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R9044/04

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**SIDE IMPACT PROTECTION
IN PRODUCTION VEHICLES**

**MDB-TO-CAR SIDE IMPACT TEST OF
A 27° CRABBED MOVING DEFORMABLE BARRIER
TO A 1991 SUZUKI SIDEKICK
AT 33.5 MPH**

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JUNE 1991

TEST REPORT

Prepared Under Contract No. DTNH22-87-C-07168, D.O. #2

For

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Research
400 Seventh Street, S.W.
Washington, DC 20590

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Date

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16. Abstract This test report documents a crash test to evaluate side impact protection. Testing was conducted on a 1991 Suzuki Sidekick at the Mobility Systems and Equipment Company Test Facility, Mira Loma, California. The test vehicle was impacted on the left side by a moving deformable barrier, crabbled to 27°, at 33.43 mph. The test was a simulation of a 90° intersection collision with the striking vehicle traveling at 30 mph and the struck vehicle traveling at 15 mph. Occupant response of one side impact dummy was measured. The dummy was located in driver's designated seating position. The test date was May 30, 1991. <i>HEAD INJURY CRITERIA</i> <i>THORACIC TRAUMA INDEX</i> <i>Pelvic Acceleration</i> <i>DRIVER</i> <i>National Technical Information Service</i> <i>Springfield, Virginia 22161</i>		13. Type of Report and Period Covered TEST REPORT MAY 1991 TO JUNE 91
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METRIC CONVERSION FACTORS

APPROXIMATE CONVERSIONS FROM METRIC MEASURES

SYMBOL WHEN YOU KNOW MULTIPLY BY TO FIND SYMBOL

LENGTH

in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

AREA

in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha

MASS (weight)

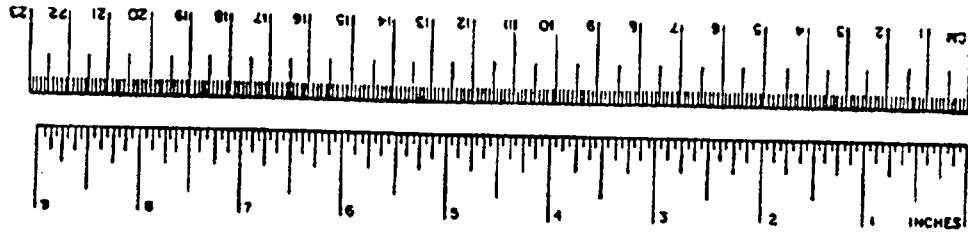
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons(2000lb)	0.9	tonnes	t

VOLUME

tsp	teaspoons	5	milliliters	ml
tbsp	tablespoons	15	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	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
----	------------------------	----------------------------	---------------------	----



APPROXIMATE CONVERSIONS FROM METRIC MEASURES

SYMBOL WHEN YOU KNOW MULTIPLY BY TO FIND SYMBOL

LENGTH

mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi

AREA

cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares(10,000m ²)	2.5	acres	

MASS (weight)

g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000kg)	1.1	short tons	

VOLUME

ml	milliliters	8.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	36	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³

TEMPERATURE(exact)

°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F
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SECTION 1

PURPOSE AND INTRODUCTION

This testing program is a part of an investigation and evaluation of side impact protection in production light trucks and vans. The test is specifically intended to simulate a 90 deg. intersection collision with the striking vehicle moving at 30 mph. This is accomplished by towing a Moving Deformable Barrier (MDB) crabbed at a 27° angle into the struck test vehicle which is placed in a stationary position. The velocity of the MDB is to be 33.5 ± 0.5 mph.

The subject vehicle for this test was a 1991 Suzuki Sidekick. The test was performed on May 30, 1991 at an actual impact speed of 33.43 mph. The leading left-hand edge of the MDB contacted the test vehicle 36.5 inches forward of the midpoint ~~between the axles.~~ of the ~~overall~~ wheelbase.

Section 2 contains a general test summary and vehicle information data sheets. Section 3 contains the test results. Appendix A contains pretest and posttest vehicle and dummy photographs and Appendix B contains data plots for transducers. Appendix C contains side impact dummy certification data and Appendix D has the side impact dummy positioning procedure.

SECTION 2

TEST SUMMARY AND VEHICLE INFORMATION

The 1991 Suzuki Sidekick, Test No. 4, was tested on 30 May 1991. General test vehicle information and pretest conditions are given in Tables 2-1 and 2-2. A crash test summary is shown in Table 2-3. The vehicle was instrumented with 10 accelerometer channels and two onboard high-speed movie cameras. Accelerometer locations and peak values are shown in Table 2-4. All pretest measurements were made detailing the right side vehicle profile. The impact point was marked on the vehicle 36.5 inches forward of the midpoint of the wheelbase.

One side impact anthropomorphic dummy (SID) was placed in the vehicles driver seat and positioned using the side impact dummy seating procedure (Appendix D). SID position measurements are shown in Table 2-5. The SID was instrumented with 12 accelerometers and one displacement transducer. A summary of the SID accelerometer data is given in Table 2-6. Colored chalk was applied to the SID's head, left shoulder, left hip and his knees to help determine dummy contact points during the test.

The MDB was crabbed at 27° and instrumented with five (5) accelerometers and two (2) high-speed movie cameras. A general crash test summary and accelerometer locations with peak values for the MDB are shown in Tables 2-7 and 2-8.

Additional film coverage of the test was also provided by two (2) overhead and two (2) ground high-speed movie cameras and one real-time camera. Camera locations are given in Table 2-9. A total of 30 channels of information was recorded on two (2) FM data tape recorders.

TABLE 2-1 TEST VEHICLE DATA

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991 SUZUKI SIDEKICK
 VEHICLE NHTSA NO.: RM0502 VIN: JS3TC01C3M4105712
 VEHICLE BODY COLOR: RED; MONTH & YEAR OF MANUFACTURE: 10/90
 ENGINE: Cyl.: 4 ^{Displacement?} ~~C.I.D.~~ 97.07 Liters; Placement; X
 Longitudinal; Lateral X Gas; X Diesel; Turbocharged
 TRANSMISSION: 5 Speed; X Manual; Automatic; Overdrive
 FINAL DRIVE: Front Wheel Drive; X Rear Wheel Drive;
Four Wheel Drive
 DATE VEHICLE AVAILABLE FOR SIDE IMPACT TESTING: 05/20/91
 ODOMETER READING: 92.4 miles; OPTIONS: A/C; X P/S; P/Wdo;
 Tilt Whl.; Cruise Control

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): 35 psi Front; 35 psi Rear
 Recommended Tire Size: P195/75R 15
 Tires On Vehicle: 195/75R15; Manufacturer: BRIDGESTONE
 Number Of Occupants: 2 Front; 2 Rear; 0 3rd Seat; 4 TOTAL
 Type Of Front Seats: X Bucket; Bench; Split Bench
 Type Of Front Seat Back: Fixed; X Adjustable With X Lever
 Rotating Knob
 Vehicle Maximum Capacity Loading = 926 lb (A)
 No. Of Occupants x 150 lb - - - = 600 lb (B)
 Cargo Capacity (A - B) - - - - = 326 lb
 *GVWR - Delivered Weight

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Right Front = 552 lb
 Left Front = 580 lb TOTAL FRONT = 1132 lb (52.4% of TOTAL)
 Right Rear = 500 lb
 Left Rear = 529 lb TOTAL REAR = 1029 lb (47.6% of TOTAL)
 TOTAL WEIGHT = 2161 lb

TABLE 2-1 TEST VEHICLE DATA (Cont'd)

CALCULATION OF TEST VEHICLE TARGET WEIGHT:

Total Test Vehicle Delivered Weight With Maximum Fluids	=	<u>2161</u>	lb
Maximum Cargo Carrying Capacity Of Test Vehicles* - - -	=	<u>300</u>	lb
Weight Of One P.572 Dummies (1 x 174 lb)- - - - -	=	<u>174</u>	lb
TEST VEHICLE TARGET WEIGHT- - - - -	=	<u>2635</u>	lb

* 300 lb for light trucks and MPVs

ACTUAL WEIGHT OF TEST VEHICLE WITH 1 DUMMY AND CARGO:

Right Front	=	<u>734</u>	lb	
Left Front	=	<u>640</u>	lb	TOTAL FRONT = <u>1374</u> lb (52.5% of TOTAL)
Right Rear	=	<u>665</u>	lb	
Left Rear	=	<u>580</u>	lb	TOTAL REAR = <u>1245</u> lb (47.5% of TOTAL)
TOTAL WEIGHT = <u>2,619</u> lb (which includes <u>60</u> lb of cargo ballast weight)				

TEST VEHICLE ATTITUDE:

As Delivered -----Right Front = 30.6 in

Left Front = 30.3 in

Right Rear = 30.6 in

Left Rear = 30.1 in

Test Vehicle Wheelbase: 87.0 in; C.G.= 41.4 in rearward of front wheel centerline

Ready For Test -- Right Front = 29.0 in

Left Front = 29.8 in

Right Rear = 30.0 in

Left Rear = 30.1 in

TOTAL VEHICLE LENGTH:

Right Side = 135.3 in

Left Side = 135.3 in

Centerline = 138.5 in

TABLE 2-2 PRETEST CONDITIONS

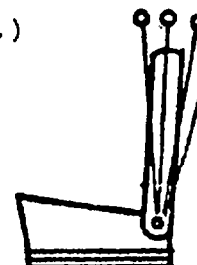
VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991 SUZUKI SIDEKICK

VEH. NHTSA NO. RM0502; TEST DATE: 05/30/91

FRONT SEAT CUSHION PLACEMENT: Midpoint of forward/aft travel
TOTAL NUMBER OF ADJUSTMENT POSITIONS OR DETENTS: 14 notches

FRONT SEAT BACK ADJUSTMENT POSITION: 1st notch after 25° angle
(latch position, knob rotations, etc.)

TORSO ANGLE 25°



ADJUSTABLE STEERING COLUMN POSITION:

X Not Applicable



Midpoint of swing

WINDOW POSITIONS: Left Front -- closed
Left Rear --- n/a
Right Front - open
Right Rear -- n/a

NOTE: Window will be in closed position on struck side of test vehicle and in open position on opposite side.

AMOUNT OF STODDARD SOLVENT IN FUEL TANK: Front Standard Tank 10.3 Gal
Rear Optional Tank 0 Gal
(92 to 94% of USABLE CAPACITY)

LOCATION OF IMPACT POINT ON TEST VEHICLE SIDE TO BE IMPACTED:

Wheelbase = 87.0 in
Impact point is 6.5 inches rearward of front axle centerline (which is 37 inches forward of the wheelbase midpoint).

TABLE 2-3 CRASH TEST SUMMARY FOR TEST VEHICLE

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1991 SUZUKI SIDEKICK

VEH. NHTSA NO. RM0502; VIN: JS3TC013M4105712

TEST DATE: 05/30/91 BUILD DATE: 10/90

OVERALL LENGTH = 138.5 inches; OVERALL WIDTH = 64.2 inches

TEST WEIGHT: Left Front = 640 lb; Left Rear = 580 lb

Right Front = 734 lb; Right Rear = 665 lb

SUBTOTALS - - - Front = 1374 lb Rear = 1245 lb

TOTAL VEHICLE WEIGHT - - - - - 2619 lb

WHEELBASE = 87.0 inches

LONGITUDINAL C.G. FROM CENTER OF FRONT AXLE = 41.4 inches

IMPACT ANGLE WITH RESPECT TO IMPACTOR = 90 degrees

MAXIMUM EXTERIOR STATIC CRUSH:

1. LEVEL 1 (15.0" above ground) = 12.6 inches

2. LEVEL 2 (28.0" above ground) = 11.1 inches

3. LEVEL 3 (28.5" above ground) = 11.0 inches

4. LEVEL 4 (41.0" above ground) = 7.2 inches

5. LEVEL 5 (61.5" above ground) = 5.2 inches

MAXIMUM POSTTEST INTRUSION = 13.2 inches

OCCUPANTS:

PASSENGER

RIGHT REAR

TYPE OF DUMMY - - - - SID S/N? N/A

RESTRAINT USED- - - - TYPE 2 ? N/A

INSTRUMENTATION:

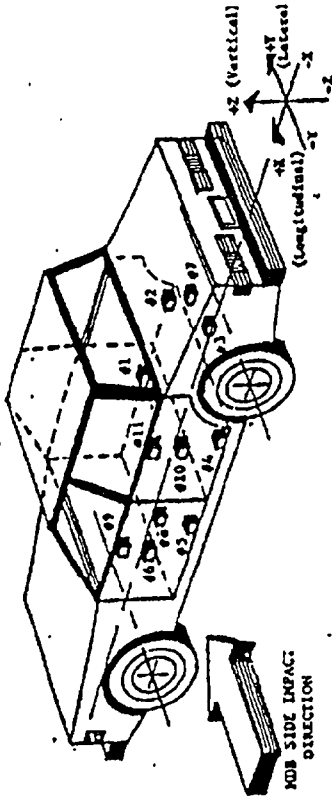
NUMBER OF DATA CHANNELS = 25 30?

NUMBER OF CAMERAS: ONBOARD = 2 High-speed

OFFBOARD = 4 High-speed, 1 Real-time

TABLE 2-4 TEST VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

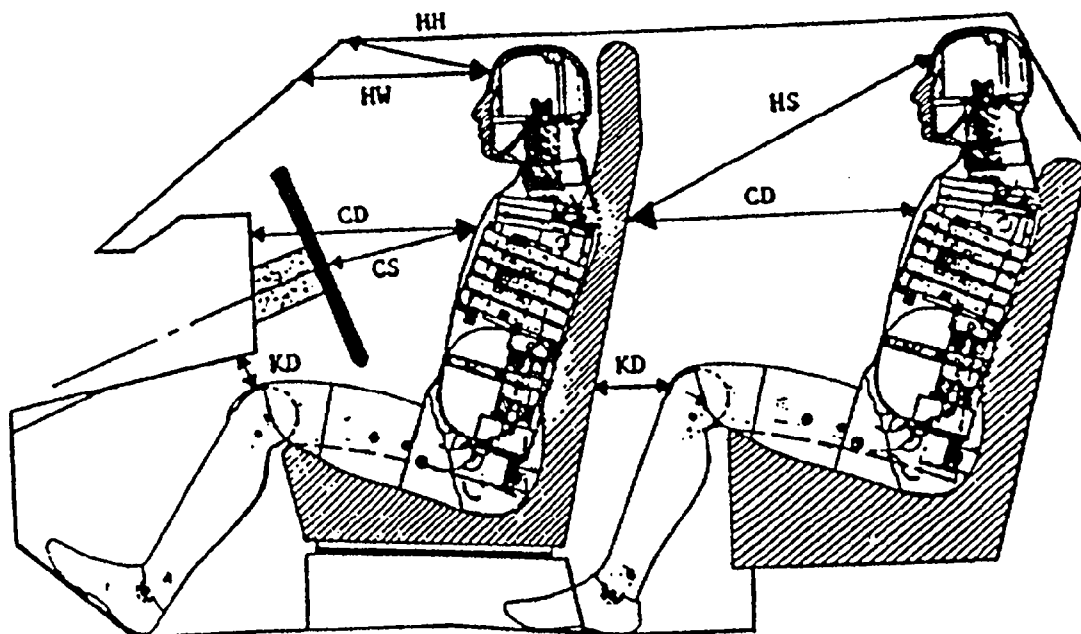
TEST VEHICLE: 1991 SUZUKI SIDEKICK NHTSA NO.: RM0502 TEST DATE: 05/31/91



ACCEL. NO.	LOCATION	COORDINATES (")			LONG. (X) POS. / NEG.		LAT. (Y) POS. / NEG.		VERT (Z) POS. / NEG.		RESULTANT	
		X*	Y*	Z*	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	Right Side Sill At Front Seat	82.8	24.5	14.3	-10.04	7.00	34.80	23.10	16.70	26.50	35.49	22.90
2	Right Side Sill At Rear Seat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3	Floorplan Above Rear Axle	19.8	0.0	25.5	21.31	22.70	19.66	37.60	21.67	47.00	27.16	22.60
4	Left Side Sill At Rear Seat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5	Left Side Sill At Front Seat	84.5	25.3	15.0	NA	NA	133.90	11.70	NA	NA	NA	NA
6	Left Front Door on Centerline	69.0	27.0	28.5	NA	NA	171.80	12.30	NA	NA	NA	NA
7	Right Rear Occ. Compartment	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
8	Midrear of Left Front Door	51.4	27.0	28.7	NA	NA	156.70	6.10	NA	NA	NA	NA
9	Left Front Door Upper Centerline	67.8	27.0	37.1	NA	NA	140.70	16.00	NA	NA	NA	NA
10	Midrear of Right Front Door	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11	Right Rear Door Upper Centerline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

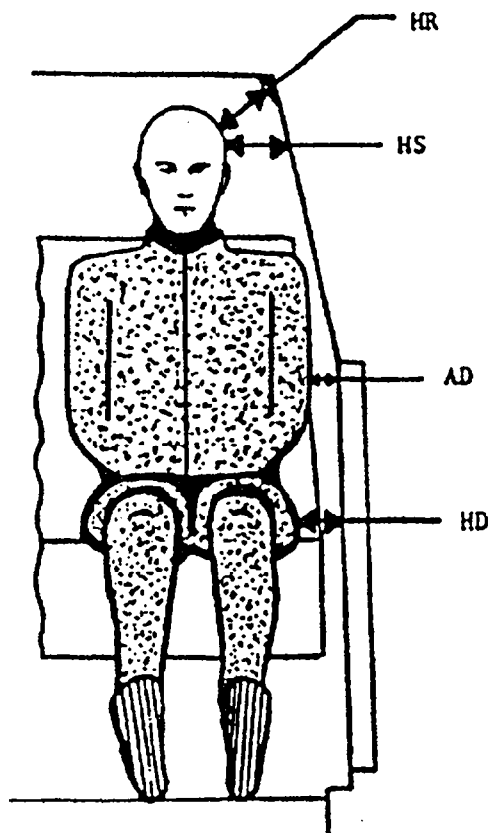
* Reference: X - Rear Bumper (+ Forward)
Y - Vehicle Centerline (+ To Right)
Z - Ground Level (+ Up)

TABLE 2-5 SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS
1991 SUZUKI SIDEKICK, RM0502



	FRONT PASSENGER ID # 319	REAR PASSENGER ID # N/A
HH	25.3 in	NA in
HW	27.8 in	NA in
HS	NA in	NA in
CD	25.8 in	NA in
CS	16.5 in	NA in
KDL	7.0 in	NA in
KDR	6.8 in	NA in

TABLE 2-5 SIDE IMPACT DUMMY (SID) LONGITUDINAL CLEARANCE DIMENSIONS
(Cont'd)



	FRONT PASSENGER ID # 319	REAR PASSENGER ID # N/A
HR	5.3 in	NA in
HS	6.6 in	NA in
AD	2.1 in	NA in
HD	5.2 in	NA in

1991 SUZUKI SIDEKICK, RM0502

TABLE 2-6 SIDE IMPACT DUMMY (SID) TEST DATA SUMMARY
1991 SUZUKI SIDEKICK, RM0502

TEST DATE: 05/30/91

	FRONT DUMMY -- ID # 319				REAR DUMMY - ID# NA			
	POS. DIRECT		NEG. DIRECT		POS. DIRECT		NEG. DIRECT	
	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
HEAD ACCELERATIONS:								
Longitudinal --- X	16.40	44.60	15.50	113.40	N/A	N/A	N/A	N/A
Lateral ----- Y	119.50	41.80	9.00	50.30	N/A	N/A	N/A	N/A
Vertical ----- Z	22.10	80.10	29.60	49.90	N/A	N/A	N/A	N/A
RESULTANT ----- R	120.30	41.80	N/A	N/A	N/A	N/A	N/A	N/A
HIC -----*	363.99	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>(Time Interval)</i>								
RIB ACCELERATIONS:								
1.Upper Rib Lateral Y*	33.97	48.75	-6.19	98.13	N/A	N/A	N/A	N/A
2.Upper Rib Lateral Y*	32.76	48.75	-6.84	98.75	N/A	N/A	N/A	N/A
1.Lower Rib Lateral Y*	42.41	32.50	-13.31	61.88	N/A	N/A	N/A	N/A
2.Lower Rib Lateral Y*	42.16	31.88	-12.93	6.50	N/A	N/A	N/A	N/A
SPINE ACCELERATIONS:								
1.Upper Lateral Y*	41.40	46.25	-10.57	96.88	N/A	N/A	N/A	N/A
2.Upper Lateral Y*	42.74	46.25	-10.26	96.88	N/A	N/A	N/A	N/A
1.Lower Lateral Y*	65.86	41.25	-10.83	60.00	N/A	N/A	N/A	N/A
2.Lower Lateral Y*	65.18	41.25	-10.59	60.63	N/A	N/A	N/A	N/A
PELVIS ACCELERATIONS:								
Lateral Y*	104.06	35.63	-10.61	76.25	N/A	N/A	N/A	N/A
RIB DEFLECTION:								
Lateral (inches)	0.38	81.00	- .71	59.80	N/A	N/A	N/A	N/A

* Data Required (other data to be used by R & D)

REFERENCE: Positive Direction -- Longitudinal (X) = forward
Lateral (Y) = to right
Vertical (Z) = down

Negative Direction -- Longitudinal (X) = rearward
Lateral (Y) = to left
Vertical (Z) = up

Thoracic Trauma Index

TABLE 2-7 CRASH TEST SUMMARY FOR SIDE IMPACTOR

TYPE OF TEST: 90°, 30 MPH/15 MPH SIMULATION TEST DATE 05/30/91
NHTSA NO. FOR TARGET VEHICLE: RM0502 VEHICLE: 1991 SUZUKI SIDEKICK
POSITION OF IMPACTOR (MDB) ON MONORAIL: CRABBED 27° TO RIGHT (CLOCKWISE)

MDB DETAILS: Overall Width of Framework Carriage = 49.35 in.

Overall Length of MDB=162 in.(including honeycomb impact face)

Wheelbase of Framework Carriage = 102 in.

Tread of Framework Carriage (Front & Rear) = 72 in.

C.G. location rearward of front axle = 44.5 in.

MDB Weight -- Left Front = 1013 lb; Left Rear = 442 lb

Right Front = 638 lb; Right Rear = 838 lb

SUBTOTAL: Front = 1651 lb; Rear = 1280 lb

TOTAL MDB WEIGHT = 2931 lb

IMPACT ANGLE (MDB C/L to Target Vehicle C/L) = 90

IMPACT SPEED = 33.43 MPH

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE:

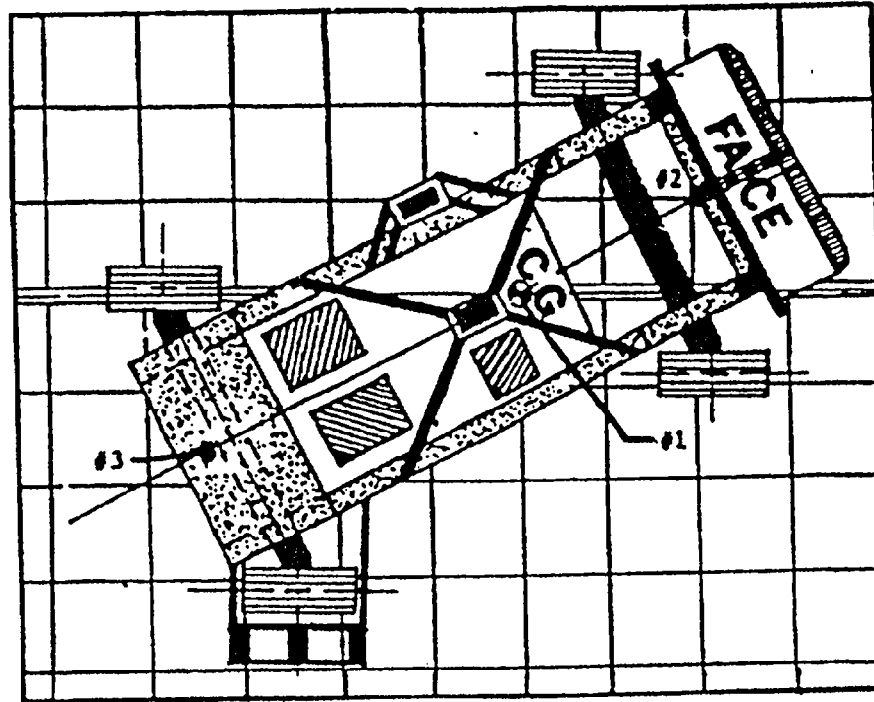
1. ROW A at bumper level = 3.2 in.
2. ROW B at mid-stack level = 0.4 in.
3. ROW C at top of stack level = 4.3 in.

INSTRUMENTATION:

Number of MDB Data Channels = 5 accelerometer channels

Number of Onboard Cameras = 2 high speed

TABLE 2-8 MOVING DEFORMABLE BARRIER (MDB) ACCELEROMETER LOCATIONS AND SAMPLE DATA SUMMARY



1991 SUZUKI SIDEKICK, RM0502

ACCEL. NO.	LOCATION	Coordinates			POS. MAX (g)	DIRECT. TIME (msec)	NEG. MAX (g)	DIRECT. TIME (msec)
		X*	Y*	Z*				
1	MDB Center of Gravity							
	Longitudinal X	74.0	0.0	14.0	3.8	140.20	20.0	29.80
	Lateral Y				5.0	125.00	8.0	30.50
	Vertical Z				10.8	19.10	9.5	69.00
	Resultant R				21.6	30.20	NA	NA
2	Front Frame Member Longitudinal X	131.0	0.0	26.5	1.4	147.70	17.9	32.30
3	Rear Frame Member Longitudinal X	13.0	0.0	17.0	4.9	108.20	17.5	34.50

*Reference: X - Rearmost Frame Point (+ Forward)
Y - Centerline of MDB (+ Right)
Z - ground Level (+Up)

TABLE 2-9 HIGH-SPEED CAMERA LOCATIONS AND DATA

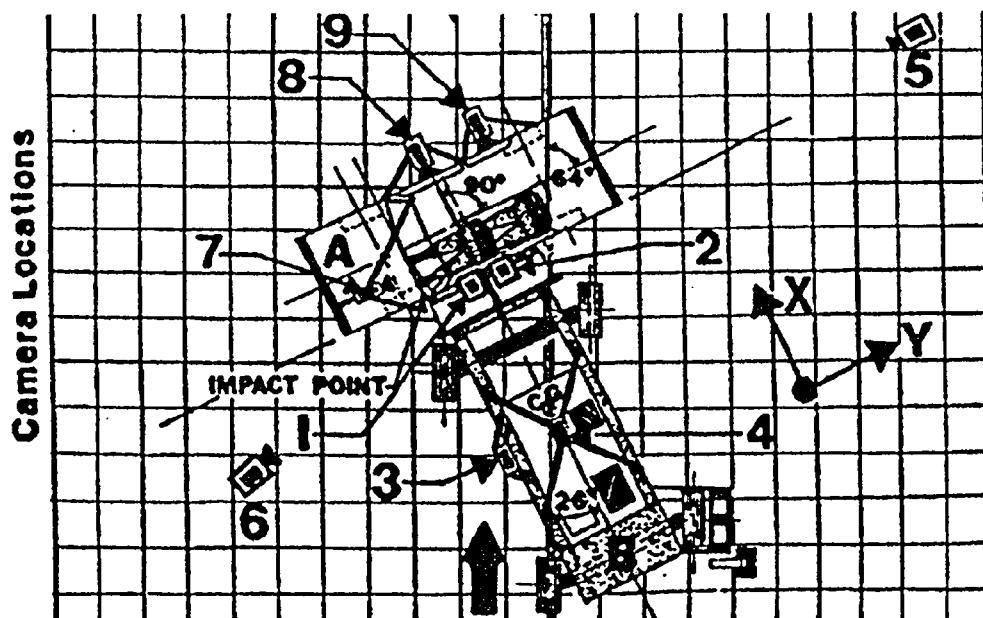
CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	COORDINATES (in)		
					X*	Y*	Z*
1	Overhead view of test vehicle dynamics	Fastax	28	600	0	60	186
2	Overhead Closeup view of impact plane	Fastax	16	600	20	35	186
3	MDB Onboard Closeup view of impact point	Himac	28	600	-121	0	29.5
4	MDB Onboard view of driver dummy kinematics	Himac	16	600	-150	37	54
5	Overall view of test area-Ground Level	Fastax	16	600	-202	565	22
6	Left Side Ground Level-Close-Up View	Fastax	28	600	5	-300	0
7	Test Vehicle Onboard-driver dummy front view kinematics	Fastax	16	600	21	-36	22
8	Test Vehicle Onboard-pass. dummy side view kinematics	Fastax	16	600	100	40	22
9	Test Vehicle Onboard-pass. dummy side view kinematics	NA	NA	NA	NA	NA	NA

NOTE: Real time (24 fps) * Reference (from point of impact film coverage of pre-test test, and post-test event included in final print

+X = Forward
+Y = To Right
+Z = Upward

SAMPLE

1991 SUZUKI SIDEKICK, RM0502



ANGLES INDICATED ARE HYPOTHETICAL

SECTION 3

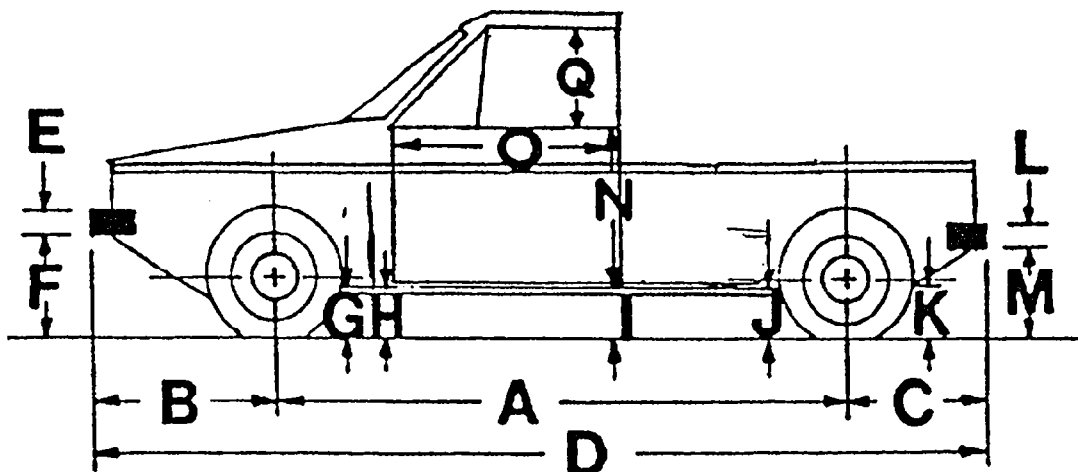
TEST RESULTS

The 1991 Suzuki Sidekick was impacted at 33.43 mph by the 27° crabbed MDB on 30 May 1991. The MDB's left edge contacted the test vehicle 0.5 inches rearward of the impact line. The test vehicle was spun around counterclockwise, the back end of the vehicle rotating around the heavier front. The vehicle driver side door and bed were crushed inwards a maximum of 13.2 inches. Pre-test and posttest vehicle dimensions are shown in Tables 3-1 to 3-5.

The SID impacted the driver door with the left knee, hip and shoulder. The head of the dummy rotated to the left and impacted the upper "B" pillar of the vehicle. The SID head did not contact the aluminum barrier or any other objects during this action. The SID then rotated to its right and ended at sitting upright facing forward. SID contact is documented in Table 3.6

The MDB impacted the test vehicle and was stopped by the remote brake system to prevent a second impact. The aluminum deformable barrier received minor damage with a maximum crush of 4.3 inches on the left-hand corner. The crush details for the MDB are given in Table 3-7.

TABLE 3-1 PRE AND POSTTEST MEASUREMENTS
1991 SUZUKI SIDEKICK, RM0502



NOTE: All dimensions are in inches

	PRETEST	POSTTEST	CHANGE
A	87.0	85.3	-1.7
B	25.0	27.0	2.0
C	26.5	26.5	0.0
D	138.5	138.8	0.3
E	4.3	4.3	0.0
F	18.8	18.8	0.0
G	13.5	13.9	0.4
H	14.8	15.7	0.9
I	15.6	16.8	1.2
J	13.3	14.8	1.5
K	13.9	14.1	0.2
L	4.3	4.3	0.0
M	21.5	21.6	0.1
N	27.0	25.1	-1.9
O	44.8	44.3	-0.5
P	N/A	N/A	N/A
Q	19.3	19.1	-0.2

TABLE 3-2 VEHICLE SIDE MEASUREMENT

TEST VEHICLE NHTSA NO.:	RM0502	TEST VEHICLE:	1991 SUZUKI SIDE KICK
LEVEL 5 @ Window Top	- - - - -		61.5 in
LEVEL 4 @ Window Sill	- - - - -		41.0 in
LEVEL 3 @ Mid Door-	- - - - -		28.5 in
LEVEL 2 @ Occupant H-Point-	- - - - -		28.0 in
LEVEL 1 @ Axle Centerline Height-	- - - - -		15.0 in

(or Sill Top Height)

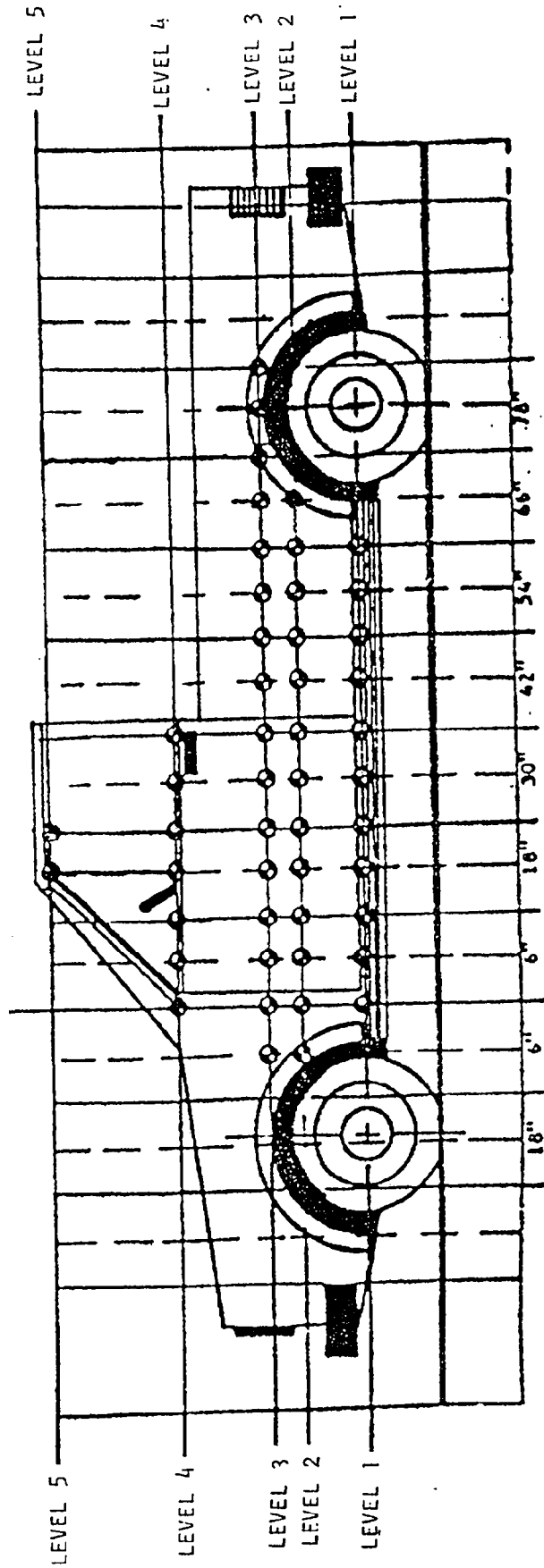


TABLE 3-3 TEST VEHICLE EXTERIOR PROFILES FROM REFERENCE PLANE* AND STATIC CRUSH DATA
1991 SUZUKI SIDEKICK, RM0502

TEST DATE 05/30/91		IMPACT POINT														
LOCATION:	HEIGHT (in)	FORWARD/REARWARD														
		PROFILES/ CRUSH	6"	0"	6"	12"	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"
1.Window Top LEVEL 5	61.5	Posttest- - - Pretest - - - Static Crush-	NA NA NA	NA NA NA	NA NA NA	NA NA NA	NA NA NA	NA NA NA	19.8 22.0 2.2	27.3 22.1 -5.2	26.8 22.1 -4.8	26.1 22.0 -4.1	25.8 22.0 -3.8	NA NA NA	NA NA NA	NA NA NA
2.Window Sill LEVEL 4	41.0	Posttest- - - Pretest - - - Static Crush-	NA NA NA	NA NA NA	NA NA NA	NA NA NA	NA NA NA	NA NA NA	NA NA NA	25.5 28.4 2.9	25.5 28.4 2.9	24.7 28.4 3.7	24.0 28.4 4.4	22.4 28.5 6.1	23.2 29.1 5.9	21.9 29.1 7.2
3.Mid-Door LEVEL 3	28.5	Posttest- - - Pretest - - - Static Crush-	NA NA NA	NA NA NA	24.9 32.1 7.2	23.5 31.4 7.9	22.2 31.1 8.9	21.4 31.1 9.7	20.6 31.1 10.5	20.5 31.1 10.6	20.4 31.1 10.7	20.7 31.1 10.4	20.1 31.1 11.0	21.0 31.3 10.3	21.5 32.0 10.5	NA NA NA
4.H-Point LEVEL 2	28.0	Posttest- - - Pretest - - - Static Crush-	NA NA NA	NA NA NA	24.8 32.0 7.2	23.3 31.4 8.1	22.0 31.0 9.0	21.5 31.1 9.6	20.5 31.1 10.6	20.3 31.1 10.8	20.3 31.1 10.8	20.6 31.1 10.5	20.0 31.1 11.1	21.0 31.2 10.2	21.4 32.0 10.6	NA NA NA
5.Axle Centerline LEVEL 1	15.0	Posttest- - - Pretest - - - Static Crush-	NA NA NA	NA NA NA	NA NA NA	20.0 31.2 11.2	19.3 30.1 10.8	18.8 30.1 11.3	18.4 30.3 11.9	18.4 30.3 12.2	17.9 30.3 12.4	18.0 30.3 12.3	17.7 30.3 12.6	19.5 31.2 11.7	NA NA NA	NA NA NA

*Reference Plane is parallel to and 55 inches from test vehicle longitudinal centerline.

**Measured from ground.

***Impact point.

TABLE 3-4 E PRE AND POSTTEST EXTERIOR PROFILE AT LEVEL 5 WINDOW TOP 61.5" ABOVE GROUND LEVEL

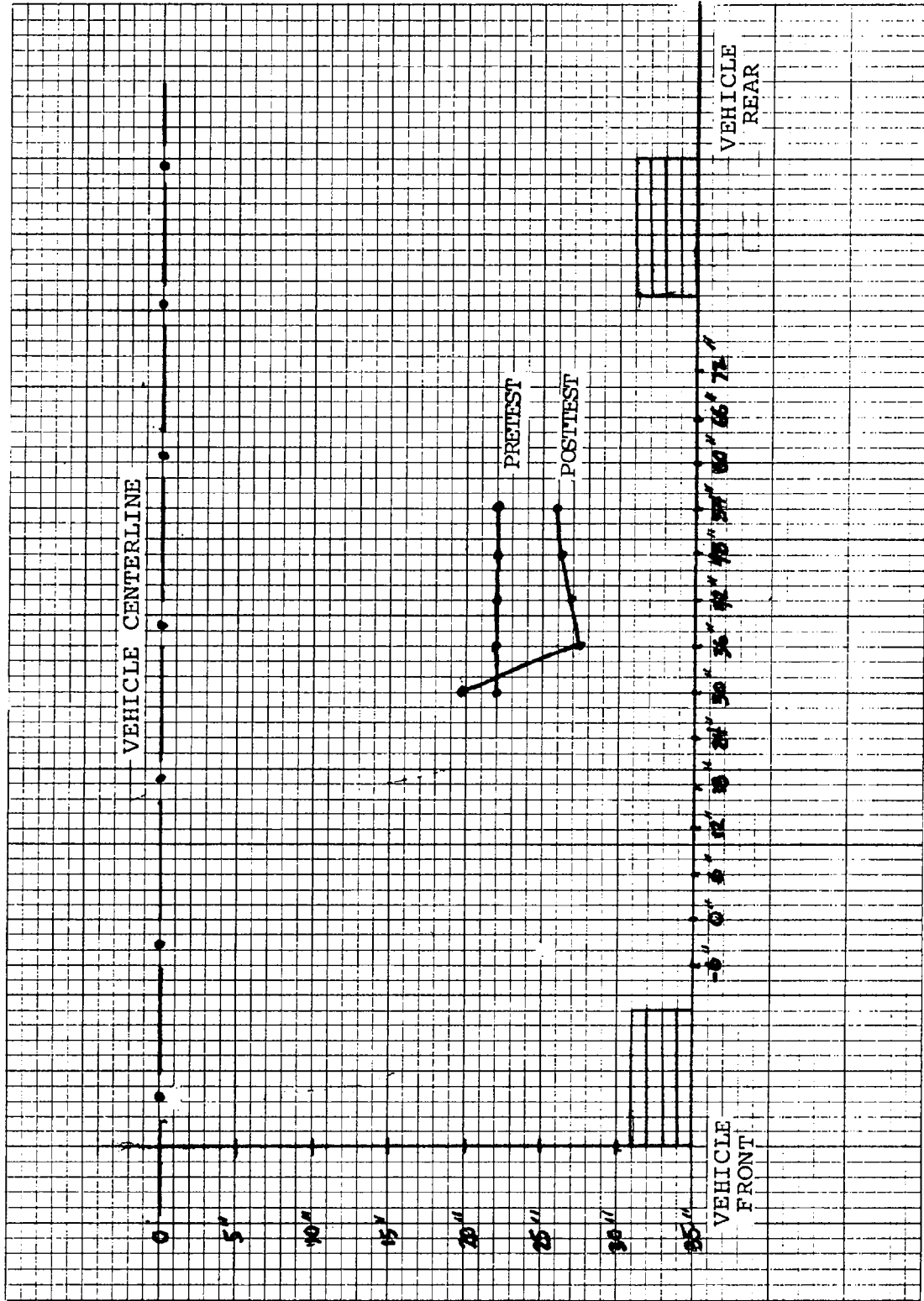


TABLE 3-4 D PRE AND POSTTEST EXTERIOR PROFILE AT LEVEL 4 WINDOW SILL 41.0" ABOVE GROUND LEVEL

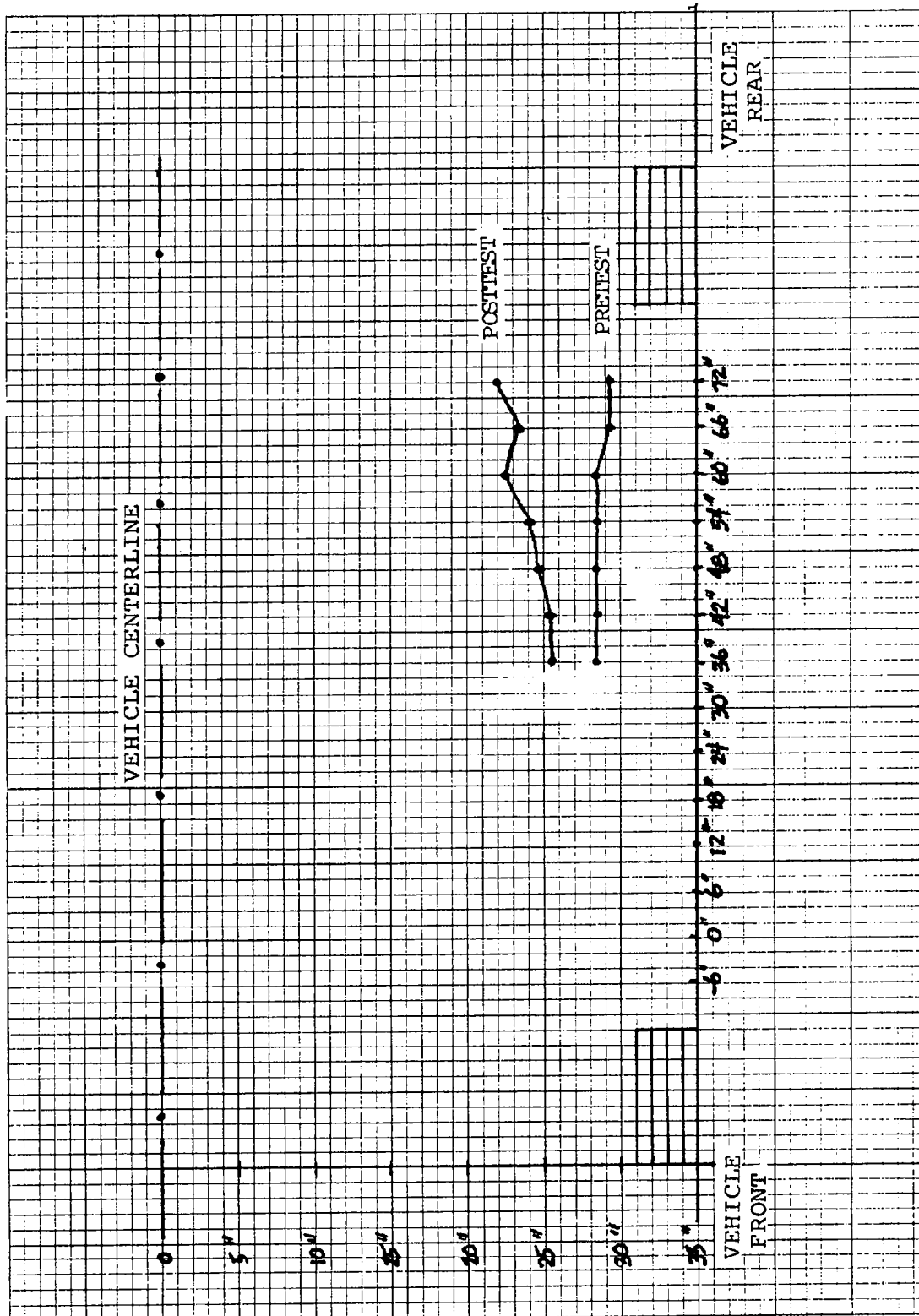
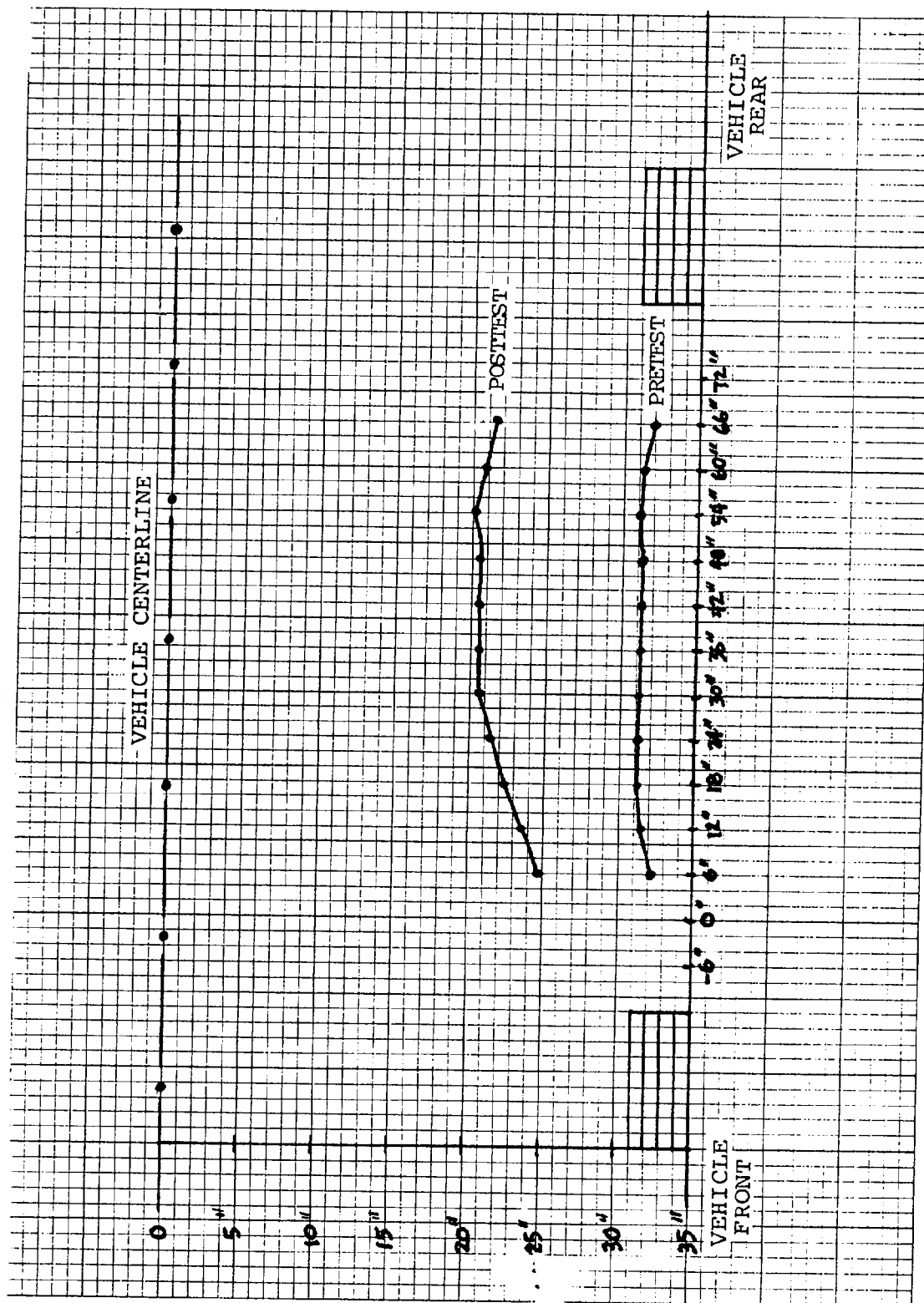
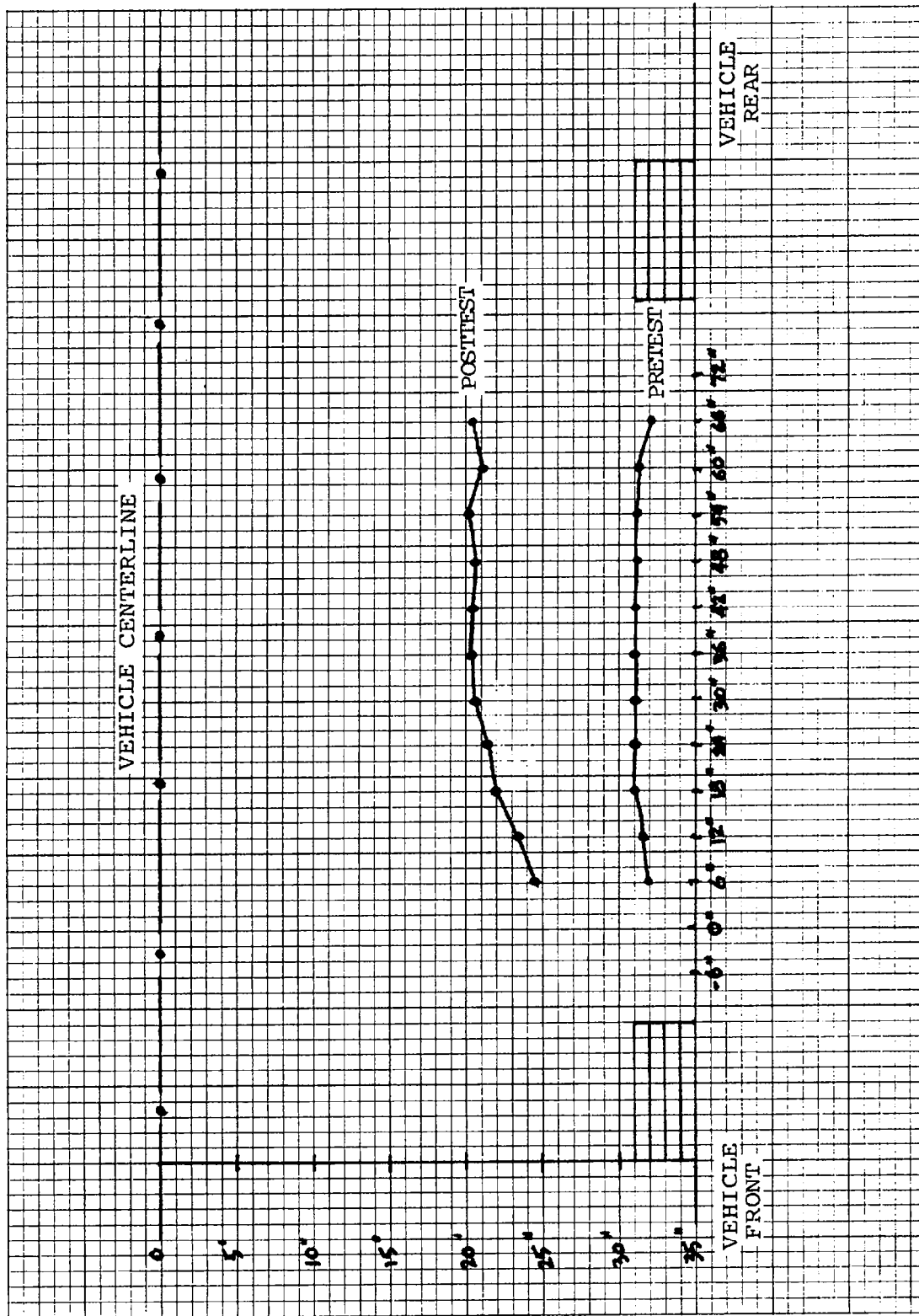


TABLE 3-4 C PRE AND POSTTEST EXTERIOR PROFILE AT LEVEL 3 MID DOOR 28.5" ABOVE GROUND LEVEL



1991 Suzuki Sidekick, RM0502

TABLE 3-4 B PRE AND POSTTEST EXTERIOR PROFILE AT LEVEL 2 H-POINT 28.0" ABOVE GROUND LEVEL



1991 Suzuki Sidekick, RMO502

TABLE 3-4 A PRE AND POSTEST EXTERIOR PROFILE AT LEVEL 1 AXIE CENTERLINE 15.0" ABOVE GROUND LEVEL

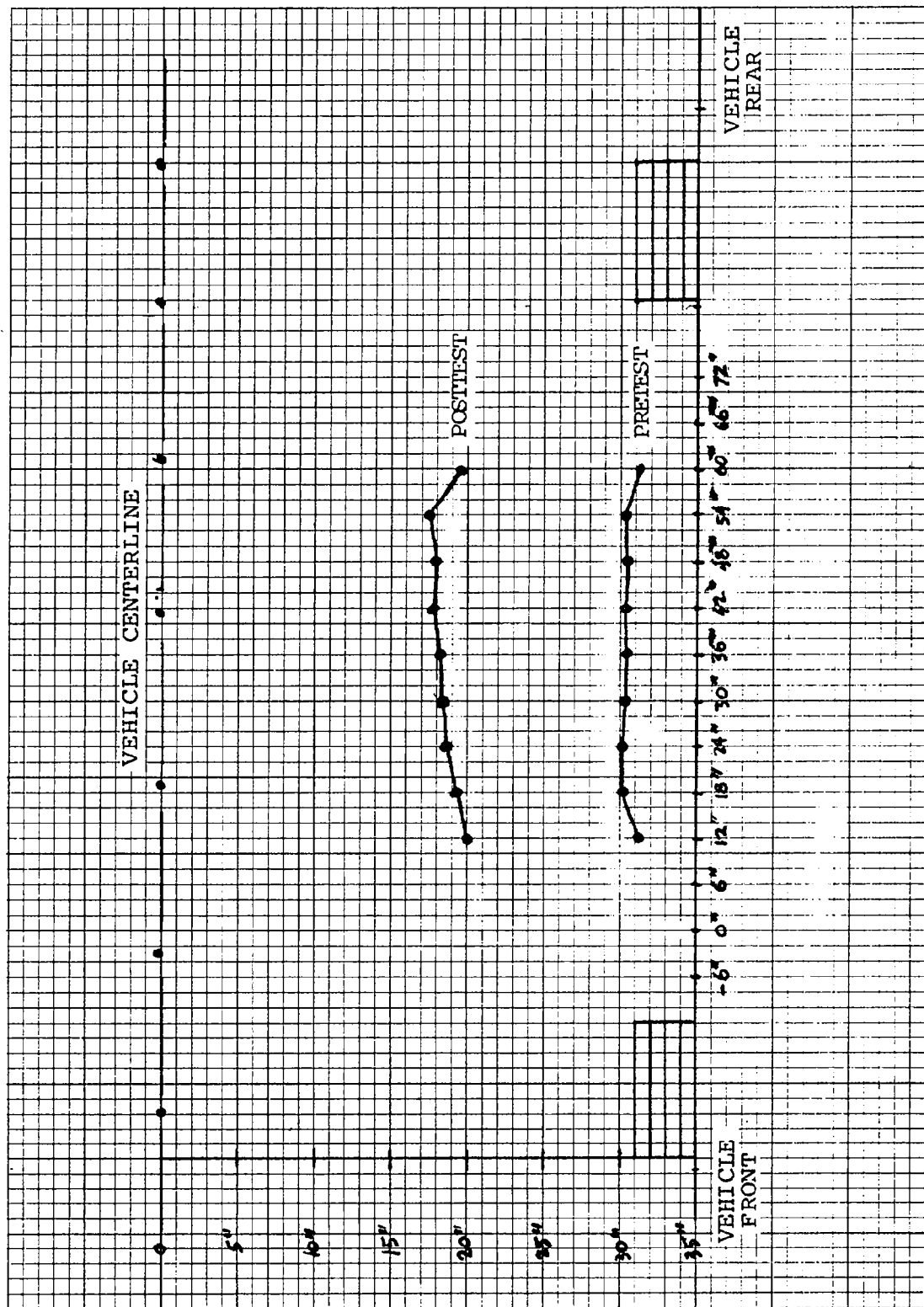


TABLE 3-5 TEST VEHICLE MEASUREMENTS
1991 SUZUKI SIDEKICK, RM0502

NO.	MEASUREMENT DESCRIPTION	Pre-Test (in.)	Post-Test (in.)	Diff. (in.)
X1	Total Length of Test Vehicle at Centerline	138.5	138.8	0.3
X2	Rear Surface of Vehicle to Front of Engine	127.5	127.6	0.1
X3	Rear Surface of Vehicle to Firewall	96.4	96.3	0.1
X4	Rear Surface to Upr. Leading Edge of Right Door	74.3	74.5	0.2
X5	Rear Surface to Upr. Leading Edge of Left Door	74.5	72.8	-1.7
X6	Rear Surface to Lwr. Leading Edge of Right Door	90.5	90.6	0.1
X7	Rear Surface to Lwr. Leading Edge of Left Door	90.5	89.1	-1.4
X8	Rear Surface to Upr. Trailing Edge of Right Door	49.0	49.0	0.0
X9	Rear Surface to Upr. Trailing Edge of Left Door	49.0	45.9	-3.1
X10	Rear Surface to Lwr. Trailing Edge of Right Door	50.0	50.2	0.2
X11	Rear Surface to Lwr. Trailing Edge of Left Door	50.0	48.0	-2.0
X12	Rear Surface to Bottom 'A' Post on Right Side	91.3	91.8	0.5
X13	Rear Surface to Bottom 'A' Post on Left Side	91.3	89.6	-1.7
X14	Rear Surface to Firewall on Right Side	96.4	97.1	0.7
X15	Rear Surface to Firewall on Left Side	96.4	93.3	-3.1
X16	Rear Surface to Steering Column	77.0	75.5	-1.5
X17	Center of Steering Column to 'A' Post	15.6	14.5	-1.1
X18	Center Steering Column to Headlining	21.3	19.0	-2.3
X19	Rear Surface to Right Side of Front Bumper	135.3	135.6	0.3
X20	Rear Surface to Left Side of Front Bumper	135.3	134.0	-1.3
X21	Length of Engine Block	16.0	16.0	0.0
X22	Strg. Whl. Hub C/L to W/Shld. Header Interior Moulding	19.0	17.0	-2.0
X23	Strg. Whl. Hub C/L to Rr.Wdo. Upper Int. Trim Moulding	63.0	62.5	-0.5

TABLE 3-6 POSTTEST OBSERVATIONS

TEST VEHICLE: 1991 SUZUKI SIDEKICK ; NHTSA NO.: RM0502

<u>VISIBLE DUMMY CONTACT POINT:</u>	<u>FRONT SID</u>	<u>REAR SID</u>
HEAD - - - - -	<u>B Pillar</u>	<u>N/A</u>
CHEST- - - - -	<u>None</u>	<u>N/A</u>
ABDOMEN- - - - -	<u>None</u>	<u>N/A</u>
LEFT KNEE- - - - -	<u>Door</u>	<u>N/A</u>
RIGHT KNEE - - - - -	<u>None</u>	<u>N/A</u>

<u>DOOR OPENING:</u>	<u>LEFT SIDE</u>	<u>RIGHT SIDE</u>
FRONT - - - - -	<u>No</u>	<u>N/A</u>
REAR - - - - -	<u>N/A</u>	<u>N/A</u>

SEAT MOVEMENT:

None

GLAZING DAMAGE:

Minor cracking of winshield only, no separation.

OTHER NOTABLE IMPACT EFFECTS:

- The door is still in its closed position, however the door top pushed out because of the deformation at the middle of the floor.
- There is no structural damage further inwards than the left frame rail.
- No fuel tank damage or leakage was detected.

TABLE 3-7 EXTERIOR STATIC CRUSH FOR SIDE IMPACTOR
1991 SUZUKI SIDEKICK, RM0502

DISTANCE RIGHT OF CENTER																	DISTANCE LEFT OF CENTER**					
LOCATION	HEIGHT at CL*	32" =====	28" =====	24" =====	20" =====	16" =====	12" =====	8" =====	4" =====	0" =====	4" =====	8" =====	12" =====	16" =====	20" =====	24" =====	28" =====	32" =====				
Top of Stack Level	32"	1.6	0.9	0.8	0.6	0.3	0.1	-0.1	-0.2	-0.2	-0.1	-0.1	0.1	0.7	2.0	1.9	3.3	4.3				
Mid-Stack Level	22"	0.3	0.2	0.0	-0.1	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	-0.2	-0.2	-0.1	0.0	0.4				
Bumper Level	17"	3.2	2.4	1.9	0.9	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.8	0.7	0.8	1.7				

* Heights measured above ground level.

** Impact Side

APPENDIX A
PHOTOGRAPHIC COVERAGE

APPENDIX B

DATA PLOTS

MISPLACED

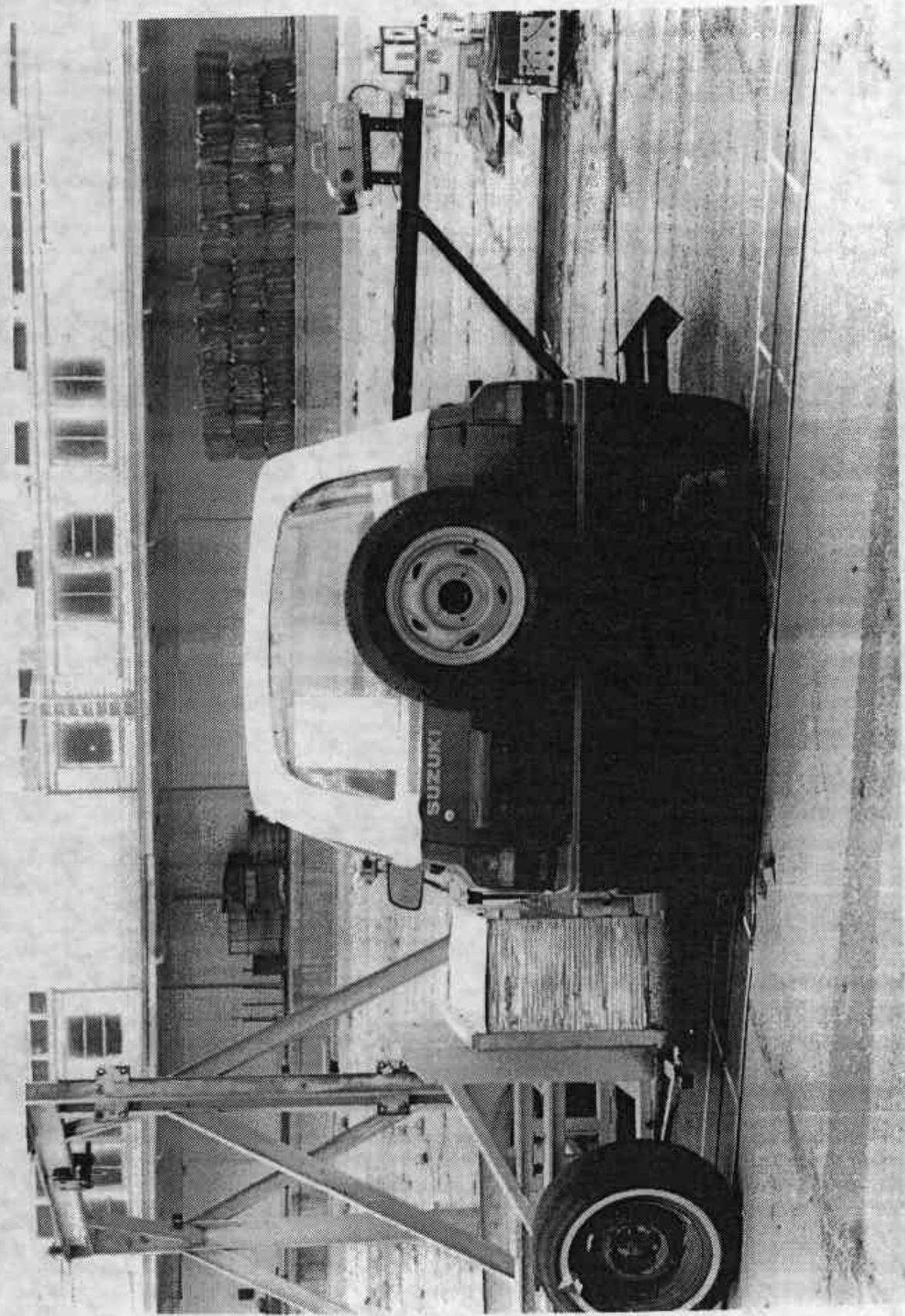


FIGURE A-1 MDB AT TEST VEHICLE, OVERALL VIEW PRETEST

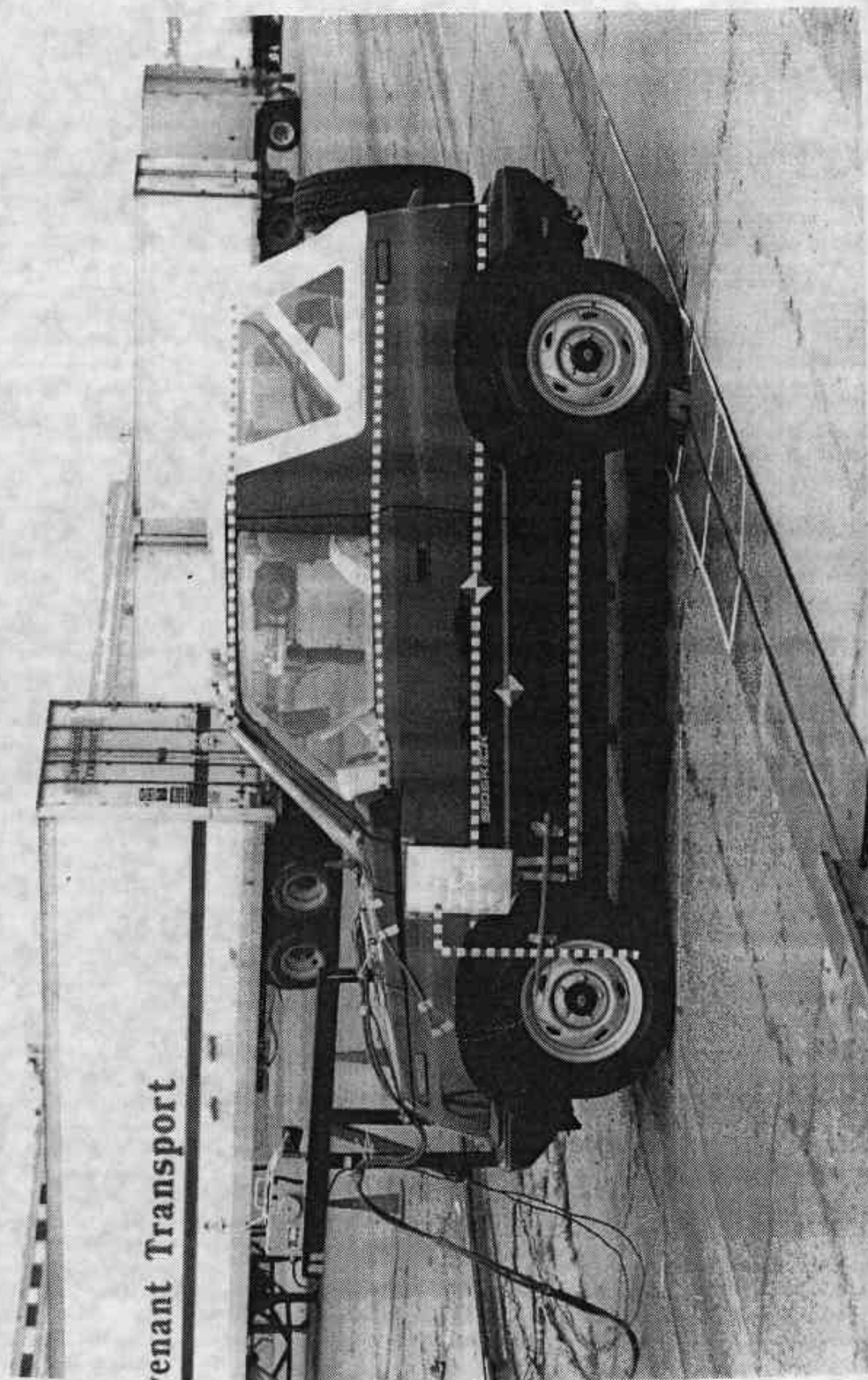


FIGURE A-2 TEST VEHICLE, LEFT SIDE VIEW - PRETEST

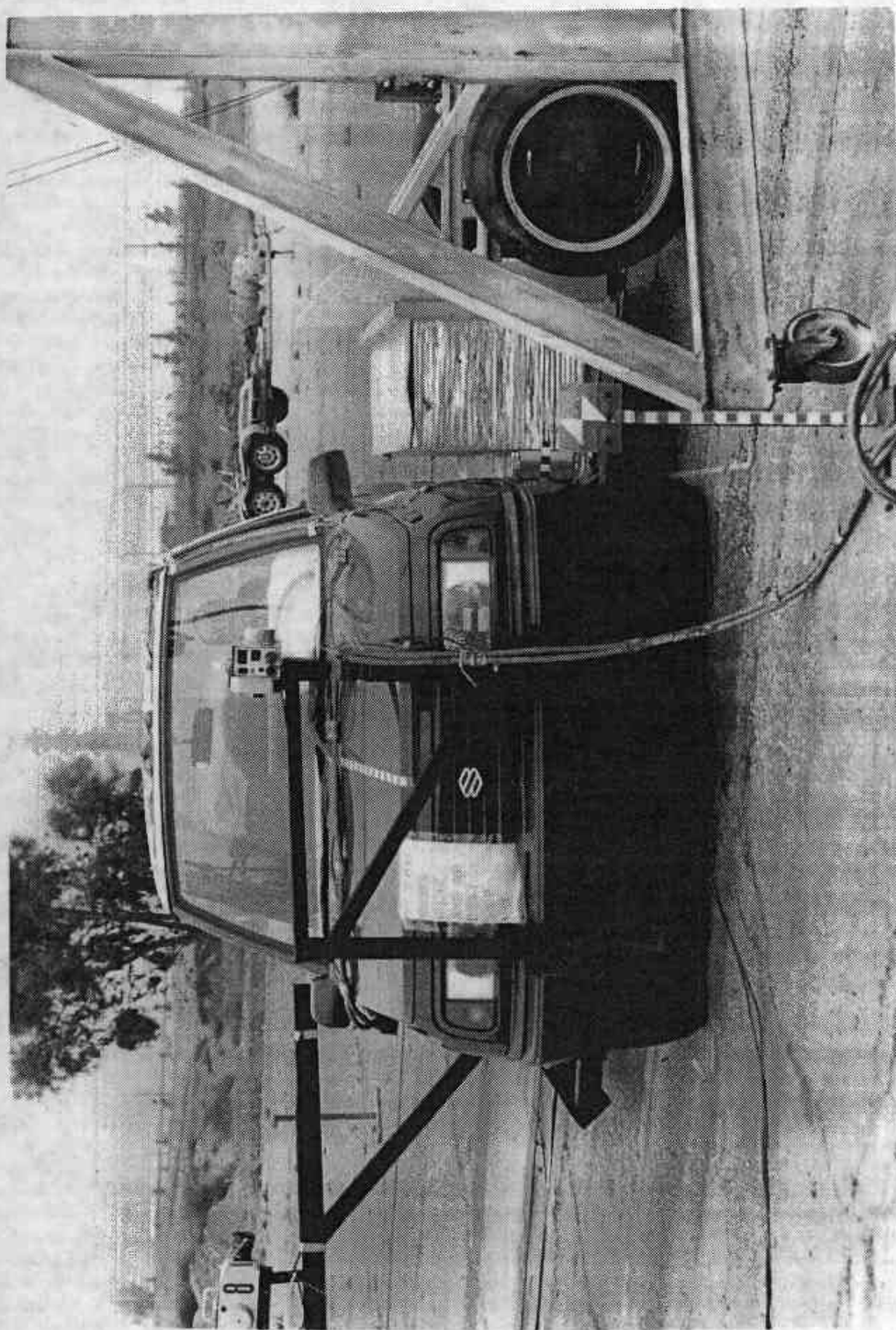


FIGURE A-3 TEST VEHICLE AND MDB, FRONT VIEW - PRETEST

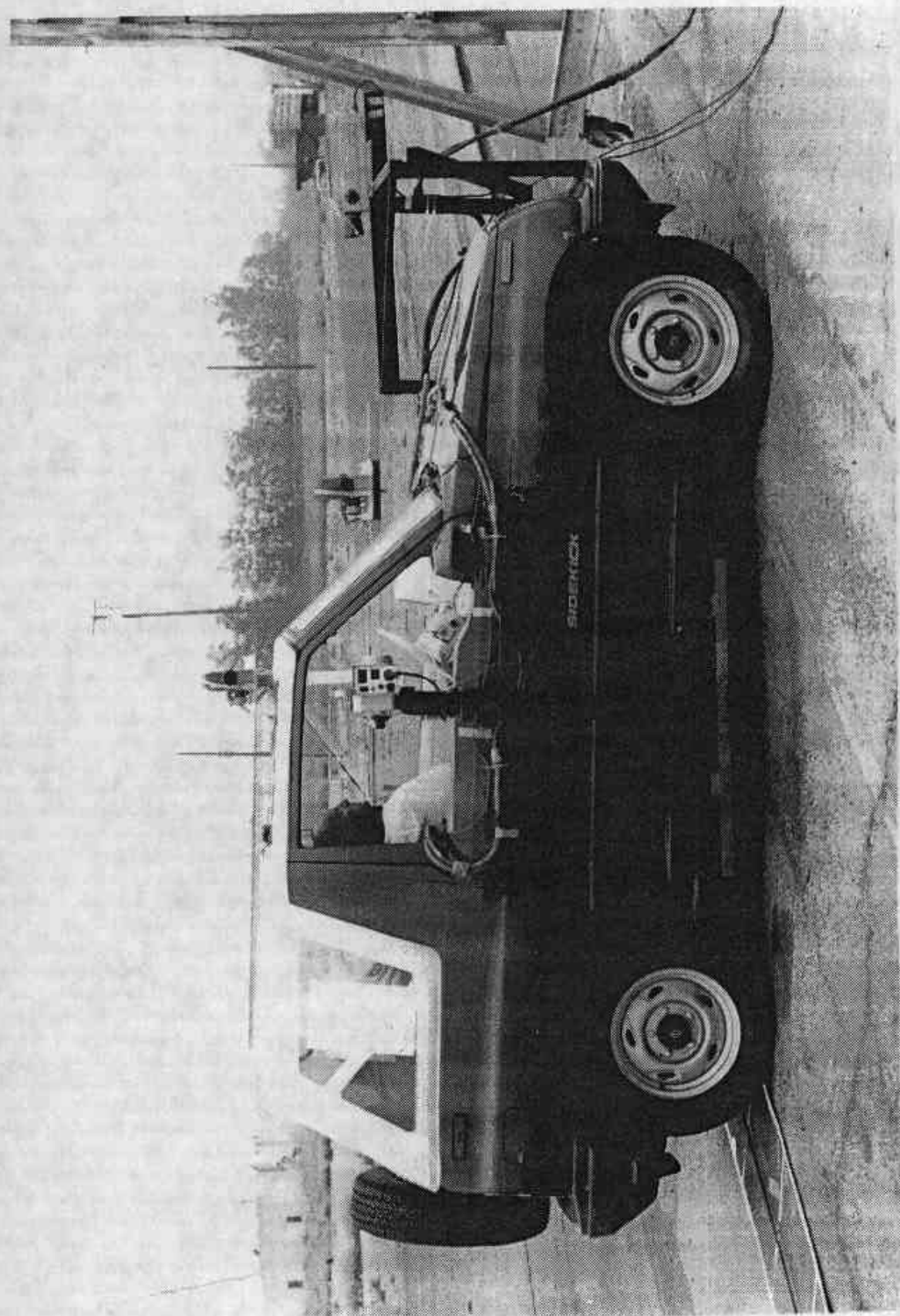


FIGURE A-4 TEST VEHICLE, RIGHT SIDE VIEW - PRETEST

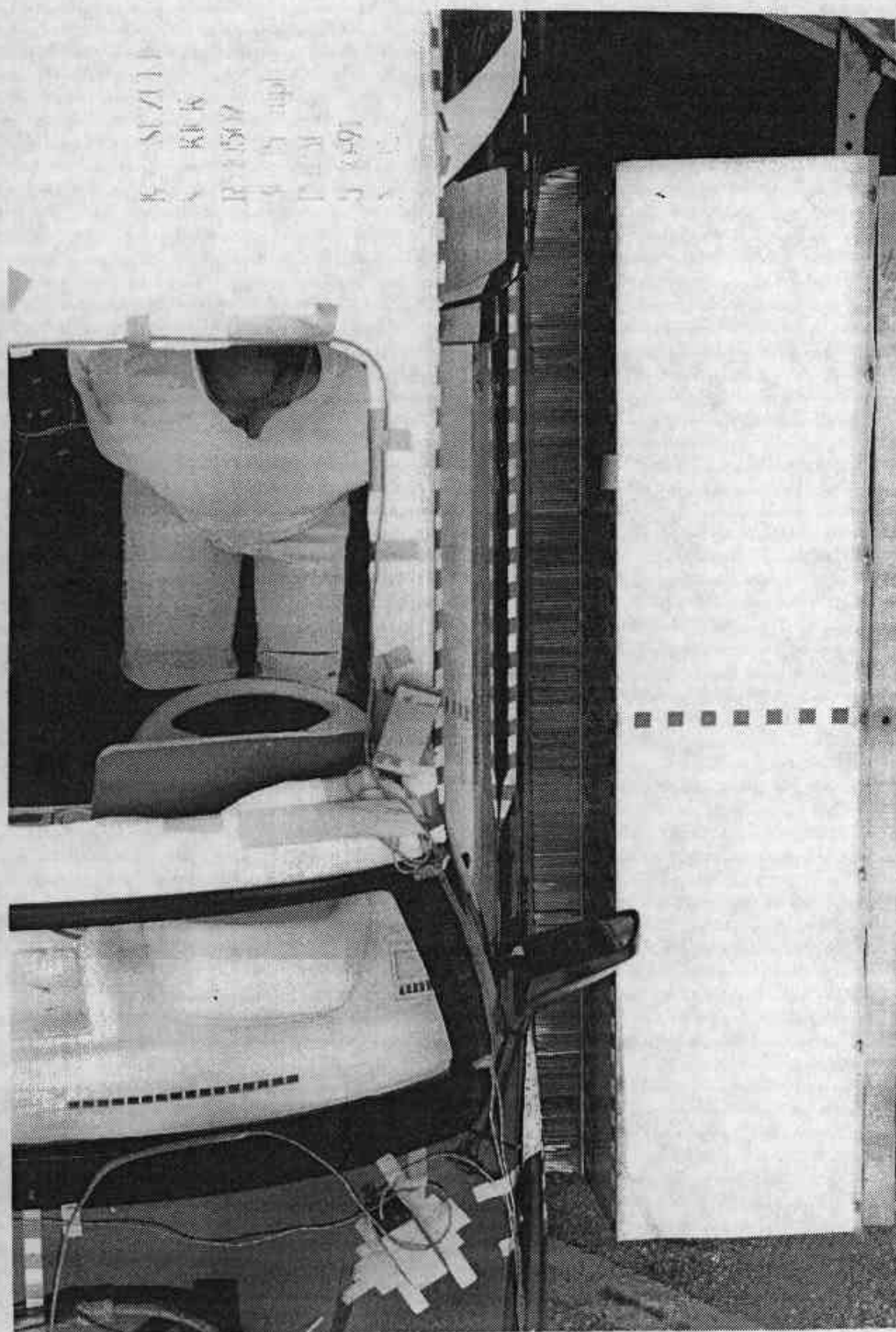


FIGURE A-5 TEST VEHICLE AND MDB, OVERHEAD VIEW - PRETEST



FIGURE A-6 TEST VEHICLE, DRIVER SIDE DOOR, PRETEST



FIGURE A-7 SID IN DRIVER POSITION, PRETEST

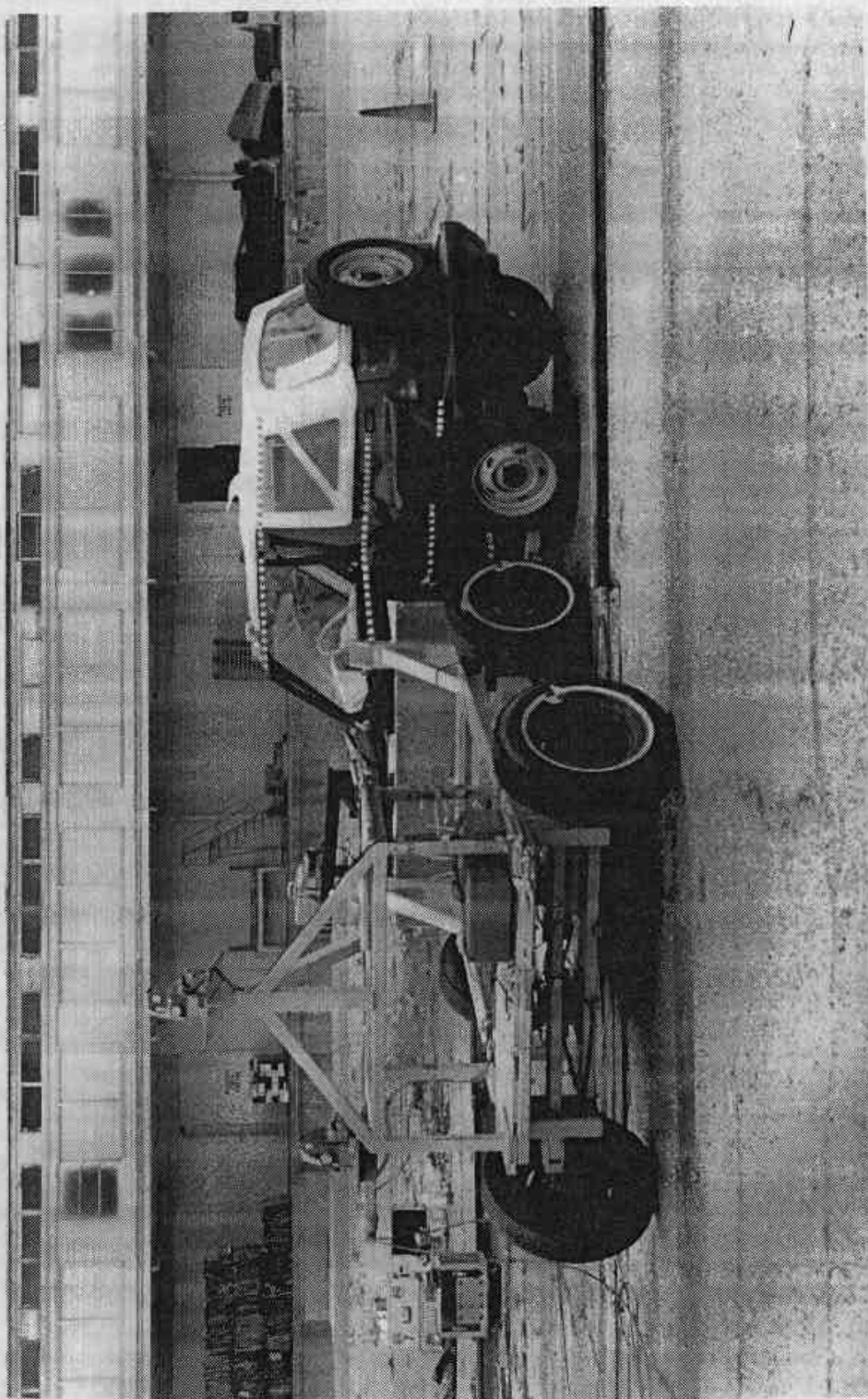


FIGURE A-8 MDB AND TEST VEHICLE, OVERALL VIEW - POSTTEST

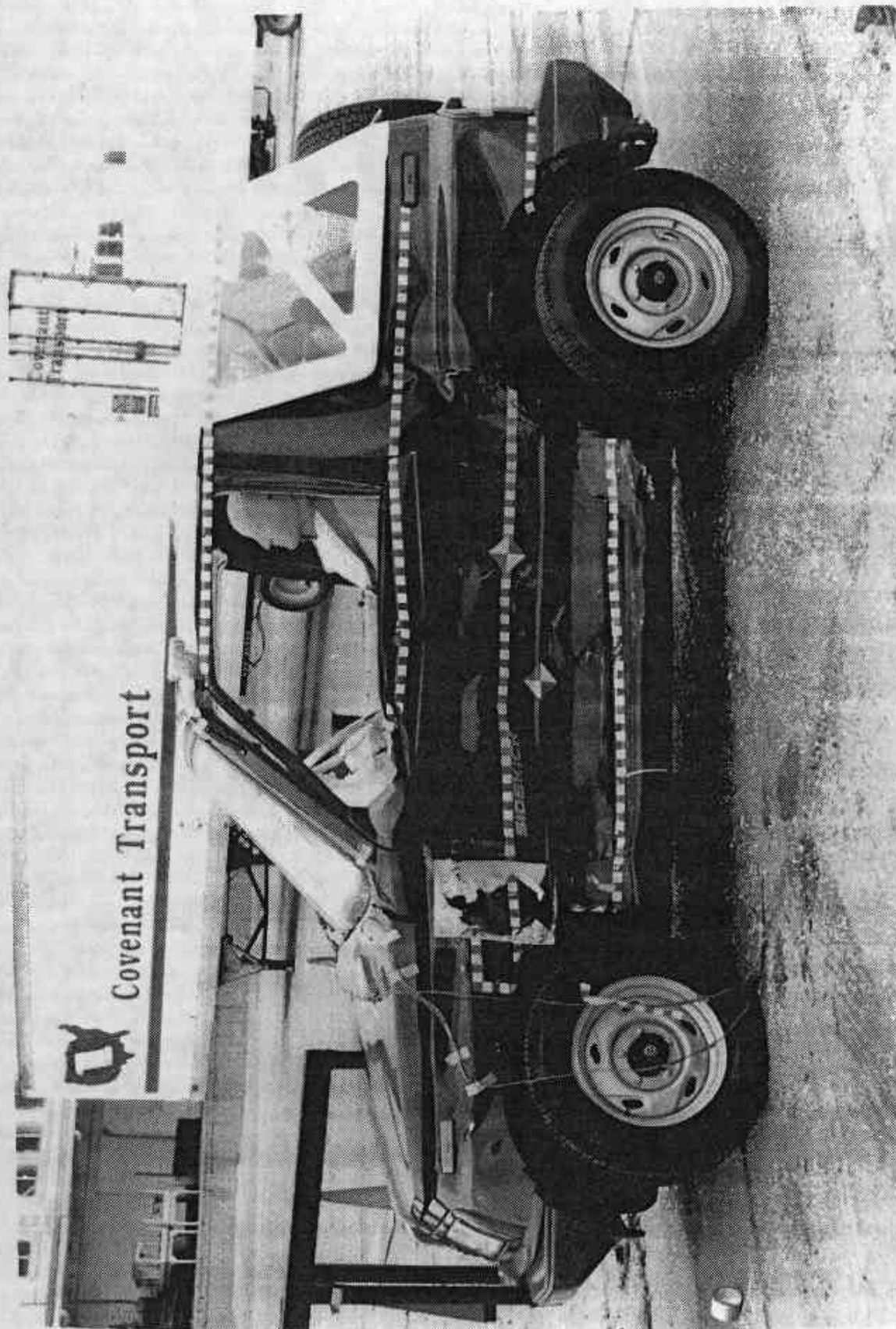


FIGURE A-9 TEST VEHICLE, LEFT SIDE VIEW - POSTTEST

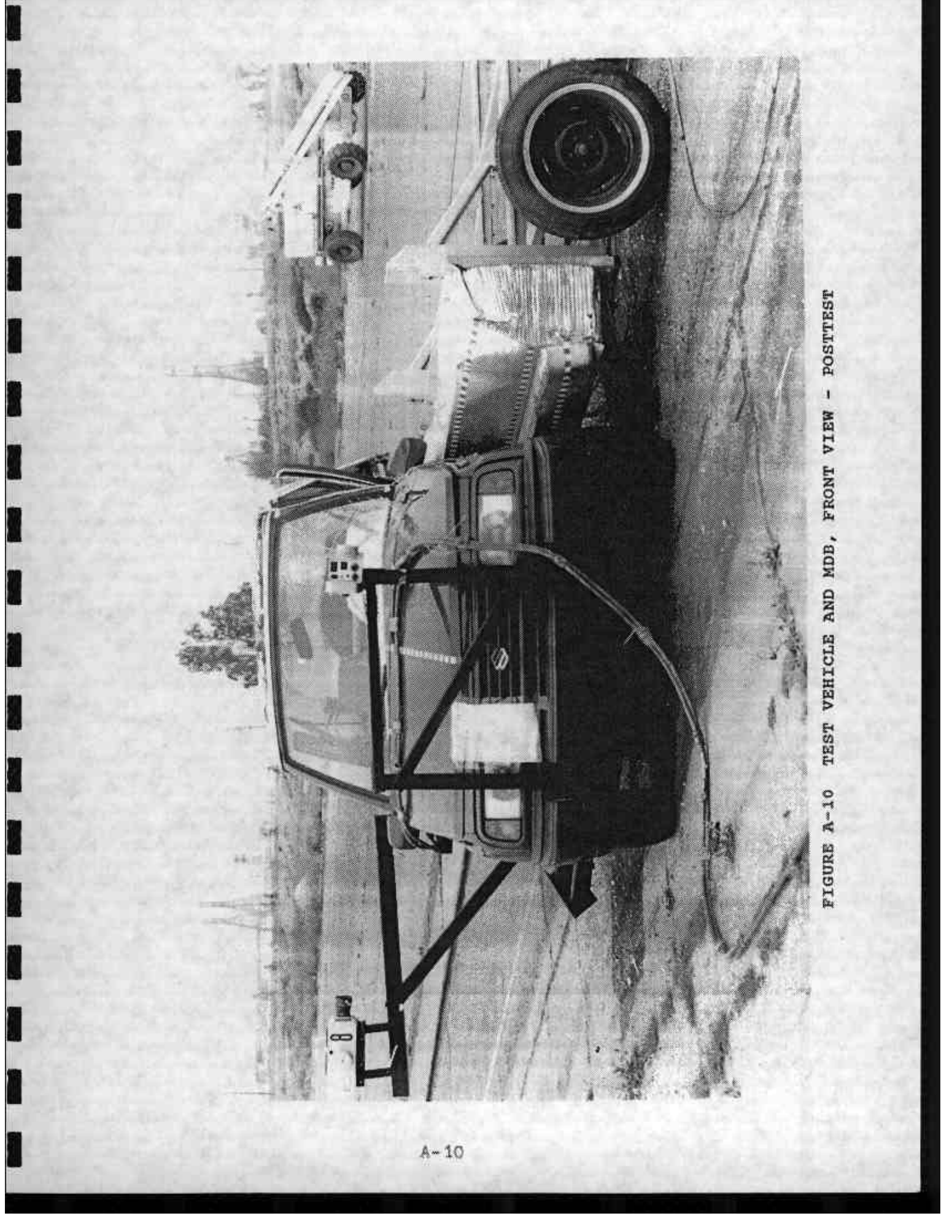


FIGURE A-10 TEST VEHICLE AND MDB, FRONT VIEW - POSTTEST

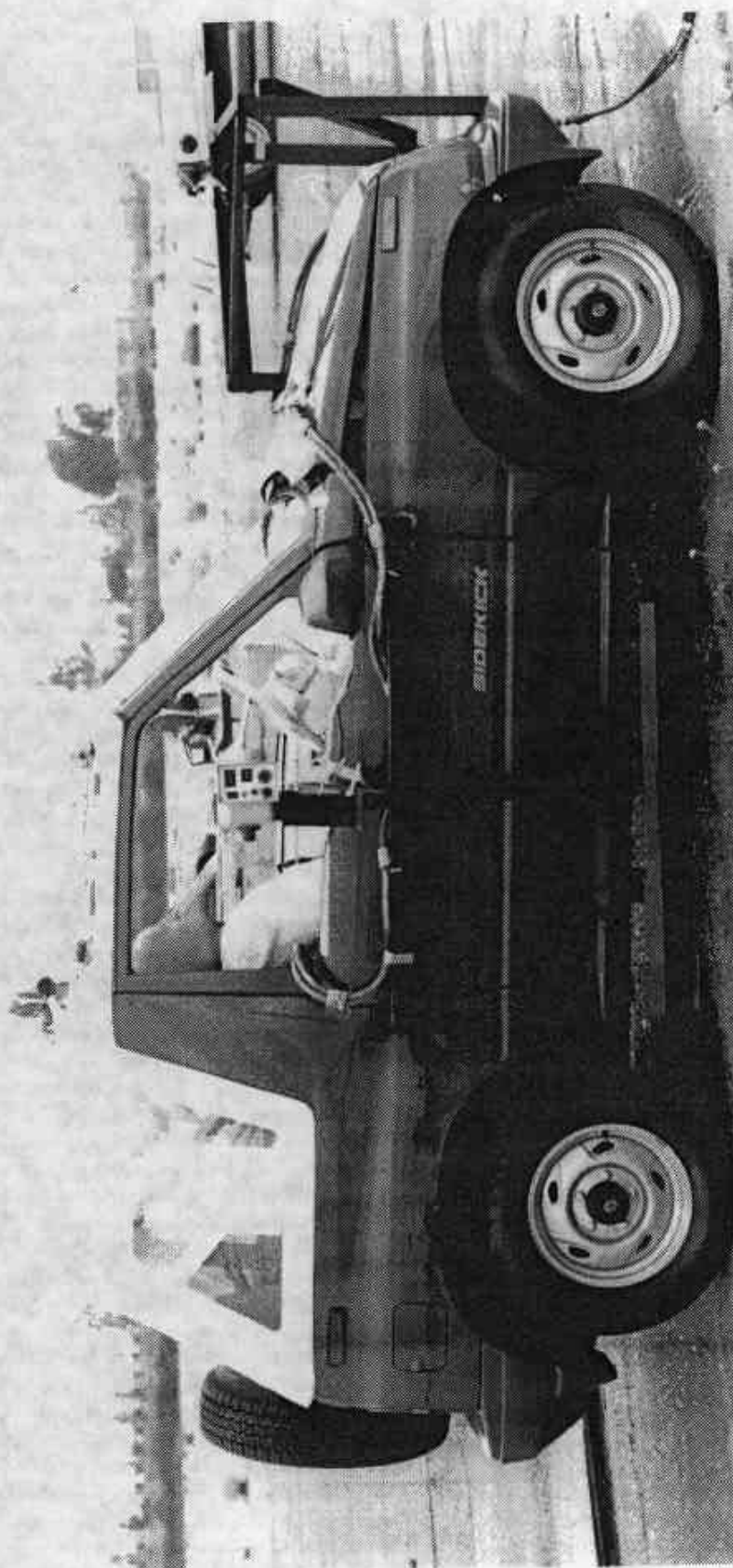


FIGURE A-11 TEST VEHICLE, RIGHT SIDE VIEW - POSTTEST

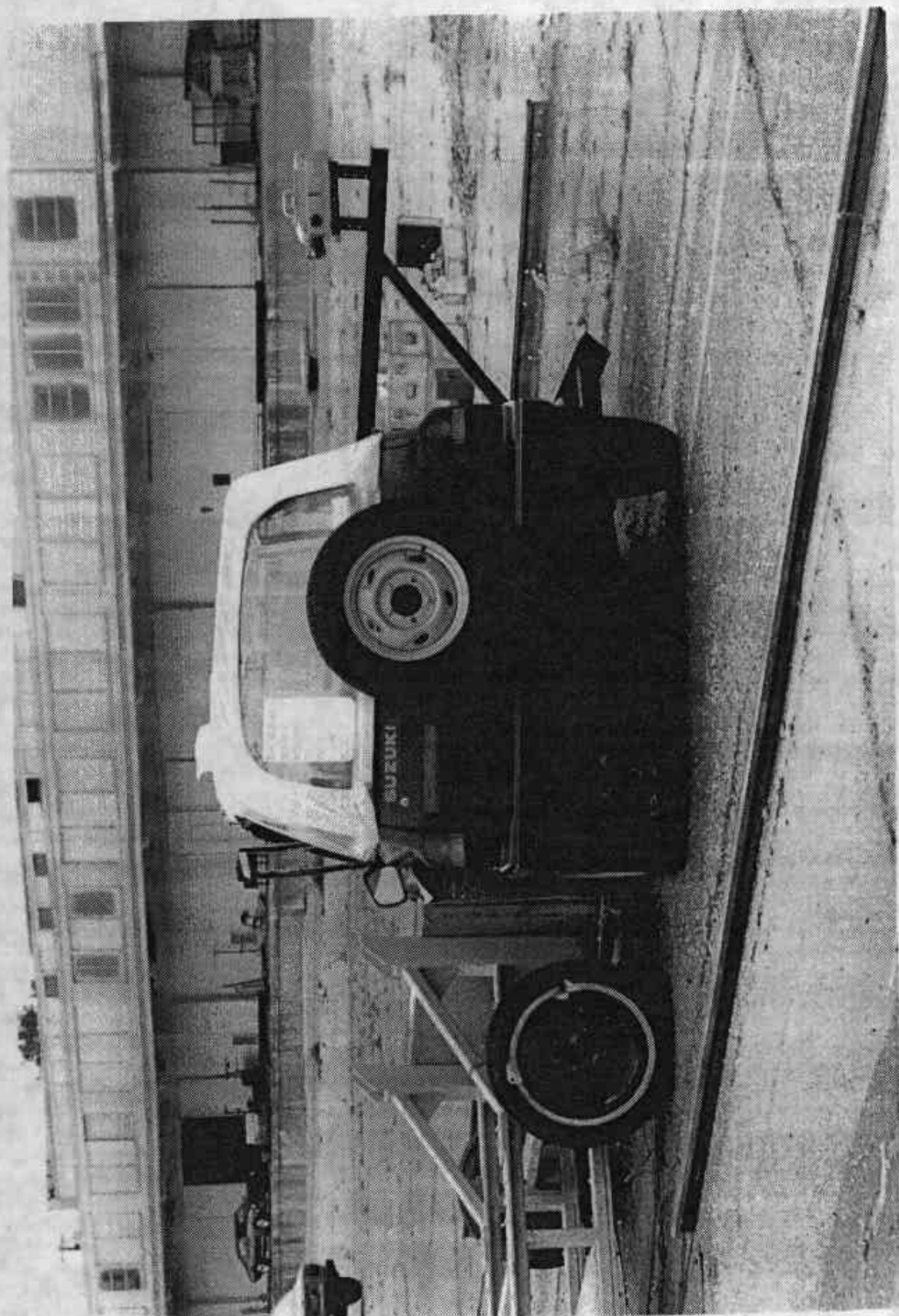


FIGURE A-12 MDB AND TEST VEHICLE, REAR VIEW - POSTTEST

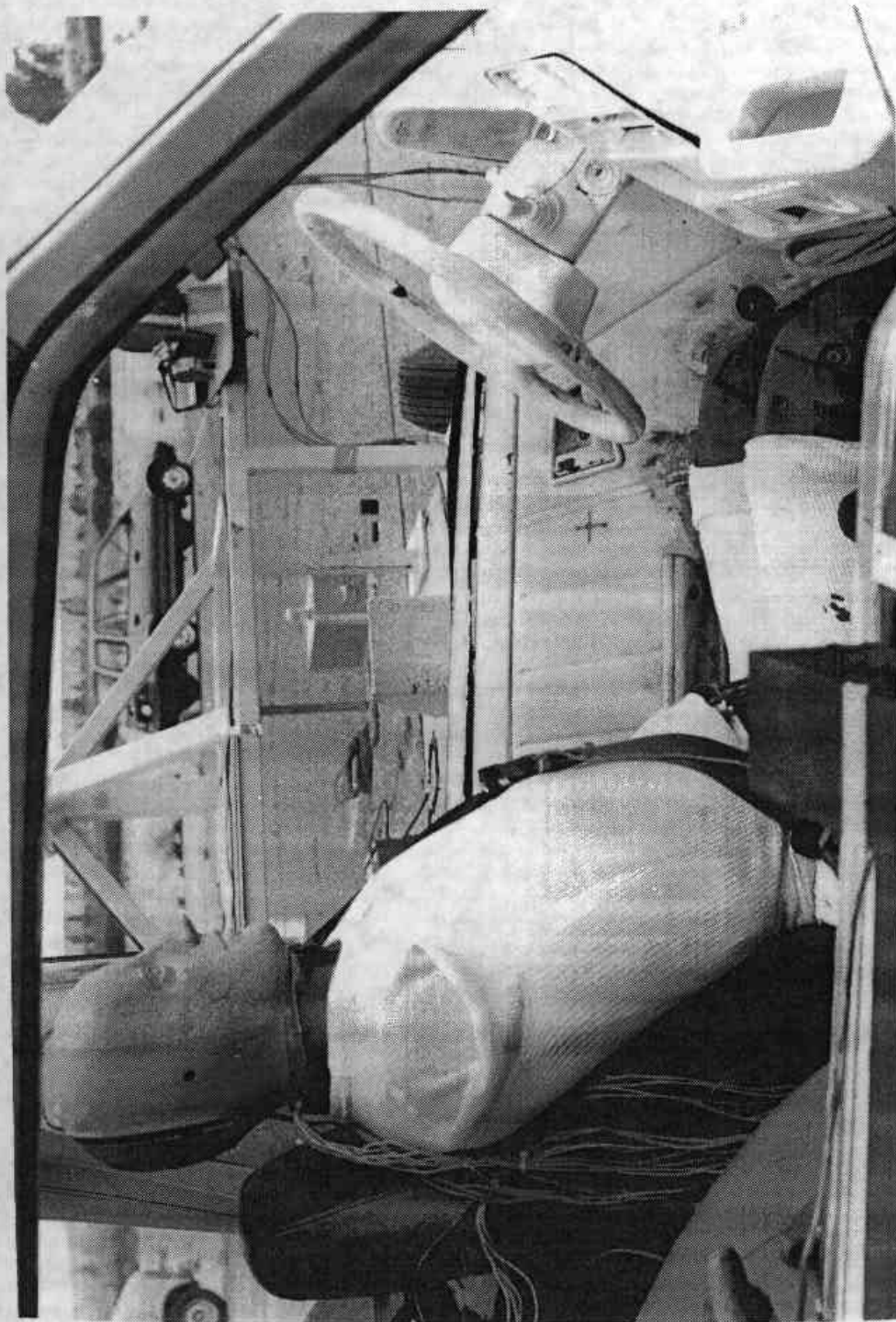


FIGURE A-13 SID FINAL POSITION - POSTTEST



FIGURE A-14 OCCUPANT COMPARTMENT INTERIOR - POSTTEST

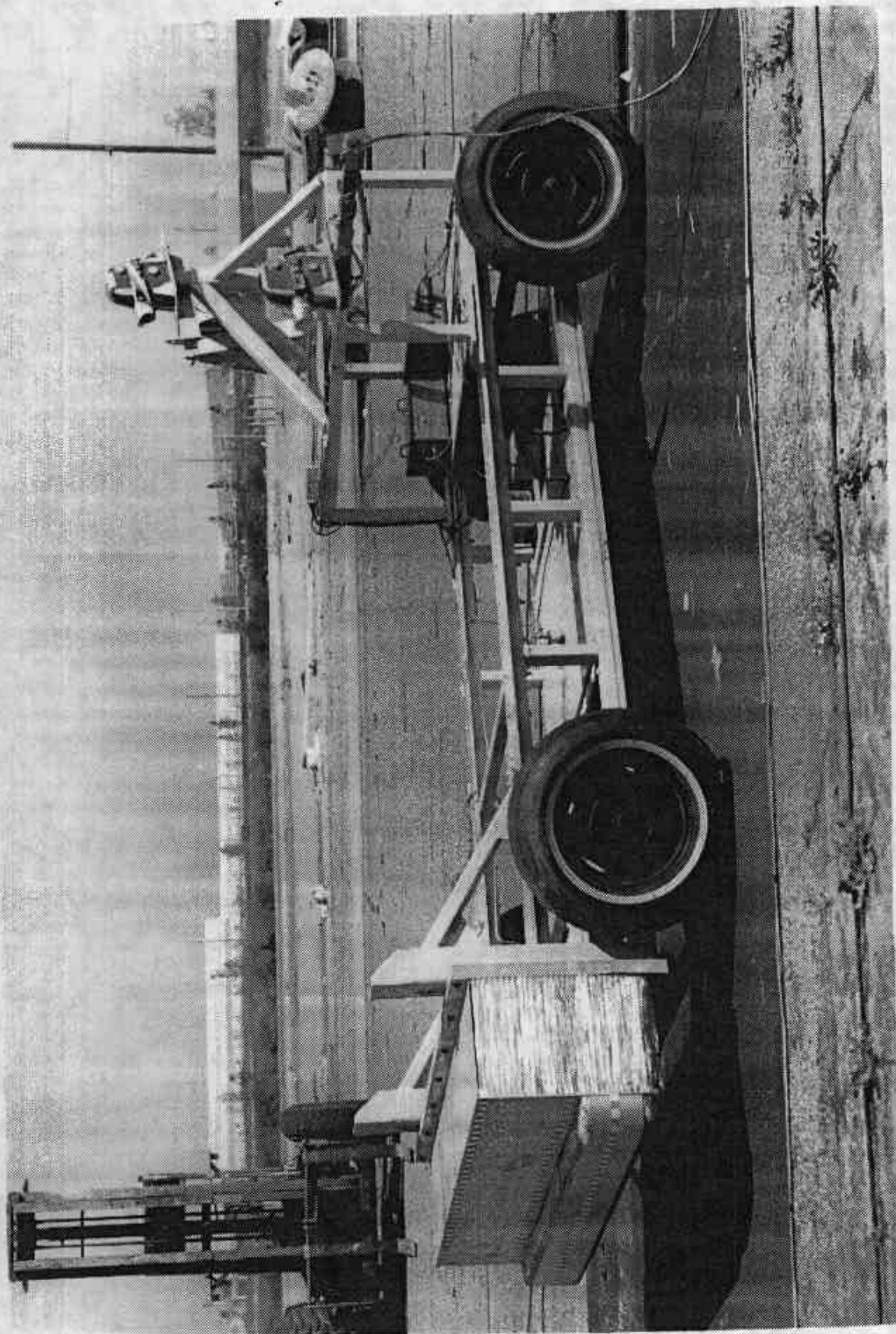


FIGURE A-15 MDB, VIEW NO. 1 - PRETEST

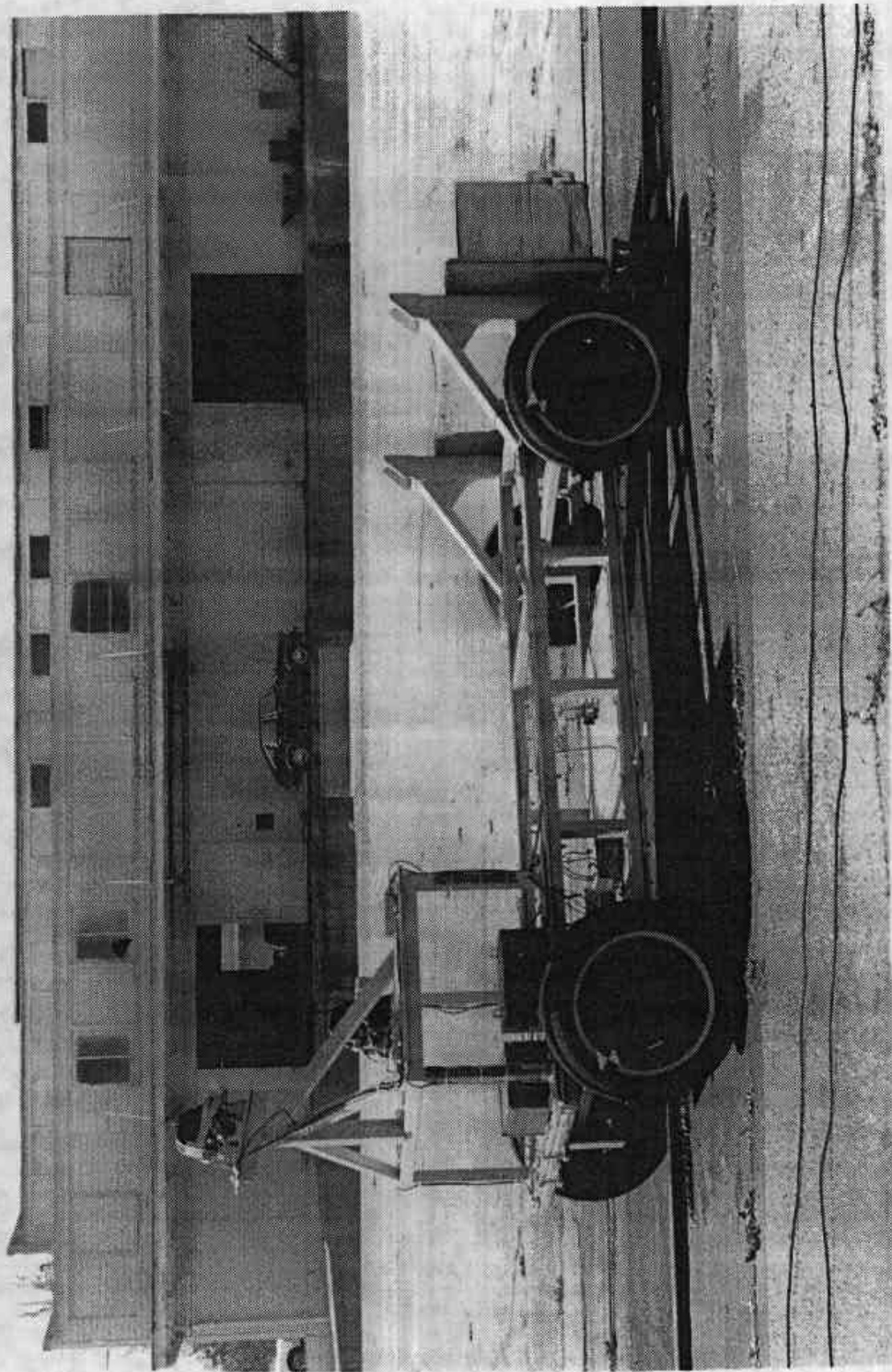


FIGURE A-16 MDB, VIEW NO. 2 - PRETEST

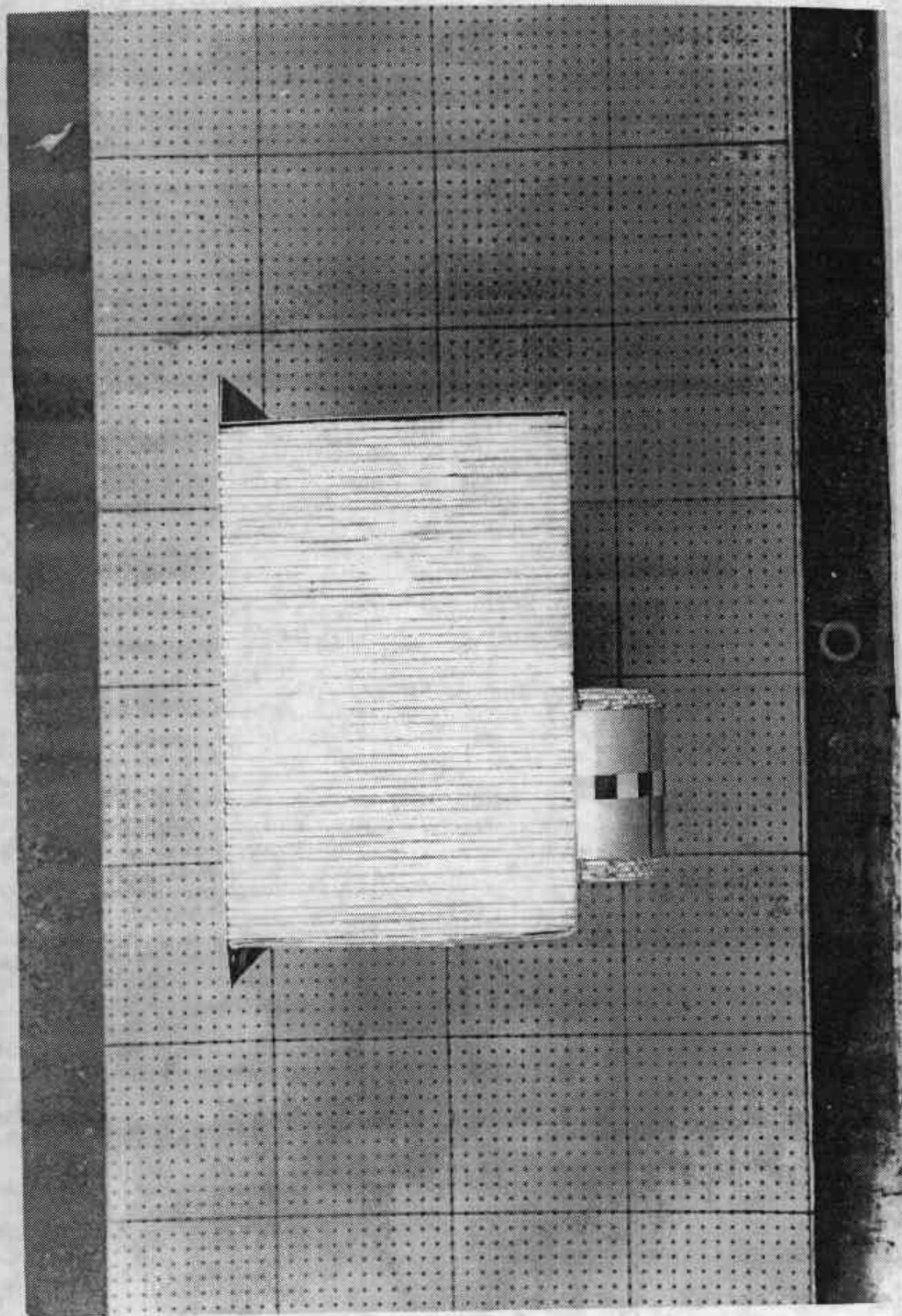


FIGURE A-17 MDB FACE, VIEW NO. 1 - PRETEST

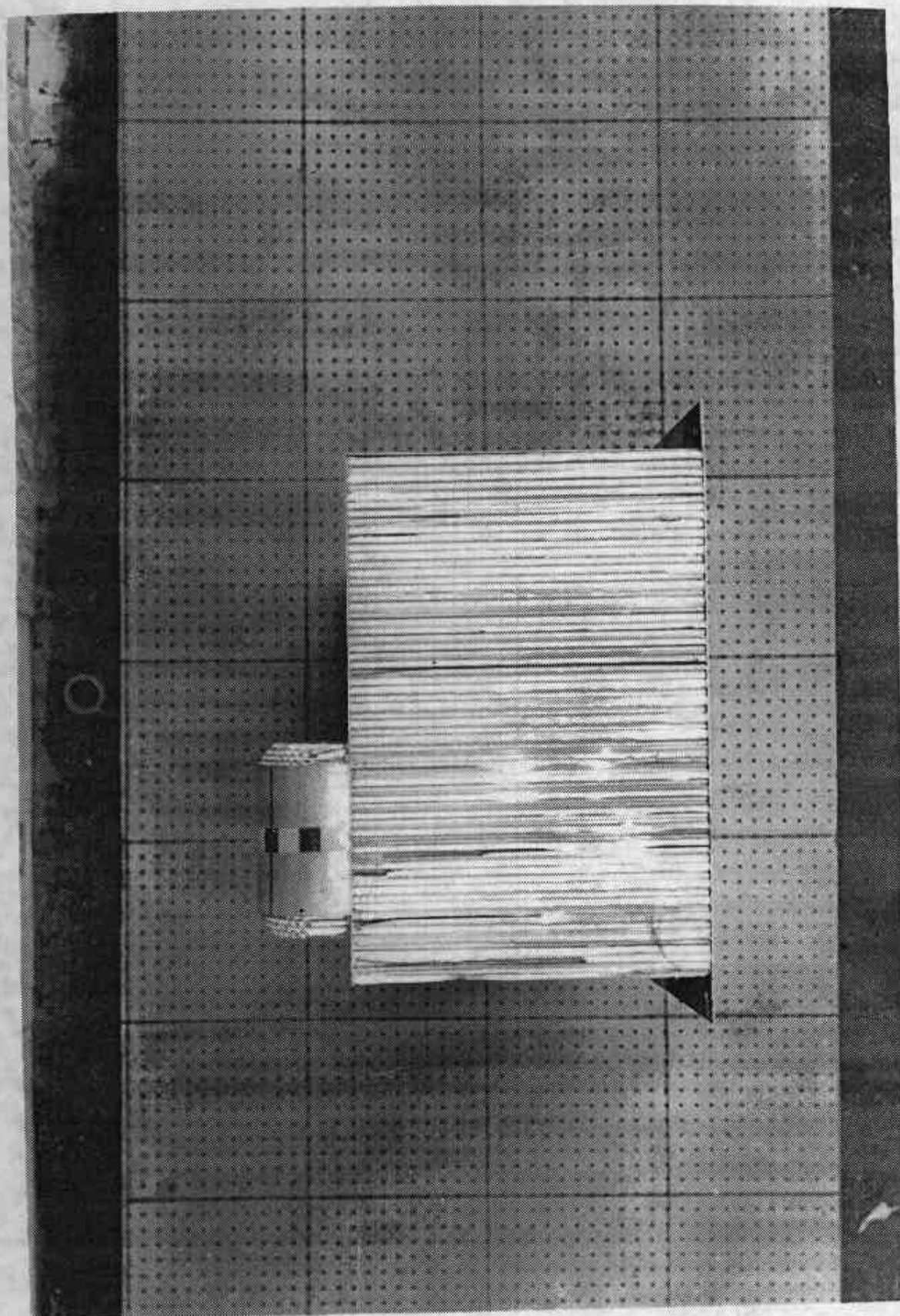


FIGURE A-18 MDB FACE, VIEW NO. 2 - PRETEST
A-18

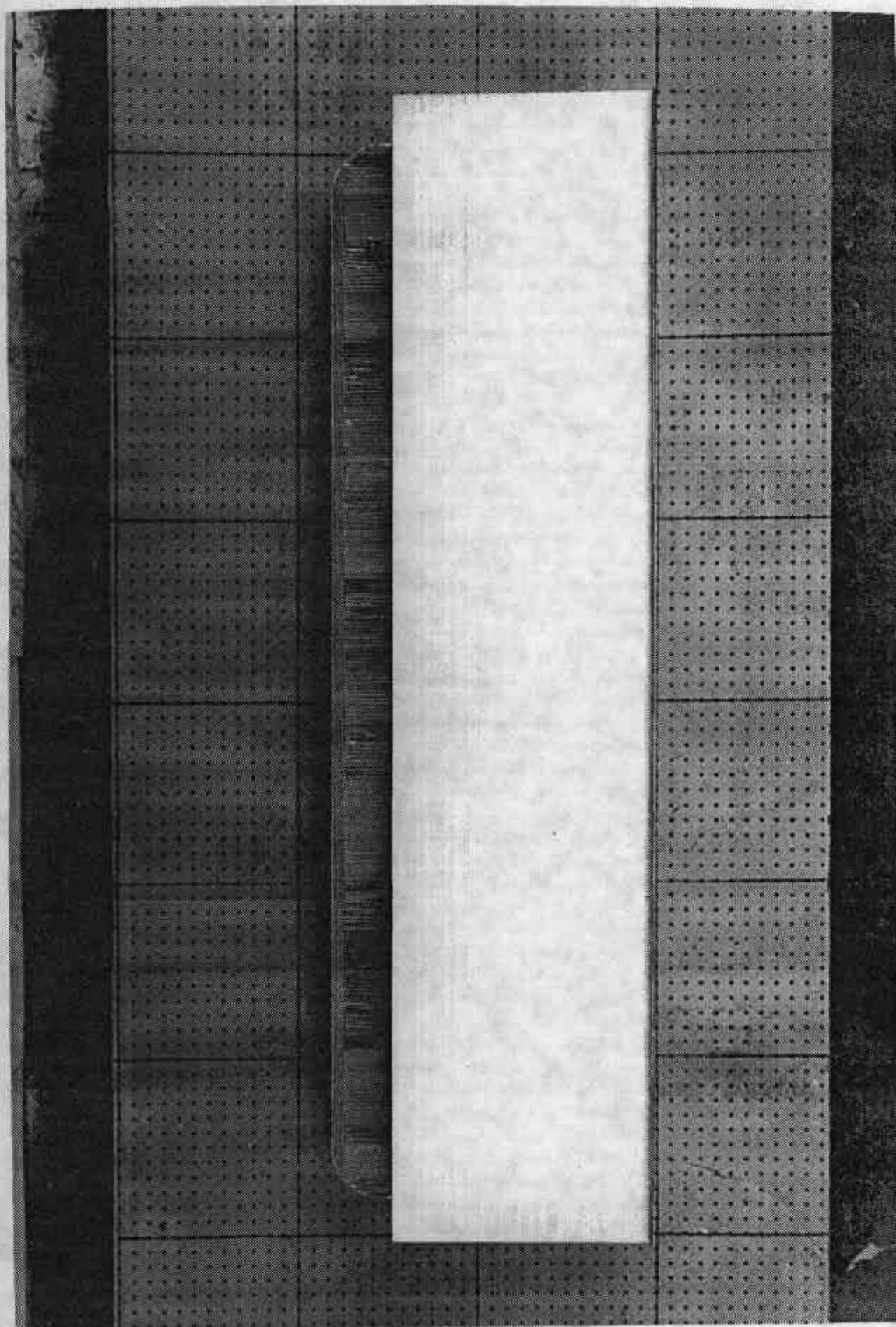


FIGURE A-19 MDB FACE, VIEW NO. 3 - PRETEST

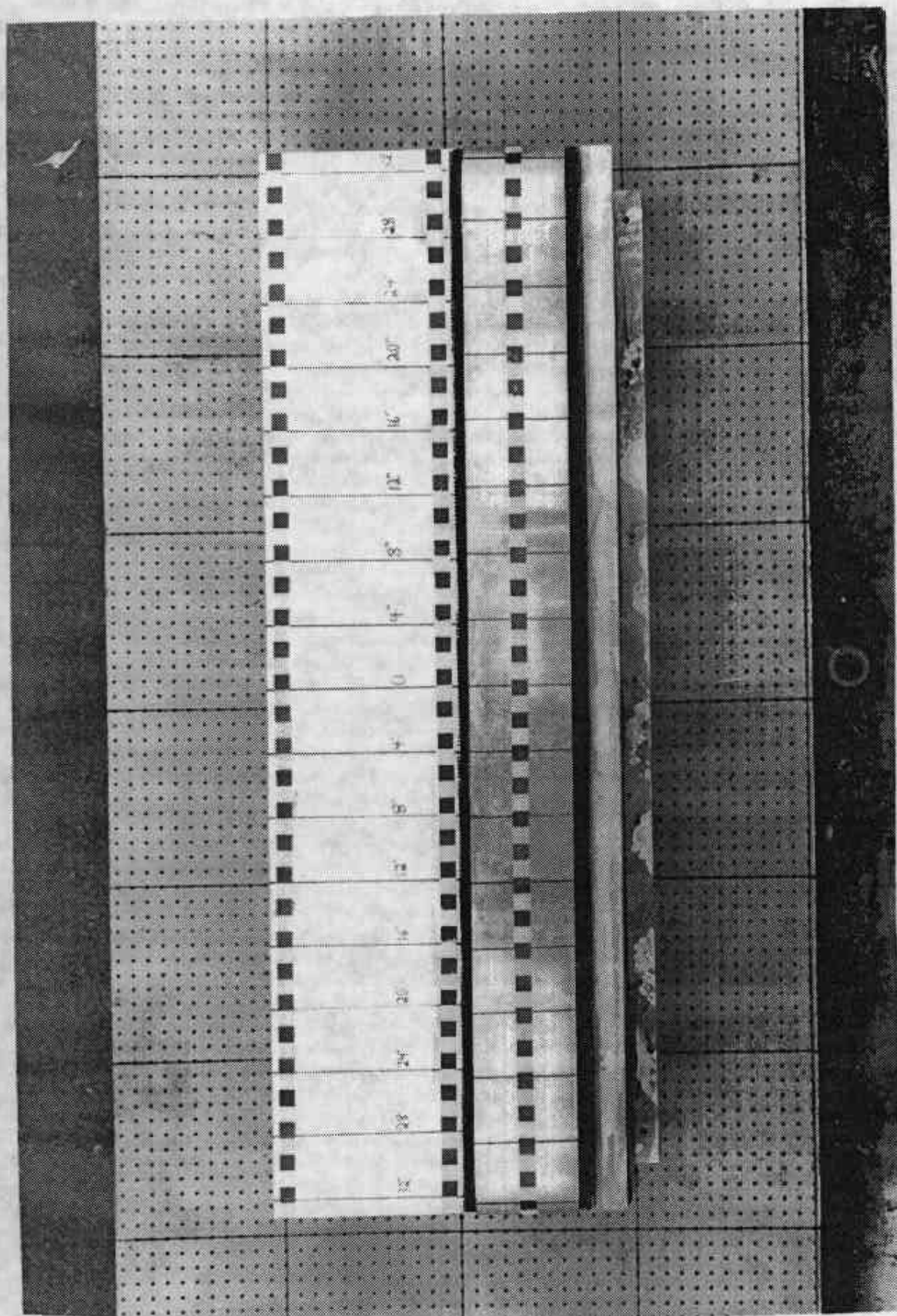


FIGURE A-20 MDB FACE, VIEW NO. 4 - PRETEST

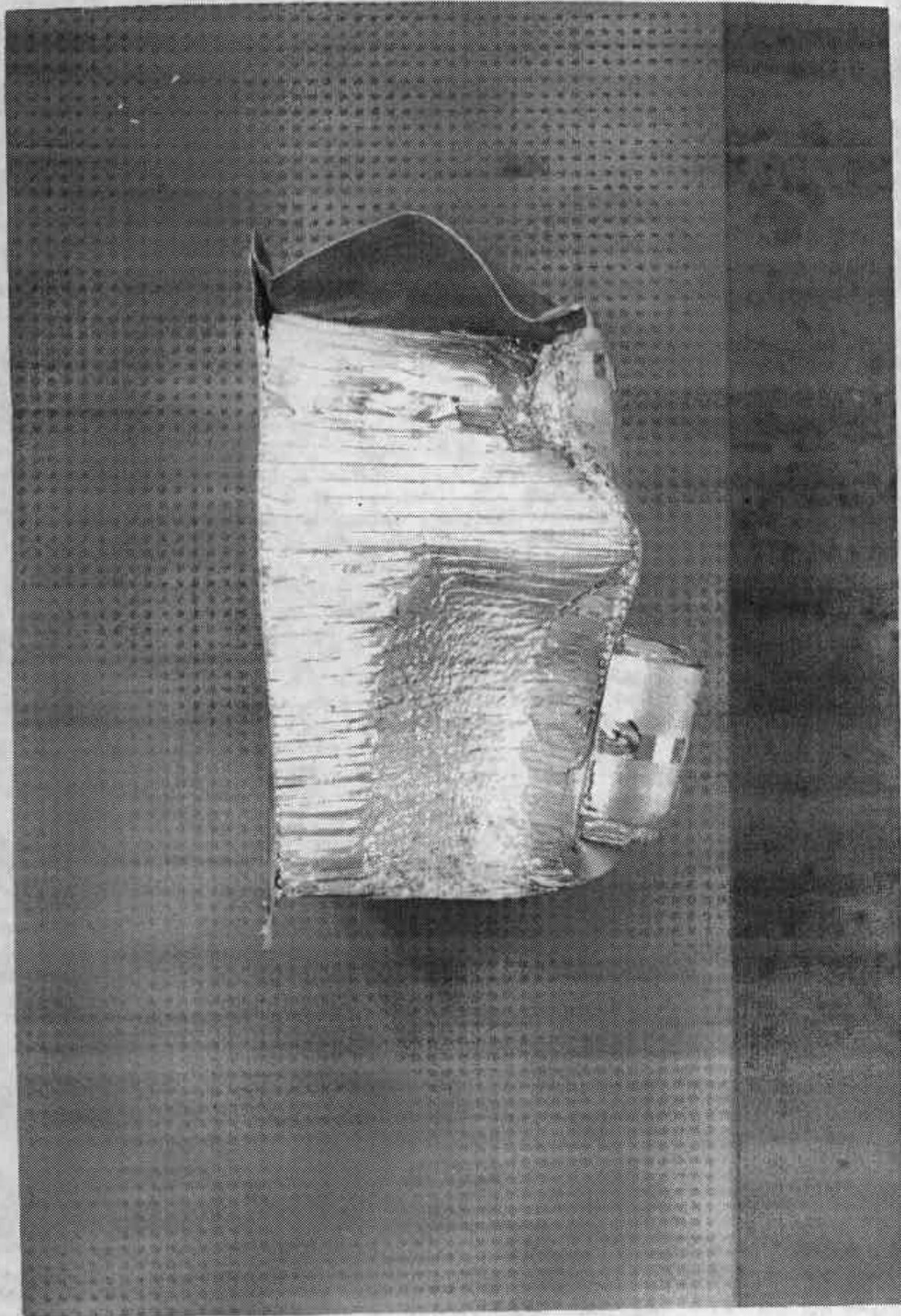


FIGURE A-21 MDB FACE, VIEW NO. 1 - POSTTEST

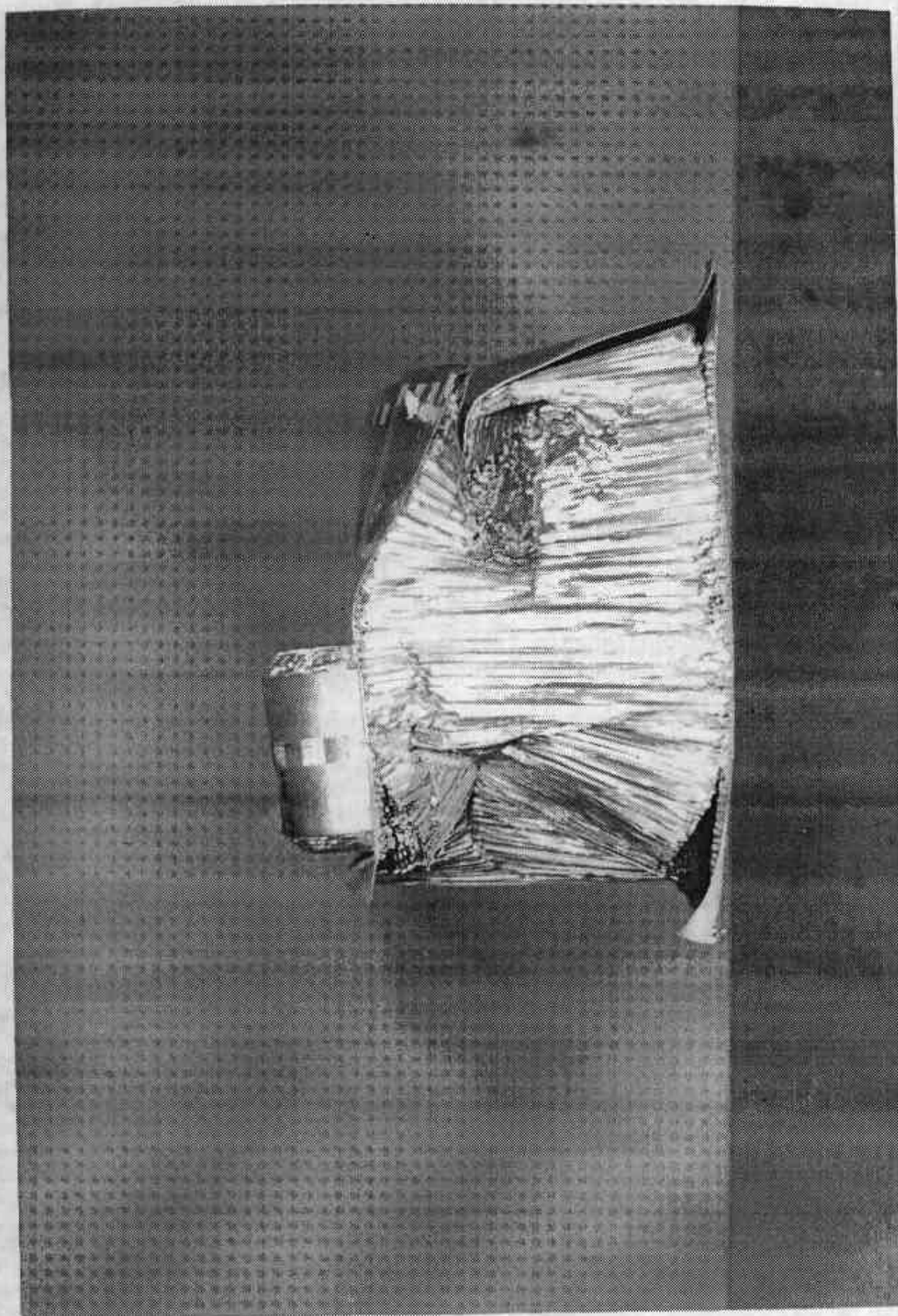


FIGURE A-22 MDB FACE, VIEW NO. 2 - POSTTEST

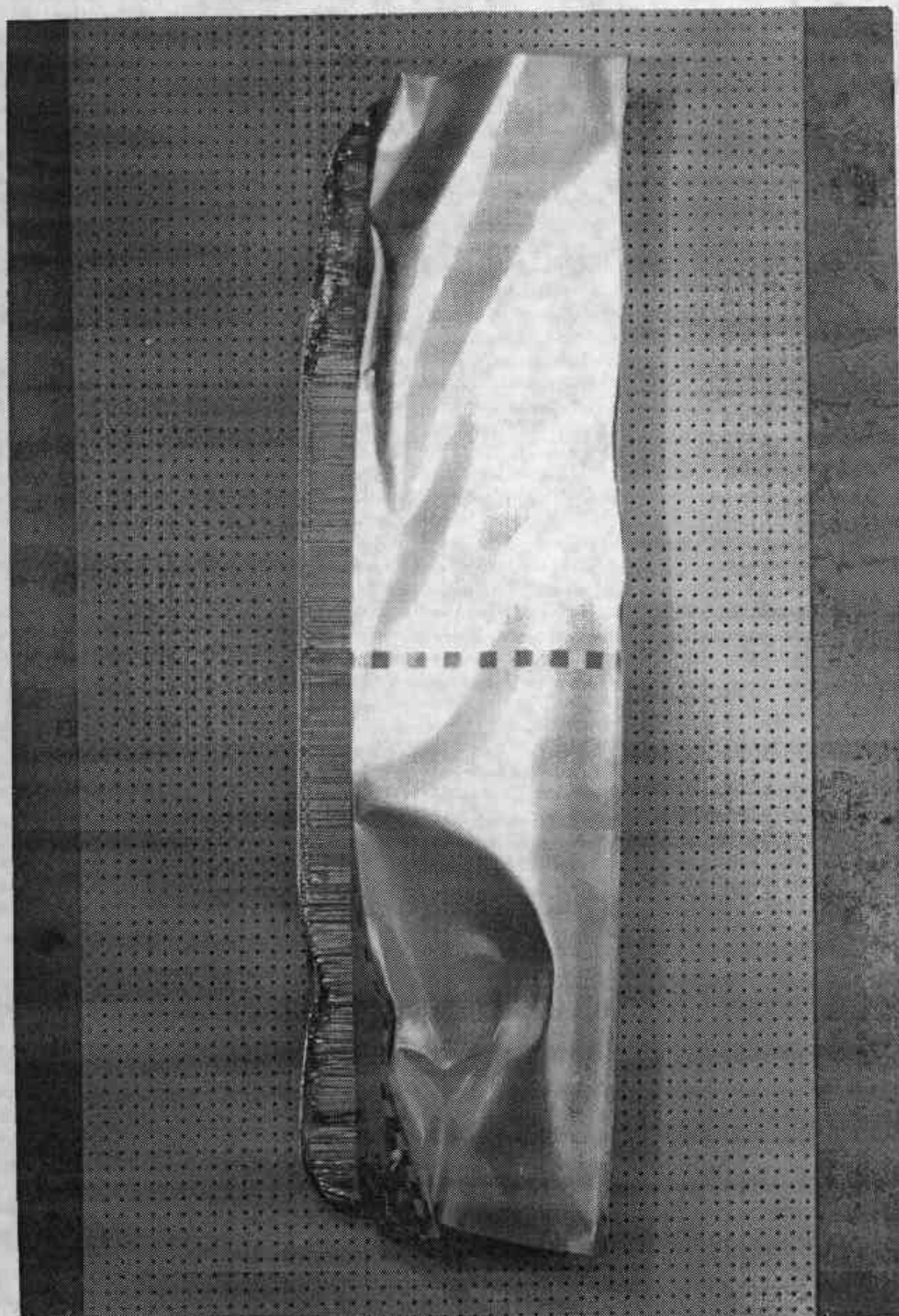


FIGURE A-23 MDB FACE, VIEW NO. 3 - POSTTEST

A-23

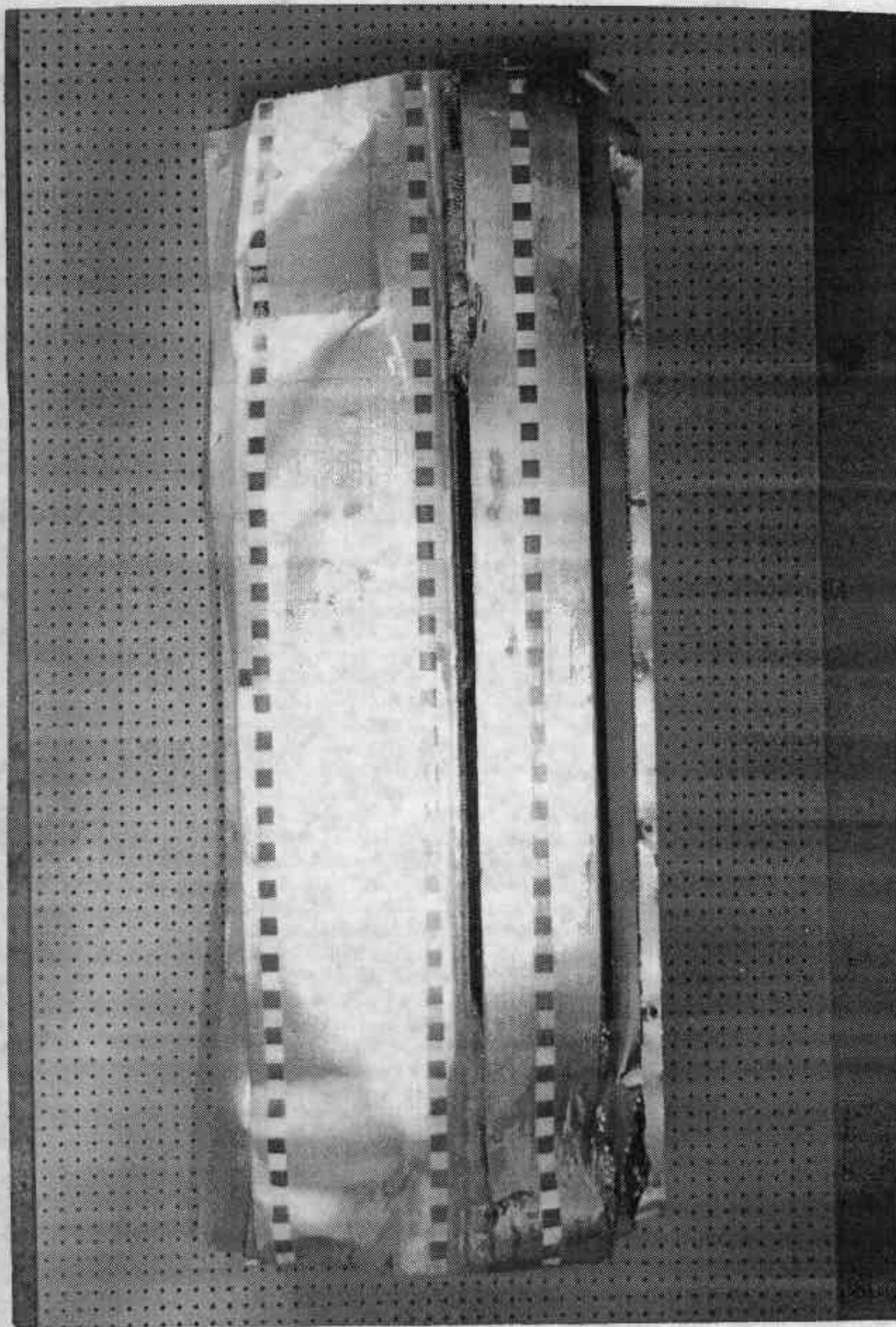
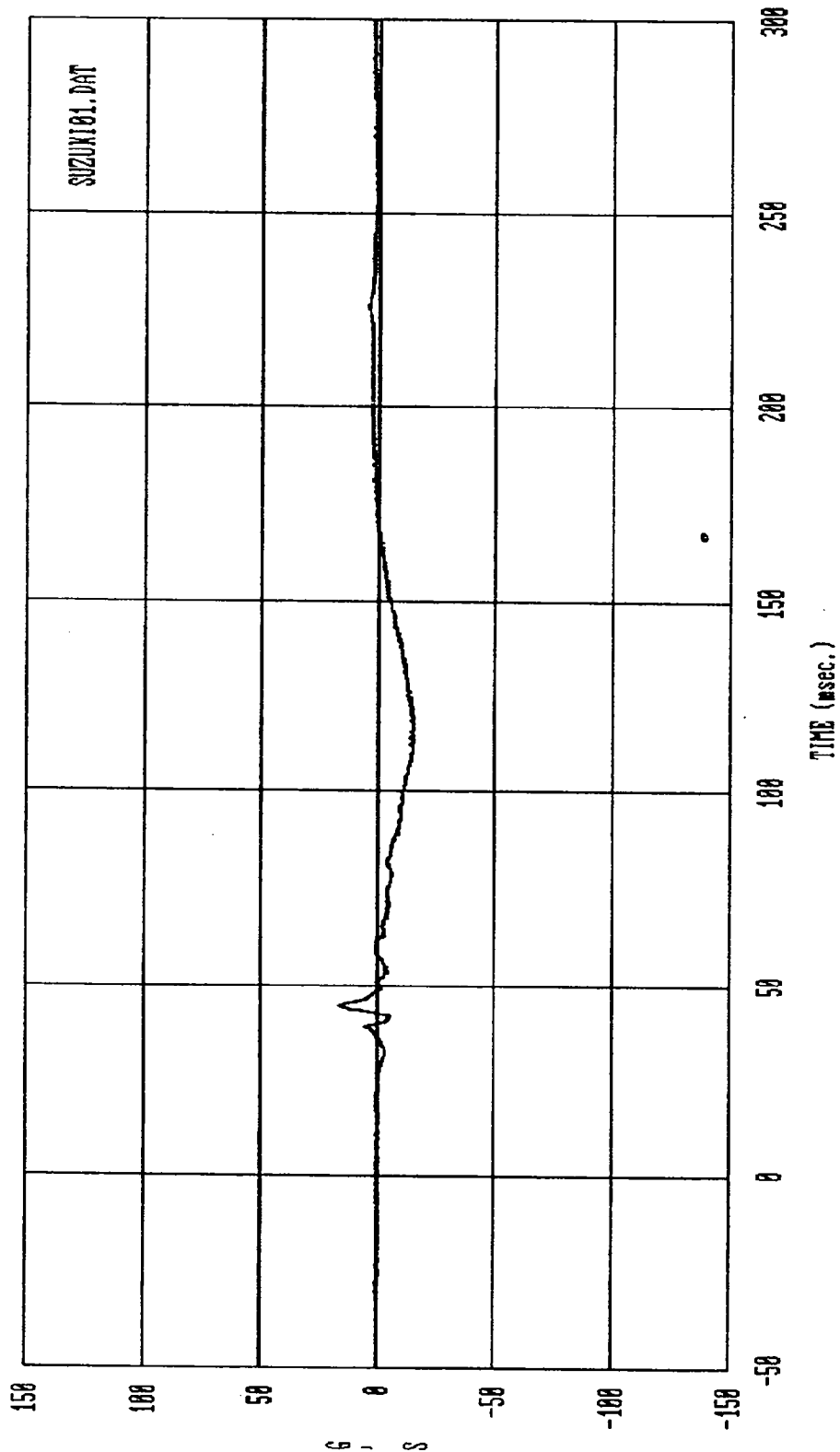


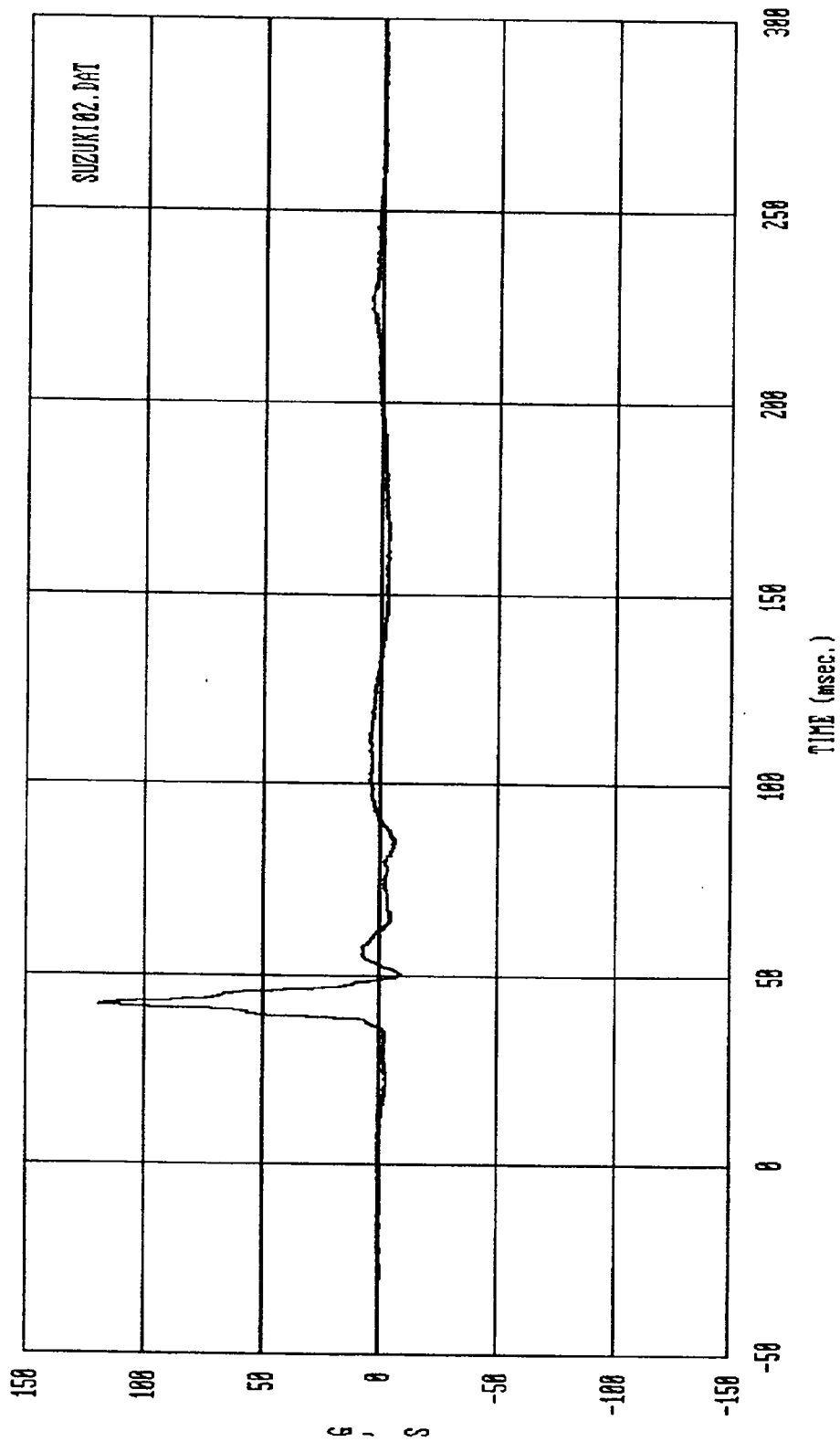
FIGURE A-24 MDB FACE, VIEW NO. 4 - POSTTEST

A-24



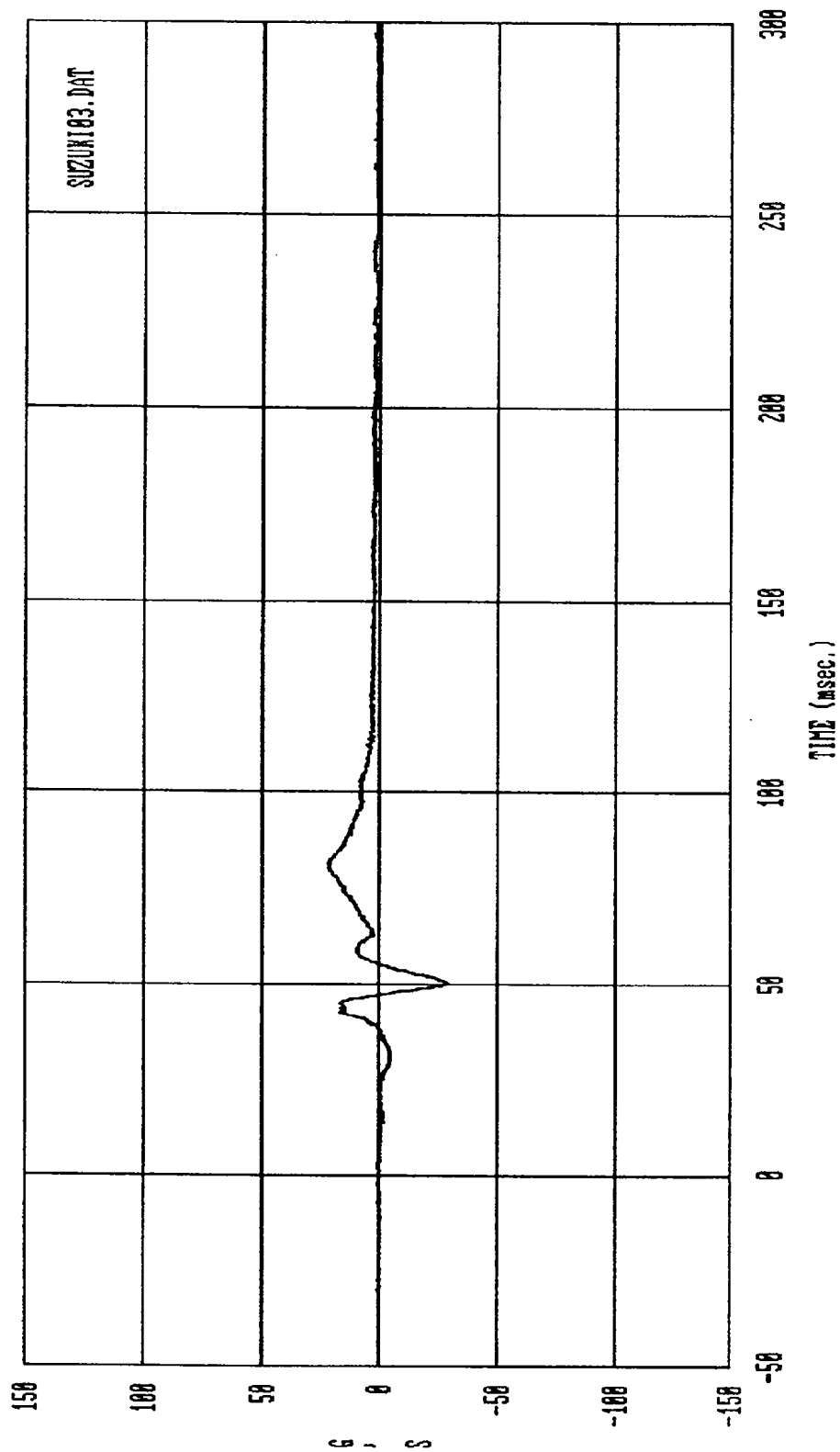
Curve: Driver Head acceleration -- X axis Filter: SAE CLASS 1000 Max = 16.408 Min = -15.506

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



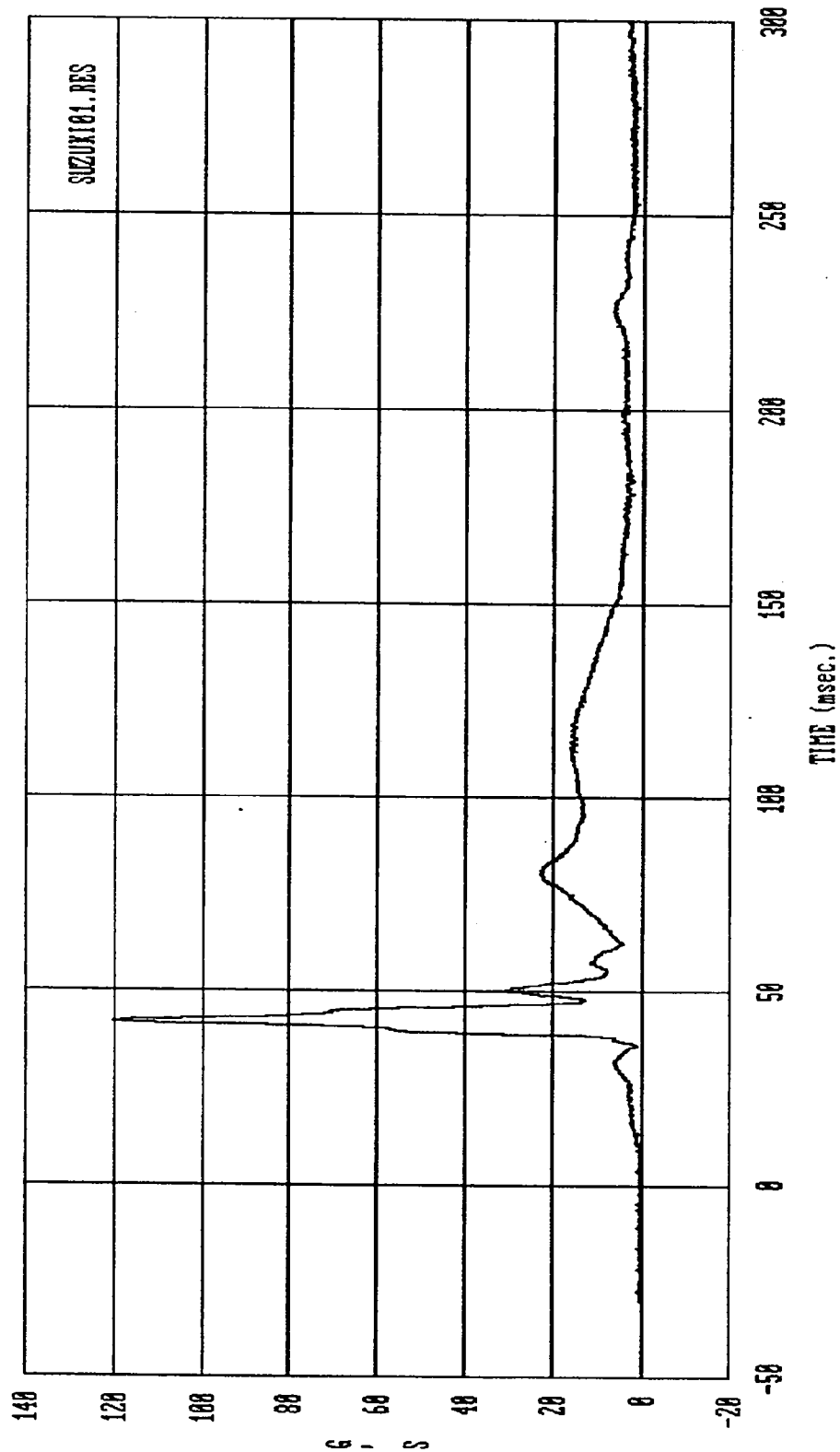
Curve: Driver Head acceleration — Y axis Filter: SAE CLASS 1000 Max = 119.50 Min = -9.0023

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



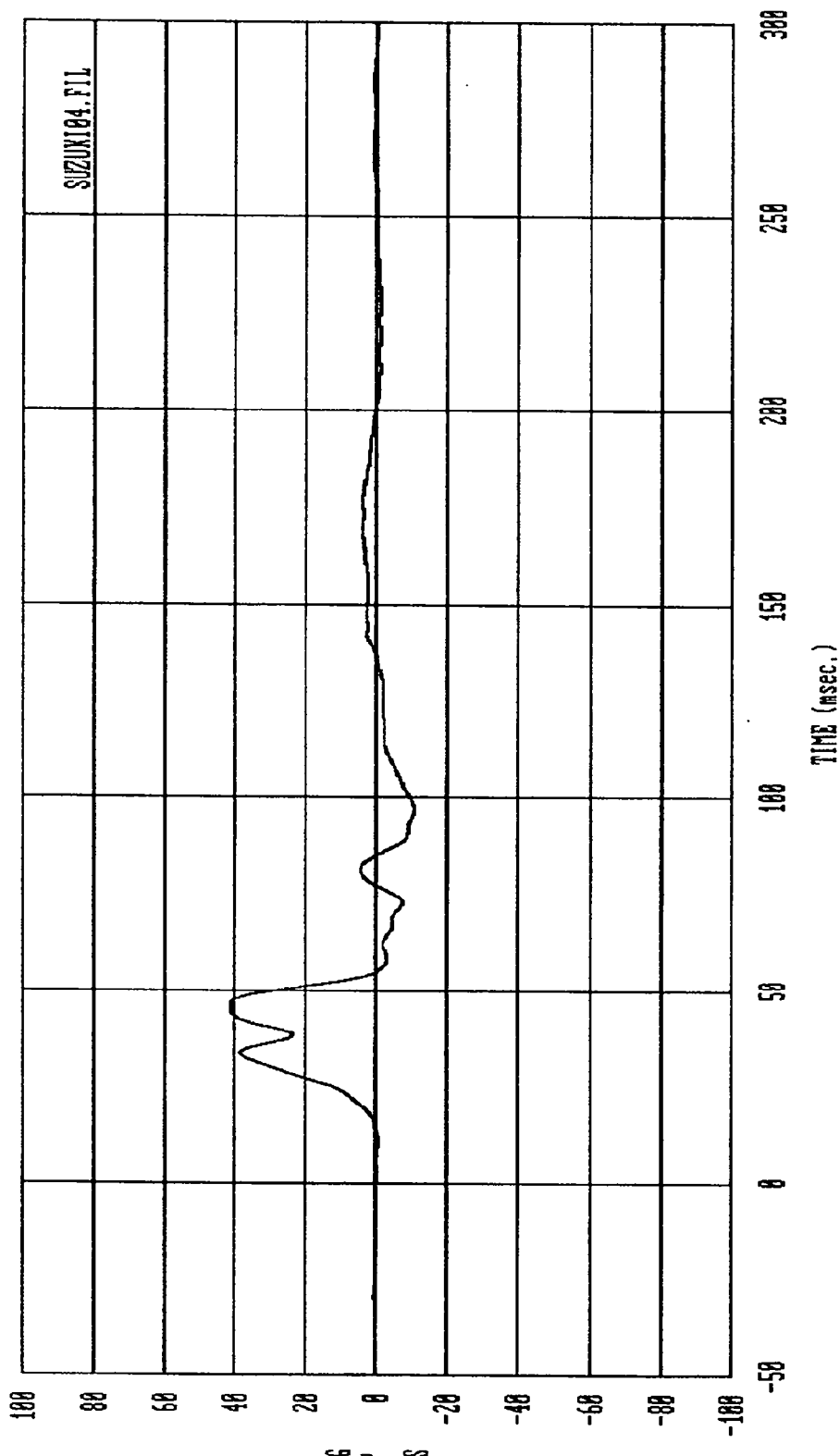
Curve: Driver Head acceleration -- Z axis Filter: SAE CLASS 1000 Max = 22.889 Min = -29.595

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



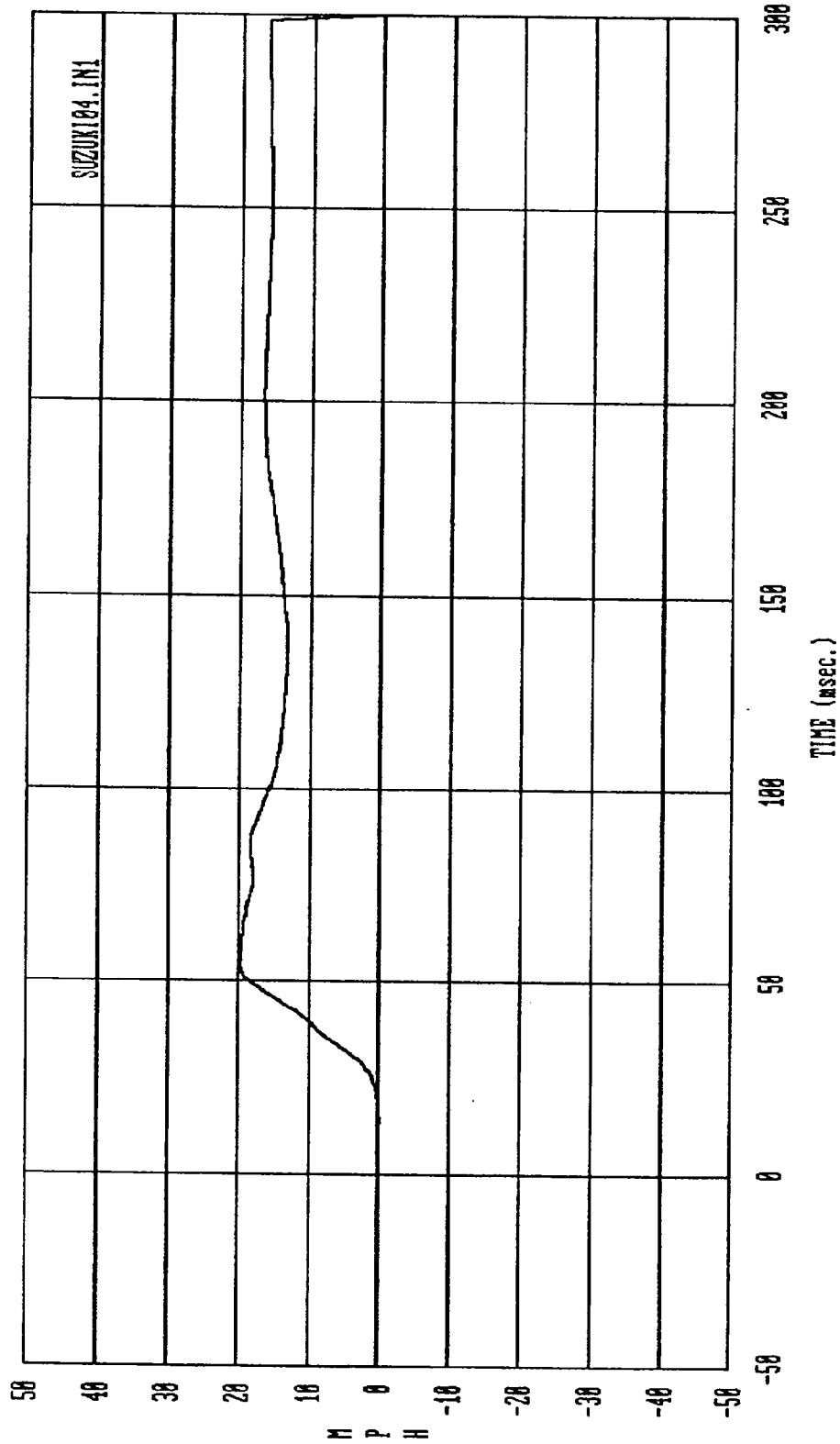
Curve: Driver Head resultant acceleration Filter: SAE CLASS 1000 Max = 120.29 Min = .00000

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



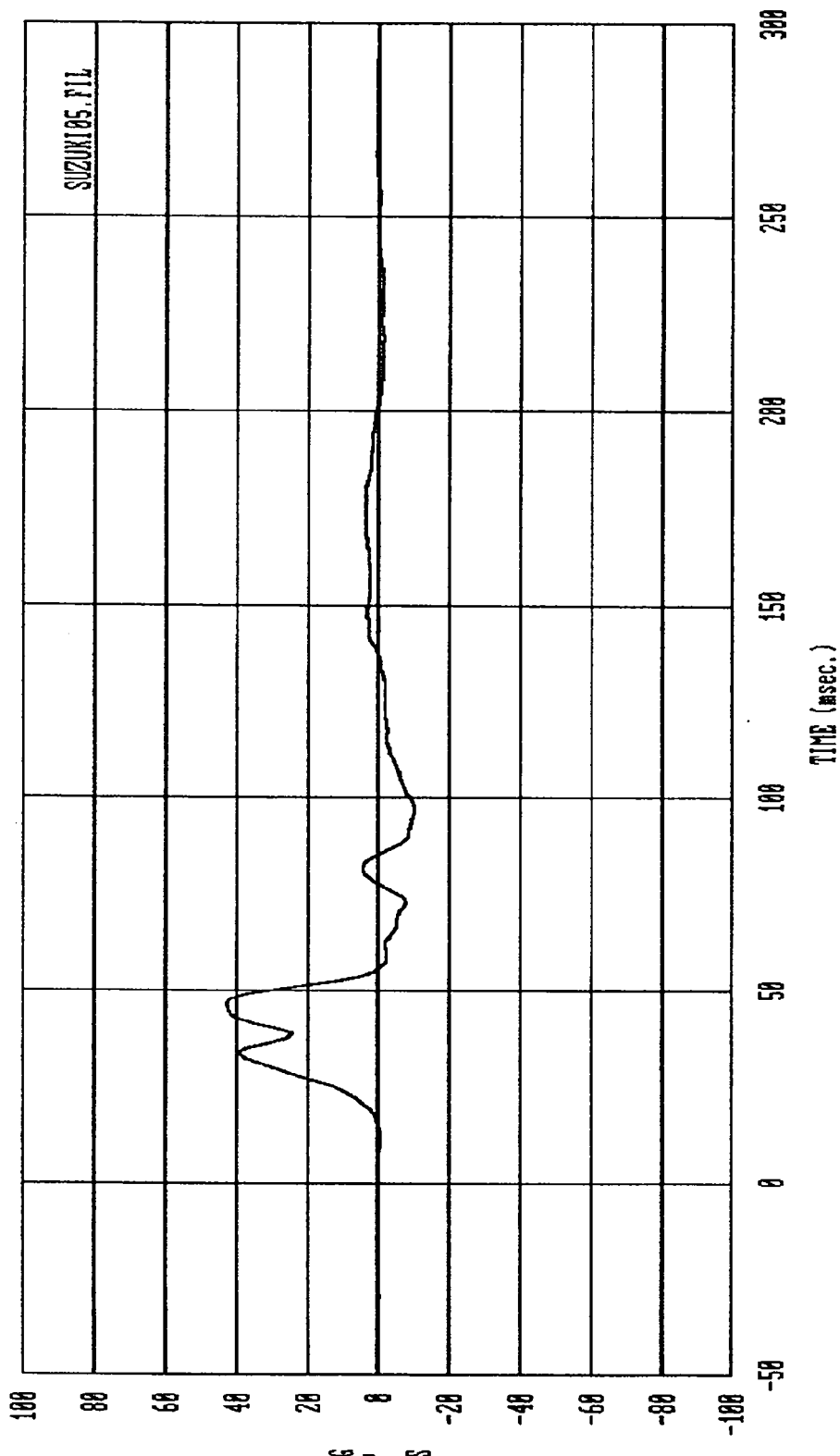
Curve: Driver Upper Spine 1 acceleration -- Primary Filter: FIR 100 Max = 41.400 Min = -10.571

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



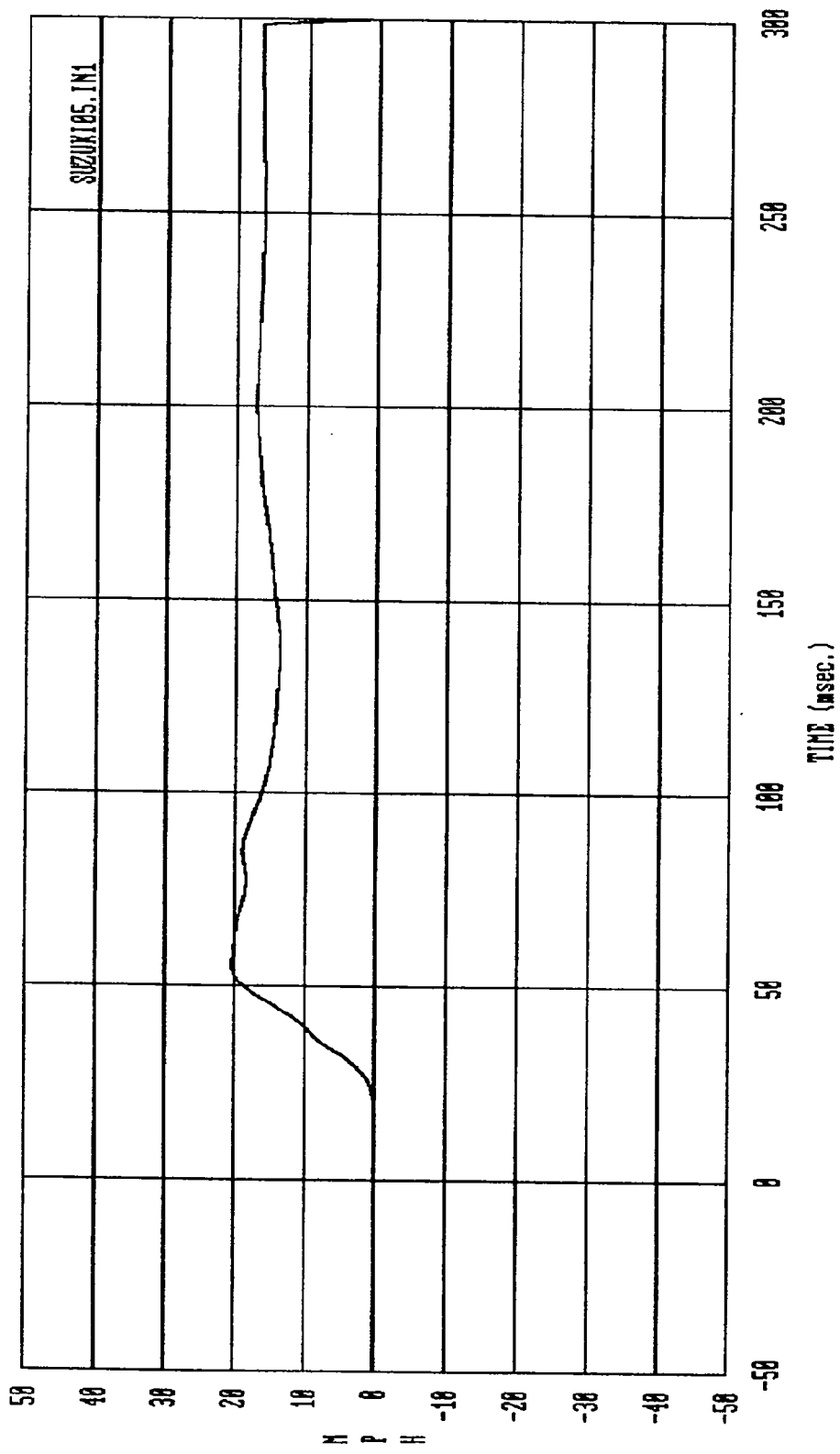
Curve: Driver Upper Spine 1 delta V -- Primary Filter: FIR 100 Max = 19.914 Min = -.82482E-01

MSD Date: 85/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



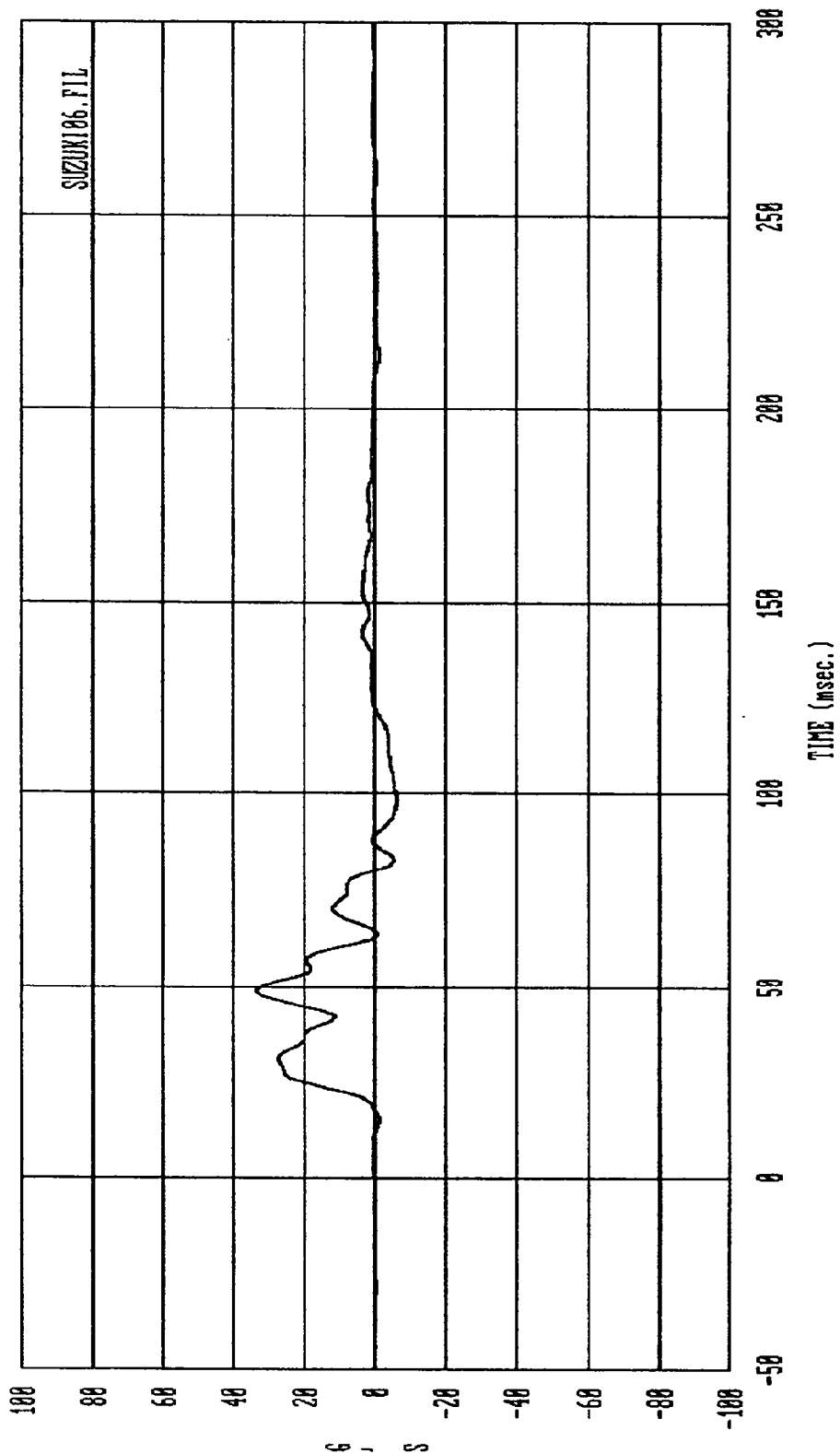
Curve: Driver Upper Spine 2 acceleration -- Redundant Filter: FIR 100 Max = 42.742 Min = -18.268

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



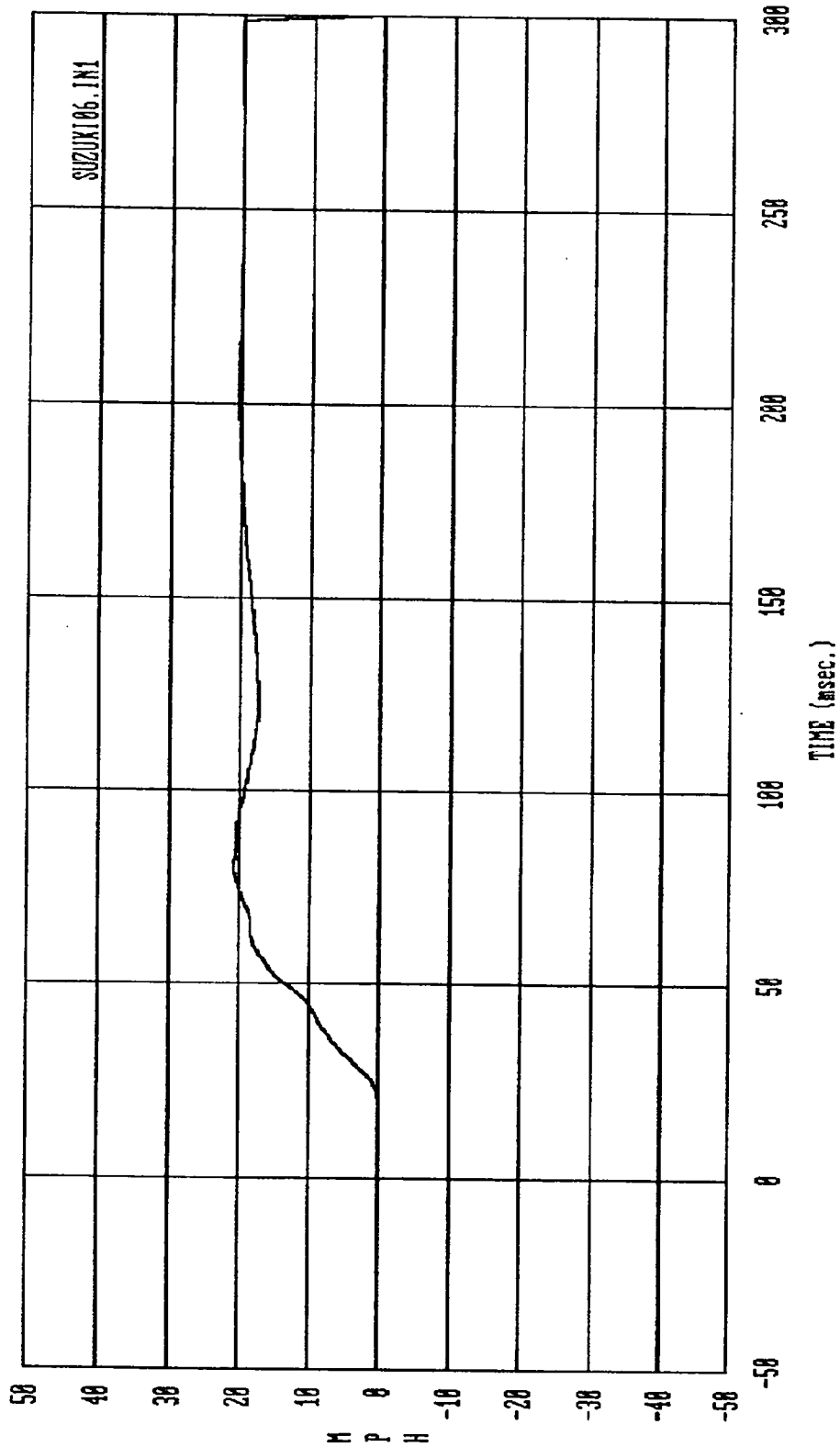
Curve: Driver Upper Spine 2 delta V -- Redundant Filter: FIR 100 Max = 28.362 Min = -.77188E-01

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



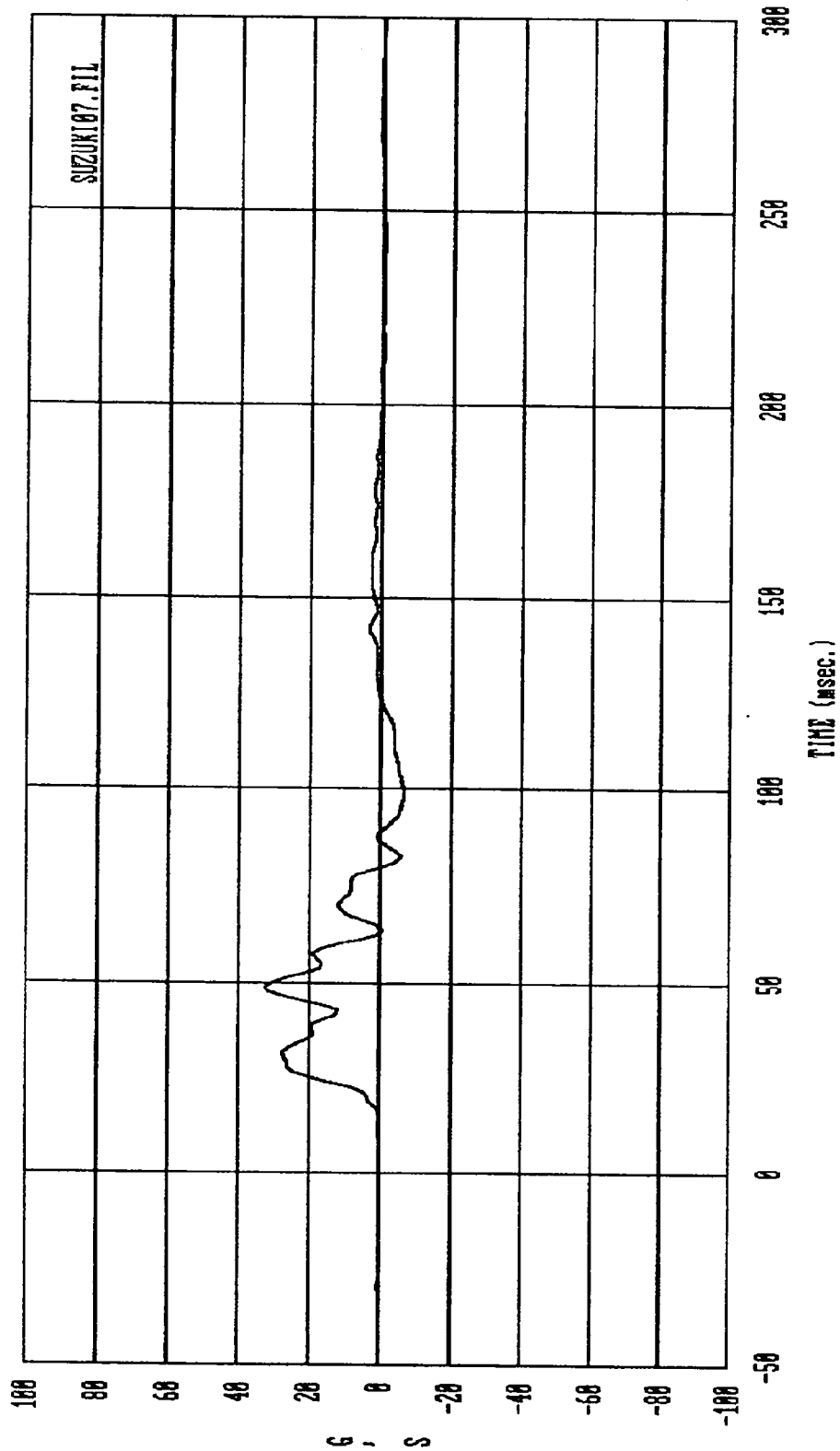
Curve: Driver Upper Rib 1 acceleration — Primary Filter: FIR 100 Max = 33.967 Min = -6.1881

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

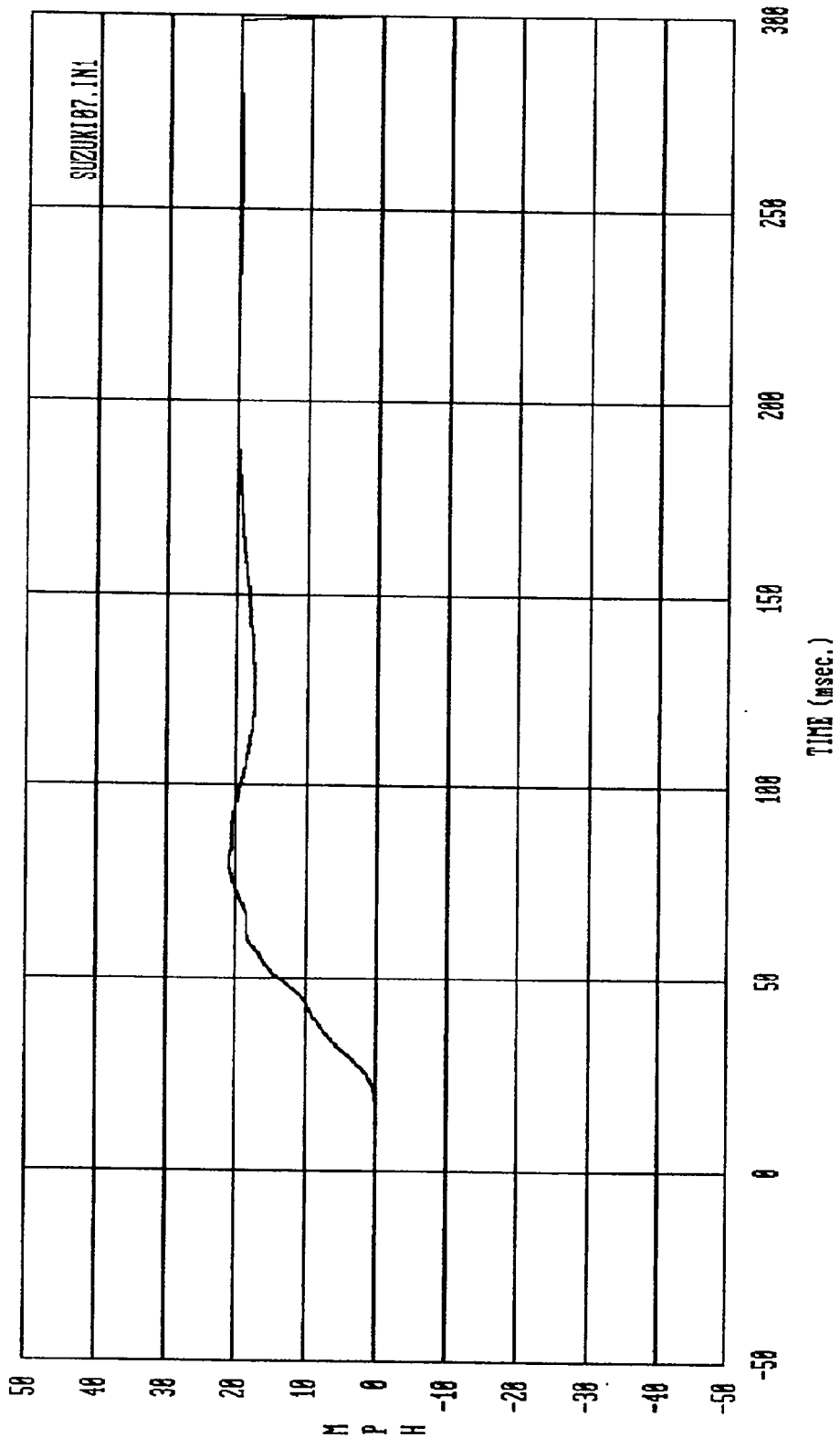


Curve: Driver Upper Rib 1 delta V -- Primary Filter: FIR 100 Max = 20.987 Min = .82971E-02

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

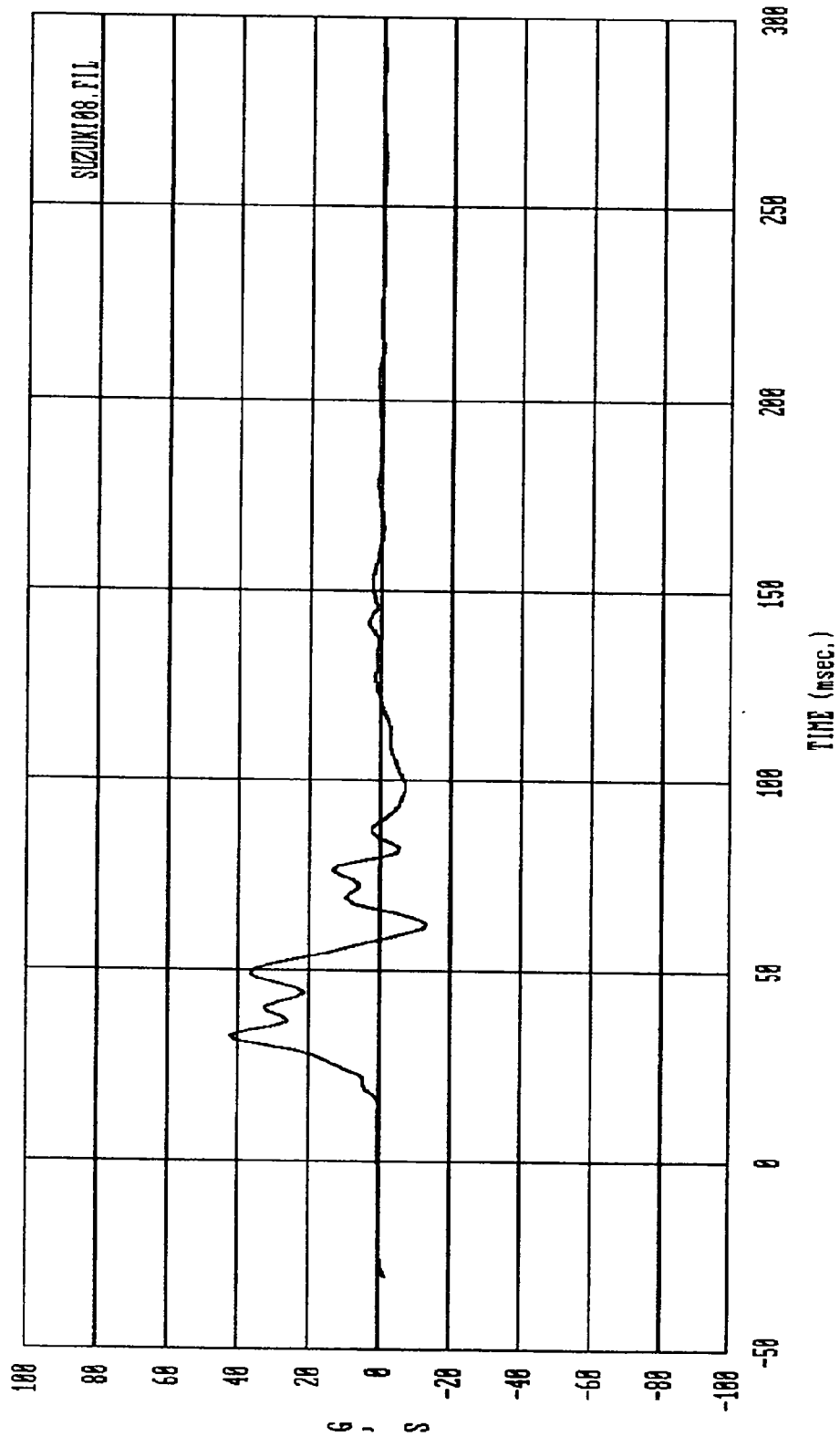


Curve: Driver Upper Rib 2 acceleration -- Redundant Filter: FIR 100 Max = 32.756 Min = -6.8351
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



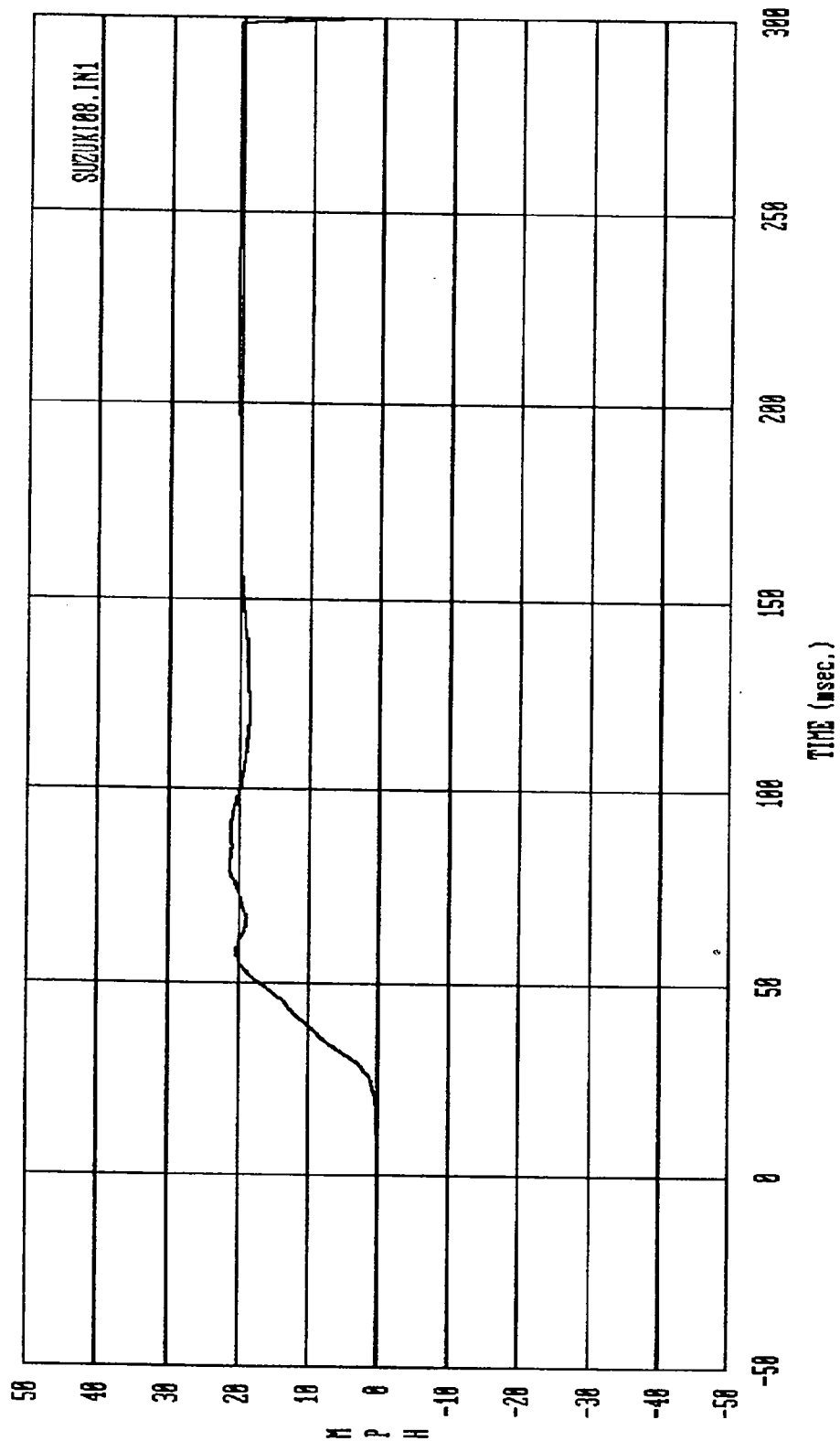
Curve: Driver Upper Rib 2 delta V -- Redundant Filter: FIR 100 Max = 21.849 Min = -.69737E-02

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



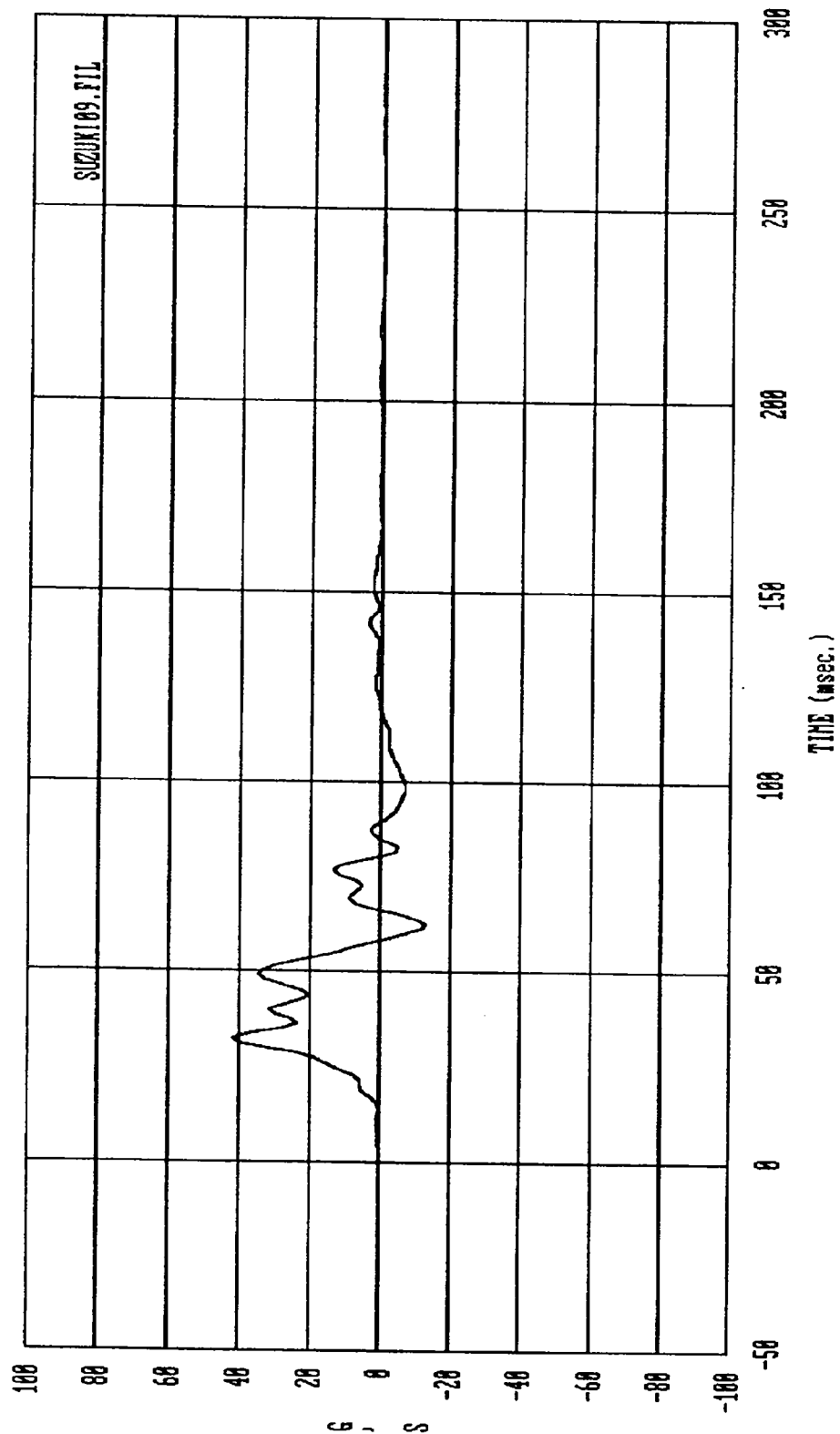
Curve: Driver Lower Rib 1 acceleration -- Primary Filter: FIR 100 Max = 42.414 Min = -13.317

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



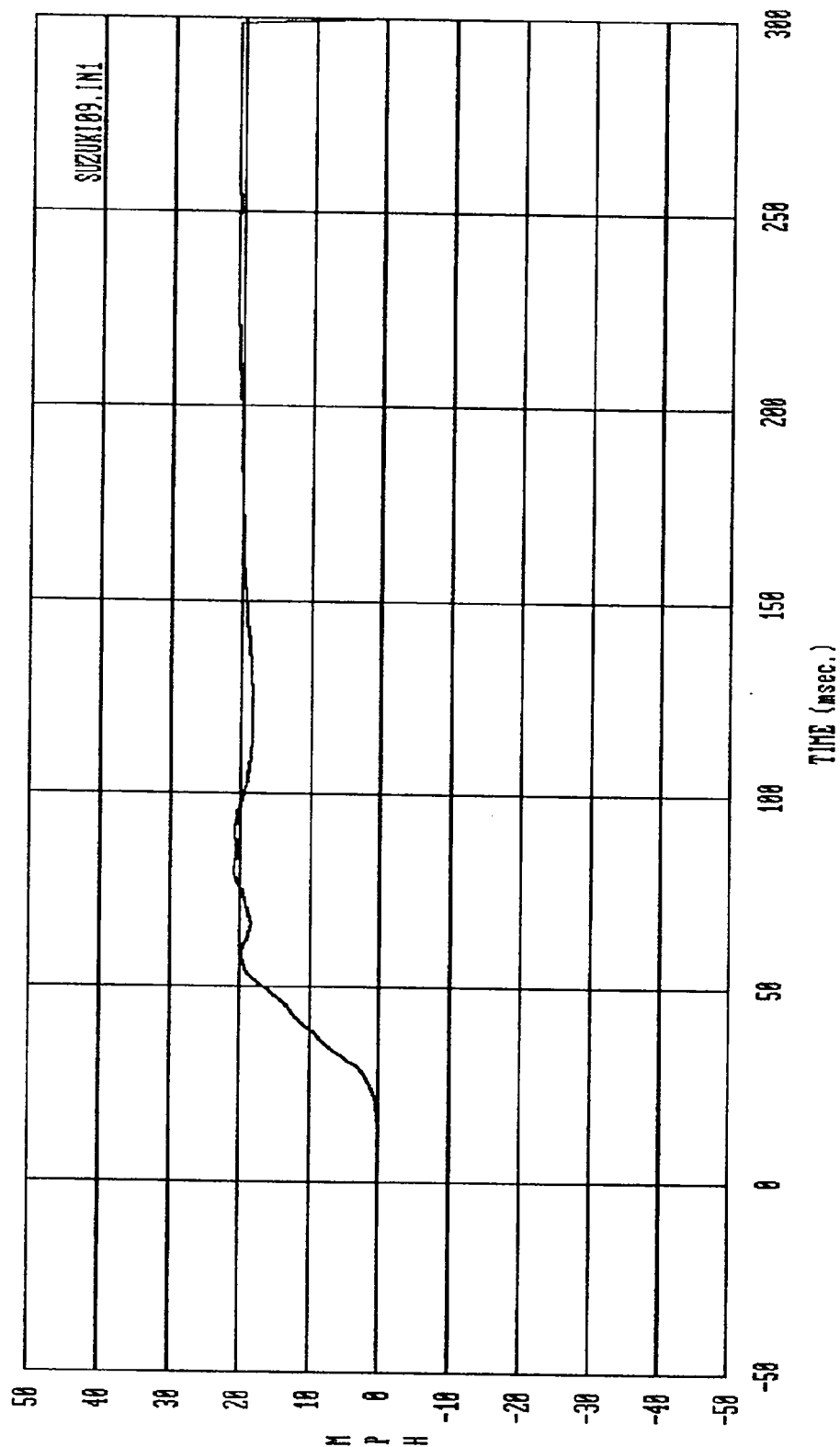
Curve: Driver Lower Rib 1 delta V -- Primary Filter: FIR 100 Max = 21.489 Min = 18.713

MSE Date: 85/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

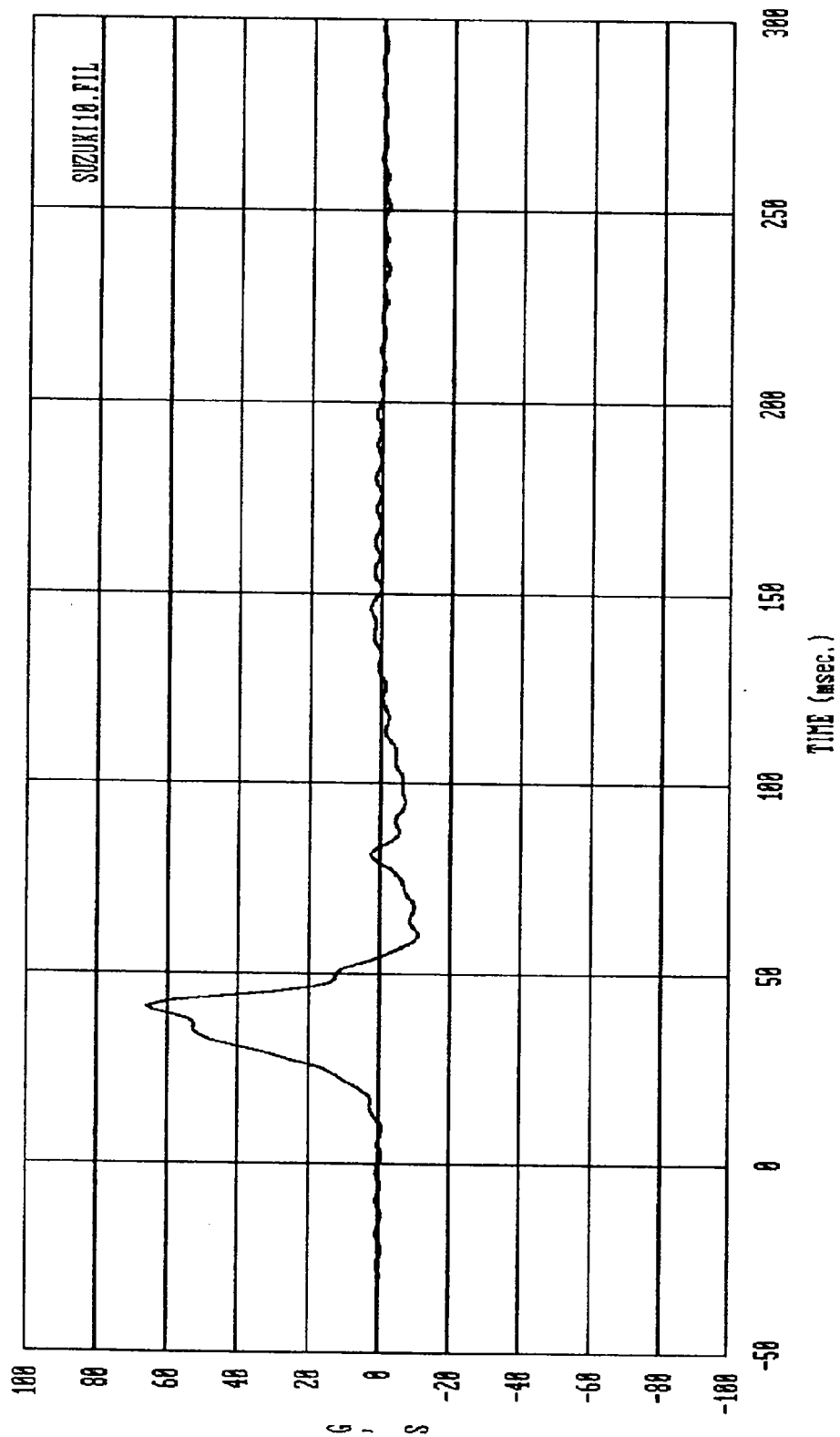


Curve: Driver Lower Rib 2 acceleration -- Redundant Filter: FIR 100 Max = 42.156 Min = -12.932

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

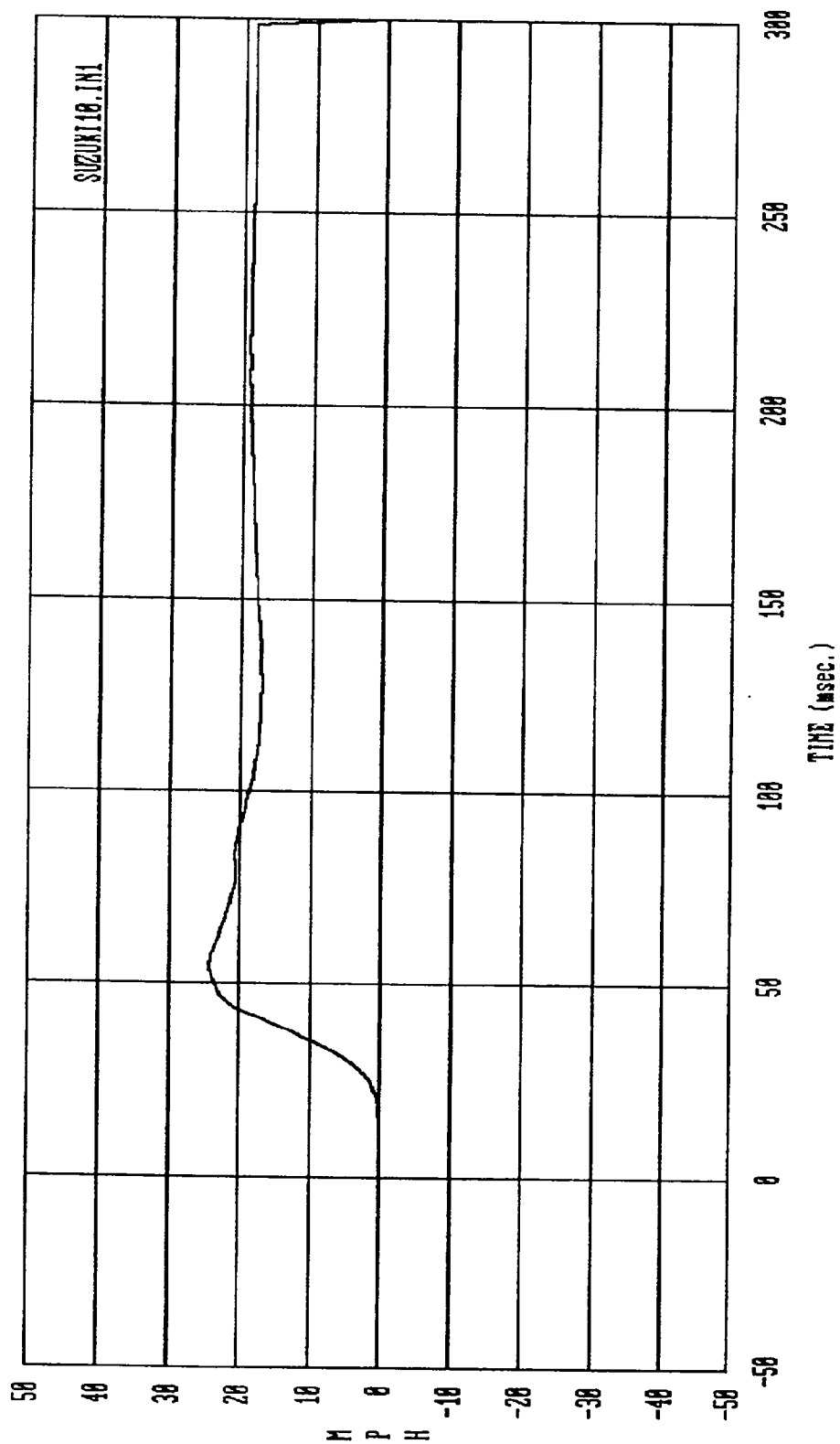


Curve: Driver Lower Rib 2 delta V -- Redundant Filter: FIR 180 Max = 20.951 Min = -.23128E-02
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

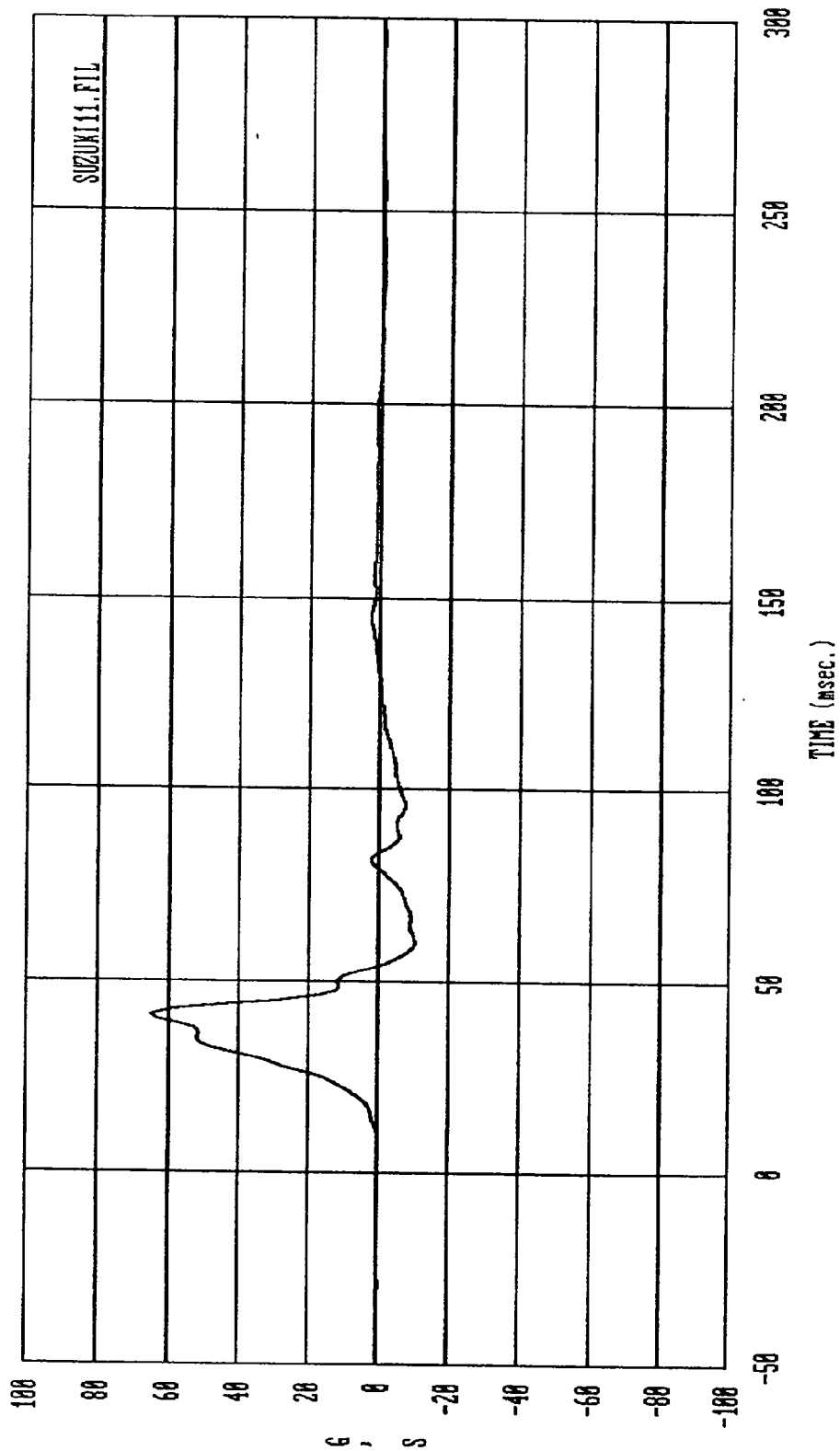


Curve: Driver Lower Spine 1 acceleration -- Primary Filter: FIR 100 Max = 65.855 Min = -10.826

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

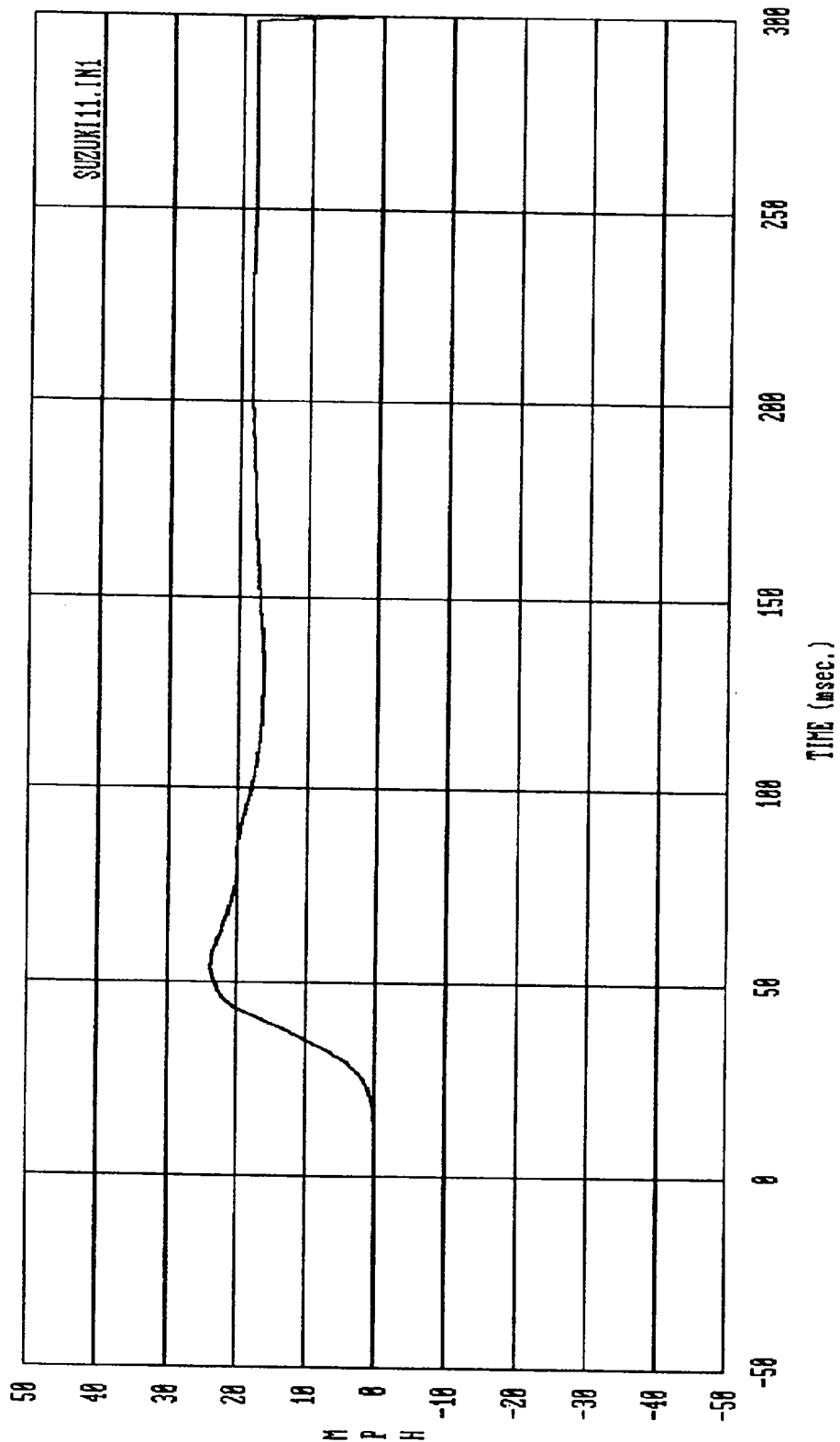


Curve: Driver Lower Spine 1 delta V -- Primary Filter: FIR 100 Max = 24.339 Min = -.75947E-01
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



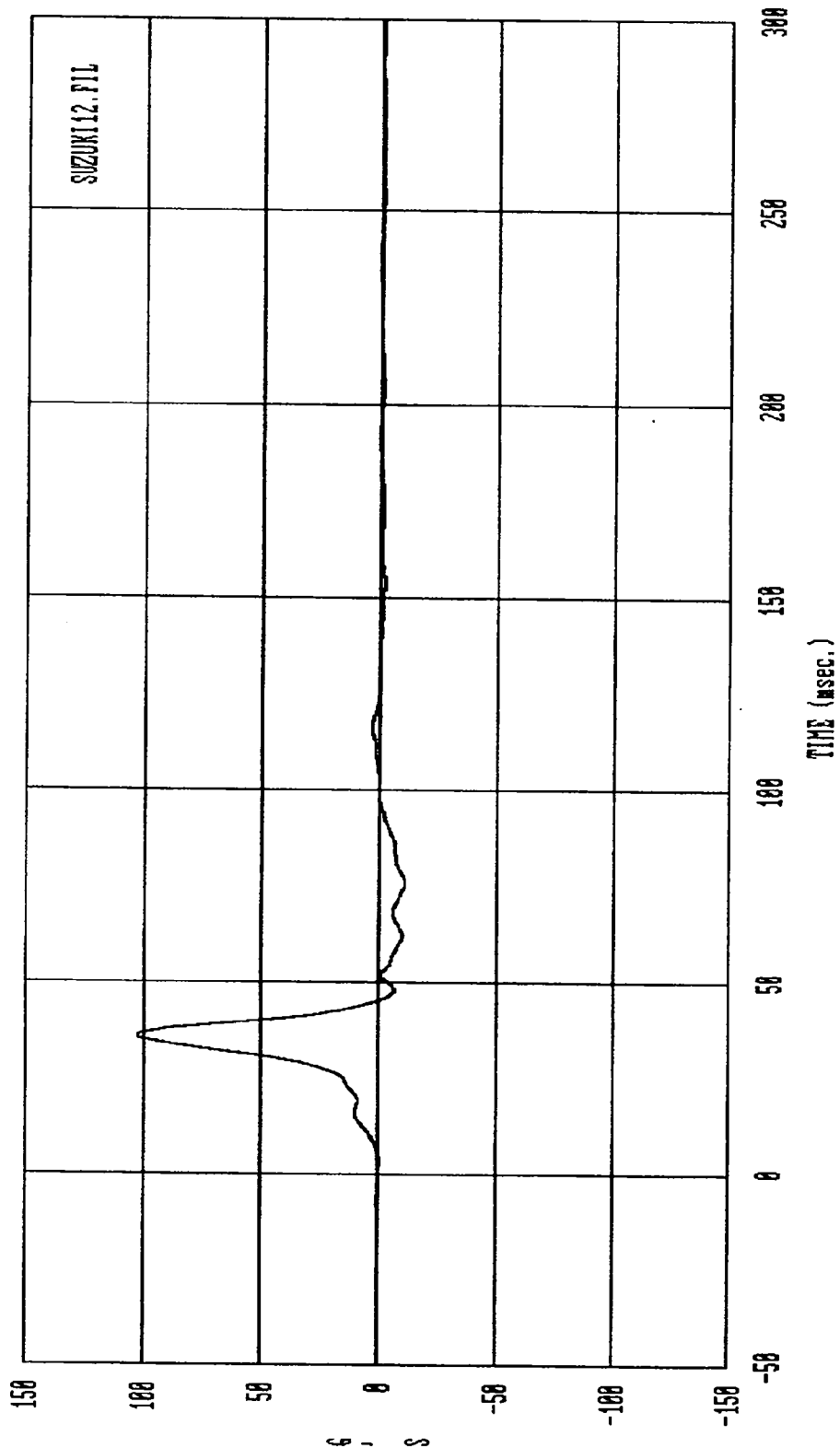
Curve: Driver Lower Spine 2 acceleration — Redundant Filter: FIR 100 Max = 65.179 Min = -10.506

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

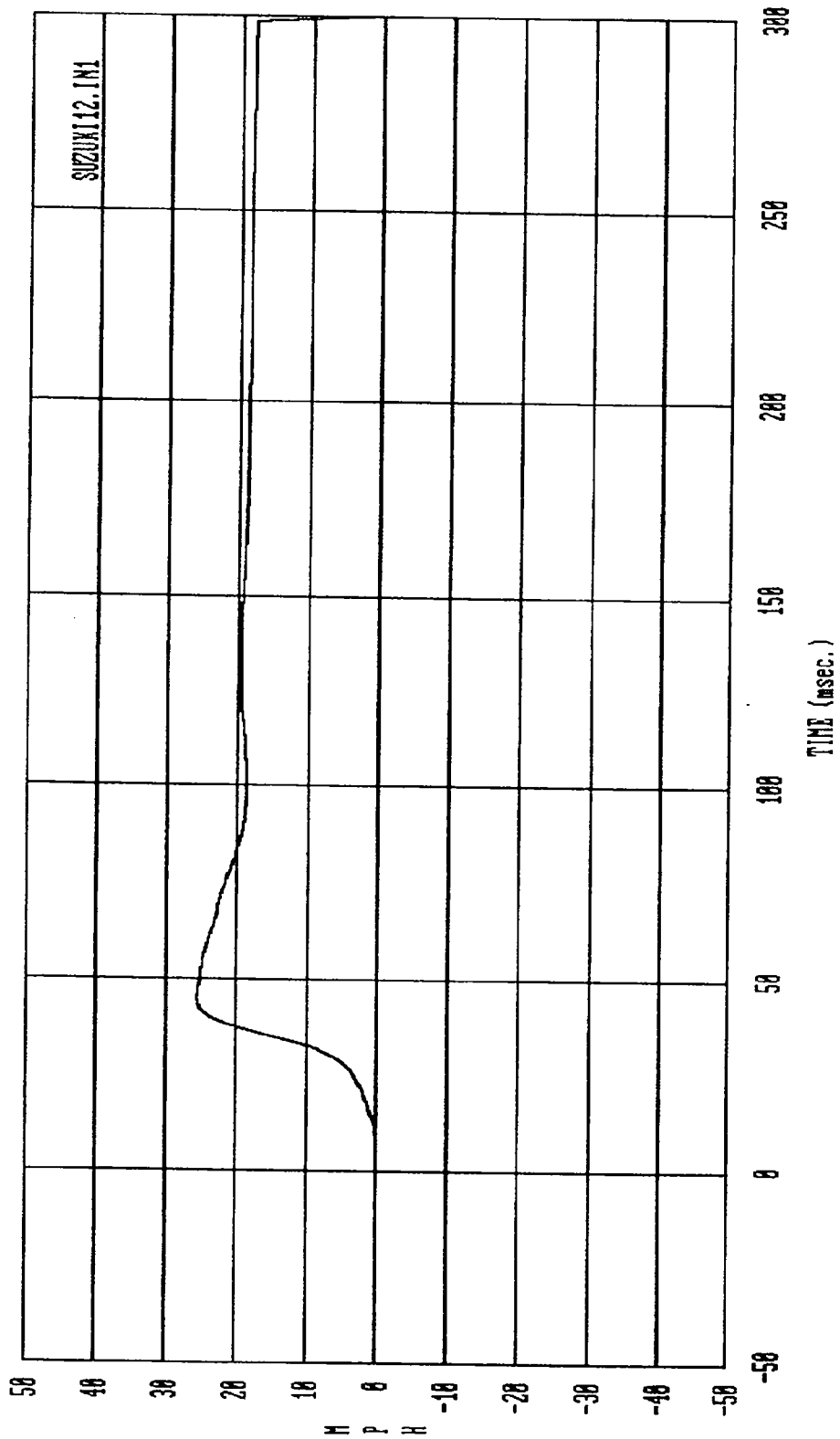


Curve: Driver Lower Spine 2 delta V -- Redundant Filter: FIR 100 Max = 23.894 Min = -.192483-02

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

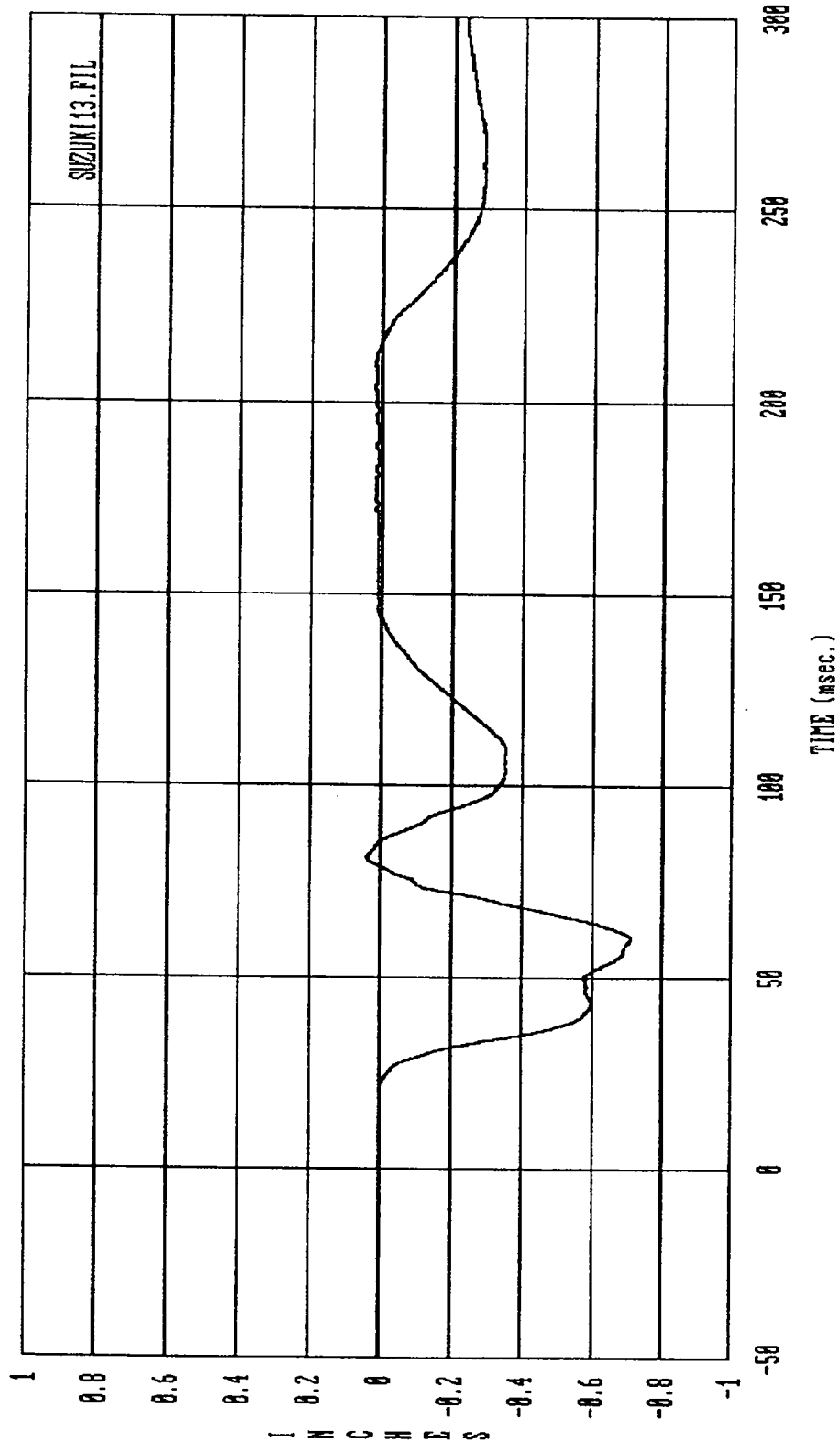


Curve: Driver Pelvis acceleration Filter: FIR 100 Max = 104.86 Min = -10.610
 HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

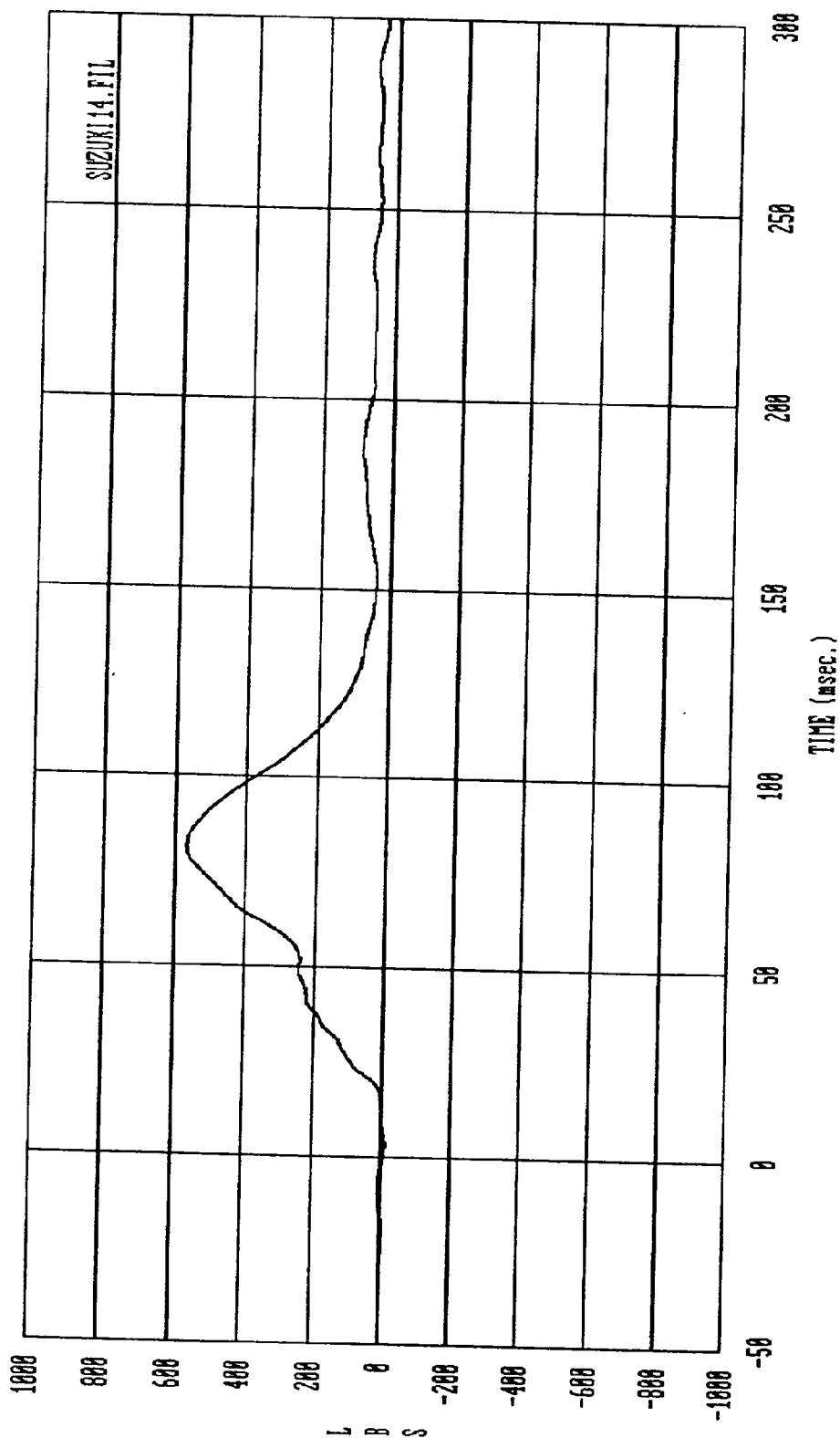


Curve: Driver Pelvis delta U Filter: FIR 100 Max = 25.697 Min = -.26518E-01

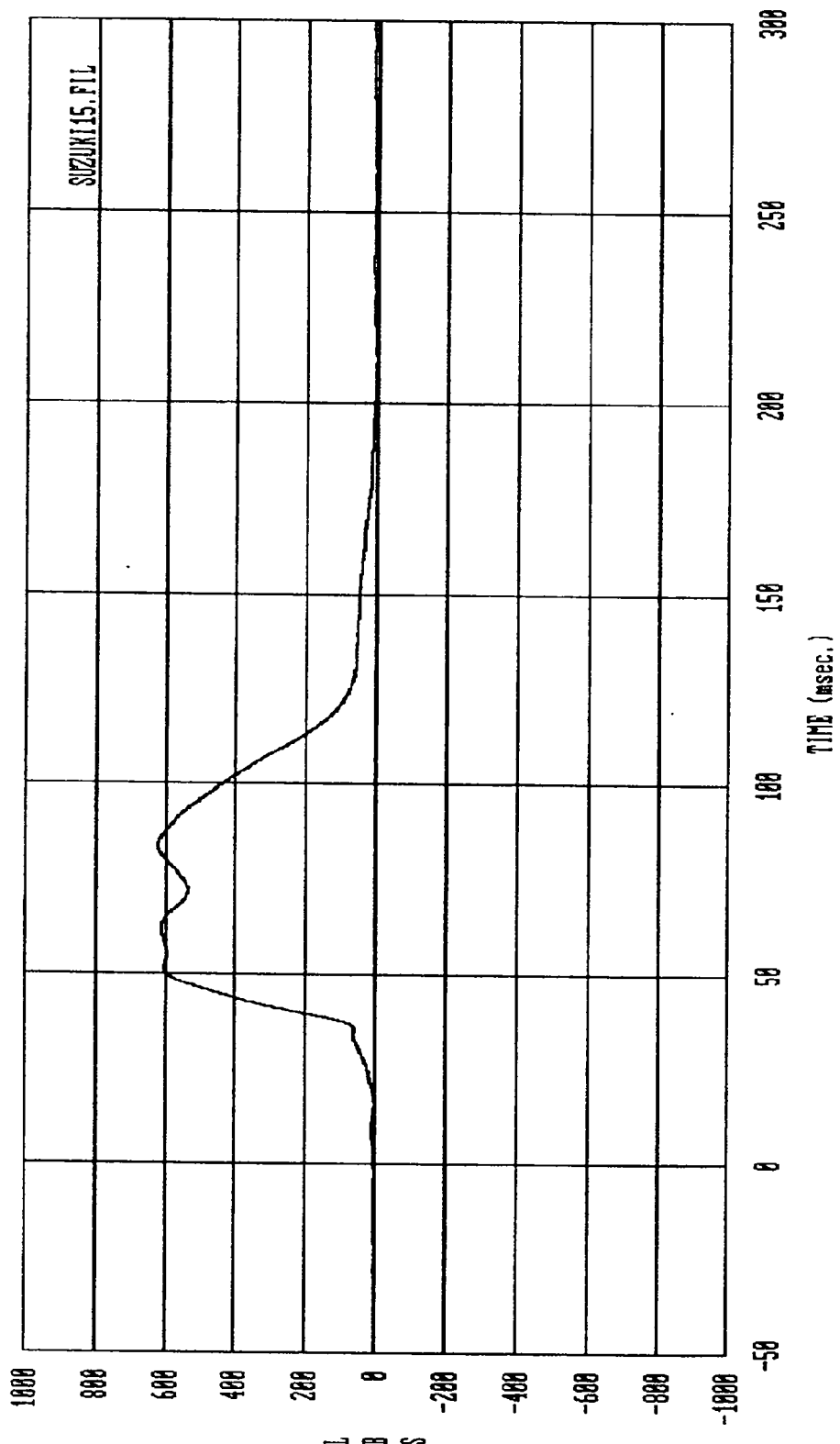
MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



Curve: Driver Rib deflection Filter: SAE CLASS 180 Max = .37847E-01 Min = -.71235
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

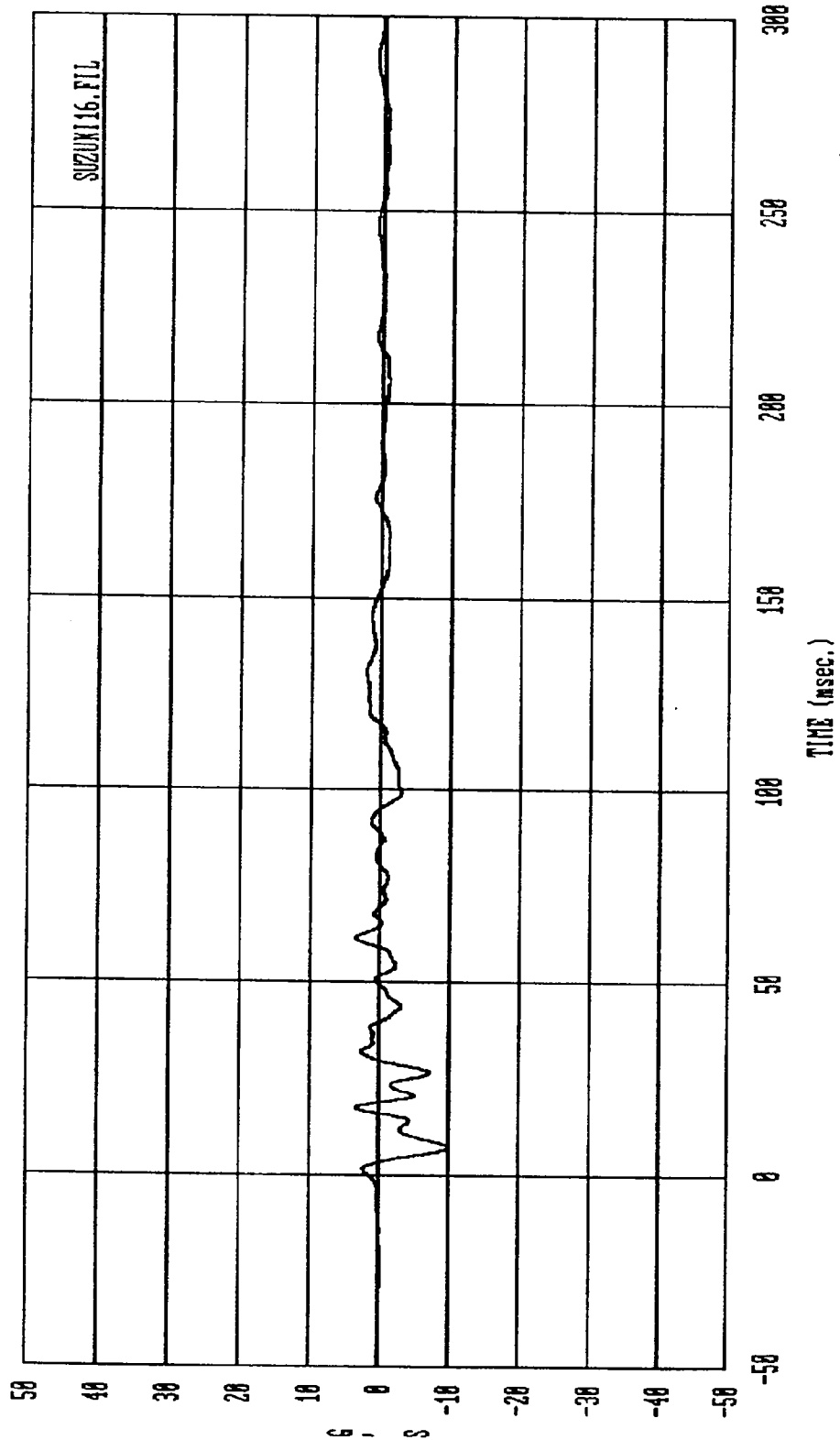


Curve: Driver lap belt load Filter: SAE CLASS 60 Max = 568.11 Min = -9.6664
 HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



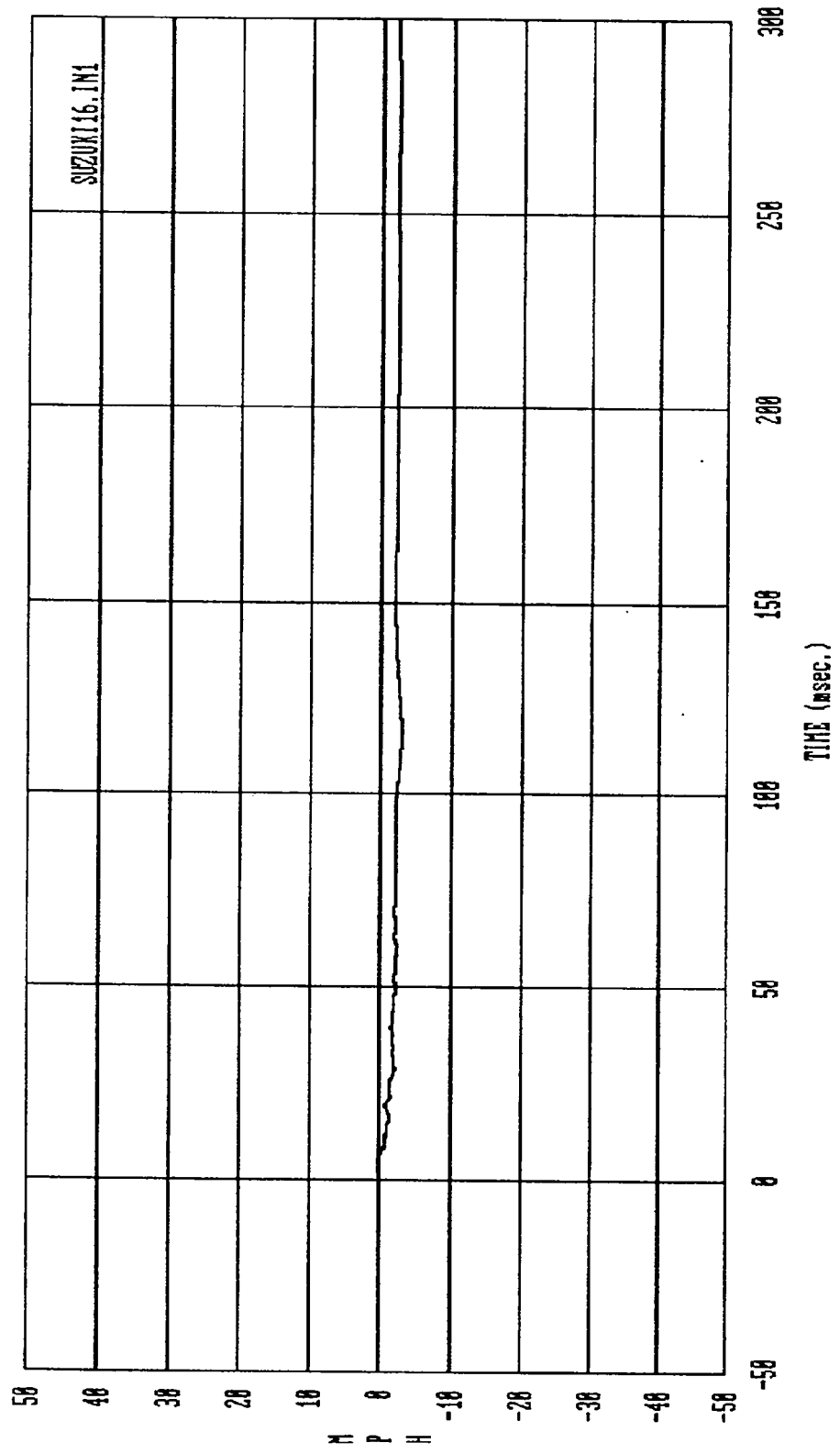
Curve: Driver shoulder belt load Filter: SAE CLASS 60 Max = 624.56 Min = 1.9748

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

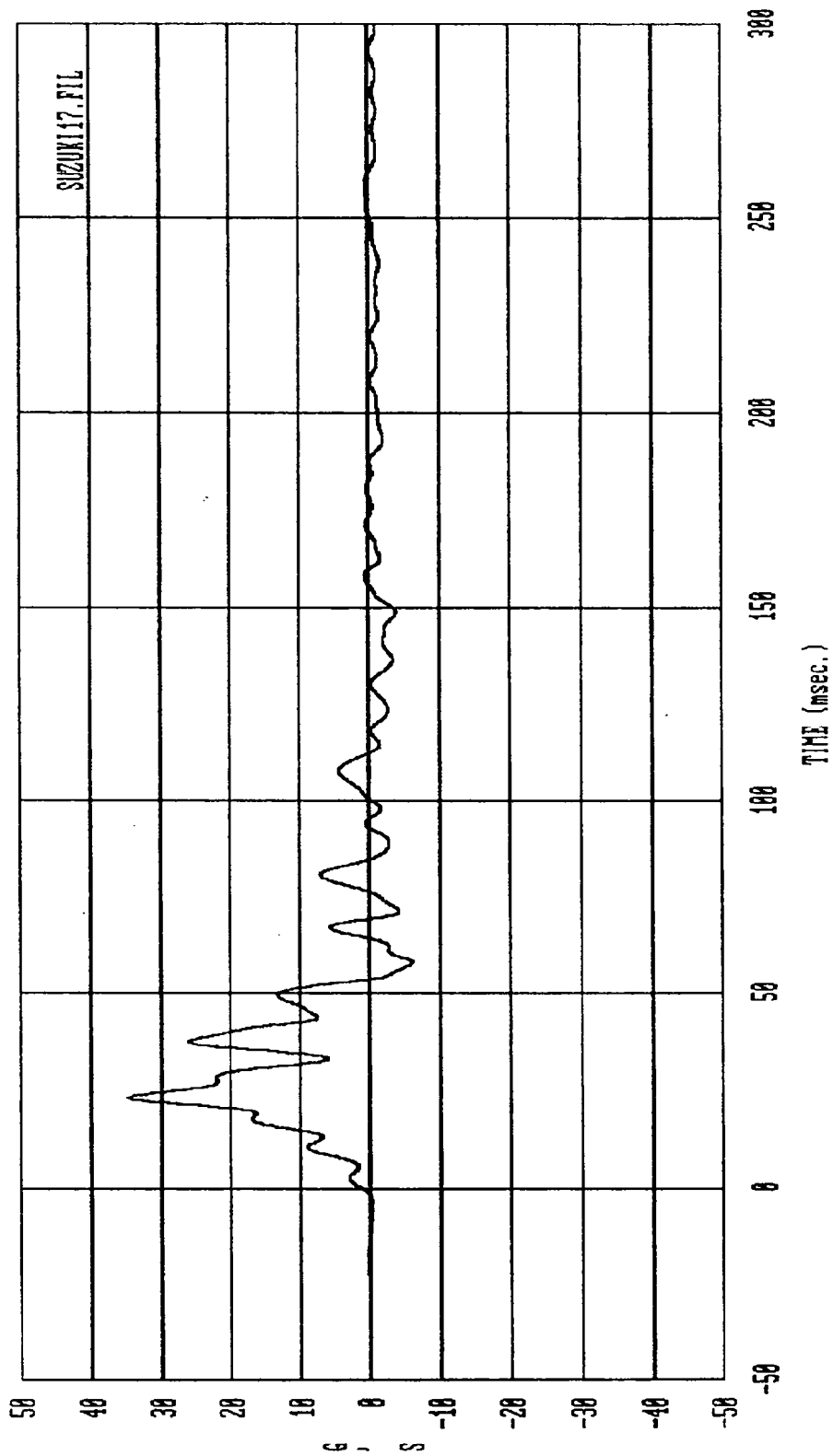


Curve: Front Seat Right sill acceleration -- X axis Filter: SAE CLASS 60 Max = 3.5428 Min = -10.835

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

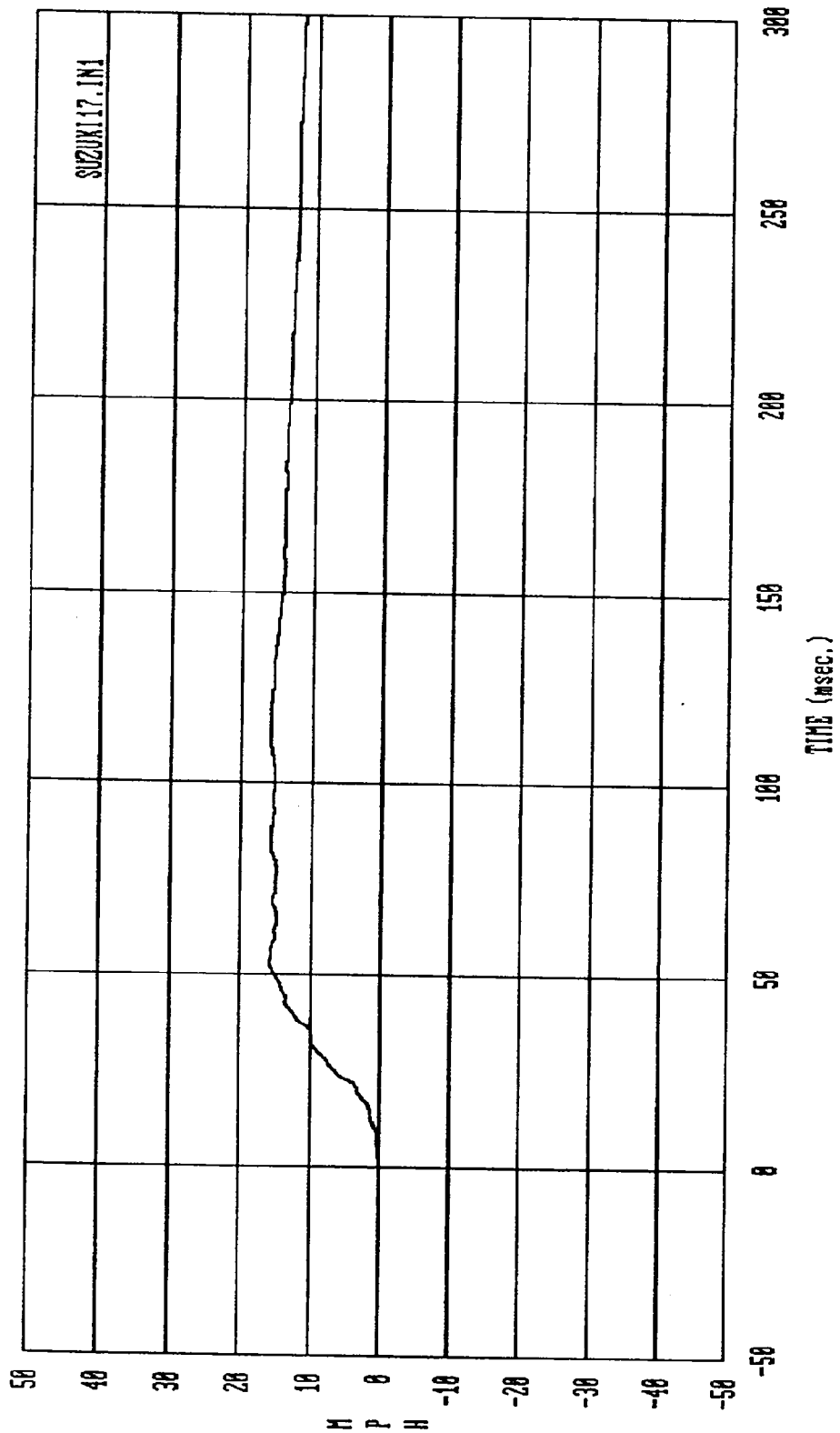


Curve: Front Seat Right sill delta V -- X axis Filter: SAE CLASS 180 Max = .18475 Min = -2.9138
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



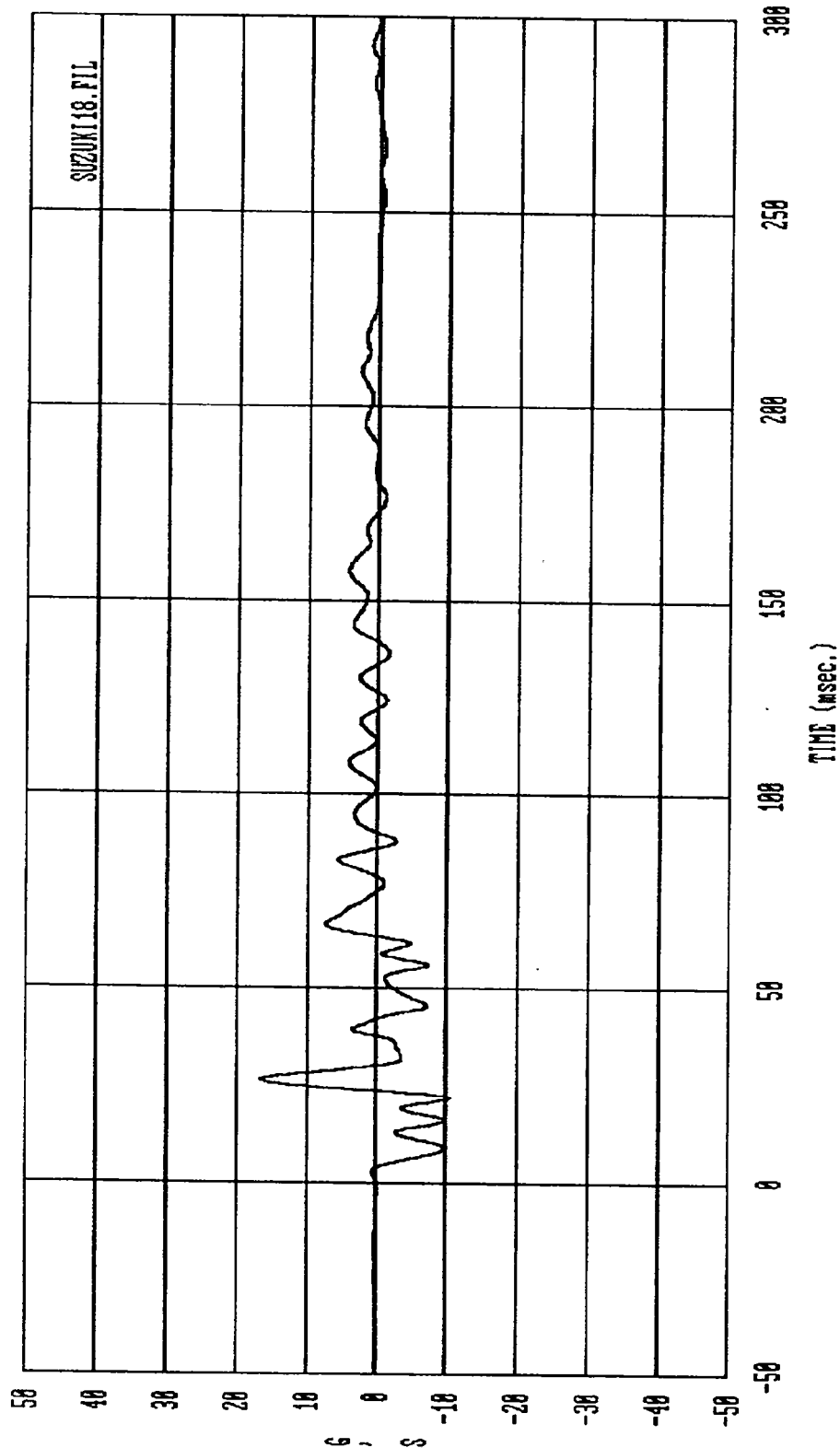
Curve: Front Seat Right sill acceleration -- Y axis Filter: SAE CLASS 60 Max = 34.881 Min = -6.1221

MSE Date: 85/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



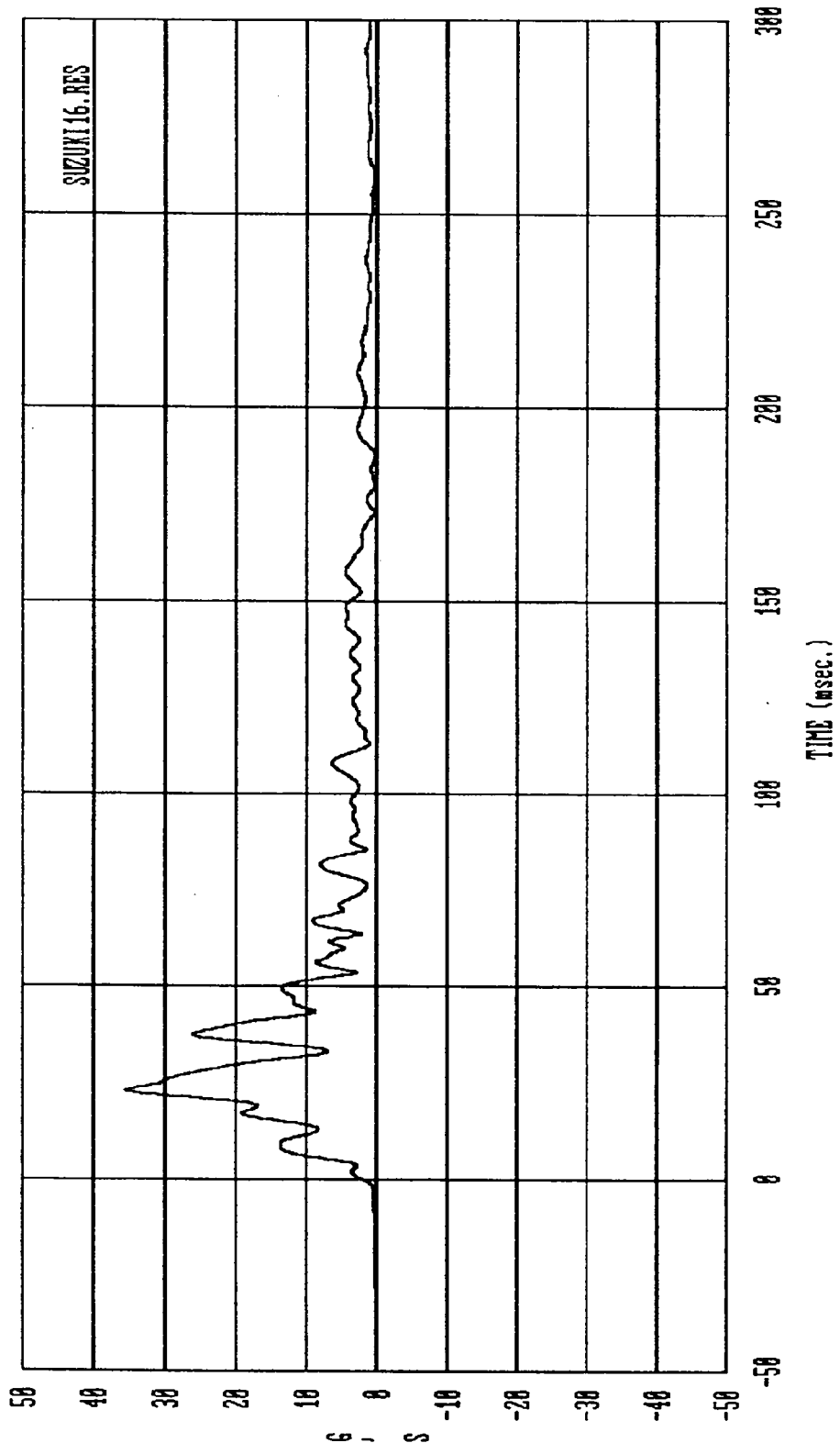
Curve: Front Seat Right sill delta V -- Y axis Filter: SAE CLASS 180 Max = 15.997 Min = .32417

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



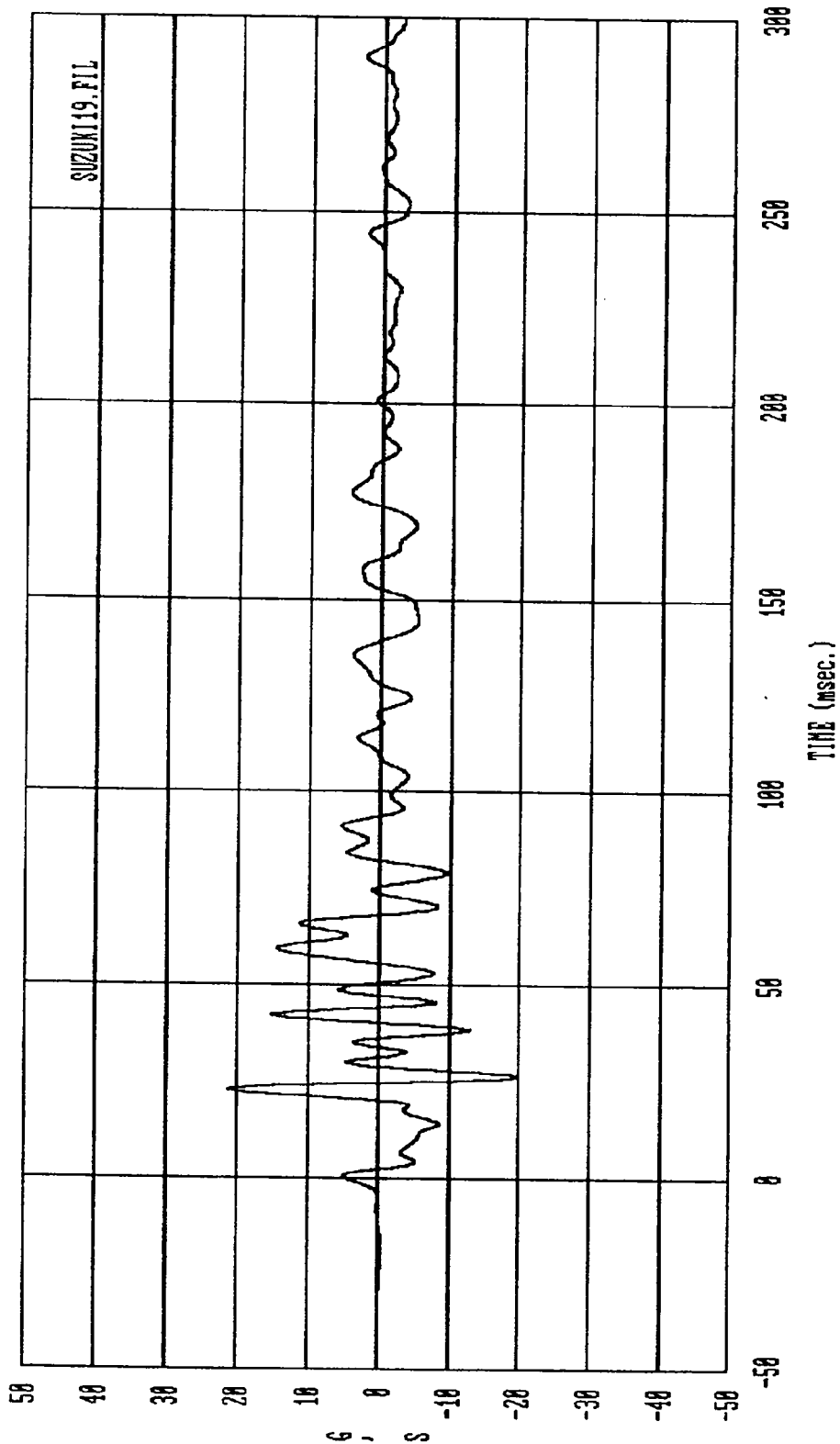
Curve: Front Seat Right sill acceleration -- Z axis Filter: SAE CLASS 60 Max = 16.784 Min = -10.520

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



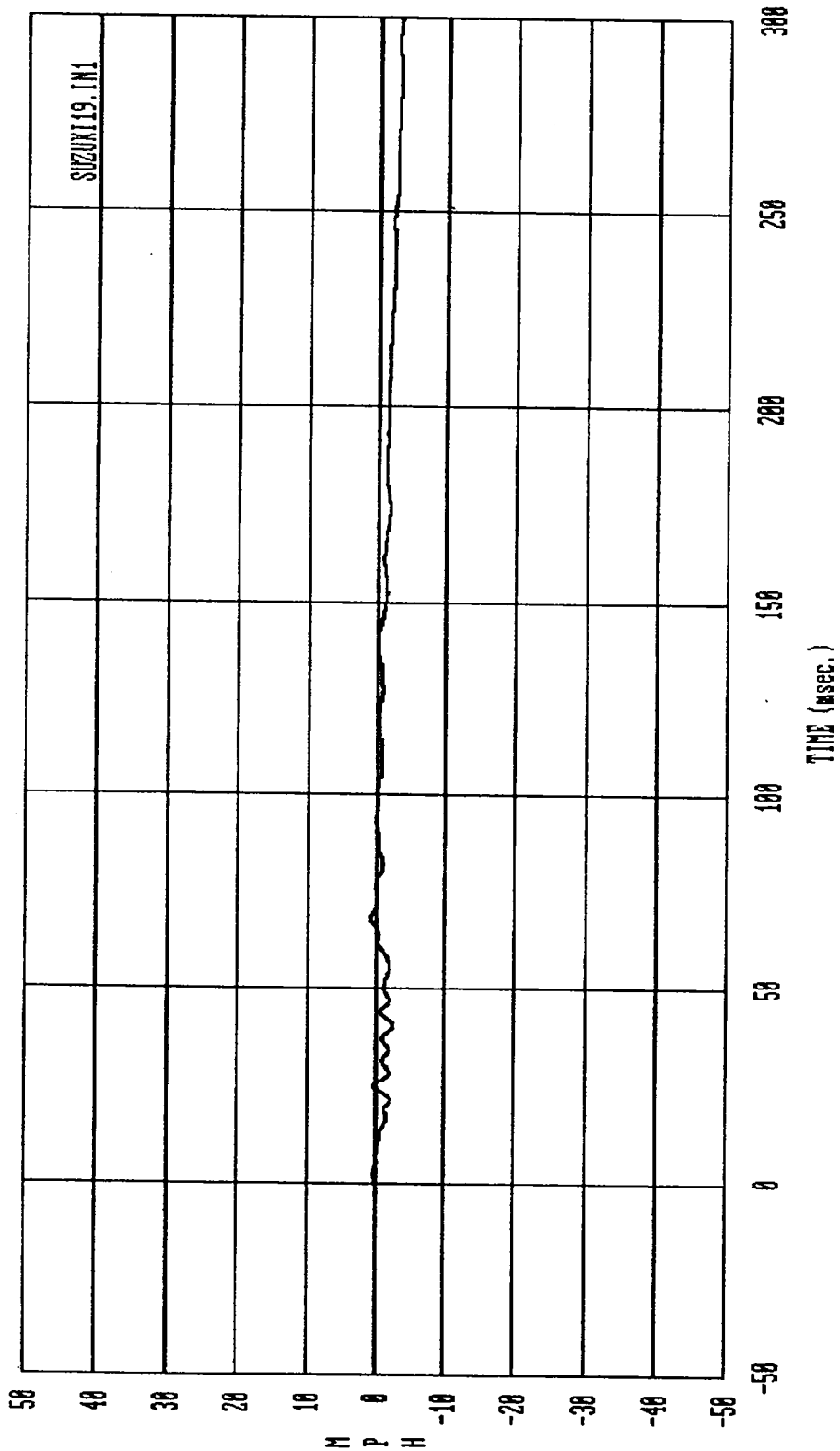
Curve: Front Seat Right sill resultant acceleration Filter: SAE CLASS 60 Max = 35.489 Min = .14975

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



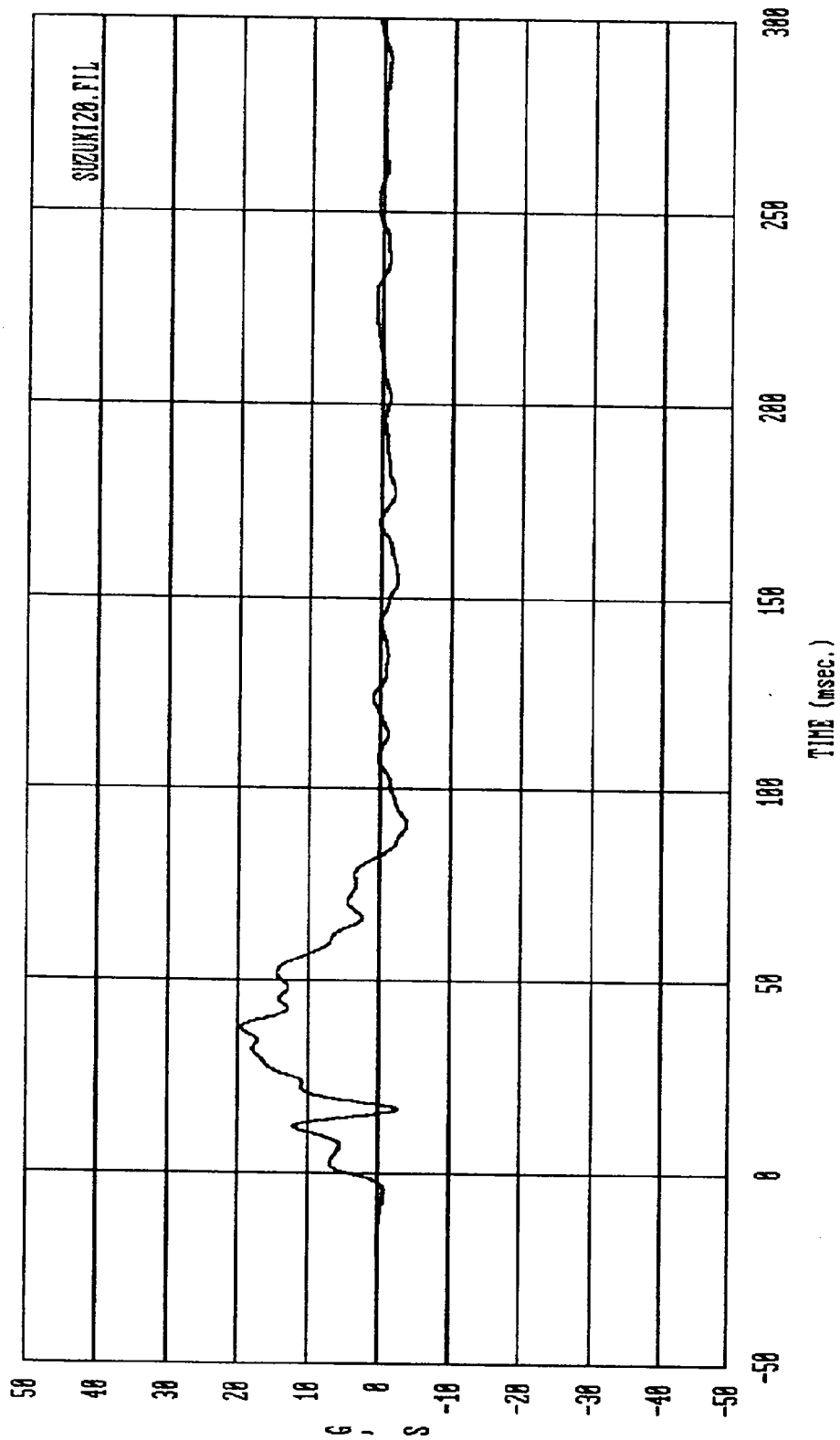
Curve: Rear Floor above axle acceleration -- X axis Filter: SAE CLASS 60 Max = 21.389 Min = -28.128

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



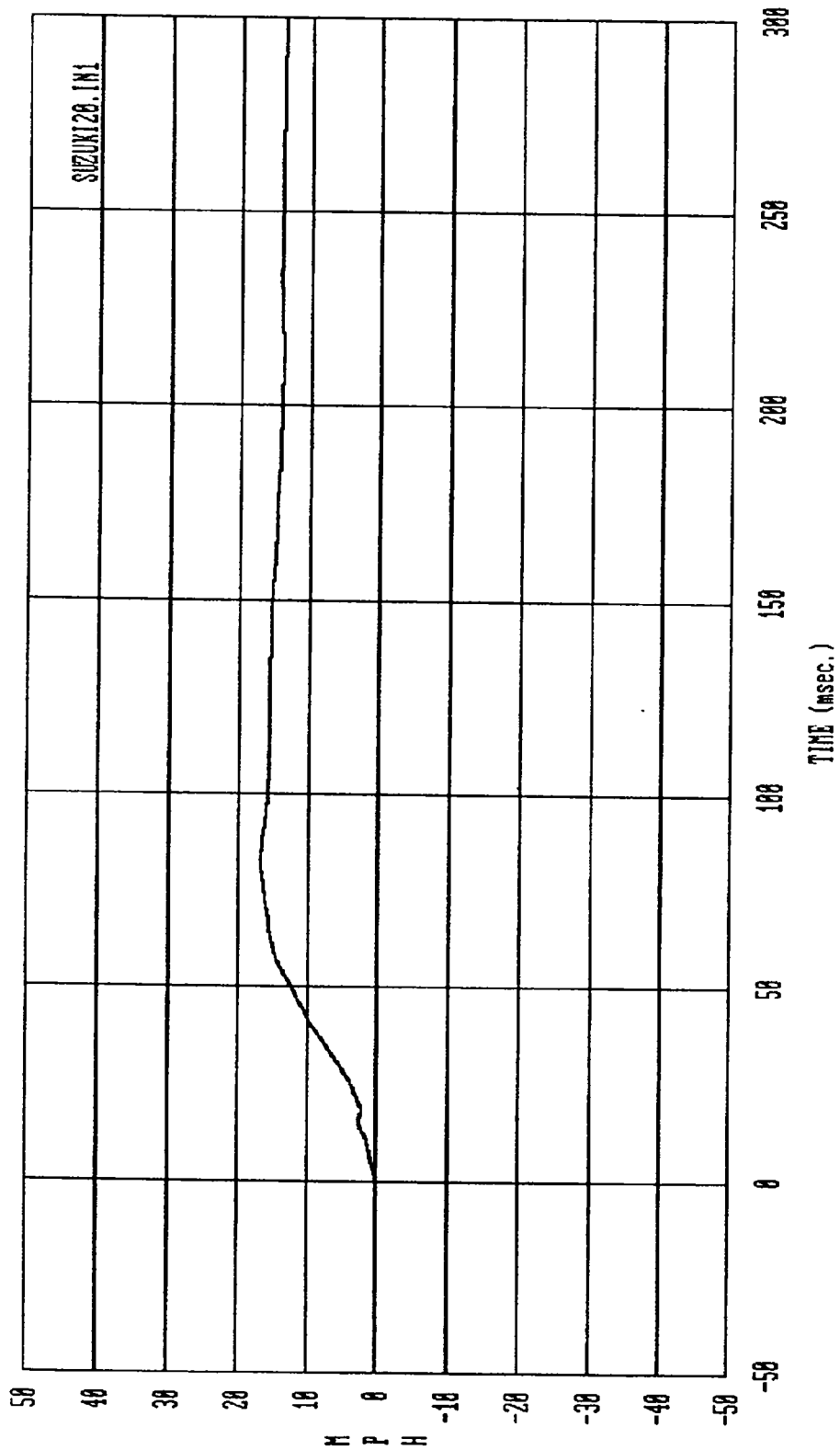
Curve: Rear Floor above axle delta V -- X axis Filter: SAE CLASS 180 Max = .83492 Min = -3.8536

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



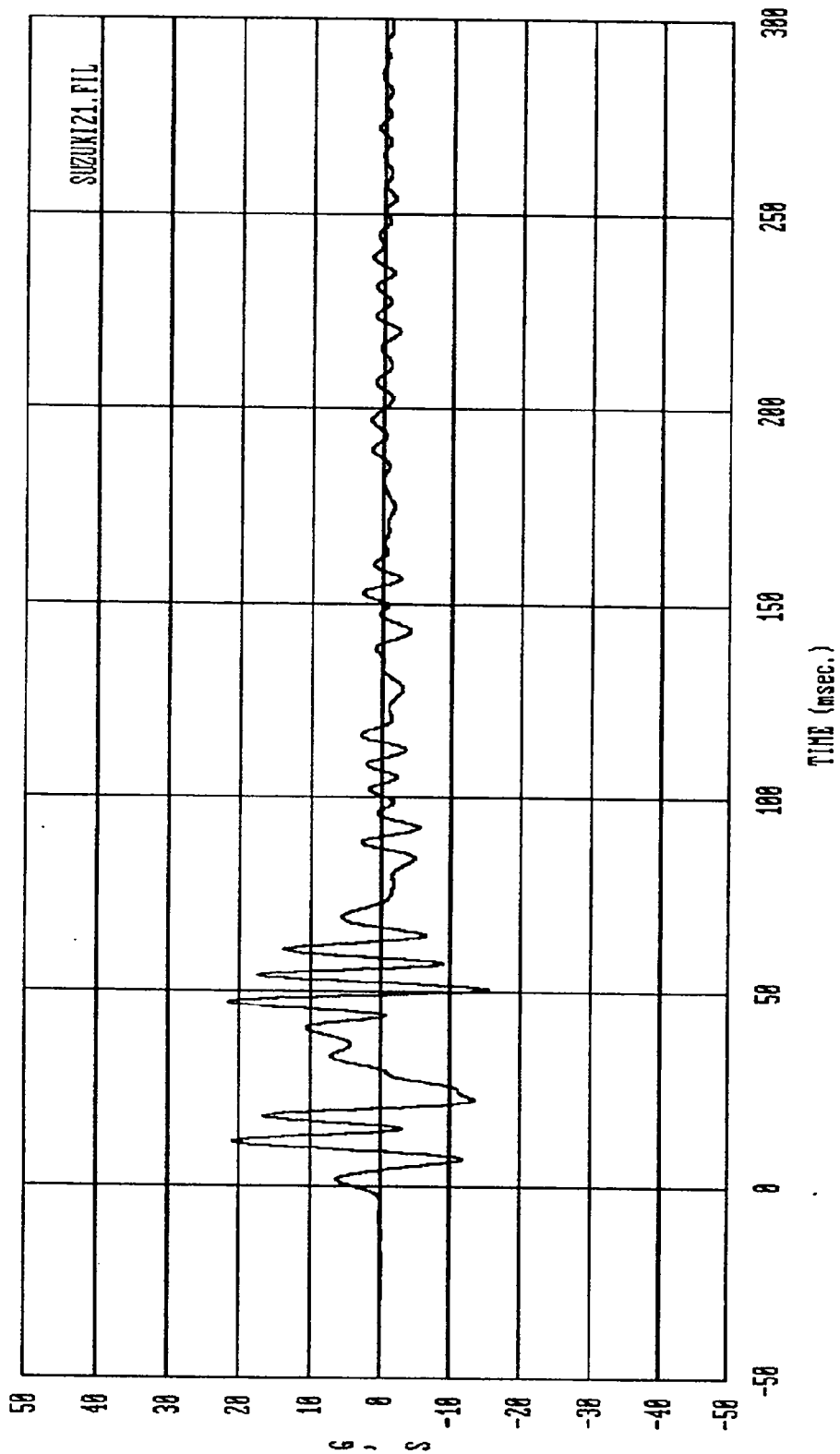
Curve: Rear Floor above axle acceleration -- Y axis Filter: SAE CLASS 60 Max = 19.656 Min = -3.7897

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



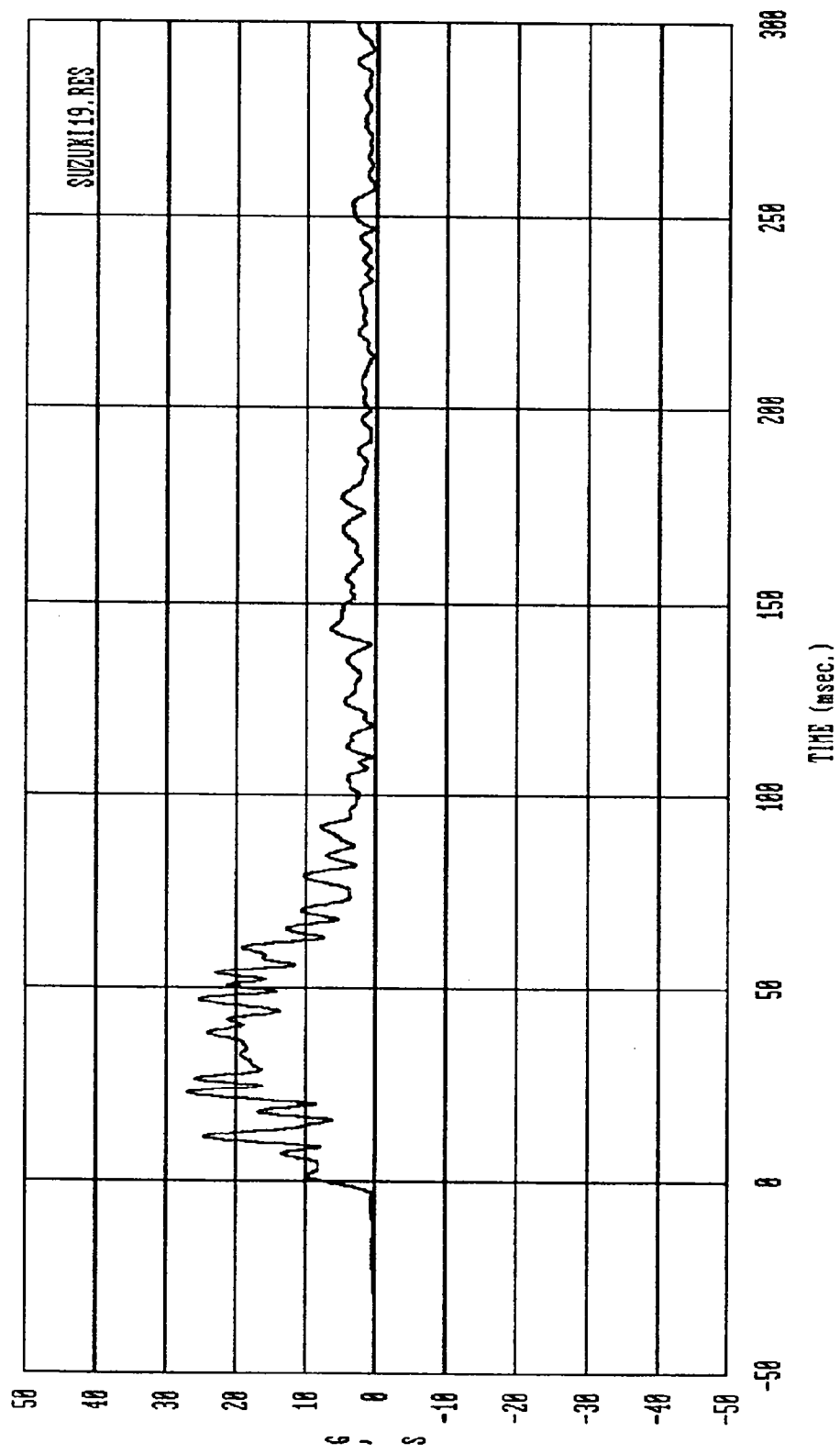
Curve: Rear Floor above axle delta V — Y axis Filter: SAE CLASS 180 Max = 16.898 Min = 2.1601

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



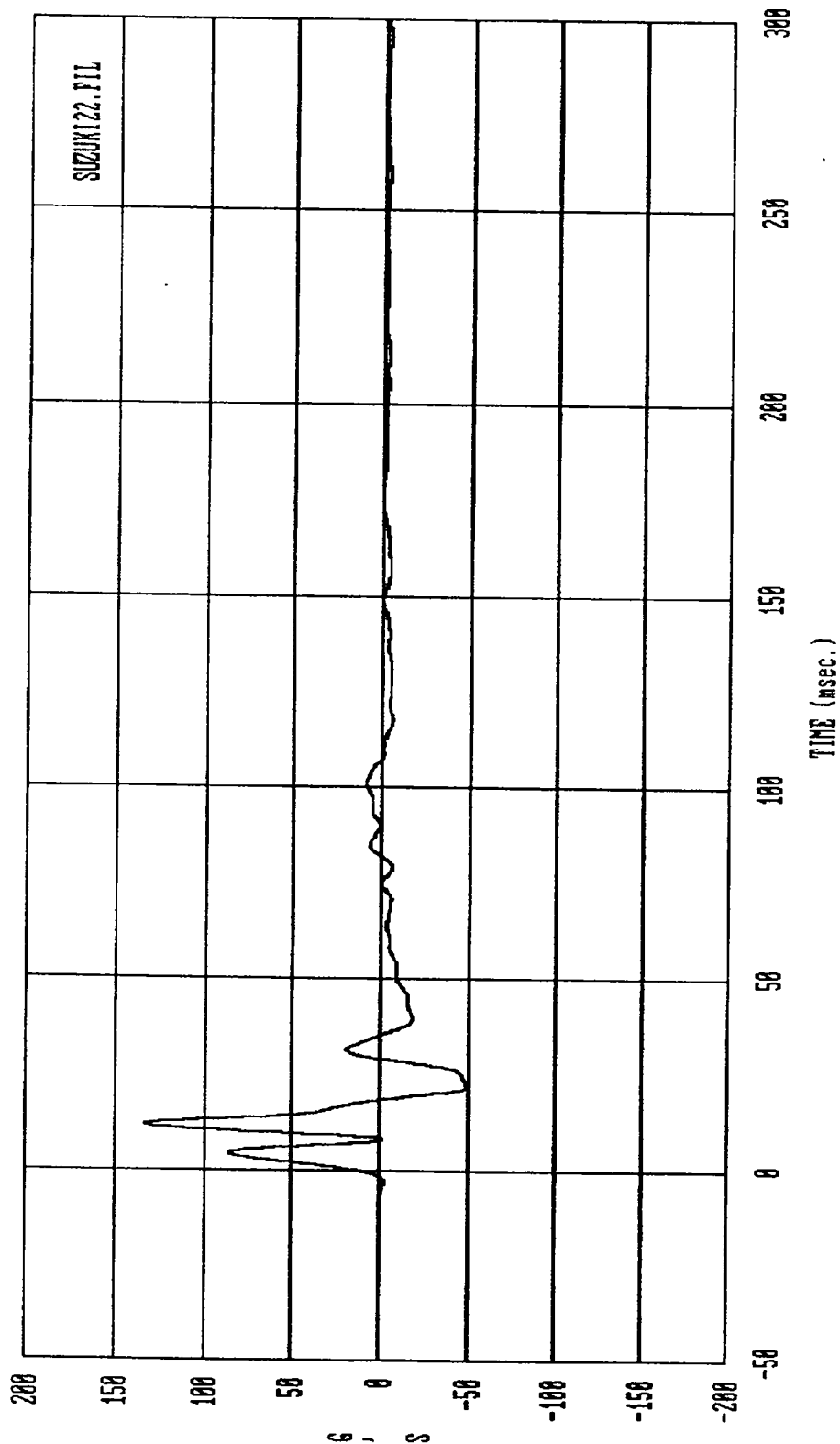
Curve: Rear Floor above axle acceleration — Z axis Filter: SAE CLASS 60 Max = 21.673 Min = -15.587

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



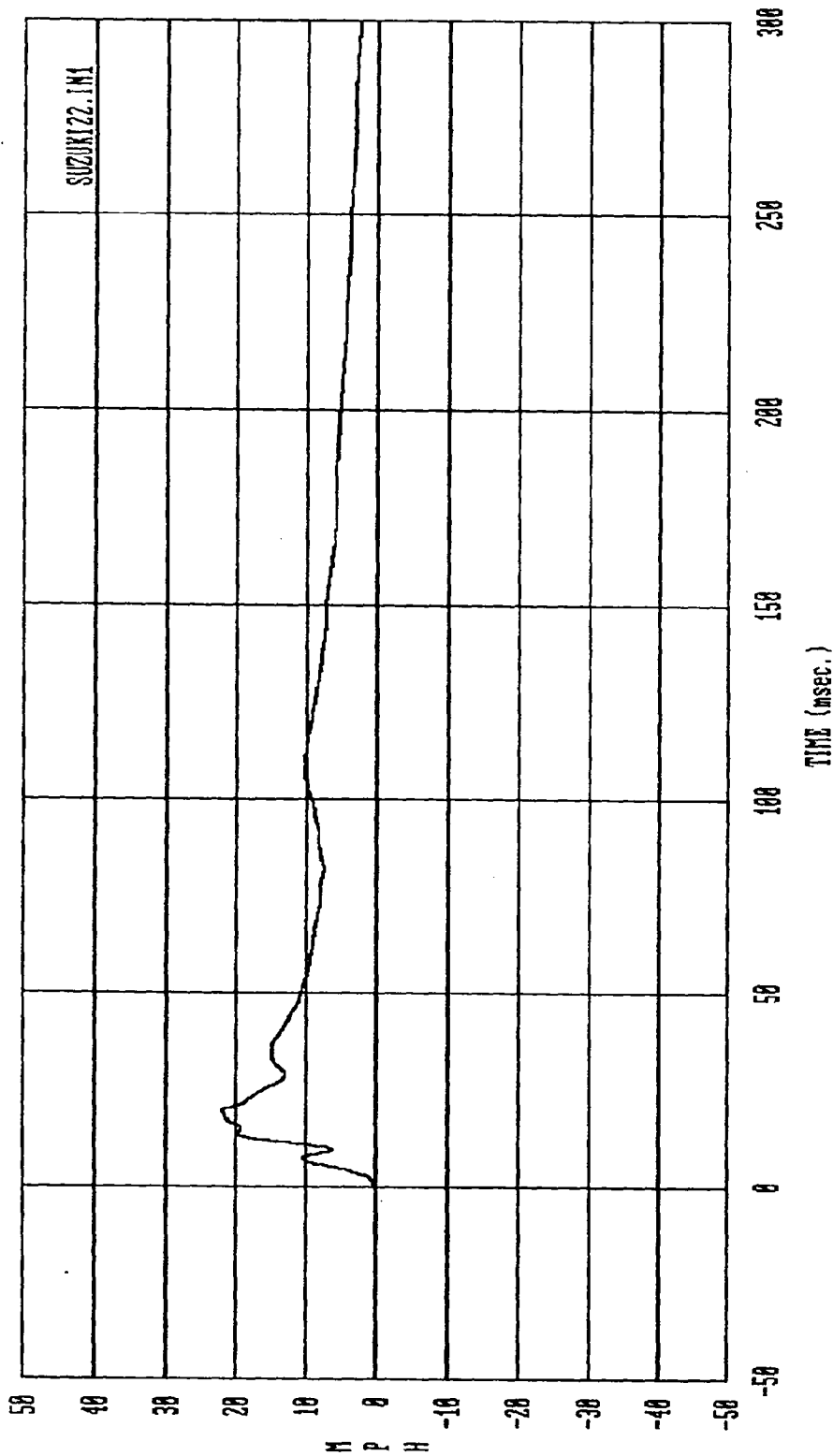
Curve: Rear Floor above axle resultant acceleration Filter: SAE CLASS 60 Max = 27.165 Min = .24766

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



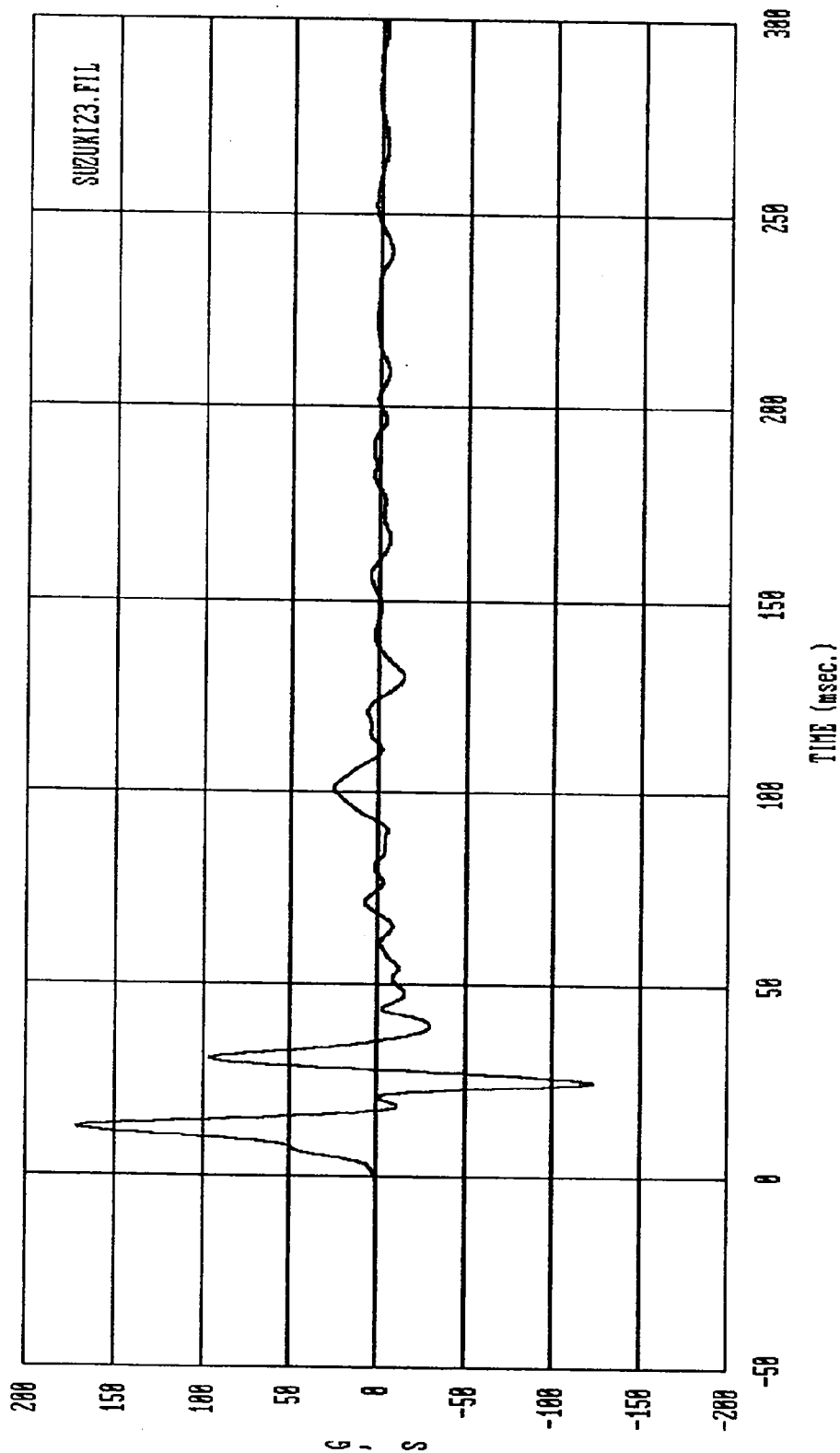
Curve: Front Seat Left Sill acceleration -- Y axis Filter: SAE CLASS 60 Max = 133.90 Min = -49.197

MSR Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

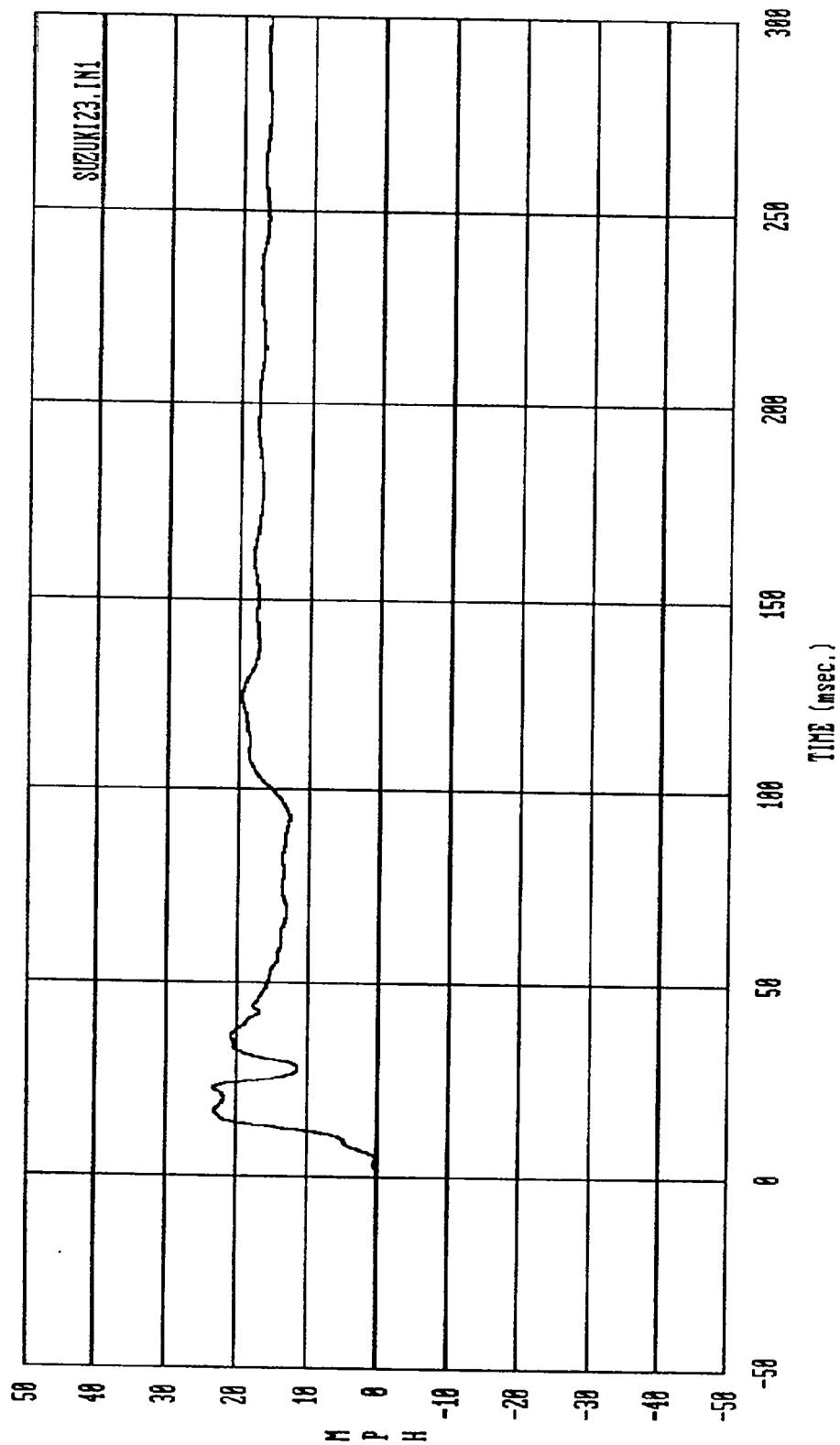


Curve: Front Seat Left Sill delta V -- Y axis Filter: SAE CLASS 100 Max = 22.125 Min = 2.5129

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

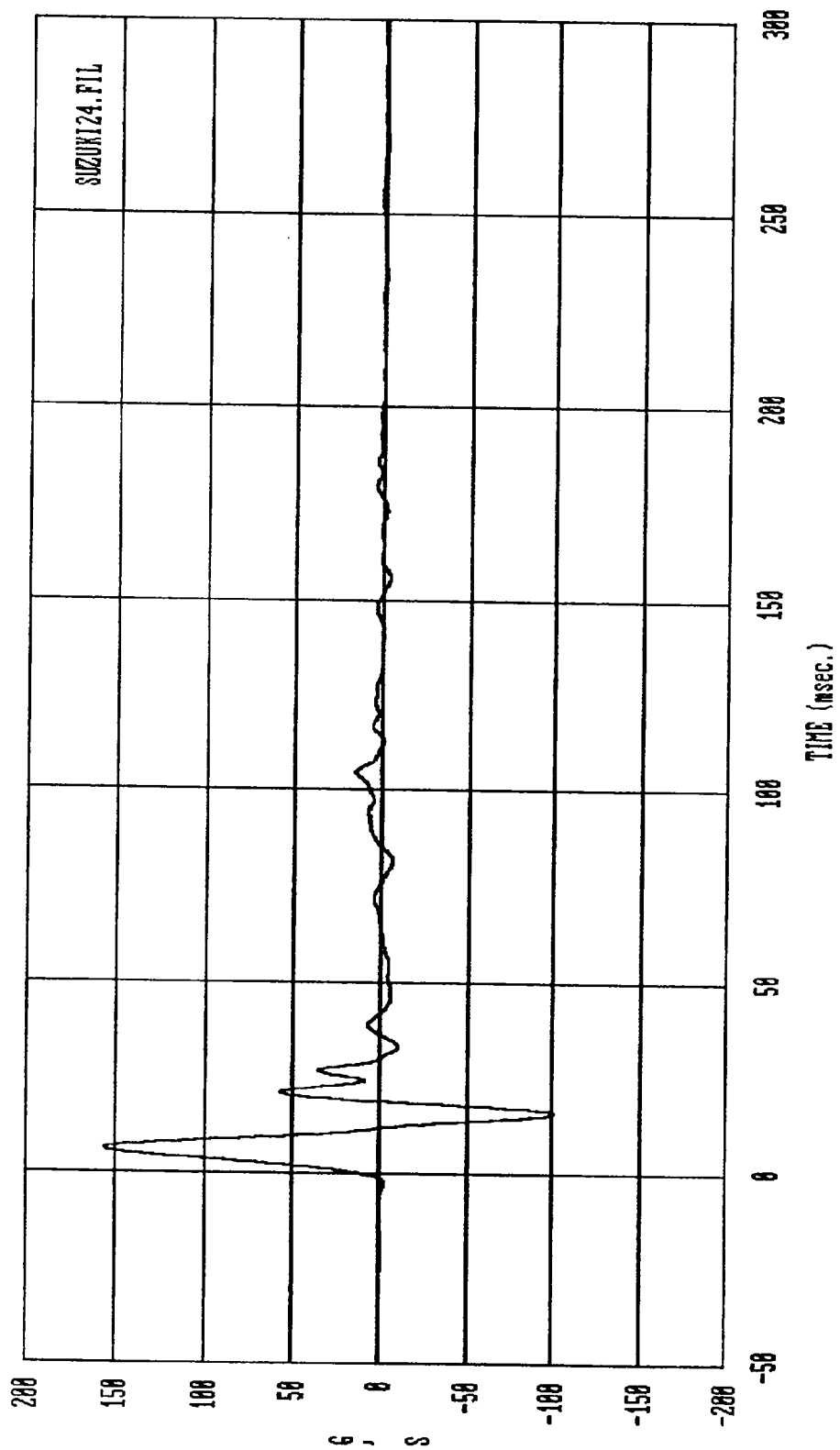


Curve: Left Front Door at centerline -- Y axis Filter: SAE CLASS 60 Max = 171.79 Min = -123.22
MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



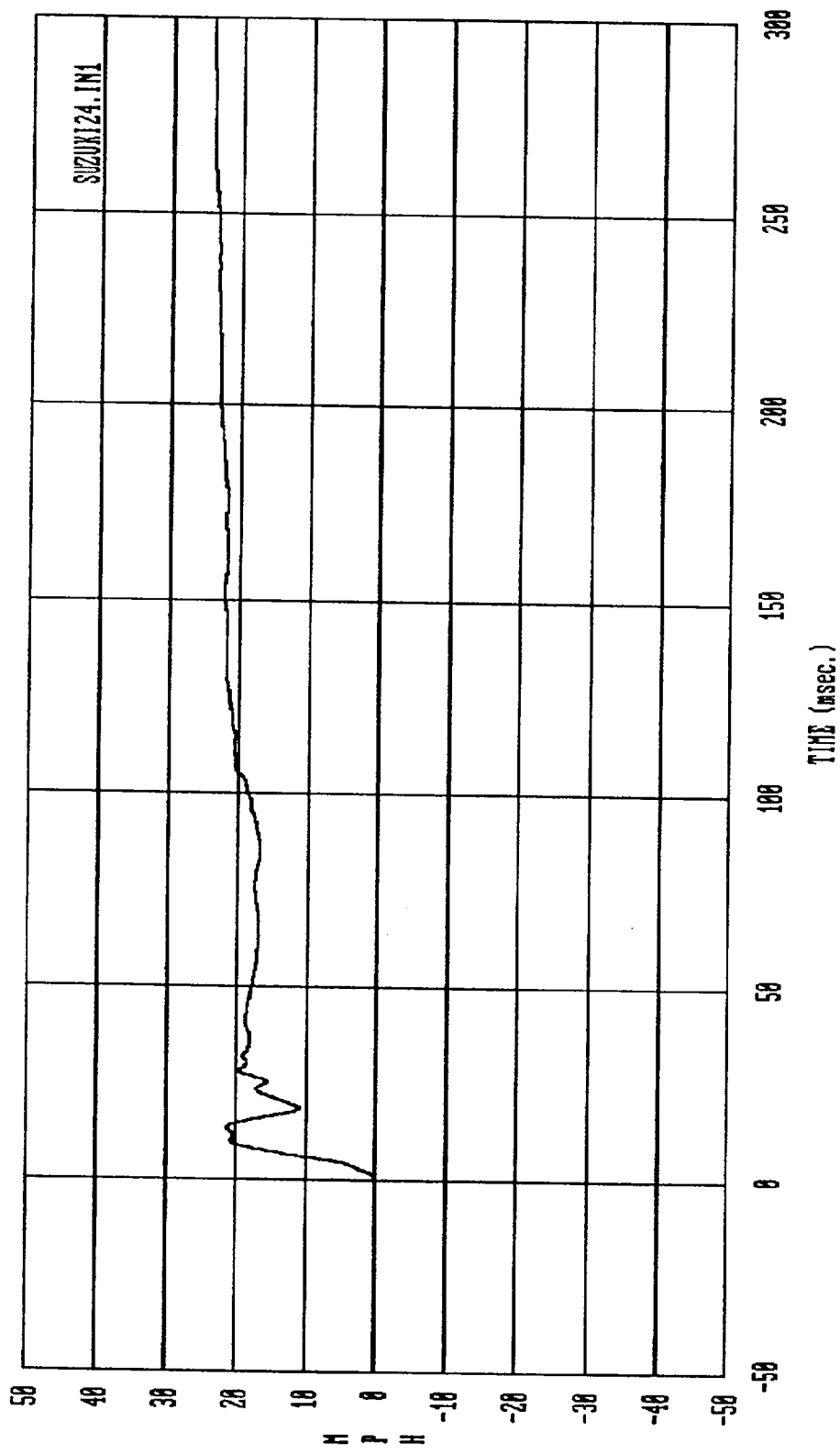
Curve: Left Front Door at centerline delta V Filter: SAE CLASS 180 Max = 23.378 Min = -.65799E-02

NSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

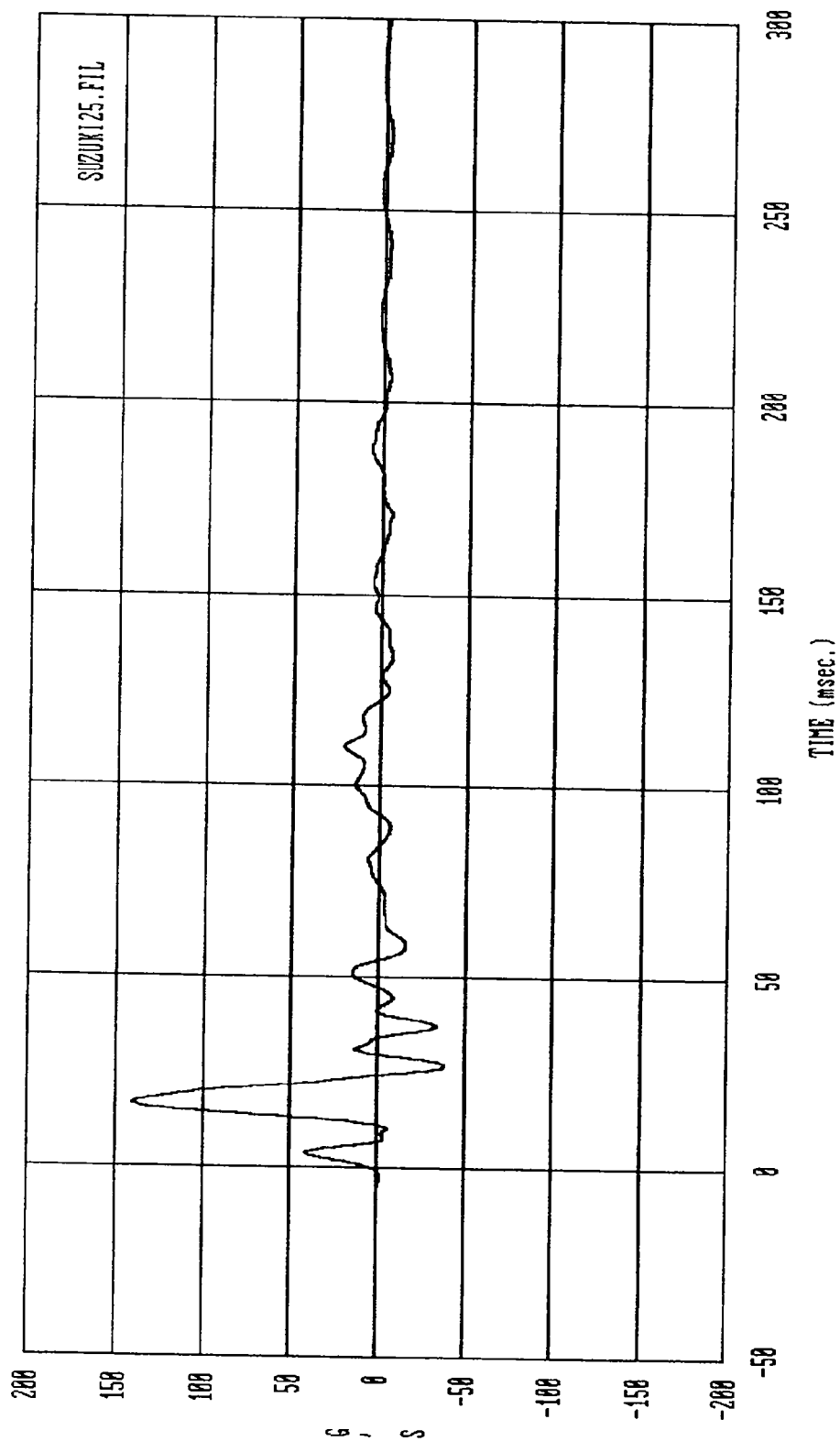


Curve: Left Front Door at mid-rear -- Y axis Filter: SAE CLASS 60 Max : 156.70 Min : -100.73

MSE Date: 85/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

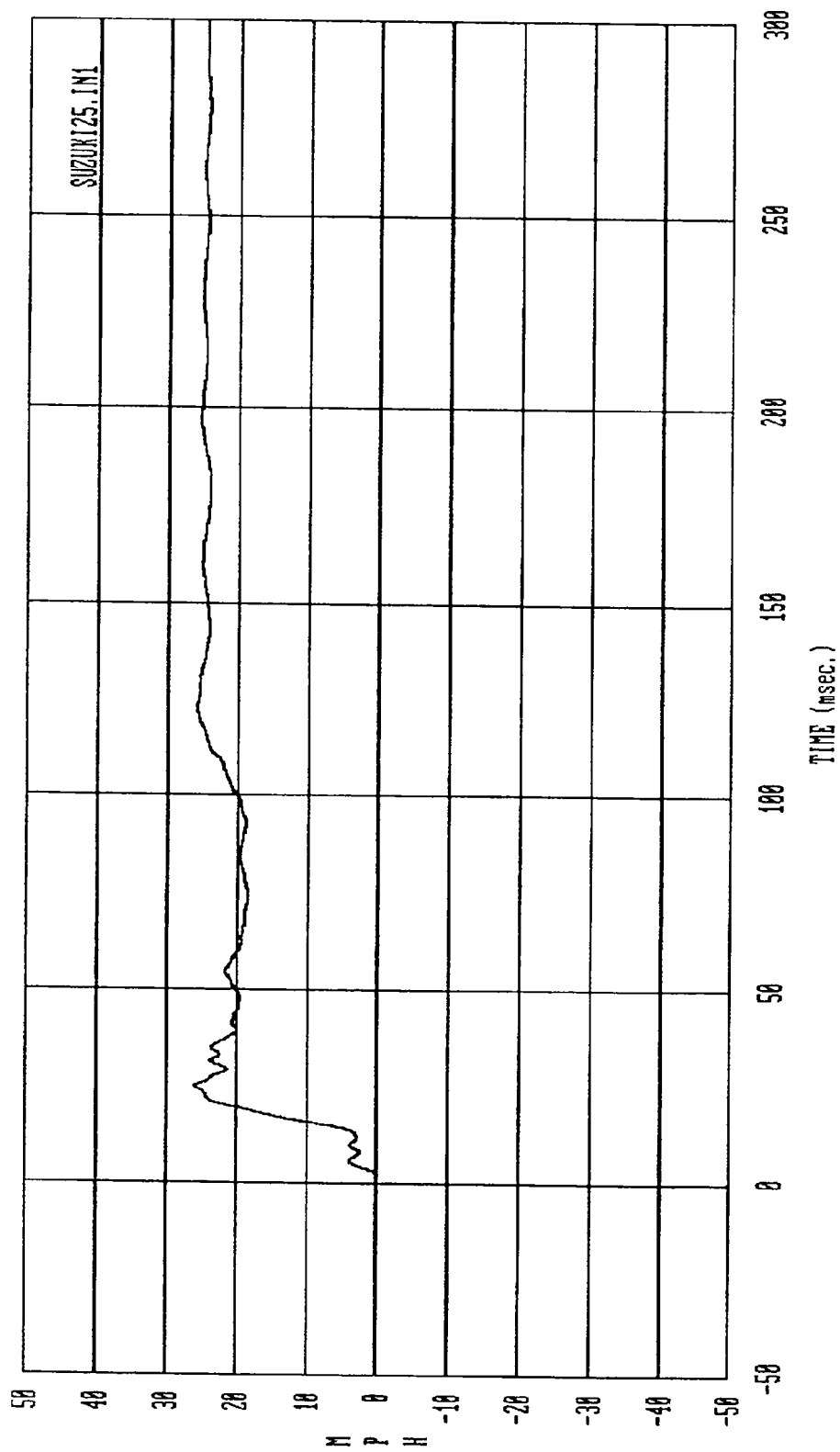


Curve: Left Front Door at mid-rear delta V Filter: SAE CLASS 180 Max = 24.227 Min = 11.025
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



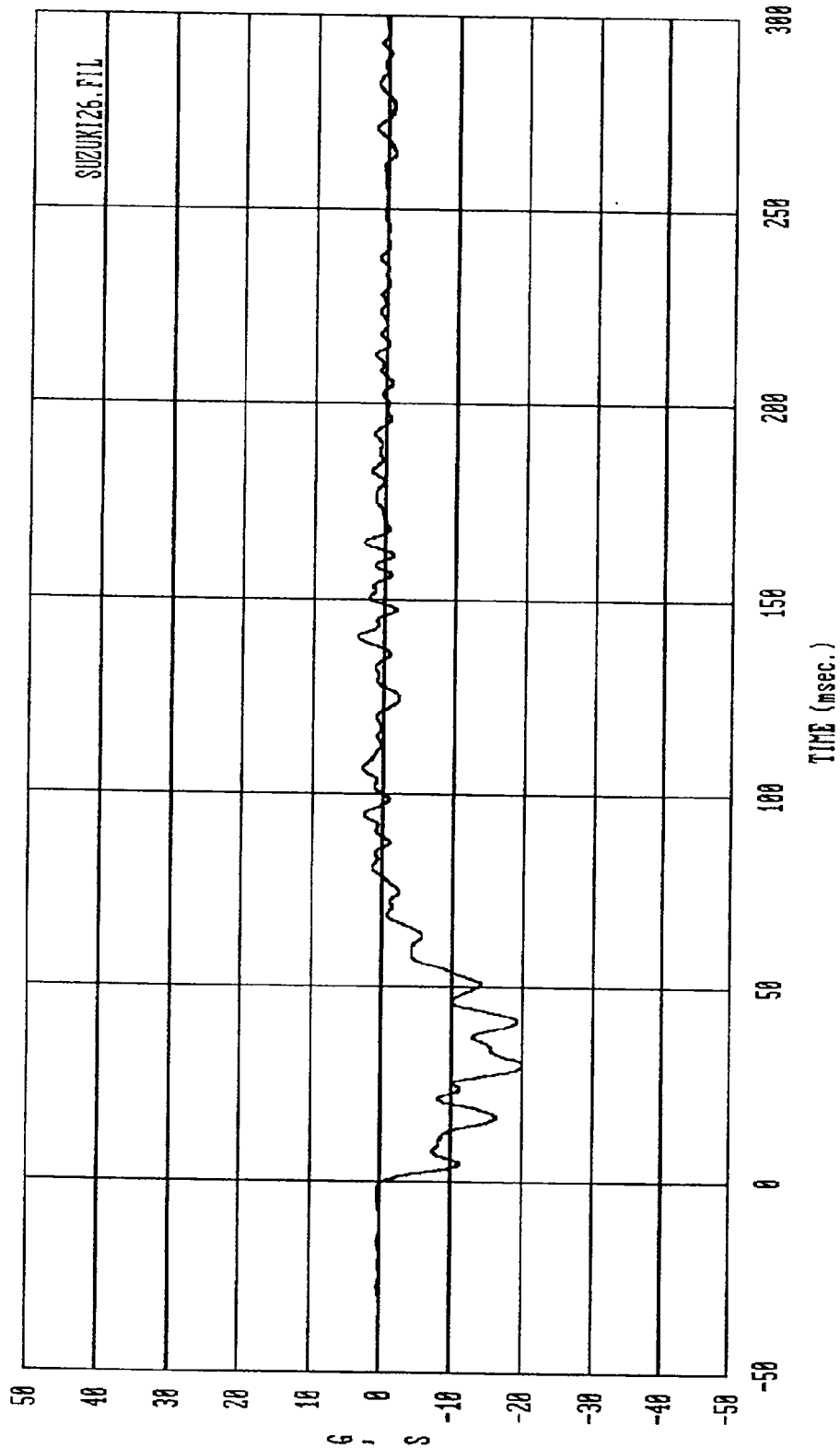
Curve: Left Front Door at upper centerline -- Y axis Filter: SHE CLASS 60 Max = 140.71 Min = -38.824

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



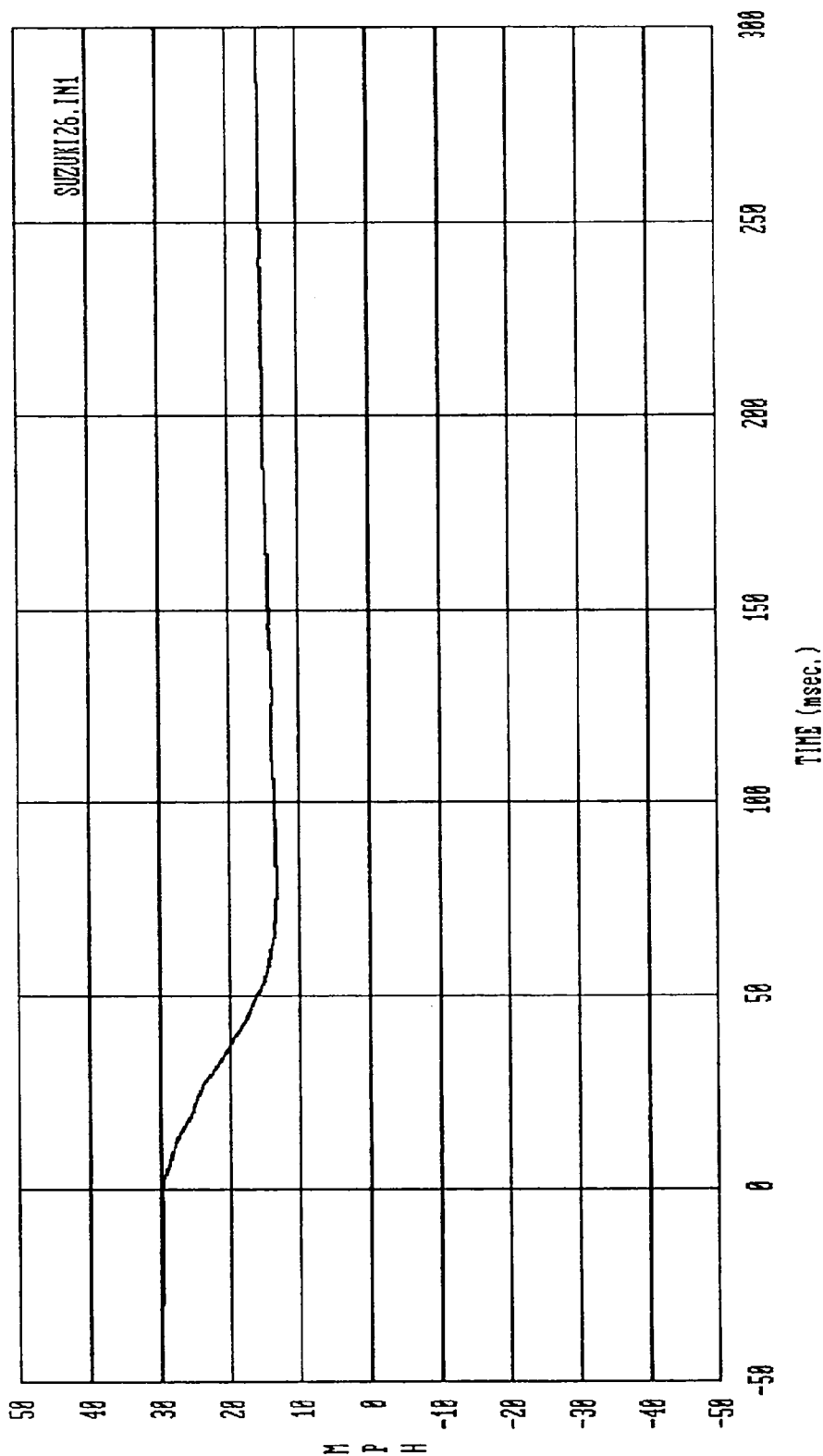
Curve: Left Front Door at upper centerline delta V Filter: SAE CLASS 180 Max = 26.180 Min = -.57185E-01

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



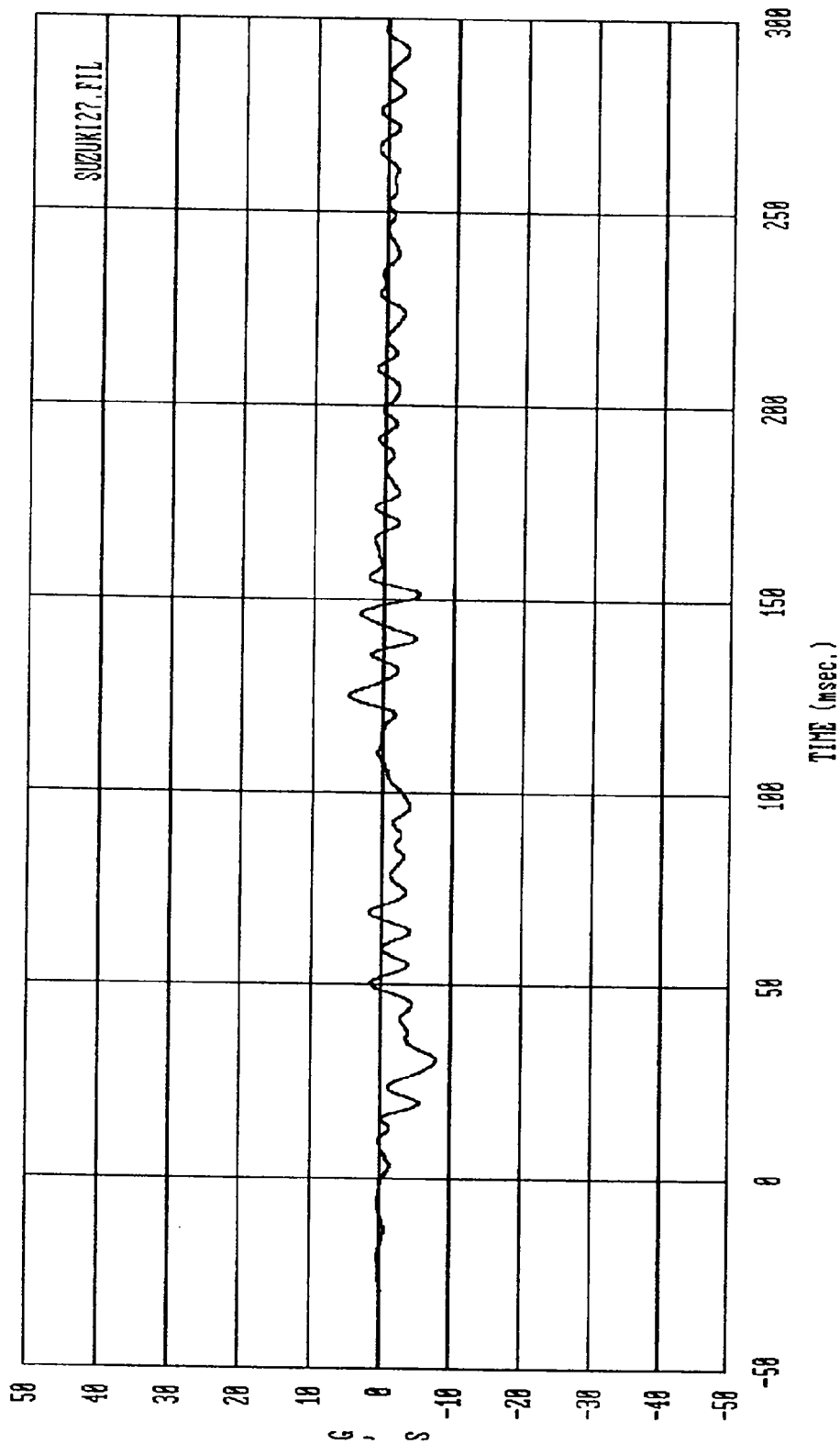
Curve: Movable Deformable Barrier C/G accel. -- X axis Filter: SAE CLASS 60 Max = 3.8378 Min = -20.0086

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



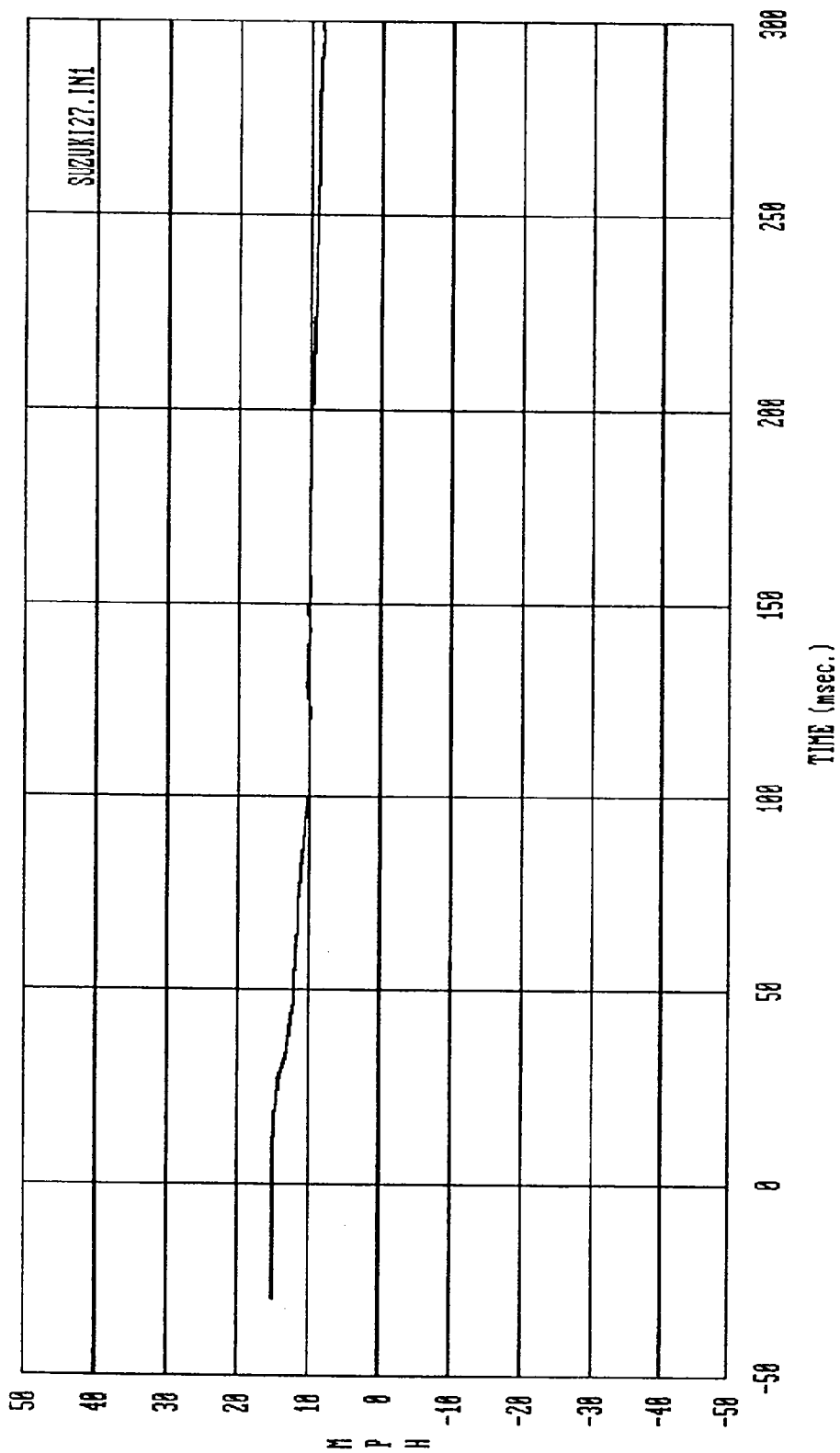
Curve: Movable Deformable Barrier C/G delta U - X axis Filter: SAE CLASS 180 Max = 29.788 Min = 13.177

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



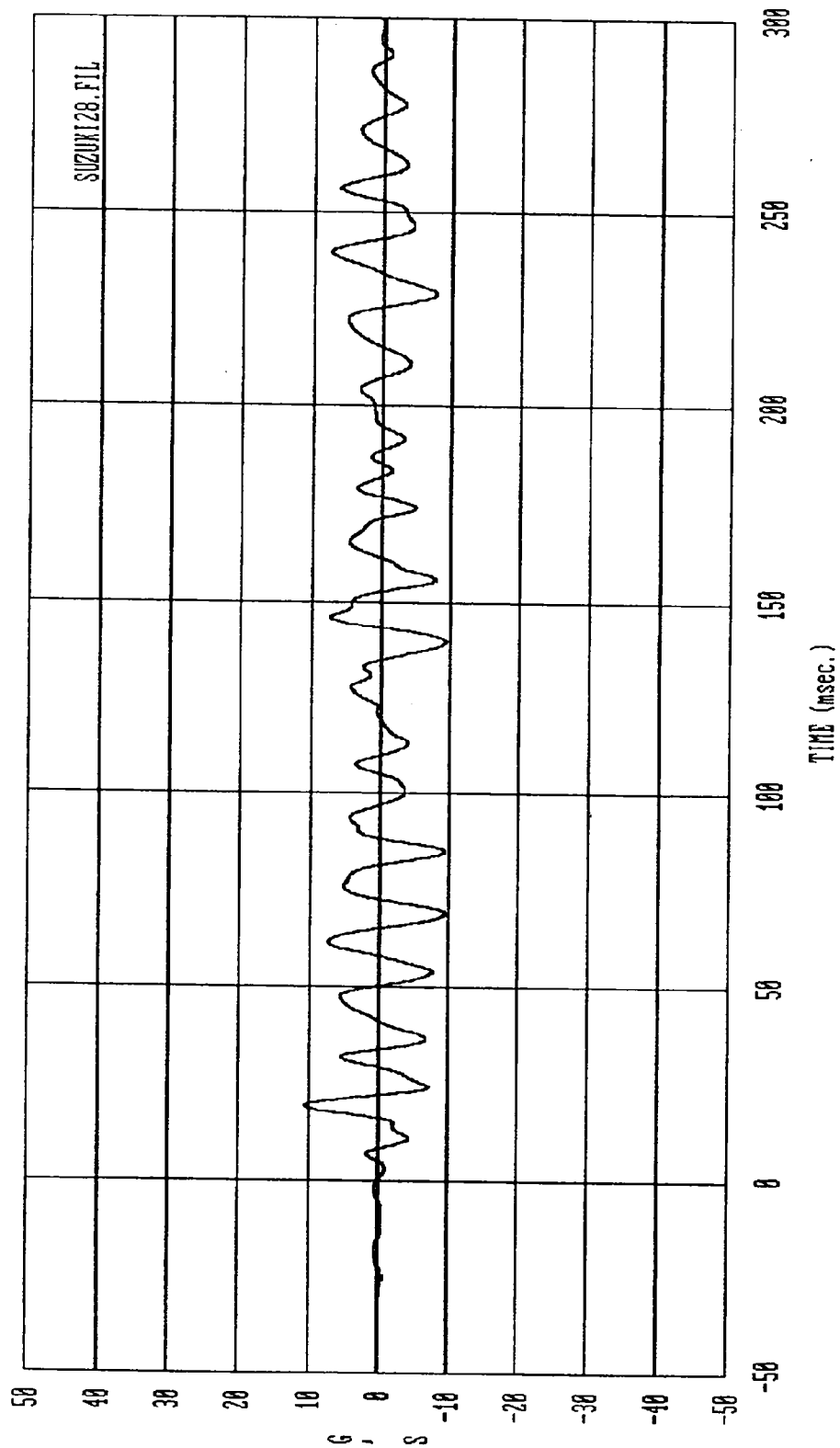
Curve: Movable Deformable Barrier C/G accel. -- Y axis Filter: SAE CLASS 60 Max = 5.0491 Min = -7.9771

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



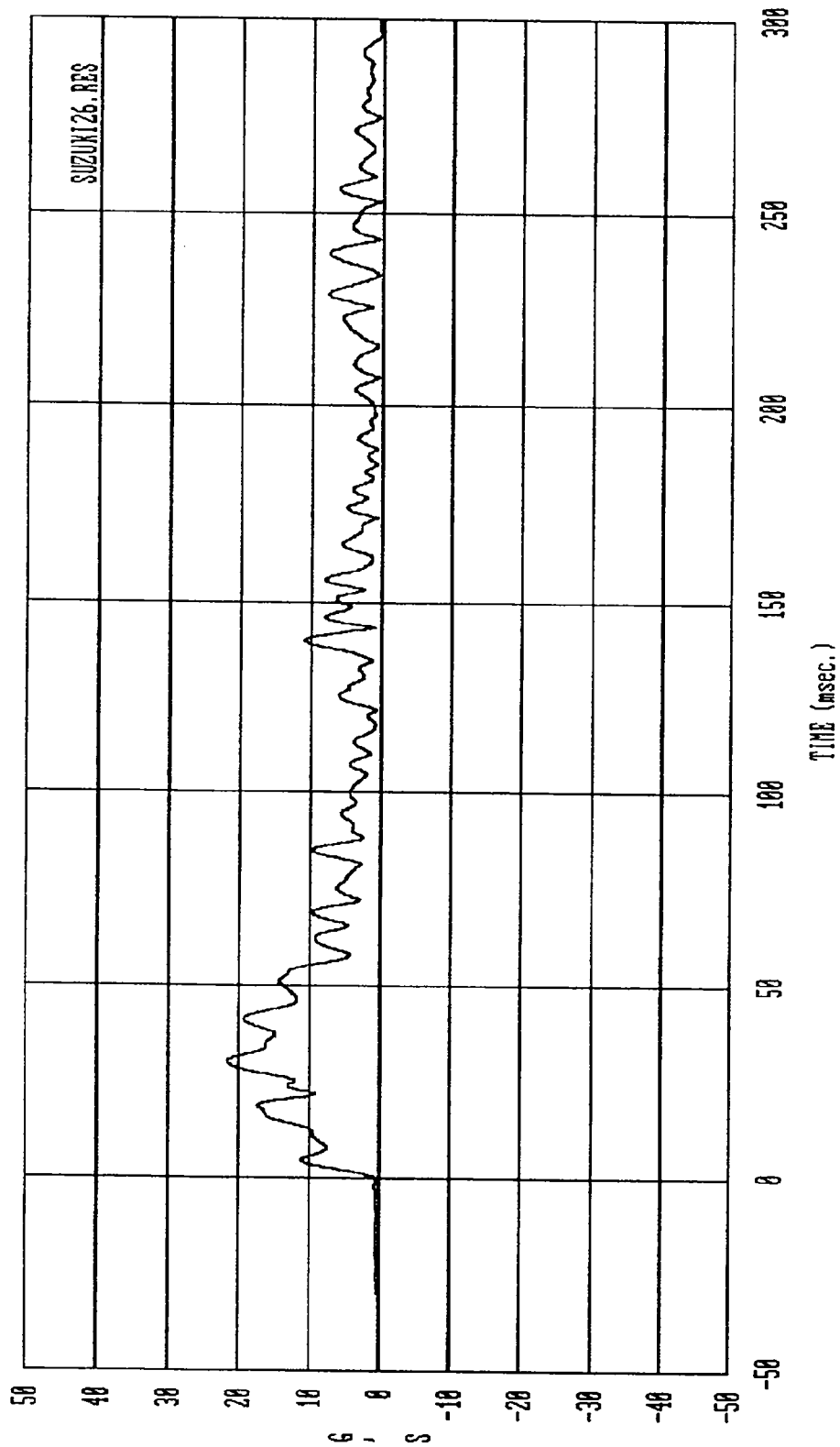
Curve: Movable Deformable Barrier C/G delta V - Y axis Filter: SAE CLASS 180 Max = 15.179 Min = 8.3506

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



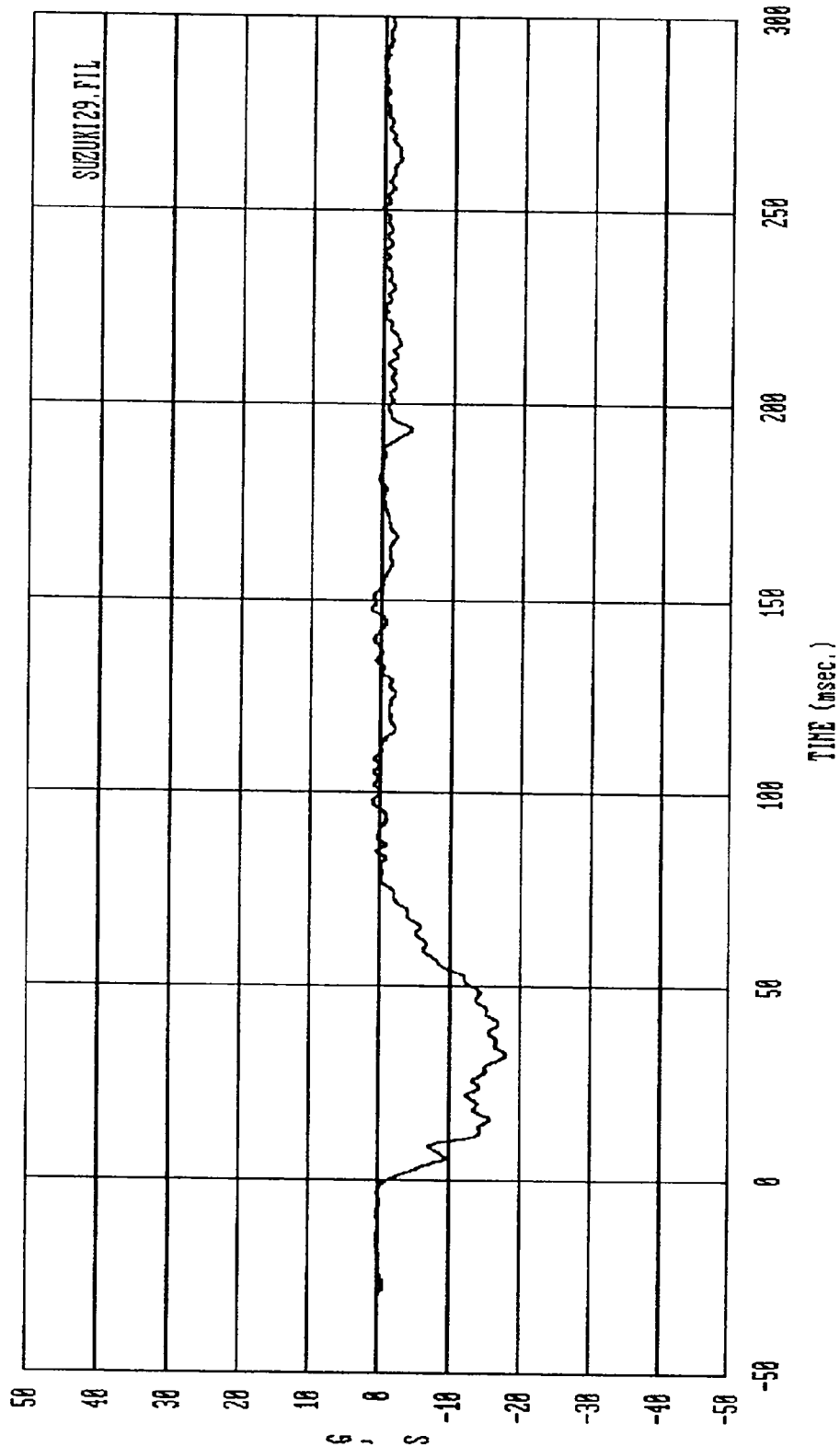
Curve: Movable Deformable Barrier C/G accel. -- Z axis Filter: SAE CLASS 60 Max = 10.850 Min = -9.4978

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



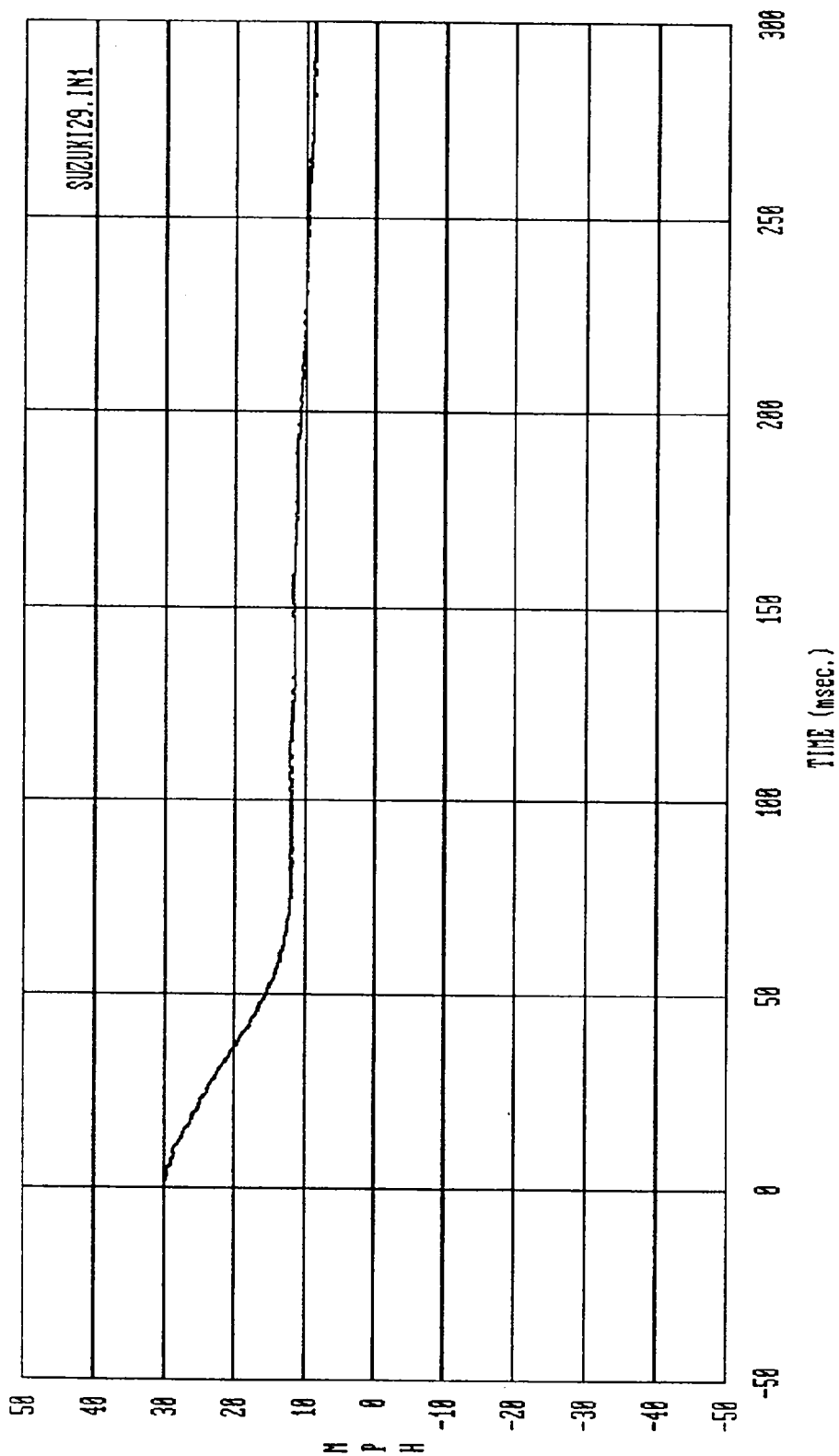
Curve: Movable Deformable Barrier C/G resultant accel. Filter: SAE CLASS 60 Max = 21.643 Min = .34433

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

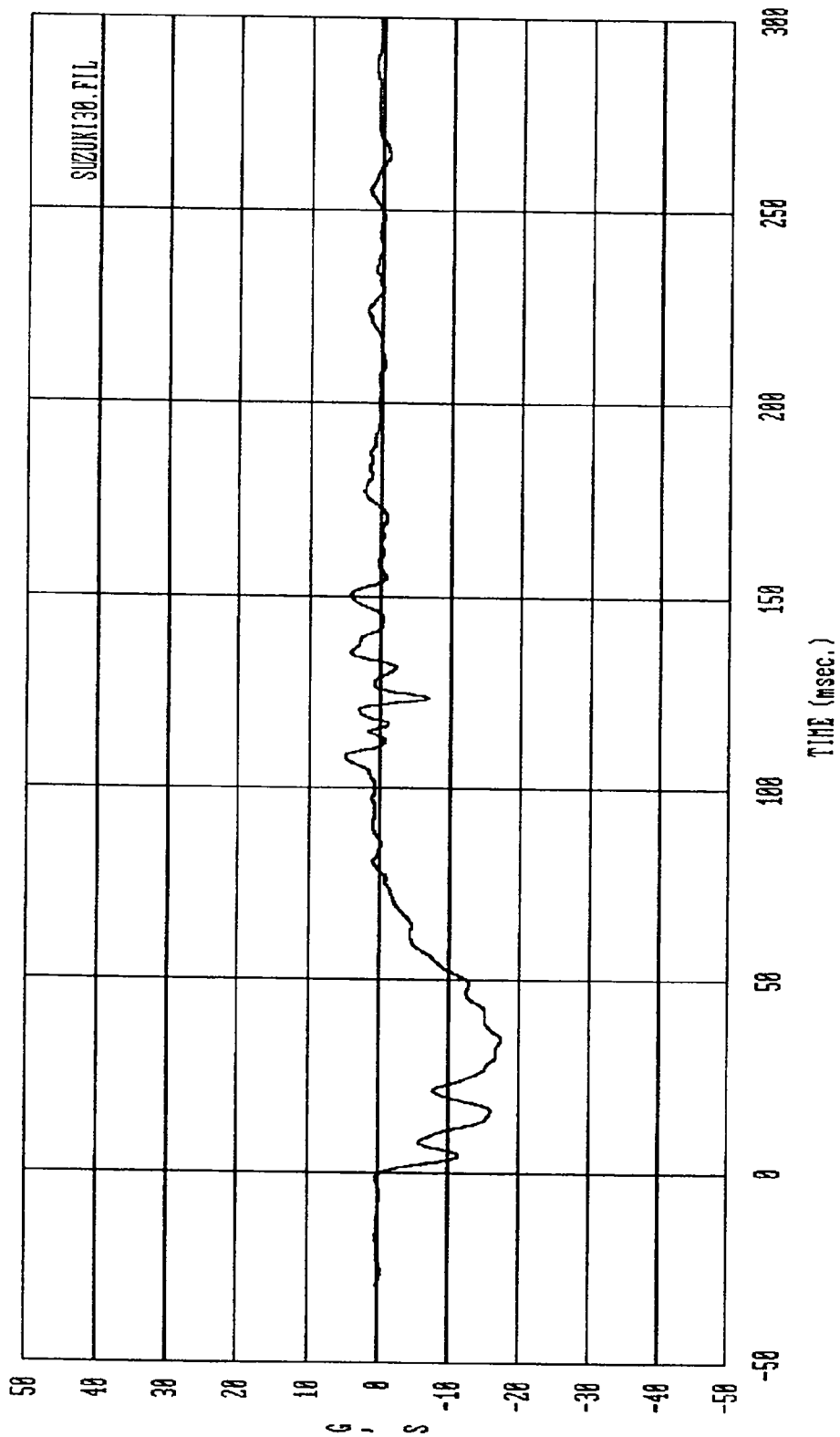


Curve: Movable Deformable Barrier Front frame - X axis Filter: SAE CLASS 60 Max = 1.4282 Min = -17.914

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

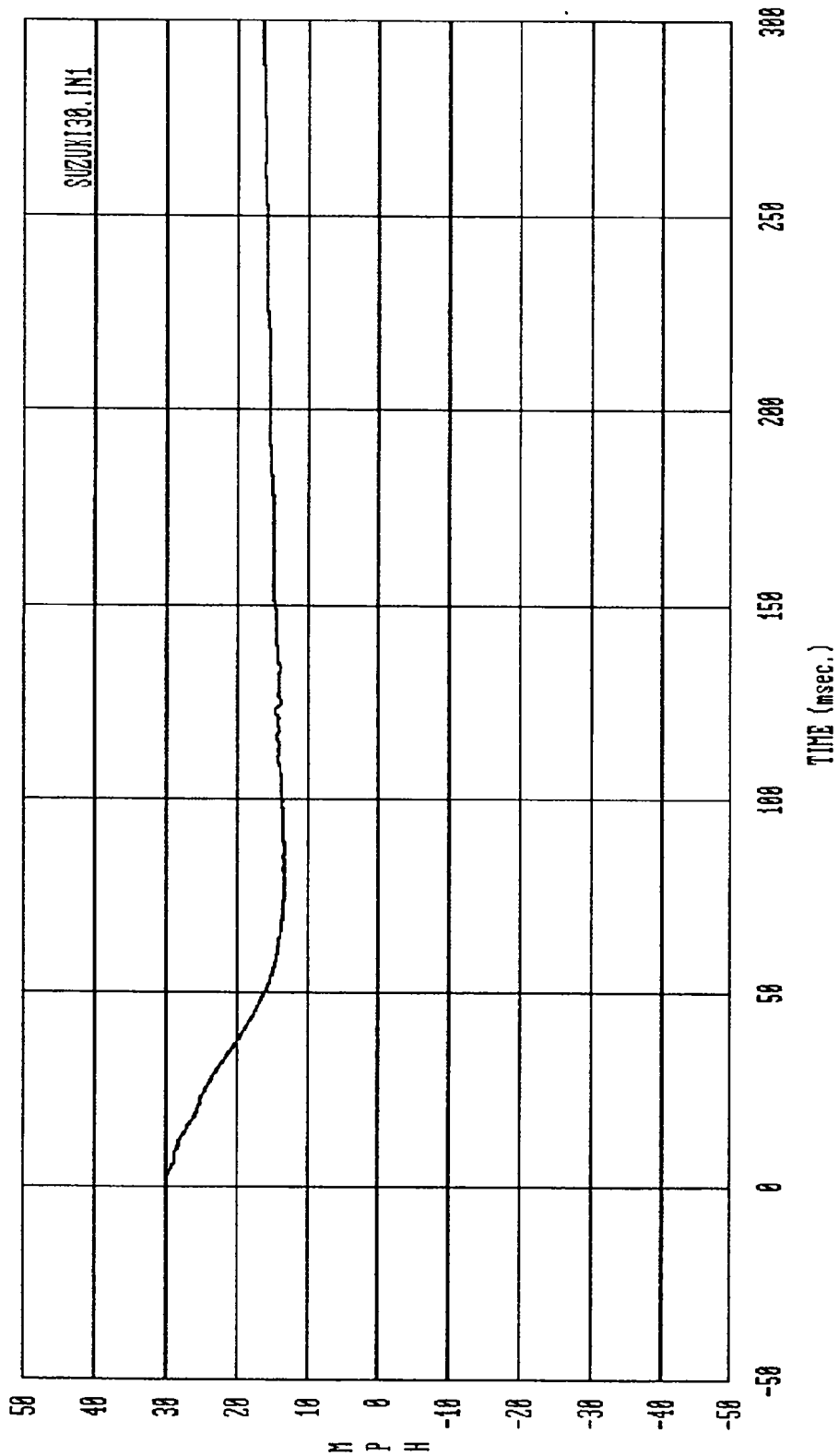


Curve: Movable Deformable Barrier Front frame delta V Filter: SAE CLASS 180 Max = 30.046 Min = 8.7783
 MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



Curve: Movable Deformable Barrier Rear frame -- X axis Filter: SAE CLASS 60 Max = 4.9478 Min = -17.533

HSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick



Curve: Movable Deformable Barrier Rear frame delta V Filter: SAE CLASS 180 Max = 30.054 Min = 13.337

MSE Date: 05/30/91 Program: 1991 Side Impact Vehicle: 1991 Suzuki Sidekick

APPENDIX C
SID CERTIFICATION DATA

SID IMPACT CALIBRATION SUMMARY SHEET

S.I.D. I.D. NO. : 319

LABORATORY TECHNICIAN: APURVA MARAPA

Sheet No. 1 of 3		Pretest Calibration	Posttest Calibration
Date of SID Calibration - - - - - Calibration Sequential Number for Dummy Temperature min Lab. (Spec. =66 to 78' F) - - Relative Humidity i n Lab. (Spec. = 10 tp 70%)		↑	
TEST PARAMETER SPECIFICATION			
1. NECK BENDING TEST: a. Pendulum Speed - - - 21.5 to 25.5 fps b. Pendulum Avg. Decel (over t3 - t2) - - - - 20 to 24G c. Peak Resultant Head Acceleration- - - - - 26G maximum d. Pendulum Decel. (t2-t1) 3 ms e. Pendulum Decel. (t2-t2) 25 to 30 ms f. Pendulum Decel. (t2-t3) 10 ms g. Pendulum Direction Reversal Time - - - - 123 ms h. Max. Head Rotation- - 63 to 73' i. Chordal Displacement: Head Rotation Angle -		N/A	
0'	Time -2 to 2 ms Displ. .5 to .5 in		
30'	Time 25.6 to 34.4 ms Displ. 2.1 to 3.1 in.		
60'	Time 40.3 to 51.7 ms Displ. 4.3 to 5.3 in		
Maximum	Time 53.2 to 66.8 ms		
(')	Displ. 5.0 to 6.0		
2. NECK BENDING TEST continued: i. Chordal Displacement: Head Angle: --		↓	
0'	Time 67.0 to 83.0 ms Displ. 4.3 to 5.3 in.		
30'	Time 85.4 to 104.6 ms Displ. 2.1 to 3.1 in.		
60'	Time 101.0 to 123.0 ms Displ. -.5 to 0.5 in.		

SID IMPACT CALIBRATION SUMMARY SHEET (Continued)

S.I.D. I.D. NO. : 319

LABORATORY TECHNICIAN: APURVA MARAPA

Sheet No. 2 of 3		Pretest	Posttest
TEST PARAMETER	SPECIFICATION		
3. ABSOMINAL COMPRESSION TEST (Preload = 10 pounds)		N/A	
a. Force @ .5" - - - -	23 - 36 lbs.		
b. Force @ .75"- - - -	36 - 50 lbs.		
c. Force @ 1.0"- - - -	50 - 63 lbs		
d. Force @ 1.3"- - - -	73 - 88 lbs.		
LUMBAR FLEXION TEST:			
a. Force @ 20' - - - -	22 to 34 lbs		
b. Force @ 30' - - - -	34 to 46 lbs		
c. Force @ 40' - - - -	46 to 58 lbs		
d. Return Angle - - - -	12 maximum		
5. THORAX IMPACT TEST:			
a. Upper Rib accel.- - -	37 - 46g's Sec	42.314	
b. Lower Rib accel.- - -	37 - 46g's Sec	39.654	
c. Lower Spine accel - -	15 -22 g's Sec	20.364	
6. PELVIC IMPACT TEST:			
Pelvic accel. - - - -	40 - 60g's	44.218	

APPENDIX D
SID POSITIONING PROCEDURE

SIDE IMPACT DUMMY SEATING PROCEDURE

1. Seat Positioning

- A. Place seat at the longitudinal midpoint of fore to aft adjustment (forward most locking position to rear most locking position). If no locking position is available at mid-travel, use the position immediately rearward of mid-travel.
- B. If the seat back angle is adjustable, place it in the manufacturer's stated nominal design location. If not specified, set it at the first detent rearward of 25'.
- C. Adjustable head restraints are set such that the top surface of the restraint is level with the c.g. of the dummy's head.
- D. If the seat is equipped with adjustable side or lumbar supports, they are set in their "released" or full back positions.
- E. All other seat adjustments are positioned to their mid-travel locations. If locking positions are not available at these mid-points, use the position immediately rearward, down, left, or clockwise of mid-travel. Clockwise is defined looking rear to front or left to right relative to the vehicle. This also applies to adjustable steering columns.

2. H-point Determination

- A. The SAE three-dimensional H-point machine (SAE J826 APR80 - 50th percentile male configuration) is used to locate the H-point for each surrogate (see Appendix A).
- B. The H-point machine is positioned on the seat as follows:
 - 1. Bucket or Contoured Seats - The H-point machine is centered on the bucket or contour such that its midsagittal plane is vertical and longitudinal.
 - 2. Bench Seats
 - a. Driver position - The H-point machine is positioned such that its midsagittal plane is vertical, longitudinal, and contains the steering wheel center point.
 - b. Outboard passenger positions - The H-point machine is positioned such that its midsagittal plane is vertical, longitudinal, and the same distance from the longitudinal vehicle centerline as that for the driver position.

- c. Center passenger positions - The H-point machine is positioned such that its midsagittal plane is vertical and contains the longitudinal vehicle centerline.
- C. Locate the H-point position using the steps outlined in sections 4 through 6 of SAE Standard J826 APR80, unless otherwise specified in section 1 or 2 of this document. Record the coordinates of this point, relative to the vehicle, for use in section 4 of this document.

3. Test Dummies

- A. All NHTSA side impact crash test use the NHTSA Side Impact Dummy (SID) as the surrogate(s), unless otherwise specified by the COTR.
- B. All dummy joints are inspected for mobility prior to each test usage and reset to hold between 1 and 2 g's. This amount just barely restrains the weight of the individual limb when it is extended horizontally.
- C. Each test dummy is clothed in form-fitting cotton stretch underwear with short sleeves and mid-calf length pants. Each foot of each dummy is equipped with a size 11EE shoe which meets the configuration, size, sole, and heel thickness specifications of MIL-S-13192 and weighs 1.25 + 0.2 pounds. All the above items are supplied by the contractor.

4. Initial Dummy Placement

The SID dummy(s) is placed in the vehicle seat with its pelvis positioned such that a lateral line passing through the dummy H-point is perpendicular to the longitudinal centerplane of the vehicle.

- A. Bucket or Contoured Seats. The dummy is centered on the bucket or contoured seat such that its midsagittal plane is vertical and longitudinal. The legs are positioned as follows, keeping the femur and tibia centerlines in a plane that is as near to vertical as possible.
 - 1. Driver position placement - The right foot of the dummy is placed on the underpressed accelerator pedal, with the heel resting on the floorpan as far forward as possible. The left knee is positioned such that the distance from the outer surface of the knee pivot bolt to the dummy's midsagittal plane is 6 inches.

2. Passenger positions placement - The knees of the dummy are initially set 11 1/2" apart, measured between the outer surfaces of the knee pivot bolt heads. If a center tunnel prevents this, place the feet on either side of the tunnel.

B. Bench Seats.

1. Driver position placement - The dummy is placed in the seat as outlined in section 4.A.2 except that its midsagittal plane is vertical, longitudinal, and contains the steering wheel center point.
2. Outboard passenger positions - The dummy is placed in the seat as outlined in section 4.A.2 except that its midsagittal plane is vertical, longitudinal, and the same distance from the vehicle centerline as that for the driver position.
3. Center passenger positions - The dummy is positioned in the seat as outlined in section 4.A.2 except that its midsagittal plane is vertical and contains the vehicle centerline.

5. Initial Dummy Positioning

A. H-point Positioning.

1. With the dummy laterally positioned as in section 4, insert the pelvis angle indicator bar in the hole provided above, and to the rear of the dummy H-point. Position the longitudinal pelvis angle between 23' and 25' to the horizontal. This may be accomplished by raising the legs or flexing the upper torso forward and allowing the pelvis to rotate. The lateral pelvis angle is to be horizontal.
2. Apply sufficient force on the lower torso in a horizontal and vertical direction to place the dummy H-point at the coordinates obtained in section 2.
3. If the H-point cannot be placed at the desired coordinates, adjust the pelvis angle within the 2' band and reposition to the coordinates. After repositioning the H-point, any deviation from the desired coordinates is recorded and used to indicate actual H-point locations. This deviation is not to exceed 1/2".

- B. Upper Torso Positioning. The dummy's upper torso should rest against the seat back. If not, adjust the upper torso, maintaining the H-point location and pelvis angle, so that the dummy's back rests against the seat back. If this

cannot be done, modify the H-point location and/or pelvis angle within the allowable bands until the back rests against the seat.

6 Final Dummy Positioning

- A. Driver Position. Without inducing pelvis or torso movement, the dummy's right foot is placed on the underpressed accelerator pedal with the heel resting as far forward as possible on the floorpan. The left foot is set perpendicular to the lower leg with the heel resting on the floorpan in the same lateral line as the right heel. If possible within these constraints, the dummy's thighs should be in contact with the seatpan.
- B. Front Passenger Positions. Without inducing pelvis or torso movement, place the dummy's feet on the vehicle's toeboard with the heel resting on the floorpan as close as possible to the intersection of the toeboard and floorpan. If the feet cannot be placed on the toeboard, they are set perpendicular to the lower legs and placed as far forward as possible such that the heels rest on the floorpan.
- C. Rear Passenger Positions. Without inducing pelvis or torso movement, the feet are placed flat on the floorpan and beneath the front seat as far forward as possible without front seat interference. If necessary, change the distance between the knees as required to place the feet beneath the seat. Record the new distance.
- D. Vehicles with wheelhouse projections in the passenger compartment. The foot(feet) in question is placed in the well of the floorpan/toeboard and not on the wheelhouse projection. This is done by twisting the foot at the ankle, maintaining the upper and lower leg positions outlined in section 4. If this does not resolve the situation, move the leg of the foot in question just enough to achieve the correct position, keeping the femur and tibia centerlines in a plane that is as near to vertical as possible. Record the new distance between the knees.
- F. Prior to conducting the test, the dummy position is visually checked. The dummy is to be properly positioned laterally with its midsagittal plane vertical and longitudinal, and the upper torso resting against the seat back. The H-point and pelvis angle are to be within the specified ranges and the foot, knee, and leg placements are to be as outlined. The COTR is to be satisfied with the final dummy position and any deviations from this procedure are to be approved by the COTR.

- G. The final dummy position is recorded. These measurements are to include, but not be limited to, pelvis and head angles as well as actual H-point and head c.g. locations relative to the vehicle. The straight line distance from the H-point to the center of the outer ankle bolt is also recorded for one of the legs (eg. left H-point to left ankle bolt).