

V3058

NEW CAR ASSESSMENT PROGRAM (NCAP)

FRONTAL BARRIER IMPACT TEST

1999 Ford Ranger EV Pick-up

MGA PROVING GROUNDS
5000 WARREN ROAD
BURLINGTON, WI 53105



Test Date: February 18, 1999

Report Date: March 1, 1999

FINAL REPORT

Prepared For:

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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract A 56 kph (35 mph) frontal barrier impact using a rigid barrier was conducted on a 1999 Ford Ranger EV Pick-up in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure No. TP-NCAP090196 for the determination of vehicle crashworthiness on February 18, 1999. The barrier impact velocity was 56.6 kph (35.2 mph), and the ambient temperature at the time of impact was 21 °C. The post-test maximum static crush was 619 mm. The test vehicle appeared to comply with the requirements of the following Federal Motor Vehicle Safety Standards: 1. FMVSS 212, "Windshield Mounting" 2. FMVSS 219 (partial), "Windshield Zone Intrusion" 3. FMVSS 301, "Fuel System Integrity" With regard to "Occupant Crash Protection" injury criteria, the driver's HIC was 372 and the 3 msec. Clip (Chest g's) was 37 g's. The left and right femur loads for the driver were 4514 and 6302 Newtons, respectively. The passenger's HIC was 410 and the 3 msec Clip was 39 g's. The left and right femur maximum loads were 3748 and 3422 Newtons respectively.			
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SIGNATURE OF APPROVAL PAGE

PREPARED BY: Chad Gadberry
Chad Gadberry, Project Engineer

APPROVED BY: Dave Kosloske
Dave Kosloske, Program Manager

APPROVAL DATE: 3-12-99

TECHNICIANS: Al Chalmers
Wayne Dahlke
Chris Kulis
Tim Michnay
Erik Nelson
Chris Novak
Paul Schlimmer
Todd Stevenson
John Wistert

SECRETARY: Sheila Buckley

FINAL REPORT ACCEPTED BY:

Manager, New Car Assess. Program (NCAP)

Date of Report Acceptance

Contracting Officer's Tech. Rep. (COTR)

Date of Report Acceptance

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SECTION 1

PURPOSE AND SUMMARY OF NCAP TEST

This 35 mph frontal barrier impact test was conducted as an optional NCAP test. 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 48 kph (30 mph) FMVSS 208/212/219/301-75 requirements.

The 56 kph (35 mph) frontal barrier impact test was conducted in accordance with the National Highway Traffic Safety Administration (NHTSA) Inducant Test Procedure for New Car Assessment Program (NCAP) dated January 1, 1990. Data for FMVSS No. 212, "Windshield Mounting", FMVSS No. 219 (Partial), "Windshield Zone Intrusion", FMVSS No. 301-75, "Fuel System Integrity," as well as occupant performance data are provided herein.

A flat concrete barrier covered with 3/4" plywood was impacted by a 1999 Ford Ranger EV Pick-up at a velocity of 56.6 kph (35.2 mph). The test was performed at the MGA Proving Grounds and Crash Test Center on February 18, 1999. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The frontal barrier impact event was documented by one real-time camera and 16 high speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Part 572E, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions according to dummy placement instructions specified in the Laboratory Inducant Test Procedure.

Both ATDs were instrumented with head and chest primary and redundant triaxial accelerometers, pelvis triaxial accelerometers, a chest displacement transducer, a six axis neck load cell, right/left femur load cells, right/left lower leg sensors, and right/left foot accelerometers. Seat belt load cells were also on the driver and passenger lap and shoulder belts to measure dummy torso and pelvic section loading. Calibrated ATDs, driver (Serial No. 065), and the right front passenger (Serial No. 066), were used for this test. Certification details, along with instrumentation calibration data, are found in Appendices C and D.

The 107 channels of data were recorded on 11 computers. Appendix B contains the vehicle and dummy response data traces.

The driver's head struck the inflated airbag. The driver HIC was 372 and the maximum chest (CLIP) deceleration over 3 milliseconds was 37 g's. The maximum chest compression was 25 mm. The left and right femur loads were 4514 and 6302 Newtons respectively.

The right front passenger's head struck the inflated airbag. The passenger HIC was 410 and maximum chest (CLIP) deceleration over 3 milliseconds was 39 g's. The maximum chest compression was 23 mm. The left and right femur loads were 3748 and 3422 Newtons respectively.

SECTION 2
OCCUPANT AND VEHICLE
INFORMATION/DATA SHEETS

DATA SHEET NO. 1
CRASH TEST SUMMARY

Vehicle Yr/Make/Model/Body Style: 1999/Ford/Ranger EV/Pick-up
VIN.: 1FTZR0876XTA30286

Vehicle Test Weight: 2443.1 kgs.

Impact Velocity: 56.6 kph Maximum Static Crush: 619 mm

Vehicle Rebound: 786 mm

DUMMIES:	DRIVER	PASSENGER
Serial Number:	<u>065</u>	<u>066</u>
Restraint System:	<u>Frontal airbag and</u> <u>type II belt</u>	<u>Frontal airbag and</u> <u>type II belt</u>
No. Data Channels:	<u>40</u>	<u>40</u>

Number of Cameras: 1 Real Time
 16 High Speed

Door Opening Data: Yes LF Yes RF N/A LR N/A RR
(without use of tools)

FRONT SEAT(S) DATA	DRIVER	FRONT PASSENGER
Seat Shift:	<u>0 mm</u>	<u>0 mm</u>
Seat Back Movement:	<u>None</u>	<u>None</u>

VISIBLE DUMMY

CONTACT POINTS:	DRIVER	PASSENGER
Head	<u>to airbag</u>	<u>to airbag</u>
Chest	<u>none noted</u>	<u>none noted</u>
Left Knee	<u>to instrument panel/tilt lever</u>	<u>to airbag/glovebox</u>
Right Knee	<u>to instrument panel</u>	<u>to airbag/glovebox</u>

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

Vehicle Yr/Make/Model/Body Style: 1999/Ford/Ranger EV/Pick-up

VIN.: 1FTZR0876XTA30286

Body color: White Date of Manufacture: 10/98

Engine: ___ Cylinders; ___ C.I.D.; ___ Liters;
 ___ Gas; ___ Diesel; ___ Turbocharged; X Electric
 ___ Longitudinal; ___ Transverse

Transmission: N/A Speed; ___ Manual; X Automatic; ___ Overdrive

Final Drive: ___ Front Wheel; X Rear Wheel; ___ Four Wheel

Odometer Reading: 6 miles

Major Option:

X A/C; X P/S; X P/B; ___ P/wdo;
___ P/locks; X Tilt Wheel; ___ Cruise Control; X ABS

Other: _____

DATA RECORDED FROM VEHICLE'S TIRE PLACARD:

Tire Pressure (at capacity): Front 345 kPa (50 Psi) Rear 345 kPa (50 Psi)

Recommended Tire Size: P225/70R15

Recommended Cold Tire Pressure: Front 345 kPa (50 Psi) Rear 345 kPa (50 Psi)

Tires on Vehicle: P225/70R15 Manufacturer: Uniroyal

Number of Occupants: 2 Front; ___ Rear; ___ 3rd Seat; 2 TOTAL

Type of Front Seats: ___ Bucket; ___ Bench; X Split Bench

Type of Front Seat Back: Fixed; X Adj. With; ___ Power; X Lever

Vehicle Capacity Weight (VCW) = 249.1 kg. (A)

No. of Occupants x 68.04 kg. = 136.1 kg. (B)

Rated Cargo Weight (RCW) A-B = 113.0* kg.

GVWR 2449.4 kg. GAWR: Front 1229.2 kg.; Rear 1361.8 kg.

* 113.0 kg is the maximum RCW in order to not exceed GVWR.

GENERAL TEST AND VEHICLE PARAMETER DATA (Cont'd)

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS) = UDW:Right Front = 545.2 kgRight Rear = 527.1 kgLeft Front = 554.7 kgLeft Rear = 553.4 kgTOTAL FRONT WEIGHT = 1099.9 kg (50.4 % of Total Vehicle Weight)TOTAL REAR WEIGHT = 1080.5 kg (49.6 % of Total Vehicle Weight)TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 2180.4 kgCALCULATION FOR TARGET TEST WEIGHT:UDW = Unloaded Delivered Weight 2180.4 kgVCW = Vehicle Capacity Weight 249.1 kgDSC = Designated Seating Capacity 2RCW = VCW - 68 (DSC) = 113.0 kg

Target Test Weight = UDW + RCW + (2 dummies x 78.0 kg/dummy)

Target Test Weight = 2449.4 kgWEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:Right Front = 589.2 kgRight Rear = 610.1 kgLeft Front = 596.5 kgLeft Rear = 647.3 kgTOTAL FRONT WEIGHT = 1185.7 kg (48.5 % of Total Vehicle Weight)TOTAL REAR WEIGHT = 1257.4 kg (51.5 % of Total Vehicle Weight)TOTAL TEST WEIGHT = 2443.1 kgWeight of ballast secured in vehicle trunk area = 0 kgVehicle components removed to meet target weight: Spare tire, hub coversVEHICLE ATTITUDE (all dimensions in mm):Delivered Attitude: RF 857 LF 853 RR 860 LR 848Test Attitude: RF 851 LF 838 RR 835 LR 825Post Test RF 955 LF 933 RR 835 LR 835Wheel Base: 2860 mm; C.G. = 1379 mm rearward of front wheel C/L

Remarks: _____

DATA SHEET NO. 3
POST-IMPACT DATA

Vehicle Yr/Make/Model/Body Style: 1999/Ford/Ranger EV/Pick-up
VIN.: 1FTZR0876XTA30286

Type of Test: 35 mph Frontal Impact Impact Angle: 0°
Date of Test: February 18, 1999 Time of Test: 3:20 p.m.

Ambient Temperature: 21°C (69.0°F) (Spec. Range = 18.8 to 25.6°C)

Temperature in Occupant Compartment: 21° C

Windshield Molding Temperature: 21° C

Required Impact Velocity Range: 55.5 to 57.1 kph

Impact Velocity: primary = 56.6 kph; secondary = N/A kph

Distance From Front Bumper to Barrier Face When

Entering Speed Trap: 1305 mm

Exiting Speed Trap: 305 mm

VEHICLE REBOUND AND CRUSH (mm):

Vehicle Length:	Pre-test	= Right	<u>4305</u>	C/L	<u>4405</u>	Left	<u>4295</u>
	Post-test	= Right	<u>3765</u>	C/L	<u>3786</u>	Left	<u>3746</u>
	Crush	= Right	<u>540</u>	C/L	<u>619</u>	Left	<u>549</u>

Distance from front of test vehicle to point of impact (rebound):

Right 805 mm C/L 757 mm Left 795 mm

Average = 786 mm

DATA SHEET NO. 4
TEST VEHICLE INFORMATION

	<u>Front</u>		<u>Rear</u>	
<u>Post-Test Door Opening</u>	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
(without use of tools)	<u>Yes</u>	<u>Yes</u>	<u>N/A</u>	<u>N/A</u>

	<u>Front</u>		<u>Rear</u>	
<u>Seat Movement</u>	<u>Left</u>	<u>Right</u>	<u>Left</u>	<u>Right</u>
Seat Back Movement	<u>None</u>	<u>None</u>	<u>N/A</u>	<u>N/A</u>
Seat Shift (mm)	<u>0 mm</u>	<u>0 mm</u>	<u>N/A</u>	<u>N/A</u>

Glazing Damage

Backlight/Windshield Windshield Cracked

Other Notable Impact Effects: Frontal airbags deployed

DATA SHEET 5

FMVSS NO. 212, "WINDSHIELD MOUNTING", DATA SHEET

Details of windshield mounting such as retention method, trim type, etc.:

Windshield set in rubber molding with glue

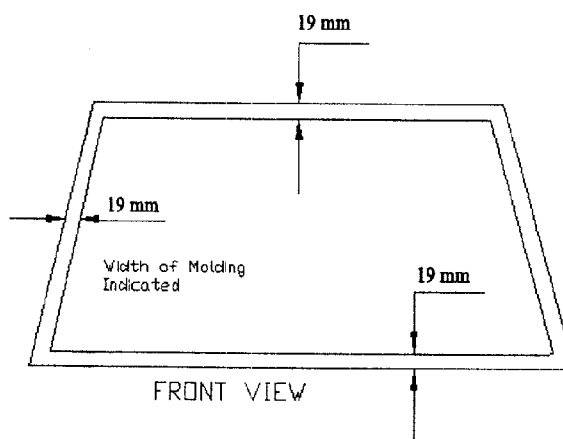
FMVSS 212 Requirements:

The Post-Test periphery retention amount must be at least 75% of the Pre-Test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

FMVSS 212 TEST DATA:

	WINDSHIELD PERIPHERY		
	PRE-TEST (mm)	POST-TEST (mm)	PERCENT RETENTION
RIGHT SIDE	1933	1933	100%
LEFT SIDE	1934	1934	100%
TOTAL	3867	3867	100%

AREA OF RETENTION FAILURE: None



FAILURE DETAILS: None

DATA SHEET 6

FMVSS NO. 219, "WINDSHIELD ZONE INTRUSION", DATA SHEET

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 6.5" dia. rigid sphere weighing 15 pounds in a position such that it simultaneously contacts the inner surface of the windshield and the surface of the instrument panel, including padding, and drawing the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contact points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and $\frac{1}{2}$ " distant from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

FMVSS 219 TEST DATA:

A= 1218 mm

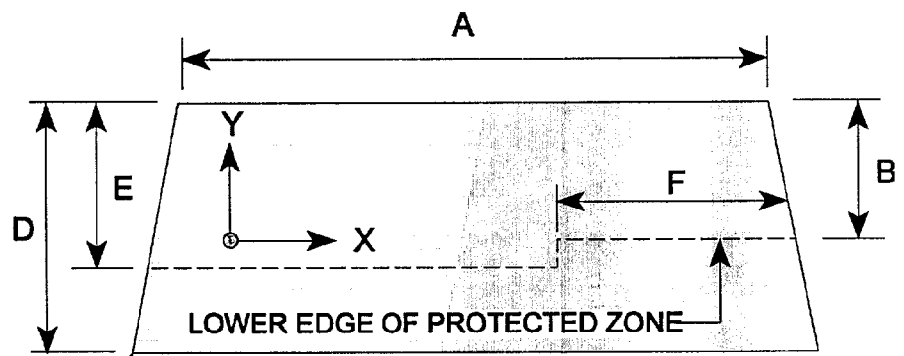
B= 330 mm

C= 1500 mm

D= 574 mm

E= 380 mm

F= 693 mm

DETAILS OF WINDSHIELD GLASS PENETRATION GREATER THAN 1/4":

(Show location of penetration)

DATA SHEET 7

FMVSS NO. 301-75, FUEL SYSTEM INTEGRITY POST IMPACT TEST DATA

FMVSS NO. 301

Note: This data sheet has been modified to include SAE J1766 (Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing).

Test Date: February 18, 1999

Vehicle Mfg./Make/Model: Ford/Ranger EV/ Pick-up

TEST REQUIREMENTS:

Crash tests shall be performed with the vehicle's traction batteries charged per manufacturer's charging provider, to a minimum state of charge of 95%.

Electrical isolation between the battery system and vehicle conducting structure must be maintained at 500 ohms/volt at the nominal traction voltage. With a traction voltage of 333V, post-test isolation resistance was found to be infinite.

STATE OF CHARGE OF TEST VEHICLE: 100%

TEST VEHICLE IMPACT TYPE: ☒ Frontal (35 mph)

☐ Oblique (30 mph) with ☐ barrier face first
contacting (driver/passenger) side

☐ Rear Moving Barrier (30 mph)

☐ Side Impact MDB (33.2 mph)

ELECTROLYTE SPILLAGE MEASUREMENT:

1. From impact until vehicle motion ceases
2. For 5 minute period after vehicle motion ceases
3. For next 25 minutes
4. During static rollover

ALLOWED
5.0 liters total

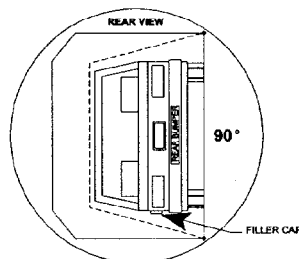
ELECTROLYTE SPILLAGE DETAILS: None

DATA SHEET 8

FMVSS NO. 301 STATIC ROLLOVER DATA SHEET

Note: This data sheet has been modified to include SAE J1766 (Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing).

TEST PHASE: 0° - 90°



I. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 51 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 51 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Electrolyte Spillage

5.0 liters from time vehicle motion ceases to completion of static rollover

III. ACTUAL TEST VEHICLE ELECTROLYTE SPILLAGE:

0.0 liters	0.0 liters	0.0 liters	0.0 liters
------------	------------	------------	------------

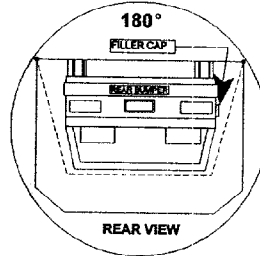
Note: Record spillage for whole minute intervals only as determined above.

IV. ELECTROLYTE SPILLAGE LOCATIONS(S): None

DATA SHEET 8
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (Cont'd)

Note: This data sheet has been modified to include SAE J1766 (Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing).

TEST PHASE: 90°- 180°



I. DETERMINATION OF ELECTROLYTE COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 30 seconds
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 30 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Electrolyte Spillage

5.0 liters from time vehicle motion ceases to completion of static rollover

III. ACTUAL TEST VEHICLE ELECTROLYTE SPILLAGE:

0.0 liters	0.0 liters	0.0 liters	0.0 liters
------------	------------	------------	------------

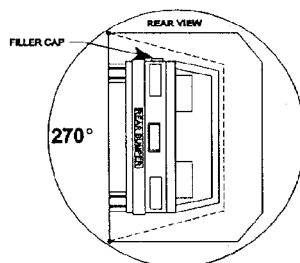
Note: Record spillage for whole minute intervals only as determined above.

IV. ELECTROLYTE SPILLAGE LOCATIONS(S): None

DATA SHEET 8
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (Cont'd)

Note: This data sheet has been modified to include SAE J1766 (Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing).

TEST PHASE: 180° - 270°



I. DETERMINATION OF ELECTROLYTE COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 9 seconds
(Spec. Range = 1 to 3 minutes)
FMVSS 301 Position Hold Time + 5 minutes 0 seconds
TOTAL 7 minutes 9 seconds
Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Electrolyte Spillage

5 .0 liters from time vehicle motion ceases to completion of static rollover
--

III. ACTUAL TEST VEHICLE ELECTROLYTE SPILLAGE:

0.0 liters	0.0 liters	0.0 liters	0.0 liters
------------	------------	------------	------------

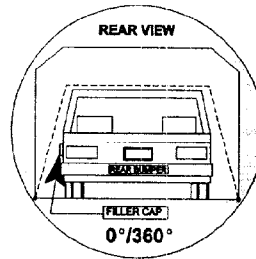
Note: Record spillage for whole minute intervals only as determined above.

IV. ELECTROLYTE SPILLAGE LOCATIONS(S): None

DATA SHEET 8
FMVSS NO. 301 STATIC ROLLOVER DATA SHEET (Cont'd)

Note: This data sheet has been modified to include SAE J1766 (Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing).

TEST PHASE: 270° - 360°



I. DETERMINATION OF ELECTROLYTE COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time 2 minutes 39 seconds

(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time + 5 minutes 0 seconds

TOTAL 7 minutes 39 seconds

Next whole minute interval 8 minutes

II. FMVSS 301 REQUIREMENTS:

(1) Time Period

First 5 min FROM onset of rotation	6th min.	7th min.	8th min. if reqd.
------------------------------------	----------	----------	-------------------

(2) Maximum Allowable Electrolyte Spillage

5.0 liters from time vehicle motion ceases to completion of static rollover

III. ACTUAL TEST VEHICLE ELECTROLYTE SPILLAGE:

0.0 liters	0.0 liters	0.0 liters	0.0 liters
------------	------------	------------	------------

Note: Record spillage for whole minute intervals only as determined above.

IV. ELECTROLYTE SPILLAGE LOCATIONS(S): None

DATA SHEET 9

DUMMY INJURY CRITERIA VALUES DATA SHEET

Vehicle Year/Make/Model/Body Style: 1999/Ford/Ranger EV/Pick-upTest Date: February 18, 1999

DESCRIPTION	UNIT	MAXIMUM VALUE			
		pos.	msec.	neg.	msec.
Pos. 1 Head X	G	2.0	31	-46.5	75
Pos. 1 Head Y	G	14.5	89	-2.9	52
Pos. 1 Head Z	G	19.6	59	-5.2	103
Pos. 1 Head Resultant	G	48.9	70	---	---
Pos. 2 Head X	G	2.0	32	-51.4	82
Pos. 2 Head Y	G	4.9	73	-13.6	98
Pos. 2 Head Z	G	25.3	83	-1.3	19
Pos. 2 Head Resultant	G	57.3	82	---	---
Pos. 1 Chest X	G	1.4	158	-36.9	74
Pos. 1 Chest Y	G	6.2	73	-5.8	39
Pos. 1 Chest Z	G	13.3	68	-8.6	92
Pos. 1 Chest Resultant	G	38.5	74	---	---
Pos. 1 Chest Displacement*	mm	10.9	25	-25.2	75
Pos. 2 Chest X	G	1.4	156	-39.6	75
Pos. 2 Chest Y	G	3.4	50	-2.4	115
Pos. 2 Chest Z	G	13.5	62	-7.0	118
Pos. 2 Chest Resultant	G	39.7	75	---	---
Pos. 2 Chest Displacement*	mm	2.2	31	-23.0	92
Pos. 1 Left Femur	N	201	126	-4514	46
Pos. 1 Right Femur	N	141	22	-6302	39
Pos. 2 Left Femur	N	238	157	-3748	49
Pos. 2 Right Femur	N	121	123	-3422	56

* Data shifted from 23.0 to 27.3 msec. and from 125.0 to 126.6 msec.

DATA SHEET 9
DUMMY INJURY CRITERIA VALUES DATA SHEET (Cont'd)

DESCRIPTION	UNIT	MAXIMUM VALUE			
		pos.	msec.	neg.	msec.
Pos. 1 Lap Belt Load	N	2805	47	---	---
Pos. 1 Torso Belt Load	N	4706	58	---	---
Pos. 2 Lap Belt Load	N	5793	75	---	---
Pos. 2 Torso Belt Load	N	4416	51	---	---
Pos. 1 Upper Neck Fx	N	238	121	-310	123
Pos. 1 Upper Neck Fy	N	256	124	-214	72
Pos. 1 Upper Neck Fz	N	1958	69	-685	17
Pos. 1 Neck Force Resultant	N	1970	69	---	---
Pos. 1 Upper Neck Mx	N•m	20.8	83	-3.1	43
Pos. 1 Upper Neck My	N•m	12.8	174	-19.5	47
Pos. 1 Upper Neck Mz	N•m	12.5	169	-20.3	96
Pos. 1 Neck Moment Result	N•m	24.0	96	---	---
Pos. 2 Upper Neck Fx	N	52	28	-49	45
Pos. 2 Upper Neck Fy	N	194	77	-170	136
Pos. 2 Upper Neck Fz	N	1382	77	-170	166
Pos. 2 Neck Force Result	N	1395	77	---	---
Pos. 2 Upper Neck Mx	N•m	15.1	101	-9.9	130
Pos. 2 Upper Neck My	N•m	35.8	91	-28.1	60
Pos. 2 Upper Neck Mz	N•m	19.6	94	-8.8	149
Pos. 2 Neck Moment Result	N•m	40.4	91	---	---
Pos. 1 Pelvic (X)	G	3.1	127	-65.2	41
Pos. 1 Pelvic (Y)	G	8.2	96	-6.8	37
Pos. 1 Pelvic (Z)	G	17.7	97	-1.9	38
Pos. 1 Pelvic Resultant	G	65.9	41	---	---

DATA SHEET 9

DUMMY INJURY CRITERIA VALUES DATA SHEET (Cont'd)

DESCRIPTION	UNIT	MAXIMUM VALUE			
		pos.	msec.	neg.	msec.
Pos. 2 Pelvic (X)	G	3.4	135	-67.4	47
Pos. 2 Pelvic (Y)	G	7.1	55	-7.7	93
Pos. 2 Pelvic (Z)	G	17.4	100	-2.7	48
Pos. 2 Pelvic Resultant	G	67.5	47	---	---
Pos. 1 Left Upper Tibia Mx	N•m	68.9	37	-38.5	52
Pos. 1 Left Upper Tibia My	N•m	41.2	147	-143.2	36
Pos. 1 Left Upper Tibia Fz	N	60	149	-994	46
Pos. 1 Left Lower Tibia Mx	N•m	33.6	36	-99.7	42
Pos. 1 Left Lower Tibia My	N•m	81.4	48	-36.2	37
Pos. 1 Left Lower Tibia Fz	N	34	143	-1011	35
Pos. 1 Right Upper Tibia Mx	N•m	27.4	40	-101.9	58
Pos. 1 Right Upper Tibia My	N•m	34.4	149	-341.3	37
Pos. 1 Right Upper Tibia Fz	N	42	193	-1547	39
Pos. 1 Right Lower Tibia Mx	N•m	32.9	40	-115.0	58
Pos. 1 Right Lower Tibia My	N•m	52.2	34	-57.3	64
Pos. 1 Right Lower Tibia Fz	N	44	192	-1655	39
Pos. 2 Left Upper Tibia Mx	N•m	58.1	46	-15.1	200
Pos. 2 Left Upper Tibia My	N•m	40.3	48	-122.7	33
Pos. 2 Left Upper Tibia Fz	N	39	166	-580	33
Pos. 2 Left Lower Tibia Mx	N•m	16.5	46	-17.2	78
Pos. 2 Left Lower Tibia My	N•m	65.6	51	-24.8	77
Pos. 2 Left Lower Tibia Fz	N	30	14	-734	33
Pos. 2 Right Upper Tibia Mx	N•m	63.3	50	-4.2	200
Pos. 2 Right Upper Tibia My	N•m	21.1	160	-146.5	34
Pos. 2 Right Lower Tibia Fz	N	28	159	-707	34
Pos. 2 Right Lower Tibia Mx	N•m	51.2	57	-36.8	71
Pos. 2 Right Lower Tibia My	N•m	18.6	49	-3.2	77
Pos. 1 Right Lower Tibia Fz	N	24	149	-894	34

DATA SHEET 10
DUMMY POSITIONING IN VEHICLE

Vehicle: 1999 Ford Ranger EV Pick-up

SEAT TYPE:

☐ Bench
☐ Bucket
☒ Split Bench

ADJUSTER TYPE:

Driver: ☒ Manual
☐ Power

Passenger: ☒ Manual
☐ Power

BUCKET SEAT BACK TYPE:

☐ Fixed
☒ Adjustable Reclining

☐ Fixed
☒ Adjustable Reclining

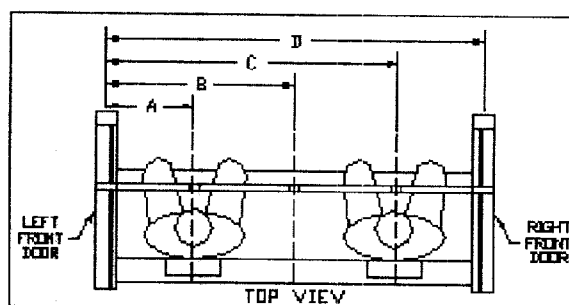
DRIVER SEAT POSITION

12th detent of 24 detents
Seat back angle 21.7° (ref. sill)

PASSENGER SEAT POSITION

12th detent of 24 detents
Seat back angle 21.3° (ref. sill)

Steering column set to mid position. Steering column angle 21.8° (3rd position of 5)



065 DUMMY ID 066

A = Left Door to Driver Centerline	<u>294</u> mm
B = Left Door to Center Passenger Centerline	<u>761</u> mm
C = Left Door to Right Passenger Centerline	<u>1120</u> mm
D = Left Door to Right Door	<u>1522</u> mm

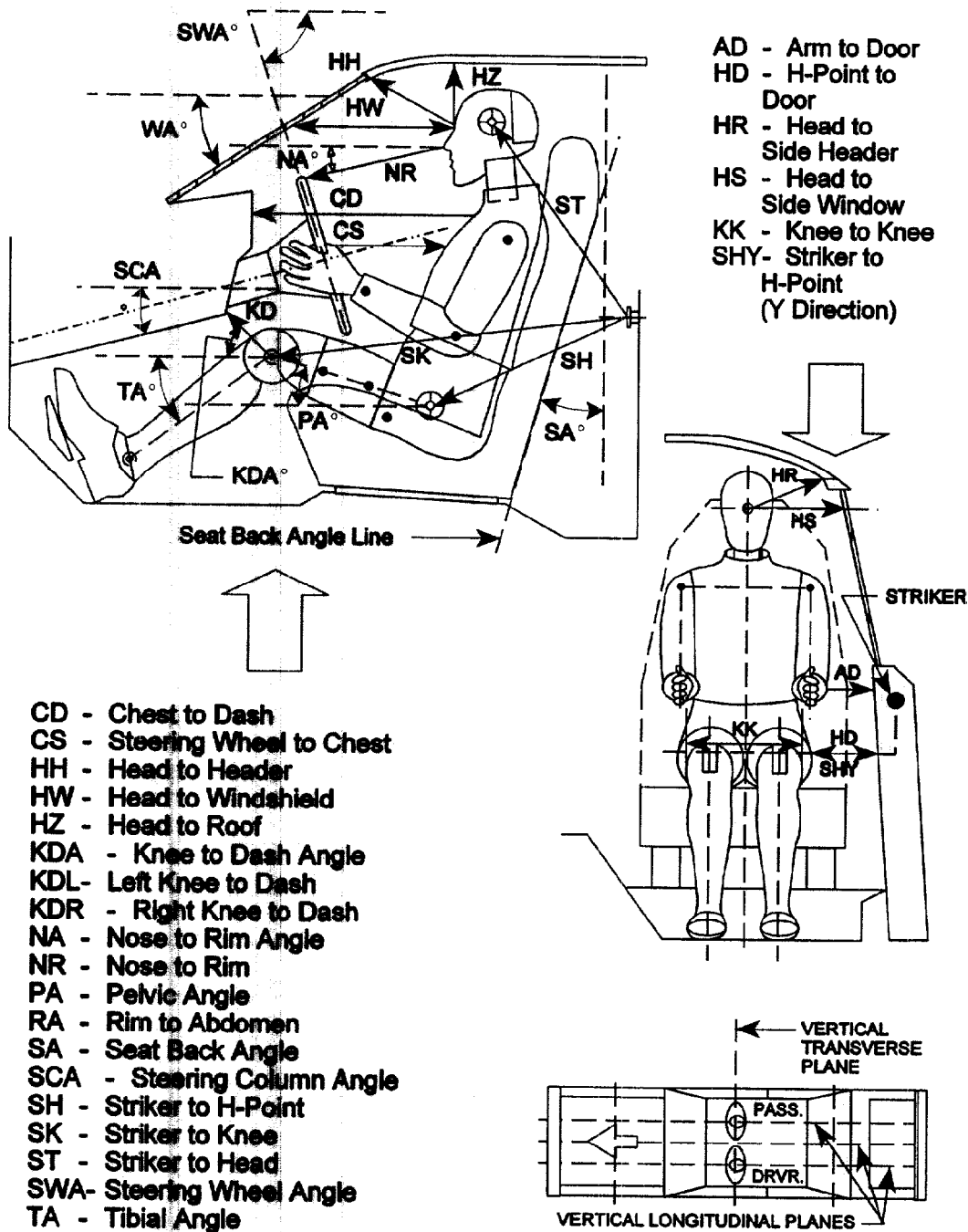
DATA SHEET 10
DUMMY POSITIONING IN VEHICLE (Cont'd)

Units (mm)

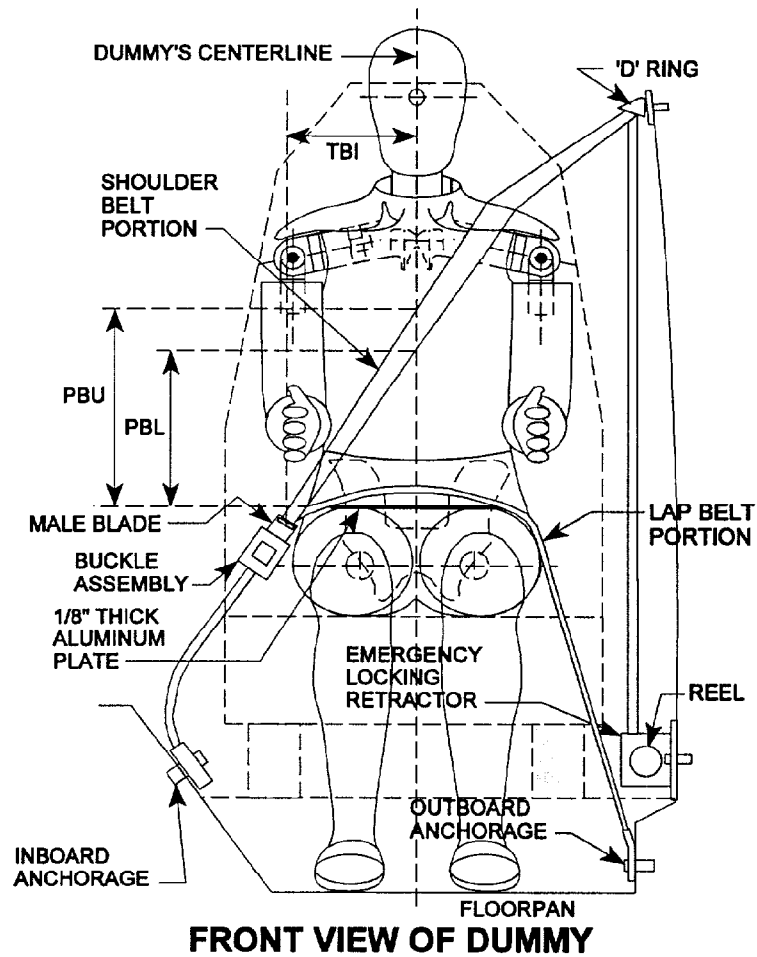
	DRIVER (Serial #065)	PASSENGER (Serial #066)
WA°	40.2°	
SWA°	21.8°	N/A
SCA°	41.4°	N/A
SA°	21.7°	21.3°
HZ	207	203
HH	445	453
HW	590	594
HR	264	280
NR	356 Angle 13.9°	N/A
CD	512	575
CS	292	N/A
RA	178	N/A
KDL	178 Angle (KDA) 11.0°	170
KDR	175	167 Angle 24.0°
PA°	23.3°	24.3°
TA°	34.2°	44.0°
KK	272	275
ST	577 Angle 18.8°	576 Angle 19.1°
SK	707 Angle 90.8°	757 Angle 92.2°
SH	316 Angle 109.1°	321 Angle 109.9°
SHY	222	220
HS	318	335
HD	128	138
AD	72	82

N/A = Not Applicable

FRONT SEAT MEASUREMENTS



DATA SHEET 11
SEAT BELT POSITIONING DATA



(illustration)

Dimension = mm

	DRIVER DUMMY	PASSENGER DUMMY
PBU -- Top surface of alum. plate to upper edge	362	370
PBL -- Top surface of alum. plate to belt lower edge	290	270

DATA SHEET 12
SEAT BELT PERFORMANCE ASSESSMENT TEST DATA

BELT LENGTH DATA:

	<u>Driver</u>	<u>Passenger</u>
Length from trim above retractor reel to "D" ring as measured on dummy.	<u>366 mm</u>	<u>370 mm</u>
Shoulder belt length as measured on Part 572 Dummy.	<u>822 mm</u>	<u>805 mm</u>
Lap belt length as measured on Part 572 Dummy.	<u>779 mm</u>	<u>770 mm</u>

SHOULDER BELT SPOOL-OFF DATA:

As determined by film analysis	<u>*</u>	<u>203 mm</u>
As determined mechanically at Retractor	<u>111 mm</u>	<u>216 mm</u>
As determined electronically	<u>86 mm</u>	<u>**68 mm</u>

RETRACTOR LOCK-UP TIME:

As determined by shoulder belt spool-off observed in on-board cameras	<u>60 msec.</u>	<u>81 msec.</u>
---	-----------------	-----------------

* Camera view of seatbelt obstructed during crash event.

** Data not valid after 41 msec.

DATA SHEET 13
CAMERA LOCATIONS

Test Date: February 18, 1999

Vehicle Year/Make/Model/Body Style: 1999/Ford/Ranger EV/Pick-up

CAMERA POSITION NO.	VIEW	CAMERA POSITIONS (mm.)*			ANGLE (deg)	FILM PLANE TO HEAD TARGET (mm)	LENS (mm)	SPEED (fps)
		X	Y	Z				
1	Real-Time Left Side View	-	-	-	-	-	18	24
2	Left Front View	1040	-8670	1550	90	8205	25	943
3	Steering Column Top	1930	-8350	1550	90	7885	25	1010
4	Steering Column Bottom	1910	-8360	1030	90	7895	25	1010
5	Driver Close-up	1310	-10620	1420	90	10155	75	922
6	Driver Angle	4770	-5130	2040			50	1042
7	Onboard Driver						13	976
8	Onboard Passenger						13	1010
9	Right Overall	2440	7970	1410	90	7515	13	1136
10	Right Passenger Half	1030	8000	1410	90	7545	25	1020
11	Right Close-up	1660	10130	1360	90	9675	75	1026
12	Right Angle	5000	5560	1990			50	1282
13	Windshield	-380	0	2770			13	926
14	Top Driver	100	-440	1630			13	926
15	Top Passenger	100	430	1615			13	926
16	Pit Front	1400	0	-3175			13	1149
17	Pit Rear	2730	0	-3170			13	966

* COORDINATES:

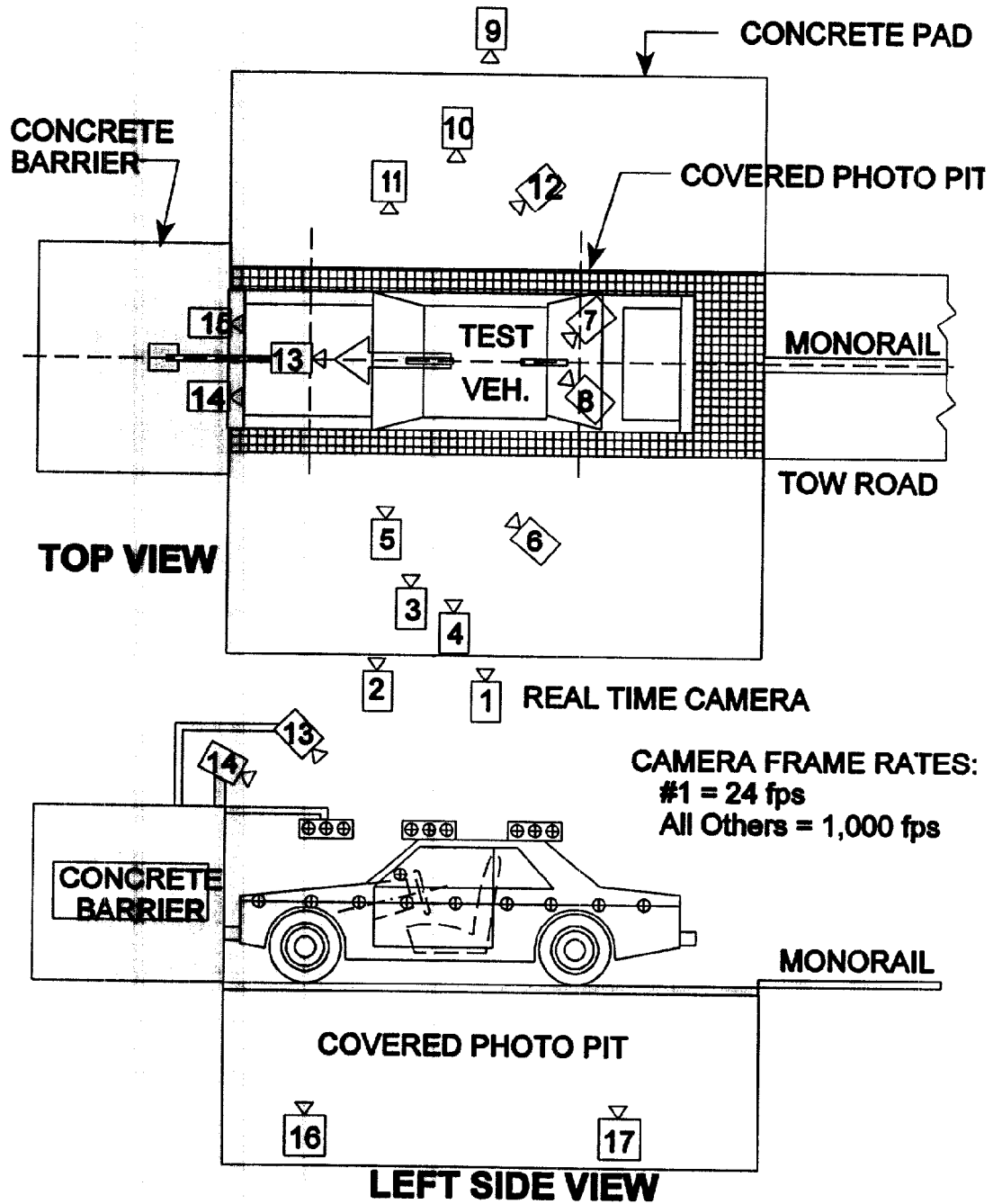
+X = film plane rearward of barrier

+Y = film plane to right of monorail centerline

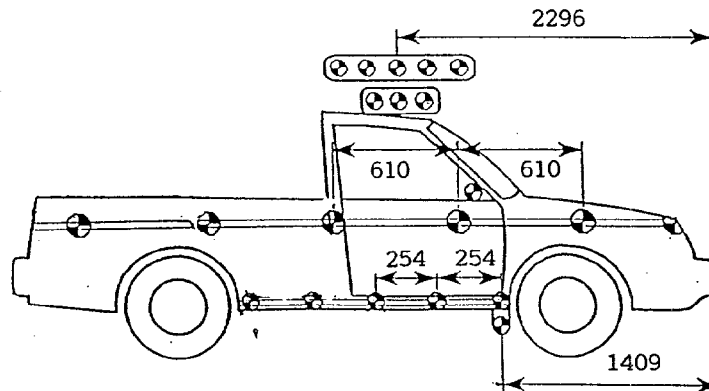
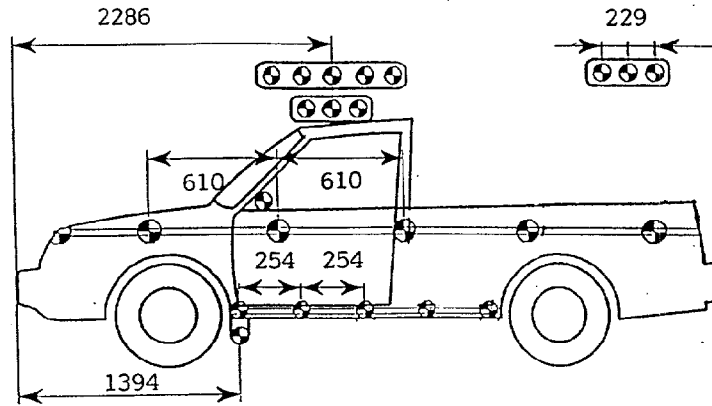
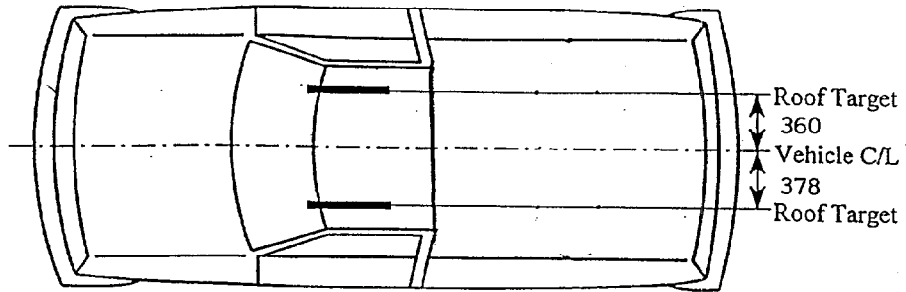
+Z = film plane to above ground level

ORIGIN: For X and Y it is the Impact Point. For Z it is the Floor.

CAMERA LOCATIONS (Cont'd)

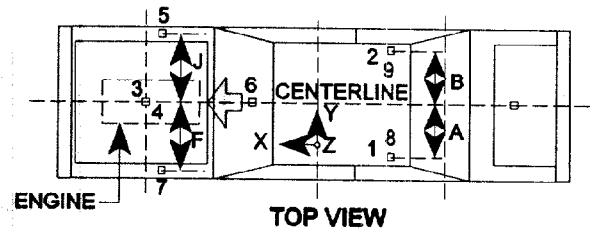
CAMERA POSITIONS FOR FRONTAL IMPACTS

DATA SHEET 14 VEHICLE TARGET LOCATIONS

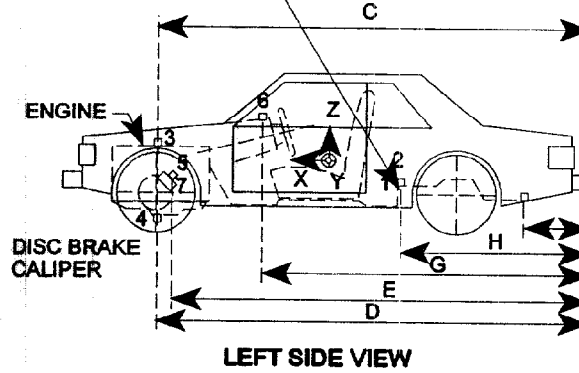


(DIMENSIONS IN MM)

DATA SHEET 15
VEHICLE ACCELEROMETER LOCATION AND DATA SUMMARY



REAR SEAT CUSHION
ASSY. FRONT ATTACHMENT
BRACKET SUPPORT



Units: (mm)

Dimension	Length		ACCEL. NO. No	ACCELEROMETER
A	428	1 and 8	Left Rear Seat Crossmember	X
B	428	2 and 9	Right Rear Seat Crossmember	X
C	3718	3	Top of Engine	X
D	3615	4	Bottom of Engine	X
E	3402	5	Right Side Brake Caliper	X
F	630	6	Instrument Panel	X
G	2785	7	Left Side Brake Caliper	X
H	1680			
J	630			

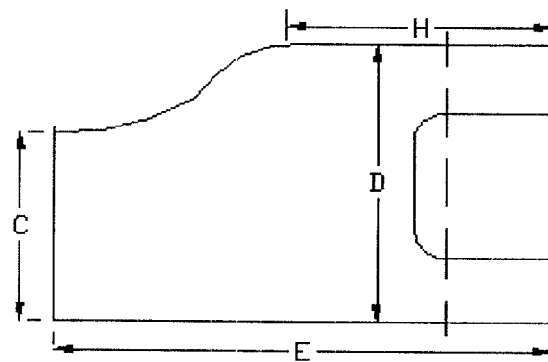
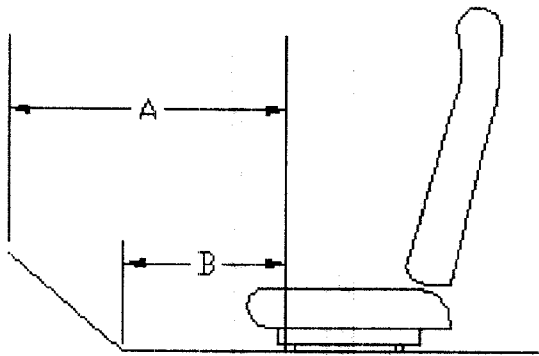
DATA SHEET 16
POST TEST AIRBAG DATA

- A. Number of Vent Holes: Driver 2; Passenger 2
- B. Size of Vent Holes: Driver 25 mm dia; Passenger 38 mm dia
- C. Total Vent Area; Driver 19.6 cm² Passenger 45.4 cm²
- D. Deflated Airbag Length and Width Dimensions or, if Round, Diameter
Driver; Length____mm, Width____mm, Diameter 610 mm
Passenger; Length 508 mm, Width 660 mm, Diameter ____ mm
- E. Is the Airbag Tethered?
Driver; X Yes; ____ No; If yes, record length of tether 309 mm
Passenger; ____ Yes; X No, If yes, record length of tether____mm

DATA SHEET 17
TEST VEHICLE MEASUREMENTS

STATIC FOOTWELL DEFORMATION

Driver's Side



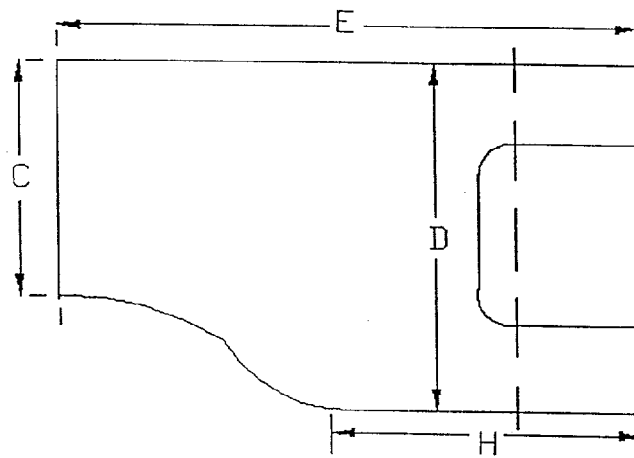
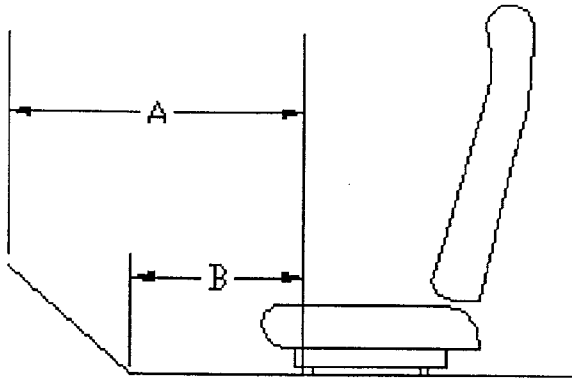
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	712	686	-26
B	535	524	-11
C	415	413	-2
D	380	385	5
E	897	888	-9
H	911	898	-13

DATA SHEET 17
TEST VEHICLE MEASUREMENTS (Cont'd)

STATIC FOOTWELL DEFORMATION

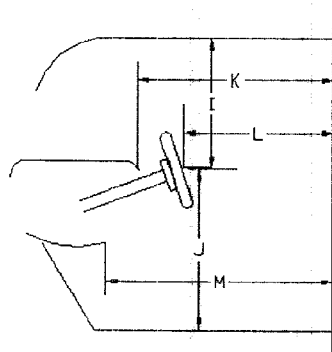
Passenger's Side



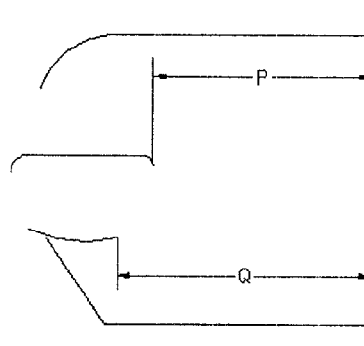
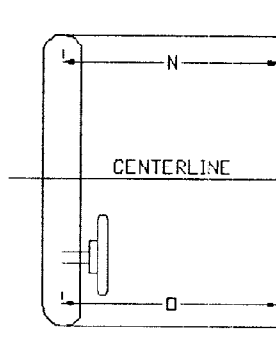
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	657	654	-3
B	492	490	-2
C	335	337	2
D	430	435	5
E	889	895	6
H	897	866	-31

DATA SHEET 17
 TEST VEHICLE MEASUREMENTS (Cont'd)
 STATIC PASSENGER COMPARTMENT INTRUSION



MEASUREMENTS
 FROM C-PILLAR
 BELT ANCHORAGE



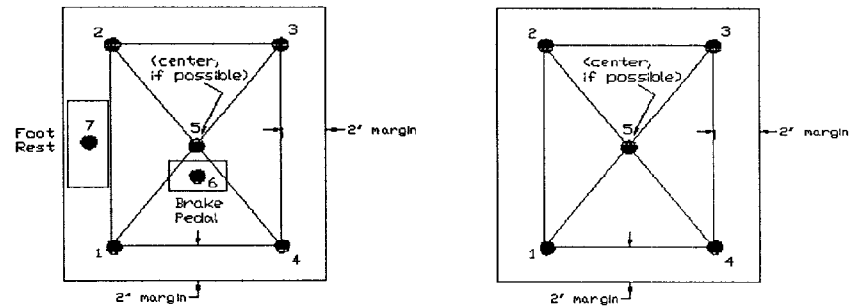
Units = mm

MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
I	428	425	-3
J	642	647	5
K	648	628	-20
L	458	433	-25
M	810	755	-55
N	848	803	-45
O	828	776	-52
P	660	626	-34
Q	818	788	-30

DATA SHEET 17

TEST VEHICLE MEASUREMENTS (Cont'd)

TOE PAN MEASUREMENTS



DRIVER

PASSENGER

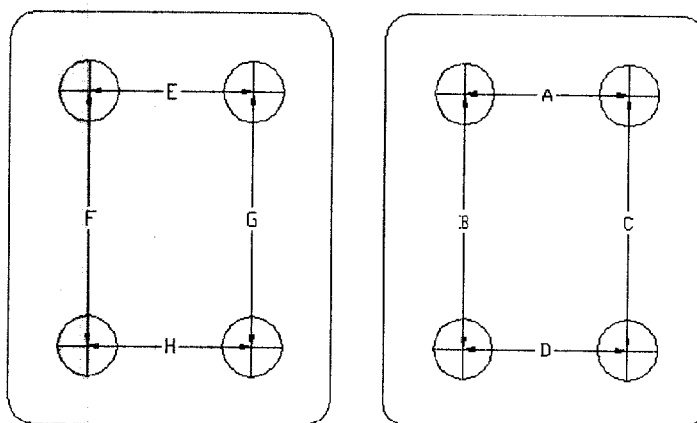
Driver						
Location	X			Z		
	Pre-Test	Post-Test	Def.	Pre-Test	Post-Test	Def.
1	514	503	-11	-8	-3	5
2	718	710	-8	174	218	44
3	715	677	-38	210	242	32
4	482	469	-13	-18	-12	6
5	713	686	-27	122	209	87
6	540	504	-36	163	186	23
7	614	591	-23	91	110	19
Passenger						
Location	X			Z		
	Pre-Test	Post-Test	Def.	Pre-Test	Post-Test	Def.
1	514	510	-4	-8	1	9
2	659	622	-37	137	169	32
3	669	647	-22	148	168	20
4	528	513	-15	-15	3	18
5	597	596	-1	73	98	25

DATA SHEET 17
TEST VEHICLE MEASUREMENTS (Cont'd)

UNDERBODY FLOORBOARD DEFORMATION

DRIVER'S SIDE

PASSENGER'S SIDE



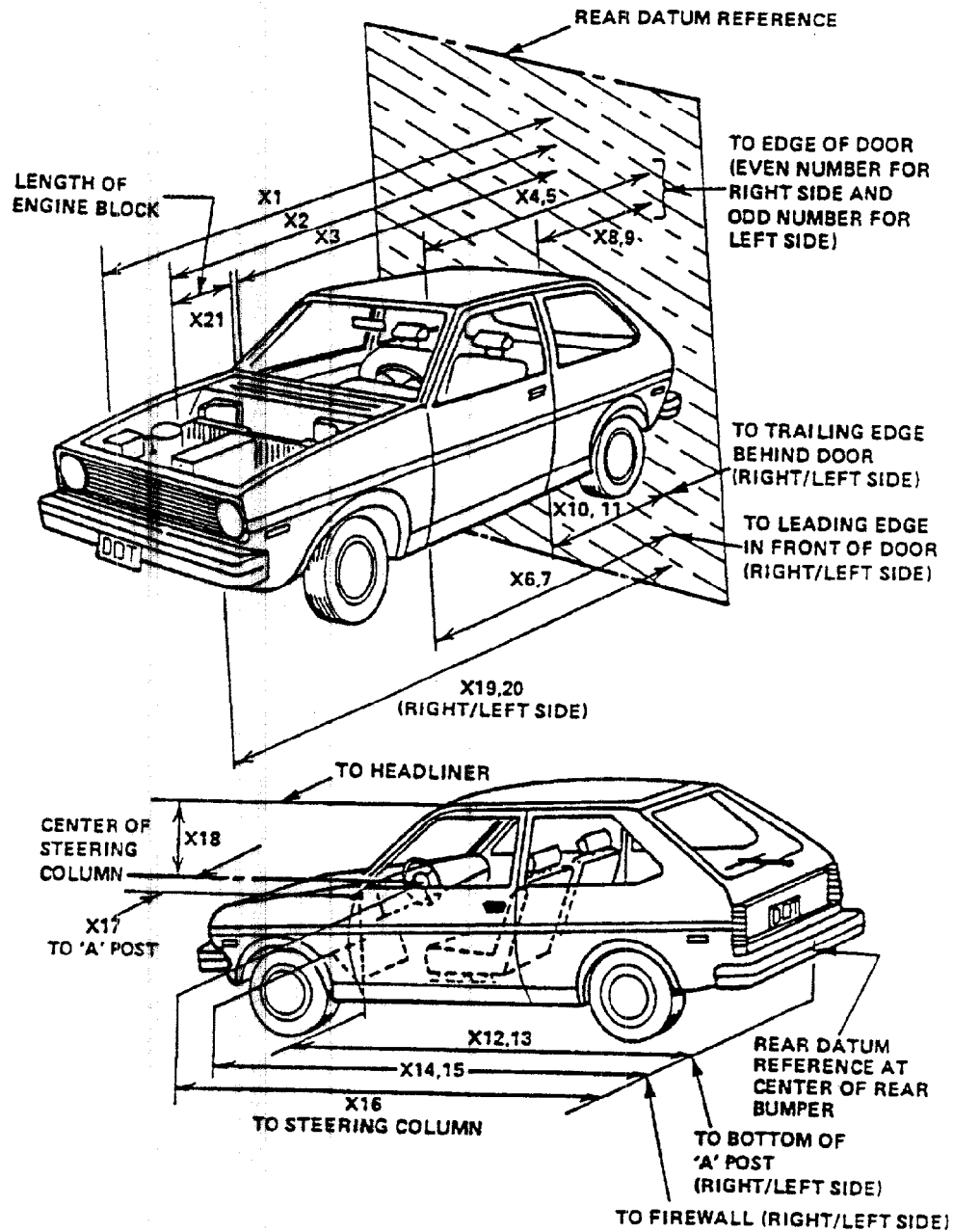
MEASUREMENT	PRE TEST	POST TEST	DIFFERENCE
A	*	*	---
B	*	*	---
C	*	*	---
D	*	*	---
E	*	*	---
F	*	*	---
G	*	*	---
H	*	*	---

* Note: These measurements were not taken due to traction battery location

DATA SHEET 17
TEST VEHICLE MEASUREMENTS (Cont'd)

No.	MEASUREMENT DESCRIPTION:	Pre-Test (mm)	Post-Test (mm)	Diff. (mm)
X1	Total Length of Test Vehicle at Centerline	4405	3786	-619
X2	Rear Surface of Vehicle to Front of Engine	3737	3586	-151
X3	Rear Surface of Vehicle to Firewall	3252	3192	-60
X4	Rear Surface to Upr. Leading Edge of Rt. Door	2955	2950	-5
X5	Rear Surface to Upr. Leading Edge of Left Door	2966	2927	-39
X6	Rear Surface to Lwr. Leading Edge of Rt. Door	2912	2930	18
X7	Rear Surface to Lwr. Leading Edge of Left Door	2908	2909	1
X8	Rear Surface to Upr. Trailing Edge of Rt. Door	1848	1838	-10
X9	Rear Surface to Upr. Trailing Edge of Left Door	1852	1820	-32
X10	Rear Surface to Lwr. Trailing Edge of Rt. Door	1855	1882	27
X11	Rear Surface to Lwr. Trailing Edge of Left Door	1855	1863	8
X12	Rear Surface to Bottom of A-Post on Rt. Side	2912	2918	6
X13	Rear Surface to Bottom of A-Post on Left Side	2905	2910	5
X14	Rear Surface to Firewall on Right Side	3202	3168	-34
X15	Rear Surface to Firewall on Left Side	3192	3177	-15
X16	Rear Surface to Steering Column	2477	2505	28
X17	Center of Steering Column to A-Post	410	440	30
X18	Center of Steering Column to Headlining	429	449	20
X19	Rear Surface to Right Side of Front Bumper	4305	3765	-540
X20	Rear Surface to Left Side of Front Bumper	4295	3746	-549
X21	Length of Engine Block	N/A	N/A	N/A

DATA SHEET 17
TEST VEHICLE MEASUREMENTS (Cont'd)



DATA SHEET 18
ACCIDENT INVESTIGATION DIVISION DATA
FOR 35 MPH FRONTAL BARRIER IMPACT

Vehicle Make/Model/Body Style: 1999/Ford/Ranger EV/Pick-up

VIN: 1FTZR0876XTA30286

Model Year: 1999 ; Build Date: 10/98 ; Test Date: February 18, 1999

Veh. Size Category: Truck ; TEST WEIGHT: 2443.1 kg

Veh. Wheelbase: 2860 mm; Front Overhang: 844 mm; Overall Width: 1734 mm

ACCELEROMETER DATA:

Location: As per measurements on pages 2-25

Calibration Procedure: As per MGA Calibration Procedure

Linearity: >99.9% ; Integration Algorithm: Trapezoidal

Veh. Impact Speed: 56.6 kph ; Time Of Separation: 156 msec

Velocity Change: 62.2 kph

Collision Deformation Classification (CDC) Code: F (Frontal)

Crush Depth C1 = 549 mm

Dimensions: C2 = 598 mm

C3 = 618 mm

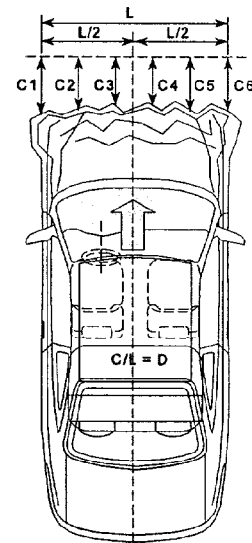
C4 = 616 mm

C5 = 574 mm

C6 = 540 mm

Midpoint Of Damage: D = Vehicle Centerline (Longitudinal)

Length Of Damaged Region: L = 1490 mm



APPENDIX A PHOTOGRAPHS

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Photo No. A-1 - Pre-Test Front View of Test Vehicle

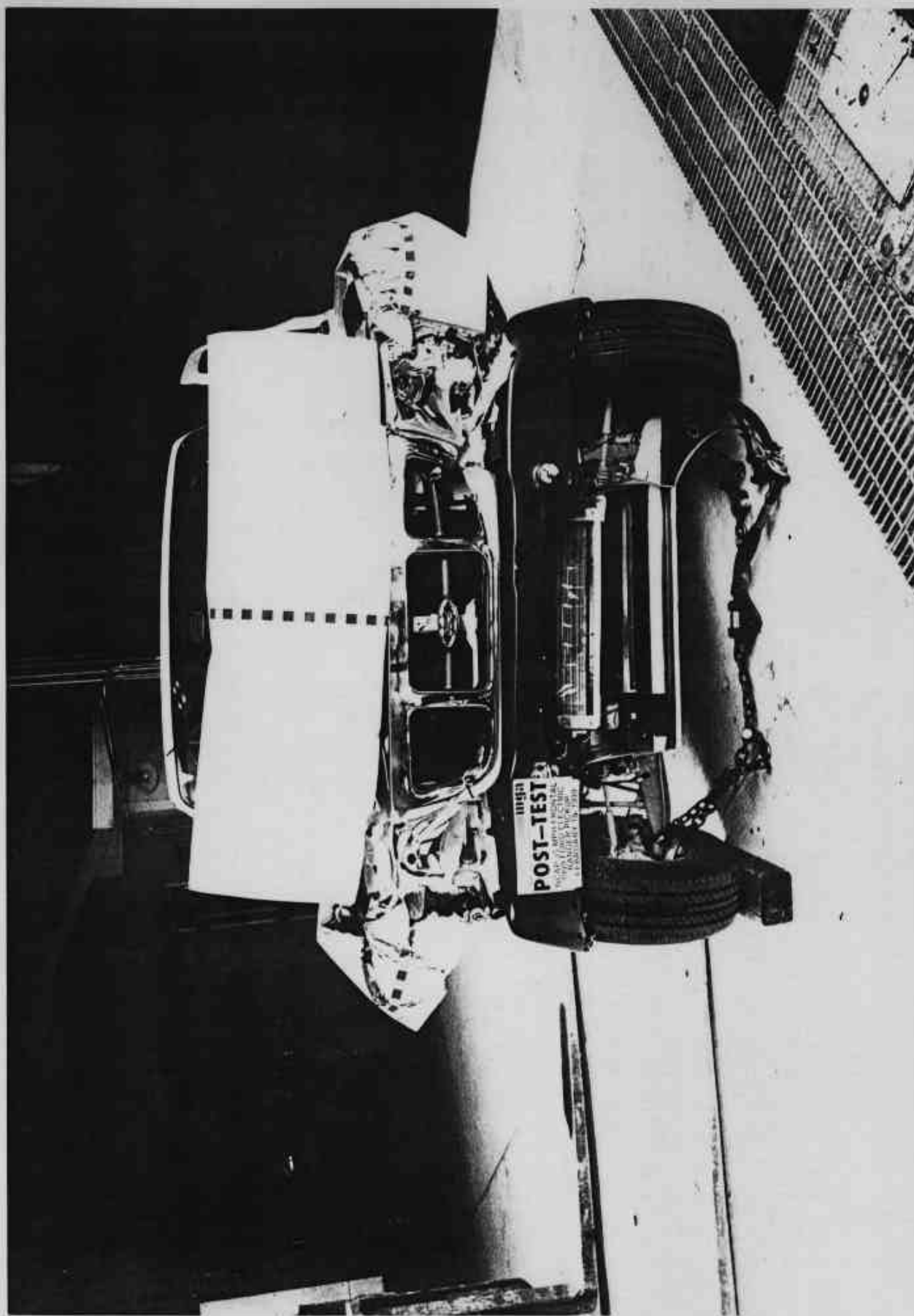


Photo No. A-2 - Post-Test Front View of Test Vehicle

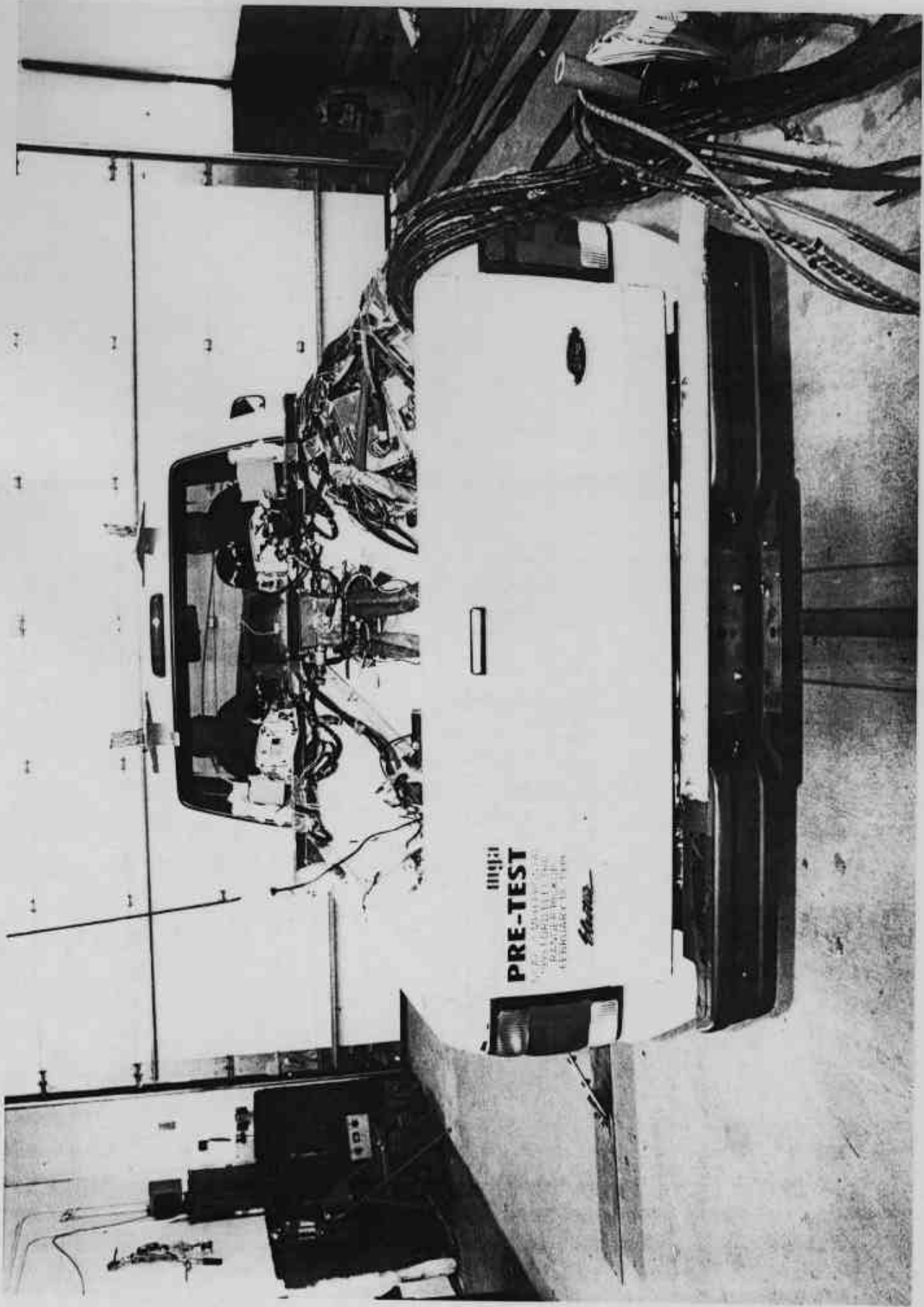


Photo No. A-3 - Pre-Test Rear View of Test Vehicle

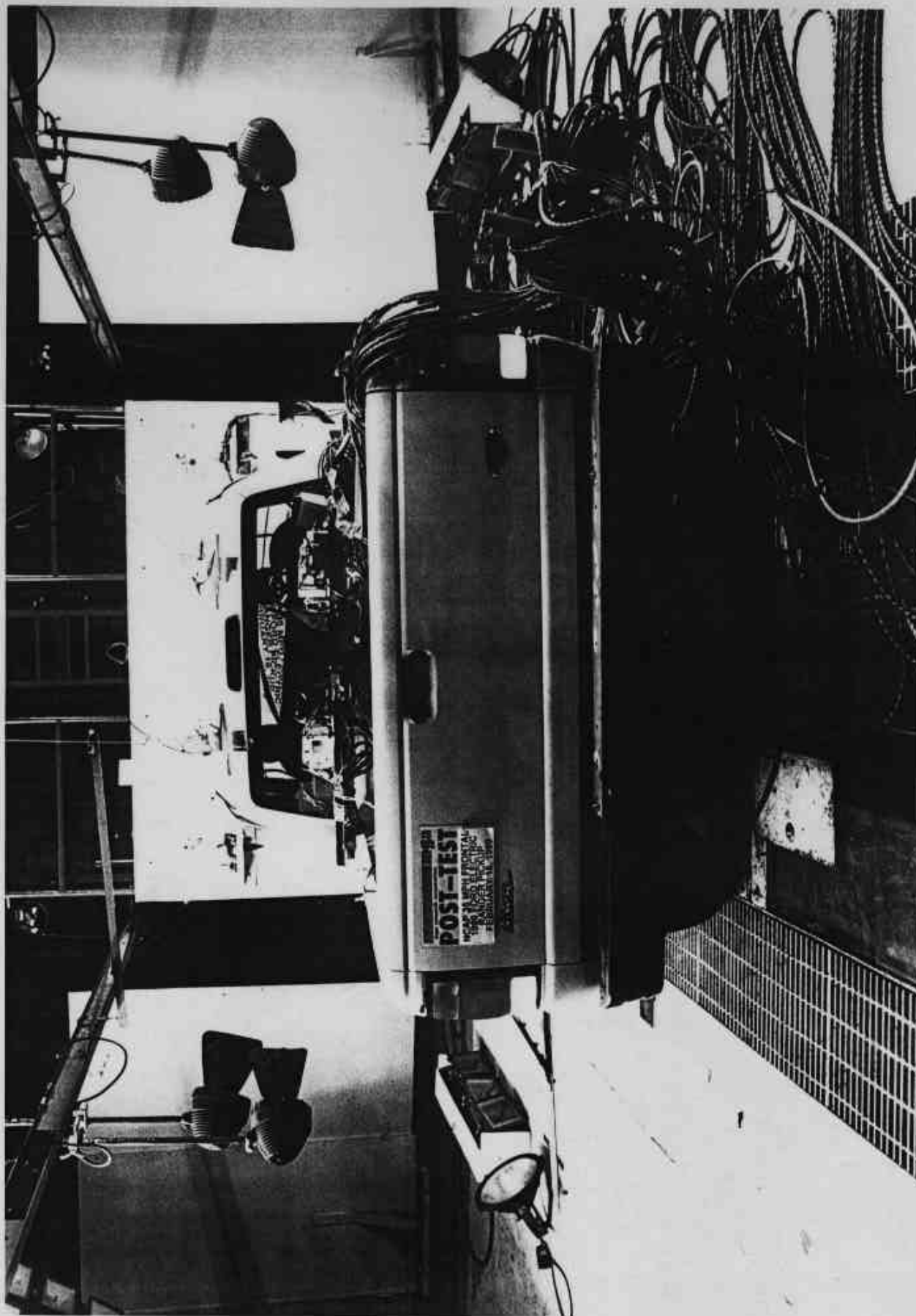


Photo-No. A-4 - Post-Test Rear View of Test Vehicle

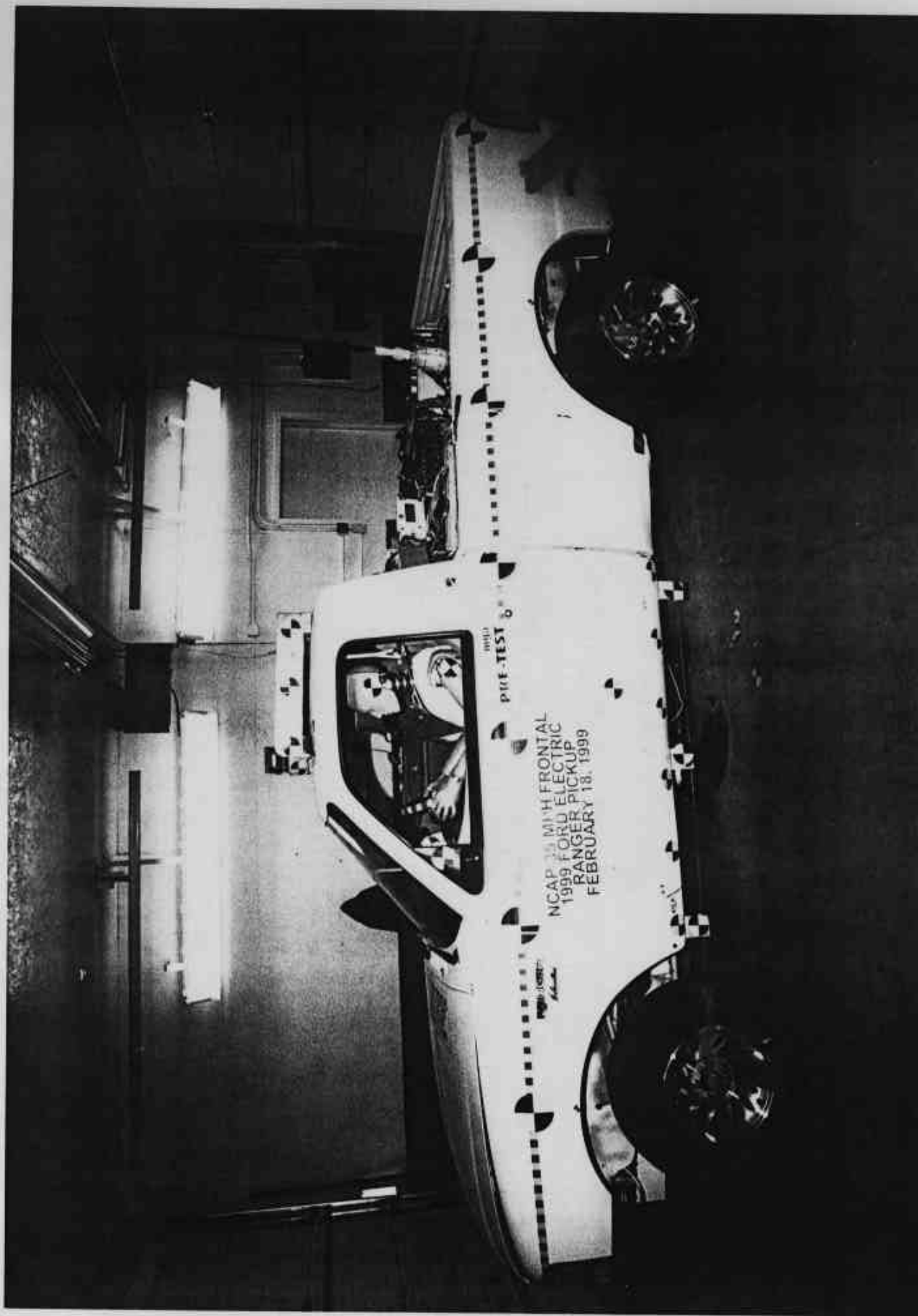


Photo No. A-5 - Pre-Test Left Side View of Test Vehicle

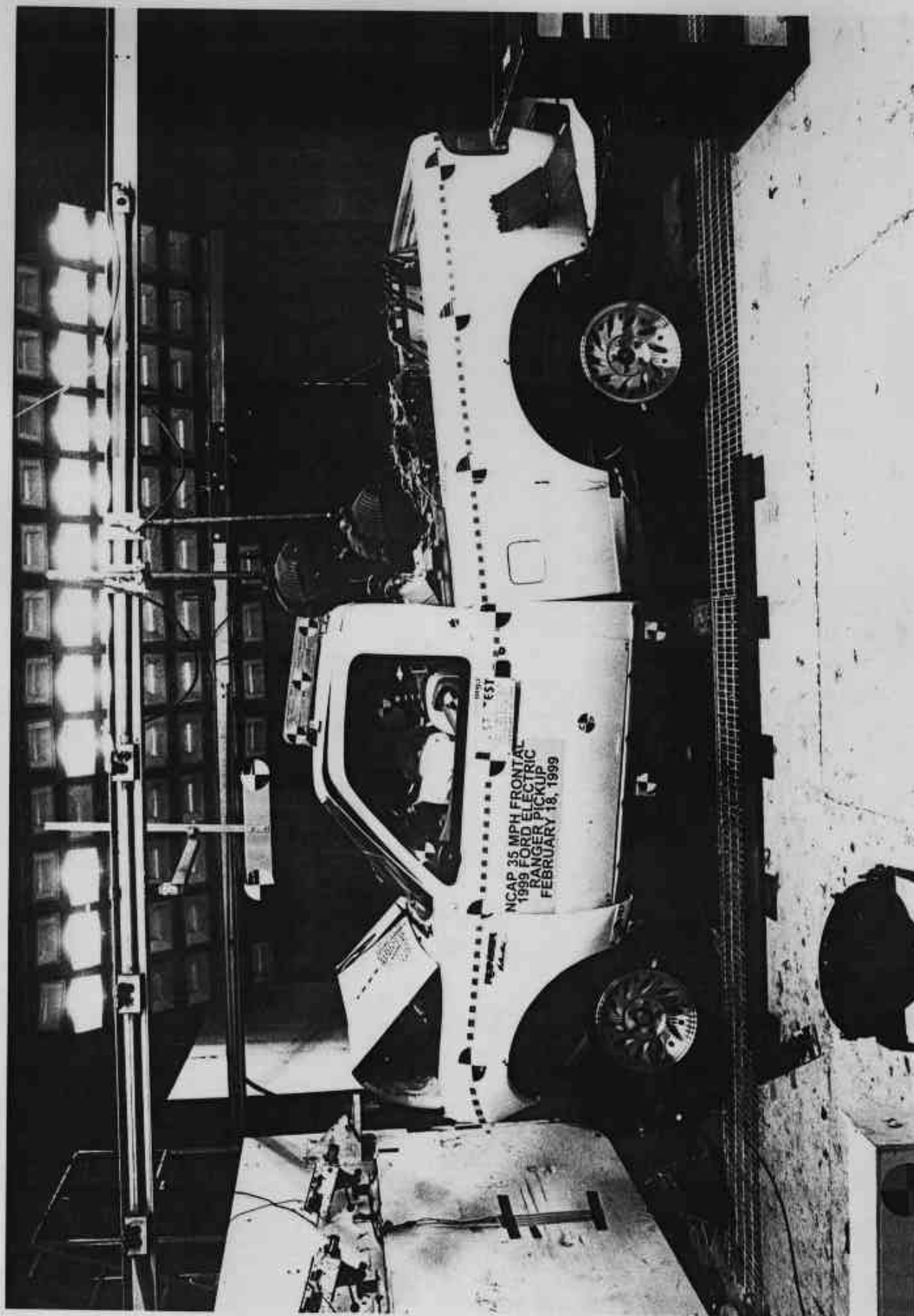


Photo No. A-6 - Post-Test Left Side View of Test Vehicle

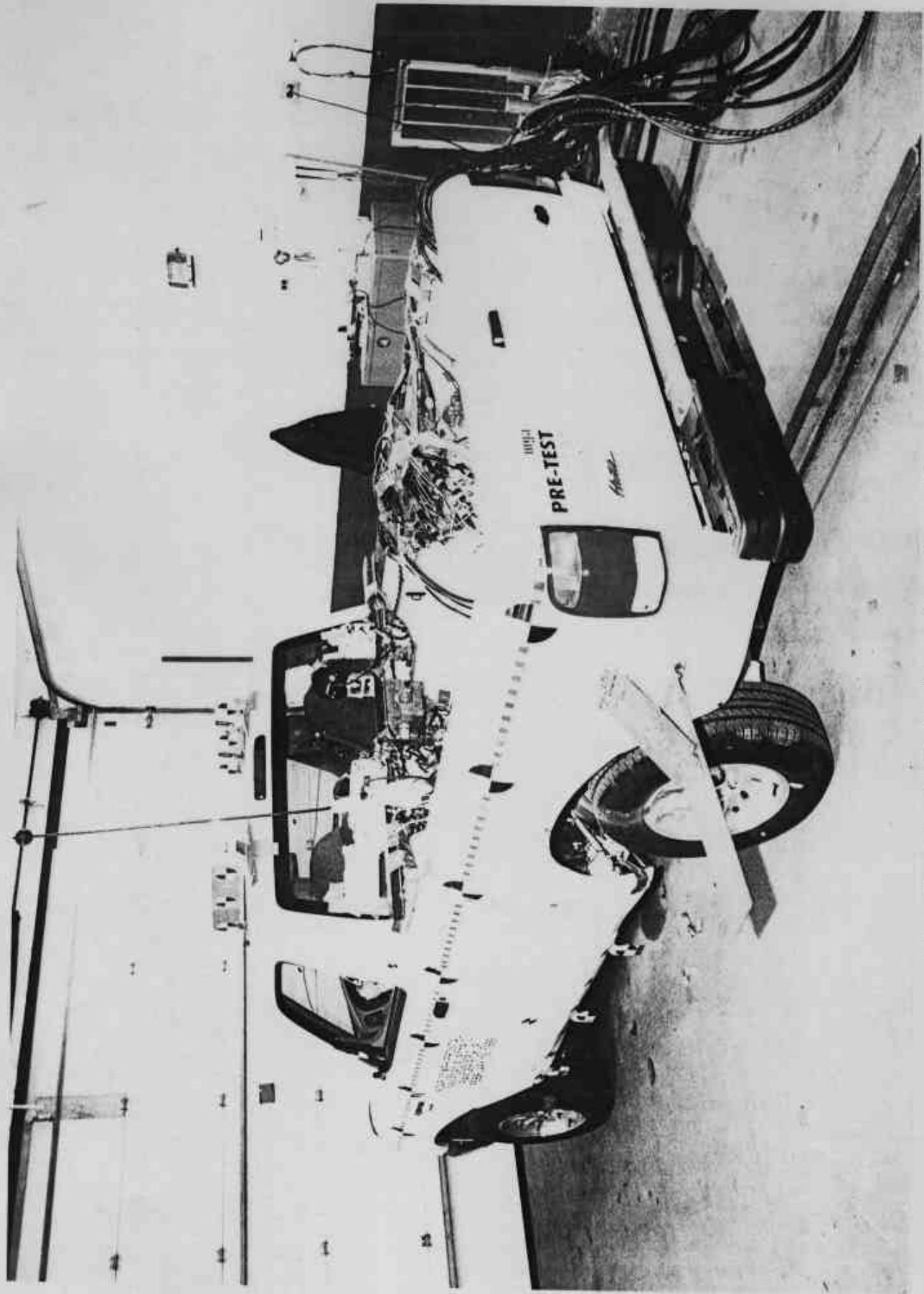


Photo No. A-7 - Pre-Test Left Rear Three-Quarter View of Test Vehicle



Photo No. A-8: Post-Test Left Rear Three-Quarter View of Test Vehicle

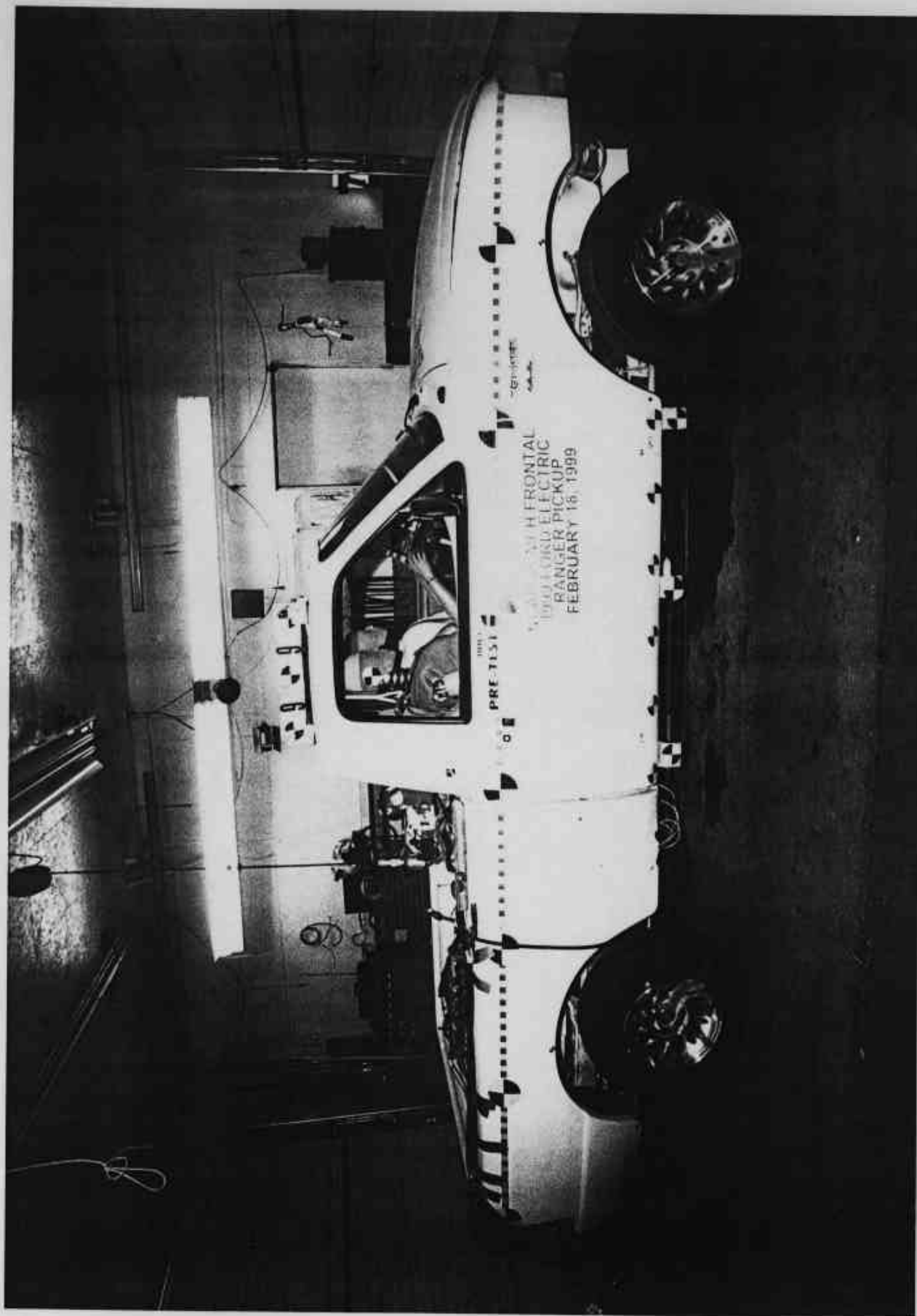


Photo No. A-9 - Pre-Test Right Side View of Test Vehicle

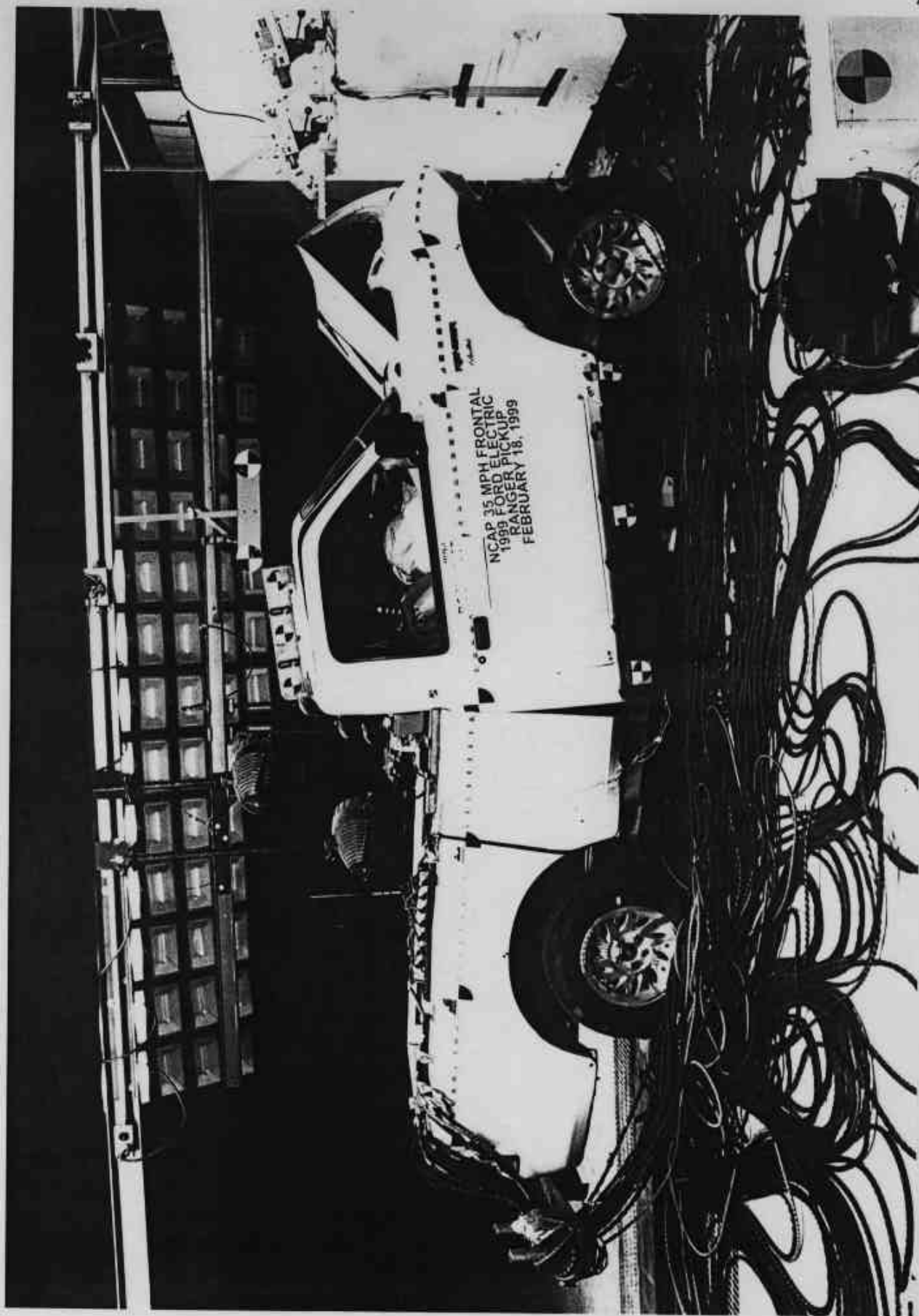


Photo No. A-10 - Post-Test Right Side View of Test Vehicle



Photo No. A-11 - Pre-Test Right Front Three-Quarter View of Test Vehicle



Photo No. A-12 - Post-Test Right Front Three-Quarter View of Test Vehicle

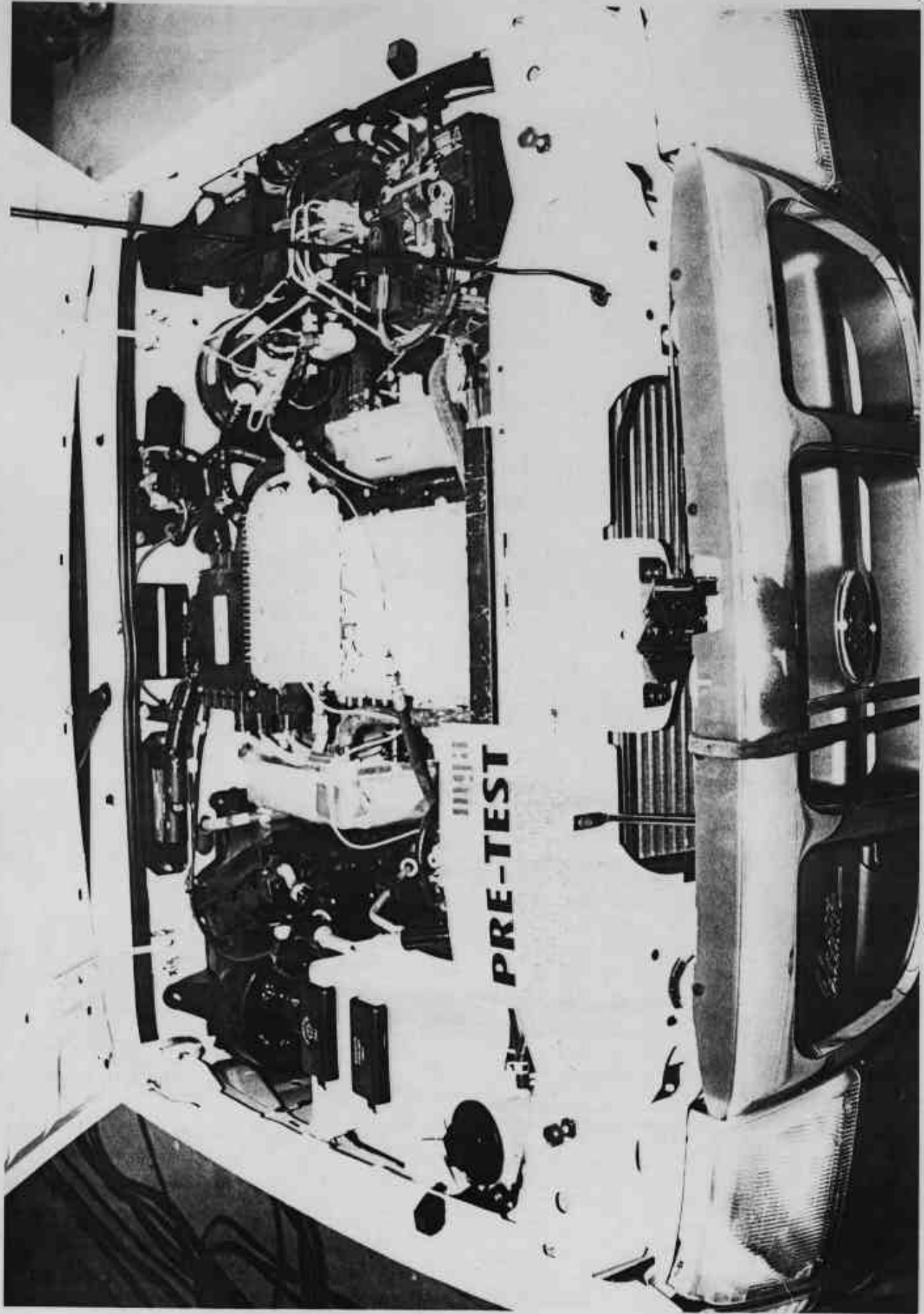


Photo No. A-13 - Pre-Test Engine Compartment View

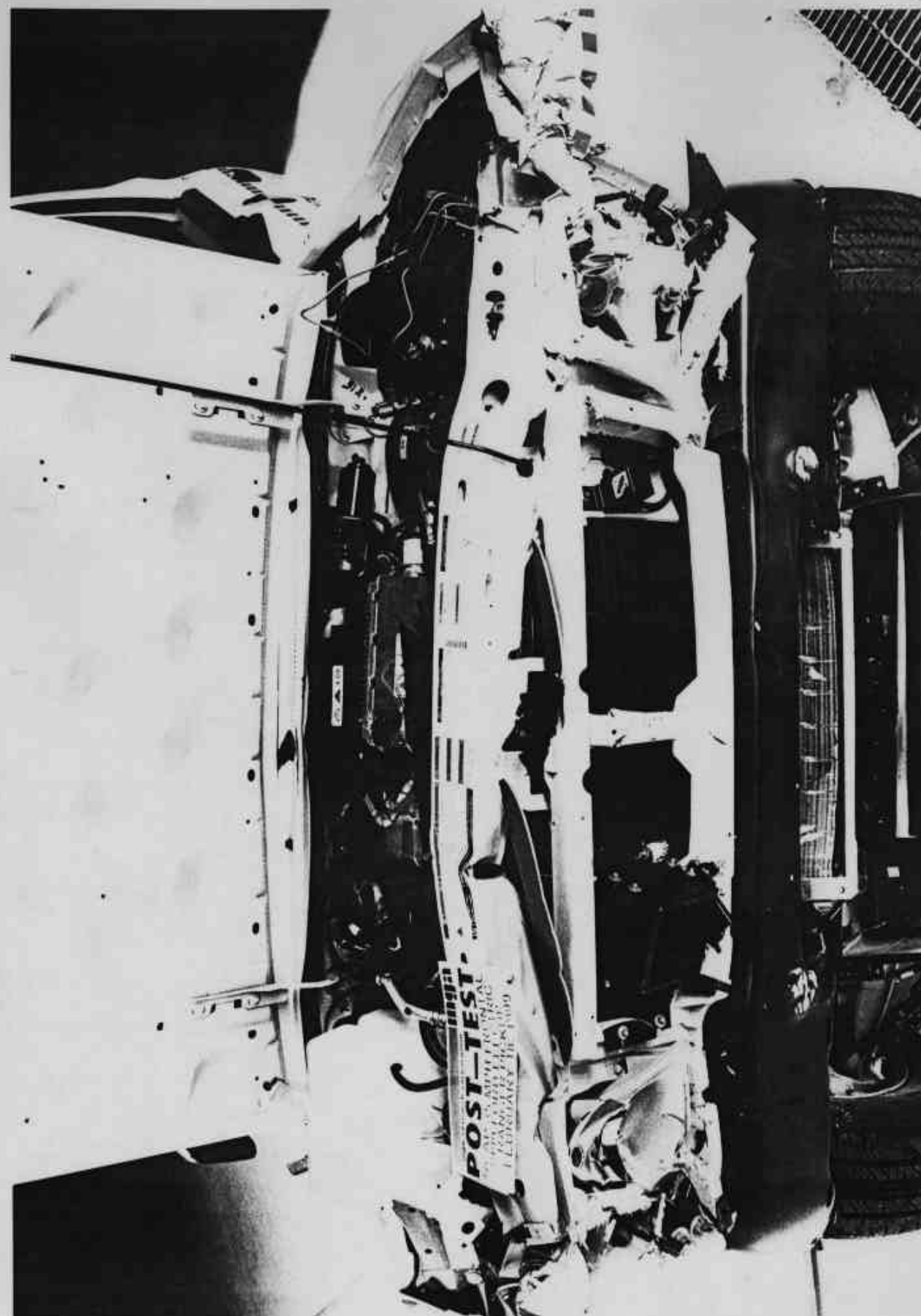


Photo No. A-14 - Post-Test Engine Compartment View

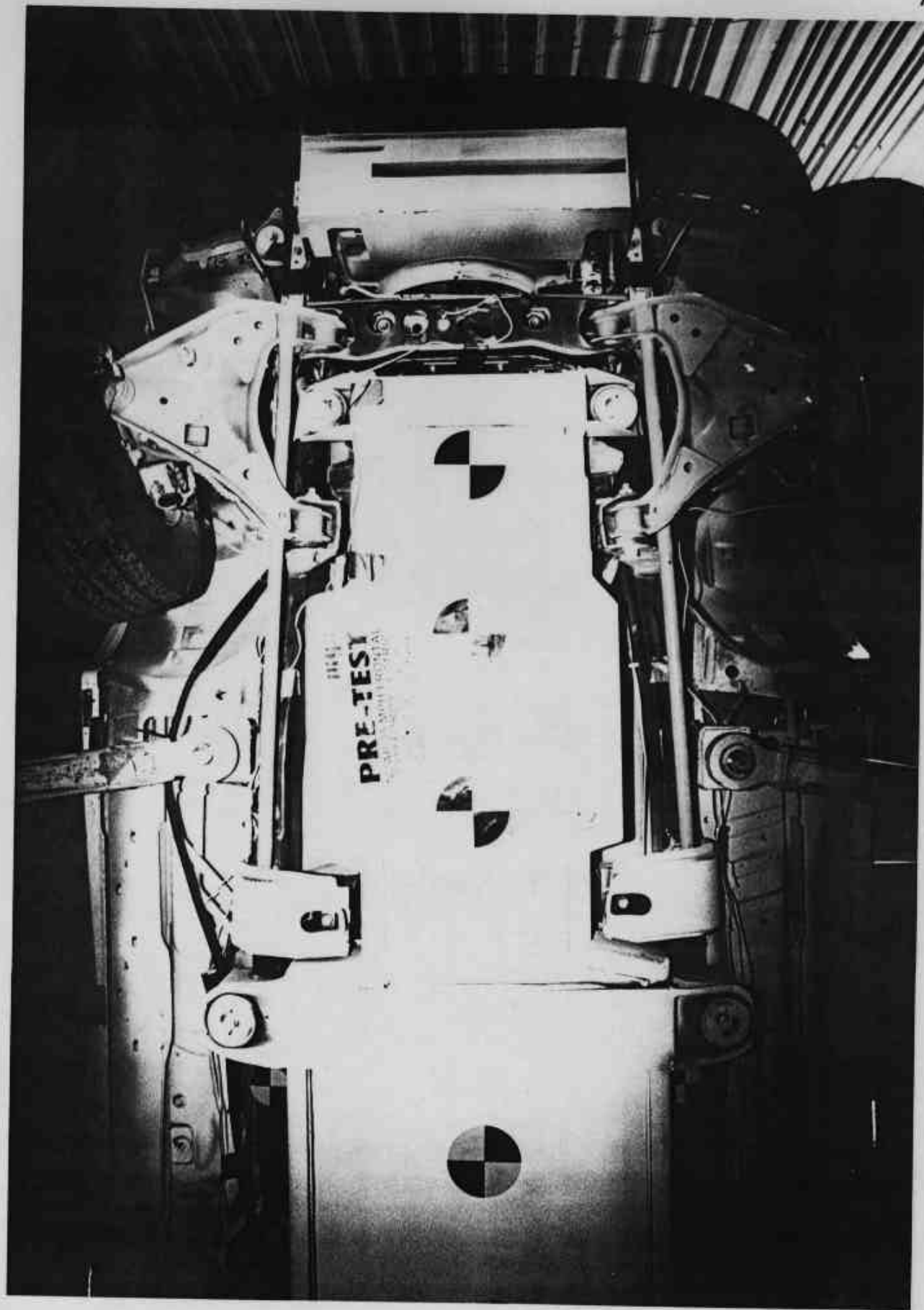


Photo No. A-15 - Pre-Test Front Underbody View

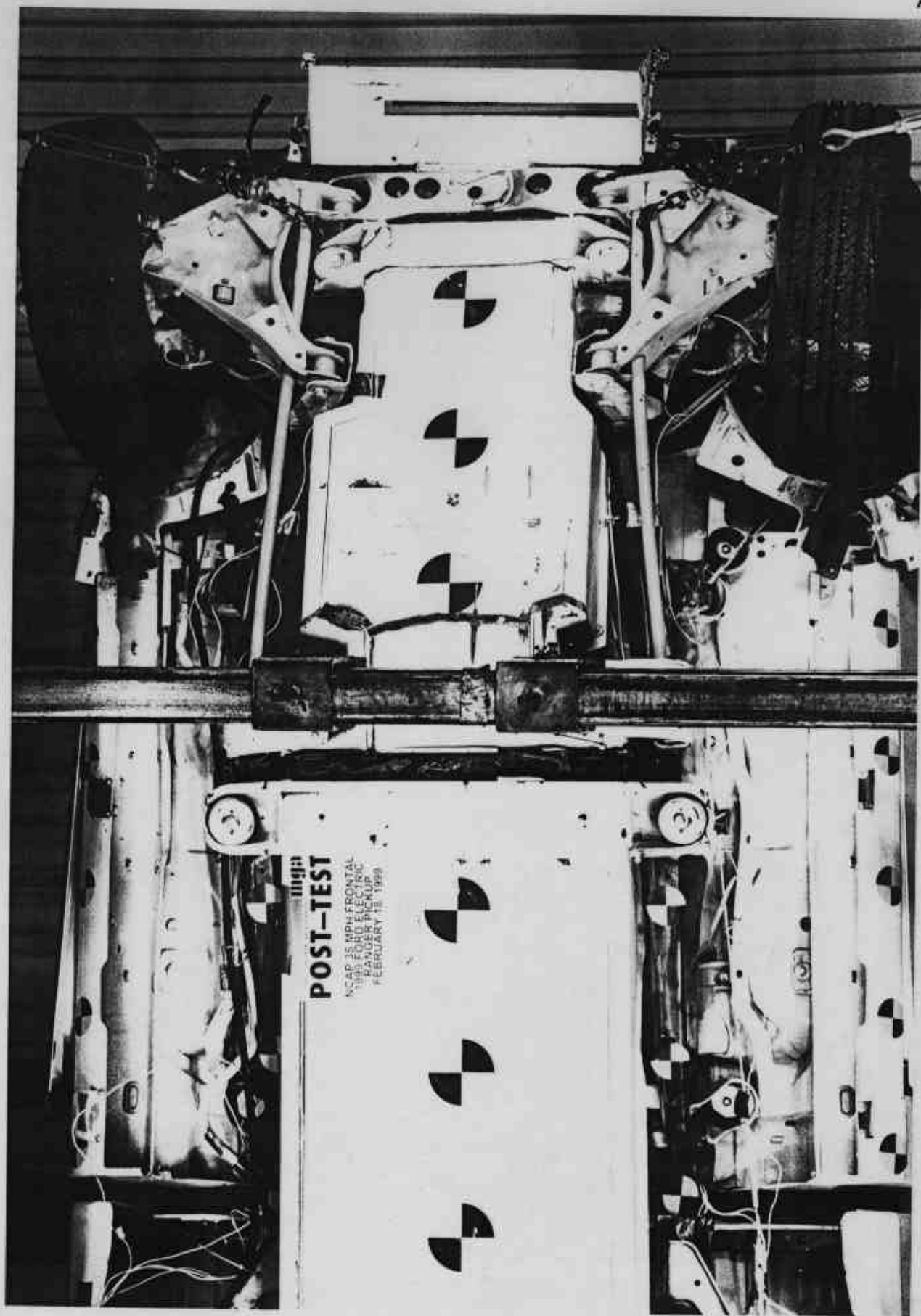


Photo No. A-16 - Post-Test Front Underbody View

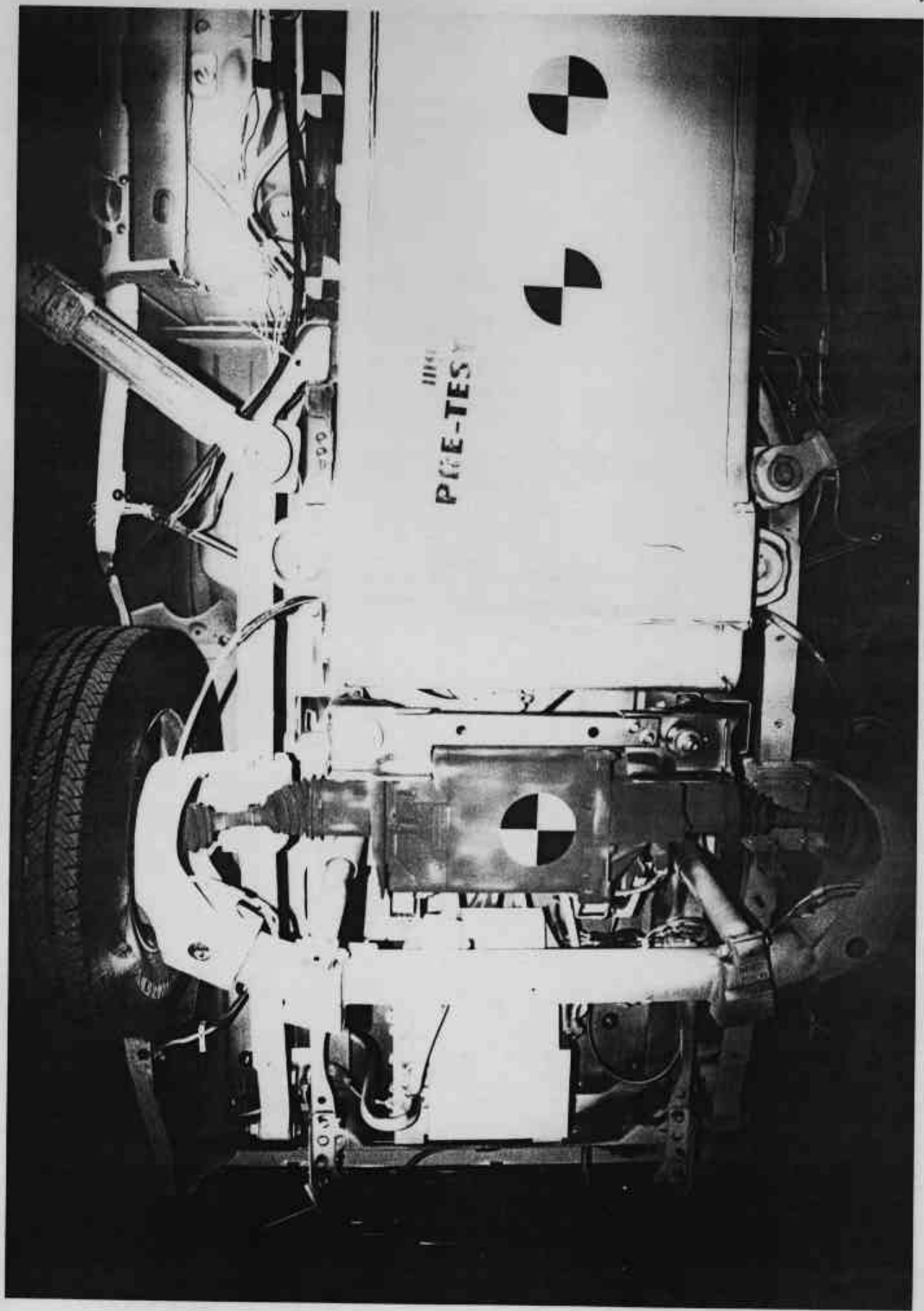


Photo No. A-17 - Pre-Test Rear Underbody View

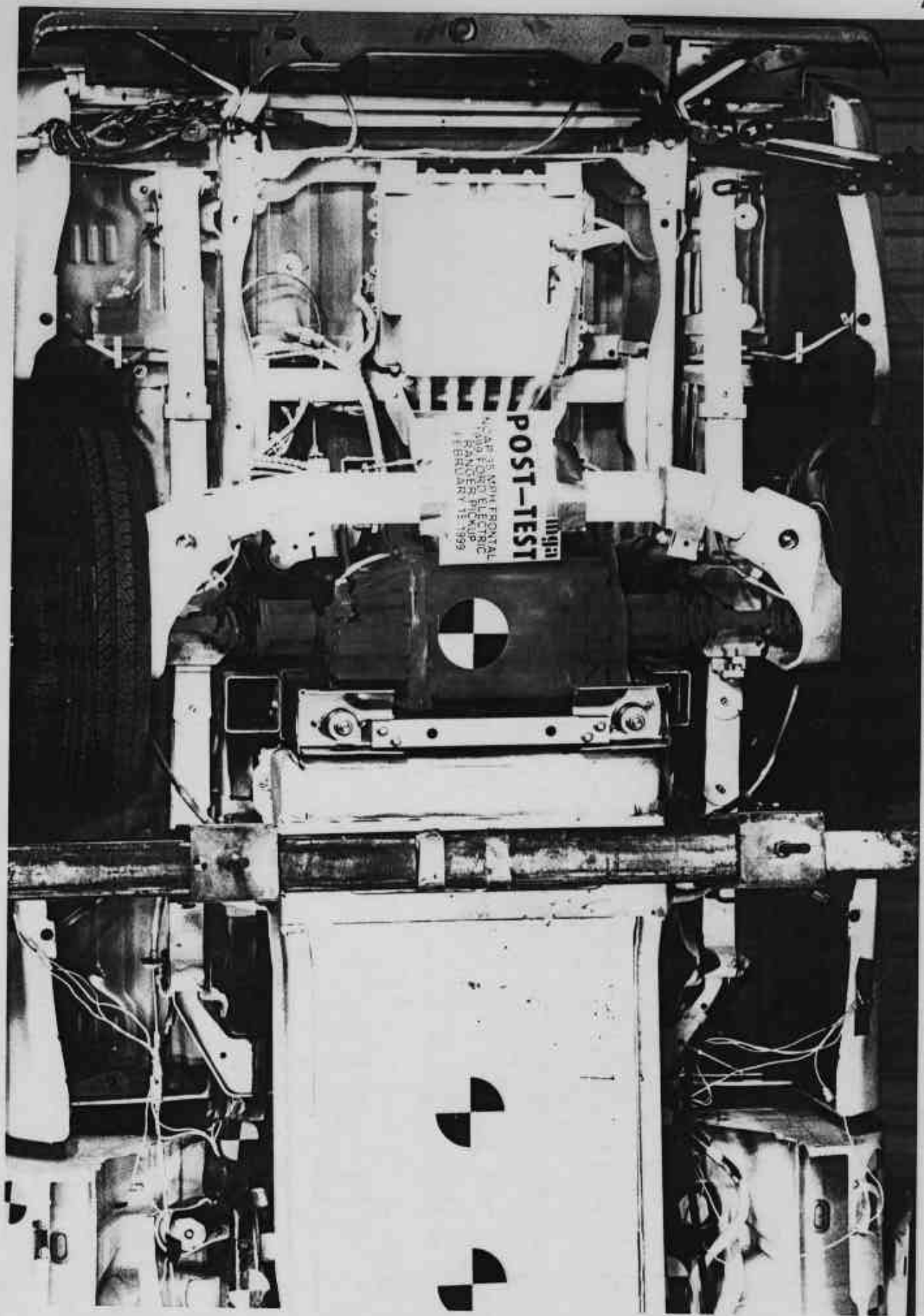


Photo No. A-18 - Post-Test Rear Underbody View

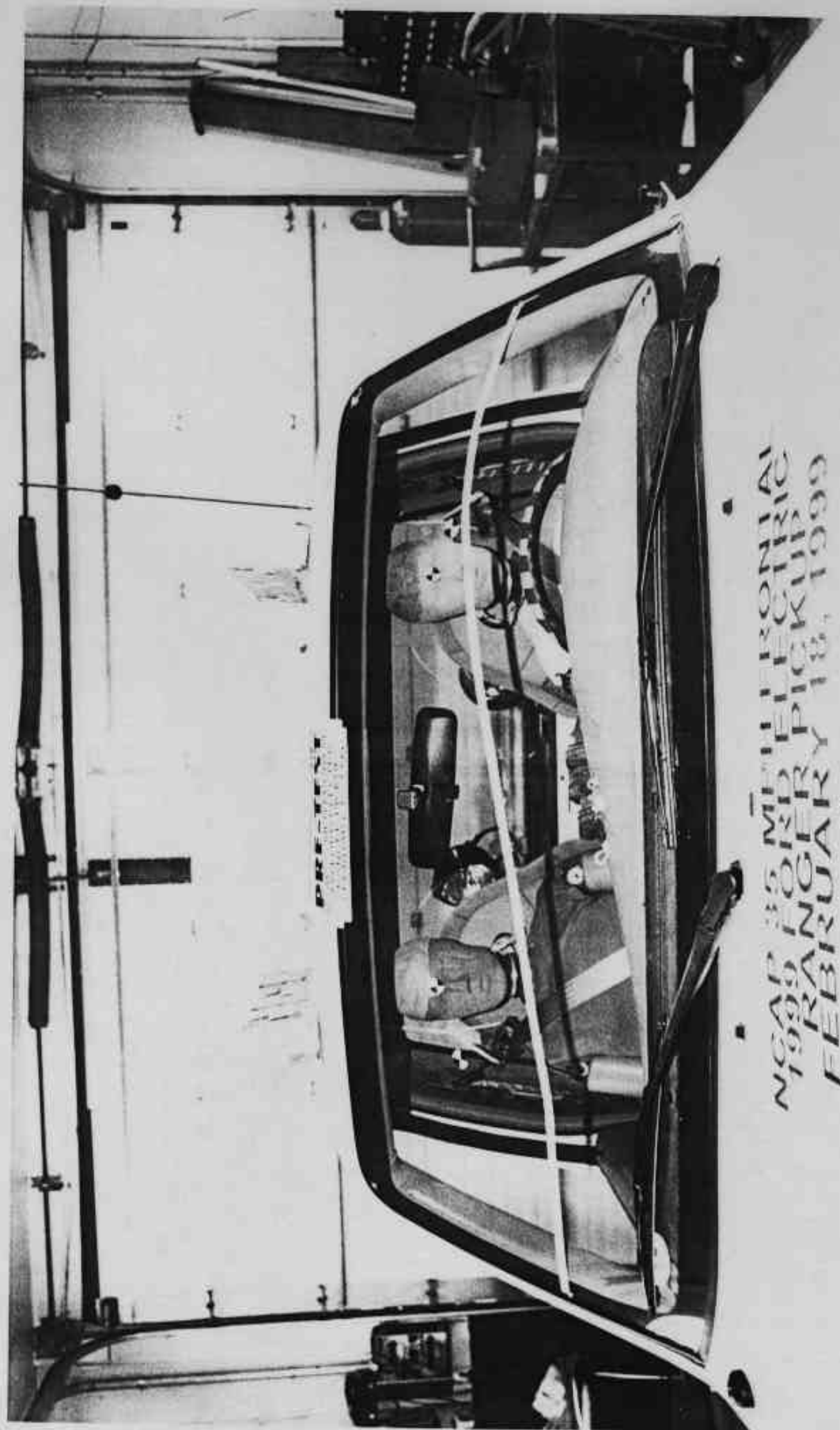


Photo No. A-19 - Pre-Test Windshield View



Photo No. A-20 - Post-Test Windshield View

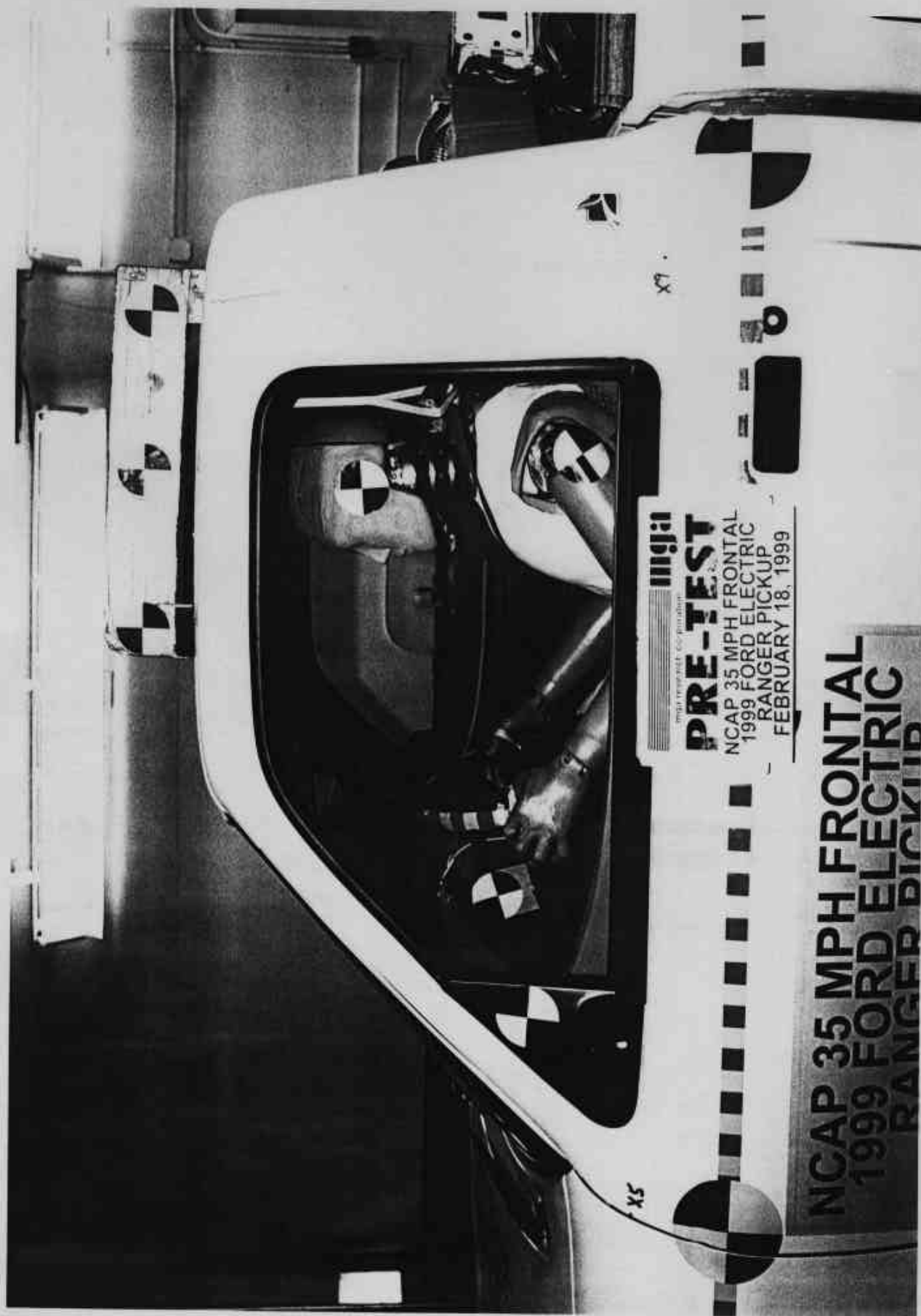


Photo No. A-21 - Pre-Test Driver Dummy Position Left Side View

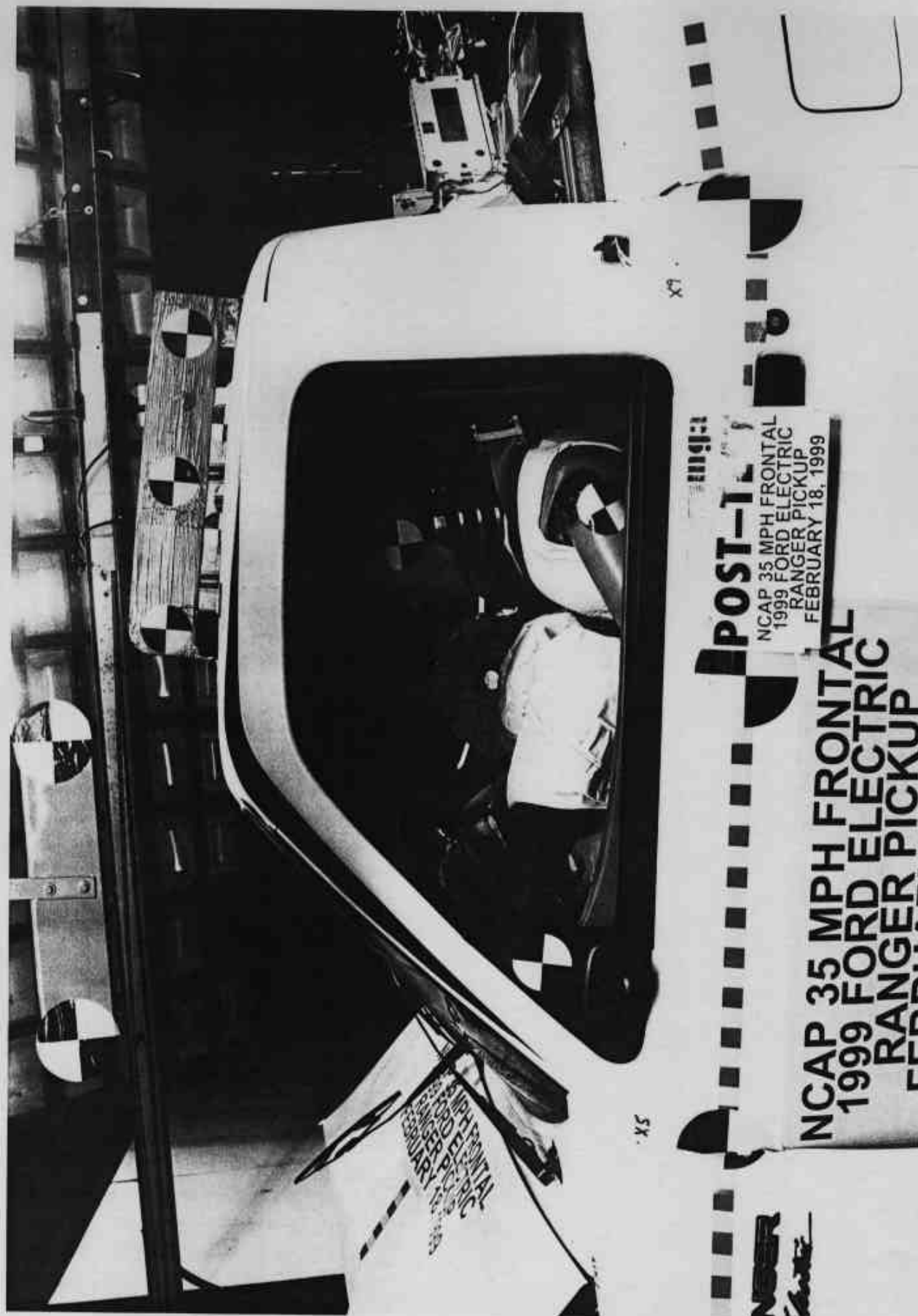


Photo No. A-22 - Post-Test Driver Dummy Position Left Side View



A-23

Photo No. A-23 - Pre-Test Driver Dummy Position Left Side View (Door Open)



Photo No. A-24 - Pest-Test Driver Dummy Position Left Side View (Door Open)

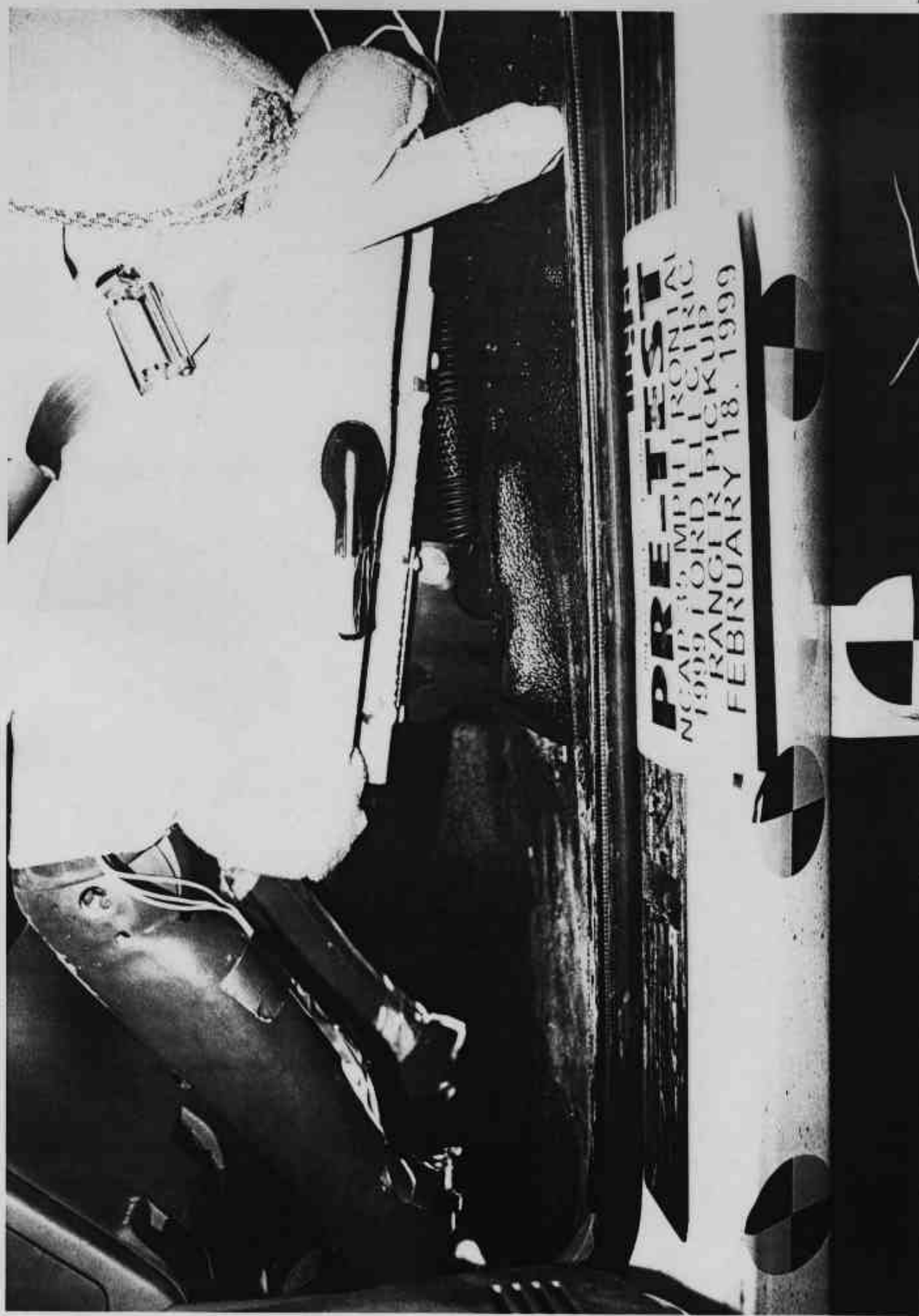


Photo-No. A-25 - Pre-Test Driver Seat Position View

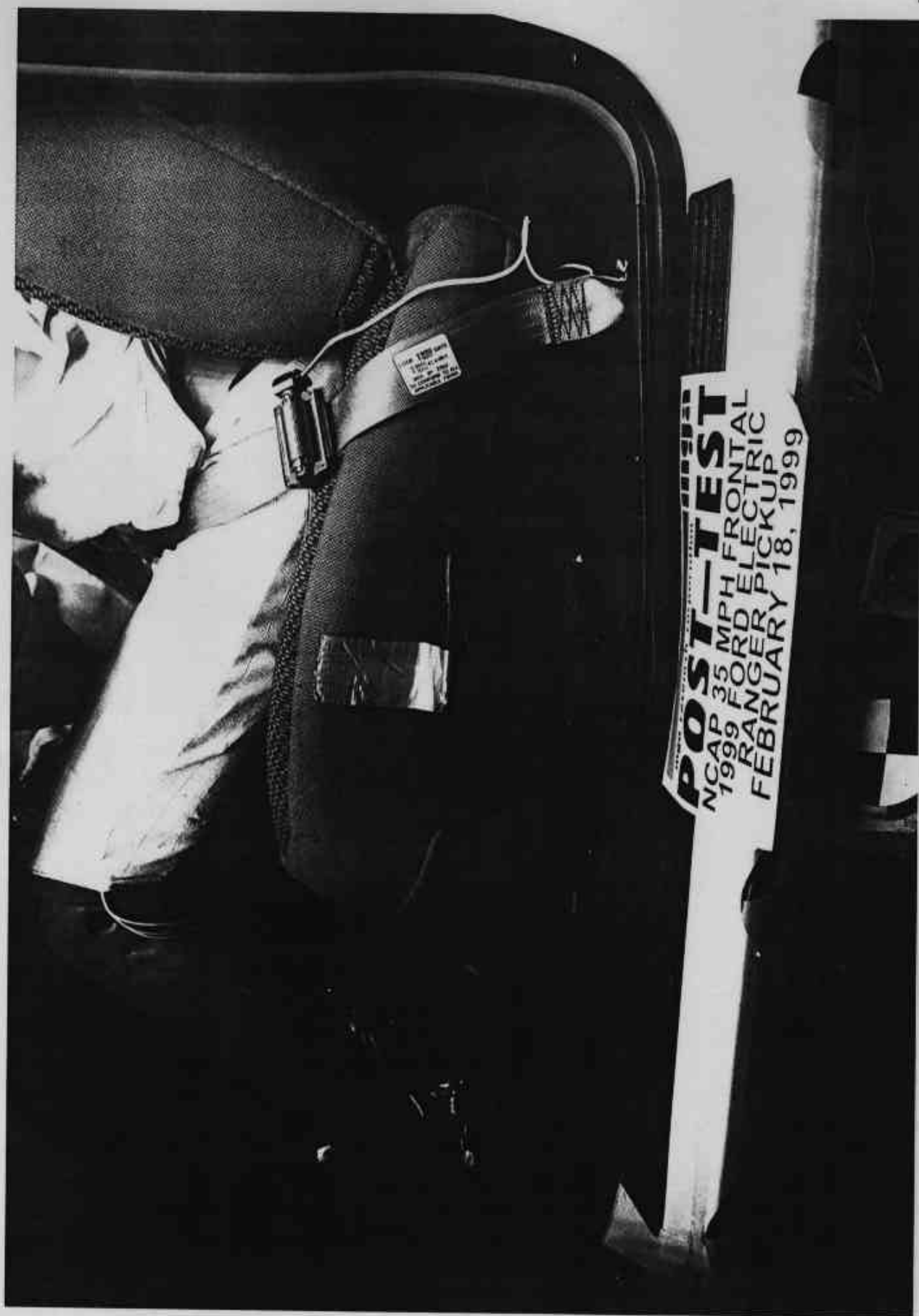


Photo No. A-26 - Post-Test Driver Seat Position View



Photo No. A-27 - Pre-Test Driver Dummy Knee Position



Photo No. A-28 - Post-Test Driver Dummy Knee Position



Photo No. A-29 - Post-Test Driver Airbag Contact

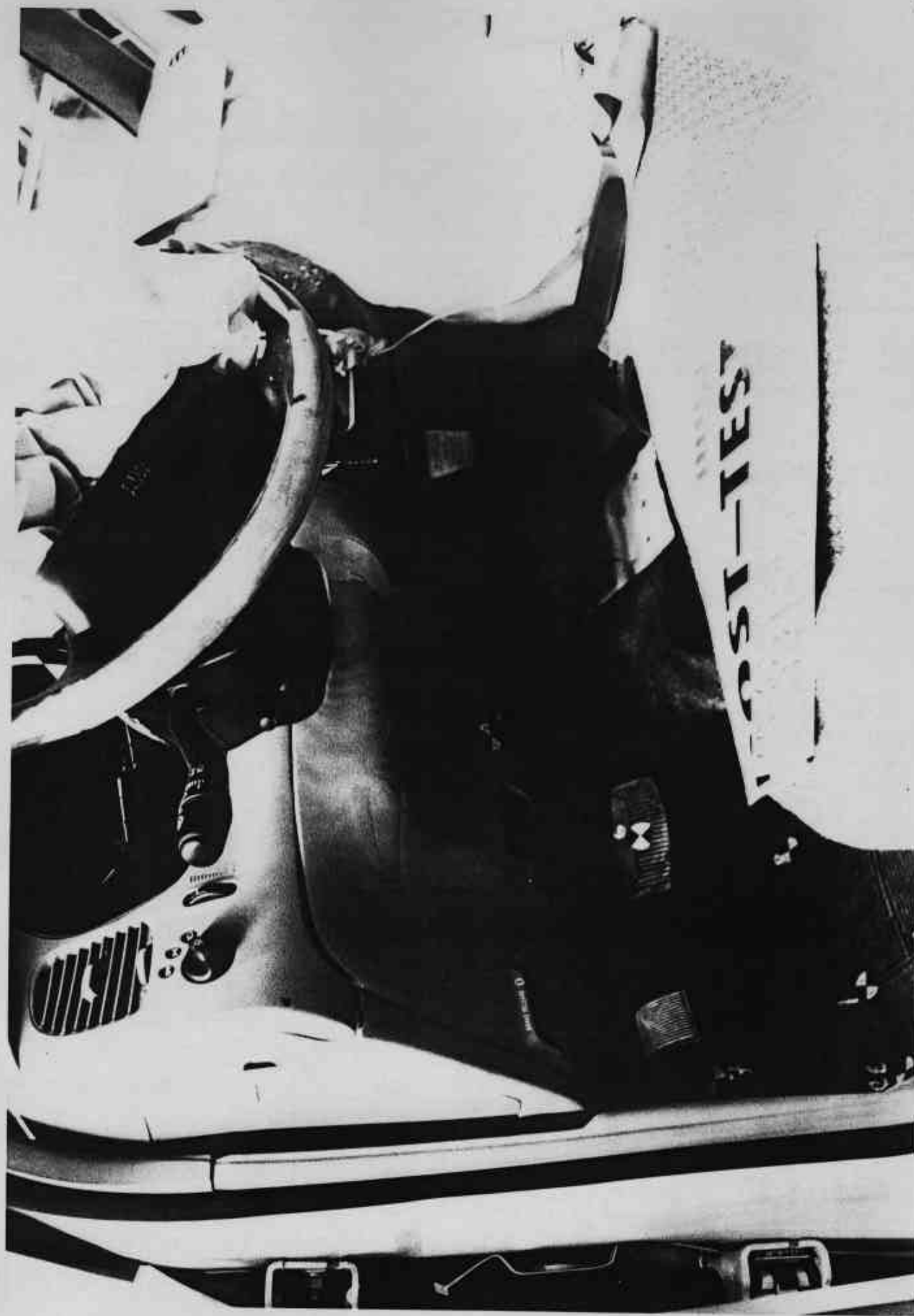
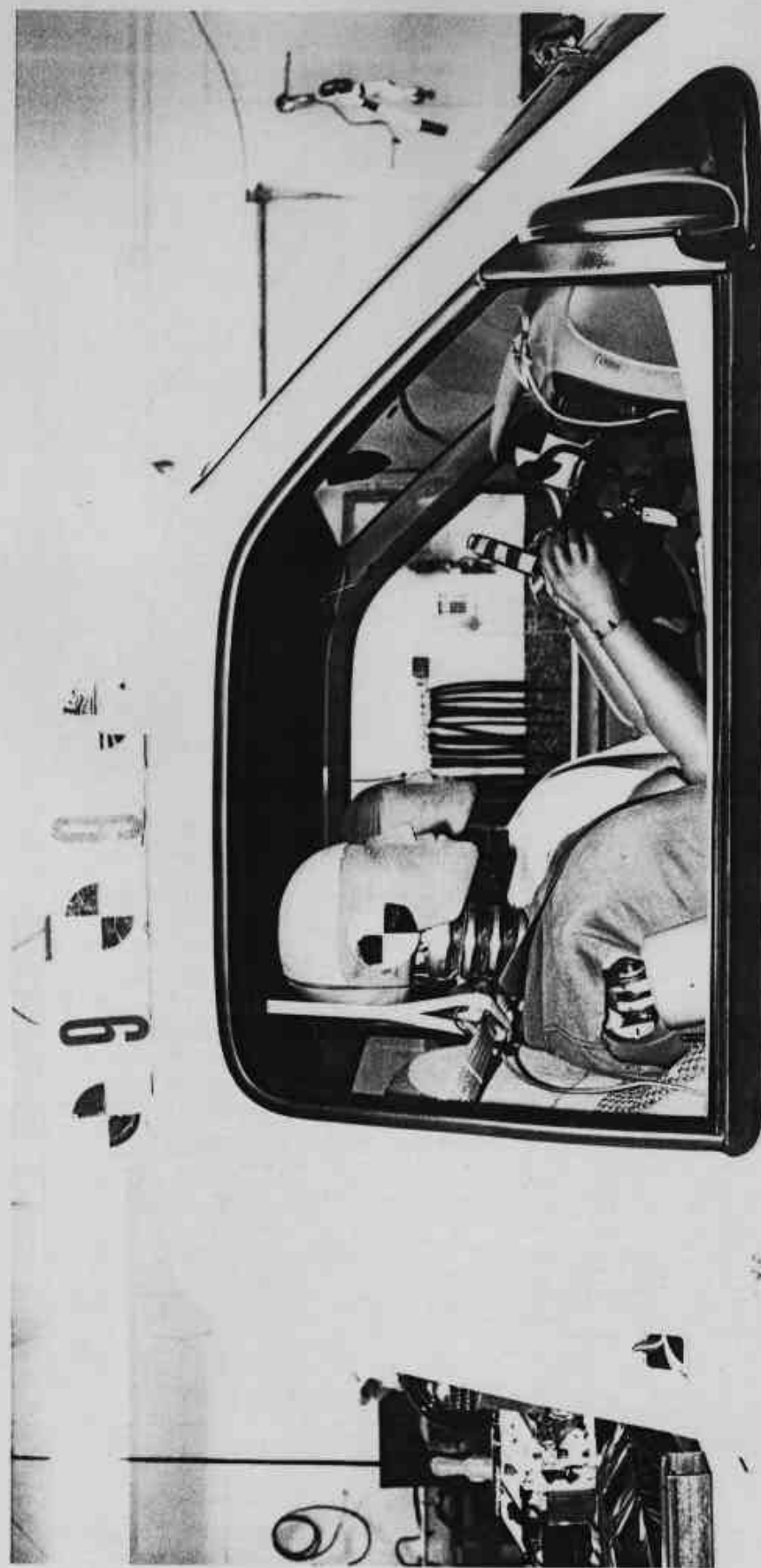


Photo No. A-30 - Post-Test Driver Knee Contact View



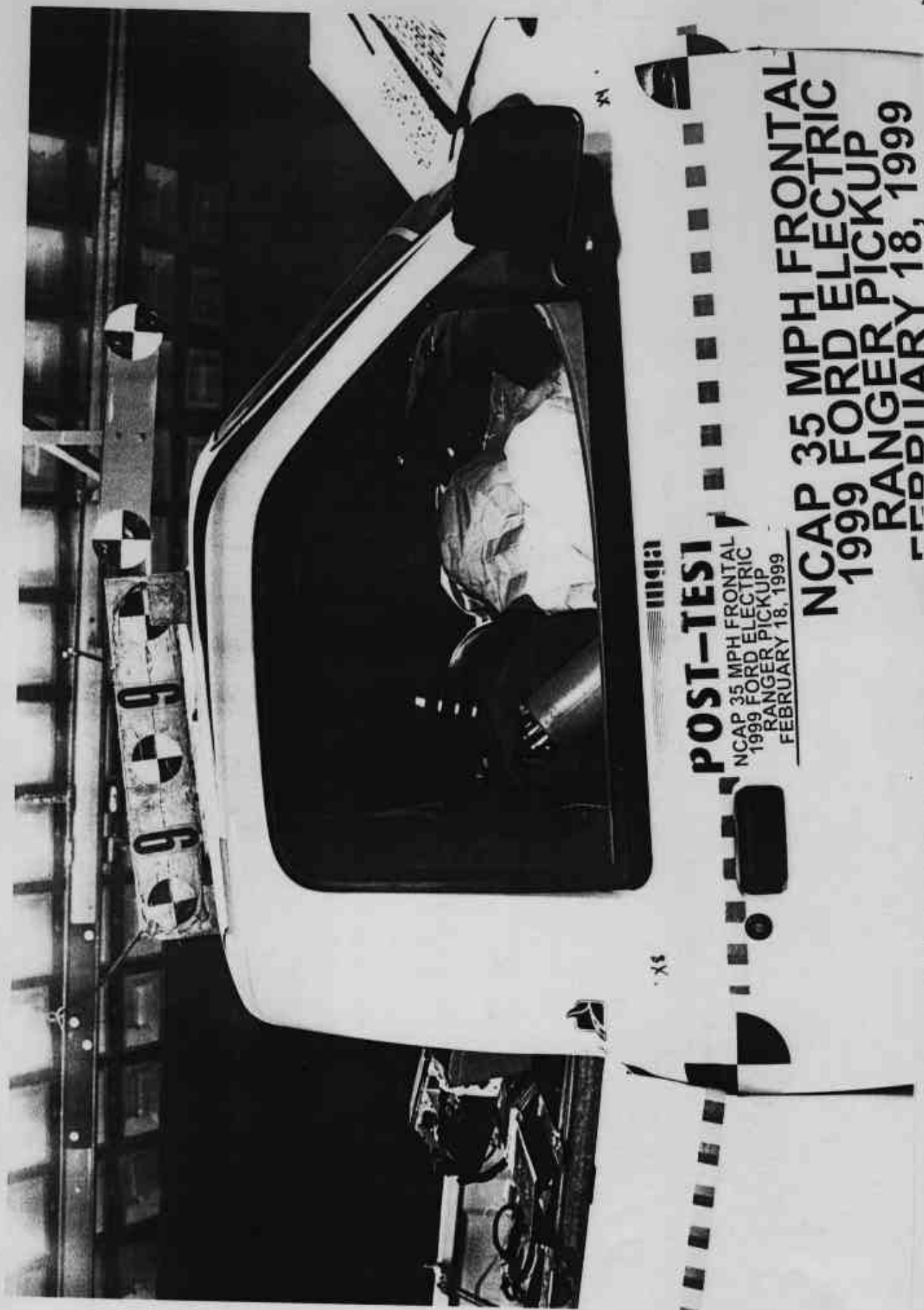
PRE-

1999 FORD ELECTRIC
RANGER PICKUP
FEBRUARY 18, 1999

A-31

**NCAP 35 MPH FRONT
1000 LBS DRIVER**

Photo No. A-31 - Pre-Test Passenger Dummy Position Right Side View



mda

POST-TEST

NCAP 35 MPH FRONTAL
1999 FORD ELECTRIC
RANGER PICKUP
FEBRUARY 18, 1999

**NCAP 35 MPH FRONTAL
1999 FORD ELECTRIC
RANGER PICKUP
FEBRUARY 18, 1999**

Photo No. A-32 - Post-Test Passenger Dummy Position Right Side View

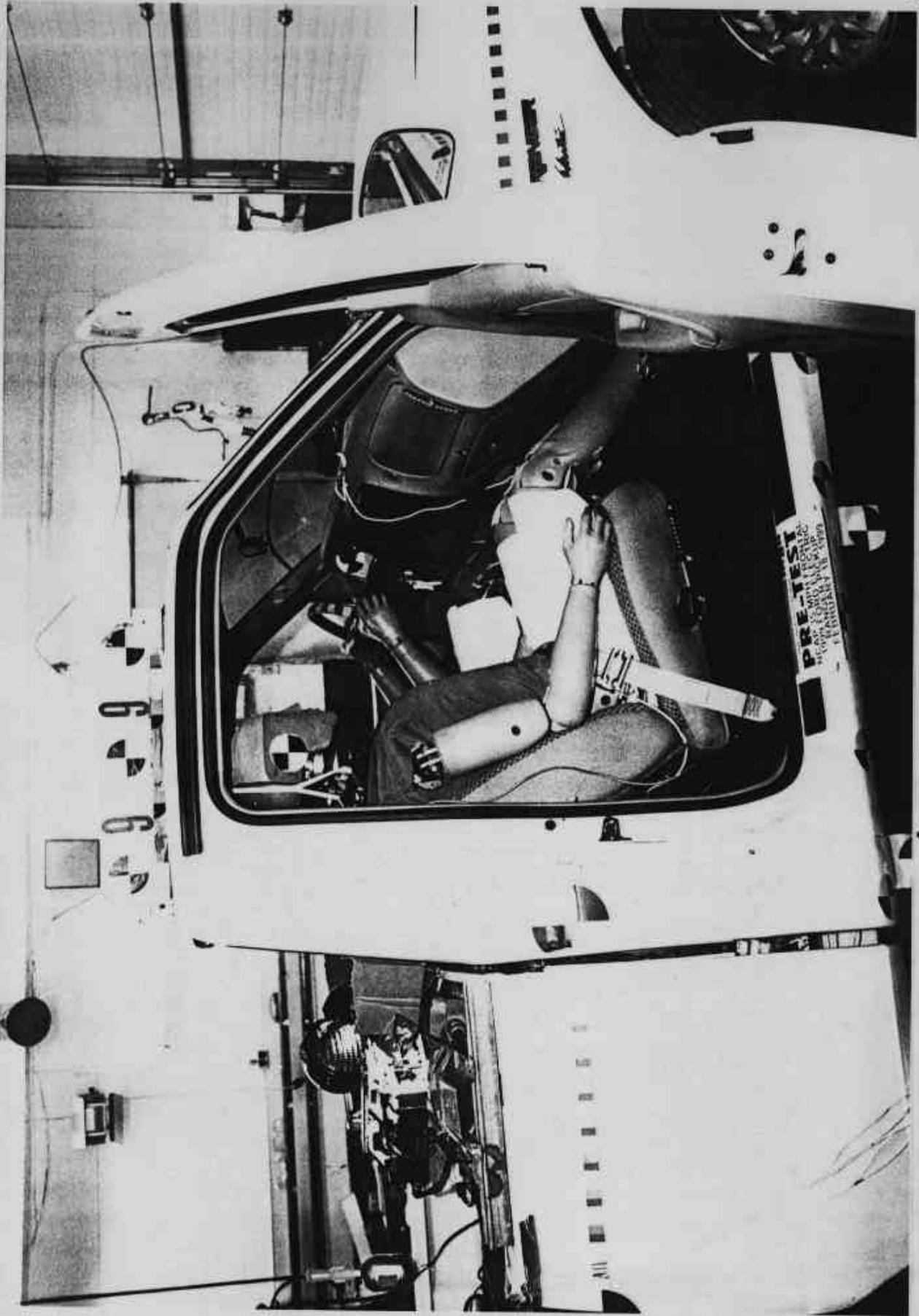


Photo No. A-33 - Pre-Test Passenger Dummy Position Right Side View (Door Open)



Photo No. A-34 - Post-Test Passenger Dummy Position Right Side View (Door Open)

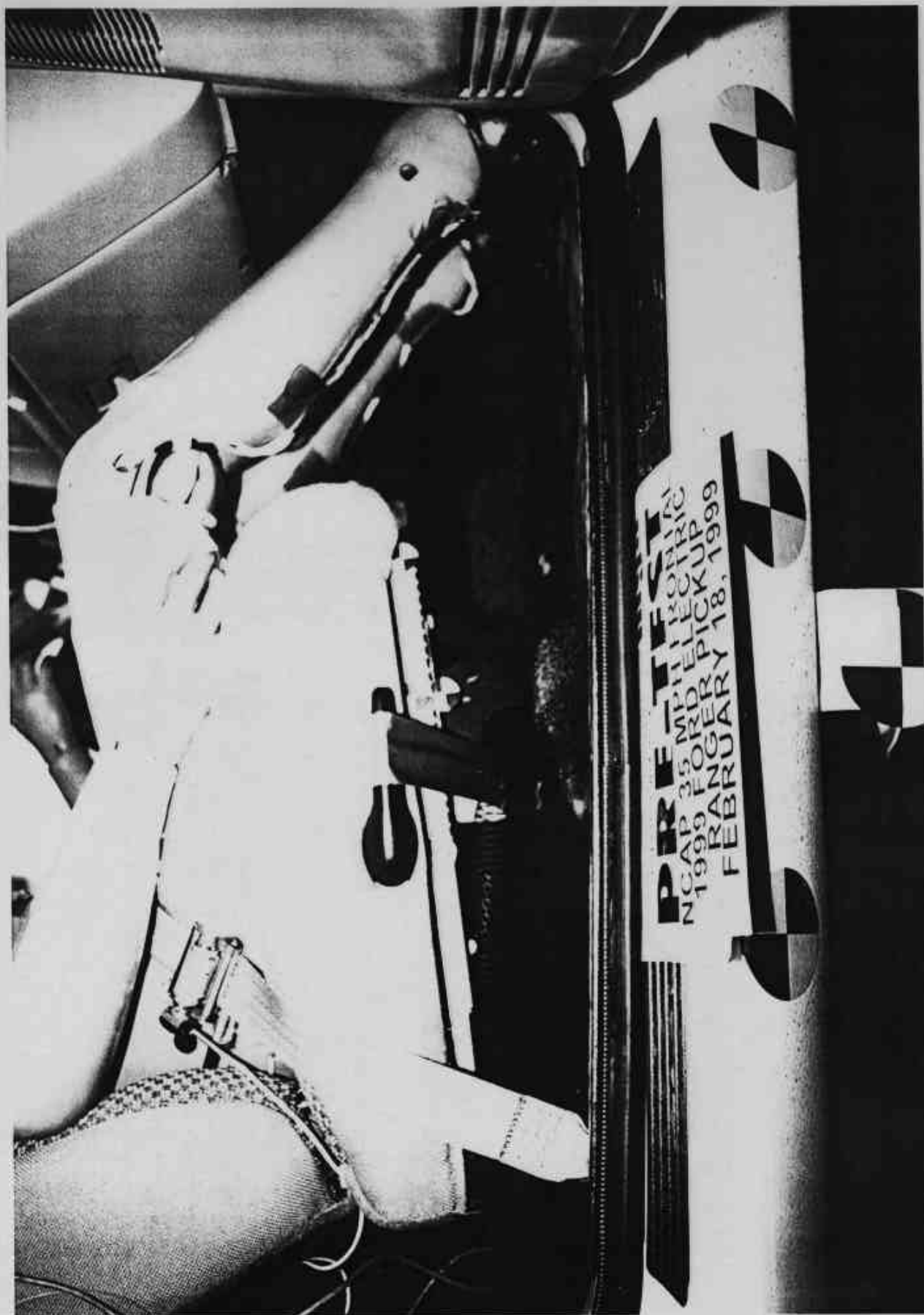


Photo No. A-35 - Pre-Test Passenger Seat Position View



Photo No. A-36 - Post-Test Passenger Seat Position View



Photo No: A-37 - Pre-Test Passenger Dummy Knee Position



Photo No. A-38 - Post-Test Passenger Dummy Knee Position



Photo No. A-39 - Post-Test Passenger Airbag Contact



Photo No. A-40 - Post-Test Passenger Knee Contact View

MFD. BY FORD MOTOR CO. IN U.S.A.

DATE: 10/98	GVWR: 5400LB / 2449KG	WITH TIRES RIMS	PSI COLD
FRONT GAWR: 2710LB	REAR GAWR: 3000LB		
1229KG	1360KG		
P225/70R15SL	P225/70R15SL		
15X7.0J	15X7.0J		
AT 345	1P0/50	AT 345	1P0/50

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 1FTZRB0876XTA30286

TYPE: TRUCK

F0017
T0000



EXC. PRG: YZ

WB	DR	INT	TR	TP/PS	R	AXLE	TR	SPR
112	D	E2			7	KA	H	F7

UTC

9 F85B1520472AB

Photo No. A-41 - Vehicle Certification Label and Tire Placard

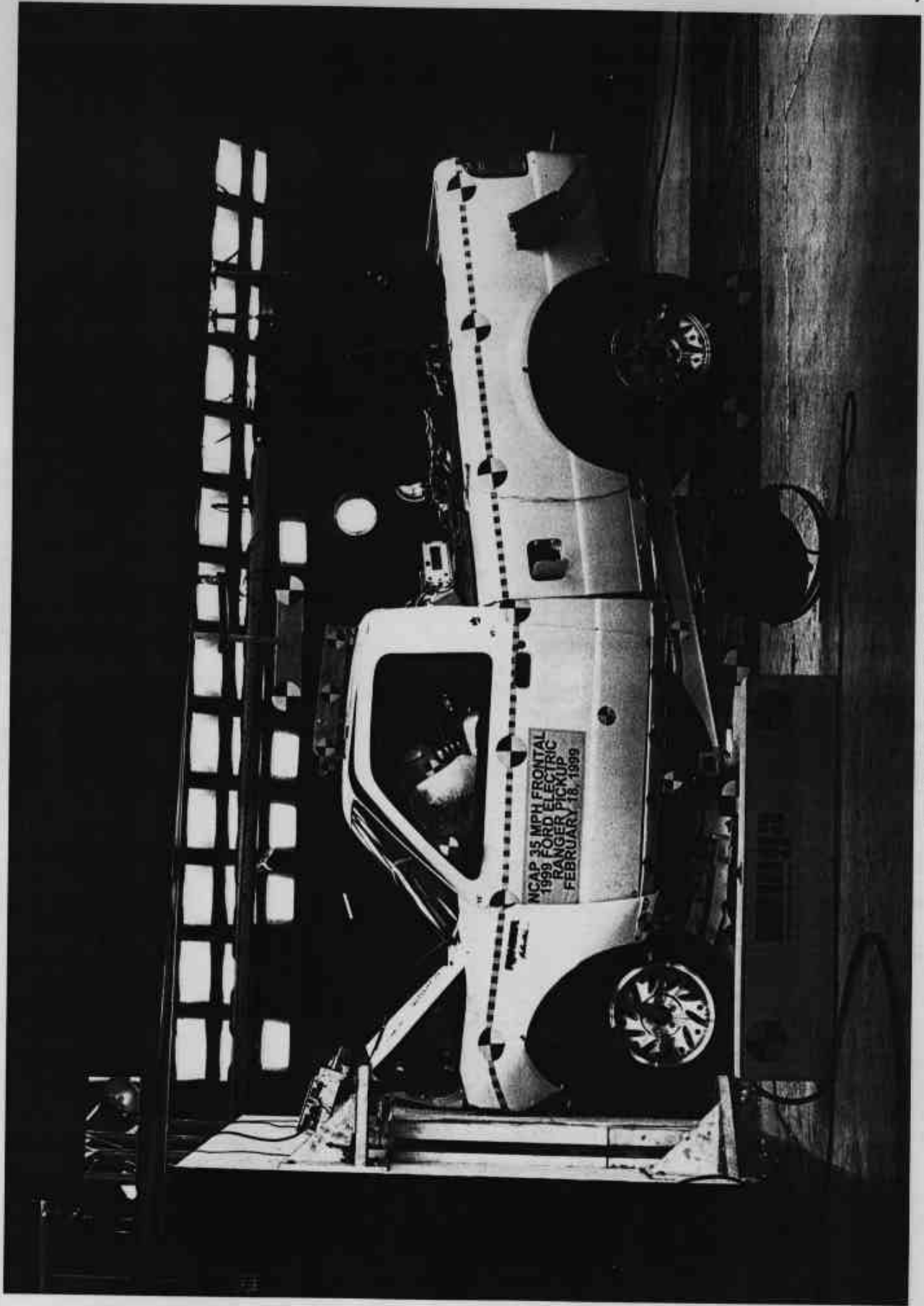
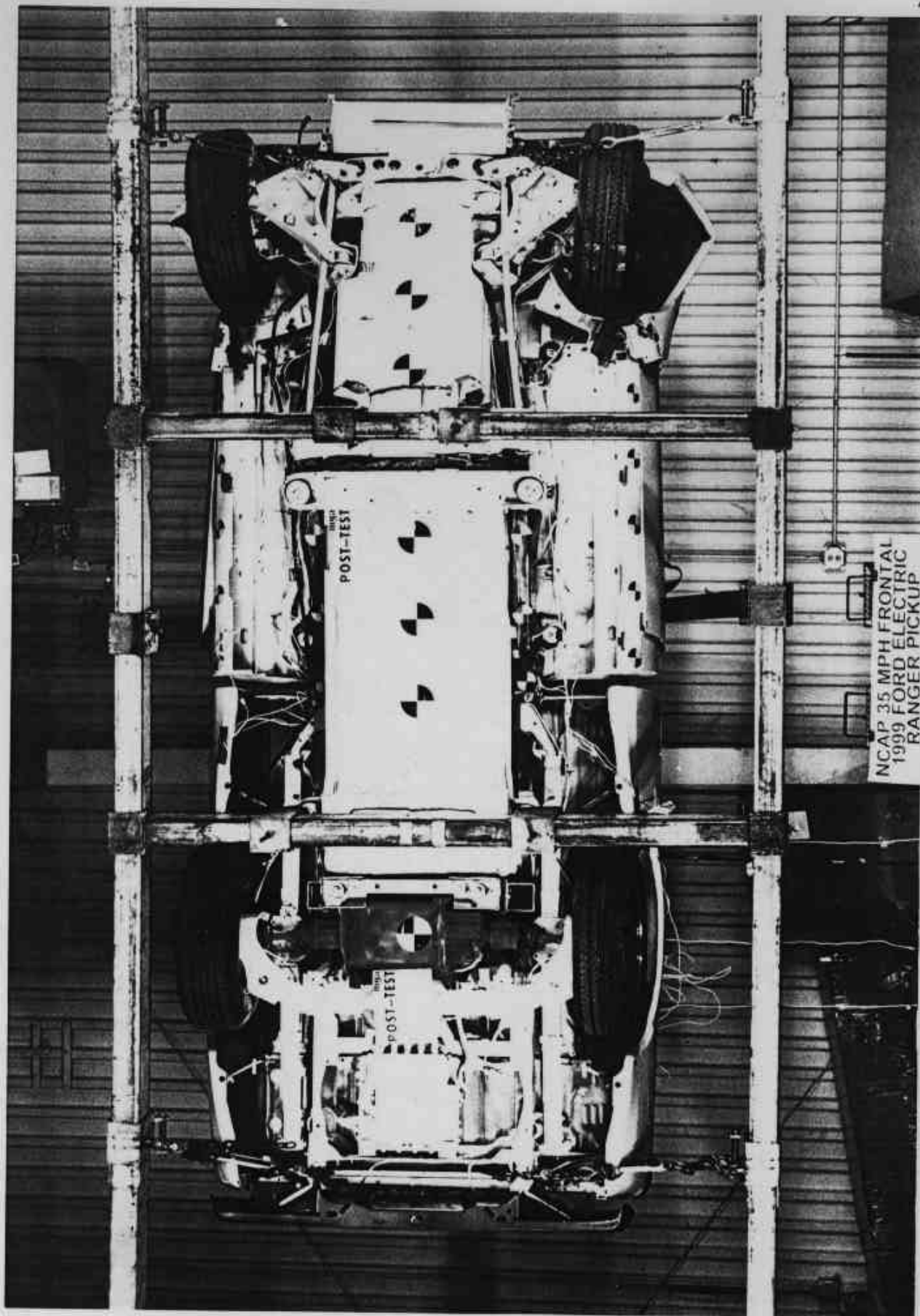


Photo No. A-42 - Vehicle Impact



NCAP 35 MPH FRONTAL
1999 FORD ELECTRIC
RANGER PICKUP

Photo No. A-43 - Rollover 90°

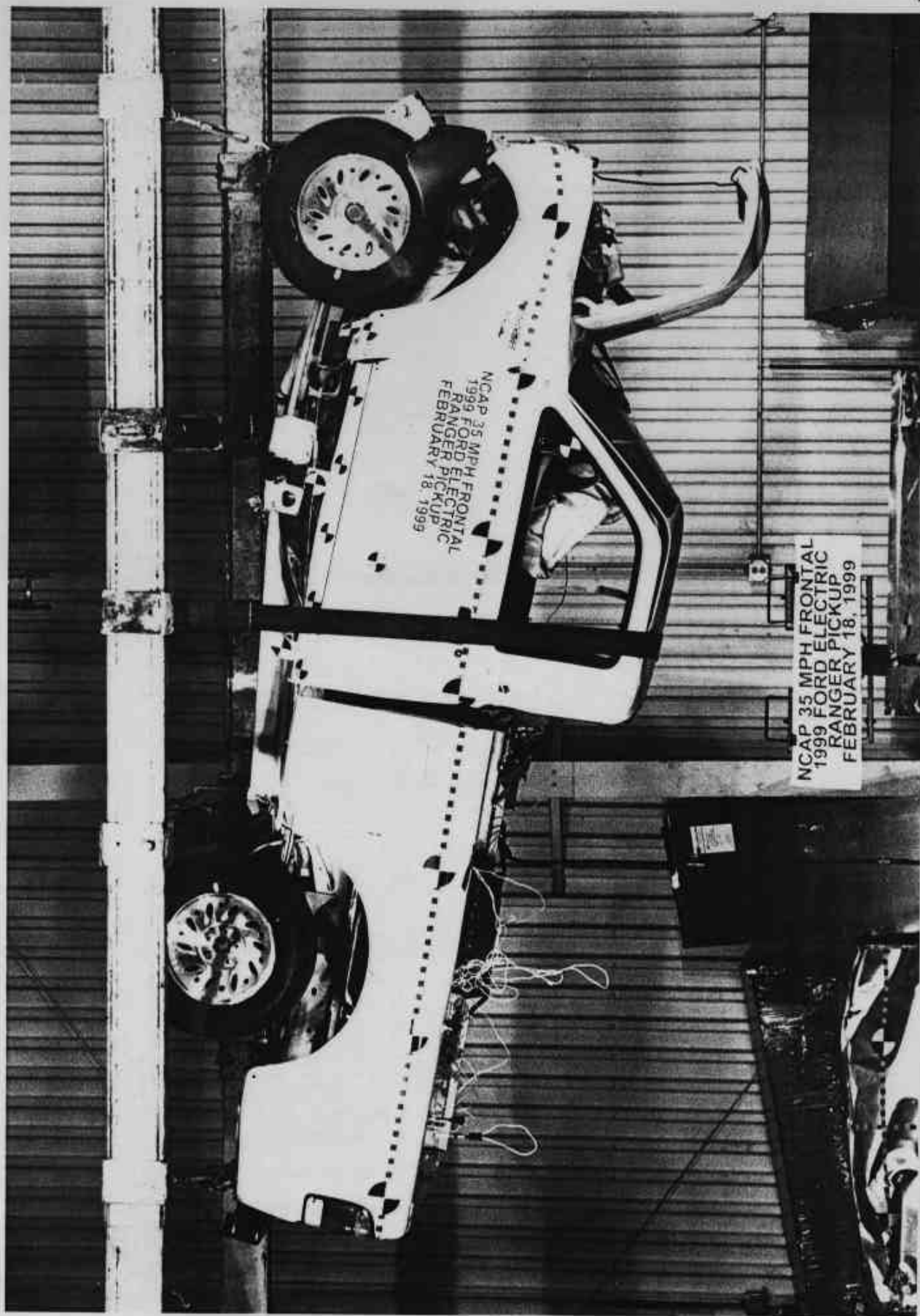


Photo No. A-44 - Rollover 180°

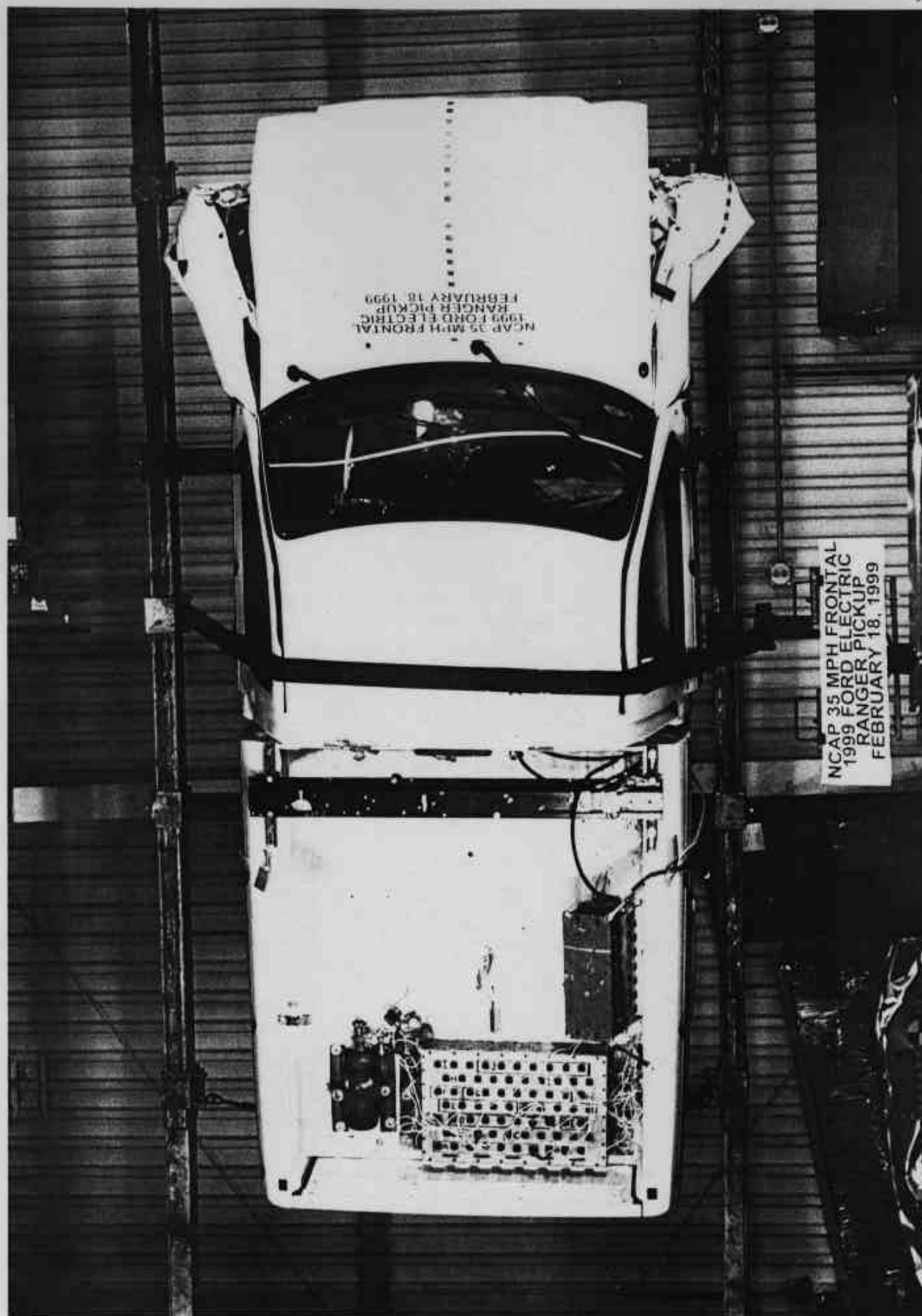


Photo No. A-45 - Rollover 270°

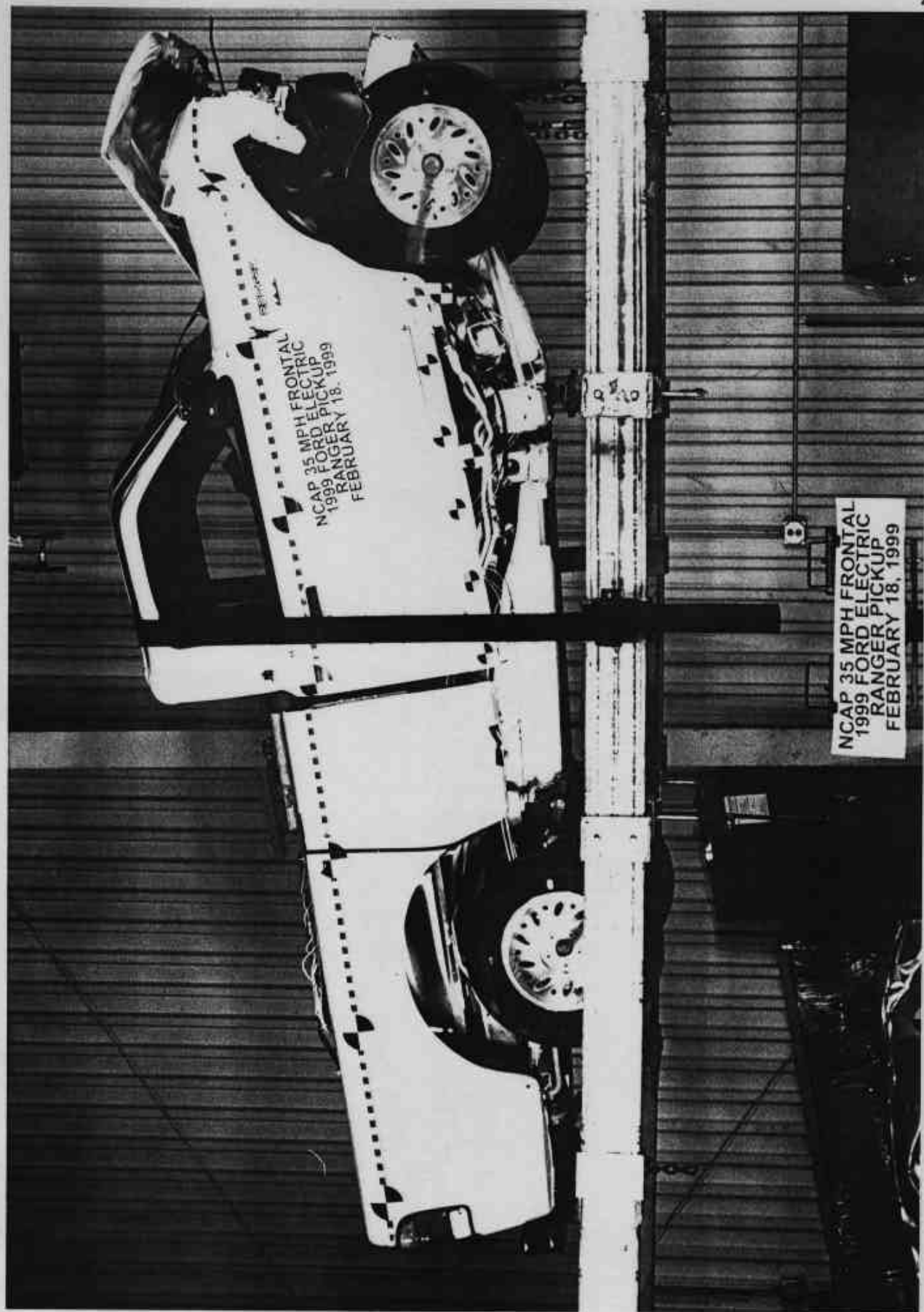


Photo No. A-46 - Rollover 360°

APPENDIX B
VEHICLE, LOAD CELL BARRIER AND DUMMY RESPONSE DATA

1999 Ford Ranger EV Pick-up

VEHICLE AND DUMMY DATA FILTER CHANNEL CLASS

Head Accelerations 1000 (1650 Hz)

Chest Accelerations 180 (300 Hz)

Vehicle Accelerations 60 (100 Hz)

Barrier Load Cells 60 (100 Hz)

Femur Load Cells 600 (1000 Hz)

Lap and Torso Belts 60 (100 Hz)

Occupant Data:

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* No valid data collected

Occupant Data: (Cont'd)

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* Data shifted from 23.0 to 27.3 msec. and from 125.0 to 126.6 msec.

Occupant Data: (Cont'd)

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* Data is questionable

** Data shifted from 23.0 to 27.3 msec. and from 125.0 to 126.6 msec.

Occupant Data: (Cont'd)Page No.

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* Data not valid after approximately 41 msec.

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* Data not valid after approximately 49 msec.

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

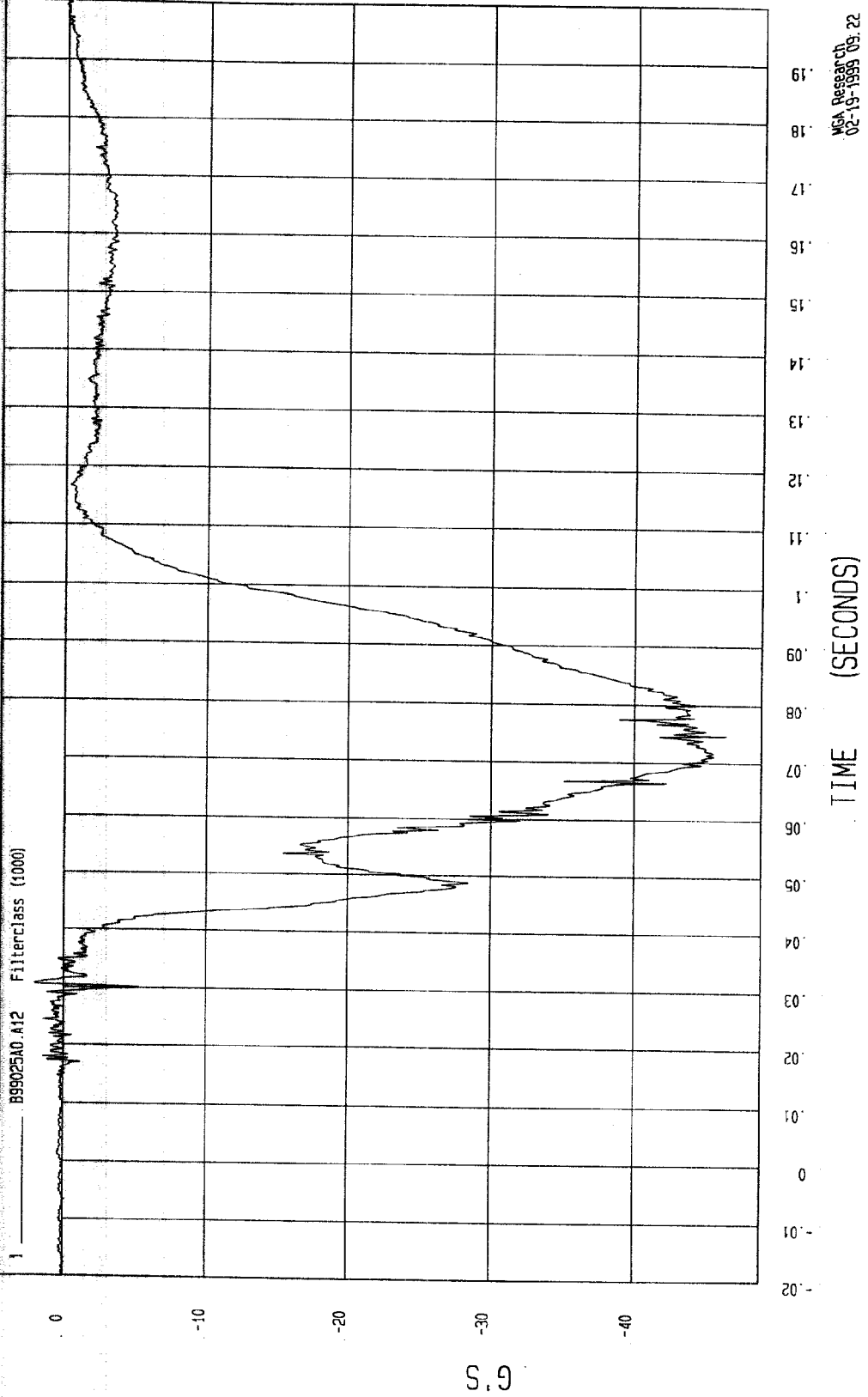
COMPONENT: 1999 FORD RANGER EV

Speed: 35.2 MPH 56.6 KPH

Minimum = -46.46 G'S at 75 msec

Maximum = 2 G'S at 31 msec

DRIVER HEAD X ACCELERATION



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

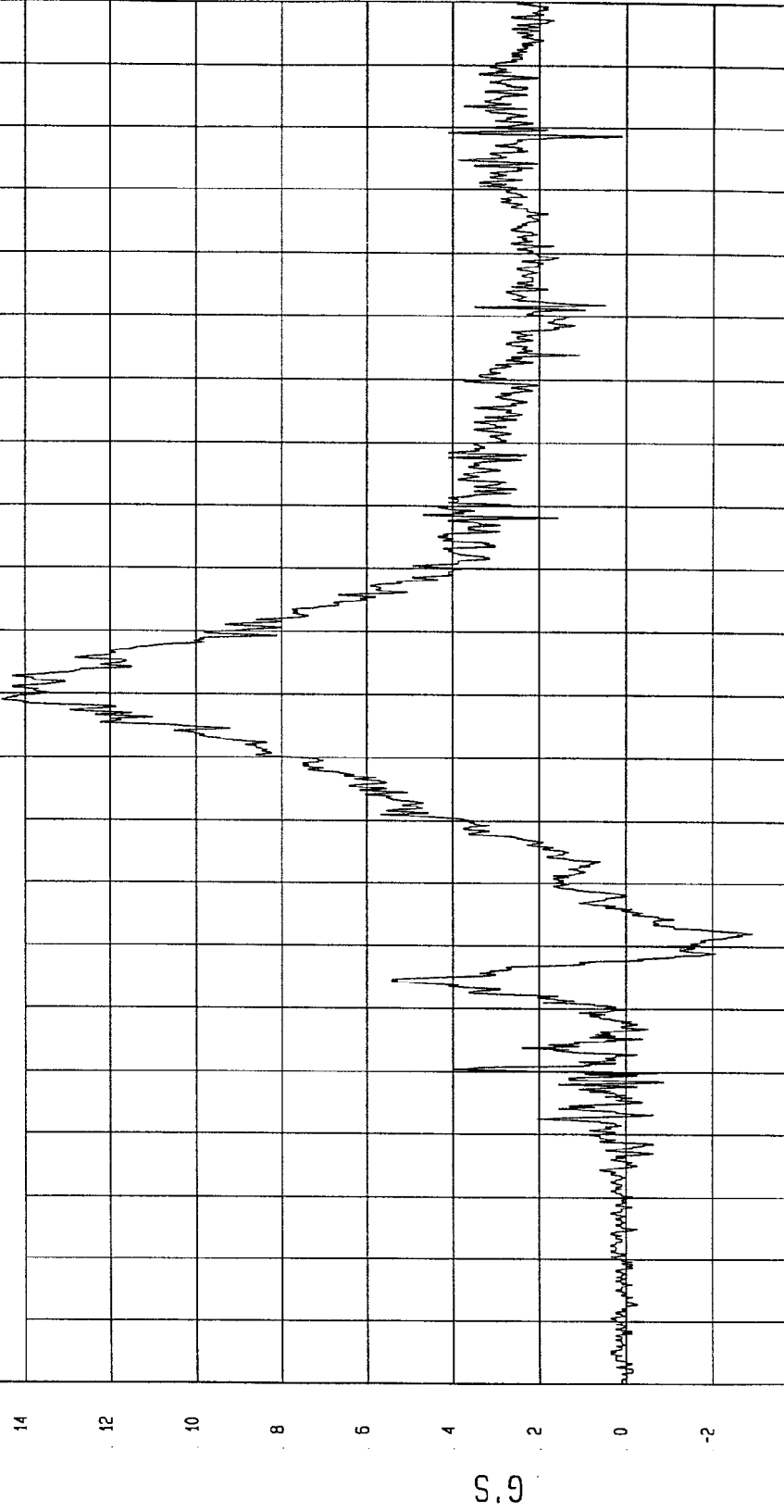
COMPONENT: 1999 FORD RANGER EV

Maximum = 14.53 G'S at 89 msec

Minimum = -2.93 G'S at 52 msec

DRIVER HEAD Y ACCELERATION

1 B99025AT.A13 Filterclass (1000)

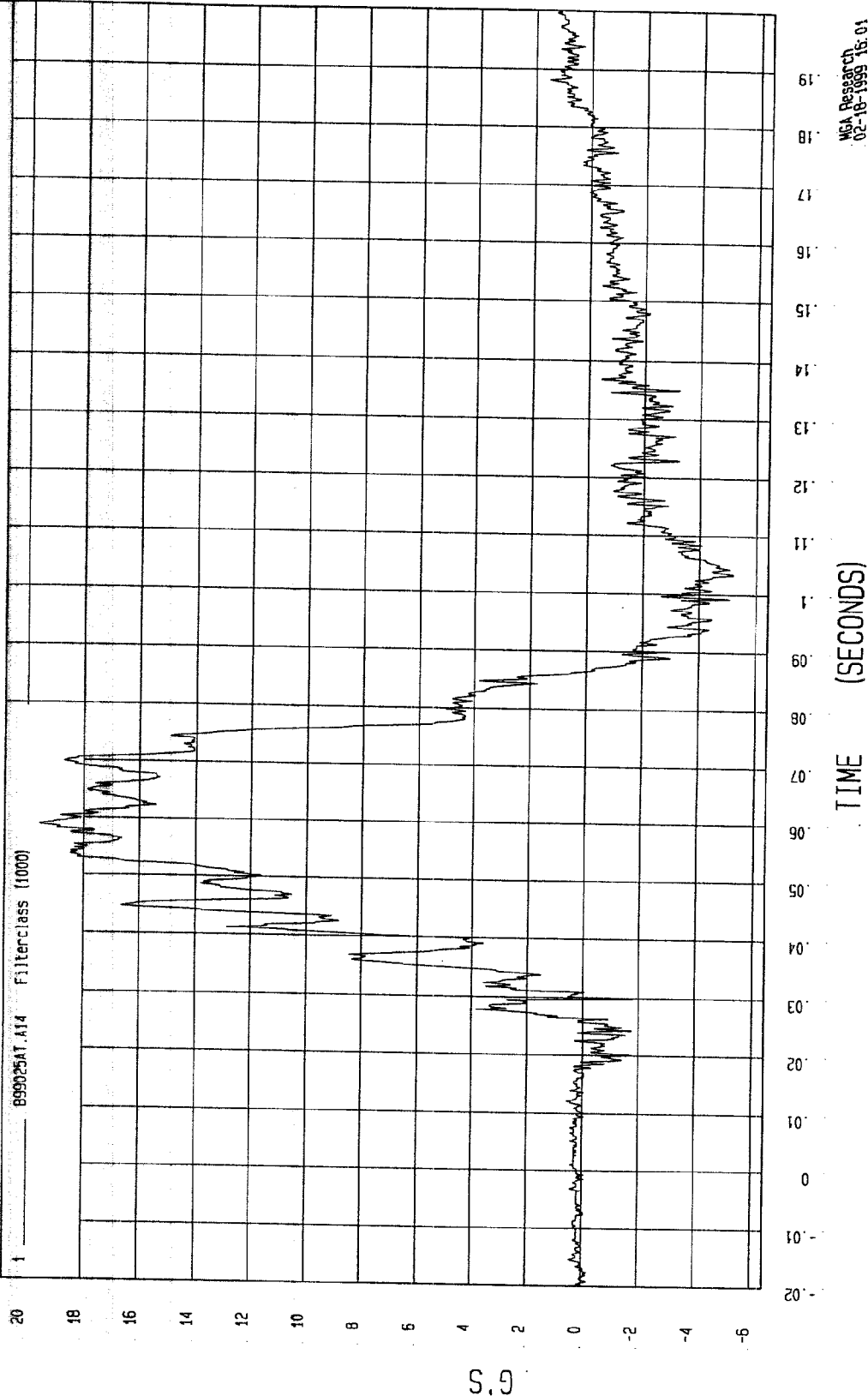


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -5.19 G'S at 103 msec Maximum = 19.56 G'S at 59 msec

DRIVER HEAD Z ACCELERATION



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV

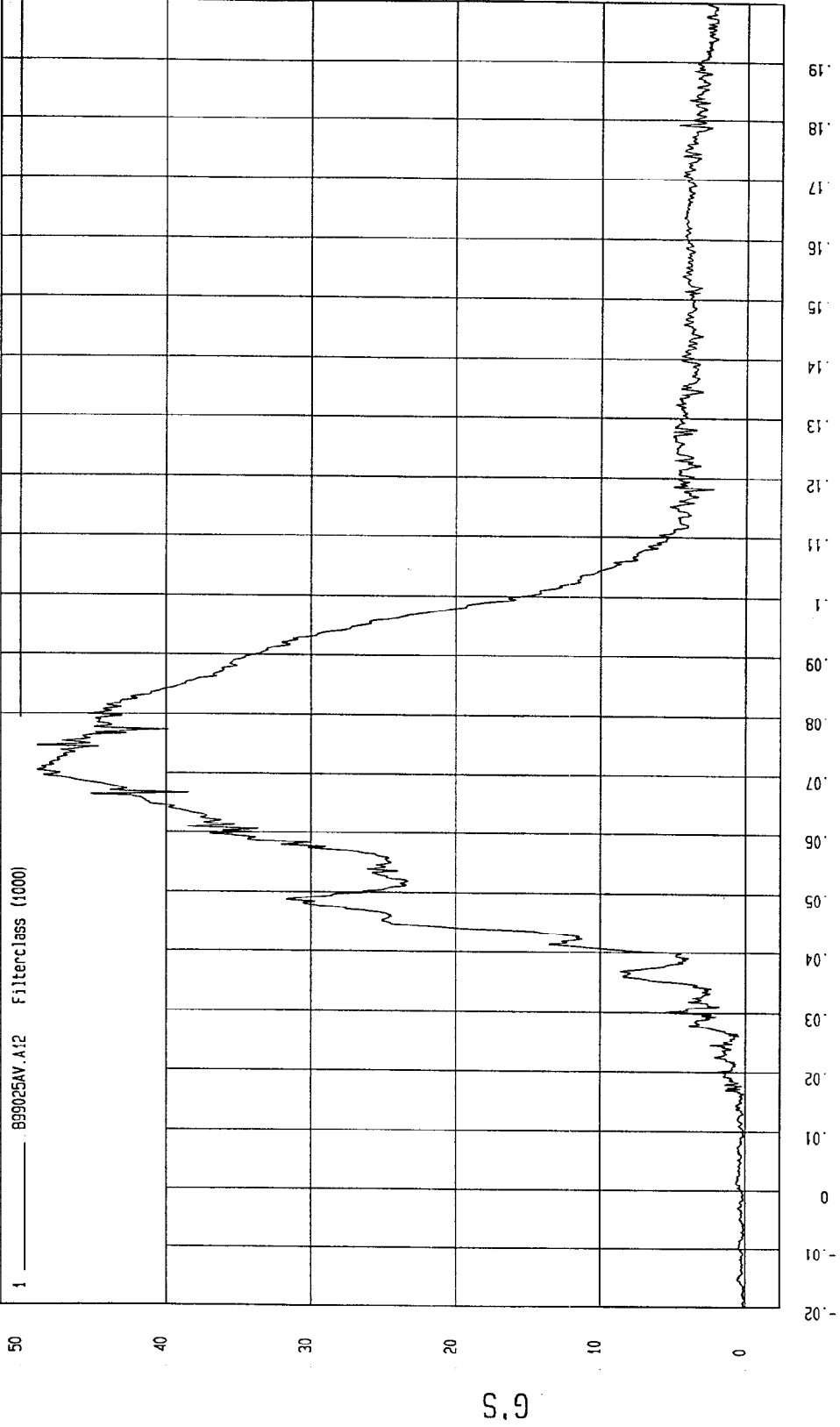
Speed: 35.2 MPH 56.6 KPH

Minimum = 6.19E-02 G'S at -20 msec

Maximum = 48.92 G'S at 70 msec

DRIVER HEAD RESULTANT ACCELERATION

1 899025AV.A12 Filterclass (1000)



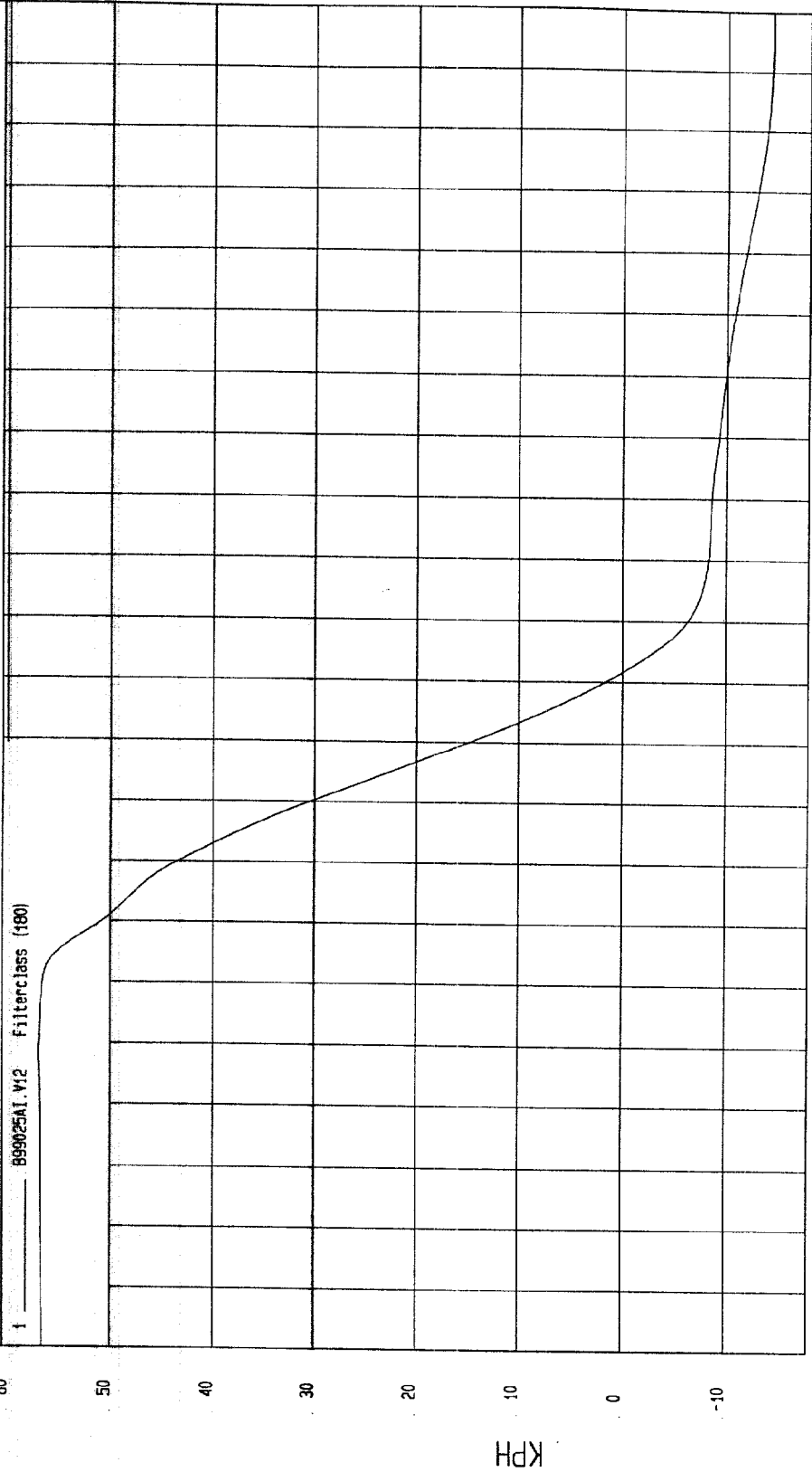
WCA Research
02-19-1999 09:26

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -14.4 KPH at 200 msec Maximum = 56.94 KPH at 29 msec

DRIVER HEAD X VELOCITY



TIME Seconds

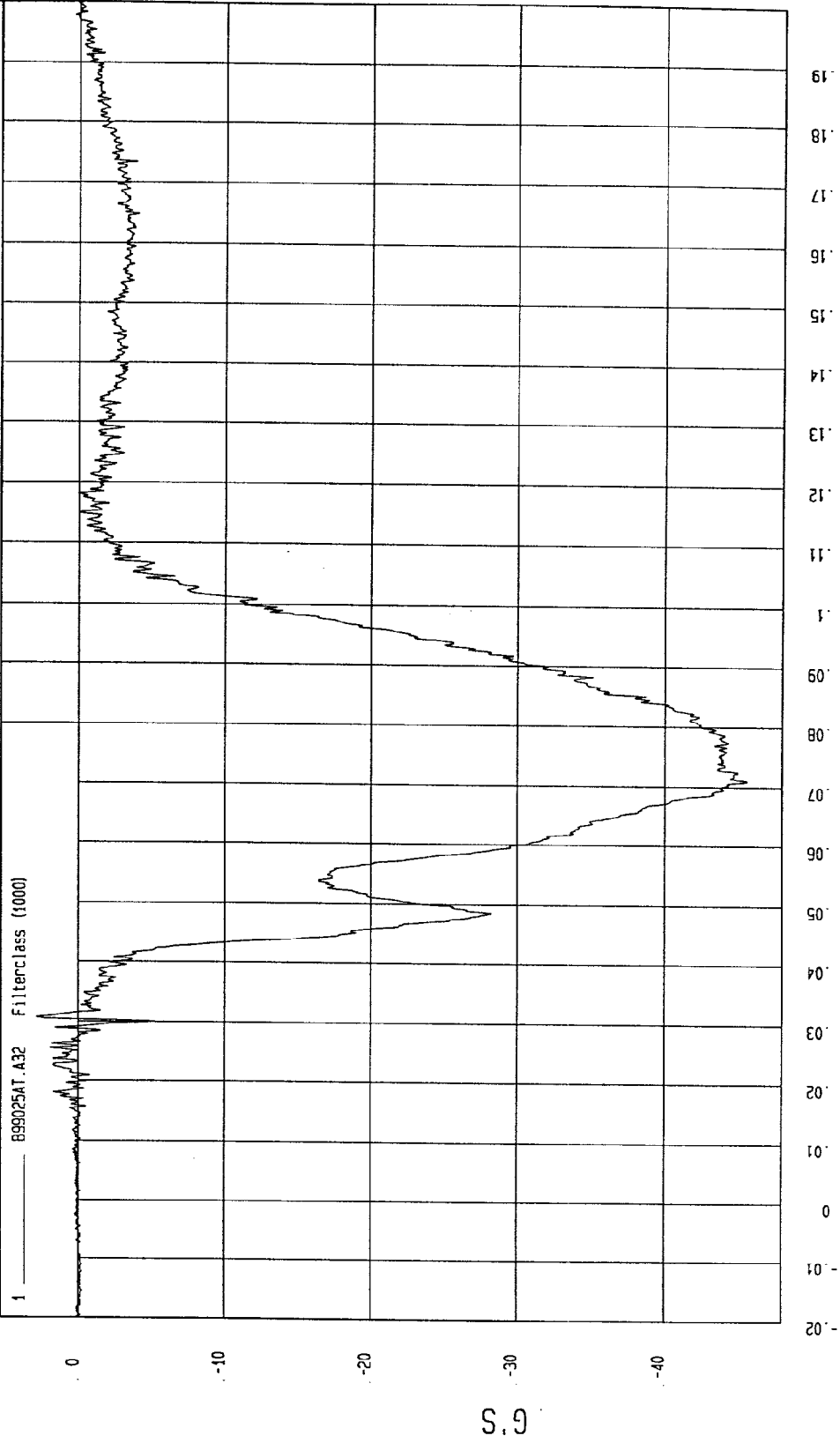
NGA Research
02-19-1999 11:22

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -45.55 G'S at 71 msec Maximum = 2.83 G'S at 31 msec

DRIVER HEAD REDUNDANT X ACCELERATION



MCA Research
02-18-1999 15:02

TEST: NCAP 35 MPH FRONTAL IMPACT

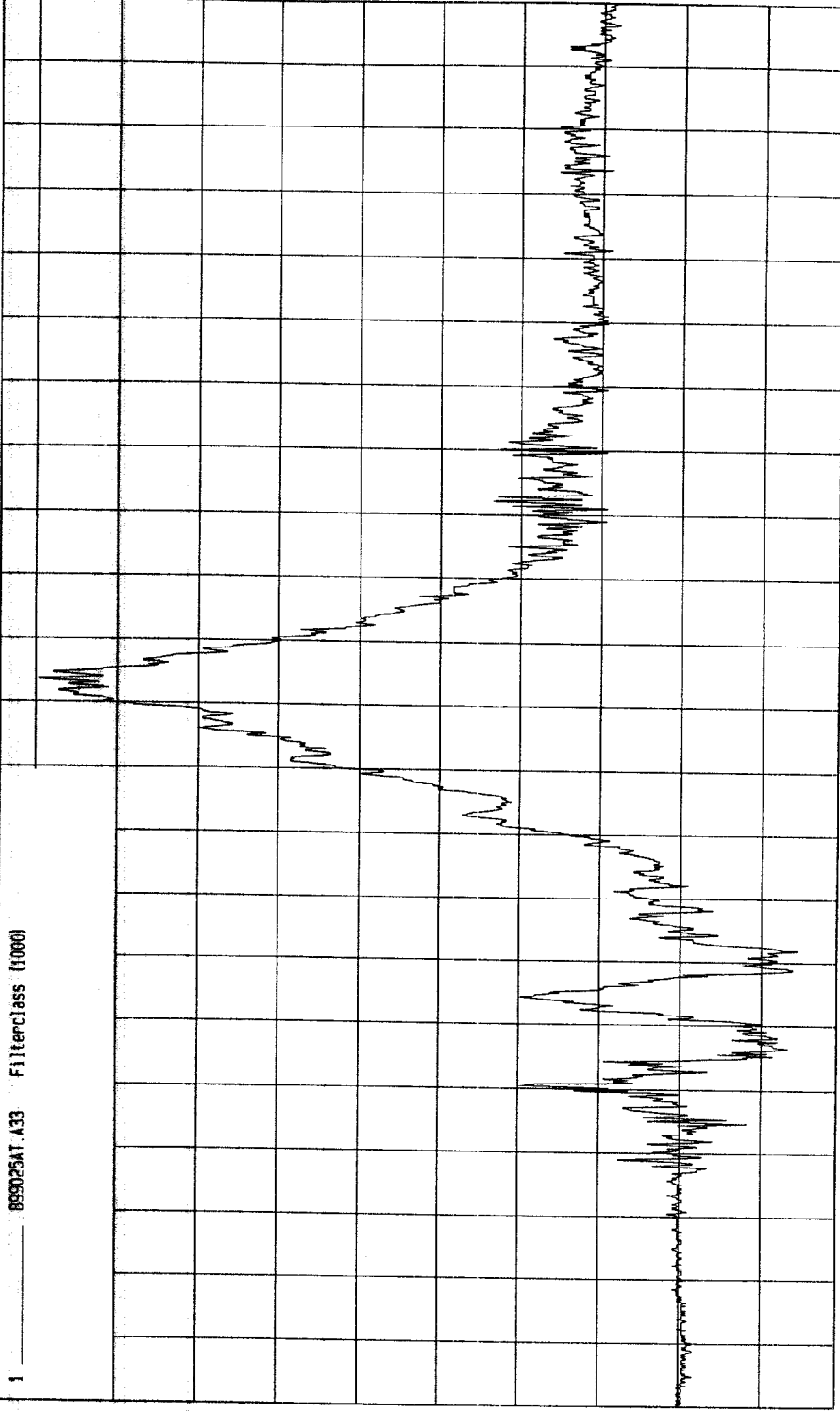
Speed: 35.2 MPH 56.6 KPH

Maximum = 15.94 G'S at 94 msec

Minimum = -2.89 G'S at 52 msec

DRIVER HEAD REDUNDANT Y ACCELERATION

1 899025AT.A33 Filterclass (1000)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

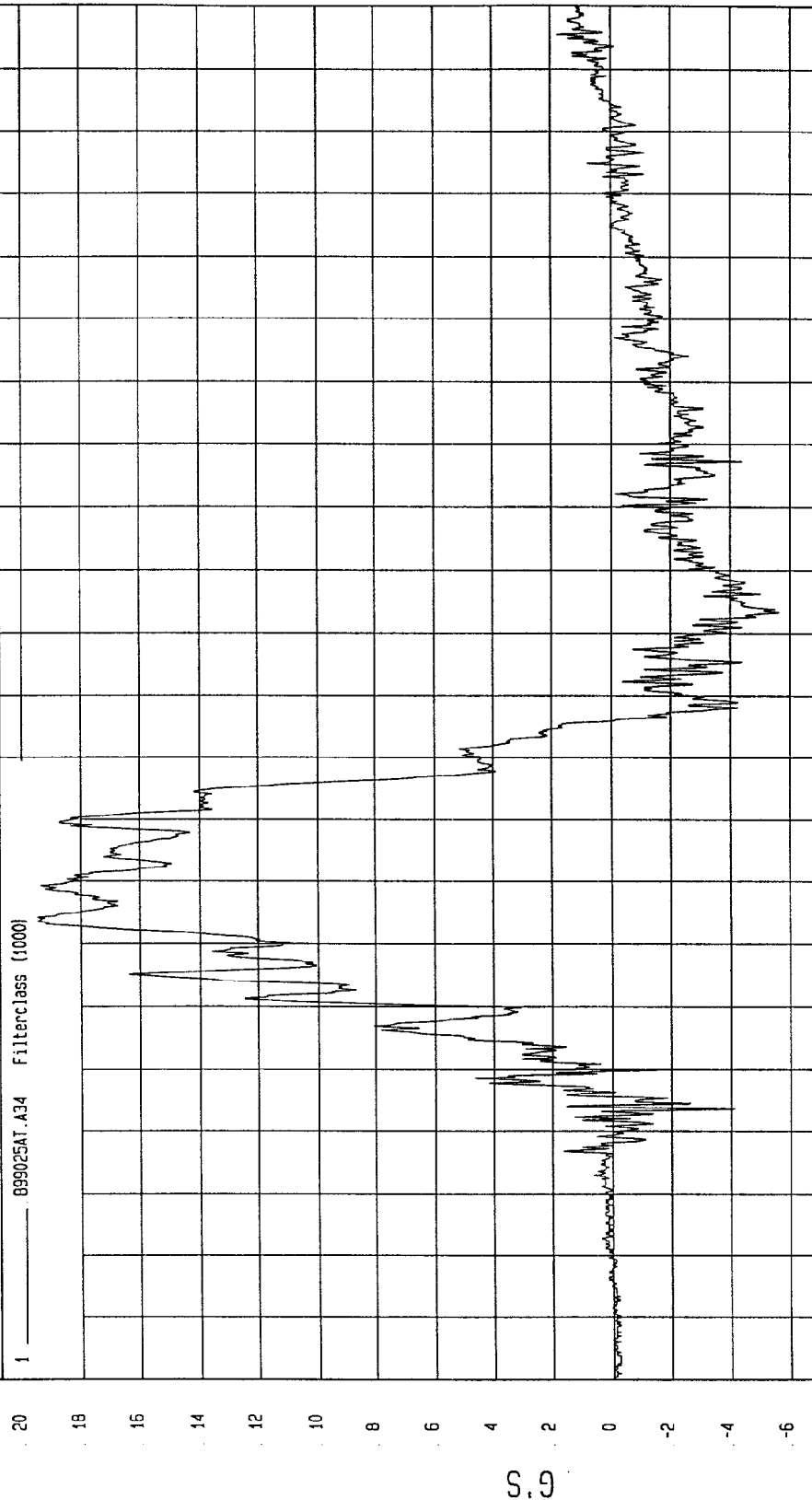
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 19.49 G'S at 54 msec

Minimum = -5.64 G'S at 103 msec

DRIVER HEAD REDUNDANT Z ACCELERATION



NSA Research
02-18-1999 16:02

TIME (SECONDS)

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

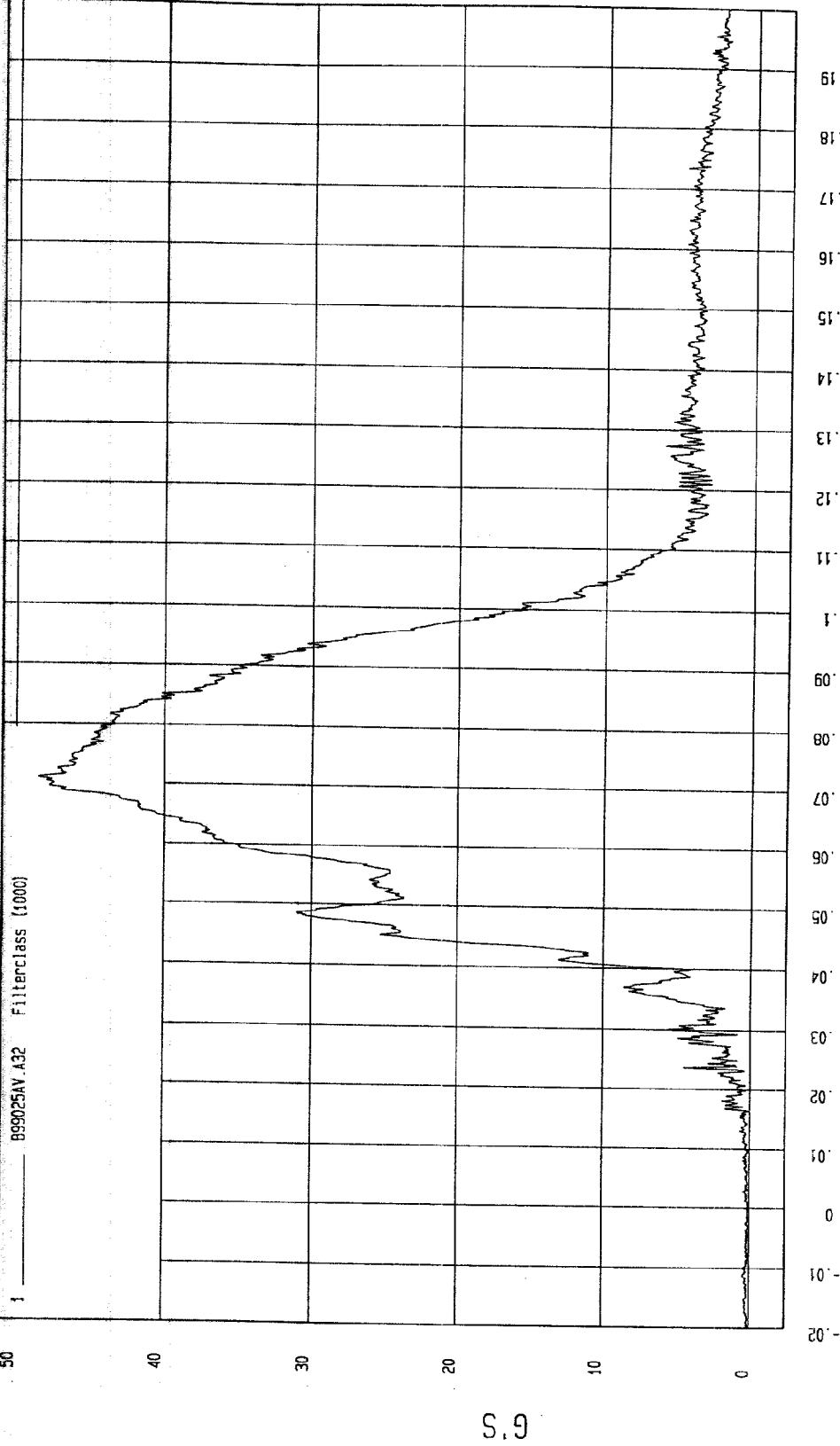
COMPONENT: 1999 FORD RANGER EV

Minimum = 6.38E-02 G'S at -20 msec

Maximum = 48.53 G'S at 71 msec

DRIVER HEAD REDUNDANT RESULTANT ACCELERATION

1 B99025AV.A32 Filterclass (1000)



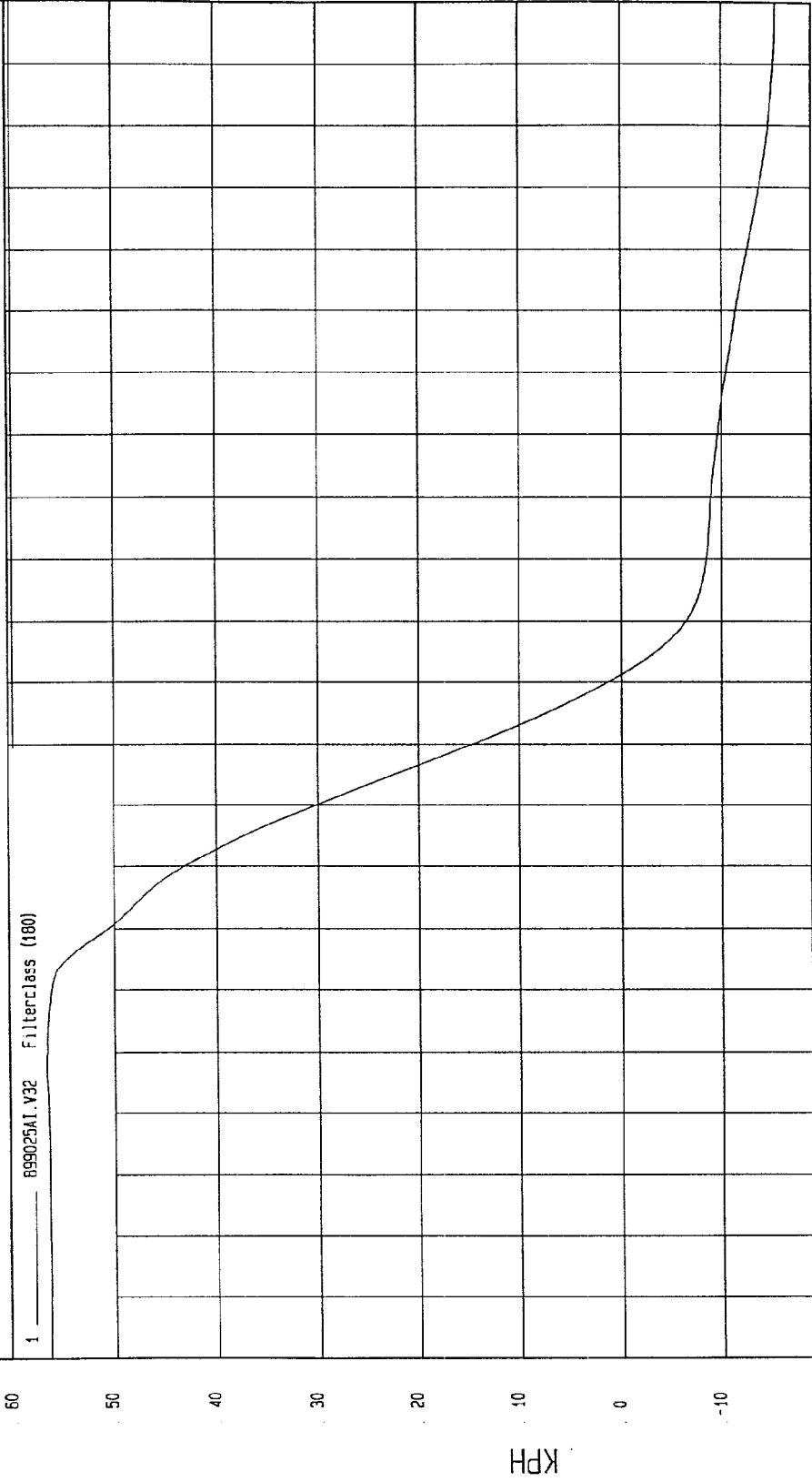
MSA Research
02-18-1999 16:02

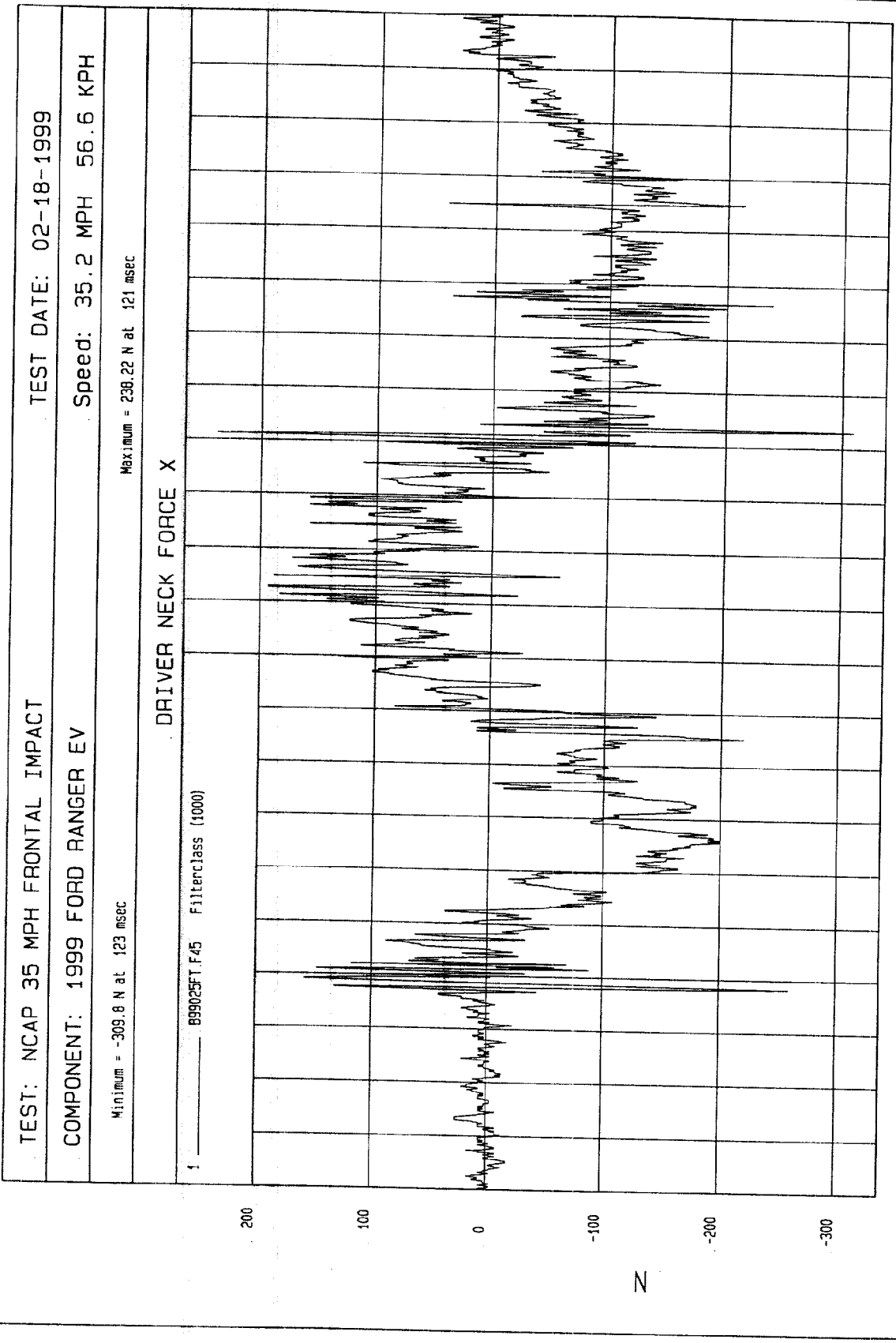
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -15.23 KPH at 200 msec Maximum = 56.83 KPH at 27 msec

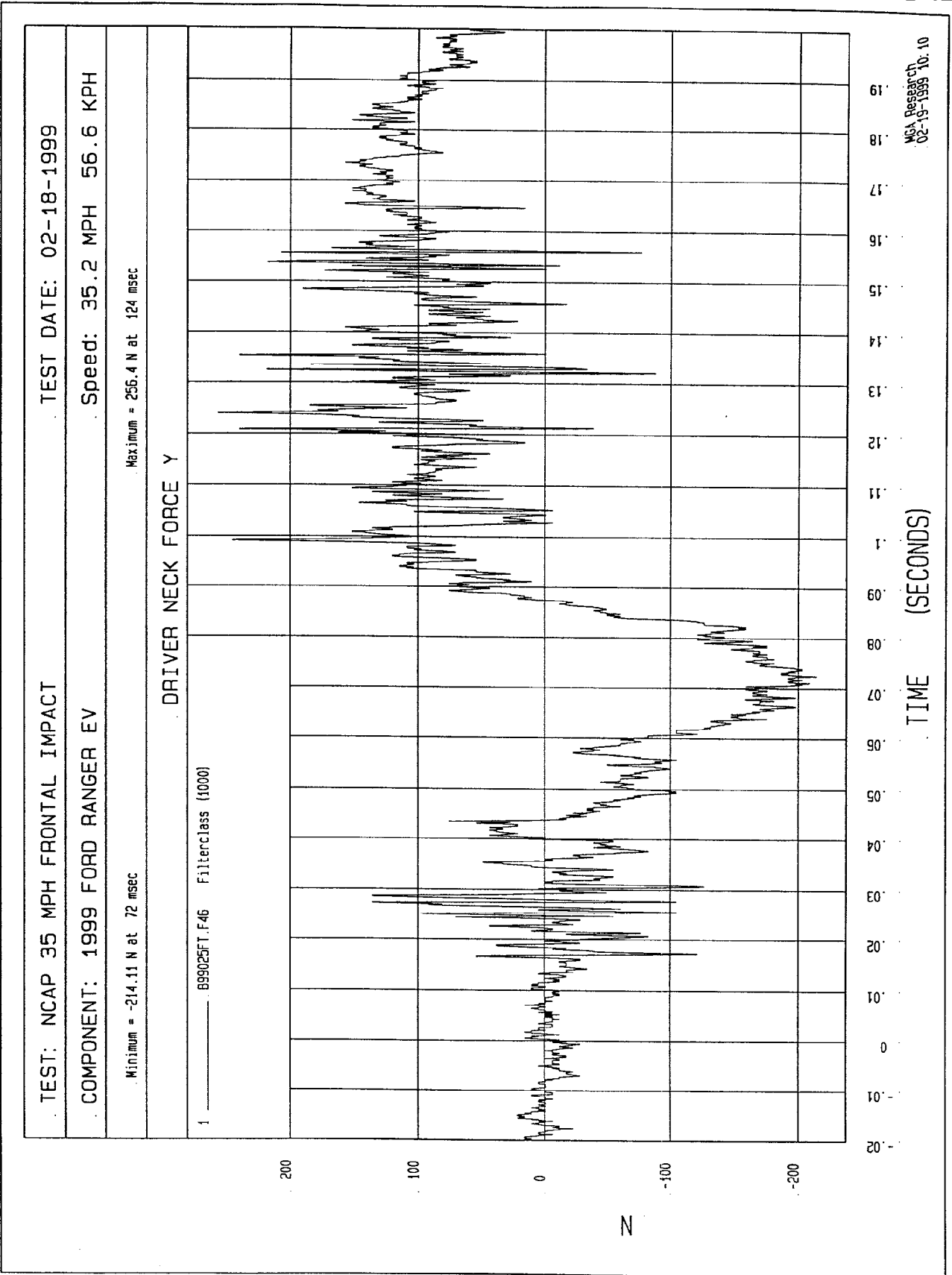
DRIVER HEAD REDUNDANT X VELOCITY





NSA Research
02-19-1999 10:10

TIME (SECONDS)

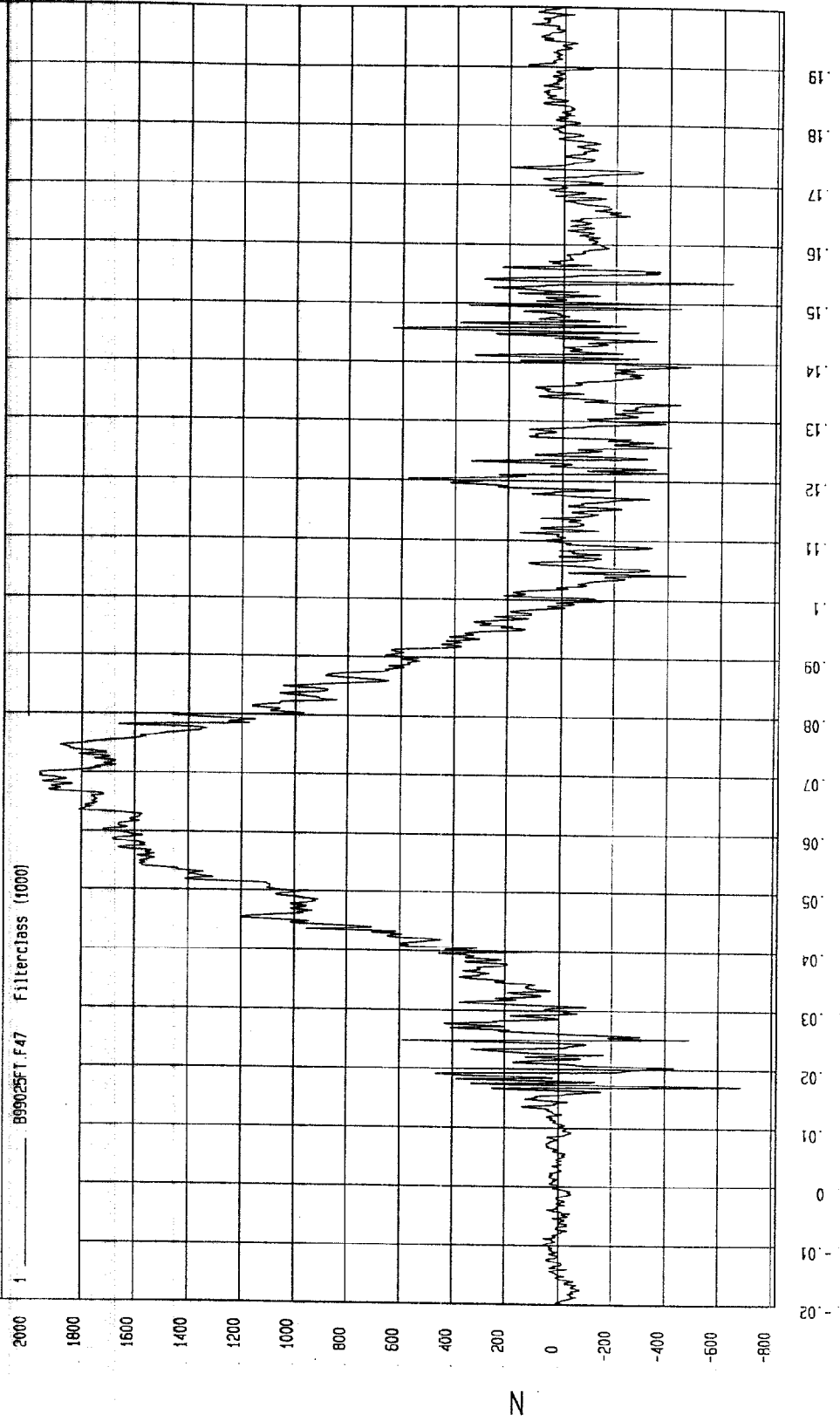


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

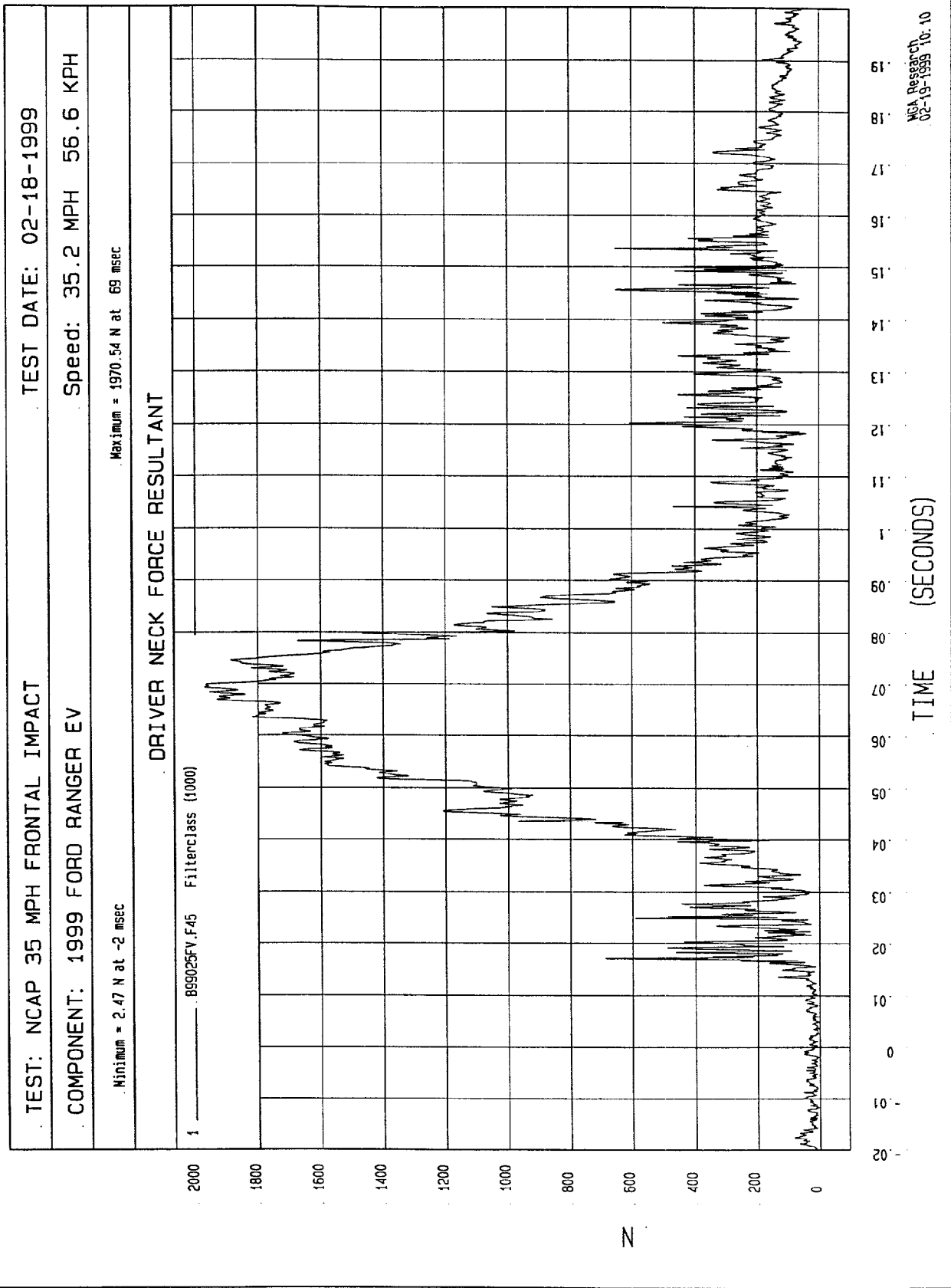
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -684.99 N at 17 msec Maximum = 1953.36 N at 69 msec

DRIVER NECK FORCE Z



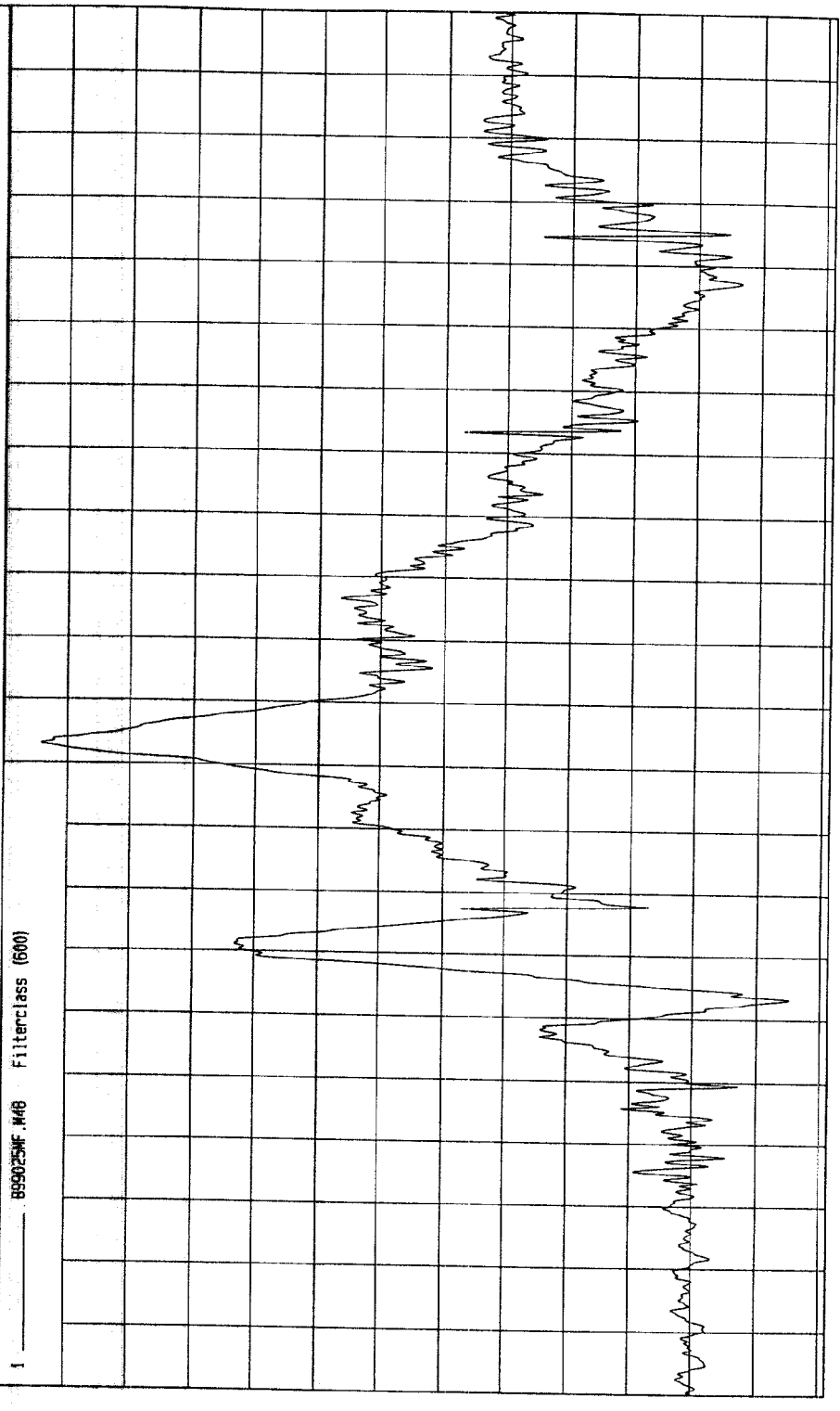
WCA Research
02-19-1999 10:40



TEST: NCAP 35 MPH FRONTAL IMPACT
TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV
Speed: 35.2 MPH 56.6 KPH

Minimum = -3.05 NM at 43 msec
Maximum = 20.84 NM at 83 msec

DRIVER NECK MOMENT X

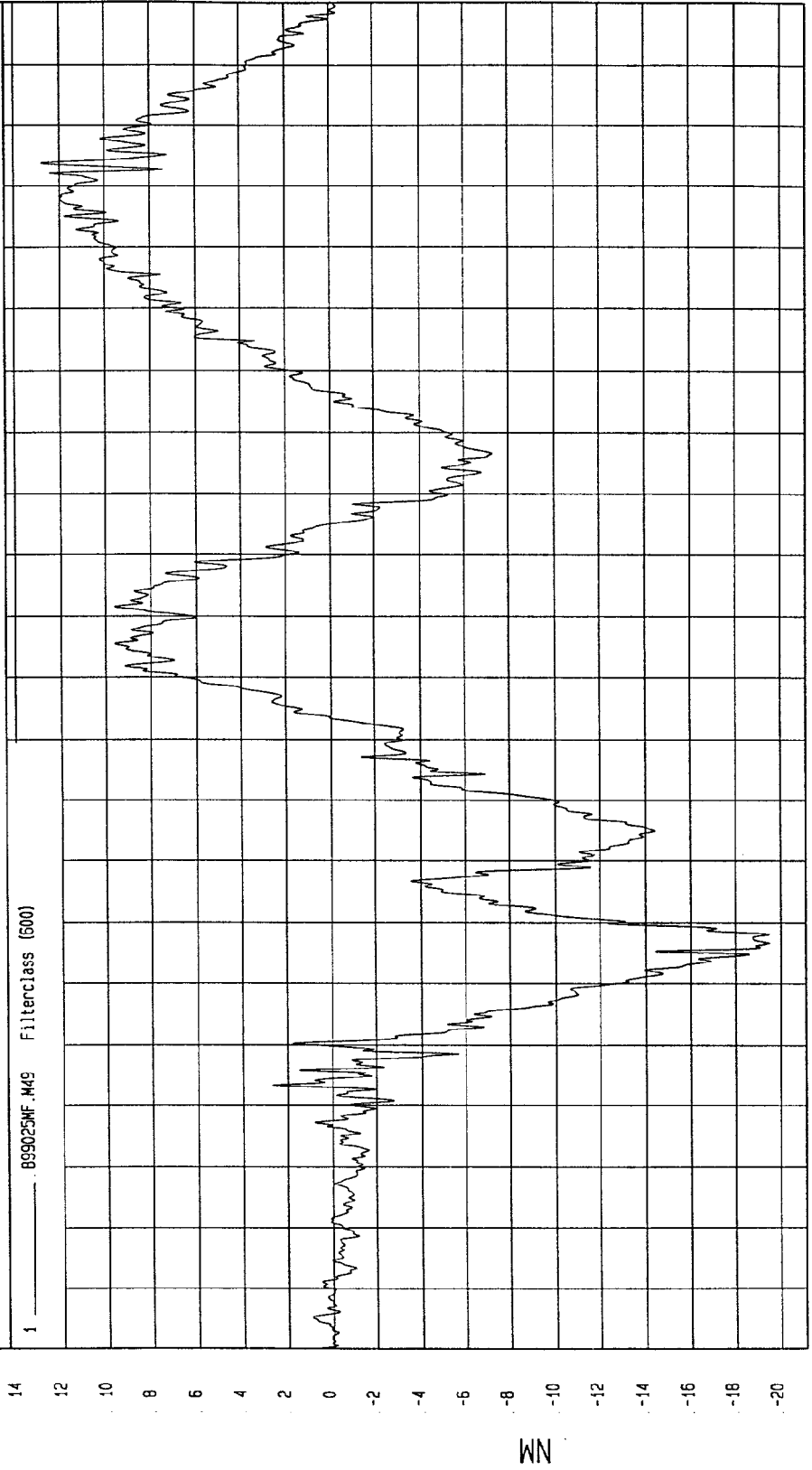


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -19.5 NM at 47 msec Maximum = 12.8 NM at 174 msec

DRIVER NECK MOMENT Y



TIME (SECONDS)

19
18
17
16
15
14
13
12
11
10
09
08
07
06
05
04
03
02
01
0
-01
-02

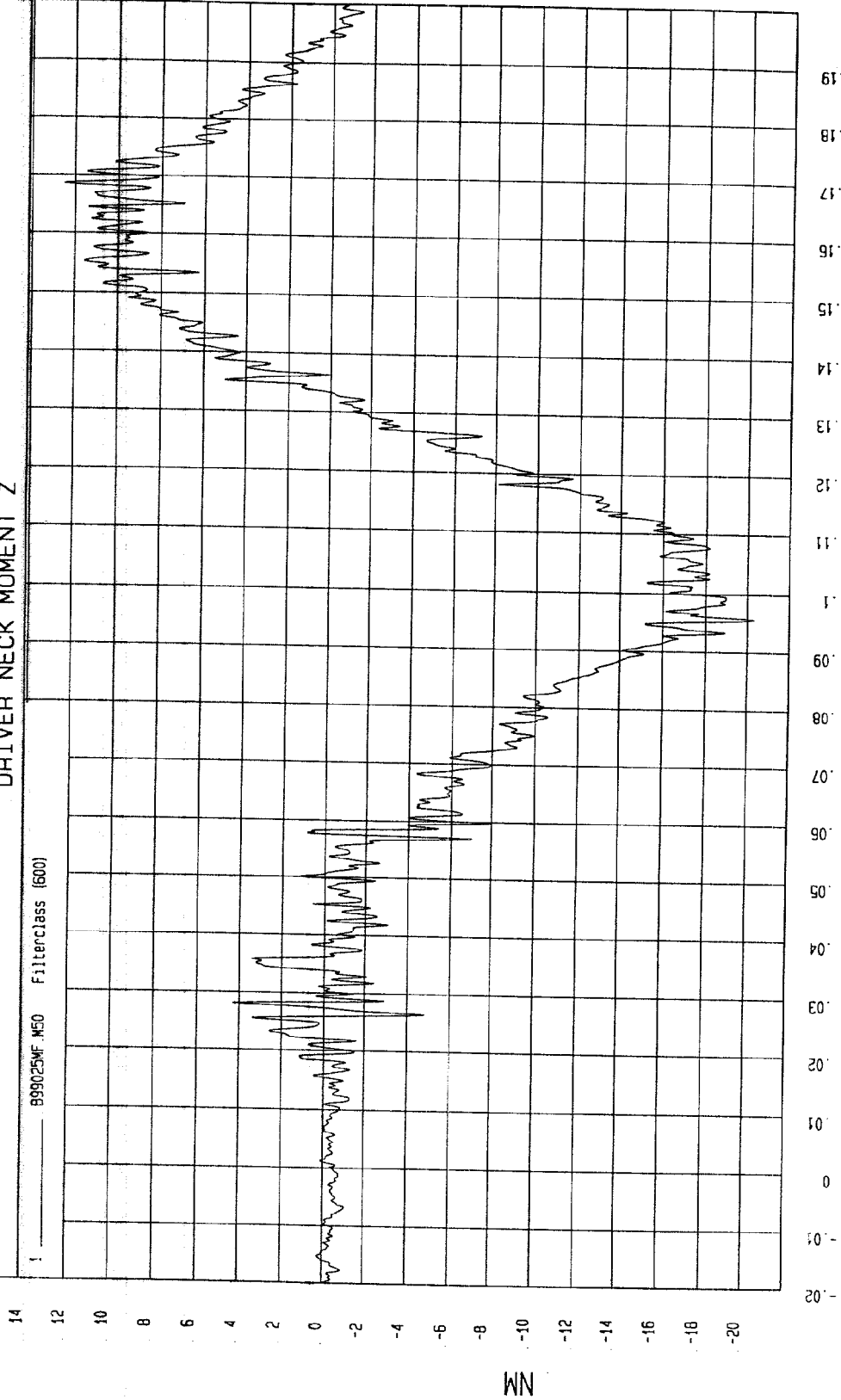
NGA Research
02-19-1999 10: 10

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -20.31 NM at 96 msec Maximum = 12.51 NM at 169 msec

DRIVER NECK MOMENT Z



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

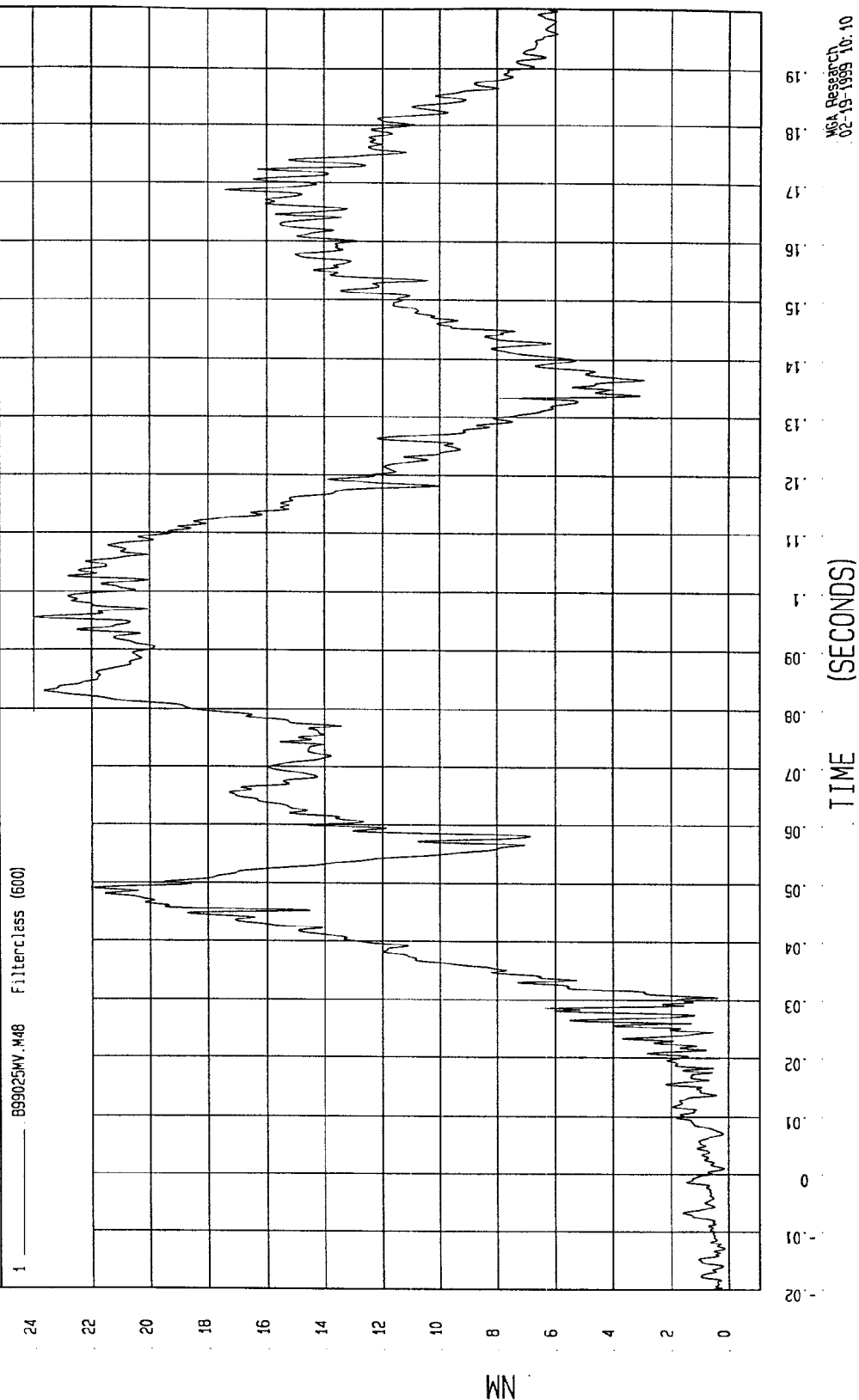
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = .14 NM at -13 msec

Maximum = 23.98 NM at 96 msec

DRIVER NECK MOMENT RESULTANT



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

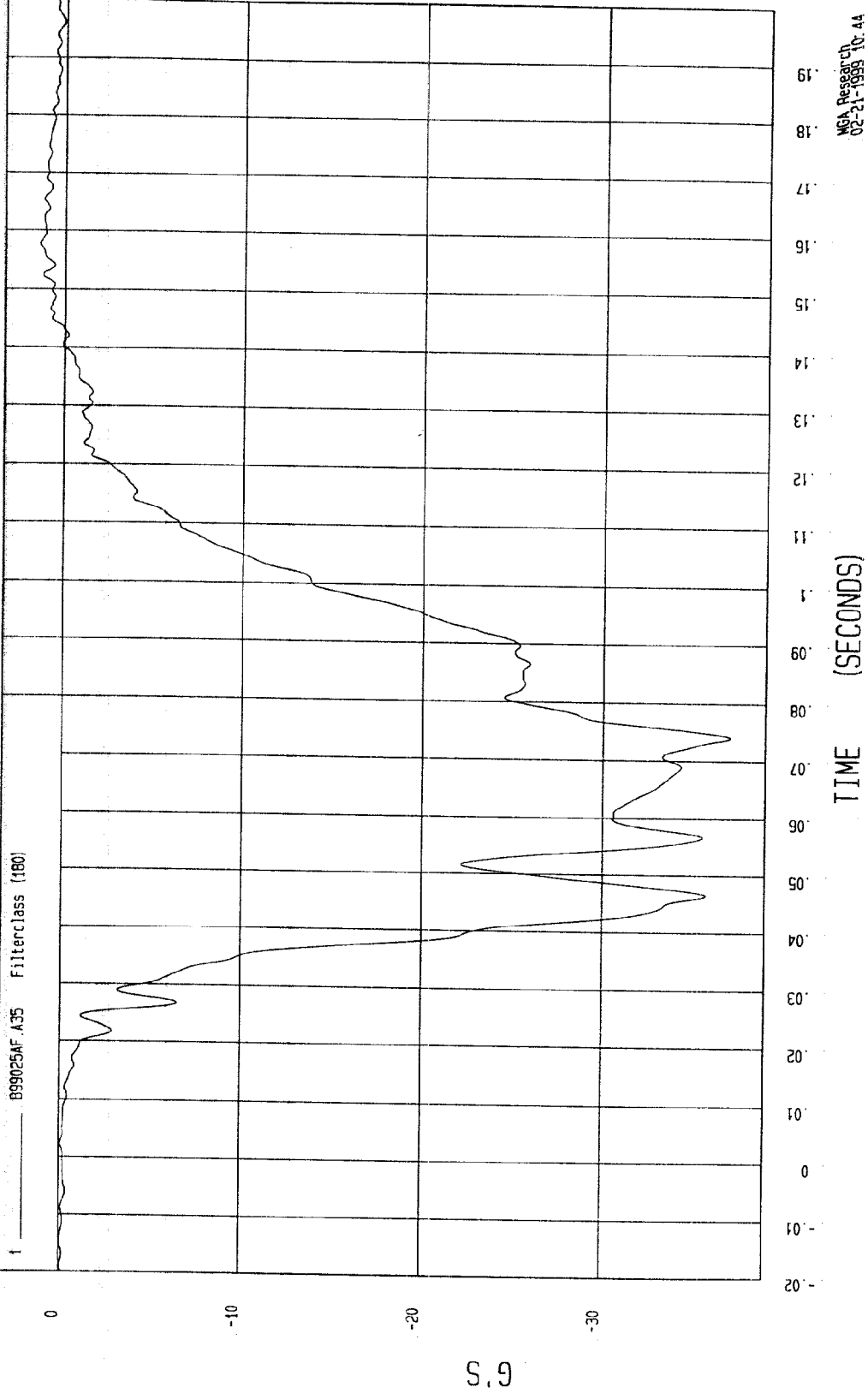
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 1.35 G'S at 158 msec

Minimum = -35.93 G'S at 74 msec

DRIVER CHEST X ACCELERATION



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

SPEED: 35.2 MPH 56.6 KPH

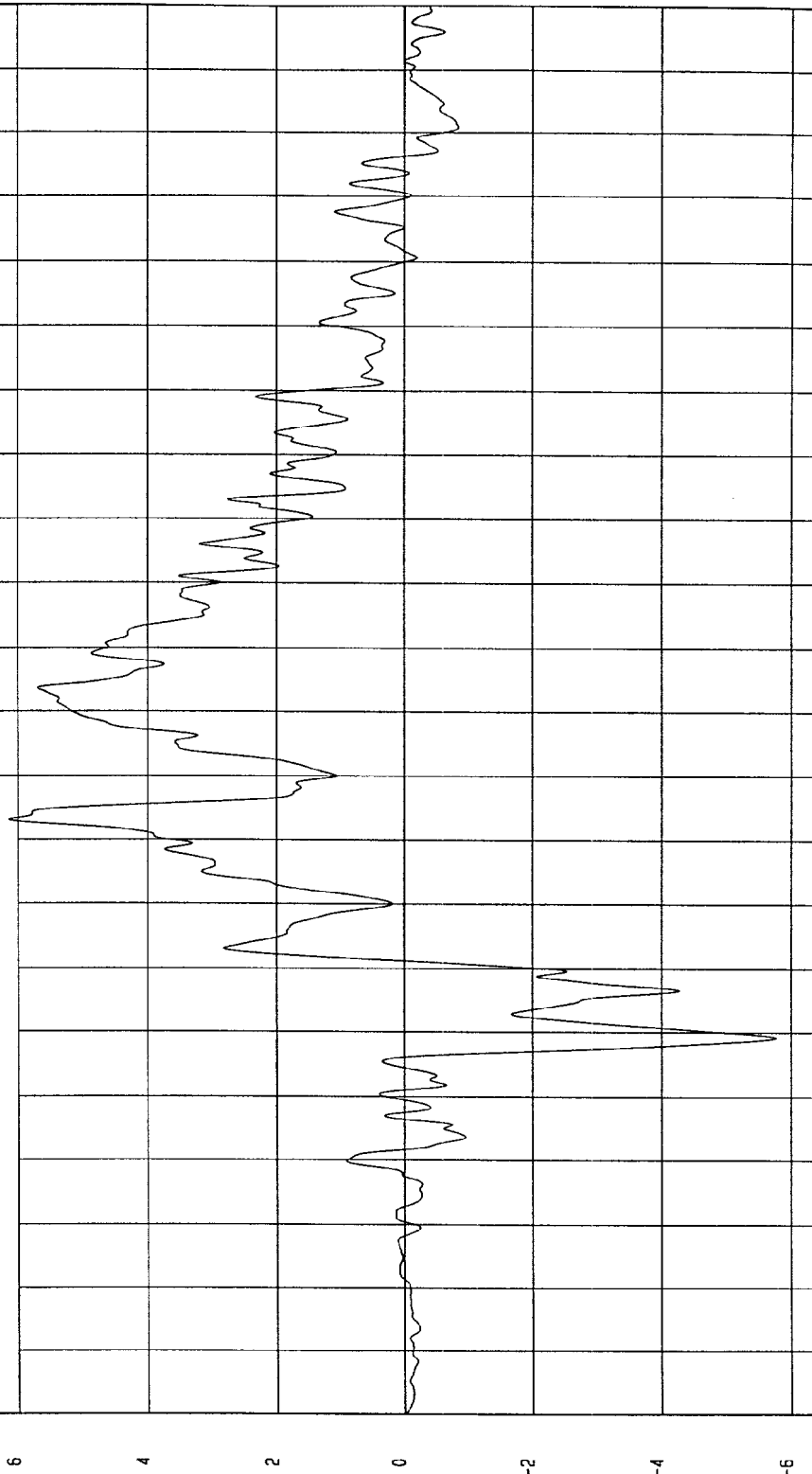
COMPONENT: 1999 FORD RANGER EV

Maximum = 6.15 G'S at 73 msec

Minimum = -5.76 G'S at 39 msec

DRIVER CHEST Y ACCELERATION

1 899025AF.A36 Filterclass (180)



NSA Research
02-21-1999 10:44

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

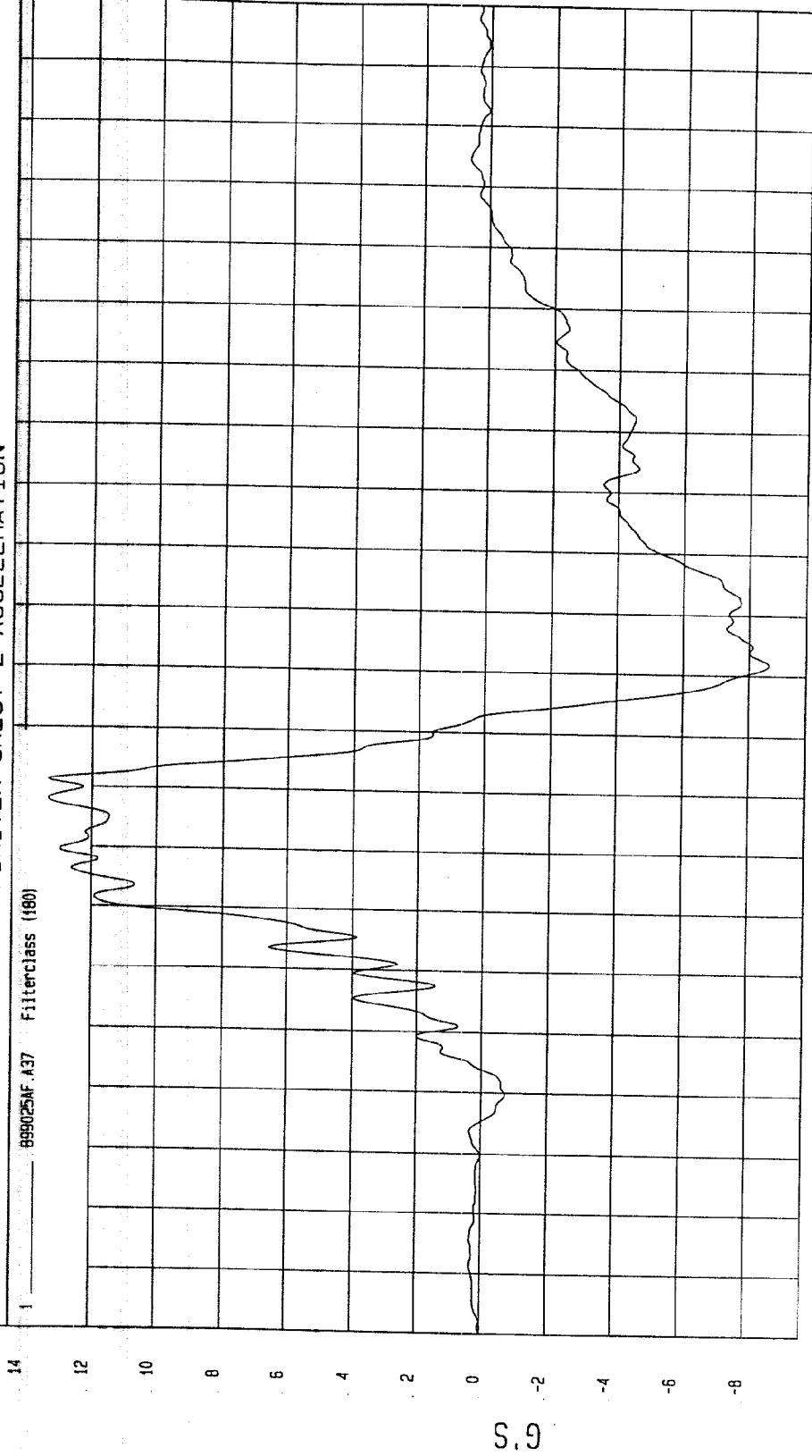
COMPONENT: 1999 FORD RANGER EV

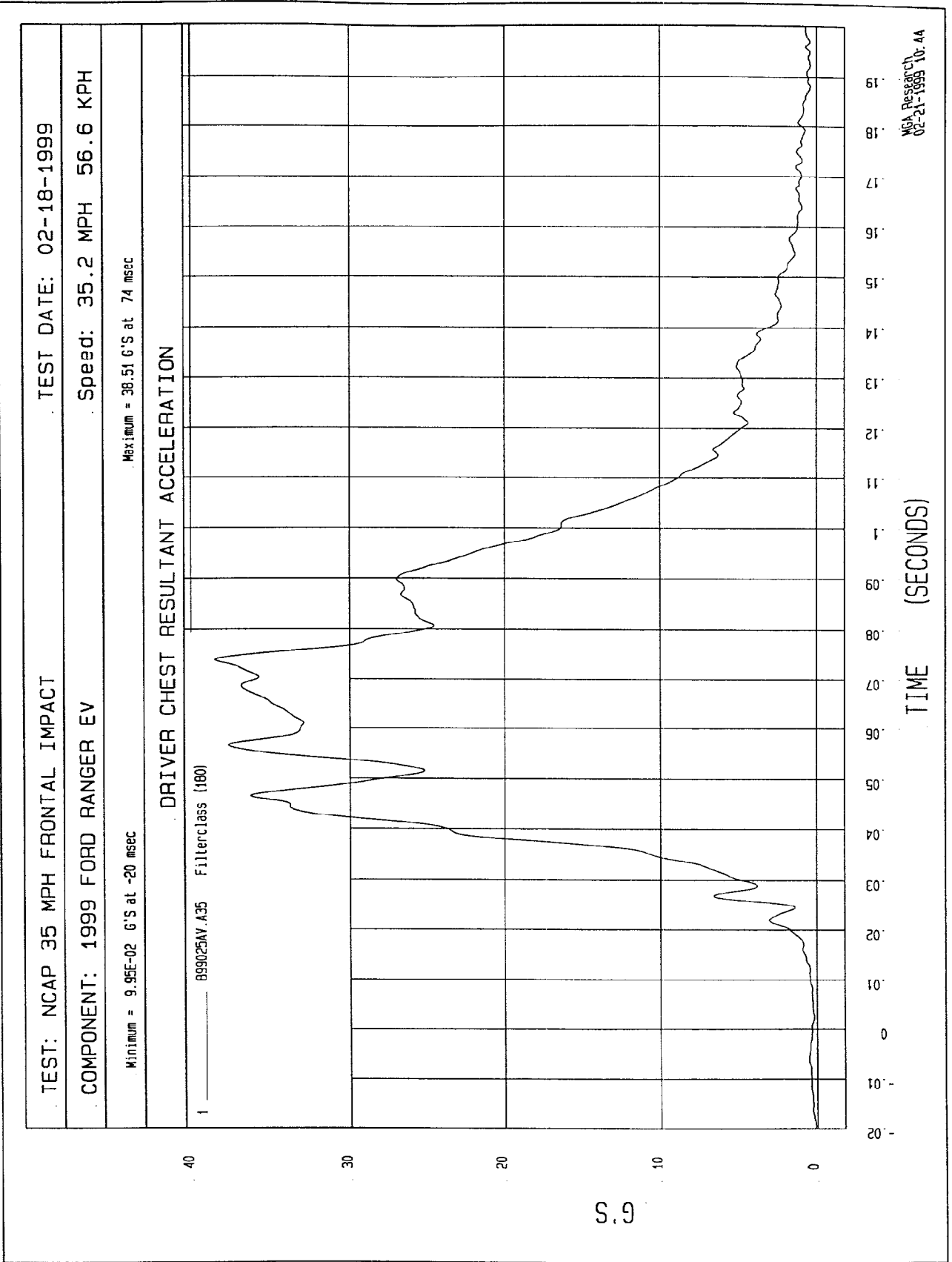
Minimum = -8.6 G'S at 92 msec

Maximum = 13.29 G'S at 68 msec

DRIVER CHEST Z ACCELERATION

1 899025AF.A37 Filterclass (180)





TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 56.6 KPH at -20 msec

Minimum = -15.13 KPH at 143 msec

DRIVER CHEST X VELOCITY

1 — 899025A1.V35 FilterClass (180)

60

50

40

30

20

10

0

-10

KPH

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME Seconds

NGA Research
02-21-1999 11:26

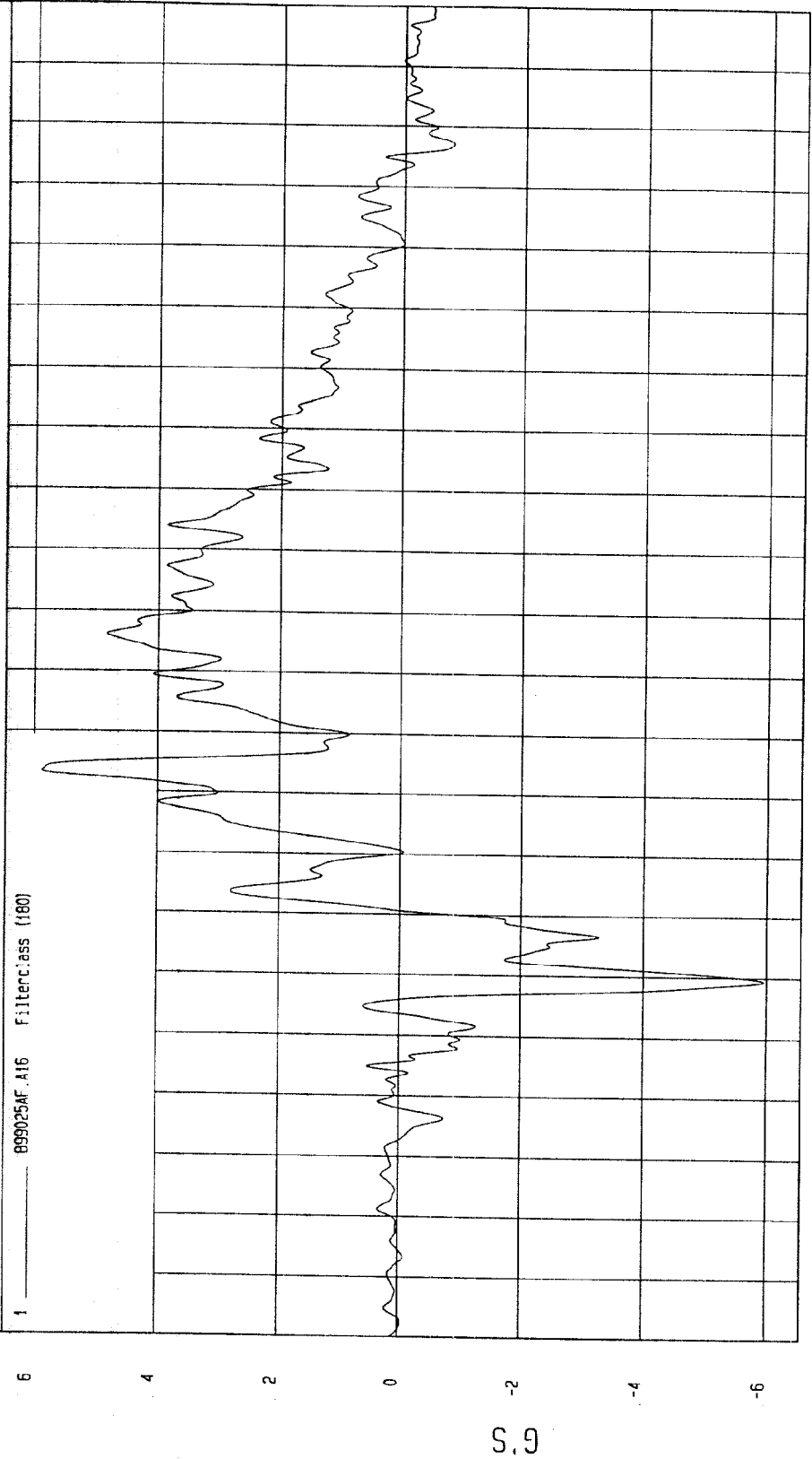
DRIVER CHEST REDUNDANT X ACCELERATION
NO VALID DATA COLLECTED

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -5.98 G'S at .29 msec Maximum = 5.87 G'S at .73 msec

DRIVER CHEST REDUNDANT Y ACCELERATION



TIME (SECONDS)

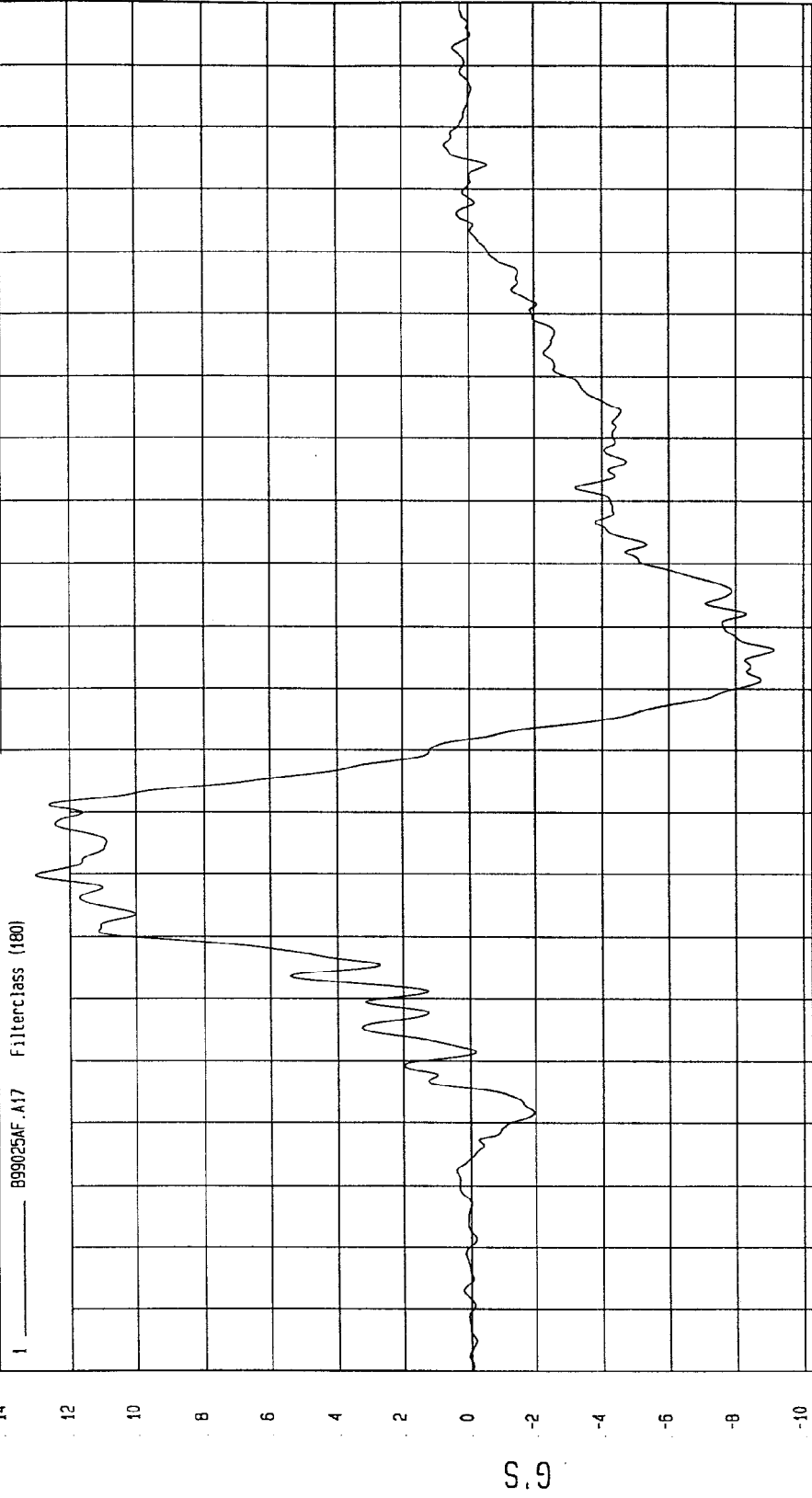
MGA Research
02-21-1999 10:44

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -9.15 G'S at 96 msec Maximum = 13.03 G'S at 60 msec

DRIVER CHEST REDUNDANT Z ACCELERATION

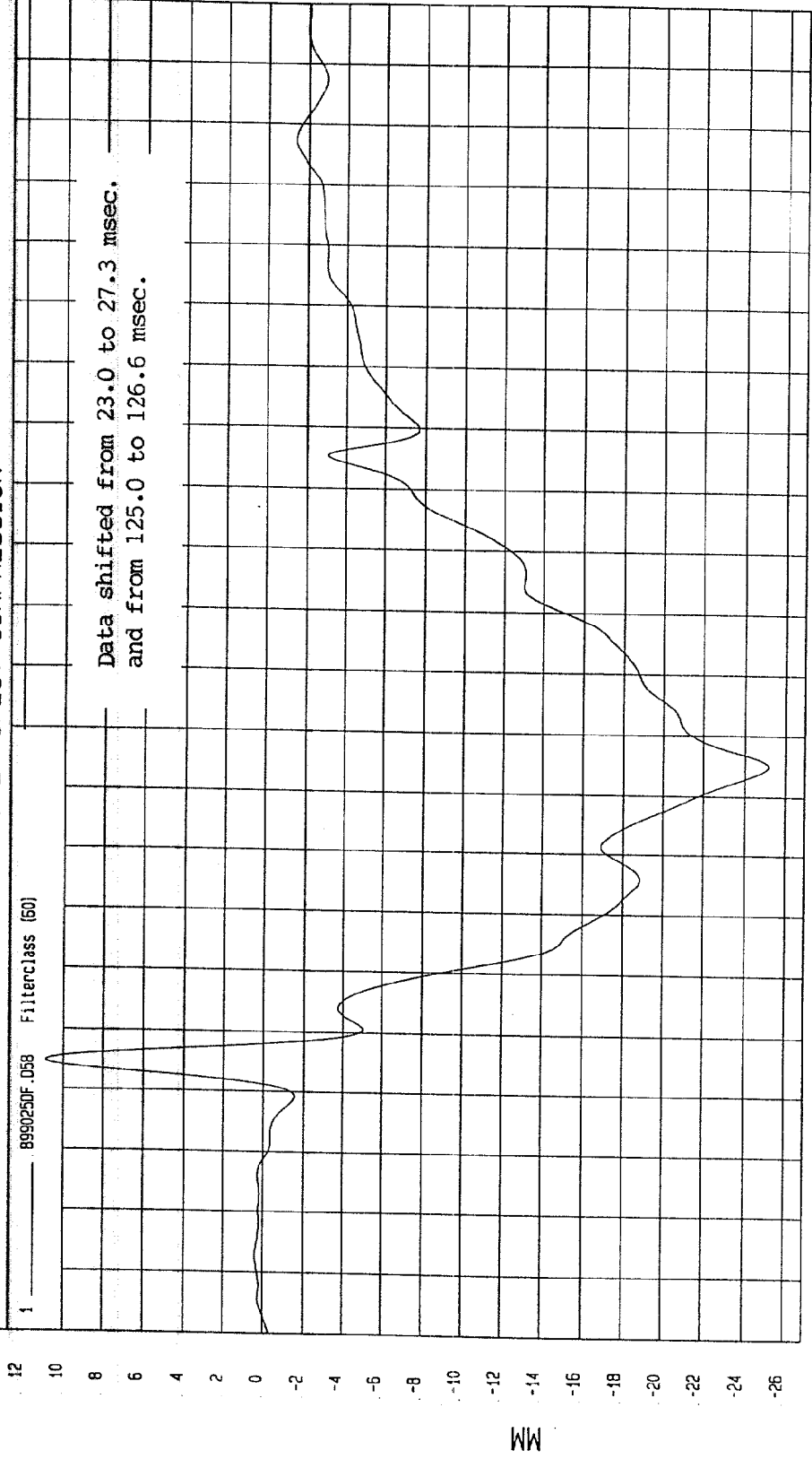


TIME (SECONDS)

MCA Research
02-21-1999 10:44

TEST: NCAP 35 MPH FRONTAL IMPACT
TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV
Speed: 35.2 MPH 56.6 KPH
Minimum = -25.16 MM at 75 msec
Maximum = 10.87 MM at 25 msec

DRIVER CHEST COMPRESSION

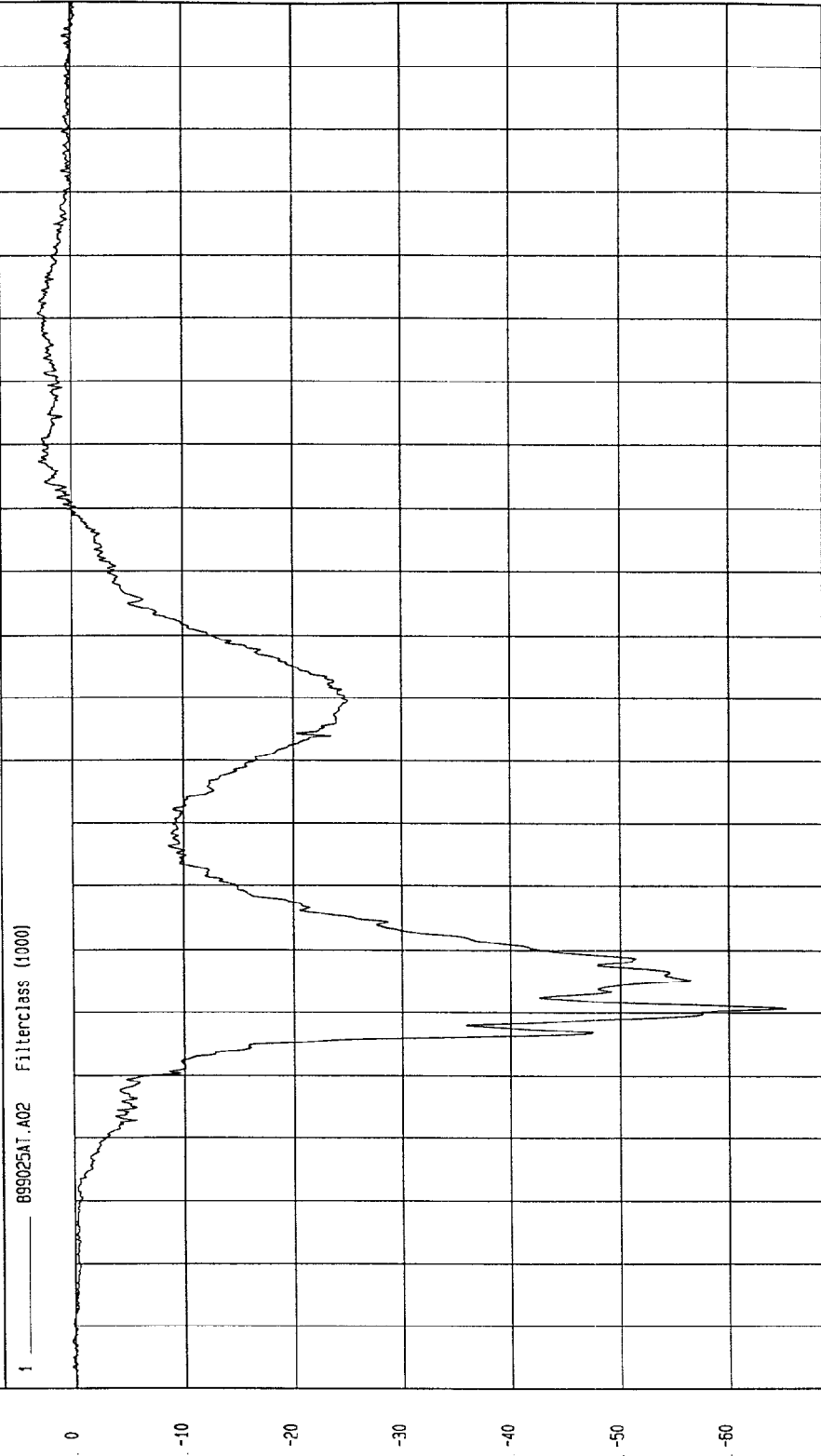


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -65.24 G'S at 41 msec Maximum = 3.05 G'S at 127 msec

DRIVER PELVIS X ACCELERATION



MGA Research
02-19-1999 10:14

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV

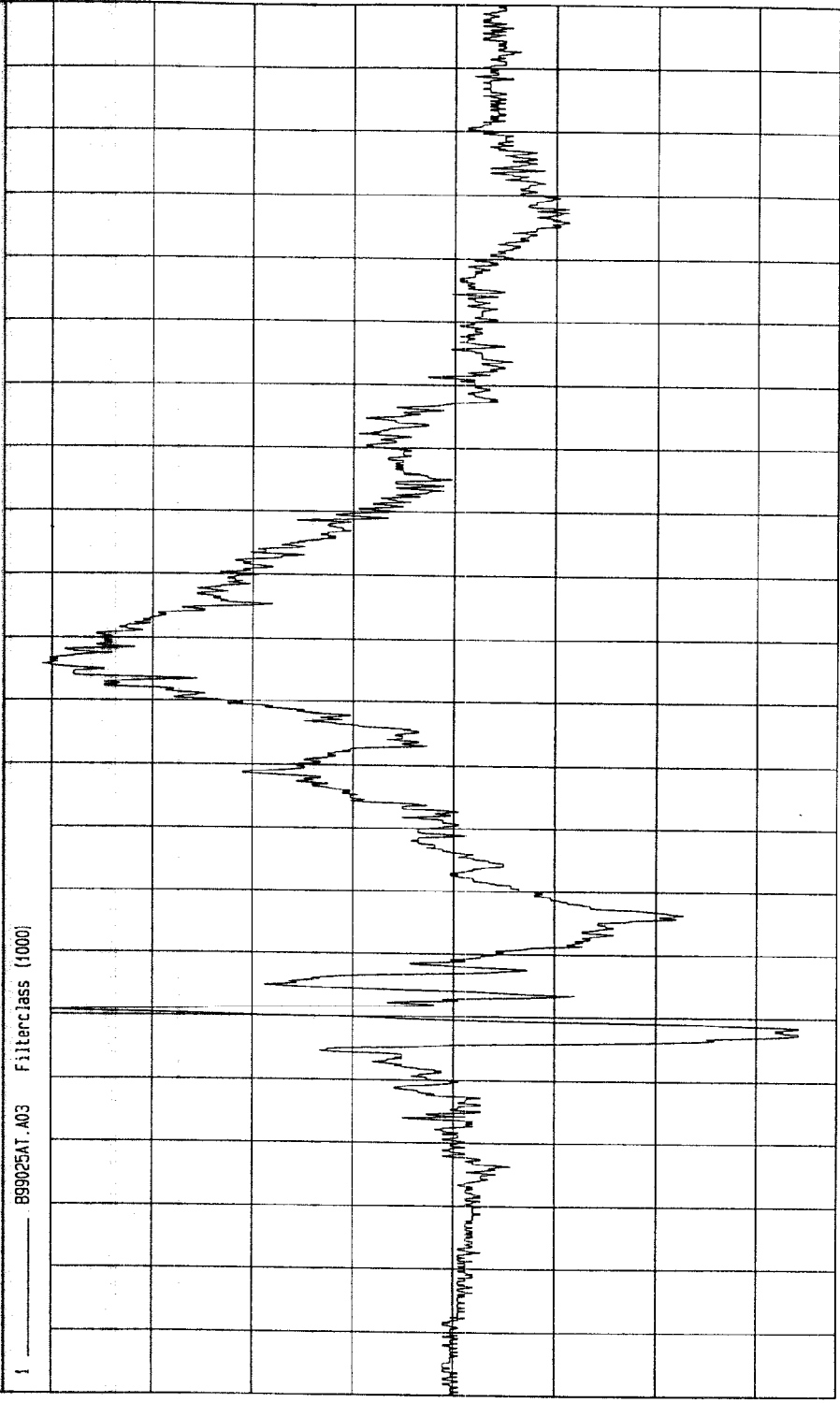
Speed: 35.2 MPH 56.6 KPH

Minimum = -6.84 G'S at 37 msec

Maximum = 8.19 G'S at 96 msec

DRIVER PELVIS Y ACCELERATION

1 899025AT.A03 Filterclass (1000)

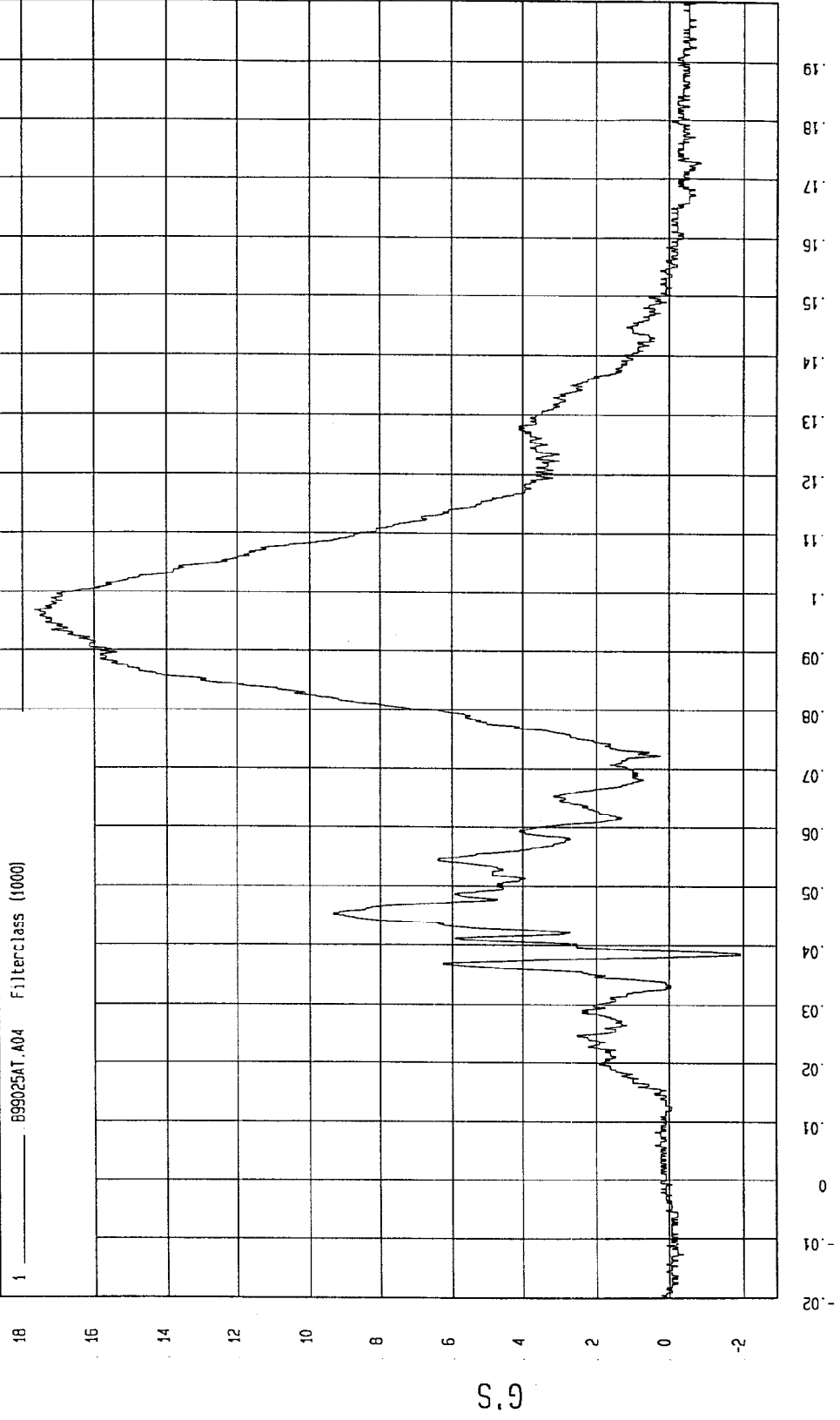


TIME (SECONDS)

NSA Research
02-19-1999 10:14

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH
Minimum = -1.93 G'S at 38 msec Maximum = 17.66 G'S at 97 msec

DRIVER PELVIS Z ACCELERATION



TIME (SECONDS)

MCA Research
02-19-1999 10:14

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

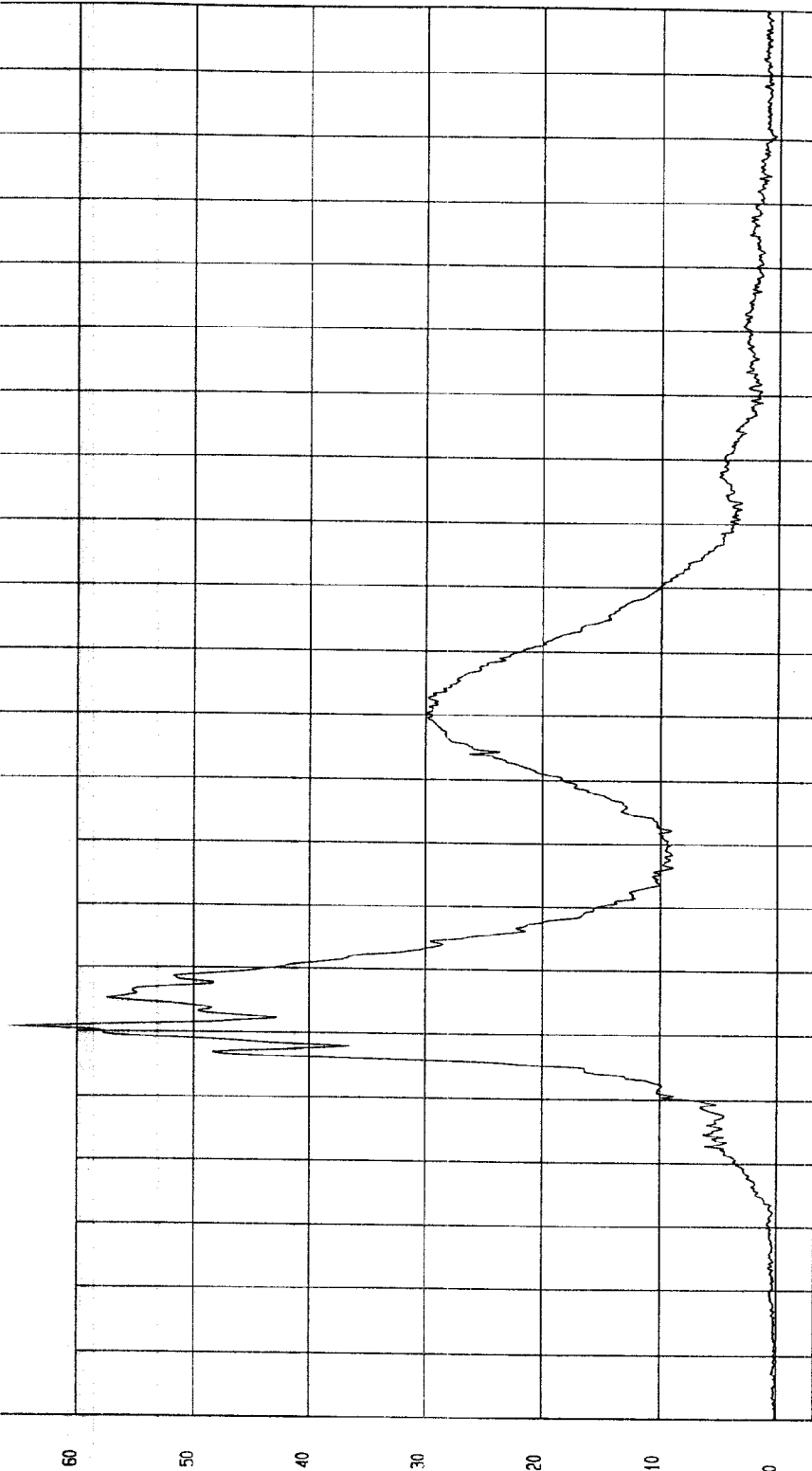
COMPONENT: 1999 FORD RANGER EV

Maximum = 65.92 G's at 41 msec

Minimum = .1 G's at -20 msec

DRIVER PELVIS RESULTANT ACCELERATION

1 899025AV.A02 Filter: class (1000)



MOA Research
02-19-1999 10:14

TIME (SECONDS)

G's

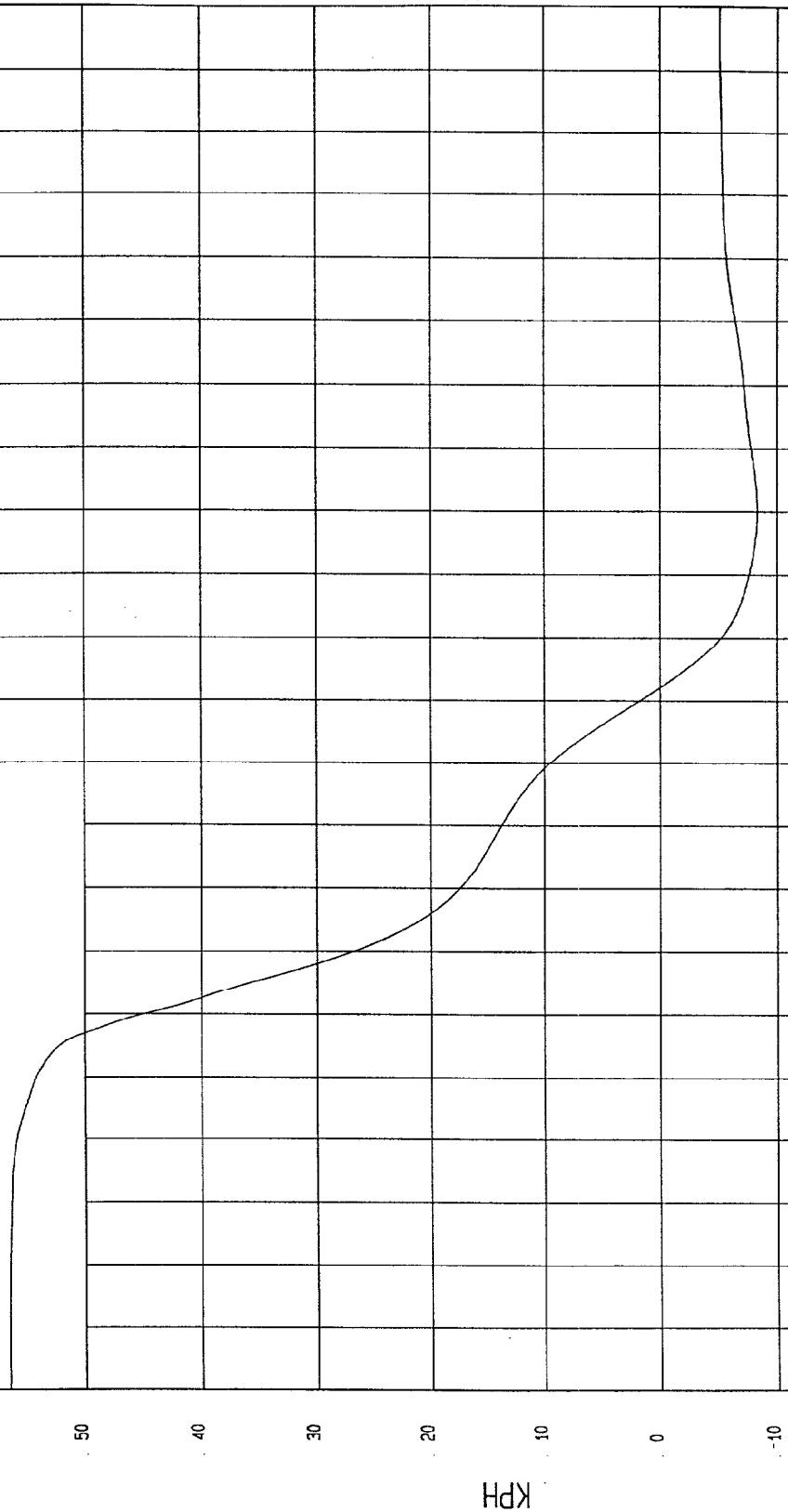
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -8.3 KPH at 120 msec Maximum = 56.62 KPH at -8 msec

DRIVER PELVIS X VELOCITY

1 ——— B99025A1.V02 Filterclass (180)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

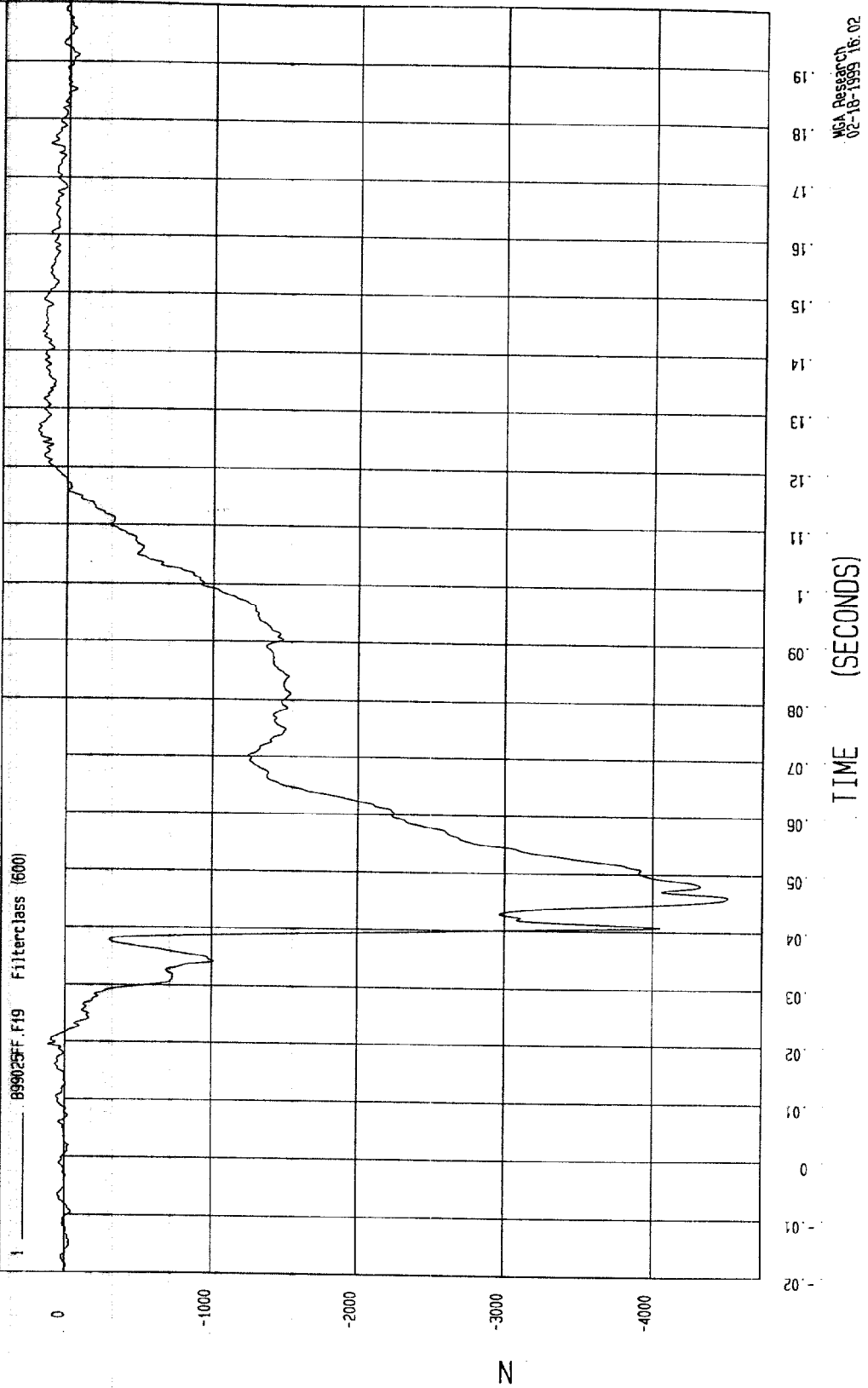
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 201.39 N at 126 msec

Minimum = -4513.87 N at 46 msec

DRIVER LEFT FEMUR FORCE

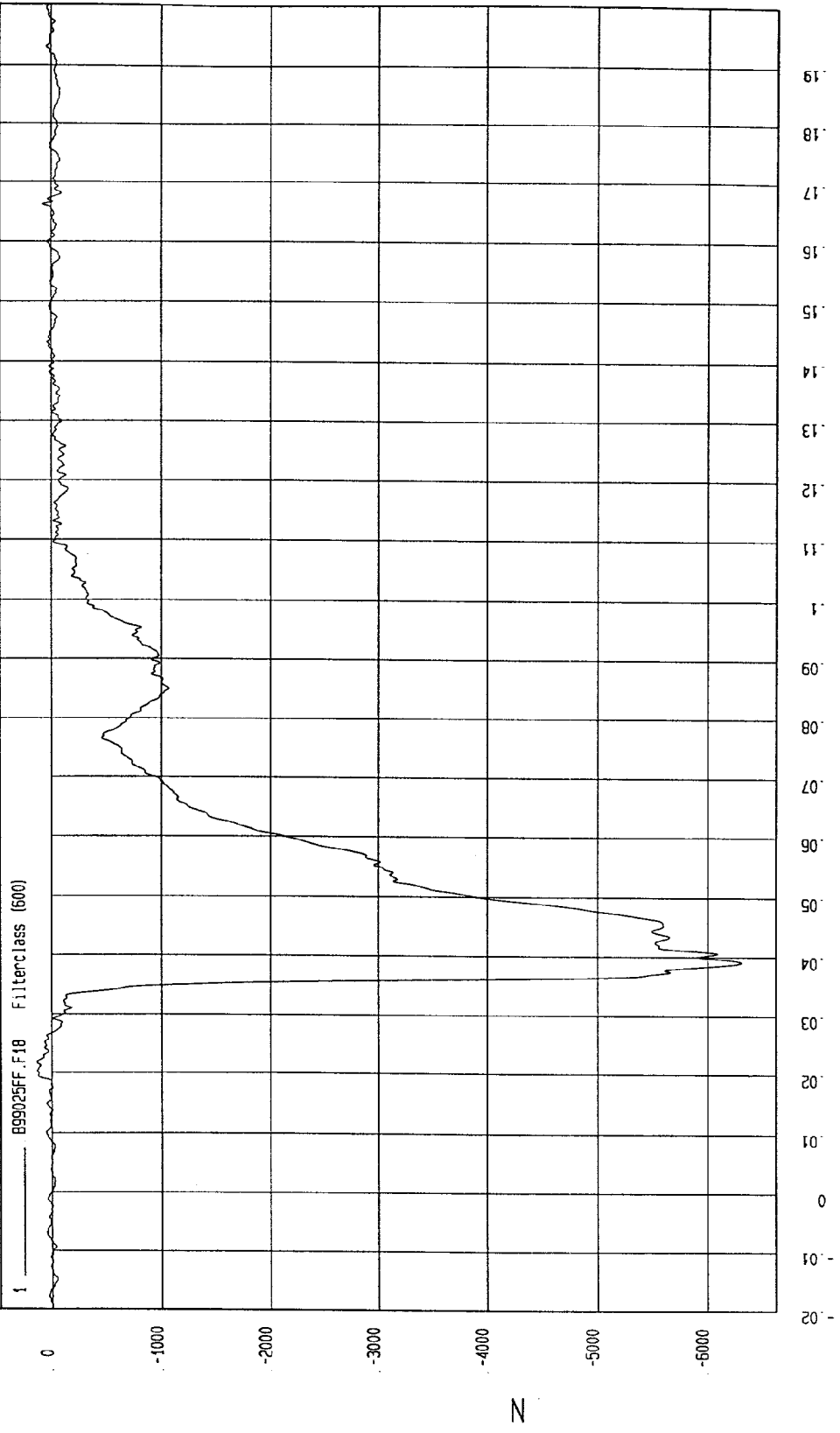


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -6302.19 N at 39 msec Maximum = 140.73 N at 22 msec

DRIVER RIGHT FEMUR FORCE



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

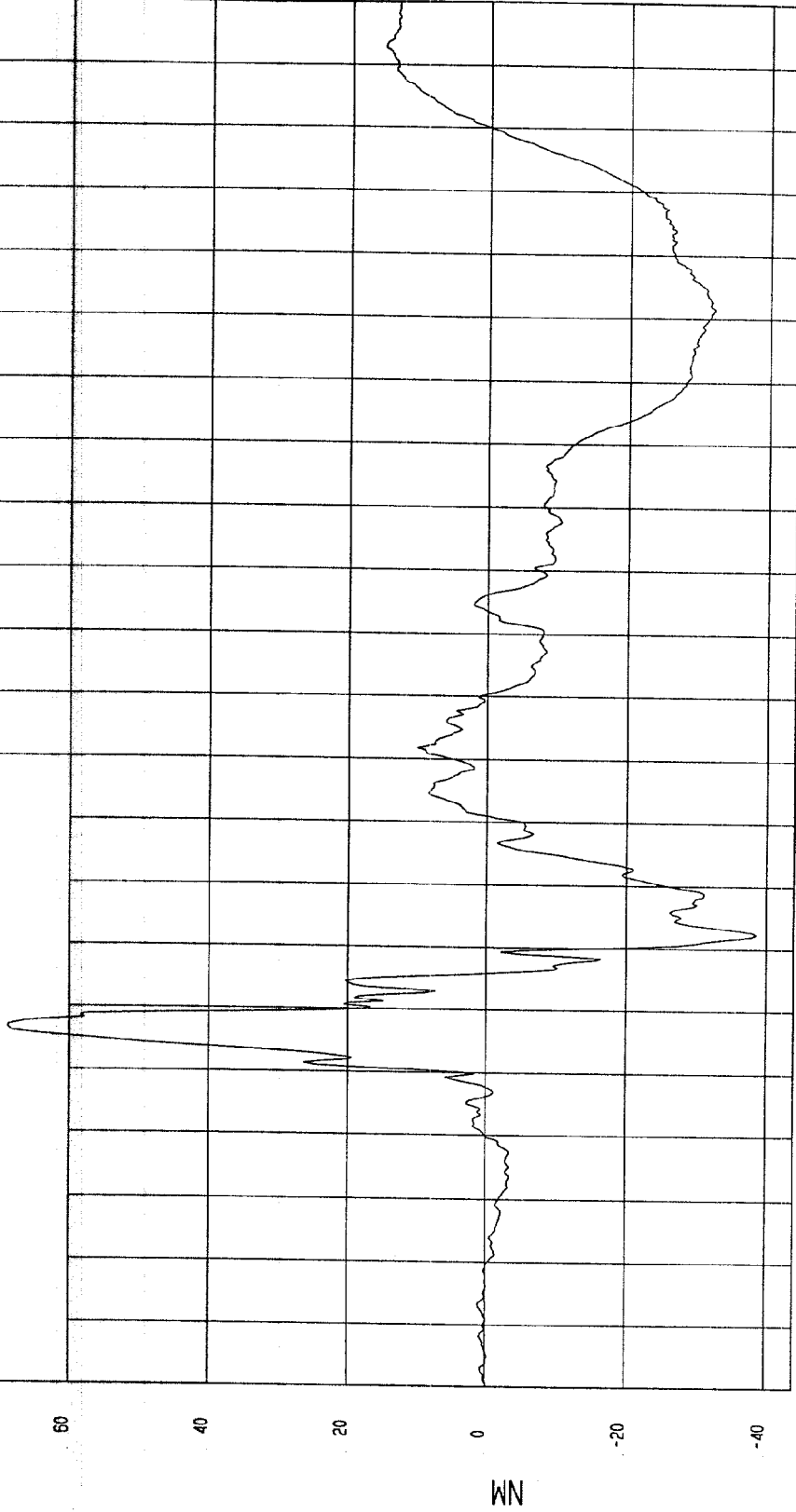
COMPONENT: 1999 FORD RANGER EV

Maximum = 68.88 NM at 37 msec

Minimum = -38.53 NM at 52 msec

DRIVER LEFT UPPER TIBIA MOMENT X

1 899025MF.M80 Filterclass (500)

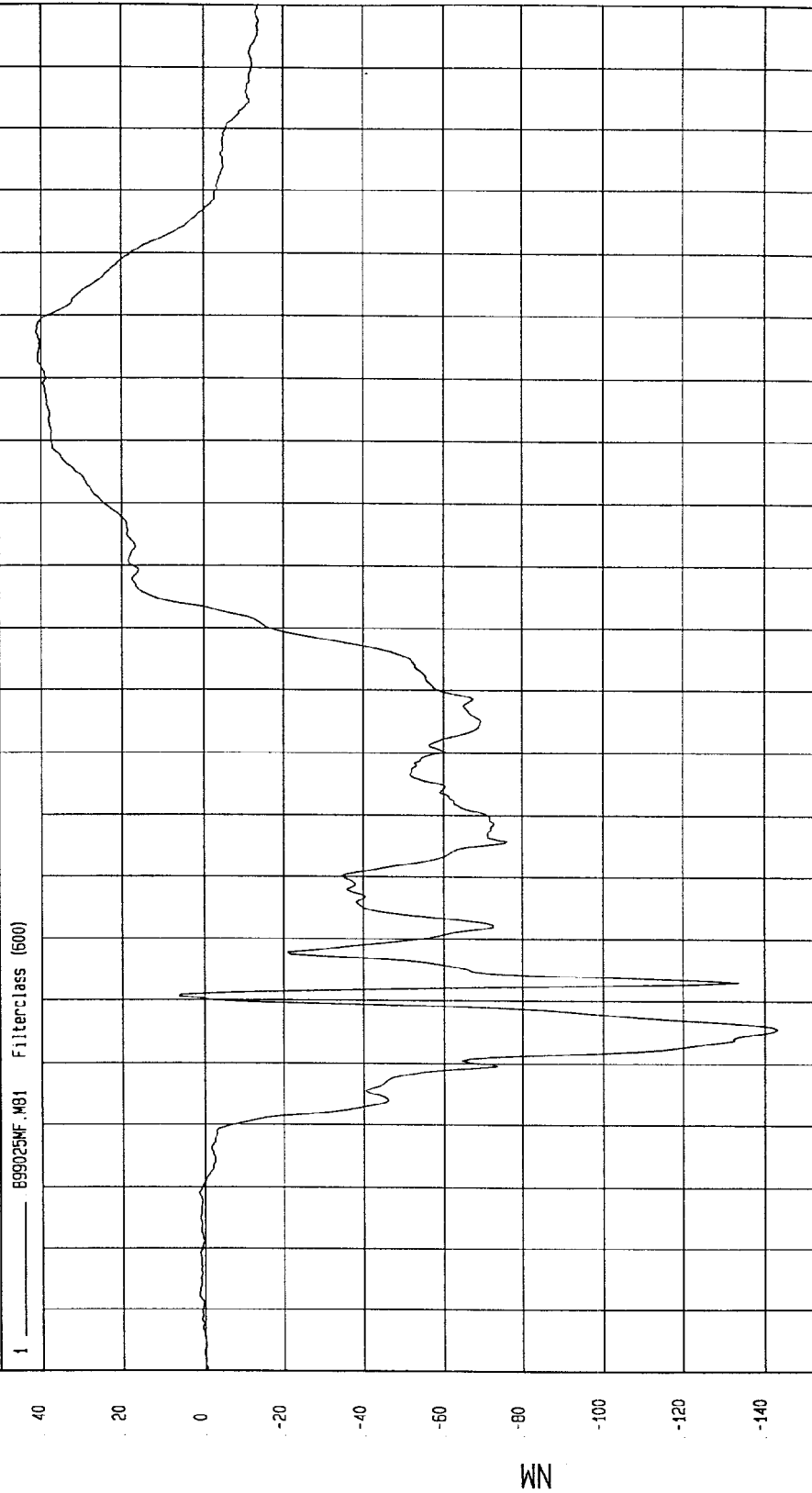


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -143.15 NM at 35 msec Maximum = 41.22 NM at 147 msec

DRIVER LEFT UPPER TIBIA MOMENT Y



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

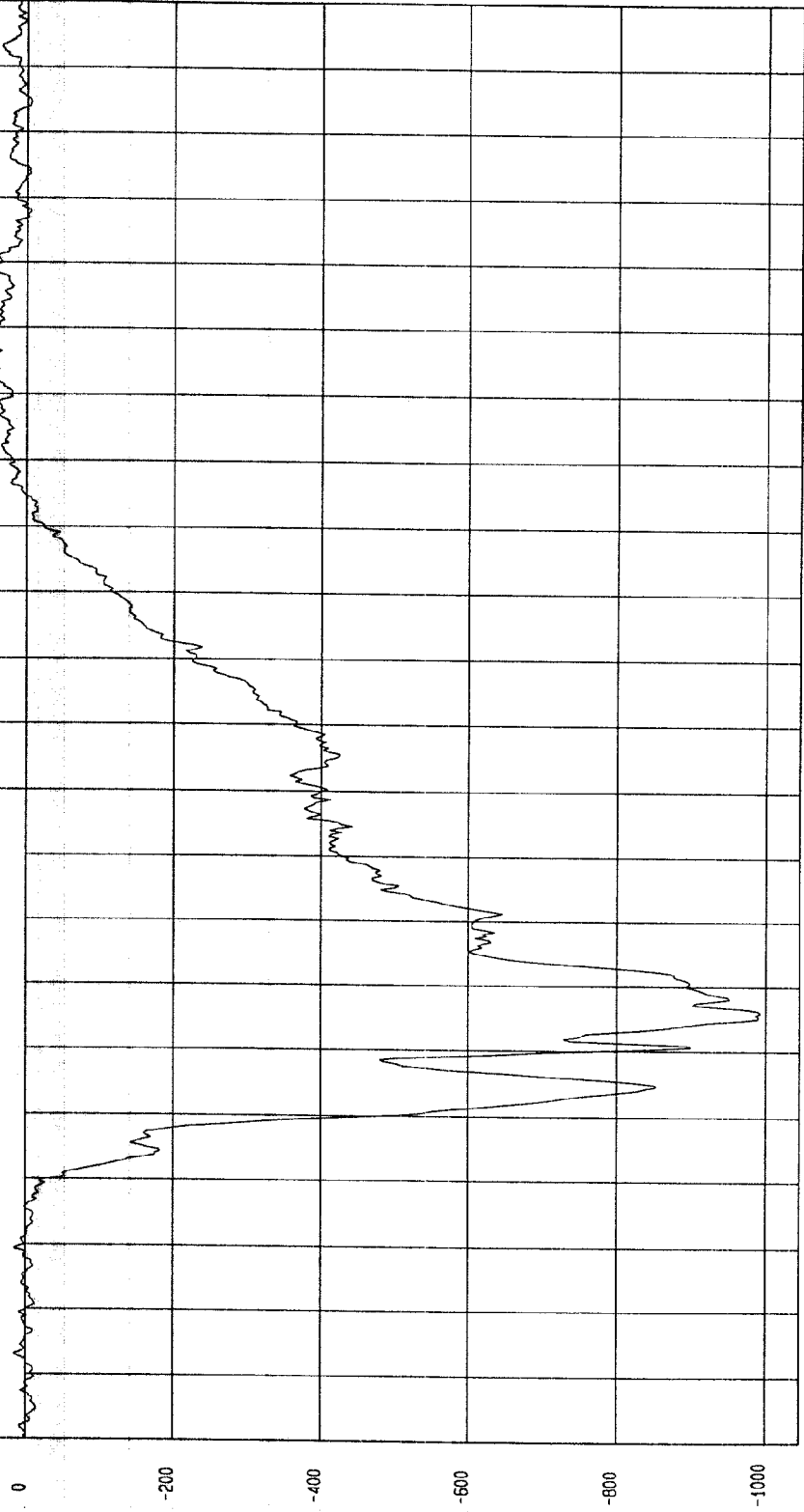
COMPONENT: 1999 FORD RANGER EV

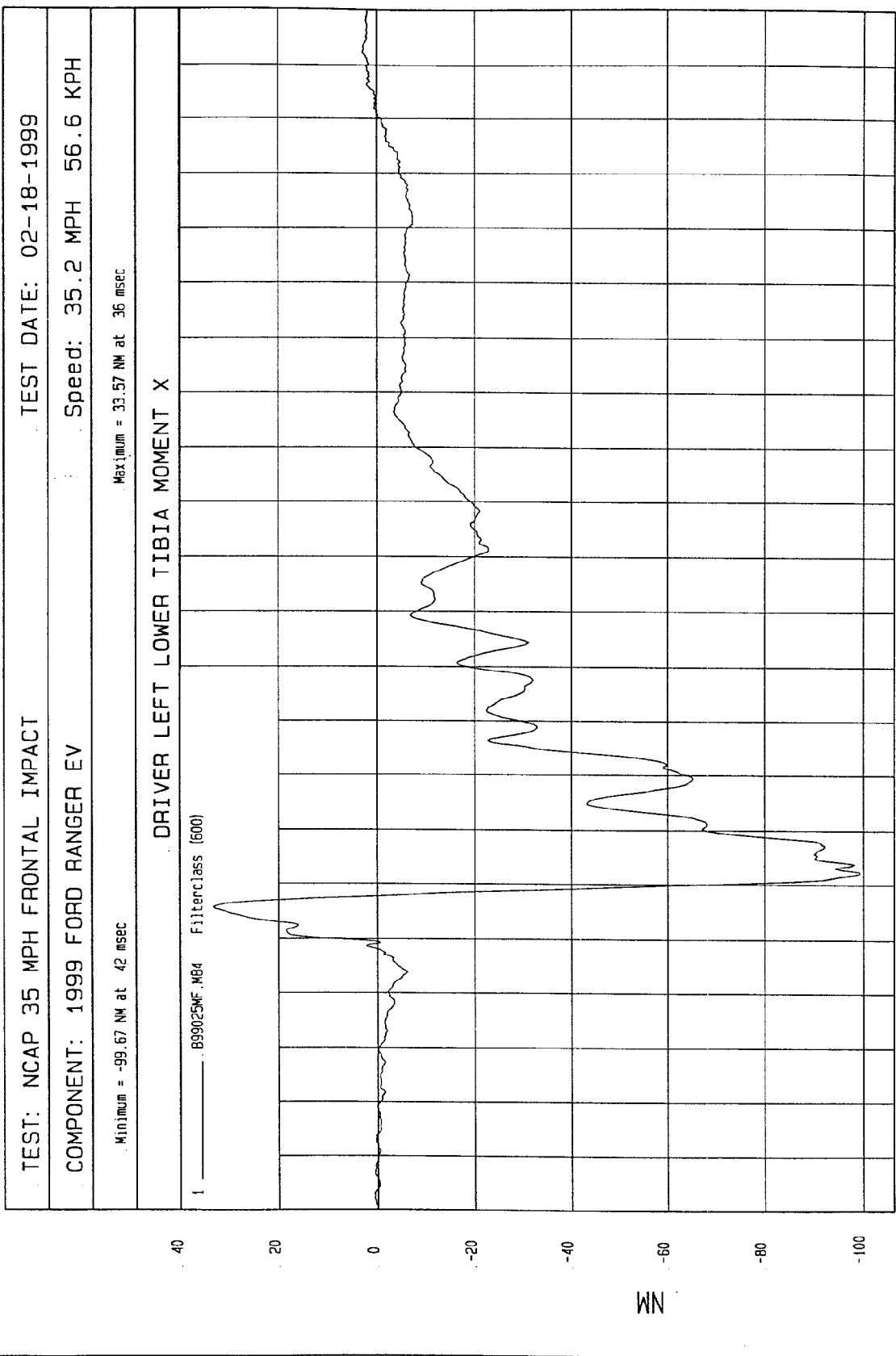
Maximum = 59.84 N at 149 msec

Minimum = -993.46 N at 46 msec

DRIVER LEFT UPPER TIBIA FORCE Z

1 ——— B99025FF.F82 Filterclass (600)





TIME (SECONDS)

NCA Research
02-19-1999 10:20

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

SPEED: 35.2 MPH 56.6 KPH

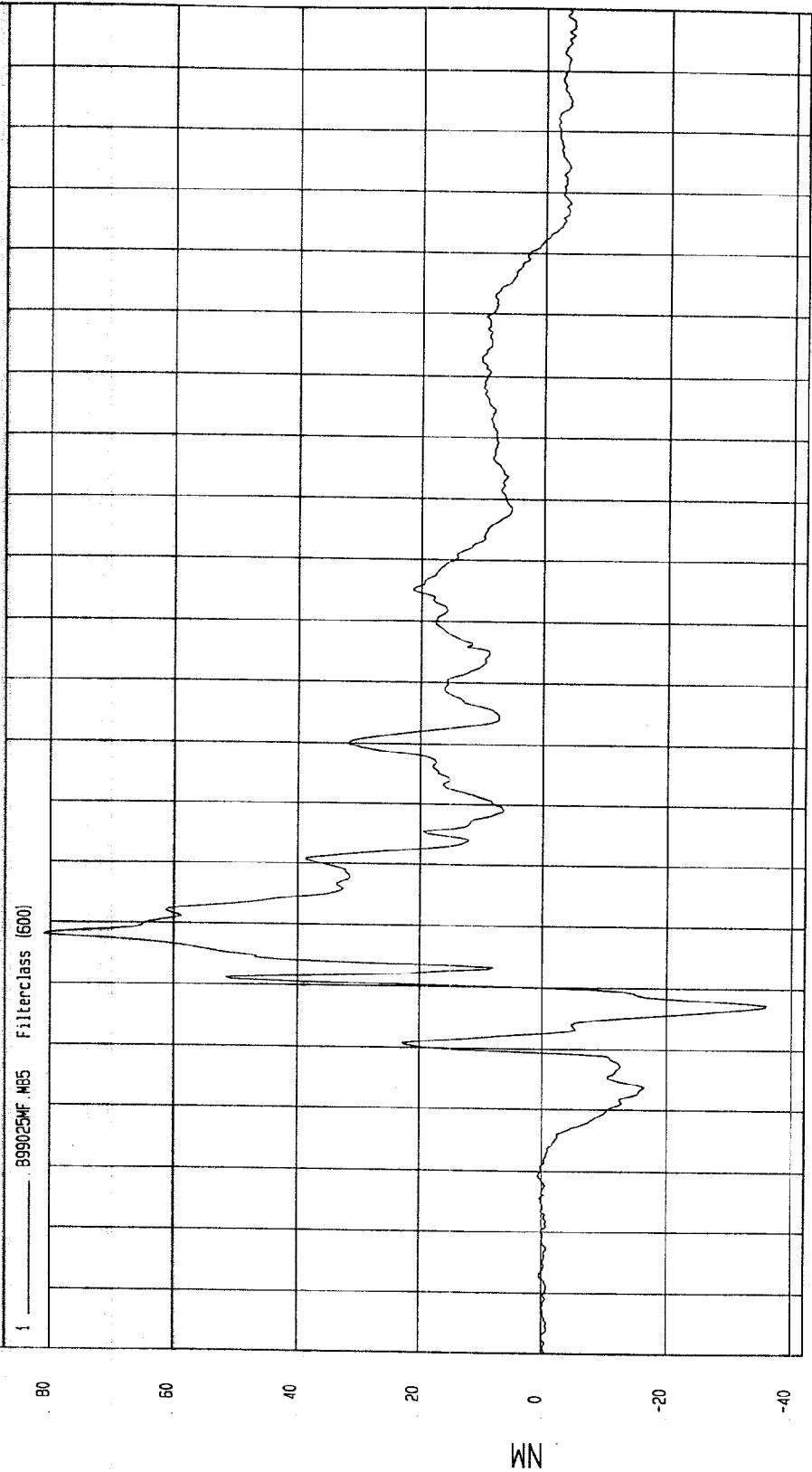
COMPONENT: 1999 FORD RANGER EV

Minimum = -36.23 NM at 37 msec

Maximum = 81.35 NM at 48 msec

DRIVER LEFT LOWER TIBIA MOMENT Y

1 899025MF.M85 Filterclass (600)



TIME (SECONDS)

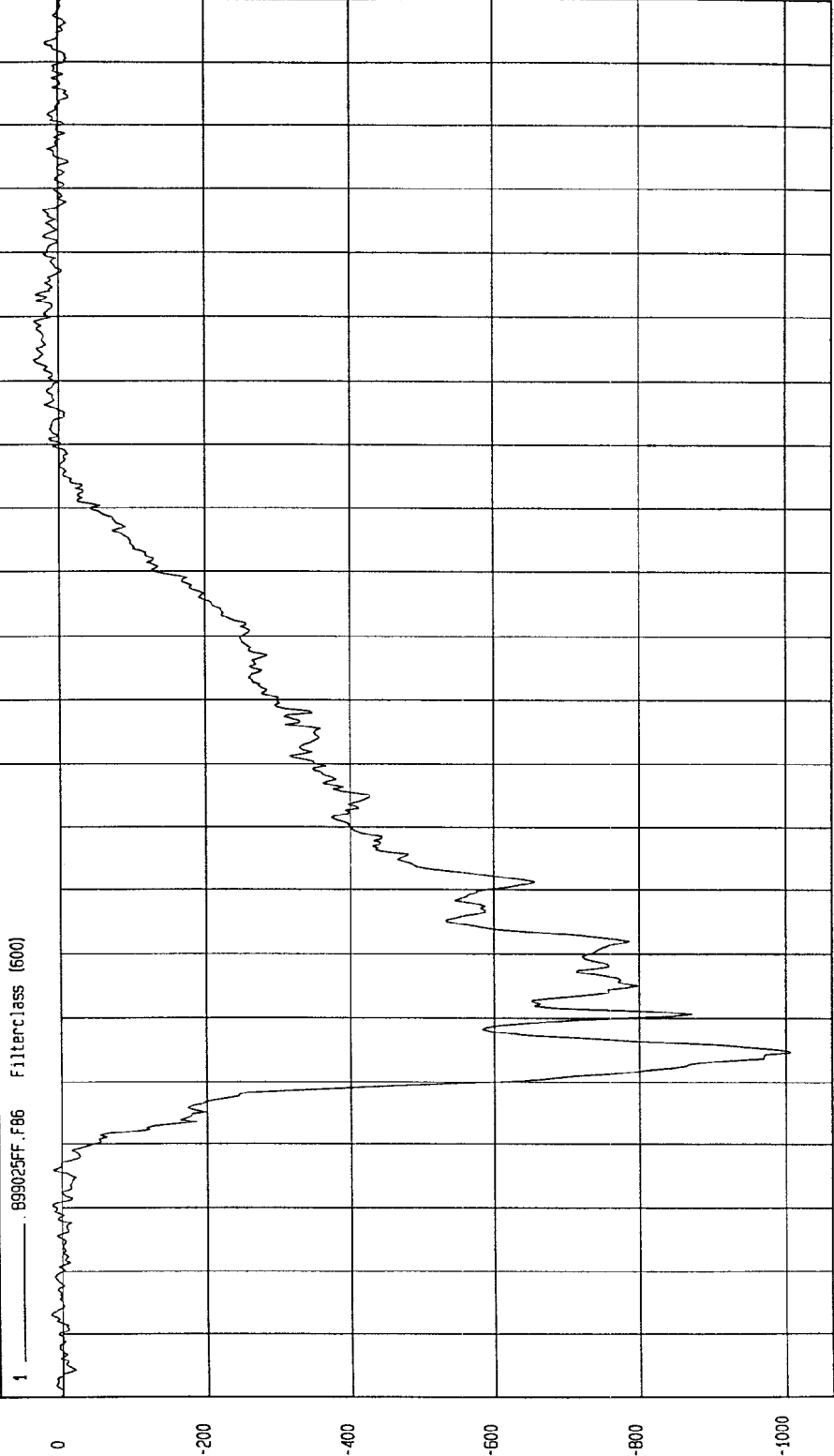
WCA Research
02-18-1999 10:20

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -1010.51 N at 35 msec Maximum = 34.13 N at 143 msec

DRIVER LEFT LOWER TIBIA FORCE Z



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

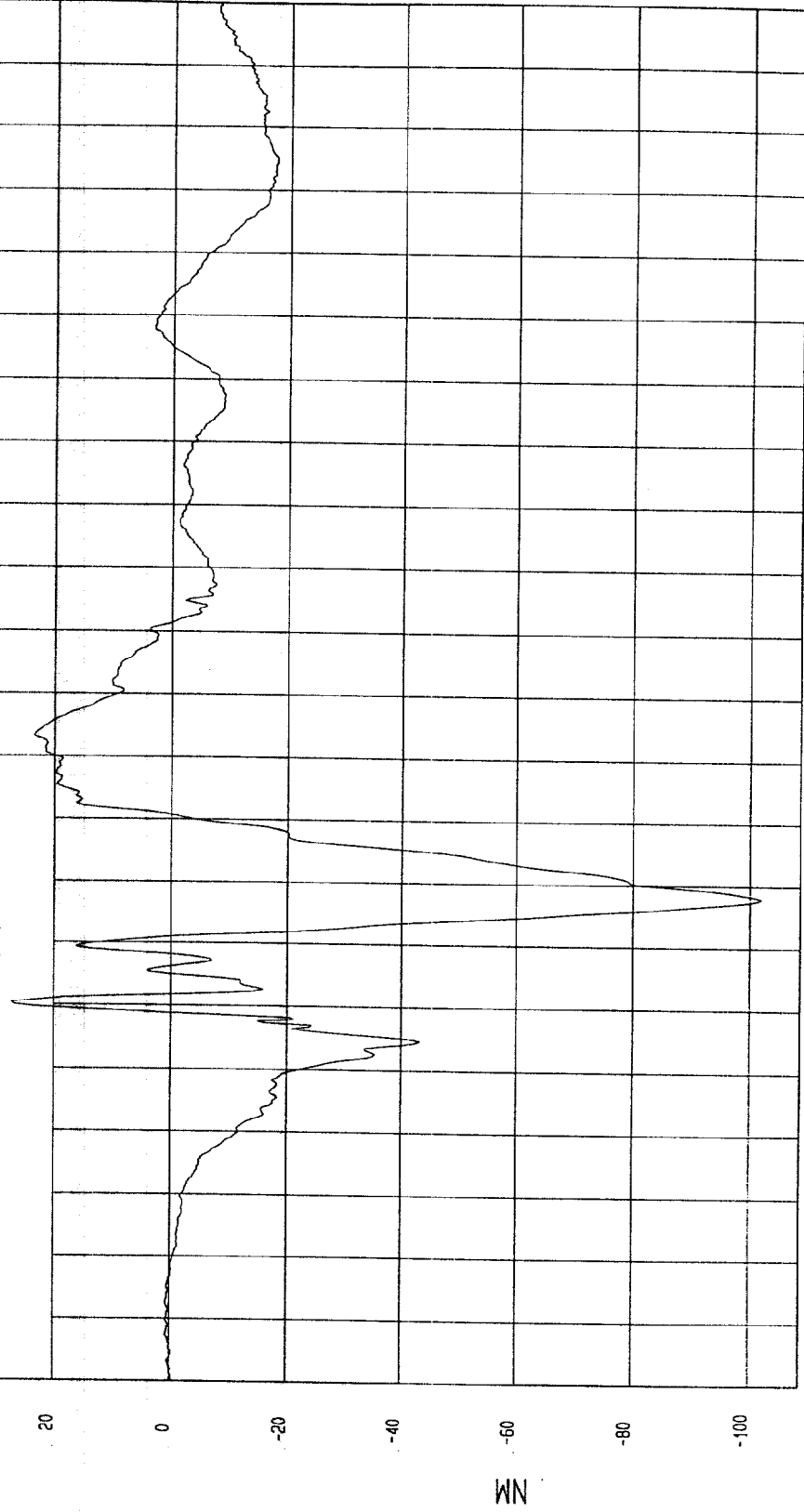
COMPONENT: 1999 FORD RANGER EV

Maximum = 27.43 NM at 40 msec

Minimum = -101.94 NM at 58 msec

DRIVER RIGHT UPPER TIBIA MOMENT X

1 ——— B99025MF.N74 Filterclass (500)

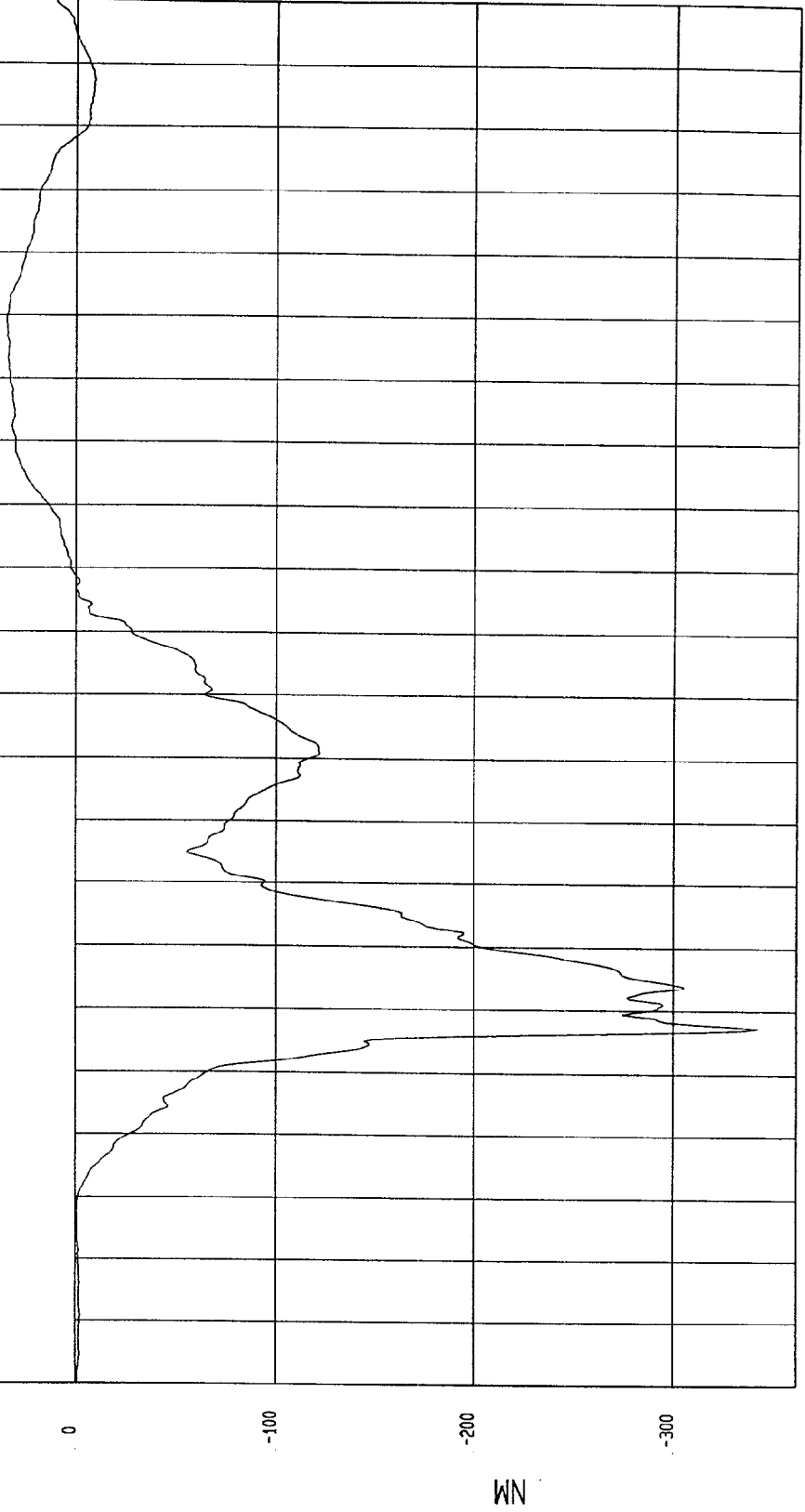


NCA Research
02-19-1999 10:21

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH
Minimum = -341.28 NM at 37 msec Maximum = 34.36 NM at 149 msec

DRIVER RIGHT UPPER TIBIA MOMENT Y

1 ——— B99025MF M75 Filterclass (600)



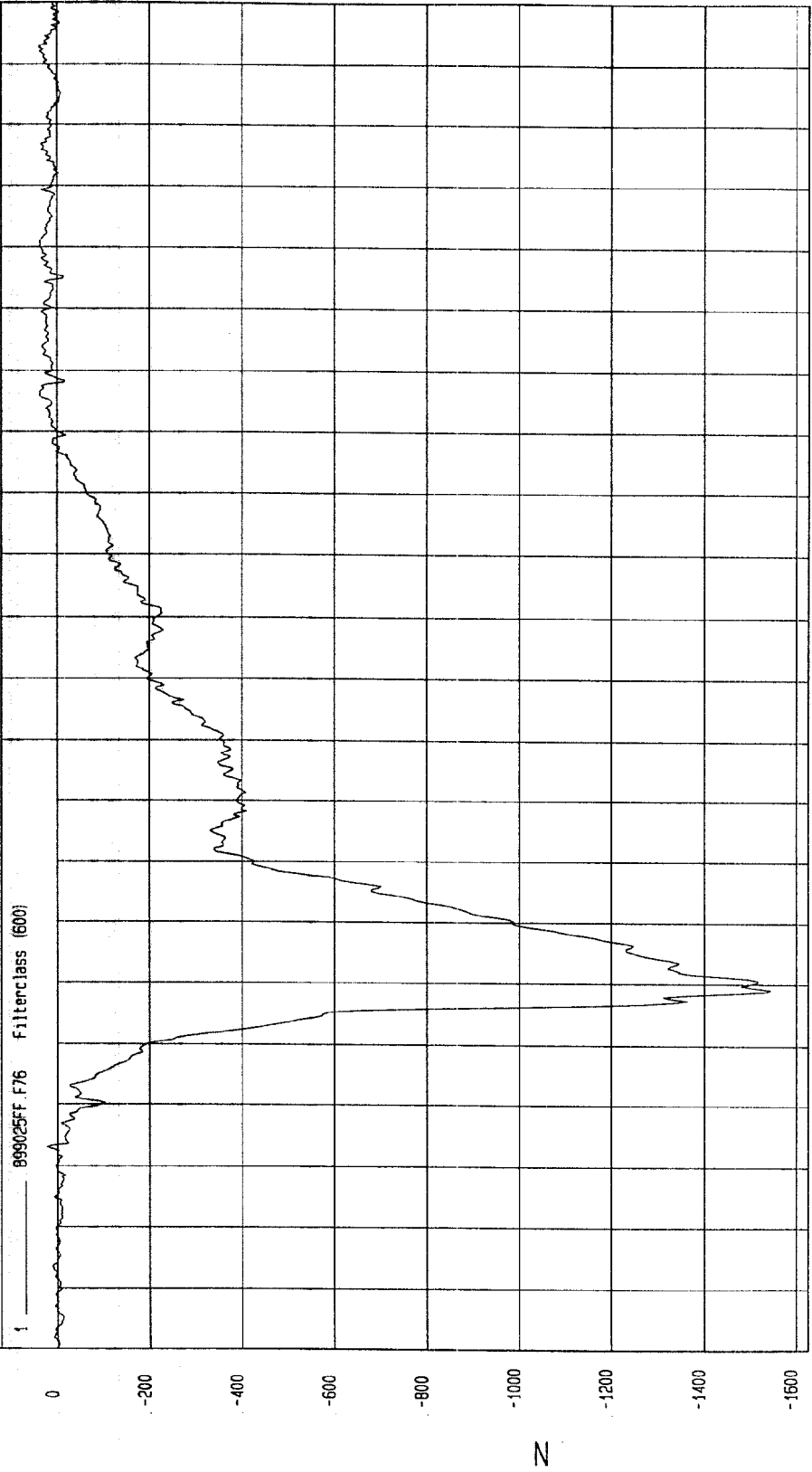
NSA Research
02-19-1999 10:21

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -1546.63 N at 39 msec Maximum = 41.88 N at 193 msec

DRIVER RIGHT UPPER TIBIA FORCE Z



TIME (SECONDS)

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2

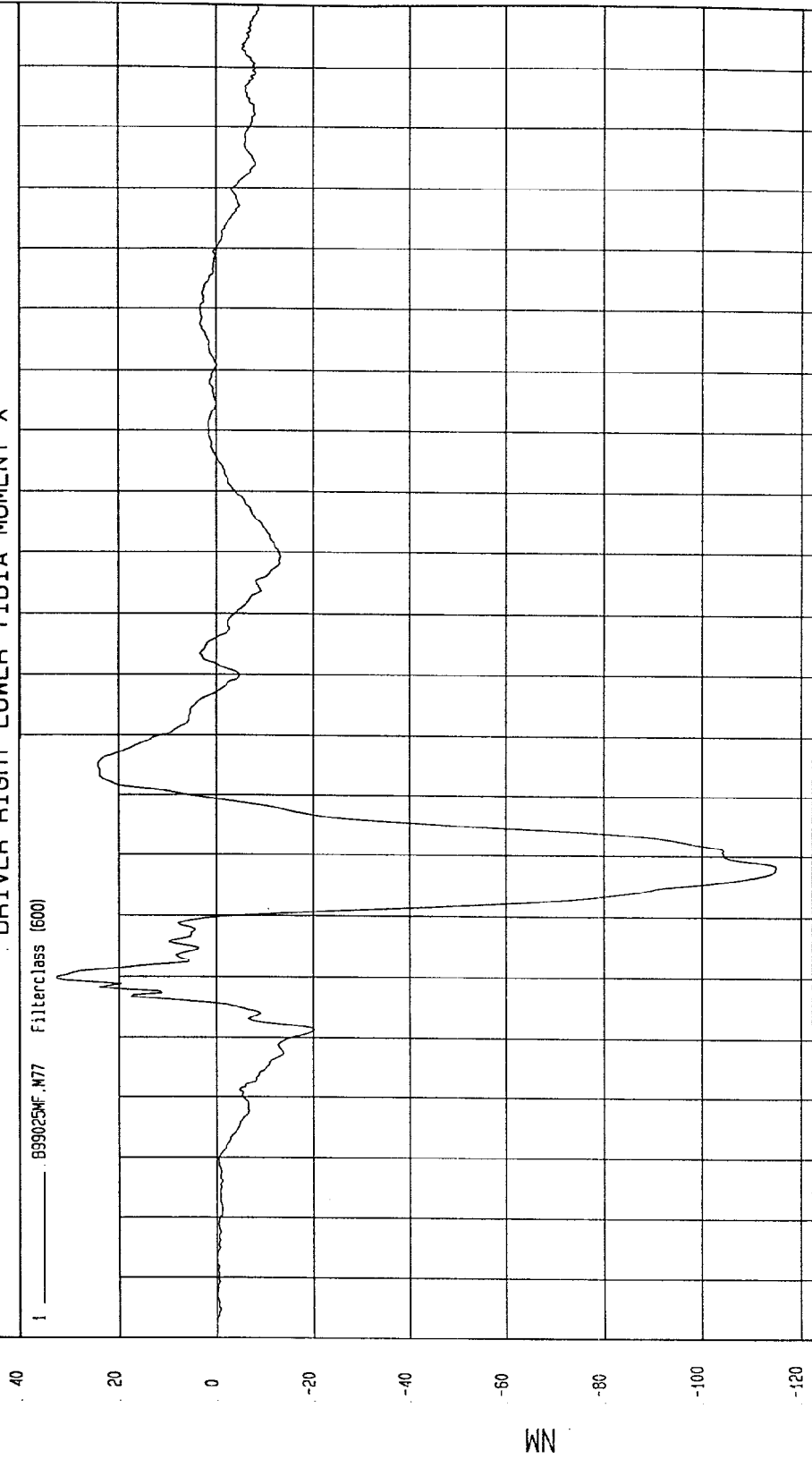
NGA Research
03-09-1999 09: 08

TEST: NCAP 35 MPH FRONTAL IMPACT
TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV
Speed: 35.2 MPH 56.6 KPH

Minimum = -115.02 NM at 58 msec
Maximum = 32.85 NM at 40 msec

DRIVER RIGHT LOWER TIBIA MOMENT X

1 _____ B99025NF.M77 Filterclass (600)



WCA Research
02-19-1999 10:21

TEST: NCAP 35 MPH FRONTAL IMPACT

Speed: 35.2 MPH 56.6 KPH

Maximum = 57.33 NM at 64 msec

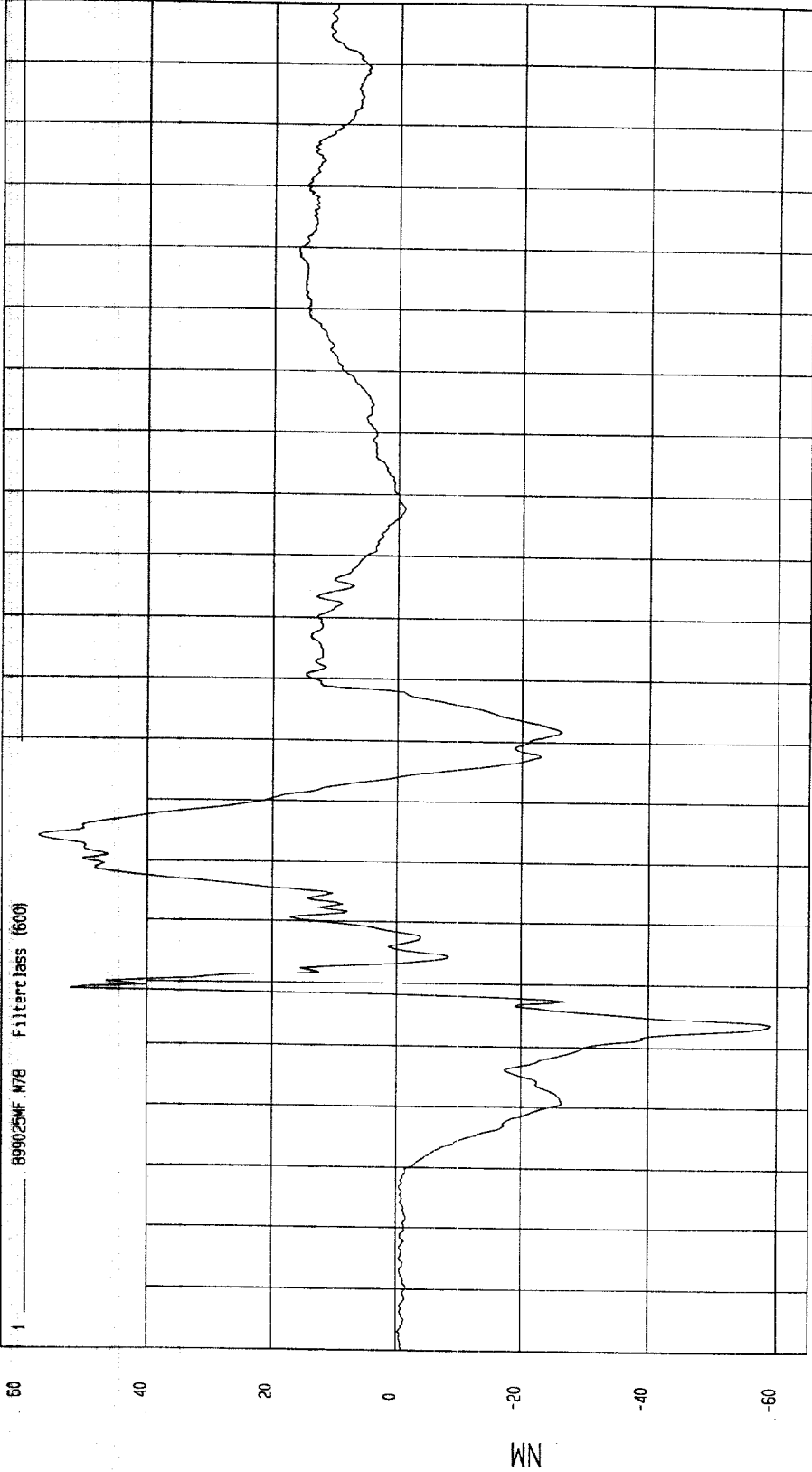
TEST: NCAP 35 MPH FRONTAL IMPACT

Component: 1999 Ford Ranger EV

Minimum = -59.17 NM at 34 msec

DRIVER RIGHT LOWER TIBIA MOMENT Y

1 899025MF.W78 Filterclass (600)



TIME (SECONDS)

MGA Research
03-09-1999 09:43

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

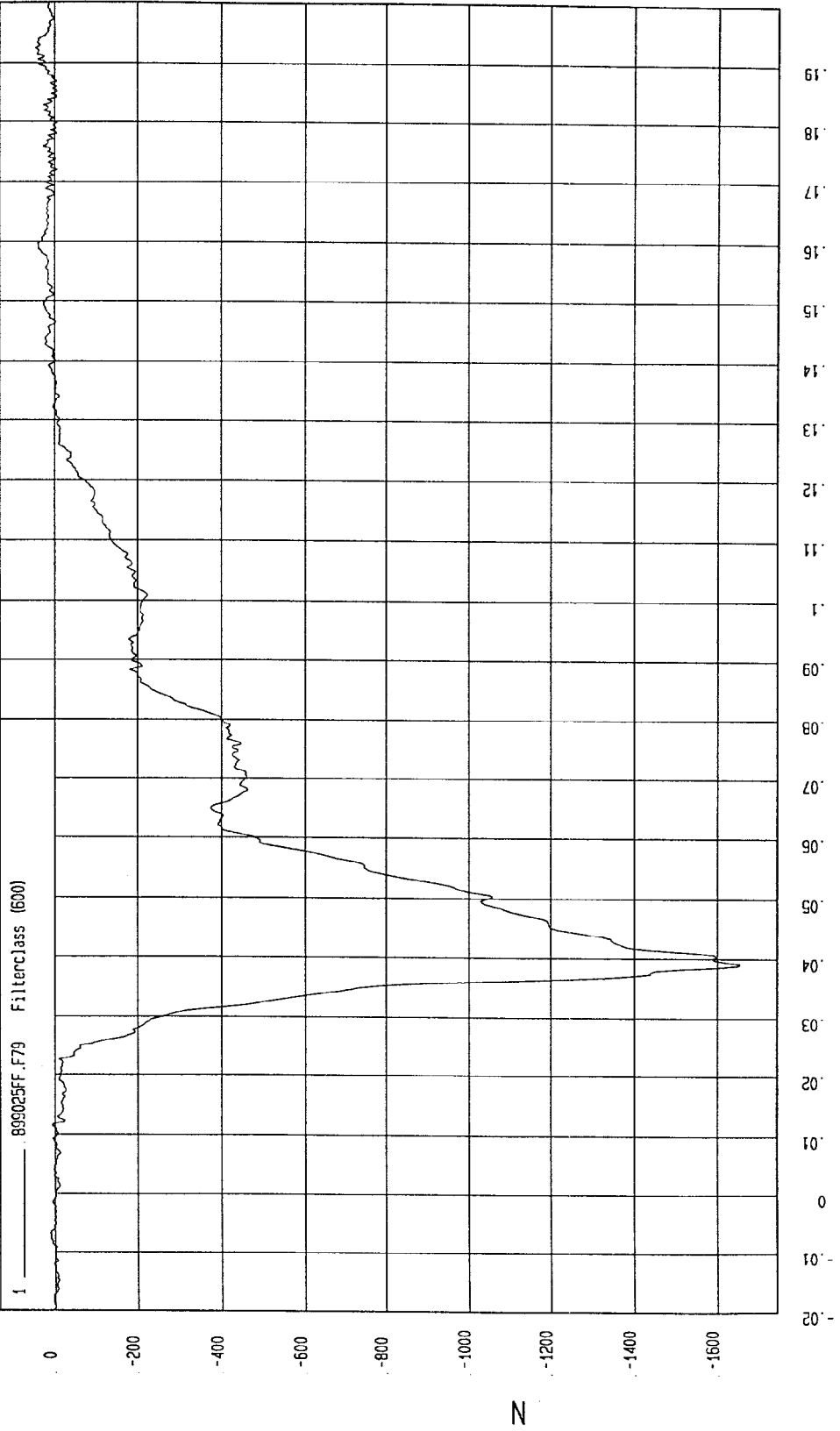
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 44.19 N at 192 msec

Minimum = -1654.9 N at 39 msec

DRIVER RIGHT LOWER TIBIA FORCE Z

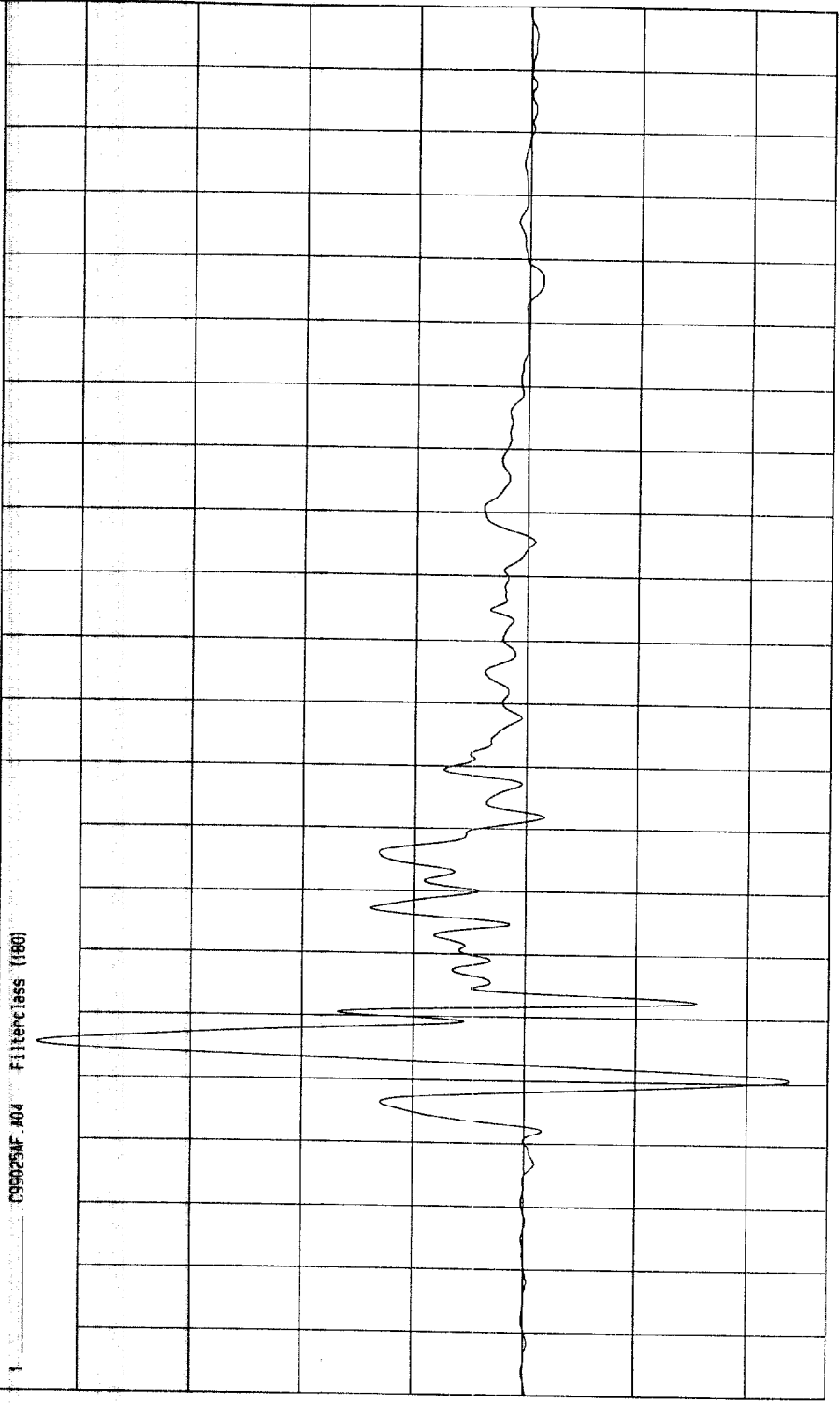


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

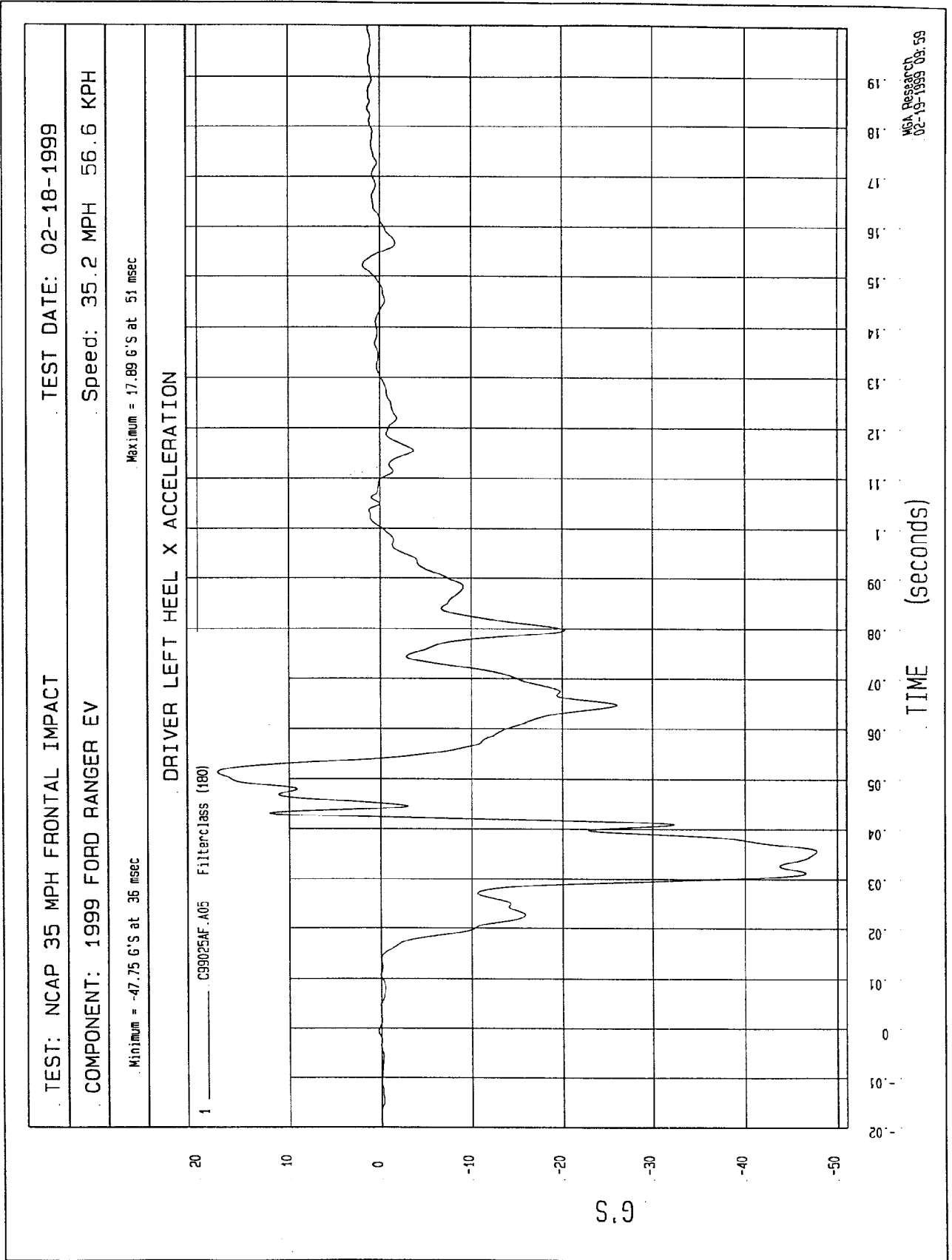
Minimum = -47.63 G'S at 30 msec Maximum = 87.61 G'S at 35 msec

DRIVER LEFT FOOT BALL Z ACCELERATION



TIME (seconds)

MSA Research
02-19-1999 09:59



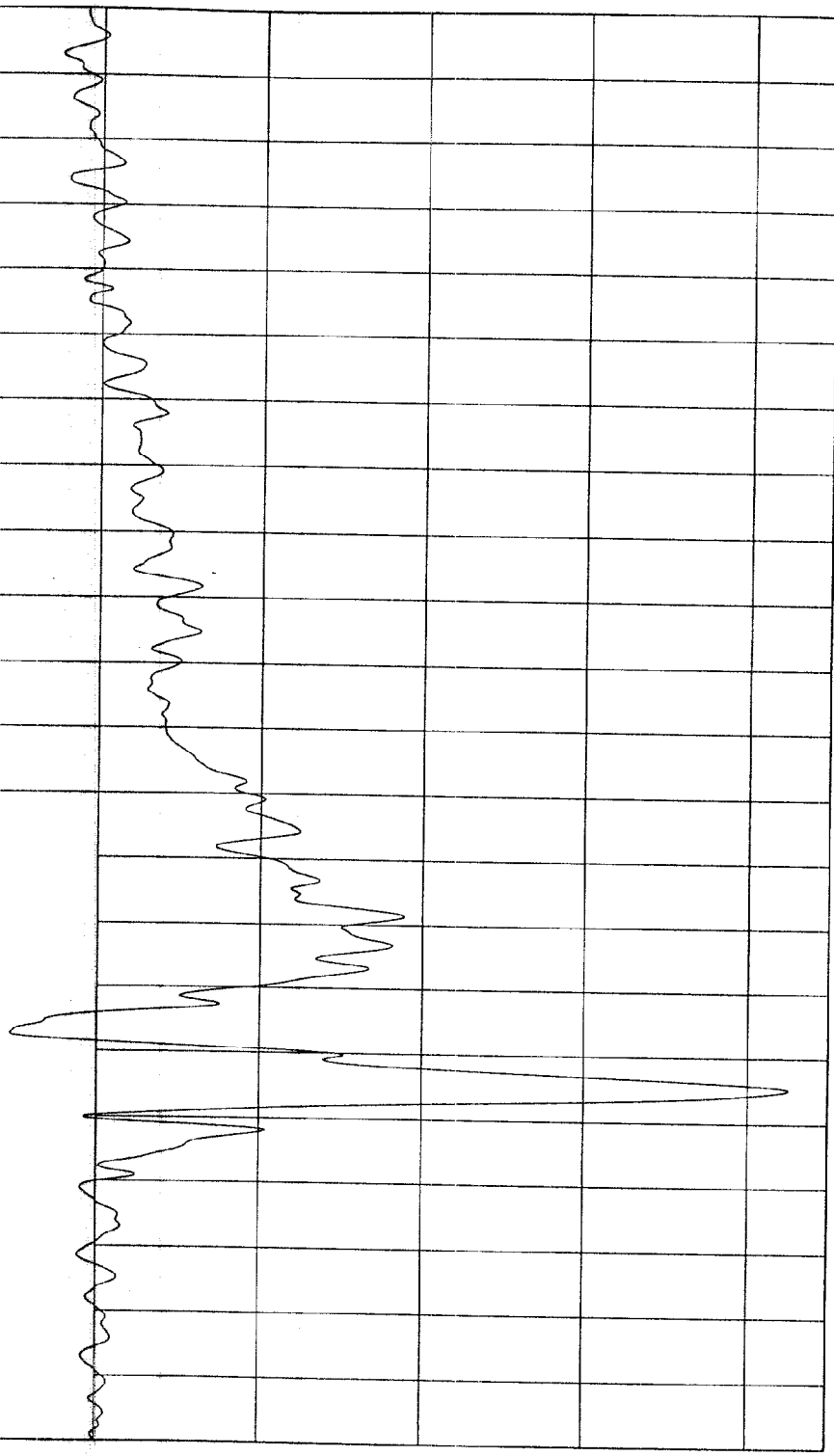
TEST: NCAP 35 MPH FRONTAL IMPACT

Speed: 35.2 MPH 56.6 KPH

Maximum = 5.44 G'S at 43 msec

DRIVER LEFT HEEL Z ACCELERATION

1 C99025AF.A05 FilterClass (180)



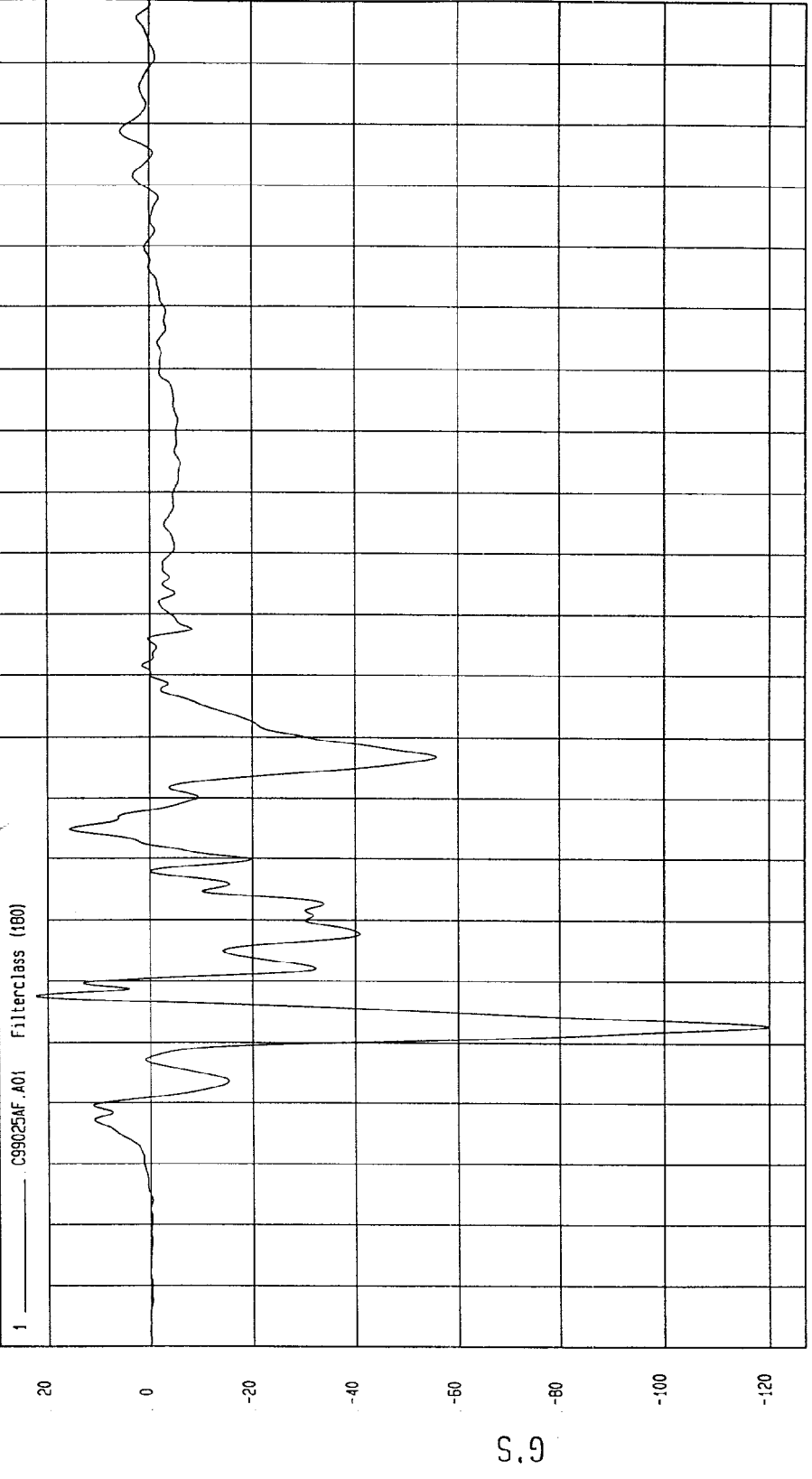
MGA Research
02-19-1999 09:59

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -119.95 G'S at 33 msec Maximum = 22.38 G'S at 38 msec

DRIVER RIGHT FOOT BALL Z ACCELERATION



NGA Research
02-19-1999 09:59

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

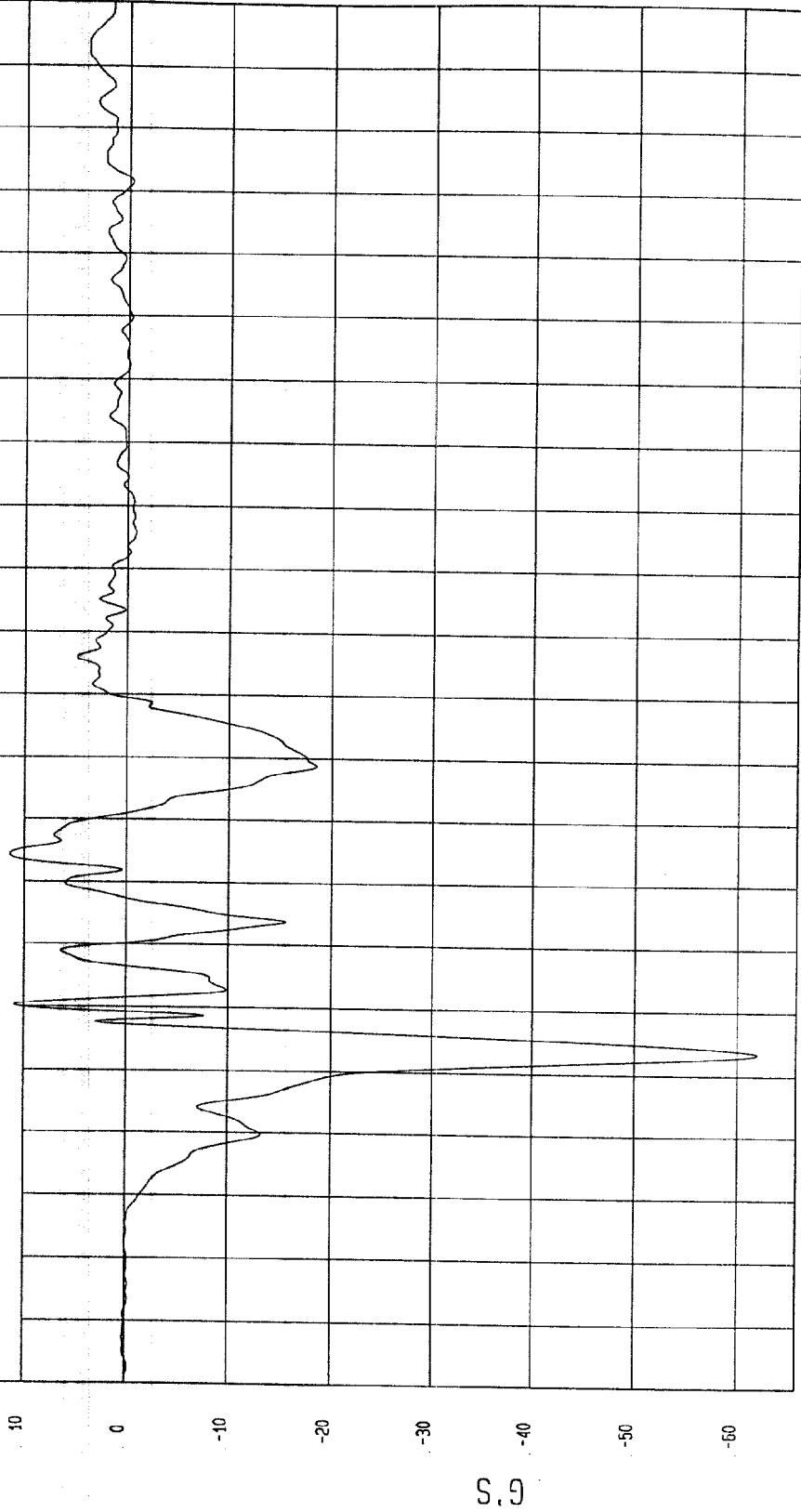
COMPONENT: 1999 FORD RANGER EV

Maximum = 11.38 G'S at 64 msec

Minimum = -61.9 G'S at 33 msec

DRIVER RIGHT HEEL X ACCELERATION

1 C99025AF.A02 Filterclass (180)



MSA Research
02-19-1999 09:59

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 3.44 G'S at 180 msec

Minimum = -66.56 G'S at 33 msec

DRIVER RIGHT HEEL Z ACCELERATION

1 C99025AF.A03 FilterClass (180)

G.S

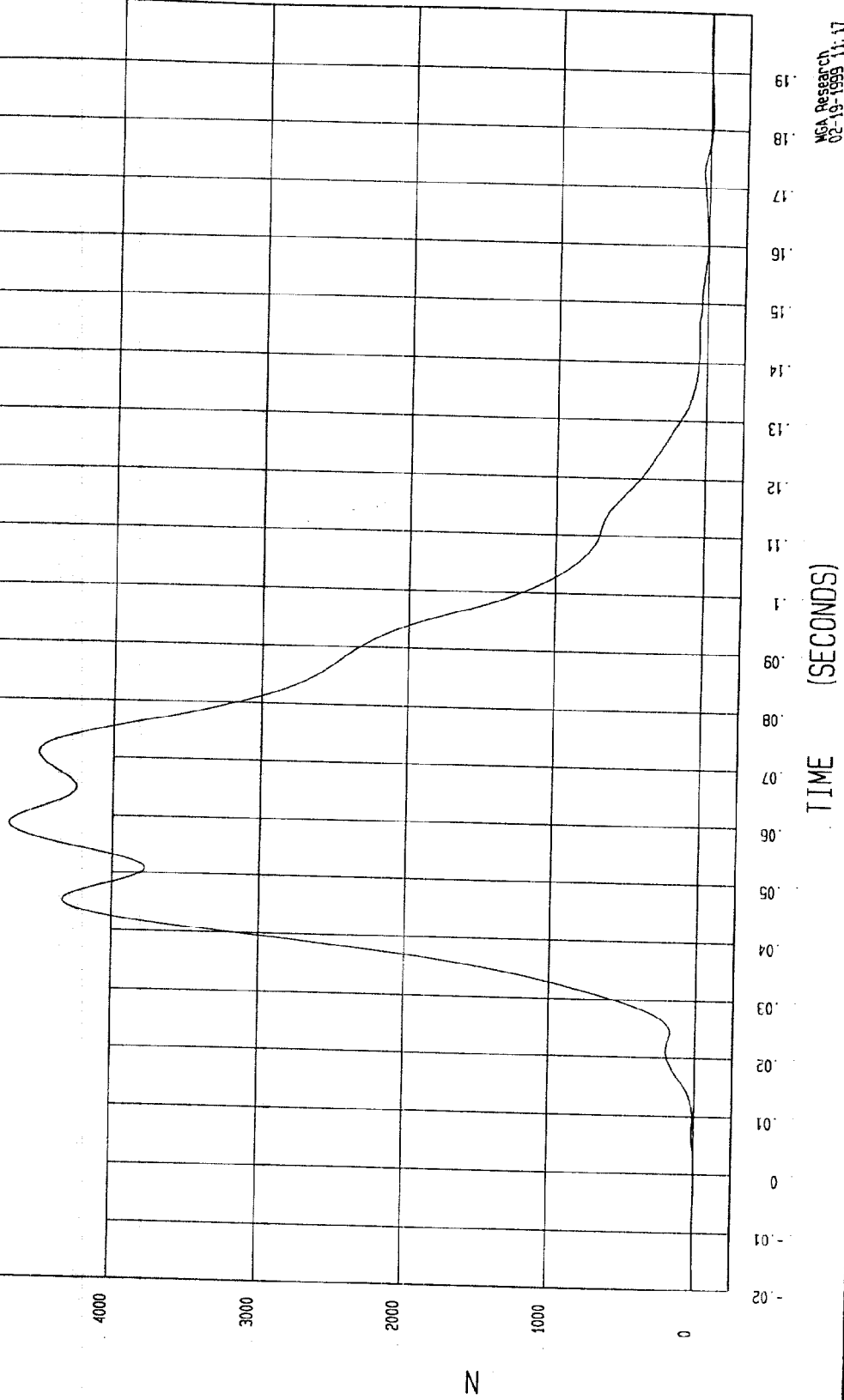
TIME (seconds)

NGA Research
02-19-1999 09:59

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH
Minimum = -13.43 N at 192 msec Maximum = 4705.67 N at 58 msec

DRIVER SHOULDER BELT FORCE

1 — 899025FF.F80 Filterclass (60)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

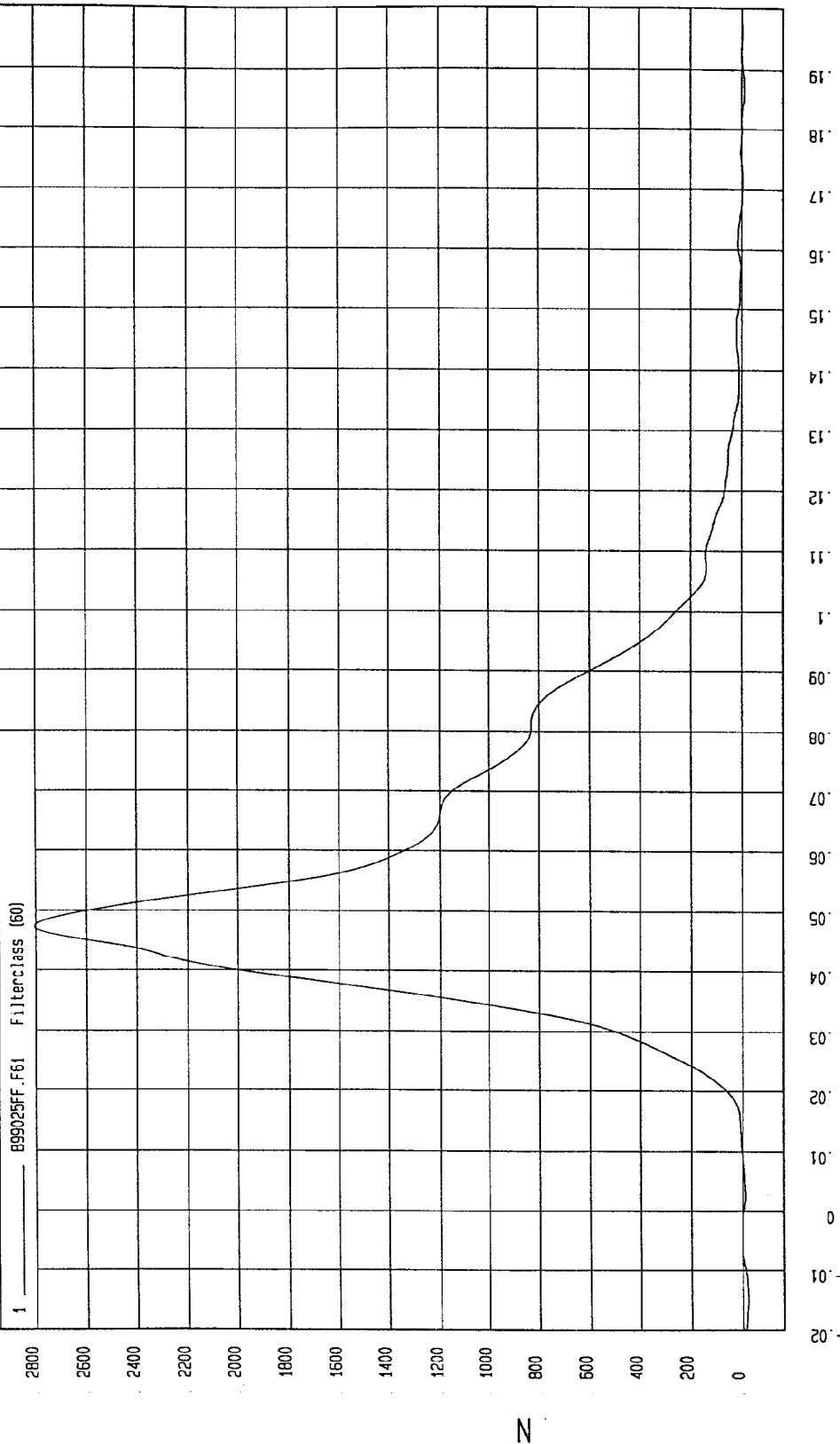
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 2804.55 N at 47 msec

Minimum = -20.25 N at -15 msec

DRIVER LAP BELT FORCE



MGA Research
02-19-1999 11:14

TIME (SECONDS)

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

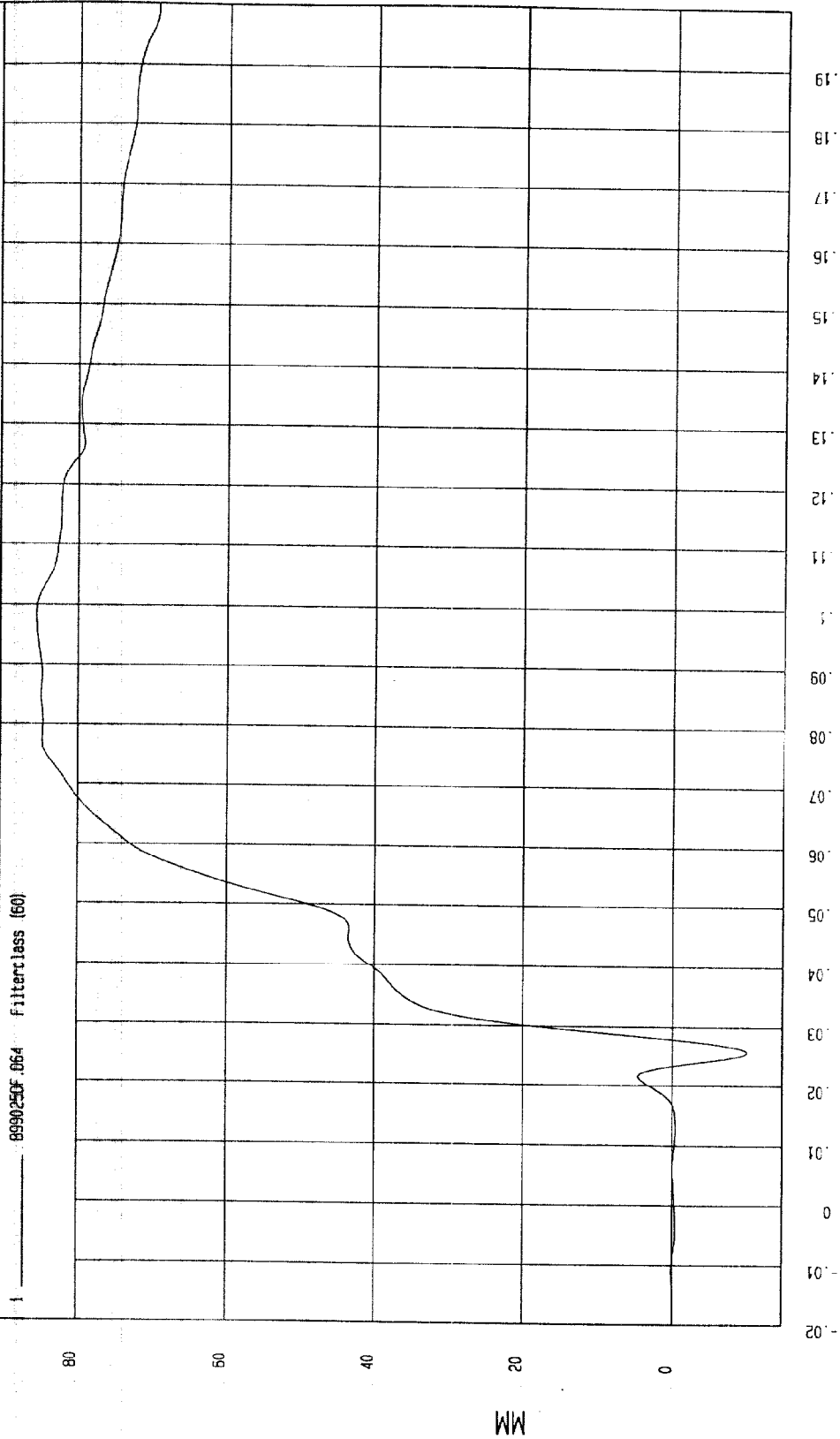
COMPONENT: 1999 FORD RANGER EV

Minimum = -9.76 MM at 26 msec

Maximum = 85.56 MM at 98 msec

DRIVER BELT SPOOLOUT

1 8990250F.064 Filterclass (60)



WCA Research
02-22-1999 12:05

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

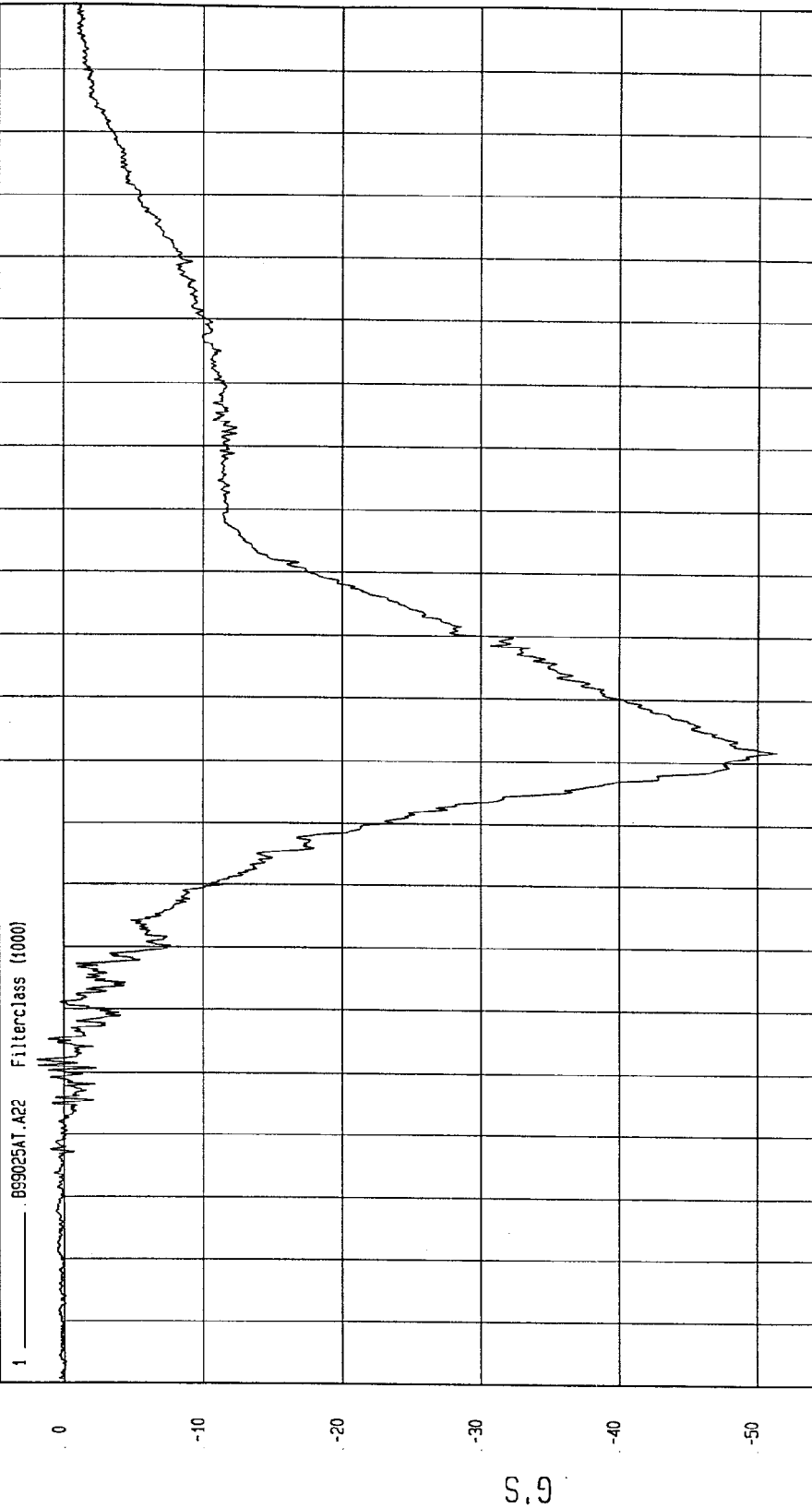
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 1.97 G'S at 32 msec

Minimum = -51.39 G'S at 82 msec

PASSENGER HEAD X ACCELERATION



MSA Research
02-18-1999 16:02

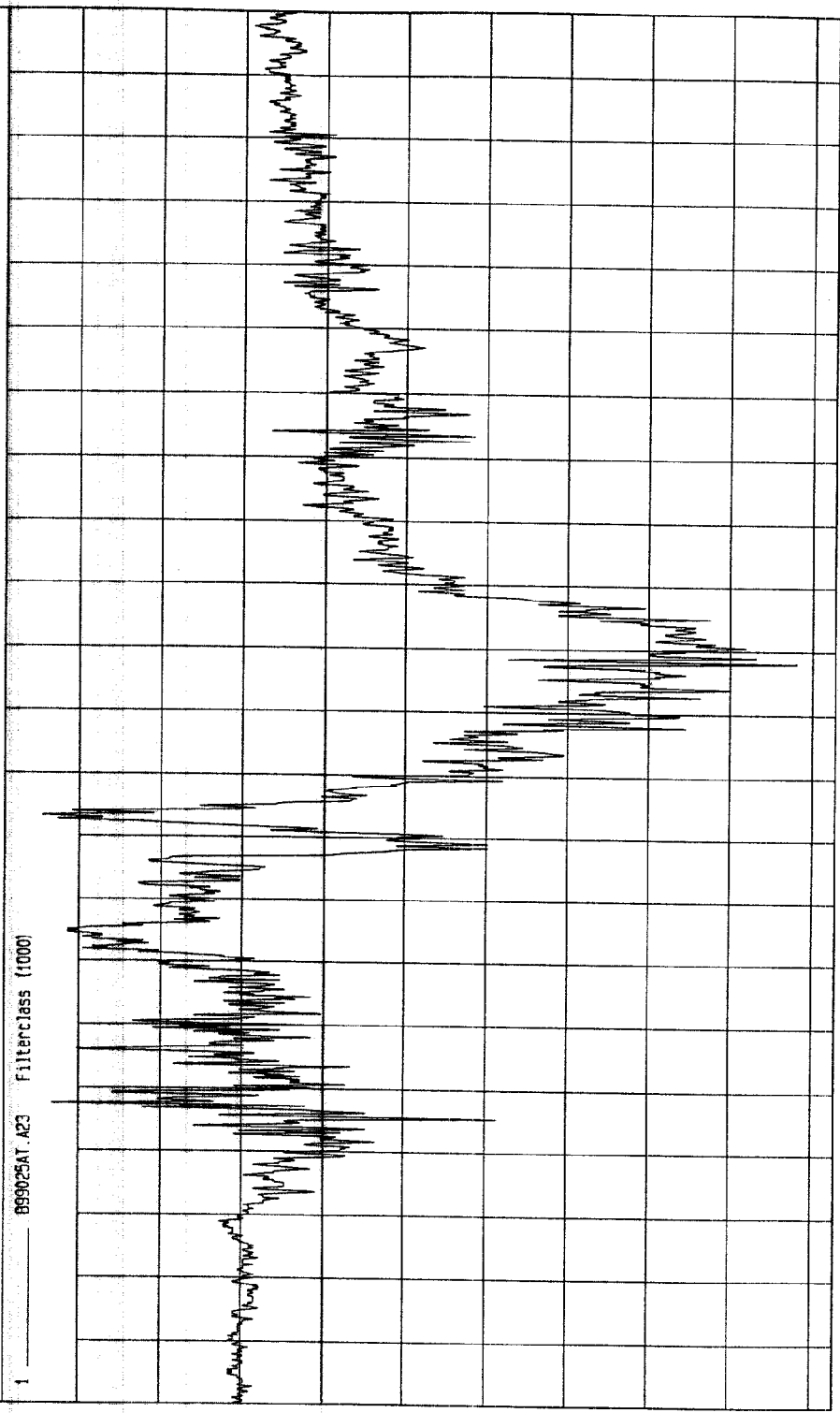
TIME (SECONDS)

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -13.63 G'S at 98 msec Maximum = 4.91 G'S at 73 msec

PASSENGER HEAD Y ACCELERATION



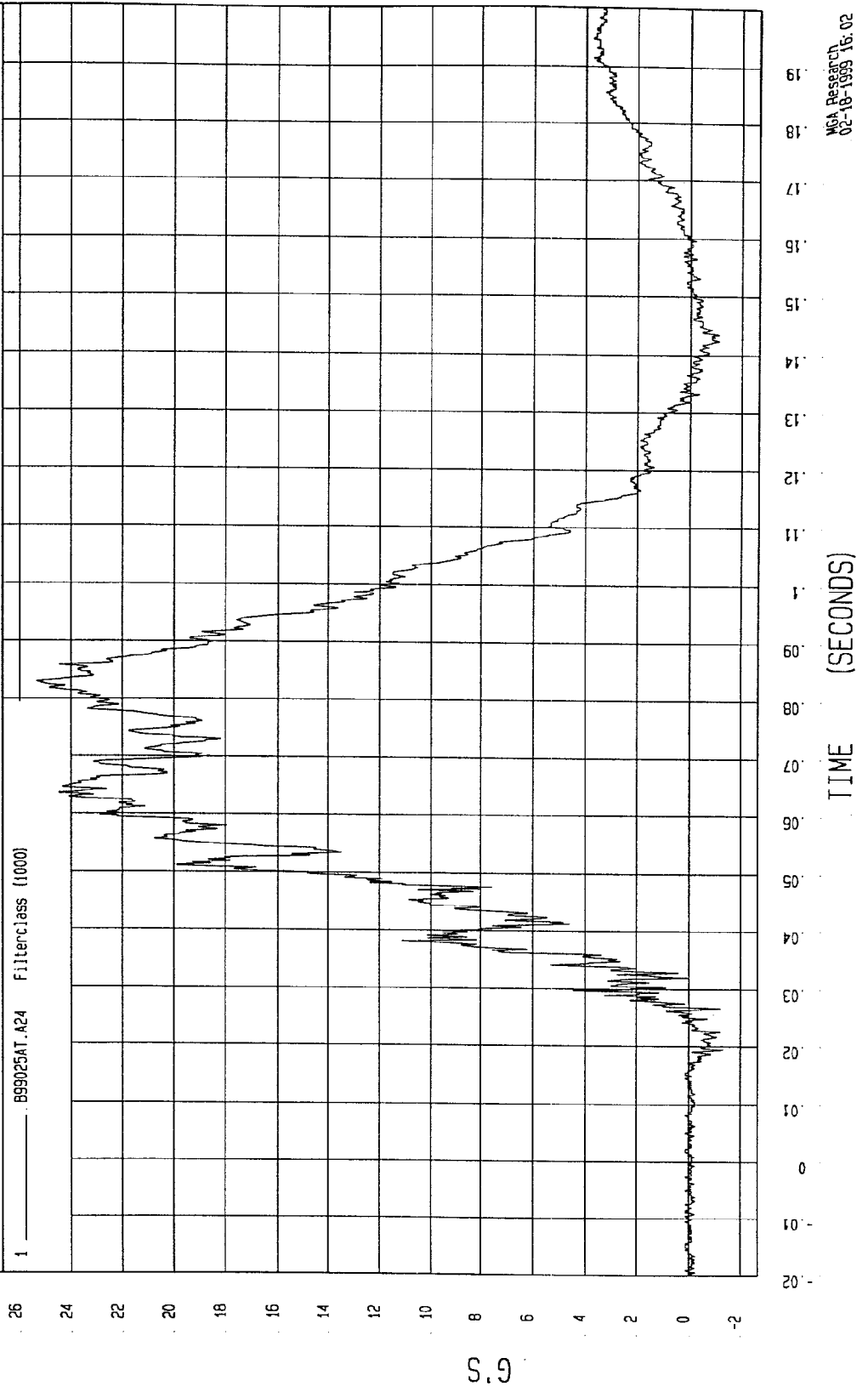
MSA Research
02-18-1999 16:02

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -1.33 G'S at 19 msec Maximum = 25.34 G'S at 83 msec

PASSENGER HEAD Z ACCELERATION



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = 6.39E-02 G'S at -20 msec

Maximum = 57.27 G'S at 82 msec

PASSENGER HEAD RESULTANT ACCELERATION

1 B99025AV.A22 Filterclass (1000)

60

50

40

30

20

10

0

G'S

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (SECONDS)

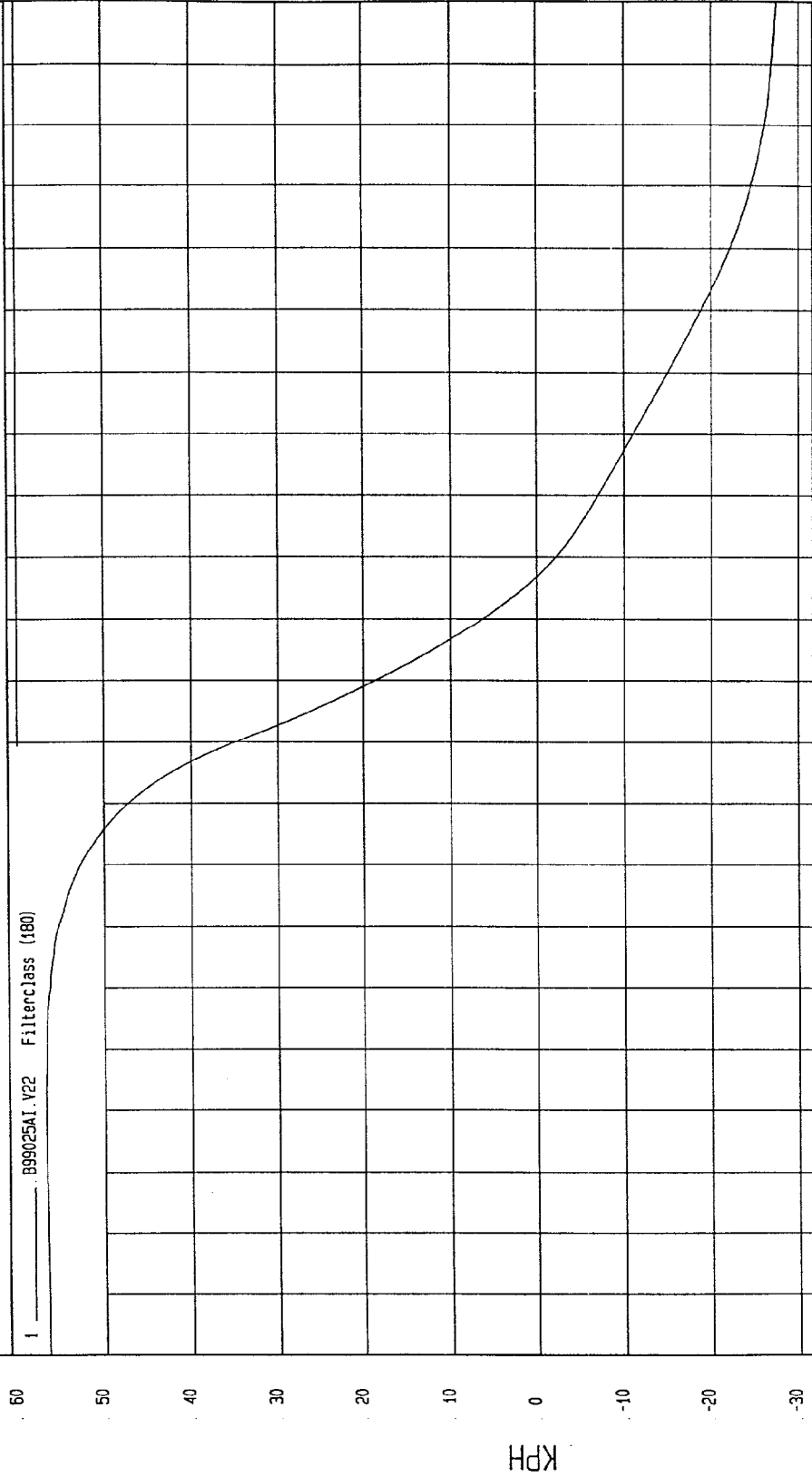
WCA Research
02-18-1999 16:02

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -27.41 KPH at 200 msec Maximum = 56.88 KPH at 22 msec

PASSENGER HEAD X VELOCITY



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

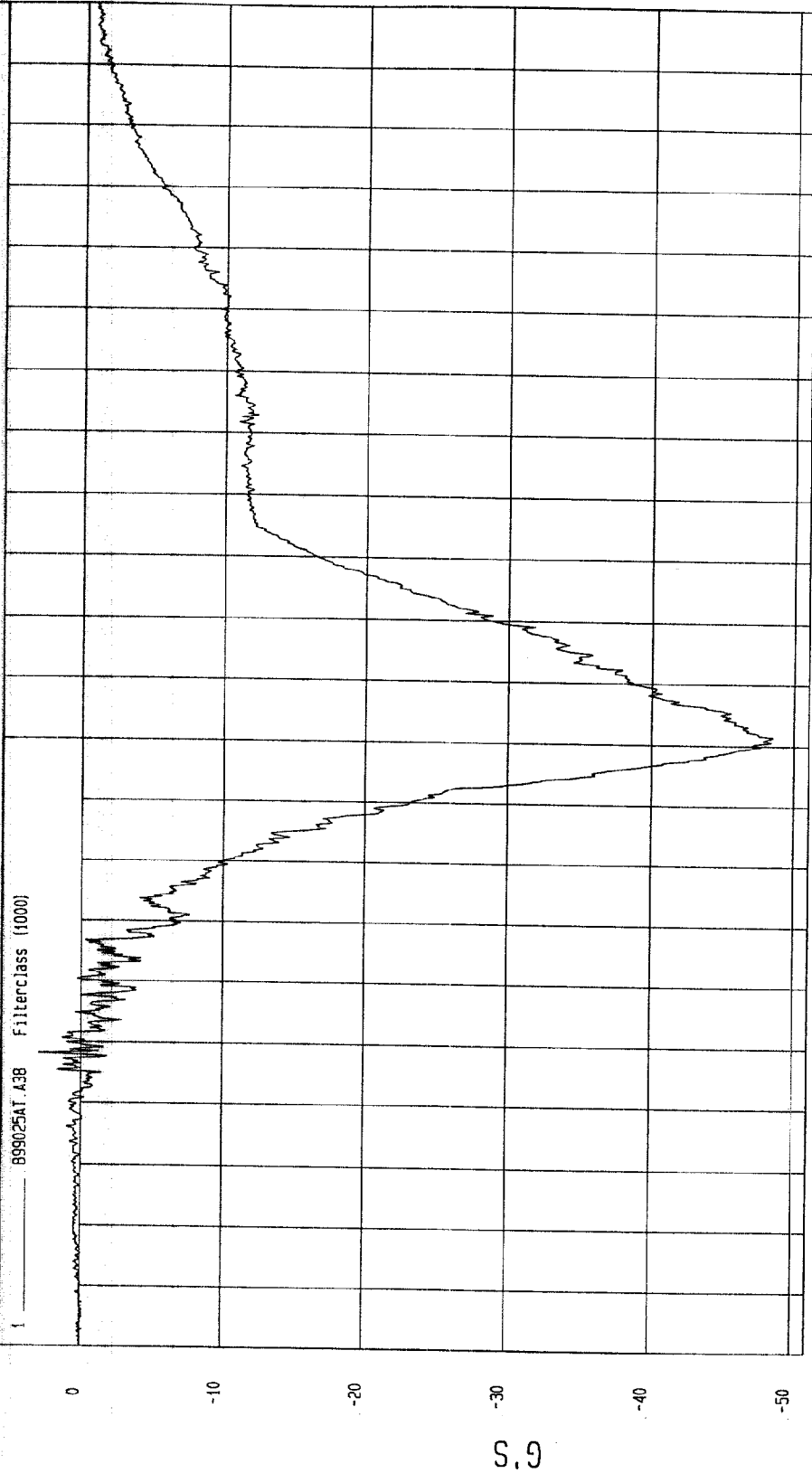
SPEED: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = -48.49 G'S at 81 msec

Maximum = 3.05 G'S at 28 msec

PASSENGER HEAD REDUNDANT X ACCELERATION



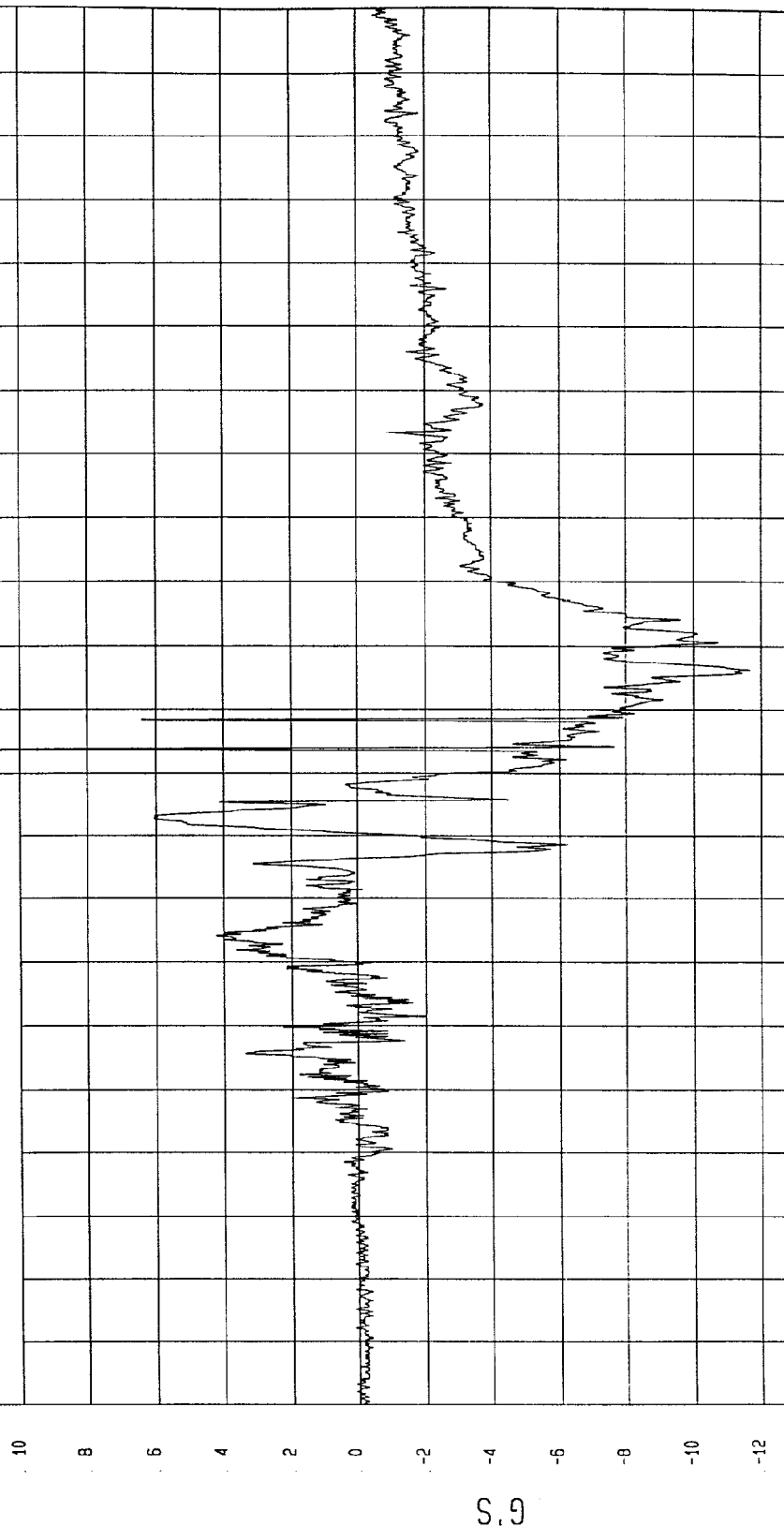
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

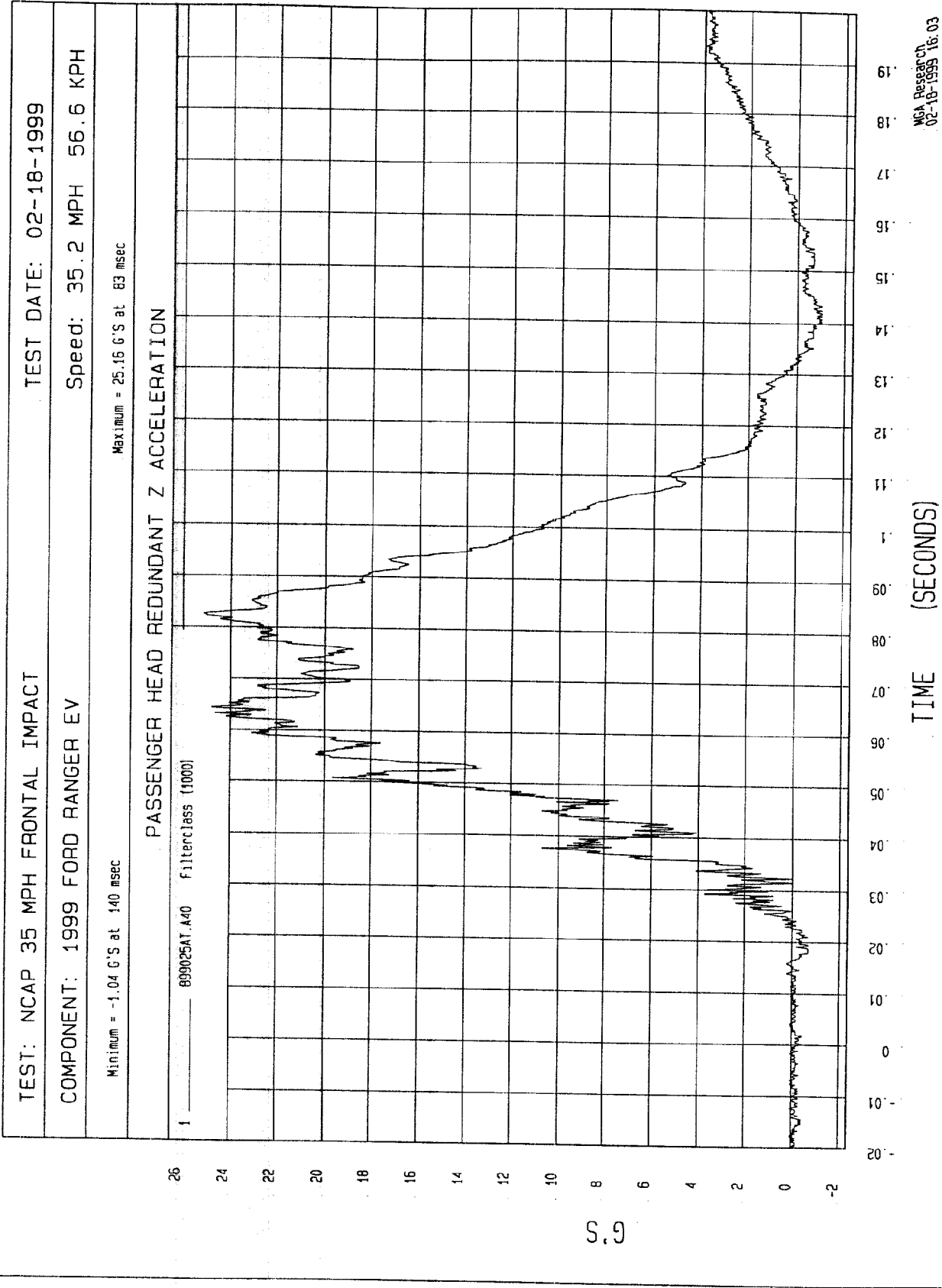
Minimum = -11.68 G'S at 96 msec Maximum = 10.67 G'S at 84 msec

PASSENGER HEAD REDUNDANT Y ACCELERATION

1 899025AT.A39 Filterclass (1000)



WCA Research
02-18-1999 16.03

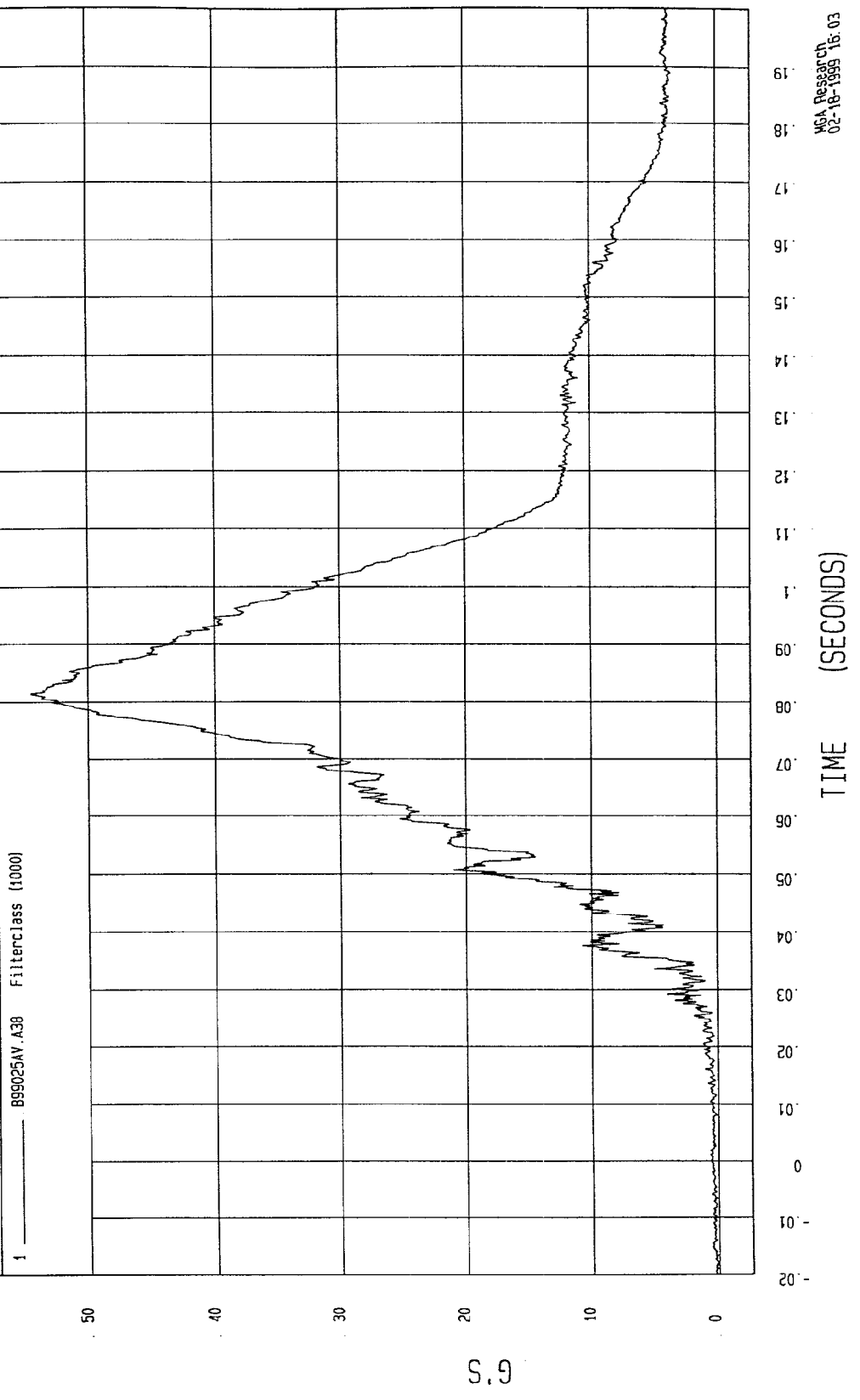


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = .08 G'S at -19 msec Maximum = 54.51 G'S at 81 msec

PASSENGER HEAD REDUNDANT RESULTANT ACCELERATION

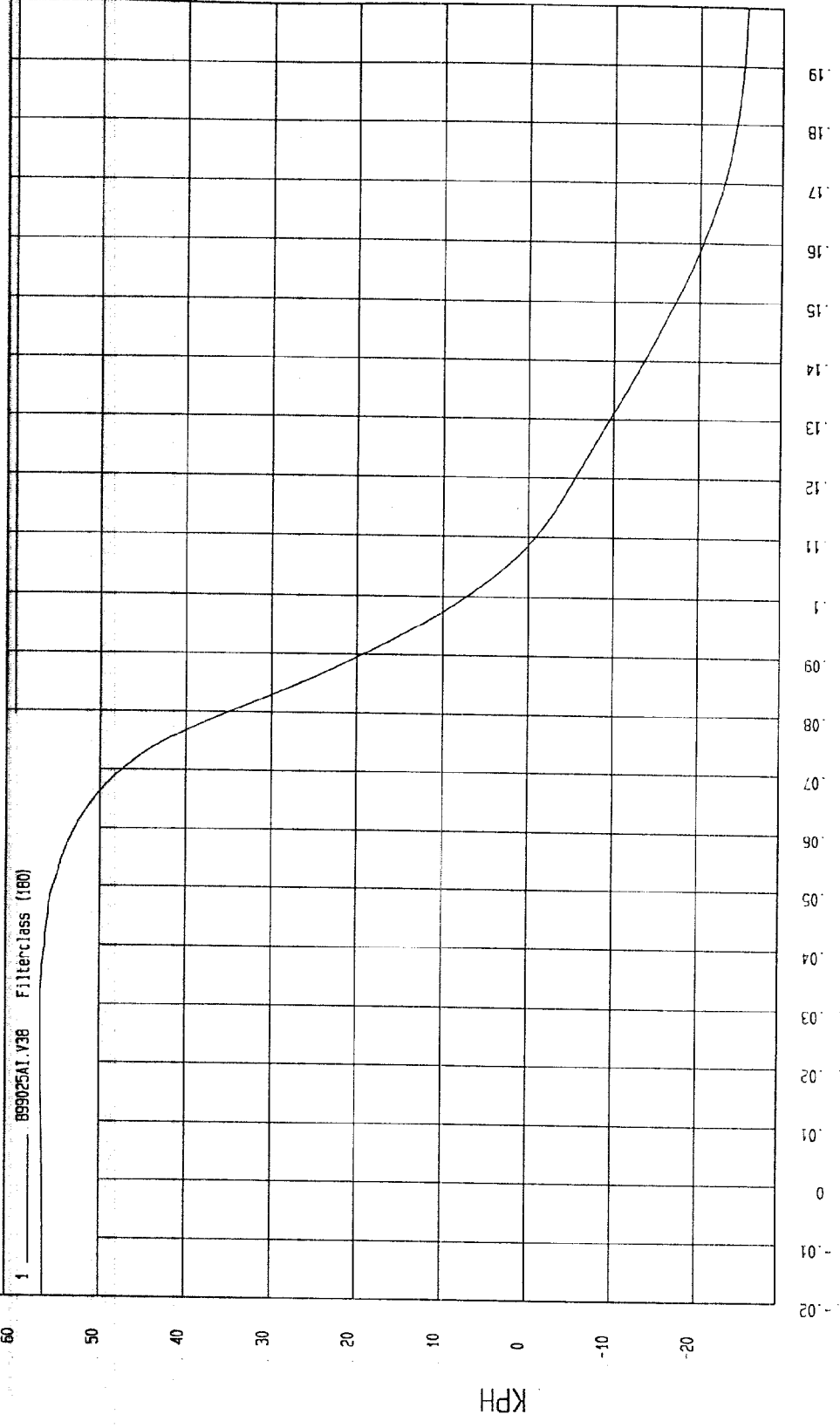


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -25.54 KPH at 200 msec Maximum = 56.95 KPH at 22 msec

PASSENGER HEAD REDUNDANT X VELOCITY



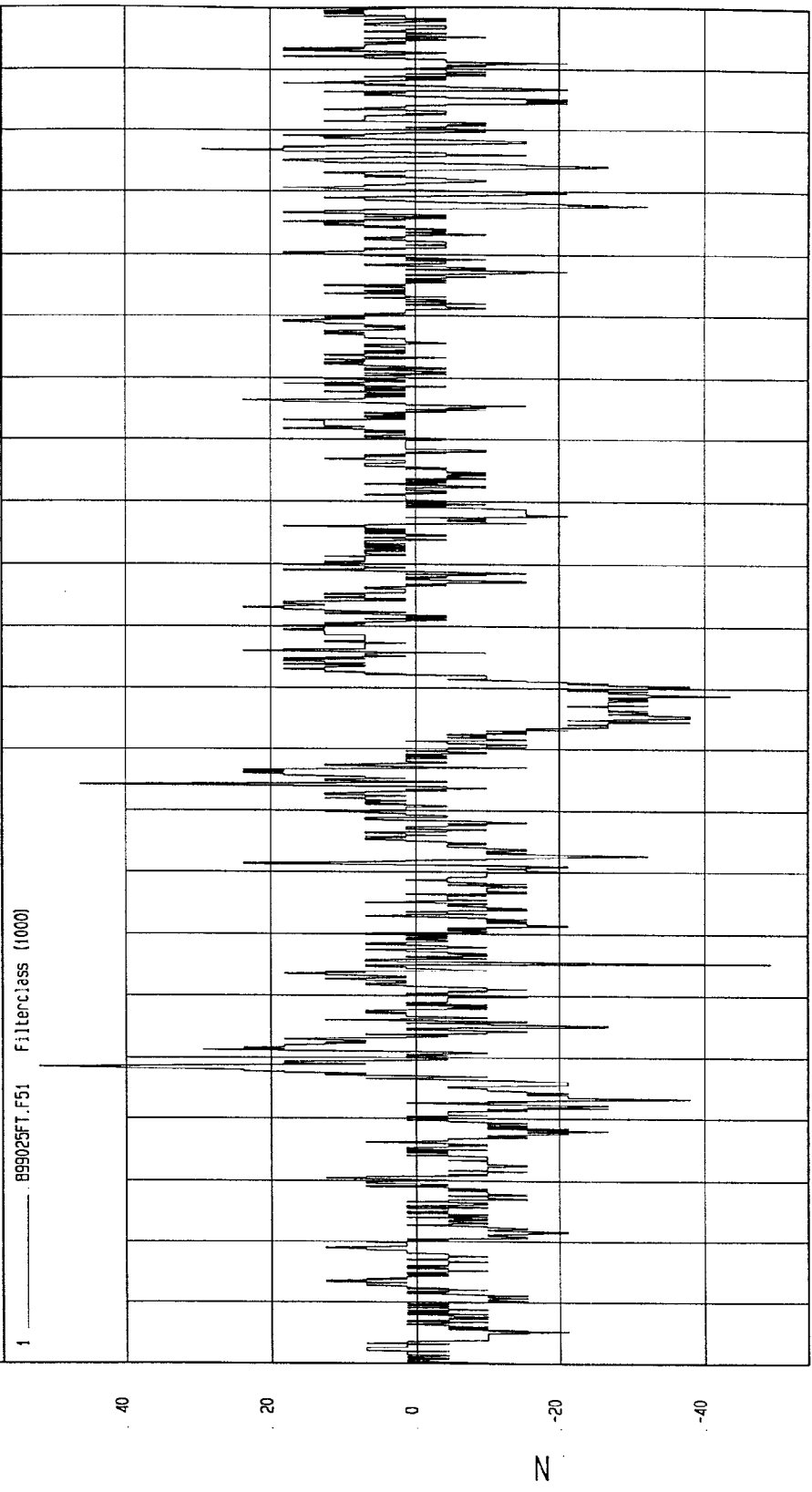
WGA Research
02-19-1999 11:22

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -49.21 N at 45 msec Maximum = 51.07 N at 28 msec

PASSENGER NECK FORCE X



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

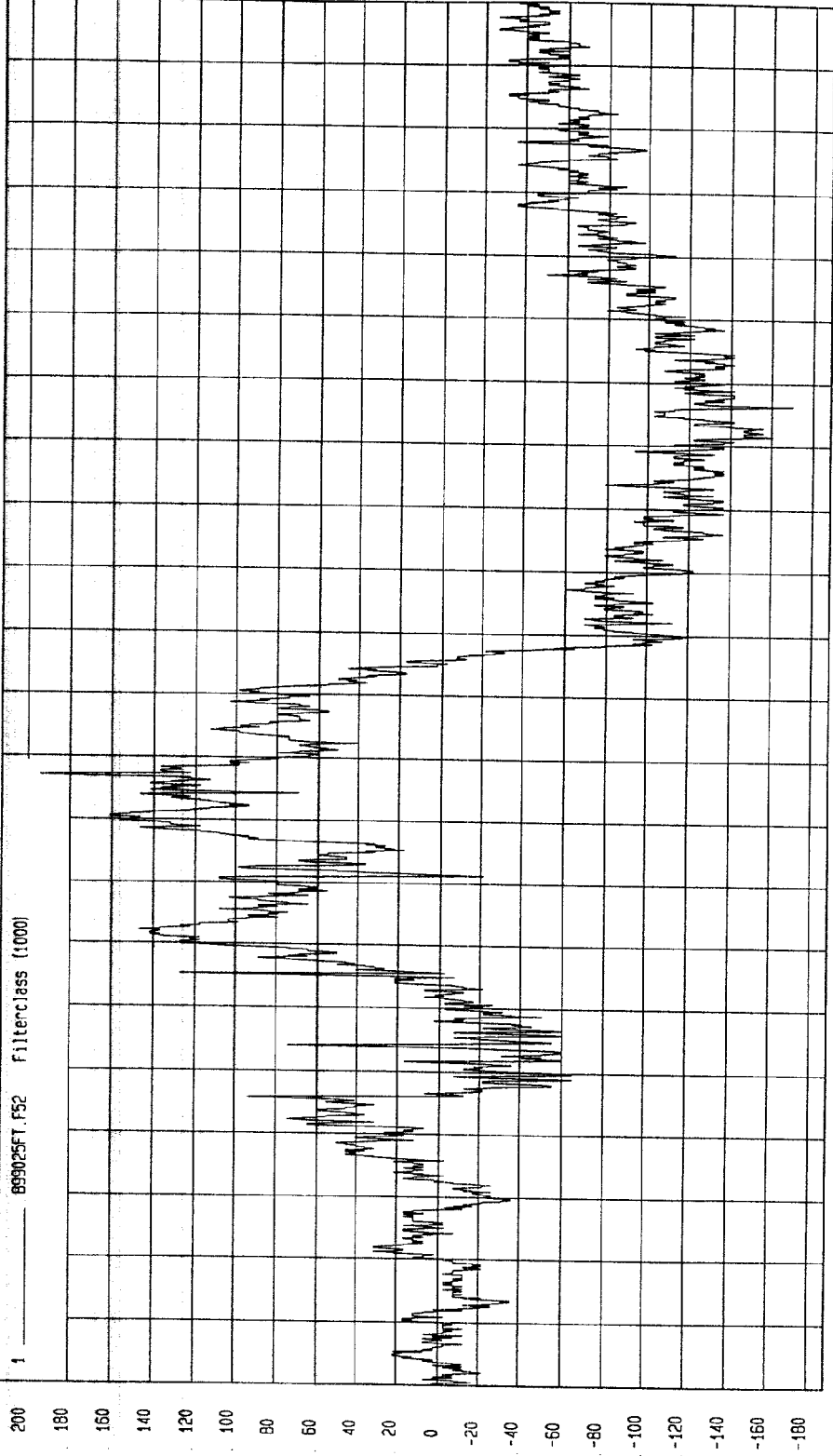
COMPONENT: 1999 FORD RANGER EV

Maximum = 194.34 N at 77 msec

Minimum = -170.2 N at 136 msec

PASSENGER NECK FORCE Y

1 899025FT.F52 Filterclass (1000)



MGA Research
02-19-1999 10:11

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

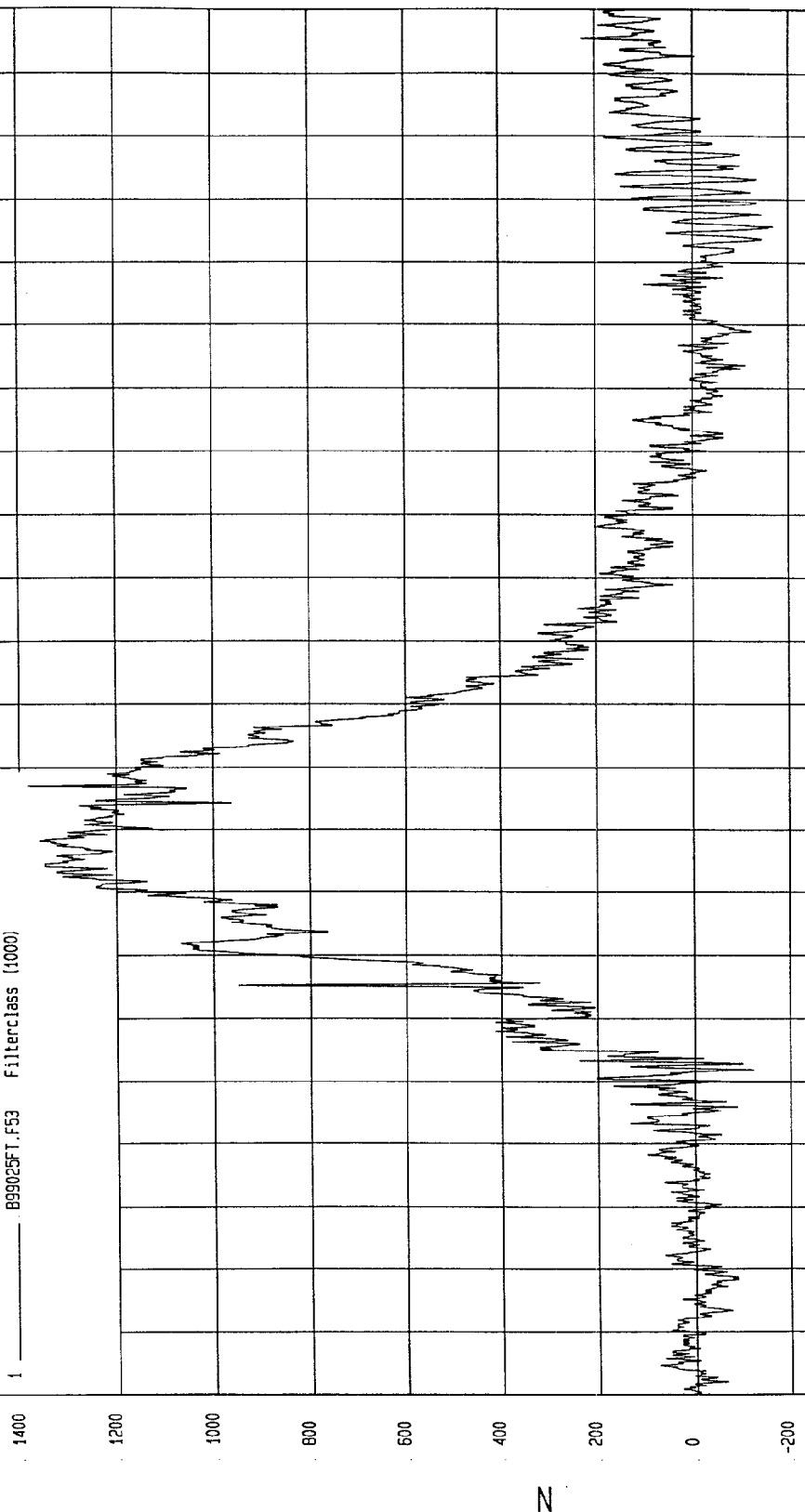
COMPONENT: 1999 FORD RANGER EV

Maximum = 1382.35 N at 77 msec

Minimum = -159.72 N at 166 msec

PASSENGER NECK FORCE Z

1 — B99025T.F53 Filterclass (1000)

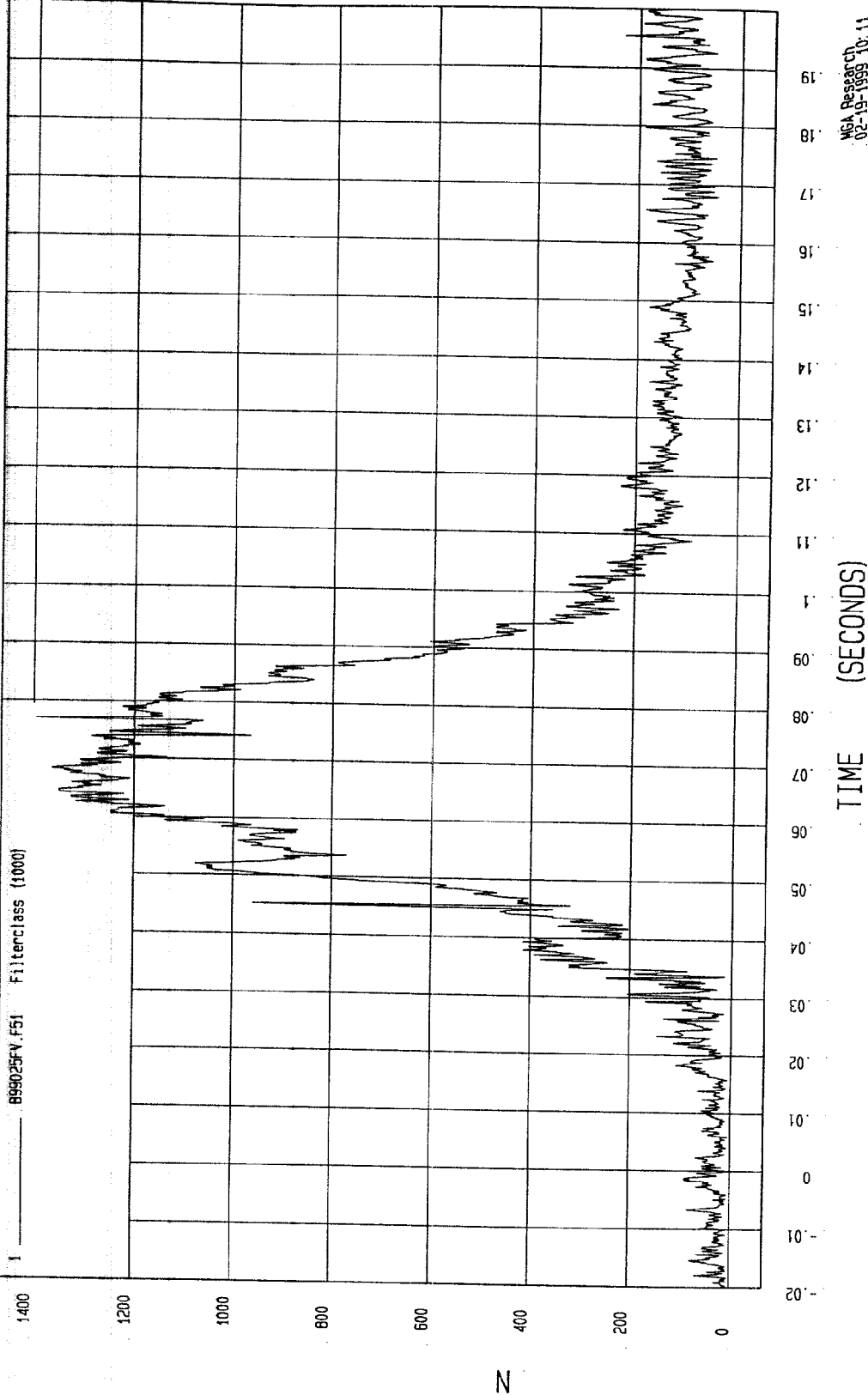


TIME (SECONDS)

MGA Research
02-18-1999 10:11

TEST: NCAP 35 MPH FRONTAL IMPACT
 COMPONENT: 1999 FORD RANGER EV
 Minimum = 5.96 N at -18 msec
 Maximum = 1395.37 N at 77 msec

PASSENGER NECK FORCE RESULTANT



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

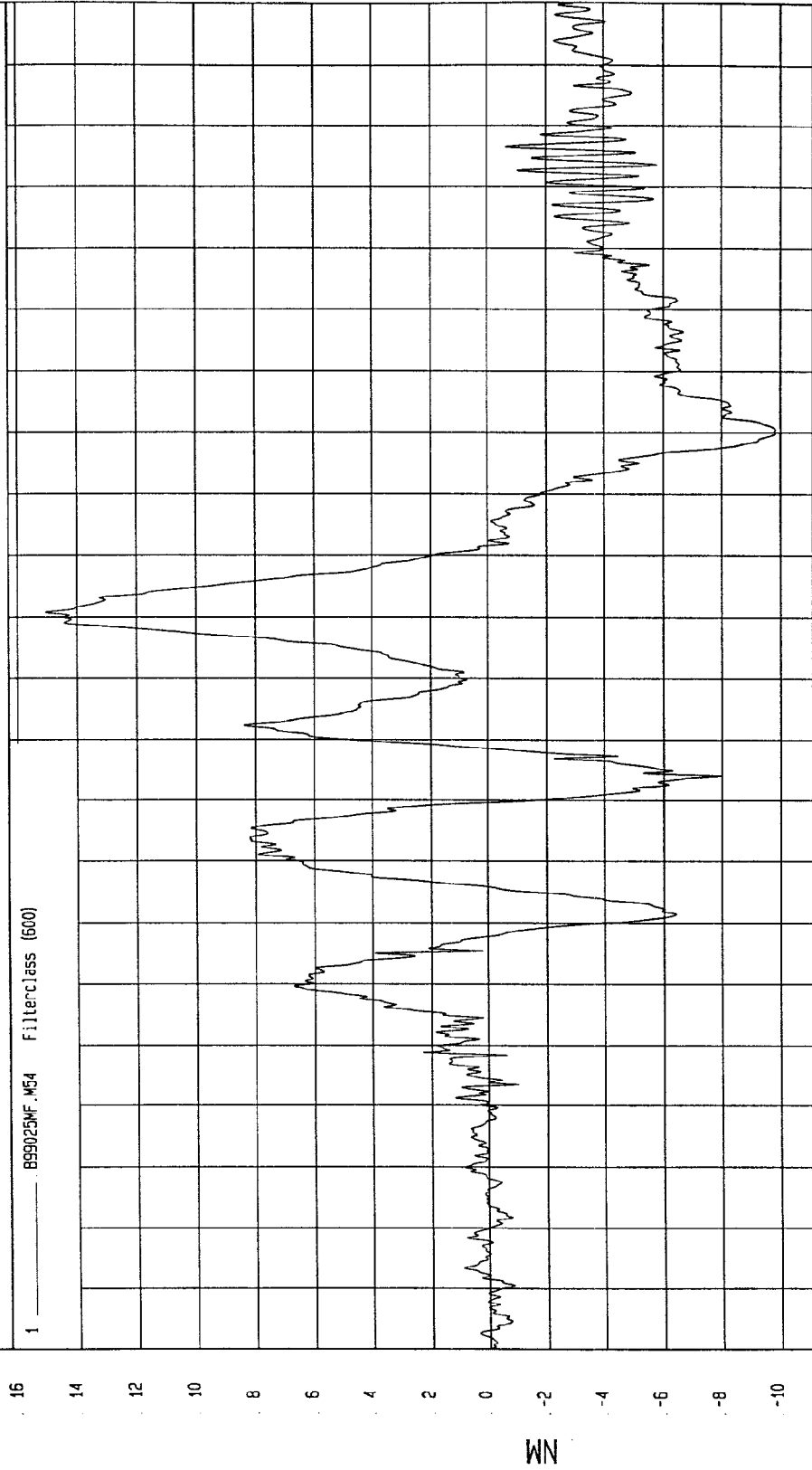
COMPONENT: 1999 FORD RANGER EV

Maximum = 15.06 NM at 101 msec

Minimum = -9.85 NM at 130 msec

PASSENGER NECK MOMENT X

1 B99025MF.M54 Filterclass (600)



MSA Research
02-19-1999 10:11

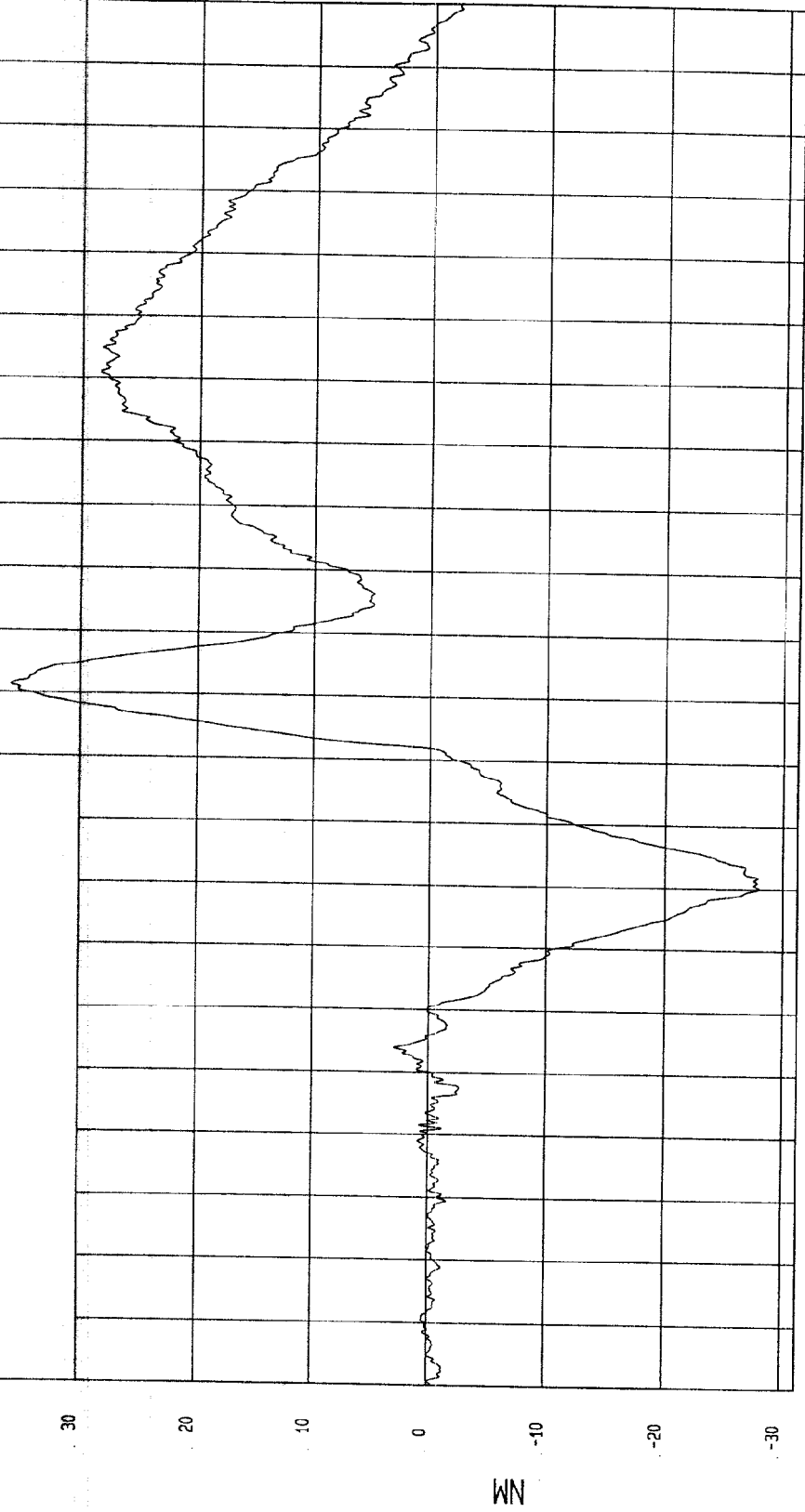
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -28.06 NM at 60 msec Maximum = 35.82 NM at 91 msec

PASSENGER NECK MOMENT Y

1 ——— 899025MF.M55 FilterClass (600)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

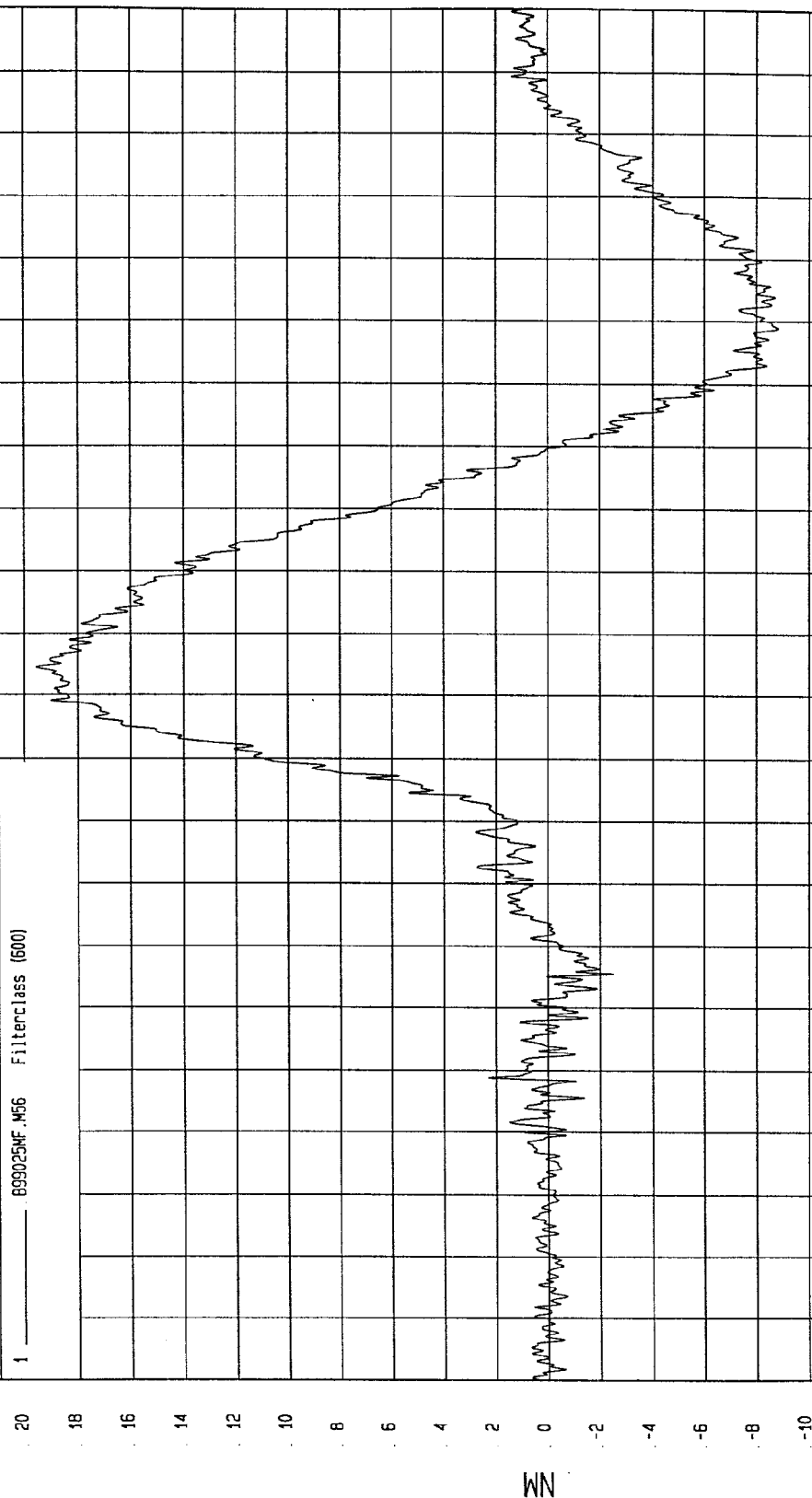
COMPONENT: 1999 FORD RANGER EV

Maximum = 19.57 NM at 94 msec

Minimum = -8.83 NM at 149 msec

PASSENGER NECK MOMENT Z

1 895025NF.M56 Filterclass (600)



MCA Research
02-19-1999 10.11

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

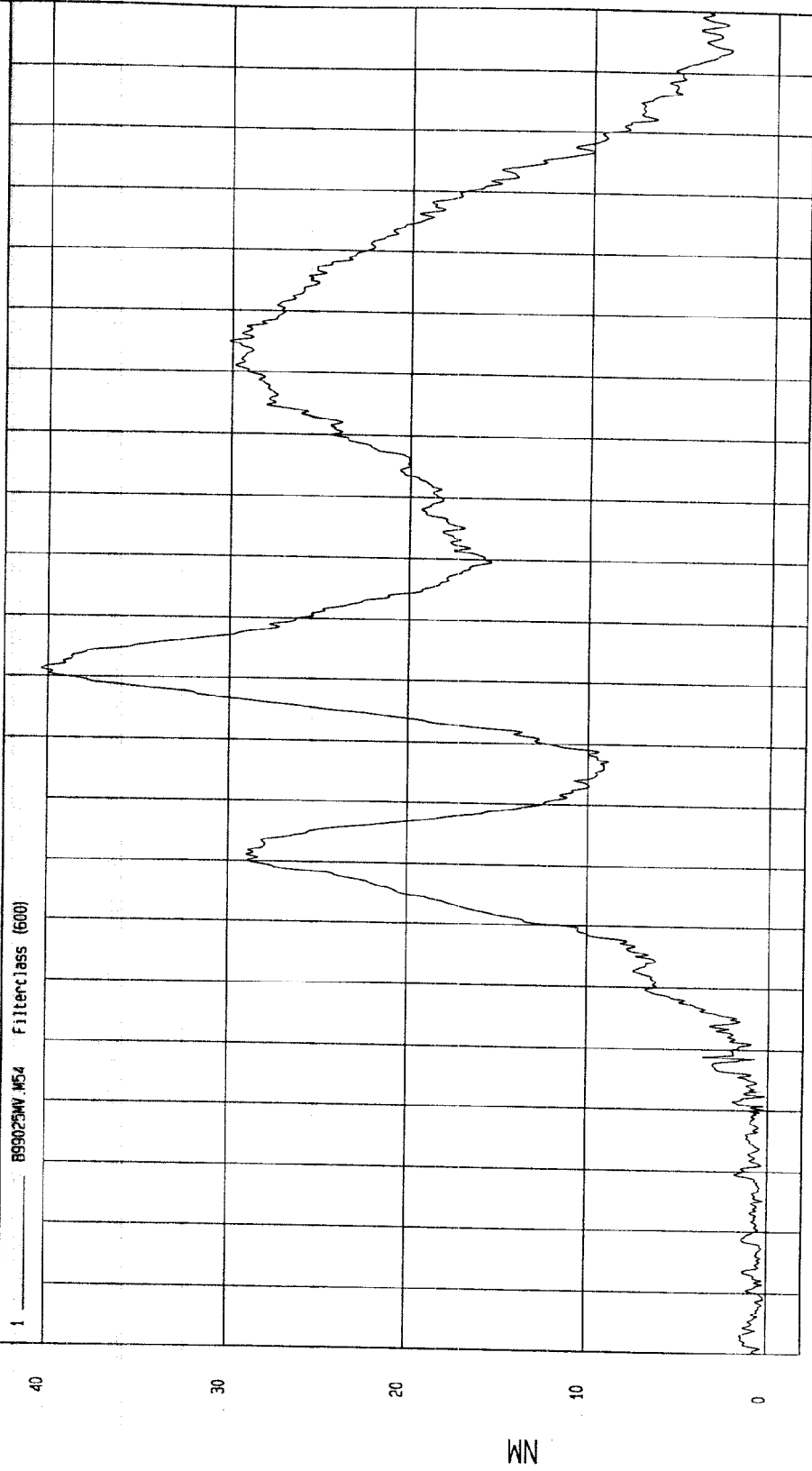
COMPONENT: 1999 FORD RANGER EV

Maximum = 40.39 NM at 91 msec

Minimum = .12 NM at -11 msec

PASSENGER NECK MOMENT RESULTANT

1 899025MV.M54 Filterclass (600)



NSA Research
02-19-1999 10:11

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

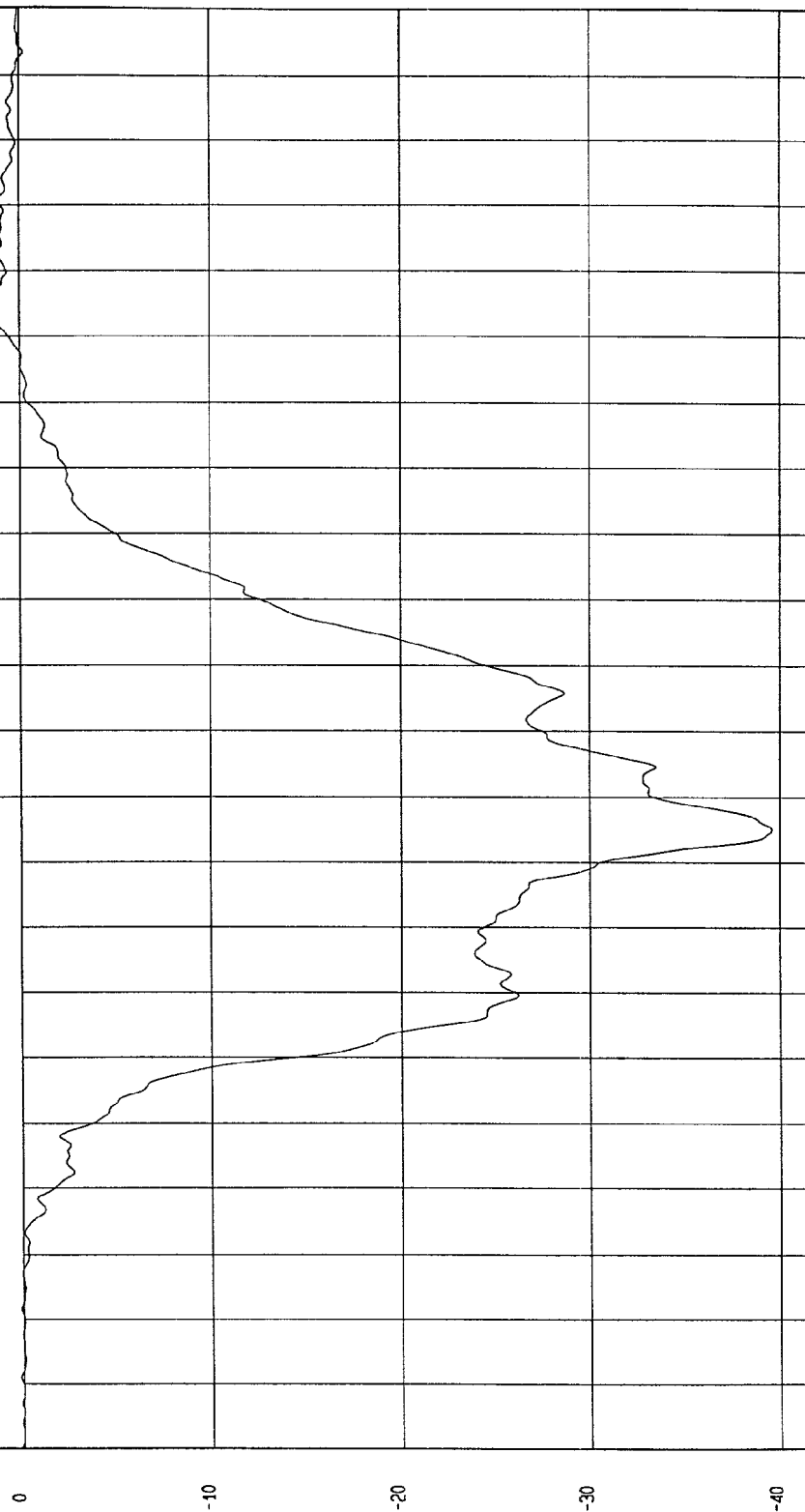
COMPONENT: 1999 FORD RANGER EV

Maximum = 1.44 G'S at 156 msec

Minimum = -39.59 G'S at 75 msec

PASSENGER CHEST X ACCELERATION

1 B99025AF.A25 Filterclass (180)



NSA Research
02-18-1999 16.03

TIME (SECONDS)

G.S

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

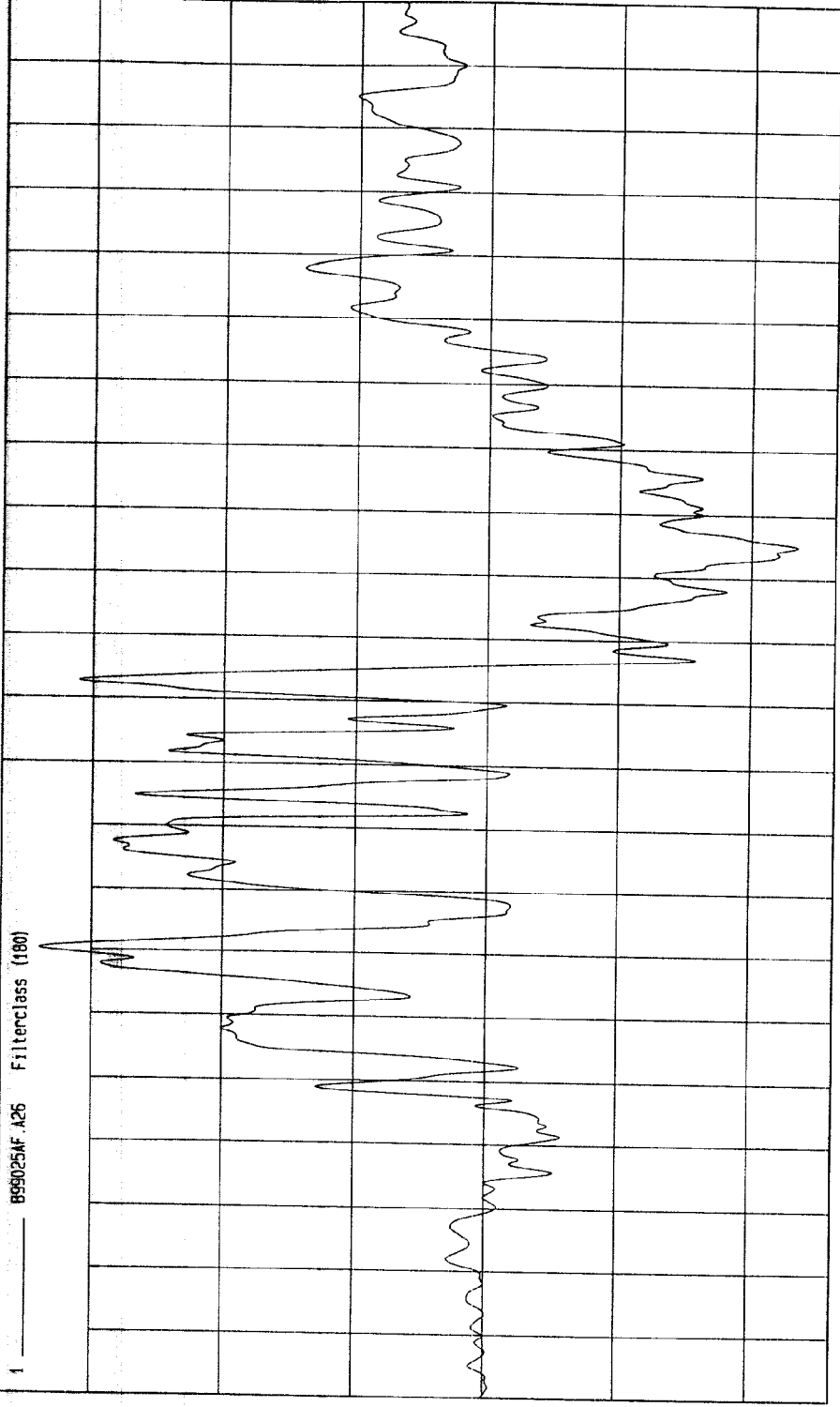
COMPONENT: 1999 FORD RANGER EV

Maximum = 3.4 G'S at 50 msec

Minimum = -2.35 G'S at 115 msec

PASSENGER CHEST Y ACCELERATION

1 — B99025AF.A26 Filterclass (180)



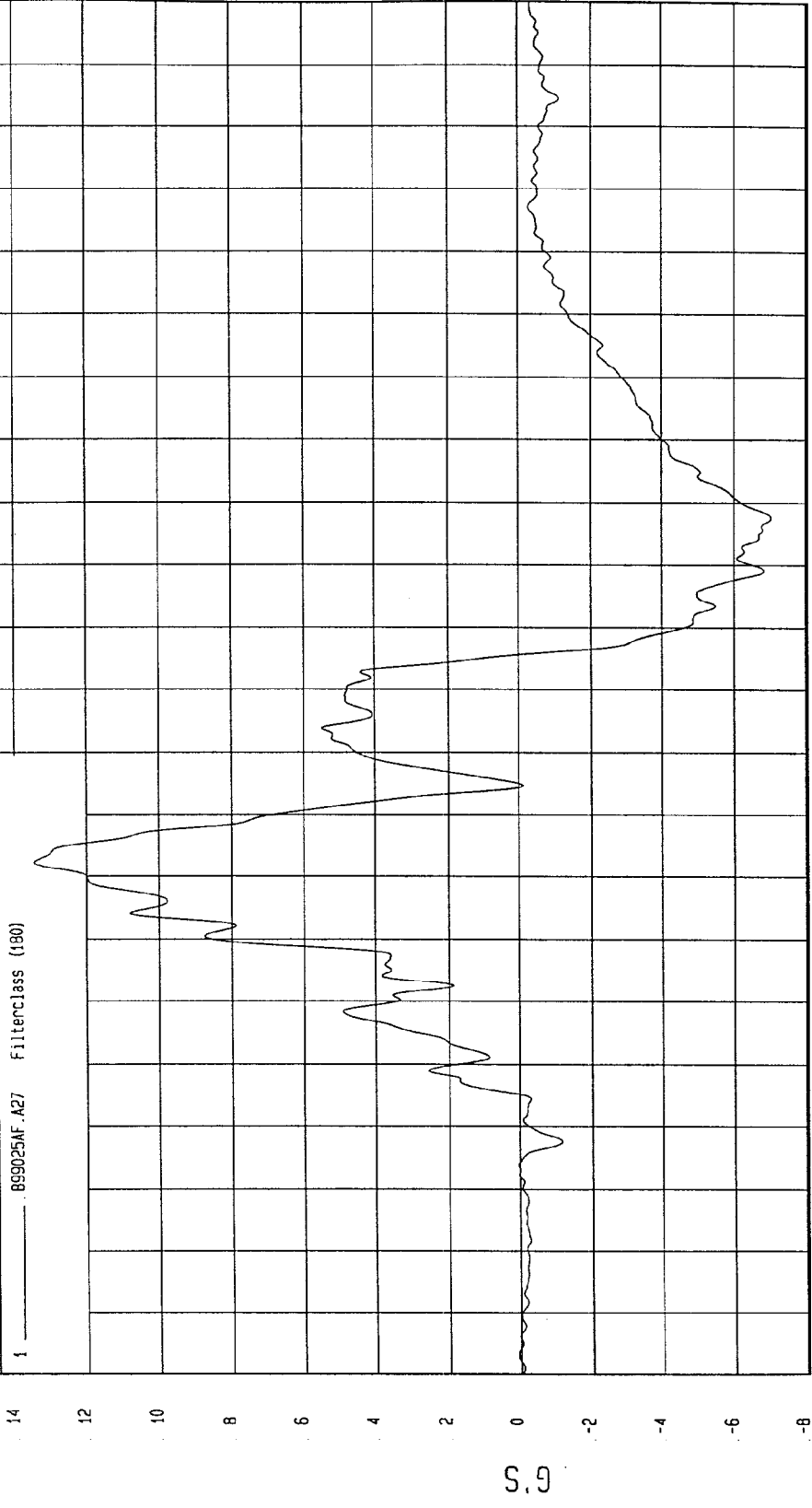
MSA Research
02-18-1999 16:03

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -7.03 G'S at 118 msec Maximum = 13.46 G'S at 62 msec

PASSENGER CHEST Z ACCELERATION



NSA Research
02-18-1999 16:03

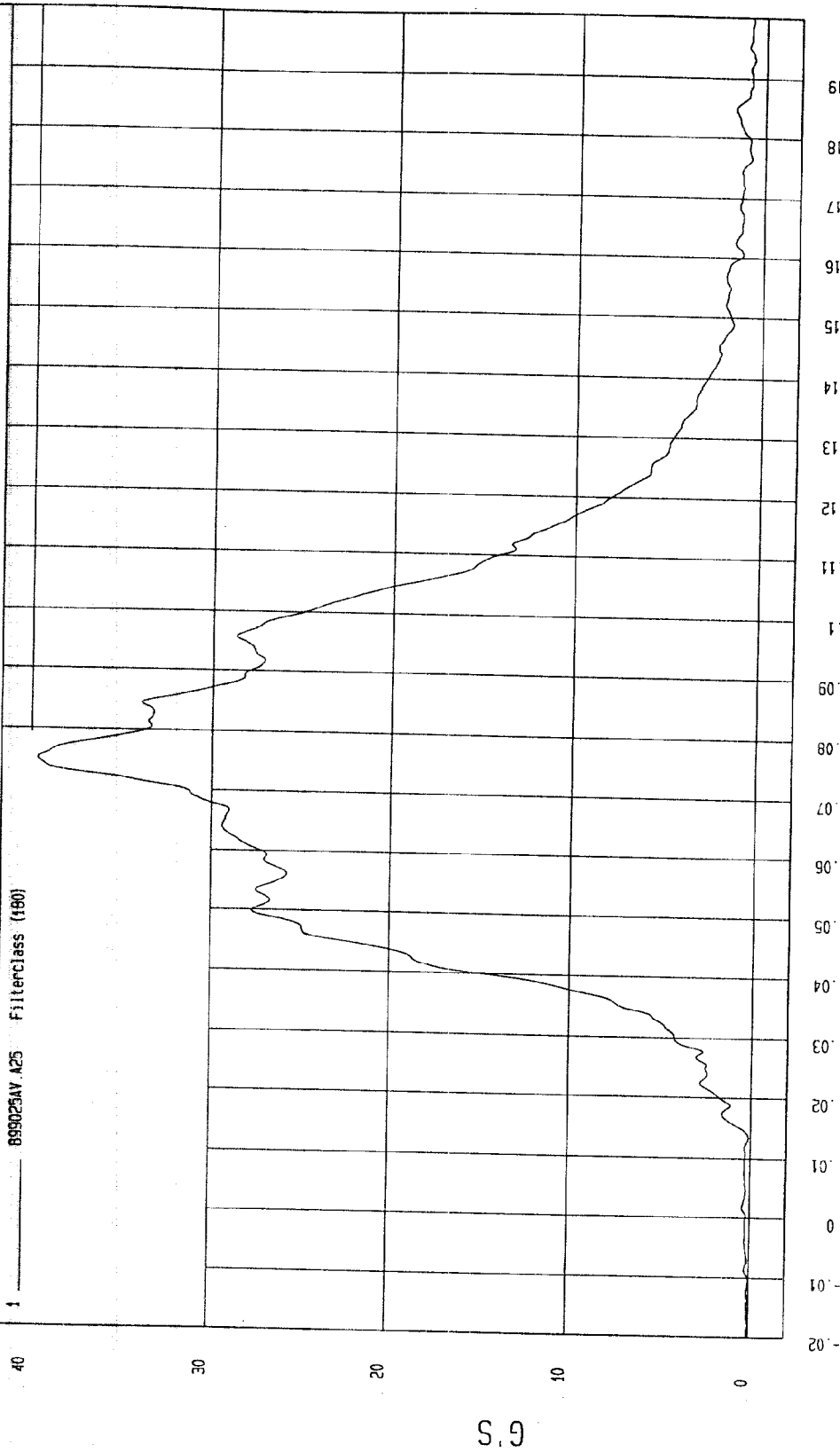
TEST: NCAP 35 MPH FRONTAL IMPACT
 COMPONENT: 1999 FORD RANGER EV

TEST DATE: 02-18-1999
 Speed: 35.2 MPH 56.6 KPH

Minimum = 2.19E-02 G'S at -10 msec
 Maximum = 39.67 G'S at 75 msec

PASSENGER CHEST RESULTANT ACCELERATION

899025AV.A25 Filterclass (180)



WCA Research
 02-18-1999 16:03

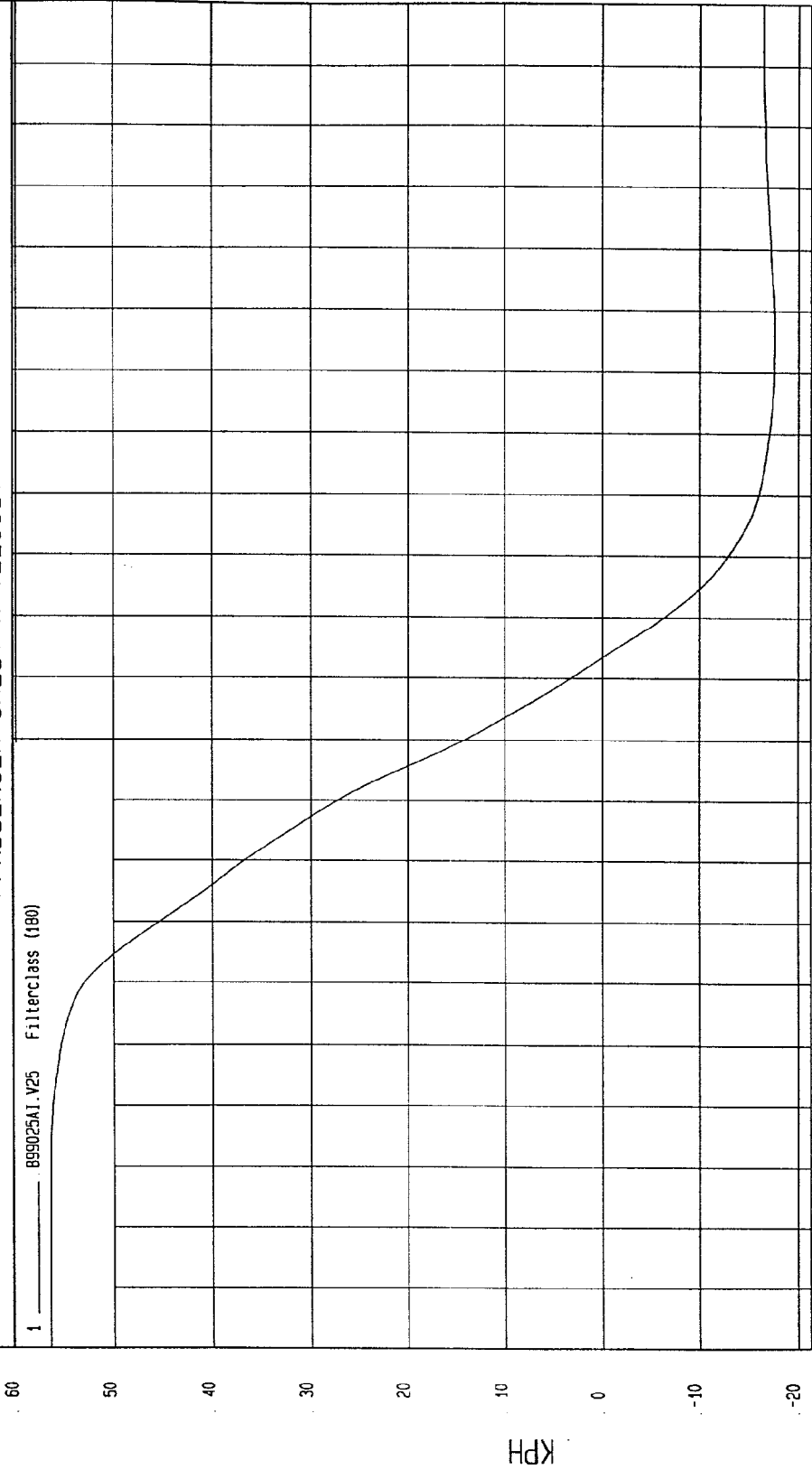
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -17.61 KPH at 148 msec Maximum = 56.61 KPH at -8 msec

PASSENGER CHEST X VELOCITY

1 _____ B99025A1.V25 Filterclass (180)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

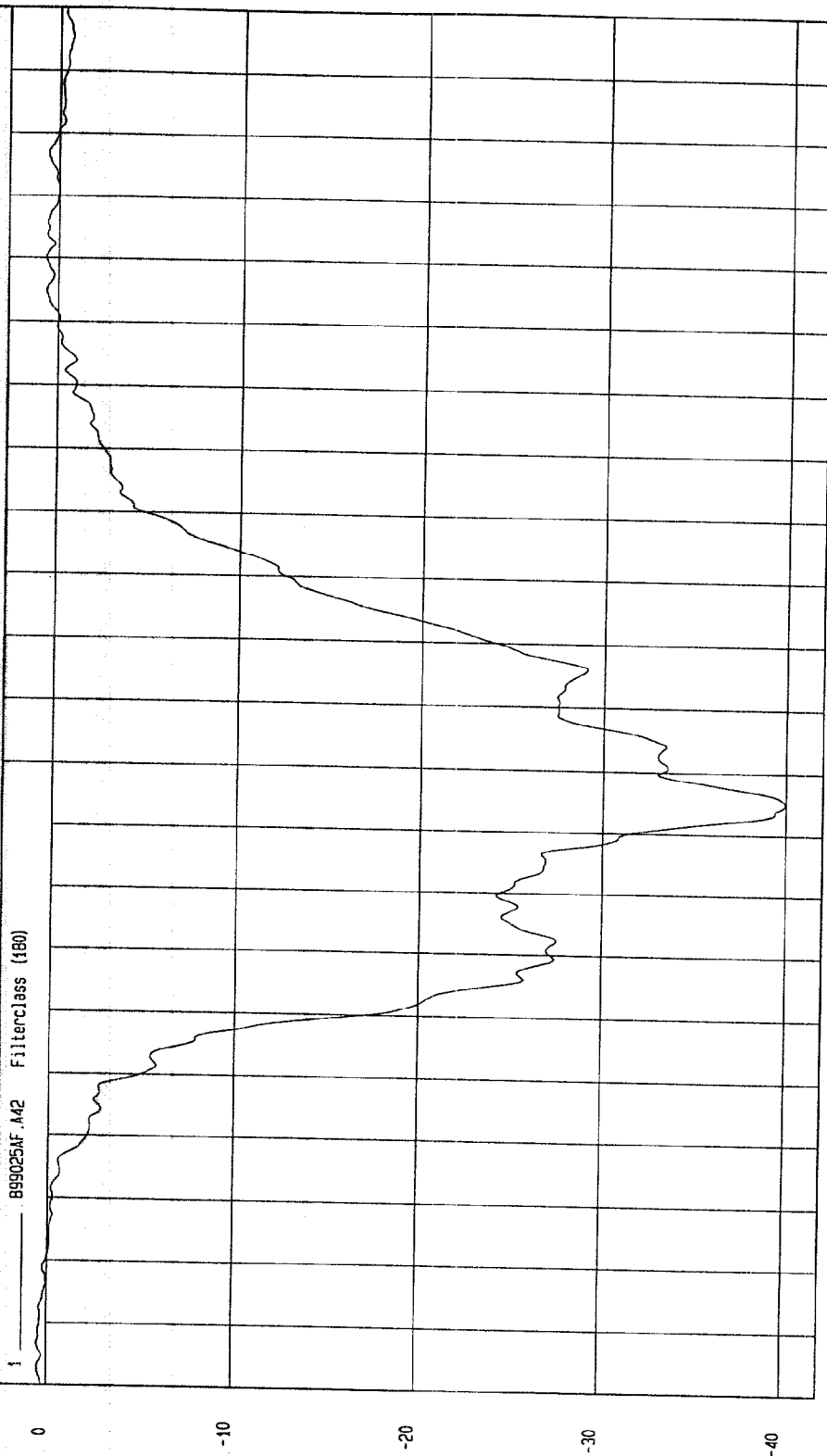
COMPONENT: 1999 FORD RANGER EV

Maximum = .67 G'S at 160 msec

Minimum = -39.95 G'S at 75 msec

PASSENGER CHEST REDUNDANT X ACCELERATION

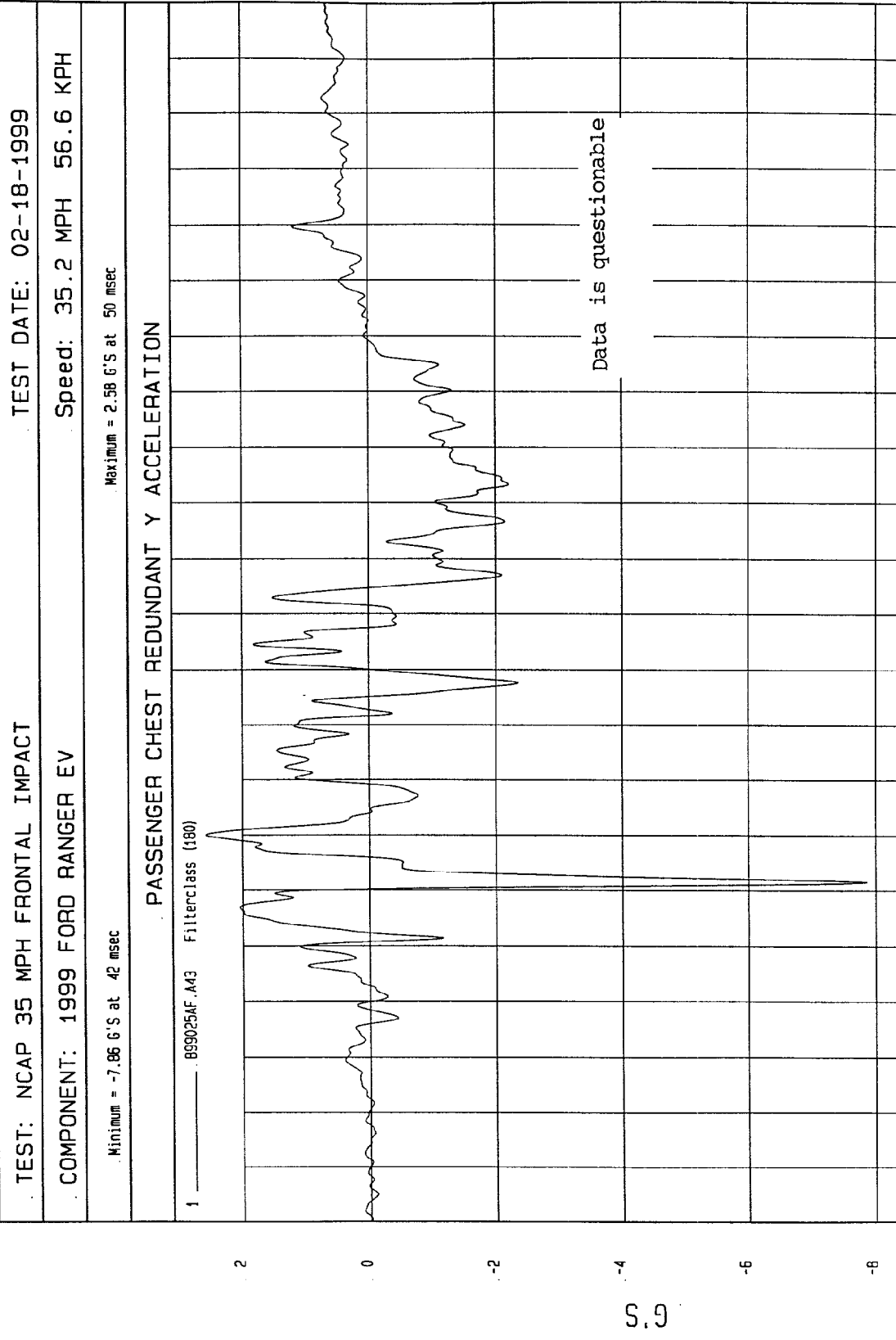
1 899025AF.M42 Filterclass (180)



NGA Research
02-18-1999 16:03

TIME (SECONDS)

G'S



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV

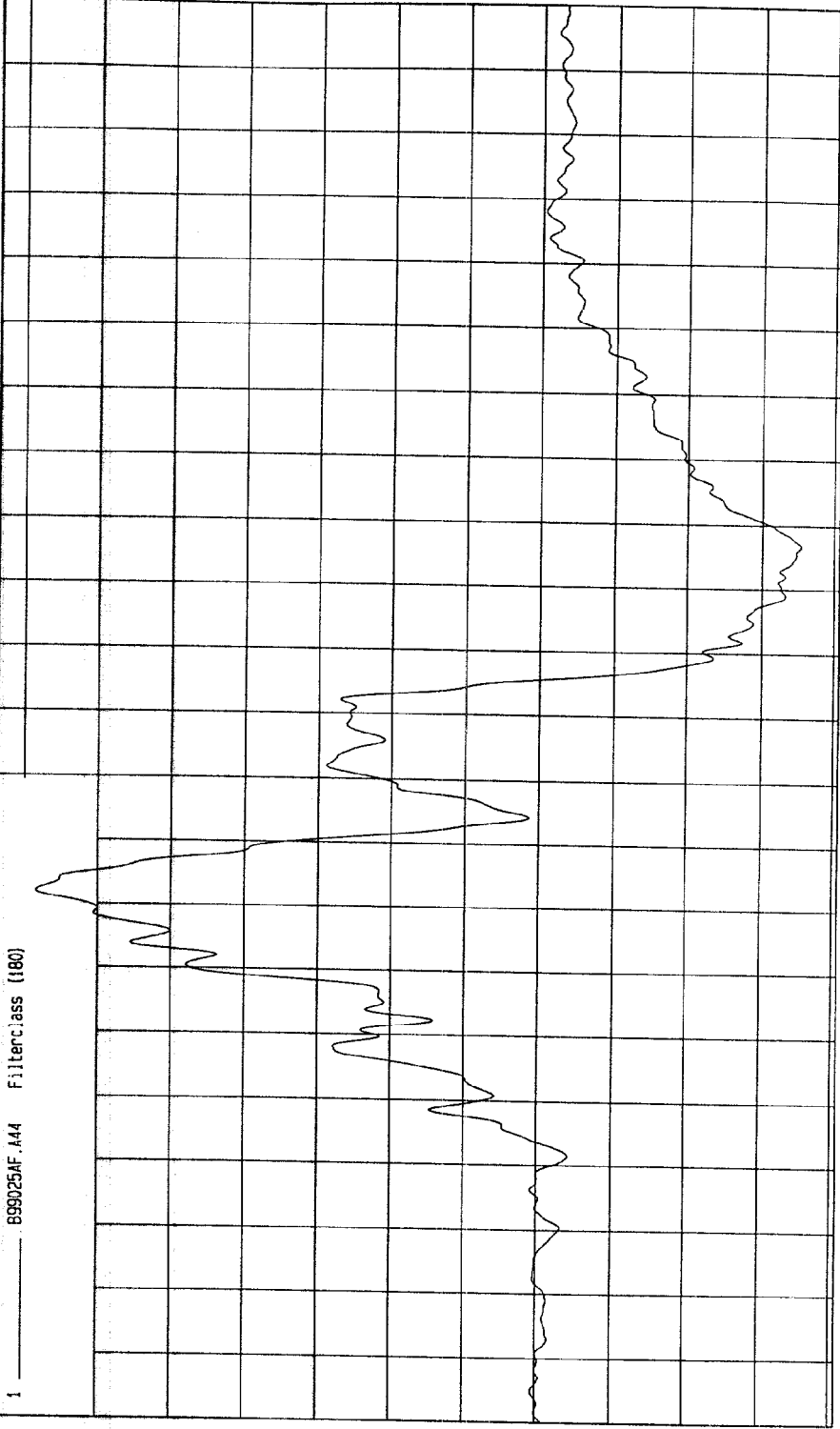
Speed: 35.2 MPH 56.6 KPH

Minimum = -7.11 G'S at 117 msec

Maximum = 13.68 G'S at 62 msec

PASSENGER CHEST REDUNDANT Z ACCELERATION

1 899025AF.A44 Filterclass (180)



19
18
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4
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2
1
0
-1
-2
-3
-4
-5
-6
-7
-8

TIME (SECONDS)

0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02

MGA Research
02-18-1999 16:03

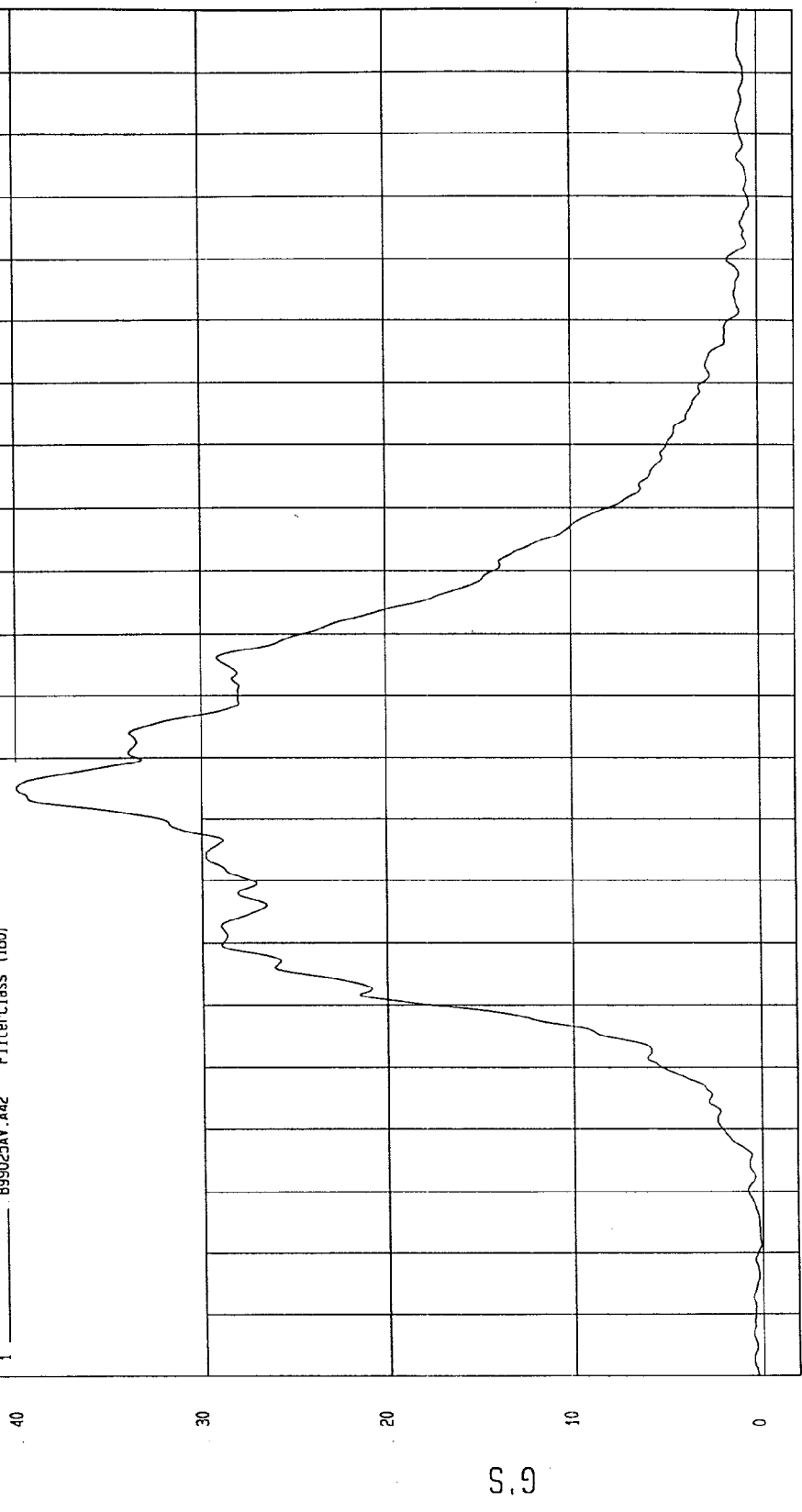
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 6.75E-02 G'S at 1 msec Maximum = 39.95 G'S at 75 msec

PASSENGER CHEST REDUNDANT RESULTANT ACCELERATION

1 ——— B99025AV.A42 Filterclass (180)



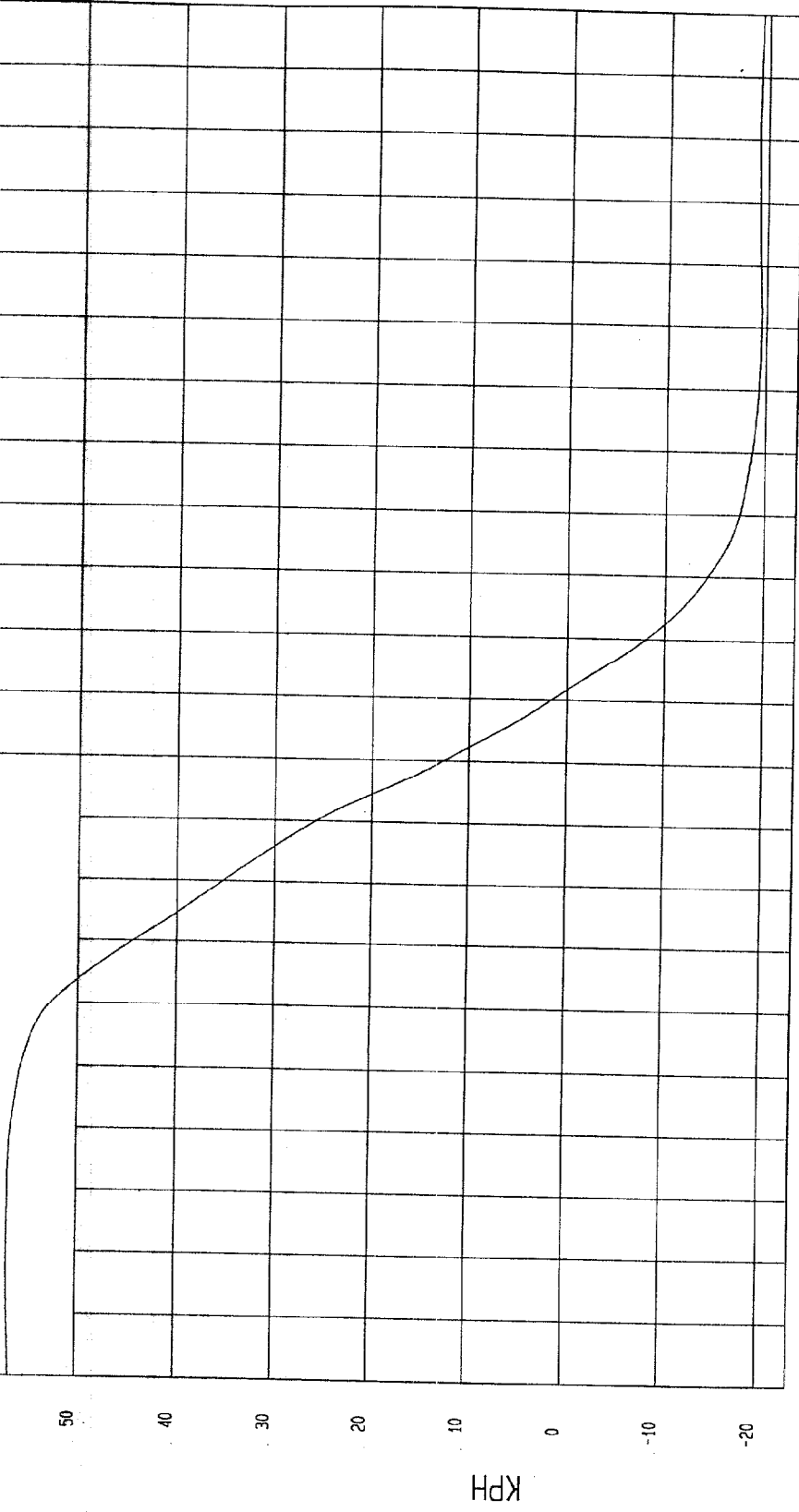
MCA Research
02-18-1999 16.03

TEST: NCAP 35 MPH FRONTAL IMPACT
TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV
Speed: 35.2 MPH 56.6 KPH

Minimum = -19.46 KPH at 151 msec
Maximum = 56.83 KPH at 1 msec

PASSENGER CHEST REDUNDANT X VELOCITY

1 899025A1.V42 Filterclass (180)



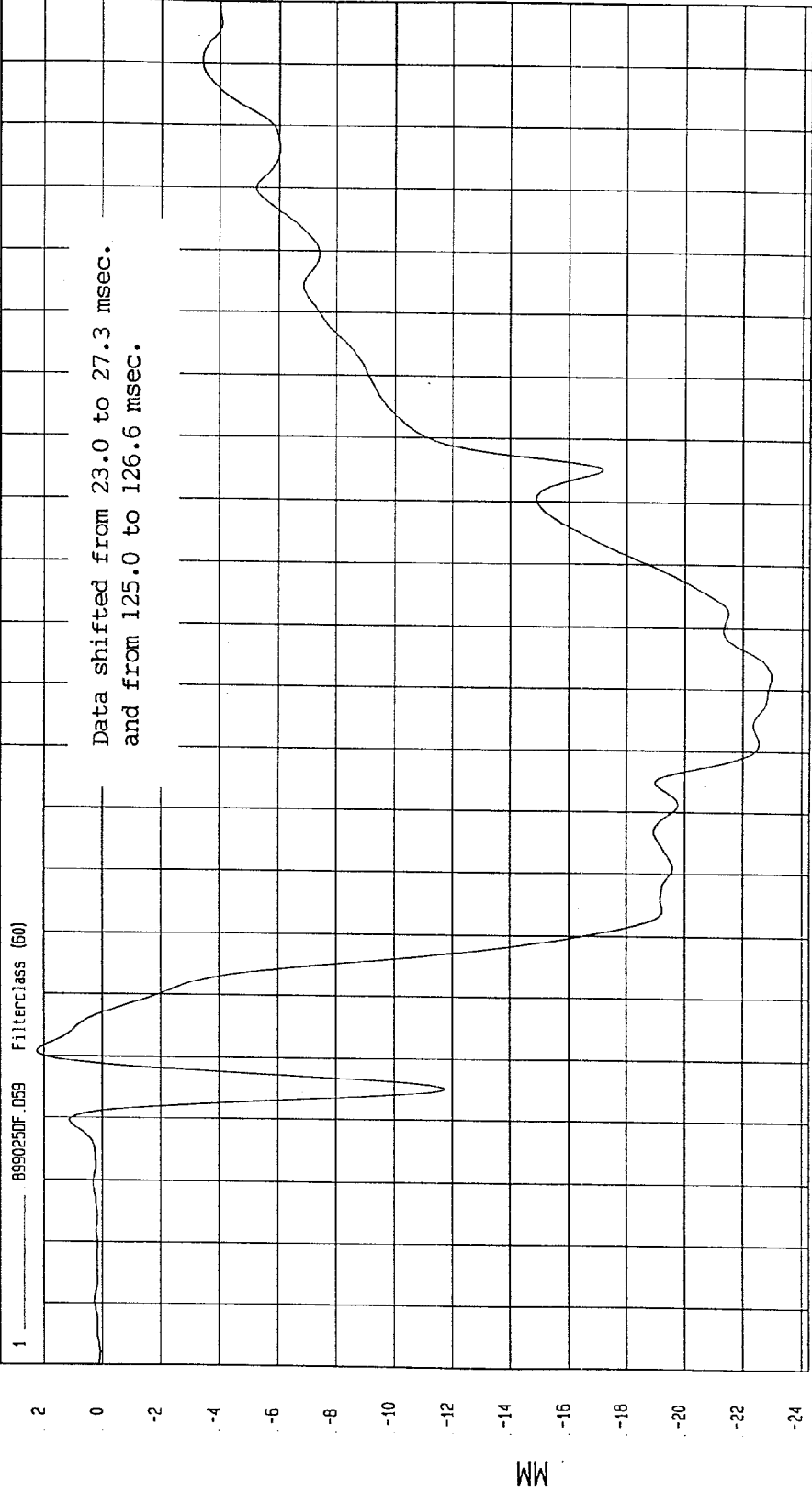
MCA Research
02-19-1999 11:22

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -22.99 MM at 92 msec Maximum = 2.23 MM at 31 msec

PASSENGER CHEST COMPRESSION



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

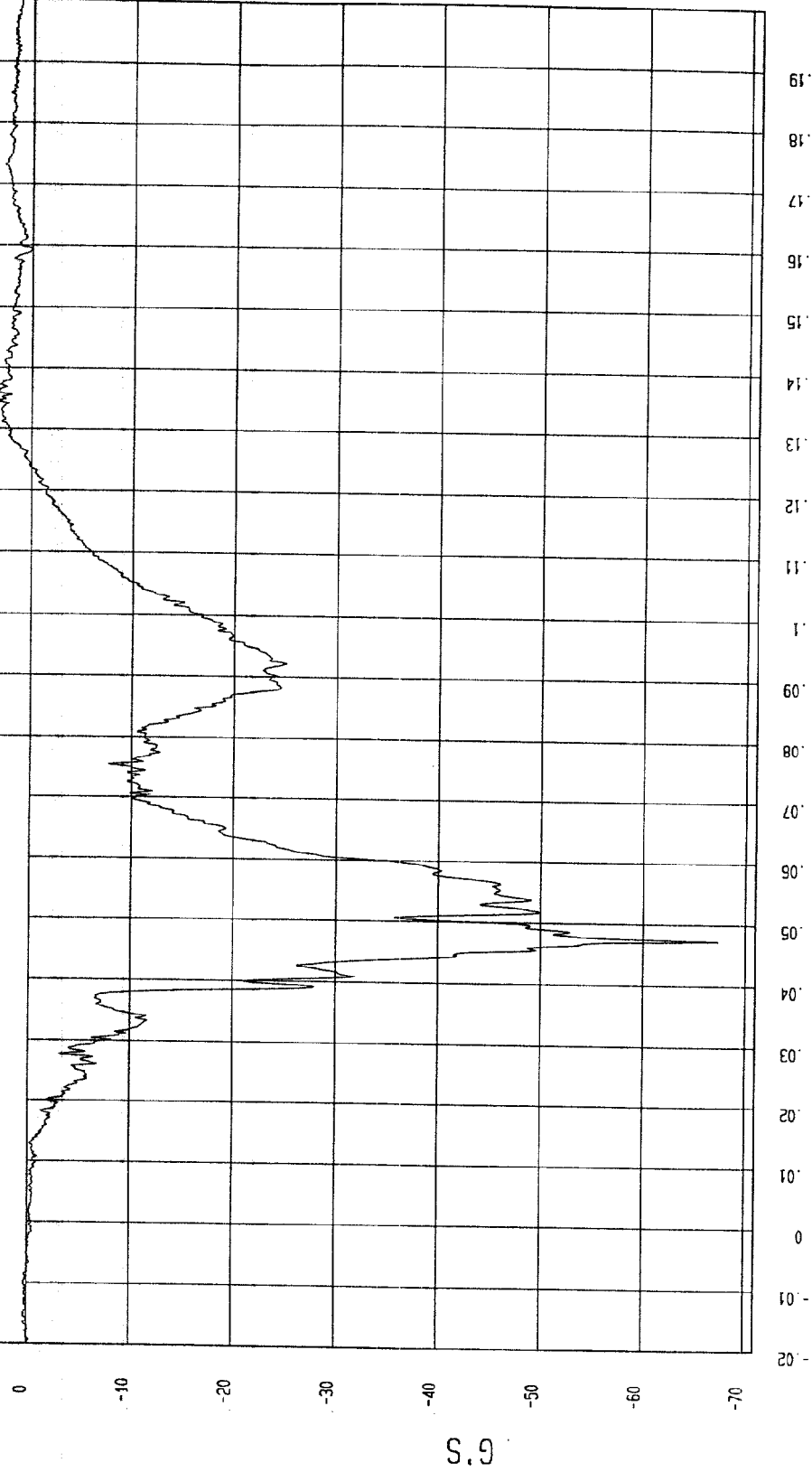
COMPONENT: 1999 FORD RANGER EV

Maximum = 3.41 G'S at 135 msec

Minimum = -67.41 G'S at 47 msec

PASSENGER PELVIS X ACCELERATION

1 89025AT.A05 Filterclass (1000)



MGA Research
02-19-1999 10:14

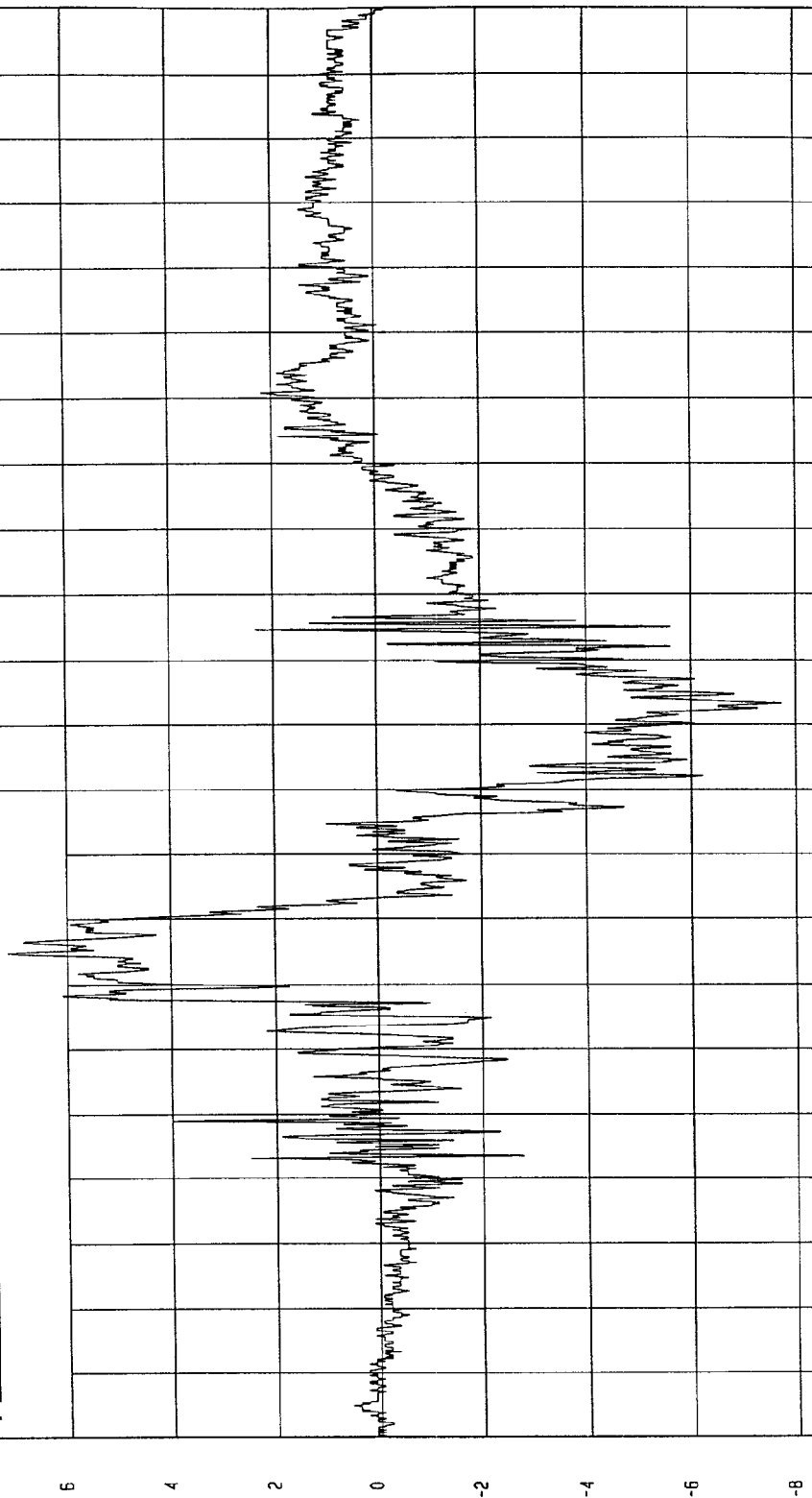
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -7.72 G'S at 93 msec Maximum = 7.14 G'S at 55 msec

PASSENGER PELVIS Y ACCELERATION

1 ——— B99025AT.A06 Filterclass (1000)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

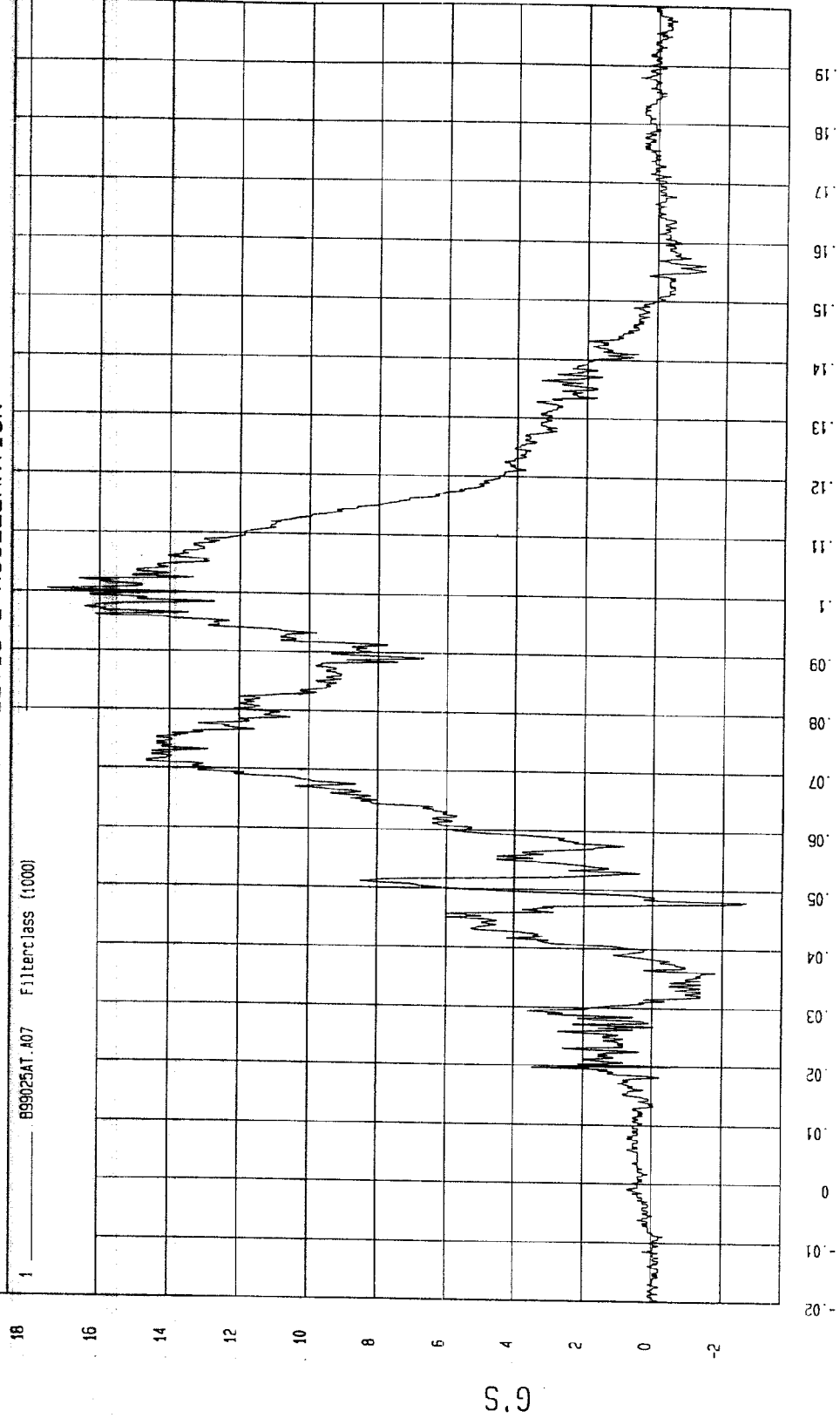
COMPONENT: 1999 FORD RANGER EV

Maximum = 17.44 G'S at 100 msec

Minimum = -2.7 G'S at 48 msec

PASSENGER PELVIS Z ACCELERATION

1 B99025AT.A07 Filterclass (1000)



MCA Research
02-18-1999 10:14

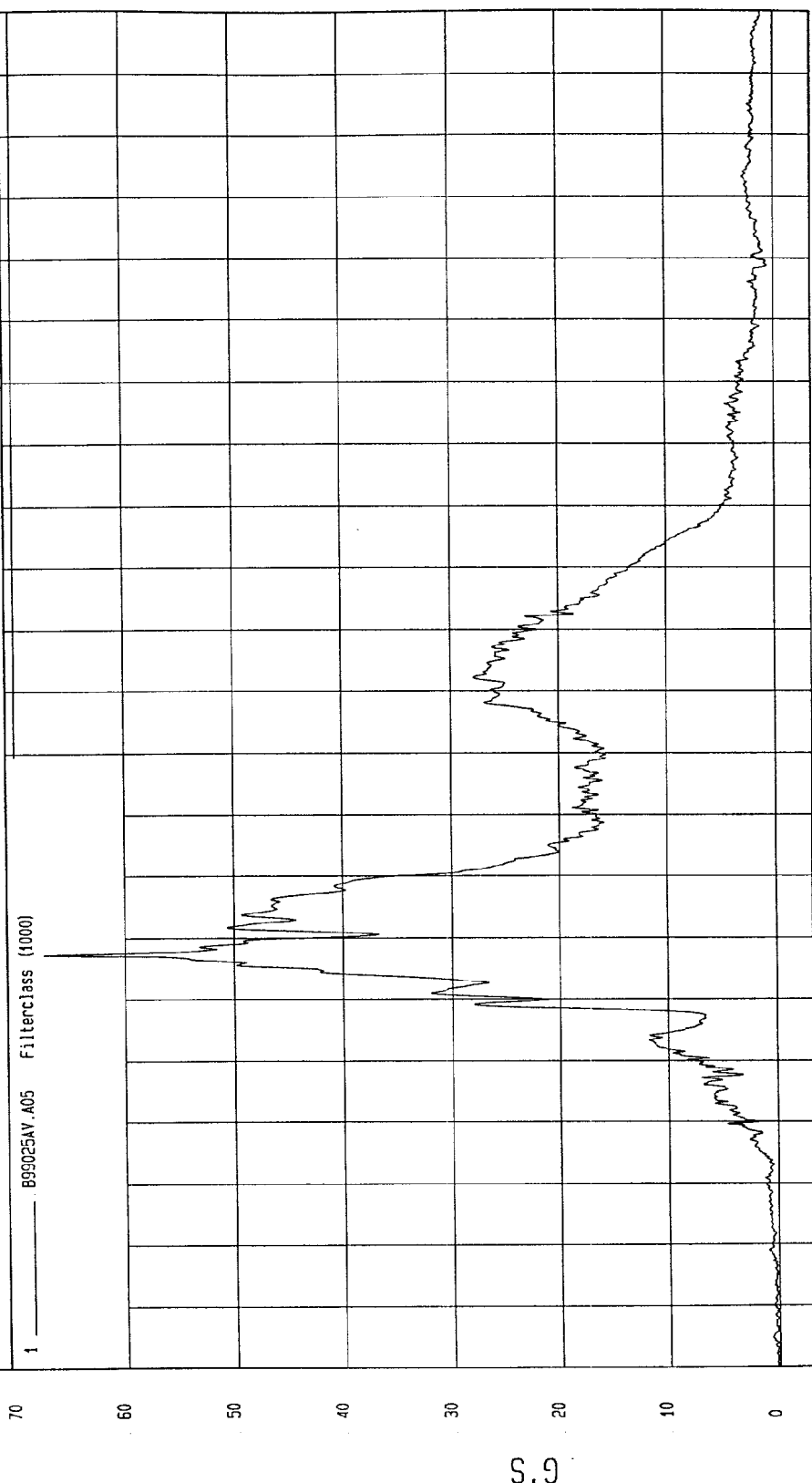
TIME (SECONDS)

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = .11 G'S at -20 msec Maximum = 67.45 G'S at 47 msec

PASSENGER PELVIS RESULTANT ACCELERATION



MSA Research
02-19-1999 10:15

TEST: NCAP 35 MPH FRONTAL IMPACT

Speed: 35.2 MPH 56.6 KPH

Maximum = 56.65 KPH at -8 msec

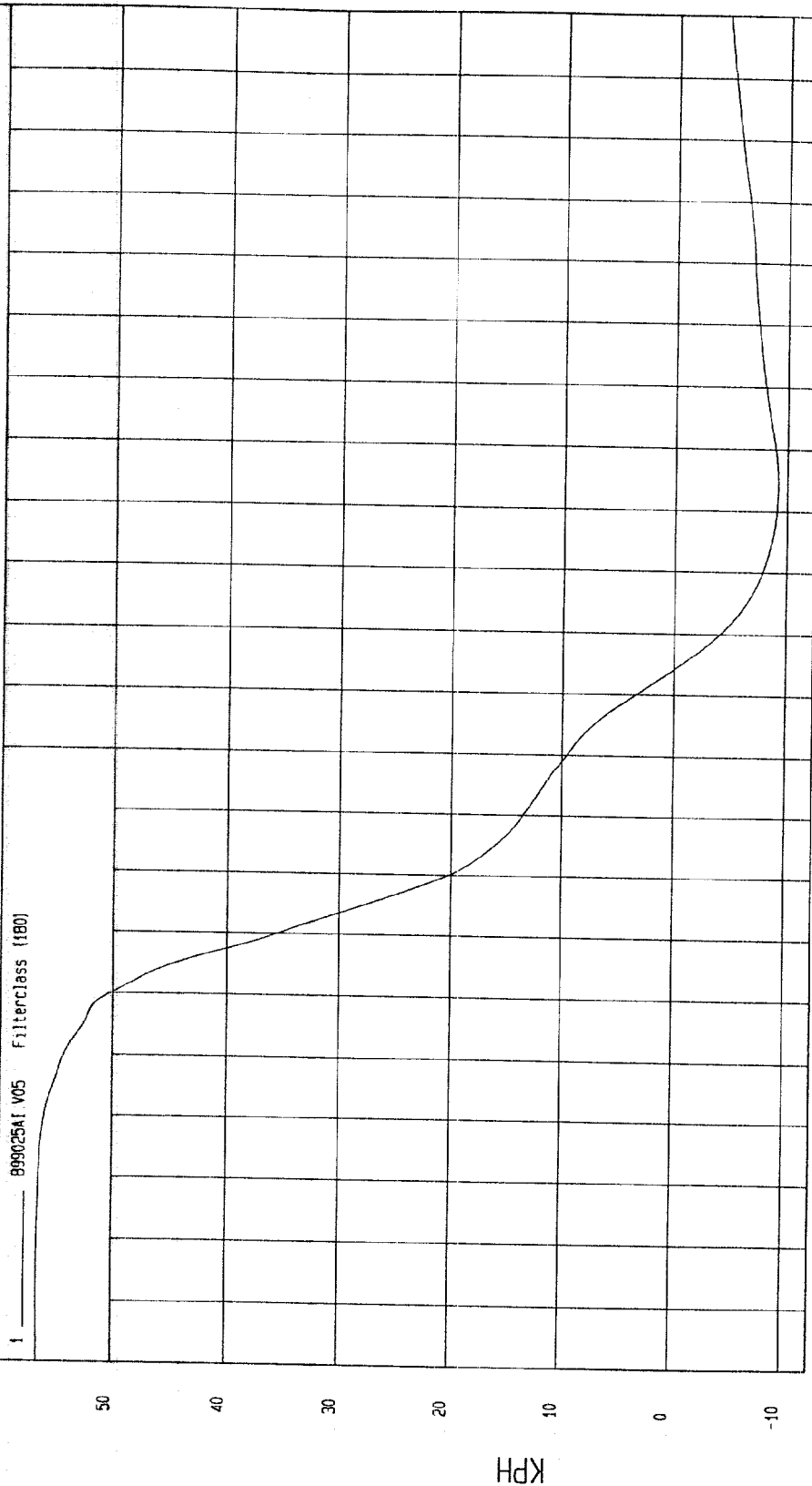
TEST: NCAP 35 MPH FRONTAL IMPACT

COMPONENT: 1999 FORD RANGER EV

Minimum = -9.16 KPH at 124 msec

PASSENGER PELVIS X VELOCITY

1 — 899025A1 V05 Filterclass (180)



MCA Research
02-18-1999 11:22

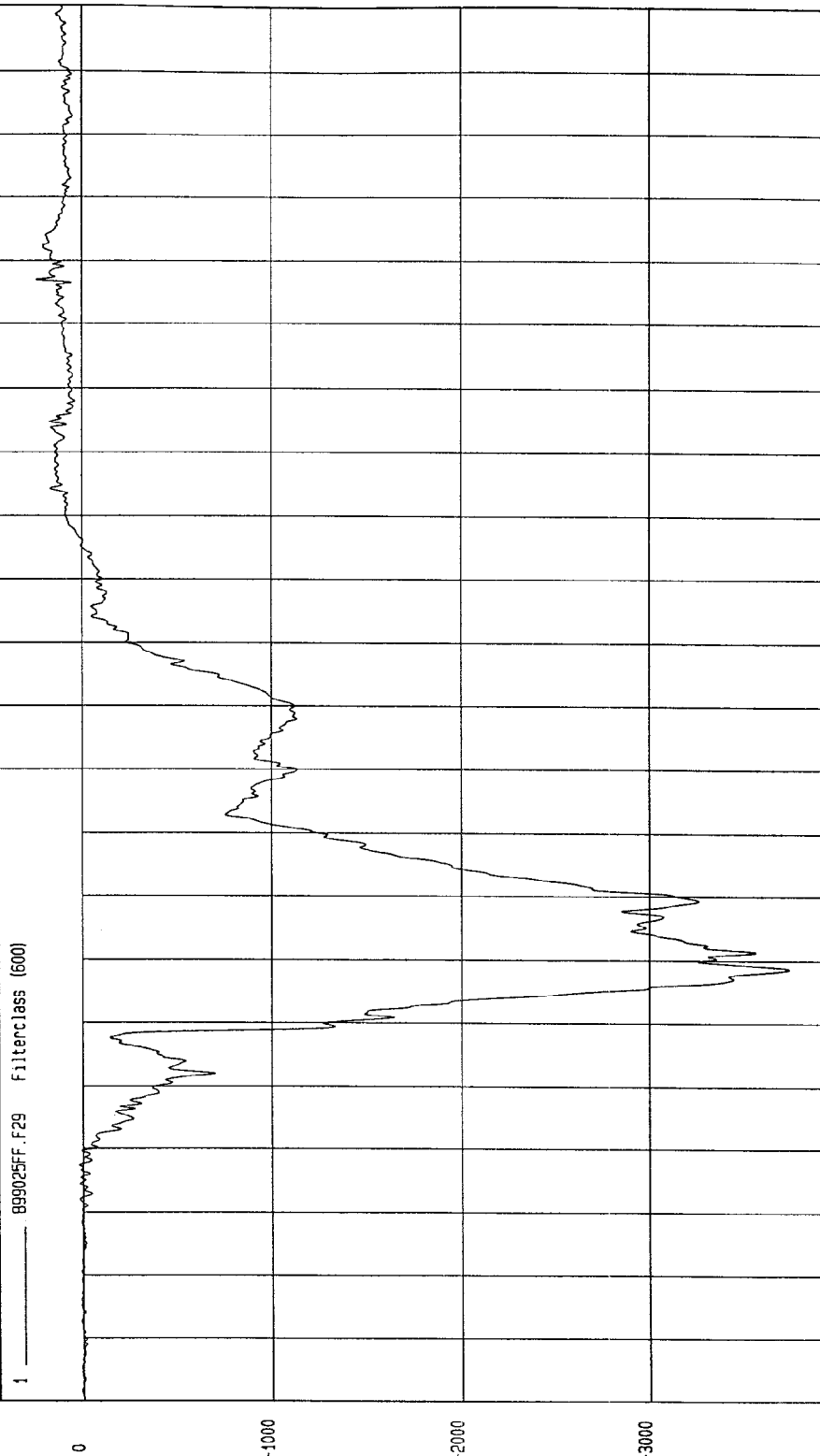
TIME Seconds

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -3747.68 N at 49 msec Maximum = 238.47 N at 157 msec

PASSENGER LEFT FEMUR FORCE



TIME (SECONDS)

MCA Research
02-18-1999 16:03

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

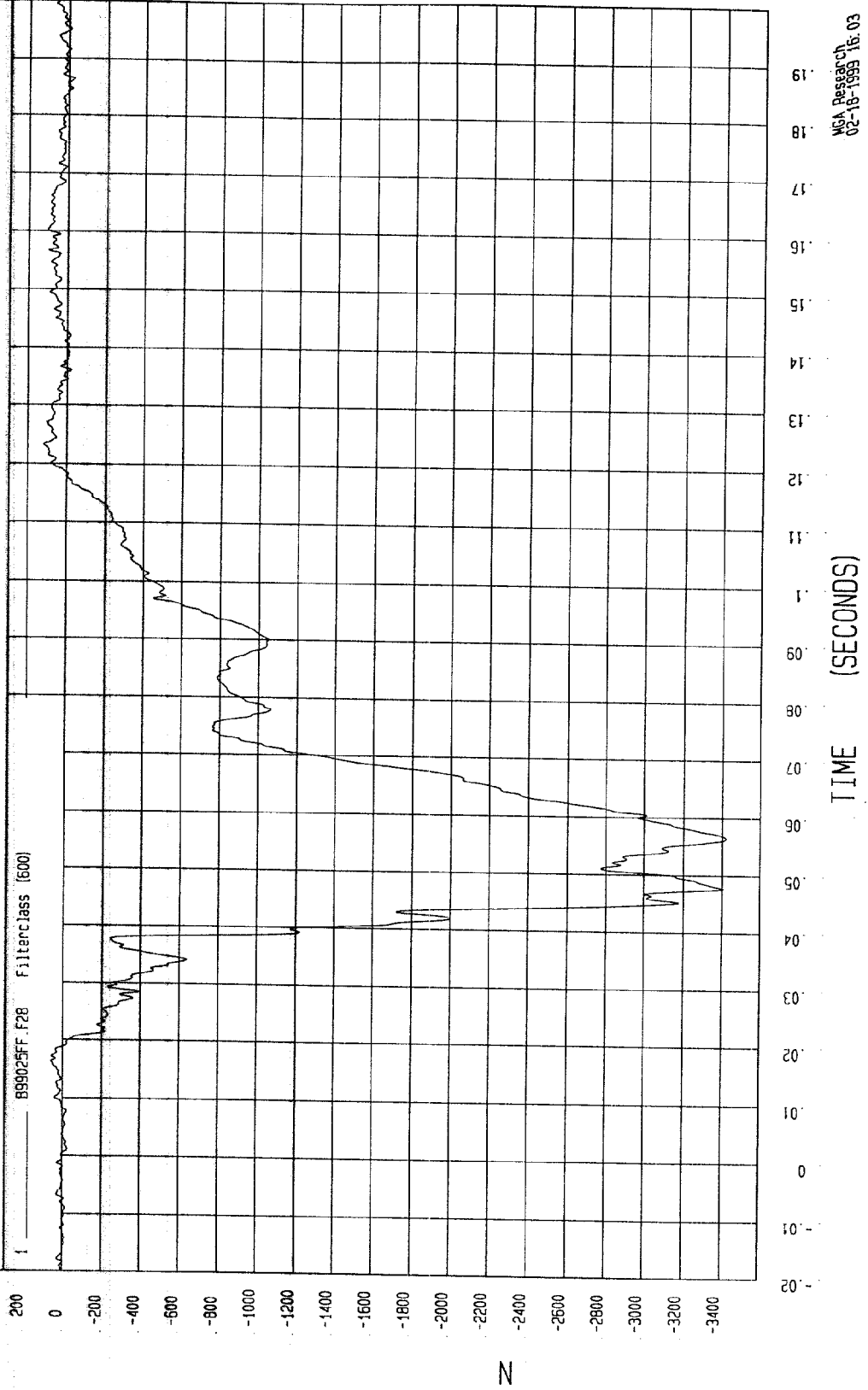
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = -3421.71 N at 56 msec

Maximum = 120.9 N at 123 msec

PASSENGER RIGHT FEMUR FORCE



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

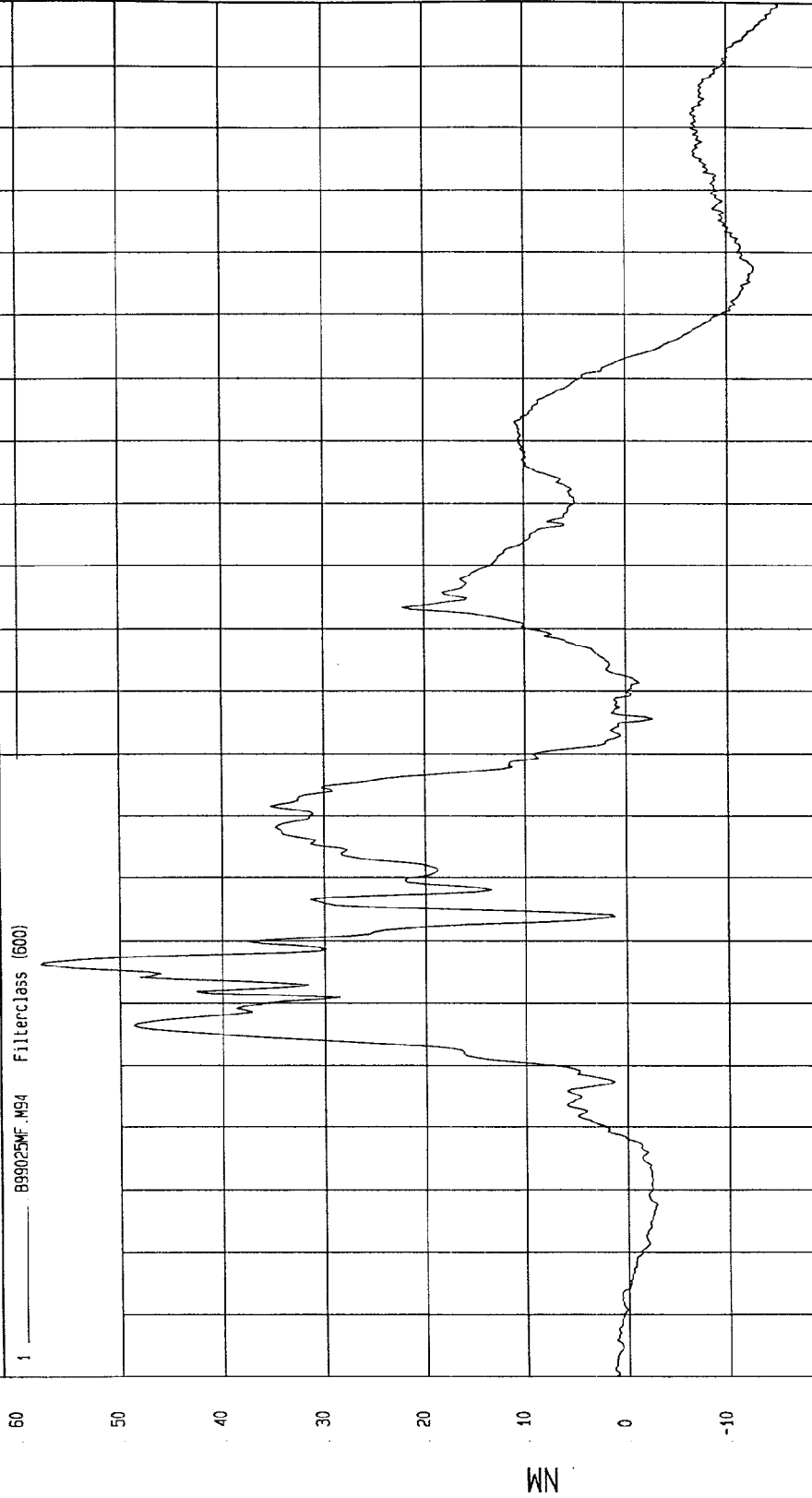
COMPONENT: 1999 FORD RANGER EV

Maximum = 58.07 NM at 46 msec

Minimum = -15.13 NM at 200 msec

PASSENGER LEFT UPPER TIBIA MOMENT X

1 B99025MF.M94 Fillerclass (500)



MGA Research
02-19-1999 10:25

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

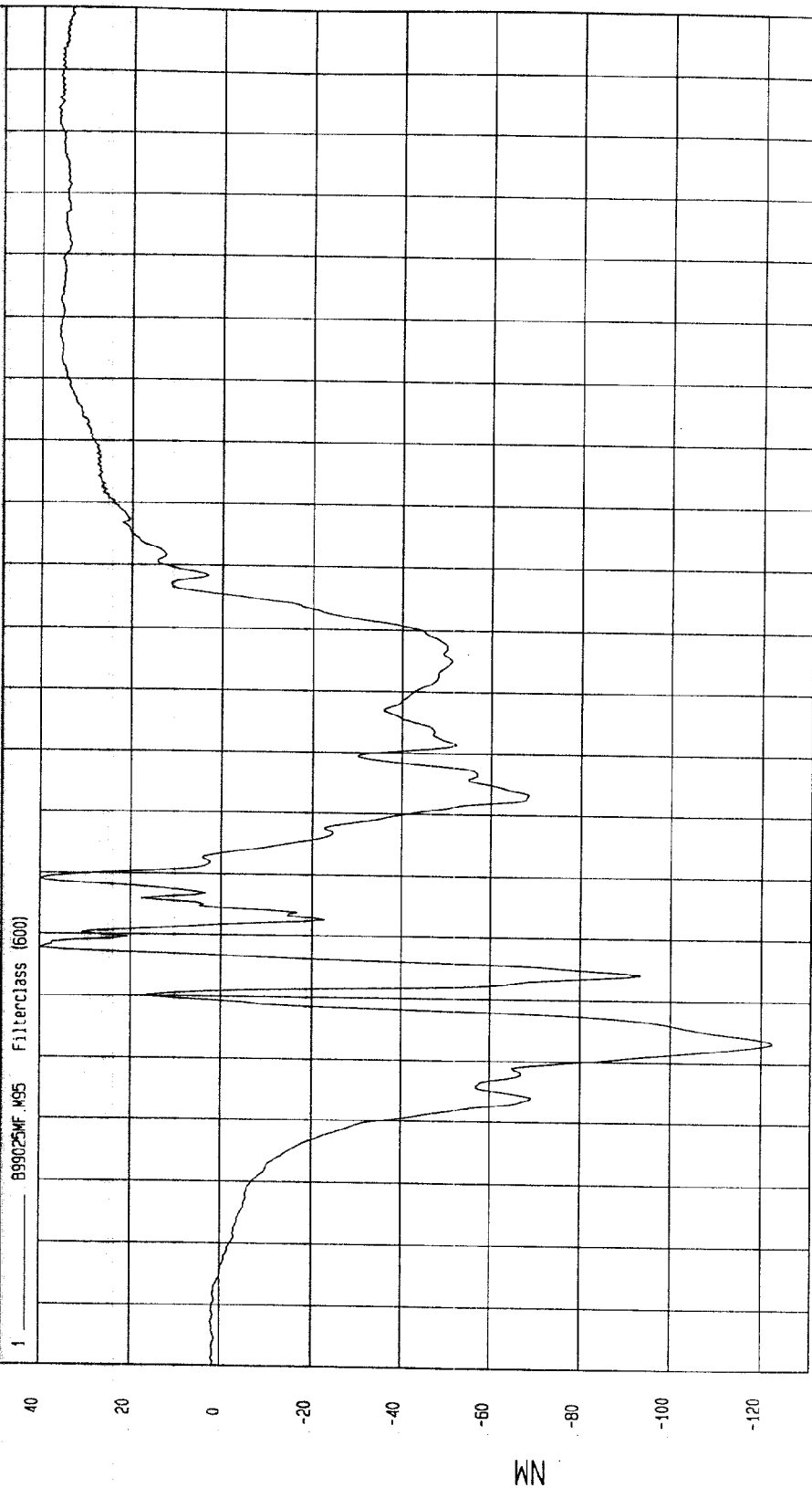
COMPONENT: 1999 FORD RANGER EV

Maximum = 40.25 NM at 48 msec

Minimum = -122.65 NM at 33 msec

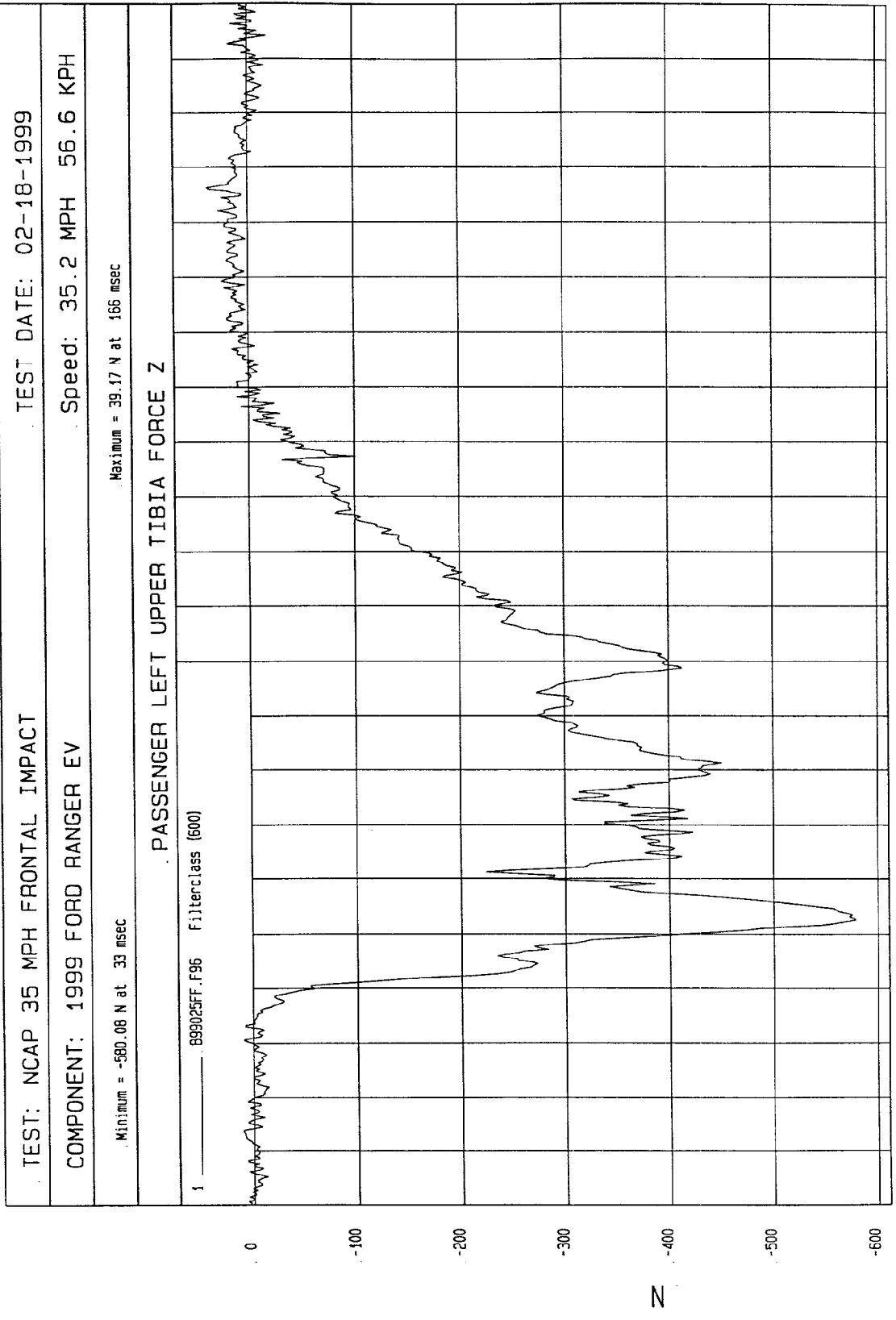
PASSENGER LEFT UPPER TIBIA MOMENT Y

1 899025MF.M95 Filterclass (600)



TIME (SECONDS)

MCA Research
02-19-1999 10:25



WCA Research
03-09-1999 09:08

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

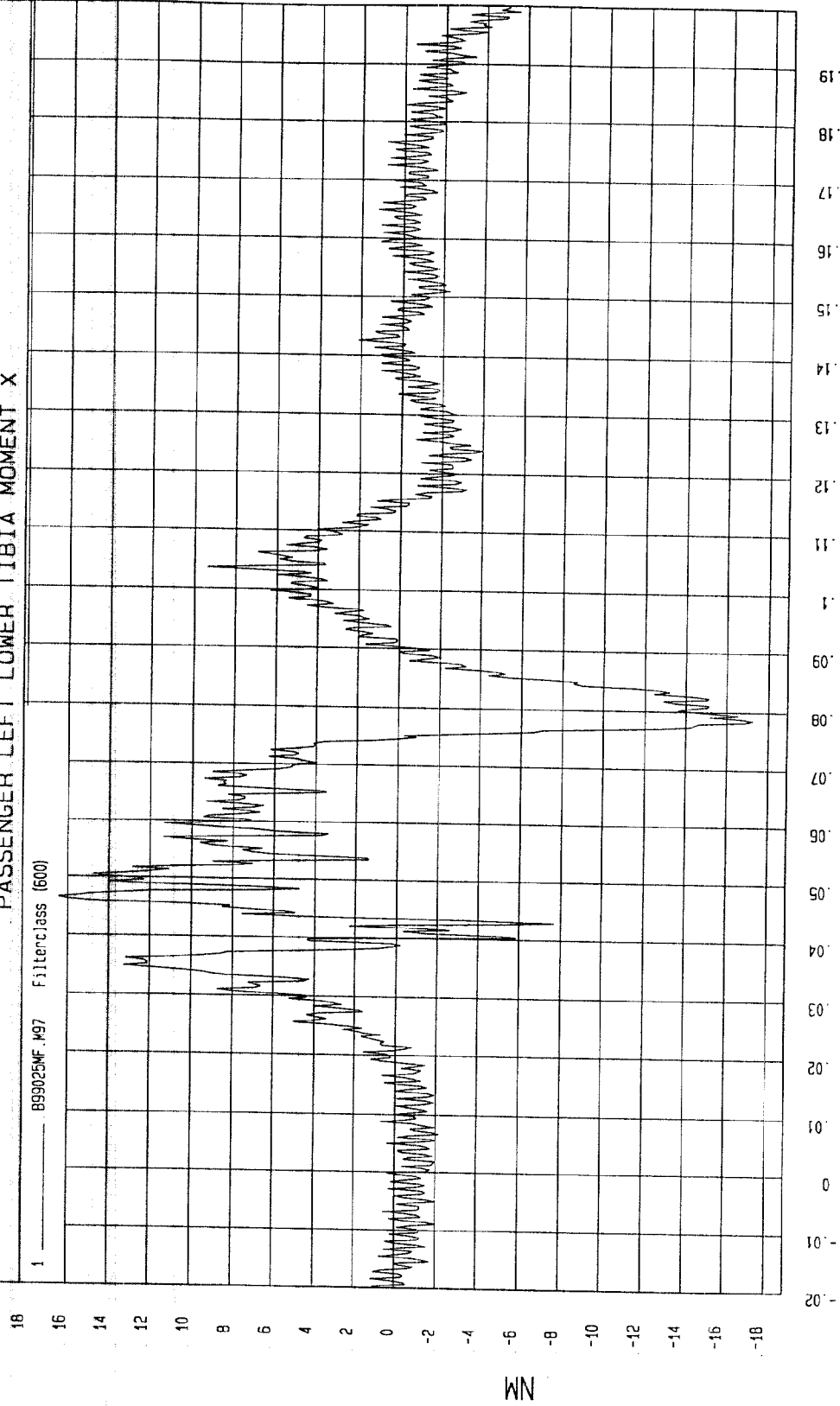
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 16.5 NM at 46 msec

Minimum = -17.23 NM at 78 msec

PASSENGER LEFT LOWER TIBIA MOMENT X

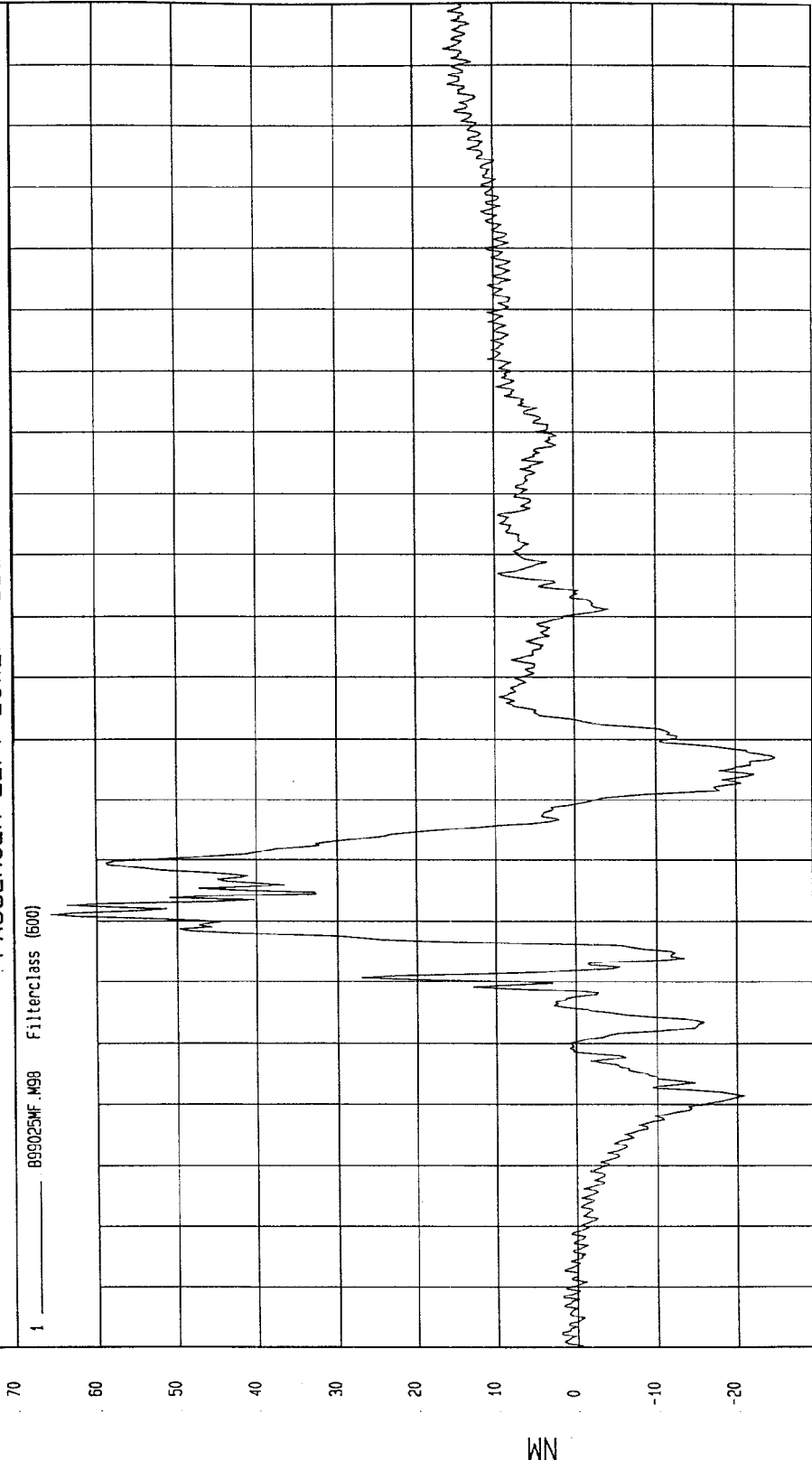


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -24.8 NM at 77 msec Maximum = 65.63 NM at 51 msec

PASSENGER LEFT LOWER TIBIA MOMENT Y



MCA Research
02-19-1999 10:25

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV

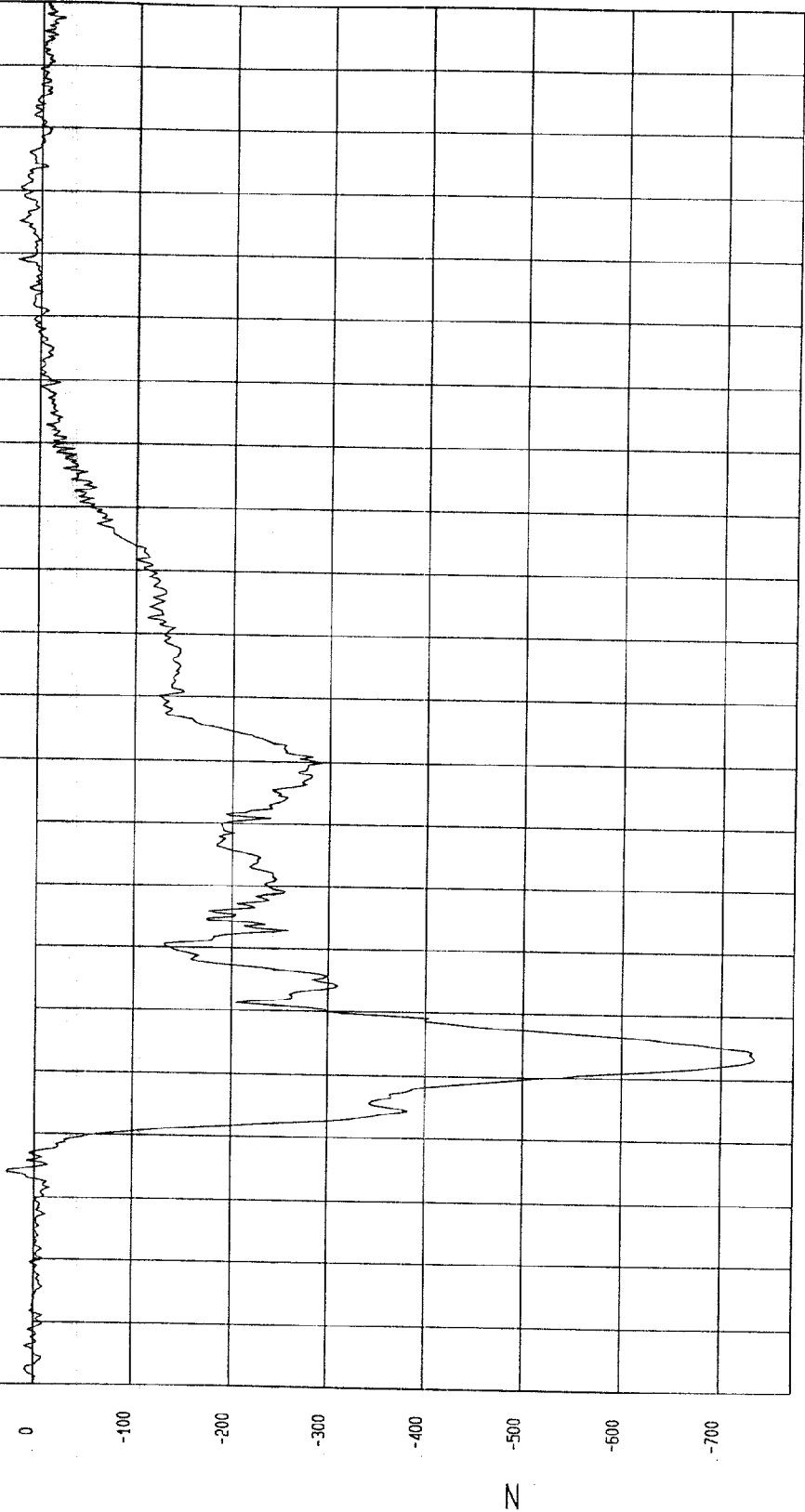
Speed: 35.2 MPH 56.6 KPH

Minimum = -733.81 N at 33 msec

Maximum = 30.31 N at 14 msec

PASSENGER LEFT LOWER TIBIA FORCE Z

1 B99025FF.F99 Filterclass (600)



MSA Research
03-03-1999 09:06

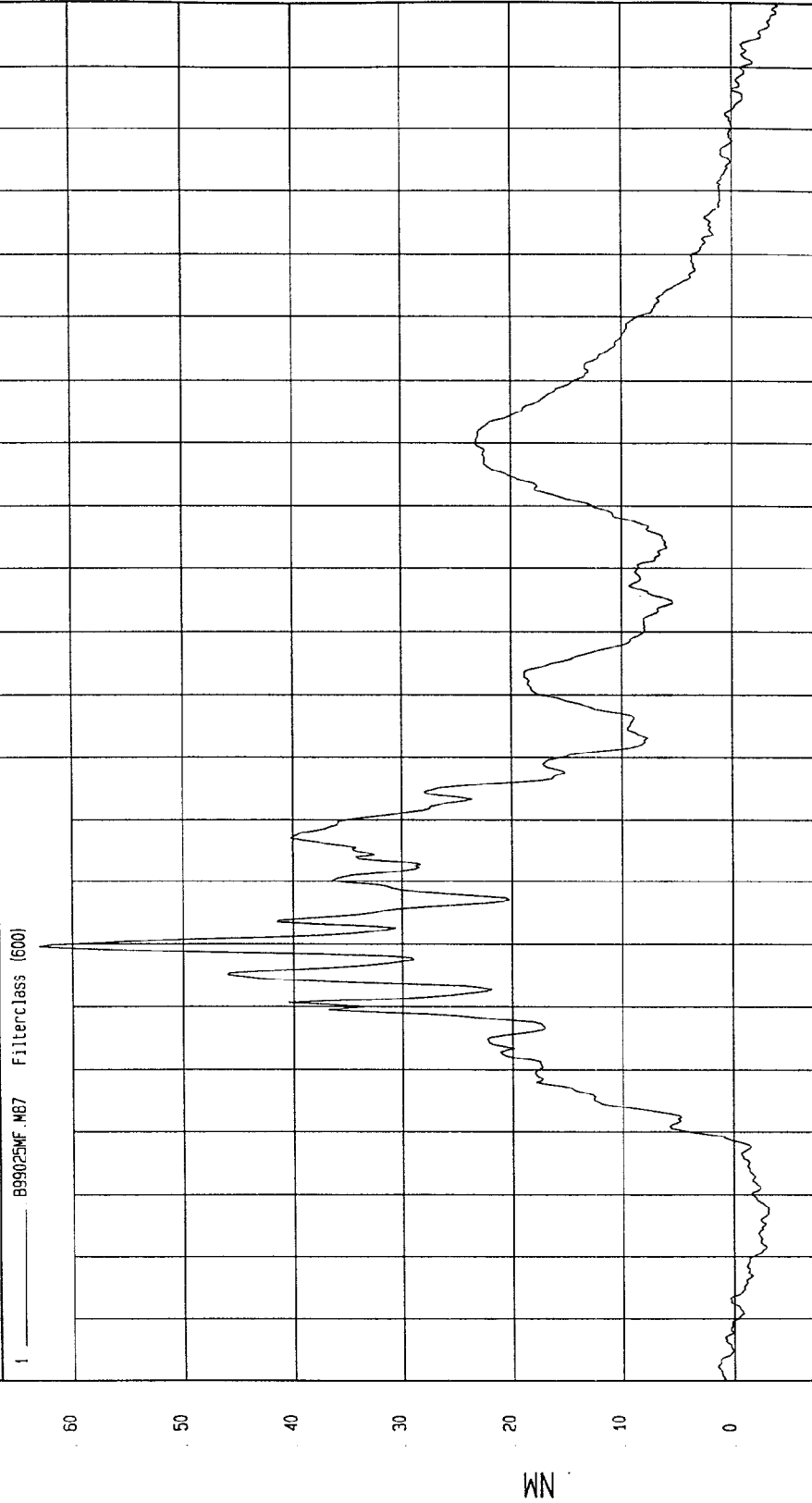
TIME (SECONDS)

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -4.17 NM at 200 msec Maximum = 63.28 NM at 50 msec

PASSENGER RIGHT UPPER TIBIA MOMENT X



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

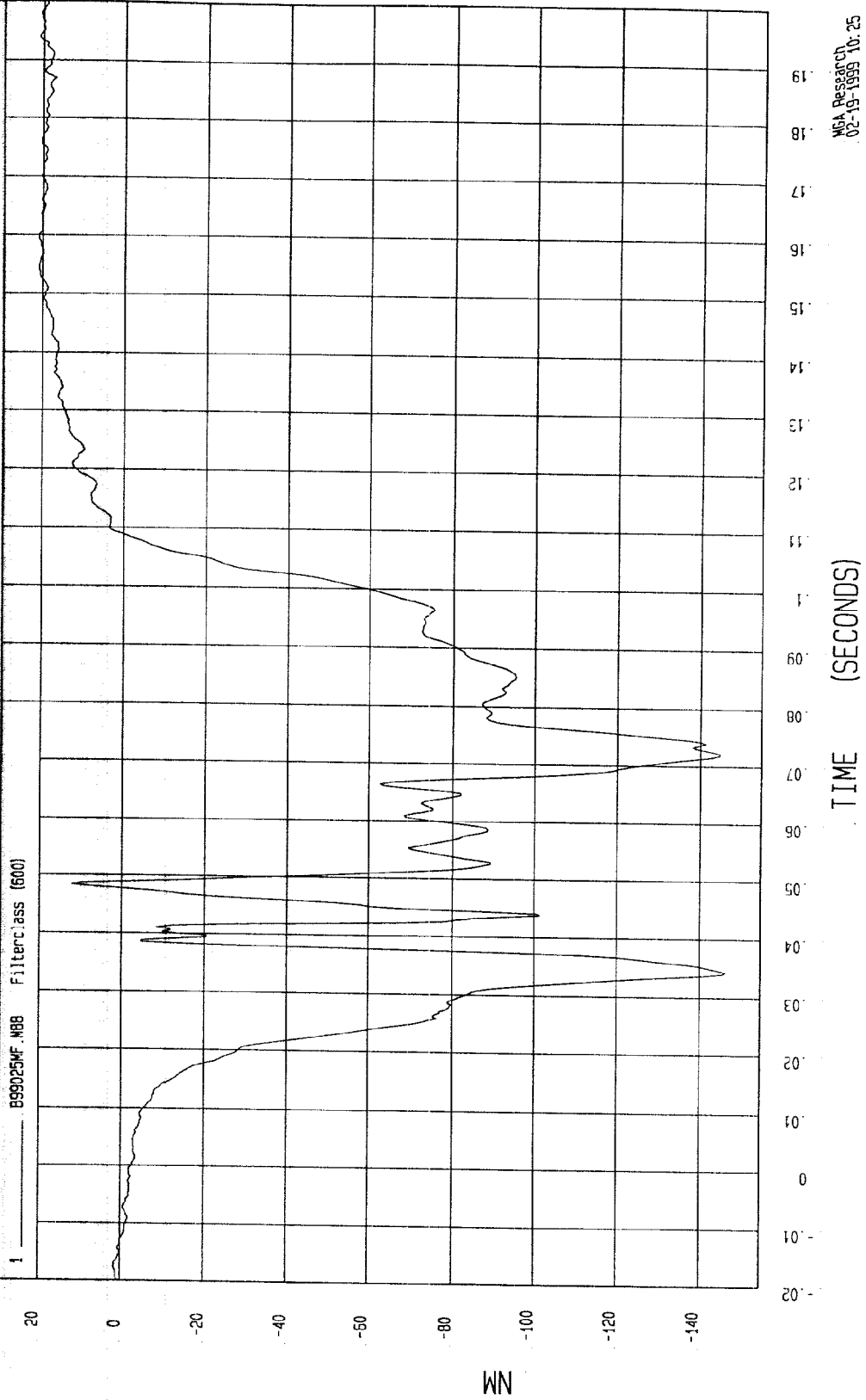
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 21.05 NM at 160 msec

Minimum = -146.45 NM at 34 msec

PASSENGER RIGHT UPPER TIBIA MOMENT Y

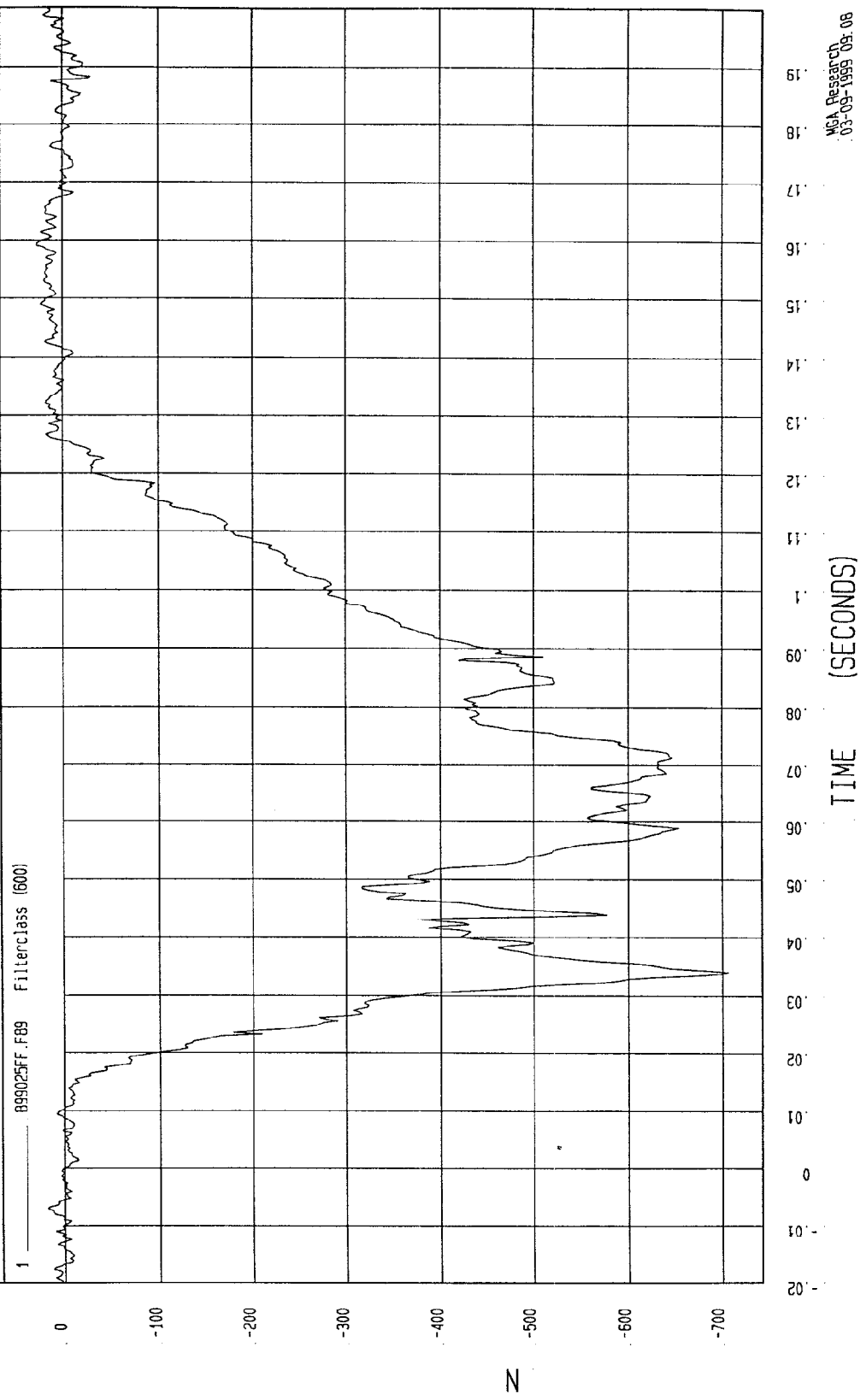


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -706.82 N at 34 msec Maximum = 27.63 N at 159 msec

PASSENGER RIGHT UPPER TIBIA FORCE Z

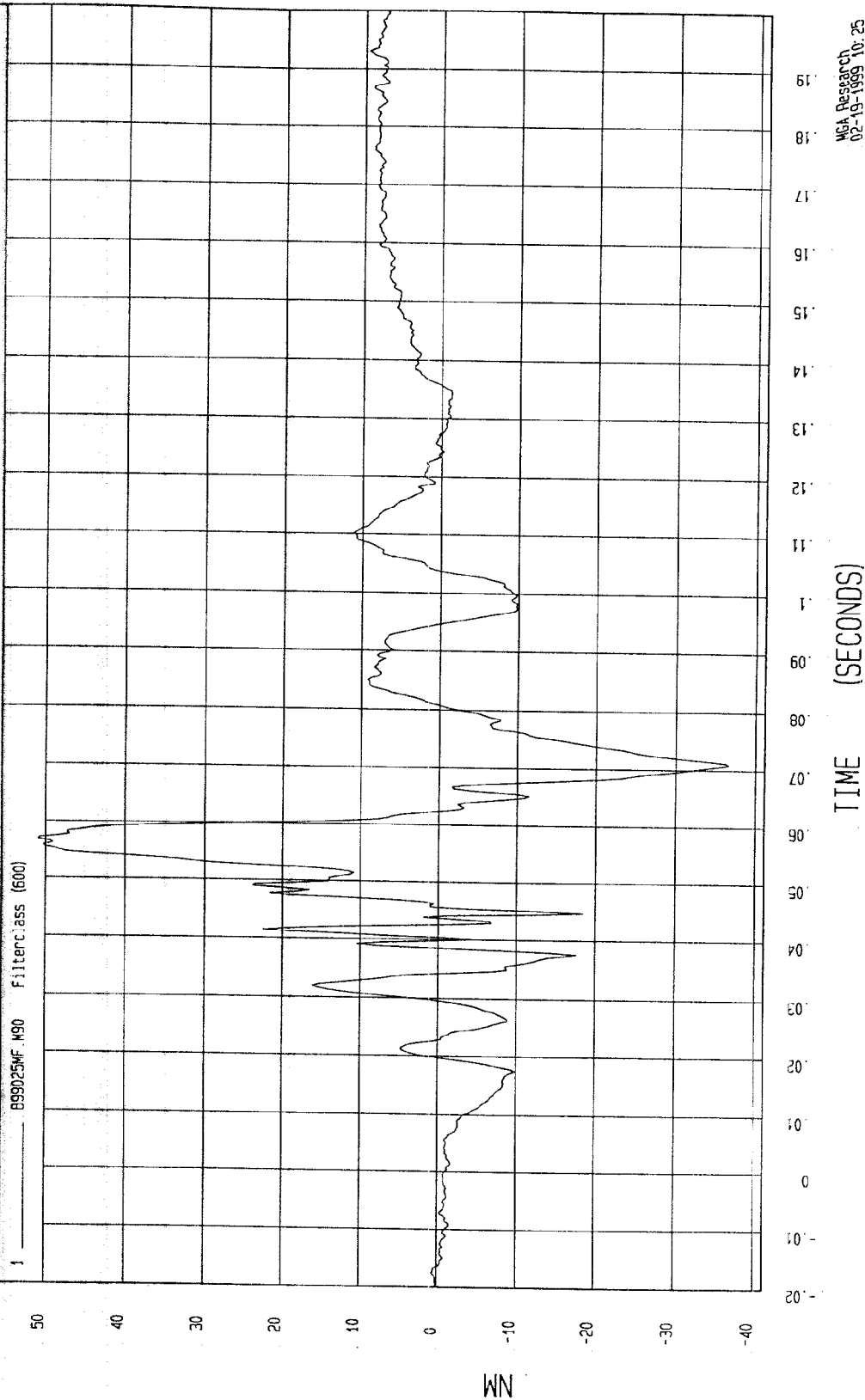


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -36.77 NM at 71 msec Maximum = 51.23 NM at 57 msec

PASSENGER RIGHT LOWER TIBIA MOMENT X



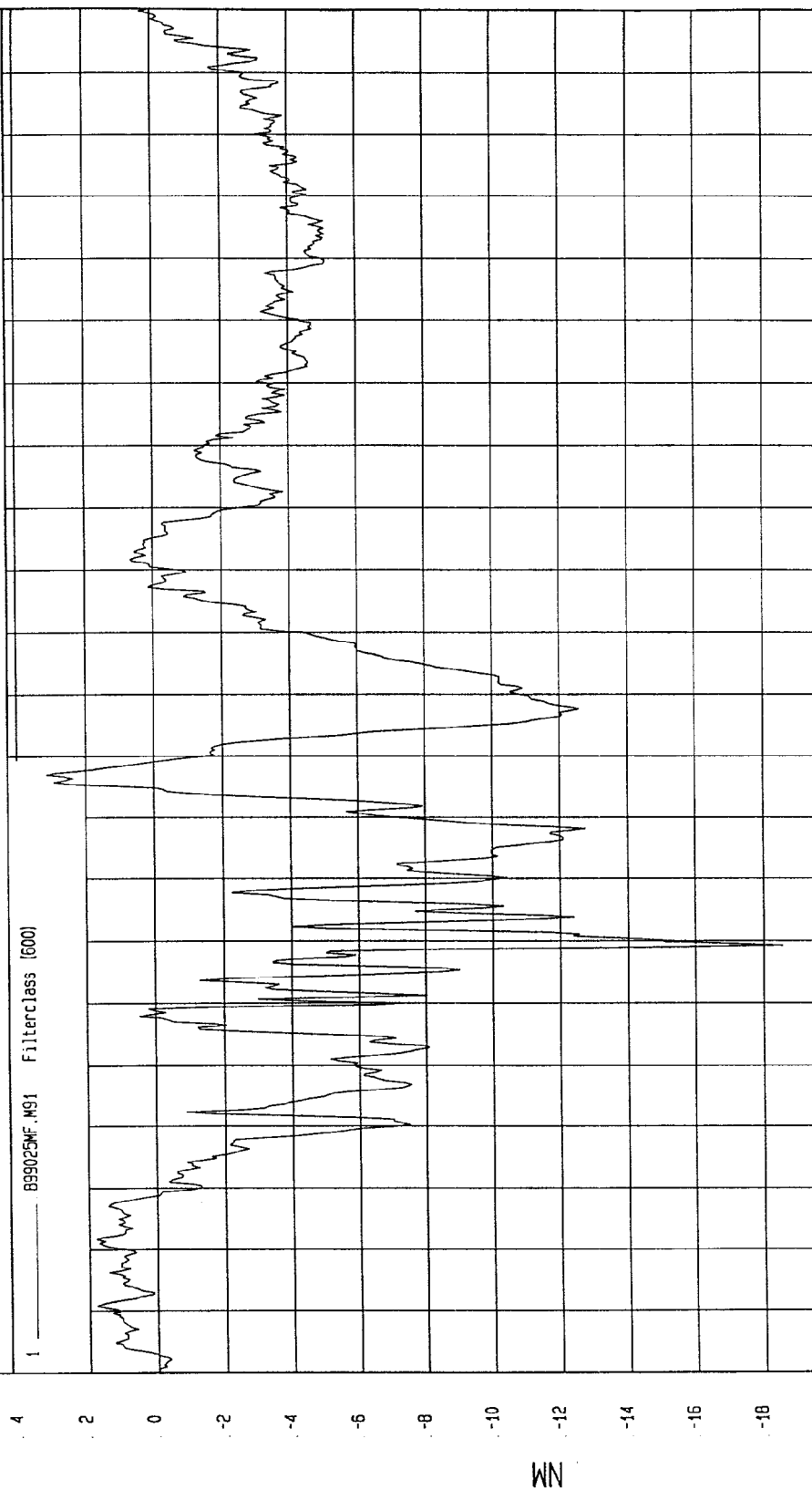
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

SPEED: 35.2 MPH 56.6 KPH

Minimum = -18.55 NM at 49 msec

PASSENGER RIGHT LOWER TIBIA MOMENT Y

1 899025MF.M91 Filterclass (600)



NGA Research
03-09-1999 09:43

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

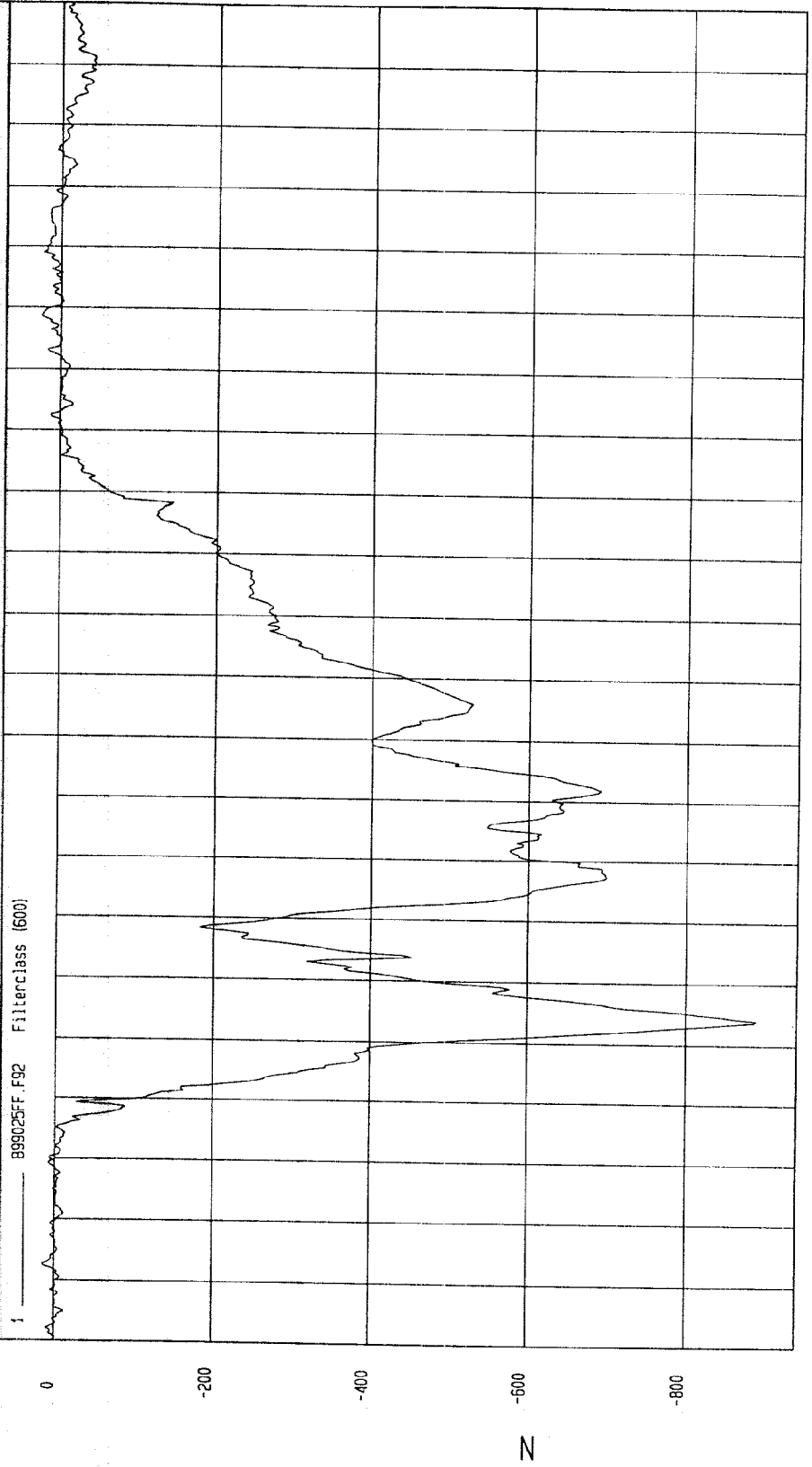
COMPONENT: 1999 FORD RANGER EV

Speed: 35.2 MPH 56.6 KPH

Minimum = -894.41 N at 34 msec

Maximum = 24.31 N at 149 msec

PASSENGER RIGHT LOWER TIBIA FORCE Z



WCA Research
03-03-1999 09:08

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

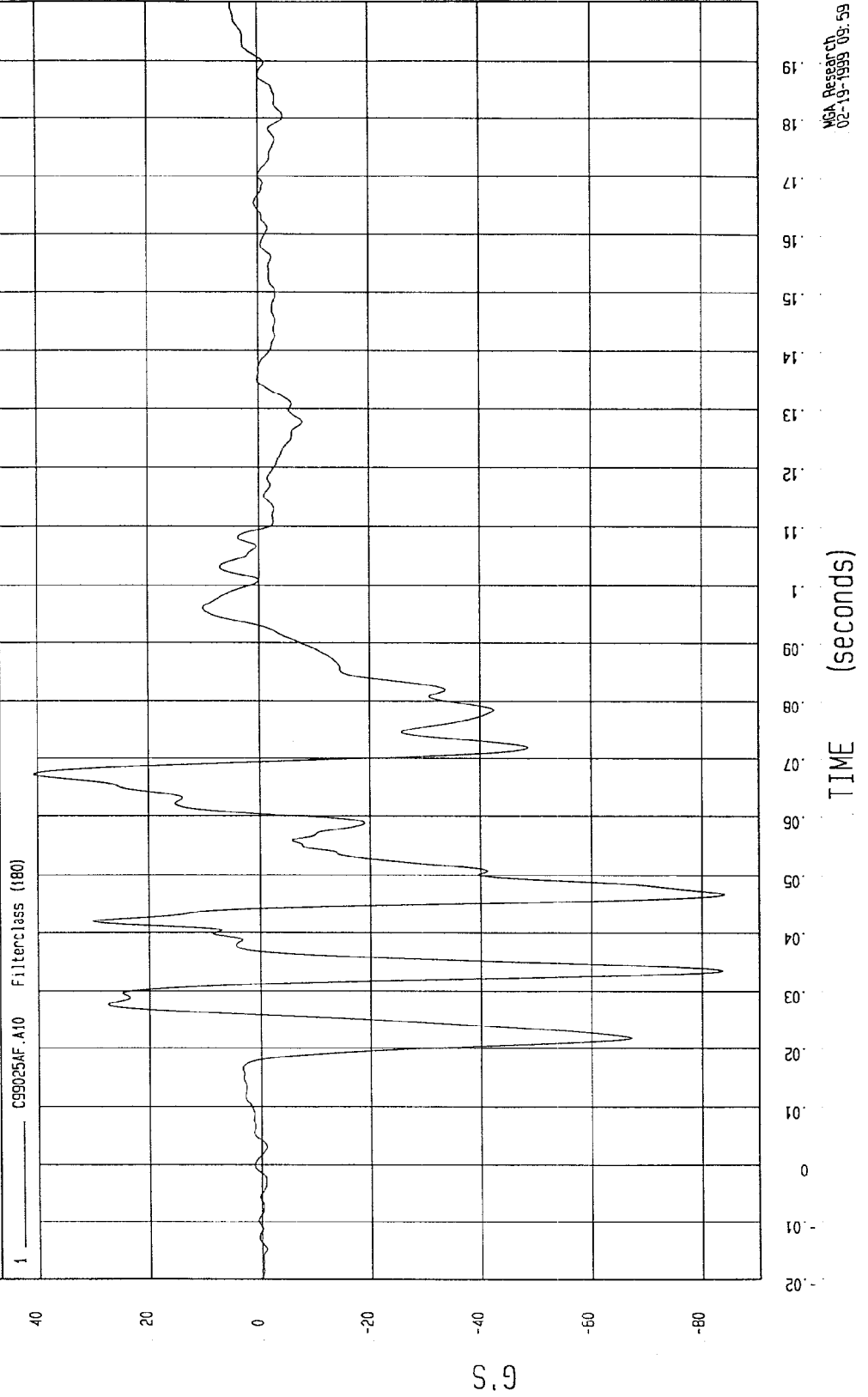
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = -84.01 G'S at 47 msec

Maximum = 40.71 G'S at 67 msec

PASSENGER LEFT FOOT BALL Z ACCELERATION



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

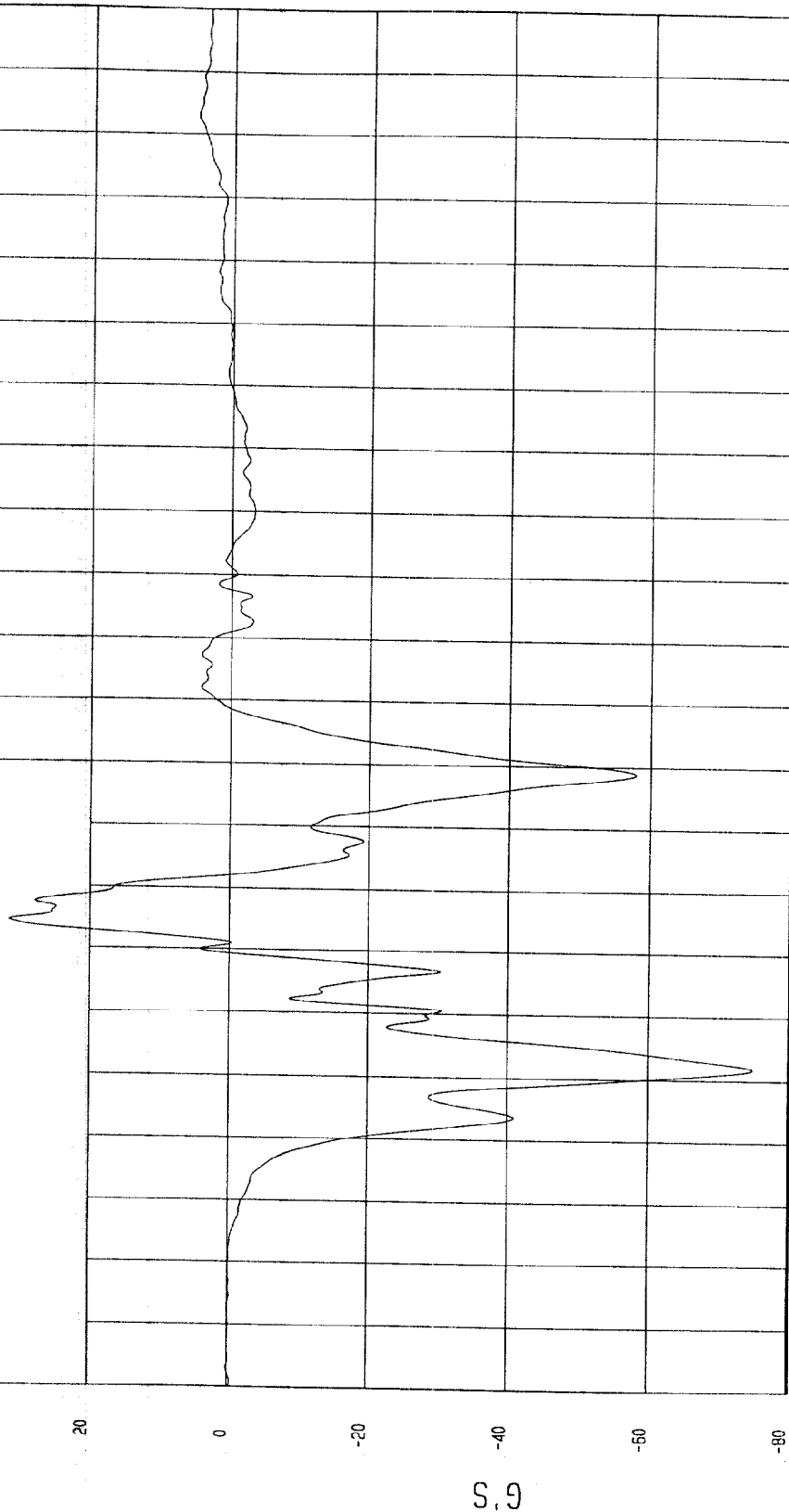
COMPONENT: 1999 FORD RANGER EV

Maximum = 31.45 G'S at 54 msec

Minimum = -74.95 G'S at 32 msec

PASSENGER LEFT HEEL X ACCELERATION

1 C99025AF.A11 Filterclass (180)



MSA Research
02-19-1999 09:59

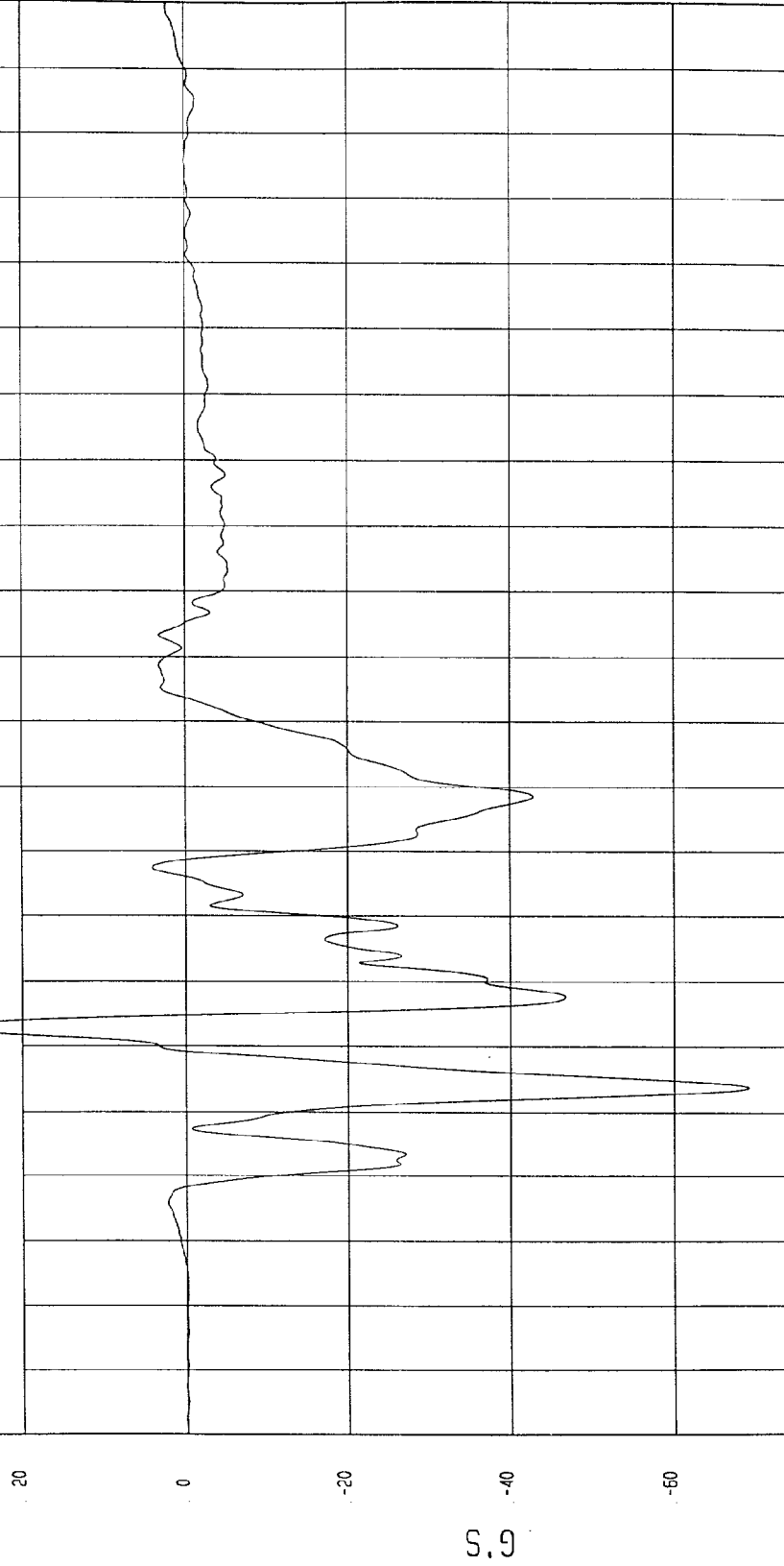
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -69.06 G'S at 34 msec Maximum = 25.45 G'S at 42 msec

PASSENGER LEFT HEEL Z ACCELERATION

1 _____ C99025AF.A12 Filterclass (180)



WCA Research
02-19-1999 09:59

TIME (seconds)

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

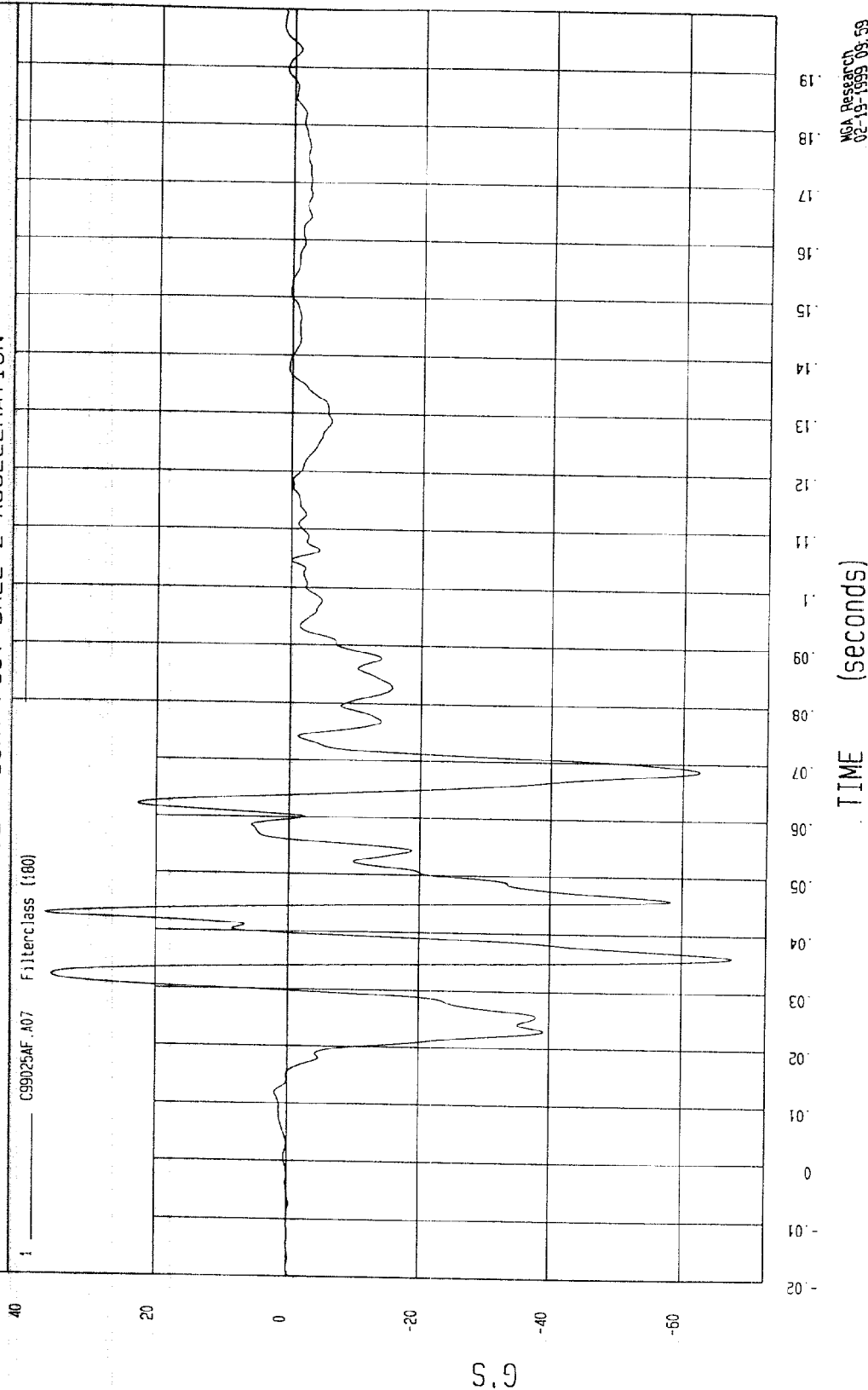
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 36.82 G'S at 43 msec

Minimum = -67.47 G'S at 36 msec

PASSENGER RIGHT FOOT BALL Z ACCELERATION

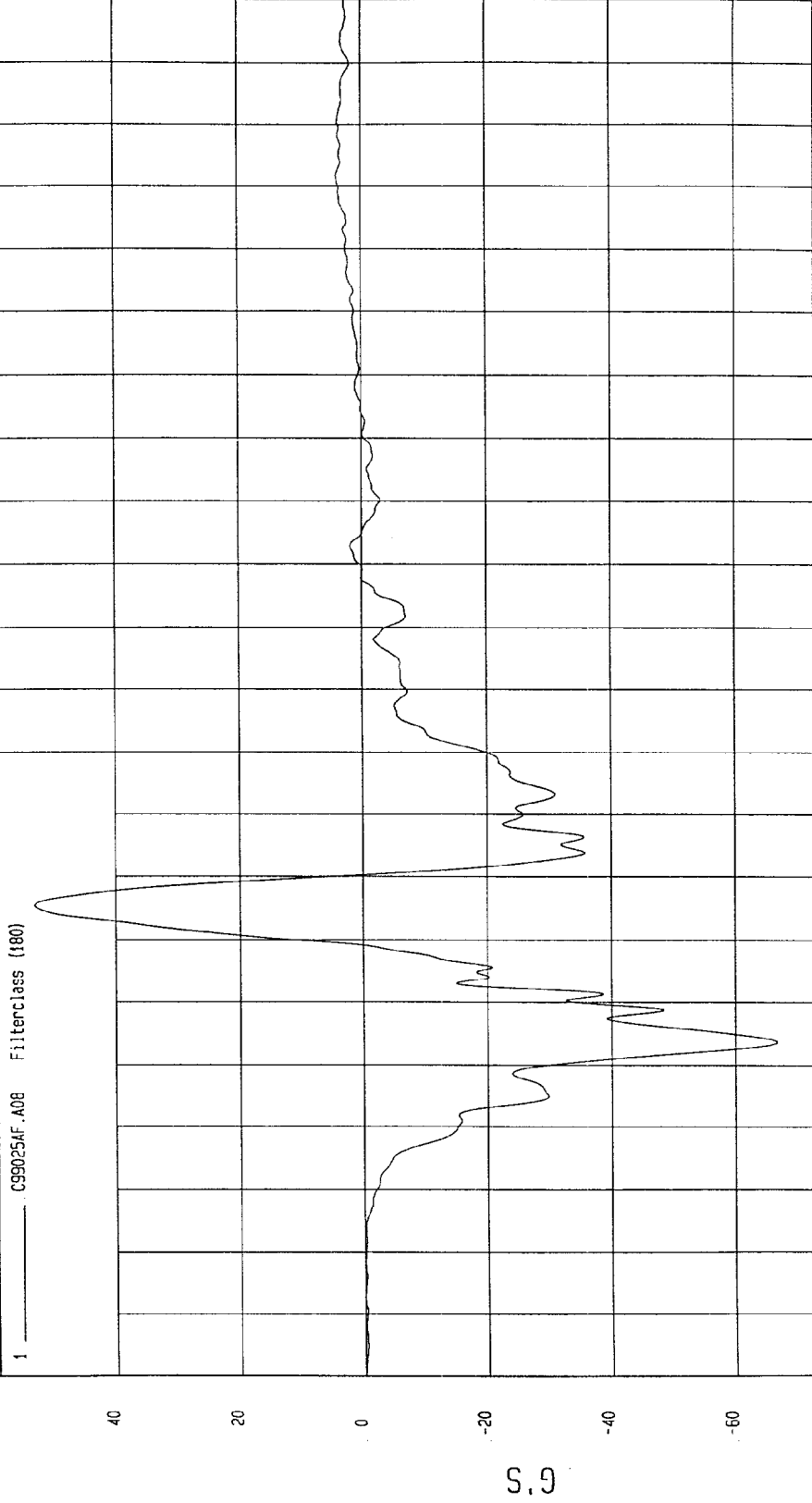


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -66.93 G'S at 34 msec Maximum = 53.03 G'S at 55 msec

PASSENGER RIGHT HEEL X ACCELERATION



WCA Research
02-19-1999 09:59

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 26.33 G'S at 44 msec

Minimum = -53.91 G'S at 36 msec

PASSENGER RIGHT HEEL Z ACCELERATION

1 C99025AF.A09 FilterClass (180)

30

20

10

0

-10

-20

-30

-40

-50

G.S

-0.02

-0.01

0

0.01

0.02

0.03

0.04

0.05

0.06

0.07

0.08

0.09

0.1

0.11

0.12

0.13

0.14

0.15

0.16

0.17

0.18

0.19

TIME (seconds)

MCA Research
02-19-1999 09:59

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

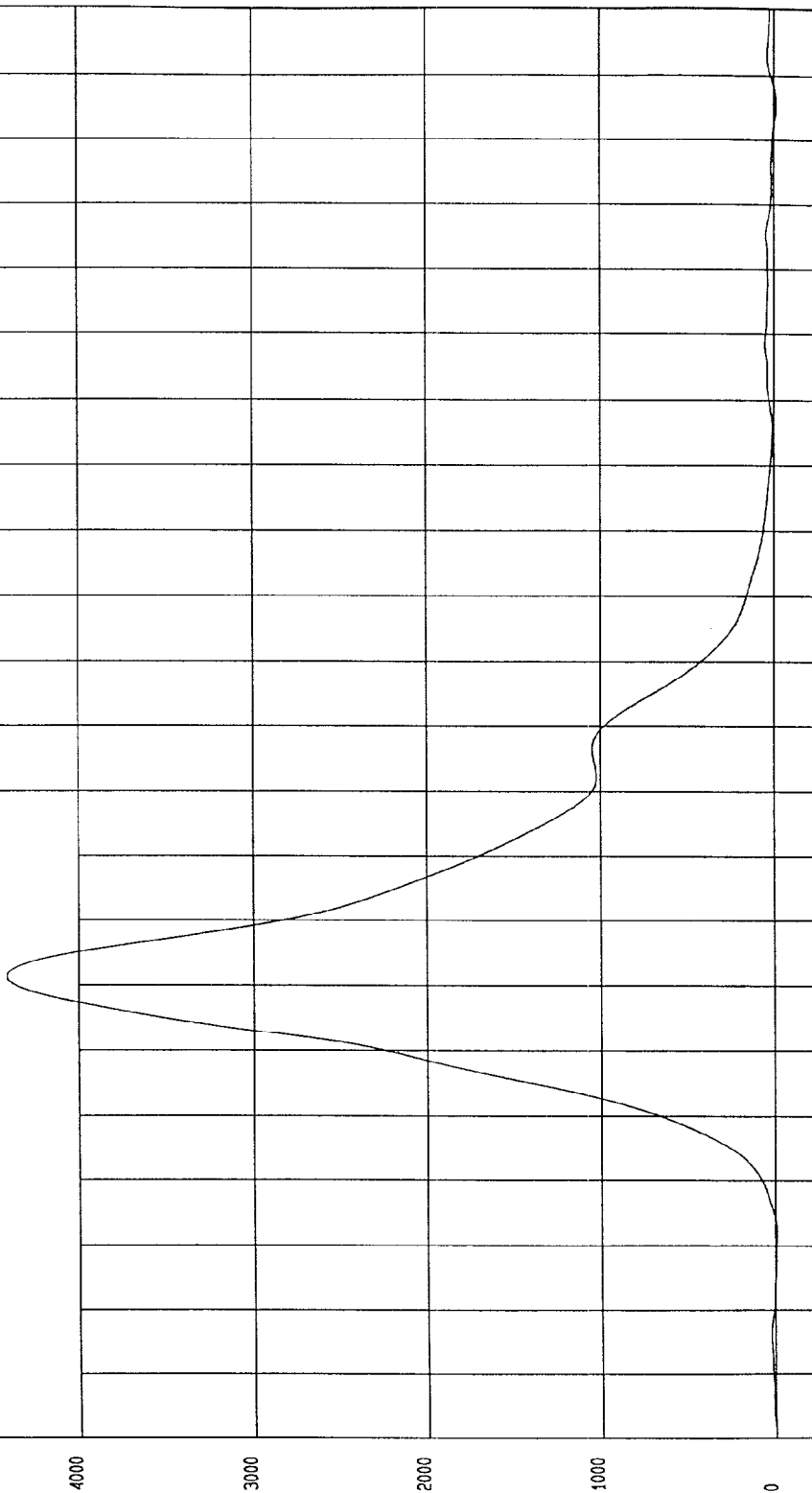
SPEED: 35.2 MPH 56.6 KPH

Maximum = 4416.39 N at 51 msec

Minimum = -13.9 N at 185 msec

PASSENGER SHOULDER BELT FORCE

1 89025FF.F62 Filterclass (G)



MCA Research
02-19-1999 11:15

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

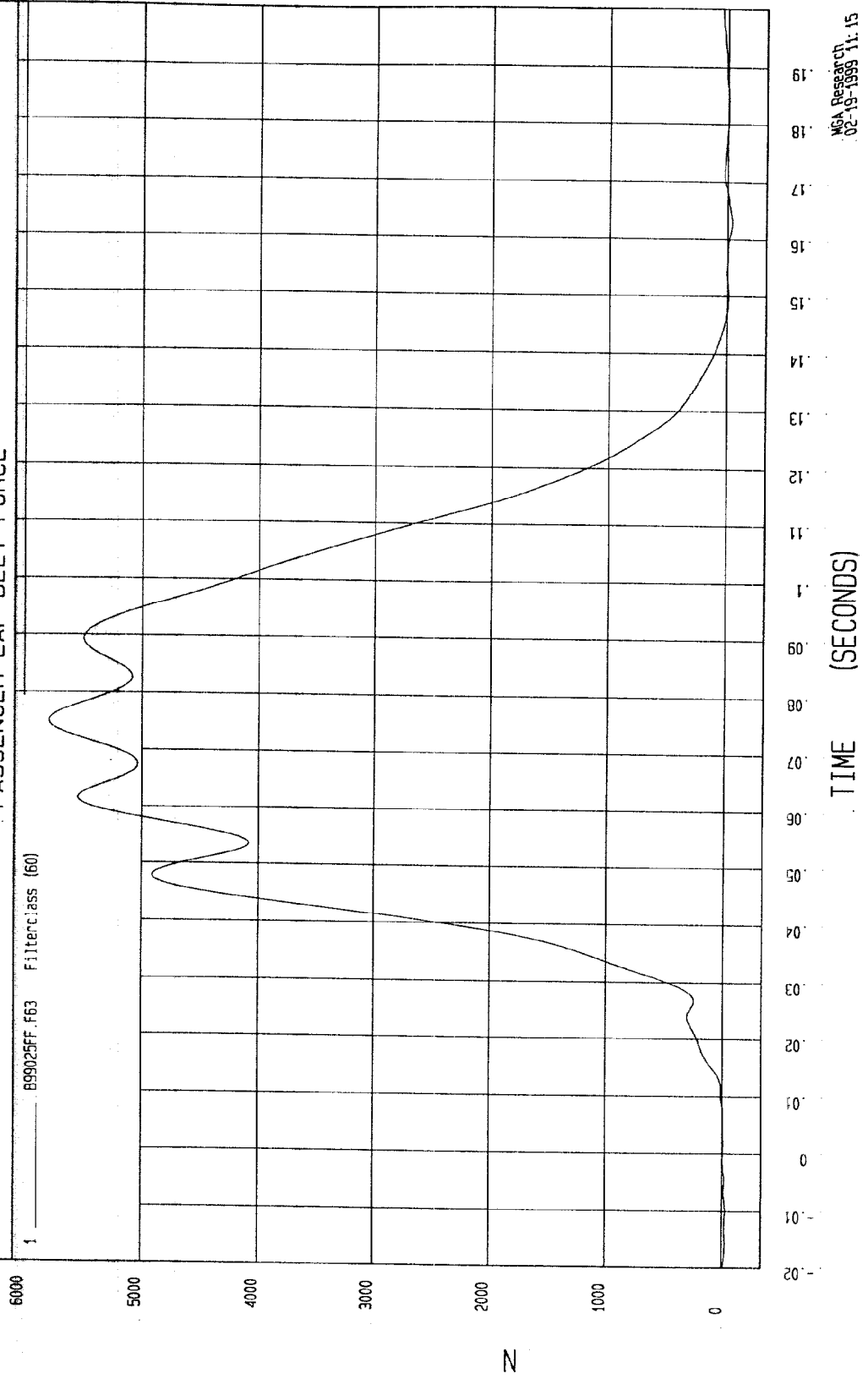
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 5792.91 N at 75 msec

Minimum = -37.4 N at 163 msec

PASSENGER LAP BELT FORCE

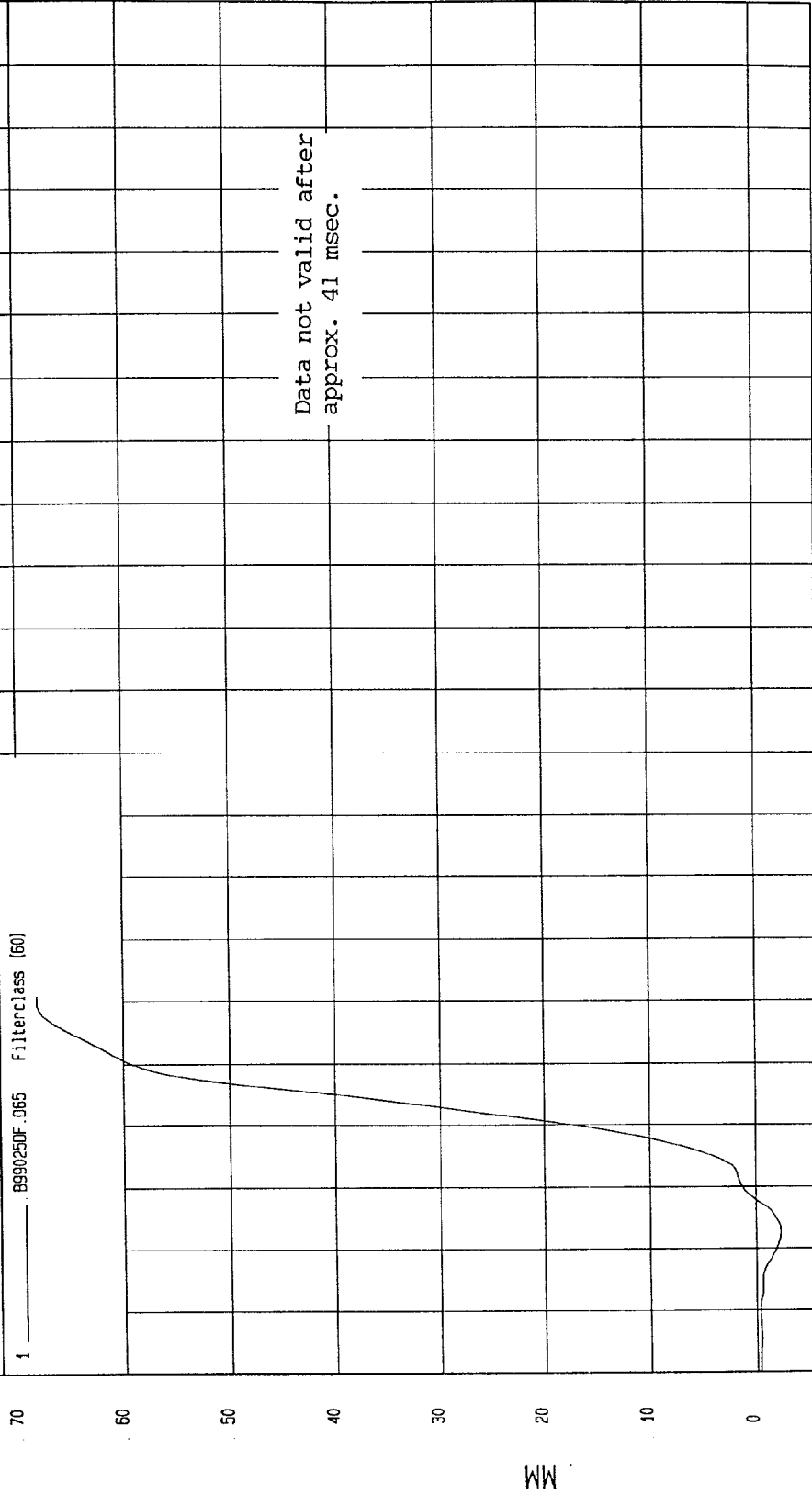


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -2.27 MM at 3 msec Maximum = 68.23 MM at 40 msec

PASSENGER BELT SPOOLOUT



TEST: NCAP 35 MPH FRONTAL IMPACT

Speed: 35.2 MPH 56.6 KPH

Maximum = 26.78 G'S at 11 msec

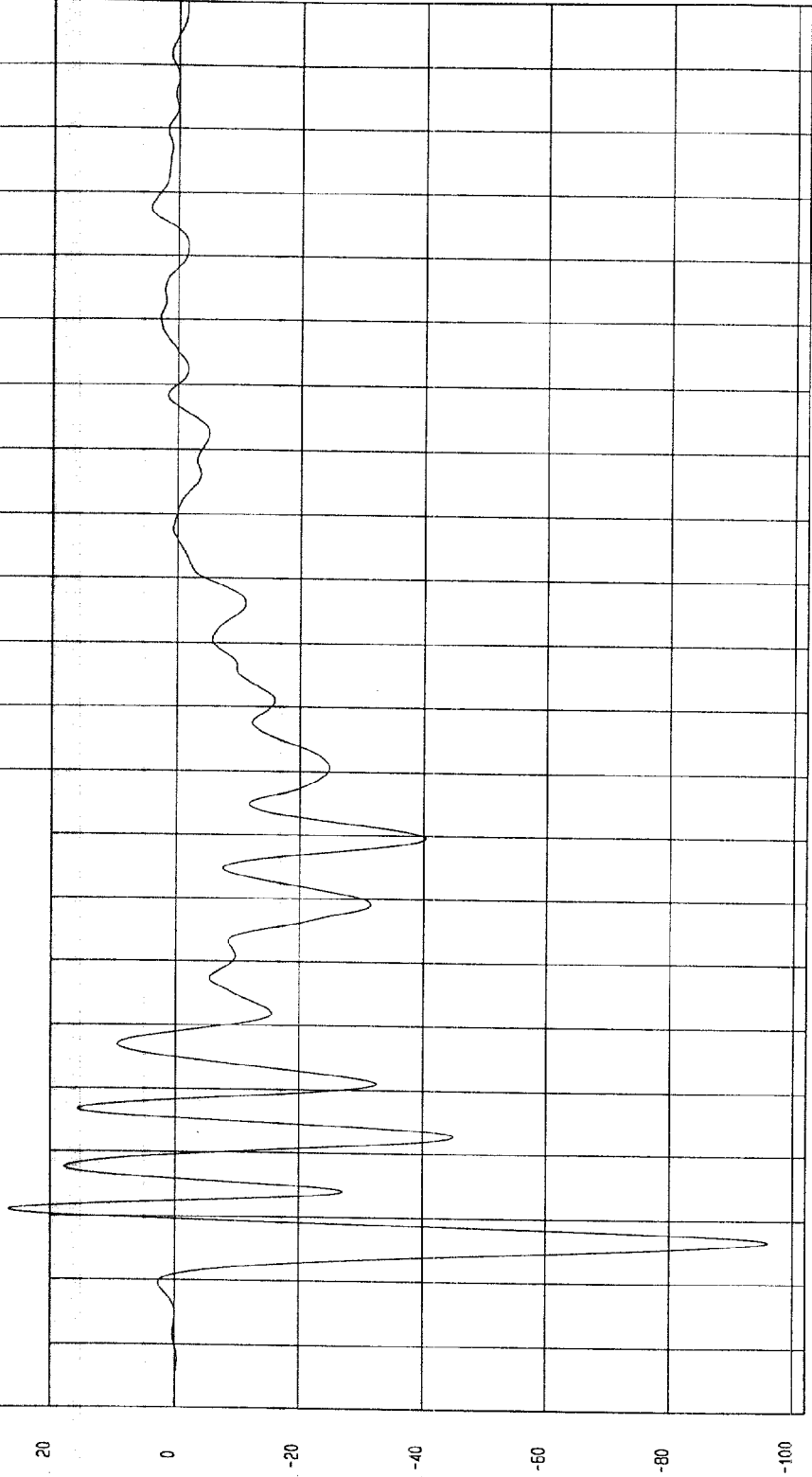
TEST: NCAP 35 MPH FRONTAL IMPACT

COMPONENT: 1999 FORD RANGER EV

Minimum = -95.96 G'S at 7 msec

LEFT REAR SEAT CROSSMEMBER X ACCELERATION

1 ——— B99025AF.A30 Filterclass (60)



MGA Research
02-19-1999 11:27

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

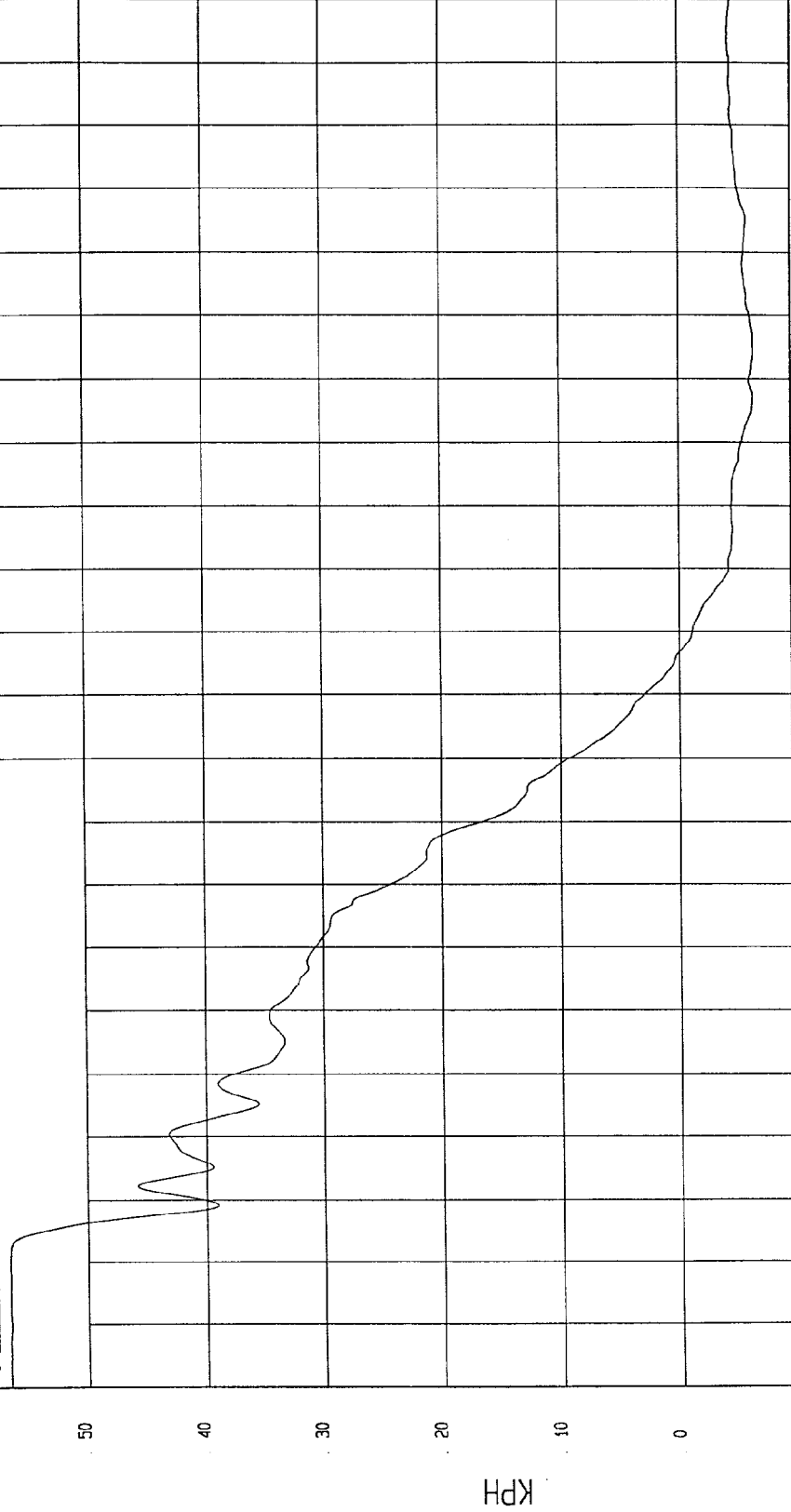
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Maximum = 56.6 KPH at -20 msec

Minimum = -6.23 KPH at 144 msec

LEFT REAR SEAT CROSSMEMBER X VELOCITY

1 899025A1.V30 Filterclass (180)



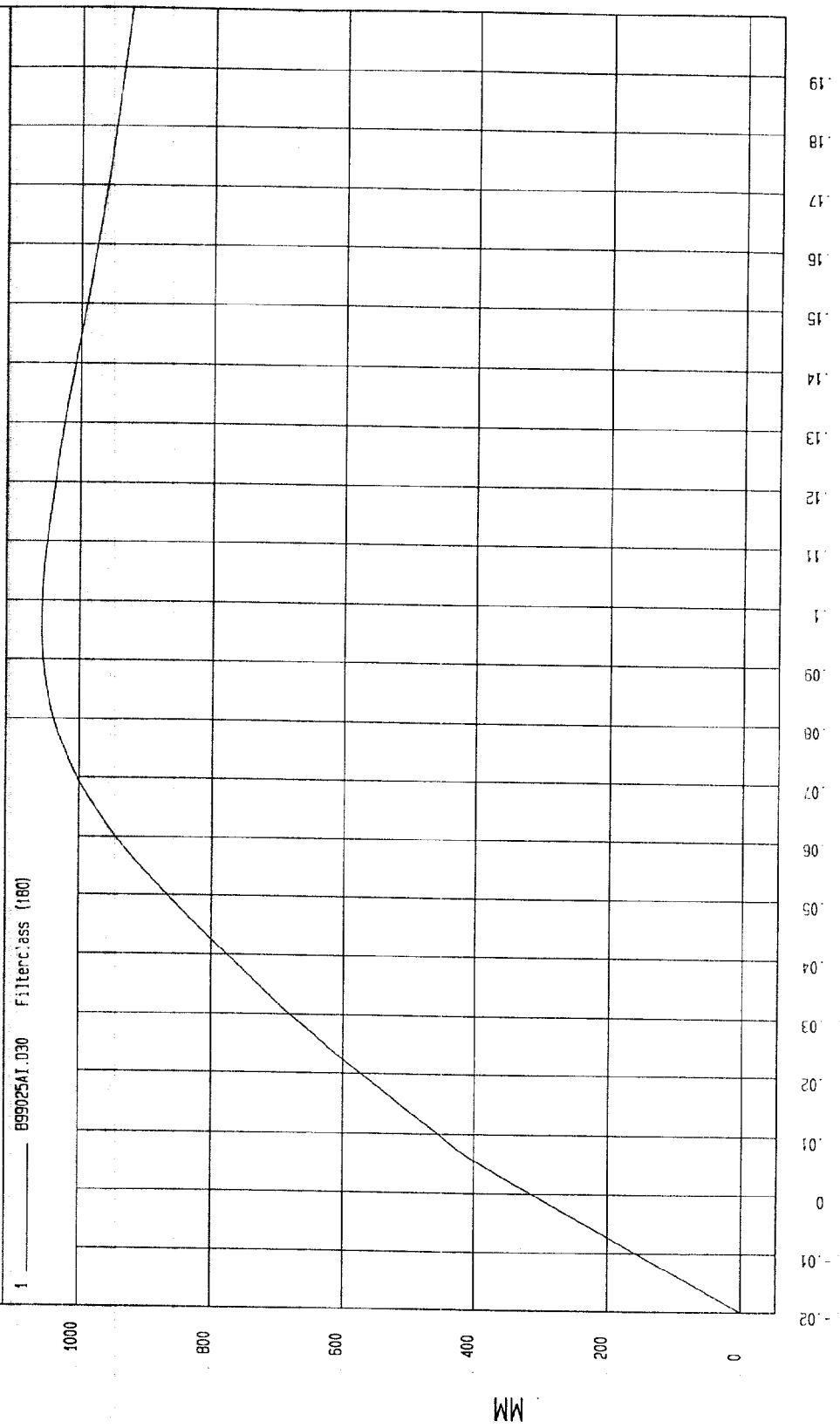
MCA Research
02-19-1999 11:37

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 0 MM at -20 msec Maximum = 1056.39 MM at 97 msec

LEFT REAR SEAT CROSSMEMBER X DISPLACEMENT



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

SPEED: 35.2 MPH 56.6 KPH

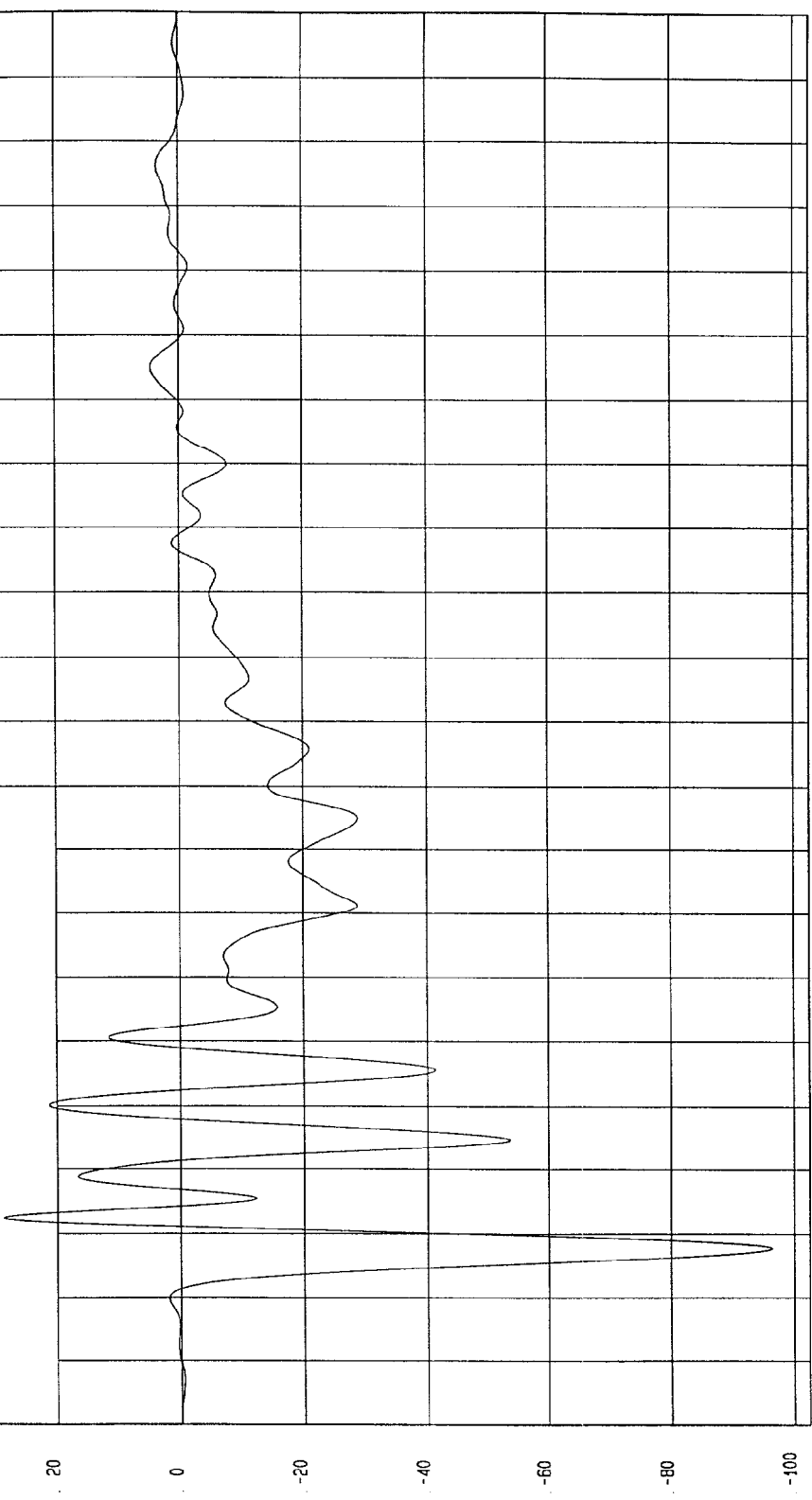
COMPONENT: 1999 FORD RANGER EV

Maximum = 28.74 G'S at 12 msec

Minimum = -96.35 G'S at 8 msec

RIGHT REAR SEAT CROSSMEMBER X ACCELERATION

1 B99025AF.A15 Filterclass (60)



NSA Research
02-19-1999 11:27

TIME (SECONDS)

G's

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

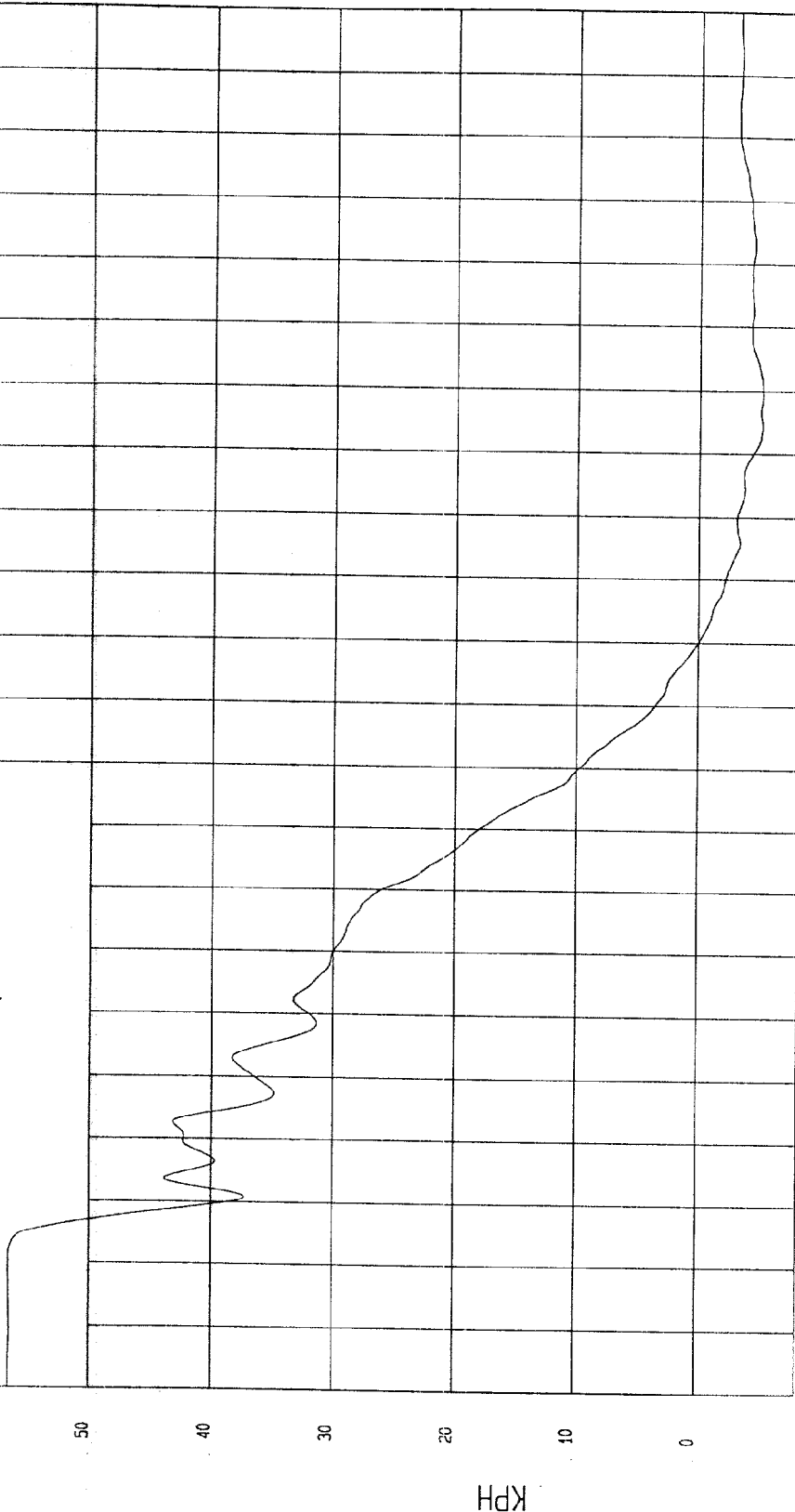
COMPONENT: 1999 FORD RANGER EV

Maximum = 56.61 KPH at 0 msec

Minimum = -5.17 KPH at 139 msec

RIGHT REAR SEAT CROSSMEMBER X VELOCITY

1 899025A1.V15 Filterclass (180)



MSA Research
02-19-1999 11:37

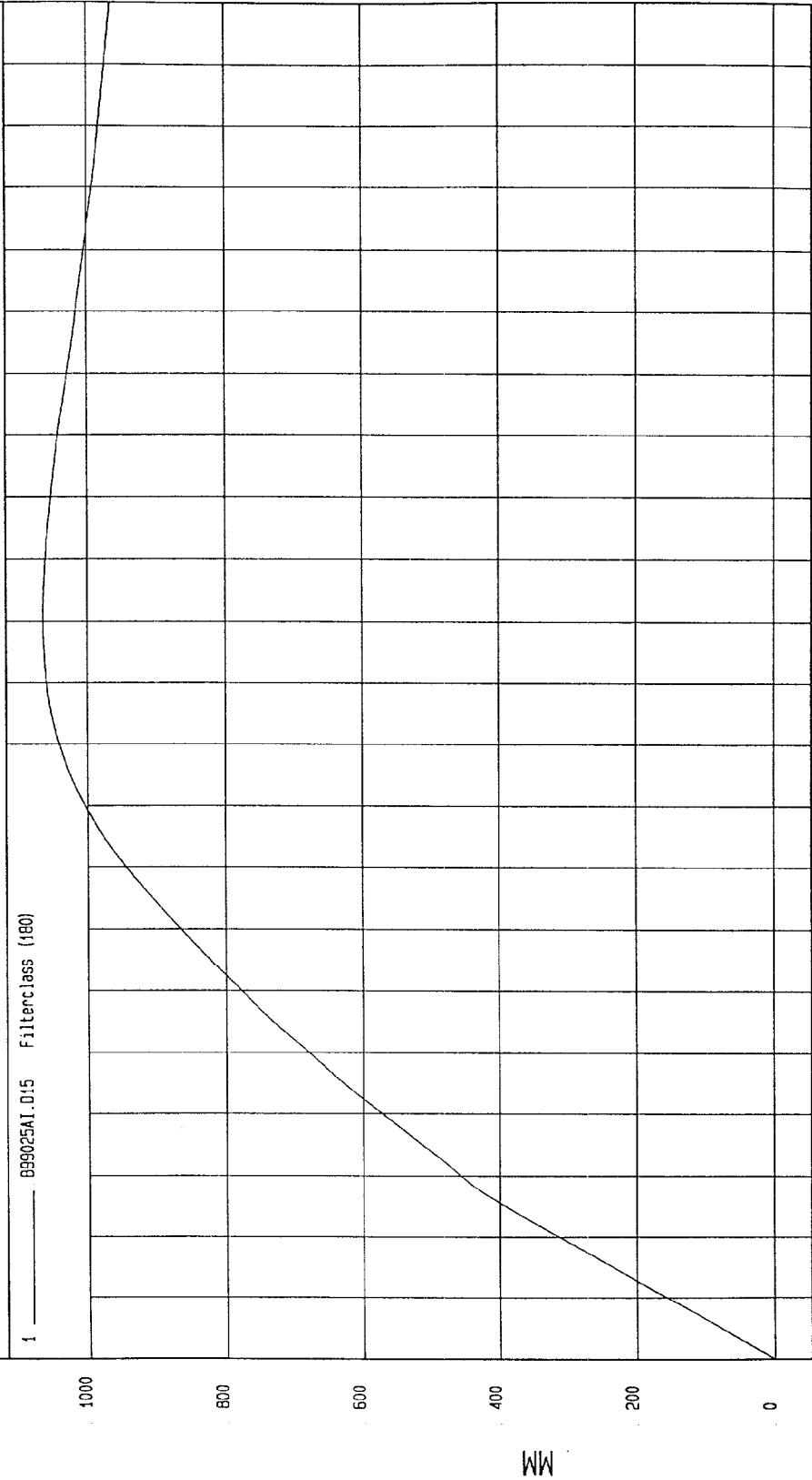
TIME Seconds

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 0 MM at -20 msec Maximum = 1064.86 MM at 100 msec

RIGHT REAR SEAT CROSSMEMBER X DISPLACEMENT



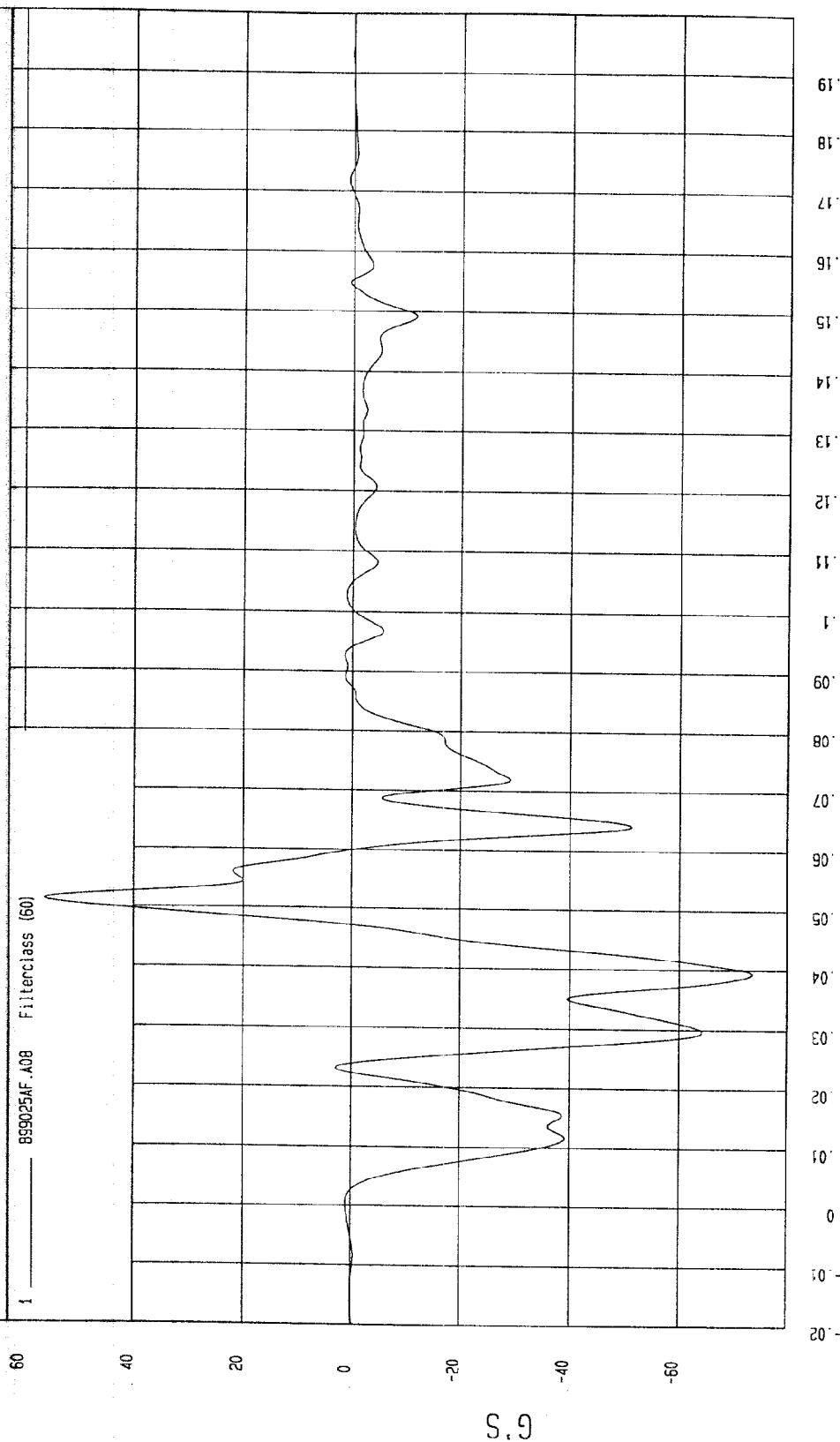
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -73.26 G'S at 39 msec Maximum = 56.42 G'S at 51 msec

TOP OF ENGINE BLOCK X ACCELERATION

1 859025AF.A08 Filterclass (50)

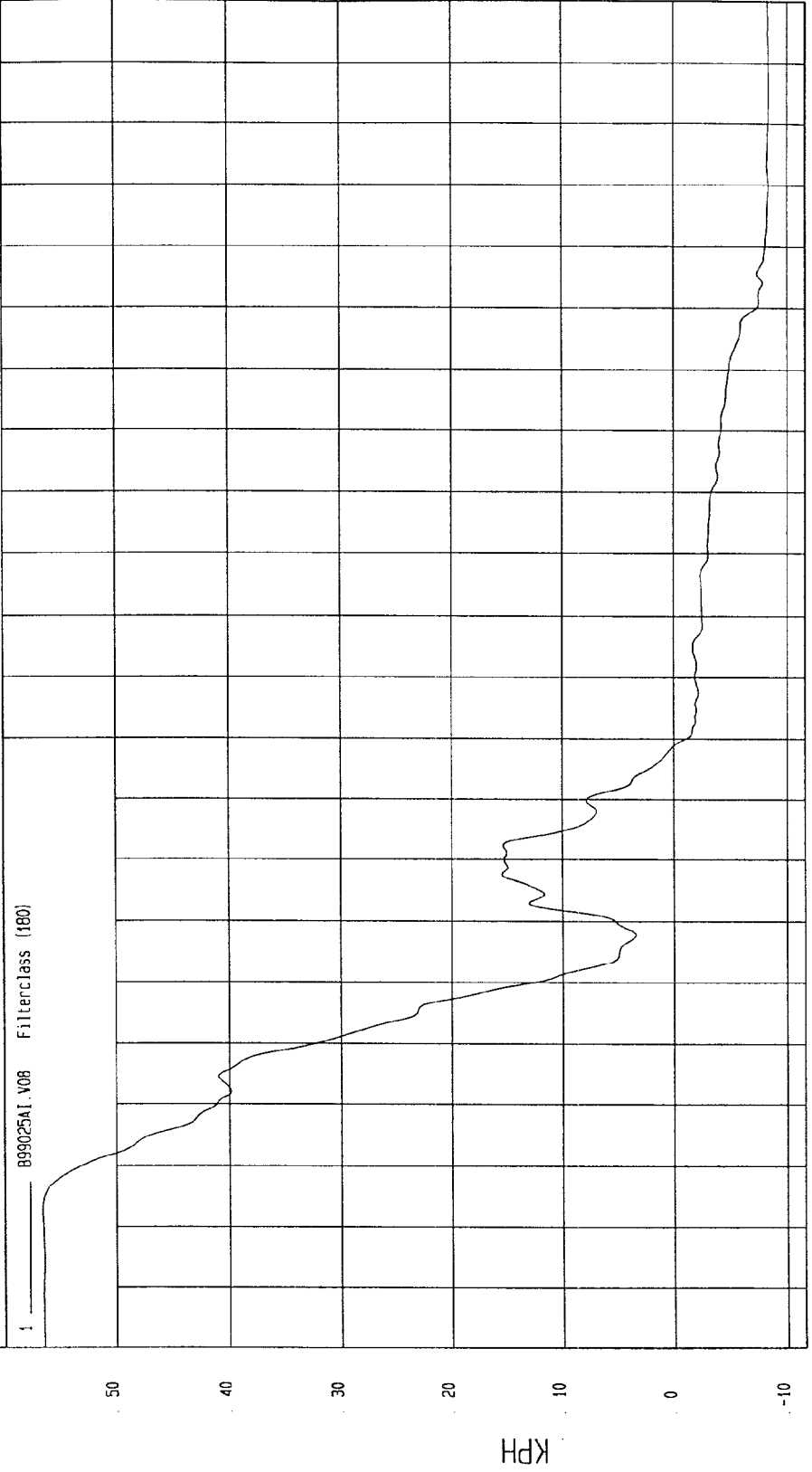


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -8.34 KPH at 186 msec Maximum = 56.71 KPH at 3 msec

TOP OF ENGINE BLOCK X VELOCITY



TIME Seconds

MCA Research
02-18-1999 11:37

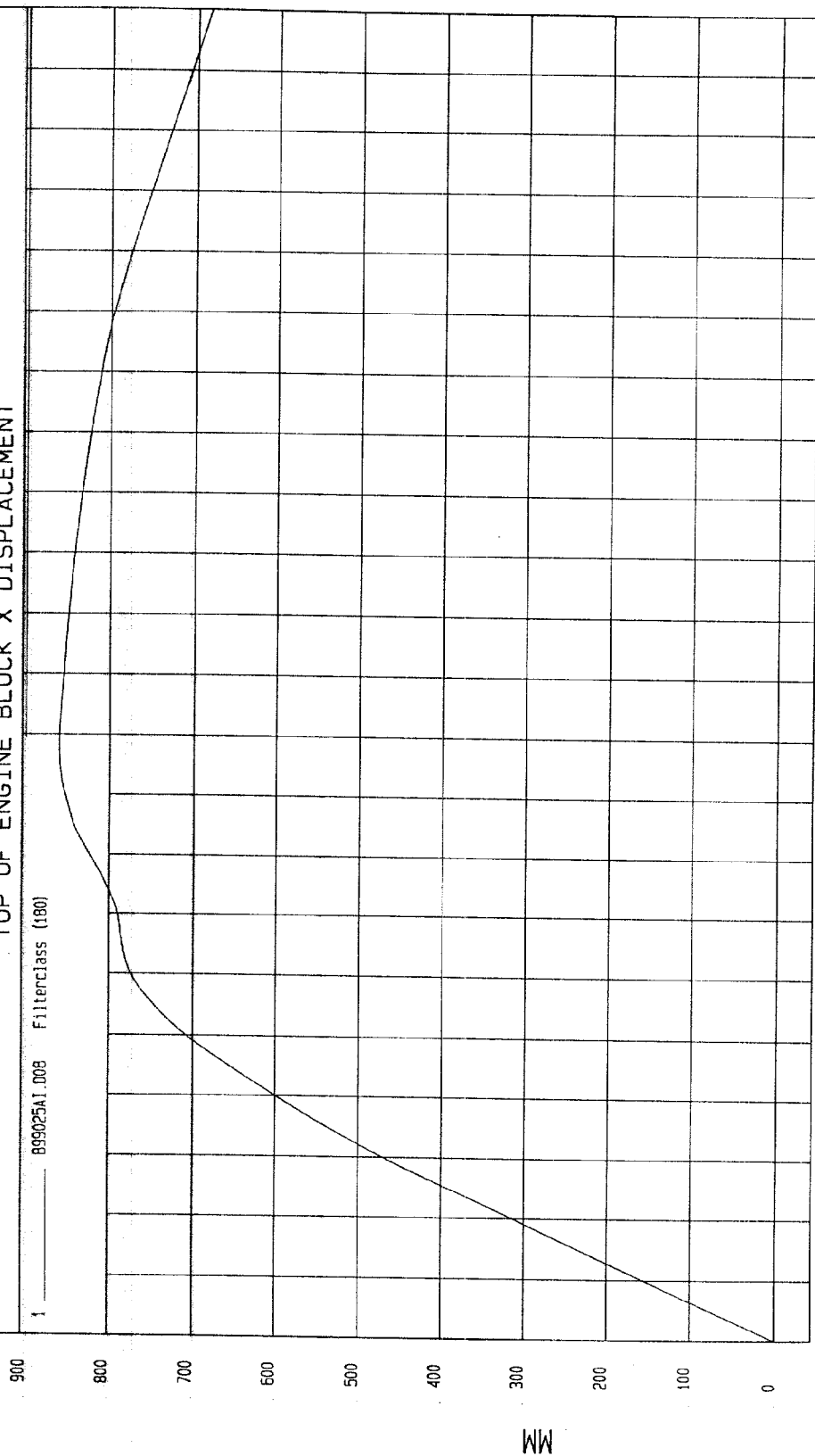
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 0 MM at -20 msec Maximum = 861.44 MM at 79 msec

TOP OF ENGINE BLOCK X DISPLACEMENT

1 899025A1.D08 Filterclass (180)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 29.45 G'S at 18 msec

Minimum = -85.02 G'S at 7 msec

BOTTOM OF ENGINE X ACCELERATION

1 B99025AF.A09 Filterclass (60)

Data not valid after
approx. 49 msec.

20

0

-20

-40

-60

-80

G'S

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

TIME (SECONDS)

McA Research
02-19-1999 11:48

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = 20.32 KPH at 48 msec

Maximum = 57.79 KPH at 4 msec

BOTTOM OF ENGINE X VELOCITY

1 899025A1.V09 Filterclass (180)

Data not valid after
approx. 49 msec.

50

40

30

20

KPH

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME Seconds

MCA Research
02-19-1999 11:51

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 849.73 MM at 48 msec

Minimum = 0 MM at -20 msec

BOTTOM OF ENGINE X DISPLACEMENT

1 _____ B99025A1.003 Filterclass (180)

Data not valid after
approx. 49 msec.

800

700

600

500

400

300

200

100

0

MM

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

TIME Seconds

NSA Research
02-19-1999 11:51

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

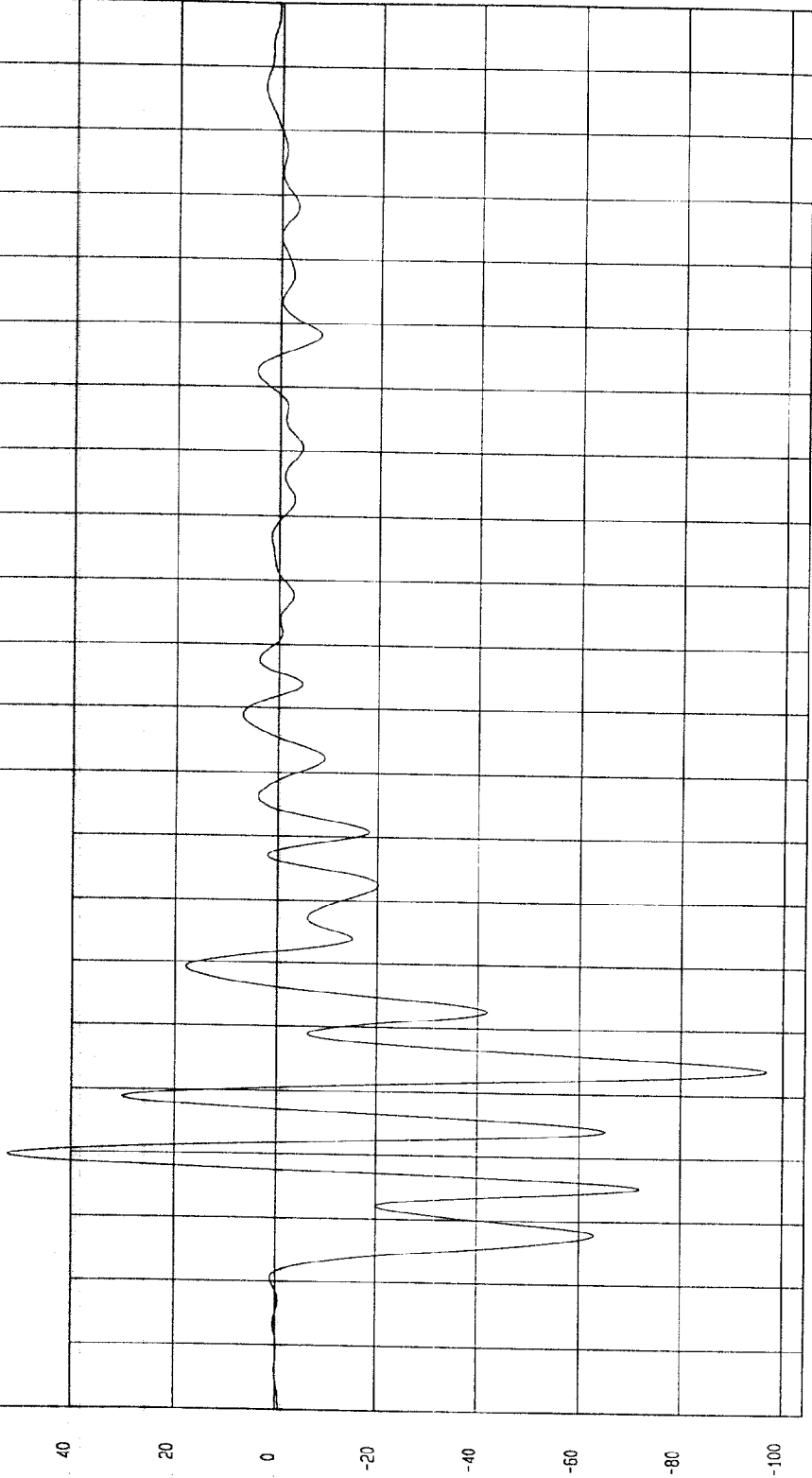
COMPONENT: 1999 FORD RANGER EV

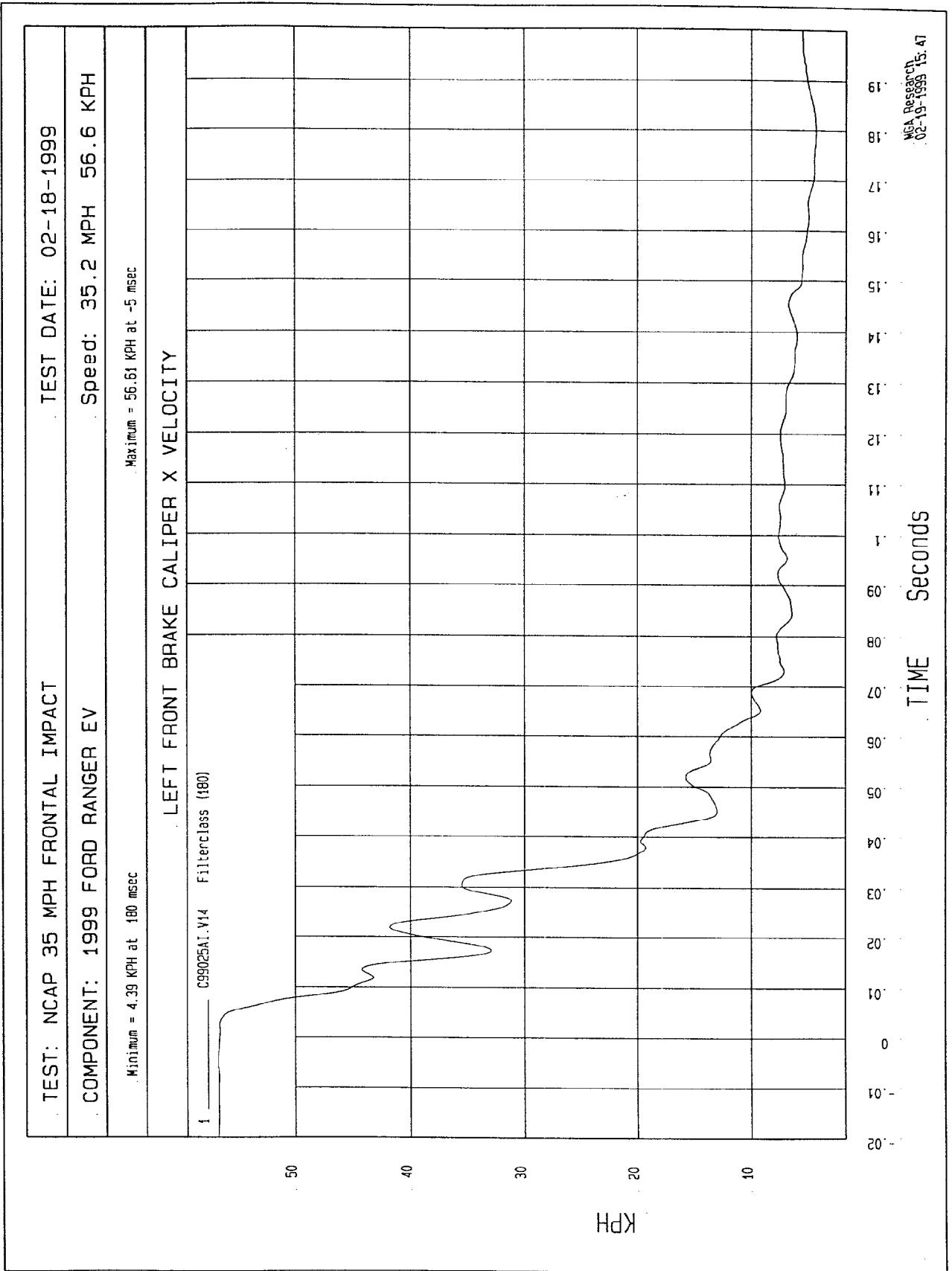
Maximum = 52.44 G's at 20 msec

Minimum = -96.81 G's at 34 msec

LEFT FRONT BRAKE CALIPER X ACCELERATION

1 — C99025AF.A14 Filterclass (60)





TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = 0 MM at -20 msec

Maximum = 1082.17 MM at 200 msec

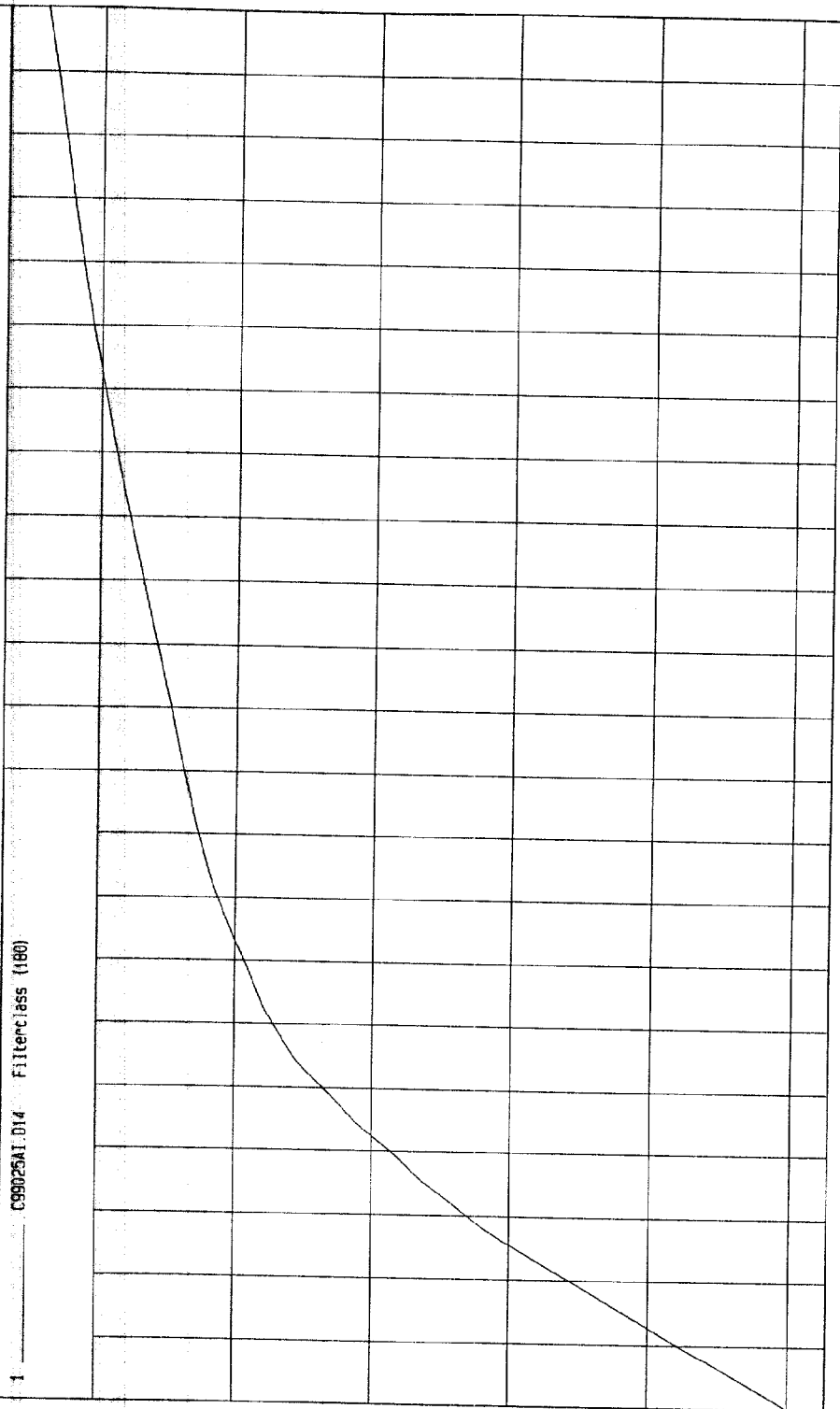
LEFT FRONT BRAKE CALIPER X DISPLACEMENT

1 C99025AI.D14 Filter: class (180)

MM

TIME Seconds

MSA Research
02-19-1999 15:47

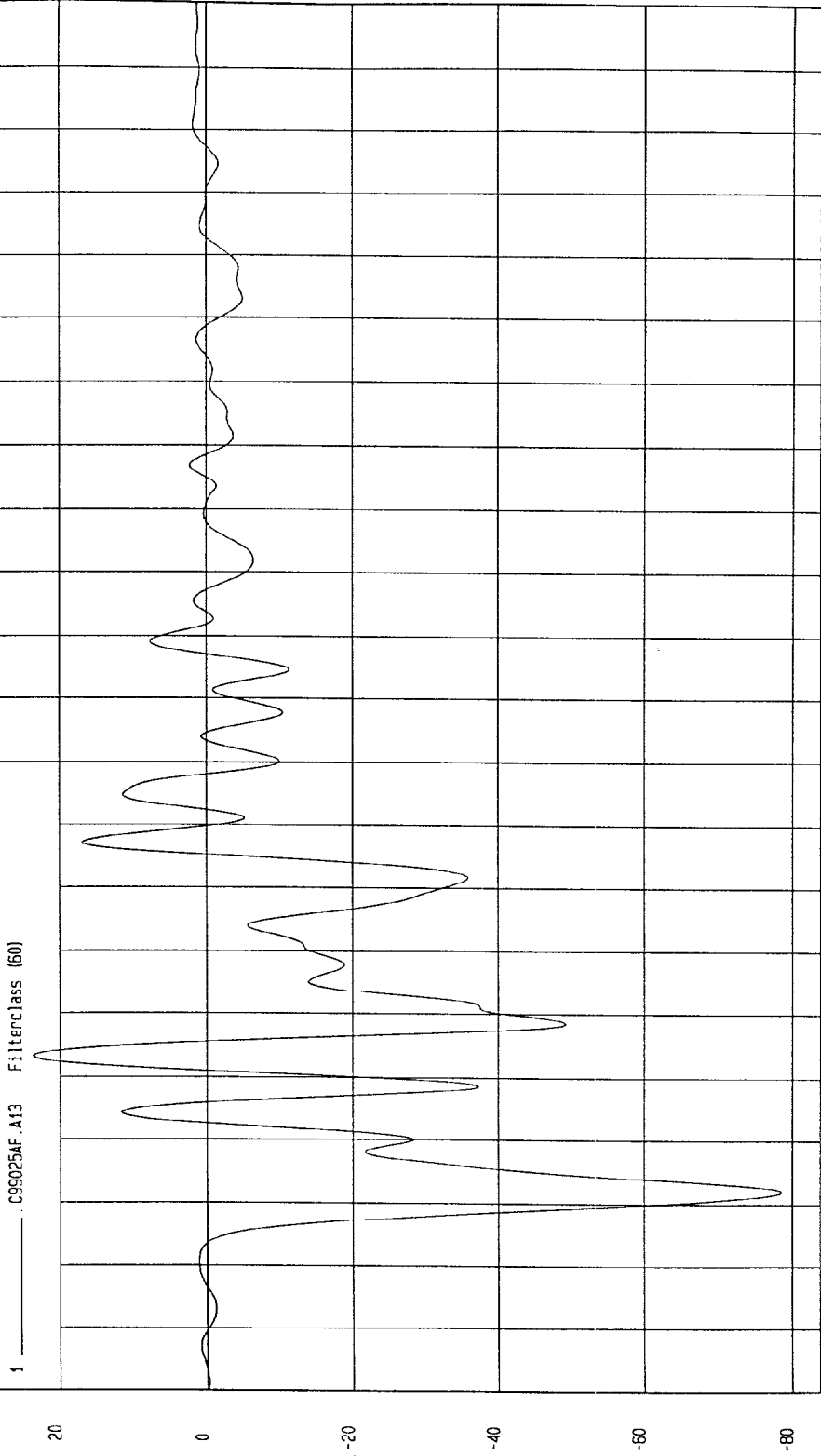


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -78.6 G'S at .12 msec Maximum = 23.5 G'S at .33 msec

RIGHT FRONT BRAKE CALIPER X ACCELERATION

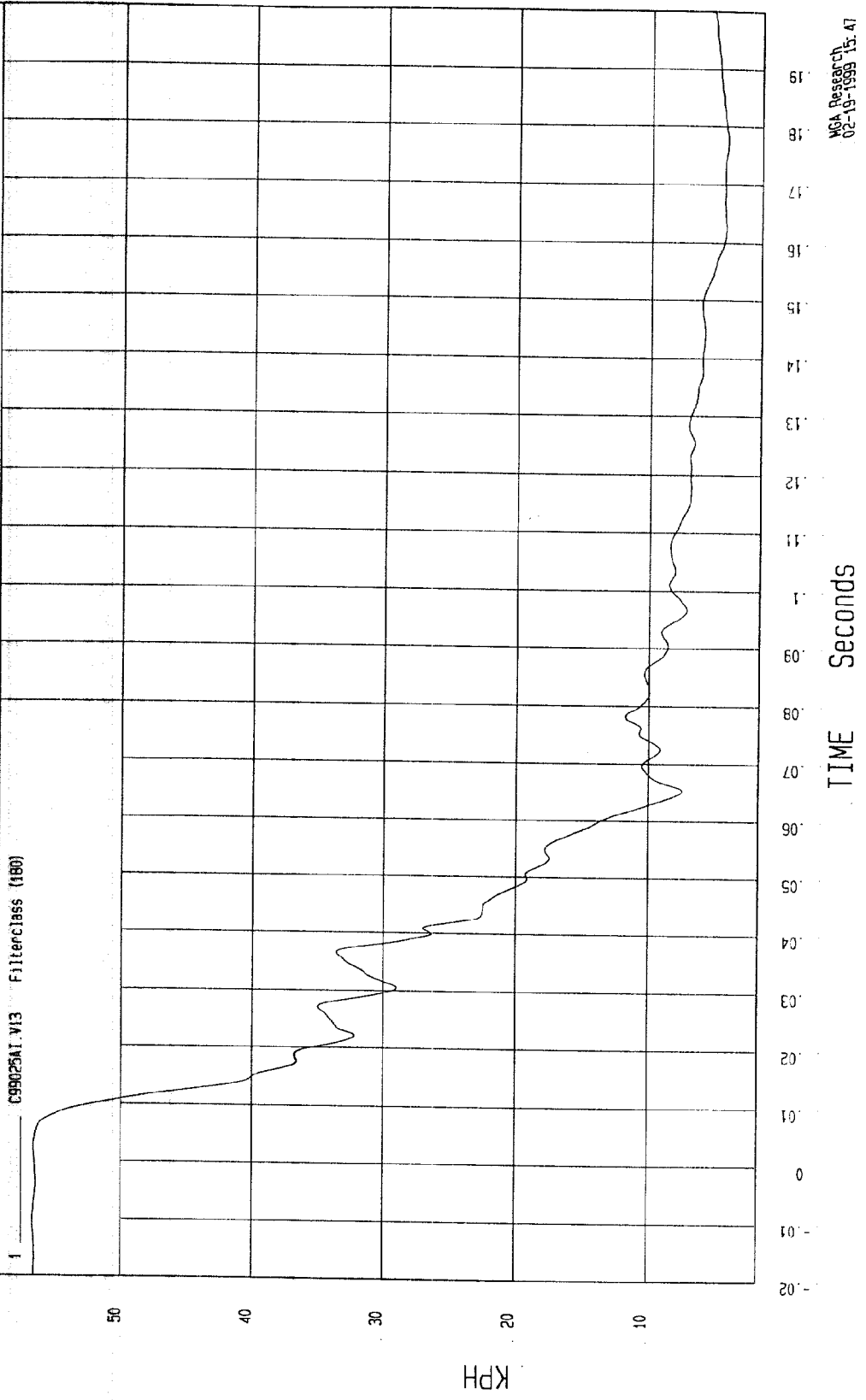


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 4.3 KPH at 178 msec Maximum = 56.69 KPH at -10 msec

RIGHT FRONT BRAKE CALIPER X VELOCITY



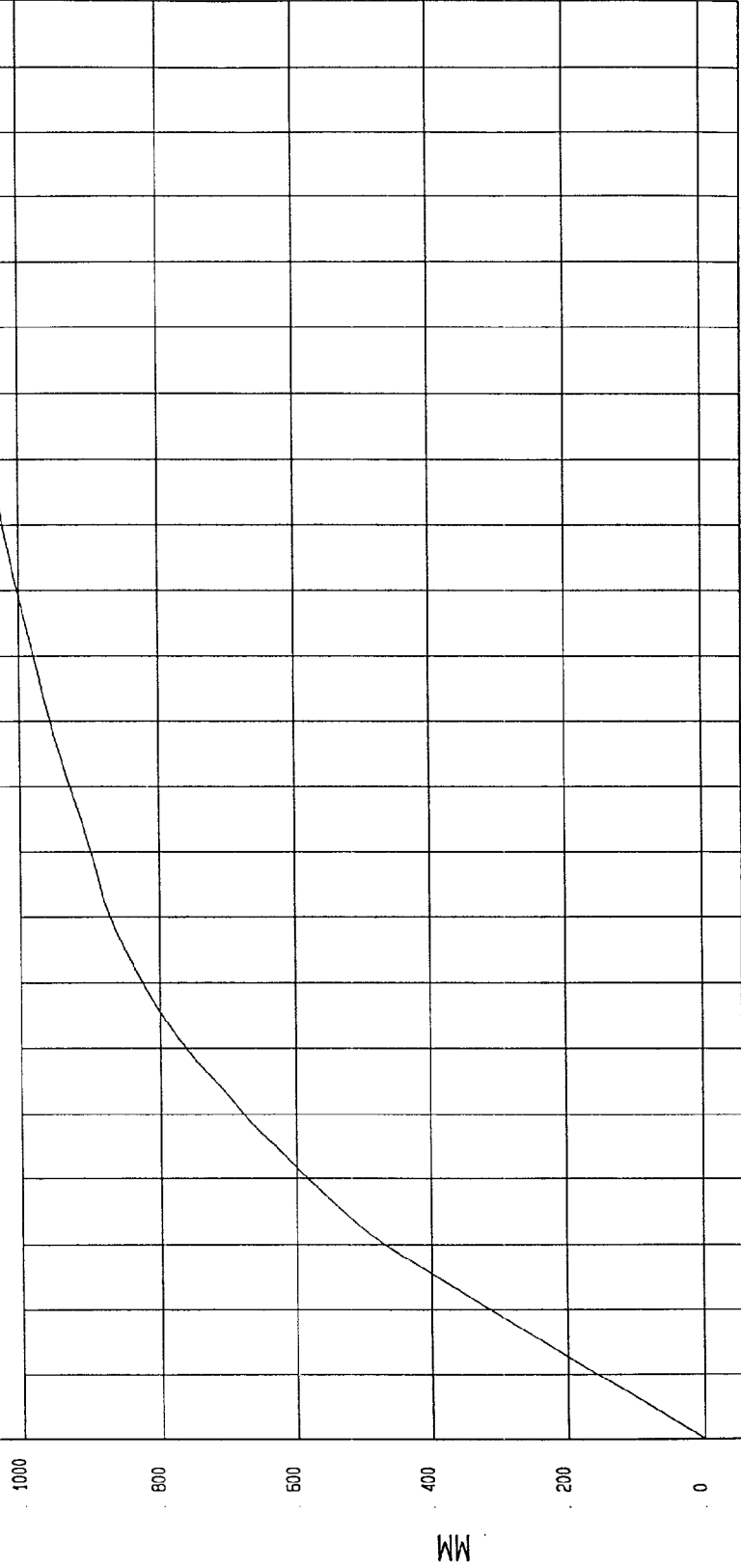
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 0 MM at -20 msec Maximum = 1142.73 MM at 200 msec

RIGHT FRONT BRAKE CALIPER X DISPLACEMENT

1 C99025A1.013 Filterclass (180)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = -84.56 G's at 24 msec

Maximum = 16.77 G's at 44 msec

INSTRUMENT PANEL X ACCELERATION

1 B99025AF A10 Filterclass (50)

20

0

-20

-40

-60

-80

G's

-02

-01

0

01

02

03

04

05

06

07

08

09

10

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

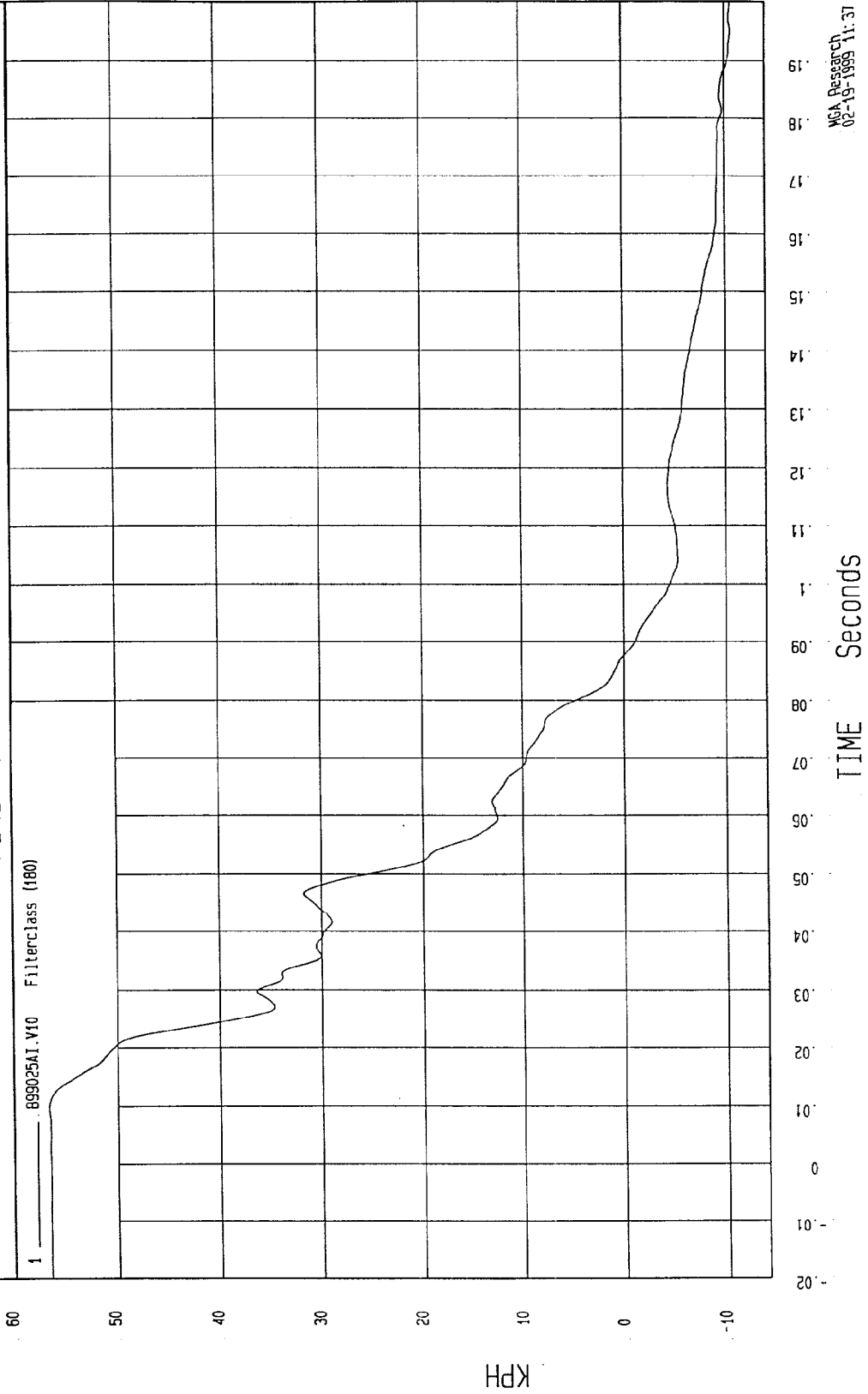
MCA Research
02-19-1999 11:28

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -10.6 KPH at 195 msec Maximum = 56.74 KPH at 10 msec

INSTRUMENT PANEL X VELOCITY



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

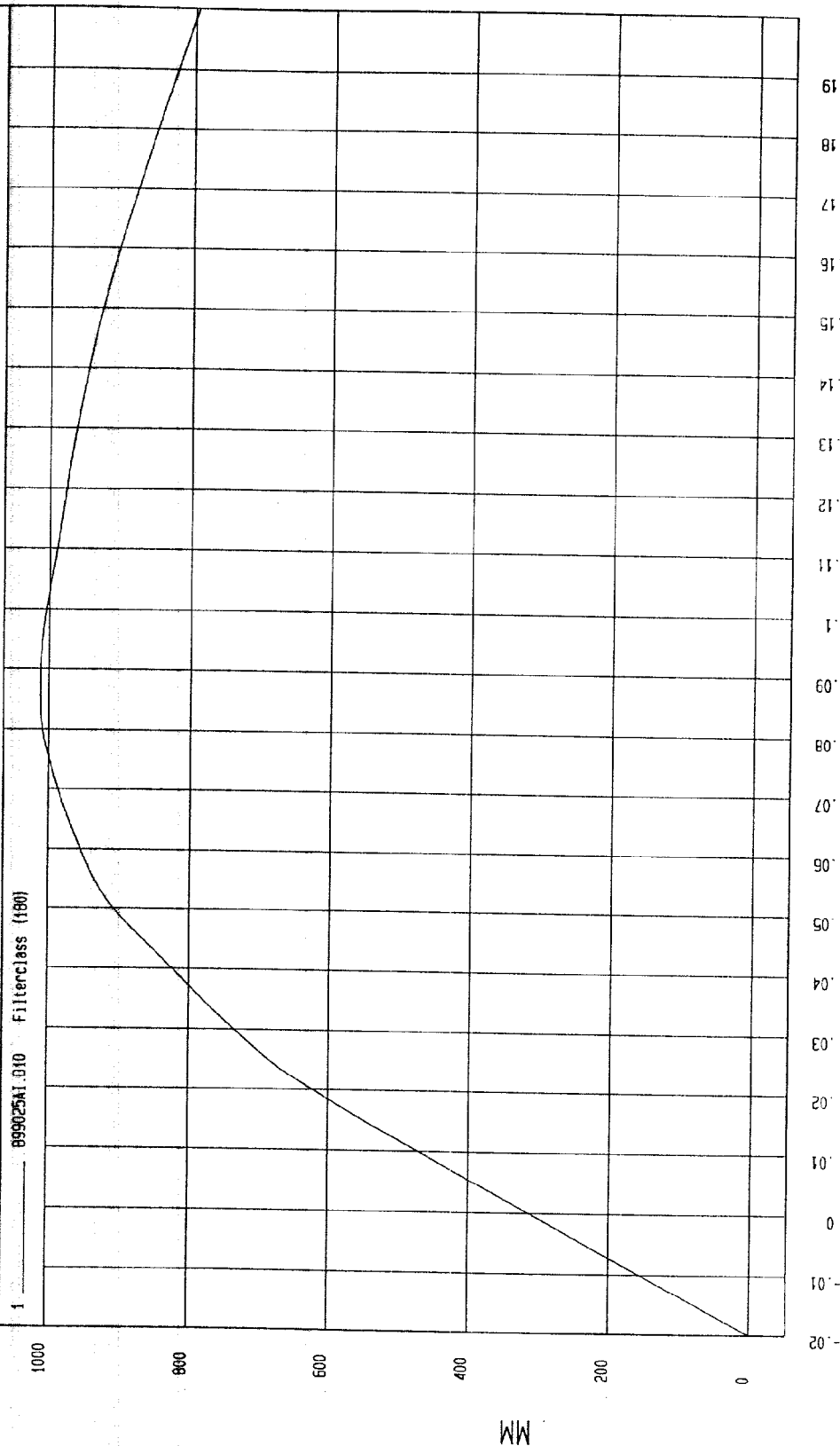
COMPONENT: 1999 FORD RANGER EV

Minimum = 0 MM at -20 msec

Maximum = 1012 MM at 88 msec

INSTRUMENT PANEL X DISPLACEMENT

1 899025A1.010 Filterclass (180)



NGA Research
02-19-1999 11:38

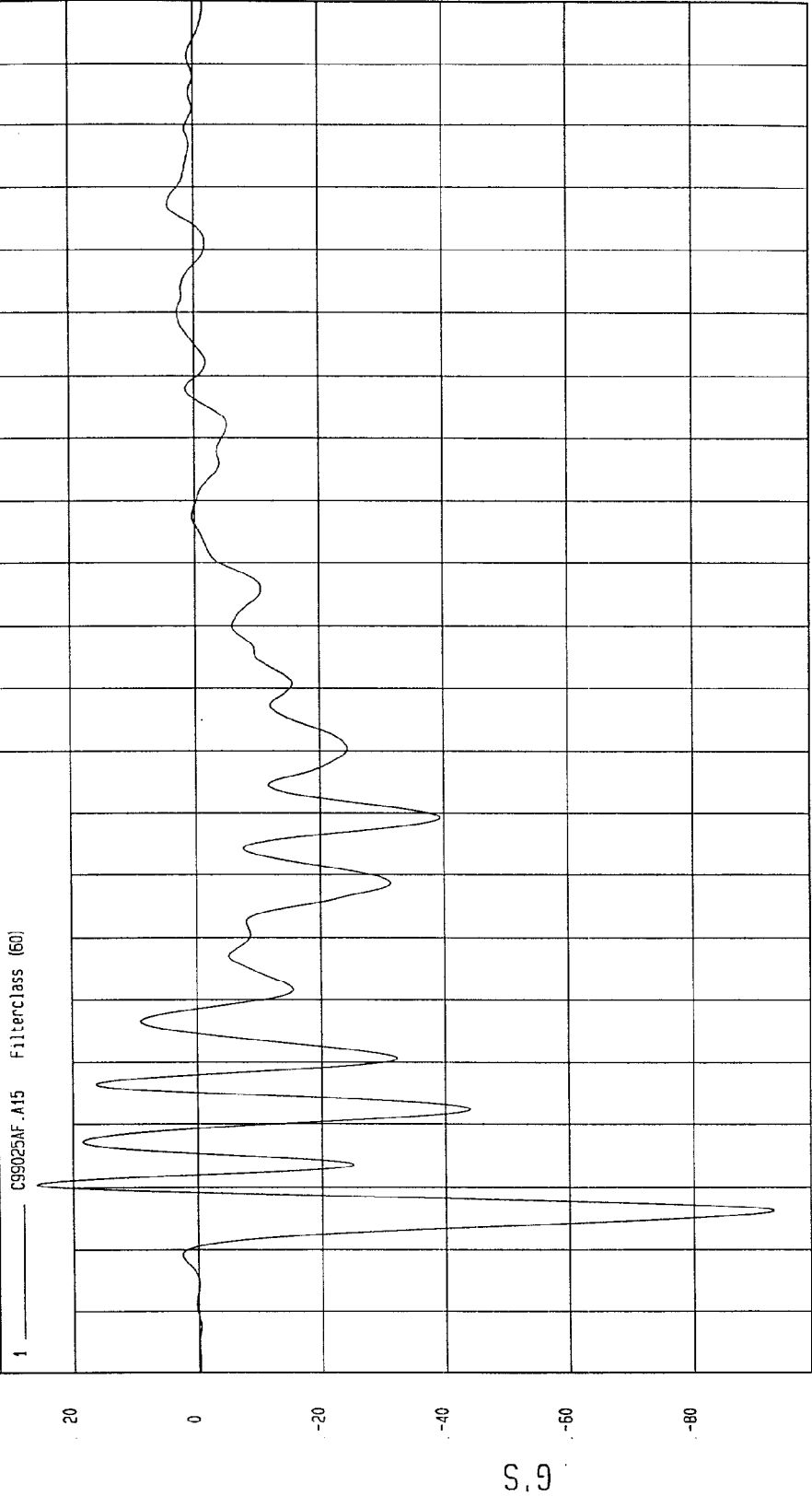
TIME Seconds

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -92.83 G'S at 6 msec Maximum = 25.81 G'S at 10 msec

LEFT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION



TIME (seconds)

0.19 0.18 0.17 0.16 0.15 0.14 0.13 0.12 0.11 0.1 0.09 0.08 0.07 0.06 0.05 0.04 0.03 0.02 0.01 0 -0.01 -0.02

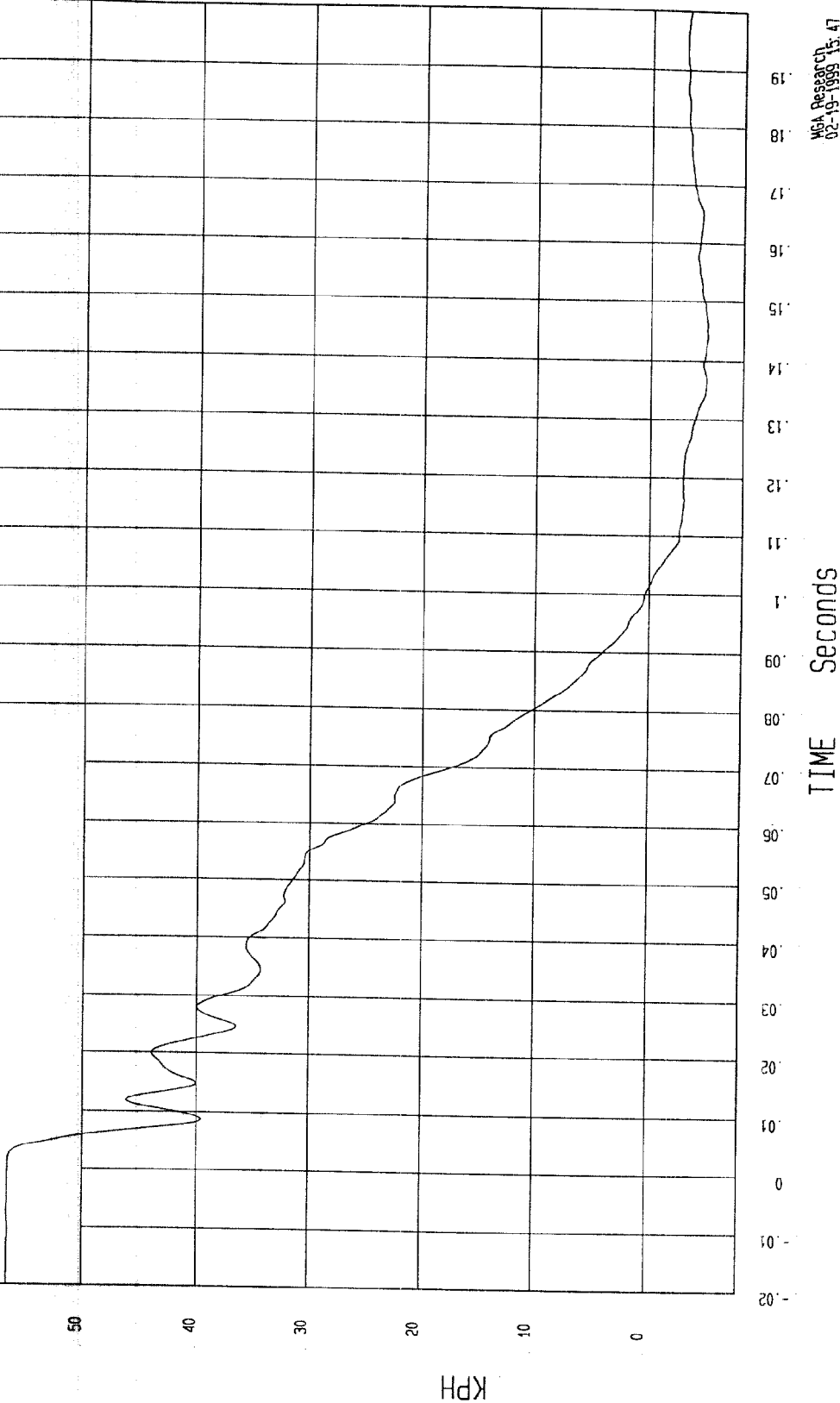
WCA Research
02-19-1999 10:05

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -4.93 KPH at 144 msec Maximum = 56.6 KPH at -20 msec

LEFT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY

1 C99025A1.V15 Filterclass (180)



MGA Research
02-19-1999 15:47

TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Minimum = 0 MM at -20 msec

Maximum = 1077.04 MM at 101 msec

LEFT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT

1 C99025A1.D15 Filterclass (180)

MM

1000

800

600

400

200

0

MM

19

18

17

16

15

14

13

12

11

10

09

08

07

06

05

04

03

02

01

0

-01

-02

TIME
Seconds

WCA Research
02-19-1999 15:47

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -100.5 G'S at 8 msec Maximum = 29.15 G'S at 12 msec

RIGHT REAR SEAT CROSSMEMBER REDUNDANT X ACCELERATION

1 B99025AF.A66 FilterClass (60)

20

0

-20

-40

-60

-80

-100

G.S

-02

-01

0

01

02

03

04

05

06

07

08

09

1

11

12

13

14

15

16

17

18

19

TIME (SECONDS)

MCA Research
02-19-1999 11:28

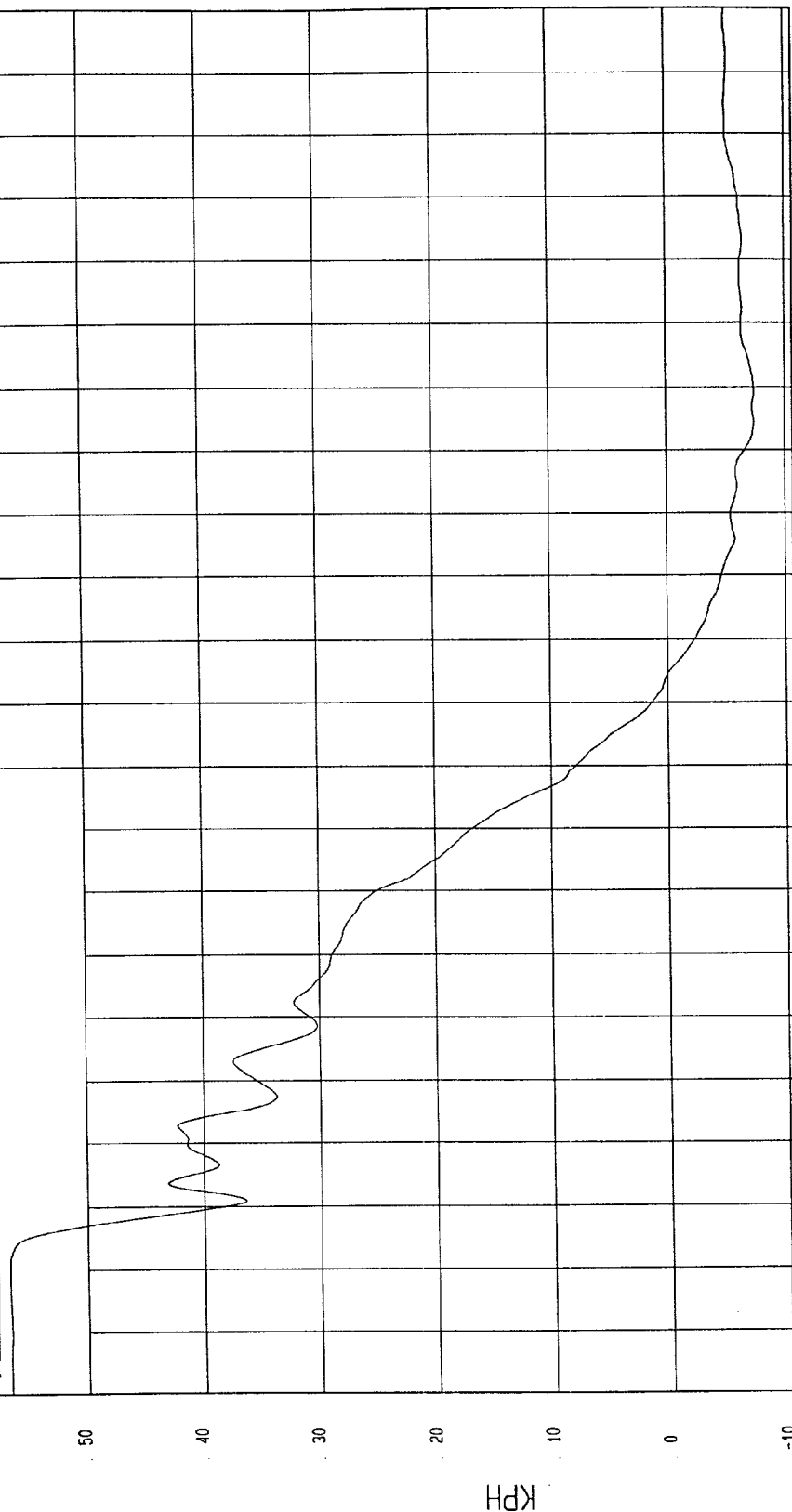
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -7.45 KPH at 139 msec Maximum = 56.65 KPH at 0 msec

RIGHT REAR SEAT CROSSMEMBER REDUNDANT X VELOCITY

1 B99025AI.V66 Filterclass (180)



MCA Research
02-18-1999 11:37

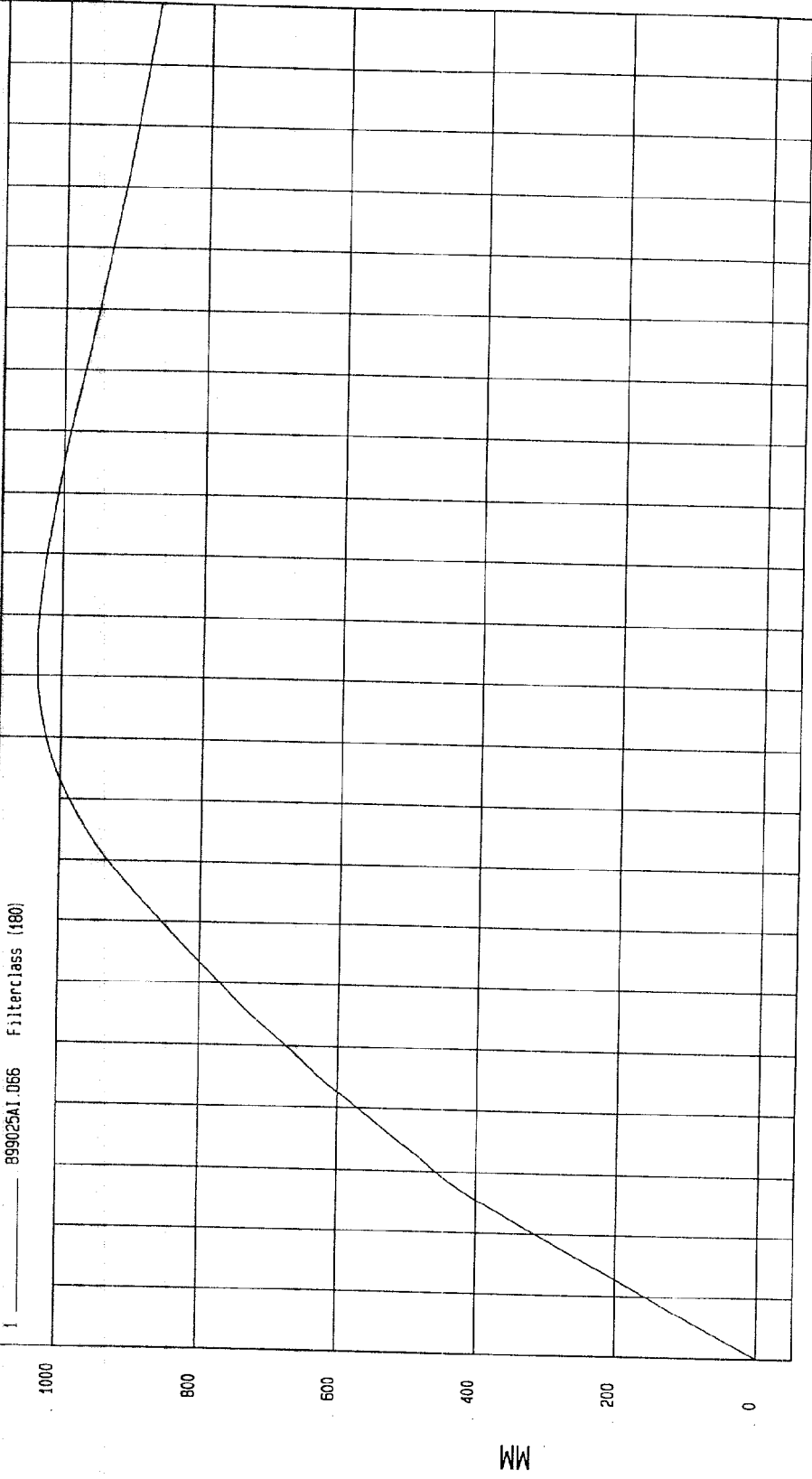
TIME Seconds

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = 0 MM at -20 msec Maximum = 1033.91 MM at 94 msec

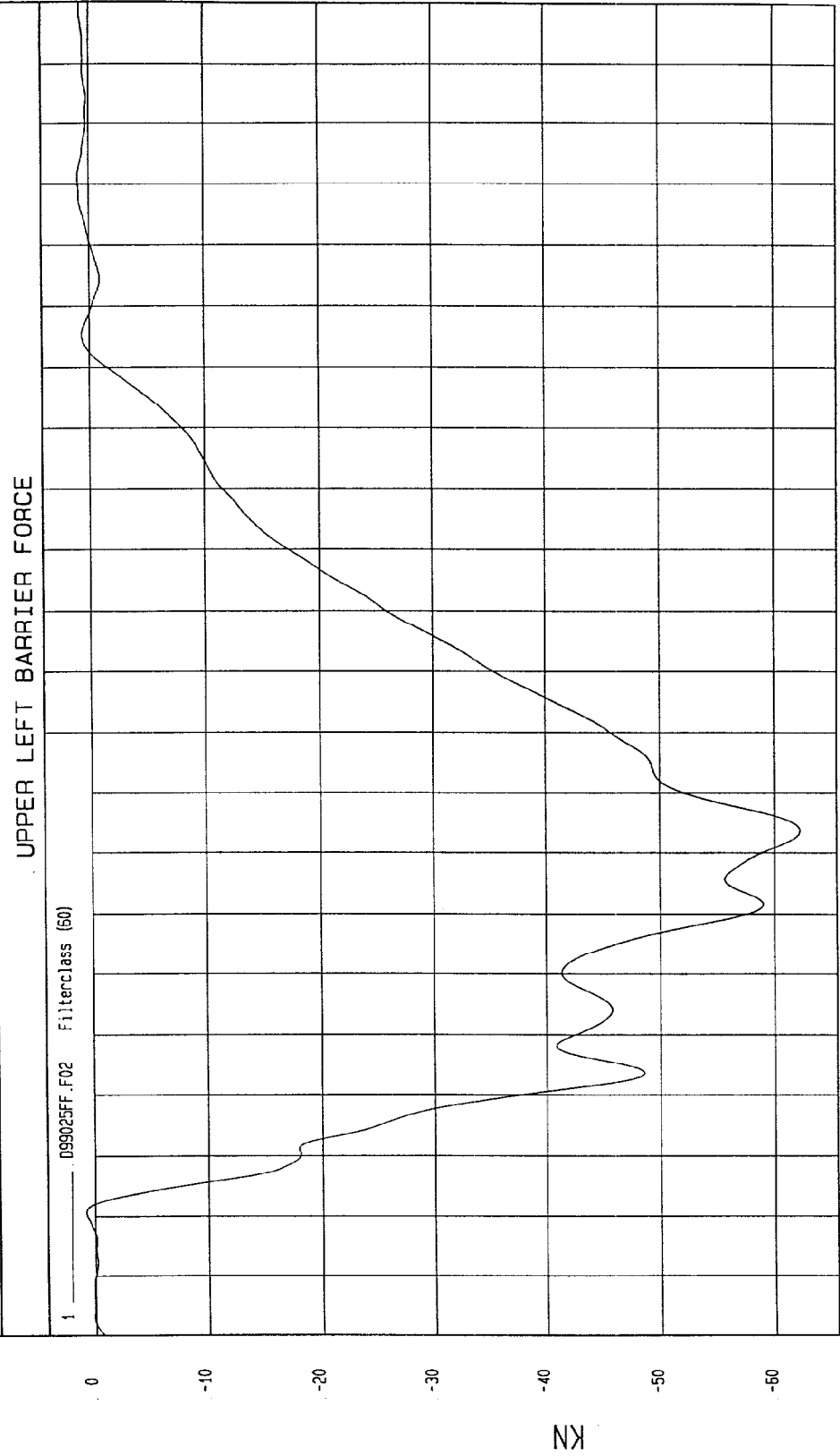
RIGHT REAR SEAT CROSSMEMBER REDUNDANT X DISPLACEMENT



MGA Research
02-19-1999 11:38

TIME Seconds

TEST: NCAP 35 MPH FRONTAL IMPACT	TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV	Speed: 35.2 MPH 56.6 KPH
Minimum = -62.29 KN at 64 msec	
Maximum = .97 KN at 171 msec	

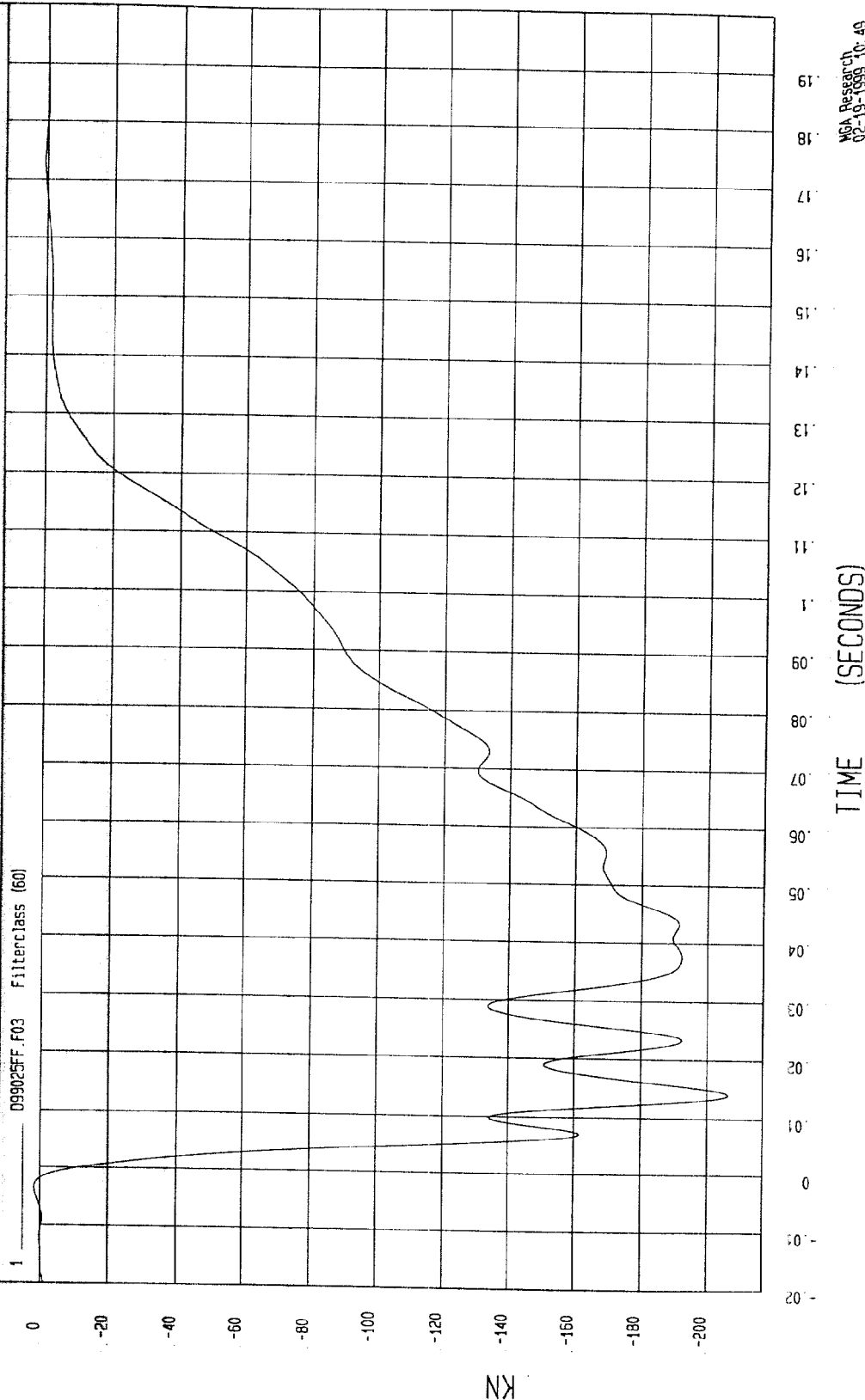


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -206.3 KN at 14 msec Maximum = 1.64 KN at -4 msec

UPPER CENTER BARRIER FORCE

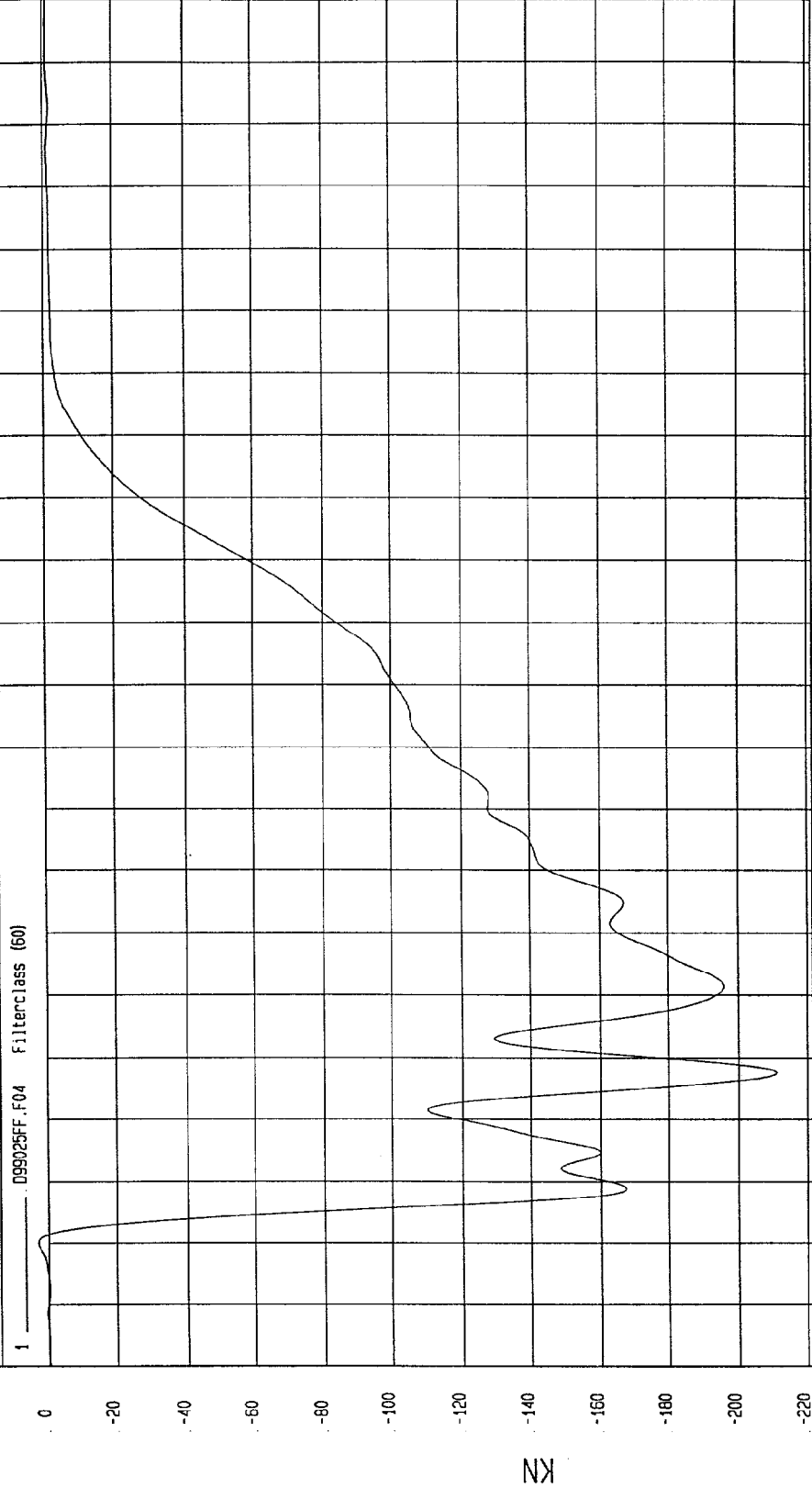


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -211.02 KN at 28 msec Maximum = 2.99 KN at 0 msec

UPPER RIGHT BARRIER FORCE



MCA Research
02-19-1999 10:49

TIME (SECONDS)

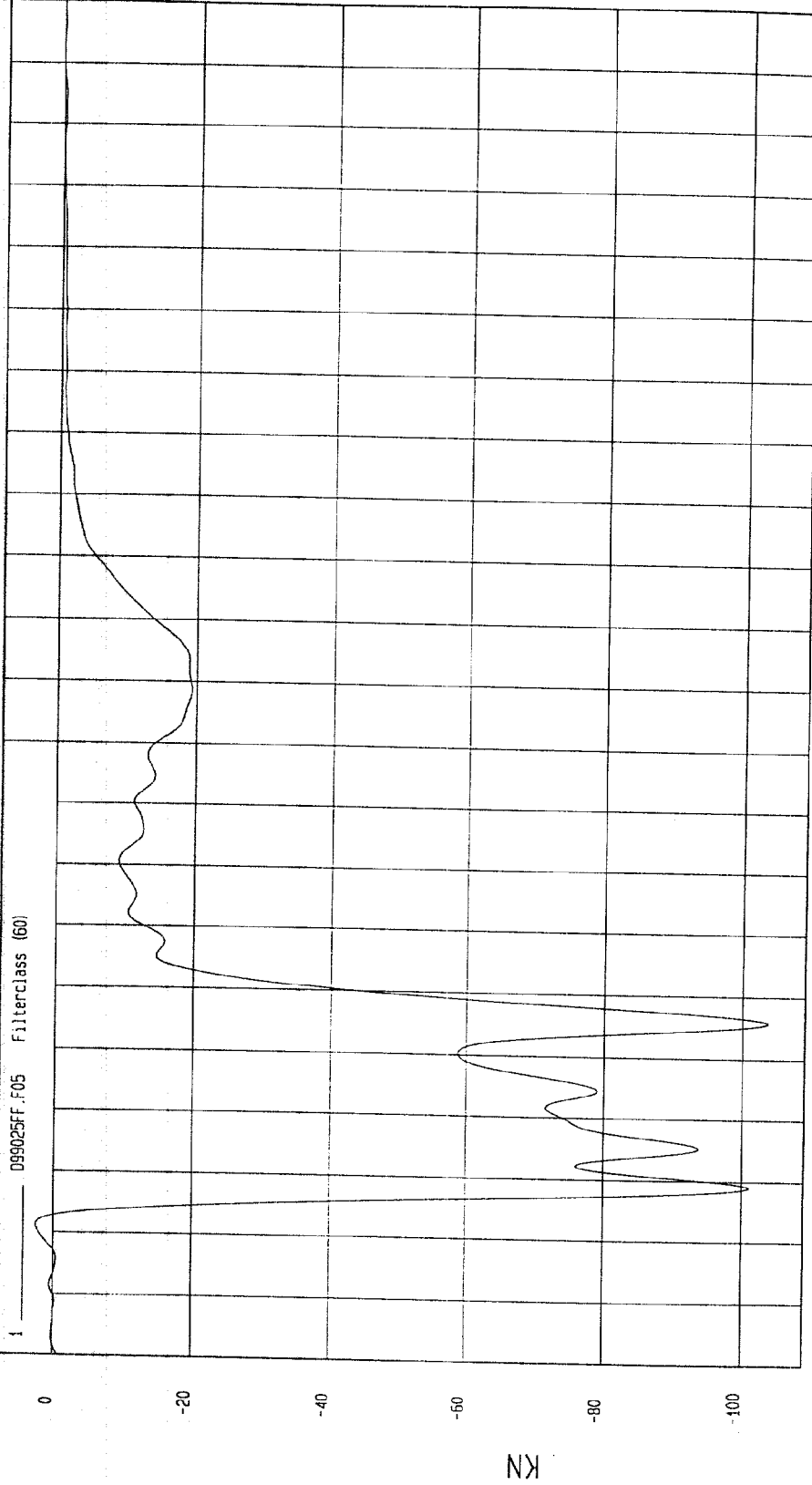
TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

Minimum = -103.65 KN at 36 msec
Maximum = 2.56 KN at 1 msec

LOWER LEFT BARRIER FORCE

1 ——— D99025FF.F05 FilterClass (60)



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

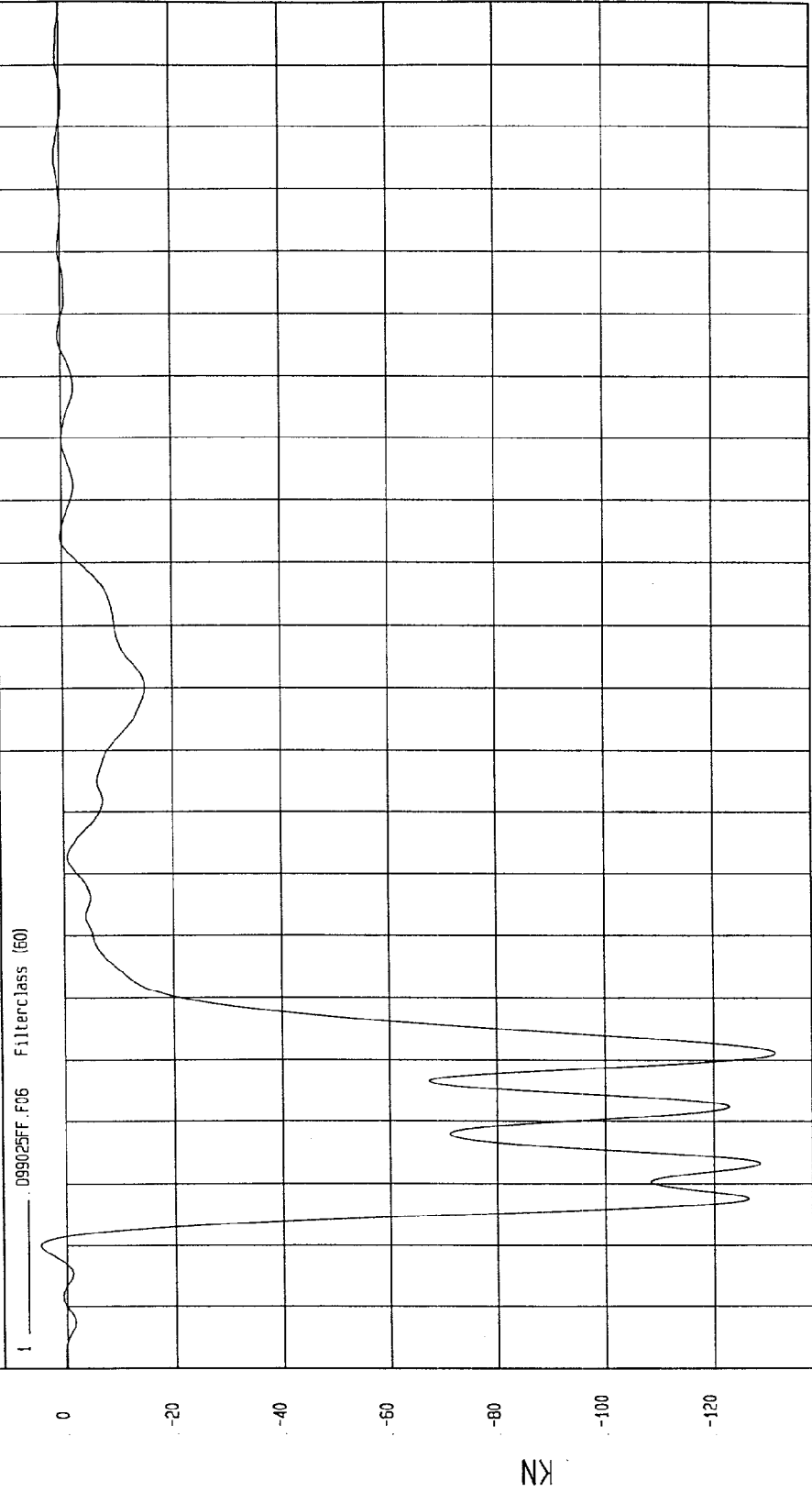
SPEED: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 4.79 KN at 0 msec

Minimum = -131.32 KN at 31 msec

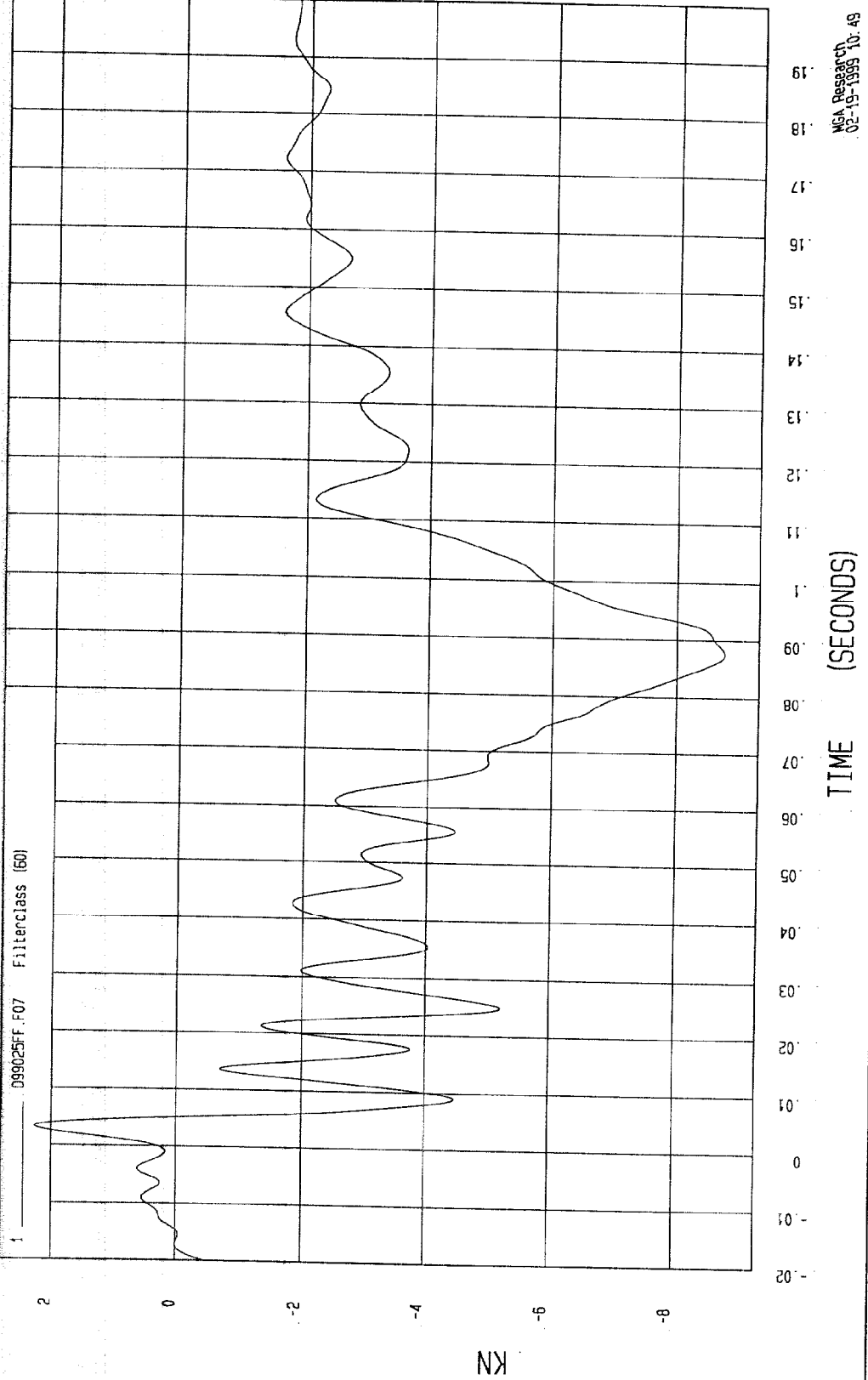
LOWER CENTER BARRIER FORCE



MCA Research
02-19-1999 10:49

TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH
Minimum = -8.77 KN at 88 msec Maximum = 2.27 KN at 3 msec

LOWER RIGHT BARRIER FORCE



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

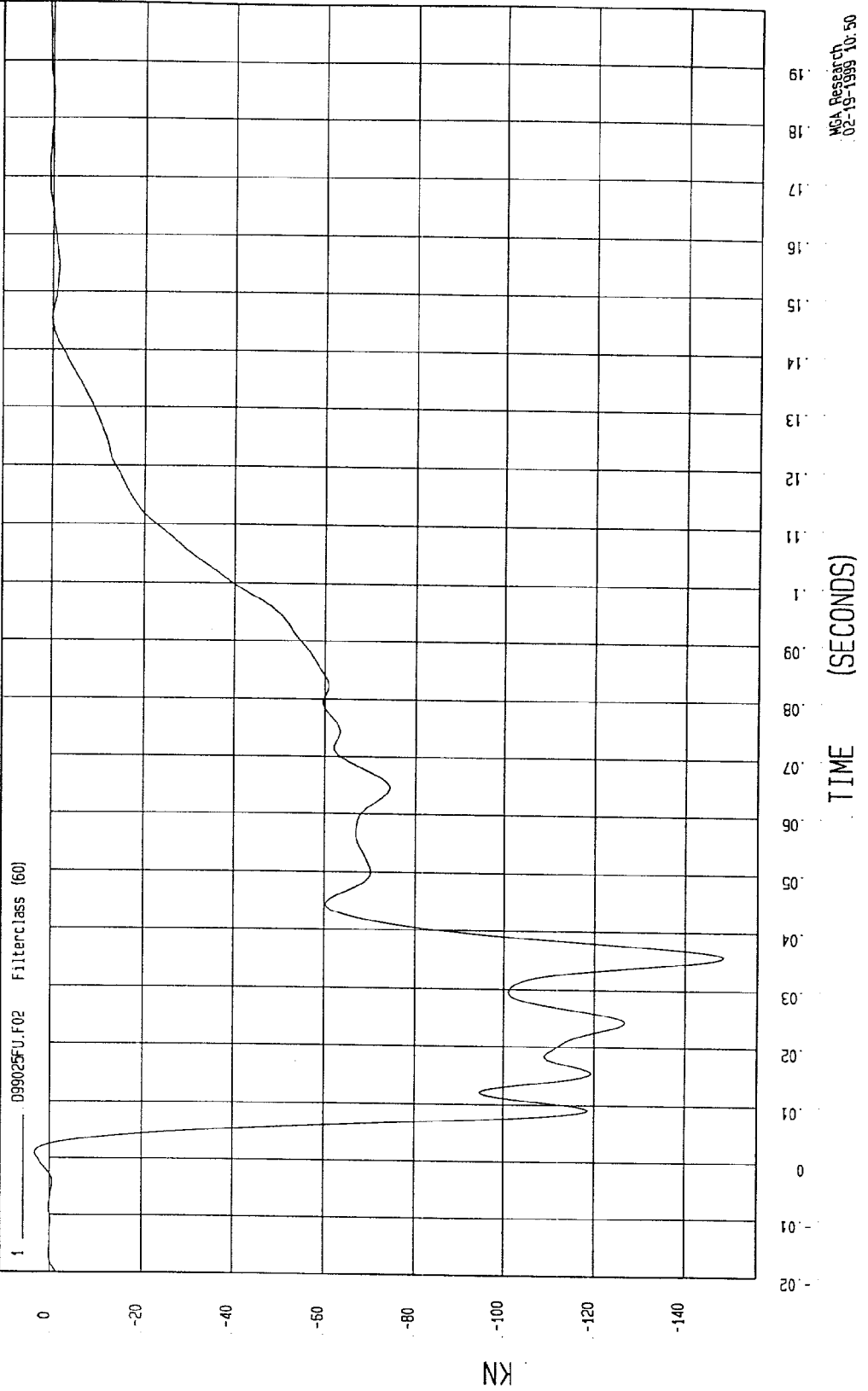
Speed: 35.2 MPH 56.6 KPH

COMPONENT: 1999 FORD RANGER EV

Maximum = 3.29 KN at 1 msec

Minimum = -148.57 KN at 36 msec

SUM OF LEFT BARRIER FORCES

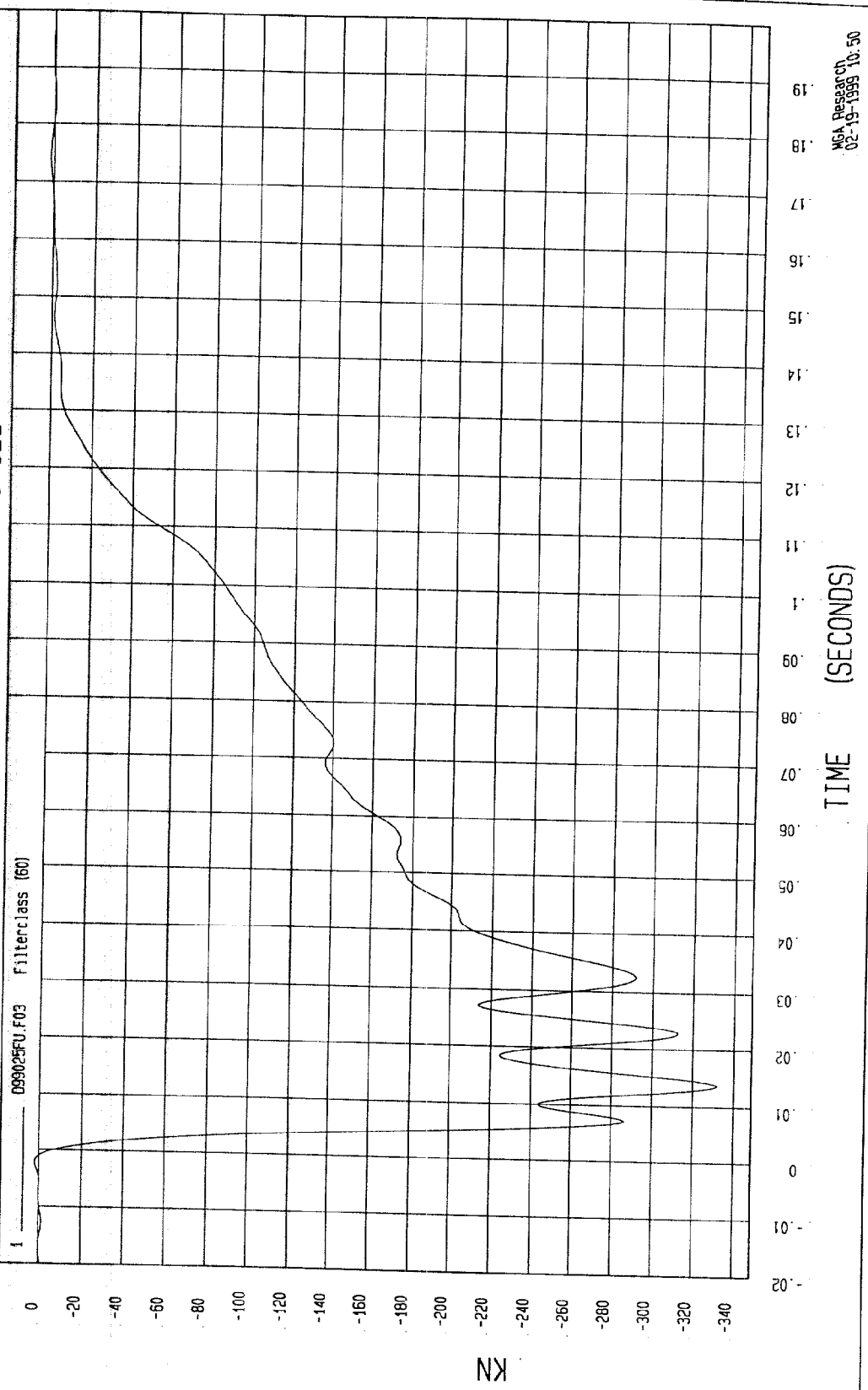


TEST: NCAP 35 MPH FRONTAL IMPACT TEST DATE: 02-18-1999

COMPONENT: 1999 FORD RANGER EV Speed: 35.2 MPH 56.6 KPH

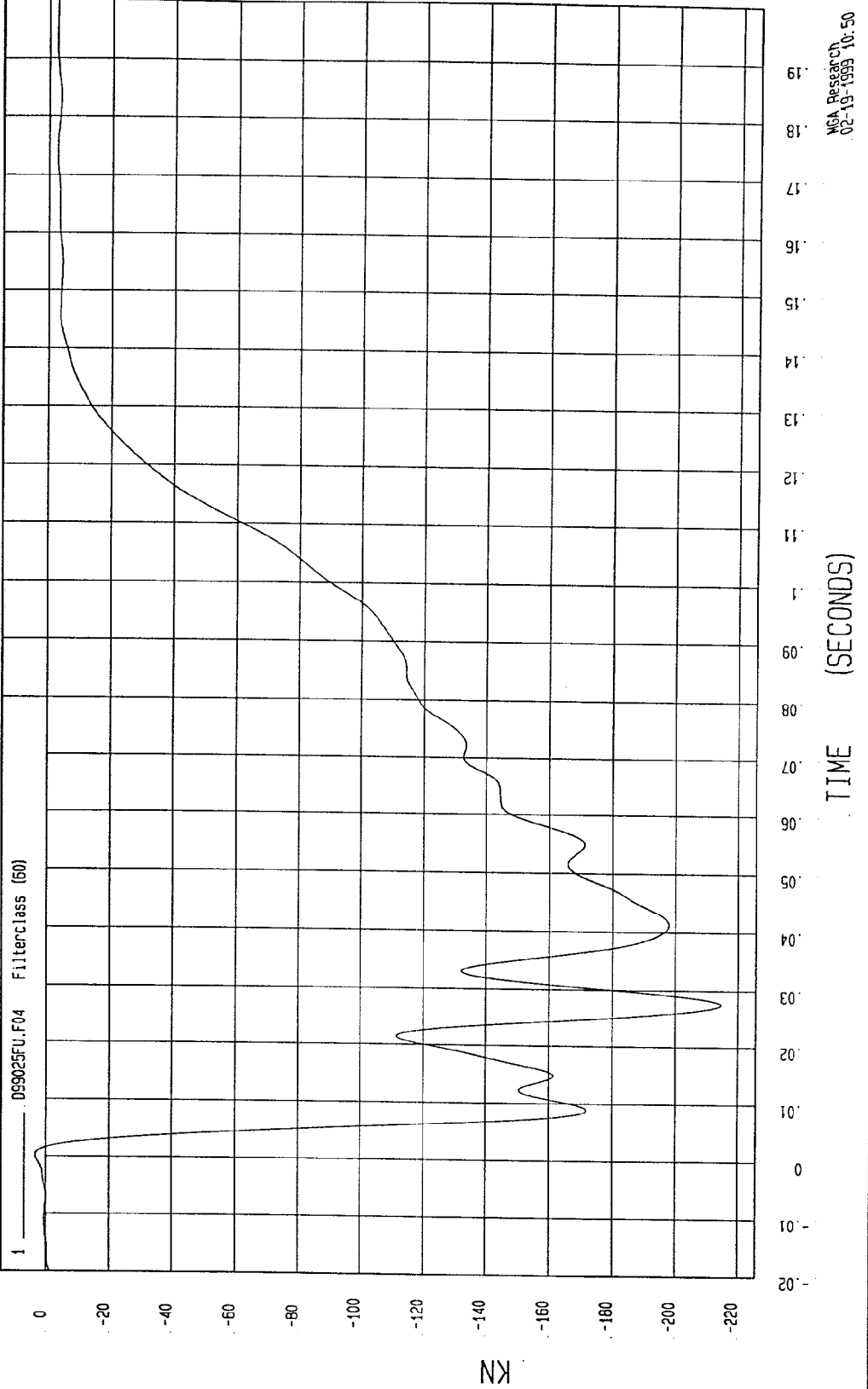
Minimum = -332 KN at 14 msec Maximum = 2.07 KN at -2 msec

SUM OF CENTER BARRIER FORCES



TEST: NCAP 35 MPH FRONTAL IMPACT
TEST DATE: 02-18-1999
COMPONENT: 1999 FORD RANGER EV
Speed: 35.2 MPH 56.6 KPH
Minimum = -214.73 KN at 28 msec
Maximum = 3.34 KN at 0 msec

SUM OF RIGHT BARRIER FORCES



TEST: NCAP 35 MPH FRONTAL IMPACT

TEST DATE: 02-18-1999

SPEED: 35.2 MPH 56.6 KPH

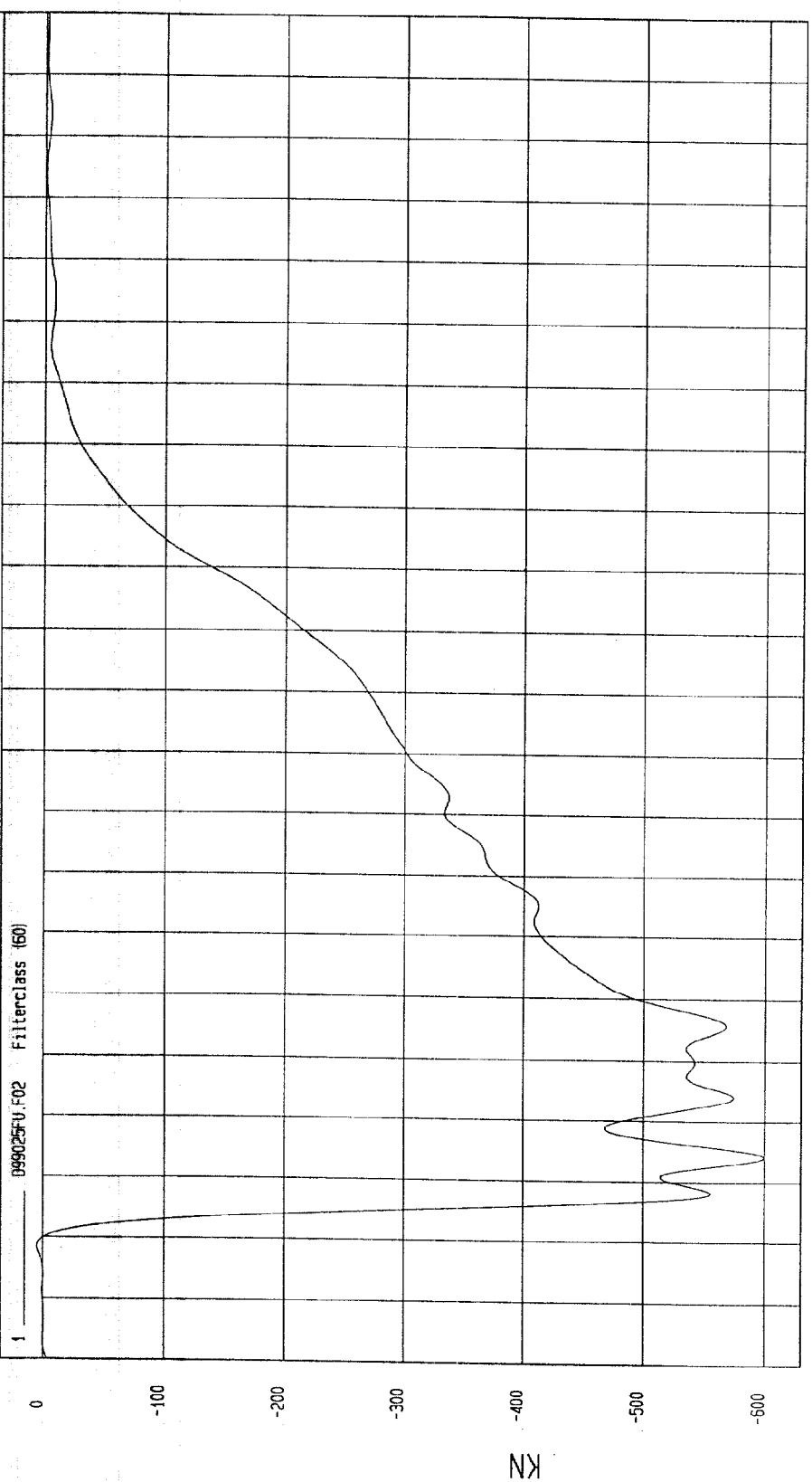
COMPONENT: 1999 FORD RANGER EV

Maximum = 4.85 KN at -2 msec

Minimum = -500.14 KN at 14 msec

SUM OF BARRIER FORCES

1 099025V.F02 Filterclass (60)



NSA Research
02-19-1999 10:50

APPENDIX C
DUMMY CONFIGURATION & PERFORMANCE VERIFICATION DATA

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 065 DUMMY CALIBRATION BY: Tim Michnay

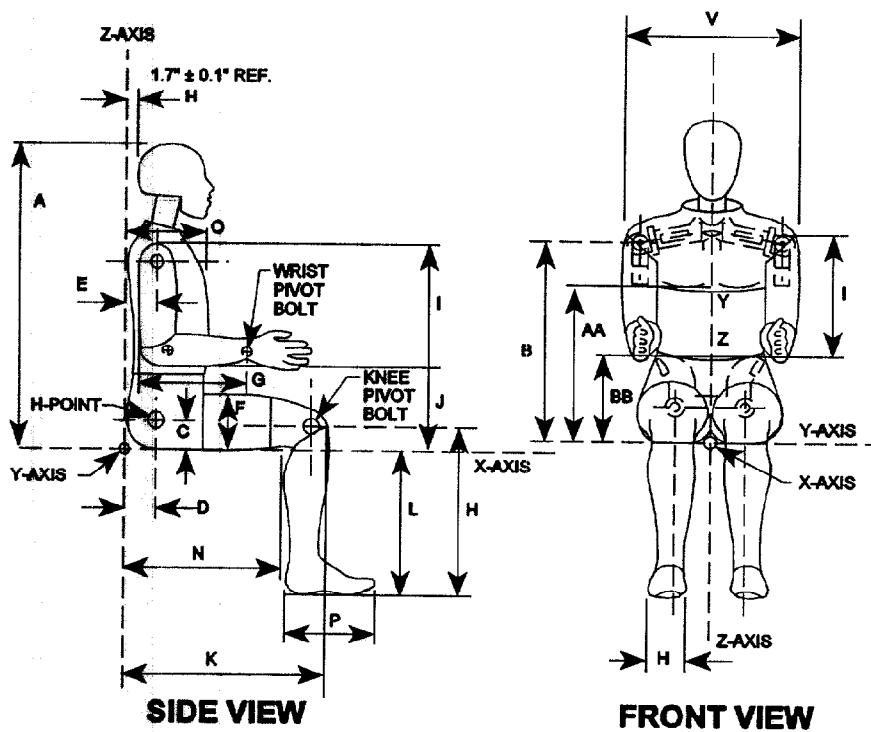
I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: January 10, 1999

DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.7
B - Shoulder Pivot Height	19.9 - 20.5	20.2
C - "H" Point Height	3.3 - 3.5	3.4
D - "H" Point from Seat Back	5.3 - 5.5	5.4
E - Shoulder Pivot From Backline	3.3 - 3.7	3.5
F - Thigh Clearance	5.5 - 6.1	5.8
G - Back of Elbow to Wrist Pivot	11.4 - 12.0	11.6
H - Skull Cap Skin to Backline	1.6 - 1.8	1.7
I - Shoulder Elbow Length	13.0 - 13.6	13.5
J - Elbow Rest Height	7.5 - 8.3	8.0
K - Buttock Knee Length	22.8 - 23.8	23.4
L - Popliteal Height	16.9 - 17.9	17.7
M - Knee Pivot Height	19.1 - 19.9	19.5
N - Buttock Popliteal Length	17.8 - 18.8	18.5
O - Chest Depth at 3rd Rib	8.4 - 9.0	8.9
P - Foot Length	9.9 - 10.5	10.4
V - Shoulder Breadth	16.6 - 17.2	16.8
W - Foot Breadth	3.5 - 4.2	4.0
Y - Chest Circumference	38.2 - 39.4	39.0
Z - Waist Circumference	32.9 - 34.1	33.8

Note: (See page C-2 for external dimensions)

HYBRID III EXTERNAL DIMENSIONS



Note: Figure is referenced to the erect seated position. The curved lumbar does not allow the hybrid III to be positioned in a perfect erect attitude.

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

DUMMY NO.: 065 DUMMY CALIBRATION BY: Tim MichnayVERIFICATION DATE: January 10, 1999VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 70°

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	257
Peak Lateral Acceleration	15 G. MAX	6
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	23.0
Pendulum Deceleration	10 MS	22.50 - 27.50 G	24.93
	20 MS	17.60 - 22.60 G	20.86
	30 MS	12.50 - 18.50 G	14.62
Max. Pendulum G Above 30 MS		29.0 G MAX	14.6
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	38
D Plane Rotation	MAX	64 - 78 DEG.	75
	TIME	57 - 64 MS	61
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	119
Moment About Occipital Condyle	MAX.	65 - 80 FT.LBS	66
	TIME	47 - 58 MS	51
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	106

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	19.79
Pendulum Deceleration	10 MS	17.20 - 21.20 G	20.75
	20 MS	14.00 - 19.00 G	16.34
	30 MS	11.00 - 16.00 G	12.97
Max. Pendulum G Above 30 MS		22 G Max	13
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	41
D Plane Rotation	MAX	81 - 106 DEG.	101
	TIME	72 - 82 MS	77
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	159
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-49.3
	TIME	65 - 79 MS	73
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	139

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	22.1
Peak Deflection	2.50 to 2.86 IN.	2.63
Peak Resistive Force	1160 to 1325 LBS.	1245
Internal Hysteresis	69 to 85%	74%

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

5.0 KNEE IMPACT TESTS

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.8
Maximum Force	1060 - 1300 LBS.	1069

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	7.0
Maximum Force	1060 - 1300 LBS.	1066

6.0 HIP JOINT-FEMUR FLEXION TEST

LEFT KNEE	SPECIFICATION	MEASUREMENT	
		LEFT	RIGHT
Relative Humidity	10 - 70%	14%	
Rotation Rate	5-10 DEG/SEC.	Yes	Yes
30 DEGREE ROTATION	70 FT-LBF	69	42
150 FT-LBF	40-50 degree maximum rotation	41°	46°

HYBRID III DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

DUMMY NO.: 066 DUMMY CALIBRATION BY: Tim Michnay

I. CONFIGURATION VERIFICATION DATA

DATE OF VERIFICATION: January 10, 1999

DESCRIPTION	SPECIFICATION (Inches)	ACTUAL MEASUREMENT (inches)
A - Total Sitting Height	34.6 - 35.0	34.8
B - Shoulder Pivot Height	19.9 - 20.5	20.1
C - "H" Point Height	3.3 - 3.5	3.4
D - "H" Point from Seat Back	5.3 - 5.5	5.4
E - Shoulder Pivot From Backline	3.3 - 3.7	3.4
F - Thigh Clearance	5.5 - 6.1	5.9
G - Back of Elbow to Wrist Pivot	11.4 - 12.0	11.7
H - Skull Cap Skin to Backline	1.6 - 1.8	1.7
I - Shoulder Elbow Length	13.0 - 13.6	13.4
J - Elbow Rest Height	7.5 - 8.3	8.1
K - Buttock Knee Length	22.8 - 23.8	23.5
L - Popliteal Height	16.9 - 17.9	17.6
M - Knee Pivot Height	19.1 - 19.9	19.5
N - Buttock Popliteal Length	17.8 - 18.8	18.2
O - Chest Depth at 3rd Rib	8.4 - 9.0	8.8
P - Foot Length	9.9 - 10.5	10.4
V - Shoulder Breadth	16.6 - 17.2	16.9
W - Foot Breadth	3.5 - 4.2	4.0
Y - Chest Circumference	38.2 - 39.4	39.1
Z - Waist Circumference	32.9 - 34.1	33.5

Note: (See next page for external dimensions)

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET

DUMMY NO.: 066 DUMMY CALIBRATION BY: Tim MichnayVERIFICATION DATE: January 10, 1999VERIFICATION LABORATORY TEMPERATURE (66° - 78°): 70°

1.0 HEAD DROP TEST

	SPECIFICATION	MEASUREMENT
Peak Resultant Acceleration	225 - 275 G	269
Peak Lateral Acceleration	15 G. MAX	-14
Is Acceleration Curve Unimodal	within 10% of peak	Yes

2.0 NECK FLEXION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		22.6 - 23.4 FT/SEC	22.8
Pendulum Deceleration	10 MS	22.50 - 27.50 G	24.00
	20 MS	17.60 - 22.60 G	19.93
	30 MS	12.50 - 18.50 G	14.11
Max. Pendulum G Above 30 MS		29.0 G MAX	14.1
Deceleration - Time Curve Decay Time to 5 G		34 - 42 MS	41
D Plane Rotation	MAX	64 - 78 DEG.	66
	TIME	57 - 64 MS	59
Rotation Angle - Time Curve Decay Time to Zero		113 - 128 MS	120
Moment About Occipital Condyle	MAX.	65 - 80 FT.LBS	67
	TIME	47 - 58 MS	54
Positive Moment - Time Curve Decay Time to Zero		97 - 107 MS	105

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

3.0 NECK EXTENSION TEST

		SPECIFICATION	MEASUREMENT
Pendulum Speed		19.50 - 20.30 F/S	19.87
Pendulum Deceleration	10 MS	17.20 - 21.20 G	18.73
	20 MS	14.00 - 19.00 G	15.15
	30 MS	11.00 - 16.00 G	13.64
Max. Pendulum G Above 30 MS		22 G Max	14
Deceleration - Time Curve Decay Time to 5 G		38 - 46 MS	43
D Plane Rotation	MAX	81 - 106 DEG.	93
	TIME	72 - 82 MS	78
Rotation Angle - Time Curve Decay Time to Zero		147 - 174 MS	160
Moment About Occipital Condyle	MIN.	-59.0/-39.0 FT LBS	-48.0
	TIME	65 - 79 MS	74
Positive Moment - Time Curve Decay Time to Zero		120 - 148 MS	143

4.0 CHEST IMPACT TESTS

	SPECIFICATION	MEASUREMENT
Probe Speed	21.6 to 22.4 F/S	22.1
Peak Deflection	2.50 to 2.86 IN.	2.67
Peak Resistive Force	1160 to 1325 LBS.	1232
Internal Hysteresis	69 to 85%	71%

HYBRID III DUMMY CALIBRATION DATA SUMMARY SHEET (CONT.)

5.0 KNEE IMPACT TESTS

RIGHT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1082

LEFT KNEE	SPECIFICATION	MEASUREMENT
Probe Speed	6.8 to 7.0 F/S	6.9
Maximum Force	1060 - 1300 LBS.	1073

6.0 HIP JOINT-FEMUR FLEXION TEST

LEFT KNEE	SPECIFICATION	MEASUREMENT	
		LEFT	RIGHT
Relative Humidity	10 - 70%	14%	
Rotation Rate	5-10 DEG/SEC.	Yes	Yes
30 DEGREE MAX. ROTATION	70 FT-LBF	59	45
150 FT-LBF	40-50 DEGREE MAX. ROTATION	42°	43°

APPENDIX D
TEST EQUIPMENT & INSTRUMENTATION CALIBRATION

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DUMMY NO. 065

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	AAMN8	Endevco	January 8, 1999
Head Y	ACC61	Endevco	January 8, 1999
Head Z	ACCW9	Endevco	January 8, 1999
Head X Redundant	AJ621	Endevco	January 8, 1999
Head Y Redundant	AJ619	Endevco	January 8, 1999
Head Z Redundant	AHY54	Endevco	January 8, 1999
Chest X	ACC78	Endevco	January 8, 1999
Chest Y	ACCE6	Endevco	January 8, 1999
Chest Z	ACCY3	Endevco	January 8, 1999
Chest X Redundant	AJ9J7	Endevco	January 8, 1999
Chest Y Redundant	AJ7A2	Endevco	January 8, 1999
Chest Z Redundant	AJ819	Endevco	January 8, 1999
Right Femur Load Cell	259	Denton	January 11, 1999
Left Femur Load Cell	260	Denton	January 11, 1999
Pelvis X	J20298	Endevco	January 8, 1999
Pelvis Y	J17709	Endevco	January 8, 1999
Pelvis Z	J20473	Endevco	January 8, 1999

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DUMMY NO. 065

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	442	Denton	October 14, 1998
Neck Load Cell Y	442	Denton	October 14, 1998
Neck Load Cell Z	442	Denton	October 14, 1998
Neck Moment X	442	Denton	October 14, 1998
Neck Moment Y	442	Denton	October 14, 1998
Neck Moment Z	442	Denton	October 14, 1998
Chest Deflection Gauge	65	Servo	January 10, 1999
Lap Belt Load Cell	690	Eaton-Lebow	February 8, 1999
Shoulder Belt Load Cell	624	Eaton-Lebow	February 8, 1999

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DUMMY NO. 065

	DRIVER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	103	Denton	December 3, 1998
Upper Right Tibia Moment Y	103	Denton	December 3, 1998
Upper Right Tibia Force Z	103	Denton	December 3, 1998
Lower Right Tibia Moment X	133	Denton	December 4, 1998
Lower Right Tibia Moment Y	133	Denton	December 4, 1998
Lower Right Tibia Force Z	133	Denton	December 4, 1998
Upper Left Tibia Moment X	105	Denton	December 3, 1998
Upper Left Tibia Moment Y	105	Denton	December 3, 1998
Upper Left Tibia Force Z	105	Denton	December 3, 1998
Lower Left Tibia Moment X	134	Denton	December 4, 1998
Lower Left Tibia Moment Y	134	Denton	December 4, 1998
Lower Left Tibia Force Z	134	Denton	December 4, 1998
Right Heel X Acceleration	ANAM1	Endevco	September 27, 1998
Right Heel Z Acceleration	ANAN7	Endevco	September 27, 1998
Right Foot Ball Z Acceleration	AJ9Y3	Endevco	September 27, 1998
Left Heel X Acceleration	AJ8Y6	Endevco	September 27, 1998
Left Heel Z Acceleration	AGTG8	Endevco	September 27, 1998
Left Foot Ball Z Acceleration	AJ820	Endevco	September 27, 1998

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

INSTRUMENTS FOR DUMMY NO. 066

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Head X	ACCY6	Endevco	January 7, 1999
Head Y	ACCH1	Endevco	January 7, 1999
Head Z	AAMW5	Endevco	January 7, 1999
Head X Redundant	AJ9D2	Endevco	January 7, 1999
Head Y Redundant	AH1E2	Endevco	January 7, 1999
Head Z Redundant	AJ7K3	Endevco	January 7, 1999
Chest X	ACCY1	Endevco	January 7, 1999
Chest Y	ACCC8	Endevco	January 7, 1999
Chest Z	ACCT7	Endevco	January 7, 1999
Chest X Redundant	AJ9D4	Endevco	January 7, 1999
Chest Y Redundant	AJ9F3	Endevco	January 7, 1999
Chest Z Redundant	AJ9D9	Endevco	January 7, 1999
Right Femur Load Cell	261	Denton	January 11, 1999
Left Femur Load Cell	262	Denton	January 11, 1999
Pelvis X	AJ9H0	Endevco	January 8, 1999
Pelvis Y	ANAN3	Endevco	January 8, 1999
Pelvis Z	ANAN6	Endevco	January 8, 1999

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DUMMY NO. 066

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Load Cell X	443	Denton	October 14, 1998
Neck Load Cell Y	443	Denton	October 14, 1998
Neck Load Cell Z	443	Denton	October 14, 1998
Neck Moment X	443	Denton	October 14, 1998
Neck Moment Y	443	Denton	October 14, 1998
Neck Moment Z	443	Denton	October 14, 1998
Chest Deflection Gauge	66	Servo	January 10, 1999
Lap Belt Load Cell	314	Denton	October 14, 1998
Shoulder Belt Load Cell	313	Denton	October 5, 1998

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION
INSTRUMENTS FOR DUMMY NO. 066

	PASSENGER		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Upper Right Tibia Moment X	106	Denton	December 3, 1998
Upper Right Tibia Moment Y	106	Denton	December 3, 1998
Upper Right Tibia Force Z	106	Denton	December 3, 1998
Lower Right Tibia Moment X	135	Denton	December 4, 1998
Lower Right Tibia Moment Y	135	Denton	December 4, 1998
Lower Right Tibia Force Z	135	Denton	December 4, 1998
Upper Left Tibia Moment X	109	Denton	December 3, 1998
Upper Left Tibia Moment Y	109	Denton	December 3, 1998
Upper Left Tibia Force Z	109	Denton	December 3, 1998
Lower Left Tibia Moment X	138	Denton	December 5, 1998
Lower Left Tibia Moment Y	138	Denton	December 5, 1998
Lower Left Tibia Force Z	138	Denton	December 5, 1998
Right Heel X Acceleration	AMPY0	Endevco	September 27, 1998
Right Heel Z Acceleration	AGRW3	Endevco	September 27, 1998
Right Football Z Acceleration	AHY71	Endevco	September 27, 1998
Left Heel X Acceleration	J13631	Endevco	September 27, 1998
Left Heel Z Acceleration	J13990	Endevco	September 27, 1998
Left Football Z Acceleration	J13930	Endevco	September 27, 1998

DUMMY, VEHICLE AND LABORATORY INSTRUMENT CALIBRATION

	VEHICLE ACCELEROMETERS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Left Rear Seat Crossmember X	I25-J01	Entran	February 2, 1999
Right Rear Seat Crossmember X	K11-J18	Entran	August 27, 1998
Top of Engine Block X	D05-R12	Entran	February 2, 1999
Bottom of Engine X	H02-J06	Entran	August 27, 1998
Left Brake Caliper X	J10-E18	Entran	December 21, 1998
Right Brake Caliper X	I25-J09	Entran	December 21, 1998
Instrument Panel X	I25-J02	Entran	August 27, 1998
Redundant Left Rear Seat Crossmember X	K19-A14	Entran	January 7, 1999
Redundant Right Rear Seat Crossmember X	MGA144	Entran	January 2, 1999

	LABORATORY INSTRUMENTS		
	SERIAL NO.	MANUFACTURER	CALIBRATION DATE
Neck Bending Pendulum Accelerometer	12871	Endevco	January 7, 1999
Neck Bending Head Rotary Potentiometer	018	Spectrol	August 5, 1998
Neck Bending Pendulum Rotary Potentiometer	019	Spectrol	August 5, 1998
Chest Probe Accelerometer	J13780	Endevco	January 7, 1999
Knee Impact Accelerometer	AMHP6	Entran	January 7, 1999

APPENDIX E
VEHICLE OWNER'S OCCUPANT RESTRAINT
SYSTEM INSTRUCTIONS

Seating and safety restraints

SEATING

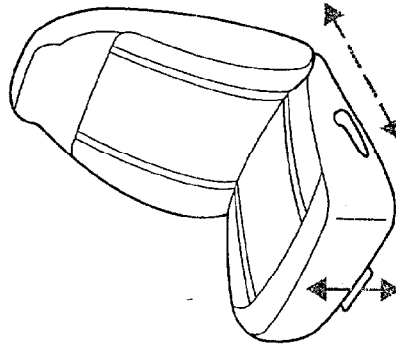
Adjusting the front manual seat

⚠ Never adjust the driver's seat or seatback when the vehicle is moving.

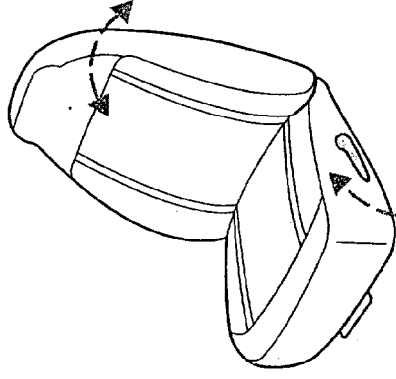
⚠ Do not pile cargo higher than the seatbacks to avoid injuring people in a collision or sudden stop.

⚠ Always drive and ride with your seatback upright and the lap belt snug and low across the hips.

Lift handle to move seat forward or backward.



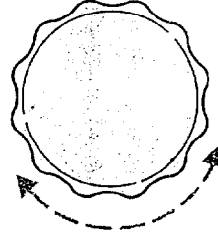
Pull lever up to adjust seatback.



Using the manual lumbar support

Turn the lumbar support control clockwise to increase firmness.

Turn the lumbar support control counterclockwise to increase softness.



REAR SEATS

Center facing jump seat (2 door SuperCab) (if equipped)

To open, pull inboard and down on the seat handle.

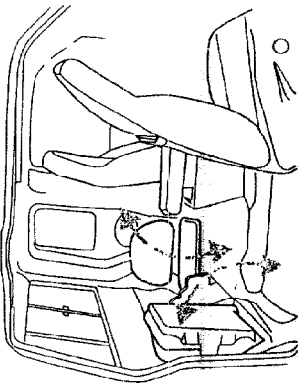
To stow the seat, pull seat bottom back to the fully upright position.

⚠ Do not install a child seat in a center facing jump seat.

Center facing jump seat (4 door SuperCab)(if equipped)

To open, pull seat assembly down, then raise seatback.

To stow the seat, fold seat back down and raise seat assembly to the fully upright position.



! Do not install a child seat in the center facing jump seat.

SAFETY RESTRAINTS

Safety restraints precautions

! Always drive and ride with your seatback upright and the lap belt snug and low across the hips.

! Always prevent the risk of injury, make sure children sit where they can be properly restrained.

! Never let a passenger hold a child on his or her lap while the vehicle is moving. The passenger cannot protect the child from injury in a collision.

! All occupants of the vehicle, including the driver, should always wear their safety belts, even when an air bag (SRS) is installed.

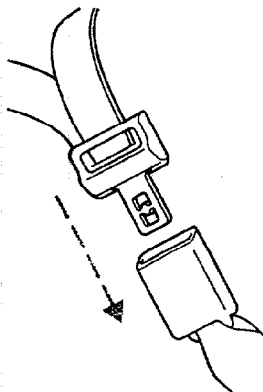
! It is extremely dangerous to ride in a cargo area inside or outside of a vehicle. In a collision, people riding in these areas are likely to be seriously injured or killed. Do not allow people to ride in any area of your vehicle that is not equipped with seats and safety belts. Be sure everyone in your vehicle is in a seat and using a safety belt properly.

! Please, seating position in your vehicle has a specific safety belt assembly which is made up of one buckle and one tongue that are designed to be used as a pair. 1) Use the shoulder belt on the outside shoulder only. Never wear the shoulder belt under the arm. 2) Never wear the safety belt around your neck over the inside shoulder. 3) Never use a single belt for more than one person.

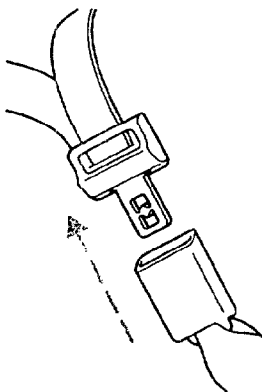
! On the rear door, SuperCab vehicles, do not open the rear door when the rear seat belt is still buckled.

Combination lap and shoulder belts

1. Insert the belt tongue into the proper buckle (the buckle closest to the direction the tongue is coming from) until you hear a snap and feel it latch. Make sure the tongue is securely fastened in the buckle.



2. To unfasten, push the release button and remove the tongue from the buckle.



The front outboard safety restraints in the vehicle are combination lap and shoulder belts. The front passenger outboard safety belt has two types of locking modes described below:

Vehicle sensitive mode

The vehicle sensitive mode is the normal retractor mode, allowing free shoulder belt length adjustment to your movements and locking in response to vehicle movement. For example, if the driver brakes suddenly or turns a corner sharply, or the vehicle receives an impact of 8 km/h (5 mph) or more, the combination safety belts will lock to help reduce forward movement of the driver and passengers.

Automatic locking mode

In this mode, the shoulder belt is automatically pre-locked. The belt will still retract to remove any slack in the shoulder belt.

The automatic locking mode is not available on the driver safety belt.

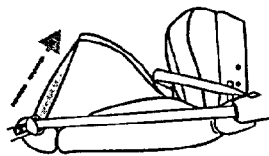
When to use the automatic locking mode

- When a tight lap/shoulder fit is desired.
- **Anytime** a child safety seat is installed in a passenger front or outboard rear seating position (if equipped). Refer to *Safety Restraints for Children* or *Safety Seats for Children* later in this chapter.

How to use the automatic locking mode

- Buckle the combination lap and shoulder belt.

- Grasp the shoulder portion and pull downward until the entire belt is extracted.

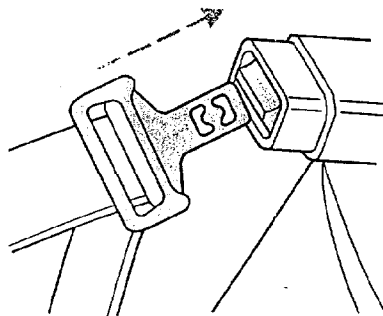
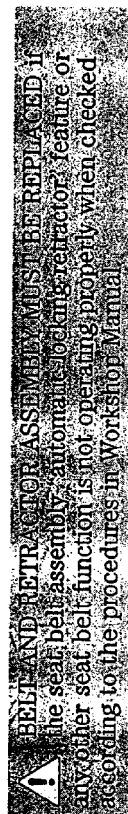
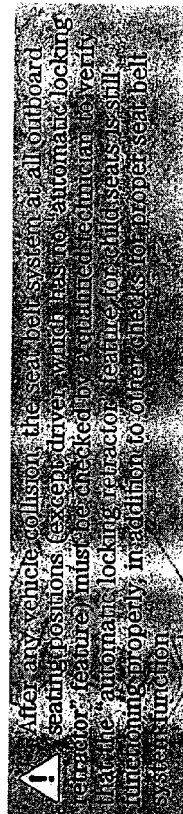


- Allow the belt to retract. As the belt retracts, you will hear a clicking sound. This indicates the safety belt is now in the automatic locking mode.

How to disengage the automatic locking mode

Disconnect the combination lap/shoulder belt and allow it to retract completely to disengage the automatic locking mode and activate the vehicle sensitive (emergency) locking mode.

- This vehicle has a seat belt system with an energy management feature at the front seating positions to help further reduce the risk of injury in the event of a head-on collision.
- This seat belt system has a retractor assembly that is designed to pay out webbing in a controlled manner. This feature is designed to help reduce the belt force acting on the occupant's chest.

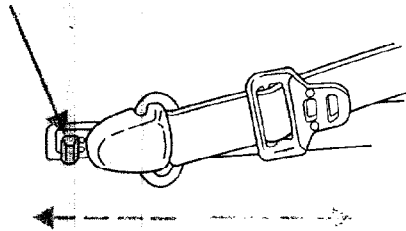


! Failure to replace the Belt and Retractor assembly could increase the risk of injury in collisions.

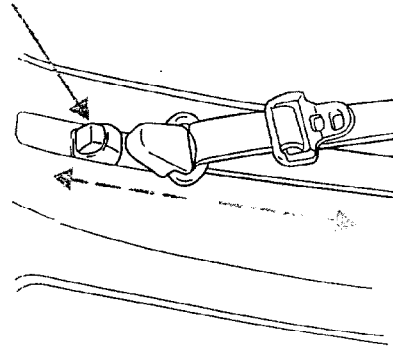
Front safety belt height adjustment

Your vehicle has safety belt height adjustments for the driver and front passenger. Adjust the height of the shoulder belt so the belt rests across the middle of your shoulder.

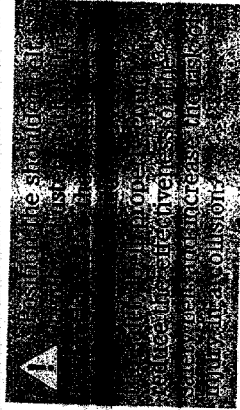
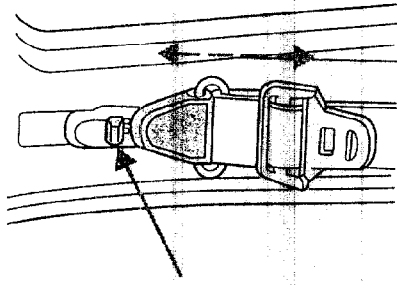
- Regular Cab and 4-door Super Cab



- 2-door SuperCab



To lower the shoulder belt height, push the button and slide the height control down. To raise the height of the shoulder belt, slide the height adjuster up. Pull down on the height adjuster assembly to make sure it is locked in place.



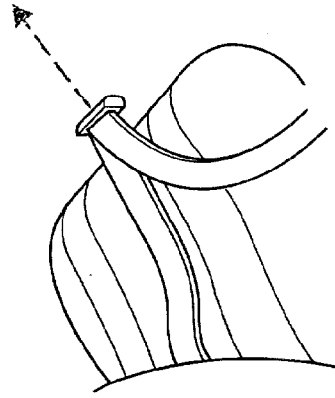
Lap belts

Adjusting the front center seat lap belt (if equipped)

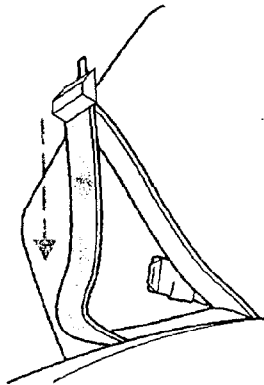
The lap belt does not adjust automatically.

! The lap belts should fit snug and as low as possible around the hips, not around the waist.

Insert the tongue into the correct buckle (the buckle closest to the direction the tongue is coming from). To lengthen the belt, turn the tongue at a right angle to the belt and pull across your lap until it reaches the buckle. To tighten the belt, pull the loose end of the belt through the tongue until it fits snugly across the hips.



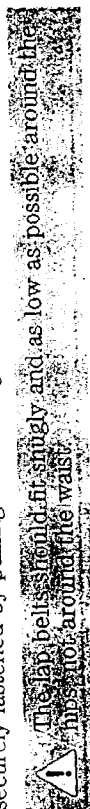
Shorten and fasten the belt when not in use.



Adjusting the rear center facing jump seat lap belt (if equipped)

The lap belts for rear center facing jump seat occupants have automatic retractors for the belt tongue and a fixed position buckle.

To fasten the belt, pull the belt all the way across your hips and insert the tongue into the buckle on your rear door until you hear a snap and feel it latch. Make sure the buckle is securely fastened by pulling on the tongue.



If you need to lengthen the belt, unfasten it and repeat the procedure above.

To unfasten the belt, push in the release button prior to opening the rear door.

Safety belt extension assembly

If the safety belt assembly is too short, even when fully extended, 20 cm (8 inches) can be added to the safety belt assembly by adding a safety belt extension assembly (part number 611C22). Safety belt extension assemblies can be obtained from your dealer at no cost.

Use only extensions manufactured by the same supplier as the safety belt. Manufacturer identification is located at the end of the webbing on the label. Also, use the safety belt extension only if the safety belt is too short for you when fully extended. Do not use extensions to change the fit of the shoulder belt across the torso.

Safety belt warning light and indicator chime

The seat belt warning light illuminates in the instrument cluster and a chime sounds to remind the occupants to fasten their safety belts.

Conditions of operation

If...	Then...
The driver's safety belt is not buckled before the ignition switch is turned to the ON position...	The safety belt warning light illuminates for one to two minutes and the warning chime sounds for four to eight seconds.
The driver's safety belt is buckled while the indicator light is illuminated and the warning chime is sounding...	The safety belt warning light and warning chime turn off.
The driver's safety belt is buckled before the ignition switch is turned to the ON position...	The safety belt warning light and indicator chime remain off.

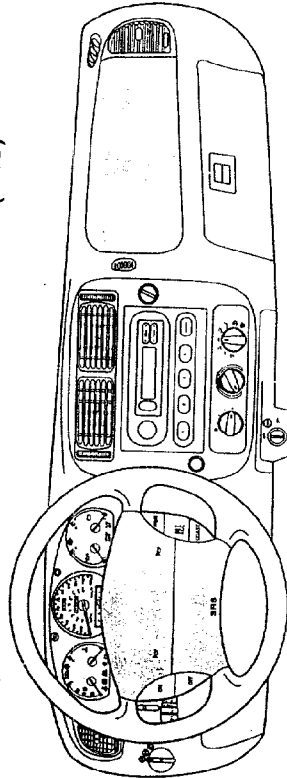
Safety belt maintenance

Inspect the safety belt systems periodically to make sure they work properly and are not damaged. Inspect the safety belts to make sure there are no nicks, wears or cuts, replacing if necessary. All safety belt assemblies, including retractors, buckles, front seat belt buckle assemblies (slide bar) (if equipped), shoulder belt height adjusters (if equipped), child safety seat tether bracket assemblies (if equipped), and attaching hardware, should be inspected after a collision. Ford recommends that all safety belt assemblies used in vehicles involved in a collision be replaced. However, if the collision was minor and a qualified technician finds that the belts do not show damage and continue to operate properly, they do not need to be replaced. Safety belt assemblies not in use during a collision should also be inspected and replaced if either damage or improper operation is noted.

! Failure to inspect and if necessary replace the safety belt assemblies under the above conditions could result in severe personal injuries in the event of a collision.

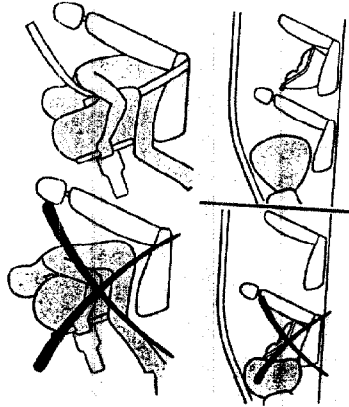
Refer to *Cleaning and maintaining the safety belts* in the *Maintenance and care* section.

AIR BAG SUPPLEMENTAL RESTRAINT SYSTEM (SRS)



Important supplemental restraint system (SRS) precautions

The supplemental restraint system is designed to work with the safety belt to help protect the driver and right front passenger from certain upper body injuries.



Air bags DO NOT inflate slowly or gently and the risk of injury from a deploying air bag is greatest close to the trim covering the air bag module.

! All occupants of the vehicle, including the driver, should always properly wear their seat belt. Air bag SRS is not a substitute for proper seat belt use.

! Always transport children 12 years old and under in the back seat and always use appropriate child restraint.

! NHTSA recommends a minimum of 25 cm (ten inches) between the side of the vehicle and the air bag module.

Steps you can take to properly position yourself away from the airbag:

- Move your seat to the rear as far as you can while still reaching the pedals comfortably.
- Recline the seat slightly (one or two degrees) from the upright position.

! Do not put anything on or over the air bag module. Placing objects on or over the air bag inflation area may cause those objects to be propelled by the air bag into your face and torso causing serious injury.

⚠ Do not attempt to service, repair or modify the Air Bag Supplemental Restraint System or its fuses. See your Ford or Lincoln-Mercury dealer.

Children and air bags

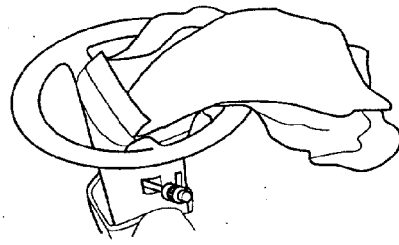
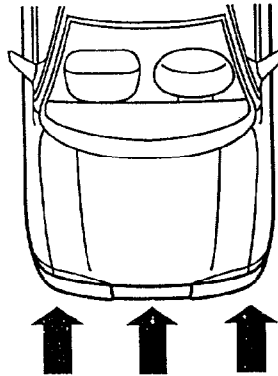
For additional important safety information, read all information on safety restraints in this guide.

Children must always be properly restrained. Failure to follow these instructions may increase the risk of injury in a collision.

⚠ Always make a rear-facing seat faces a high risk of serious or fatal injury from a deploying passenger air bag. Rear-facing infant seats should NEVER be placed in the front seats, unless the passenger air bag is turned off. See *Passenger air bag ON/OFF switch*.

How does the air bag supplemental restraint system work?

The air bag SRS is designed to activate when the vehicle sustains sufficient longitudinal deceleration. The fact that the air bags did not inflate in a collision does not mean that something is wrong with the system. Rather, it means the forces were not of the type sufficient to cause activation. Air bags are designed to inflate in frontal and near-frontal collisions, not rollover, side-impact, or rear-impacts.



The air bags inflate and deflate rapidly upon activation. After air bag deployment, it is normal to notice a smoke-like, powdery residue or smell the burnt propellant. This may consist of cornstarch, talcum powder (to lubricate the bag) or sodium compounds (e.g., baking soda) that result from the combustion process that inflates the air bag. Small amounts of sodium hydroxide may be present which may irritate the skin and eyes, but none of the residue is toxic.

While the system is designed to help reduce serious injuries, it may also cause minor burns, abrasions, swelling or temporary hearing loss. Because air bags must inflate rapidly and with considerable force, there is the risk of death or serious injuries such as fractures, facial and eye injuries or internal injuries, particularly to occupants who are not properly restrained or are otherwise out of position at the time of air bag deployment. Thus, it is extremely important that occupants be properly restrained as far away from the air bag module as possible while maintaining vehicle control.

⚠ Several air bag system components get hot after inflation. Do not touch them after inflation.

⚠ If the air bag is inflated, the air bag will not function again and must be replaced immediately. If the air bag is not replaced, the unrepaired area will increase the risk of injury in a collision.

- driver and passenger air bag modules (which include the inflators and air bags),

- one or more impact and safing sensors, passenger air bag deactivation switch and diagnostic monitor (RCM)
- a readiness light and tone
- and the electrical wiring which connects the components.

The RCM (restraints control module) monitors its own internal circuits and the supplemental air bag electrical system warning (including the passenger air bag deactivation switch, the impact sensors, the system wiring, the air bag system readiness light, the air bag back up power and the air bag sensors).

The SRS uses readiness lights in the instrument cluster and the passenger air bag deactivate switch or a tone to indicate the condition of the system. Refer to the *Air bag readiness* section in the *Instrumentation* chapter or *Passenger air bag deactivate switch* section in this chapter. Routine maintenance of the air bag is not required.

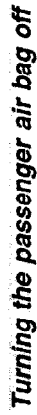
A difficulty with the system is indicated by one or more of the following:

- The readiness lights will either flash or stay lit.
- The readiness lights will not illuminate immediately after ignition is turned on.
- A series of five beeps will be heard. The tone pattern will repeat periodically until the problem and light are repaired

If any of these things happen, even intermittently, have the SRS serviced at your dealership or by a qualified technician immediately. Unless serviced, the system may not function properly in the event of a collision.

For disposal of air bags or air bag equipped vehicles, see your local dealership or qualified technician. Air bags MUST BE disposed of by qualified personnel.

 An air-bag ON/OFF switch has been installed in this vehicle. Before driving, always check that the face of the switch is to the left. If the face of the switch is in the proper position in accordance with these instructions and warnings, failure to turn the switch in a proper position will increase the risk of serious injury or death in a crash.



1. Insert the ignition key, turn the switch to OFF and remove the key.
2. When the ignition is turned to the ON position the OFF light illuminates briefly, momentarily shuts off and then turns back on. This indicates that the passenger air bag is deactivated.

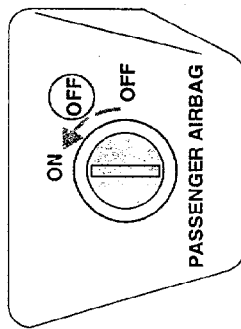


Turning the passenger air bag back on

The passenger air bag remains OFF until you turn it back ON.

1. Insert the ignition key and turn the switch to ON.

2. The OFF light will briefly illuminate when the ignition is turned to ON. This indicates that the passenger air bag is operational.



! If the light is illuminated when the passenger air bag ON/OFF switches in the ON position and the ignition switch is in ON, have the passenger air bag ON/OFF switch serviced at your Ford or Lincoln/Mercury dealer immediately.

The passenger side air bag should always be ON (the air bag OFF light should *not* be illuminated) unless the passenger is a person who meets the requirements stated either in Category 1, 2 or 3 of the NHTSA/Transport Canada deactivation criteria which follows.

! The safety belts for the driver and right front passenger seating positions have been specifically designed to function together with the air bags in certain types of crashes. When you turn OFF your air bag, you not only lose the protection of the air bag, you also may reduce the effectiveness of your safety belt system, which was designed to work with the air bag. If you are not a person who meets the requirements stated in the NHTSA/Transport Canada deactivation criteria, turning OFF the air bag can increase the risk of serious injury or death in a collision.

! Always transport children who are 12 and younger in the rear seat. Always use safety belts and child restraints properly. If a child in a rear-facing infant seat must be transported in front, the passenger air bag *must* be turned OFF. This is because the back of the infant seat is too close to the inflating air bag and the risk of a fatal injury to the infant when the air bag inflates is substantial.

The vast majority of drivers and passengers are much safer with an air bag than without. To do their job and reduce the risk of life threatening injuries, air bags must open with great force, and this force can pose a potentially deadly risk in some situations, particularly when a front seat occupant is not properly buckled up. The most effective way to reduce the risk of unnecessary air bag injuries without reducing the overall safety of the vehicle is to make sure all occupants are properly restrained in the vehicle, especially in the front seat. This provides the protection of safety belts and permits the air bags to provide the additional protection they were designed to provide. If you choose to deactivate your air bag, you are losing the very significant risk reducing benefits of the air bag and you are also reducing the effectiveness of the safety belts, because safety belts in modern vehicles are designed to work as a safety system with the air bags.

Read all air bag Warning labels in the vehicle as well as the other important air bag instructions and Warnings in this Owner's Guide.

NHTSA deactivation criteria (excluding Canada)

1. **Infant.** An infant (less than 1 year old) must ride in the front seat because:
 - the vehicle has no rear seat;
 - the vehicle has a rear seat too small to accommodate a rear-facing infant seat; or
 - the infant has a medical condition which, according to the infant's physician, makes it necessary for the infant to ride in the front so that the driver can constantly monitor the child's condition.
2. **Child age 1 to 12.** A child age 1 to 12 must ride in the front seat because:
 - the vehicle has no rear seat;
 - although children ages 1 to 12 ride in the rear seat(s) whenever possible, children ages 1 to 12 sometimes must ride in the front because no space is available in the rear seat(s) of the vehicle; or
 - the child has a medical condition which, according to the child's physician, makes it necessary for the child to ride in the front seat so that the driver can constantly monitor the child's condition.

