



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

**DOT HS 807 757
Final Report**

July 1991

Final Report of Minicars RSV into 50% Left Offset Frontal Barrier

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

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15. Supplementary Notes					
16. Abstract One 50% left offset frontal barrier impact test was conducted to determine the structural integrity of the test vehicle. This test was conducted on a Minicars RSV, VIN A1035, at the Transportation Research Center of Ohio on July 1, 1991. TEST NUMBER: 910701 TIME: 1238 TEMPERATURE: 86° F SPEED: 49.8 MPH					
17. Key Words 50% Left Offset Frontal Barrier Impact			18. Distribution Statement Available to the public from the National Technical Information Service, Springfield, VA 22161		
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SECTION 1.0

PURPOSE AND TEST SUMMARY

The 50 percent offset frontal barrier impact test was conducted to determine the structural integrity of the Minicars RSV.

The Minicars RSV was equipped with a 4-cylinder, transverse, gasoline engine with a 4-speed manual transmission. The test weight of the vehicle was 3117 pounds. The test speed was 49.8 mph.

The test vehicle impacted the offset barrier with the left half of the vehicle's front surface making direct contact with the barrier face.

The impacted vehicle was instrumented with fourteen (14) accelerometers to measure vehicle X-axis, Y-axis and Z-axis accelerations.

The crash test event was recorded by four (4) high-speed and one (1) real-time motion picture cameras.

Section 2.0 contains Vehicle and Test Information. Appendix A contains pre-test and post-test photographs. Appendix B contains Data Plots. Appendix C contains Miscellaneous Information.

SECTION 2.0

VEHICLE AND TEST INFORMATION

CRASH TEST SUMMARY

TEST TYPE: 50% left offset frontal

TEST DATE: 07/01/91 TEST TIME: 1238 AMBIENT TEMP. (°F): 86

VEHICLE: Minicars RSV

VEHICLE TEST WEIGHT (LBS): 3117

IMPACT ANGLE (DEG)*: 0

IMPACT VELOCITY (MPH)**: PRIMARY = 49.8 SECONDARY = 50.0

MAXIMUM STATIC CRUSH (IN): 52.9

NUMBER OF DATA CHANNELS: 14

NUMBER OF CAMERAS: HIGH-SPEED 4 REAL-TIME 1

*With respect to tow track centerline.

**Speed trap measurement (± .05 mph accuracy)

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Minicars

MAKE/MODEL: Minicars/RSV

VIN: A1035

BODY STYLE: 3-door hatchback

MODEL YEAR: NA

COLOR: White

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: NA

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

DATE VEHICLE RECEIVED: 07/19/91

ODOMETER READING: NA

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

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

REMARKS:

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

CERTIFICATION DATA FROM VEHICLE'S LABEL: **

VEHICLE MANUFACTURED BY:

DATE OF MANUFACTURE:

VIN:

GVWR: LBS

GAWR: FRONT: LBS., REAR: LBS.

*The test vehicle was a prototype constructed by Minicars.

**The vehicle did not contain a label stating certification data.

TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Michelin 185-14X

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 32 PSI
REAR: 32 PSI

SPARE TIRE (MFR., LINE, SIZE): NA

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: NA

MAXIMUM WIDTH: 72.3 INCHES

WHEELBASE: 106.0 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA: *

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL: *

RECOMMENDED TIRE SIZE:

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

DESIGNATED SEATING CAPACITY: ___FRONT ___REAR ___TOTAL

VEHICLE CAPACITY WEIGHT: _____ LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 29.1; RF 29.1; LR 28.8; RR 28.7

PRE-TEST ATTITUDE: LF 28.5; RF 28.4; LR 27.9; RR 27.6

POST-TEST ATTITUDE: LF 14.5; RF 28.5; LR 26.2; RR 28.0

*The vehicle did not contain a label stating tire and capacity data.

TEST VEHICLE INFORMATION CONT'D

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

RIGHT FRONT	617 LBS.	RIGHT REAR	716 LBS.
LEFT FRONT	602 LBS.	LEFT REAR	706 LBS.
TOTAL FRONT WEIGHT	1219 LBS.	(46.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1422 LBS.	(53.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT 2641 LBS.			
TARGET TEST WEIGHT = 3114 LBS *			

WEIGHT OF TEST VEHICLE:

RIGHT FRONT	723 LBS.	RIGHT REAR	861 LBS.
LEFT FRONT	693 LBS.	LEFT REAR	840 LBS.
TOTAL FRONT WEIGHT	1416 LBS.	(45.4% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1701 LBS.	(54.6% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3117 LBS.	(0.1% OVER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE: 325 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 57.8 INCHES REARWARD OF FRONT WHEEL CENTERLINE

*The target test weight was supplied by VRTC.

POST-IMPACT DATA

TEST NUMBER: 910701

TEST DATE: 07/01/91

TEST TIME: 1238

TEST TYPE: 50% left offset frontal

IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA:

86° F

IMPACT VELOCITY: PRIMARY = 49.8 MPH

SECONDARY = 50.0 MPH

(SPECIFIED RANGE = 49.5 to 50.5 MPH)

DISTANCE FROM BARRIER TO VEHICLE: ENTERING VELOCITY TRAP = 26.0 IN.

EXITING VELOCITY TRAP = 2.0 IN.

TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN INCHES):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 175.0; C 177.5; R 175.0

POST-TEST: L 133.2; C 124.6; R 149.8

TOTAL CRUSH: L 41.8; C 52.9; R 25.2

AVERAGE CRUSH: 40.0

POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #	PASSENGER #
HEAD	NA	NA
CHEST	NA	NA
ABDOMEN	NA	NA
LEFT KNEE	NA	NA
RIGHT KNEE	NA	NA

DOOR OPENING:

	LEFT	RIGHT
FRONT	Tools required	Easy
REAR	NA	NA

SEAT MOVEMENT: *

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	NA	None
REAR	NA	NA

GLAZING DAMAGE:

The entire windshield cracked upon impact.

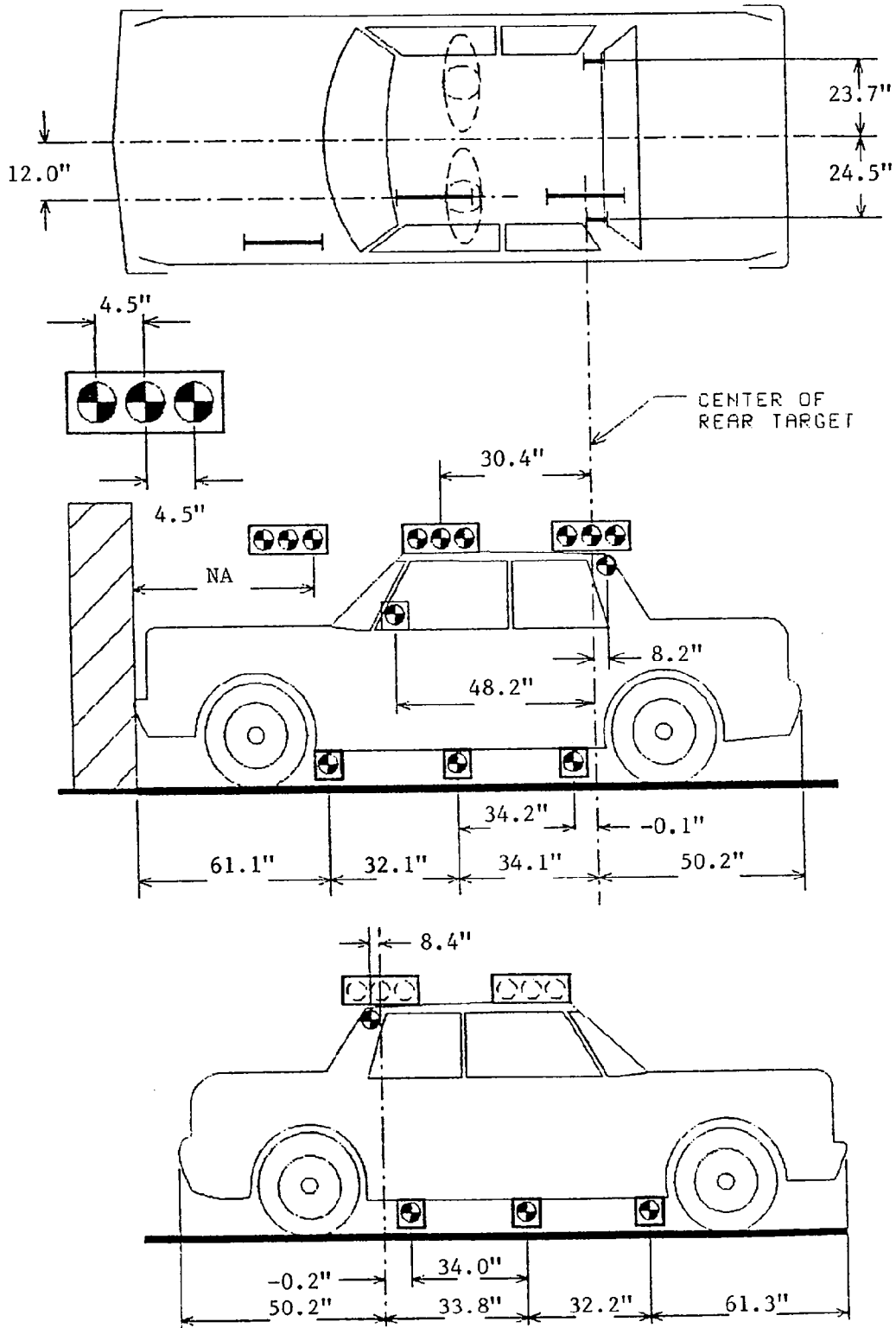
OTHER NOTABLE IMPACT EFFECTS:

The vehicle's hood came off on impact. The left

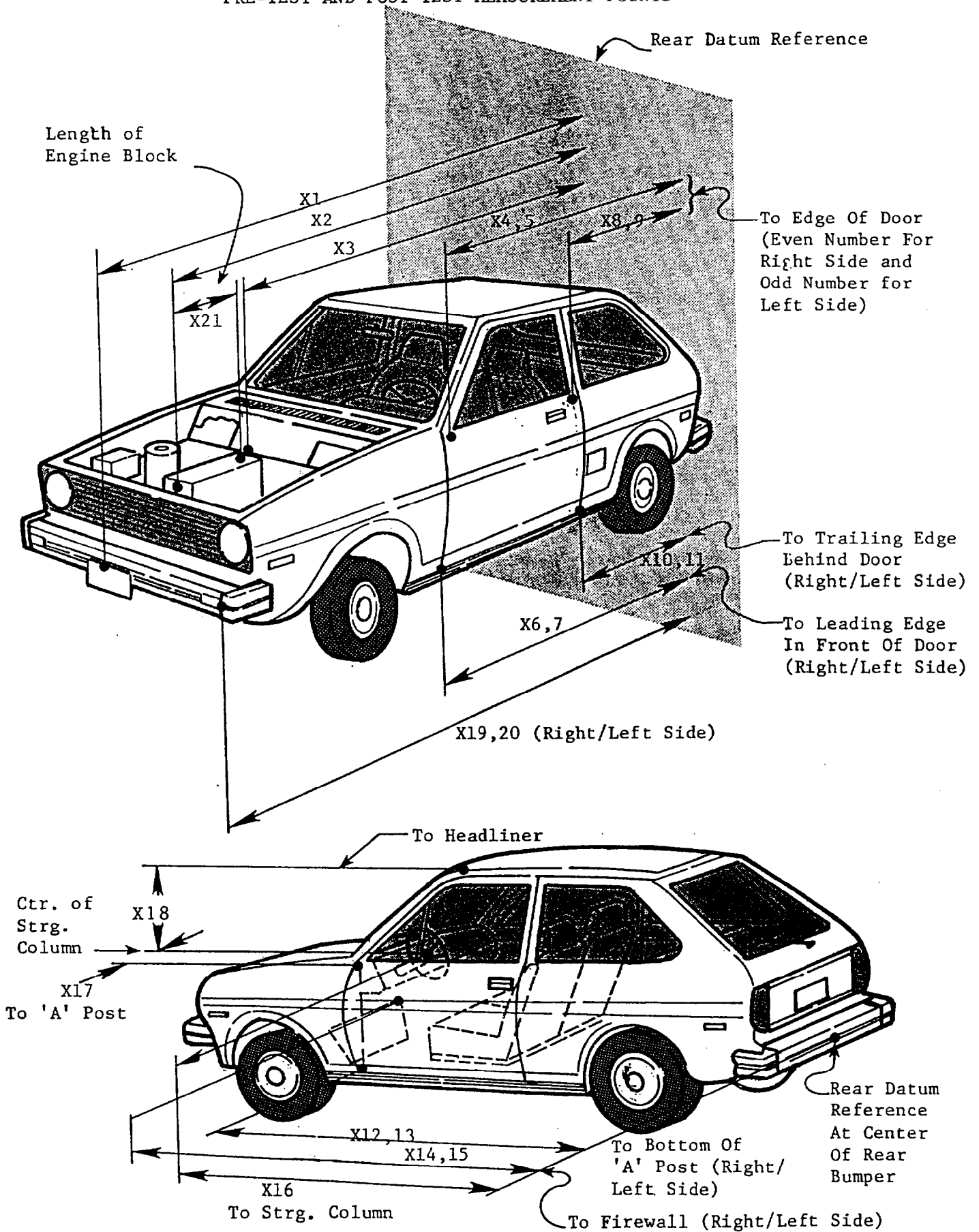
front tire was punctured on impact.

*The vehicle's driver seat and rear seat were removed for this test.

VEHICLE TARGET LOCATIONS



PRE-TEST AND POST-TEST MEASUREMENT POINTS



IMPACTED VEHICLE MEASUREMENTS

VEHICLE: Minicars/RSV

TEST NUMBER: 910701

NO.	TYPE OF MEASUREMENT	ALL MEASUREMENTS ARE IN INCHES		
		PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	177.5	124.6	52.9
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	34.2	34.2	0.0
X3	REAR SURFACE OF VEHICLE TO FIREWALL	125.1	119.0	6.1
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	113.0	113.0	0.0
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	113.0	111.5	1.5
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	113.0	112.8	0.2
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	113.1	100.0	13.1
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	48.6	49.0	-0.4
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	48.9	47.5	1.4
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	56.0	55.5	0.5
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	56.0	55.0	1.0
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	113.6	113.1	0.5
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	113.8	100.5	13.3
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	125.8	123.1	2.7
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	125.2	111.2	14.0
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	91.2	79.4	11.8
X17	CENTER OF STEERING COLUMN TO "A" POST	11.9	20.4	-8.5
X18	CENTER OF STEERING COLUMN TO HEADLINER	18.2	18.2	0.0
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	175.0	149.8	25.2
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	175.0	133.2	41.8
X21	LENGTH OF ENGINE BLOCK	16.0	16.0	0.0

ACCIDENT INVESTIGATION DIVISION DATA
FOR MPH FRONTAL BARRIER IMPACT

VEHICLE: Minicars RSV 3-door hatchback

VIN: A1035

MODEL YEAR: NA; BUILD DATE: NA; TEST DATE: 07/01/91

VEHICLE SIZE CATEGORY: NA; TEST WEIGHT: 3117 LBS.

VEHICLE WHEELBASE: 106.0 INCHES

MAXIMUM WIDTH: 72.3 INCHES

FRONT OVERHANG: NA INCHES

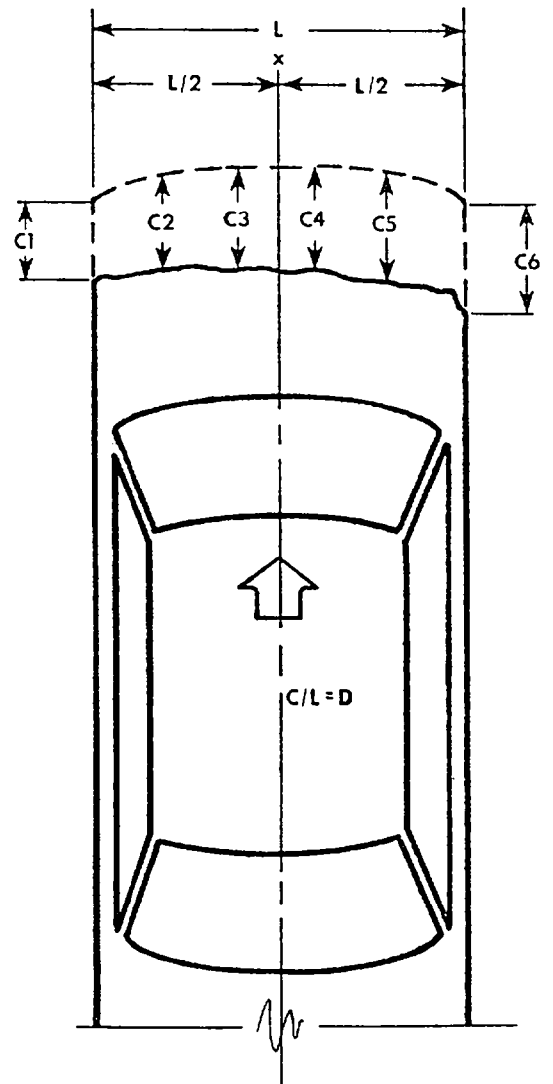
COLLISION DEFORMATION
CLASSIFICATION (CDC) CODE: 12FLEW5

CRUSH DEPTH
MEASUREMENTS:

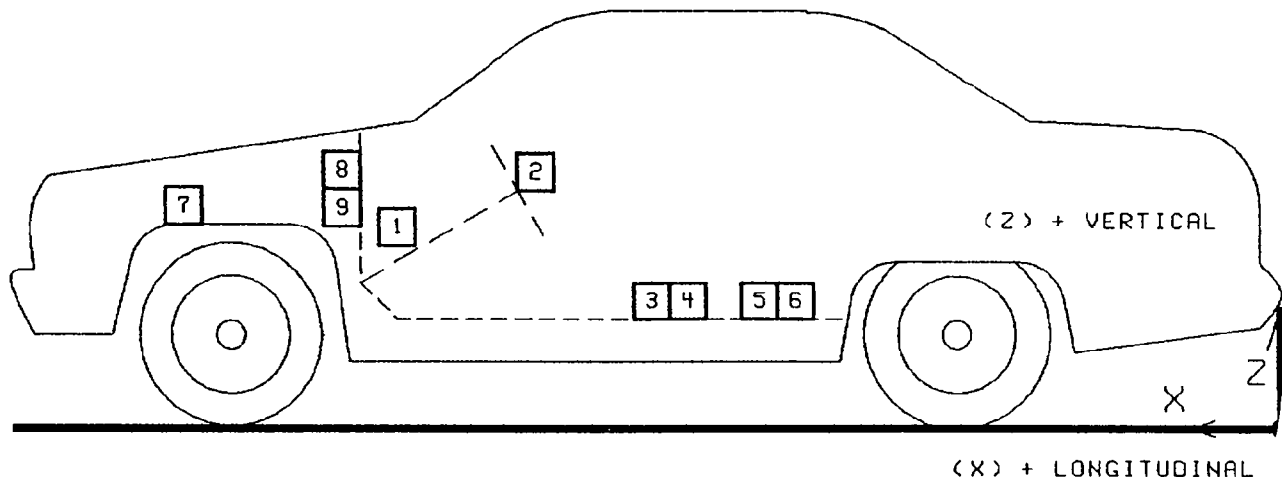
C1 =	<u>41.8</u>	INCHES
C2 =	<u>46.3</u>	INCHES
C3 =	<u>50.3</u>	INCHES
C4 =	<u>47.1</u>	INCHES
C5 =	<u>37.8</u>	INCHES
C6 =	<u>25.2</u>	INCHES

MIDPOINT OF DAMAGE: D = VEHICLE CENTERLINE
(LONGITUDINAL)

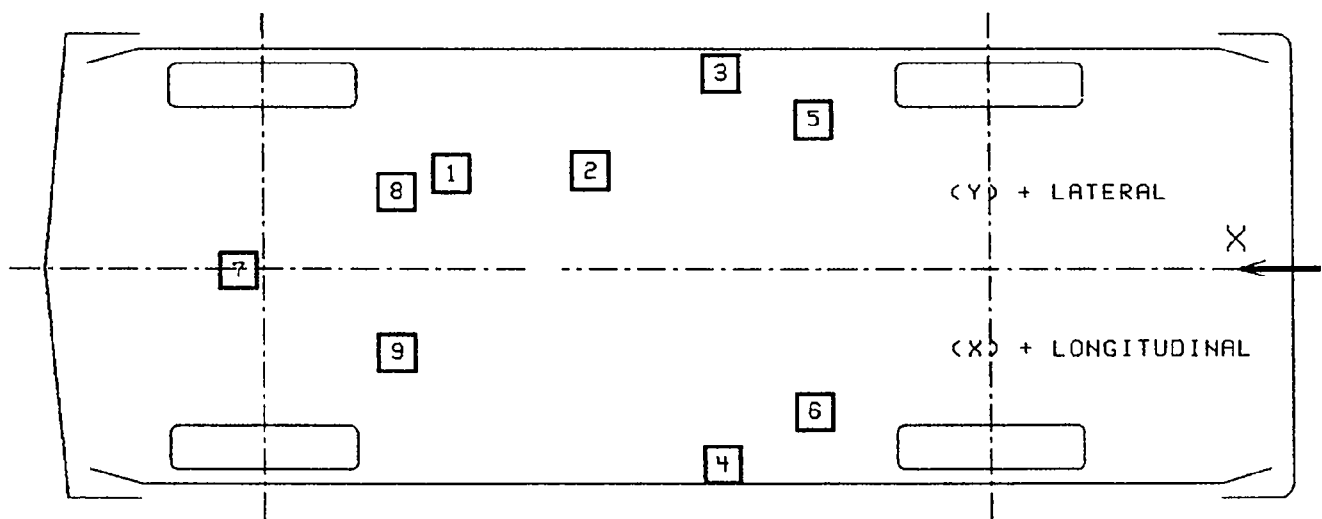
LENGTH OF DAMAGED
REGION: L = 50.0 INCHES



VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910701

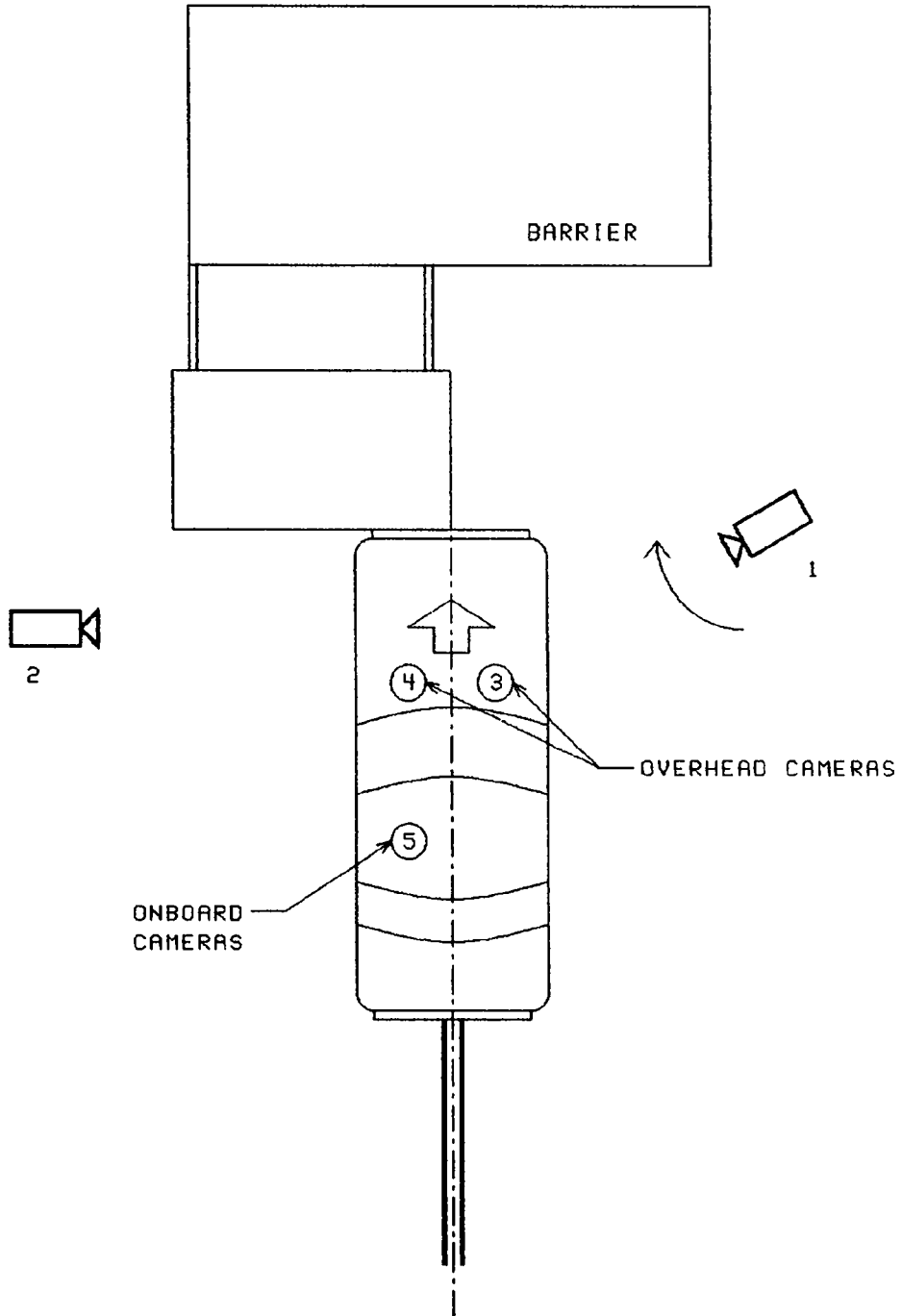
No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G	MSEC	MAX G	MSEC
1	STEERING COLUMN LOWER A-P AXIS	108.9	14.2	34.2	7.3	93.1	84.0	70.5
2	STEERING WHEEL HUB A-P AXIS	98.5	11.5	37.0	26.4	78.3	72.7	71.3
	L-R AXIS				25.9	67.1	46.1	88.9
	I-S AXIS				44.6	71.3	52.0	97.8
3	LEFT B-PILLAR SILL LONGITUDINAL	60.5	22.8	13.8	2.9	187.0	29.2	55.1
4	RIGHT B-PILLAR SILL LONGITUDINAL	61.4	-22.6	8.0	1.8	229.0	25.3	63.5
	LATERAL				2.7	72.6	10.3	44.1
5	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL	56.8	20.6	13.8	1.9	223.0	27.1	55.1
	LATERAL				3.3	72.9	6.8	44.4
6	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL	57.2	-20.3	14.0	1.9	244.1	32.0	85.3
	LATERAL				3.4	127.5	7.1	86.1
7	ENGINE BLOCK LONGITUDINAL	28.3	-1.0	25.2	3.2	231.8	26.5	72.0
8	LEFT FIREWALL LONGITUDINAL	120.2	17.0	22.2	---	---	Y	---
9	RIGHT FIREWALL LONGITUDINAL	121.2	-13.8	23.2	3.1	290.9	91.3	64.1

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

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

Y See TEST ANOMALIES

CAMERA POSITIONS



CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right panning	Photosonic 1B	13	24	Vehicle dynamics
2	Left wide	Photosonic 1B	13	496	Impact overall
3	Overhead wide	Photosonic 1B	8.5	500	Impact overall
4	Overhead tight	Photosonic 1B	17	501	Impact close-up
5	Onboard	Photosonic 1B	8.5	500	Interior deformation

TEST ANOMALIES

The left firewall X-axis accelerometer data, FWLXG1, was lost at approximately 34 milliseconds due to the accelerometer cable being damaged by the vehicle's crush during impact.

APPENDIX A

PHOTOGRAPHS

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Figure A-1. PRE-TEST FRONT VIEW

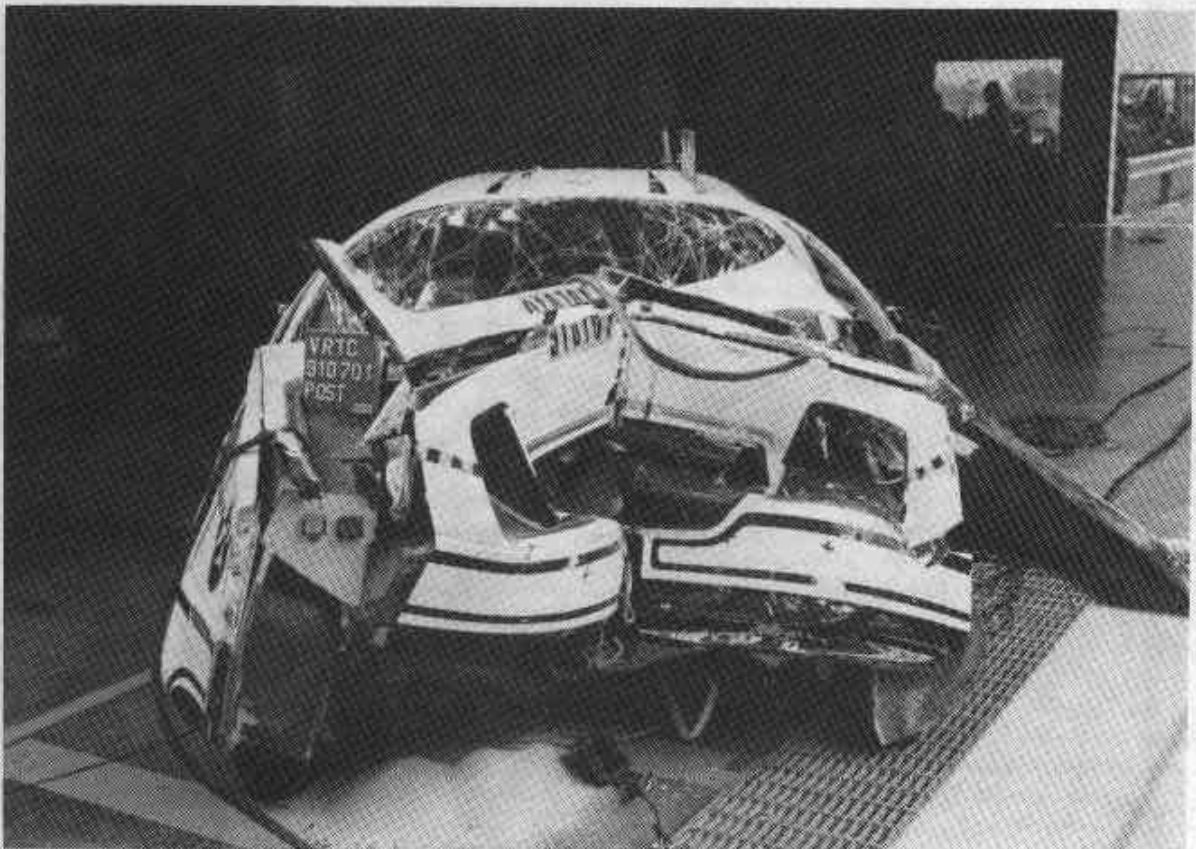


Figure A-2. POST-TEST FRONT VIEW

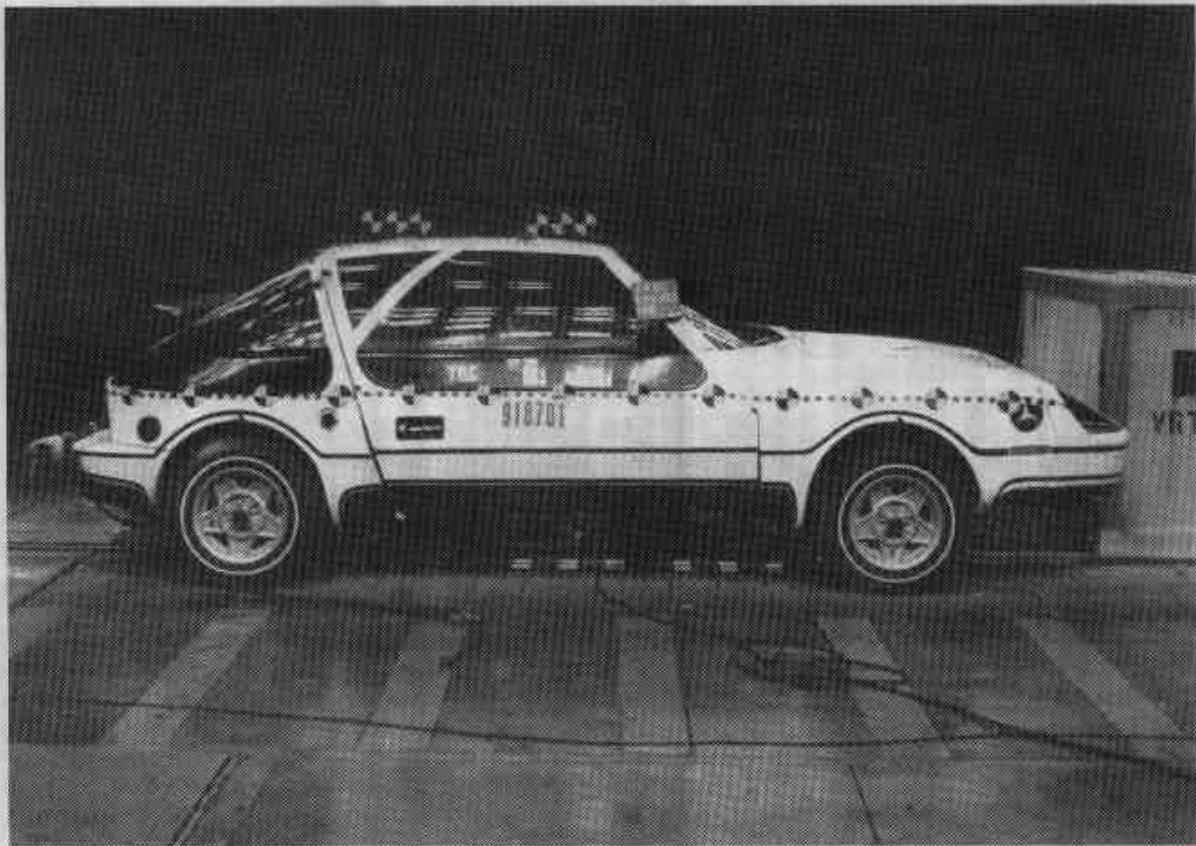


Figure A-3. PRE-TEST RIGHT SIDE VIEW



Figure A-4. POST-TEST RIGHT SIDE VIEW



Figure A-5. PRE-TEST REAR VIEW



Figure A-6. POST-TEST REAR VIEW



Figure A-7. PRE-TEST LEFT SIDE VIEW



Figure A-8. POST-TEST LEFT SIDE VIEW



Figure A-9. PRE-TEST RIGHT FRONT VIEW



Figure A-10. POST-TEST RIGHT FRONT VIEW

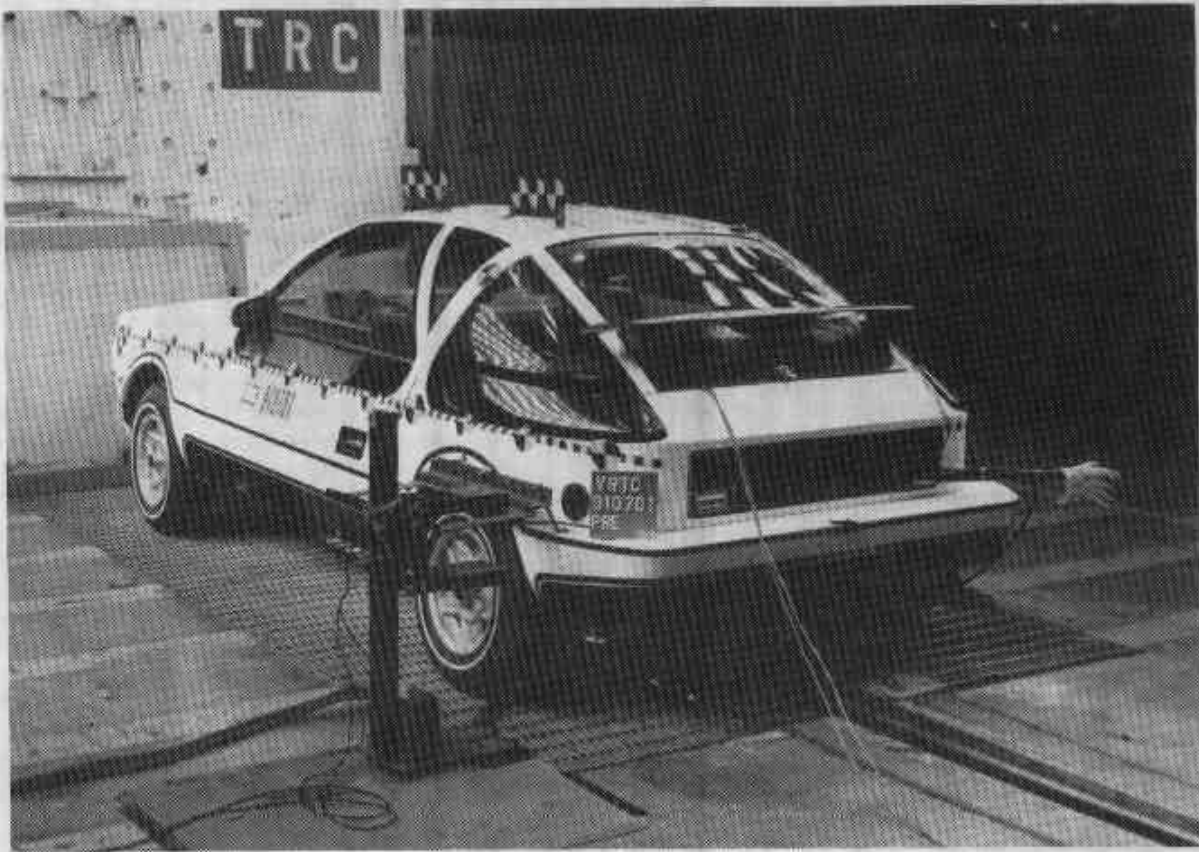


Figure A-11. PRE-TEST LEFT REAR VIEW



Figure A-12. POST-TEST LEFT REAR VIEW



Figure A-13. PRE-TEST CARGO AREA VIEW



Figure A-14. POST-TEST CARGO AREA VIEW

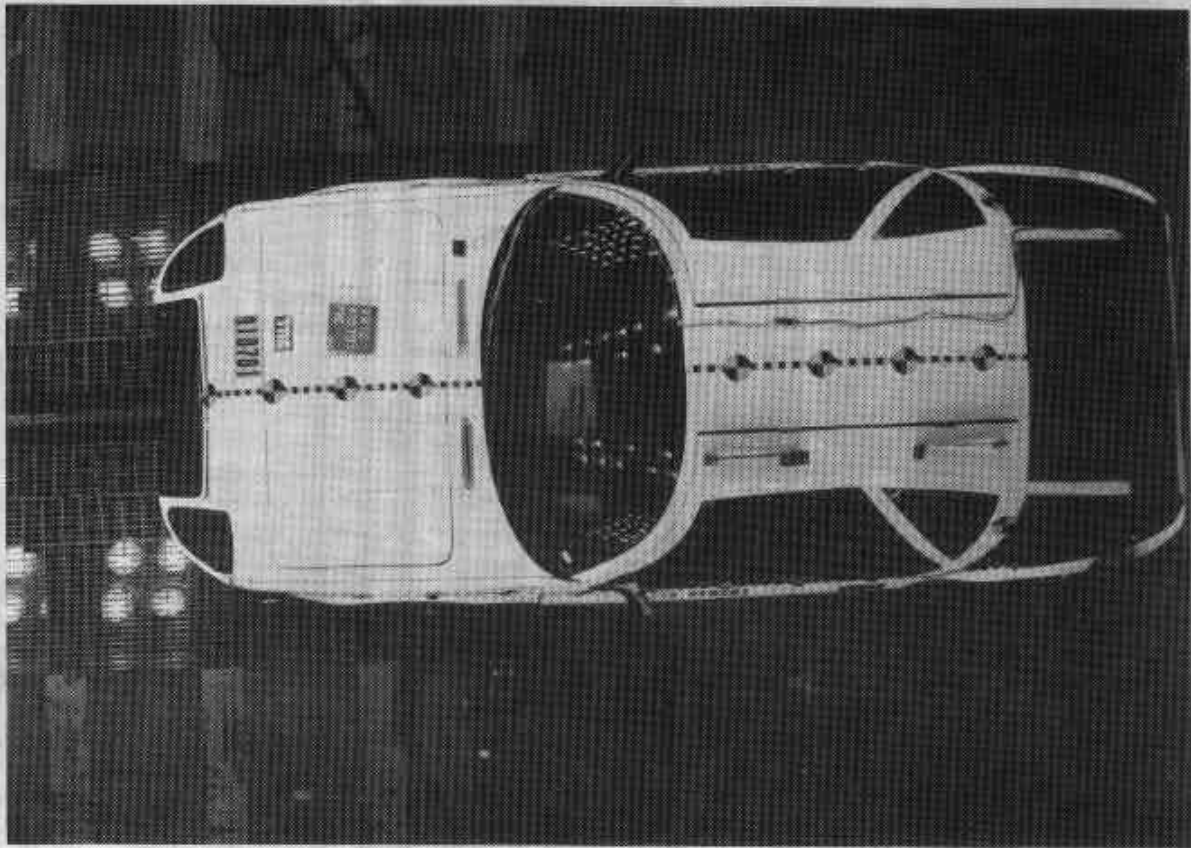


Figure A-15. PRE-TEST OVERHEAD VIEW

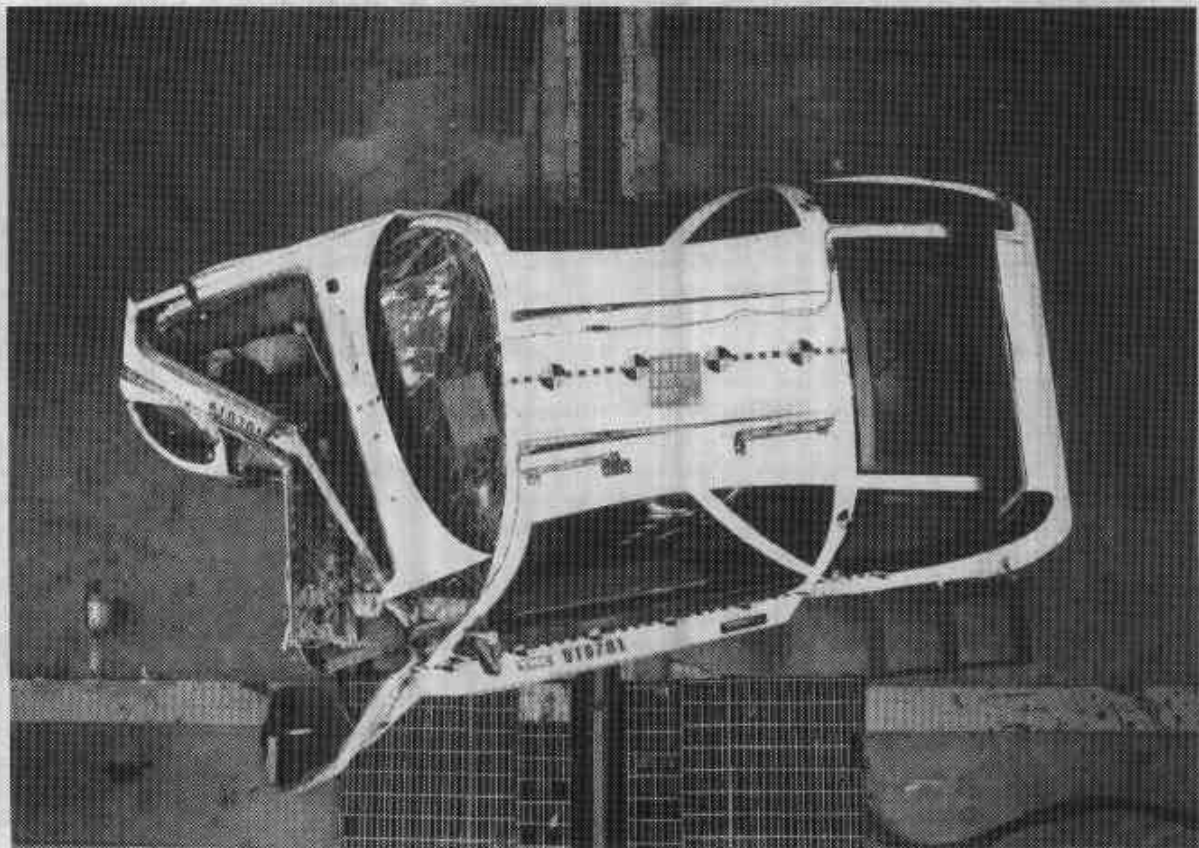


Figure A-16. POST-TEST OVERHEAD VIEW

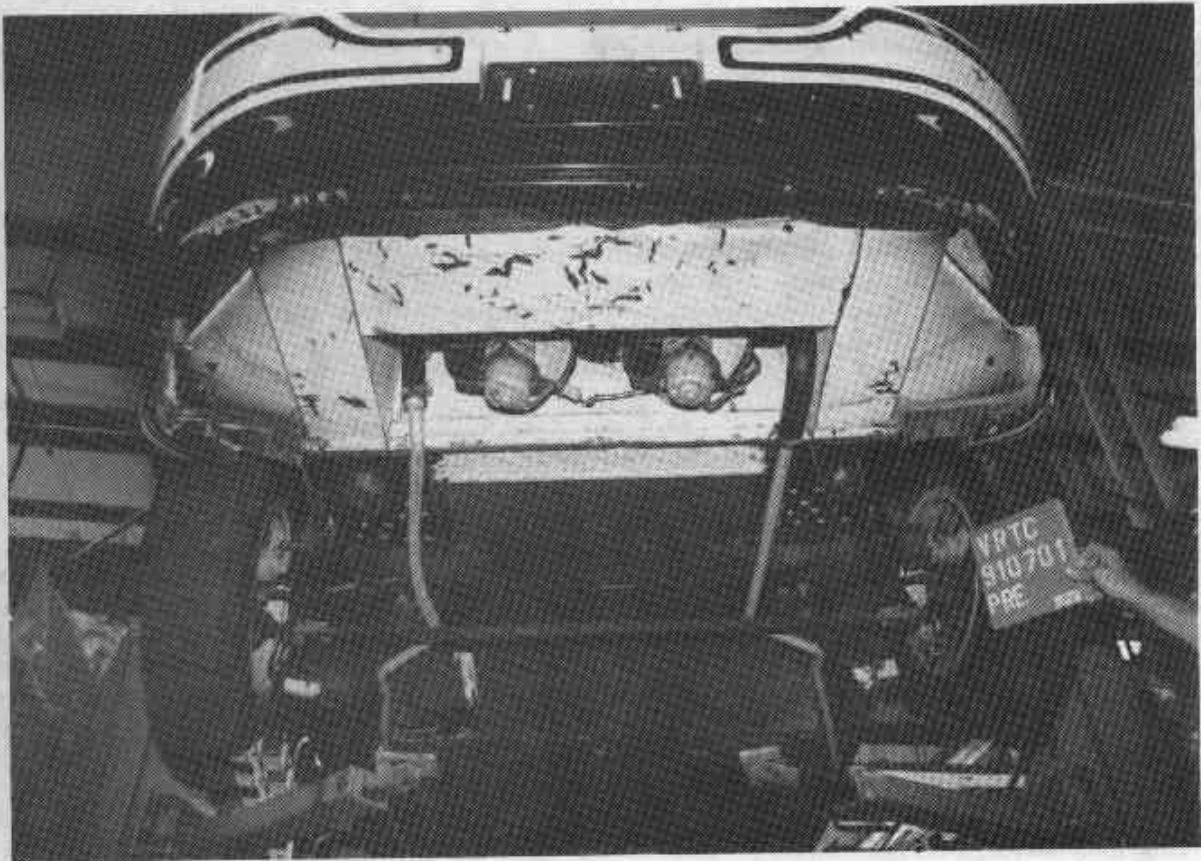


Figure A-17. PRE-TEST FRONT UNDERBODY VIEW

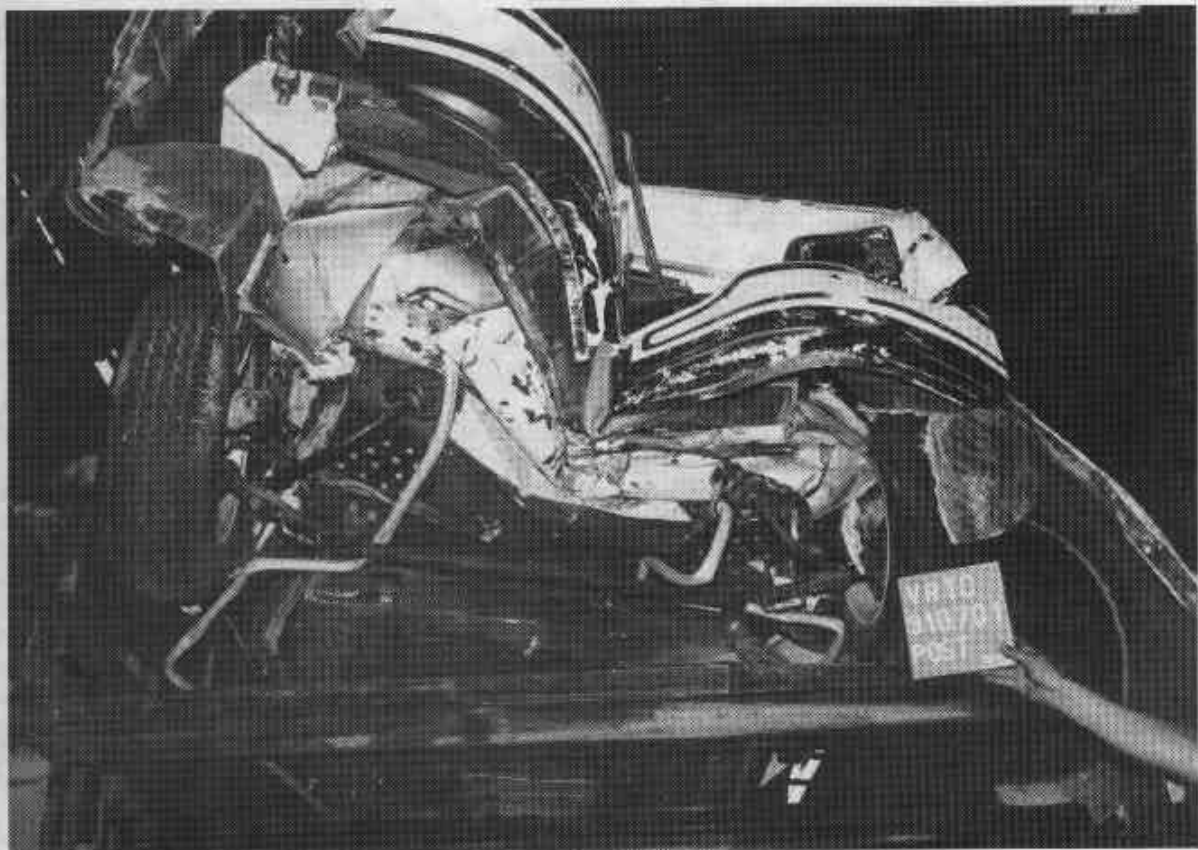


Figure A-18. POST-TEST FRONT UNDERBODY VIEW

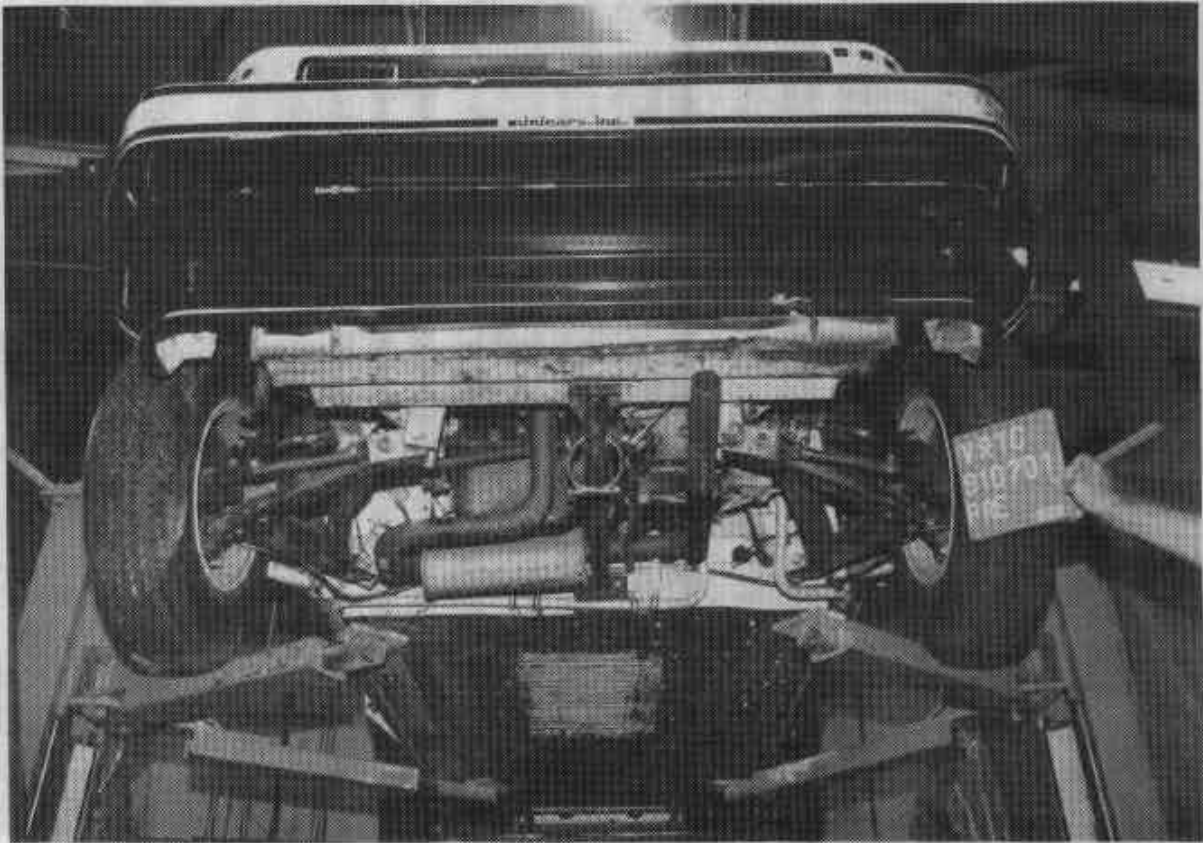


Figure A-19. PRE-TEST REAR UNDERBODY VIEW

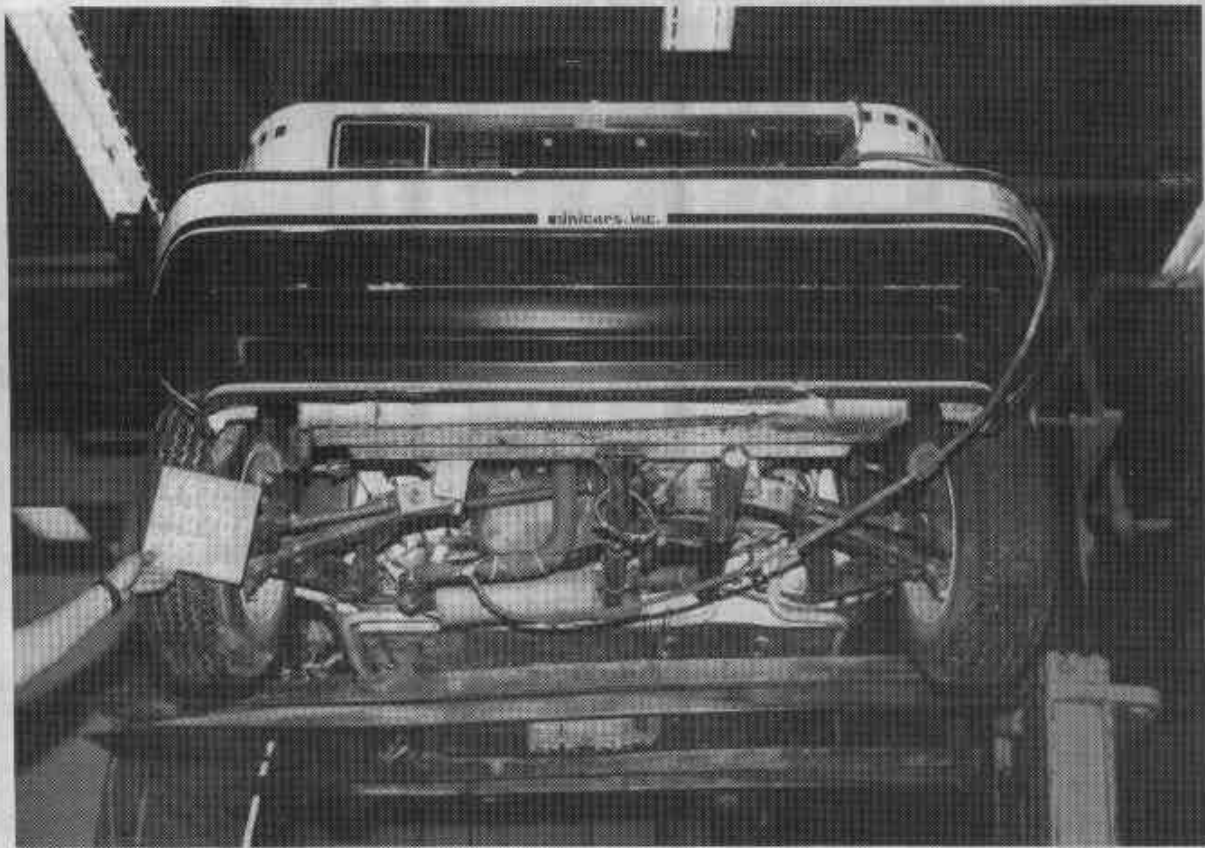


Figure A-20. POST-TEST REAR UNDERBODY VIEW

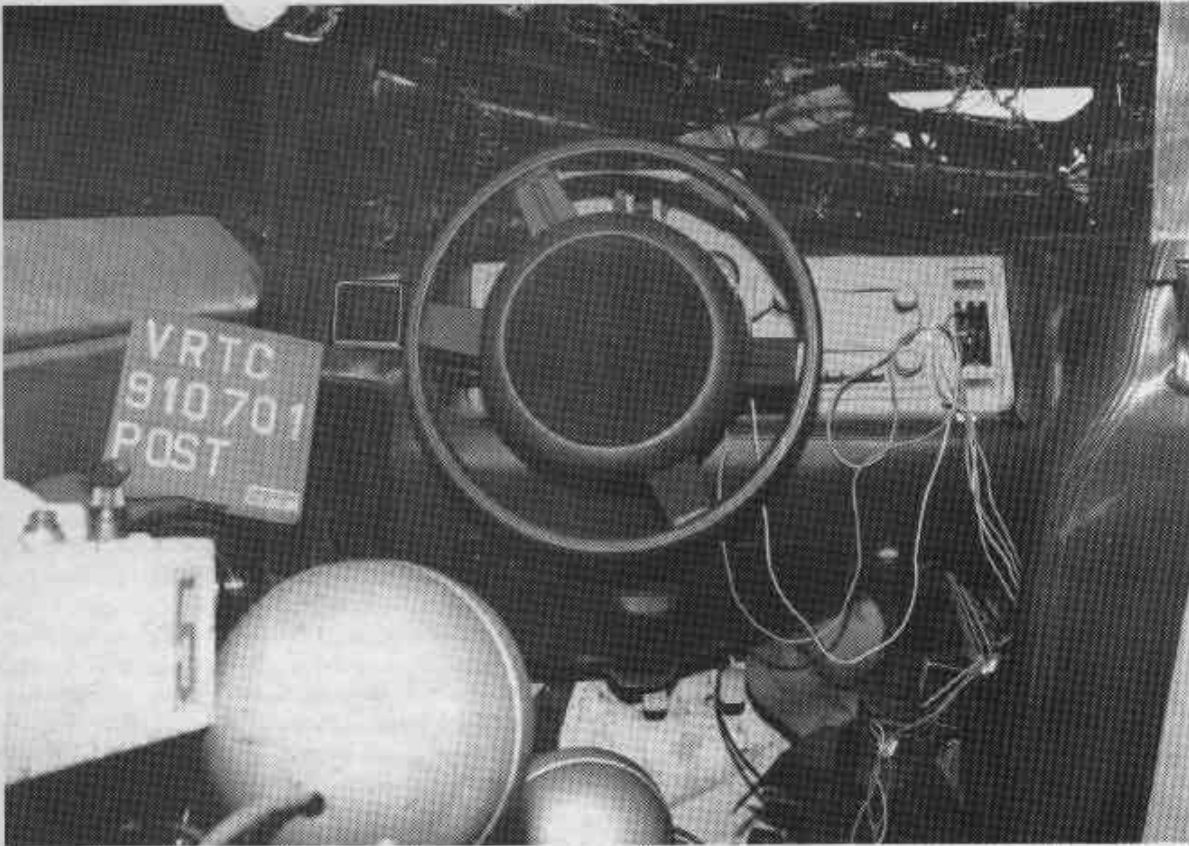


Figure A-21. POST-TEST INTERIOR VIEW

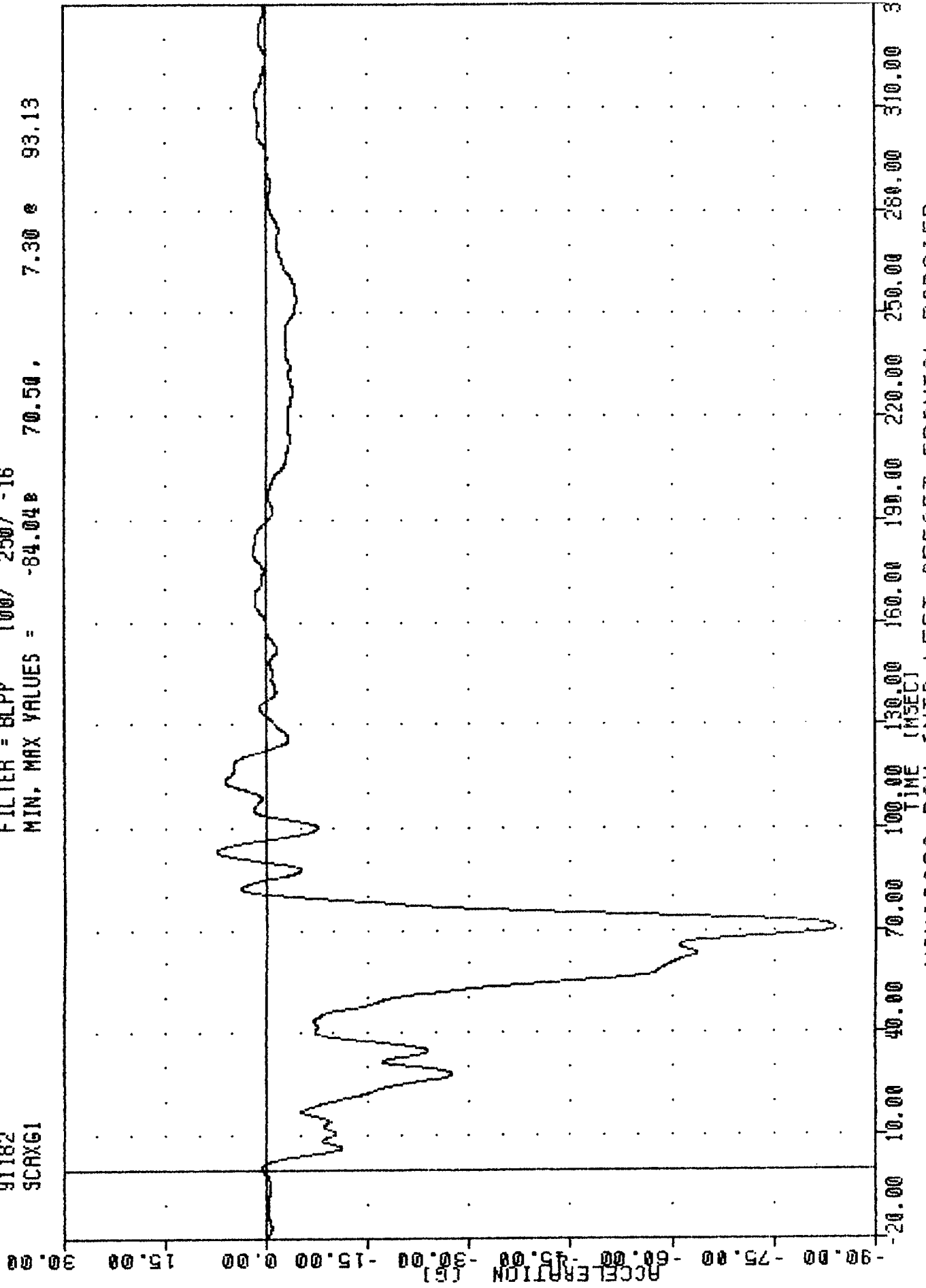
APPENDIX B

DATA PLOT PRESENTATION

OFFSET BARRIER IMPACT

91182
SCAXG1

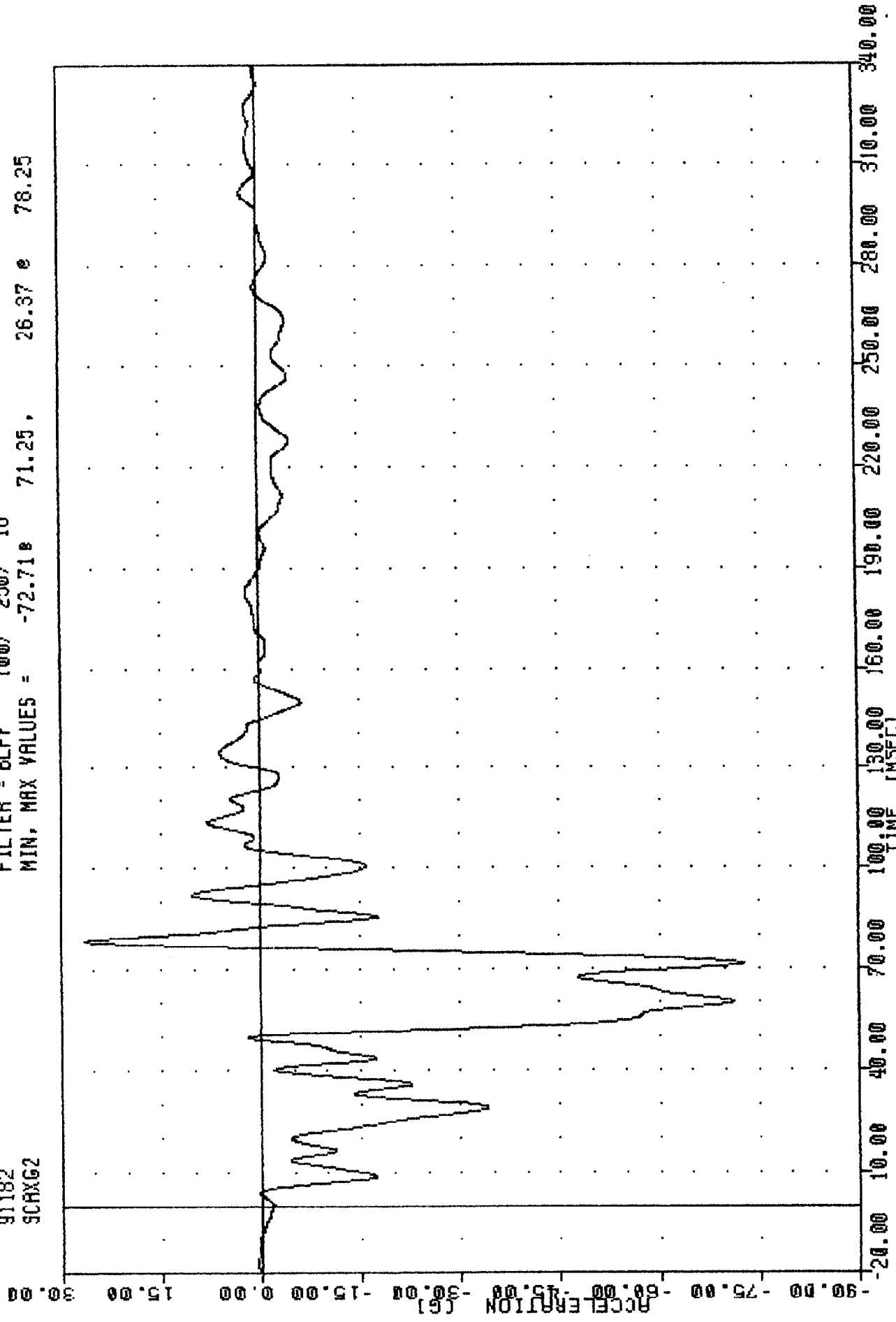
FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -84.048 70.50 . 7.30 e 93.13



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
STEERING COLUMN LOWER A-P AXIS ACCELERATION

VRTC , 910701
OFFSET BARRIER IMPACT
91182
SCRXG2

FILTER = BLPP 100/ 250/ -16
MIN, MAX VALUES = -72.71 71.25 26.37 78.25



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
STEERING WHEEL HUB A-P AXIS ACCELERATION

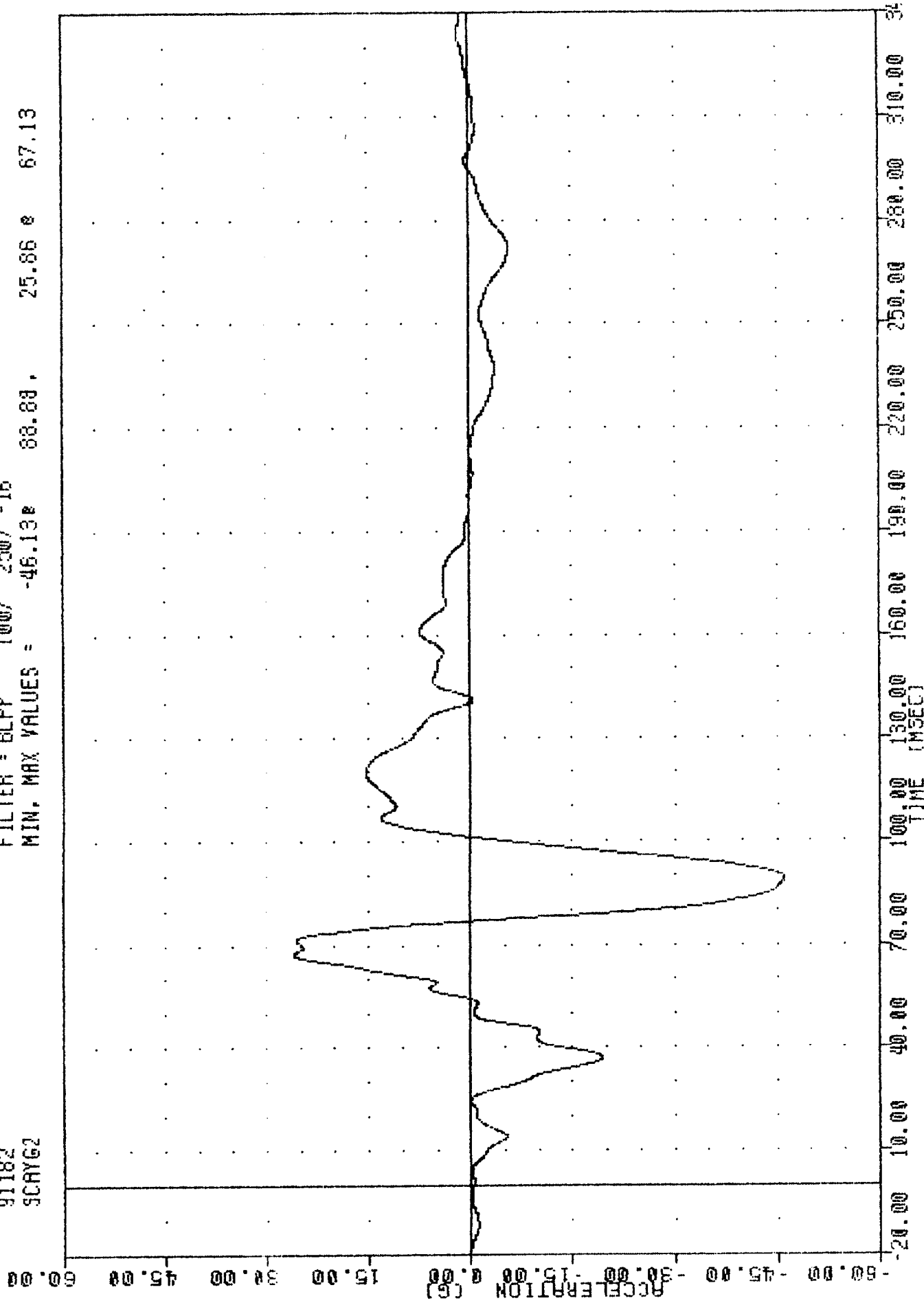
OFFSET BARRIER IMPACT

91182

SCRYG2

FILTER = BLPP 100/ 250/ -16

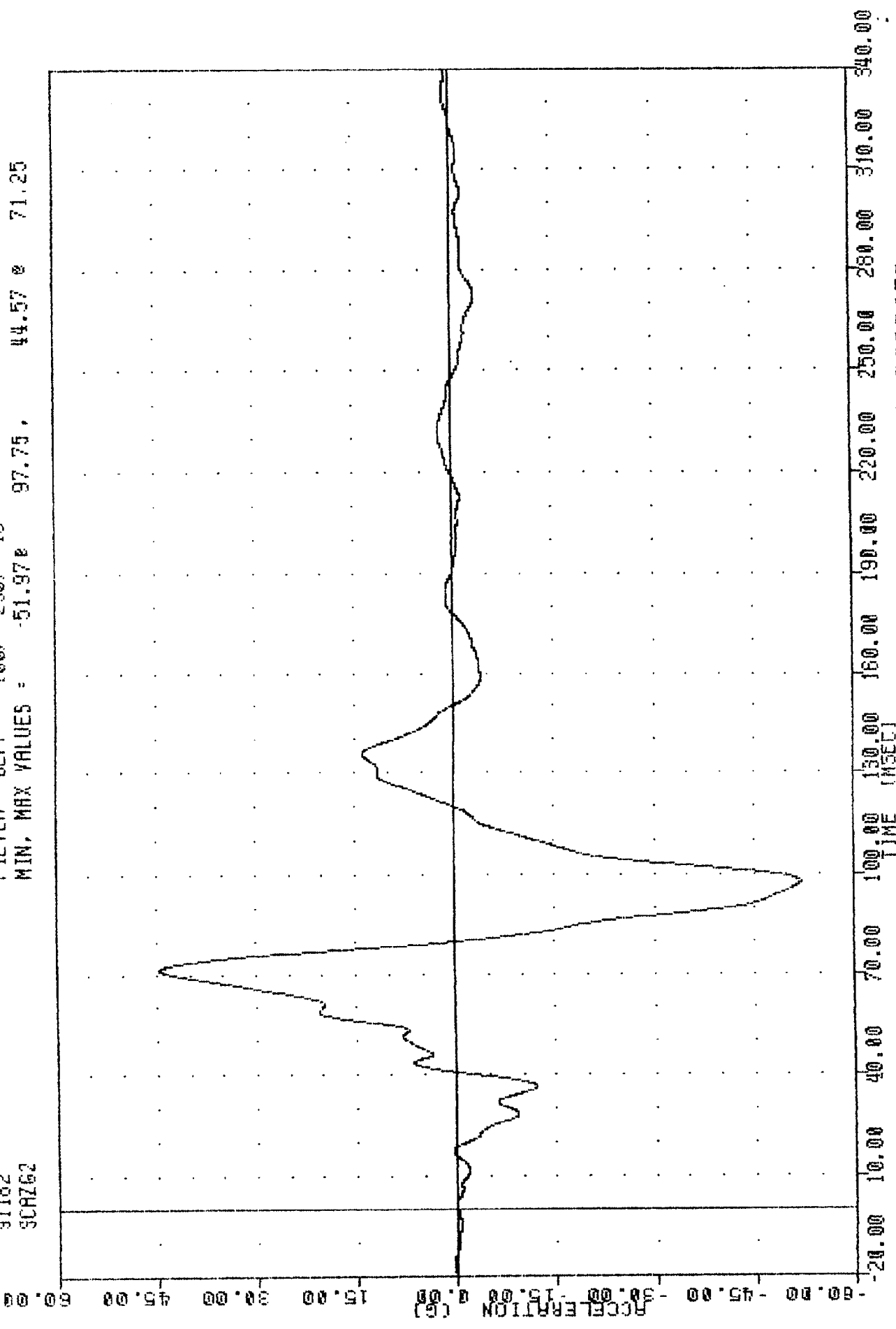
MIN. MAX VALUES = -46.13e 68.88, 25.86 e 67.13



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
STEERING WHEEL HUB L-R AXIS ACCELERATION

VRTC
OFFSET BARRIER IMPACT
91182
304262

FILTER = 6LPP 100/ 250/ -16
MIN, MAX VALUES = -51.97e 97.75, 44.57e 71.25



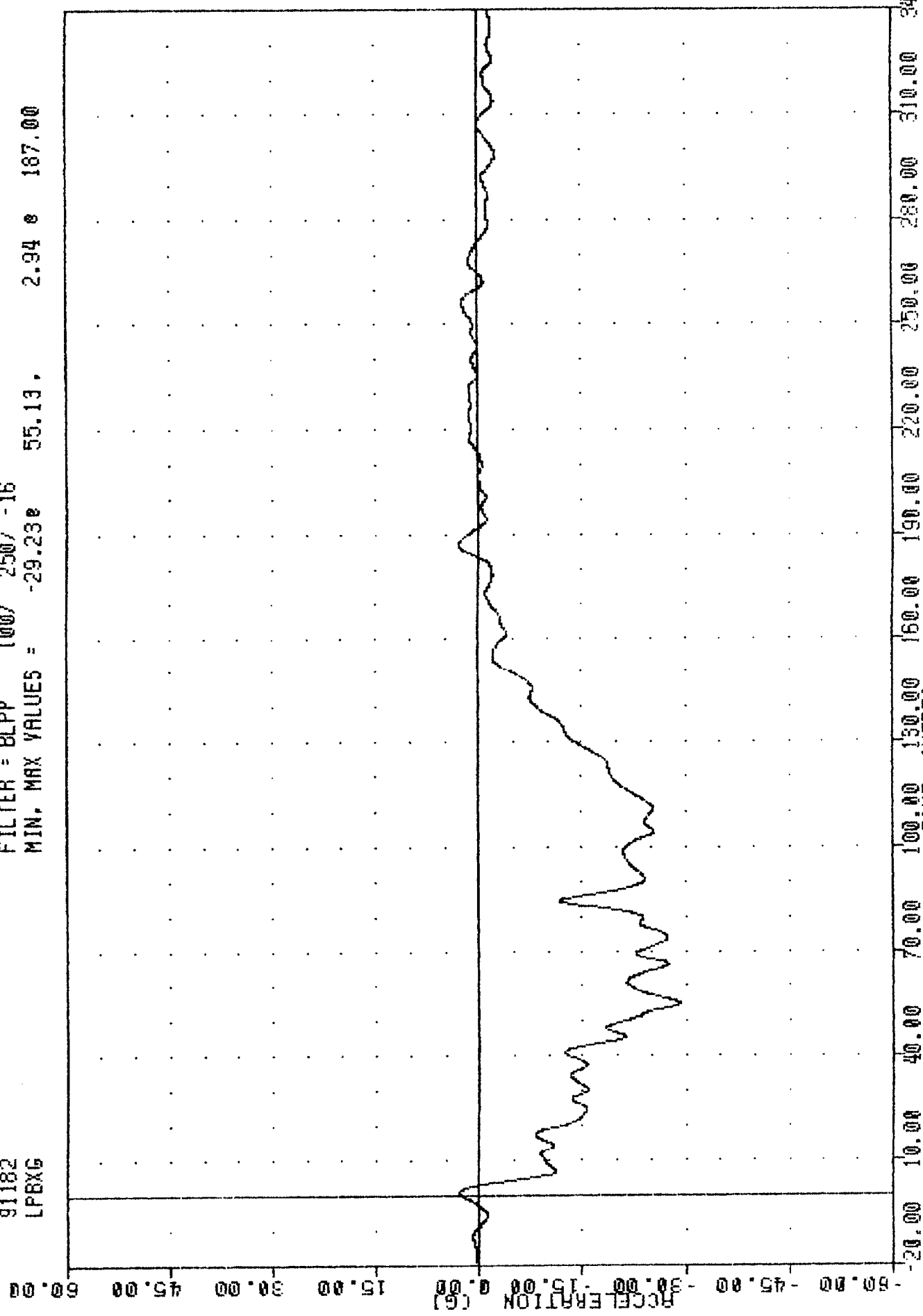
MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
STEERING WHEEL HUB I-S AXIS ACCELERATION

OFFSET BARRIER IMPACT

91182
LPBXG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -29.23e 55.13.

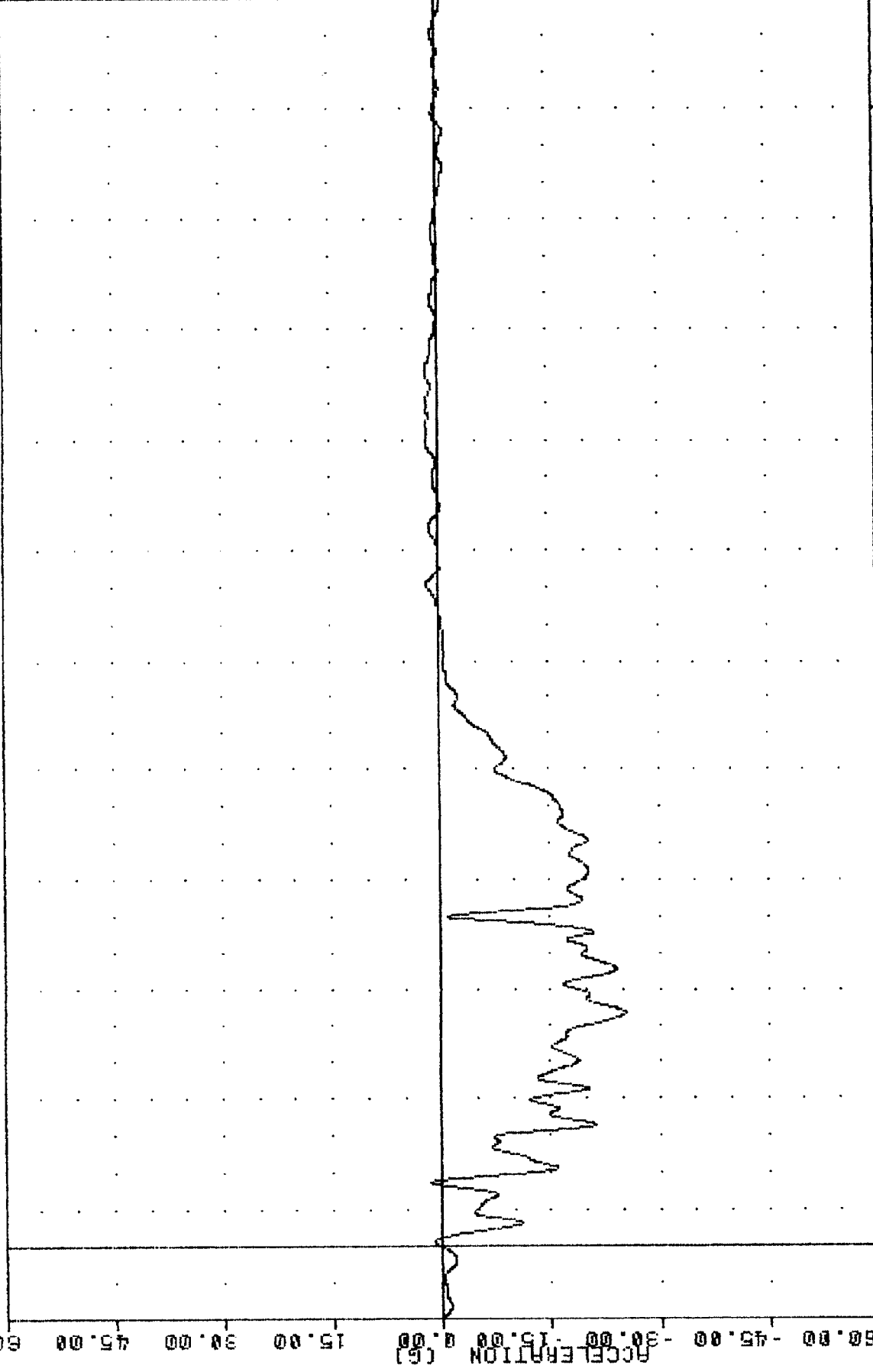
2.94 e 187.00



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
LEFT B-PILLAR X-AXIS ACCELERATION

VRTC , 910701
OFFSET BARRIER IMPACT
91182
RPBXG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -25.27% 63.50, 1.76 @ 229.00



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
RIGHT B-PILLAR X-AXIS ACCELERATION

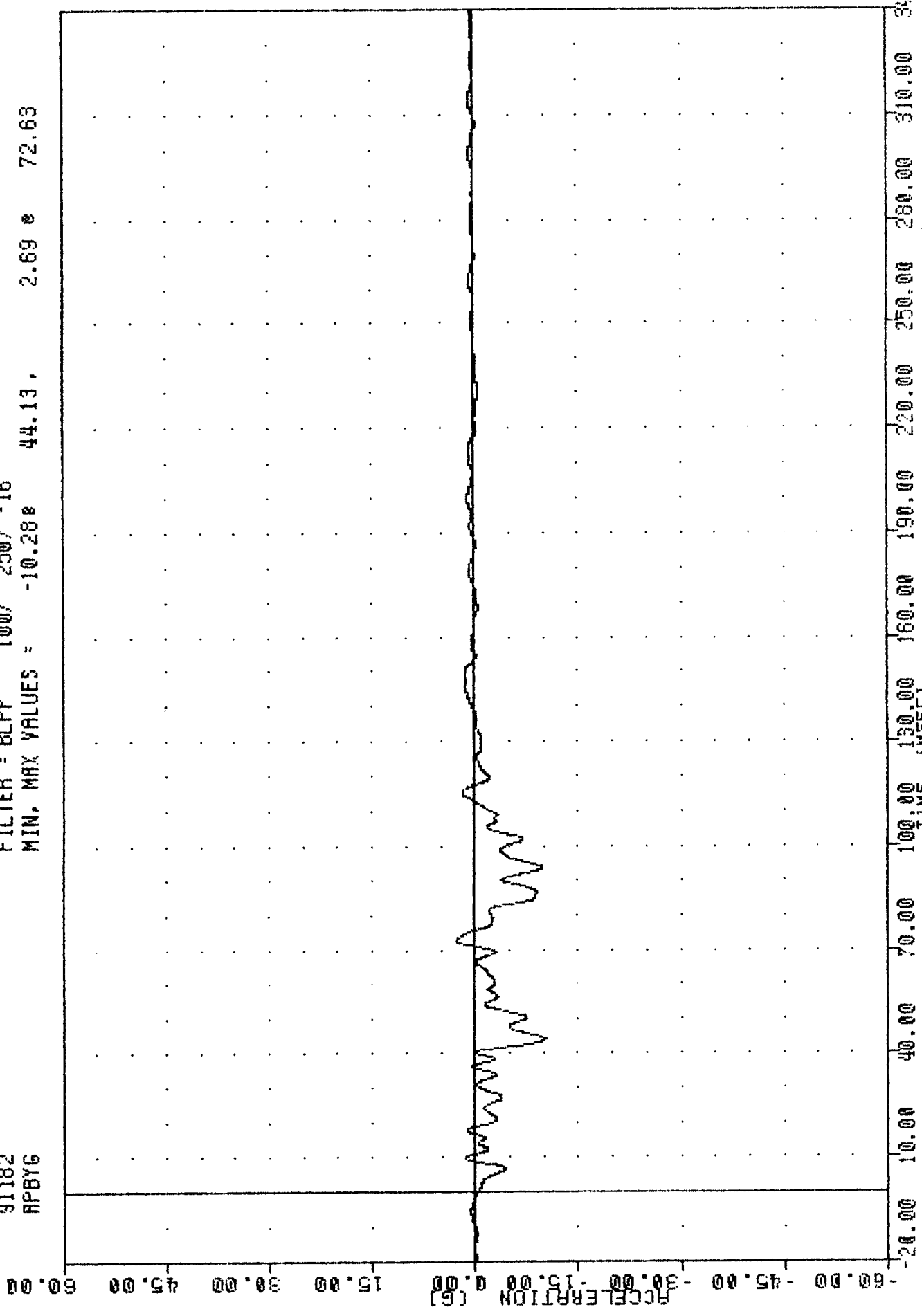
OFFSET BARRIER IMPACT

91182

RPBYG

FILTER = BLPP 100/ 250/ -16

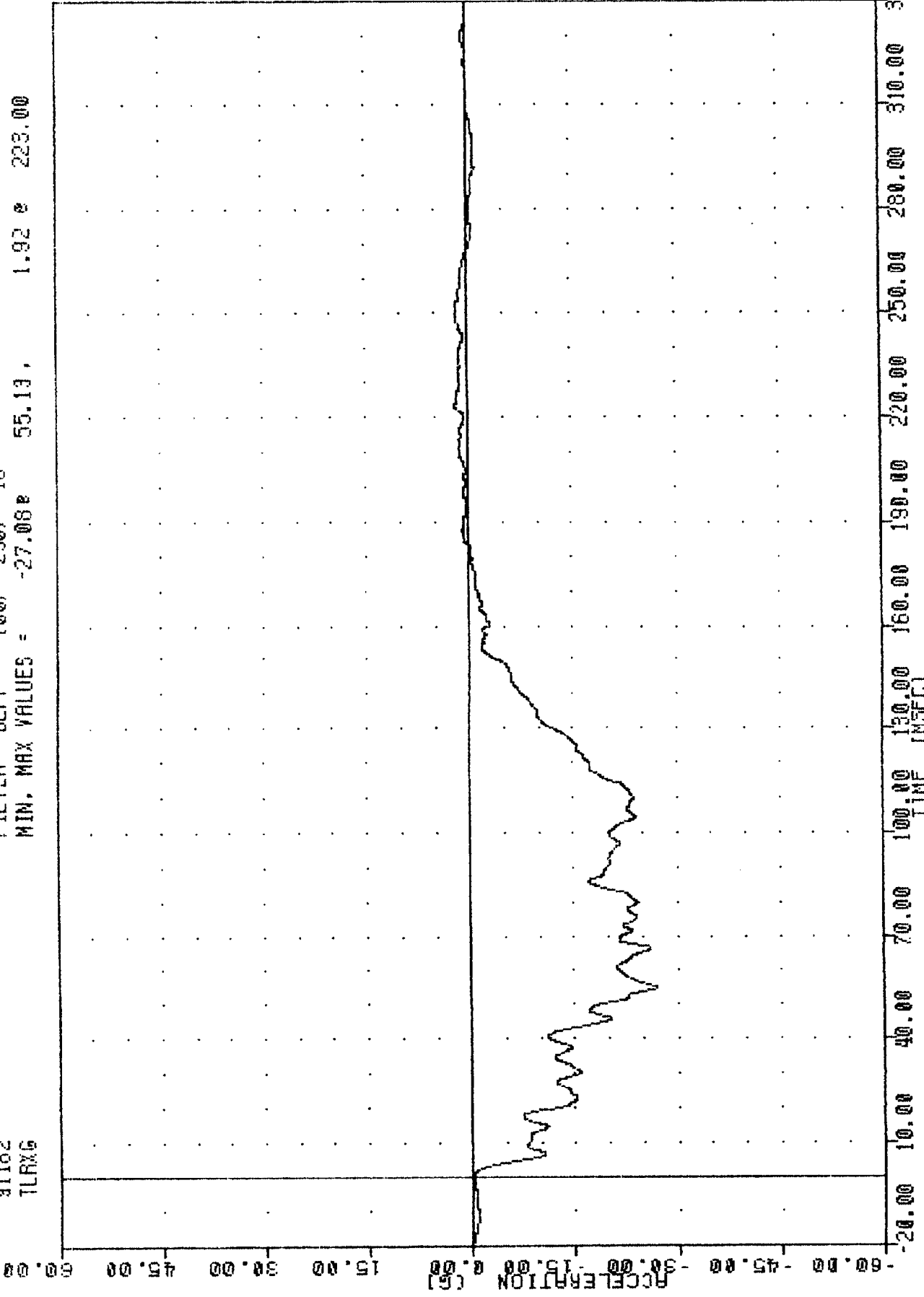
MIN. MAX VALUES = -10.28e 44.13, 2.69 e 72.63



MINICARS RSY INTO LEFT OFFSET FRONTAL BARRIER
RIGHT B-PILLAR Y-AXIS ACCELERATION

VRTC 910701
OFFSET BARRIER IMPACT
91182
TLRXG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -27.08 e 55.13 , 1.92 e 223.00



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
LEFT, REAR SEAT CROSSMEMBER X-AXIS ACCELERATION

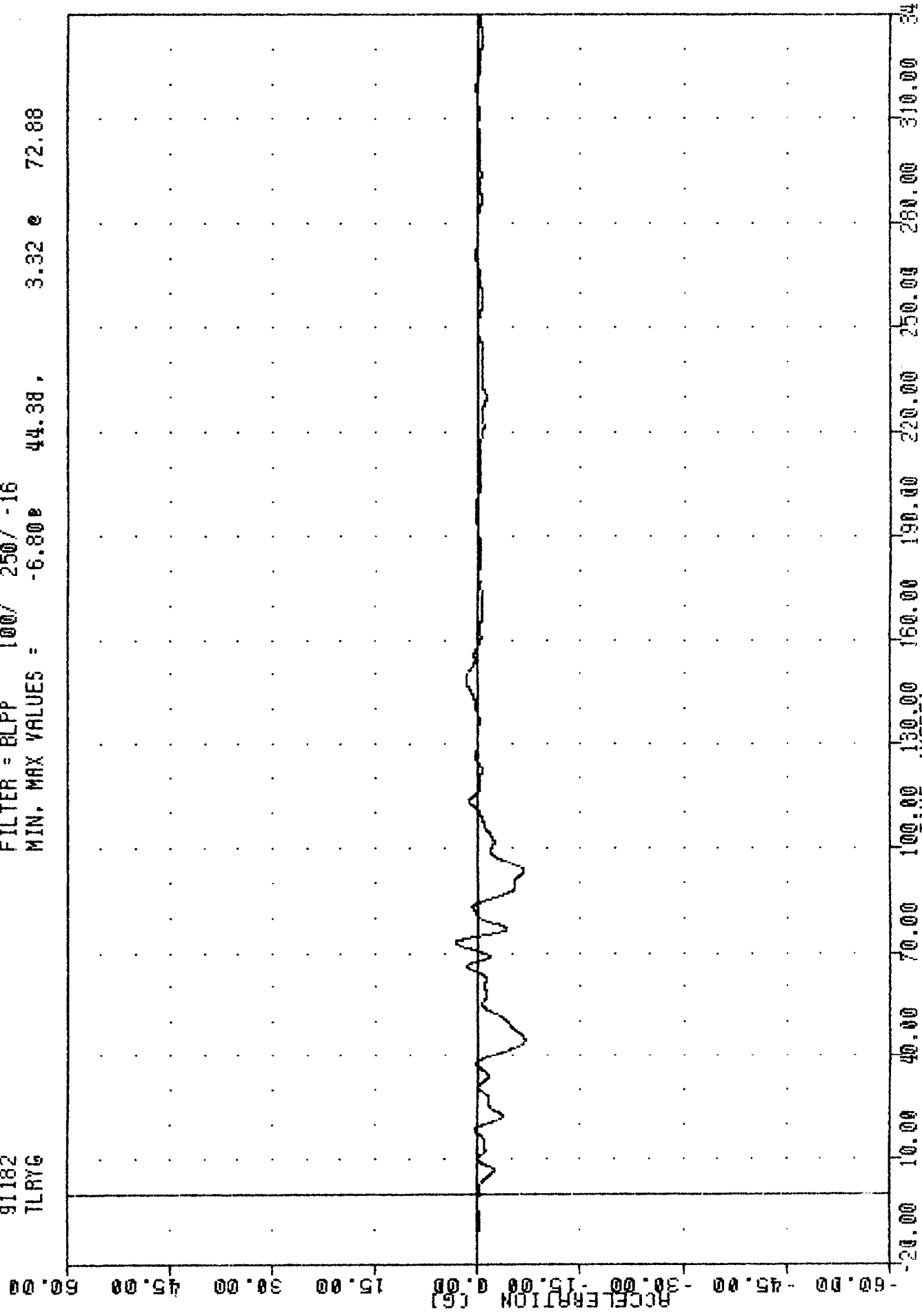
OFFSET BARRIER IMPACT

91182

TLRYG

FILTER = BLPP 100/ 250/ -16

MIN. MAX VALUES = -6.80e 44.38, 3.32 e 72.88



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
LEFT REAR SEAT CROSSMEMBER Y-AXIS ACCELERATION

TRUCK

OFFSET BARRIER IMPACT

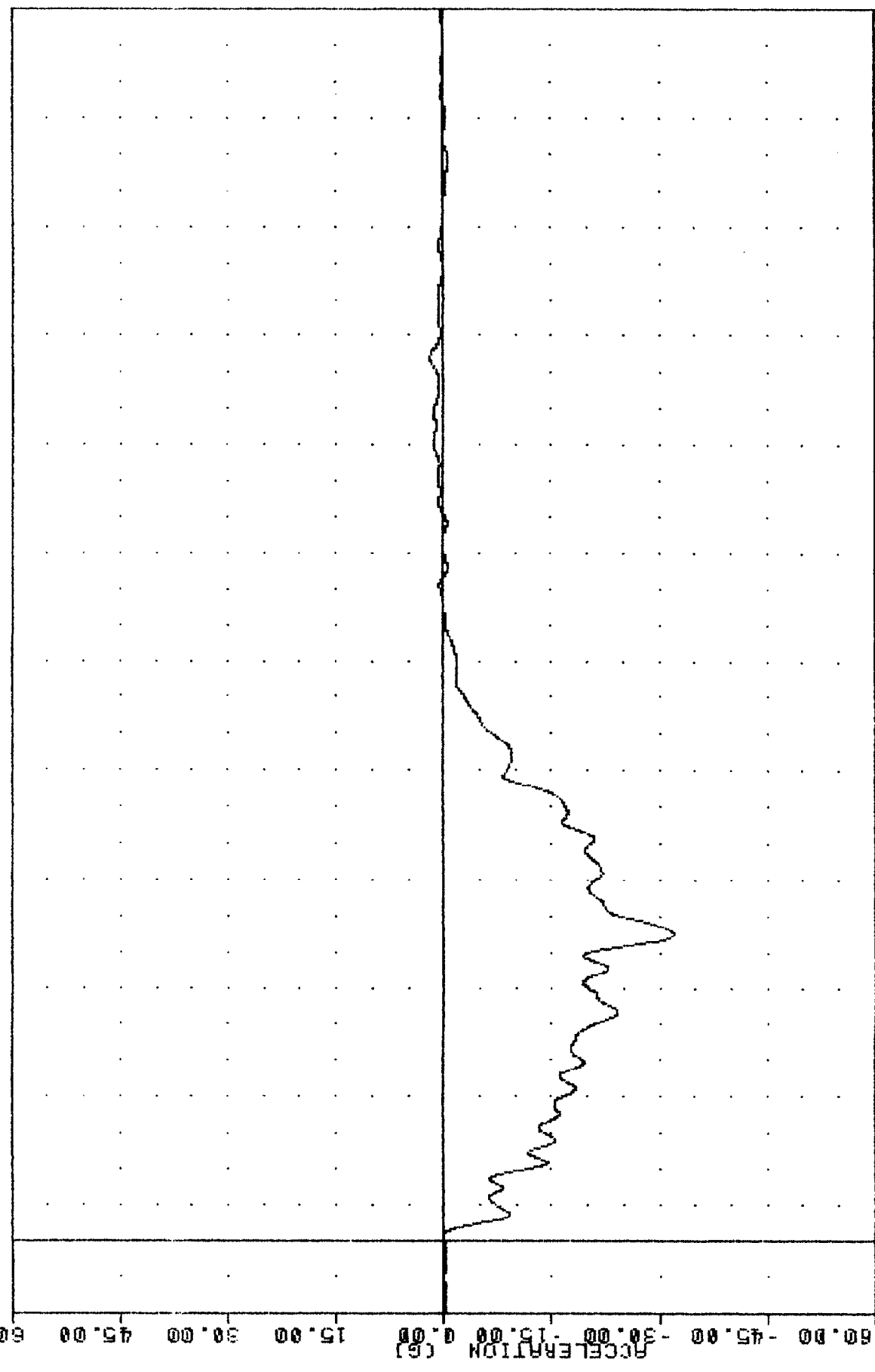
91182

TRXG

FILTER = BLPP 100/ 250/ -16

MIN, MAX VALUES = -31.98 85.25

1.88 244.13



ACCELERATION (G) TIME (MSEC)

MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
RIGHT REAR SEAT CROSSMEMBER X-AXIS ACCELERATION

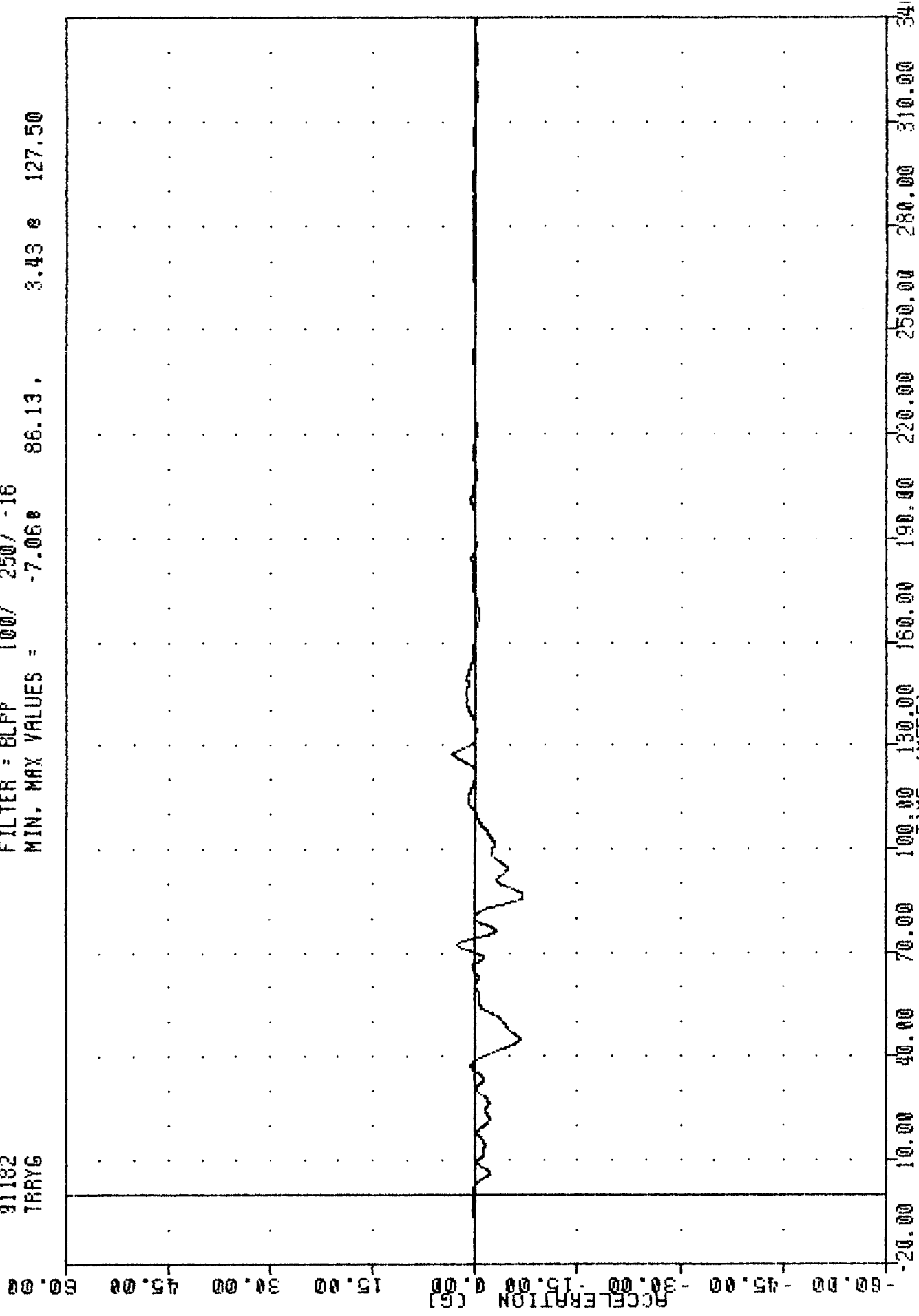
OFFSET BARRIER IMPACT

91182

TRAYG

FILTER = BLPP 100/ 250/ -16

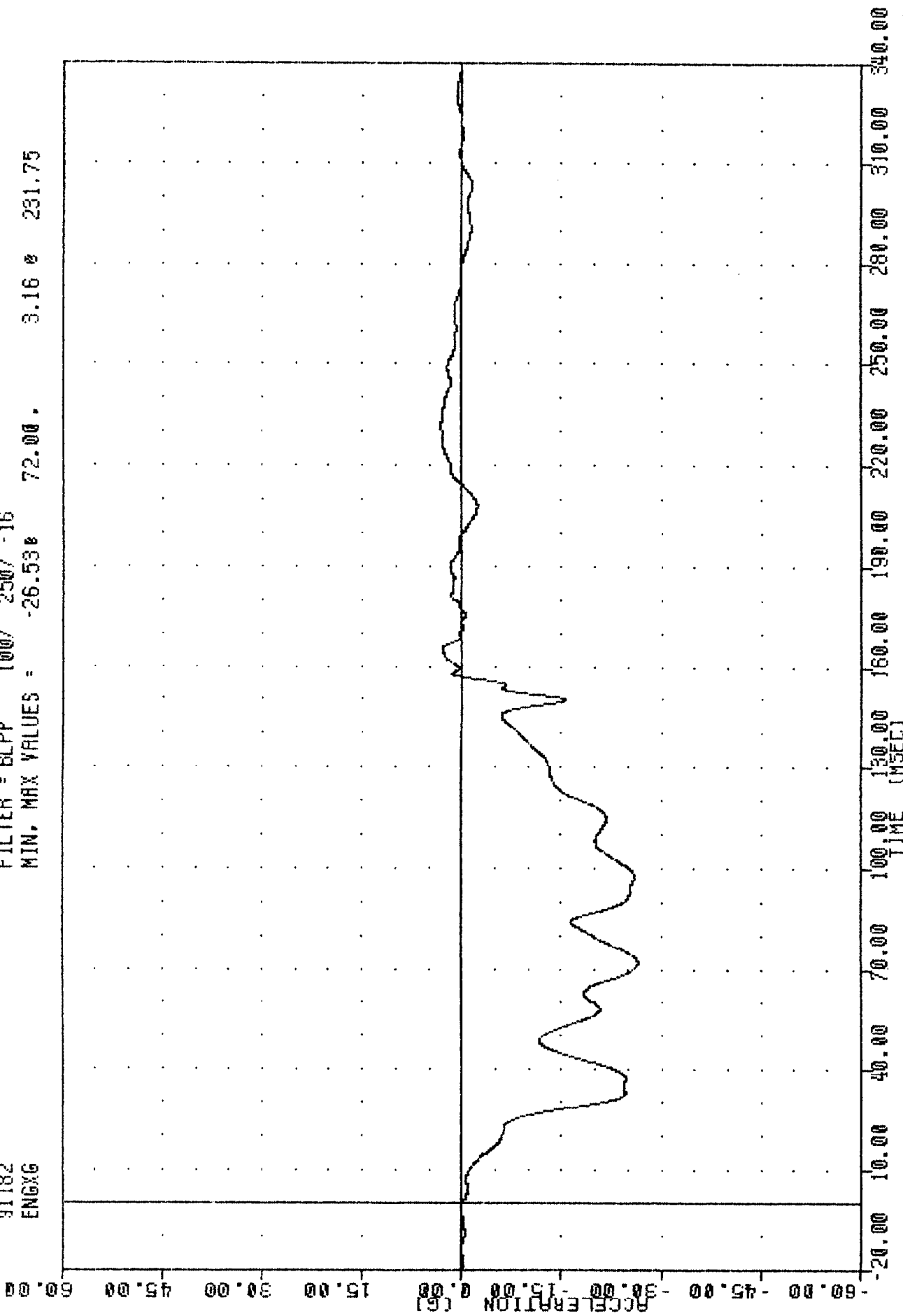
MIN. MAX VALUES = -7.06e 86.13, 3.43 e 127.50



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
RIGHT REAR SEAT CROSSMEMBER Y-AXIS ACCELERATION

VRTC , 310701
OFFSET BARRIER IMPACT
31182
ENGXG

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -26.53 72.00 . 3.16 231.75



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
ENGINE X-AXIS ACCELERATION

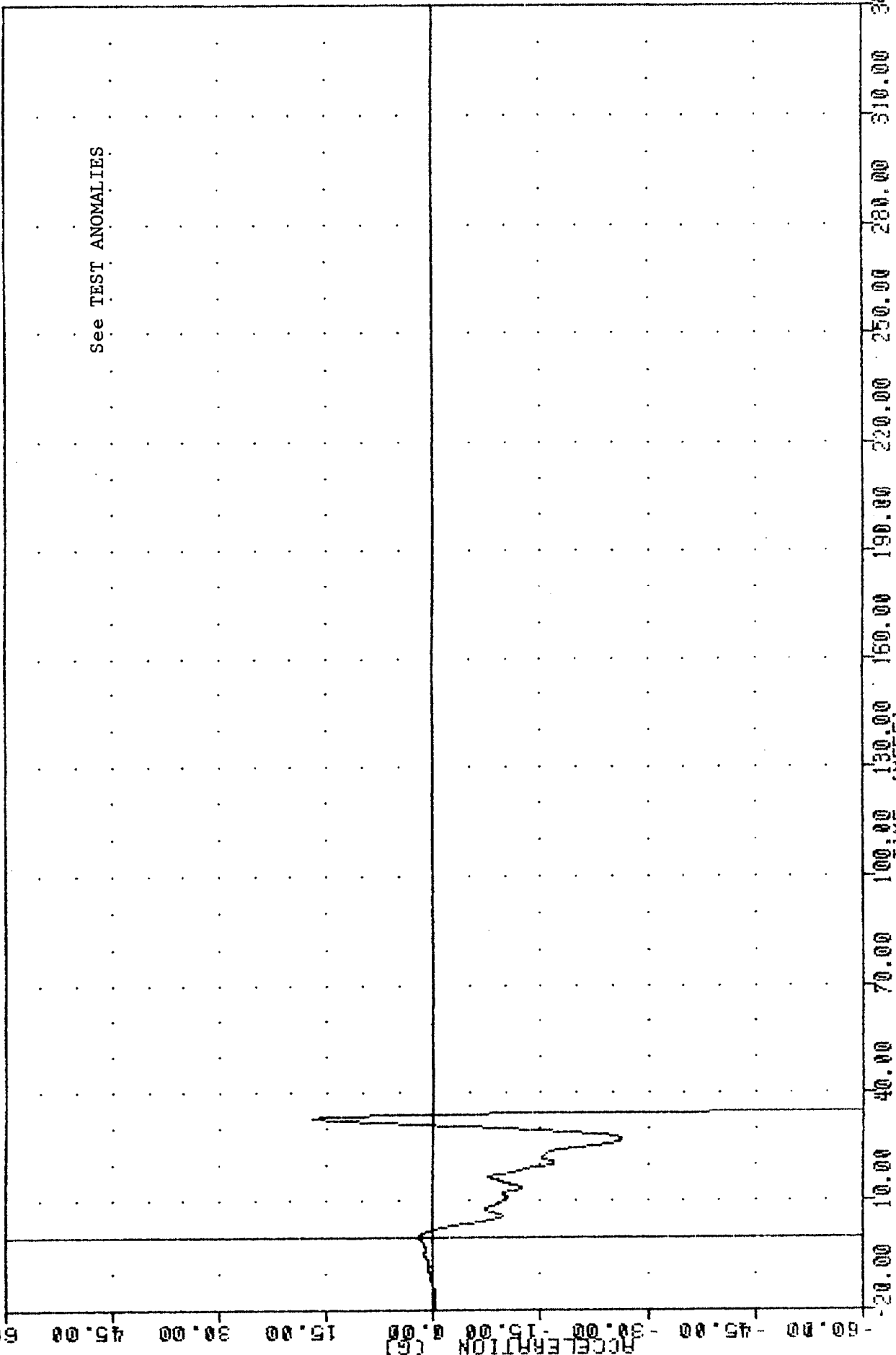
OFFSET BARRIER IMPACT

31182

FWLXG1

FILTER = BLPP 100/ 250/ -16

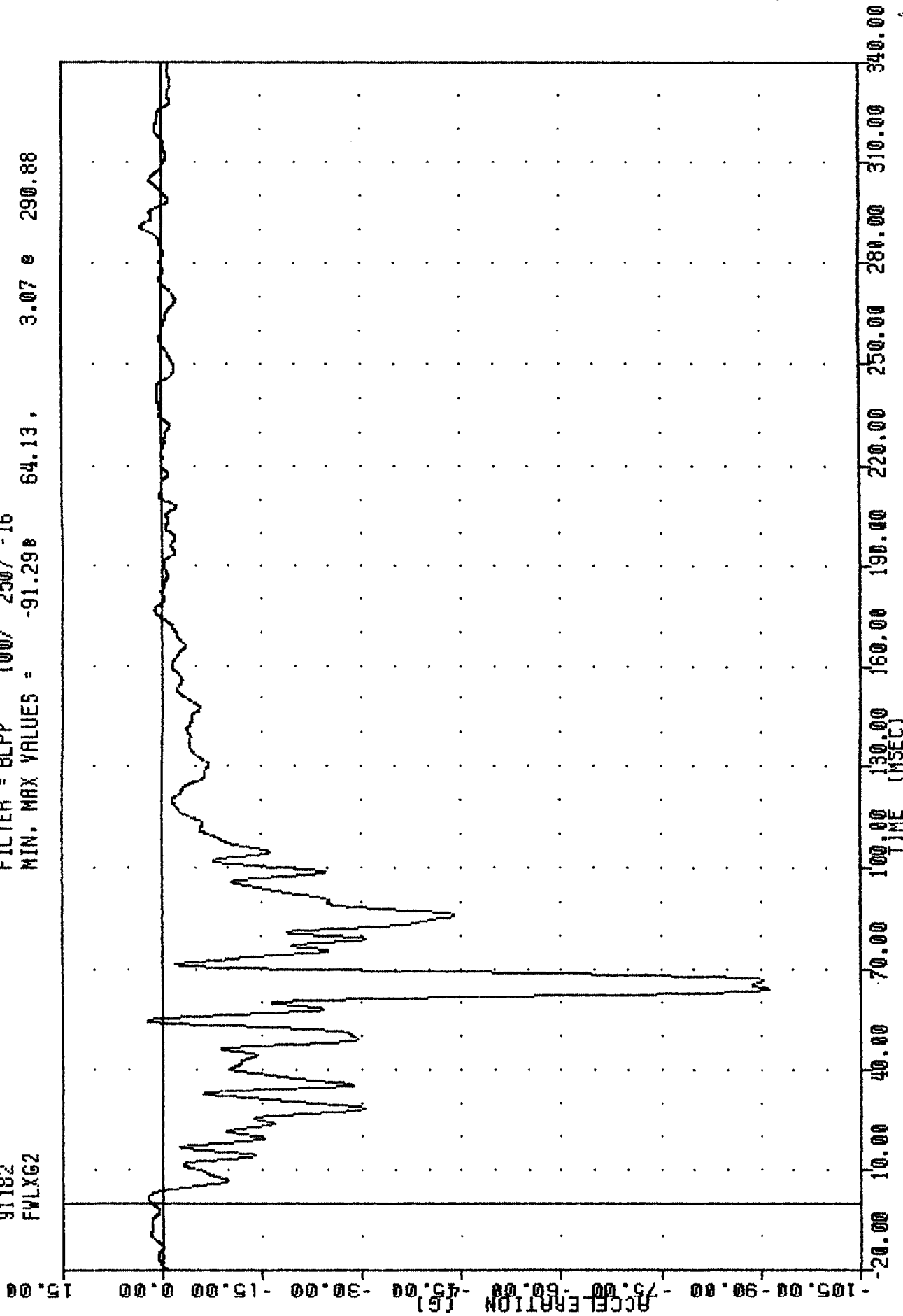
MIN. MAX VALUES = -1195.52e 295.00, 16.79 e 32.88



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
LEFT FIREWALL X-AXIS ACCELERATION

VRTC , 910701
OFFSET BARRIER IMPACT
91182
FWLX62

FILTER = BLPP 100/ 250/ -16
MIN. MAX VALUES = -91.29e 64.13, 3.07 e 290.88



MINICARS RSV INTO LEFT OFFSET FRONTAL BARRIER
RIGHT FIREWALL X-AXIS ACCELERATION

APPENDIX C

MISCELLANEOUS INFORMATION

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VEHICLE ACCELEROMETER INFORMATION

NO.	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+ SENSING)
1	STEERING COLUMN LOWER	A-P	ENDEVCO	2264	AZ66	REAR
2	STEERING WHEEL HUB	A-P	ENDEVCO	2264	AZ88	FRONT
	STEERING WHEEL HUB	L-R	ENDEVCO	2264	BA68	LEFT
	STEERING WHEEL HUB	I-S	ENDEVCO	2264	AV27	DOWN
3	LEFT B-PILLAR SILL	X	ENDEVCO	2264	AN06	REAR
4	RIGHT B-PILLAR SILL	X	ENDEVCO	2264	AY13	REAR
	RIGHT B-PILLAR SILL	Y	ENDEVCO	2264	AS95	LEFT
5	LEFT REAR SEAT					
	CROSSMEMBER	X	ENDEVCO	2264	BB60	REAR
	LEFT REAR SEAT					
	CROSSMEMBER	Y	ENDEVCO	2264	AS06	RIGHT
6	RIGHT REAR SEAT					
	CROSSMEMBER	X	ENDEVCO	2264	AR38	FRONT
	RIGHT REAR SEAT					
	CROSSMEMBER	Y	ENDEVCO	2264	AN45	LEFT
7	ENGINE BLOCK	X	ENDEVCO	2264	AS76	REAR
8	LEFT FIREWALL	X	ENDEVCO	2264	AS71	FRONT
9	RIGHT FIRE WALL	X	ENDEVCO	2264	AS03	FRONT