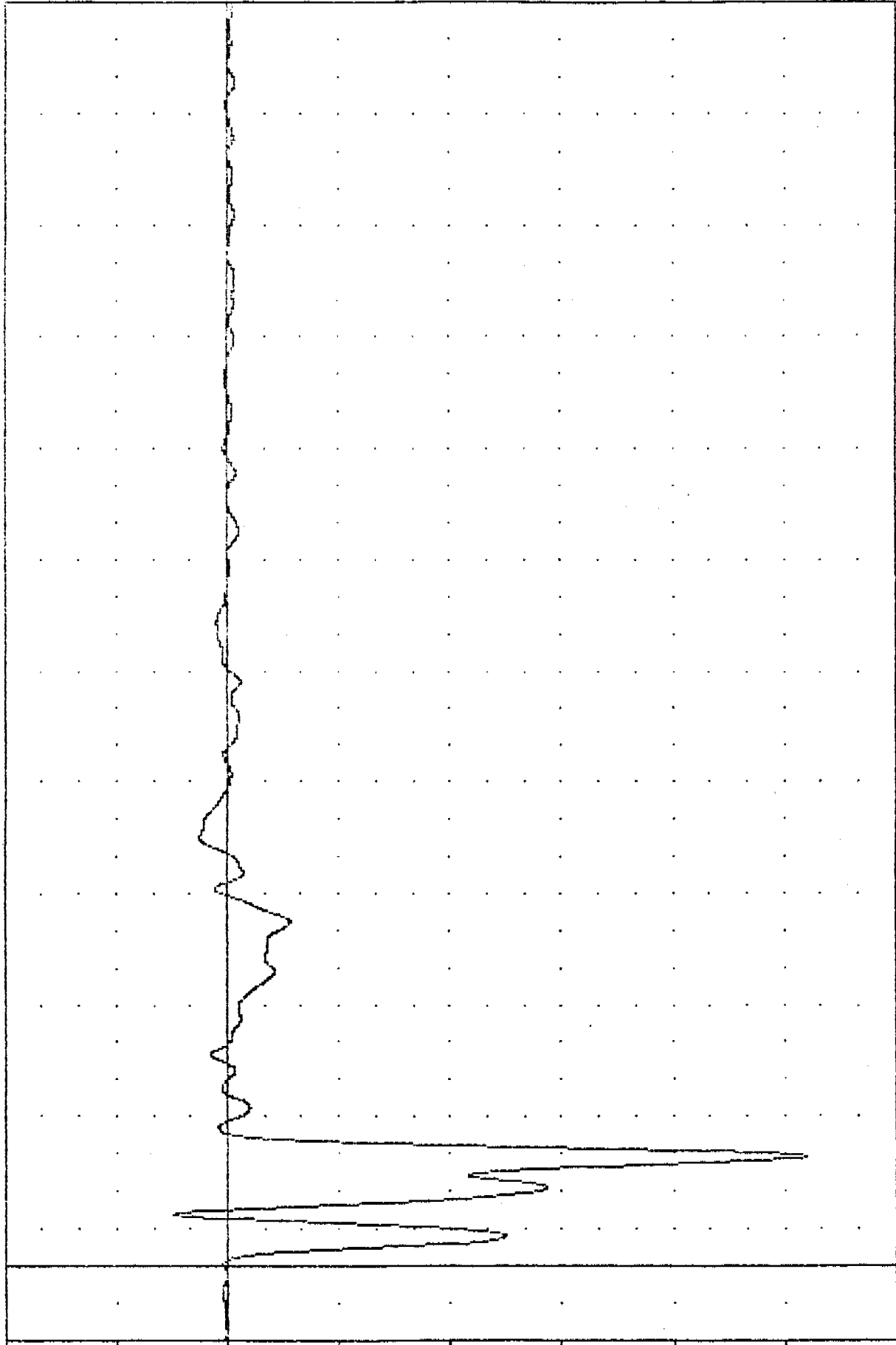
88291

FFRXG

FILTER = BLFF 100/ 250/ -16

MIN. MAX VALUES = -77.62% 29.13, 7.26 % 13.75

ACCELERATION (G)



TIME (msec)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE LEFT FRAME RAIL FRONT X AXIS ACCELERATION

VRIC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

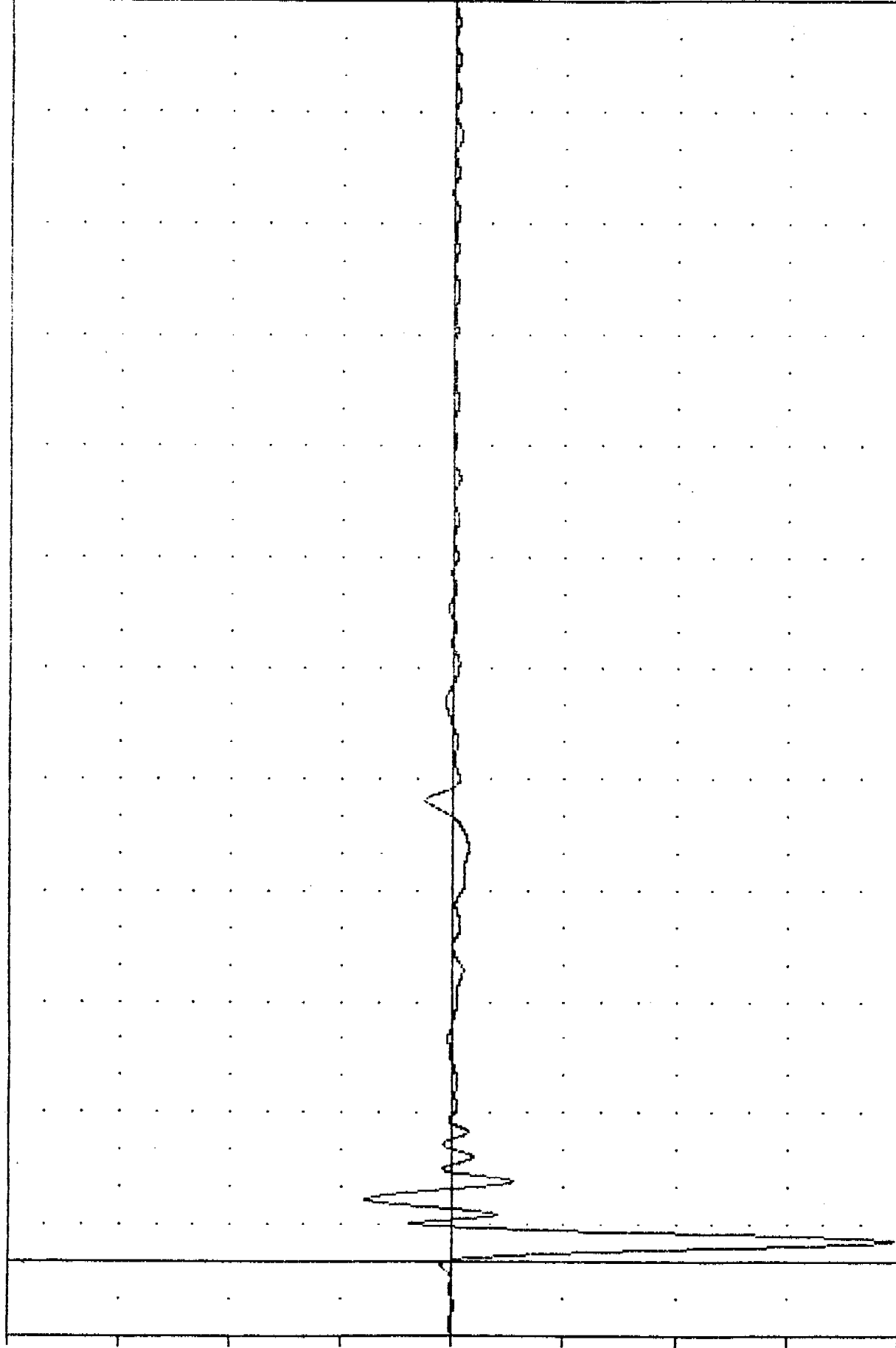
88291

HLCXG

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -197.56 5.50 39.43 16.63

ACCELERATION (G)



TIME (MSEC)

-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

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
VEHICLE HOOD LATCH CROSSMEMBER X AXIS ACCELERATION

YRTC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

FILX6

FILTER = BLPP 100/ 250/ -18

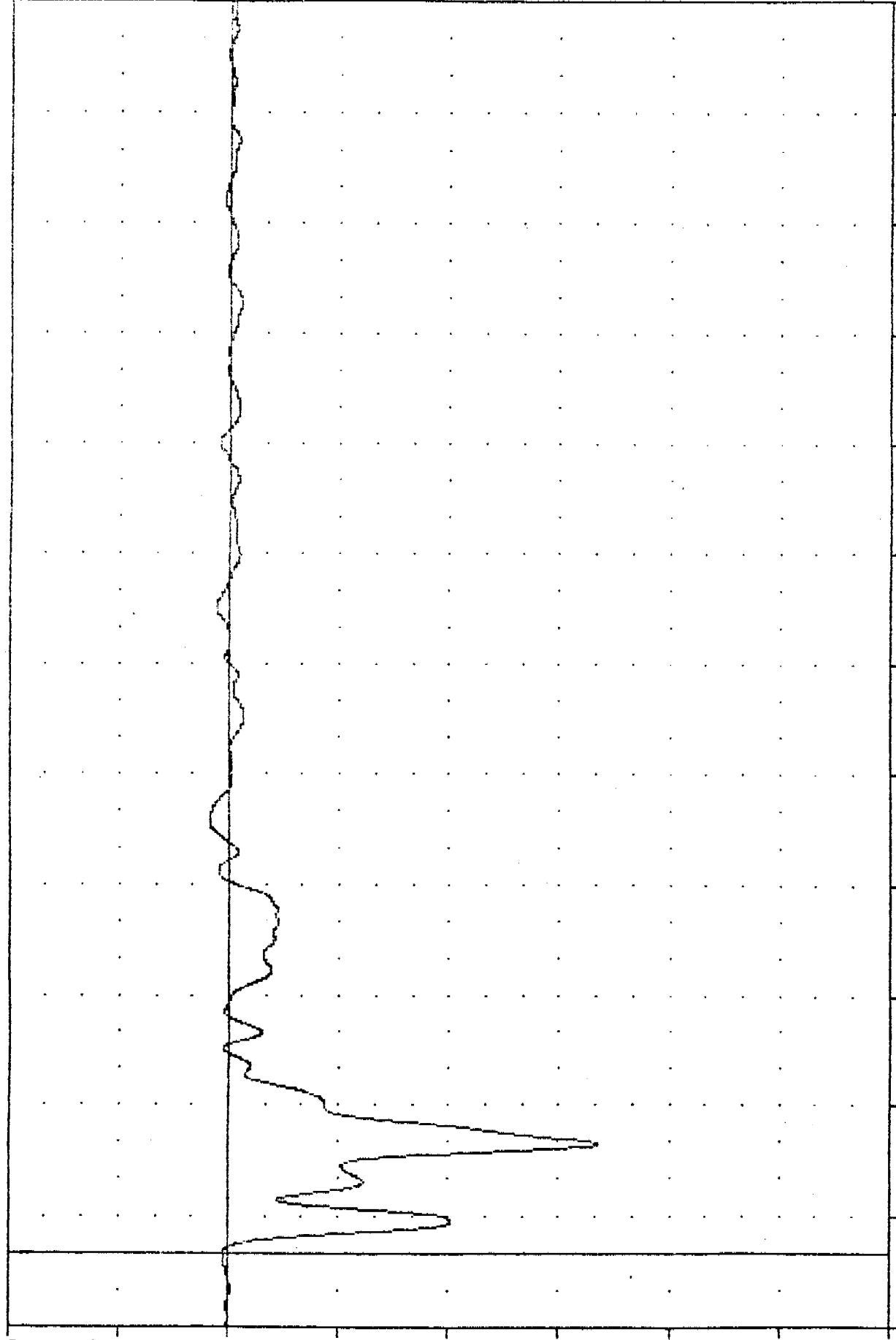
MIN, MAX VALUES =

-50.312

29.25,

2.68 e 116.88

ACCELERATION (G)



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE LEFT FENDER WELL INSIDE X AXIS ACCELERATION

NRTC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

SFRXG

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -42.44 33.50 , 8.97 20.50

20.00

10.00

0.00

-10.00

-20.00

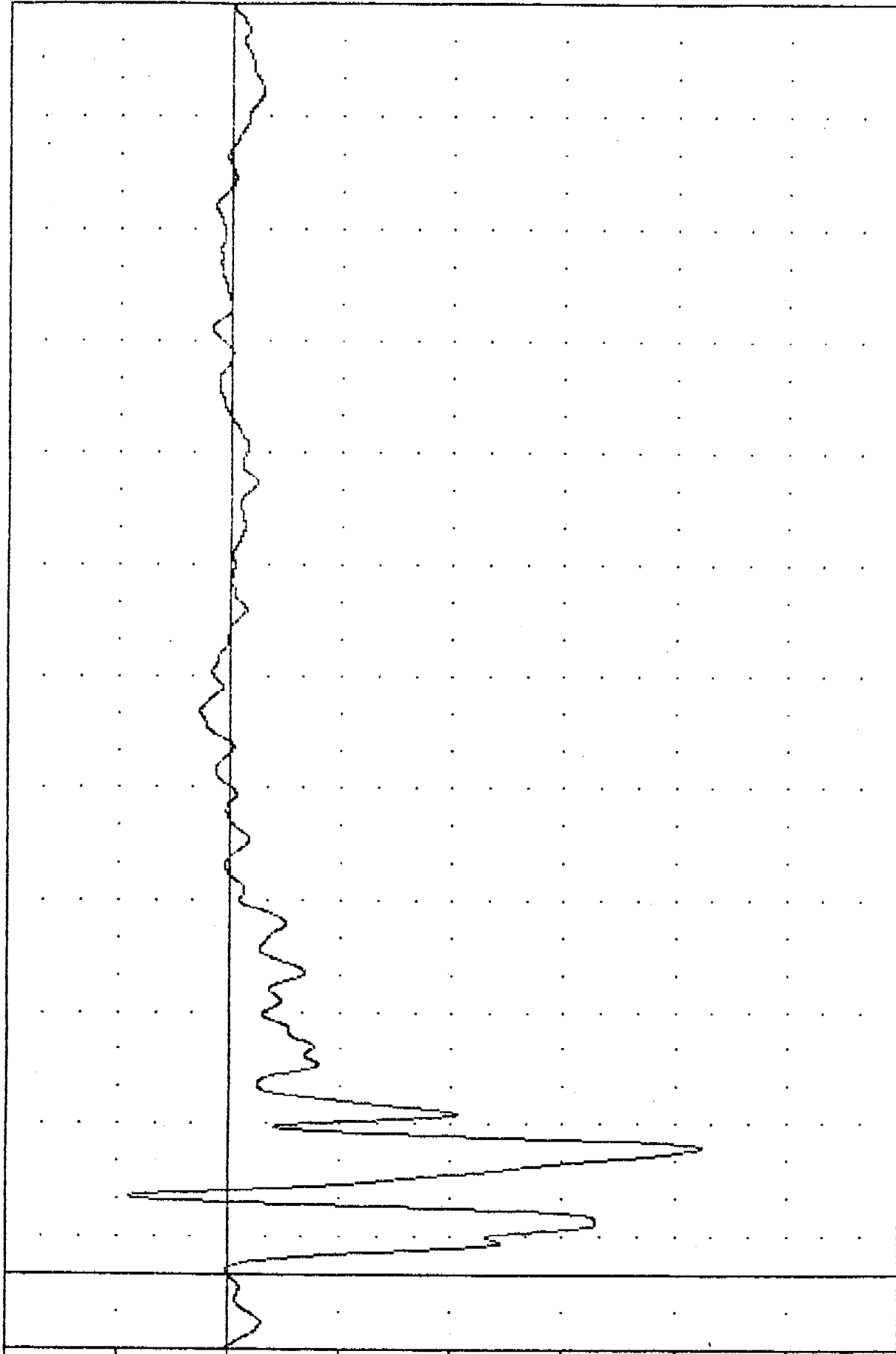
-30.00

-40.00

-50.00

-60.00

ACCELERATION (G)



TIME (MSEC)

340.00

310.00

280.00

250.00

220.00

190.00

160.00

130.00

100.00

70.00

40.00

10.00

-20.00

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

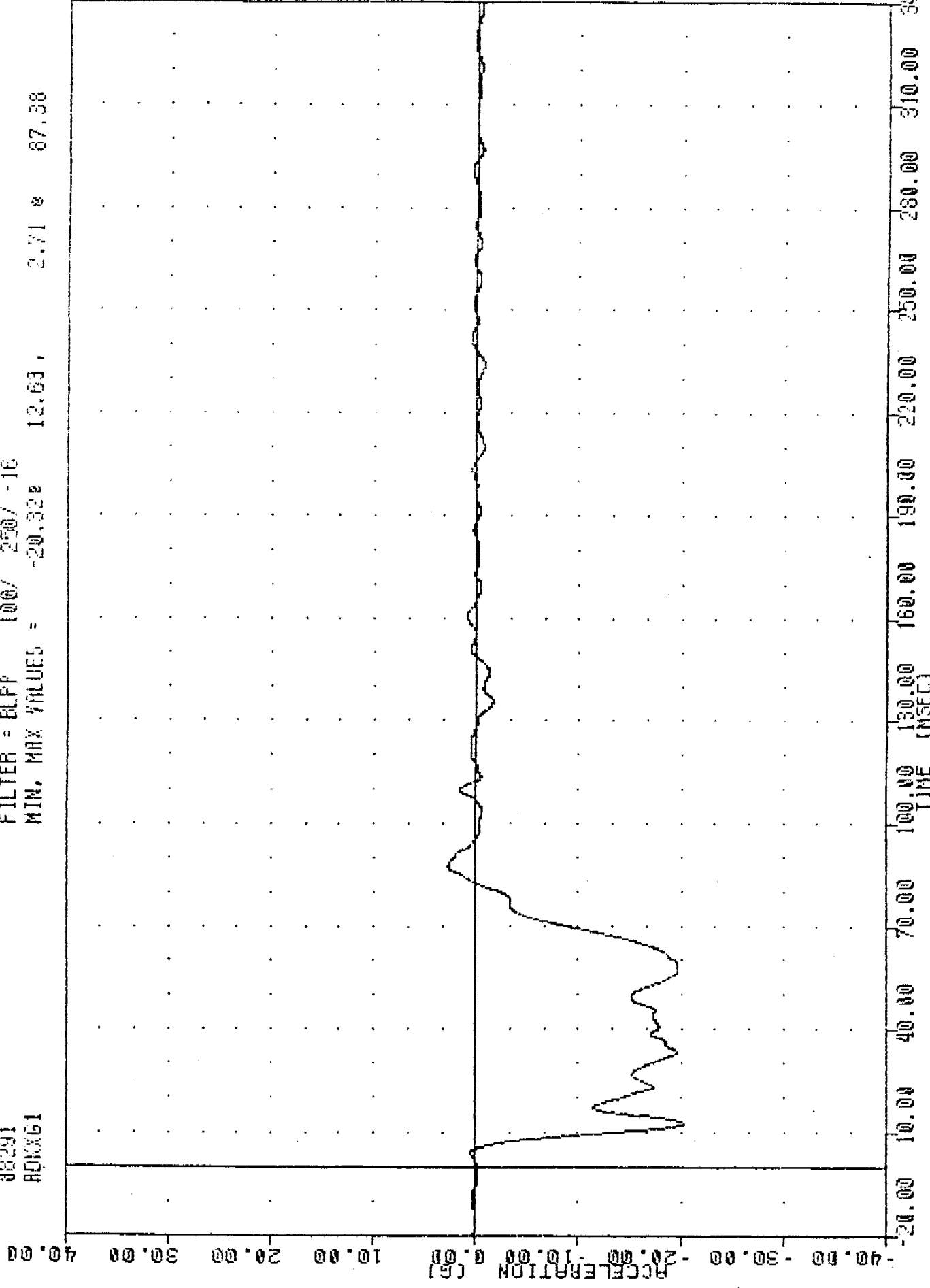
VEHICLE SUSPENSION FRONT RIGHT X AXIS ACCELERATION

VRTC-2 , 881017
DAMAGE ALGORITHM REFORMULATION

88291
ADKX61

FILTER = BLPP 100/ 250/ -18
MIN, MAX VALUES = -20.32 12.63 ,

2.71 * 87.38



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK X AXIS ACCELERATION

VRIC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

08291

HOLYVI

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -3.50%

93.25, 28.02 & 5.25

25.00

20.00

15.00

10.00

5.00

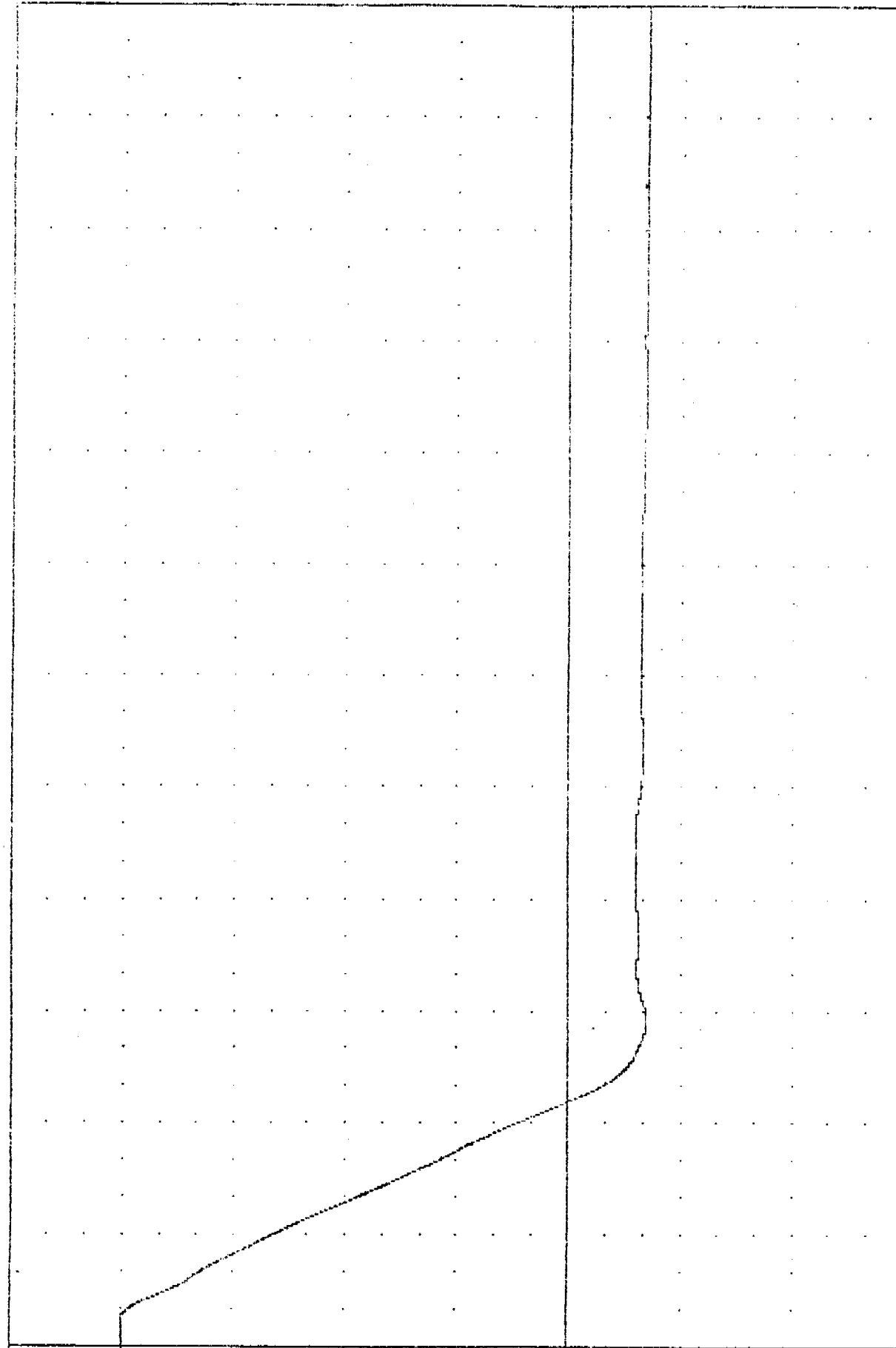
0.00

-5.00

-10.00

-15.00

VELOCITY (MPH)



0.00	20.33	56.66	65.00	113.33	141.66	170.00	198.33	226.66	255.00	283.33	311.66	340.00
				TIME (SEC)								

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

VEHICLE REAR DECK X AXIS VELOCITY

881017

DAMAGE ALGORITHM REFORMULATION

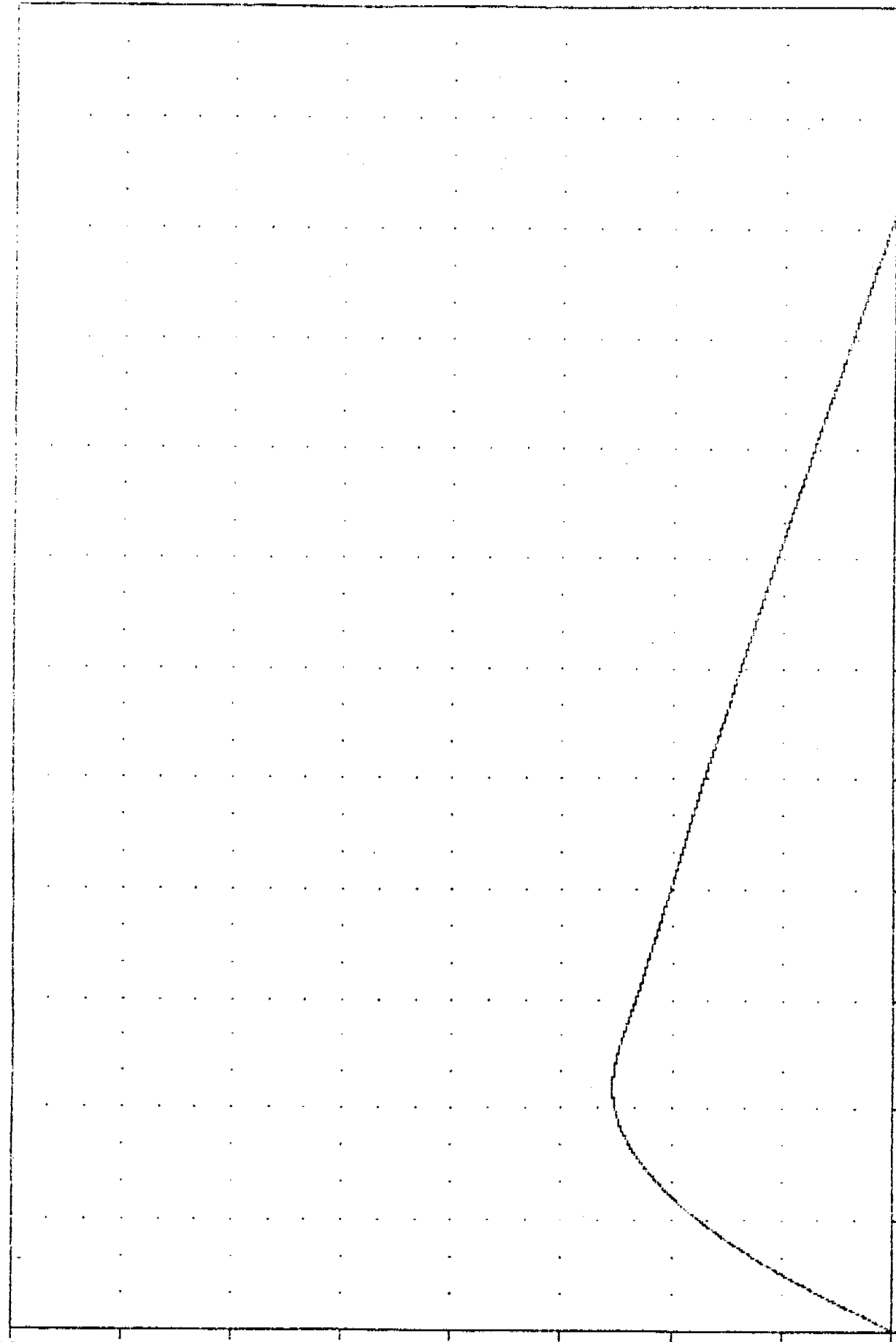
88291

ADXX01

FILTER = BLPP 100/ 150/ -10

MIN. MAX VALUES = -3.24E 310.00 12.00 62.00

DISPLACEMENT (IN)



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

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT

VRTC-2 . 881017

DAMAGE ALGORITHM REFORMULATION

88291

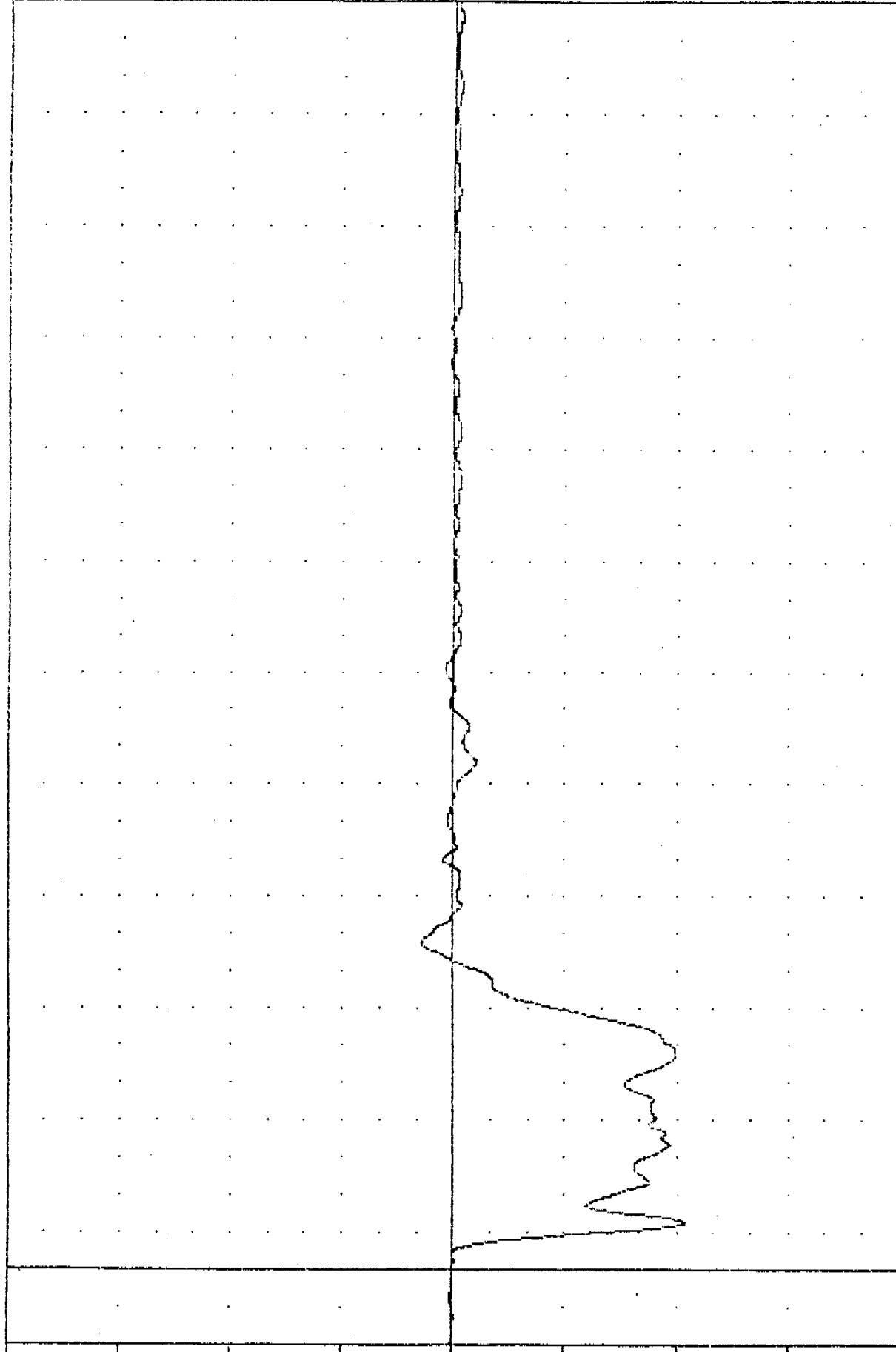
ADKX6A

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -20.720 12.50 ,

2.87 e 87.13

ACCELERATION (G)



TIME (msec)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK X AXIS REDUNDANT ACCELERATION

WATC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

HOKXVA

FILTER = BLPP 100/ 250/ -13

MIN. MAX VALUES =

-5.154

340.00

23.00

0.00

25.00

20.00

15.00

10.00

5.00

0.00

-5.00

-10.00

-15.00

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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

VEHICLE REAR DECK X AXIS VELOCITY REMNANT

VRIC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88251

801XDA

FILTER = BLPP 1007 2507-10

MIN, MAX VALUES = -8.102 340.84,

12.51 2 61.25

40.00

35.00

30.00

25.00

20.00

15.00

10.00

5.00

0.00

DISPLACEMENT (IN)

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 (SEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

VEHICLE REAR DECK X AXIS DISPLACEMENT REFORMULATION

VRIC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

FILSI

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -6.96%

16.75 , 0.41 % 75.13

10.00

7.50

5.00

2.50

0.00

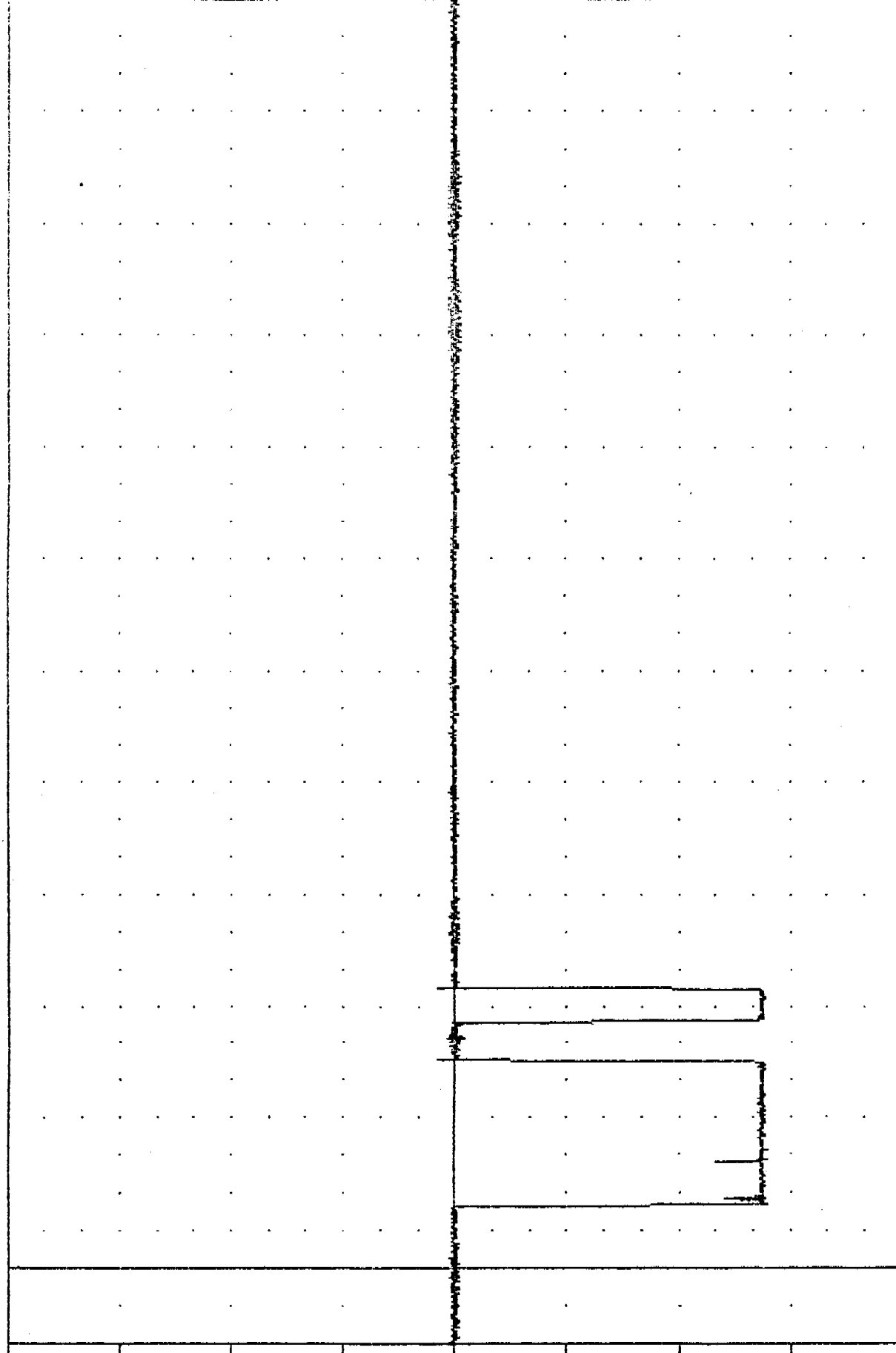
-2.50

-5.00

-7.50

-10.00

VOLTAGE (VOLTS)



-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

VEHICLE LEFT FENDER WELL INSIDE SENSOR #1

VRIC-2 , 881017
DAMAGE ALGORITHM REFORMULATION

88291 FILTER = ALPF 1650/ 5214/ -40

FILS2 MIN. MAX VALUES = -7.12e 32.63 , 0.11 e 143.25

10.00

7.50

5.00

2.50

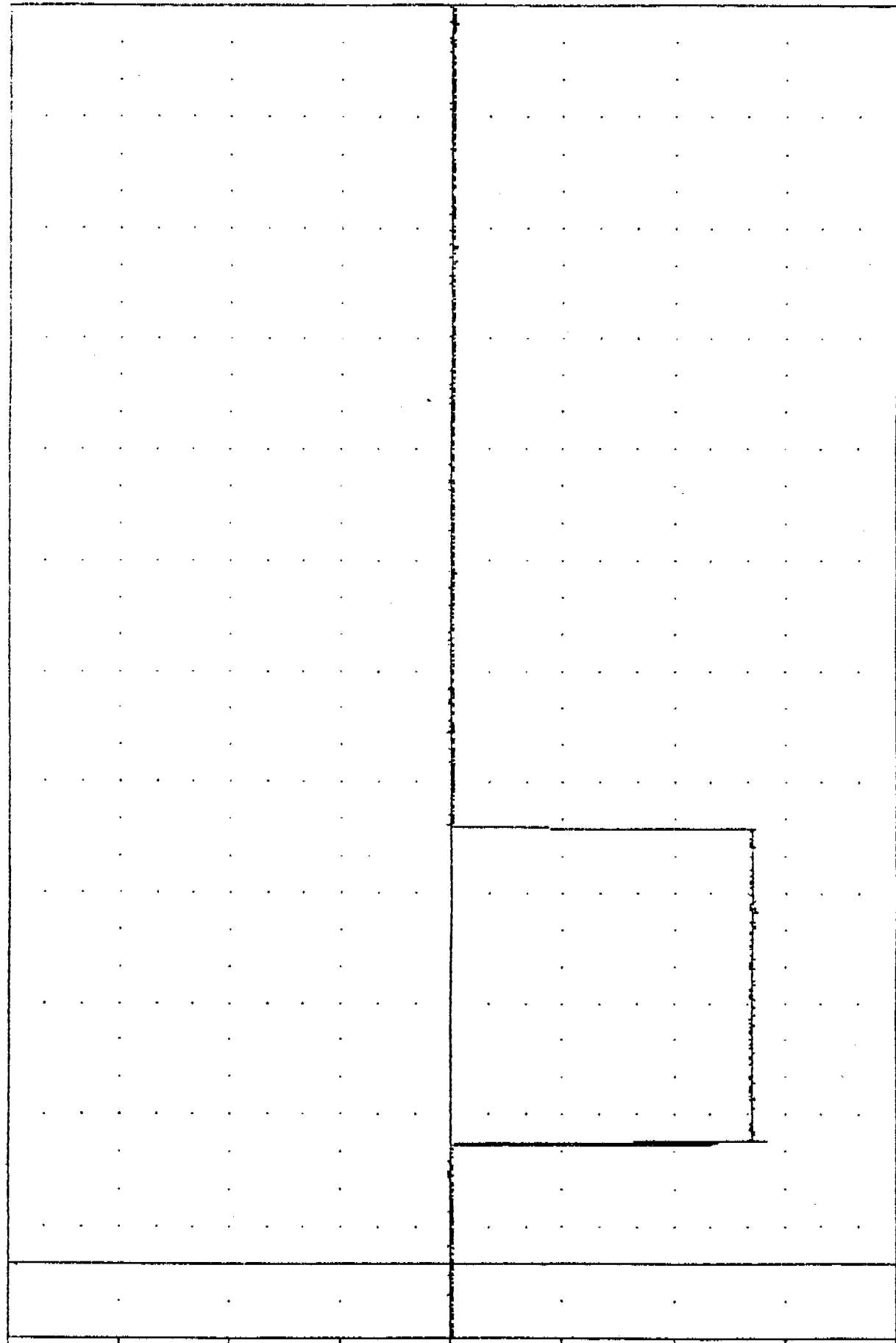
0.00

-2.50

-5.00

-7.50

-10.00



-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 (NSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE LEFT FENDER W/11 INSIDE SENSOR 20

VRTC-2 , 881017
DAMAGE ALGORITHM REFORMULATION

88291 FILTER = ALPF 1650/ 5214/ -40

0TH1 MIN. MAX VALUES = -10.190 -1.38 , 0.00 2 117.00

12.00

9.00

6.00

3.00

0.00

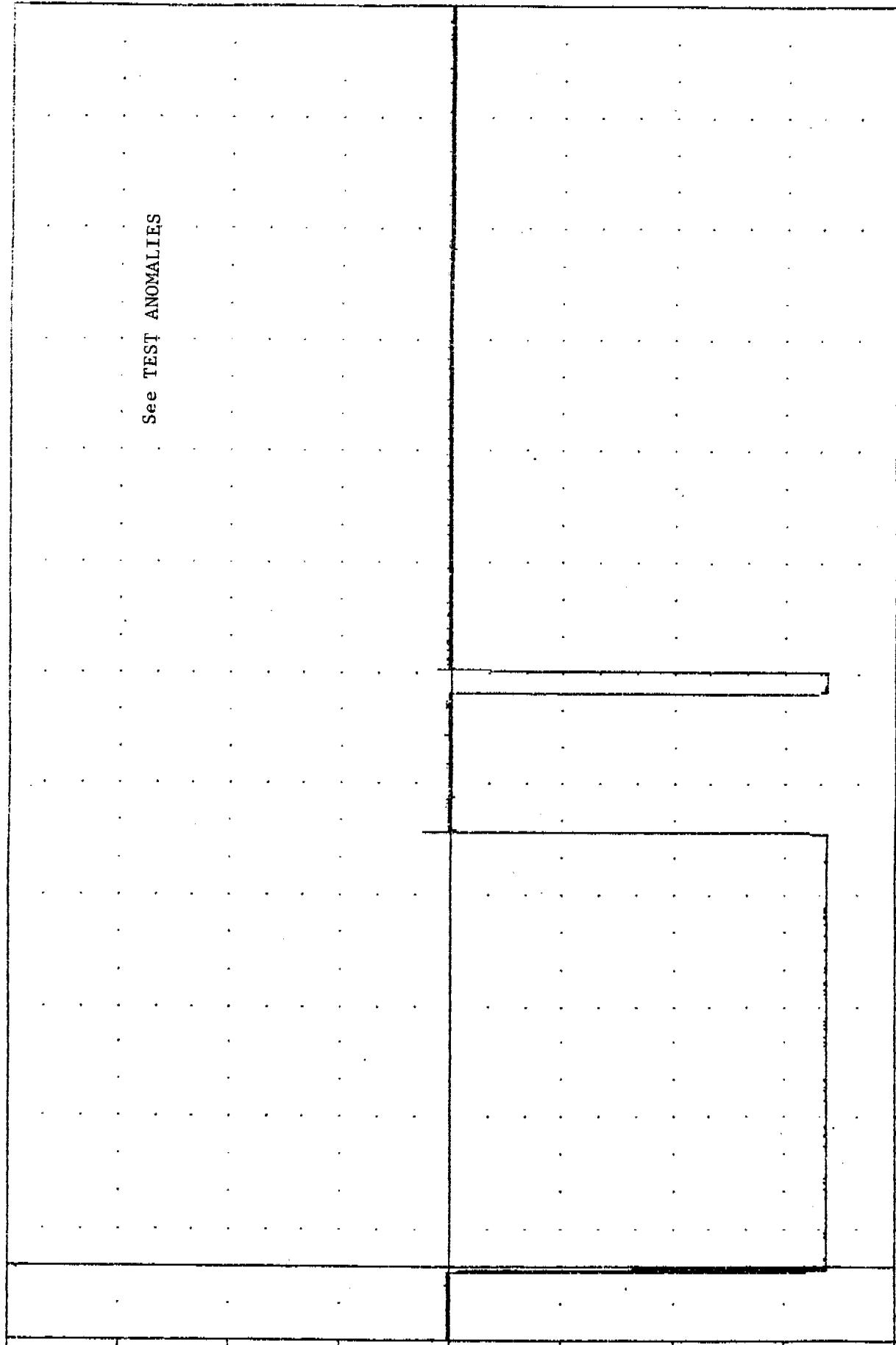
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



-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)

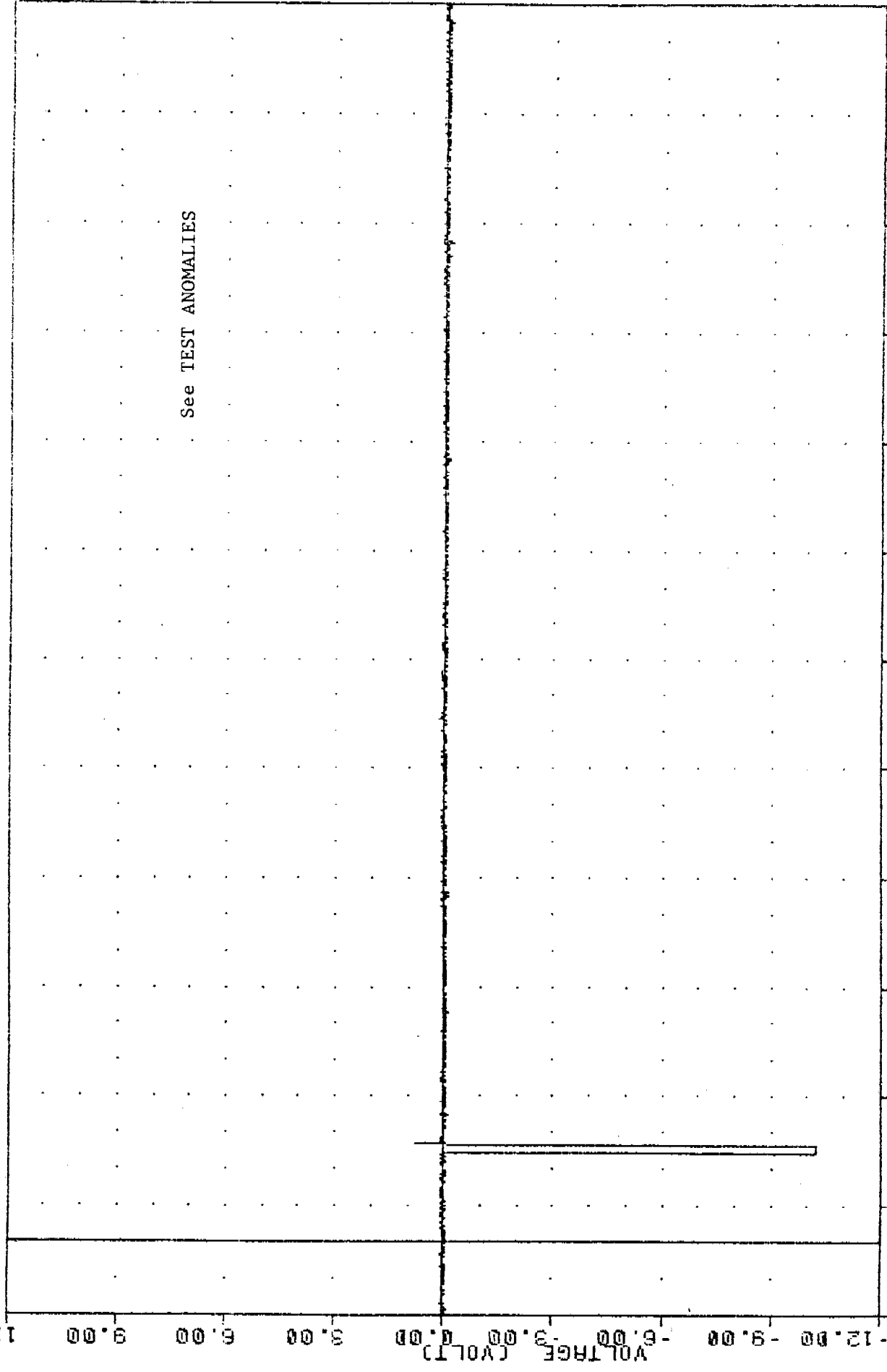
1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

VEHICLE CONTACT SWITCH - LEFT

VRTC-2 , 881017
DAMAGE ALGORITHM REFORMULATION

88291 FILTER = ALPF 1650/ 5214/ -40

0TH2 MIN, MAX VALUES = -10.250 24.50 0.01 0 26.75



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

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE CONTACT SWITCH - CENTER

VRIC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

FILTER = ALPF 1650/ 5214/ -40

0TH3

MIN, MAX VALUES = -10.014

0.13.

0.66 & 119.25

12.00

9.00

6.00

3.00

0.00

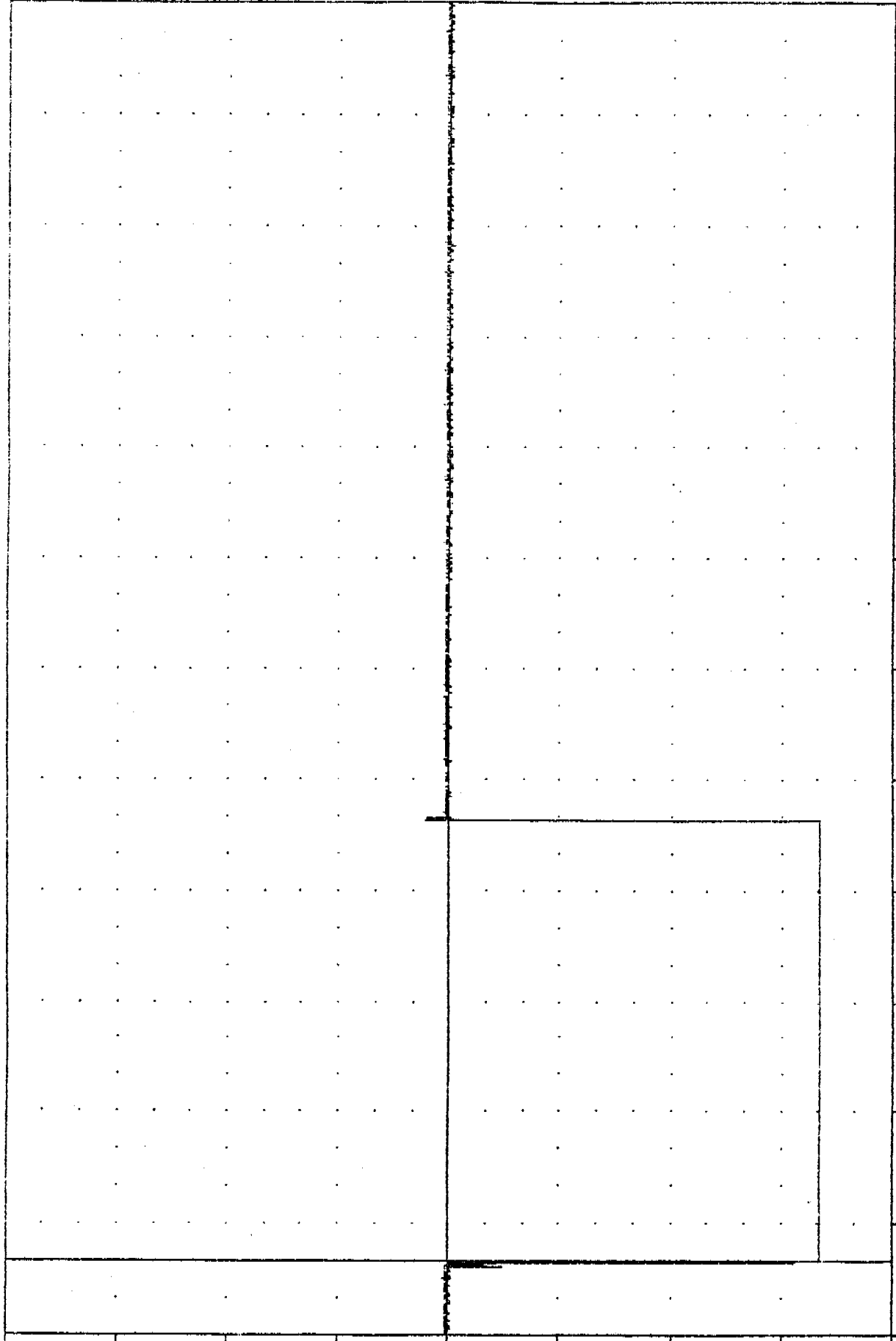
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



20.00 10.00 0.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST
VEHICLE CONTACT SWITCH - RIGHT

VRTC-2 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

0TH9

FILTER = HLPF 1650/ 5214/ -40

MIN, MAX VALUES = -10.168 3.13 ,

0.79 e 118.88

12.00

9.00

6.00

3.00

0.00

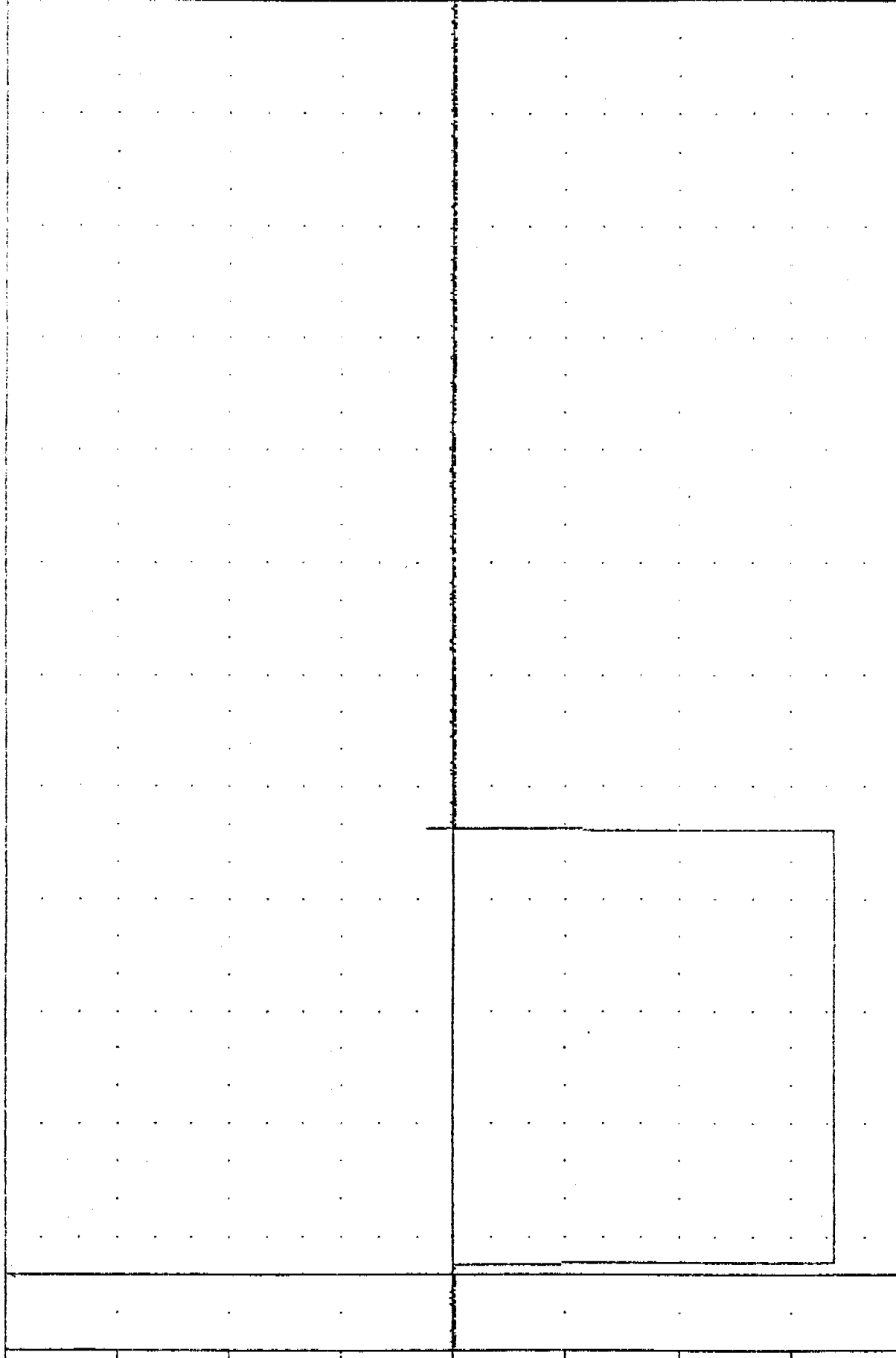
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

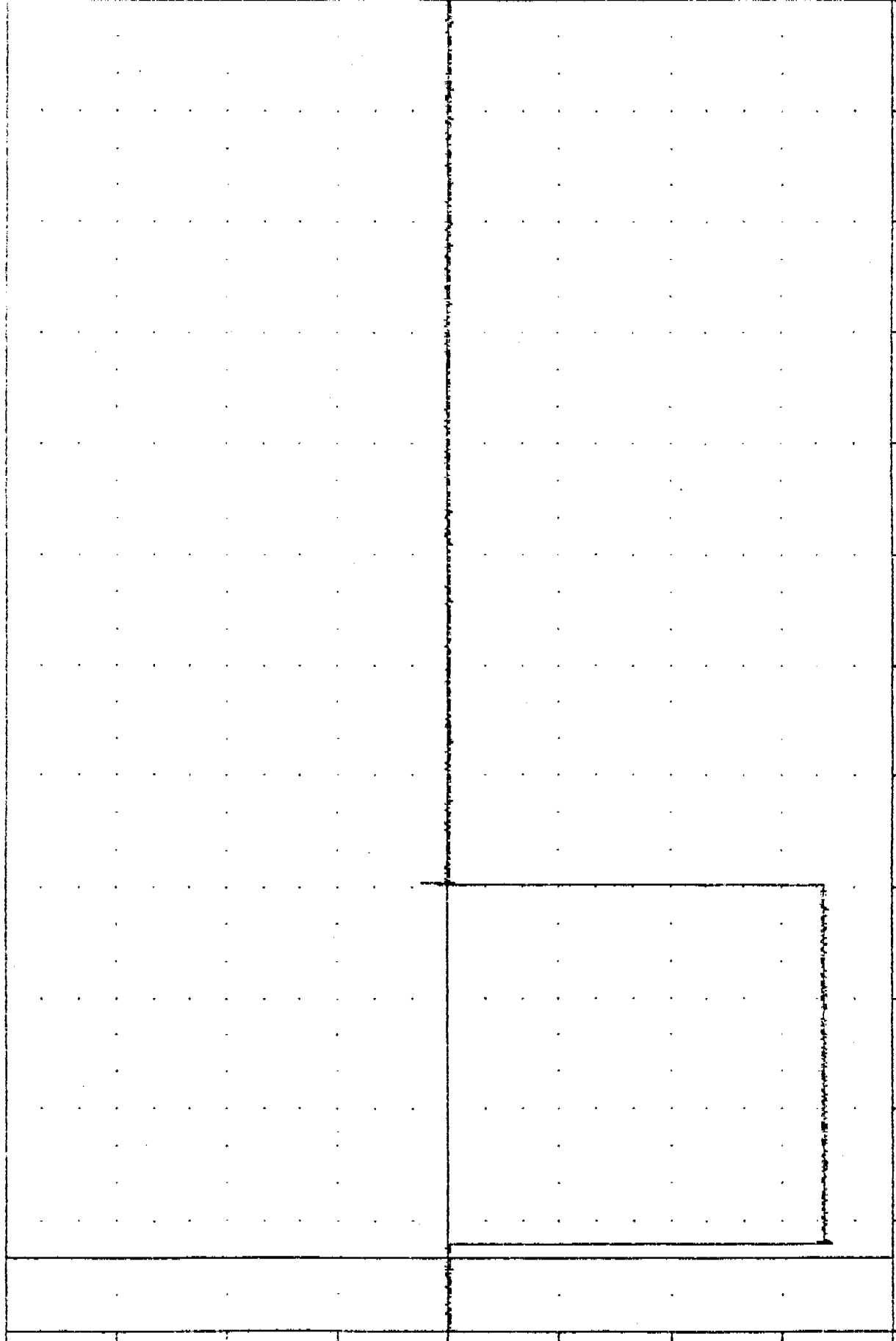
BARRIER CONTACT SWITCH - 1FFT

VRIC-2 , 881017
DAMAGE ALGORITHM REFORMULATION

88291 FILTER = ALPF 1650/ 5214/ -40

0TH5 MIN. MAX VALUES = -10.360 3.60 0.73 100.75

VOLTAGE (VOLT)



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH SECOND TEST

BARRIER CONTACT SWITCH - RIGHT

VRIC-3 , 881017

DAMAGE ALGORITHM REFORMULATION

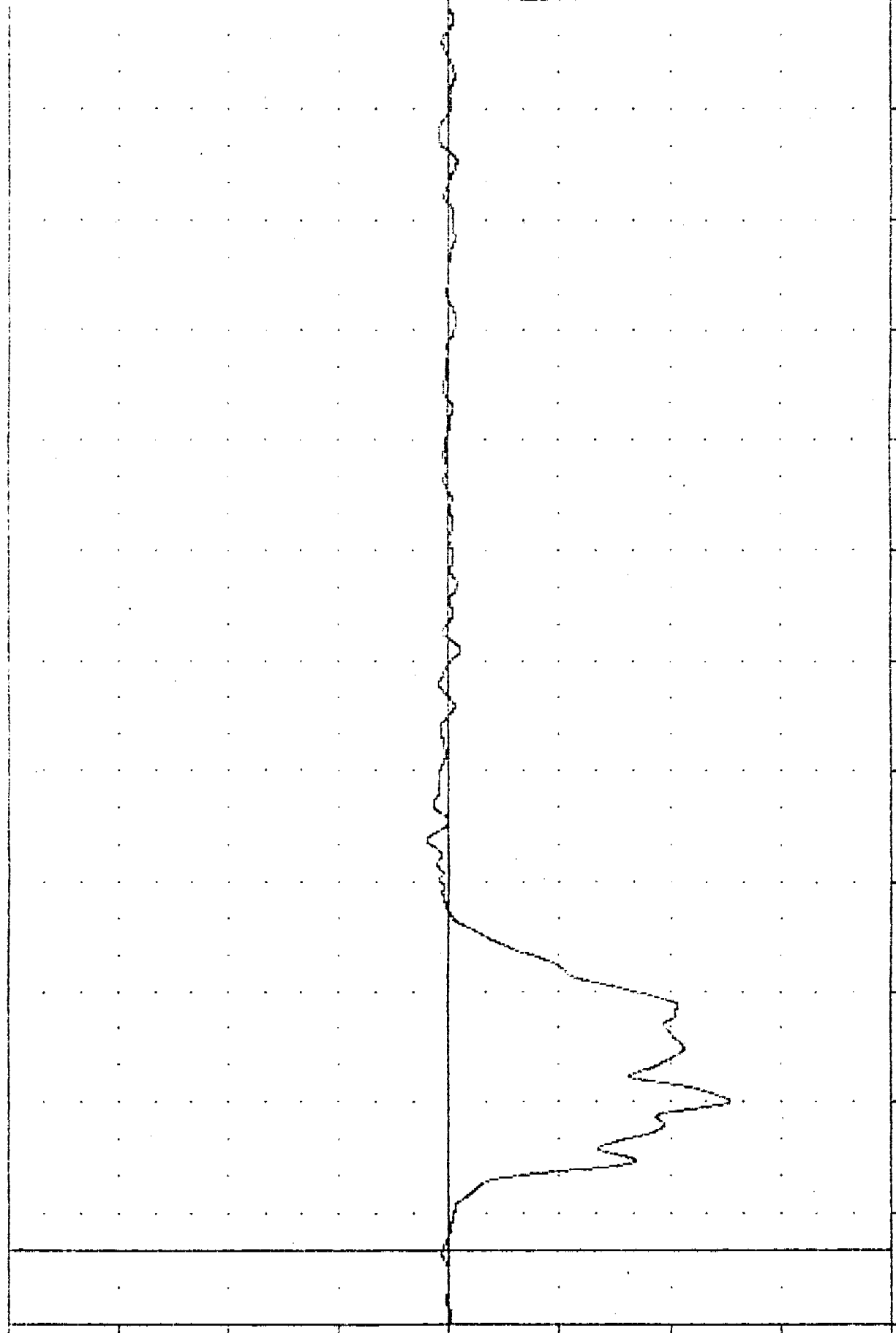
88291

ADKXG1

FILTER = ELPP 100/ 250/ -16

MIN. MAX VALUES = -25.40% 40.13, 1.93 & 111.50

ACCELERATION (G)



TIME (MSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK X AXIS ACCELERATION

NRTC-3
88291
RDKXV1

881017

DAMAGE ALGORITHM REFORMULATION

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -4.35e 92.00 20.03 e 4.00

25.00

20.00

15.00

10.00

5.00

0.00

-5.00

-10.00

-15.00

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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST

VEHICLE REAR DECK X AXIS VELOCITY

VRTC-3 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

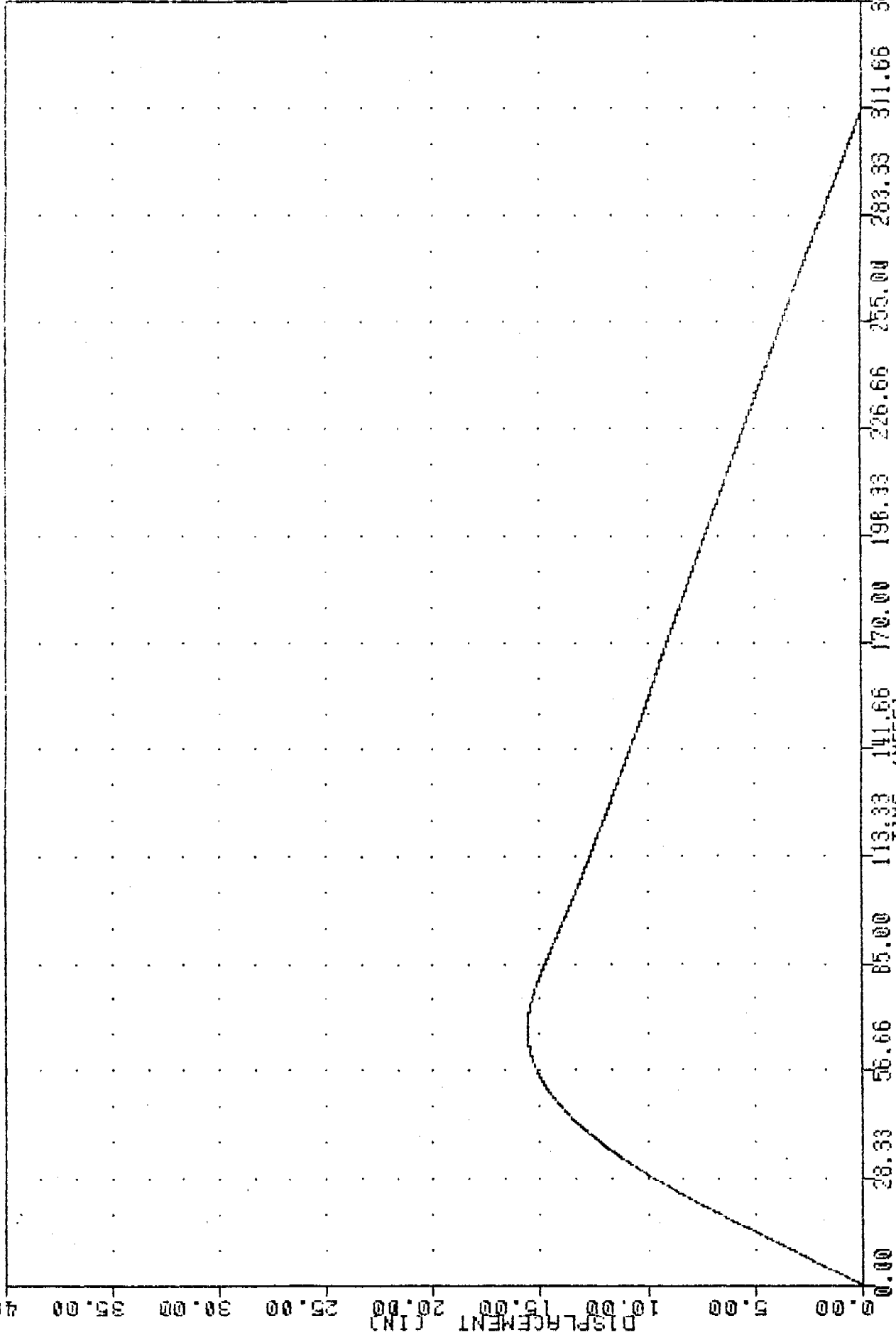
ADKXD1

FILTER = GLPP 100/ 250/ -16

MIN. MAX VALUES = -1.89 340.00 .

15.59 2 67.13

40.00



0.00

25.33

50.66

75.99

101.33

126.66

152.00

177.33

202.66

228.00

253.33

278.66

304.00

TIME (HSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST

VEHICLE REAR DECK X AXIS DISPLACEMENT

VRIC-1 881017

DAMAGE ALGORITHM REFORMULATION

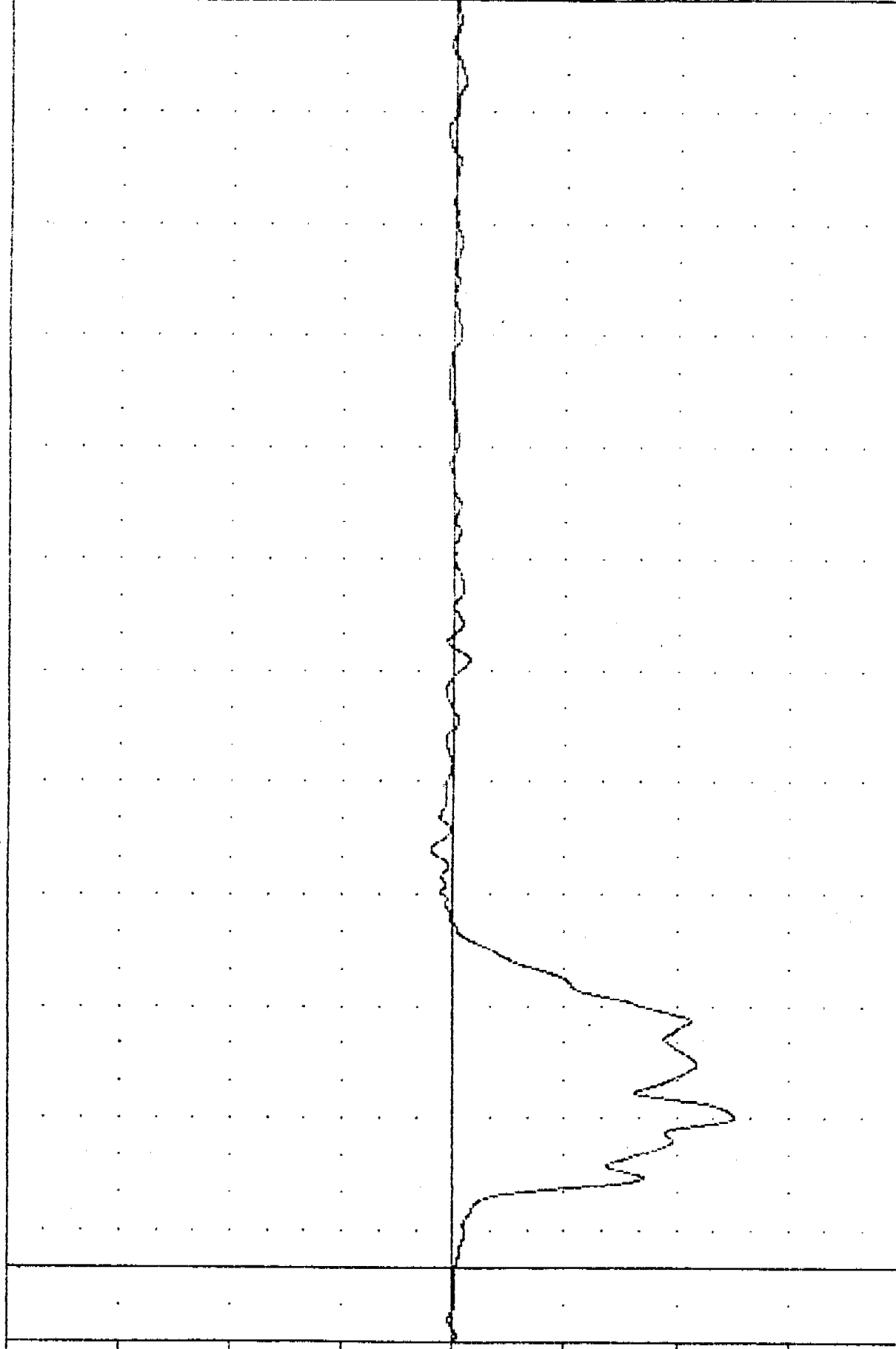
88291

ADKXGA

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -25.22 40.25, 2.01 112.00

ACCELERATION (G)



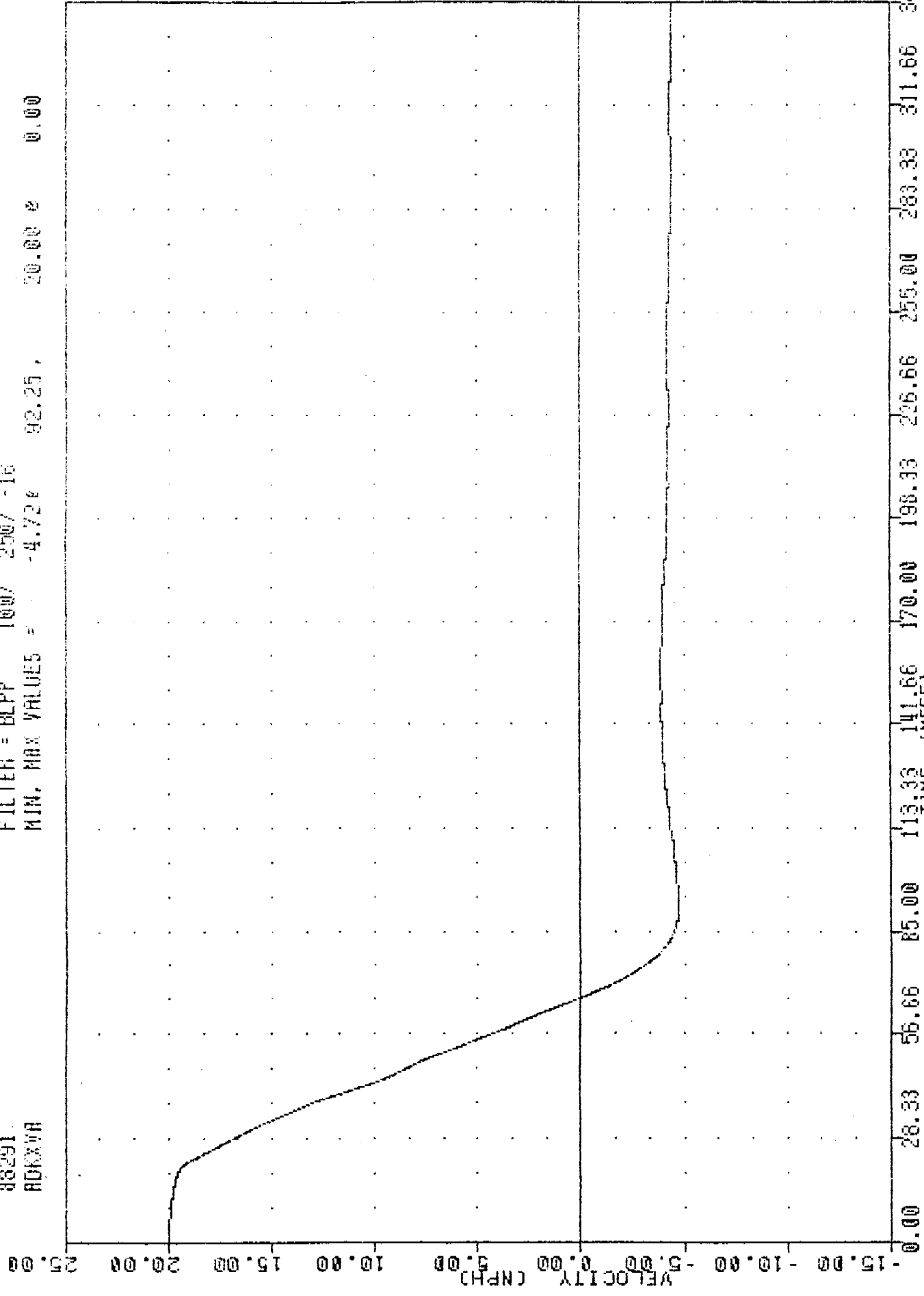
1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST

VEHICLE REAR DECK X AXIS REDUNDANT ACCELERATION

VRAC-3 . 881017
DAMAGE ALGORITHM REFORMULATION

88291 FILTER = BLPP 100/ 250/ -16

ADKXVR MIN, MAX VALUES = -4.726 92.25, 20.00 0.00



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK X AXIS VELOCITY REDUNDANT

NRTC-3 , 881017

DAMAGE ALGORITHM REFORMULATION

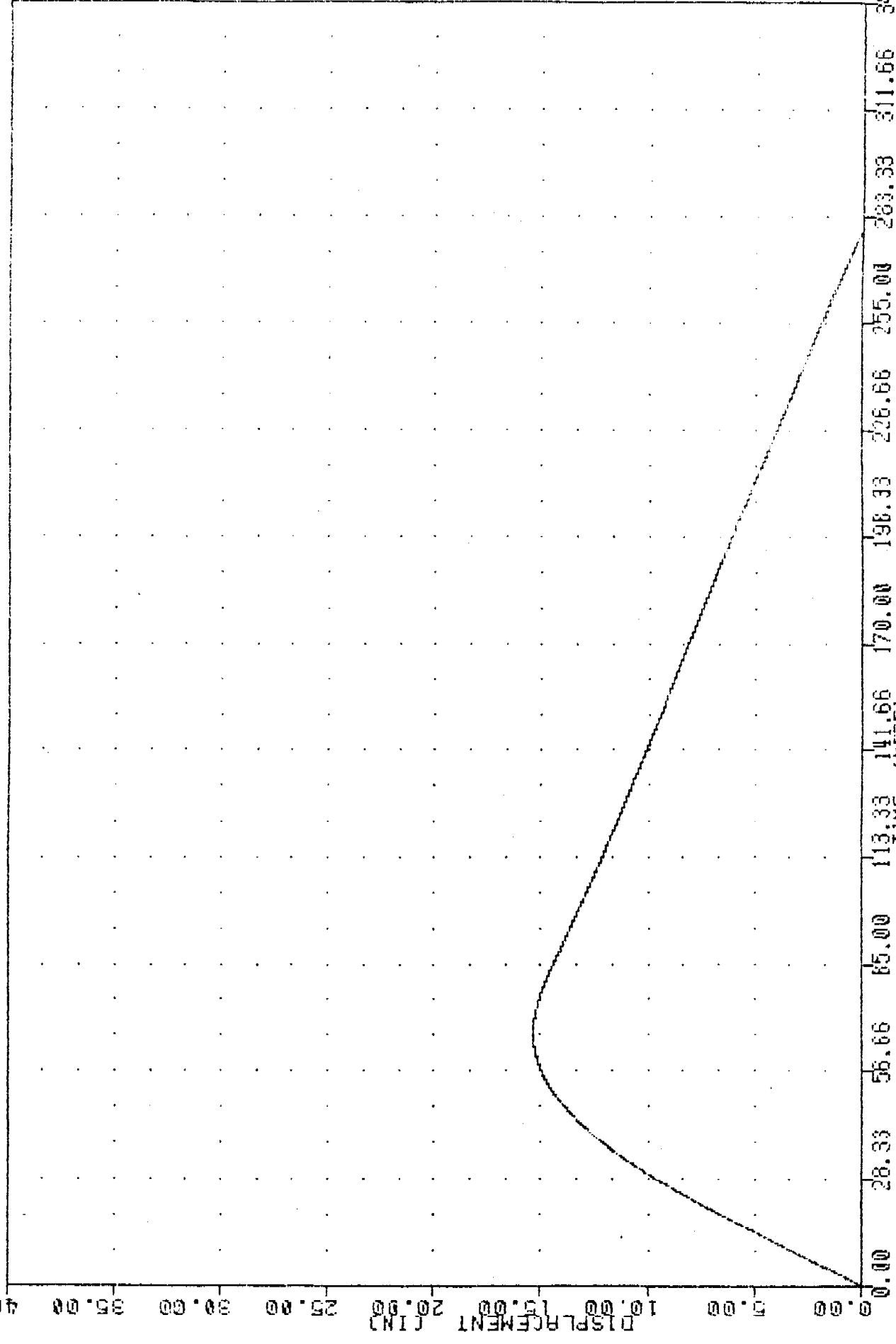
88291

ADKXDA

FILTER = BLPP 100/ 250/ -10

MIN. MAX VALUES = -4.63e 340.00 , 15.36 e 66.50

40.00



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT REDUNDANT

NRIC-3 , 881017
DAMAGE ALGORITHM REFORMULATION

88291

BTHT

FILTER = ALPF 1650/ 5214/ -40
MIN, MAX VALUES = -10.27% 1.38 , 0.67 & 146.00

12.00

9.00

6.00

3.00

0.00

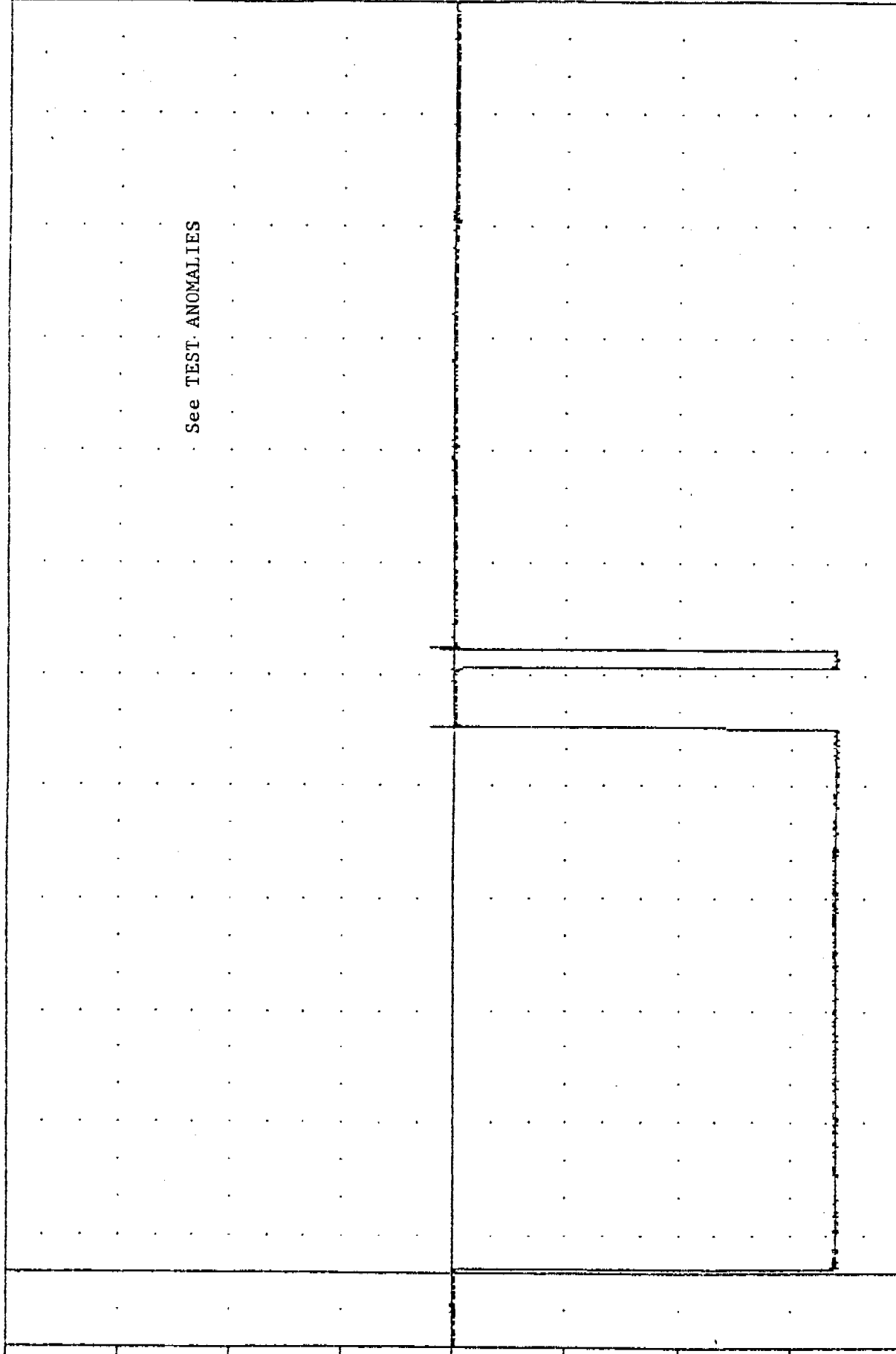
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLTS)



-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 (INSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
VEHICLE CONTACT SWITCH - LEFT

VRTC-3
 DAMAGE ALGORITHM REFORMULATION
 88291
 0TH2

881017

FILTER = ALFF 1650/ 5214/ -40
 MIN, MAX VALUES = -0.150 281.63, 0.12 8 14.25

12.00

9.00

6.00

3.00

0.00

-3.00

-6.00

-9.00

-12.00

-20.00

10.00

40.00

70.00

100.00

130.00

150.00

190.00

220.00

250.00

280.00

310.00

340.00

TIME (MSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST

VEHICLE CONTACT SWITCH - CENTER

See TEST ANOMALIES

VRTC-3 , 881017
DAMAGE ALGORITHM REFORMULATION

88291

0TH3

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.050 7.00 ,

0.71 @ 123.75

12.00

9.00

6.00

3.00

0.00

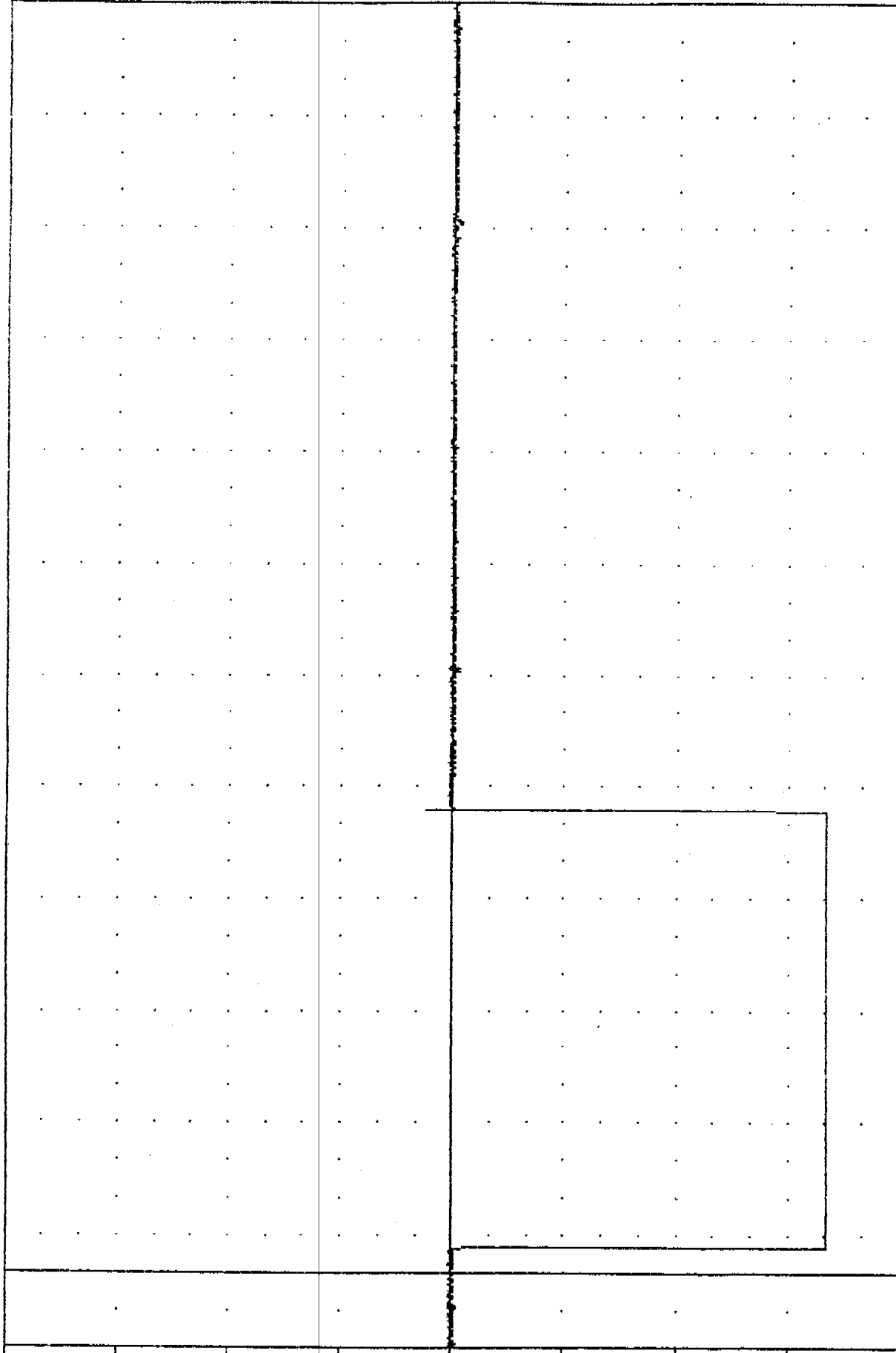
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST

VEHICLE CONTACT SWITCH - RIGHT

VRIC-3 , 881017
DAMAGE ALGORITHM REFORMULATION

88291 FILTER = ALPF 1650/ 5214/ -40

0TH4 MIN, MAX VALUES = -10.216 10.75, 0.616 121.13

12.00

9.00

6.00

3.00

0.00

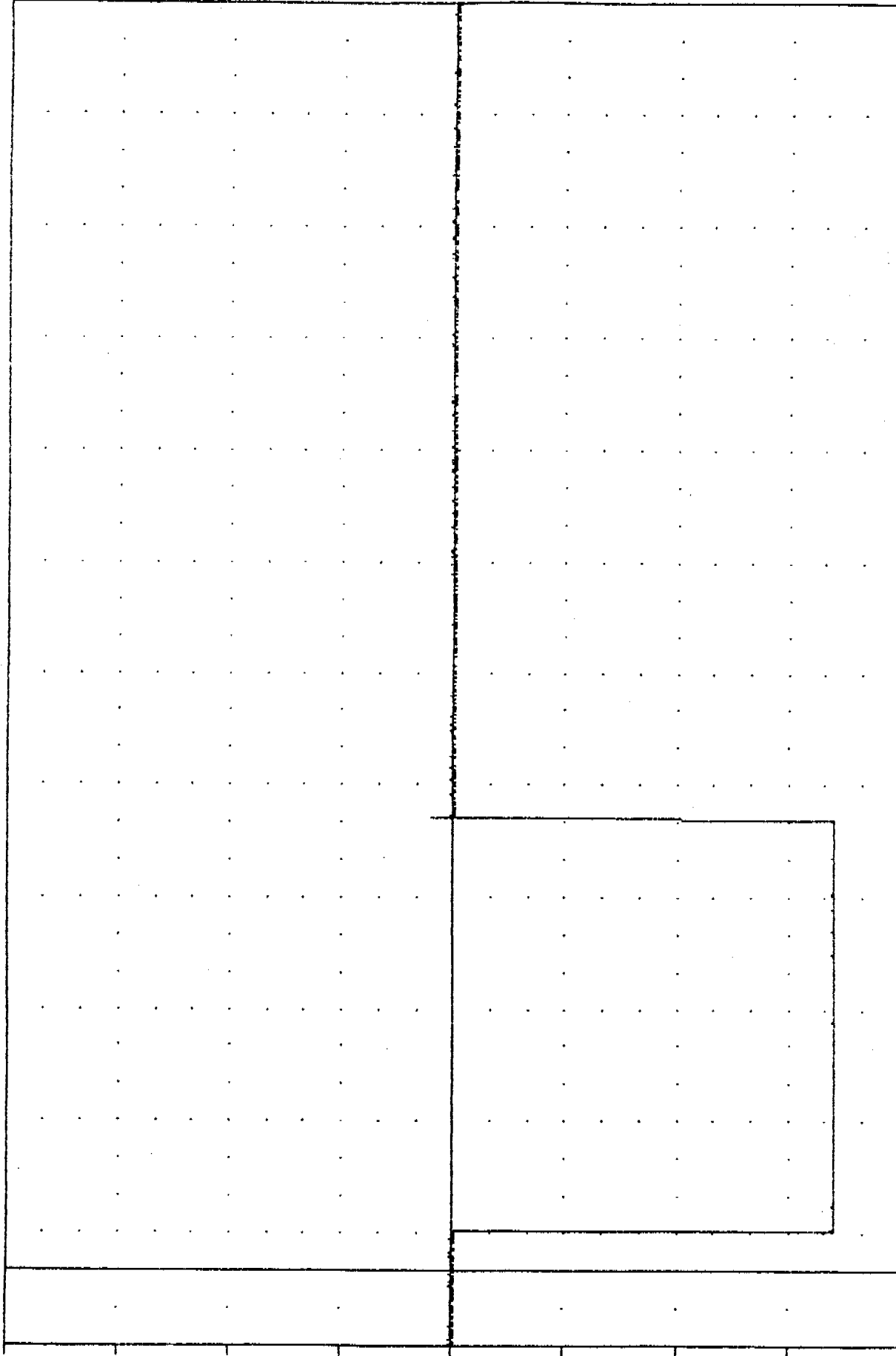
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



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

TIME (MSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
BARRIER CONTACT SWITCH - LEFT

VRIC-3 , 881017

DAMAGE ALGORITHM REFORMULATION

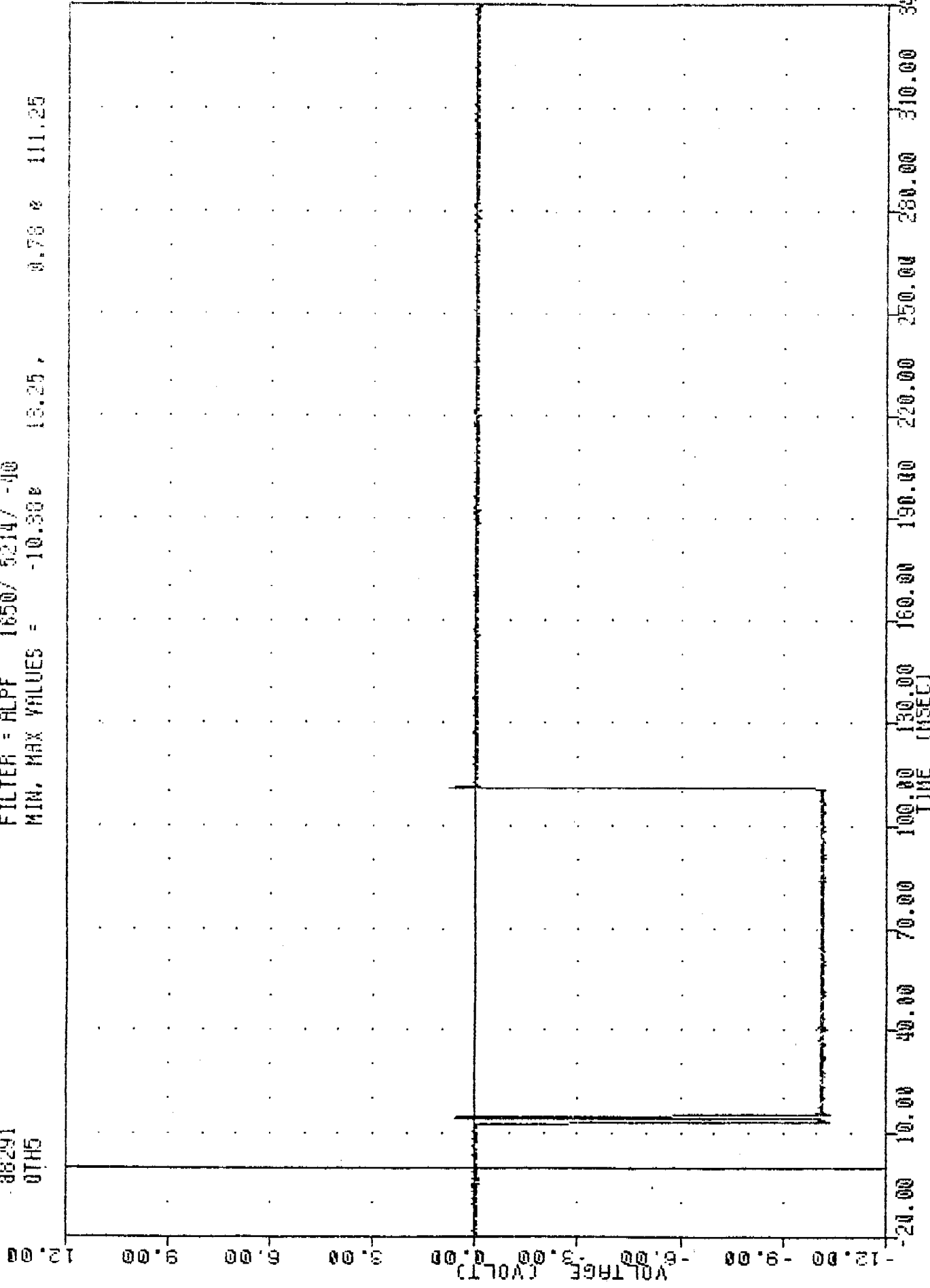
88291

FILTER = ALPF 1650/ 5214/ -40

0TH5

MIN. MAX VALUES = -10.30%

13.25 , 0.78 % 111.25



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 20 MPH THIRD TEST
BARRIER CONTACT SWITCH - RIGHT

NRTC-4 , 881017

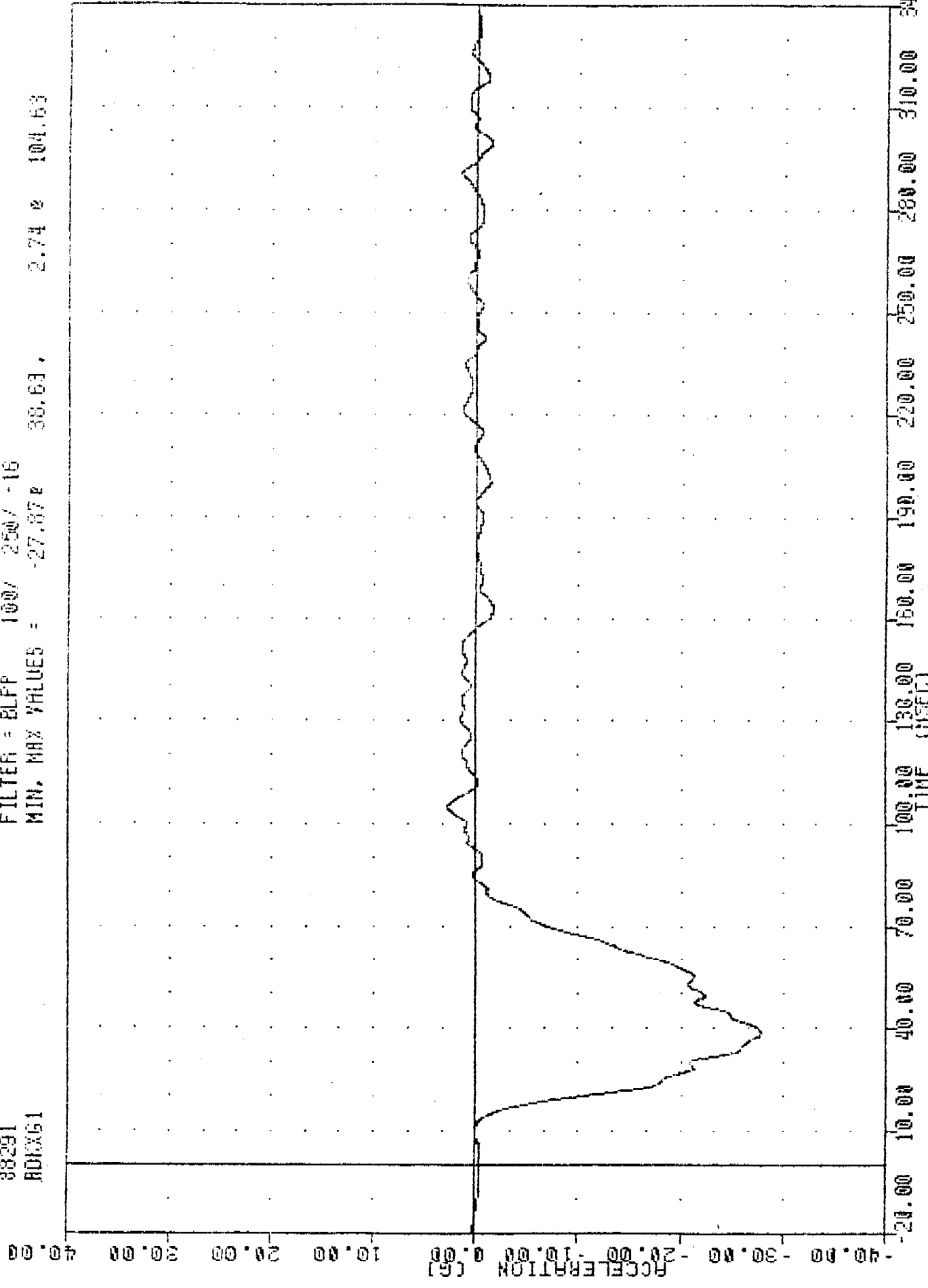
DAMAGE ALGORITHM REFORMULATION

88291

ADXXG1

FILTER = BLPF 100/ 250/ -16

MIN. MAX VALUES = -27.87 38.63 , 2.74 104.63



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST
VEHICLE REAR DECK X AXIS ACCELERATION

V6TC-4 , 881017

DAMAGE ALGORITHM REFORMULATION

38291

ADKXV1

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -4.88e

92.25 , 10.80 e 0.00

25.00

20.00

15.00

10.00

5.00

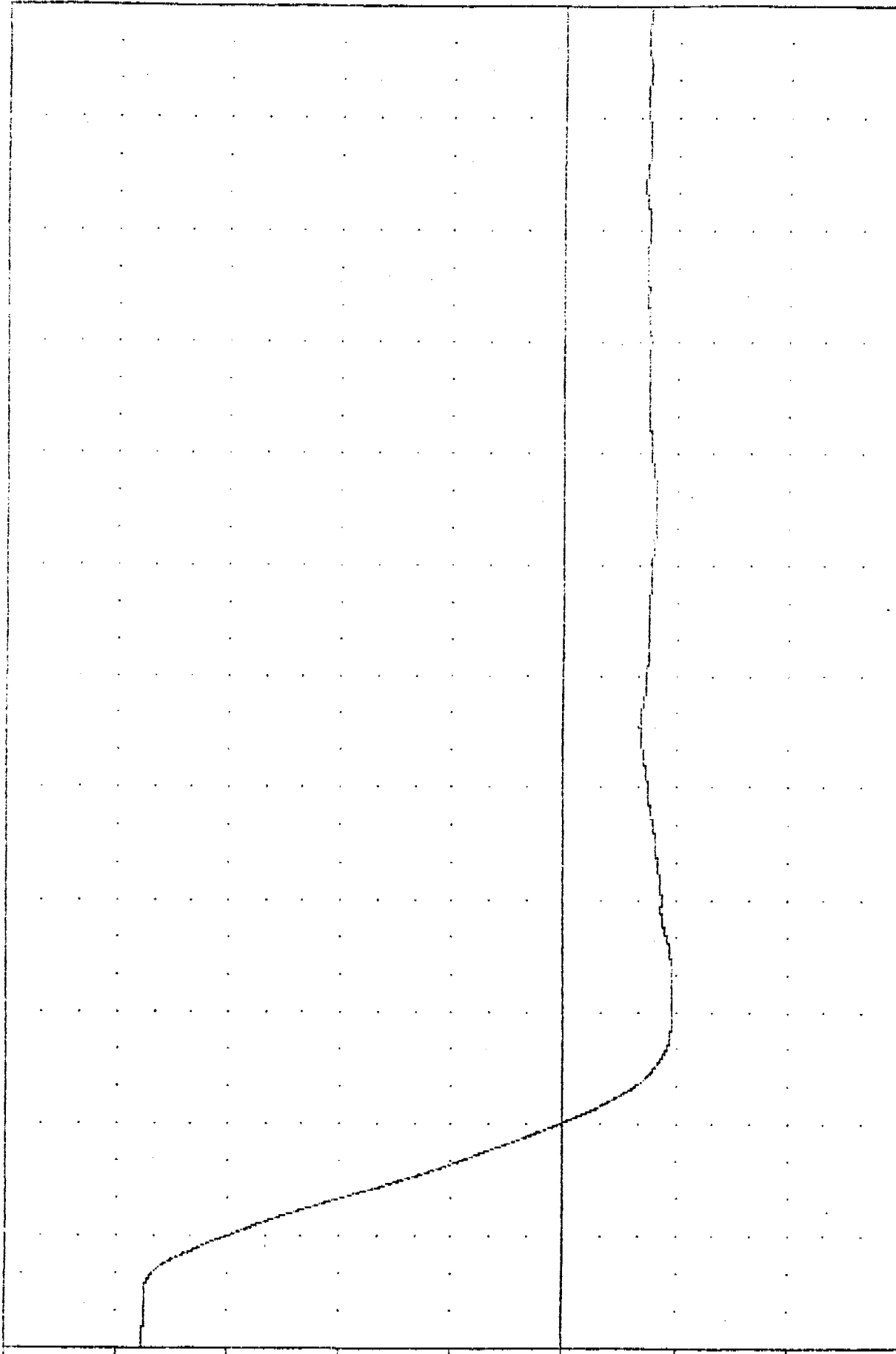
0.00

-5.00

-10.00

-15.00

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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST
VEHICLE REAR DECK X AXIS VELOCITY

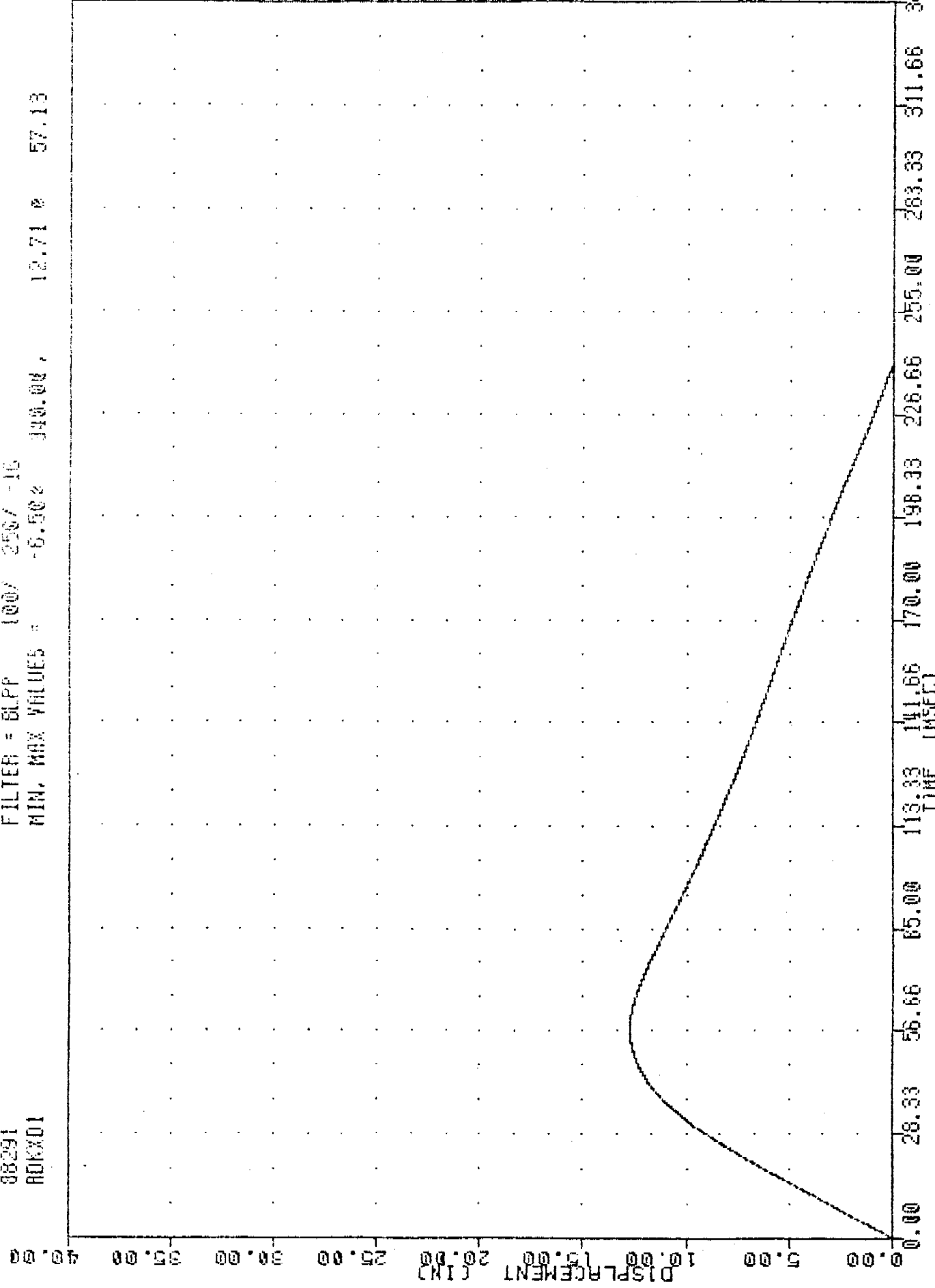
VALU-4 , 881817

DAMAGE ALGORITHM REFORMULATION

88291 FILTER = BLPP 100/ 250/ -10

ADKX01

MIN, MAX VALUES = -6.502 340.00, 12.71 0 57.13



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT

VRIC-4 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

ADCKGR

FILTER = BLPP 100/ 250/ -18

MIN. MAX VALUES = -28.47% 58.03 , 2.50 % 104.75

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

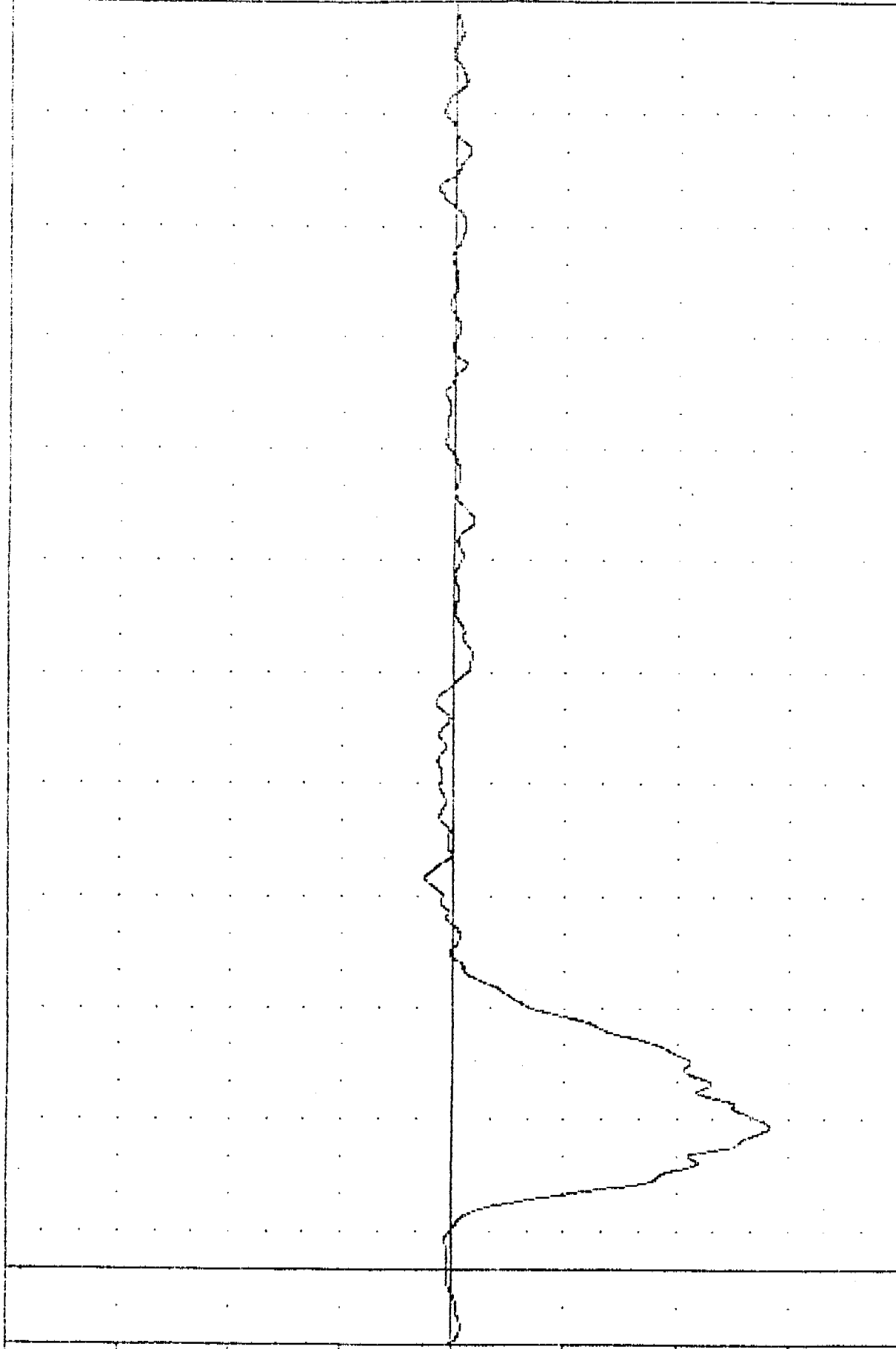
-30.00

-40.00

-50.00

(G)

ACCELERATION



TIME (msec)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST

VEHICLE REAR DECK X AXIS REDUNDANT ACCELERATION

VRIC-4 , 881017

DAMAGE ALGORITHM REFORMULATION

88291 FILTER = BLPP 100/ 250/ -16

ADKXVH MIN. MAX VALUES = -4.988 92.00 , 18.92 2 10.63

25.00

20.00

15.00

10.00

5.00

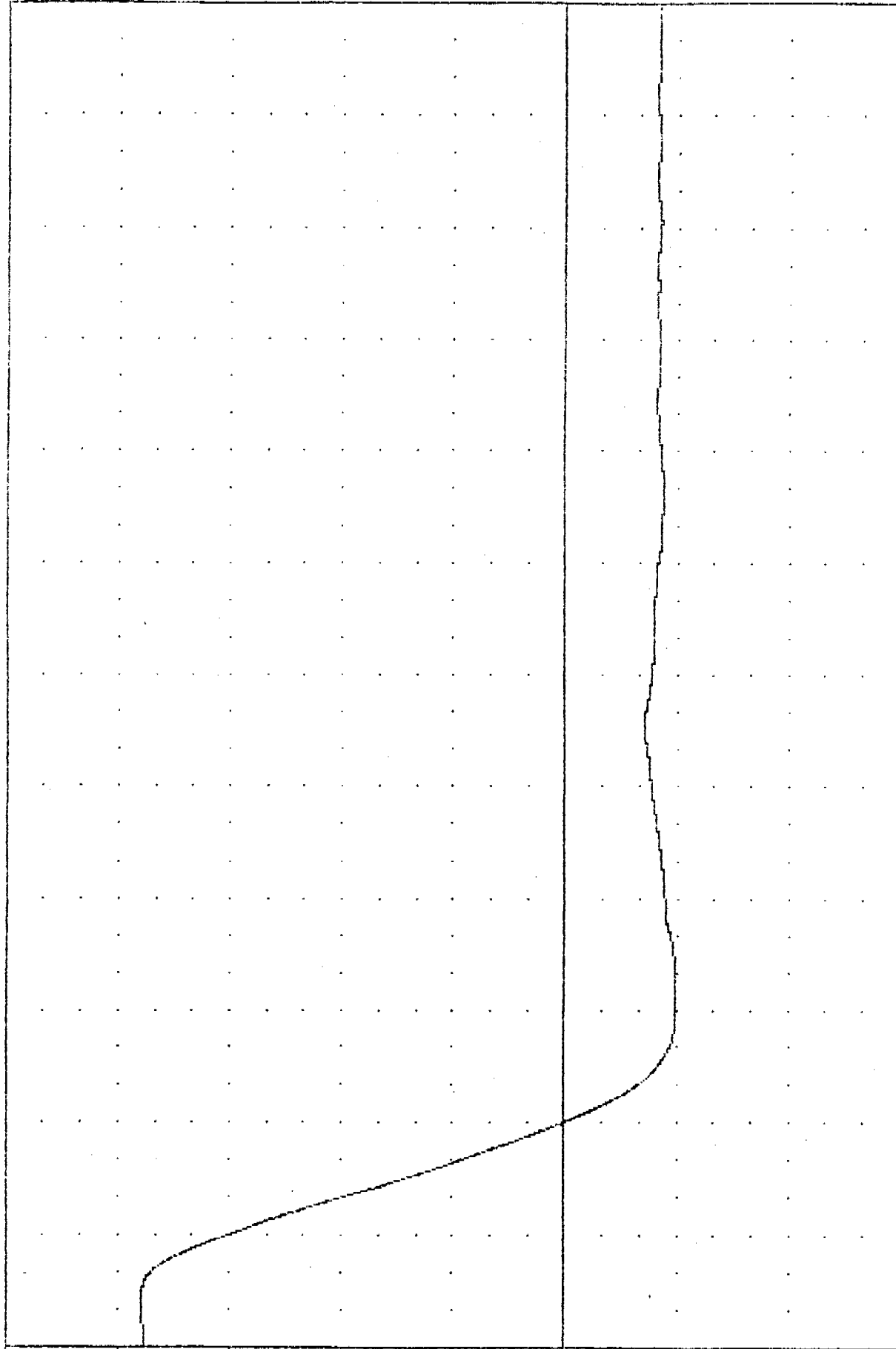
0.00

-5.00

-10.00

-15.00

VELOCITY (MPH)



0.00

20.33

56.66

85.00

113.33

141.66

170.00

198.33

226.66

255.00

283.33

311.66

340.00

TIME (MSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST
VEHICLE REAR DECK X AXIS VELOCITY REDUNDANT

NRIC-4 , 881817

DAMAGE ALGORITHM REFORMULATION

88291

ADKXDA

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -7.84E 340.00, 12.75 @ 56.88

40.00

35.00

30.00

25.00

20.00

15.00

10.00

5.00

0.00

DISPLACEMENT (IN)

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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST

VEHICLE REAR DECK X AXIS DISPLACEMENT REDUNDANT

KBIC-4 , 831017

DATAAGE ALGORITHM REFORMULATION

88291

0TH1

FILTER = ALPF 1850/ 5214/ -40

MIN. MAX VALUES = -10.200

2.38 , 0.68 0 0.63

12.00

9.00

6.00

3.00

0.00

-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)

See TEST ANOMALIES

-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST

VEHICLE CONTACT SWITCH - LEFT

VRIC-4 881017

DAMAGE ALGORITHM REFORMULATION

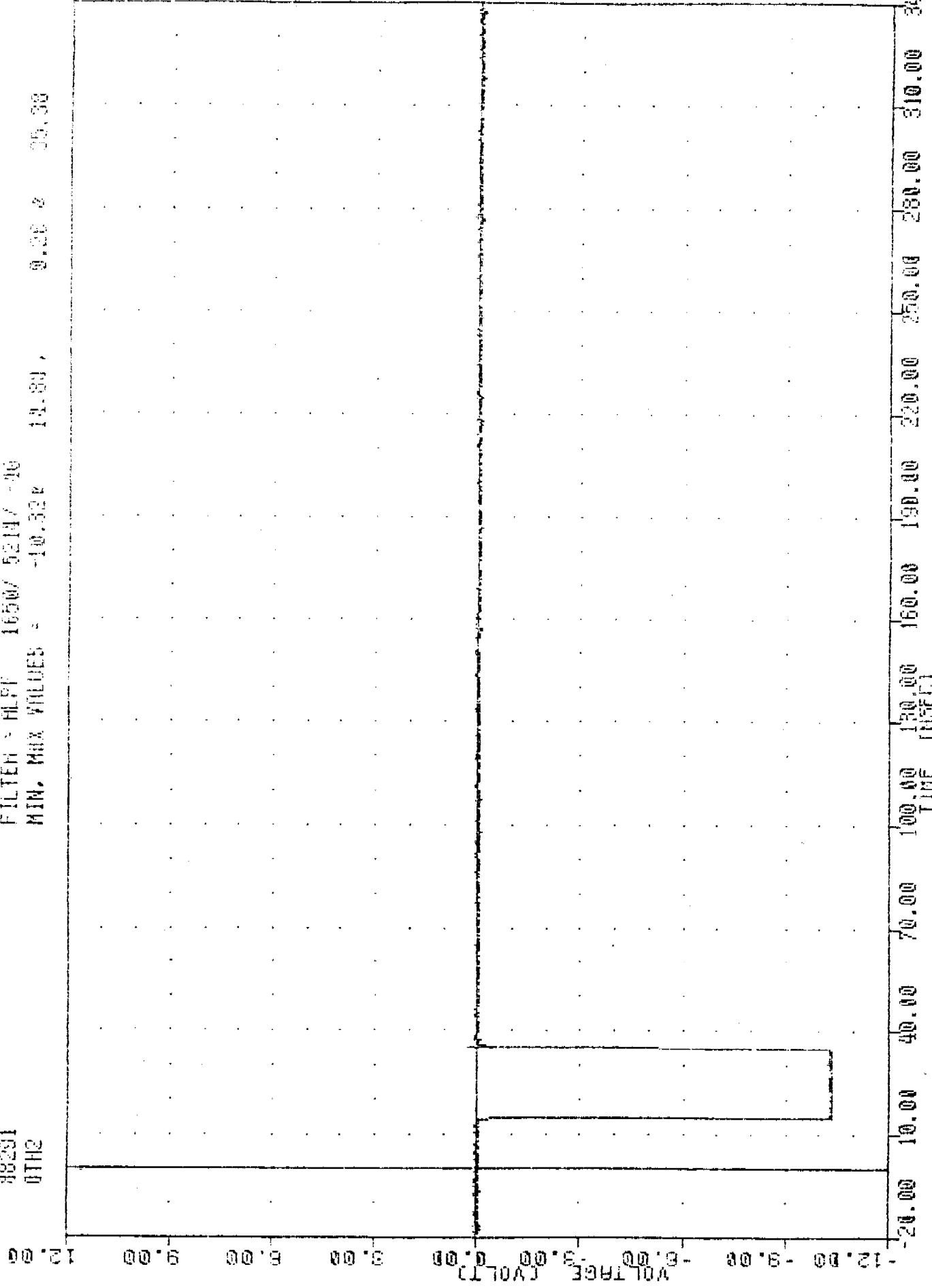
88231

0TH2

FILTER - MLPT 1650/ 52147 -40

MIN. MAX VALUES - -10.324

12.83, 9.20 & 25.38

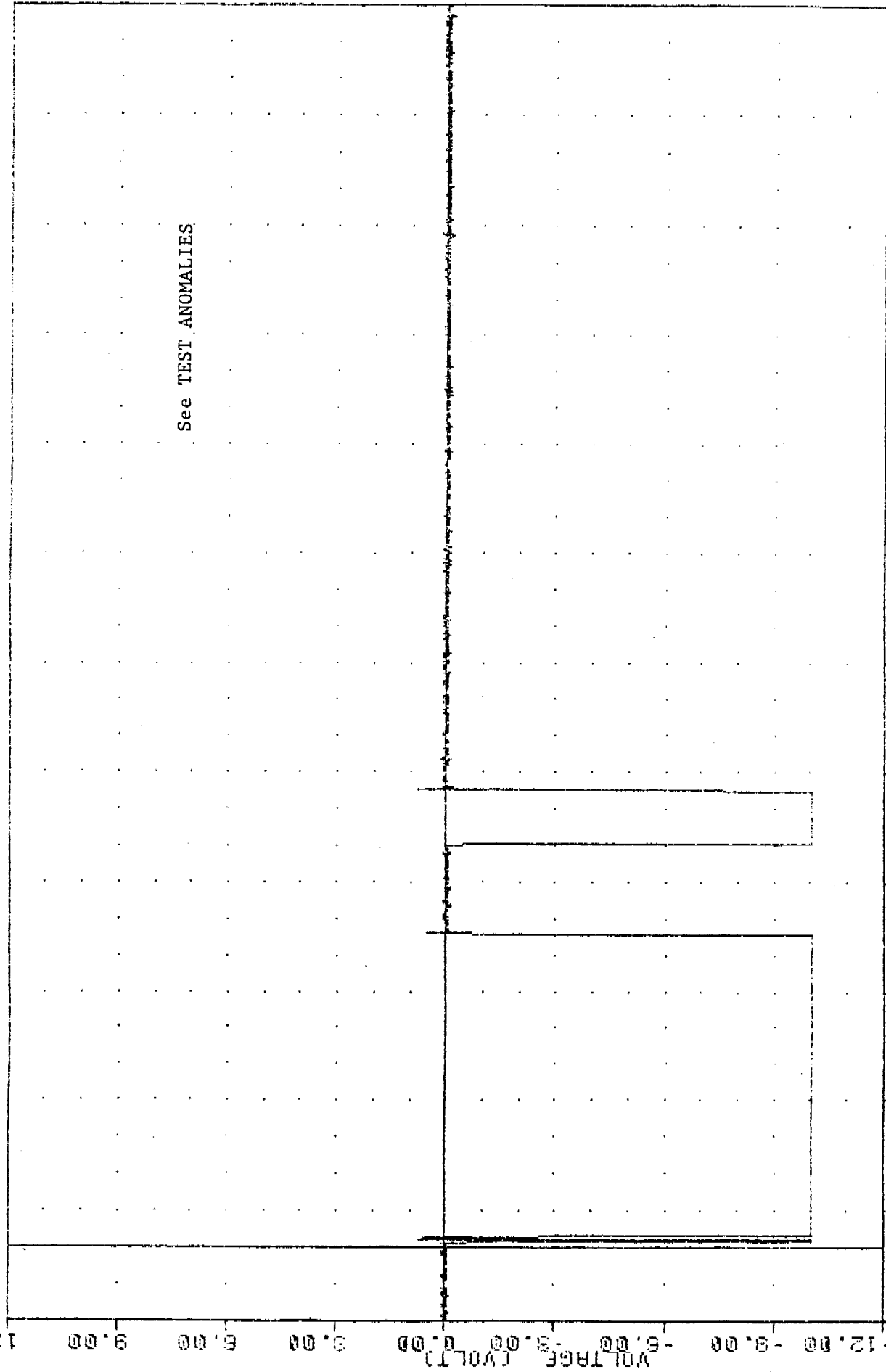


1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST
VEHICLE CONTACT SWITCH - CENTER

NRIC-4 , 881017
DAMAGE ALGORITHM REFORMULATION

08291 FILTER = ALPF 1650/ 5214/ -00

0TH2 MIN. MAX VALUES = -10.054 1.61, 0.60 125.38



-12.00 -9.00 -6.00 -3.00 0.00 3.00 6.00 9.00 12.00
-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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST
VEHICLE CONTACT SWITCH - RIGHT

NR10-4 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

FILTER = ALPI 1650/ 5214/ -40

UTM

MIN. MAX VALUES =

-10.24

3.88 ,

0.00 e 133.50

12.00

9.00

6.00

3.00

0.00

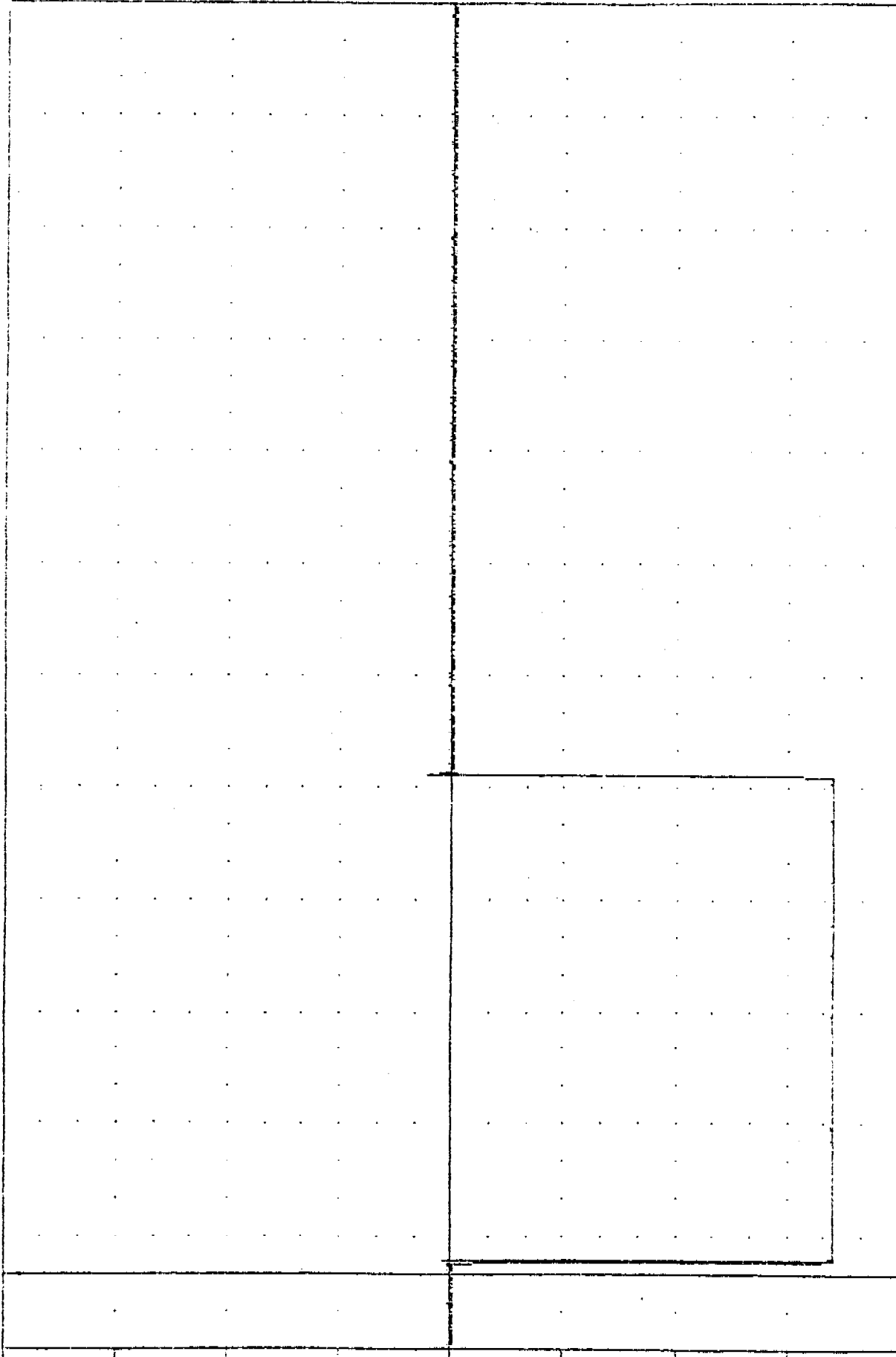
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



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)

NR10-4 , 881017

DAMAGE ALGORITHM REFORMULATION

38291

0TH5

FILTER = ALPF 1850/ 5214/ -40

MIN. MAX VALUES = -10.062

8.53 , 0.62 % 77.25

12.00

9.00

6.00

3.00

0.00

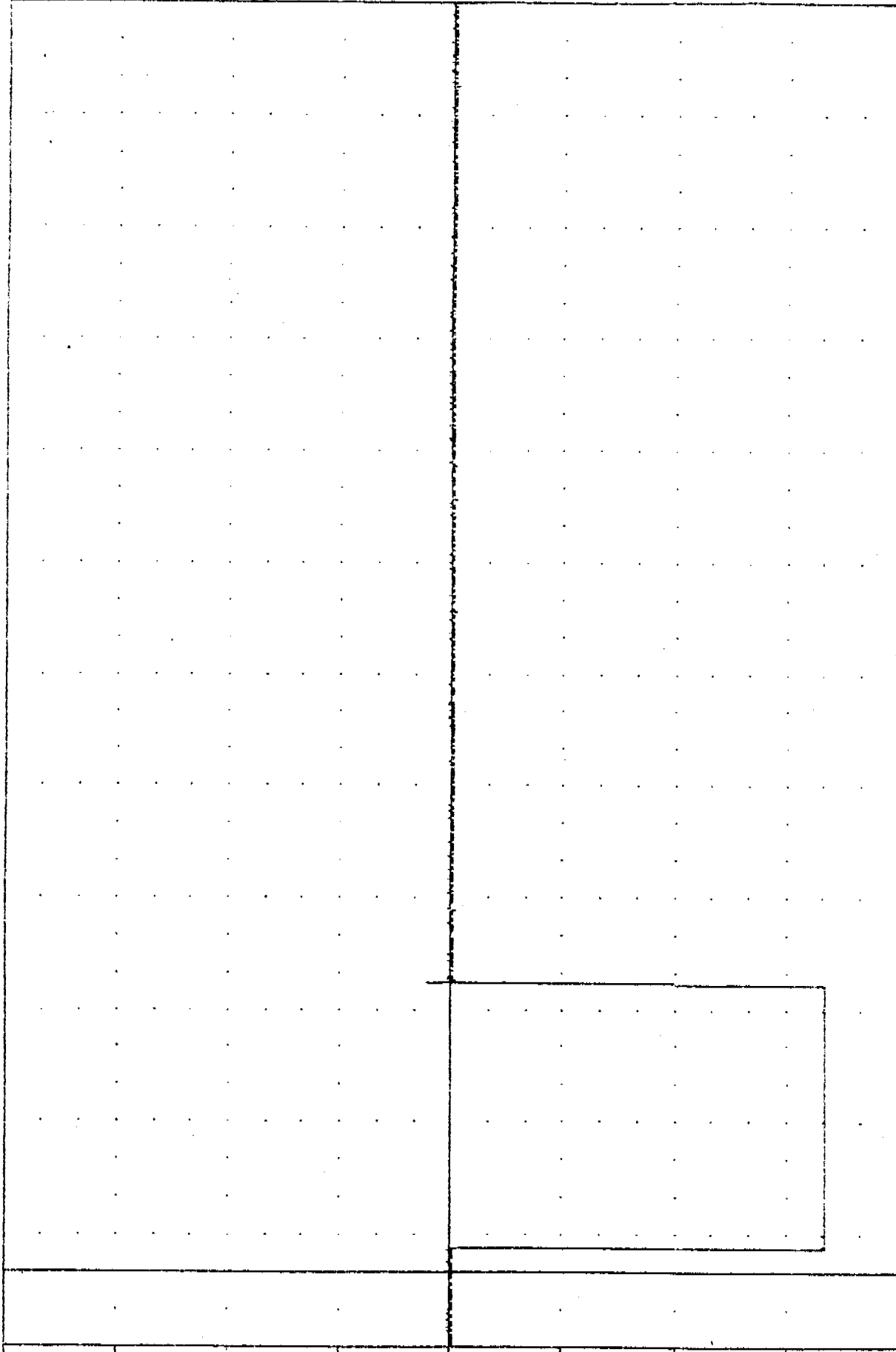
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 18 MPH FOURTH TEST

BARRIER CONTACT SWITCH - RIGHT

VRTC-5 , 861017

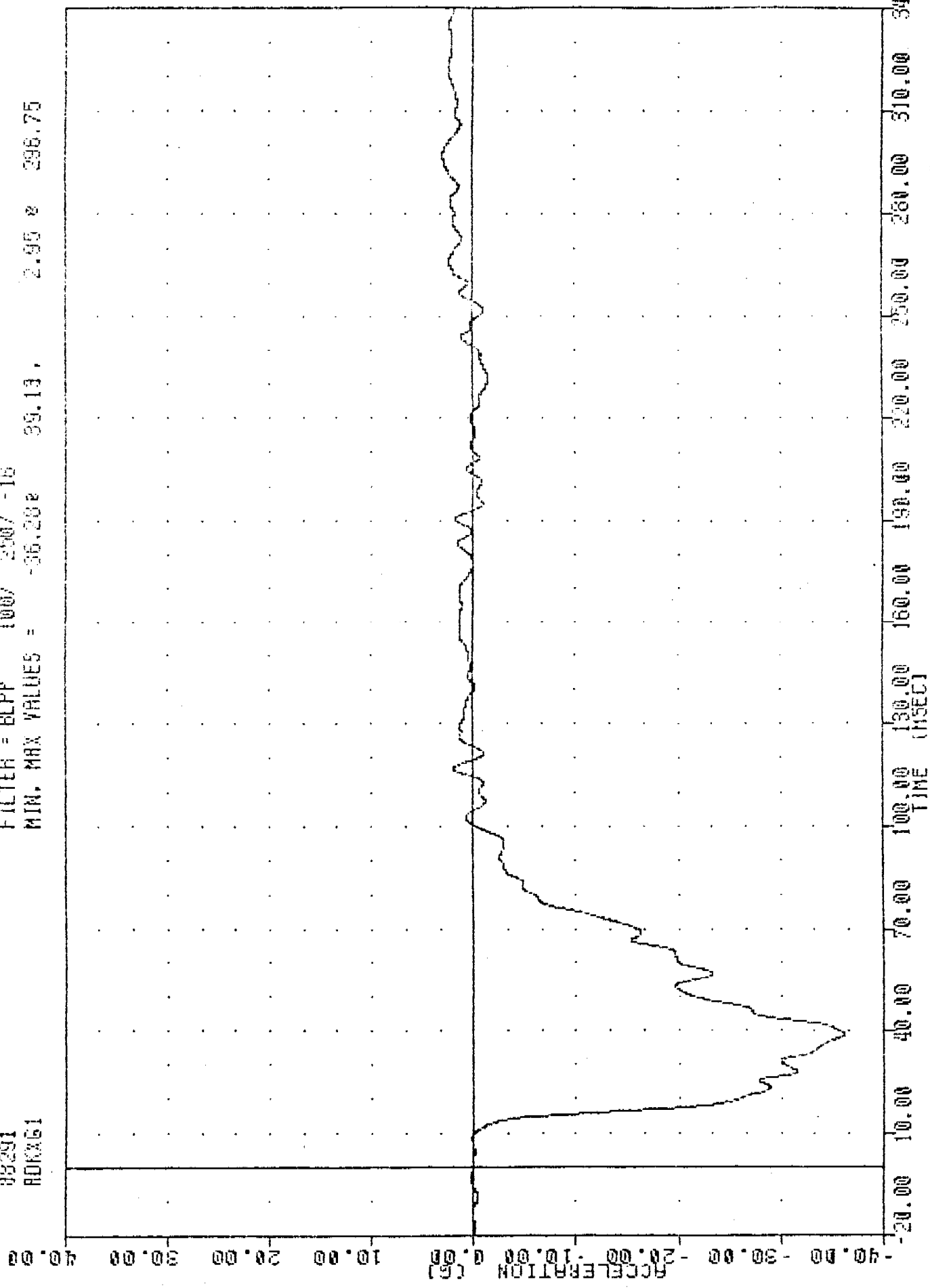
DAMAGE ALGORITHM REFORMULATION

88291

RDKAG1

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -36.20e 39.13, 2.95 e 398.75



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS ACCELERATION

NRIC-5
88291
RDKXV1

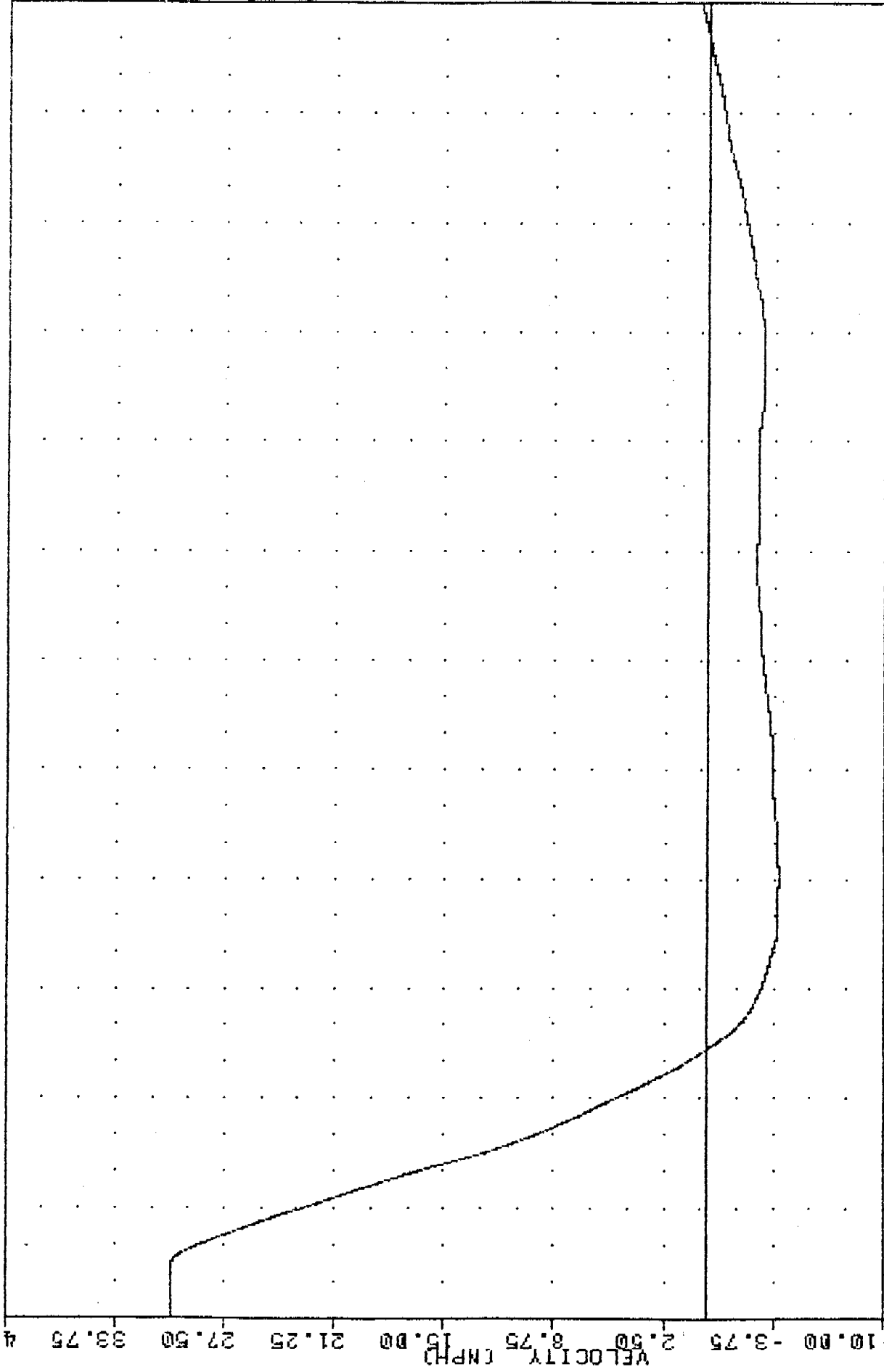
, 881017

DAMAGE ALGORITHM REFORMULATION

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -4.042 114.631 30.60 9.75

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

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS VELOCITY

VRTC-5 , 881017

DAMAGE ALGORITHM REFORMULATION

FILTER = BLPP 100/ 250/ -16

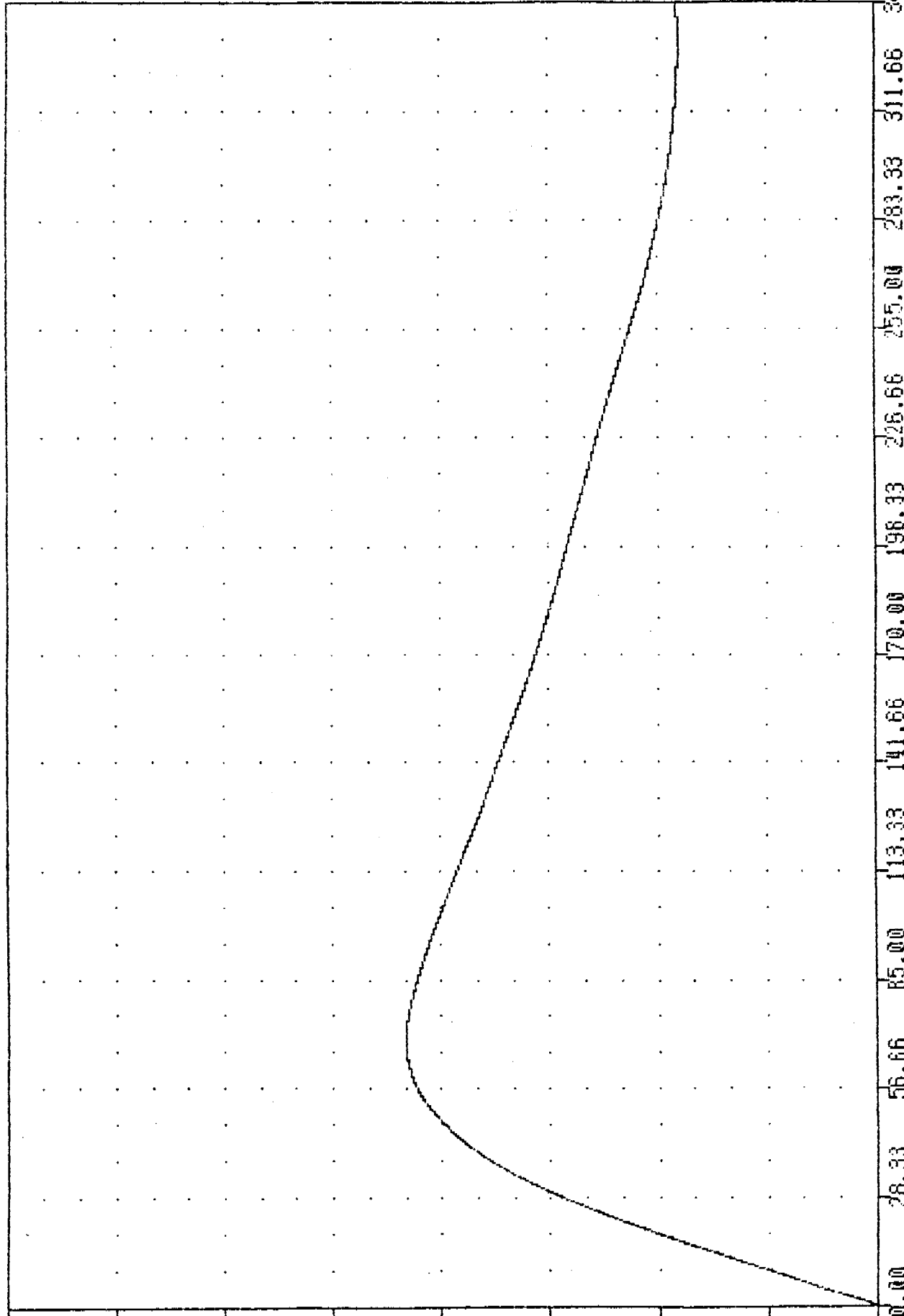
88291

ADKX01

MIN, MAX VALUES = 0.000 0.00 , 21.64 0 69.25

DISPLACEMENT (IN)

40.00 35.00 30.00 25.00 20.00 15.00 10.00 5.00 0.00



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT

NRIC-5 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

RDKXGR

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -36.97 39.25 ,

-2.91 297.88

40.00

30.00

20.00

10.00

0.00

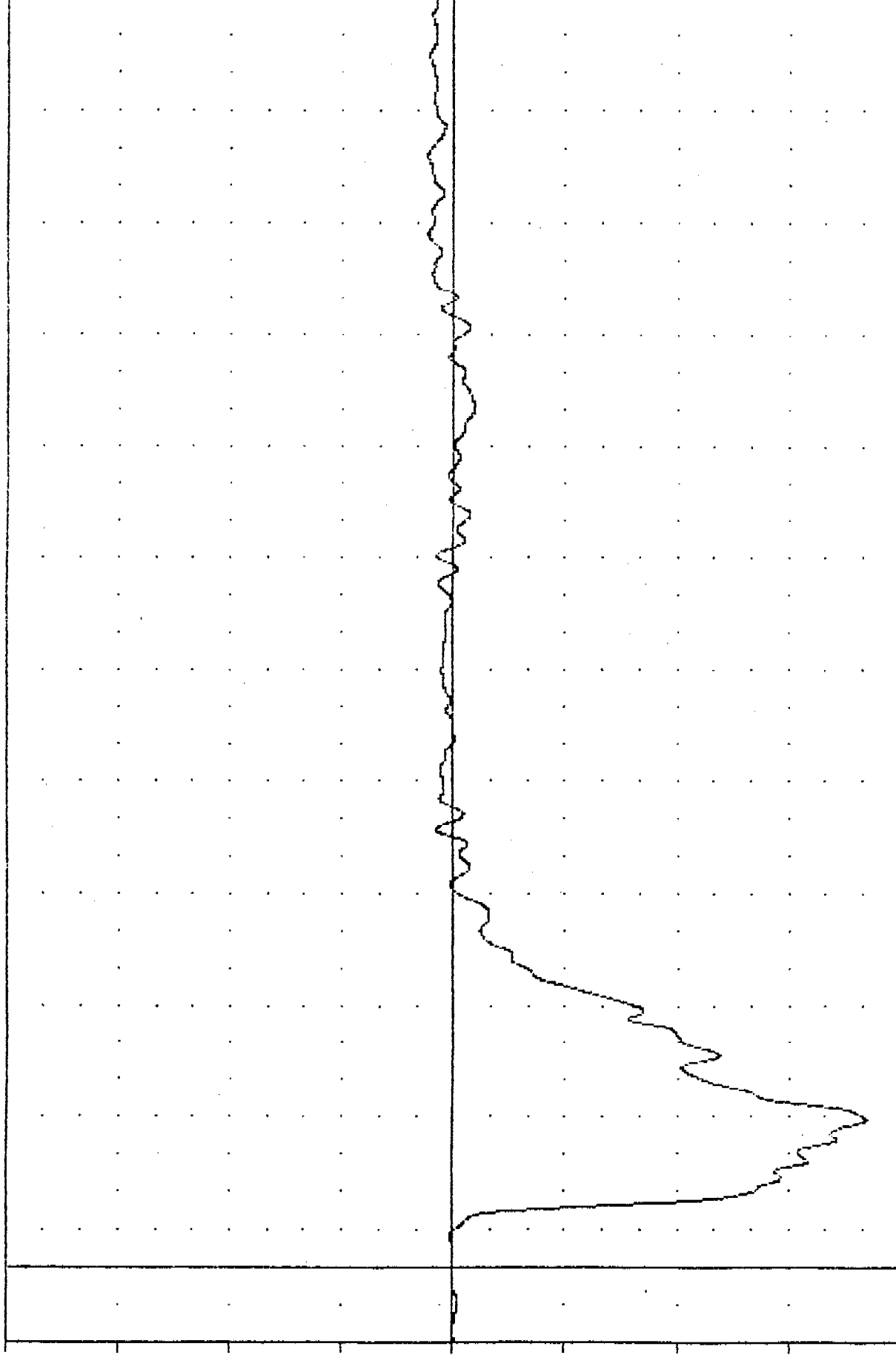
-10.00

-20.00

-30.00

-40.00

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)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS REDUNDANT ACCELERATION

YRTC-5 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

ADKXVA

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES =

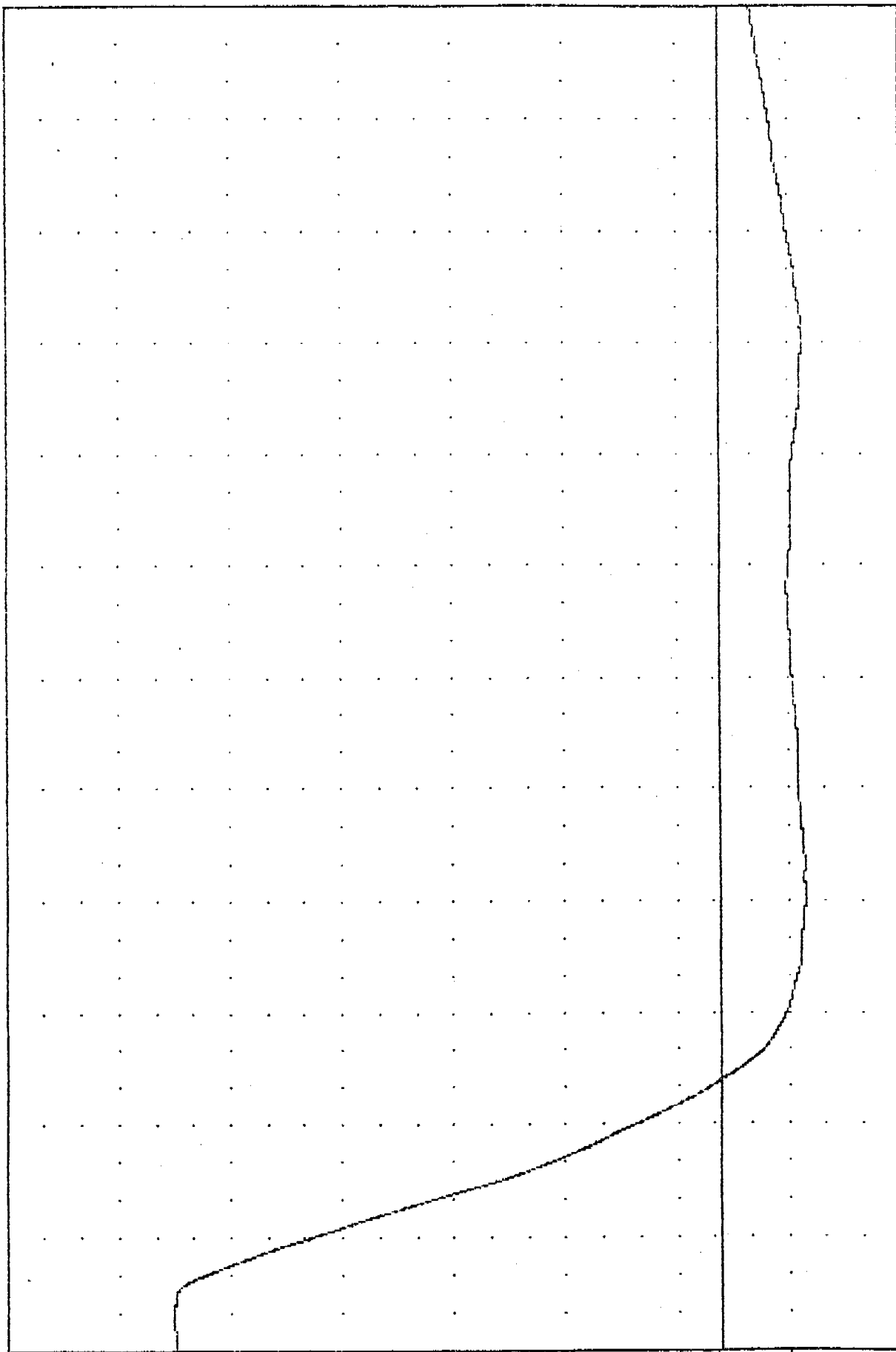
-4.72%

115.13,

30.52 @

9.50

VELOCITY (MPH)



0.00

25.00

50.00

75.00

100.00

125.00

150.00

175.00

200.00

225.00

250.00

275.00

300.00

TIME (HSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS VELOCITY REDUNDANT

VRIC-5 , 881017

DAMAGE ALGORITHM REFORMULATION

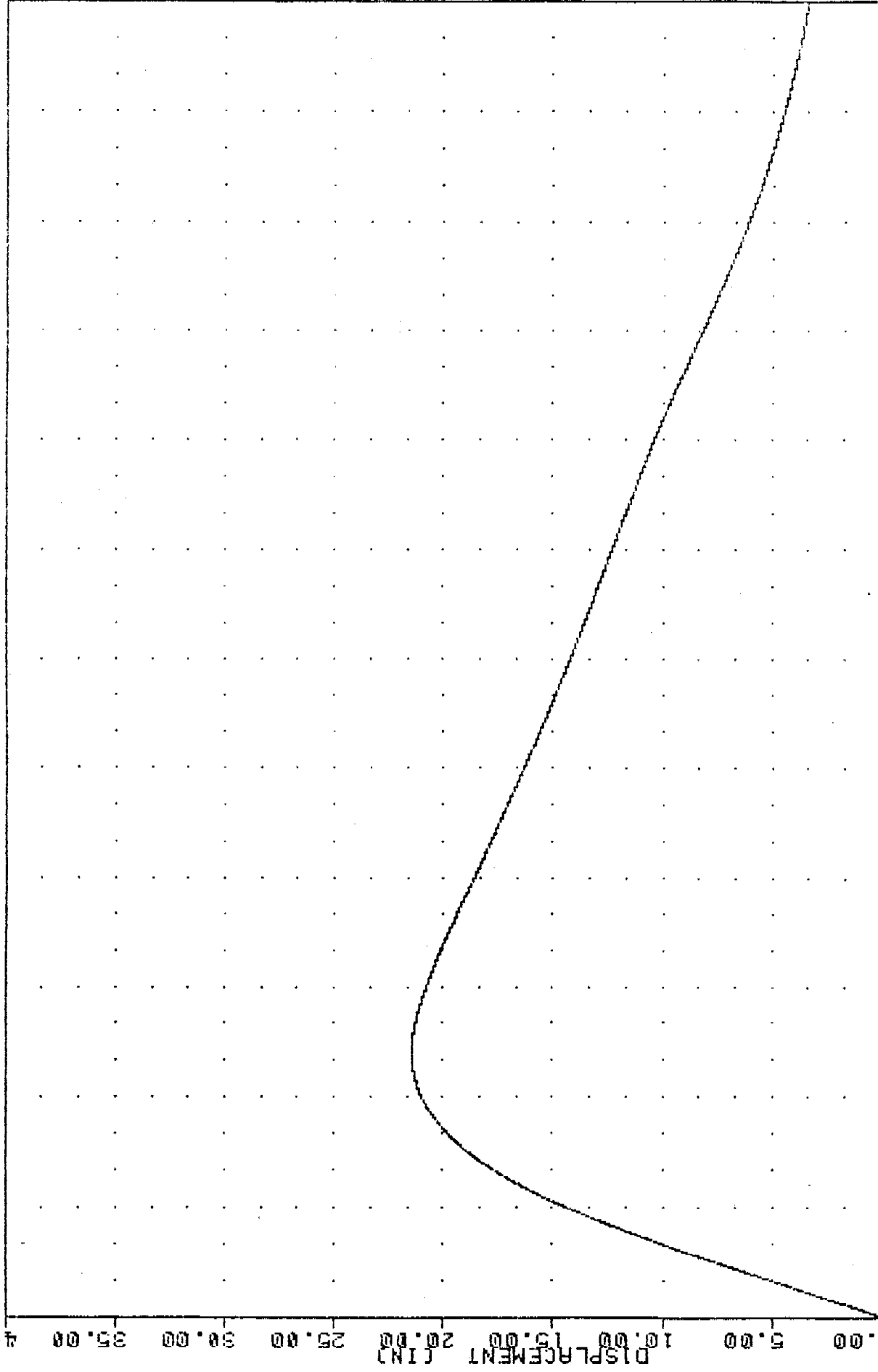
88291

ADKXDA

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = 0.00 0.00 , 21.43 2 66.00

40.00



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

65.00

70.00

75.00

80.00

85.00

90.00

95.00

100.00

105.00

110.00

115.00

120.00

125.00

130.00

135.00

140.00

145.00

150.00

155.00

160.00

165.00

170.00

175.00

180.00

185.00

190.00

195.00

200.00

205.00

210.00

215.00

220.00

225.00

230.00

235.00

240.00

245.00

250.00

255.00

260.00

265.00

270.00

275.00

280.00

285.00

290.00

295.00

300.00

305.00

310.00

315.00

320.00

325.00

330.00

335.00

340.00

345.00

350.00

355.00

360.00

365.00

370.00

375.00

380.00

385.00

390.00

395.00

400.00

405.00

410.00

415.00

420.00

425.00

430.00

435.00

440.00

445.00

450.00

455.00

460.00

465.00

470.00

475.00

480.00

485.00

490.00

495.00

500.00

505.00

510.00

515.00

520.00

525.00

530.00

535.00

540.00

545.00

550.00

555.00

560.00

565.00

570.00

575.00

580.00

585.00

590.00

595.00

600.00

605.00

610.00

615.00

620.00

625.00

630.00

635.00

640.00

645.00

650.00

655.00

660.00

665.00

670.00

675.00

680.00

685.00

690.00

695.00

700.00

705.00

710.00

715.00

720.00

725.00

730.00

735.00

740.00

745.00

750.00

755.00

760.00

765.00

770.00

775.00

780.00

785.00

790.00

795.00

800.00

805.00

810.00

815.00

820.00

825.00

830.00

835.00

840.00

845.00

850.00

855.00

860.00

865.00

870.00

875.00

880.00

885.00

890.00

895.00

900.00

905.00

910.00

915.00

920.00

925.00

930.00

935.00

940.00

945.00

950.00

955.00

960.00

965.00

970.00

975.00

980.00

985.00

990.00

995.00

1000.00

1005.00

1010.00

1015.00

1020.00

1025.00

1030.00

1035.00

1040.00

1045.00

1050.00

1055.00

1060.00

1065.00

1070.00

1075.00

1080.00

1085.00

1090.00

1095.00

1100.00

1105.00

1110.00

1115.00

1120.00

1125.00

1130.00

1135.00

1140.00

1145.00

1150.00

1155.00

1160.00

1165.00

1170.00

1175.00

1180.00

1185.00

1190.00

1195.00

1200.00

1205.00

1210.00

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1250.00

1255.00

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1270.00

1275.00

1280.00

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1480.00

1485.00

1490.00

1495.00

1500.00

1505.00

1510.00

1515.00

1520.00

1525.00

VRIC-5 , 881017

DAMAGE ALGORITHM REFORMULATION

88291

0TH1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.24 0.00 ,

0.75 e 132.75

12.00

9.00

6.00

3.00

0.00

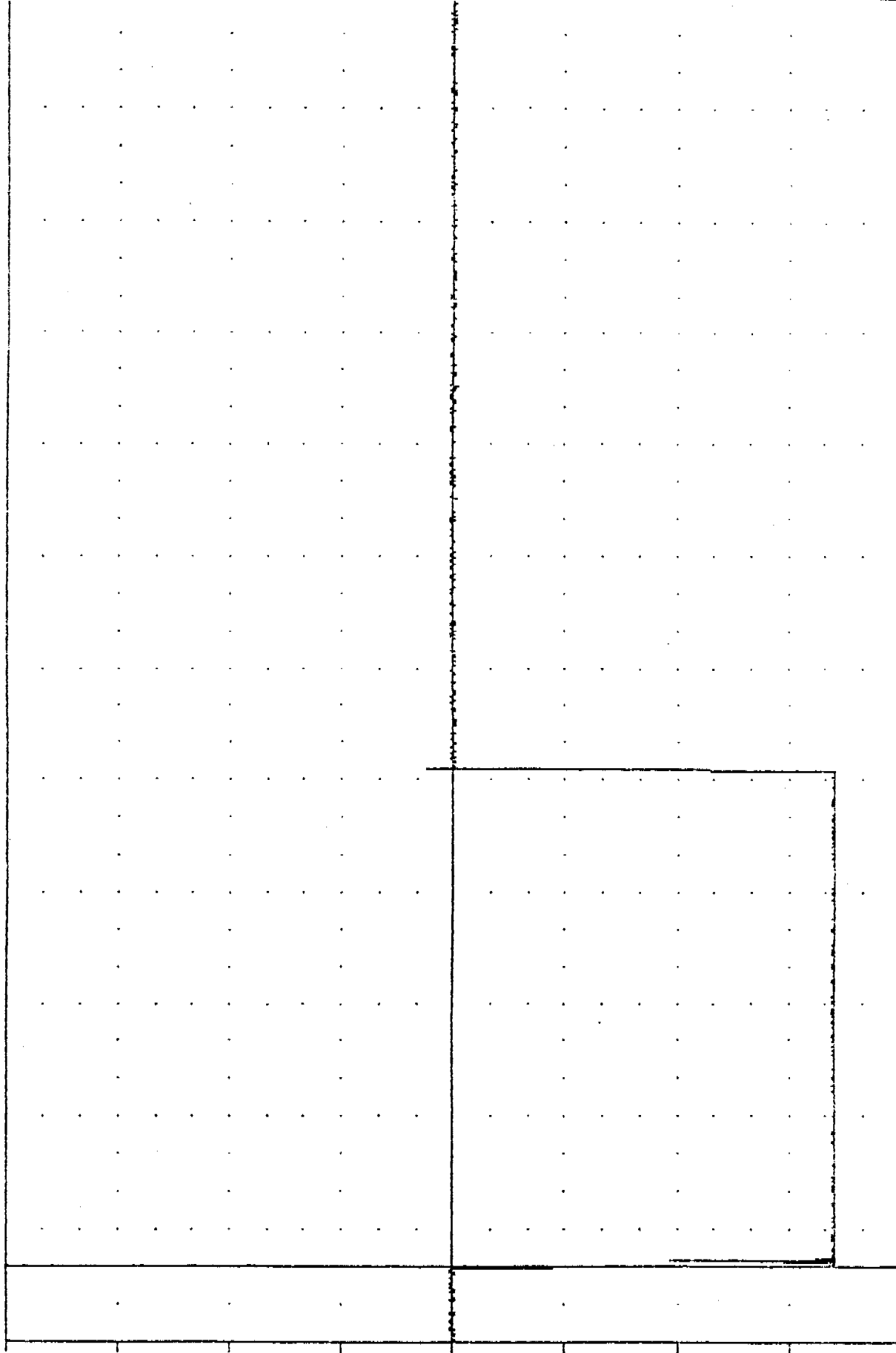
-3.00

-6.00

-9.00

-12.00

VOLTAGE (VOLT)



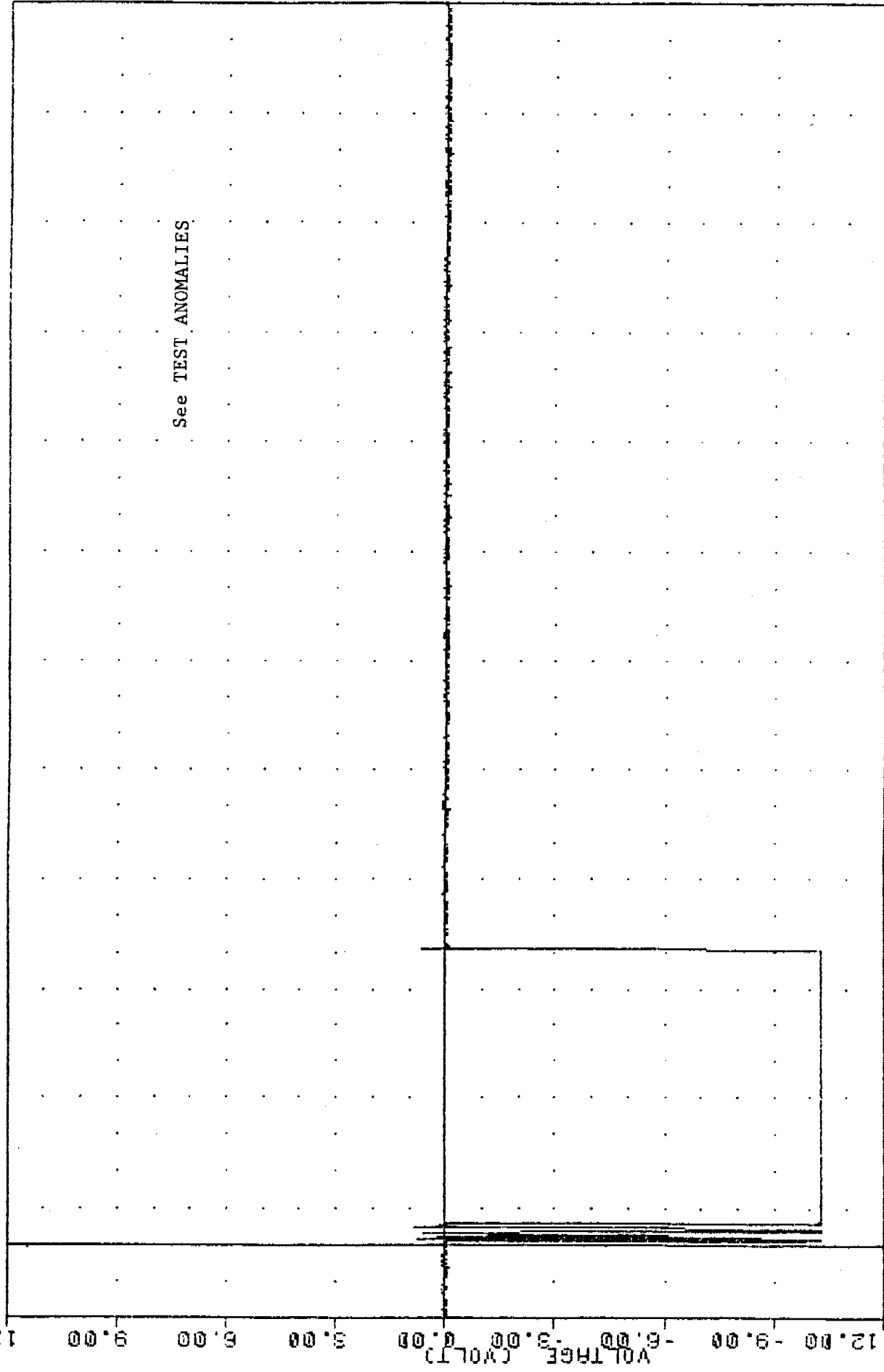
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (MSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE CONTACT SWITCH - LEFT

VRTC-5 , 881017
DAMAGE ALGORITHM REFORMULATION

88291
0TH2
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.268 1.361 0.87 4.75



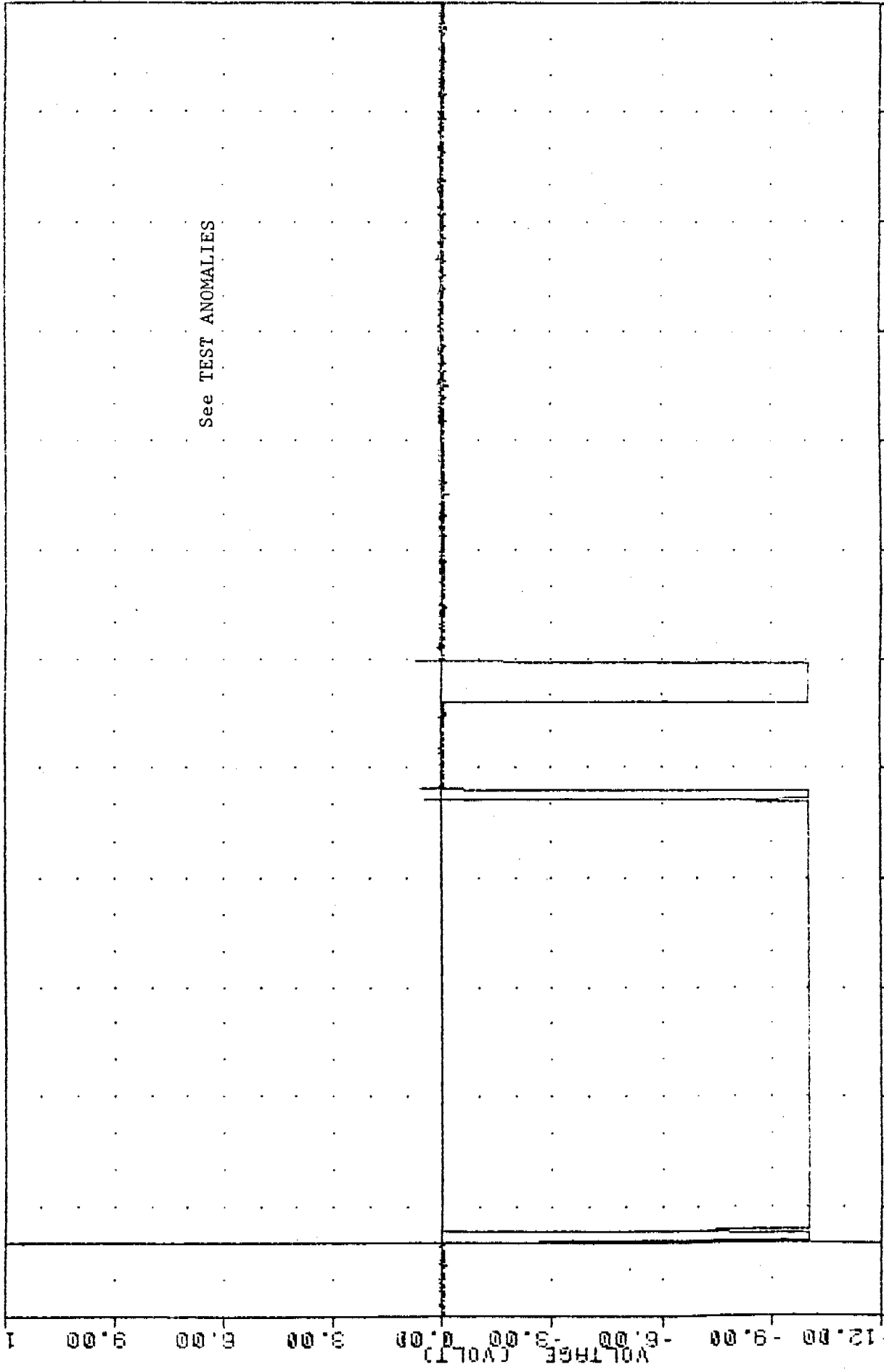
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)

1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE CONTACT SWITCH - CENTER

VRTC-5 , 881017
DAMAGE ALGORITHM REFORMULATION

88231 FILTER = ALPF 1650/ 5214/ -40

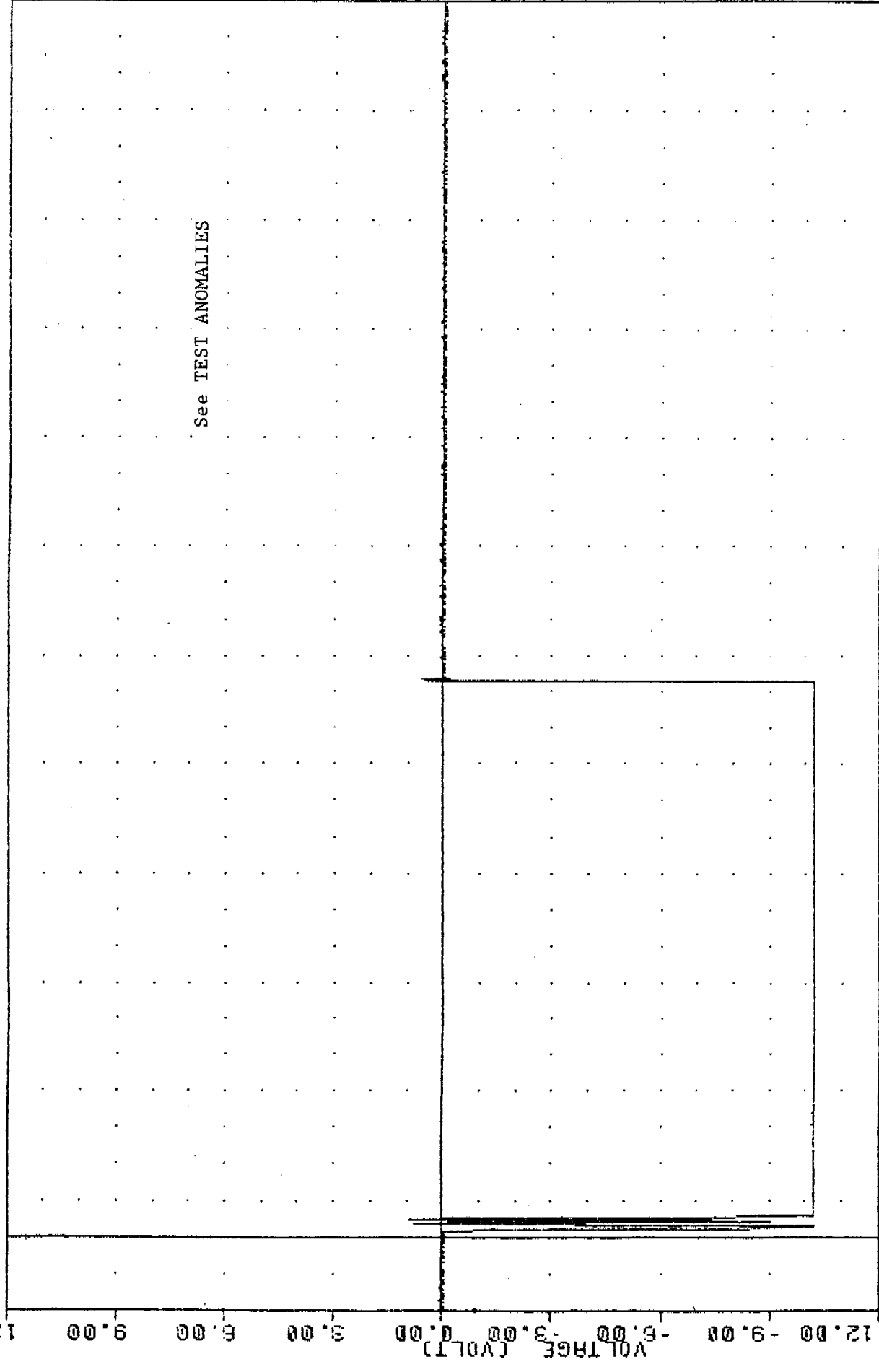
0TH3 MIN. MAX VALUES = -10.04e 0.50, 0.73 e 159.13



-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)
1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
VEHICLE CONTACT SWITCH - RIGHT

VRTC-5 881017
DAMAGE ALGORITHM REFORMULATION

88291
0TH4
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.21e 2.38, 0.89 e 4.75



-12.00 -9.00 -6.00 -3.00 0.00 3.00 6.00 9.00 12.00
-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)

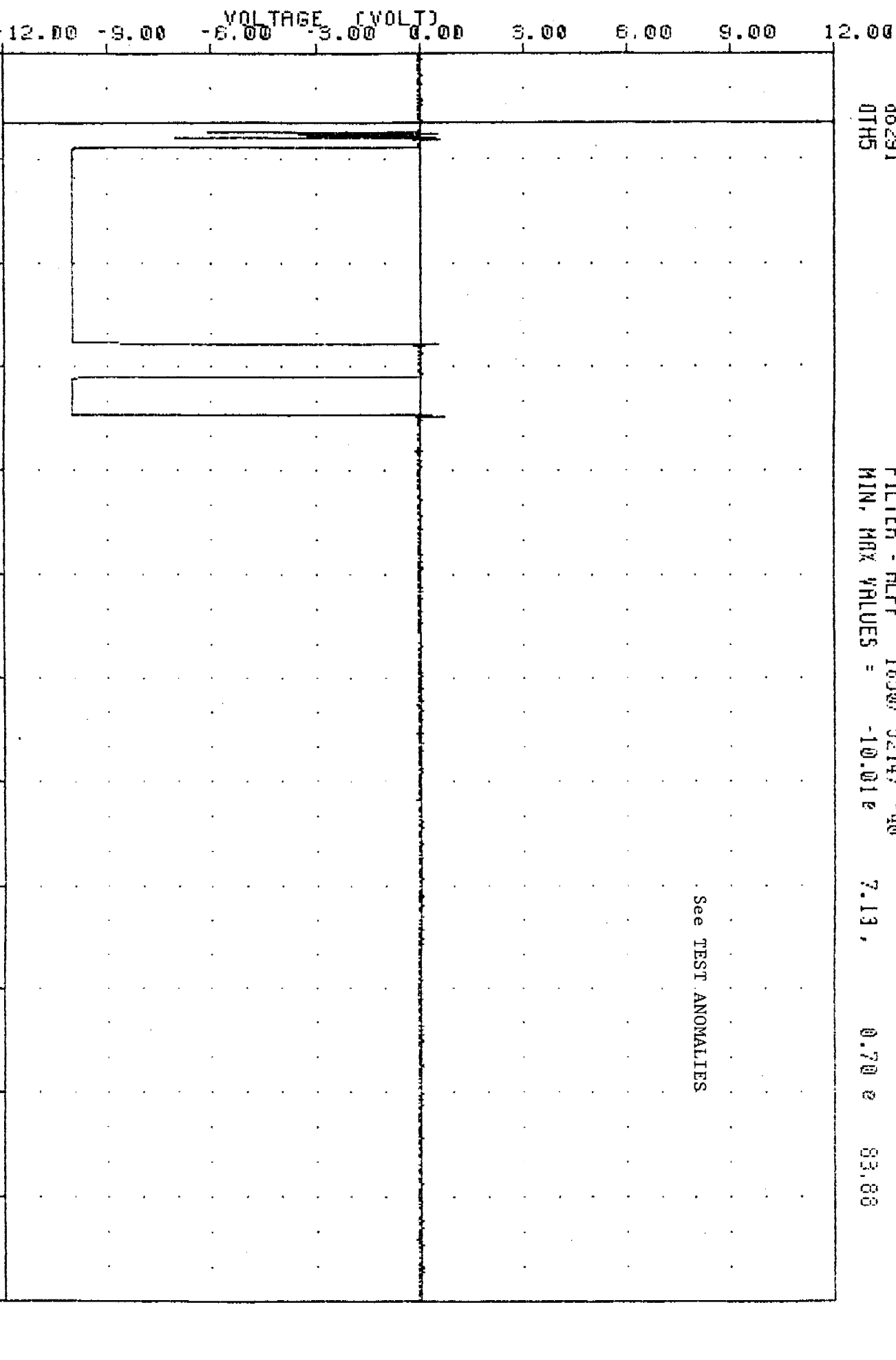
1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
BARRIER CONTACT SWITCH - LEFT

VRIC-5 , 881017
 DAMAGE ALGORITHM REFORMULATION
 88291
 DTMS

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -10.01e

7.13, 0.70e 83.88

See TEST ANOMALIES



1985 PONTIAC GRAND AM INTO FLAT FRONT BARRIER AT 30 MPH FIFTH TEST
 BARRIER CONTACT SWITCH - RIGHT