DOT 1453

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

BAYERISCHE MOTOREN WERKE A.G.
1990 BMW 325i
2 DOOR SEDAN (ACP)
NHTSA NO. ML0500

MOBILITY SYSTEMS AND EQUIPMENT COMPANY
9920 LA CIENEGA BOULEVARD SUITE 708
INGLEWOOD, CALIFORNIA 90301

MARCH 26, 1990

FINAL REPORT

Prepared For:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF MARKET INCENTIVES
400 Seventh Street, S.W.
Room No. 5313 (NRM-22)
Washington, DC 20590

This Final Report was prepared for the U. S. Department of Transportation, National Highway Traffic Safety Administration under Contract No. DTNH22-87-D-02009. This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

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DATE: 26 MARCH 1990

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JUL 16 1990

Date of Report Acceptance

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
MSE-90-N010		

4. Title and Subtitle	5. Report Date
NEW CAR ASSESSMENT PROGRAM (NCAP) FRONTAL BARRIER IMPACT TEST 1990 BMW 325i/2 DOOR SEDAN (ACP) NHTSA No. ML0500	MARCH 26, 1990
	6. Performing Organization Code MSE
7. Author(s) Dr. Anil V. Khadilkar/S.D. Pruitt/T. Kippen/A. Mapara	8. Performing Organization Report No. R9092-04
9. Performing Organization Name and Address MOBILITY SYSTEMS AND EQUIPMENT COMPANY 9920 La Cienega Boulevard, Suite 708 Inglewood, California 90301	10. Work Unit No. (TRAIS)
	11. Contract or Grant No. DTNH22-87-D-02009, D.O. #5
12. Sponsoring Agency Name and Address U.S. DEPARTMENT OF TRANSPORTATION National Highway Traffic Safety Administration Office of Market Incentives 400 Seventh Street, S.W. Washington, DC 20590	13. Type of Report and Period Covered FINAL
	14. Sponsoring Agency Code DOT/NHTSA/RM/OMI

15. Supplementary Notes

16. Abstract

A 35 mph frontal barrier impact test using a load cell barrier was conducted on a 1990 BMW 325i 2 door sedan at the Mobility System and Equipment Company (MSE) crash test facility in Mira Loma, CA, 13 March 1990.

The barrier impact velocity was 34.8 mph, and the ambient temperature at the barrier face at the time of impact was 63 deg. F. The post-test vehicle crush maximum was 20.5 in.

A summary of occupant injury measure data from the test appears below:

Injury Criteria Threshold Value	Driver Dummy	Passenger Dummy
Head Injury Criterion HIC = 1000	1036	*
Chest Resultant Peak 60 Gs (3 ms clip)	55.7	*
Femur Load 2250 Pounds Left	865	
Femur Load 2250 Pounds Right	853	*

TYPE OF RESTRAINT SYSTEM: A manual 3-point continuous webbing system at each front outboard seating position. In addition a supplementary Restraint System of an airbag unit at the driver position.

* Data not reportable, since passenger belt broke during the impact event.

17. Key Words	18. Distribution Statement
35 MPH FRONTAL BARRIER IMPACT TEST NEW CAR ASSESSMENT PROGRAM (NCAP) 1990 BMW 325i / 2 DOOR SEDAN (ACP)	COPIES OF THIS REPORT ARE AVAILABLE FROM: Technical Reference Division Nat'l Highway Traffic Safety Admin. Room 5108, Nassif Building 400 7th St. S.W., Wash., DC 20590

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED	32	

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SECTION 1

PURPOSE AND TEST PROCEDURE

This 35 mph frontal barrier impact test is a part of the FY 90 Vehicle Barrier Impact and Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-87-D-02009. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for an impact speed in excess of the current 30 mph FMVSS 208/212/219/301-75 requirements.

This 35 mph frontal barrier impact test was conducted in accordance with the Office of Market Incentives (OMI) Laboratory Indicant Test Procedure, dated 01 September 1986.

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SECTION 2

SUMMARY OF FRONTAL BARRIER IMPACT TESTS

A load cell barrier consisting of 36 cell units was impacted by a 1990 BMW 325i, 2 door sedan, NHTSA No. ML0500, at a velocity of 34.8 mph. The frontal impact test was conducted by Mobility Systems and Equipment Company (MSE) on 13 March 1990. The general test and vehicle description information is presented in Tables 1 and 2. Pretest and posttest photographs of the test vehicle and dummies are shown in Appendix A.

Two (2) Part 572 50th percentile adult male Anthropomorphic Test Devices (ATDs) were placed in the driver and right front passenger designated seating positions (DSP's) according to the NHTSA test requirements.

The ATD's were instrumented with head and chest triaxial accelerometers and right/left femur load cells. In addition, load cells were placed on the driver's and passenger's lap and shoulder belts to measure dummy upper torso and pelvic section belt loading. A summary of dummy configuration and performance verification test data is presented in Appendix C.

The frontal impact event was documented by one (1) real time camera and fifteen (15) high-speed cameras. The camera location data are presented in Table 8.

Sixty-five (65) channels of crash parameters were recorded using two (2) FM tape recorders, three (3) computers and associated data acquisition system. Time history plots of all recorded channels are presented in Appendix B.

2.1 GENERAL COMMENTS

The 1990 BMW 325i, 2 door sedan, was equipped with a 152 cubic inch, 6 cylinder engine and 5 speed transmission. The test weight of the 1990 BMW 325i, 2 door sedan, with two (2) 50th percentile male dummies, instrumentation, and cameras was 3,398 pounds.

The 1990 BMW 325i, 2 door sedan, involved in a frontal load cell barrier crash at a velocity of 34.8 mph.

The maximum static crush for the vehicle of 20.5 inches occurred at the centerline of the front bumper. The windshield was cracked, but no separation was observed. The driver's front door was opened without the aid of tools. The passenger's front door needed tools to open.

The driver ATD's head hit the airbag. The driver's left and right knees hit the dash panel and steering column. The driver ATD had a HIC value of 1,036, the maximum chest acceleration (resultant clipped) was 55.7 g's and the maximum femur loads were 865 (left) and 853 (right) pounds.

The passenger ATD's head hit the dash panel, glovebox door and sunvisor. His left knee hit the dash panel. Both of his knees hit the glovebox door. The passenger restraint belt broke during the impact event, hence, the passenger dummy injury measurements are not reportable and comparable as NCAP data.

Seat belt spool out, measured mechanically, was 3.0 inches for the driver. The passenger belt broke during the impact event.

The inboard and outboard track latching devices of the front seats remained latched. The up/forward - down/rearward seat adjustment released allowing the driver and passenger seats to move up and forward from their original, preimpact position.

There were no apparent visual indications of any stoddard solvent leaks.

Each of the test vehicle's front outboard seating position was equipped with a manual 3-point continuous webbing belt system with an additional supplementary restraint system on the driver's side which consisted of an airbag unit.

Data Table No. 1 Test Vehicle Data

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1990/BMW/325i/2 DOOR SEDAN

VEHICLE NHTSA NO.: M L 0 5 0 0 VIN: W B A A A 1 3 1 X L E C 6 6 2 8 7

VEHICLE BODY COLOR: SILVER ; MONTH & YEAR OF MANUFACTURE: 10/89

ENGINE: 6 Cylinders; 152 C.I.D; _____ Liters; _____ CC
X Gas; _____ Diesel: _____ Turbocharged
PLACEMENT-- X Longitudinal; _____ Transverse (Lateral)

TRANSMISSION: 5 Speed; X Manual; ___ Automatic; _____ Overdrive
FINAL DRIVE: _____ Front Wheel Drive X Rear Wheel Drive;
_____ Four Wheel Drive

DATE VEHICLE AVAILABLE FOR 35 MPH CRASH TESTING: February, 1990

ODOMETER READING: 40 miles; OPTIONS: X A/C; X P/S; X P/Wdo.; ___
_____ Tilt Whl.; ___ Cruise Control

DATA RECORD FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): 33 psi Front; 41 psi Rear
Recommended Tire Size: 195/65R14 89V
Tires on Vehicle: 195/65R14 89V ; Manufacturer: Pirelli
Number of Occupants: 2 Front; 3 Rear; ____ 3rd Seat; 5 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 = 970 lbs. (A)
No. of Occupants x 150 lbs.- - - = 750 lbs. (B)
Cargo Capacity (A - B)- - - - - = 220 lbs.
* GVWR - Delivered Weight.

TEST VEHICLE DELIVERED WEIGHT WITH MAXIMUM FLUIDS:

Right Front = 727 lbs.
Left Front = 747 lbs. TOTAL FRONT = 1474 lbs. (51.5% of TOTAL)
Right Rear = 696 lbs.
Left Rear = 692 lbs
TOTAL WEIGHT = 2862 lbs. TOTAL REAR = 1388 lbs. (48.5% of TOTAL)

Data Table No. 1 (Con't) Test Vehicle Data

CALCULATION OF TEST VEHICLE TARGET WEIGHT:

Total Test Vehicle Delivered Weight With Maximum Fluids =	2862	lbs.
Maximum Cargo Carrying Capacity of Test Vehicle*- - - - -	220	lbs.
Weight of Two P.572 Dummies (2 x 164 lbs.)- - - - - - - -	328	lbs.
TEST VEHICLE TARGET WEIGHT	3410	lbs.

*300 lbs. for light trucks and MPVs

ACTUAL WEIGHT OF TEST VEHICLE WITH 2 DUMMIES AND CARGO:

Right Front = 800 lbs. TOTAL FRONT = 1639 lbs.(48.2% of TOTAL)
Left Front = 839 lbs.
Right Rear = 865 lbs. TOTAL REAR = 1759 lbs.(51.8% of TOTAL)
Left Rear = 894 lbs.

TOTAL WEIGHT= 3398 lbs. (which includes 120 lbs. of cargo ballast weight placed in the cargo/luggage area)

VEHICLE COMPONENTS REMOVED TO MEET TARGET WEIGHT:

1. X Spare Tire
2. __ Rear Bumper Assembly
3. X Tail lamp hsg. ___ Rt.Side X Left Side
4. Rear Seat Assembly

TEST VEHICLE ATTITUDE:

As Delivered----Right Front = 26.4 inches
Left Front = 26.3 inches
Right Rear = 26.8 inches
Left Rear = 26.3 inches

Ready For Test--Right Front = 26.1 inches
Left Front = 25.4 inches
Right Rear = 23.6 inches
Left Rear = 23.9 inches

Test Vehicle Wheelbase: 101.2 inches; C.G.= 49.1 inches rearward of front wheel centerline

Total Vehicle Length:

Right Side = 154.2 inches
Left Side = 154.0 inches
Centerline = 170.5 inches

Data Table No. 2 Post Crash Test Data

DATA OF 35 MPH FRONTAL BARRIER IMPACT RATING TEST: 03/13/90

TIME OF TEST: 2:45 PM: AMBIENT TEMPERATURE AT BARRIER FACE: 63 °F

VEHICLE'S OCCUPANT COMPARTMENT TEMPERATURE: 71 °F

(spec. Range = 66 to 78 °F.)

VEHICLE WINDSHIELD MOLDING TEMPERATURE: 71 °F.

VEHICLE IMPACT VELOCITY: Primary Speed Trap = 34.72 mph
Secondary Speed Trap 34.88 mph
(Specified Range = 34.5 to 35.5 mph)

Distance from vehicle's front bumper forwardmost surface to barrier face when--

(a) entering the speed trap = 5 ft
(b) exiting the speed trap = 1 ft

VEHICLE STATIC CRUSH:

Vehicle Pre-test Length-Right Side =154.2"; C/Line=170.5"; Left Side=154.0"
Vehicle Post-test Length-Right Side=134.8"; C/Line=150.0"; Left Side=138.5"
Vehicle Static Crush --- Right Side= 19.4"; C/Line= 20.5"; Left Side= 15.5"

VEHICLE REBOUND FROM BARRIER FACE:

Vehicle Right Side = 4.3 inches
Vehicle Centerline = 2.1 inches
Vehicle Left Side = 2.3 inches

VEHICLE DUMMY CONTACT POINTS:

	DRIVER (I.D. No. 464)			PASSENGER (I.D. No. 467)		
	Strg.Col. Hub	Strg. Wheel	Instru. Panel	Instru. Panel	Knee Assy.	Glove Box Door
HEAD - - - - -	NO	NO	NO	YES	NO	YES
RIGHT KNEE - -	////////	/////	YES	NO	//////	YES
LEFT KNEE - -	////////	/////	YES	YES	//////	YES

VEHICLE DOOR OPENING INFORMATION:

	RIGHT SIDE		LEFT SIDE	
	OPENED	JAMMED	OPENED	JAMMED
FRONT DOORS - - - - - - - - - - - -	YES	YES	YES	NO
REAR DOORS - - - - - - - - - - - -	N/A	N/A	N/A	N/A

Data Table No. 2 (Cont'd) Post Crash Test Data

VEHICLE'S FRONT SEAT MOVEMENT DURING CRASH EVENT:

	RIGHT SIDE	LEFT SIDE
Seat Cushion Shift - - - - -	1.4 " forward;	0.3 " forward
Seat Adjuster Failure- - - -	YES ;	YES

Details of Any Failure:

Vertical seat adjustment which allows up/forward and down/rearward motion failed to restrain front seats in the original full down/rearward position. This allowed the driver's seat to move approximately 0.75 inches upwards and 0.3 inches forwards and the passenger seat to move approximately 1.25 inches upwards and 1.4 inches forwards.

OTHER NOTABLE IMPACT EFFECTS:

- The passenger side belt broke during the impact event.
- No solvent leaks were detected.
- No windshield separation.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

I. <u>OMI DATA</u>

Dummy Injury Criteria Data Summary
Dummy Positioning Data
Seat Belt Positioning Data
Seat Belt Performance Assessment Data
Driver Dummy to Steering Column Dimensions
Camera Locations

II. <u>OVR DATA</u>

Load Cell Barrier Data
Vehicle Accelerometer Data

Data Table No. 3 FMVSS No. 208 Occupant Crash Protection Data Sheet

VEH. YR./MAKE/MODEL/BODY STYLE: 1990/BMW/325i/2 DOOR SEDAN

VEH. NHTSA NO.: ML0500 ; TEST DATE: 03/13/90

MAXIMUM ACCELERATION VALUES:		DRIVER DUMMY # 464	PASSENGER DUMMY # 467
Head Channel X	HEAD X	-66.55	*
Head Channel Y	Y	-17.03	*
Head Channel Z	Z	56.27	*
HEAD RESULTANT	R	82.05	*
Chest Channel X	CHEST X	-56.13	*
Chest Channel Y	Y	-10.22	*
Chest Channel Z	Z	-15.73	*
CHEST RESULTANT	R	55.68	*
TIME INTERVAL (seconds)		0.0627 to 0.0657	*

* Passenger restraint belt broke during the impact event. Hence, the data are not reportable as NCAP data.

HEAD INJURY CRITERIA (HIC) VALUES:

HIC	HIC	1036.02	*
t_1 (seconds)		0.0569	*
t_2 (seconds)		0.0919	*
Avg. Accel. t_1 to t_2		61.38	*

MAXIMUM FEMUR FORCES:

Right Side (lbs.)	FR	852.6	*
Left Side (lbs.)	FL	864.9	*

MAXIMUM SEAT BELT FORCES:

Lap Belt	LAP	1876.1	*
Shoulder Belt	SHLDR	2231.3	*

MAXIMUM SEAT BELT WEBBING SPOOL-OUT:

Lap/Shoulder Belt Combination	3.0	Belt broke

* Determined mechanically

Data Table No. 4 Test Dummy Positioning Data

PRE-IMPACT DATA:

Make/Model: BMW/325i

Body Style: 2 DOOR SEDAN Model Year: 1990

NHTSA No.: ML0500 Color: SILVER

DATA FROM CERTIFICATION LABEL:

Vehicle Manufacturer: BAYERISCHE MOTOREN WERKE AG

Date of Manufacture: 10/89 ; VIN: WBAAA131XLEC66287

GVWR: 3781 lb; GAWR: Front = 1830 lb; Rear = 2116 lb

POST-IMPACT DATA:

Date of Test: 03/13/90 Time: 2:45 PM Temperature: 63 °F

Required Impact Velocity Range: 34.5 to 35.5 mph

Impact Velocity: Primary = 34.72 mph Secondary = 34.88 mph

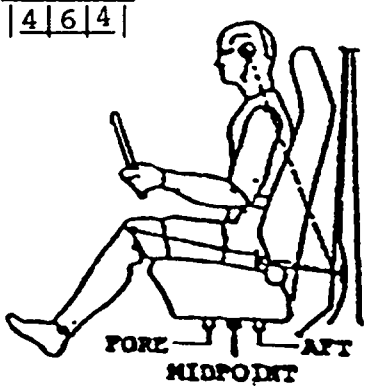
Seat Type: Bucket Adjuster Type: Lever

Bucket Seat Back Type: Adjustable headrests

TECHNICIANS: Enrique Marin

DRIVER DUMMY # |4|6|4|

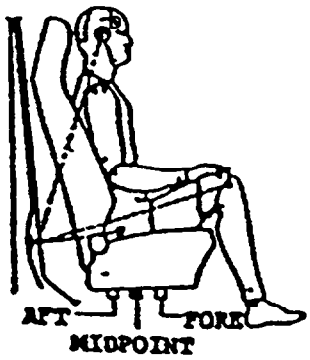
HEAD TARGET	17.3 "	
	+75.0	
KNEE JOINT	29.1 "	
	-10.0	
APPROXIMATE "H" POINT	14.9 "	
	-33.0	



FORE AFT
MIDPOINT

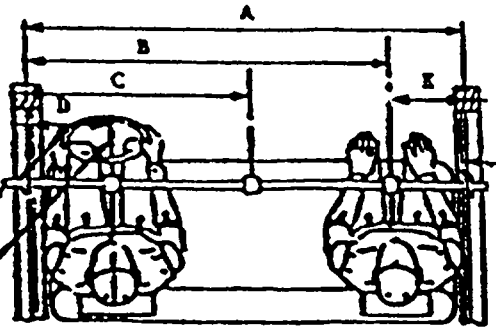
PASSENGER DUMMY # |4|6|7|

	18.2 "	HEAD TARGET
	+72.0	
	29.0 "	KNEE JOINT
	-10.0	
	15.0 "	APPROXIMATE "H" POINT
	-31.0	



AFT FORE
MIDPOINT

A = 55.3 "
B = 41.6 "
C = 27.65 "
D = 14.0 "
E = 13.7 "



LATERAL BAR

ADJUSTABLE POINTER

DOOR GLASS HEIGHT

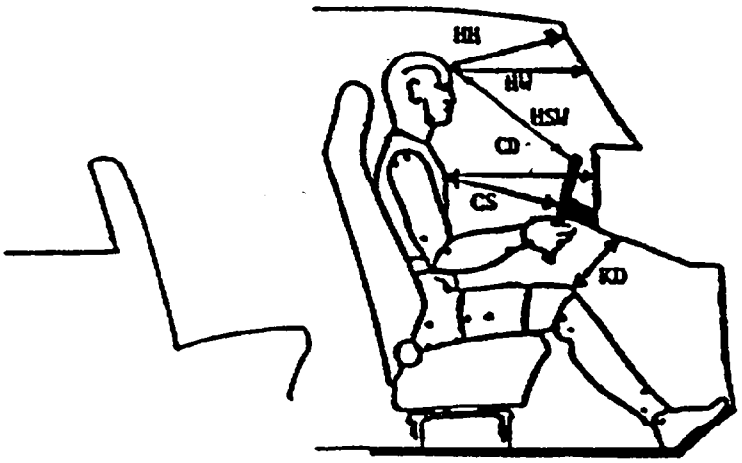
LEFT FRONT DOOR

RIGHT FRONT DOOR

DRIVER DUMMY # |4|6|4|

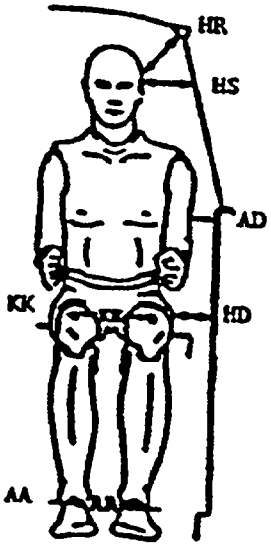
PASSENGER DUMMY # |4|6|7|

Data Table No. 4 (Cont'd) Test Dummy Positioning Data



	Driver		Passenger
HH	18.3		17.0
HW	25.6		25.0
CD	25.3		24.7
CS	16.4		N/A
KD	L- 7.8		L- 8.8
KD	R- 7.8		R- 9.3
Torso Angle	25.0	Torso Angle	25.0
Seat Back Angle	-25.0	Seat Back Angle	-25.0
HSW	23.6		N/A

HSW = Head to Steering Wheel (in.)
HA = Head Target to A Pillar (in.)
HH = Head to Windshield Header (in.)
HW = Head to Windshield (in.)
CD = Chest to Dash (in.)
CS = Chest to Steering Wheel (in.)
HR = Head to Side Roof
HS = Head to Side Window (in.)
AD = Arm to Door (in.)
HD = Hip to Door (in.)
KK = Knee to Knee (in.)
Torso and seat back angles are relative to vertical. (deg.)



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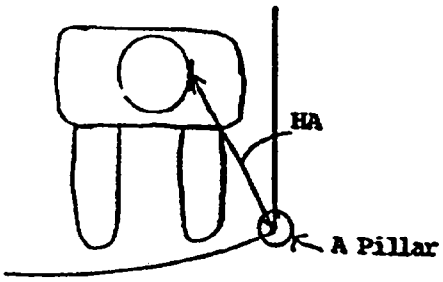
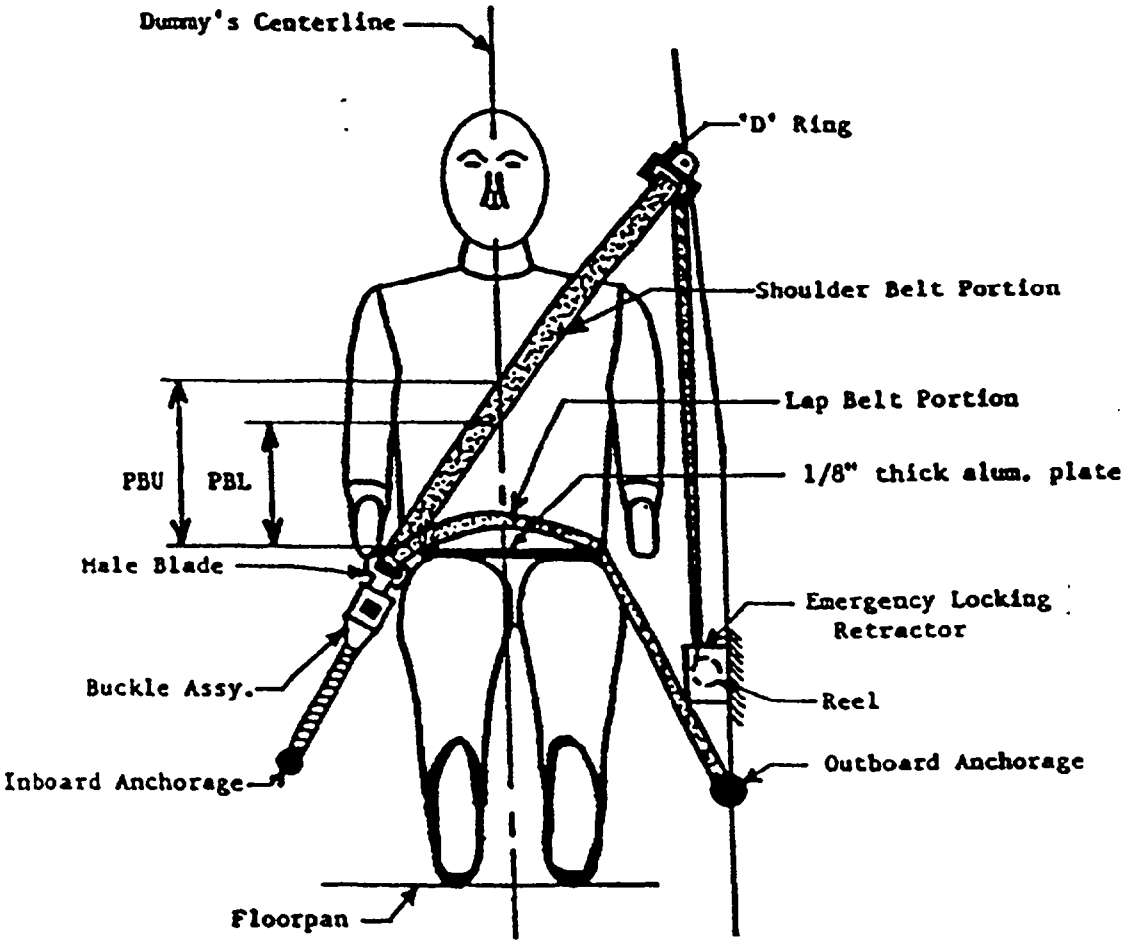


	Driver	Passenger
HR	6.5	6.4
HS	7.3	7.0
AD	3.1	2.4
HD	5.1	5.0
KK	14.5	11.7
AA	14.0	9.5
HA	26.1	25.0



FRONT VIEW OF DRIVER DUMMY

	DRIVER DUMMY (inches)	PASSENGER DUMMY (inches)
PBU -- Top surface of alum. plate to belt upper edge	14.0	13.5
PBL -- Top surface of alum. plate to belt lower edge	10.5	10.0

LAP BELT TENSION, POUNDS	0.0	0.0
SHOULDER BELT TENSION, POUNDS	0.0	0.0

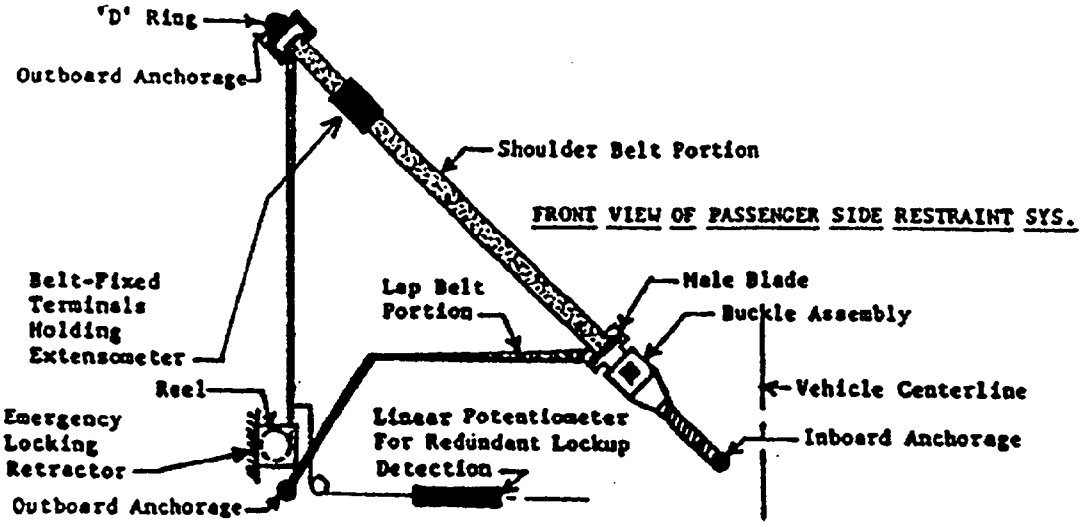
Data Table 6 Seat Belt Performance Assessment Test Data

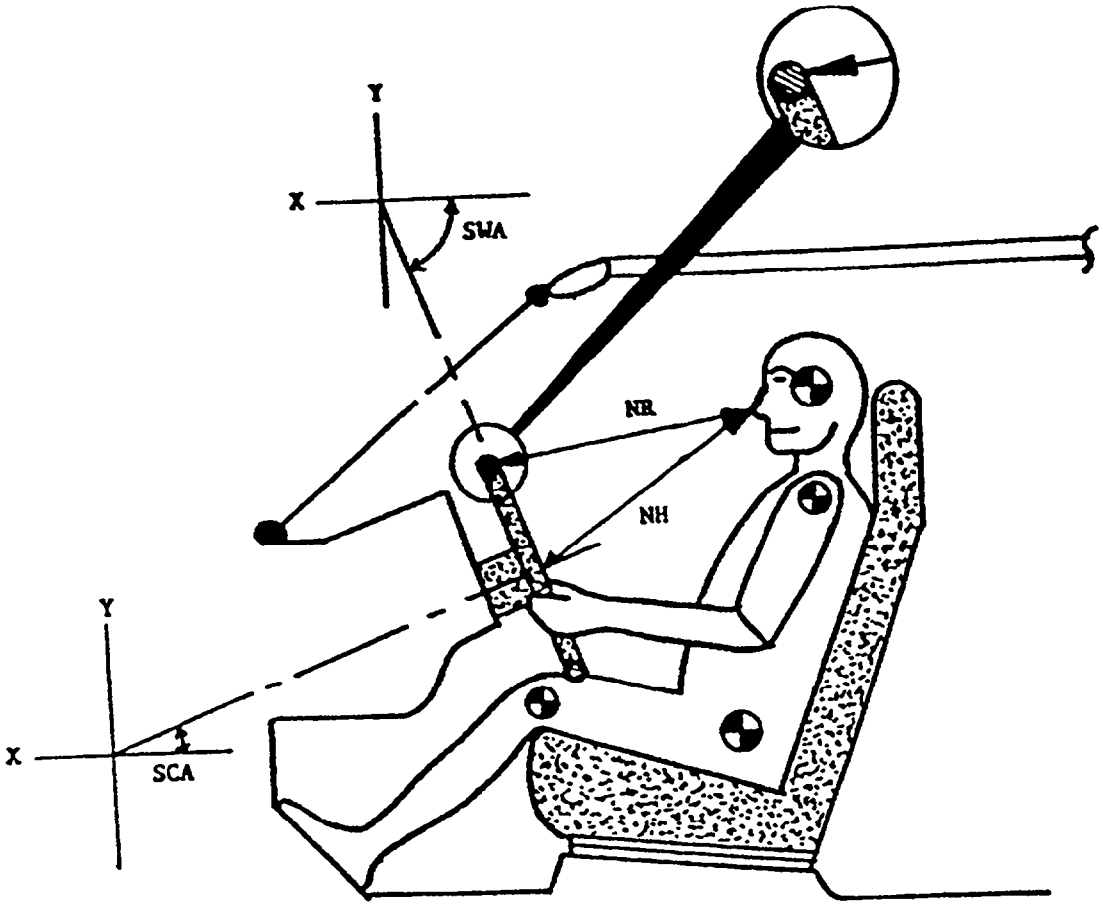
BELT LENGTH DATA:	DRIVER SIDE		PASSENGER SIDE	
	PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
Total belt length from retractor reel to bolt hole anchor point for continuous webbing systems	97.7	97.7	98.0	Belt Broke
Retractor reel to 'D' ring as measured on Part 572	7.0	6.5	7.2	Belt Broke
Shoulder belt length as measured on Part 572 dummy	33.3	34.5	33.1	Belt Broke
Lap belt length as measured on Part 572 dummy	25.2	27.3	25.5	Belt Broke
Remainder of belt webbing left on retractor reel	32.2	29.4	32.2	Belt Broke

BELT SPOOL-OFF DATA:		
As determined by film analysis	No Data	No Data
As determined electronically	NOT MEASURED	NOT MEASURED
As determined mechanically	3.0 in	Belt Broke

BELT STRAIN DATA:		
Measured between male blade and 'D' ring	5.2 Percent	Belt Broke

*S = Shoulder
L = Lap





LEFT SIDE VIEW

	MEASUREMENTS
NR--Distance from tip of dummy's nose to Top Rear surface of steering wheel rim.	21.2 Inches
NH--Distance from tip of dummy's nose to center of steering column hub.	20.6 Inches
SCA-Angle of steering column relative to the horizontal X axis.	15.0 Degrees
SWA-Angle of steering wheel relative to the horizontal X axis.	67.0 Degrees

Data Table No.8 Camera Location Data

VEH. NHTSA NO.: ML0500 ; TEST DATE: 03/13/90 ; TIME: 2:45 PM

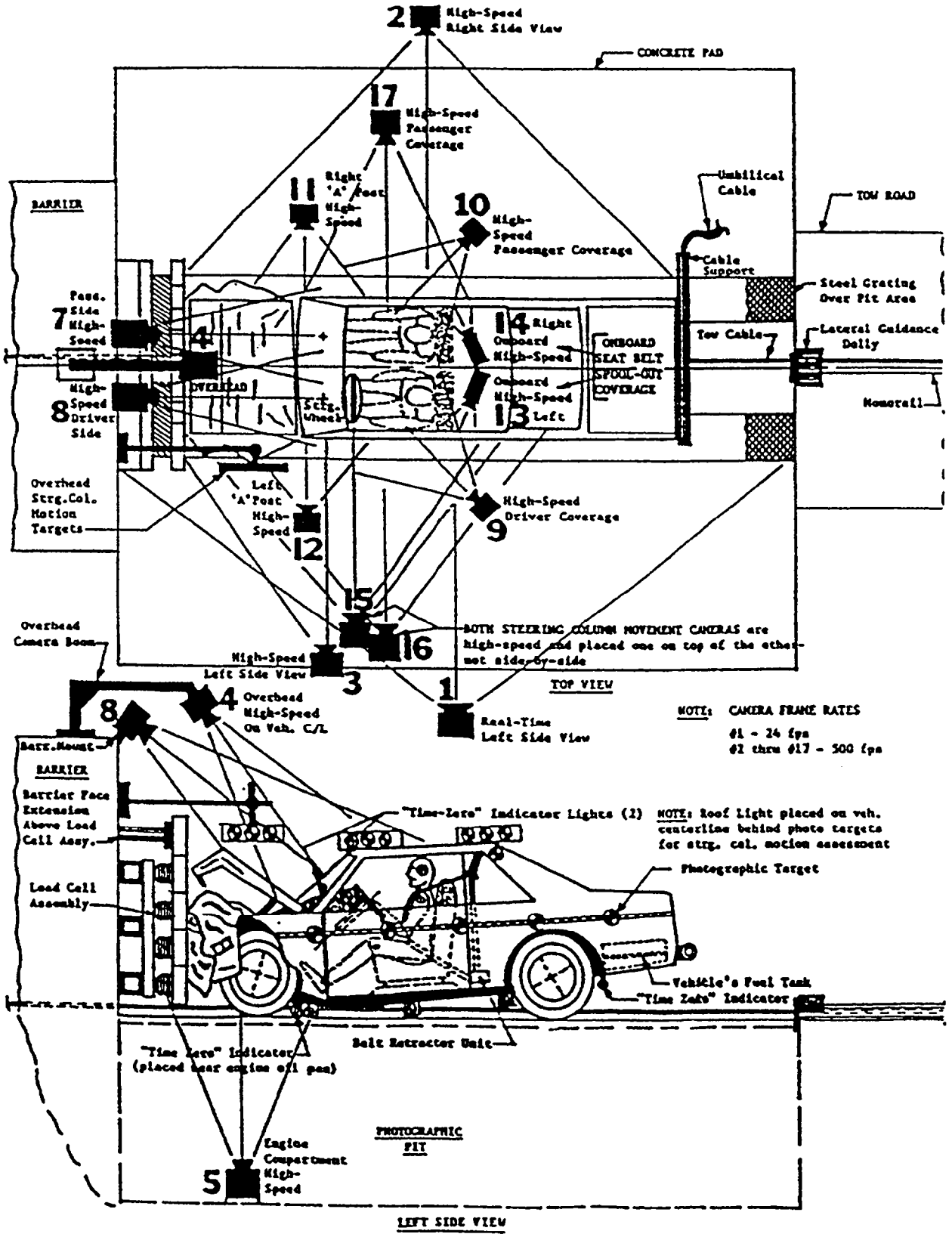
VEH. YEAR/MAKE/MODEL/BODY STYLE: 1990/BMW/325I/2 DOOR SEDAN

CAMERA NO.	VIEW	CAMERA POS. (in.) X	Y	Z	ANGLE (deg)	FILM PLANE TO HEAD TARGET	LENS (mm)	SPEED (fps)
1	Left Side View	-676	268	57	3	683	50	24
2	Right Side View	351	86	52	0	335	16	600
3	Left Side View	-295	69	35	0	280	16	500
4	Overhead	- 1	- 4	124	-71	127	16	550
5	Pit-Engine	70	3	- 53	22	**	16	500
6	Pit-Fuel Tank	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Front-Passenger	13	-14	+104	-52	123	50	600
8	Front-Driver	- 12	-14	+104	-46	123	50	600
9	Left Side-Driver	- 92	97	82	28	4	50	600
10	Right Side-Passenger	89	102	82	24	82	50	600
11	Right Side-'A' Post	176	16	52	4	178	50	550
12	Left Side-'A' Post	-297	-36	51	2	287	50	750
13	Onboard-Left Side	- 7.5	118	20	21	36	16	N/A
14	Onboard-Right Side	7.5	118	20	21	36	16	N/A
15	Left Side-Steering Col.	-361	86	129	16	355	50	600
16	Left Side-Steering Col.	-357	82	111	11	348	50	600
17	Right Side Passenger	147	64	52	8	135	50	700

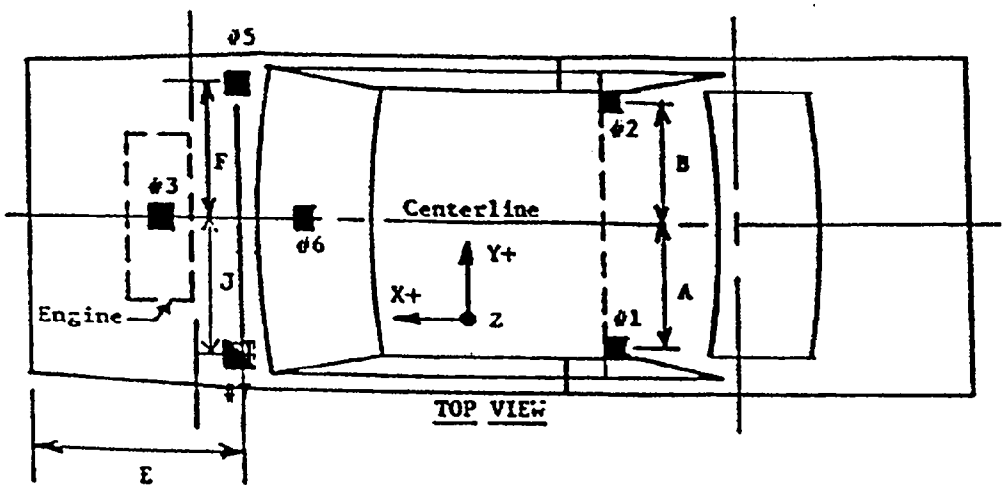
* X = film plane to monorail centerline
Y = film plane to barrier face
Z = film plane to ground

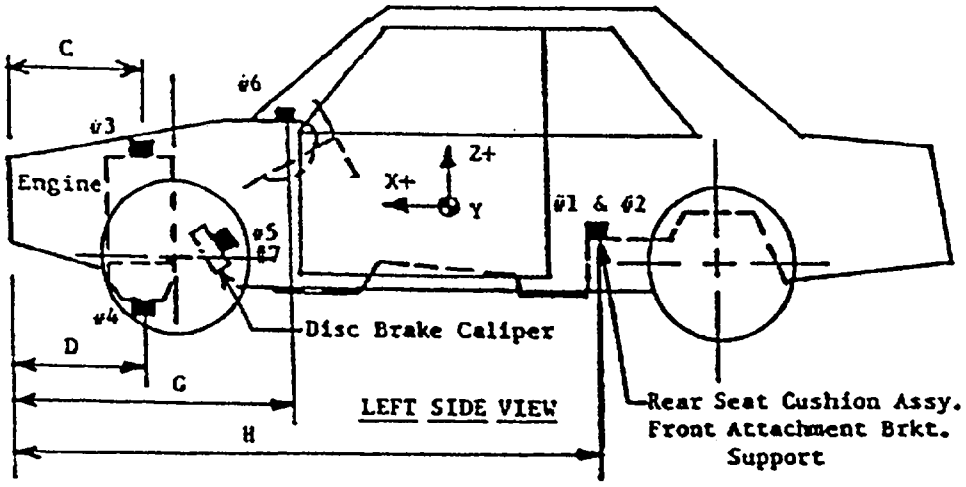
**Pit camera uses refractor lens for imagery.

Data Table No. 8 (Cont'd) Camera Location Data



Data Table No. 9 Vehicle Accelerometer Location and Data Summary



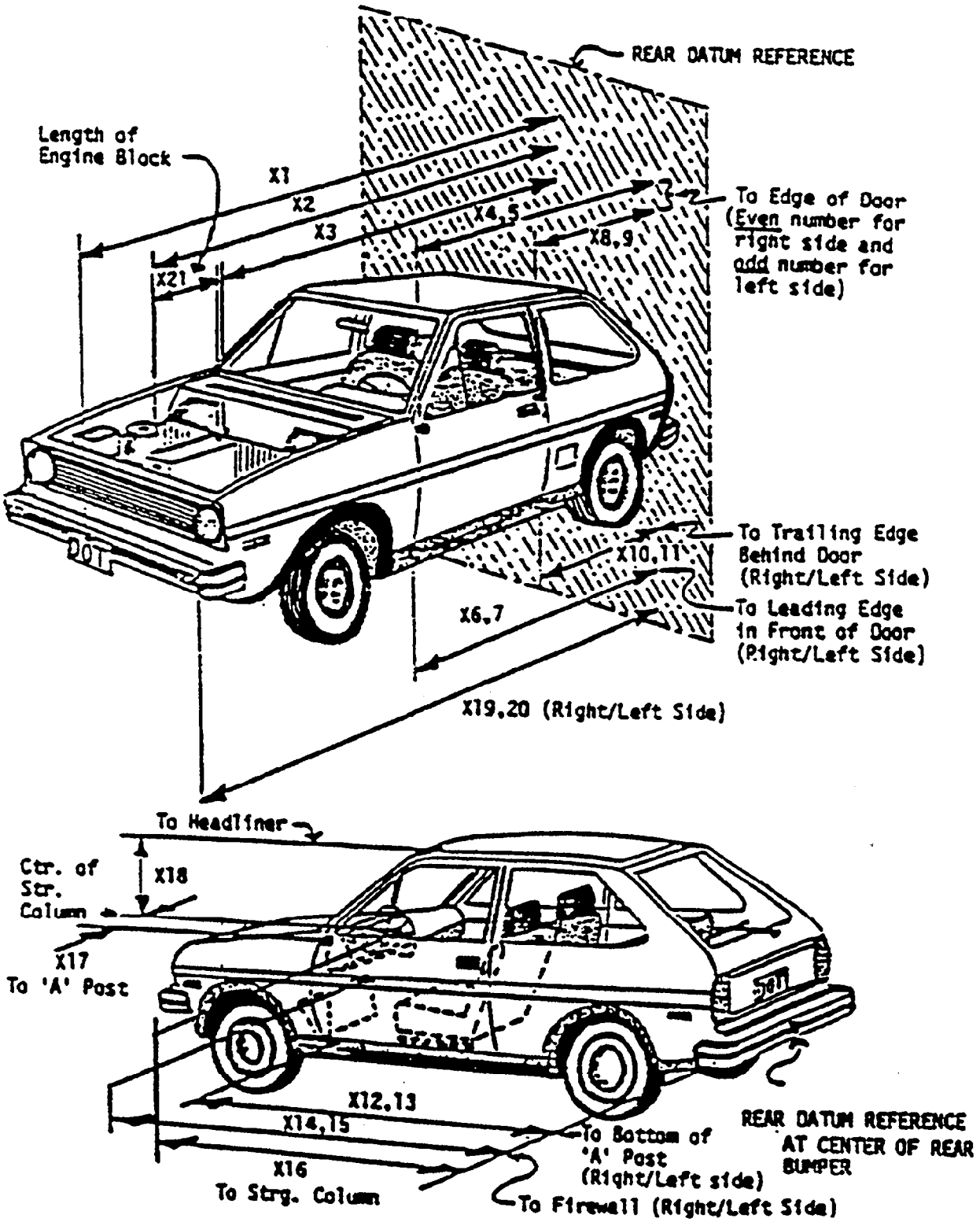


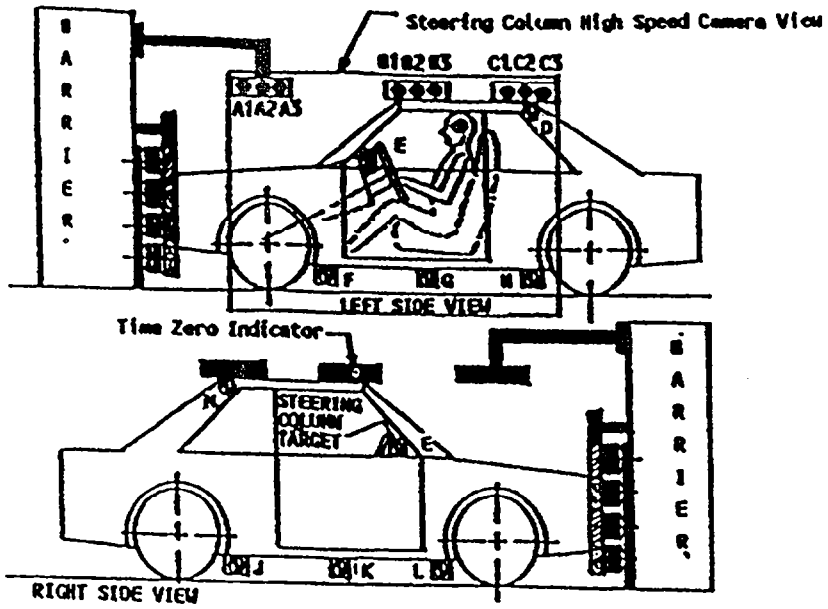
Dimension	Length (in.)
A	23.5
B	23.5
C	31.0
D	51.7
E	36.2
F	23.2
G	58.5
H	97.0
J	23.2

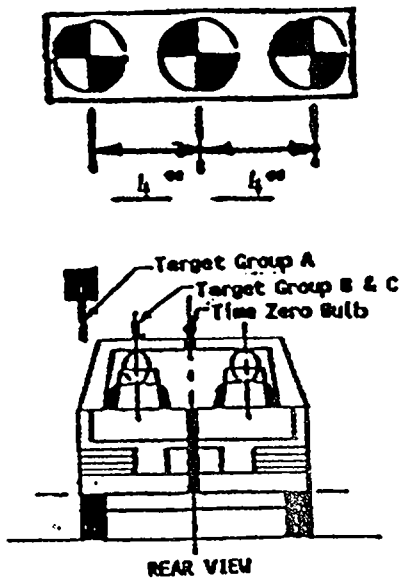
Loc. No.	Description	Maximum Value			
		X-	msec.	X+	msec.
1	Rear seat X-member @ Left Side	-49.3	28.0	2.4	137.2
2	Rear seat X-member @ Right Side	-40.7	31.0	3.9	16.7
3	Top of Engine Block	-169.5	21.7	34.6	32.5
4	Bottom of Engine	-151.7	20.6	75.0	32.7
5	Disc Brake Caliper Right Side	- 82.5	27.1	36.3	49.8
6	Instrument Panel	-66.8	130.5	60.9	134.2
7	Disc Brake Caliper @Left Side	- 93.7	29.3	57.1	51.7

NO.	MEASUREMENT DESCRIPTION	Pre-Test (in.)	Post-Test (in.)	Diff. (in.)
X1	Total Length of Test Vehicle at Centerline	170.5	150.0	20.5
X2	Rear Surface of Vehicle to Front of Engine	155.4	140.8	14.6
X3	Rear Surface of Vehicle to Firewall	129.3	124.0	5.3
X4	Rear Surface to Upr. Leading Edge of Right Door	116.3	115.4	0.9
X5	Rear Surface to Upr. Leading Edge of Left Door	116.4	115.7	0.7
X6	Rear Surface to Lwr. Leading Edge of Right Door	116.7	116.2	0.5
X7	Rear Surface to Lwr. Leading Edge of Left Door	116.8	116.3	0.5
X8	Rear Surface to Upr. Trailing Edge of Right Door	71.4	70.8	0.6
X9	Rear Surface to Upr. Trailing Edge of Left Door	71.5	71.0	0.5
X10	Rear Surface to Lwr. Trailing Edge of Right Door	72.0	71.2	0.8
X11	Rear Surface to Lwr. Trailing Edge of Left Door	72.1	71.7	0.4
X12	Rear Surface to Bottom 'A' Post on Right Side	116.4	115.0	1.4
X13	Rear Surface to Bottom 'A' Post on Left Side	116.5	115.3	1.2
X14	Rear Surface to Firewall on Right Side	124.6	122.0	2.6
X15	Rear Surface to Firewall on Left Side	127.6	124.0	3.6
X16	Rear Surface to Steering Column	100.3	96.7	3.6
X17	Center of Steering Column to 'A' Post	16.2	18.6	-2.4
X18	Center Steering Column to Headlining	16.7	18.5	-1.8
X19	Rear Surface to Right Side of Front Bumper	154.2	134.8	19.4
X20	Rear Surface to Left Side of Front Bumper	154.0	138.5	15.5
X21	Length of Engine Block	28.0	28.0	0.0

Data Table No. 10 (Cont'd) Test Vehicle Measurements







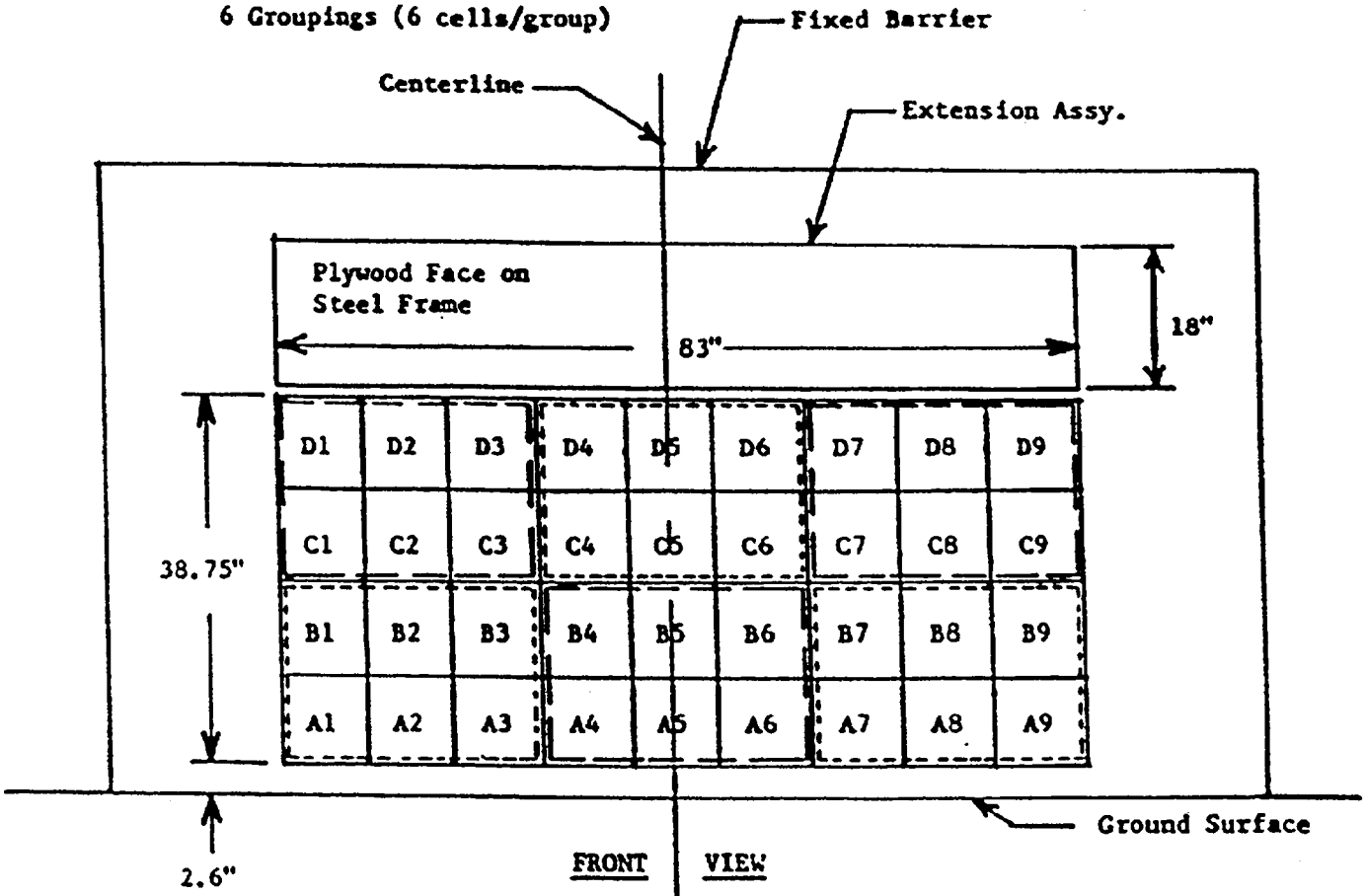
BARRIER TARGETS	'X' From Imag. Barrier Face Vertical Plane	'Y' From Monorail C/L	'Z' Above Ground
A-1	62.0	21.5	70.5
A-2	66.0	21.5	70.5
A-3	70.0	21.5	70.5

BARRIER TARGETS	'X' From Imag. Barrier Face Vertical Plane	'Y' From Monorail C/L	'Z' Above Ground
B-1	74.0	14.7	54.5
B-2	78.0	14.7	54.5
B-3	82.0	14.7	54.5
C-1	119.2	14.7	54.5
C-2	123.2	14.7	54.5
C-3	127.2	14.7	54.5
D	127.2	22.5	48.3
E	63.0	13.0	35.8
F	48.0	25.9	5.7
G	81.7	25.7	5.5
H	115.5	26.6	5.5
J	115.2	26.6	5.6
K	81.7	25.7	5.8
L	48.0	25.9	5.7
M	127.2	22.5	48.3

NOTE: Diameter of all photo targets is 4".

Data Table No. 12 Load Cell Locations on Fixed Barrier

36 Load Cells
4 Rows
9 Columns
6 Groupings (6 cells/group)



6 GROUPINGS OF 6 LOAD CELLS EACH

C1 thru D3	C4 thru D6	C7 thru D9
A1 thru B3	A4 thru B6	A7 thru B9

DATA REQUIREMENTS: (1) Data from 36 individual load cells
(2) Total or Sum of 36 individual load cells
(3) Data from 6 Groupings shown above (6 cells/group)

APPENDIX A

PHOTOGRAPHS

PRETEST FRONT VIEW
POSTTEST FRONT VIEW
PRETEST LEFT SIDE VIEW
POSTTEST LEFT SIDE VIEW
PRETEST RIGHT SIDE VIEW
POSTTEST RIGHT SIDE VIEW
PRETEST RIGHT FRONT 3/4 VIEW
POSTTEST RIGHT FRONT 3/4 VIEW
PRETEST LEFT REAR 3/4 VIEW
POSTTEST LEFT REAR 3/4 VIEW
PRETEST WINDSHIELD VIEW
POSTTEST WINDSHIELD VIEW
PRETEST ENGINE COMPARTMENT VIEW
POSTTEST ENGINE COMPARTMENT VIEW
PRETEST FRONT UNDERBODY VIEW
POSTTEST FRONT UNDERBODY VIEW
PRETEST REAR UNDERBODY VIEW
POSTTEST REAR UNDERBODY VIEW
PRETEST DRIVER DUMMY POSITION VIEW
POSTTEST DRIVER DUMMY POSITION VIEW
PRETEST PASSENGER DUMMY POSITION VIEW
POSTTEST PASSENGER DUMMY POSITION VIEW
PRETEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (Door Open)
POSTTEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (Door Open)
POSTTEST DRIVER DUMMY (ATD) HEAD AND KNEE CONTACT AREA
POSTTEST PASSENGER DUMMY (ATD) HEAD AND KNEE CONTACT AREA
POSTTEST VIEW OF PASSENGER RESTRAINT SYSTEM D-RING
POSTTEST VIEW OF PASSENGER RESTRAINT SYSTEM BROKEN BELT

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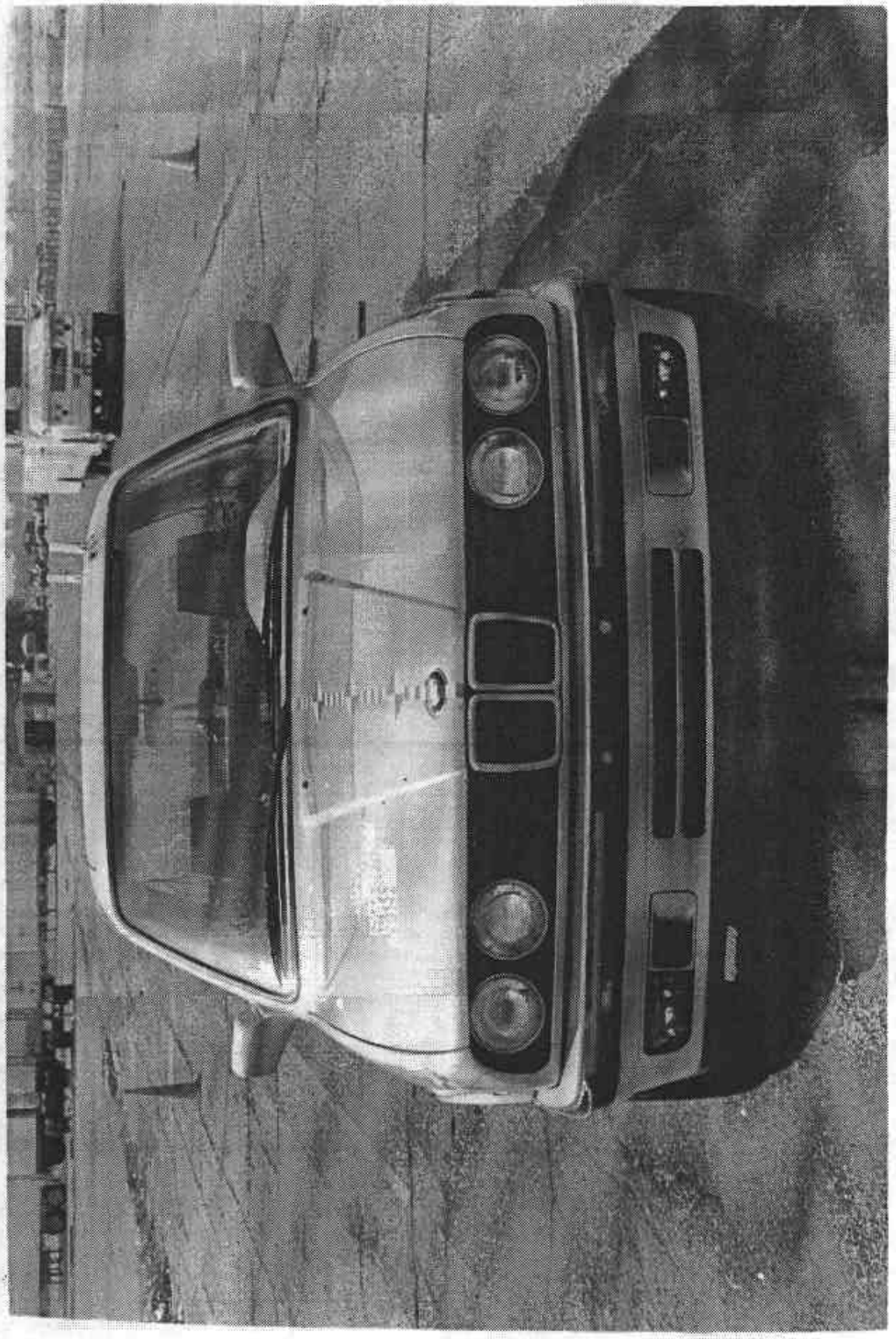
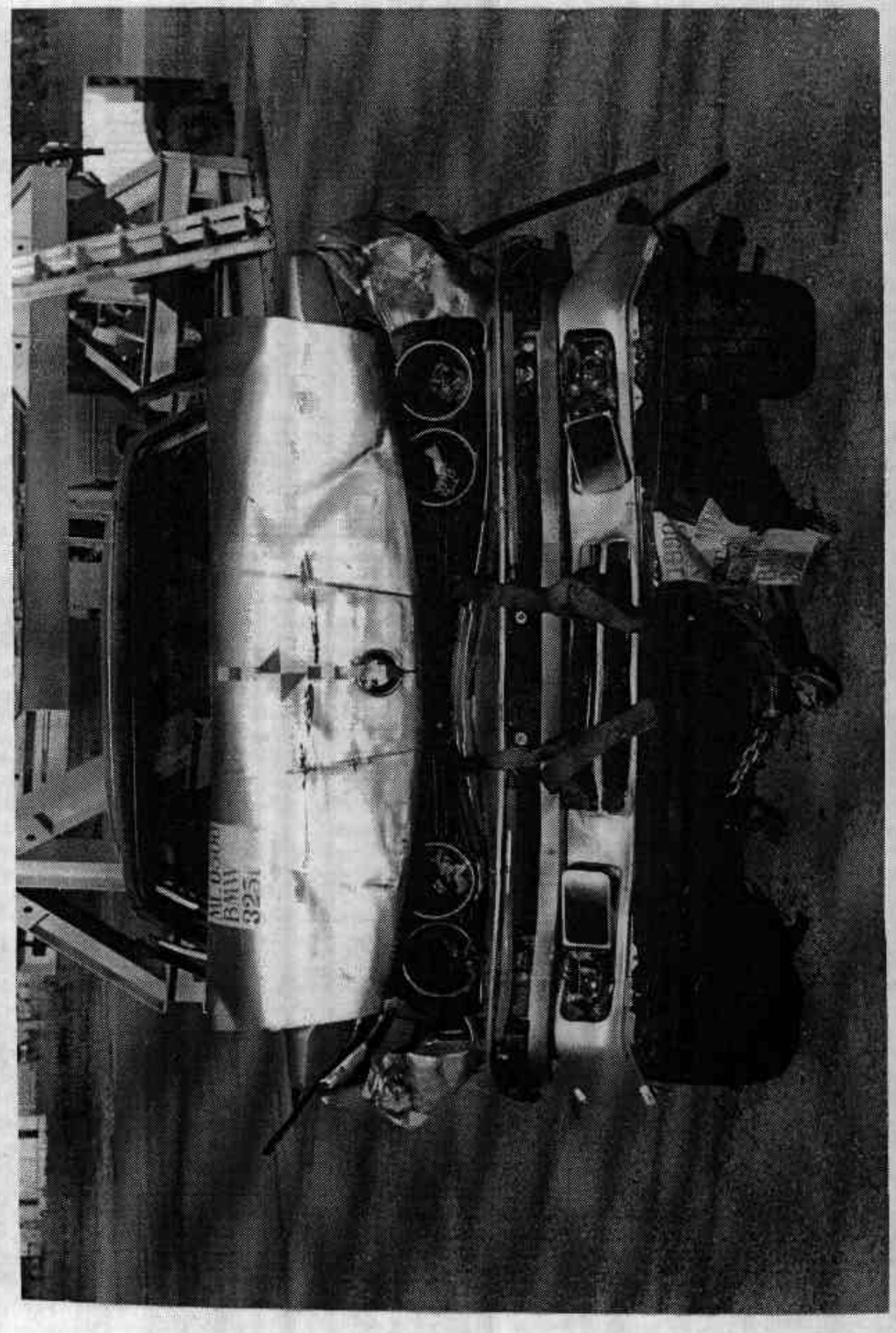
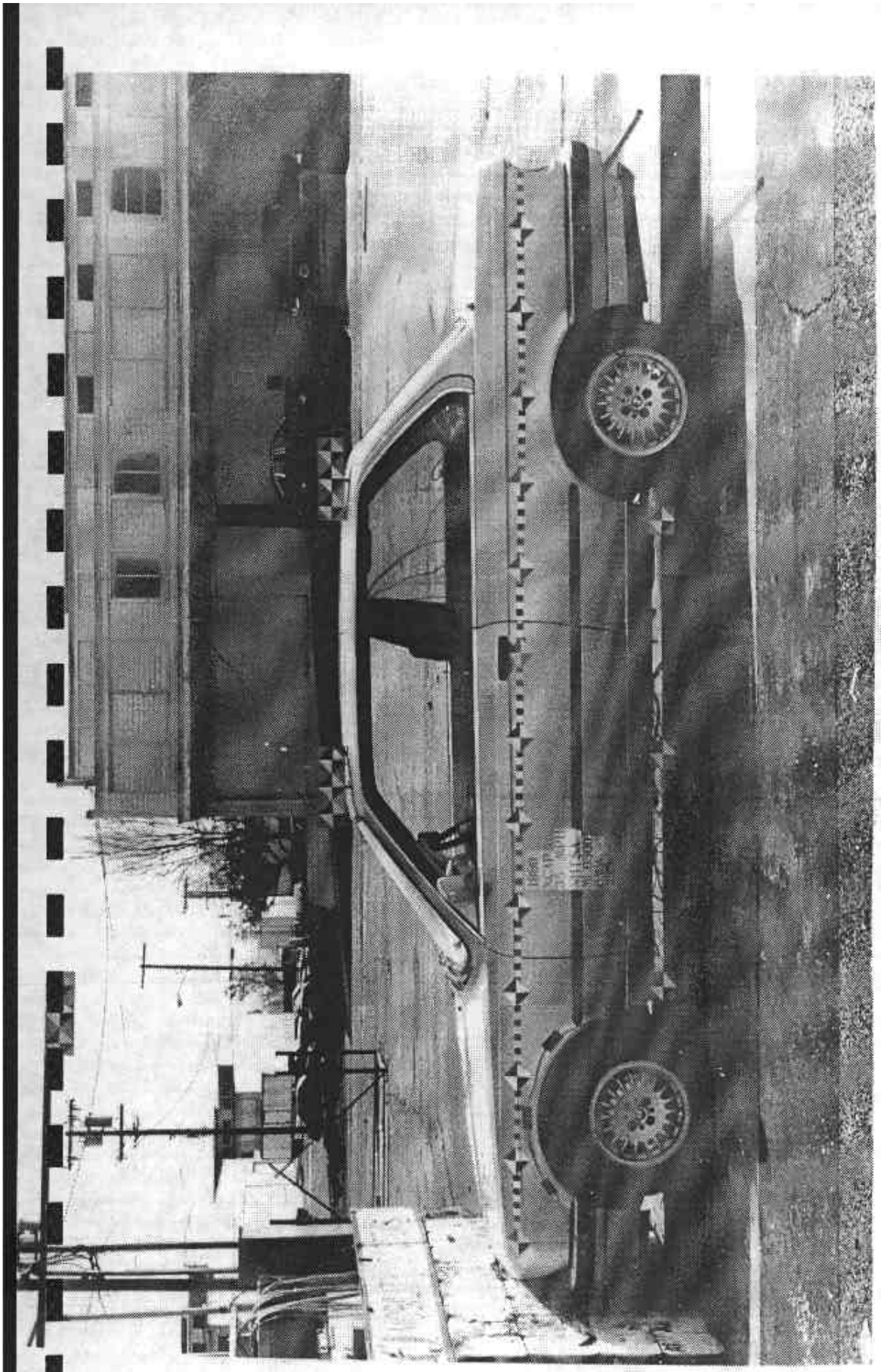


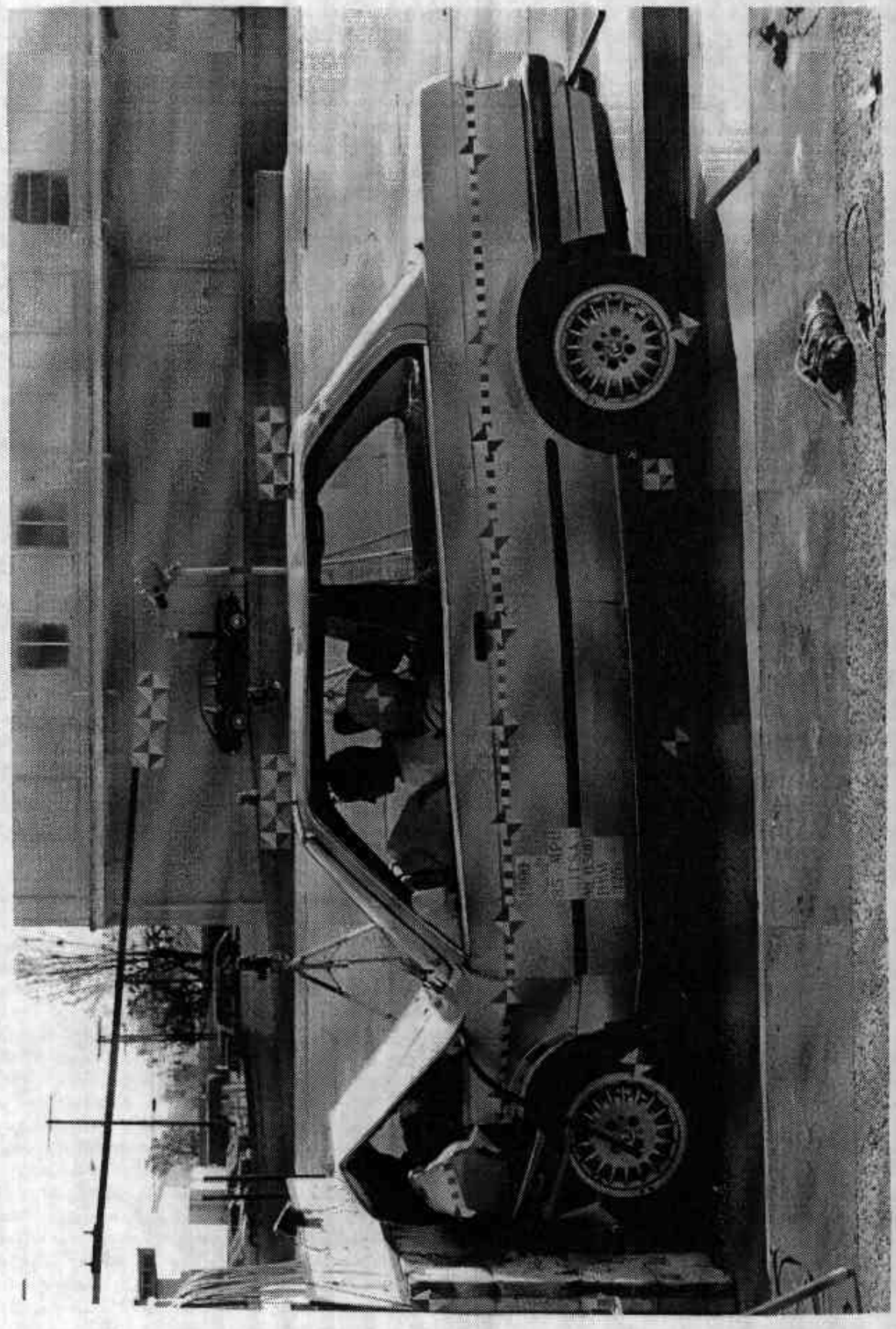
PRETEST FRONT VIEW



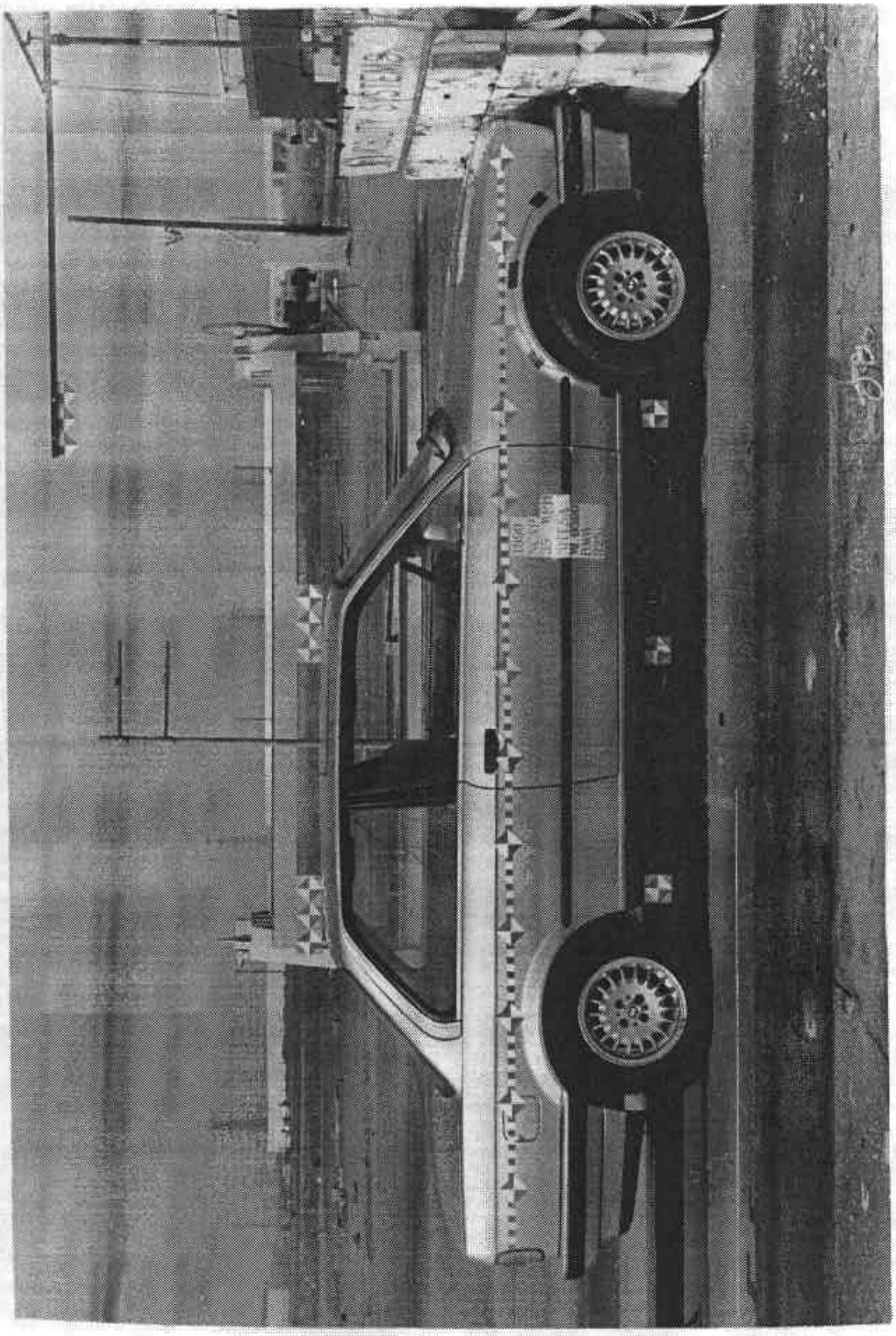
POSTTEST FRONT VIEW



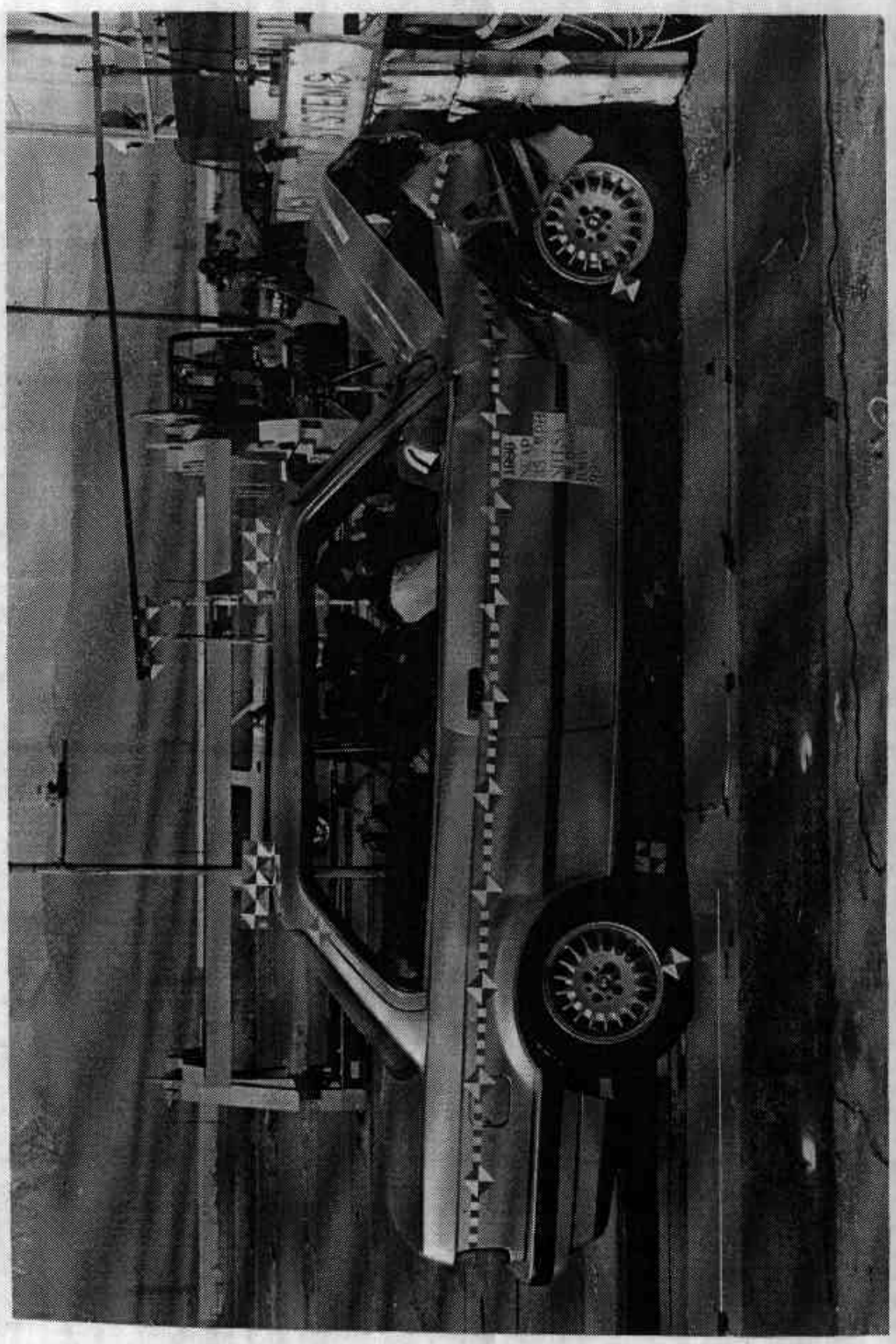
PRETEST LEFT SIDE VIEW



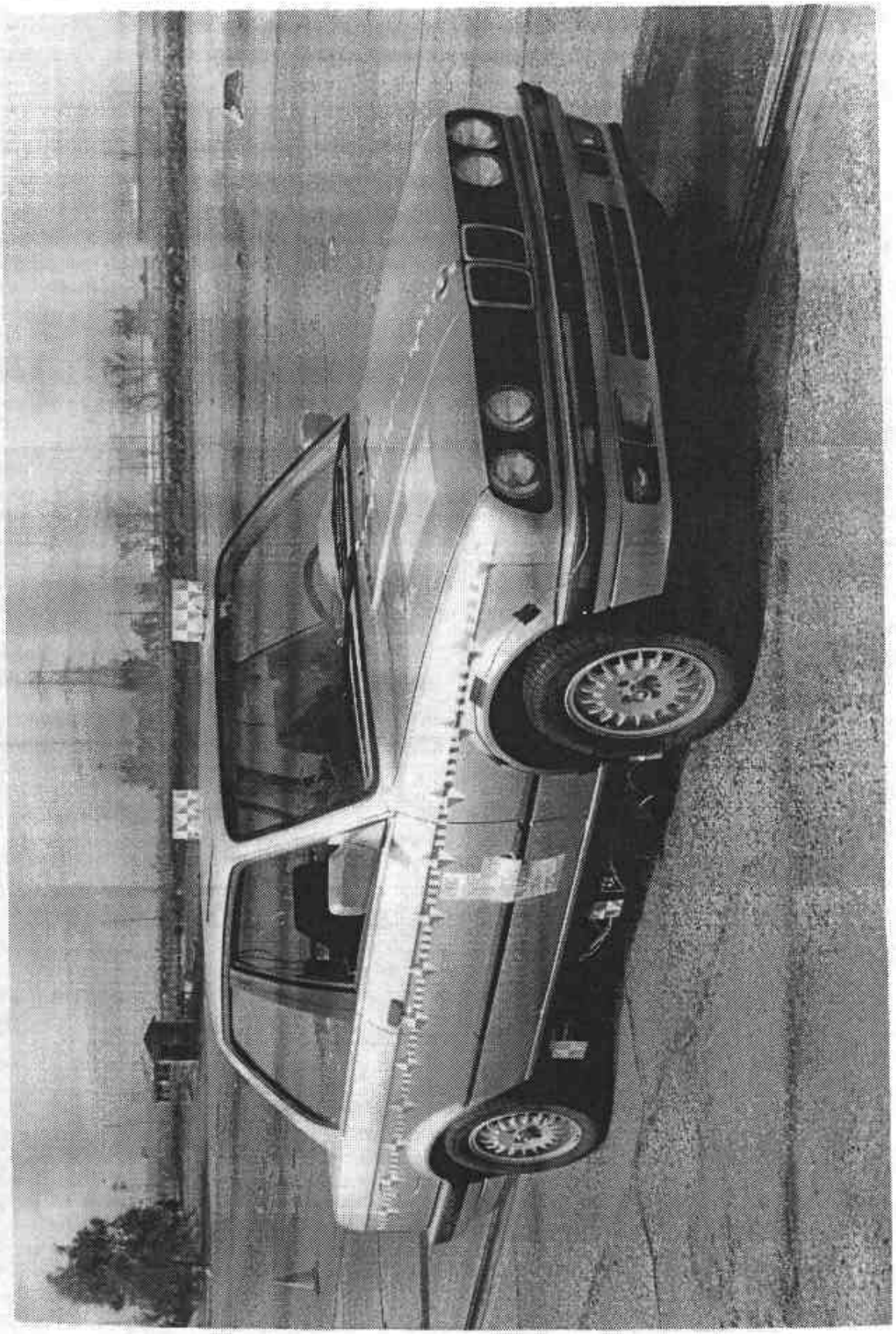
POSTTEST LEFT SIDE VIEW



PRETEST RIGHT SIDE VIEW



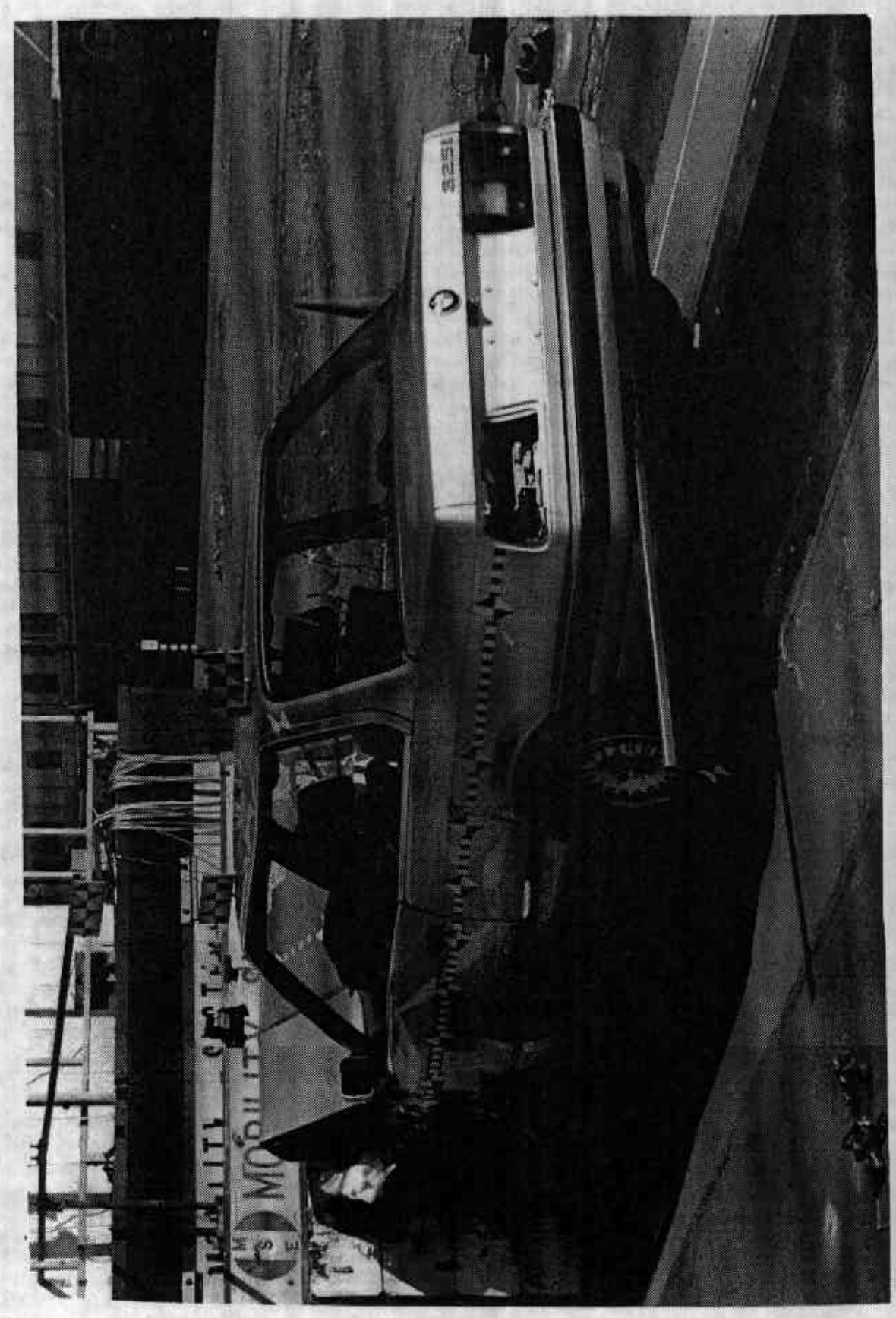
POSTTEST RIGHT SIDE VIEW



PRETEST RIGHT FRONT 3/4 VIEW

POSTTEST RIGHT FRONT 3/4 VIEW

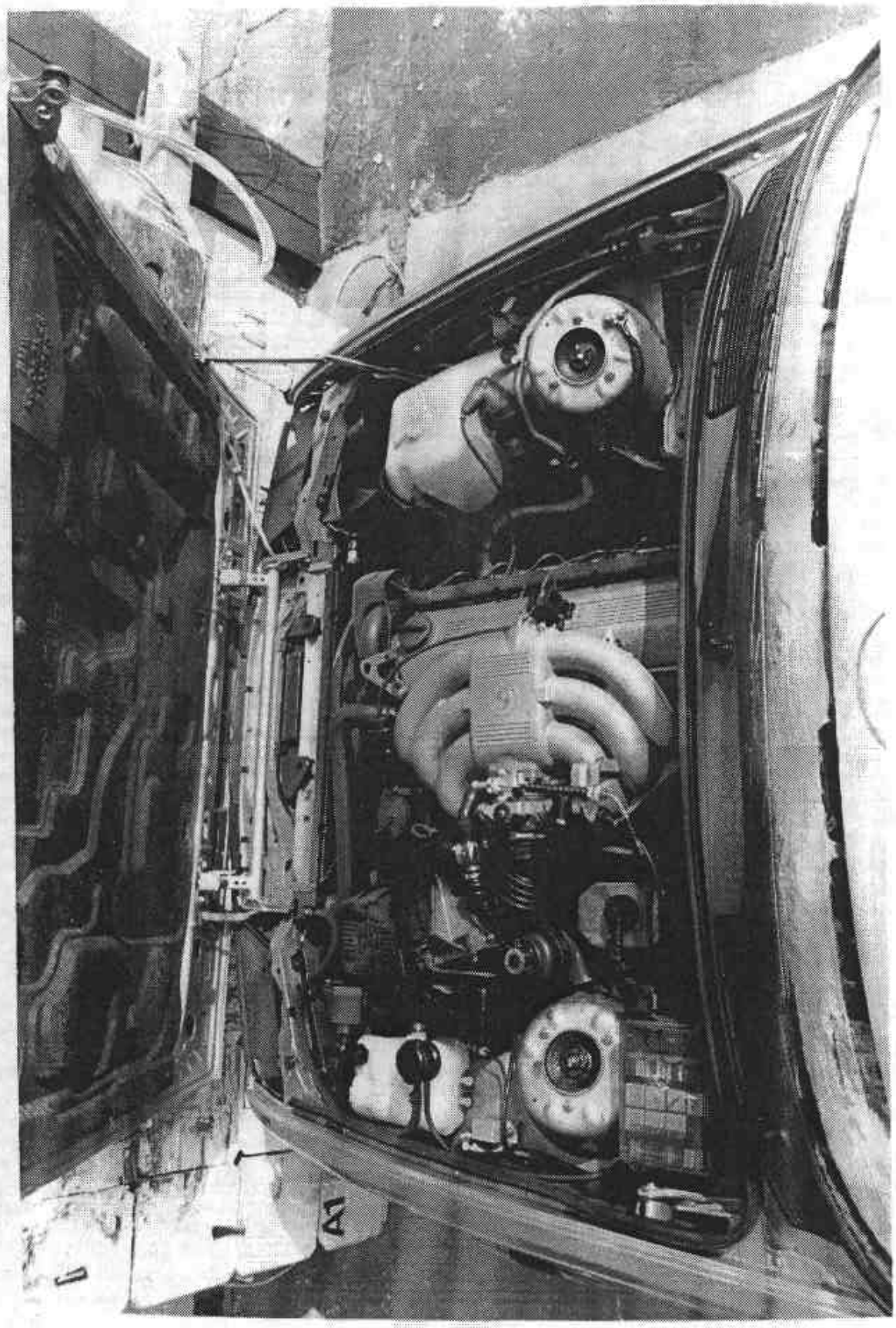
PRETEST LEFT REAR 3/4 VIEW



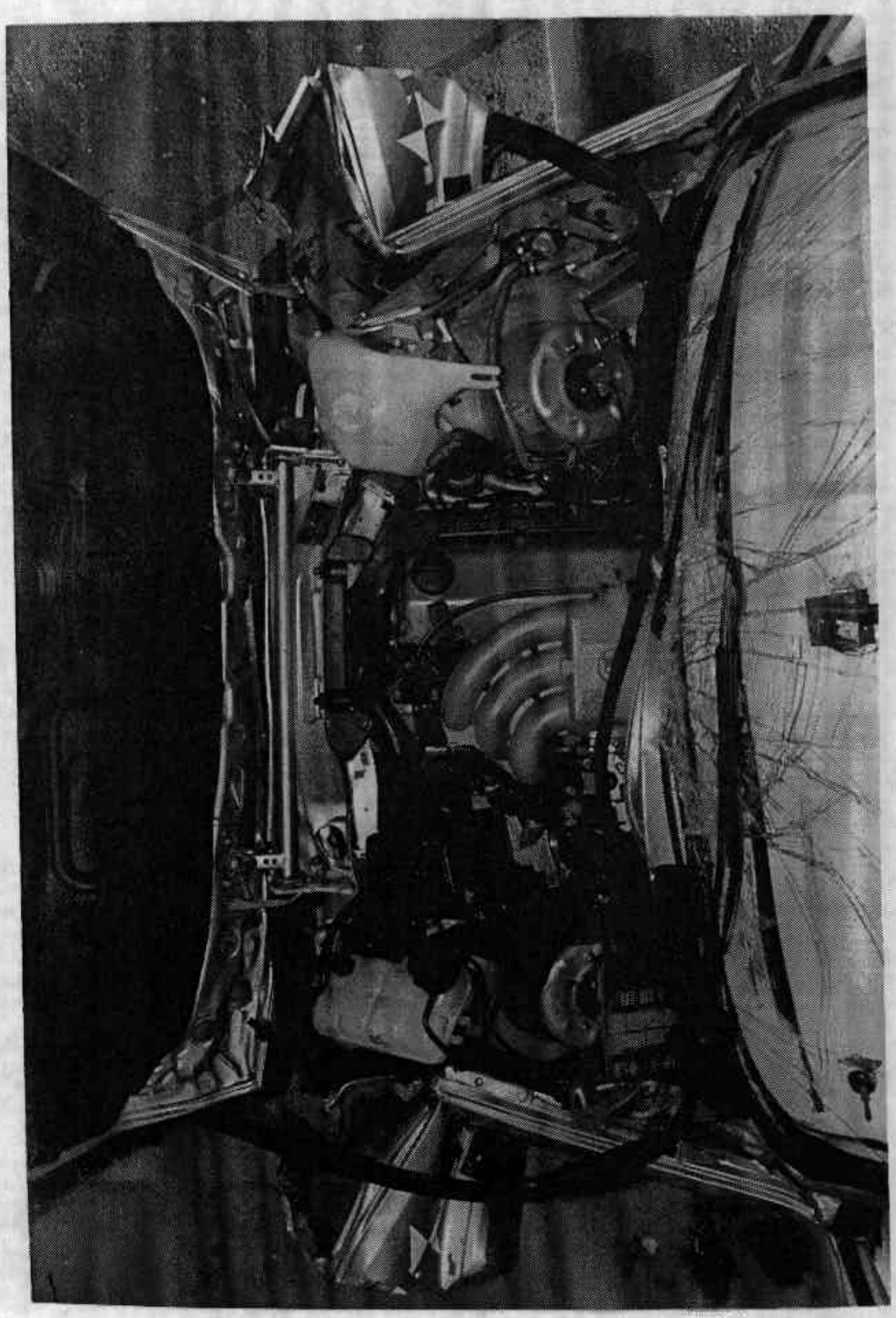
POSTTEST LEFT REAR 3/4 VIEW

PRETEST WINDSHIELD VIEW

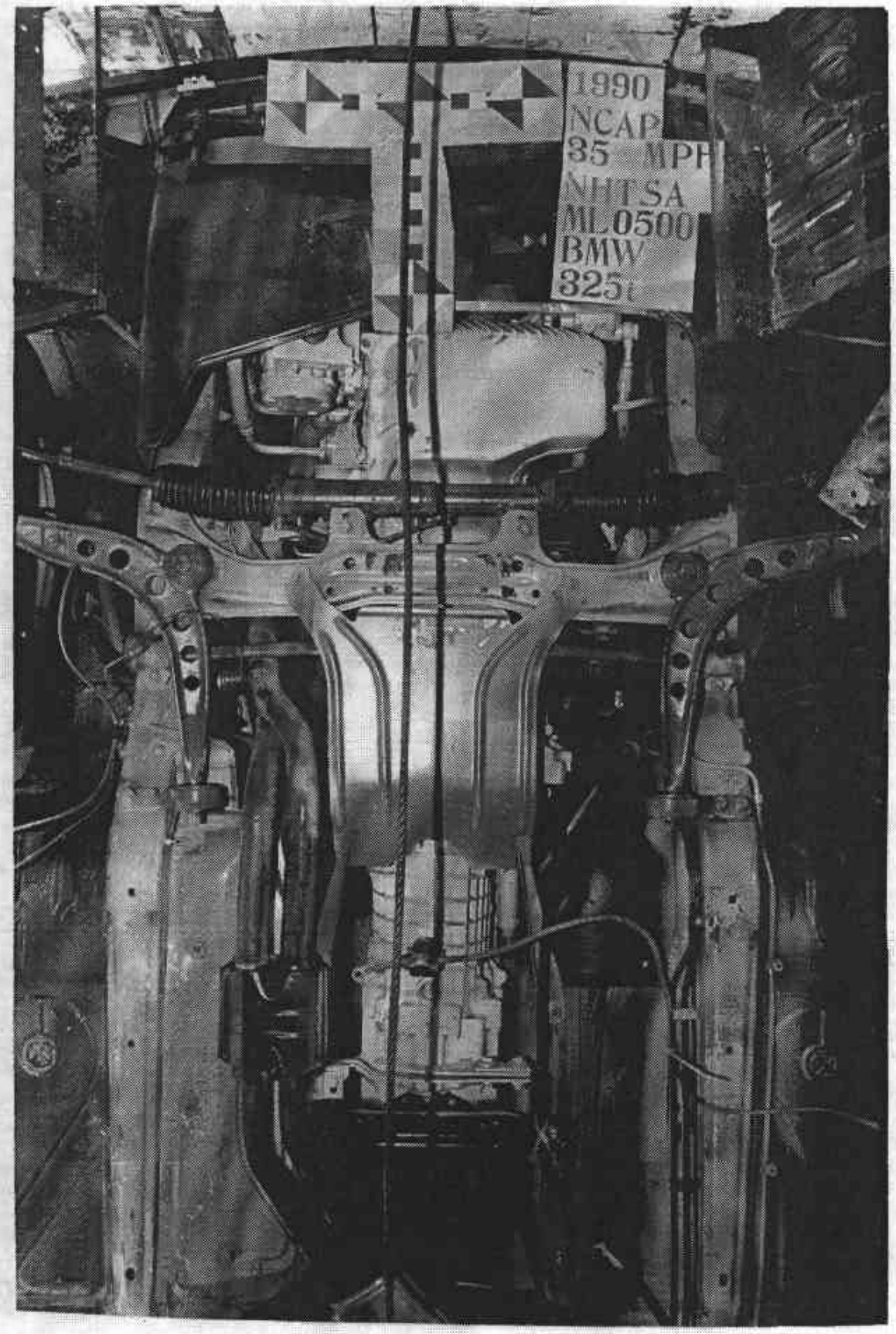
POSTTEST WINDSHIELD VIEW



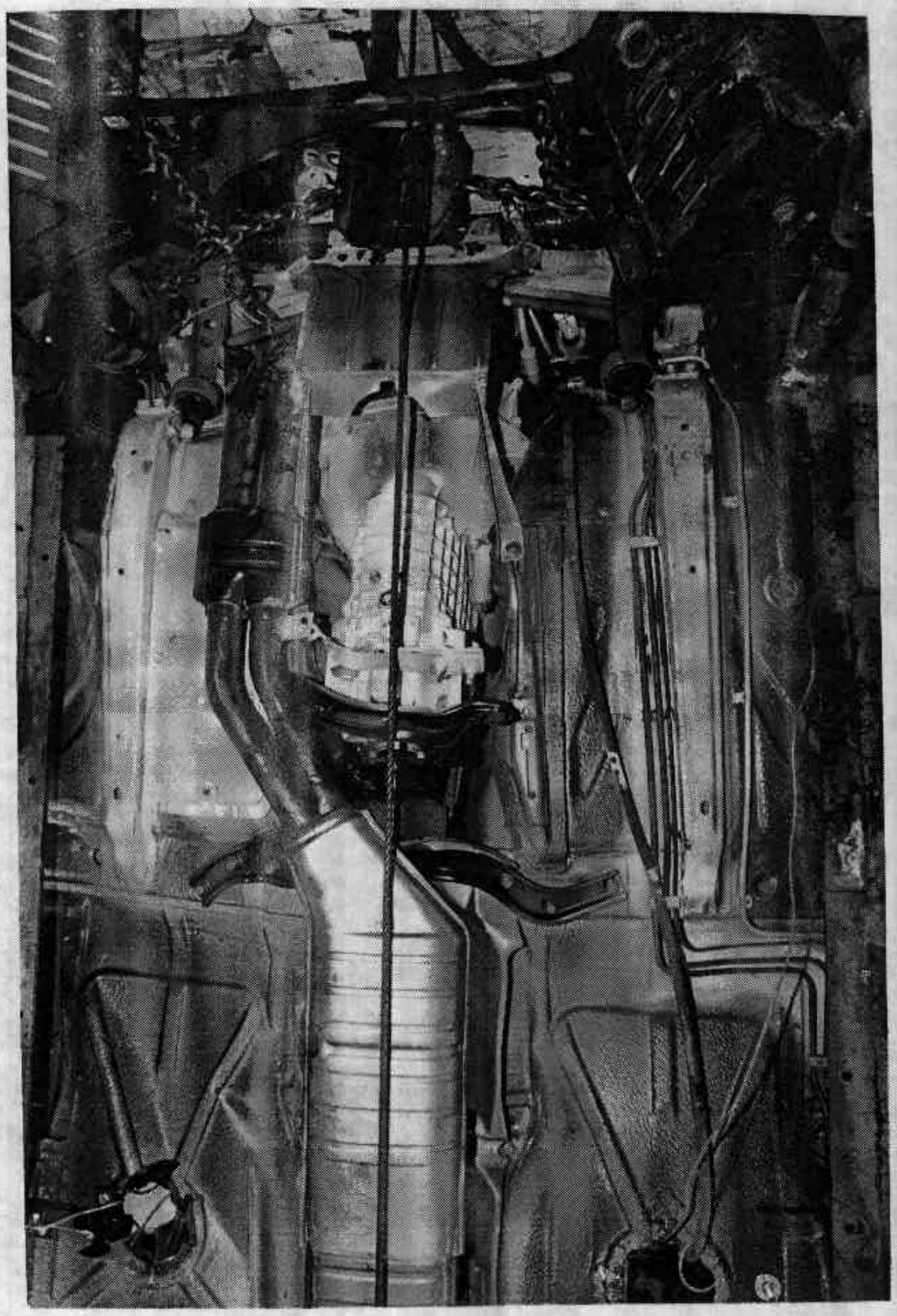
PRETEST ENGINE COMPARTMENT VIEW



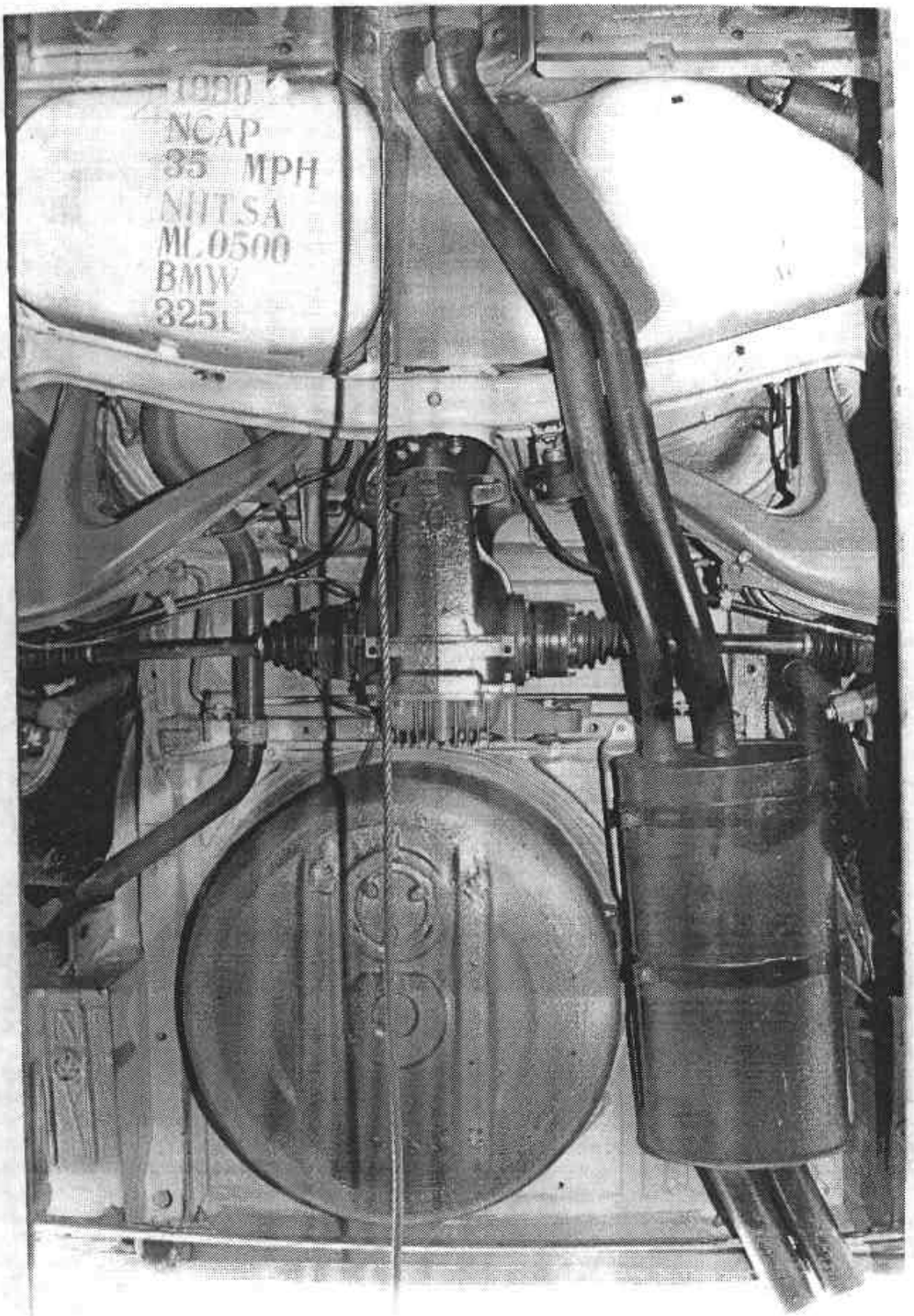
POSTTEST ENGINE COMPARTMENT VIEW



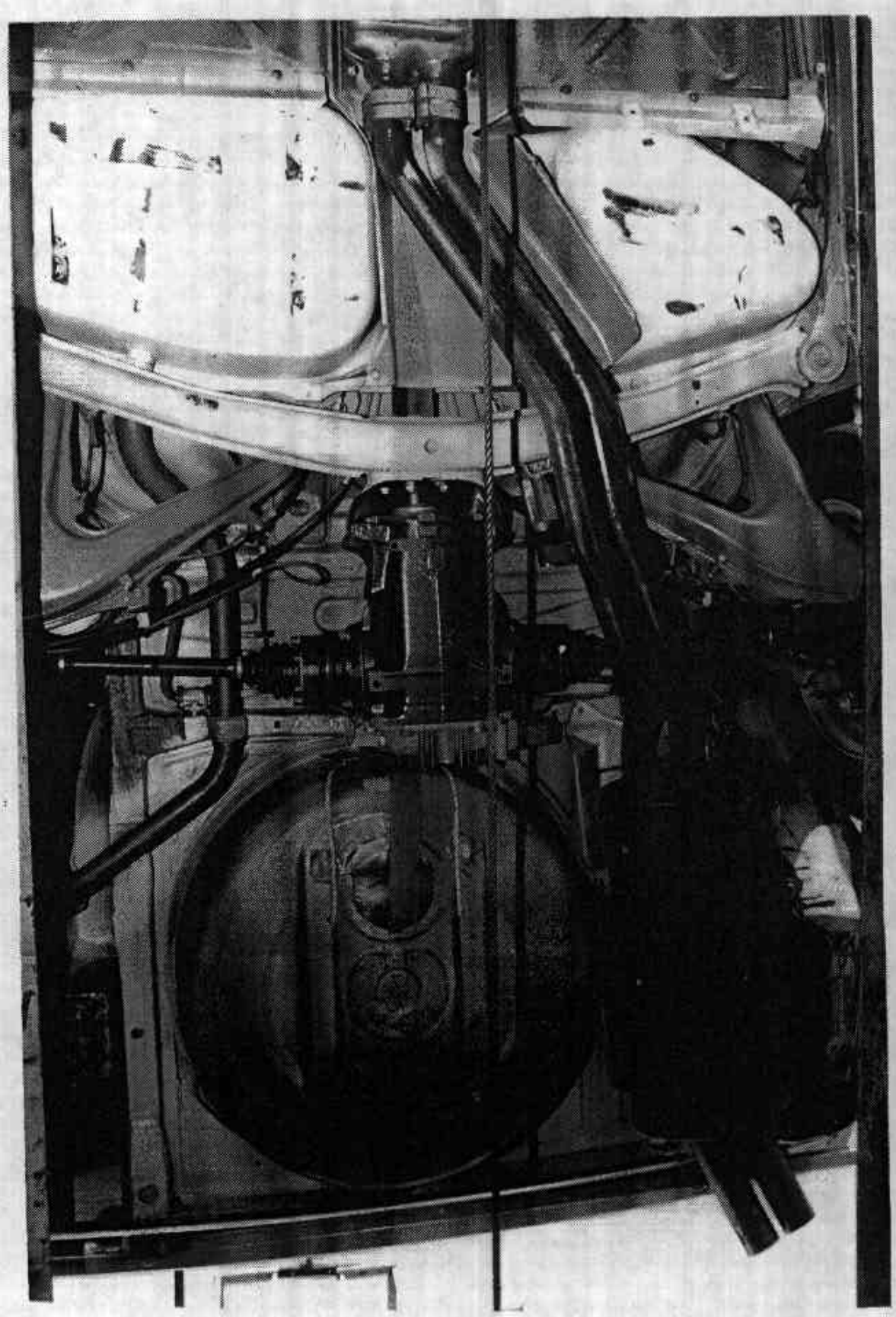
PRETEST FRONT UNDERBODY VIEW



POSTTEST FRONT UNDERBODY VIEW

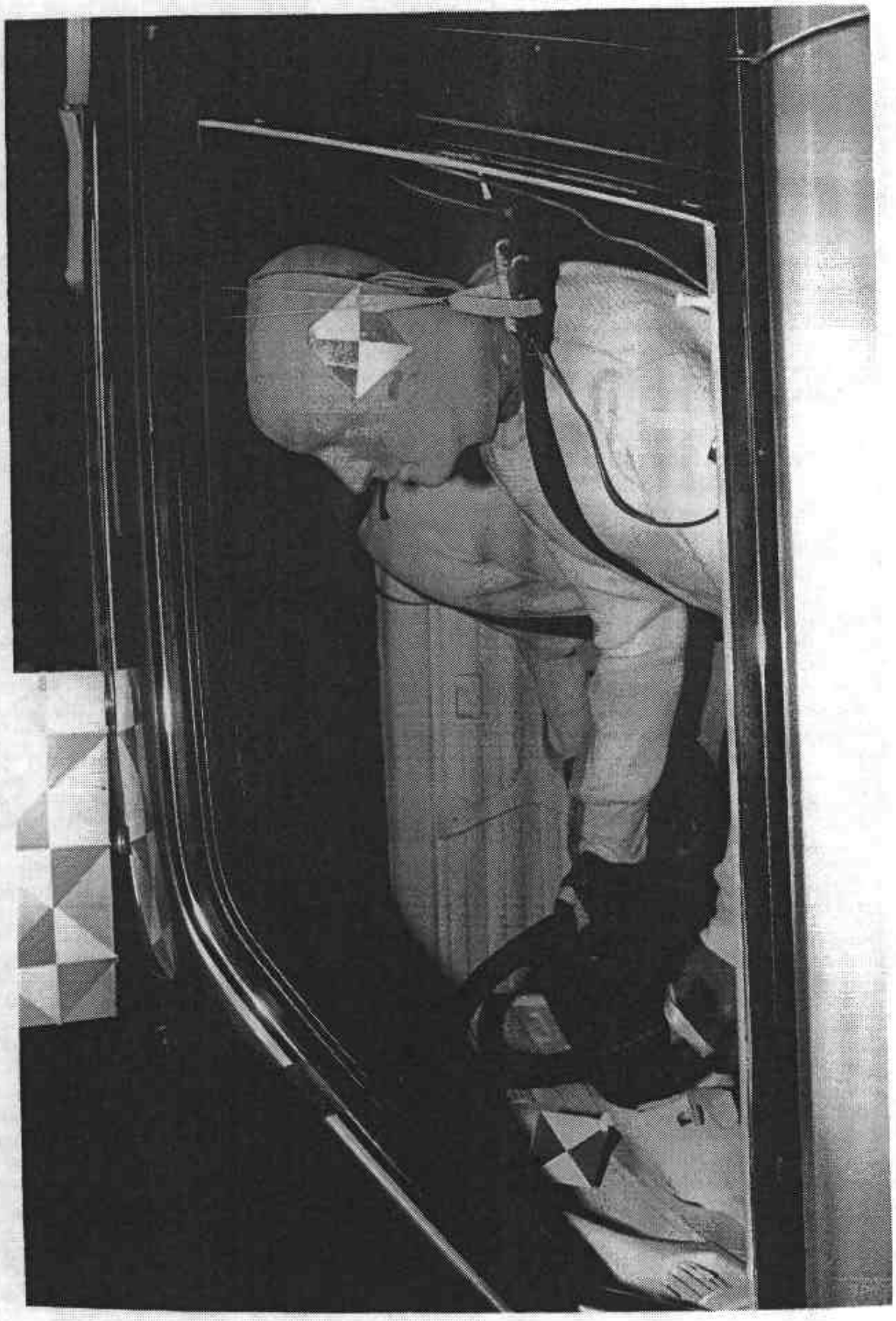


PRETEST REAR UNDERBODY VIEW



POSTTEST REAR UNDERBODY VIEW

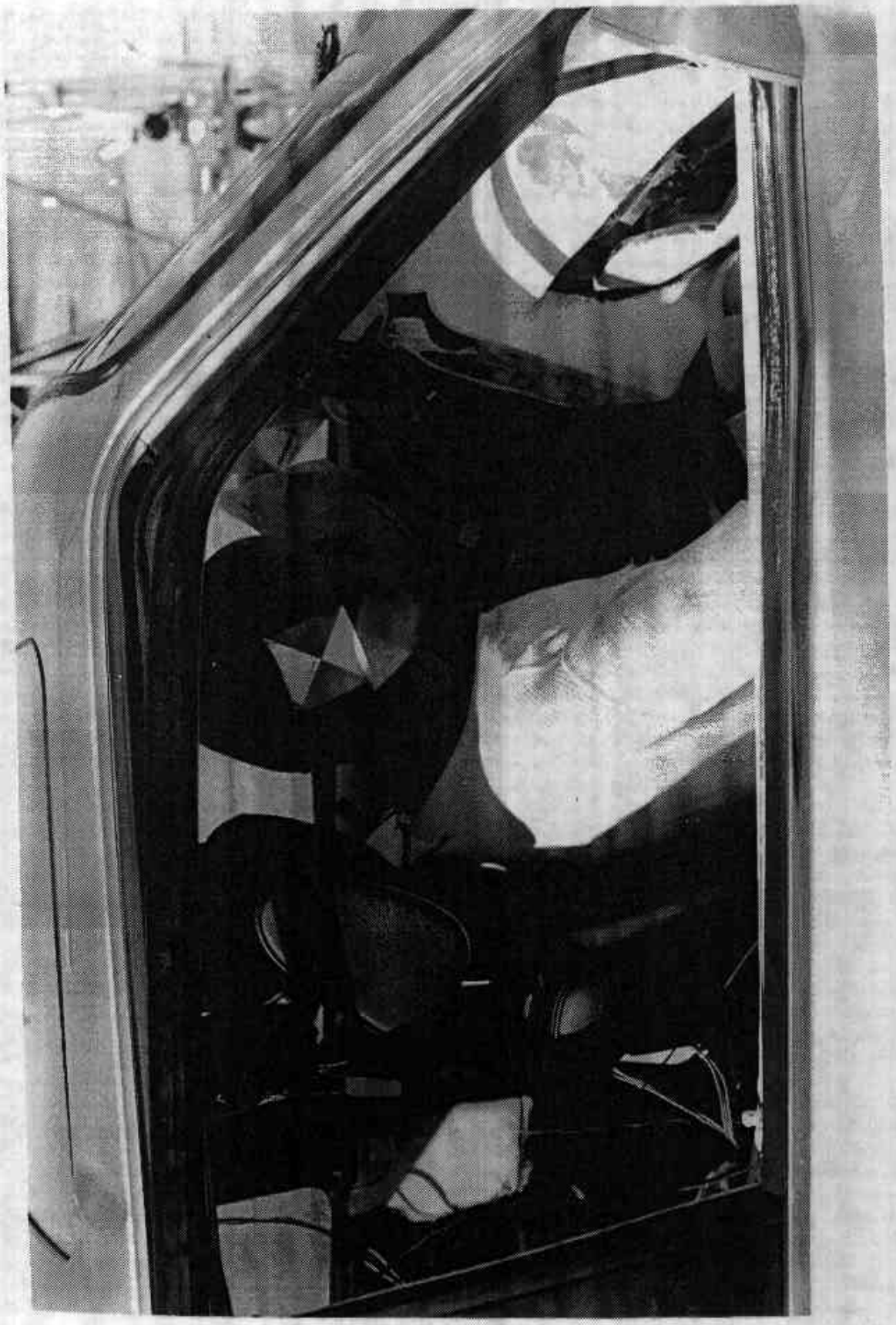
MSE-90-R9092-N04



PRETEST DRIVER DUMMY POSITION VIEW

POSTTEST DRIVER DUMMY POSITON VIEW

PRETEST PASSENGER DUMMY POSITION VIEW



POSTTEST PASSENGER DUMMY POSITION VIEW

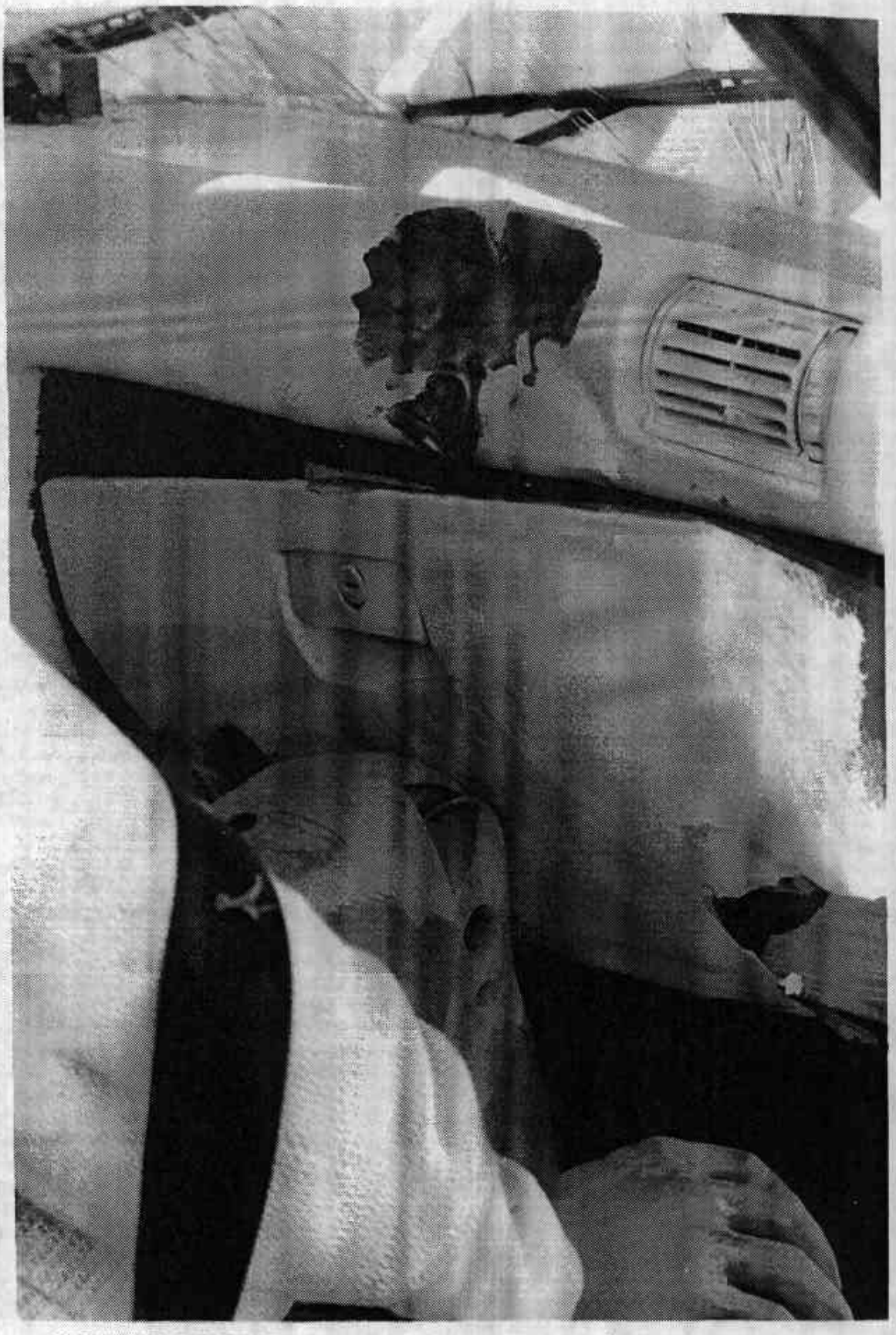
POSTTEST DRIVER DUMMY & VEHICLE INTERIOR VIEW (Door Open)

POSTTEST PASSENGER DUMMY & VEHICLE INTERIOR VIEW (Door Open)

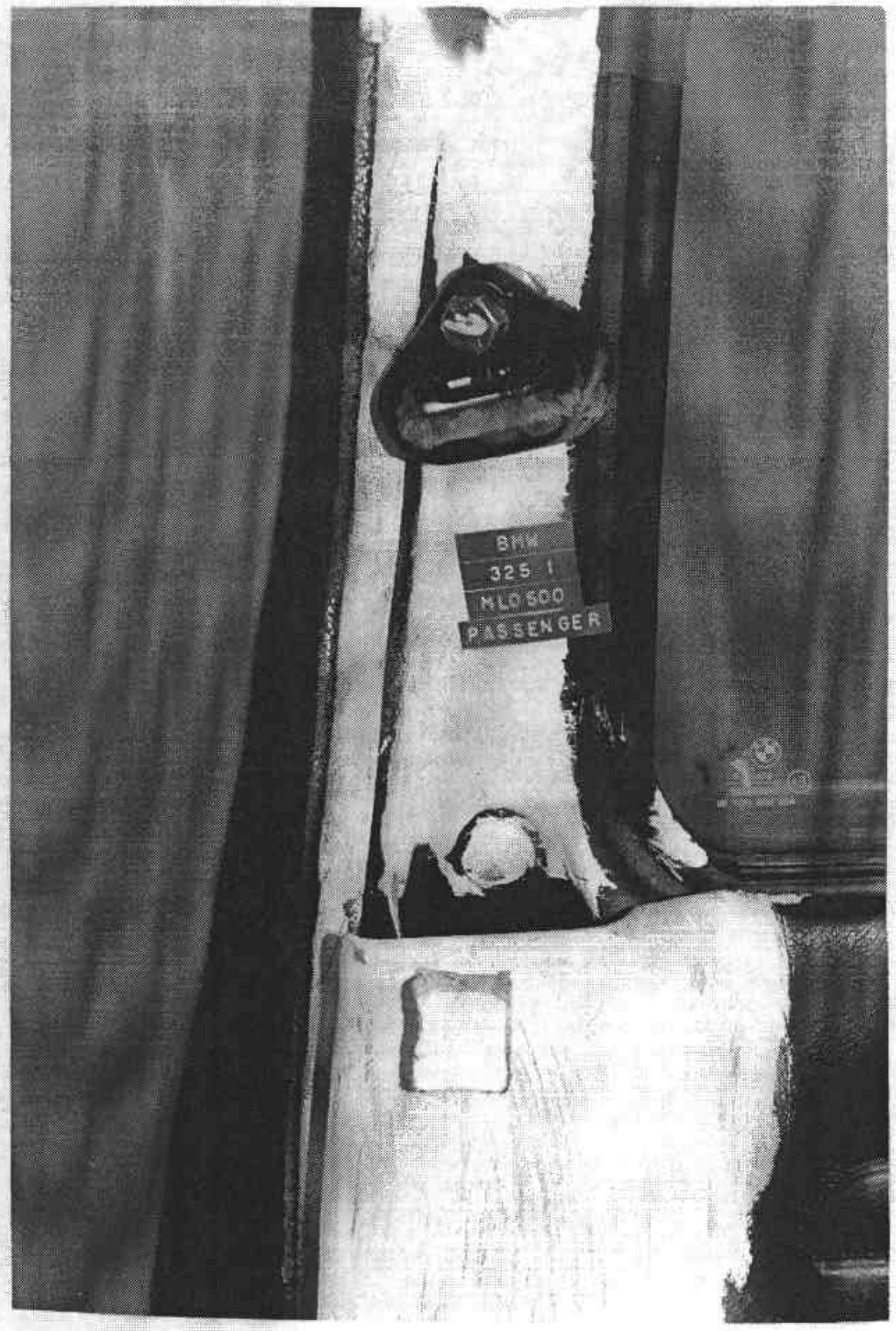
A-24

MSE-90-R9092-N04

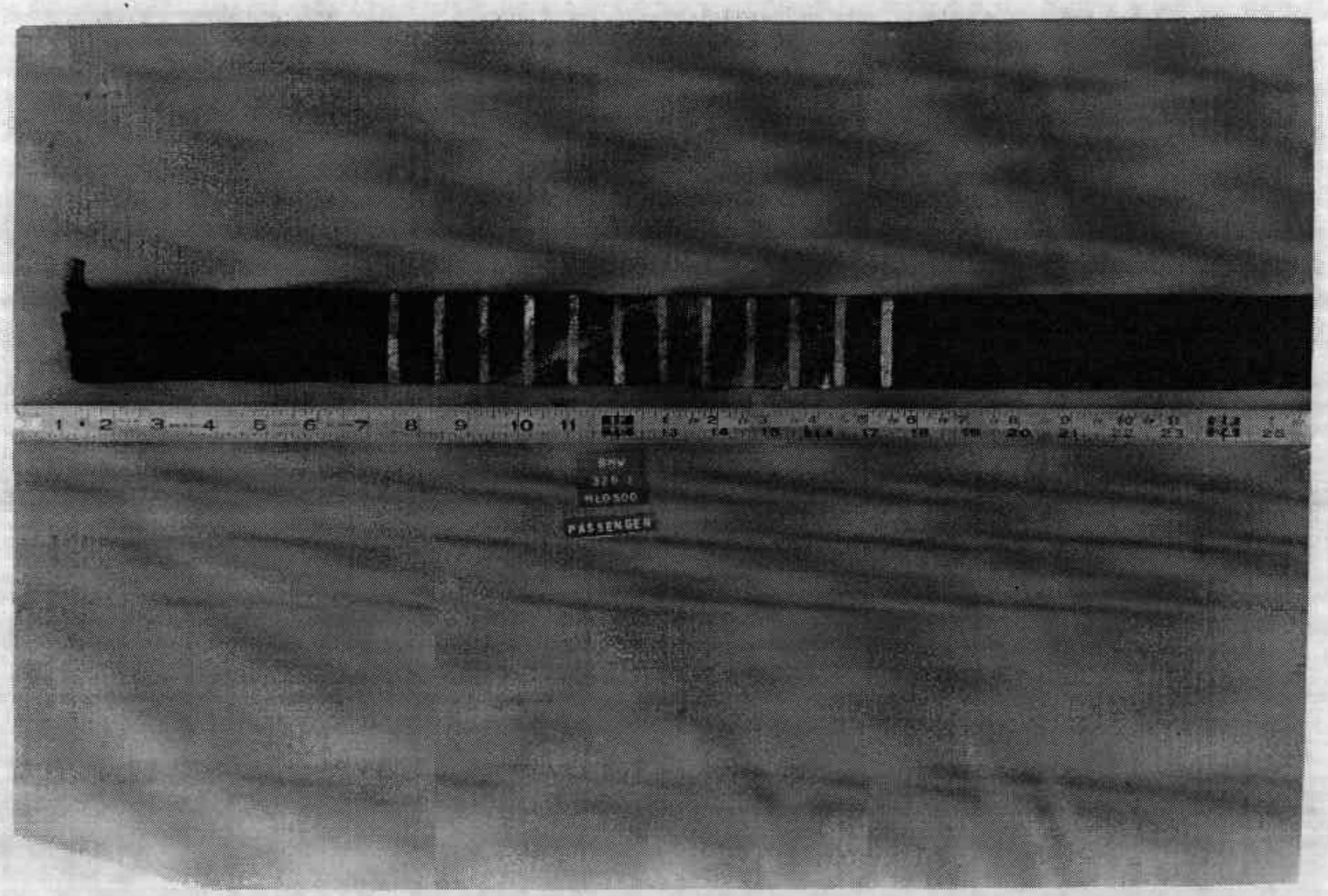
POSTTEST DRIVER DUMMY (ATD) HEAD AND KNEE CONTACT AREA



POSTTEST PASSENGER DUMMY (ATD) HEAD AND KNEE CONTACT AREA



POSTTEST VIEW OF PASSENGER RESTRAINT SYSTEM D-RING



POSTTEST VIEW OF PASSENGER RESTRAINT SYSTEM BROKEN BELT

APPENDIX B-1

VEHICLE AND DUMMY (ATD) RESPONSE DATA

DATA FILTERING:

ATD Head Channels	- Class 1000
ATD Chest Channels	- Class 180
ATD Femur Channels	- Class 600
Vehicle Channels	- Class 60

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General Test Information

VERSNO: V2 TGID: 1
TITLE: 1990 35MPH NCAP FRONTAL BARRIER IMPACT
TSTOBJ: ACQUIRE NCAP DATA USING TWO INSTR. DUMMIES AND LOAD CELL BARRIER
TSTDAT: 13/MAR/90 TSTPRF: MSE CONNO: DTNH22-87-D-02009
TSTREF: NCA100 TSTTYP: NCA TSTCFN: VTB
TKSURF: ASH TKCOND: DRY TEMP: 71 RECTYP: FMT
LINK: UMB CLSSPD: 34.8 IMPANG: 0 OFFSET: 0.0
IMPPNT: 9999.9 MEASUR: ENG TOTCRV: 65
TSTCOM: PASS SHOULDER BELT SEVERED BETWEEN D-RING & RETRACTOR APPROX. T=65 MSC

Vehicle Information

VGID: 2 VEHNO: 1 MAKE: 27 MODEL: 99 YEAR: 90 BODY: 2S
VIN: WBAAA131XLEC66287 ENGINE: V6IF ENGDSP: 152 CID TRANSM: MR
VEHTWT: 3865 WHLBAS: 101.2 VEHLEN: 170.5 VEHWID: 64.8
VEHCG: 49.1 STRSEP: NO COLMEC: OTH MODIND: P
MODDSC: UNMODIFIED
BX
1: 170.5
2: 155.4
3: 129.3
4: 116.3
5: 116.4
6: 116.7
7: 116.8
8: 71.4
9: 71.5
10: 72.0
11: 72.1
12: 116.4
13: 116.5
14: 124.6
15: 127.6
16: 100.3
17: 16.2
18: 16.7
19: 154.2
20: 154.0
21: 28.0
VEHSPD: 34.8 CRBANG: 0 PDOF: 0 BMPENG: NA
SILENG: NA APLENG: NA
DPD
1: 19.1
2: 20.0
3: 21.3
4: 20.9
5: 20.2
6: 18.8
VDI: 12FCAW9 LENCNT: 69.5 DAMDST: 0.0 CRHDST: 21.3
AX
1: 150.0
2: 140.8
3: 124.0
4: 115.4
5: 115.7
6: 116.2
7: 116.3
8: 70.8
9: 71.0
10: 71.2
11: 71.7
12: 115.0
13: 115.3
14: 122.0
15: 124.0
16: 96.7
17: 18.6
18: 18.5
19: 134.8
20: 138.5
21: 28.0
CARANG: 999 VEHOR: 999
VEHCOM: MODEL IS 325i; COLMEC IS TELESCOPING TUBING

Barrier Information

Barrier ID: 3
BARRIG: R
BARSHP: LCB
BARANG: 0
BARDIA: 999.9
BARCOM: 36 50KLB LOAD CELLS ARRANGED IN A 9 WIDE BY 4 HIGH MATRIX.

Occupant Information

```
Occupant Group ID: 4          VEHNO: 1
OCCLOC: 01   OCCTYP: P5   OCCAGE: 99   OCCSEX: M    OCCHT: 999   OCCWT: 999
MTHCAL: P5   DUMSIZ: 50
DUMMAN: MFG: HUMANOID SYSTEMS, S/N 464
DUMMOD: UNMODIFIED
DUMDSC: NO COMMENTS
HH: 18.3  HW: 25.6  HR:  6.5  HS:  7.3  CD: 25.3  CS: 16.4  AD:  3.1  HD:  5.1
KD:  7.8  HB:999.9  NB:999.9  CB:999.9  KB:999.9
RESTR1: 3PT      RESTR2: ABG
RESTXT: NO COMMENTS
SEPOSN: CN      AIRDEP: DP
CNTRH1: NO   CNTRH2: NO   CNTRC1: NO   CNTRC2: NO   CNTRL1: DP   CNTRL2: NO
HIC: 1036.          T1:  56.900         T2:  91.900
CLIP3M:  55.7  LFEM:  865.  RFEM:  853.  CSI:  607.  LBELT: 1876.  SBELT: 2231.
OCCCOM:
```

Occupant Information

```
Occupant Group ID: 4          VEHNO: 1
OCCLOC: 02   OCCTYP: P5   OCCAGE: 99   OCCSEX: M    OCCHT: 999   OCCWT: 999
MTHCAL: P5   DUMSIZ: 50
DUMMAN: MFG: HUMANOID SYSTEMS, S/N 467
DUMMOD: UNMODIFIED
DUMDSC: NO COMMENTS
HH: 17.0  HW: 25.0  HR:  6.4  HS:  7.3  CD: 24.7  CS:999.9  AD:  2.4  HD:  5.0
KD:  9.1  HB:999.9  NB:999.9  CB:999.9  KB:999.9
RESTR1: 3PT      RESTR2: NON
RESTXT: NO COMMENTS
SEPOSN: CN      AIRDEP: NA
CNTRH1: DP   CNTRH2: NO   CNTRC1: NO   CNTRC2: NO   CNTRL1: DP   CNTRL2: NO
HIC:                T1:  93.900          T2: 110.300
CLIP3M:        LFEM:        RFEM:        CSI:  548.  LBELT: 1970.  SBELT: 3962.
OCCCOM: SHOULDER BELT SEVERED UNDER HIGH LOAD APPROX T=65. MSEC.
```

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 001
SENTYP: AC SENLOC: 01 SENATT: HDCG
AXIS: XL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: AT34
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 33 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 002
SENTYP: AC SENLOC: 01 SENATT: HDCG
AXIS: YL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BB91H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 9 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 003
SENTYP: AC SENLOC: 01 SENATT: HDCG
AXIS: ZL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BF82H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 28 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 004
SENTYP: AC SENLOC: 01 SENATT: CHST
AXIS: XL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BJ28H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 29 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 005
SENTYP: AC SENLOC: 01 SENATT: CHST
AXIS: YL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BT28H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 8 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

```
Inst. Group ID: 5     VEHNO: 1            CURNO: 006
SENTYP: AC            SENLOC: 01          SENATT: CHST
AXIS: ZL              UNITS: G'S          PREFIL:  1650
INSMAN: MFG: ENDEVCO,  MODEL: 7264-200,  S/N: AE29
CALDAT: 17/JAN/90     INSRAT:   200       CHLMAX:   8          INIVEL:   0.0
NFP:  -300            NLP:  2999          DELT:    100         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5     VEHNO: 1            CURNO: 007
SENTYP: LC            SENLOC: 01          SENATT: FMRL
AXIS: XL              UNITS: LBS          PREFIL:  1650
INSMAN: MFG: GSE INC,  MODEL: 2430,  S/N: 634
CALDAT: 16/JAN/90     INSRAT:  3000       CHLMAX:  29          INIVEL:   0.0
NFP:  -300            NLP:  2999          DELT:    100         DASTAT: QD
INSCOM: NOISE APPEARS BEFORE DATA FROM T=0 TO T=48 MSEC.; UNKNOWN CAUSE
```

Instrumentation Information

```
Inst. Group ID: 5     VEHNO: 1            CURNO: 008
SENTYP: LC            SENLOC: 01          SENATT: FMRR
AXIS: XL              UNITS: LBS          PREFIL:  1650
INSMAN: MFG: GSE INC,  MODEL: 2430,  S/N: 735
CALDAT: 16/JAN/90     INSRAT:  3000       CHLMAX:  29          INIVEL:   0.0
NFP:  -300            NLP:  2999          DELT:    100         DASTAT: QD
INSCOM: NOISE APPEARS BEFORE DATA FROM T=0 TO T=48 MSEC.; UNKNOWN CAUSE
```

Instrumentation Information

```
Inst. Group ID: 5     VEHNO: 1            CURNO: 009
SENTYP: AC            SENLOC: 02          SENATT: HDCG
AXIS: YL              UNITS: G'S          PREFIL:  1650
INSMAN: MFG: ENDEVCO,  MODEL: 7264-200,  S/N: BJ61H
CALDAT: 17/JAN/90     INSRAT:   200       CHLMAX:  78          INIVEL:  34.8
NFP:  -300            NLP:  2999          DELT:    100         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5     VEHNO: 1            CURNO: 010
SENTYP: AC            SENLOC: 02          SENATT: HDCG
AXIS: YL              UNITS: G'S          PREFIL:  1650
INSMAN: MFG: ENDEVCO,  MODEL: 7264-200,  S/N: BG95H
CALDAT: 17/JAN/90     INSRAT:   200       CHLMAX:   9          INIVEL:   0.0
NFP:  -300            NLP:  2999          DELT:    100         DASTAT: AM
INSCOM:
```

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 011
SENTYP: AC SENLOC: 02 SENATT: HDCG
AXIS: ZL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BJ54H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 24 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 012
SENTYP: AC SENLOC: 02 SENATT: CHST
AXIS: XL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BJ27H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 38 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 013
SENTYP: AC SENLOC: 02 SENATT: CHST
AXIS: YL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: BG78H
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 26 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 014
SENTYP: AC SENLOC: 02 SENATT: CHST
AXIS: ZL UNITS: G'S PREFIL: 1650
INSMAN: MFG: ENDEVCO, MODEL: 7264-200, S/N: AR39
CALDAT: 17/JAN/90 INSRAT: 200 CHLMAX: 14 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 015
SENTYP: LC SENLOC: 02 SENATT: FMRL
AXIS: XL UNITS: LBS PREFIL: 1650
INSMAN: MFG: GSE INC, MODEL: 2430, S/N: 550
CALDAT: 16/JAN/90 INSRAT: 3000 CHLMAX: 17 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 016
SENTYP: LC SENLOC: 02 SENATT: FMRR
AXIS: XL UNITS: LBS PREFIL: 1650
INSMAN: MFG: GSE INC, MODEL: 2430, S/N: 559
CALDAT: 16/JAN/90 INSRAT: 3000 CHLMAX: 11 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 017
SENTYP: LC SENLOC: 01 SENATT: LPBO
AXIS: OT UNITS: LBS PREFIL: 1650
INSMAN: MFG: LEBOW, MODEL: 3371, S/N: 333
CALDAT: 16/JAN/90 INSRAT: 3500 CHLMAX: 54 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 018
SENTYP: LC SENLOC: 01 SENATT: SHBT
AXIS: OT UNITS: LBS PREFIL: 1650
INSMAN: MFG: LEBOW, MODEL: 3371, S/N: 327
CALDAT: 16/JAN/90 INSRAT: 3500 CHLMAX: 67 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 019
SENTYP: LC SENLOC: 02 SENATT: LPBO
AXIS: OT UNITS: LBS PREFIL: 1650
INSMAN: MFG: LEBOW, MODEL: 3371, S/N: 330
CALDAT: 16/JAN/90 INSRAT: 3500 CHLMAX: 57 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 020
SENTYP: LC SENLOC: 02 SENATT: SHBT
AXIS: OT UNITS: LBS PREFIL: 1650
INSMAN: MFG: LEBOW, MODEL: 3371, S/N: 308
CALDAT: 16/JAN/90 INSRAT: 3500 CHLMAX: 113 INIVEL: 0.0
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 1            CURNO: 021
SENTYP: DS           SENLOC: 01          SENATT: SHBT
AXIS: OT             UNITS: INS          PREFIL:  1650
INSMAN: MFG: ETI,  MODEL: LCP12A-12,  S/N: 8803-1
CALDAT: 01/MAR/90    INSRAT:    30       CHLMAX:  17          INIVEL:   0.0
NFP:  -300           NLP:  2999          DELT:    100         DASTAT: AM
INSCOM: SEAT BELT ELONGATION, UNITS ARE INCHES/IN. (PERCENTAGE BELT STRETCH)
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 1            CURNO: 022
SENTYP: DS           SENLOC: 02          SENATT: SHBT
AXIS: OT             UNITS: OTH          PREFIL:  1650
INSMAN: MFG: ETI,  MODEL: LCP12A-12,  S/N: 8712-1
CALDAT: 01/MAR/90    INSRAT:    30       CHLMAX:  38          INIVEL:   0.0
NFP:  -300           NLP:  2999          DELT:    100         DASTAT: AM
INSCOM: SEAT BELT ELONGATION, UNITS ARE INCHES/IN. (PERCENTAGE BELT STRETCH)
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 1            CURNO: 023
SENTYP: AC           SENLOC: NA          SENATT: BRCL
AXIS: XG             UNITS: G'S          PREFIL:  1650
INSMAN: MFG: SETRA,  MODEL: 111,  S/N: 1103
CALDAT: 17/JAN/90    INSRAT:   250       CHLMAX:  57          INIVEL:  34.8
NFP:  -300           NLP:  2999          DELT:    100         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 1            CURNO: 024
SENTYP: AC           SENLOC: NA          SENATT: BRCR
AXIS: XG             UNITS: G'S          PREFIL:  1650
INSMAN: MFG: SETRA,  MODEL: 111,  S/N: 1124
CALDAT: 17/JAN/90    INSRAT:   250       CHLMAX:  56          INIVEL:  34.8
NFP:  -300           NLP:  2999          DELT:    100         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 1            CURNO: 025
SENTYP: AC           SENLOC: NA          SENATT: ENGN
AXIS: XG             UNITS: G'S          PREFIL:  1650
INSMAN: MFG: SETRA,  MODEL: 113B,  S/N: 1877
CALDAT: 17/JAN/90    INSRAT:   250       CHLMAX: 113          INIVEL:  34.8
NFP:  -300           NLP:  2999          DELT:    100         DASTAT: AM
INSCOM: TRANSDUCER WIRE SEVERED APPROX. T=89 MSEC.
```

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 026
SENTYP: AC SENLOC: NA SENATT: ENGN
AXIS: XG UNITS: G'S PREFIL: 1650
INSMAN: MFG: SETRA, MODEL: 113B, S/N: 1878
CALDAT: 17/JAN/90 INSRAT: 250 CHLMAX: 97 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 027
SENTYP: AC SENLOC: NA SENATT: DPLC
AXIS: XG UNITS: G'S PREFIL: 1650
INSMAN: MFG: SETRA, MODEL: 111, S/N: 1108
CALDAT: 17/JAN/90 INSRAT: 250 CHLMAX: 110 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 028
SENTYP: AC SENLOC: NA SENATT: FLLR
AXIS: XG UNITS: G'S PREFIL: 1650
INSMAN: MFG: SETRA, MODEL: 111, S/N: 1105
CALDAT: 17/JAN/90 INSRAT: 100 CHLMAX: 77 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 1 CURNO: 029
SENTYP: AC SENLOC: NA SENATT: FLRR
AXIS: XG UNITS: G'S PREFIL: 1650
INSMAN: MFG: SETRA, MODEL: 111, S/N: 1123
CALDAT: 17/JAN/90 INSRAT: 250 CHLMAX: 101 INIVEL: 34.8
NFP: -300 NLP: 2999 DELT: 100 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 030
SENTYP: LC SENLOC: NA SENATT: LCA1
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19349
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 5 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 0            CURNO: 031
SENTYP: LC           SENLOC: NA          SENATT: LCA2
AXIS: XG             UNITS: LBS          PREFIL:  1650
INSMAN: MFG: INTERFACE,  MODEL: 1220-FS, S/N: 19324
CALDAT: 14/MAY/85    INSRAT: 50000       CHLMAX:   4          INIVEL:   0.0
NFP:  -250           NLP:  2499          DELT:    120         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 0            CURNO: 032
SENTYP: LC           SENLOC: NA          SENATT: LCA3
AXIS: XG             UNITS: LBS          PREFIL:  1650
INSMAN: MFG: INTERFACE,  MODEL: 1220-FS, S/N: 19283
CALDAT: 14/MAY/85    INSRAT: 50000       CHLMAX:   3          INIVEL:   0.0
NFP:  -250           NLP:  2499          DELT:    120         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 0            CURNO: 033
SENTYP: LC           SENLOC: NA          SENATT: LCA4
AXIS: XG             UNITS: LBS          PREFIL:  1650
INSMAN: MFG: INTERFACE,  MODEL: 1220-FS, S/N: 19263
CALDAT: 14/MAY/85    INSRAT: 50000       CHLMAX:   5          INIVEL:   0.0
NFP:  -250           NLP:  2499          DELT:    120         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 0            CURNO: 034
SENTYP: LC           SENLOC: NA          SENATT: LCA5
AXIS: XG             UNITS: LBS          PREFIL:  1650
INSMAN: MFG: INTERFACE,  MODEL: 1220-FS, S/N: 19265
CALDAT: 14/MAY/85    INSRAT: 50000       CHLMAX:   7          INIVEL:   0.0
NFP:  -250           NLP:  2499          DELT:    120         DASTAT: AM
INSCOM:
```

Instrumentation Information

```
Inst. Group ID: 5    VEHNO: 0            CURNO: 035
SENTYP: LC           SENLOC: NA          SENATT: LCA6
AXIS: XG             UNITS: LBS          PREFIL:  1650
INSMAN: MFG: INTERFACE,  MODEL: 1220-FS, S/N: 19266
CALDAT: 14/MAY/85    INSRAT: 50000       CHLMAX:   6          INIVEL:   0.0
NFP:  -250           NLP:  2499          DELT:    120         DASTAT: AM
INSCOM:
```

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 036
SENTYP: LC SENLOC: NA SENATT: LCA7
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19317
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 1 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 037
SENTYP: LC SENLOC: NA SENATT: LCA8
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19270
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 3 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 038
SENTYP: LC SENLOC: NA SENATT: LCA9
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19428
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 5 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 039
SENTYP: LC SENLOC: NA SENATT: LCB1
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19273
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 4 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 040
SENTYP: LC SENLOC: NA SENATT: LCB2
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19276
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 6 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 041
SENTYP: LC SENLOC: NA SENATT: LCB3
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19258
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 28 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 042
SENTYP: LC SENLOC: NA SENATT: LCB4
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19278
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 37 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 043
SENTYP: LC SENLOC: NA SENATT: LCB5
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19279
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 60 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 044
SENTYP: LC SENLOC: NA SENATT: LCB6
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19282
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 52 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 045
SENTYP: LC SENLOC: NA SENATT: LCB7
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19262
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 41 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 046
SENTYP: LC SENLOC: NA SENATT: LCB8
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19285
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 10 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 047
SENTYP: LC SENLOC: NA SENATT: LCB9
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19286
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 5 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 048
SENTYP: LC SENLOC: NA SENATT: LCC1
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19287
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 5 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 049
SENTYP: LC SENLOC: NA SENATT: LCC2
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19288
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 12 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 050
SENTYP: LC SENLOC: NA SENATT: LCC3
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19289
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 23 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 051
SENTYP: LC SENLOC: NA SENATT: LCC4
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19291
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 20 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 052
SENTYP: LC SENLOC: NA SENATT: LCC5
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19324
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 52 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 053
SENTYP: LC SENLOC: NA SENATT: LCC6
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19313
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 29 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 054
SENTYP: LC SENLOC: NA SENATT: LCC7
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19314
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 15 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 055
SENTYP: LC SENLOC: NA SENATT: LCC8
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19315
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 14 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 056
SENTYP: LC SENLOC: NA SENATT: LCC9
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19316
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 4 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 057
SENTYP: LC SENLOC: NA SENATT: LCD1
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19460
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 2 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 058
SENTYP: LC SENLOC: NA SENATT: LCD2
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19318
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 4 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 059
SENTYP: LC SENLOC: NA SENATT: LCD3
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19322
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 9 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 060
SENTYP: LC SENLOC: NA SENATT: LCD4
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19323
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 6 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 061
SENTYP: LC SENLOC: NA SENATT: LCD5
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 120-FS, S/N: 19260
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 7 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 062
SENTYP: LC SENLOC: NA SENATT: LCD6
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19325
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 5 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

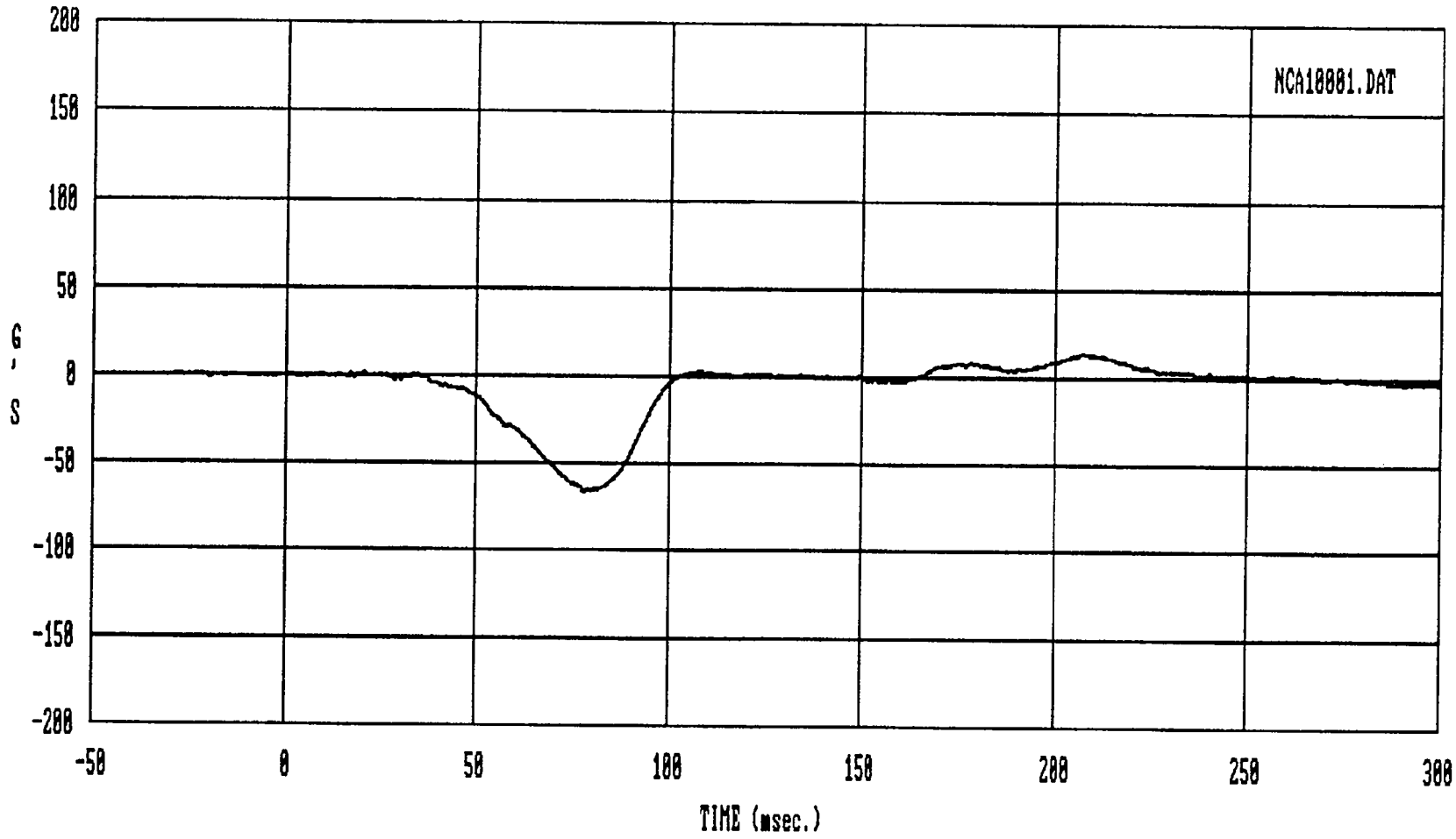
Inst. Group ID: 5 VEHNO: 0 CURNO: 063
SENTYP: LC SENLOC: NA SENATT: LCD7
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19332
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 7 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 064
SENTYP: LC SENLOC: NA SENATT: LCD8
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19333
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 3 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:

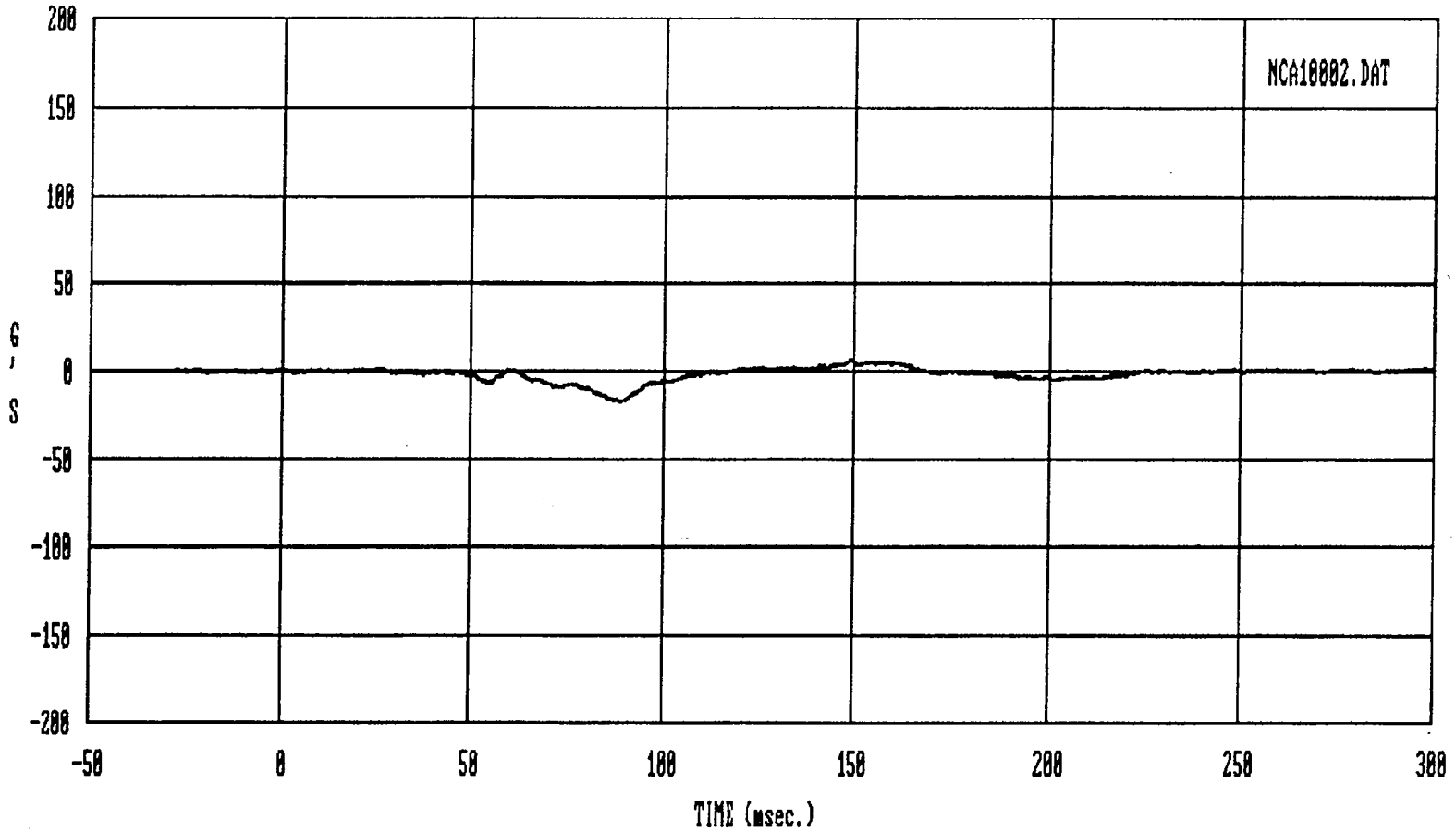
Instrumentation Information

Inst. Group ID: 5 VEHNO: 0 CURNO: 065
SENTYP: LC SENLOC: NA SENATT: LCD9
AXIS: XG UNITS: LBS PREFIL: 1650
INSMAN: MFG: INTERFACE, MODEL: 1220-FS, S/N: 19466
CALDAT: 14/MAY/85 INSRAT: 50000 CHLMAX: 4 INIVEL: 0.0
NFP: -250 NLP: 2499 DELT: 120 DASTAT: AM
INSCOM:



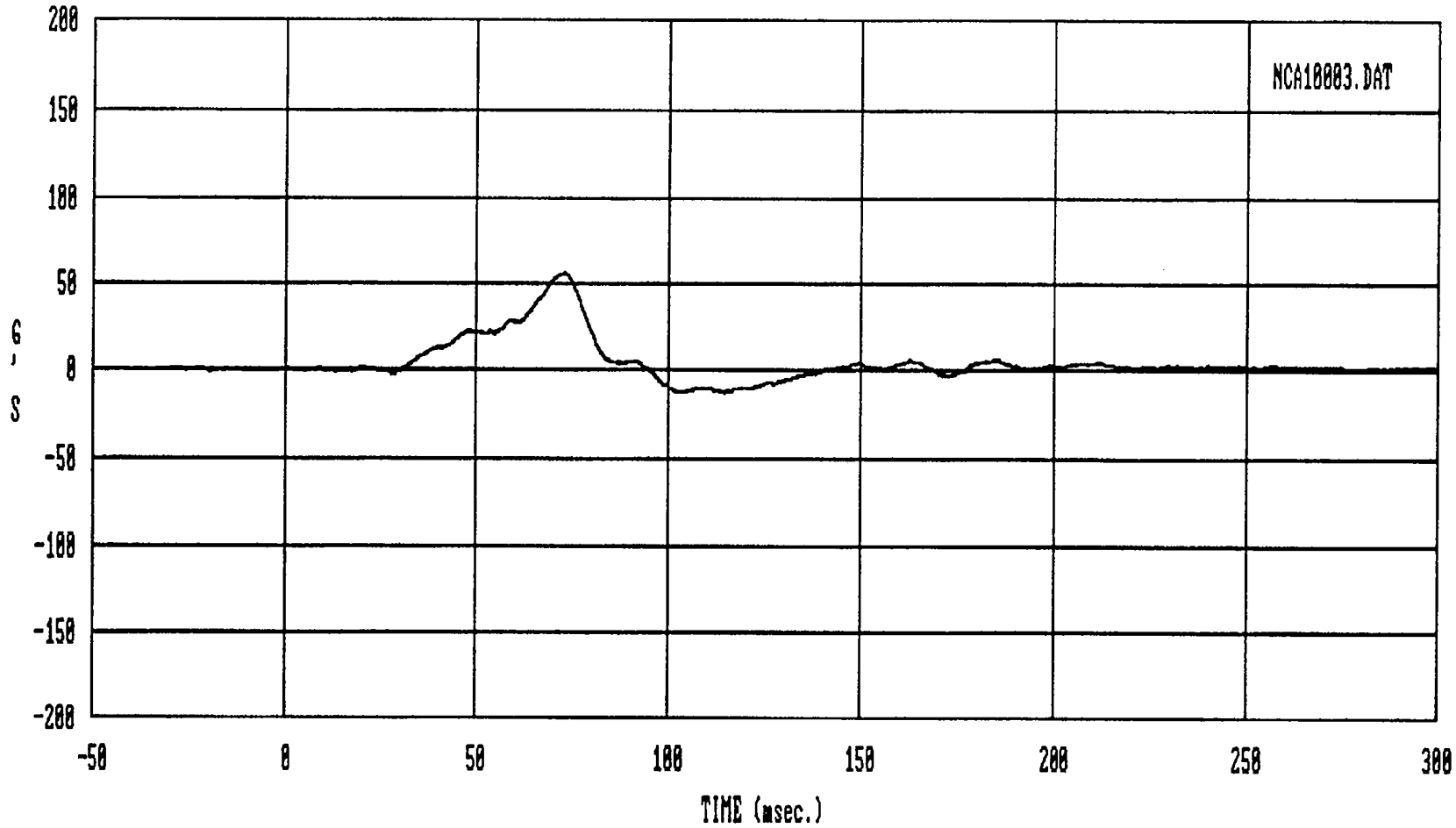
Curve: Driver Head acceleration -- X axis Filter: SAE CLASS 1000 Max = 14.735 Min = -66.545

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



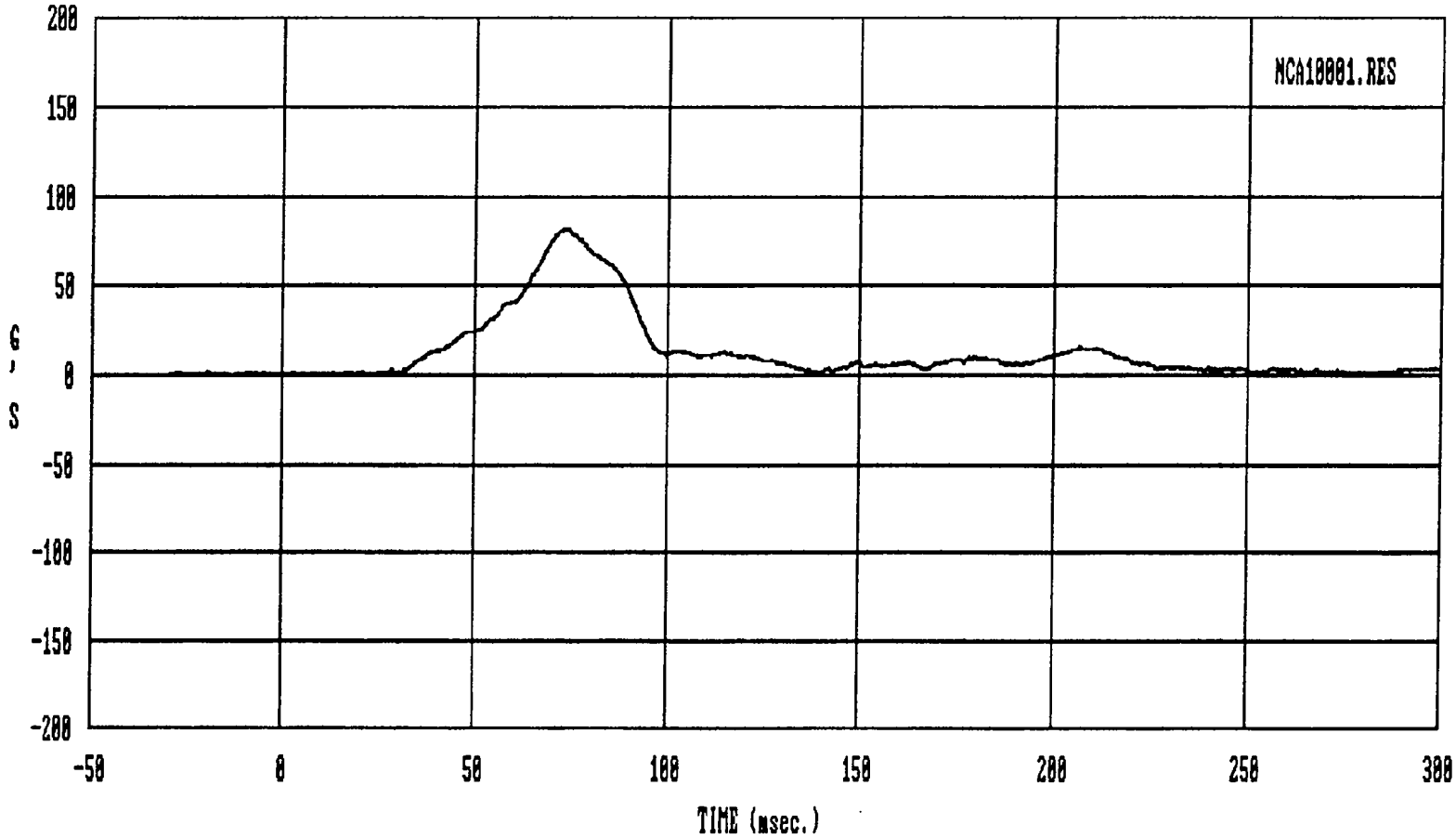
Curve: Driver Head acceleration — Y axis Filter: SAE CLASS 1000 Max = 6.8102 Min = -17.026

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



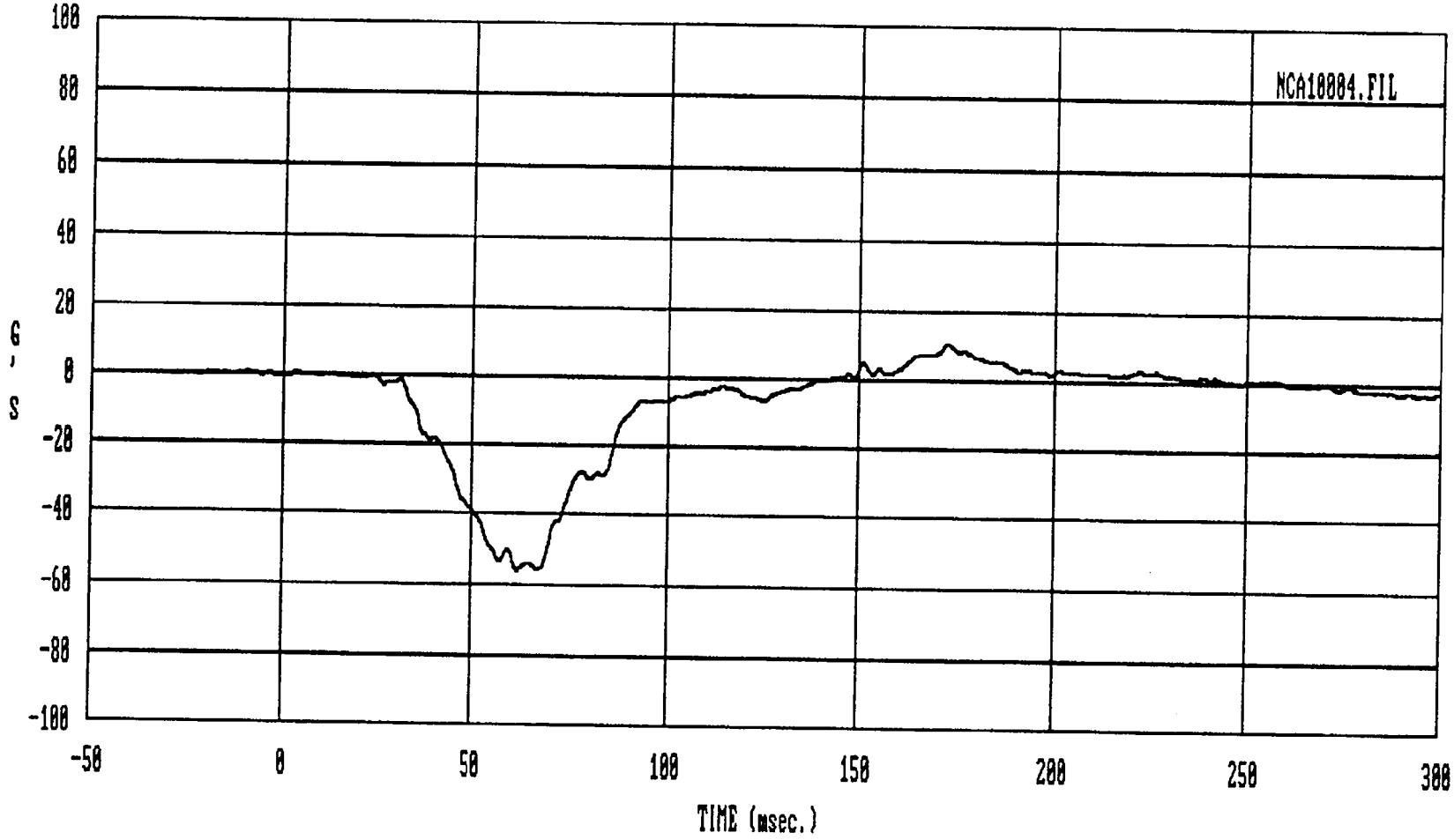
Curve: Driver Head acceleration — Z axis Filter: SAE CLASS 1000 Max = 56.274 Min = -13.382

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



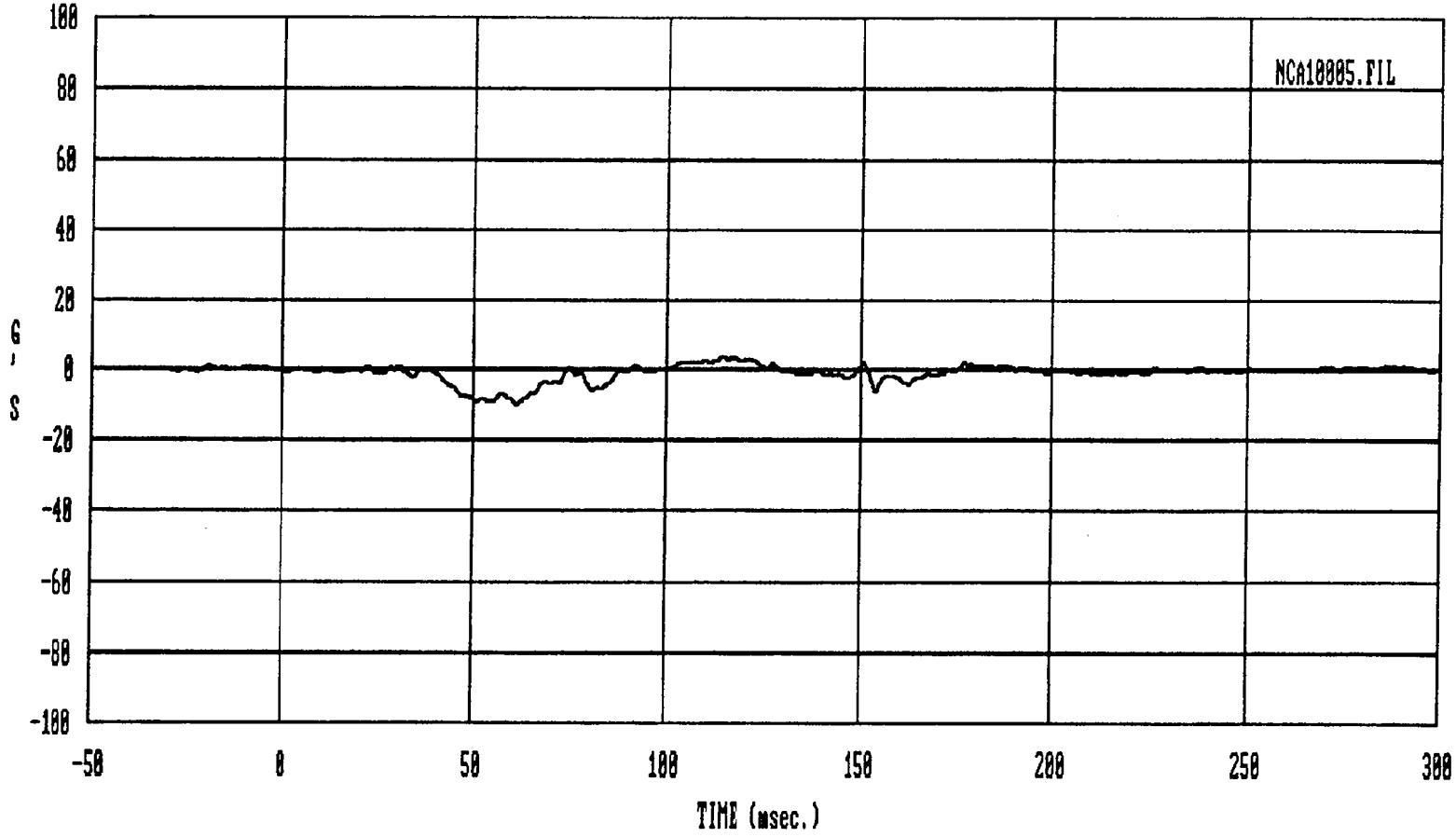
Curve: Driver Head resultant acceleration Filter: SAE CLASS 1000 Max = 82.048 Min = .00000

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



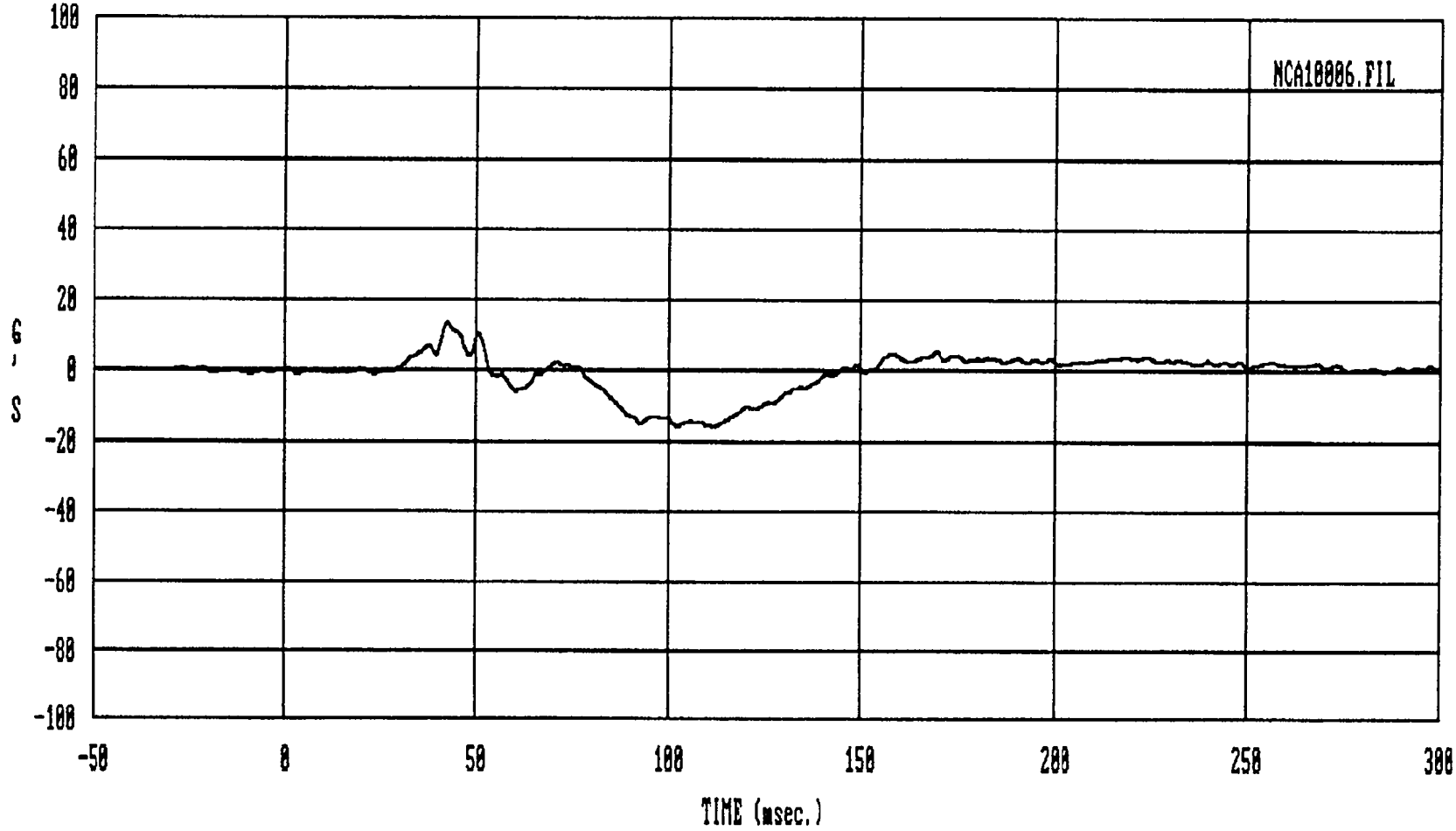
Curve: Driver Chest acceleration — X axis Filter: SAE CLASS 180 Max = 18.852 Min = -56.132

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



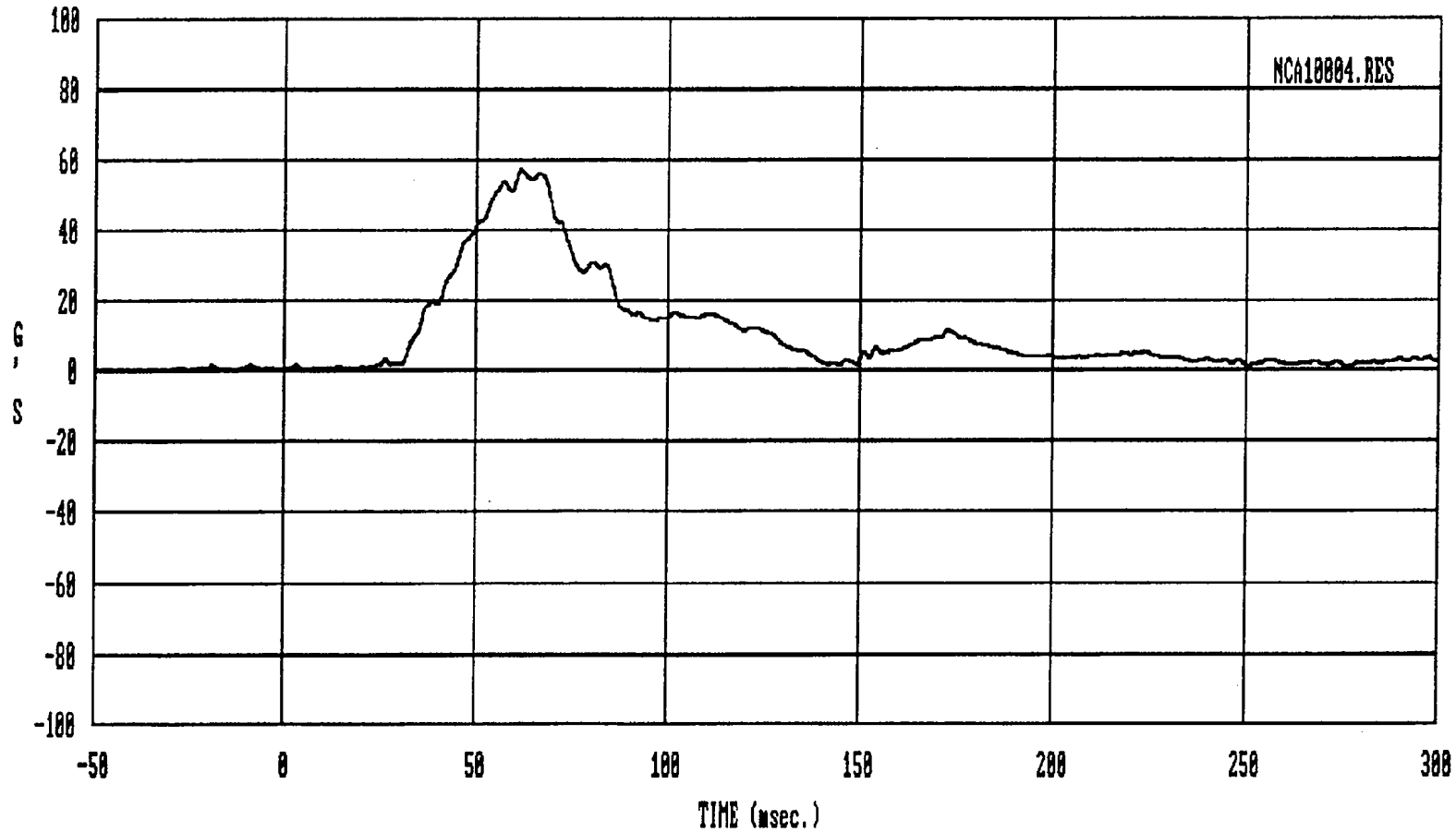
Curve: Driver Chest acceleration -- Y axis Filter: SAE CLASS 180 Max = 3.7944 Min = -10.219

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



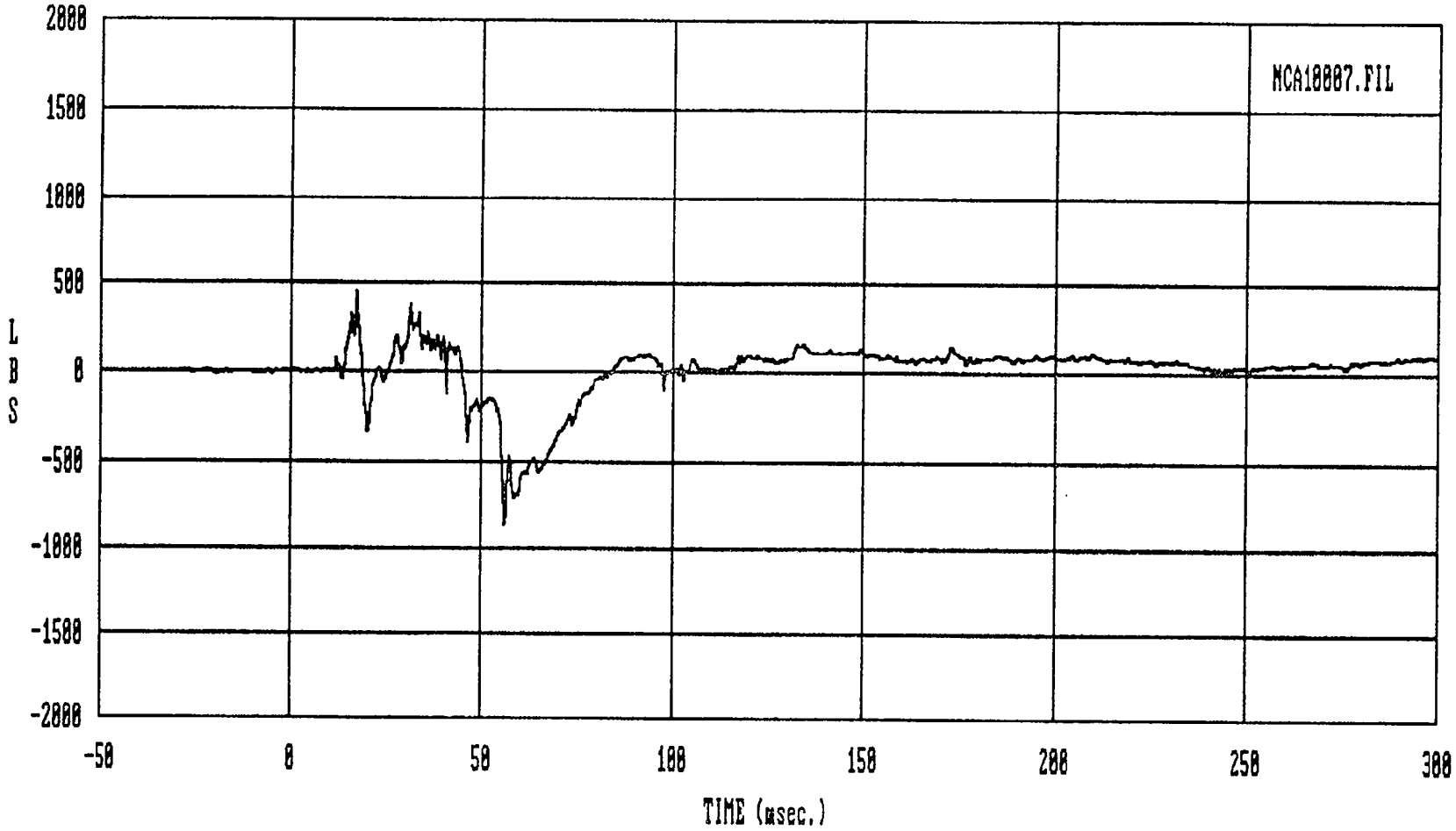
Curve: Driver Chest acceleration -- Z axis Filter: SAE CLASS 180 Max = 13.671 Min = -15.728

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



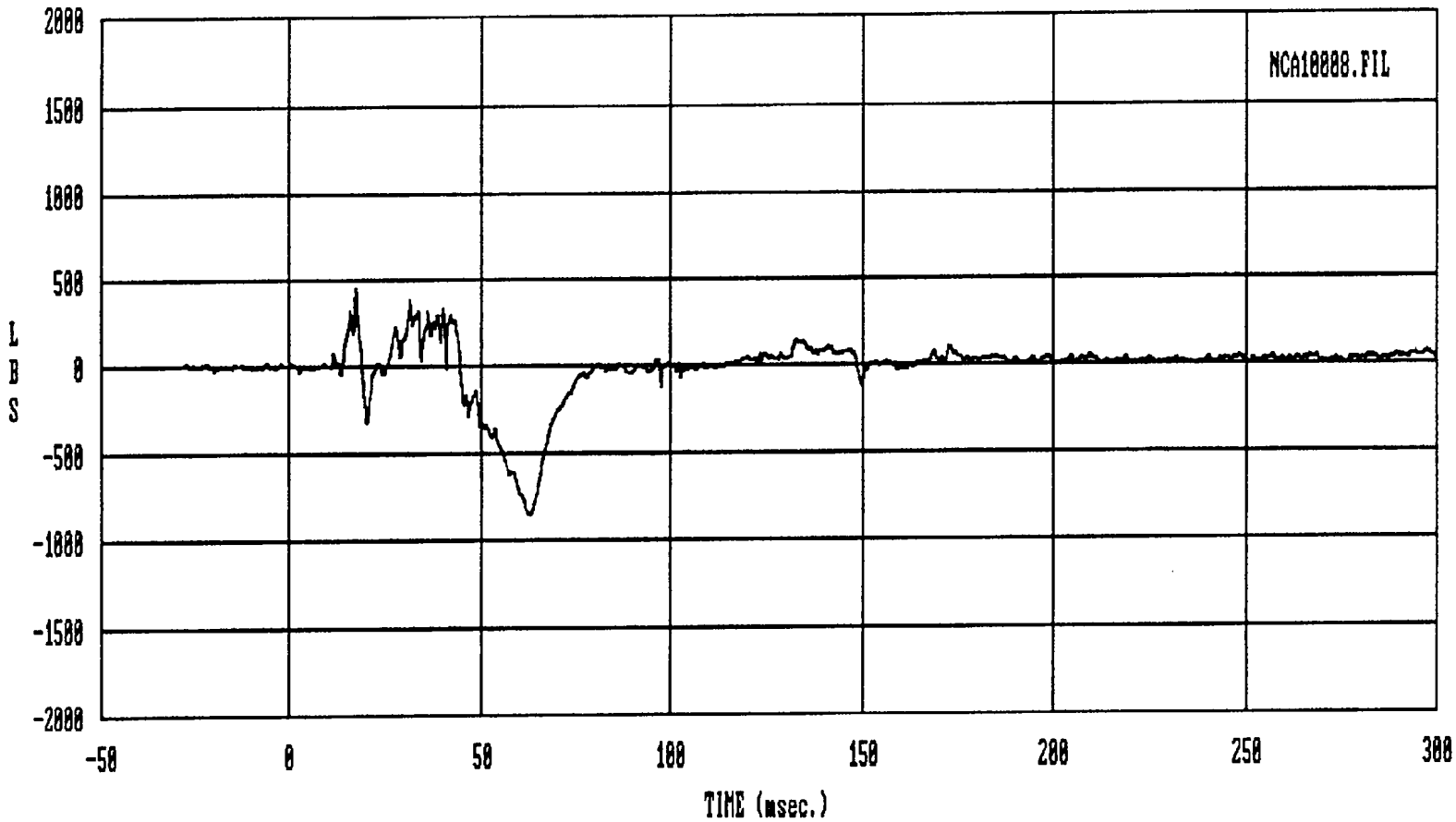
Curve: Driver Chest resultant acceleration Filter: SAE CLASS 180 Max = 57.272 Min = .36312

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



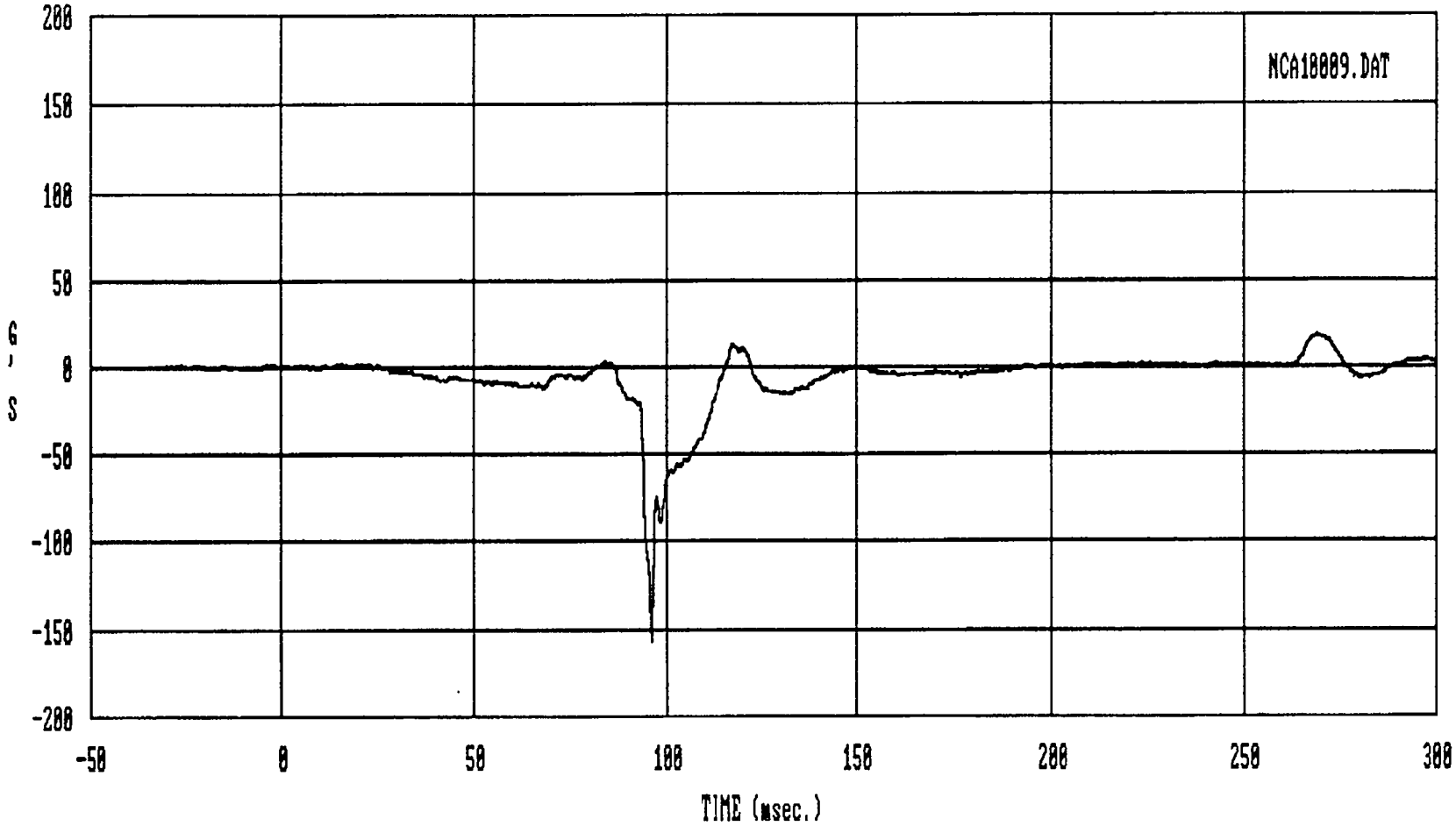
Curve: Driver Left Femur force (Noise before data) Filter: SAE CLASS 600 Max = 460.29 Min = -864.09

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



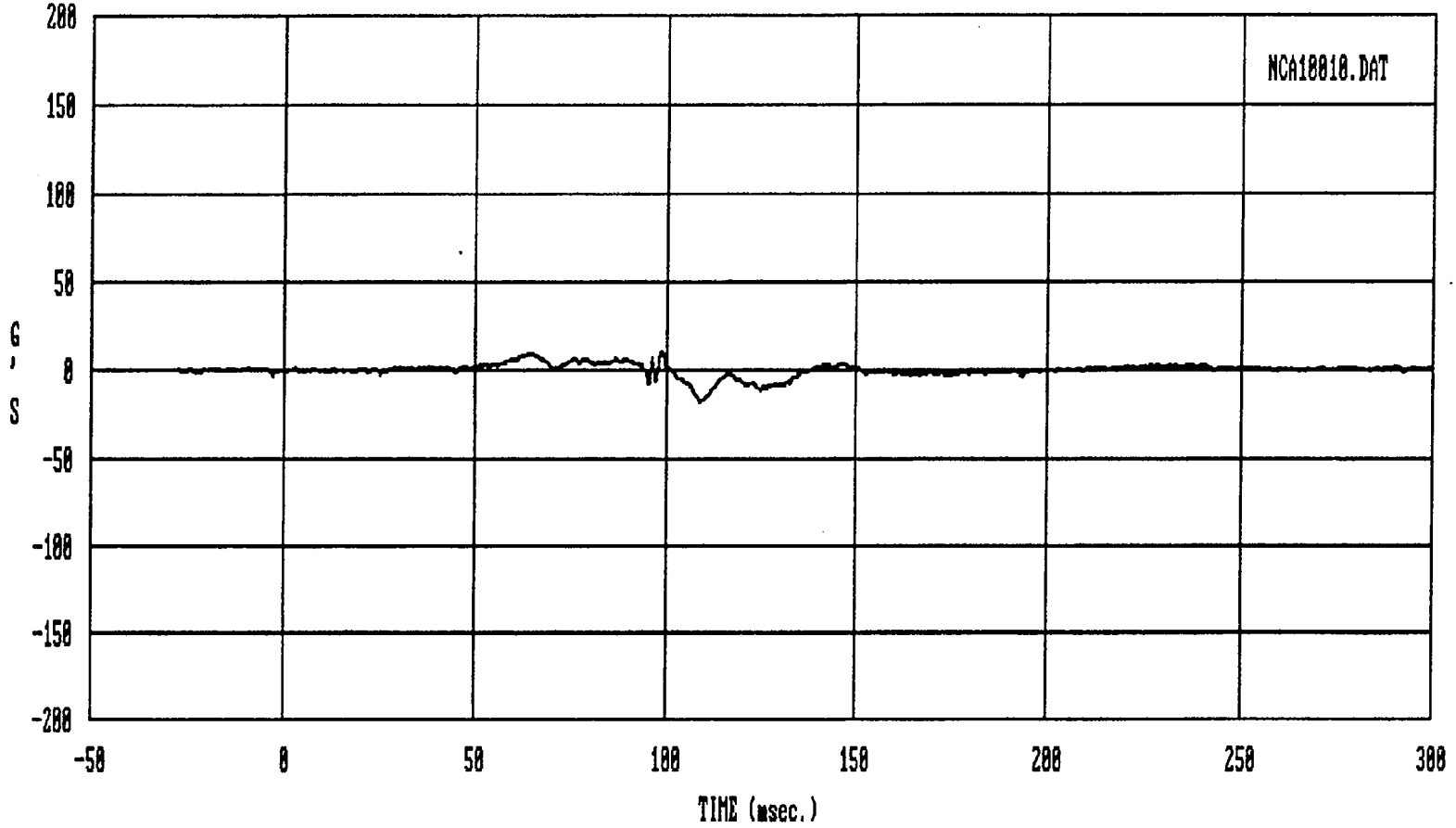
Curve: Driver Right Femur force (Noise before data) Filter: SAE CLASS 600 Max = 453.75 Min = -852.61

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



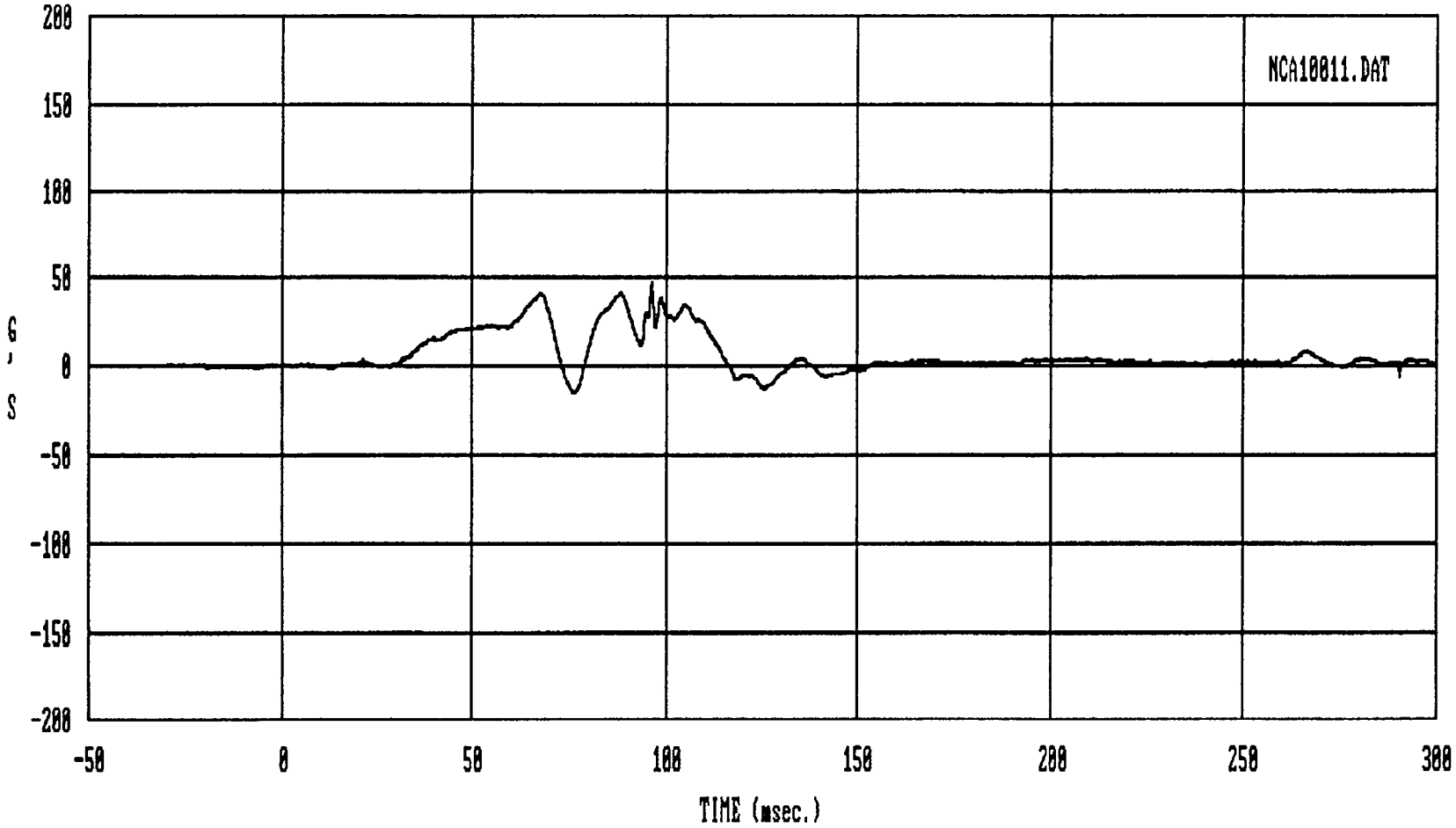
Curve: Pasngr Head acceleration -- X axis Filter: SAE CLASS 1000 Max = 18.661 Min = -156.33

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



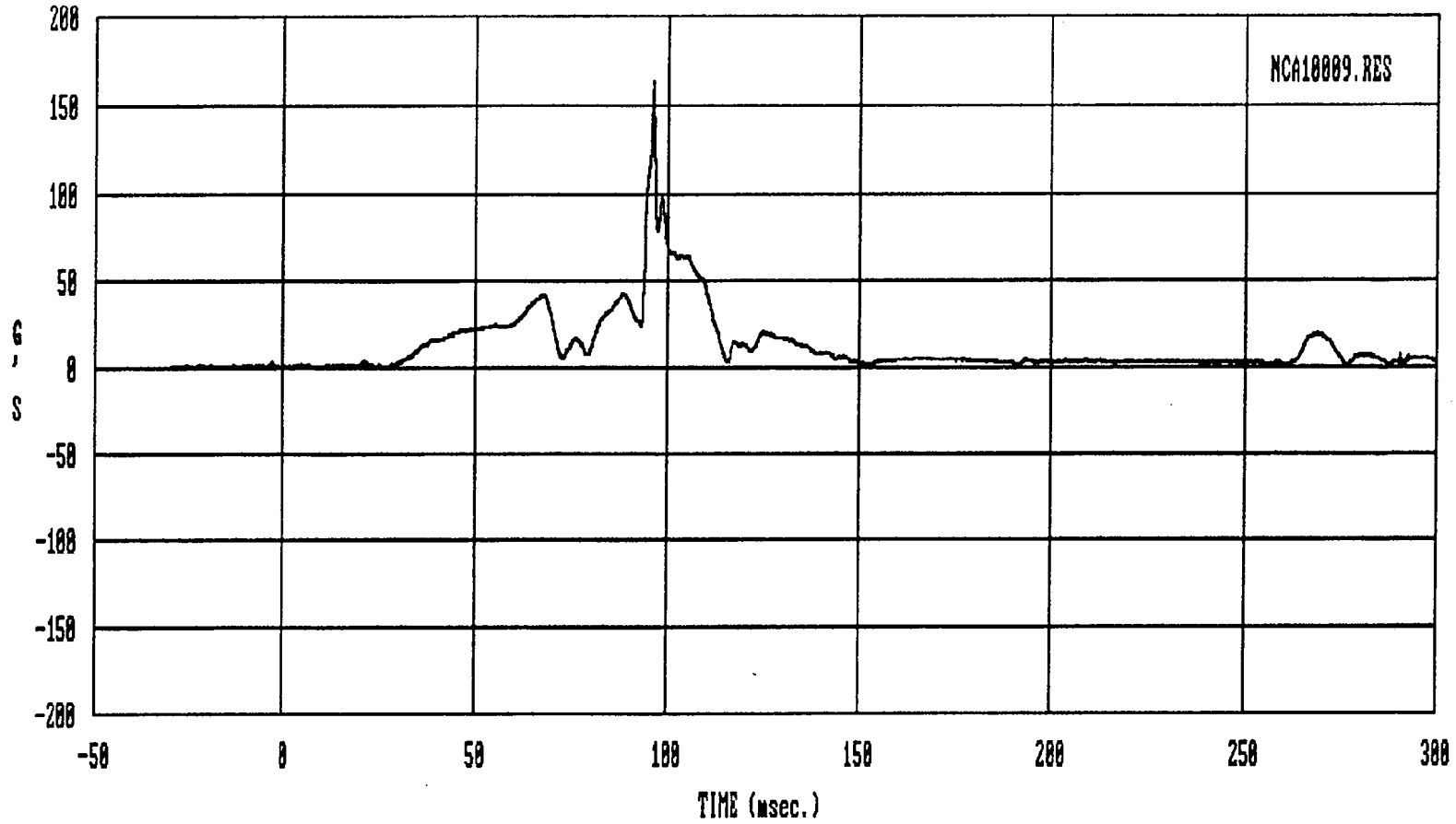
Curve: Pasngr Head acceleration -- Y axis Filter: SAE CLASS 1000 Max = 11.198 Min = -18.249

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



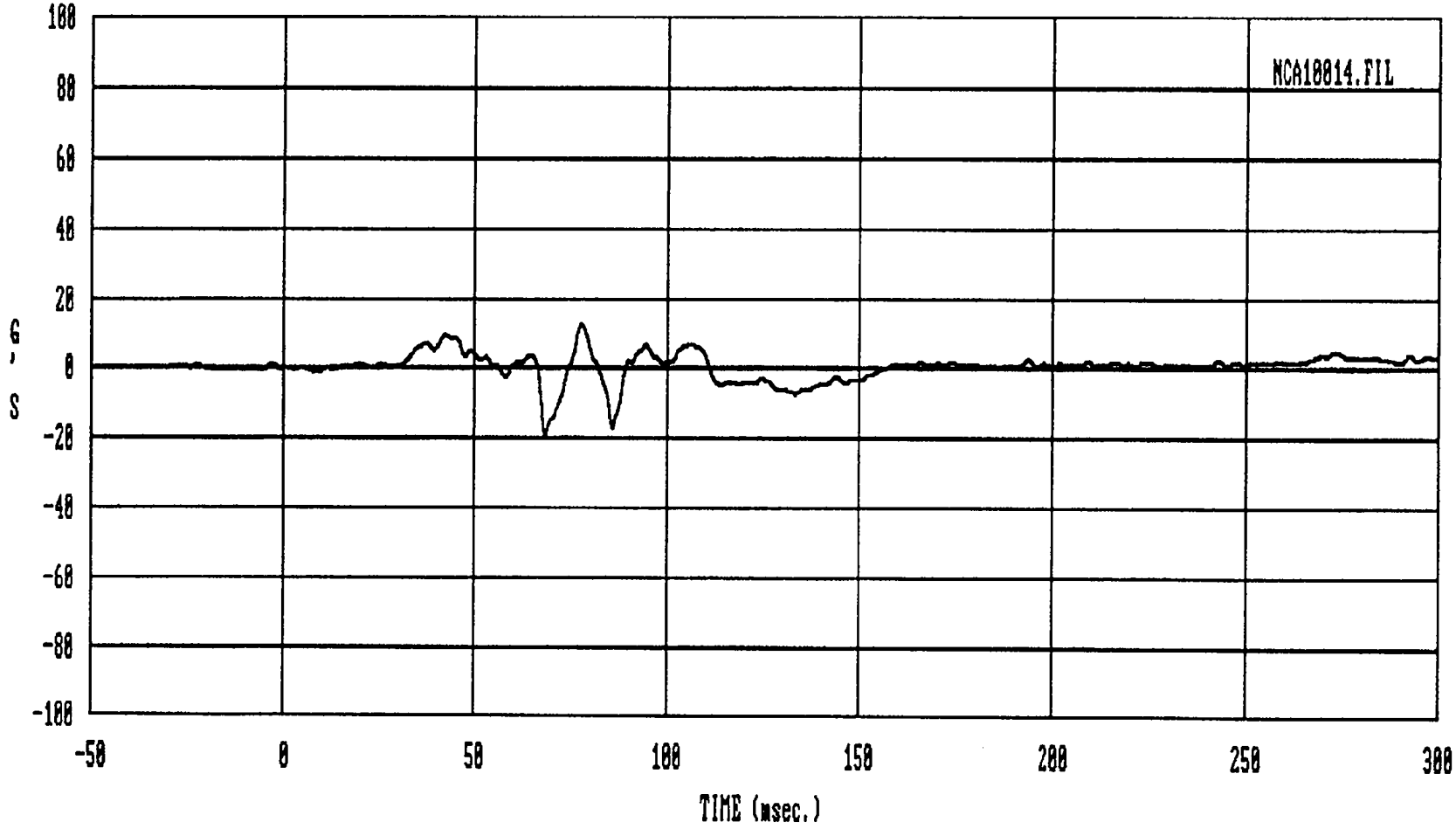
Curve: Pasngr Head acceleration -- Z axis Filter: SAE CLASS 1000 Max = 48.031 Min = -14.926

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



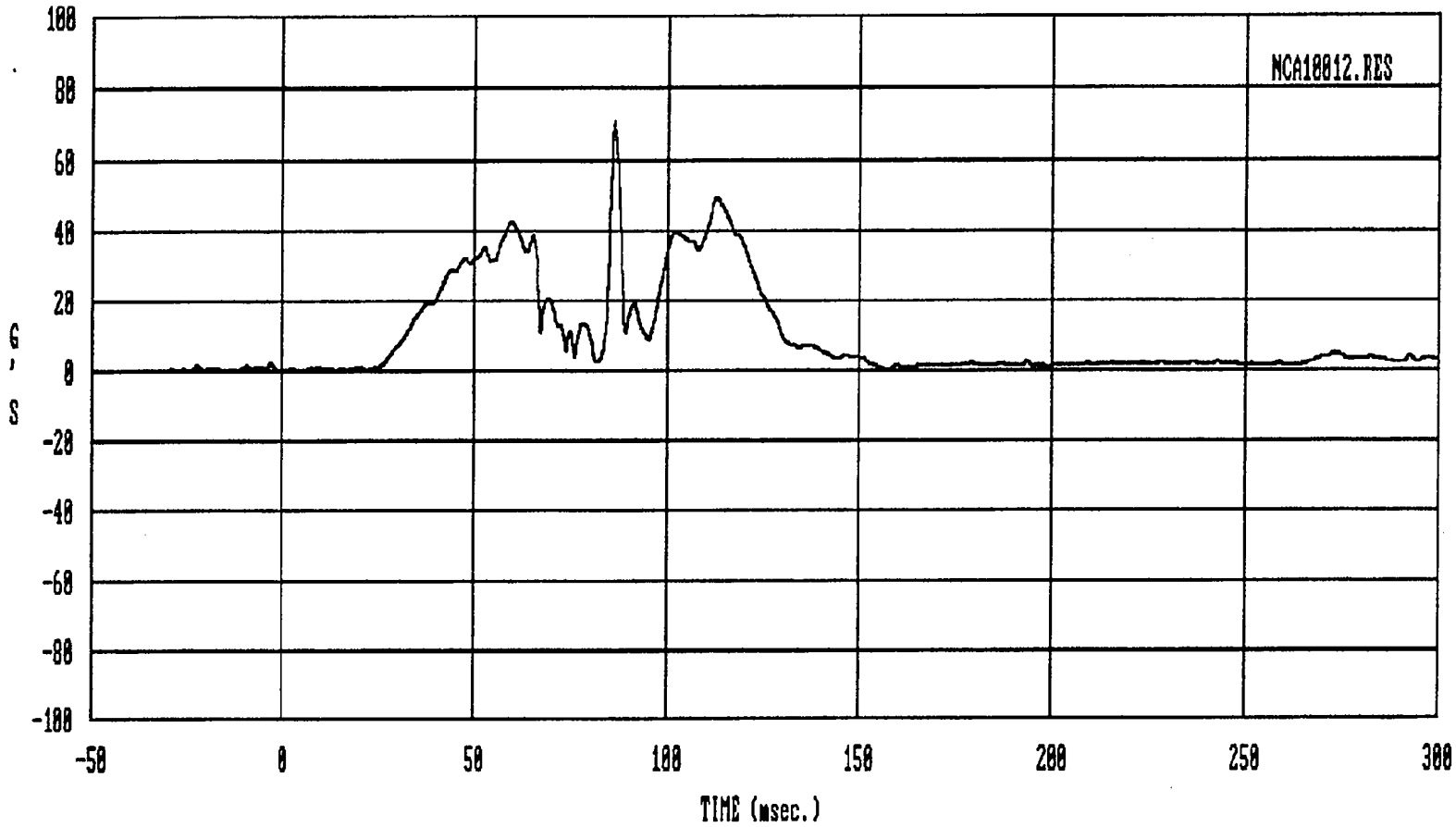
Curve: Pasngr Head resultant acceleration Filter: SAE CLASS 1000 Max = 163.54 Min = .00000

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



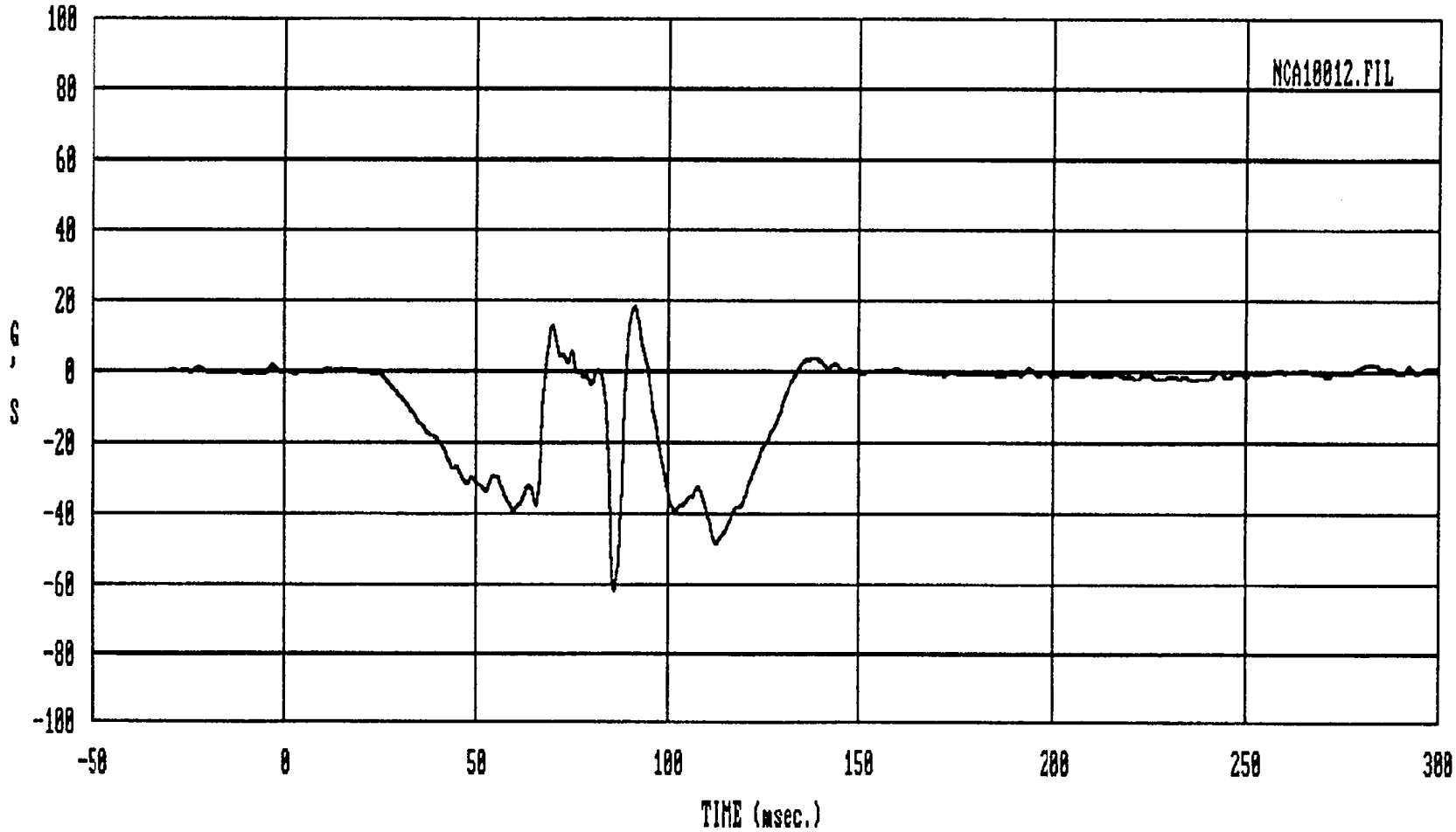
Curve: Pasngr Chest acceleration -- Z axis Filter: SAE CLASS 180 Max = 12.946 Min = -19.043

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



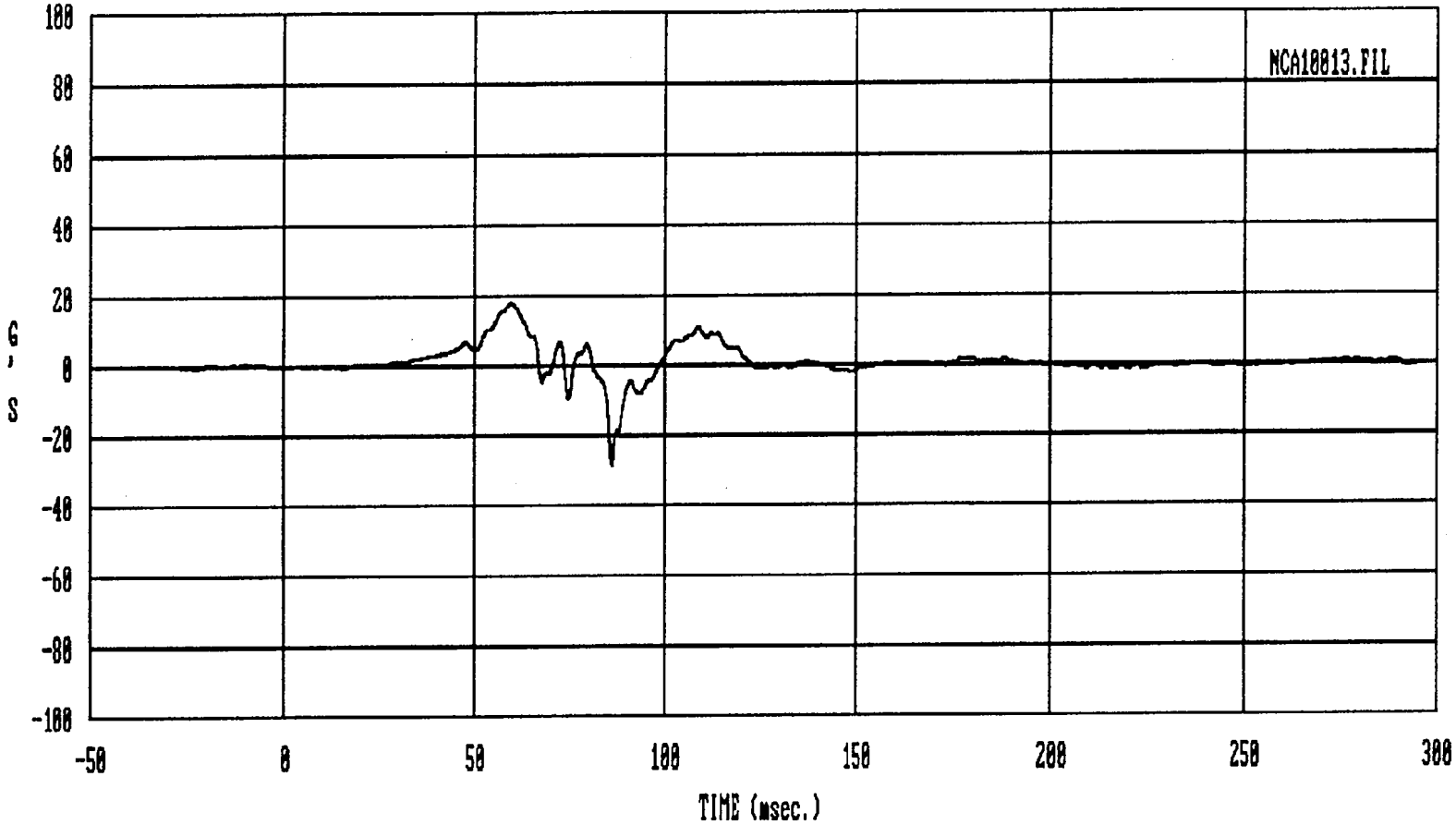
Curve: Pasngr Chest resultant acceleration Filter: SAE CLASS 180 Max = 70.577 Min = .11213

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



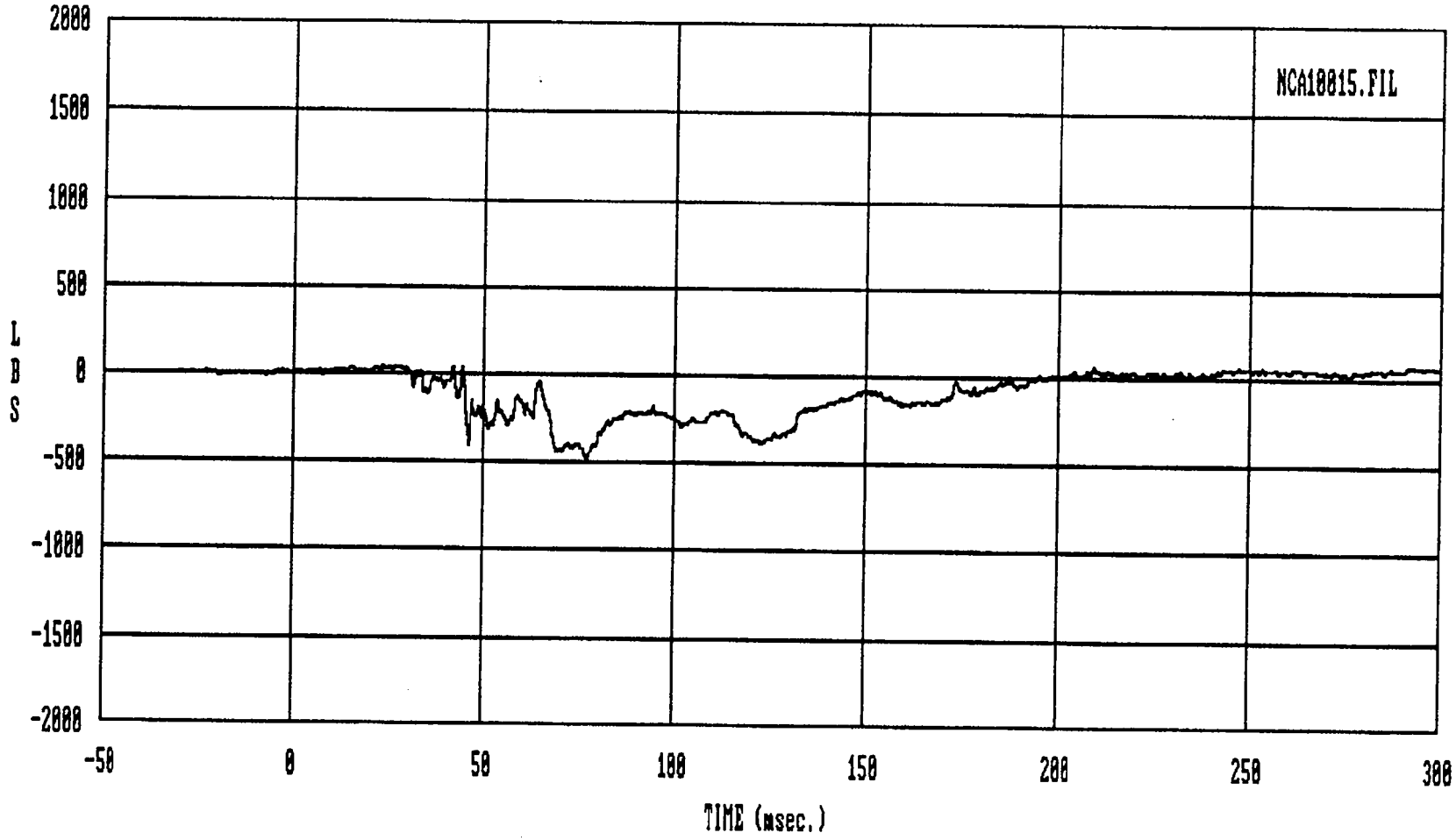
Curve: Pasngr Chest acceleration -- X axis Filter: SAE CLASS 180 Max = 18.676 Min = -62.168

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



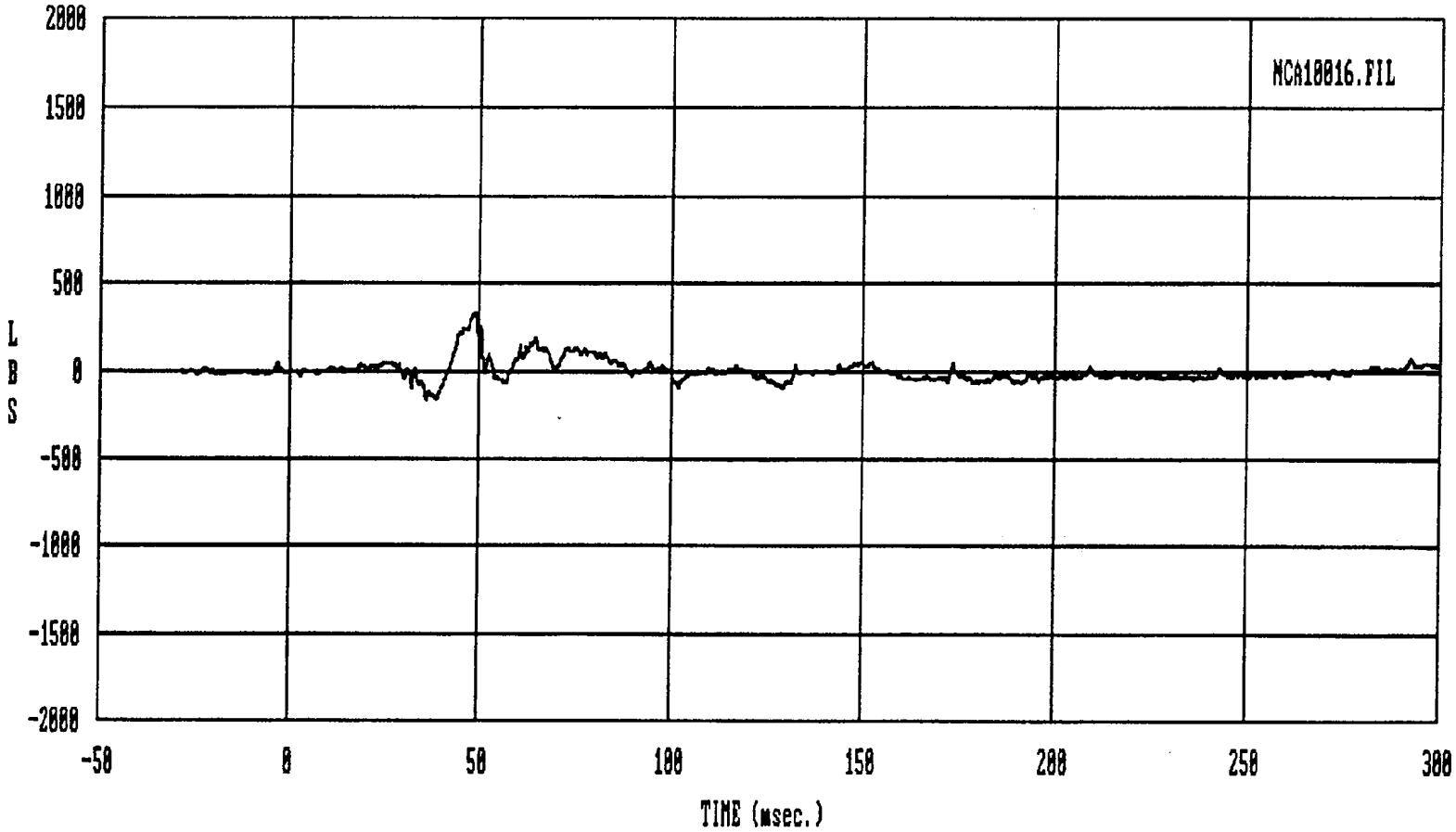
Curve: Pasngr Chest acceleration -- Y axis Filter: SAE CLASS 180 Max = 17.953 Min = -28.625

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



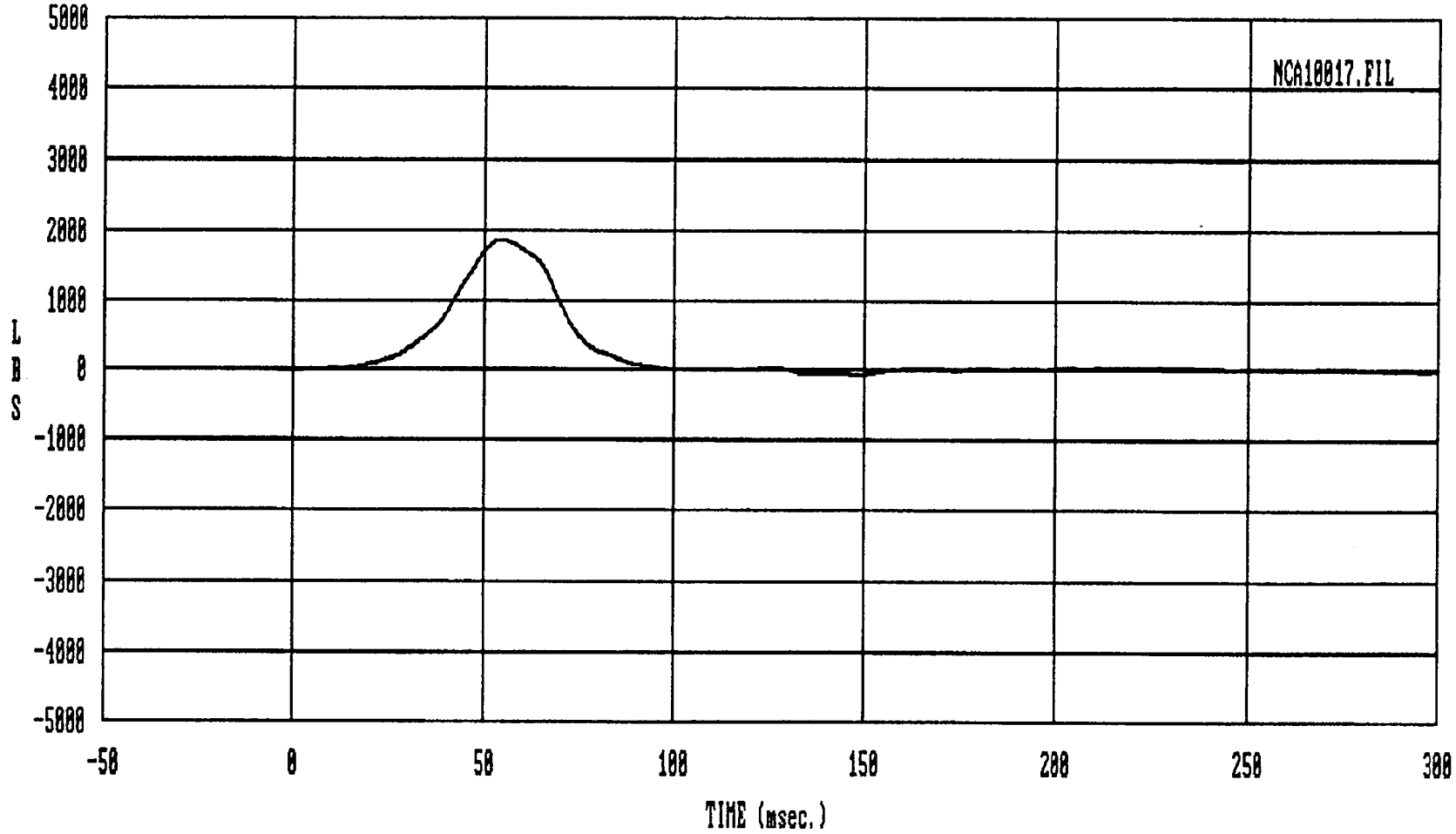
Curve: Pasngr Left Femur force Filter: SAE CLASS 600 Max = 81.028 Min = -488.36

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



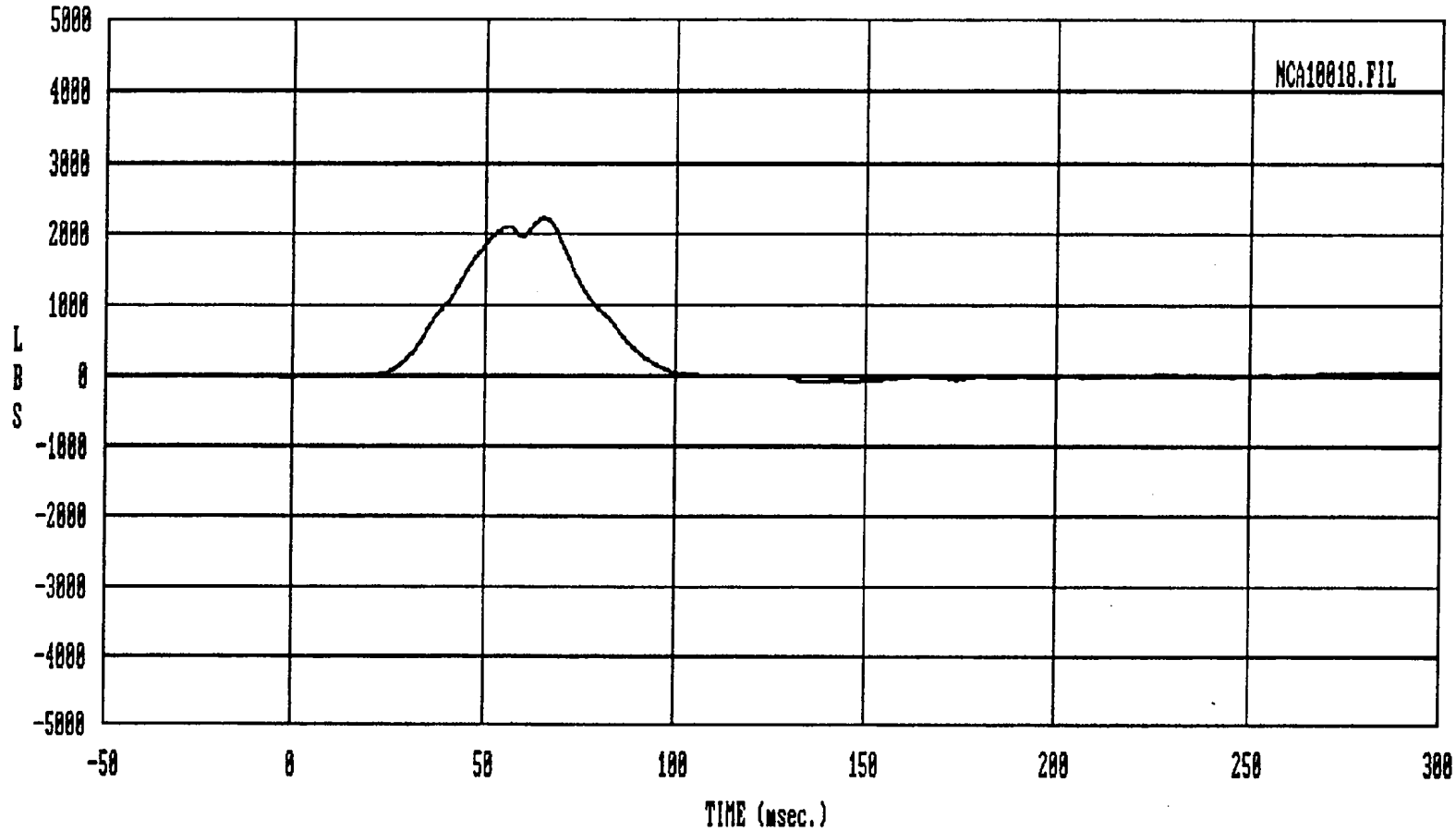
Curve: Pasngr Right Femur force Filter: SAE CLASS 600 Max = 329.98 Min = -165.89

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



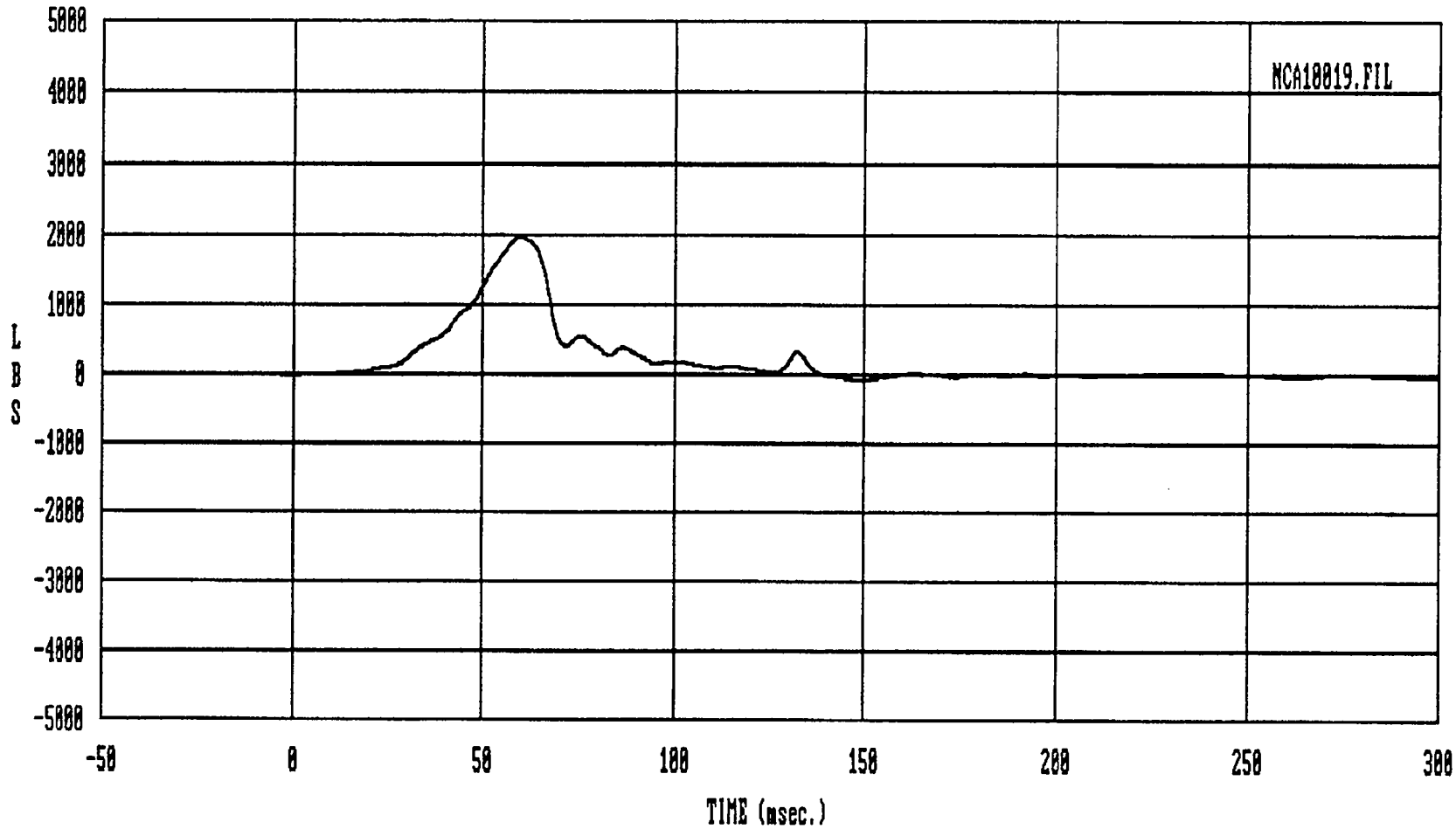
Curve: Driver Lap seat belt force Filter: SAE CLASS 60 Max = 1876.1 Min = -77.015

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



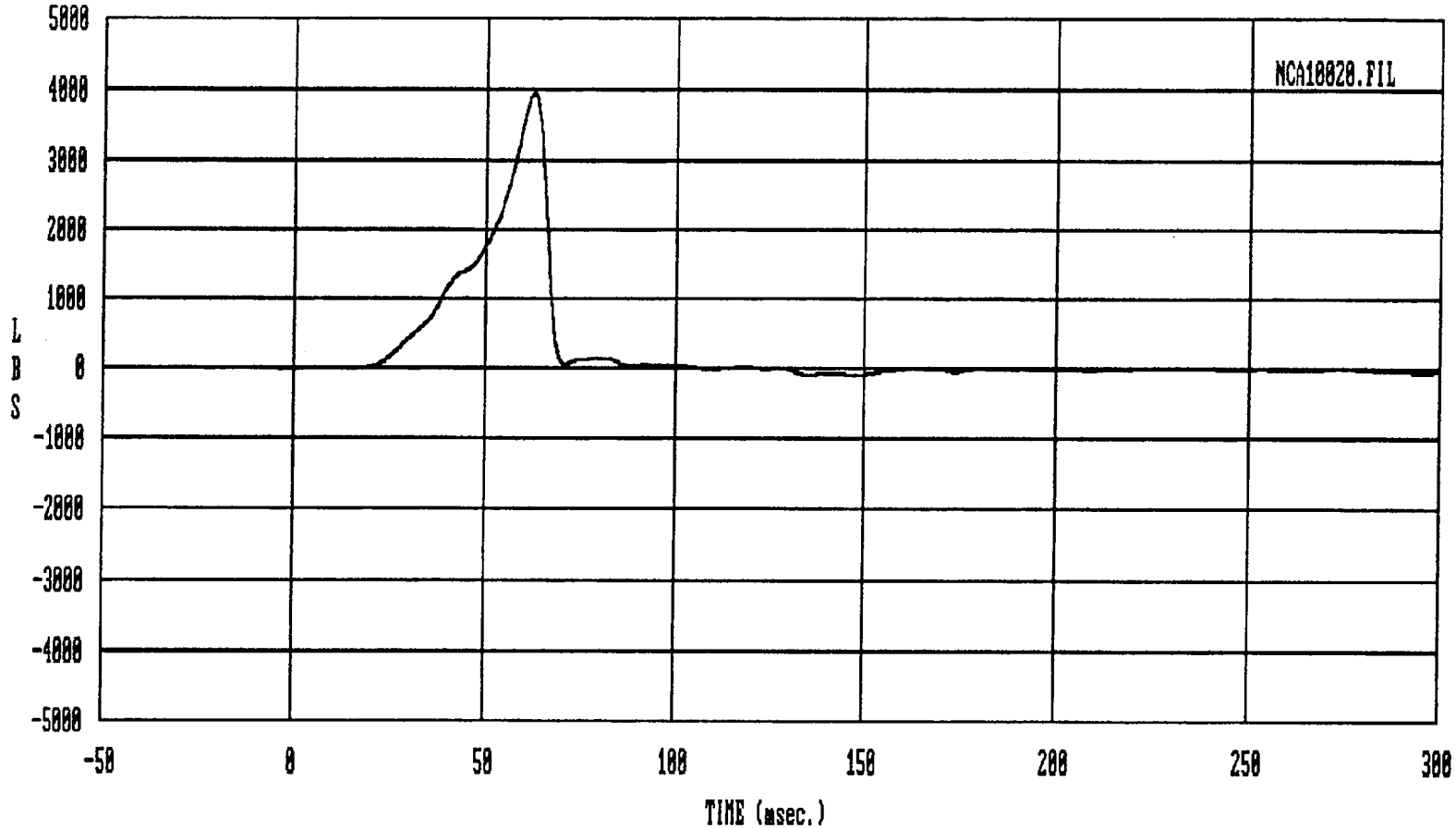
Curve: Driver Shoulder seat belt force Filter: SAE CLASS 60 Max = 2231.3 Min = -77.839

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



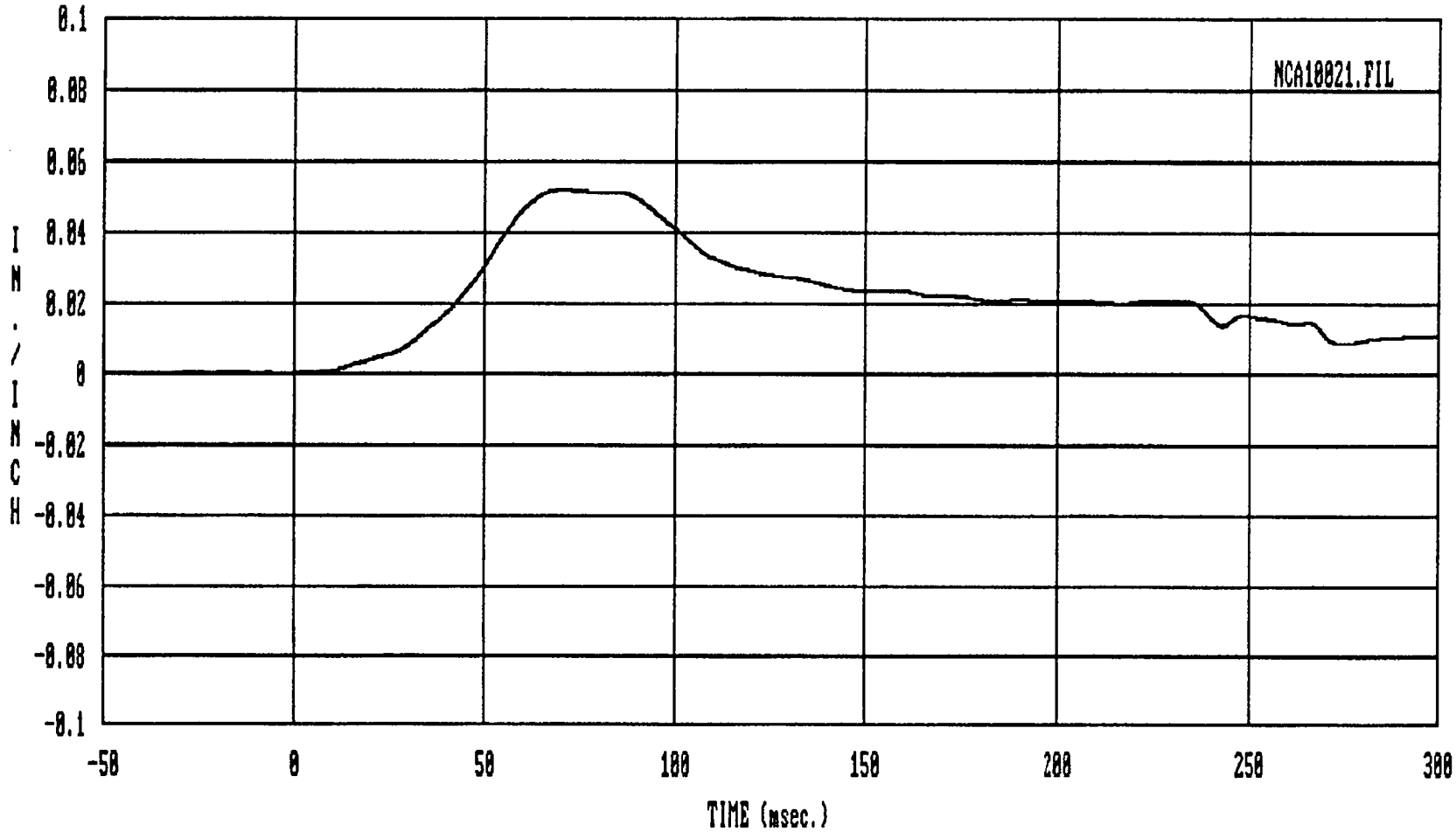
Curve: Pasngr Lap seat belt force Filter: SAE CLASS 60 Max = 1969.6 Min = -78.031

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



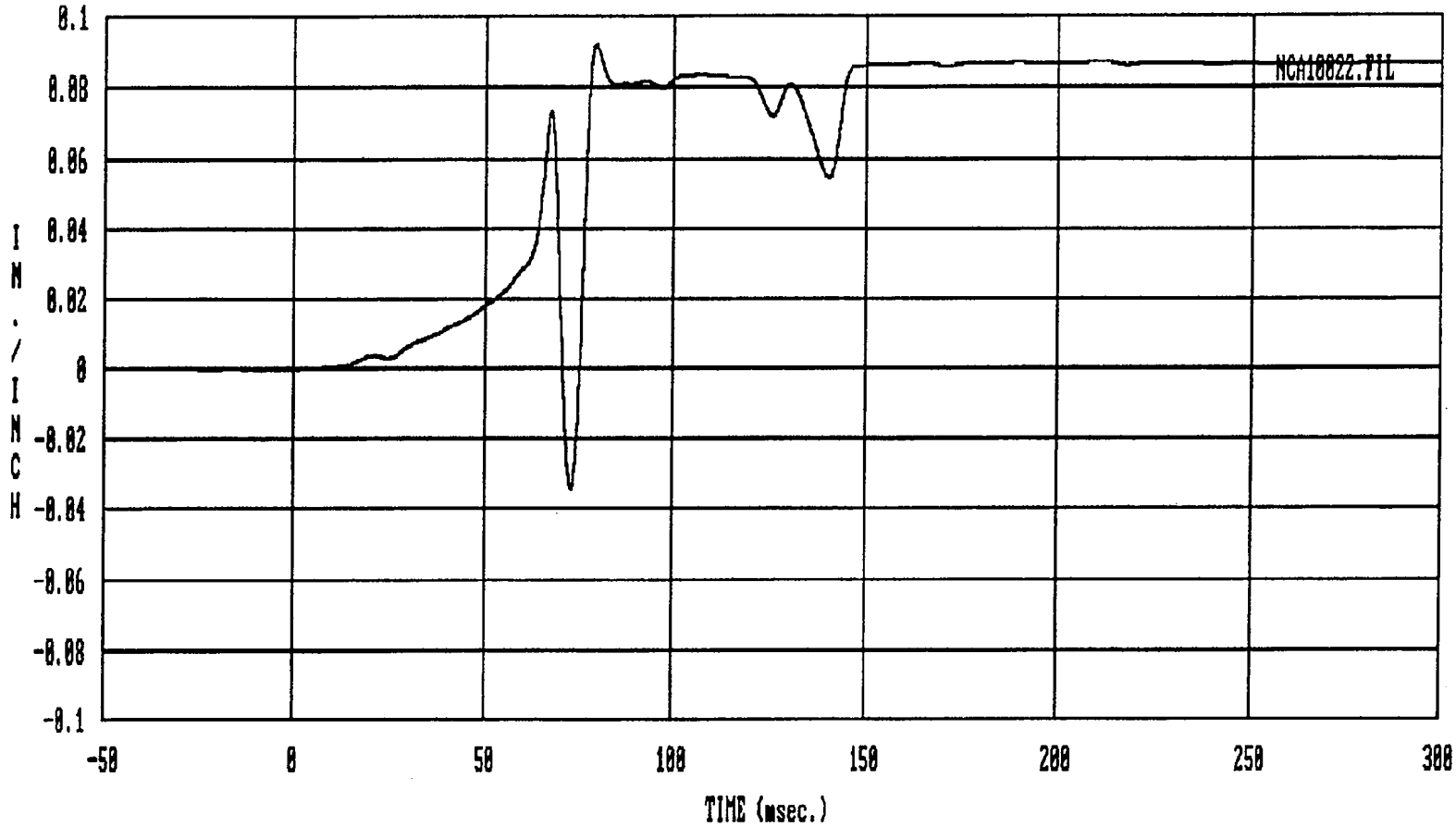
Curve: Pasngr Shoulder seat belt force Filter: SAE CLASS 60 Max = 3961.7 Min = -101.98

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



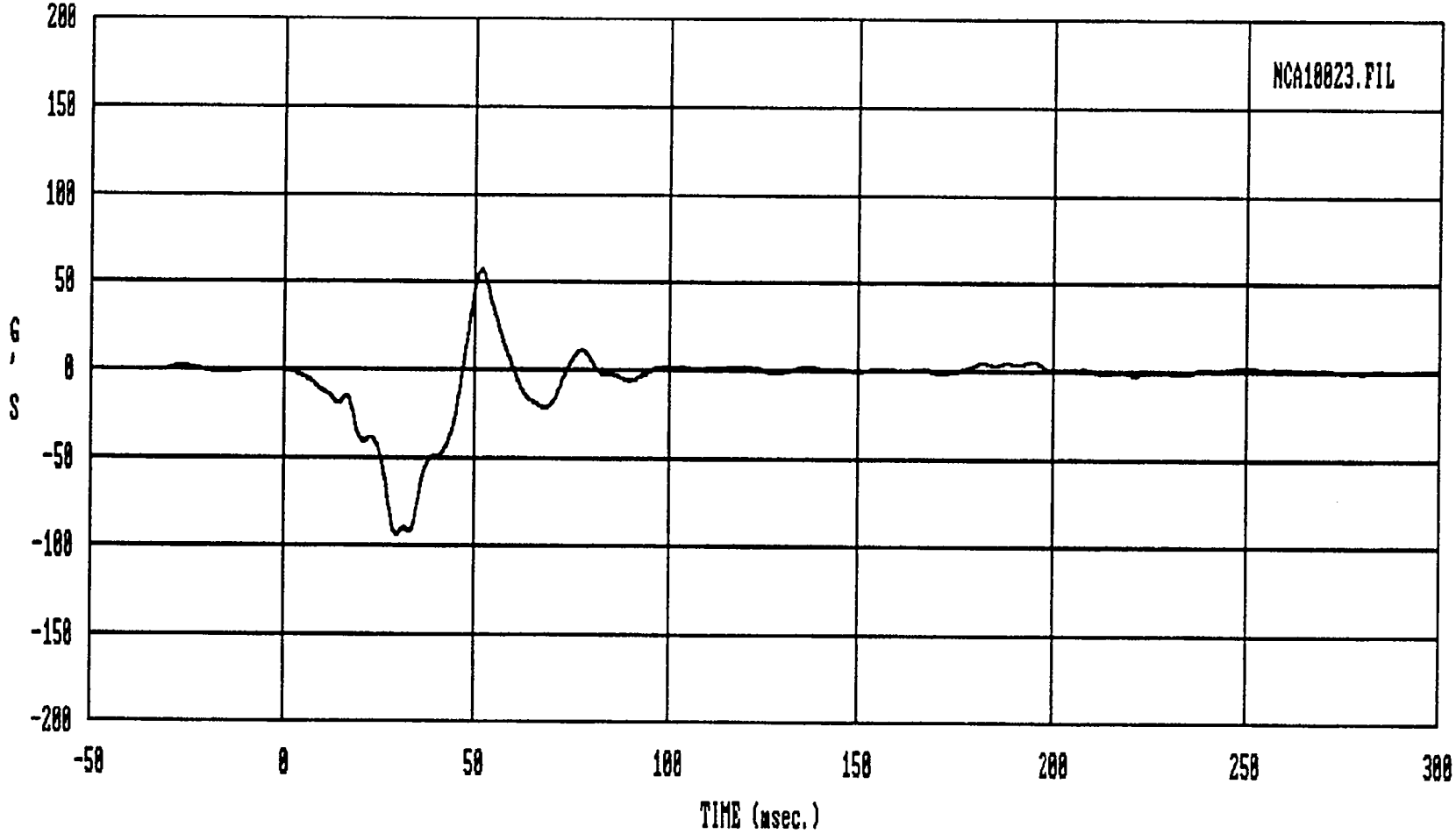
Curve: Driver seat belt elongation (Percent stretch) Filter: SAE CLASS 60 Max = .52166E-01 Min = .90205E-02

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



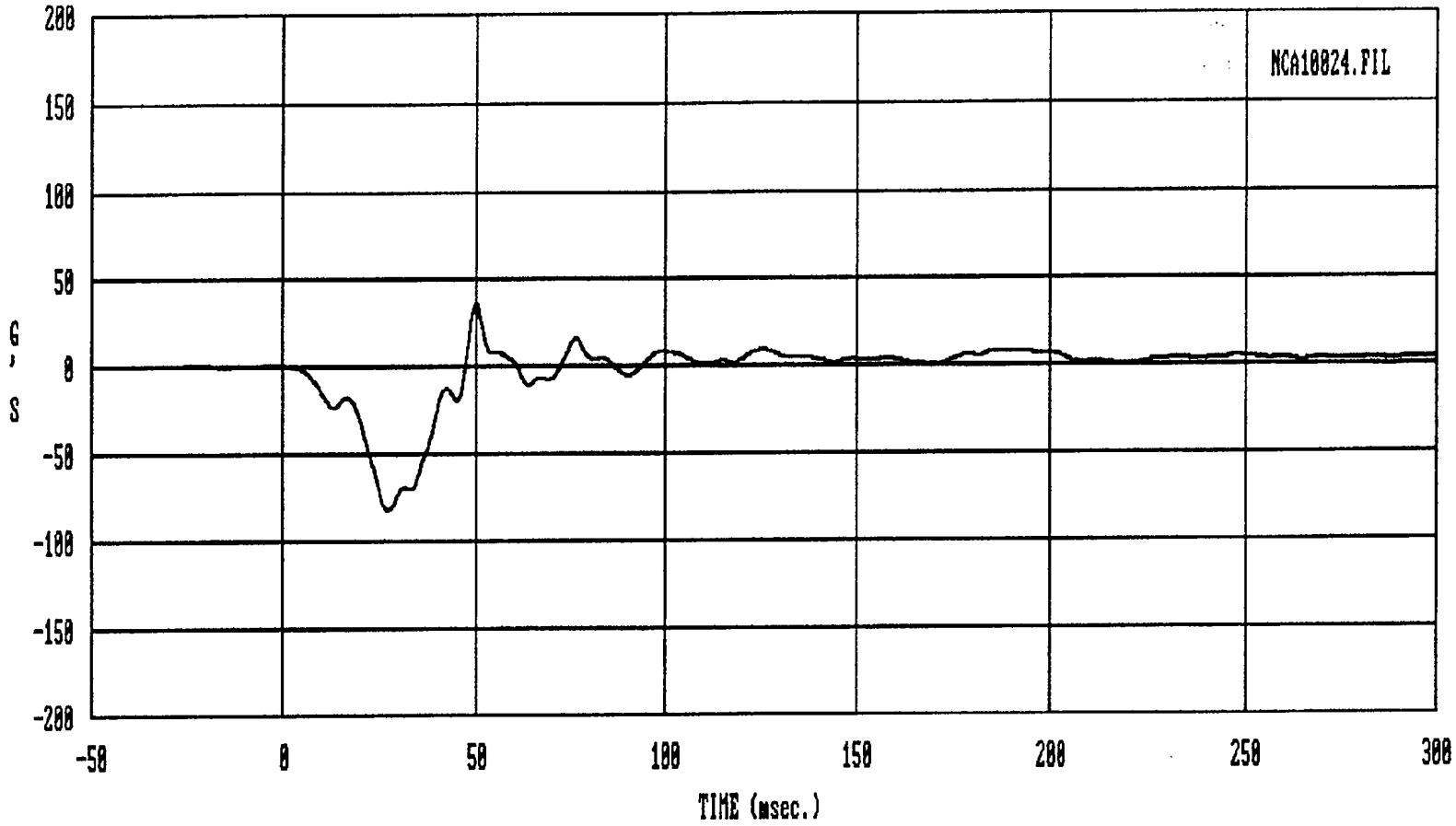
Curve: Pasngr seat belt elongation (Percent stretch) Filter: SAE CLASS 60 Max = .92833E-01 Min = -.34699E-01

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



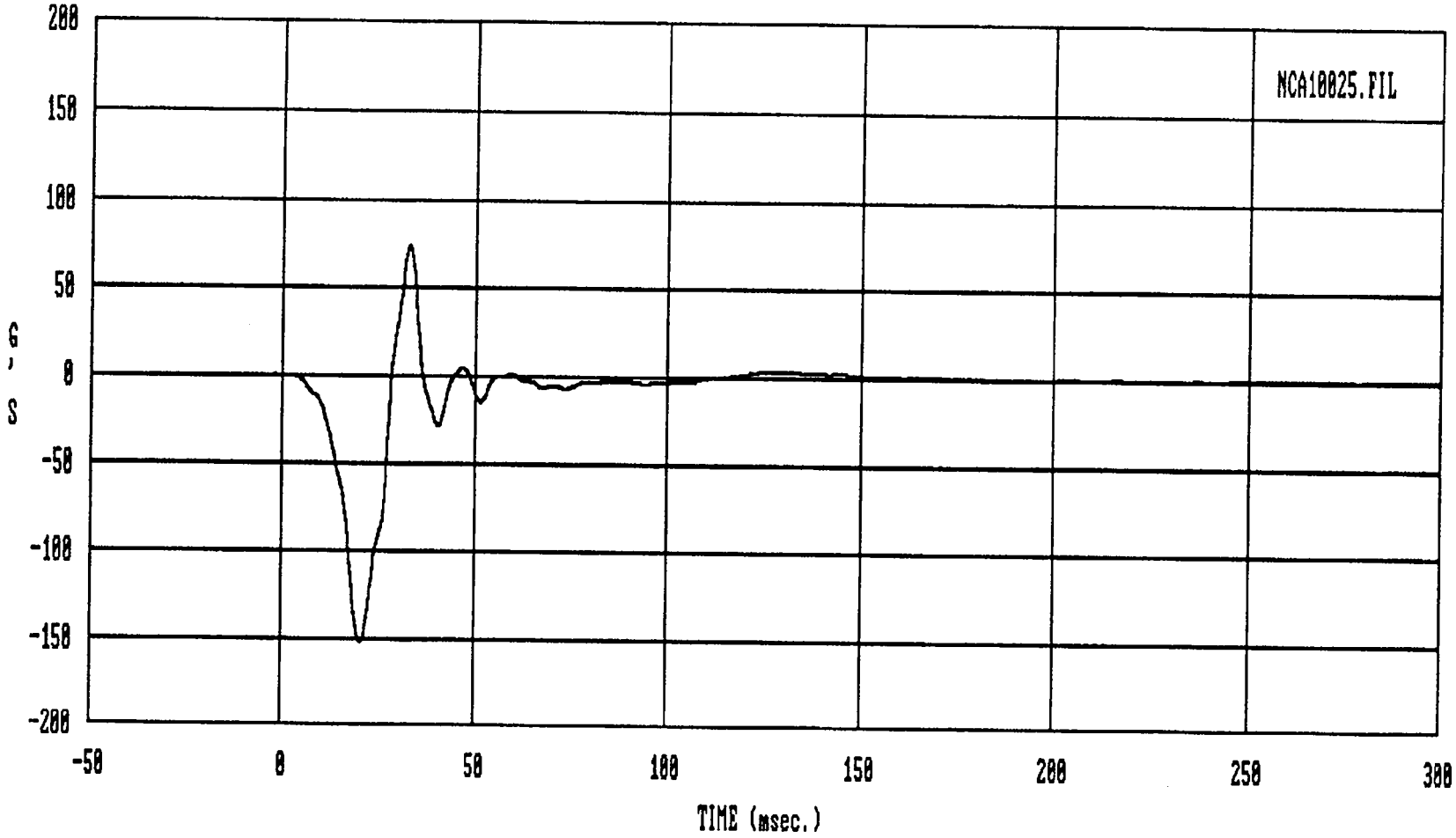
Curve: Left front brake caliper acceleration -- X axis Filter: SAE CLASS 60 Max = 57.098 Min = -93.693

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



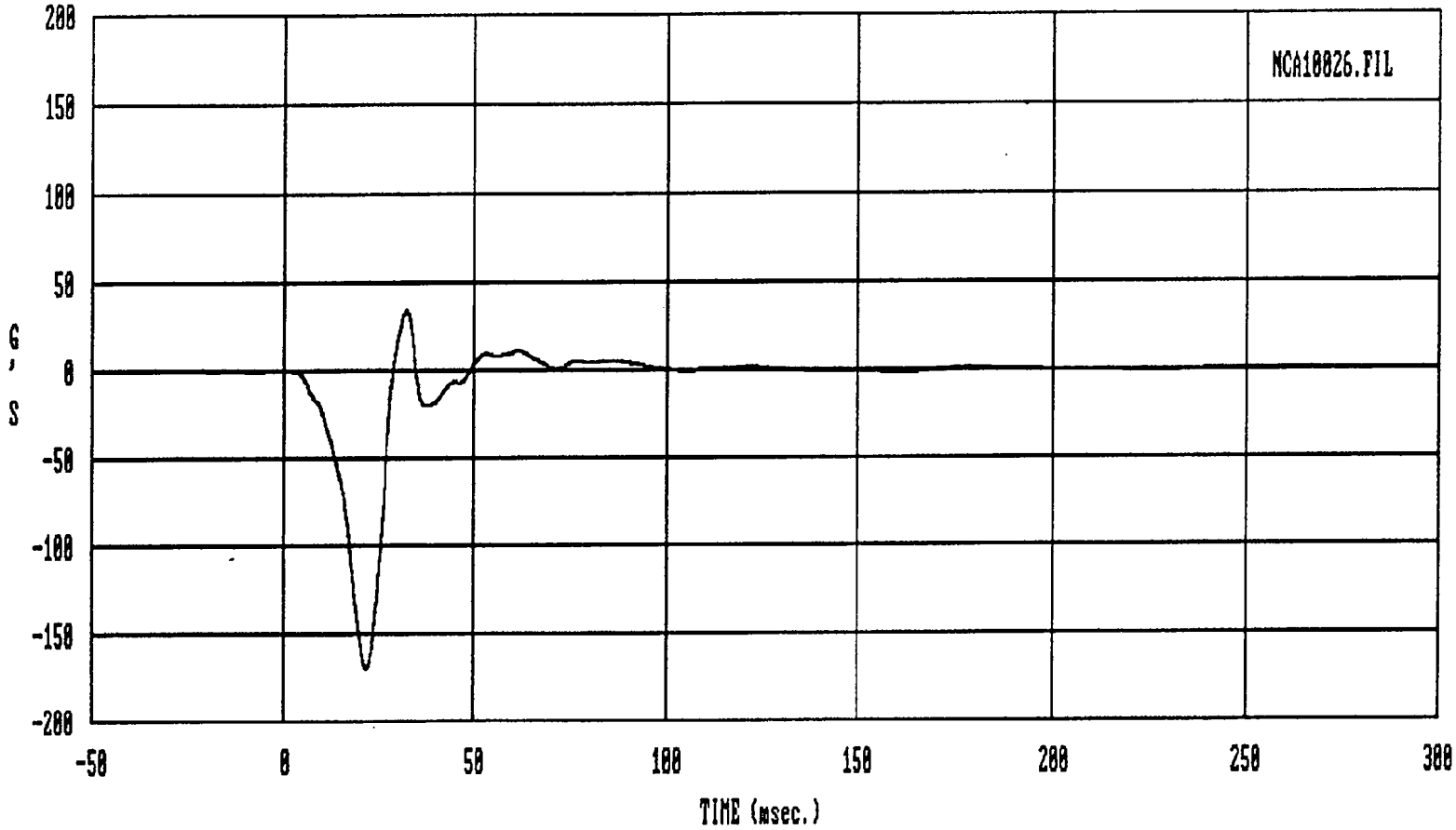
Curve: Right front brake caliper accel. — X axis Filter: SAE CLASS 60 Max = 36.281 Min = -82.509

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



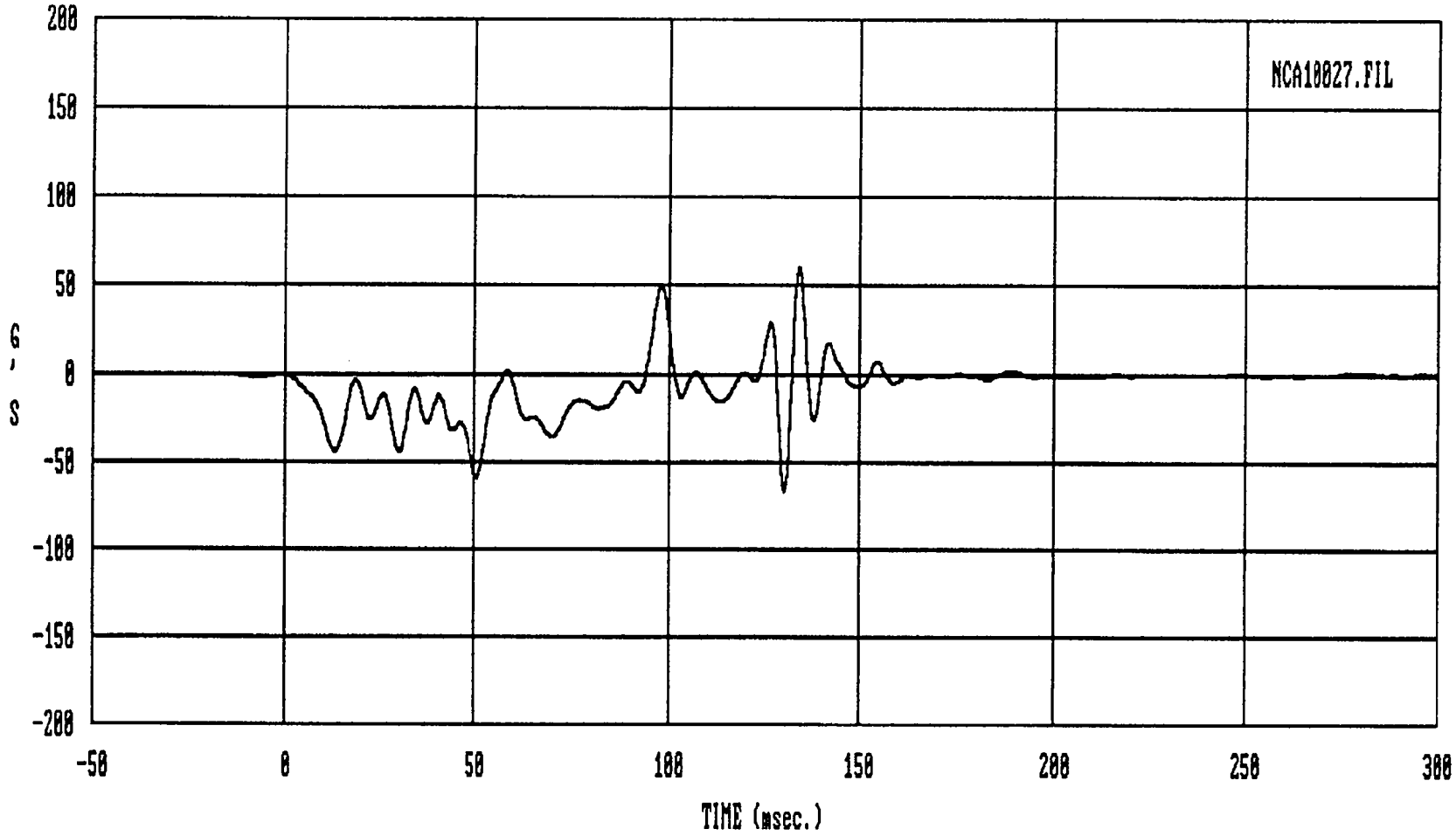
Curve: Engine bottom acceleration -- X axis Filter: SAE CLASS 60 Max = 74.989 Min = -151.70

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



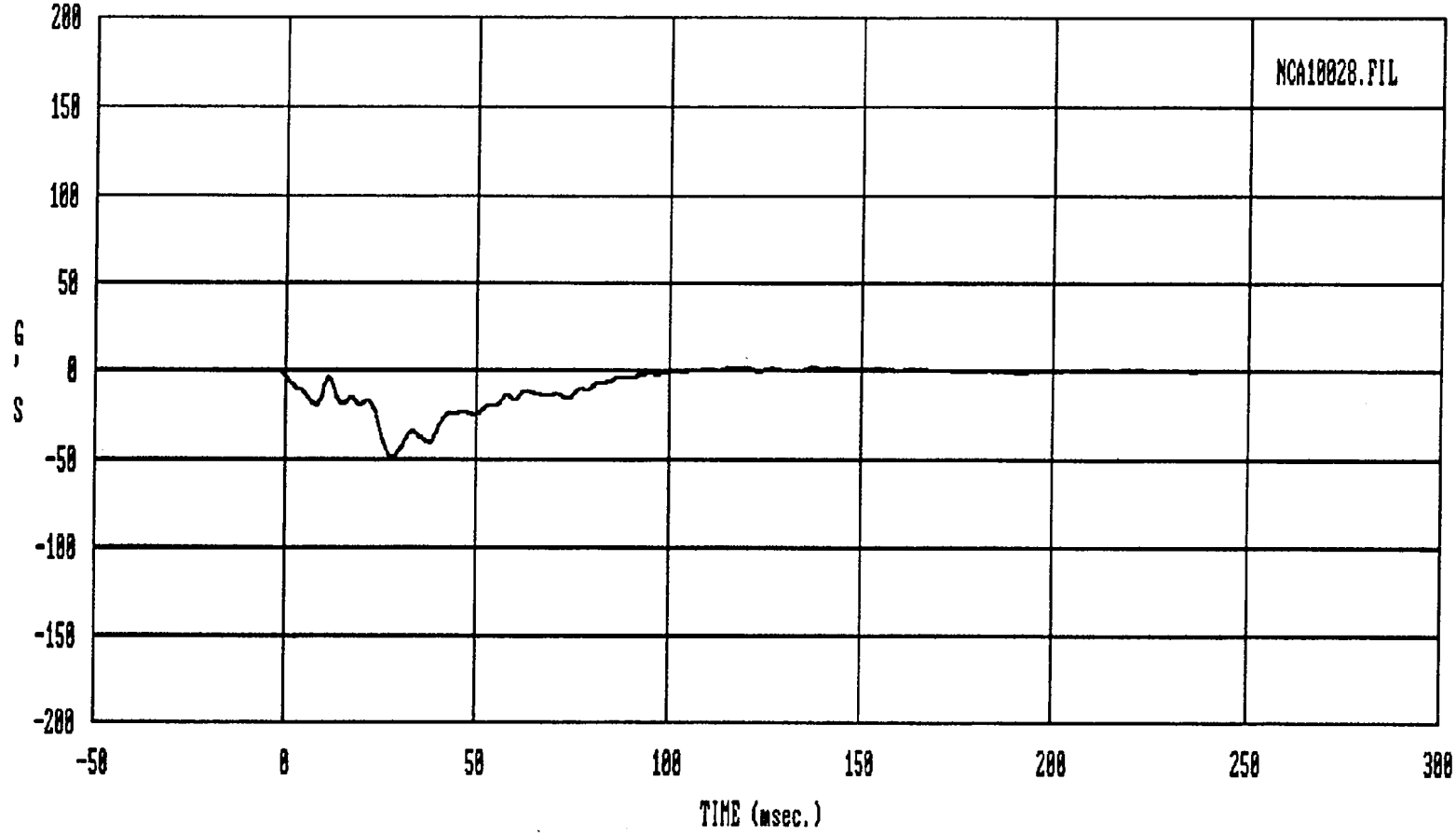
Curve: Engine top acceleration — X axis Filter: SAE CLASS 60 Max = 34.574 Min = -169.46

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



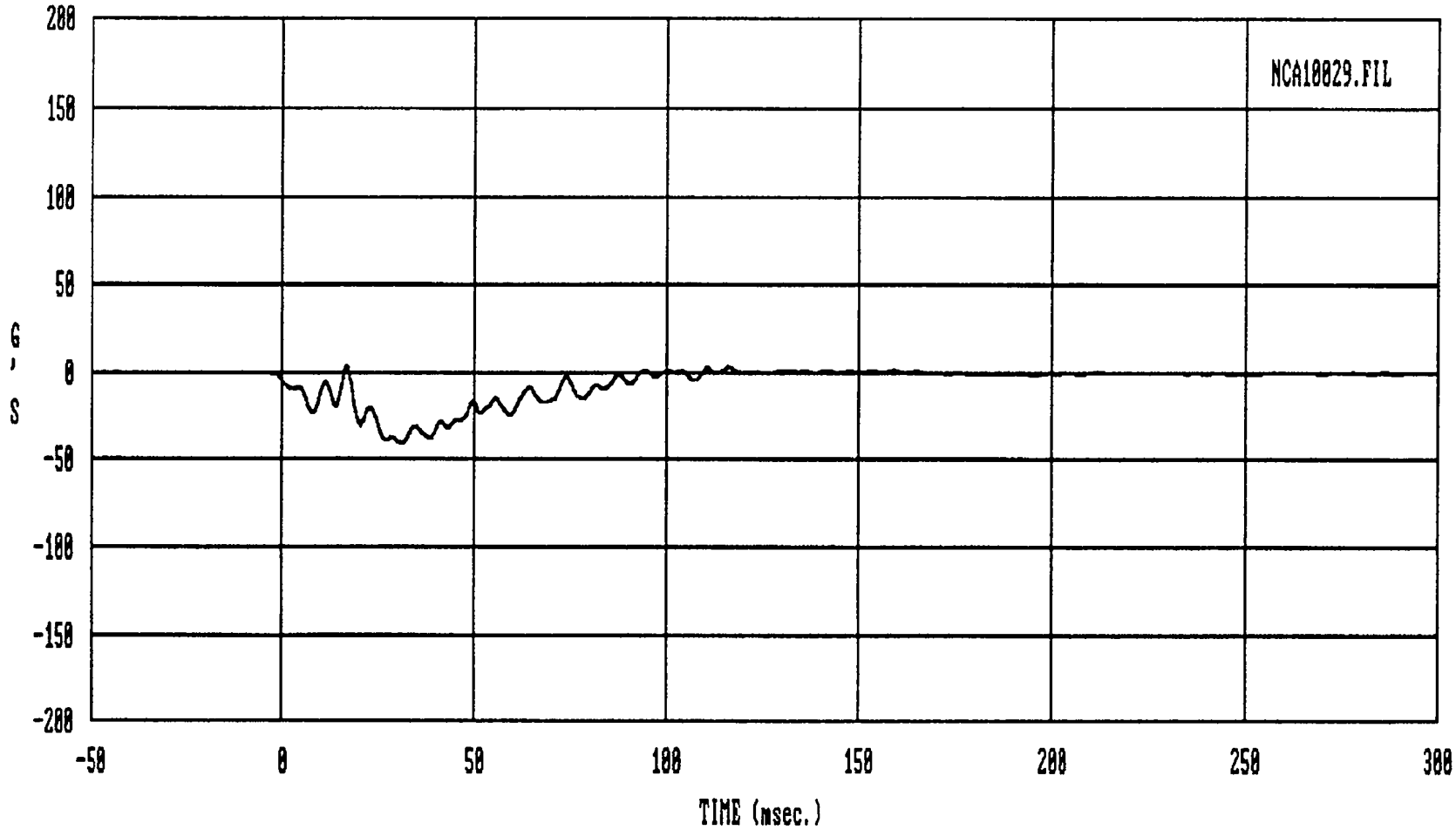
Curve: Instrument panel acceleration -- X axis Filter: SAE CLASS 60 Max = 60.887 Min = -66.789

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



Curve: Left-rear seat cross-member accel. — X axis Filter: SAE CLASS 60 Max = 2.4280 Min = -49.297

MSE Date: 03/13/98 Program: 1998 New Car Assessment #10 Vehicle: 1998 BMW 325i



Curve: Right-rear seat cross member accel. -- X axis Filter: SAE CLASS 60 Max = 3.8697 Min = -40.698

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i

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APPENDIX B-2

LOAD CELL BARRIER DATA

DATA FILTERING:
Load Cell Barrier Channels - Class 60

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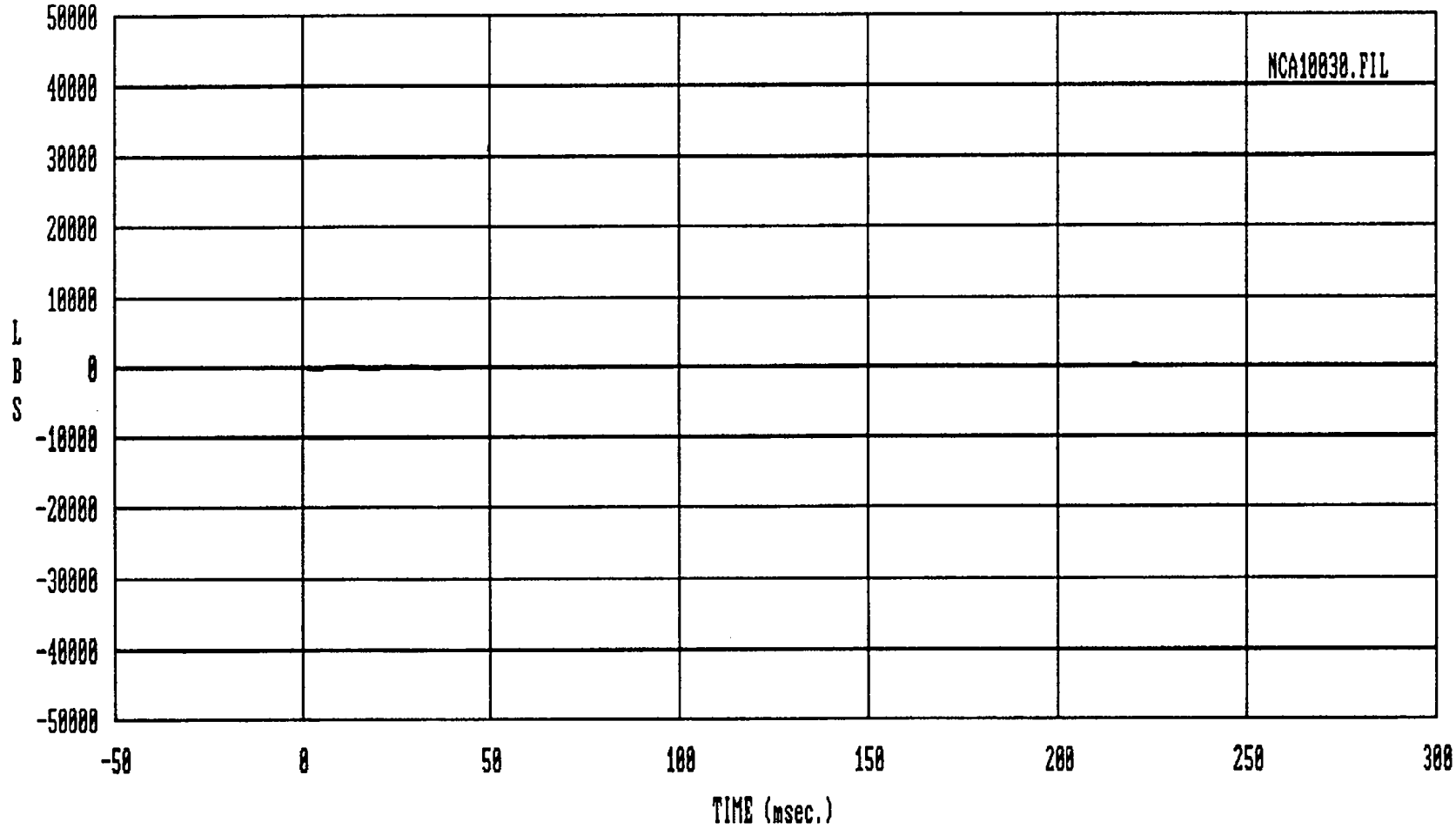
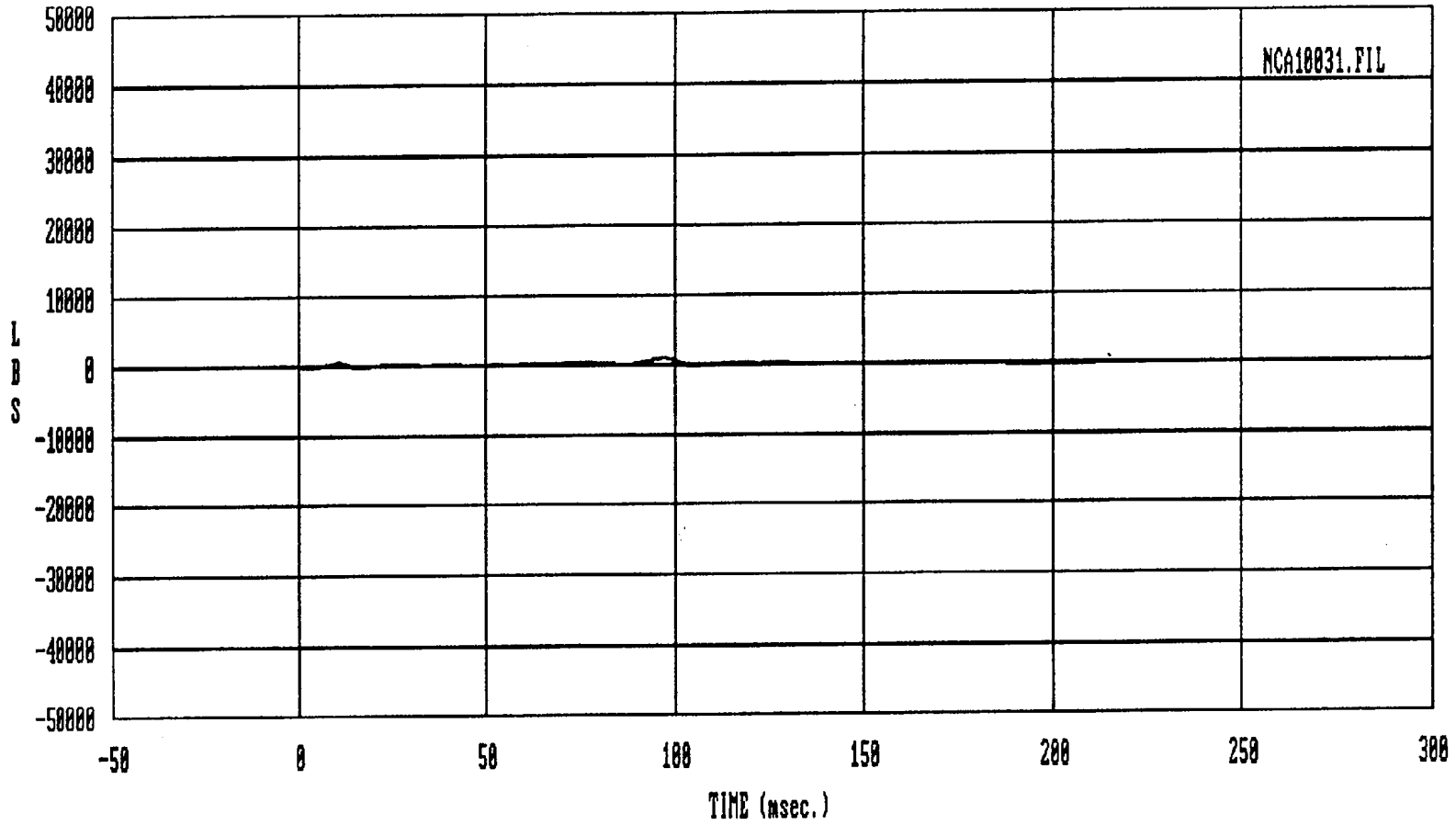


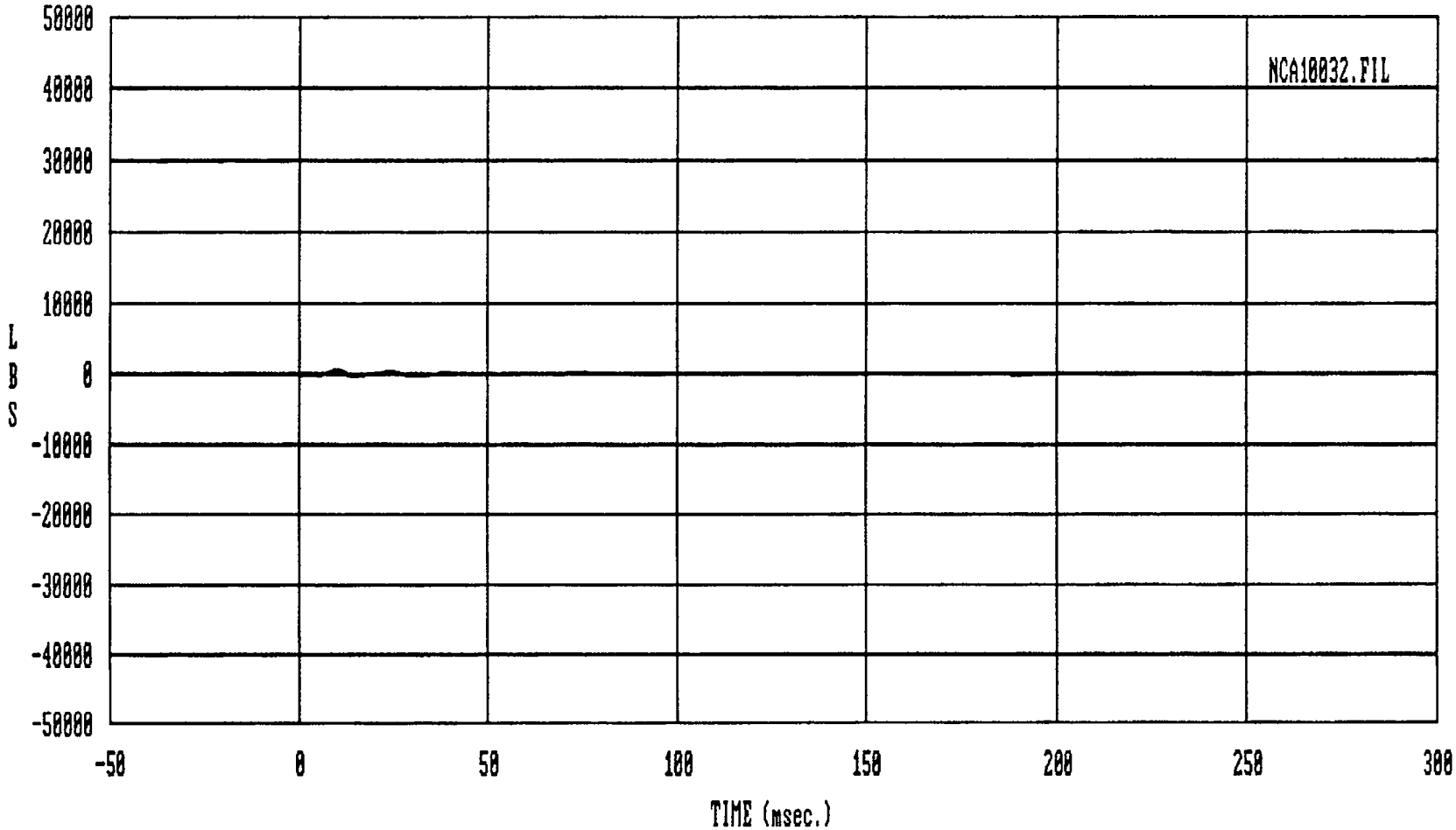
Curve: Force on Barrier load cell A1 Filter: SAE CLASS 60 Max = 303.75 Min = -208.01

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



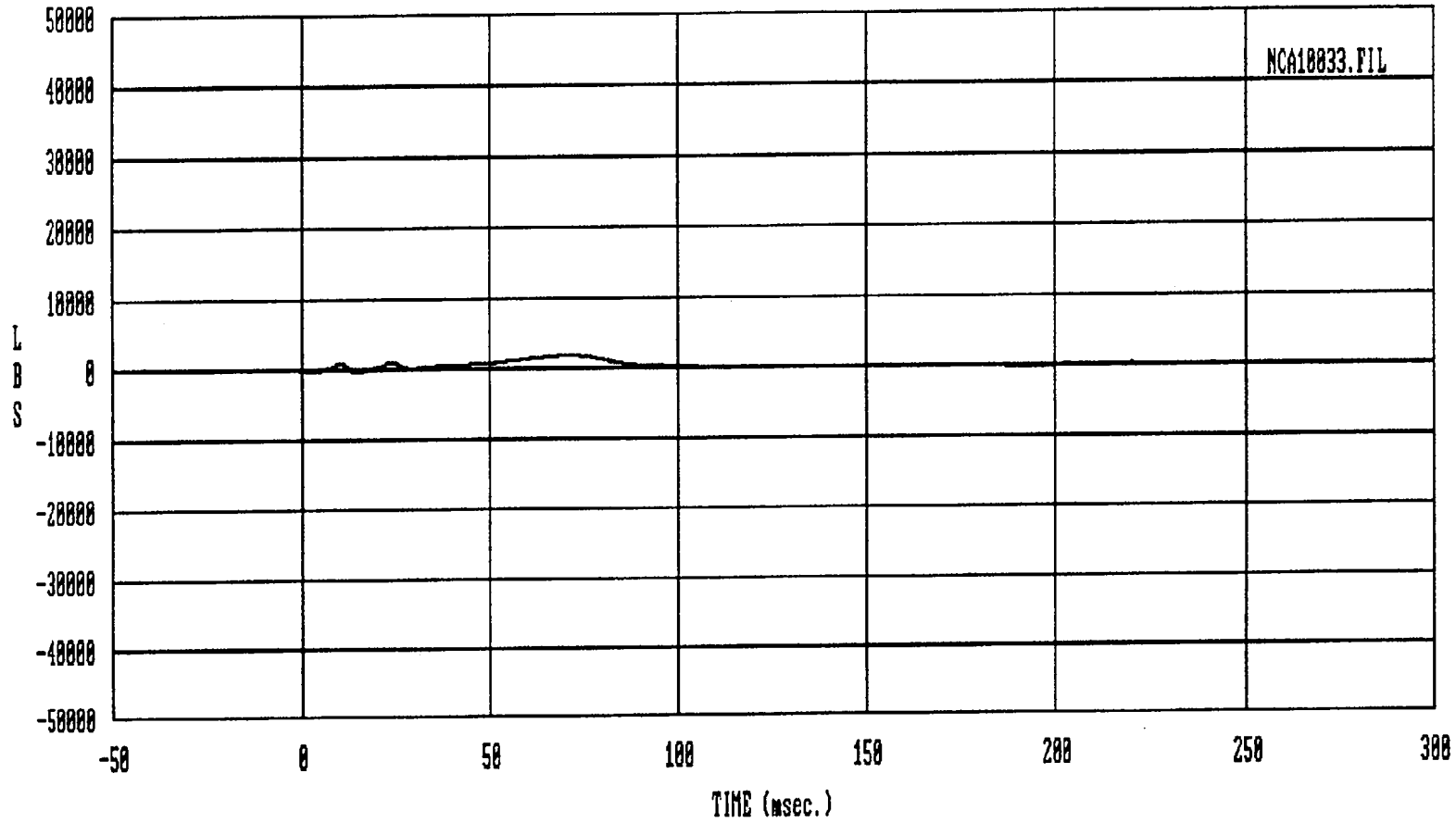
Curve: Force on Barrier load cell A2 Filter: SAE CLASS 60 Max = 920.88 Min = -215.43

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



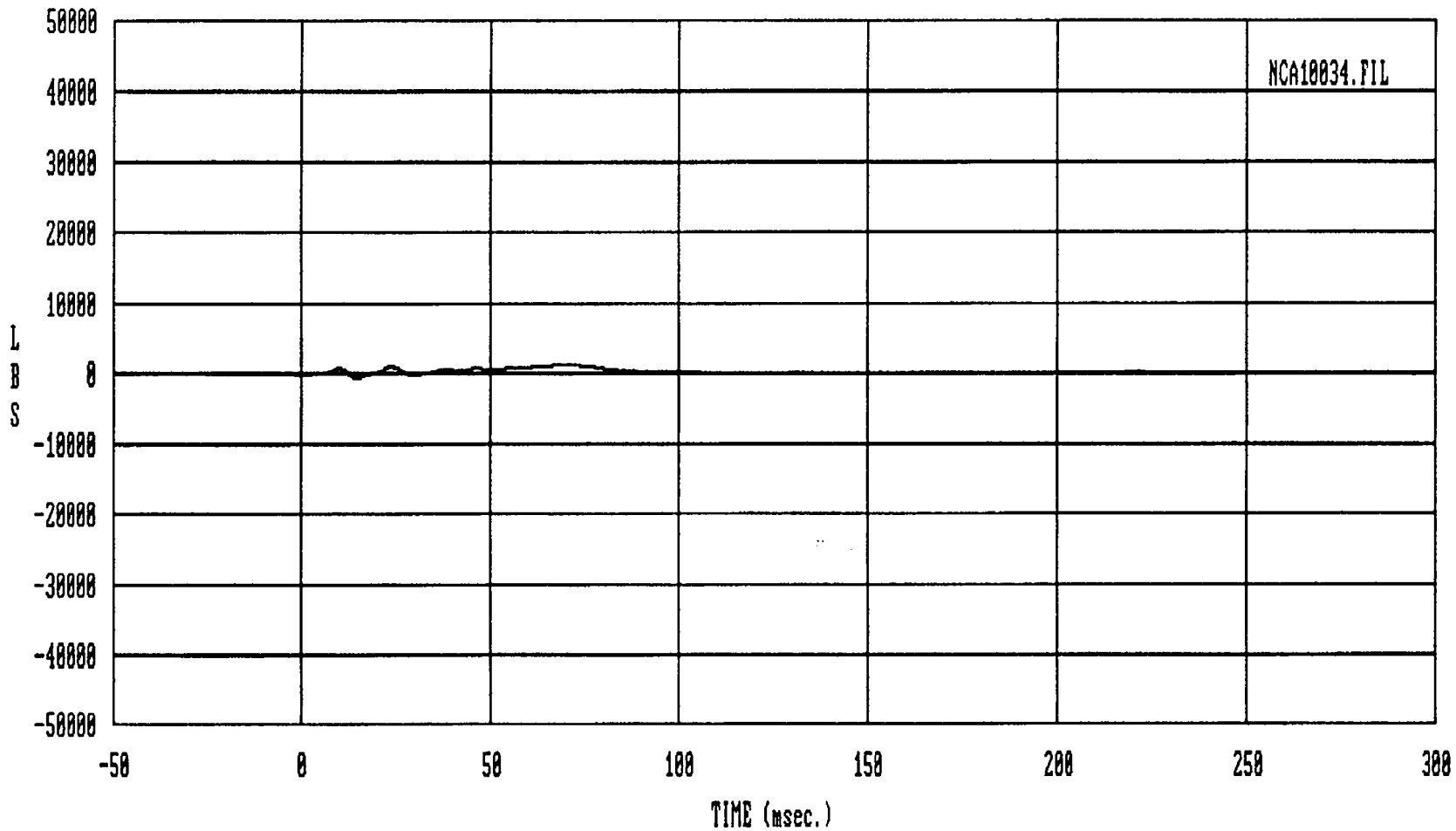
Curve: Force on Barrier load cell A3 Filter: SAE CLASS 60 Max = 620.29 Min = -317.35

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



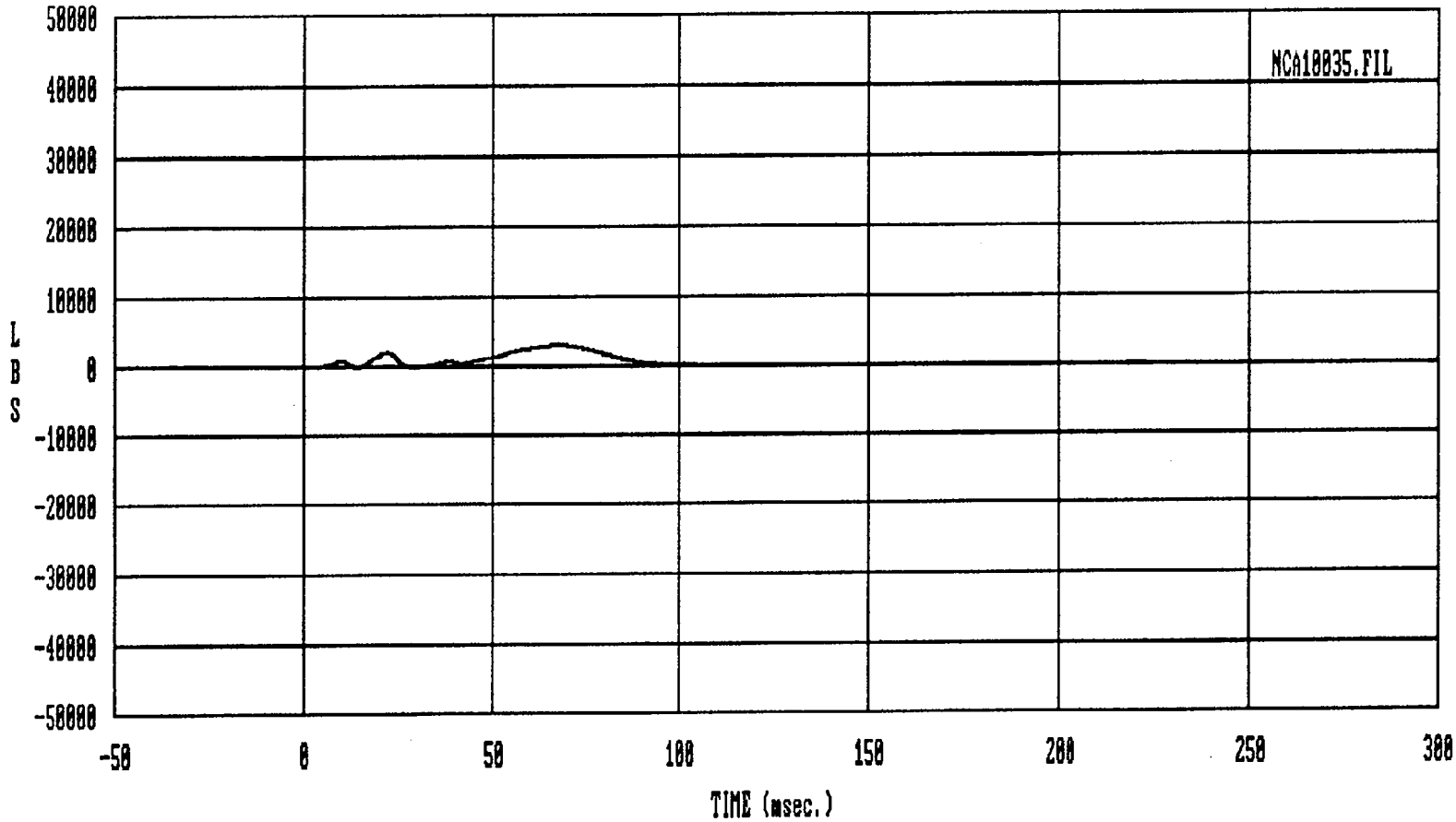
Curve: Force on Barrier load cell A4 Filter: SAE CLASS 60 Max = 1940.6 Min = -469.64

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



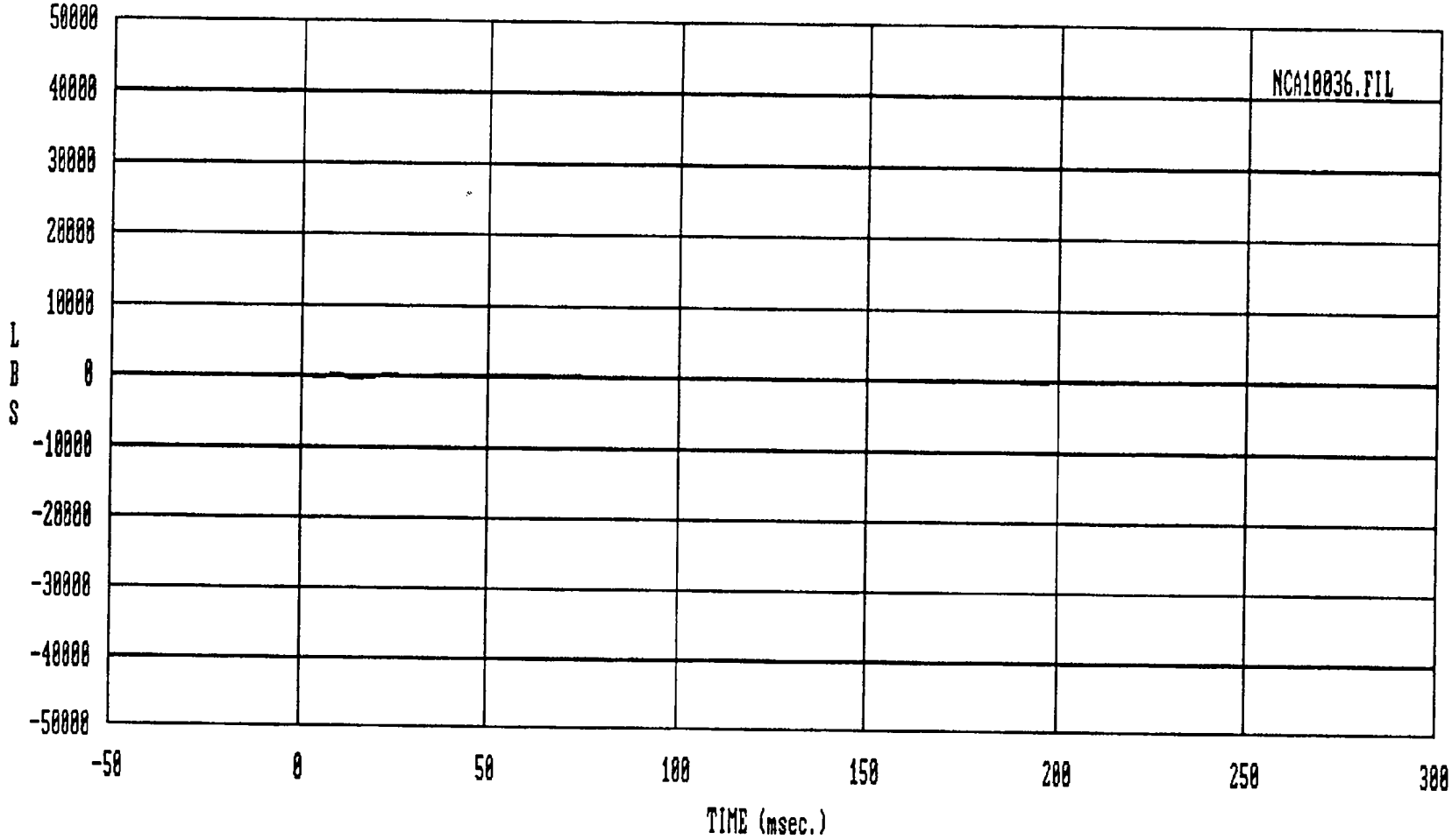
Curve: Force on Barrier load cell A5 Filter: SAE CLASS 60 Max = 1158.1 Min = -569.61

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



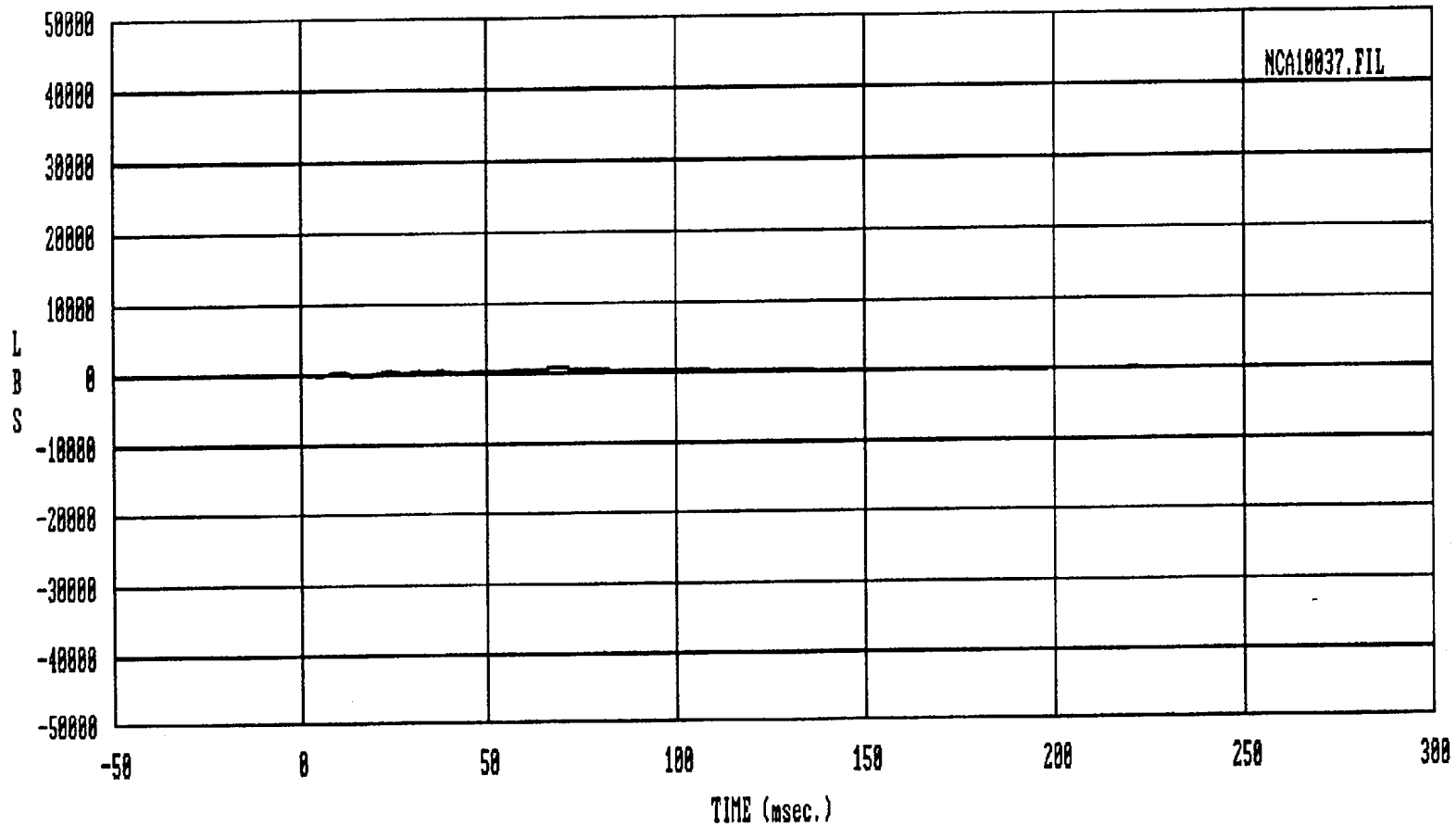
Curve: Force on Barrier load cell A6 Filter: SAE CLASS 60 Max = 3126.2 Min = -157.86

MSE Date: 03/13/98 Program: 1998 New Car Assessment #10 Vehicle: 1998 BMW 325i



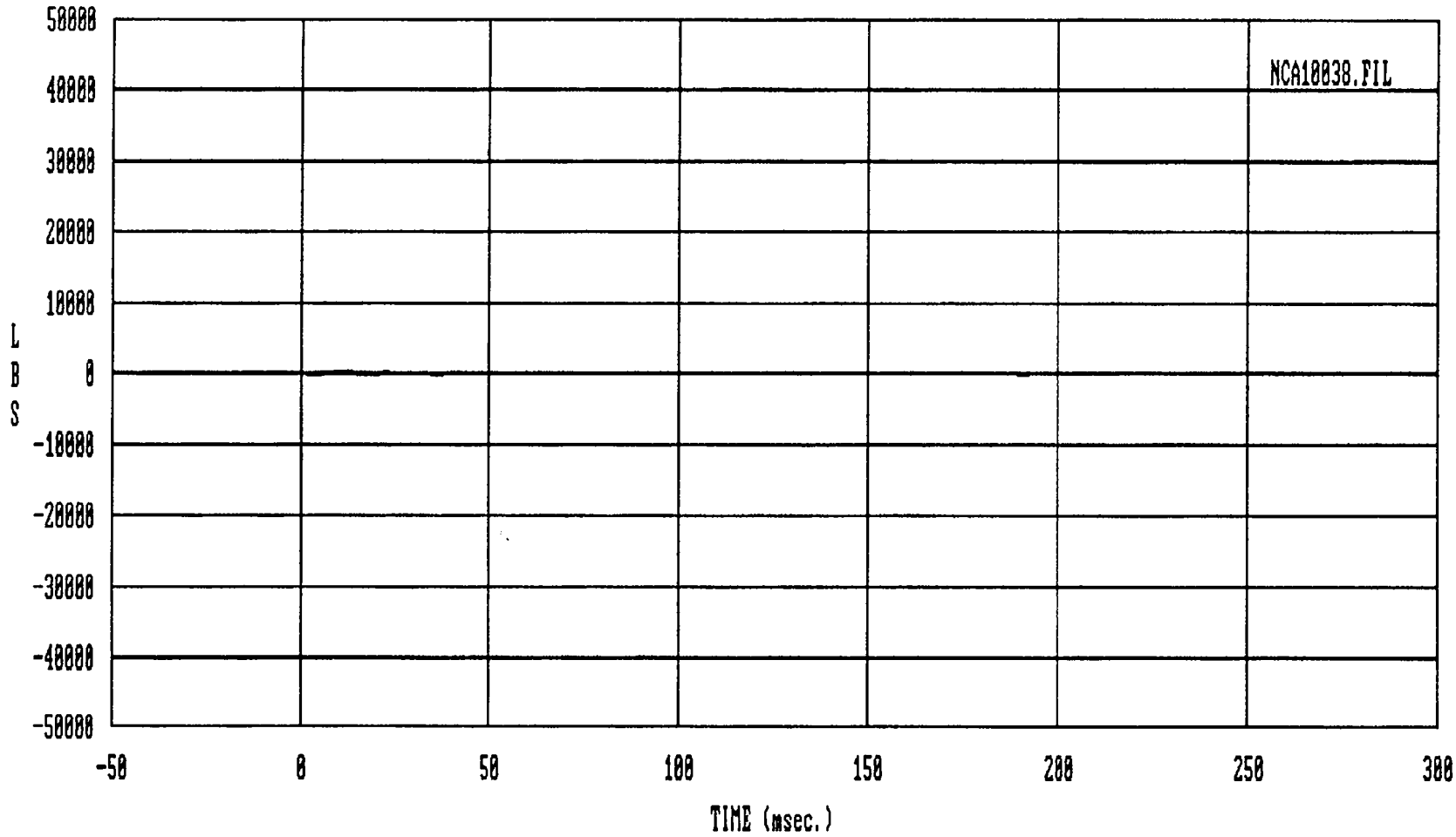
Curve: Force on Barrier load cell A7 Filter: SAE CLASS 60 Max = 276.18 Min = -381.28

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



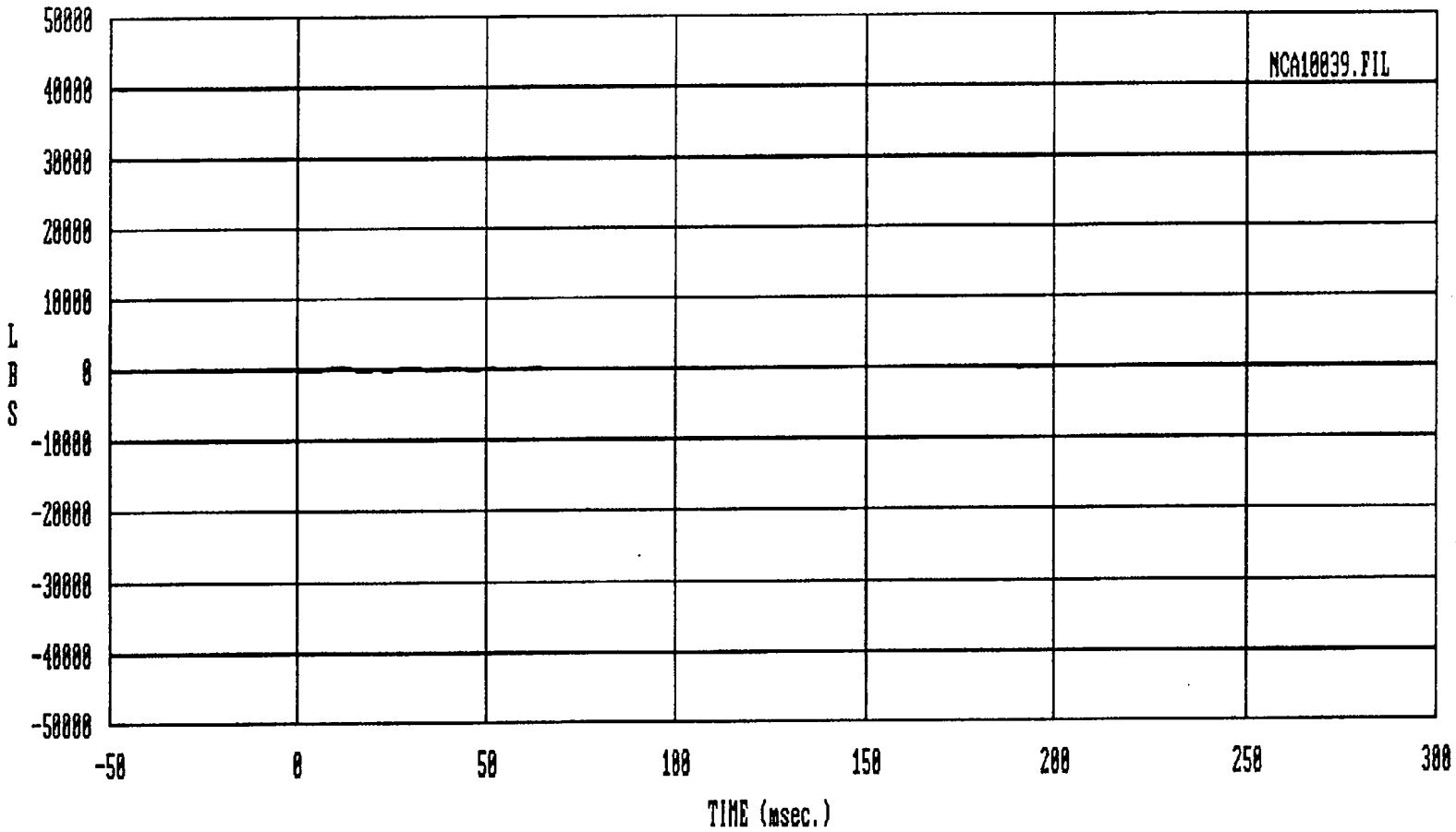
Curve: Force on Barrier load cell A8 Filter: SAE CLASS 60 Max = 759.32 Min = -246.24

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



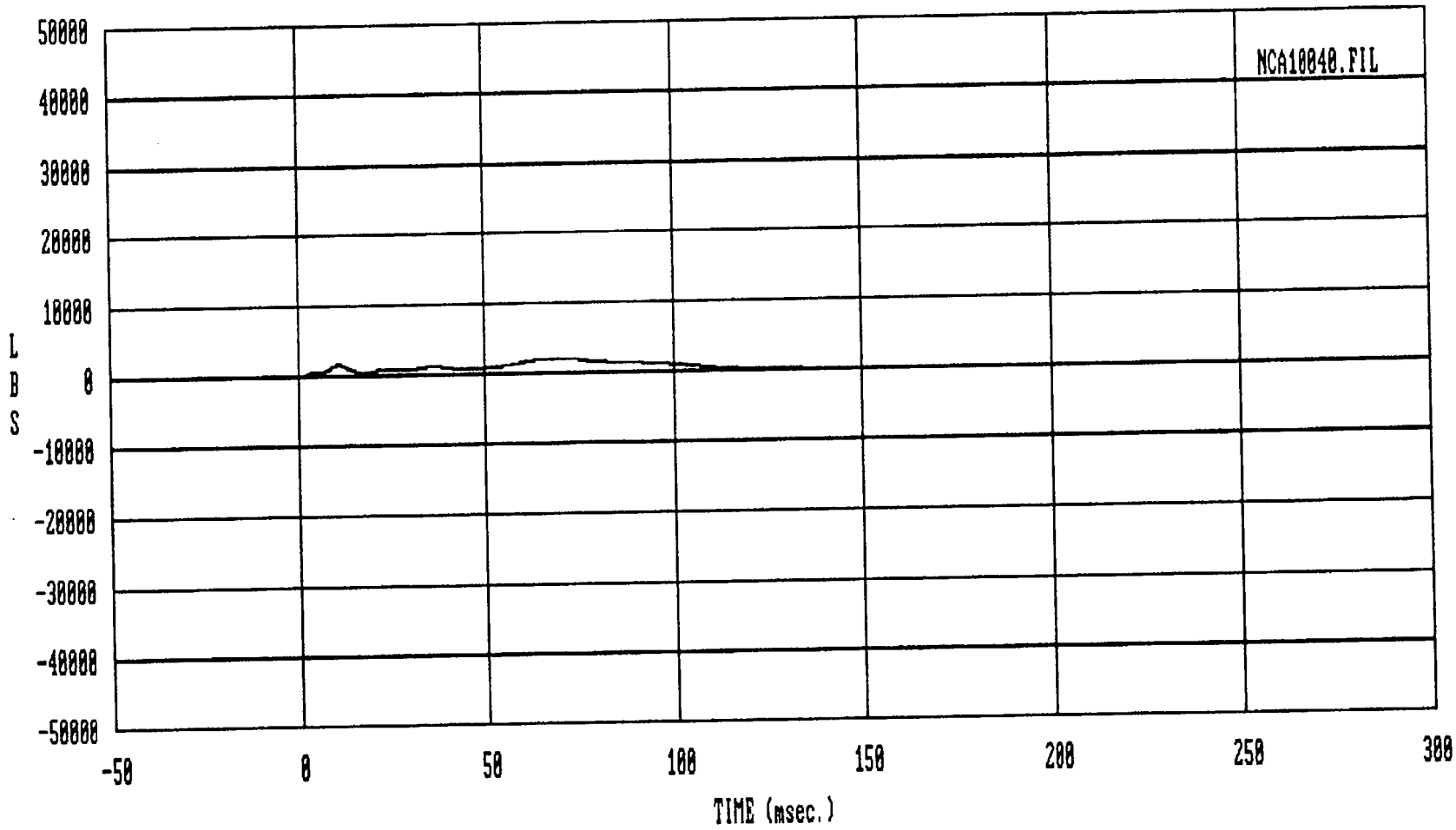
Curve: Force on Barrier load cell A9 Filter: SAE CLASS 60 Max = 289.70 Min = -230.61

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



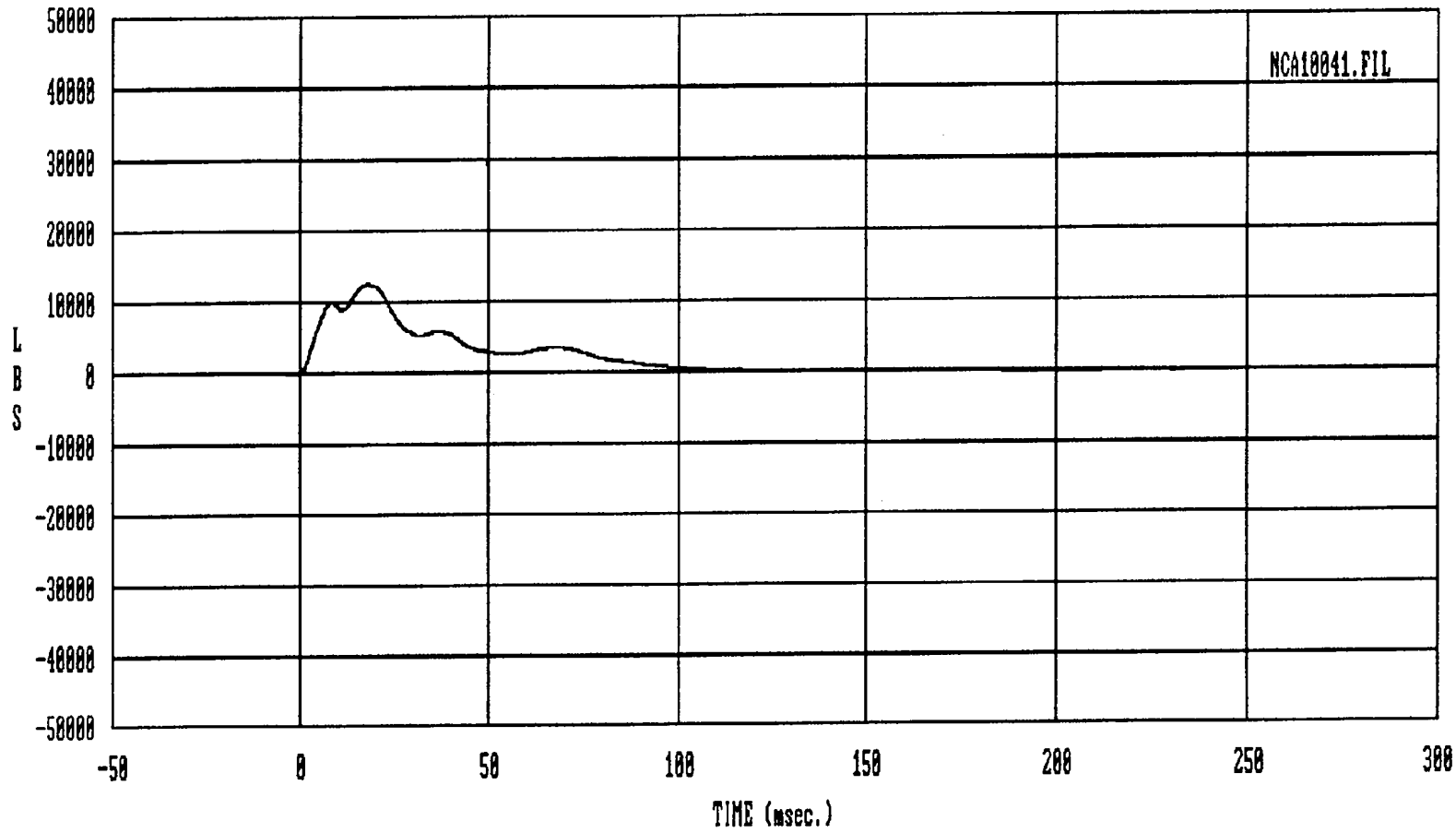
Curve: Force on Barrier load cell B1 Filter: SAE CLASS 60 Max = 458.87 Min = -261.17

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



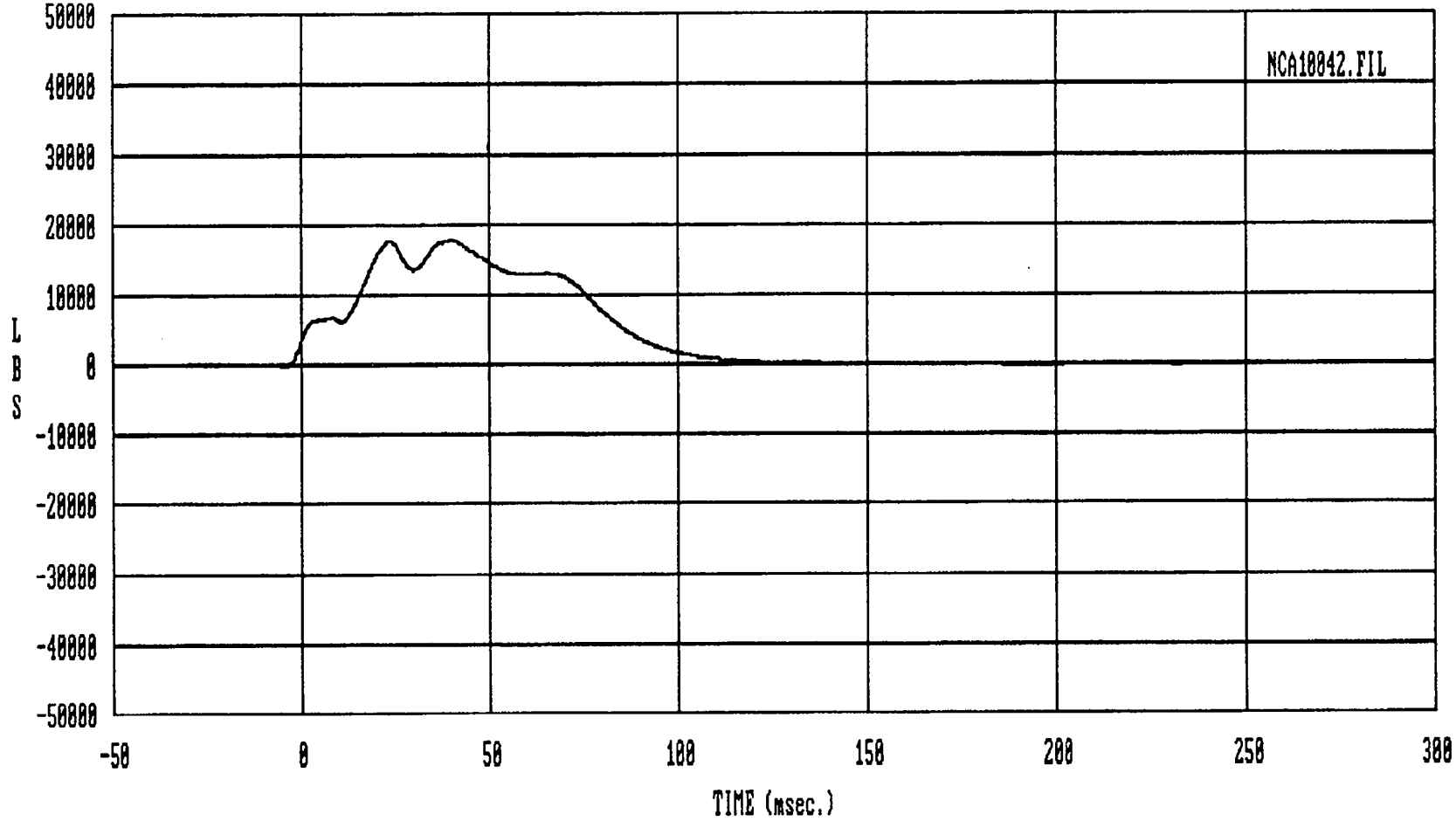
Curve: Force on Barrier load cell B2 Filter: SAE CLASS 60 Max = 2006.7 Min = -66.398

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



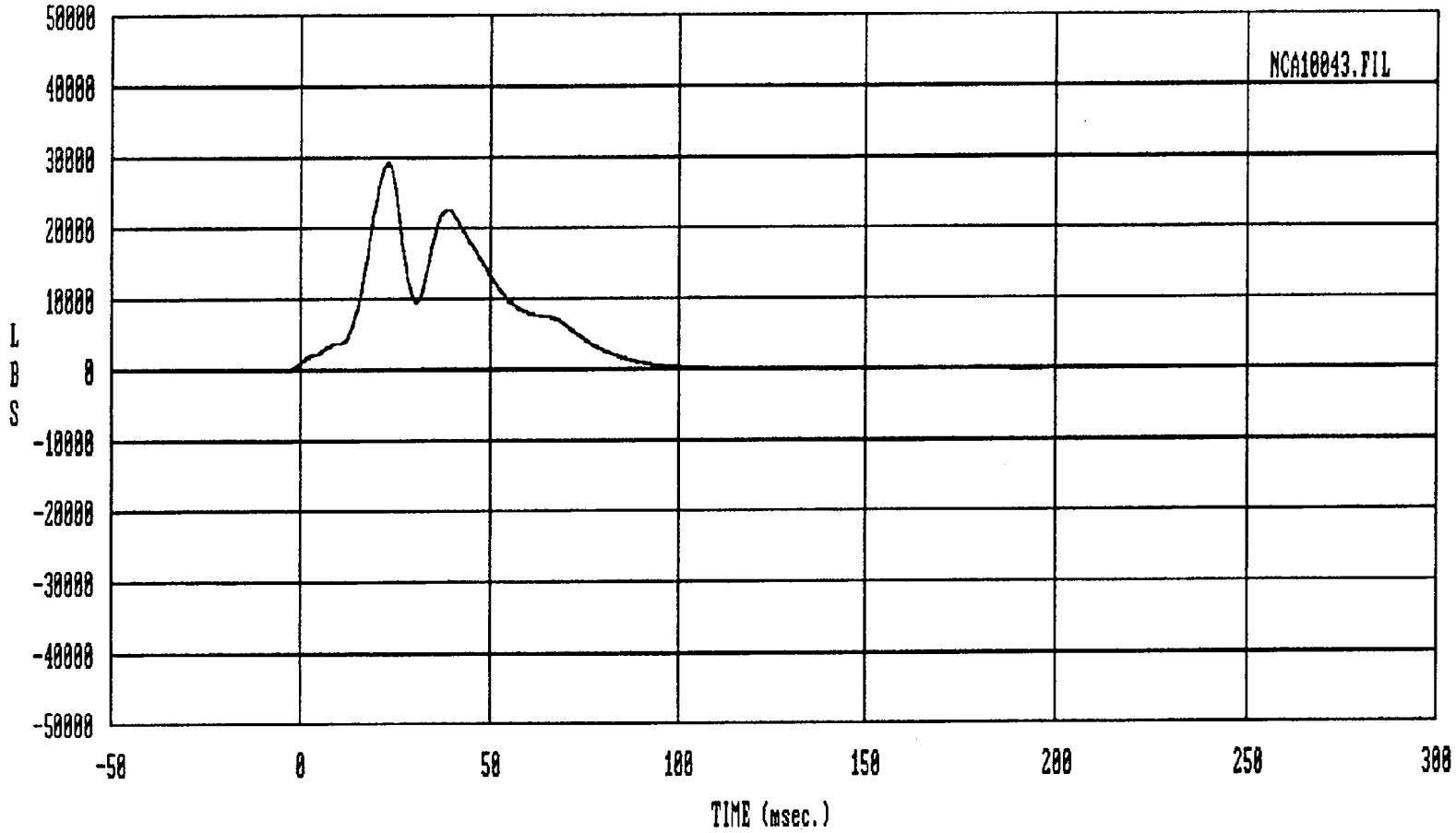
Curve: Force on Barrier load cell E3 Filter: SAE CLASS 60 Max = 12499. Min = -206.78

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



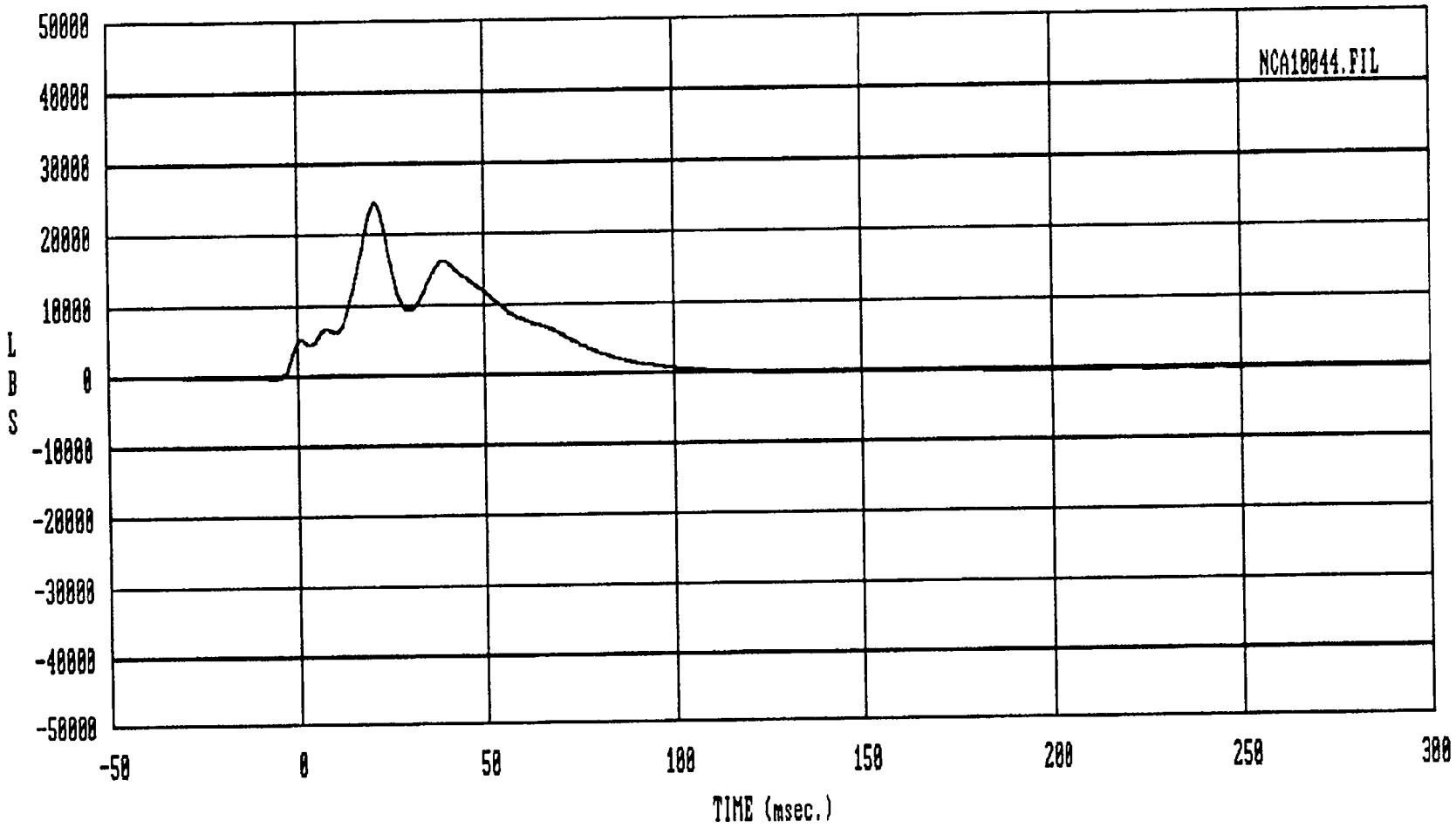
Curve: Force on Barrier load cell B4 Filter: SAE CLASS 60 Max = 17826. Min = -158.48

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



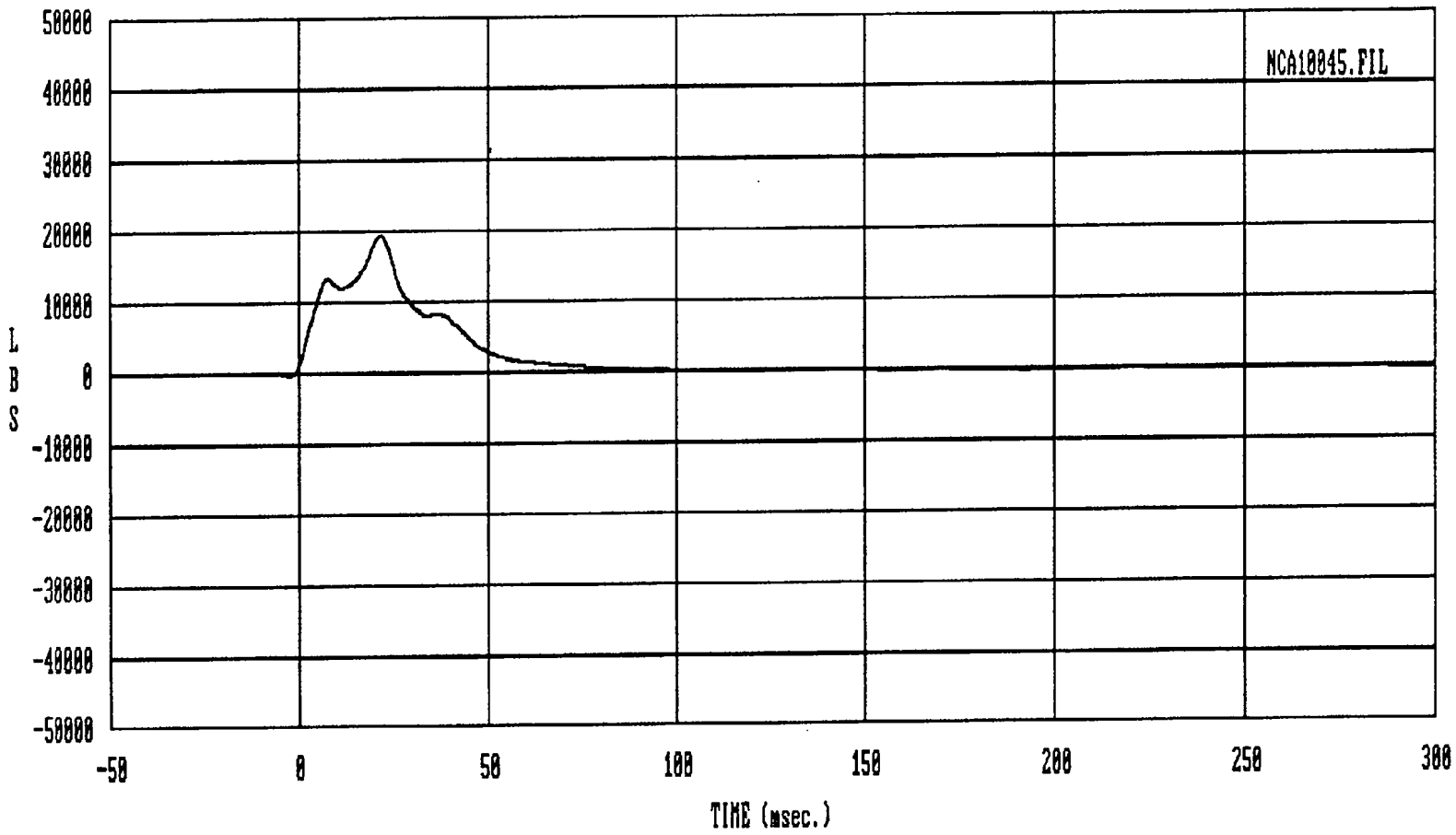
Curve: Force on Barrier load cell B5 Filter: SAE CLASS 60 Max = 29240. Min = -118.52

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



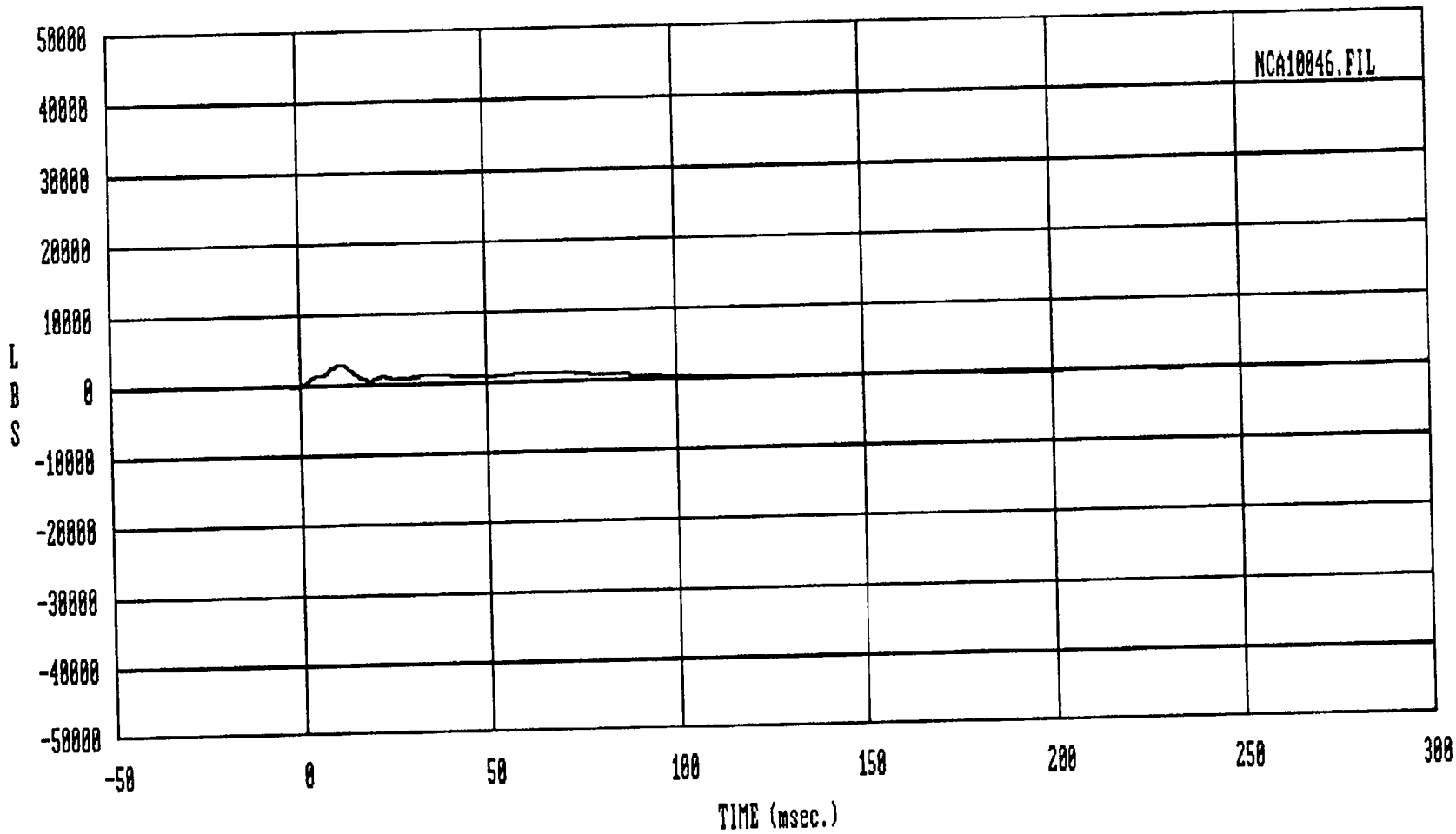
Curve: Force on Barrier load cell B6 Filter: SAE CLASS 60 Max = 24551. Min = -466.92

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



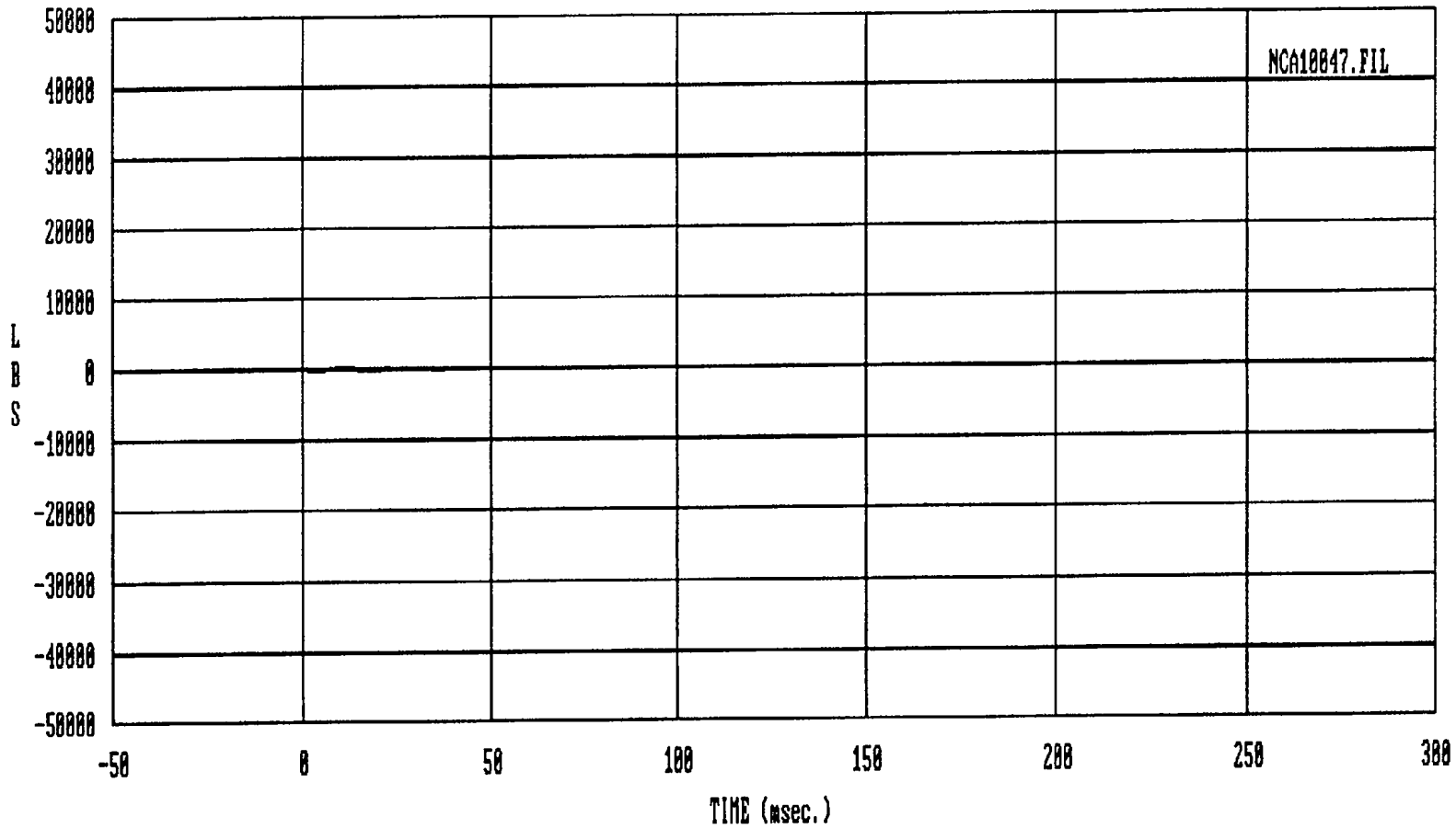
Curve: Force on Barrier load cell B7 Filter: SAE CLASS 60 Max = 19538. Min = -281.79

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



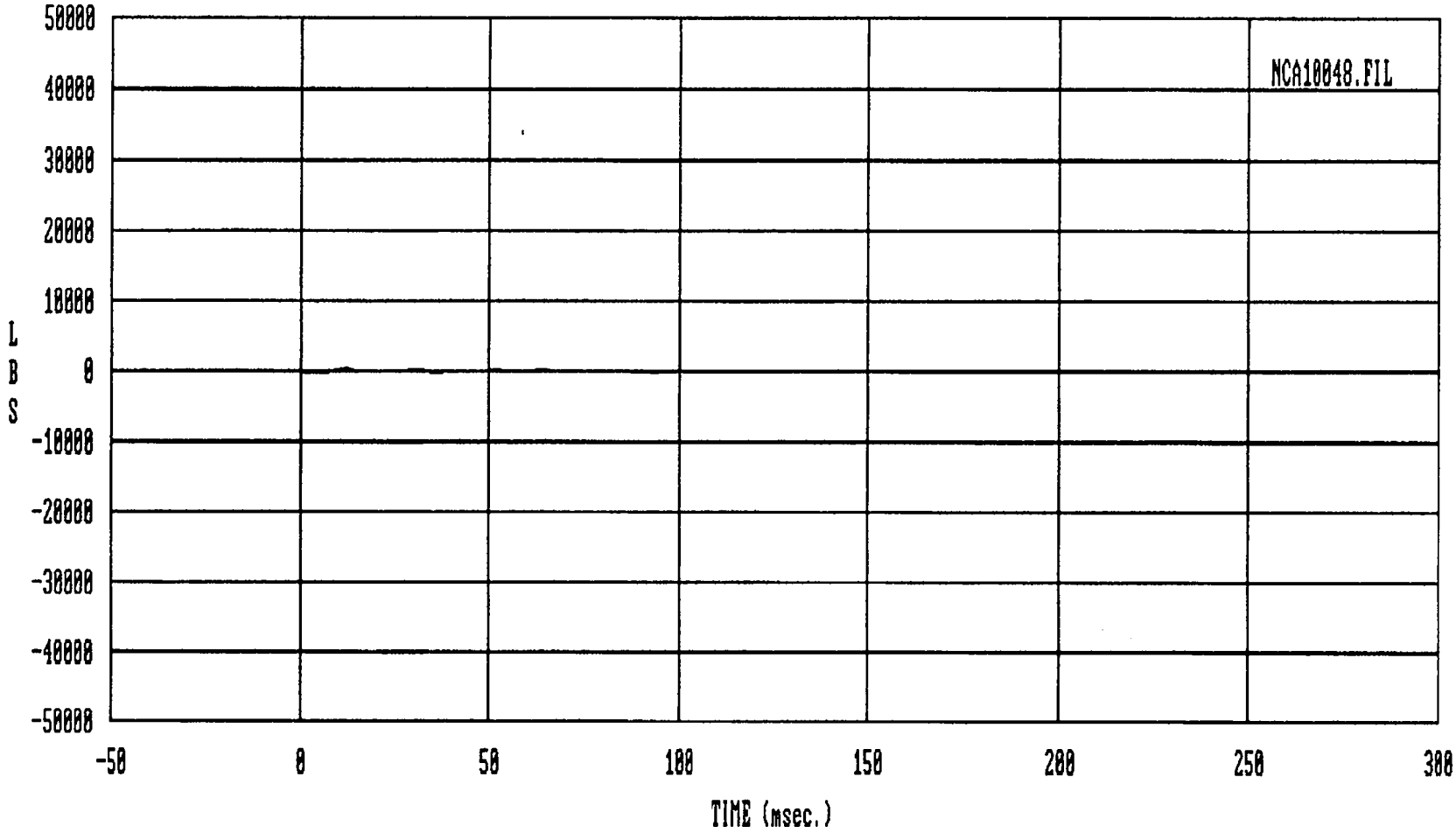
Curve: Force on Barrier load cell B8 Filter: SAE CLASS 60 Max = 2770.6 Min = -118.64

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



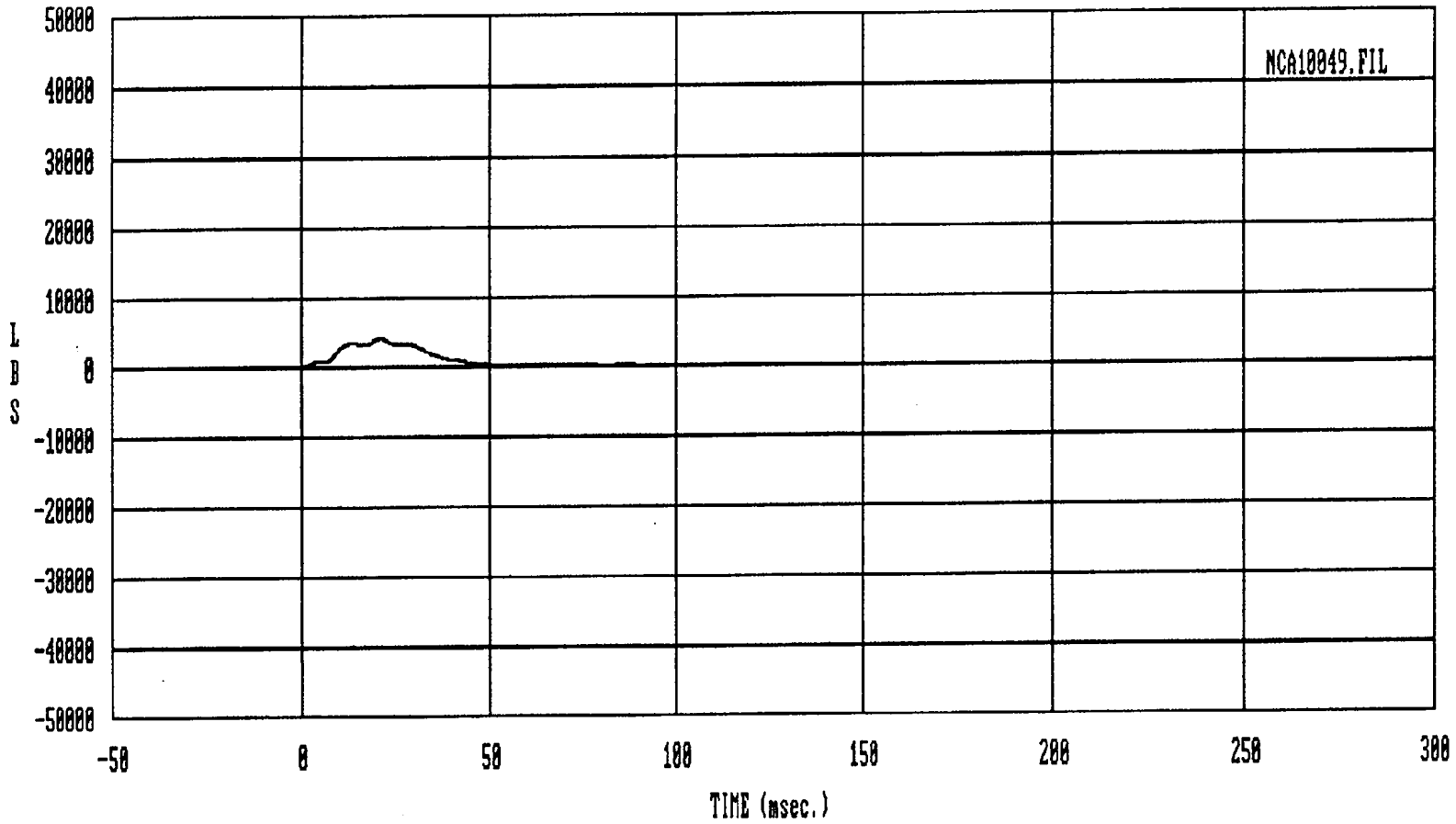
Curve: Force on Barrier load cell B9 Filter: SAE CLASS 60 Max = 289.70 Min = -230.61

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



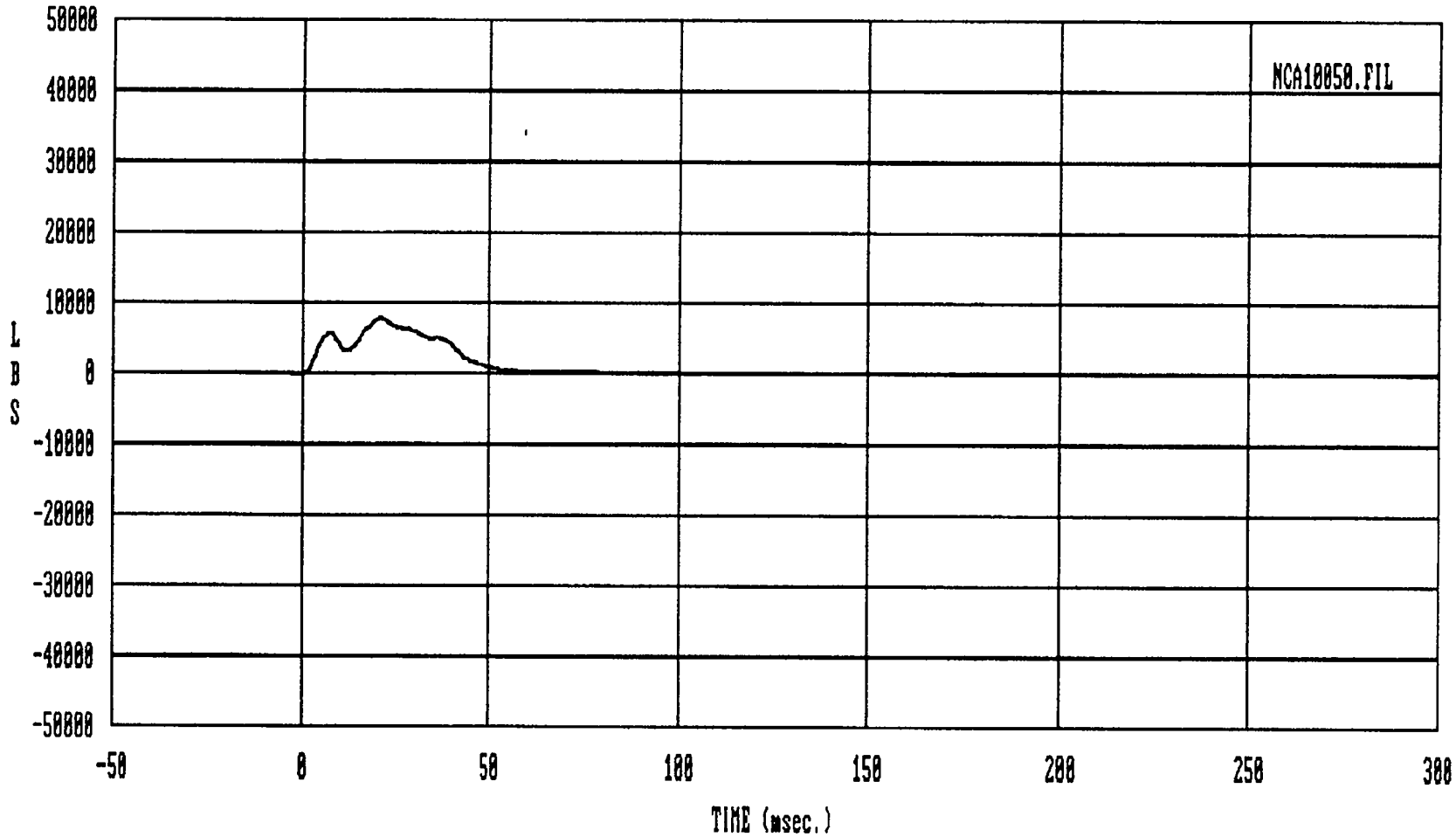
Curve: Force on Barrier load cell C1 Filter: SAE CLASS 60 Max = 425.53 Min = -256.87

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



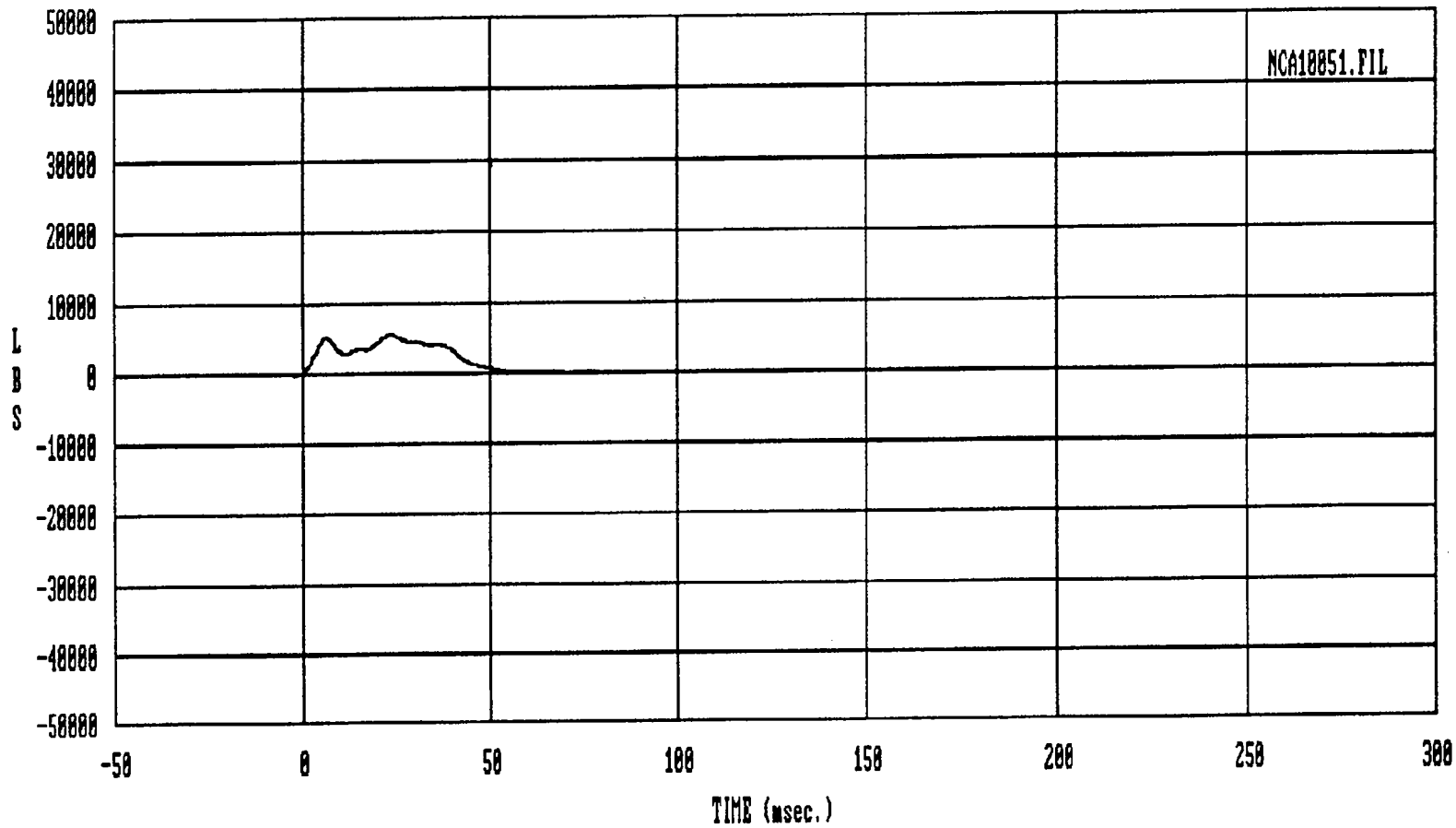
Curve: Force on Barrier load cell C2 Filter: SAE CLASS 60 Max = 4295.0 Min = -41.955

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



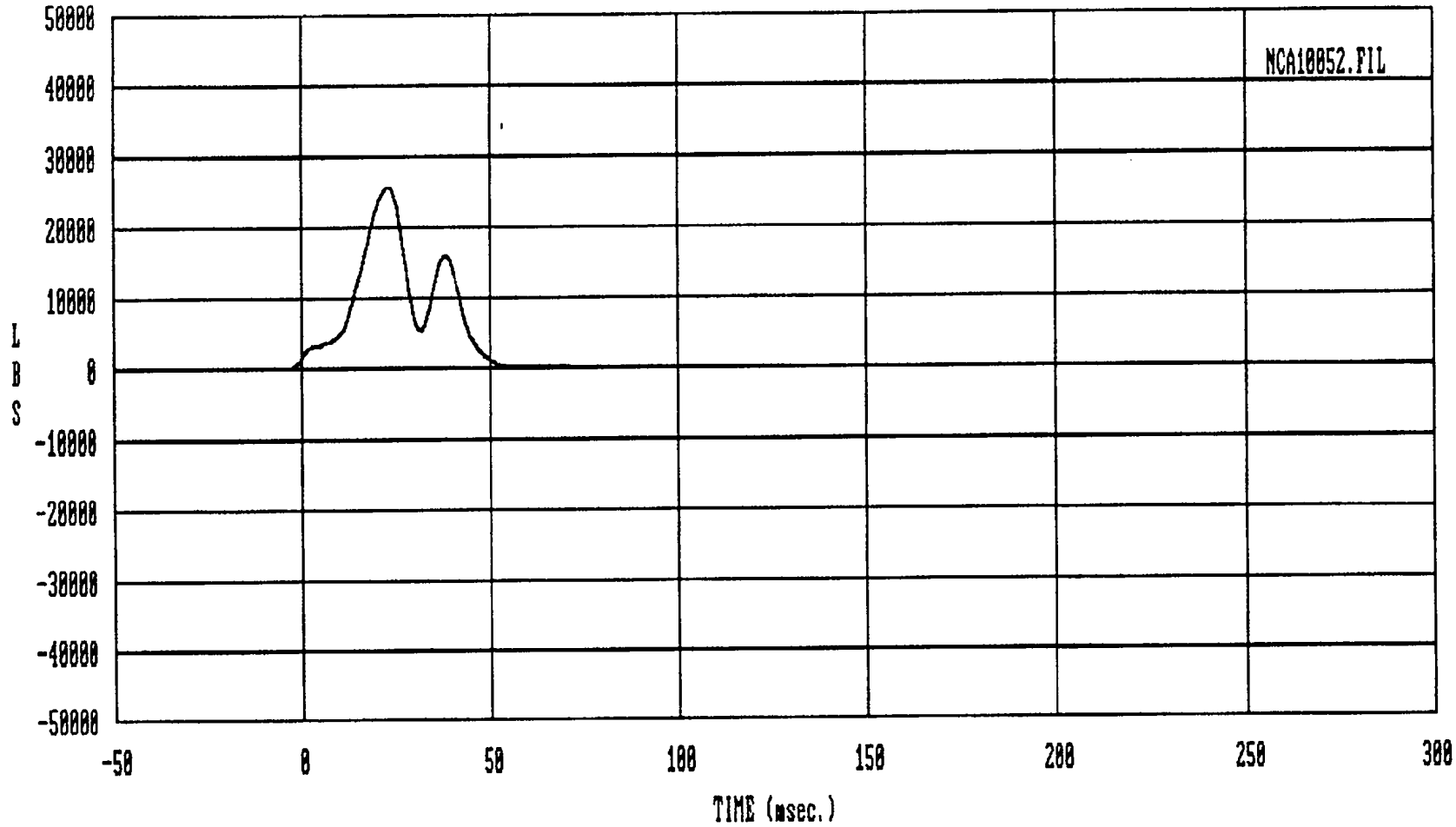
Curve: Force on Barrier load cell C3 Filter: SAE CLASS 60 Max = 7881.9 Min = -66.119

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



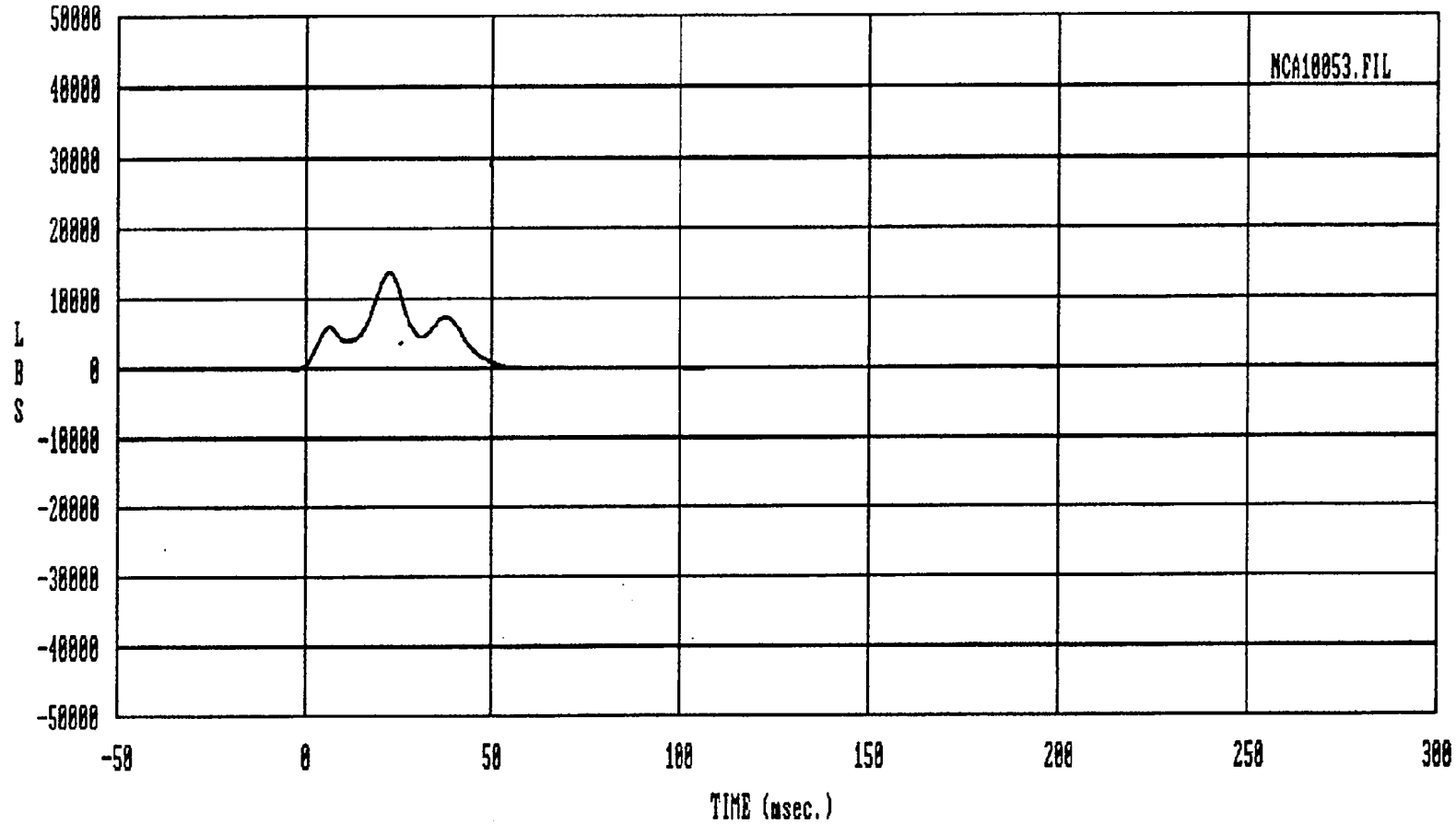
Curve: Force on Barrier load cell C4 Filter: SAE CLASS 60 Max = 5507.4 Min = -50.472

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



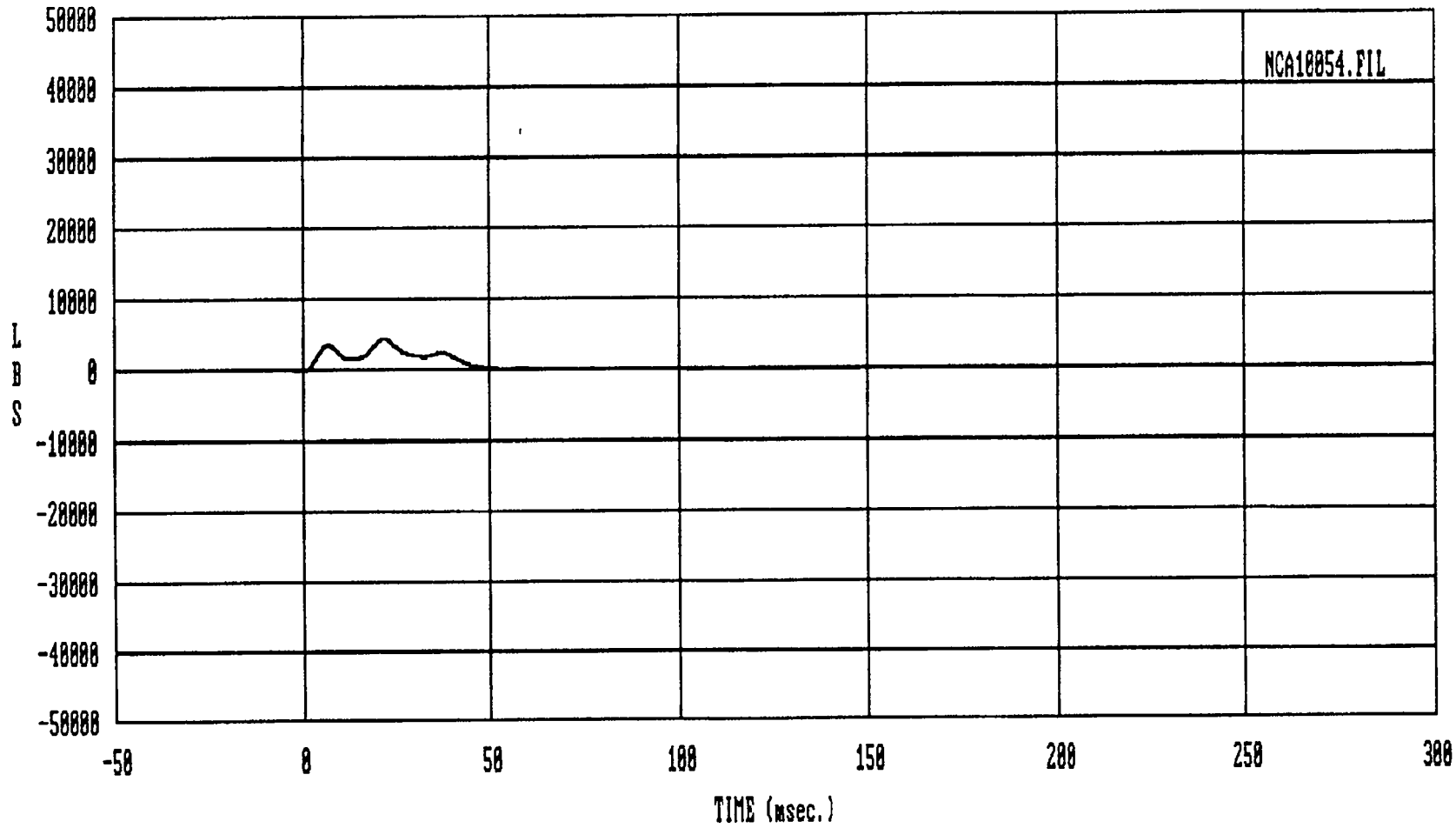
Curve: Force on Barrier load cell C5 Filter: SAE CLASS 60 Max = 25797. Min = -33.962

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



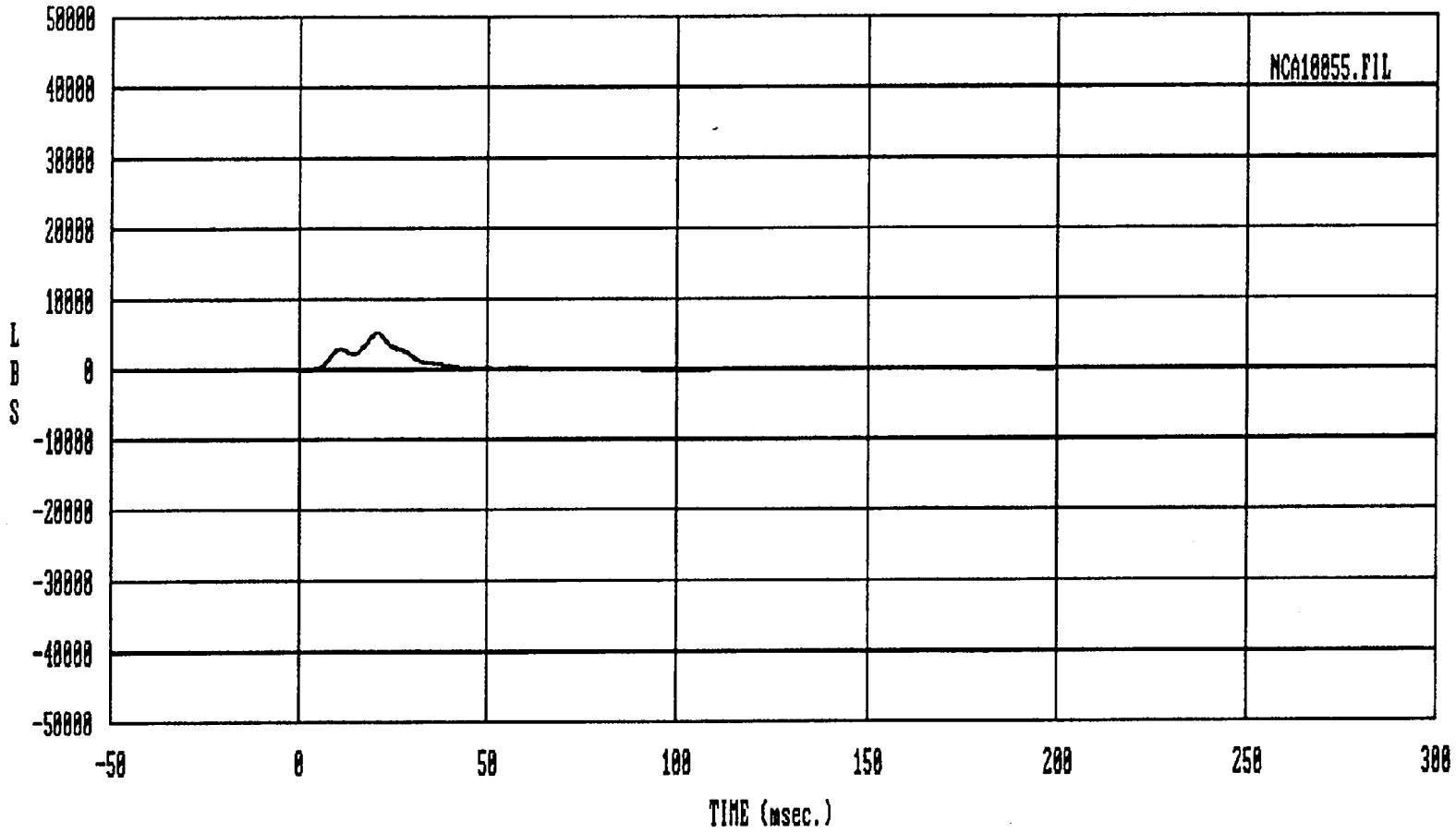
Curve: Force on Barrier load cell C6 Filter: SAE CLASS 60 Max = 13730. Min = -100.96

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



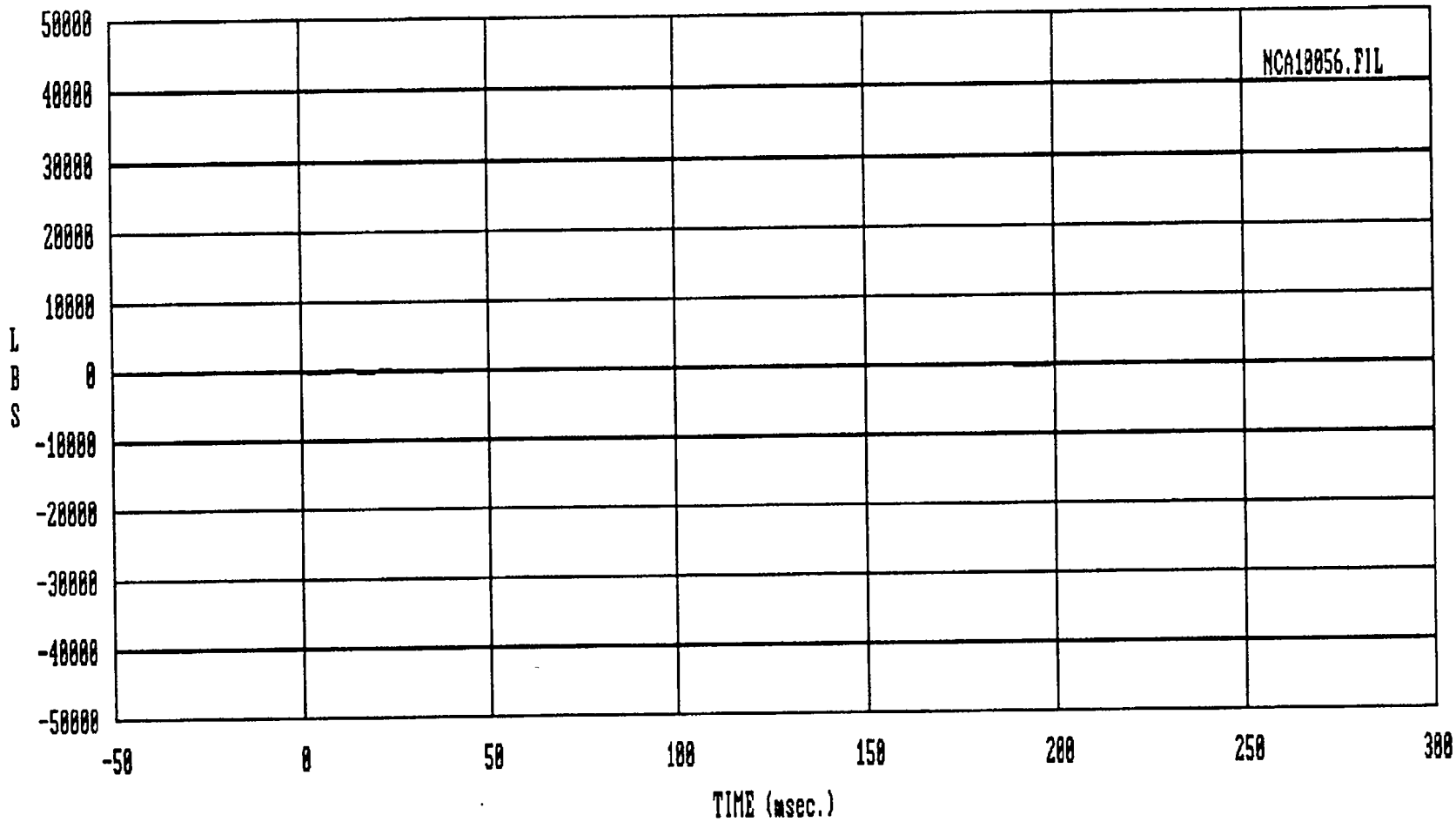
Curve: Force on Barrier load cell C7 Filter: SAE CLASS 60 Max = 4413.9 Min = -85.813

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



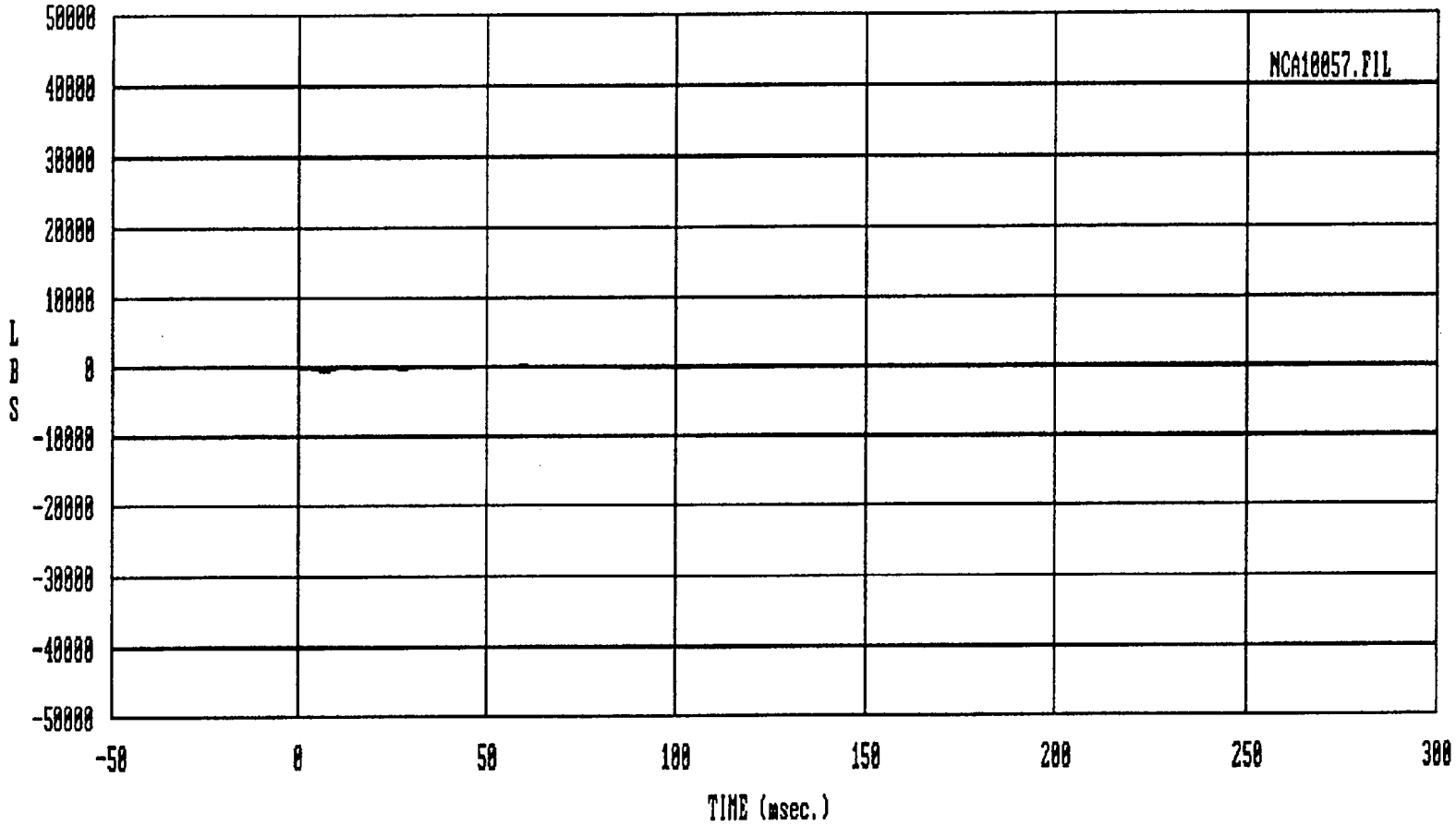
Curve: Force on Barrier load cell C8 Filter: SAE CLASS 60 Max = 5312.4 Min = -152.36

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



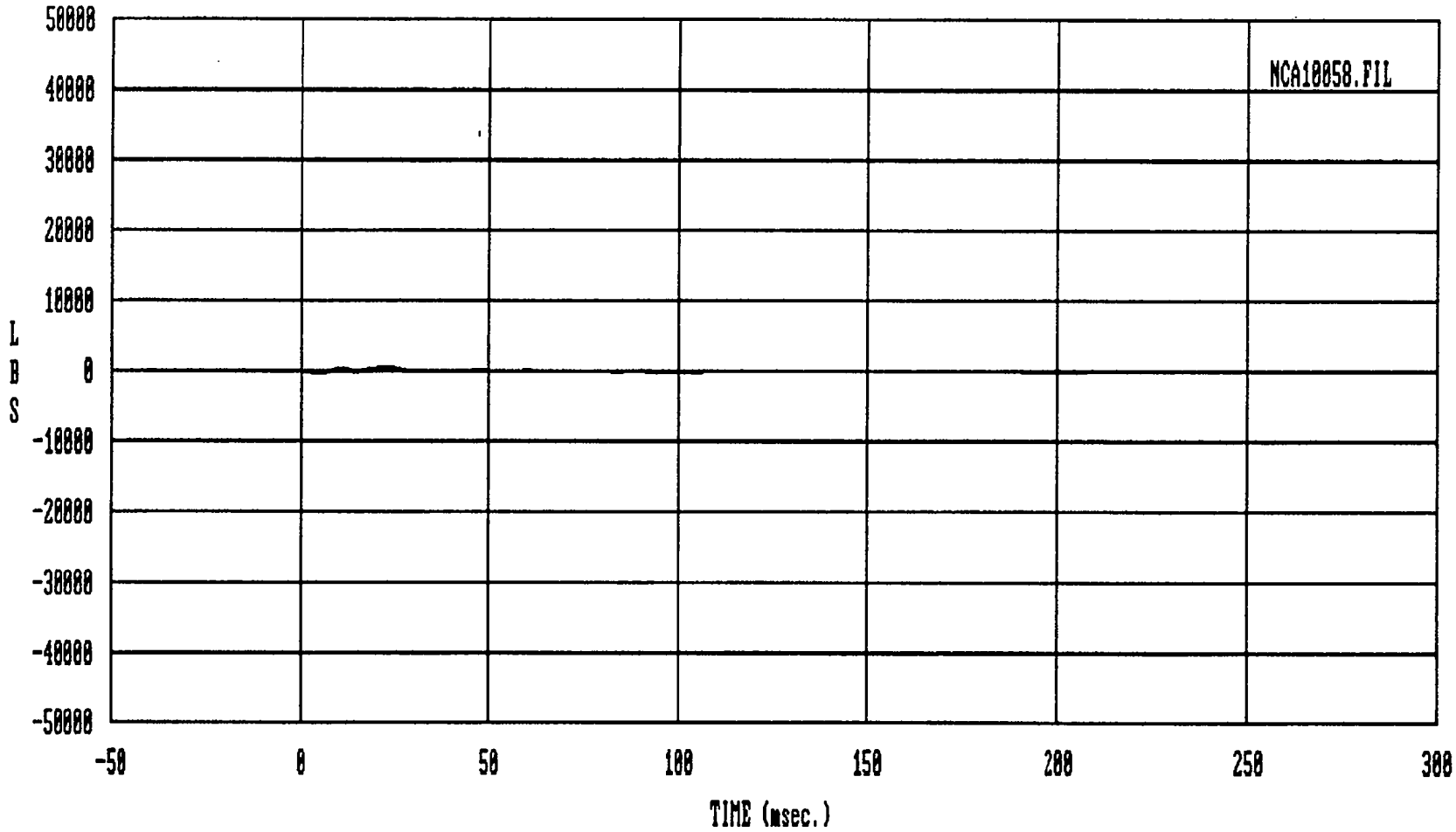
Curve: Force on Barrier load cell C9 Filter: SAE CLASS 60 Max = 291.62 Min = -195.18

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



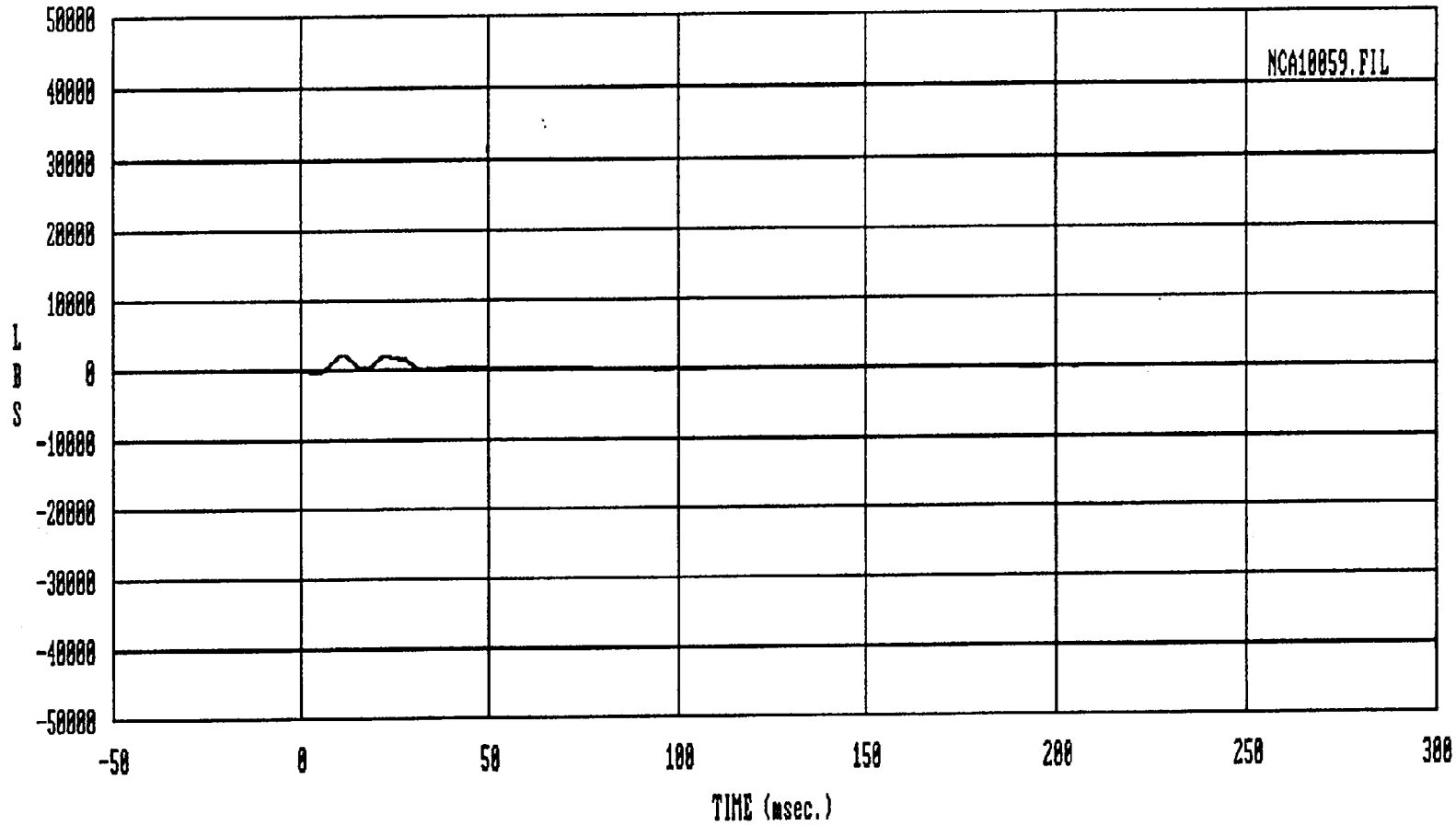
Curve: Force on Barrier load cell D1 Filter: SAE CLASS 60 Max = 135.07 Min = -564.30

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



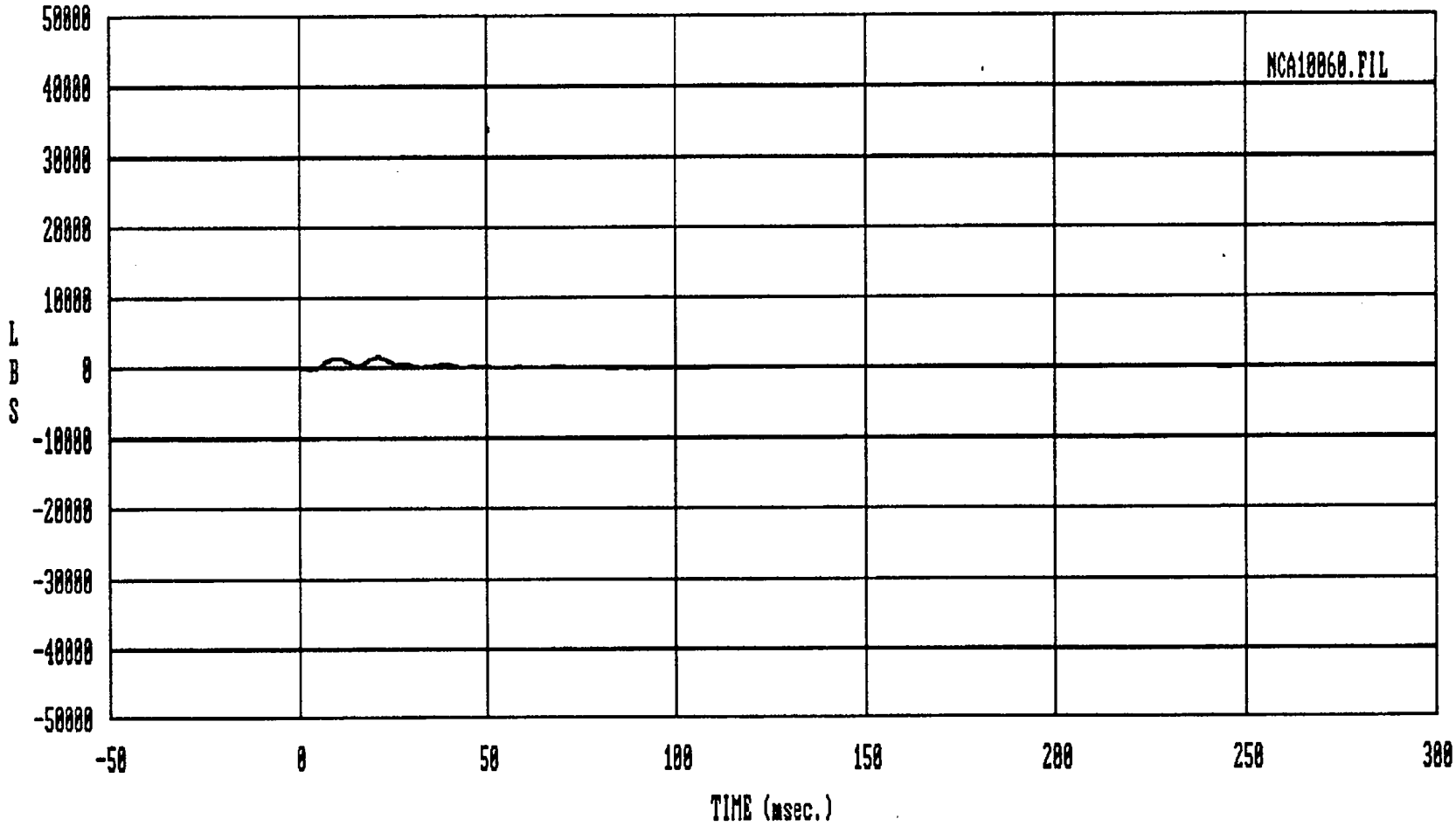
Curve: Force on Barrier load cell D2 Filter: SAE CLASS 60 Max = 628.67 Min = -373.01

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



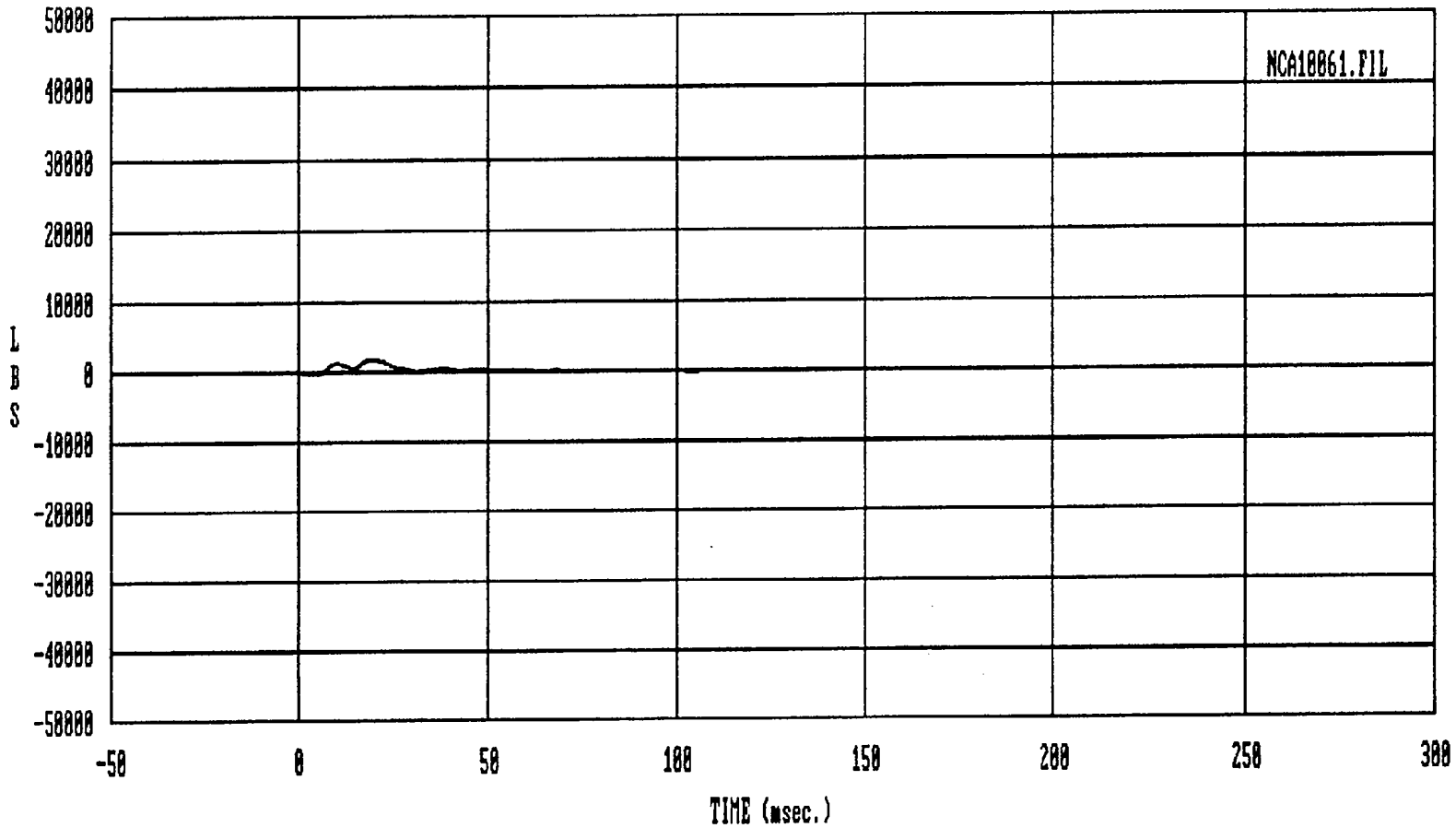
Curve: Force on Barrier load cell D3 Filter: SAE CLASS 60 Max = 2146.3 Min = -373.34

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



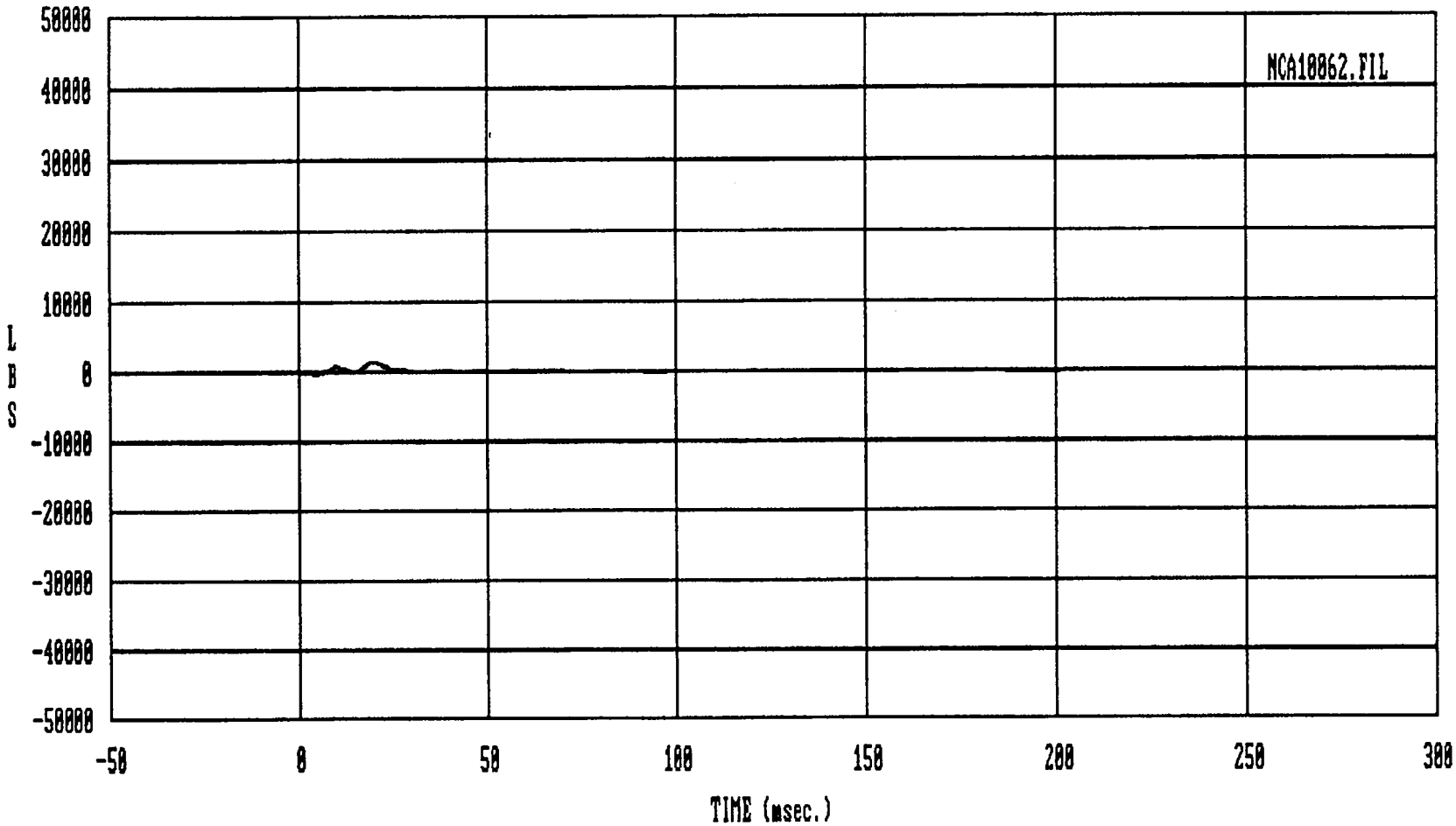
Curve: Force on Barrier load cell D4 Filter: SAE CLASS 60 Max = 1529.2 Min = -286.67

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



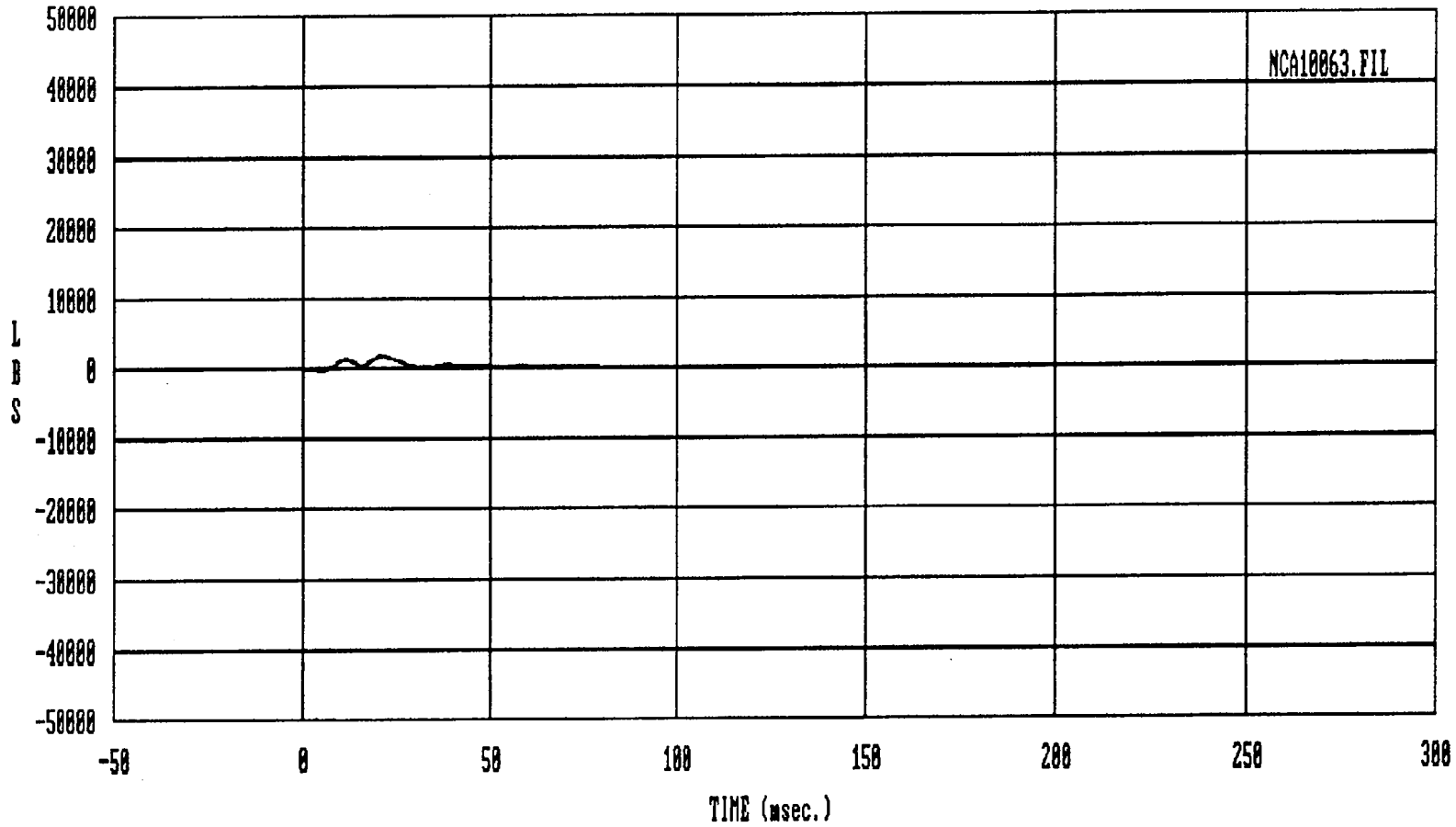
Curve: Force on Barrier load cell D5 Filter: SAE CLASS 60 Max = 1868.7 Min = -378.63

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



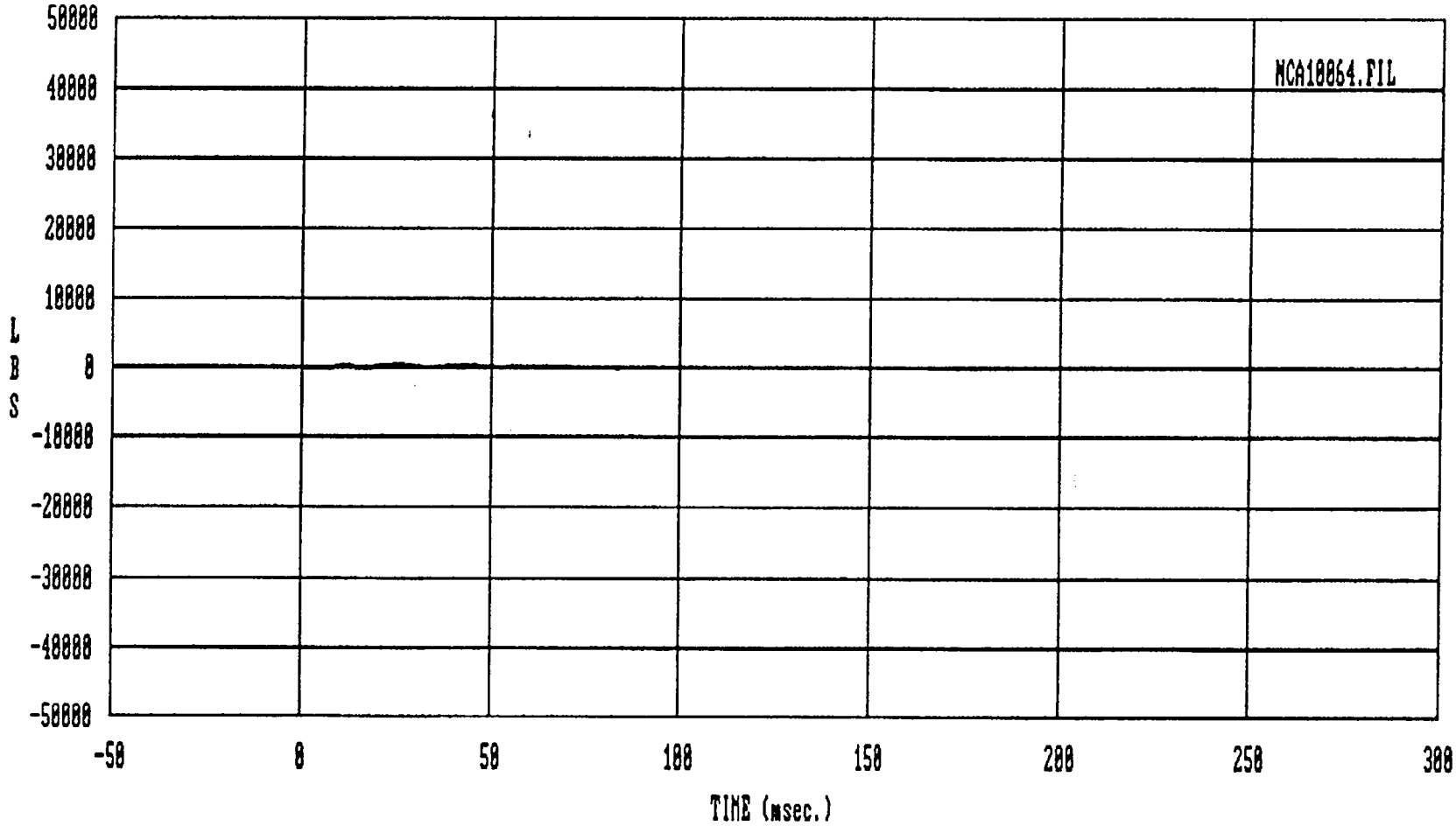
Curve: Force on Barrier load cell D6 Filter: SAE CLASS 60 Max = 1484.6 Min = -292.62

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



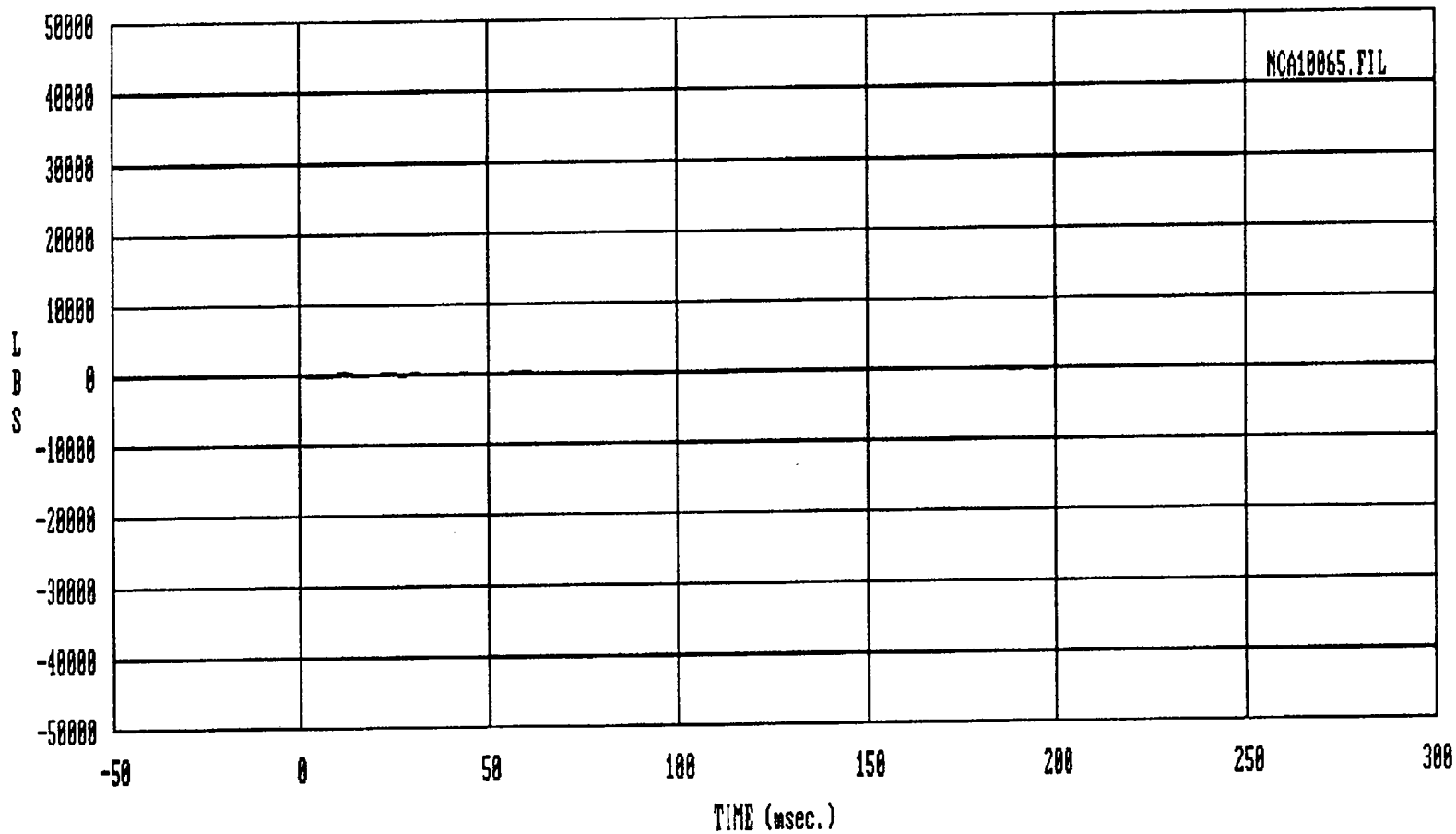
Curve: Force on Barrier load cell D7 . Filter: SAE CLASS 60 Max = 1761.3 Min = -300.30

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



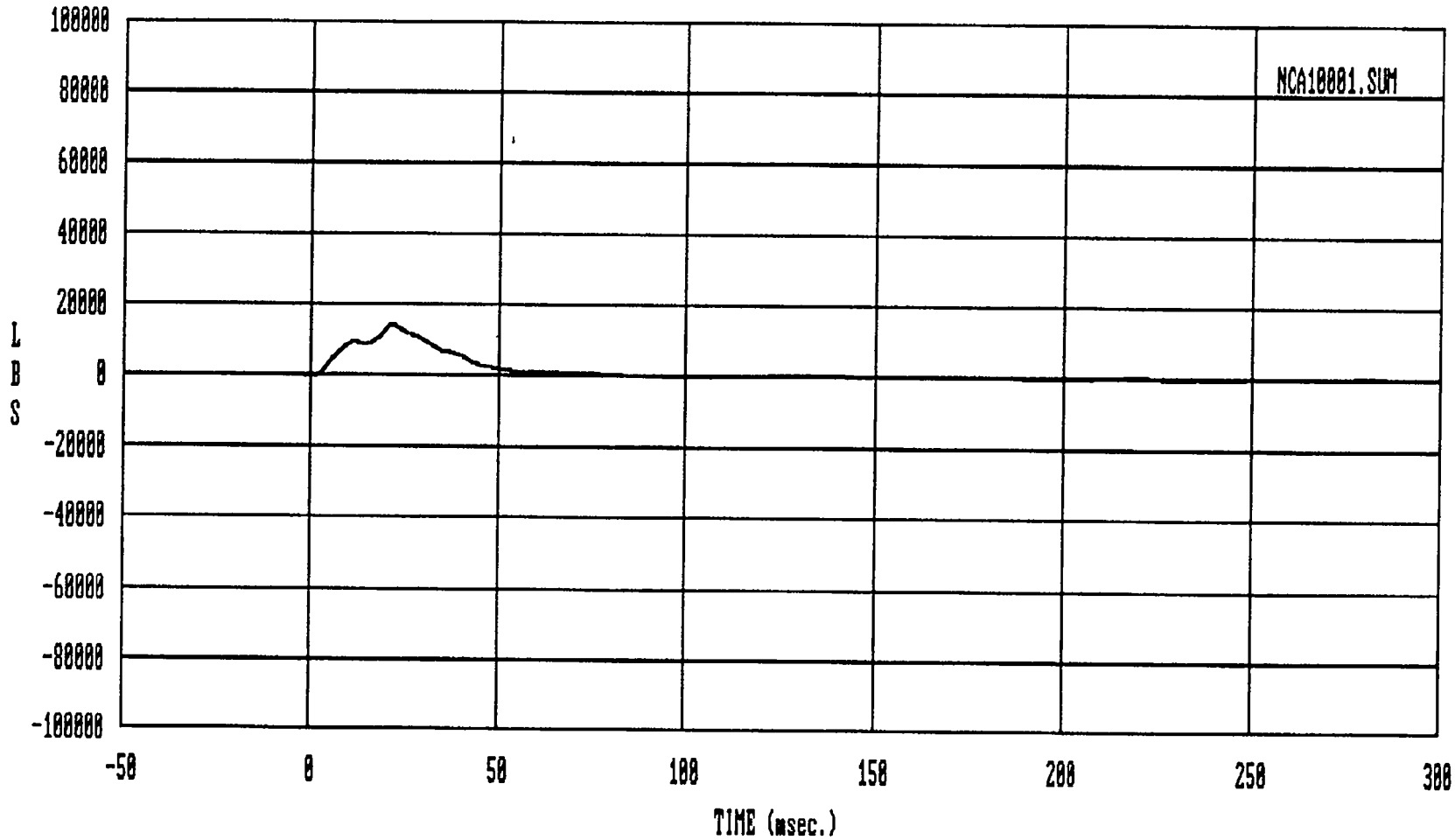
Curve: Force on Barrier load cell D8 Filter: SAE CLASS 60 Max = 549.77 Min = -242.80

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



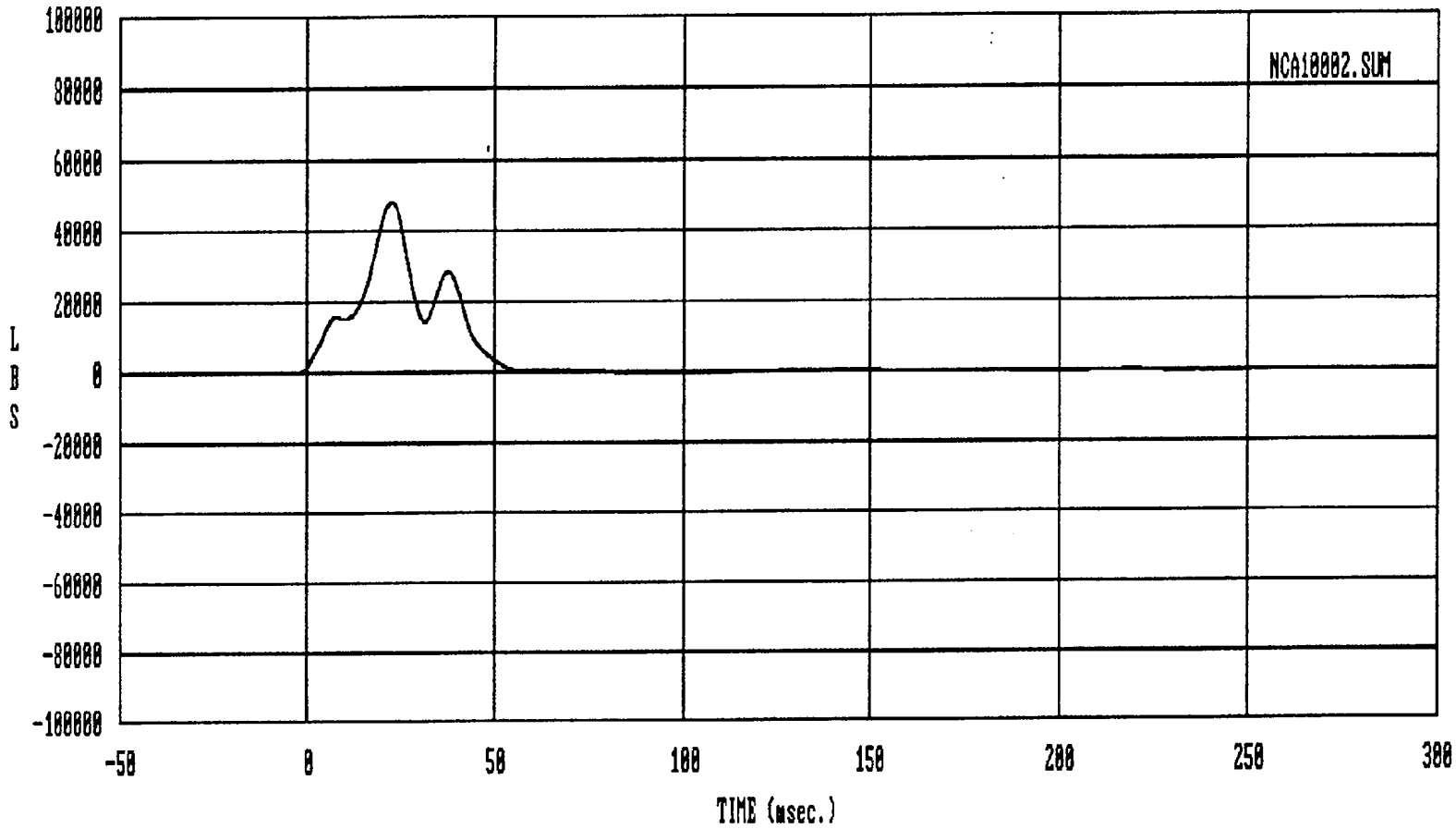
Curve: Force on Barrier load cell D9 Filter: SAE CLASS 60 Max = 457.01 Min = -272.74

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



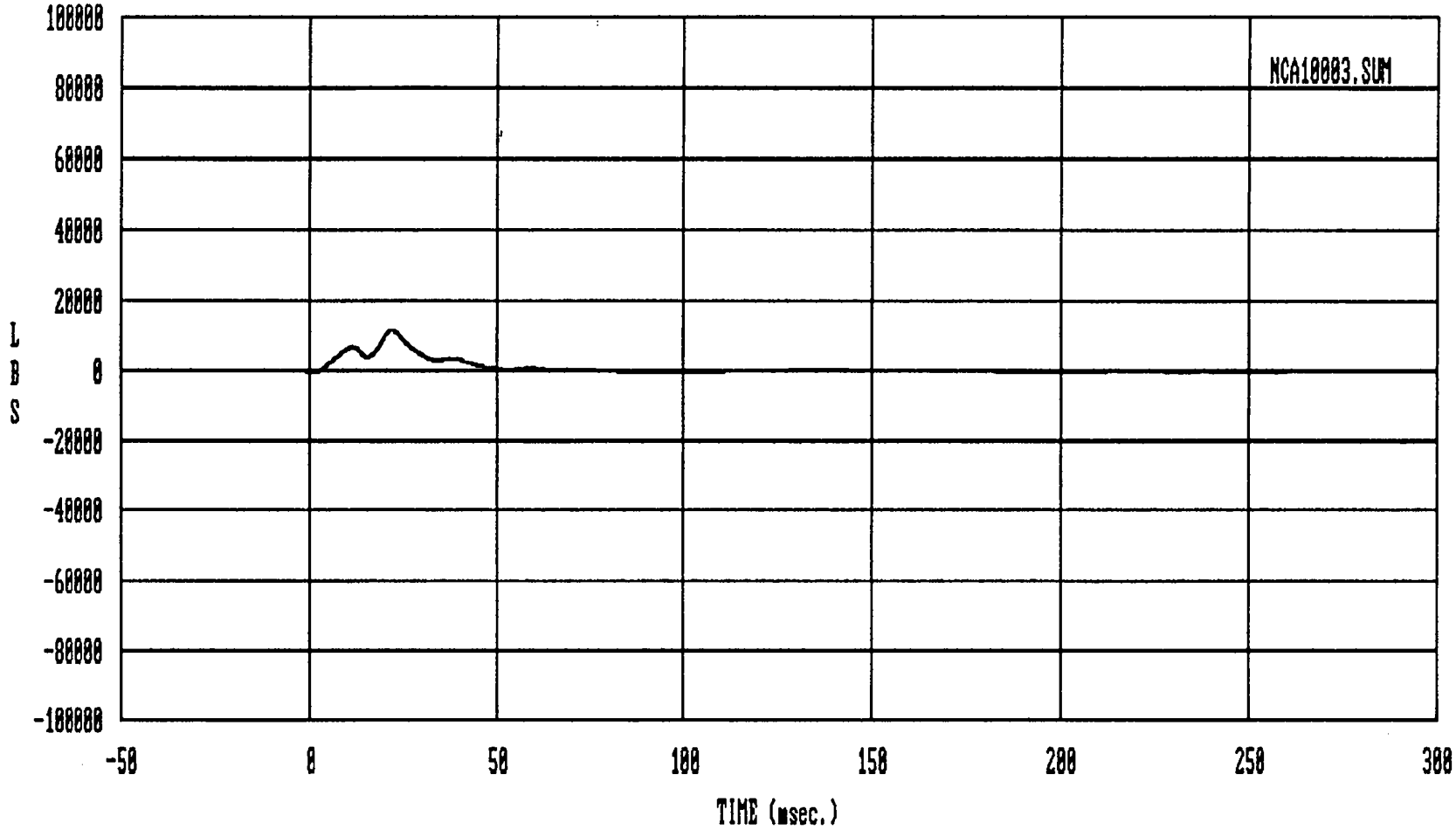
Curve: LCB sum force C1,C2,C3,D1,D2,D3 -- Group 1 Filter: SAE CLASS 60 Max = 14275. Min = -440.01

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



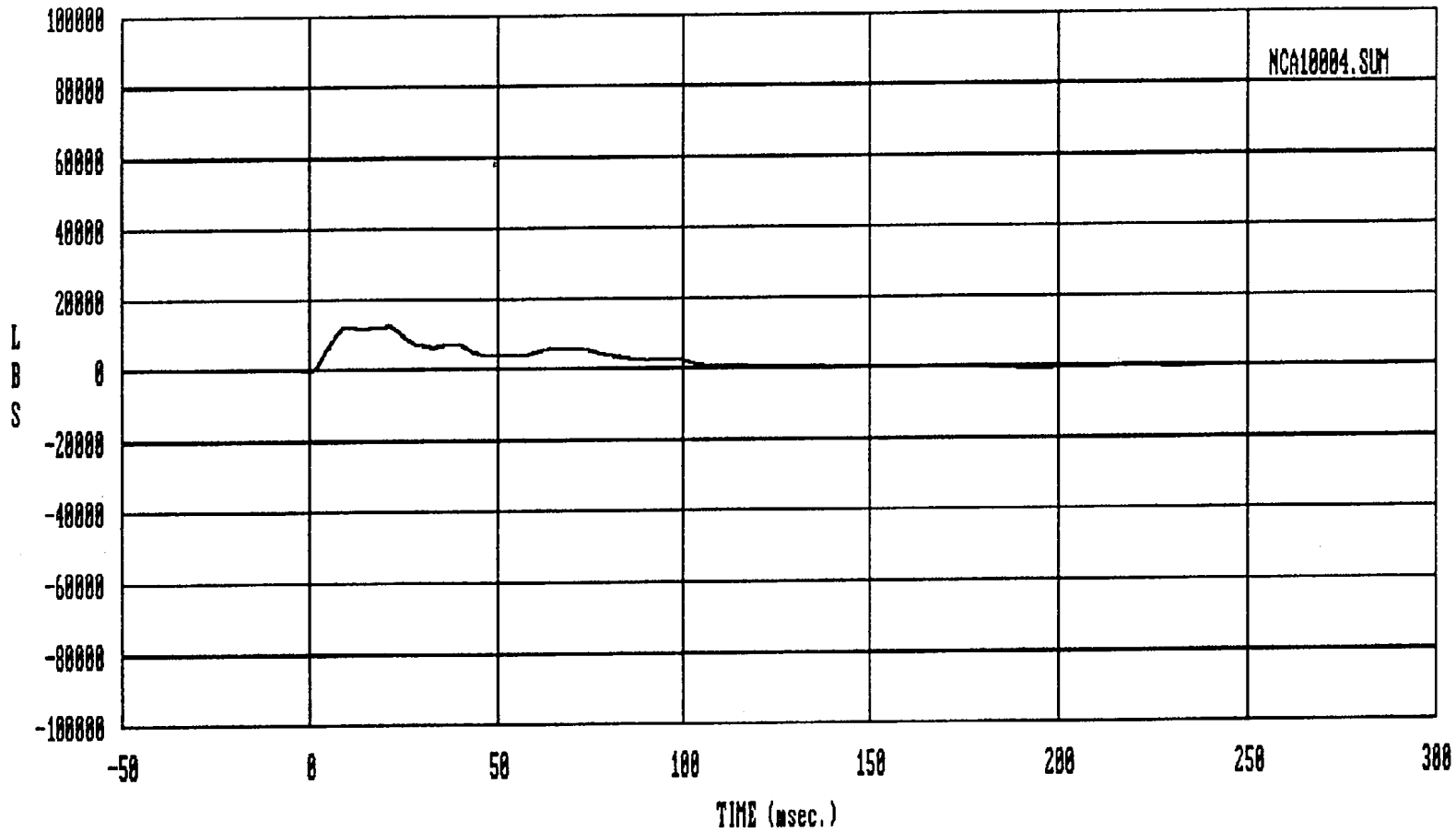
Curve: LCB sum force C4,C5,C6,D4,D5,D6 — Group 2 Filter: SAE CLASS 60 Max = 48556. Min = -435.41

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



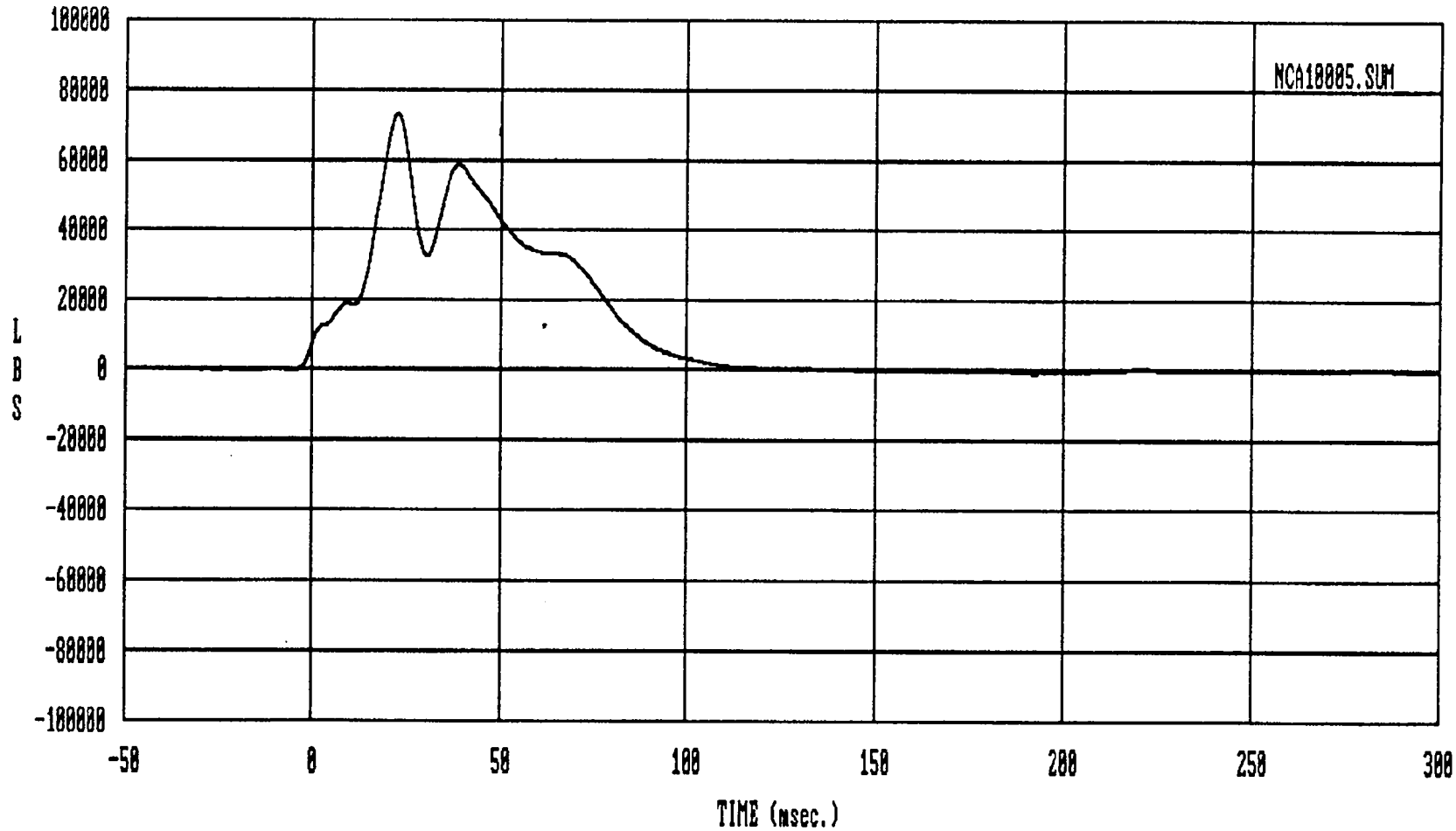
Curve: LCB sum force C7,C8,C9,D7,D8,D9 -- Group 3 Filter: SAE CLASS 60 Max = 11988. Min = -582.97

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



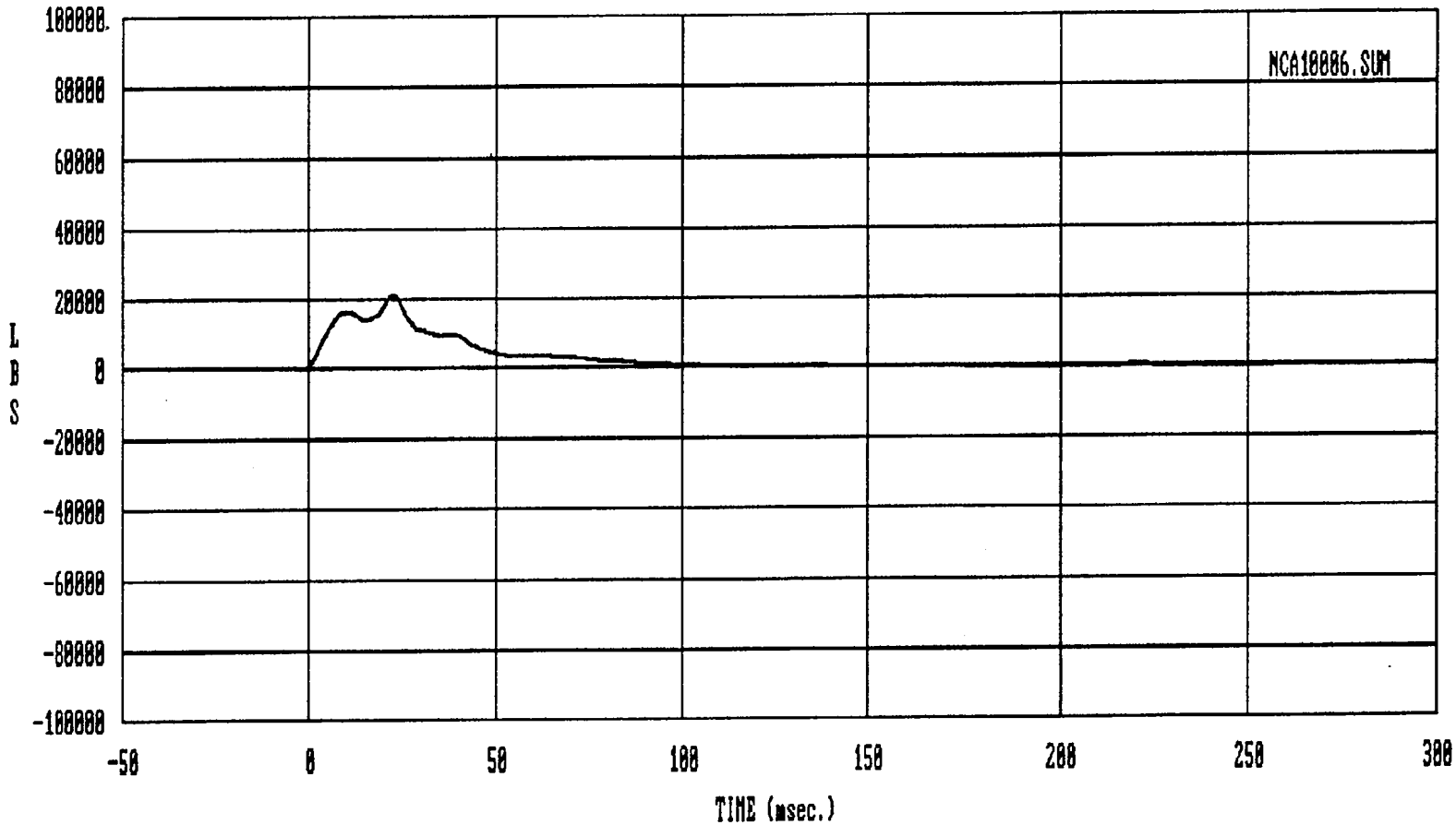
Curve: LCB sum force A1,A2,A3,B1,B2,B3 — Group 4 Filter: SAE CLASS 60 Max = 12432. Min = -664.16

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



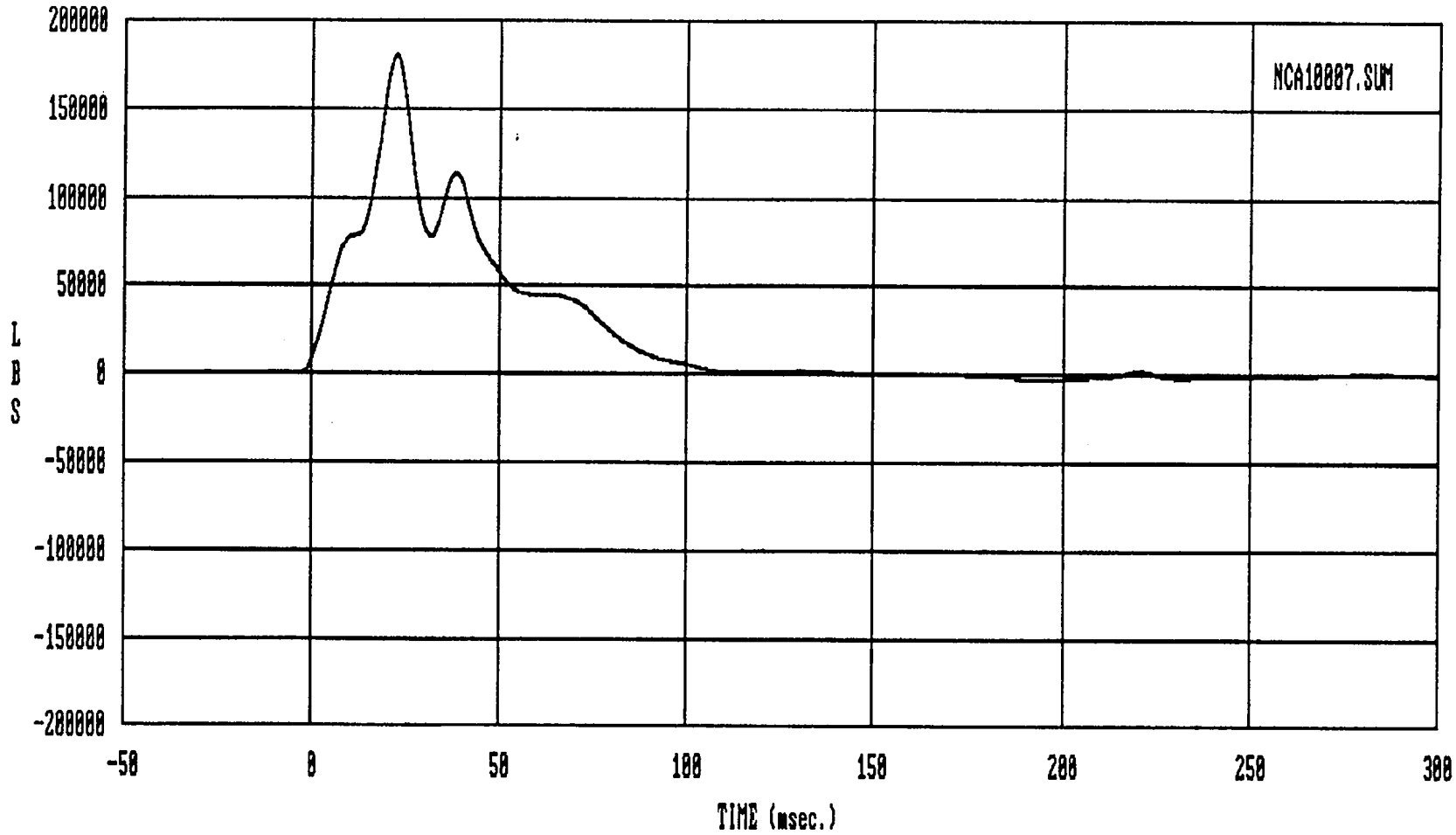
Curve: LCB sum force A4,A5,A6,B4,B5,B6 — Group 5 Filter: SAE CLASS 60 Max = 73526. Min = -952.14

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



Curve: LCB sum force A7,A8,A9,B7,B8,B9 -- Group 6 Filter: SAE CLASS 60 Max = 21201. Min = -744.39

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i



Curve: Load Cell Barrier total force Filter: SAE CLASS 60 Max = .18095E+06 Min = -3437.5

MSE Date: 03/13/90 Program: 1990 New Car Assessment #10 Vehicle: 1990 BMW 325i

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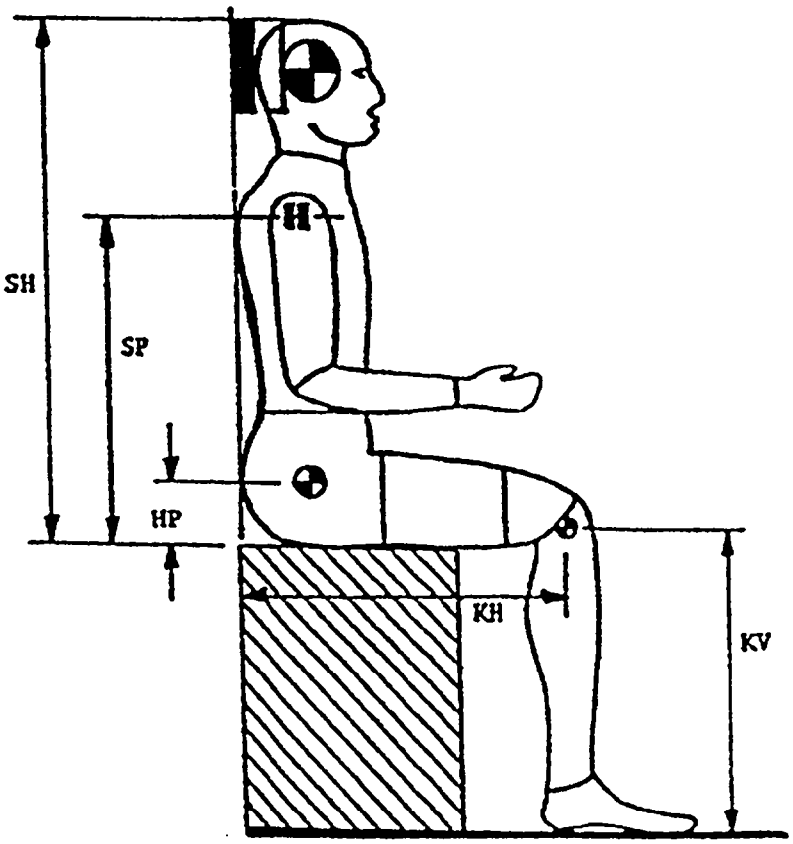
APPENDIX C

PART 572 DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION TESTS

I. CONFIGURATION VERIFICATION DATA:



	P. 572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION	//////////////	02/05/90 to 02/20/90	
VERIFICATION NUMBER FOR DUMMY* ---	//////////////	05	
SH - Seated Height- - - - - - - - -	35.6 to 35.8"	35.60	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	21.91	
HP - Hip Pivot Height - - - - - -	3.9 ref.	3.90	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.60	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.40	
SW - Shoulder Width - - - - - - - -	17.8 to 18.4"	18.20	
HW - Hip Width- - - - - - - - - - -	14.0 to 15.4"	15.00	

TECHNICIAN'S NAME: APURVA MAPARA

*Sequential number beginning with "1" at the start of each fiscal year's crash test program

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA: NHTSA DUMMY I.D. NO.: 4 6 4

TECHNICIAN NAME: APURVA MAPARA

	PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------	02/05-02/20/90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----	05	
VERIF. LAB. TEMPERATURE (66 to 78 F Range)----	68-72 F	F
VERIF. LAB. HUMIDITY (10 to 70% Range---------	60-70 %	%

TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.	210 to 260G	213.50	
b. Peak Lateral Accel.-	<10G	6.79	
c. Time above 100G - - -	0.9 to 1.5 ms	1.30	
2. NECK BENDING TEST--			
a. Pendulum Speed- - - -	21.5 to 22.5 fps	22.00	
b. Pend. Avg. Decel. over $t_3 - t_2$	20 to 24G	22.77	
c. Peak Resultant Head Acceleration - - - -	26G max.	25.80	
d. Pendulum Decel. $(t_2 - t_1)$	<3 ms	2.10	
e. Pendulum Decel. $(t_3 - t_2)$	25 to 30 ms	27.50	
f. Pendulum Decel. $(t_4 - t_3)$	<10 ms	10.00	
g. Max. Head Rotation -	63 to 73	64.25	
h. Chordal Displacement-Head Rotation Angle-			
0° Time- -	-2 to 2 ms	0.00	
0° Displ.-	-.5 to .5"	0.006	
30° Time- -	22.6 to 34 ms	31.60	
30° Displ.-	2.1 to 3.1"	2.78	
60° Time- -	40.3 to 51.7ms	51.40	
60° Displ.-	4.3 to 5.3"	5.30	
Maximum Time- -	53.2 to 66.8ms	57.50	
(64.25°) Displ.-	5.0 to 6.0"	5.84	

*beginning with "1" at the start of each fiscal year's crash test program

TECHNICIAN NAME: APURVA MAPARA

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST---- Continued: h. Chordal Displacement- Head Rotation Angle-				
60°	Time- -	67.0 to 83.0 ms	68.00	
	Displ.-	4.3 to 5.3 in.	5.28	
30°	Time- -	85.4 to 104.6 ms	86.60	
	Displ.-	2.1 to 3.1 in.	2.62	
0°	Time- -	101.0 to 123.0 ms	101.00	
	Displ.-	-.5 to 0.5 in.	0.169	
3. ABDOMINAL COMPRESSION TEST: (Preload=10 pounds)				
a. Force @ .5" - - - -		23 to 36 lbs.	27.00	
b. Force @ .75" - - - -		36 to 50 lbs.	43.00	
c. Force @ 1.0"- - - - -		50 to 63 lbs.	61.00	
d. Force @ 1.3"- - - - -		73 to 88 lbs.	84.00	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	32.60	
b. Force @ 30° - - - - -		34 to 46 lbs.	40.60	
c. Force @ 40° - - - - -		46 to 58 lbs.	54.00	
d. Return Angle- - - - -		12° maximum	10.00	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - - -		21.78-22.22 fps	21.88	
(2) Peak Deflection -		1.7" maximum	1.43	
(3) Peak Resistive Force - - - - - -		2250 lbs.maximum	2163.60	
(4) Internal Hysteresis		50 to 70%	50.50%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	13.90	
(2) Peak Deflection -		1.1" maximum	1.01	
(3) Peak Resistive Force - - - - - -		1450 lbs.maximum	1209.20	
(4) Internal Hysteresis		50 to 70%	53.30%	

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

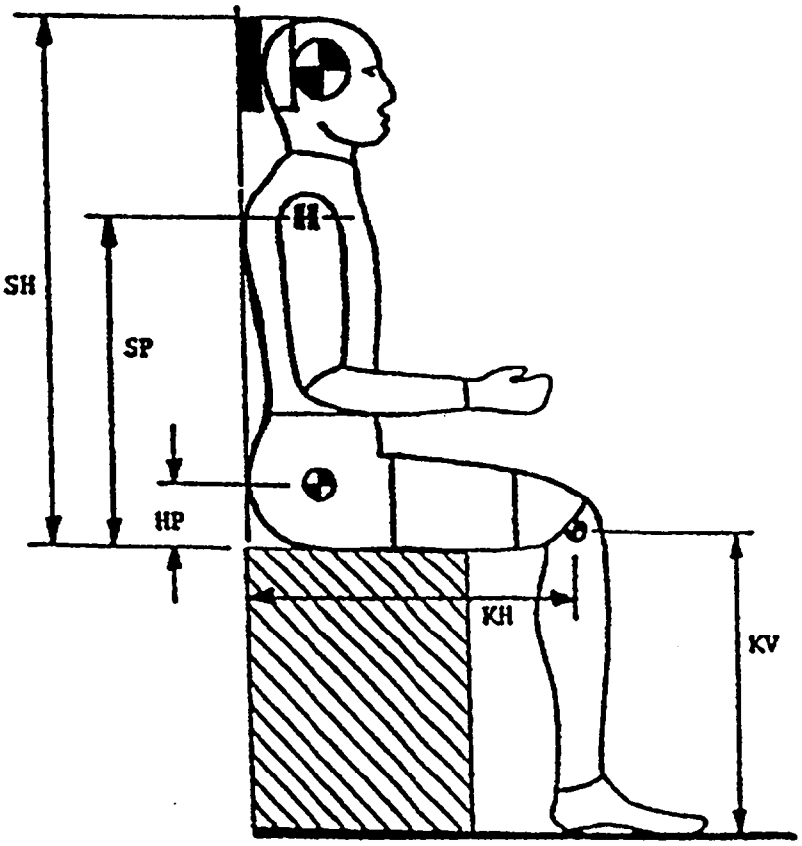
II. PERFORMANCE VERIFICATION DATA: NHTSA DUMMY I.D. NO.: 4 6 4

TECHNICIAN NAME: APURVA MAPARA

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
6. KNEE IMPCT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.81	
(2) Maximum Force - -	1850 to 2500 lbs	1906.40	
(3) Time Above 1000#-	1.7 ms minimum	2.40	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.80	
(2) Maximum Force - -	1850 to 2500 lbs	1880.90	
(3) Time Above 1000#-	1.7 ms minimum	2.10	

NHTSA DUMMY I.D. NO.: | 4 | 6 | 7 |

I. CONFIGURATION VERIFICATION DATA:



	P. 572 SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
DATE OF CONFIGURATION VERIFICATION	//////////////	02/05/90 to 02/20/90	
VERIFICATION NUMBER FOR DUMMY* ---	//////////////	03	
SH - Seated Height- - - - - - - - -	35.6 to 35.8"	35.60	
SP - Shoulder Pivot Height- - - -	21.8 to 22.4"	21.80	
HP - Hip Pivot Height - - - - - -	3.9 ref.	3.90	
KH - Knee Pivot from back line- -	20.1 to 20.7"	20.70	
KV - Knee Pivot from floor- - - -	19.3 to 19.9"	19.30	
SW - Shoulder Width - - - - - - - -	17.8 to 18.4"	18.20	
HW - Hip Width- - - - - - - - - - - -	14.0 to 15.4"	14.50	

TECHNICIAN'S NAME: APURVA MAPARA

*Sequential number beginning with "1" at the start of each fiscal year's crash test program

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA: NHTSA DUMMY I.D. NO.: | 4 | 6 | 7 |

TECHNICIAN NAME: APURVA MAPARA

		PRE-TEST (if required)	POST-TEST (if required)
DATE OF PERFORMANCE VERIFICATION----------		02/05-02/20/90	
SEQUENTIAL VERIFICATION NUMBER FOR DUMMY*-----		03	
VERIF. LAB. TEMPERATURE (66 to 78 F Range)----		68-72 F	F
VERIF. LAB. HUMIDITY (10 to 70% Range---------		60-70 %	%
TEST PARAMETER	SPECIFICATION		
1. HEAD DROP TEST--			
a. Peak Resultant Accel.	210 to 260G	222.84	
b. Peak Lateral Accel.-	<10G	3.07	
c. Time above 100G - - -	0.9 to 1.5 ms	1.20	
2. NECK BENDING TEST--			
a. Pendulum Speed- - - -	21.5 to 22.5 fps	22.00	
b. Pend. Avg. Decel. over $t_3 - t_2$	20 to 24G	22.34	
c. Peak Resultant Head Acceleration - - - -	26G max.	24.43	
d. Pendulum Decel. $(t_2 - t_1)$	<3 ms	2.65	
e. Pendulum Decel. $(t_3 - t_2)$	25 to 30 ms	26.70	
f. Pendulum Decel. $(t_4 - t_3)$	<10 ms	10.00	
g. Max. Head Rotation -	63 to 73	68.40	
h. Chordal Displacement-Head Rotation Angle-			
0° Time- -	-2 to 2 ms	0.00	
0° Displ.-	-.5 to .5"	0.012	
30° Time- -	22.6 to 34 ms	29.60	
30° Displ.-	2.1 to 3.1"	2.79	
60° Time- -	40.3 to 51.7ms	46.20	
60° Displ.-	4.3 to 5.3"	5.30	
Maximum Time- -	53.2 to 66.8ms	59.90	
(68.40°) Displ.-	5.0 to 6.0"	6.00	

*beginning with "1" at the start of each fiscal year's crash test program

TEST PARAMETER		SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
2. NECK BENDING TEST---- Continued:				
h. Chordal Displacement- Head Rotation Angle-				
60°	Time- -	67.0 to 83.0 ms	71.90	
	Displ.-	4.3 to 5.3 in.	5.30	
30°	Time- -	85.4 to 104.6 ms	88.45	
	Displ.-	2.1 to 3.1 in.	2.50	
0°	Time- -	101.0 to 123.0 ms	101.00	
	Displ.-	-.5 to 0.5 in.	0.152	
3. ABDOMINAL COMPRESSION TEST: (Preload=10 pounds)				
a. Force @ .5" - - - -		23 to 36 lbs.	32.00	
b. Force @ .75" - - - -		36 to 50 lbs.	49.00	
c. Force @ 1.0"- - - - -		50 to 63 lbs.	63.00	
d. Force @ 1.3"- - - - -		73 to 88 lbs.	85.00	
4. LUMBAR FLEXION TEST:				
a. Force @ 20° - - - - -		22 to 34 lbs.	31.00	
b. Force @ 30° - - - - -		34 to 46 lbs.	41.80	
c. Force @ 40° - - - - -		46 to 58 lbs.	51.00	
d. Return Angle- - - - -		12° maximum	5.20	
5. CHEST IMPACT TESTS:				
a. High Speed				
(1) Probe Speed - - -		21.78-22.22 fps	22.00	
(2) Peak Deflection -		1.7" maximum	1.69	
(3) Peak Resistive Force - - - - - -		2250 lbs.maximum	1969.50	
(4) Internal Hysteresis		50 to 70%	53.50%	
b. Low Speed				
(1) Probe Speed - - -		13.86-14.14 fps	14.00	
(2) Peak Deflection -		1.1" maximum	1.00	
(3) Peak Resistive Force - - - - - -		1450 lbs.maximum	1271.40	
(4) Internal Hysteresis		50 to 70%	61.60%	

DUMMY CONFIG. & PERF. VERIF. DATA....Continued:

II. PERFORMANCE VERIFICATION DATA: NHTSA DUMMY I.D. NO.: 4 6 7

TECHNICIAN NAME: APURVA MAPARA

TEST PARAMETER	SPECIFICATION	PRE-TEST (if required)	POST-TEST (if required)
6. KNEE IMPCT TESTS:			
a. Right Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.88	
(2) Maximum Force - -	1850 to 2500 lbs	2214.60	
(3) Time Above 1000#-	1.7 ms minimum	1.70	
b. Left Side--			
(1) Probe Speed - - -	6.76 to 7.04 fps	6.88	
(2) Maximum Force - -	1850 to 2500 lbs	1866.43	
(3) Time Above 1000#-	1.7 ms minimum	2.10	

APPENDIX D

VEHICLE OWNER'S MANUAL OCCUPANT RESTRAINT SYSTEM INSTRUCTIONS

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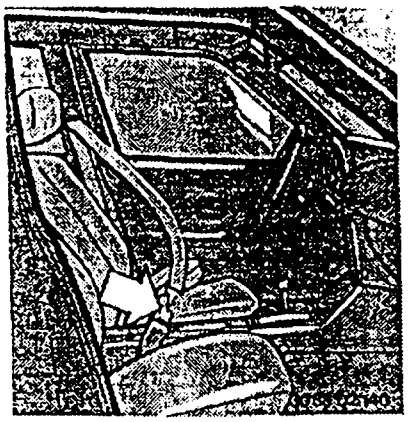


Seatbelts

Wear your seatbelts during each and every drive. The seatbelt must be locked with an audible click. To release the belt push the red square button marked "PRESS". To store the belt, move the belt tongue to its stowed position on the door post. Pull the belt across the chest and lap and be sure that the belts are not twisted. Make sure the belt does not pass over any hard or breakable objects in your pockets or clothing. The belts automatically adjust to ensure freedom of movement.

The belt must fit tightly against the body, that is why you should not incline the seat back too far to the rear and should avoid wearing thick and heavy clothing.

Tighten it from time to time by pulling up the shoulder strap.

The reminder in the Check Control will be actuated for a time of about 6 seconds when the ignition is switched on. At the same time a chime will sound. The chime will not sound, when the driver's belt is put on before switching on the ignition.

Note: The belt locking mechanism may operate

- **when taking sharp curves,**
- **when the car is at a steep angle,**
- **when pulling the belt rapidly,**
- **when the car accelerates or slows down.**

Only secure one person (over 6 years old) with each belt. Make sure that the belt does not pass over the throat.

Do not allow the belt to rub against sharp edges.

If seatbelts or **child restraint systems** are damaged or stretched by an accident, they must be replaced completely as a safety precaution.

Have the anchor points checked by your BMW dealer.

Do not tamper with any occupant restraint system.

Care of the belts is described in Section "Vehicle care".

General remarks on seat position

Back muscles and spinal discs obtain most relief when you move right back in your seat and relax. Ideally the driver's head should be on a line forming a direct extension of the spinal column.

On long trips the seatback angle can be slightly increased, thereby further reducing the strain on the body muscles. Make sure that you are able to hold the steering wheel with the arms slightly bent.

Child restraints

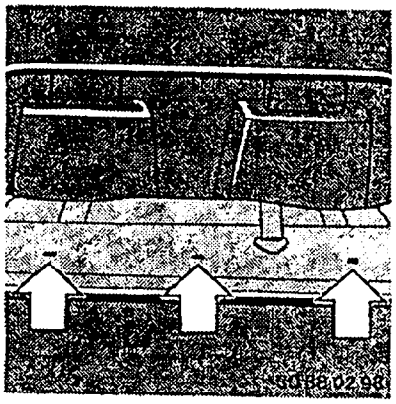
All occupants and especially children should be restrained whenever riding in cars.

Children should sit in the rear and use, depending on age, either a child restraint system or the existing safety belts. Accident statistics have shown that children are safer when properly restrained in the rear seats than in the front seating positions. In the rear seat, the center position is the safest.

Infants or toddlers should be secured with a child restraint system appropriate for their size.

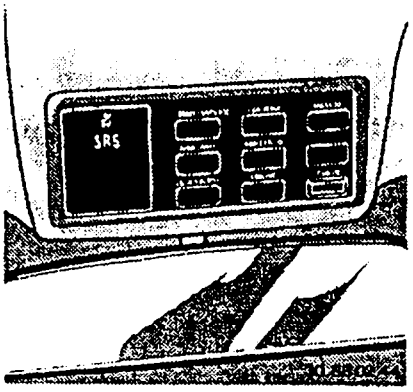
Children 6 years and older may wear seatbelts.

Commercially available child seats complying with the legal standard are designed to be secured with a seatbelt or with the



seatbelt portion of a combination lap-shoulder belt. Because improperly or inadequately installed restraint systems can increase the risk of injury to children, always read and follow the instructions that come with the system.

If the child restraint of your choice requires the use of a tether strap, three fastening points (arrow) have been provided on the rear shelf for attachment. Ask your authorized BMW dealer to perform the necessary work.



Supplementary Restraint System (SRS)

The Supplementary Restraint System which consists of an airbag, the gas generator, the crash sensors and the control unit, is designed to supplement the three-point seatbelt and to provide additional protection for the driver in the event of a serious frontal accident.

A diagnostic system continually monitors the readiness of the squib sensors and wiring integrity of the SRS. Monitoring begins when the ignition key is turned to position 1 (and further) and continues when the car is being driven.

System is working:
The SRS indicator is illuminated for about 6 seconds and goes out.

System defective:
indicator is not illuminated
- indicator goes out briefly after about 6 seconds and comes on again
- indicator comes on, flickers during a journey for about 5 minutes and stays on.

Have the system tested by an authorized BMW dealer as soon as possible.

Function

The airbag is mounted under the cover in the center of the steering wheel and is designed to inflate in a fraction of a second during collisions equivalent from approximately 12 mph/20 km/h and faster or frontal impacts into solid objects.

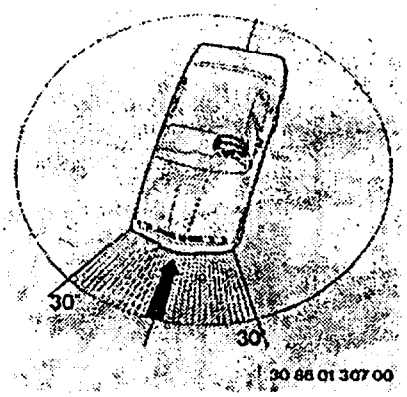
During the impact a sudden, fairly loud inflation noise will be heard and a small quantity of smoke will be released, neither of which is injurious.

Lesser impacts and those from the side and rear will not deploy the airbag, and protection will only be provided by the seatbelts.

The SRS does not replace the fastening of the seatbelts.

In connection with the seatbelt the SRS offers the best precondition for the protection of the body in case of a serious accident.

Tampering and improperly performed repairs can result in a failure of the system to operate or inadvertent activation.



The SRS can only be activated once. Only authorized BMW dealers should repair or replace the system.

Do not affix any labels, decorations, badges etc. to the cover at the center of the steering wheel.

Should a SRS have to be scrapped, contact a BMW dealer for the safety precautions. If you sell your car, we urge you to inform the purchaser about the system and give him this manual.

At the date specified on the label on the glovebox please have an authorized BMW dealer thoroughly inspect the entire SRS.