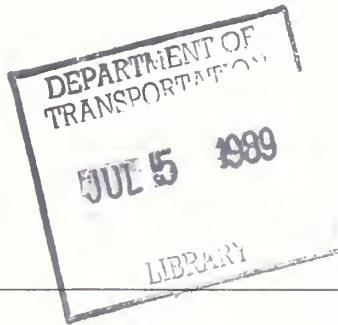


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Department
of Transportation
National Highway
Traffic Safety
Administration



DOT HS 807 350
Final Report

September 1988

Final Report of Frontal Barrier Impacts of a 1986 Ford Taurus 4-Door Sedan in Support of Crash III Damage Algorithm Reformation

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear only because they are considered essential to the object of this report.

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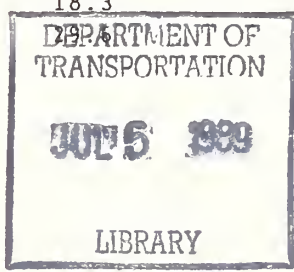
1. Report No. DOT HS 807 350		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle FINAL REPORT OF FRONTAL BARRIER IMPACTS OF A 1986 FORD TAURUS 4-DOOR SEDAN IN SUPPORT OF CRASH III DAMAGE ALGORITHM REFORMATION,				5. Report Date SEPTEMBER, 1988	
				6. Performing Organization Code	
7. Author(s) N.A. El-Habash, Project Engineer, TRC				8. Performing Organization Report No. 880822 & 880823	
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15. Supplementary Notes					
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 1986 Ford Taurus 4-door sedan, VIN 1FABP29UOGA124513, at the Transportation Research Center of Ohio. The following five tests were conducted on one vehicle:					
				AVERAGE CUMULATIVE	
TEST NO.	DATE	TIME	SPEED (mph)	CRUSH	
880822-1	8/22/88	1030	9.6	2.5	
880822-2	8/22/88	1315	19.8	8.1	
880822-3	8/22/88	1540	20.1	14.1	
880823-1	8/23/88	1030	18.6	18.3	
880823-2	8/23/88	1130	30.0		
					
17. Key Words Flat Frontal Impact Crash III Damage Algorithm Reformation.			18. Distribution Statement This document is available to the public through the National Technical Information Service Springfield, VA 22161		
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages	22. Price

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1.0	PURPOSE AND TEST SUMMMARY	1-1
2.0	VEHICLE AND TEST DATA	2-1
3.0	TEST #880822-1 SUMMARY	3-1
4.0	TEST #880822-2 SUMMARY	4-1
5.0	TEST #880822-3 SUMMARY	5-1
6.0	TEST #880823-1 SUMMARY	6-1
7.0	TEST #880823-2 SUMMARY	7-1
APPENDIX A	PHOTOGRAPHS	A-1
APPENDIX B	DATA PLOTS	B-1

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 1986 Ford Taurus was equipped with a 3.0 liter, 4-cylinder, transverse, gas engine with a 3-speed automatic transmission. The intended total test weight of the vehicle was 3460 pounds. The actual weight was 3507 pounds, including 438 pounds of sandbag 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, CONT'D

WHEELBASE: 104.8

MAXIMUM WIDTH: 69.6

WEIGHT OF TEST VEHICLE WITH REQUIRED OCCUPANTS AND LUGGAGE:

RIGHT FRONT	1124 LBS.	RIGHT REAR	631 LBS.
LEFT FRONT	1139 LBS.	LEFT REAR	613 LBS.
TOTAL FRONT WEIGHT	2263 LBS.	(64.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1244 LBS.	(35.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3507 LBS.		

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 438 LBS.

VEHICLE TIRE DATA:

TIRES ON VEHICLE (MFR. & LINE, SIZE): General P195/75R14 M + S

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? No

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. 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.

LOCATION OF CONTACT SWITCHES:

OTH1 Two inches right of the front bumper centerline
OTH2 Front bumper centerline
OTH3 Two inches left of the front bumper centerline

SECTION 3.0

TEST #880822-1 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 880822-1

DATE OF TEST: 8/22/88

TIME OF TEST: 1030

AMBIENT TEMPERATURE AT IMPACT AREA: 80° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3507.0	3460.0
VEHICLE ORIENTATION (deg.)	0.0	0.0
VEHICLE VELOCITY (mph.)	9.6	10.0
MAXIMUM CRUSH (in.)	3.1	
AVERAGE CRUSH = $\frac{\{C1+C6+C2+C3+C4+C5\}}{5}$ (in.)	2.5	

2

TEST NUMBER 880822-1

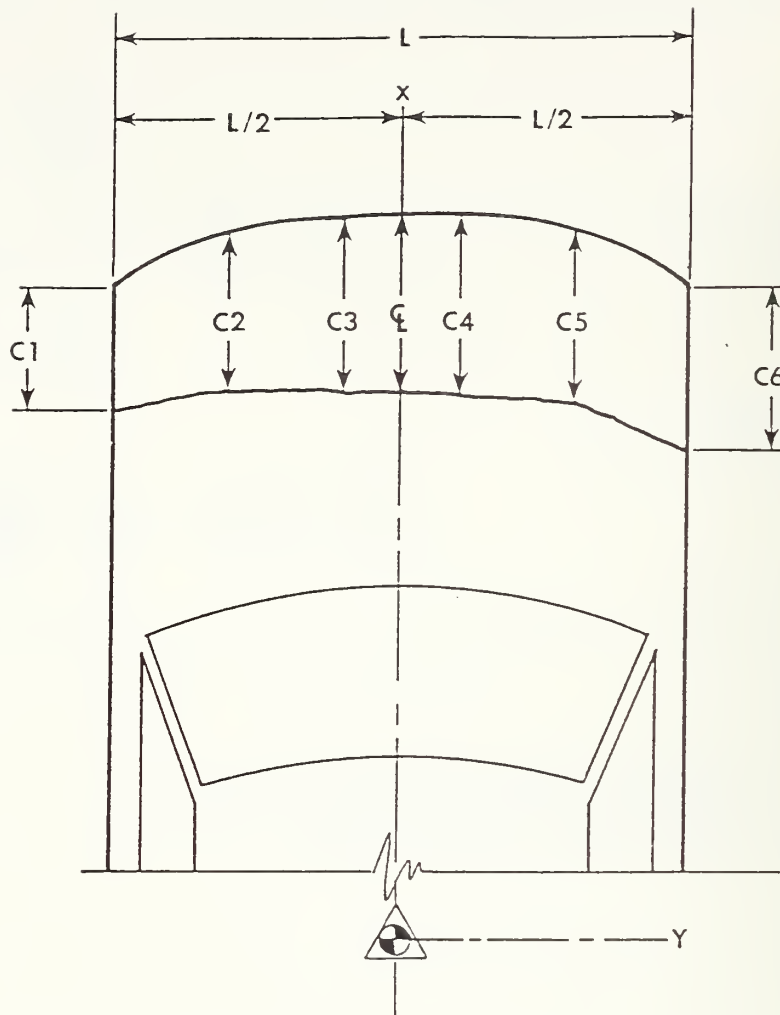
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	G MSEC	MAX	G MSEC
1 VEHICLE REAR DECK				
LONGITUDINAL	1.9	245.1	12.1	44.4
LATERAL	1.0	75.5	0.6	121.0
VERTICAL	3.9	85.1	2.8	74.5
RESULTANT	12.2	44.5		

VEHICLE SEPARATION TIMES:

LEFT SWITCH: 151.0 MSEC
 CENTER SWITCH: 152.0 MSEC
 RIGHT SWITCH: 151.0 MSEC

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



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 1986 Ford Taurus - Test #880822-1

	PRE-TEST	POST-TEST	CRUSH
L	<u>65.5</u>		
C1	<u>169.8</u>	C1 <u>168.8</u>	C1 <u>1.0</u>
C2	<u>173.9</u>	C2 <u>171.8</u>	C2 <u>2.1</u>
C3	<u>175.8</u>	C3 <u>172.8</u>	C3 <u>3.0</u>
C4	<u>175.6</u>	C4 <u>172.5</u>	C4 <u>3.1</u>
C5	<u>173.8</u>	C5 <u>171.0</u>	C5 <u>2.8</u>
C6	<u>169.6</u>	C6 <u>167.7</u>	C6 <u>1.9</u>
CL	<u>175.9</u>	CL <u>172.8</u>	CL <u>3.1</u>

TEST #880822-1

CAMERA INFORMATION

<u>CAMERA NO.</u>	<u>LOCATION</u>	<u>TYPE</u>	<u>LENS (mm)</u>	<u>SPEED (fps)</u>	<u>PURPOSE OF CAMERA DATA</u>
1	Right side wide	Photosonic 1B	13	500	Impact overall
2	Right side tight	Photosonic 1B	50	500	Impact closeup

SECTION 4.0

TEST #880822-2 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 880822-2

DATE OF TEST: 8/22/88

TIME OF TEST: 1315

AMBIENT TEMPERATURE AT IMPACT AREA: 80° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3507.8	3460.0
VEHICLE ORIENTATION (deg.)	0.0	0.0
VEHICLE VELOCITY (mph.)	19.8	20.0
MAXIMUM CUMULATIVE CRUSH (in.)	8.9	
AVERAGE CUMULATIVE CRUSH $\frac{\{C_1+C_6+C_2+C_3+C_4+C_5\}}{5}$ (in.)	8.1	

2

TEST NUMBER 880822-2

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

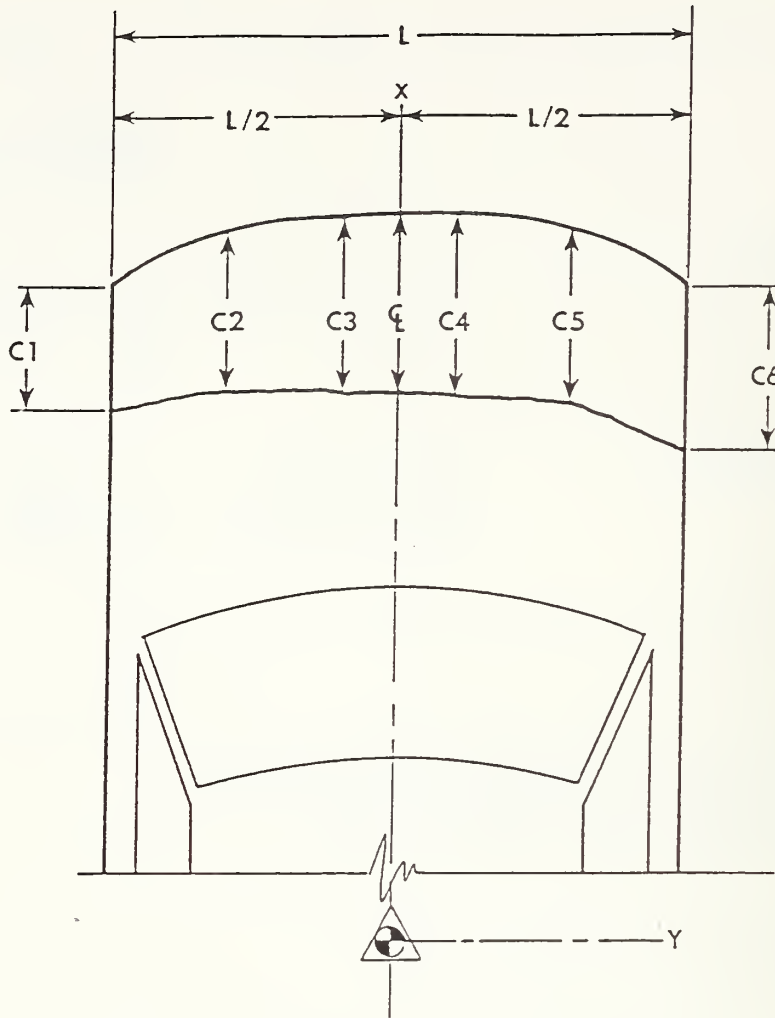
No.	LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
		MAX G	MSEC	MAX G	MSEC
1	VEHICLE REAR DECK				
	LONGITUDINAL	10.2	98.9	27.5	39.
	LATERAL	3.8	16.5	2.2	27.
	VERTICAL	13.5	50.1	17.0	40.
	RESULTANT	32.3	40.0		

VEHICLE SEPARATION TIMES:

LEFT SWITCH: --- Y MSEC
 CENTER SWITCH: 132.0 Y MSEC
 RIGHT SWITCH: --- Y MSEC

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

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 1986 Ford Taurus - Test #880822-2

	PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L	<u>65.5</u>		
$C1$	<u>169.8</u>	$C1$ <u>163.1</u>	$C1$ <u>6.7</u>
$C2$	<u>173.9</u>	$C2$ <u>166.0</u>	$C2$ <u>7.9</u>
$C3$	<u>175.8</u>	$C3$ <u>167.1</u>	$C3$ <u>8.7</u>
$C4$	<u>175.6</u>	$C4$ <u>166.8</u>	$C4$ <u>8.8</u>
$C5$	<u>173.8</u>	$C5$ <u>165.4</u>	$C5$ <u>8.4</u>
$C6$	<u>169.6</u>	$C6$ <u>162.8</u>	$C6$ <u>6.8</u>
CL	<u>175.9</u>	CL <u>167.0</u>	CL <u>8.9</u>

*Pre-test measurements taken from test #880822-1.

TEST #880822-2

CAMERA INFORMATION

<u>CAMERA NO.</u>	<u>LOCATION</u>	<u>TYPE</u>	<u>LENS (mm)</u>	<u>SPEED (fps)</u>	<u>PURPOSE OF CAMERA DATA</u>
1	Right side wide	Photosonic 1B	13	500	Impact overall
2	Right side tight	Photosonic 1B	50	500	Impact closeup

SECTION 5.0

TEST #880822-3 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 880822-3

DATE OF TEST: 8/22/88

TIME OF TEST: 1540

AMBIENT TEMPERATURE AT IMPACT AREA: 80° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3507.0	3460.0
VEHICLE ORIENTATION (deg.)	0.0	0.0
VEHICLE VELOCITY (mph.)	20.1	20.0
MAXIMUM CUMULATIVE CRUSH (in.)	14.9	
AVERAGE CUMULATIVE CRUSH $\frac{\{C1+C6+C2+C3+C4+C5\}}{5}$ (in.)	14.1	

2

TEST NUMBER 880822-3

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

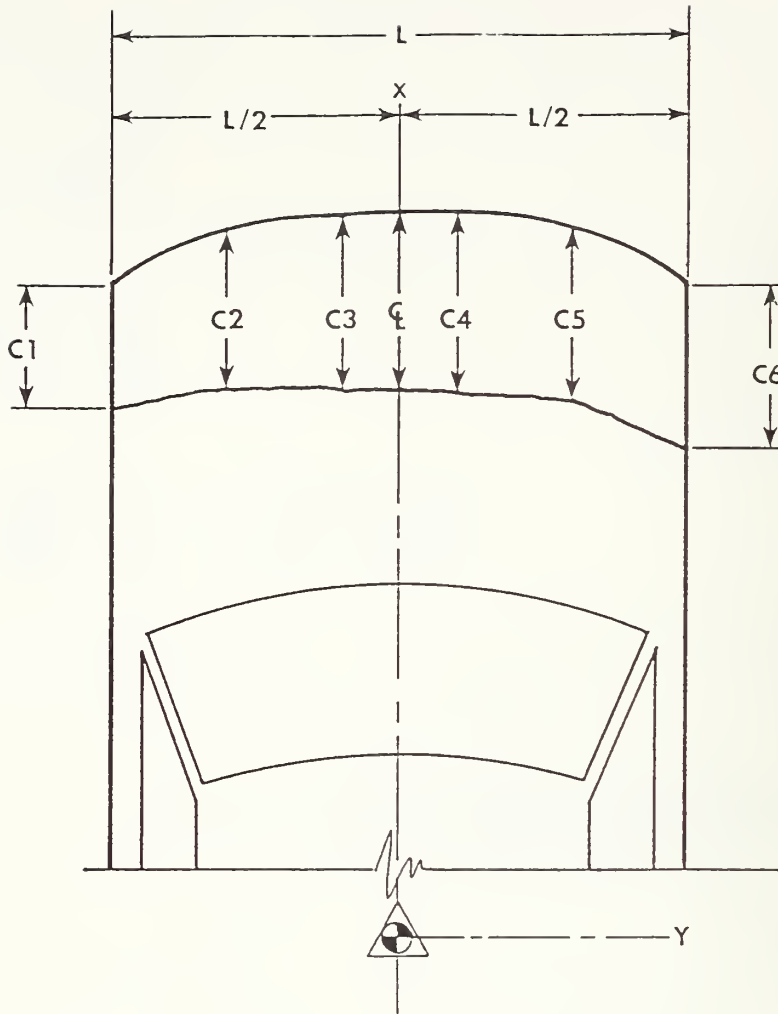
No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX G	MSEC	MAX G	MSEC
1 VEHICLE REAR DECK				
LONGITUDINAL	32.0	93.8	41.2	41.1
LATERAL	5.8	98.1	4.3	109.4
VERTICAL	38.3	108.5	50.7	99.1
RESULTANT	63.3	99.0		

VEHICLE SEPARATION TIMES:

LEFT SWITCH: ---Y MSEC
 CENTER SWITCH: ---Y MSEC
 RIGHT SWITCH: 123.2 MSEC

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

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 1986 Ford Taurus - Test #880822-3

	PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L	<u>65.5</u>		
C1	<u>169.8</u>	C1 <u>157.2</u>	C1 <u>12.6</u>
C2	<u>173.9</u>	C2 <u>160.0</u>	C2 <u>13.9</u>
C3	<u>175.8</u>	C3 <u>161.1</u>	C3 <u>14.7</u>
C4	<u>175.6</u>	C4 <u>160.8</u>	C4 <u>14.8</u>
C5	<u>173.8</u>	C5 <u>159.4</u>	C5 <u>14.4</u>
C6	<u>169.6</u>	C6 <u>156.5</u>	C6 <u>13.1</u>
CL	<u>175.9</u>	CL <u>161.0</u>	CL <u>14.9</u>

*Pre-test measurements taken from test #880822-1.

TEST #880822-3

CAMERA INFORMATION

<u>CAMERA NO.</u>	<u>LOCATION</u>	<u>TYPE</u>	<u>LENS (mm)</u>	<u>SPEED (fps)</u>	<u>PURPOSE OF CAMERA DATA</u>
1	Right side wide	Photosonic 1B	13	500	Impact overall
2	Right side tight	Photosonic 1B	50	500	Impact closeup

SECTION 6.0

TEST #880823-1 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 880823-1

DATE OF TEST: 8/23/88

TIME OF TEST: 1030

AMBIENT TEMPERATURE AT IMPACT AREA: 80° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3507.0	3460.0
VEHICLE ORIENTATION (deg.)	0.0	0.0
VEHICLE VELOCITY (mph.)	18.6	18.5
MAXIMUM CUMULATIVE CRUSH (in.)	19.0	
AVERAGE CUMULATIVE CRUSH $\frac{\{C1+C6+C2+C3+C4+C5\}}{5}$ (in.)	18.3	

2

TEST NUMBER 880823-1

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

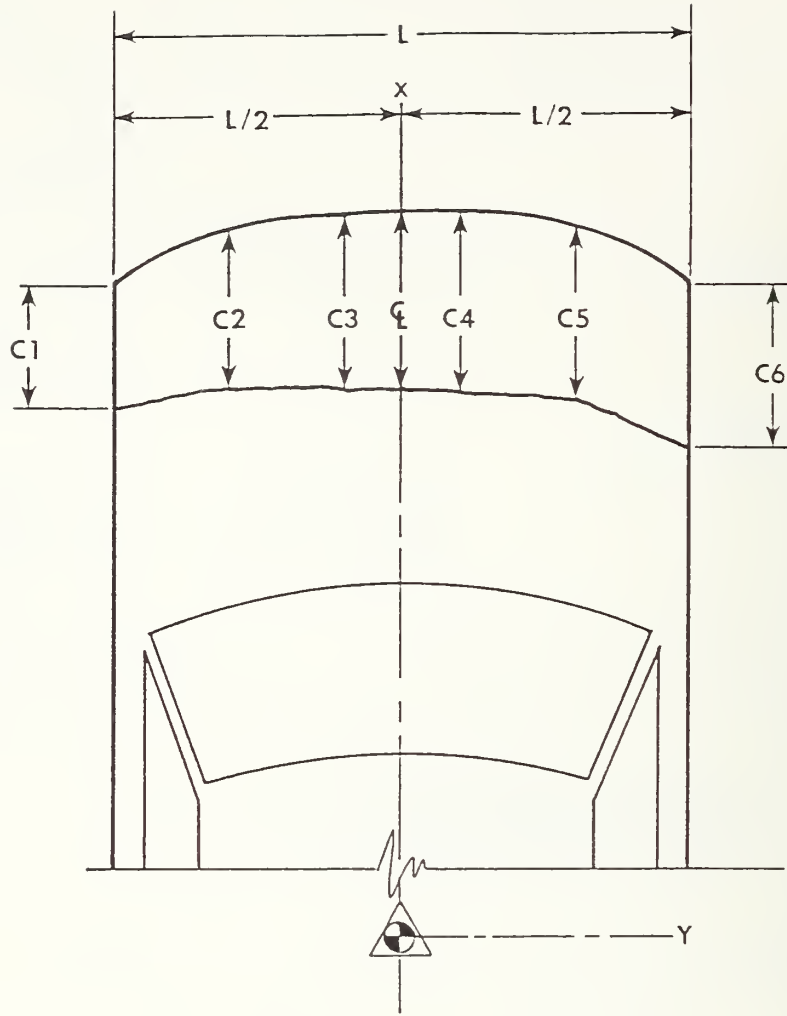
No.	LOCATION	POSITIVE		NEGATIVE	
		DIRECTION	MAX @ MSEC	DIRECTION	MAX @ MSEC
1	VEHICLE REAR DECK				
	LONGITUDINAL		8.0 132.0	35.7	27.0
	LATERAL		5.5 61.3	4.0	32.0
	VERTICAL		24.0 31.4	21.6	43.0
	RESULTANT		36.1 27.0		

VEHICLE SEPARATION TIMES:

LEFT SWITCH: ---Y MSEC
 CENTER SWITCH: ---Y MSEC
 RIGHT SWITCH: 125.4 MSEC

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

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 1986 Ford Taurus - Test #880823-1

	PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L	<u>65.5</u>		
C1	<u>169.8</u>	C1 <u>152.9</u>	C1 <u>16.9</u>
C2	<u>173.9</u>	C2 <u>155.8</u>	C2 <u>18.1</u>
C3	<u>175.8</u>	C3 <u>156.8</u>	C3 <u>19.0</u>
C4	<u>175.6</u>	C4 <u>156.7</u>	C4 <u>18.9</u>
C5	<u>173.8</u>	C5 <u>155.2</u>	C5 <u>18.6</u>
C6	<u>169.6</u>	C6 <u>152.6</u>	C6 <u>17.0</u>
CL	<u>175.9</u>	CL <u>157.0</u>	CL <u>18.9</u>

*Pre-test measurements taken from test #880822-1.

TEST #880823-1

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right side wide	Photosonic 1B	13	500	Impact overall
2	Right side tight	Photosonic 1B	50	500	Impact closeup

SECTION 7.0

TEST #880823-2 SUMMARY

TEST CONDITIONS:

TEST NUMBER: 880823-2

DATE OF TEST: 8/23/88

TIME OF TEST: 1130

AMBIENT TEMPERATURE AT IMPACT AREA: 80° F

SUBJECT VEHICLE DATA:

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (lbs.)	3507.0	3460.0
VEHICLE ORIENTATION (deg.)	0.0	0.0
VEHICLE VELOCITY (mph.)	30.0	30.0
MAXIMUM CUMULATIVE CRUSH (in.)	31.0	
AVERAGE CUMULATIVE CRUSH $\frac{\{C1+C6+C2+C3+C4+C5\}}{5}$ (in.)	29.6	

TEST NUMBER 880823-2

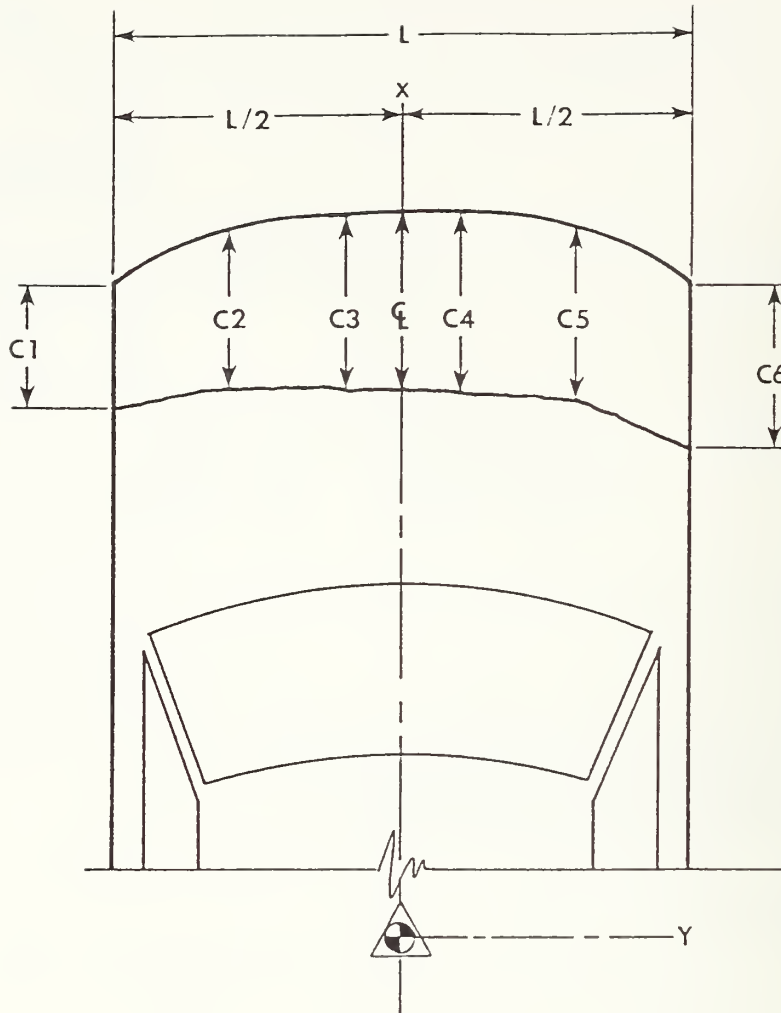
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

No. LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX G	MSEC	MAX G	MSEC
1 VEHICLE REAR DECK				
LONGITUDINAL	8.8	216.3	51.1	21.4
LATERAL	5.2	81.5	5.0	51.9
VERTICAL	17.5	49.3	24.6	40.0
RESULTANT	51.4	21.4		

VEHICLE SEPARATION TIMES:
 LEFT SWITCH: ---Y MSEC
 CENTER SWITCH: 152.0YMSEC
 RIGHT SWITCH: 156.4 MSEC

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

Y See TEST ANOMALIES

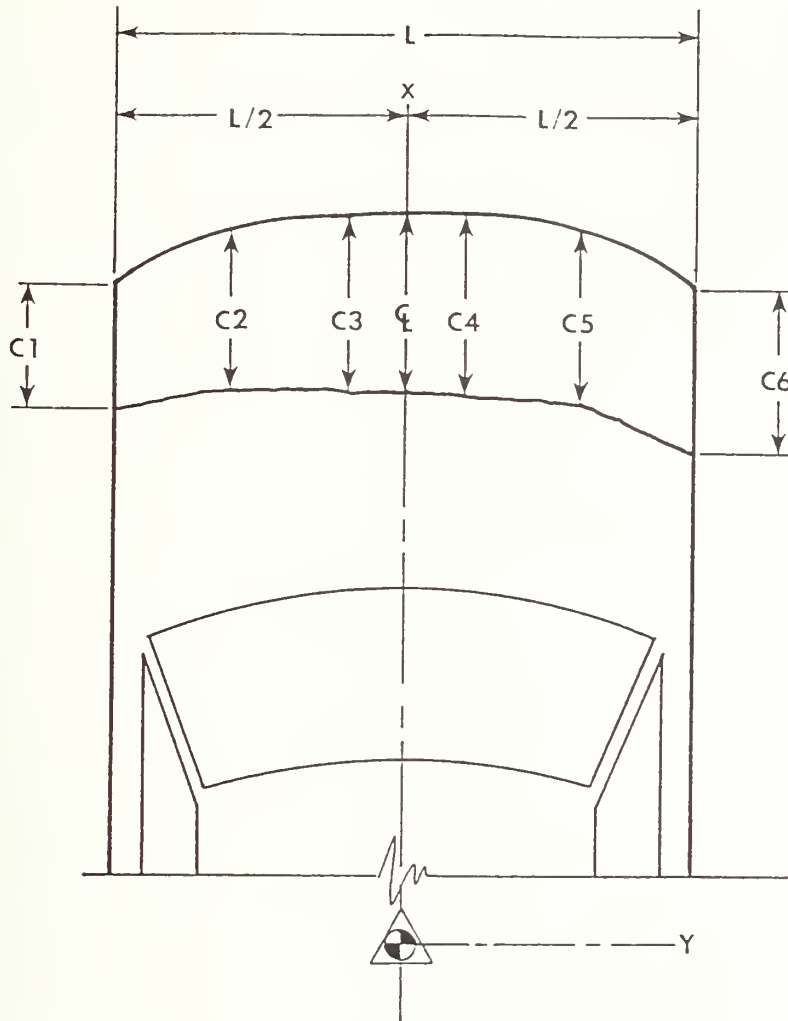


NOTE: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL is taken at centerline of vehicle.
 All measurements are in inches.

Vehicle 1986 Ford Taurus - Test #880823-2

	PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L	<u>65.5</u>		
C1	<u>169.8</u>	C1 <u>140.8</u>	C1 <u>29.0</u>
C2	<u>173.9</u>	C2 <u>144.0</u>	C2 <u>29.9</u>
C3	<u>175.8</u>	C3 <u>144.8</u>	C3 <u>31.0</u>
C4	<u>175.6</u>	C4 <u>145.2</u>	C4 <u>30.4</u>
C5	<u>173.8</u>	C5 <u>144.7</u>	C5 <u>29.1</u>
C6	<u>169.6</u>	C6 <u>143.0</u>	C6 <u>26.6</u>
CL	<u>175.9</u>	CL <u>145.0</u>	CL <u>30.9</u>

*Pre-test measurements taken from test #880822-1.



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 1986 Ford Taurus - Test #880823-2

	PRE-TEST*	POST-TEST	CUMULATIVE CRUSH
L	<u>65.5</u>		
C1	<u>169.8</u>	C1 <u>140.8</u>	C1 <u>29.0</u>
C2	<u>173.9</u>	C2 <u>144.0</u>	C2 <u>29.9</u>
C3	<u>175.8</u>	C3 <u>144.8</u>	C3 <u>31.0</u>
C4	<u>175.6</u>	C4 <u>145.2</u>	C4 <u>30.4</u>
C5	<u>173.8</u>	C5 <u>144.7</u>	C5 <u>29.1</u>
C6	<u>169.6</u>	C6 <u>143.0</u>	C6 <u>26.6</u>
CL	<u>175.9</u>	CL <u>145.0</u>	CL <u>30.9</u>

*Pre-test measurements taken from test #880822-1.

TEST #880823-2

CAMERA INFORMATION

<u>CAMERA NO.</u>	<u>LOCATION</u>	<u>TYPE</u>	<u>LENS (mm)</u>	<u>SPEED (fps)</u>	<u>PURPOSE OF CAMERA DATA</u>
1	Right side wide	Photosonic 1B	13	500	Impact overall
2	Right side tight	Photosonic 1B	50	505	Impact closeup

APPENDIX A
PHOTOGRAPHS

TEST #880823-1

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 LEFT FRONT VIEW
8. POST-TEST LEFT FRONT VIEW
9. PRE-TEST RIGHT FRONT VIEW
10. POST-TEST RIGHT FRONT VIEW



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

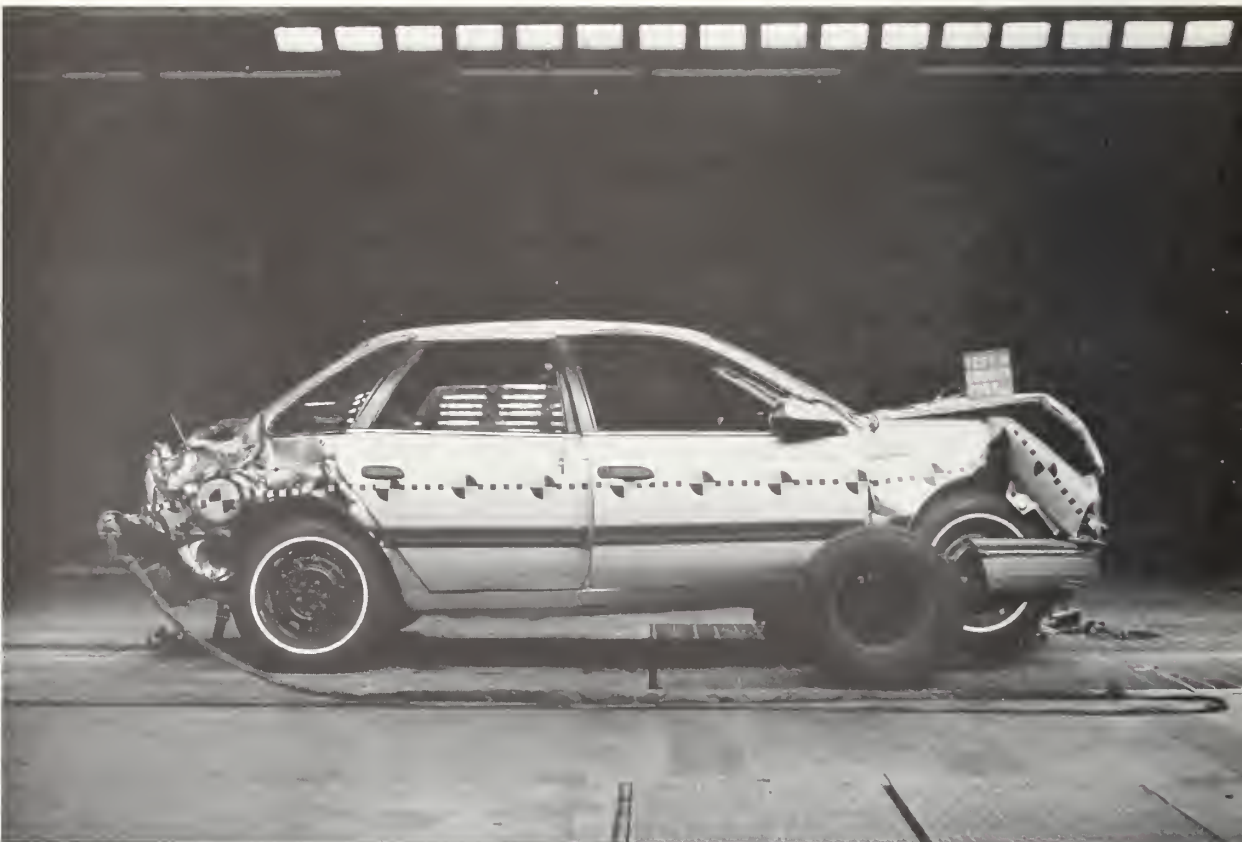


Figure A-4. POST-TEST OVERALL RIGHT SIDE VIEW



Figure A-5. PRE-TEST OVERALL FRONT VIEW



Figure A-6. POST-TEST OVERALL FRONT VIEW



Figure A-7. PRE-TEST LEFT FRONT VIEW



Figure A-8. POST-TEST LEFT FRONT VIEW



Figure A-9. PRE-TEST RIGHT FRONT VIEW



Figure A-10. POST-TEST RIGHT FRONT VIEW

TEST #880823-2
LIST OF PHOTOGRAPHS

11. POST-TEST OVERALL LEFT SIDE VIEW
12. POST-TEST OVERALL RIGHT SIDE VIEW
13. POST-TEST OVERALL FRONT VIEW
14. POST-TEST LEFT FRONT VIEW
15. POST-TEST RIGHT FRONT VIEW
16. POST-TEST CLOSEUP - VIEW 1
17. POST-TEST CLOSEUP - VIEW 2
18. POST-TEST CLOSEUP - VIEW 3
19. POST-TEST CLOSEUP - VIEW 4
20. POST-TEST CLOSEUP - VIEW 5
21. POST-TEST CLOSEUP - VIEW 6
22. POST-TEST CLOSEUP - VIEW 7
23. POST-TEST CLOSEUP - VIEW 8



Figure A-11. POST-TEST OVERALL LEFT SIDE VIEW



Figure A-12. POST-TEST OVERALL RIGHT SIDE VIEW

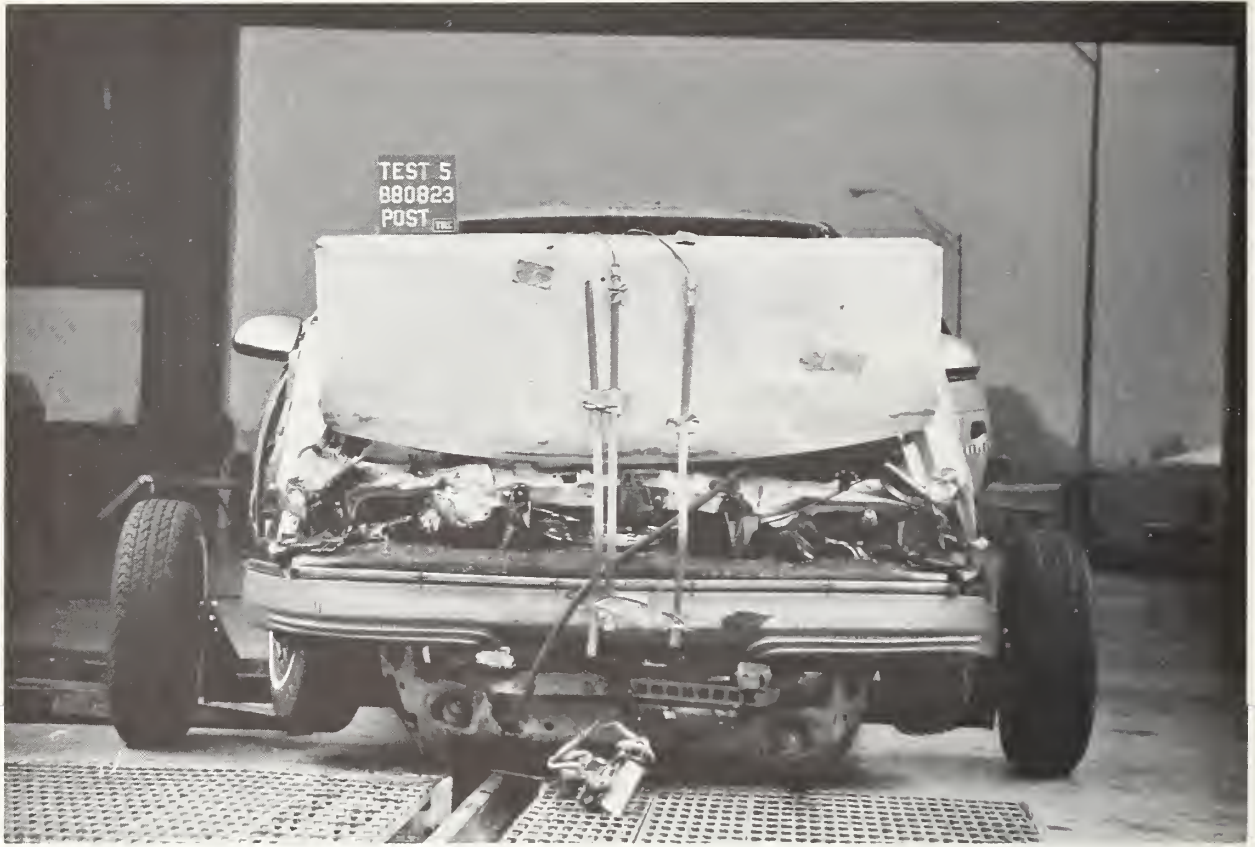


Figure A-13. POST-TEST OVERALL FRONT VIEW



Figure A-14. POST-TEST LEFT FRONT VIEW



Figure A-15. POST-TEST RIGHT FRONT VIEW

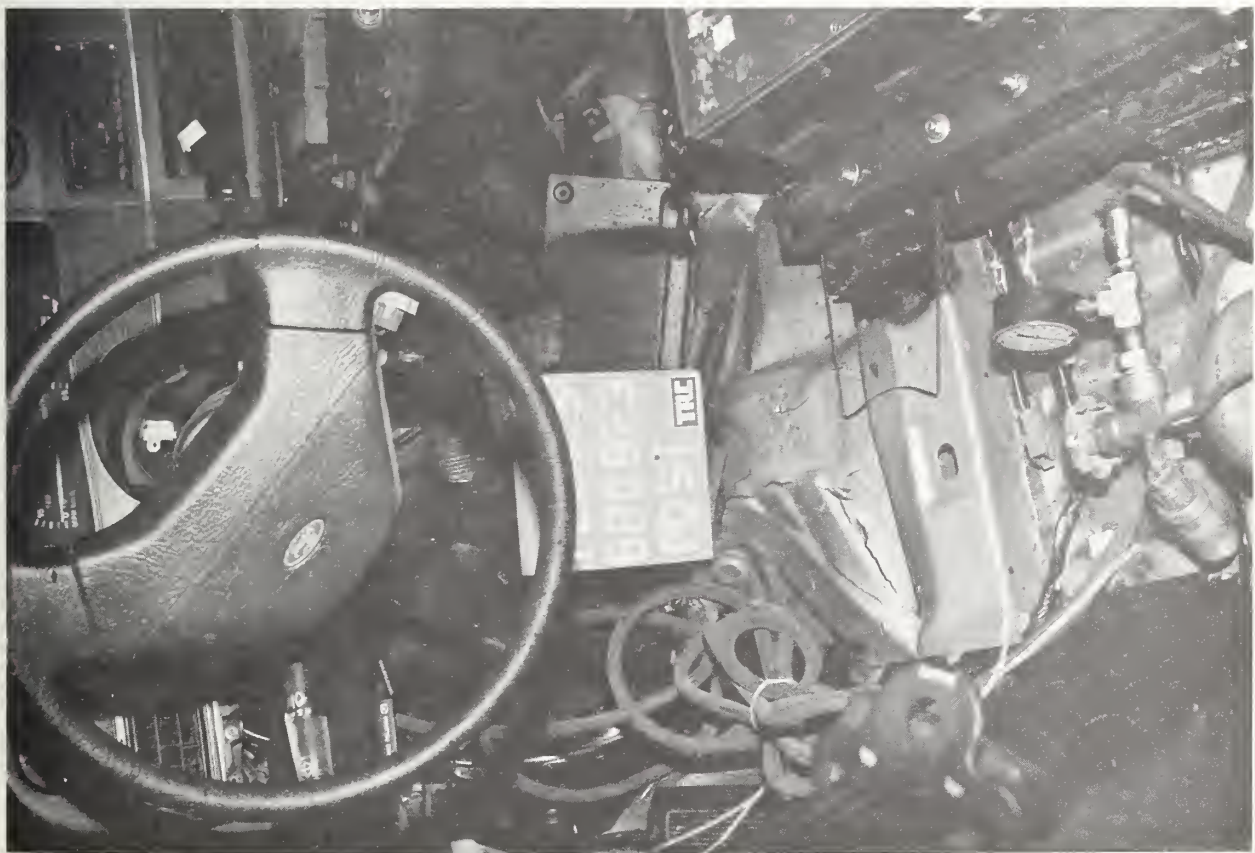


Figure A-16. POST-TEST CLOSEUP - VIEW 1



Figure A-17. POST-TEST CLOSEUP - VIEW 2

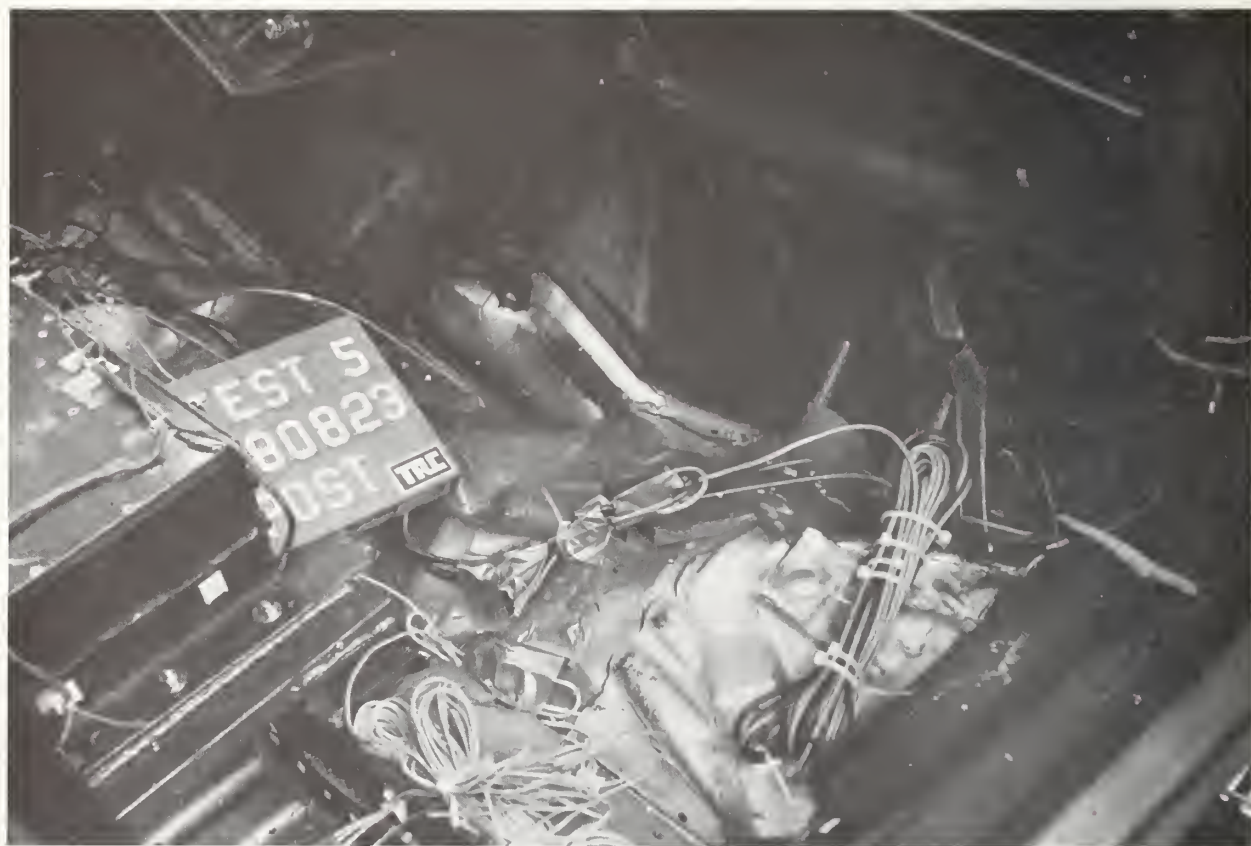


Figure A-18. POST-TEST CLOSEUP - VIEW 3

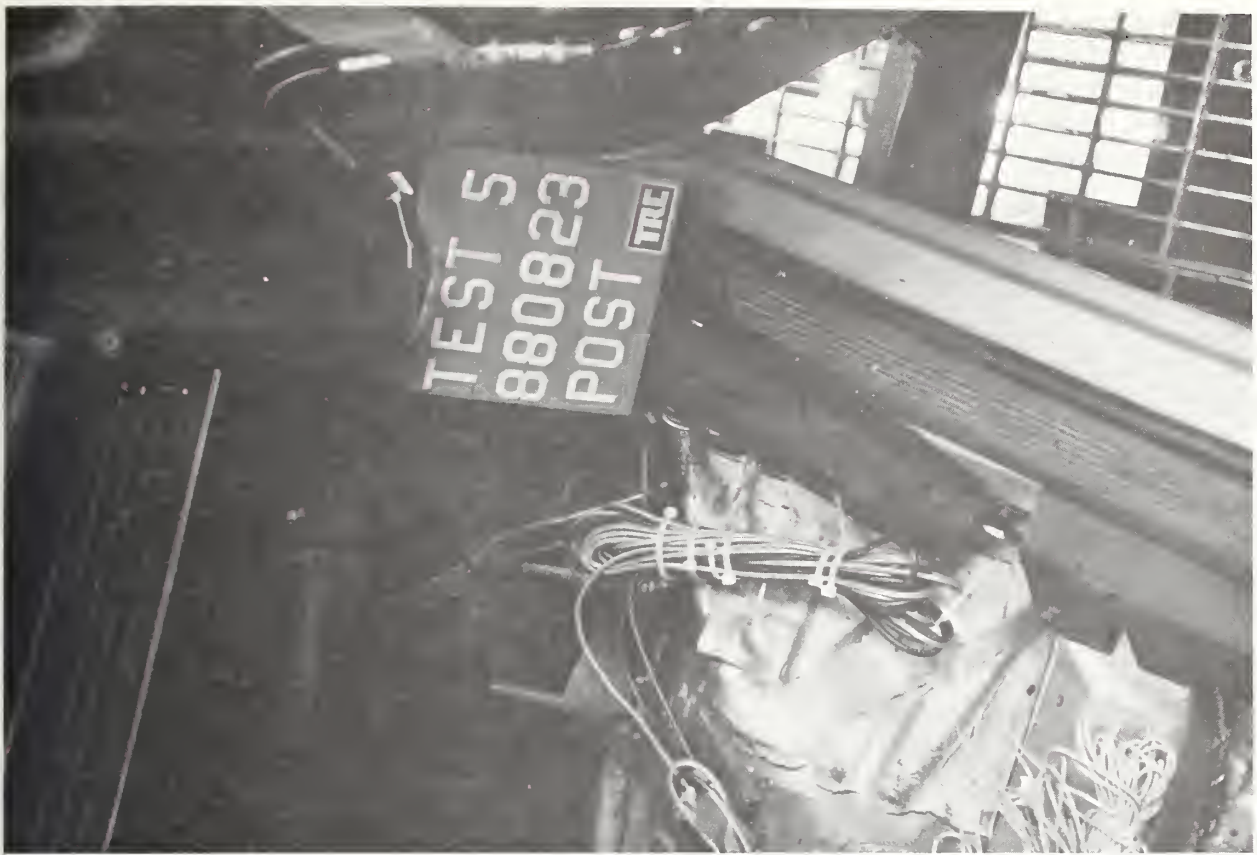


Figure A-19. POST-TEST CLOSEUP - VIEW 4



Figure A-20. POST-TEST CLOSEUP - VIEW 5



Figure A-21. POST-TEST CLOSEUP - VIEW 6

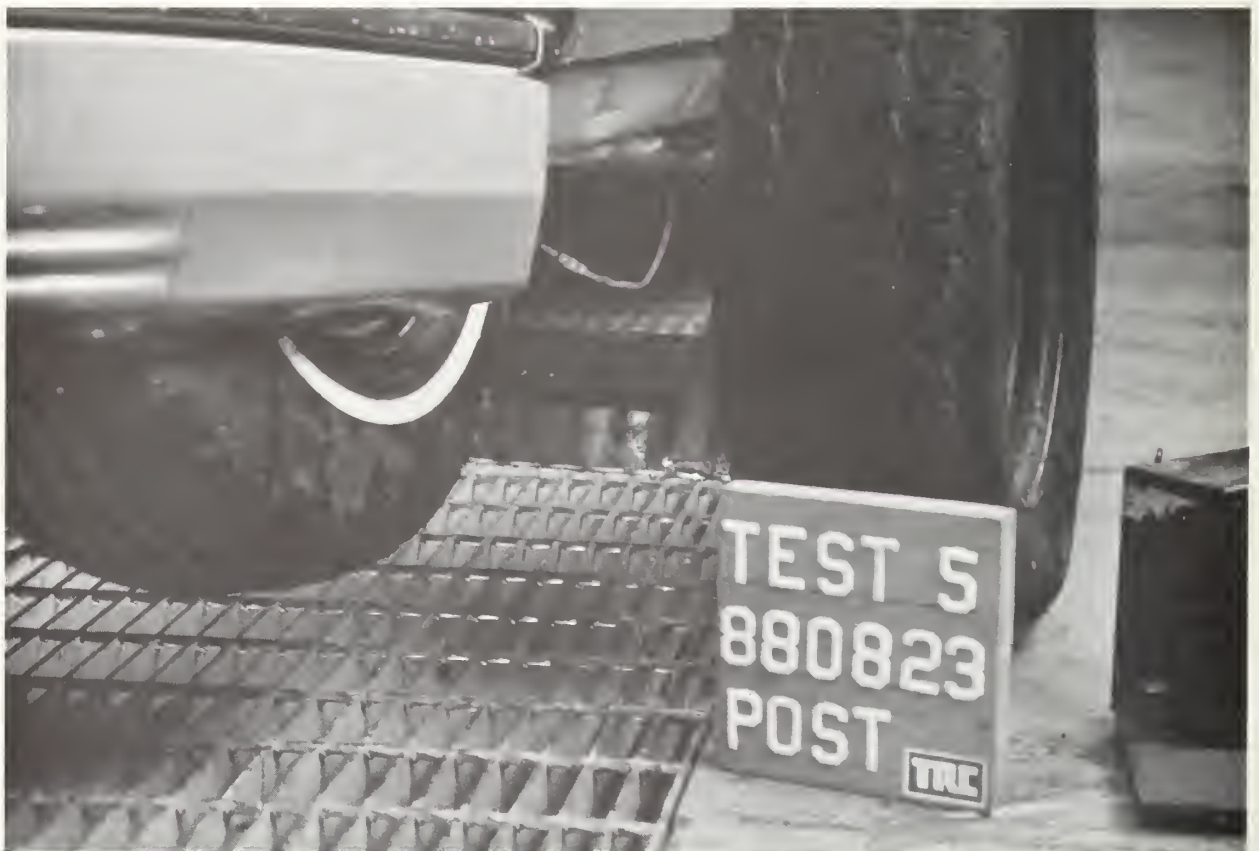


Figure A-22. POST-TEST CLOSEUP - VIEW 7

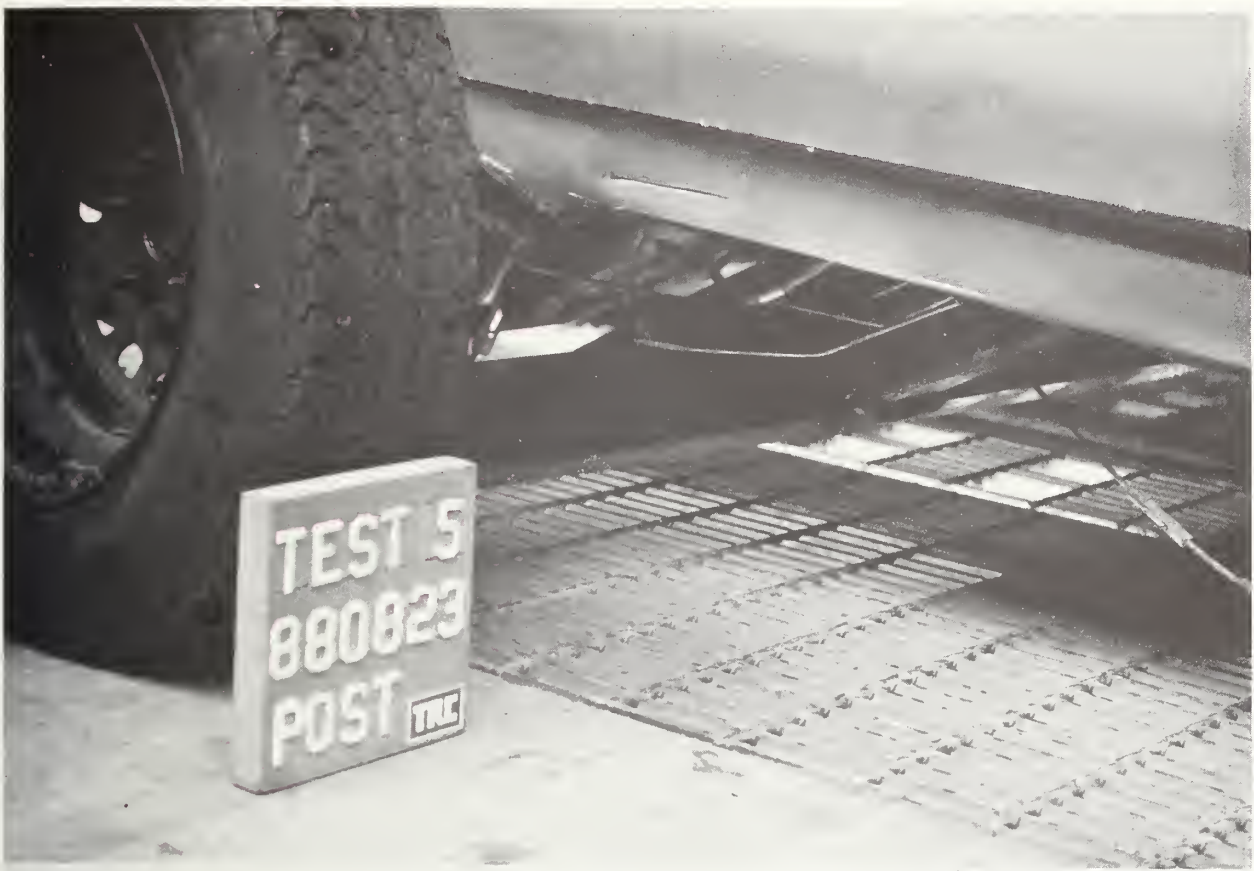


Figure A-23. POST-TEST CLOSEUP - VIEW 8

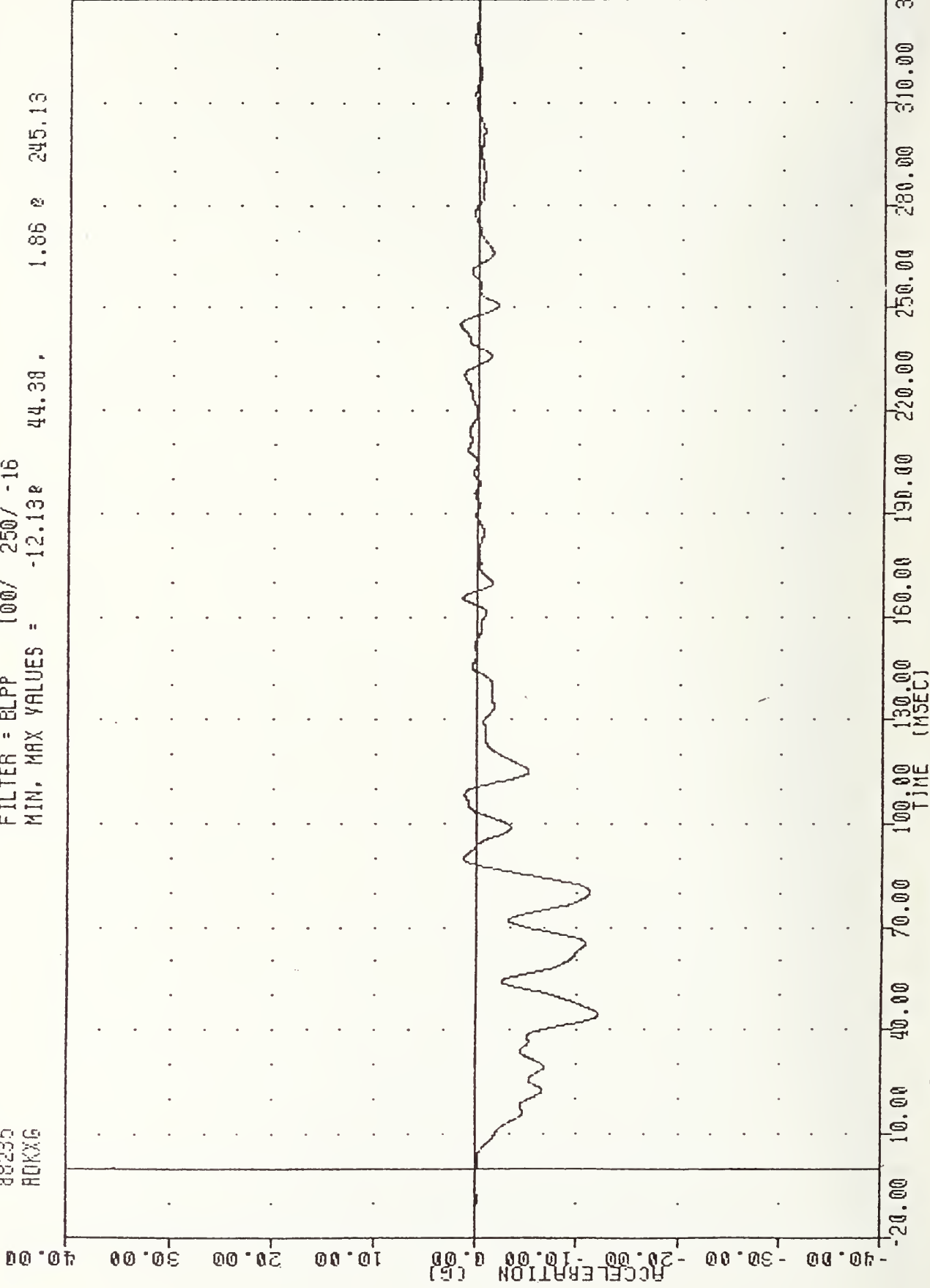
APPENDIX B
DATA PLOTS

VRTC-1 , 880822
DAMAGE ALGORITHM REFORMULATION

88235
ADKXG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -12.13e 44.38 ,

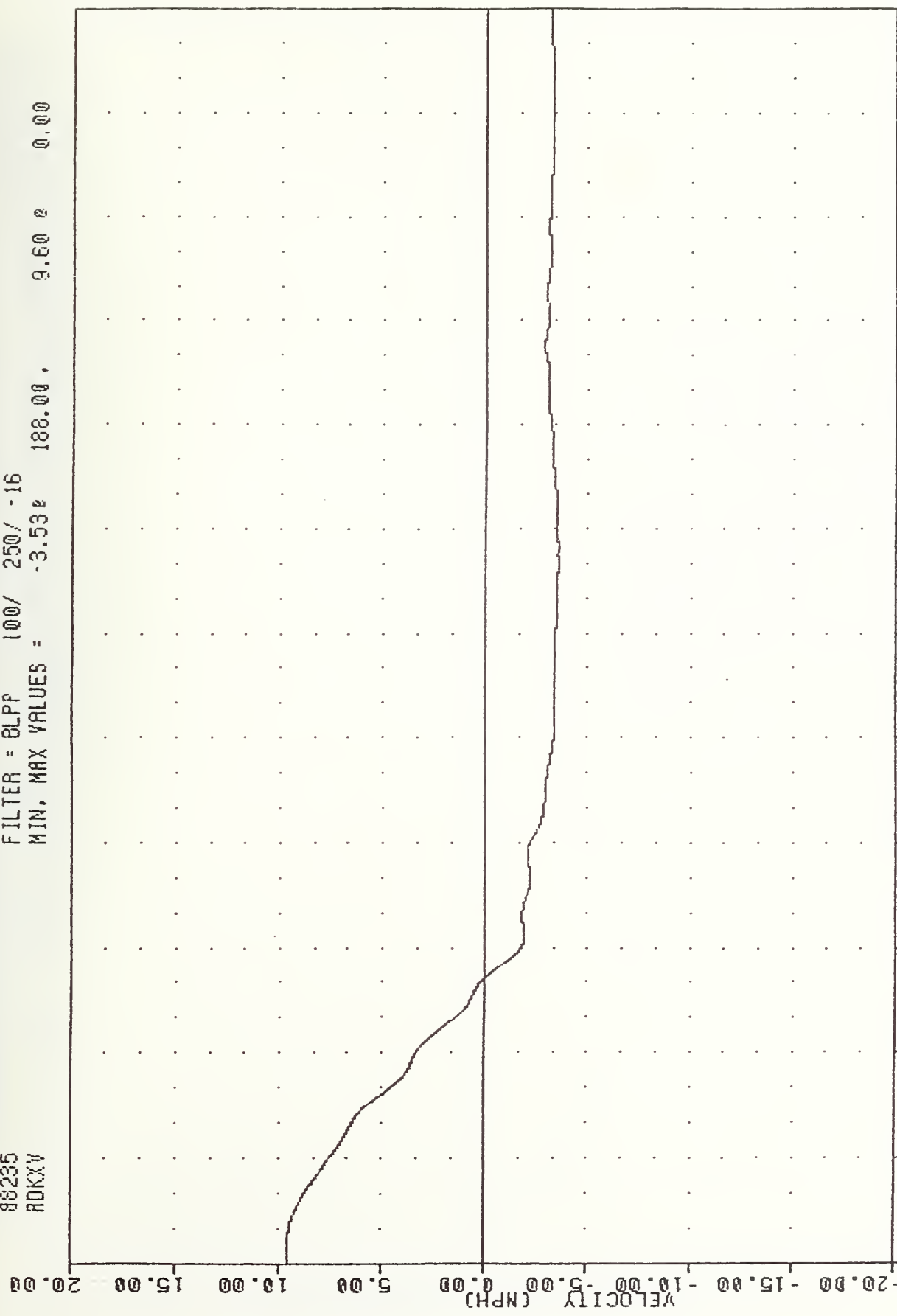
1.86 e 245.13



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
VEHICLE REAR DECK X AXIS ACCELERATION

VRTC-1 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 RDKXW

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -3.53e 188.00, 9.60 e 0.00



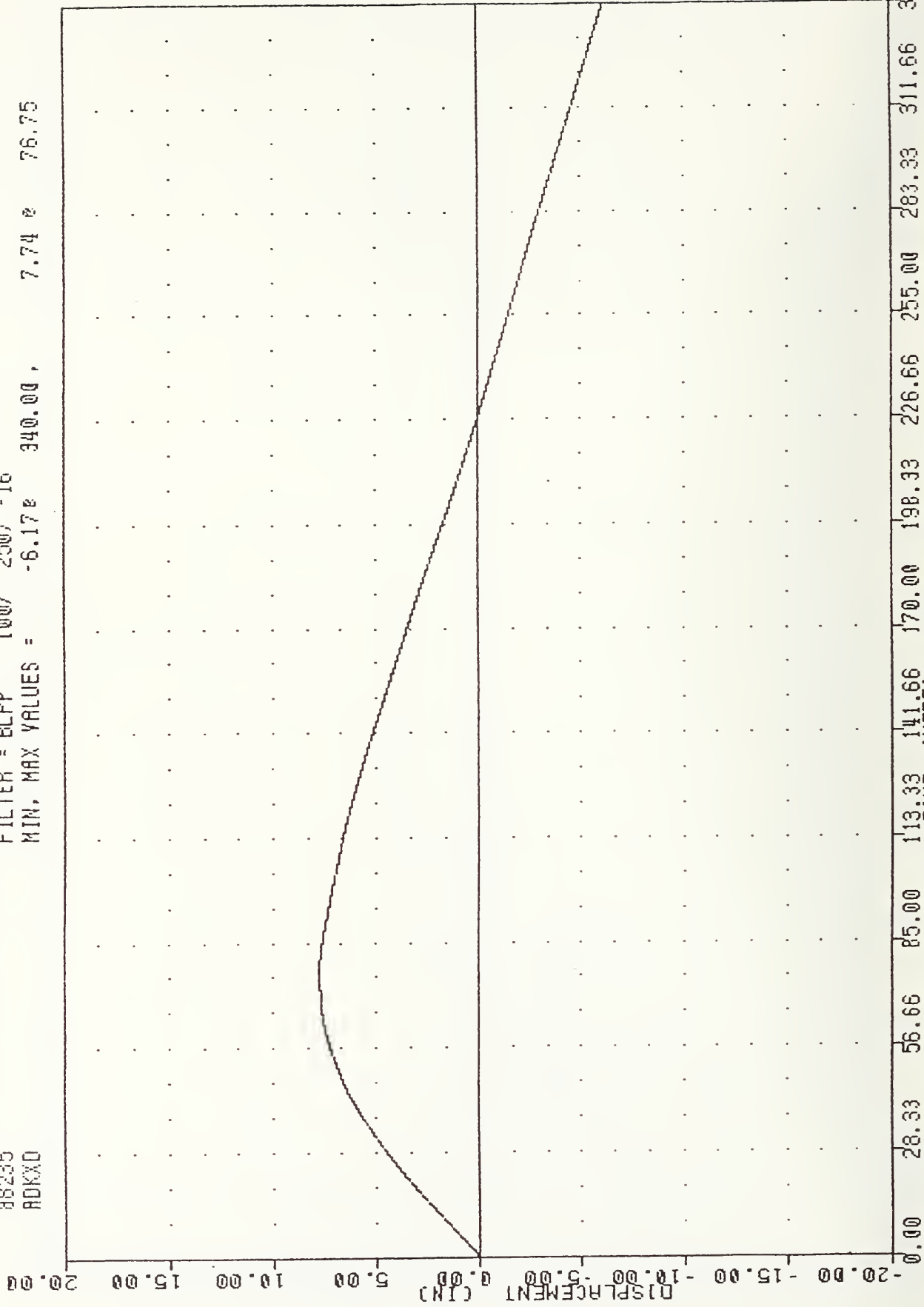
0.00 28.33 55.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00
 TIME (MSEC)
 1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
 VEHICLE REAR DECK X AXIS VELOCITY

VRTC-1 . 880822
DAMAGE ALGORITHM REFORMULATION

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -6.17e 340.00, 7.74e 76.75

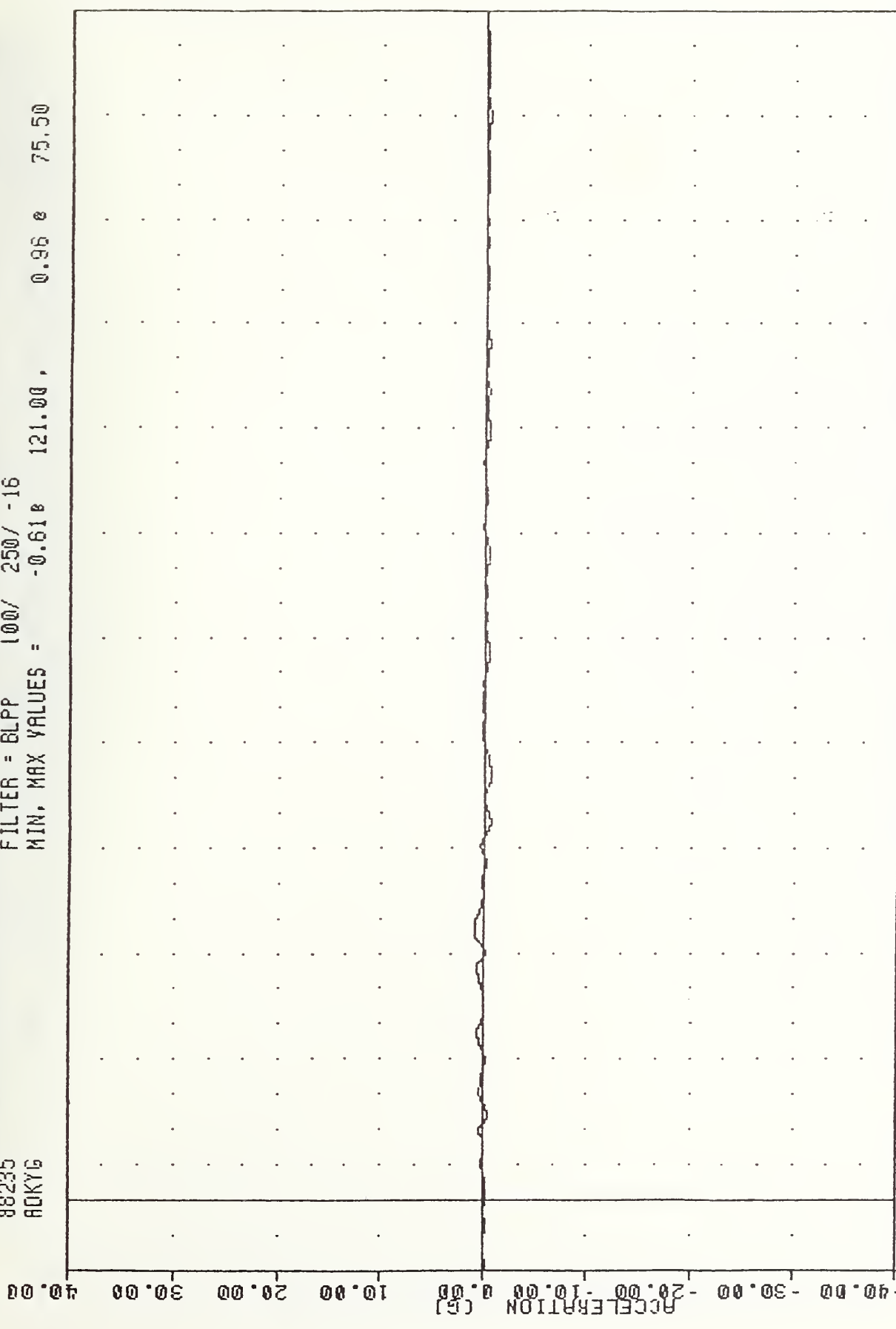
ADKXD



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT

VRTC-1 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 ADKYG

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -0.618 121.00 , 0.96 8 75.50



-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 (MSEC)

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
 VEHICLE REAR DECK Y AXIS ACCELERATION

VRTC-1 , 880822

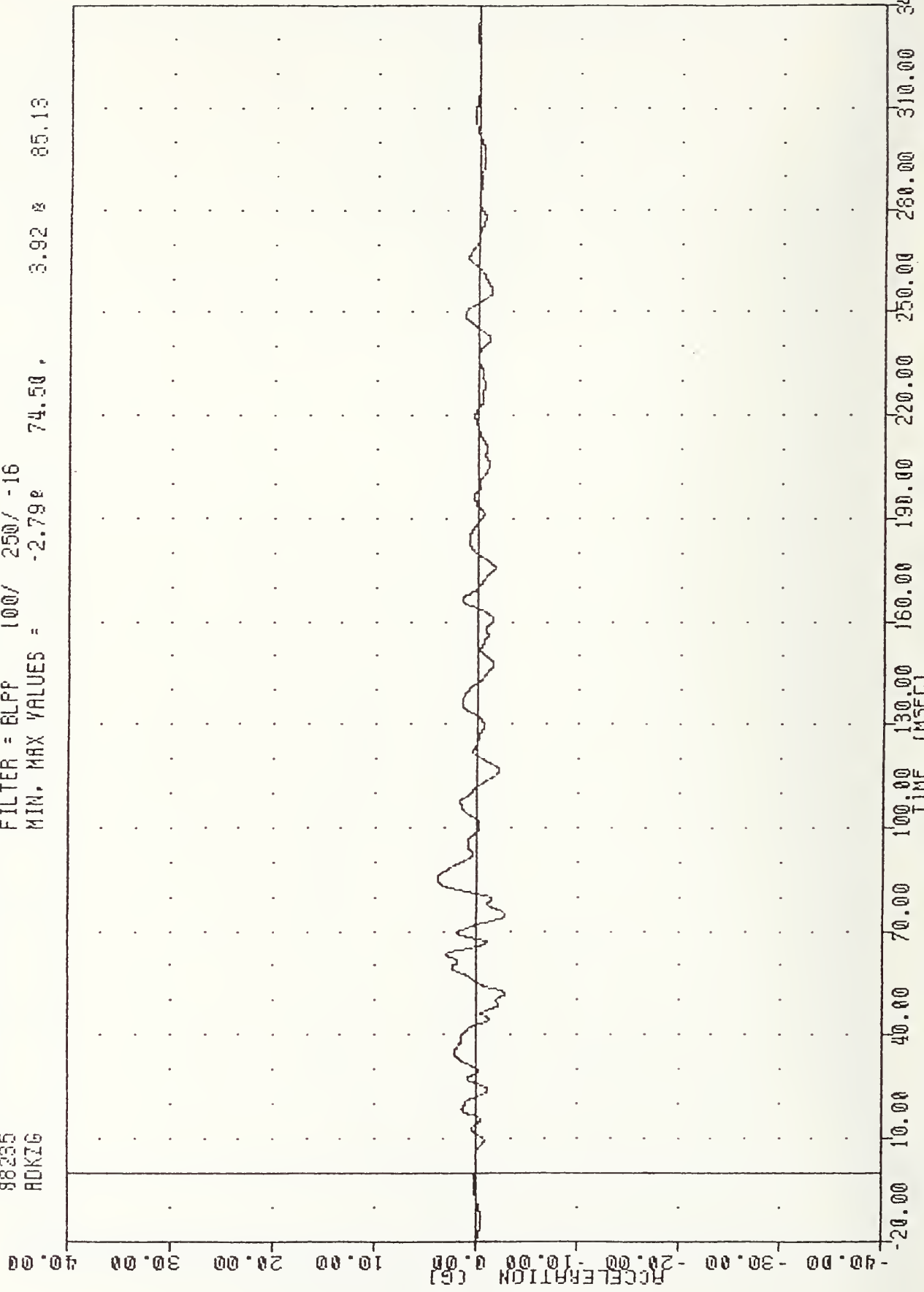
DAMAGE ALGORITHM REFORMULATION

88235

ADKIG

FILTER = BLPF 100/ 250/ -16

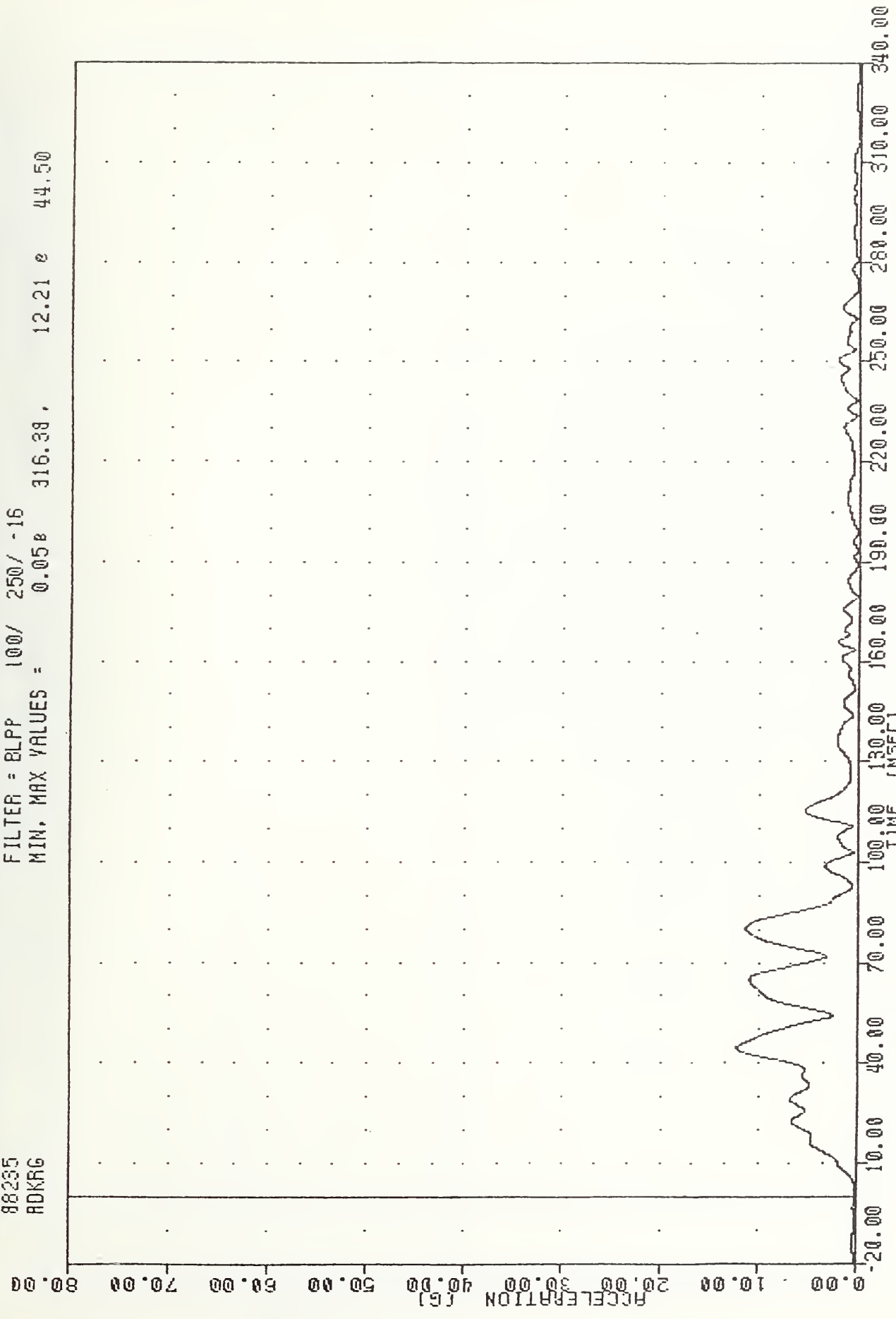
MIN. MAX VALUES = -2.79e 74.50 , 3.92 e 85.13



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
VEHICLE REAR DECK Z AXIS ACCELERATION

VRTC-1 , 880822
DAMAGE ALGORITHM REFORMULATION
88235
ADKRG

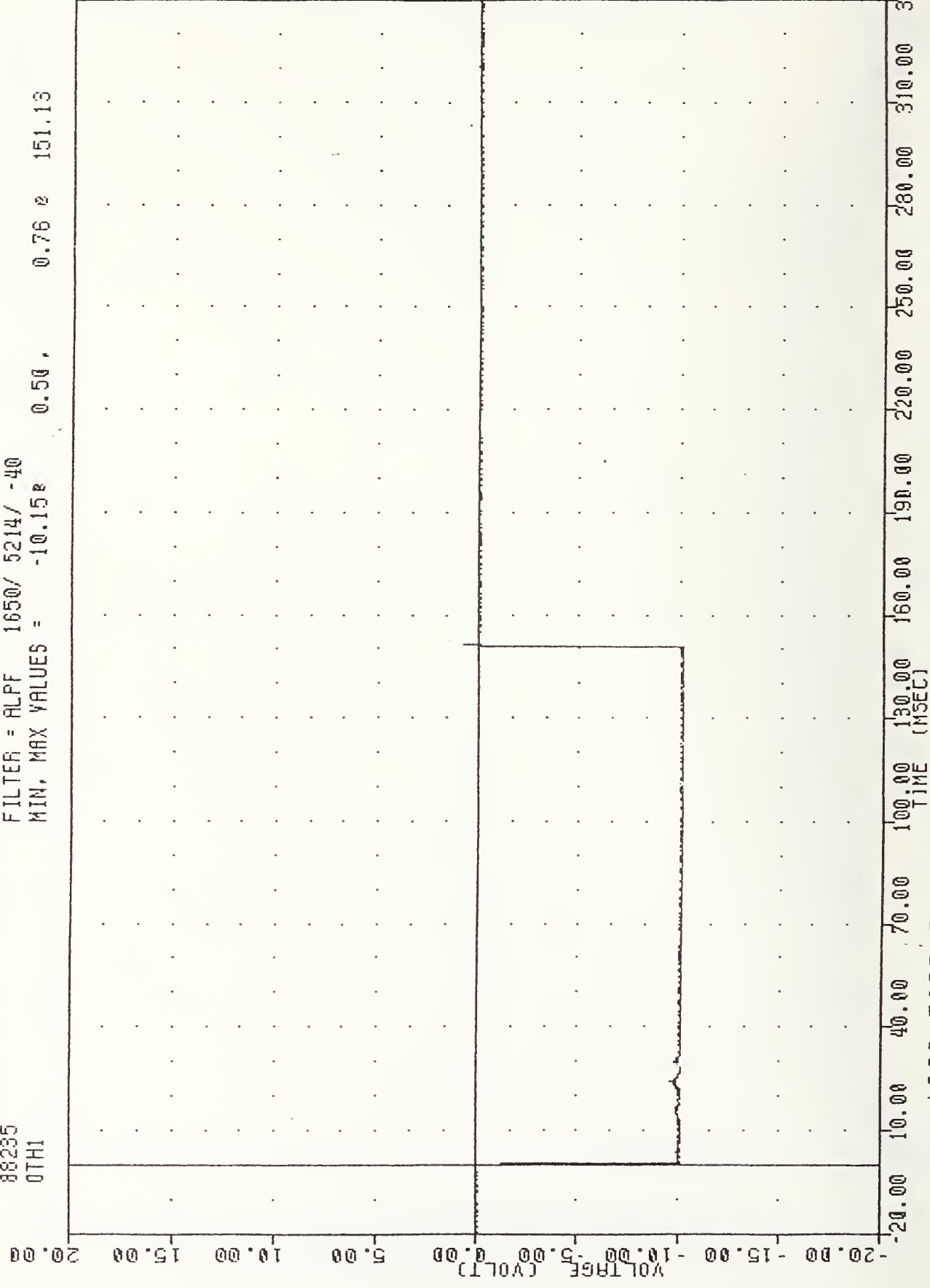
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = 0.05g 316.38 , 12.21 e 44.50



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
VEHICLE REAR DECK RESULTANT ACCELERATION

VRTC-1 , 880622
DAMAGE ALGORITHM REFORMULATION

88235 FILTER = ALPF 1650/ 5214/ -40
0TH1 MIN, MAX VALUES = -10.158 0.50 , 0.76 2 151.13



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
CONTACT SWITCH

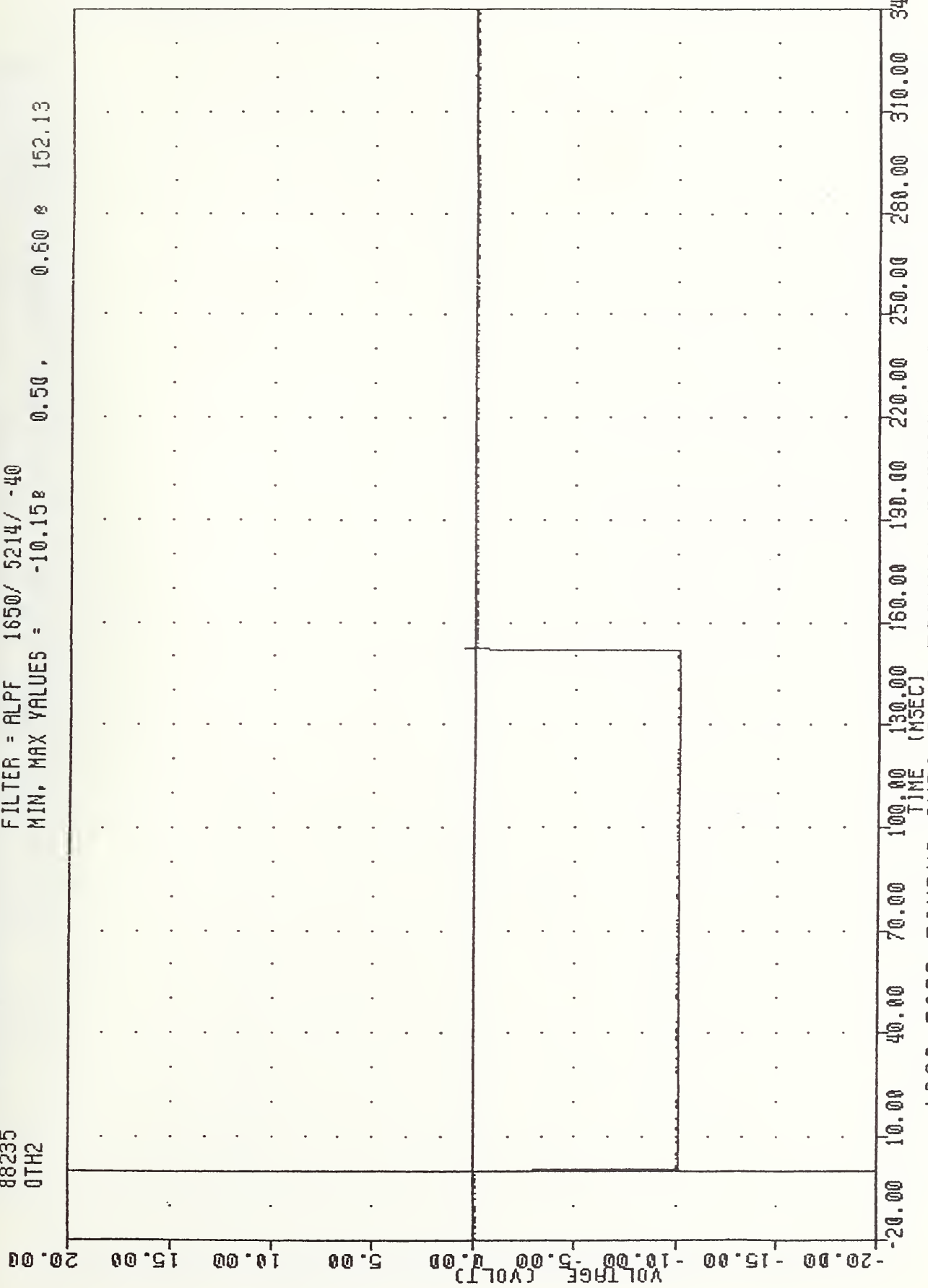
VRTC-1 , 880822

DAMAGE ALGORITHM REFORMULATION

88235

0TH2

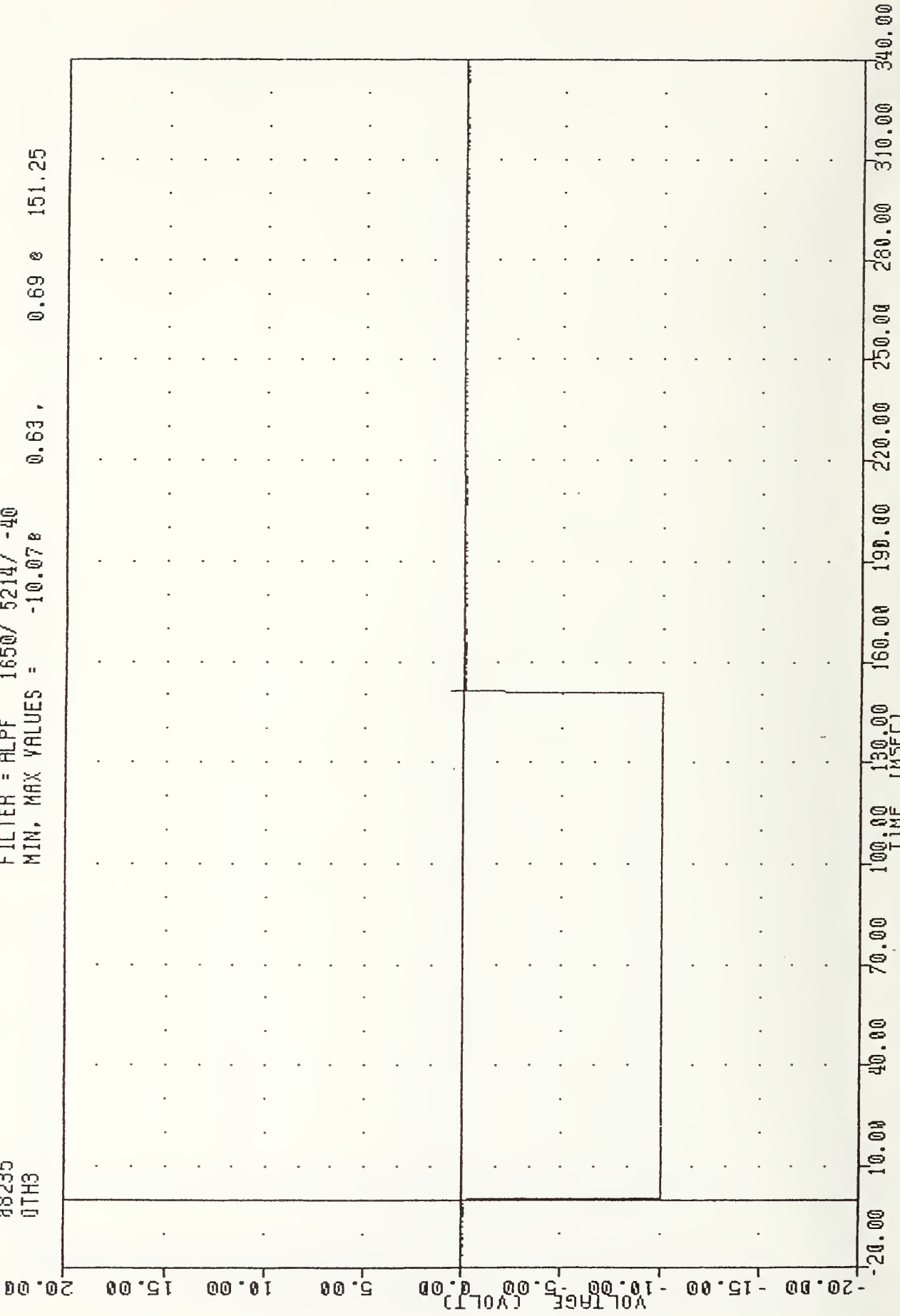
FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.15e 0.50 , 0.60 e 152.13



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
CONTACT SWITCH

VRTC-1 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 QTH3

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -10.07 e 0.63 , 0.69 e 151.25



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 10 MPH FIRST TEST
 CONTACT SWITCH

YRTC-2 , 880822

DAMAGE ALGORITHM REFORMULATION

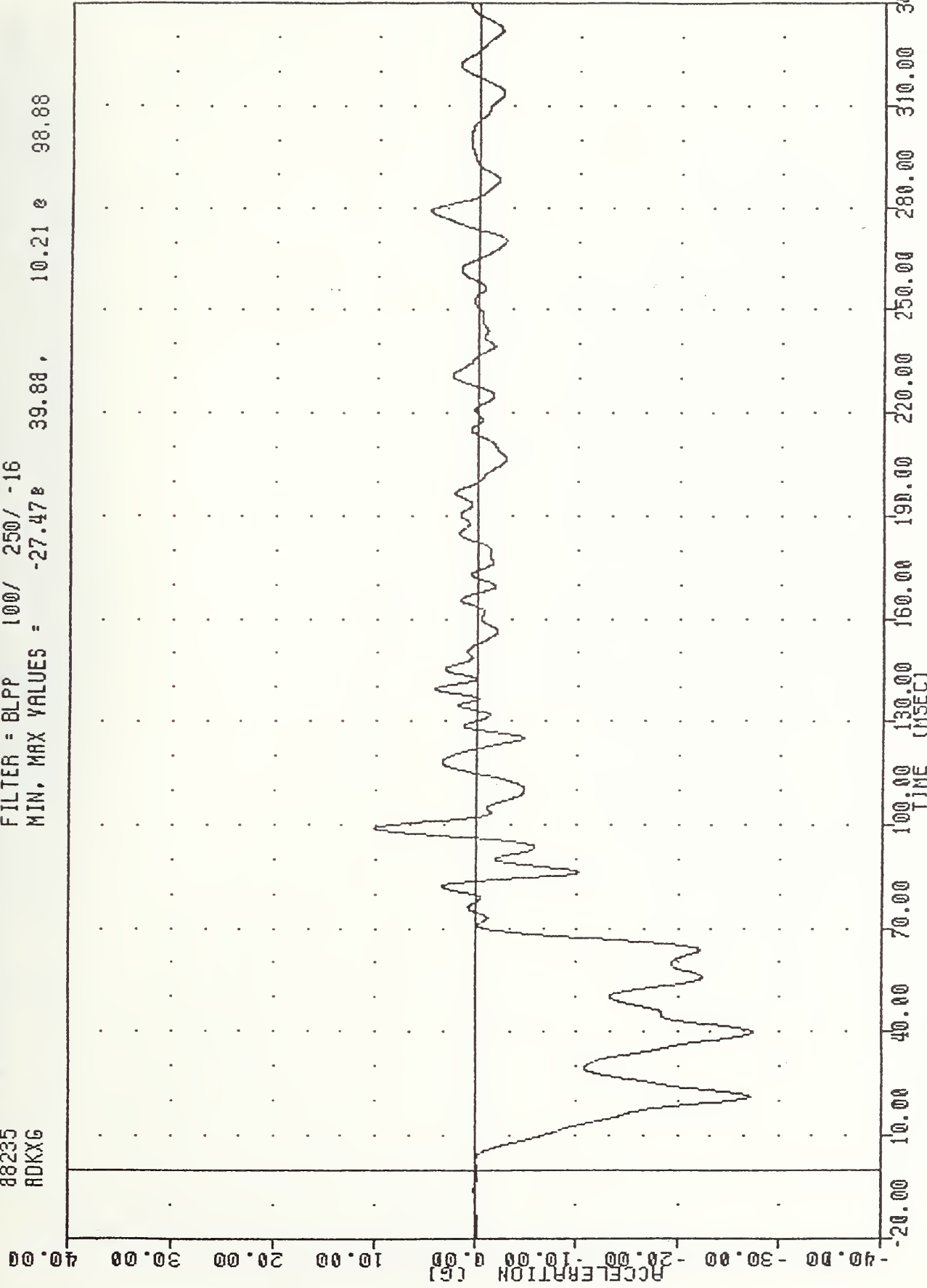
88235

ADKXG

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -27.47 39.88 ,

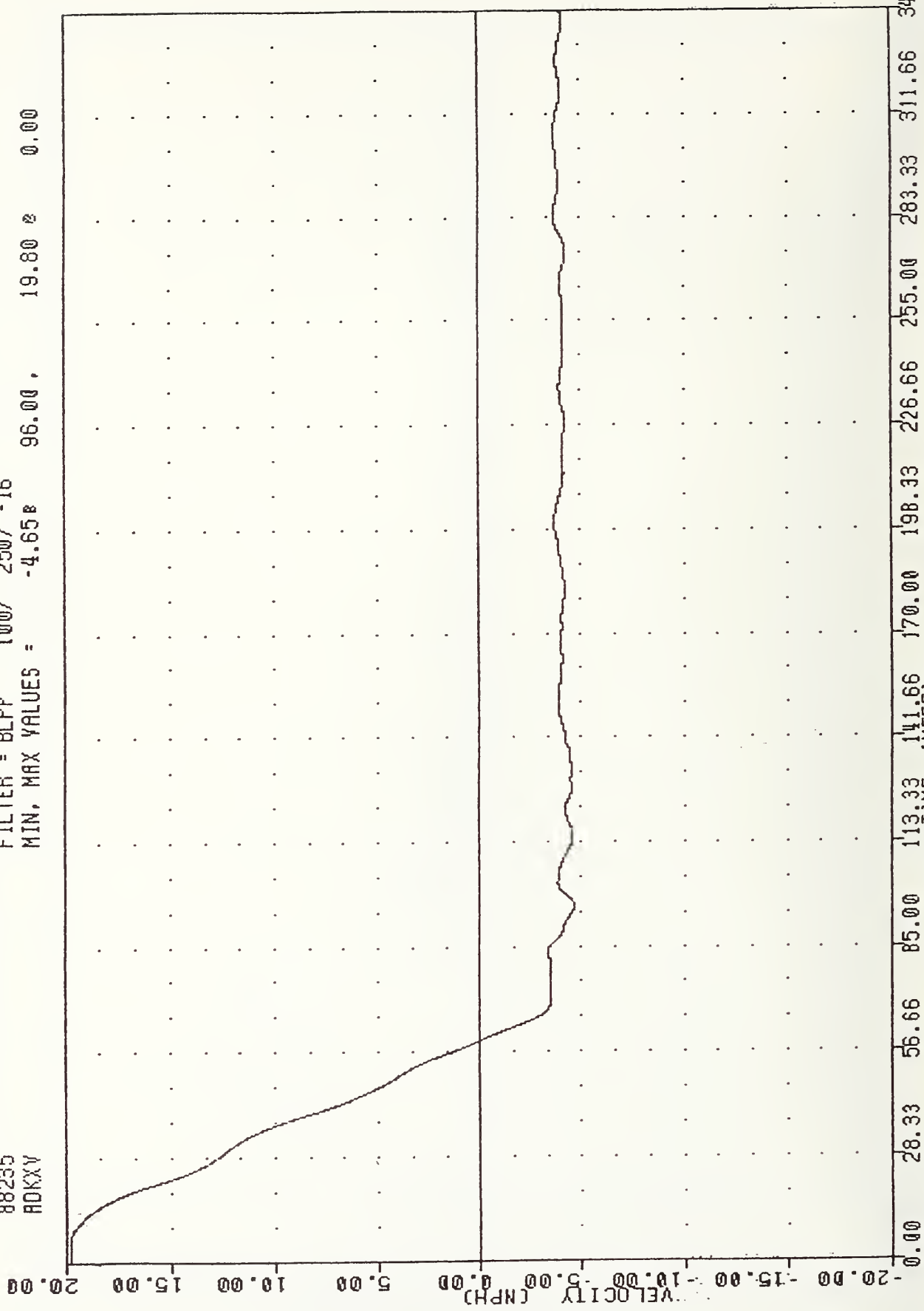
10.21 e 98.88



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK X AXIS ACCELERATION

YRTC-2 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 ADKXY

FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -4.65 96.00 , 19.80 0.00



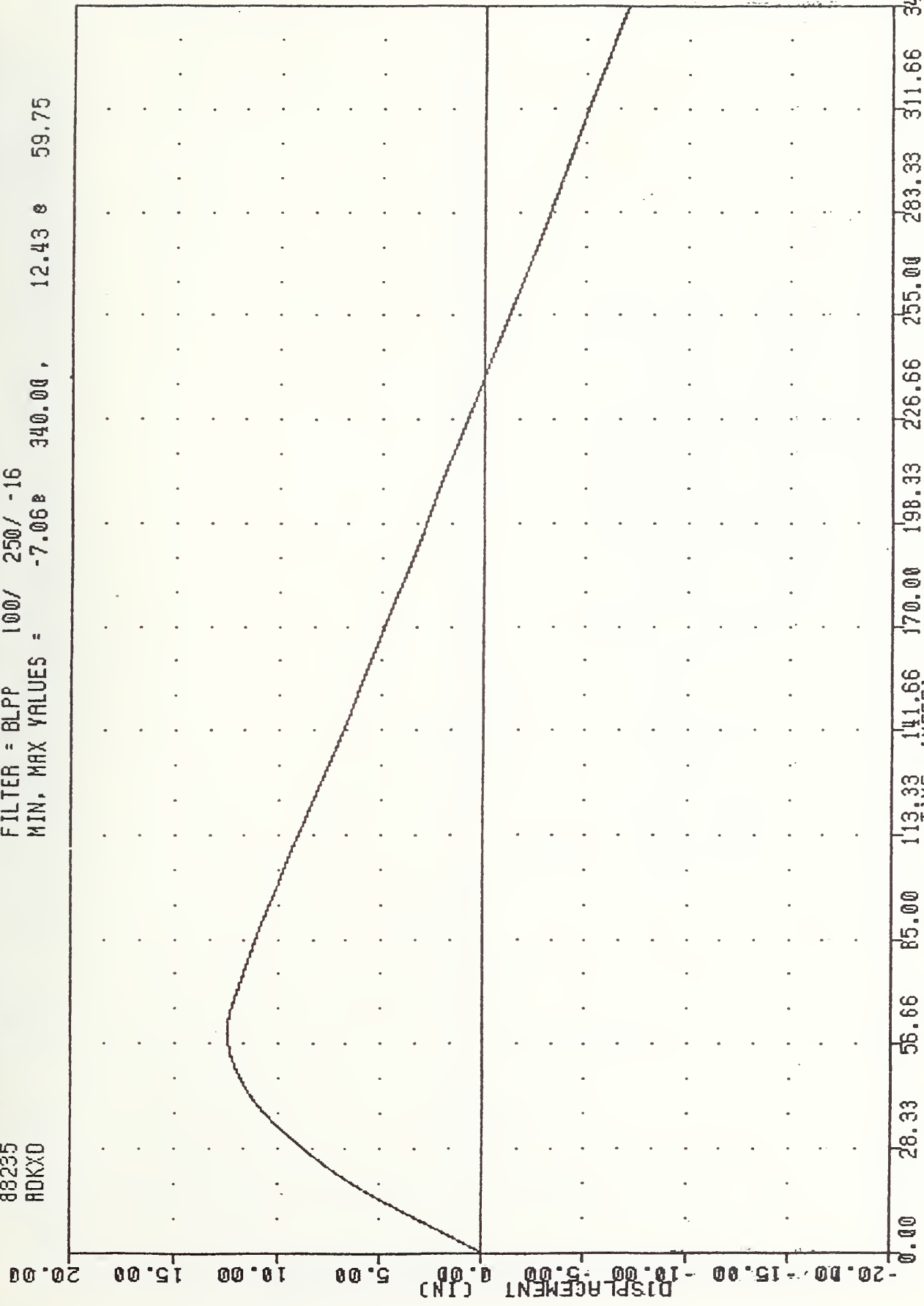
1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
 VEHICLE REAR DECK X AXIS VELOCITY

VRTC-2 , 880822

DAMAGE ALGORITHM REFORMULATION

88235
RDKXD

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -7.06 e 340.00 , 12.43 e 59.75

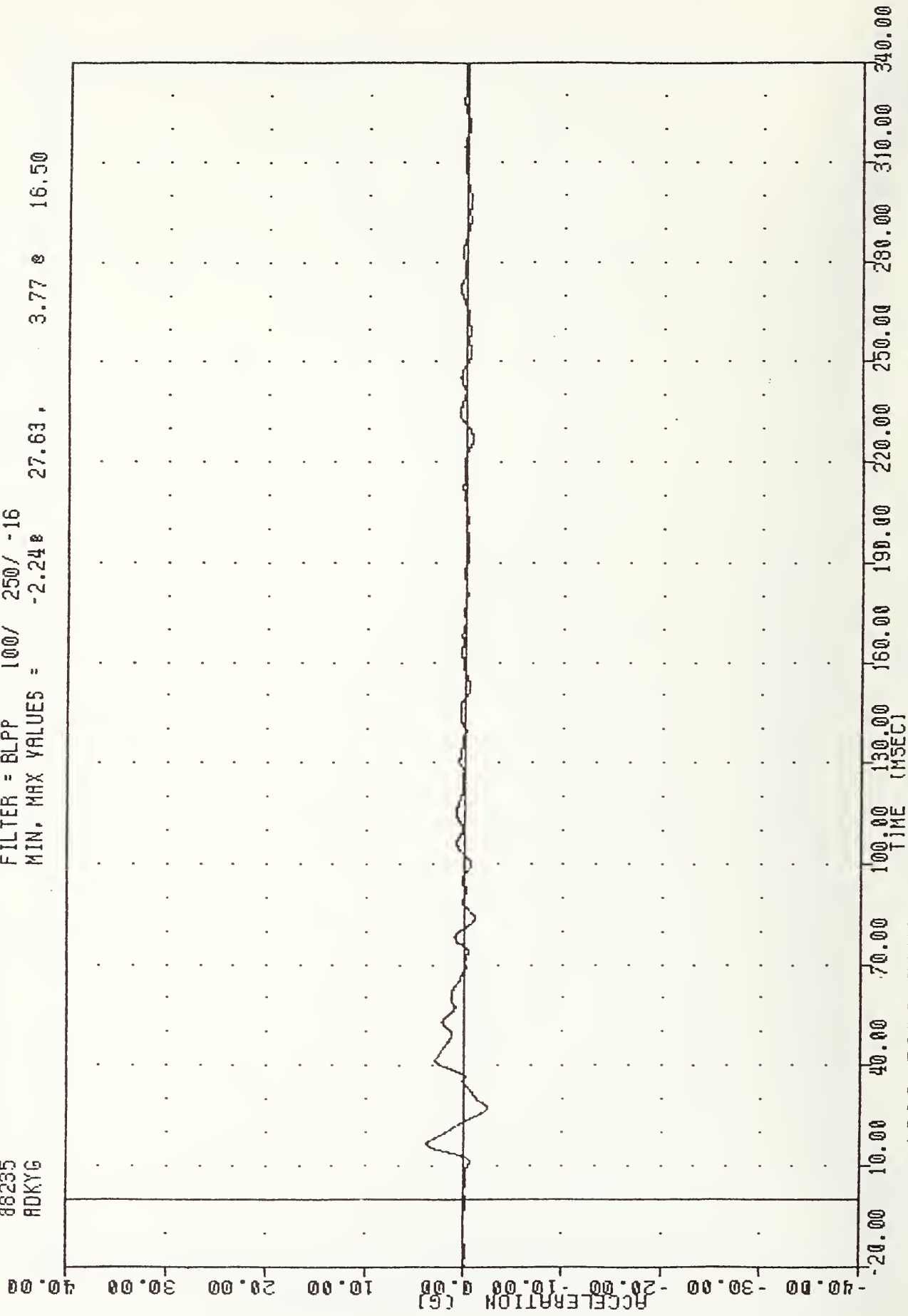


0.00 28.33 56.66 85.00 113.33 141.66 170.00 198.33 226.66 255.00 283.33 311.66 340.00
TIME (MSEC)

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT

YRTC-2 , 880822
 DAMAGE ALGORITHM REFORMULATION
 86235
 ADKYG

FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -2.24e 27.63 , 3.77 e 16.50



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
 VEHICLE REAR DECK Y AXIS ACCELERATION

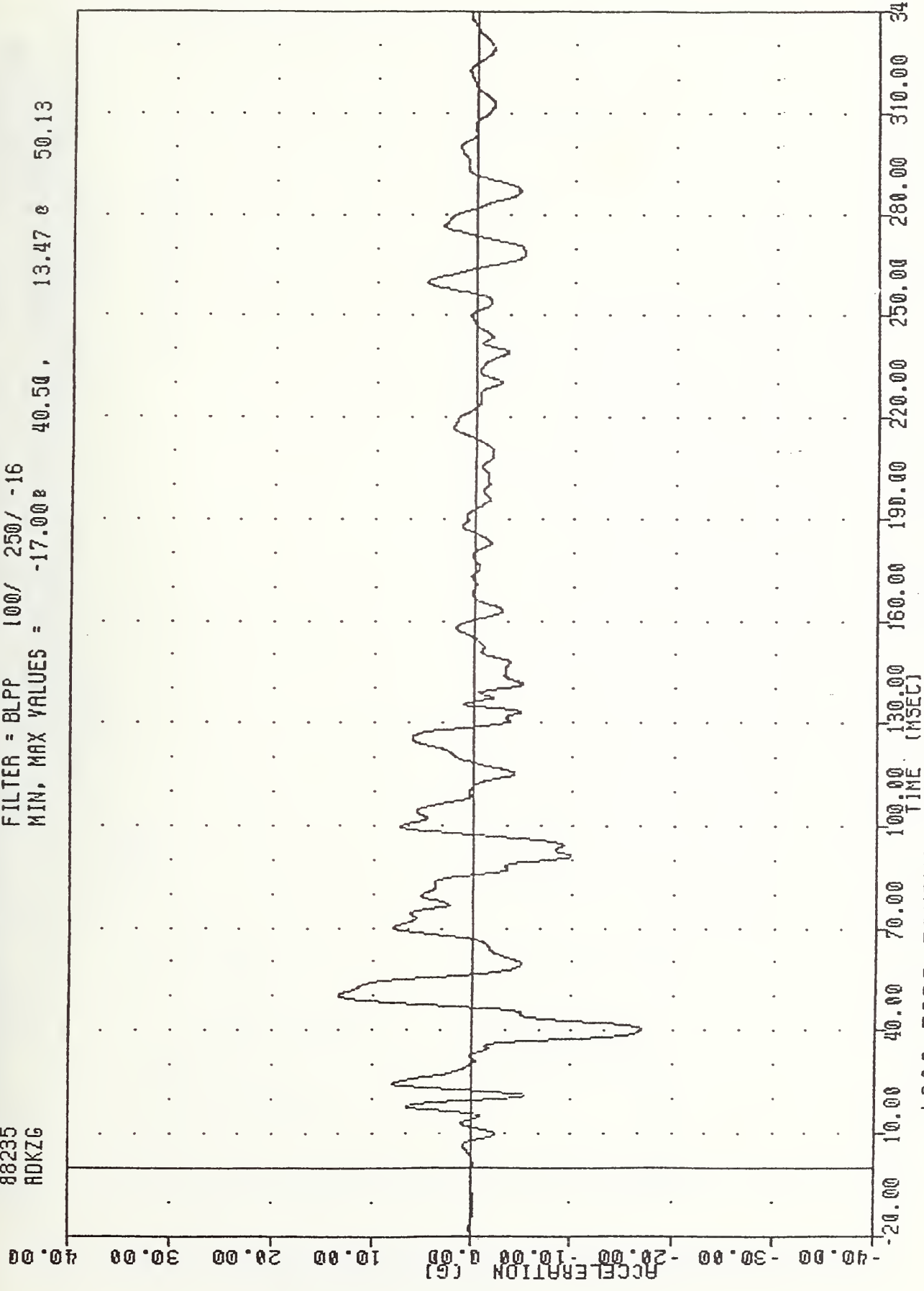
VRTC-2 , 880822

DAMAGE ALGORITHM REFORMULATION

88235

ADKZG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -17.00 40.50 , 13.47 50.13

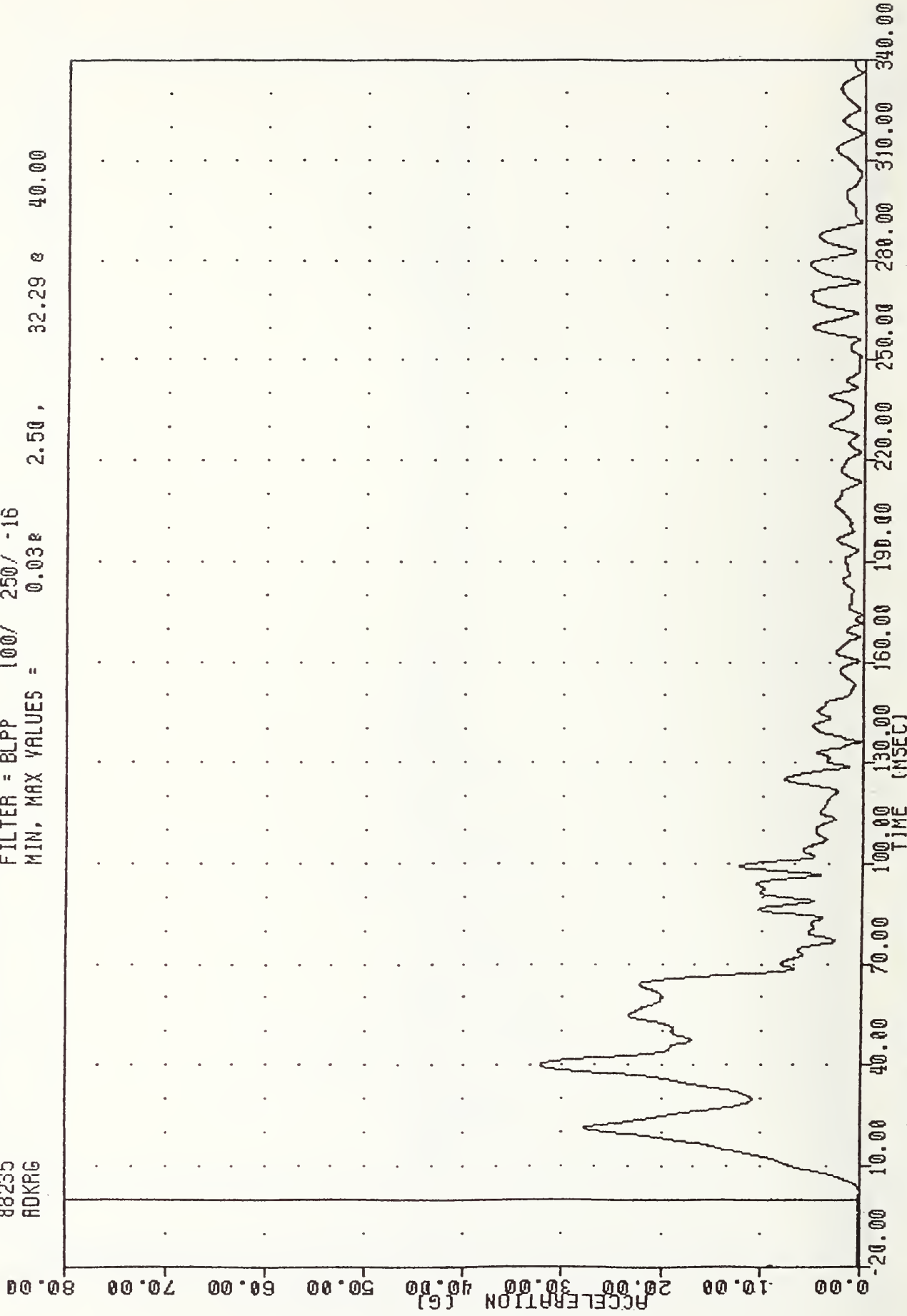


1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK Z AXIS ACCELERATION

VRTC-2 , 880822
DAMAGE ALGORITHM REFORMULATION

88235
ADKRG

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = 0.03e 2.50 , 32.29 e 40.00



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
VEHICLE REAR DECK RESULTANT ACCELERATION

VRTC-2 , 880822

DAMAGE ALGORITHM REFORMULATION

88235

0TH1

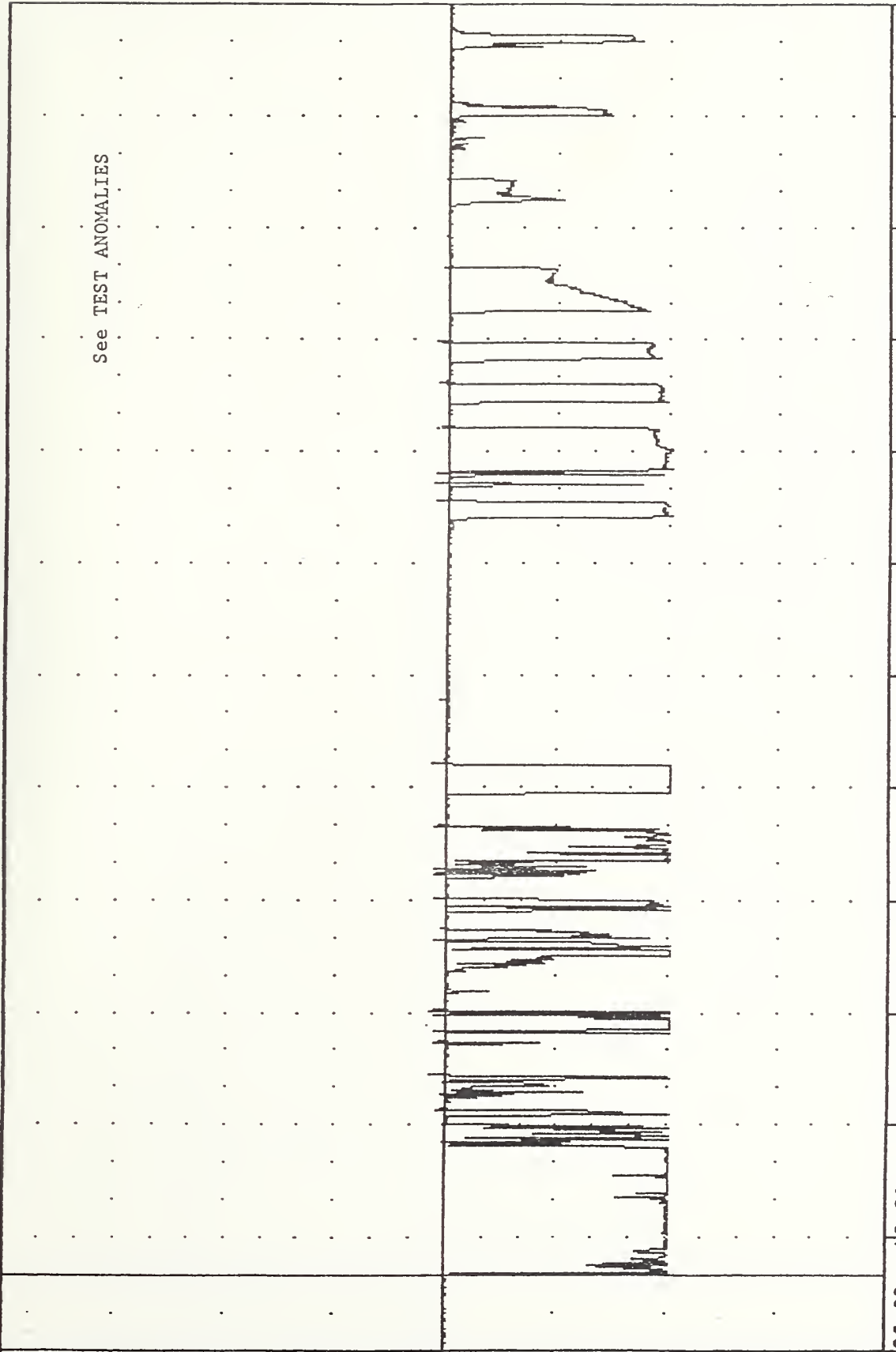
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.15 0.63

0.82 0

70.50

20.00
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00

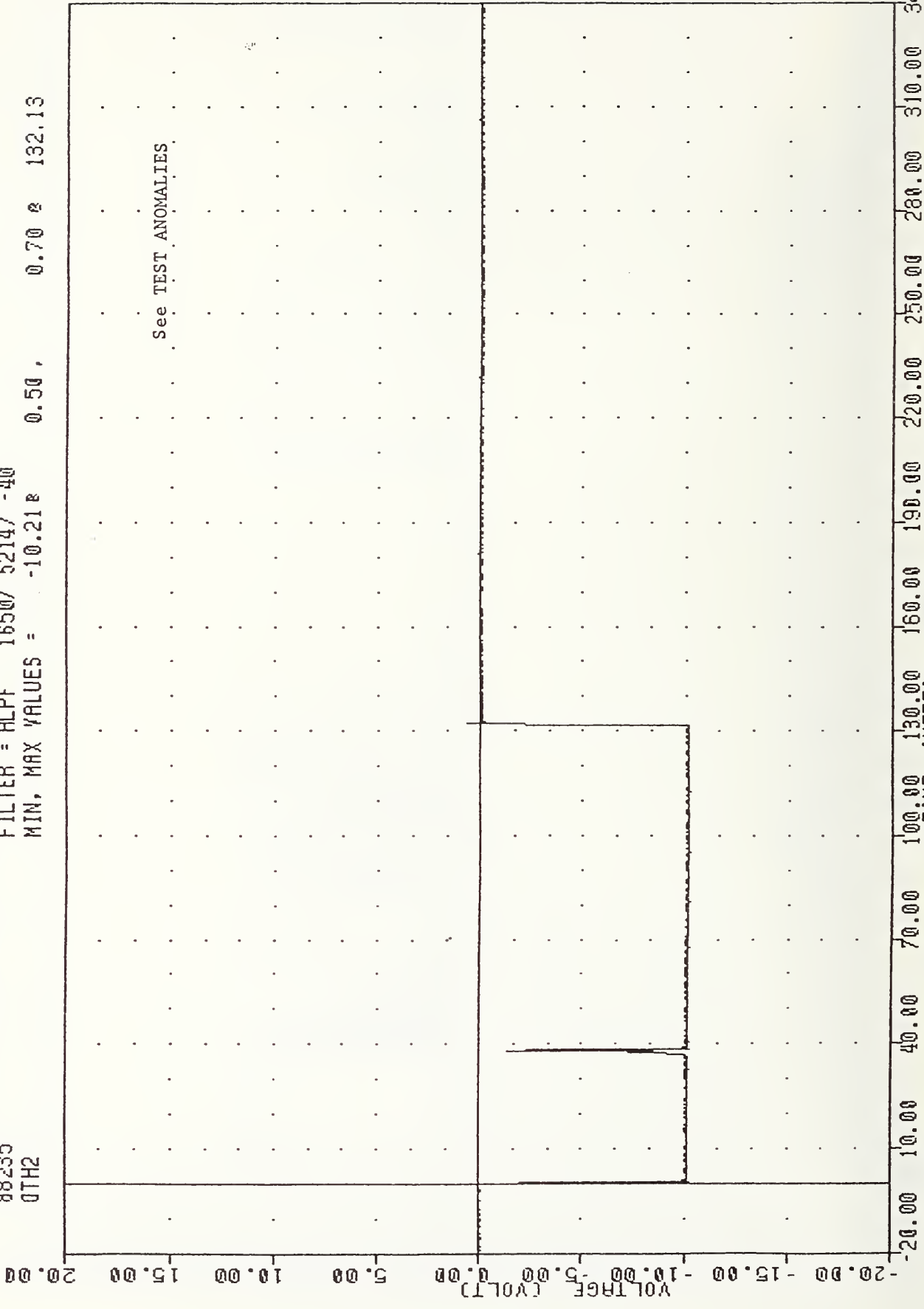


20.00 10.00 0.00 -5.00 -10.00 -15.00 -20.00
0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
CONTACT SWITCH

YRTC-2 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 0TH2

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -10.218 0.50 , 0.70 & 132.13



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
 CONTACT SWITCH

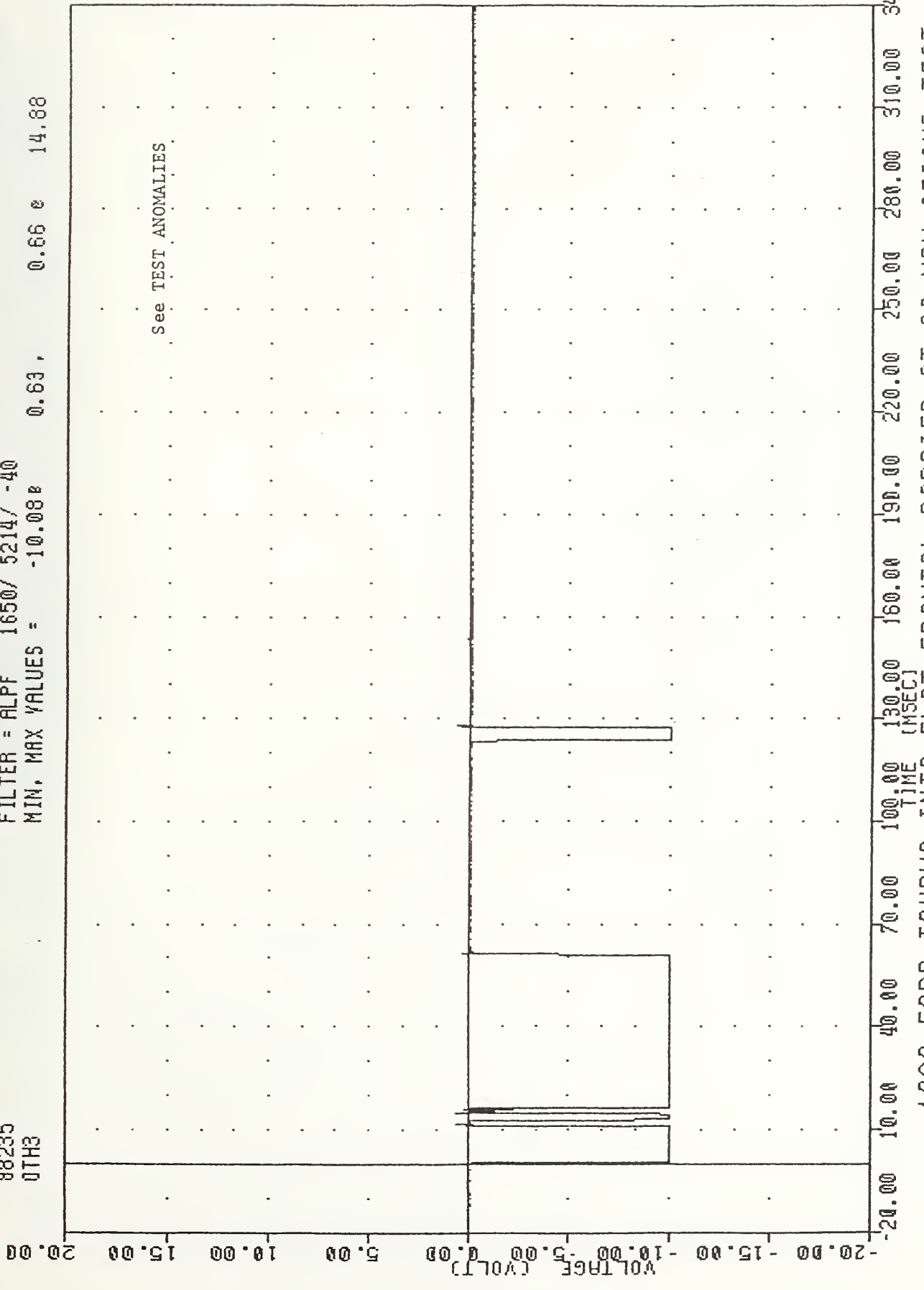
VRTC-2 , 880822

DAMAGE ALGORITHM REFORMULATION

88235

0TH3

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -10.088 0.63 , 0.66 e 14.88

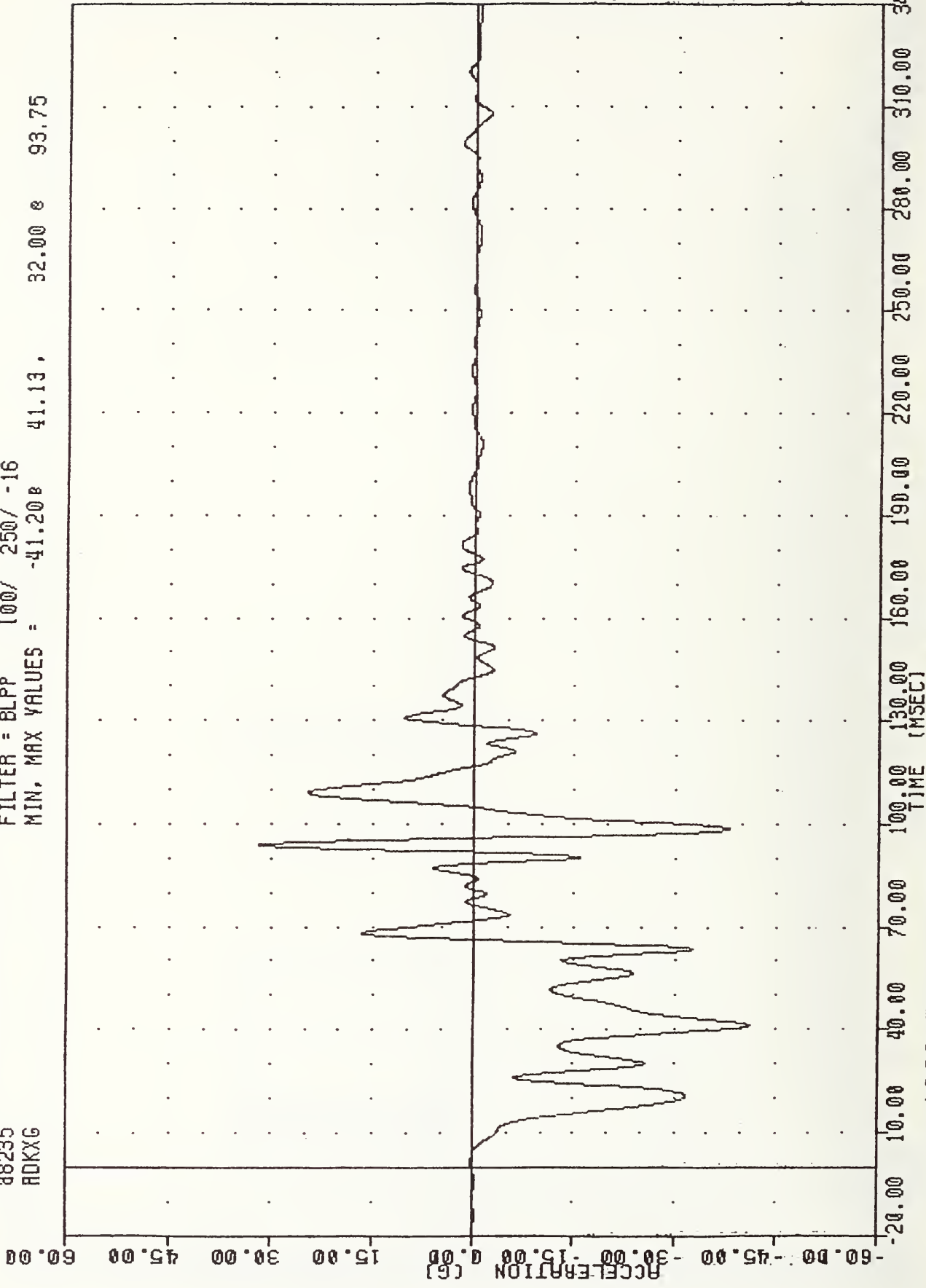


1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH SECOND TEST
CONTACT SWITCH

VRTC-3 , 880822
DAMAGE ALGORITHM REFORMULATION

88235
ADKXG

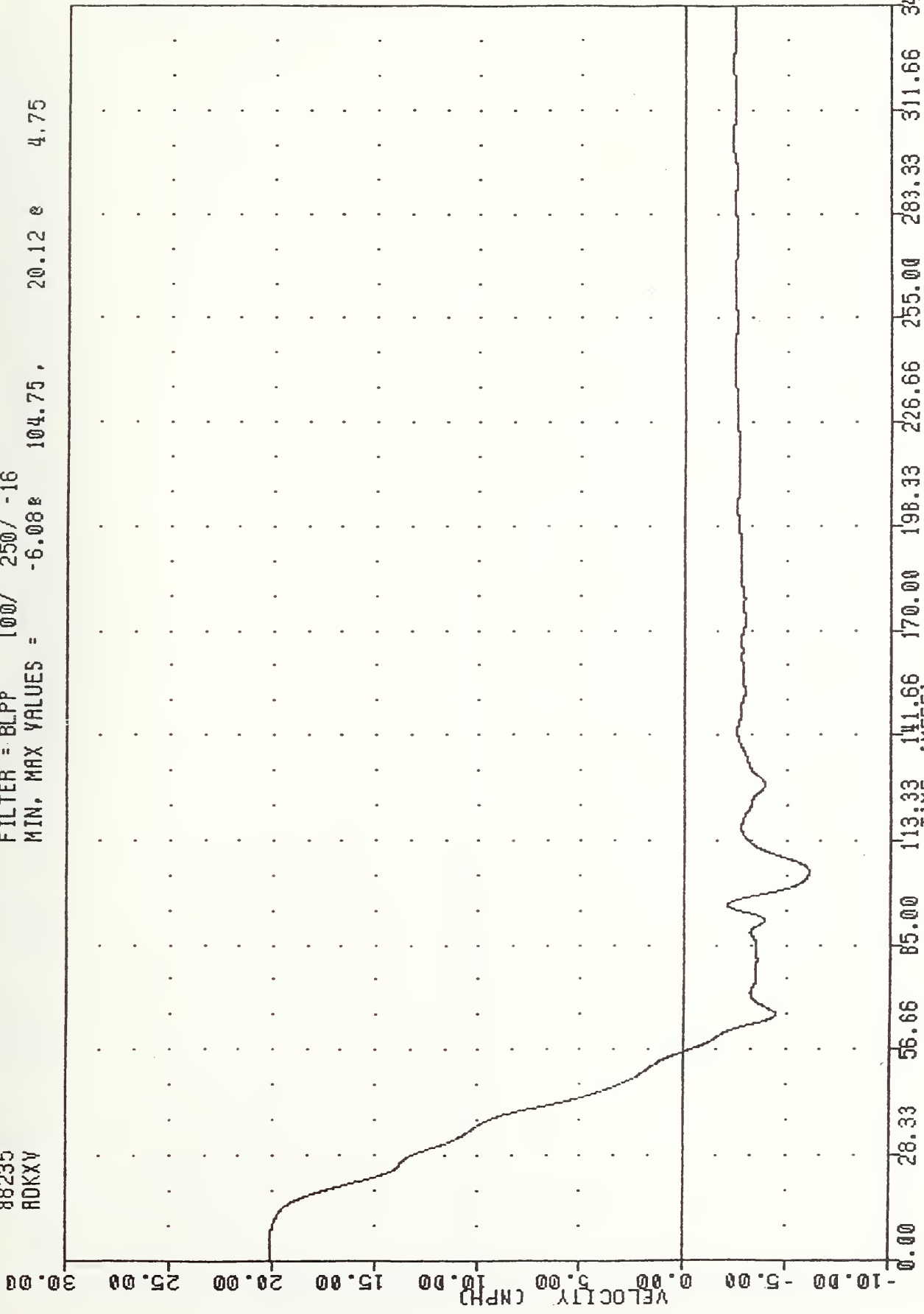
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -41.20 41.13, 32.00 93.75



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK X AXIS ACCELERATION

VRTC-3 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 RDKXY

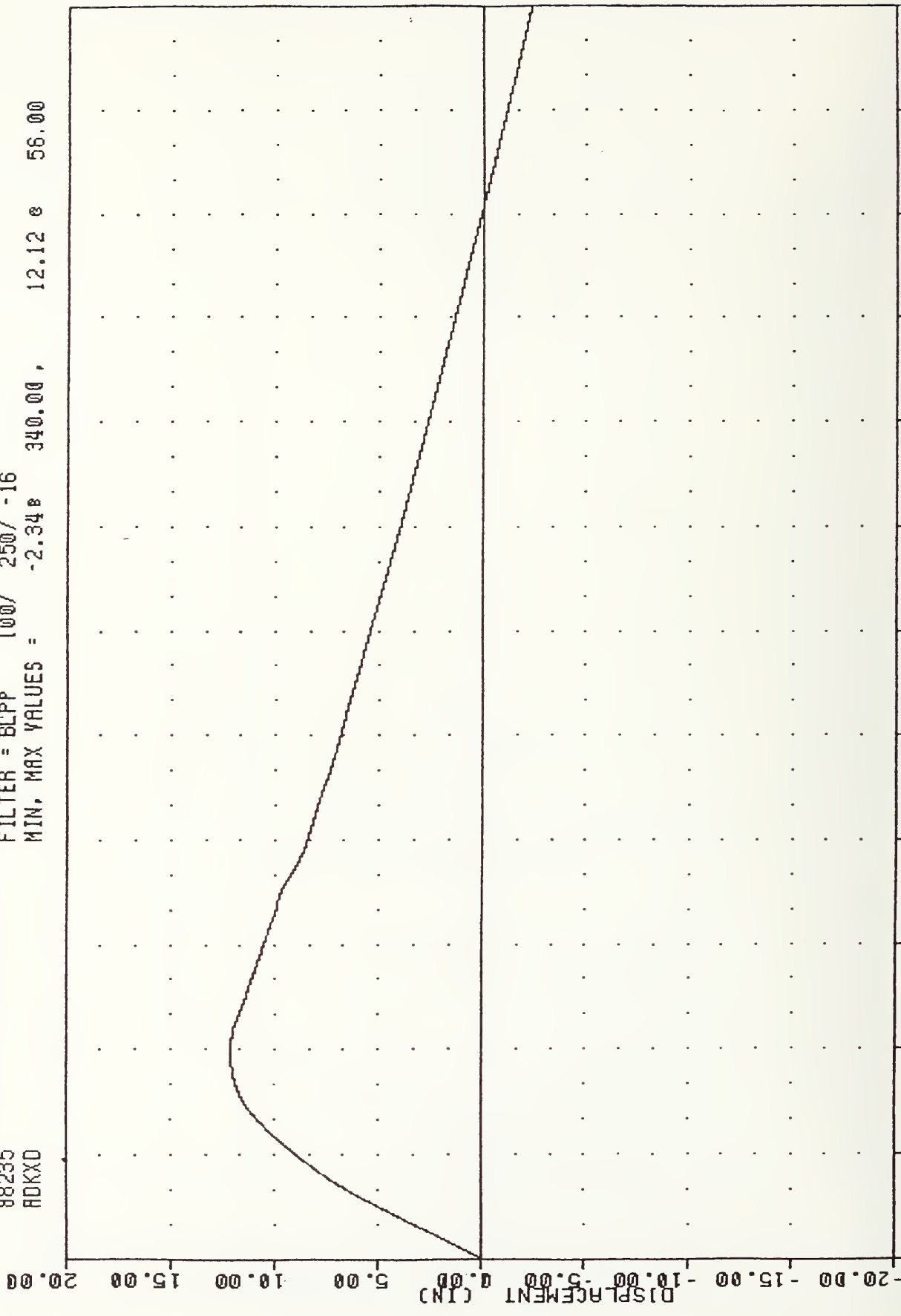
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -6.08 104.75 , 20.12 e 4.75



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
 VEHICLE REAR DECK X AXIS VELOCITY

YRTC-3 , 880822
 DAMAGE ALGORITHM REFORMULATION
 88235
 ADKXD

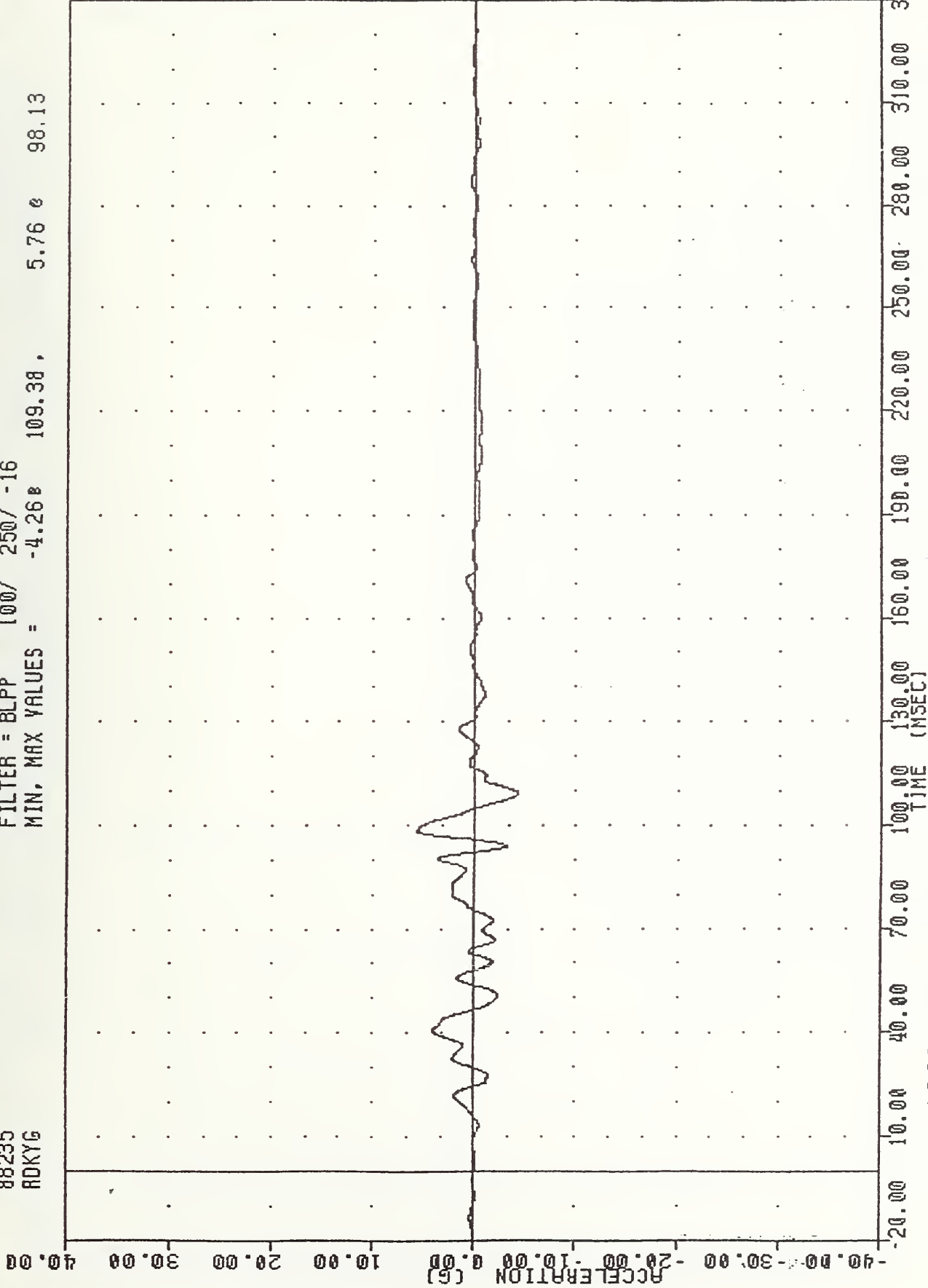
FILTER = BLPP 100/ 250/ -16
 MIN, MAX VALUES = -2.34E 340.00 , 12.12 E 56.00



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)
 1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
 VEHICLE REAR DECK X AXIS DISPLACEMENT

VRTC-3 , 680822
DAMAGE ALGORITHM REFORMULATION

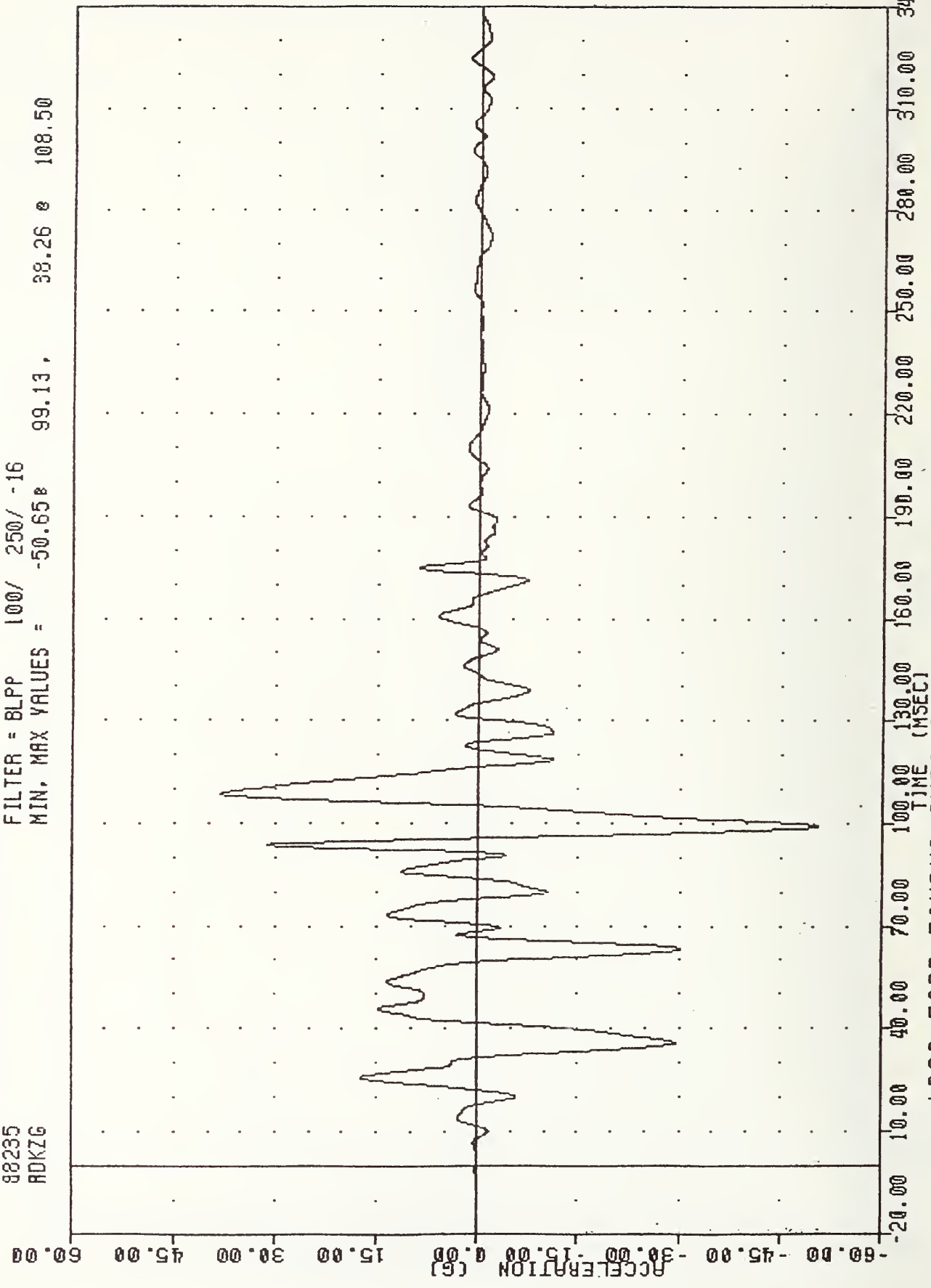
88235 FILTER = BLPP 100/ 250/ -16
ADKYG MIN, MAX VALUES = -4.268 109.38 , 5.76 e 98.13



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK Y AXIS ACCELERATION

VRTC-3 , 880822
DAMAGE ALGORITHM REFORMULATION
88235
ADKZG

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -50.65 99.13 , 38.26 e 108.50



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK Z AXIS ACCELERATION

VRTC-3 , 880822

DAMAGE ALGORITHM REFORMULATION

88235

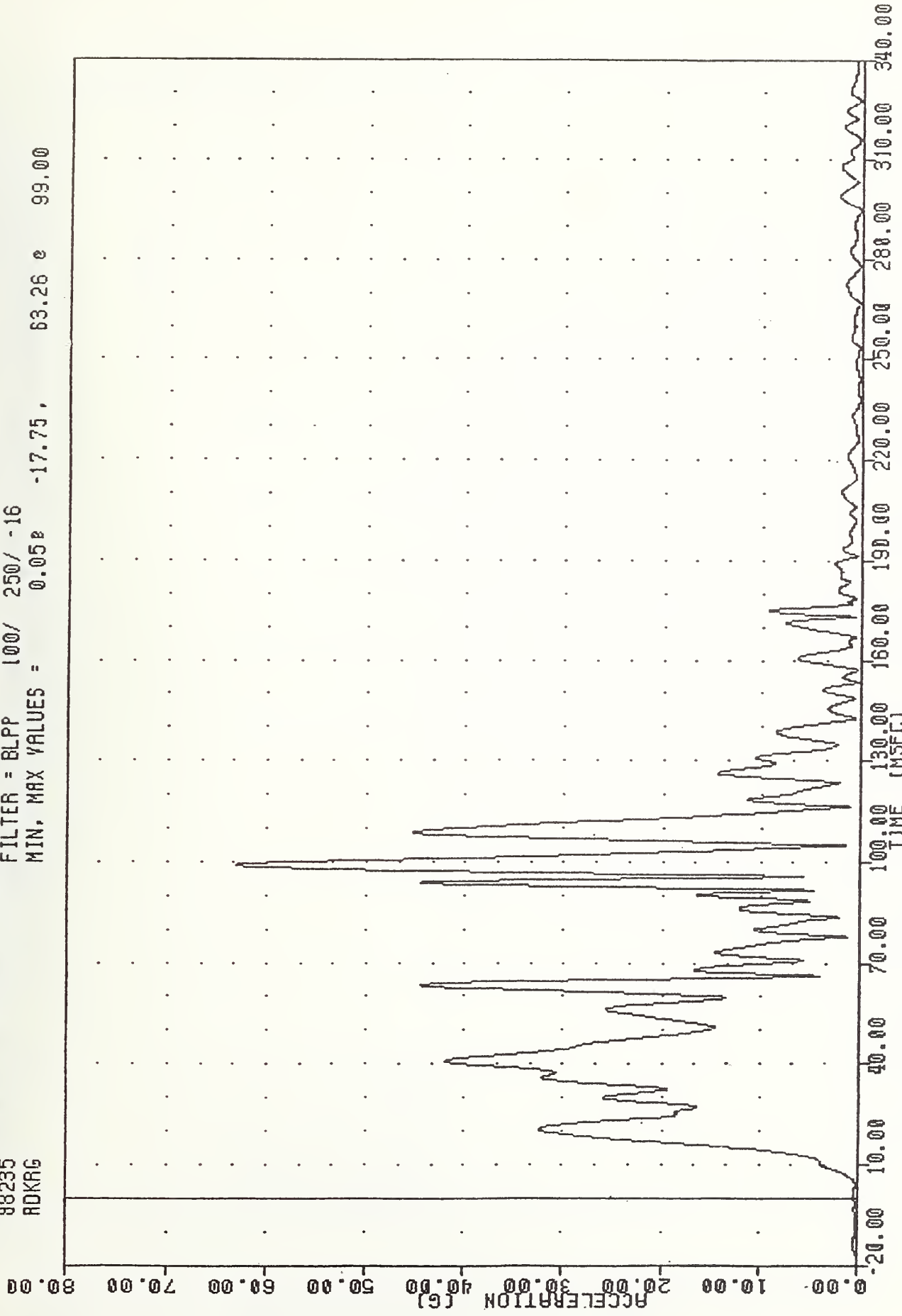
ADKRG

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = 0.05g

-17.75,

63.26 e 99.00



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
VEHICLE REAR DECK RESULTANT ACCELERATION

VRTC-3 , 880822

DAMAGE ALGORITHM REFORMULATION

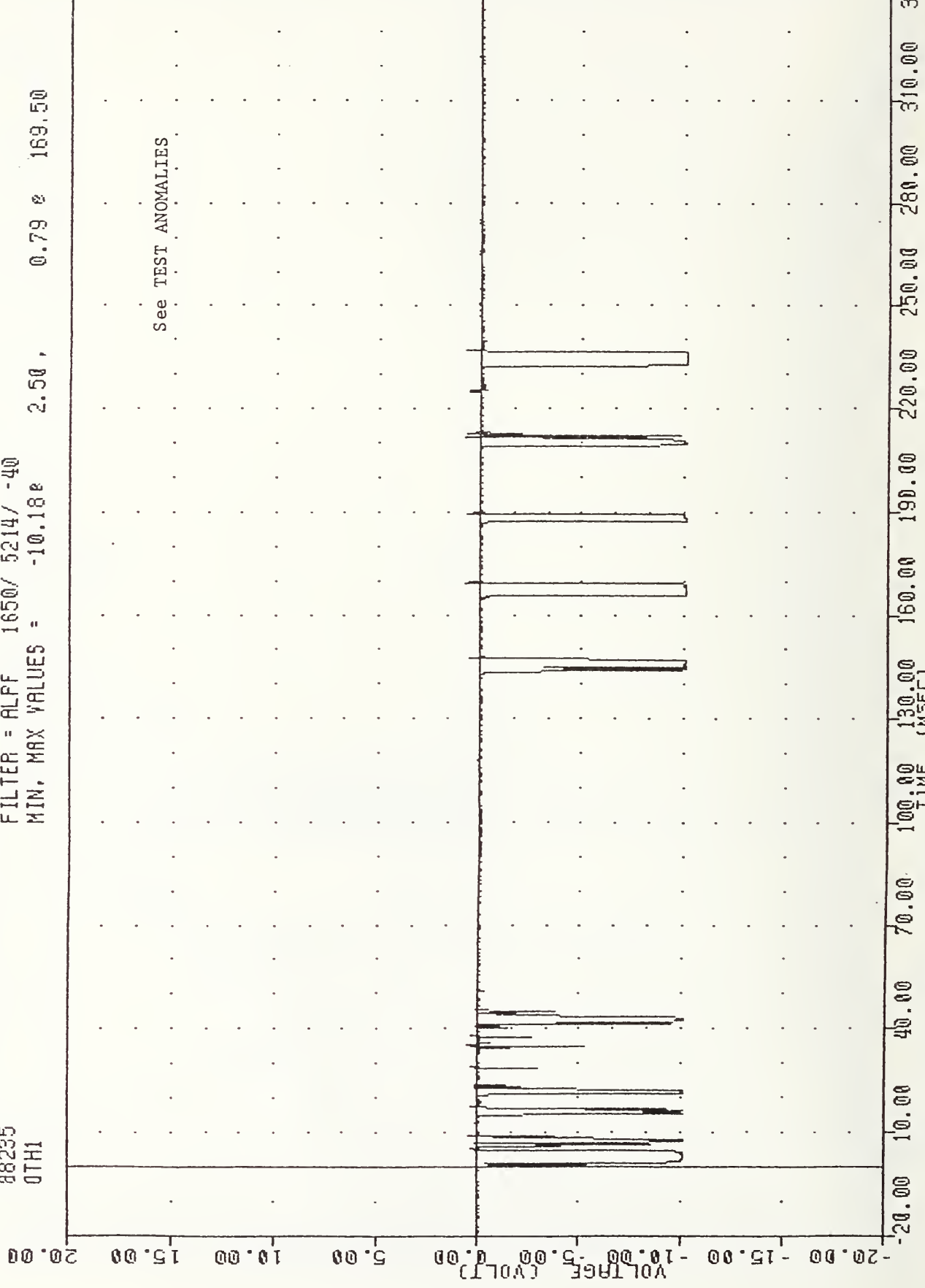
88235

0TH1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.18e

2.50 , 0.79 e 169.50



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
CONTACT SWITCH

VRTC-3 , 880822

DAMAGE ALGORITHM REFORMULATION

88235

0TH2

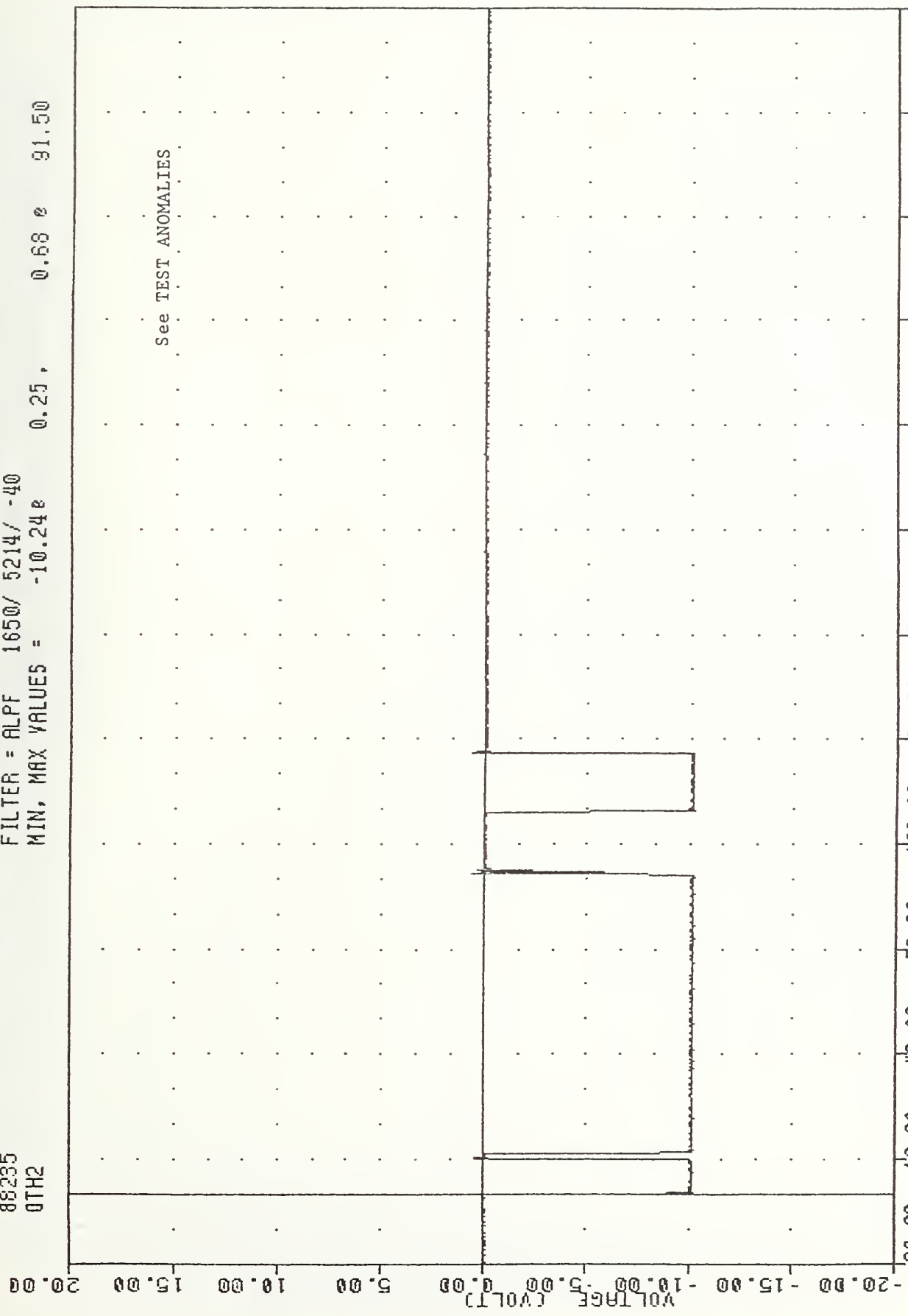
FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -10.24e

0.25 ,

0.68 e

91.50



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

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
 CONTACT SWITCH

VRTC-3
 DAMAGE ALGORITHM REFORMULATION

88235

0TH3

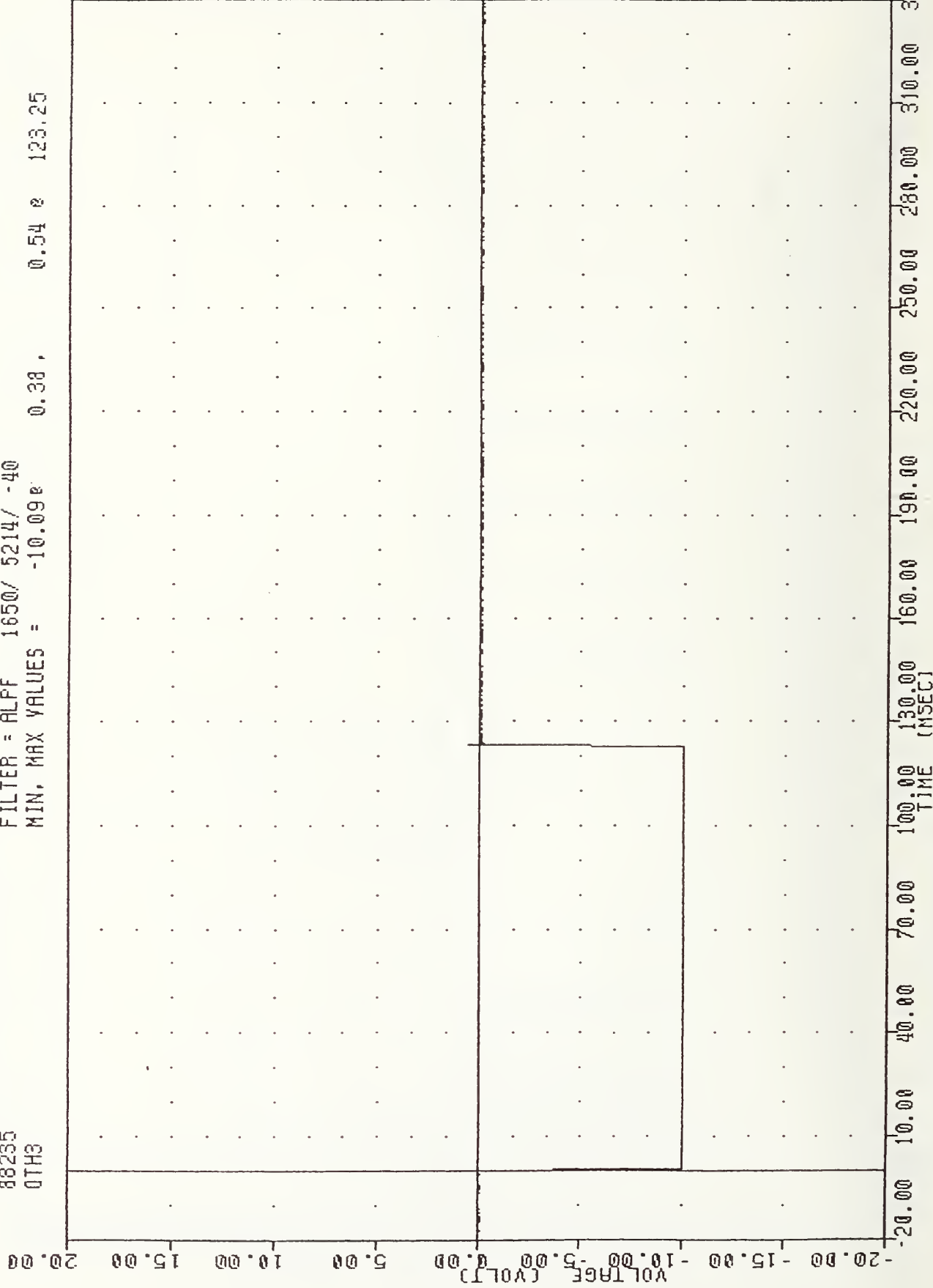
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.09e

0.38,

0.54 e

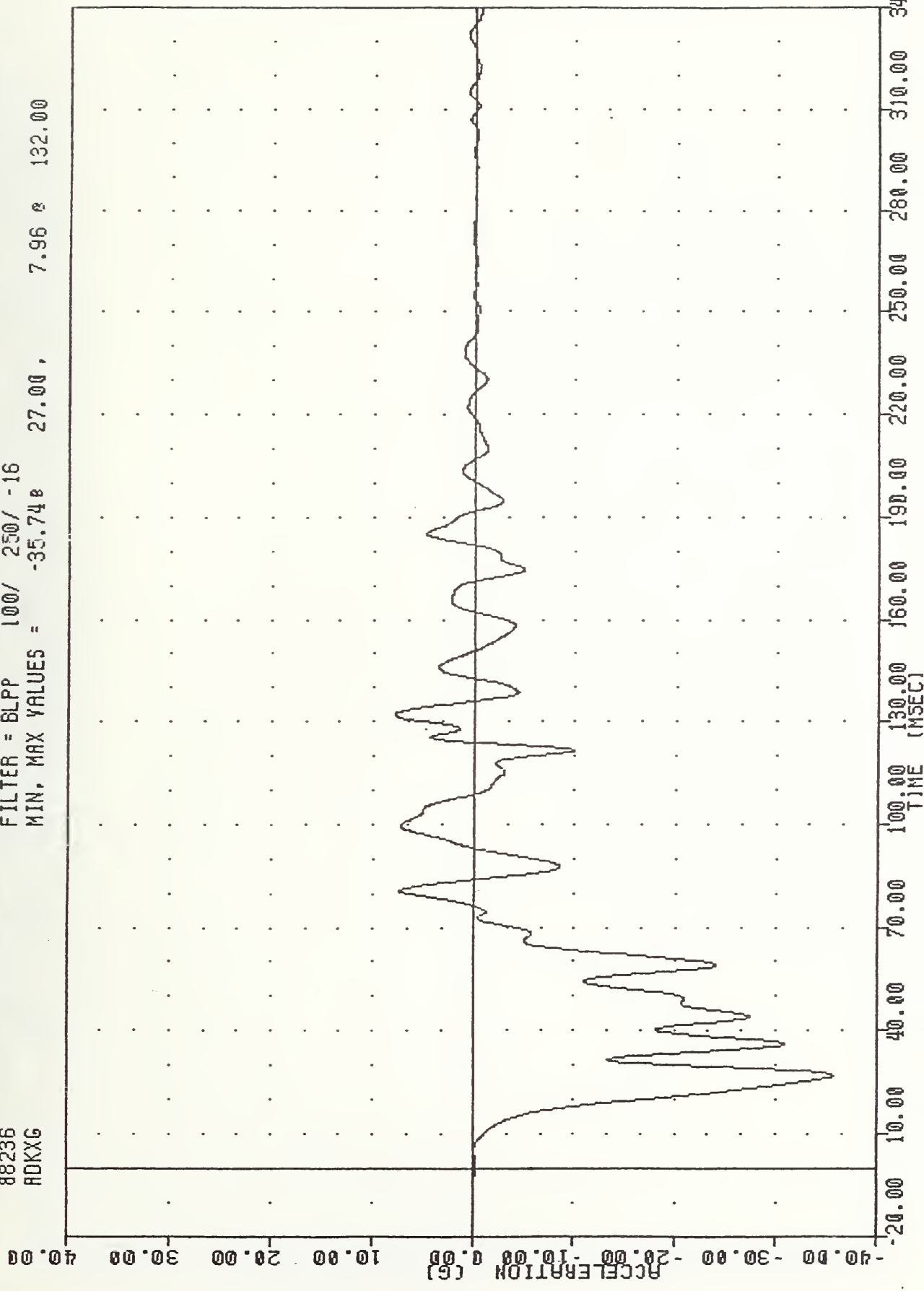
123.25



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH THIRD TEST
 CONTACT SWITCH

VRTC-4
DAMAGE ALGORITHM REFORMULATION
88236
ADKXG

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -35.74e 27.00, 7.96 e 132.00



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
VEHICLE REAR DECK X AXIS ACCELERATION

YRTC-4 , 880823

DAMAGE ALGORITHM REFORMULATION

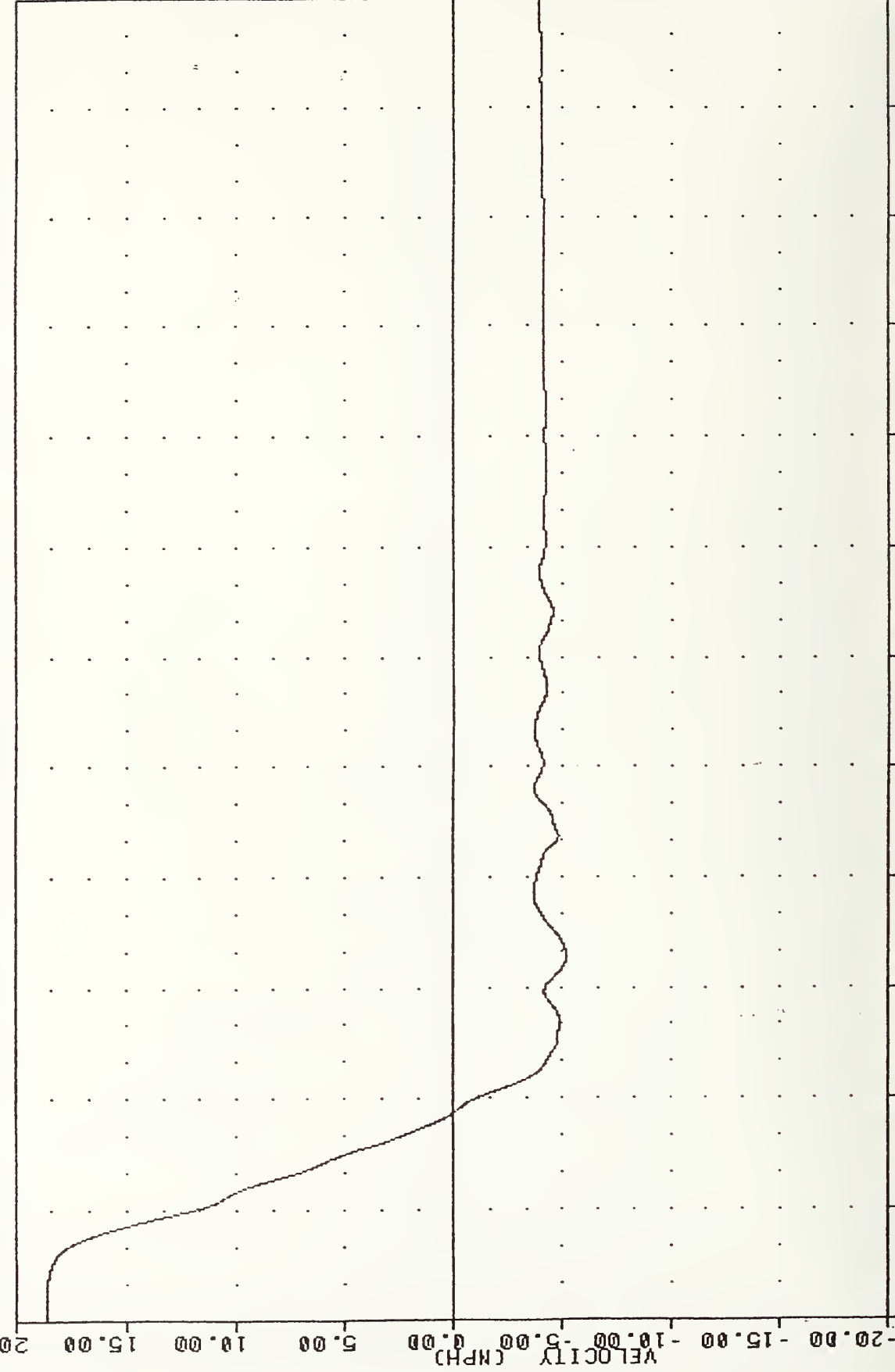
88236

ADKXY

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -5.17 92.88 , 18.60 0.00

20.00



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

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
VEHICLE REAR DECK X AXIS VELOCITY

VRTC-4 , 880823

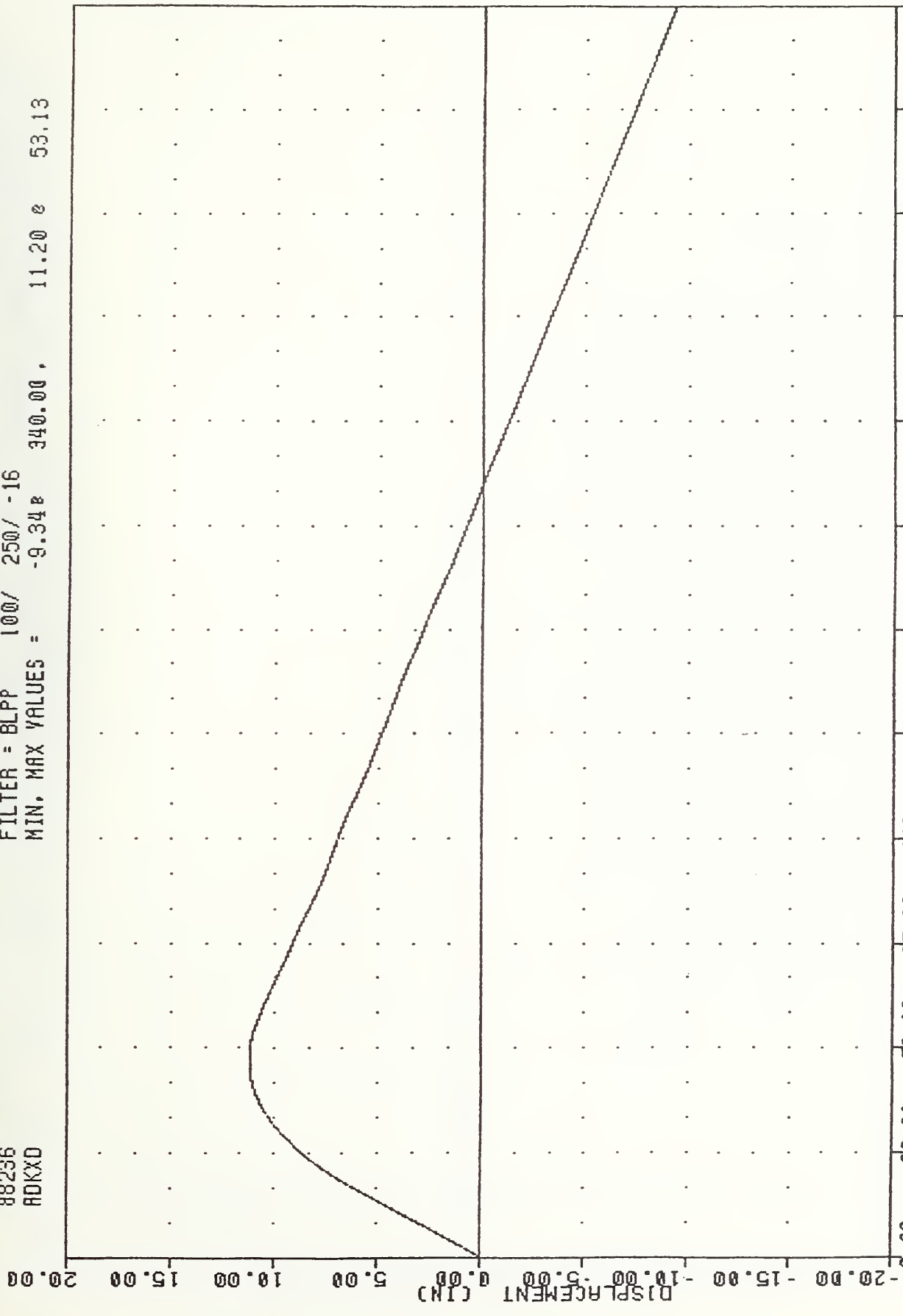
DAMAGE ALGORITHM REFORMULATION

88236

ADKXD

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -9.34B 340.00 , 11.20 e 53.13



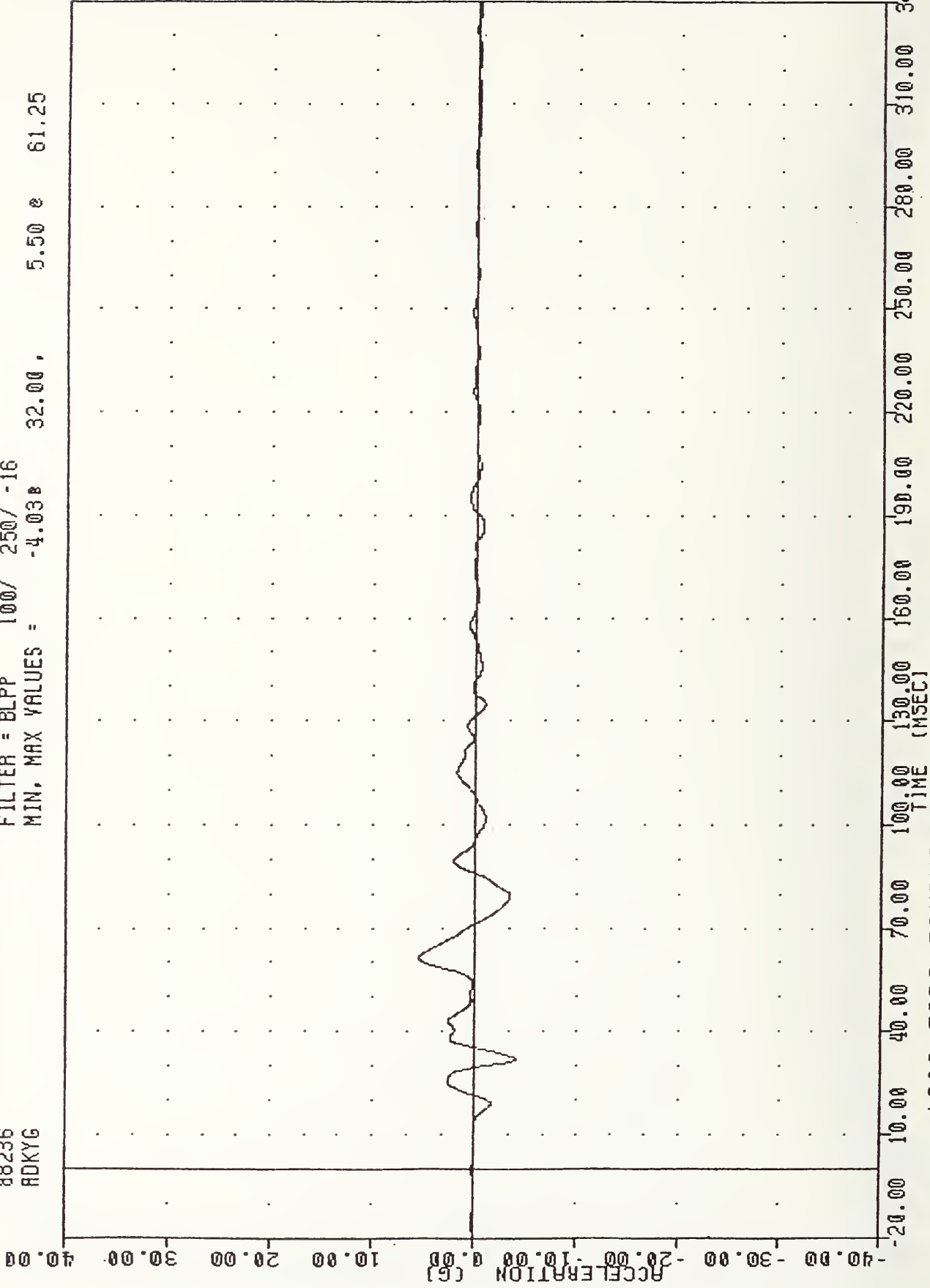
1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
 VEHICLE REAR DECK X AXIS DISPLACEMENT

YRTC-4 , 880823
DAMAGE ALGORITHM REFORMULATION

88236
ADKYG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -4.03 32.00 ,

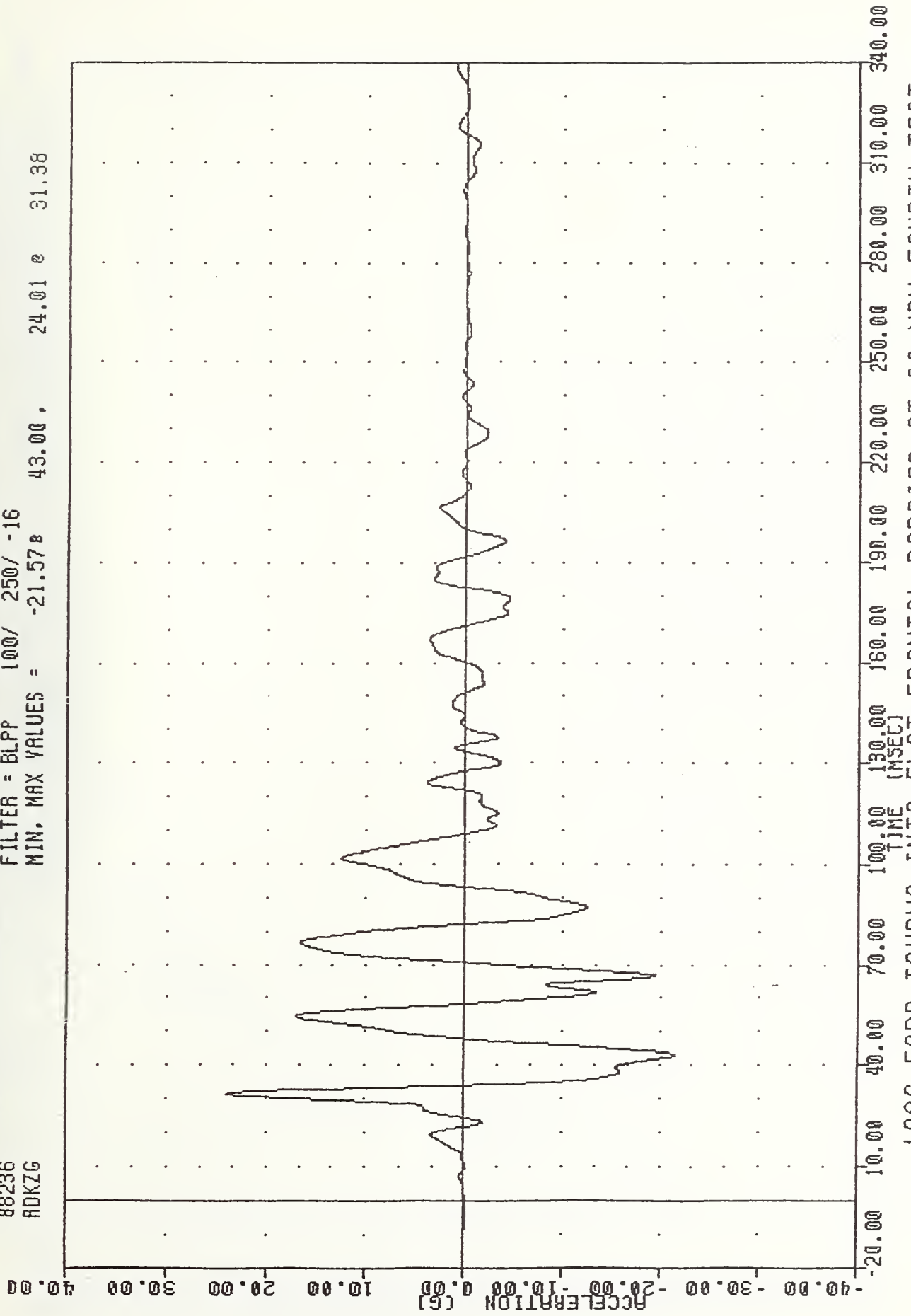
5.50 e 61.25



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
VEHICLE REAR DECK Y AXIS ACCELERATION

VRTC-4 , 880823
DAMAGE ALGORITHM REFORMULATION
88236
ADKZG

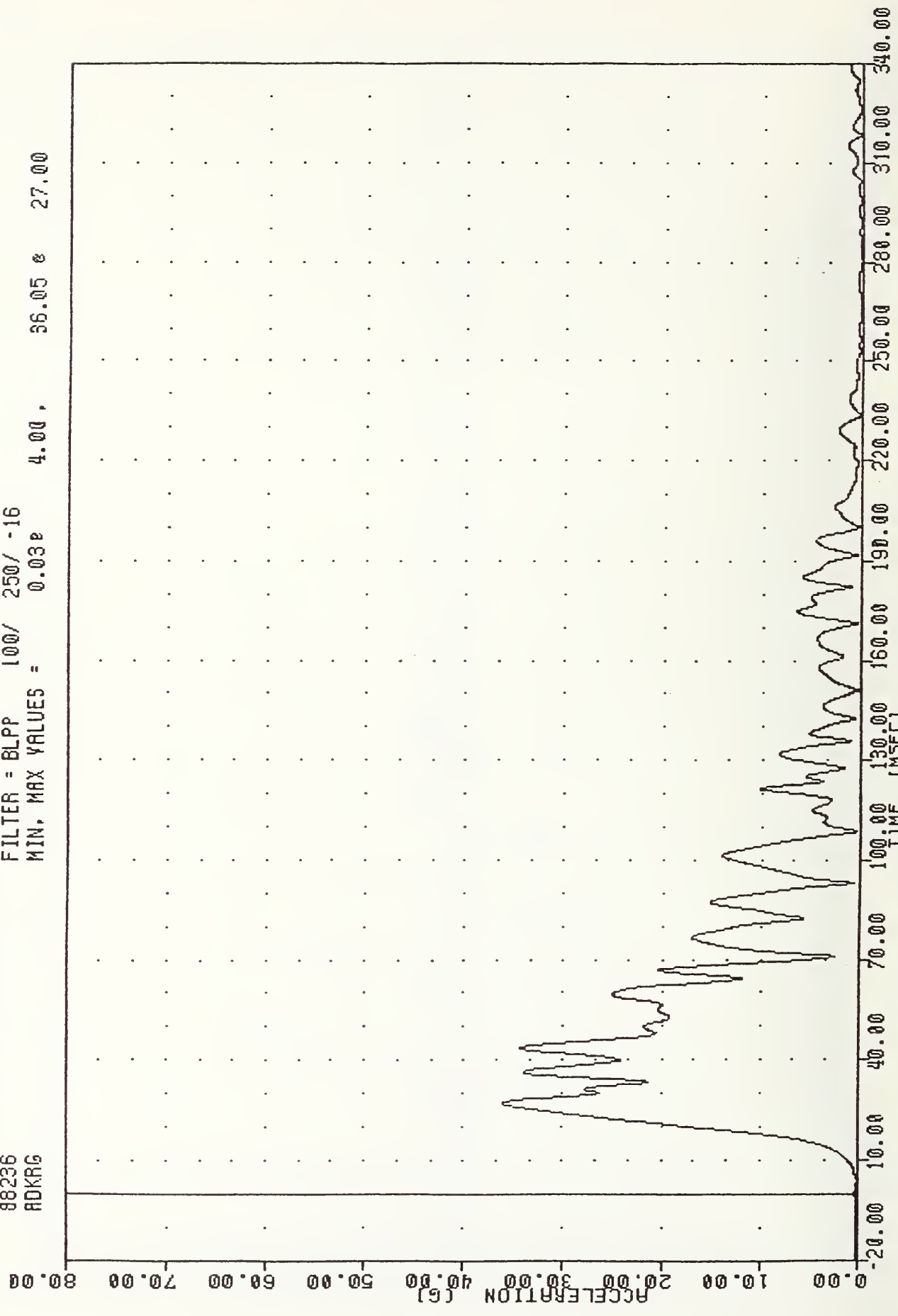
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -21.57 43.00 , 24.01 e 31.38



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
VEHICLE REAR DECK Z AXIS ACCELERATION

VRTC-4 , 880823
DAMAGE ALGORITHM REFORMULATION
88236
ADKRG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = 0.03e 4.00 , 36.05 e 27.00



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
VEHICLE REAR DECK RESULTANT ACCELERATION

VRTC-4 , 680823

DAMAGE ALGORITHM REFORMULATION

88236

QTH1

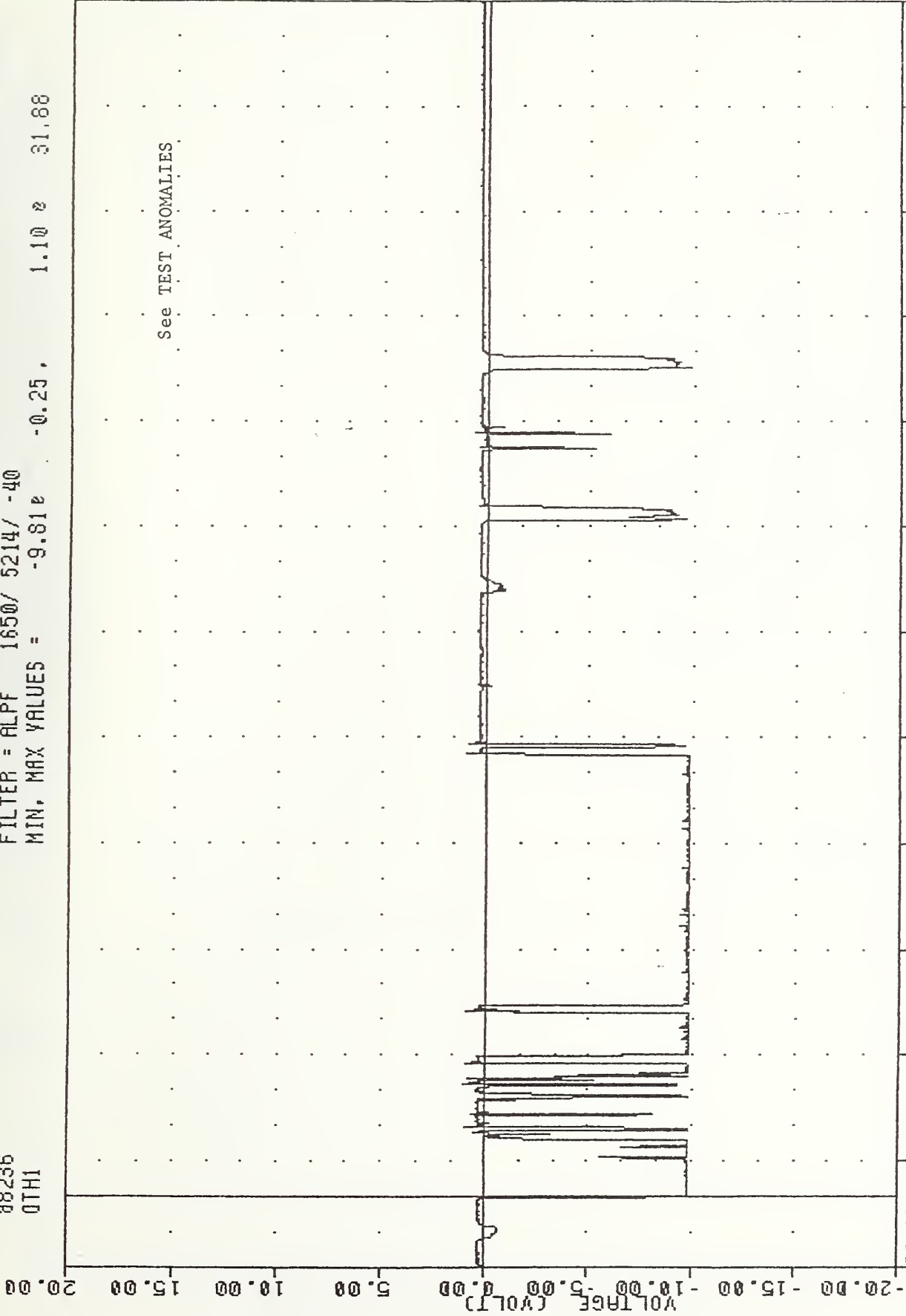
FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -9.81e

-0.25,

1.10 e

31.68



130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
CONTACT SWITCH

YRTC-4 , 880823

DAMAGE ALGORITHM REFORMULATION

88236

0TH2

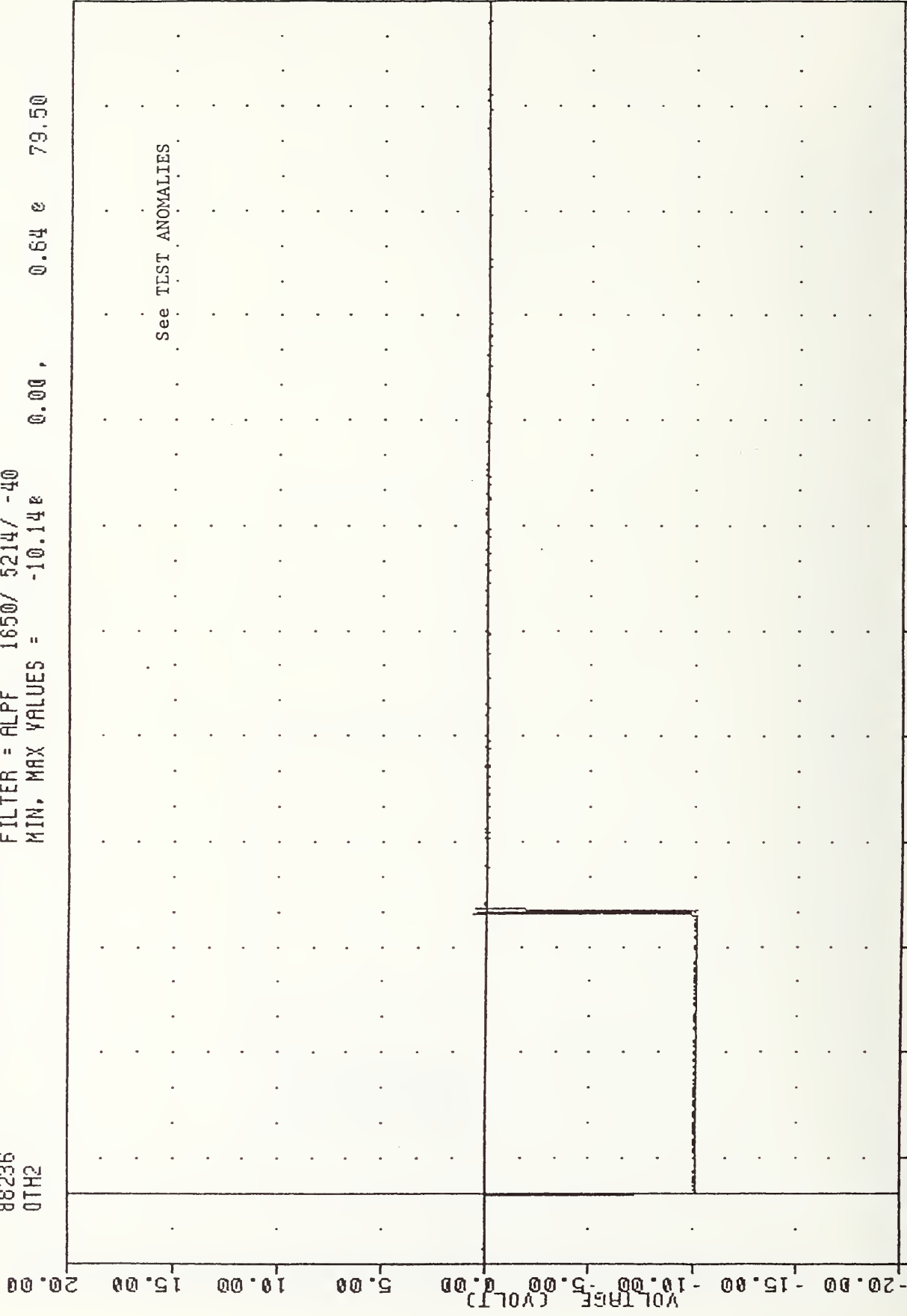
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.14E

0.00 ,

0.64 e

79.50



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

1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
CONTACT SWITCH

VRTC-4 , 880823

DAMAGE ALGORITHM REFORMULATION

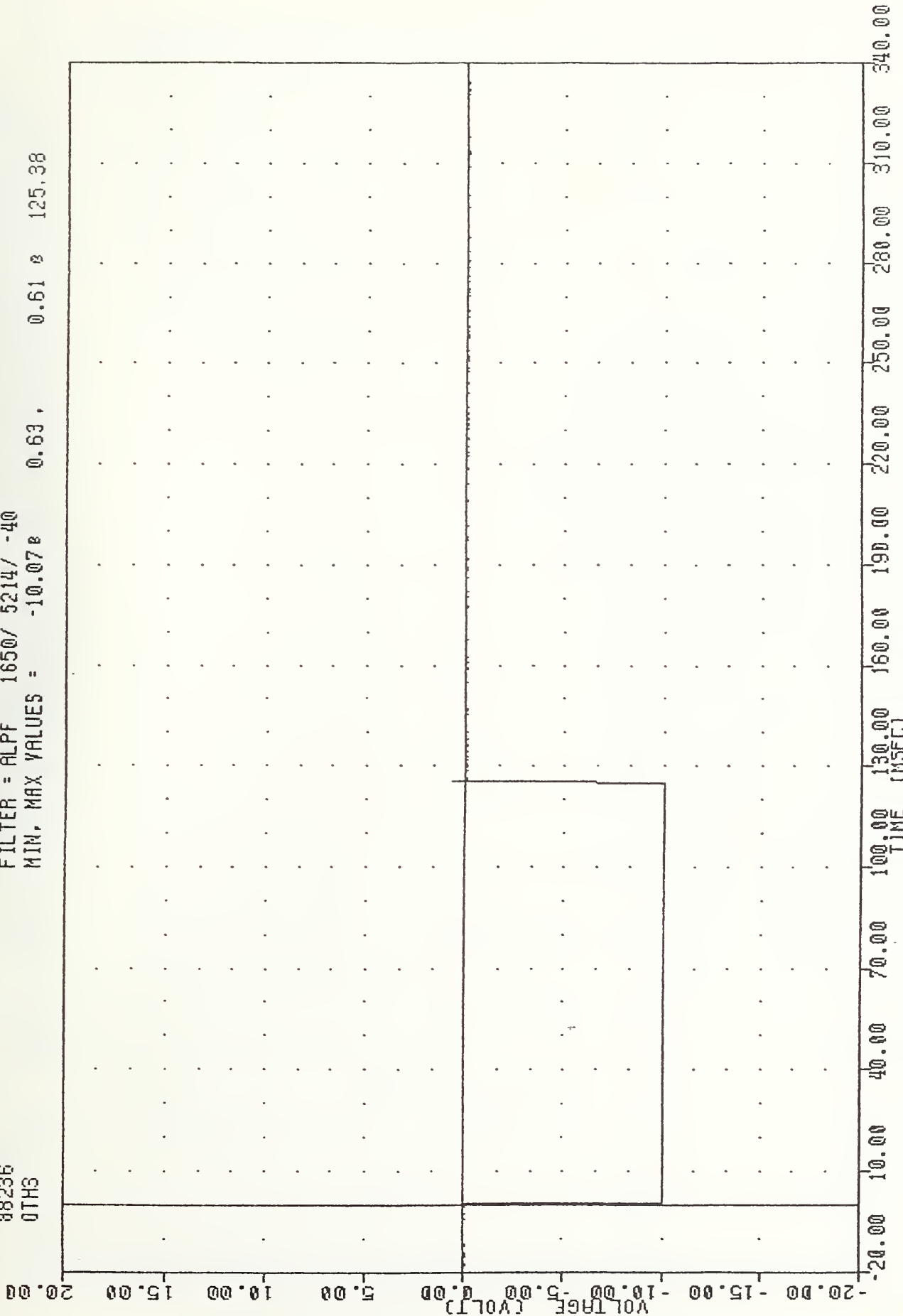
88236

OTHS

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -10.078

0.63 , 0.61 8 125.38

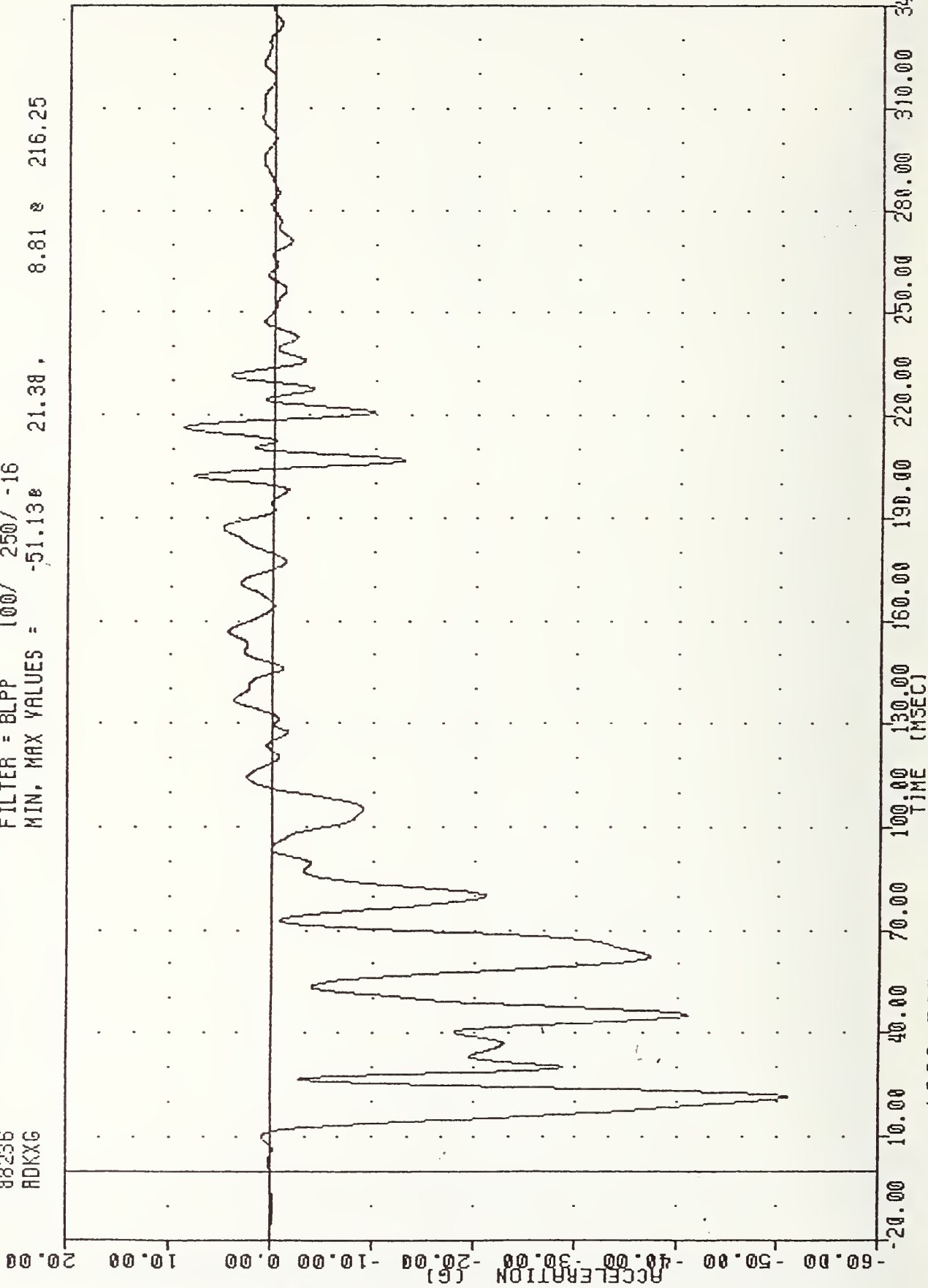


1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 20 MPH FOURTH TEST
CONTACT SWITCH

VRTC-5 , 880823
DAMAGE ALGORITHM REFORMULATION

88236 FILTER = BLPP 100/ 250/ -16

ADKXG MIN. MAX VALUES = -51.13 21.38 , 8.81 216.25



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS ACCELERATION

VRTC-5 , 880823

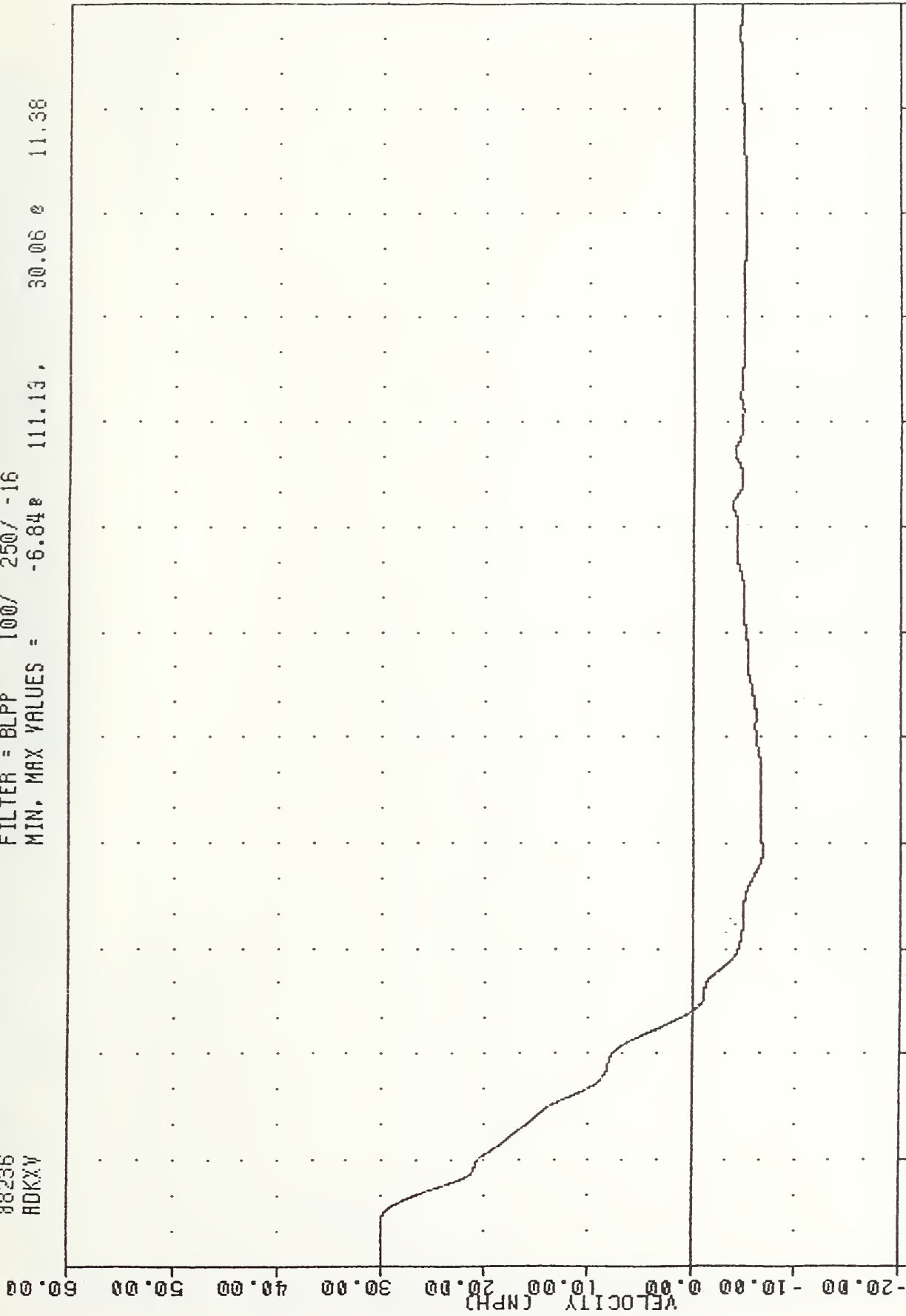
DAMAGE ALGORITHM REFORMULATION

88236

ADKXV

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -6.84e 111.13, 30.06 e 11.38



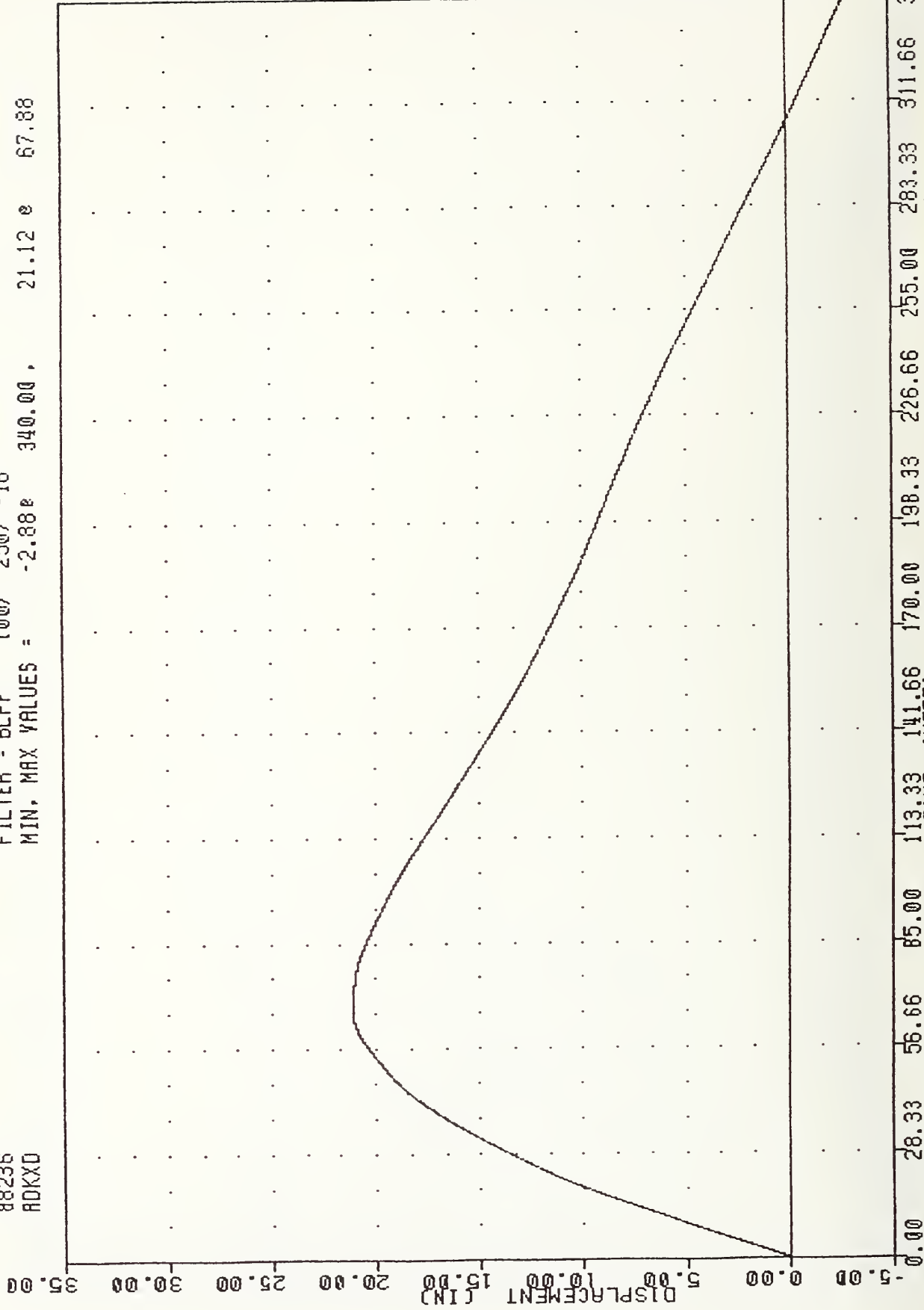
1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS VELOCITY

VRTC-5 , 880823

DAMAGE ALGORITHM REFORMULATION

88236 FILTER = BLPP 100/ 250/ -16

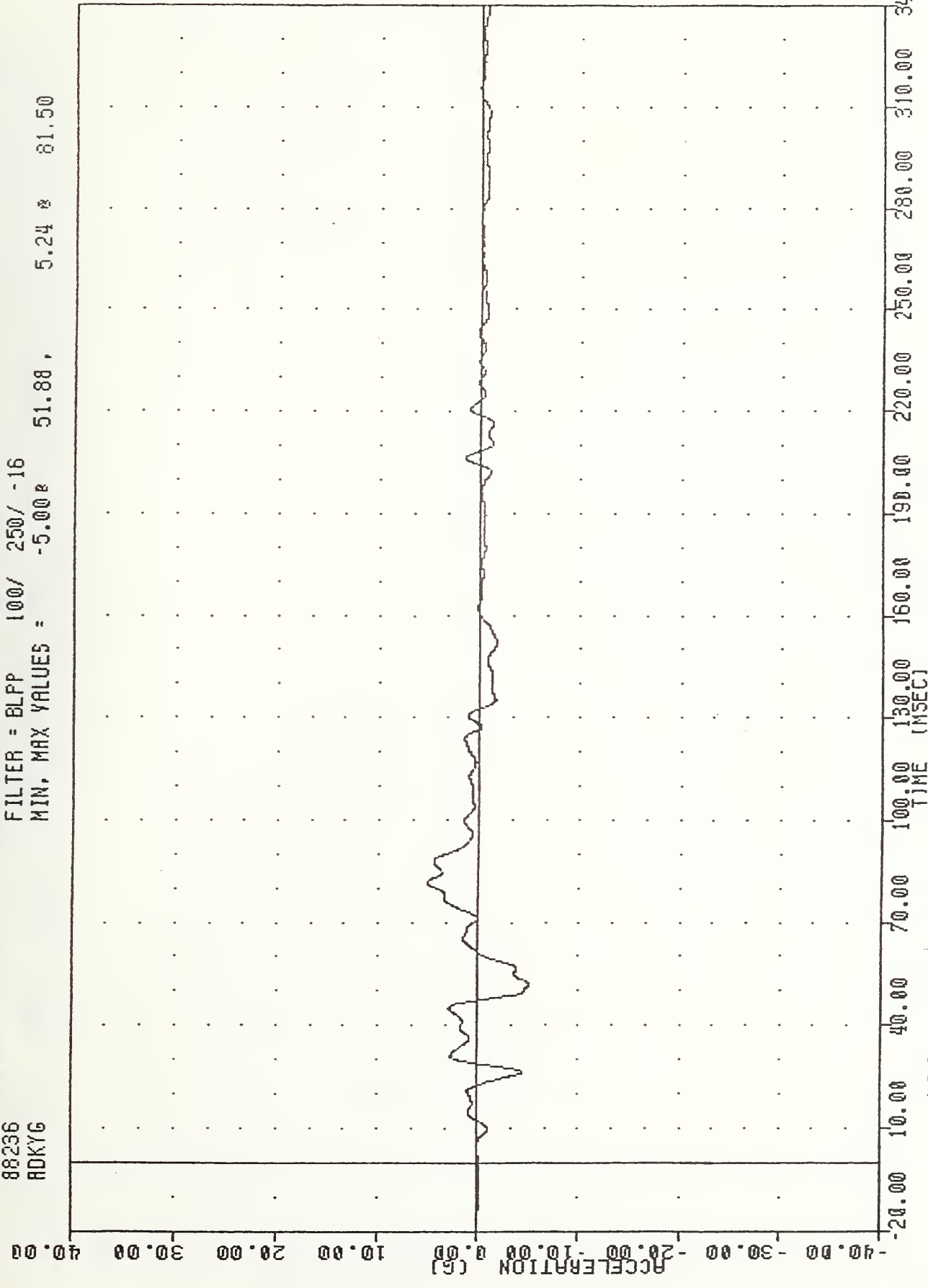
ADKXD MIN, MAX VALUES = -2.88e 340.00 , 21.12 e 67.88



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK X AXIS DISPLACEMENT

VRTC-5 , 880823
 DAMAGE ALGORITHM REFORMULATION
 88236
 ADKY6

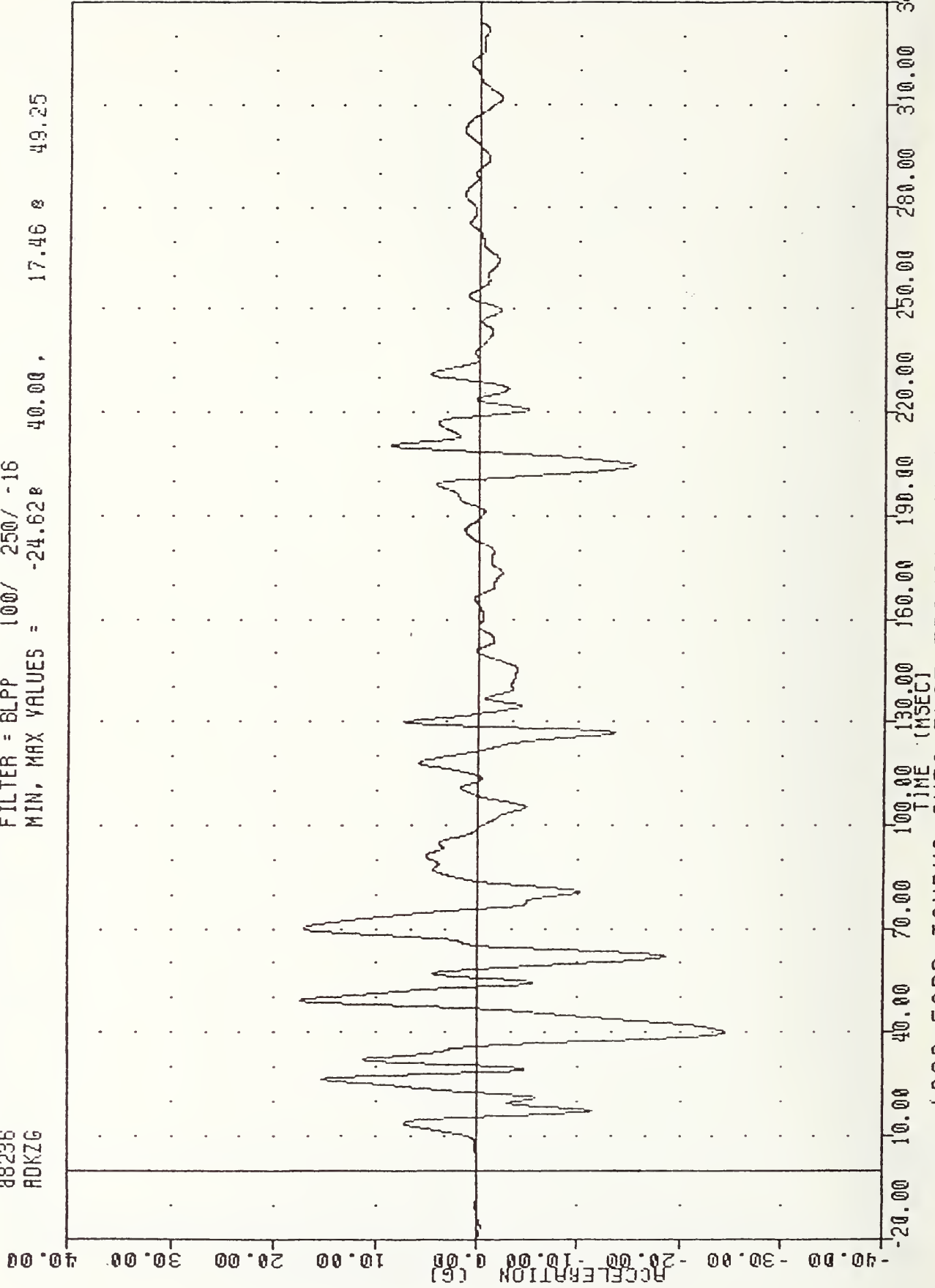
FILTER = BLPP 100/ 250/ -16
 MIN. MAX VALUES = -5.00E 51.88 , 5.24 * 81.50



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
 VEHICLE REAR DECK Y AXIS ACCELERATION

VRTC-5 , 880823
DAMAGE ALGORITHM REFORMULATION
88236
ADKZG

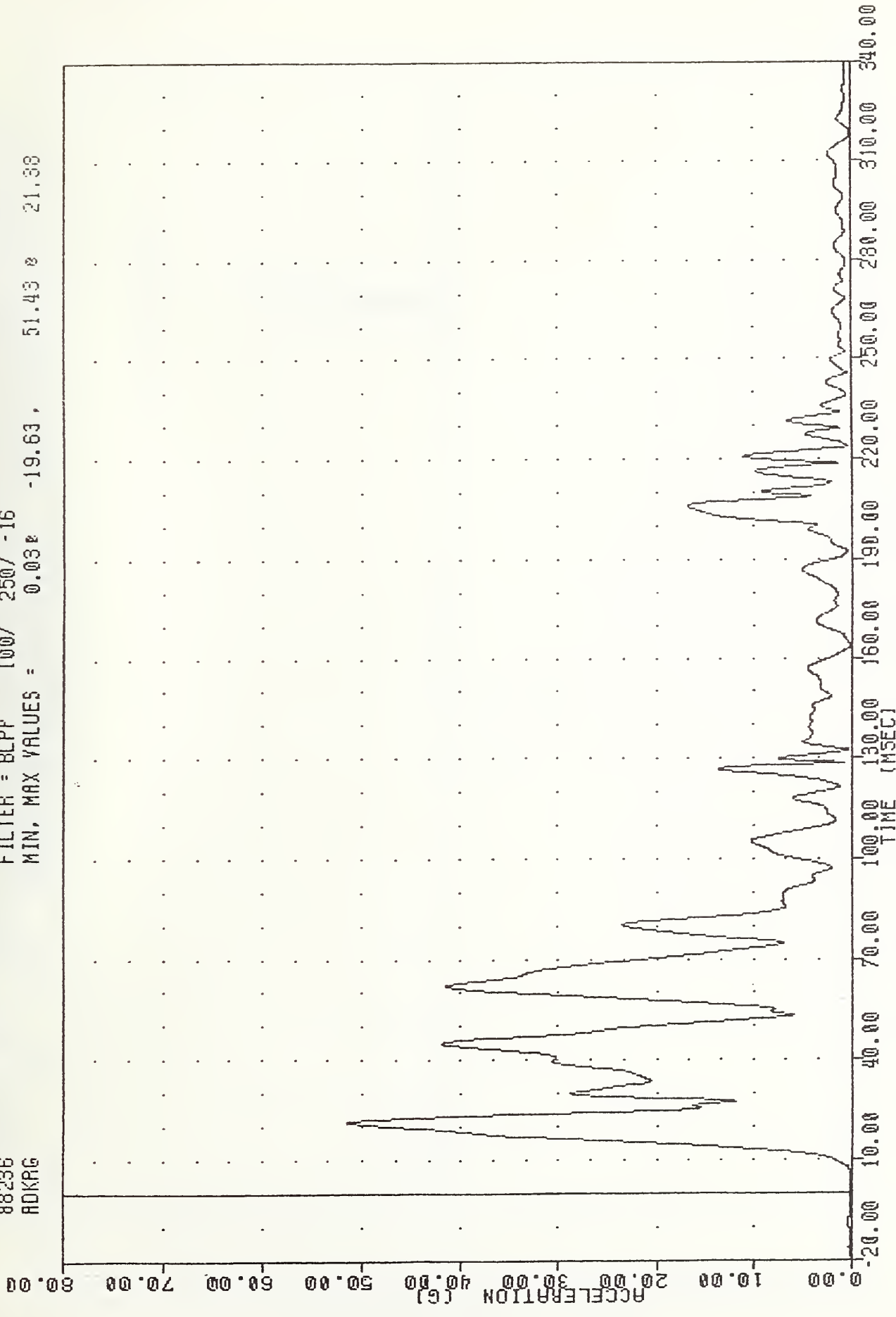
FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -24.62g 40.00, 17.46g 49.25



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK Z AXIS ACCELERATION

VRTC-5 , 880823
DAMAGE ALGORITHM REFORMULATION
88236
ADKRG

FILTER = BLPF 100/ 250/ -16
MIN, MAX VALUES = 0.03E -19.63, 51.43 E 21.38



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
VEHICLE REAR DECK RESULTANT ACCELERATION

VRTC-5 , 880823

DAMAGE ALGORITHM REFORMULATION

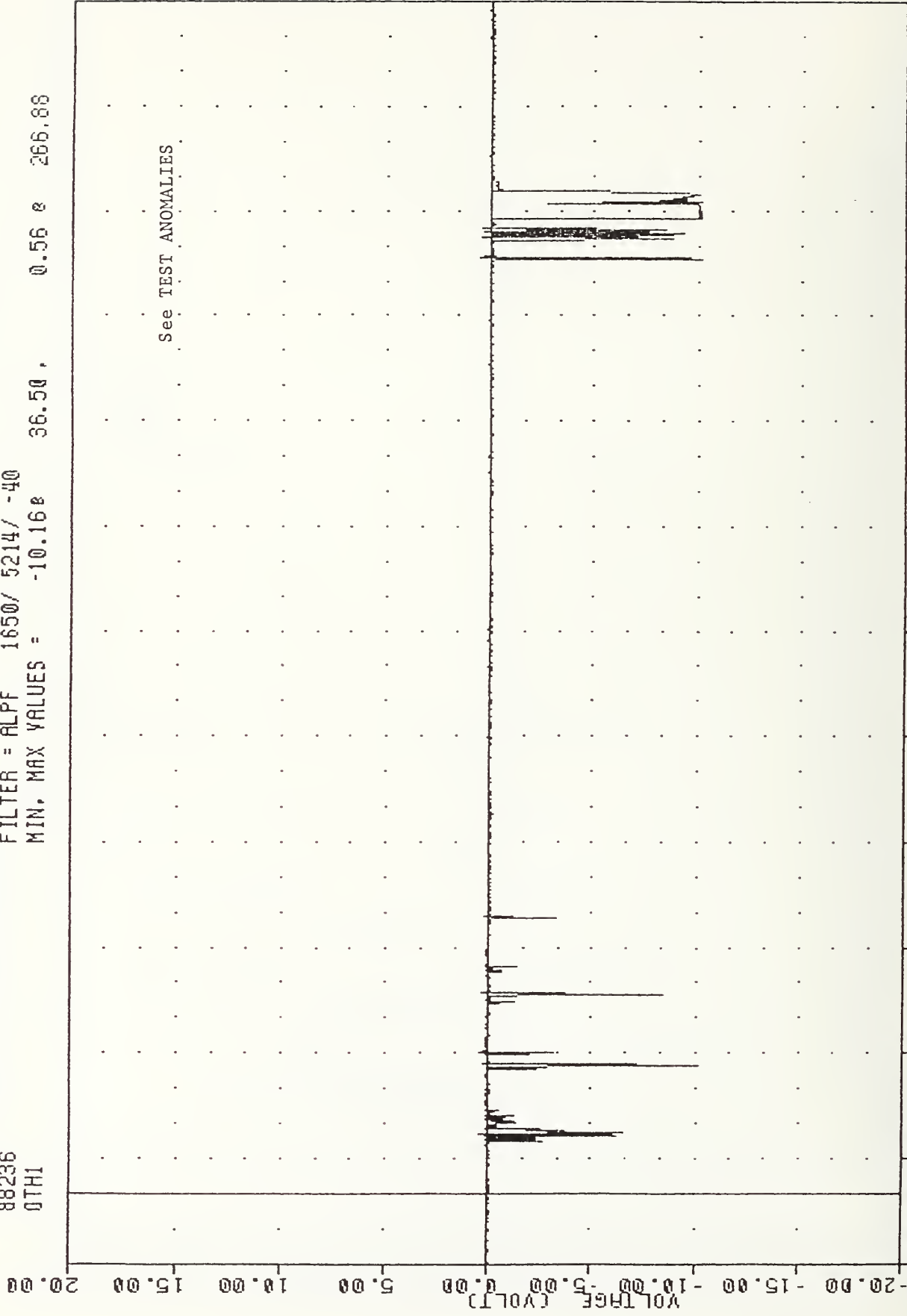
88236

0TH1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -10.16e 36.50 ,

0.56 e 266.88



-20.00 10.00 20.00
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
TIME (MSEC)
0.00 100.00 200.00 300.00 340.00

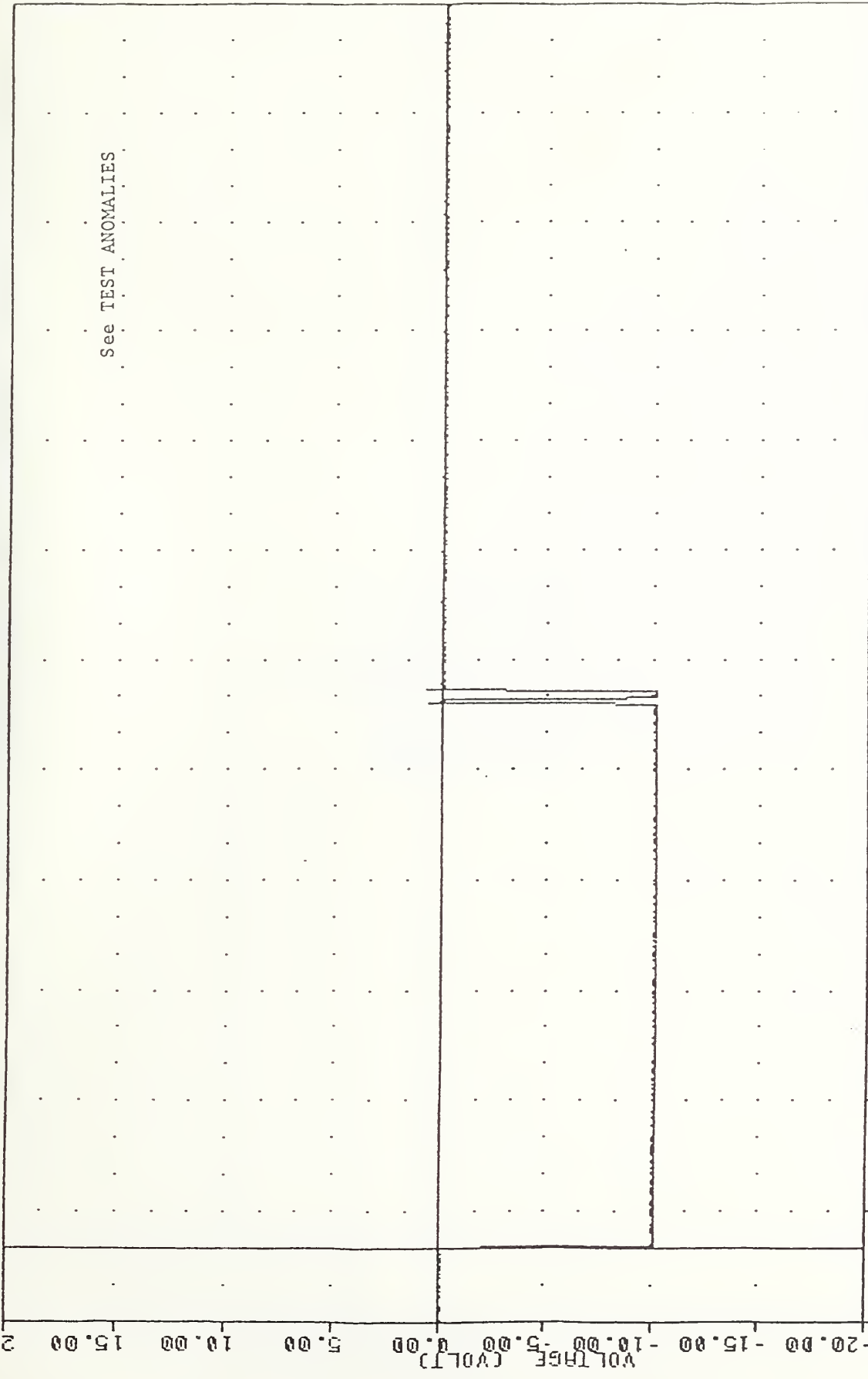
1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
CONTACT SWITCH

VRTC-5
 88236
 0TH2

DAMAGE ALGORITHM REFORMULATION

FILTER = ALPF 1650/ 5214/ -40
 MIN, MAX VALUES = -10.16e 0.50

0.74 e 151.75



-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)
 1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST
 CONTACT SWITCH

VRTC-5 , 880823

DAMAGE ALGORITHM REFORMULATION

88236

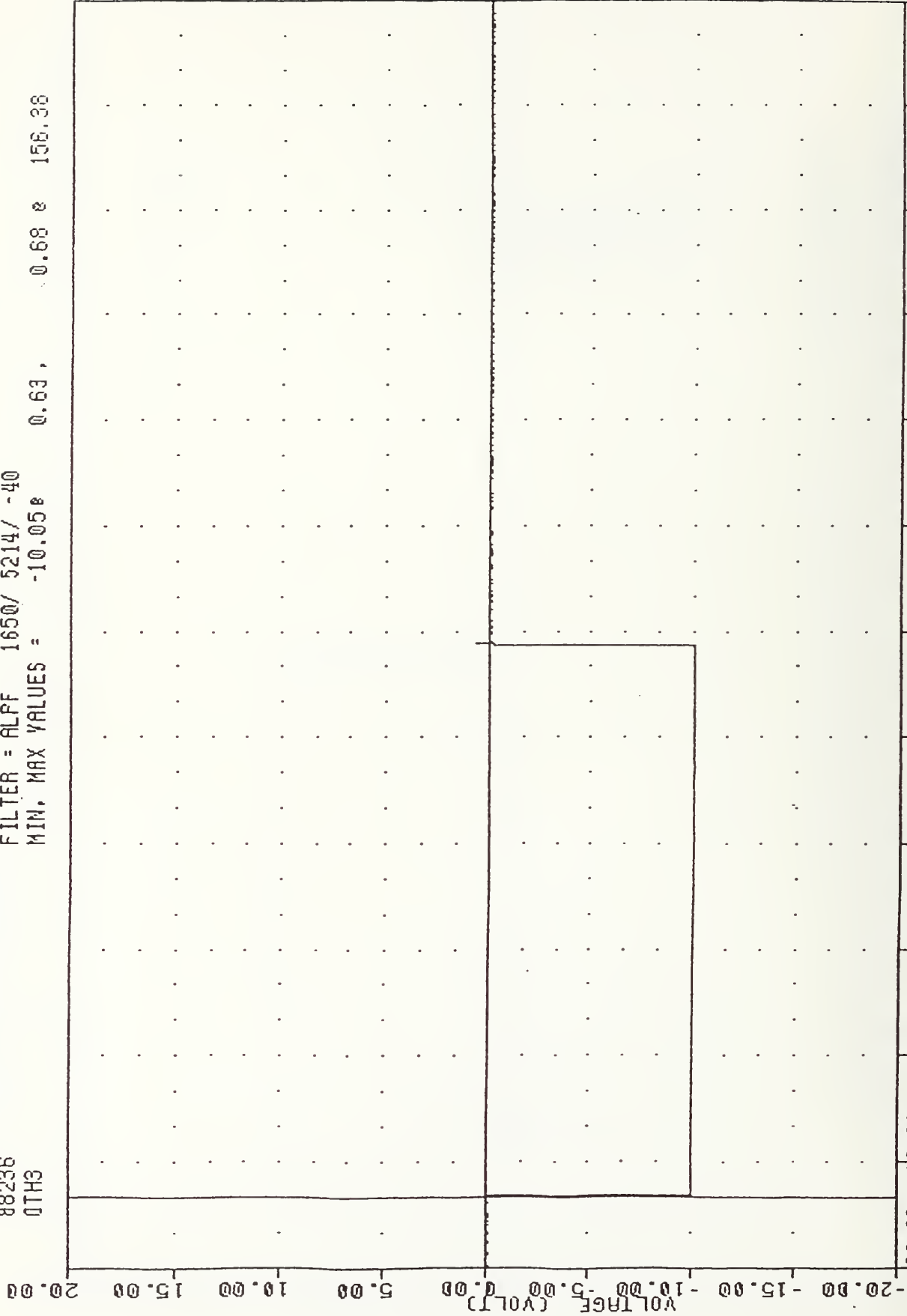
QTH3

FILTER = ALFF 1650/ 5214/ -40

MIN. MAX VALUES = -10.058

0.63 ,

0.68 & 156.38



1986 FORD TAURUS INTO FLAT FRONTAL BARRIER AT 30 MPH FIFTH TEST

CONTACT SWITCH

TL 242 .E656

EI-Habash, M

Final report
barrier imp

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