

V3413

Vehicle Research and Test Center

Moving Deformable Barrier into Moving 1997 Dodge Caravan at 35 mph

Centerline to Centerline

TRC Test Number 000619

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Final Report

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Table of Contents

<u>Section</u>	<u>Description</u>	<u>Page</u>
1.0	Purpose and Test Procedure	1-1
2.0	Moving Deformable Barrier into Car	
	Centerline to Centerline Test Summary	2-1
3.0	Summary of FMVSS 208 Data	3-1
4.0	Vehicle, Occupant, and Camera Measurements	4-1
Appendix A	Photographs	A-1
Appendix B	Data Plots	B-1
Appendix C	Dummy Calibration Information	C-1
Appendix D	Miscellaneous Test Information	D-1

List of Tables

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	Crash Test Summary	2-4
2	Target Test Vehicle Information	2-5
3	Bullet Test Vehicle Information	2-8
4	Post-Impact Data	2-9
5	Target Vehicle Accelerometer Locations and Data Summary	2-12
6	Bullet Vehicle Accelerometer Locations and Data Summary	2-15
7	Target Vehicle Dummy Injury Criteria	3-2
8	Target Vehicle Post-Impact Dummy and Vehicle Data	3-4
9	Target Vehicle Dummy Measurement Data for Front Seat Occupants	4-4
10	Target Vehicle Measurements	4-9
11	Target Vehicle Exterior Toe Pan Intrusion Measurements	4-10
12	Bullet Vehicle Deformable Barrier Face Profile Measurements	4-14
13	Camera Information	4-17

List of Figures

<u>Number</u>	<u>Description</u>	<u>Page</u>
1	Impact Velocity Measurement System	2-10
2	Target Vehicle Accelerometer Placement	2-11
3	Bullet Vehicle Accelerometer Placement	2-14
4	Target Vehicle Dummy Measurement Locations for Front Seat Occupants	4-3
5	Target Vehicle Seat Belt Positioning Data	4-5
6	Target Vehicle Crush with Bumper	4-6
7	Target Vehicle Crush without Bumper	4-7
8	Target Vehicle Pre-Test and Post-Test Measurement Points	4-8
9	Bullet Vehicle Deformable Barrier Face Profile Measurements	4-11
10	Camera Positions	4-16

List Of Photographs

<u>Description</u>	<u>Figure</u>
Pre-Test Target Vehicle Front View	A-1
Post-Test Target Vehicle Front View	A-2
Pre-Test Target Vehicle Front with Barrier View	A-3
Pre-Test Target Vehicle Left Front Three-Quarter with Barrier View	A-4
Post-Test Target Vehicle Left Front Three-Quarter View	A-5
Pre-Test Target Vehicle Left Side with Barrier View	A-6
Post-Test Target Vehicle Left Side View	A-7
Pre-Test Target Vehicle Rear View	A-8
Post-Test Target Vehicle Rear View	A-9
Pre-Test Target Vehicle Right Side with Barrier View	A-10
Post-Test Target Vehicle Right Side View	A-11
Pre-Test Target Vehicle Right Front Three-Quarter with Barrier View	A-12
Post-Test Target Vehicle Right Front Three-Quarter View	A-13
Pre-Test Overhead Alignment - View 1	A-14
Pre-Test Overhead Alignment - View 2	A-15
Pre-Test Impact Alignment View	A-16
Pre-Test Target Vehicle Front Underbody - View 1	A-17
Post-Test Target Vehicle Front Underbody - View 1	A-18
Pre-Test Target Vehicle Front Underbody - View 2	A-19
Post-Test Target Vehicle Front Underbody - View 2	A-20
Pre-Test Target Vehicle Front Underbody - View 3	A-21
Post-Test Target Vehicle Front Underbody - View 3	A-22
Pre-Test Target Vehicle Rear Underbody View	A-23
Post-Test Target Vehicle Rear Underbody View	A-24
Pre-Test Target Vehicle Windshield View - Driver and Passenger Dummies	A-25
Post-Test Target Vehicle Windshield View - Driver and Passenger Dummies	A-26
Pre-Test Target Vehicle Driver Dummy through Windshield View	A-27
Post-Test Target Vehicle Driver Dummy through Windshield View	A-28

List of Photographs Cont'd.

<u>Description</u>	<u>Figure</u>
Pre-Test Target Vehicle Passenger Dummy through Windshield View	A-29
Pre-Test Moving Deformable Barrier Front View	A-30
Post-Test Moving Deformable Barrier Front - View 1	A-31
Post-Test Moving Deformable Barrier Front - View 2	A-32
Pre-Test Moving Deformable Barrier Left Side View	A-33
Post-Test Moving Deformable Barrier Left Side View	A-34
Pre-Test Moving Deformable Barrier Right Side View	A-35
Post-Test Moving Deformable Barrier Right Side View	A-36
Pre-Test Target Vehicle Driver Dummy - View 1	A-37
Post-Test Target Vehicle Driver Dummy - View 1	A-38
Pre-Test Target Vehicle Driver Dummy - View 2	A-39
Post-Test Target Vehicle Driver Dummy - View 2	A-40
Pre-Test Target Vehicle Driver Dummy - View 3	A-41
Post-Test Target Vehicle Driver Dummy - View 3	A-42
Post-Test Target Vehicle Driver Dummy Head Contact - View 1	A-43
Post-Test Target Vehicle Driver Dummy Head Contact - View 2	A-44
Post-Test Target Vehicle Driver Dummy Knee Contact - View 1	A-45
Post-Test Target Vehicle Driver Dummy Chest Contact - View 1	A-46
Pre-Test Target Vehicle Passenger Dummy - View 1	A-47
Post-Test Target Vehicle Passenger Dummy - View 1	A-48
Pre-Test Target Vehicle Passenger Dummy - View 2	A-49
Post-Test Target Vehicle Passenger Dummy - View 2	A-50
Pre-Test Target Vehicle Passenger Dummy - View 3	A-51
Post-Test Target Vehicle Passenger Dummy - View 3	A-52
Post-Test Target Vehicle Passenger Dummy Head Contact - View 1	A-53
Post-Test Target Vehicle Passenger Dummy Head Contact - View 2	A-54
Post-Test Target Vehicle Passenger Dummy Knee Contact - View 1	A-55
Post-Test Driver Dummy - View 1	A-56

List of Photographs Cont'd.

<u>Description</u>	<u>Figure</u>
Post-Test Driver Dummy - View 2	A-57
Post-Test Driver Dummy - View 3	A-58
Post-Test Passenger Dummy - View 1	A-59
Post-Test Passenger Dummy - View 2	A-60
Post-Test Passenger Dummy - View 3	A-61
Post-Test Target Vehicle Ballast View	A-62
Target Vehicle Certification Label View	A-63
Tire Information Label - View 1	A-64
Tire Information Label - View 2	A-65
Tire Information Label - View 3	A-66

Section 1.0

Purpose and Test Procedure

Purpose

This 56 kph centerline to centerline moving deformable barrier-to-vehicle impact test was conducted for National Highway Transportation and Safety Administration (NHTSA) and Vehicle Research and Test Center (VRTC) by Transportation Research Center Inc. (TRC). This is a three series test mode. The first two tests have a moving deformable barrier representing the bullet vehicle. This test is the second of three tests, having a moving deformable barrier impact a Dodge Caravan.

The purpose of this test was to determine the response of the subject vehicle hitting another vehicle at 56 kph, centerline to centerline.

Test Procedure

This test was conducted per NHTSA and VRTC instructions. Data was obtained relative to FMVSS 208, "Occupant Protection."

The target vehicle, a 1997 Dodge Caravan, was instrumented with seven (7) longitudinal axis accelerometers, three (3) lateral axis accelerometers, four (4) vertical axis accelerometers, and its specified impact velocity range was 55.5 to 57.1 km/h.

The bullet vehicle, a moving deformable barrier, was instrumented with two (2) accelerometers to measure longitudinal axis accelerations, two (2) accelerometers to measure lateral accelerations, one (1) accelerometer to measure vertical axis acceleration, two (2) rate gyros to measure pitch and yaw and one-hundred-thirty-one (131) load cells to measure barrier face forces. The specified impact velocity range was 55.5 to 57.1 kph.

The bullet vehicle's centerline was aligned with the target vehicle's centerline. This test represented a full frontal car to car moving test.

One (1) 50th percentile adult male Hybrid III dummy and one (1) 5th percentile adult female dummy were placed in the target vehicle's left front and right front designated seating positions, respectively. Each dummy had accelerometers in the head, chest, and pelvis to measure longitudinal, lateral, and vertical accelerations; 6-axis upper neck load cells to measure forces and moments in the neck; uniaxial femur load cells in the left and right femurs to measure axial forces; and a potentiometer in the chest to measure chest deflection. Each dummy was restrained with a 3-point unbelt.

The one hundred-eighty-nine (189) data channels were digitally sampled and recorded at 12,500 samples per second and processed per SAE J211 March 1995.

The crash event was recorded by one (1) real-time panning motion picture camera and ten (10) high-speed motion picture cameras.

The vehicle data are summarized in Section 2.0. The FMVSS 208 are presented in Section 3.0. The vehicle, occupant, barrier and camera measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the vehicle data plots. Appendix C contains dummy calibration information. Appendix D contains miscellaneous test information.

Section 2.0

Moving Deformable Barrier into Car Centerline to Centerline Test Summary

Test Results Summary

This 56 kph full frontal centerline to centerline moving deformable barrier-to-vehicle impact test was conducted at TRC on June 19, 2000.

The target test vehicle, a 1997 Dodge Caravan, was equipped with a 6-cylinder, transverse engine, automatic transmission, power steering, and power brakes. The target vehicle's test weight was 2138.0 kg and its impact speed was 56.8 km/h. The bullet vehicle, a moving deformable barrier, was to represent the Plymouth Neon. The bullet vehicle's test weight was 1377.0 kg and its impact speed was 56.2 kph. The target vehicle's maximum static crush was 586 millimeters. The bullet vehicle's barrier face was measured with TRC's Faro arm.

The target vehicle driver dummy's Head Injury Criteria (HIC) was 719. The target vehicle driver dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 51.3 g. The target vehicle driver dummy's chest deflection was 45 mm. The target vehicle's driver dummy's left and right femur forces were 5546 N and 6385 N, respectively. The driver dummy's neck injury calculations were as follows: NTF, 0.63; NTE, 0.46; NCF, 0.01; NCE, 0.25.

The target vehicle right front passenger dummy's HIC¹ was 523. The target vehicle right front passenger dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.3 g. The target vehicle right front passenger dummy's chest deflection was 33 mm. The target vehicle's right front passenger dummy's left and right femur forces were 5937 N and 3533 N, respectively. The passenger dummy's neck injury calculations were as follows: NTF, 0.10; NTE, 3.78; NCF, 0.12; NCE, 1.01.

Data Acquisition Explanation

The instrument panel X-axis accelerometer, DPCXG1, lost data after 40 milliseconds.

The following moving barrier force load cells did not return to zero after impact:

A1X-axis force, BA1XF

A1Z-axis force, BA1ZF

A2X-axis force, BA2XF

A2Y-axis force, BA2YF

A2Z-axis force, BA2ZF

B1X-axis force, BB1XF

B2X-axis force, BB2XF

D1X-axis force, BD1XF

D1Y-axis force, BD1YF

F1X-axis force, BF1XF

G1X-axis force, BG1XF

H1X-axis force, BH1XF

I1X-axis force, BI1XF

I2X-axis force, BI2XF

J1X-axis force, BJ1XF

J2X-axis force, BJ2XF

K1X-axis force, BK1XF

K1Z-axis force, BK1ZF

K2X-axis force, BK2XF

K2Y-axis force, BK2YF

Table 1 Crash Test Summary

Test type:	Full Front Centerline to Centerline	
Test date:	6/19/00	
Test time:	1440	
Ambient temperature:	23° C	
Target vehicle:	1997 Dodge Caravan	
Target vehicle test weight:	2138.0 kg	
Bullet vehicle:	Moving Deformable Barrier	
Bullet vehicle test weight:	1377.0 kg	
Impact angle: ¹	0°	
Impact velocity: ²	Target vehicle = 56.8 kph Bullet vehicle = 56.2 kph	
Target vehicle's maximum static crush:	606 mm	
Target vehicle dummies:	Driver #045	Passenger #416
Type:	572 E (50% male)	Hybrid III (5% female)
Location:	Left front	Right front
Restraint:	3-point unbelt/airbag	3-point unbelt/airbag
Total number of data channels:	18	18
Number of cameras:		
High-speed	10	
Real-time	1	

¹ With respect to tow track centerline.

² Speed trap measurement (± .08 kph accuracy)

Table 2 Target Test Vehicle Information

Vehicle manufacturer:	Chrysler Corporation		
Make/model:	Dodge/ Caravan		
VIN:	1B4GP54R2VB358113		
Model year:	1997		
Body style:	5-door		
Color:	Grey		
Engine data:			
Type:	Transverse		
Cylinders:	6		
Displacement:	3.3		
Transmission data:	<u>4</u> Speed, <u> </u> Manual, <u> X</u> Automatic, <u> X</u> FWD, <u> </u> RWD, <u> </u> 4WD		
Date vehicle received:	N/A		
Odometer reading:	47,411		
Dealer's name and address:	N/A		
<u>Accessories:</u>			
Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	Yes
Power seats	Yes	Tilting steering wheel	Yes
Power windows	Yes	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	Yes
Radio	Yes	Anti-skid brake	Yes
Clock	Yes	Rear window defroster	Yes
Other	None		
<u>Certification data from vehicle's label:</u>			
Vehicle manufactured by:	Chrysler Corporation		
Date of manufacture:	1/97		
VIN:	1B4GP54R2VB358113		
GVWR:	5350 lbs		(2427 kg.)
GAWR: Front:	2746 lbs.		(1246 kg.)
Rear:	2746 lbs.		(1246 kg.)

Table 2 Target Test Vehicle Information, Cont'd.

Tires on vehicle (mfr., line, size): P215/65R16

Tire pressure with maximum capacity vehicle load: Front: 35 psi (240 kpa)
Rear: 35 psi (240 kpa)

Spare tire (mfr., line, size): N/A

Type of seats: Front: Bucket
Middle: Bucket
Rear: Bench

Type of front seat backs: Manually adjustable

Maximum width: 1952 mm

Wheelbase: 3040 mm

Location of "Recommended Tire Pressure" label:

The label was located on the driver door.

Data from vehicle's "Recommended Tire Pressure" label:

Recommended tire size: P215/65R16

Recommended cold tire pressure: Front: 35 psi
Rear: 35 psi

Seating capacity: Front: 2
Middle: 2
Rear: 3
Total: 7

Vehicle capacity weight: 1150 lbs.

Test vehicle attitude:

Delivered attitude: LF 746 mm; RF 755 mm; LR 763 mm; RR 770 mm

Pre-test attitude: LF 735 mm; RF 744 mm; LR 726 mm; RR 730 mm

Post-test attitude: LF 807 mm; RF 765 mm; LR 769 mm; RR 729 mm

Table 2 Target Test Vehicle Information, Cont'd.

Delivered Weight:

Right Front:	518.5 kg	Right Rear:	395.0 kg
Left Front:	558.0 kg	Left Rear:	408.0 kg
Total Front Weight:	1076.5 kg	(57.3% of total vehicle weight)	
Total Rear Weight:	803.0 kg	(42.7% of total vehicle weight)	
Total Delivered Weight:	1879.5 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated cargo and luggage weight (136.0 kg)

UDW = Unloaded delivered weight (1879.5 kg)

VCW = Vehicle capacity weight (522.0 kg)

DSC = Designated seating capacity (7)

Target test weight = UDW + RCLW + (No. of Hybrid III dummies x 75.8 kg
+ No. of Hybrid III dummies x 47.6 kg)

Target test weight = 1879.5 + 136.0 kg + 75.8 kg + 47.6 kg

Target test weight = 2138.9 kg

Weight of test vehicle with required dummies and 136.0 kg cargo weight:

Right front	548.0 kg	Right rear	488.0 kg
Left front	611.0 kg	Left rear	491.0 kg
Total front weight	1159.0 kg	(54.2% of total vehicle weight)	
Total rear weight	979.0 kg	(45.8% of total vehicle weight)	
Total test weight	2138.0 kg		

Weight of ballast secured in cargo area: 50 kg

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 1392 mm

Table 3 Bullet Test Vehicle Information

Target test weight = 1377.6 kg (Based on the test weight of the Plymouth Neon)

Weight of test vehicle

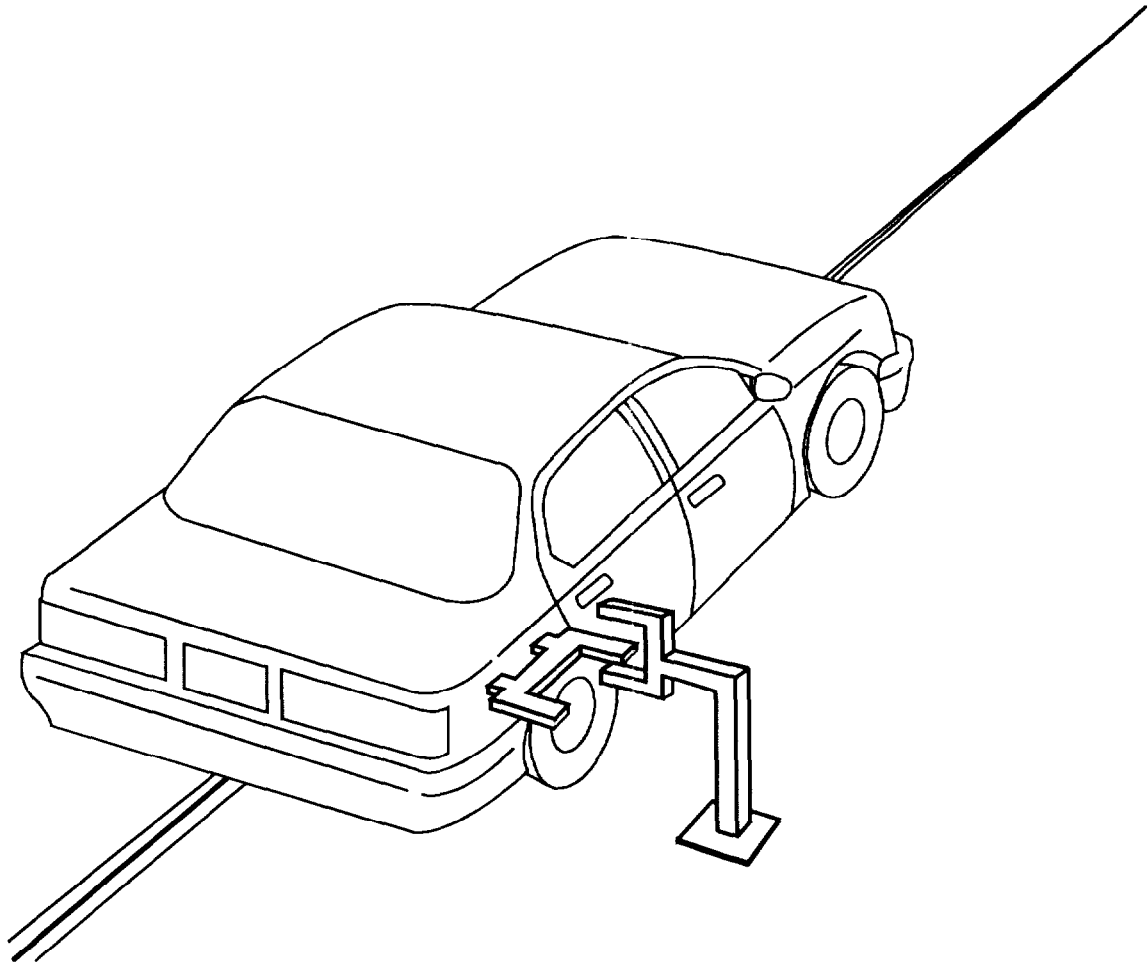
Right front	469.0 kg	Right rear	227.0 kg
Left front	320.0 kg	Left rear	361.0 kg
Total front weight	789.0 kg	(57.3% of total vehicle weight)	
Total rear weight	588.0 kg	(42.7% of total vehicle weight)	
Total test weight	1377.0 kg		

CG rearward of front wheel centerline: 1106 mm

Table 4 Post-Impact Data

Test number:	000619
Date of test:	6/19/00
Time of test:	1440
Type of test:	Full Front Centerline to Centerline
Impact angle:	0°
Ambient temperature at impact area:	23° C
Impact velocity:	
Target vehicle:	56.8 kph
Bullet vehicle:	56.2 kph
	(Specified range = 55.5 to 57.1 kph)
Distance from vehicle to vehicle:	
Entering trap	610 mm
Exiting trap	51 mm

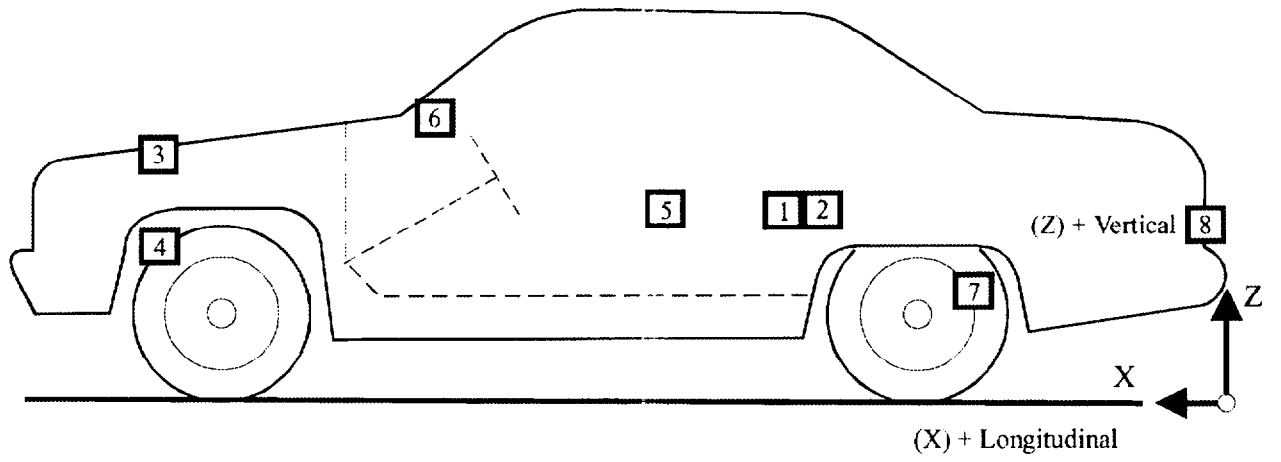
Figure 1 Impact Velocity Measurement System



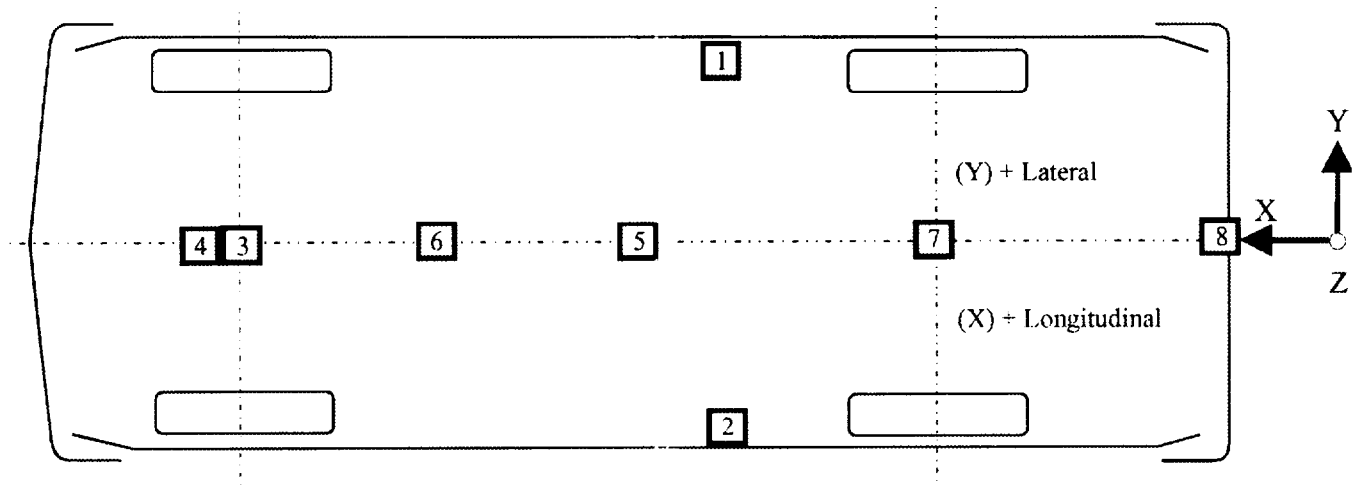
The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 610-millimeter spacing.

Figure 2 Target Vehicle Accelerometer Placement



Side View



Bottom View

Table 5. Target Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 000619 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 LEFT REAR SEAT CROSSMEMBER	NA	NA	NA		
LONGITUDINAL		3.3 g		@ 142.0 ms	@ 50.2 ms
LATERAL		2.1 g		@ 92.6 ms	@ 77.0 ms
VERTICAL		9.5 g		@ 54.0 ms	@ 43.9 ms
RESULTANT		29.0 g		@ 43.8 ms	
2 RIGHT REAR SEAT CROSSMEMBER	NA	NA	NA		
LONGITUDINAL		2.7 g		@ 142.7 ms	@ 50.6 ms
LATERAL		7.5 g		@ 48.8 ms	@ 76.9 ms
VERTICAL		14.4 g		@ 47.4 ms	@ 52.4 ms
RESULTANT		35.6 g		@ 51.5 ms	
3 ENGINE TOP LONGITUDINAL	NA	NA	NA	@ 47.3 ms	@ 19.9 ms
4 ENGINE BOTTOM LONGITUDINAL	NA	NA	NA	@ 58.6 ms	@ 19.4 ms
5 VEHICLE CENTER OF GRAVITY	NA	NA	NA		
LONGITUDINAL		3.2 g		@ 141.0 ms	@ 48.2 ms
LATERAL		5.1 g		@ 64.2 ms	@ 32.9 ms
VERTICAL		38.4 g		@ 48.0 ms	@ 42.7 ms
RESULTANT		79.0 g		@ 42.6 ms	

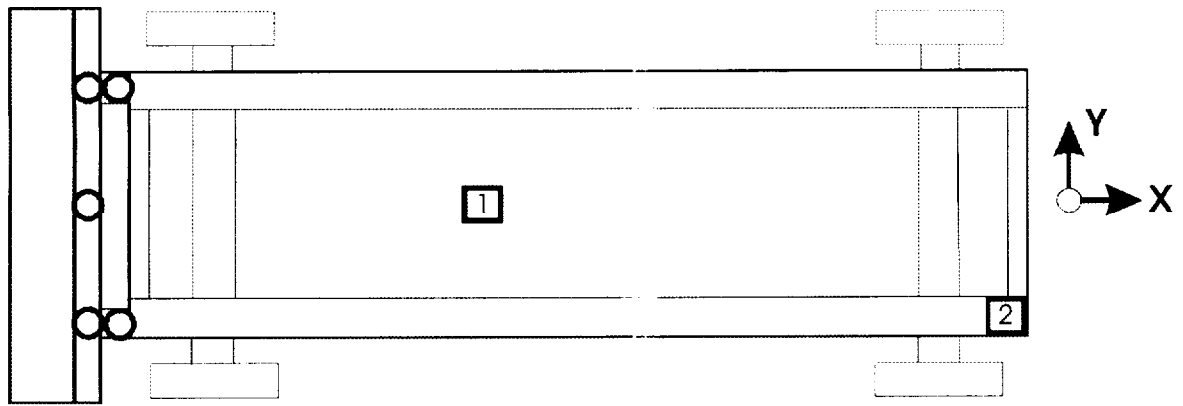
Table 5 Target Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 000619 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
6 INSTRUMENT PANEL LONGITUDINAL ¹	NA	NA	NA	---	---
7 REAR AXLE LONGITUDINAL	NA	NA	NA	2.9 g @ 141.9 ms	30.0 g @ 49.8 ms
8 VEHICLE REAR CENTER VERTICAL	NA	NA	NA	10.9 g @ 64.4 ms	14.8 g @ 52.7 ms

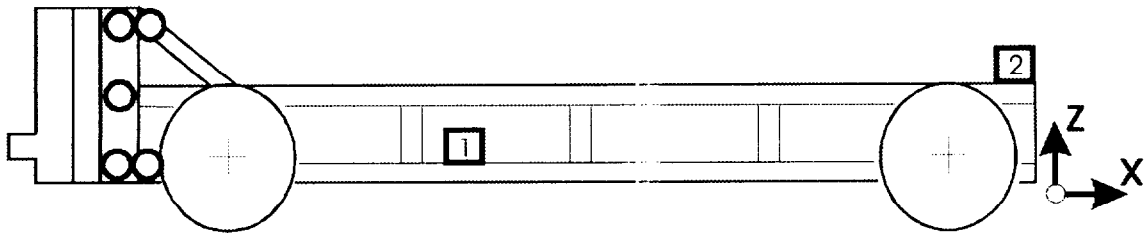
REFERENCE: X: + FORWARD FROM REAR BUMPER
 Y: + LEFTWARD FROM VEHICLE CENTERLINE
 Z: + UPWARD FROM GROUND LEVEL

¹ See DATA ACQUISITION EXPLANATIONS

Figure 3 Bullet Vehicle Accelerometer Placement



TOP VIEW



SIDE VIEW

Table 6 Bullet Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 000619	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
No. LOCATION					
1 BARRIER CENTER OF GRAVITY	NA	NA	NA		
LONGITUDINAL				0.9 g @ 112.0 ms	60.1 g @ 36.3 ms
LATERAL				14.7 g @ 61.1 ms	12.1 g @ 45.5 ms
VERTICAL				36.0 g @ 57.2 ms	39.3 g @ 24.1 ms
RESULTANT				65.2 g @ 34.8 ms	
2 LEFT REAR FRAME	NA	NA	NA		
LONGITUDINAL				2.4 g @ 118.5 ms	58.8 g @ 35.1 ms
LATERAL				7.7 g @ 52.4 ms	9.7 g @ 62.6 ms

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

Section 3.0

Summary of FMVSS 208 Data

Table 7 Target Vehicle Dummy Injury Criteria

	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-77.7 g	9.8 g	-13.3 g	77.8 g	-52.3 g	-3.7 g	9.8 g
Passenger	-119.4 g	-44.5 g	-110.6 g	131.9 g	-60.1 g	-9.0 g	-21.0 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Driver	5546 N	6385 N
Passenger	5937 N	3533 N

	<u>Head Injury Criteria¹</u>		
	HIC	Time t ₁	Time t ₂
Driver	719	61.6 ms	84.9 ms
Passenger	523	26.3 ms	46.8 ms

	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
Driver	51.3 g	66.6 ms	69.7 ms
Passenger	48.3 g	62.9 ms	65.9 ms

<u>Maximum Chest Deflection</u>	
Driver	45 mm
Passenger	33 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Table 7 Target Vehicle Dummy Injury Criteria Cont'd

Neck Injury Calculations (Nij)

	NTF	NTE	NCF	NCE
Driver	0.63	0.46	0.01	0.25
Passenger	0.10	3.78	0.12	1.01

Table 8 Target Vehicle Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	<u>Driver</u>	<u>Passenger</u>
Head	Airbag/headrest	Airbag
Chest	Airbag	Airbag
Abdomen	Steering wheel	None
Left knee	Instrument panel	Instrument panel
Right knee	Instrument panel	Instrument panel

Door opening:

	<u>Left</u>	<u>Right</u>
Front	N/A	N/A
Rear	N/A	N/A

Seat movement:

	<u>Seat back failure</u>	<u>Seat shift</u>
Front	None	None
Rear	None	None

Glazing damage: The windshield was cracked in various locations.

Other notable impact effects: None

Section 4.0

Vehicle, Occupant, and Camera Measurements

Target Vehicle Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest impacted the airbag. The dummy's head and upper torso rotated rearward as the dummy rebounded into the seat back. The driver dummy came to rest seated in the driver's seat.

Right Front Passenger Dummy

Upon impact, the passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest impacted the airbag. The dummy's head rotated upward, extending the neck. The dummy's head and upper torso rotated rearward as the dummy rebounded into the seat back. The dummy's head contacted the head restraint. The passenger dummy came to rest seated in the passenger's seat

Figure 4 Target Vehicle Dummy Measurement Locations for Front Seat Occupants

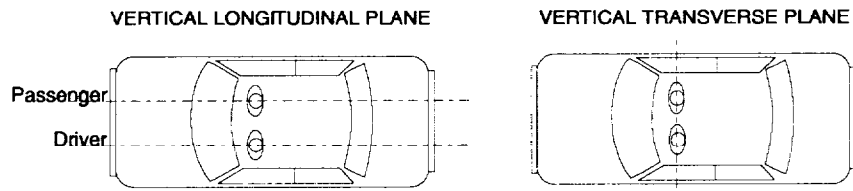
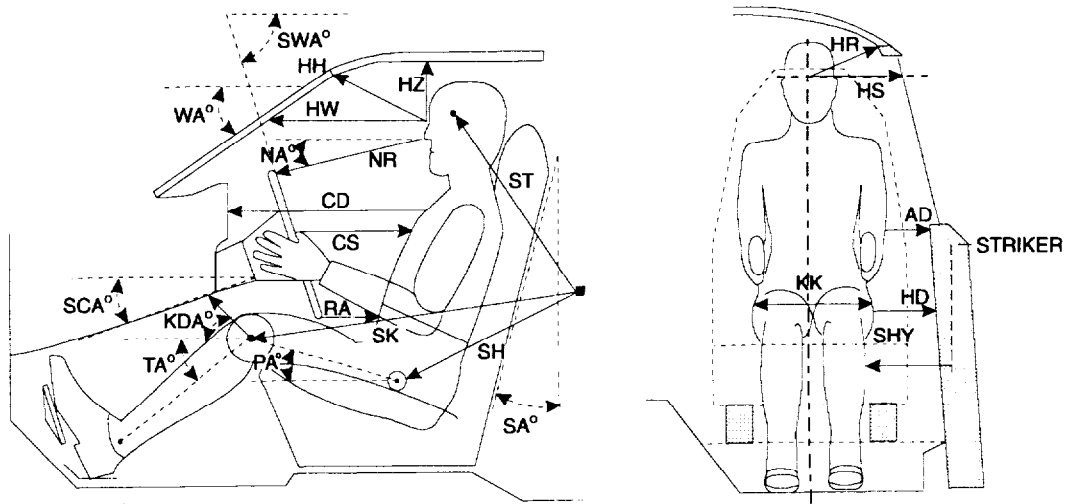


Table 9 Target Vehicle Dummy Measurement Data for Front Seat Occupants

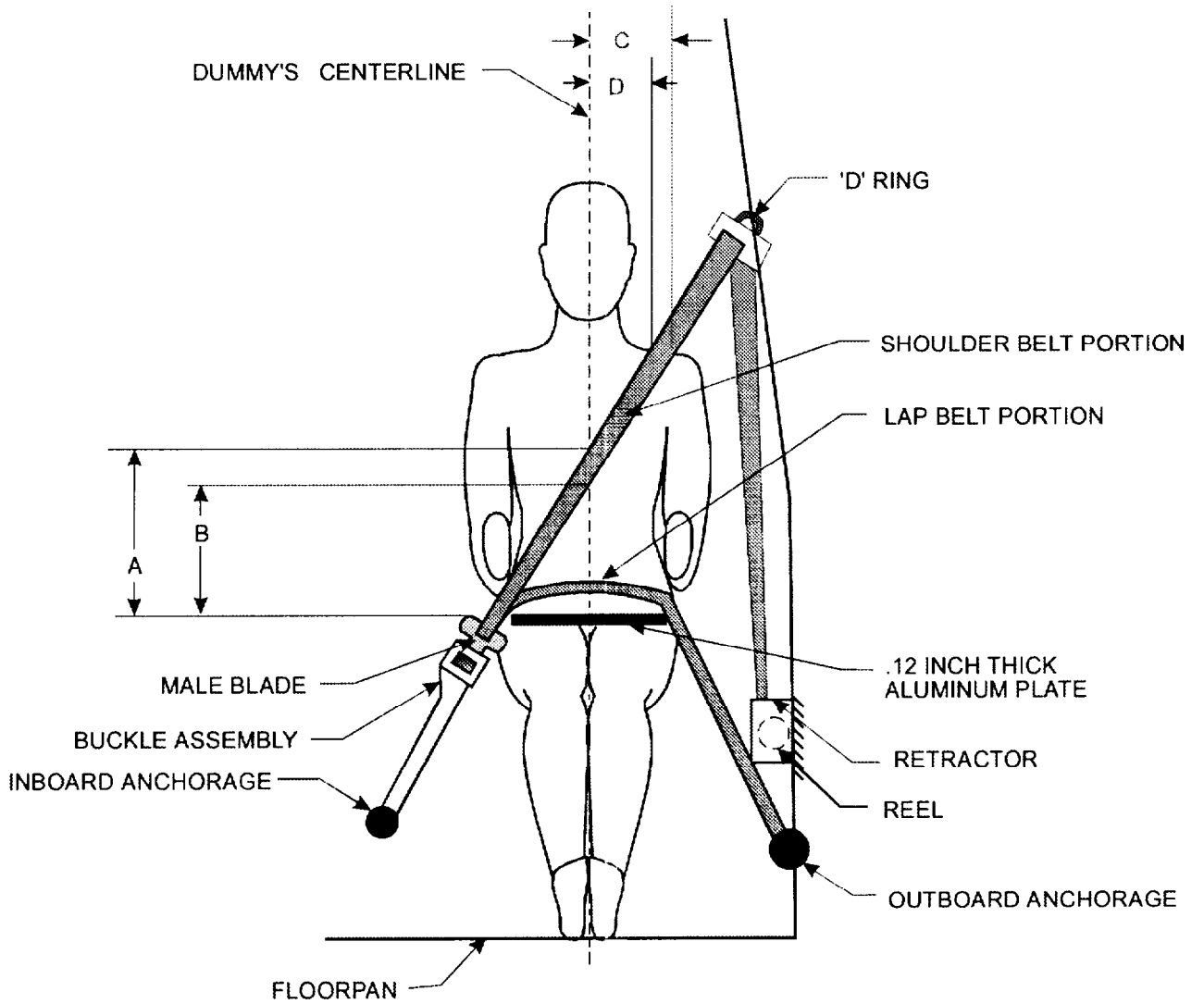
<u>Designation</u>	<u>Type of Measurement</u>	<u>Driver (Serial #090)</u>	<u>Passenger (Serial #329)</u>
WA	Windshield angle	31°	31°
SWA	Steering wheel angle	64°	NA
SCA	Steering column angle	26°	NA
SA	Seat back angle	26°	21°
HZ ²	Head to roof	232 mm	235 mm
HH	Head to header	349 mm	311 mm
HW	Head to windshield	663 mm	645 mm
HR	Head to side header	240 mm	235 mm
NR	Nose to rim	364 mm	NA
NA	Nose to rim angle	10°	NA
CD	Chest to dash	538 mm	438 mm
CS	Steering wheel to chest	271 mm	NA
RA	Rim to abdomen	159 mm	NA
KDL	Left knee to dash	201 mm	120 mm
KDR	Right knee to dash	205 mm	119 mm
KDA	Outboard knee to dash angle	25°	21°
PA	Pelvic angle	23°	18°
TA	Tibial angle	57°	82°
KK	Knee to knee	317 mm	238 mm
ST ¹	Striker to head	640 mm	619 mm
	Striker to head angle	-80°	-71°
SK	Striker to knee	615 mm	711 mm
	Striker to knee angle	-10°	-9°
SH	Striker to H-point	229 mm	369 mm
	Striker to H-point angle	2°	3°
SHY	Striker to H-point (Y dir.)	219 mm	361 mm
HS	Head to side window	363 mm	333 mm
HD	H-point to door	135 mm	155 mm
AD	Arm to door	131 mm	136 mm

The seat back angle (SA°) is measured relative to vertical, all other angles are measured relative to horizontal.

¹ A negative angle indicates the measurement point was above the striker.

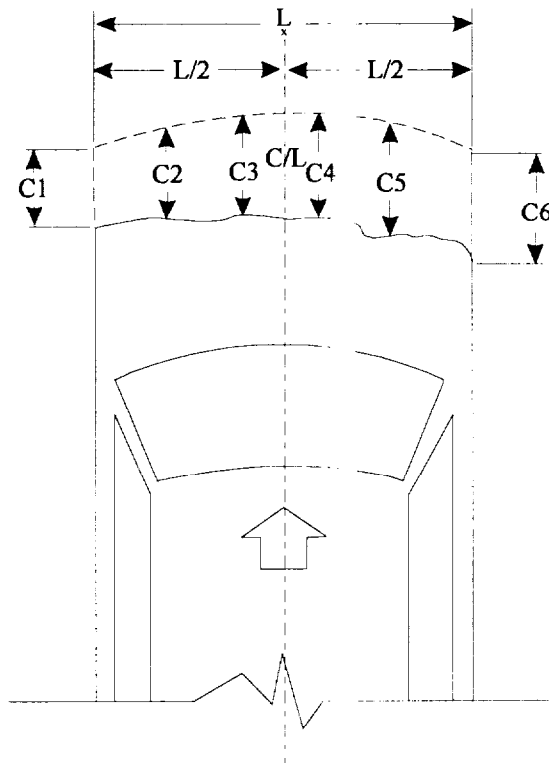
² Passenger's measurement was taken to the visor.

Figure 5 Target Vehicle Seat Belt Positioning Data



	Driver Dummy	Passenger Dummy
A - Top surface of aluminum plate to belt upper edge	350 mm	301 mm
B - Top surface of aluminum plate to belt lower edge	280 mm	215 mm
C - Dummy centerline to outer edge of belt at chest flesh top	118 mm	113 mm
D - Dummy centerline to inner edge of belt at chest flesh top	58 mm	60 mm

Figure 6 Target Vehicle Crush with Bumper



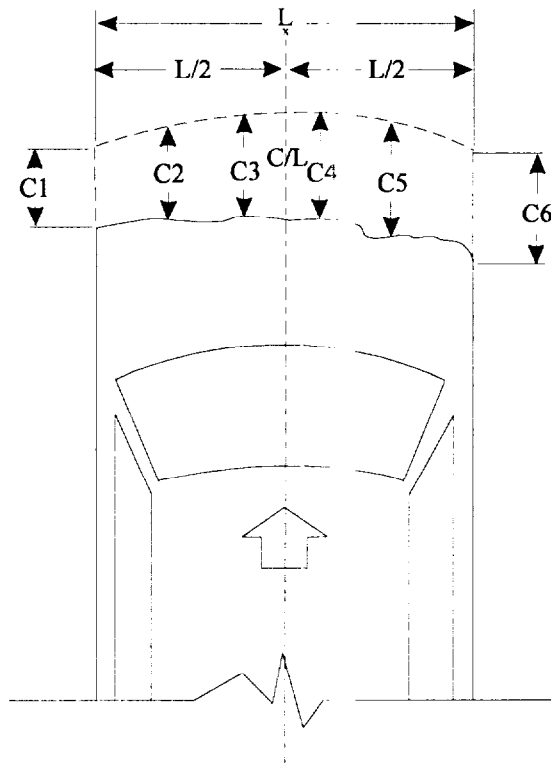
NOTES: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL is vehicle centerline.

Vehicle: 1997 Dodge Caravan

	Pre-test	Post-test*	Crush*
L	1525 mm		
C1	4960 mm	N/A mm	N/A mm
C2	5075 mm	N/A mm	N/A mm
C3	5120 mm	N/A mm	N/A mm
C4	5115 mm	N/A mm	N/A mm
C5	5060 mm	N/A mm	N/A mm
C6	4960 mm	N/A mm	N/A mm
CL	5130 mm	N/A mm	N/A mm

* At impact, target vehicle bumper fascia disengaged from the vehicle and was lodged into the moving barrier front.

Figure 7 Target Vehicle Crush without Bumper



NOTES: L is pre-test length of contact surface.
 C1 through C6 are spaced equally apart.
 CL is vehicle centerline.

Vehicle: 1997 Dodge Caravan

	Pre-test	Post-test*	Crush*
L	1525 mm		
C1	4900 mm	4473 mm	427 mm
C2	5018 mm	4462 mm	556 mm
C3	5051 mm	4468 mm	583 mm
C4	5050 mm	4464 mm	586 mm
C5	5005 mm	4500 mm	505 mm
C6	4900 mm	4497 mm	403 mm
CL	5061 mm	4479 mm	582 mm

* Measurements were taken from the bumper beam.

Figure 8 Target Vehicle Pre-test and Post-test Measurement Points

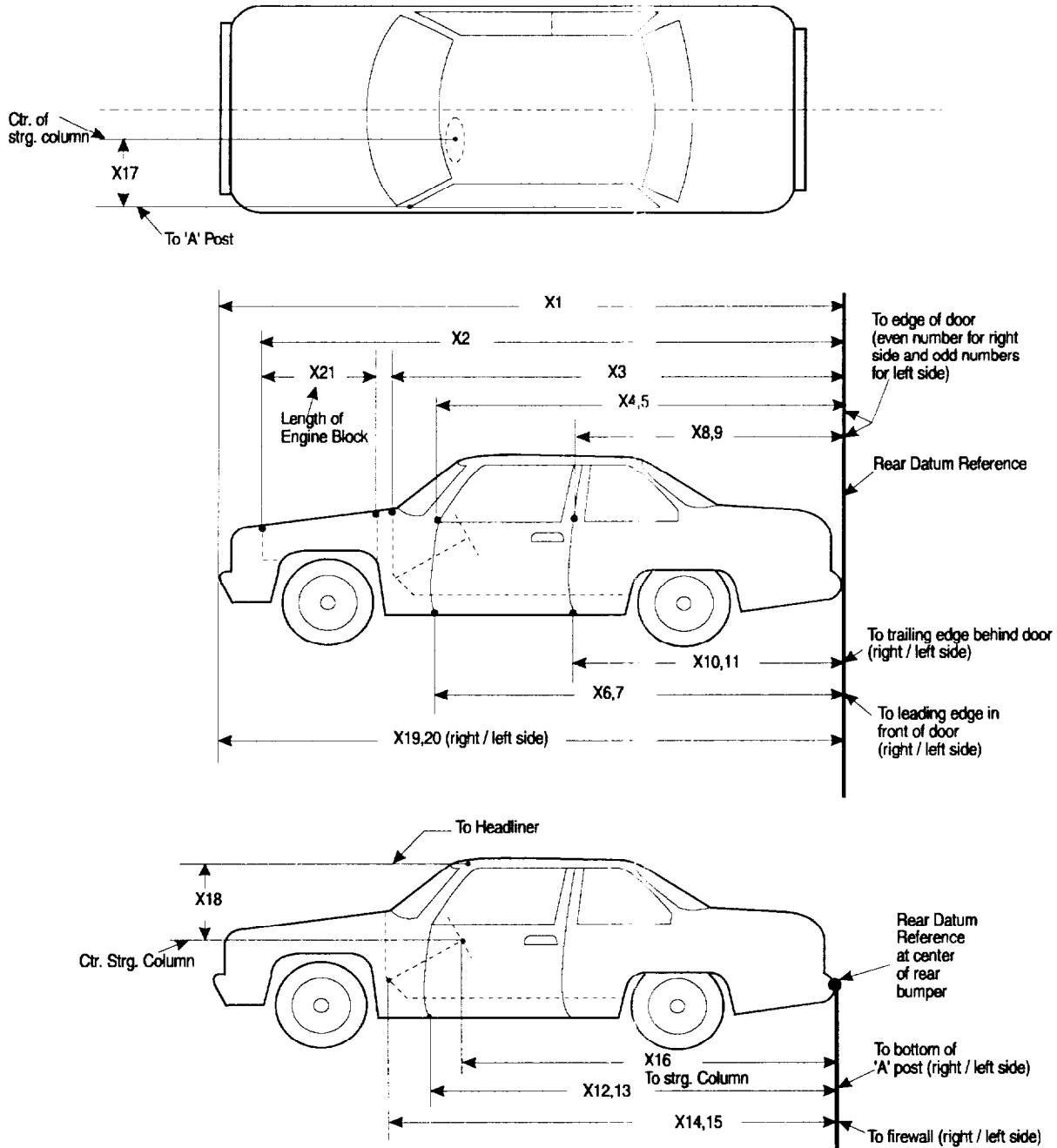


Table 10 Target Vehicle Measurements

Vehicle Make/Model: Dodge Caravan

Test Number: 000619

<u>No.</u>	<u>Type of measurement</u>	<u>Pre-test</u>	<u>Post-test</u>	<u>Difference</u>
X1	Total length of vehicle at centerline	5130 mm	N/A mm	N/A mm
X2	Rear surface of vehicle to front of engine block	4580 mm	4321 mm	159 mm
X3	Rear surface of vehicle to firewall	4416 mm	4416 mm	0 mm
X4	Rear surface of vehicle to upper leading edge of right door	3760 mm	3749 mm	11 mm
X5	Rear surface of vehicle to upper leading edge of left door	3751 mm	3750 mm	1 mm
X6	Rear surface of vehicle to lower leading edge of right door	3714 mm	3680 mm	34 mm
X7	Rear surface of vehicle to lower leading edge of left door	3715 mm	3695 mm	20 mm
X8	Rear surface of vehicle to upper trailing edge of right door	2770 mm	2757 mm	13 mm
X9	Rear surface of vehicle to upper trailing edge of left door	2763 mm	2760 mm	3 mm
X10	Rear surface of vehicle to lower trailing edge of right door	2770 mm	2737 mm	33 mm
X11	Rear surface of vehicle to lower trailing edge of left door	2767 mm	2751 mm	16 mm
X12	Rear surface of vehicle to bottom of "A" post on right side	3747 mm	3715 mm	32 mm
X13	Rear surface of vehicle to bottom of "A" post on left side	3747 mm	3740 mm	7 mm
X14	Rear surface of vehicle to firewall - right side	4230 mm	4250 mm	-20 mm
X15	Rear surface of vehicle to firewall - left side	4240 mm	4250 mm	-10 mm
X16	Rear surface of vehicle to steering wheel center	3355 mm	3321 mm	34 mm
X17	Center of steering column to "A" post	310 mm	273 mm	37 mm
X18	Center of steering column to headliner	440 mm	380 mm	60 mm
X19	Rear surface of vehicle to right side of front bumper	4960 mm	N/A mm	N/A mm
X20	Rear surface of vehicle to left side of front bumper	4960 mm	N/A mm	N/A mm
X21	Length of engine block	400 mm	400 mm	0 mm

Table 11 Target Vehicle Toe Pan Intrusion Measurements

Intrusion of toe pan at five locations for each front seat position.

Left Side

	Pre-Test			Post-Test			Intrusion		
	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)
Point 1	1285	671	571	1250	655	660	35	16	-89
Point 2	1333	230	464	1210	305	620	123	-75	-156
Point 3	840	176	374	839	228	420	1	-52	-46
Point 4	805	608	374	798	605	440	7	3	-66
Point 5	1124	394	374	1092	366	405	32	28	-31

Right Side

	Pre-Test			Post-Test			Intrusion		
	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)	X (mm)	Y (mm)	Z (mm)
Point 1	830	-205	375	824	-185	420	6	20	-45
Point 2	1280	-165	527	1078	-160	690	202	5	-163
Point 3	1080	-433	375	1003	-448	430	73	-15	-55
Point 4	1244	-647	555	1158	-690	595	86	-43	-40
Point 5	840	-668	375	840	-658	365	0	10	10

+X: Forward of reference point behind the driver and passenger seats.

+Y: Left from vehicle longitudinal centerline.

+Z: Up from ground.

Figure 9 Bullet Vehicle Deformable Barrier Face Profile 1-17

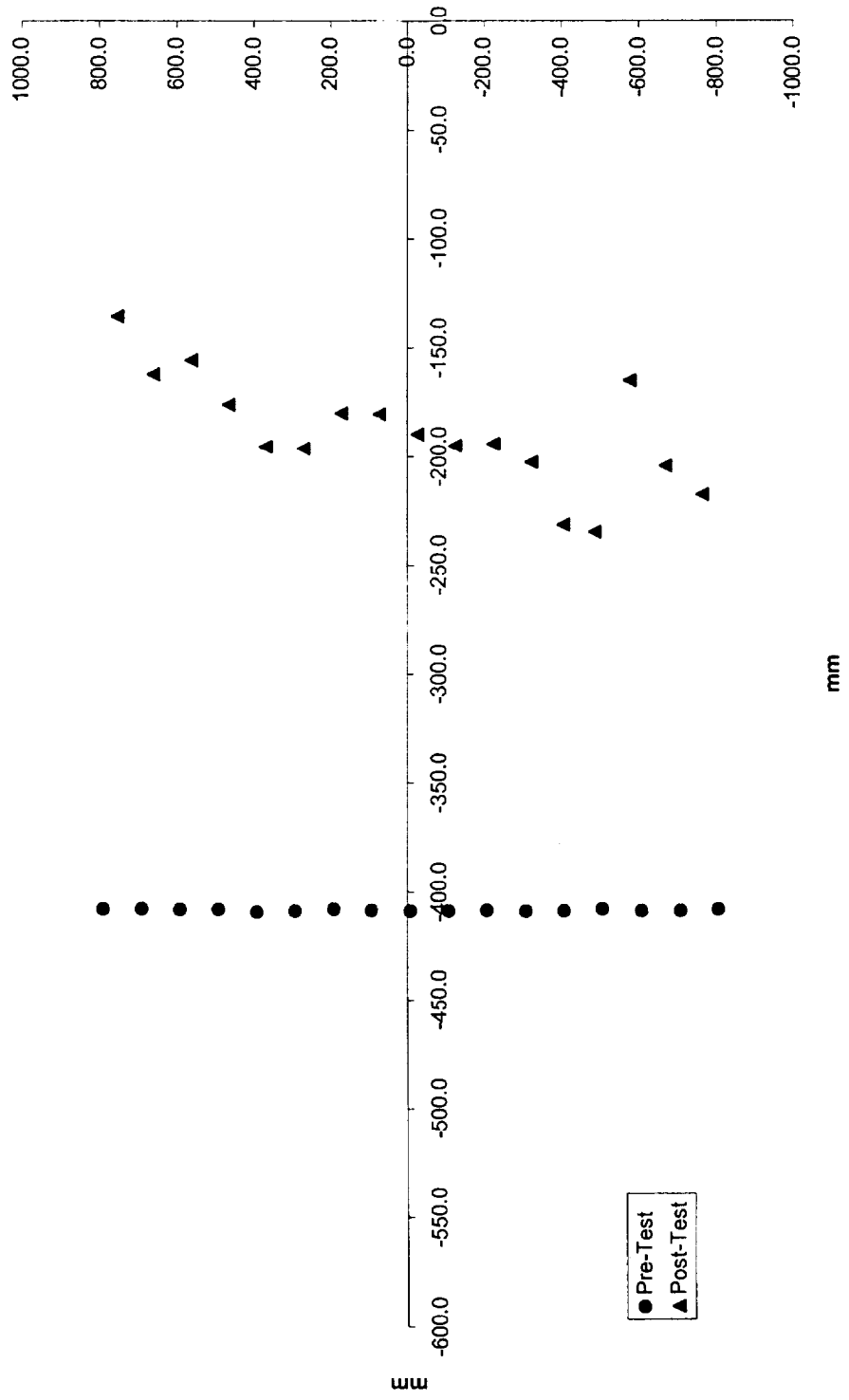


Figure 9 Bullet Vehicle Deformable Barrier Face Profile 18-34

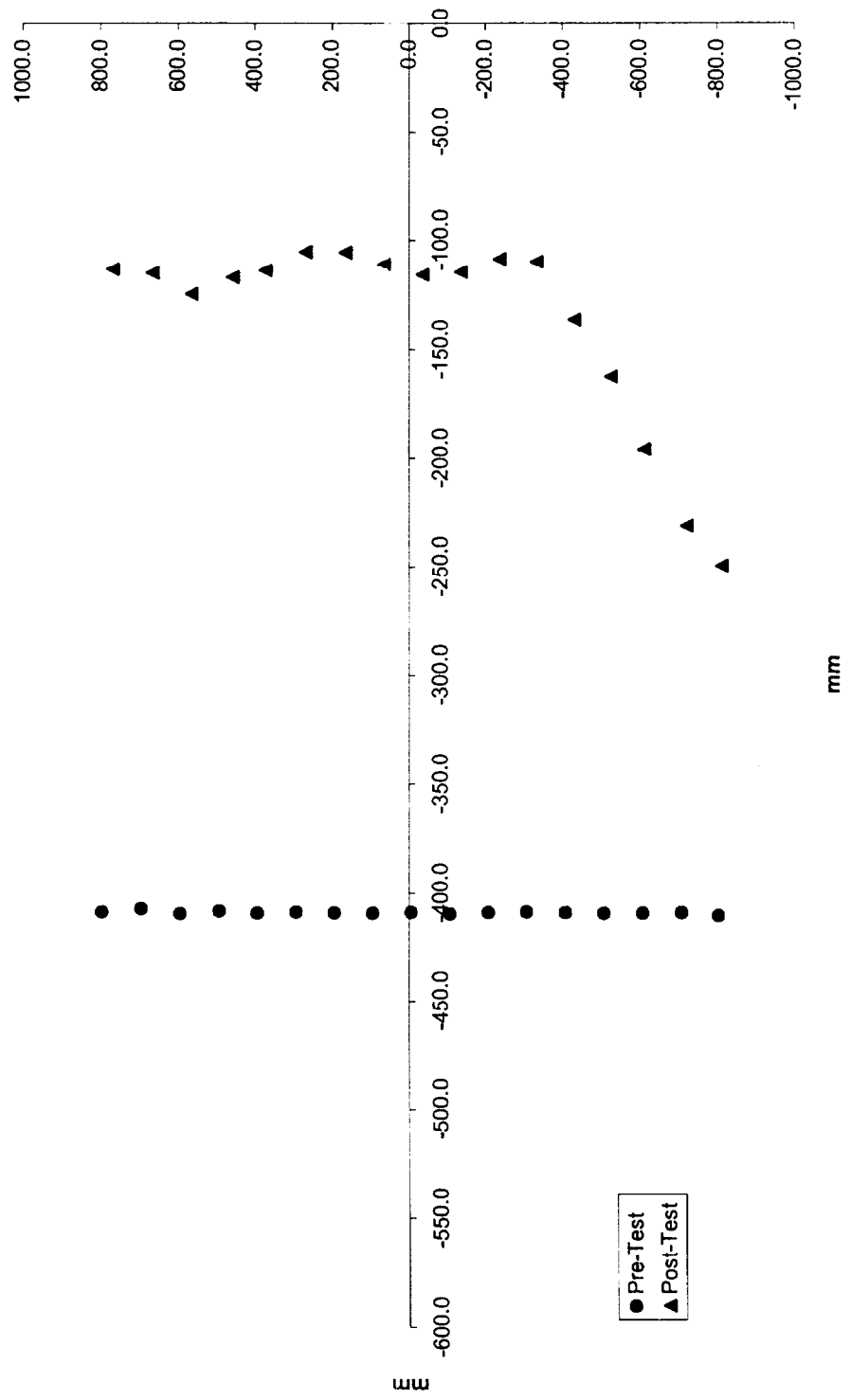


Figure 9 Bullet Vehicle Deformable Barrier Face Profile 35-51

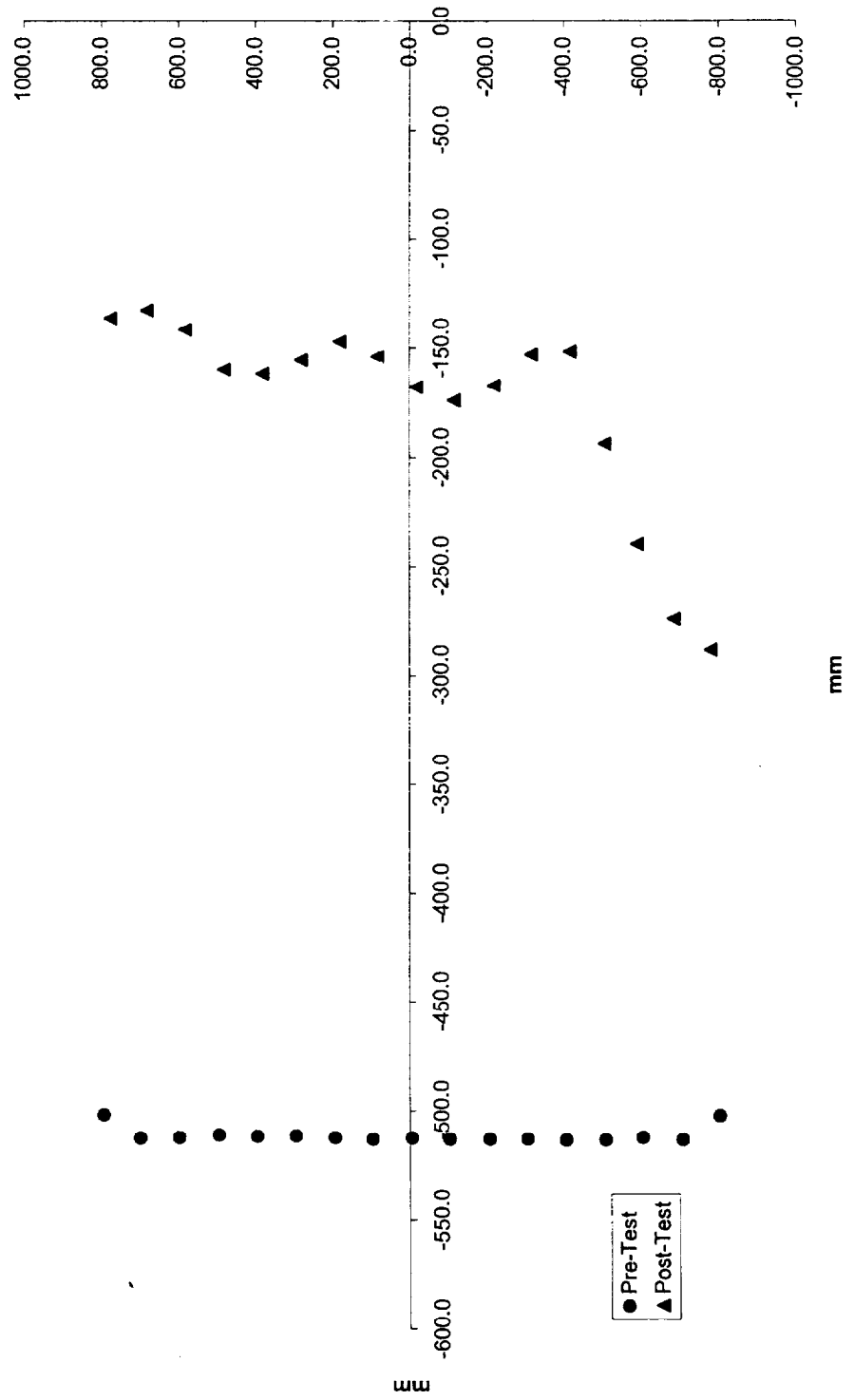


Table 12. Bullet Vehicle Deformable Barrier Face Profile

Pre-Test				Post-Test				Difference			
Index	Xmm	Ymm	Zmm	Index	Xmm	Ymm	Zmm	Index	Xmm	Ymm	Zmm
1	-407.2	789.7	-75.7	1	-135.5	753.6	-203.2	1	-271.8	36.1	127.5
2	-407.4	689.3	-75.4	2	-161.8	659.7	-195.7	2	-245.6	29.6	120.3
3	-407.8	590.5	-75.4	3	-155.5	561.4	-190.6	3	-252.3	29.1	115.3
4	-407.7	490.3	-75.2	4	-176.2	465.4	-182.5	4	-231.5	25.0	107.4
5	-409.0	391.1	-75.7	5	-195.5	368.4	-176.5	5	-213.5	22.7	100.8
6	-408.6	291.7	-76.2	6	-196.3	270.1	-174.8	6	-212.3	21.6	98.7
7	-407.8	190.0	-76.1	7	-180.3	170.7	-171.9	7	-227.6	19.3	95.8
8	-408.3	91.4	-75.7	8	-180.6	72.5	-168.4	8	-227.8	18.9	92.7
9	-408.5	-8.4	-76.4	9	-189.7	-26.6	-165.4	9	-218.8	18.3	89.0
10	-408.6	-108.0	-75.3	10	-194.9	-124.8	-158.5	10	-213.7	16.8	83.3
11	-408.3	-208.4	-76.0	11	-194.2	-224.5	-152.0	11	-214.2	16.1	76.0
12	-408.8	-310.1	-77.5	12	-202.8	-323.2	-151.5	12	-206.0	13.1	74.0
13	-408.8	-407.6	-78.3	13	-231.9	-405.7	-167.3	13	-177.0	-2.0	89.0
14	-407.9	-507.1	-77.7	14	-235.3	-487.2	-205.1	14	-172.6	-19.9	127.4
15	-408.9	-608.5	-77.2	15	-164.9	-577.4	-298.3	15	-244.0	-31.1	221.2
16	-408.9	-708.4	-77.3	16	-204.5	-669.5	-259.3	16	-204.4	-38.9	182.1
17	-408.1	-805.5	-77.0	17	-217.8	-764.6	-243.1	17	-190.3	-41.0	166.2
18	-408.3	794.7	-319.8	18	-113.1	767.5	-356.7	18	-295.2	27.2	36.9
19	-406.9	693.3	-322.8	19	-114.6	664.9	-363.9	19	-292.3	28.4	41.1
20	-409.3	592.6	-323.6	20	-124.2	564.2	-376.0	20	-285.1	28.4	52.4
21	-408.0	491.0	-323.9	21	-116.8	457.5	-384.8	21	-291.2	33.5	60.9
22	-409.1	392.9	-324.4	22	-113.7	372.9	-389.7	22	-295.4	20.0	65.3
23	-408.5	291.3	-324.3	23	-105.3	268.4	-387.4	23	-303.2	22.9	63.1
24	-408.9	192.6	-326.5	24	-105.6	165.3	-387.7	24	-303.4	27.3	61.3
25	-409.3	92.8	-325.4	25	-111.0	65.1	-382.2	25	-298.3	27.7	56.8
26	-408.9	-6.6	-325.9	26	-115.8	-34.4	-380.1	26	-293.1	27.8	54.2
27	-409.5	-107.9	-326.7	27	-114.6	-135.7	-378.6	27	-295.0	27.8	51.9
28	-409.0	-208.3	-325.9	28	-108.7	-236.1	-375.9	28	-300.3	27.8	50.0

Table 12 Bullet_Vehicle_Deformable_Barrier_Face_Profile_Cont'd.

Pre-Test				Post-Test				Difference			
Index	Xmm	Ymm	Zmm	Index	Xmm	Ymm	Zmm	Index	Xmm	Ymm	Zmm
29	-408.8	-307.5	-326.4	29	-110.0	-333.4	-379.7	29	-298.8	25.9	53.4
30	-409.3	-407.7	-327.2	30	-136.4	-431.0	-396.8	30	-272.9	23.3	69.6
31	-409.5	-507.4	-328.2	31	-162.9	-525.0	-414.0	31	-246.7	17.7	85.8
32	-409.7	-608.5	-328.7	32	-196.3	-611.1	-440.0	32	-213.4	2.5	111.3
33	-409.3	-709.2	-328.4	33	-231.9	-721.4	-445.3	33	-177.4	12.2	116.9
34	-410.8	-804.8	-328.3	34	-250.0	-813.4	-447.1	34	-160.8	8.6	118.8
35	-501.4	792.9	-451.9	35	-136.3	776.5	-465.7	35	-365.2	16.4	13.9
36	-512.3	698.3	-453.0	36	-132.7	682.0	-468.1	36	-379.6	16.3	15.2
37	-512.1	597.5	-452.9	37	-141.7	582.5	-471.7	37	-370.4	15.0	18.9
38	-511.0	494.7	-452.7	38	-159.9	481.7	-477.3	38	-351.1	13.0	24.6
39	-511.5	394.9	-453.2	39	-161.8	381.9	-481.9	39	-349.8	13.1	28.7
40	-511.4	295.0	-453.2	40	-155.7	281.9	-486.4	40	-355.7	13.1	33.3
41	-512.2	194.1	-454.3	41	-147.3	181.9	-491.4	41	-364.9	12.3	37.1
42	-513.0	95.6	-453.9	42	-154.2	83.4	-493.0	42	-358.8	12.3	39.2
43	-512.4	-6.0	-453.9	43	-168.2	-17.1	-494.3	43	-344.3	11.1	40.4
44	-513.1	-105.2	-454.5	44	-174.2	-115.6	-496.8	44	-338.9	10.5	42.3
45	-513.1	-207.4	-455.4	45	-167.5	-218.0	-504.7	45	-345.6	10.6	49.3
46	-513.0	-306.0	-455.1	46	-153.3	-315.3	-511.7	46	-359.7	9.3	56.7
47	-513.7	-405.7	-455.5	47	-152.0	-414.6	-519.5	47	-361.8	8.9	64.0
48	-513.8	-507.1	-455.9	48	-193.7	-504.6	-532.2	48	-320.1	-2.4	76.3
49	-512.7	-604.8	-455.8	49	-240.2	-590.0	-546.2	49	-272.5	-14.8	90.4
50	-513.7	-707.3	-455.3	50	-274.4	-684.8	-557.1	50	-239.3	-22.5	101.8
51	-502.7	-802.9	-456.0	51	-288.9	-779.7	-566.7	51	-213.8	-23.2	110.7

Figure 10 Camera Positions

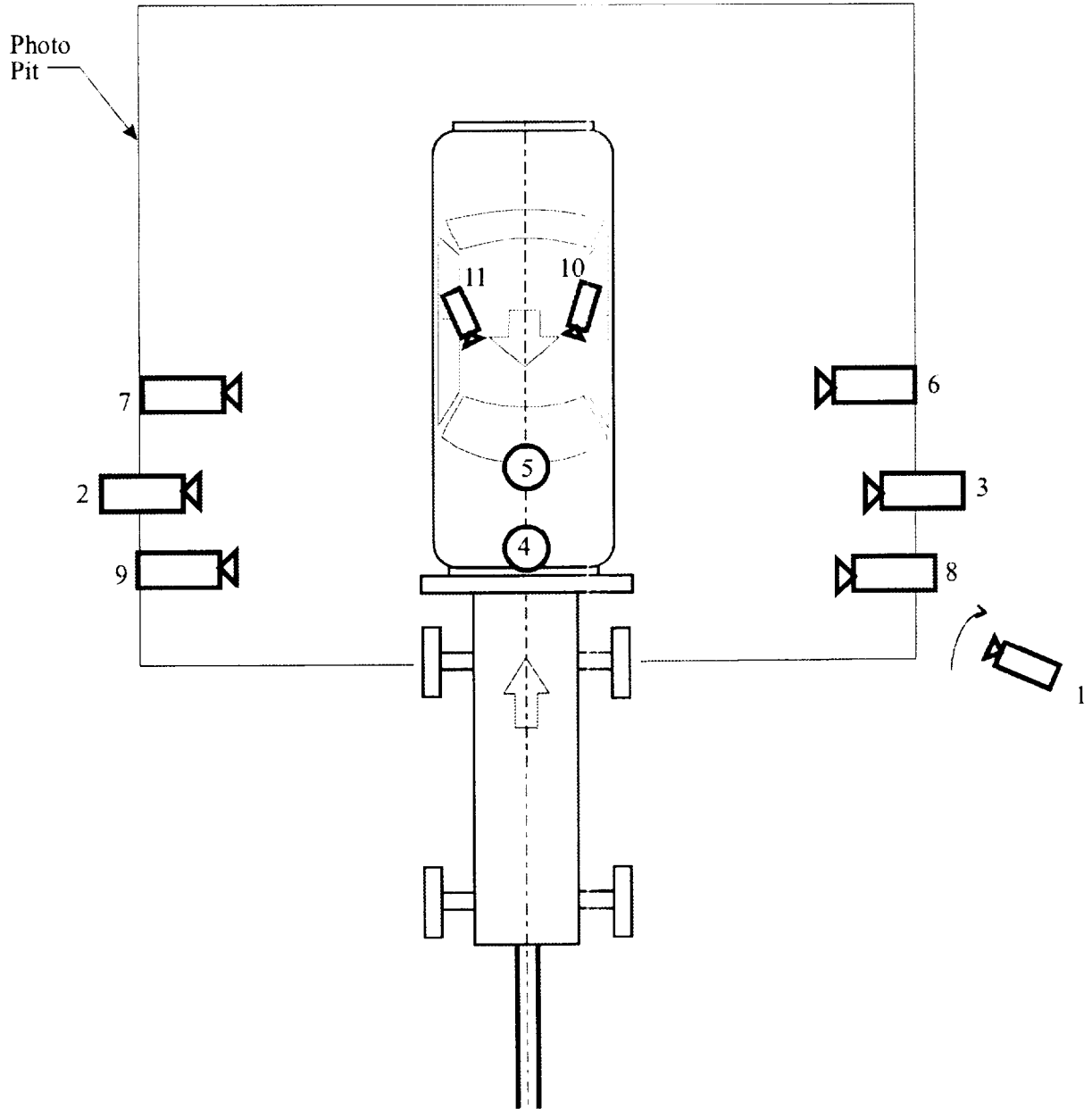


Table 13 Camera Information

Camera Number	Location	Type	Lens (mm)	Speed (fps)	Purpose of camera data
1	Panning	Bolex	16	24	Vehicle dynamics
2	Right wide	Photosonic	13	1000	Dummy kinematics
3	Left wide	Photosonic	13	1007	Dummy kinematics
4	Overhead wide	Photosonic	8.5	990	Vehicle crush
5	Overhead tight	Photosonic	25	990	Impact point
6	Tight driver	Photosonic	50	997	Dummy kinematics
7	Tight passenger	Photosonic	50	1002	Dummy kinematics
8	Moving barrier tight left	Photosonic	25	995	Impact
9	Moving barrier tight right	Photosonic	25	995	Impact
10	Onboard driver	Photosonic	8	1000	Dummy kinematics
11	Onboard passenger	Photosonic	8	1000	Dummy kinematics

Description Of Timing Marks On TRC High-Speed Film

All TRC high-speed cameras are equipped with red LEDs which put timing marks on the right edge of the film. TRC uses a single timing generator to generate the timing for all cameras. This allows the timing marks to be common to all cameras. The timing marks can be used to measure camera speed (frames per second) or to locate a point in time before or after the time-zero event.

The timing marks appear on the film as small red marks on the right edge of the film. Round marks are left by the Photo-Sonics and Stalex cameras while horizontal bars are left by the Hycam, Locam, and Fastax II cameras.

The timing generator puts out a pulse for every millisecond plus it generates additional pulses for hundredths and tenths of seconds. To explain this further, we can use an example of a camera running at 1000 frames per second.

1. Every frame will have **one** LED appear in it. This indicates a *millisecond* pulse.
2. Every ten frames will have **two** LEDs appear in it. These indicate a *millisecond* pulse plus a *hundredth of a second* pulse.
3. Every one hundred frames will have **three** LEDs appear in it. These indicate a *millisecond* pulse, a *hundredth of a second* pulse, and a *tenth of a second* pulse.

Appendix A

Photographs



Figure A-1 Pre-Test Target Vehicle Front View



Figure A-2 Post-Test Target Vehicle Front View



Figure A-3 Pre-Test Target Vehicle Front with Barrier View

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Figure A-4 Pre-Test Target Vehicle Left Front Three-Quarter with Barrier View



Figure A-5 Post-Test Target Vehicle Left Front Three-Quarter View



Figure A-6 Pre-Test Target Vehicle Left Side with Barrier View



Figure A-7 Post-Test Target Vehicle Left Side View



Figure A-8 Pre-Test Target Vehicle Rear View



Figure A-9 Post-Test Target Vehicle Rear View



Figure A-10 Pre-Test Target Vehicle Right Side with Barrier View



Figure A-11 Post-Test Target Vehicle Right Side View



Figure A-12 Pre-Test Target Vehicle Right Front Three-Quarter with Barrier View



Figure A-13 Post-Test Target Vehicle Right Front Three-Quarter View

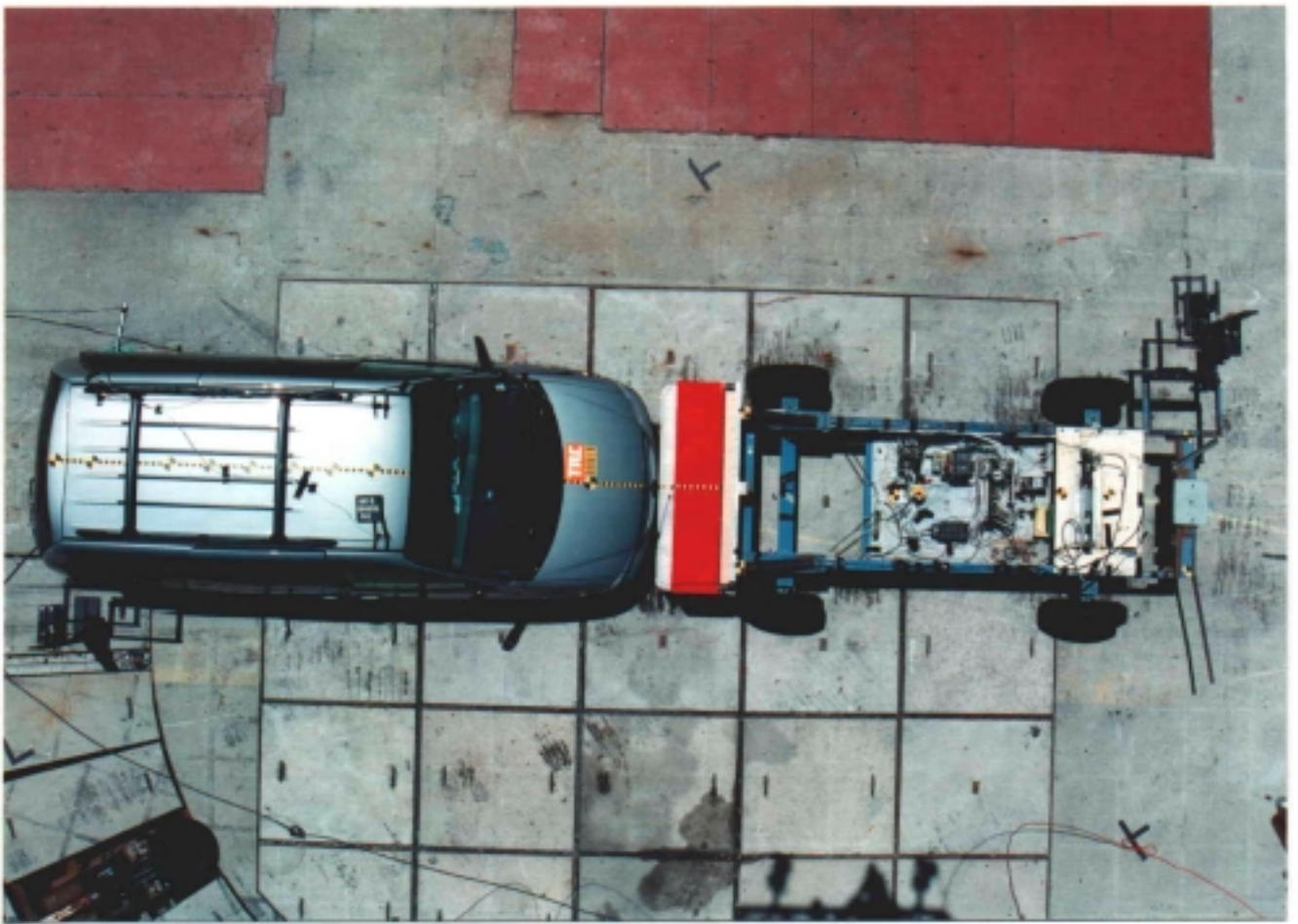


Figure A-14 Pre-Test Overhead Alignment - View 1

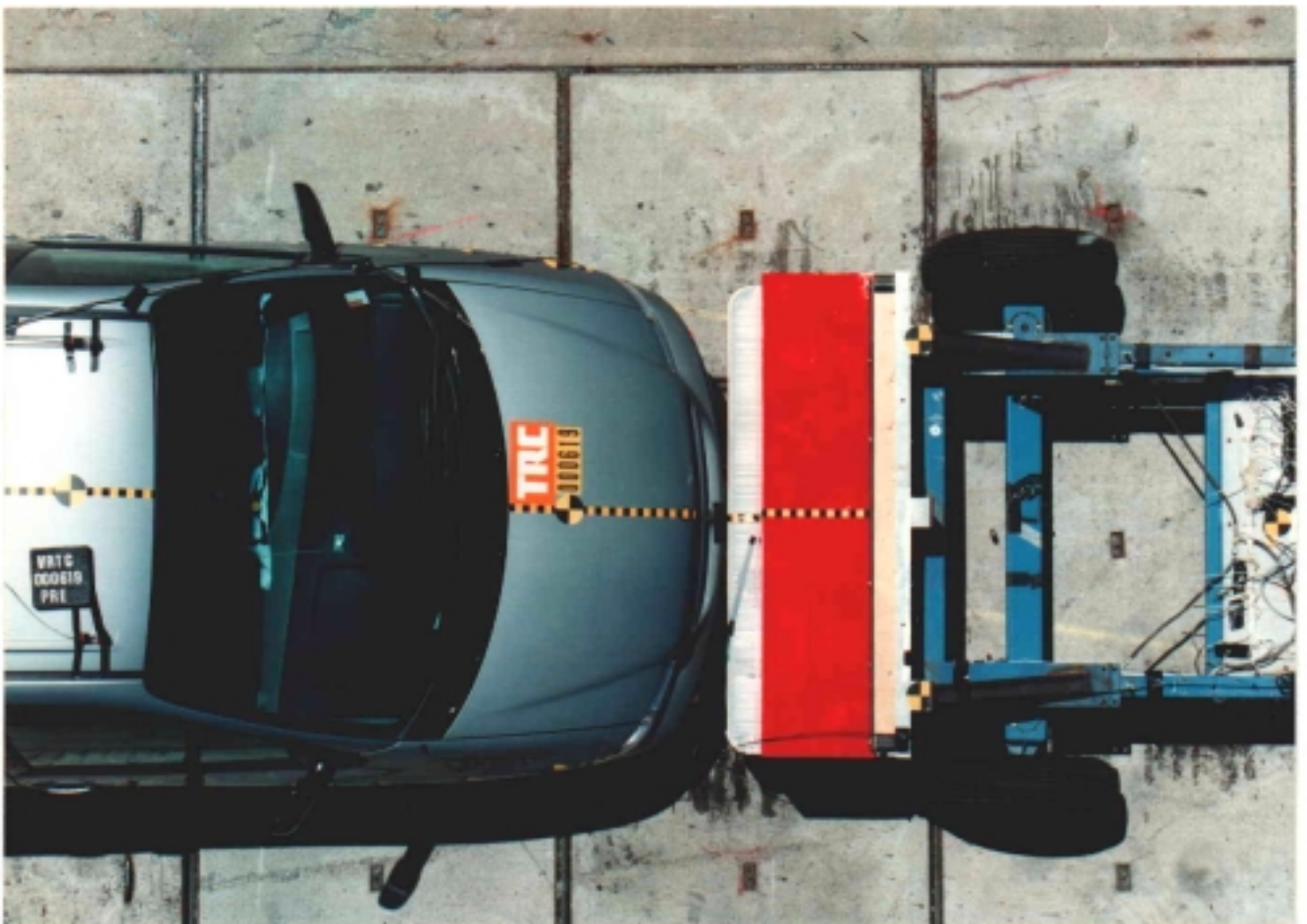


Figure A-15 Pre-Test Overhead Alignment - View 2



Figure A-16 Pre-Test Impact Alignment View

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Figure A-17 Pre-Test Target Vehicle Front Underbody - View 1

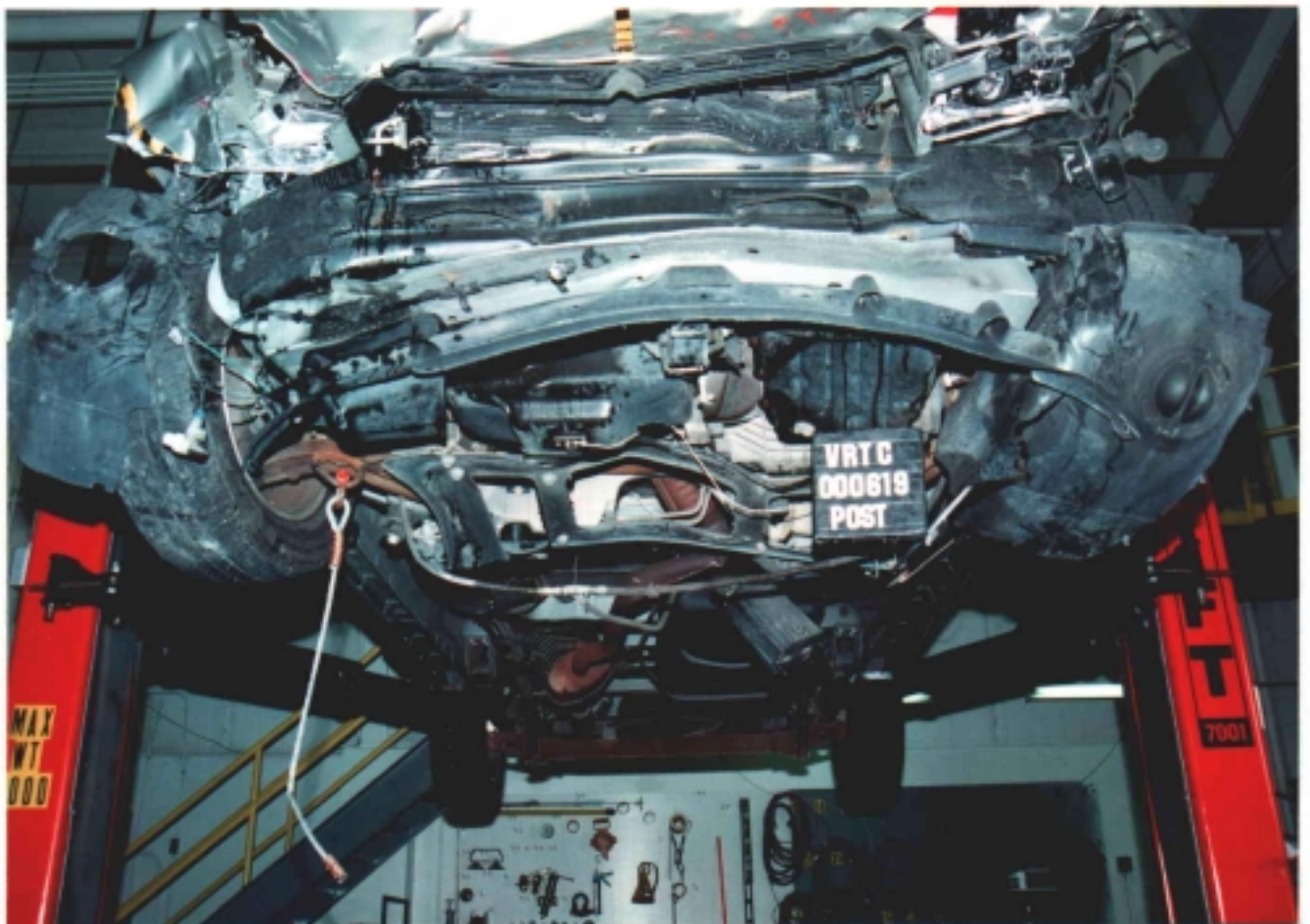


Figure A-18 Post-Test Target Vehicle Front Underbody - View 1

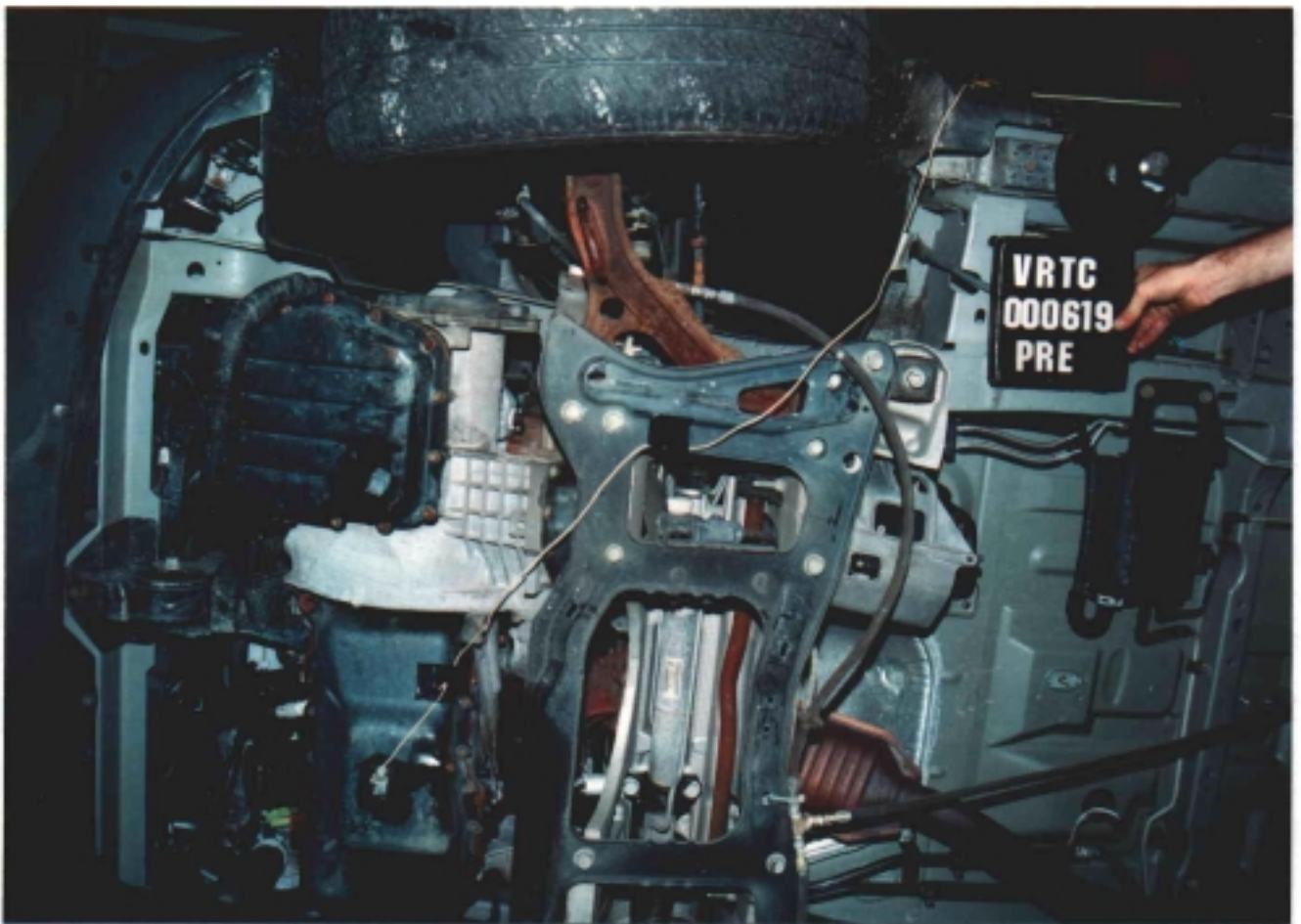


Figure A-19 Pre-Test Target Vehicle Front Underbody - View 2

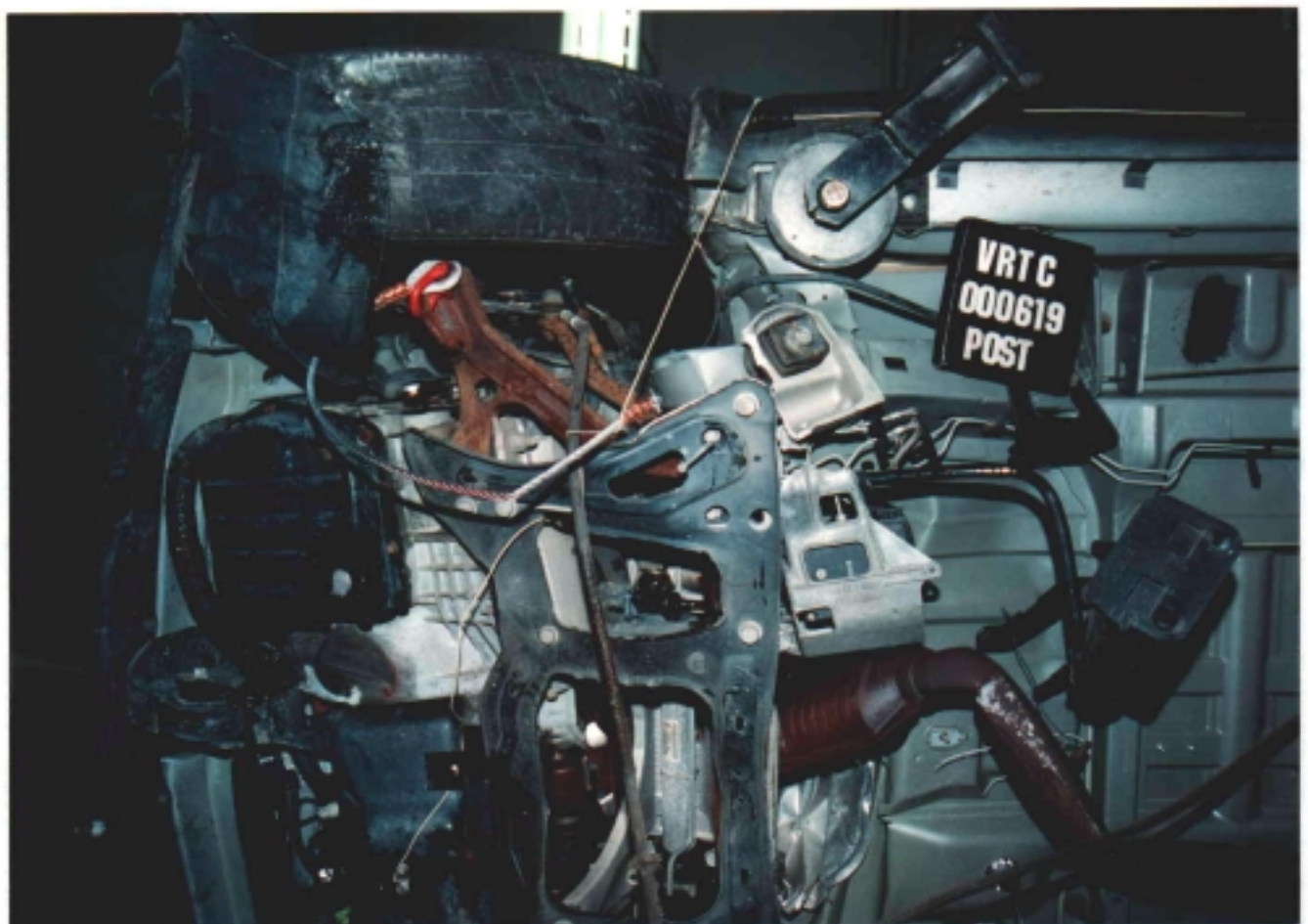


Figure A-20 Post-Test Target Vehicle Front Underbody - View 2

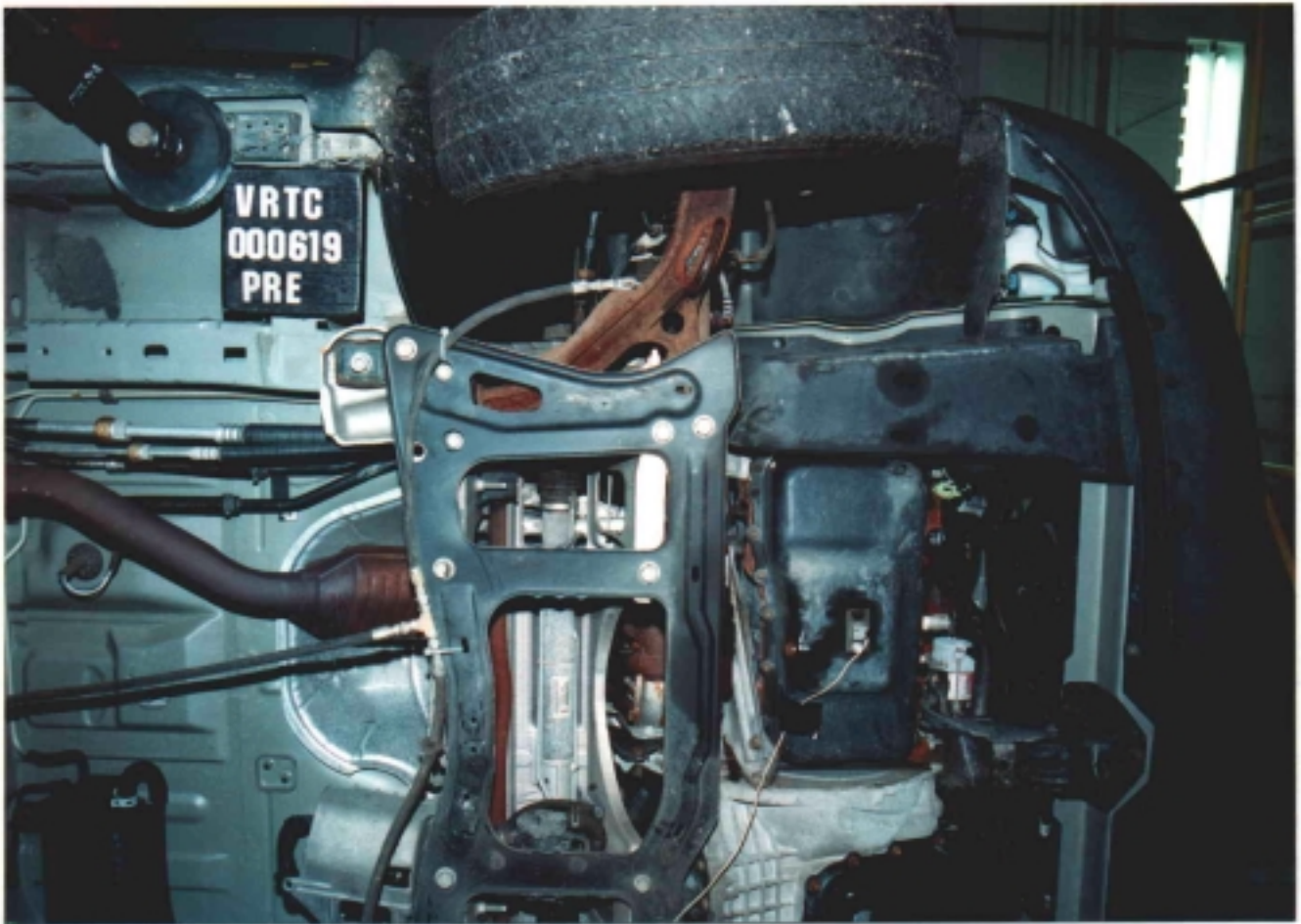


Figure A-21 Pre-Test Target Vehicle Front Underbody - View 3

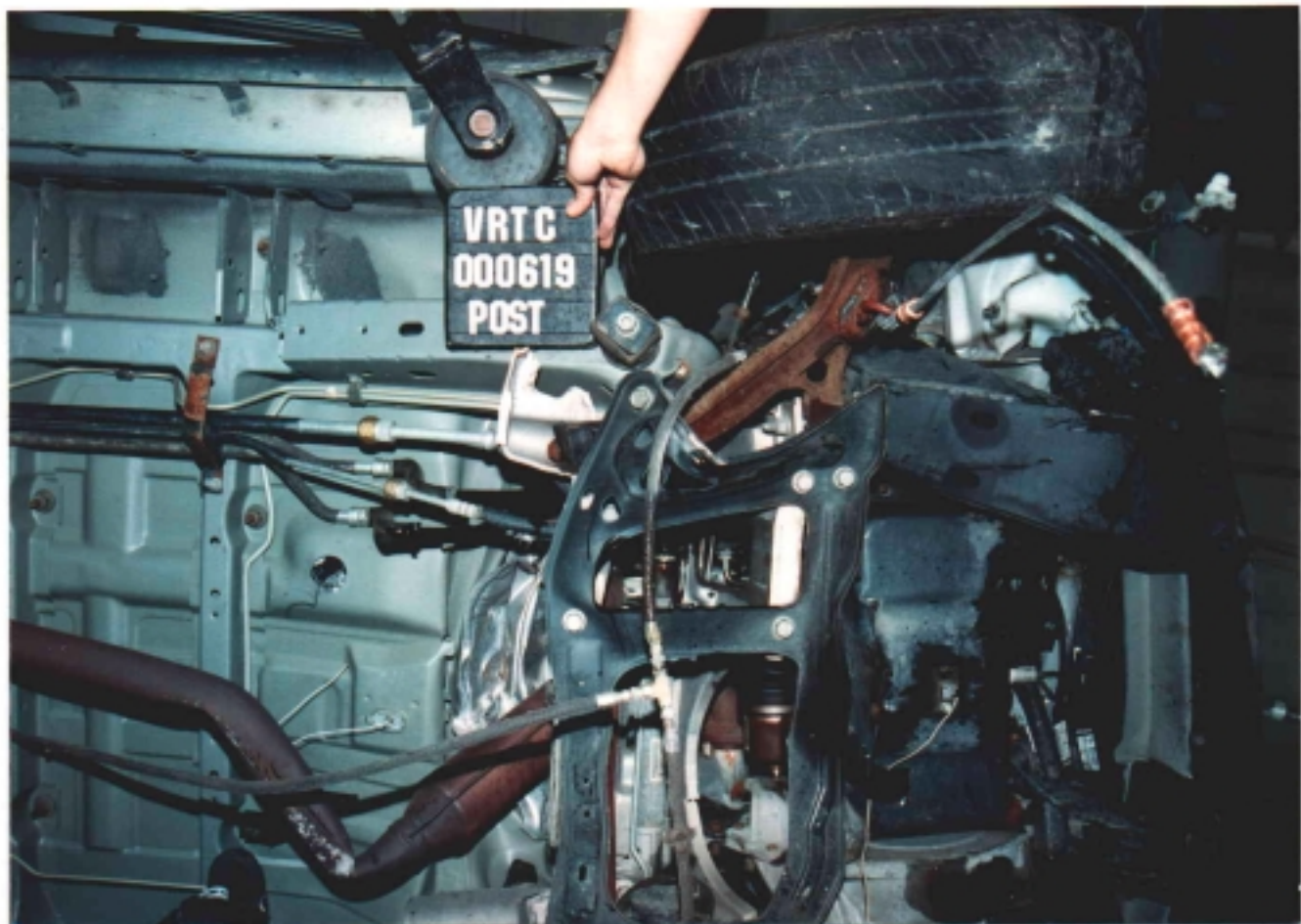


Figure A-22 Post-Test Target Vehicle Front Underbody - View 3



Figure A-23 Pre-Test Target Vehicle Rear Underbody View



Figure A-24 Post-Test Target Vehicle Rear Underbody View



Figure A-25 Pre-Test Target Vehicle Windshield View - Driver and Passenger Dummies



Figure A-26 Post-Test Target Vehicle Windshield View - Driver and Passenger Dummies



Figure A-27 Pre-Test Target Vehicle Driver Dummy through Windshield View



Figure A-28 Post-Test Target Vehicle Driver Dummy through Windshield View



Figure A-29 Pre-Test Target Vehicle Passenger Dummy through Windshield View

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Figure A-30 Pre-Test Moving Deformable Barrier Front View



Figure A-31 Post-Test Moving Deformable Barrier Front - View 1



Figure A-32 Post-Test Moving Deformable Barrier Front - View 2

Intentionally Left Blank



Figure A-33 Pre-Test Moving Deformable Barrier Left Side View



Figure A-34 Post-Test Moving Deformable Barrier Left Side View



Figure A-35 Pre-Test Moving Deformable Barrier Right Side View



Figure A-36 Post-Test Moving Deformable Barrier Right Side View



Figure A-37 Pre-Test Target Vehicle Driver Dummy - View 1



Figure A-38 Post-Test Target Vehicle Driver Dummy - View 1



Figure A-39 Pre-Test Target Vehicle Driver Dummy - View 2



Figure A-40 Post-Test Target Vehicle Driver Dummy - View 2



Figure A-41 Pre-Test Target Vehicle Driver Dummy - View 3



Figure A-42 Post-Test Target Vehicle Driver Dummy - View 3



Figure A-43 Post-Test Target Vehicle Driver Dummy Head Contact - View 1



Figure A-44 Post-Test Target Vehicle Driver Dummy Head Contact - View 2



Figure A-45 Post-Test Target Vehicle Driver Dummy Knee Contact - View 1



Figure A-46 Post-Test Target Vehicle Driver Dummy Chest Contact - View 1



Figure A-47 Pre-Test Target Vehicle Passenger Dummy - View 1



Figure A-48 Post-Test Target Vehicle Passenger Dummy - View 1



Figure A-49 Pre-Test Target Vehicle Passenger Dummy - View 2



Figure A-50 Post-Test Target Vehicle Passenger Dummy - View 2



Figure A-51 Pre-Test Target Vehicle Passenger Dummy - View 3



Figure A-52 Post-Test Target Vehicle Passenger Dummy - View 3



Figure A-53 Post-Test Target Vehicle Passenger Dummy Head Contact - View 1



Figure A-54 Post-Test Target Vehicle Passenger Dummy Head Contact - View 2



Figure A-55 Post-Test Target Vehicle Passenger Dummy Knee Contact - View 1



Figure A-56 Post-Test Driver Dummy - View 1



Figure A-57 Post-Test Driver Dummy - View 2

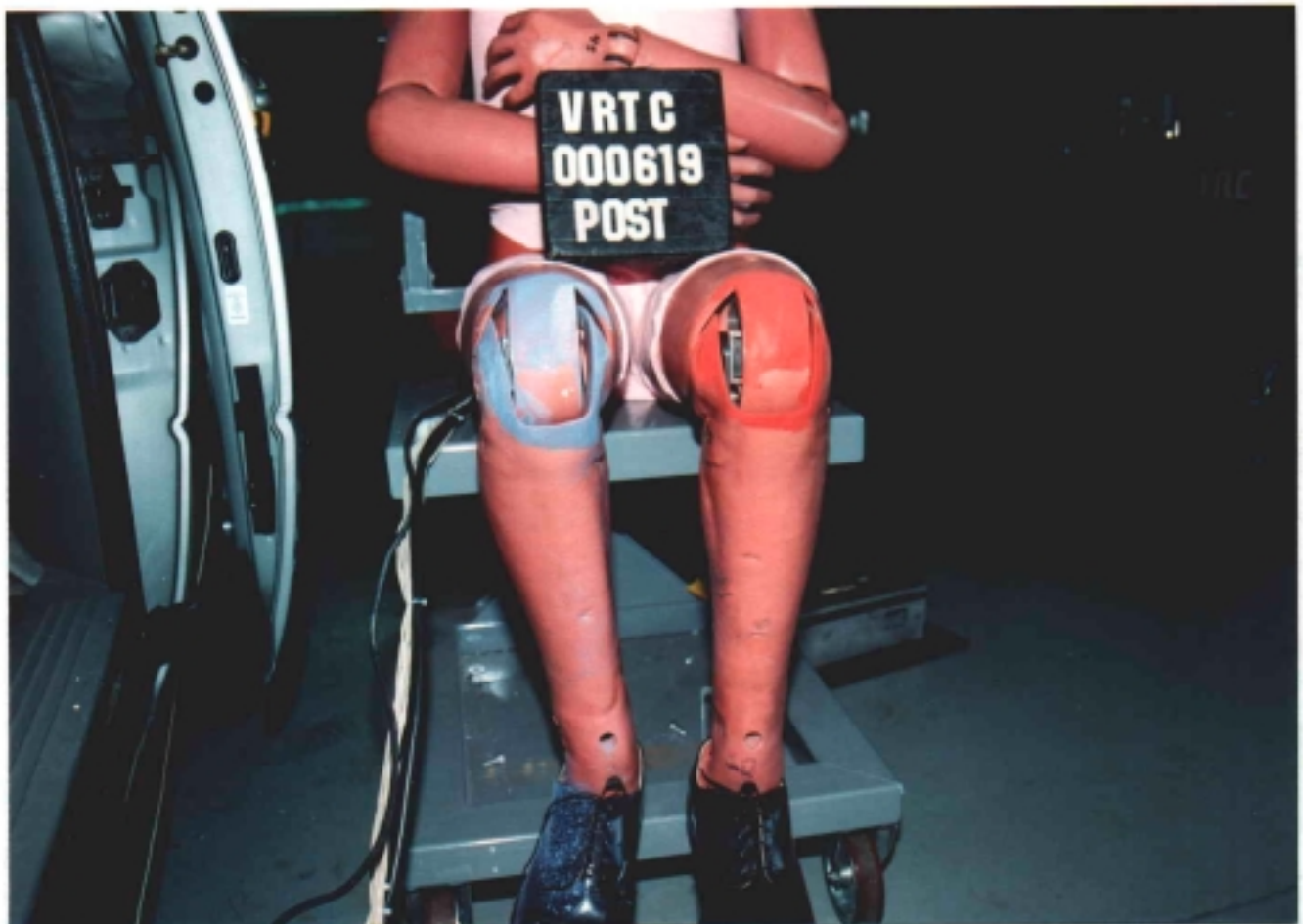


Figure A-58 Post-Test Driver Dummy - View 3



Figure A-59 Post-Test Passenger Dummy - View 1



Figure A-60 Post-Test Passenger Dummy - View 2



Figure A-61 Post-Test Passenger Dummy - View 3



Figure A-62 Post-Test Target Vehicle Ballast View



Figure A-63 Target Vehicle Certification Label View



Figure A-64 Tire Information Label - View 1



Figure A-65 Tire Information Label - View 2



Figure A-66 Tire Information Label - View 3

Appendix B

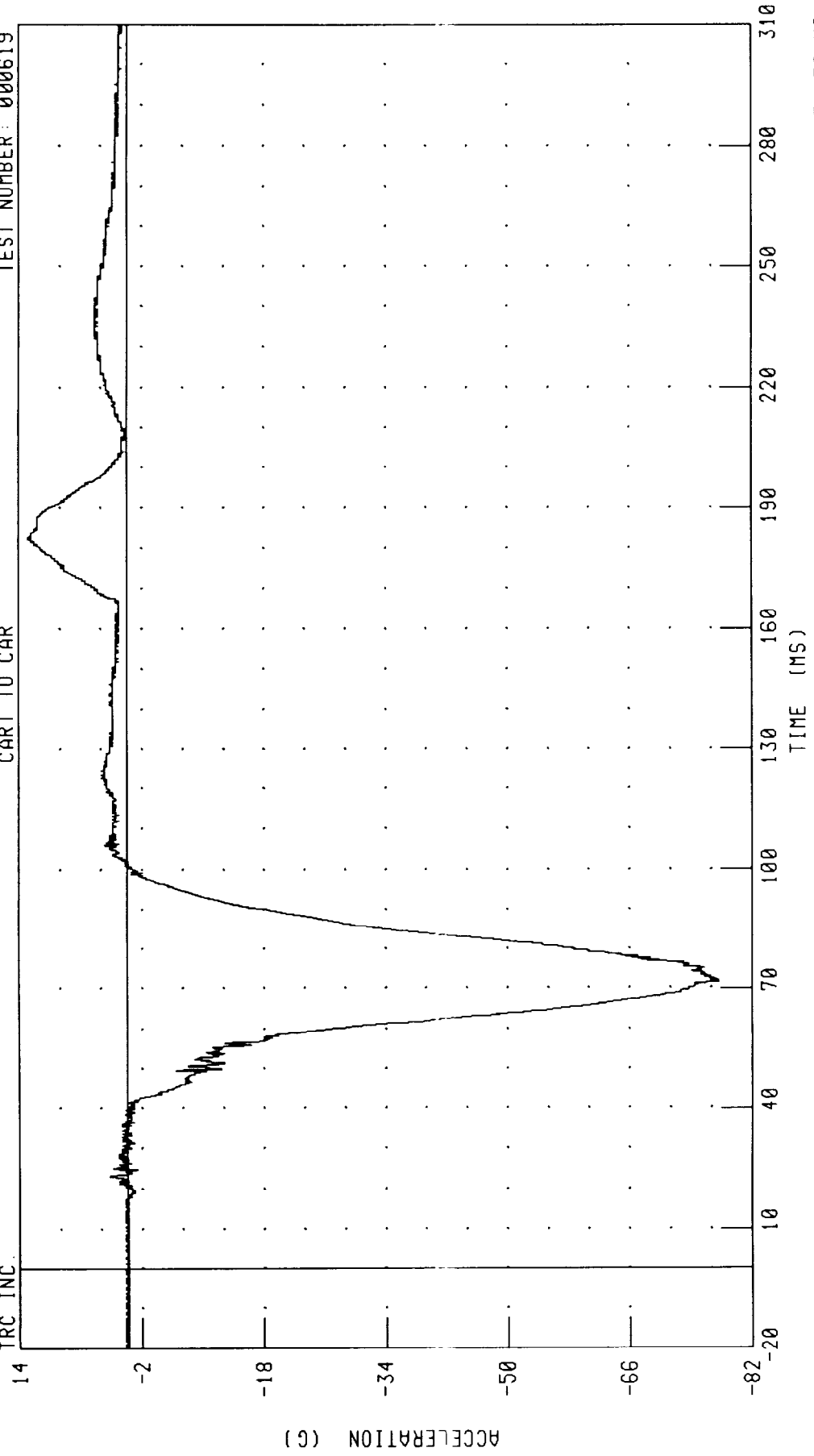
Data Plots

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER HEAD X-AXIS ACCELERATION

TRC INC.

CART TO CAR

TEST NUMBER: 000619



CHANNEL: HEDXC1 FILTER: CH. CLASS 1000

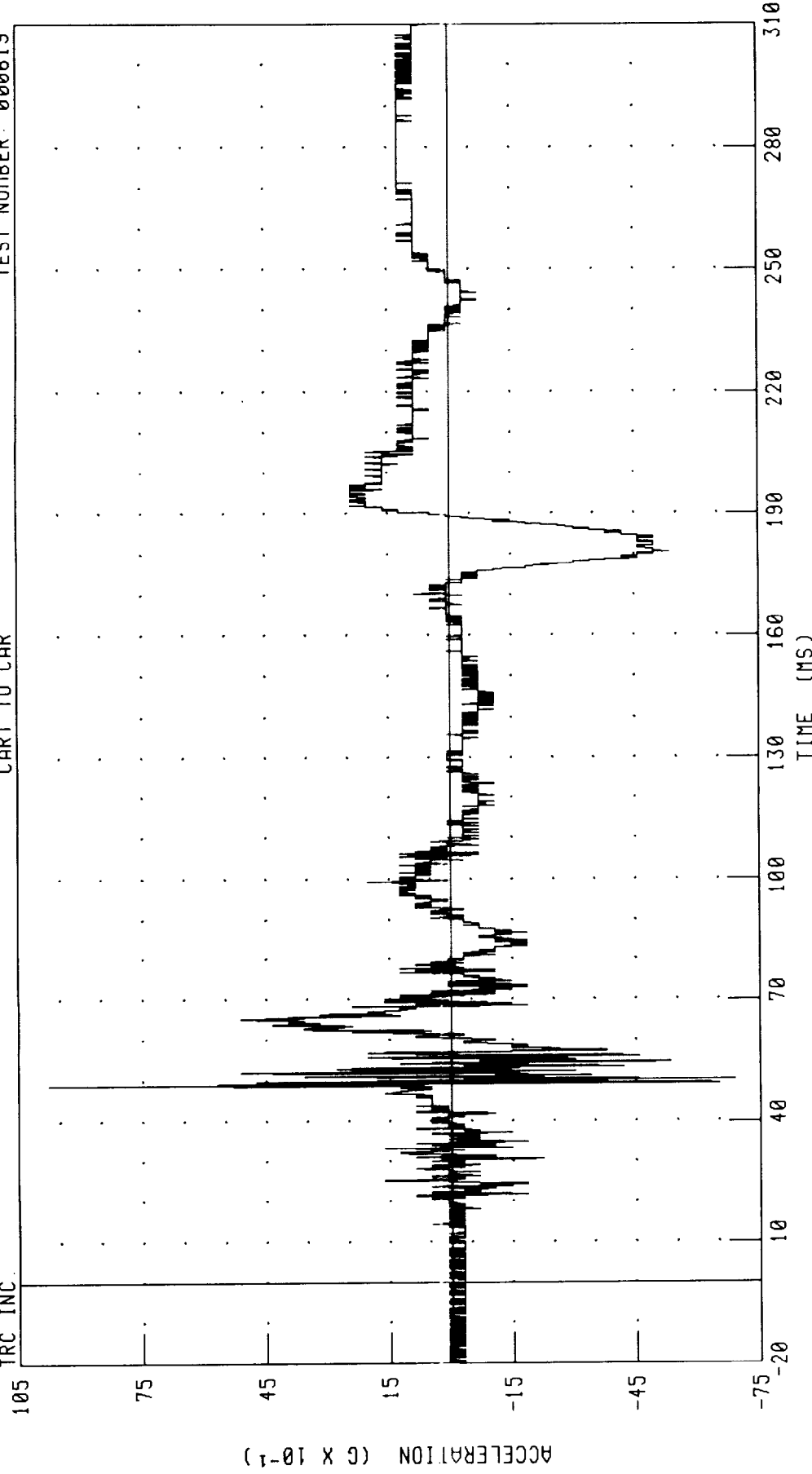
PEAK DATA: 12.83 G @ 182.32 MS, -77.73 G @ 71.52 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER HEAD Y-AXIS ACCELERATION

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 9.77 G @ 49.04 MS, -6.91 G @ 50.32 MS

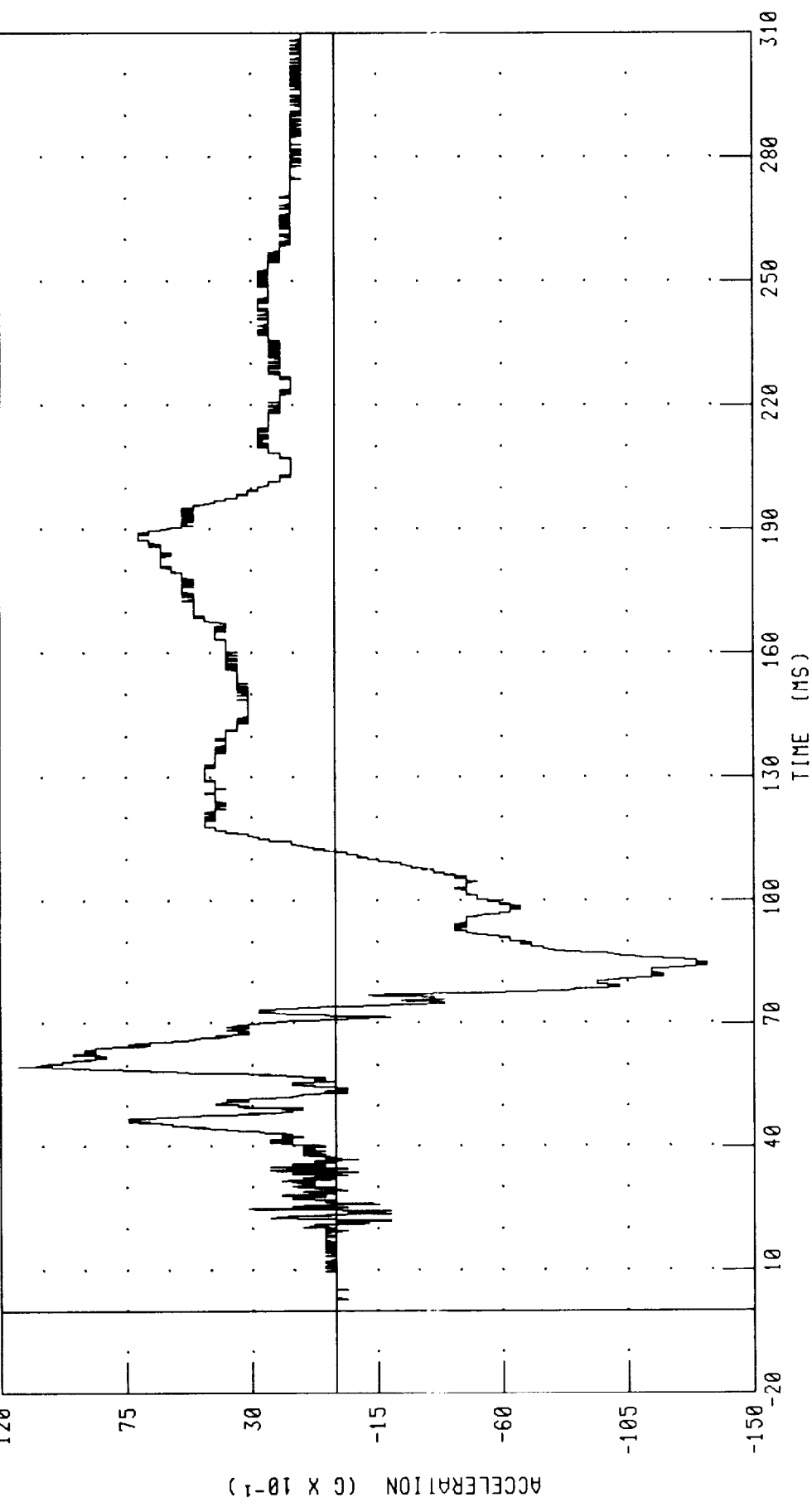
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER HEAD Z-AXIS ACCELERATION

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 11.36 G @ 59.76 MS, -13.32 G @ 84.16 MS

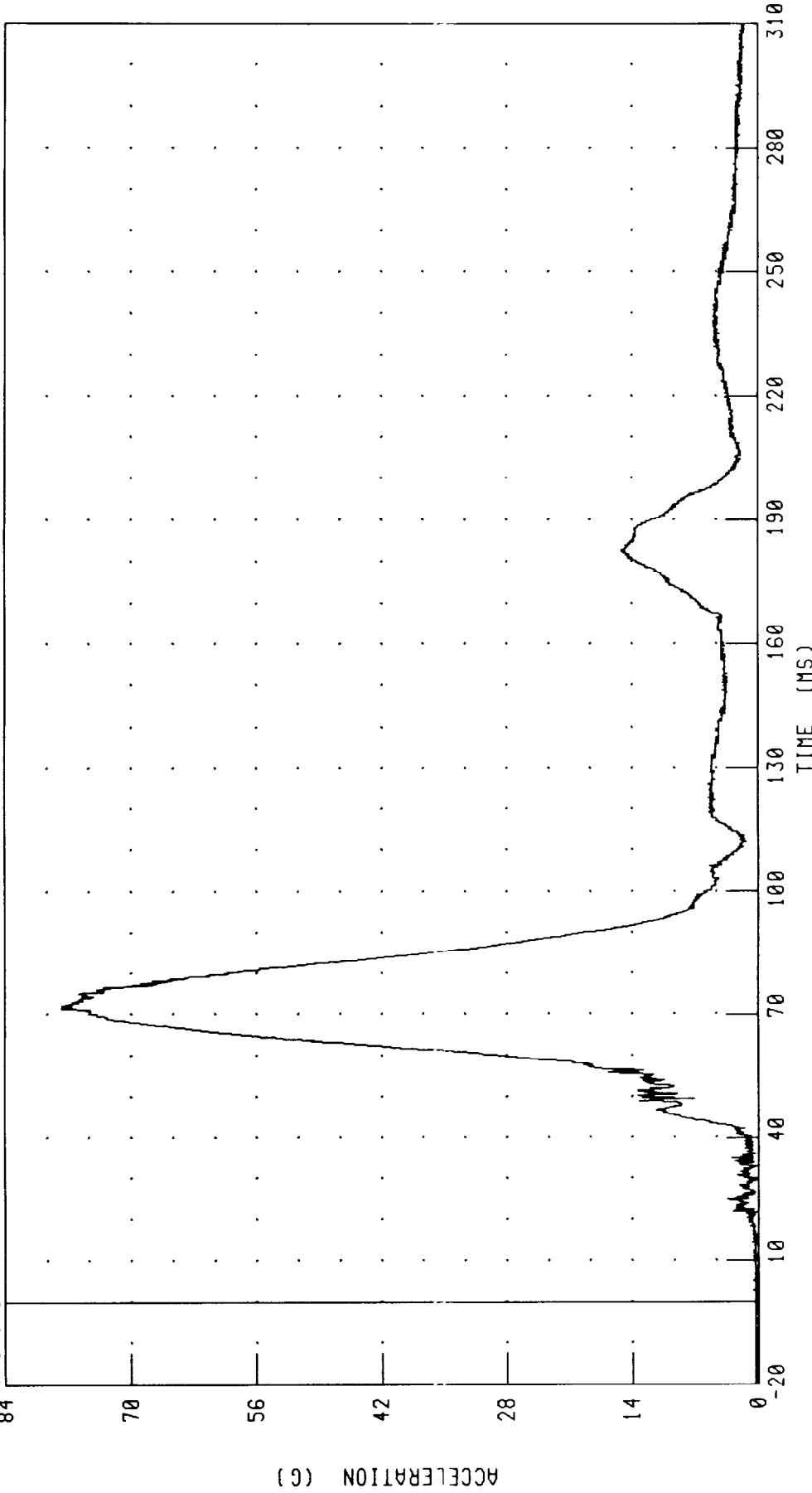
CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER HEAD RESULTANT ACCELERATION

TRC INC.

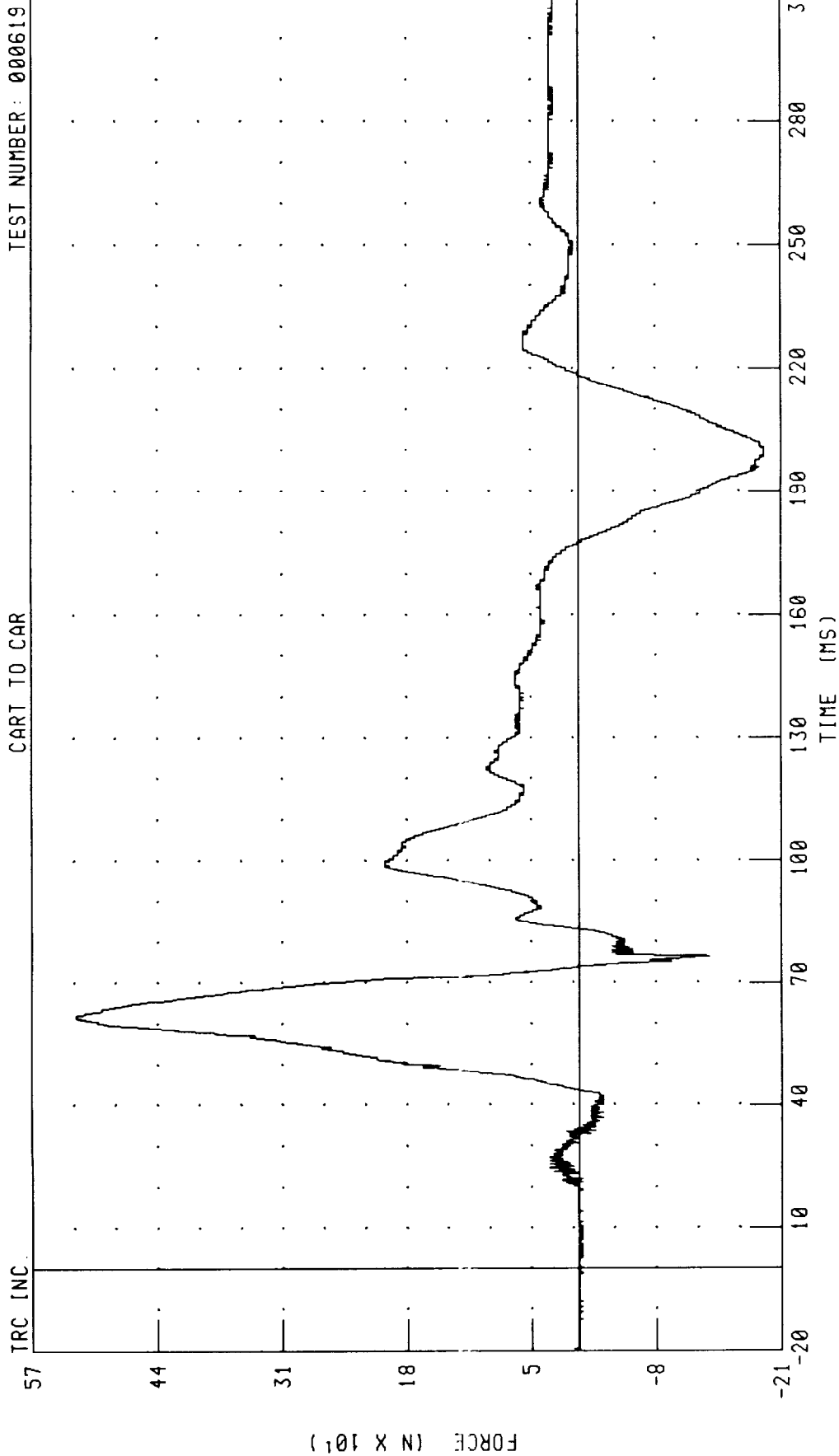
CART TO CAR

TEST NUMBER: 000619



CHANNEL: HEDRG1 FILTER: CH. CLASS 1000 PEAK DATA: 77.76 G @ 71.52 MS; 0.18 G @ 198.84 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK X-AXIS SHEAR FORCE

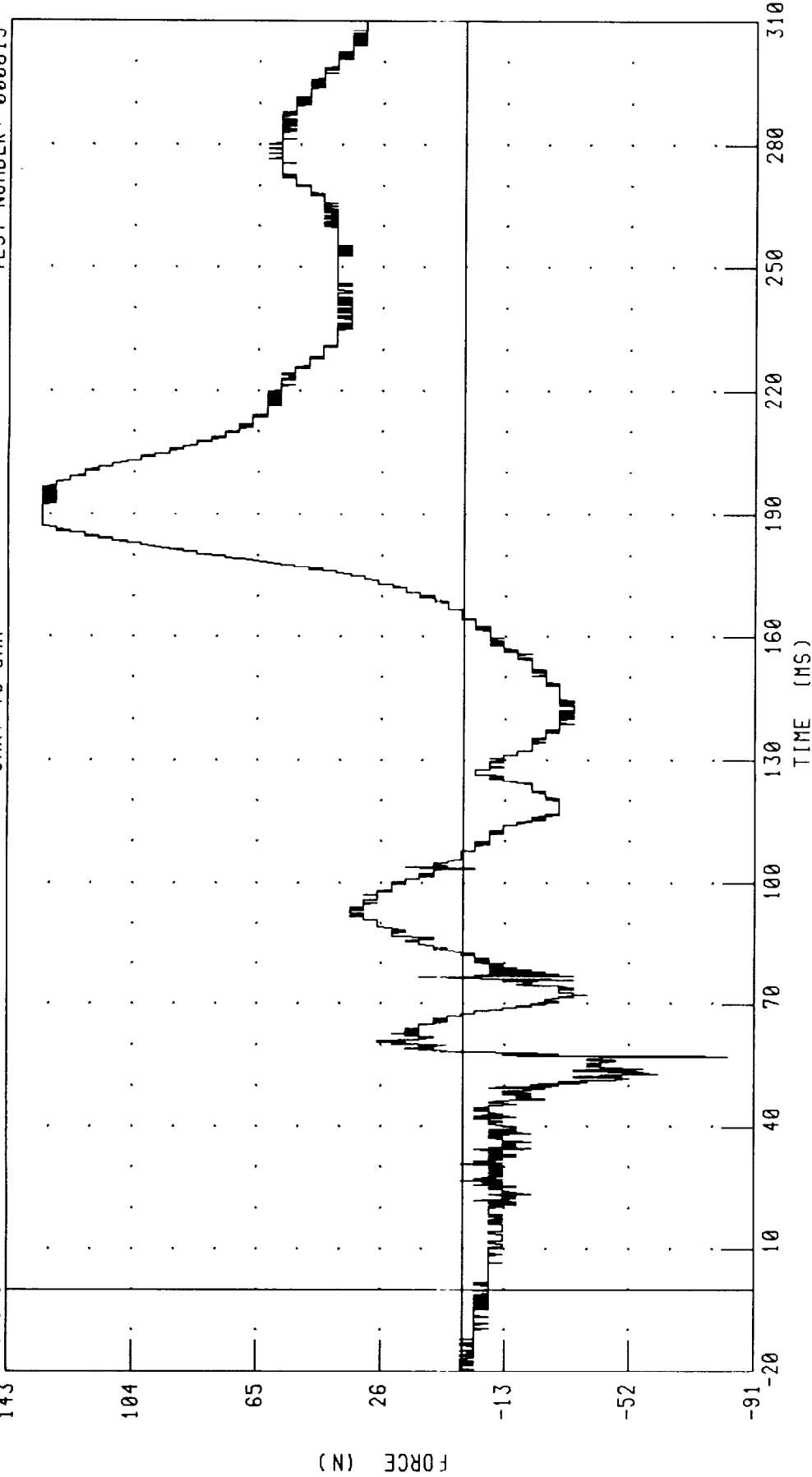


MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK Y-AXIS SHEAR FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

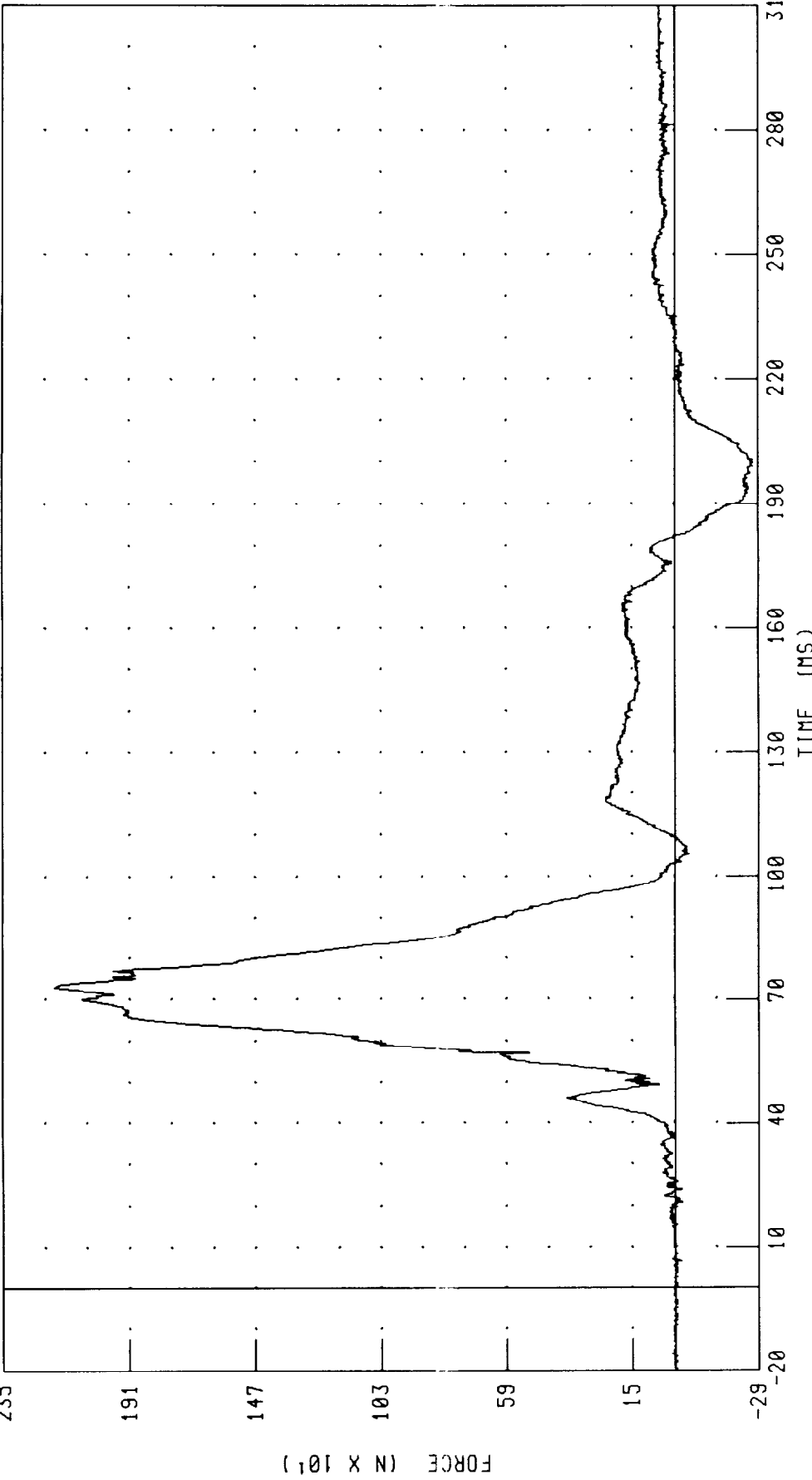
PEAK DATA: 132.58 N @ 187.12 MS, -82.80 N @ 57.04 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



TIME (MS)

PEAK DATA: 2172.55 N @ 73.04 MS, -271.53 N @ 198.88 MS

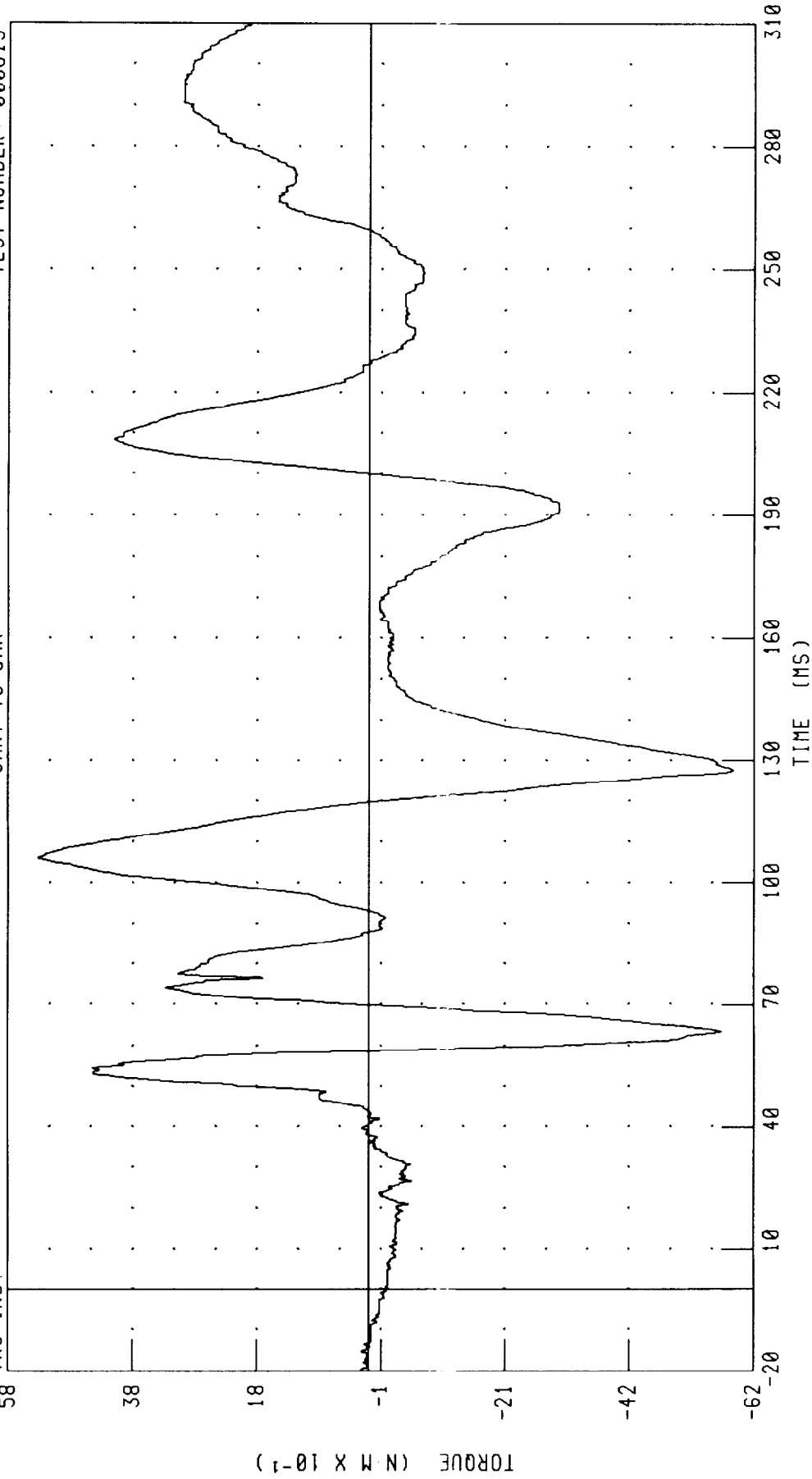
CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK MOMENT ABOUT X-AXIS

TRC INC.

CART TO CAR

TEST NUMBER: 000619



PEAK DATA: 5.34 N·M @ 106.16 MS, -5.86 N·M @ 127.68 MS

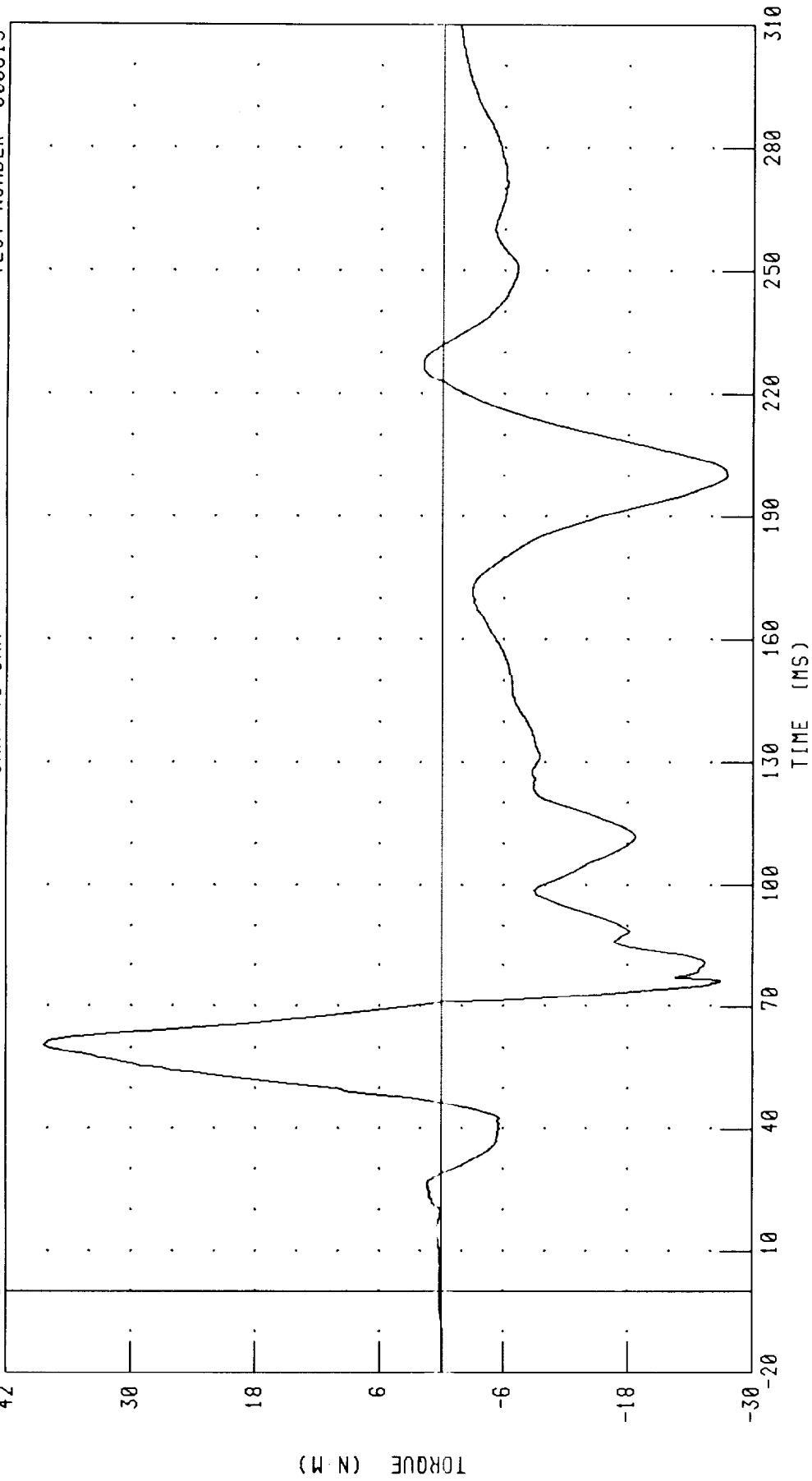
CHANNEL: NEKXM1 FILTER: CH. CLASS 600

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK MOMENT ABOUT Y-AXIS

TRC INC.

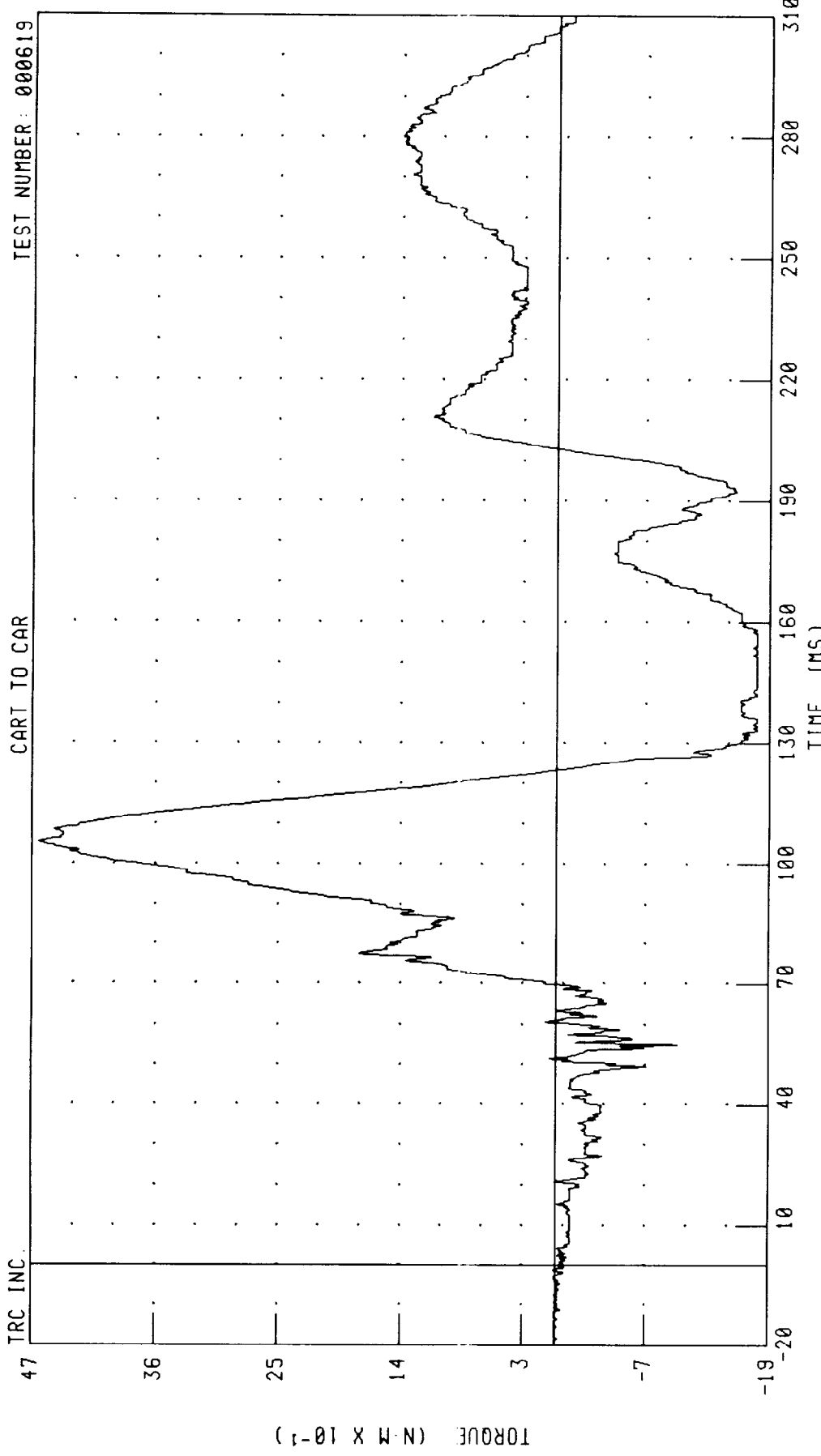
CART TO CAR

TEST NUMBER: 000619



CHANNEL: NEKYM1 FILTER: CH. CLASS 600 PEAK DATA: 38.33 N·M @ 60.72 MS, -27.54 N·M @ 190.16 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK MOMENT ABOUT Z-AXIS



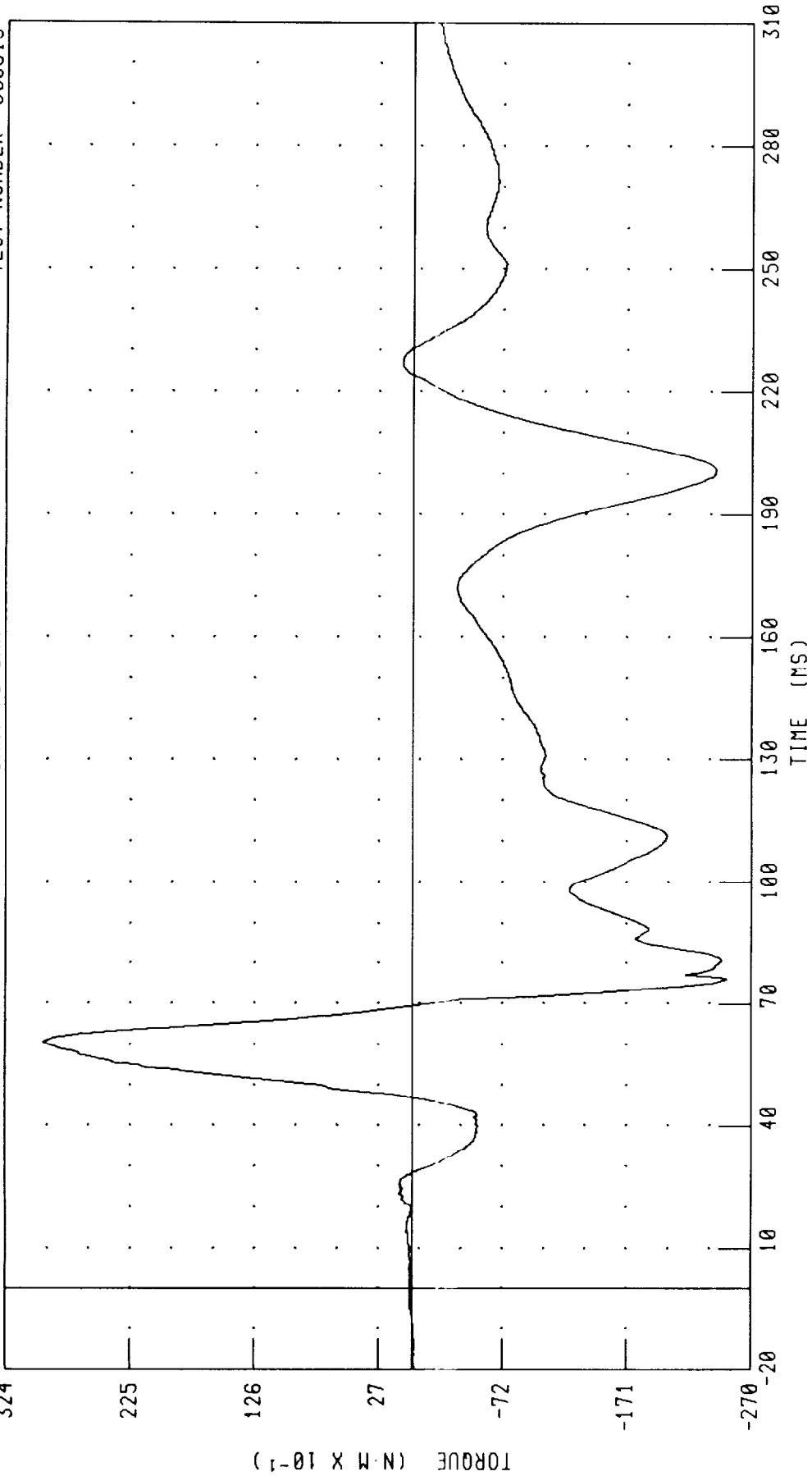
CHANNEL: NEKZM1 FILTER: CH. CLASS 600 PEAK DATA: 4.64 N·M @ 105.44 MS, -1.79 N·M @ 133.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER NECK MOMENT OCCIPITAL CONDYLE ABOUT Y-AXIS

TRC INC.

CART TO CAR

TEST NUMBER: 000619

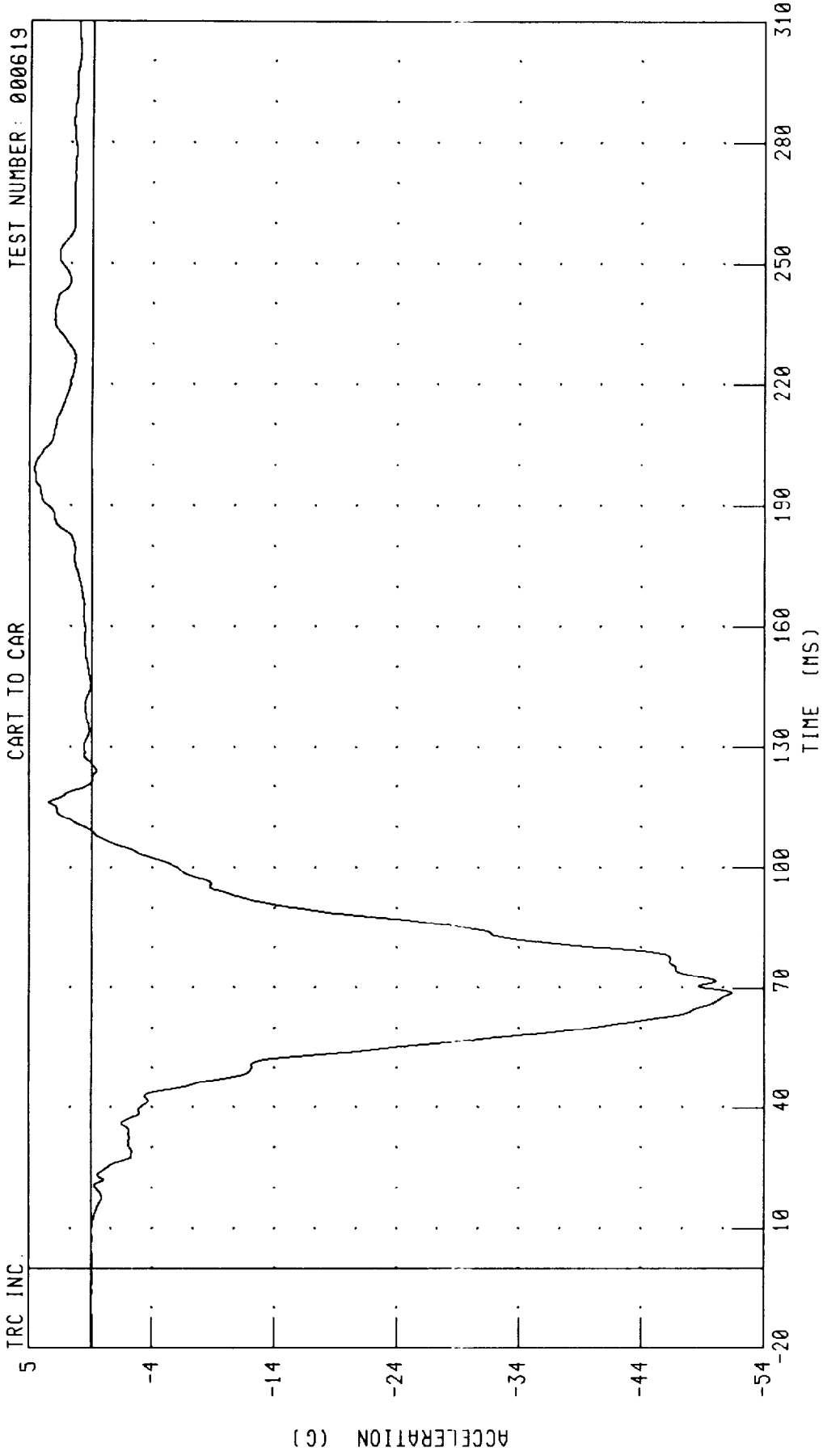


CHANNEL: NEKOM1

FILTER: CH. CLASS 600

PEAK DATA: 29.37 N·M @ 60.64 MS, -25.07 N·M @ 76.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER CHEST X-AXIS ACCELERATION



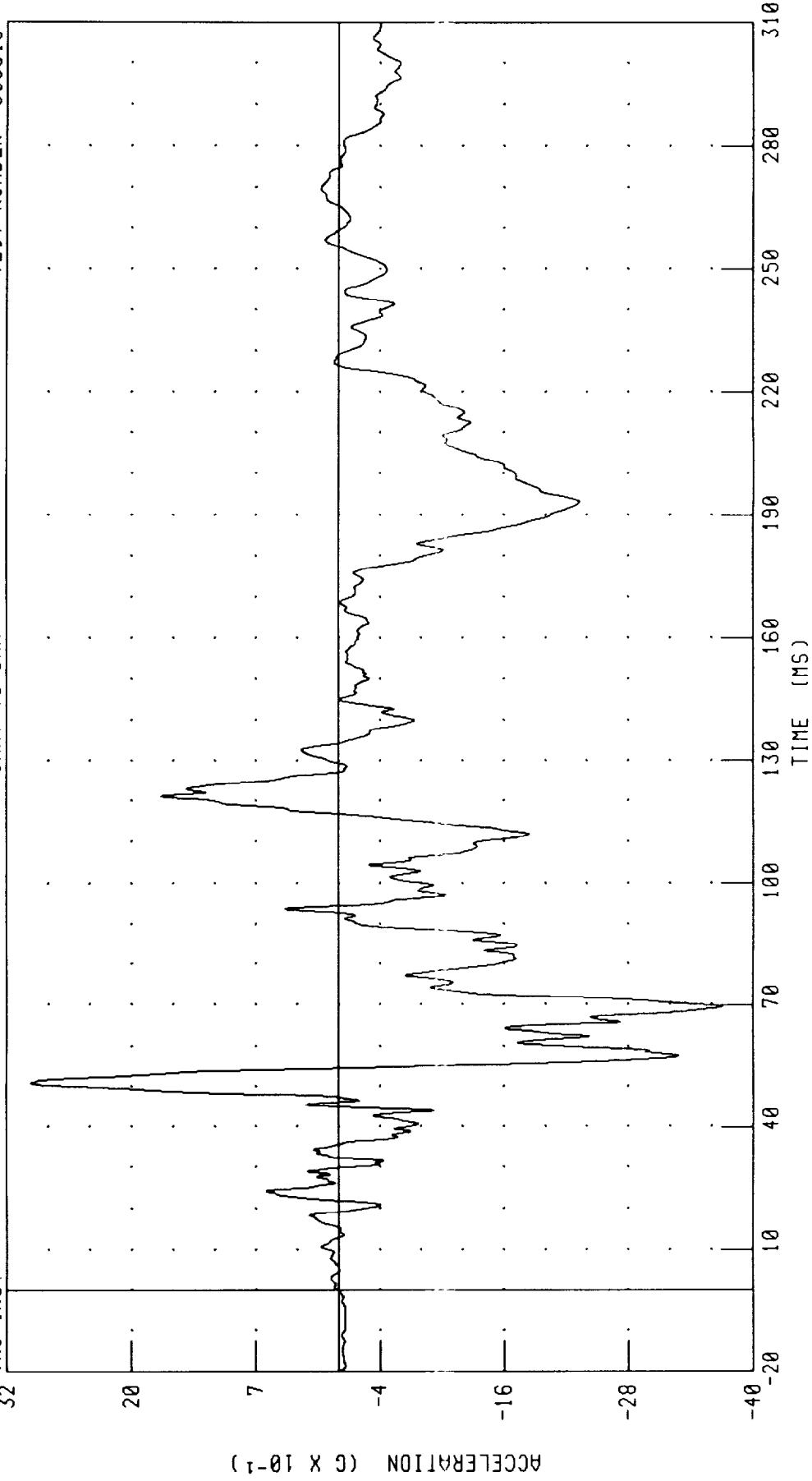
CHANNEL: CSTXG1 FILTER: CH. CLASS 180 PEAK DATA: 4.68 G @ 199.12 MS; -52.25 G @ 68.80 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER CHEST Y-AXIS ACCELERATION

TRC INC.

CART TO CAR

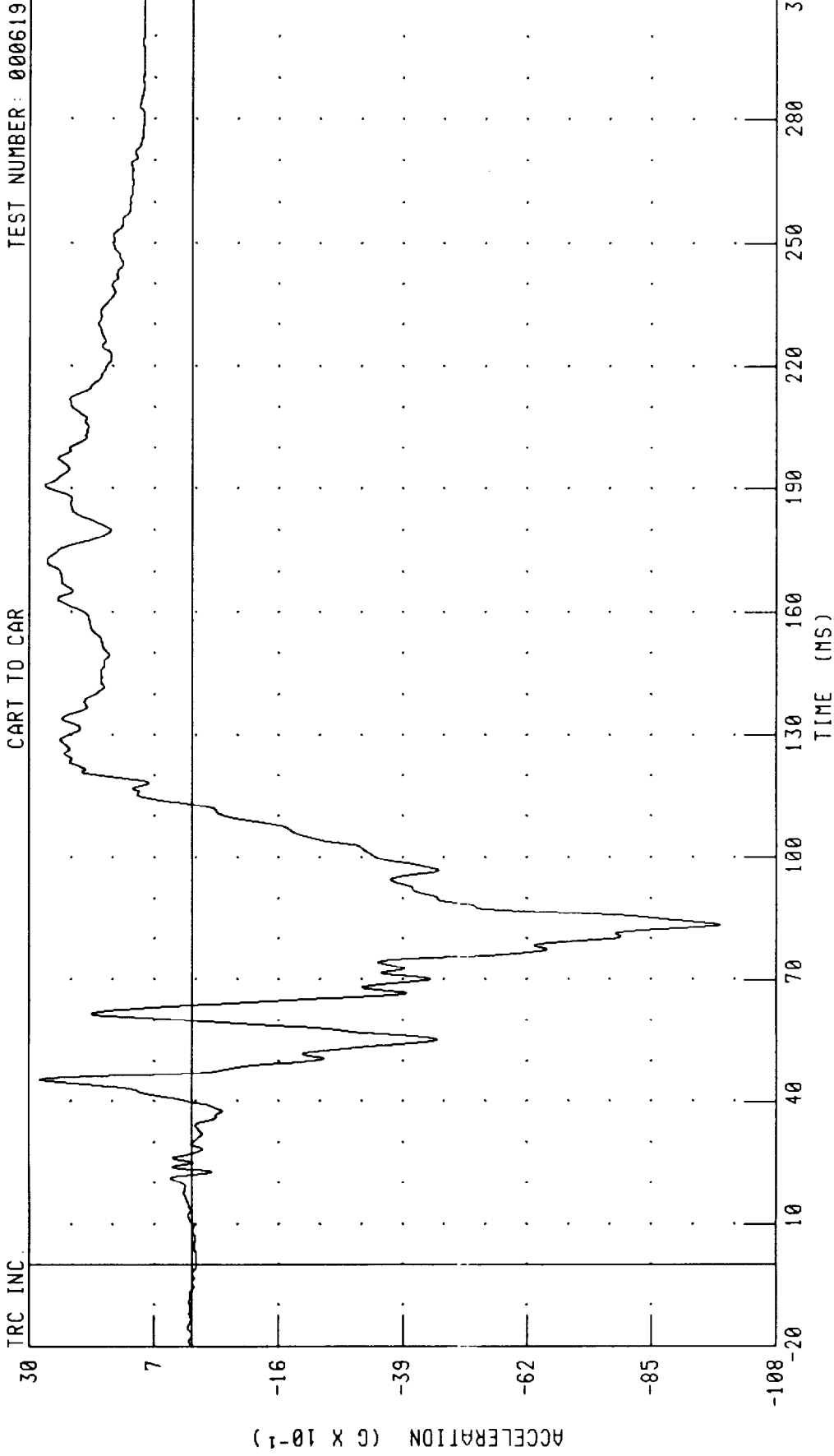
TEST NUMBER: 000619



PEAK DATA: 2.96 G @ 50.80 MS; -3.70 G @ 69.52 MS

CHANNEL: CSTYG1 FILTER: CH. CLASS 180

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER CHEST Z-AXIS ACCELERATION



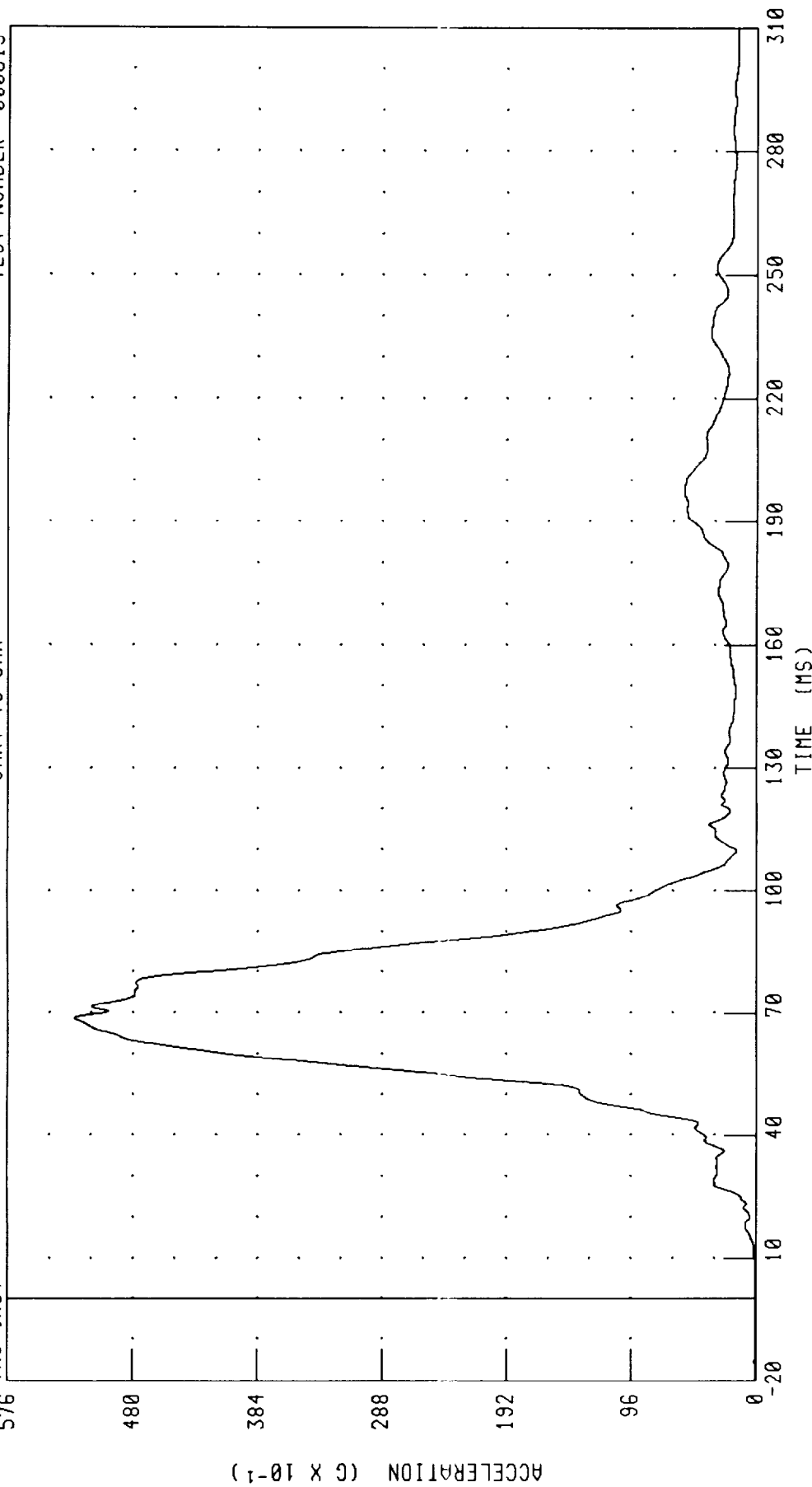
CHANNEL: CSTZG1 FILTER: CH. CLASS 180 PEAK DATA: 2.80 G @ 45.36 MS; -9.76 G @ 83.44 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER CHEST RESULTANT ACCELERATION

TRC INC.

CART TO CAR

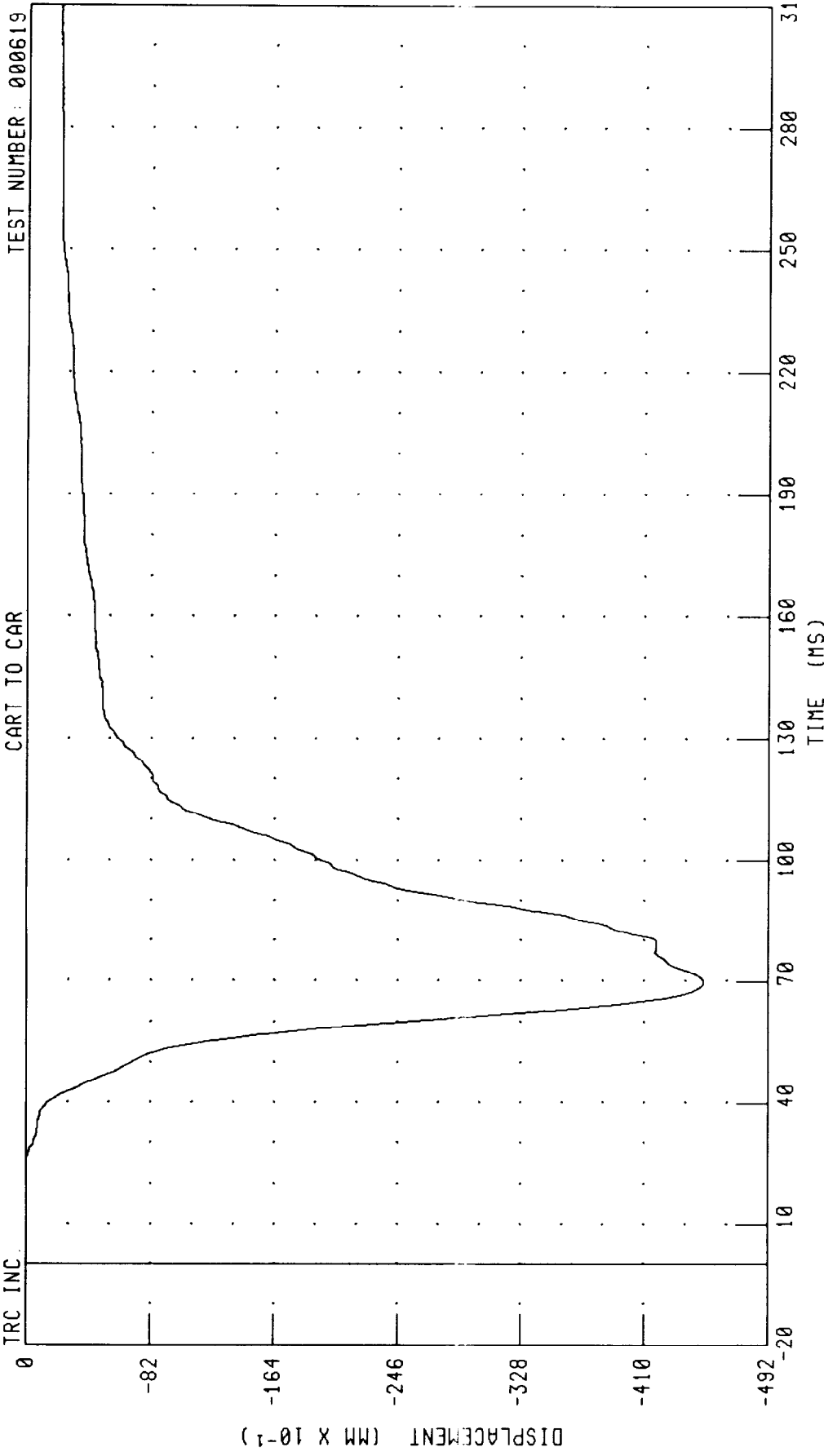
TEST NUMBER: 000619



CHANNEL: CSTRG1 FILTER: CH. CLASS 180

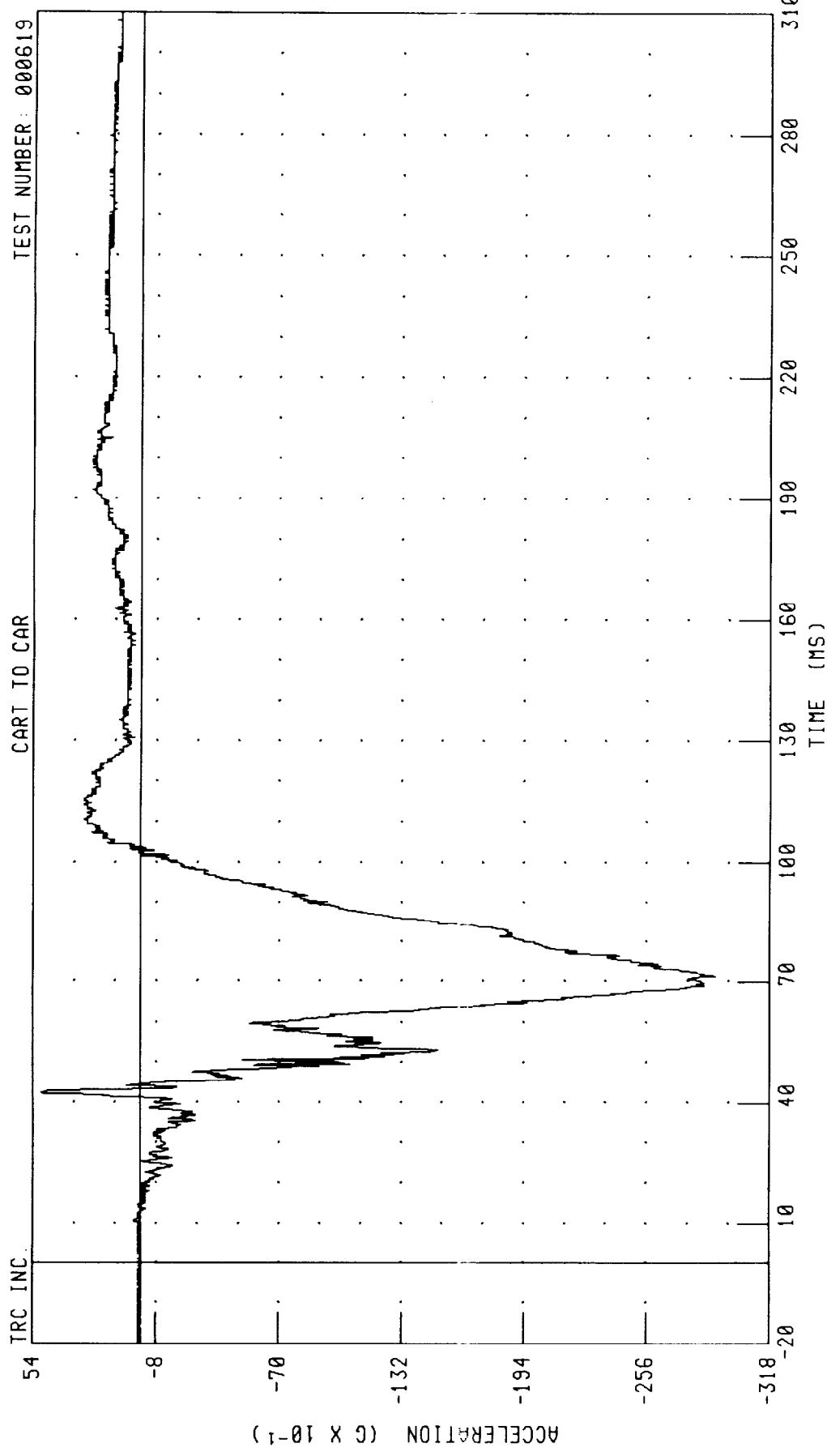
PEAK DATA: 52.48 G @ 68.80 MS, 0.01 G @ -20.00 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER CHEST DEFLECTION
CART TO CAR



CHANNEL: CSTXD1 FILTER: CH. CLASS 600 PEAK DATA: 0.01 MM @ -17.60 MS, -44.92 MM @ 69.52 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER PELVIS X-AXIS ACCELERATION
CART TO CAR



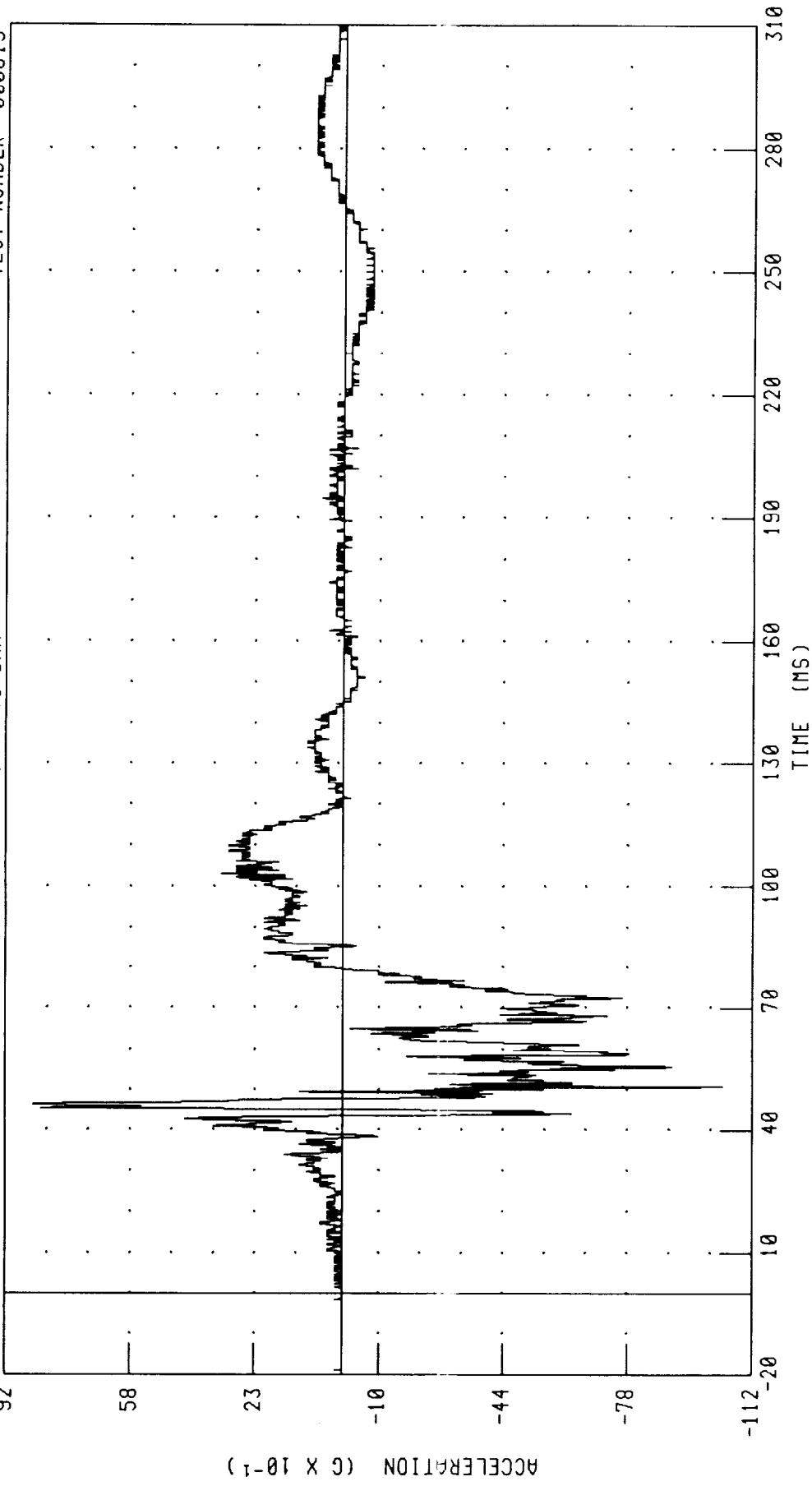
CHANNEL: PEVXG1 FILTER: CH. CLASS 1000 PEAK DATA: 5.00 G @ 42.40 MS, -29.10 G @ 71.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER PELVIS Y-AXIS ACCELERATION

TRC_INC

CART TO CAR

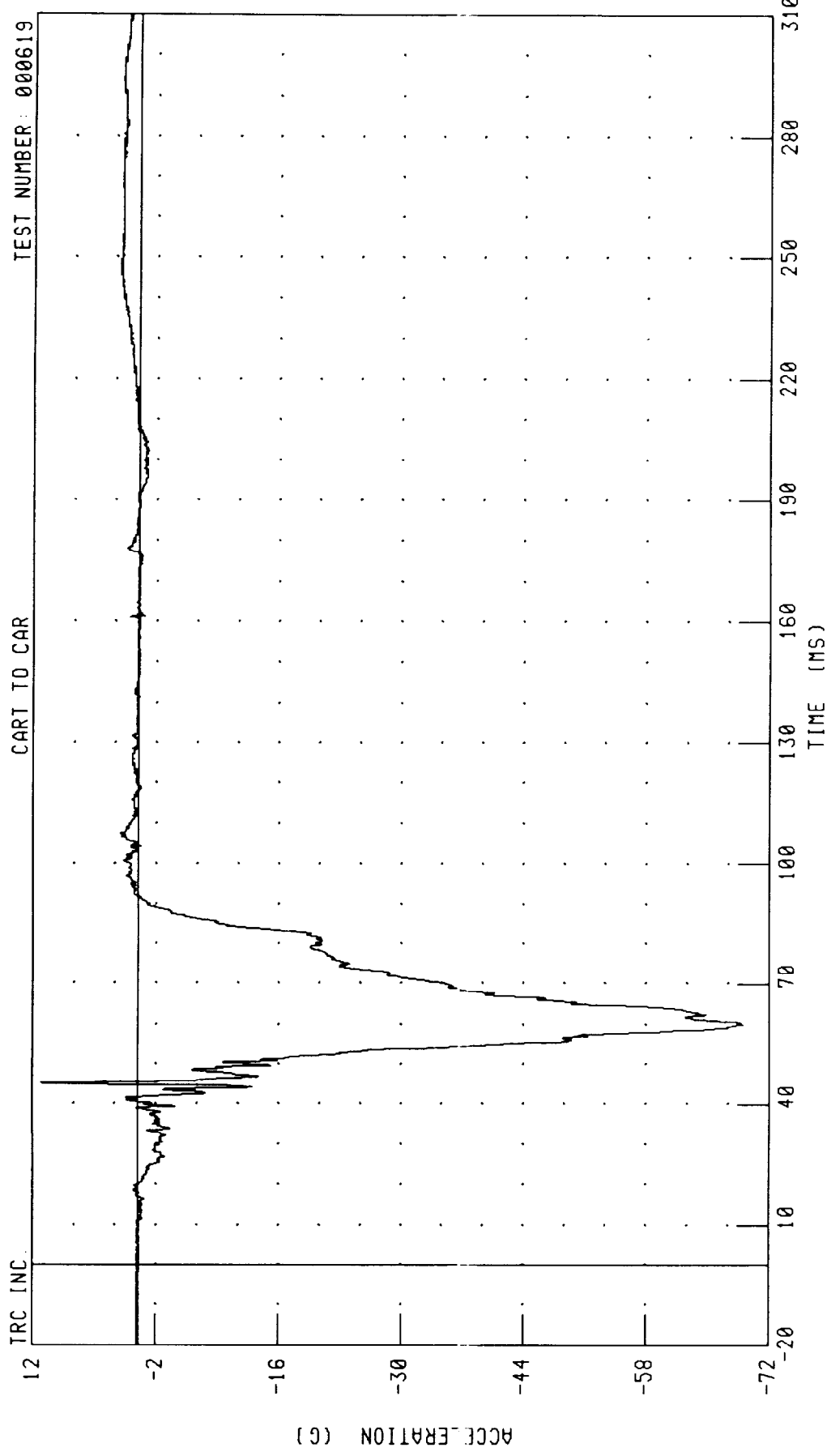
TEST NUMBER: 000619



CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

PEAK DATA: 8.44 G @ 46.32 MS; -10.40 G @ 50.72 MS

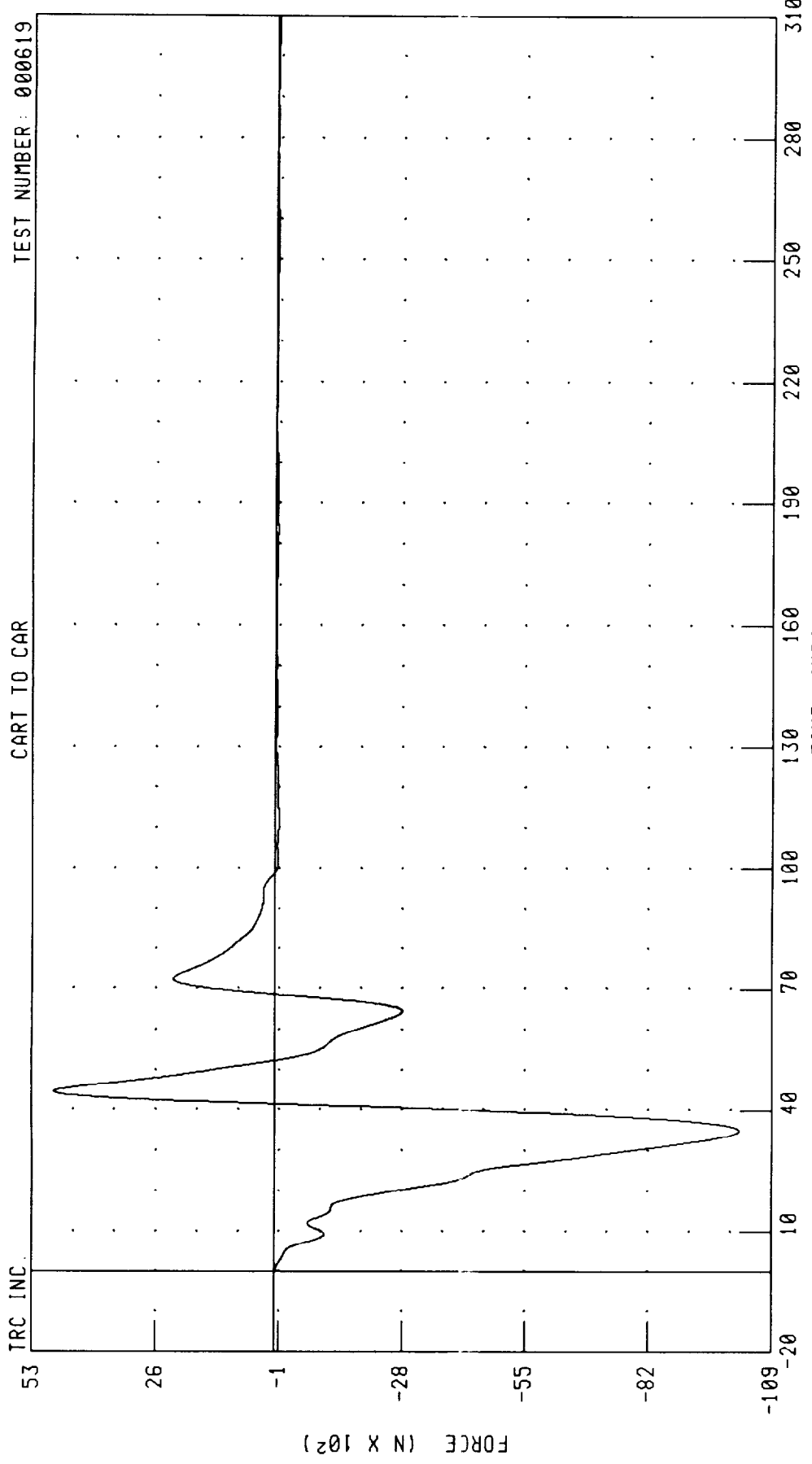
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
DRIVER PELVIS Z-AXIS ACCELERATION



CHANNEL: PEVZG1 FILTER: CH. CLASS 1000 PEAK DATA: 11.08 G @ 45.12 MS, -68.99 G @ 60.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D4 Y-AXIS FORCE
CART TO CAR

TEST NUMBER: 000619



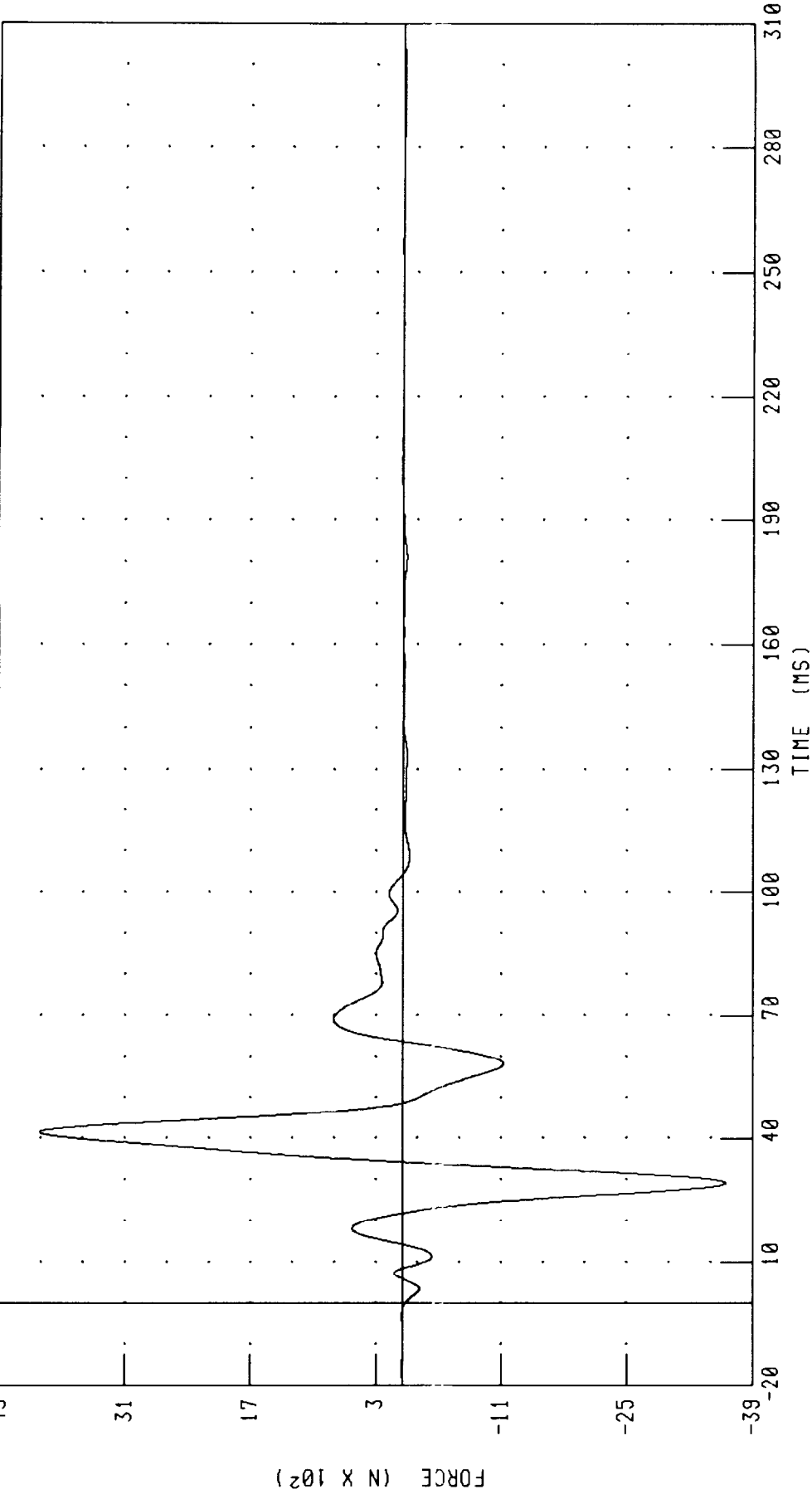
CHANNEL: BD4YF FILTER: CH. CLASS 60
PEAK DATA: 4821.49 N @ 44.56 MS; -10198.71 N @ 34.96 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D4 Z-AXIS FORCE

TRC INC

CART TO CAR

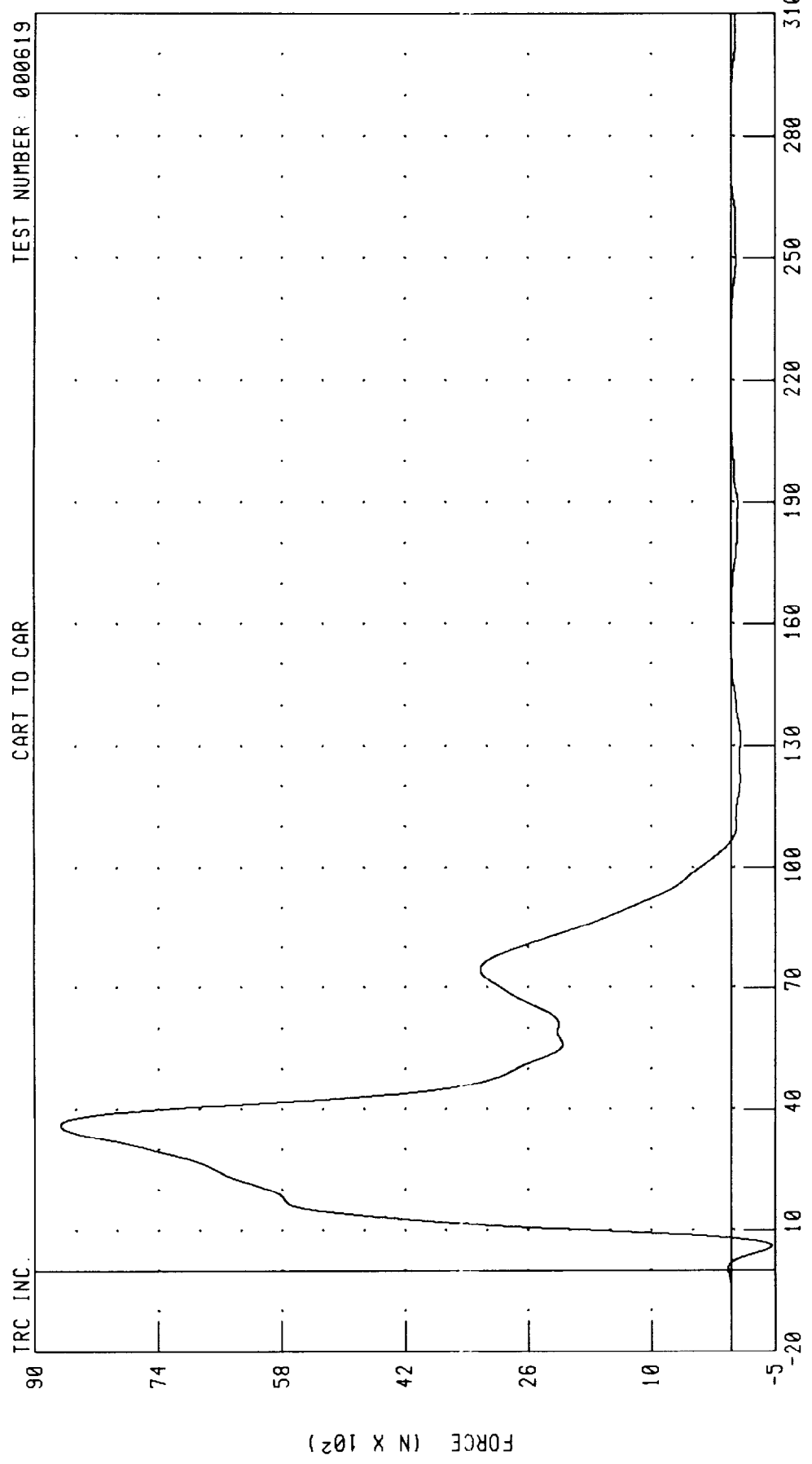
TEST NUMBER: 000619



PEAK DATA: 4046.11 N @ 41.52 MS; -3608.37 N @ 29.20 MS

CHANNEL: BD4ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E1 X-AXIS FORCE



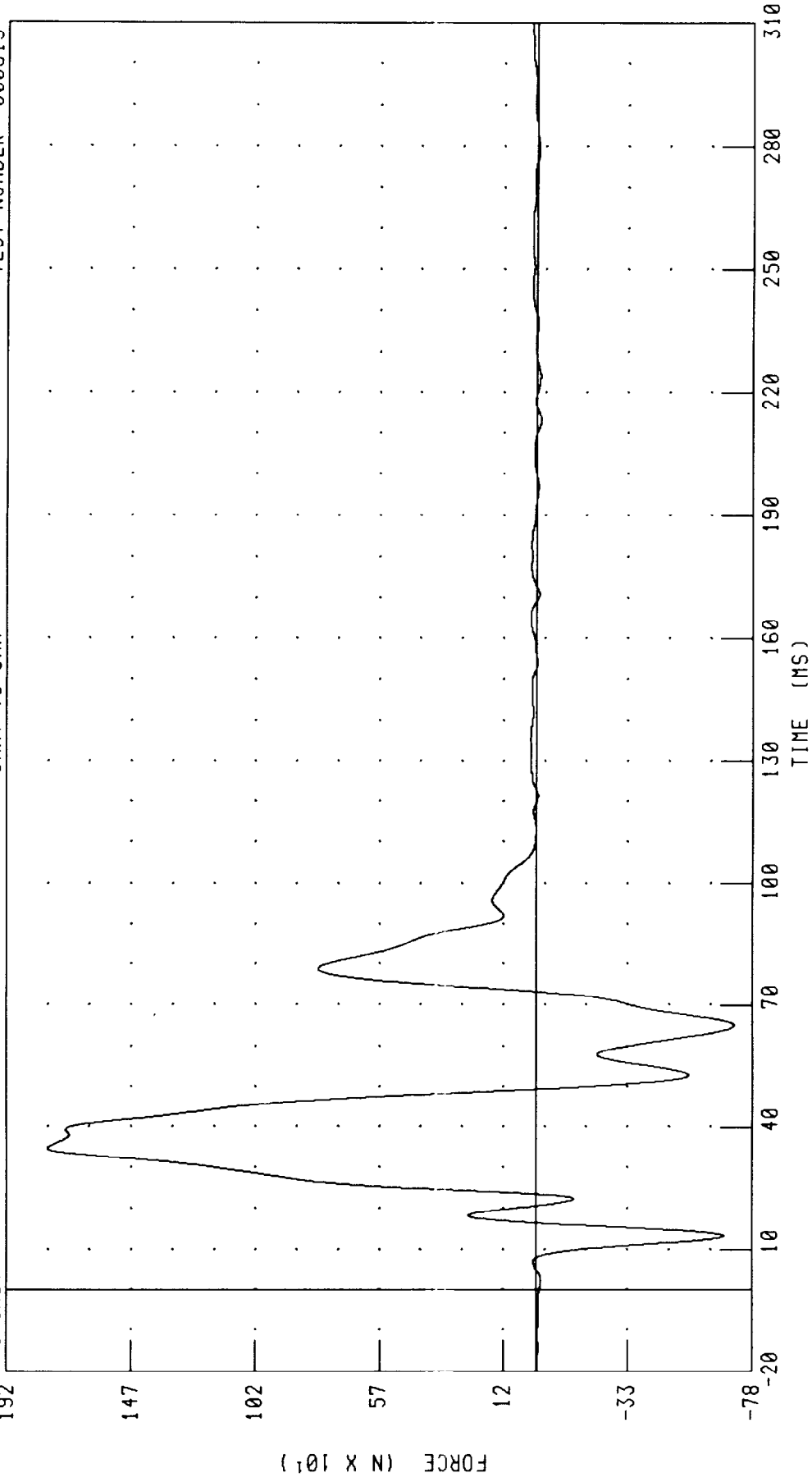
CHANNEL: BEIXF FILTER: CH. CLASS 60 PEAK DATA: 8699.66 N @ 36.24 MS, -524.20 N @ 6.00 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E1 Y-AXIS FORCE

TRC INC.

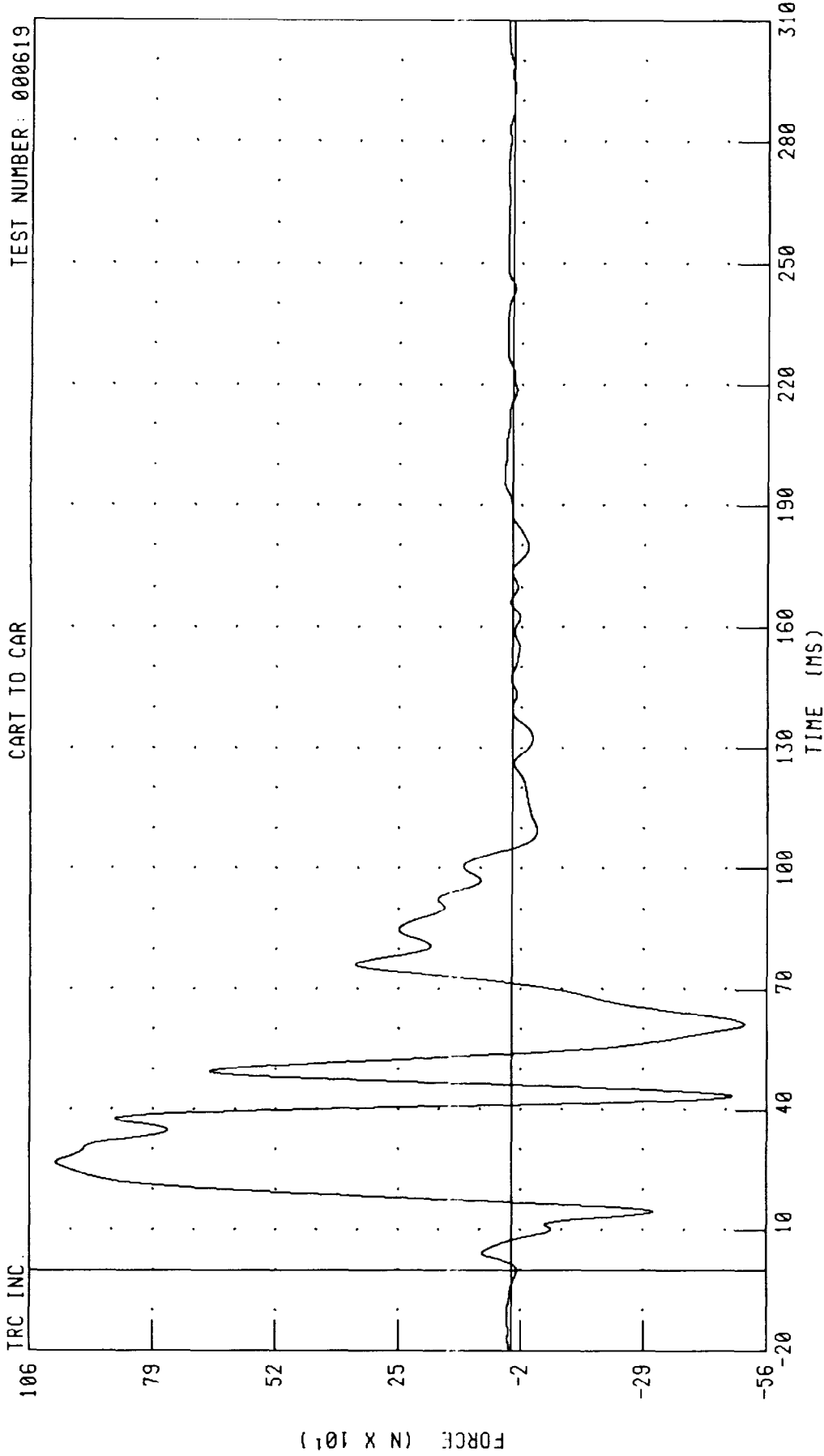
CART TO CAR

TEST NUMBER: 000619



CHANNEL: BE1YF FILTER: CH. CLASS 60 PEAK DATA: 1773.65 N @ 34.80 MS, -715.08 N @ 65.12 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E1 Z-AXIS FORCE



CART TO CAR

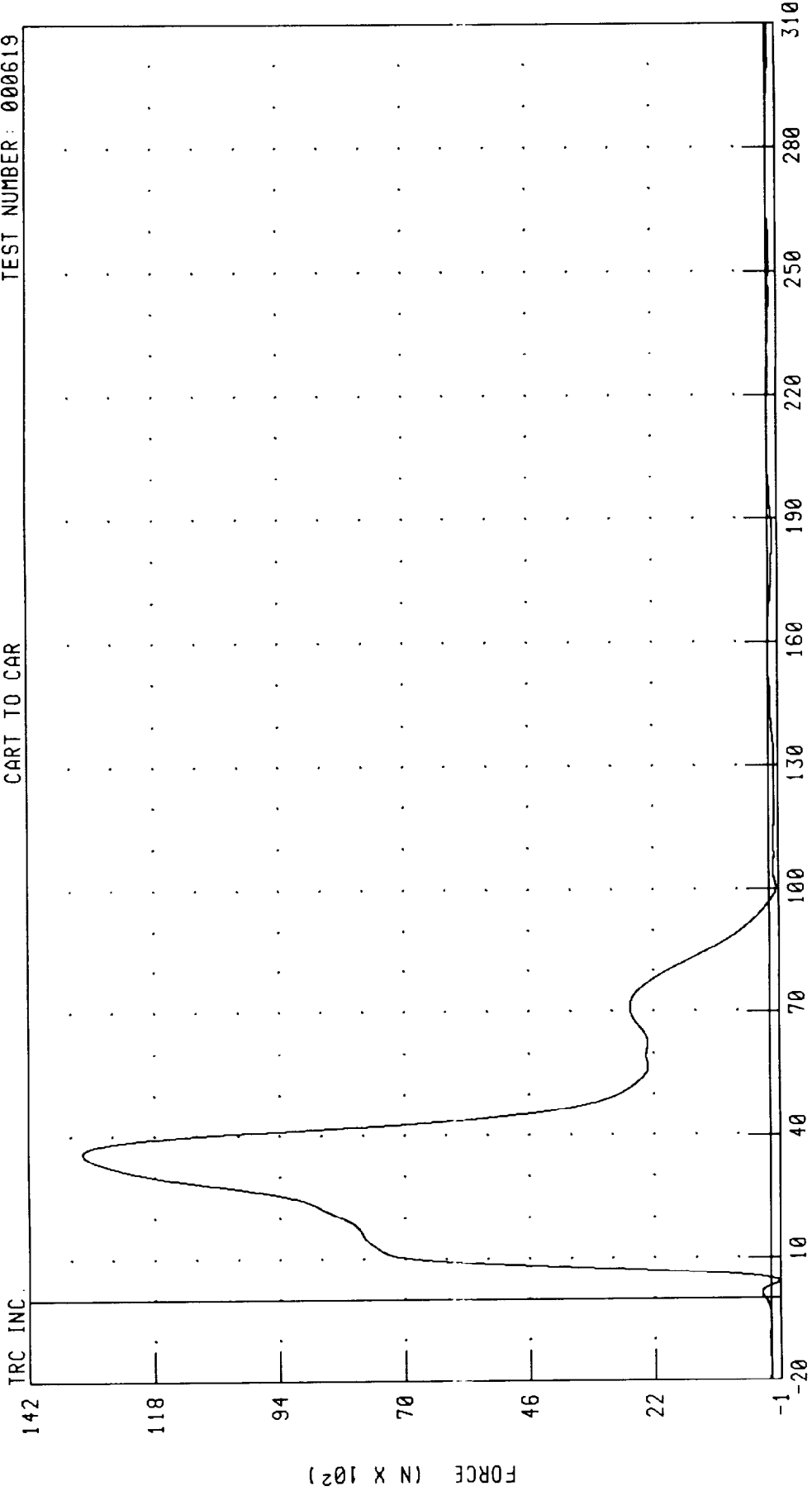
CHANNEL: BE1ZF FILTER: CH. CLASS 60

PEAK DATA: 1002.79 N @ 26.88 MS; -511.13 N @ 61.20 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E2 X-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR



PEAK DATA: 13177.56 N @ 35.92 MS, -173.13 N @ 4.08 MS

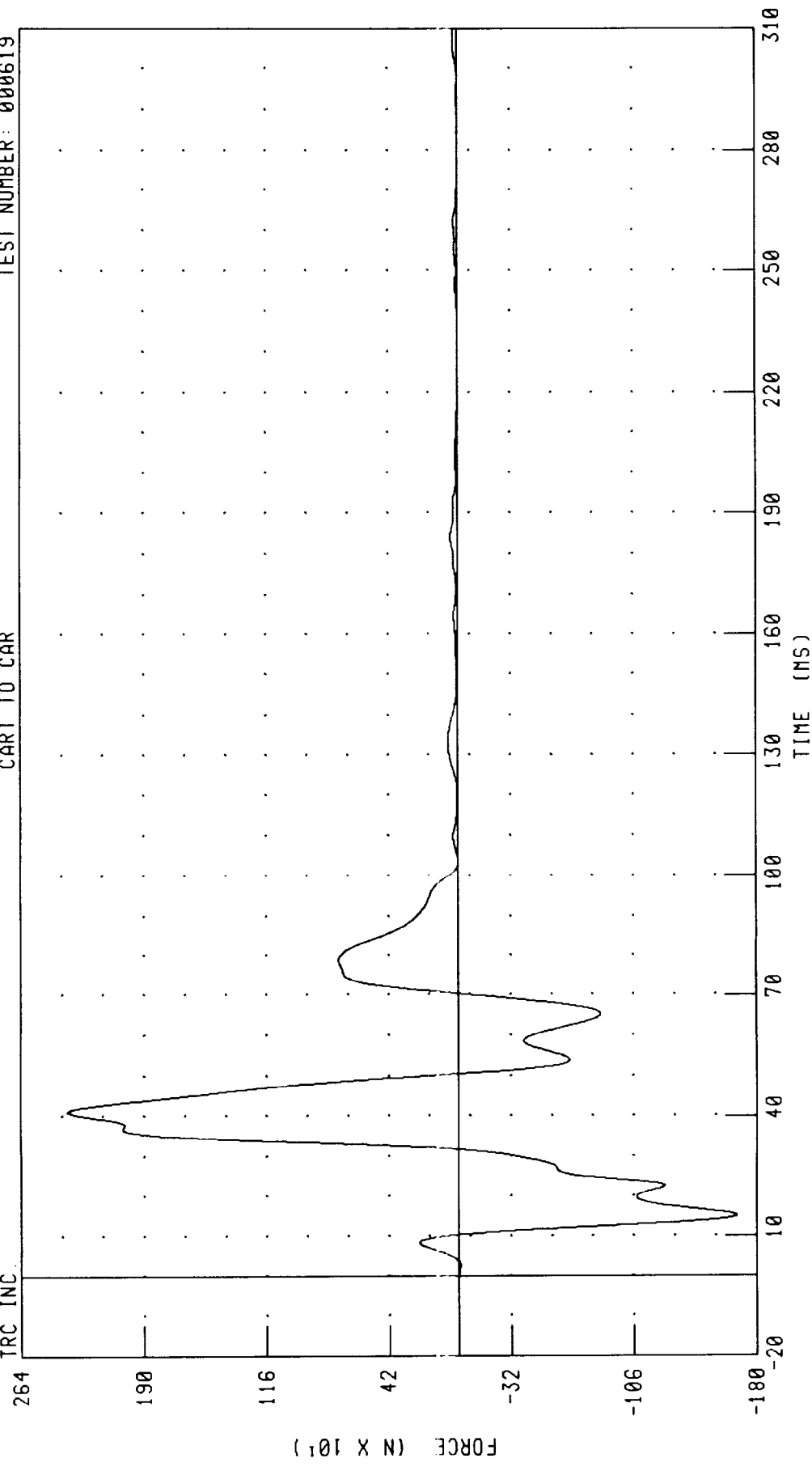
CHANNEL: BE2XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E2 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



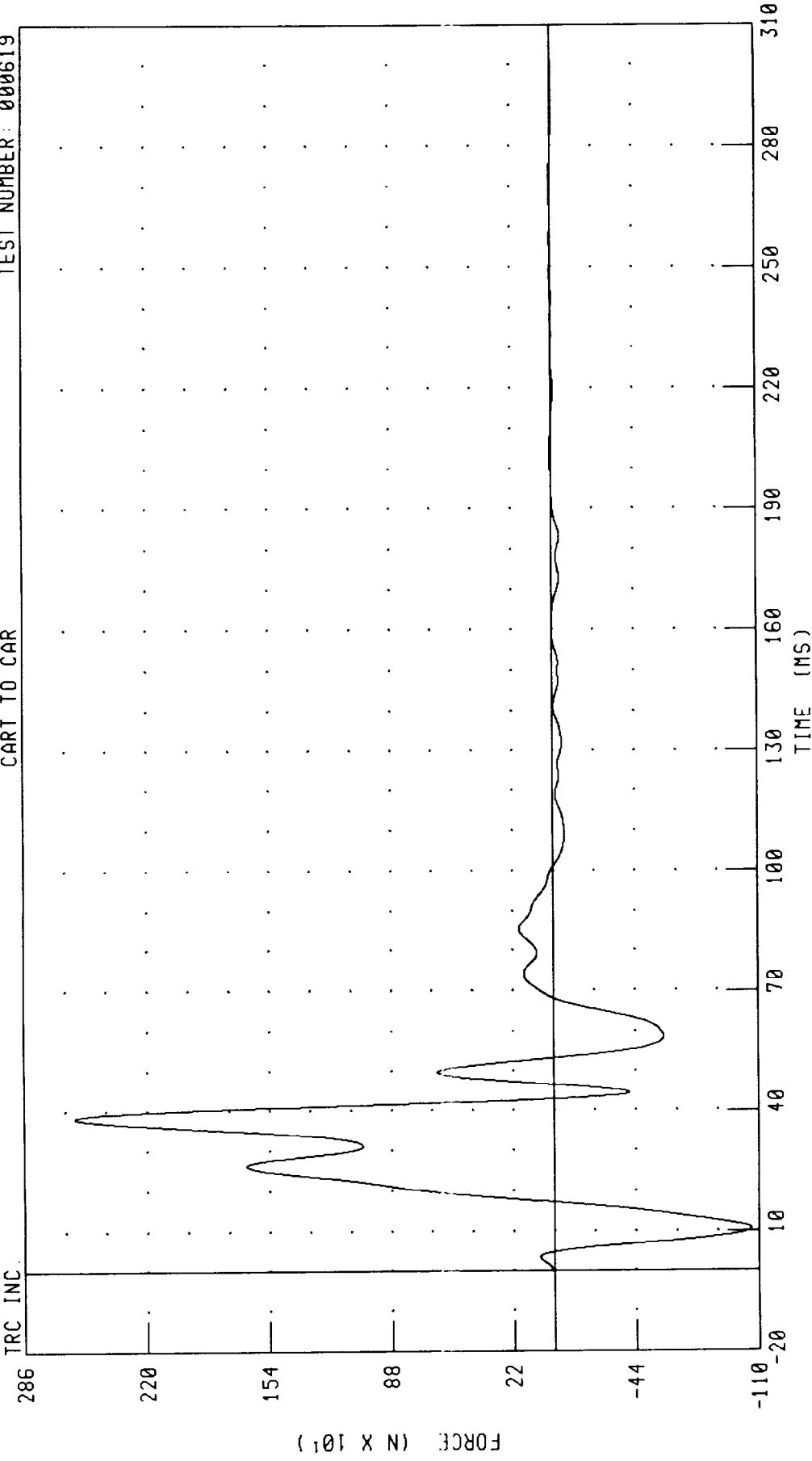
PEAK DATA: 2357.34 N @ 41.12 MS, -1684.02 N @ 15.04 MS

CHANNEL: BE2YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E2 Z-AXIS FORCE

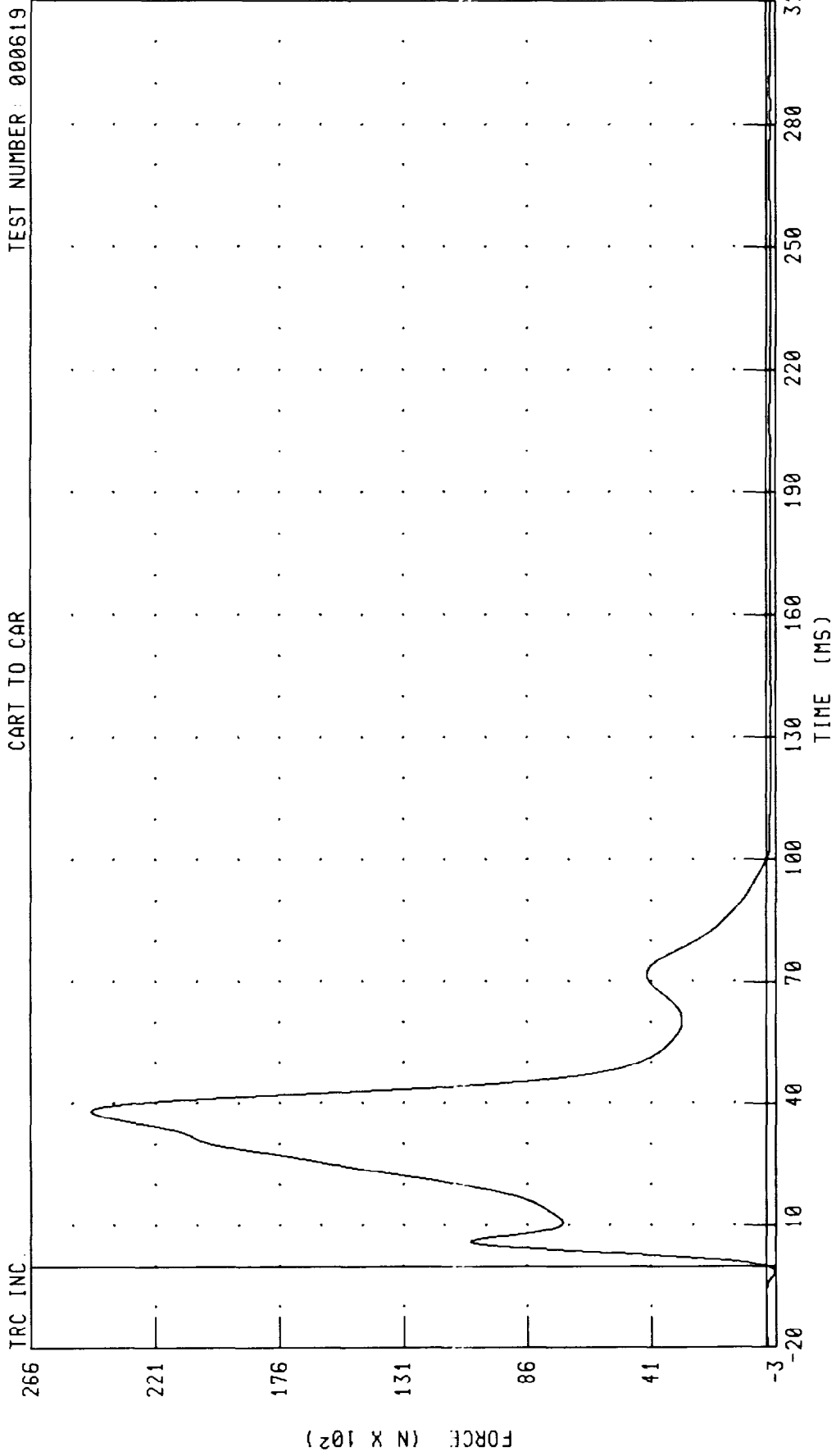
TRC INC. TEST NUMBER: 000619

CART TO CAR



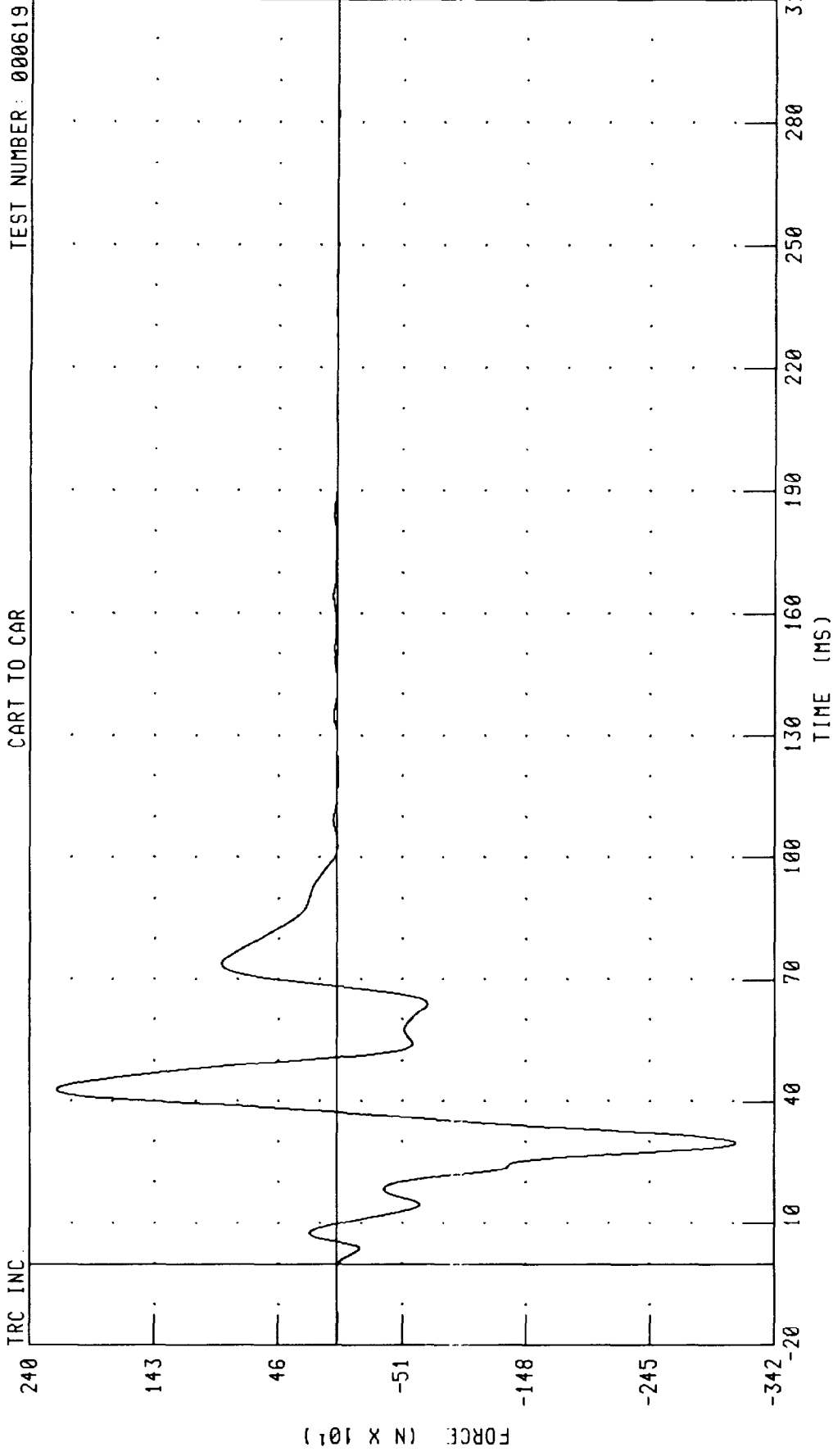
CHANNEL: BE2ZF FILTER: CH. CLASS 60 PEAK DATA: 2588.58 N @ 38.32 MS, -1062.20 N @ 10.56 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E3 X-AXIS FORCE



CHANNEL: BE3XF FILTER: CH. CLASS 60 PEAK DATA: 24501.53 N @ 38.16 MS, -296.41 N @ -1.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E3 Y-AXIS FORCE

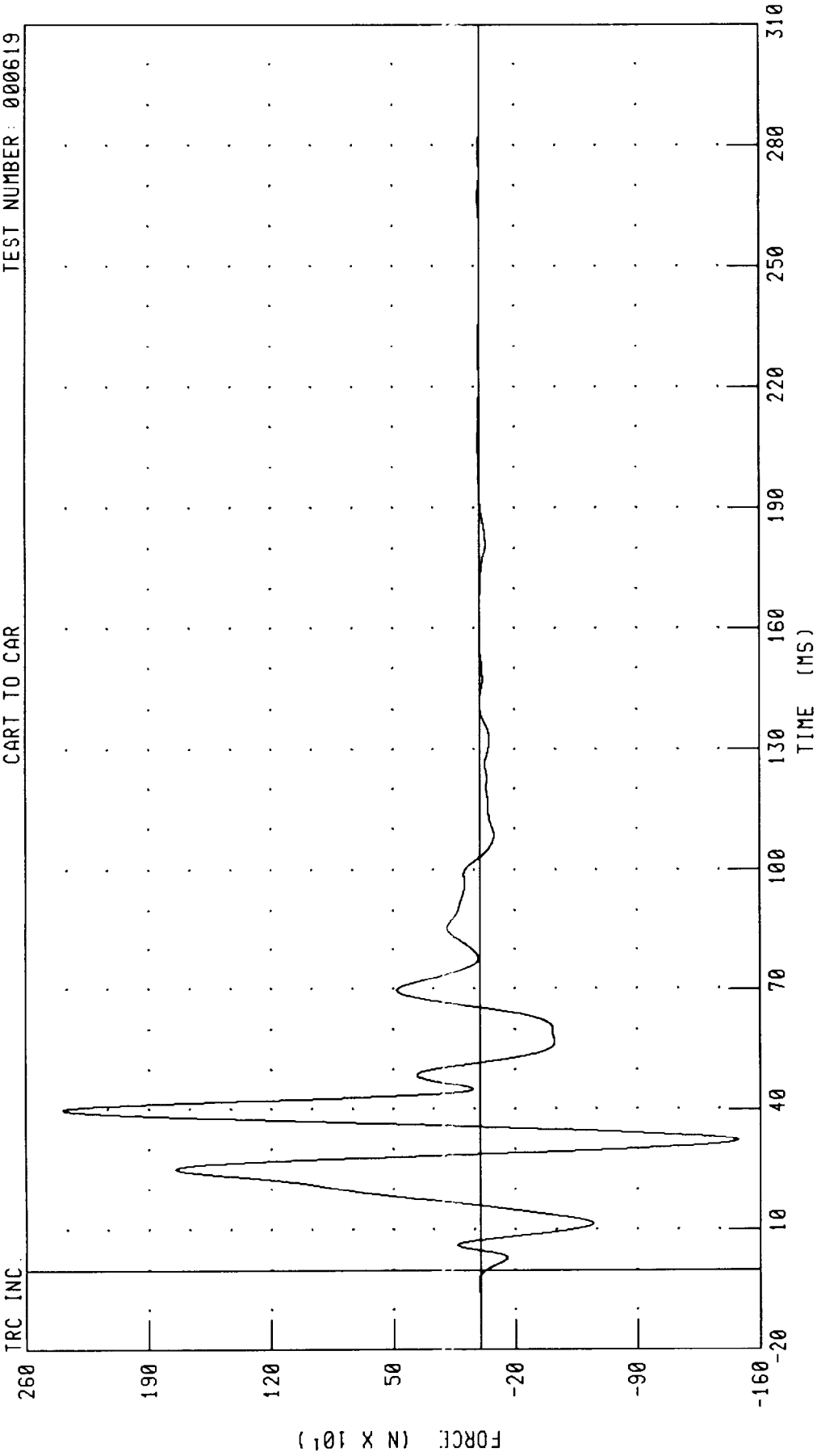


CHANNEL: BE3YF FILTER: CH. CLASS 60 PEAK DATA: 2189.03 N @ 42.88 MS, -3119.74 N @ 29.76 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E3 Z-AXIS FORCE

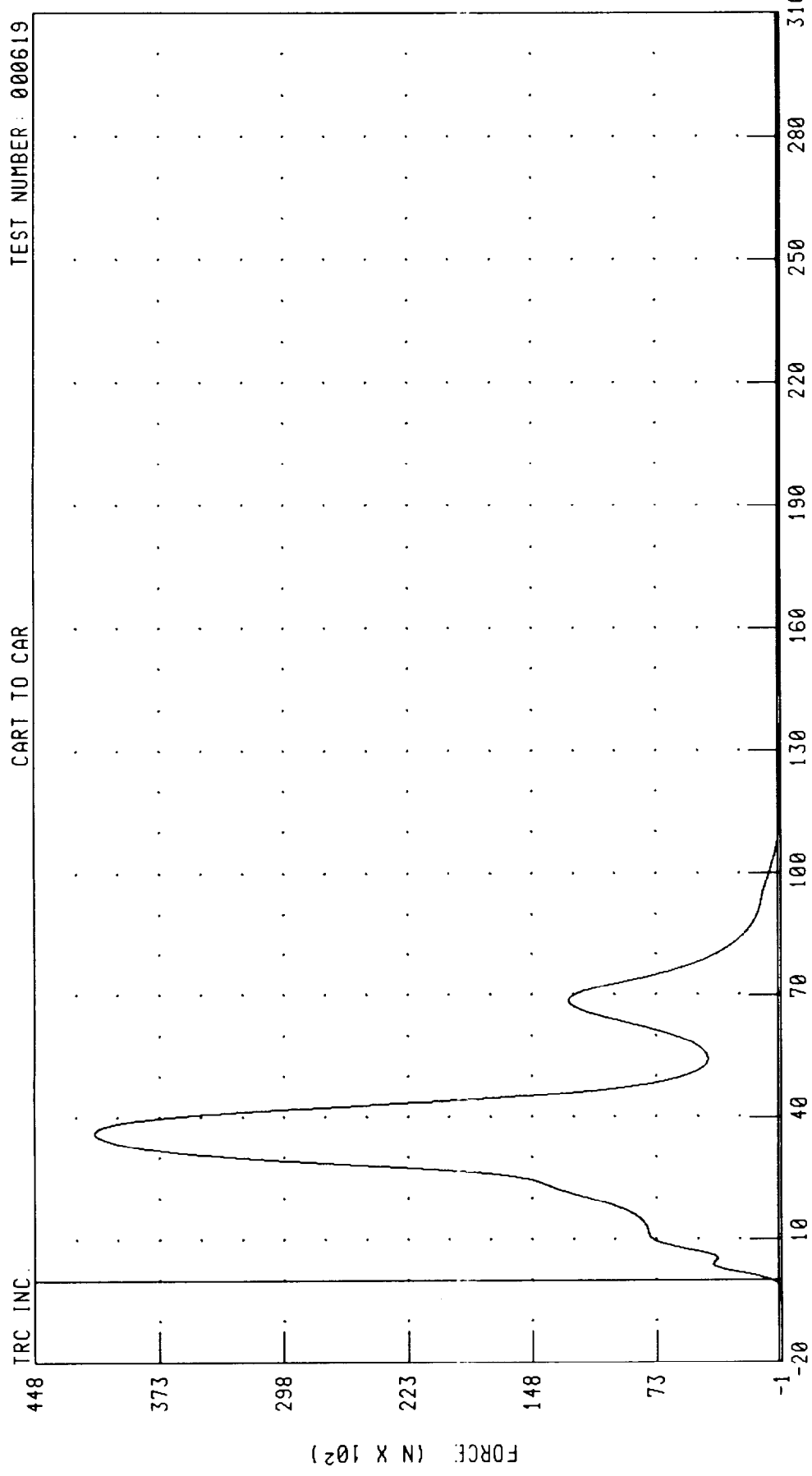
TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BE3ZF FILTER: CH. CLASS 60 PEAK DATA: 2389.38 N @ 39.92 MS, -1474.39 N @ 32.24 MS

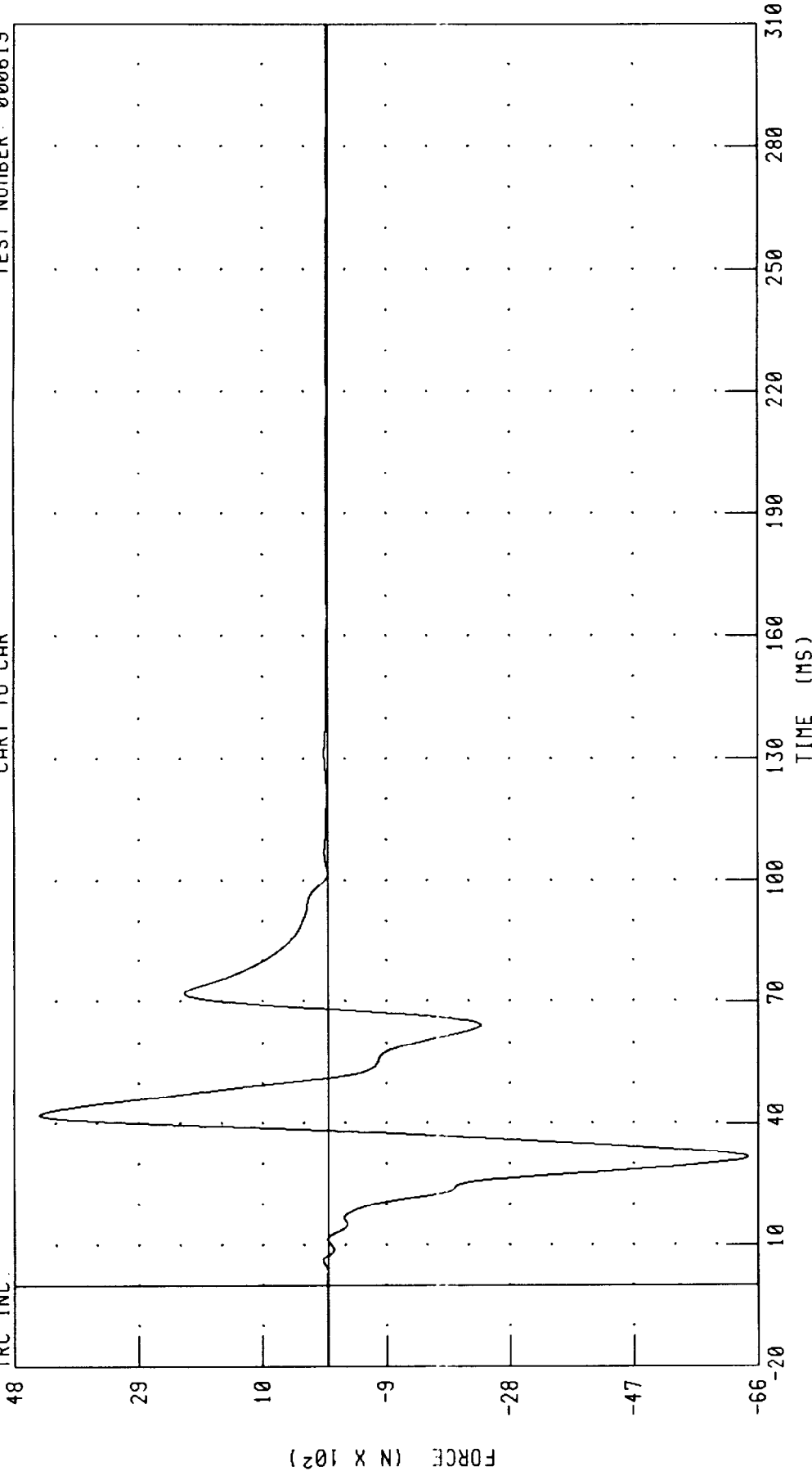
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E4 X-AXIS FORCE



MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E4 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



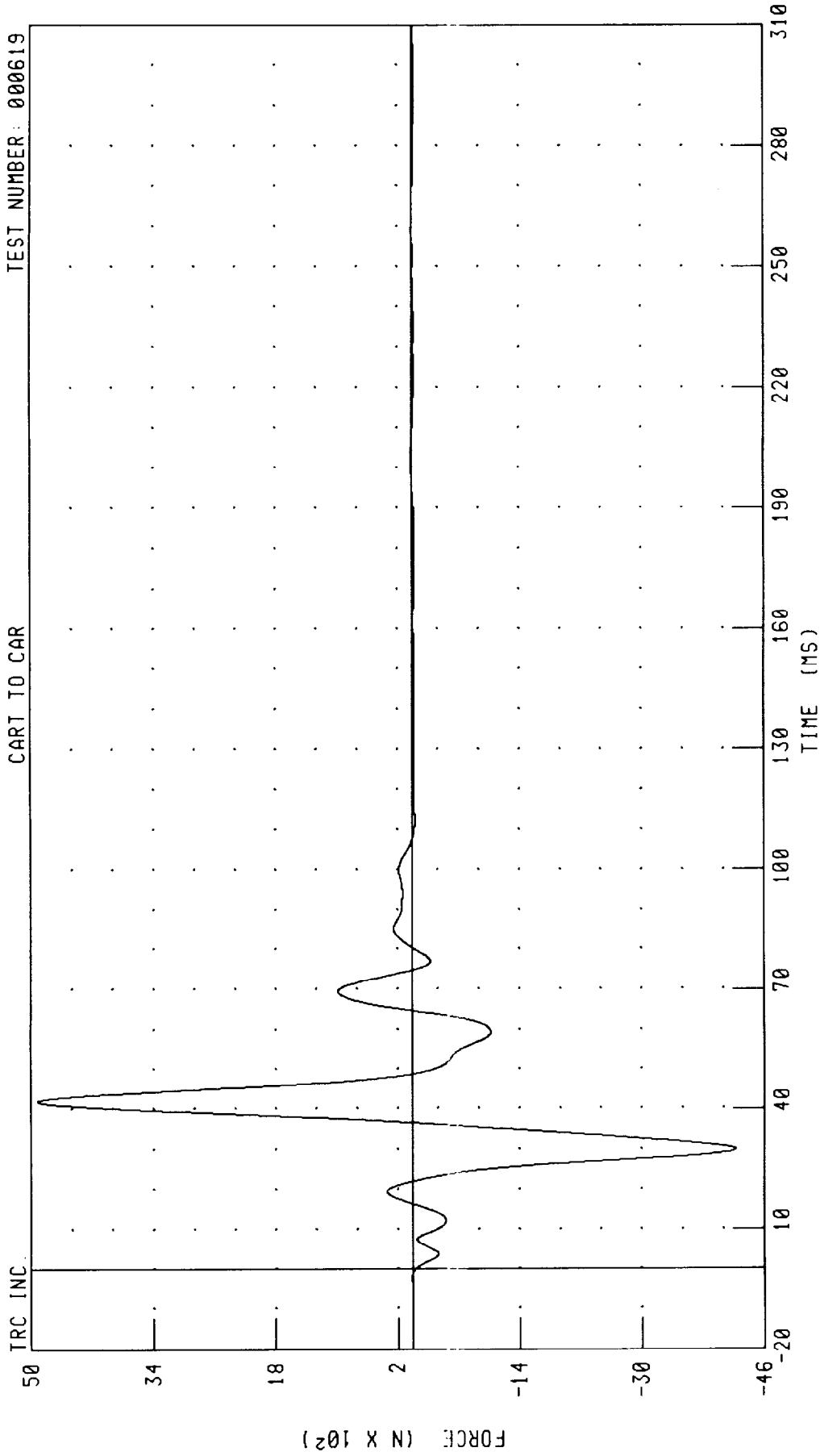
PEAK DATA: 4412.87 N @ 42.24 MS, -6447.52 N @ 31.68 MS

CHANNEL: BE4YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL E4 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



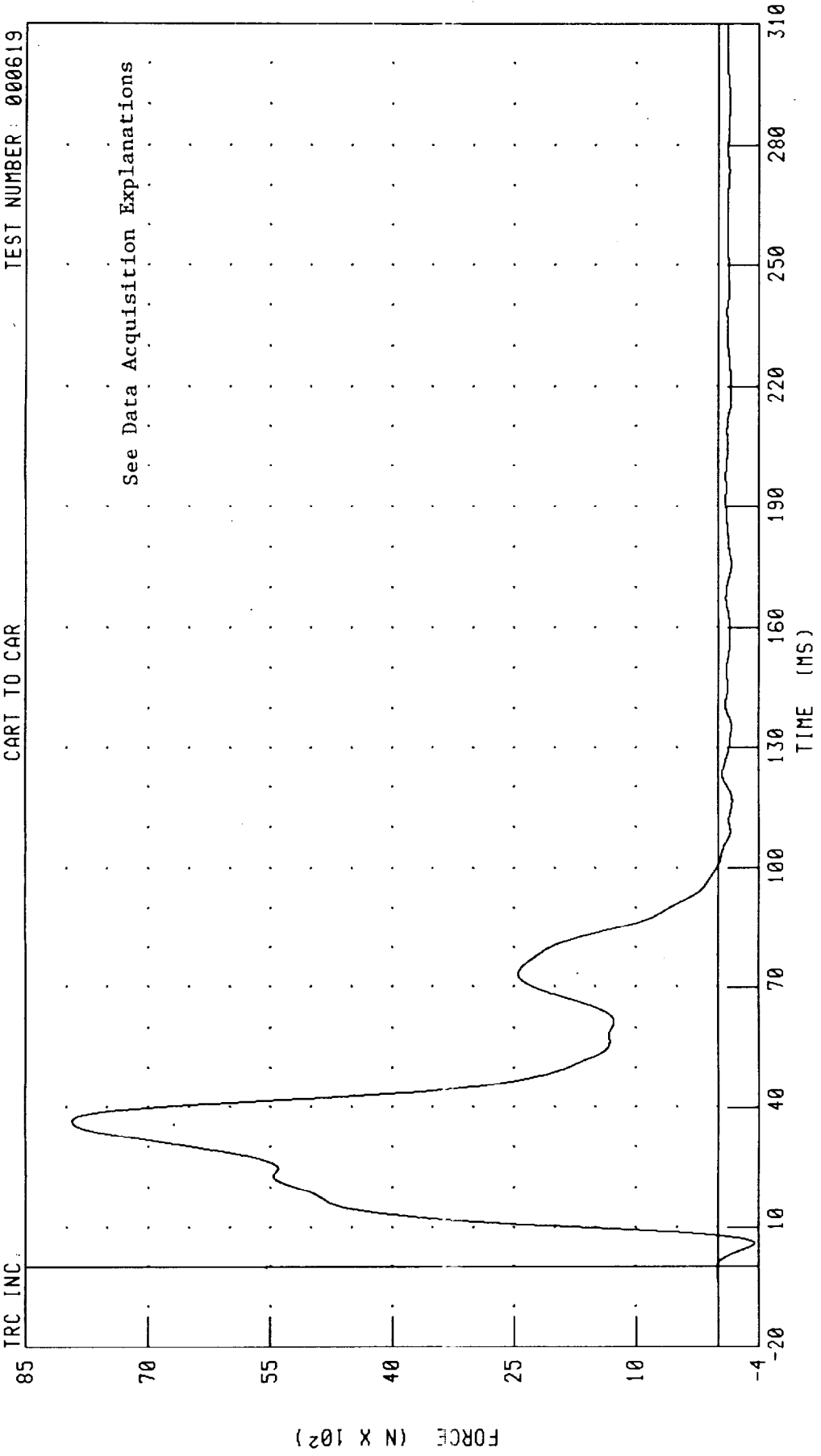
PEAK DATA: 4911.35 N @ 41.92 MS, -4230.14 N @ 29.92 MS

CHANNEL: BE4ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F1 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BF1XF FILTER: CH. CLASS 60

PEAK DATA: 7939.57 N @ 36.56 MS, -445.98 N @ 5.84 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F1 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

324

257

190

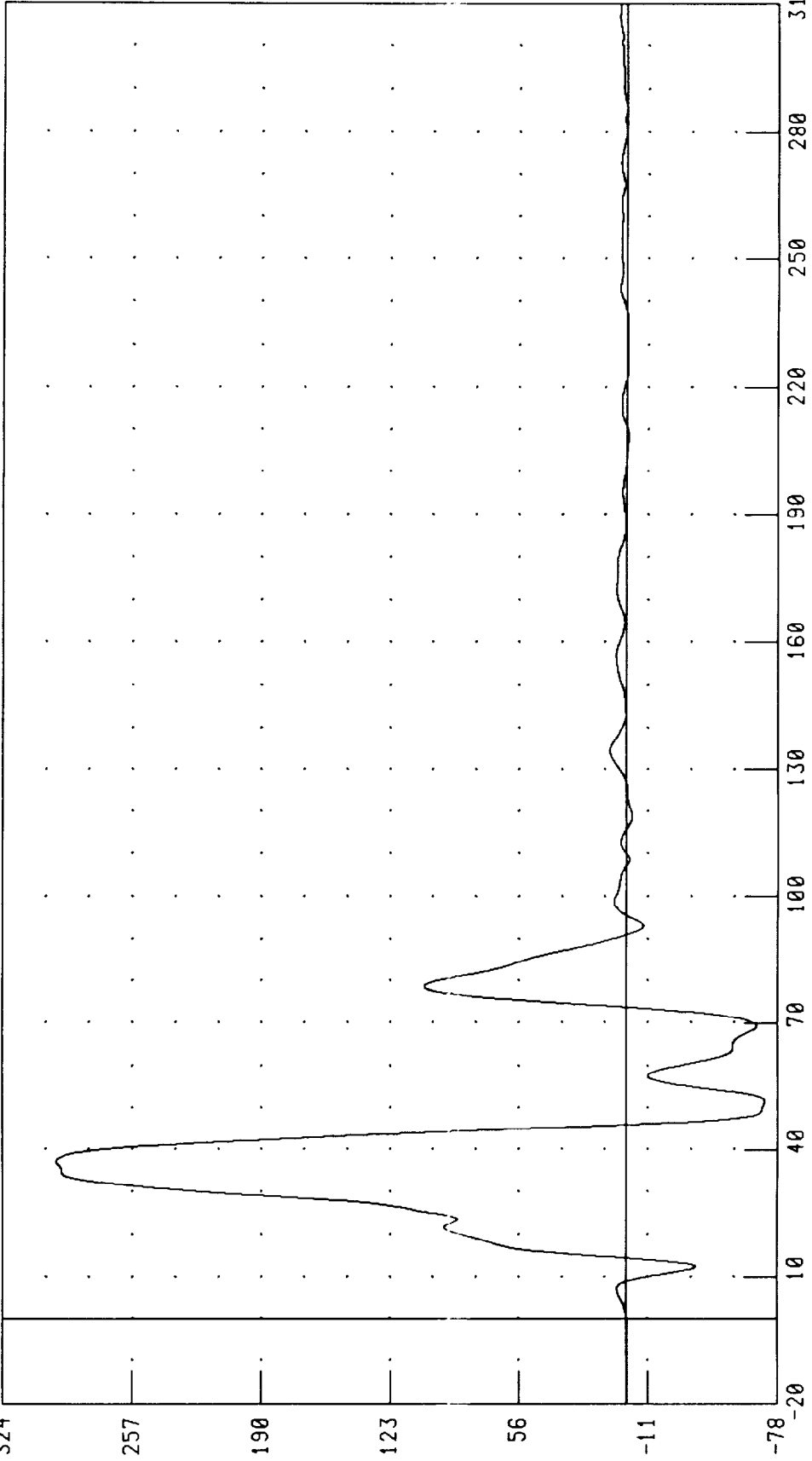
123

56

-11

-78

FORCE (N X 10⁴)



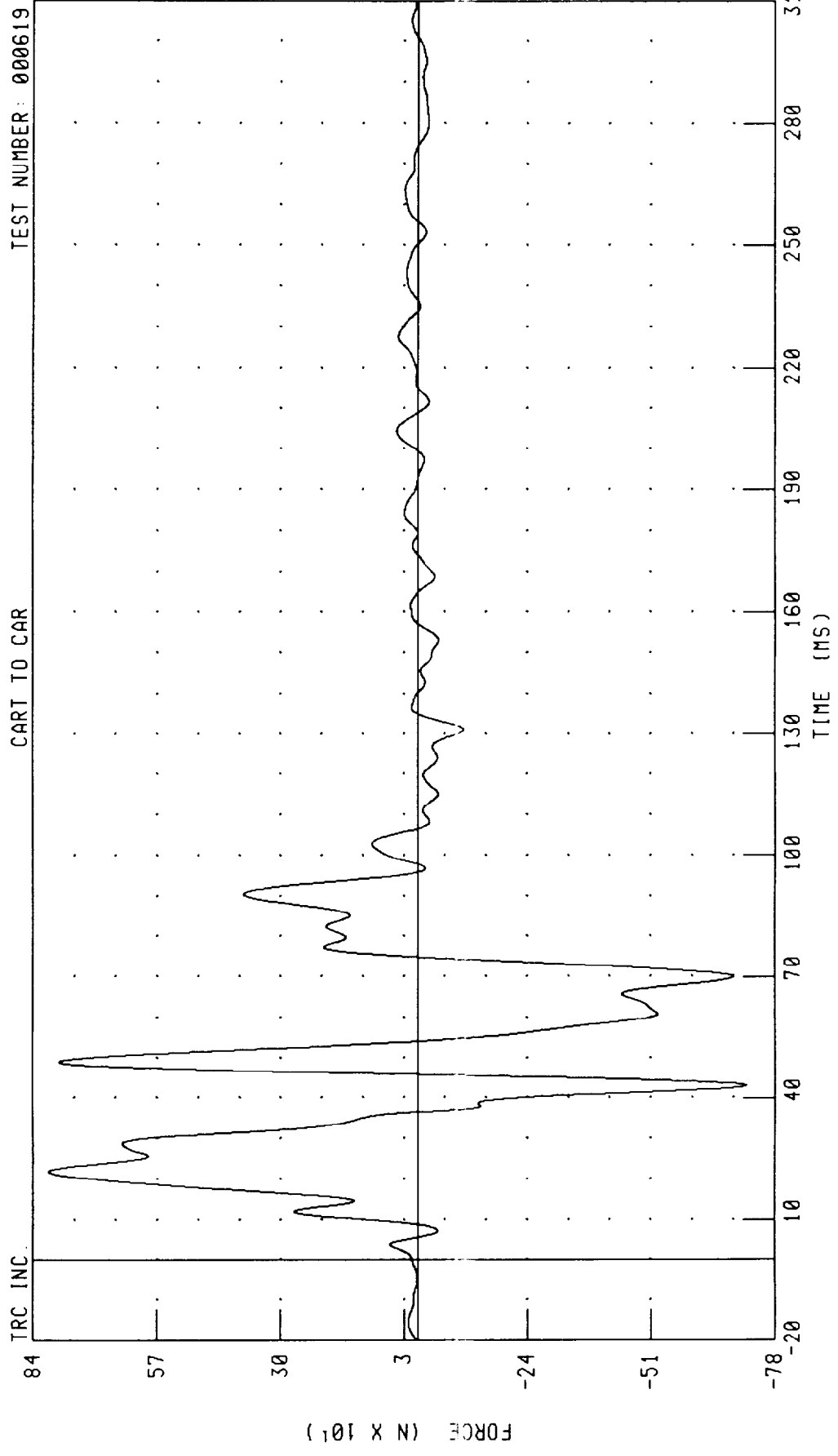
TIME (MS)

PEAK DATA: 2961.88 N @ 37.20 MS; -714.77 N @ 51.52 MS

FILTER: CH. CLASS 60

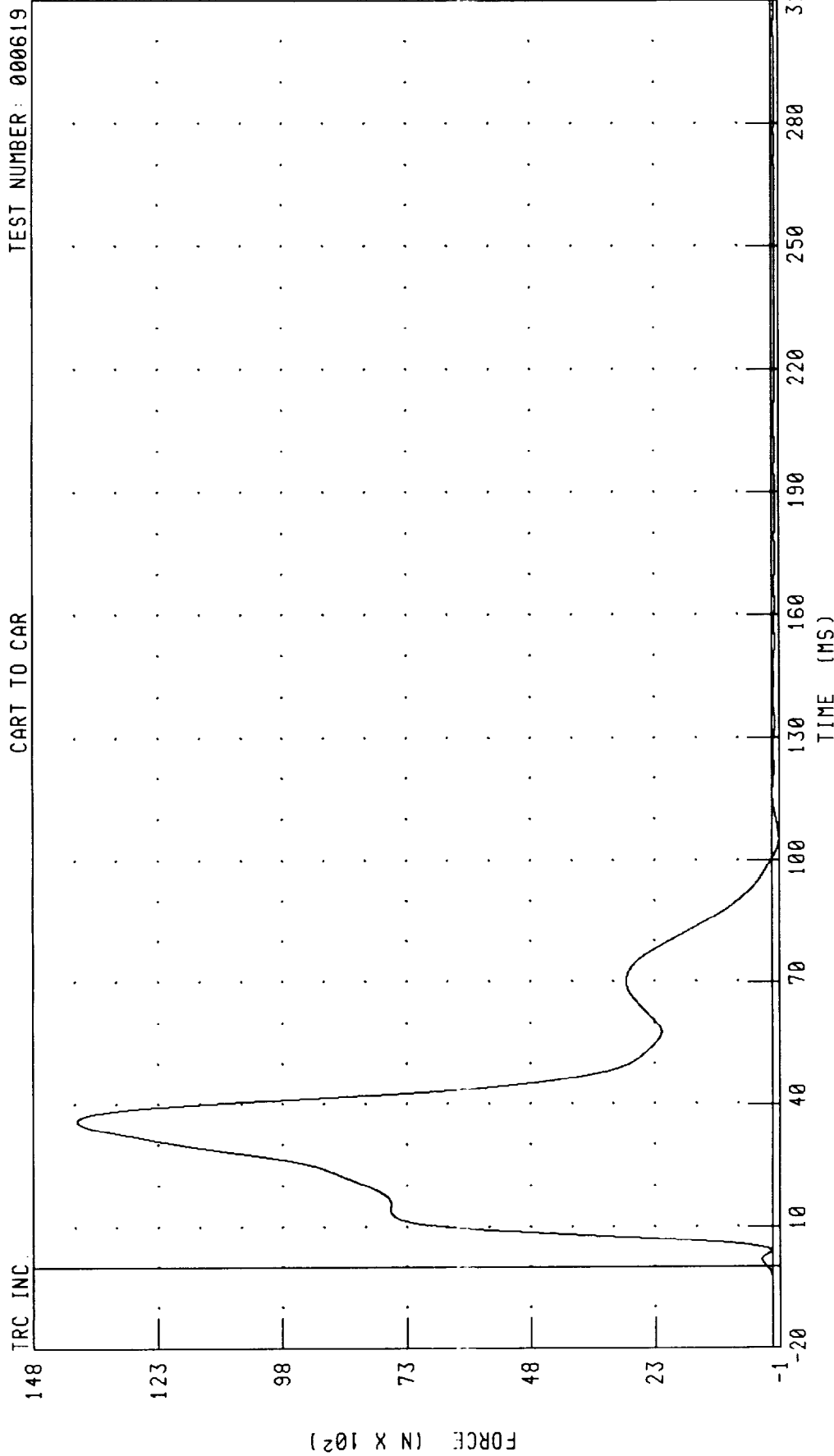
CHANNEL: BFIYF

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F1 Z-AXIS FORCE
CART TO CAR



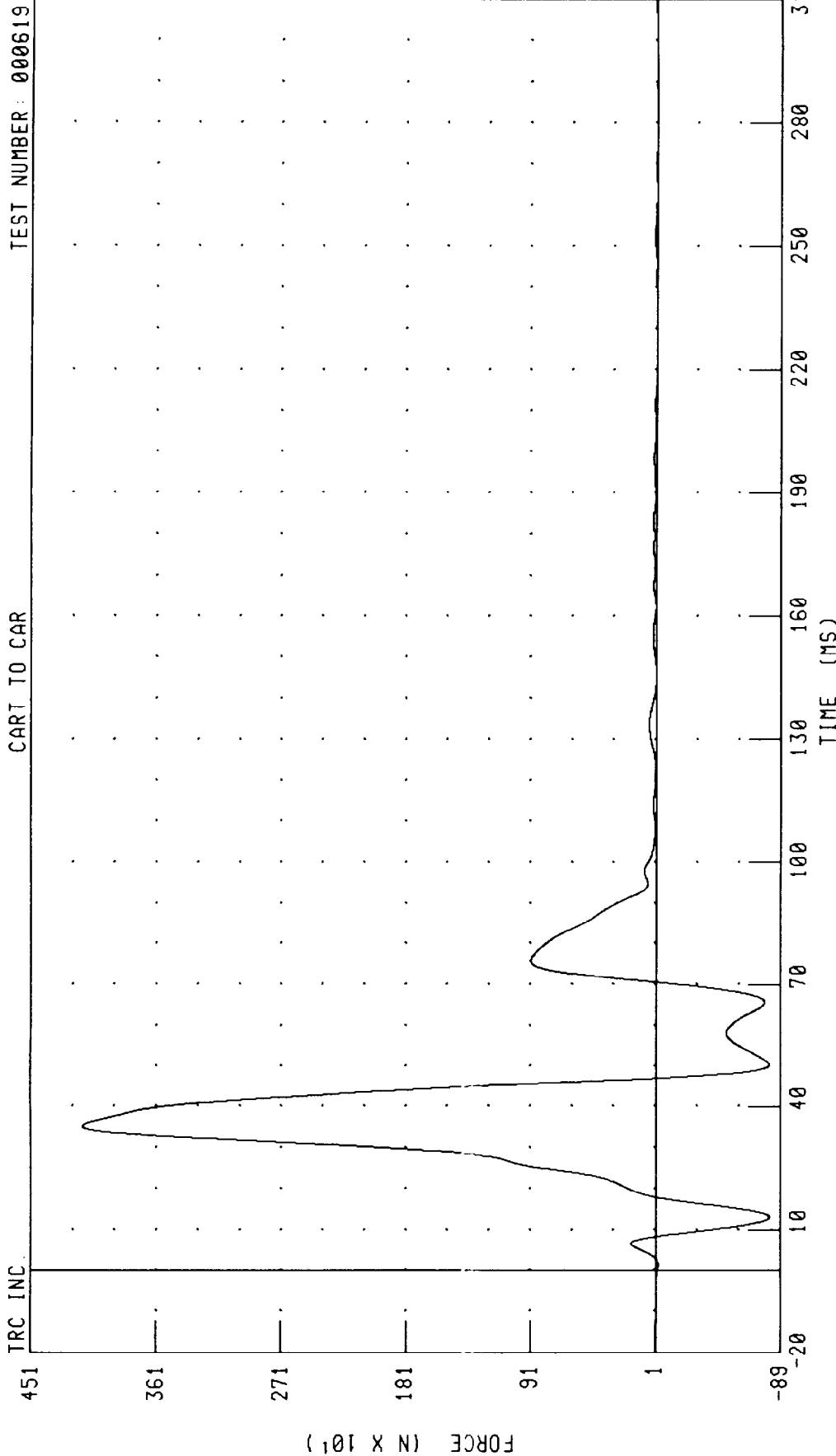
CHANNEL: BF1ZF FILTER: CH. CLASS 60 PEAK DATA: 806.89 N @ 21.92 MS; -717.56 N @ 43.12 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F2 X-AXIS FORCE



CHANNEL: BF2XF FILTER: CH. CLASS 60 PEAK DATA: 13965.45 N @ 35.92 MS; -143.54 N @ 105.20 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F2 Y-AXIS FORCE

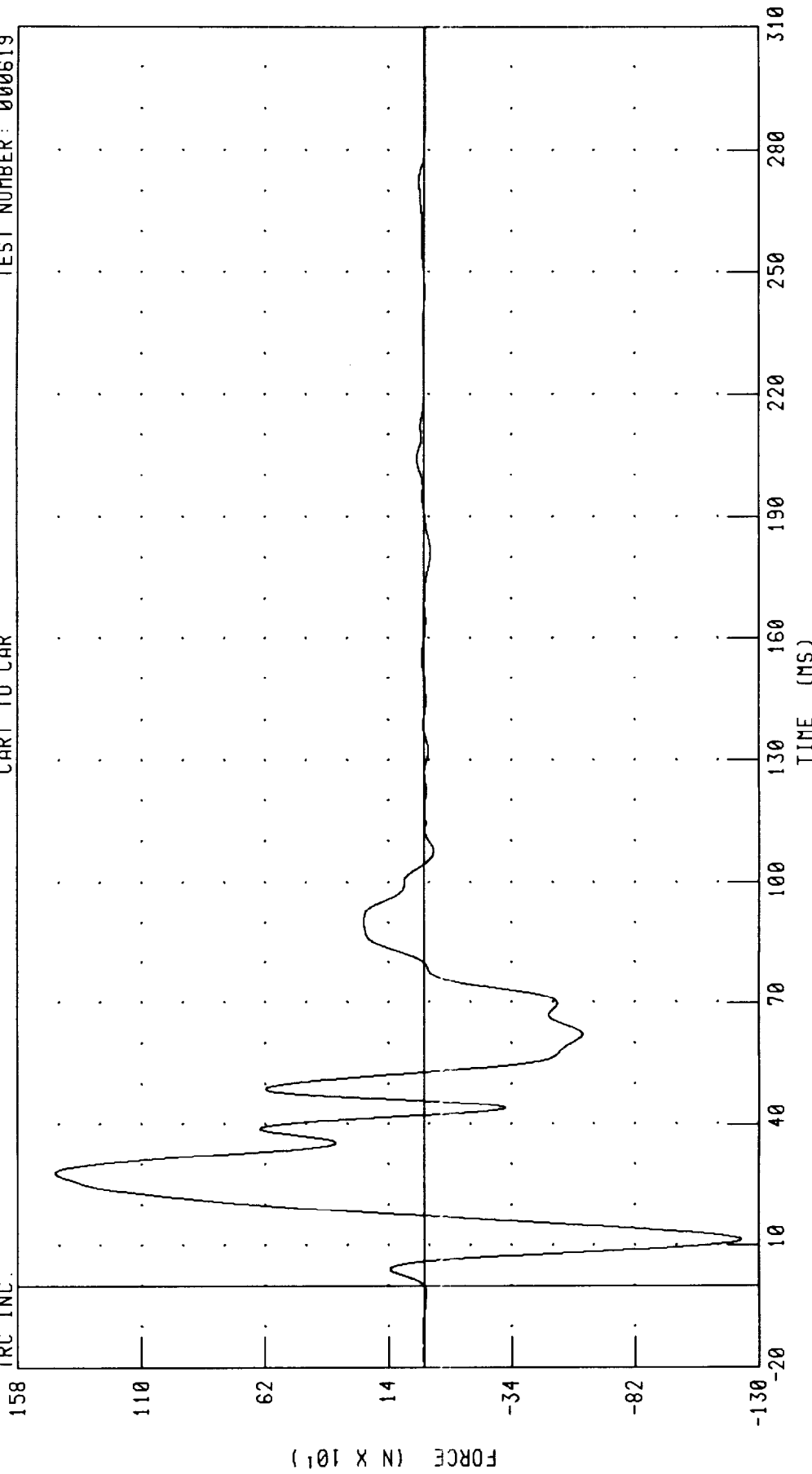


CHANNEL: BF2YF FILTER: CH. CLASS 60 PEAK DATA: 4141.75 N @ 35.12 MS, -815.53 N @ 12.96 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F2 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



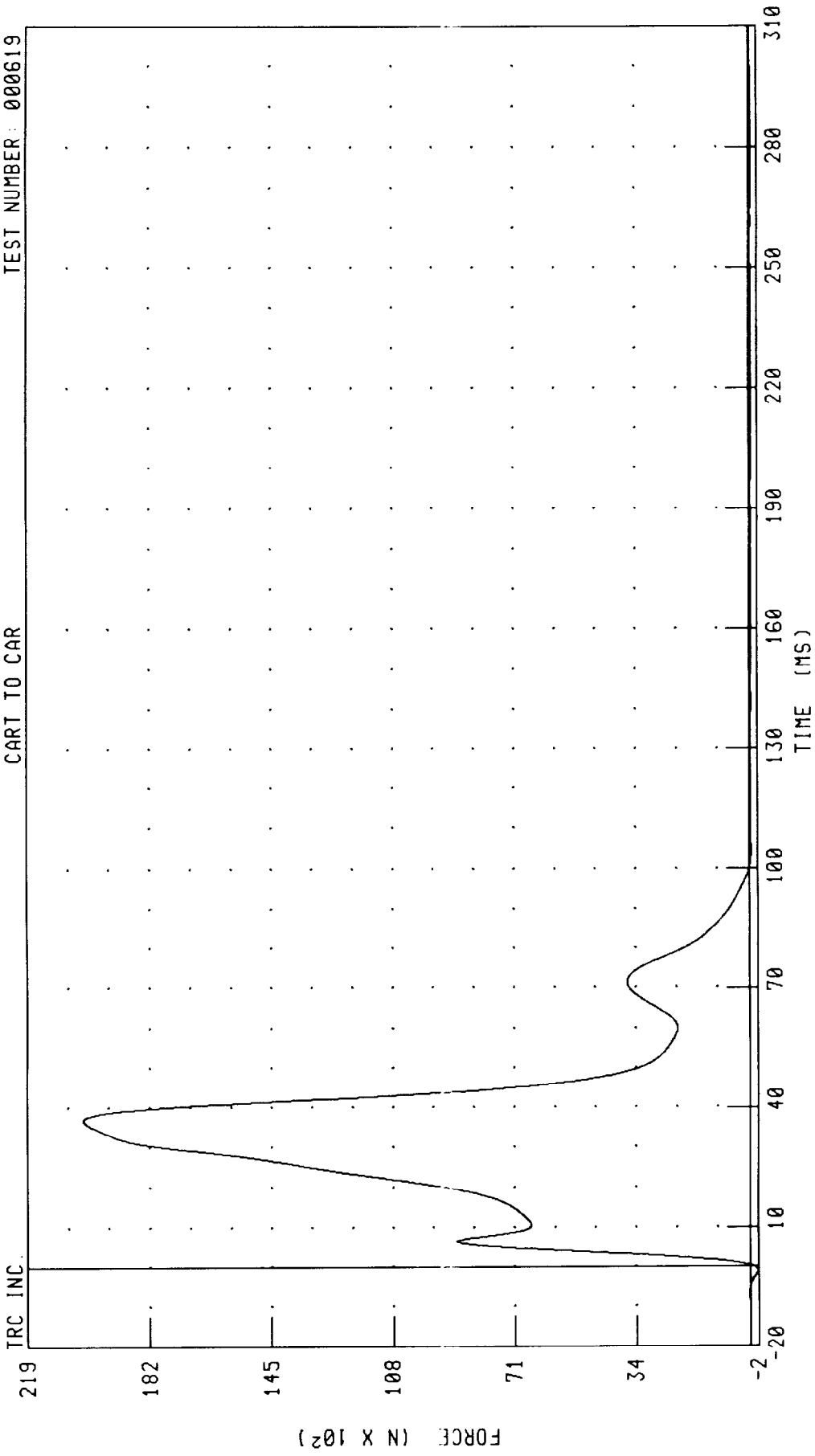
CHANNEL: BF2ZF FILTER: CH. CLASS 60 PEAK DATA: 1434.59 N @ 27.92 MS; -1232.18 N @ 11.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F3 X-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



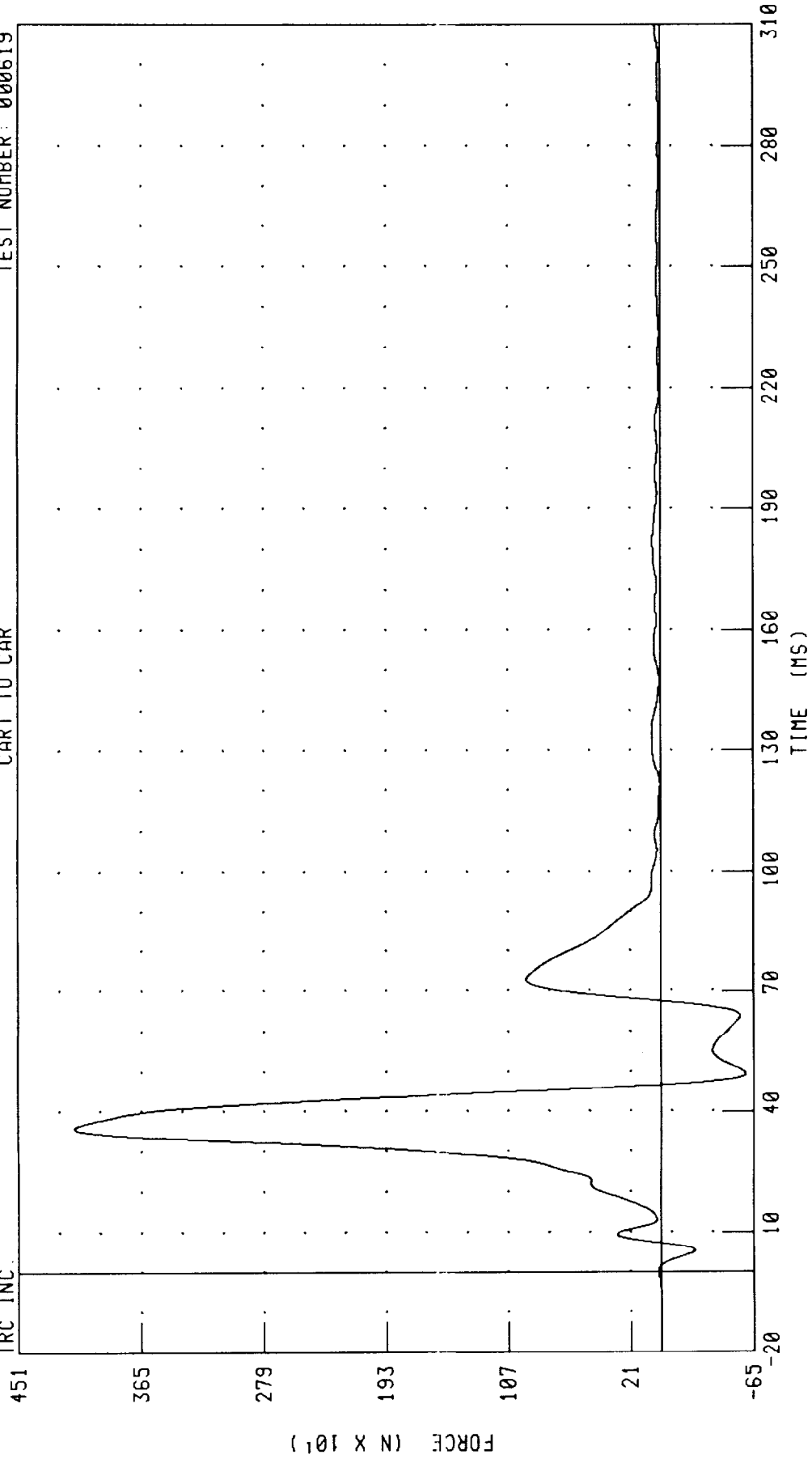
CHANNEL: BF3XF FILTER: CH. CLASS 60

PEAK DATA: 20254.79 N @ 36.80 MS, -230.22 N @ -1.04 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F3 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



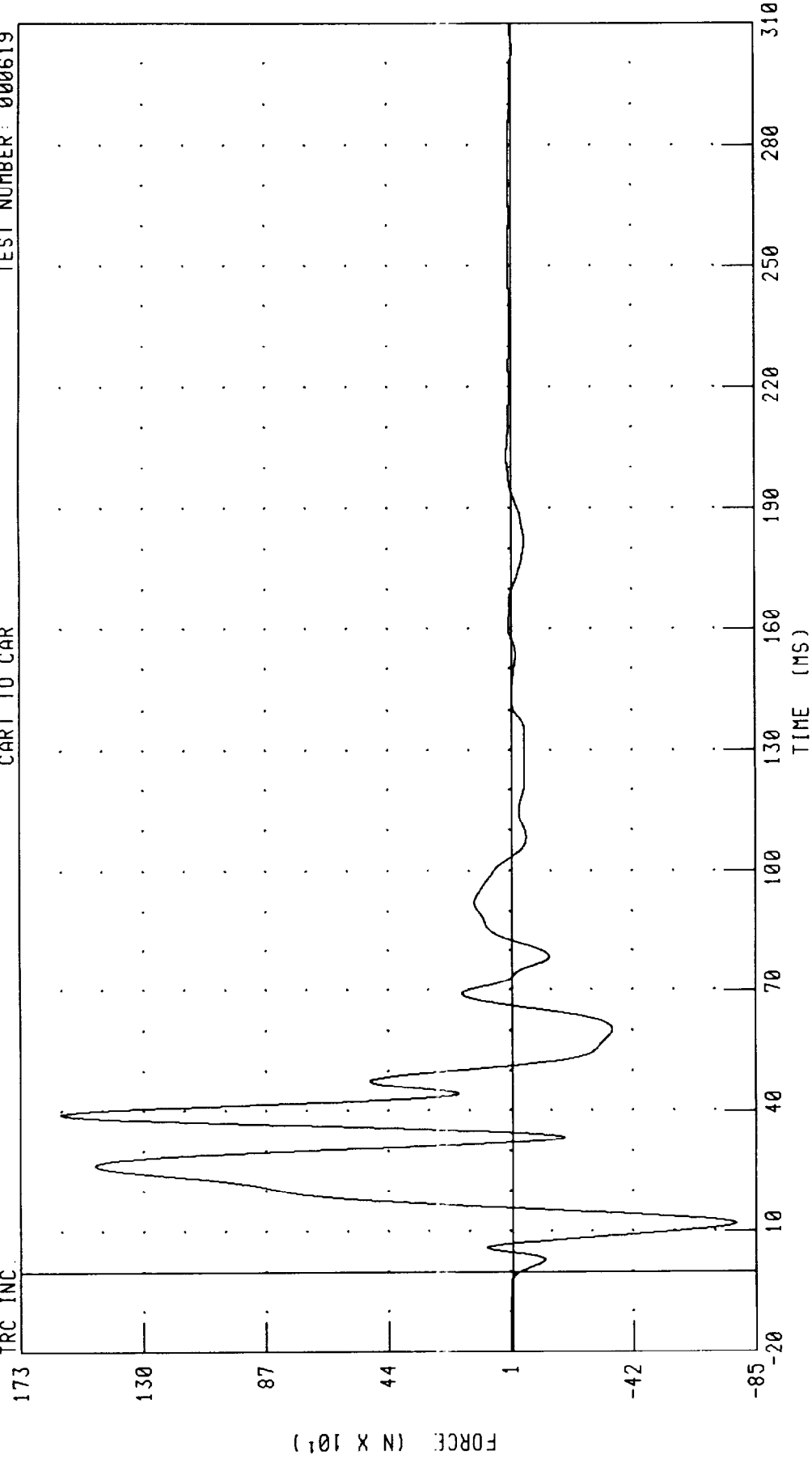
CHANNEL: BF3YF FILTER: CH. CLASS 60 PEAK DATA: 4116.19 N @ 35.84 MS, -595.11 N @ 49.44 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F3 Z-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.

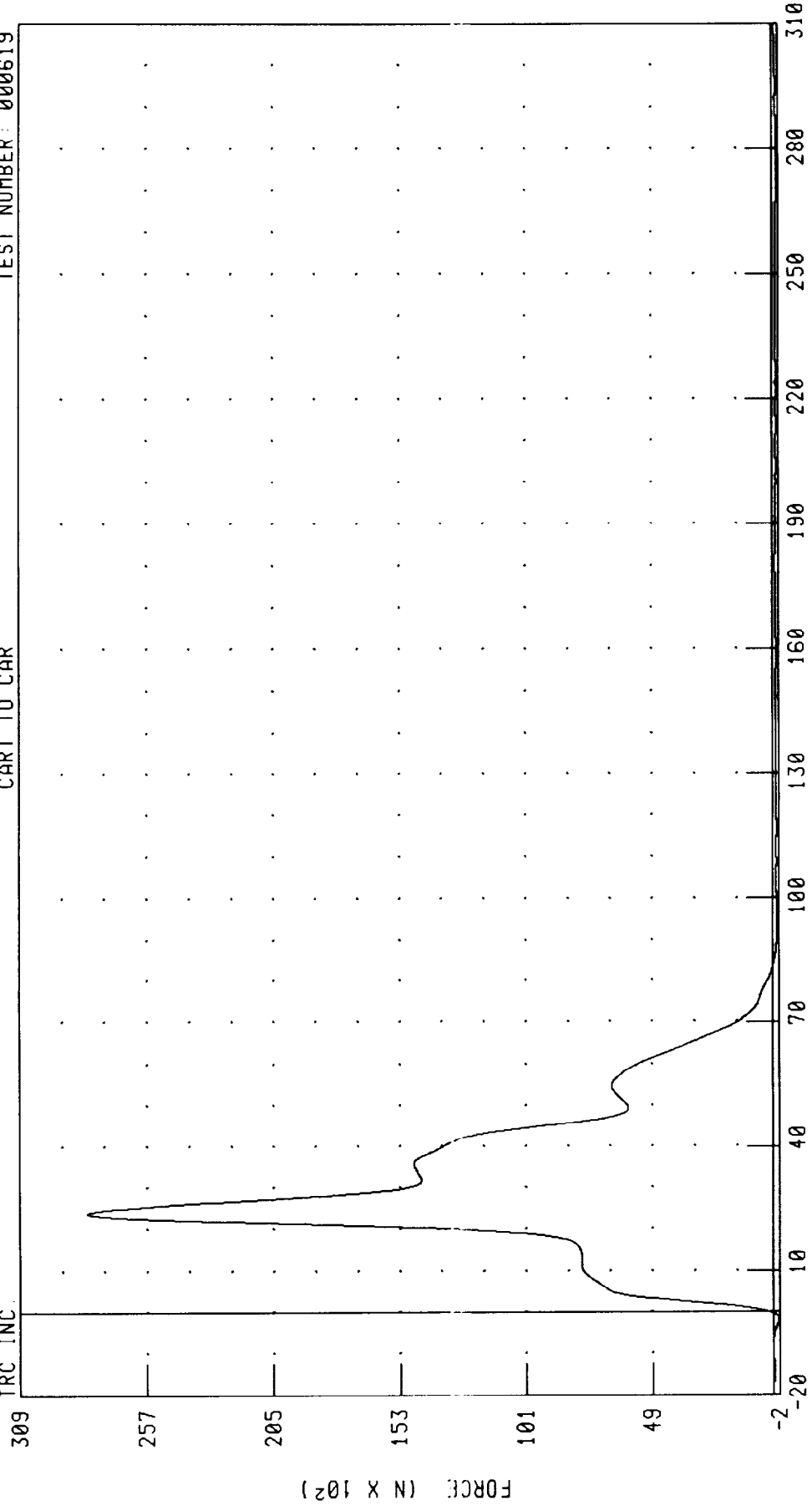


CHANNEL: BF3ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL A4 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

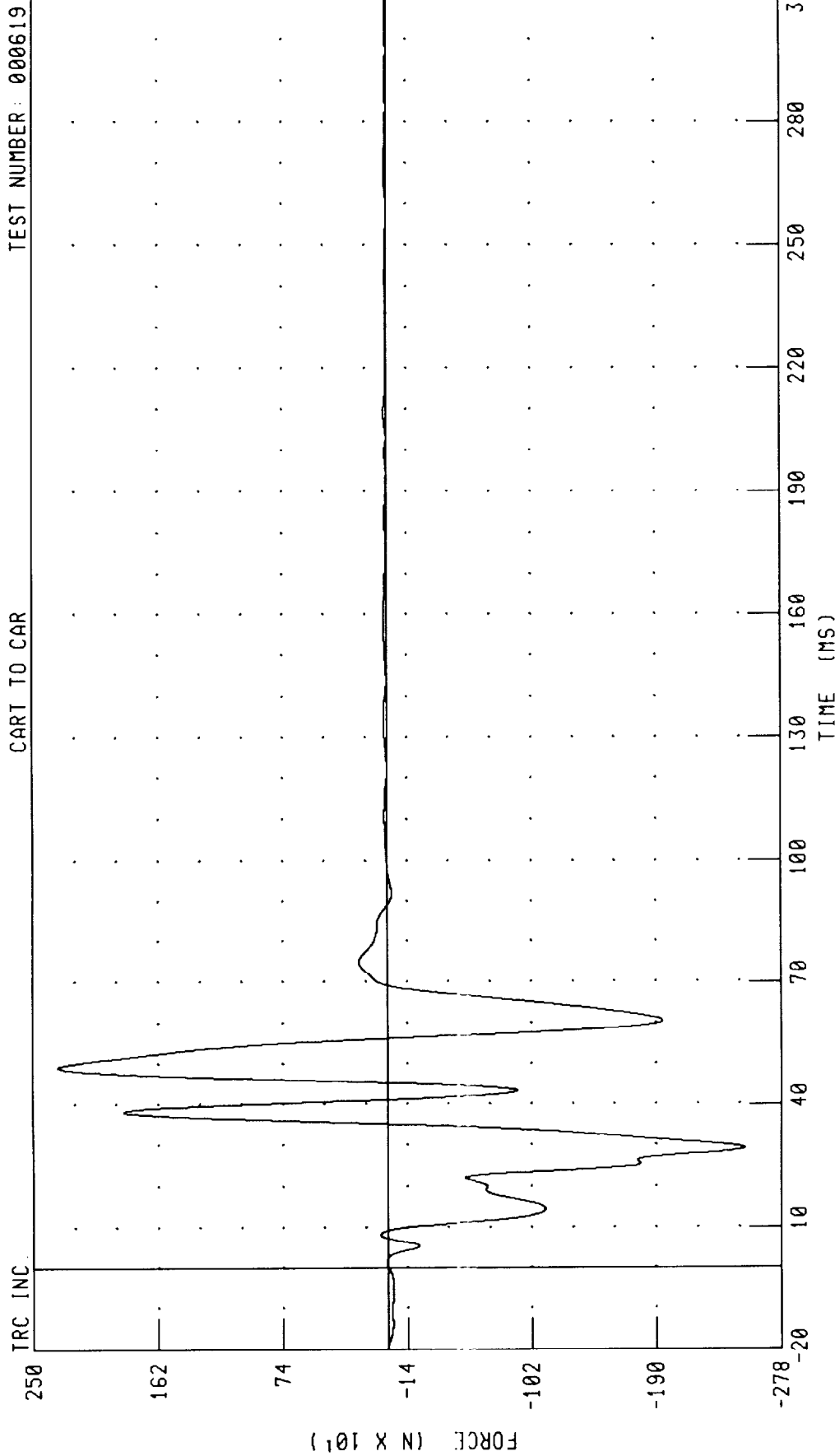
CART TO CAR



PEAK DATA: 28170.50 N @ 23.76 MS, -235.50 N @ -1.76 MS

CHANNEL: BA4XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL A4 Y-AXIS FORCE



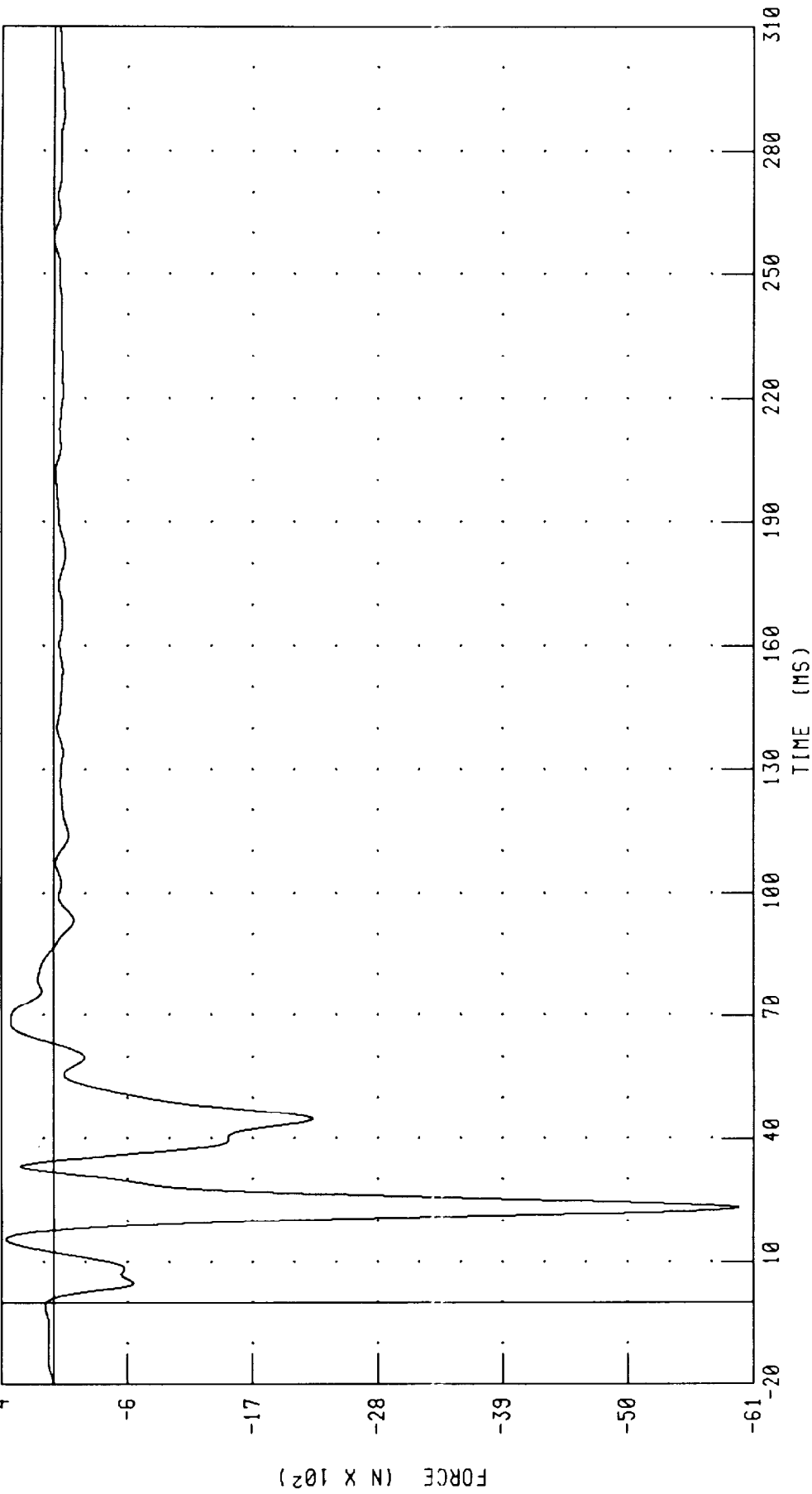
CHANNEL: BA4YF FILTER: CH. CLASS 60 PEAK DATA: 2320.73 N @ 49.20 MS; -2528.73 N @ 29.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL A4 Z-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

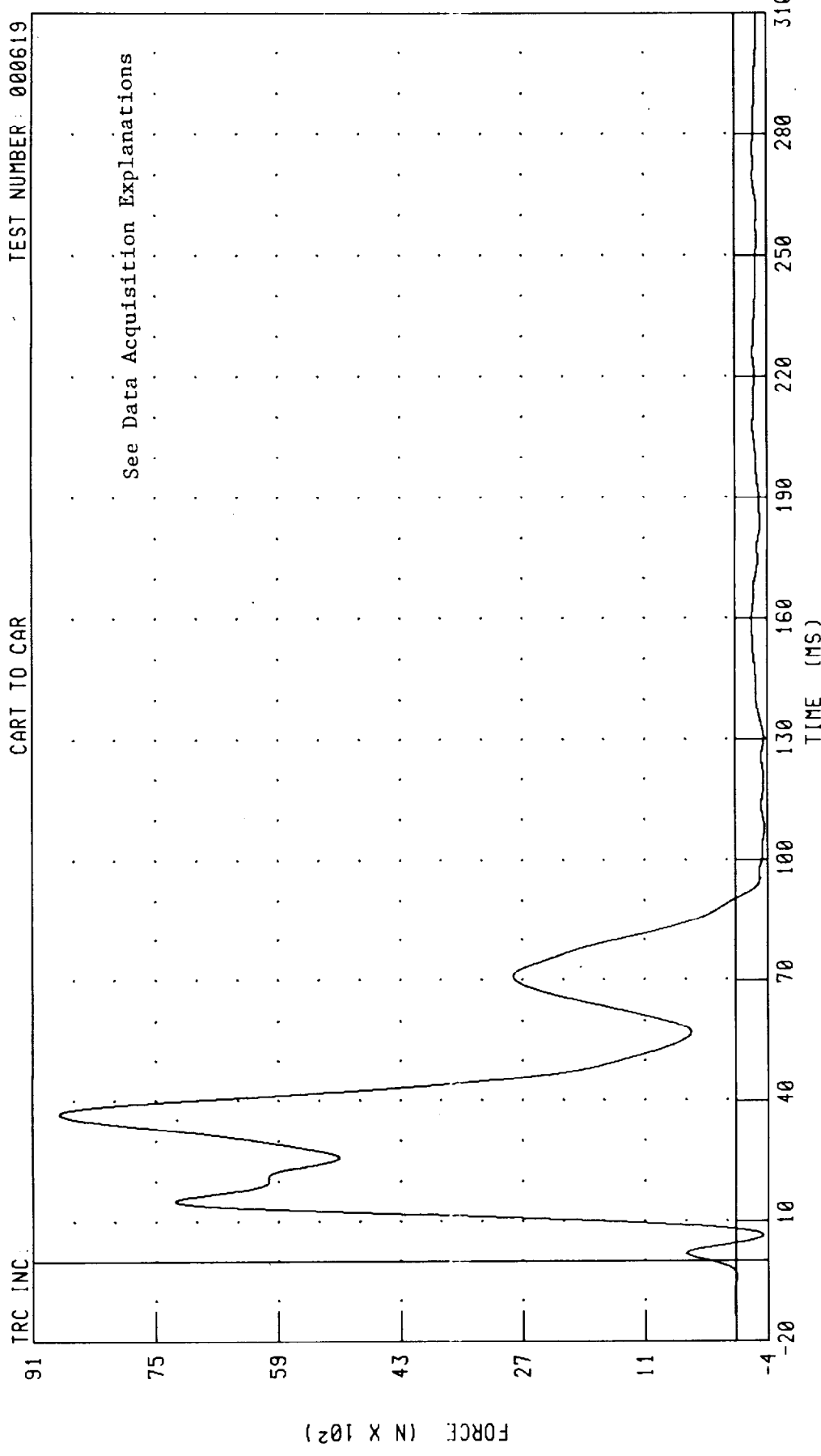
TRC INC.



CHANNEL: BA4ZF FILTER: CH. CLASS 60

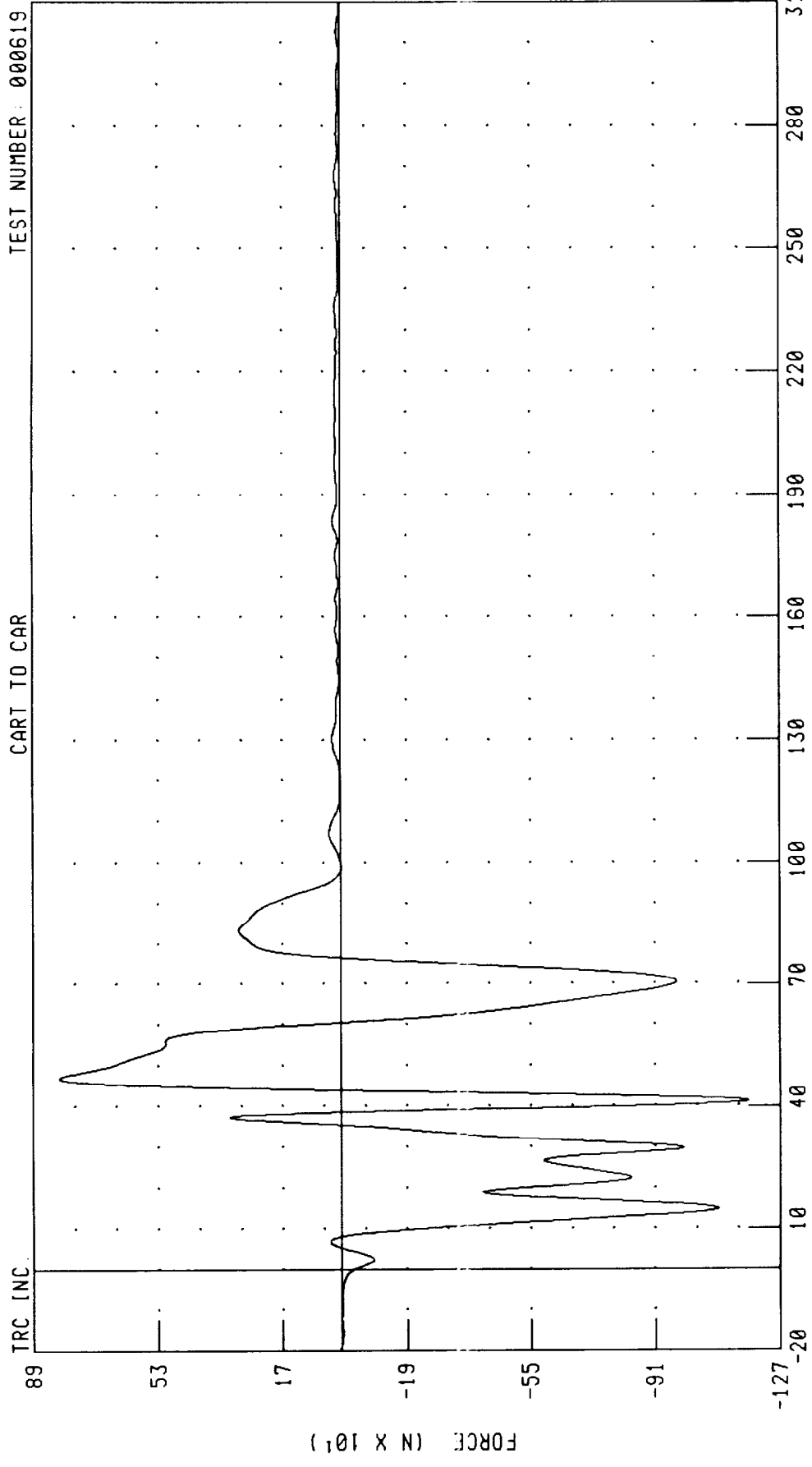
PEAK DATA: 415.11 N @ 15.60 MS; -6021.34 N @ 23.20 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B1 X-AXIS FORCE



CHANNEL: BB1XF FILTER: CH. CLASS 60 PEAK DATA: 8835.08 N @ 36.88 MS; -383.11 N @ 108.00 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B1 Y-AXIS FORCE



TRC INC.

CART TO CAR

TEST NUMBER: 000619

PEAK DATA: 813.55 N @ 47.04 MS; -1178.19 N @ 41.28 MS

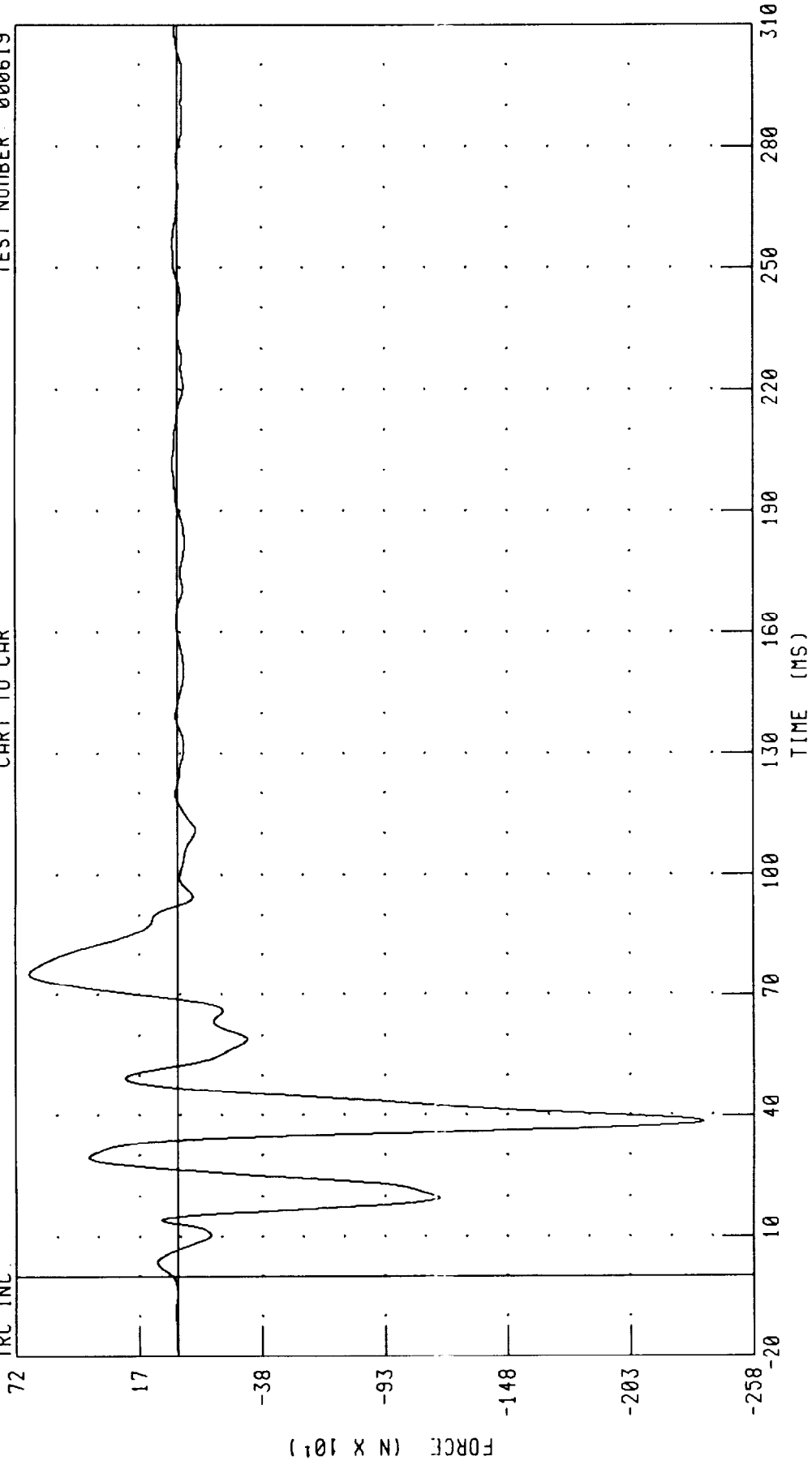
CHANNEL: BB1YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B1 Z-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



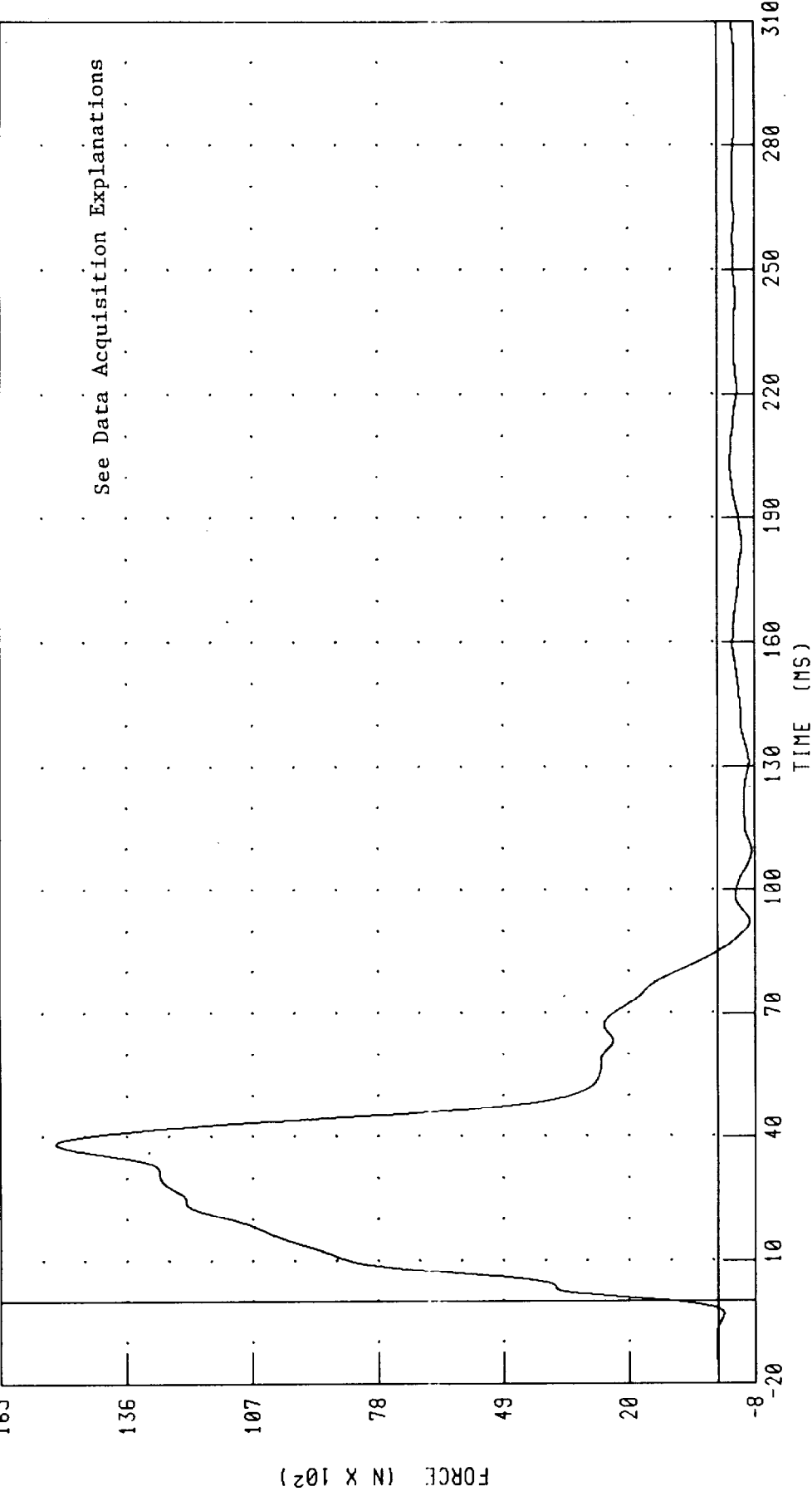
CHANNEL: BB1ZF FILTER: CH. CLASS 60 PEAK DATA: 659.23 N @ 75.36 MS, -2354.87 N @ 38.48 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B2 X-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 15262.45 N @ 38.32 MS; -784.64 N @ 109.36 MS

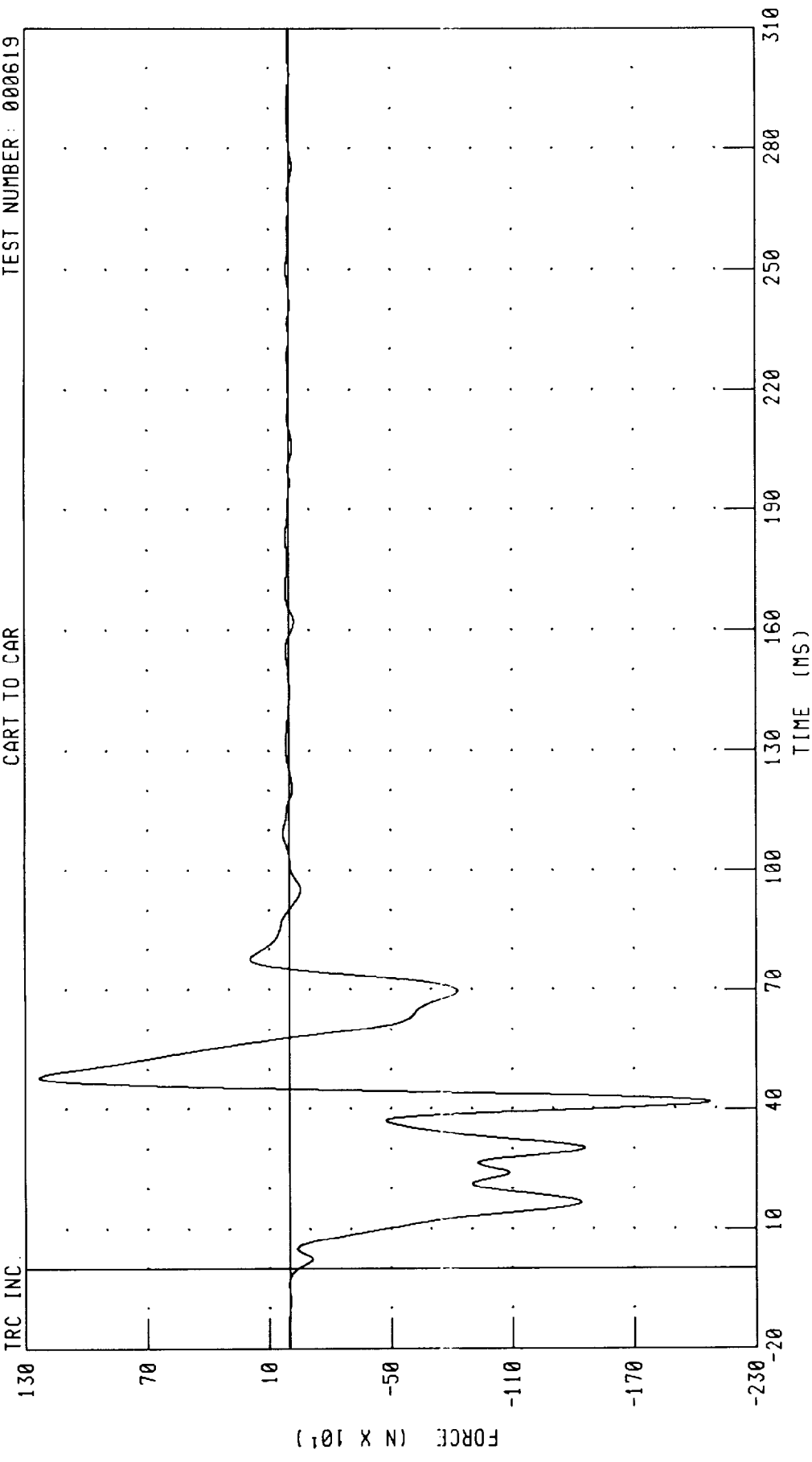
CHANNEL: BB2XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B2 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 1233.38 N @ 48.08 MS; -2071.49 N @ 41.76 MS

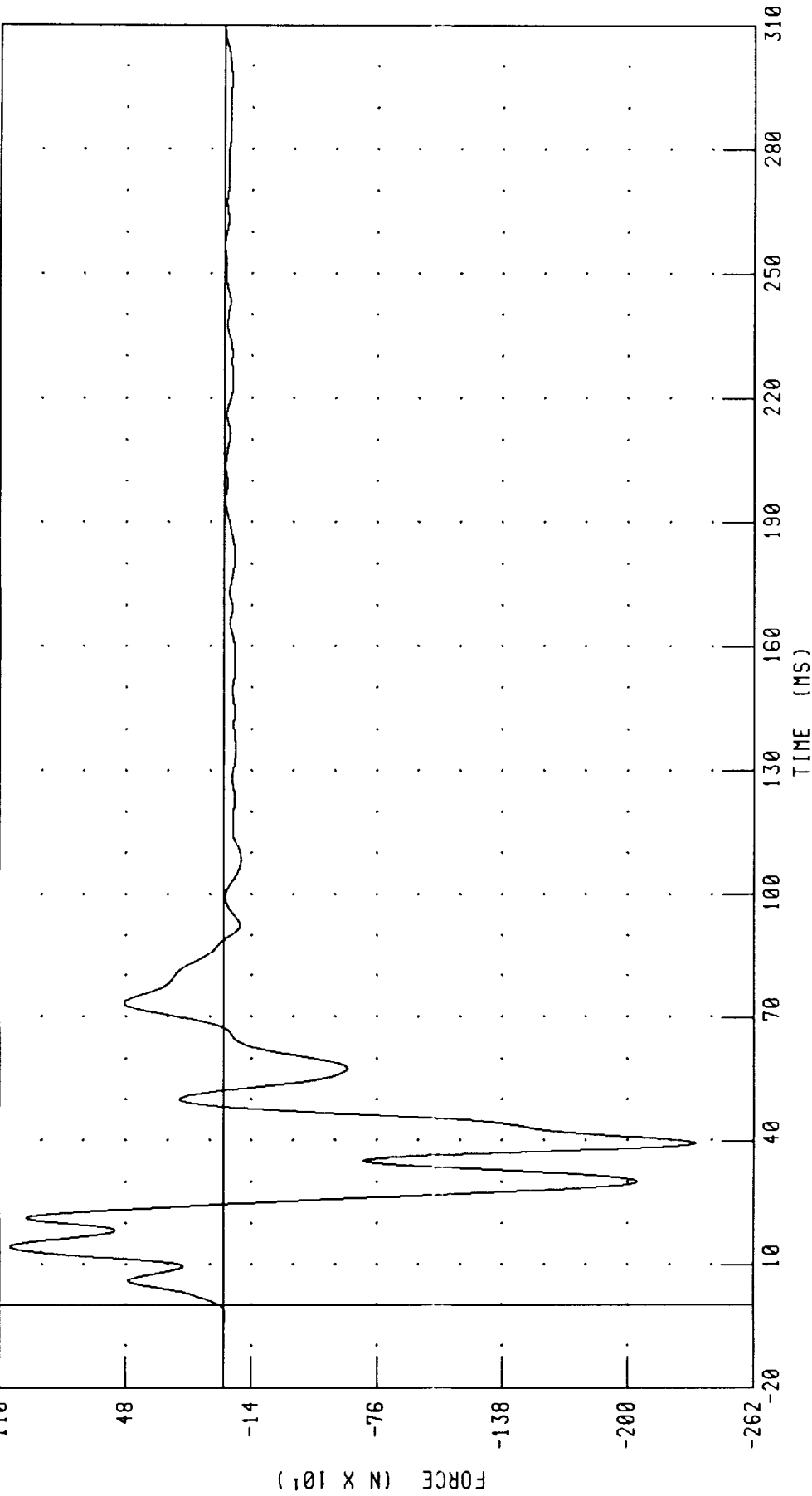
CHANNEL: BB2YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B2 Z-AXIS FORCE

TRC INC.

CART TO CAR

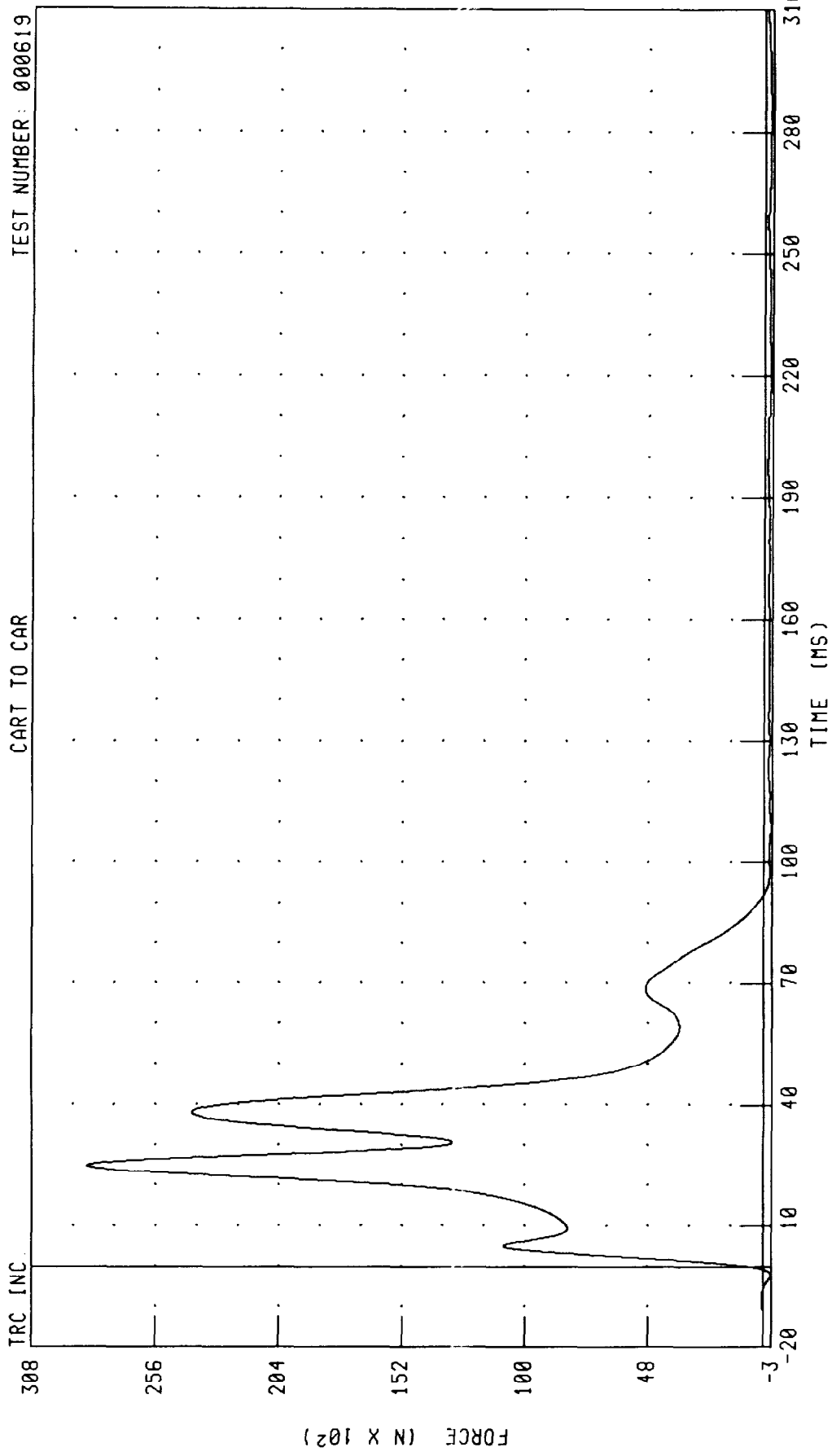
TEST NUMBER: 000619



PEAK DATA: 1051.17 N @ 14.32 MS, -2338.22 N @ 39.44 MS

CHANNEL: BB2ZF FILTER: CH CLASS 60

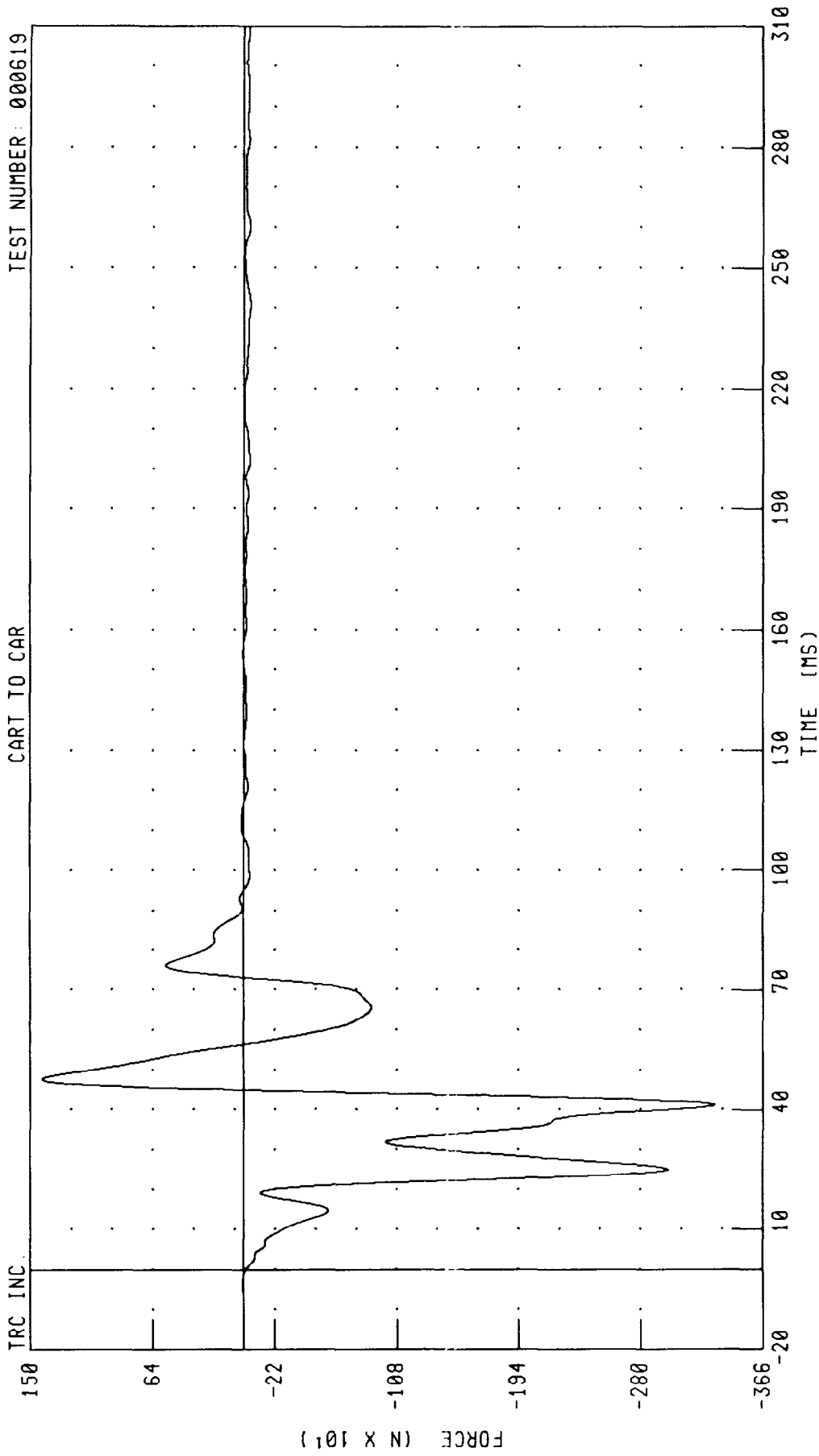
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B3 X-AXIS FORCE



CHANNEL: BB3XF FILTER: CH CLASS 60

PEAK DATA: 28517.10 N @ 24.88 MS, -335.78 N @ -2.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B3 Y-AXIS FORCE

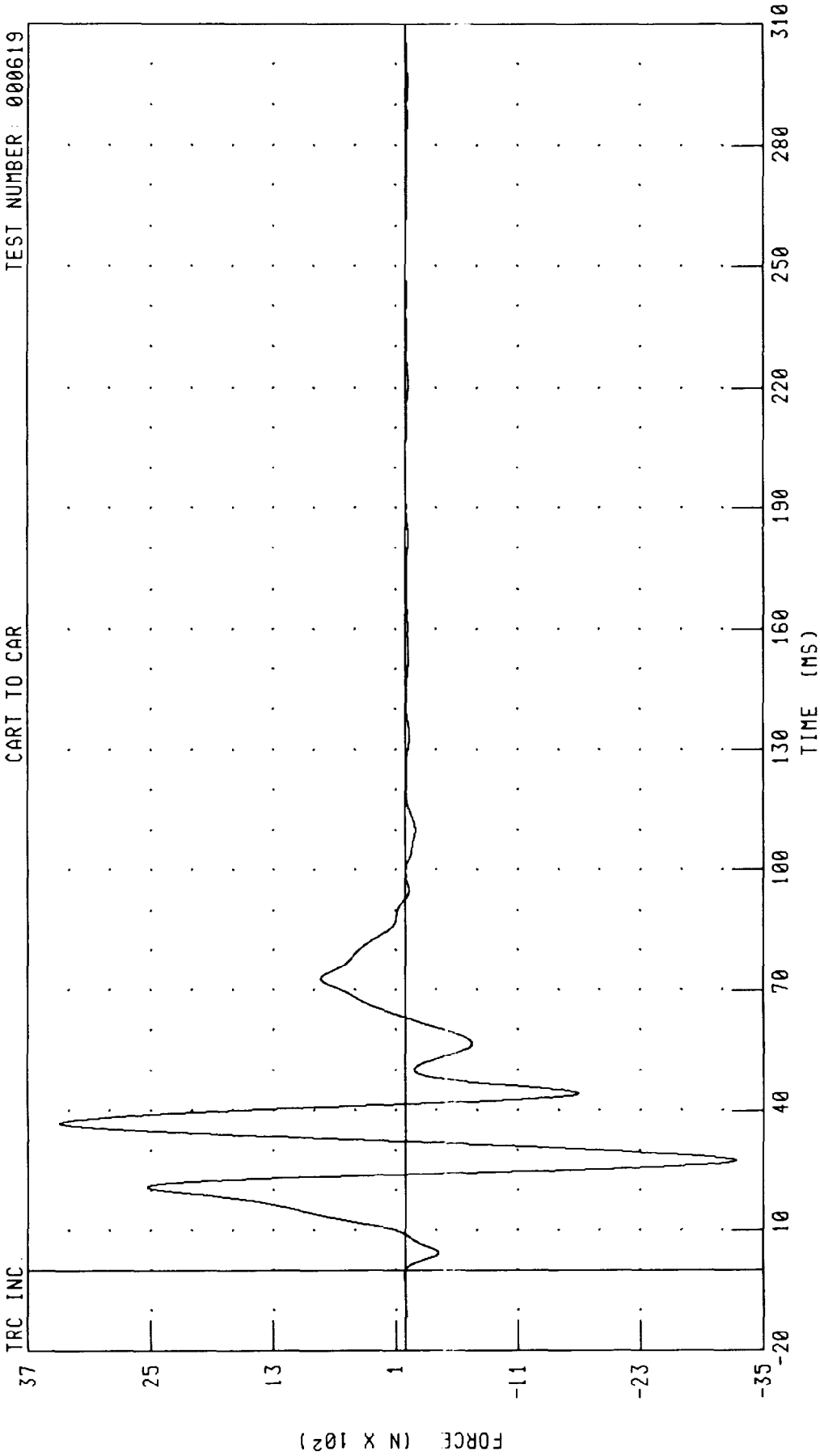


CHANNEL: BB3YF FILTER: CH. CLASS 60 PEAK DATA: 1417.86 N @ 47.68 MS, -3319.69 N @ 41.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B3 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BB3ZF FILTER: CH. CLASS 60

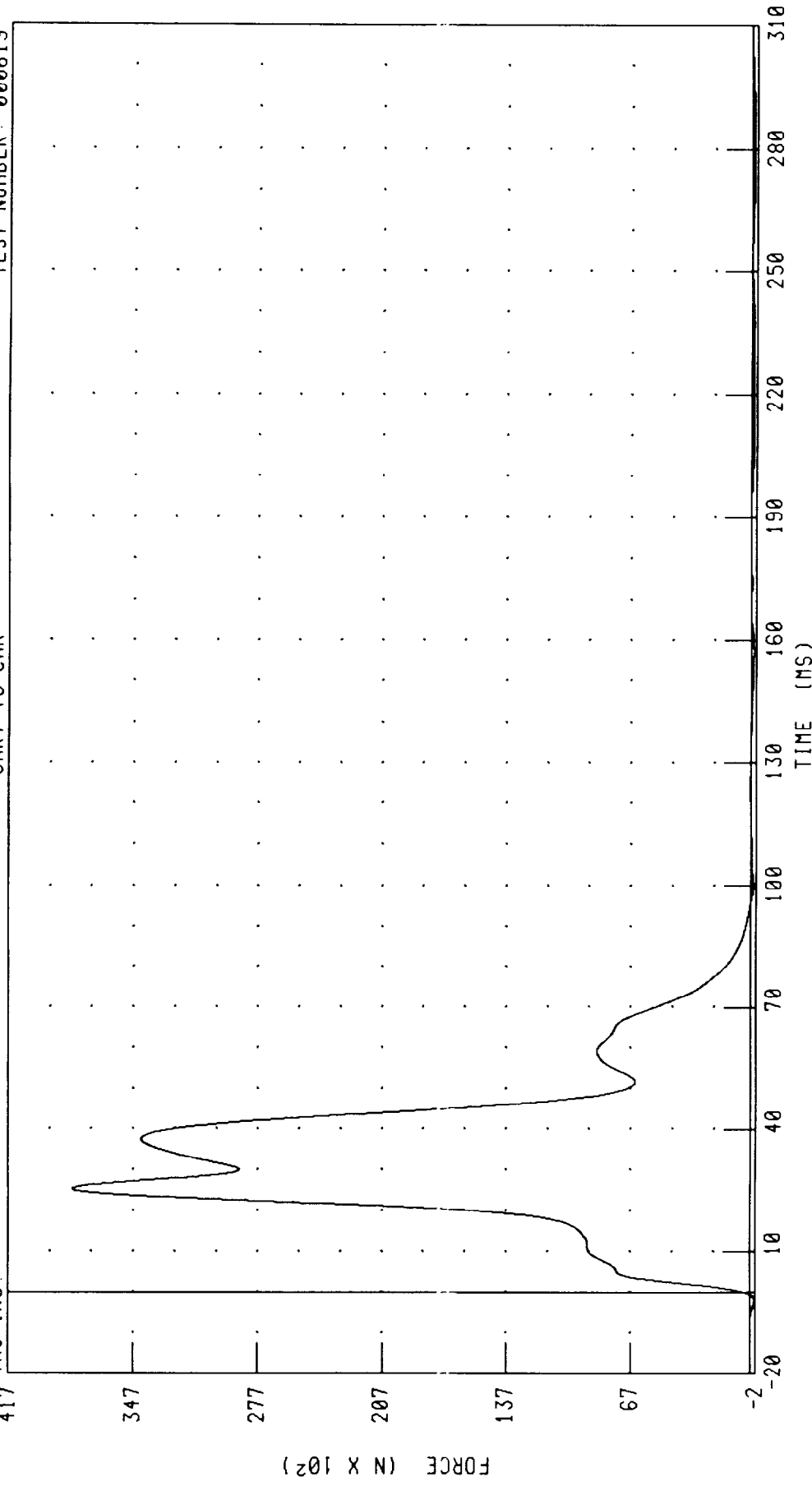
PEAK DATA: 3391.31 N @ 36.88 MS, -3235.45 N @ 27.52 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B4 X-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



PEAK DATA: 38140.24 N @ 25.36 MS, -258.90 N @ -2.00 MS

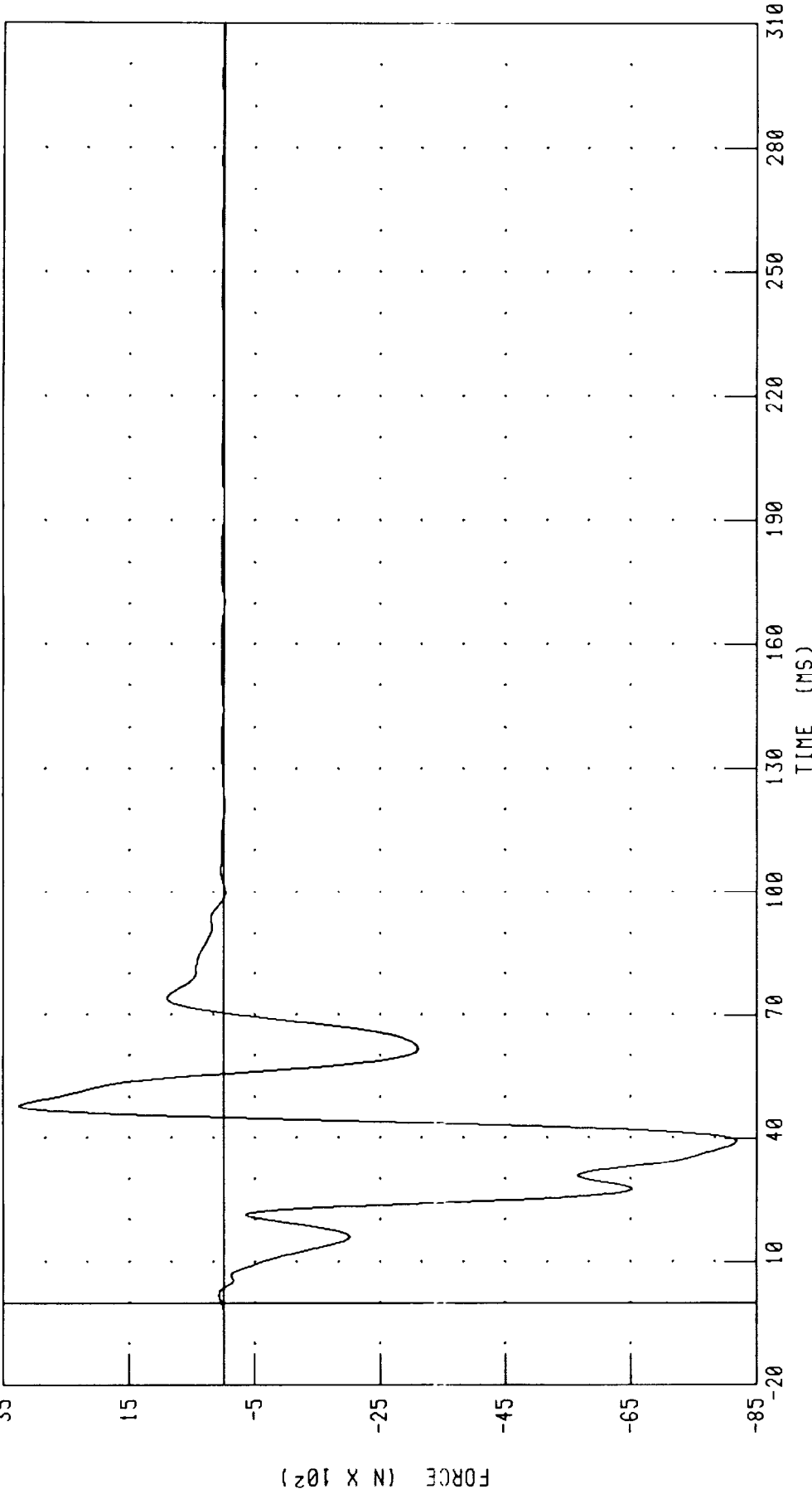
CHANNEL: BB4XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B4 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 3241.73 N @ 47.84 MS, -8177.59 N @ 39.20 MS

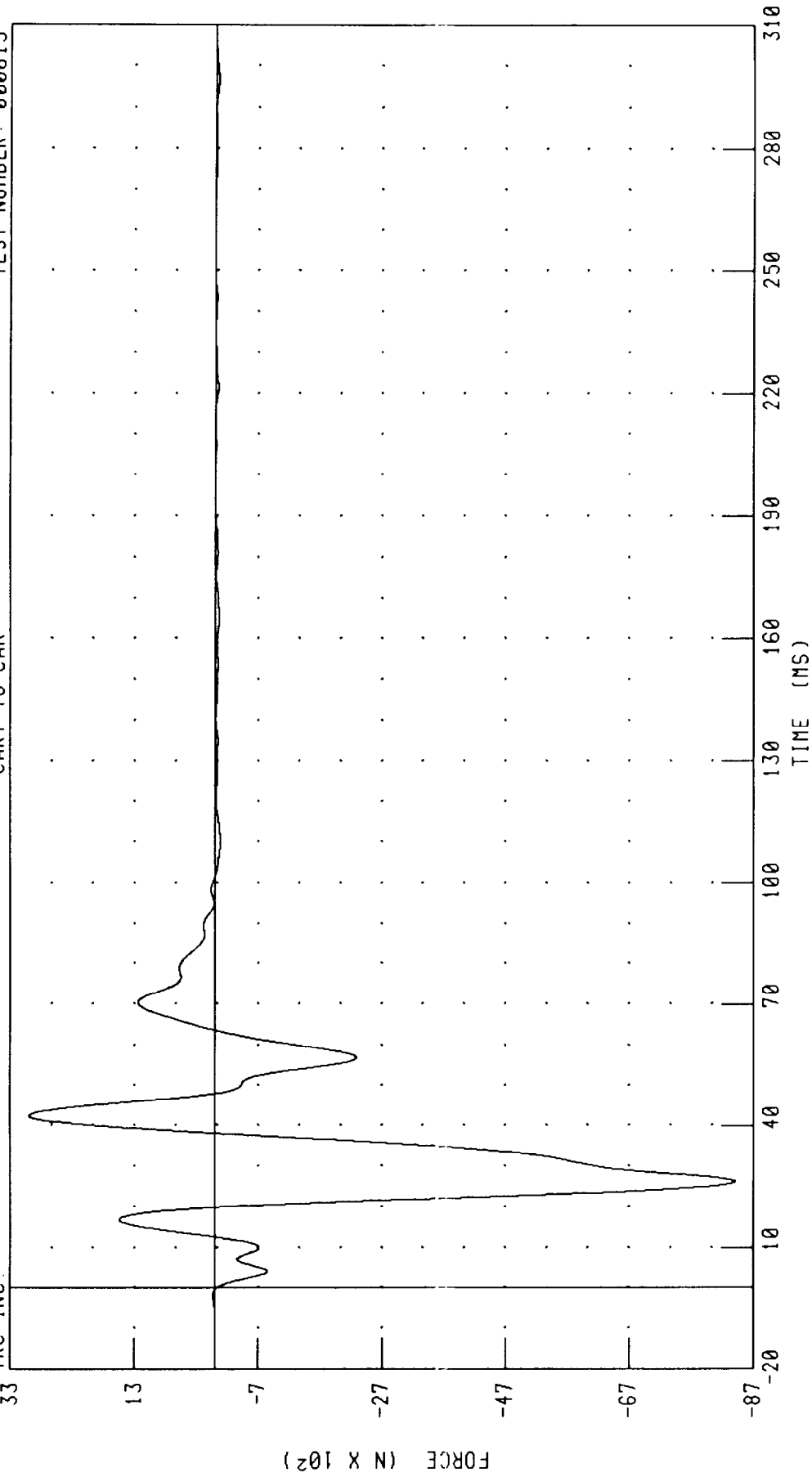
CHANNEL: BB4YF FILTER: CH CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL B4 Z-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619

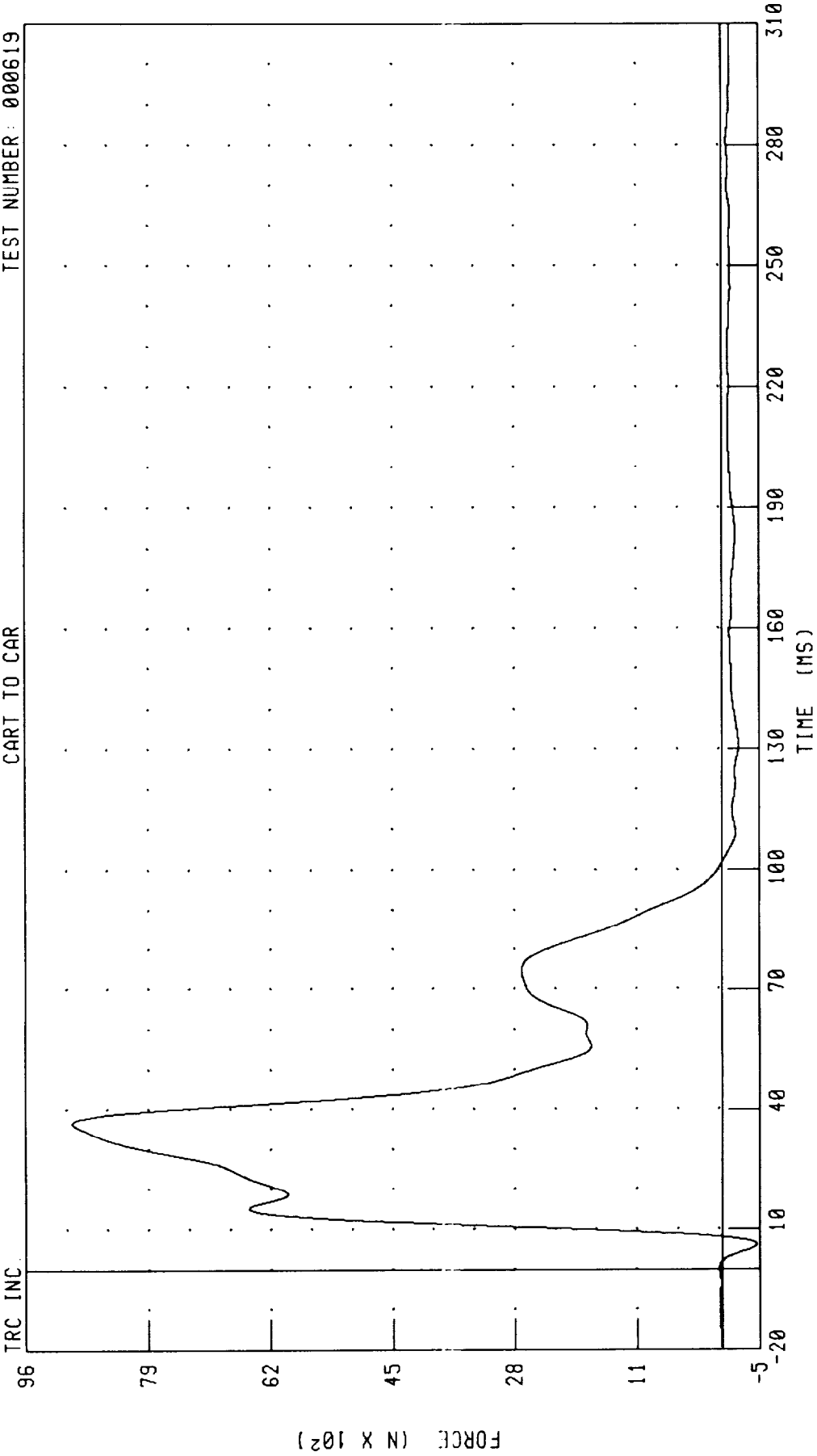


CHANNEL: BB4ZF FILTER: CH. CLASS 60 PEAK DATA: 3000.87 N @ 42.40 MS; -8413.83 N @ 26.24 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C1 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

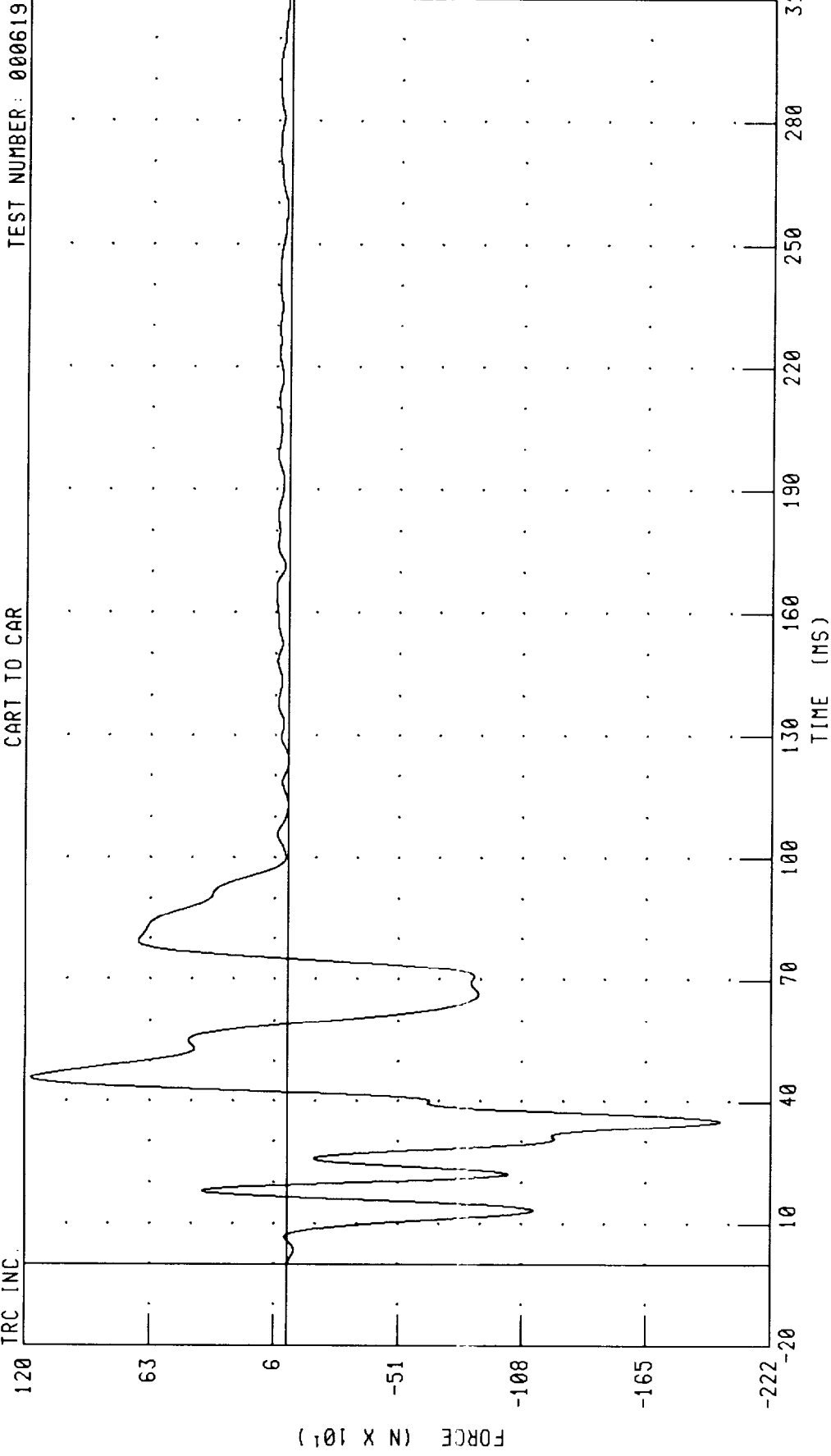
CART TO CAR



CHANNEL: BC1XF FILTER: CH. CLASS 60 PEAK DATA: 9033.75 N @ 36.72 MS; -476.43 N @ 6.16 MS

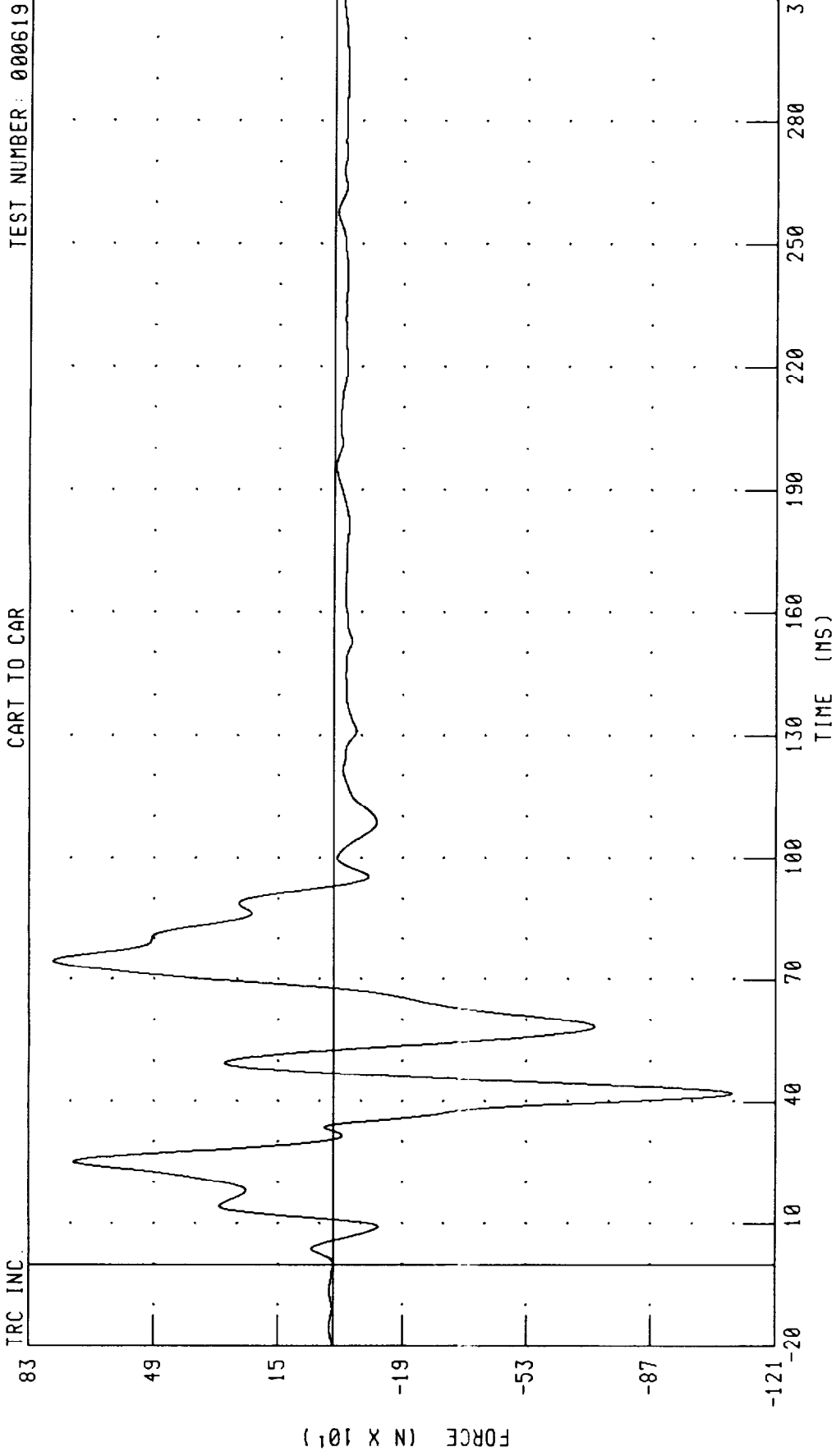
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C1 Y-AXIS FORCE
CART TO CAR

TRC INC.



CHANNEL: BC1YF FILTER: CH CLASS 60 PEAK DATA: 1172.55 N @ 45.84 MS, -1988.86 N @ 35.20 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C1 Z-AXIS FORCE



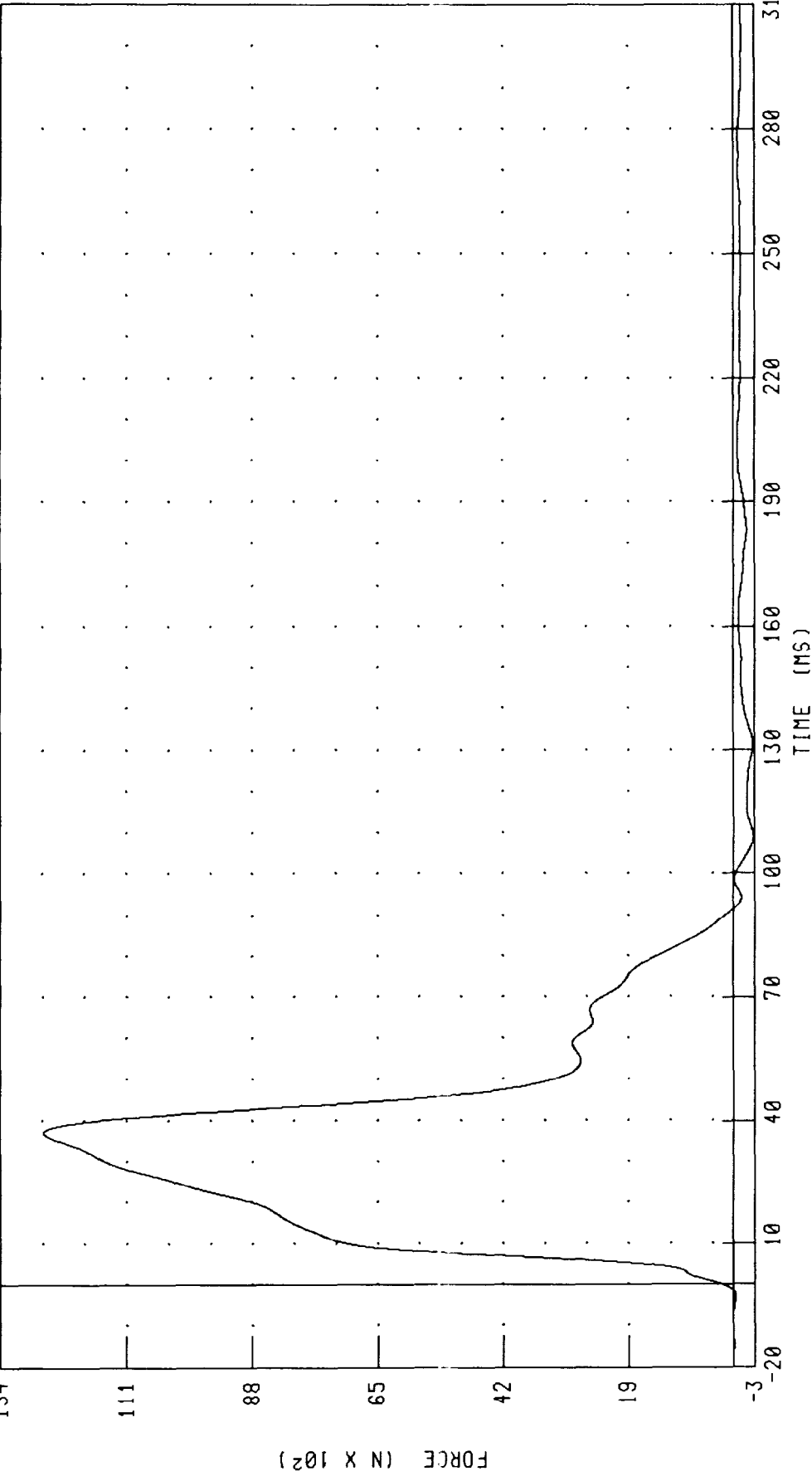
CHANNEL: BC1ZF FILTER: CH CLASS 60 PEAK DATA: 763.23 N @ 74.64 MS, -1092.91 N @ 42.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C2 X-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



CHANNEL: BC2XF

FILTER: CH. CLASS 60

PEAK DATA: 12635.10 N @ 37.20 MS;

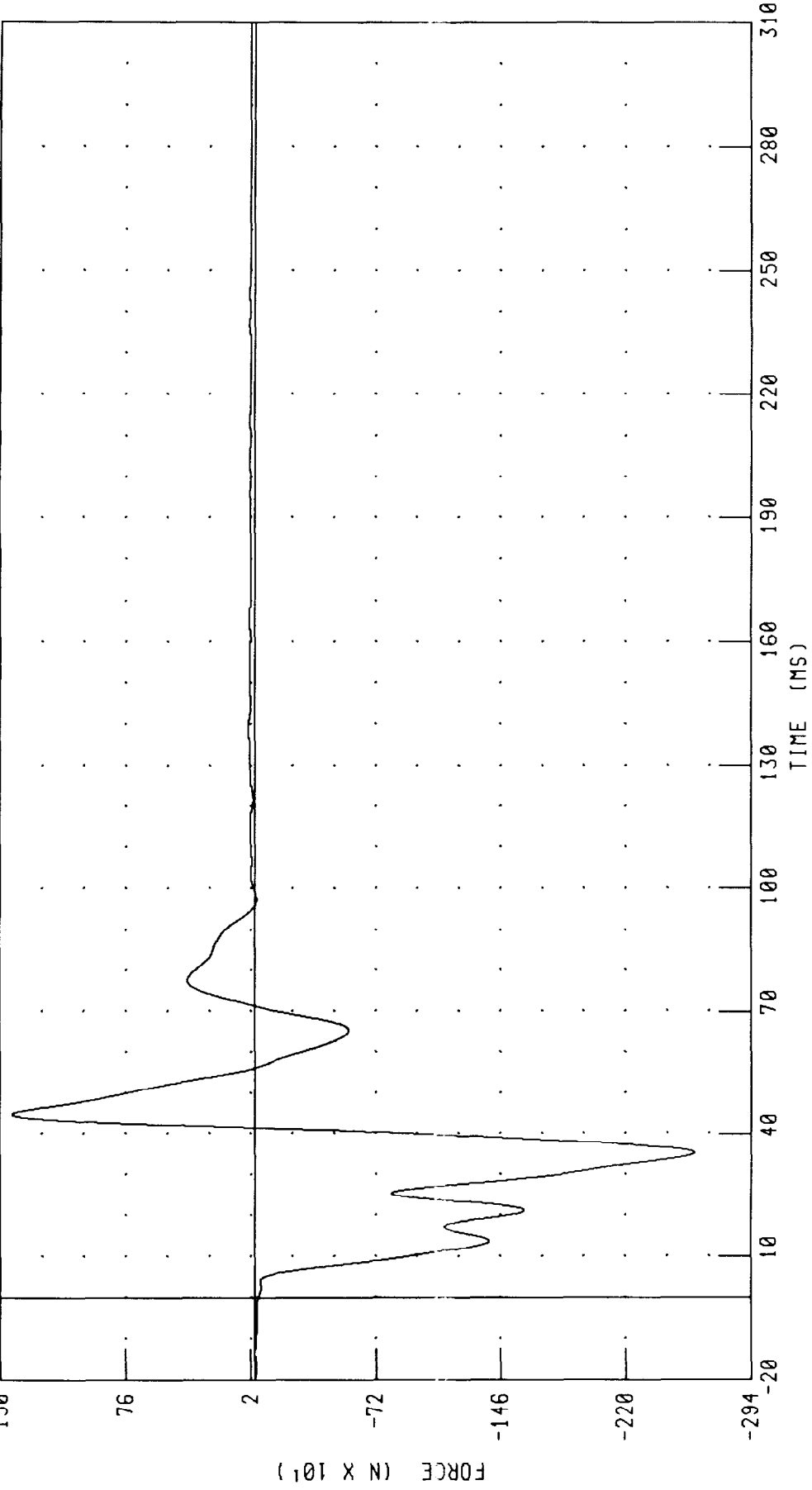
-354.30 N @ 108.96 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C2 Y-AXIS FORCE

TEST NUMBER: 000619

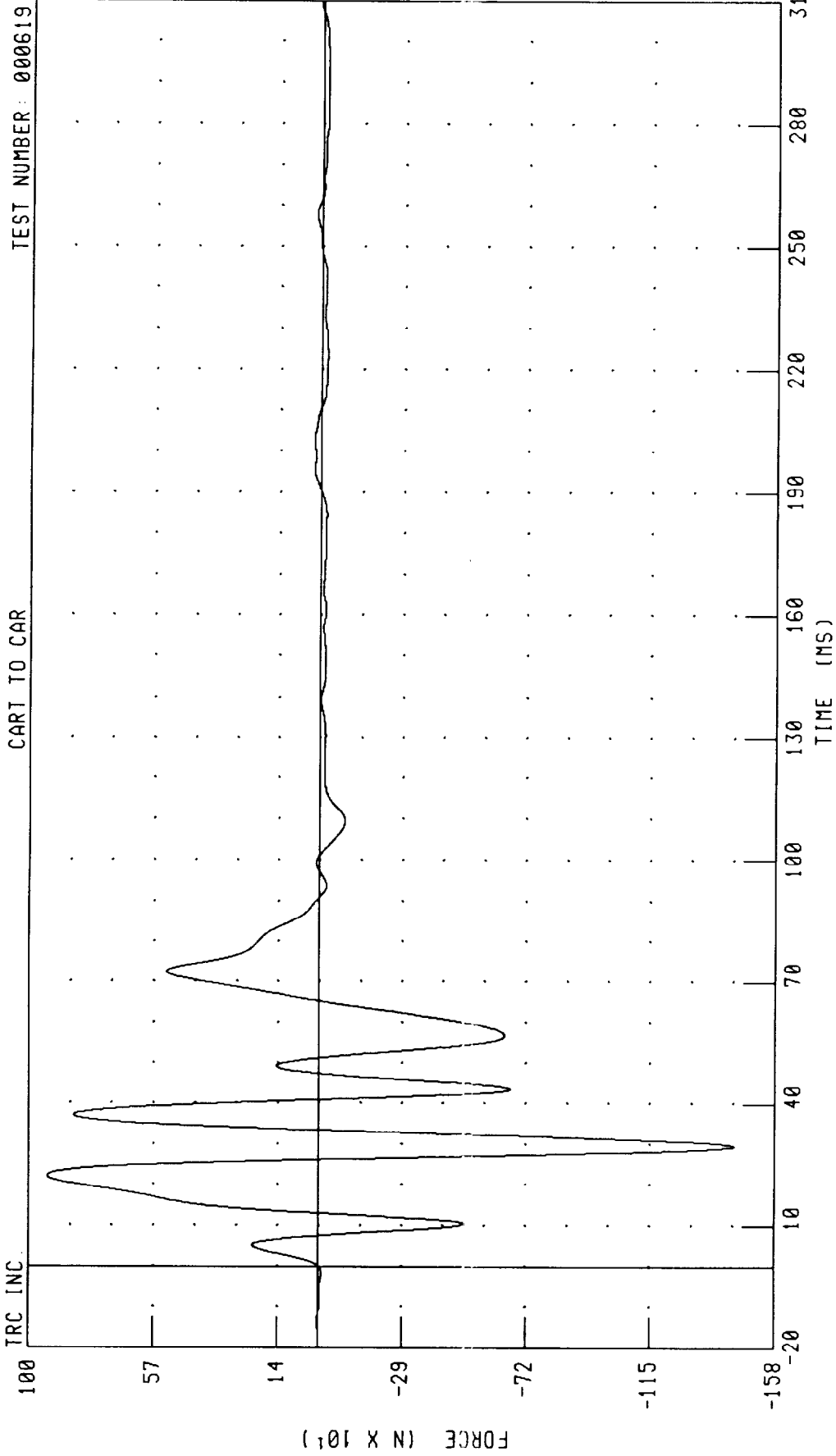
CART TO CAR

TRC INC.



CHANNEL: BC2YF FILTER: CH. CLASS 60 PEAK DATA: 1429.06 N @ 44.80 MS; -2609.40 N @ 35.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C2 Z-AXIS FORCE



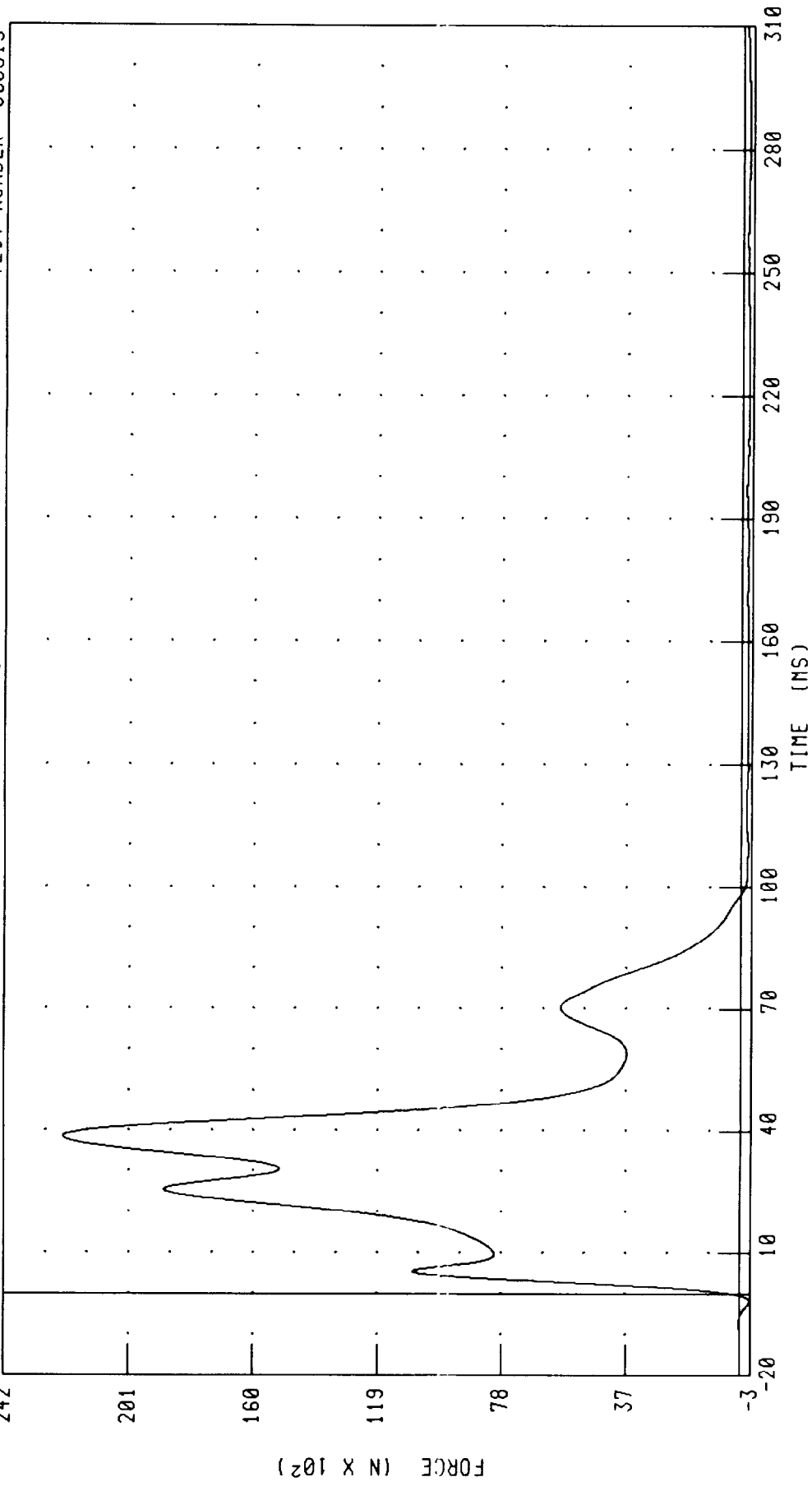
CHANNEL: BC2ZF FILTER: CH. CLASS 60 PEAK DATA: 936.79 N @ 22.16 MS, -1440.82 N @ 29.60 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C3 X-AXIS FORCE

TRC INC.

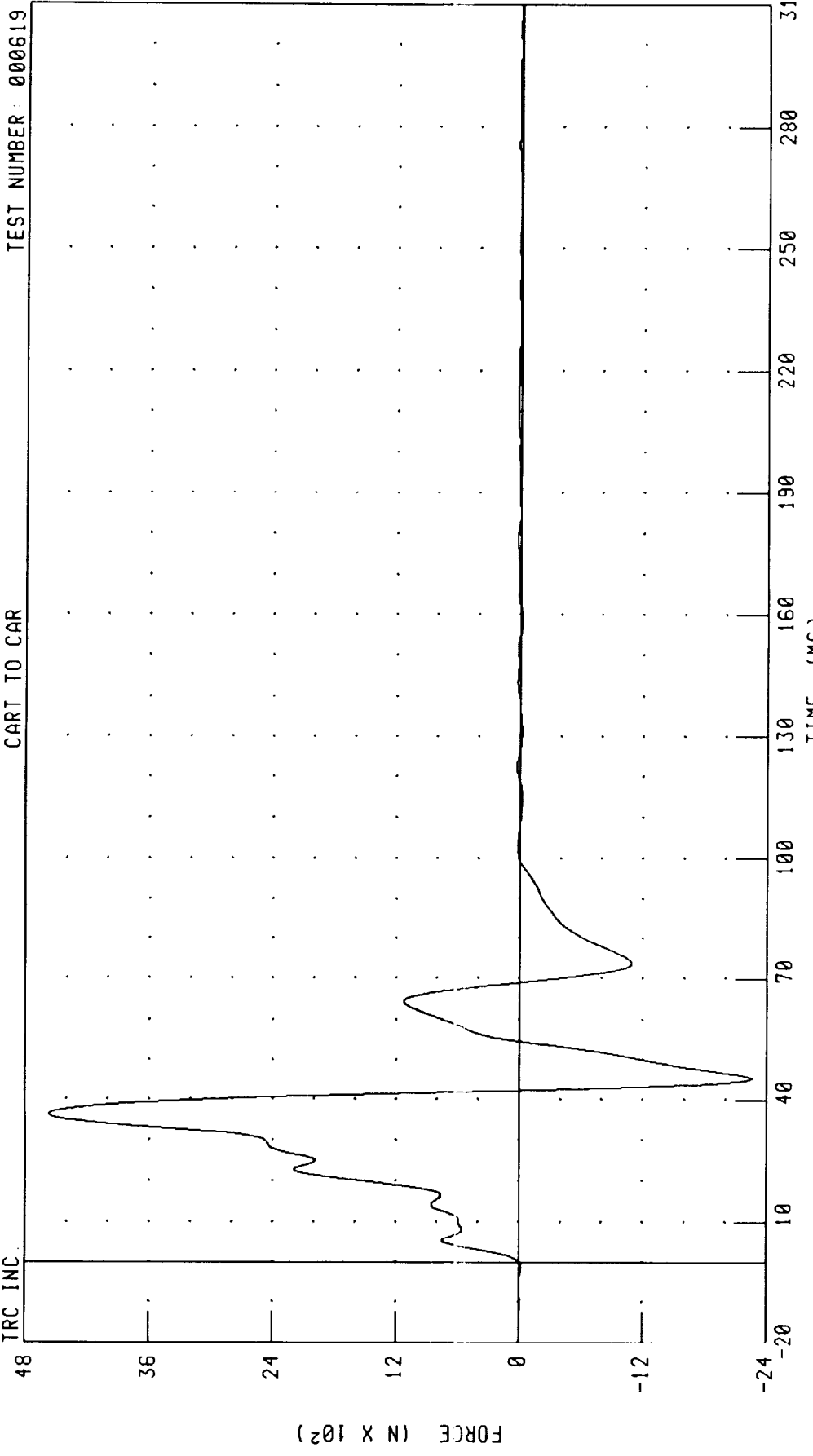
CART TO CAR

TEST NUMBER: 000619



CHANNEL: BC3XF FILTER: CH. CLASS 60 PEAK DATA: 22326.26 N @ 38.64 MS; -301.54 N @ -1.76 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C3 Y-AXIS FORCE



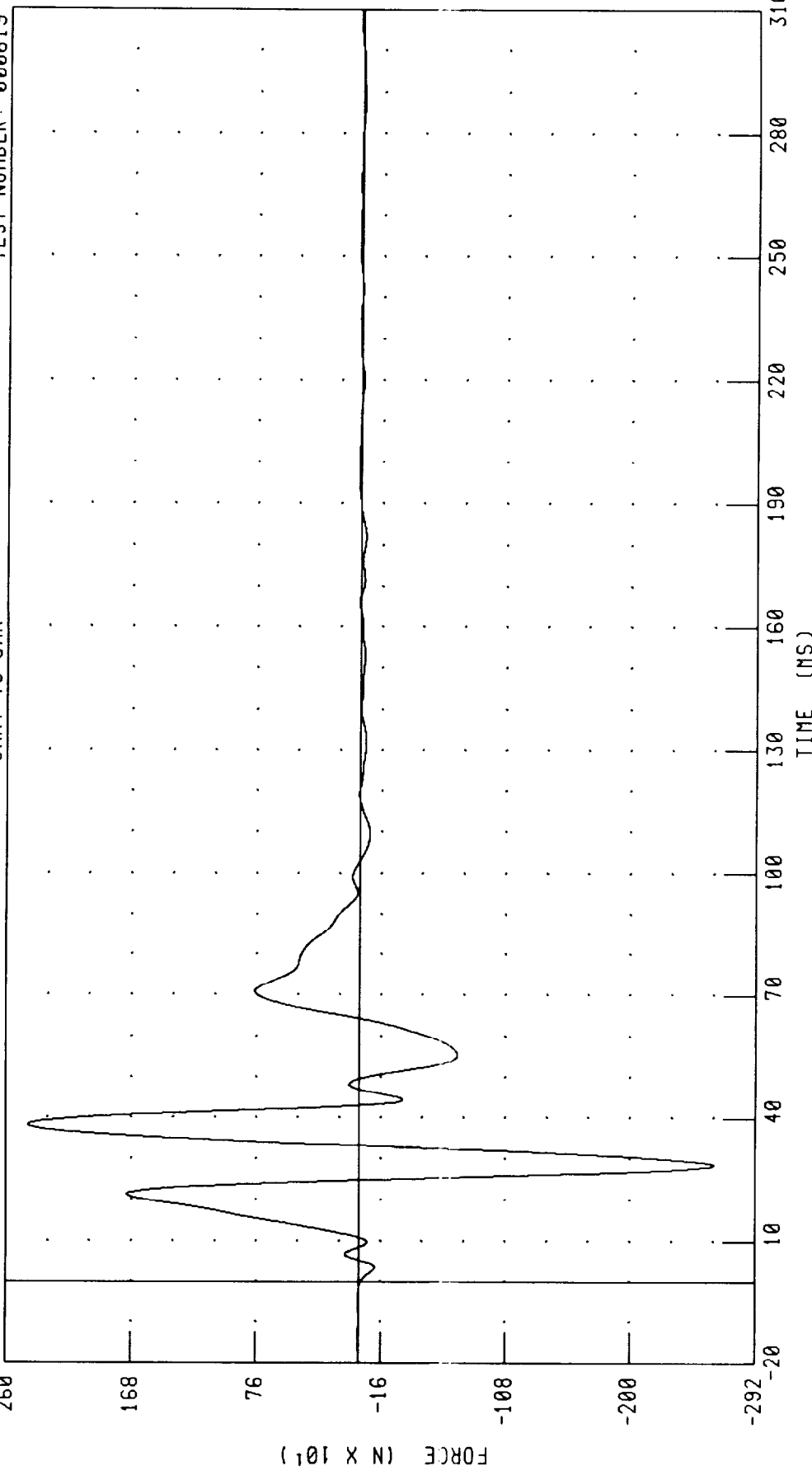
CHANNEL: BC3YF FILTER: CH. CLASS 60 PEAK DATA: 4573.33 N @ 36.48 MS, -2255.99 N @ 45.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C3 Z-AXIS FORCE

TRC INC.

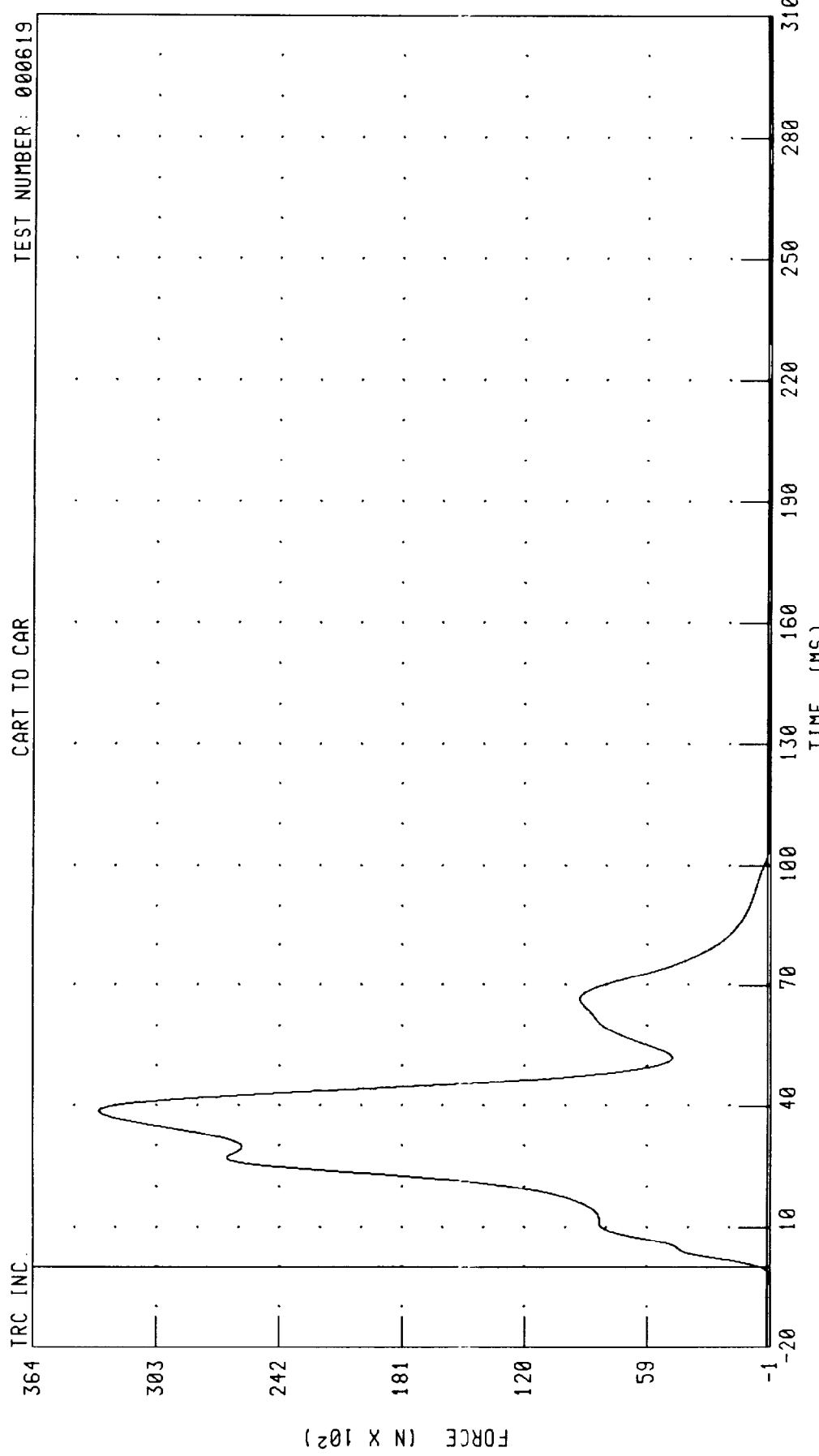
TEST NUMBER: 000619

CART TO CAR



CHANNEL: BC3ZF FILTER: CH CLASS 60 PEAK DATA: 2437.13 N @ 38.32 MS; -2617.03 N @ 28.48 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C4 X-AXIS FORCE



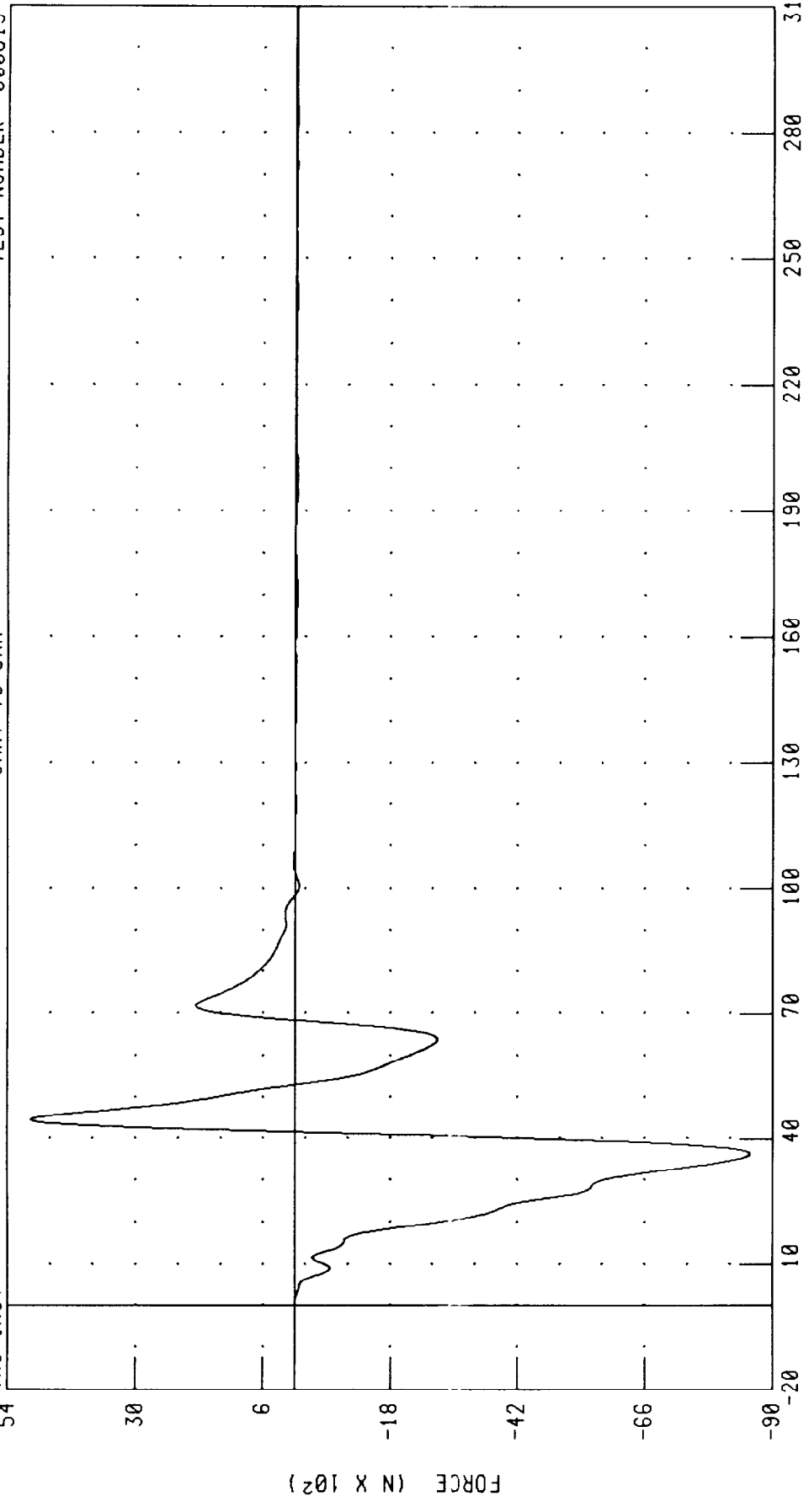
CHANNEL: BC4XF FILTER: CH. CLASS 60

PEAK DATA: 33164.46 N @ 38.80 MS, -161.70 N @ 158.56 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C4 Y-AXIS FORCE
CART TO CAR

TRC INC.

TEST NUMBER: 000619



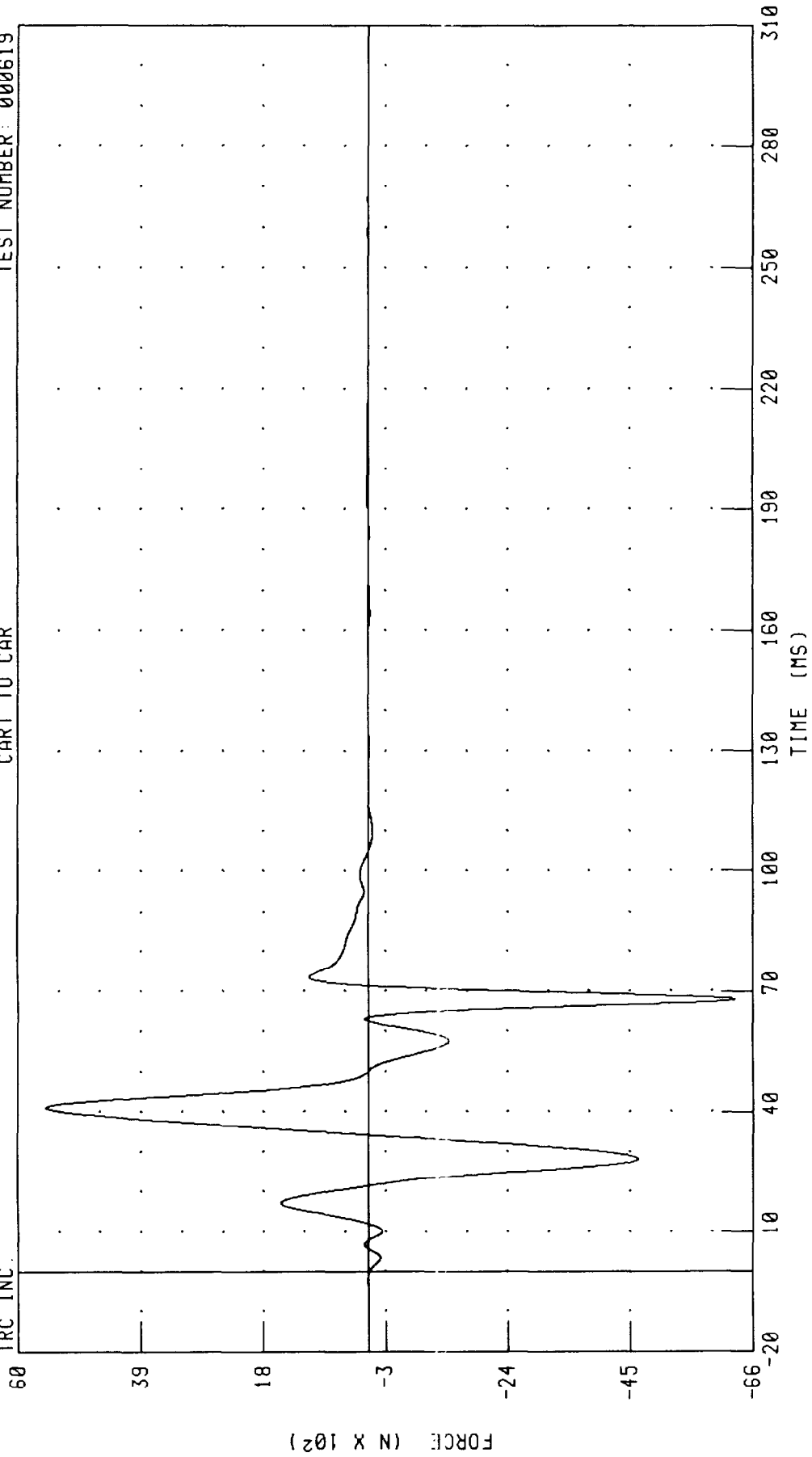
CHANNEL: BC4YF FILTER: CH. CLASS 60
PEAK DATA: 4952.59 N @ 44.56 MS, -8584.71 N @ 36.40 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL C4 Z-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



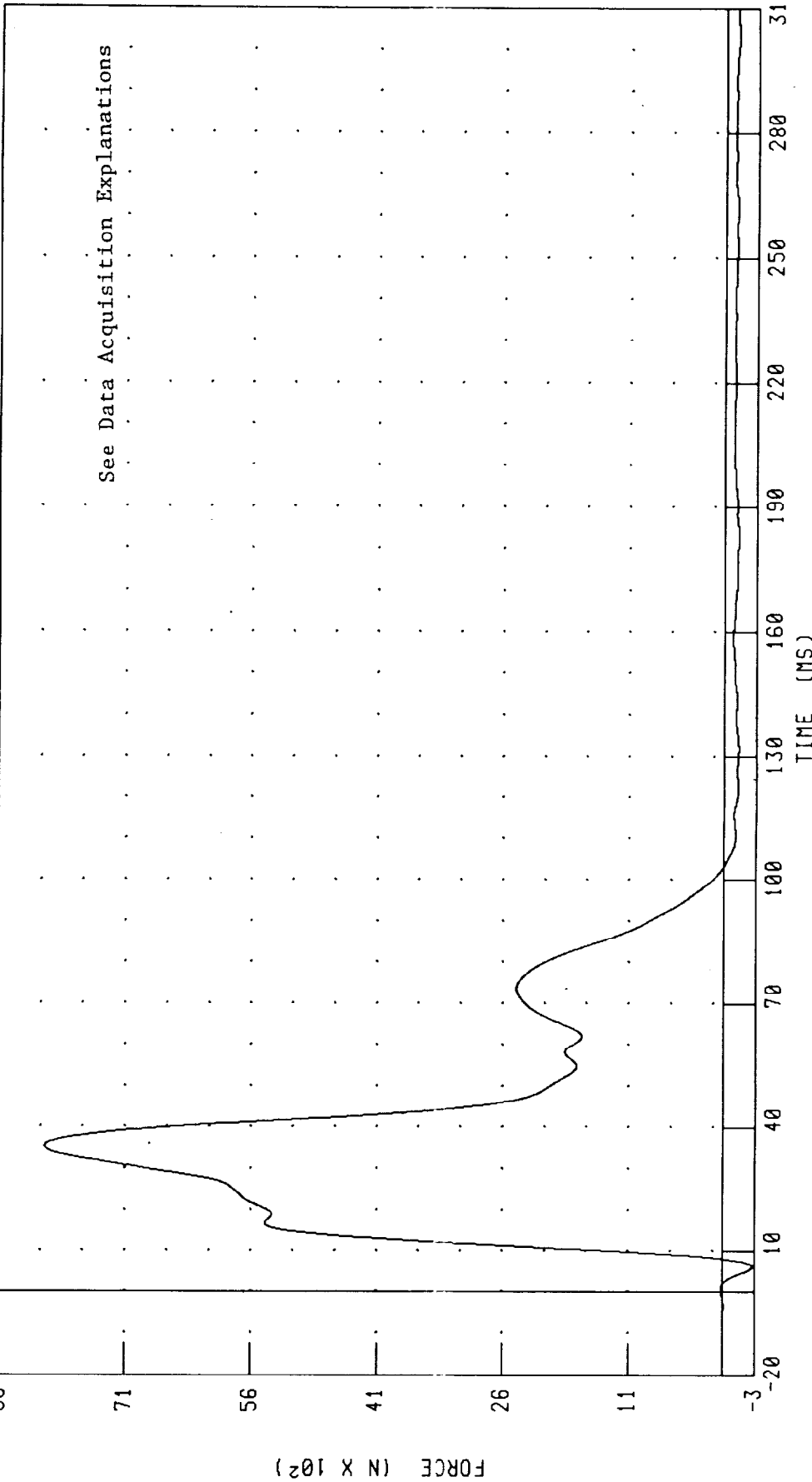
CHANNEL: BC4ZF FILTER: CH. CLASS 60 PEAK DATA: 5525.19 N @ 41.12 MS; -6293.84 N @ 68.00 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D1 X-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619

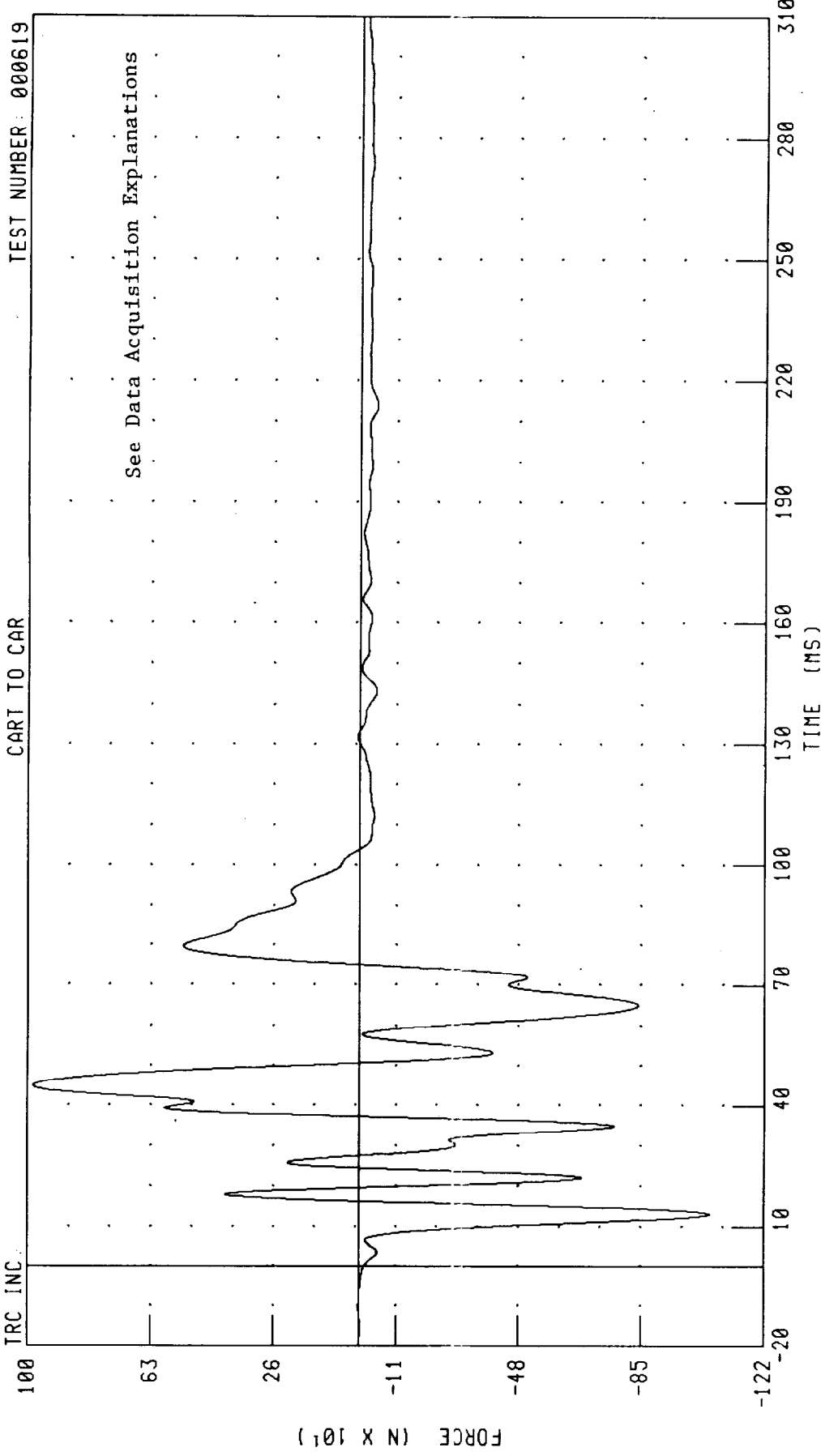


CHANNEL: B01XF FILTER: CH. CLASS 60

TIME (MS)

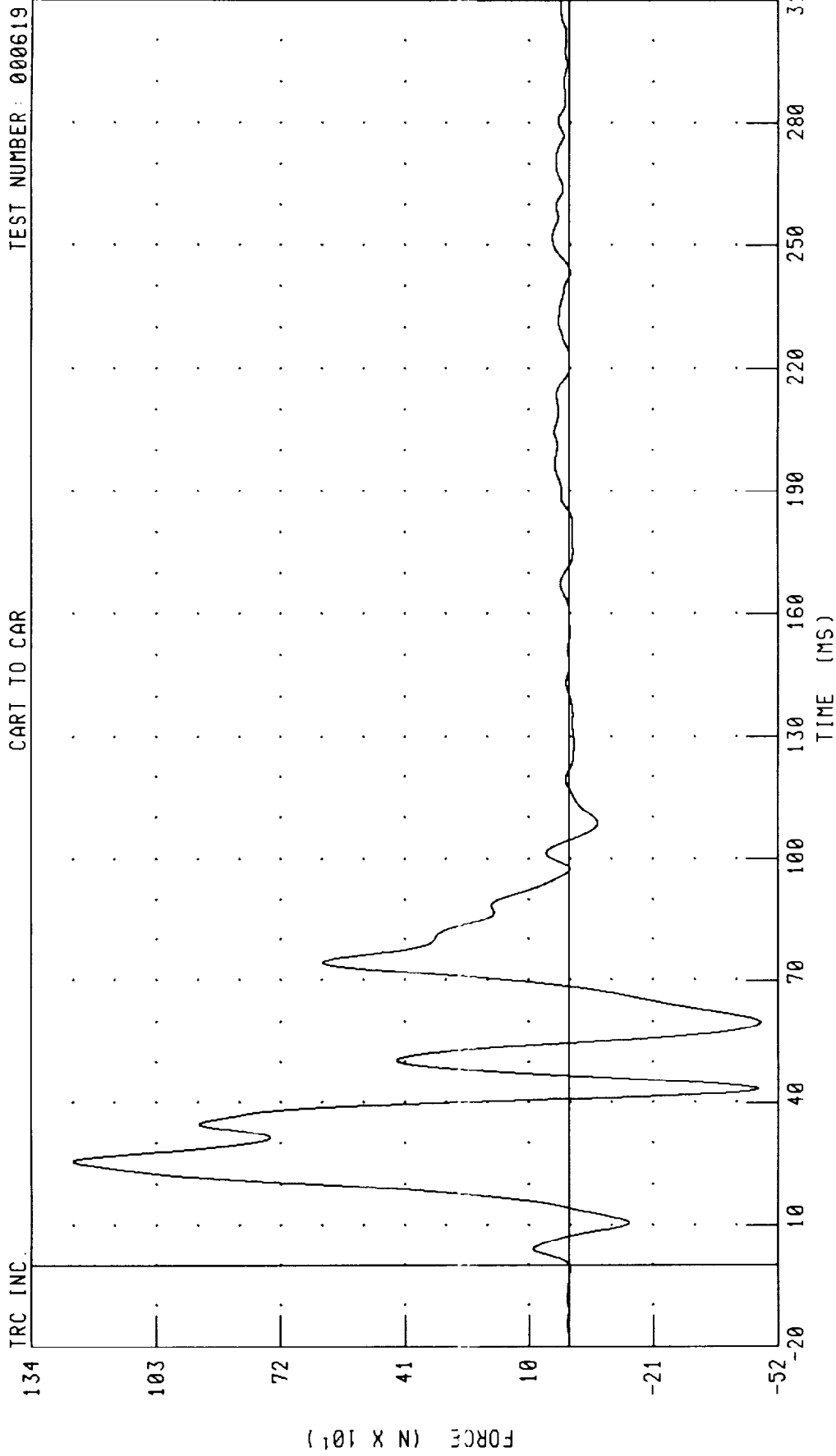
PEAK DATA: 8071.18 N @ 35.36 MS, -354.39 N @ 6.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D1 Y-AXIS FORCE



CHANNEL: B01YF FILTER: CH. CLASS 60 PEAK DATA: 983.75 N @ 44.96 MS, -1056.89 N @ 13.12 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D1 Z-AXIS FORCE

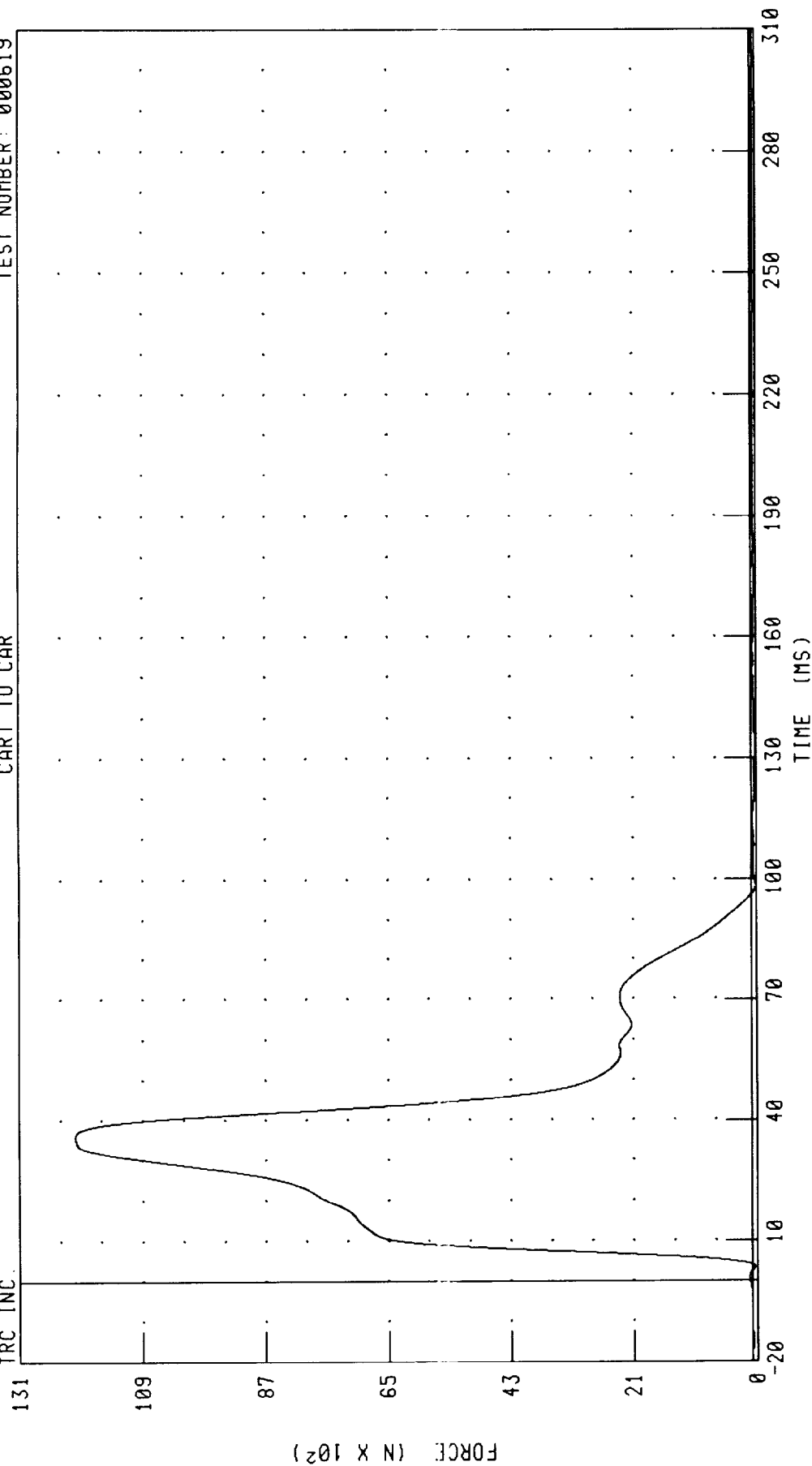


CHANNEL: BD1ZF FILTER: CH. CLASS 60 PEAK DATA: 1235.88 N @ 25.68 MS, -477.54 N @ 59.76 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D2 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



PEAK DATA: 12111.97 N @ 36.16 MS, -78.17 N @ 98.48 MS

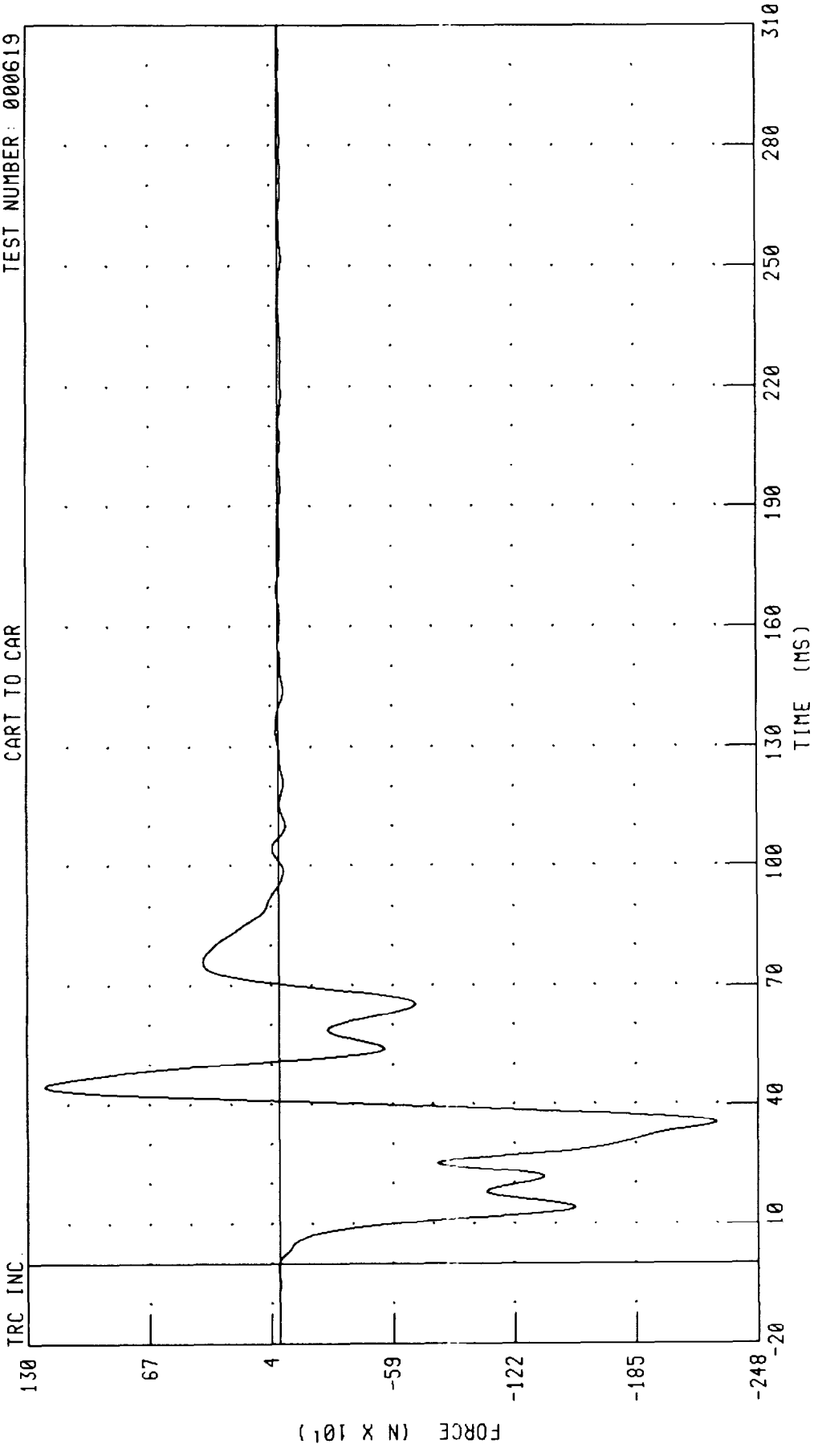
CHANNEL: BD2XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D2 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.

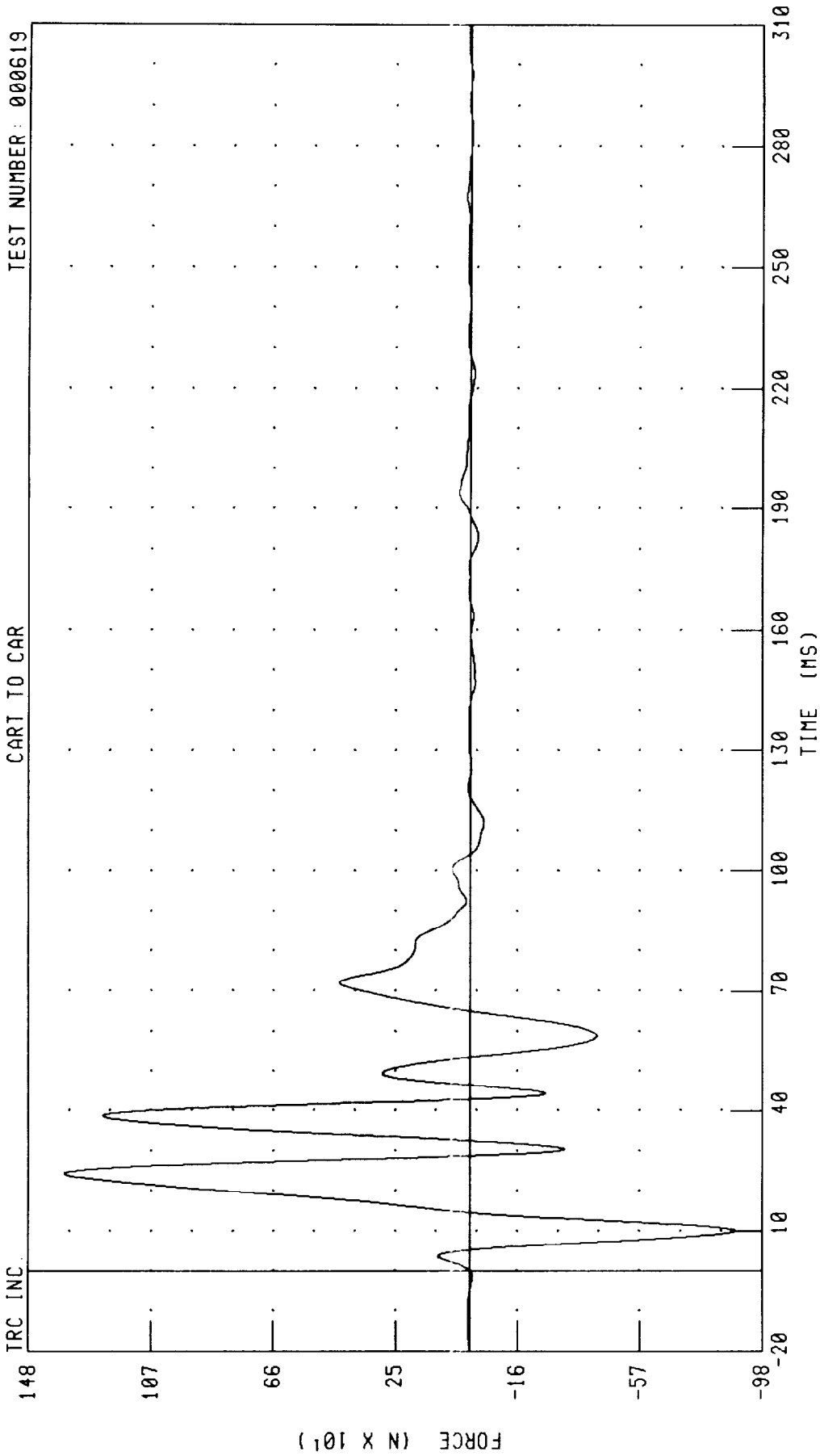


CHANNEL: BD2YF FILTER: CH CLASS 60 PEAK DATA: 1208.17 N @ 44.56 MS; -2267.19 N @ 35.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D2 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

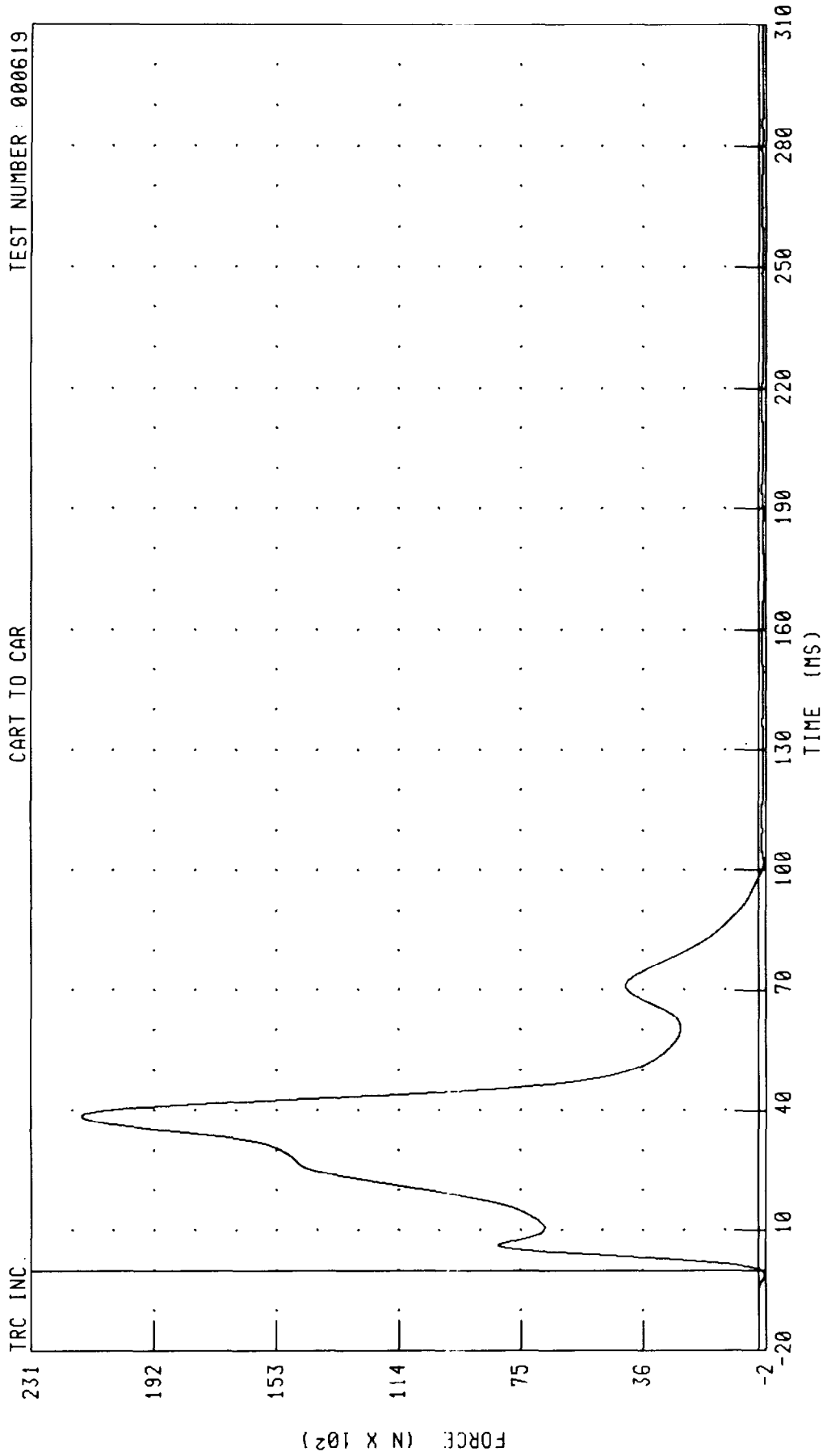
CART TO CAR



CHANNEL: BD2ZF FILTER: CH. CLASS 60

PEAK DATA: 1360.87 N @ 24.32 MS, -891.58 N @ 10.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D3 X-AXIS FORCE

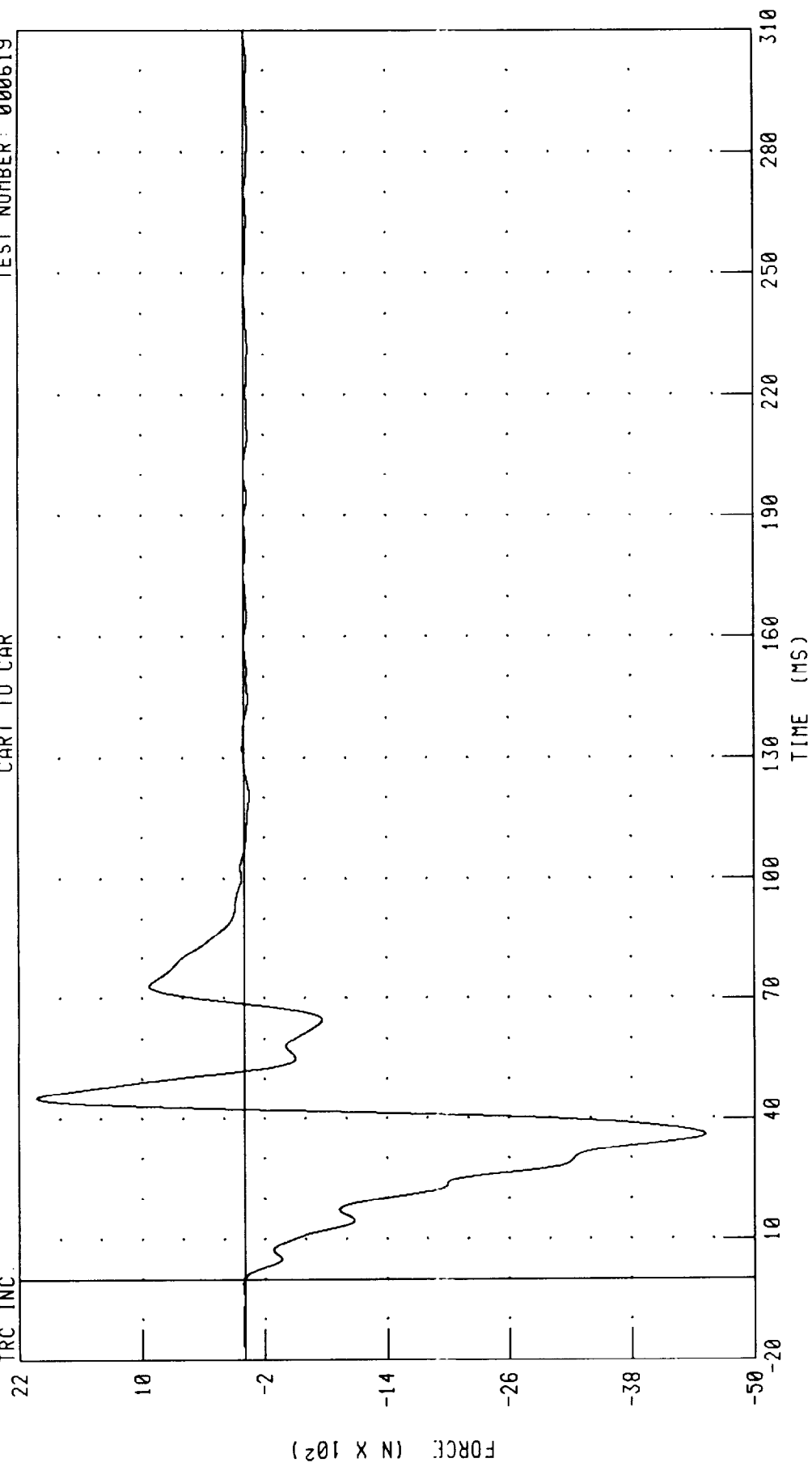


CHANNEL: BD3XF FILTER: CH CLASS 60 PEAK DATA: 21579.71 N @ 38.64 MS, -201.95 N @ -1.04 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D3 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

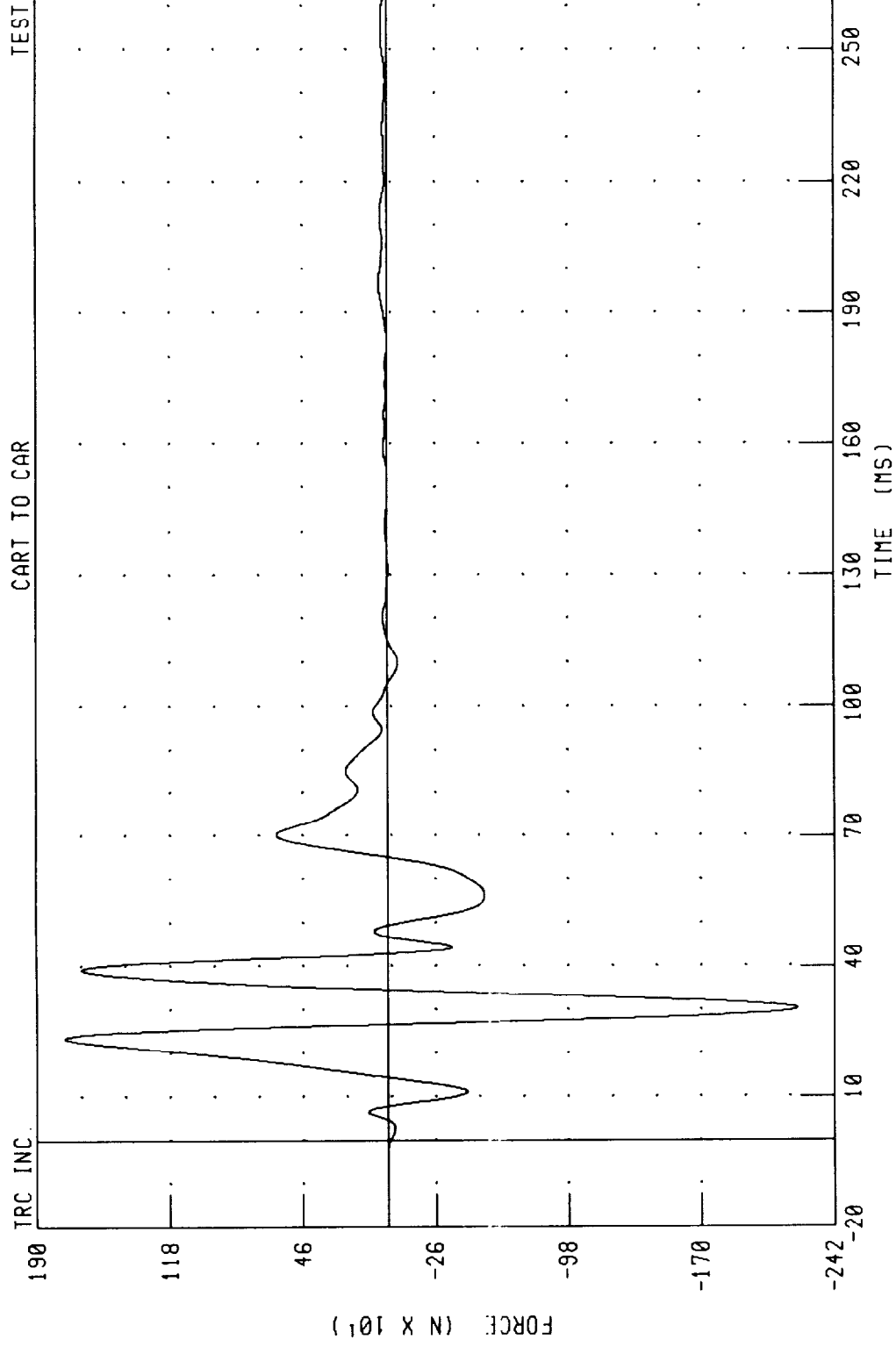
CART TO CAR



CHANNEL: BD3YF FILTER: CH. CLASS 60 PEAK DATA: 2026.08 N @ 45.36 MS; -4521.37 N @ 36.08 MS

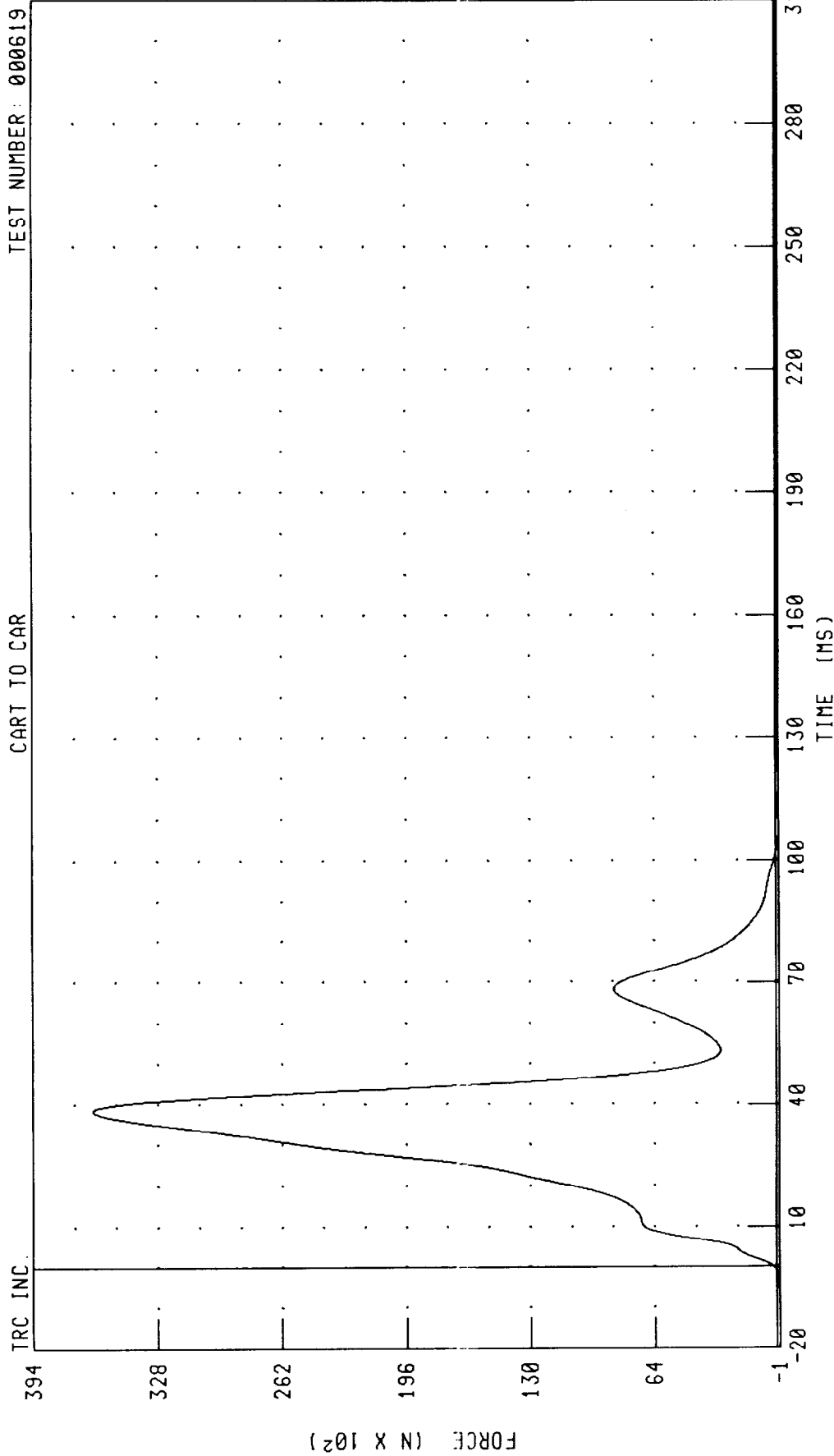
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D3 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619



CHANNEL: B03ZF FILTER: CH. CLASS 60 PEAK DATA: 1750.01 N @ 23.52 MS, -2222.25 N @ 30.32 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL D4 X-AXIS FORCE



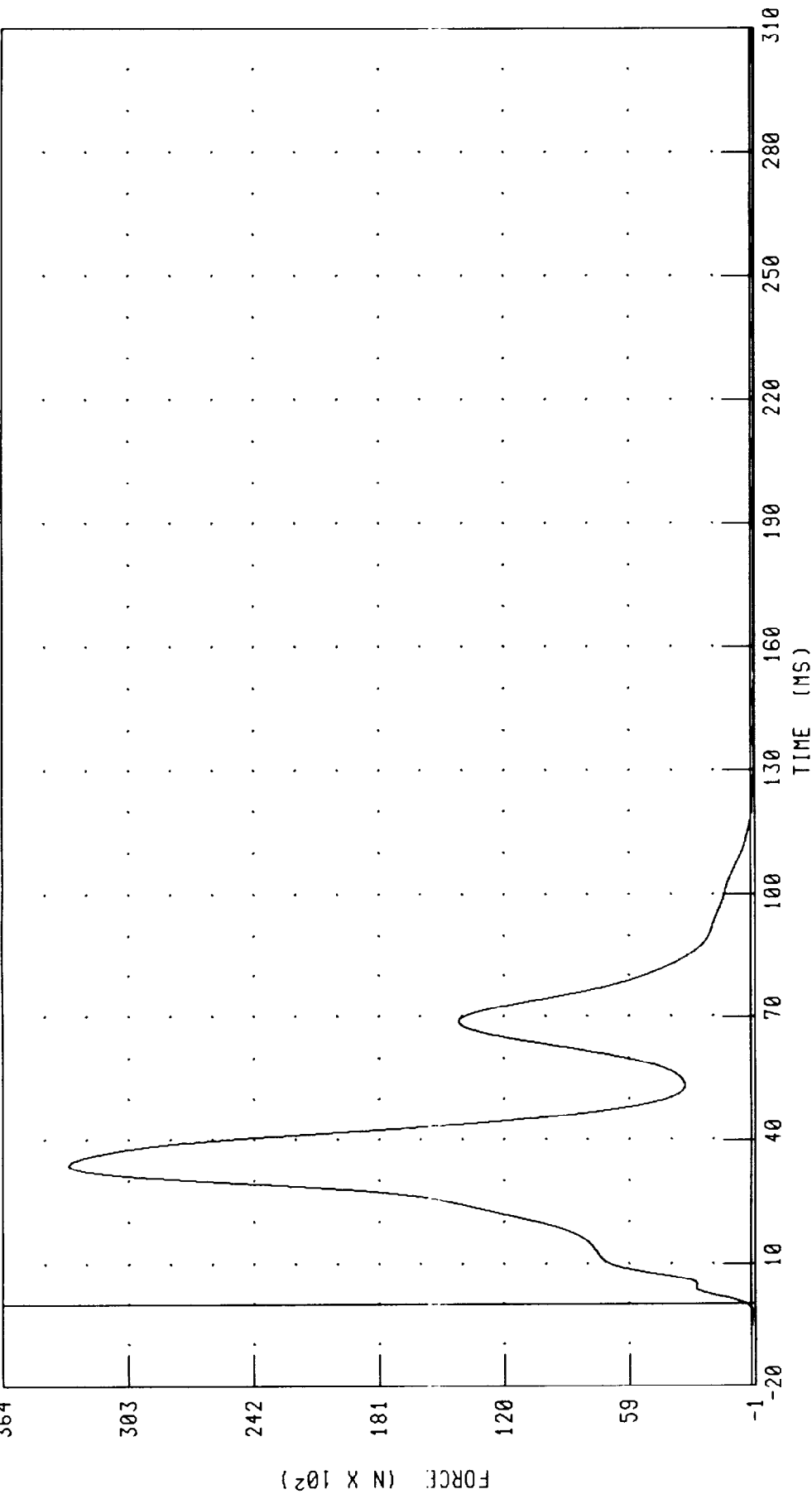
CHANNEL: BD4XF FILTER: CH. CLASS 60 PEAK DATA: 36283.02 N @ 38.48 MS, -133.73 N @ 107.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F4 X-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



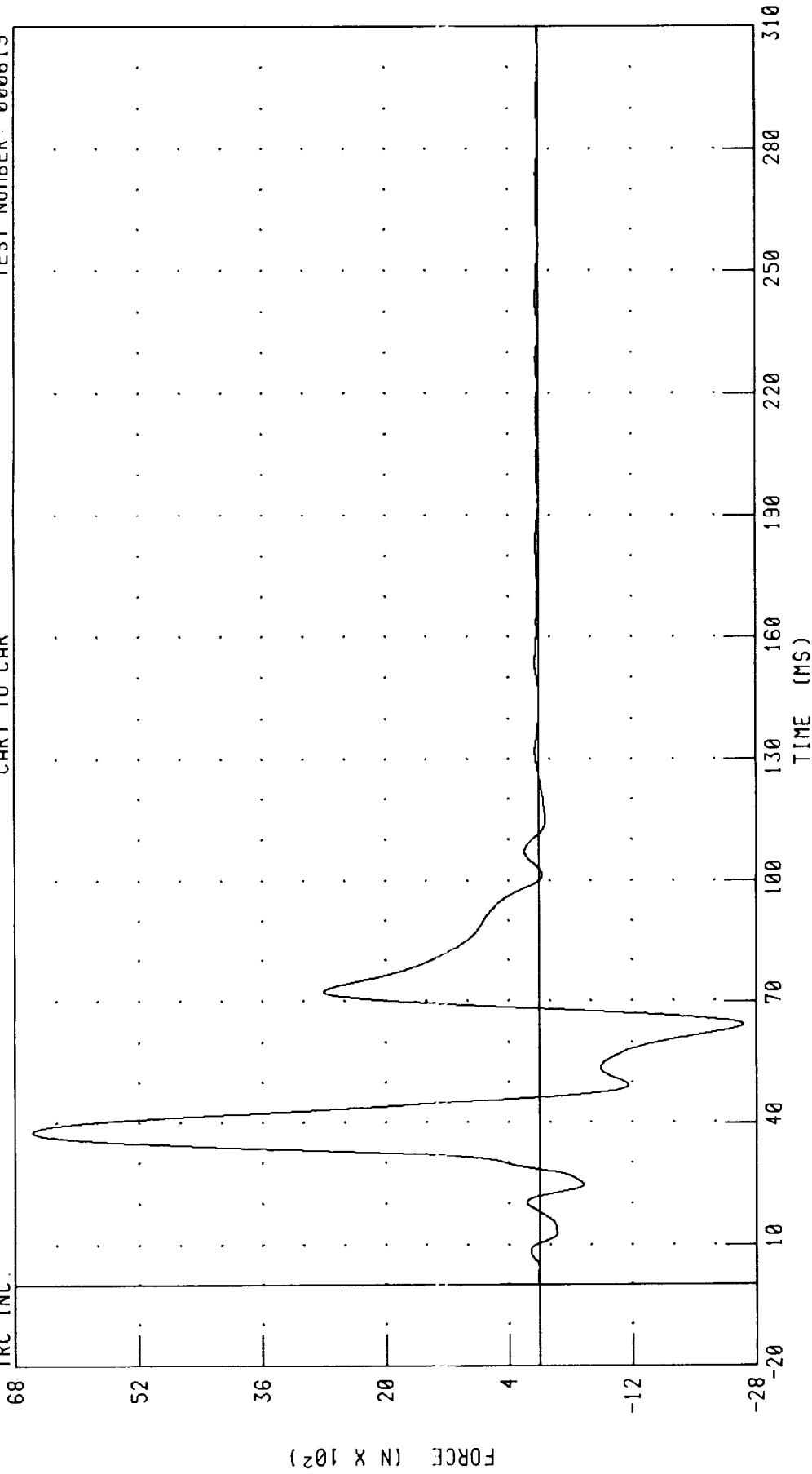
PEAK DATA: 33200.89 N @ 34.00 MS, -174.30 N @ 153.04 MS

CHANNEL: BF4XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F4 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

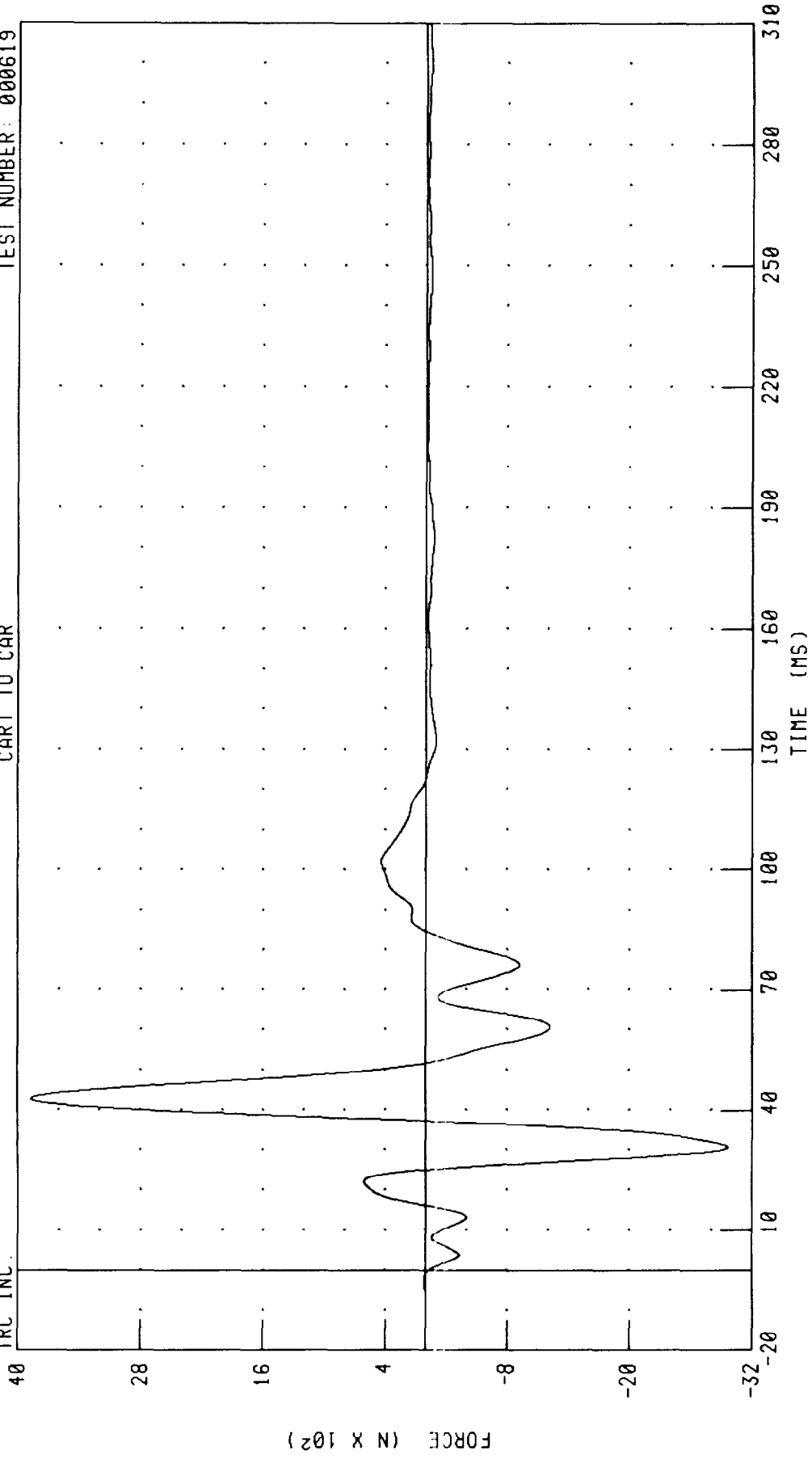


CHANNEL: BF4YF FILTER: CH. CLASS 60 PEAK DATA: 6572.83 N @ 37.84 MS; -2635.90 N @ 64.40 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL F4 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

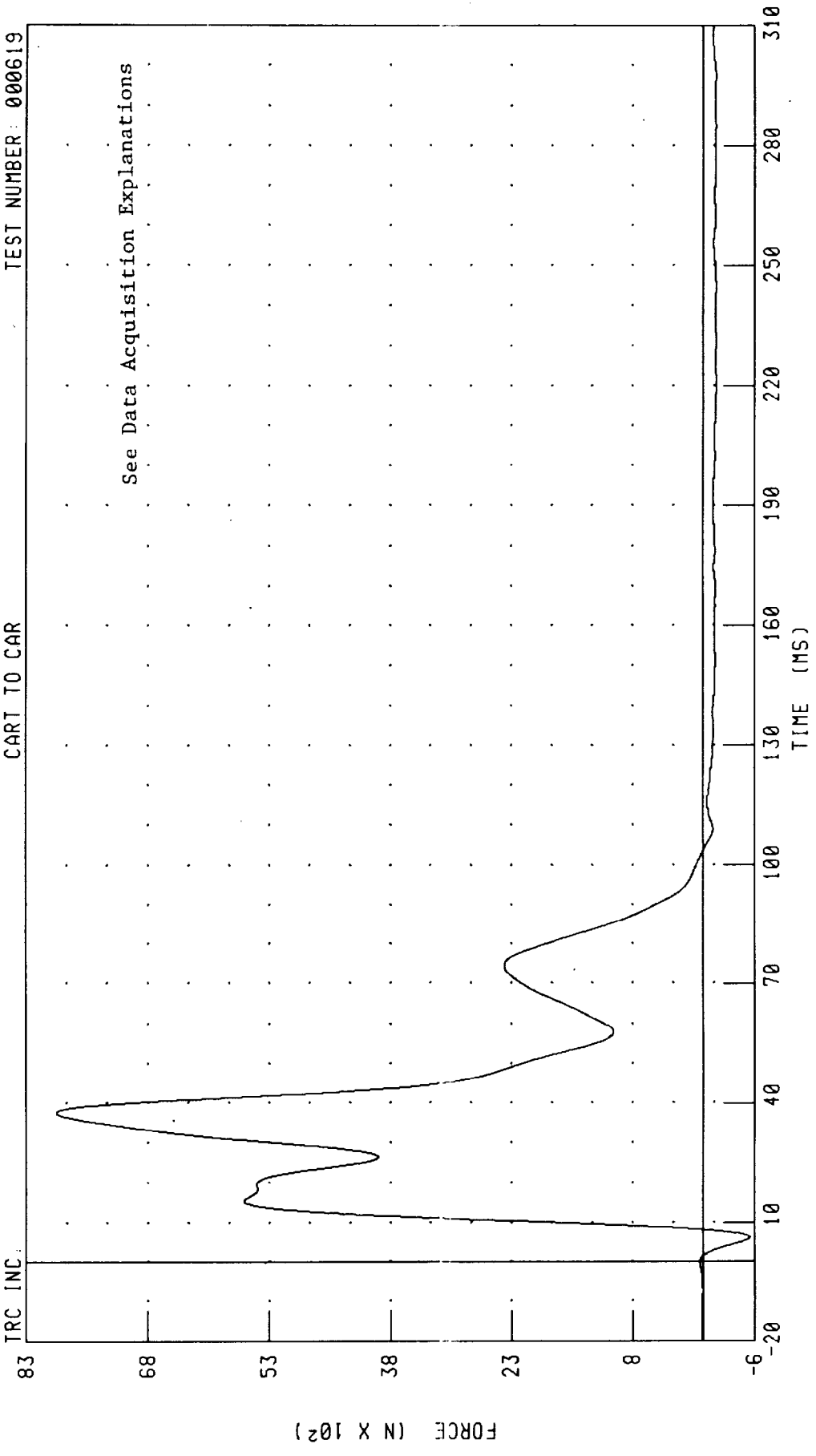


CHANNEL: BF4ZF FILTER: CH. CLASS 60 PEAK DATA: 3869.51 N @ 42.88 MS; -2969.81 N @ 30.64 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G1 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



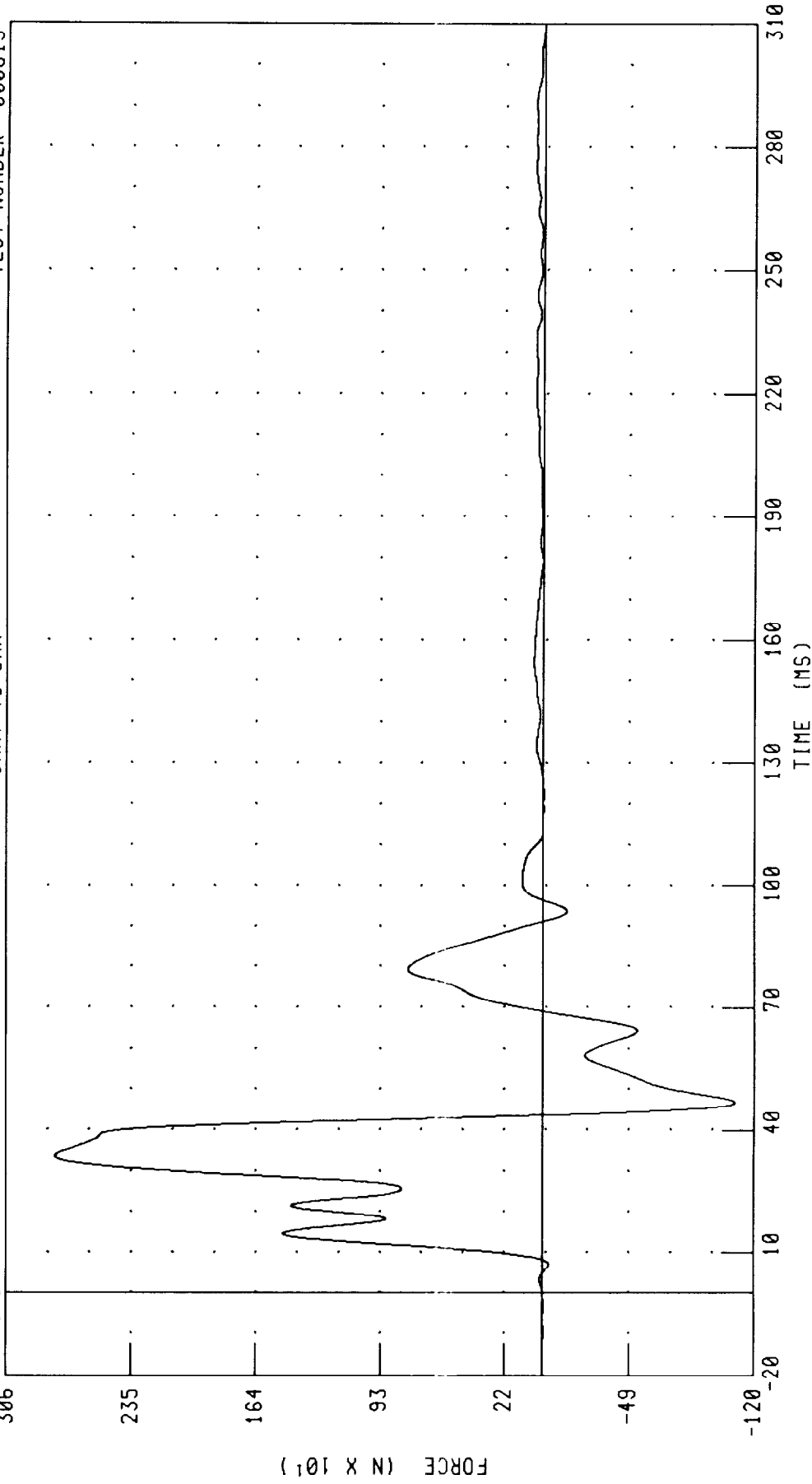
CHANNEL: BC1XF FILTER: CH. CLASS 60 PEAK DATA: 7987.26 N @ 37.68 MS, -585.23 N @ 6.16 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G1 Y-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



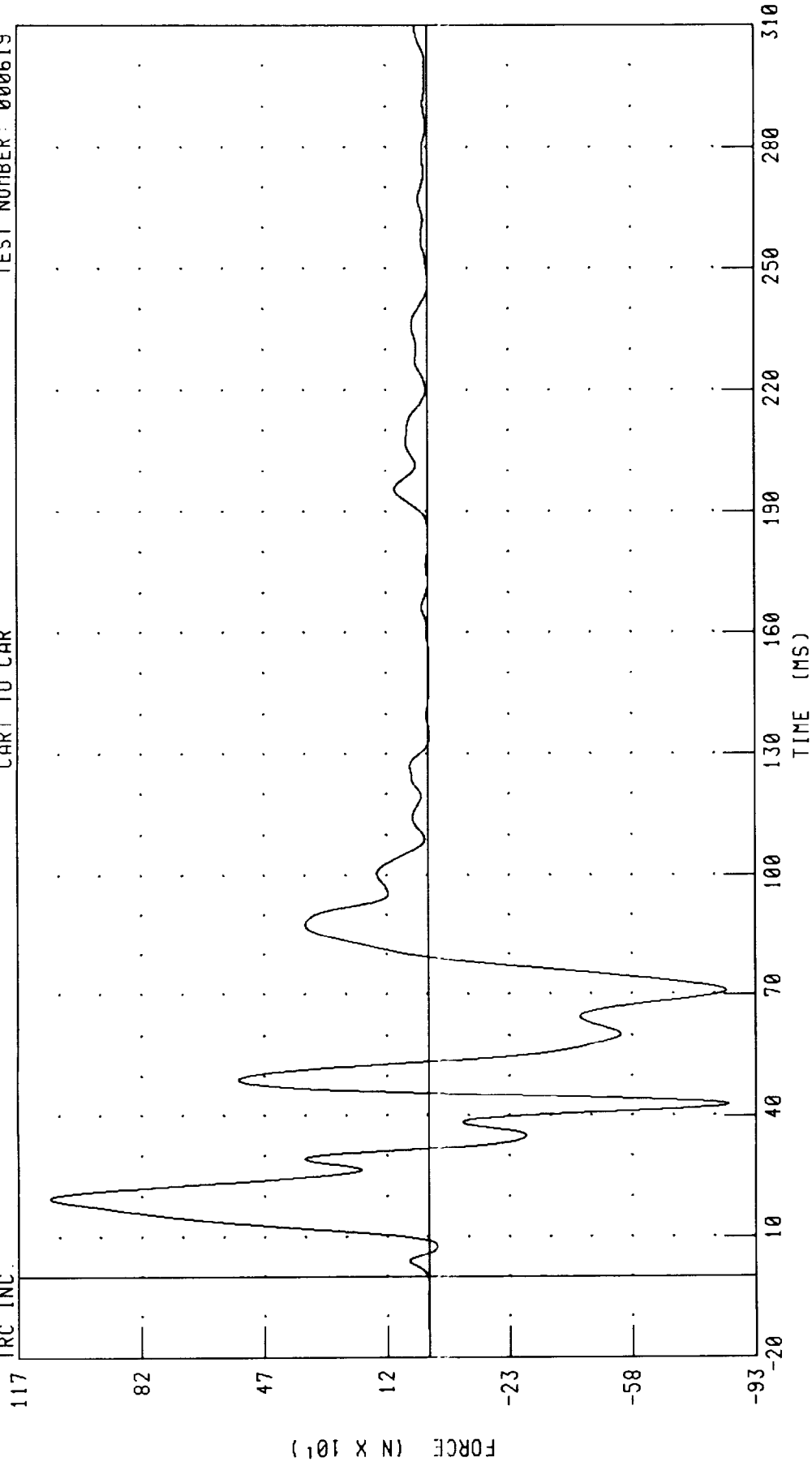
PEAK DATA: 2782.70 N @ 33.68 MS; -1094.91 N @ 46.64 MS

CHANNEL: BG1YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G1 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



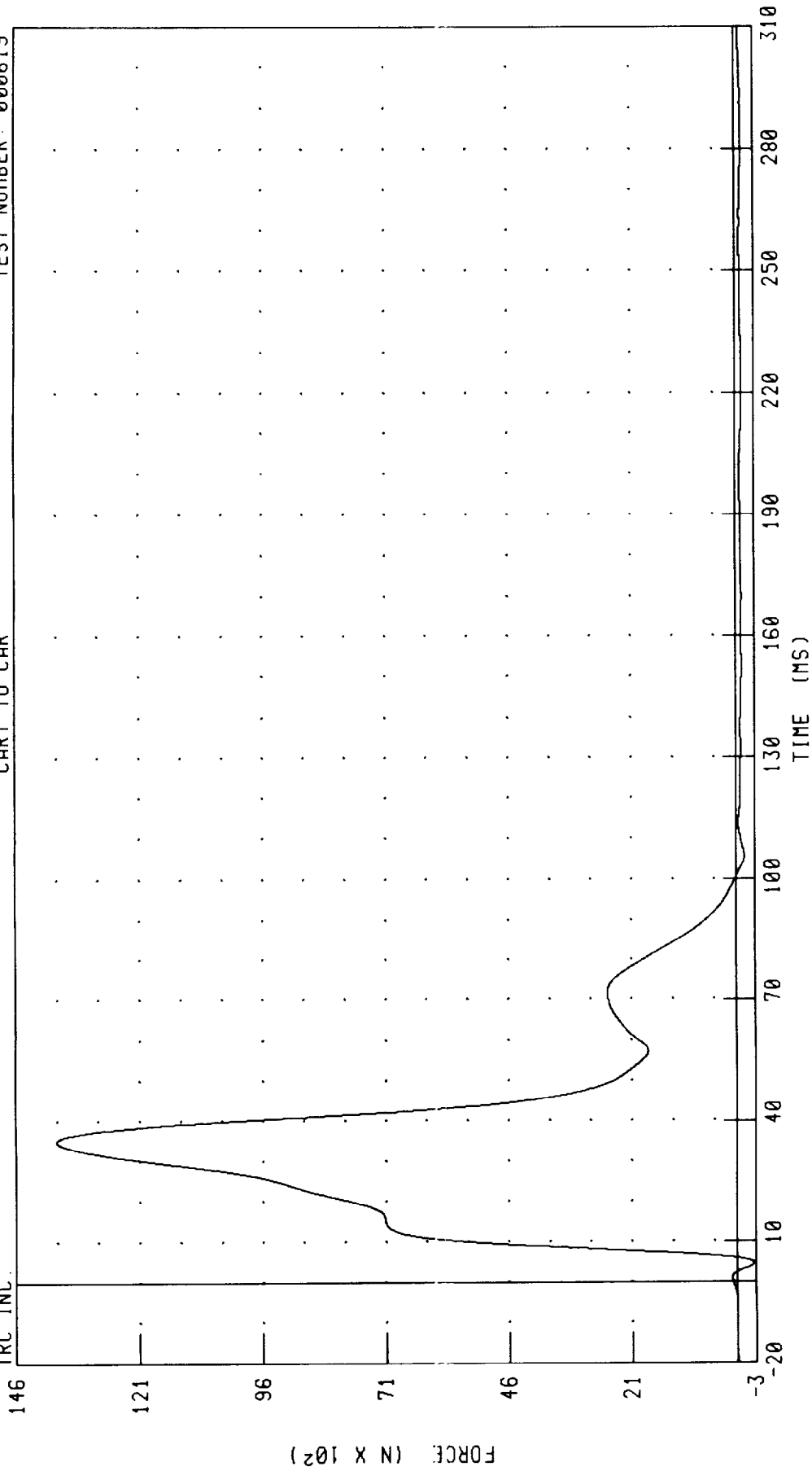
PEAK DATA: 1079.95 N @ 19.60 MS, -852.64 N @ 42.80 MS

CHANNEL: BG1ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G2 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



PEAK DATA: 13813.66 N @ 35.12 MS; -340.58 N @ 4.56 MS

CHANNEL: BG2XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G2 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

47

37

27

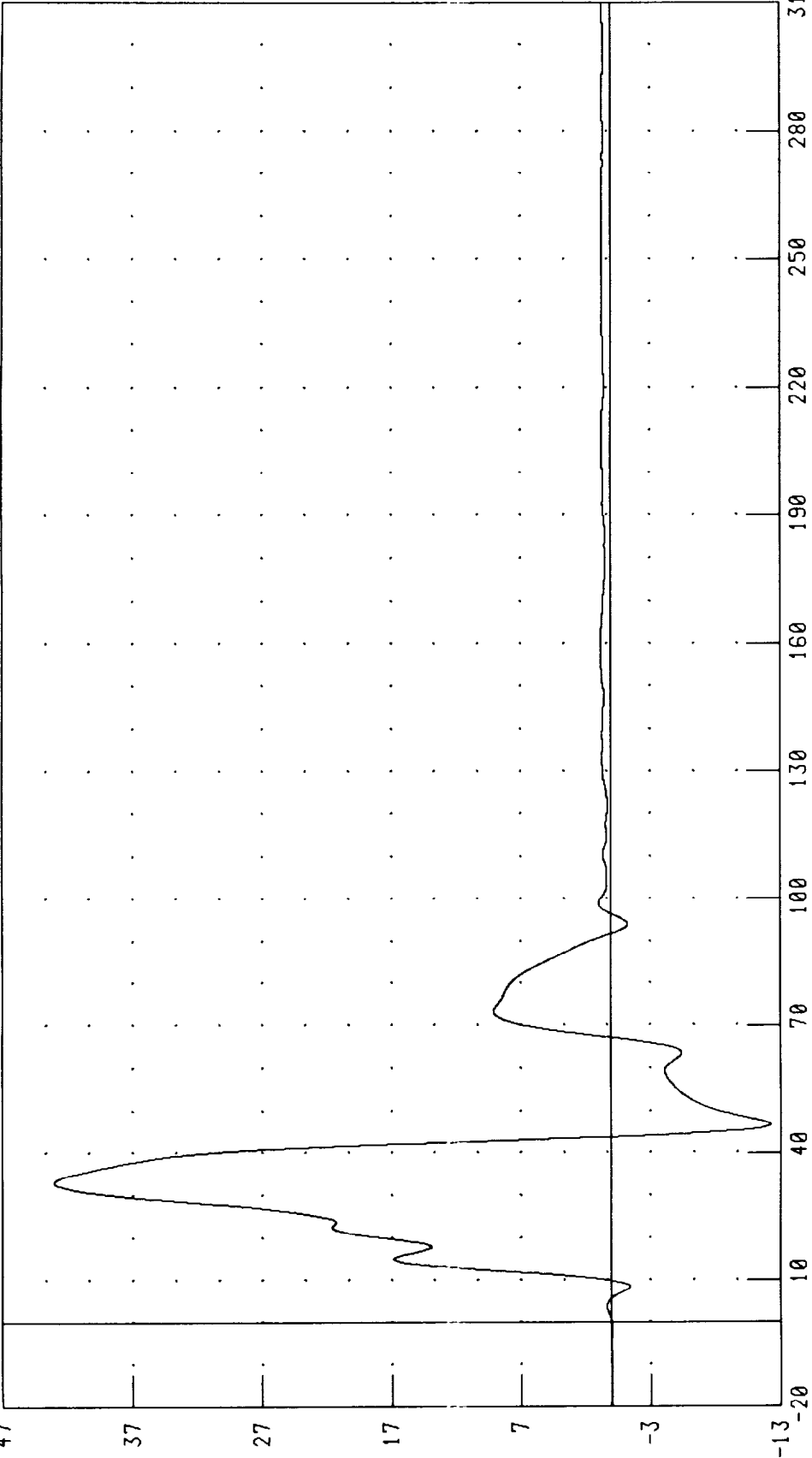
17

7

-3

-13

FORCE (N X 10²)



TIME (MS)

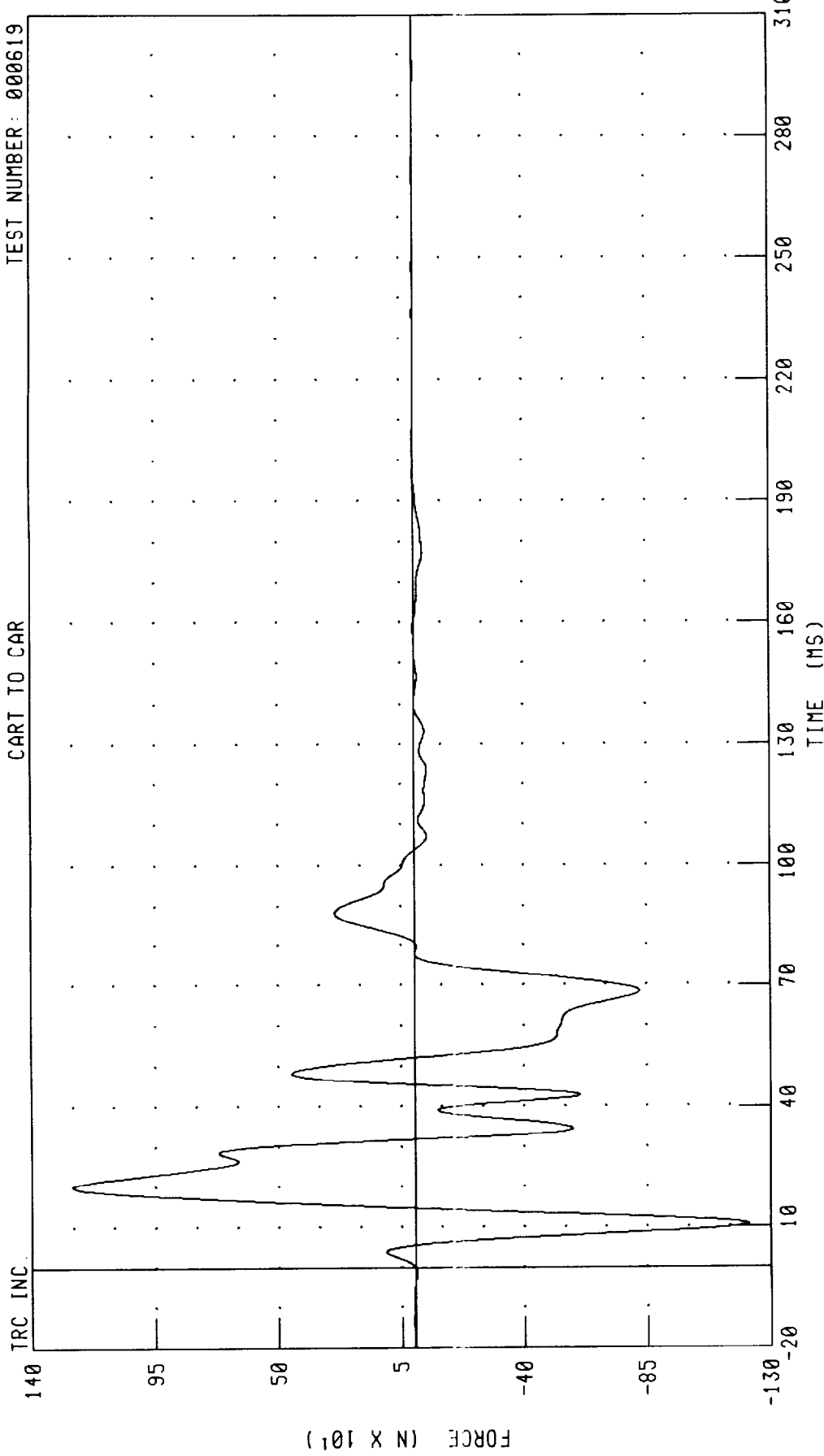
PEAK DATA: 4304 40 N @ 33.12 MS, -1221.95 N @ 46.64 MS

CHANNEL: BG2YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G2 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



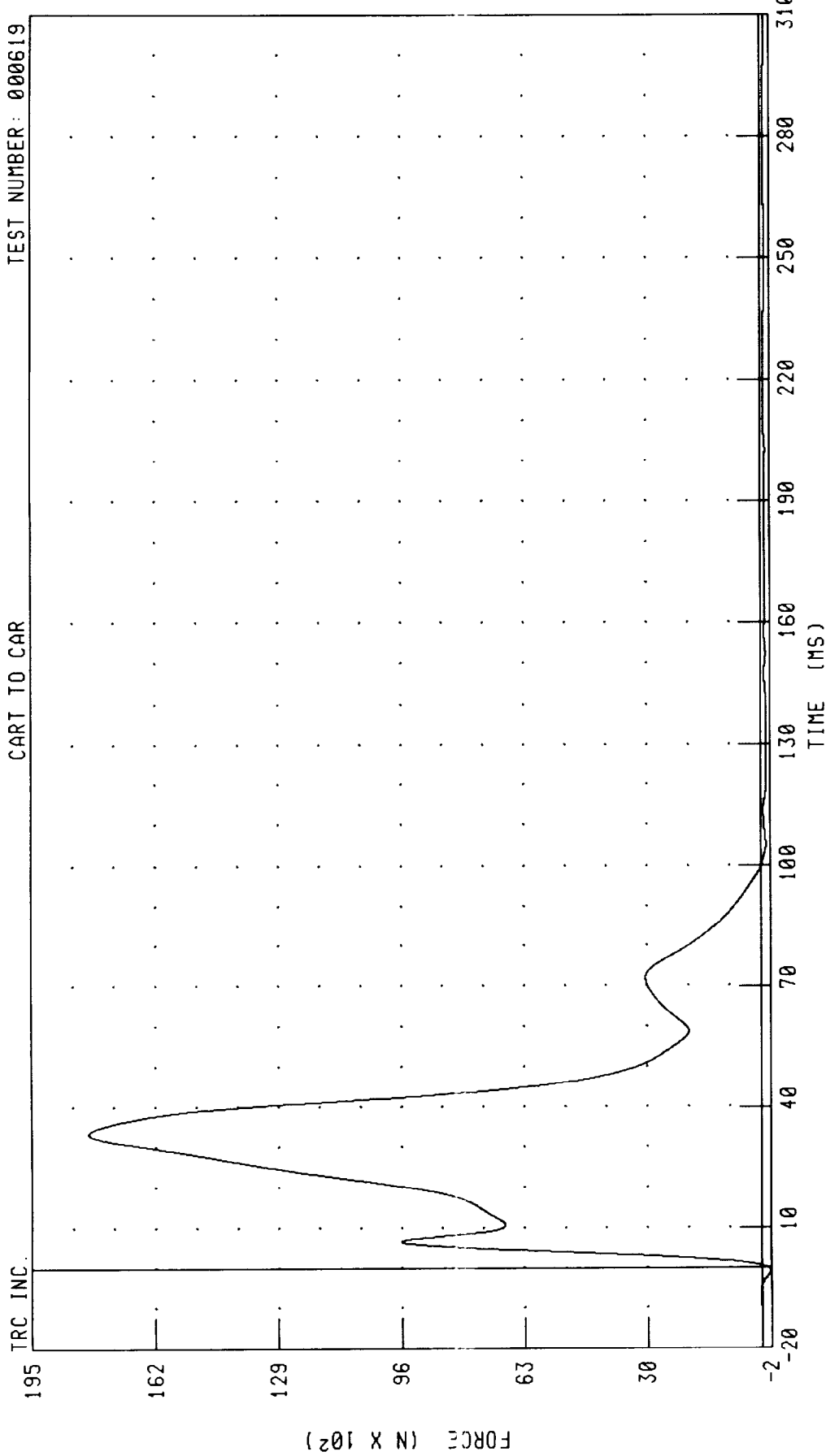
PEAK DATA: 1251.57 N @ 20.08 MS, -1222.13 N @ 10.56 MS

CHANNEL: BC2ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G3 X-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR



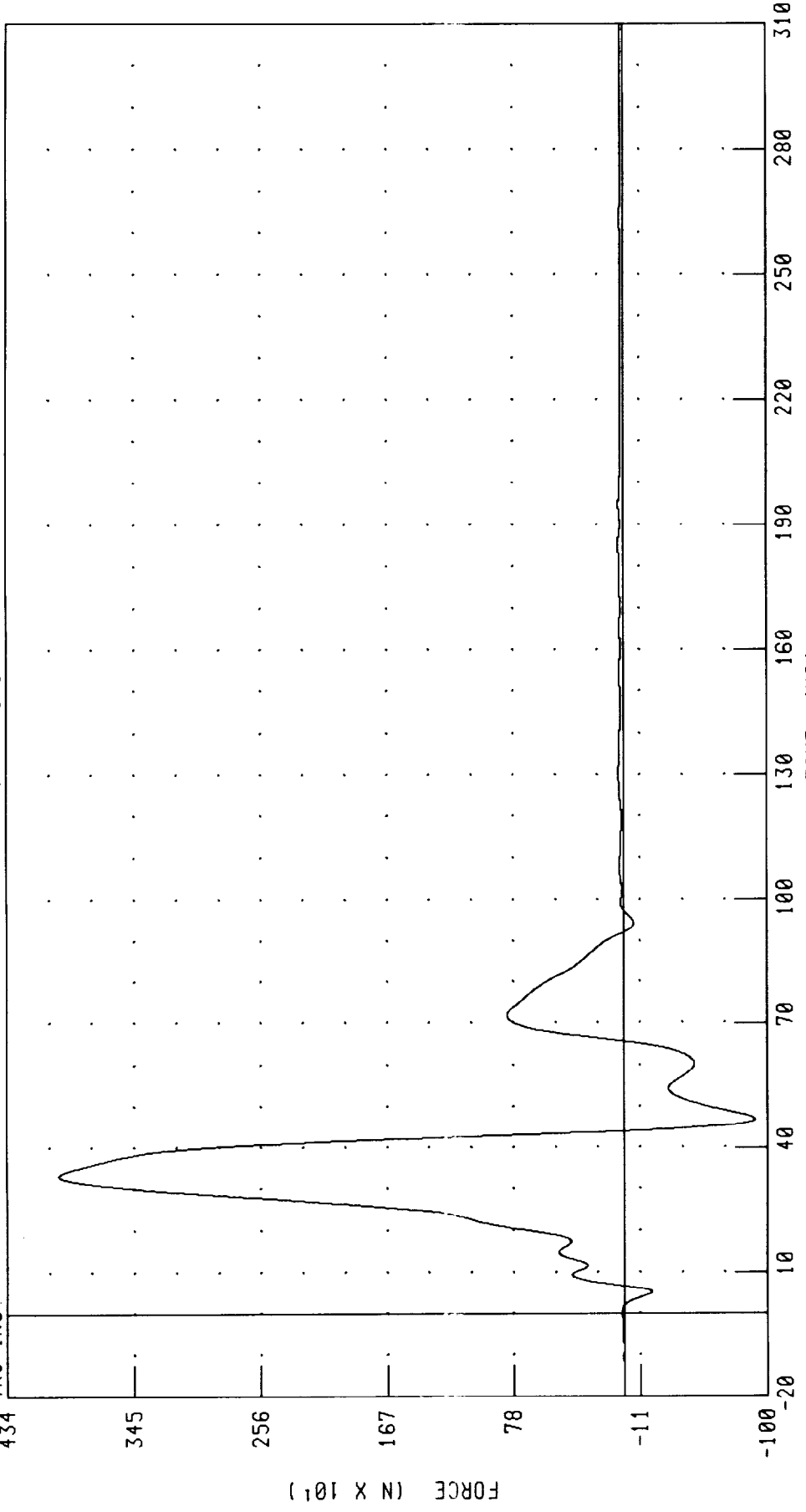
PEAK DATA: 18035.91 N @ 33.52 MS, -231.01 N @ -0.80 MS

CHANNEL: BC3XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G3 Y-AXIS FORCE
CART TO CAR

TEST NUMBER: 000619

TRC INC



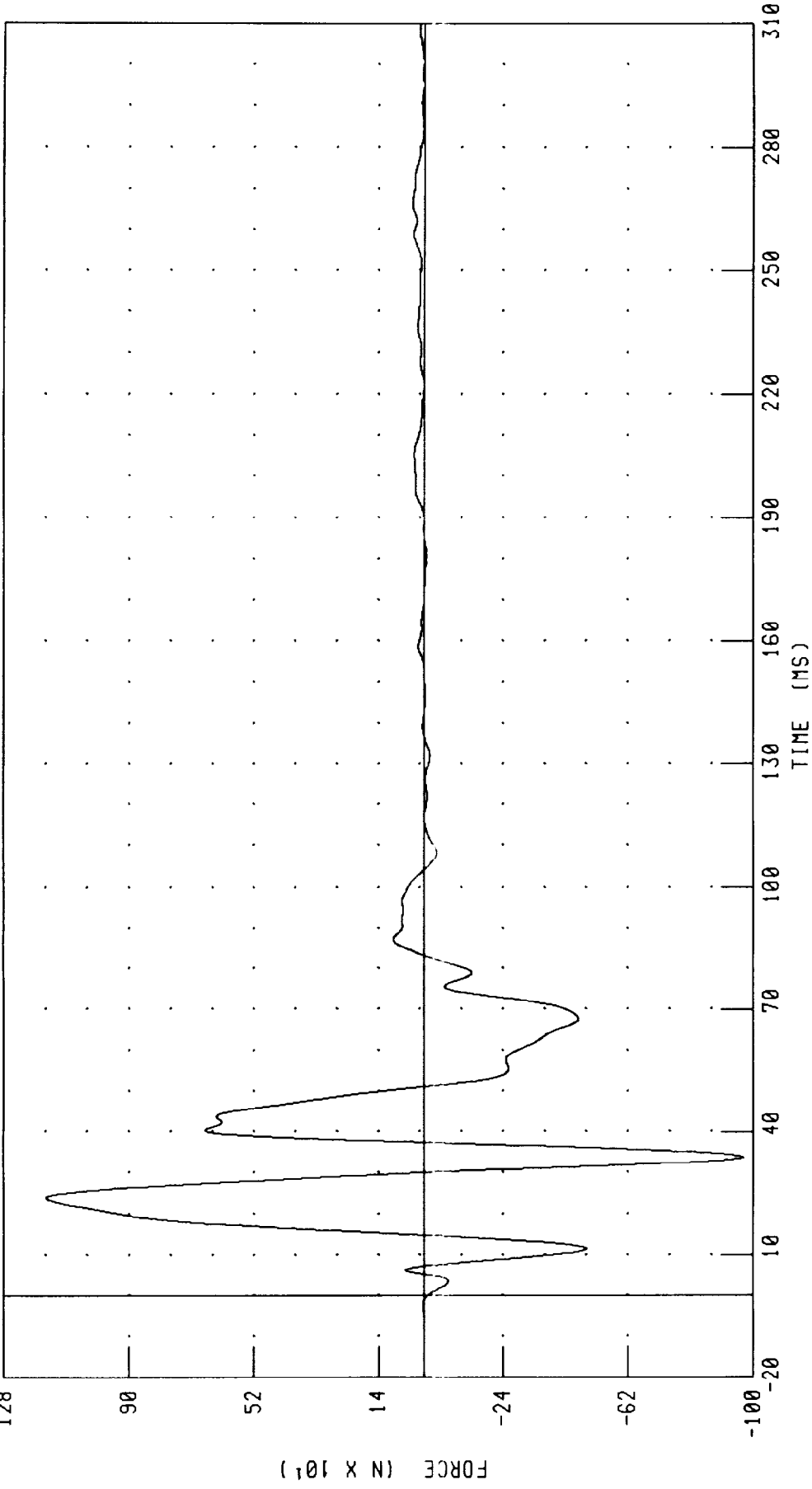
CHANNEL: BC3YF FILTER: CH. CLASS 60 PEAK DATA: 3978.41 N @ 33.20 MS, -914.76 N @ 46.80 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G3 Z-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619

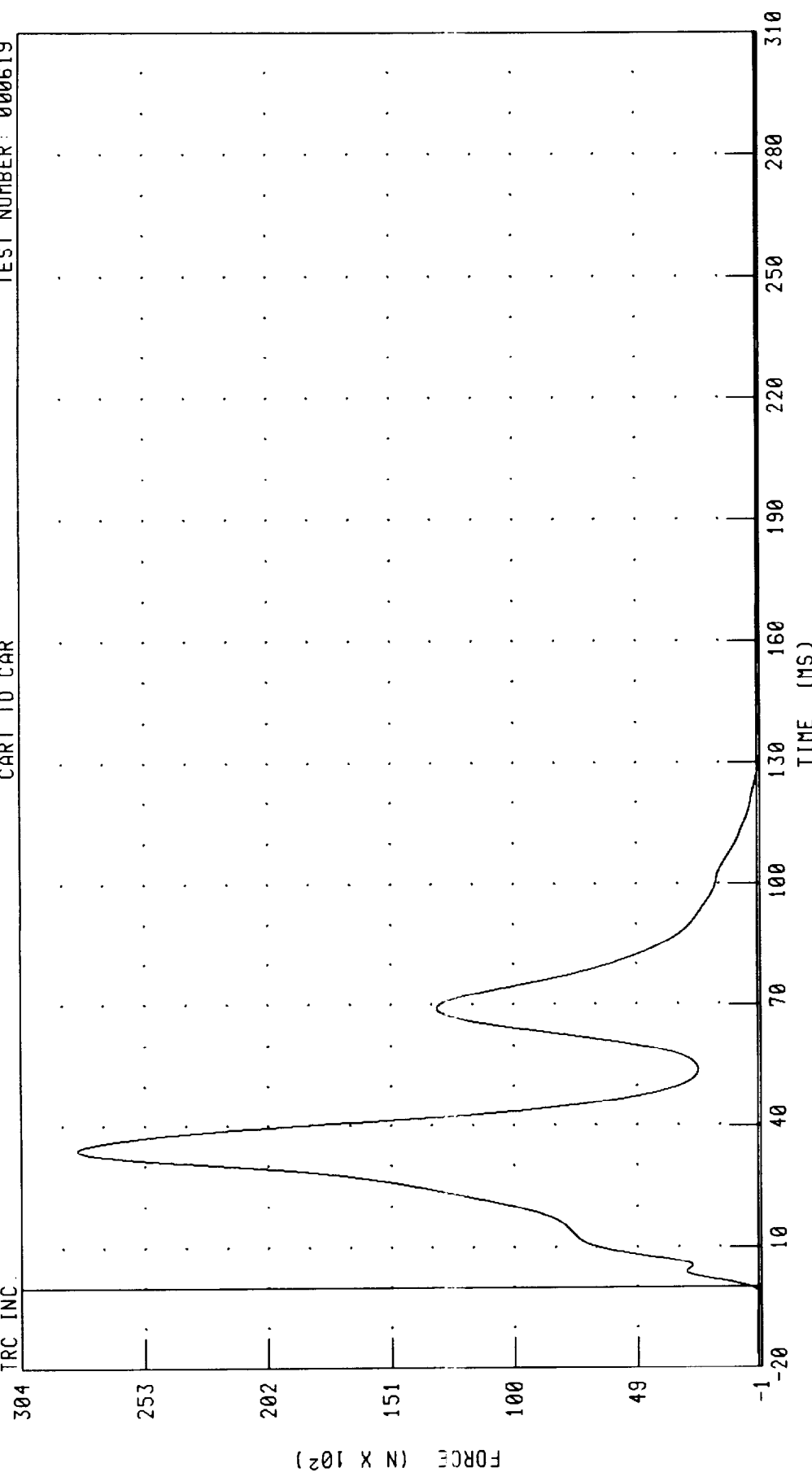


CHANNEL: BC3ZF FILTER: CH. CLASS 60 PEAK DATA: 1151.31 N @ 23.92 MS, -969.88 N @ 33.68 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G4 X-AXIS FORCE
CART TO CAR

TEST NUMBER: 000619

TRC INC.

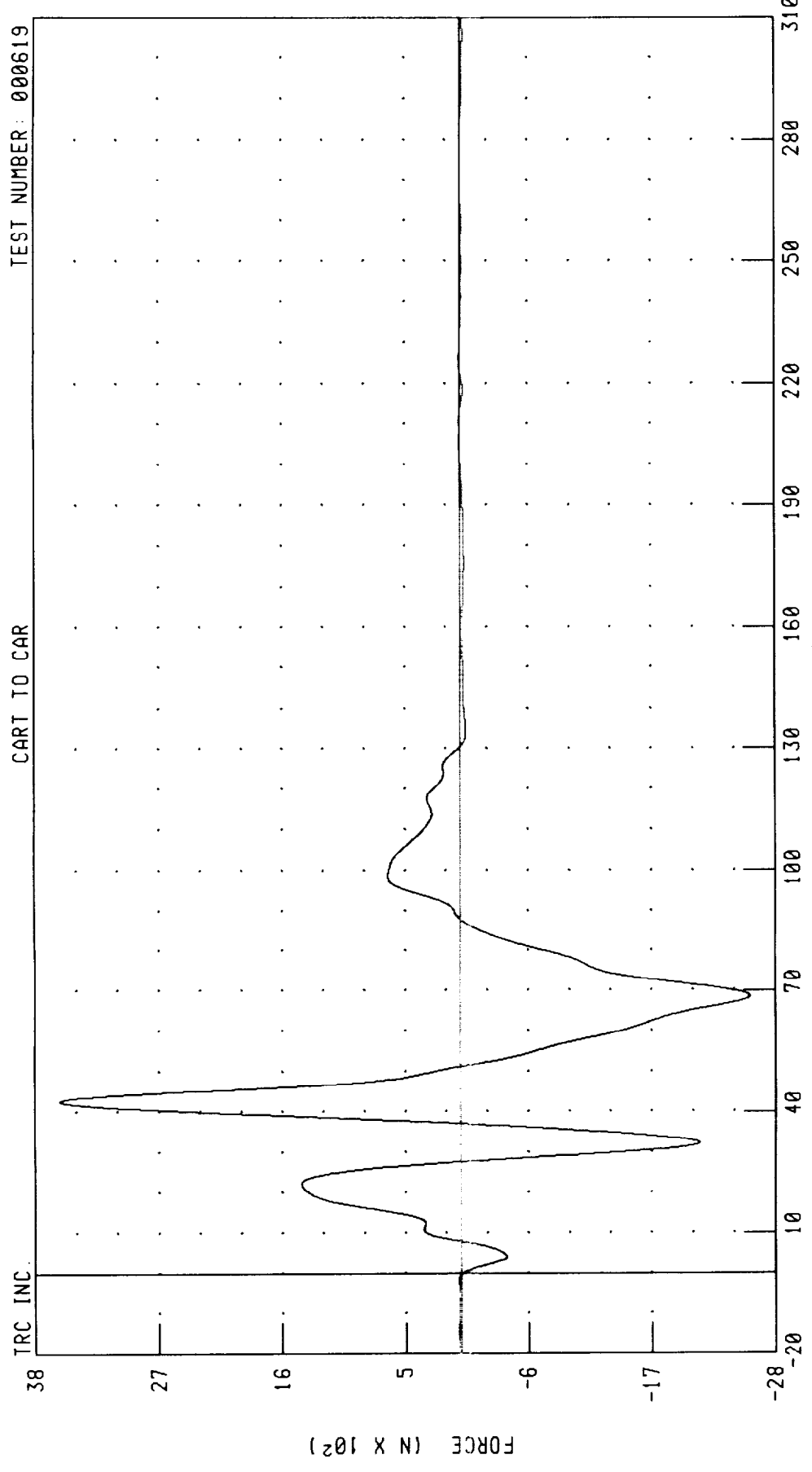


CHANNEL: BC4XF FILTER: CH. CLASS 60 PEAK DATA: 28139.67 N @ 34.00 MS, -135.49 N @ 133.44 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G4 Z-AXIS FORCE

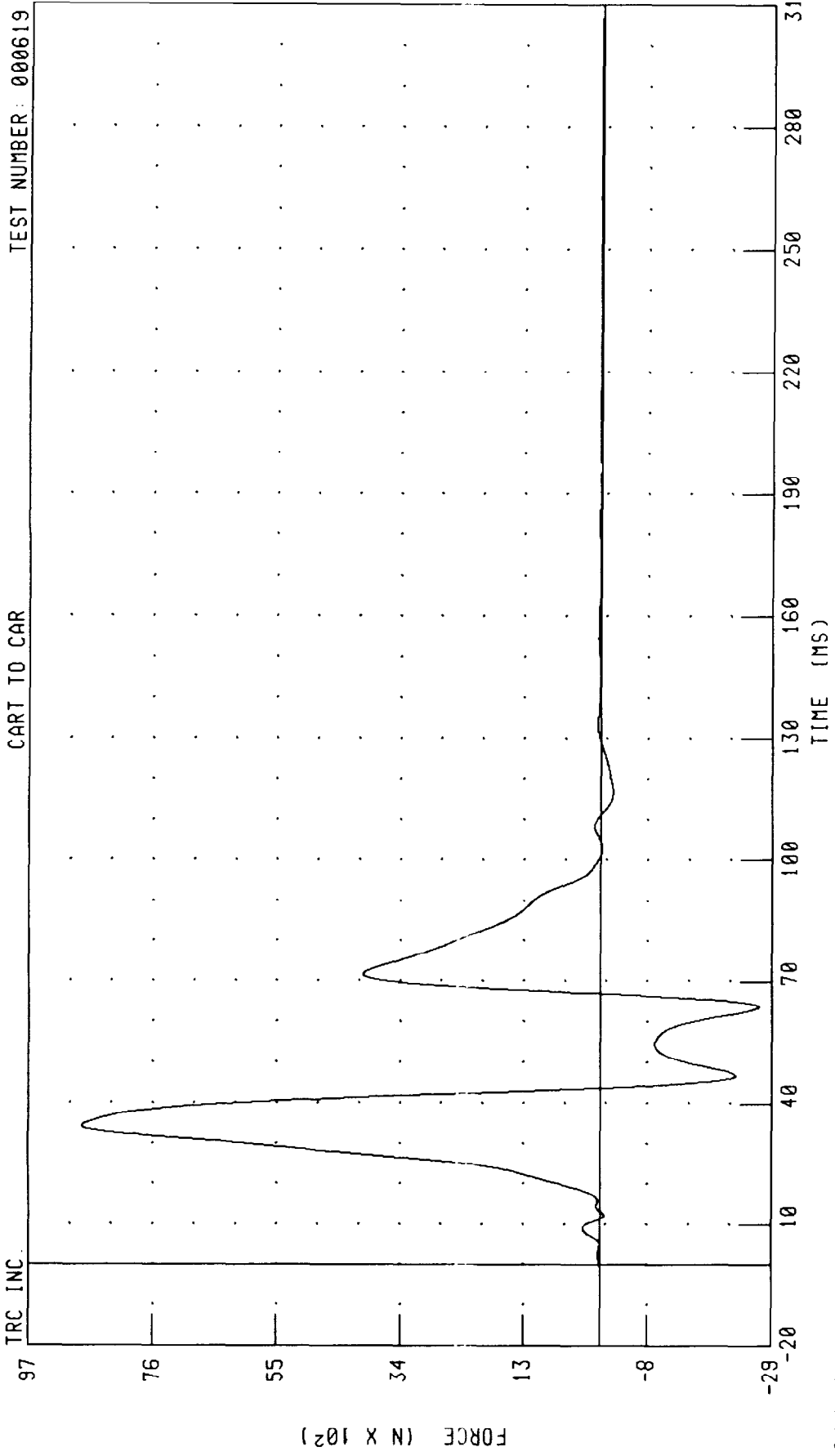
TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BG4ZF FILTER: CH. CLASS 60 PEAK DATA: 3577.29 N @ 42.72 MS, -2575.81 N @ 68.48 MS

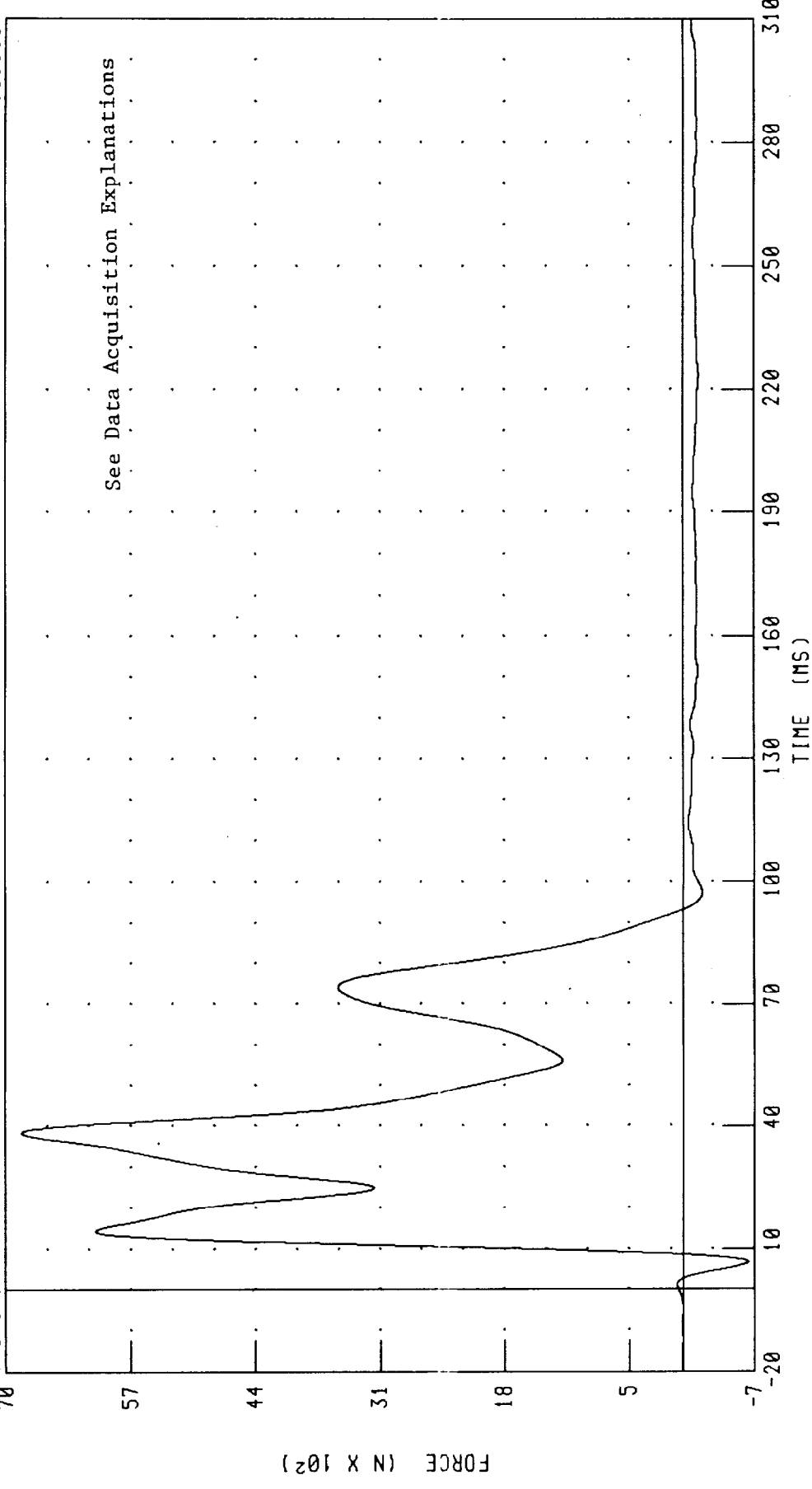
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL G4 Y-AXIS FORCE



MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H1 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

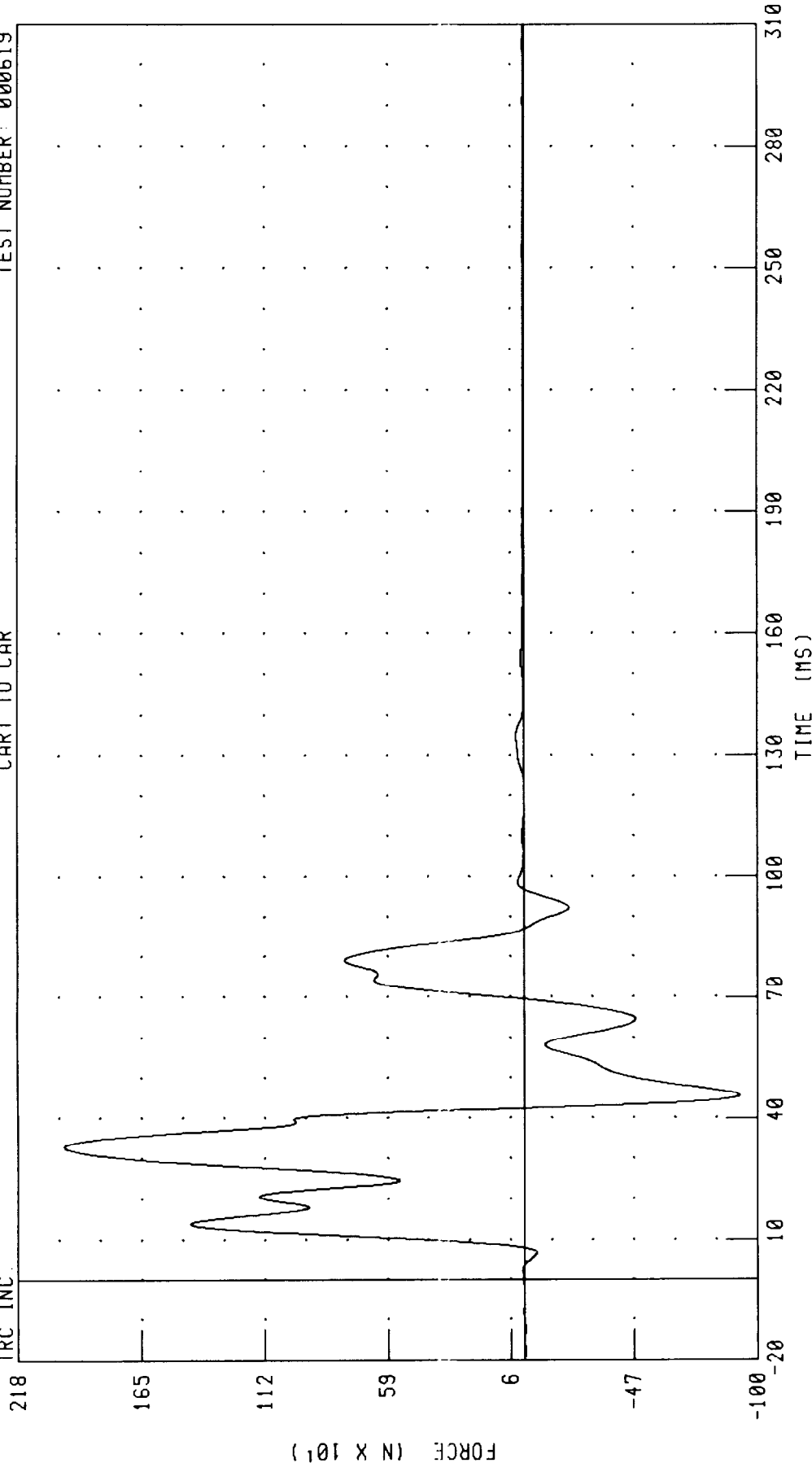


CHANNEL: BH1XF FILTER: CH. CLASS 60 PEAK DATA: 6895.19 N @ 38.40 MS, -681.69 N @ 6.64 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H1 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

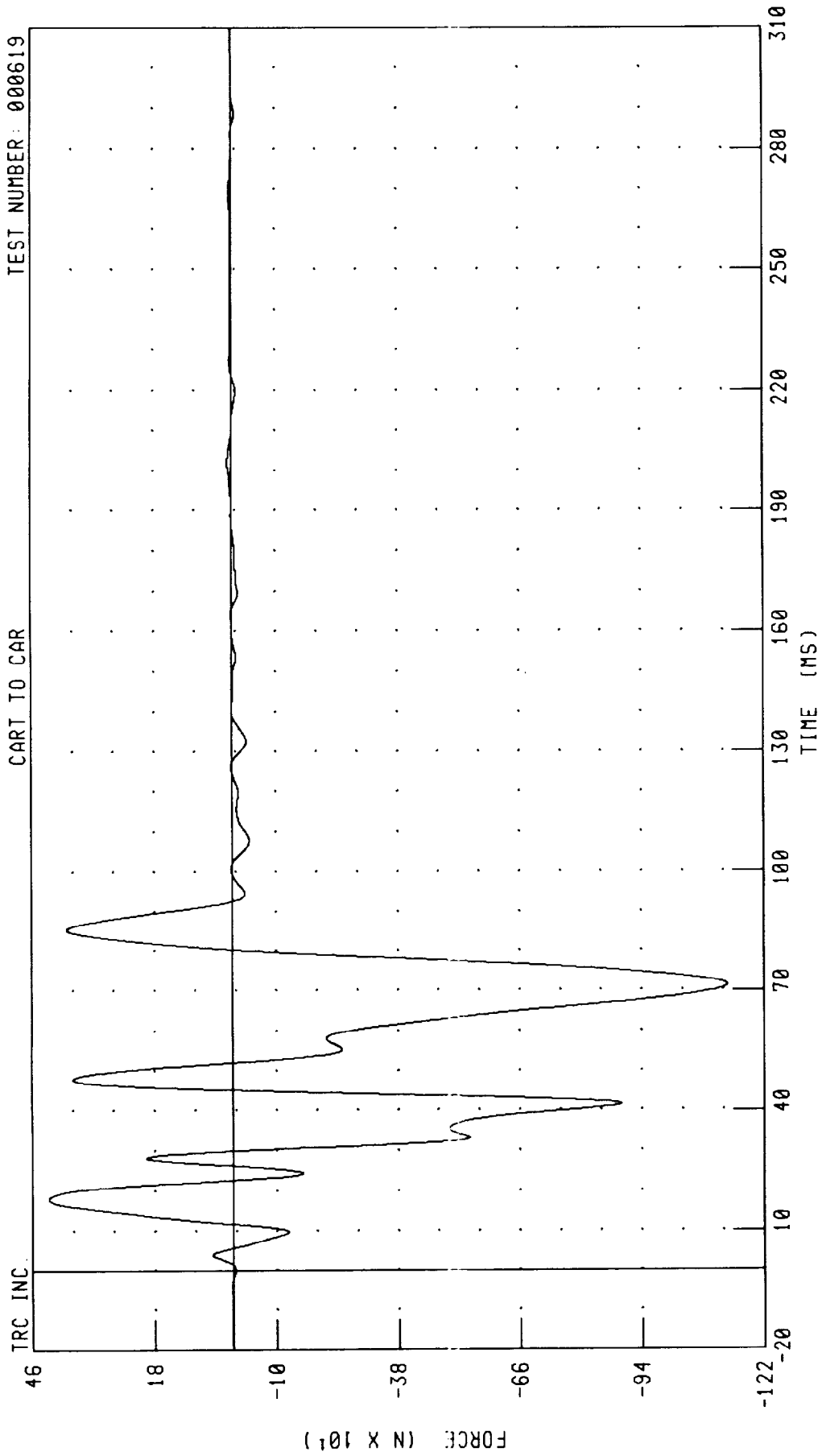


CHANNEL: BHIYF FILTER: CH. CLASS 60 PEAK DATA: 1981.76 N @ 32.96 MS; -922.93 N @ 45.60 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H1 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



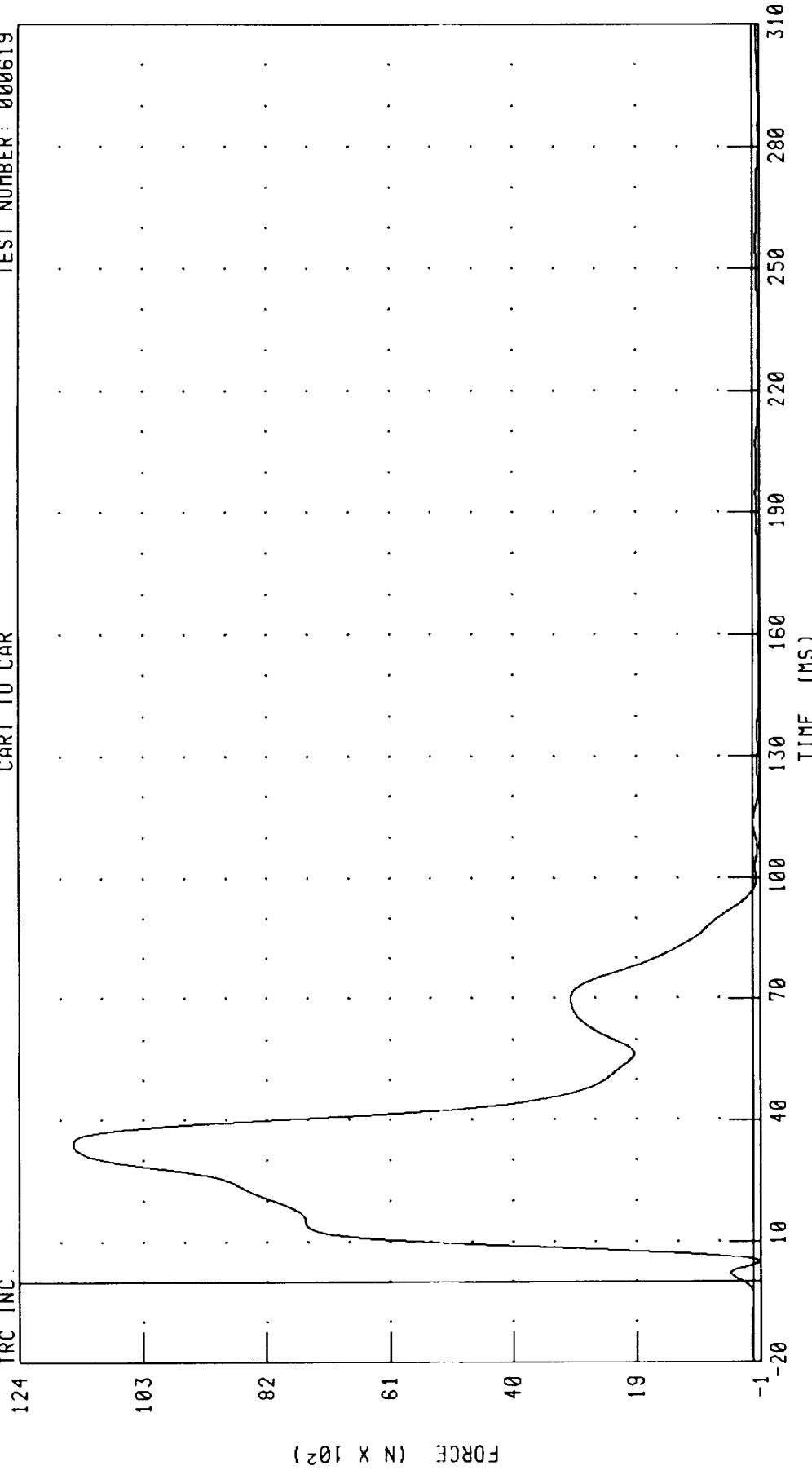
CHANNEL: BH1ZF FILTER: CH. CLASS 60 PEAK DATA: 422.95 N @ 17.92 MS, -1137.60 N @ 71.28 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H2 X-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



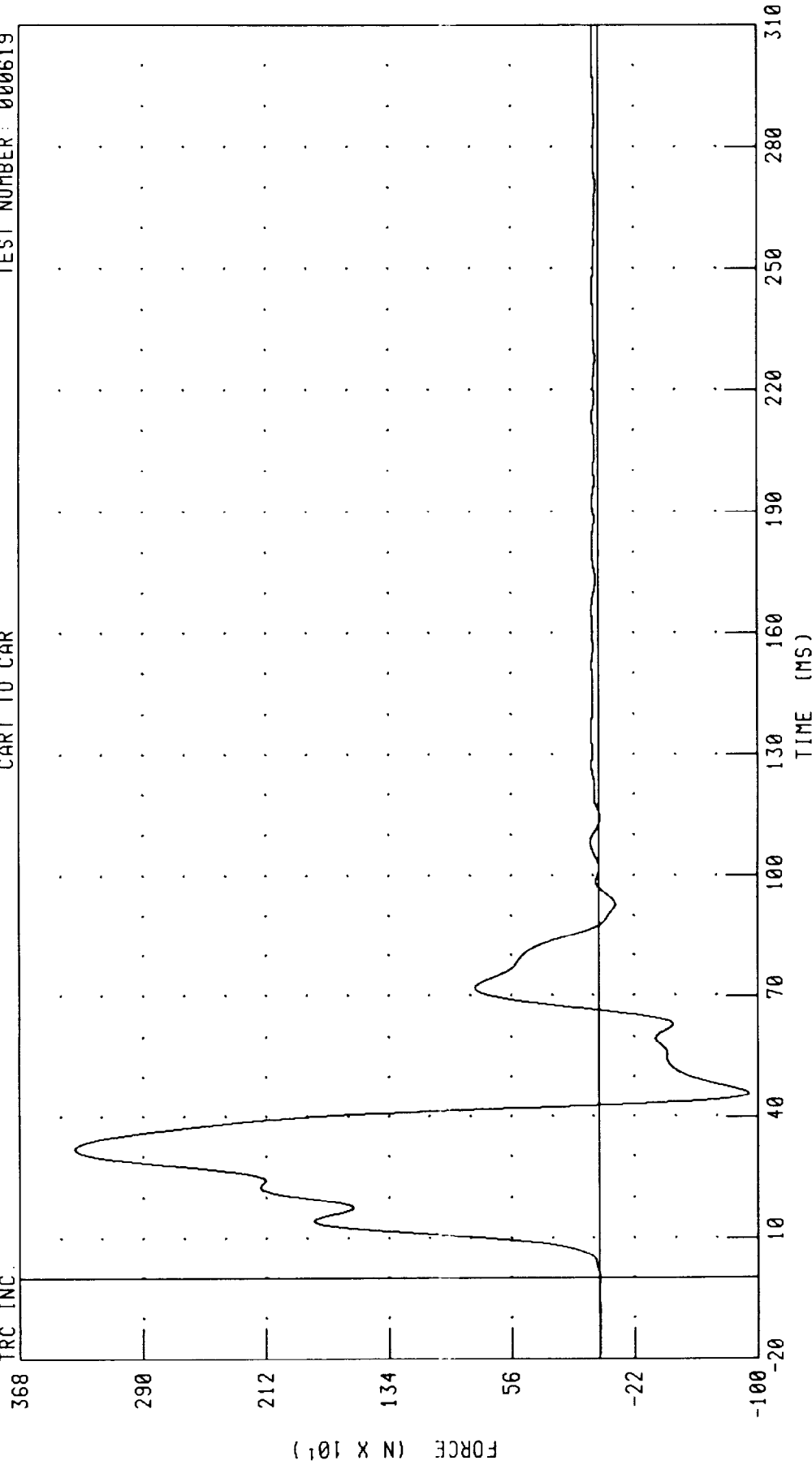
CHANNEL: BH2XF FILTER: CH. CLASS 60 PEAK DATA: 11558.15 N @ 34.40 MS, -120.72 N @ 151.60 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H2 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 3329.96 N @ 32.00 MS; -944.30 N @ 45.76 MS

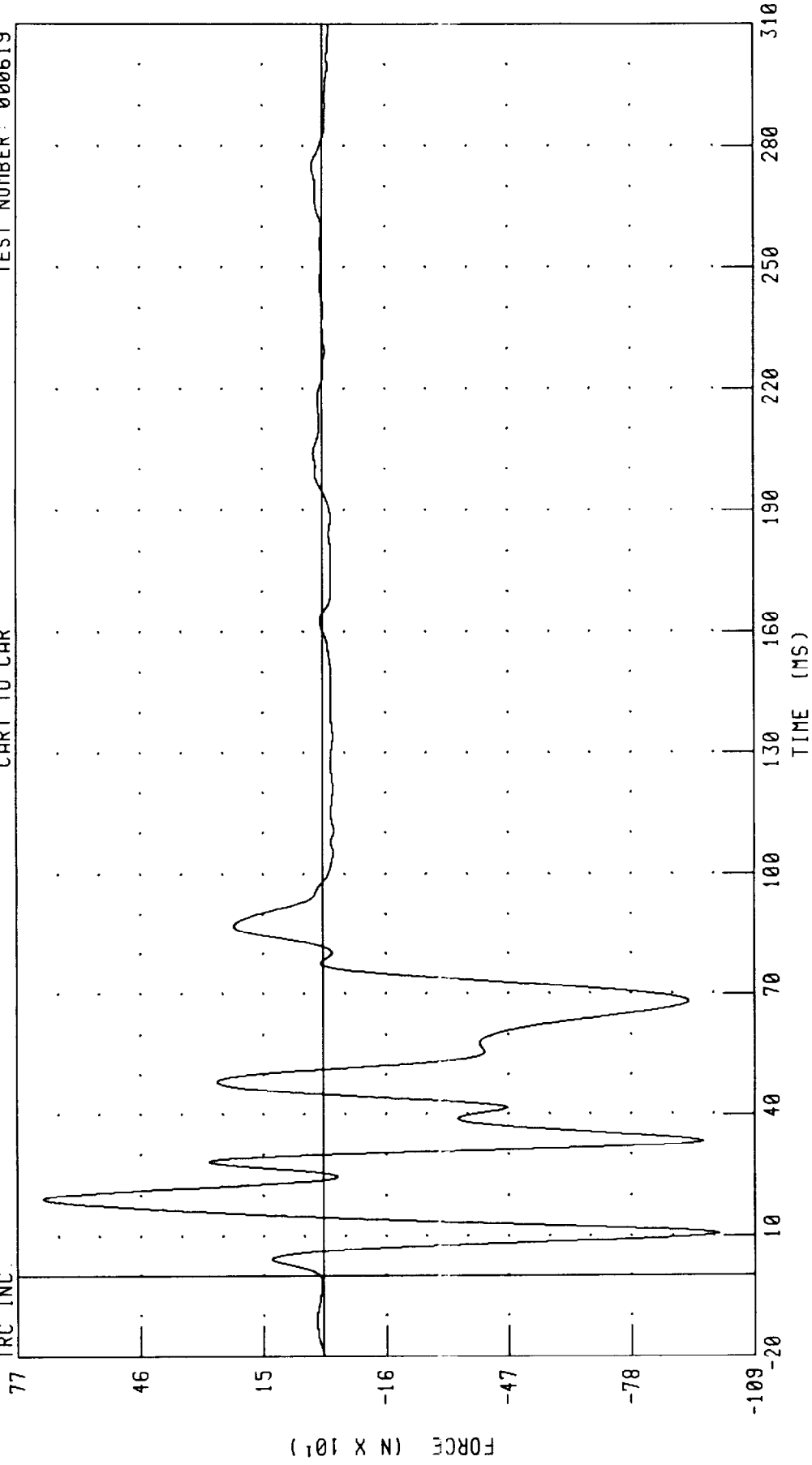
CHANNEL: BH2YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H2 Z-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

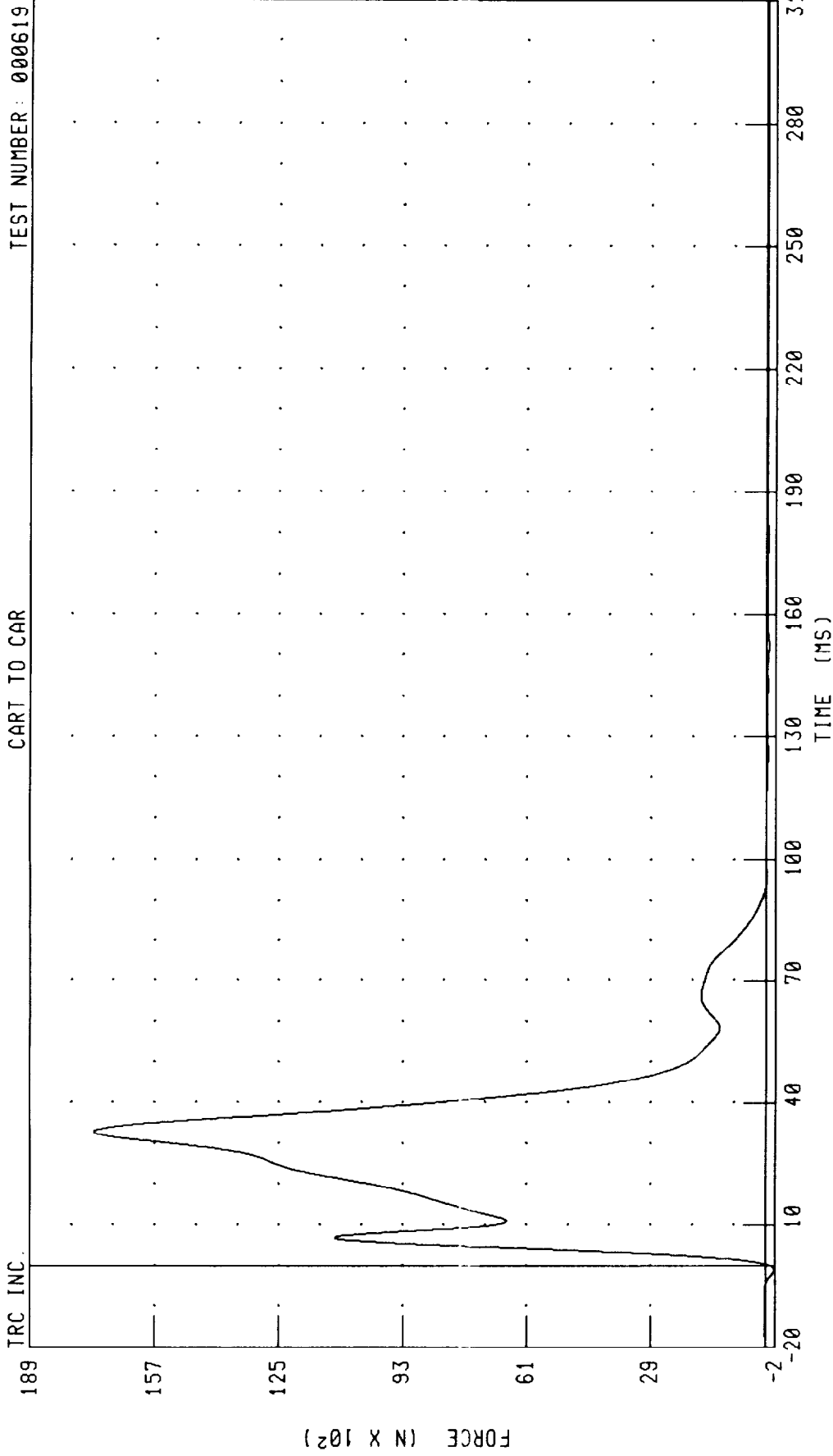
TRC INC.



PEAK DATA: 706.07 N @ 19.20 MS, -999.75 N @ 10.56 MS

CHANNEL: BH2ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H3 X-AXIS FORCE
CART TO CAR



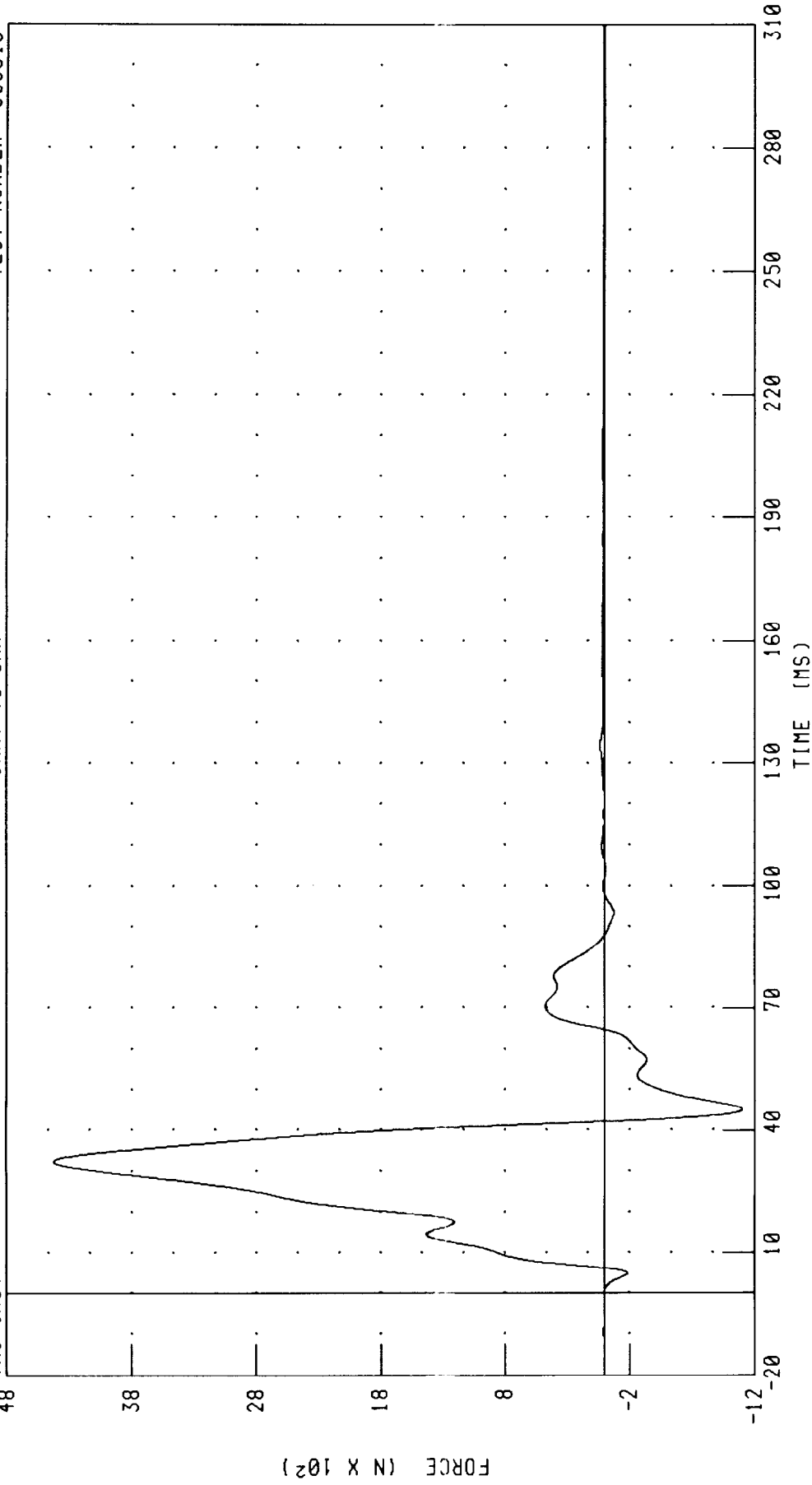
CHANNEL: BH3XF FILTER: CH. CLASS 60 PEAK DATA: 17315.03 N @ 32.96 MS, -231.05 N @ -0.88 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H3 Y-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619

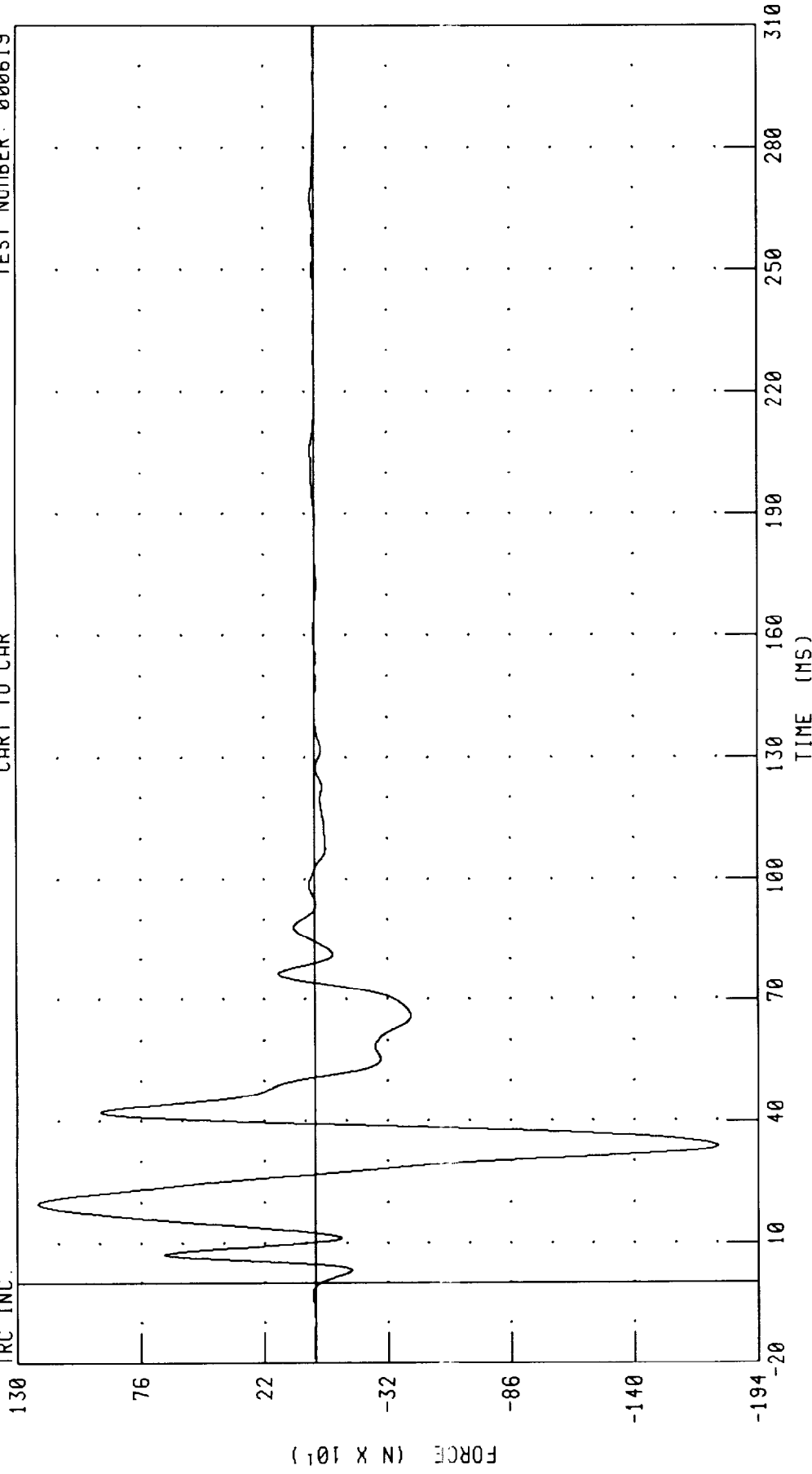


CHANNEL: BH3YF FILTER: CH. CLASS 60 PEAK DATA: 4424.44 N @ 32.40 MS, -1102.84 N @ 45.04 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H3 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



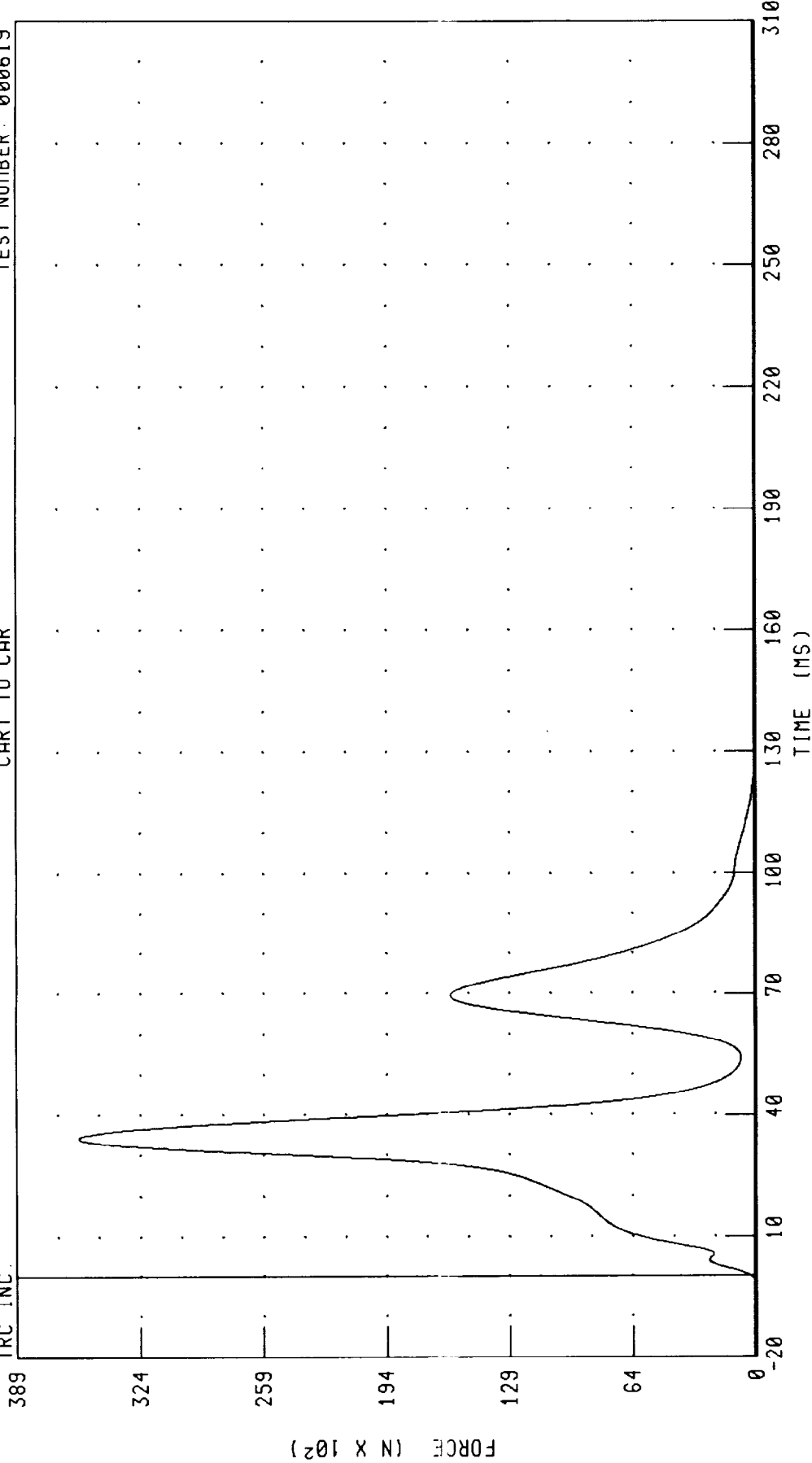
CHANNEL: BH3ZF FILTER: CH. CLASS 60

PEAK DATA: 1207.65 N @ 19.84 MS, -1764.69 N @ 33.76 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H4 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

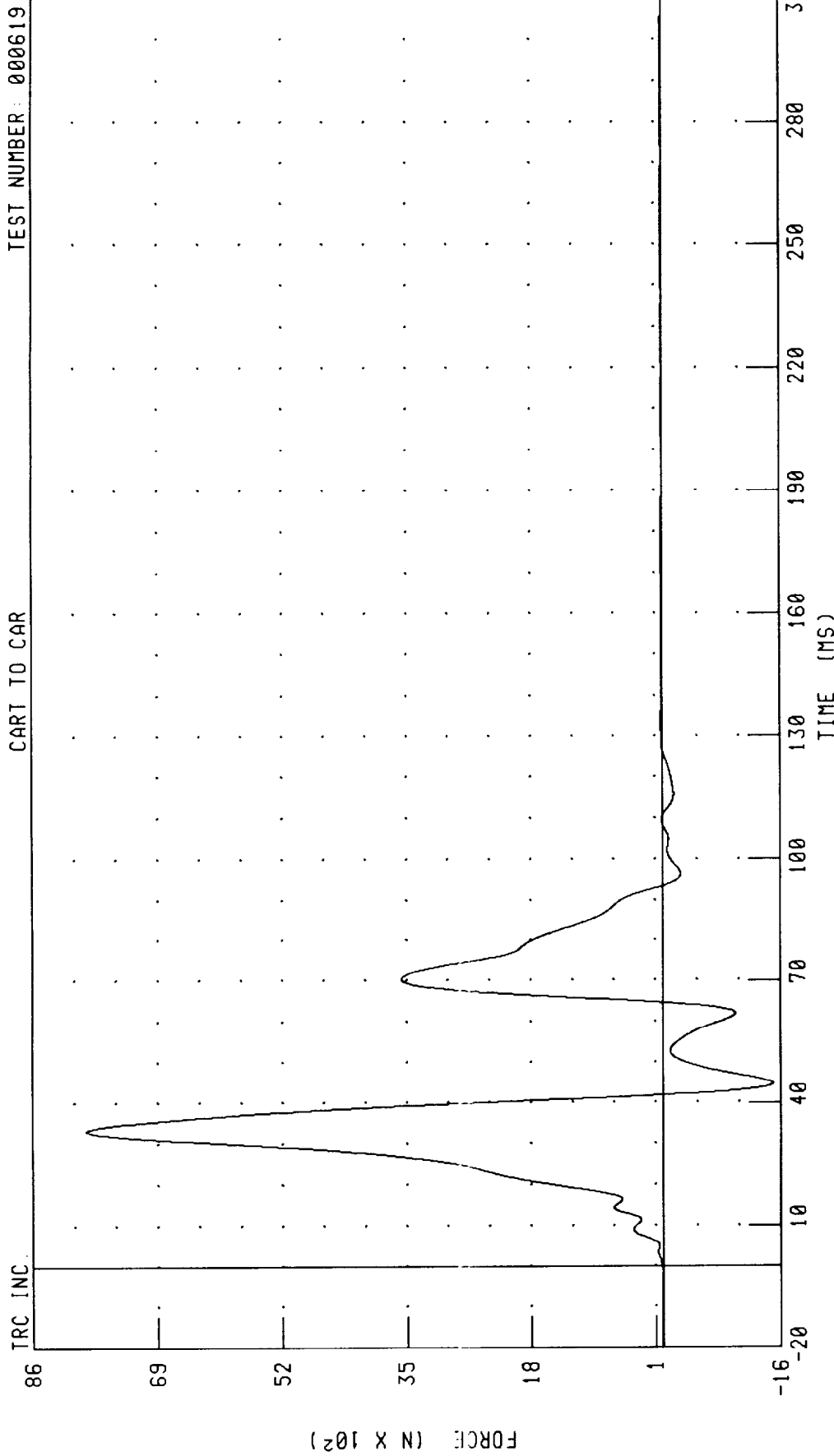
CART TO CAR



PEAK DATA: 35628.54 N @ 34.24 MS; -90.78 N @ -2.24 MS

CHANNEL: BH4XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H4 Y-AXIS FORCE

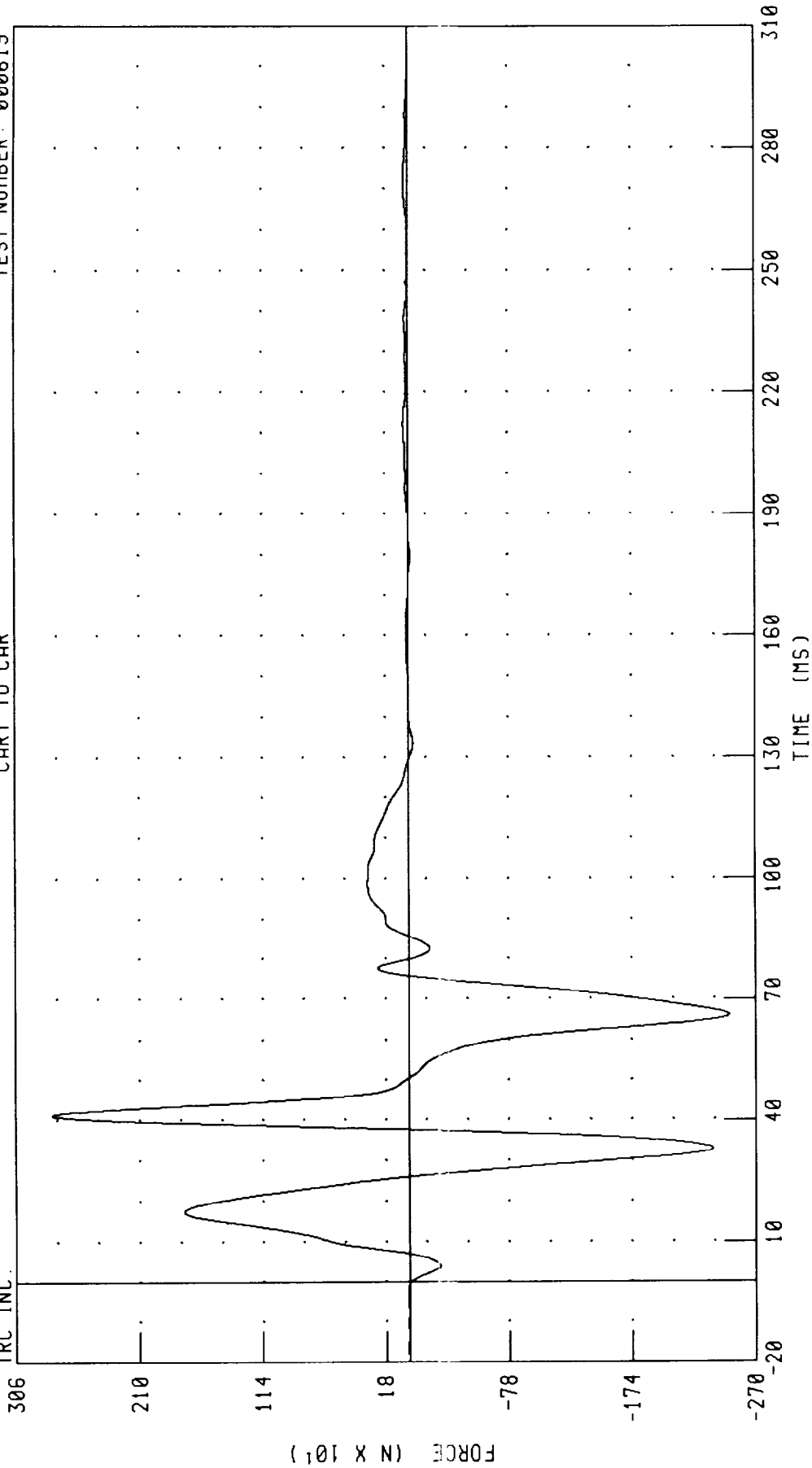


CHANNEL: BH4YF FILTER: CH. CLASS 60
PEAK DATA: 7872.25 N @ 33.36 MS; -1494.49 N @ 44.56 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL H4 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



PEAK DATA: 2778.50 N @ 41.28 MS; -2196.35 N @ 66.08 MS

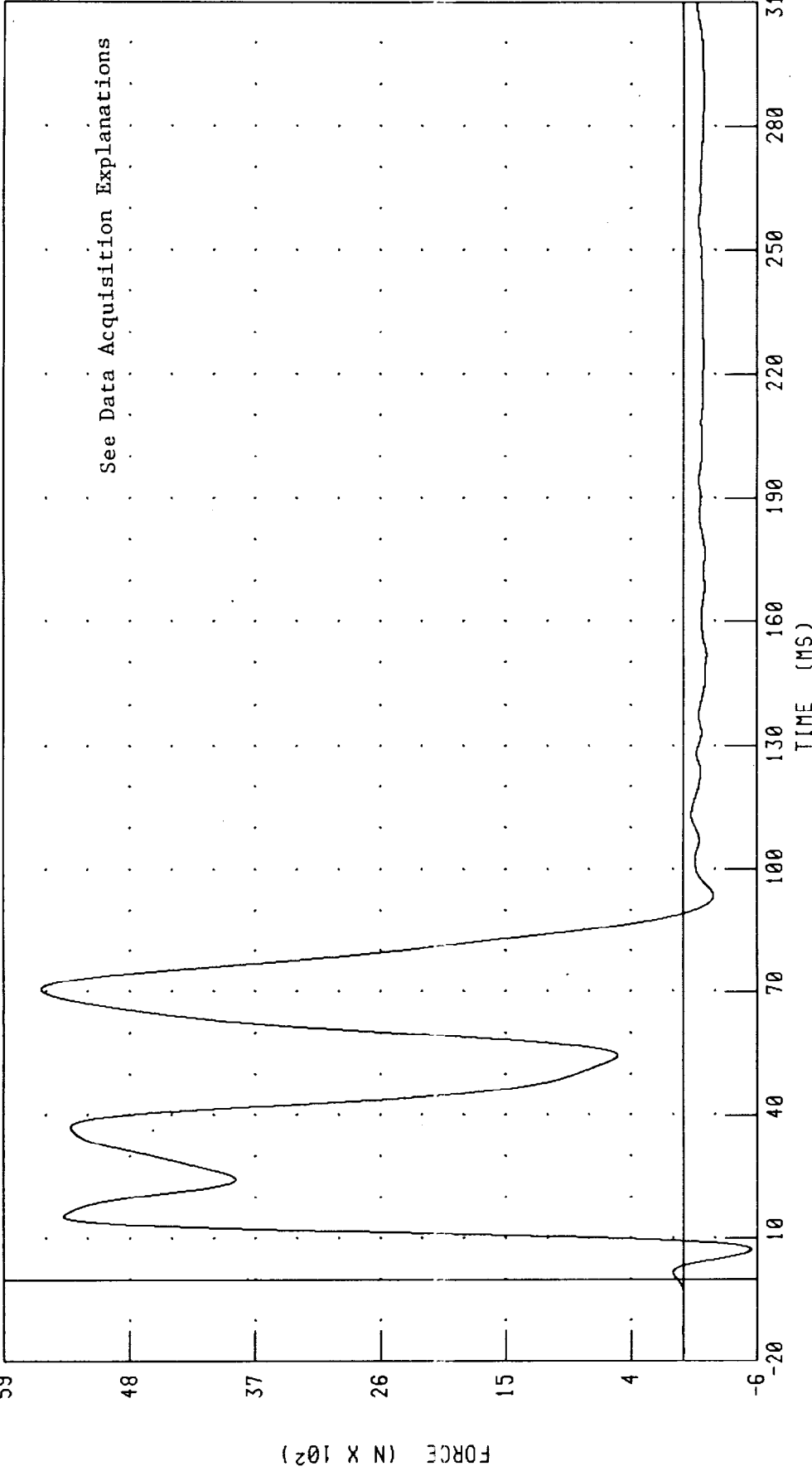
CHANNEL: BH4ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I1 X-AXIS FORCE

TRC INC

CART TO CAR

TEST NUMBER: 000619



PEAK DATA: 5636.52 N @ 70.64 MS, -590.65 N @ 7.20 MS

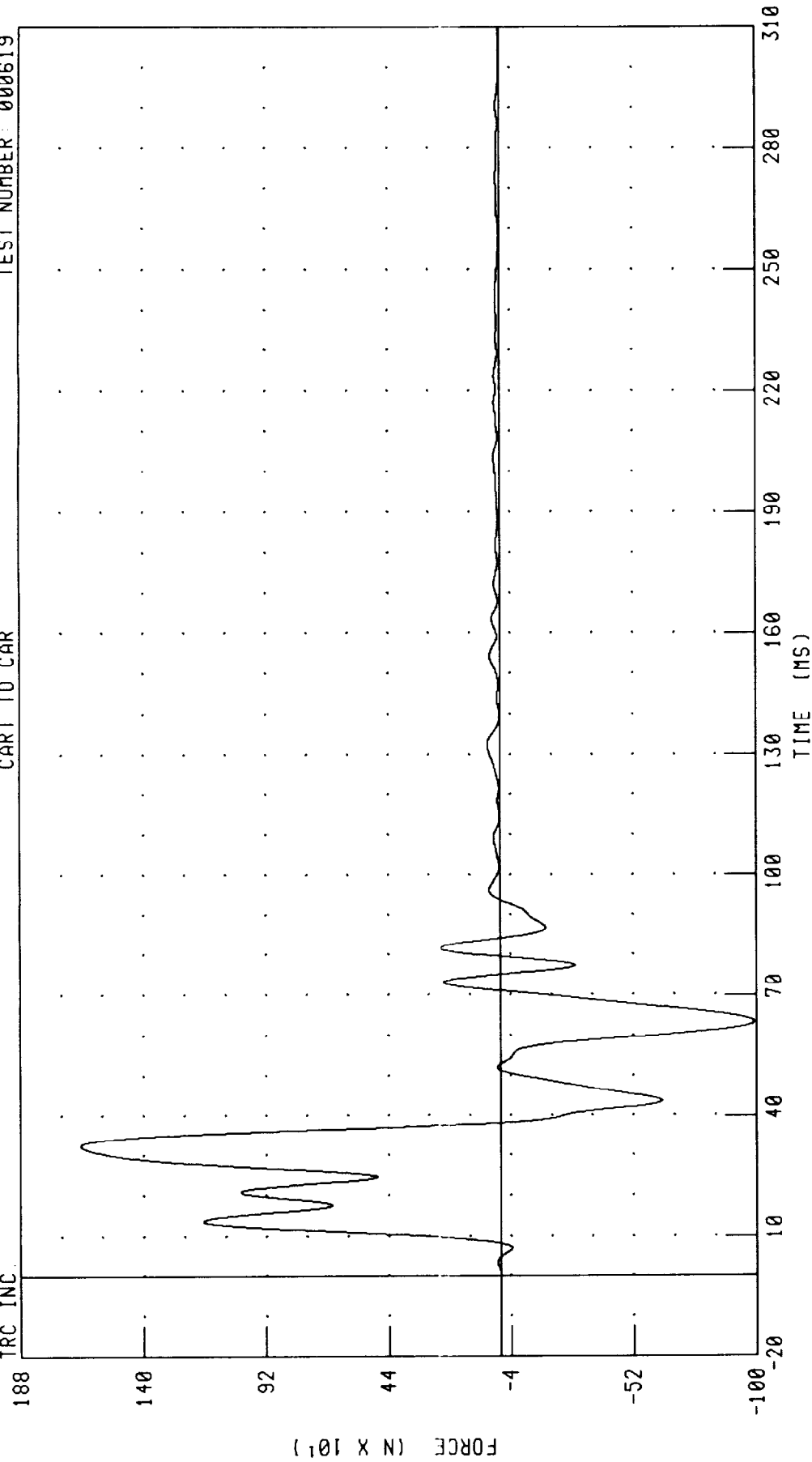
CHANNEL: BI1XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I1 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC



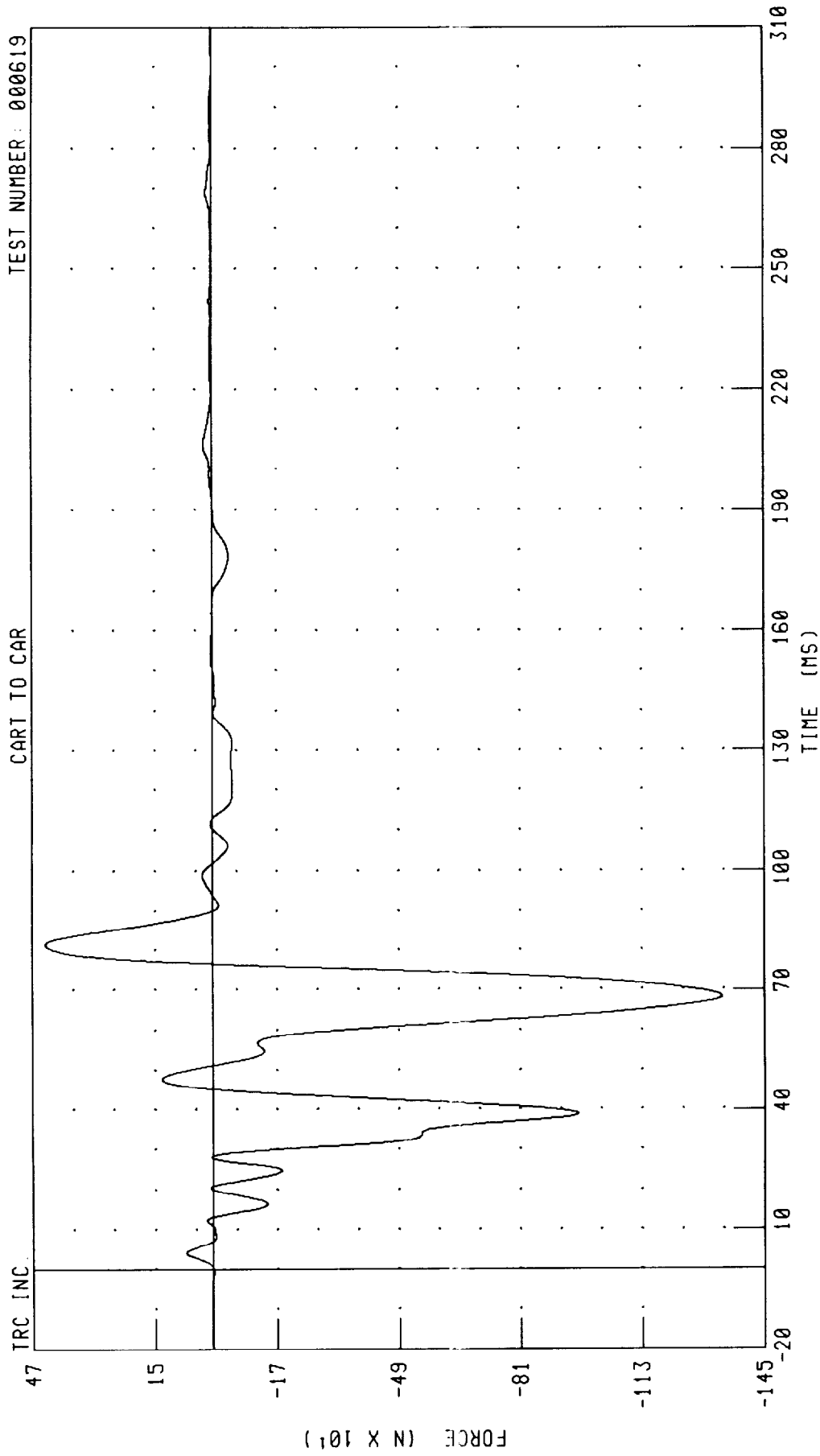
CHANNEL: B11YF FILTER: CH. CLASS 60

PEAK DATA: 1646.27 N @ 32.56 MS, -990.56 N @ 63.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I1 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



PEAK DATA: 435.42 N @ 81.44 MS; -1340.20 N @ 68.24 MS

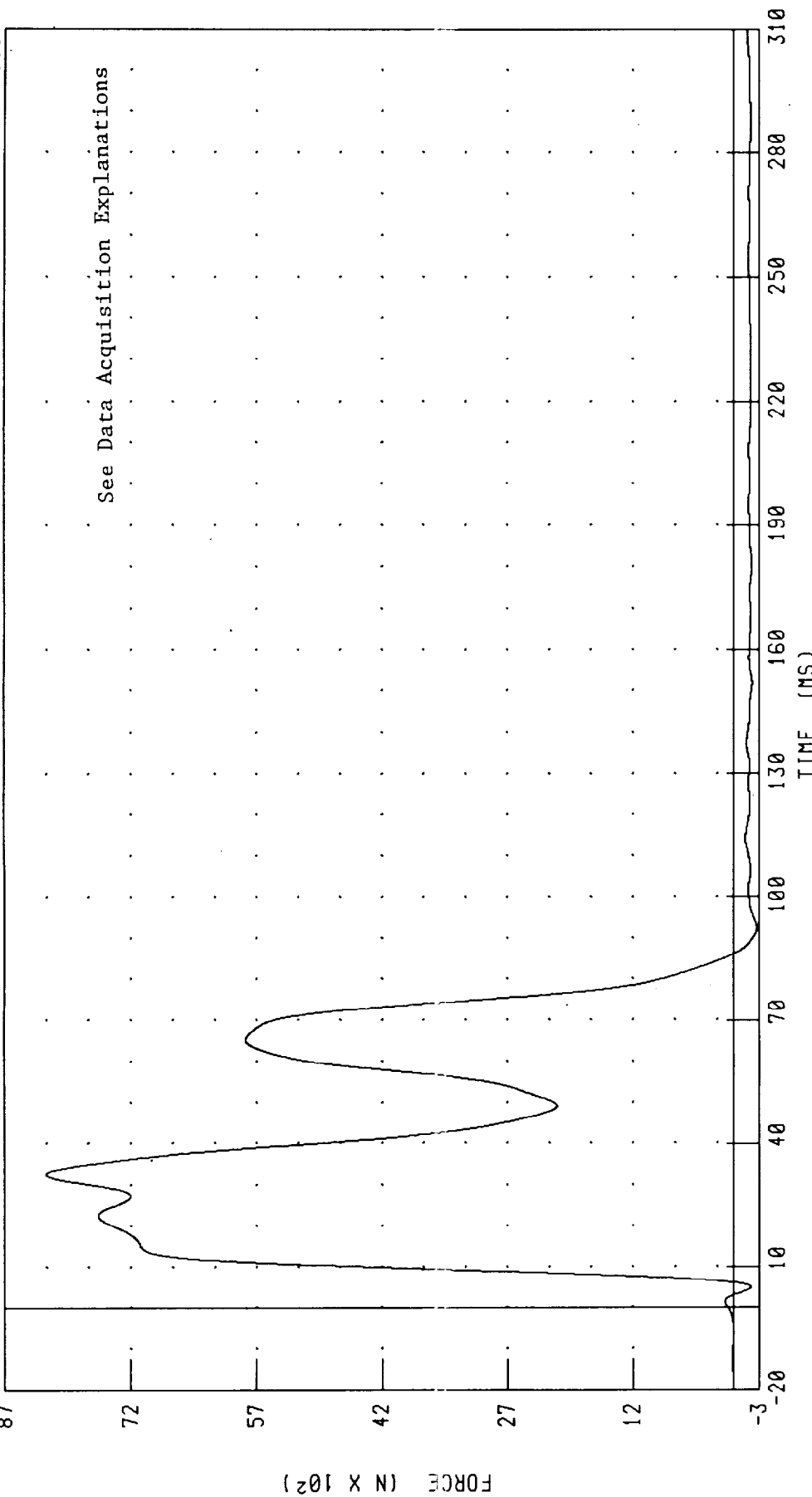
CHANNEL: BI1ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I2 X-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



PEAK DATA: 8206.67 N @ 32.64 MS; -273.30 N @ 92.32 MS

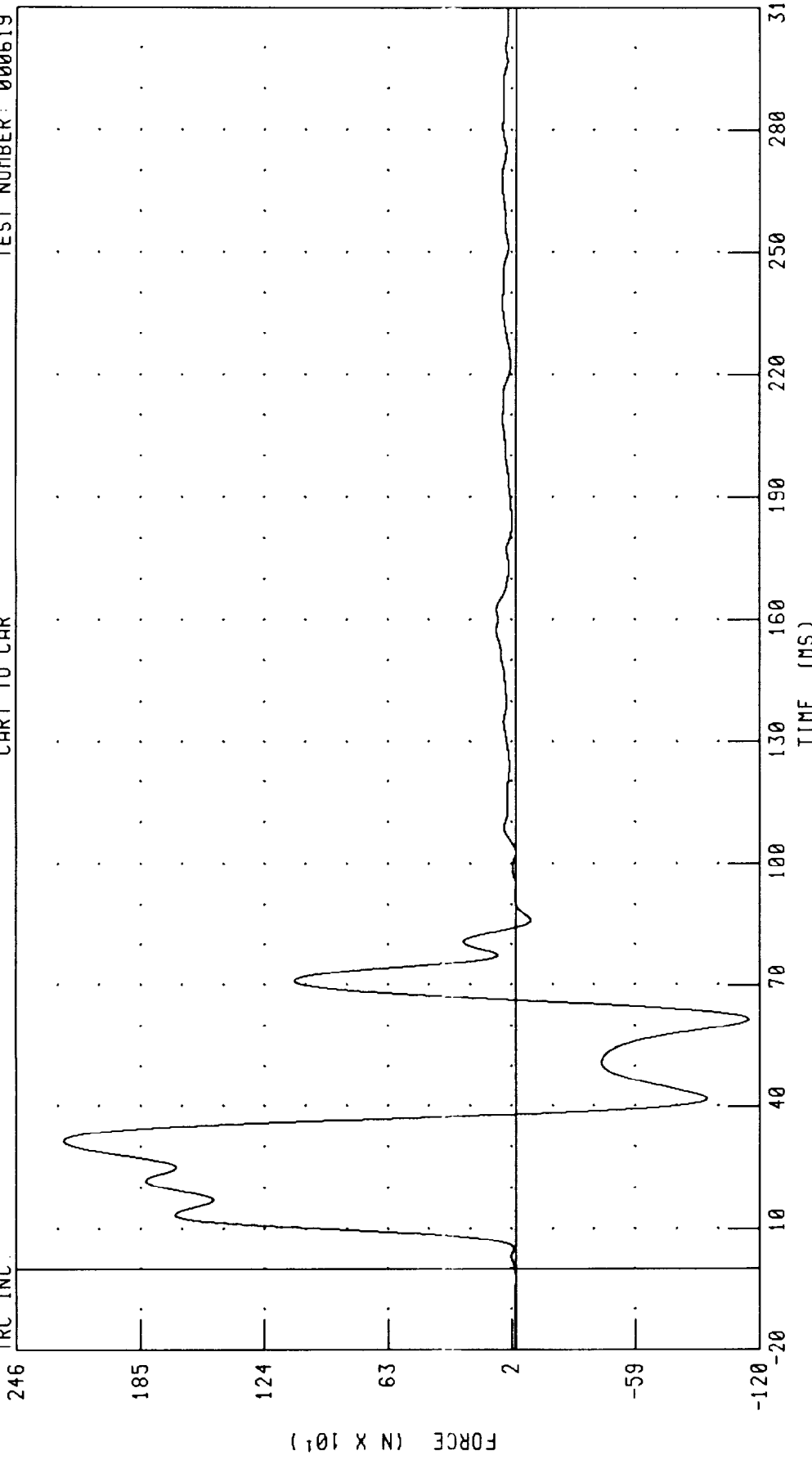
CHANNEL: BI2XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I2 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC



PEAK DATA: 2226.96 N @ 31.44 MS; -1146.72 N @ 61.60 MS

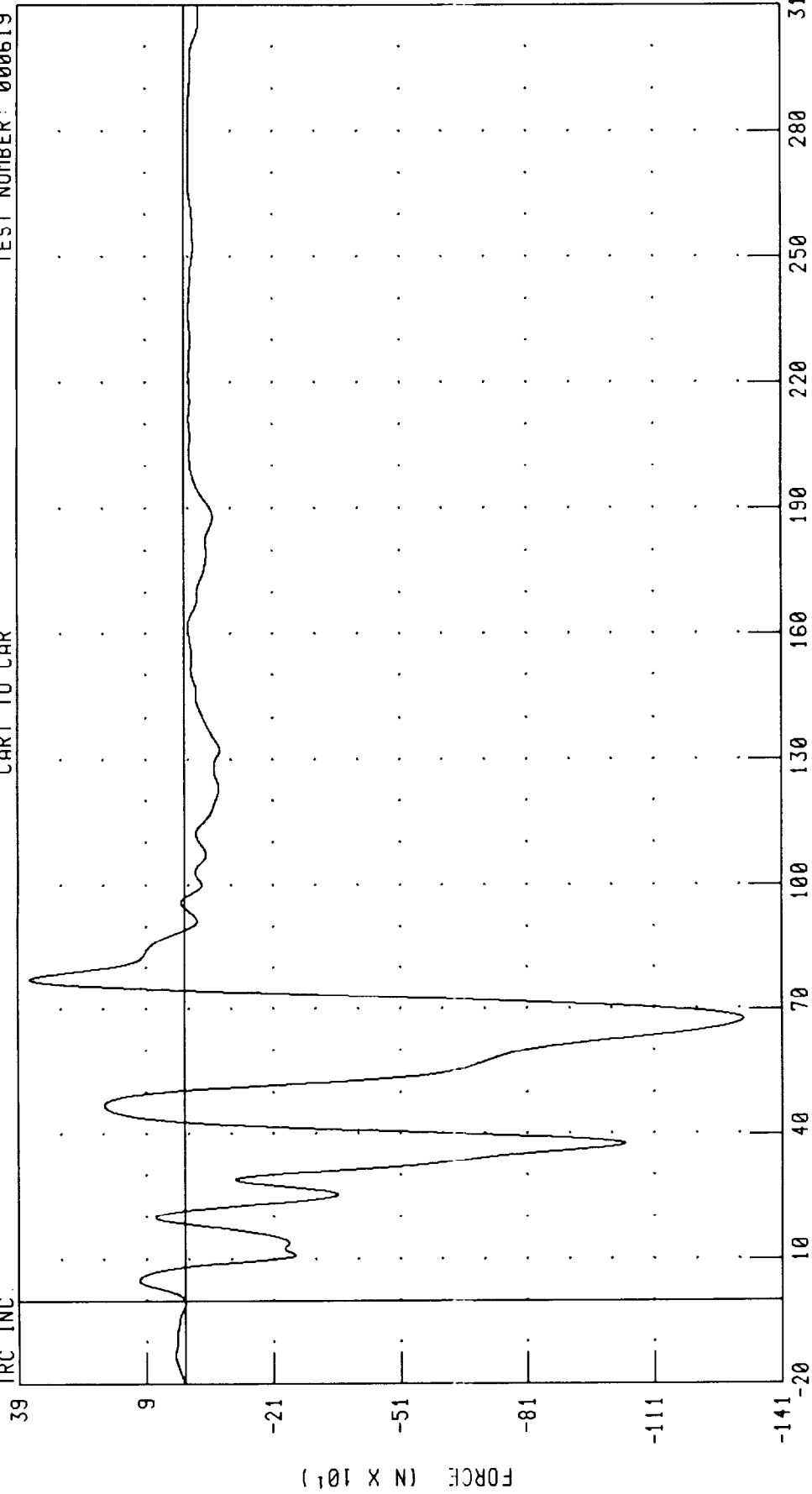
CHANNEL: BI2YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I2 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

39



TIME (MS)

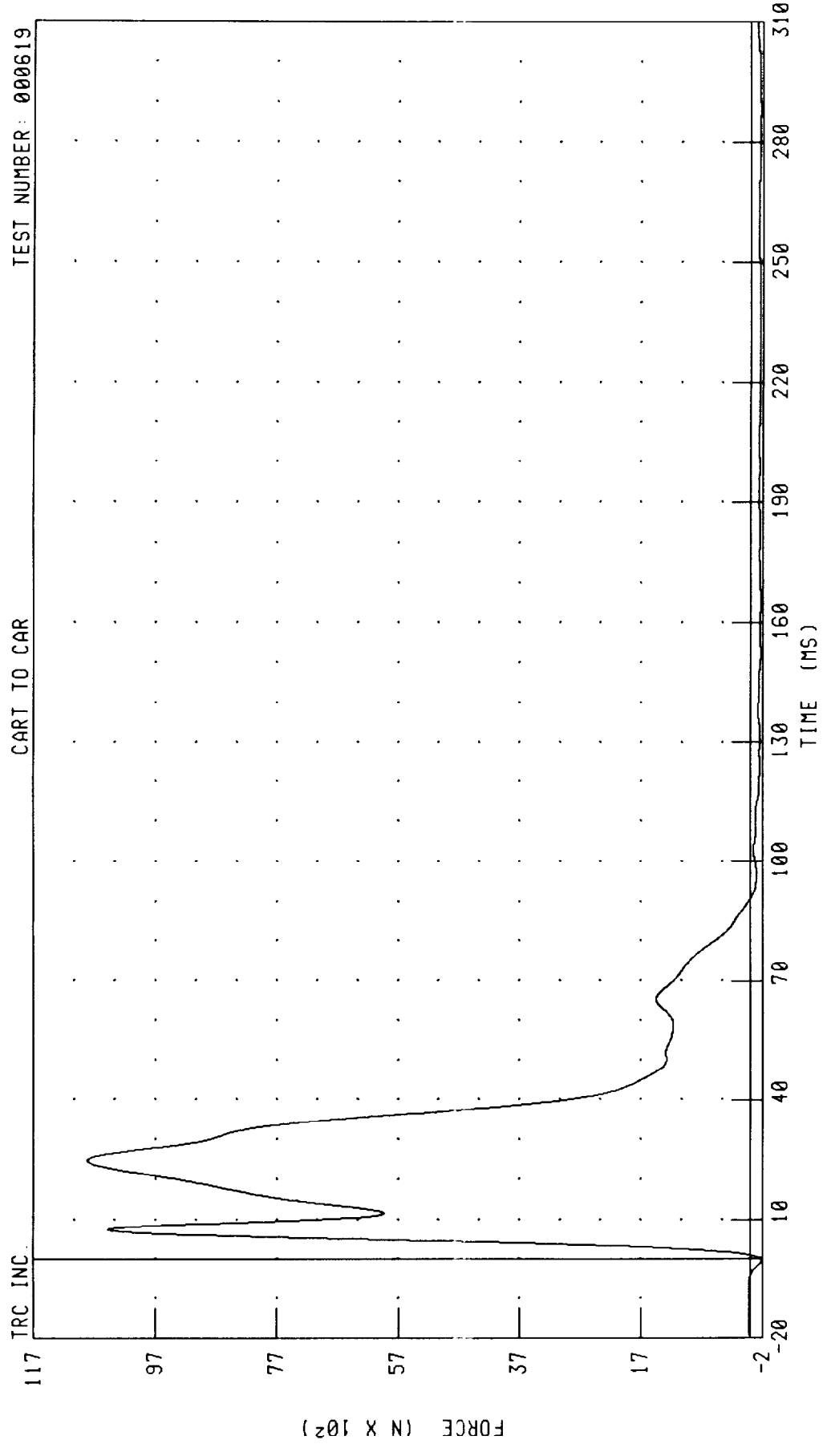
PEAK DATA: 361.64 N @ 77.36 MS, -1320.56 N @ 67.60 MS

CHANNEL: B12ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I3 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BI3XF FILTER: CH CLASS 60 PEAK DATA: 10907.23 N @ 24.80 MS, -192.80 N @ -0.40 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I3 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

224

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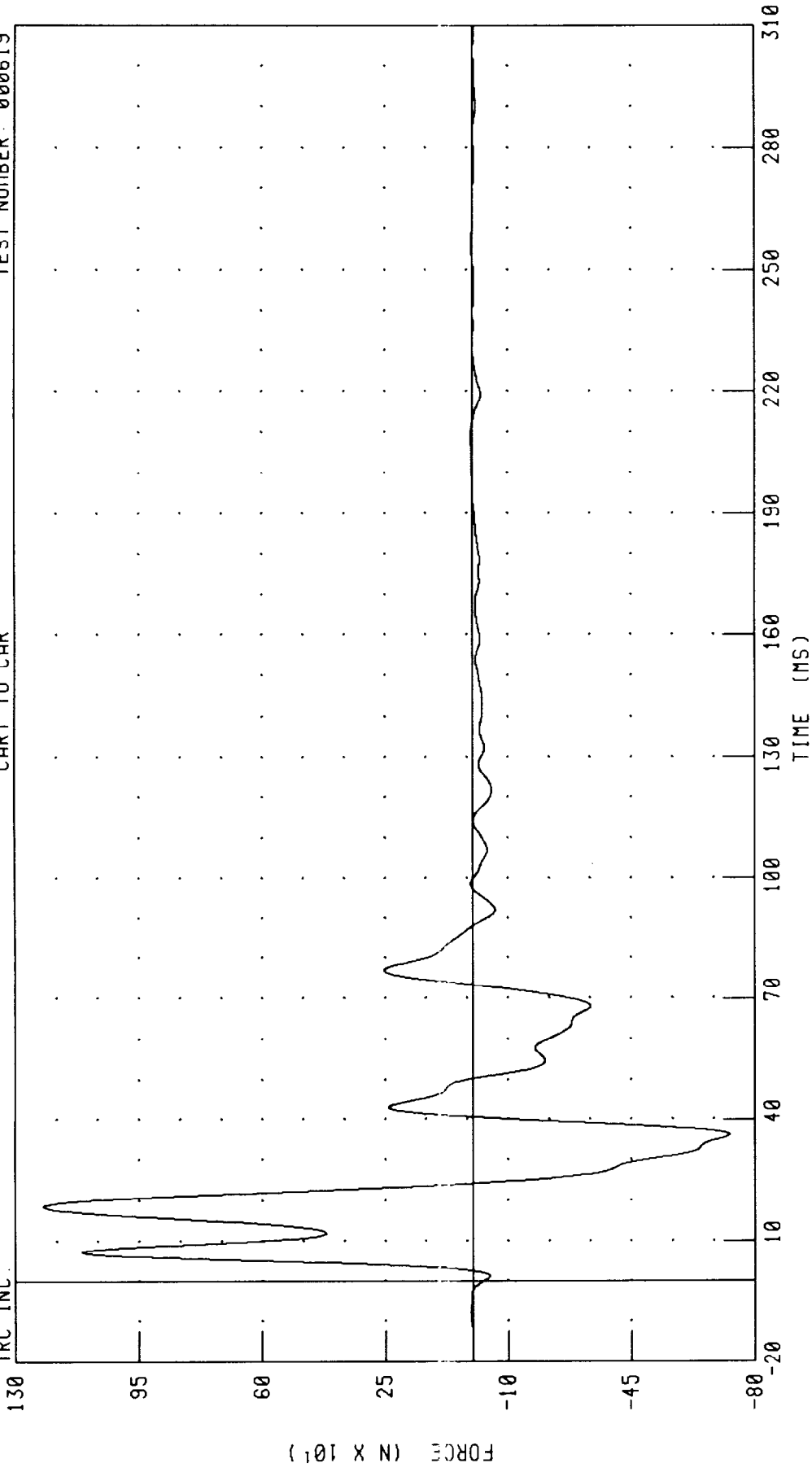
86

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MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I3 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



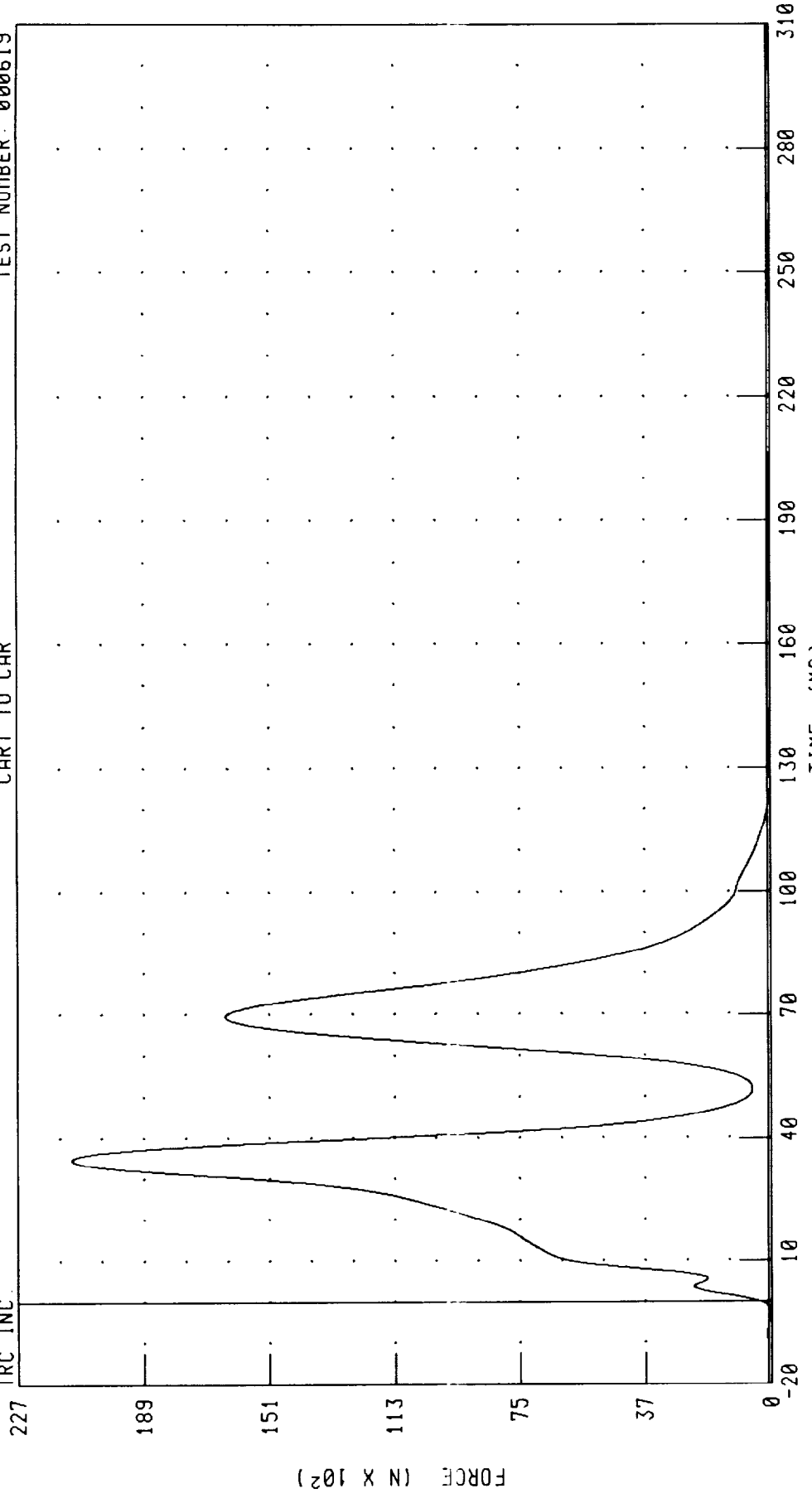
CHANNEL: B13ZF FILTER: CH. CLASS 60 PEAK DATA: 1220.36 N @ 18.72 MS, -728.87 N @ 36.32 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL 14 X-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619

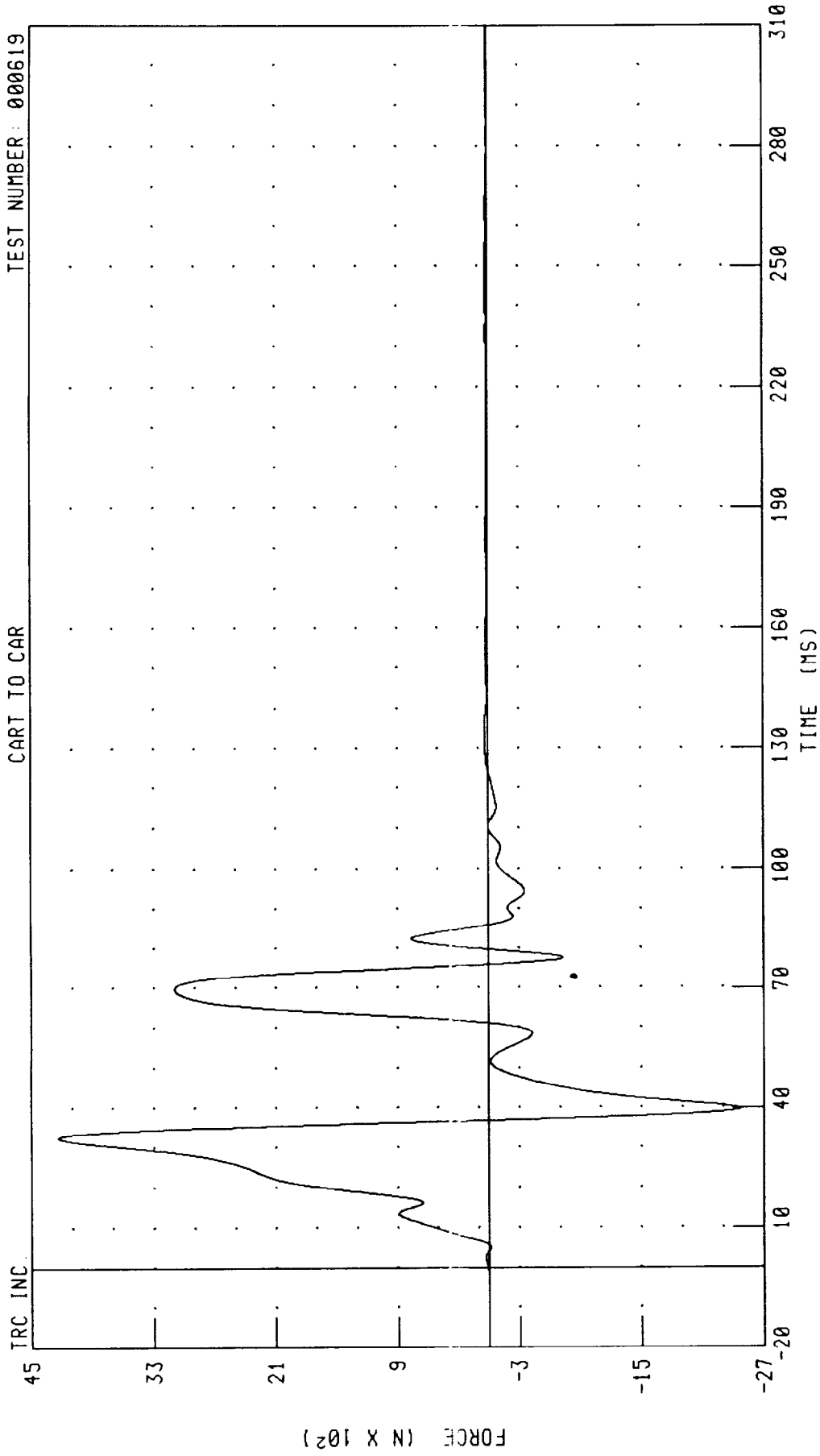


CHANNEL: BI4XF FILTER: CH. CLASS 60
PEAK DATA: 21085.44 N @ 34.88 MS, -89.29 N @ 125.76 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I4 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



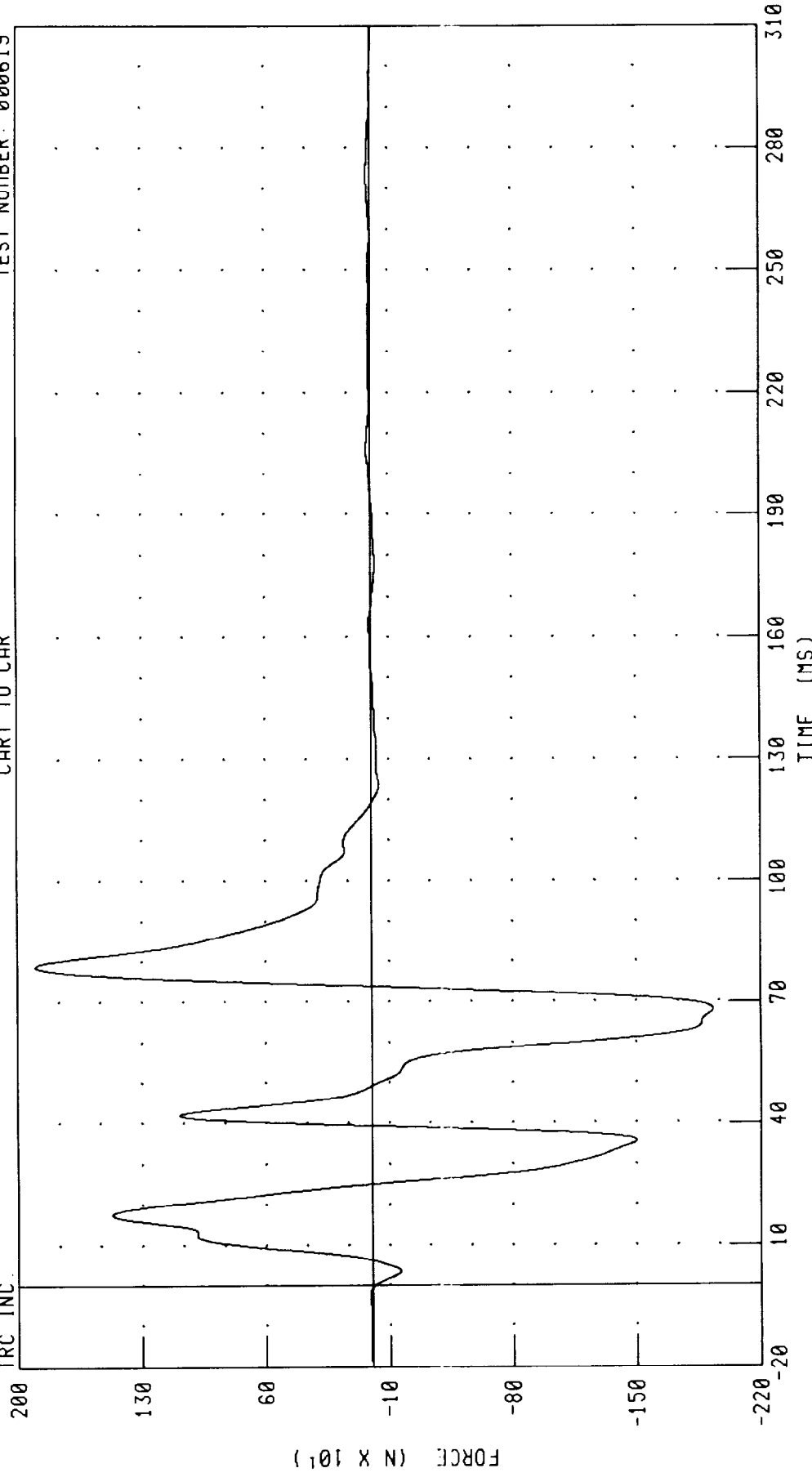
CHANNEL: BI4YF FILTER: CH. CLASS 60

PEAK DATA: 4235.92 N @ 32.56 MS, -2466.51 N @ 39.68 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL I4 Z-AXIS FORCE

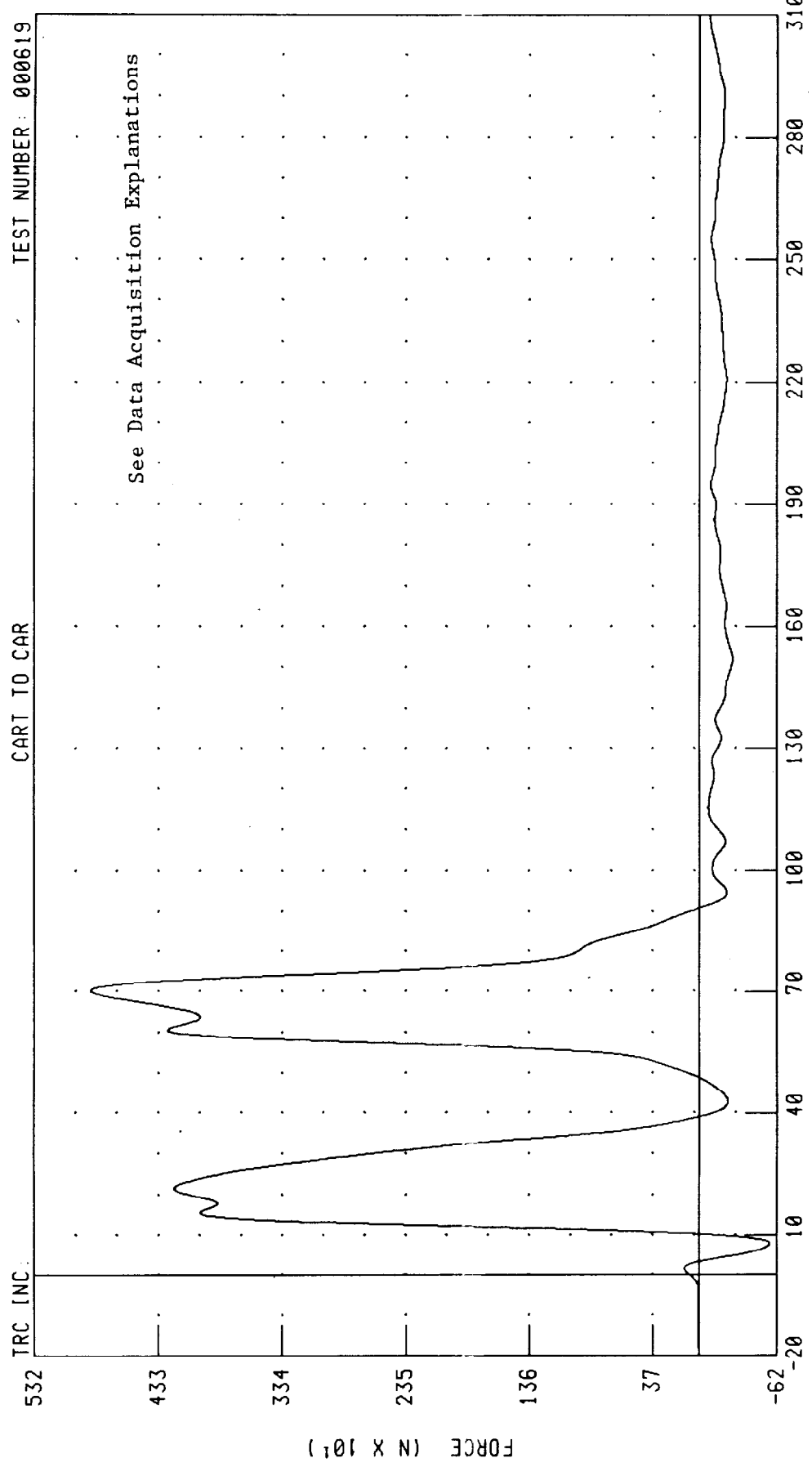
TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BI4ZF FILTER: CH. CLASS 60 PEAK DATA: 1898.10 N @ 78.88 MS, -1934.49 N @ 68.08 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J1 X-AXIS FORCE
CART TO CAR



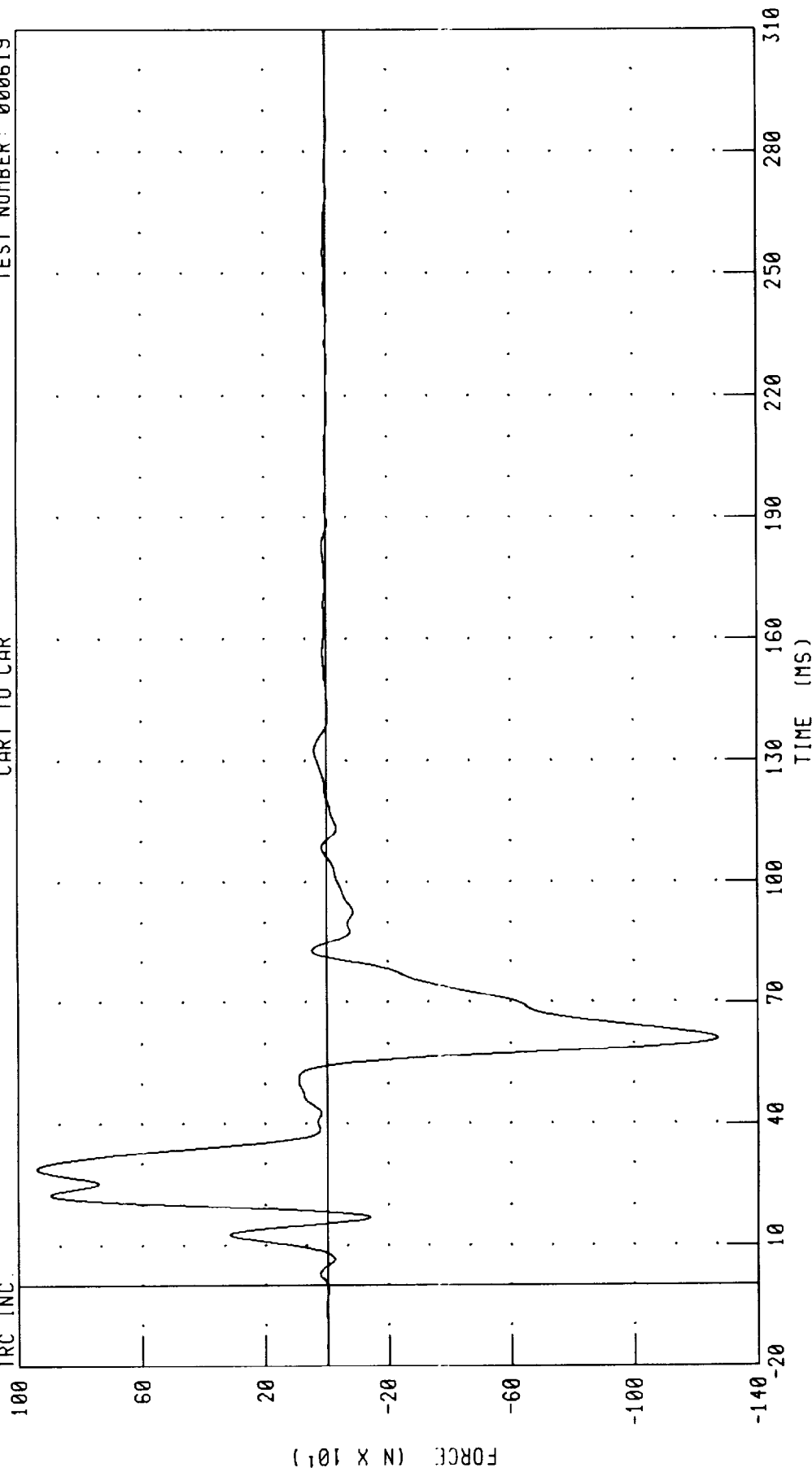
TRC INC. TEST NUMBER: 000619

CHANNEL: BJ1XF FILTER: CH. CLASS 60 PEAK DATA: 4870.39 N @ 70.24 MS, -565.13 N @ 7.76 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J1 Y-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



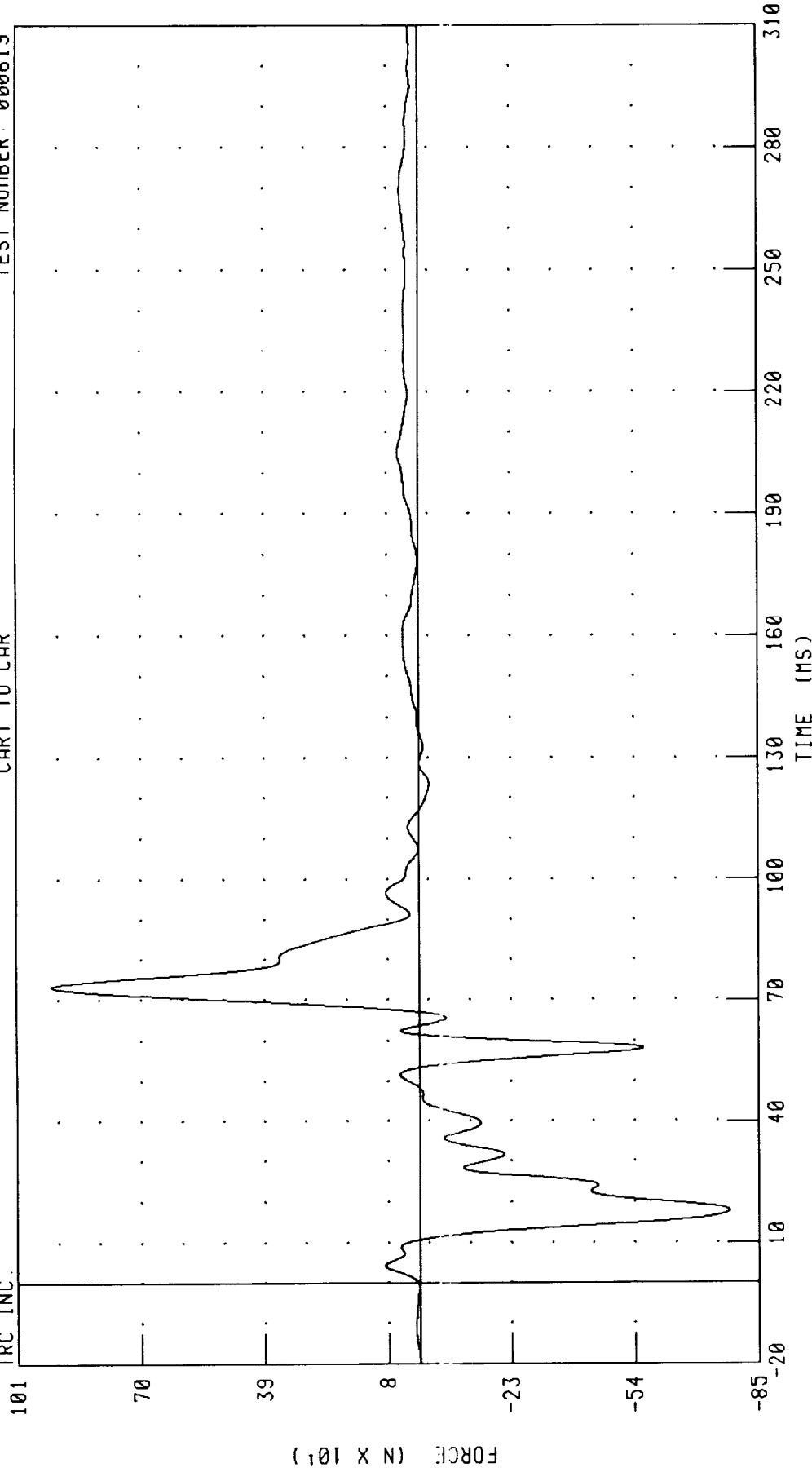
PEAK DATA: 938.44 N @ 28.88 MS; -1271.42 N @ 61.20 MS

CHANNEL: BJ1YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J1 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



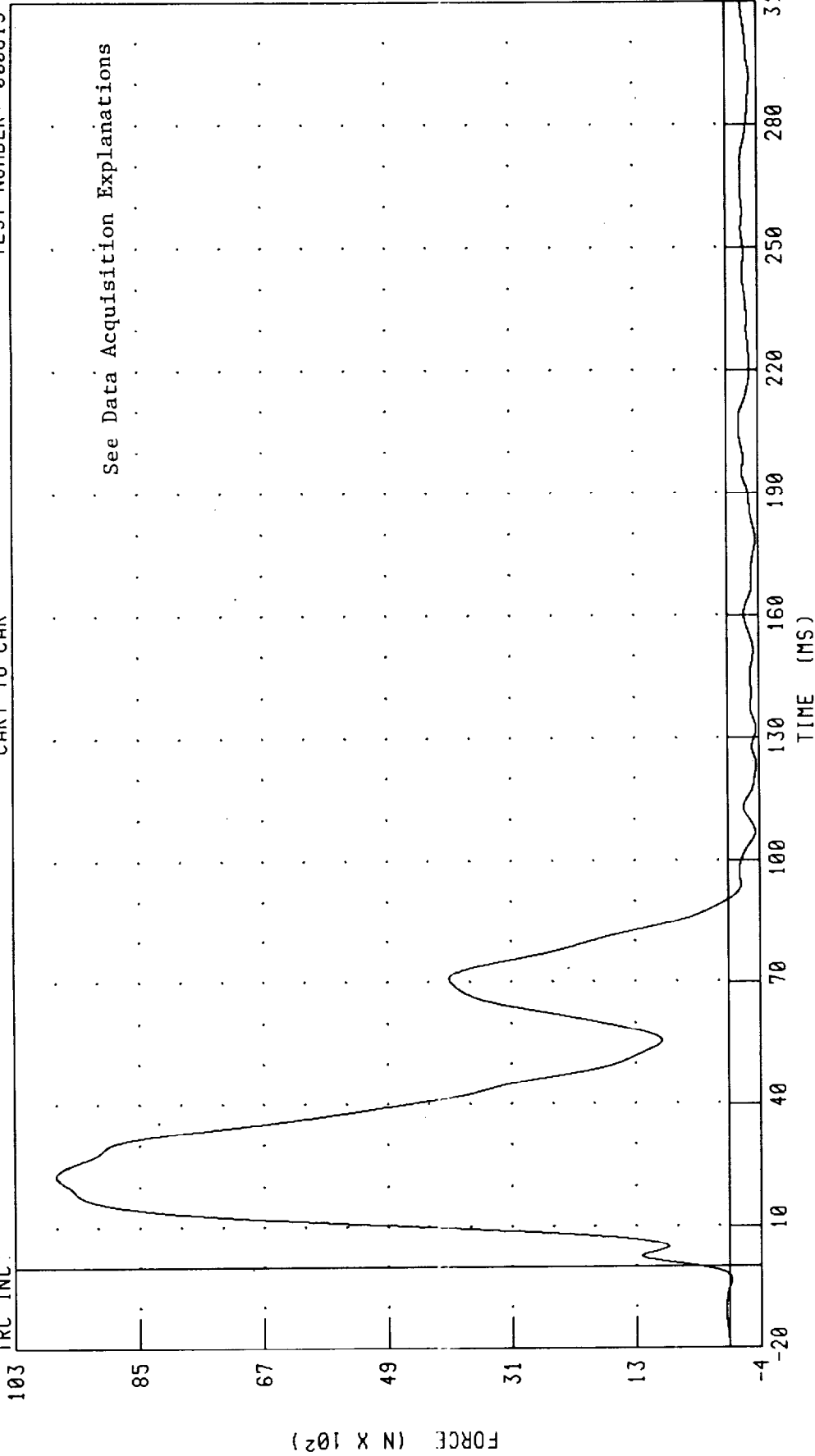
PEAK DATA: 924.12 N @ 73.36 MS, -777.80 N @ 17.84 MS

CHANNEL: BJ1ZF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J2 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

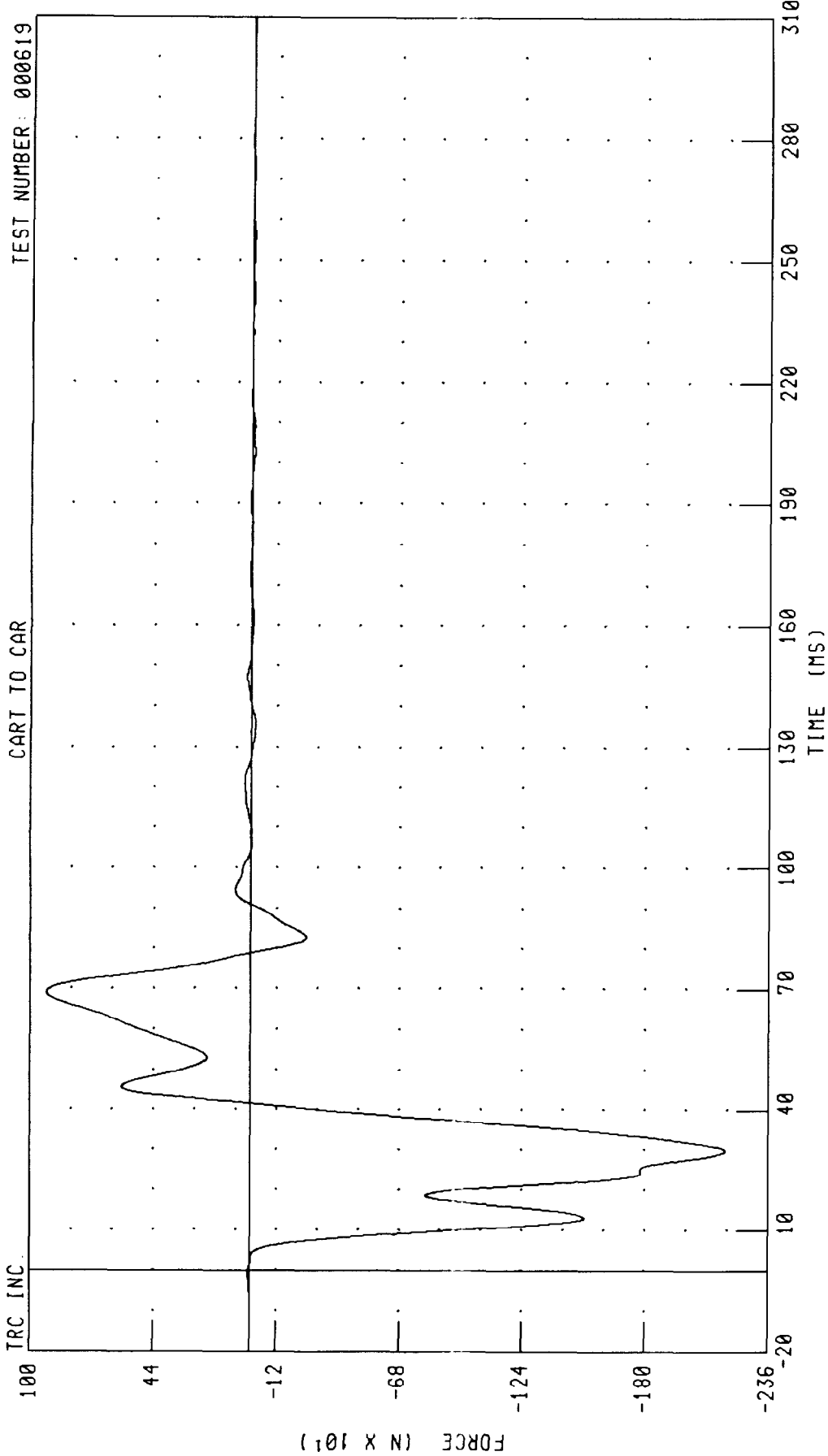
CART TO CAR



PEAK DATA: 9757.17 N @ 22.88 MS; -411.97 N @ 123.36 MS

CHANNEL: BJ2XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J2 Y-AXIS FORCE

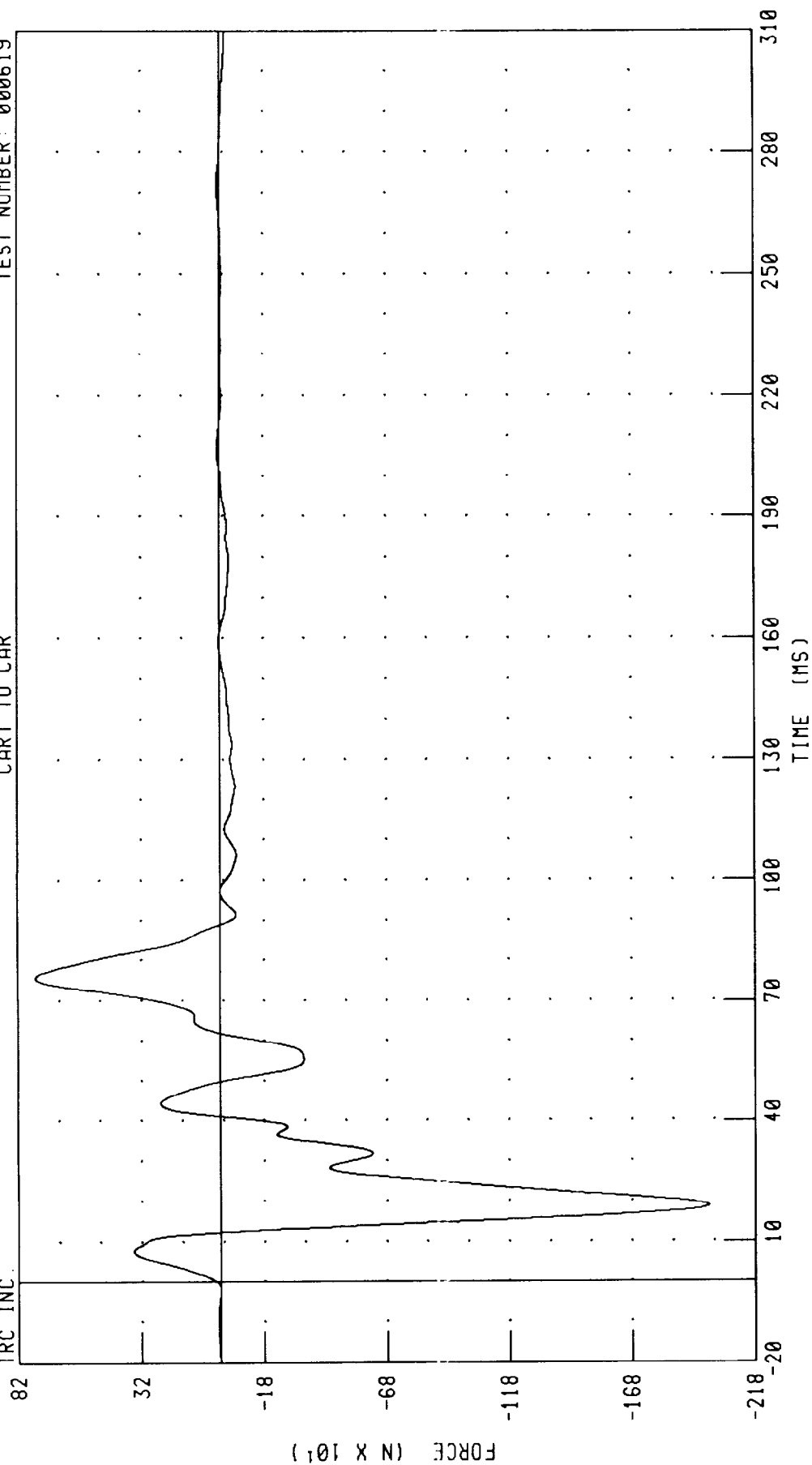


CHANNEL: BJ2YF FILTER: CH. CLASS 60 PEAK DATA: 926.25 N @ 69.12 MS, -2166.68 N @ 29.84 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J2 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



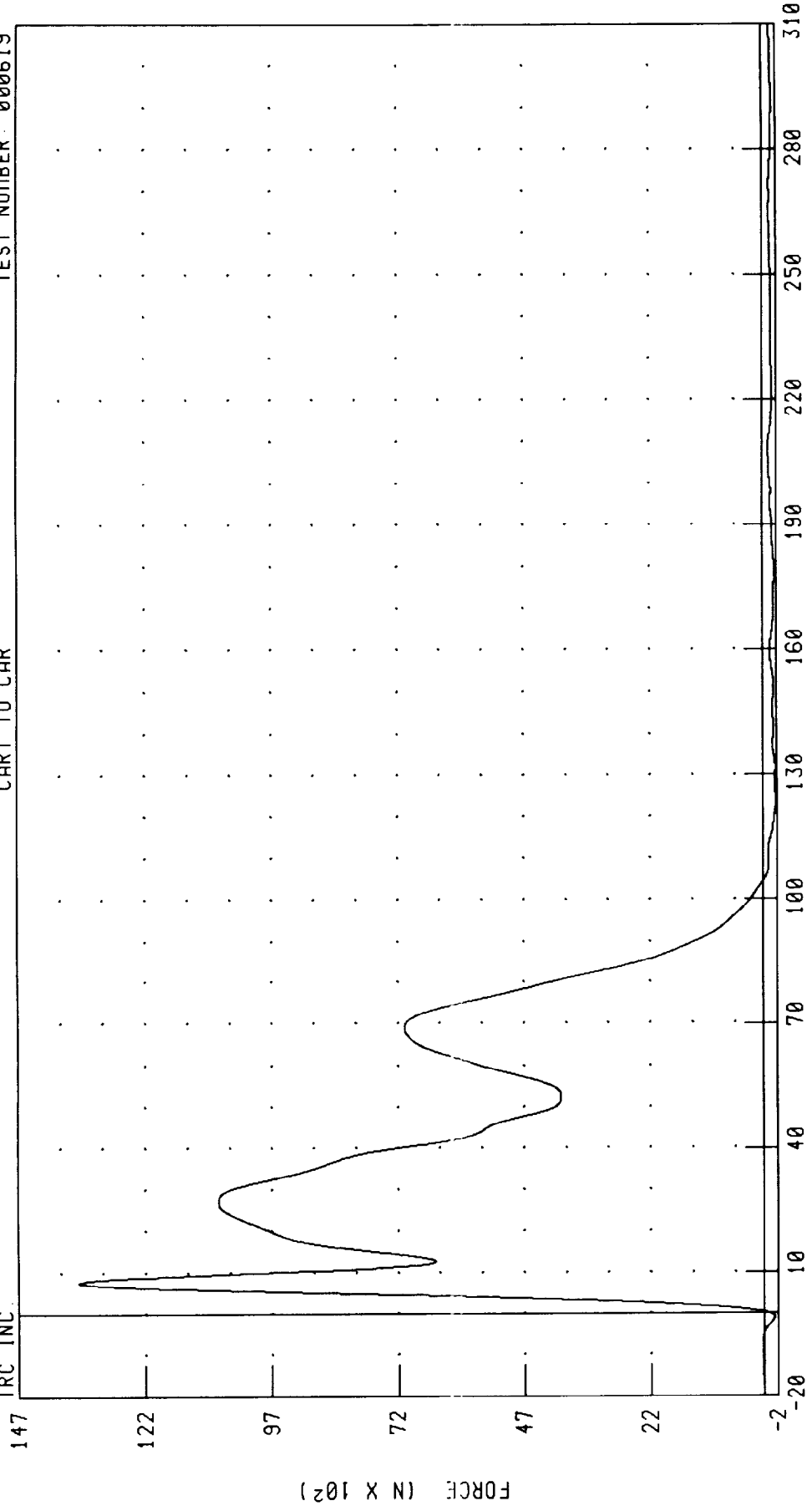
CHANNEL: BJZF FILTER: CH. CLASS 60 PEAK DATA: 749.56 N @ 75.76 MS, -1992.62 N @ 18.88 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J3 X-AXIS FORCE

TEST NUMBER: 000619

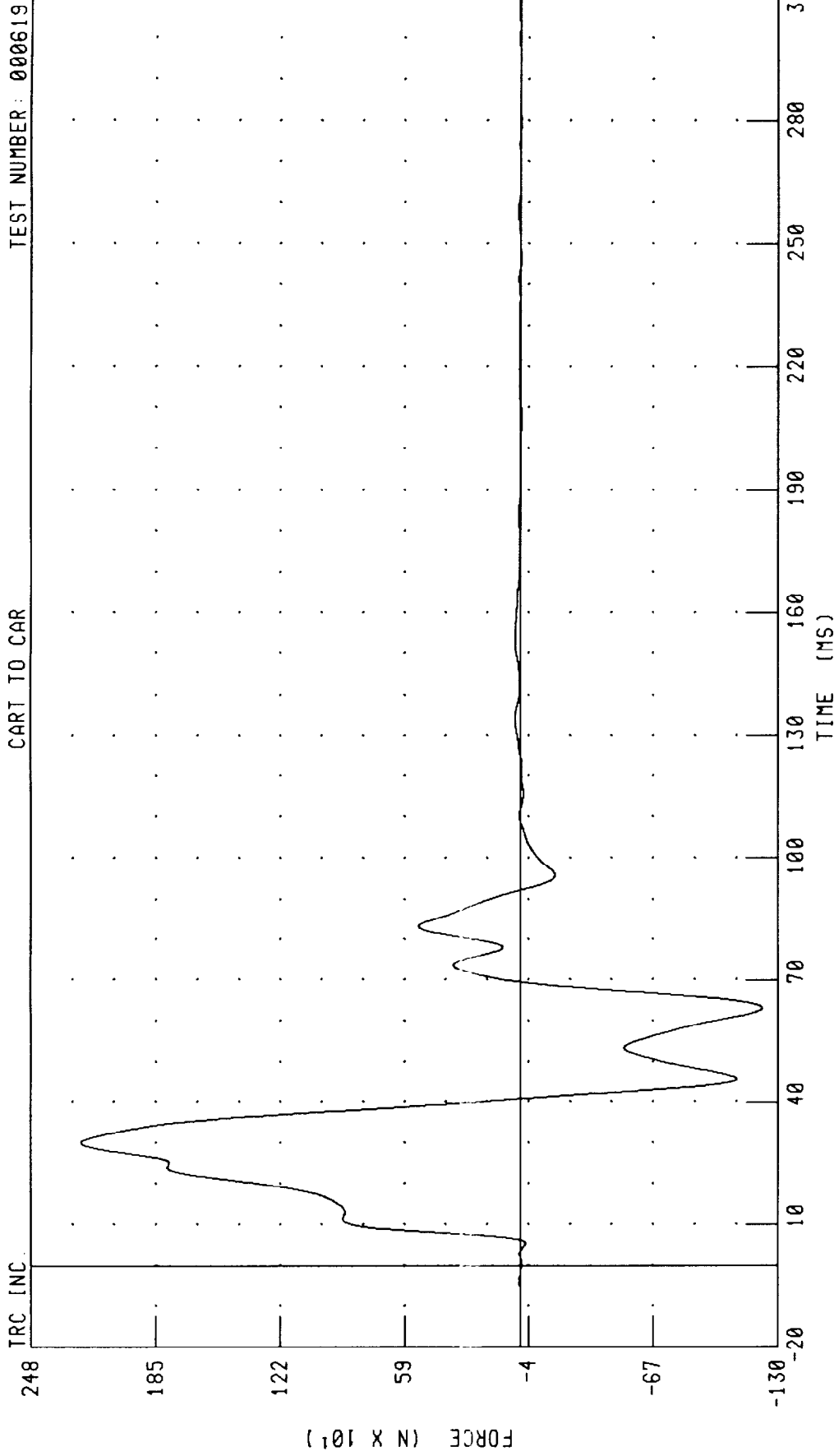
CART TO CAR

TRC INC.



CHANNEL: BJ3XF FILTER: CH. CLASS 60 PEAK DATA: 13548.58 N @ 7.68 MS, -251.88 N @ 124.00 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J3 Y-AXIS FORCE
CART TO CAR



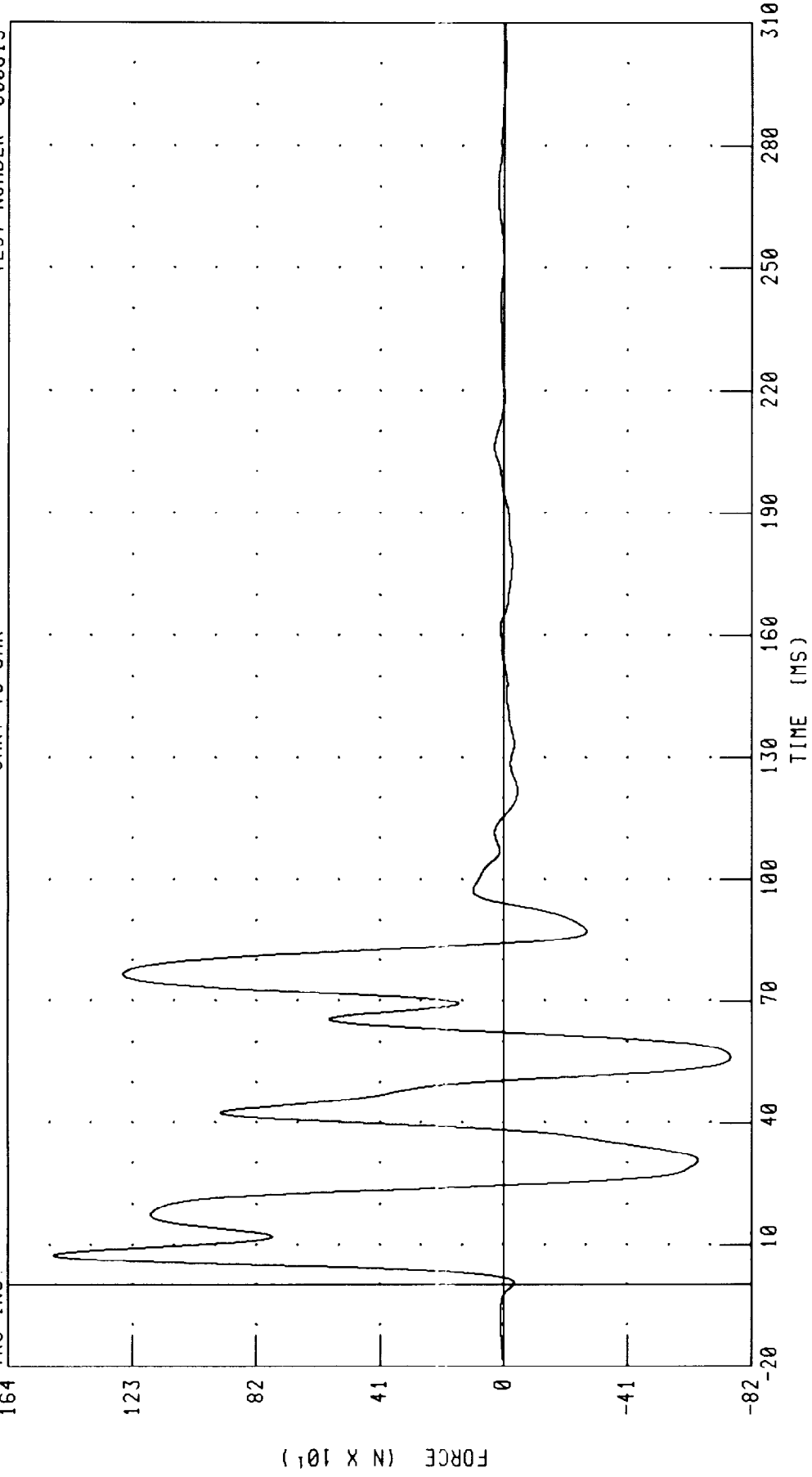
CHANNEL: BJ3YF FILTER: CH. CLASS 60 PEAK DATA: 2227.25 N @ 30.08 MS, -1221.05 N @ 63.12 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J3 Z-AXIS FORCE

TRC INC

CART TO CAR

TEST NUMBER: 000619

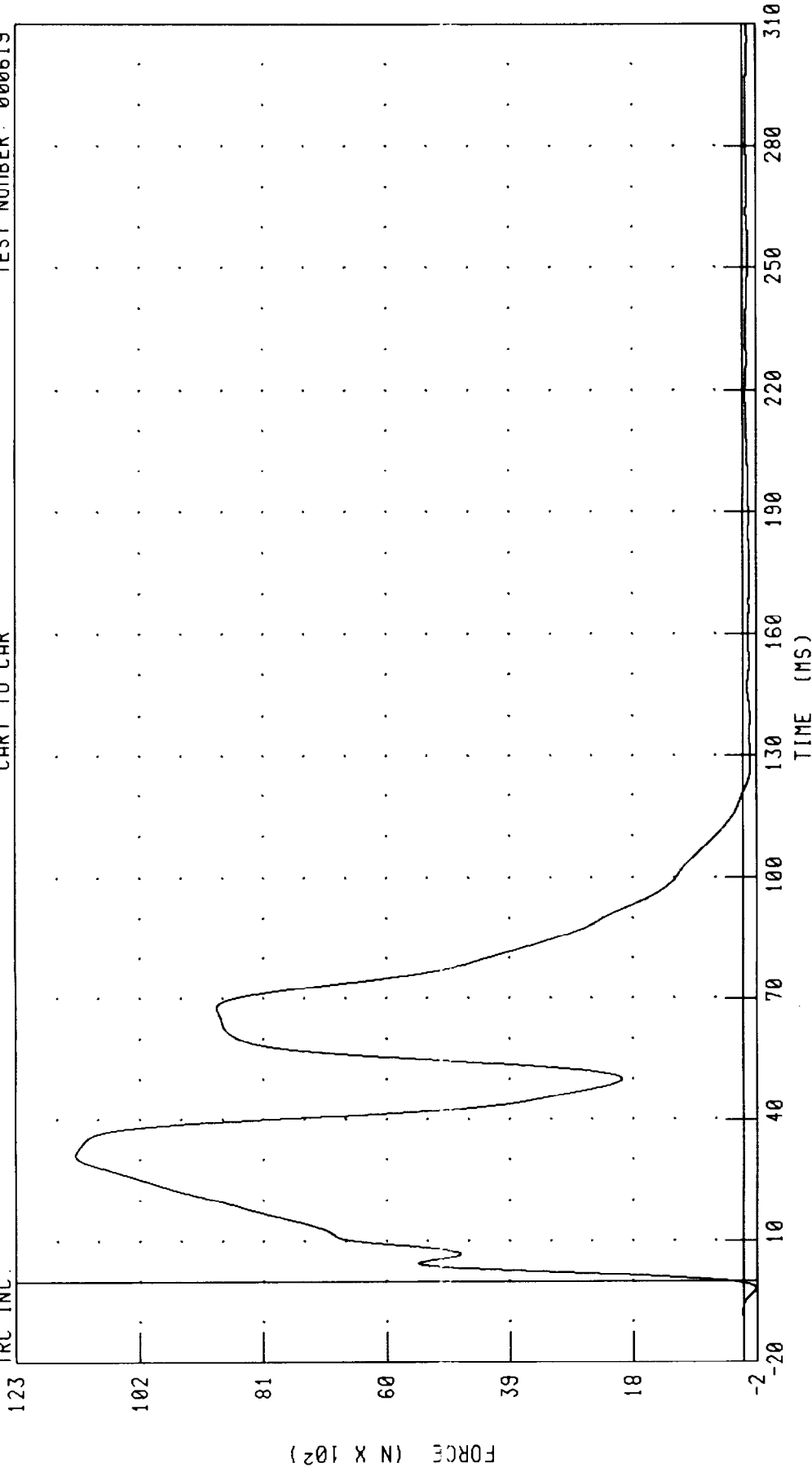


CHANNEL: BJ3ZF FILTER: CH. CLASS 60 PEAK DATA: 1491.89 N @ 7.44 MS, -750.04 N @ 56.16 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J4 X-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: BJ4XF FILTER: CH. CLASS 60

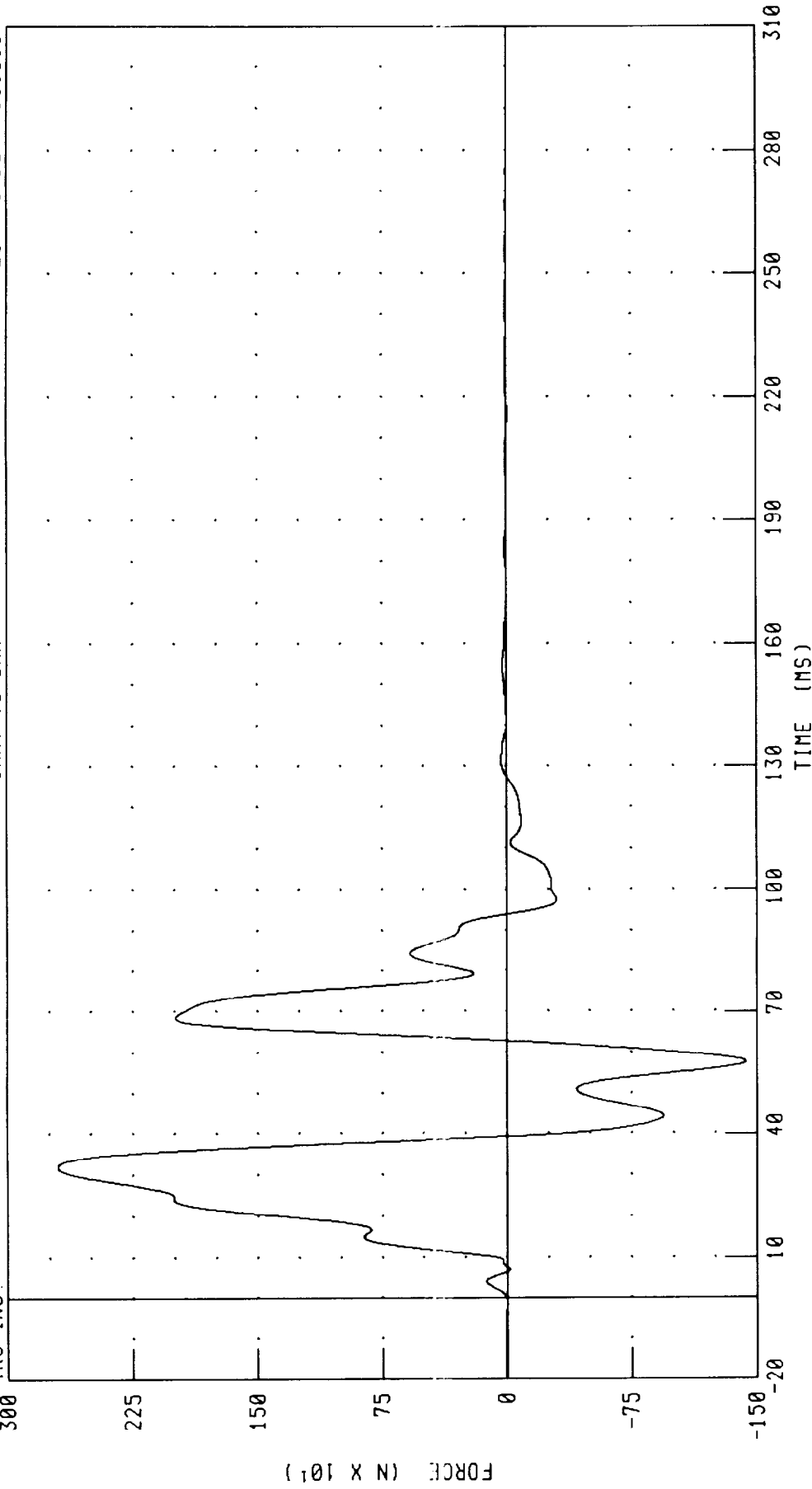
PEAK DATA: 11355.04 N @ 31.20 MS, -212.01 N @ -1.84 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J4 Y-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 2699.89 N @ 32.08 MS; -1431.57 N @ 57.68 MS

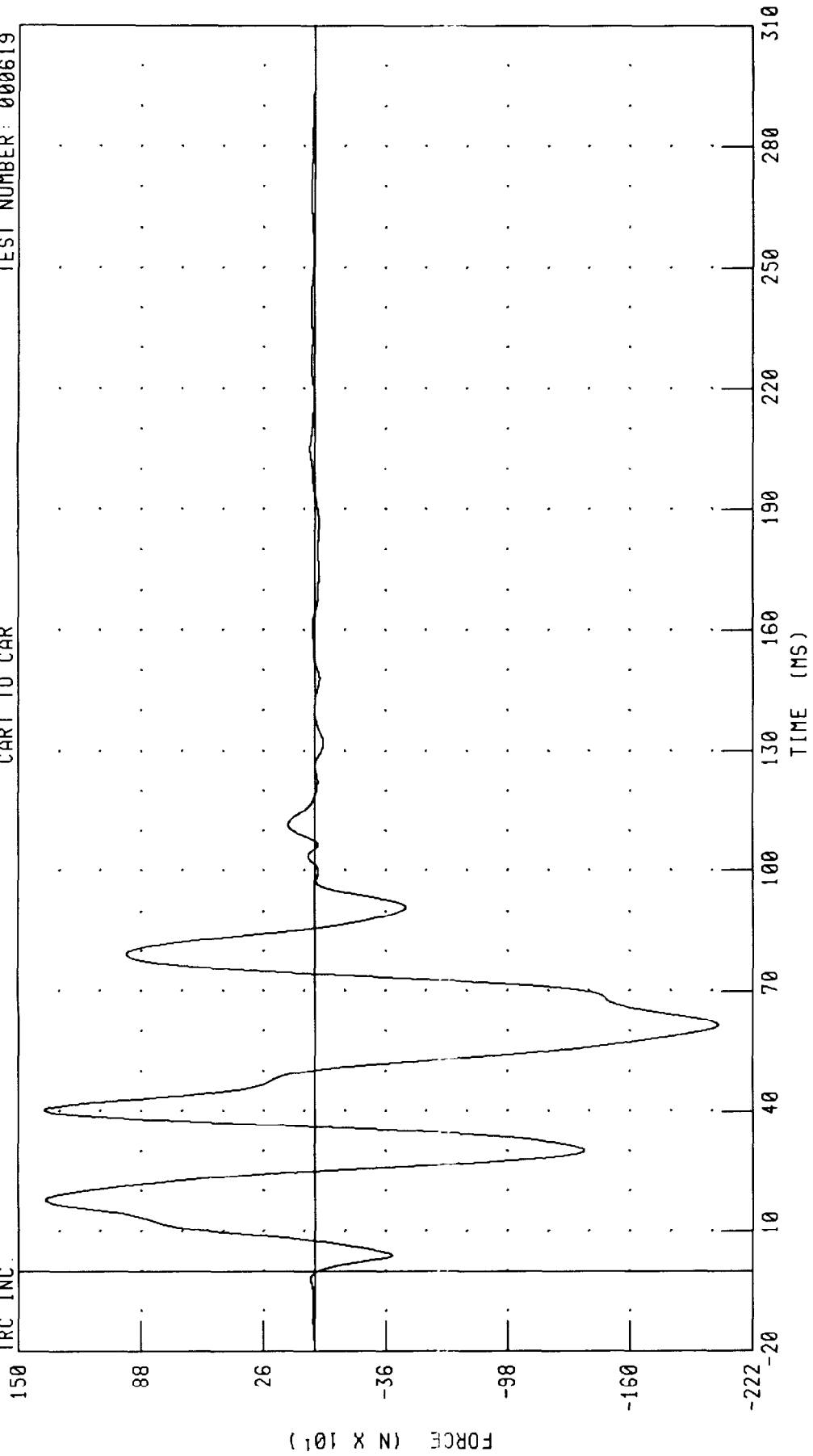
CHANNEL: BJ4YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL J4 Z-AXIS FORCE

TRC INC.

CART TO CAR

TEST NUMBER: 000619



CHANNEL: BJ4ZF FILTER: CH. CLASS 60 PEAK DATA: 1368.68 N @ 40.32 MS; -2045.03 N @ 61.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K1 X-AXIS FORCE
CART TO CAR

TRC INC

TEST NUMBER: 000619

25

15

5

-5

-15

-25

-35

-20

10

40

70

100

130

160

190

220

250

280

310

TIME (MS)

See Data Acquisition Explanations

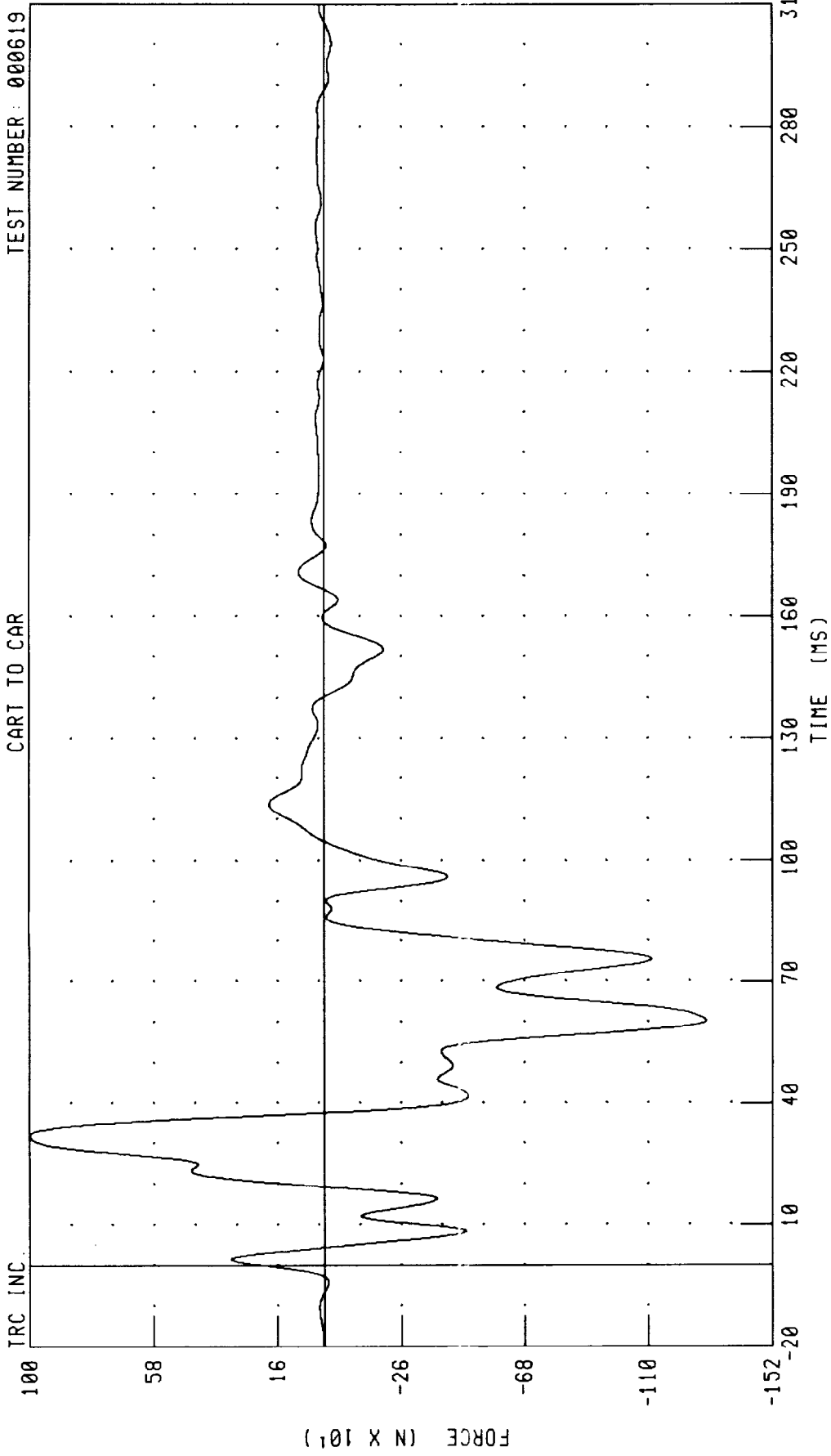
FORCE (N X 10²)

CHANNEL: BK1XF FILTER: CH. CLASS 60 PEAK DATA: 2334.04 N @ 71.60 MS; -3341.47 N @ 11.20 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K1 Y-AXIS FORCE
CART TO CAR

TEST NUMBER: 000619

TRC INC.



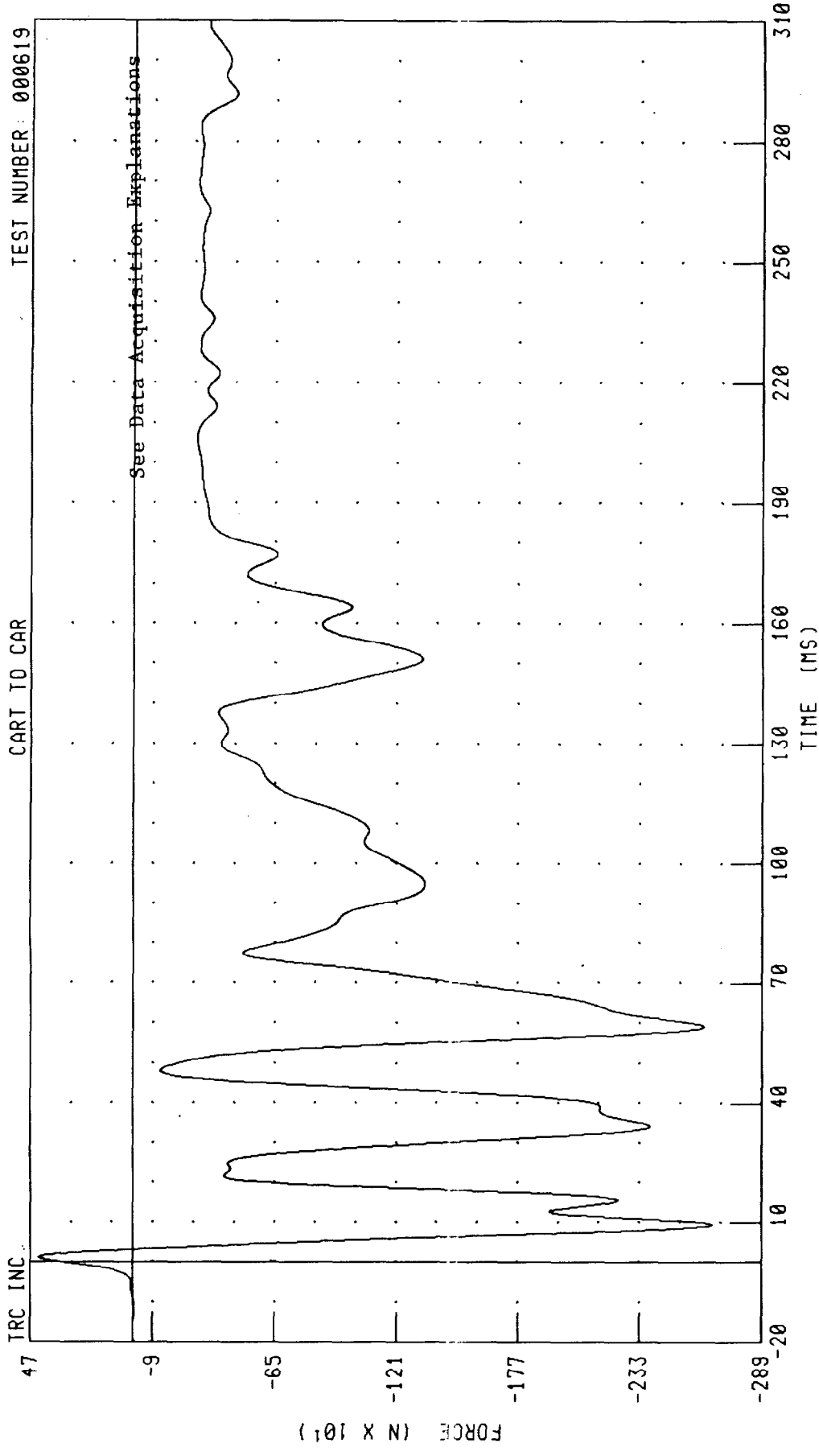
CHANNEL: BK1YF FILTER: CH. CLASS 60 PEAK DATA: 998.00 N @ 31.92 MS; -1296.12 N @ 60.32 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K1 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

See Data Acquisition Explanations

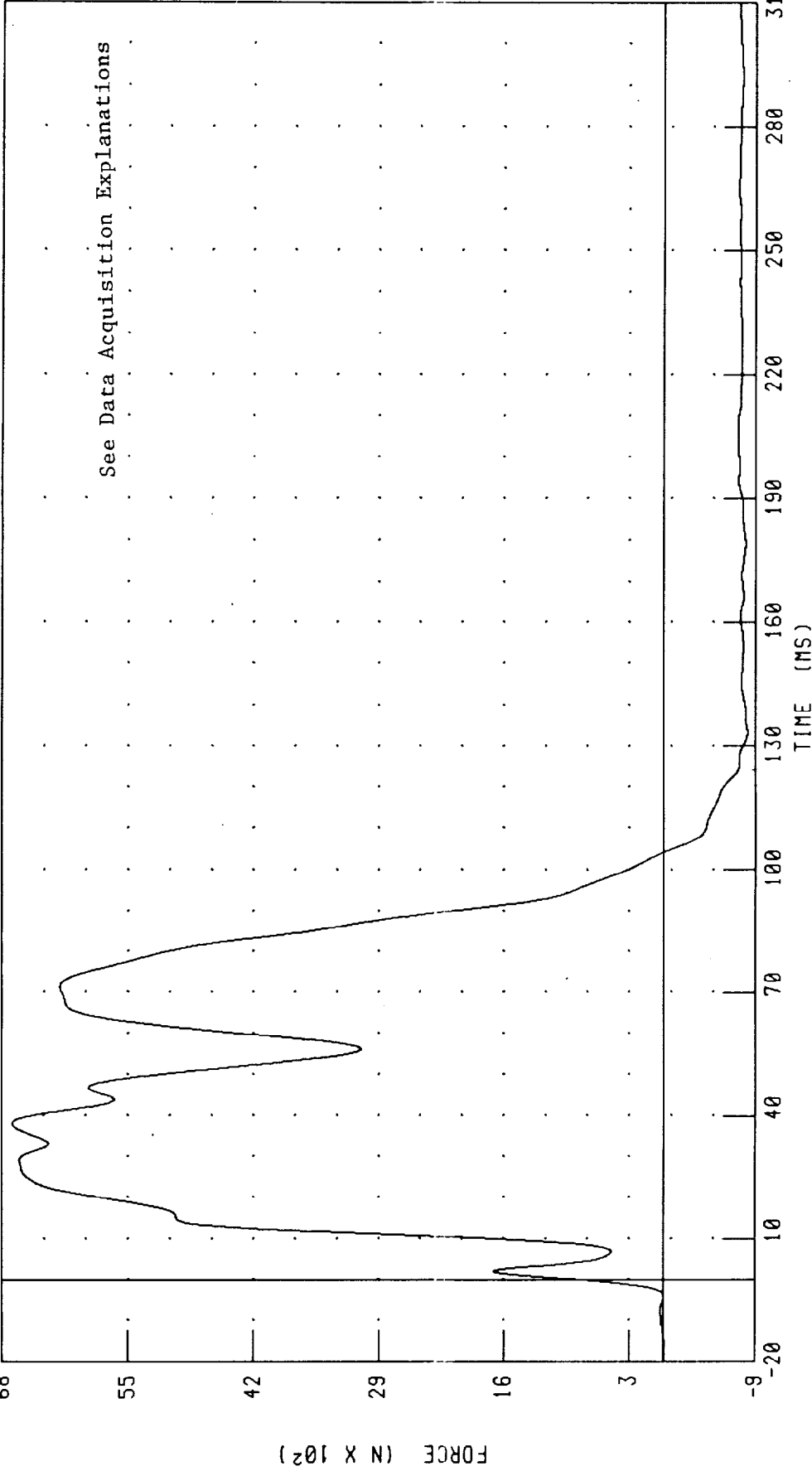


CHANNEL: BK1ZF FILTER: CH. CLASS 60 PEAK DATA: 432.00 N @ 1.20 MS, -2663.43 N @ 9.36 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K2 X-AXIS FORCE

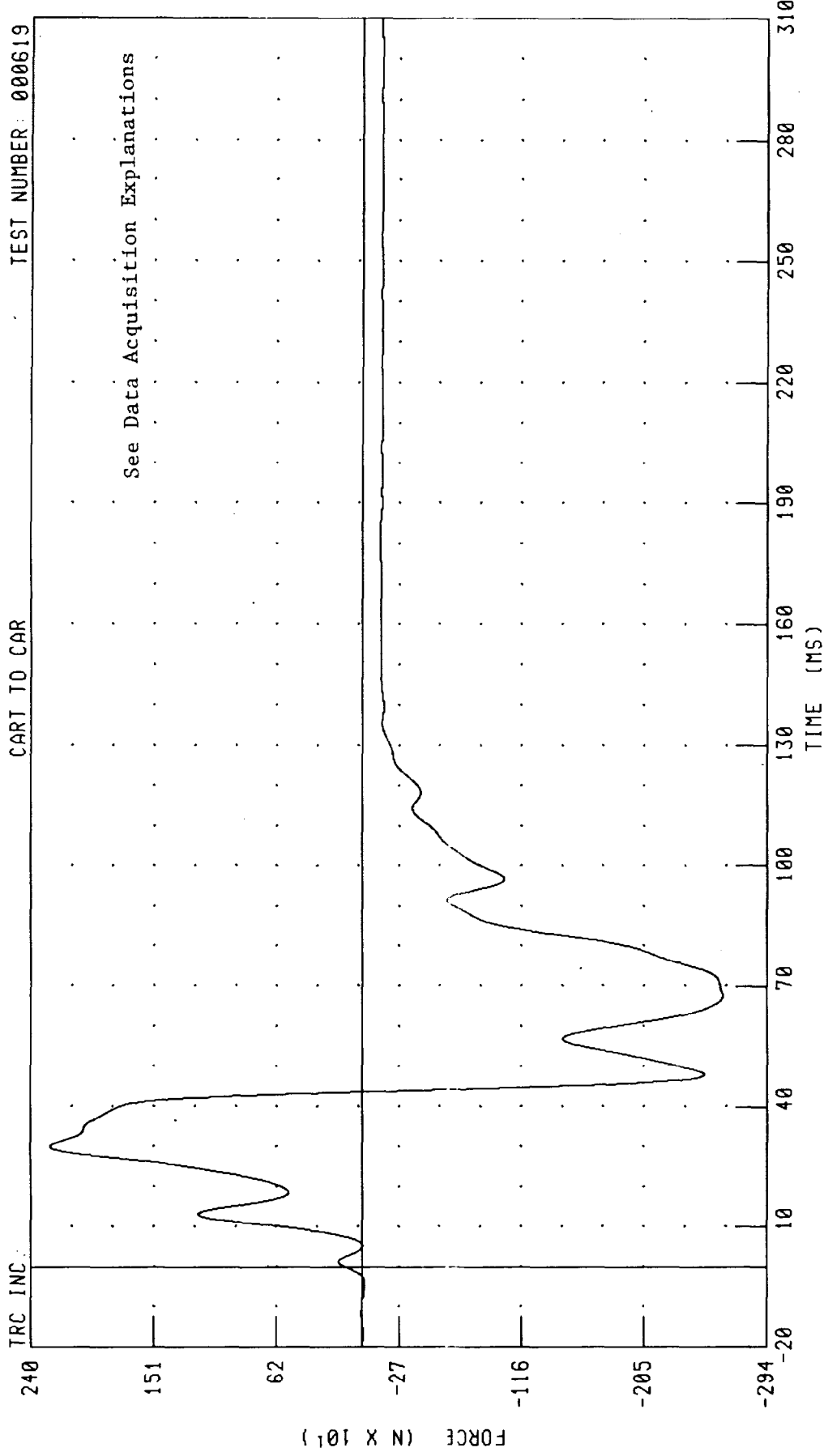
TRC INC. TEST NUMBER: 000619

CART TO CAR



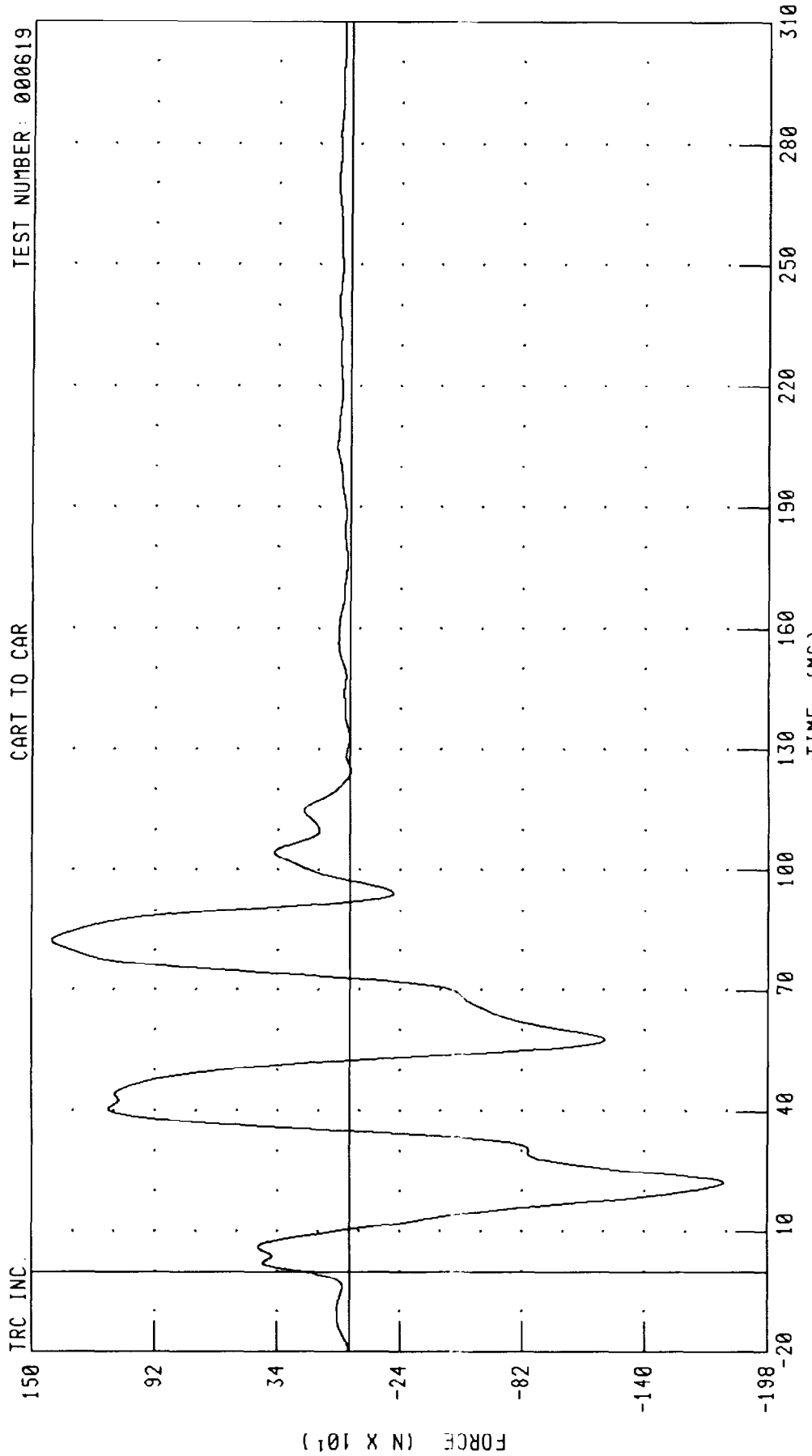
CHANNEL: BK2XF FILTER: CH. CLASS 60 PEAK DATA: 6752.53 N @ 38.16 MS, -860.38 N @ 133.20 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K2 Y-AXIS FORCE



CHANNEL: BK2YF FILTER: CH. CLASS 60 PEAK DATA: 2259.70 N @ 30.00 MS; -2623.09 N @ 67.68 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K2 Z-AXIS FORCE



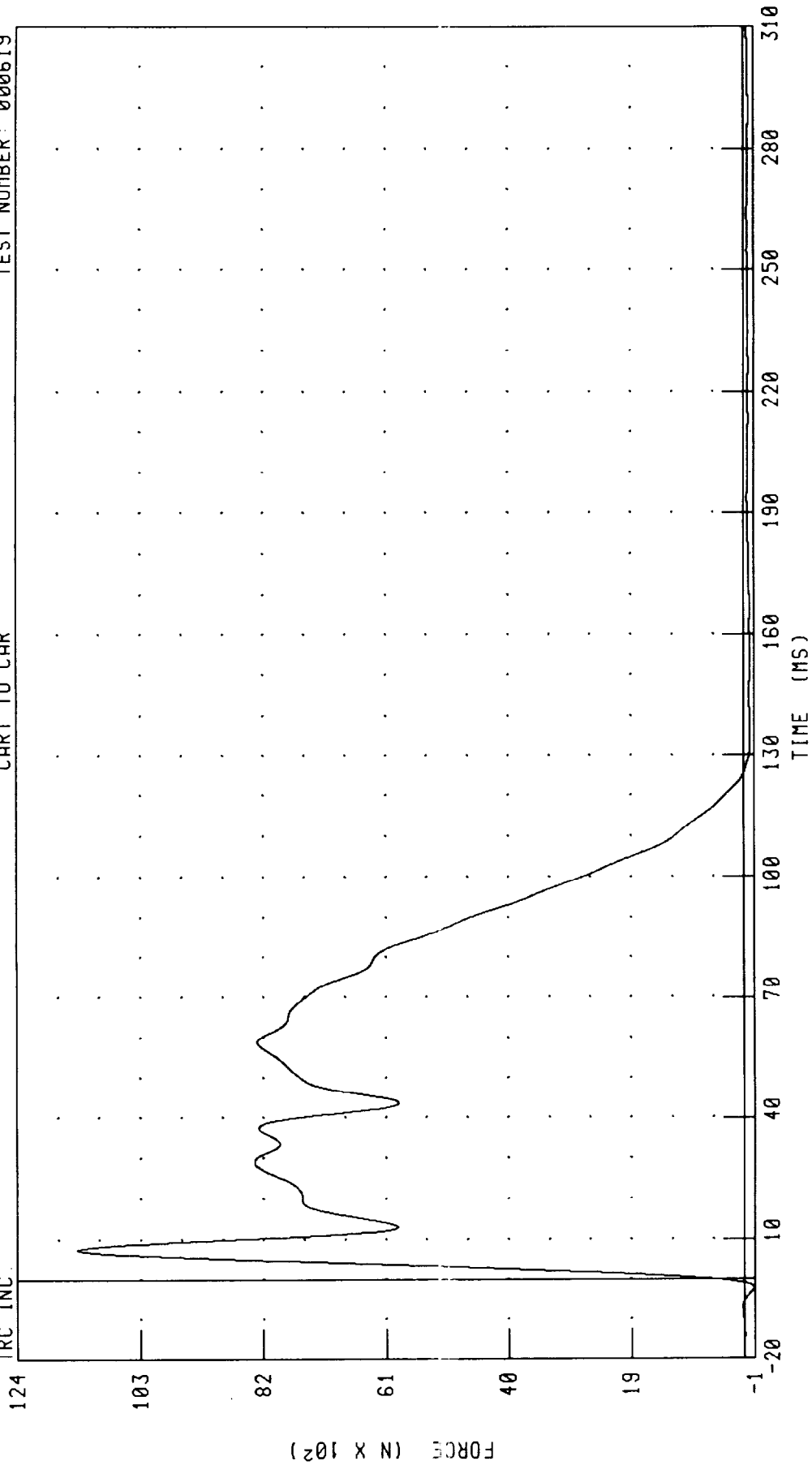
CHANNEL: BK2ZF FILTER: CH. CLASS 60 PEAK DATA: 1405.25 N @ 82.56 MS; -1772.56 N @ 22.16 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K3 X-AXIS FORCE

TEST NUMBER: 000619

CART TO CAR

TRC INC.



PEAK DATA: 11414.42 N @ 7.44 MS, -165.62 N @ -2.24 MS

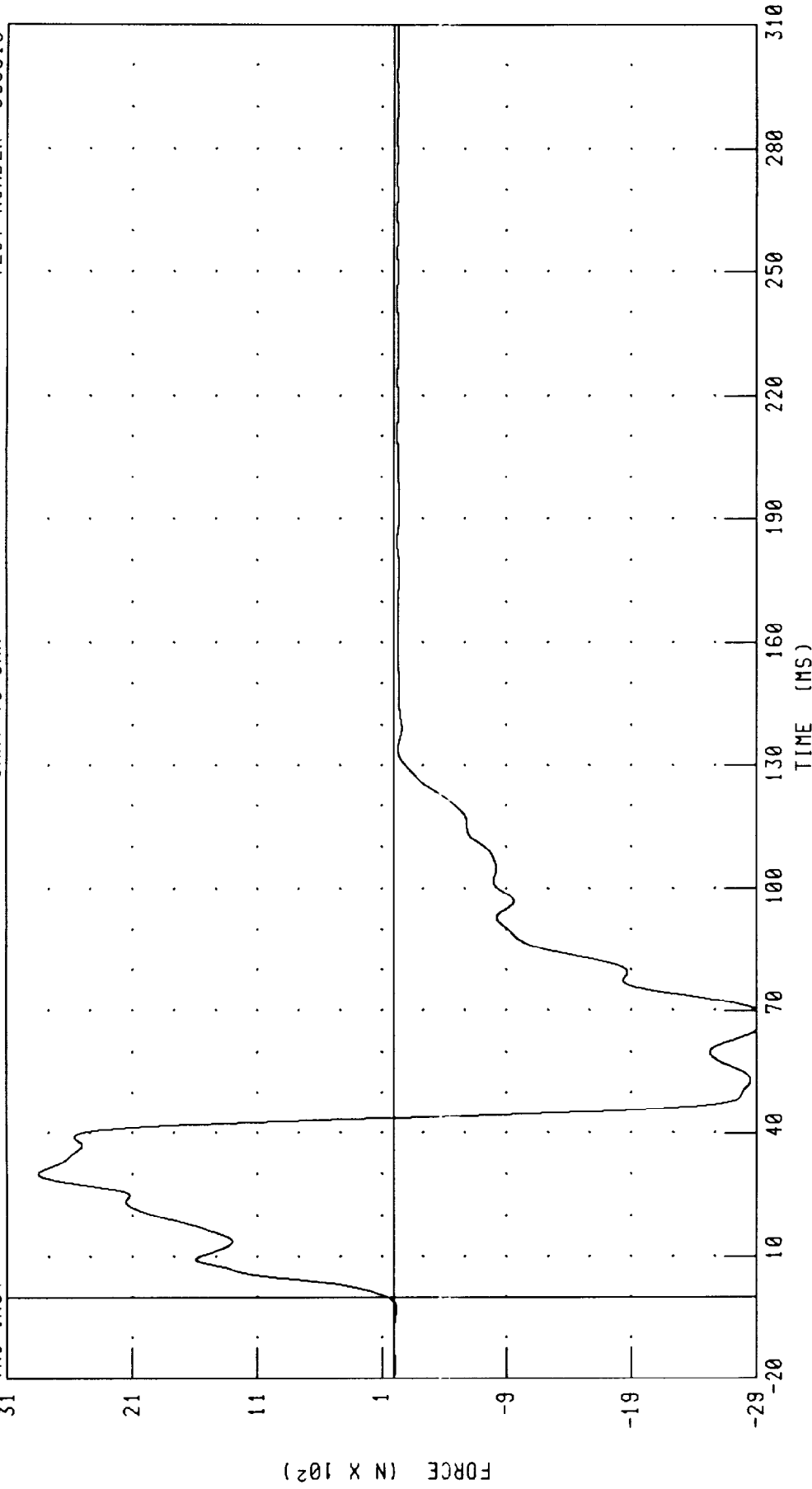
CHANNEL: BK3XF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K3 Y-AXIS FORCE

TRC INC

CART TO CAR

TEST NUMBER: 000619



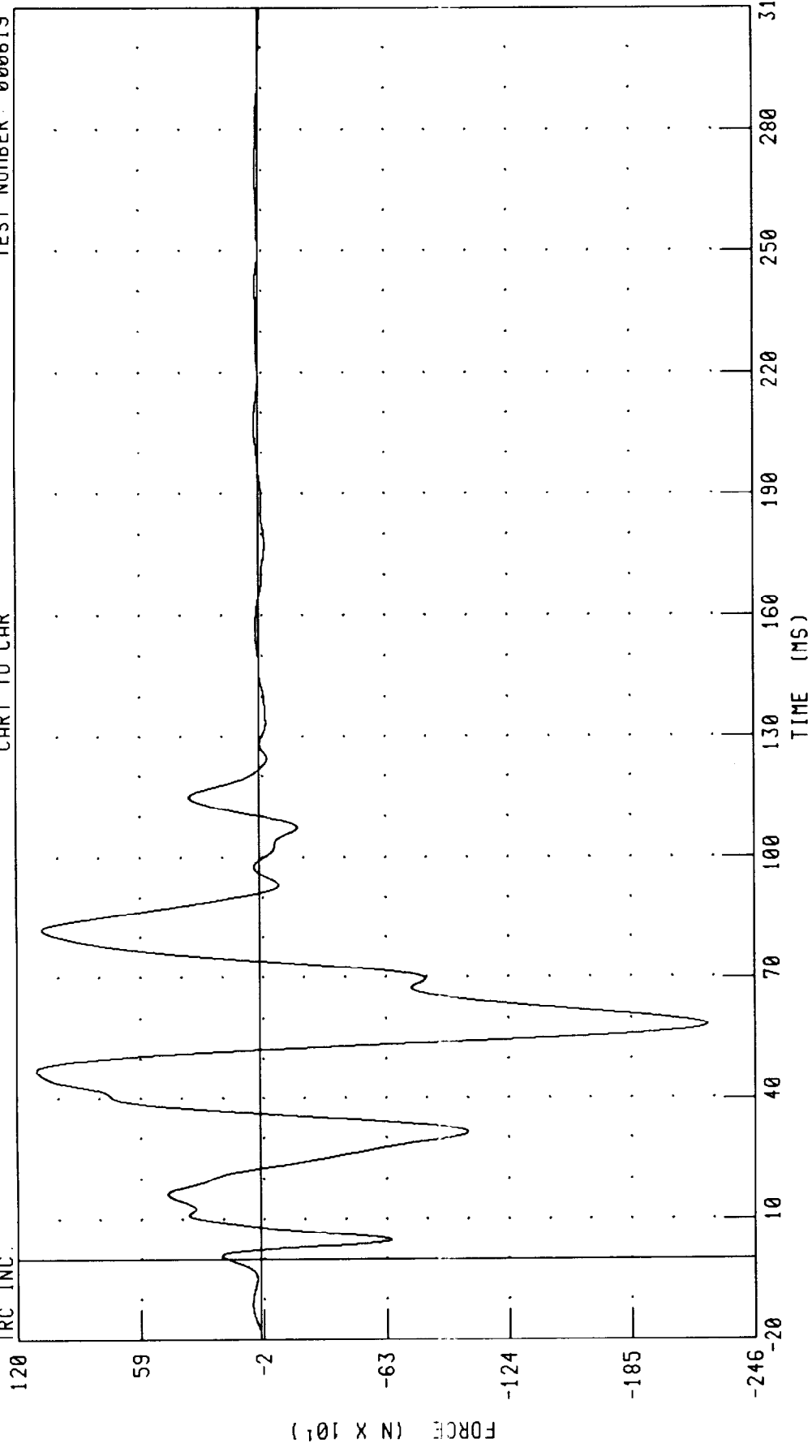
PEAK DATA: 2848.64 N @ 30.08 MS, -2982.07 N @ 67.44 MS

CHANNEL: BK3YF FILTER: CH. CLASS 60

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K3 Z-AXIS FORCE

TRC INC. TEST NUMBER: 000619

CART TO CAR

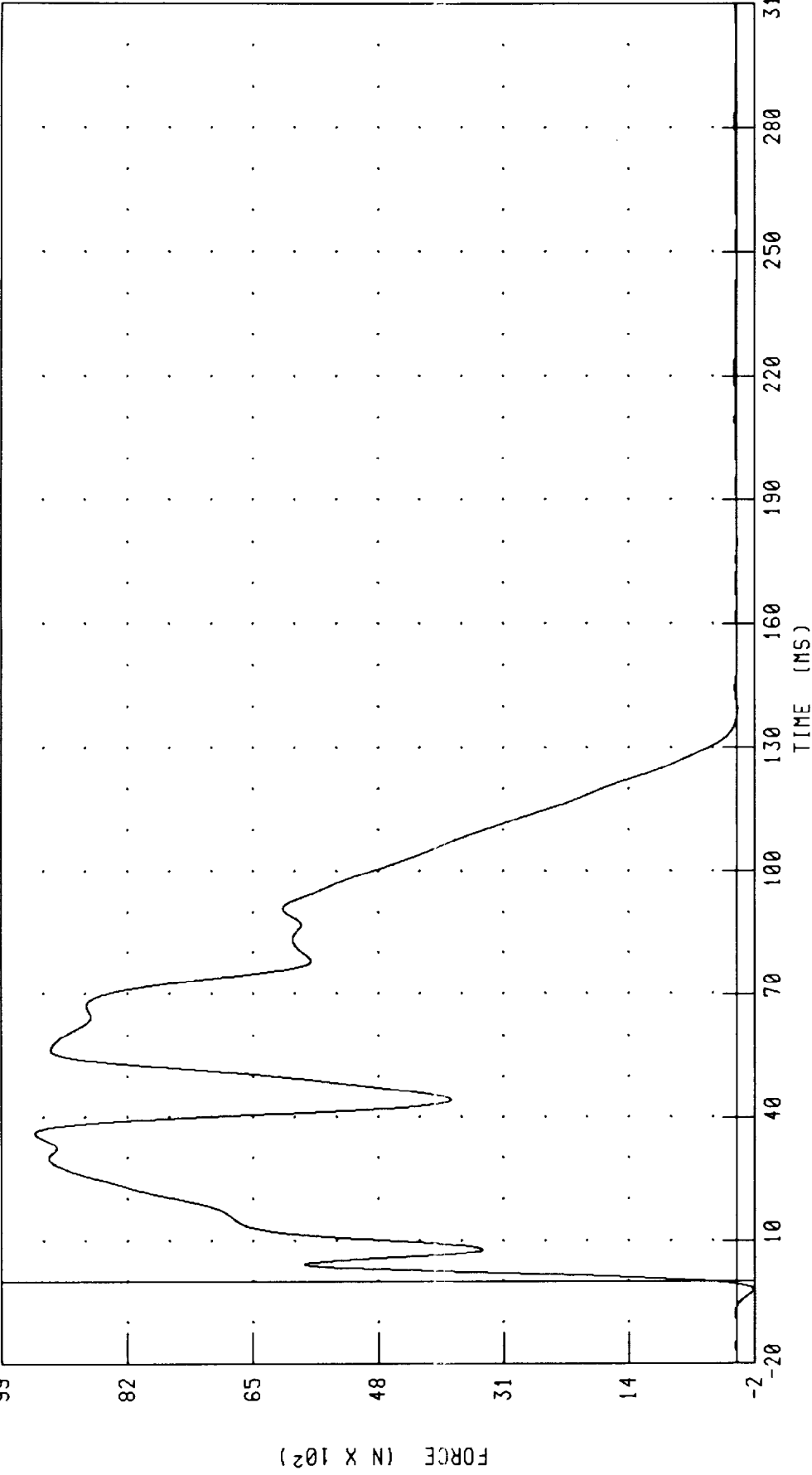


CHANNEL: BK3ZF FILTER: CH. CLASS 60 PEAK DATA: 1104.95 N @ 47.12 MS; -2226.25 N @ 58.32 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K4 X-AXIS FORCE
CART TO CAR

TEST NUMBER: 000619

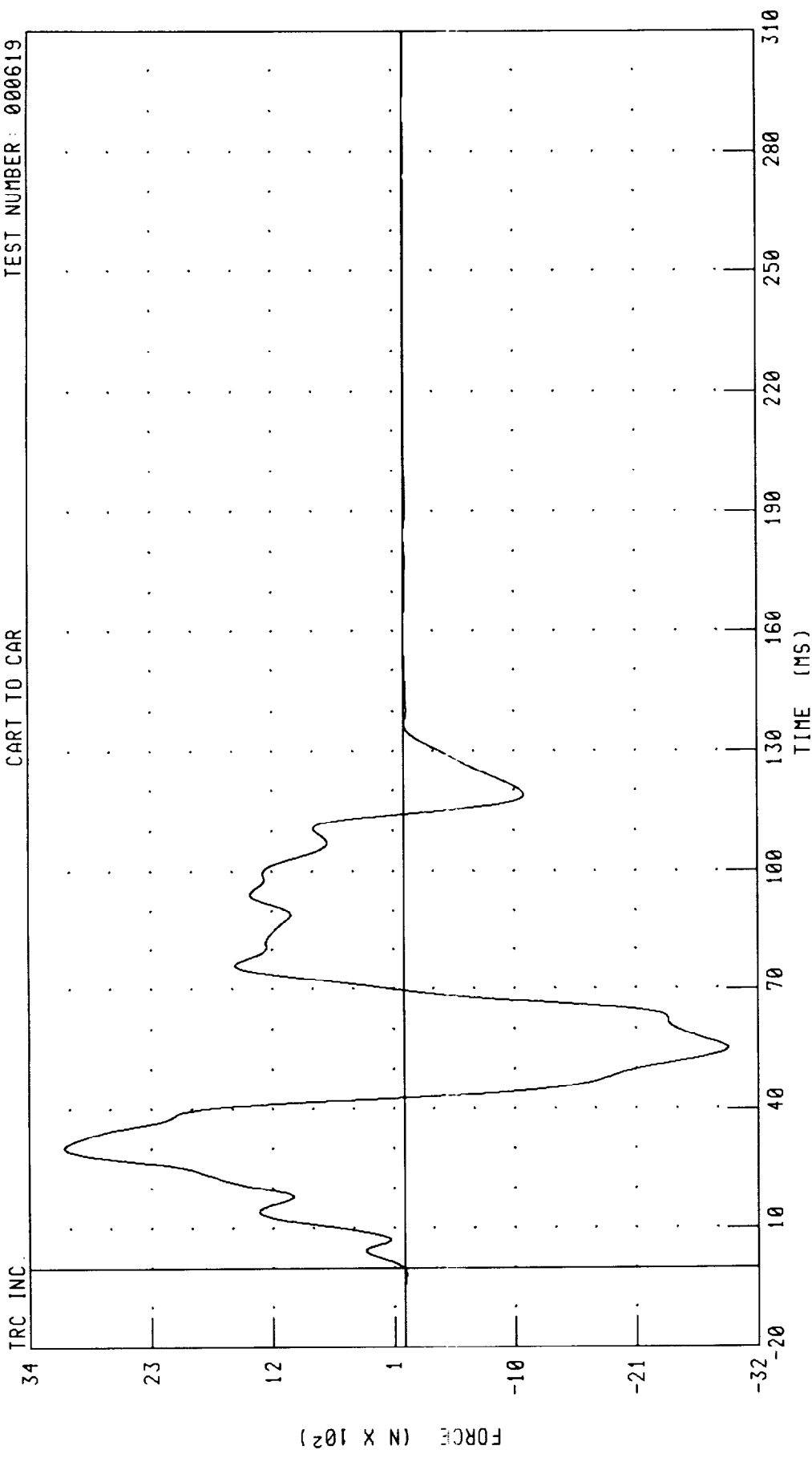
TRC INC.



CHANNEL: BK4XF FILTER: CH. CLASS 60 PEAK DATA: 9506.86 N @ 36.16 MS, -223.53 N @ -2.00 MS

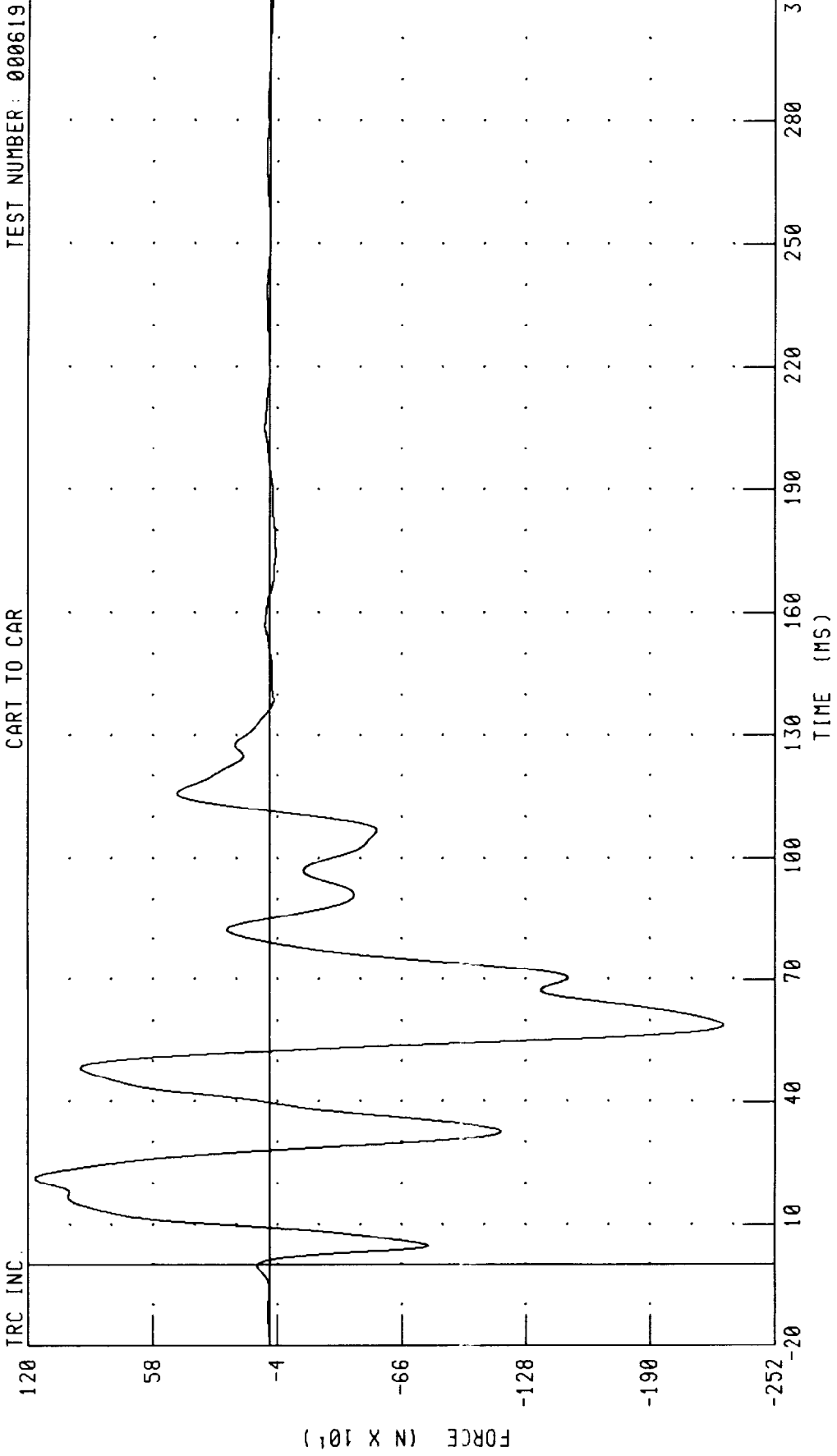
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K4 Y-AXIS FORCE
CART TO CAR

TEST NUMBER: 000619



CHANNEL: BK4YF FILTER: CH. CLASS 60 PEAK DATA: 3082.73 N @ 30.32 MS; -2930.76 N @ 55.04 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LOAD CELL K4 Z-AXIS FORCE
CART TO CAR



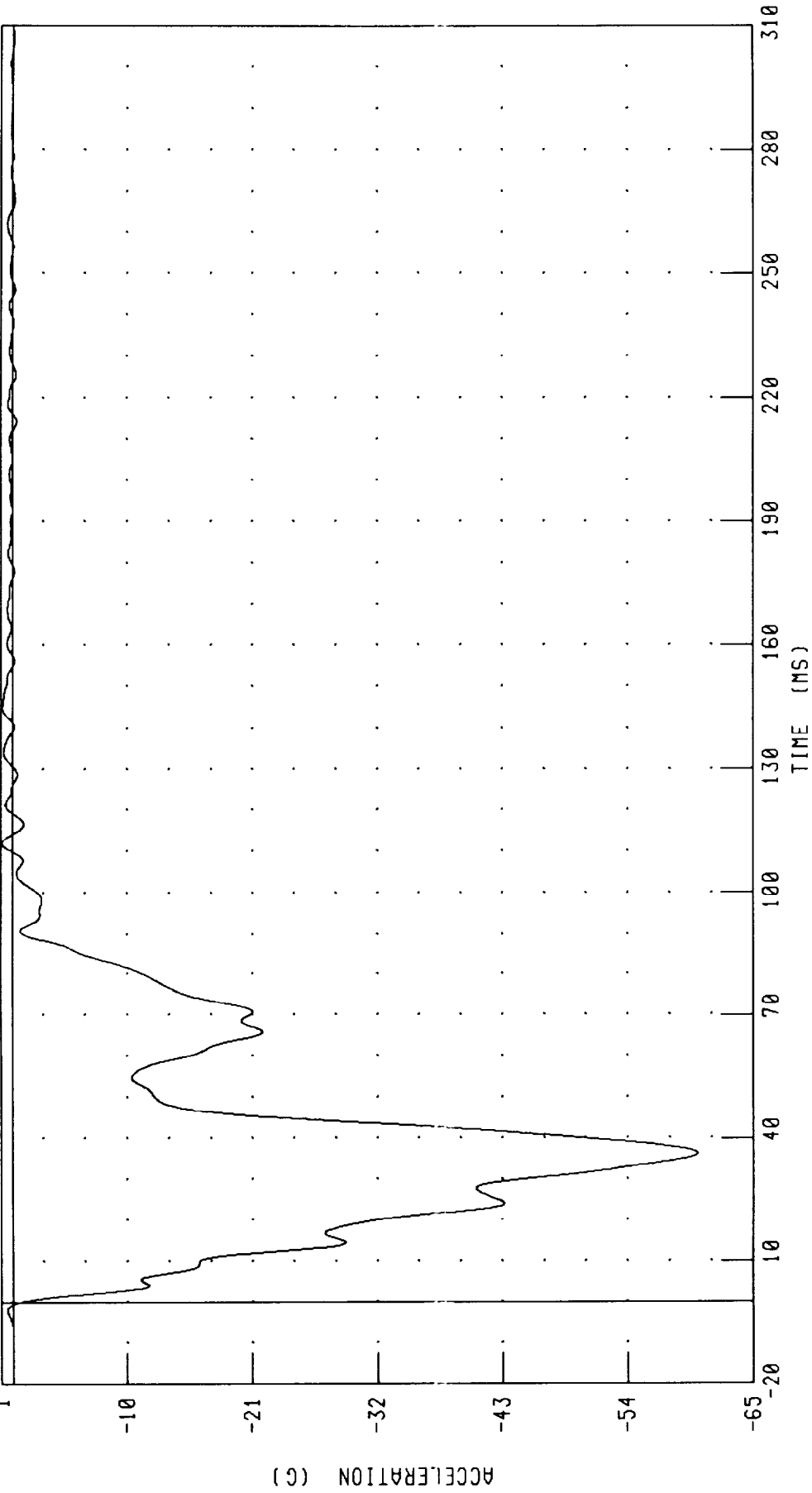
CHANNEL: BK4ZF FILTER: CH. CLASS 60 PEAK DATA: 1165.75 N @ 21.36 MS, -2265.43 N @ 58.80 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION

TEST NUMBER: 000619

CART TO CAR

1 TRC INC.



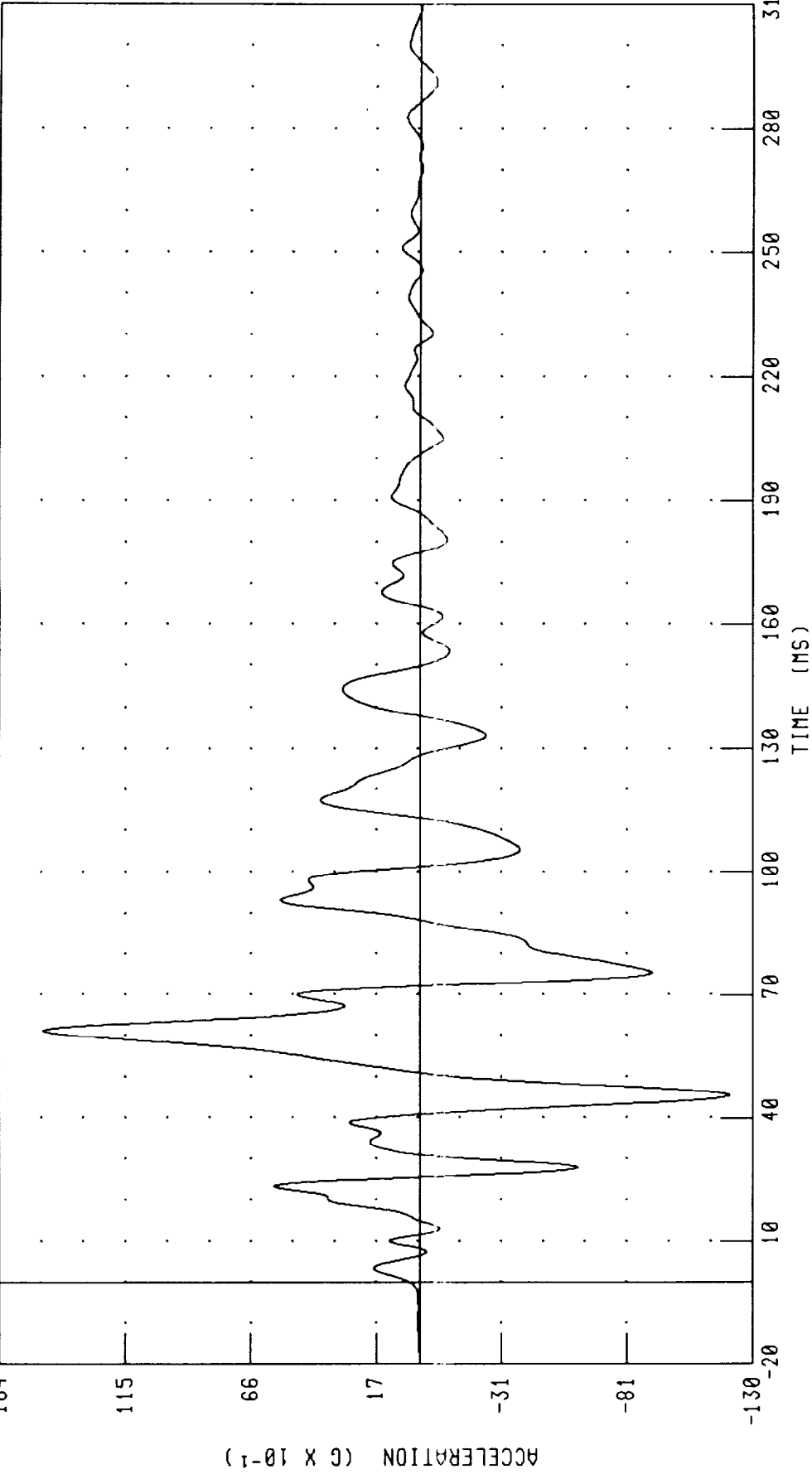
CHANNEL: BCCXG1 FILTER: CH. CLASS 60

PEAK DATA: 0.93 G @ 112.00 MS, -60.13 G @ 36.32 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION
CART TO CAR

TEST NUMBER: 000619

TRC INC.

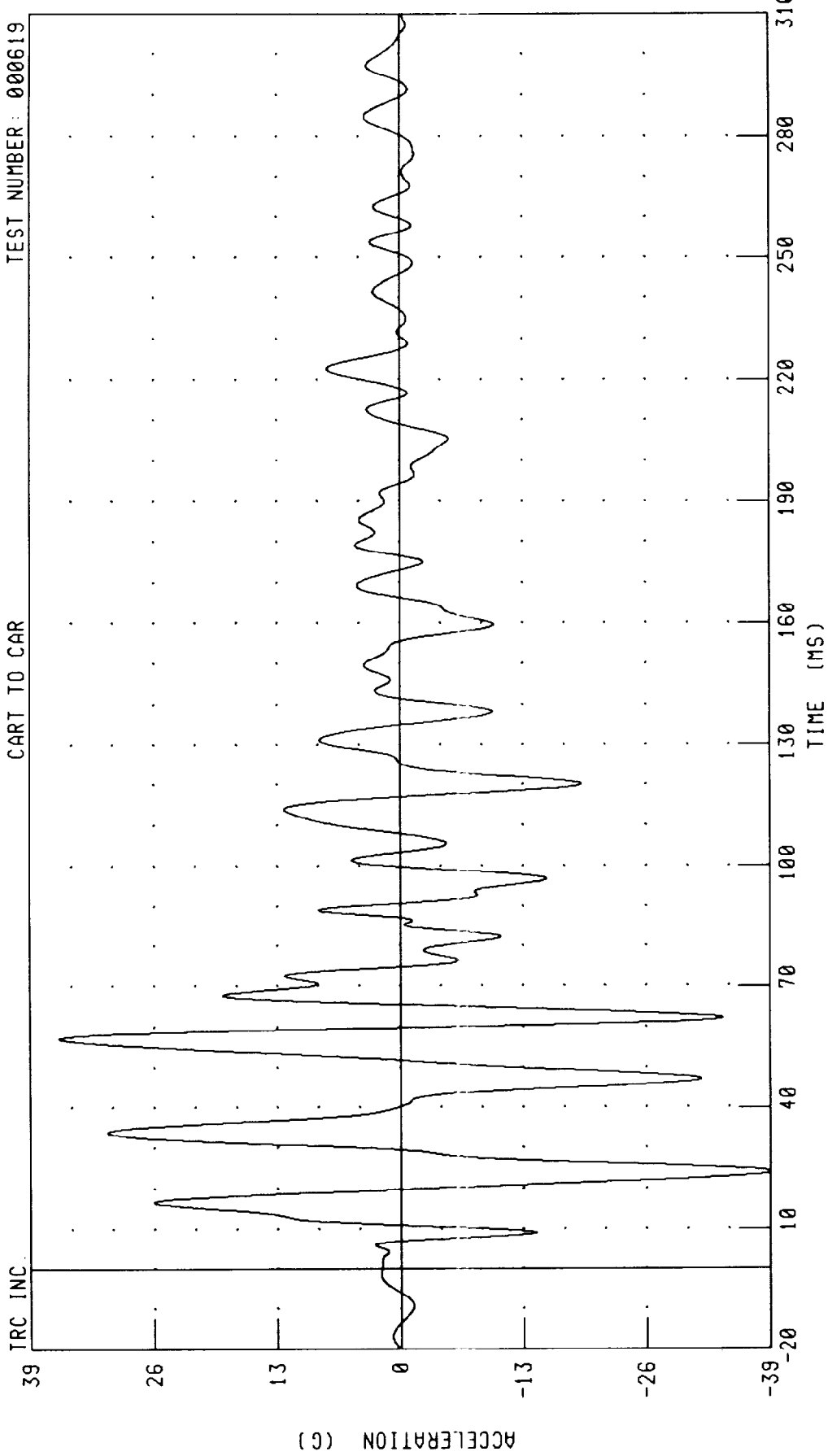


CHANNEL: BCCYG1 FILTER: CH. CLASS 60 PEAK DATA: 14.70 G @ 61.12 MS, -12.11 G @ 45.52 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION

TRC INC. TEST NUMBER: 000619

CART TO CAR

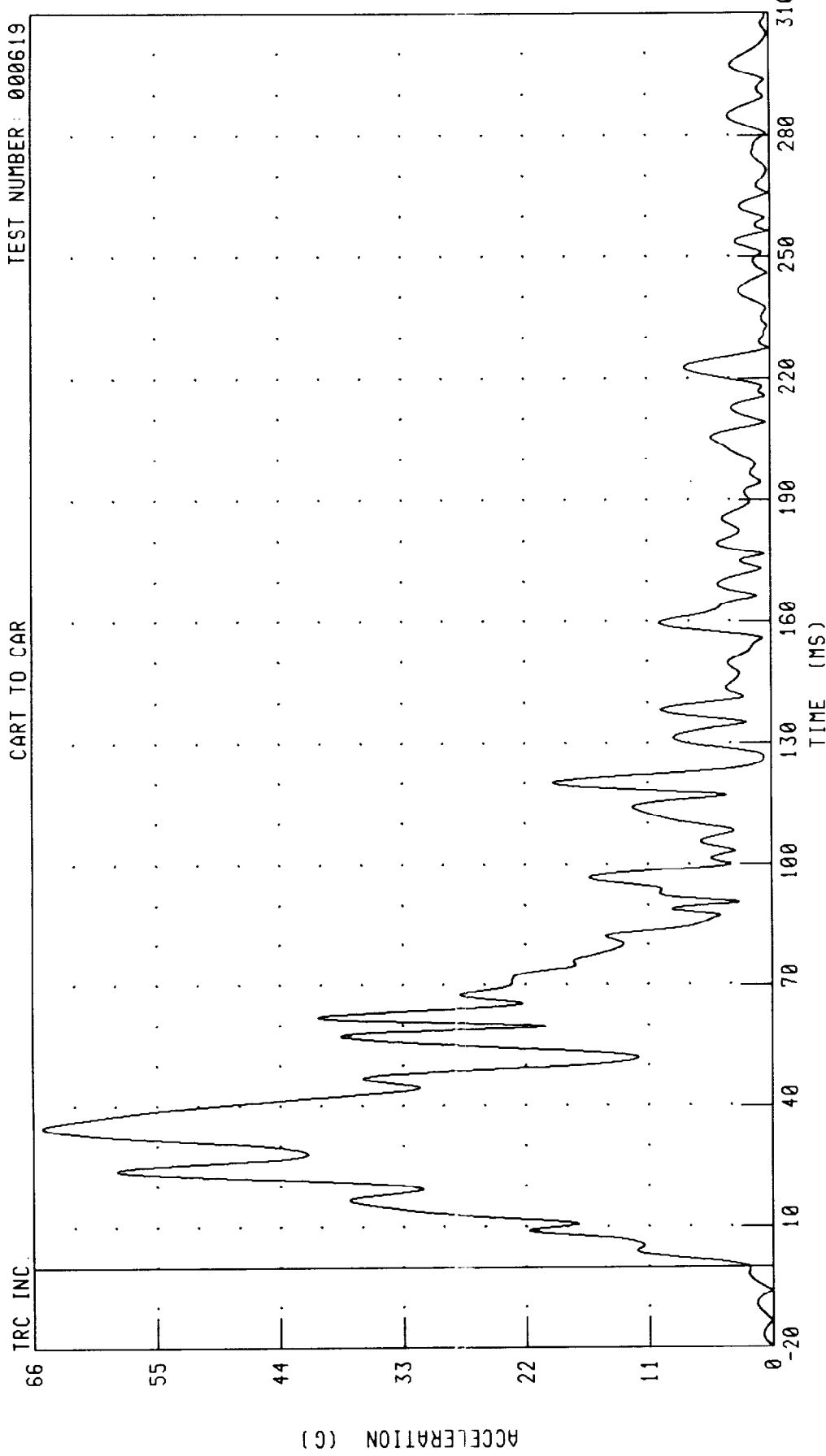


CHANNEL: BCCZG1 FILTER: CH. CLASS 60

PEAK DATA: 35.98 G @ 57.20 MS, -39.31 G @ 24.08 MS

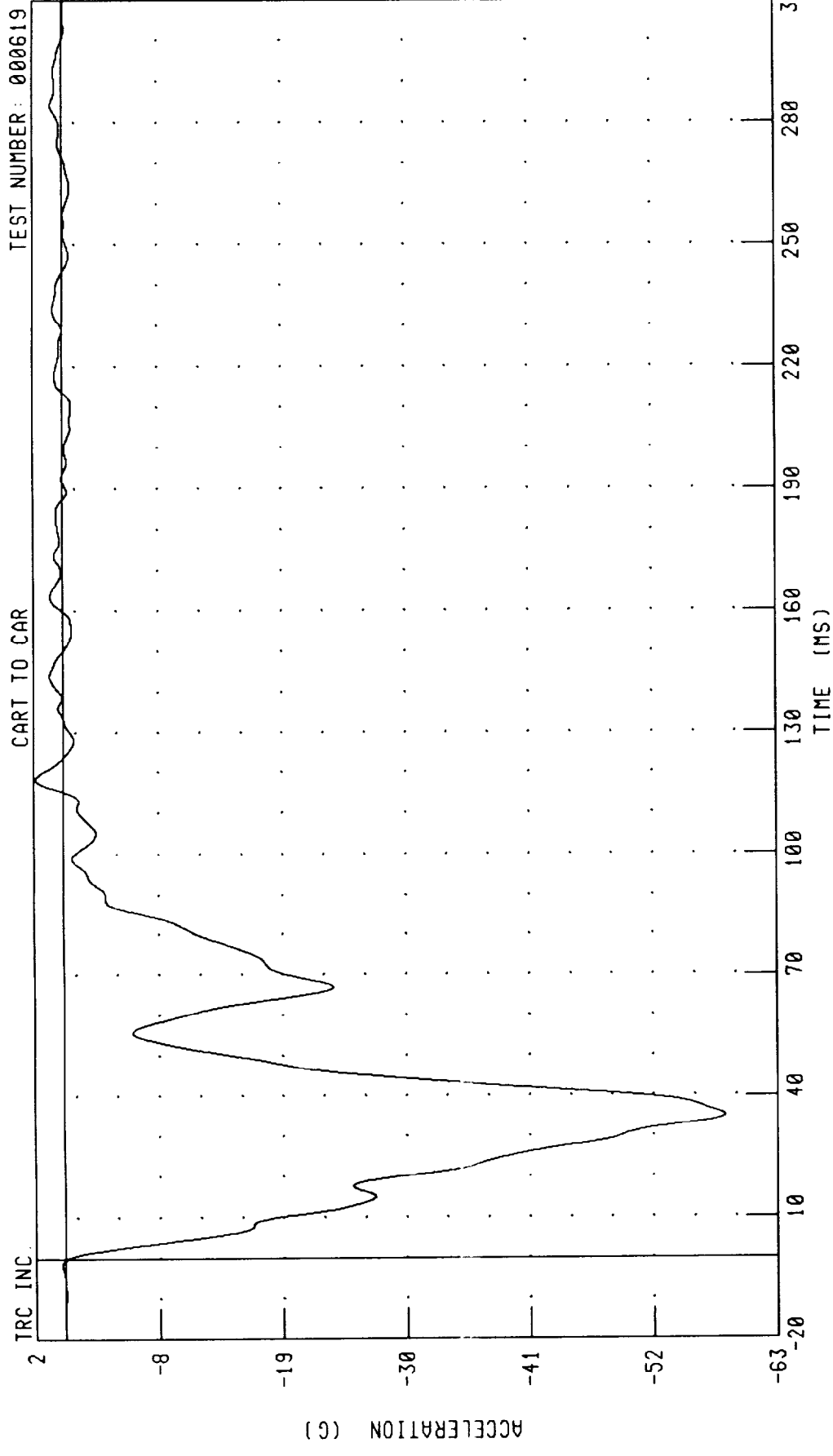
MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER CENTER OF GRAVITY RESULTANT
CART TO CAR

TEST NUMBER: 000619



CHANNEL: BCCRG1 FILTER: CH. CLASS 60 PEAK DATA: 65.21 G @ 34.80 MS, 0.03 G @ -13.68 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LEFT REAR FRAME X-AXIS ACCELERATION



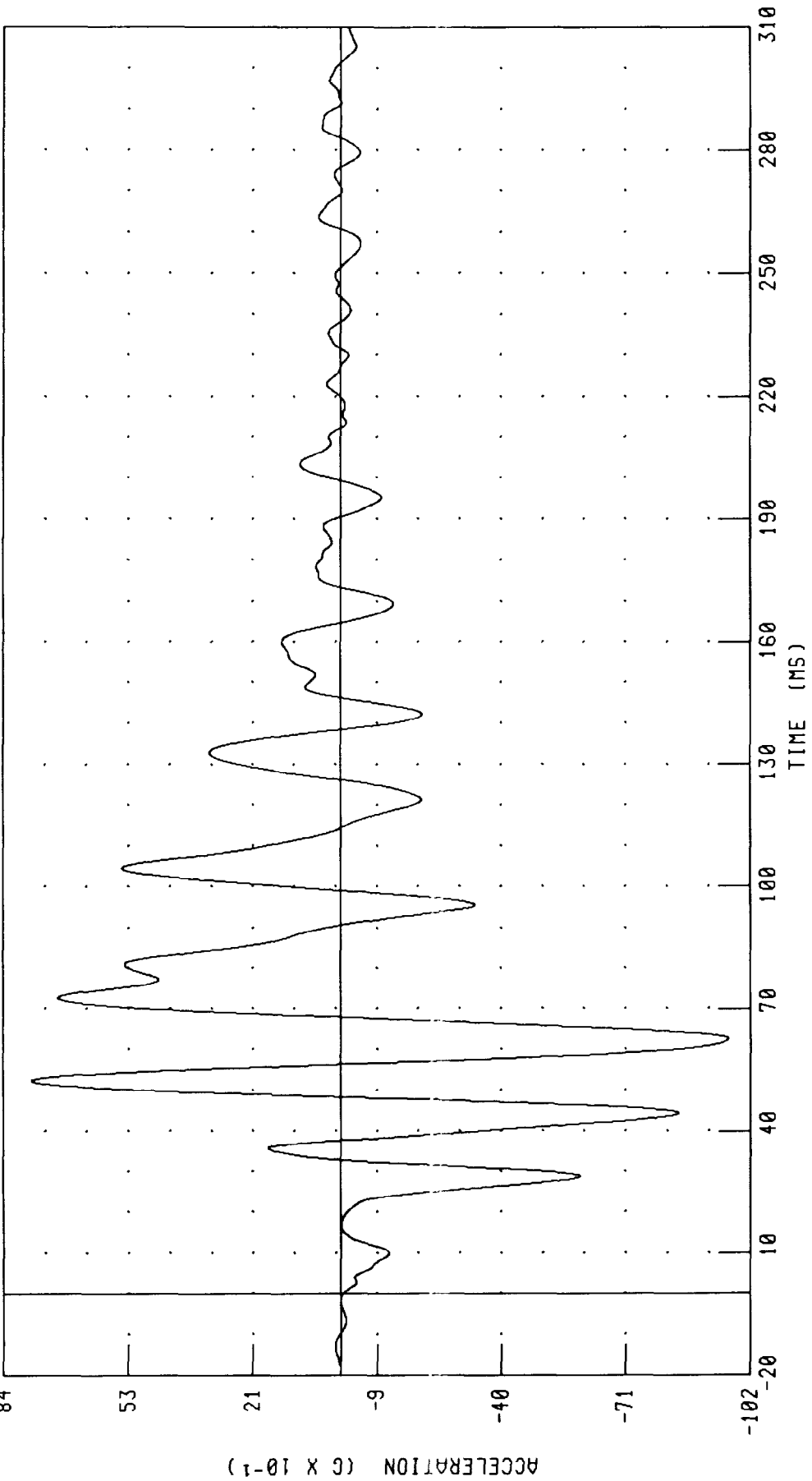
CHANNEL: BLRXG1 FILTER: CH. CLASS 60 PEAK DATA: 2.45 G @ 118.48 MS; -58.77 G @ 35.12 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER LEFT REAR FRAME Y-AXIS ACCELERATION

TRC INC.

CART TO CAR

TEST NUMBER: 000619

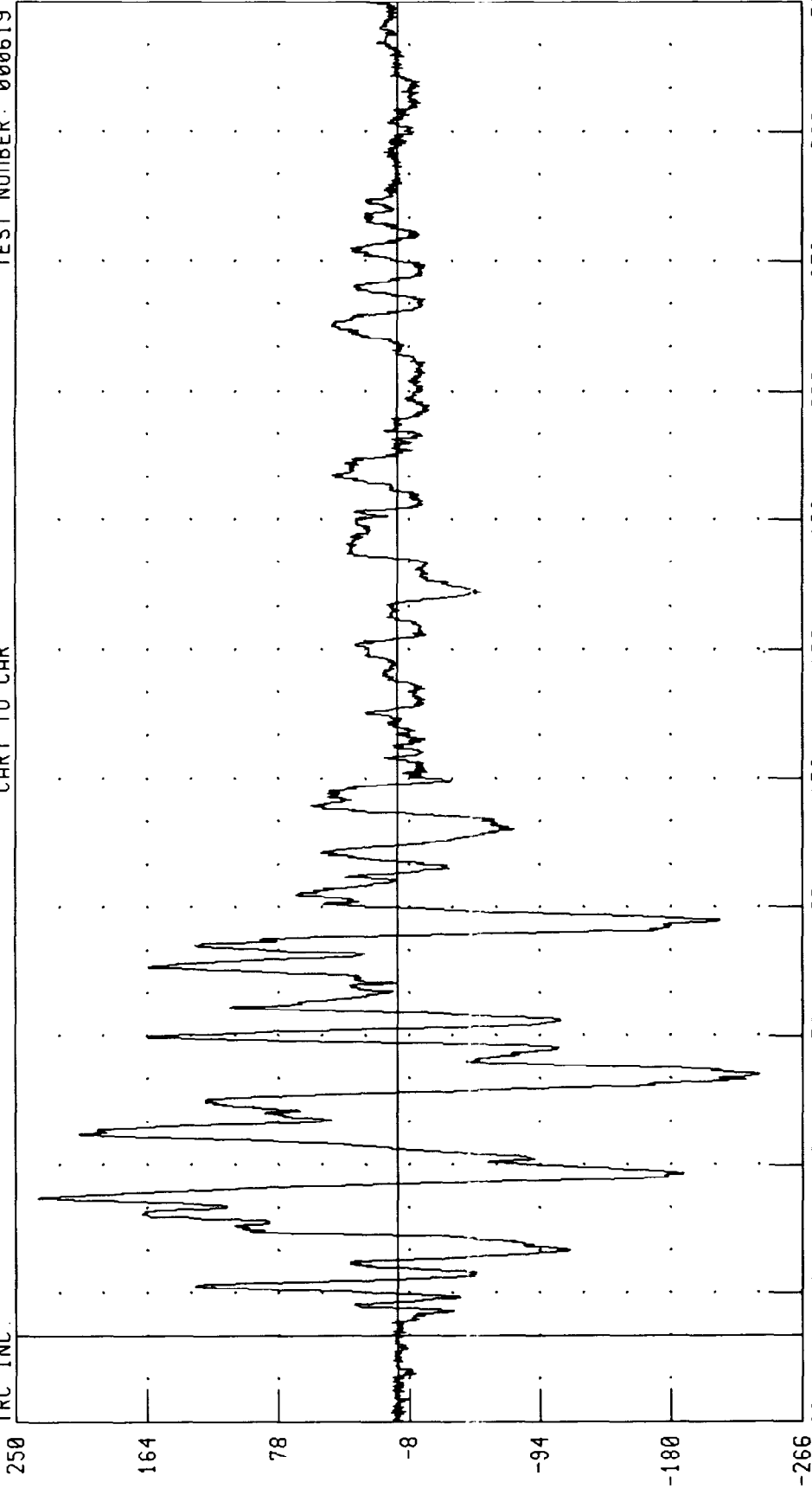


CHANNEL: BLRYG1 FILTER: CH. CLASS 60 PEAK DATA: 7.70 G @ 52.40 MS, -9.66 G @ 62.56 MS

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER PITCH
CART TO CAR

TRC INC. TEST NUMBER: 000619

250



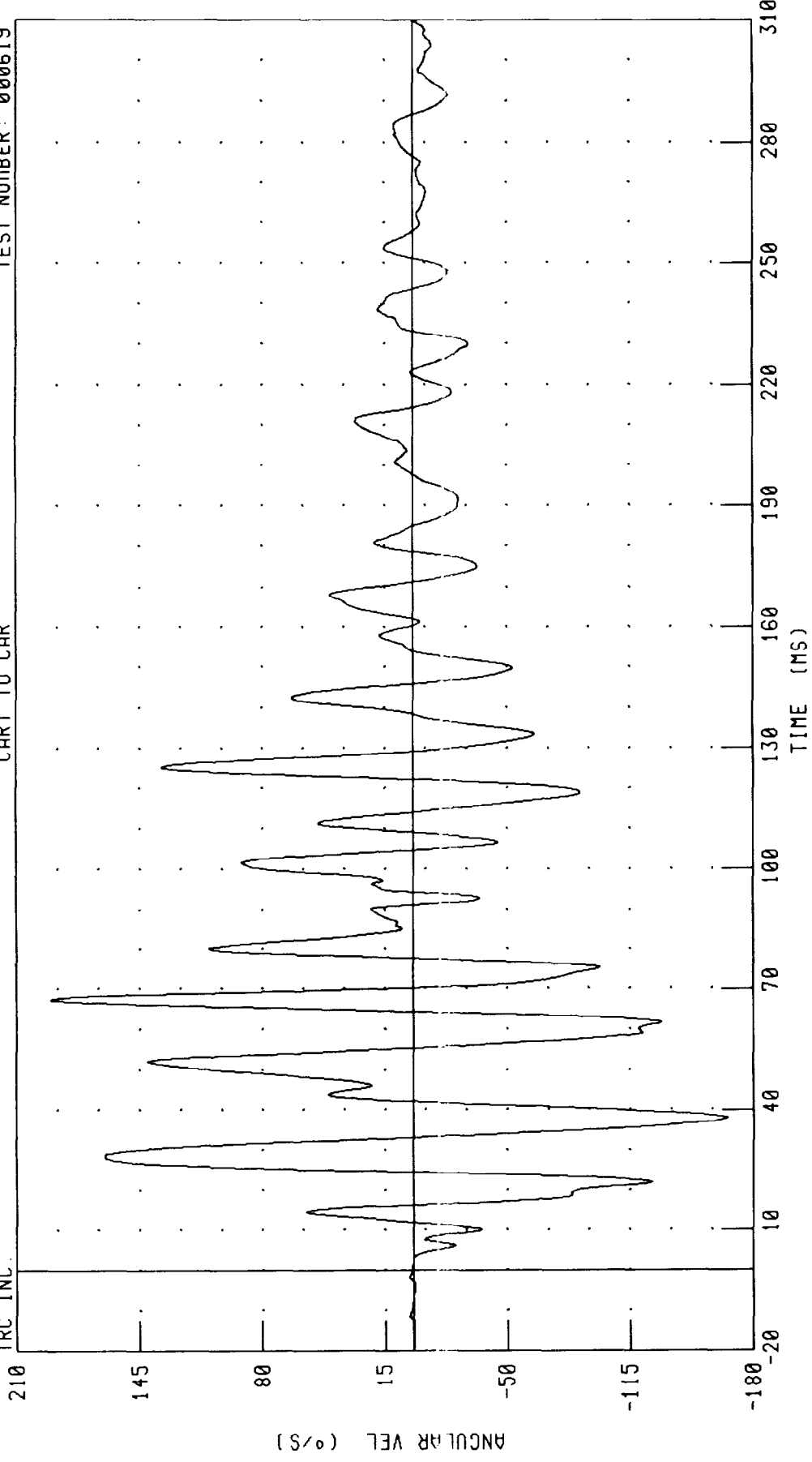
PEAK DATA: 235.65 °/S @ 32.40 MS, -237.90 °/S @ 60.96 MS

CHANNEL: VCGYV1 FILTER: CH. CLASS 1000

MOVING DEFORMABLE BARRIER INTO 1997 DODGE CARAVAN AT 35 MPH CENTERLINE TO CENTERLINE
MOVING BARRIER YAW

TRC INC. TEST NUMBER: 000619

CART TO CAR



CHANNEL: VCGZV1 FILTER: CH. CLASS 1000 PEAK DATA: 192.08 °/S @ 67.36 MS, -166.50 °/S @ 37.92 MS

Appendix C

Dummy Certification Data

Pre-Test Calibration

Target Vehicle Driver Dummy S/N 045

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS

45

26-05-00

TRC INC. TEST NO: 45C41ED1 572E SN45 EXT.DIMENTION CAL41

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		429 - 434 MM	431. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		226 - 231 MM	229. MM
CHEST CIRCUMFERENCE	(Y)	970 -1001 MM	985. MM
WAIST CIRCUMFERENCE	(Z)	836 - 866 MM	854. MM
CHEST DEPTH	(O)	213 - 229 MM	219. MM
H-POINT HEIGHT	(C)	84 - 89 MM	85. MM
H-POINT FROM SEATBACK	(D)	135 - 140 MM	136. MM
SKULL CAP TO BACKLINE	(H)	41 - 46 MM	44. MM
TOTAL SITTING HEIGHT	(A)	879 - 889 MM	884. MM
THIGH CLEARANCE	(F)	140 - 155 MM	147. MM
BUTTOCK KNEE LENGTH	(K)	579 - 605 MM	593. MM
BUTTOCK POPLITEAL LENGTH	(N)	452 - 478 MM	462. MM
POPLITEAL HEIGHT	(L)	429 - 455 MM	441. MM
KNEE PIVOT HEIGHT	(M)	485 - 500 MM	493. MM
FOOT LENGTH	(P)	252 - 267 MM	257. MM
FOOT BREADTH	(W)	91 - 107 MM	98. MM
SHOULDER PIVOT FROM BACKLINE	(E)	84 - 94 MM	87. MM
SHOULDER BREADTH	(V)	422 - 437 MM	431. MM
SHOULDER PIVOT HEIGHT	(B)	506 - 521 MM	512. MM
ELBOW REST HEIGHT	(J)	191 - 211 MM	199. MM
SHOULDER-ELBOW LENGTH	(I)	330 - 345 MM	341. MM
BACK OF ELBOW TO WRIST PIVOT	(G)	290 - 305 MM	298. MM

572E SN45 EXT.DIMENTION CAL41

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

[Handwritten Signature]

RUN NUMBER: 052600.1215

B

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III 50th

26-MAY-00

TRC INC.

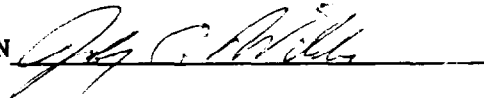
TEST NO: 45C41HD1

572E SN45 HEAD DROP CAL 41

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	237.35 G
PEAK LATERAL ACCELERATION	15 G MAX	2.61 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 052600.1132;2

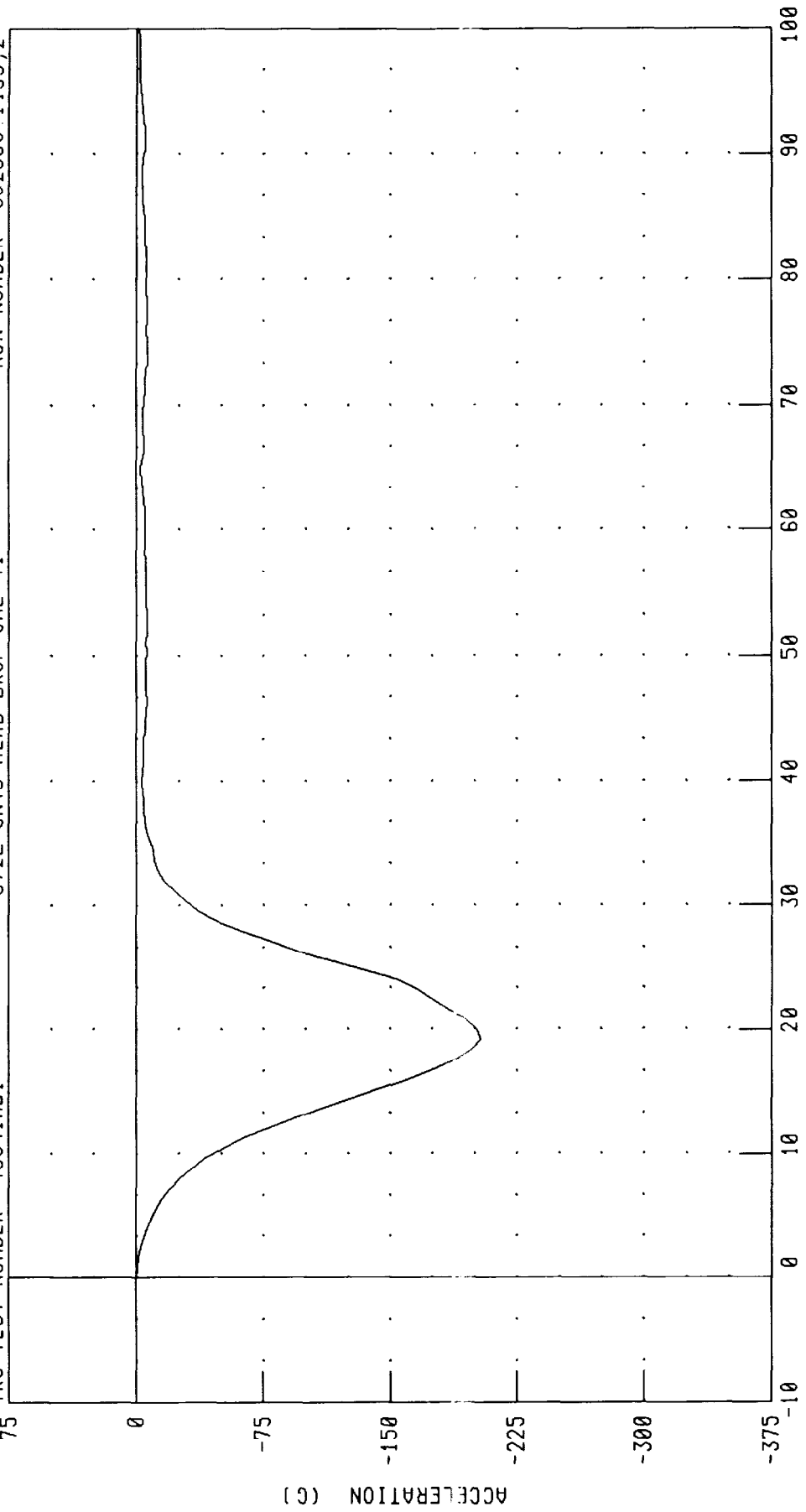
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

TRC TEST NUMBER : 45C41HD1

572E SN45 HEAD DROP CAL 41

RUN NUMBER : 052600 1133.2



CHANNEL : HEDXC FILTER : CH. CLASS 1000 PEAK DATA : 0.00 G @ -0.96 MS, -203.38 G @ 1.92 MS

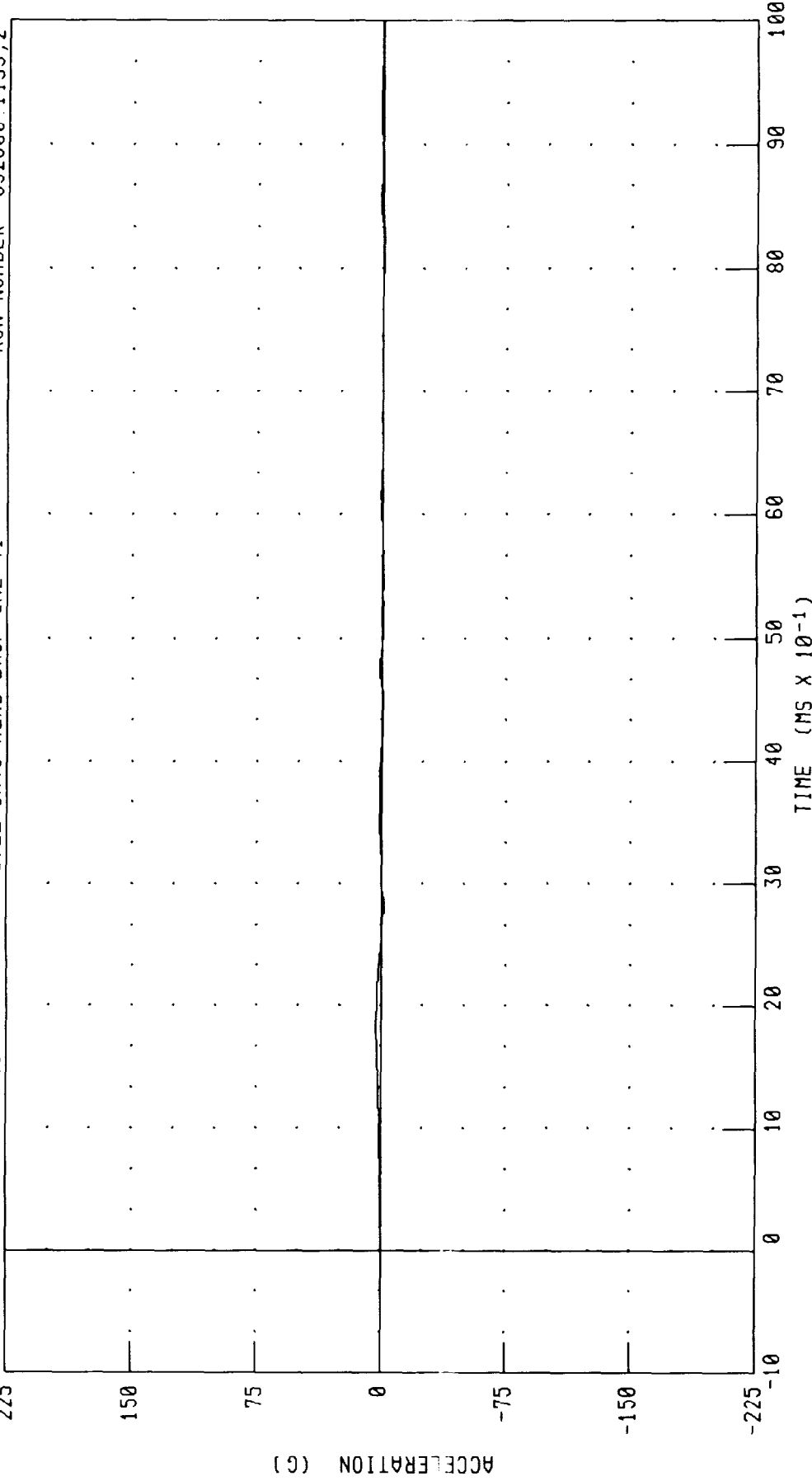
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 45C41HD1

572E SN45 HEAD DROP CAL 41

RUN NUMBER: 052600.1133,2



CHANNEL: HEDYC FILTER: CH CLASS 1000

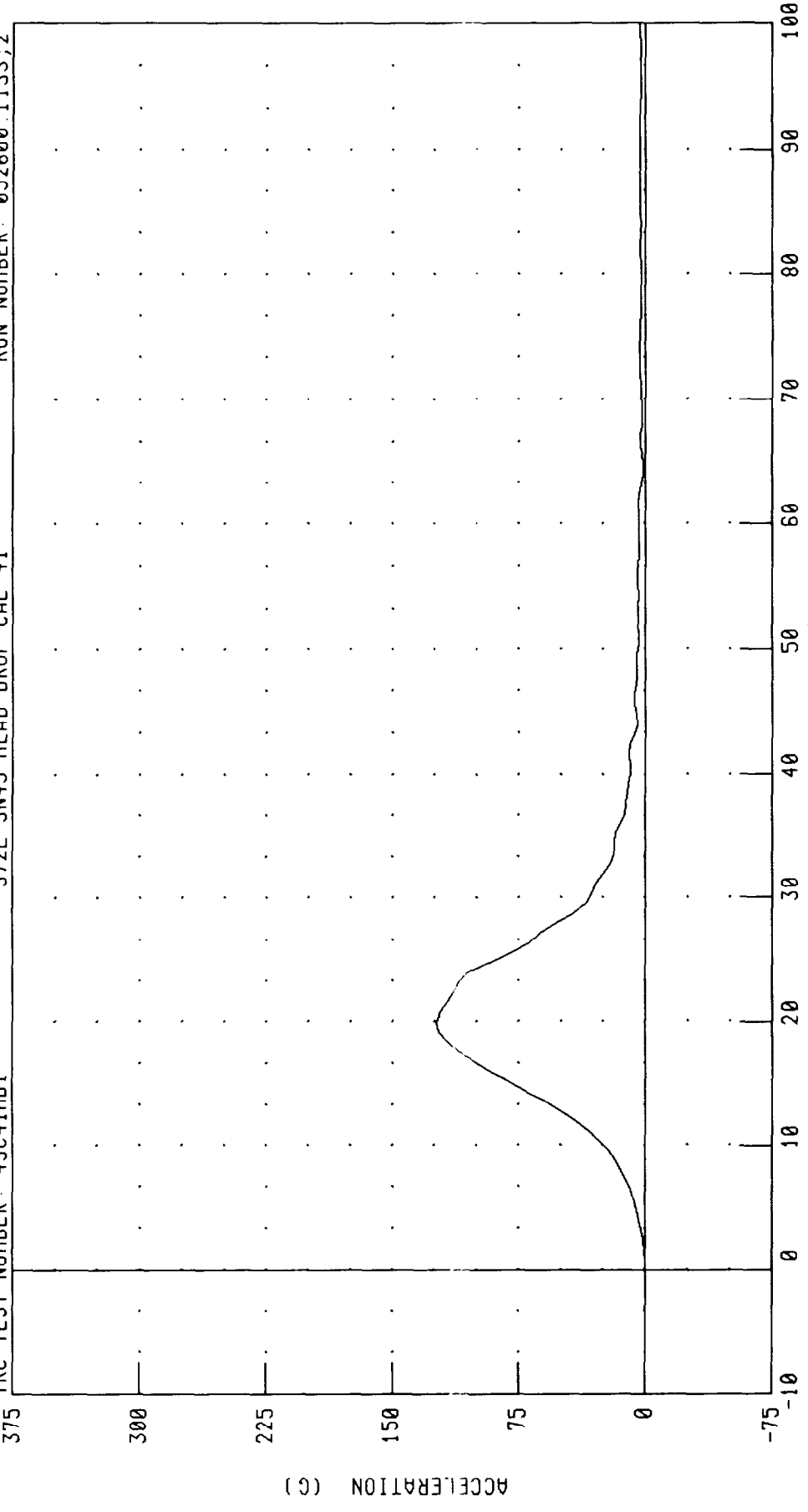
PEAK DATA: 2.62 G @ 1.76 MS; -1.81 G @ 2.80 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER : 45C41HD1

572E SN45 HEAD DROP CAL 41

RUN NUMBER : 052600.1133,2



CHANNEL : HEDZG FILTER : CH. CLASS 1000 PEAK DATA : 123.79 G @ 2.00 MS; 0.00 G @ -0.96 MS

PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572E SN45 HEAD DROP CAL 41

RUN NUMBER: 052600.1133,2

TRC TEST NUMBER: 45C41HD1

375

300

225

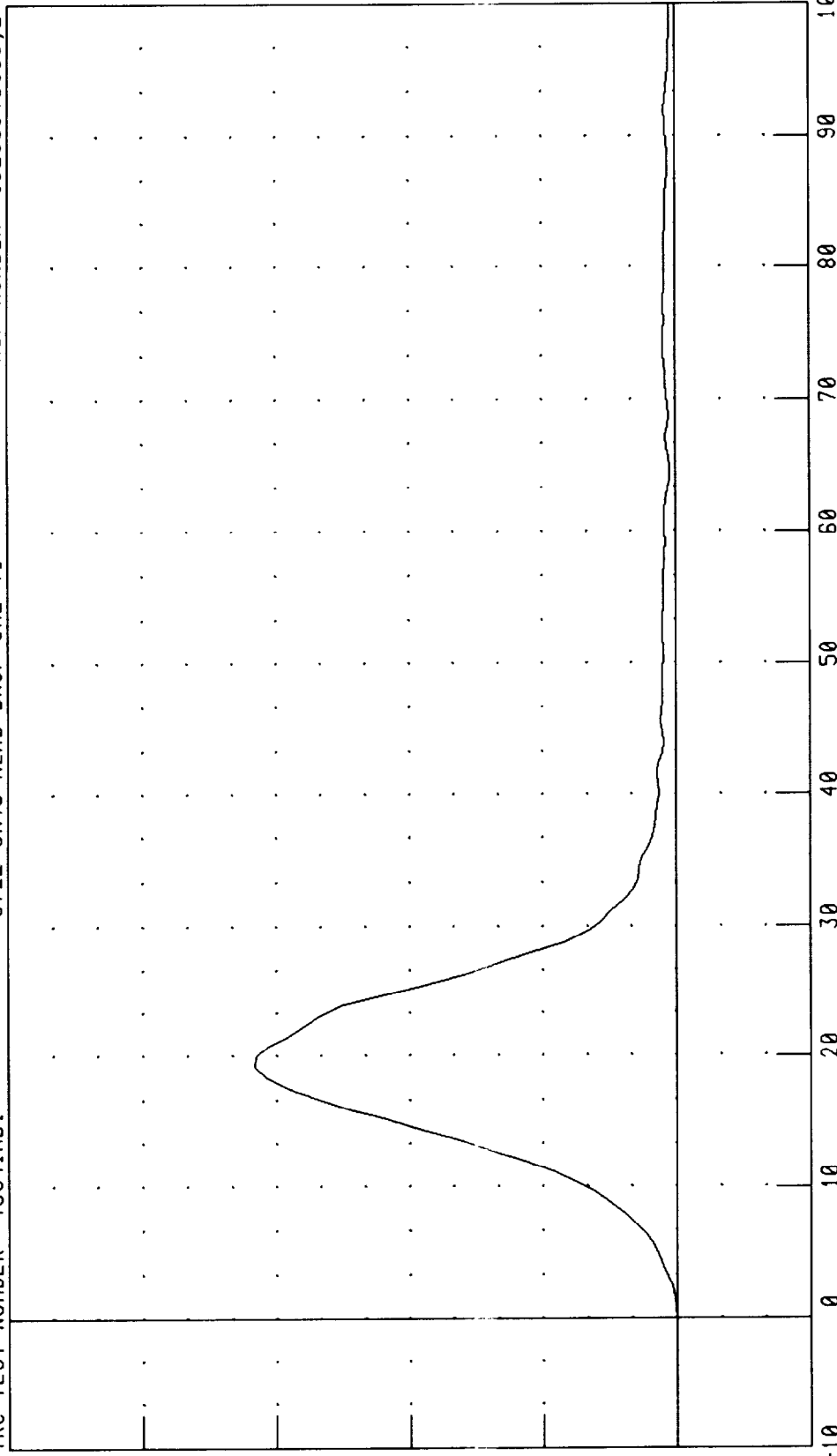
150

75

0

-75

ACCELERATION (G)



TIME (MS X 10⁻¹)

PEAK DATA: 237.35 G @ 1.92 MS; 0.00 G @ -0.96 MS

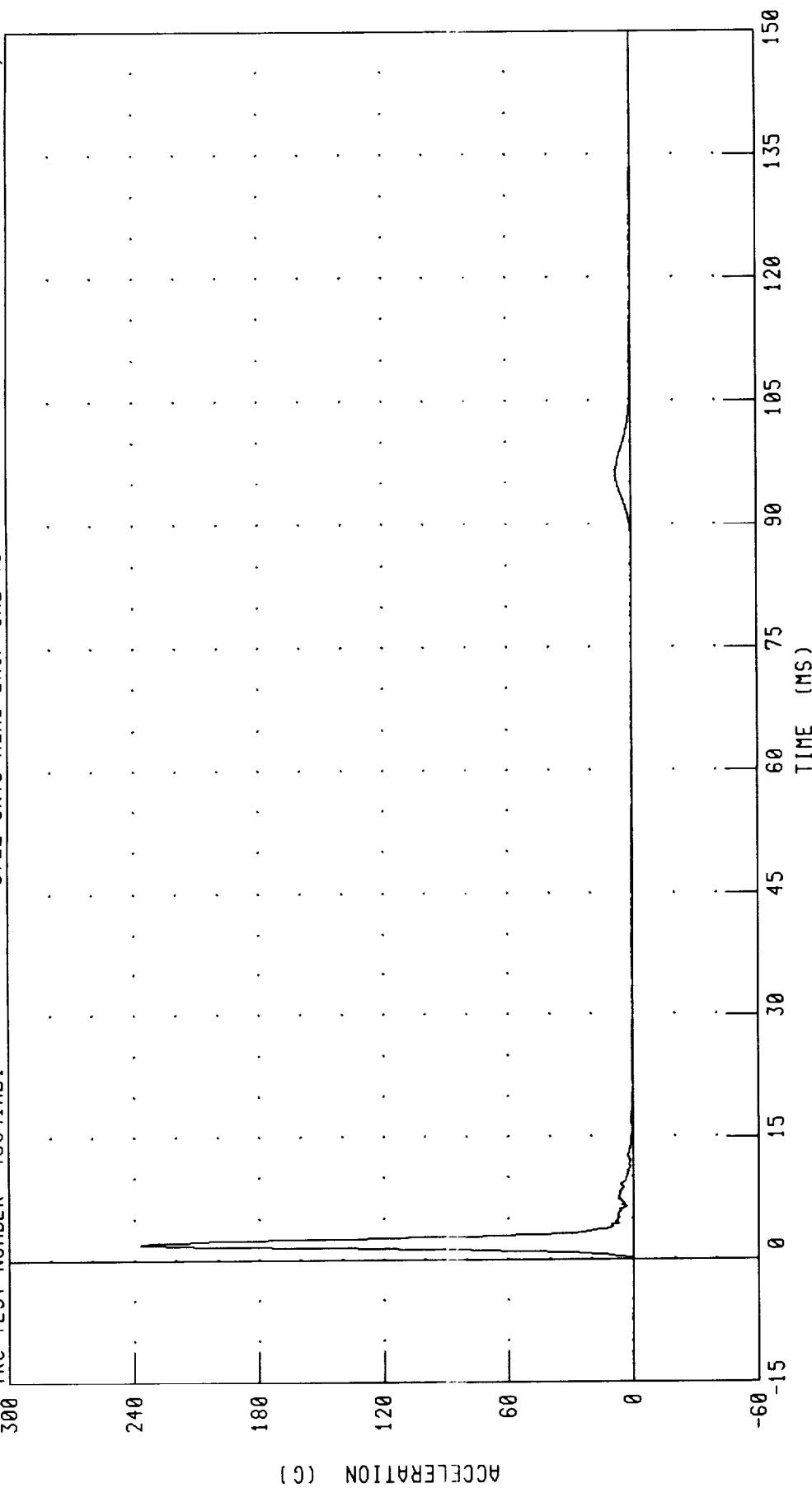
CHANNEL: HEDRG FILTER: CH. CLASS 1000

PART 572-E HYBRID III HEAD CALIBRATION
CHECK PLOT - HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 45C41HD1

572E SN#5 HEAD DROP CAL 41

RUN NUMBER: 052600.1133;2



CHANNEL: HEDRC FILTER: CH. CLASS 1000 PEAK DATA: 237.35 G @ 1.92 MS; 0.00 G @ -14.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th

30-MAY-00

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 45C41NF4 572E SN45 NECK FLEXION CAL41

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	6.99 M/S
PENDULUM DECELERATION	10 MS 22.50 - 27.50 G	23.55 G
	20 MS 17.60 - 22.60 G	22.22 G
	30 MS 12.50 - 18.50 G	18.46 G
MAX PENDULUM G	29 G MAX	23.87 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	18.41 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	37.52 MS
D PLANE	MAX 64 - 78 DEG.	75.00 DEG.
ROTATION	TIME 57 - 64 MS	60.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX 88.2 - 108.5 NM	98.38 NM
	TIME 47 - 58 MS	50.56 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	118.56 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	103.68 MS

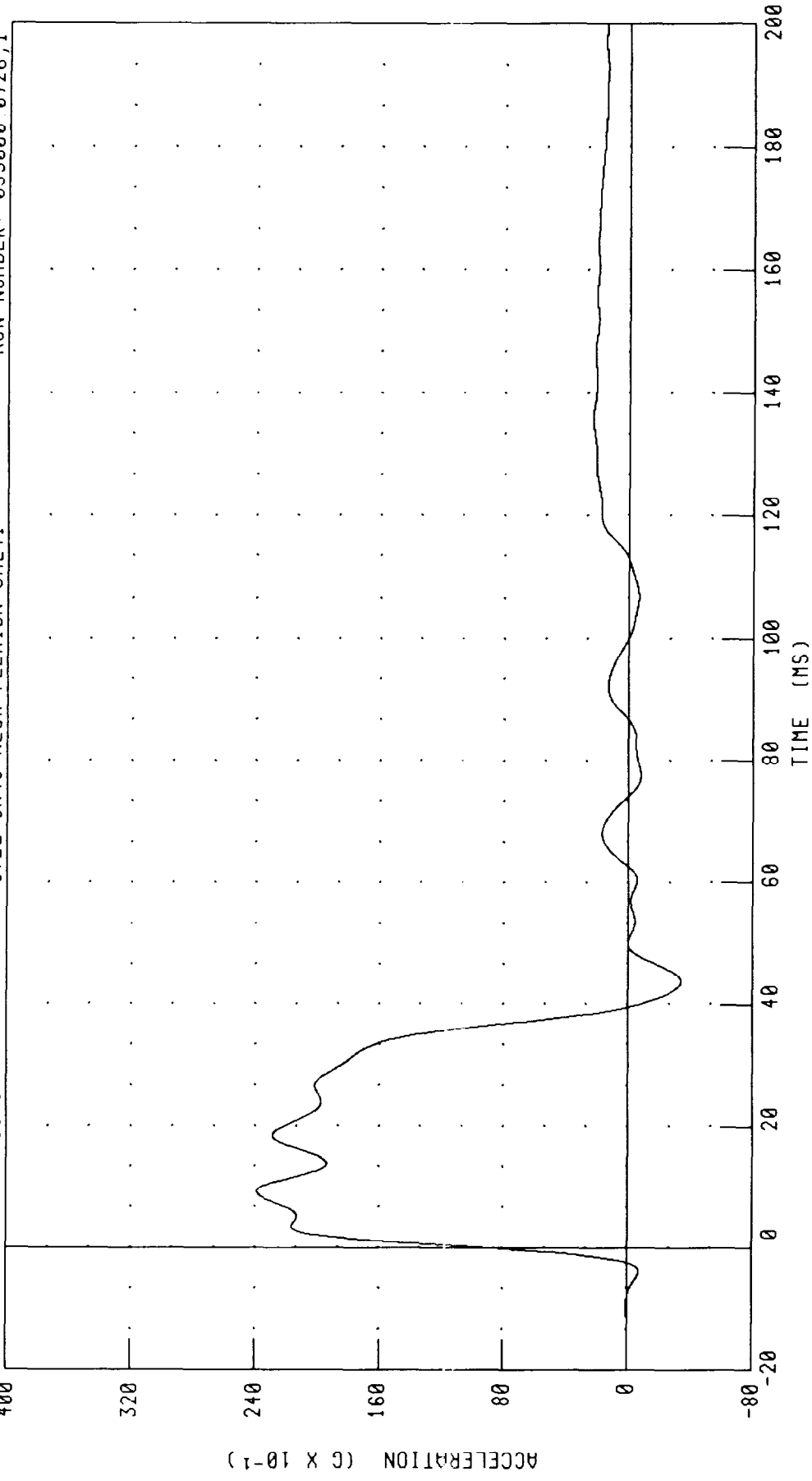
TEST MEETS SPECIFICATIONS

TECHNICIAN *J. C. Miller*

RUN NUMBER: 053000.0725;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 45C41NF4 572E SN45 NECK FLEXION CAL41 RUN NUMBER: 053000 0726,1



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 23.87 G @ 9.20 MS, -3.42 G @ 43.84 MS

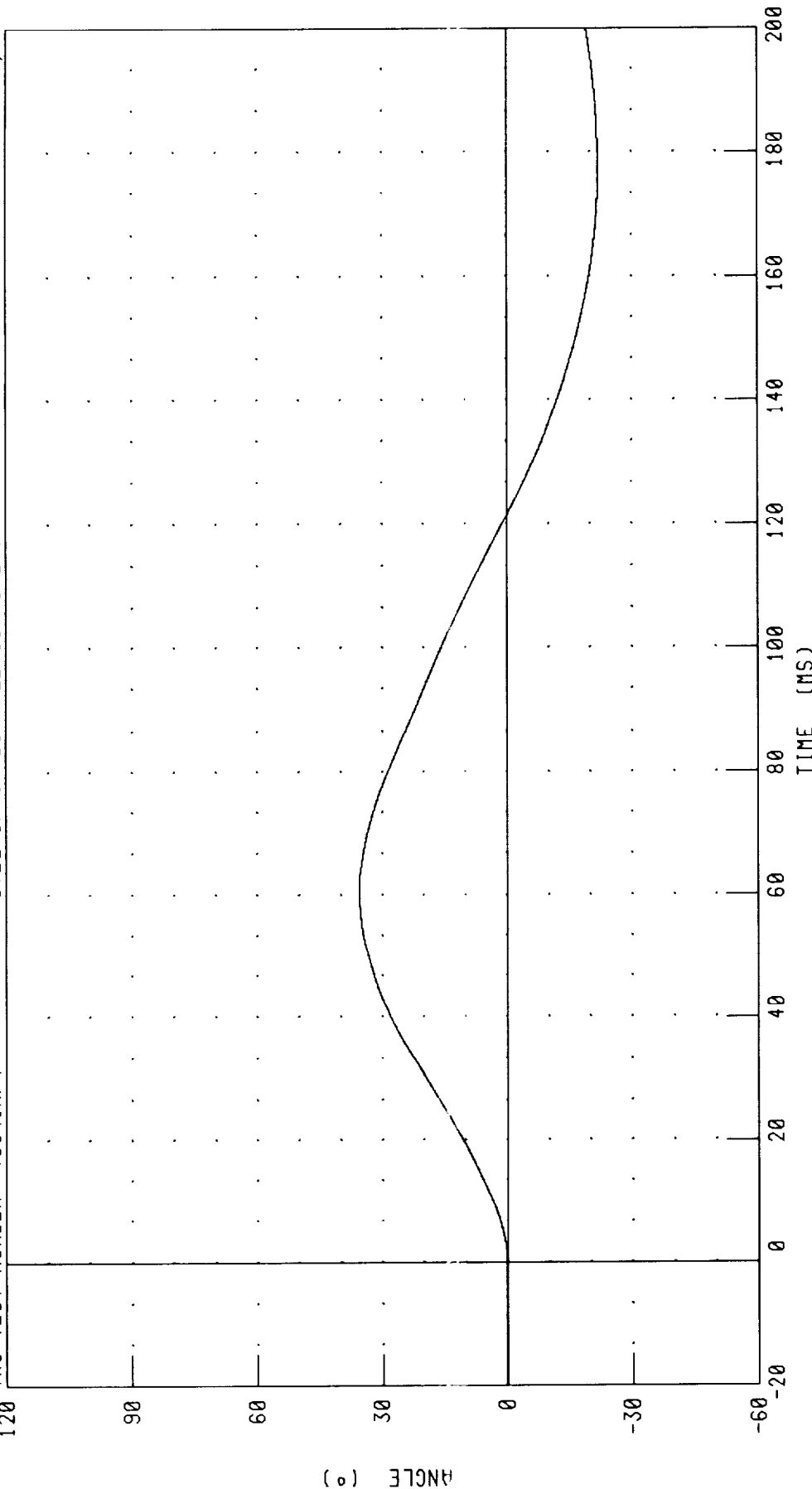
PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN45 NECK FLEXION CAL41

TRC TEST NUMBER: 45C41NF4

RUN NUMBER: 053000 0726,1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 35.60 ° @ 61.04 MS, -21.96 ° @ 176.80 MS

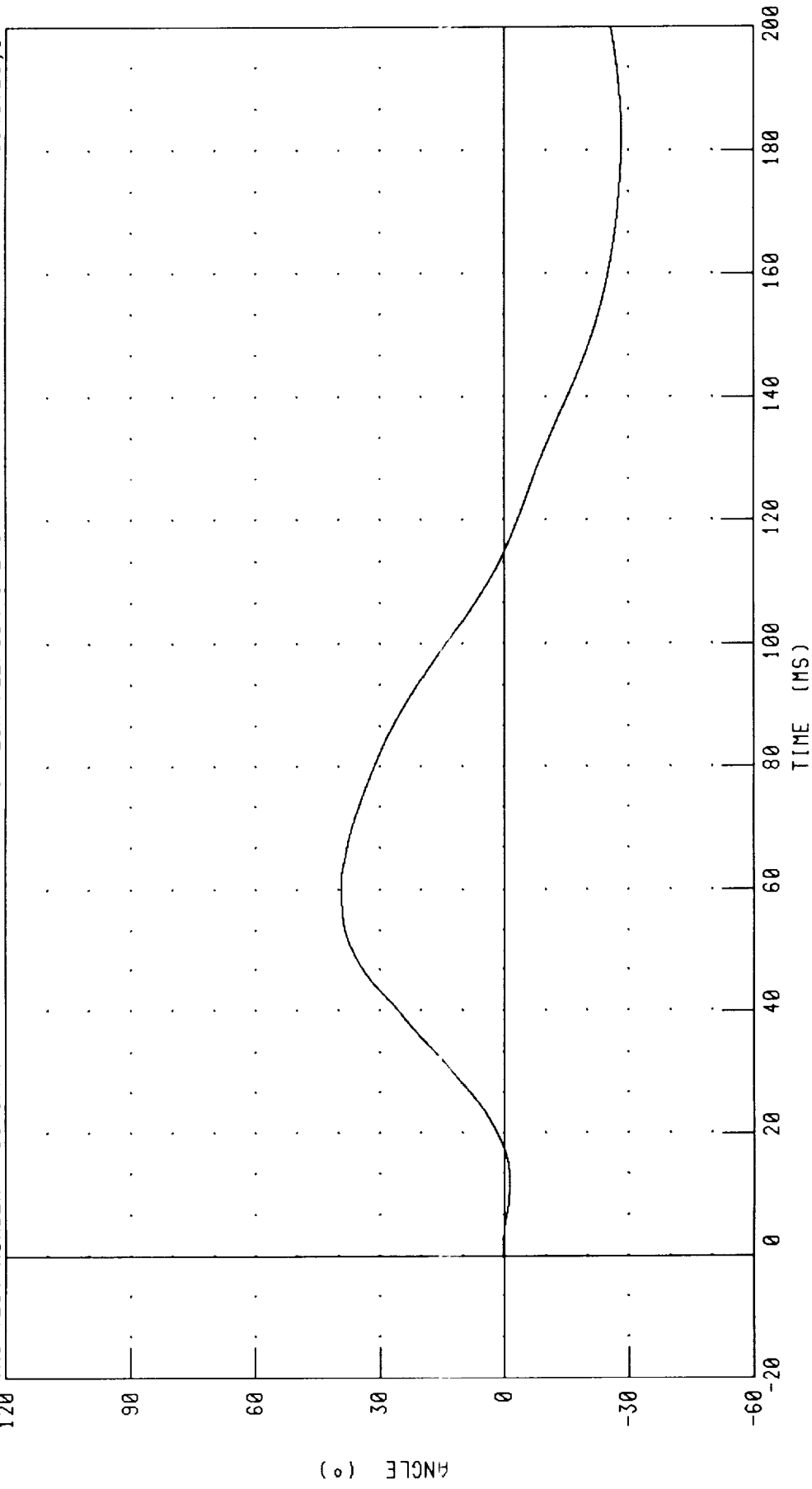
ANGLE (°)

PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 45C41NF4

572E SN45 NECK FLEXION CAL41

RUN NUMBER: 053000 0726,1

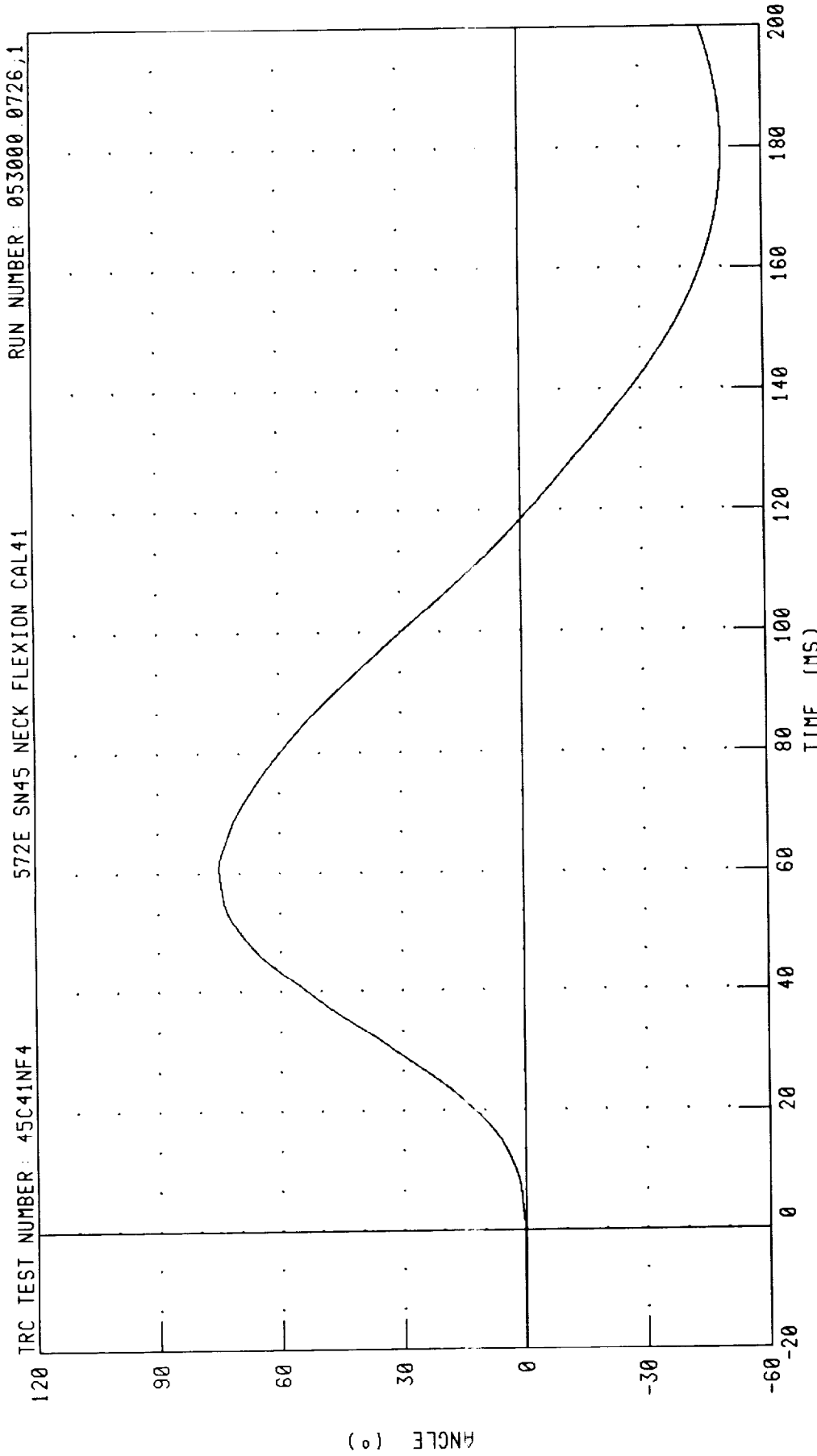


CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 39.40 ° @ 60.72 MS, -28.26 ° @ 182.16 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION



PEAK DATA: 75.00 ° @ 60.88 MS, -50.14 ° @ 179.44 MS

CHANNEL: TOTAN FILTER: CH. CLASS 60

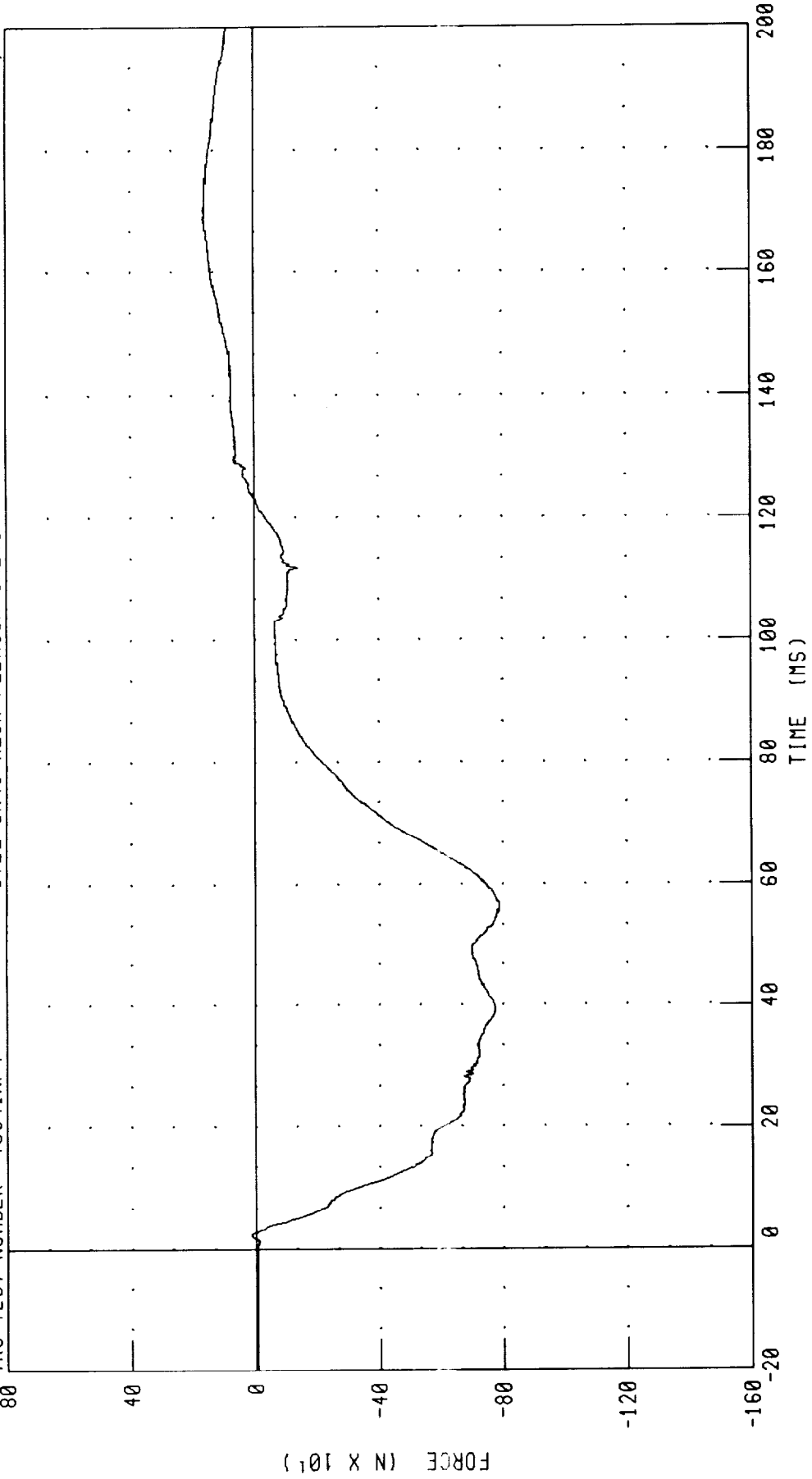
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 45C41NF4

572E SN45 NECK FLEXION CAL41

RUN NUMBER: 053000 0726.1



PEAK DATA: 163.09 N @ 168.32 MS; -786.17 N @ 55.44 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

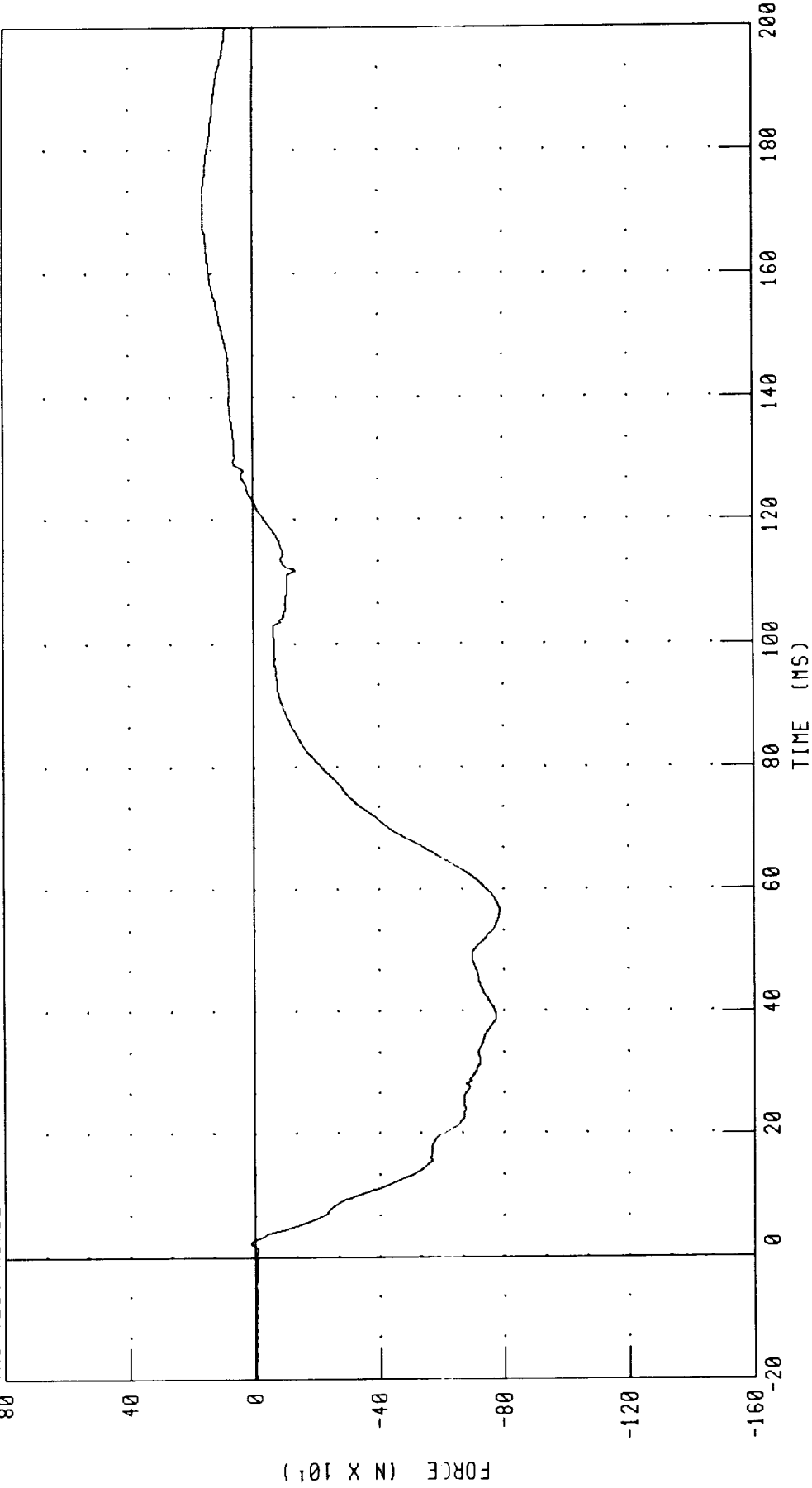
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 45C41NF4

572E SN45 NECK FLEXION CAL41

RUN NUMBER: 053000.0726,1



CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 161.78 N @ 168.80 MS, -786.31 N @ 56.72 MS

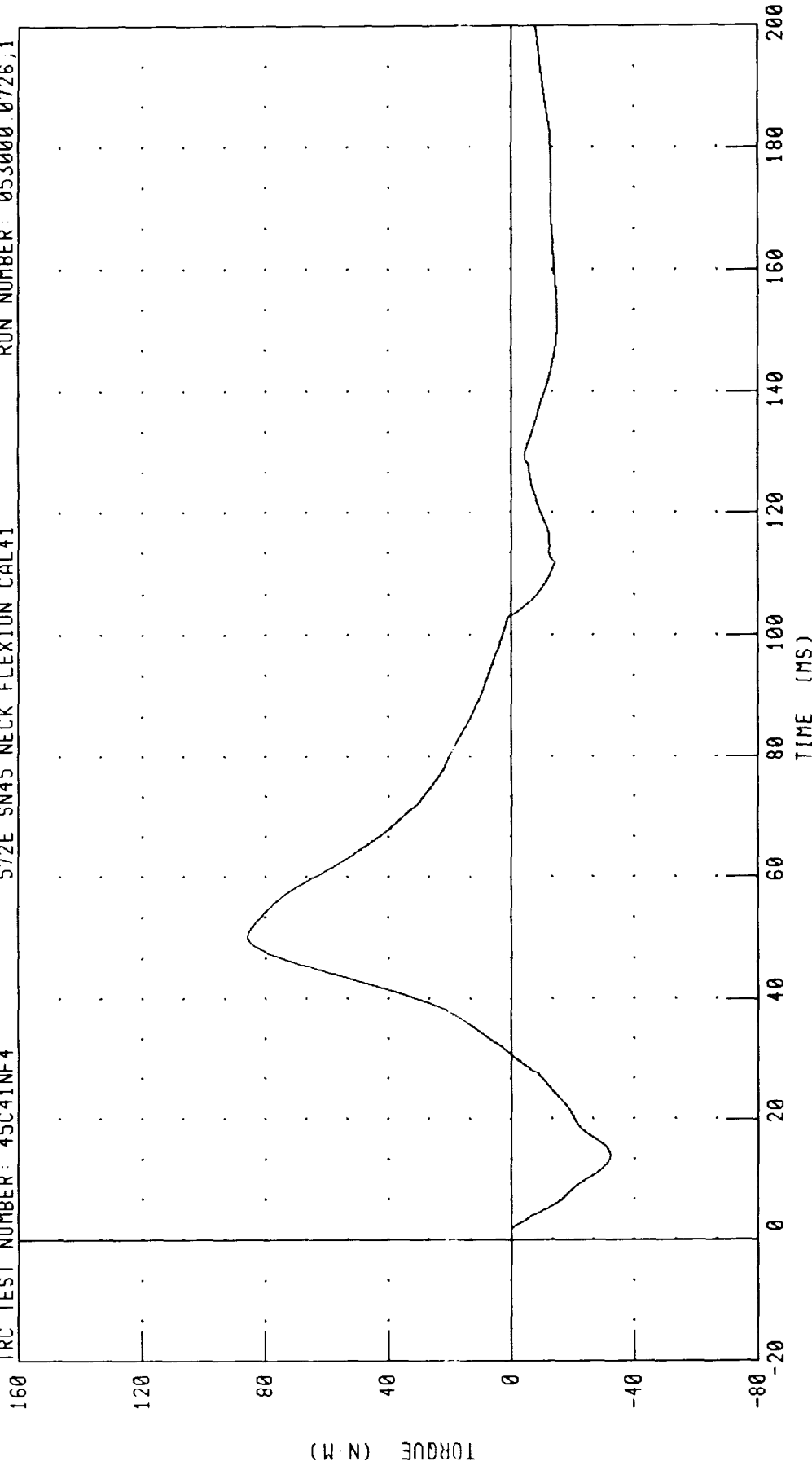
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 45C41NF4

572E SN45 NECK FLEXION CAL41

RUN NUMBER: 053000.0726,1



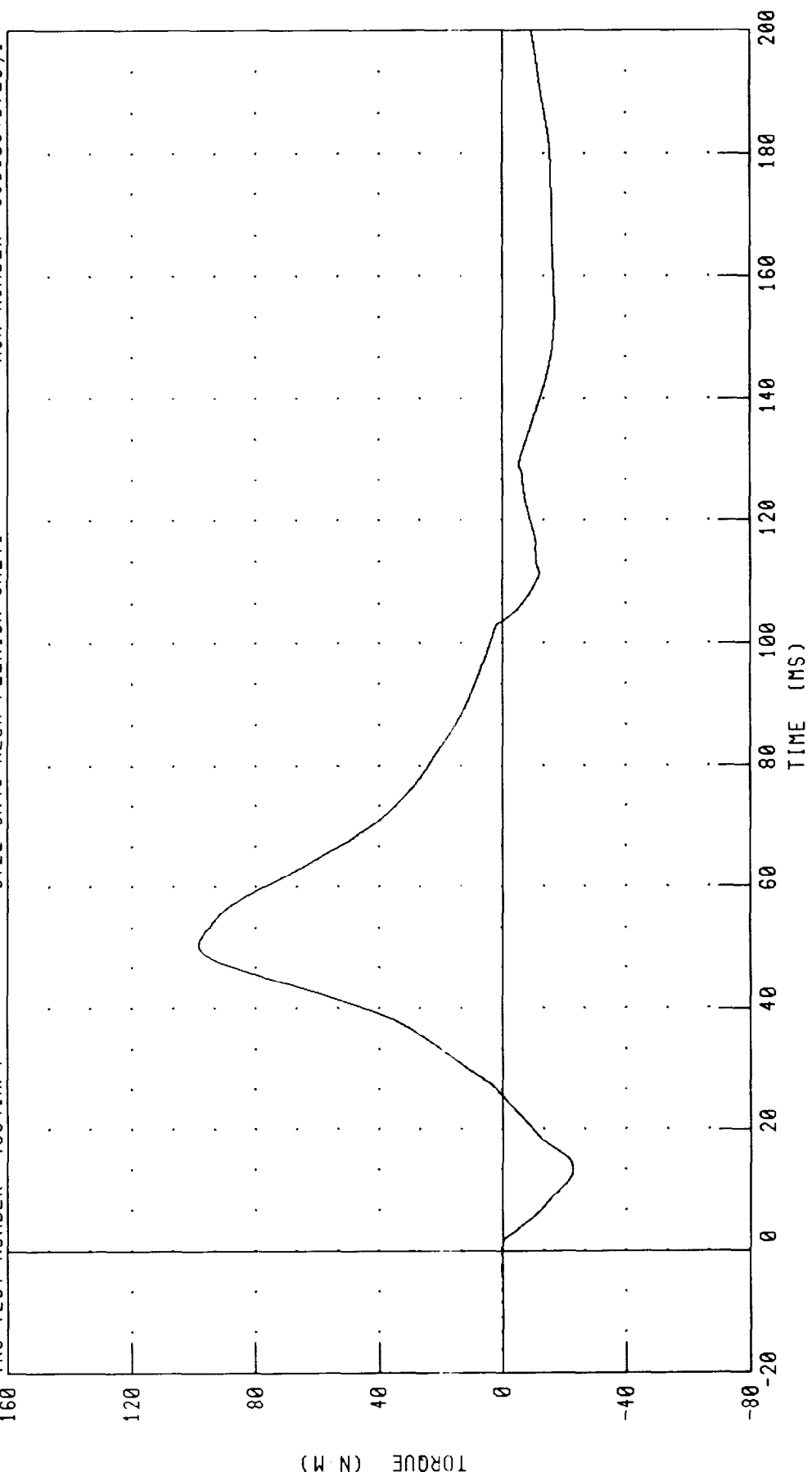
CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 85.76 N.M @ 50.32 MS, -32.17 N.M @ 140.00 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 45C41NF4

572E SN45 NECK FLEXION CAL41

RUN NUMBER: 053000 0726,1



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 98.38 N.M @ 50.56 MS, -22.93 N.M @ 13.28 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th

30-MAY-00

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 45C41NE1 572E SN45 NECK EXT CAL41

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.10 M/S
PENDULUM DECELERATION	10 MS 17.20 - 21.20 G	20.19 G
	20 MS 14.00 - 19.00 G	17.35 G
	30 MS 11.00 - 16.00 G	15.01 G
MAX PENDULUM G	22 G MAX	20.62 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	14.97 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	39.76 MS
D PLANE	MAX 81 - 106 DEG.	99.39 DEG.
ROTATION	TIME 72 - 82 MS	74.96 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN -80.0/-52.9 NM	-68.46 NM
	TIME 65 - 79 MS	70.00 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	156.16 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	143.36 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN *John C. Smith*

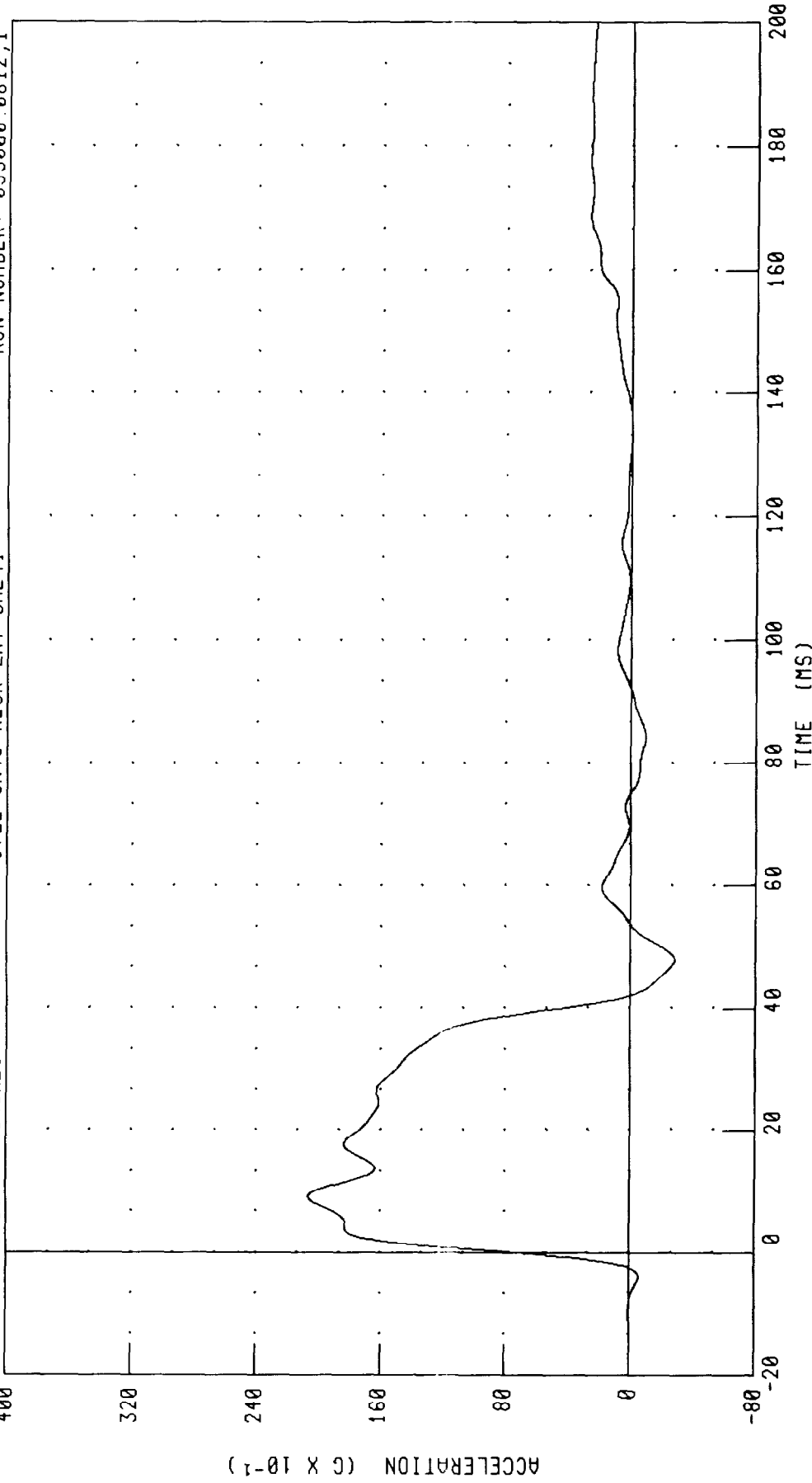
RUN NUMBER: 053000.0811;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 45C41NE1

572E SN+5 NECK EXT CAL41

RUN NUMBER: 053000.0812,1



CHANNEL: PENXC

FILTER: CH. CLASS 60

PEAK DATA: 20.62 G @ 9.04 MS; -2.84 G @ 47.84 MS

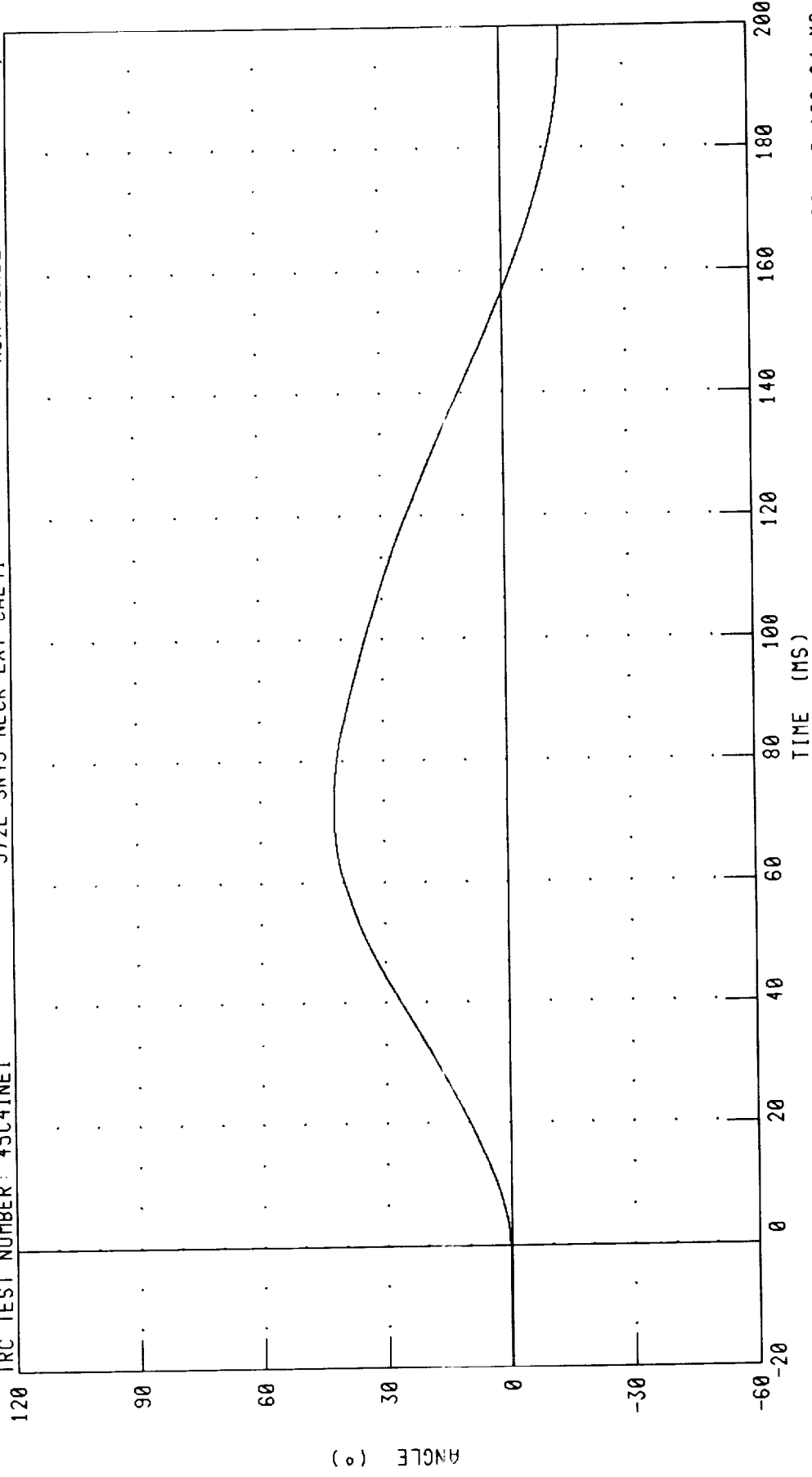
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572E SN45 NECK EXT CAL41

RUN NUMBER: 053000.0812;1

TRC TEST NUMBER: 45C41NE1

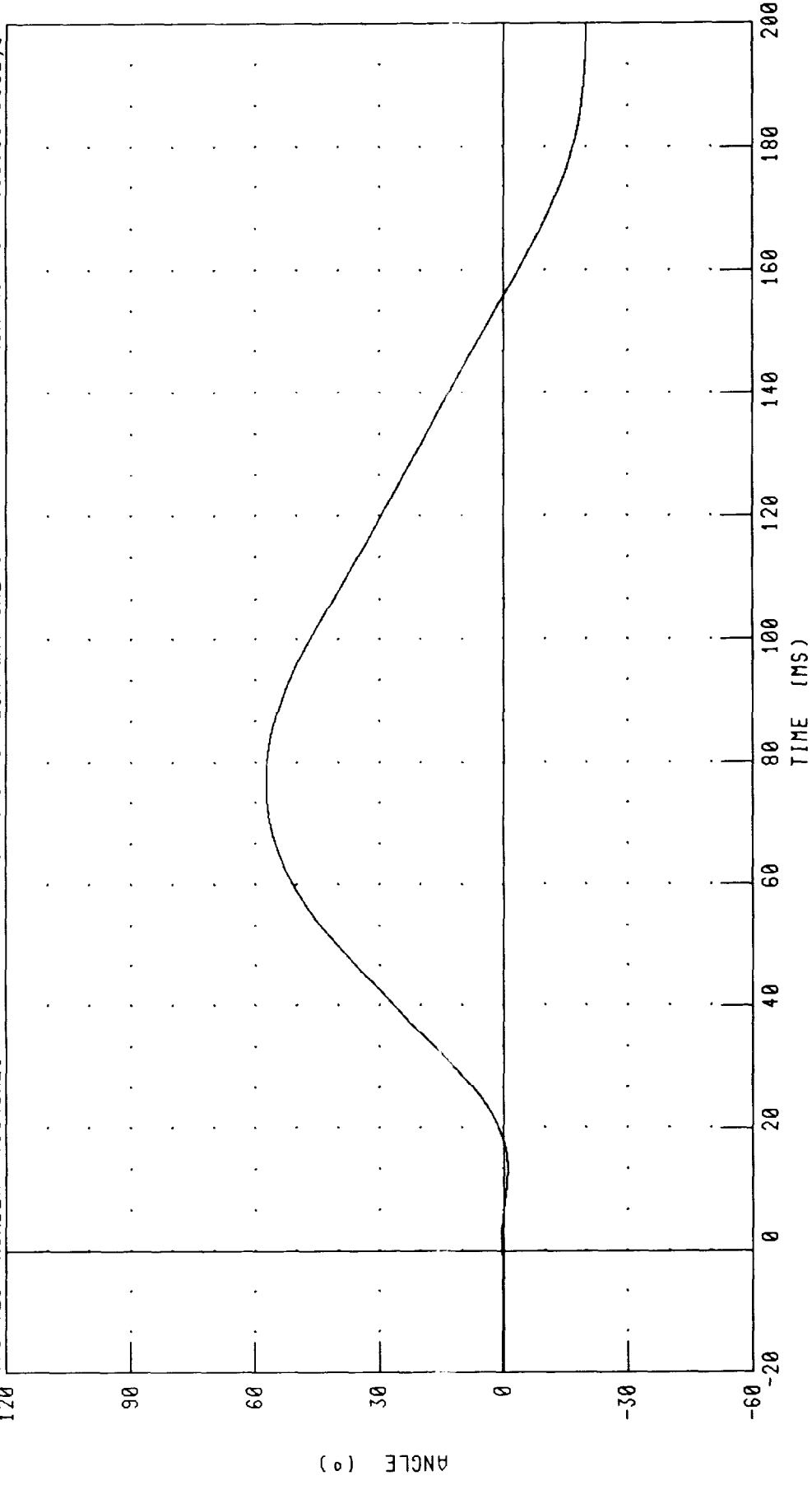


PEAK DATA: 42.15 ° @ 72.08 MS; -14.66 ° @ 198.64 MS

CHANNEL: BETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 45C41NE1 572E SN45 NECK EXT CAL41 RUN NUMBER: 053000.0812;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 57.45 ° @ 77.44 MS; -19.89 ° @ 197.76 MS

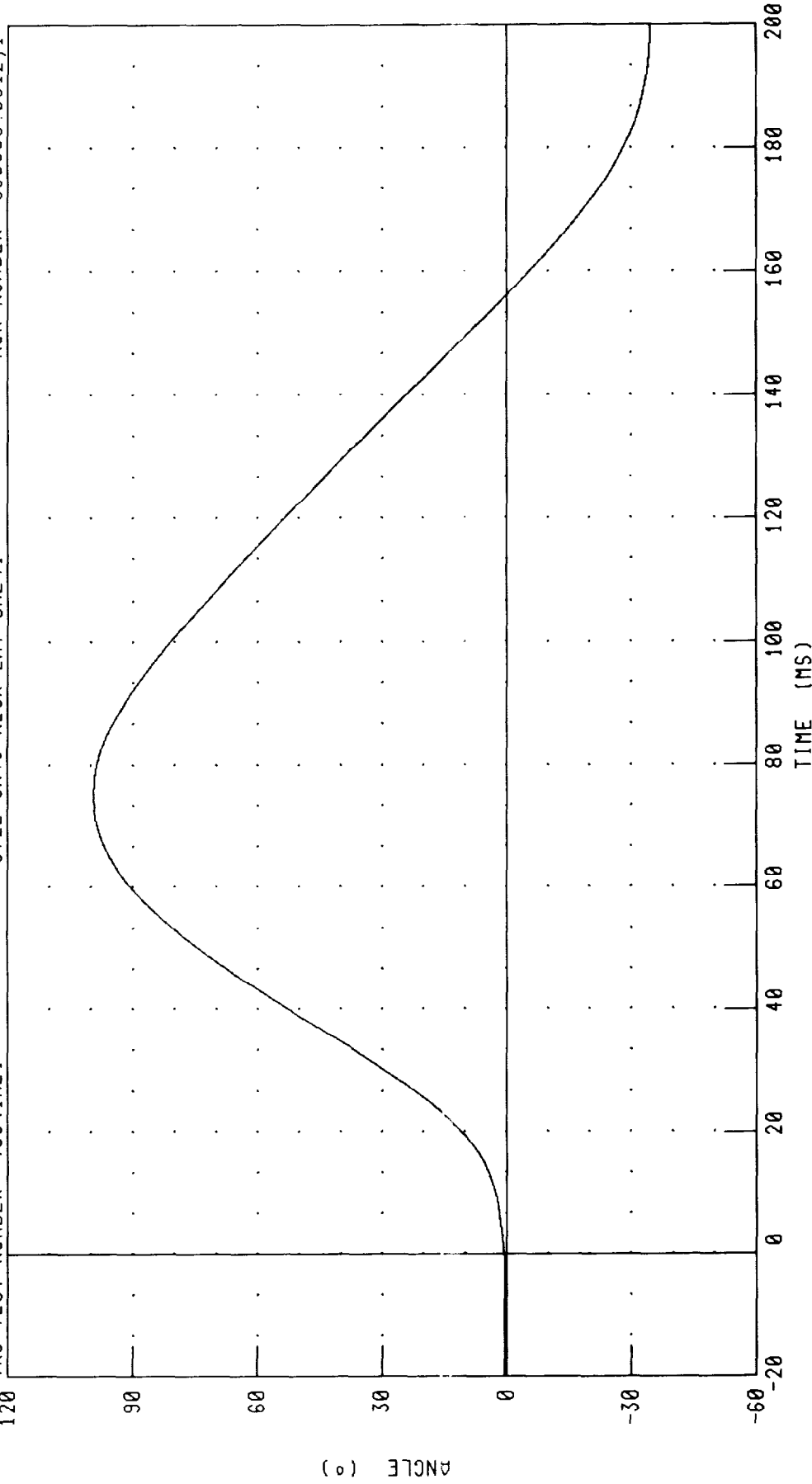
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER : 45C41NE1

572E SN45 NECK EXT CAL41

RUN NUMBER : 053000.0812,1



CHANNEL : TOTAN FILTER : CH. CLASS 60 PEAK DATA : 99.40 ° @ 74.96 MS, -34.55 ° @ 198.32 MS

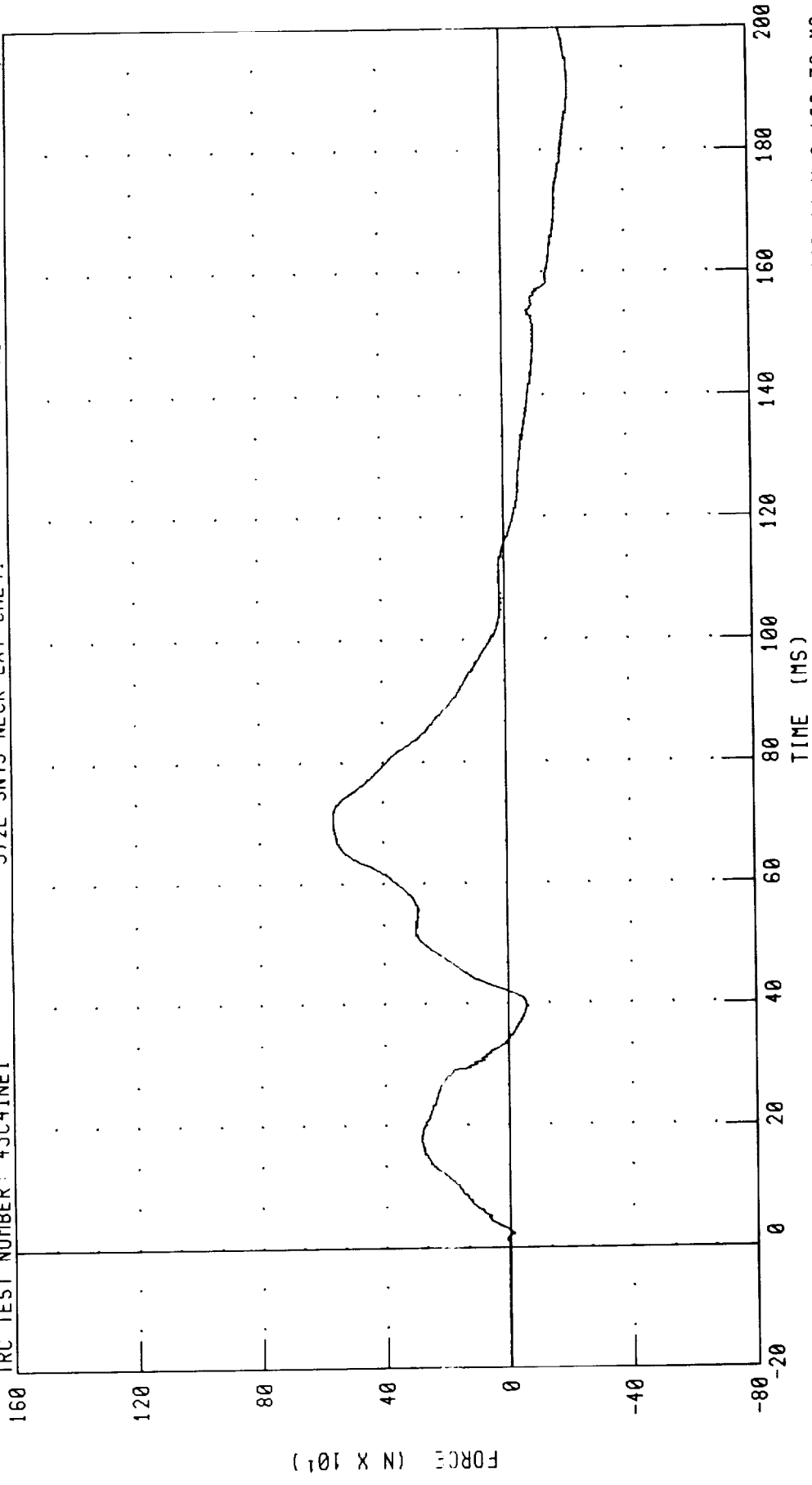
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

RUN NUMBER: 053000.0812,1

572E SN45 NECK EXT CAL41

TRC TEST NUMBER: 45C41NE1

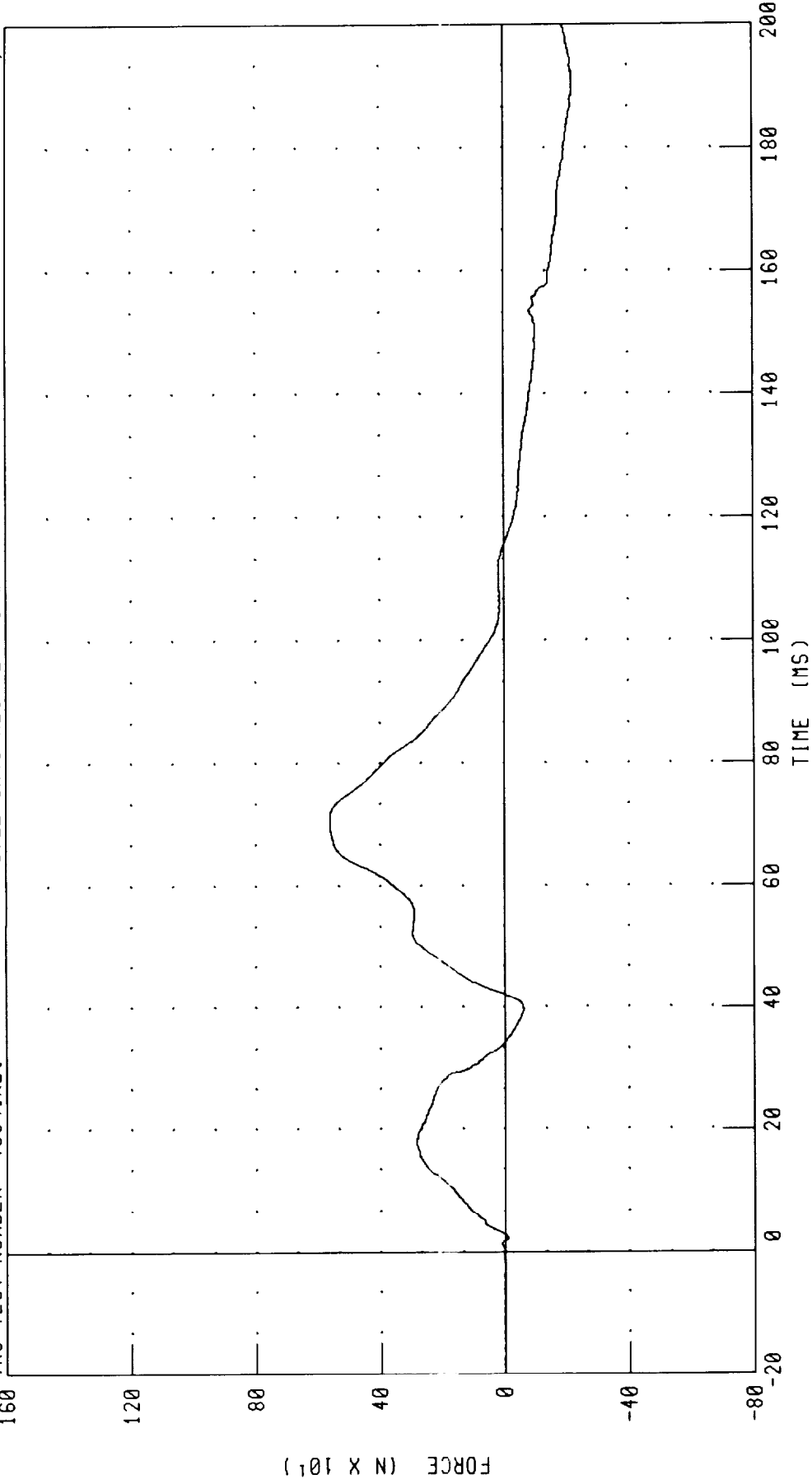


PEAK DATA: 561.17 N @ 68.88 MS, -220.11 N @ 188.32 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 45C41NE1 572E SN45 NECK EXT CAL41 RUN NUMBER: 053000 0812,1



CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 561.25 N @ 69.60 MS, -220.25 N @ 188.72 MS

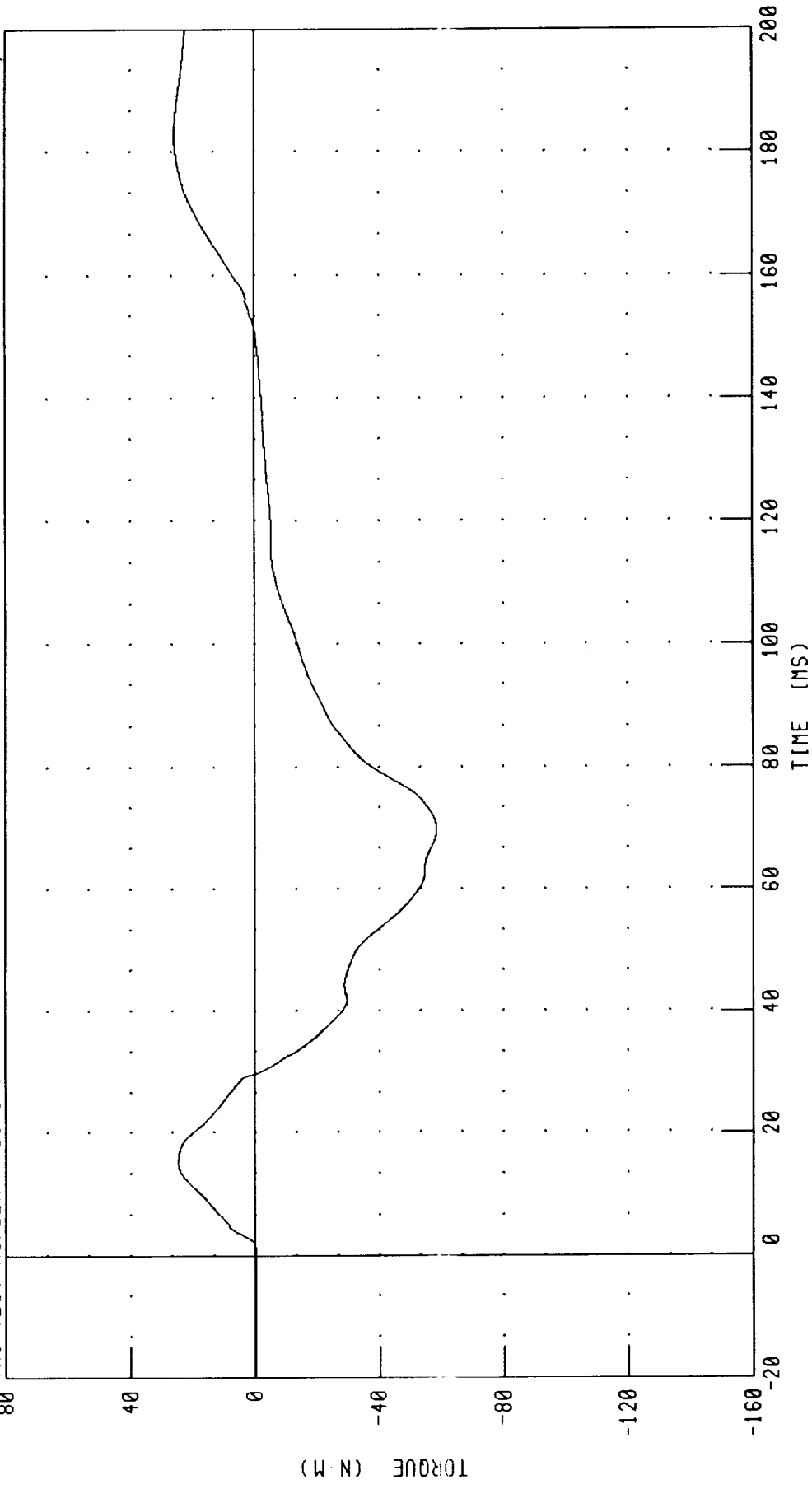
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 45C41NE1

572E SN45 NECK EXT CAL41

RUN NUMBER: 053000 0812;1

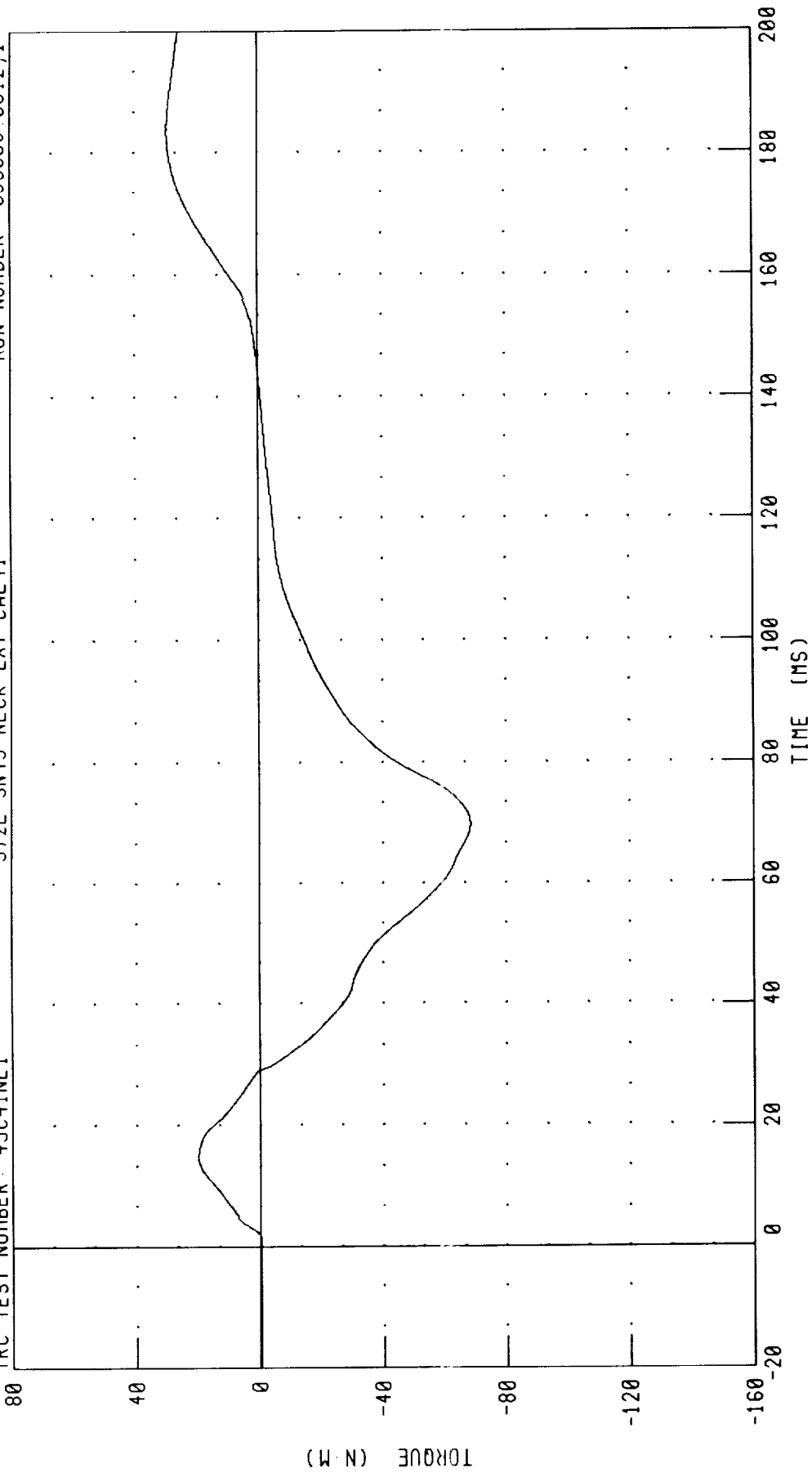


PEAK DATA: 25.86 N.M @ 183.20 MS, -58.48 N.M @ 70.00 MS

CHANNEL: NEKYN FILTER: CH. CLASS 600

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 45C41NE1 572E SN45 NECK EXT CAL41 RUN NUMBER: 053000 0812,1



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 29.49 N.M @ 183.20 MS, -68.46 N.M @ 70.00 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III 50th

24-MAY-00

TRC INC.

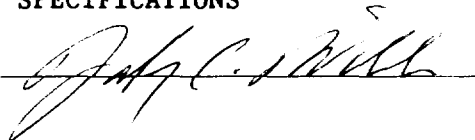
TEST NO: 45C41TH1

572E SN45 H.S.THORAX CAL41

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	66.4 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5650. N
INTERNAL HYSTERESIS	69% - 85%	72.6%

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 052400.1453;1

PART 572-E HYBRID III THORAX CALIBRATION

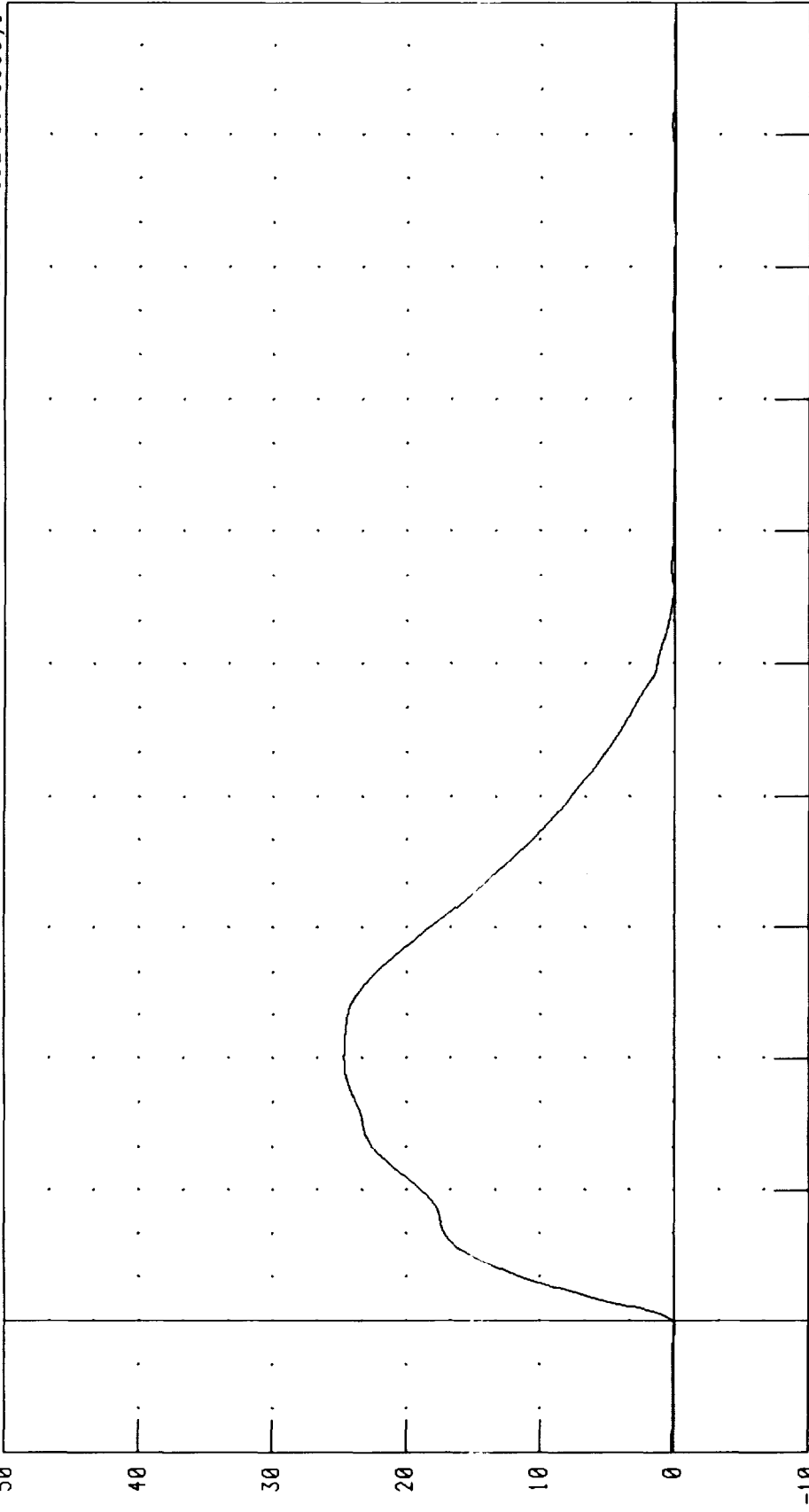
PENDULUM DECELERATION

TRC TEST NUMBER: ???C??TH??

572E SN45 H.S. THORAX CAL41

RUN NUMBER: 052400 1509.1

50



PEAK DATA: 24.66 G @ 20.00 MS; -0.12 G @ -0.64 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

CH. CLASS 180

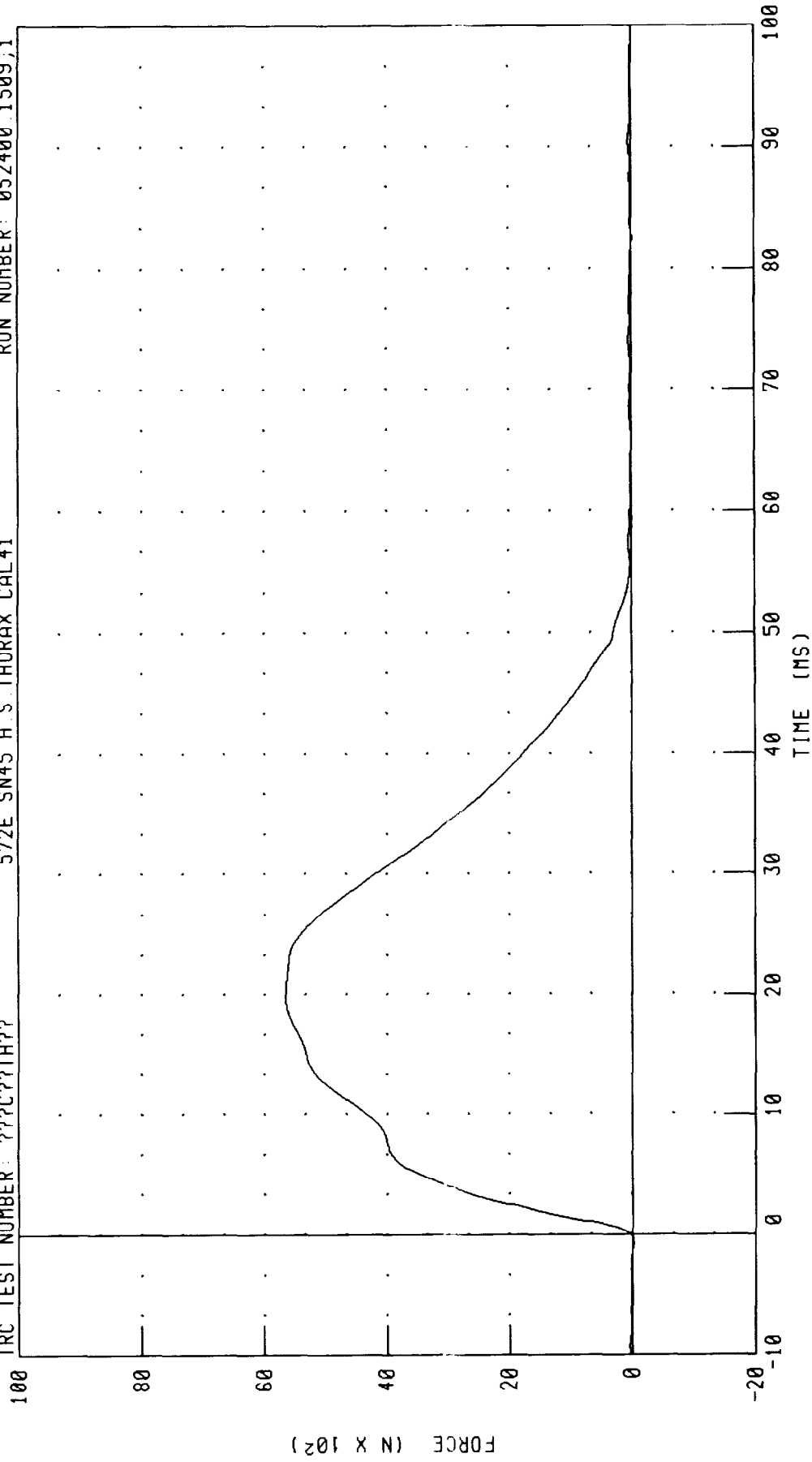
PART 572-E HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: ???C??TH??

572E SN45 H S THORAX CAL41

RUN NUMBER: 052400.1509;1



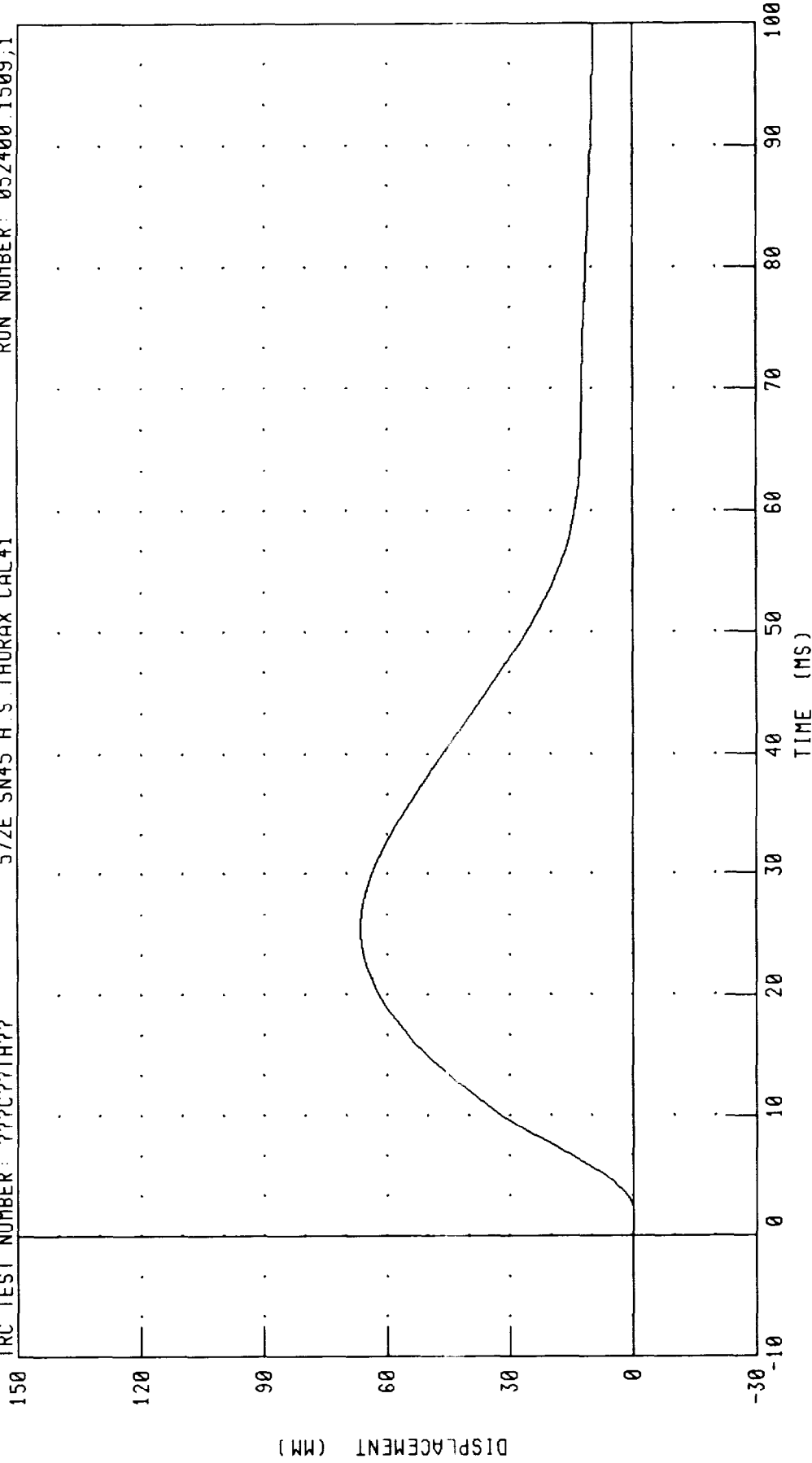
CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 5650.14 N @ 20.00 MS; -26.46 N @ -0.64 MS

PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: ???C??TH?? 572E SN45 H.S. THORAX CAL41 RUN NUMBER: 052400.1509,1



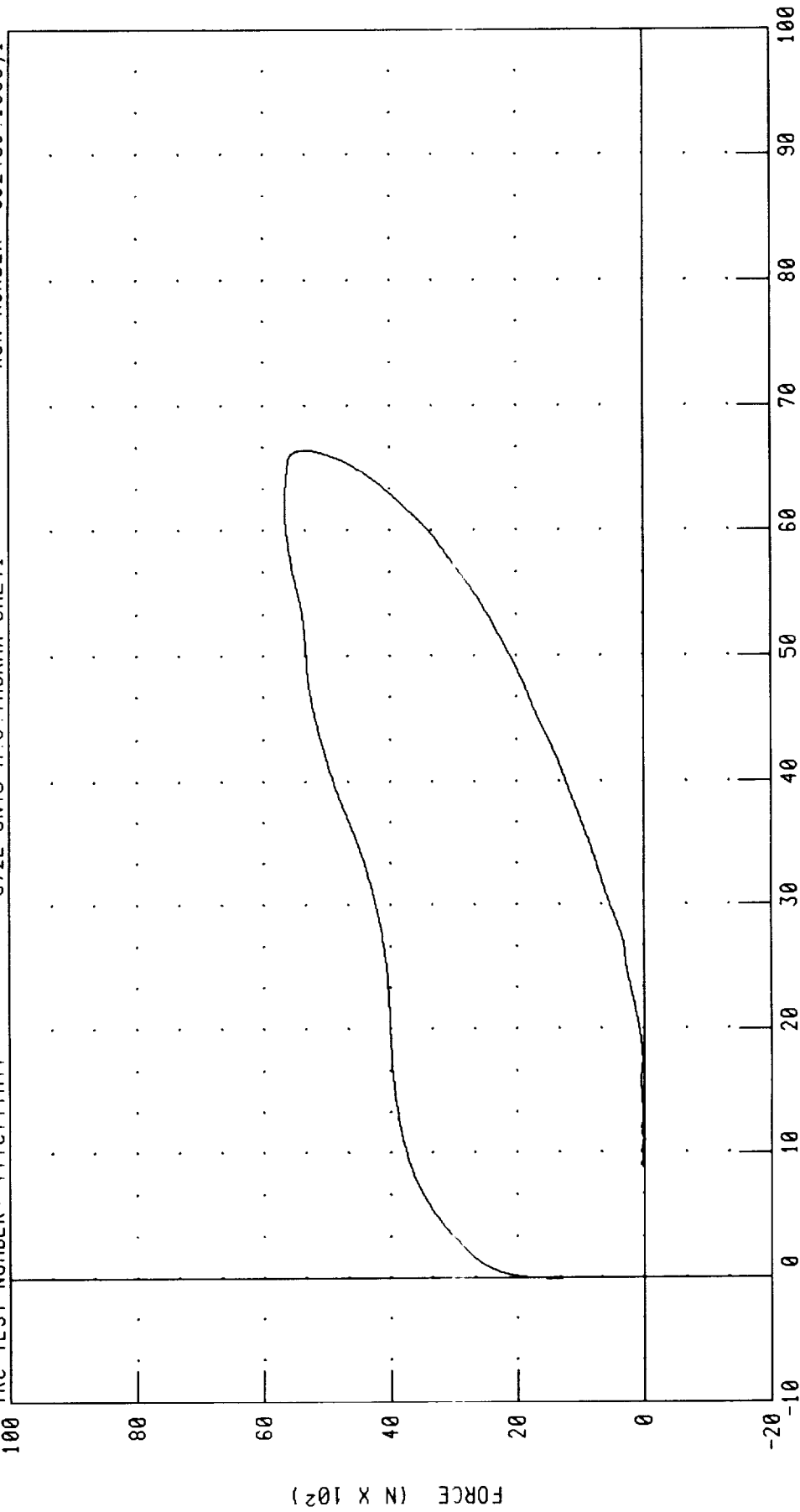
CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 66.47 MM @ 25.52 MS; -0.07 MM @ 1.84 MS

PART 572-E HYBRID III THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: ???C??TH??

572E SN45 H.S. THORAX CAL41

RUN NUMBER: 052400.1509;1



DISPLACEMENT (MM)

PEAK DATA: 66.47 NM @ 25.52 MS; -0.07 MM @ 1.84 MS
5650.14 N @ 20.00 MS; -26.46 N @ -0.64 MS

CHANNEL: CSTXD FILTER: CH. CLASS 180
PENXF CH. CLASS 180

Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 45R

Date: 05/26/2000

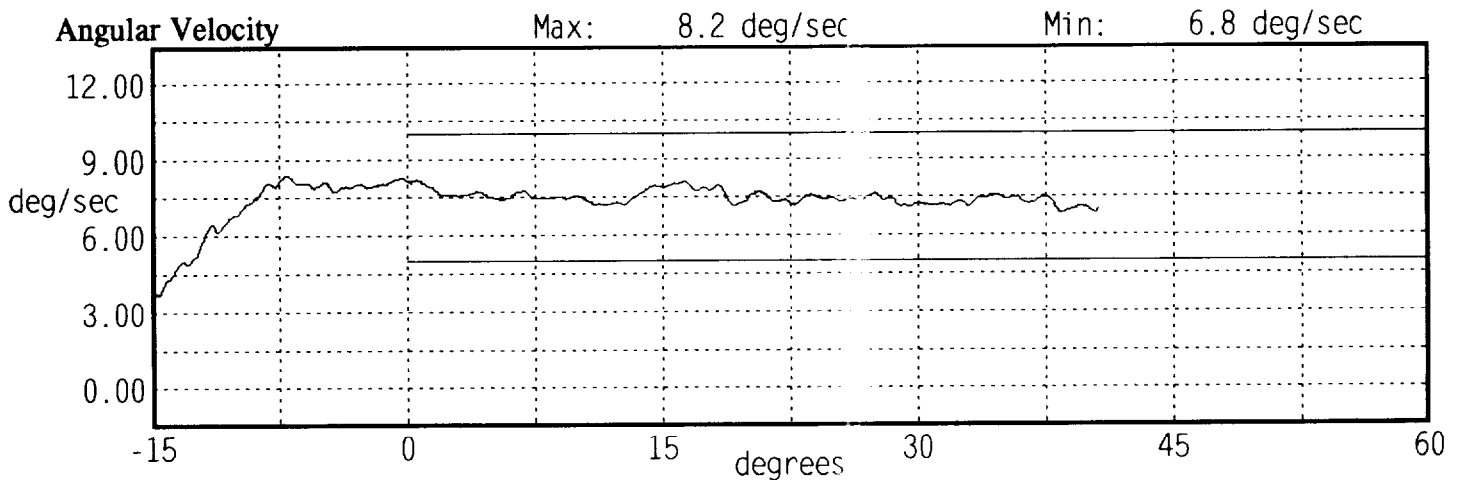
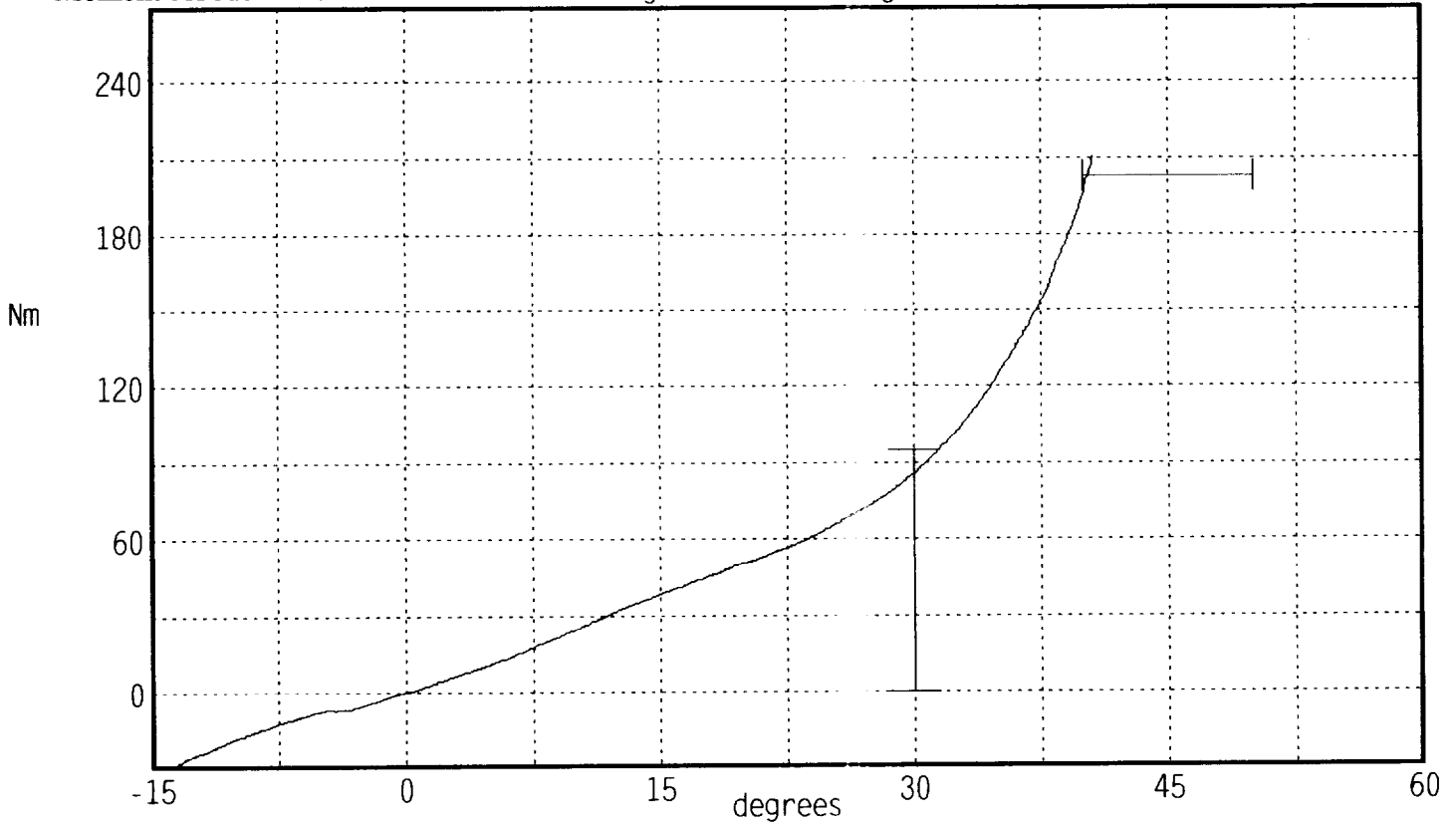
Test Number:

Time: 12:25

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Temperature	18.9 - 25.6	22.0 °C Pass
Humidity	10 - 70	55 % Pass
Moment at 30 deg	<= 94.9	86.0 Nm Pass
Angle at 203 Nm	40.0 - 50.0	40.3 deg Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec Pass

Moment About H-Point
Peak Moment: 210.3 Nm at 40.6 deg
Peak Angle: 40.6 deg at 210.3 Nm



Transportation Research Center Inc

Hybrid III Hip Range of Motion

Serial Number: 45L

Date: 05/26/2000

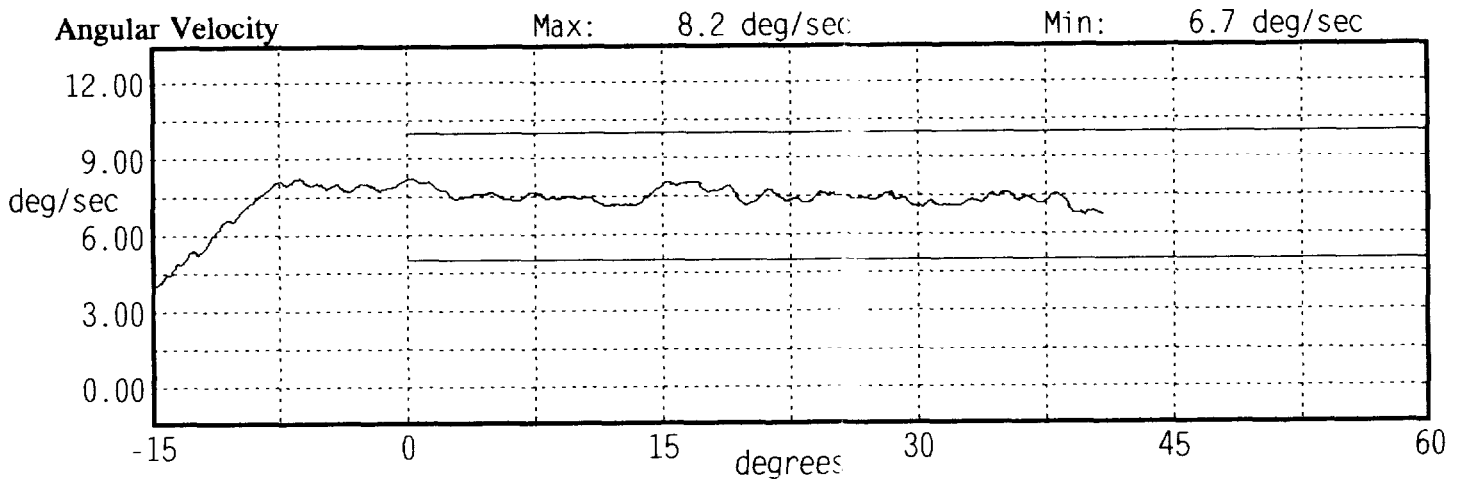
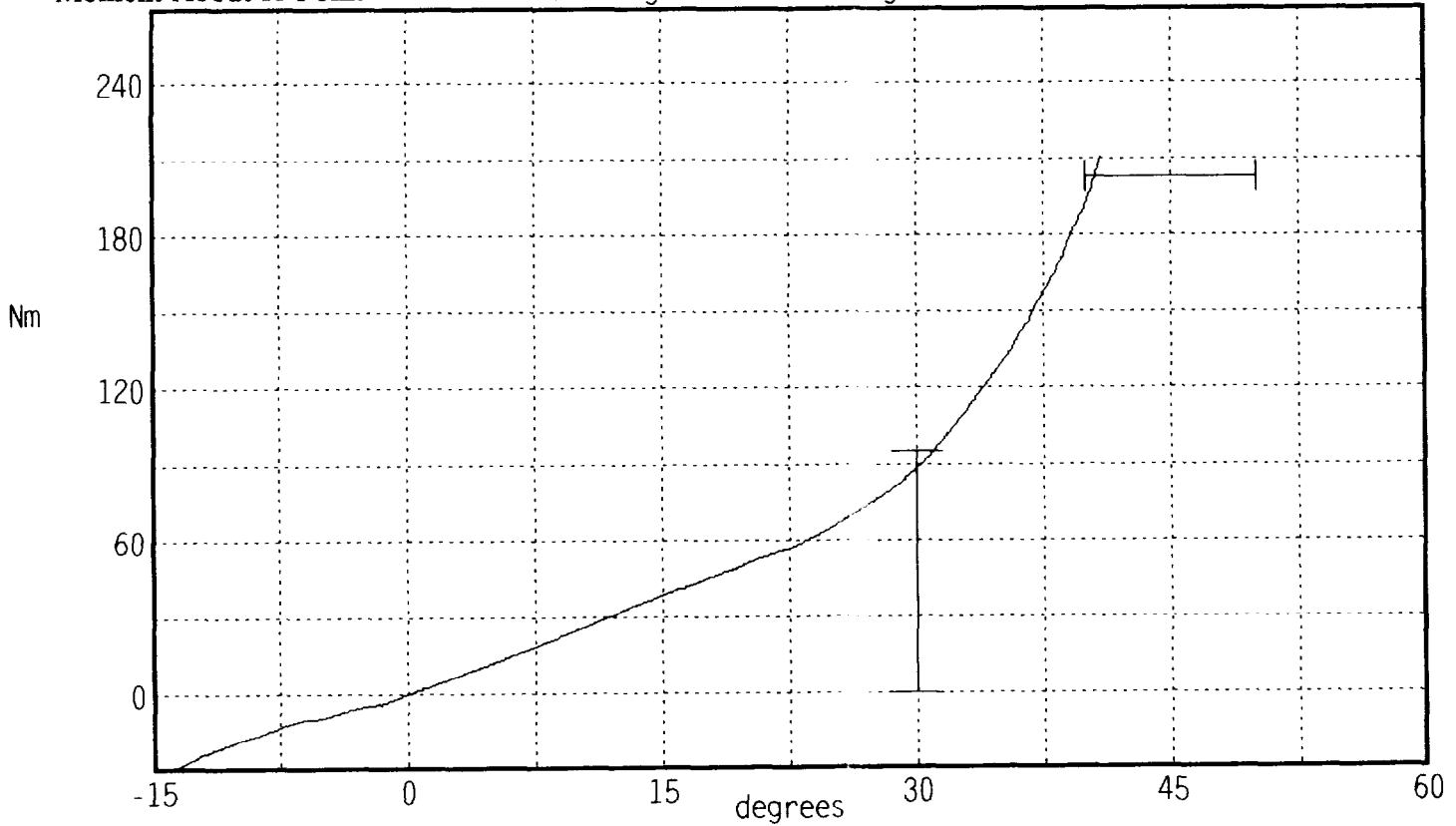
Test Number:

Time: 12:19

Comments:

TEST PARAMETER	SPECIFICATION	TEST RESULTS	
Temperature	18.9 - 25.6	22.0 °C	Pass
Humidity	10 - 70	55 %	Pass
Moment at 30 deg	<= 94.9	88.9 Nm	Pass
Angle at 203 Nm	40.0 - 50.0	40.6 deg	Pass
Average Velocity	5.0 - 10.0	7.4 deg/sec	Pass

Moment About H-Point
Peak Moment: 210.4 Nm at 40.9 deg
Peak Angle: 40.9 deg at 210.4 Nm



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III 50th

24-MAY-00

TRC INC.

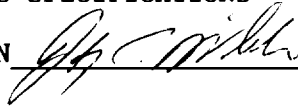
TEST NO: 45C41RK2

572E SN45 RIGHT KNEE CAL 41

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5263.3 N

TEST MEETS SPECIFICATIONS

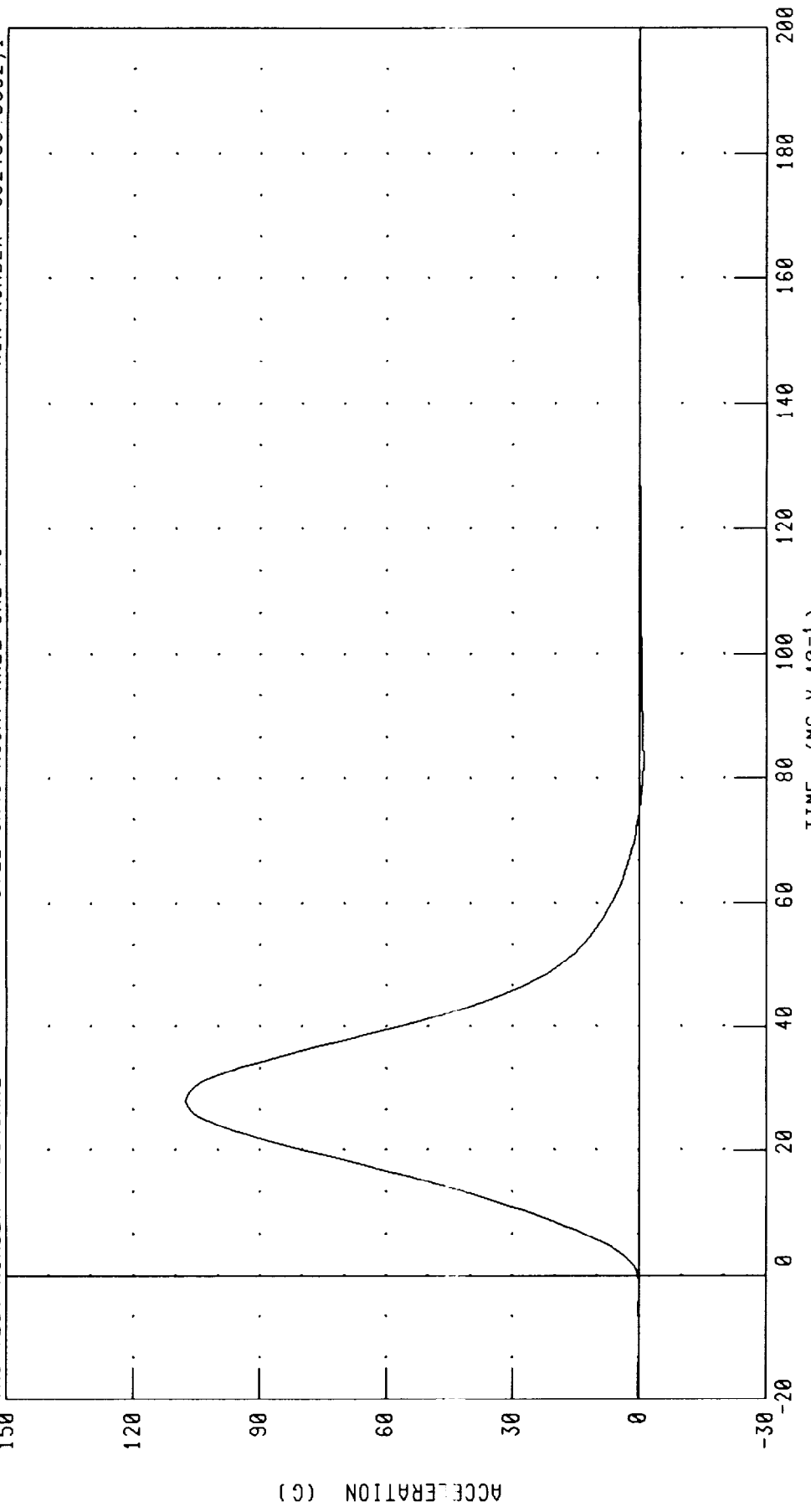
TECHNICIAN



RUN NUMBER: 052400.0932;1

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

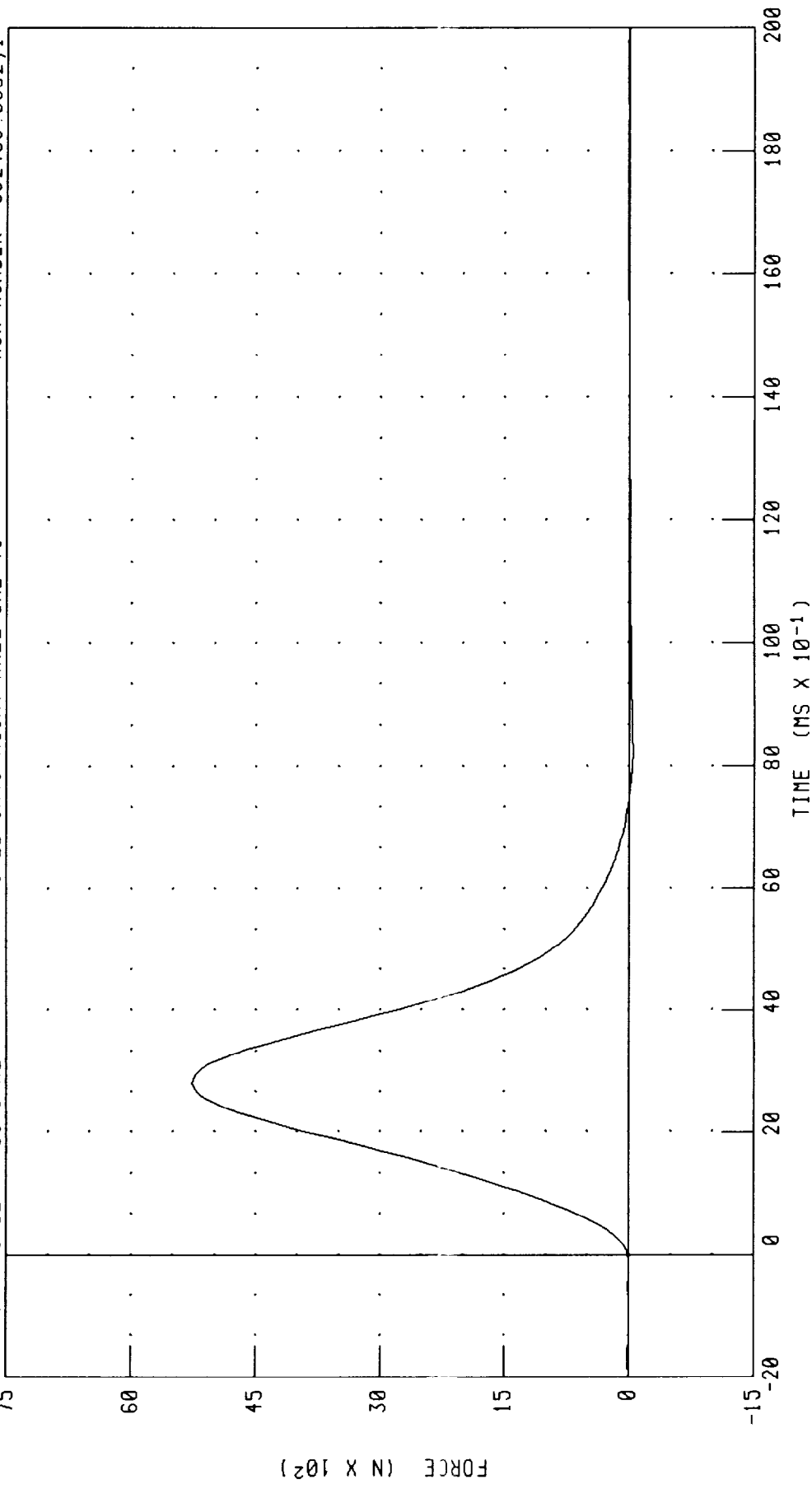
TRC TEST NUMBER: 45C41RK2 572E SN45 RIGHT KNEE CAL 41 RUN NUMBER: 052400 0932,1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 107.57 G @ 2.80 MS, -0.99 G @ 8.24 MS

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 45C41RK2 572E SN45 RIGHT KNEE CAL 41 RUN NUMBER: 052400 0932,1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 5263.35 N @ 2.80 MS; -48.37 N @ 8.24 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III 50th

24-MAY-00

TRC INC.

TEST NO: 45C41LK2

572E SN45 LEFT KNEE CAL 41

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5012.7 N

TEST MEETS SPECIFICATIONS

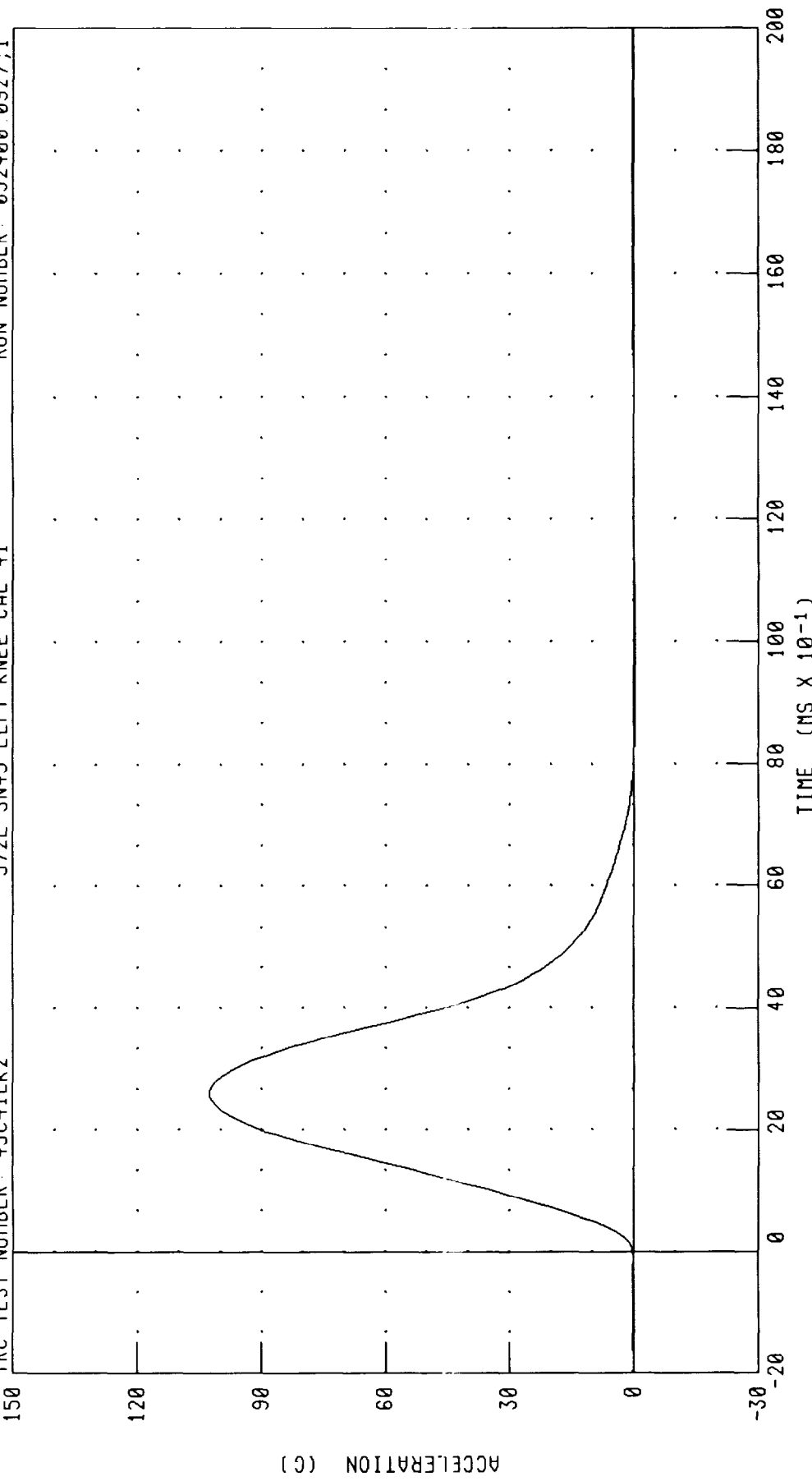
TECHNICIAN



RUN NUMBER: 052400.0927;1

PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 45C41LK2 572E SN45 LEFT KNEE CAL 41 RUN NUMBER: 052100 0927,1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 102.45 G @ 2.64 MS, -0.39 G @ 9.44 MS

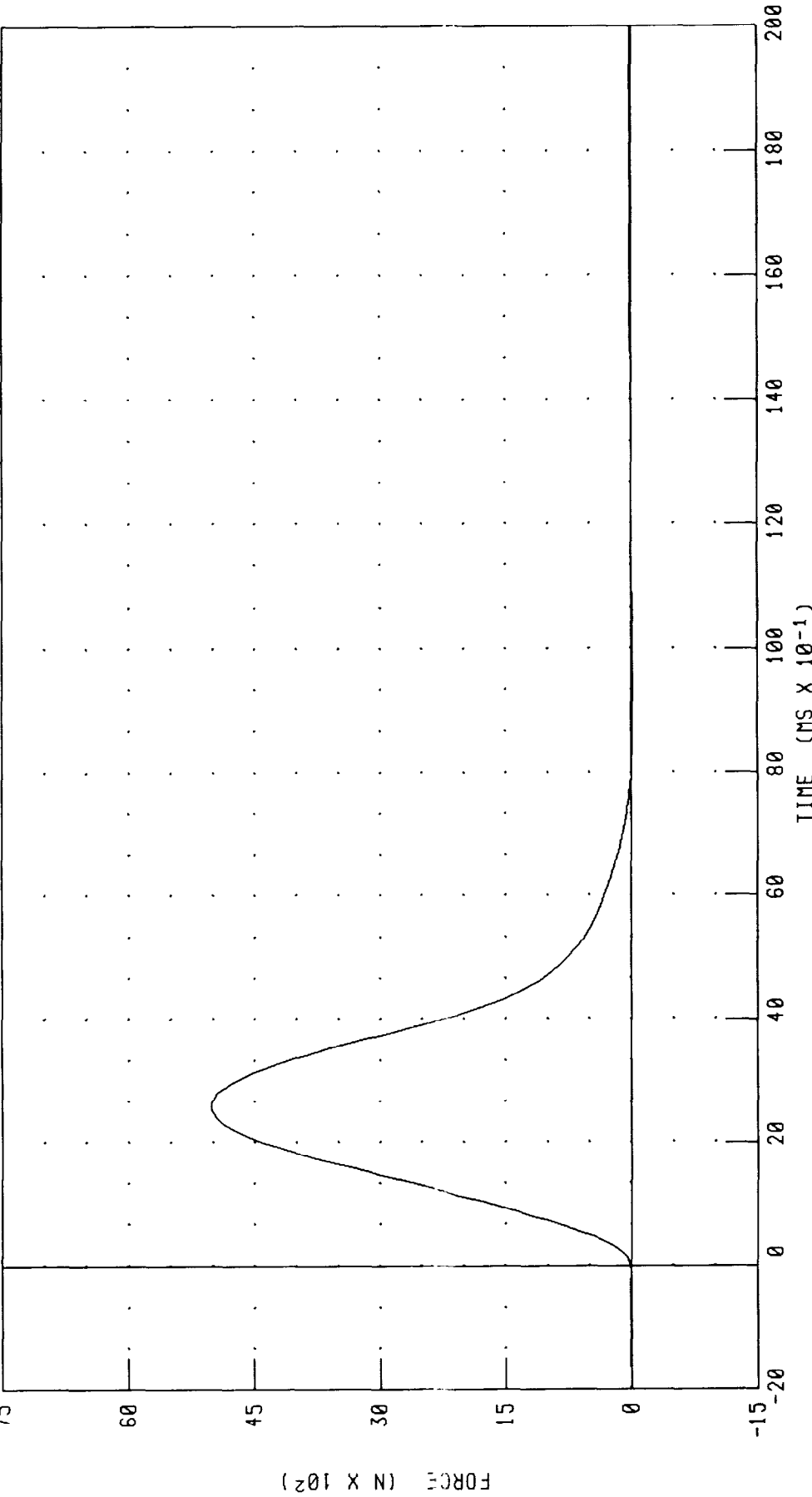
PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572E SN45 LEFT KNEE CAL 41

TRC TEST NUMBER: 45C41LK2

RUN NUMBER: 052400.0927,1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 5012.76 N @ 2.64 MS, -19.21 N @ 9.44 MS

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

24-MAY-00

TRC INC.

TEST NO: 416C4HD1

572 0 SN416 HEAD DROP CAL 4

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	275.18 G
PEAK LATERAL ACCELERATION	15 G MAX	4.77 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 052400.1244;1

PART 572-0 HYBRID III HEAD CALIBRATION

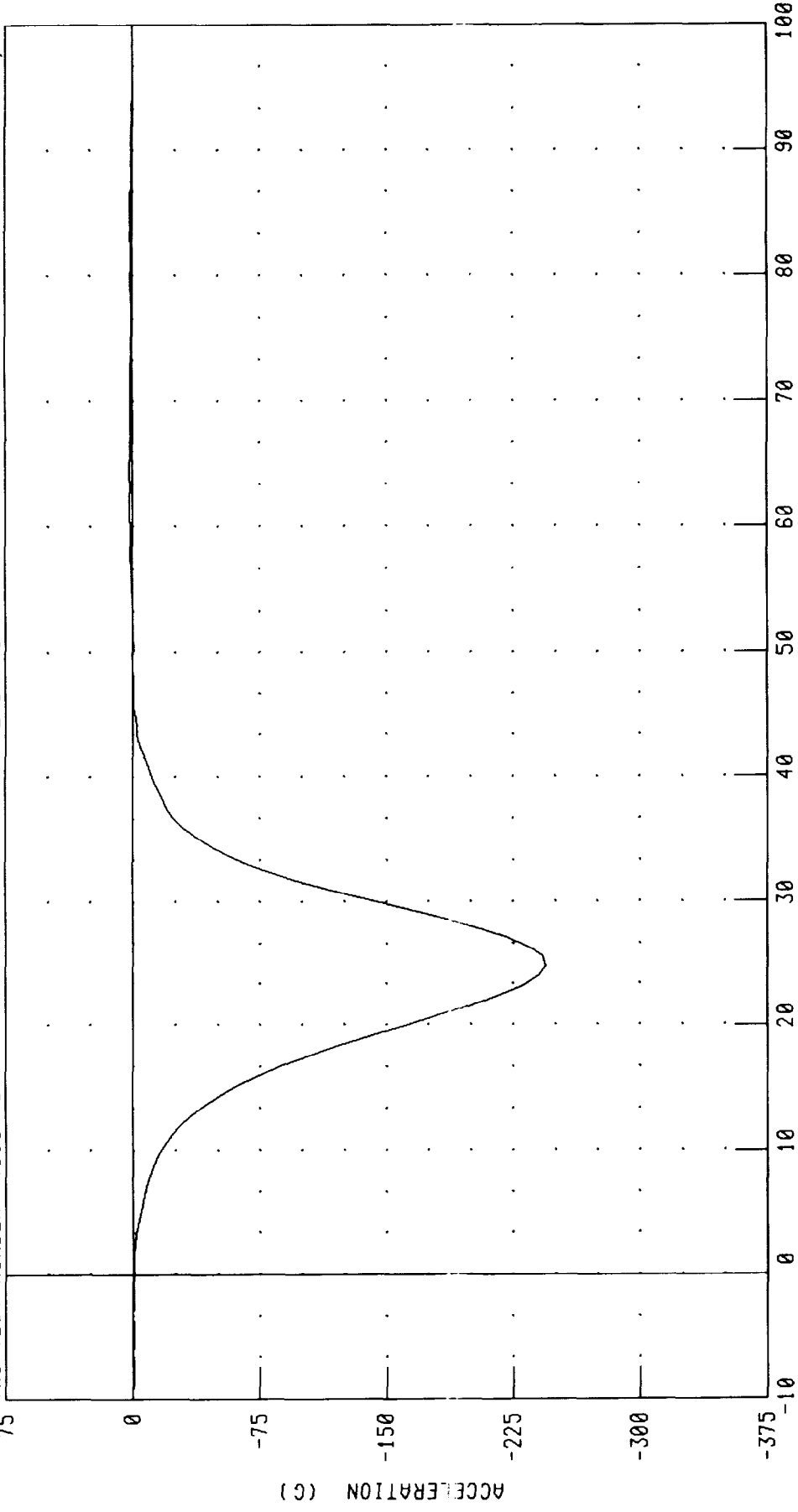
HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 416C4HD1

572 0 SN416 HEAD DROP CAL 4

RUN NUMBER: 052400.1245,1

75



PEAK DATA: 2.17 G @ 6.16 MS, -244.58 G @ 2.48 MS

CHANNEL: HEDXC FILTER: CH. CLASS 1000

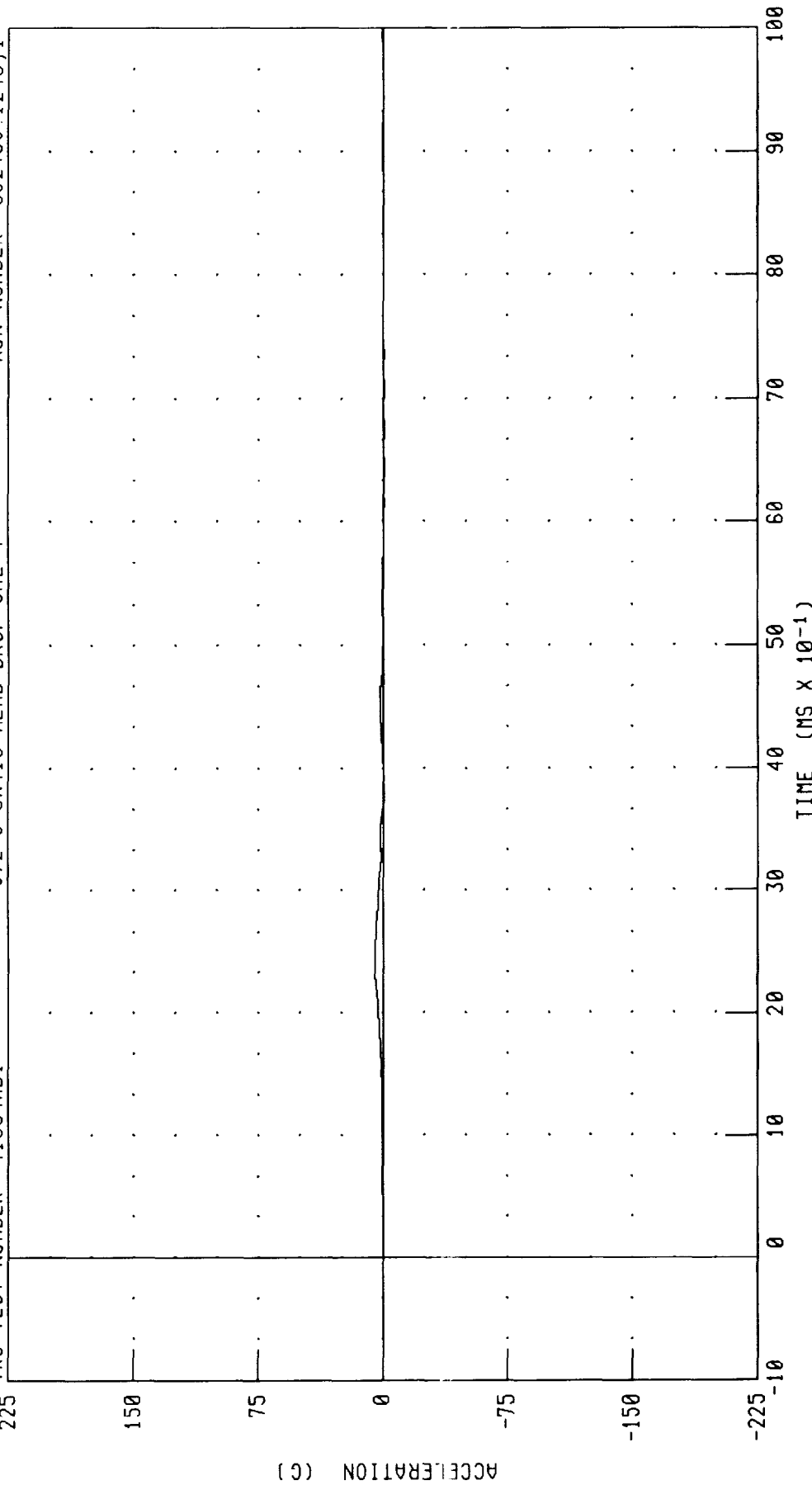
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 416C4HD1

572 0 SN416 HEAD DROP CAL 4

RUN NUMBER: 052400.1245,1



CHANNEL: HEDYC FILTER: CH. CLASS 1000

PEAK DATA: 4.77 G @ 2.40 MS, -0.85 G @ 6.40 MS

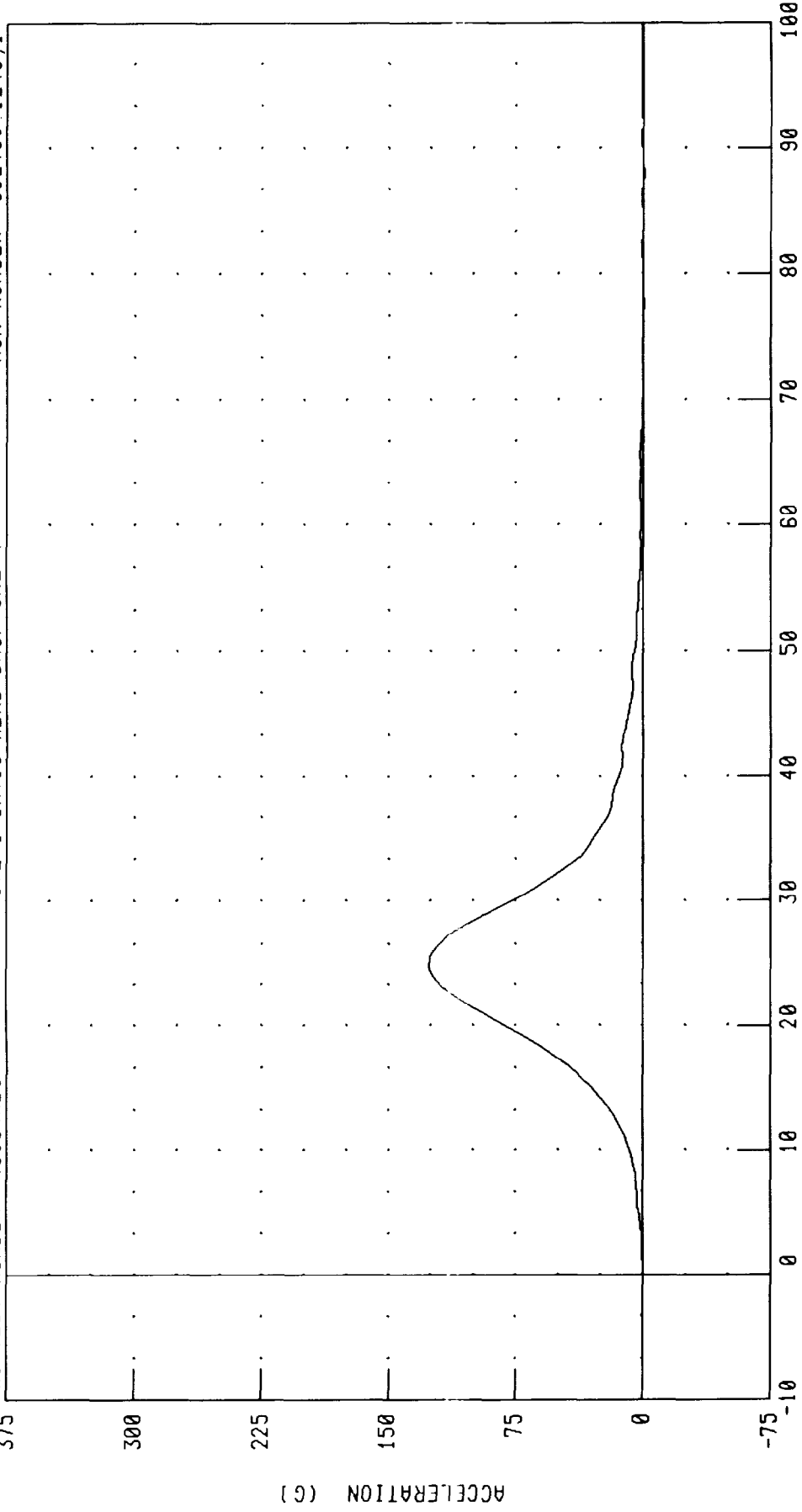
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 416C4HD1

572 0 SN416 HEAD DROP CAL 4

RUN NUMBER: 052400 1215,1



CHANNEL: HEDZG FILTER: CH. CLASS 1000

PEAK DATA: 126.04 G @ 2.48 MS; -0.59 G @ 7.76 MS

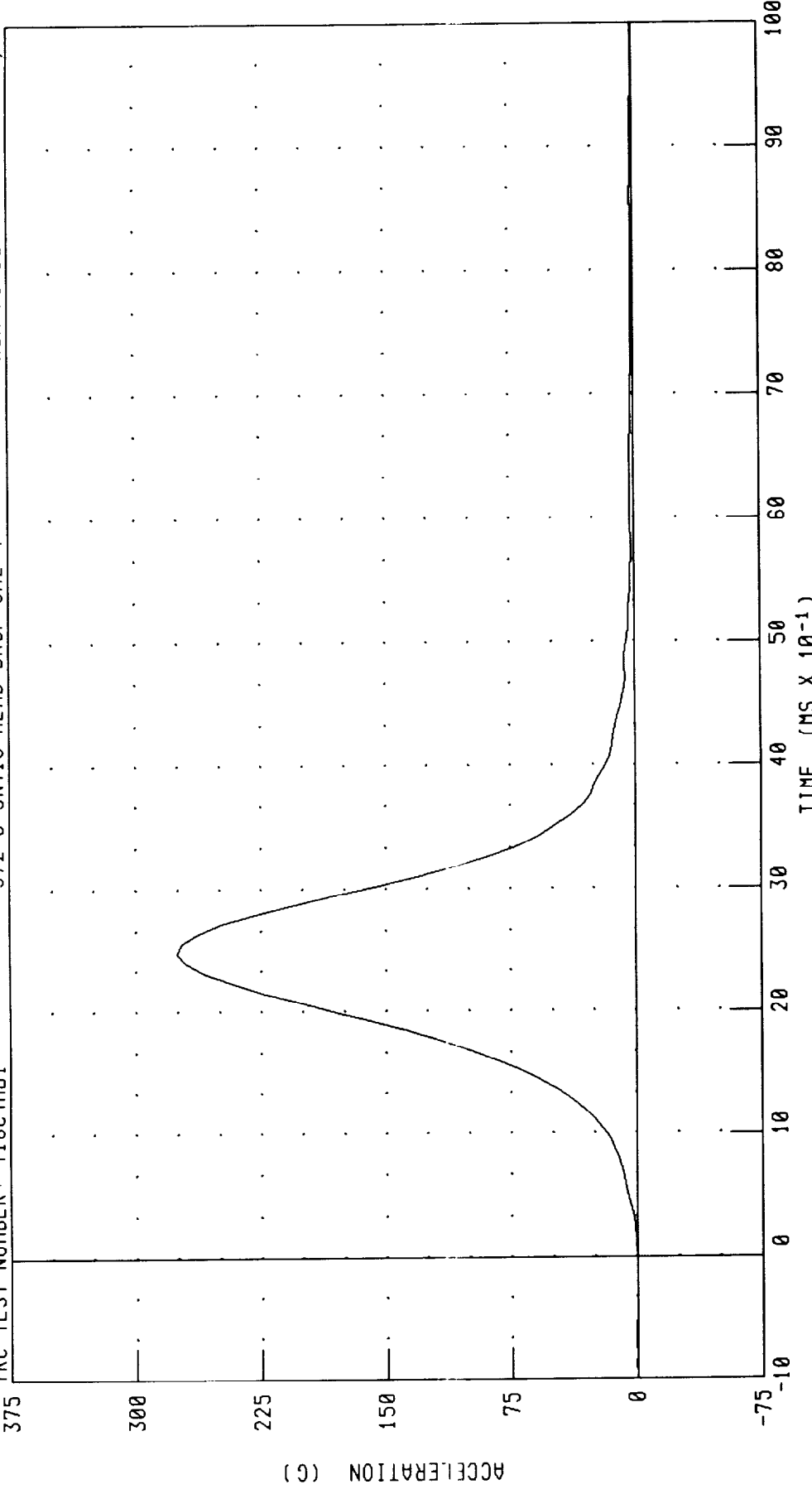
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572 0 SN416 HEAD DROP CAL 4

RUN NUMBER: 052400 1245.1

TRC TEST NUMBER: 416C4HD1



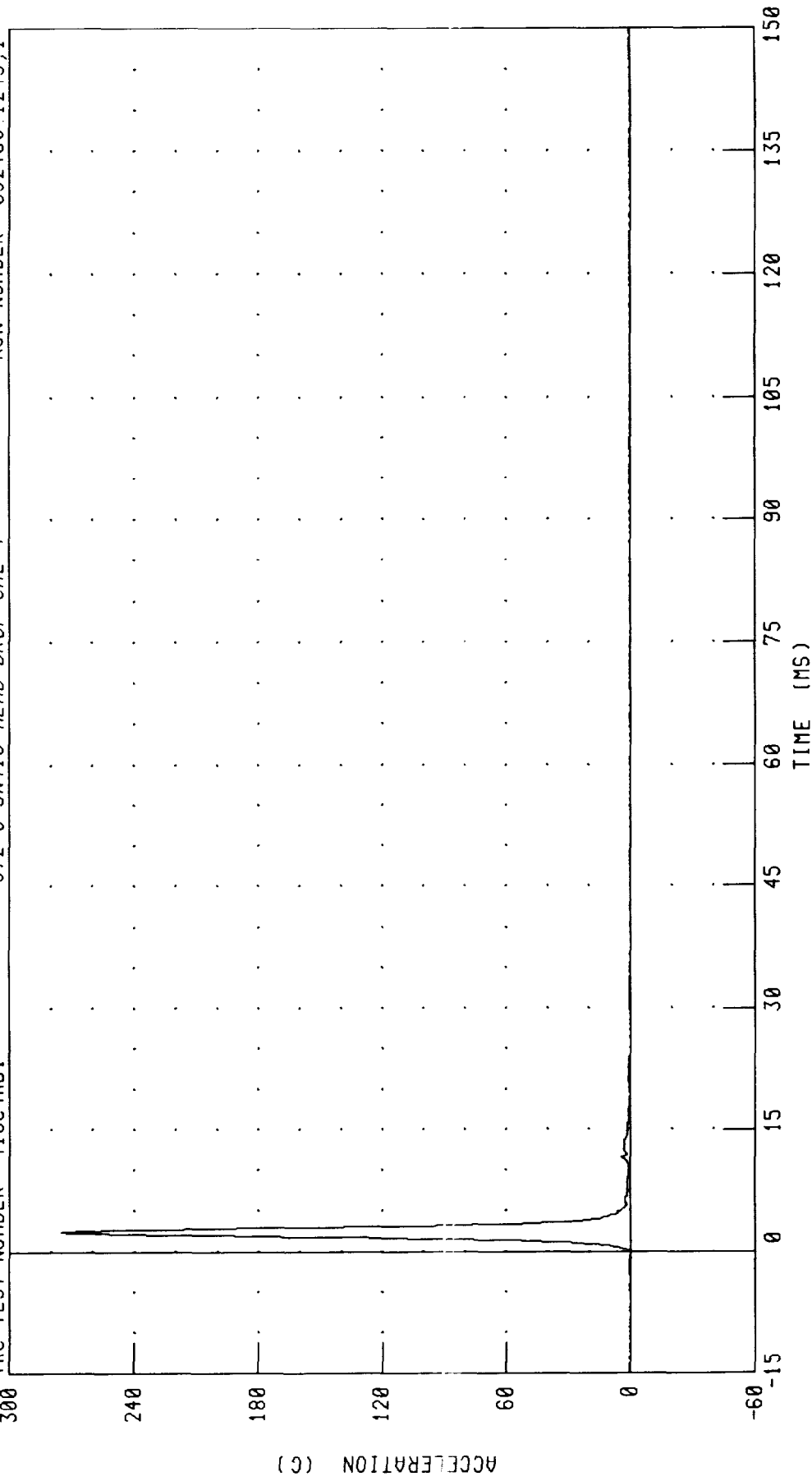
CHANNEL: HEDRC FILTER: CH. CLASS 1000 PEAK DATA: 275.18 G @ 2.48 MS; 0.10 G @ -0.96 MS

PART 572-0 HYBRID III HEAD CALIBRATION
CHECK PLOT - HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 416C4HD1

572 0 SN416 HEAD DROP CAL 4

RUN NUMBER: 052400 1245,1



CHANNEL: HEDRC FILTER: CH. CLASS 1000 PEAK DATA: 275.18 G @ 2.48 MS; 0.10 G @ -14.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

24-MAY-00

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 416C4NF1 572 0 SN416 NECK FLEX. CAL4

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	7.12 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 2.0 - 2.5 M/S	2.17 M/S
	20 MS 4.0 - 5.0 M/S	4.36 M/S
	30 MS 5.8 - 7.0 M/S	6.34 M/S
PEAK D-PLANE ROTATION	77 - 91 DEG.	78.04 DEG.
PEAK MOMENT DURING ROTATION INTERVAL	69 - 83 NM	73.95 NM
POSITIVE MOMENT DECAY TIME TO 10 NM	80 - 100 MS	87.92 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

J. C. Miller

RUN NUMBER: 052400.1323;1

[DUMMY.416C4]416C4NF1D.RAD;1
TRC INC. 416C4NF1 00145
NEKOM Deltax = 0.080000 msec

572 0 SN416 NECK FLEX. CAL4 7.1 m
Npts = 8000; IPO = 1722; Filter =

	msec	NEKOM	(N-m)		Min, Max val
2410	55.0400 -->	73.946	73.875	73.808	73.743	73.680
2420	55.8400 -->	73.160	73.058	72.961	72.869	72.783
2430	56.6400 -->	72.341	72.278	72.215	72.148	72.074
2440	57.4400 -->	71.705	71.641	71.568	71.489	71.406
2450	58.2400 -->	70.805	70.676	70.538	70.393	70.244
2460	59.0400 -->	69.181	68.987	68.794	68.603	68.417
2470	59.8400 -->	67.198	66.966	66.735	66.506	66.276
2480	60.6400 -->	64.786	64.518	64.247	63.974	63.697
2490	61.4400 -->	62.060	61.812	61.567	61.320	61.068
2500	62.2400 -->	59.486	59.224	58.960	58.694	

[DUMMY.416C4]416C4NF1D.RAD;1

TRC INC. 416C4NF1 00145

572 0 SN416 NECK FLEX. CAL4 7.1 m

NEKOM Deltax = 0.080000 msec

Npts = 8000; IPO = 1722; Filter =

	msec		NEKOM	(N-m)		Min, Max val
2597	70.0000 -->	34.531	34.333	34.140	33.945	33.745	
2607	70.8000 -->	32.512	32.311	32.117	31.929	31.745	
2617	71.6000 -->	30.677	30.509	30.342	30.172	29.997	
2627	72.4000 -->	28.954	28.795	28.638	28.482	28.327	
2637	73.2000 -->	27.379	27.225	27.077	26.935	26.797	
2647	74.0000 -->	26.008	25.884	25.765	25.652	25.546	
2657	74.8000 -->	24.938	24.821	24.699	24.575	24.451	
2667	75.6000 -->	23.819	23.724	23.629	23.532	23.433	
2677	76.4000 -->	22.871	22.789	22.709	22.627	22.541	
2687	77.2000 -->	21.949	21.838	21.724	21.610	21.498	
2697	78.0000 -->	20.929	20.822	20.710	20.596	20.481	
2707	78.8000 -->	19.862	19.763	19.661	19.554	19.445	
2717	79.6000 -->	18.846	18.748	18.645	18.536	18.422	
2727	80.4000 -->	17.746	17.641	17.538	17.439	17.344	
2737	81.2000 -->	16.828	16.728	16.625	16.523	16.422	
2747	82.0000 -->	15.870	15.784	15.696	15.605	15.511	
2757	82.8000 -->	14.942	14.861	14.781	14.698	14.607	
2767	83.6000 -->	14.065	13.992	13.917	13.837	13.753	
2777	84.4000 -->	13.278	13.192	13.108	13.028	12.955	
2787	85.2000 -->	12.524	12.443	12.362	12.285	12.216	
2797	86.0000 -->	11.804	11.732	11.660	11.587	11.515	
2807	86.8000 -->	11.059	10.974	10.894	10.820	10.750	
2817	87.6000 -->	10.315	10.239	10.162	10.086	10.011	
2827	88.4000 -->	9.596	9.525	9.454	9.383	9.313	
2837	89.2000 -->	8.864	8.790	8.720	8.652	8.584	
2847	90.0000 -->	8.150					

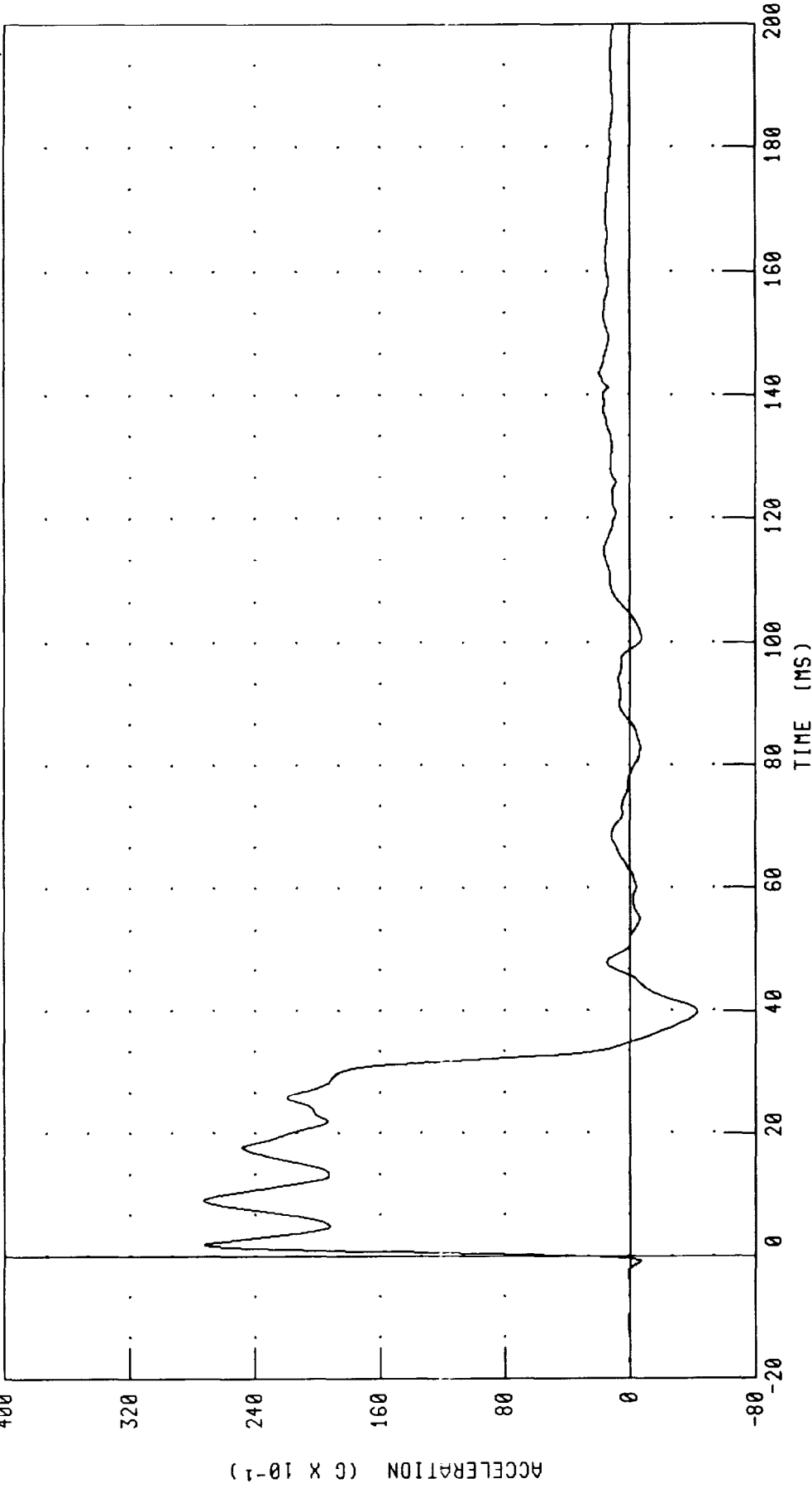
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX. CAL4

RUN NUMBER: 052400.1336.1



CHANNEL: PENXC FILTER: CH. CLASS 180

PEAK DATA: 27.31 G @ 9.12 MS, -4.30 G @ 39.92 MS

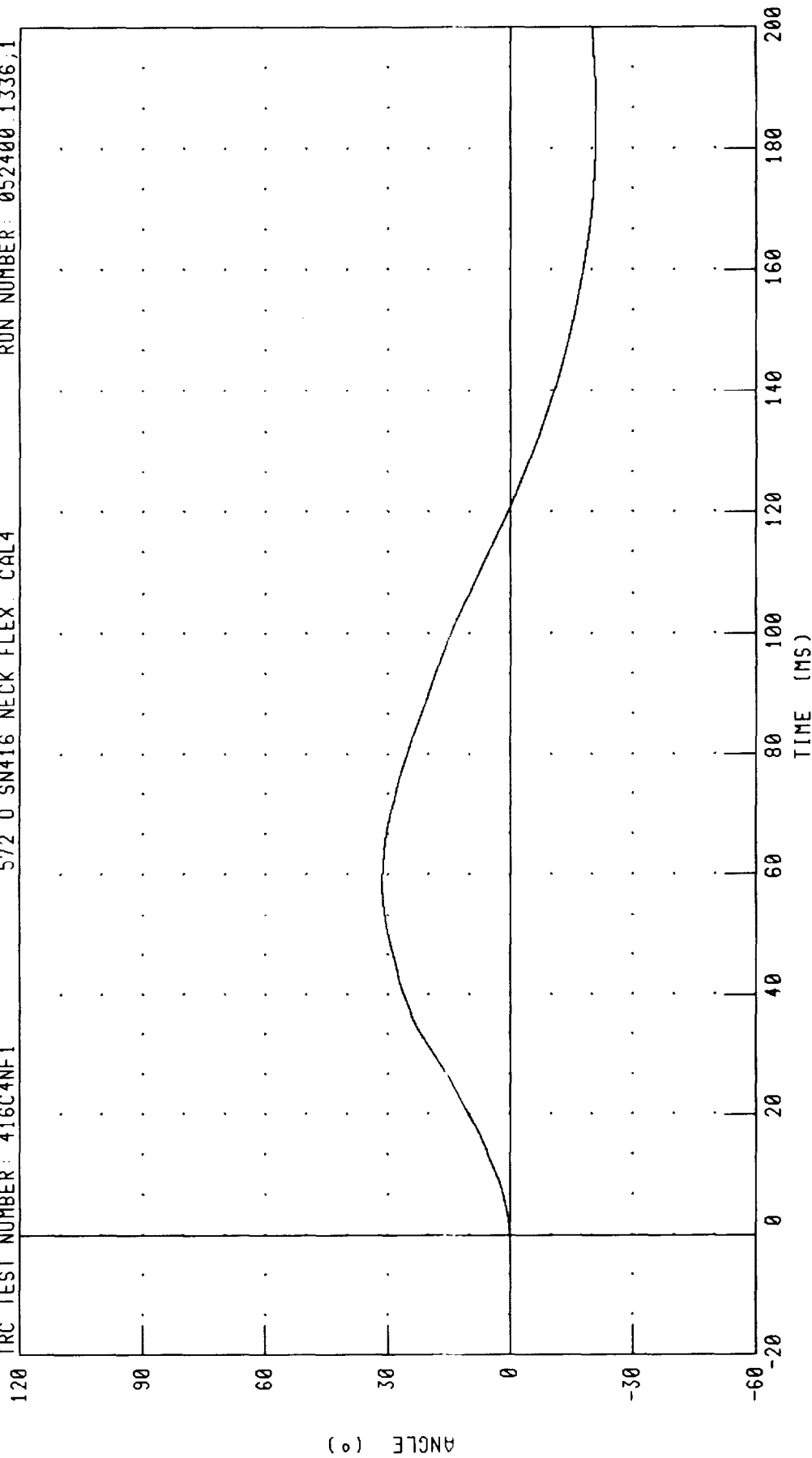
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX CAL4

RUN NUMBER: 052400.1336,1



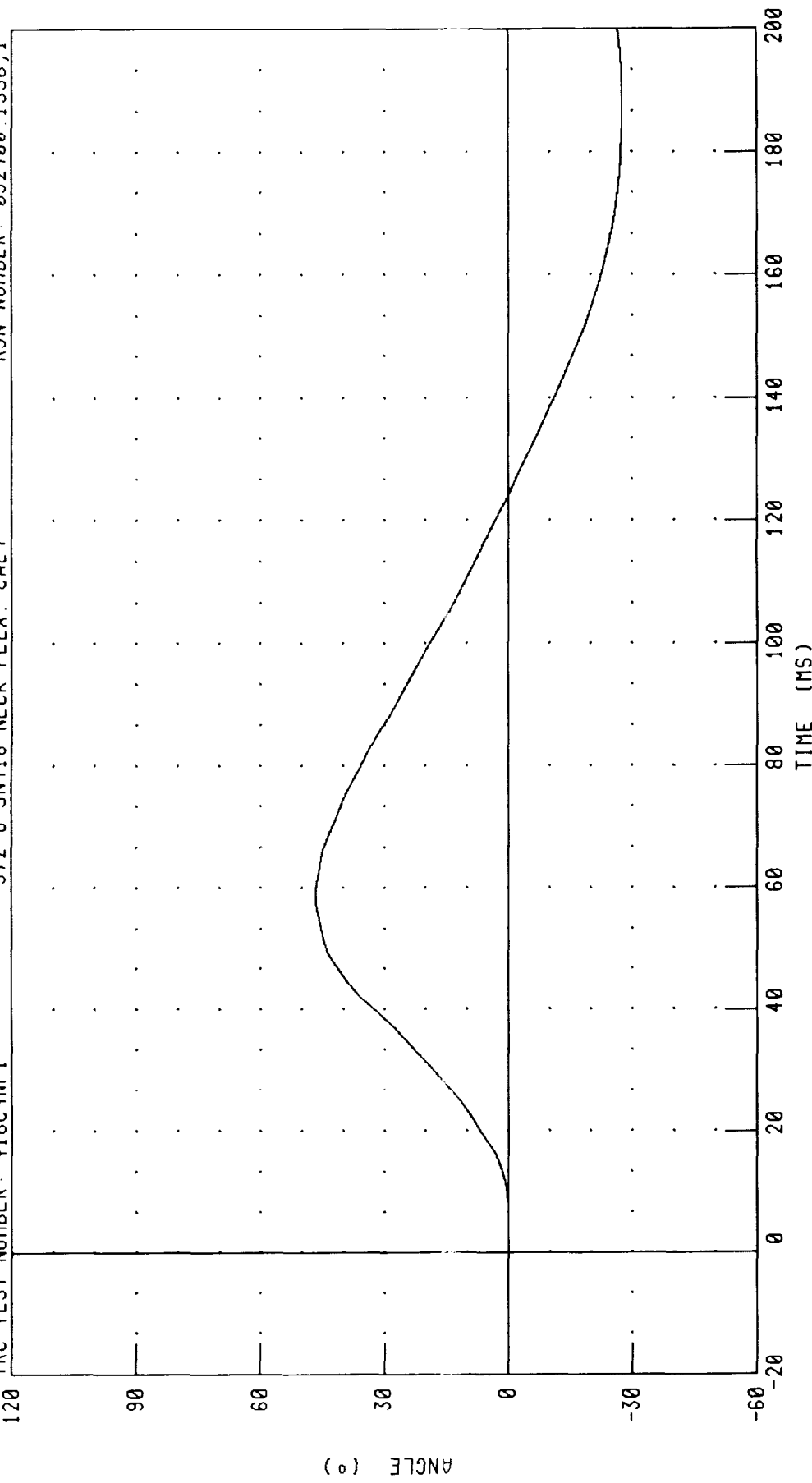
CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 31.37 ° @ 58.48 MS; -20.99 ° @ 183.68 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX. CAL4

RUN NUMBER: 052400.1336,1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 46.67 ° @ 58.64 MS, -27.60 ° @ 187.52 MS

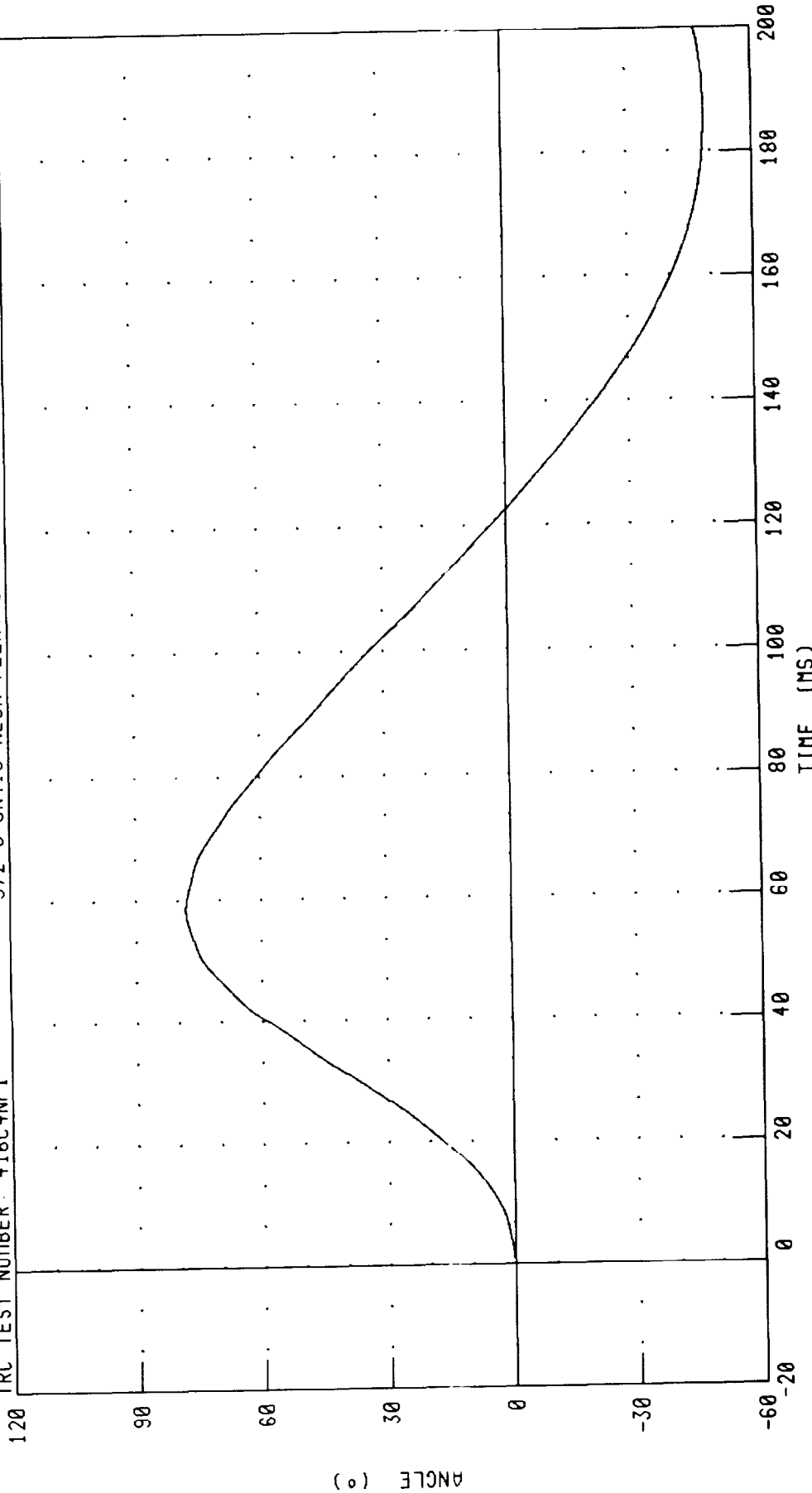
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX. CAL4

RUN NUMBER: 052400.1336,1



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 78.04 ° @ 58.56 MS; -48.55 ° @ 185.76 MS

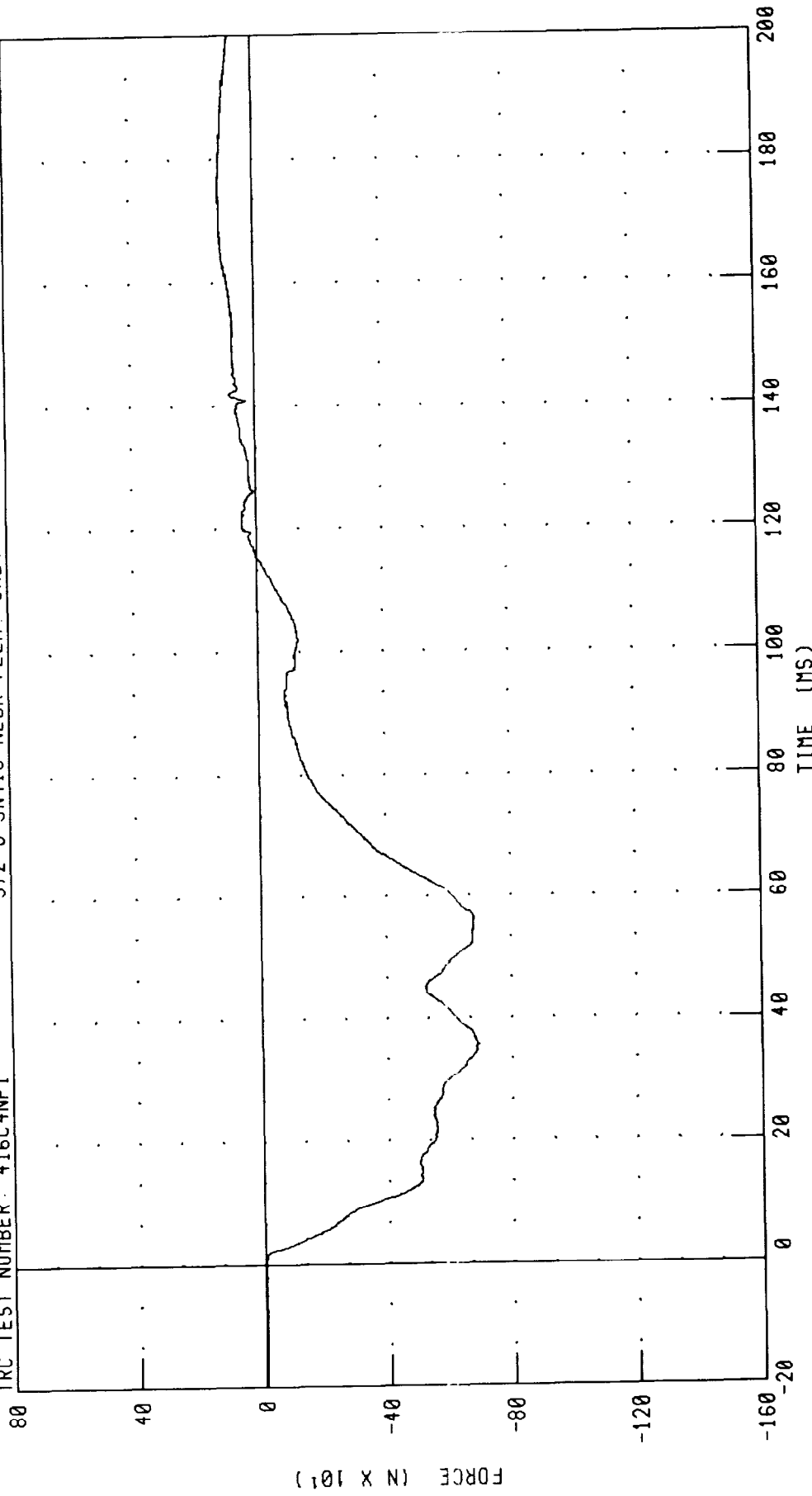
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX. CAL4

RUN NUMBER: 052400.1336;1

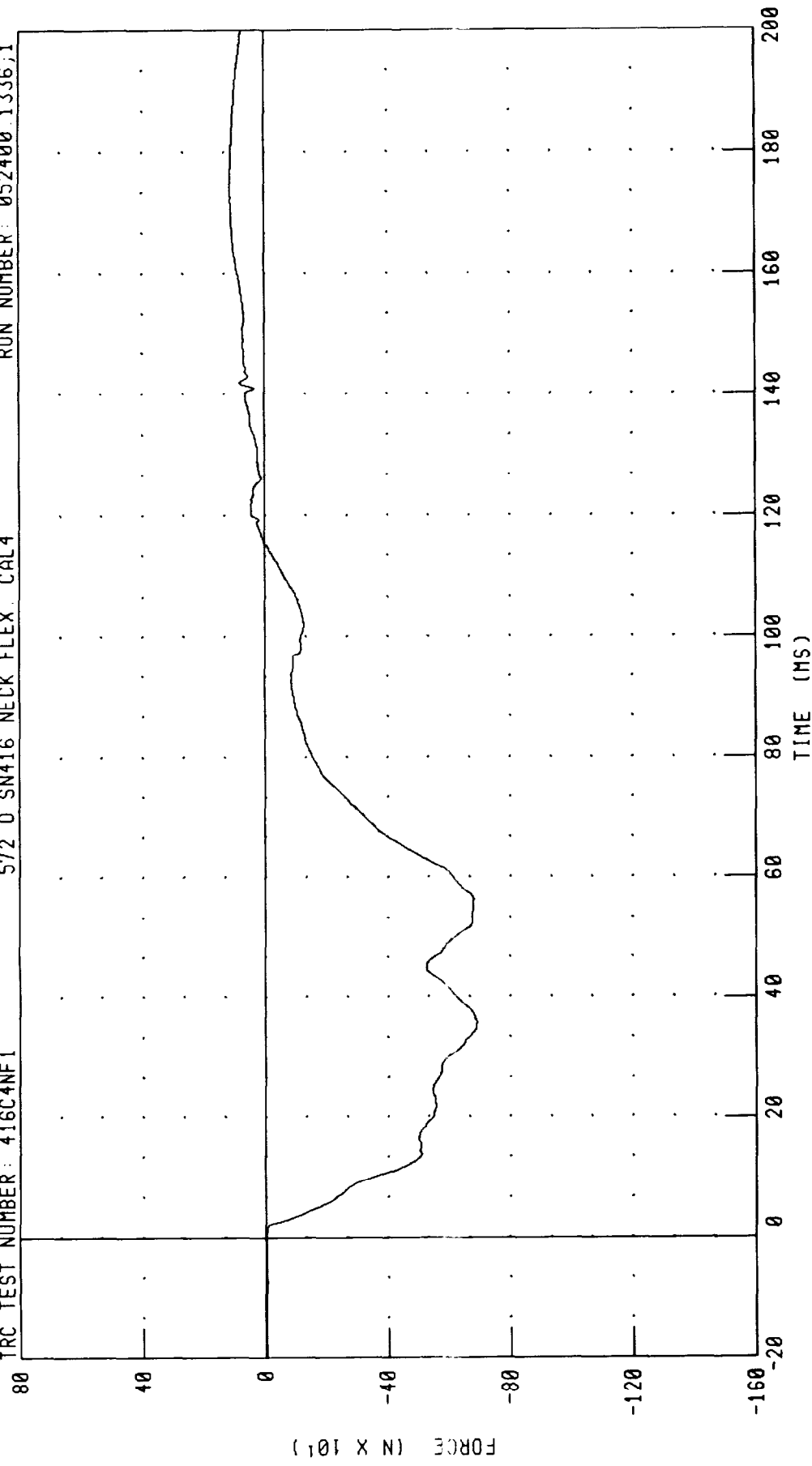


PEAK DATA: 114.67 N @ 171.92 MS; -694.80 N @ 35.92 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

PART 572-0 HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 416C4NF1 572 0 SN416 NECK FLEX. CAL4 RUN NUMBER: 052400.1336;1



CHANNEL: NEKXFC FILTER: CH. CLASS 600 PEAK DATA: 114.81 N @ 176.80 MS; -691.90 N @ 35.92 MS

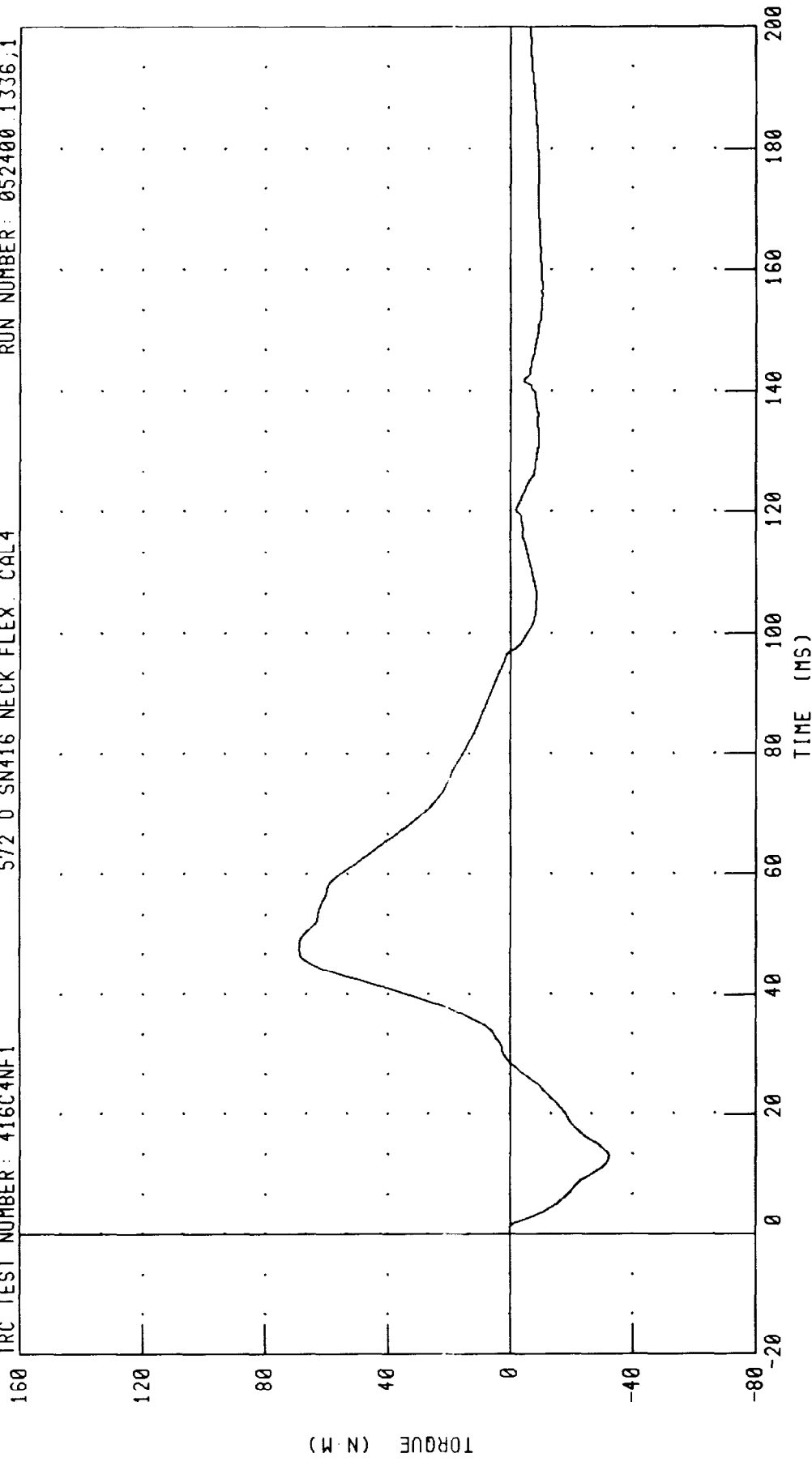
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX. CAL4

RUN NUMBER: 052400 1336.1



CHANNEL: NEKYM

FILTER: CH. CLASS 600

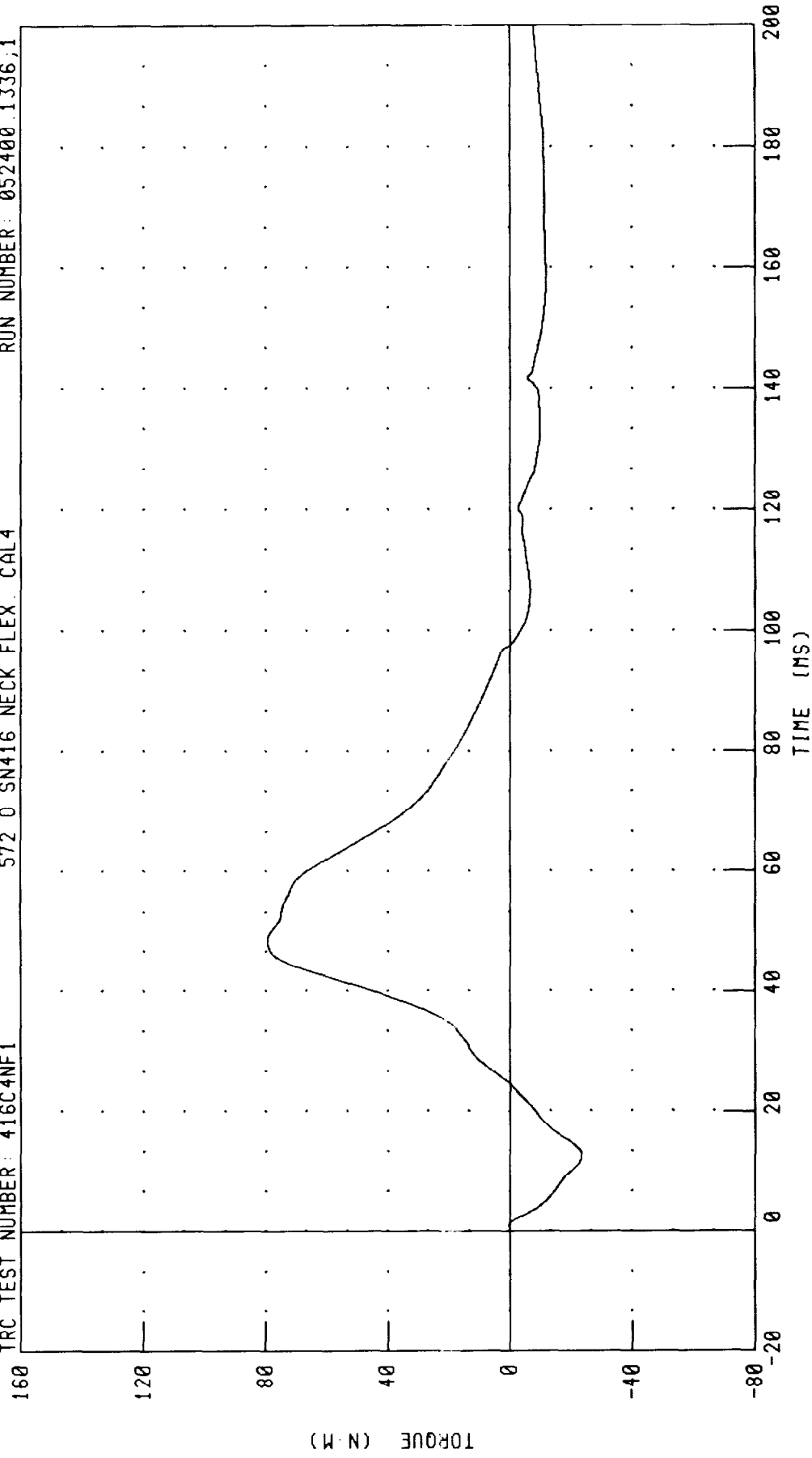
PEAK DATA: 69.09 N·M @ 48.56 MS, -32.30 N·M @ 12.88 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 416C4NF1

572 0 SN416 NECK FLEX. CAL4

RUN NUMBER: 052400.1336,1



CHANNEL: NEKOM

FILTER: CH. CLASS 600

PEAK DATA: 79.56 N.M @ 48.56 MS; -23.60 N.M @ 12.48 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

24-MAY-00

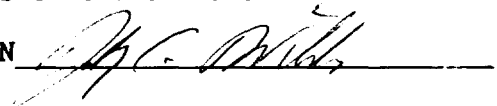
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 416C4NE1 572 0 SN416 NECK EXT. CAL 4

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.10 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.5 - 1.9 M/S	1.67 M/S
	20 MS 3.1 - 3.9 M/S	3.31 M/S
	30 MS 4.6 - 5.6 M/S	4.95 M/S
PEAK D-PLANE ROTATION	99 - 114 DEG.	99.44 DEG.
PEAK MOMENT DURING ROTATION INTERVAL	-53 / -65 NM	-53.63 NM
NEGATIVE MOMENT DECAY TIME TO 10 NM LEVEL	94 - 114 MS	102.88 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 052400.1413;1

[DUMMY.416C4]416C4NE1D.RAD;1
TRC INC. 416C4NE1 00145
NEKOM Deltax = 0.080000 msec

572 0 SN416 NECK EXT. CAL 4 6.1 m
Npts = 8000; IPO = 1807; Filter =

	msec		NEKOM	(N-m)		Min, Max val
2721	73.1200 -->	-53.626	-53.484	-53.338	-53.191	-53.046	
2731	73.9200 -->	-52.256	-52.124	-51.988	-51.849	-51.707	
2741	74.7200 -->	-50.880	-50.741	-50.599	-50.455	-50.311	
2751	75.5200 -->	-49.454	-49.310	-49.162	-49.006	-48.845	
2761	76.3200 -->	-47.963	-47.824	-47.686	-47.545	-47.397	
2771	77.1200 -->	-46.411	-46.239	-46.065	-45.890	-45.715	
2781	77.9200 -->	-44.647	-44.460	-44.272	-44.080	-43.888	
2791	78.7200 -->	-42.722	-42.518	-42.311	-42.104	-41.898	
2801	79.5200 -->	-40.712	-40.519	-40.323	-40.121	-39.915	
2811	80.3200 -->	-38.689	-38.485	-38.282	-38.081	-37.882	
2821	81.1200 -->	-36.698	-36.509	-36.320	-36.133	-35.947	
2831	81.9200 -->	-34.891	-34.713				

[DUMMY.416C4]416C4NE1D.RAD;1

TRC INC. 416C4NE1 00145

572 0 SN416 NECK EXT. CAL 4 6.1 m

NEKOM Deltax = 0.080000 msec

Npts = 8000; IPO = 1807; Filter =

	msec		NEKOM	(N-m)	Min, Max val
2832	82.0000 -->	-34.718	-34.539	-34.354	-34.162	-33.969
2842	82.8000 -->	-32.964	-32.799	-32.635	-32.471	-32.309
2852	83.6000 -->	-31.346	-31.197	-31.047	-30.893	-30.735
2862	84.4000 -->	-29.863	-29.730	-29.594	-29.457	-29.319
2872	85.2000 -->	-28.457	-28.316	-28.180	-28.045	-27.908
2882	86.0000 -->	-27.002	-26.858	-26.723	-26.595	-26.471
2892	86.8000 -->	-25.725	-25.598	-25.471	-25.343	-25.216
2902	87.6000 -->	-24.497	-24.366	-24.228	-24.089	-23.956
2912	88.4000 -->	-23.365	-23.271	-23.173	-23.070	-22.966
2922	89.2000 -->	-22.386	-22.290	-22.191	-22.093	-21.995
2932	90.0000 -->	-21.428	-21.346	-21.268	-21.192	-21.114
2942	90.8000 -->	-20.575	-20.487	-20.404	-20.324	-20.246
2952	91.6000 -->	-19.748	-19.668	-19.591	-19.515	-19.434
2962	92.4000 -->	-18.893	-18.802	-18.712	-18.624	-18.539
2972	93.2000 -->	-18.064	-17.973	-17.885	-17.799	-17.716
2982	94.0000 -->	-17.239	-17.152	-17.062	-16.970	-16.877
2992	94.8000 -->	-16.376	-16.299	-16.222	-16.146	-16.071
3002	95.6000 -->	-15.575	-15.479	-15.393	-15.317	-15.250
3012	96.4000 -->	-14.835	-14.758	-14.674	-14.586	-14.496
3022	97.2000 -->	-14.049	-13.975	-13.900	-13.827	-13.758
3032	98.0000 -->	-13.350	-13.273	-13.193	-13.115	-13.040
3042	98.8000 -->	-12.646	-12.585	-12.525	-12.464	-12.402
3052	99.6000 -->	-12.044	-11.983	-11.919	-11.853	-11.784
3062	100.4000 -->	-11.398	-11.345	-11.292	-11.238	-11.184
3072	101.2000 -->	-10.854	-10.799	-10.744	-10.694	-10.651
3082	102.0000 -->	-10.437	-10.395	-10.354	-10.316	-10.279
3092	102.8000 -->	-10.050	-10.005	-9.960	-9.914	-9.868
3102	103.6000 -->	-9.637	-9.612	-9.586	-9.554	-9.514
3112	104.4000 -->	-9.262	-9.239	-9.219	-9.199	-9.176
3122	105.2000 -->	-9.008	-8.978	-8.951	-8.923	-8.891
3132	106.0000 -->	-8.697	-8.671	-8.648	-8.629	-8.614
3142	106.8000 -->	-8.448	-8.406	-8.368	-8.339	-8.316
3152	107.6000 -->	-8.169	-8.130	-8.091	-8.053	-8.014
3162	108.4000 -->	-7.838	-7.821	-7.808	-7.795	-7.778
3172	109.2000 -->	-7.649	-7.625	-7.603	-7.582	-7.558
3182	110.0000 -->	-7.410				

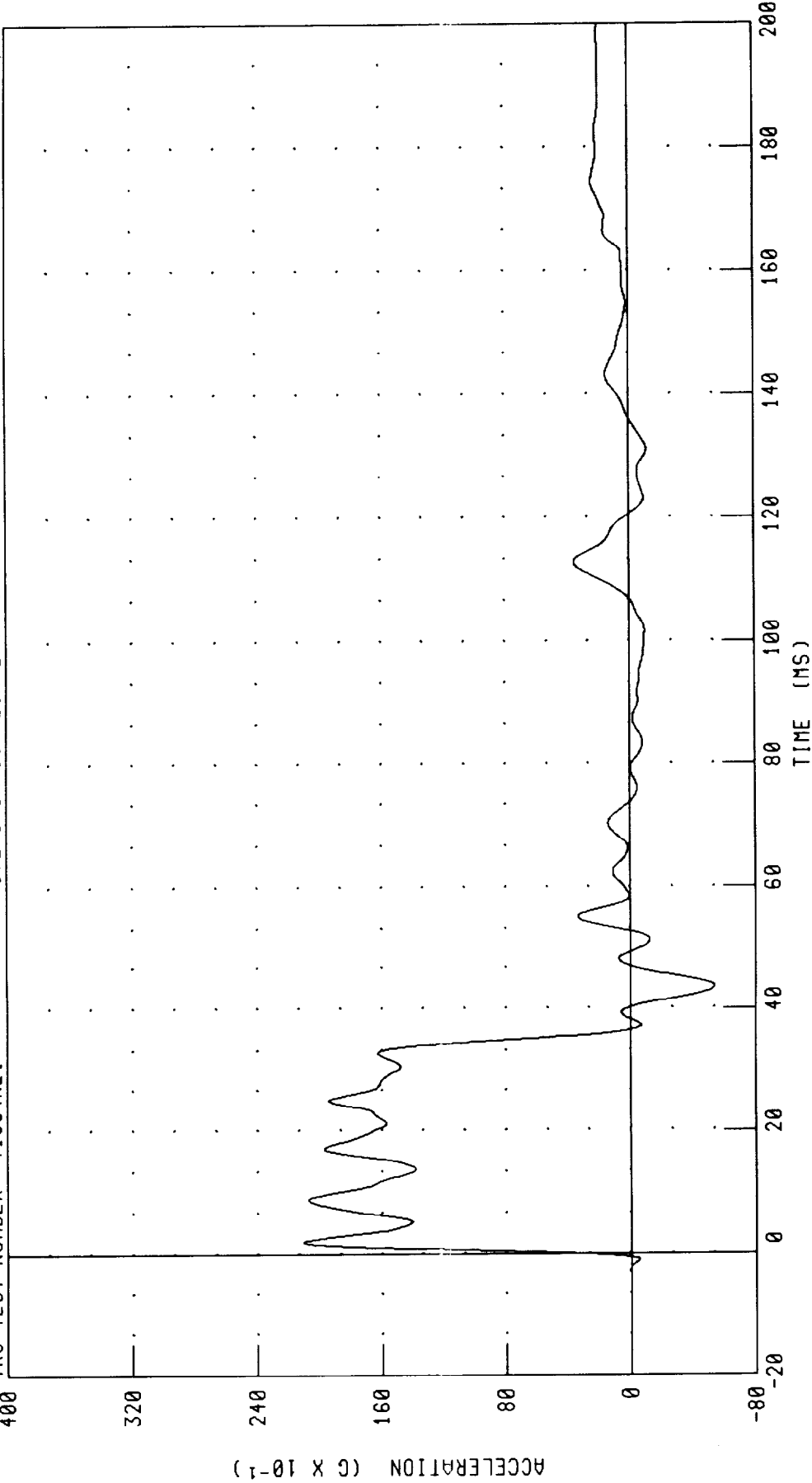
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 416C4NE1

572 0 SN416 NECK EXT CAL 4

RUN NUMBER: 052400 1423,1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 21.06 G @ 1.92 MS, -5.36 G @ 43.60 MS

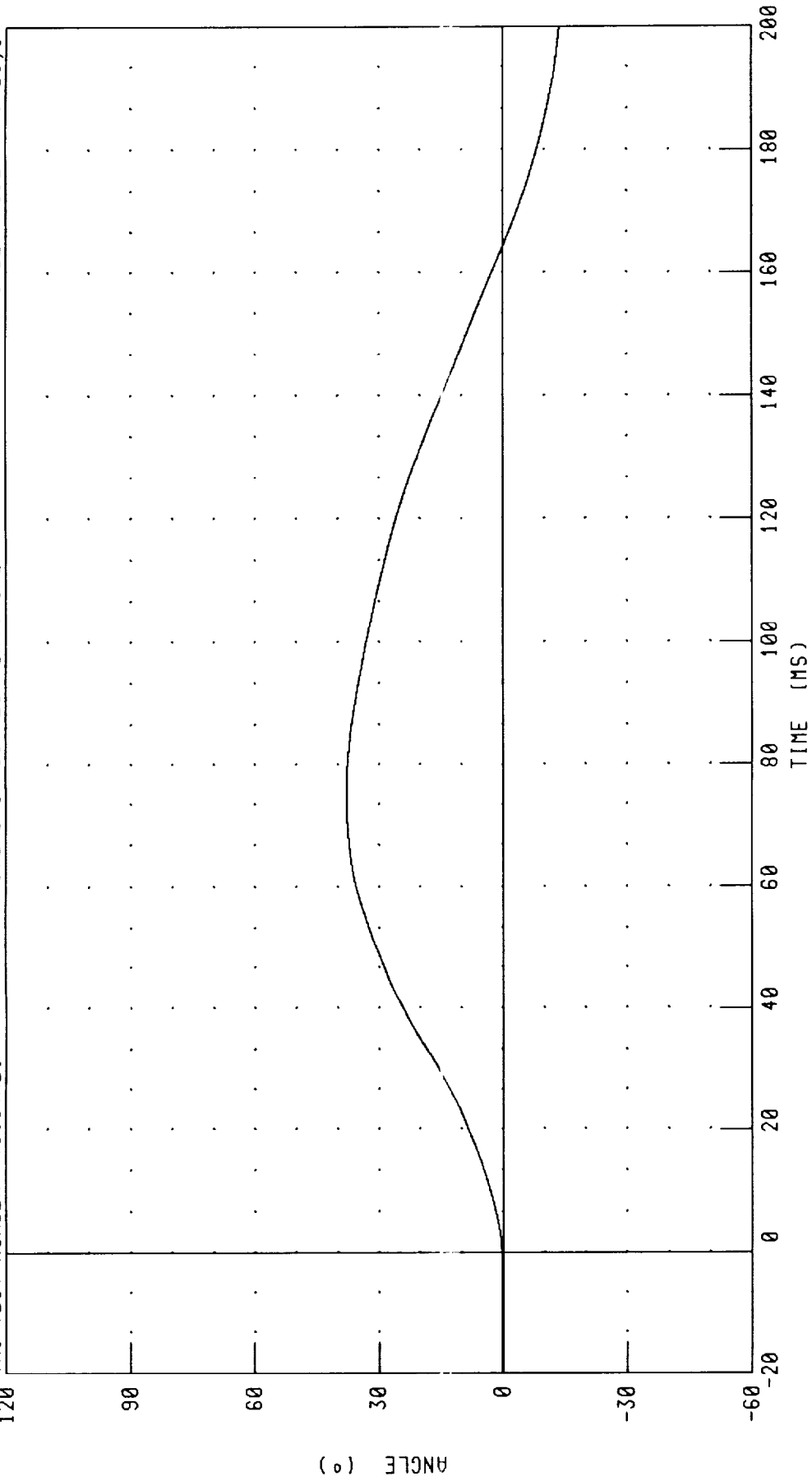
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 416C4NE1

572 0 SN416 NECK EXT. CAL 4

RUN NUMBER: 052400.1423,1



CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 37.86 ° @ 75.60 MS, -13.73 ° @ 200.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 416C4NE1

572 0 SN416 NECK EXT. CAL 4

RUN NUMBER: 052400 1423;1

120

90

60

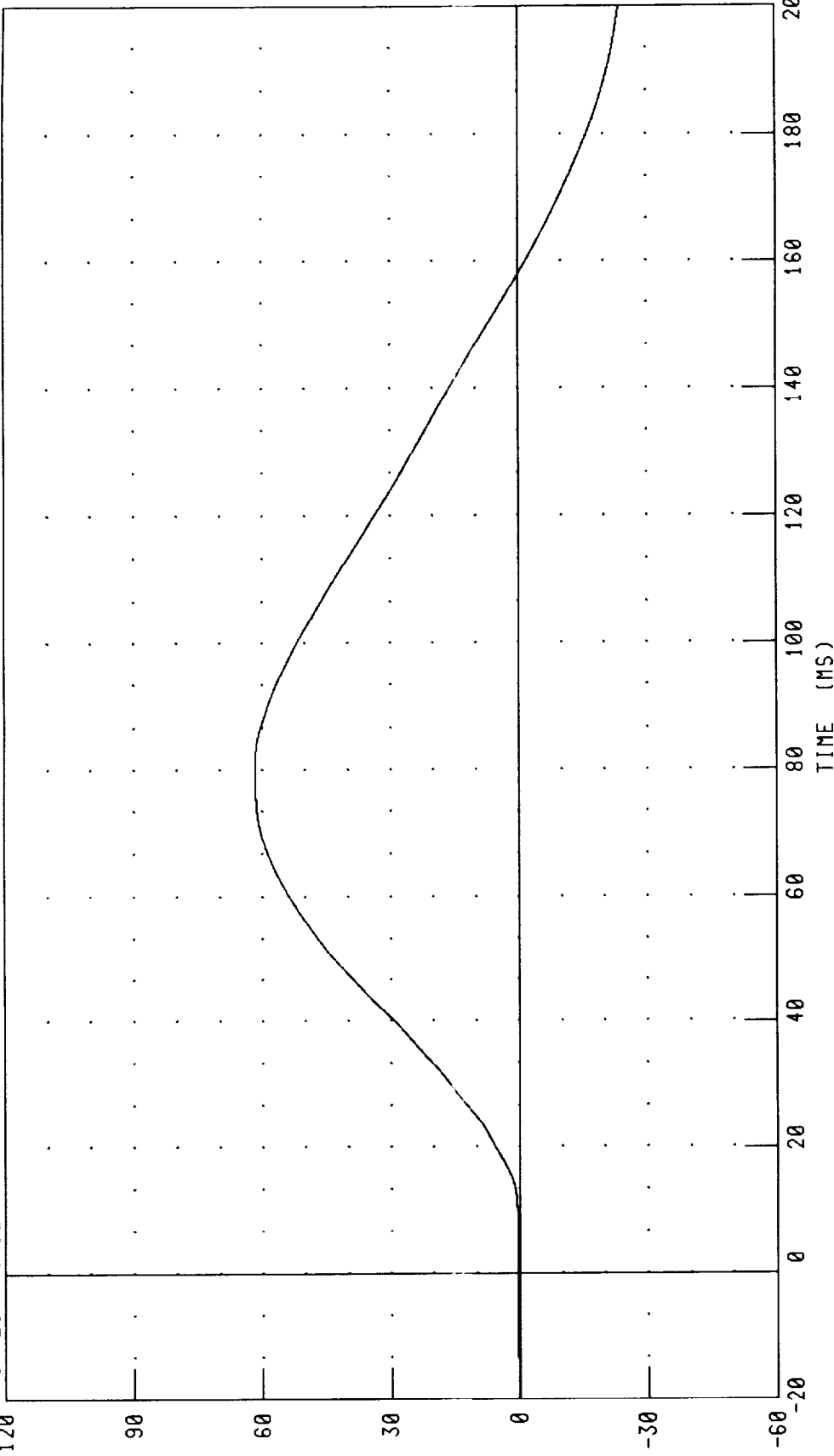
30

0

-30

-60

ANGLE (°)



TIME (MS)

PEAK DATA: 61.68 ° @ 79.92 MS, -23.73 ° @ 200.00 MS

CHANNEL: THETA FILTER: CH CLASS 60

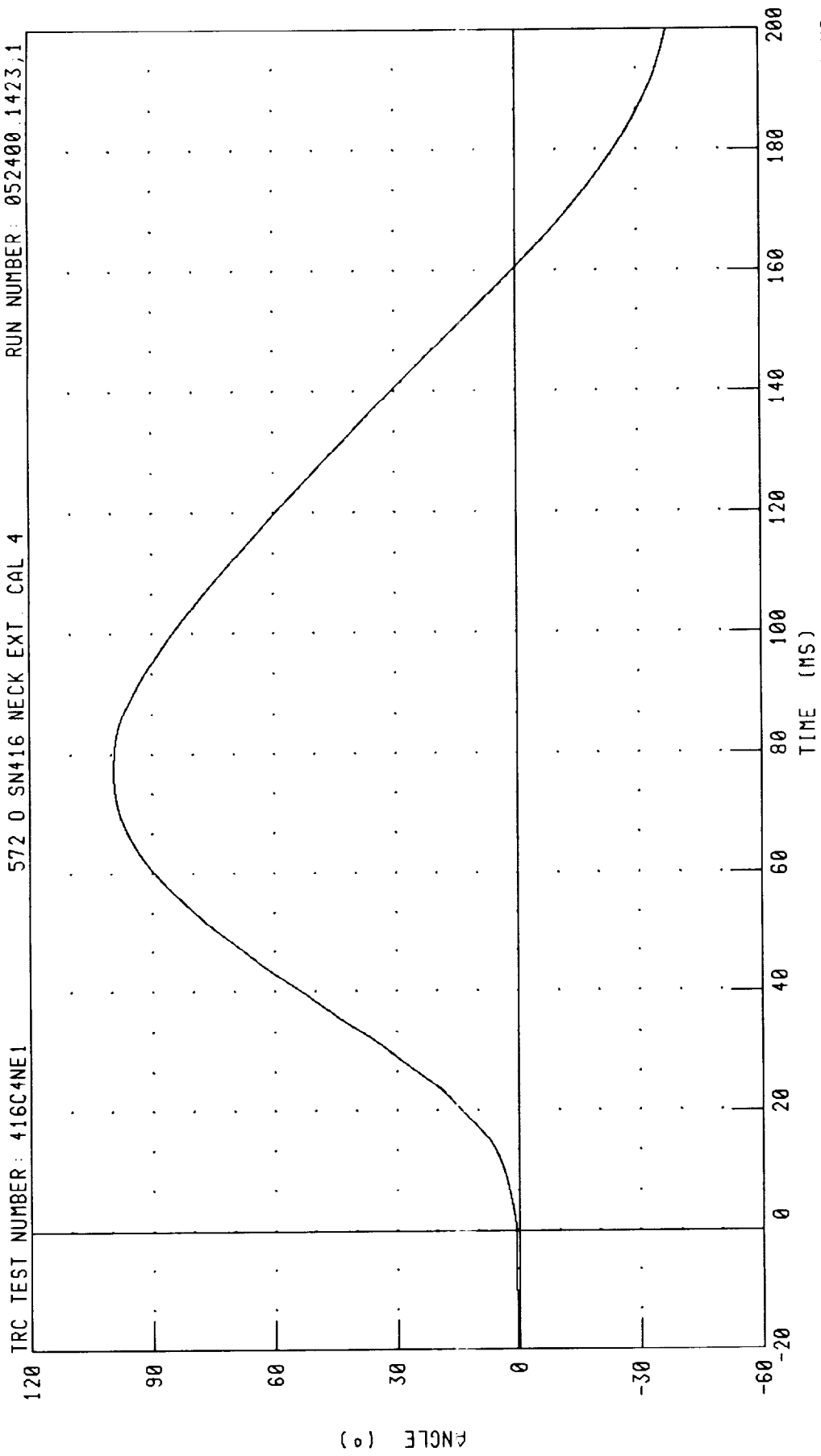
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

RUN NUMBER: 052400.1423,1

572 0 SN416 NECK EXT. CAL 4

TRC TEST NUMBER: 416C4NE1



PEAK DATA: 99.45 ° @ 77.12 MS, -37.47 ° @ 200.00 MS

CHANNEL: TOTAN FILTER: CH. CLASS 60

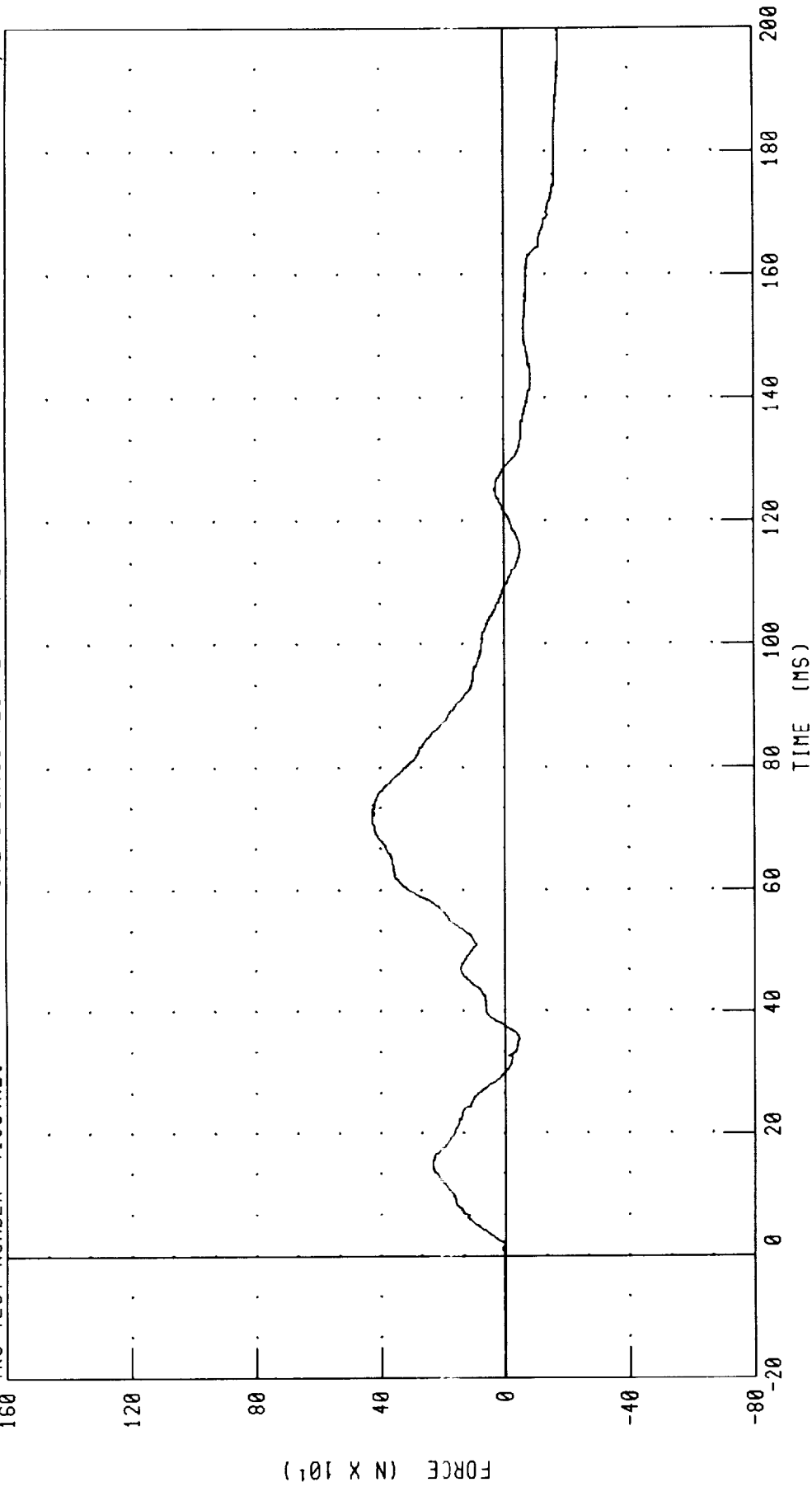
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 416C4NE1

572 0 SN416 NECK EXT. CAL 4

RUN NUMBER: 052400.1423,1



CHANNEL: NEKXF FILTER: CH. CLASS 1000

PEAK DATA: 424.23 N @ 70.88 MS, -177.99 N @ 192.08 MS

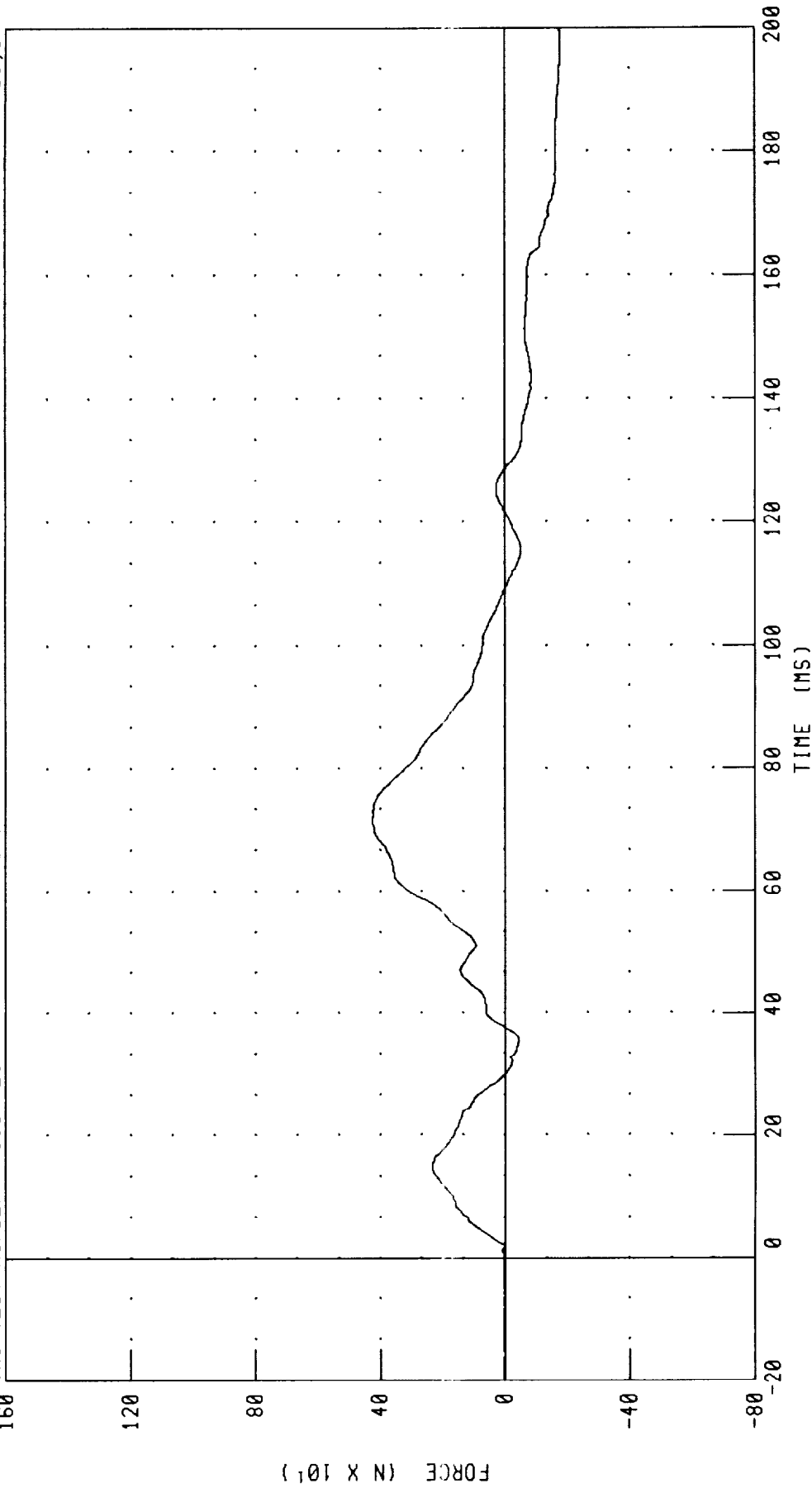
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 416C4NE1

572 0 SN416 NECK EXT CAL 4

RUN NUMBER: 052400.1423;1



CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 424.37 N @ 71.28 MS, -178.05 N @ 194.80 MS

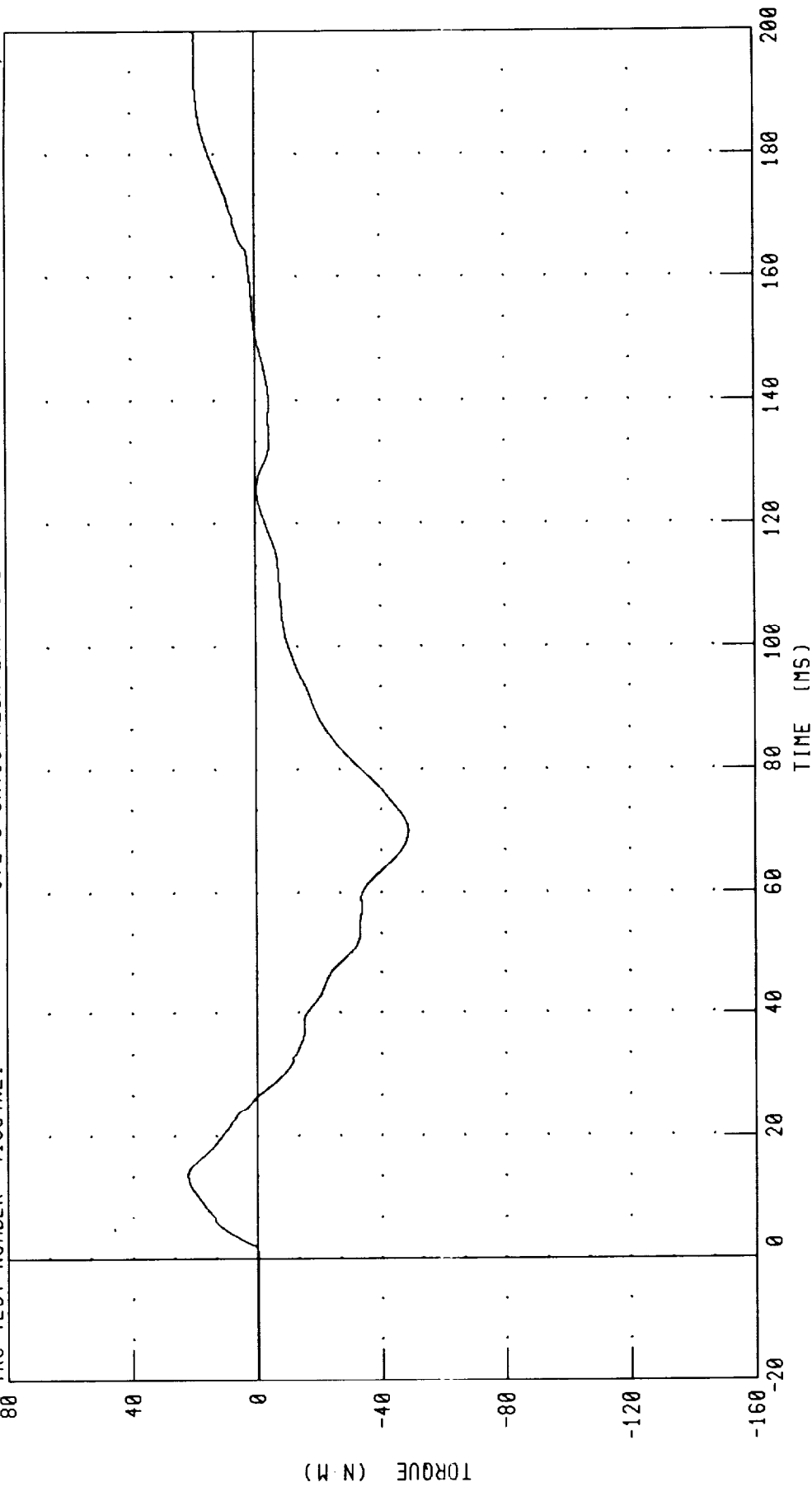
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 416C4NE1

572 0 SN416 NECK EXT. CAL 4

RUN NUMBER: 052400 1423,1

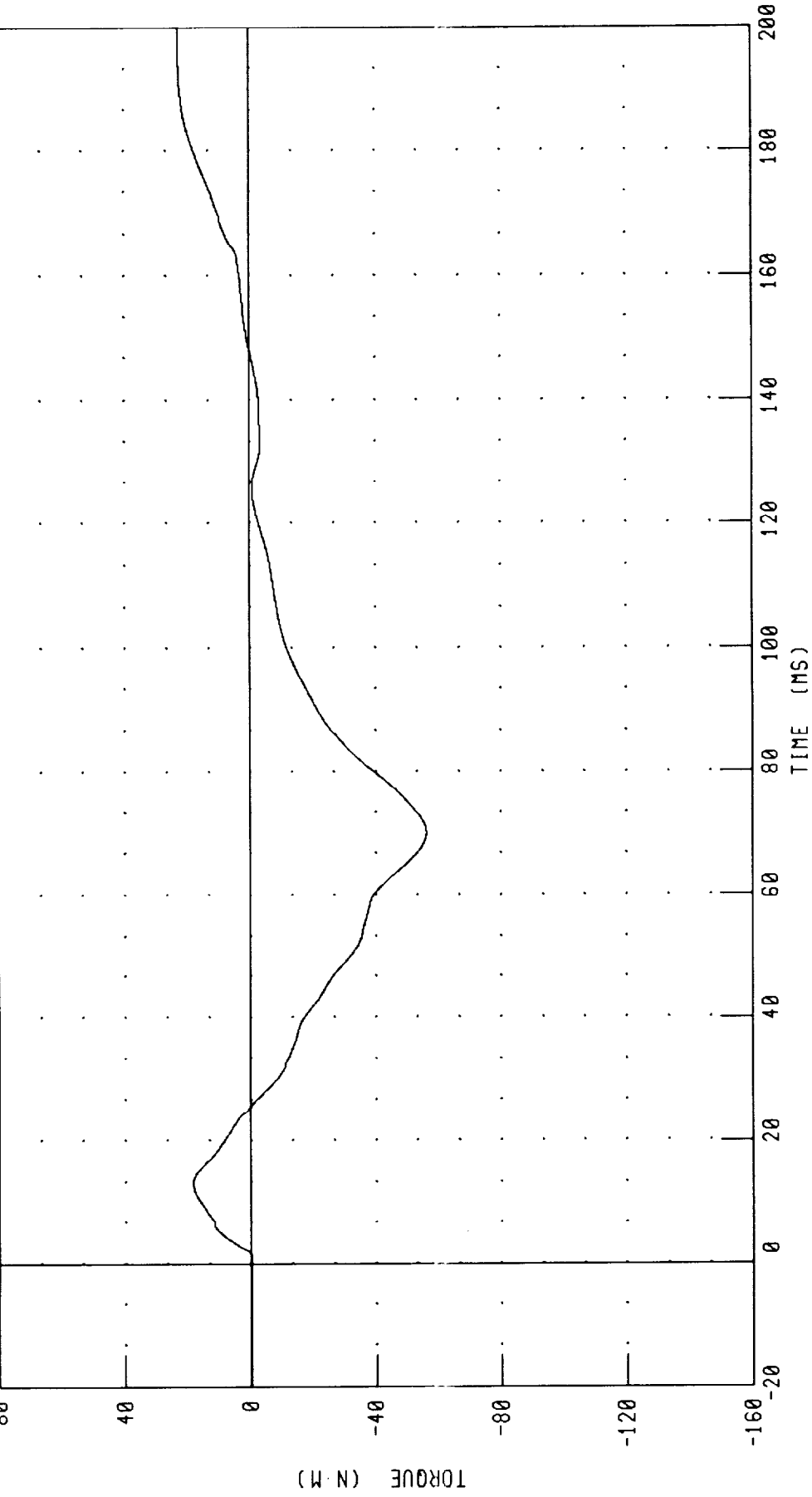


CHANNEL: NEKYM FILTER: CH. CLASS 600

PEAK DATA: 22.38 N.M @ 13.52 MS, -48.81 N.M @ 70.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 416C4NE1 572 0 SM416 NECK EXT. CAL 4 RUN NUMBER: 052400 1423,1



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 22.81 N·M @ 198.40 MS, -56.28 N·M @ 70.00 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

25-MAY-00

TRC INC.

TEST NO: 416C4TH1

572 0 SN416 THORAX CAL4

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	50 - 58 MM	53.2 MM
MAXIMUM RESISTIVE FORCE	3900 - 4400 N	4098. N
PEAK FORCE DURING 18 MM TO 50MM DEFLECTION	<= 105%	98%
INTERNAL HYSTERESIS	69% - 85%	73.6%

TEST MEETS SPECIFICATIONS

TECHNICIAN *J. C. Smith*

RUN NUMBER: 052500.1406;1

[DUMMY.416C4]416C4TH1D.RAD;1
TRC INC. 416C4TH1 00146
CSTXD Deltax = 0.080000 msec

572 0 SN416 THORAX CAL4 6.6 m
Npts = 8000; IPO = 1048; Filter =

	msec		CSTXD (mm)		Min, Max val
1248	16.0000 -->	49.743	49.867	49.986	50.097	50.199
1258	16.8000 -->	50.720	50.799	50.877	50.952	51.024
1268	17.6000 -->	51.449	51.525	51.601	51.675	51.746
1278	18.4000 -->	52.167	52.232	52.292	52.348	52.400
1288	19.2000 -->	52.674	52.714	52.753	52.790	52.827
1298	20.0000 -->	53.050	53.079	53.105	53.129	53.152
1308	20.8000 -->	53.227	53.224	53.220	53.216	53.214
1318	21.6000 -->	53.167	53.151	53.133	53.115	53.096
1328	22.4000 -->	52.911	52.874	52.834	52.791	52.745
1338	23.2000 -->	52.438	52.376	52.310	52.241	52.172
1348	24.0000 -->	51.754	51.681	51.605	51.526	51.444
1358	24.8000 -->	50.934	50.848	50.762	50.676	

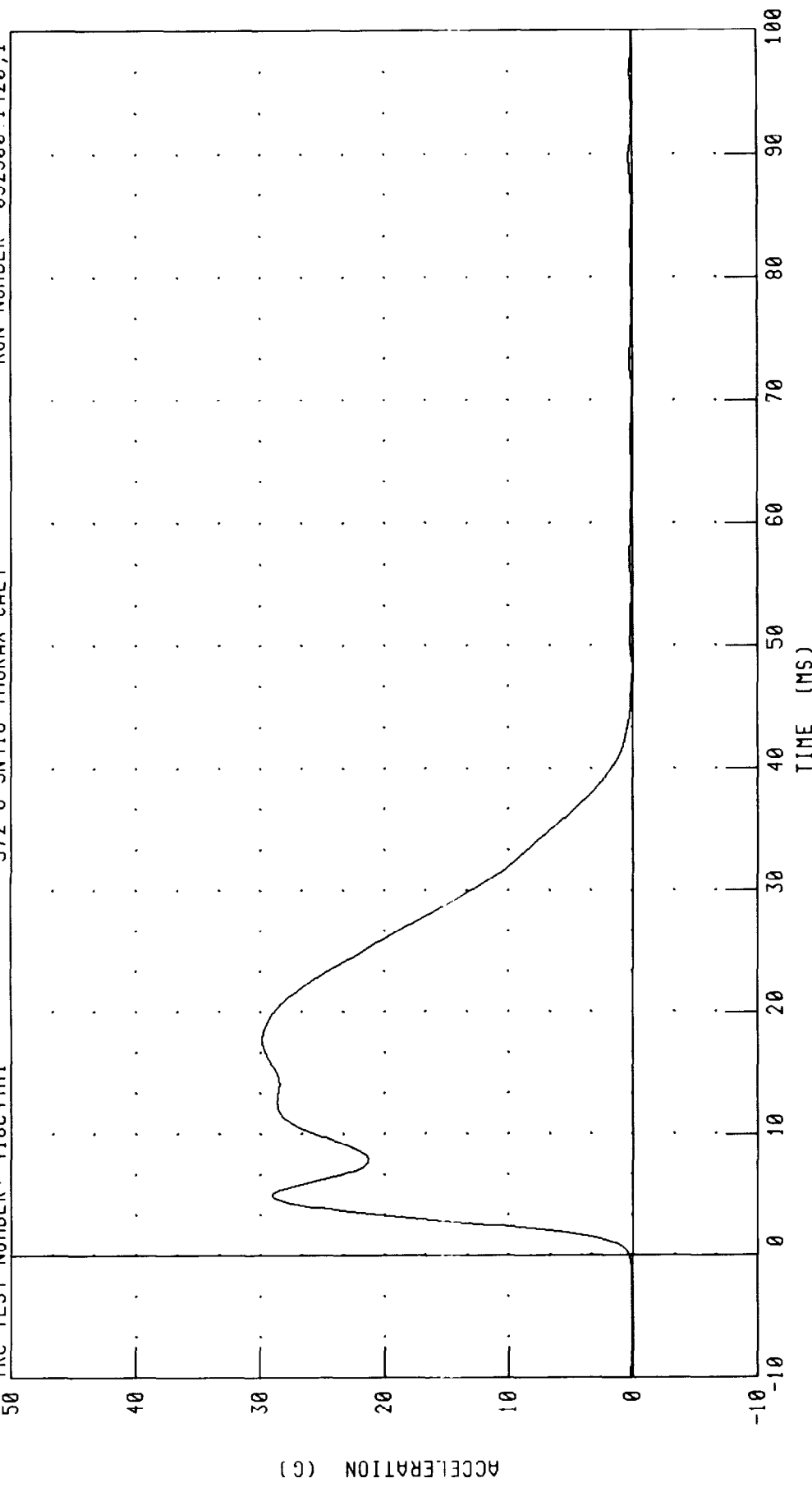
[DUMMY.416C4]416C4TH1D.RAD;1
TRC INC. 416C4TH1 00146
CSTXD Deltax = 0.080000 msec

572 0 SN416 THORAX CAL4 6.6 m
Npts = 8000; IPO = 1048; Filter =

	msec	CSTXD	(mm)		Min, Max val
1123	6.0000 -->	12.944	13.443	13.940	14.437	14.939
1133	6.8000 -->	18.104	18.631	19.160	19.693	20.227
1143	7.6000 -->	23.340	23.825	24.300	24.766	25.222
1153	8.4000 -->	27.544	27.868	28.189	28.509	28.831
1163	9.2000 -->	30.766	31.105	31.452	31.805	32.162
1173	10.0000 -->	34.113	34.390	34.659	34.922	35.185
1183	10.8000 -->	36.796	37.084	37.378	37.675	37.971
1193	11.6000 -->	39.546	39.774	39.999	40.225	40.450
1203	12.4000 -->	41.850	42.078	42.301	42.519	42.736
1213	13.2000 -->	44.020	44.237	44.458	44.680	44.902
1223	14.0000 -->	46.115	46.296	46.472	46.643	46.806
1233	14.8000 -->	47.685	47.833	47.986	48.140	48.293
1243	15.6000 -->	49.114	49.238	49.363	49.489	49.617
1253	16.4000 -->	50.294	50.383	50.470	50.555	50.638
1263	17.2000 -->	51.094	51.162	51.231	51.301	51.374
1273	18.0000 -->	51.815				

PART 572-0 HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 416C4TH1 572 0 SN416 THORAX CAL4 RUN NUMBER: 052500.1420,1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 29.86 G @ 17.76 MS; 0.00 G @ 48.24 MS

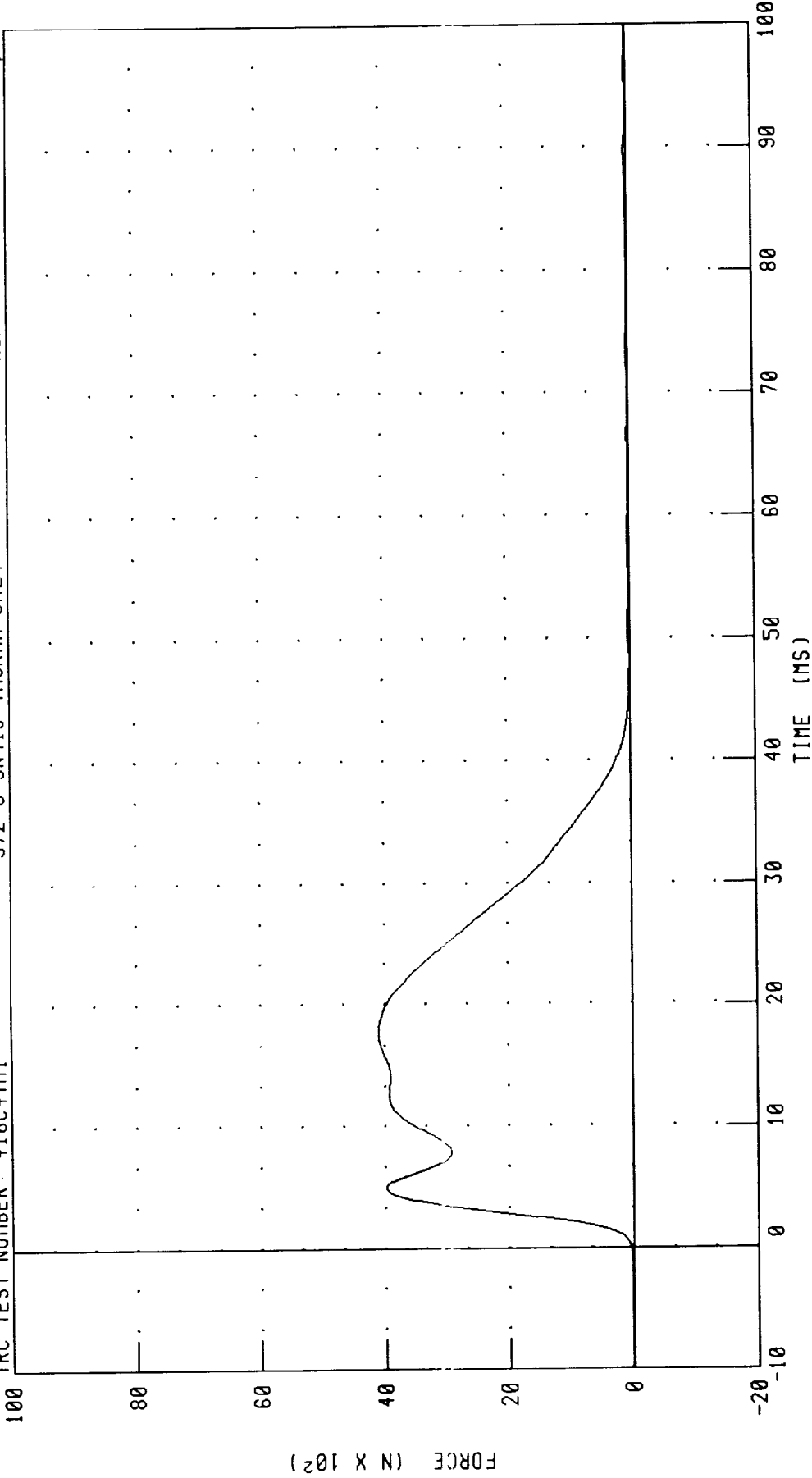
PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 416C4TH1

572 0 SN416 THORAX CAL4

RUN NUMBER: 052500.1420,1



CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 4098.11 N @ 17.76 MS; 0.65 N @ 48.24 MS

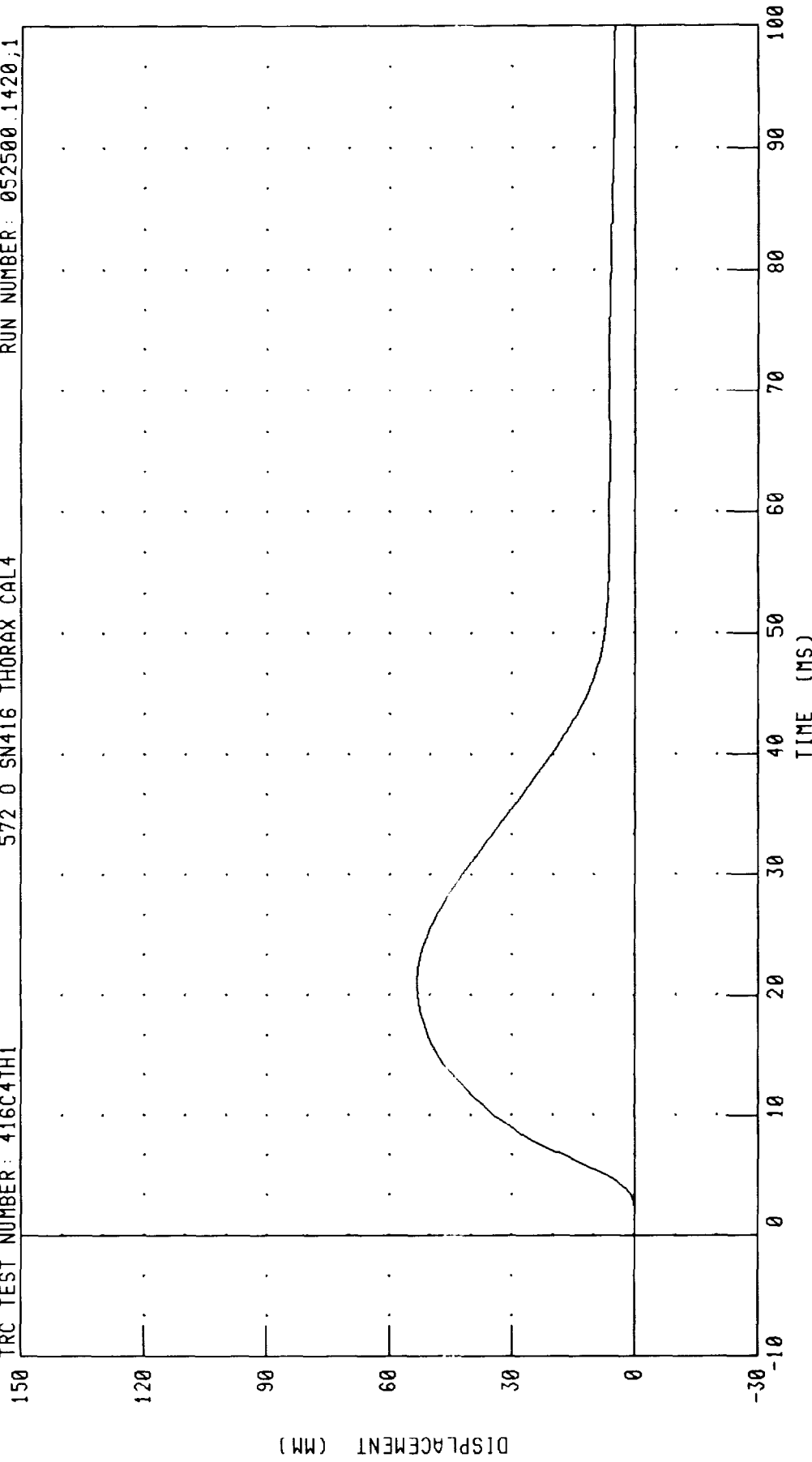
PART 572-0 HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER : 416C4TH1

572 0 SN416 THORAX CAL4

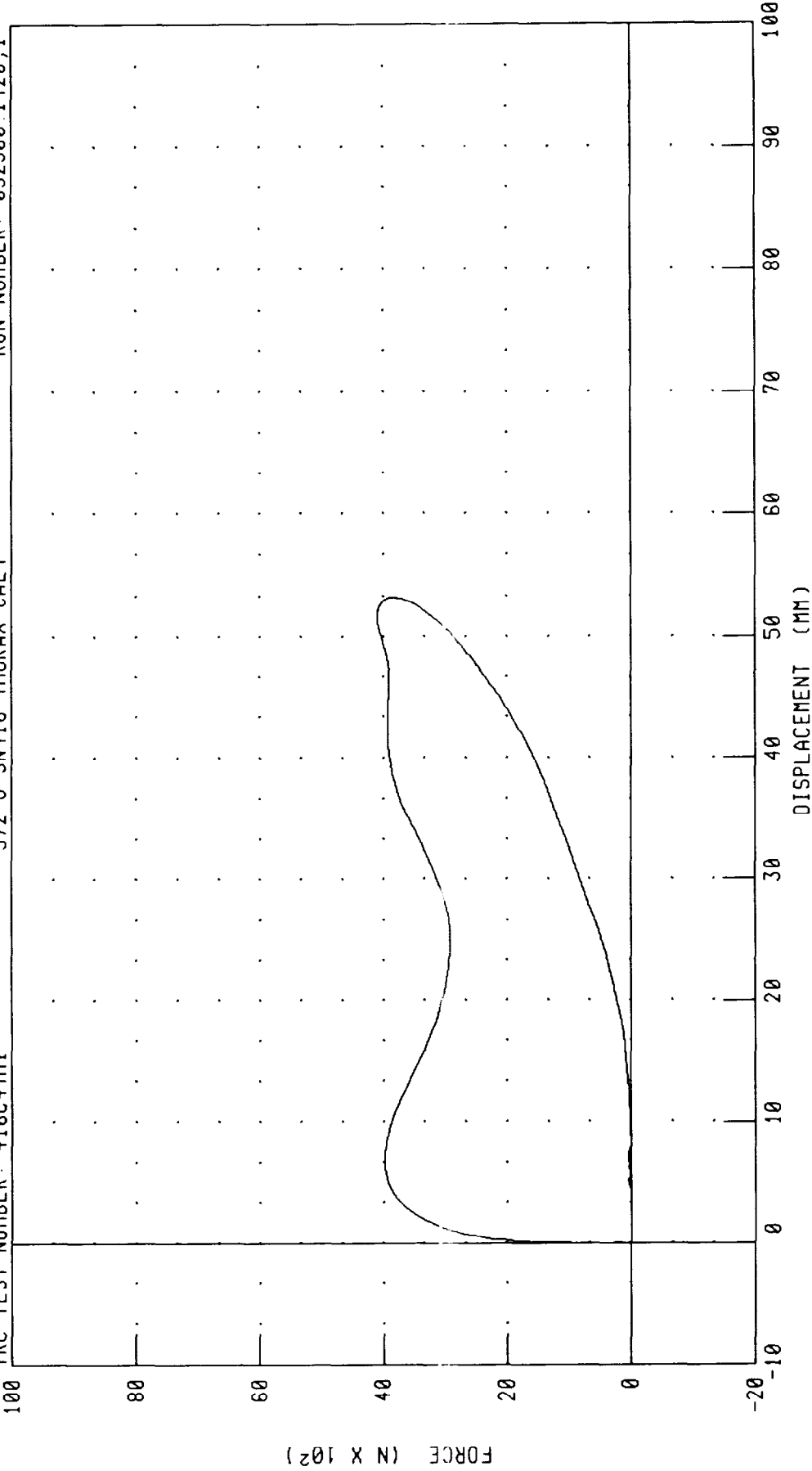
RUN NUMBER : 052500.1420,1



CHANNEL : CSTXD FILTER : CH. CLASS 600 PEAK DATA : 53.23 MM @ 20.80 MS, -0.01 MM @ -8.16 MS

PART 572-0 HYBRID III THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 416C4TH1 572 0 SN416 THORAX CAL4 RUN NUMBER: 052500.1420;1



CHANNEL: CSTXD FILTER: CH. CLASS 600
PENXF CH. CLASS 180

DISPLACEMENT (MM) PEAK DATA: 53.23 MM @ 20.80 MS; -0.01 MM @ -8.16 MS
4098.11 N @ 17.76 MS; 0.65 N @ 48.24 MS

TRANSPORTATION RESEARCH CENTER INC.

TORSO FLEXION TEST

HYBRID III SMALL FEMALE

CAL DATE: 25-May-00

TRC, INC.

TEST NO: 416CTF1

572 O SN416 TORSO FLEX CAL 4

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9 – 25.6 DEG. C	22.0 DEG. C
RELATIVE HUMIDITY	10 – 70 %	50 %
INITIAL ANGLE OF UNSUPPORTED DUMMY	\leq 20 DEG. REFERENCED TO VERTICAL	17 DEG.
MAXIMUM FORCE AT 45 DEG. DURING 10 SECOND PERIOD	320 - 390 N	378 N
RETURN ANGLE	\pm 8 DEG OF INITIAL ANGLE	23 DEG.

TEST MEETS SPECIFICATIONS

TECHNICIAN *Fred D. Dreback*

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

24-MAY-00

TRC INC.

TEST NO: 416C4RK1

572 0 SN416 R.KNEE CAL4

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.08 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3450 - 4060 N	3694.9 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

J. C. Miller

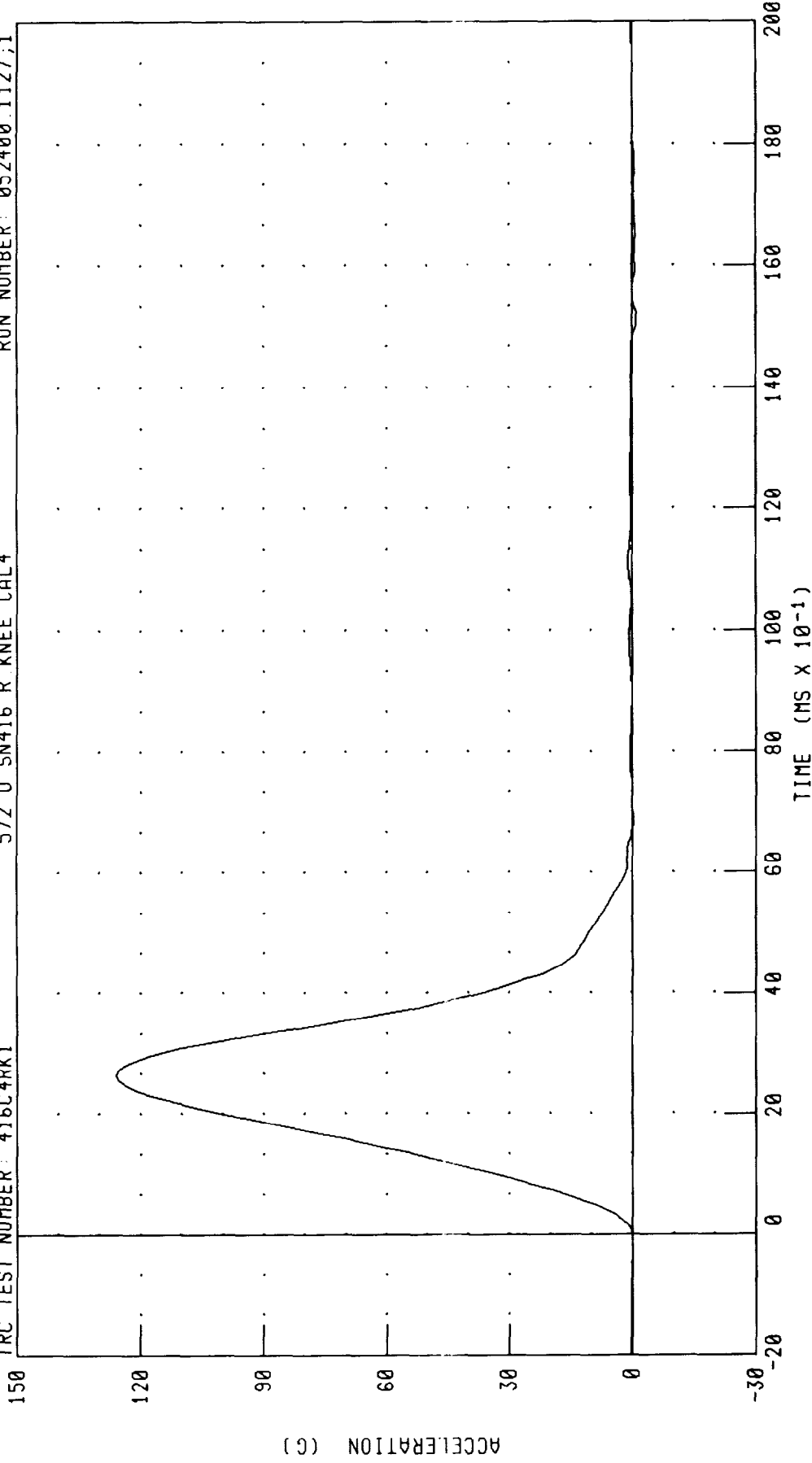
RUN NUMBER: 052400.1126;1

PART 572-0 HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 416C4RK1

572 0 SN416 R KNEE CAL4

RUN NUMBER: 052400.1127,1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 125.86 G @ 2.64 MS; -1.05 G @ 15.12 MS

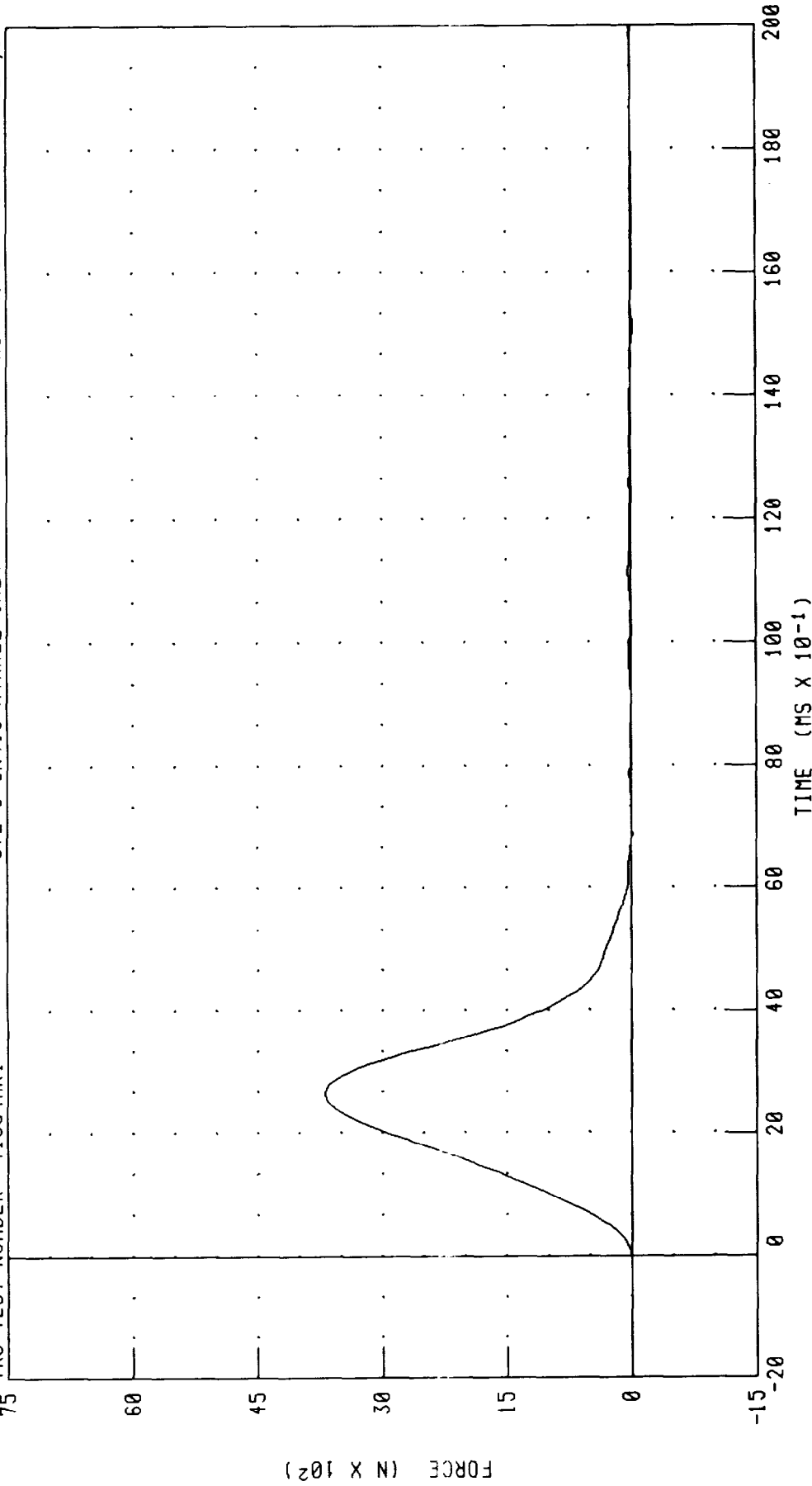
PART 572-0 HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 416C4RK1

572 0 SN416 R. KNEE CAL4

RUN NUMBER: 052400.1127,1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 3694.94 N @ 2.64 MS; -30.68 N @ 15.12 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

24-MAY-00

TRC INC.


TEST NO: 416C4LK1

572 0 SN416 LEFT KNEE CAL4

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.7 DEG. C
RELATIVE HUMIDITY	10 - 70 %	65.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.08 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3450 - 4060 N	3986.6 N

TEST MEETS SPECIFICATIONS

TECHNICIAN



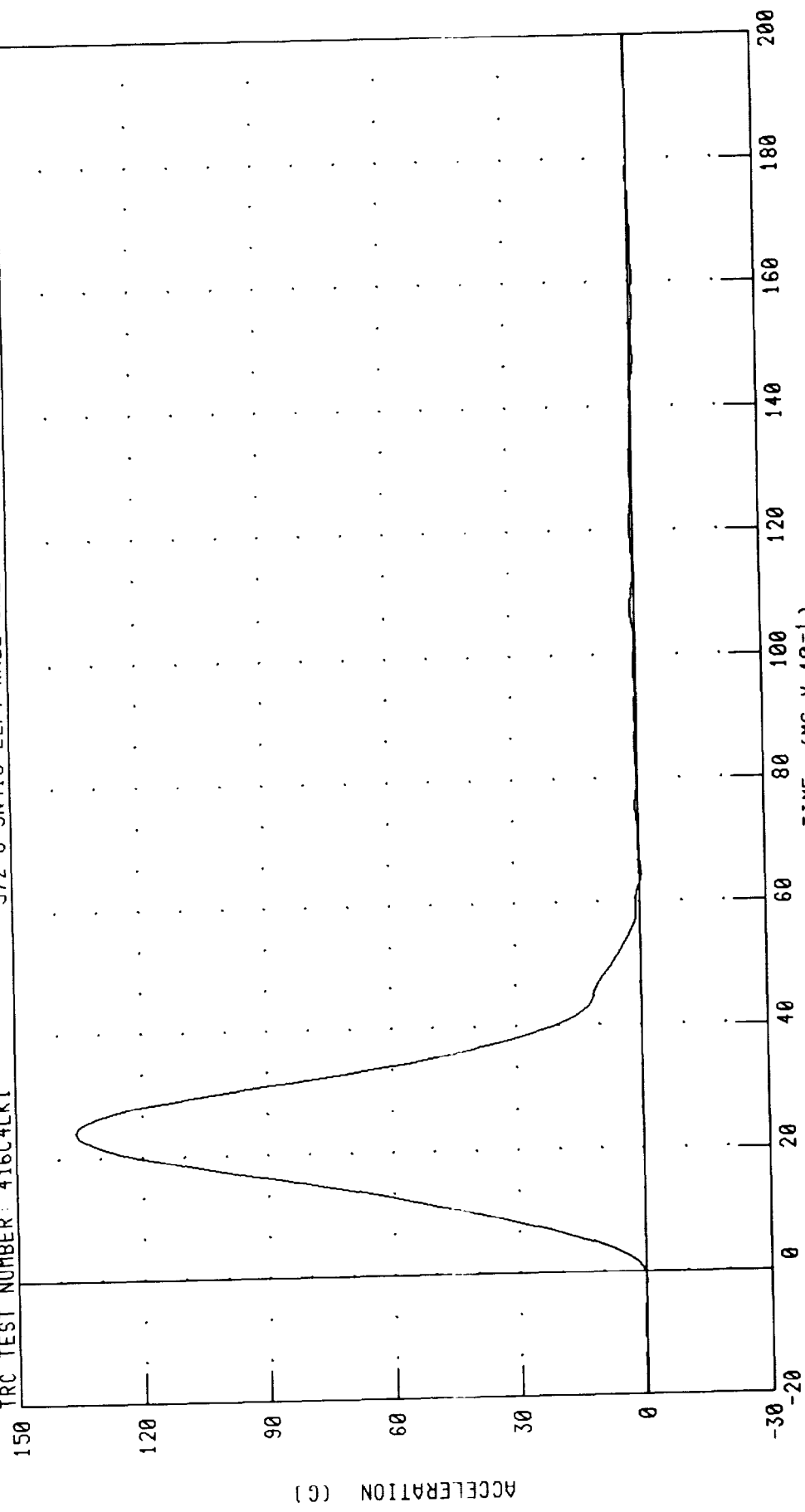
RUN NUMBER: 052400.1122;1

PART 572-0 HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

RUN NUMBER: 052400.1123,1

TRC TEST NUMBER: 416C4LK1

572 0 SN416 LEFT KNEE CAL4



PEAK DATA: 135.80 G @ 2.40 MS, -0.88 G @ 15.52 MS

CHANNEL: PENXC FILTER: CH. CLASS 600

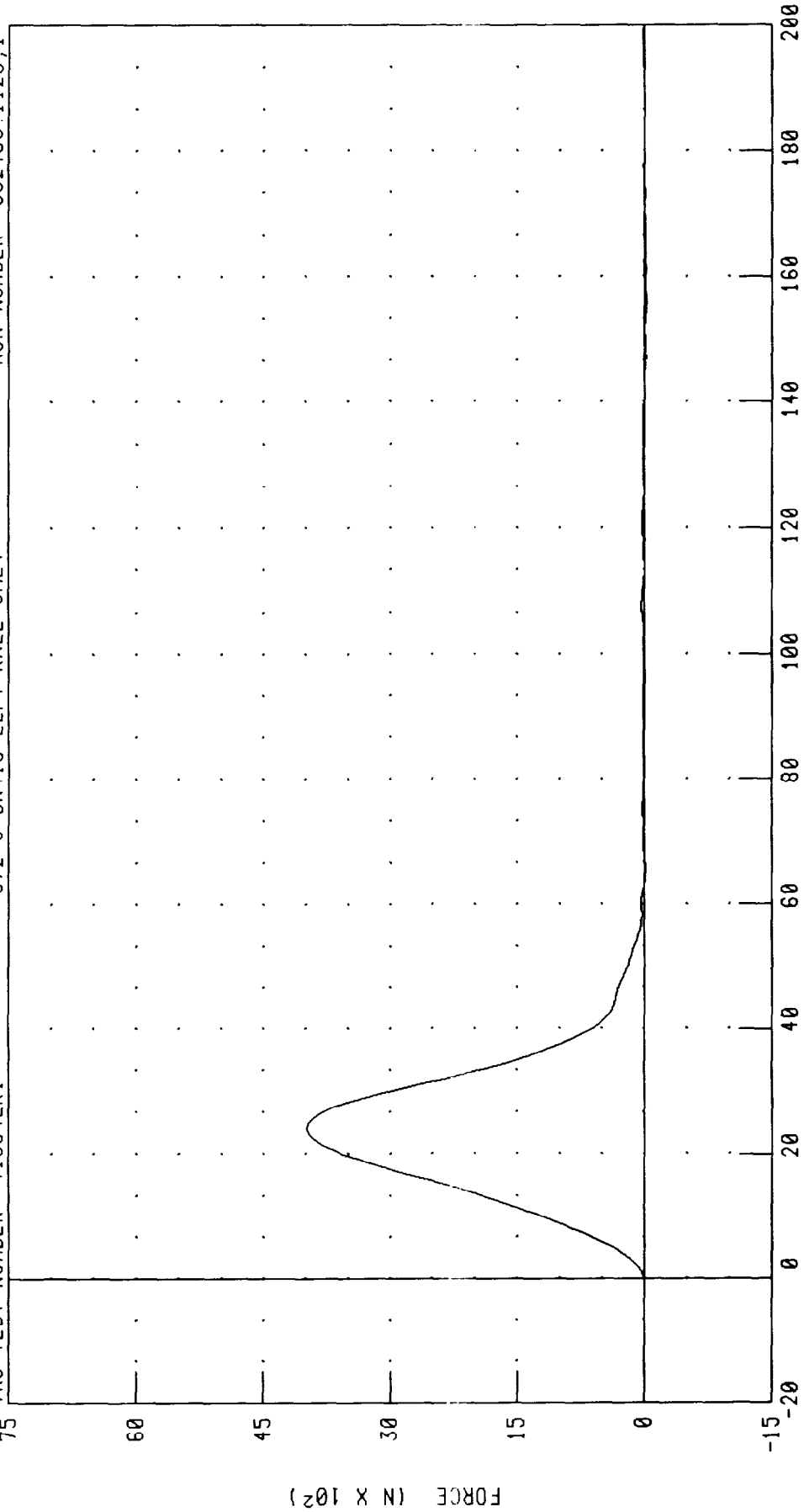
PART 572-0 HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 416C4LK1

572 0 SN416 LEFT KNEE CAL4

RUN NUMBER: 052400.1123,1



TIME (MS X 10⁻¹)

CHANNEL: PENXF

FILTER: CH. CLASS 600

PEAK DATA: 3986.65 N @ 2.40 MS; -25.71 N @ 15.52 MS

Appendix D

Miscellaneous Test Information

Dummy Sign Convention

Accelerometers: +X: Forward
+Y: Rightward
+Z: Downward

Potentiometers: +Chest longitudinal deflection: Inward

Load cells: +Femur force: Compression

Neck load cells: +X force: Head forward
+Y force: Head leftward
+Z force: Head upward (tension on neck)
+X moment: Right ear rotating toward right shoulder
+Y moment: Chin rotating toward chest
+Z moment: Chin rotating toward left shoulder

Filtering Data

J211 OCT88

Load Cell Barrier Forces Class 60

Vehicle Structural Accelerations Class 60

Occupant

Head Accelerometer Class 1000

Neck Class 60

Chest Accelerometer Class 180

Chest Deflection Class 180

Femur Force Class 600

Sternum Accelerometer Class 180

Lower Leg Class 600

Target Vehicle Dummy Instrumentation Placement

Dummy Manufacturer and S/N: Humanoid/045

Seating position: Driver

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>S/N</u>	<u>Orientation (+ Sensing)</u>
HEDXG1	Head	X	Endevco	7264	AJ4L1	Rearward
HEDYG1	Head	Y	Endevco	7264	J23996	Left
HEDZG1	Head	Z	Endevco	7264	EJ97J	Up
NEKXF1 ¹	Neck	X	First Tech	IF-205	180-FX	N/A
NEKYF1 ¹	Neck	Y	First Tech	IF-205	180-FY	N/A
NEKZF1 ¹	Neck	Z	First Tech	IF-205	180-FZ	N/A
NEKXM1 ¹	Neck	X	First Tech	IF-205	180-MX	N/A
NEKYM1 ¹	Neck	Y	First Tech	IF-205	180-MY	N/A
NEKZM1 ¹	Neck	Z	First Tech	IF-205	180-MZ	N/A
CSTXG1	Chest	X	Endevco	7264	AJ7W9	Forward
CSTYG1	Chest	Y	Endevco	7264	J21989	Left
CSTZG1	Chest	Z	Endevco	7264	BE95J	Up
PEVXG1	Pelvis	X	Endevco	7264	AJ4F8	Rearward
PEVYG1	Pelvis	Y	Endevco	7264	AJ7G7	Left
PEVZG1	Pelvis	Z	Endevco	7264	J19338	Up
CSTXD1	Chest	X	Servo	14CBI-2897	86696-1	Inward
LFMF1	Femur	Z	GSE	2430	736	Tension
RFMF2	Femur	Z	GSE	2430	631	Tension

¹ See Dummy Sign Convention sheet for polarity

Target Vehicle Dummy Instrumentation Placement

Dummy Manufacturer and S/N: First Technologies/416

Seating position: Passenger

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>S/N</u>	<u>Orientation (+ Sensing)</u>
HEDXG2	Head	X	Entran	EGE-73BQE0	99H12-F20	Rearward
HEDYG2	Head	Y	Entran	EGE-73BQE0	98H12-F26	Left
HEDZG2	Head	Z	Entran	EGE-73BQE0	99H12-F24	Up
NEKXF2 ¹	Neck	X	First Tech	IF-205	199-FX	N/A
NEKYF2 ¹	Neck	Y	First Tech	IF-205	199-FY	N/A
NEKZF2 ¹	Neck	Z	First Tech	IF-205	199-FZ	N/A
NEKXM2 ¹	Neck	X	First Tech	IF-205	199-MX	N/A
NEKYM2 ¹	Neck	Y	First Tech	IF-205	199-MY	N/A
NEKZM2 ¹	Neck	Z	First Tech	IF-205	199-MZ	N/A
CSTXG2	Chest	X	Entran	EGE-73BQE0	98H12-F07	Forward
CSTYG2	Chest	Y	Entran	EGE-73BQE0	98H12-F08	Left
CSTZG2	Chest	Z	Entran	EGE-73BQE0	98H12-F15	Up
CSTXD2	Chest	X	Servo	14CB1-2897	416	Inward
PEVXG2	Pelvis	X	Entran	EGE-73BQE0	98H12-F21	Rearward
PEVYG2	Pelvis	Y	Entran	EGE-73BQE0	98H12-F30	Left
PEVZG2	Pelvis	Z	Entran	EGE-73BQE0	98H12-F06	Up
LFMF2	Left femur	Z	GSE	2430	717	Tension
RFMF2	Left femur	Z	GSE	2430	729	Tension

¹ See Dummy Sign Convention sheet for polarity

Target Vehicle Instrumentation Placement

Number	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Left rear seat crossmember	X	Endevco	7264	J34848	Right
		Y	Endevco	7264	J27112	Left
		Z	Endevco	7264	J34843	Up
2	Right rear seat crossmember	X	Endevco	7264	J34529	Forward
		Y	Endevco	7264	J32030	Left
		Z	Endevco	7264	J34528	Up
3	Engine top	X	Endevco	7264	J34847	Forward
4	Engine bottom	X	Endevco	7264	J27305	Forward
5	Vehicle center of gravity	X	Endevco	7264	J32150	Forward
		Y	Endevco	7264	J32268	Left
		Z	Endevco	7264	J28746	Up
6	Instrument panel center	X	Endevco	7264	J30493	Forward
7	Rear Axle	X	Endevco	7264	J27328	Forward
8	Vehicle rear center	Z	Endevco	7264	CR58H	Up

Bullet Vehicle Instrumentation Placement

Number	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Vehicle center of gravity	X	Endevco	7264	J34806	Forward
		Y	Endevco	7264	J32138	Left
		Z	Endevco	7264	J29068	Up
2	Vehicle left rear frame	X	Endevco	7264	J27129	Rear
		Y	Endevco	7264	J27238	Left
3	Vehicle pitch	Y	Humphrey	RG28	H16	
4	Vehicle yaw	Z	Humphrey	RG28	H19	

Pre-Test Calibration

Target Vehicle Passenger Dummy S/N 416



**TRANSPORTATION RESEARCH CENTER INC.
HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
SN: 416 MFG:FTSS**

DATE: 25-May-00

TRC INC. TEST NO: 416C4ED

5720 SN416EXT. DIMENSION CAL4

TEST PARAMETER	DIMEN.	SPECIFICATION	TEST RESULTS
Total Sitting Height	A	622.3 - 647.7 MM	779.78 MM
Shoulder Pivot Height	B	348.0 - 363.2 MM	447.04 MM
Hip Pivot Height	C	63.5 - 73.7 MM	81.28 MM
Hip Pivot from Backline	D	88.9 - 99.1 MM	147.32 MM
Shoulder Pivot from Backline	E	53.3 - 63.5 MM	76.2 MM
Thigh Clearance	F	88.9 - 104.1 MM	129.54 MM
Back of Elbow to Wrist Pivot	G	182.9 - 198.1 MM	251.46 MM
Head Back from Backline	H	41.2 - 48.3 MM	48.26 MM
Shoulder to Elbow Length	I	215.9 - 231.1 MM	287.02 MM
Elbow Rest Height	J	157.4 - 177.8 MM	190.5 MM
Buttock to Knee Length	K	370.8 - 391.2 MM	538.48 MM
Popliteal Height	L	269.2 - 289.6 MM	363.22 MM
Knee to Floor Height	M	307.4 - 322.6 MM	403.86 MM
Buttock Popliteal Length	N	320.0 - 340.4 MM	426.72 MM
Chest Depth	O	129.6 - 144.8 MM	180.34 MM
Foot Length	P	170.2 - 185.4 MM	226.06 MM
Buttock to Knee Pivot Length	R	342.9 - 363.3 MM	467.36 MM
Head Breadth	S	137.1 - 147.3 MM	144.78 MM
Head Depth	T	167.6 - 177.8 MM	185.42 MM
Hip Breadth	U	208.3 - 223.5 MM	307.34 MM
Shoulder Breadth	V	259.1 - 274.3 MM	355.6 MM
Foot Breadth	W	62.3 - 77.5 MM	88.9 MM
Head Circumference	X	510.5 - 530.9 MM	541.02 MM
Chest Circumference with Jacket	Y	596.9 - 622.3 MM	866.14 MM
Waist Circumference	Z	558.8 - 584.2 MM	779.78 MM
Ref Location for Chest Circumference	AA	325.1 - 335.3 MM	302.26 MM
Ref Location for Waist Circumference	BB	153.7 - 163.9 MM	165.1 MM

DUMMY MEETS SPECIFICATION

TECHNICIAN: Todd D. Durbank