

**1997 Thomas Built Bus
into a Flat Frontal Barrier
TRC Test Number: 990421-1**

*Test Number
3161*

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**Prepared For:
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Section 1.0

Purpose and Test Procedure

Purpose and Test Summary

The overall objective of this test program is the evaluation and /or development of school bus safety systems. This 30 mph flat barrier impact test was conducted to generate both vehicle and occupant dynamics in order to develop a frontal crash profile for subsequent HYGE sled testing.

The test was conducted with a 1997 Thomas Built Bus obtained from General Testing Laboratories (GTL). The vehicle had previously been used as a FMVSS 301 test vehicle. The test vehicle contained two instrumented Hybrid III 50th percentile adult male dummies; two instrumented Hybrid III 5th percentile adult female dummies; two instrumented 6 year old child dummies; and two uninstrumented 50th percentile adult male ballast dummies.

Section 2.0

Frontal Barrier Impact Test Summary

Test Procedure

This test was conducted per VRTC personnel's instructions. Data was obtained relative to FMVSS 208, "Occupant Crash Protection," performance.

The test vehicle was instrumented with twelve (12) accelerometers to measure longitudinal, lateral, and vertical axis accelerations. The vehicle's specified impact velocity range was 29.5 to 30.5 mph. The vehicle impacted a flat frontal barrier.

The test vehicle contained six (6) instrumented anthropomorphic test devices (dummies) and four (4) uninstrumented anthropomorphic test devices (dummies). The dummies were positioned according to Figure 1.

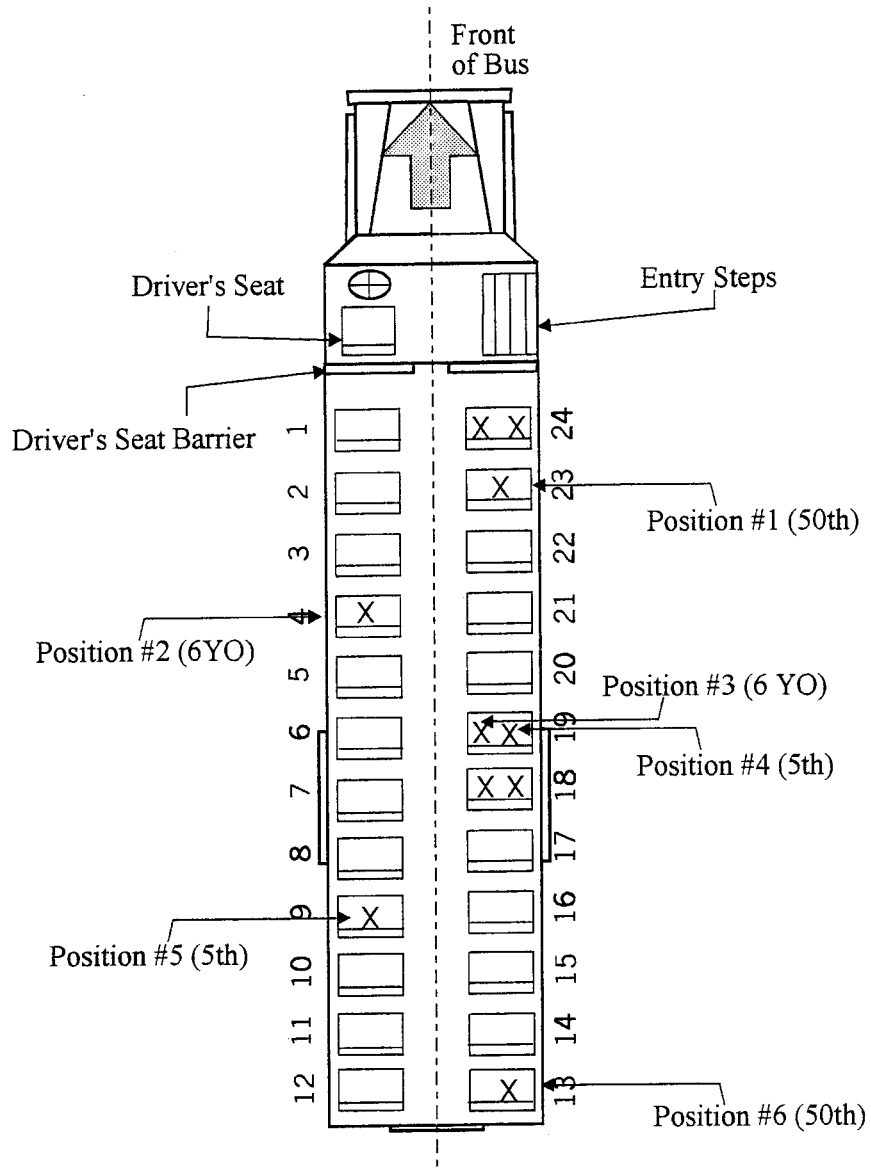
The dummies were instrumented with head, chest, and pelvis accelerometers to measure longitudinal, lateral, and vertical accelerations; chest deflection potentiometers; left and right femur load cells to measure axial forces; and upper neck load cells to measure forces and moments.

The one hundred-twenty (120) data channels were digitally sampled at 12,500 samples per second and processed per Sections 11.13 through 11.15 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and fourteen (14) high-speed motion picture cameras. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera.

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

Figure 1 Dummy Positioning Data



Test Results Summary

This flat frontal barrier test was conducted at TRC on April 21, 1999.

The test vehicle was a 1997 Thomas Built Bus. The vehicle's test weight was 17,760 pounds. The vehicle's impact speed was 30.0 mph. The vehicle's maximum static crush was 206 millimeters.

The Position #1 dummy's 36 milliseconds Head Injury Criteria (HIC) was 244. The Position #1 dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 26.0 g. The Position #1 dummy's chest deflection was 4 mm. The Position #1 dummy's left and right femur maximum compressive forces were 2704 N and 2708 N, respectively.

The Position #2 dummy's 36 milliseconds HIC was 175. The Position #2 dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 30.8 g. The Position #2 dummy's chest deflection was 4 mm. The Position #2 dummy's left and right femur maximum compressive forces were 1270 N and 9028 N, respectively.

The Position #3 dummy's 36 milliseconds HIC was 280. The Position #3 dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 33.1 g. The Position #3 dummy's chest deflection was 4 mm. The Position #3 dummy's left and right femur maximum compressive forces were 1150 N and 1855 N, respectively.

The Position #4 dummy's 36 milliseconds HIC was 112. The Position #4 dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 23.2¹ g. The Position #4 dummy's chest deflection was 4 mm. The Position #4 dummy's left and right femur maximum compressive forces were 2996 N and 2769 N, respectively.

The Position #5 dummy's 36 milliseconds HIC was 330. The Position #5 dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 22.6 g. The Position #5 dummy's chest deflection was 5 mm. The Position #5 dummy's left and right femur maximum compressive forces were 3287 N and 2274 N, respectively.

The Position #6 dummy's 36 milliseconds HIC was 153. The Position #6 dummy's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 22.3 g. The Position #6 dummy's chest deflection was 4 mm. The Position #6 dummy's left and right femur maximum compressive forces were 4271 N and 2956 N, respectively.

¹ See Data Acquisition Explanations

Data Acquisition Explanations

The Position #1 dummy's neck moment about Y-axis data channel, NEKYM1, exceeded its data channel's full scale input between approximately 130 and 140 milliseconds. This affected the calculation for the moment about the occipital condyle for the Position #1 dummy.

The Position #1 dummy's pelvis X-axis acceleration data channel, PEVXG1, recorded questionable data throughout the event. This affected the resultant calculation for the Position #1 dummy's pelvis.

The Position #2 dummy's right femur force data channel, RFMF2, recorded questionable data spikes at approximately 25, 128, and 154 milliseconds.

The Position #4 dummy's chest X-axis acceleration data channel, CSTXG4, recorded questionable data throughout the event. This affected the resultant calculation for the Position #4 dummy's chest.

The Position #4 dummy's pelvis X-axis acceleration data channel, PEVXG4, recorded questionable data spikes at approximately 57 and 100 milliseconds. This affected the resultant calculation for the Position #4 dummy's pelvis.

The Position #4 dummy's pelvis Y-axis acceleration data channel, PEVYG4, recorded questionable data throughout the event. This affected the resultant calculation for the Position #4 dummy's pelvis.

Table 1 Crash Test Summary

Test type:	Frontal barrier impact
Test date:	04/21/99
Test time:	1822
Ambient temperature at impact area:	21° C
Vehicle year/make/ model/body style:	1997/Thomas Built/Bus
Vehicle test weight:	17,760 lbs
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	30.0 mph
Secondary:	N/A
Maximum static crush:	8.1 in
Average rebound:	8.9 in
Number of cameras:	
Real-time:	1
High-speed:	14
Door opening data:	
Left-front:	N/A
Right-front:	N/A

¹ With respect to tow track centerline.

² Speed trap measurement ($\pm .08$ km/h accuracy)

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 1997/Thomas Built/Bus

Color: Yellow

VIN: 4UZ3CFFA5VC749501

Engine data:

Placement: Longitudinal

Cylinders: 6

Displacement: 5.9 liters

Transmission data: 4 speed, ___ manual, X automatic, ___ overdrive

Final drive: ___ fwd, X rwd, ___ 4wd

Date vehicle received: N/A

Odometer reading: N/A

Dealer's name and address: N/A

Accessories:

Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	No
Power seats	No	Tilting steering wheel	No
Power windows	No	Telescoping steering wheel	No
Tinted glass	No	Air conditioning	No
Radio	No	Anti-skid brake	No
Clock	No	Rear window defroster	No
Power door locks	No	Other:	None

Certification data from vehicle's label:

Vehicle manufactured by: Thomas Built

Date of manufacture: 11/96

VIN: 4UZ3CFFA5VC749501

GVWR: 29,000 lbs

GAWR: Front: 10,000 lbs

Rear: 19,000 lbs

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle:	11R x 22.5
Spare tire:	N/A
Type of front seats:	N/A

Tire & capacity data from vehicle's label:

Recommended tire size:	22.5 x 8.25
Recommended cold tire pressure:	
Front:	100 psi
Rear:	100 psi
Designated Seating Capacity:	
Front	N/A
Rear	N/A
Total	N/A
Vehicle Cargo Weight:	N/A

Table 2 Test Vehicle Information, Cont'd.

Weight of test vehicle as received (with maximum fluids):

Right front	N/A	Right rear	N/A
Left front	N/A	Left rear	N/A
Total front weight	N/A	(N/A% of total vehicle weight)	
Total rear weight	N/A	(N/A% of total vehicle weight)	
Total delivered weight	N/A		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight

DSC¹ = Designated Seating Capacity

RCLW² = N/A

Target test weight = UDW + RCLW + (number of Hybrid III Dummies x 75.7 kg per dummy)

Target test weight³ = N/A

Weight of test vehicle with required dummies:

Front	10,380 lbs
Rear	7,380 lbs
Total	17,760 lbs

Weight of ballast secured in vehicle: None

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 114 in

Vehicle Wheelbase: 274.2 in

¹ The designated seating capacity is determined by counting the number of seat belts installed in the vehicle.

² From vehicle's tire label.

³ There was no target test weight provided.

Table 3 Post-Impact Data

Test number: 990421-1
Test date: 04/21/99
Test time: 1822
Test type: Frontal barrier impact
Impact angle: 0°
Ambient temperature at impact area: 21° C
Temperature in occupant compartment: 18° C
Impact velocity:
Cable speed: 30.0 mph
Specified range: 29.5 to 30.5 mph

Test vehicle static crush:

Overall length of test vehicle:

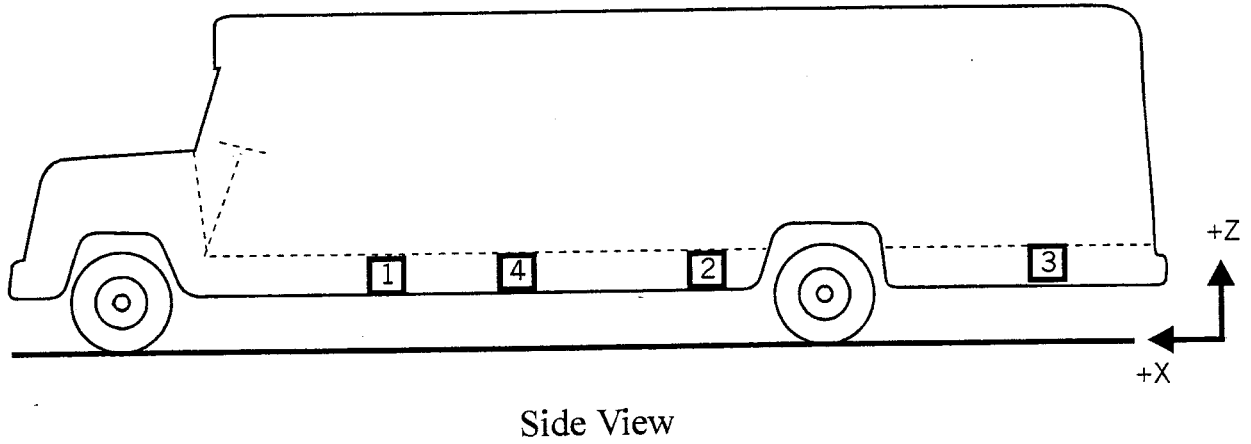
Pre-test:	L:	428.4 in	C:	442.9 in	R:	430.1 in
Post-test:	L:	427.6 in	C:	435.1 in	R:	425.3 in
Total crush:	L:	0.8 in	C:	7.8 in	R:	4.8 in
Average crush:		4.5 in				

Test vehicle rebound from flat barrier:

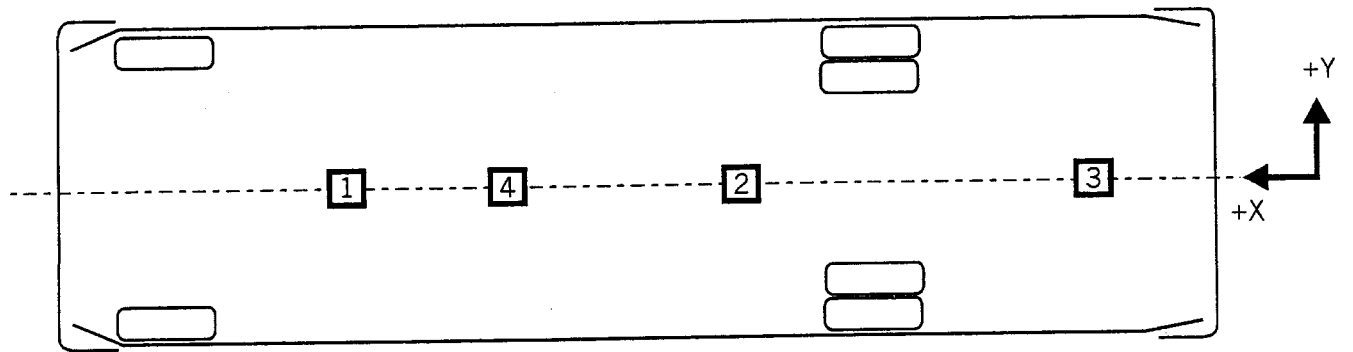
Distance from test vehicle to barrier:

Post-test:	L:	N/A	C:	8.9 in	R:	N/A
Average rebound:		8.9 in				

Figure 2 Vehicle Accelerometer Placement



Side View



Bottom View

Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 990421-1 No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
1 FLOOR TUNNEL #1 LONGITUDINAL	NA	NA	NA	1.1 g @ 257.3 ms	23.6 g @ 76.3 ms
LATERAL				4.7 g @ 187.6 ms	12.5 g @ 63.2 ms
VERTICAL				25.4 g @ 72.9 ms	39.9 g @ 76.6 ms
RESULTANT				46.7 g @ 76.5 ms	
2 FLOOR TUNNEL #2 LONGITUDINAL	NA	NA	NA	5.8 g @ 15.4 ms	21.4 g @ 51.1 ms
LATERAL				4.4 g @ 98.6 ms	10.9 g @ 67.5 ms
VERTICAL				37.2 g @ 24.5 ms	34.5 g @ 50.3 ms
RESULTANT				39.2 g @ 50.5 ms	
3 FLOOR TUNNEL #3 LONGITUDINAL	NA	NA	NA	2.1 g @ 218.2 ms	17.3 g @ 135.0 ms
LATERAL				5.8 g @ 105.6 ms	6.3 g @ 26.6 ms
VERTICAL				44.9 g @ 86.6 ms	38.9 g @ 91.4 ms
RESULTANT				45.3 g @ 86.6 ms	
4 VEHICLE CENTER OF GRAVITY	NA	NA	NA		
LONGITUDINAL				4.5 g @ 68.4 ms	16.2 g @ 136.5 ms
LATERAL				4.4 g @ 159.1 ms	11.9 g @ 64.1 ms
VERTICAL				50.9 g @ 63.9 ms	51.4 g @ 69.3 ms
RESULTANT				53.4 g @ 63.9 ms	

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

Section 3.0

FMVSS 208 Data

Table 5 Dummy Injury Criteria

	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
Position #1 Dummy	-79.0 g	-6.9 g	20.2 g	79.4 g	-26.2 g	3.4 g	11.7 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Position #1 Dummy	2704 N	2708 N

	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
Position #1 Dummy	244	120.3 ms	130.9 ms

	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
Position #1 Dummy	26.0 g	135.9 ms	139.0 ms

	<u>Maximum Chest Deflection</u>
Position #1 Dummy	4 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Table 5 Dummy Injury Criteria, Cont'd.

Position #2 Dummy	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
	-50.3 g	-8.6 g	25.7 g	54.9 g	-27.1 g	4.5 g	18.4 g

Position #2 Dummy	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur ³
	1270 N	9028 N

Position #2 Dummy	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
	175	141.4 ms	177.4 ms

Position #2 Dummy	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
	30.8 g	156.3 ms	159.4 ms

Position #2 Dummy	<u>Maximum Chest Deflection</u>
	4 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. Duration

³ See Data Acquisition Explanations

Table 5 Dummy Injury Criteria, Cont'd.

Position #3 Dummy	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
	-77.6 g	-11.8 g	31.7 g	83.8 g	-24.5 g	-4.0 g	33.0 g

Position #3 Dummy	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
	1150 N	1855 N

Position #3 Dummy	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
	280	141.0 ms	176.9 ms

Position #3 Dummy	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
	33.1 g	173.0 ms	176.1 ms

Position #3 Dummy	<u>Maximum Chest Deflection</u>
	4 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Table 5 Dummy Injury Criteria, Cont'd.

Position #4 Dummy	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
	-42.9 g	76.4 g	36.0 g	89.5 g	-70.3 ³ g	9.8 g	19.8 g

Position #4 Dummy	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
	2996 N	2769 N

Position #4 Dummy	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
	112	113.8 ms	133.7 ms

Position #4 Dummy	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
	23.2 ³ g	145.0 ms	148.1 ms

Position #4 Dummy	<u>Maximum Chest Deflection</u>
	4 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

³ See Data Acquisition Explanations

Table 5 Dummy Injury Criteria, Cont'd.

	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
Position #5 Dummy	-91.9 g	5.8 g	-20.4 g	93.7 g	-18.3 g	5.4 g	14.4 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Position #5 Dummy	3287 N	2274 N

	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
Position #5 Dummy	330	120.6 ms	128.6 ms

	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
Position #5 Dummy	22.6 g	149.3 ms	152.3 ms

	<u>Maximum Chest Deflection</u>
Position #5 Dummy	5 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Table 5 Dummy Injury Criteria, Cont'd.

Position #6 Dummy	<u>Maximum Acceleration</u>						
	Head				Chest		
	X	Y	Z	R	X	Y	Z
	-47.7 g	8.4 g	16.3 g	48.1 g	-20.9 g	-1.8 g	9.7 g

Position #6 Dummy	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
	4271 N	2956 N

Position #6 Dummy	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
	153	124.6 ms	142.6 ms

Position #6 Dummy	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
	22.3 g	140.6 ms	143.6 ms

Position #6 Dummy	<u>Maximum Chest Deflection</u>
	4 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 3 Pre-test and Post-test Measurement Points

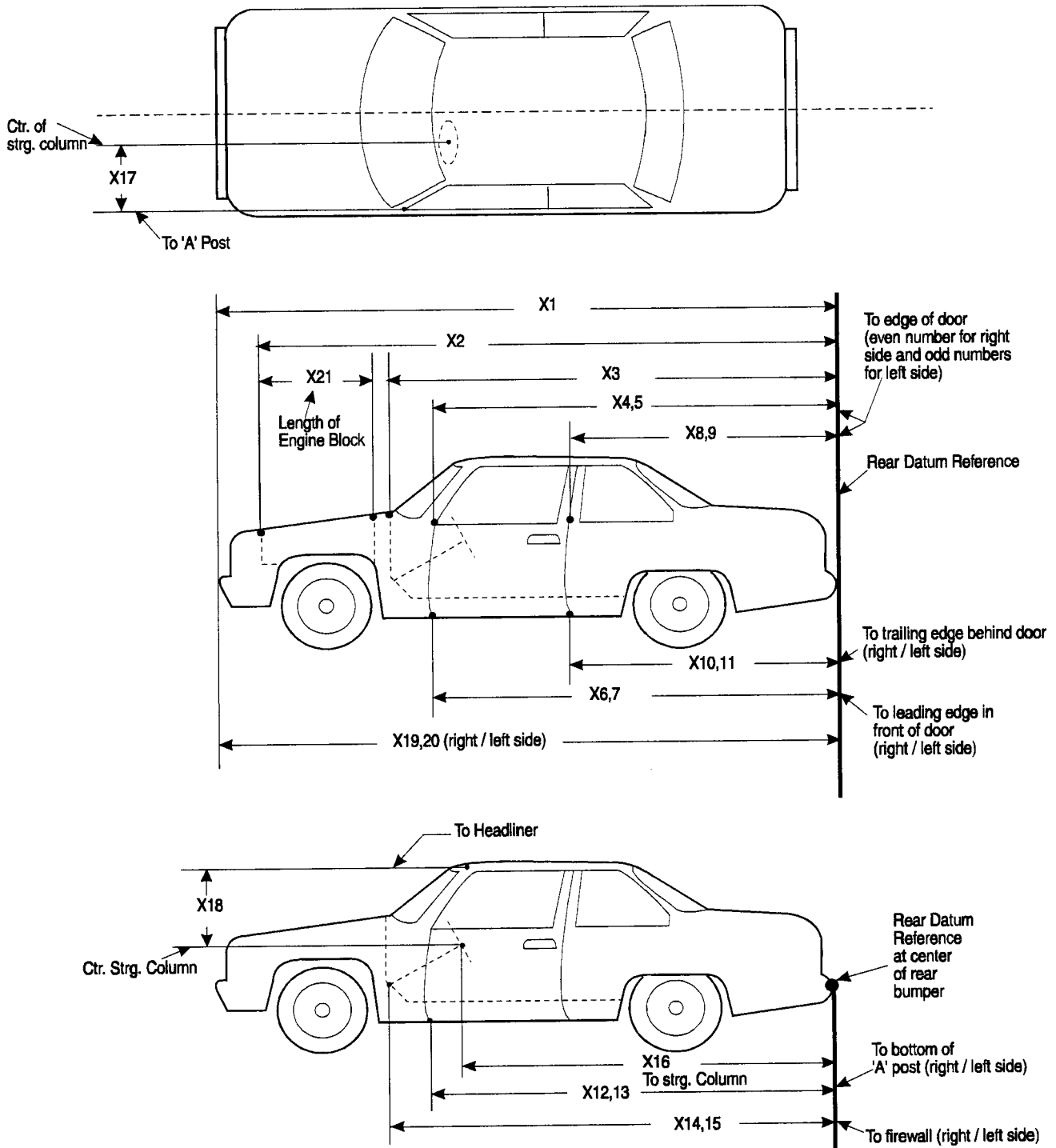


Table 6 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1997/Thomas Built/Bus

Test Number: 990421-1

No.	Type of measurement	Pre-Test	Post-Test	Difference
X1	Total Length of Veh. at Centerline	442.9	435.1	7.8
X2	Rear Surface of Veh. to Front of Engine Block	422.5	428.5	-6.0
X3	Rear Surface of Veh. to Firewall	394.0	419.5	-25.5
X4	Rear Surface of Veh. to Upper Leading Edge of Right Door	374.0	390.6	-16.6
X5	Rear Surface of Veh. to Upper Leading Edge of Left Door	N/A	N/A	N/A
X6	Rear Surface of Veh. to Lower Leading Edge of Right Door	373.5	387.7	-14.2
X7	Rear Surface of Veh. to Lower Leading Edge of Left Door	N/A	N/A	N/A
X8	Rear Surface of Veh. to Upper Trailing Edge of Right Door	337.9	382.0	-44.1
X9	Rear Surface of Veh. to Upper Trailing Edge of Left Door	N/A	N/A	N/A
X10	Rear Surface of Veh. to Lower Trailing Edge of Right Door	337.8	369.7	-31.9
X11	Rear Surface of Veh. to Lower Trailing Edge of Left Door	N/A	N/A	N/A
X12	Rear Surface of Veh. to Bottom of " A " Post on Right Side	372.8	390.4	-17.6
X13	Rear Surface of Veh. to Bottom of " A " Post on Left Side	372.8	417.5	-44.7
X14	Rear Surface of Veh. to Firewall--Right Side	389.7	416.2	-26.5
X15	Rear Surface of Vehicle to Firewall --Left Side	390.2	426.4	-36.2
X16	Rear Surface of Veh. to Steering Wheel Center	365.3	391.0	-25.7
X17	Center of Steering Column to " A " Post	29.0	28.0	1.0
X18	Center of Steering Column to Headliner	29.6	36.8	-7.2
X19	Rear Surface of Veh. to Right Side of Front Bumper	430.1	425.3	4.8
X20	Rear Surface of Veh. to Left Side of Front Bumper	428.4	427.6	0.8
X21	Length of Engine Block	29.0	29.0	0

Figure 4 Vehicle Target Locations

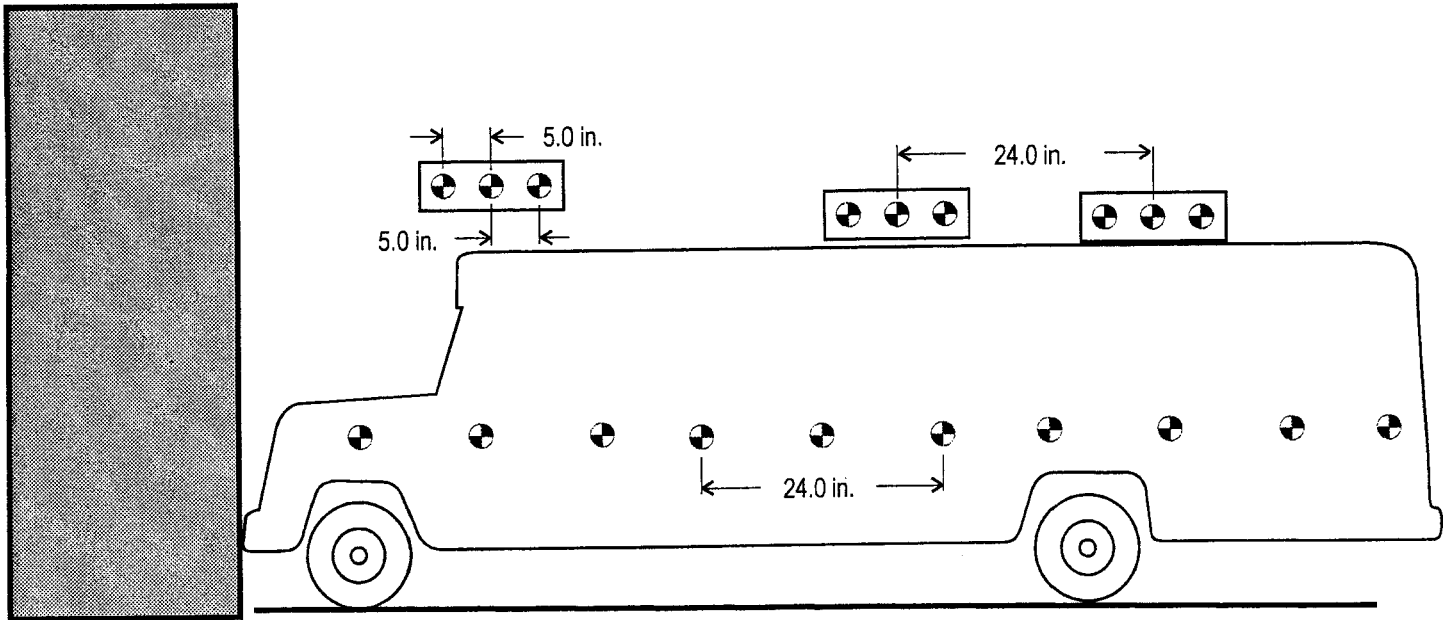


Table 7 Dummy Measurement Data For Bus Seat Occupants

All measurements are referenced to the front outboard seat mounting belt.

Placement of Left Side, Instrumented 6-Yr.-Old Dummy:

Bus seat #4

Distance from bus seat back hinge to head CG	x: -344	y: 345	z: 879
Distance from bus seat back hinge to H-point	x: -315	y: 325	z: 442
Distance from bus seat back hinge to knee pivot	x: -47	y: 325	z: 489

Placement of Left Side, Instrumented HIII 5th Female Dummy:

Bus seat #9

Distance from seat back hinge to head CG	x: -307	y: 110	z: 1025
Distance from seat back hinge to H-point	x: -195	y: 30	z: 445
Distance from seat back hinge to knee pivot	x: 110	y: 30	z: 423

Placement of Right Side, Instrumented 6-Yr.-Old Dummy:

Bus seat #19

Distance from seat back hinge to head CG	x: -360	y: -120	z: 887
Distance from seat back hinge to H-point	x: -290	y: -75	z: 422
Distance from seat back hinge to knee pivot	x: -25	y: -75	z: 460

Placement of Right Side, Instrumented HIII 5th Female Dummy:

Bus seat #19

Distance from seat back hinge to head CG	x: -210	y: -620	z: 1035
Distance from seat back hinge to H-point	x: -265	y: -450	z: 460
Distance from seat back hinge to knee pivot	x: 70	y: -480	z: 410

Placement of Right Side, Instrumented HIII 50th Male Dummy:

Bus seat #23

Distance from seat back hinge to head CG	x: -240	y: -385	z: 1112
Distance from seat back hinge to H-point	x: -270	y: -250	z: 462
Distance from seat back hinge to knee pivot	x: 155	y: -290	z: 507

Table 7 Dummy Measurement Data For Bus Seat Occupants, Cont'd.

All measurements are referenced to the front outboard seat mounting belt.

Placement of Right Side, Instrumented HIII 50th Male Dummy:

Bus seat #13

Distance from bus seat back hinge to head CG	x: -265	y: -245	z: 1110
Distance from bus seat back hinge to H-point	x: -270	y: -150	z: 393
Distance from bus seat back hinge to knee pivot	x: 140	y: -170	z: 510

Placement of Right Side, Ballast 6-Yr.-Old Dummy:

Bus seat #24

Distance from bus seat back hinge to head CG	x: -330	y: -145	z: 890
Distance from bus seat back hinge to H-point	x: -300	y: -85	z: 465
Distance from bus seat back hinge to knee pivot	x: -50	y: -100	z: 406

Placement of Right Side, Ballast HIII 50th Male Dummy:

Bus seat #24

Distance from bus seat back hinge to head CG	x: -330	y: -585	z: 1145
Distance from bus seat back hinge to H-point	x: -260	y: -475	z: 451
Distance from bus seat back hinge to knee pivot	x: 140	y: -495	z: 471

Placement of Right Side, Ballast HIII 50th Male Dummy:

Bus seat #18

Distance from bus seat back hinge to head CG	x: -260	y: -590	z: 1160
Distance from bus seat back hinge to H-point	x: -276	y: -450	z: 448
Distance from bus seat back hinge to knee pivot	x: 130	y: -505	z: 480

Placement of Right Side, Ballast HIII 50th Male Dummy:

Bus seat #18

Distance from bus seat back hinge to head CG	x: -348	y: -70	z: 1160
Distance from bus seat back hinge to H-point	x: -285	y: 40	z: 470
Distance from bus seat back hinge to knee pivot	x: 115	y: 5	z: 498

Figure 6 Camera Positions

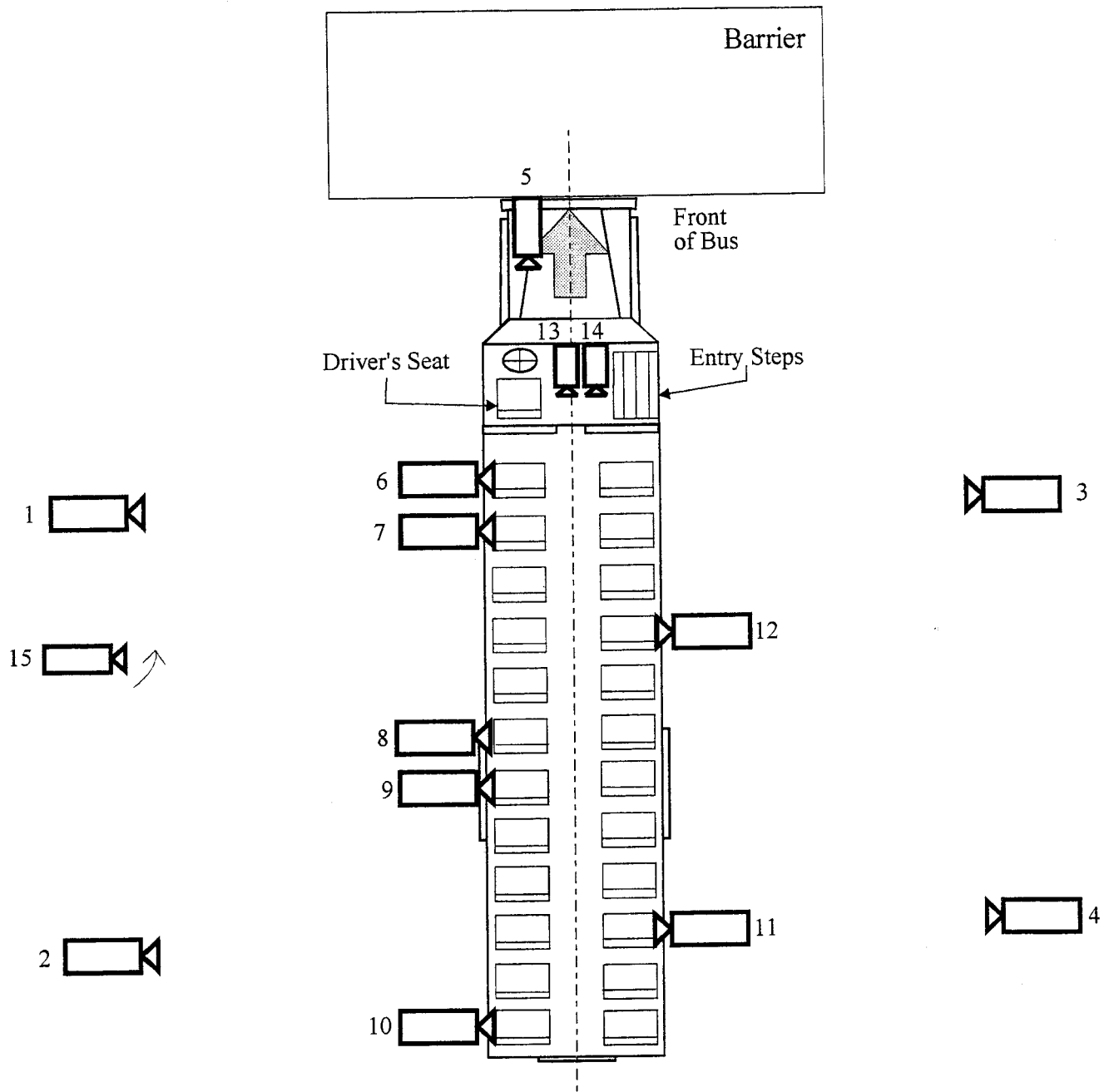


Table 8 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1997/Thomas Built/Bus

Test number: 990421-1

Camera Number	View	Camera Positions ¹			Camera Angle ²	Film Plane to Head Target	Camera Lens	Film Speed
		X	Y	Z				
1	Left front	7' 4"	30' 0"	4' 10"	0°	NA	10 mm	1005 frames/s
2	Left rear	26' 0"	28' 10"	5' 0"	0°	NA	13 mm	990 frames/s
3	Right front	9' 0"	-29' 0"	5' 0"	0°	NA	13 mm	1012 frames/s
4	Right rear	27' 3"	-34' 0"	5' 0"	0°	NA	13 mm	753 frames/s
5	Front roof line	-0' 14"	22' 0"	11' 8"	0°	NA	Zoom	508 frames/s
6	Right #24 seat	10' 6"	4' 4"	6' 4"	0°	NA	8 mm	968 frames/s
7	Right #23 seat	12' 10"	4' 4"	6' 4"	0°	NA	8 mm	992 frames/s
8	Right #19 seat	22' 3"	4' 4"	6' 4"	0°	NA	8.5 mm	455 frames/s
9	Right #18 seat	24' 2"	4' 4"	6' 4"	0°	NA	8 mm	708 frames/s
10	Right #13 seat	34' 8"	4' 4"	6' 3"	0°	NA	8 mm	828 frames/s
11	Left #9 seat	29' 0"	-4' 4"	6' 3"	0°	NA	8 mm	1005 frames/s
12	Left #4 seat	17' 7"	-4' 4"	6' 3"	0°	NA	8 mm	750 frames/s
13	Front (Frontal area)	7' 0"	-3' 0"	8' 9"	0°	NA	8 mm	555 frames/s
14	Front (Rear area)	7' 0"	0' 6"	8' 9"	0°	NA	13 mm	520 frames/s
15	Real-time panning	NA	NA	NA	NA	NA	16 mm	24 frames/s

¹ +X: Film plane forward of barrier face

+Y: Film plane to left of monorail centerline

+Z: Film plane above ground level

² +Angle: Film plane angled upward from horizontal plane

Appendix A

Photographs



Figure A-1 Pre-Test Front View



Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Front Three-Quarter View



Figure A-4 Post-Test Left Front Three-Quarter View



Figure A-5 Pre-Test Left Side View



Figure A-6 Post-Test Left Side View



Figure A-7 Pre-Test Rear View



Figure A-8 Post-Test Rear View



Figure A-9 Pre-Test Right Side View



Figure A-10 Post-Test Right Side View



Figure A-11 Pre-Test Right Front Three-Quarter View



Figure A-12 Post-Test Right Front Three-Quarter View

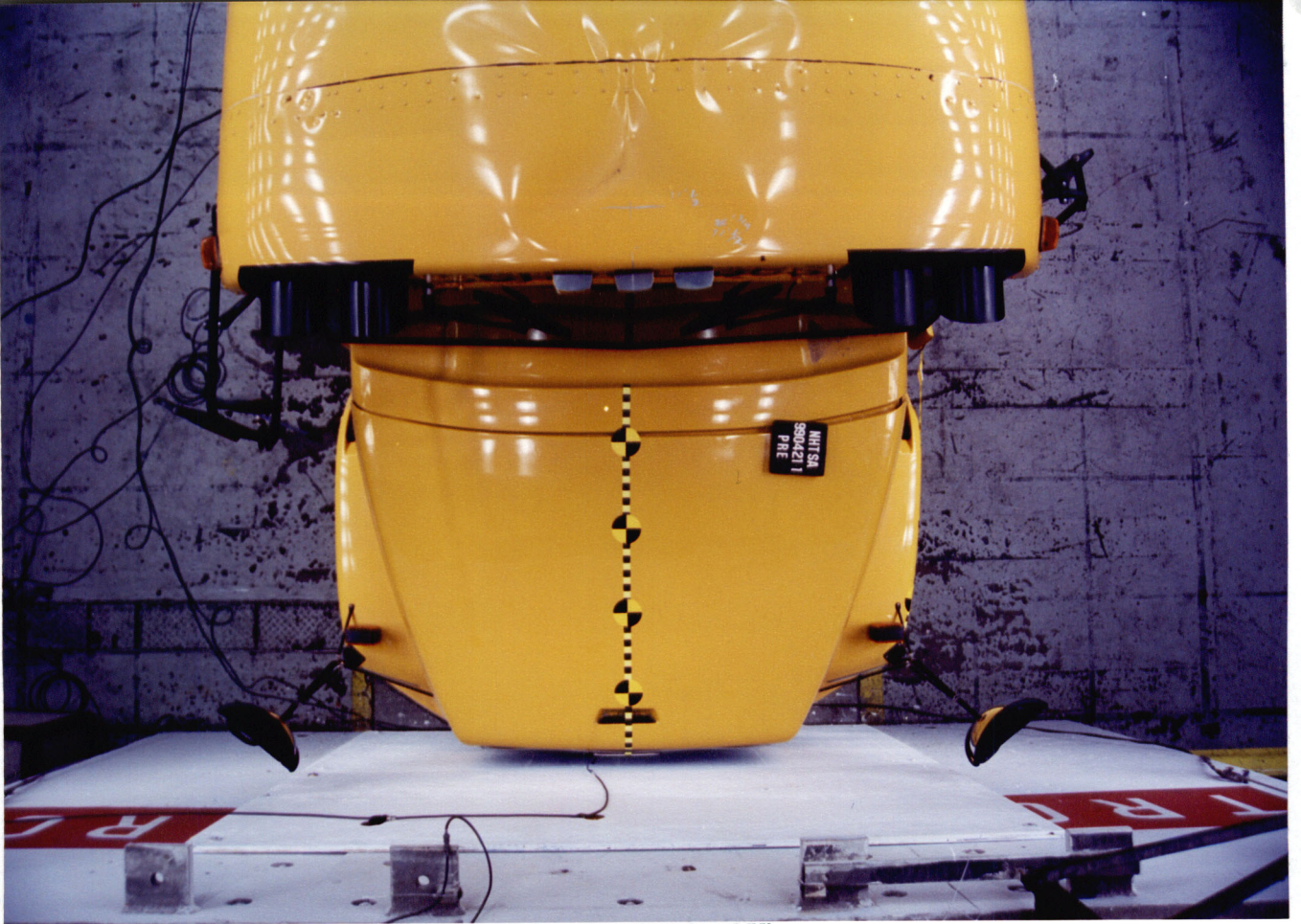


Figure A-13 Pre-Test Overhead View

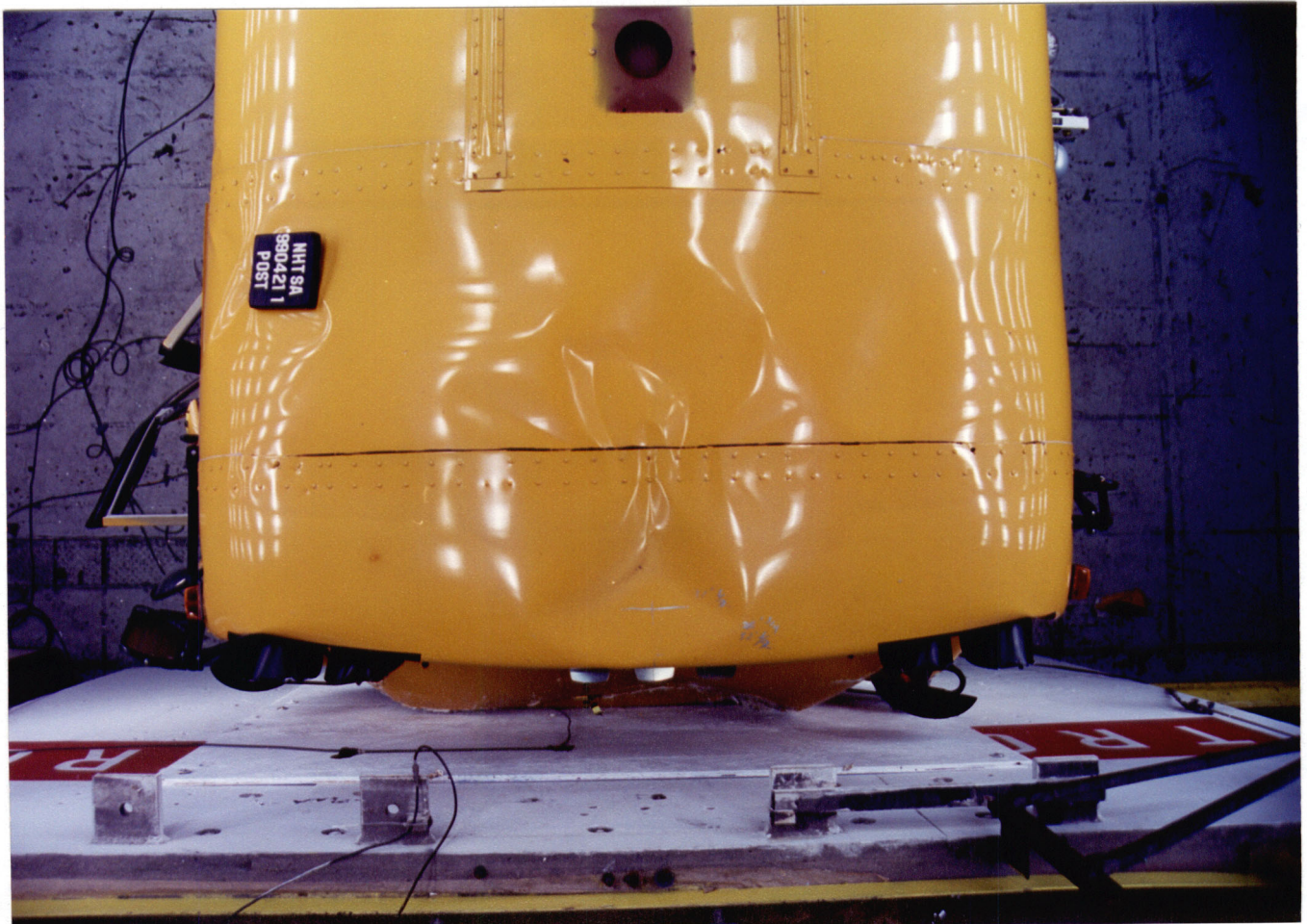


Figure A-14 Post-Test Overhead View



Figure A-15 Pre-Test Right Side Seat 1 Ballast 50th and 6 Year Old - View 1

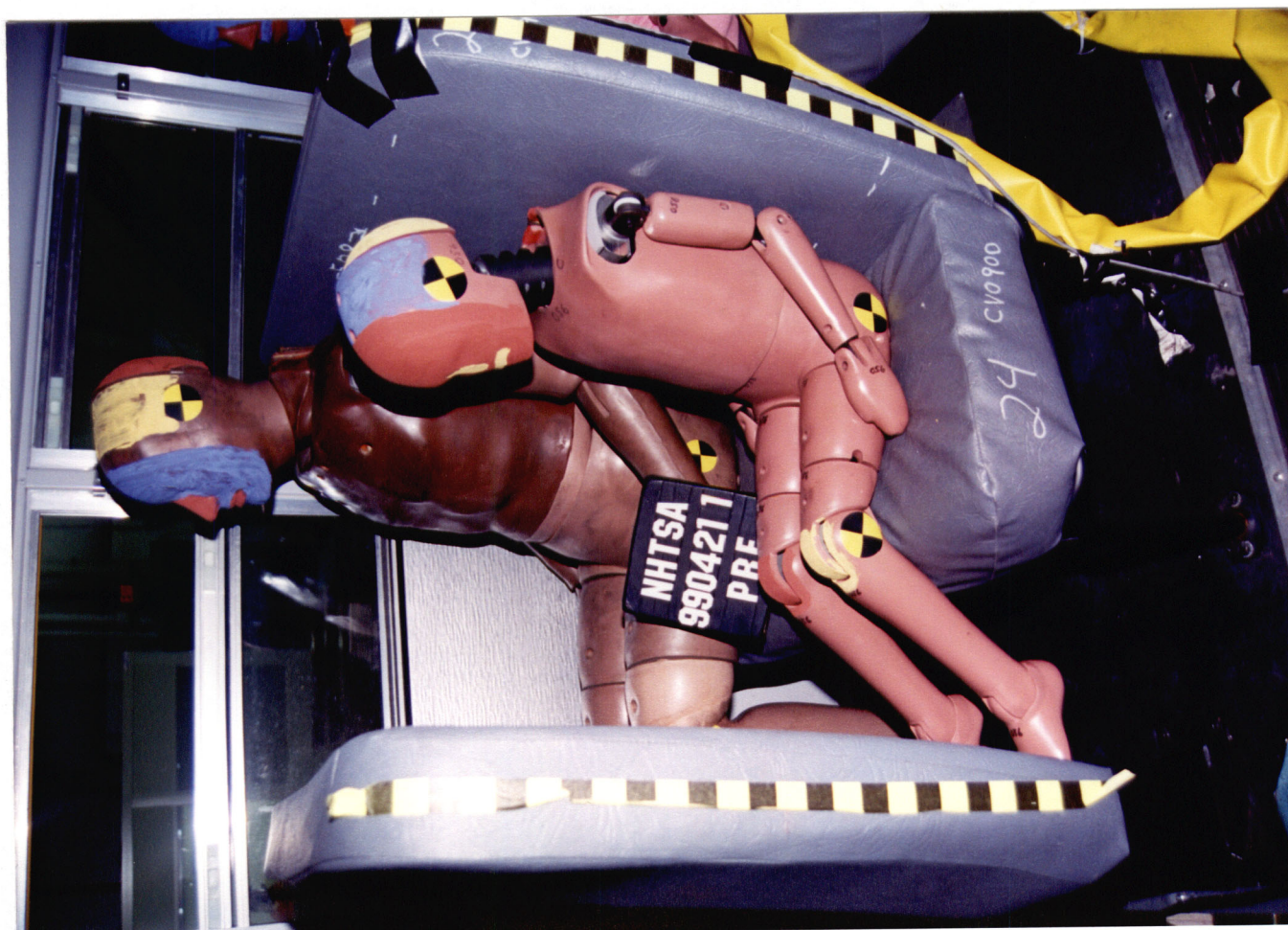


Figure A-16 Pre-Test Right Side Seat 1 Ballast 50th and 6 Year Old - View 2



Figure A-17 Pre-Test Right Side Seat 1 Ballast 50th and 6 Year Old - View 3



Figure A-18 Pre-Test Right Side Seat 2 Instrumented 50th - View 1

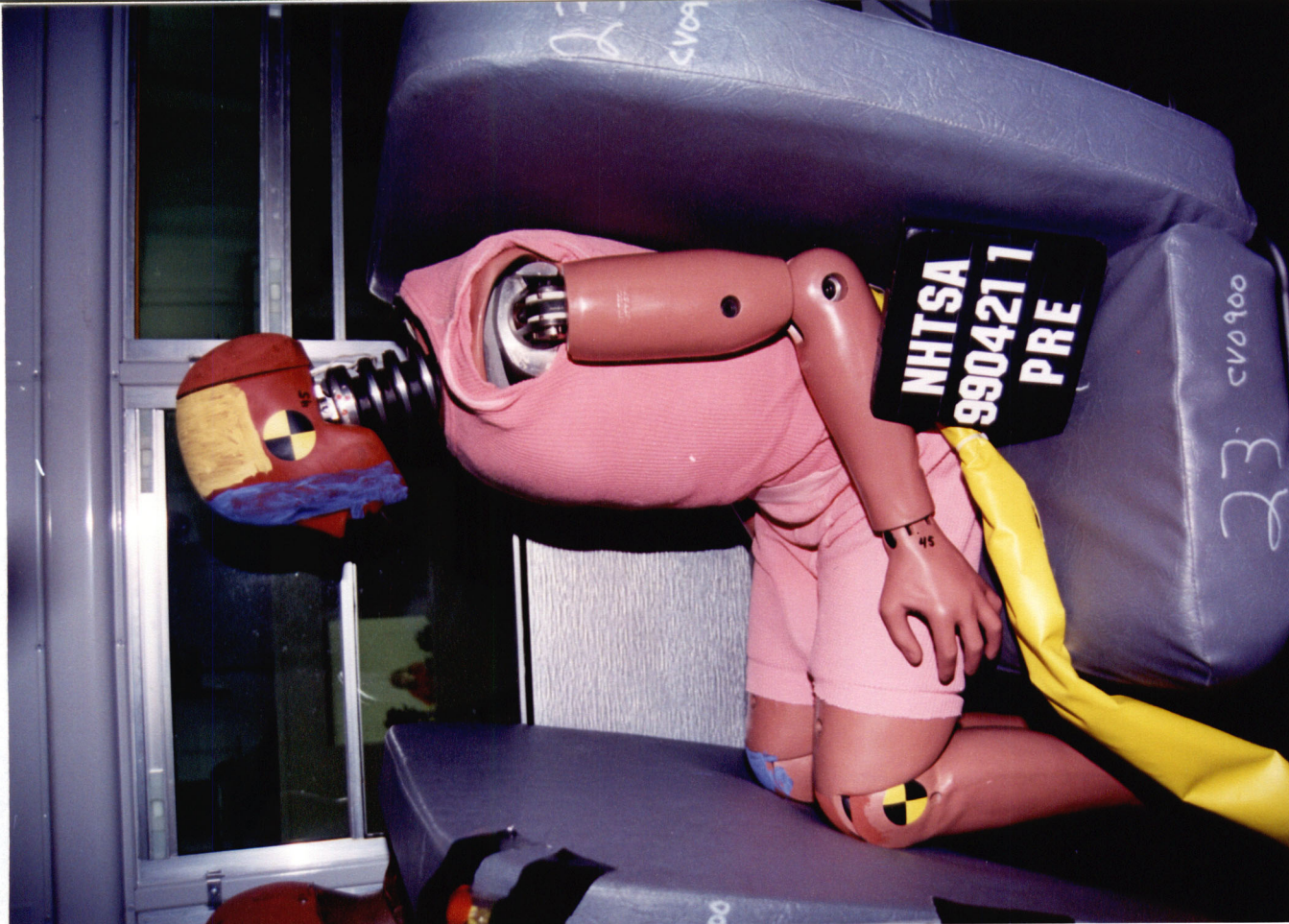


Figure A-19 Pre-Test Right Side Seat 2 Instrumented 50th - View 2



Figure A-20 Pre-Test Right Side Seat 2 Instrumented 50th - View 3



Figure A-21 Pre-Test Left Side Seat 4 Instrumented 6 Year Old - View 1



Figure A-22 Pre-Test Left Side Seat 4 Instrumented 6 Year Old - View 2



Figure A-23 Pre-Test Left Side Seat 4 Instrumented 6 Year Old - View 3



Figure A-24 Pre-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 1



Figure A-25 Pre-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 2



Figure A-26 Pre-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 3



Figure A-27 Pre-Test Right Side Seat 7 Two Ballast 50th - View 1



Figure A-28 Pre-Test Right Side Seat 7 Two Ballast 50th - View 2



Figure A-29 Pre-Test Right Side Seat 7 Two Ballast 50th - View 3



Figure A-30 Pre-Test Left Side Seat 10 Instrumented 5th - View 1

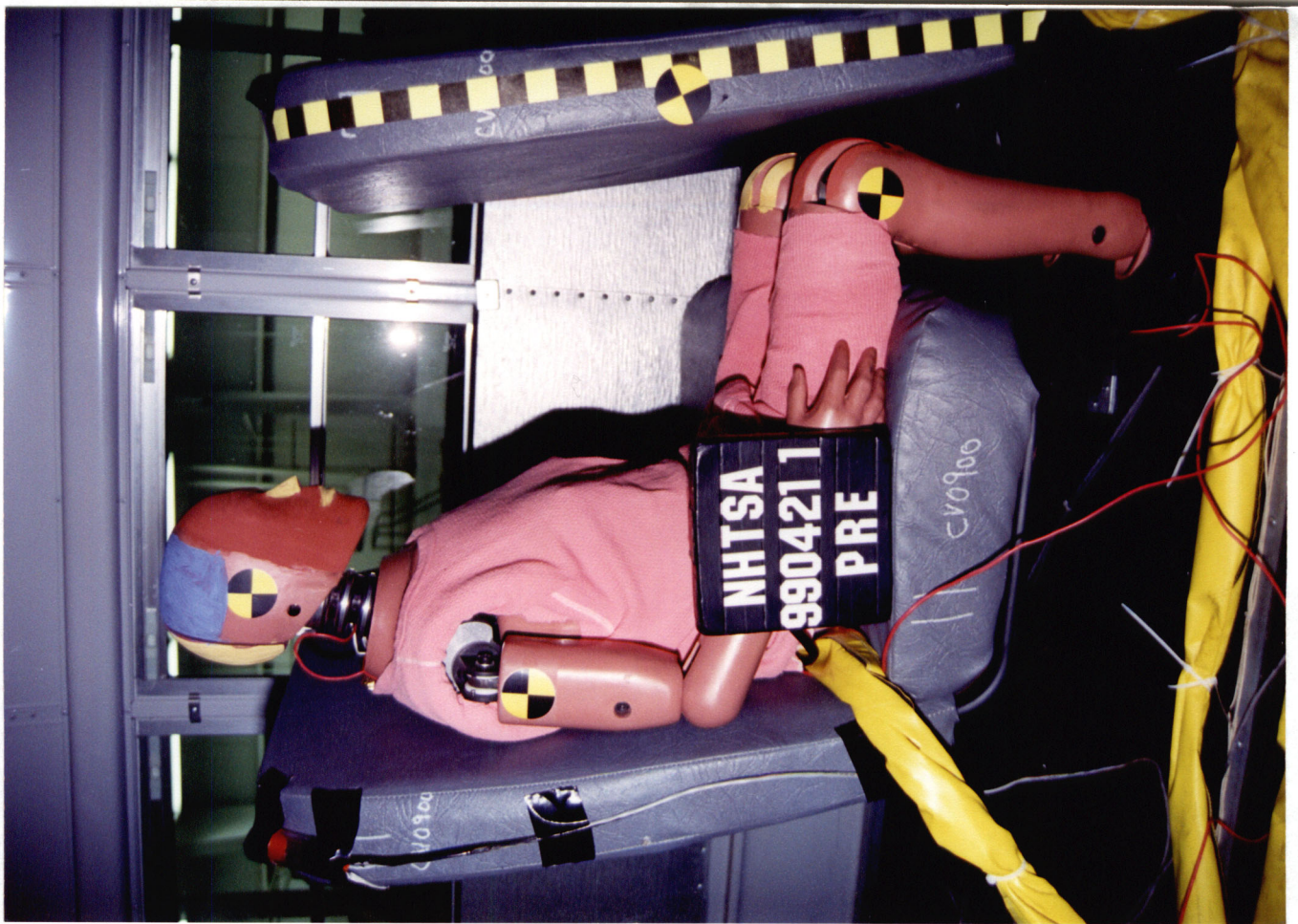


Figure A-31 Pre-Test Left Side Seat 10 Instrumented 5th - View 2



Figure A-32 Pre-Test Left Side Seat 10 Instrumented 5th - View 3



Figure A-33 Pre-Test Right Side Seat 12 Instrumented 50th - View 1

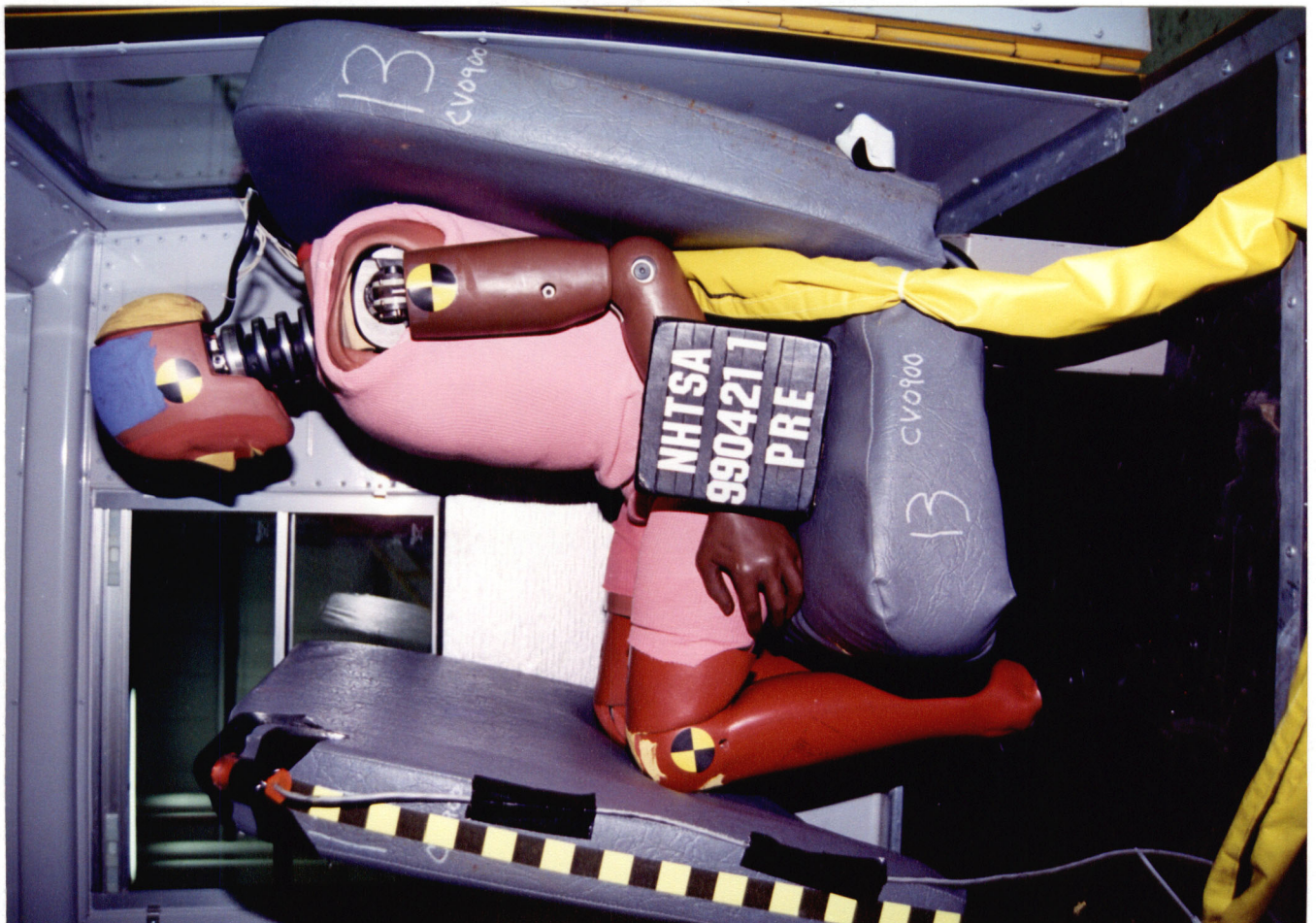


Figure A-34 Pre-Test Right Side Seat 12 Instrumented 50th - View 2



Figure A-35 Pre-Test Right Side Seat 12 Instrumented 50th - View 3

Intentionally Left Blank



Figure A-36 Post-Test Right Side Seat 1 50th and 6 Year Old Ballast - View 1



Figure A-37 Post-Test Right Side Seat 1 50th and 6 Year Old Ballast - View 2



Figure A-38 Post-Test Right Side Seat 1 50th and 6 Year Old Ballast - View 3

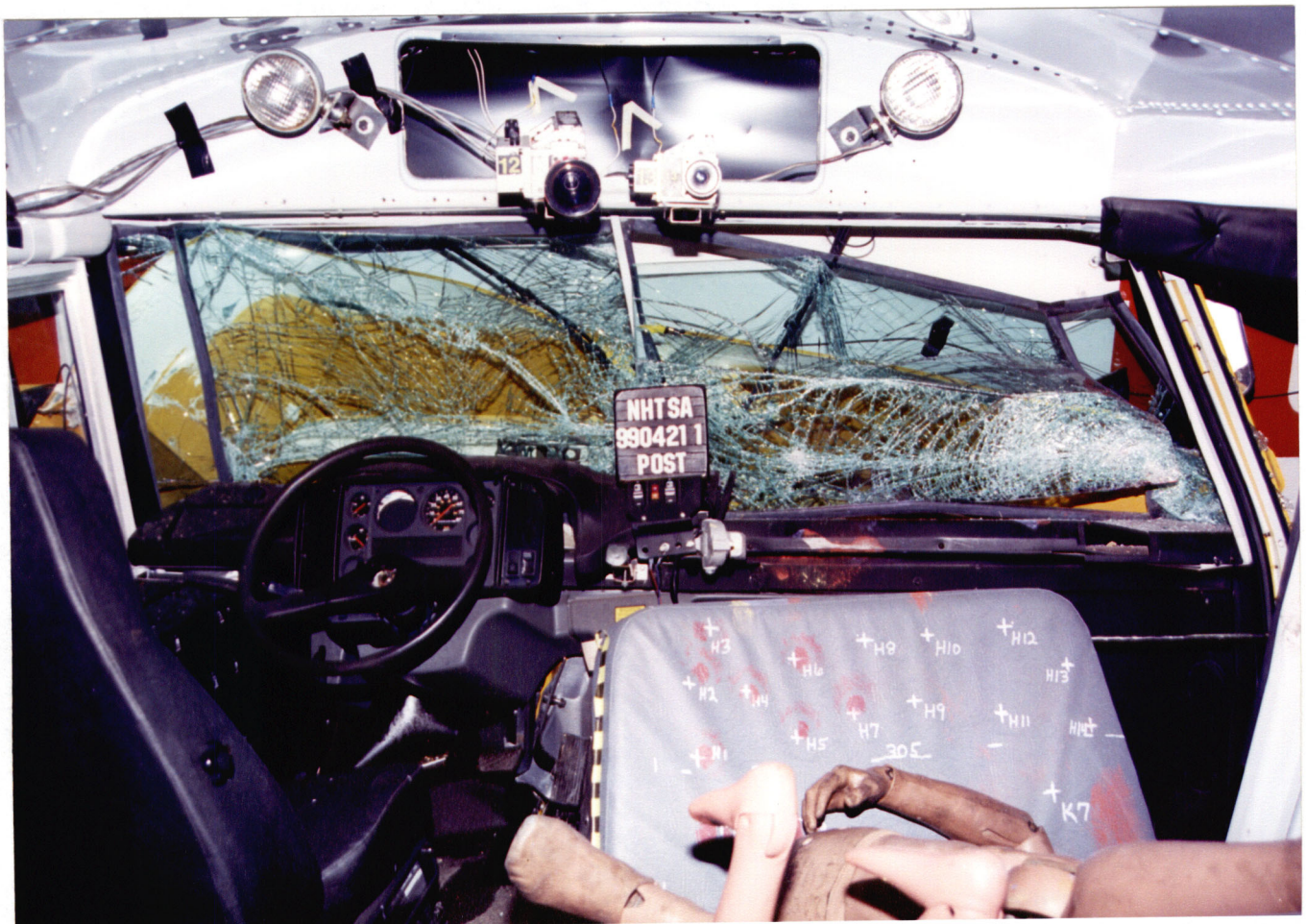


Figure A-39 Post-Test Right Side Seat 1 50th and 6 Year Old Ballast - View 4



Figure A-40 Post-Test Right Side Seat 1 50th and 6 Year Old Ballast - View 5



Figure A-41 Post-Test Right Side Seat 2 Instrumented 50th - View 1

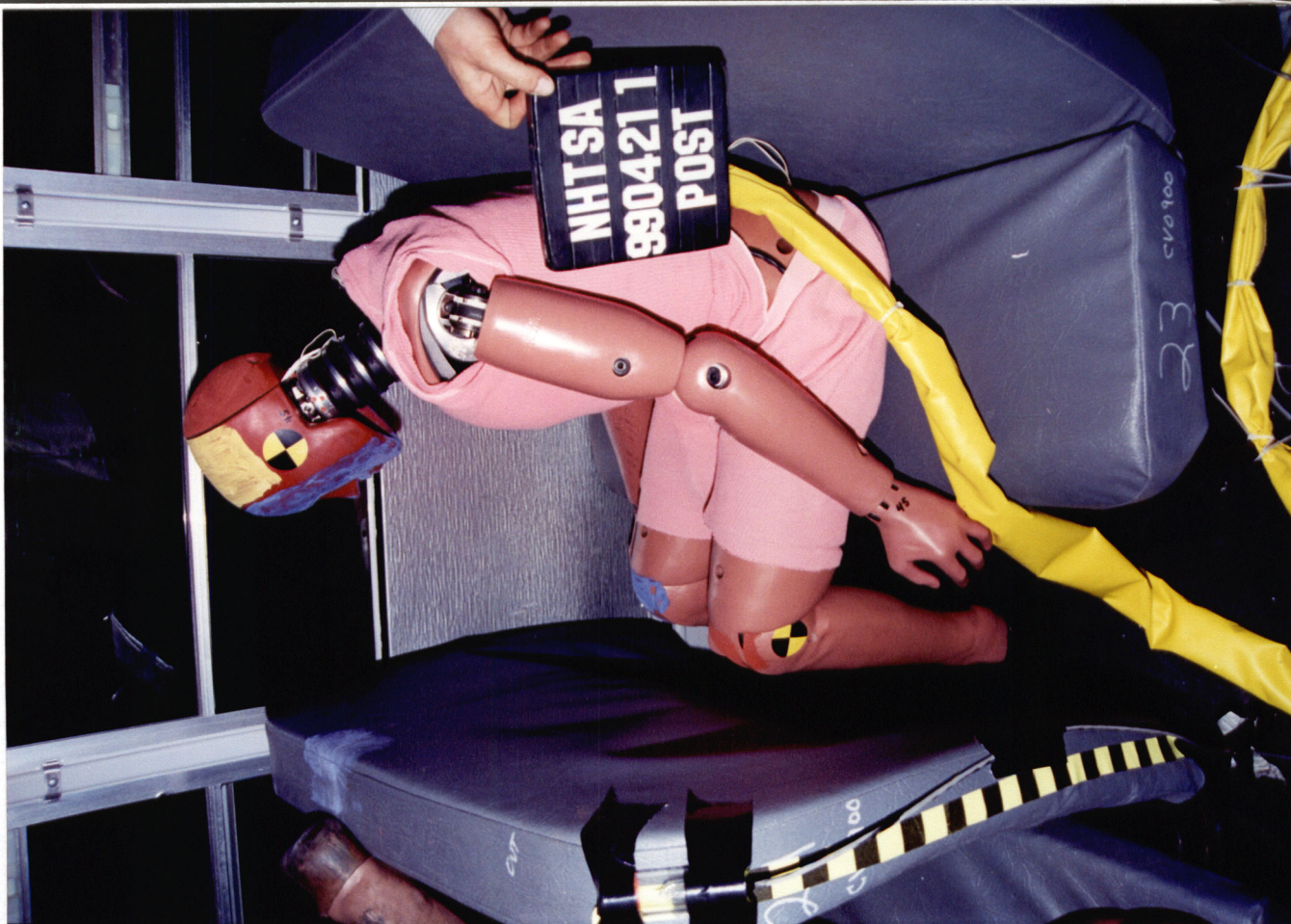


Figure A-42 Post-Test Right Side Seat 2 Instrumented 50th - View 2



Figure A-43 Post-Test Right Side Seat 2 Instrumented 50th - View 3

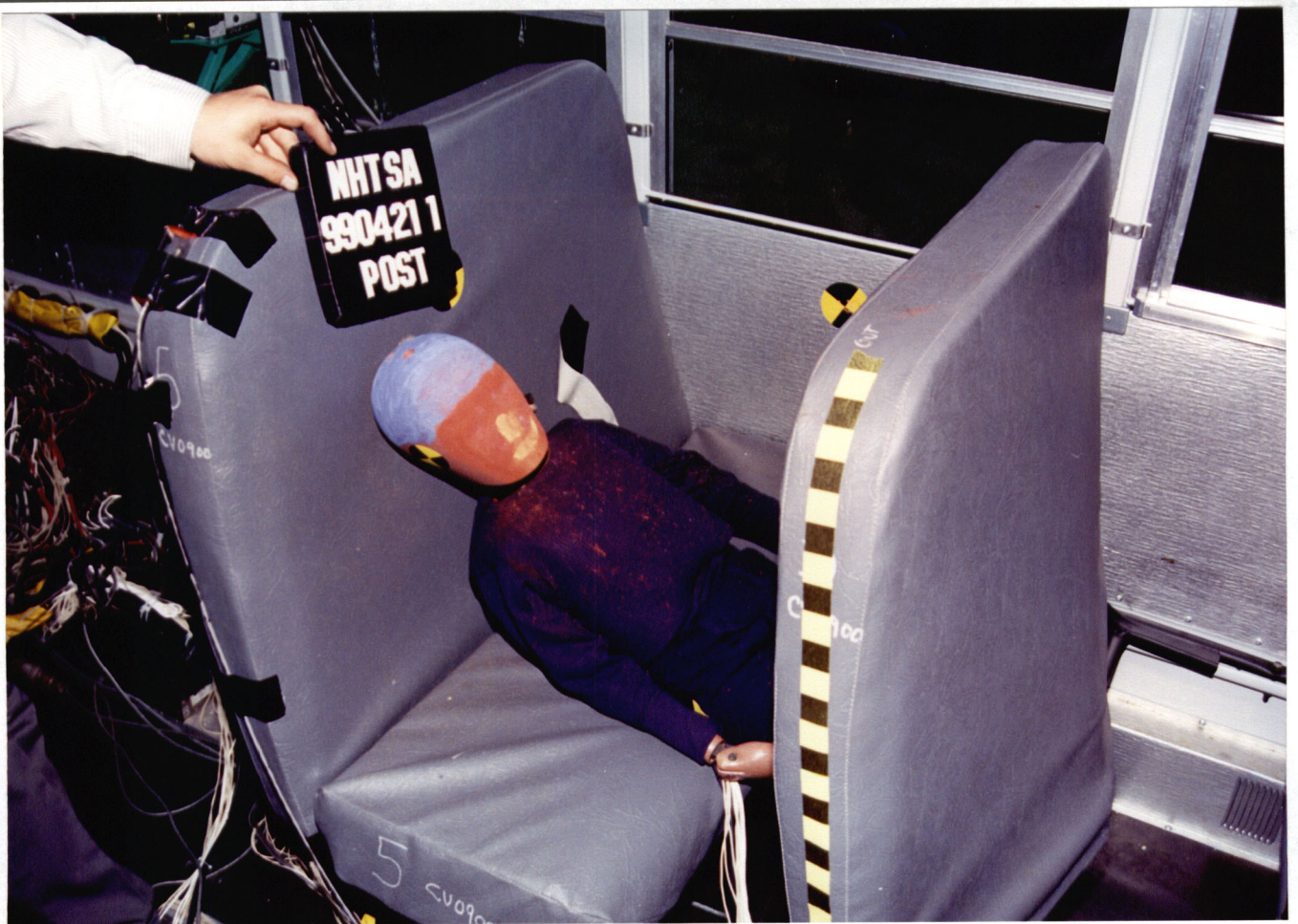


Figure A-44 Post-Test Left Side Seat 4 Instrumented 6 Year Old - View 1

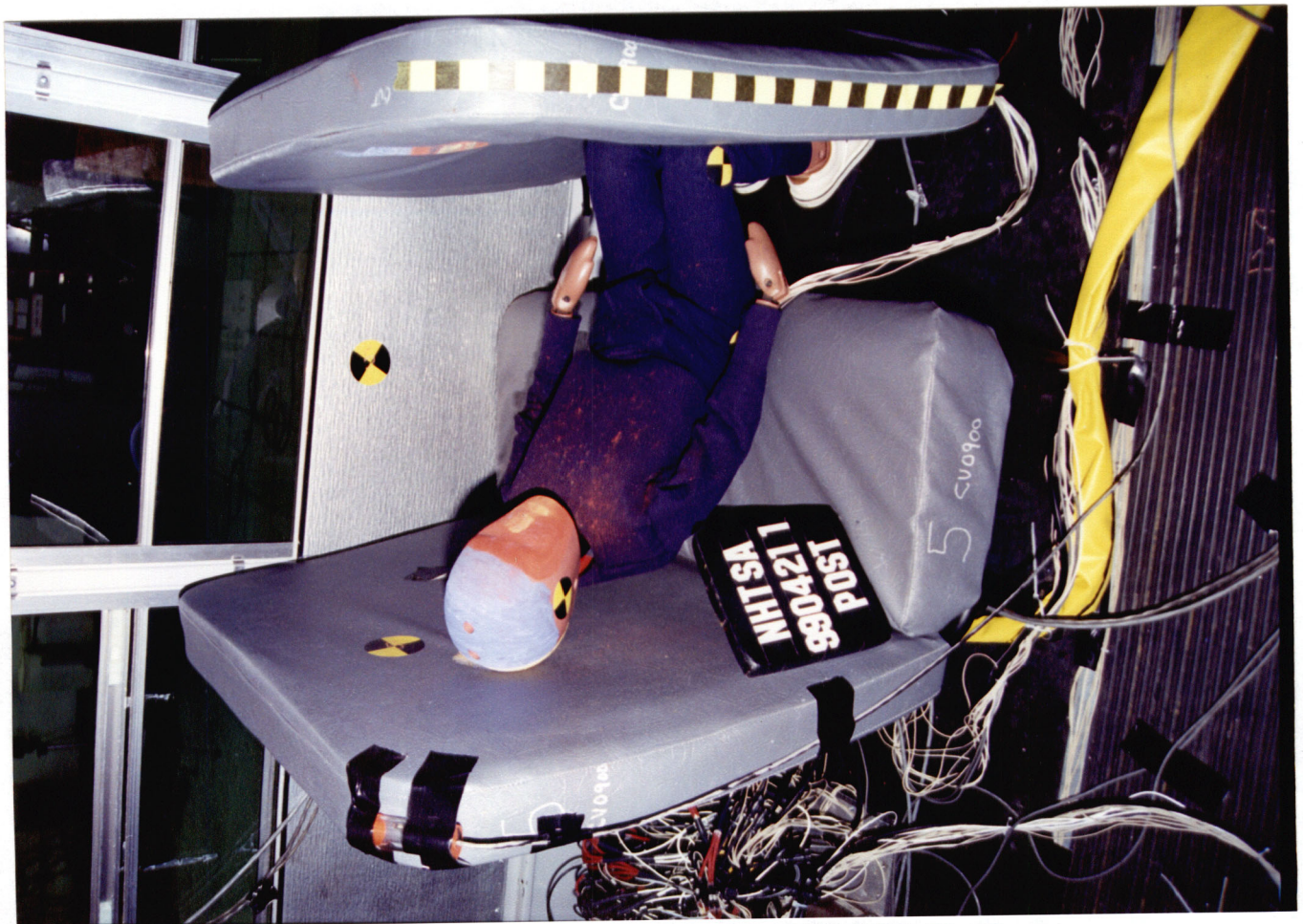


Figure A-45 Post-Test Left Side Seat 4 Instrumented 6 Year Old - View 2



Figure A-46 Post-Test Left Side Seat 4 Instrumented 6 Year Old - View 3



Figure A-47 Post-Test Left Side Seat 4 Instrumented 6 Year Old - View 4

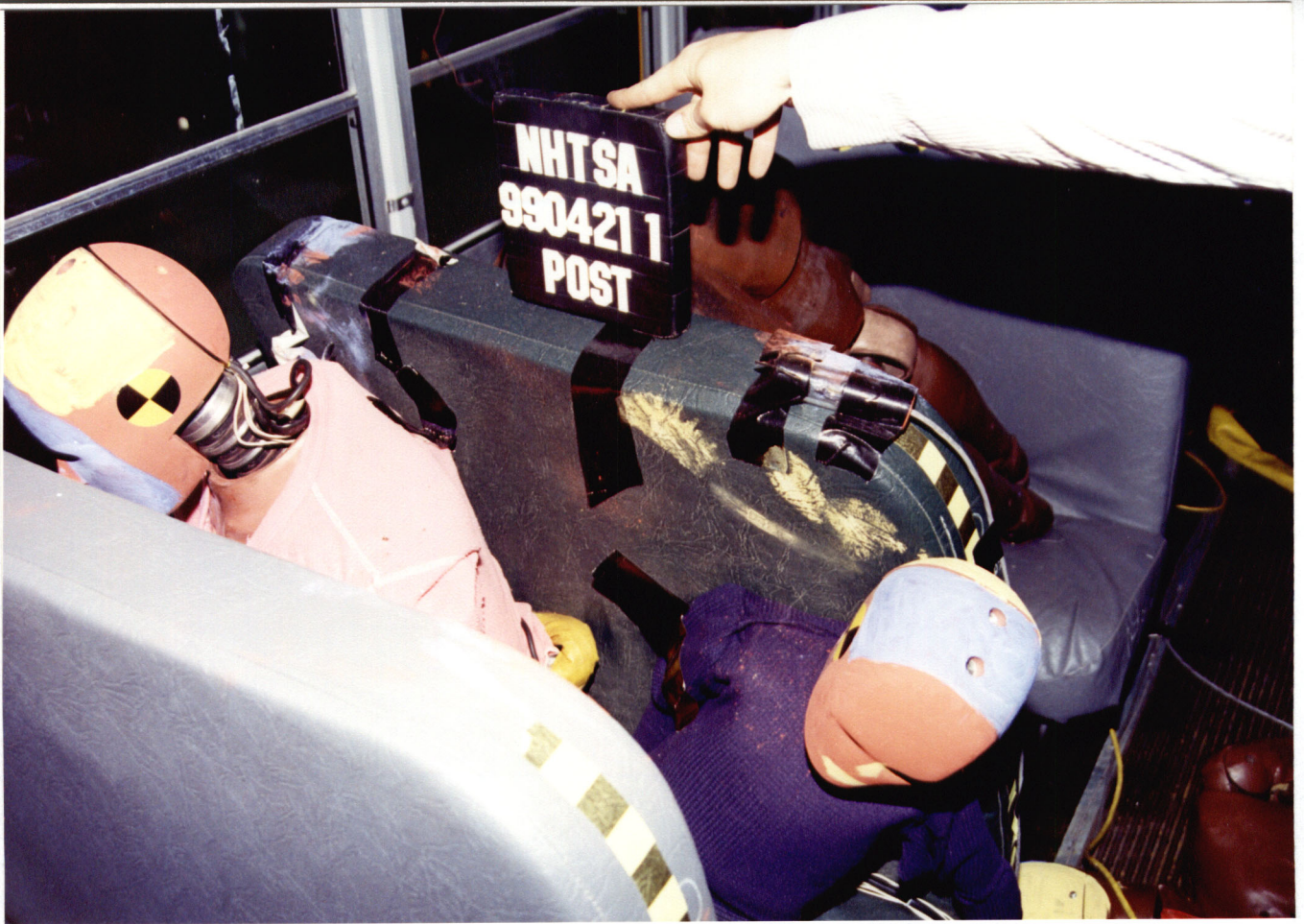


Figure A-48 Post-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 1



Figure A-49 Post-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 2



Figure A-50 Post-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 3



Figure A-51 Post-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 4



Figure A-52 Post-Test Right Side Seat 6 Instrumented 5th and 6 Year Old - View 5



Figure A-53 Post-Test Right Side Seat 7 Two Ballast 50th - View 1



Figure A-54 Post-Test Right Side Seat 7 Two Ballast 50th - View 2

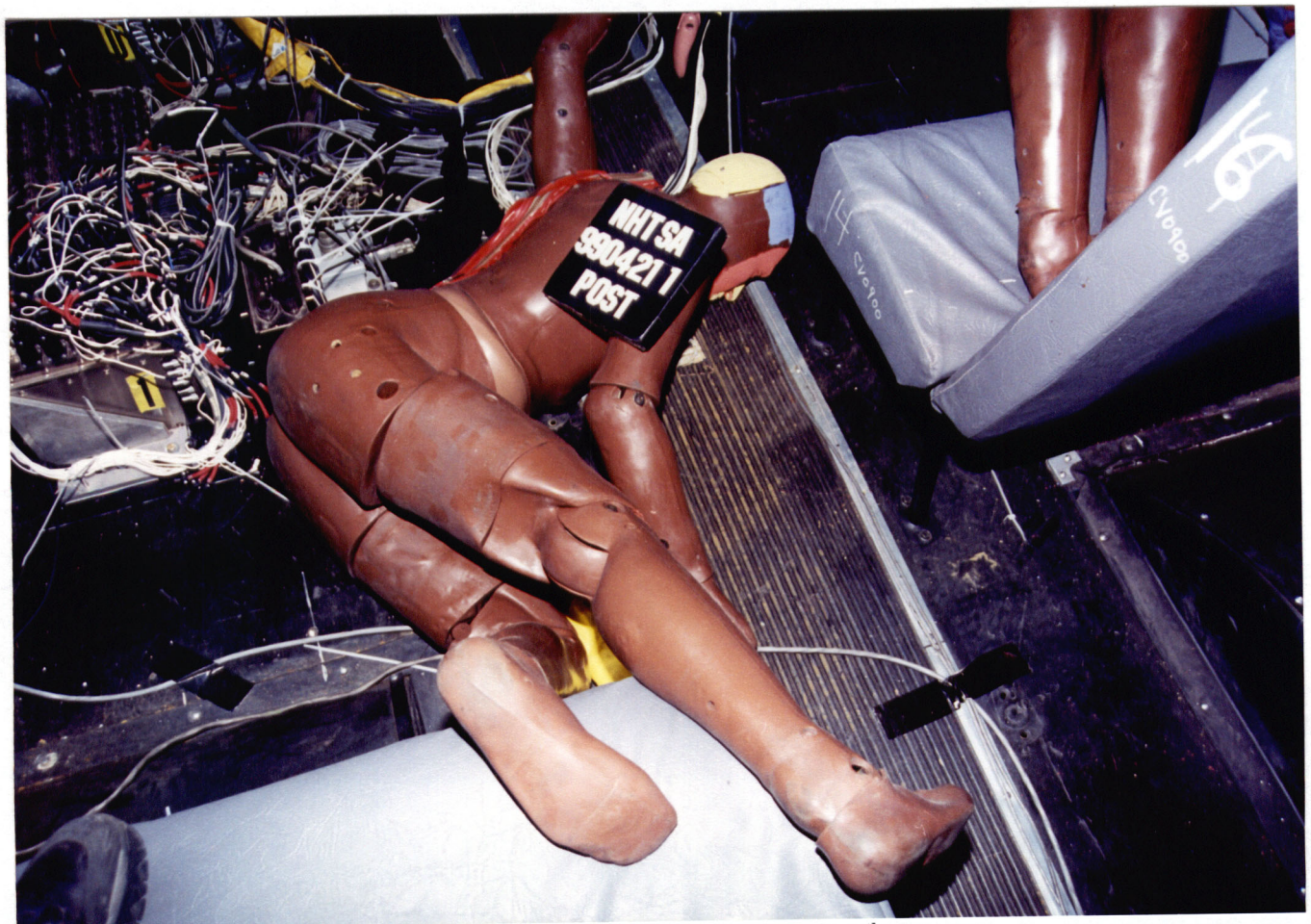


Figure A-55 Post-Test Right Side Seat 7 Two Ballast 50th - View 3



Figure A-56 Post-Test Right Side Seat 7 Two Ballast 50th - View 4

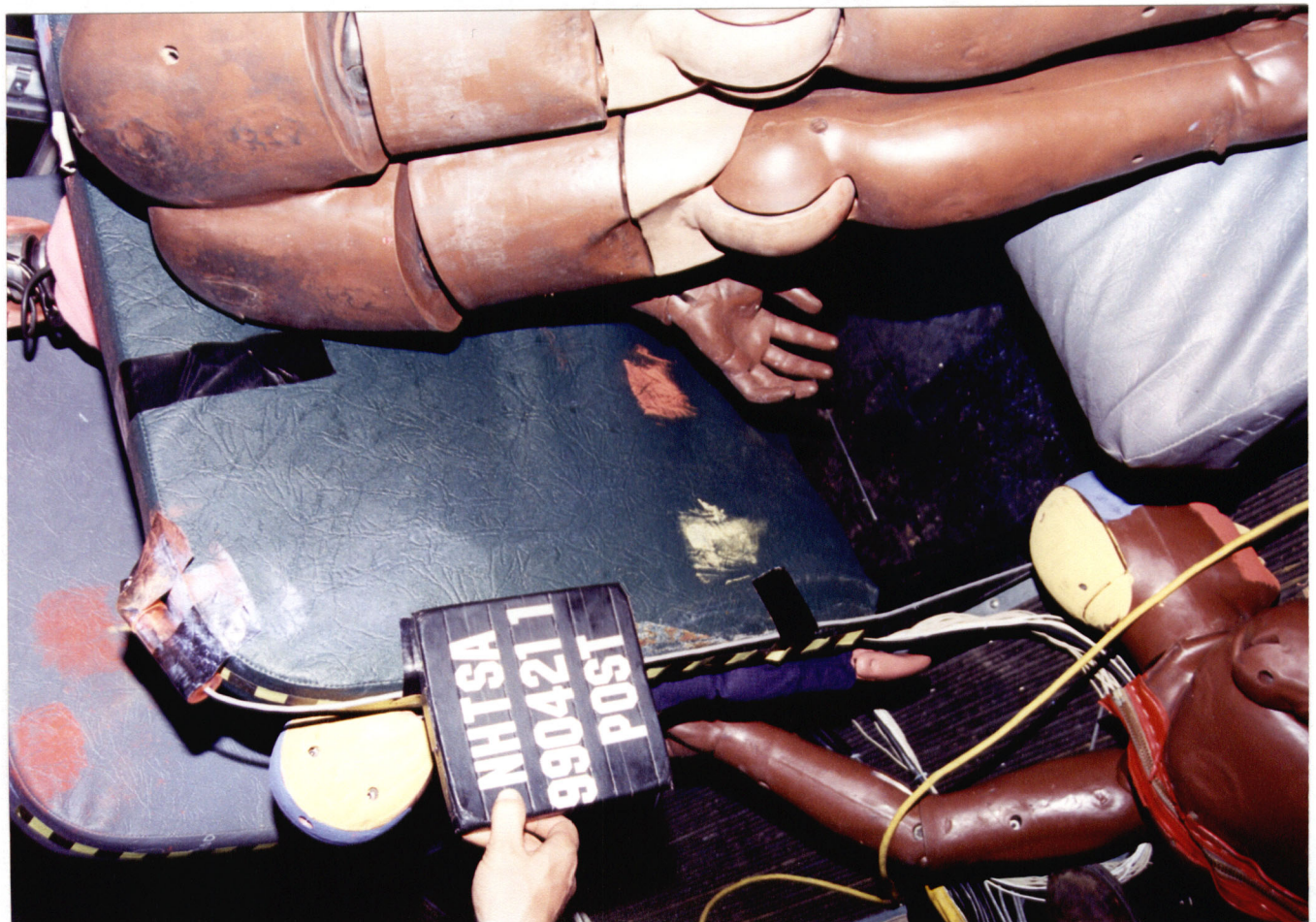


Figure A-57 Post-Test Right Side Seat 7 Two Ballast 50th - View 5

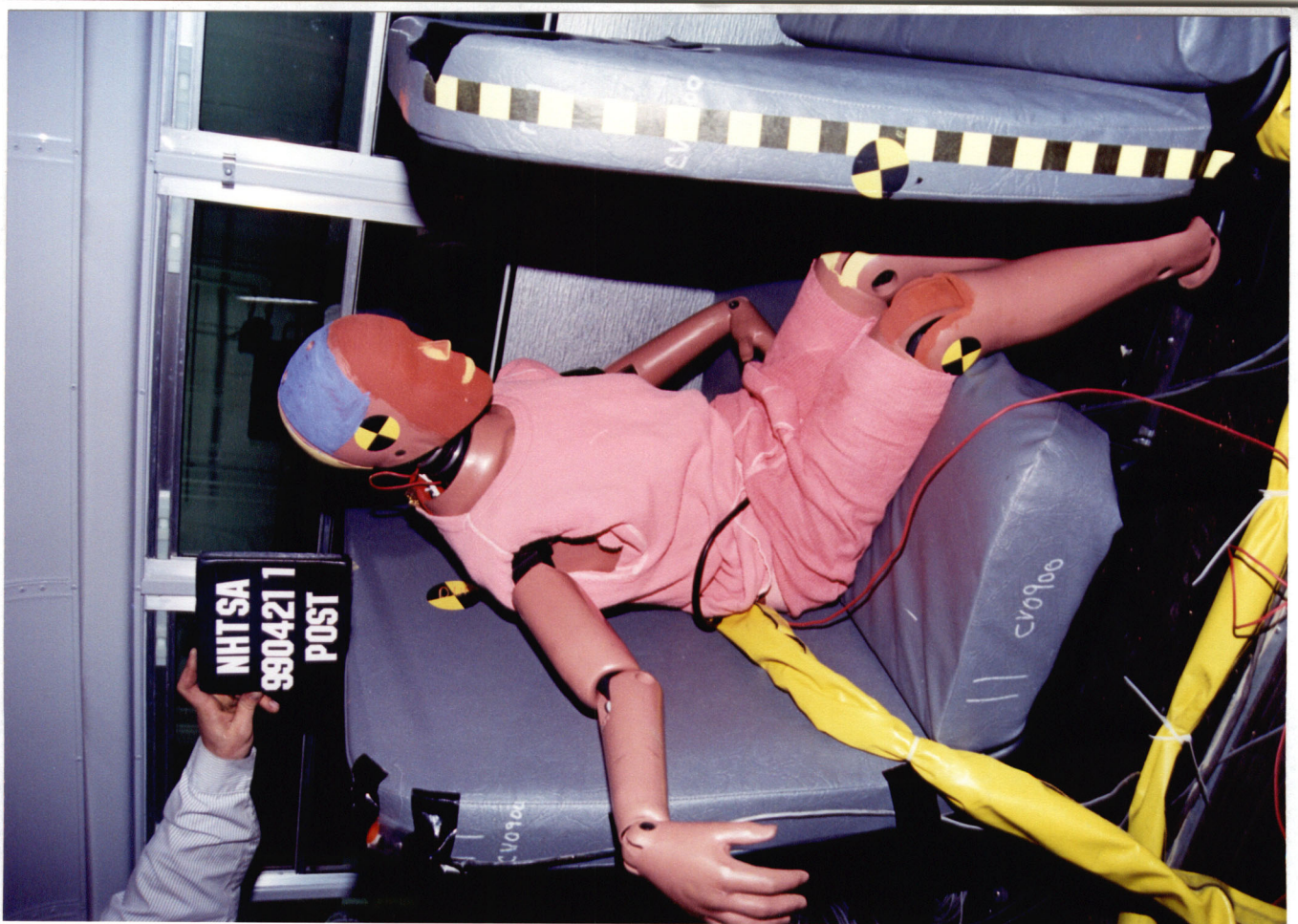


Figure A-58 Post-Test Left Side Seat 10 Instrumented 5th - View 1



Figure A-59 Post-Test Left Side Seat 10 Instrumented 5th - View 2



Figure A-60 Post-Test Left Side Seat 10 Instrumented 5th - View 3

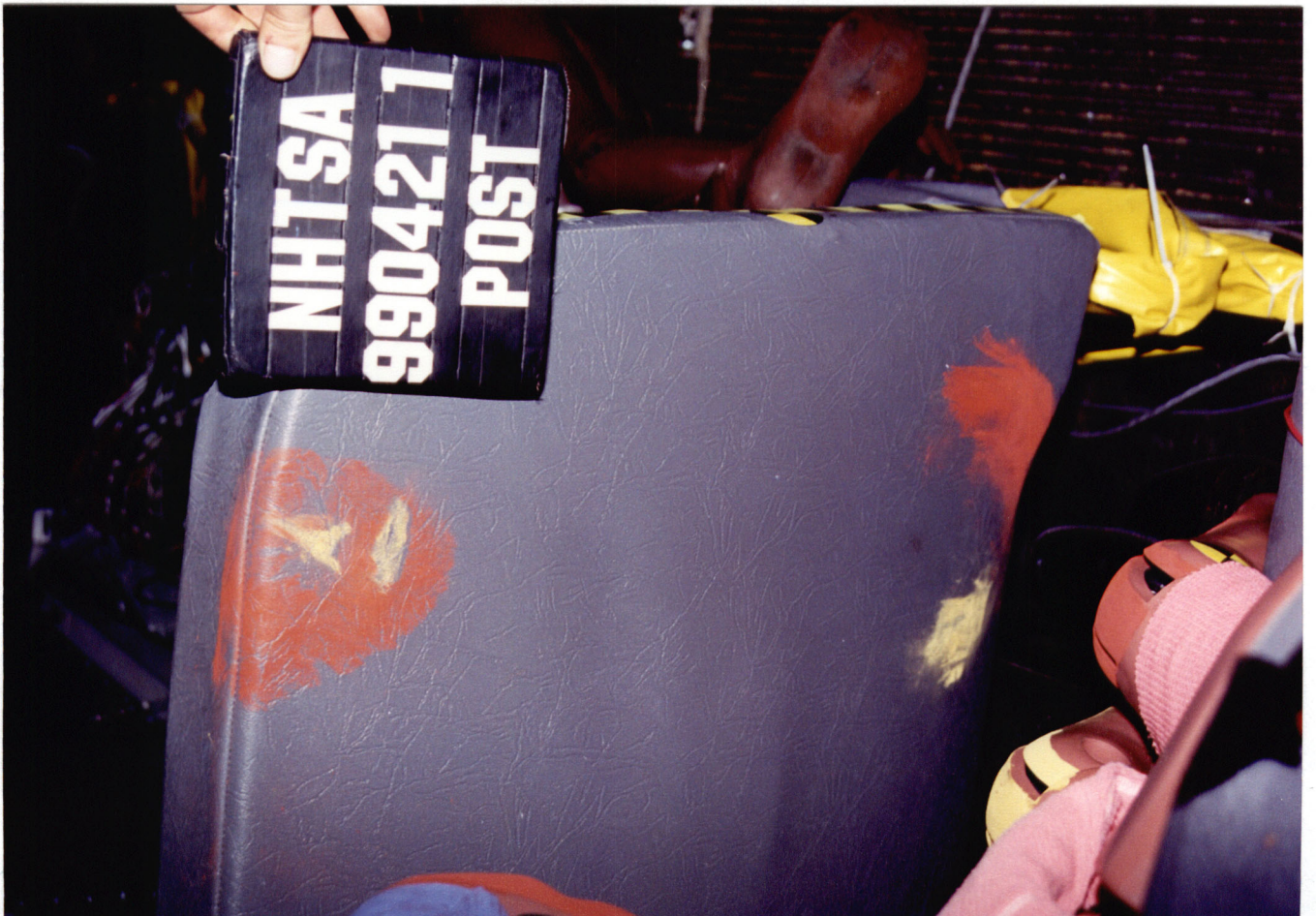


Figure A-61 Post-Test Left Side Seat 10 Instrumented 5th - View 4



Figure A-62 Post-Test Right Side Seat 12 Instrumented 50th - View 1



Figure A-63 Post-Test Right Side Seat 12 Instrumented 50th - View 2

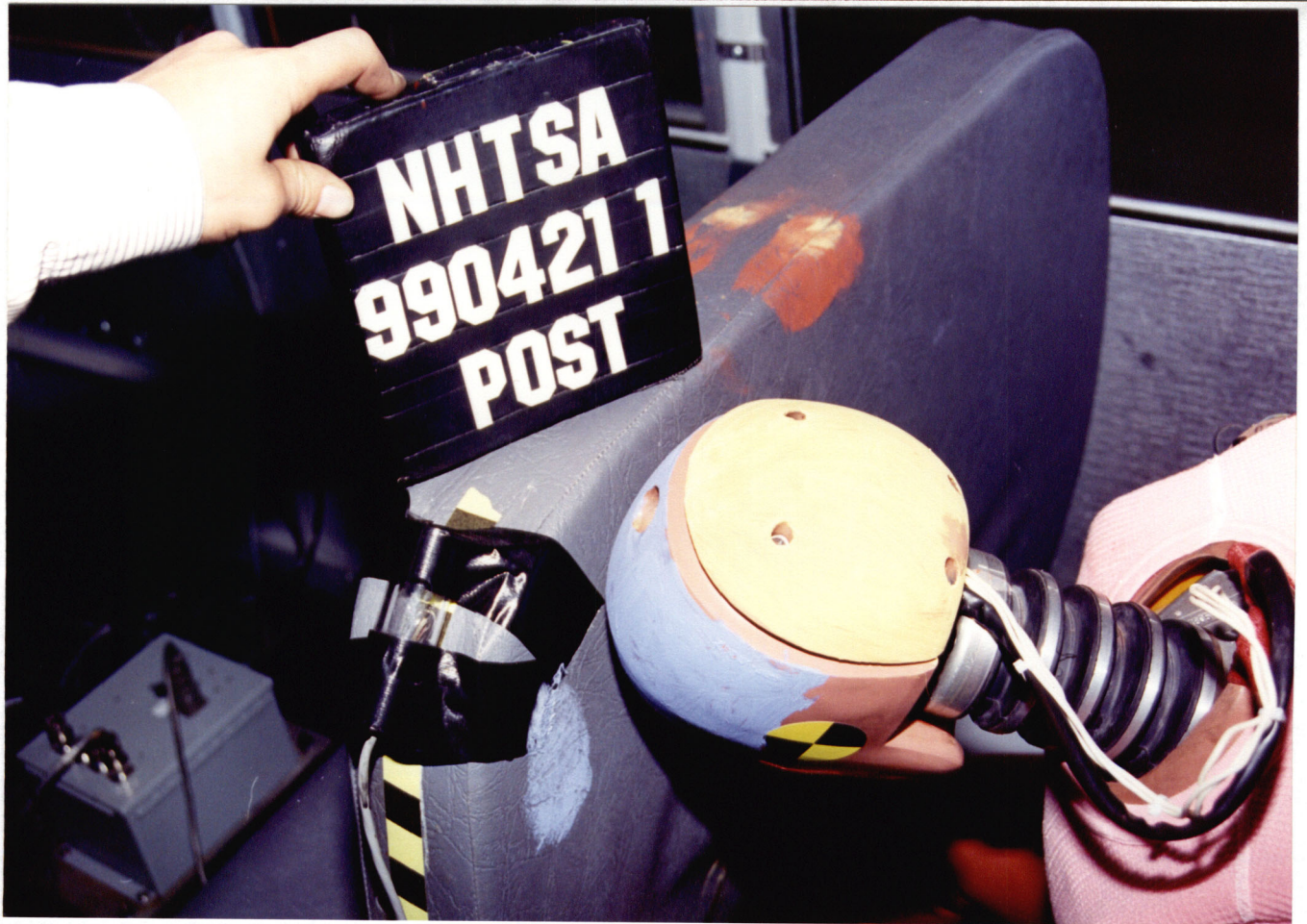


Figure A-64 Post-Test Right Side Seat 12 Instrumented 50th - View 3



Figure A-65 Post-Test Right Side Seat 12 Instrumented 50th - View 4

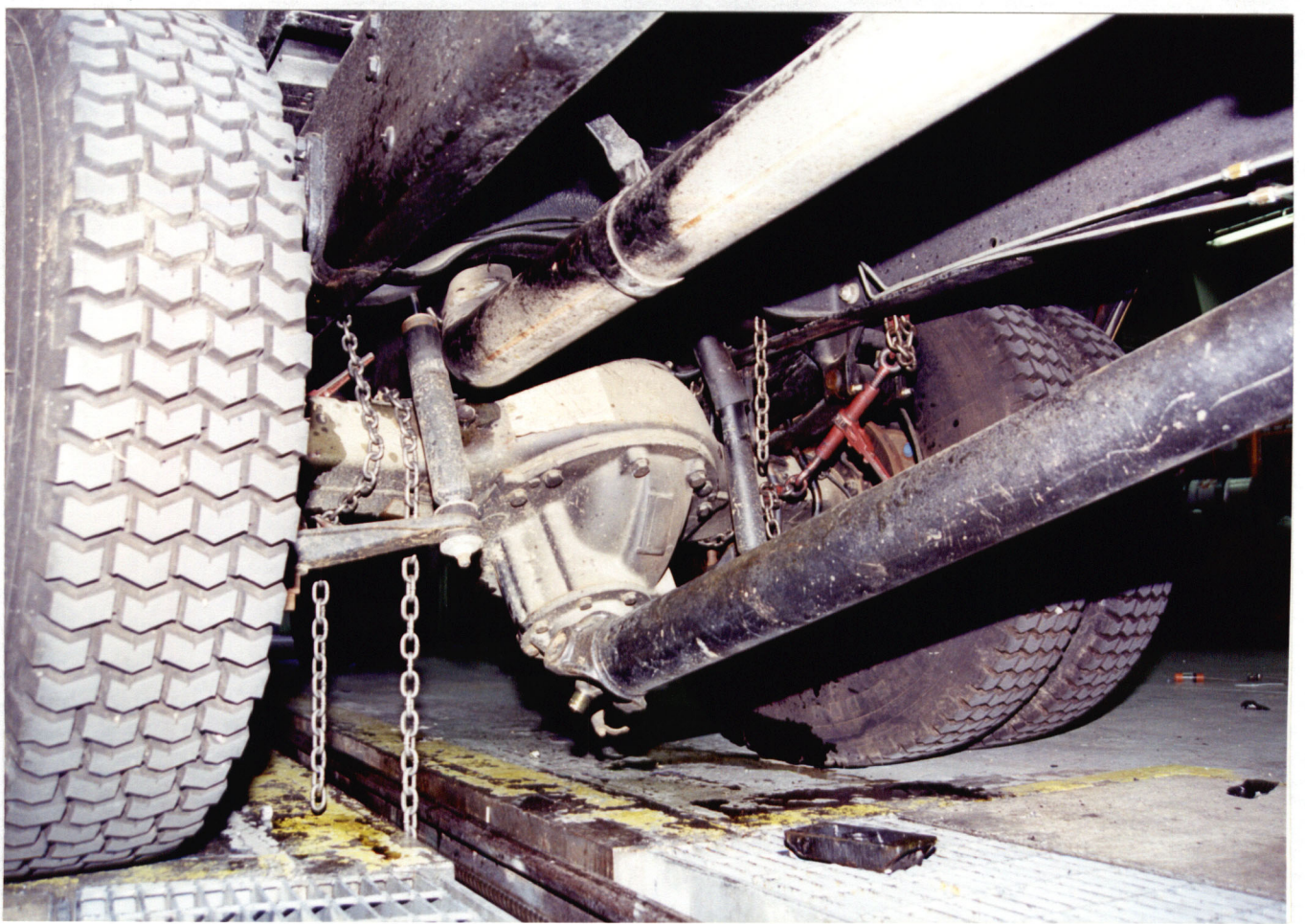


Figure A-66 Post-Test Miscellaneous Damage - View 1

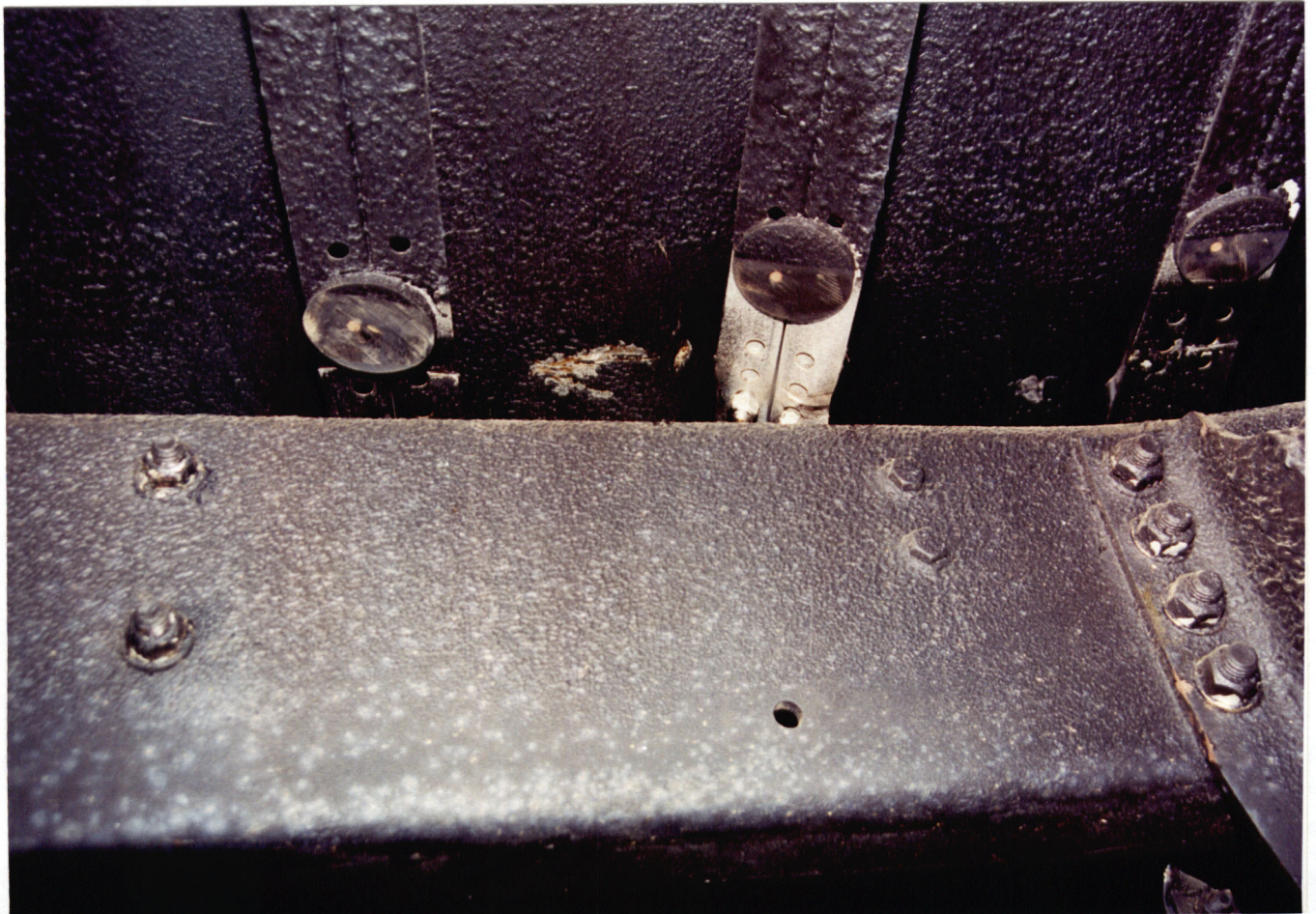


Figure A-67 Post-Test Miscellaneous Damage - View 2

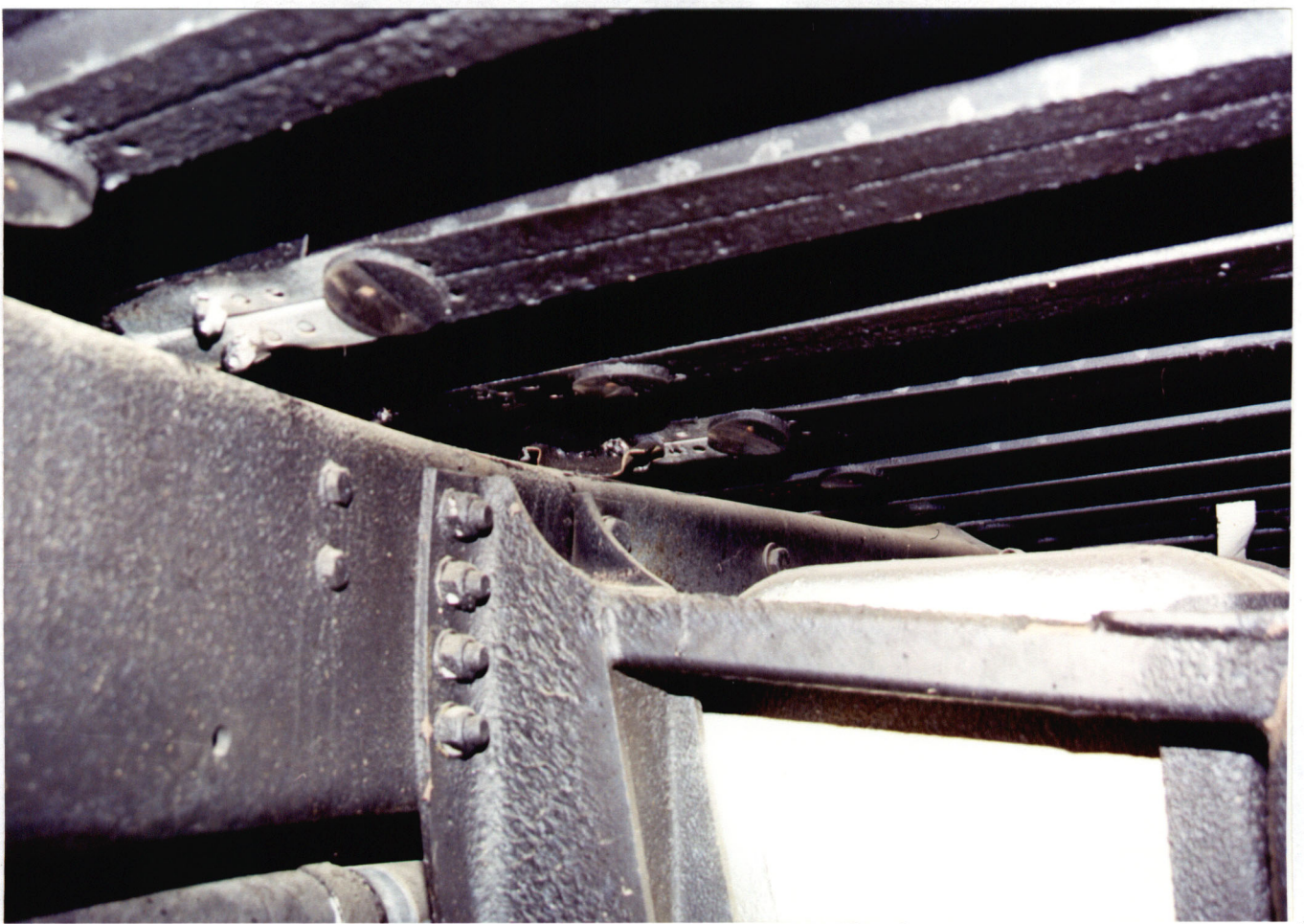


Figure A-68 Post-Test Miscellaneous Damage - View 3

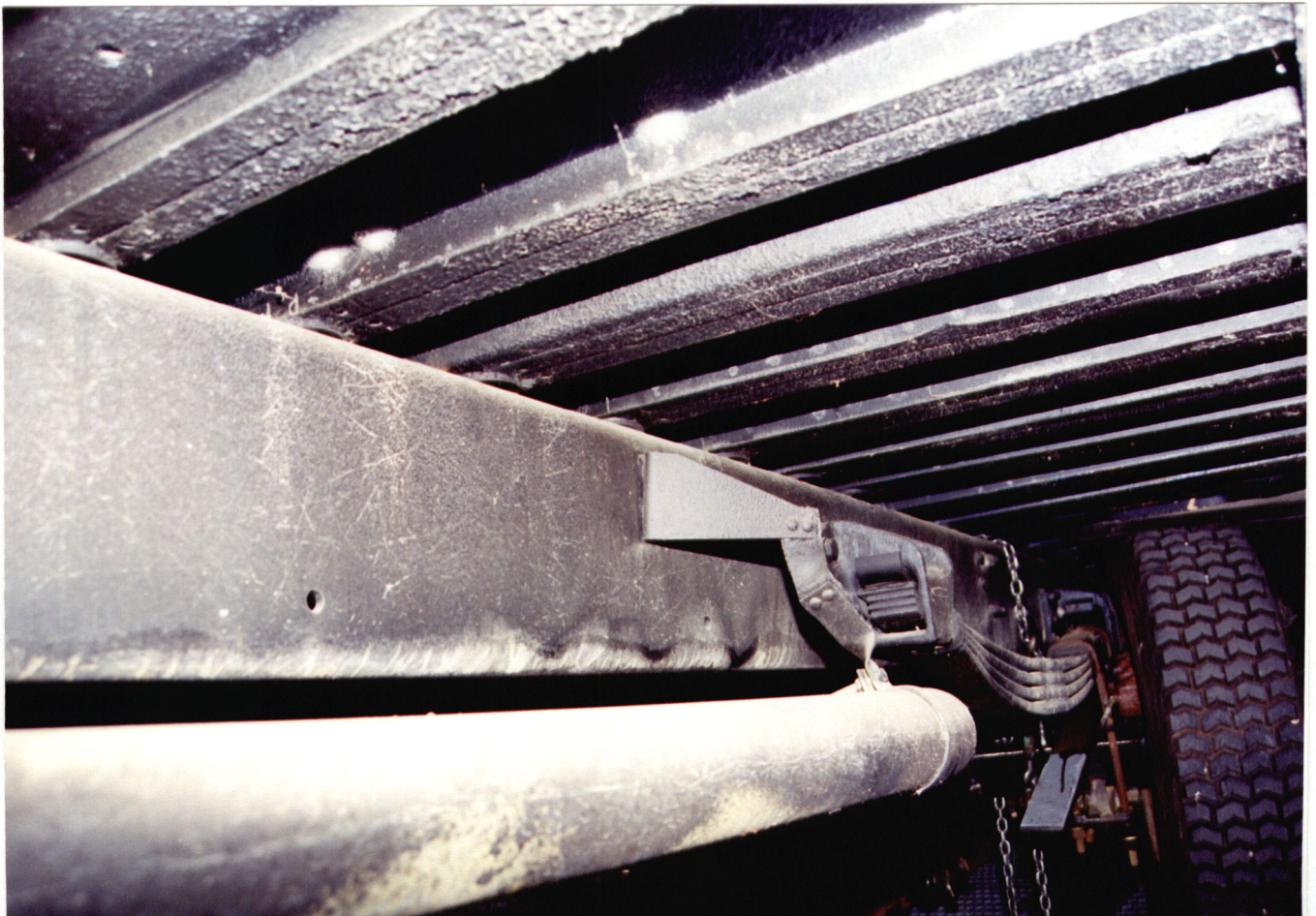


Figure A-69 Post-Test Miscellaneous Damage - View 4



Figure A-70 Post-Test Miscellaneous Damage - View 5

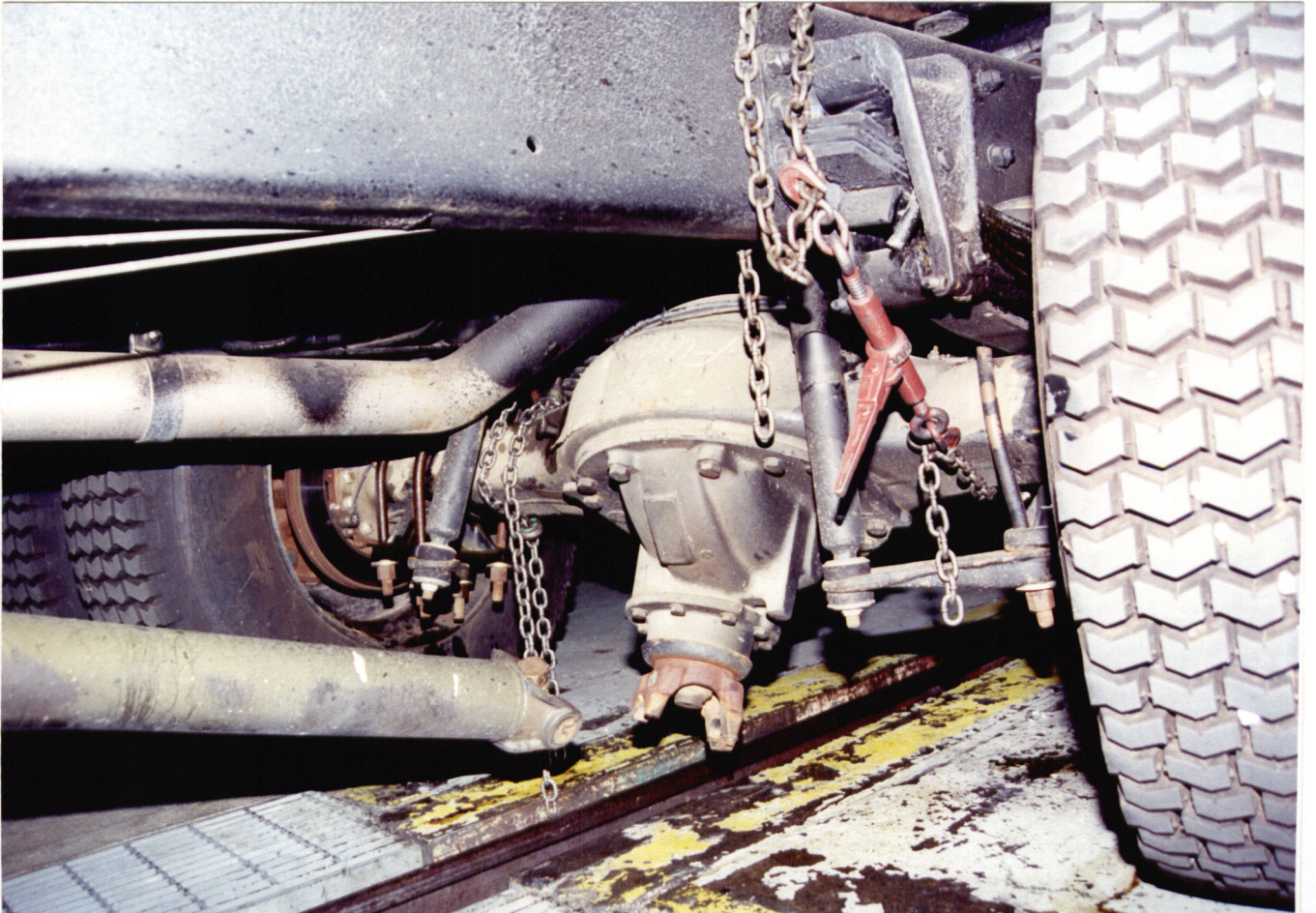


Figure A-71 Post-Test Miscellaneous Damage - View 6

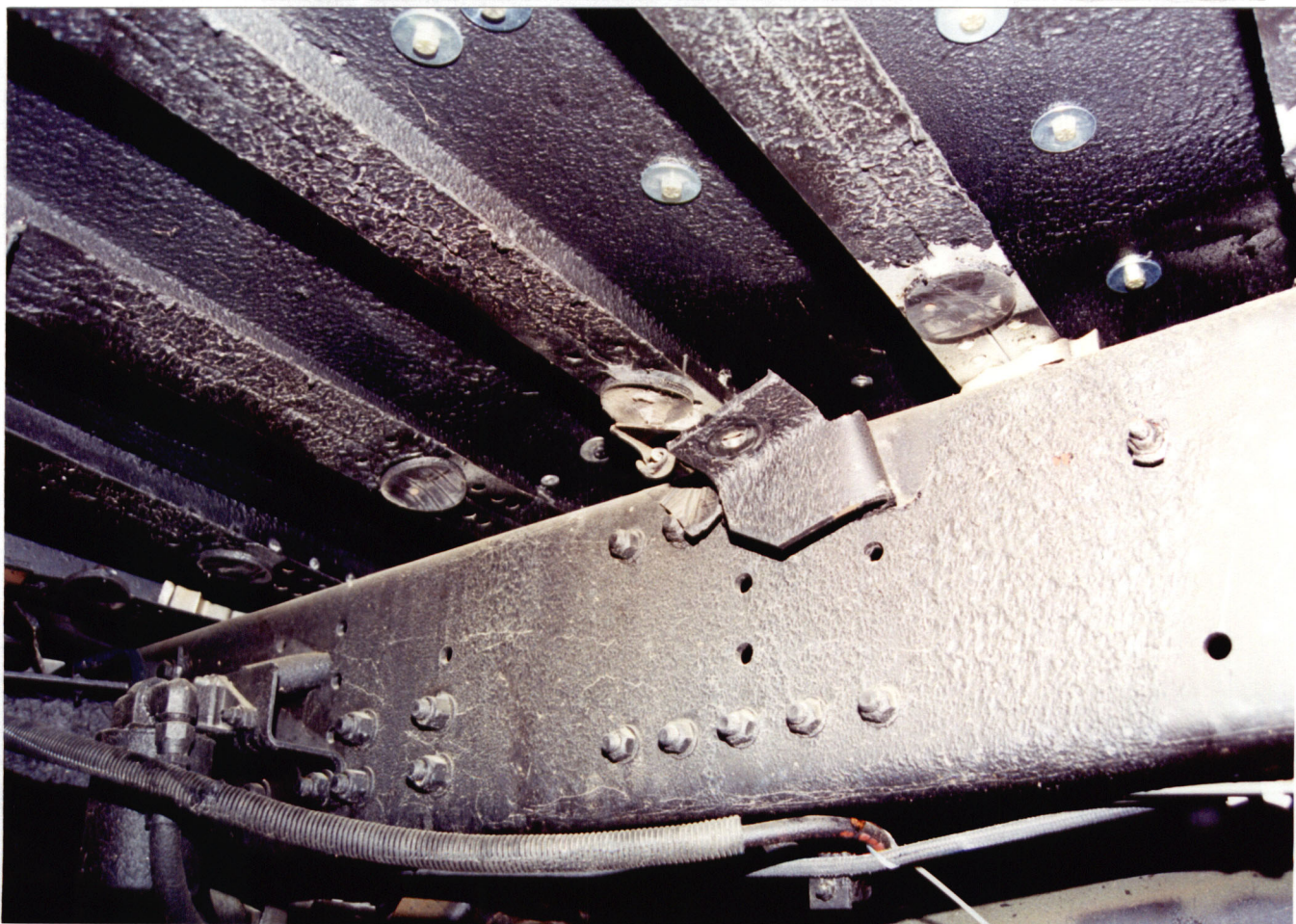


Figure A-72 Post-Test Miscellaneous Damage - View 7

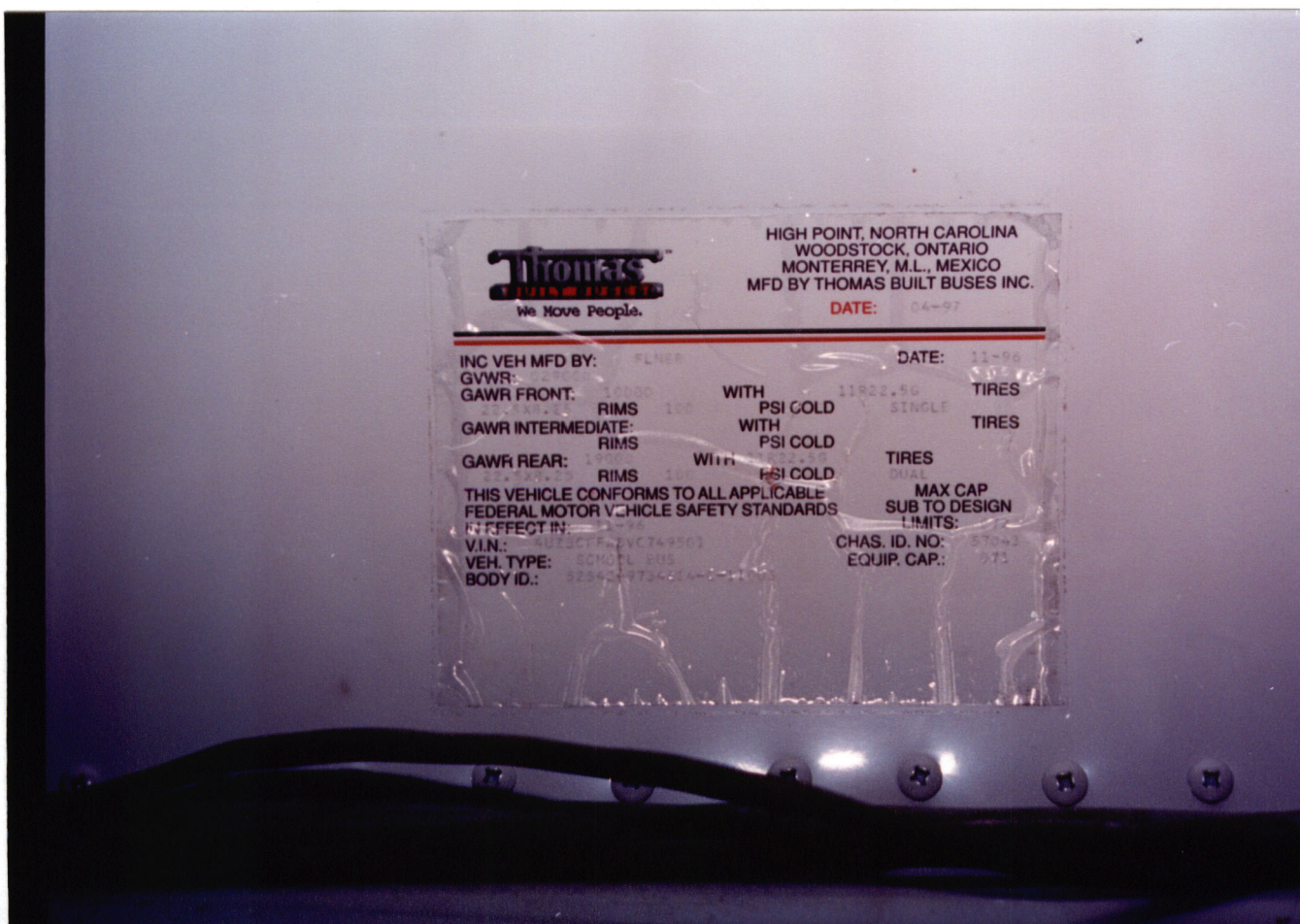


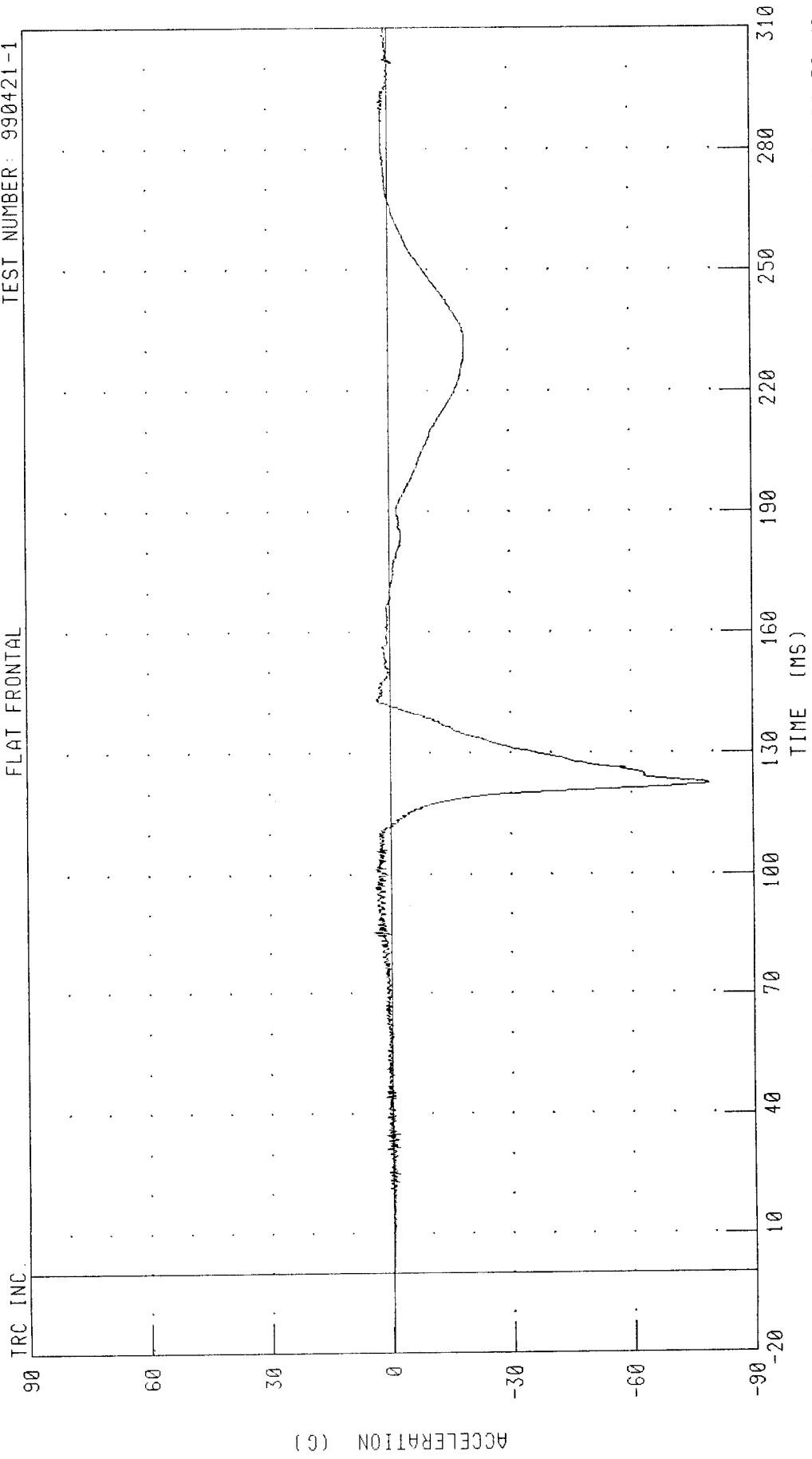
Figure A-73 Pre-Test Certification Label View

Appendix B

Data Plots

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 HEAD X-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1

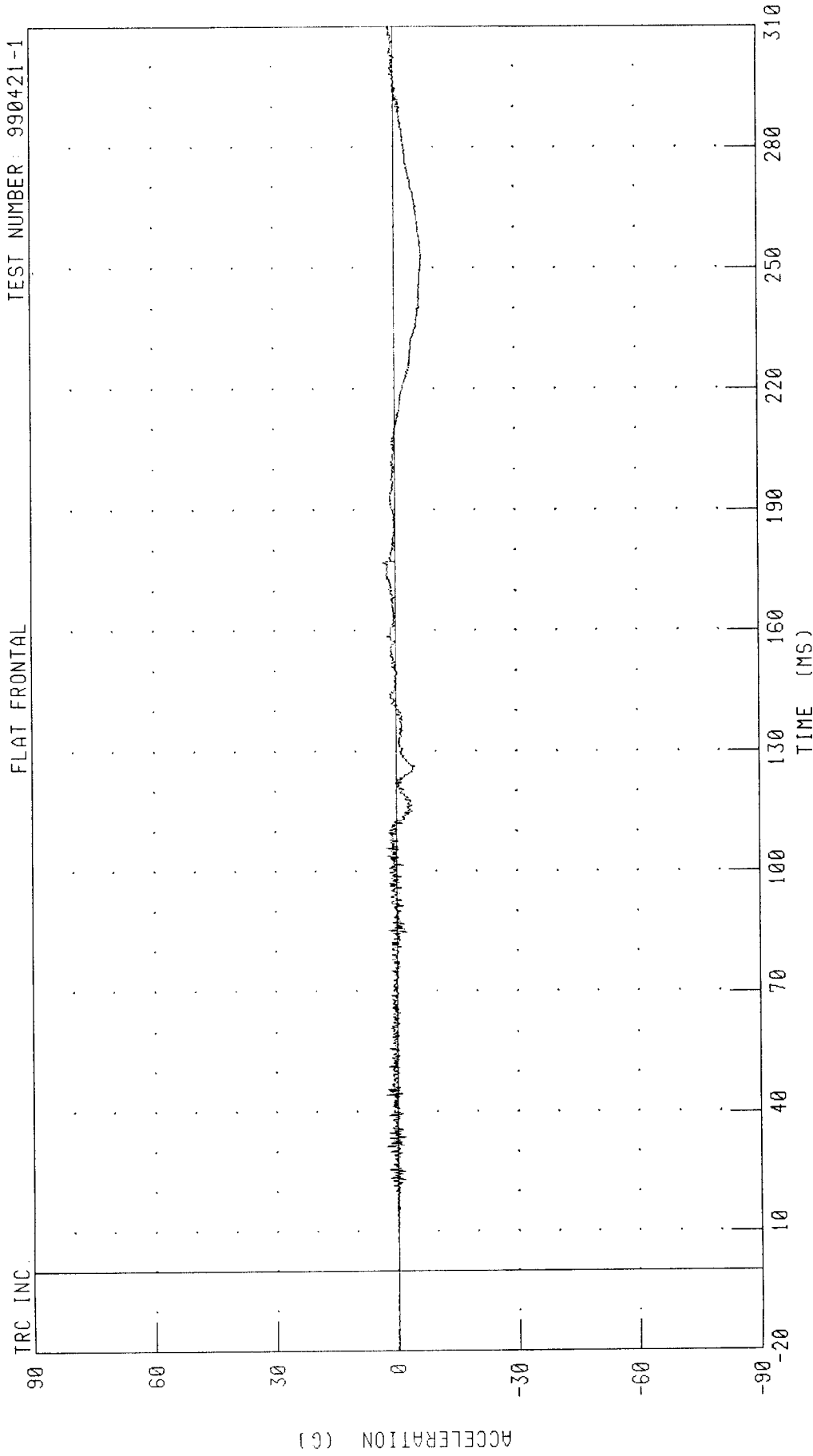


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000 PEAK DATA: 4.12 G @ 85.28 MS, -79.01 G @ 122.56 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 HEAD Y-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

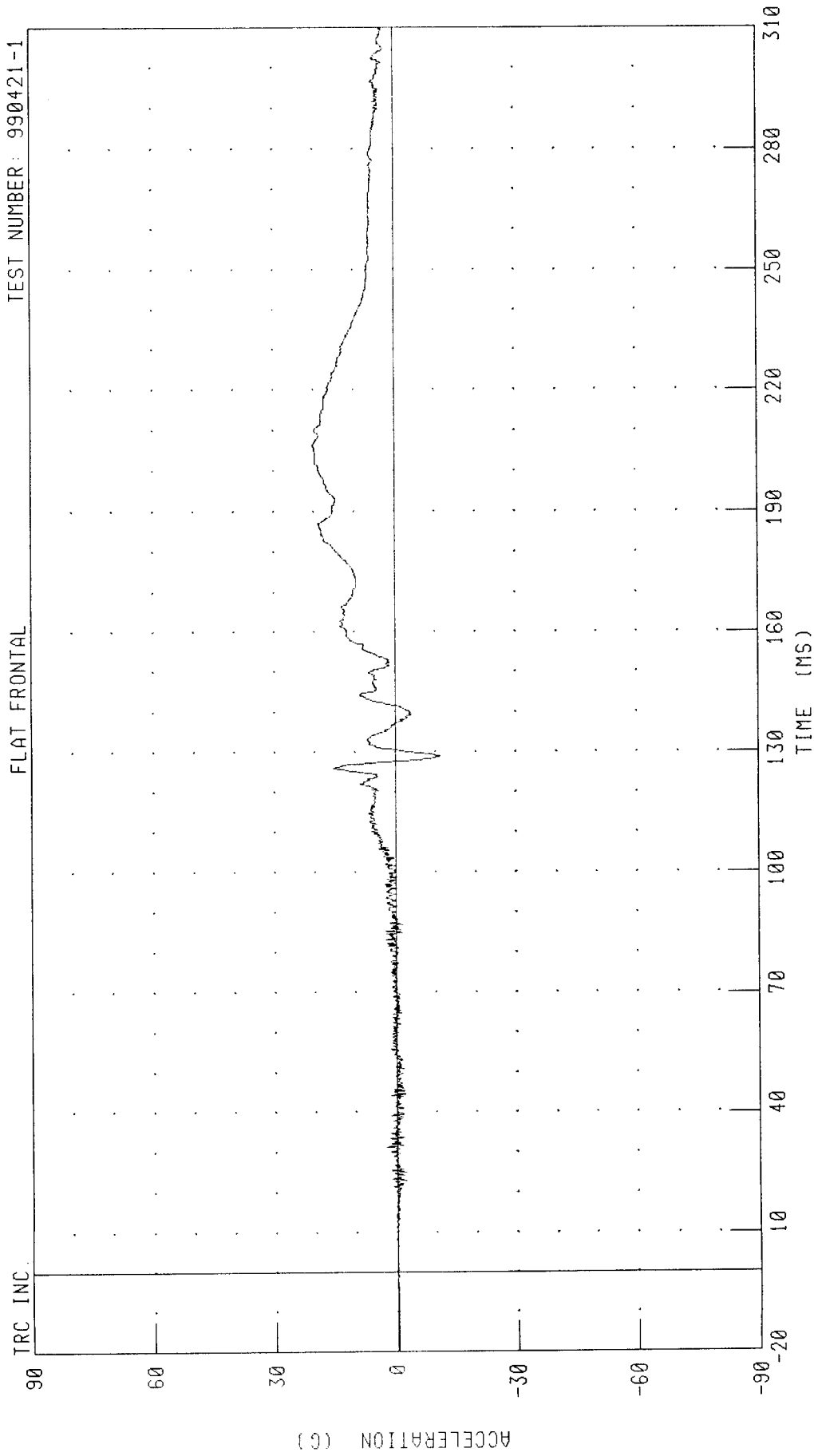


CHANNEL: HEDYG1 FILTER: CH. CLASS 1000 PEAK DATA: 2.85 G @ 177.04 MS; -6.93 G @ 250.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 HEAD Z-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

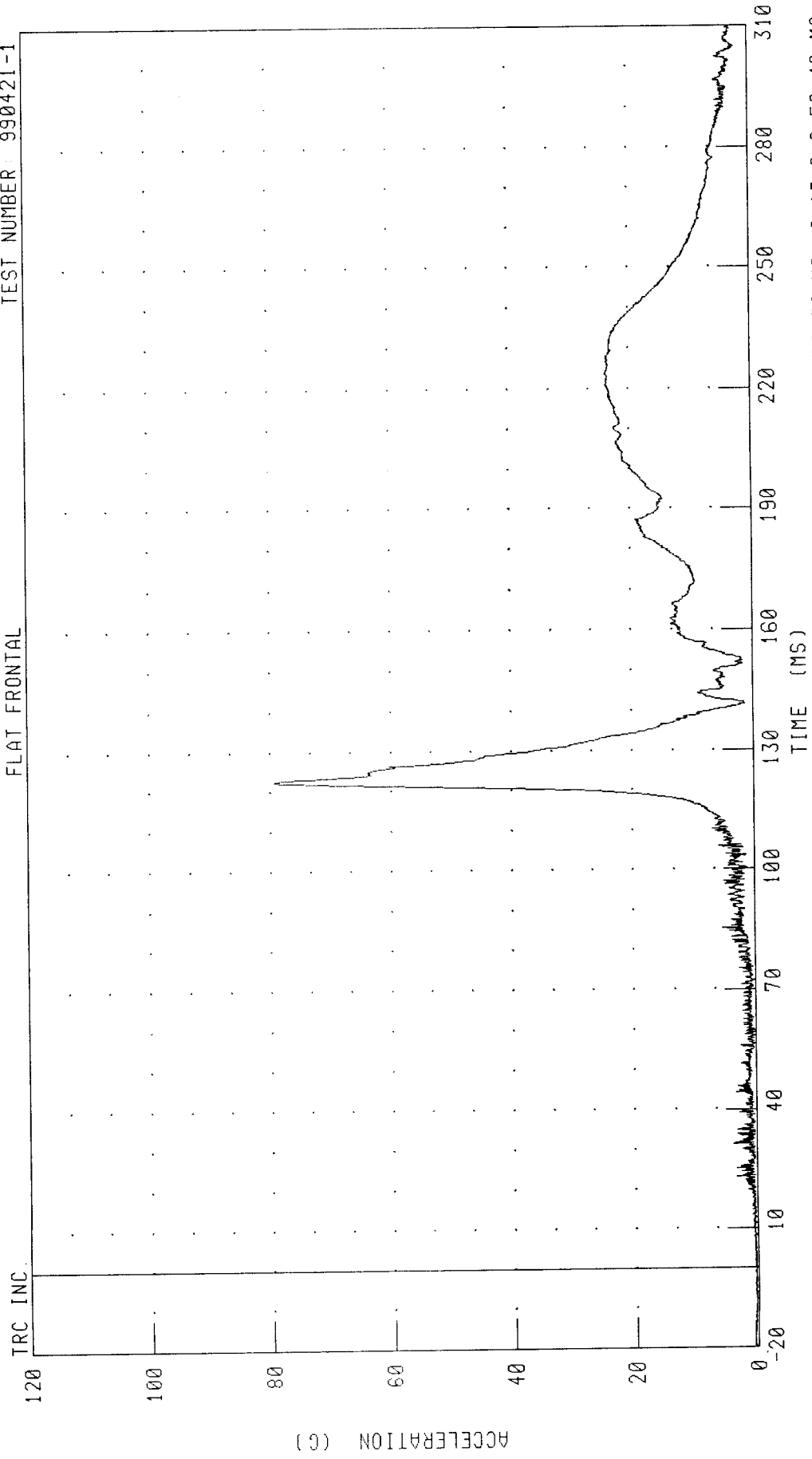


CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 20.18 G @ 206.00 MS; -11.17 G @ 128.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 HEAD RESULTANT ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1

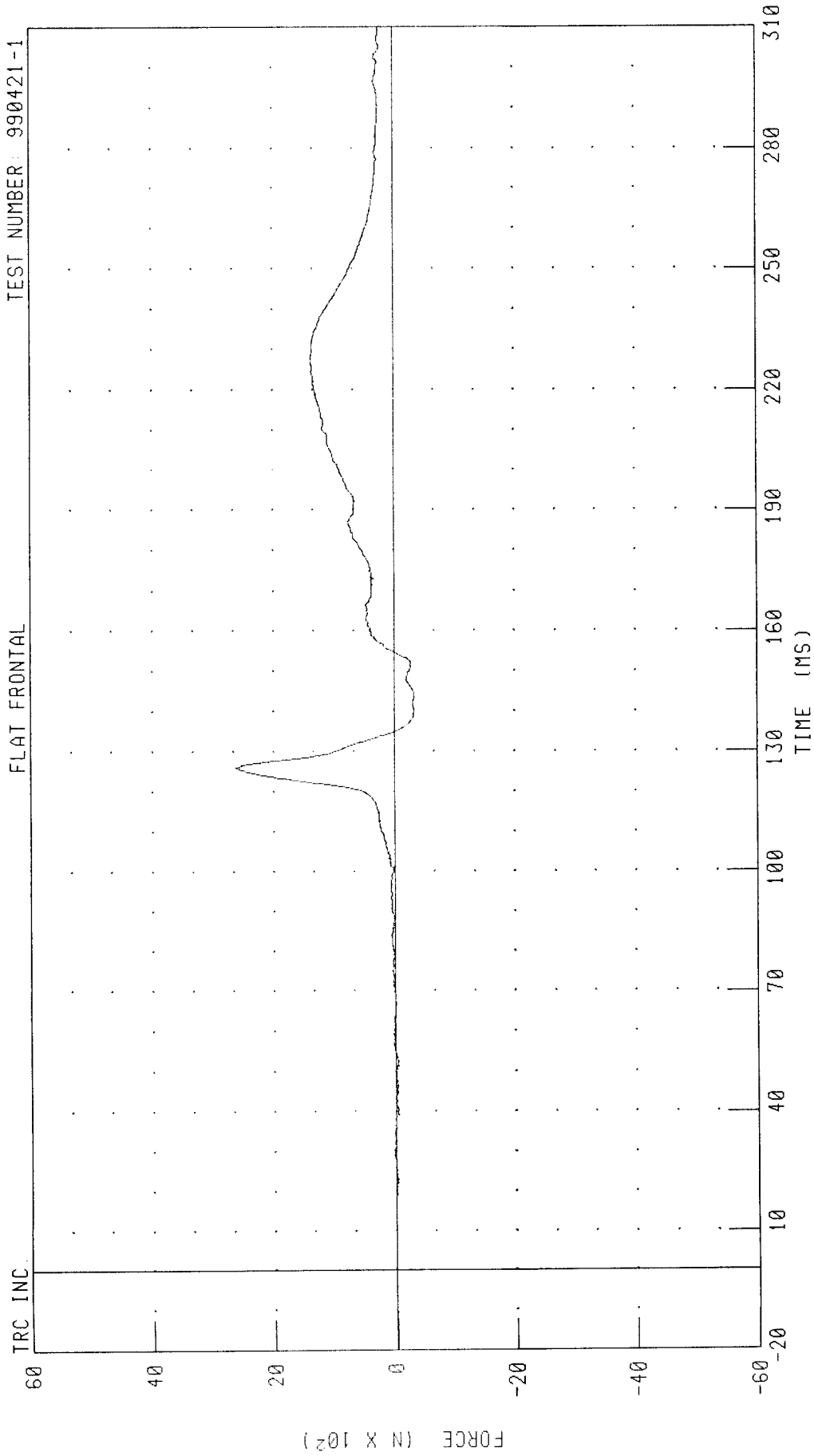


CHANNEL: HEDRC1 FILTER: CH. CLASS 1000 PEAK DATA: 79.40 G @ 122.56 MS; 0.13 G @ 56.40 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 NECK Z-AXIS AXIAL FORCE

TEST NUMBER: 990421-1

FLAT FRONTAL



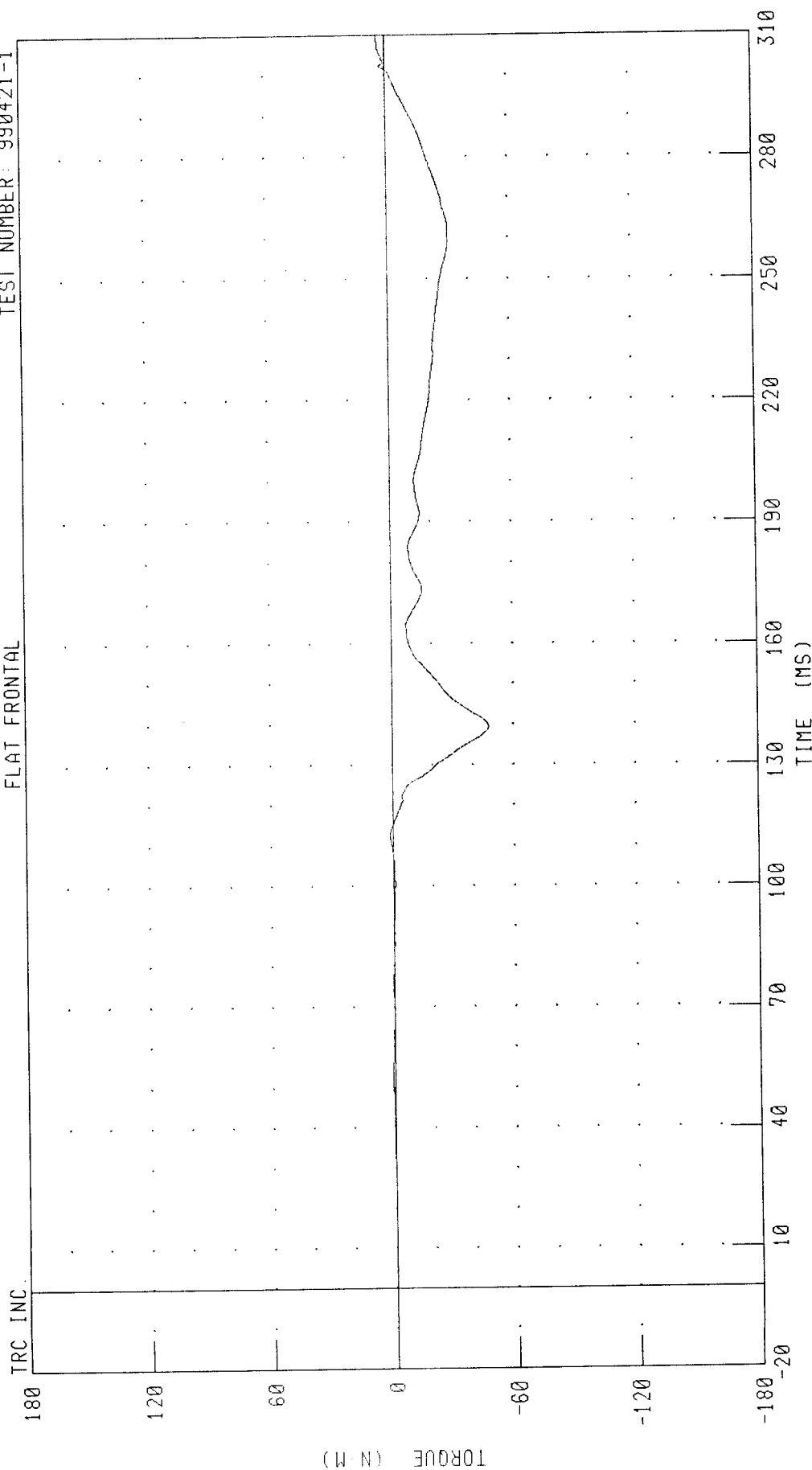
CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

PEAK DATA: 2621.70 N @ 126.08 MS; -338.13 N @ 143.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 NECK MOMENT ABOUT X AXIS

TEST NUMBER: 990421-1

FLAT FRONTAL

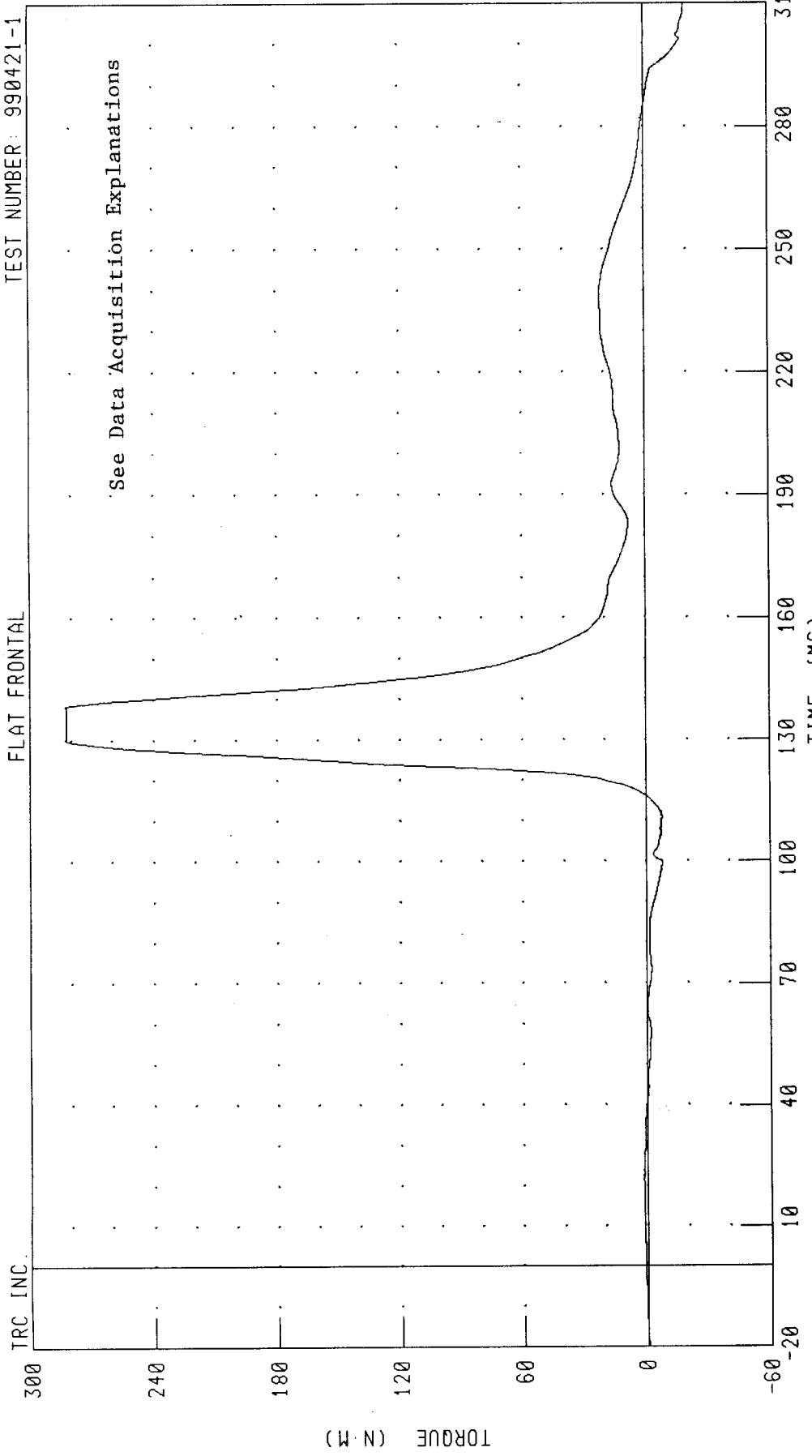


PEAK DATA: 3.86 N·M @ 309.76 MS; -47.92 N·M @ 139.60 MS

CHANNEL: NEKX1 FILTER: CH. CLASS 600

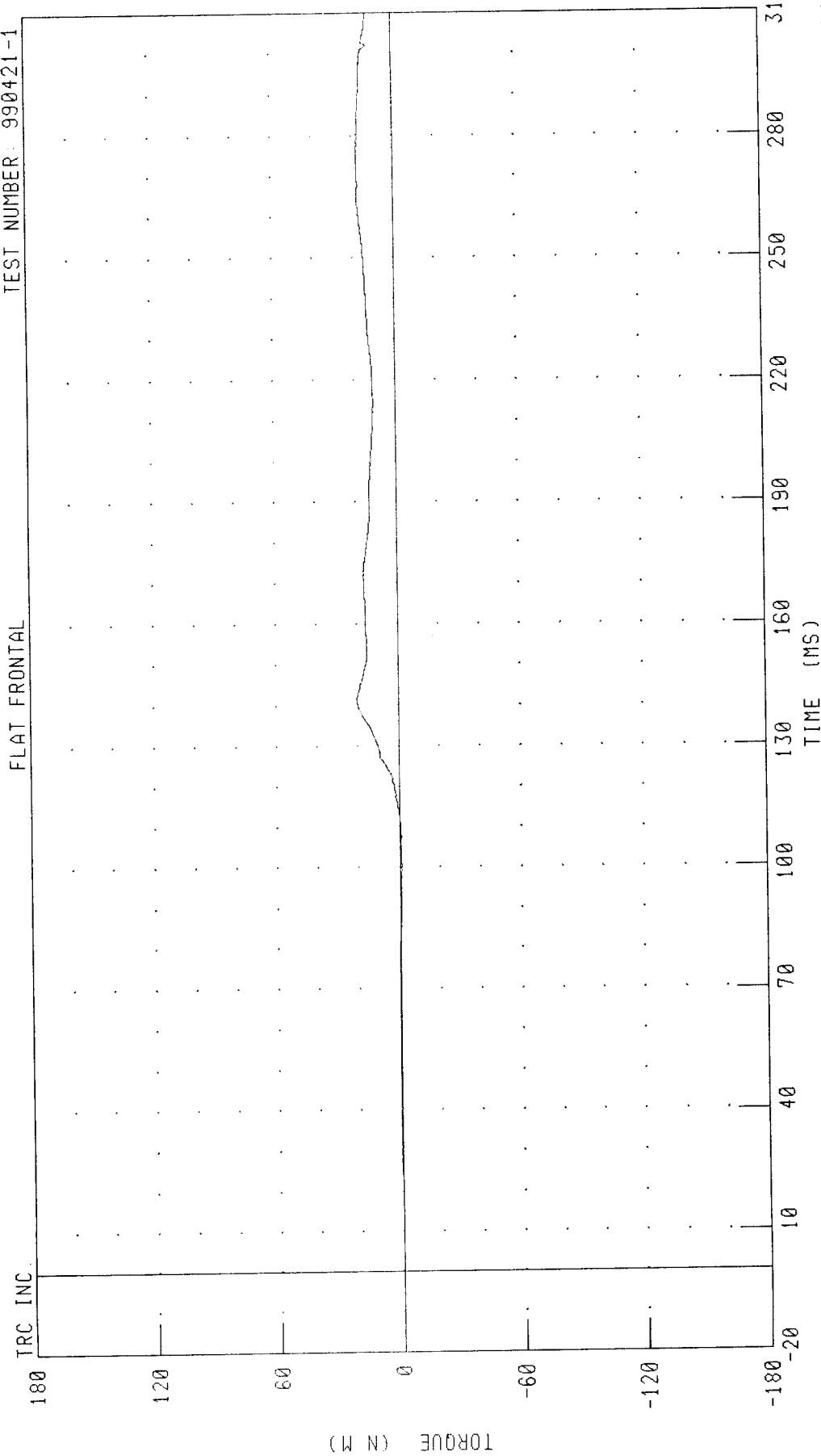
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 990421-1



1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 NECK MOMENT ABOUT Z AXIS

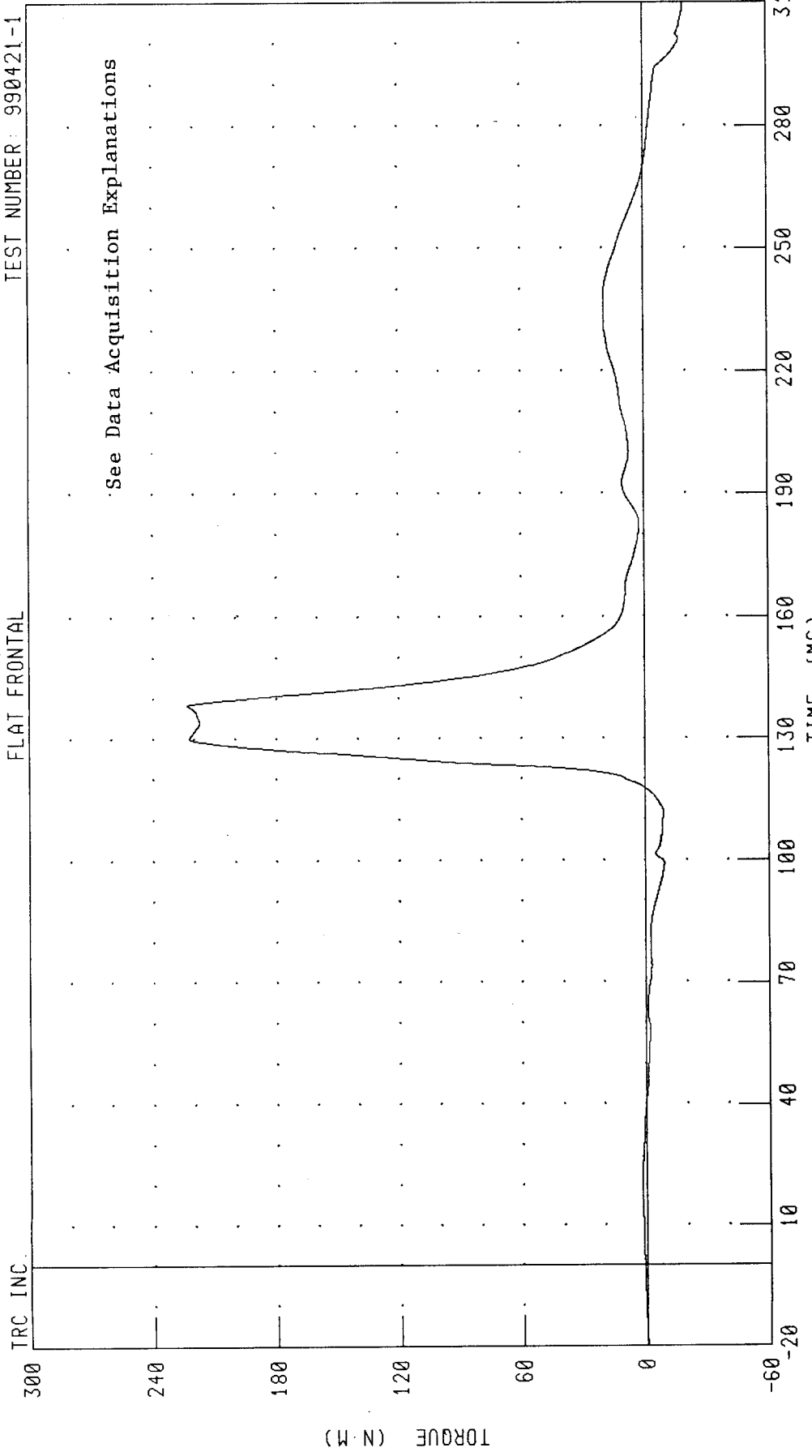
TEST NUMBER: 990421-1



CHANNEL: NEKZM1 FILTER: CH CLASS 600 PEAK DATA: 20.09 N.M @ 141.52 MS, -1.14 N.M @ 99.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 NECK OCCIPITAL CONDYLE

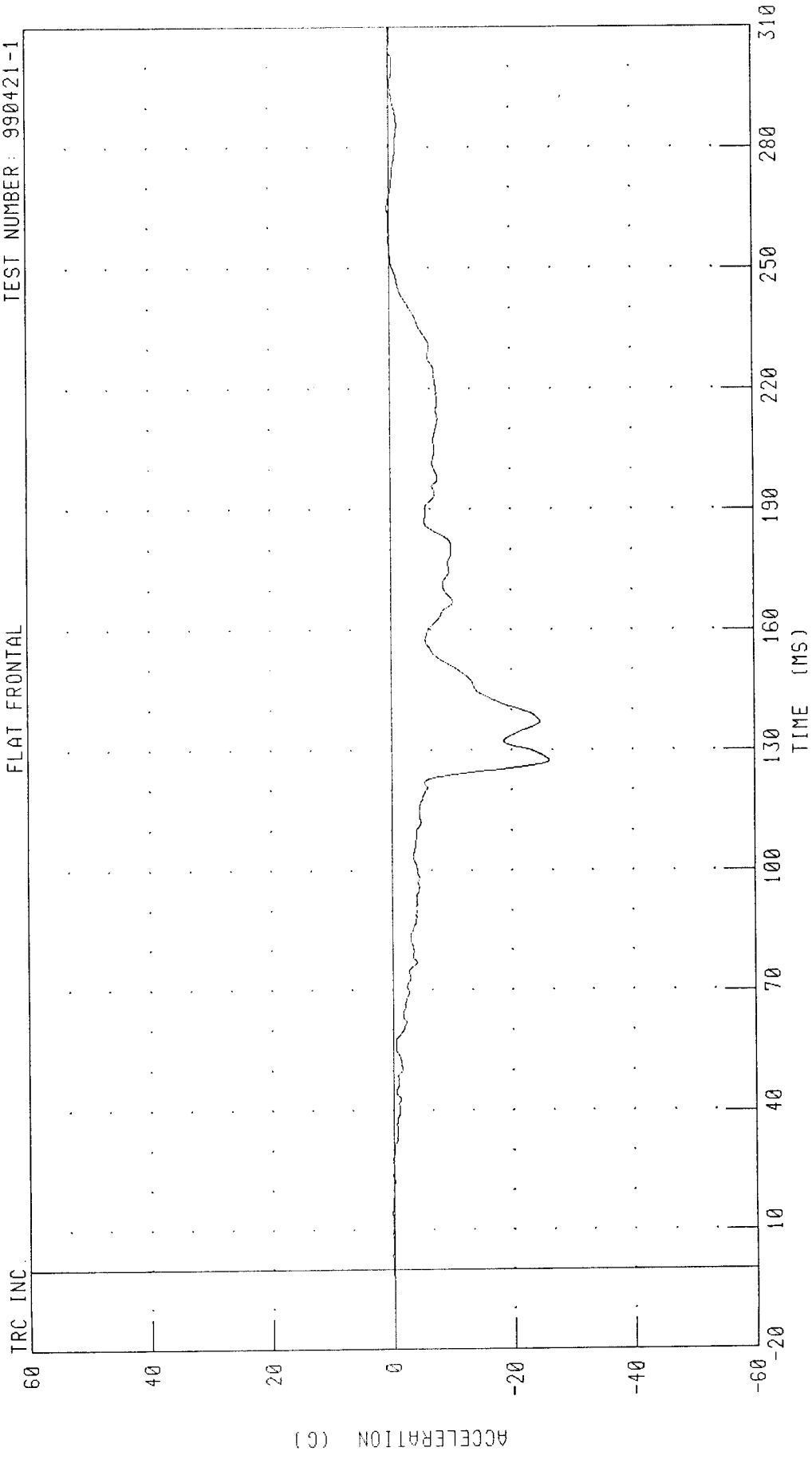
TEST NUMBER: 990421-1



CHANNEL: NEK0M1 FILTER: CH. CLASS 600 PEAK DATA: 223.57 N·M @ 138.40 MS; -19.42 N·M @ 309.60 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 CHEST X-AXIS ACCELERATION
FLAT FRONTAL

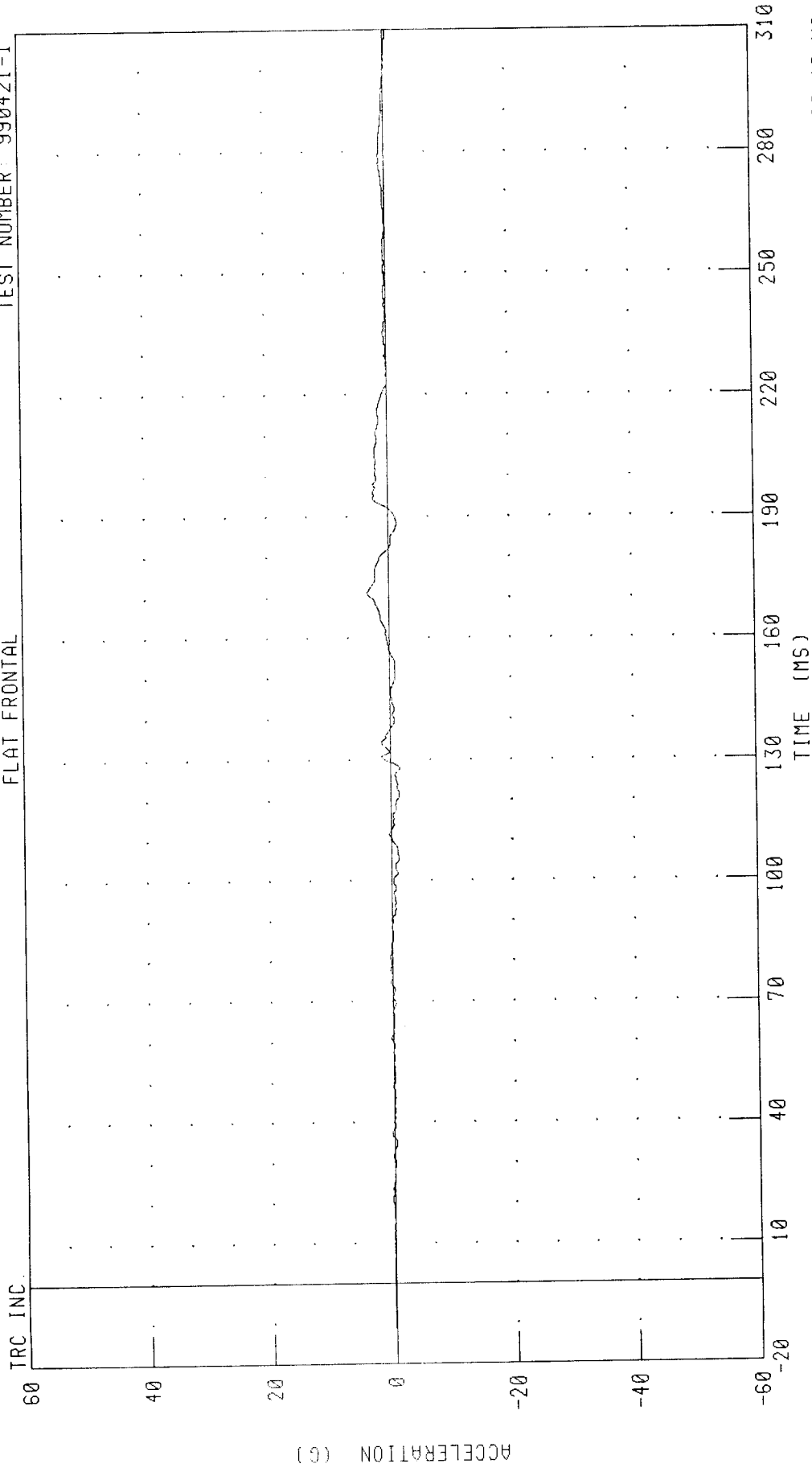
TEST NUMBER: 990421-1



CHANNEL: CSTXG1 FILTER: CH. CLASS 180 PEAK DATA: 0.22 G @ 14.24 MS; -26.16 G @ 127.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 CHEST Y-AXIS ACCELERATION
FLAT FRONTAL

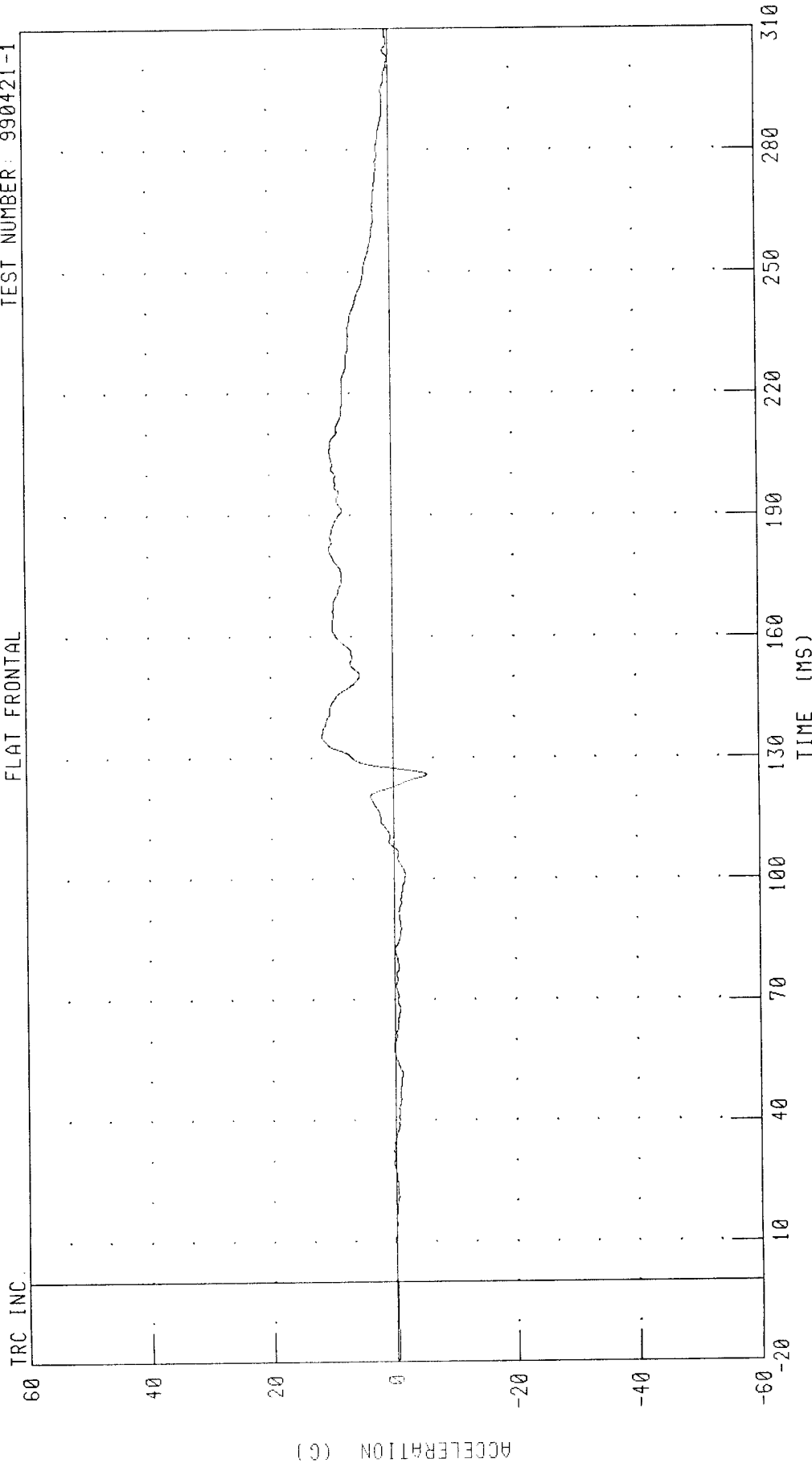
TEST NUMBER: 990421-1



CHANNEL: CSTYG1 FILTER: CH. CLASS 180
PEAK DATA: 3.43 G @ 171.20 MS; -1.61 G @ 128.16 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 CHEST Z-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1

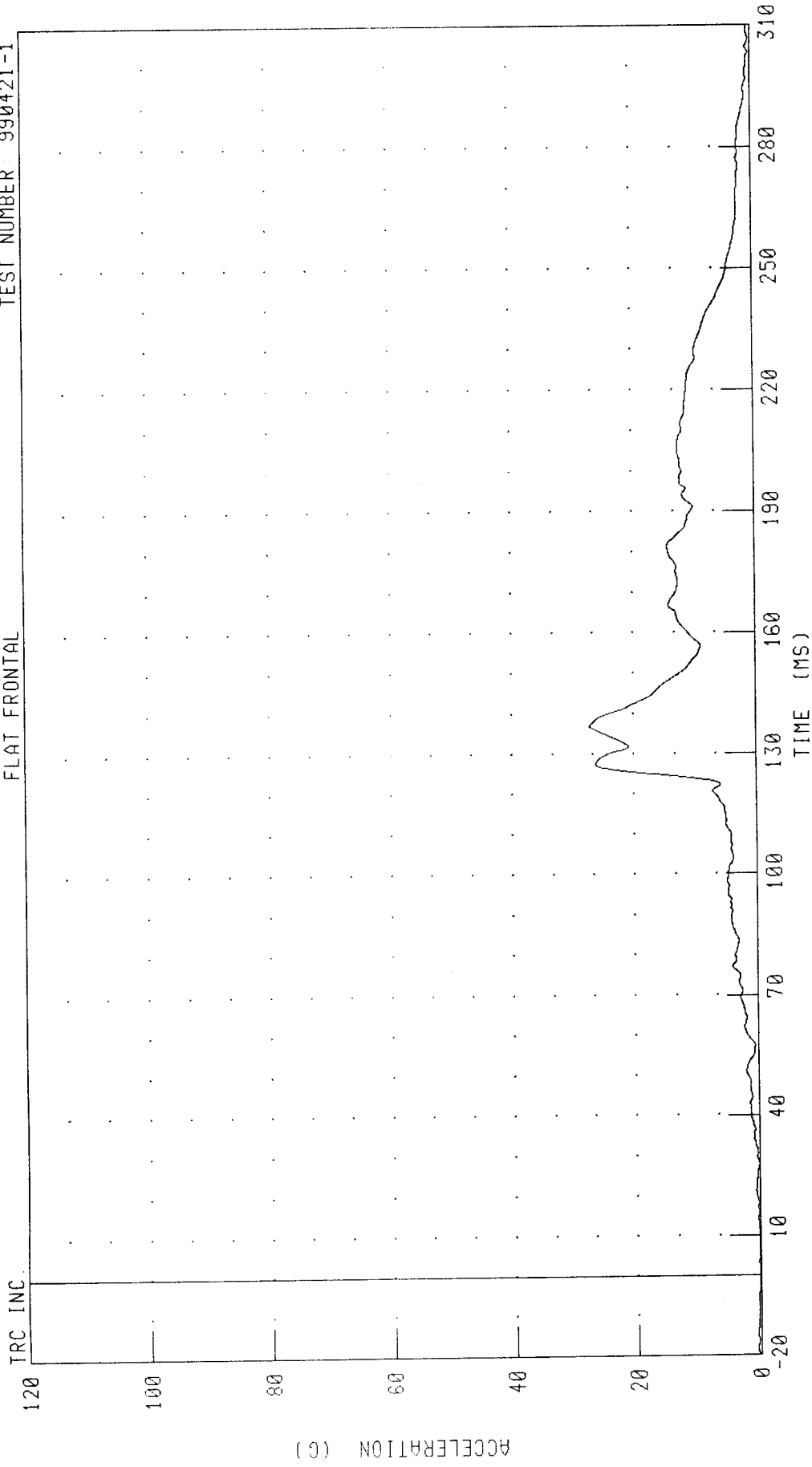


CHANNEL: CSTZG1 FILTER: CH CLASS 180 PEAK DATA: 11.68 G @ 135.28 MS; -5.60 G @ 126.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 CHEST RESULTANT ACCELERATION

TEST NUMBER 990421-1

FLAT FRONTAL



PEAK DATA: 27.18 G @ 137.12 MS; 0.03 G @ -20.00 MS

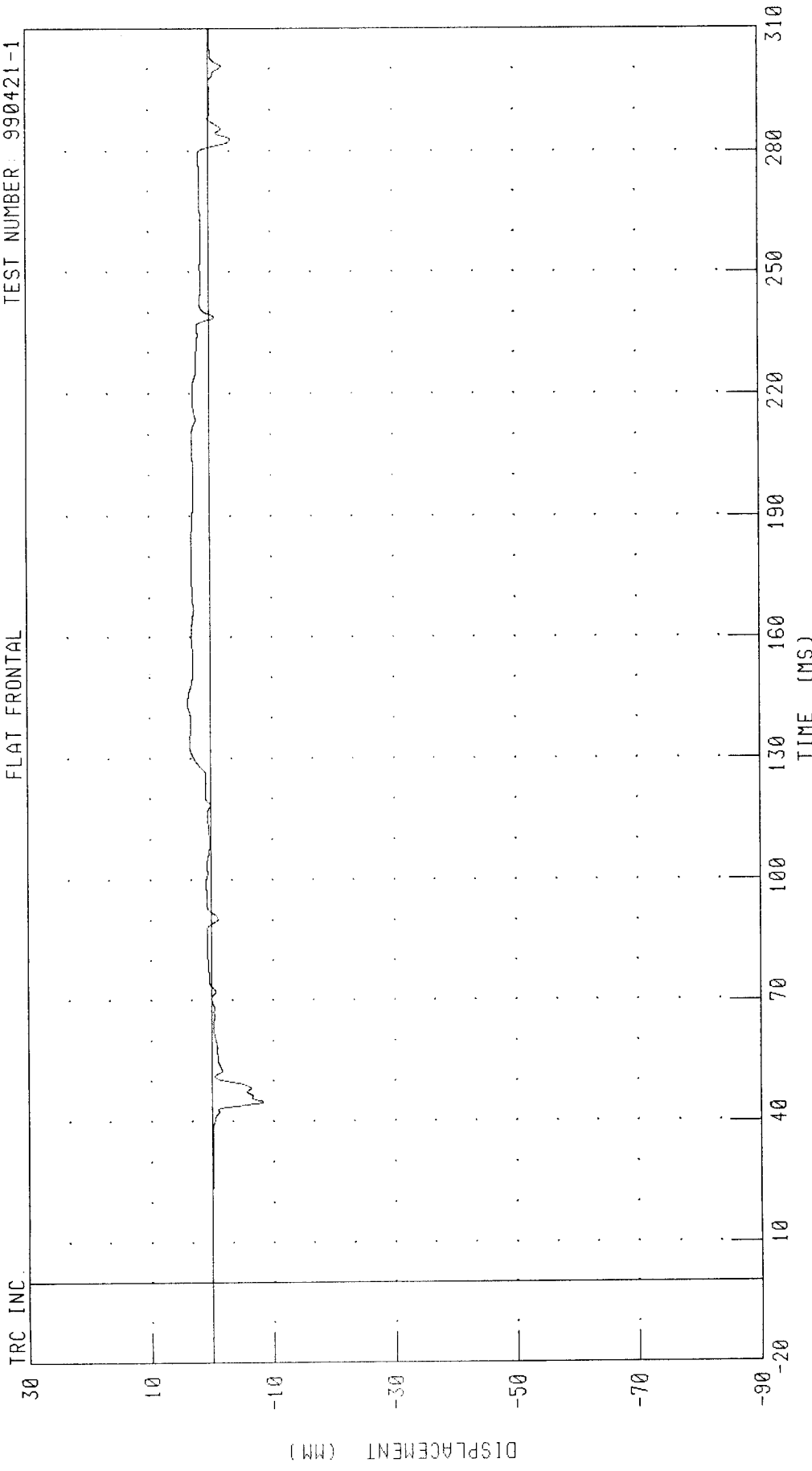
CHANNEL: CSTRG1 FILTER: CH. CLASS 180

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 1 CHEST DEFLECTION

FLAT FRONTAL

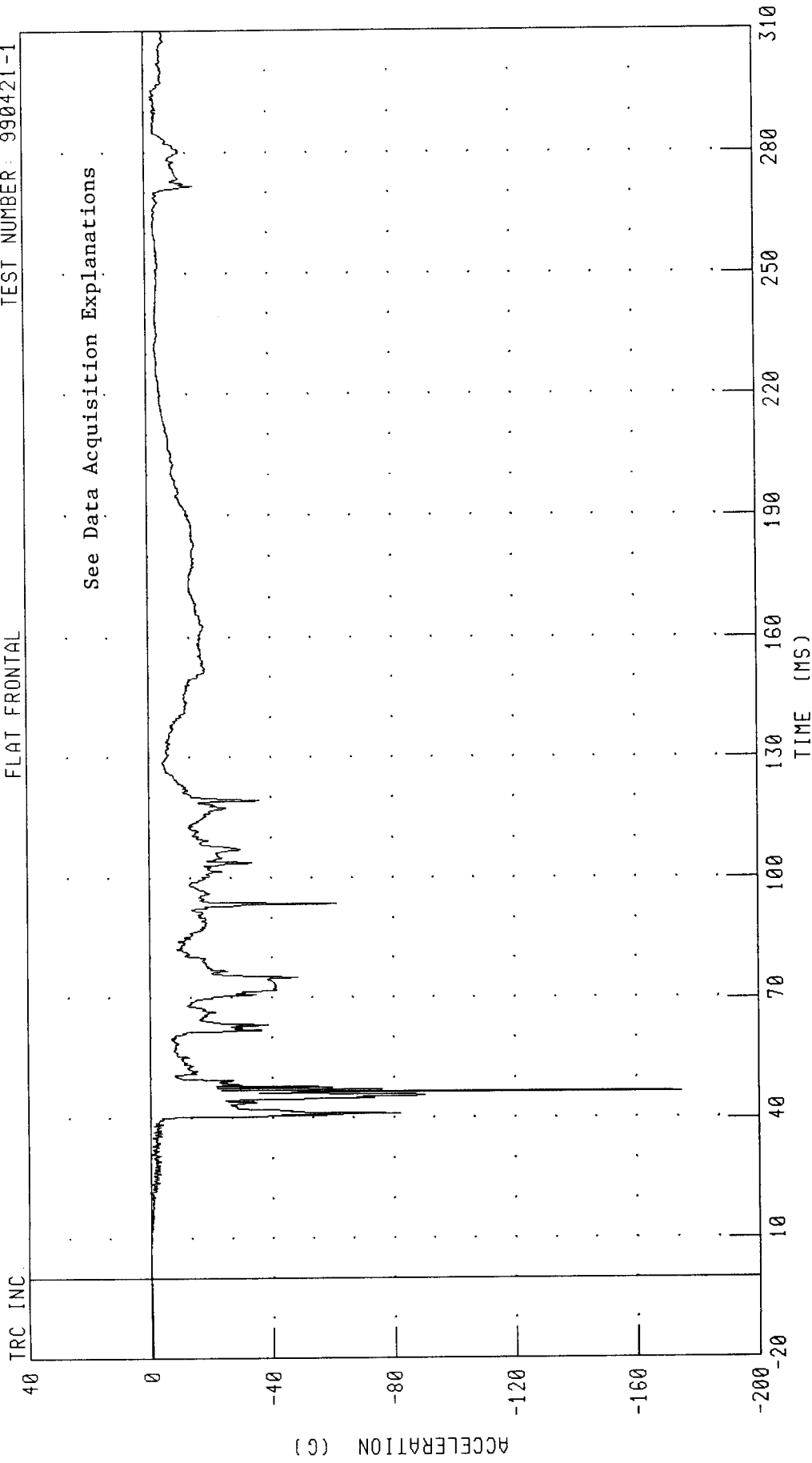
TEST NUMBER: 990421-1



CHANNEL: CSTXD1 FILTER: CH. CLASS 180 PEAK DATA: 3.80 MM @ 143.76 MS; -8.27 MM @ 44.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 PELVIS X-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1

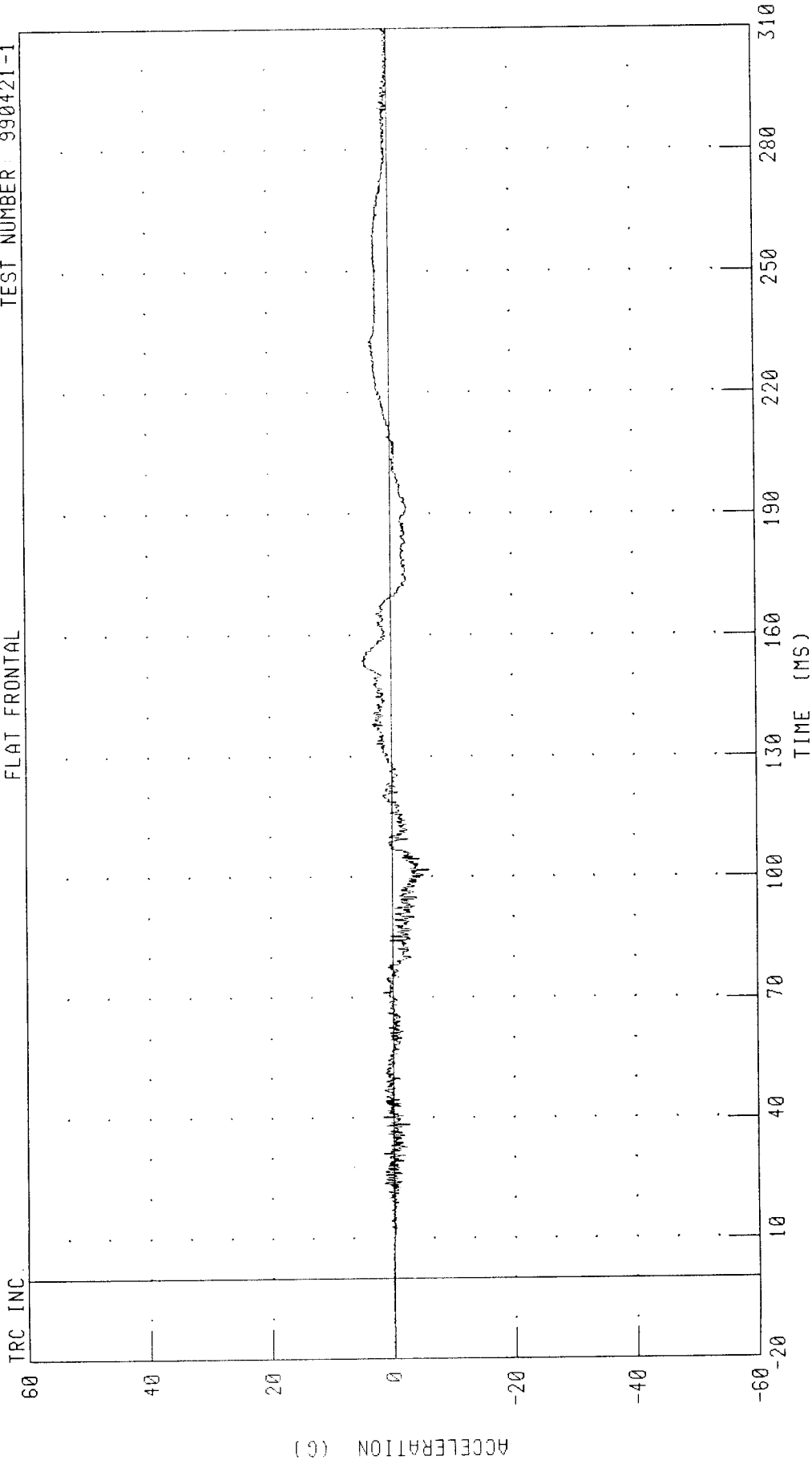


CHANNEL: PEYXG1 FILTER: CH. CLASS 1000

PEAK DATA: 0.52 G @ 21.52 MS; -174.79 G @ 46.64 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 PELVIS Y-AXIS ACCELERATION

TEST NUMBER 990421-1



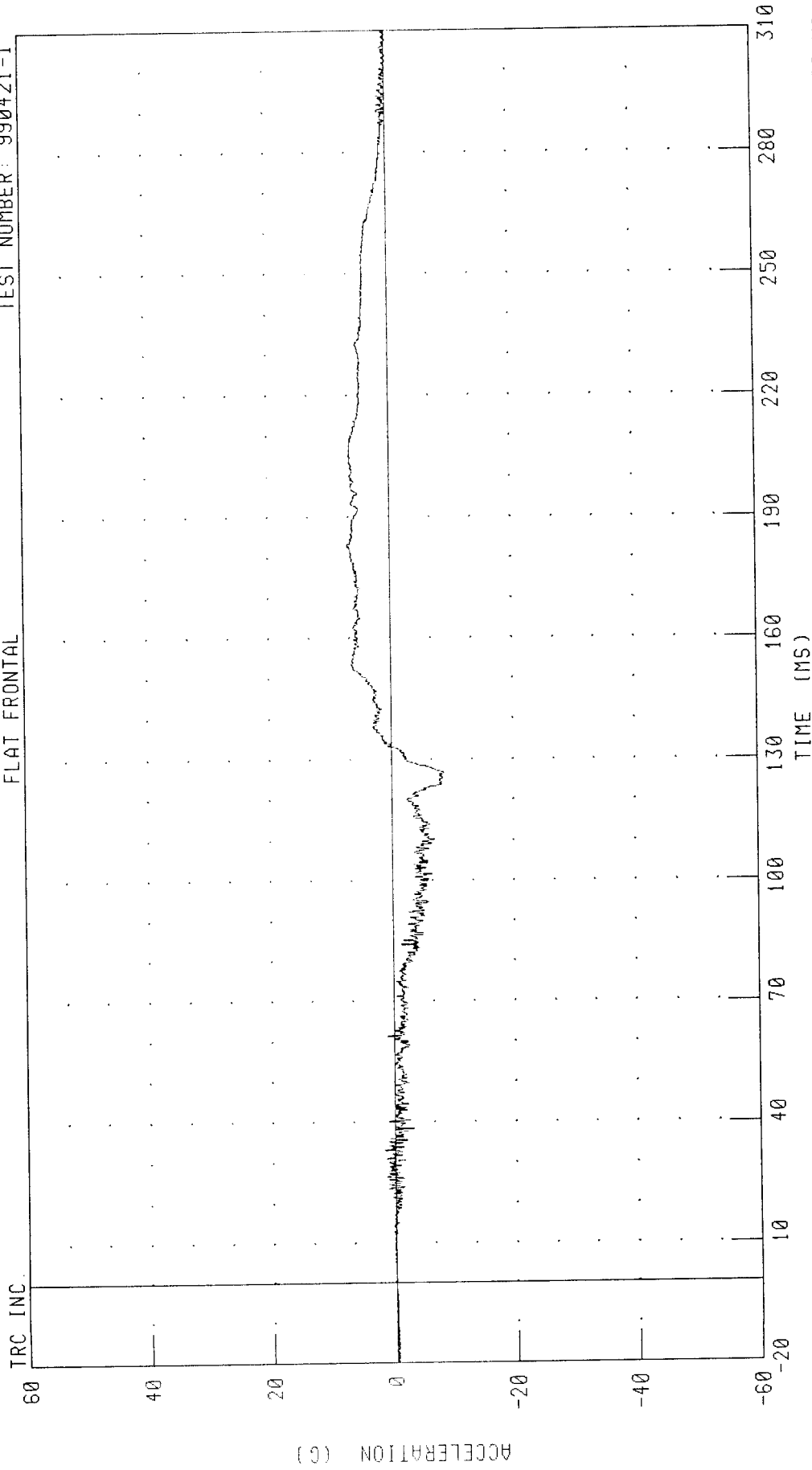
CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

PEAK DATA: 4.65 C @ 153.68 MS; -6.28 G @ 101.84 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 PELVIS Z-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL



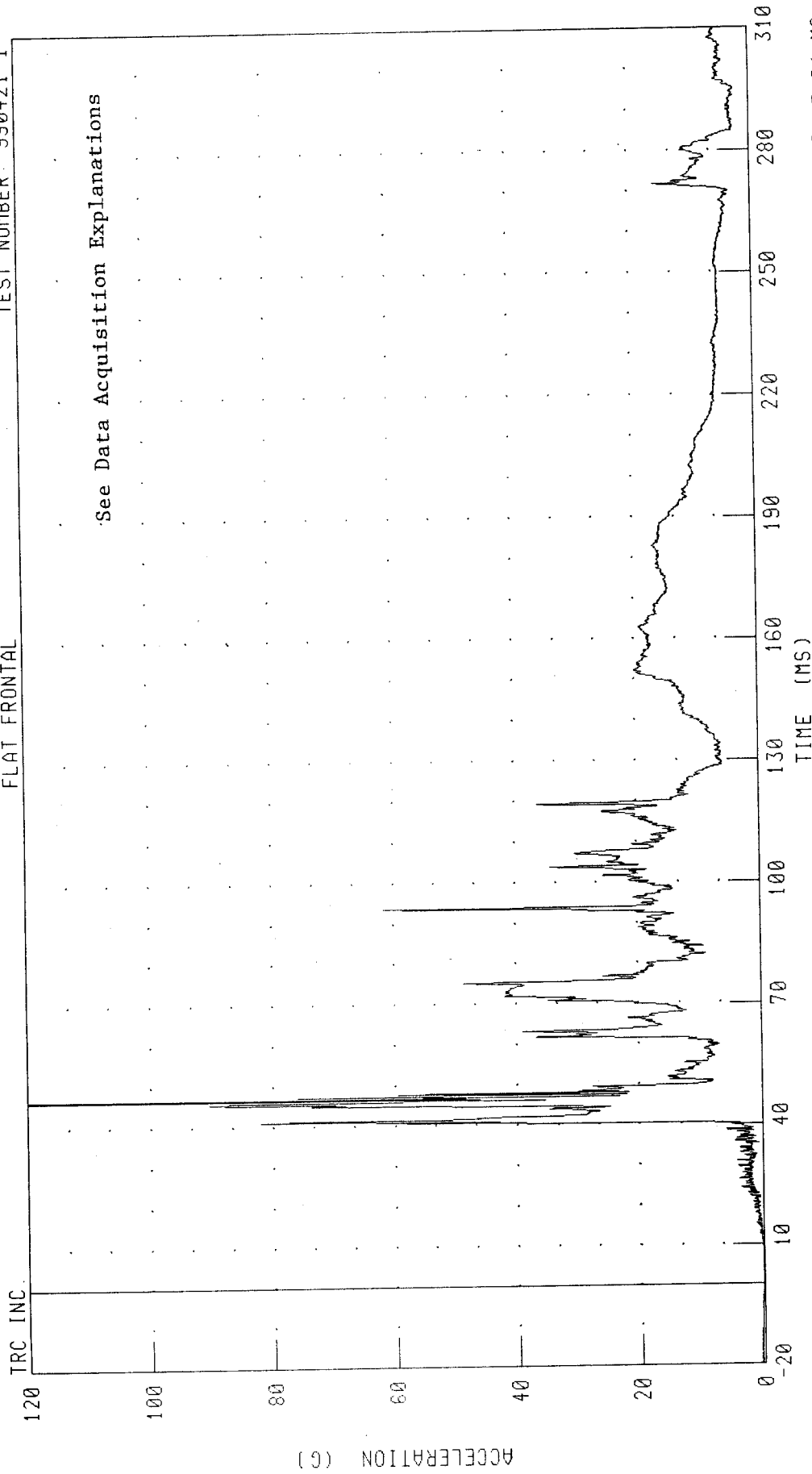
CHANNEL: PEVZG1 FILTER: CH. CLASS 1000

PEAK DATA: 6.80 G @ 182.64 MS; -8.72 G @ 126.80 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 PELVIS RESULTANT ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL



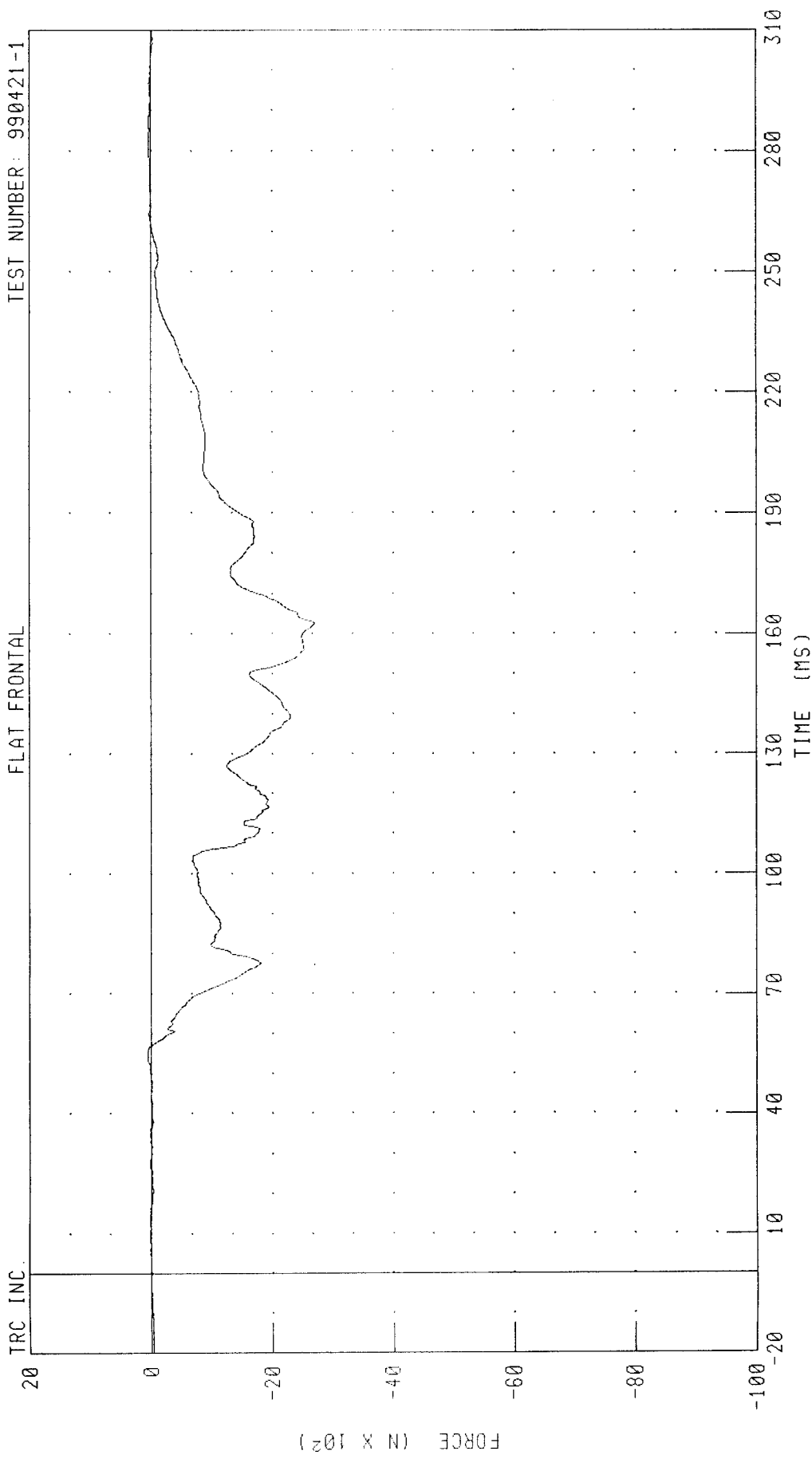
CHANNEL: PEVRG1 FILTER: CH. CLASS 1000 PEAK DATA: 174.79 G @ 46.64 MS; 0.16 G @ -3.84 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 1 LEFT FEMUR FORCE

FLAT FRONTAL

TEST NUMBER: 990421-1

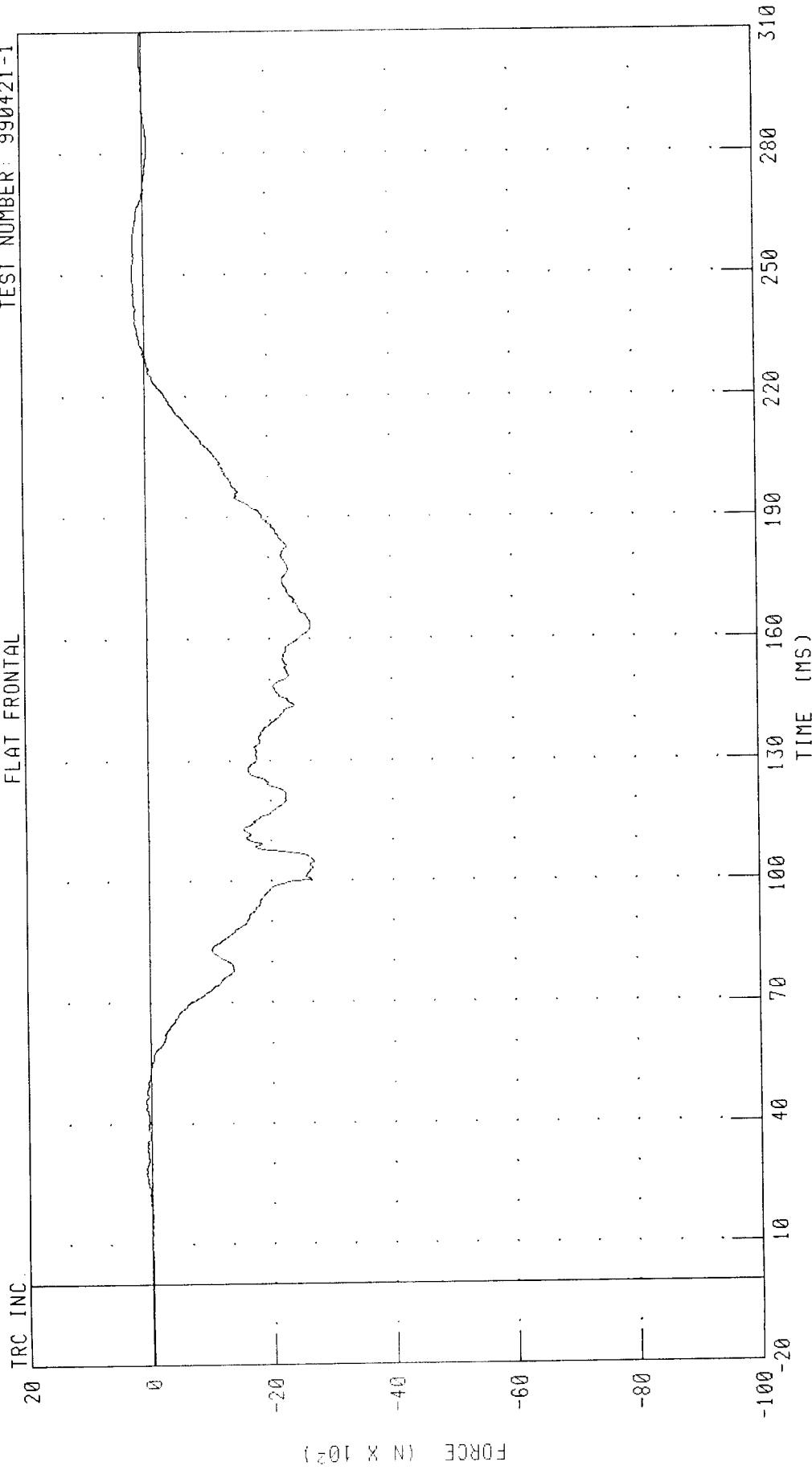


CHANNEL: LFMF1 FILTER: CH. CLASS 600 PEAK DATA: 61.51 N @ 53.84 MS; -2703.65 N @ 162.80 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 1 RIGHT FEMUR FORCE

TEST NUMBER: 990421-1

FLAT FRONTAL

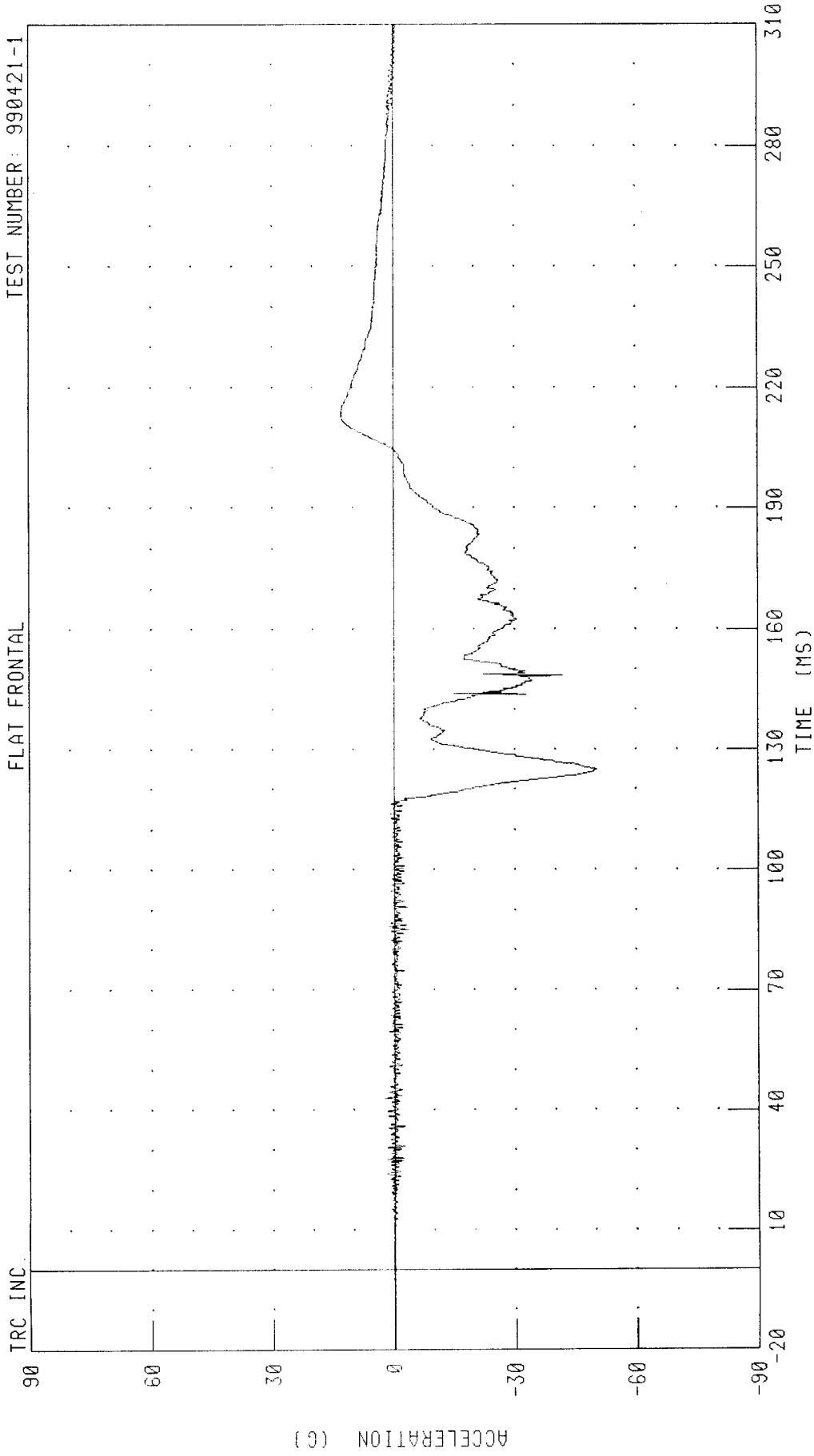


CHANNEL: RFMF1 FILTER: CH CLASS 600 PEAK DATA: 189.98 N @ 250.16 MS, -2708.45 N @ 104.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 HEAD X-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL



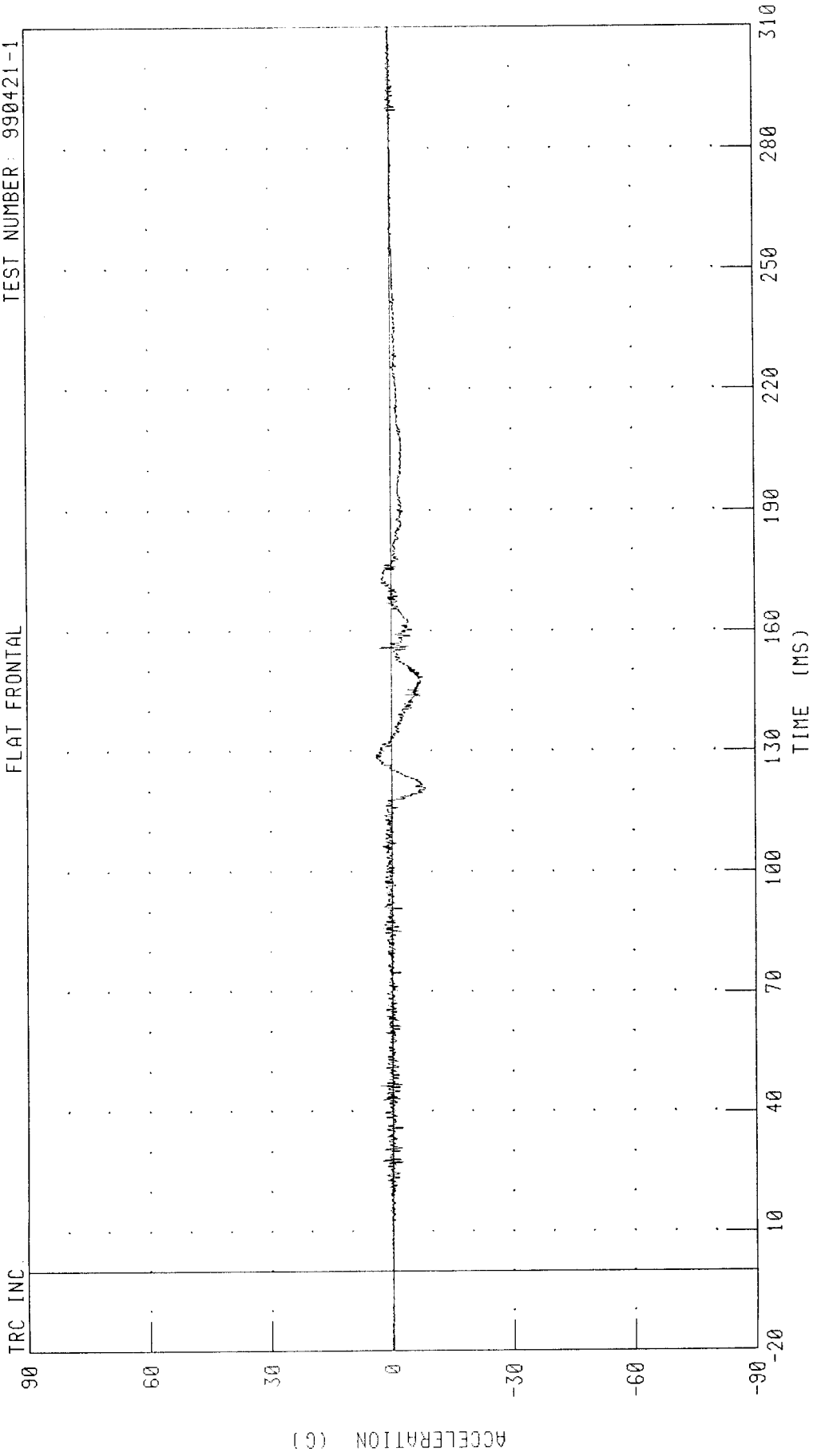
CHANNEL: HEDXC2 FILTER: CH. CLASS 1000 PEAK DATA: 12.95 G @ 212.56 MS, -50.31 G @ 124.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 2 HEAD Y-AXIS ACCELERATION

FLAT FRONTAL

TEST NUMBER: 990421-1



TRC INC.

CHANNEL: HEDYC2 FILTER: CH. CLASS 1000

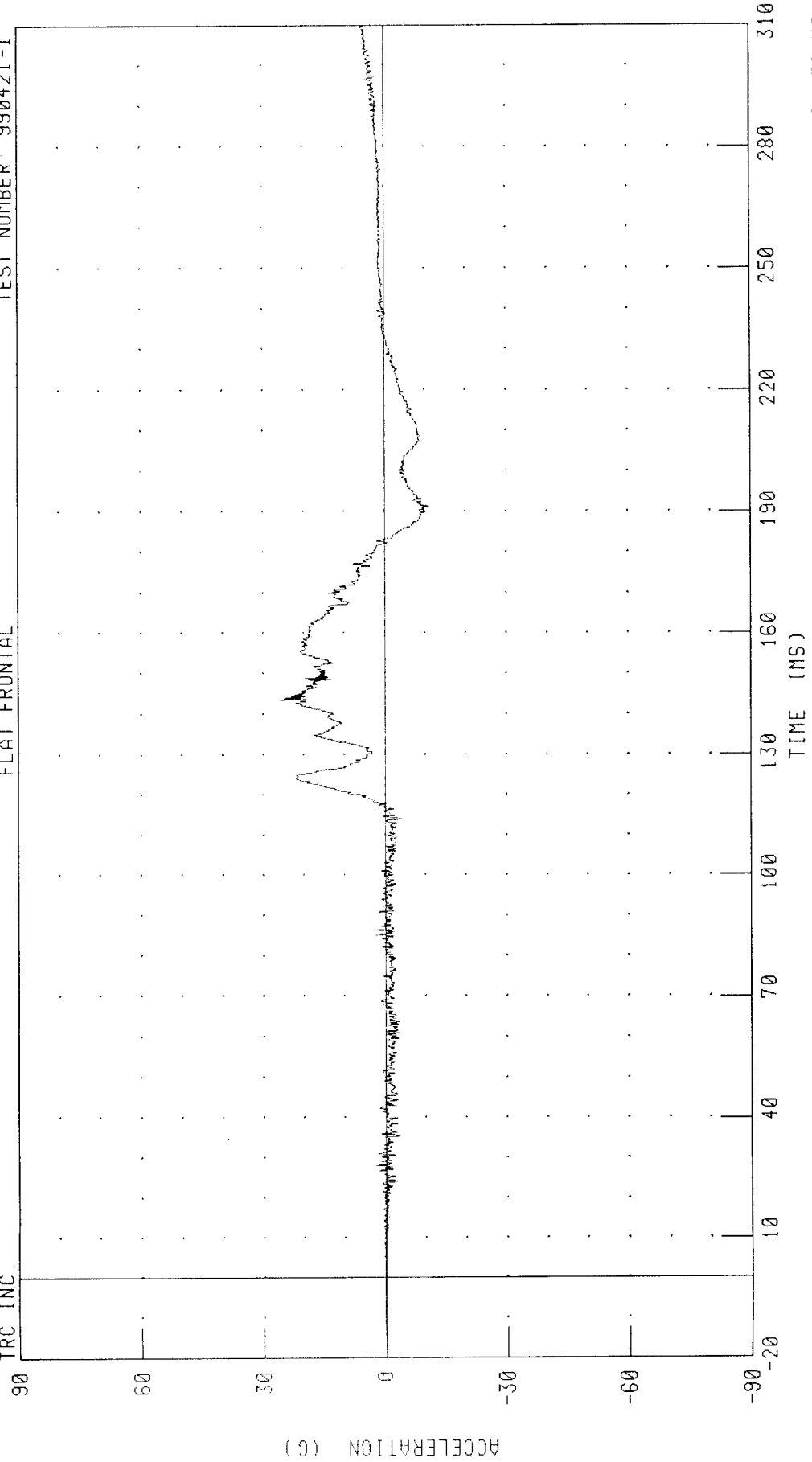
PEAK DATA: 3.95 G @ 128.96 MS, -8.56 G @ 120.64 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 HEAD Z-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

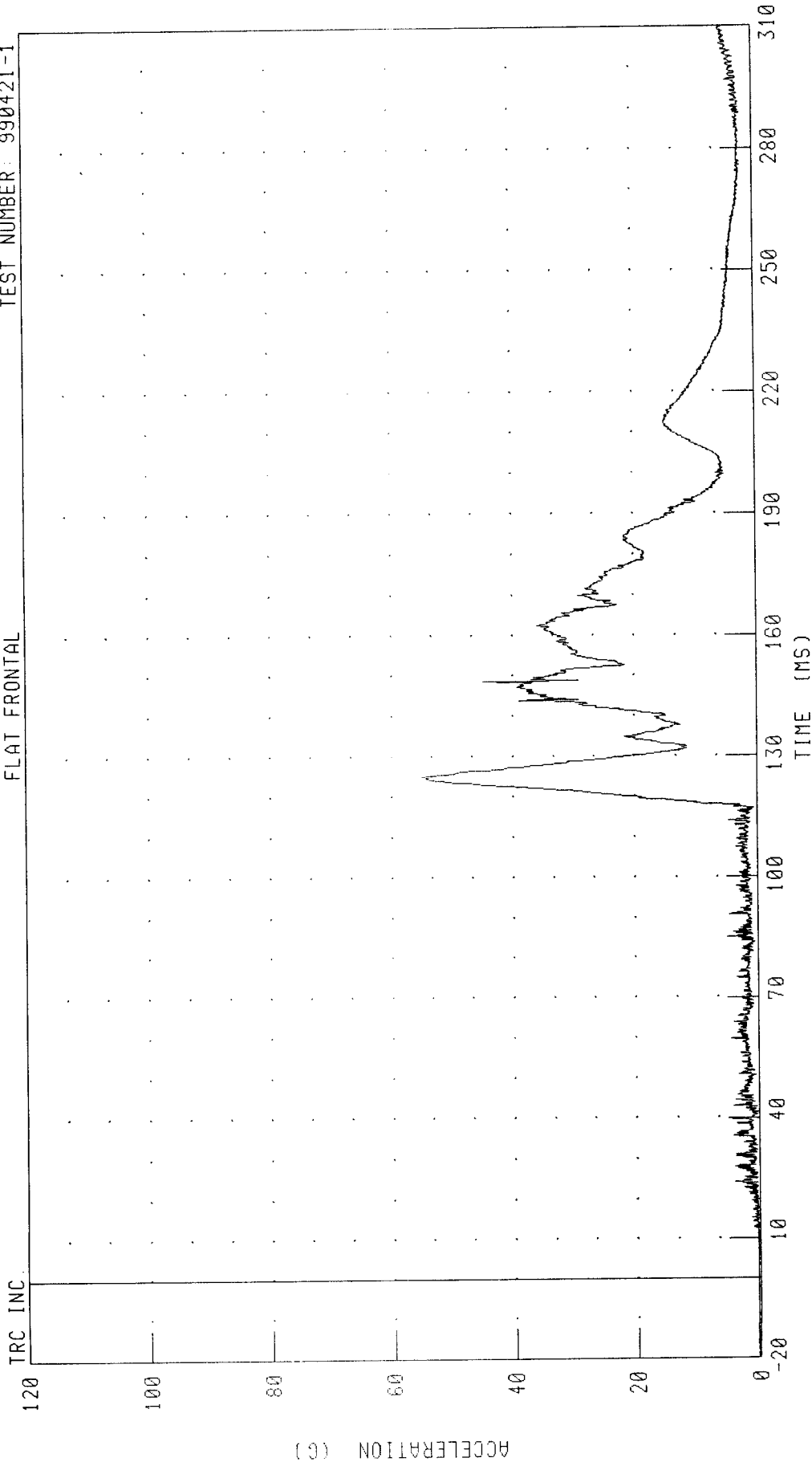
TRC INC.



CHANNEL: HEDZC2 FILTER: CH. CLASS 1000 PEAK DATA: 25.68 G @ 143.60 MS, -11.06 G @ 191.36 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 HEAD RESULTANT ACCELERATION

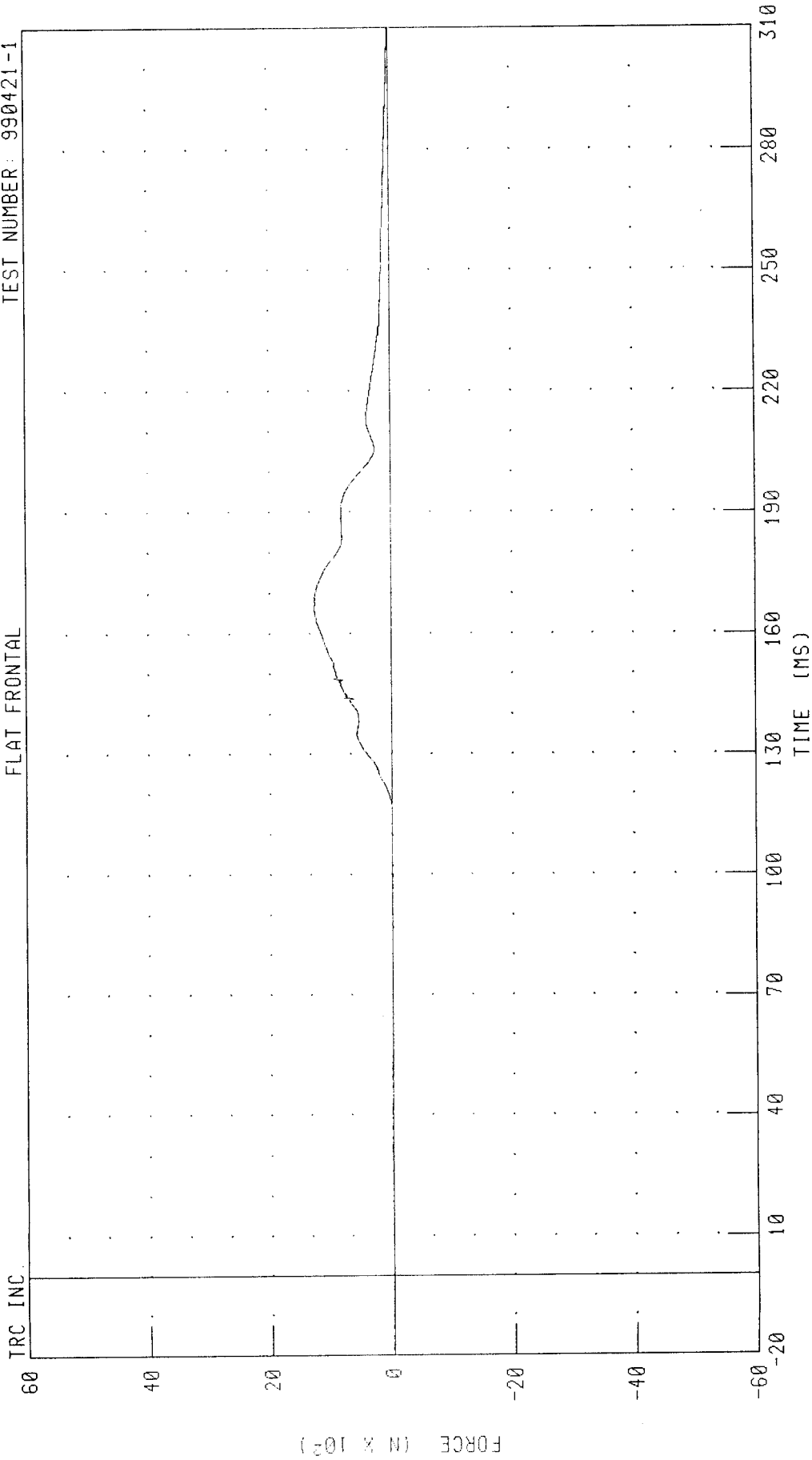
TEST NUMBER: 990421-1



CHANNEL: HEDRC2 FILTER: CH. CLASS 1000 PEAK DATA: 54.95 G @ 125.04 MS; 0.14 G @ -19.92 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 NECK X-AXIS SHEAR FORCE
FLAT FRONTAL

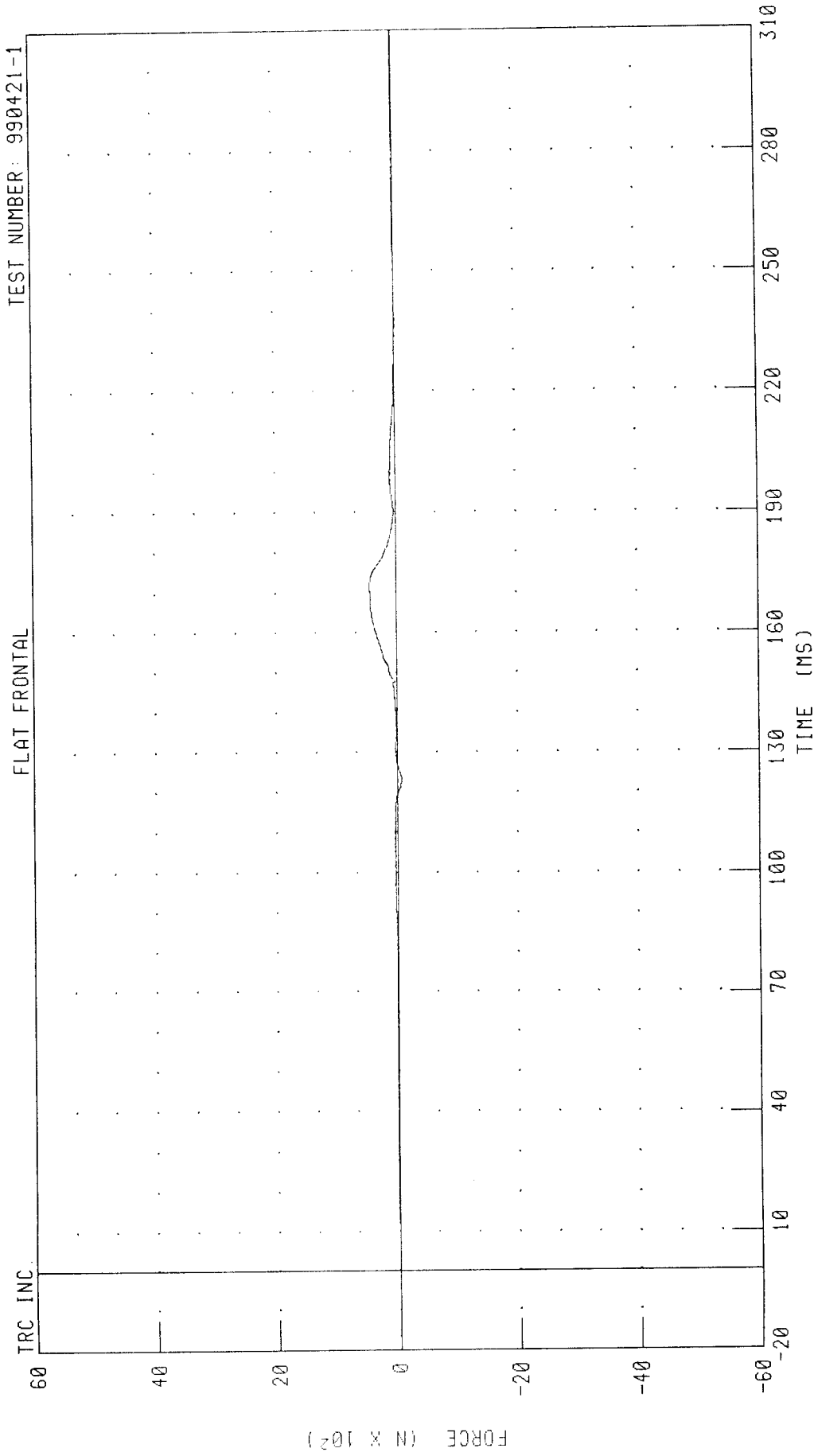
TEST NUMBER: 990421-1



CHANNEL: NEKXF2 FILTER: CH. CLASS 1000

PEAK DATA: 1271.24 N @ 166.64 MS; -17.70 N @ 86.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 NECK Y-AXIS SHEAR FORCE



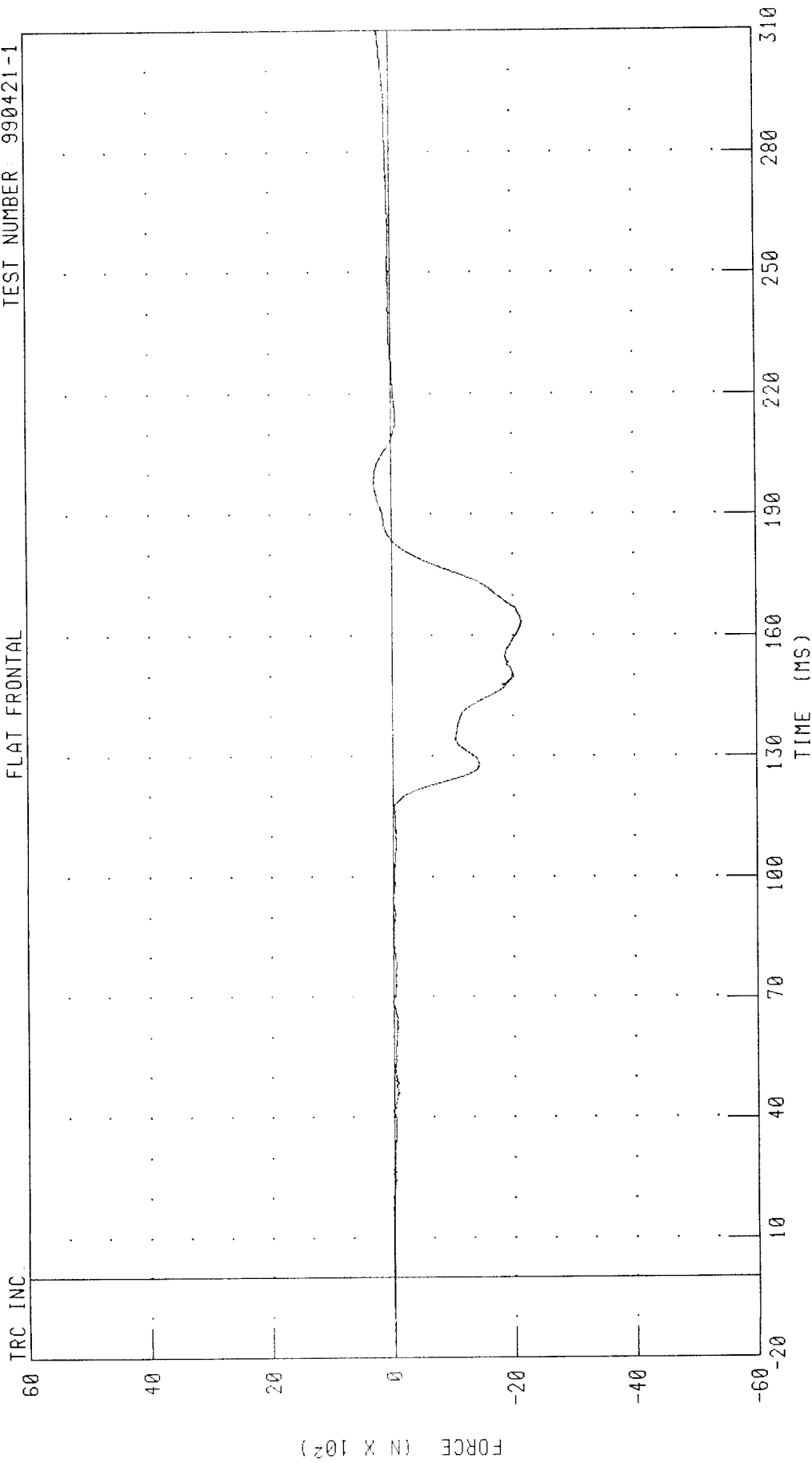
CHANNEL: NEKYF2 FILTER: CH. CLASS 1000 PEAK DATA: 430.97 N @ 170.80 MS, -73.16 N @ 123.04 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 2 NECK Z-AXIS AXIAL FORCE

FLAT FRONTAL

TEST NUMBER: 990421-1



TRC INC.

TIME (MS)

PEAK DATA: 276.44 N @ 197.04 MS, -2133.85 N @ 163.12 MS

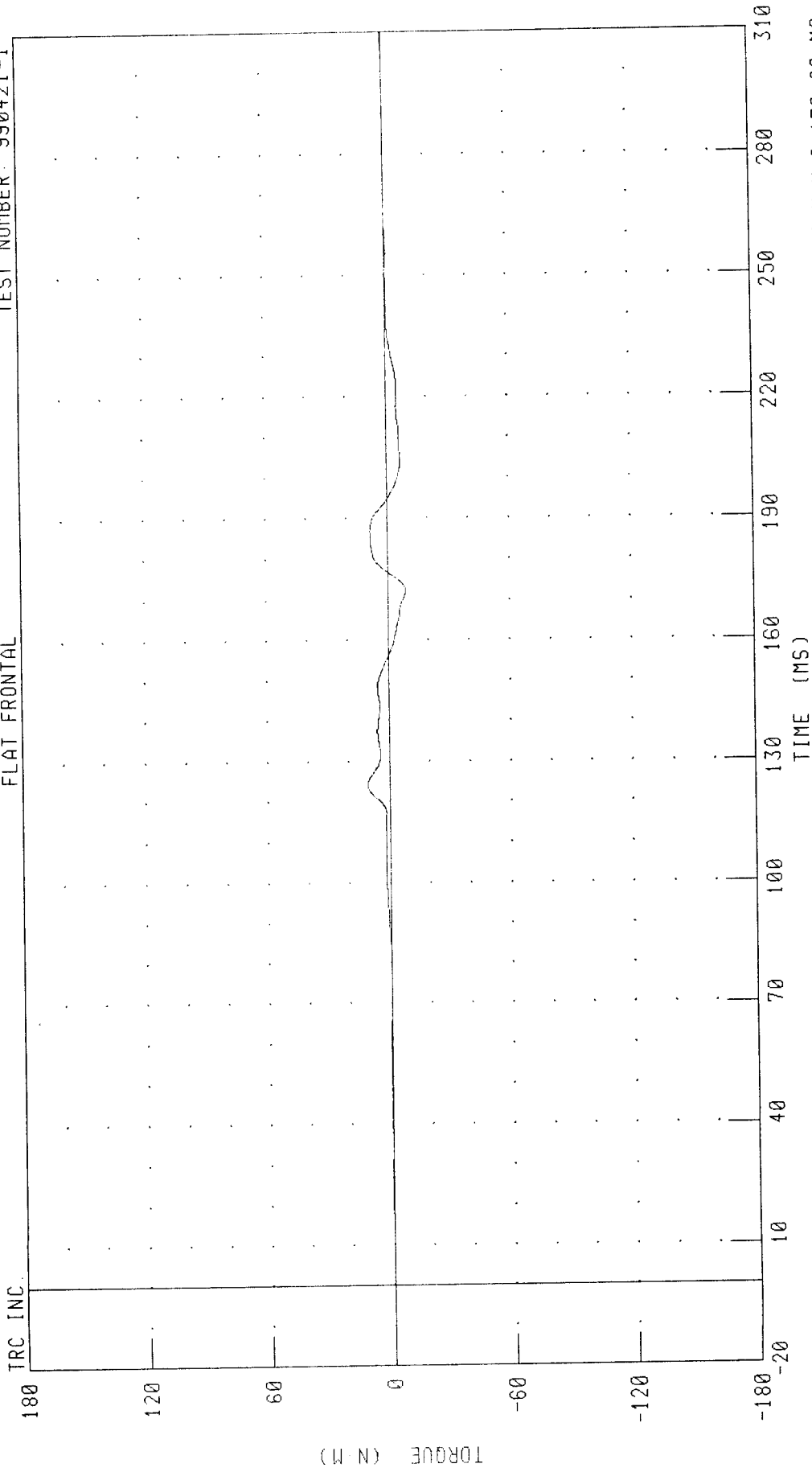
CHANNEL: NEKZF2 FILTER: CH. CLASS 1000

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 2 NECK MOMENT ABOUT X AXIS

FLAT FRONTAL

TEST NUMBER: 990421-1

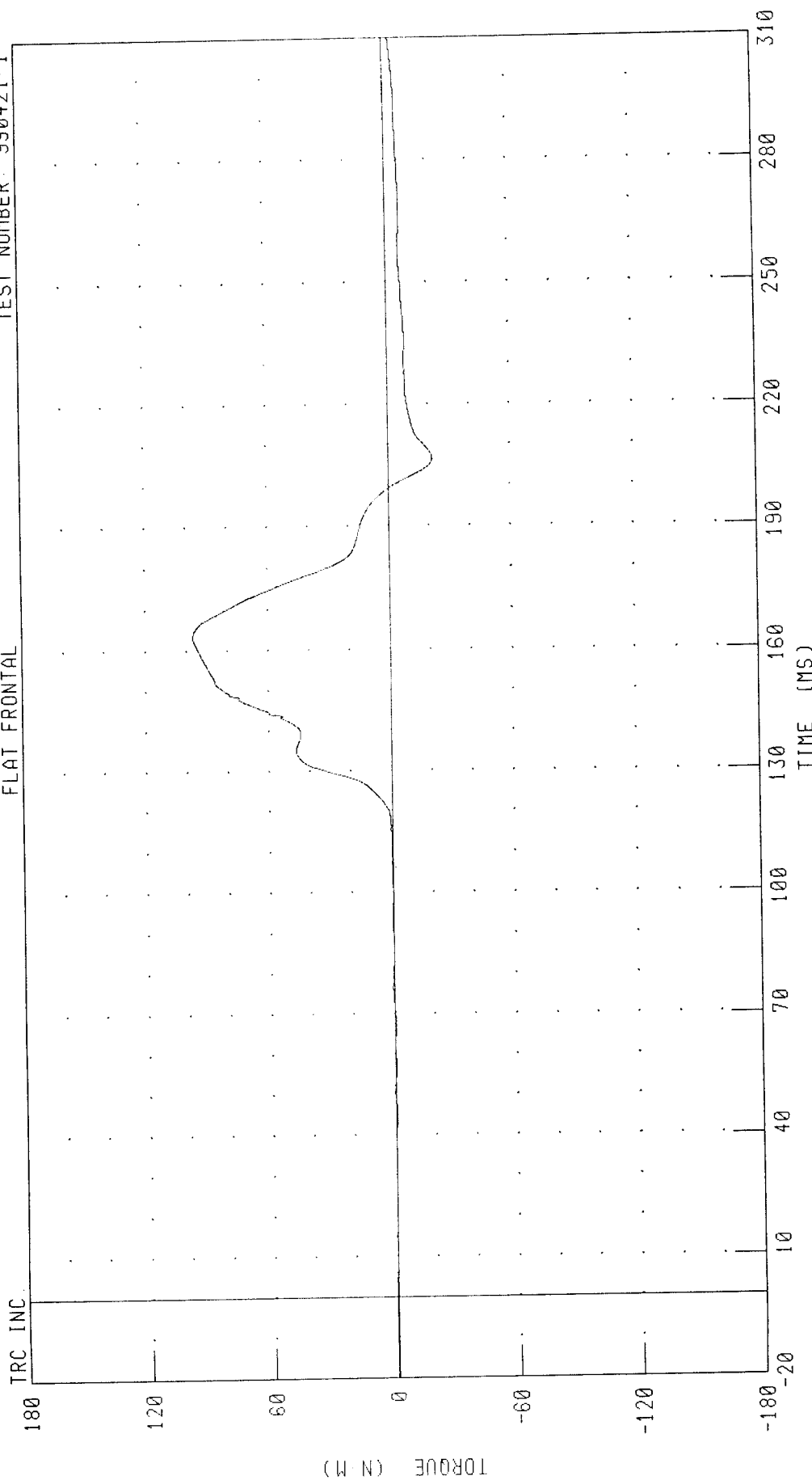


CHANNEL: NEKX12 FILTER: CH. CLASS 600 PEAK DATA: 10.59 N.M @ 124.08 MS, -8.88 N.M @ 172.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 990421-1

FLAT FRONTAL

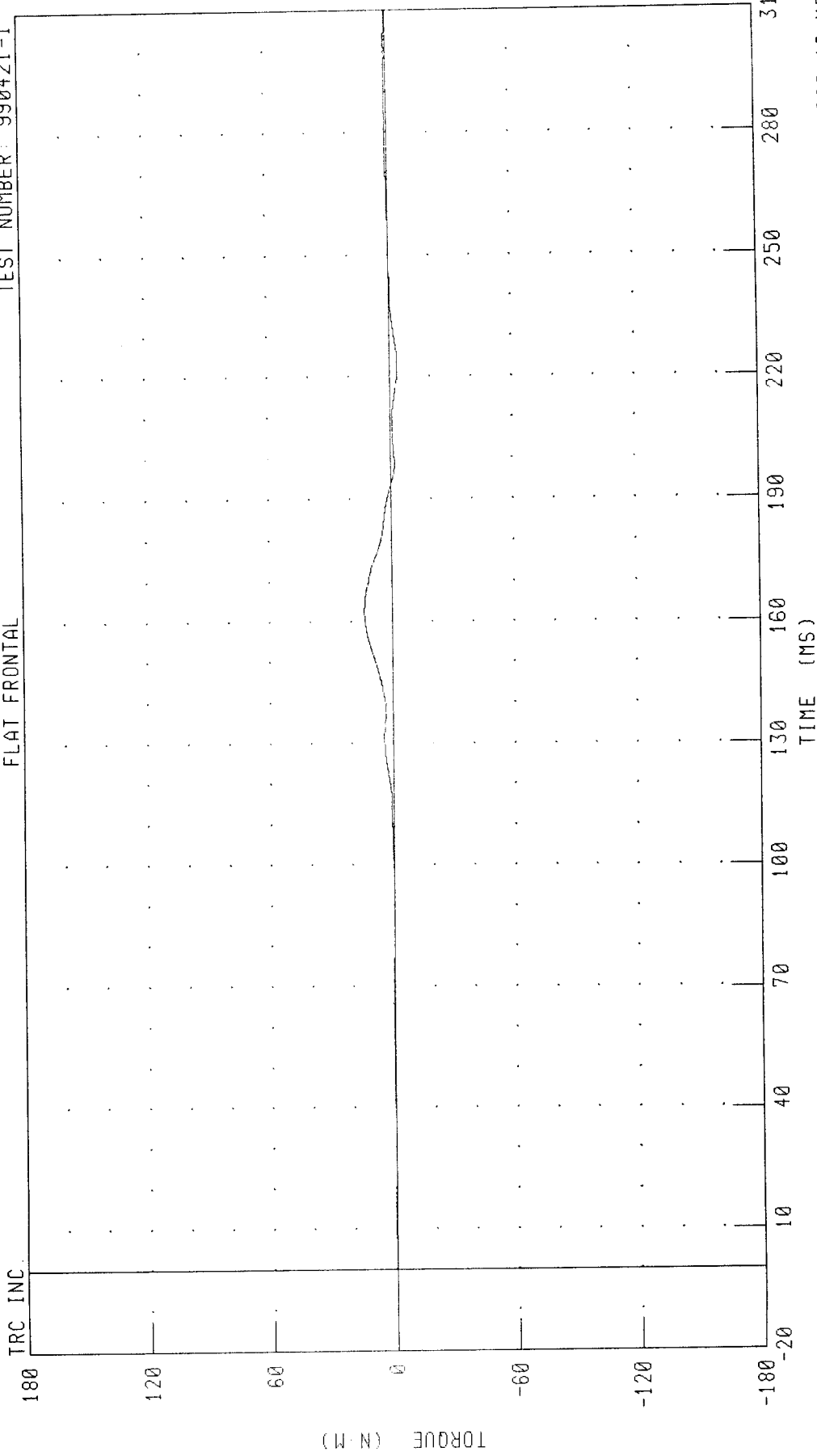


PEAK DATA: 96.78 N.M @ 163.28 MS; -21.83 N.M @ 206.48 MS

CHANNEL: NEKYM2 FILTER: CH CLASS 600

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 NECK MOMENT ABOUT Z AXIS

TEST NUMBER: 990421-1



TRC INC.

FLAT FRONTAL

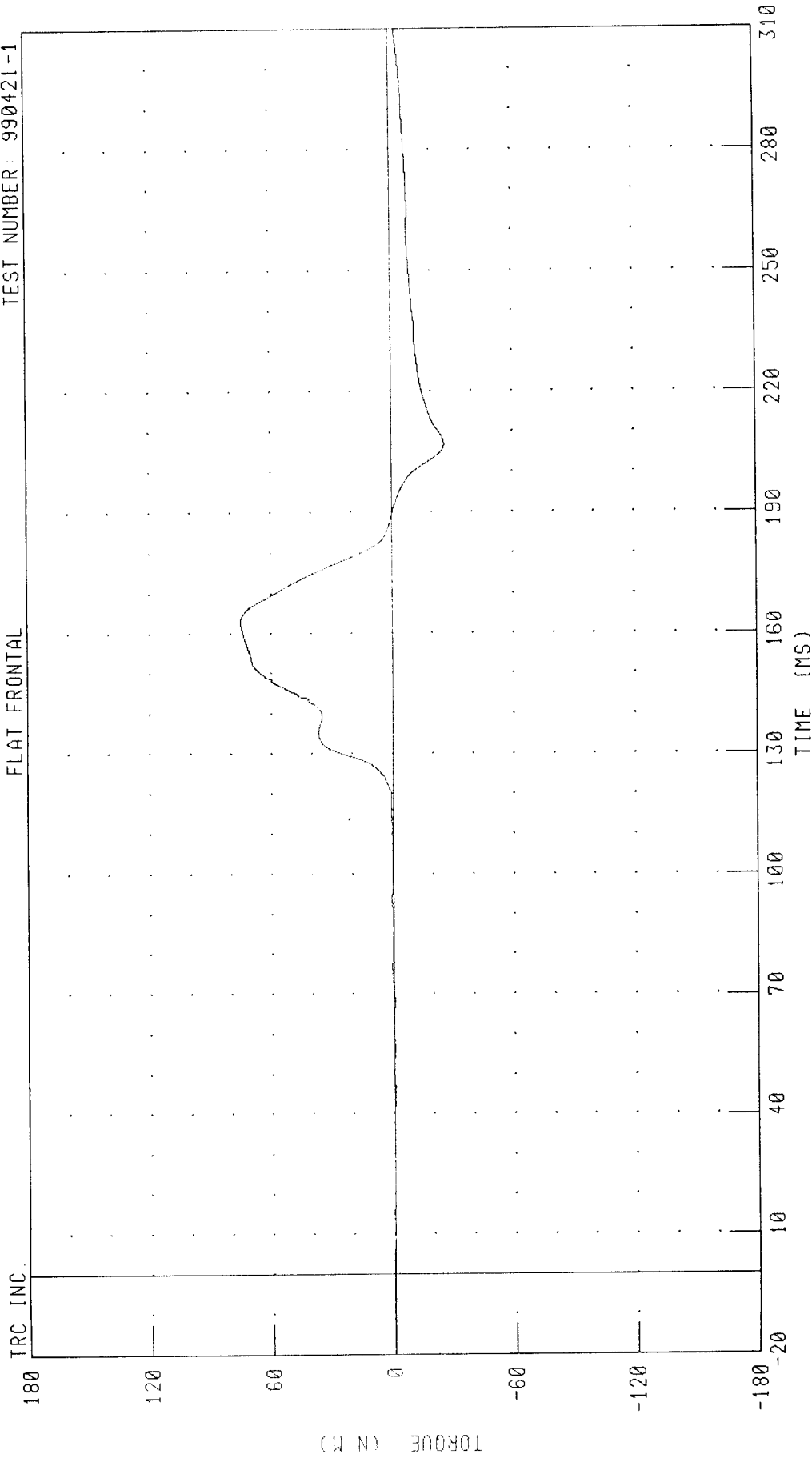
CHANNEL: NEKZM2

FILTER: CH. CLASS 600

PEAK DATA: 13.40 N-M @ 162.56 MS; -3.91 N-M @ 222.16 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 NECK OCCIPITAL CONDYLE

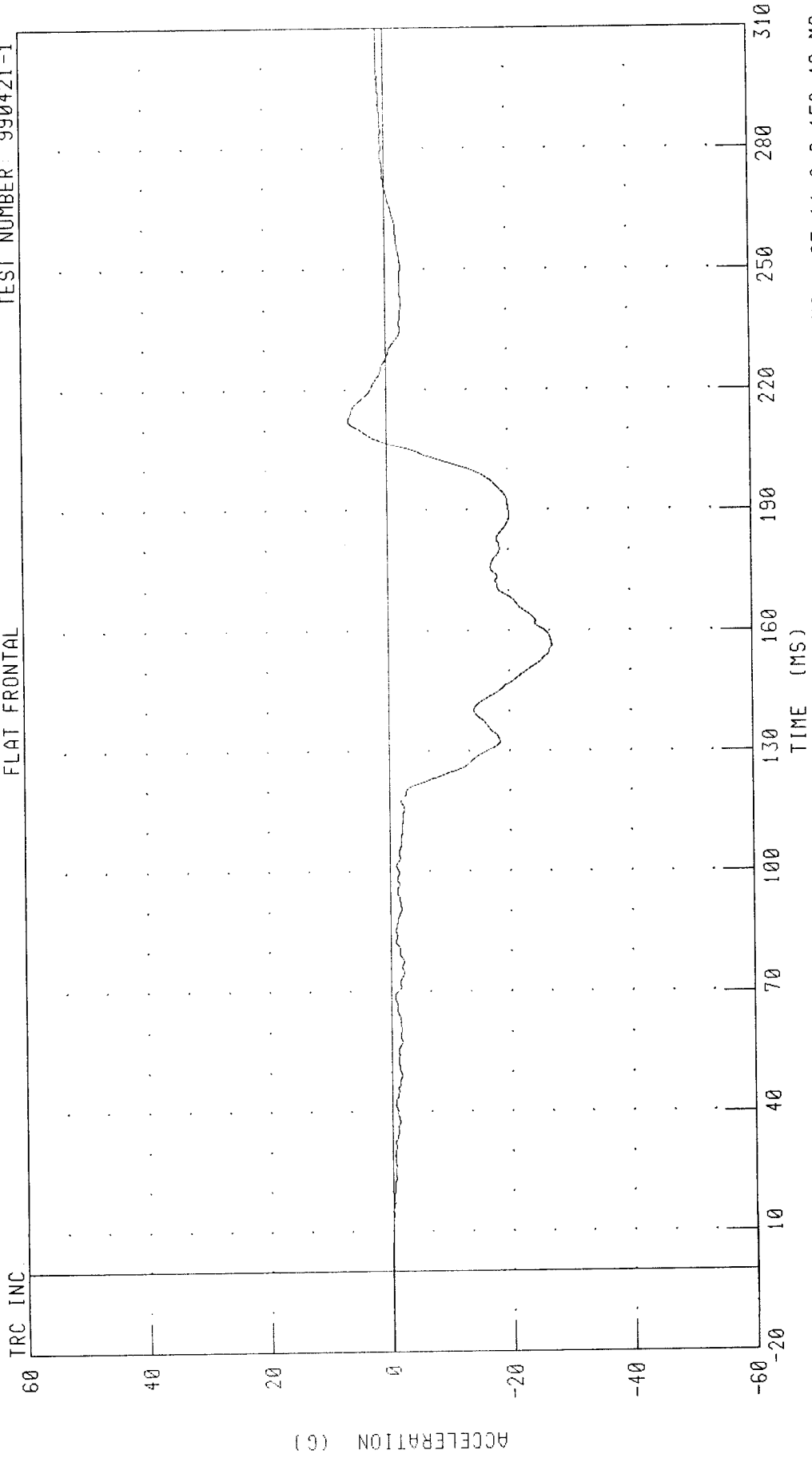
TEST NUMBER: 990421-1



CHANNEL: NEKOM2 FILTER: CH. CLASS 600

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 CHEST X-AXIS ACCELERATION
FLAT FRONTAL

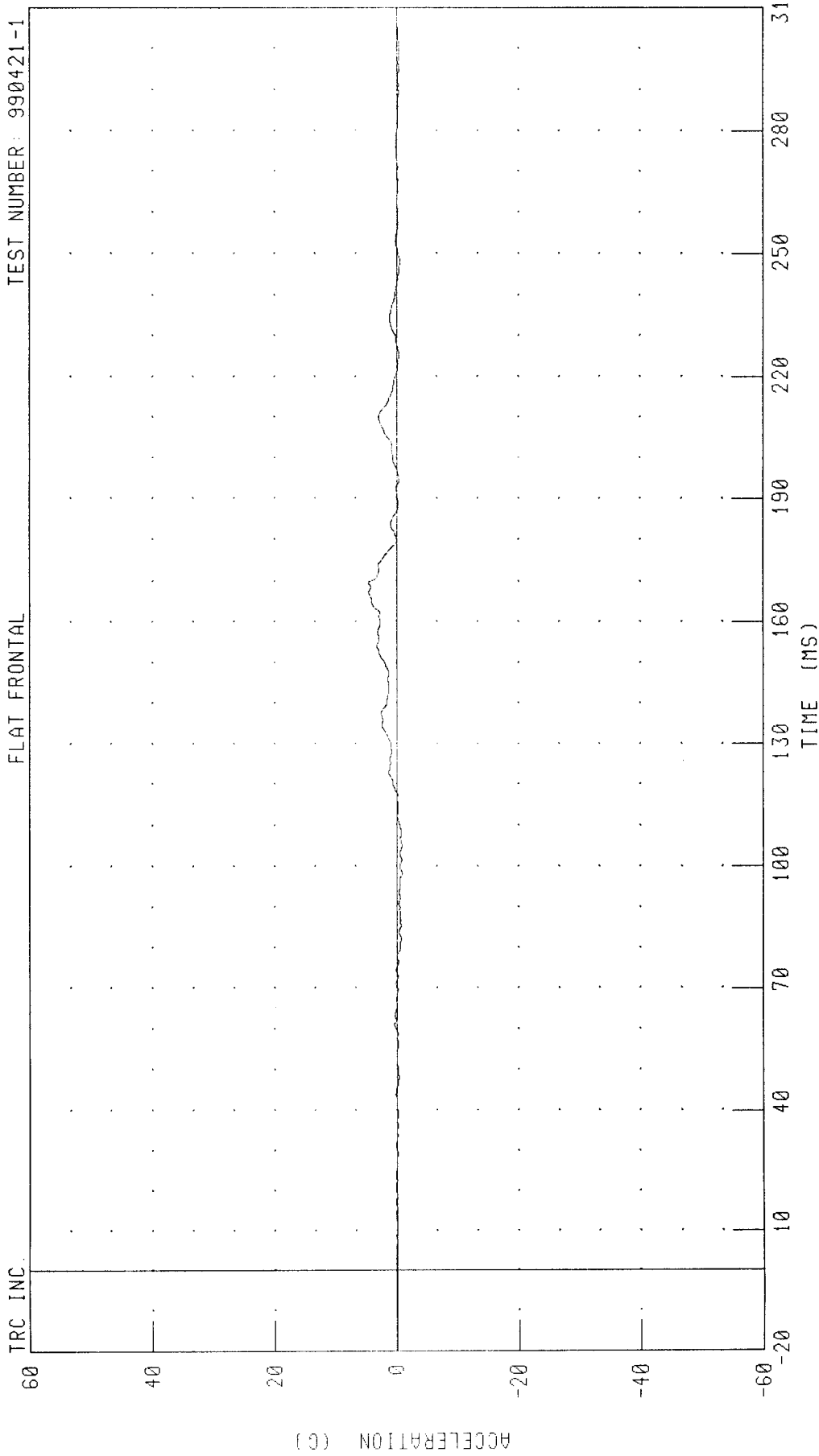
TEST NUMBER 990421-1



CHANNEL: CSTXC2 FILTER: CH. CLASS 180 PEAK DATA: 6.28 G @ 212.40 MS; -27.11 G @ 156.48 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 CHEST Y-AXIS ACCELERATION
FLAT FRONTAL

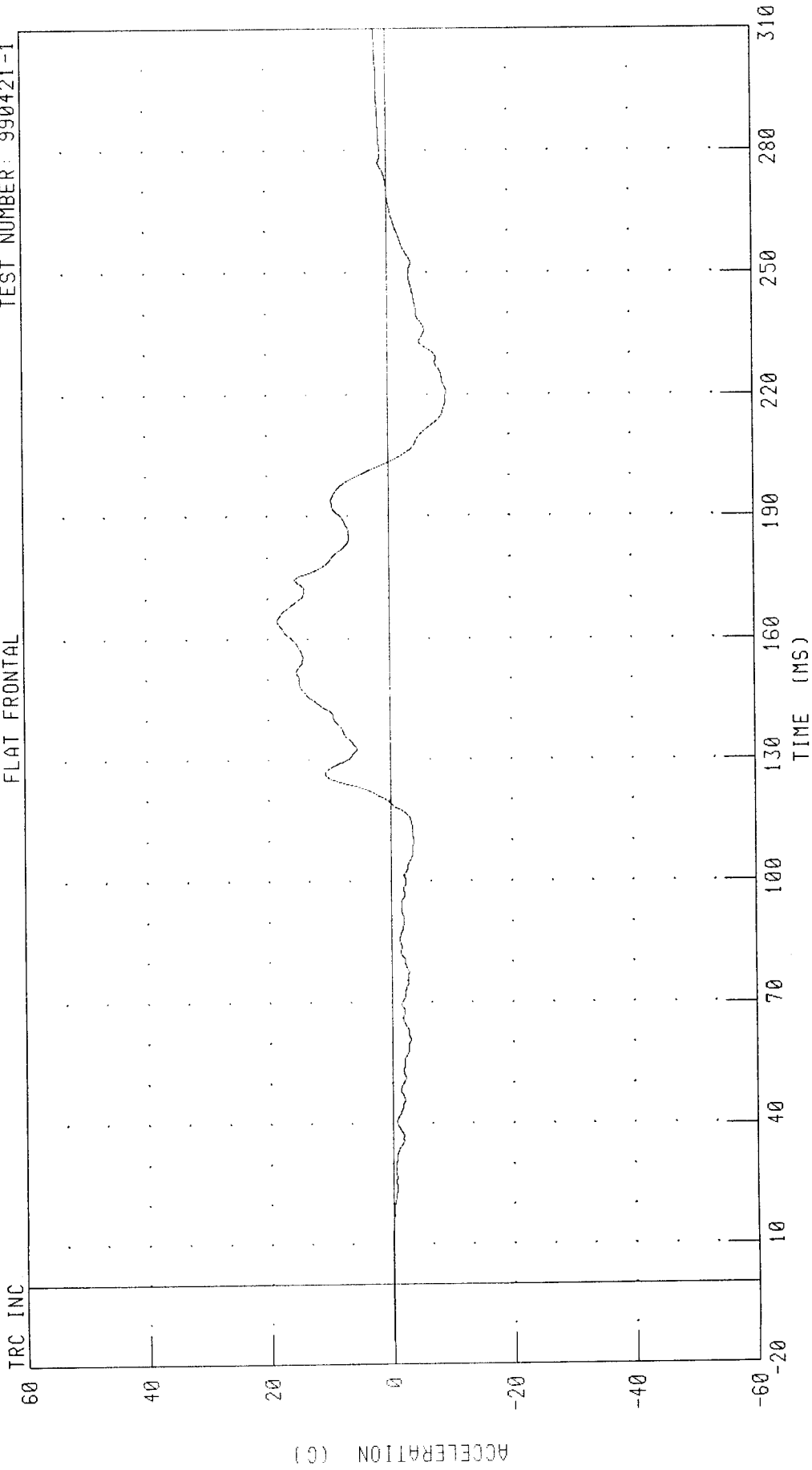
TEST NUMBER: 990421-1



CHANNEL: CSTYG2 FILTER: CH. CLASS 180 PEAK DATA: 4.52 G @ 169.60 MS, -0.95 G @ 98.32 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 CHEST Z-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1

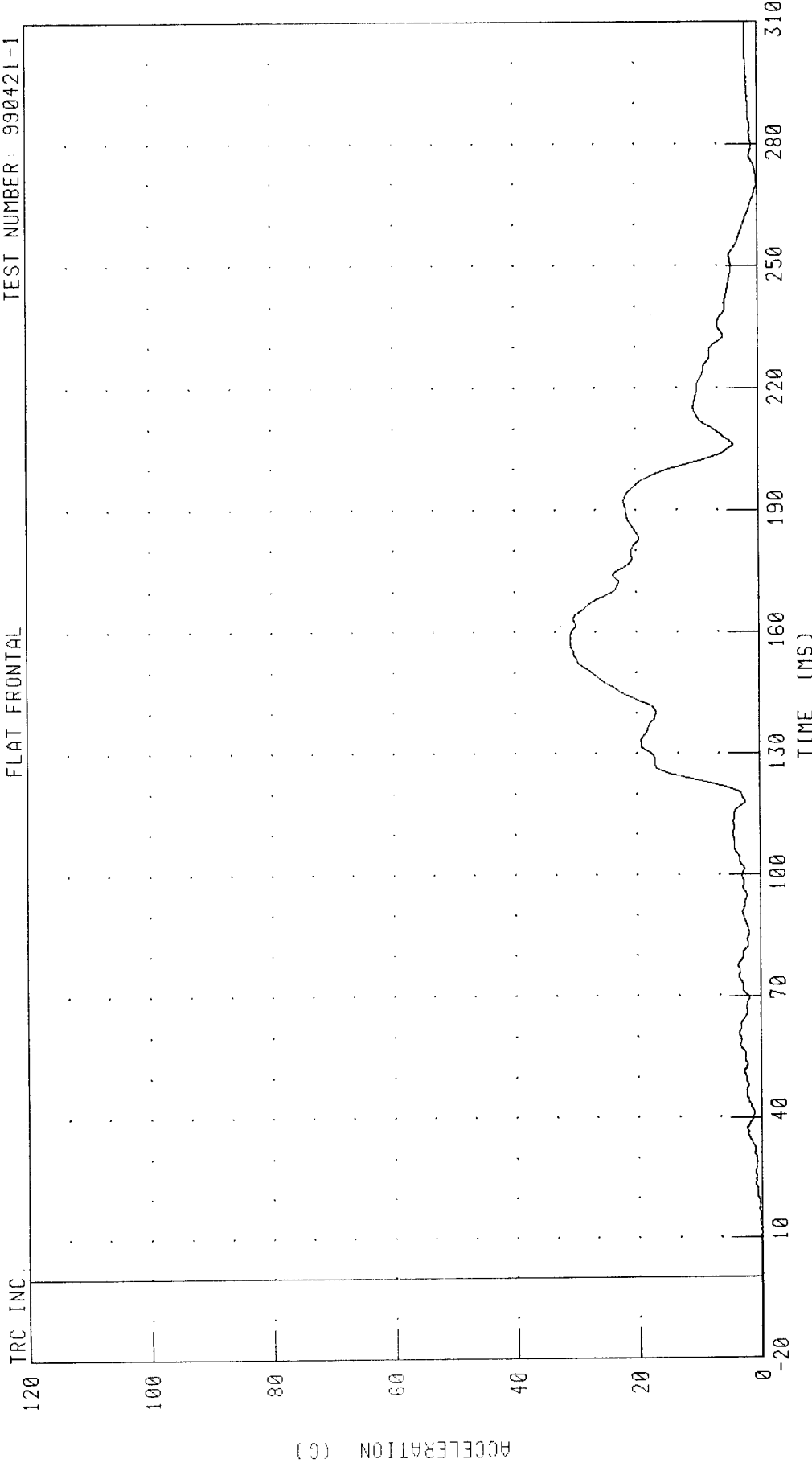


CHANNEL: CSTZG2 FILTER: CH. CLASS 180 PEAK DATA: 18.38 G @ 164.48 MS; -9.72 G @ 220.88 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 CHEST RESULTANT ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL



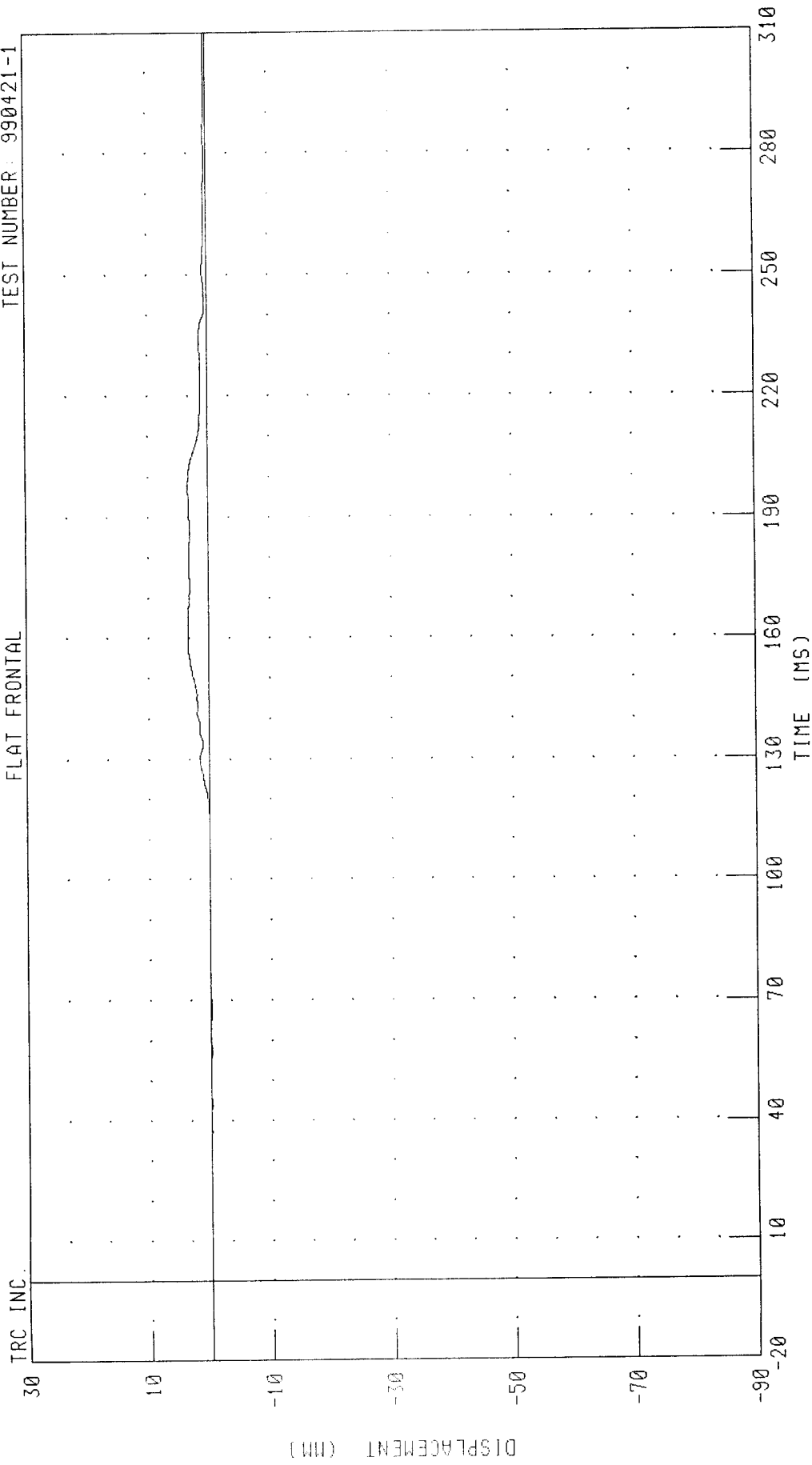
CHANNEL: CSTRC2 FILTER: CH. CLASS 180 PEAK DATA: 30.86 G @ 157.76 MS; 0.01 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 2 CHEST DEFLECTION

FLAT FRONTAL

TEST NUMBER: 990421-1

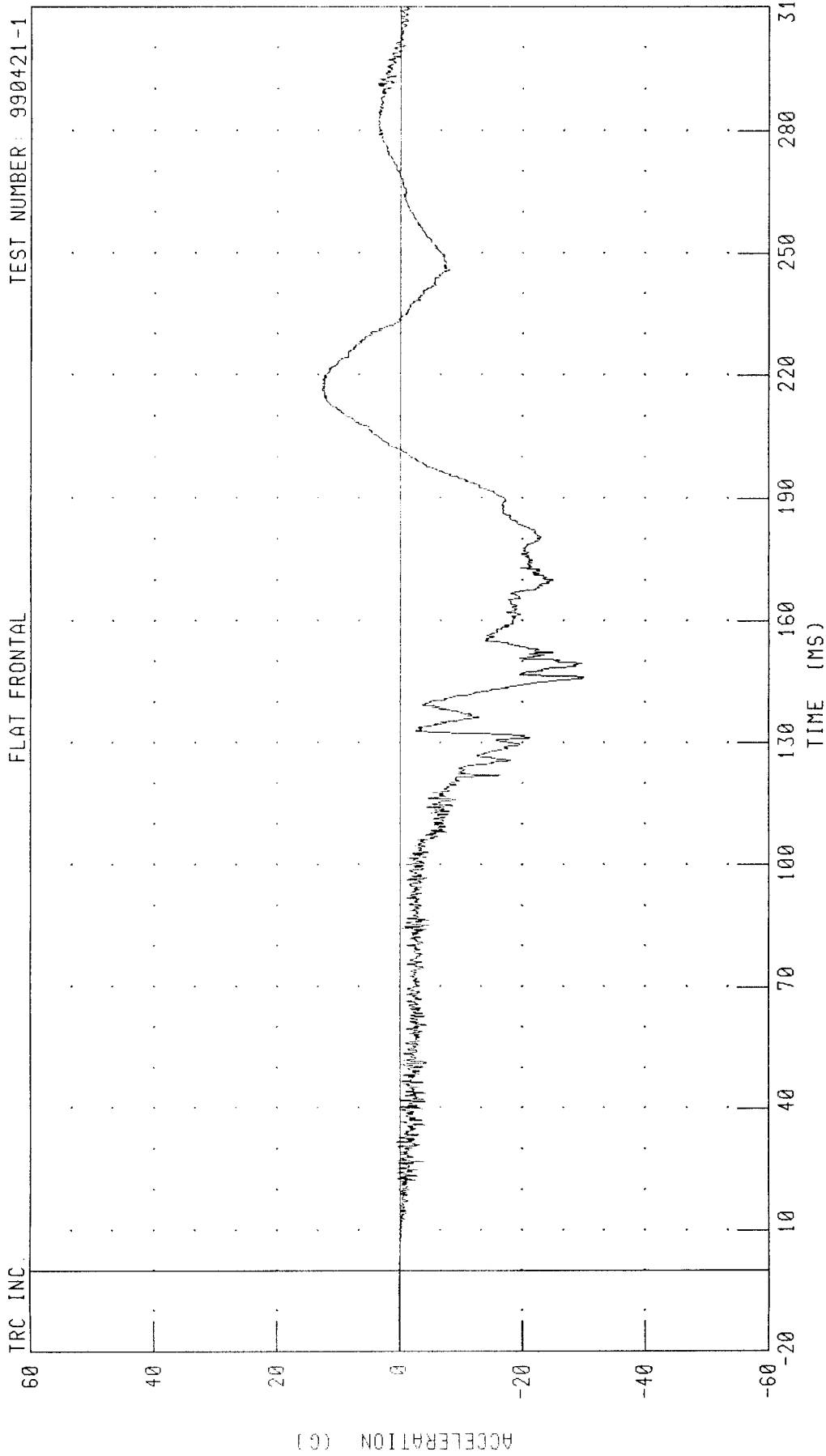


CHANNEL: CSTXD2 FILTER: CH. CLASS 180 PEAK DATA: 3.53 MM @ 160.40 MS; -0.07 MM @ 67.12 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 PELVIS X-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

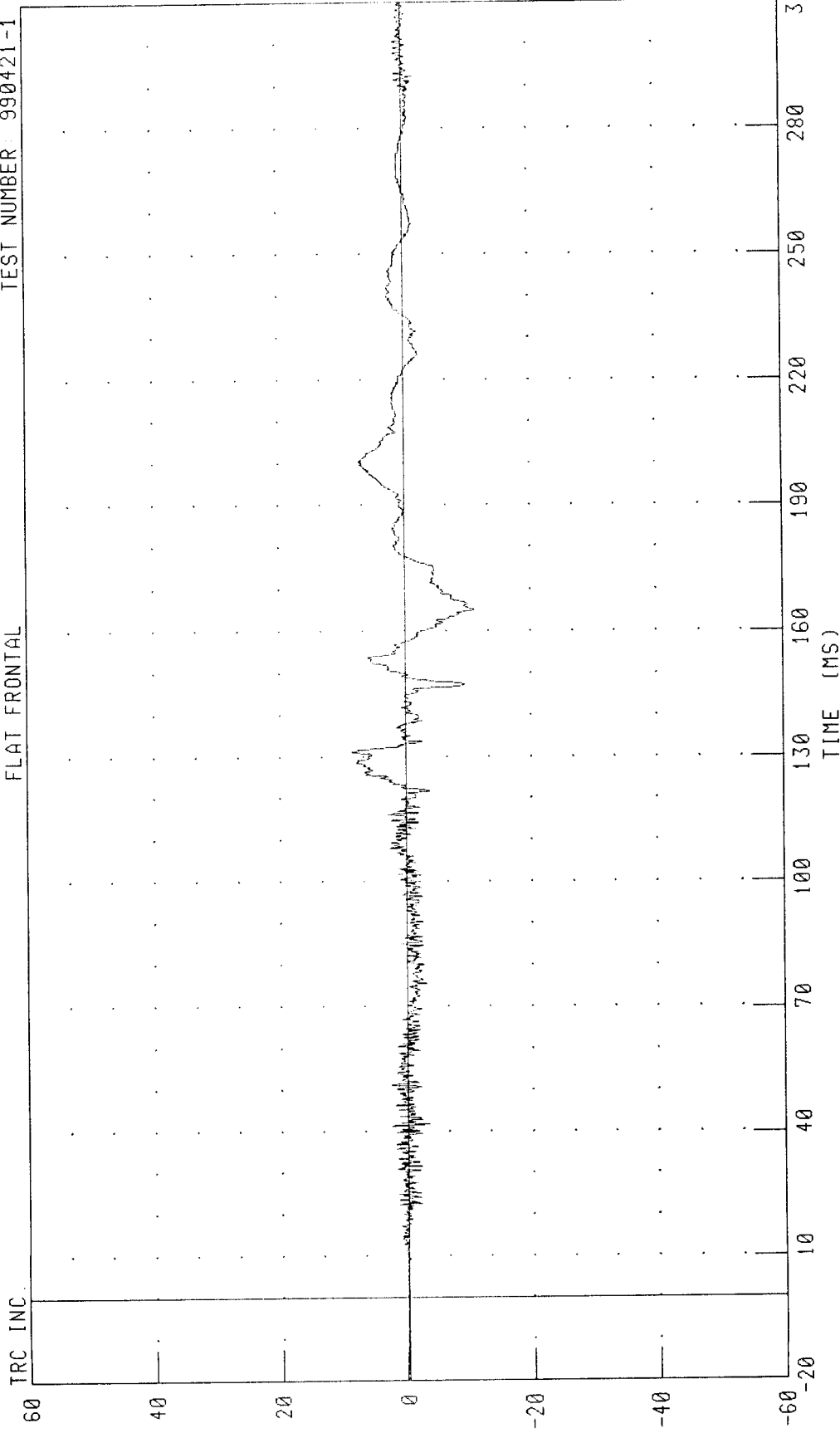


CHANNEL: PEVXC2 FILTER: CH. CLASS 1000 PEAK DATA: 12.61 G @ 216.16 MS; -30.09 G @ 146.24 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 PELVIS Y-AXIS ACCELERATION

TEST NUMBER 990421-1

TRC INC.



ACCELERATION (G)

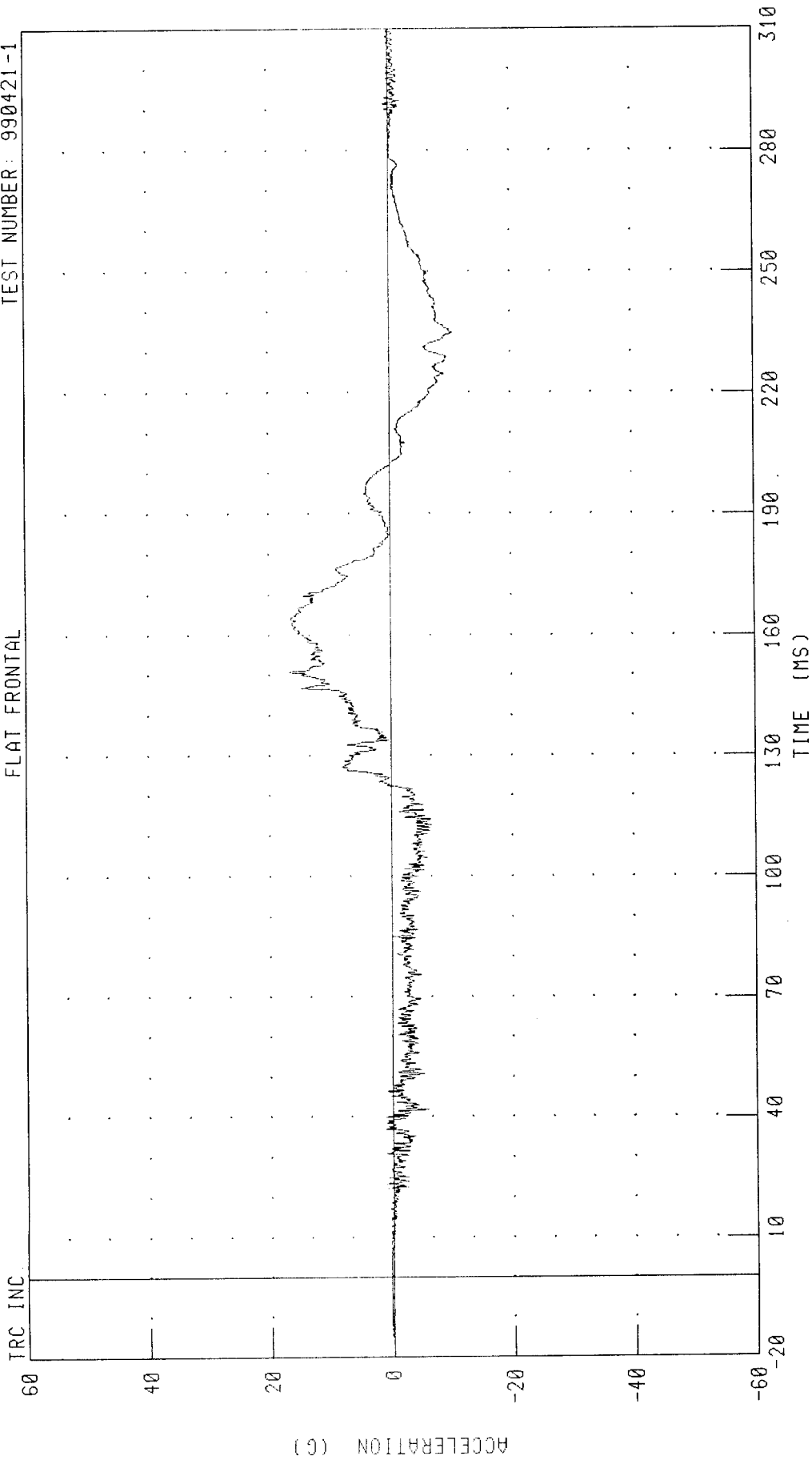
TIME (MS)

CHANNEL: PEVYC2 FILTER: CH. CLASS 1000 PEAK DATA: 8.53 G @ 131.28 MS, -11.08 G @ 165.12 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 PELVIS Z-AXIS ACCELERATION

FLAT FRONTAL

TEST NUMBER: 990421-1

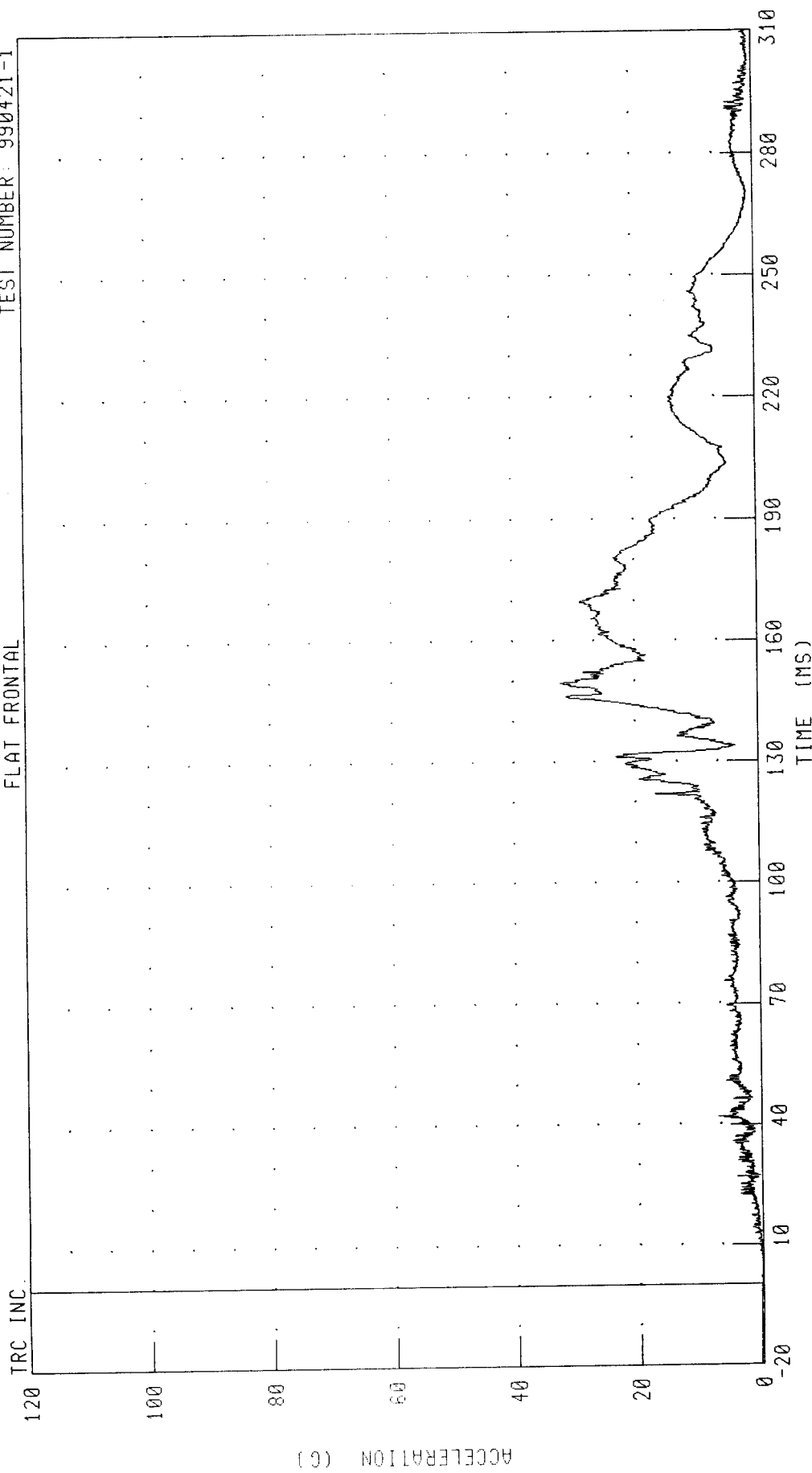


CHANNEL: PEVZG2 FILTER: CH. CLASS 1000

PEAK DATA: 16.75 G @ 150.88 MS; -10.62 G @ 234.88 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 PELVIS RESULTANT ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



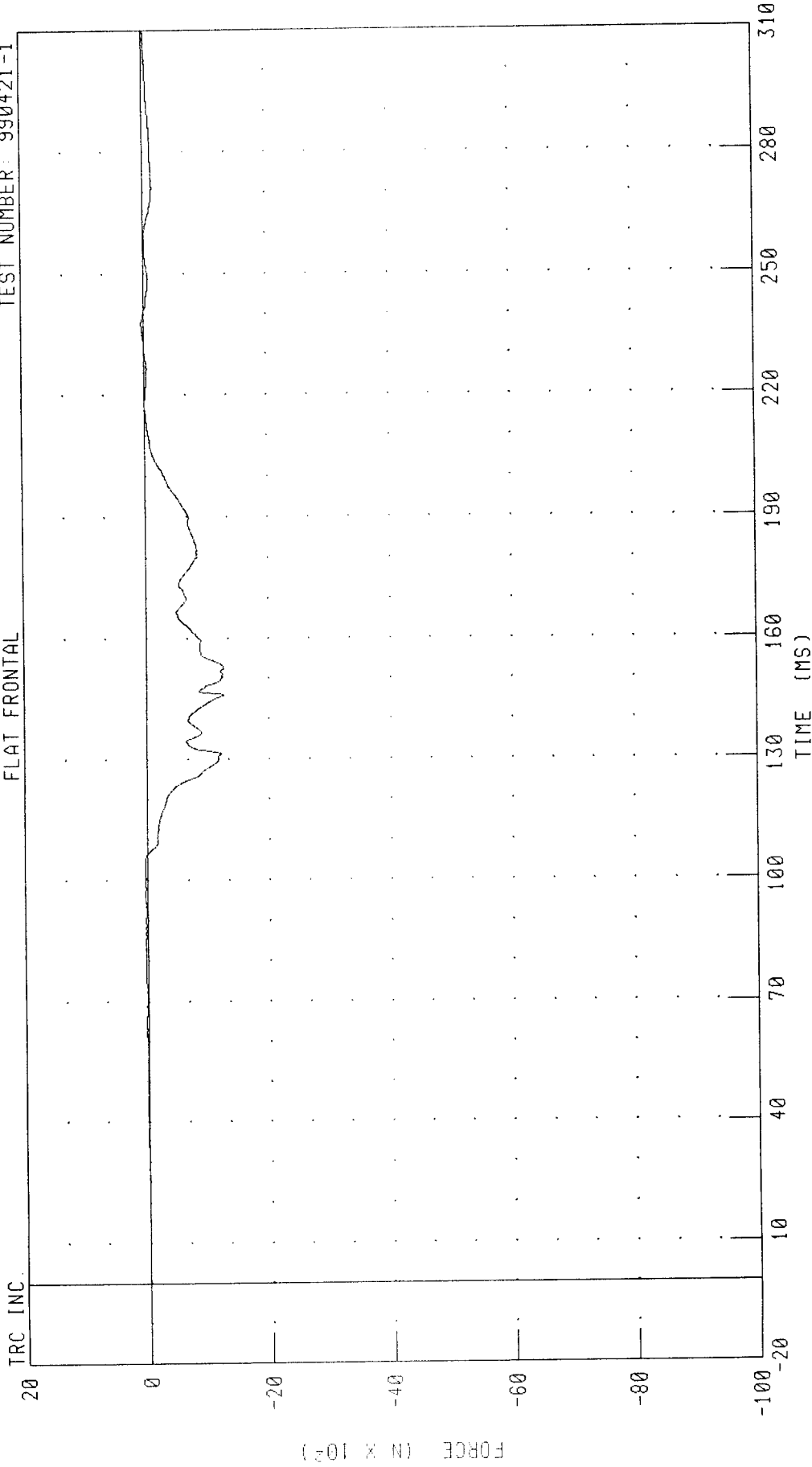
CHANNEL: PEVR62 FILTER: CH. CLASS 1000 PEAK DATA: 32.20 G @ 149.68 MS; 0.13 G @ -18.48 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 2 LEFT FEMUR FORCE

FLAT FRONTAL

TEST NUMBER: 990421-1

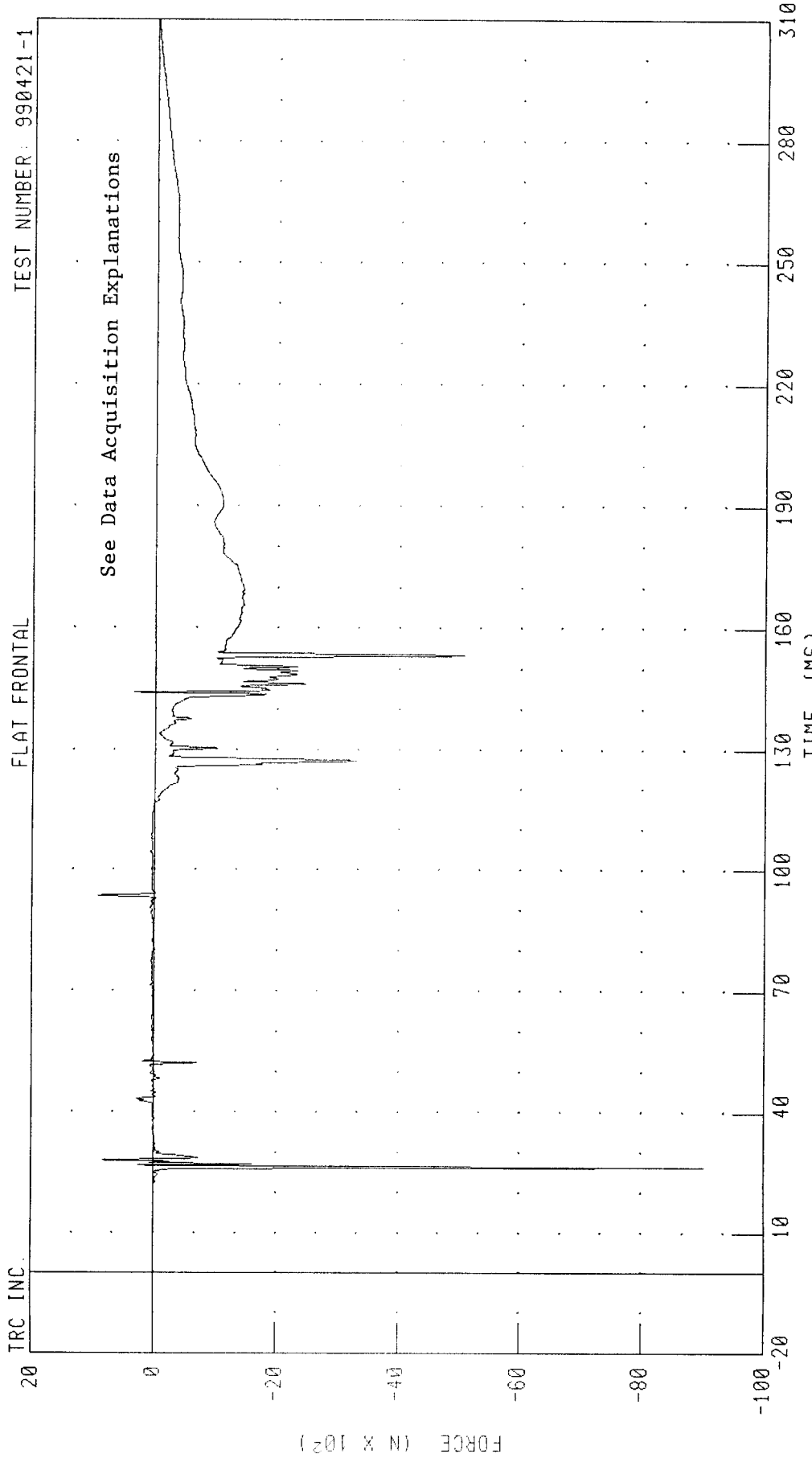


TRC INC.

CHANNEL: LFMF2 FILTER: CH. CLASS 600

PEAK DATA: 51.40 N @ 237.68 MS, -1269.80 N @ 146.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 2 RIGHT FEMUR FORCE

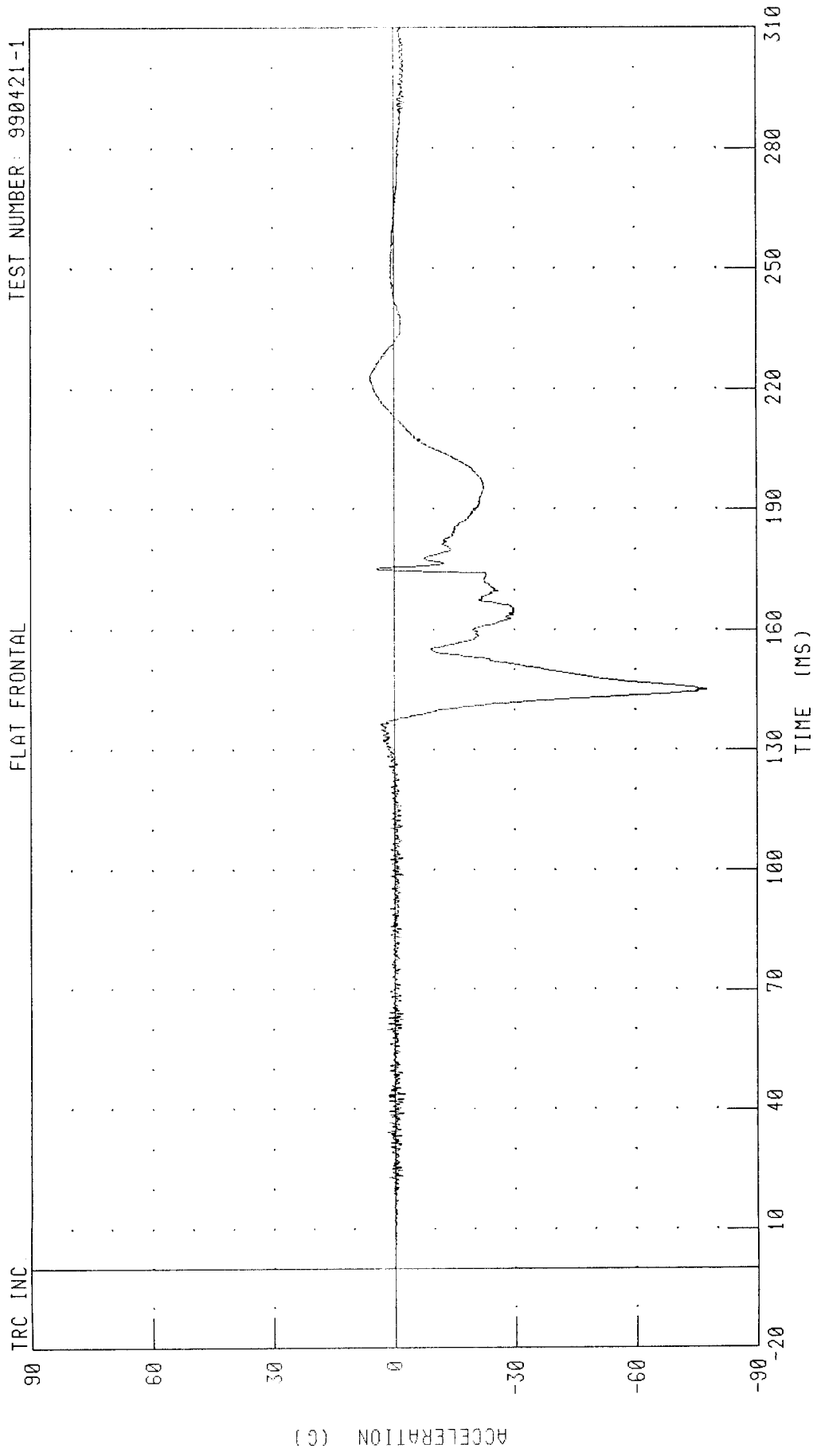


CHANNEL: RFMF2 FILTER: CH. CLASS 600 PEAK DATA: 919.61 N @ 93.60 MS, -9027.77 N @ 26.40 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 HEAD X-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

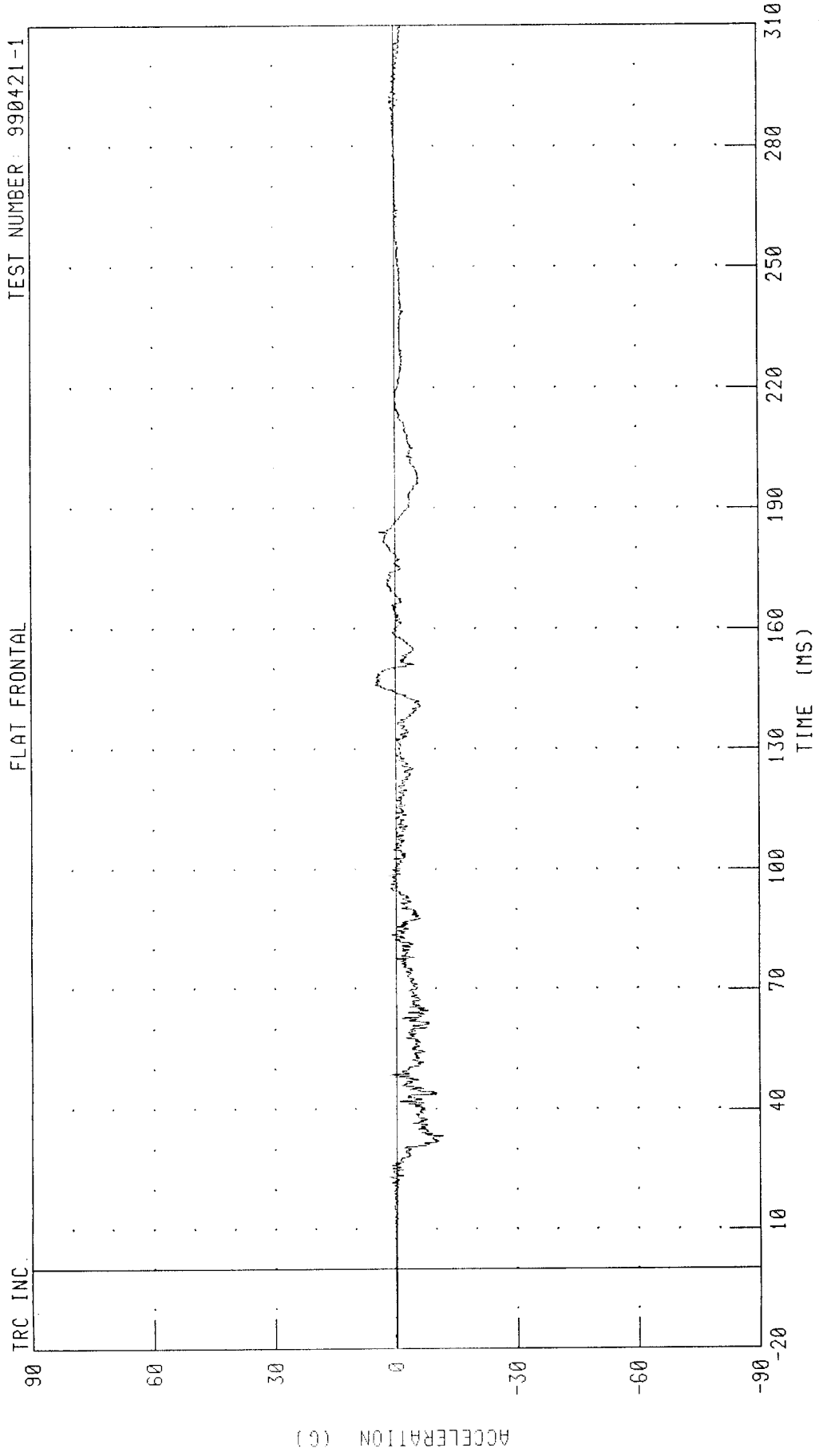


CHANNEL: HEDXG3 FILTER: CH CLASS 1000 PEAK DATA: 5.73 G @ 222.08 MS, -77.63 G @ 145.12 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 HEAD Y-AXIS ACCELERATION

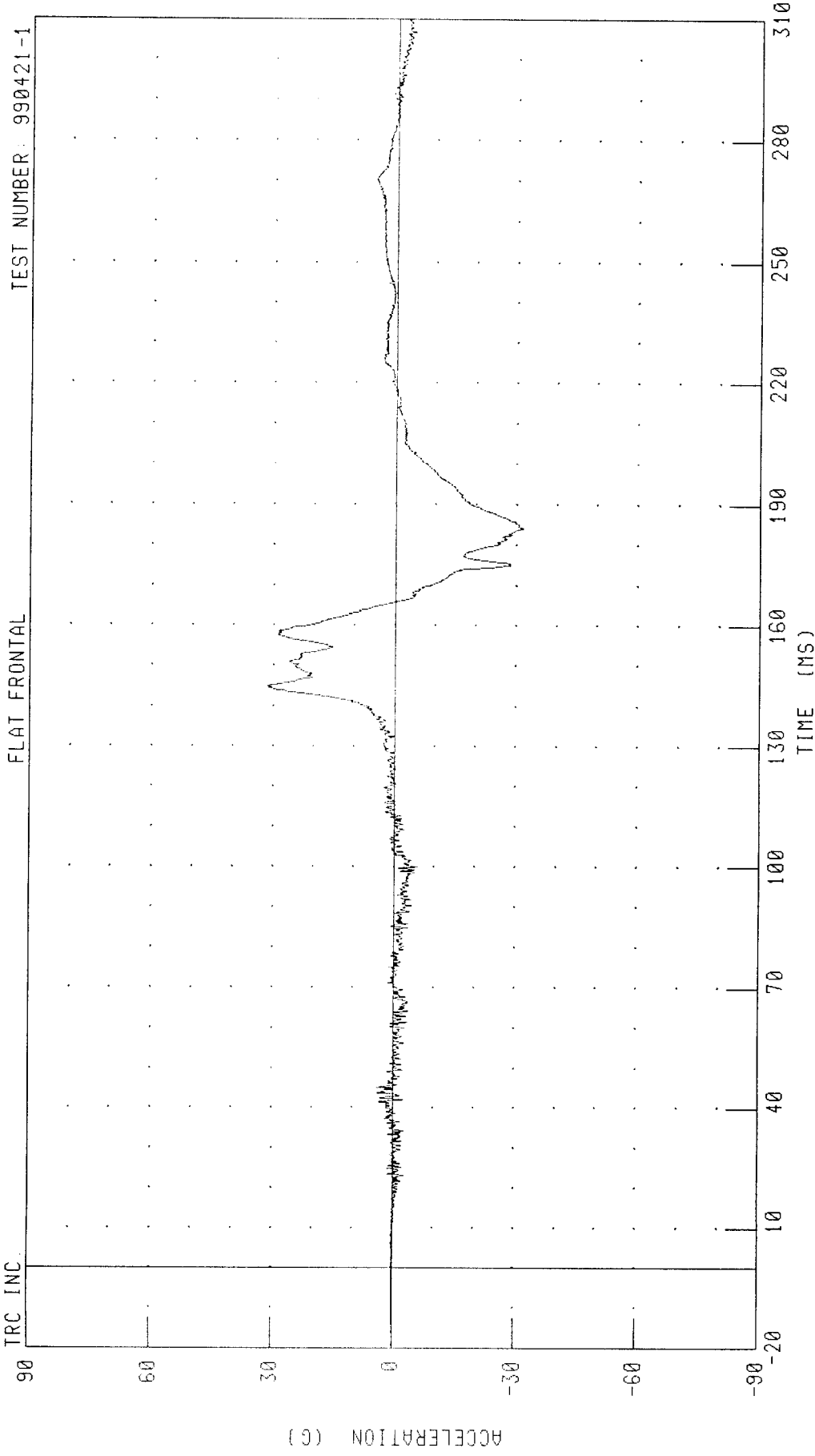
TEST NUMBER: 990421-1

FLAT FRONTAL



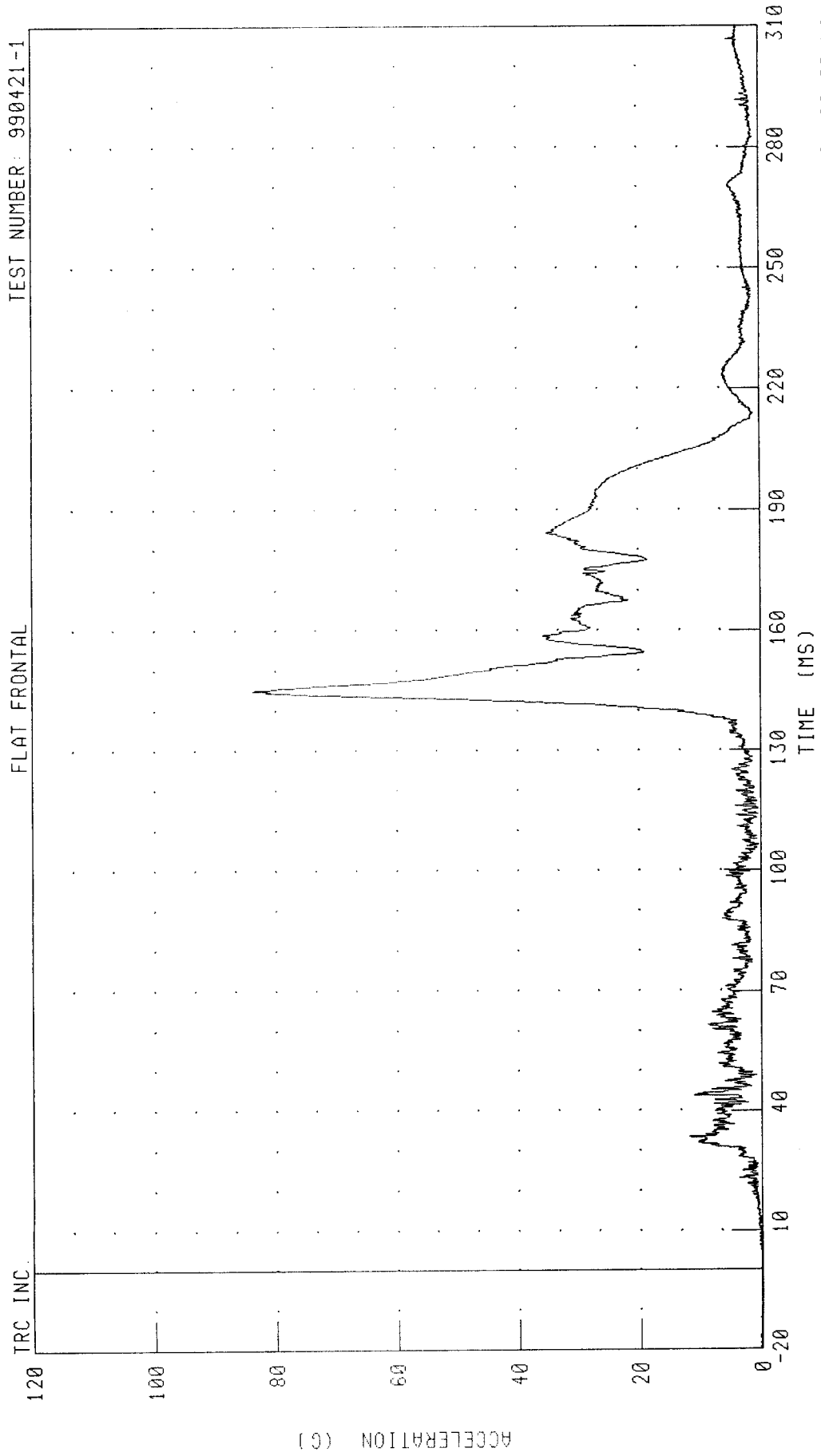
CHANNEL: HEDY63 FILTER: CH. CLASS 1000 PEAK DATA: 4.96 G @ 146.00 MS, -11.77 G @ 33.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 HEAD Z-AXIS ACCELERATION



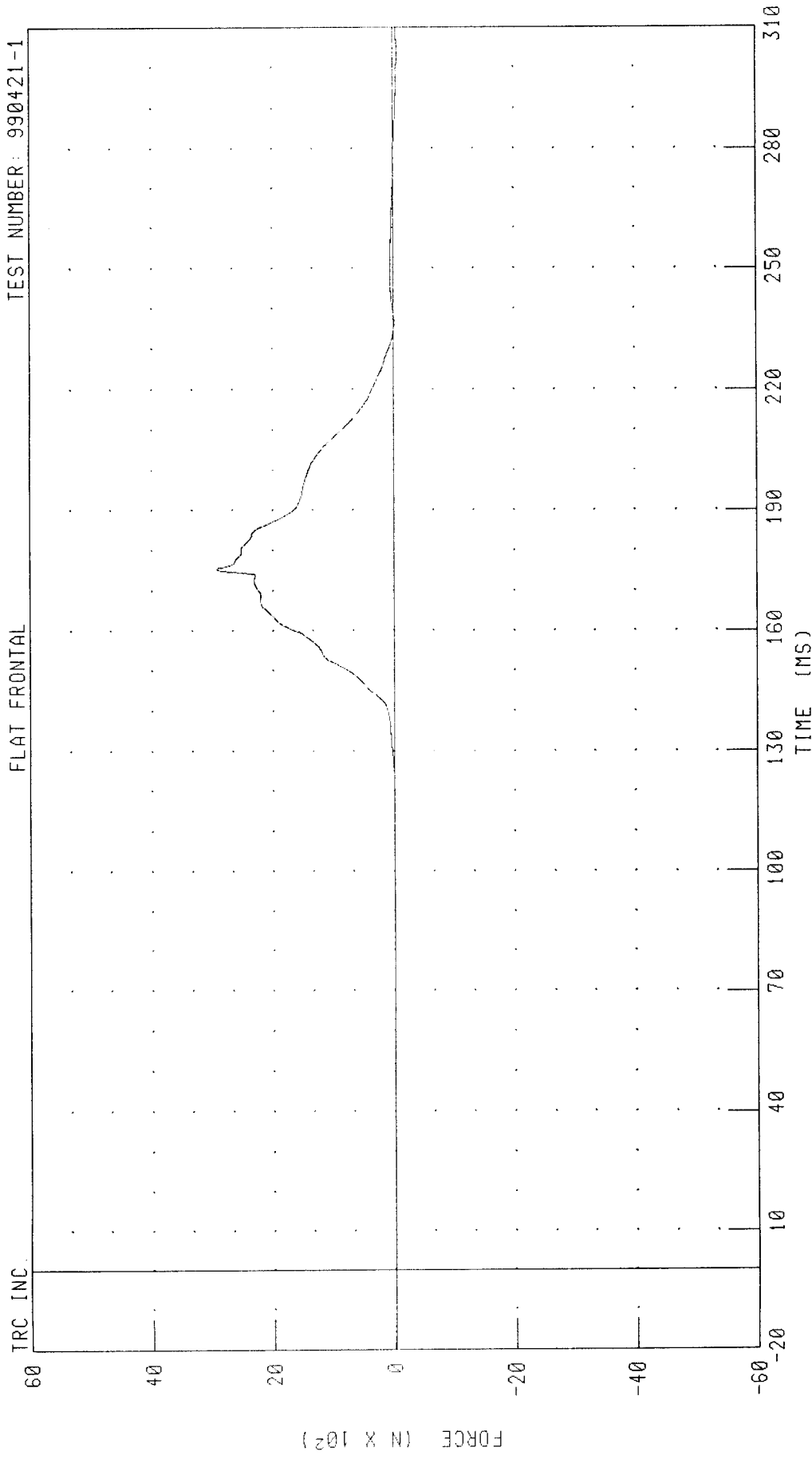
CHANNEL: HEDZG3 FILTER: CH. CLASS 1000 PEAK DATA: 31.74 G @ 145.04 MS, -31.69 G @ 184.24 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 HEAD RESULTANT ACCELERATION



CHANNEL: HEDRG3 FILTER: CH. CLASS 1000 PEAK DATA: 83.77 G @ 145.12 MS; 0.11 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 NECK X-AXIS SHEAR FORCE



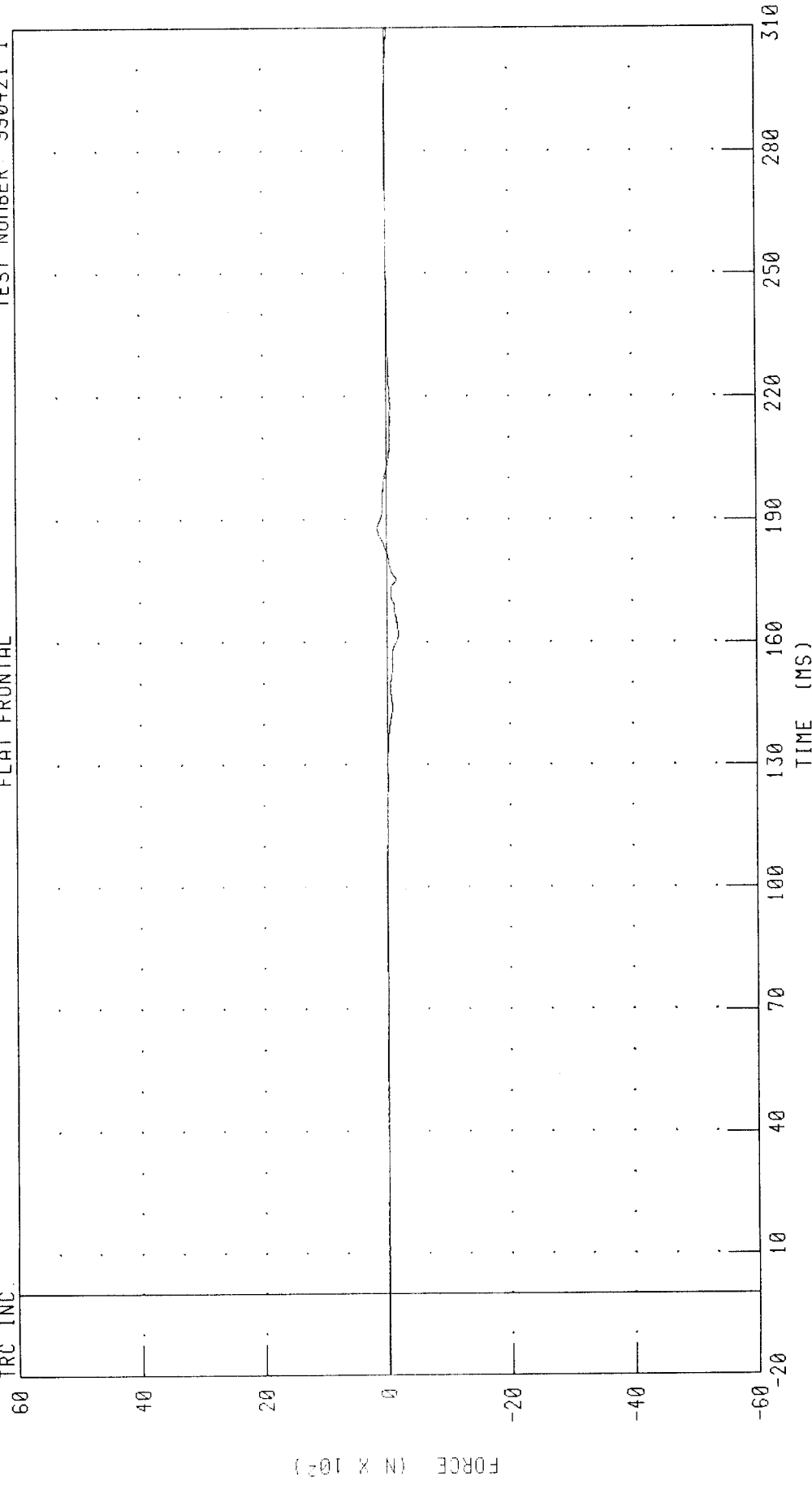
CHANNEL: NEKXF3 FILTER: CH. CLASS 1000 PEAK DATA: 2924.35 N @ 175.44 MS, -70.93 N @ 302.24 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 NECK Y-AXIS SHEAR FORCE

TEST NUMBER: 990421-1

FLAT FRONTAL

TRC INC.

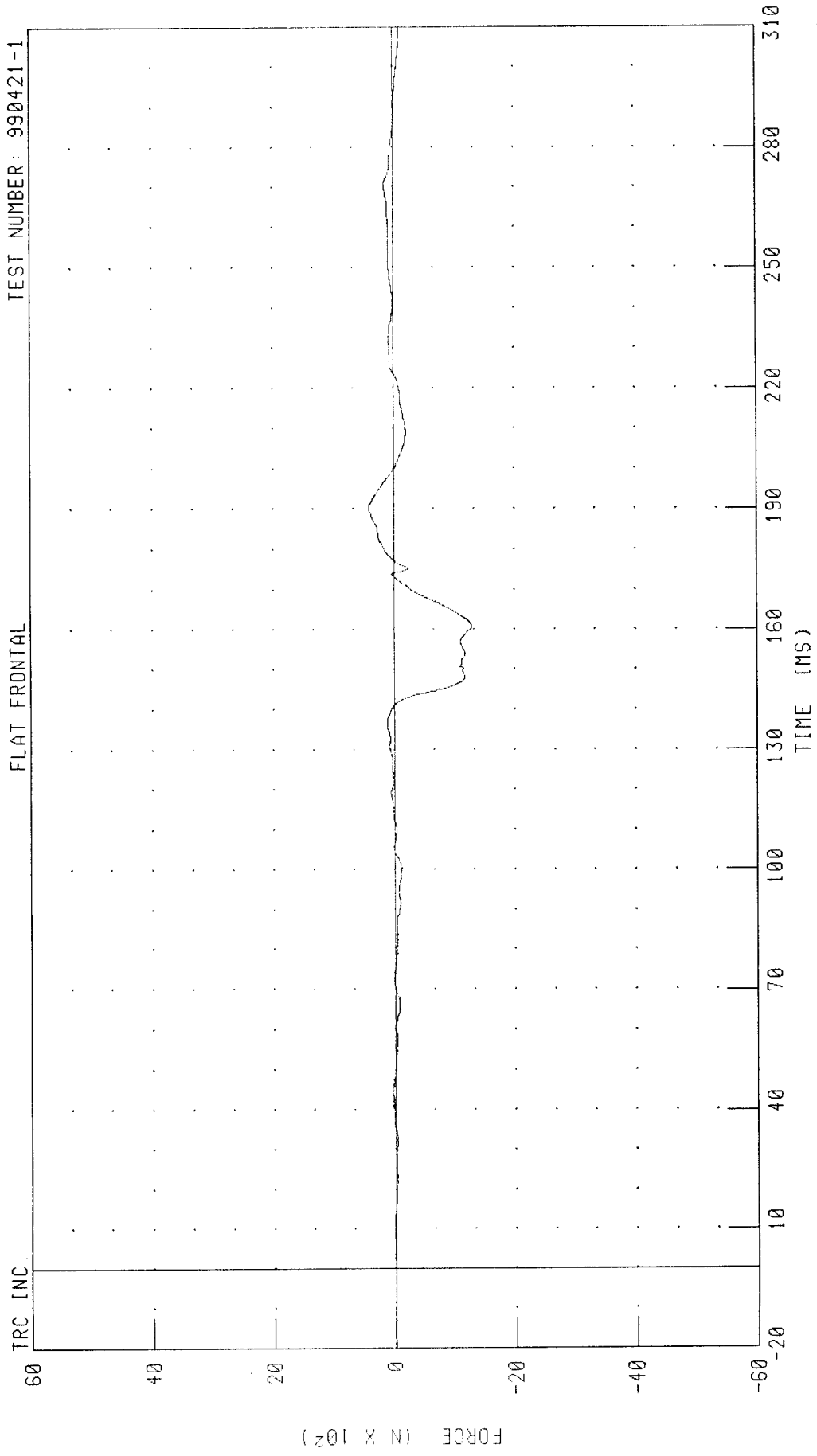


PEAK DATA: 142.36 N @ 187.92 MS, -193.00 N @ 161.76 MS

TIME (MS)

CHANNEL: NEKYF3 FILTER: CH. CLASS 1000

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 NECK Z-AXIS AXIAL FORCE



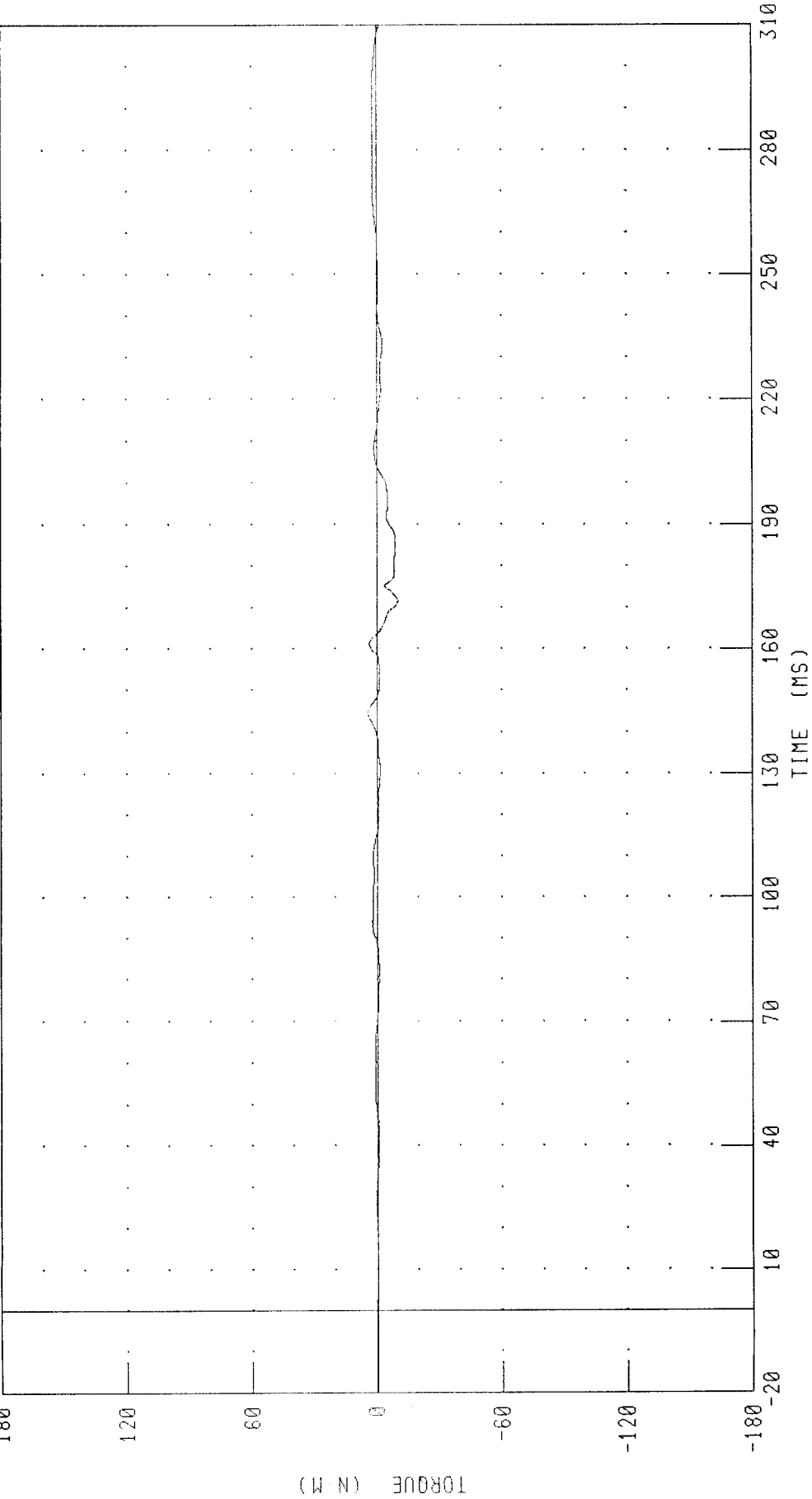
CHANNEL: NEKZF3 FILTER: CH. CLASS 1000
PEAK DATA: 398.41 N @ 189.92 MS, -1299.72 N @ 160.80 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 NECK MOMENT ABOUT X AXIS

TEST NUMBER: 990421-1

FLAT FRONTAL

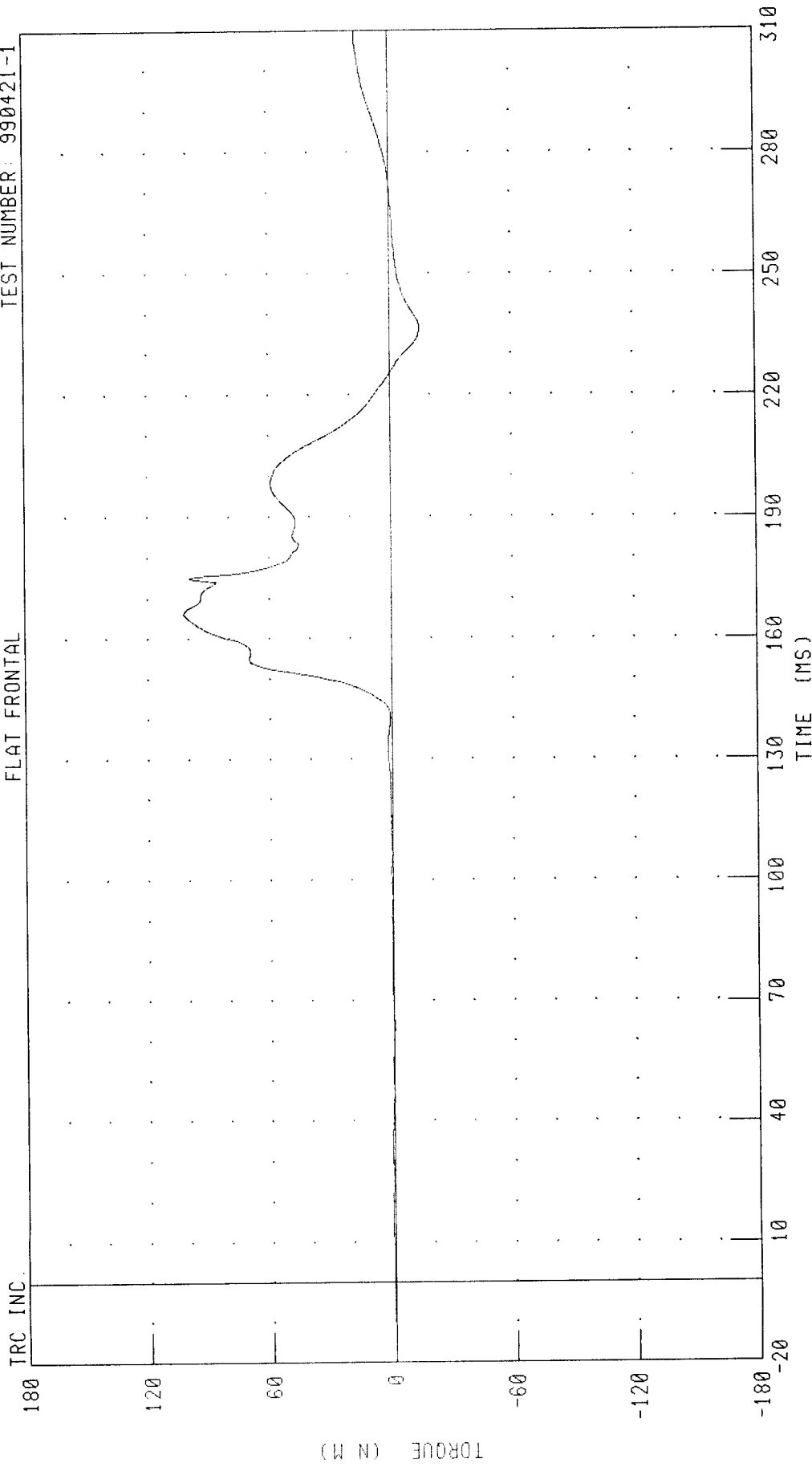
TRC INC.



CHANNEL: NEKXN3 FILTER: CH. CLASS 600 PEAK DATA: 4.29 N-M @ 144.64 MS, -10.17 N-M @ 171.68 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 990421-1

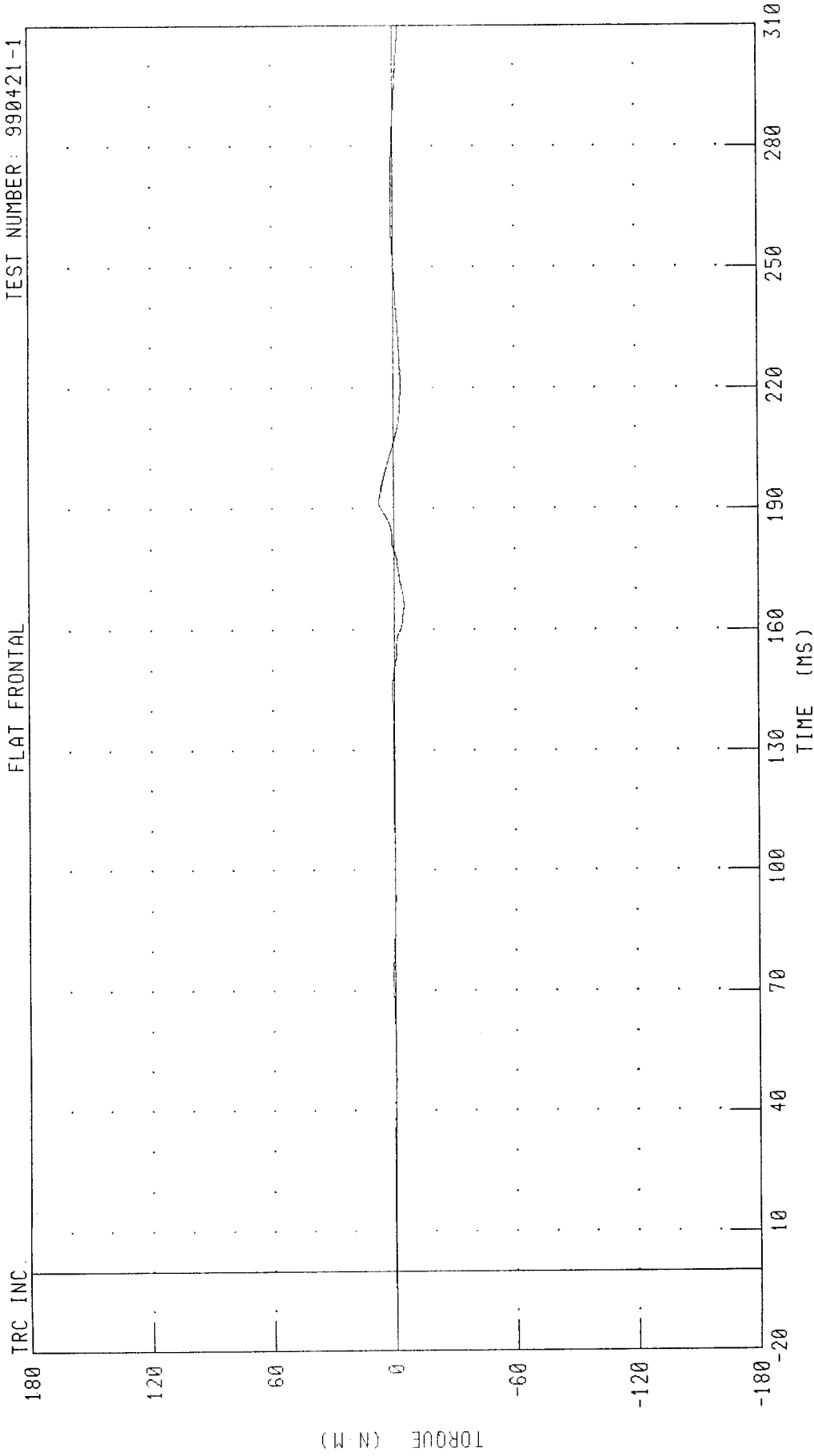


CHANNEL: NEKYM3 FILTER: CH. CLASS 600

PEAK DATA: 102.25 N.M @ 166.40 MS, -15.00 N.M @ 236.48 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 NECK MOMENT ABOUT Z AXIS

TEST NUMBER: 990421-1

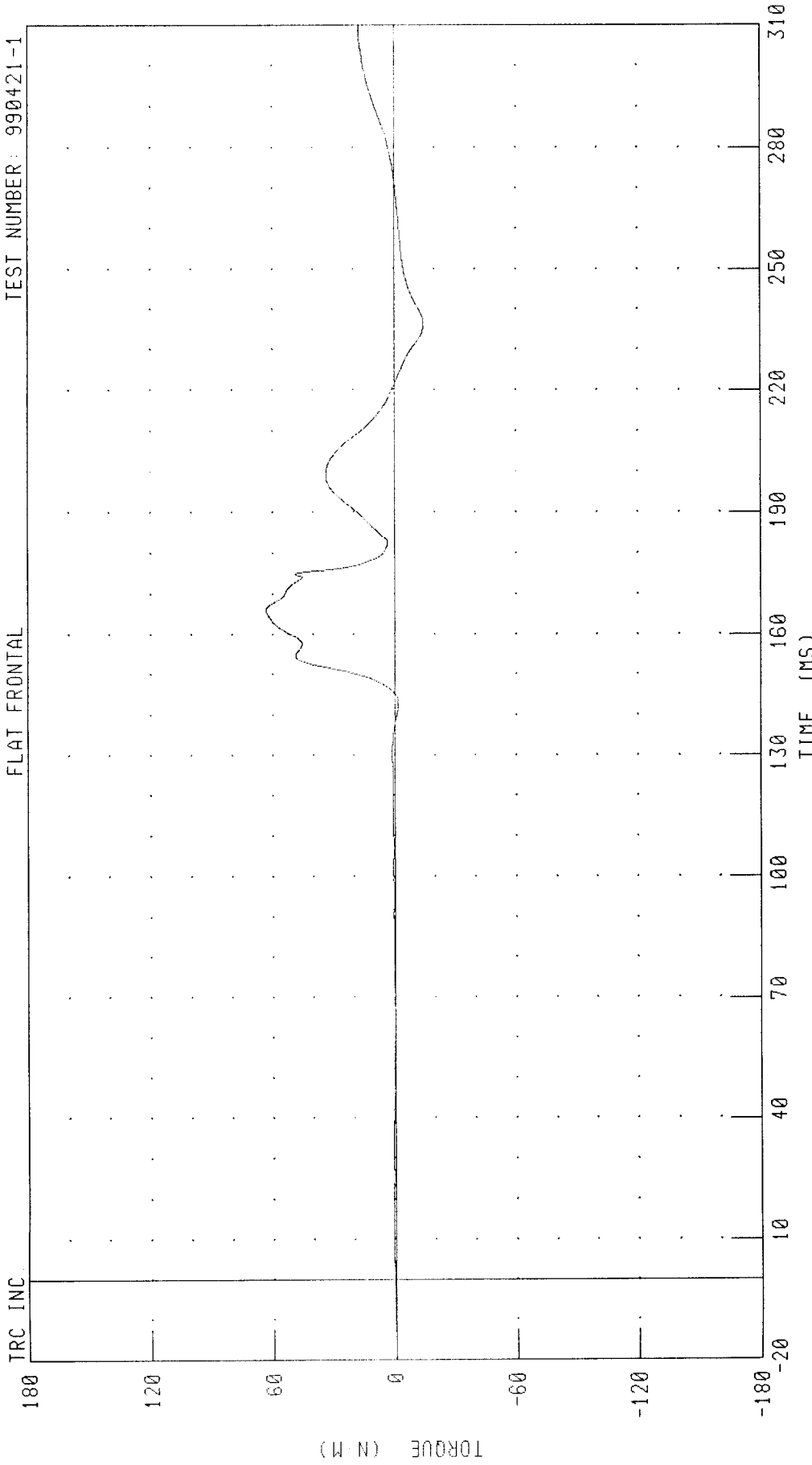


CHANNEL: NEKZM3 FILTER: CH. CLASS 600 PEAK DATA: 6.94 N.M @ 191.92 MS, -5.17 N.M @ 166.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3NECK OCCIPITAL CONDYLE

TEST NUMBER: 990421-1

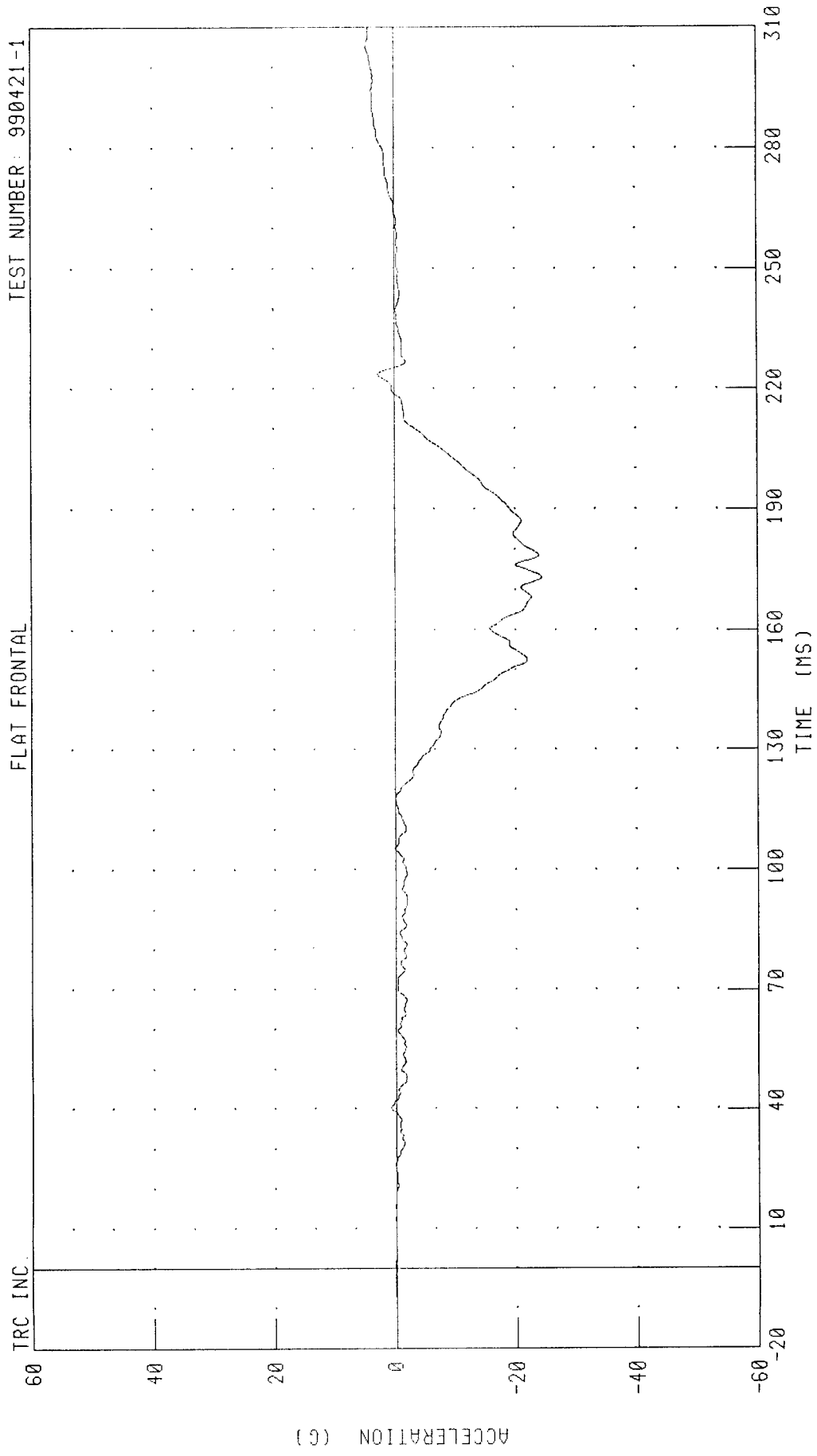
FLAT FRONTAL



CHANNEL: NEKOM3 FILTER: CH. CLASS 600
PEAK DATA: 63.41 N·M @ 166.32 MS, -14.67 N·M @ 236.48 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 CHEST X-AXIS ACCELERATION
FLAT FRONTAL

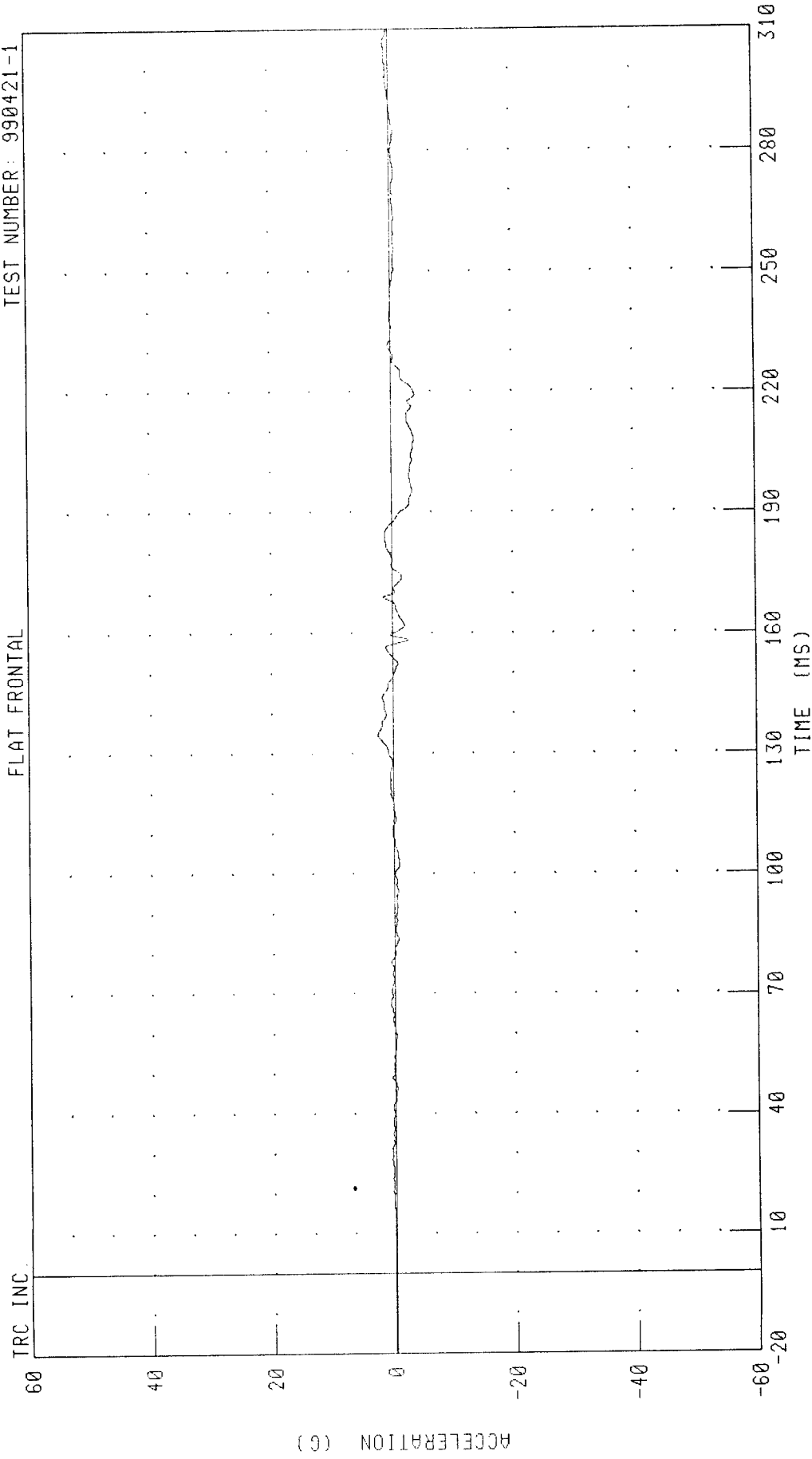
TEST NUMBER: 990421-1



CHANNEL: CSTXG3 FILTER: CH. CLASS 180 PEAK DATA: 4.48 G @ 304.96 MS, -24.45 G @ 173.20 MS

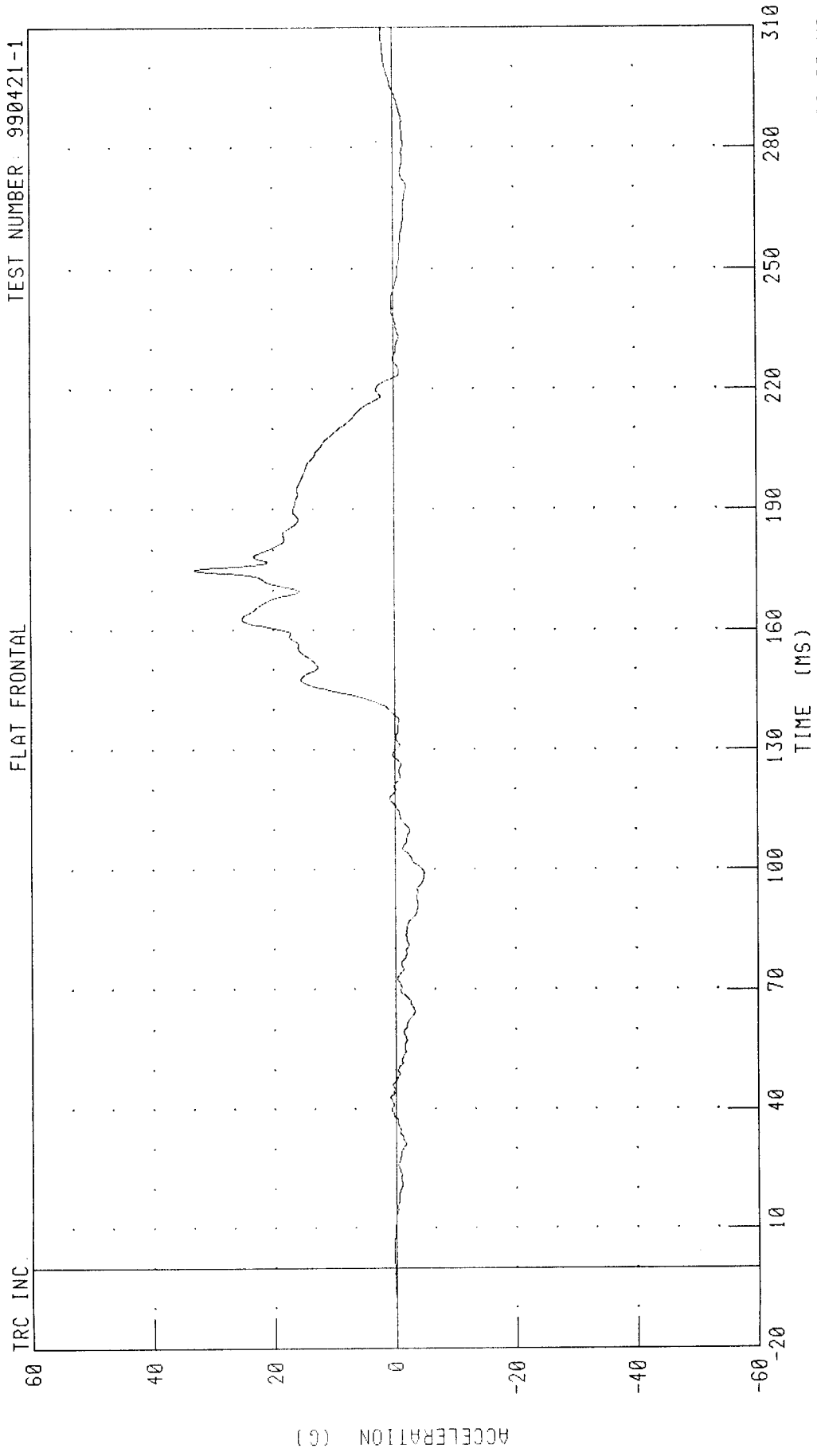
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 CHEST Y-AXIS ACCELERATION

TEST NUMBER: 990421-1



CHANNEL: CSTYG3 FILTER: CH. CLASS 180 PEAK DATA: 2.40 G @ 134.72 MS, -3.95 G @ 219.36 MS

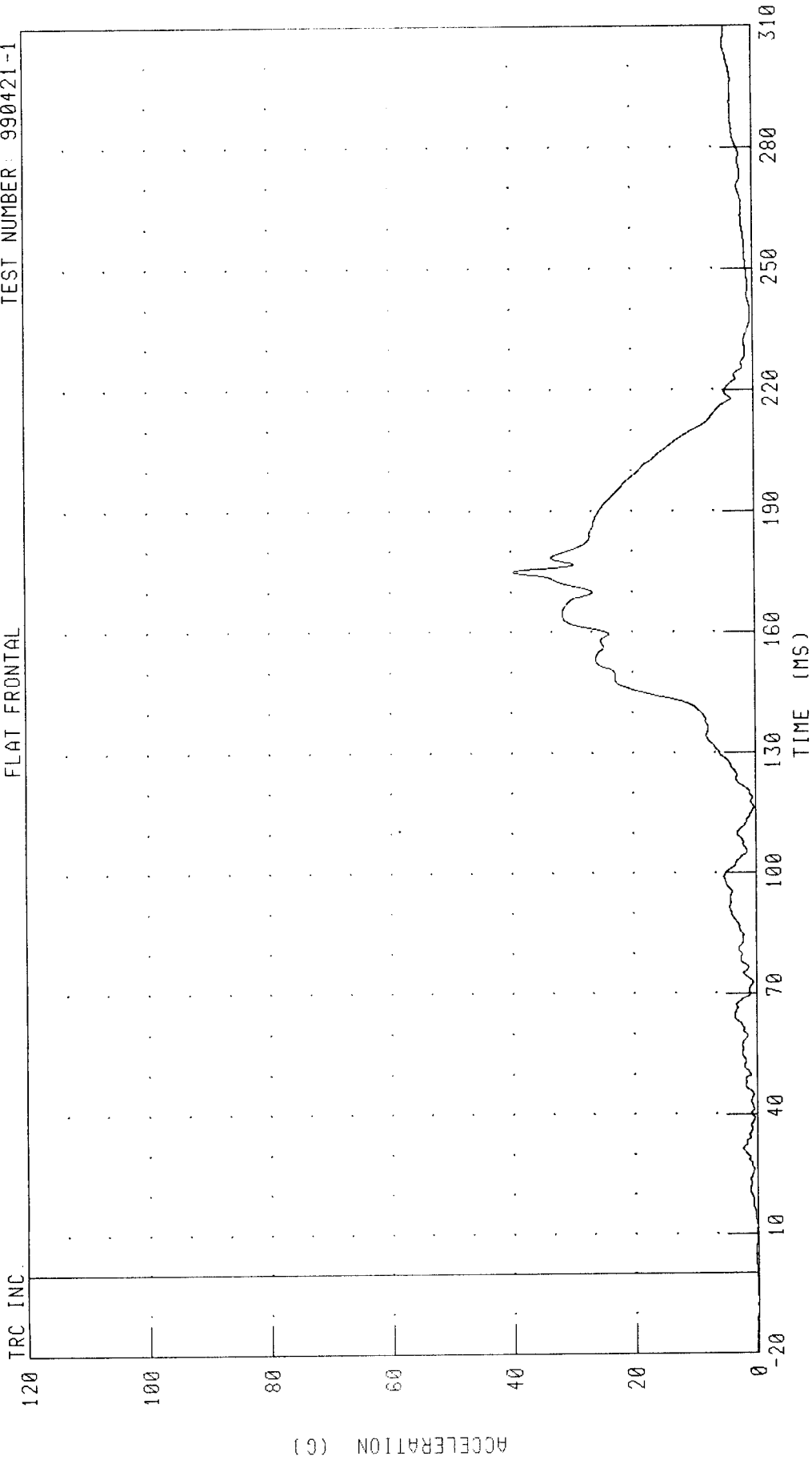
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 CHEST Z-AXIS ACCELERATION
FLAT FRONTAL



CHANNEL: CSTZG3 FILTER: CH. CLASS 180 PEAK DATA: 33.05 G @ 175.12 MS, -4.92 G @ 99.20 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 CHEST RESULTANT ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



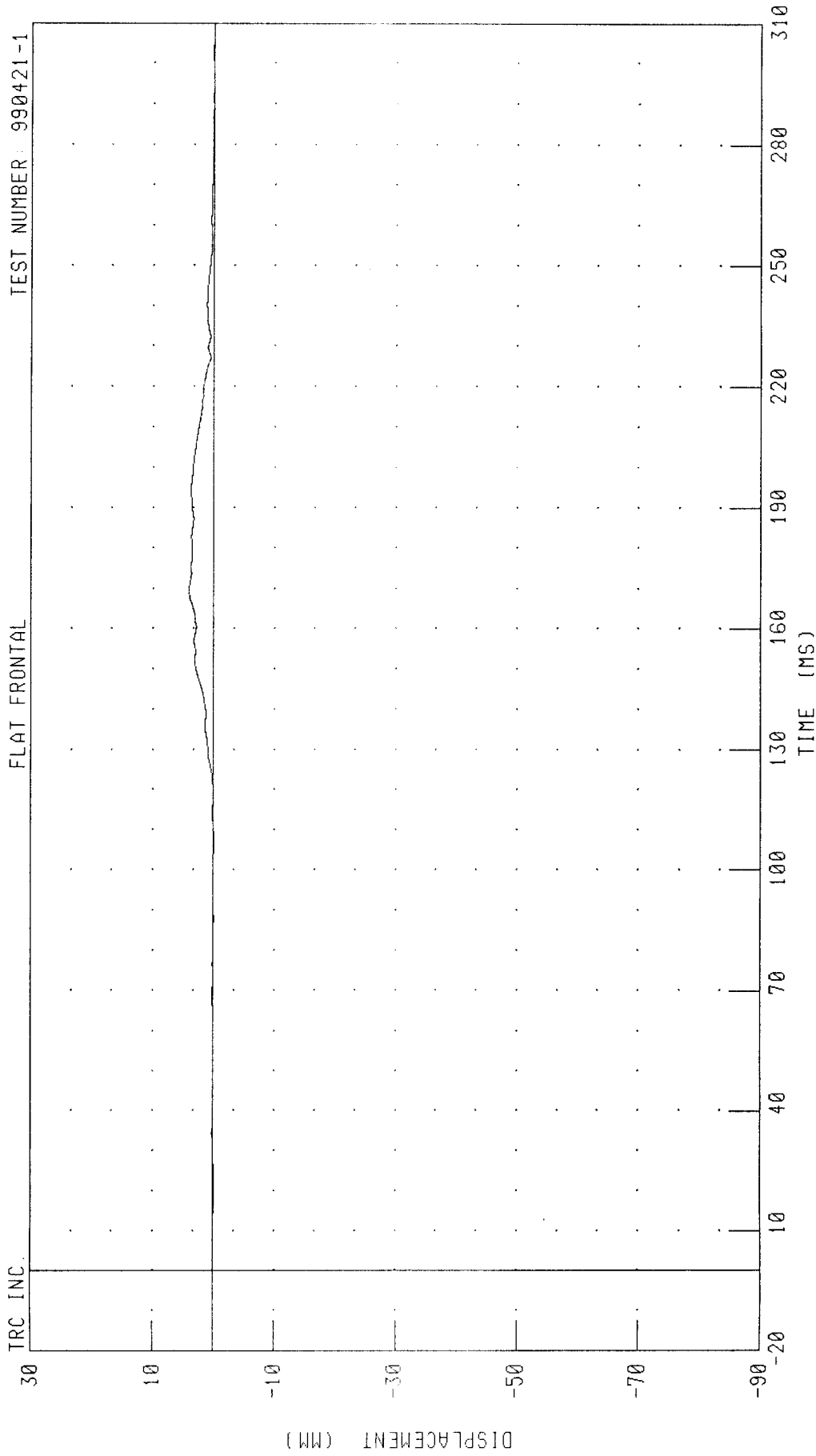
CHANNEL: CSTRG3 FILTER: CH. CLASS 180 PEAK DATA: 39.66 G @ 175.04 MS; 0.01 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 3 CHEST DEFLECTION

FLAT FRONTAL

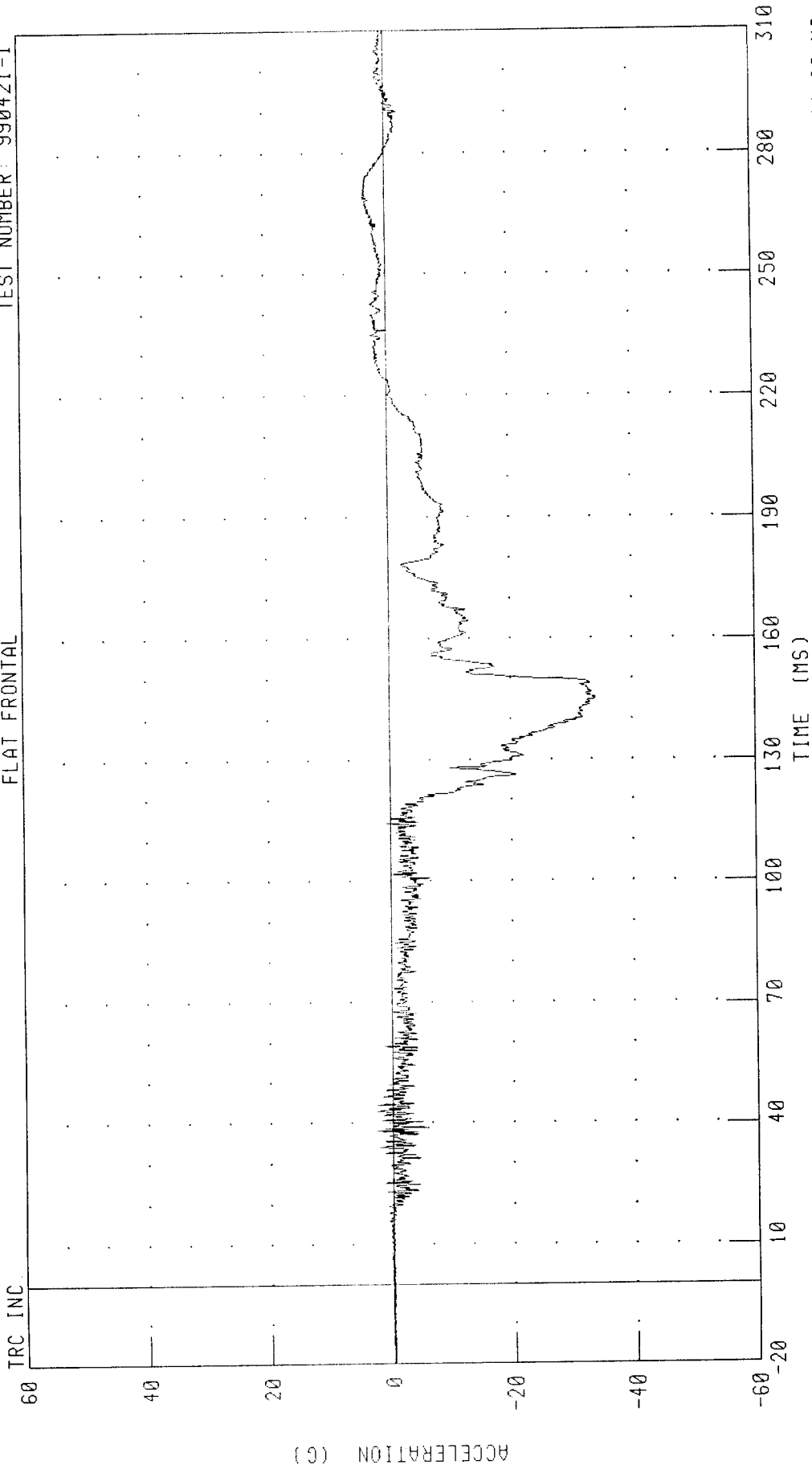
TEST NUMBER: 990421-1



CHANNEL: CSTXD3 FILTER: CH. CLASS 180 PEAK DATA: 4.10 MM @ 169.52 MS, -0.15 MM @ 107.84 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 PELVIS X-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: PEVC63 FILTER: CH. CLASS 1000

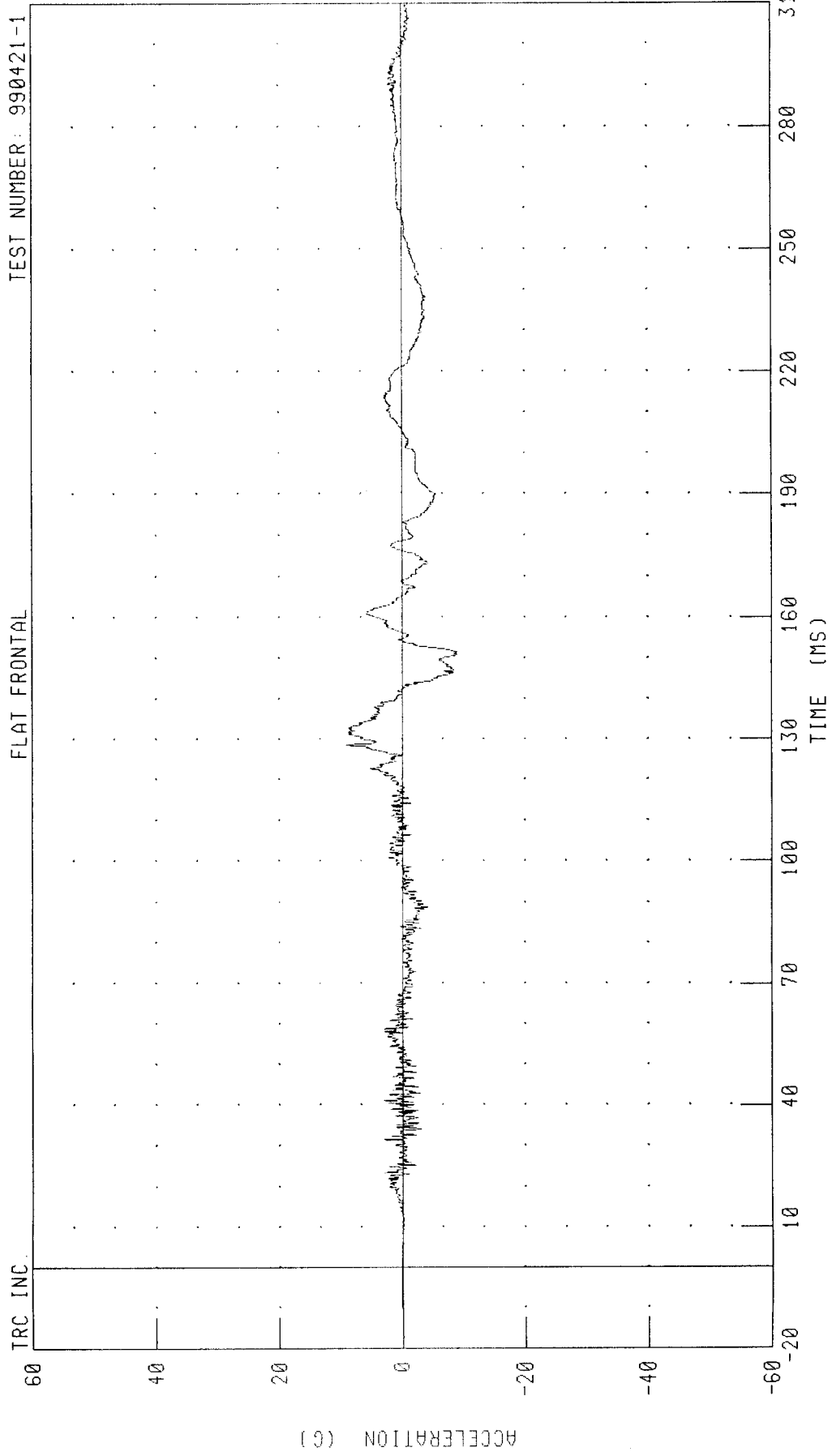
PEAK DATA: 3.71 G @ 269.20 MS, -33.94 G @ 144.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

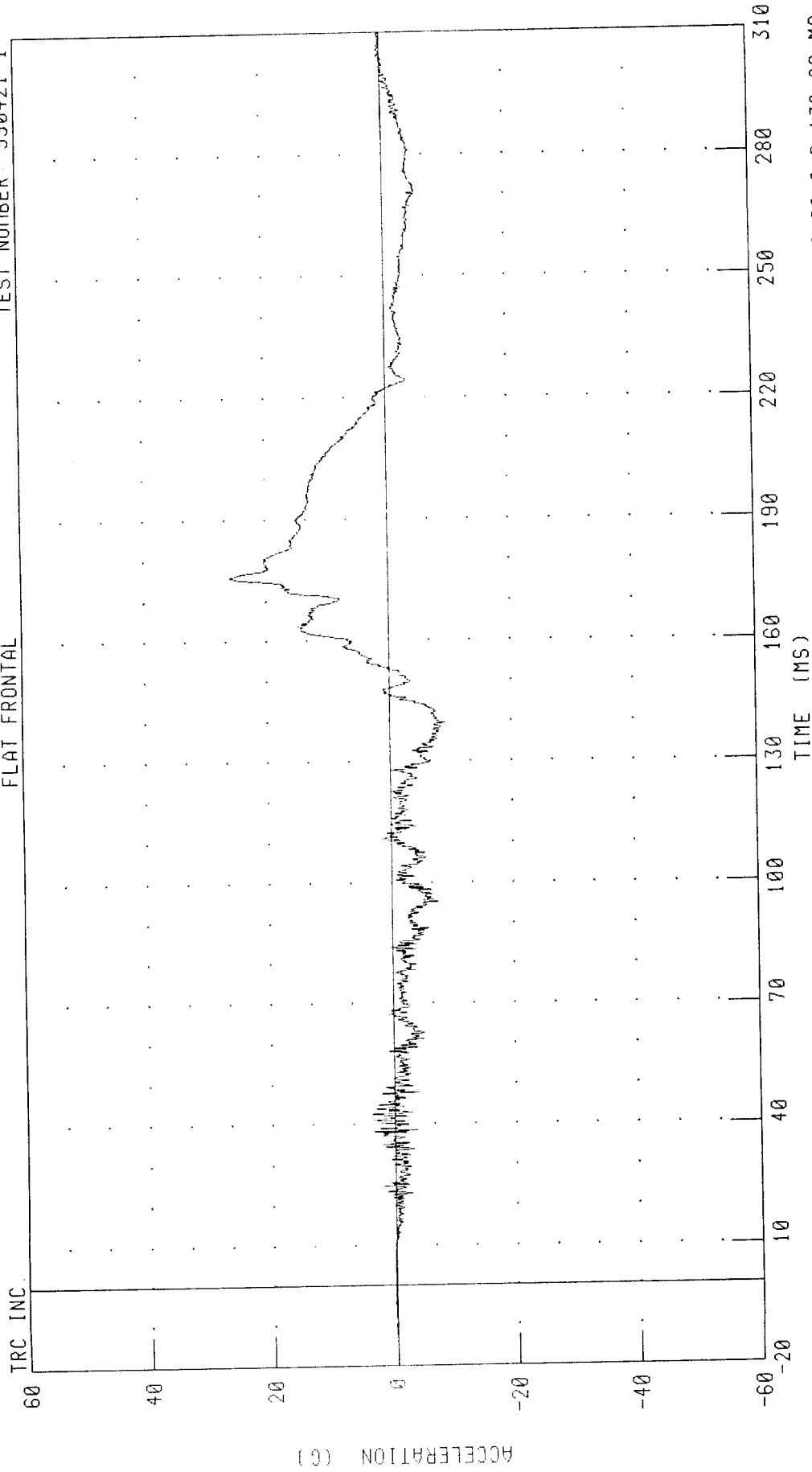
TRC INC.



CHANNEL: PEVYG3 FILTER: CH. CLASS 1000 PEAK DATA: 9.00 G @ 128.56 MS; -8.99 G @ 150.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 PELVIS Z-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: PEVZG3 FILTER: CH. CLASS 1000 PEAK DATA: 25.76 G @ 175.84 MS, -9.22 G @ 139.68 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 PELVIS RESULTANT ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

TRC INC.

120

100

80

60

40

20

0

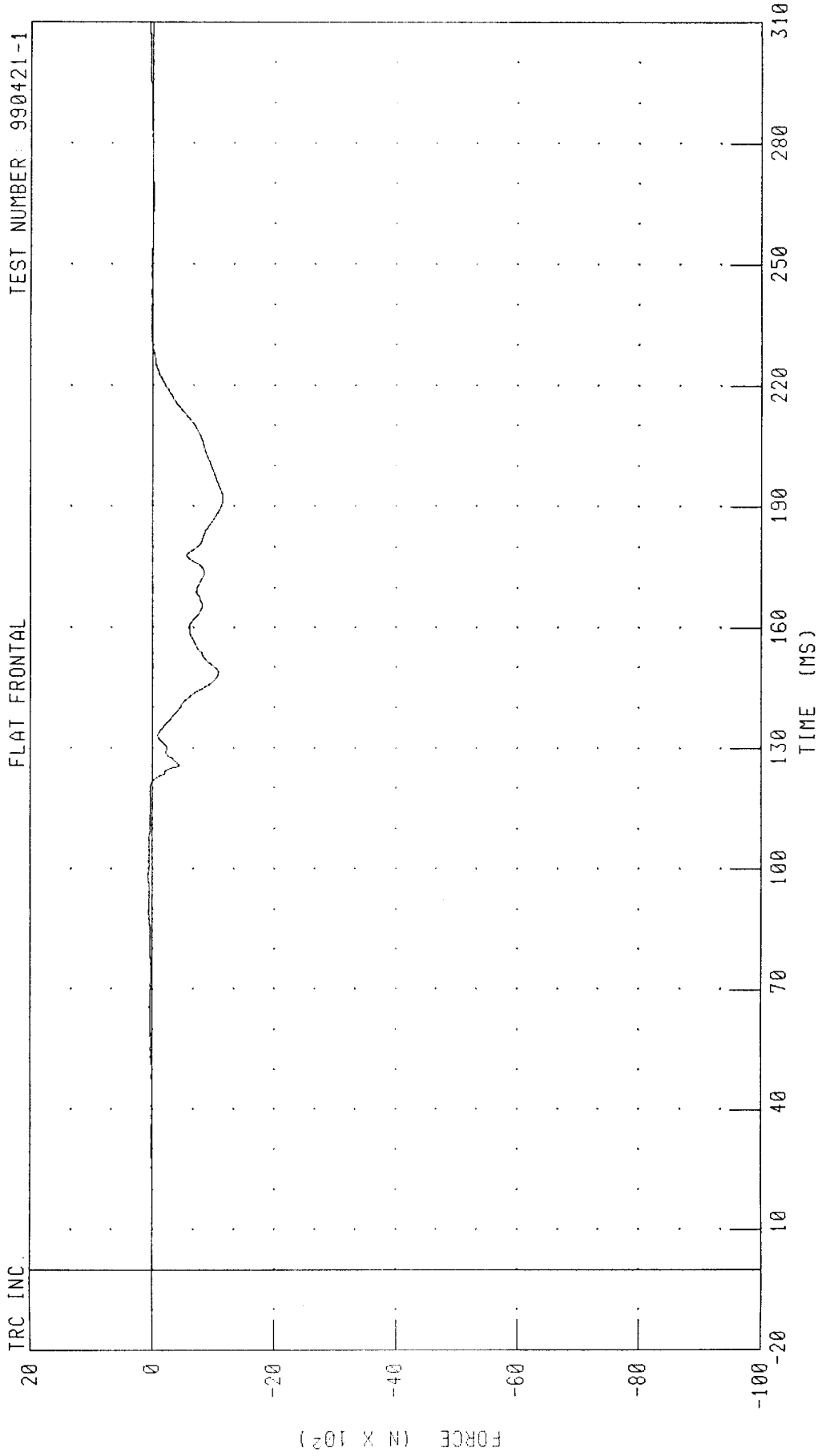
ACCELERATION (G)

10 40 70 100 130 160 190 220 250 280 310

TIME (MS)

CHANNEL: PEVRG3 FILTER: CH. CLASS 1000 PEAK DATA: 34.58 G @ 144.96 MS; 0.06 G @ -19.68 MS

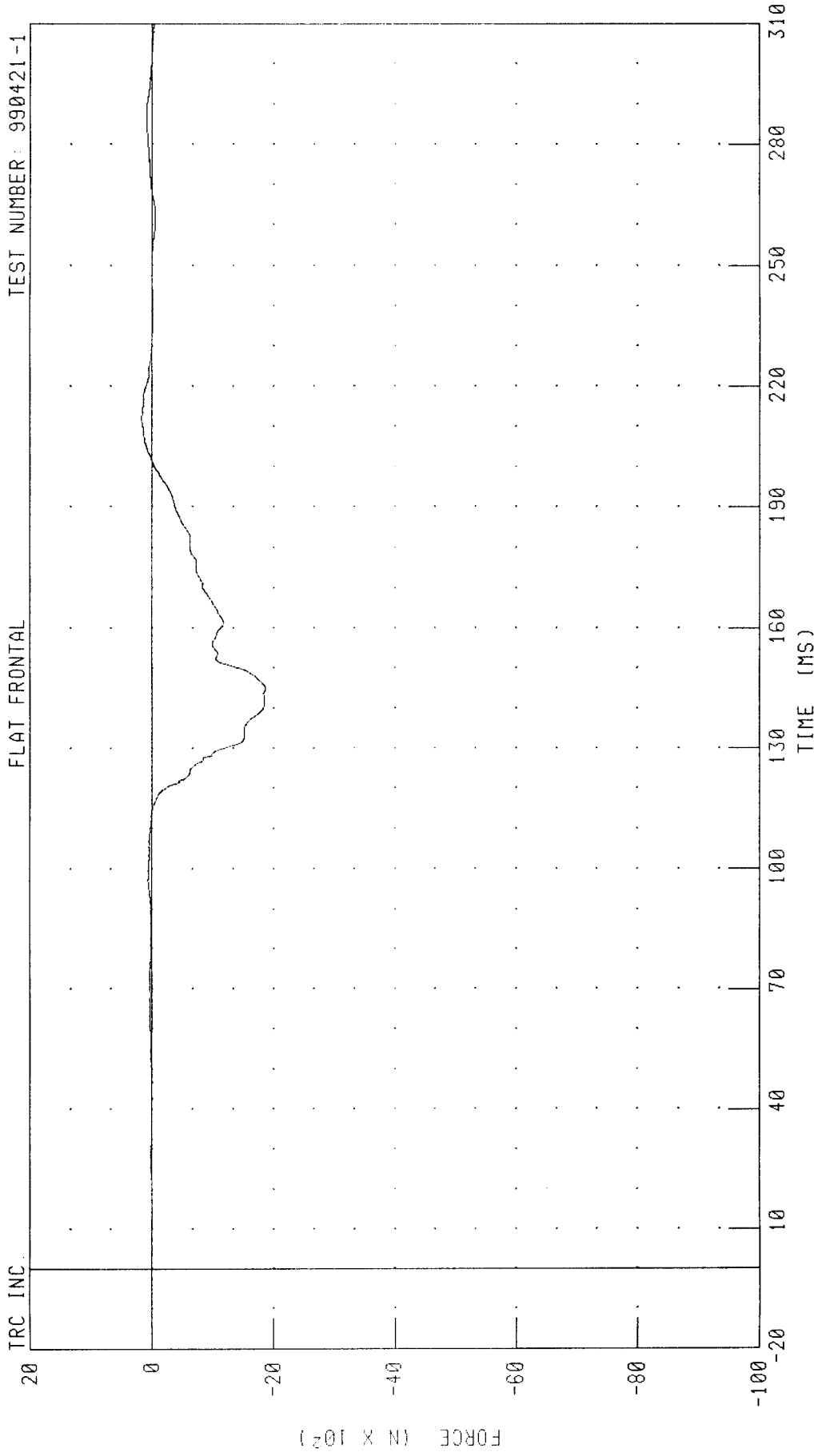
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 LEFT FEMUR FORCE



CHANNEL: LFMF3 FILTER: CH. CLASS 600
PEAK DATA: 70.39 N @ 97.36 MS; -1149.77 N @ 191.92 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 3 RIGHT FEMUR FORCE
FLAT FRONTAL

TEST NUMBER: 990421-1



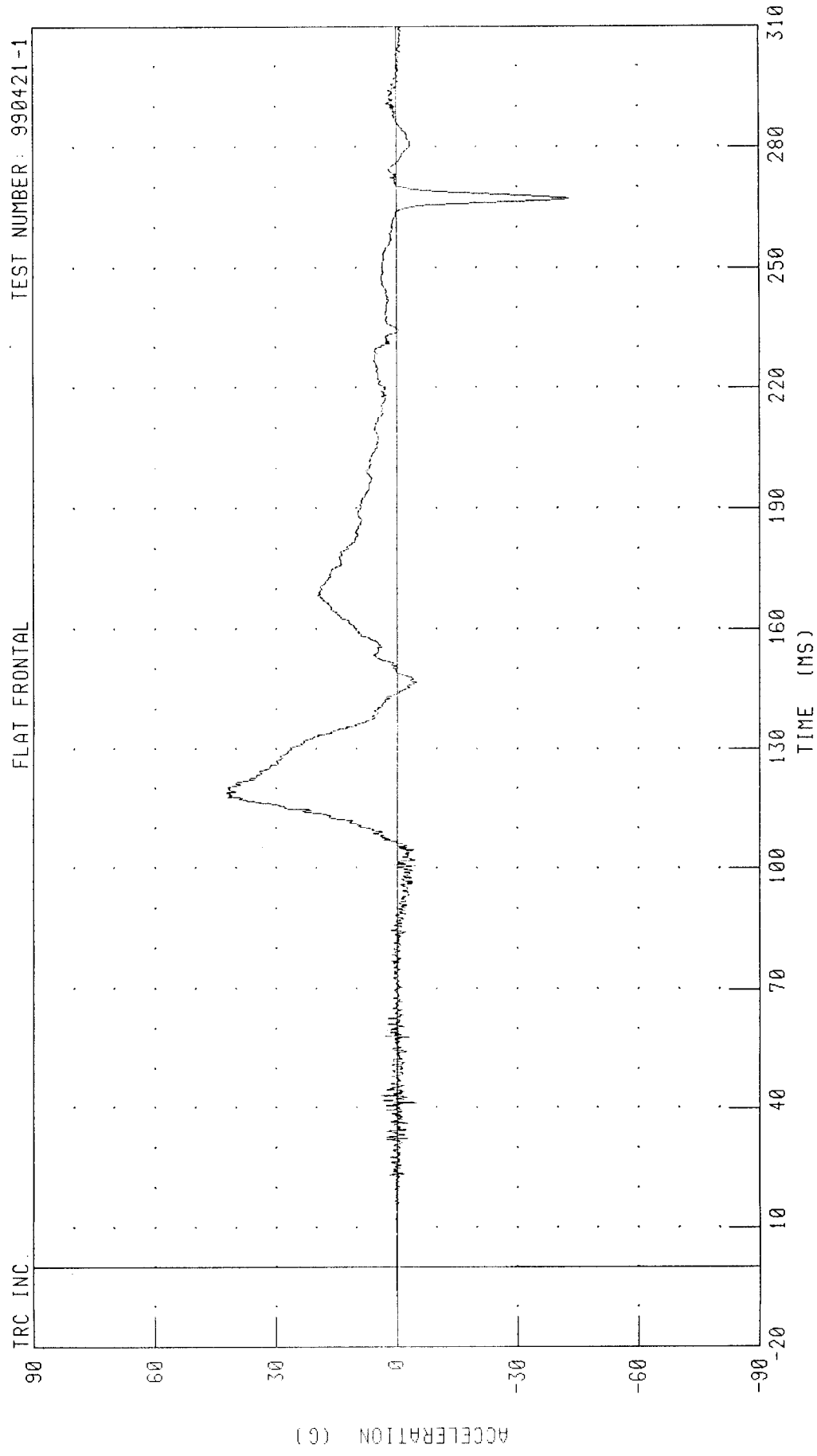
TRC INC.

CHANNEL: RFMF3 FILTER: CH. CLASS 600

PEAK DATA: 169.16 N @ 212.32 MS; -1854.86 N @ 145.28 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 HEAD X-AXIS ACCELERATION
FLAT FRONTAL

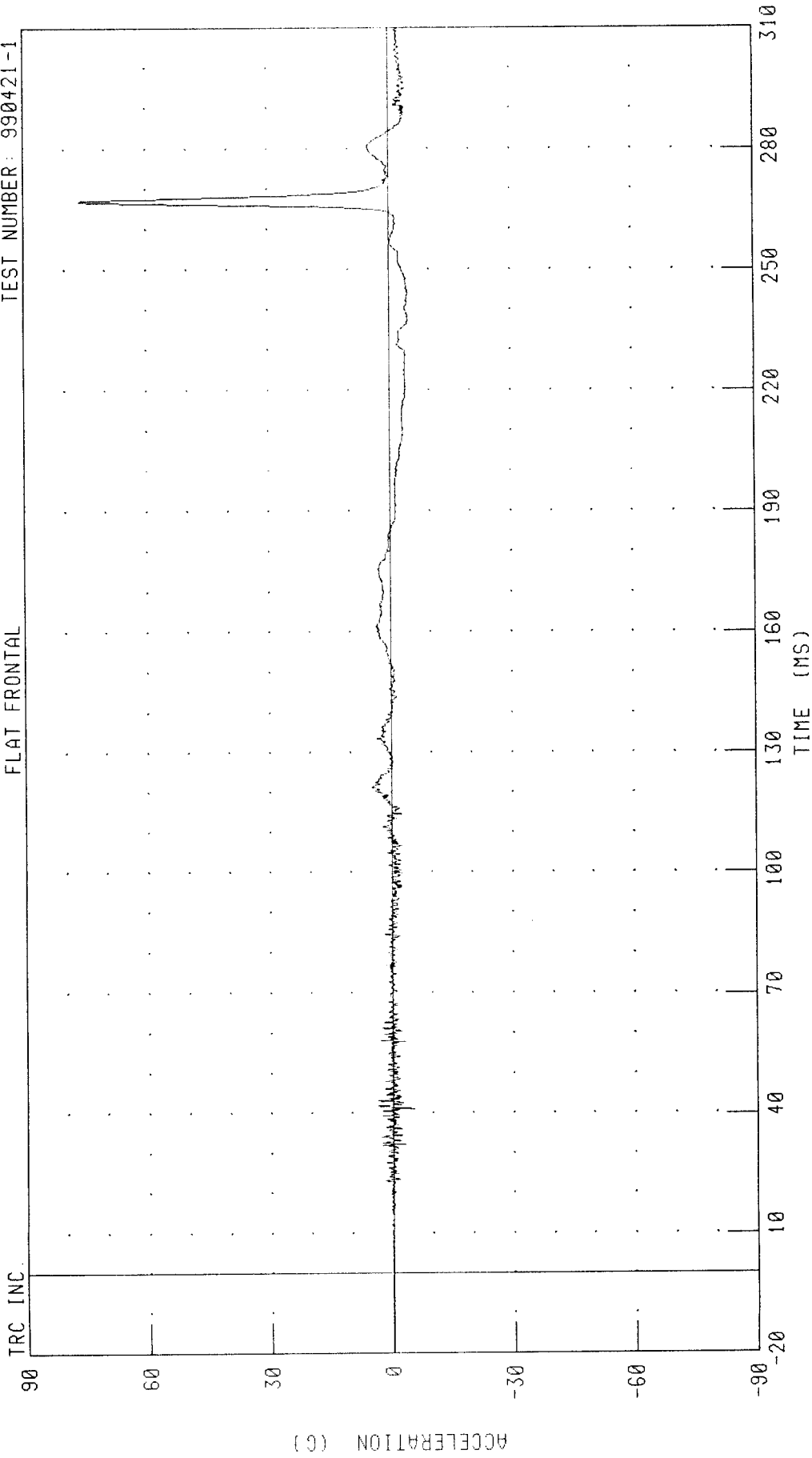
TEST NUMBER: 990421-1



CHANNEL: HEDXG4 FILTER: CH. CLASS 1000 PEAK DATA: 42.27 G @ 118.96 MS; -42.93 G @ 267.28 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 HEAD Y-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1

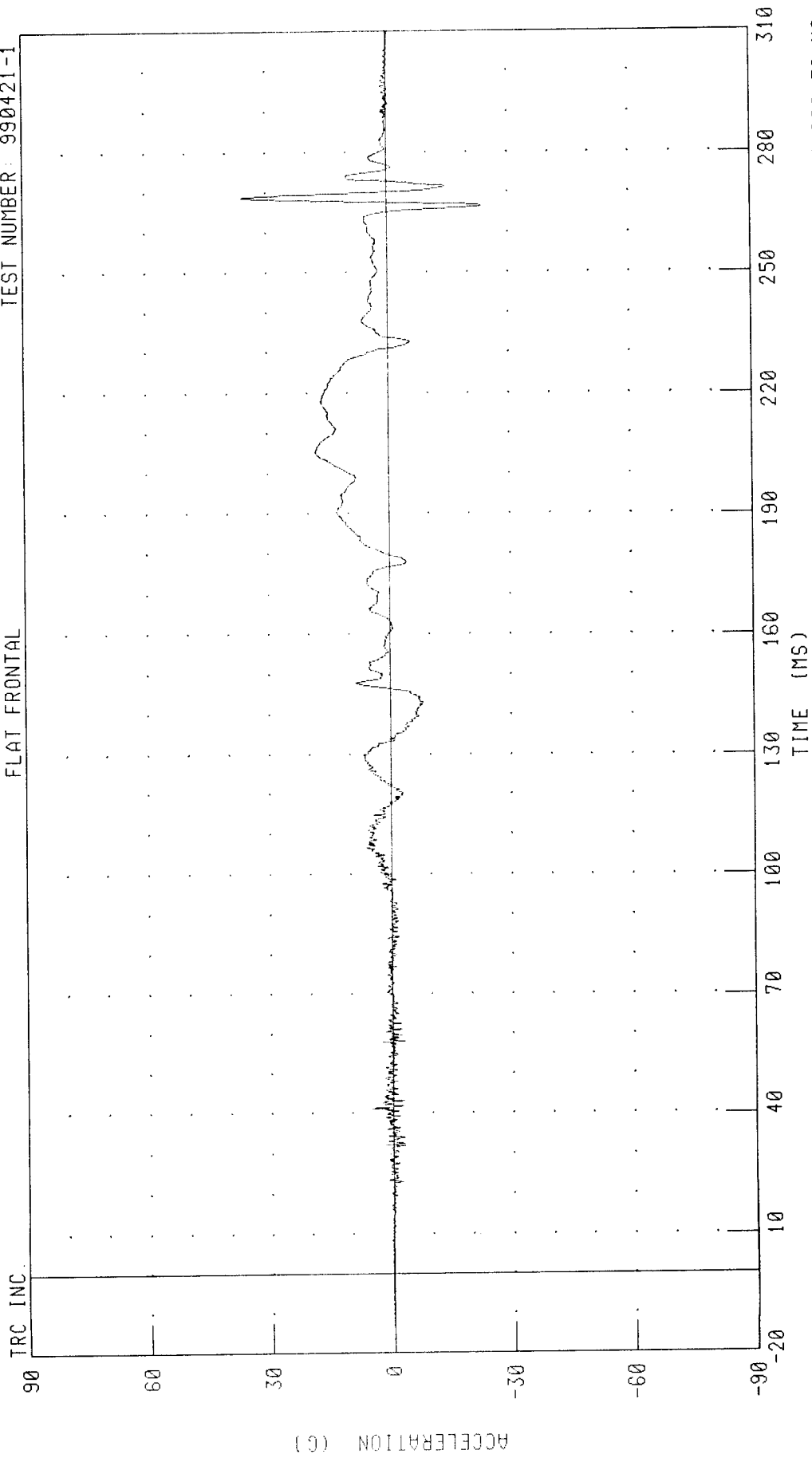


CHANNEL: HEDY64 FILTER: CH. CLASS 1000

PEAK DATA: 76.39 G @ 267.04 MS; -5.42 G @ 41.28 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 HEAD Z-AXIS ACCELERATION
FLAT FRONTAL

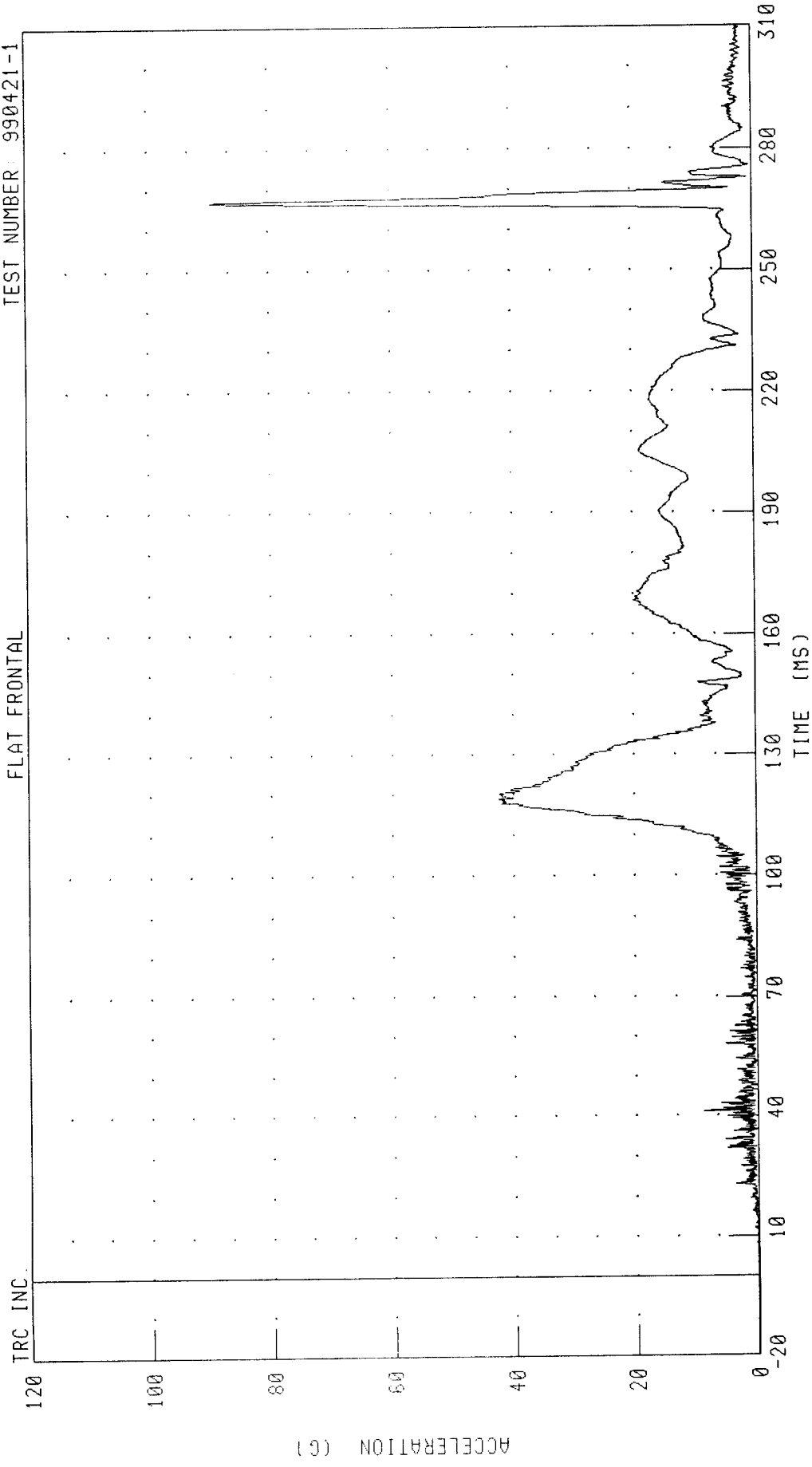
TEST NUMBER 990421-1



CHANNEL: HEDZG4 FILTER: CH. CLASS 1000 PEAK DATA: 36.00 G @ 268.88 MS; -23.85 G @ 266.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 HEAD RESULTANT ACCELERATION

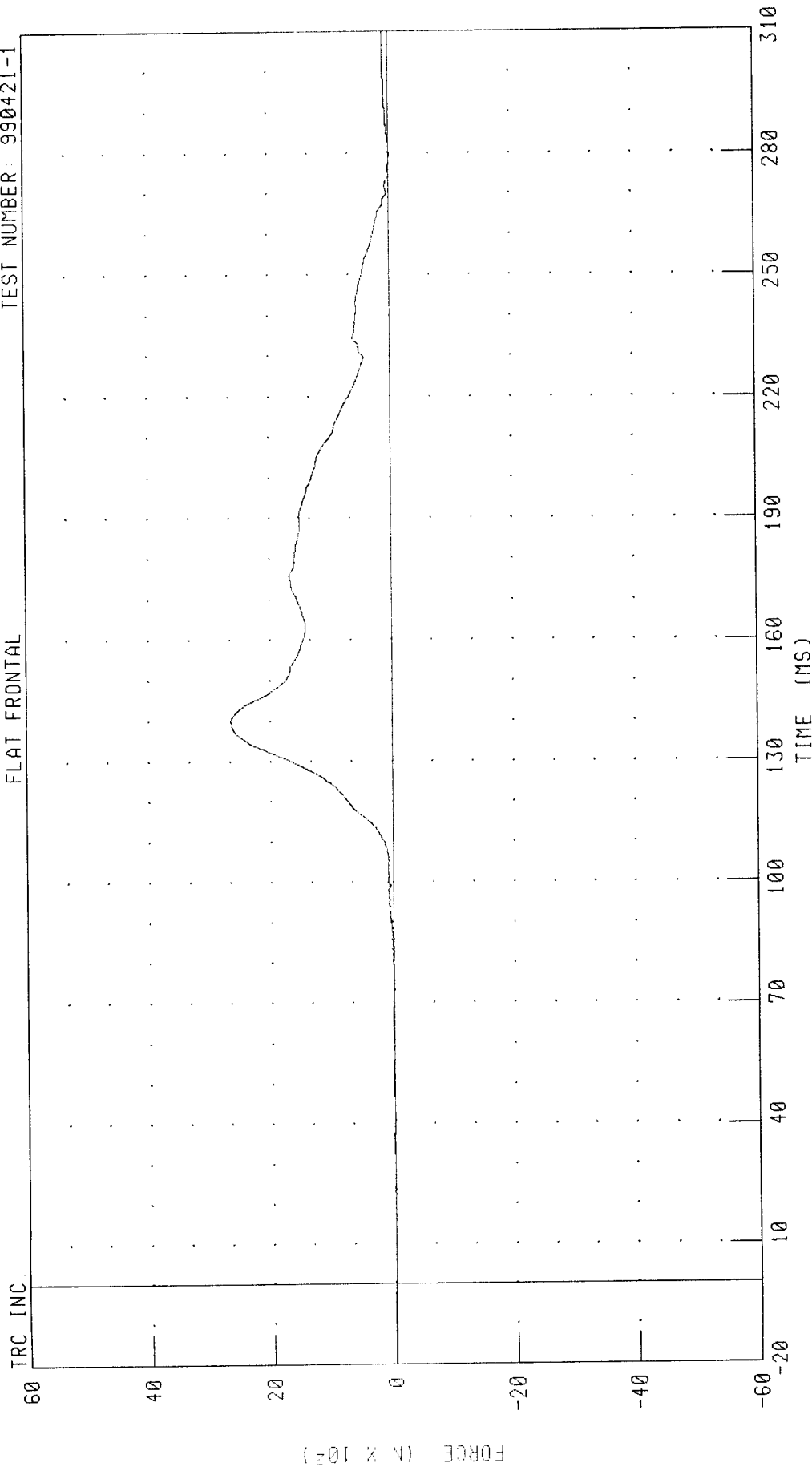
TEST NUMBER: 990421-1



CHANNEL: HEDRC4 FILTER: CH. CLASS 1000 PEAK DATA: 89.52 G @ 267.04 MS; 0.11 G @ -9.12 MS

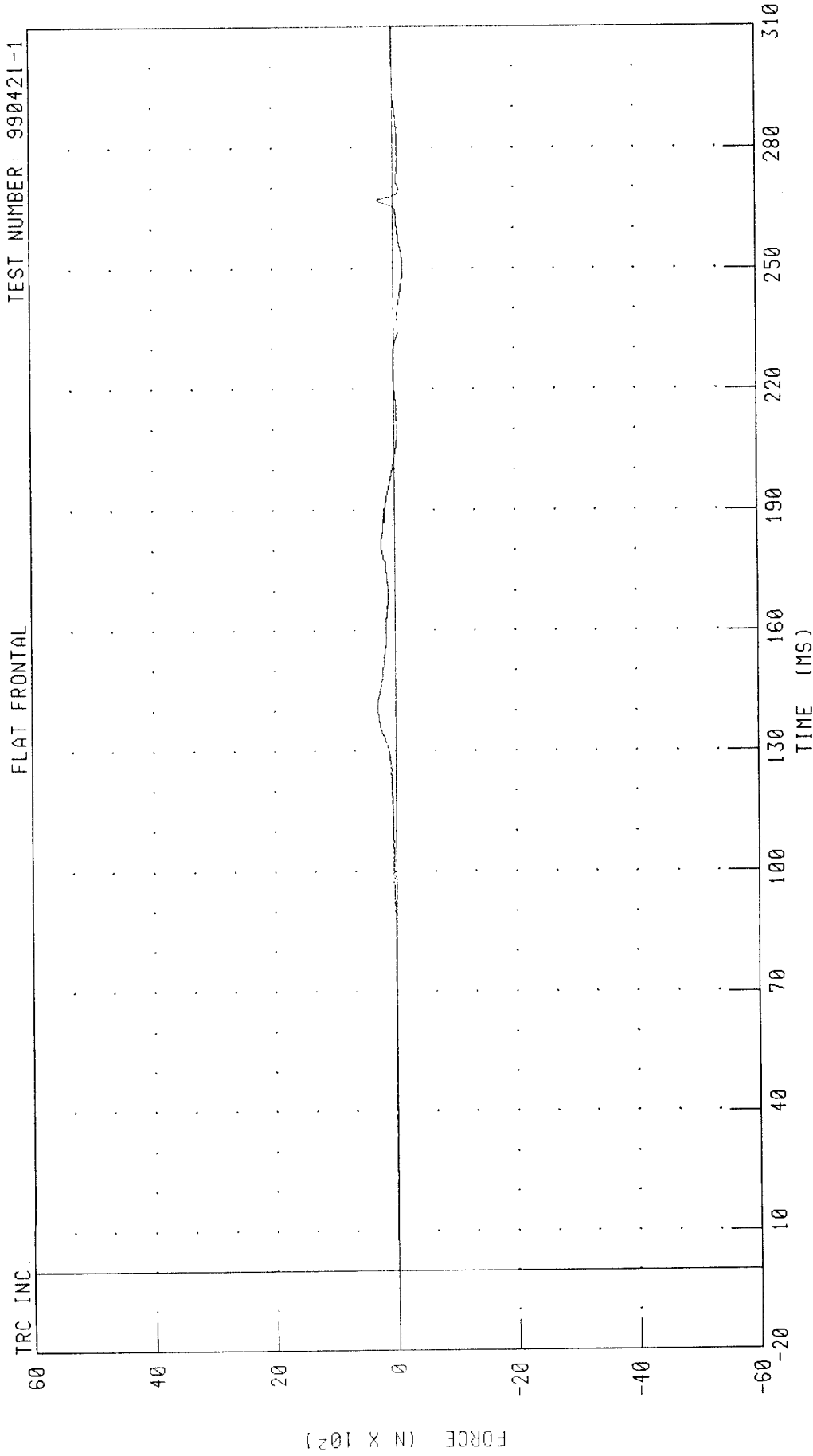
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 NECK X-AXIS SHEAR FORCE
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: NEKXF4 FILTER: CH. CLASS 1000
PEAK DATA: 2651.35 N @ 140.08 MS, -26.06 N @ 22.48 MS

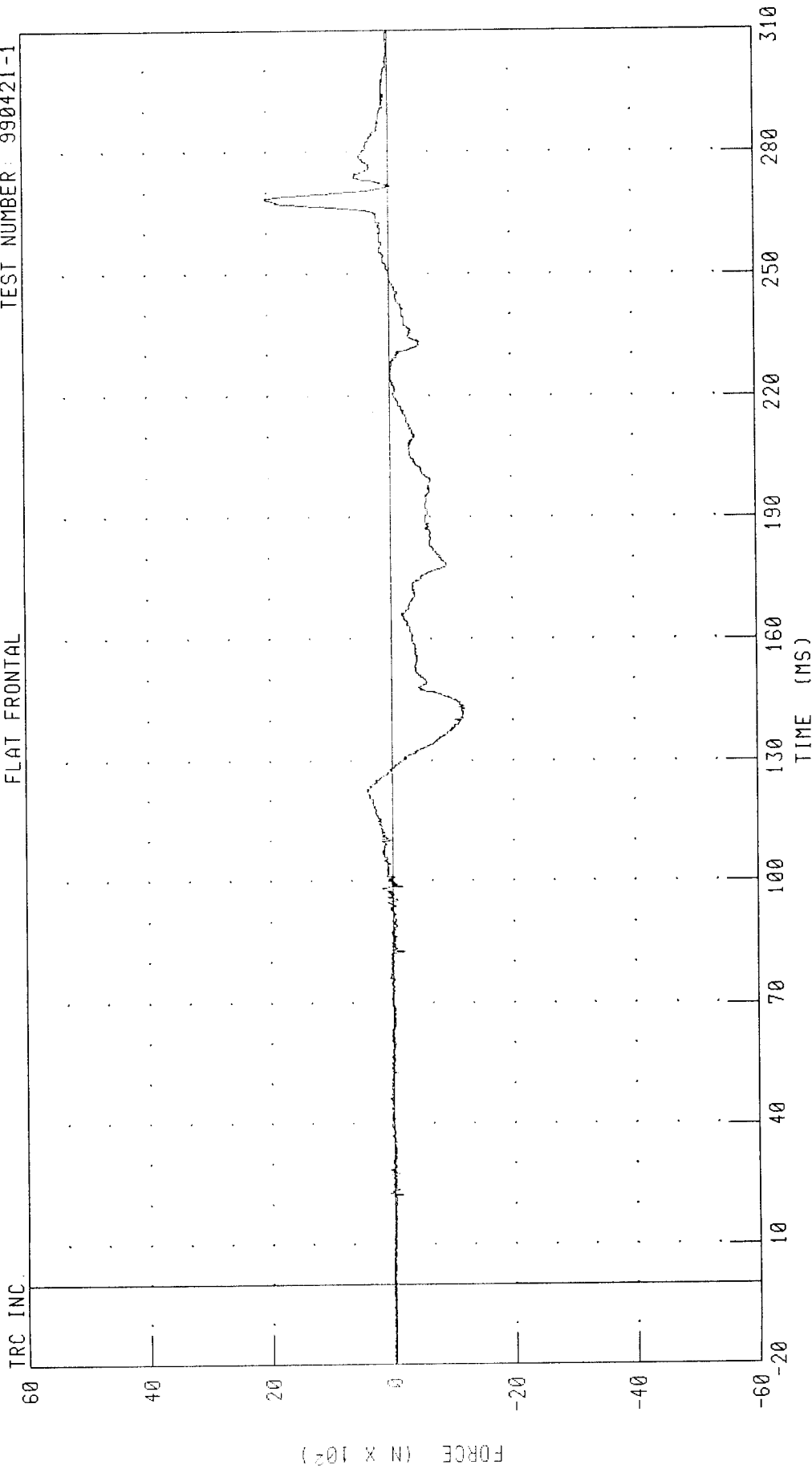
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 NECK Y-AXIS SHEAR FORCE



CHANNEL: NEKYF4 FILTER: CH. CLASS 1000 PEAK DATA: 282.37 N @ 140.00 MS, -157.16 N @ 248.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 NECK Z-AXIS AXIAL FORCE
FLAT FRONTAL

TEST NUMBER: 990421-1



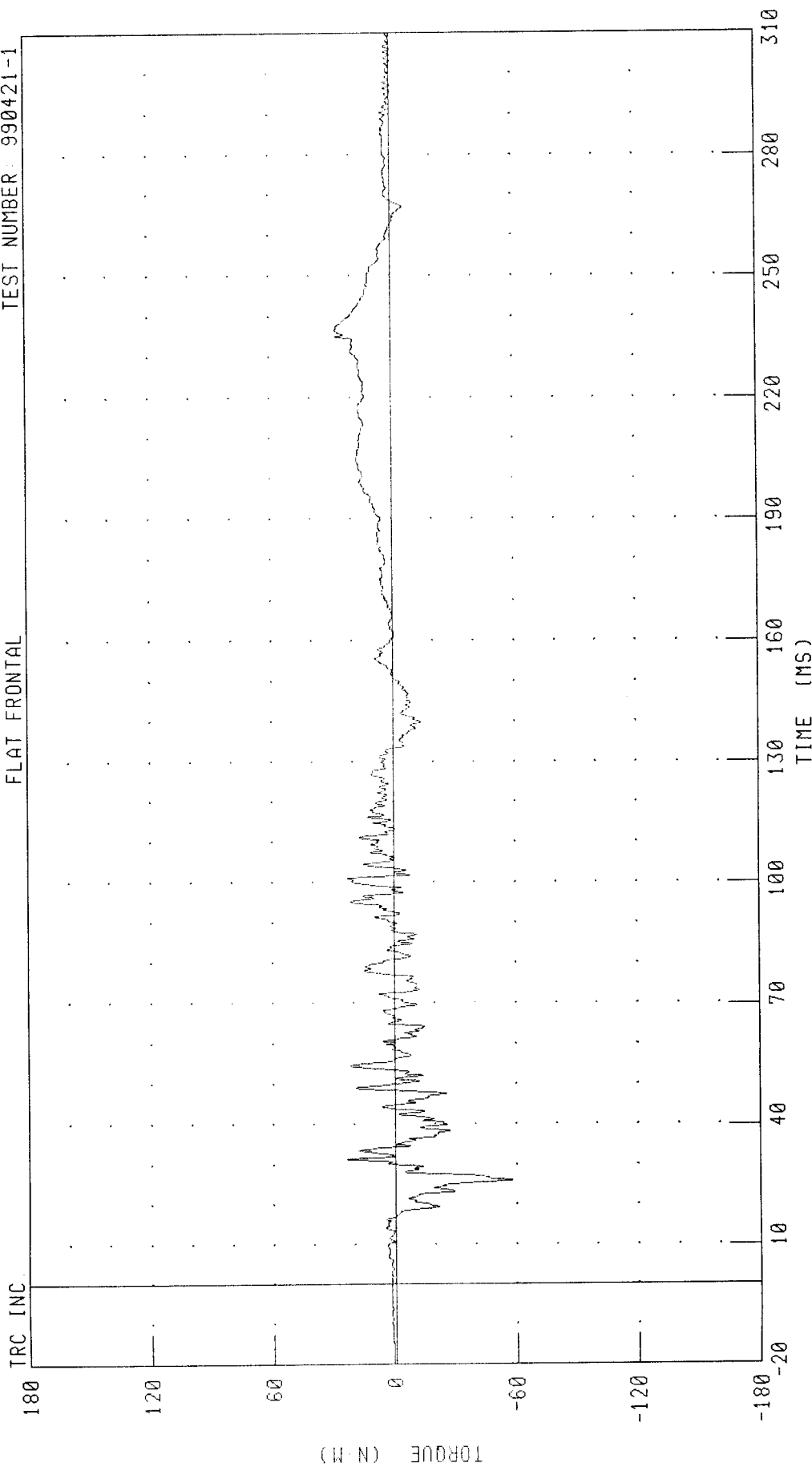
CHANNEL: NEKZF4 FILTER: CH. CLASS 1000
PEAK DATA: 2029.00 N @ 268.48 MS, -1216.95 N @ 142.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 4 NECK MOMENT ABOUT X AXIS

FLAT FRONTAL

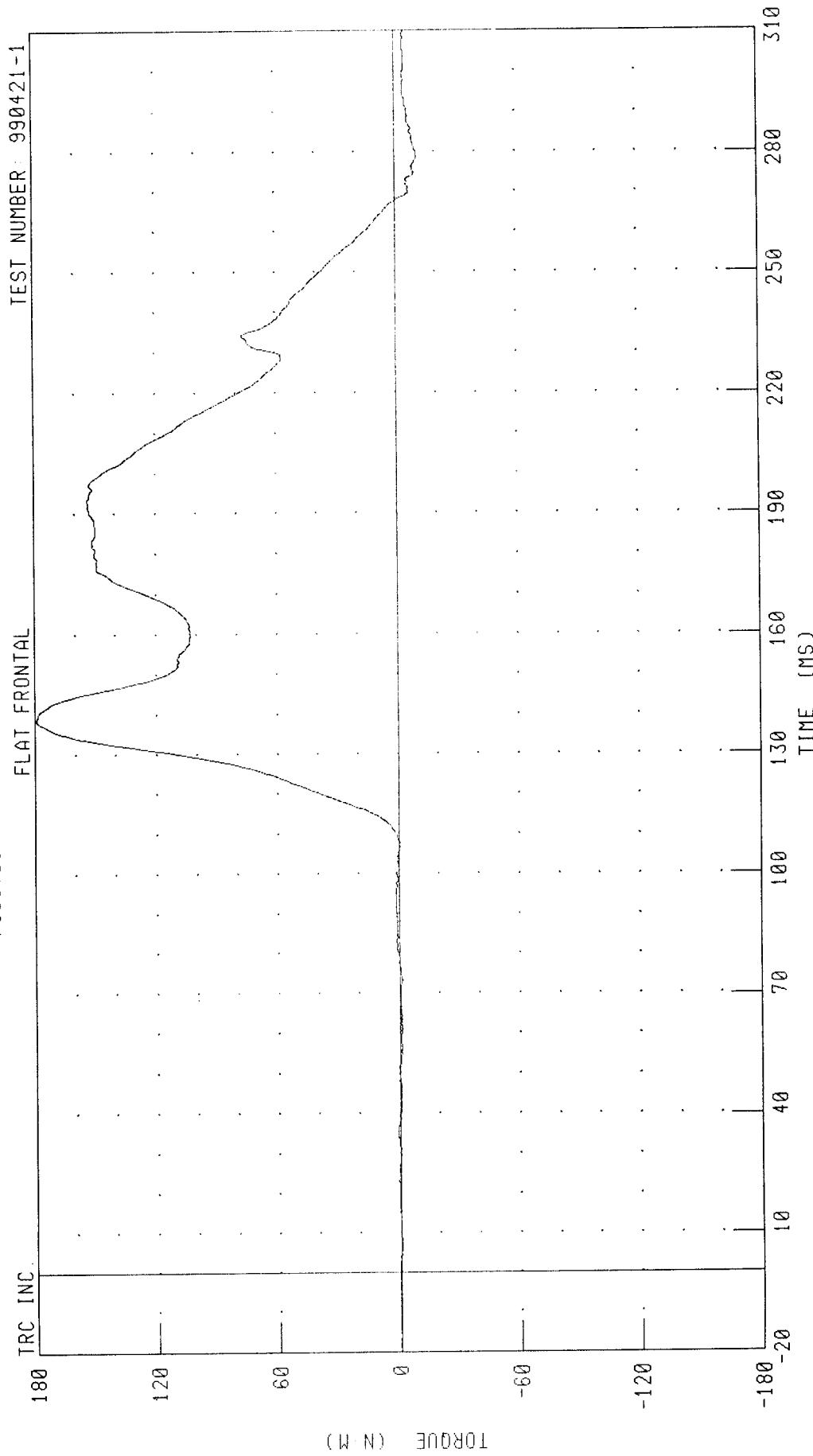
TEST NUMBER: 990421-1



CHANNEL: NEKXM4 FILTER: CH. CLASS 600

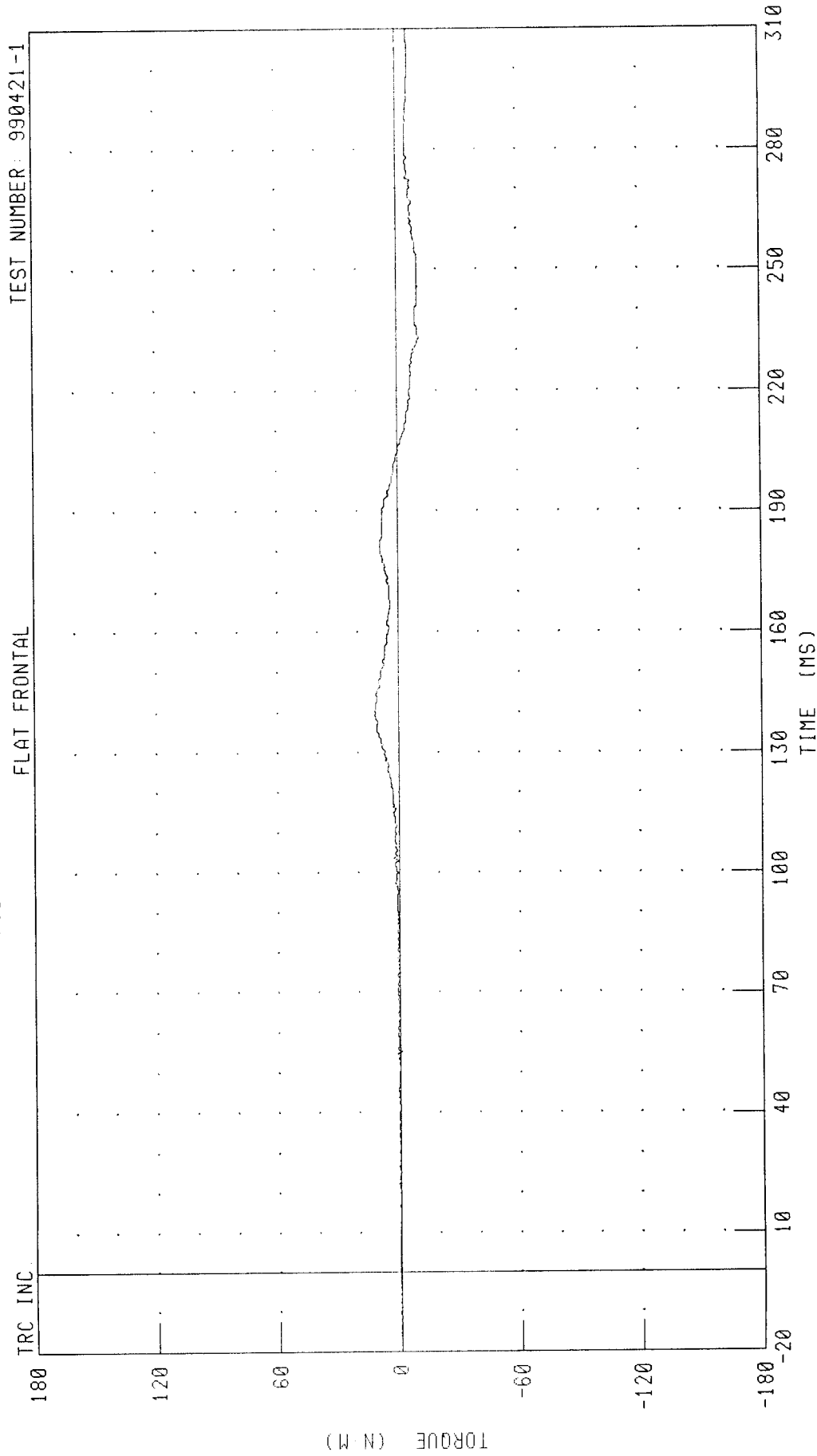
PEAK DATA: 27.21 N-M @ 235.12 MS, -58.03 N-M @ 26.08 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 NECK MOMENT ABOUT Y AXIS



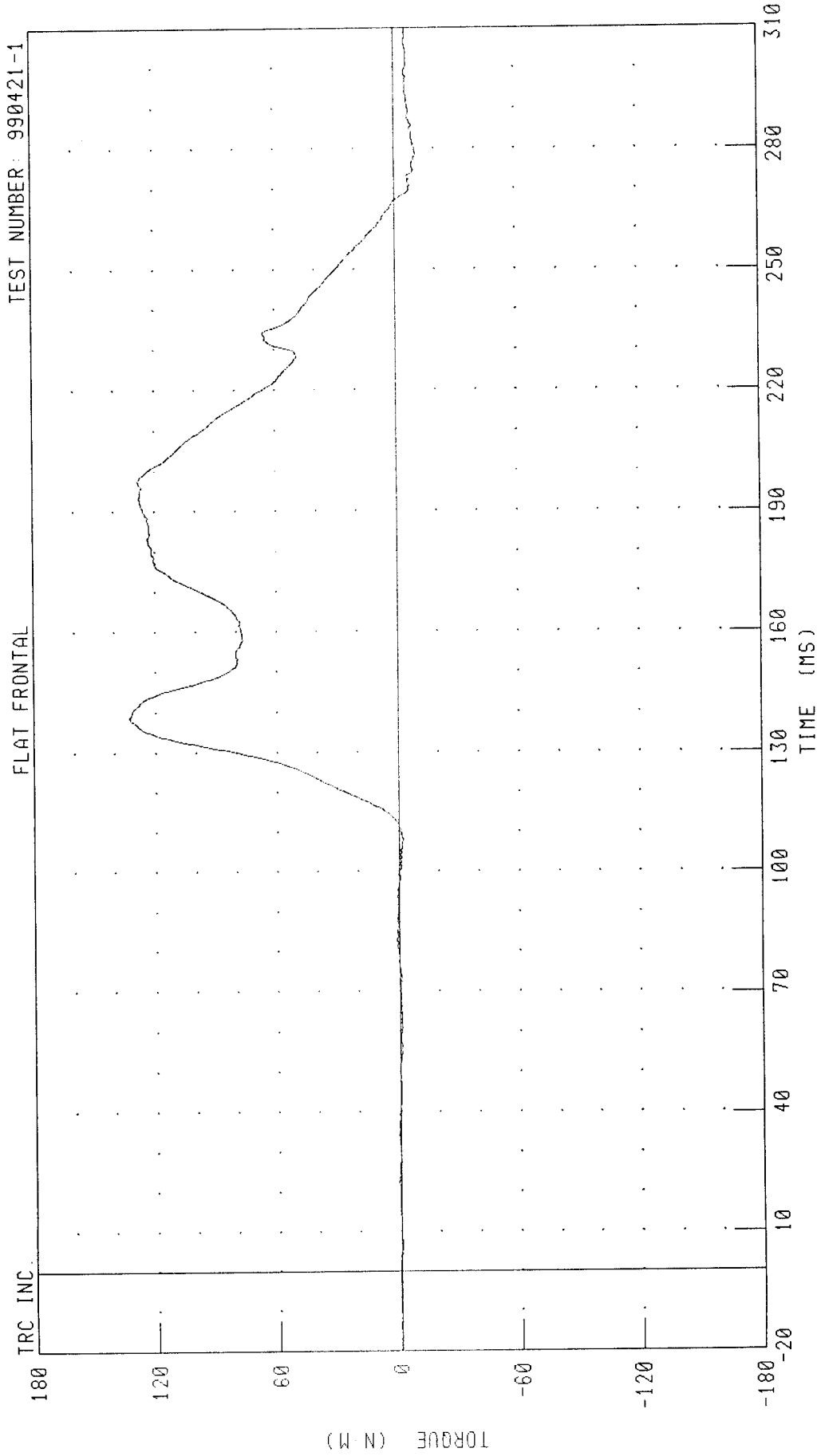
CHANNEL: NEKYM4 FILTER: CH. CLASS 600
PEAK DATA: 179.55 N.M @ 138.88 MS; -10.96 N.M @ 278.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 NECK MOMENT ABOUT Z AXIS



CHANNEL: NEKZM4 FILTER: CH. CLASS 600 PEAK DATA: 11.46 N·M @ 139.44 MS, -11.27 N·M @ 233.20 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 NECK OCCIPITAL CONDYLE



CHANNEL: NEKOM4 FILTER: CH. CLASS 600

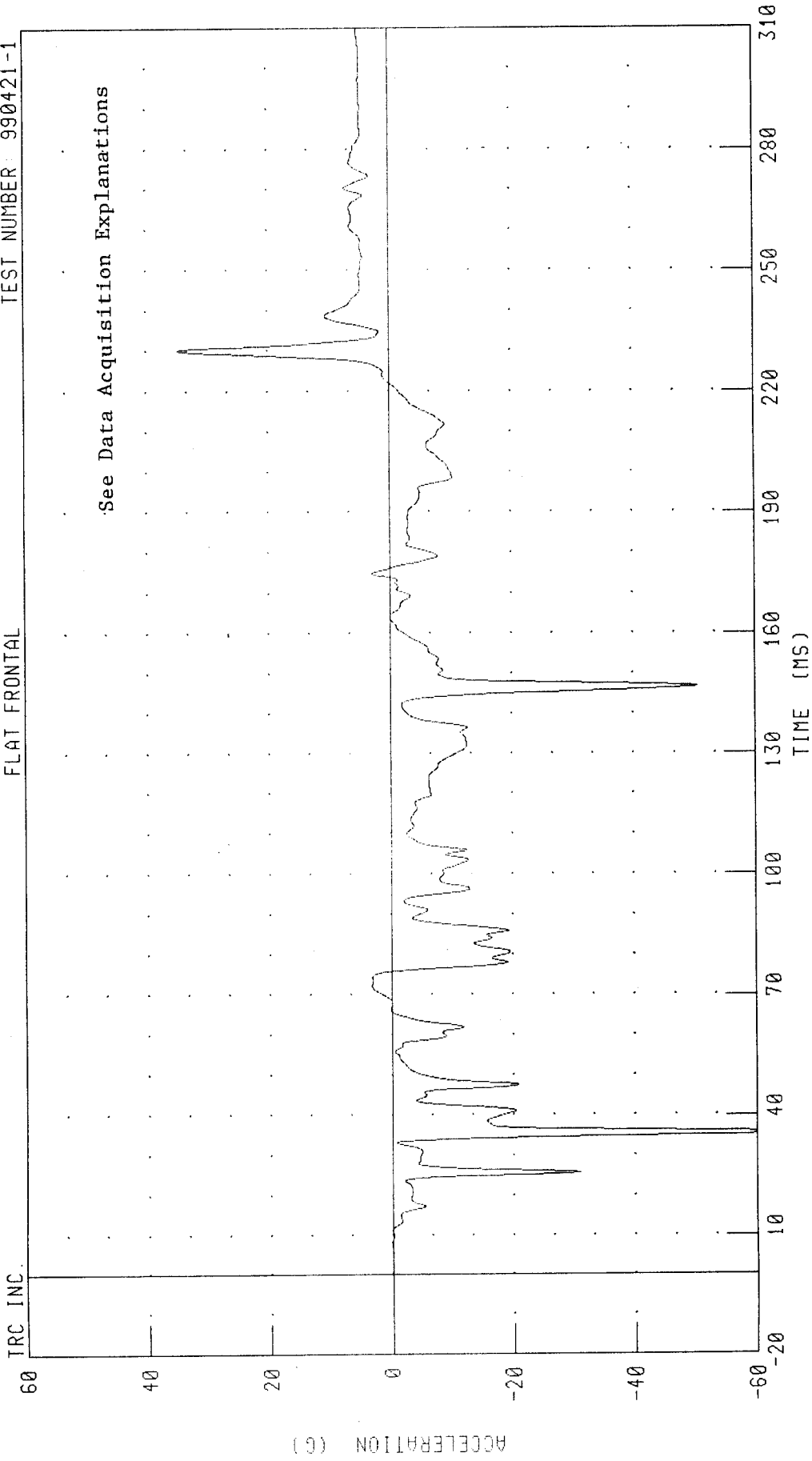
PEAK DATA: 132.73 N·M @ 138.88 MS; -10.75 N·M @ 278.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 4 CHEST X-AXIS ACCELERATION

FLAT FRONTAL

TEST NUMBER 990421-1



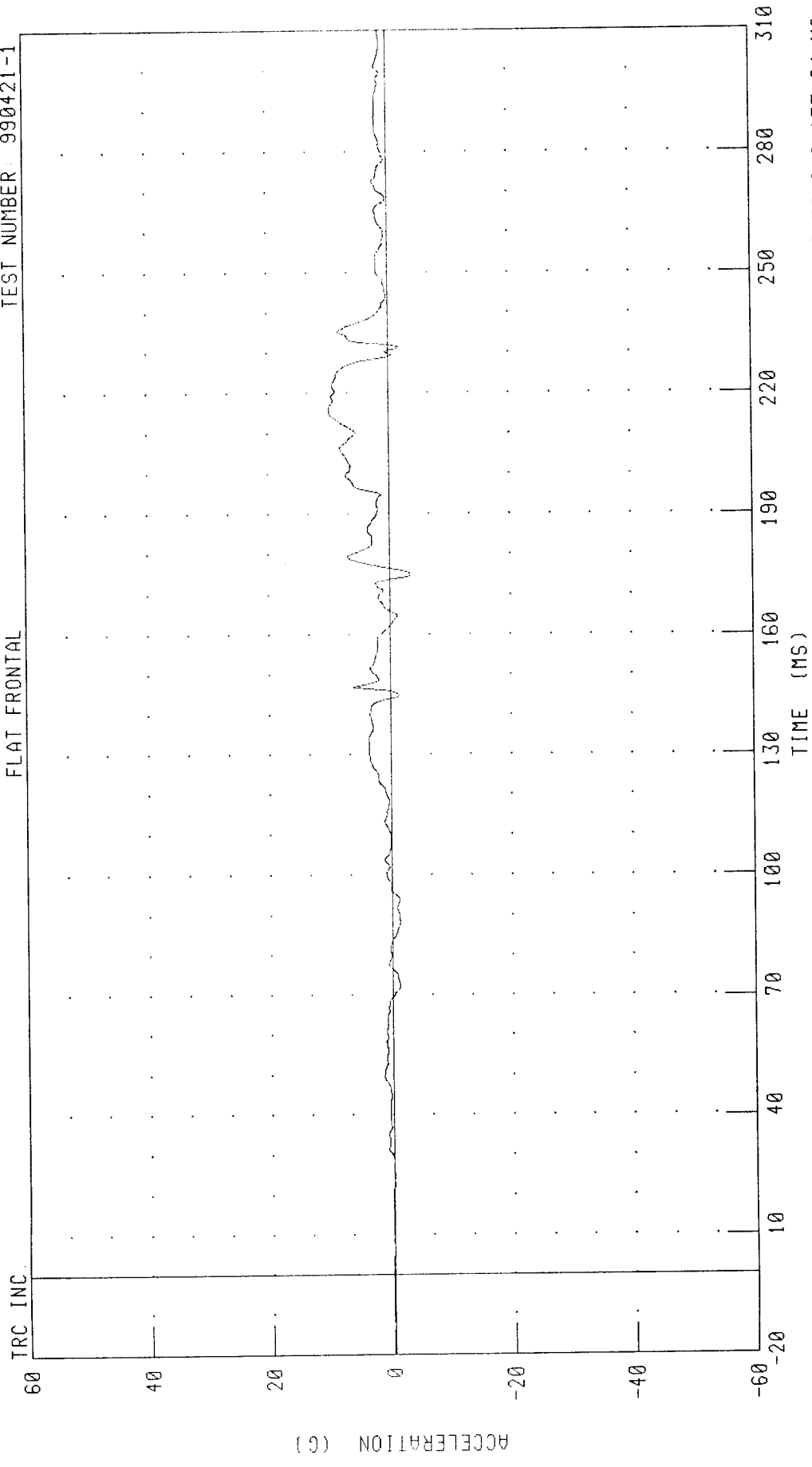
CHANNEL: CSTXG4 FILTER: CH. CLASS 180

PEAK DATA: 34.82 G @ 230.16 MS; -70.29 G @ 35.60 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 CHEST Y-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

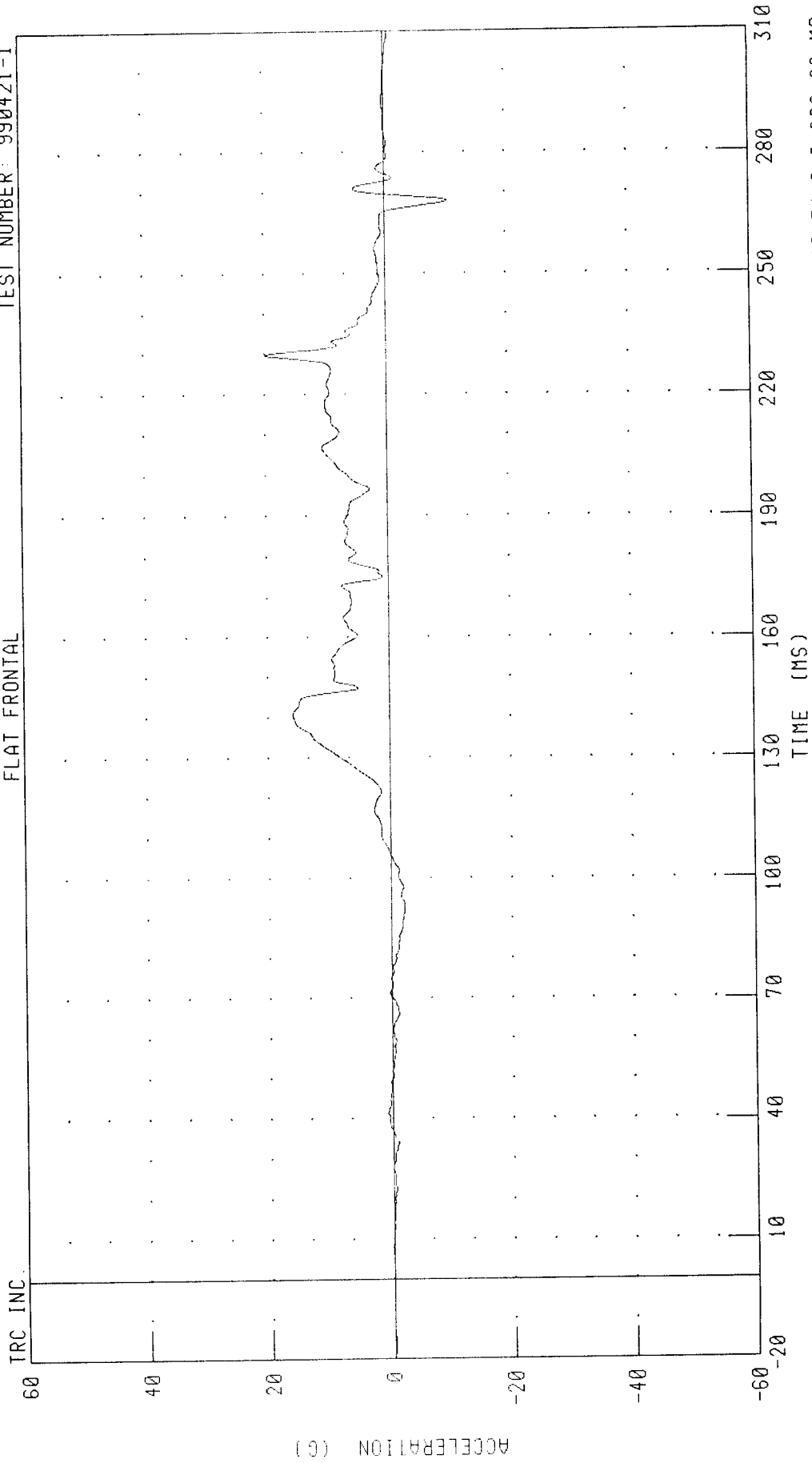


PEAK DATA: 9.77 G @ 215.76 MS, -3.58 G @ 175.04 MS

CHANNEL: CSTYG4 FILTER: CH. CLASS 180

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 CHEST Z-AXIS ACCELERATION
FLAT FRONTAL

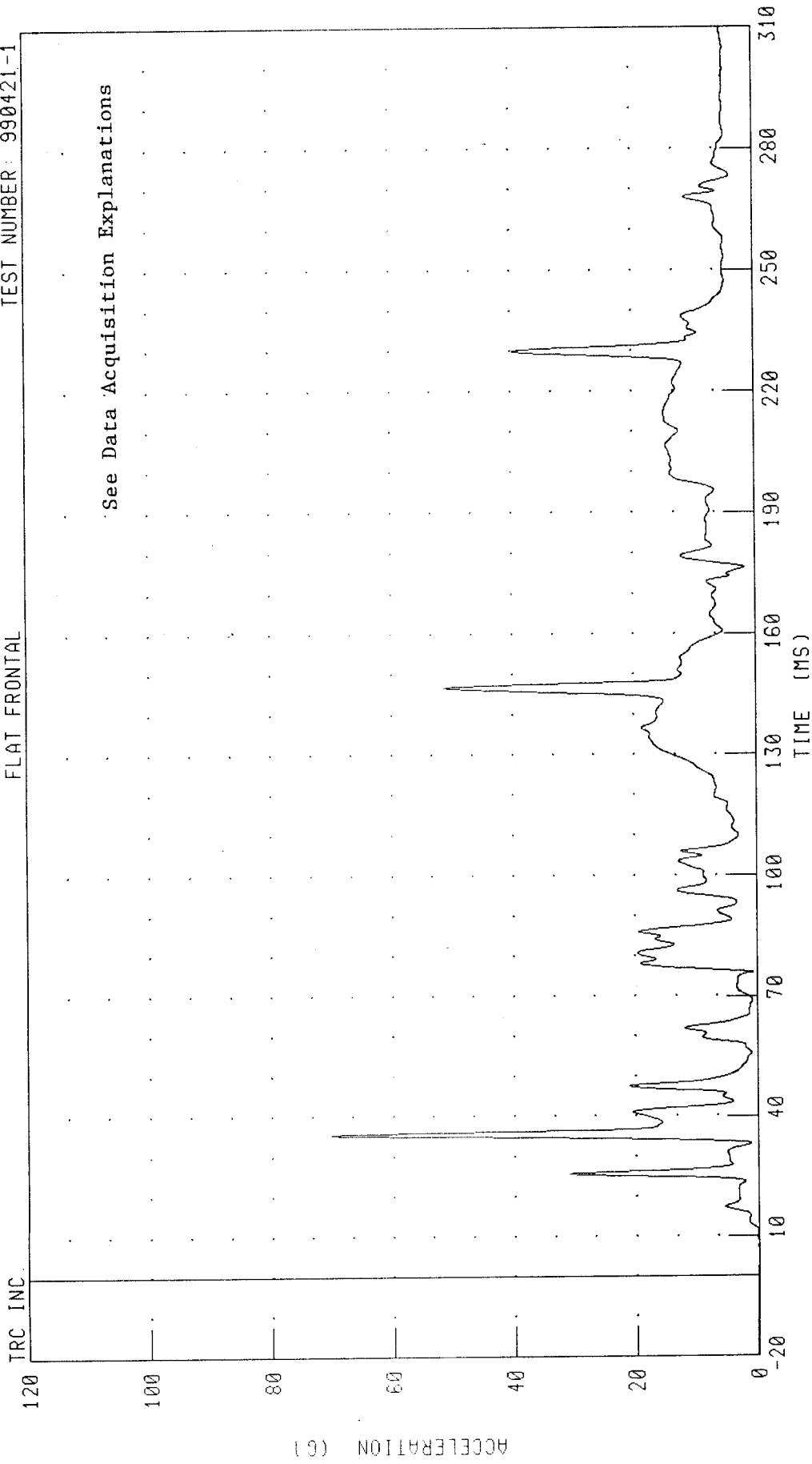
TEST NUMBER: 990421-1



CHANNEL: CSTZG4 FILTER: CH. CLASS 180 PEAK DATA: 19.84 G @ 229.76 MS; -10.34 G @ 268.08 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 CHEST RESULTANT ACCELERATION
FLAT FRONTAL

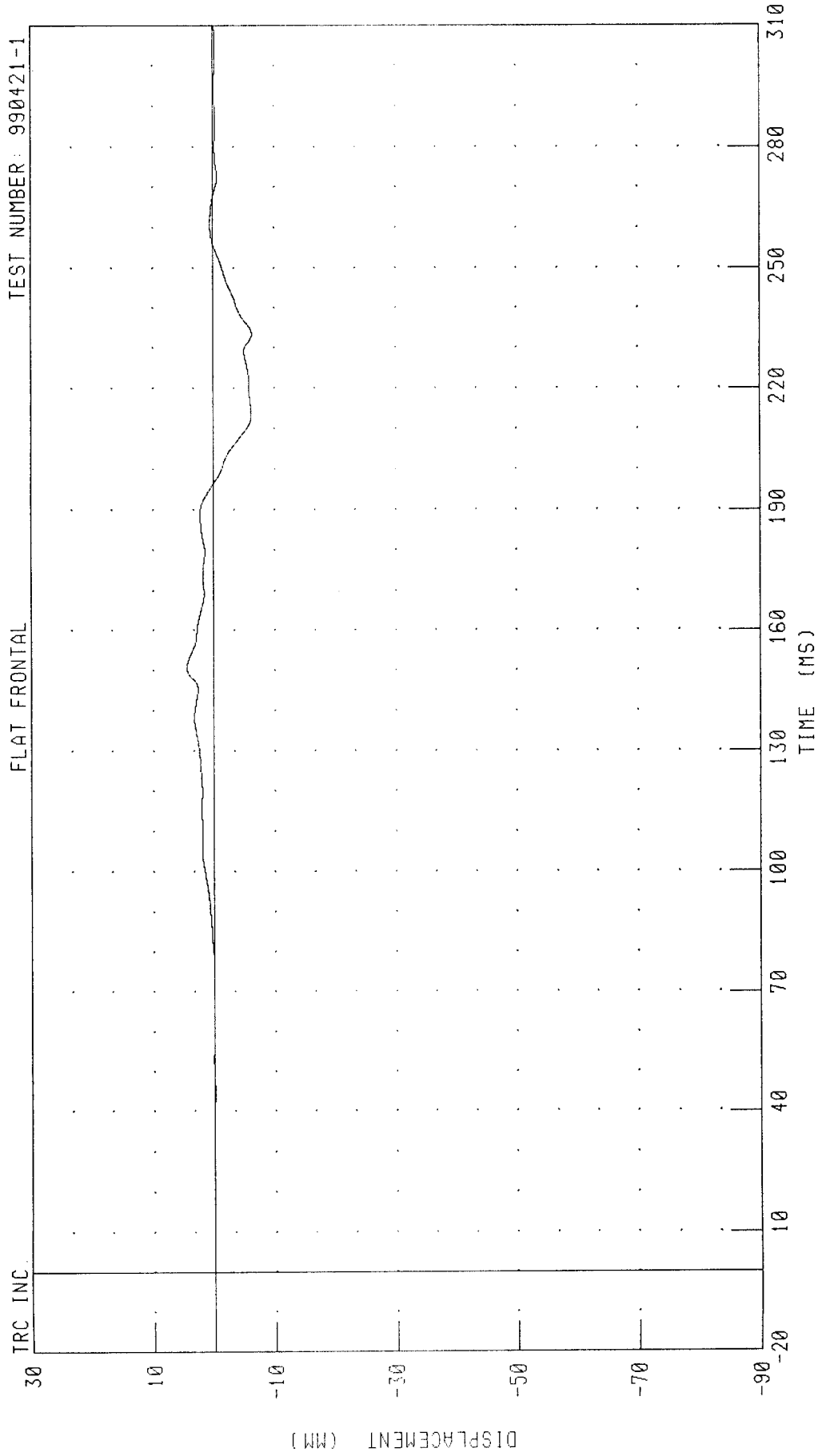
TEST NUMBER: 990421-1



CHANNEL: CSTRG4 FILTER: CH. CLASS 180
PEAK DATA: 70.30 G @ 35.60 MS; 0.01 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 CHEST DEFLECTION
FLAT FRONTAL

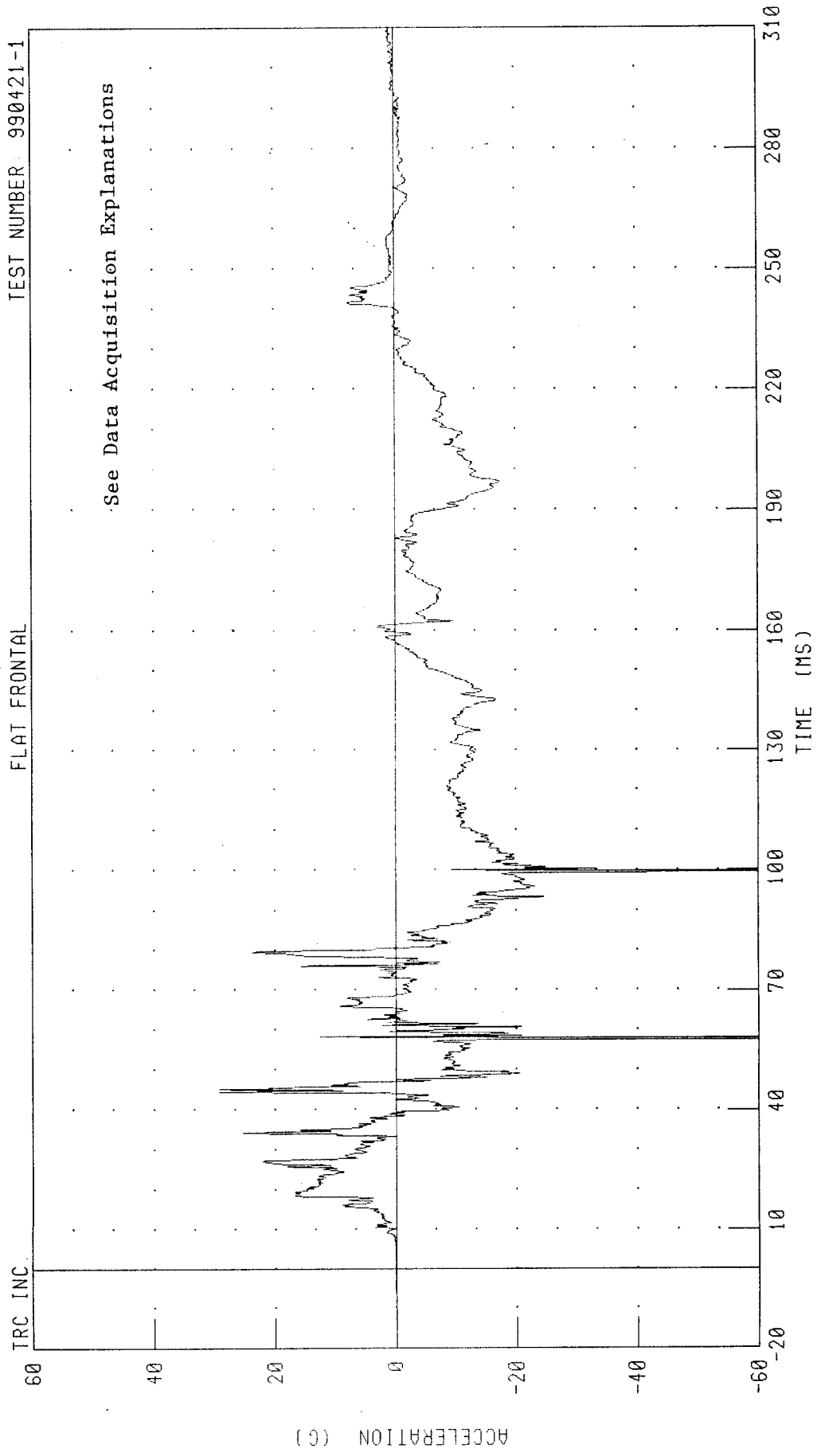
TEST NUMBER: 990421-1



CHANNEL: CSTXD4 FILTER: CH. CLASS 180 PEAK DATA: 4.46 MM @ 150.56 MS; -6.32 MM @ 233.44 MS

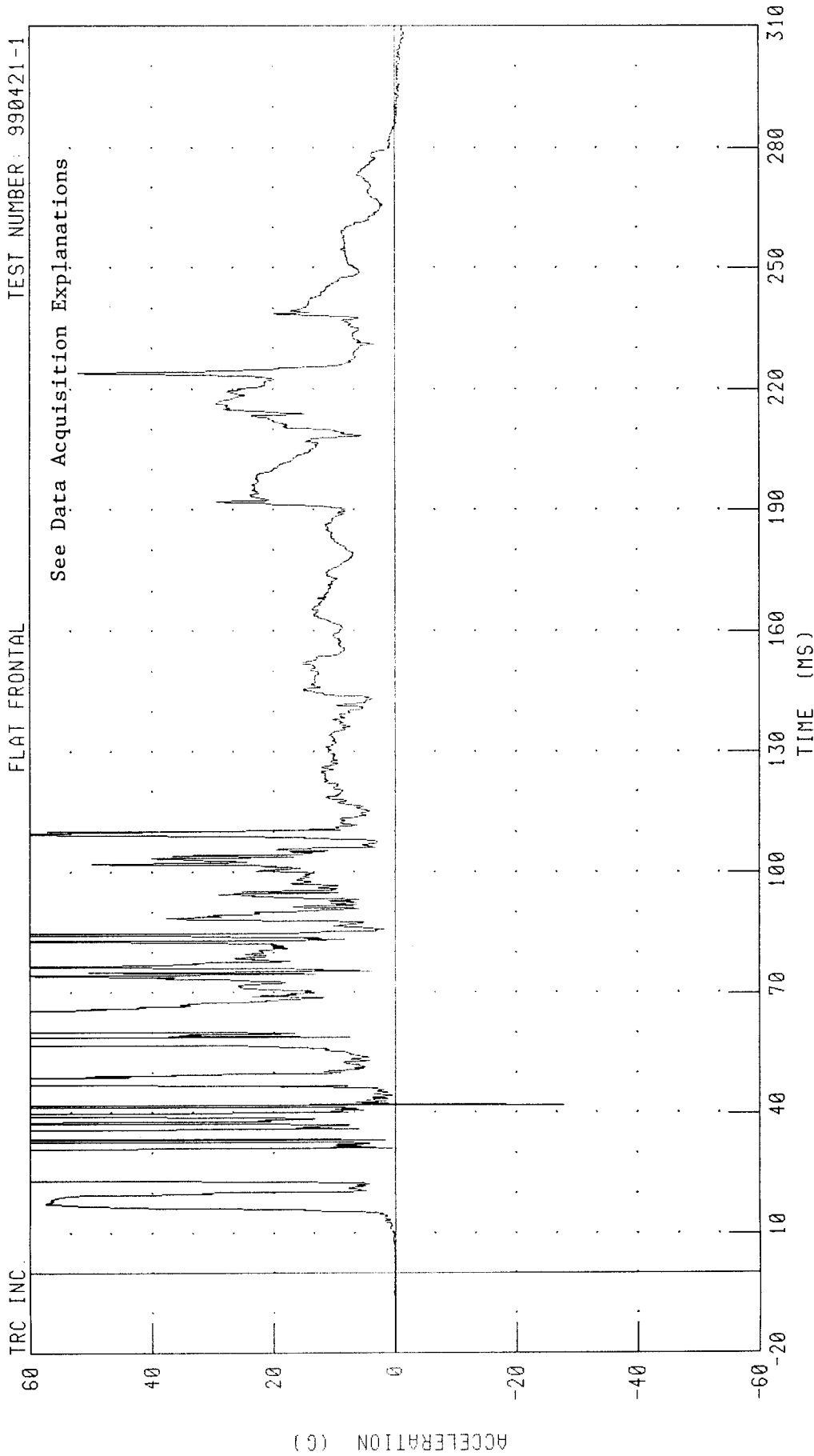
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 PELVIS X-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: PEVXG4 FILTER: CH. CLASS 1000 PEAK DATA: 29.30 G @ 45.12 MS, -164.70 G @ 164.70 MS

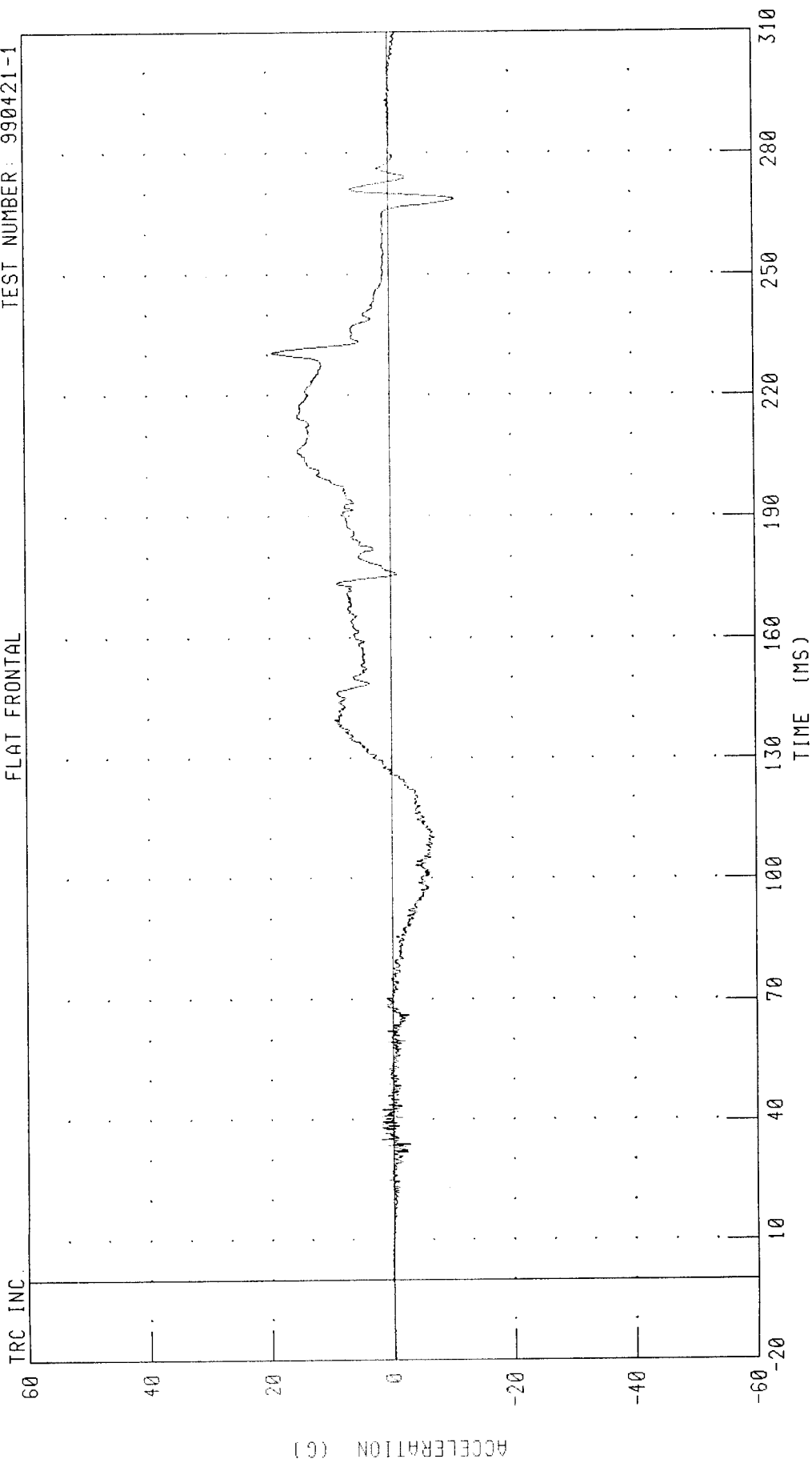
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 PELVIS Y-AXIS ACCELERATION



CHANNEL: PEVYG4 FILTER: CH. CLASS 1000 PEAK DATA: 402.33 G @ 24.00 MS, -27.93 G @ 42.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 PELVIS Z-AXIS ACCELERATION
FLAT FRONTAL

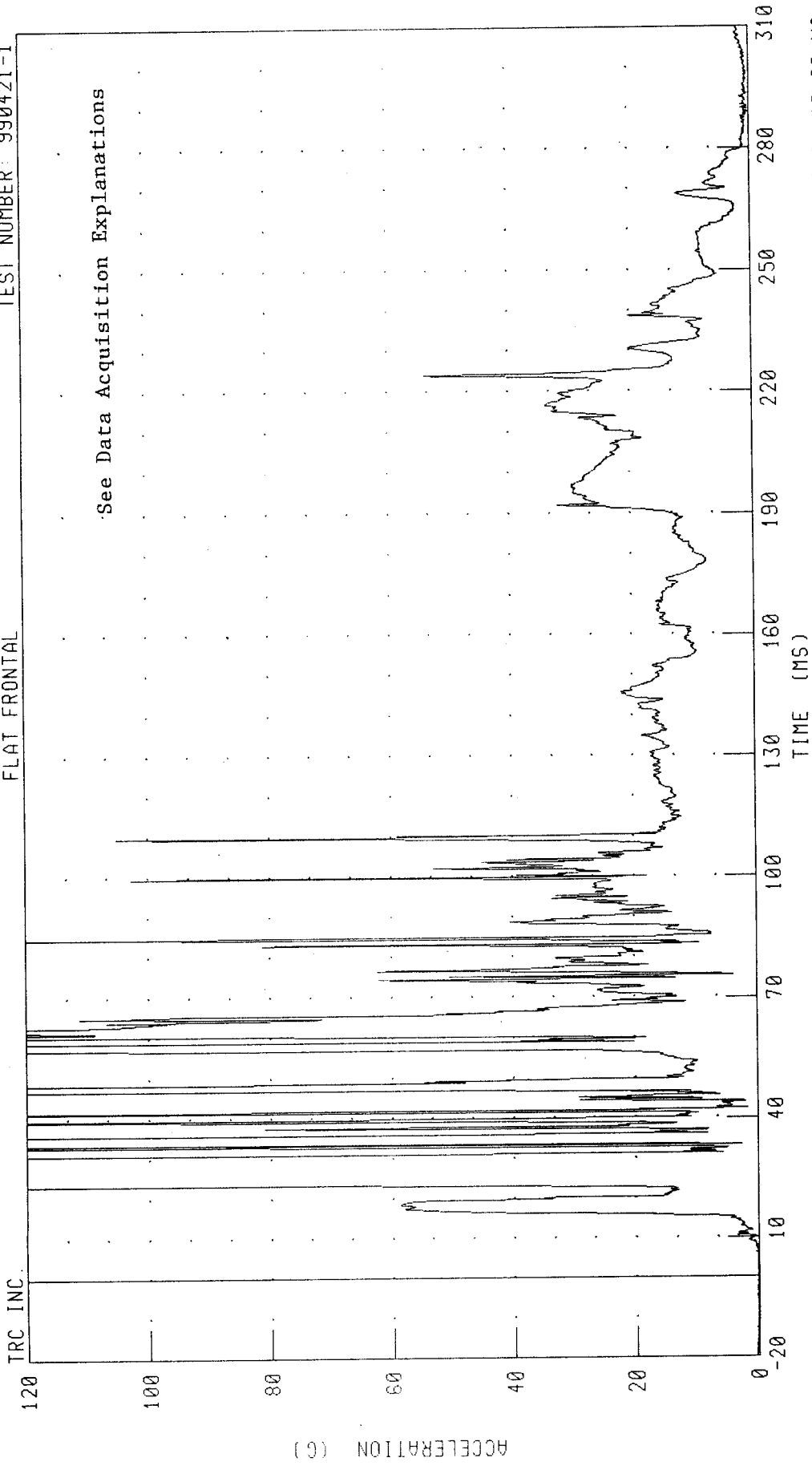
TEST NUMBER: 990421-1



CHANNEL: PEVZG4 FILTER: CH. CLASS 1000 PEAK DATA: 19.37 G @ 230.64 MS; -11.06 G @ 268.64 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 PELVIS RESULTANT ACCELERATION

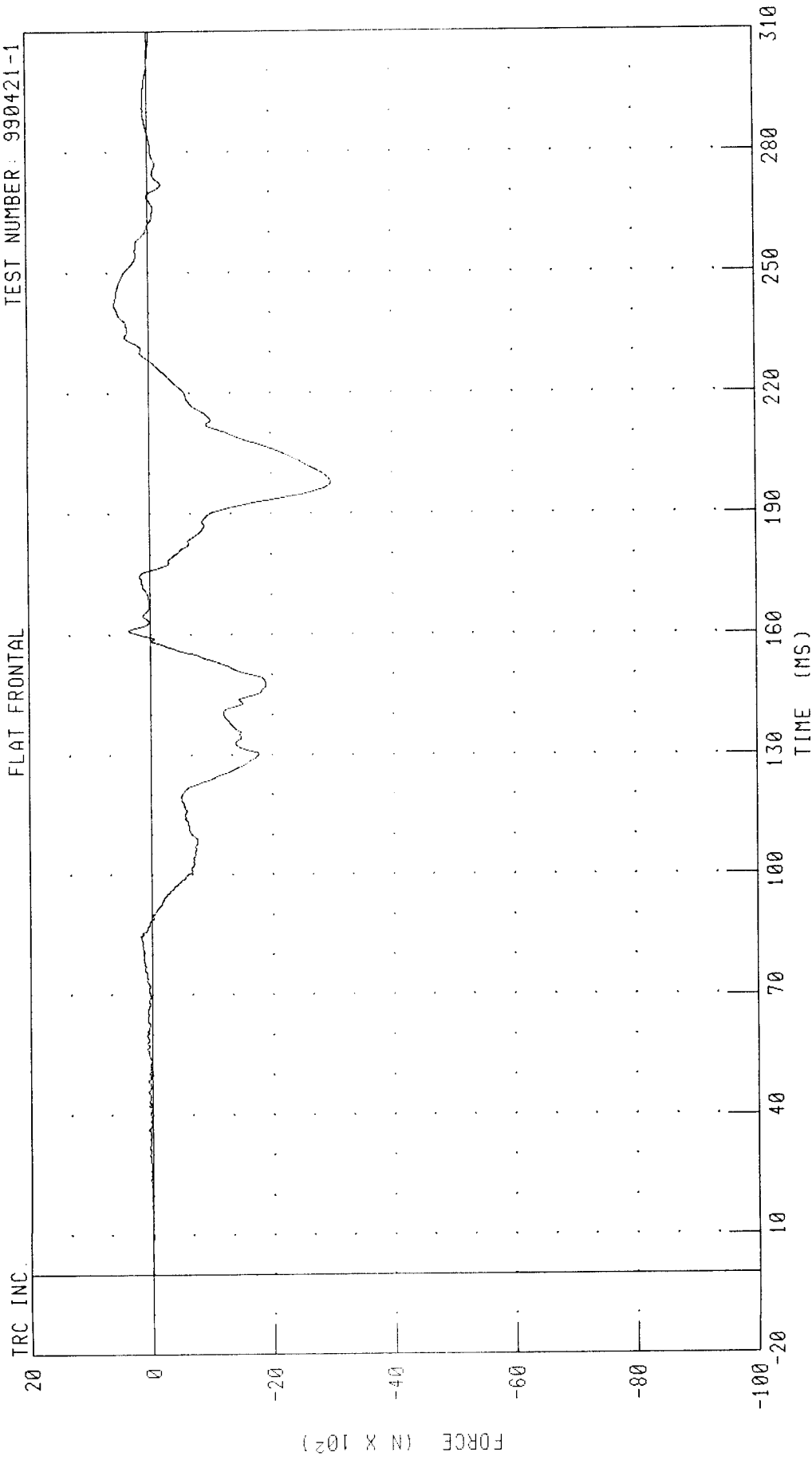
TEST NUMBER: 990421-1



CHANNEL: PEVRC4 FILTER: CH. CLASS 1000 PEAK DATA: 403 03 G @ 34.40 MS, 0.11 G @ -19.28 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 LEFT FEMUR FORCE

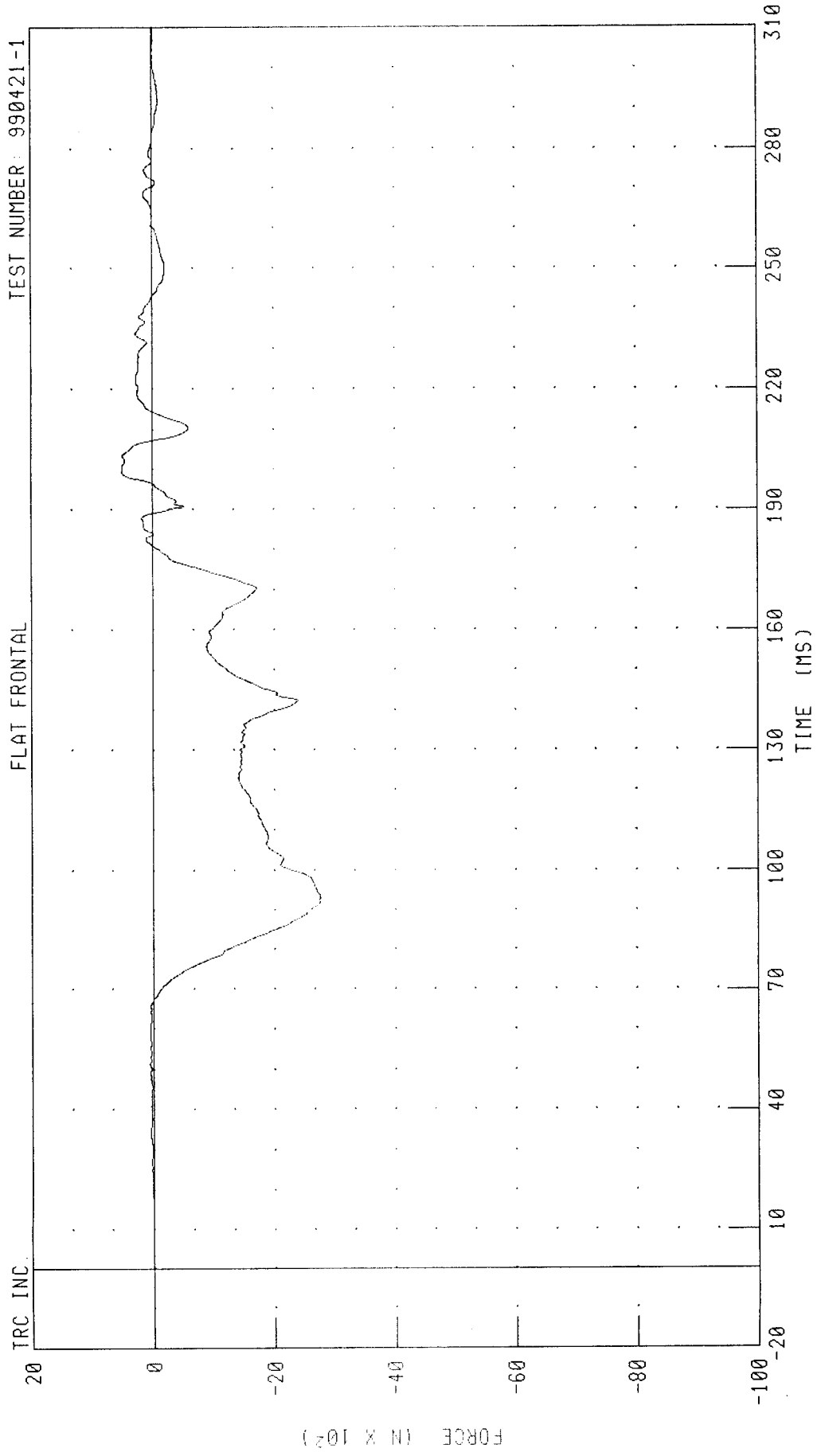
TEST NUMBER: 990421-1



CHANNEL: LFMF4 FILTER: CH. CLASS 600 PEAK DATA: 559.09 N @ 241.84 MS, -2996.25 N @ 197.76 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 4 RIGHT FEMUR FORCE

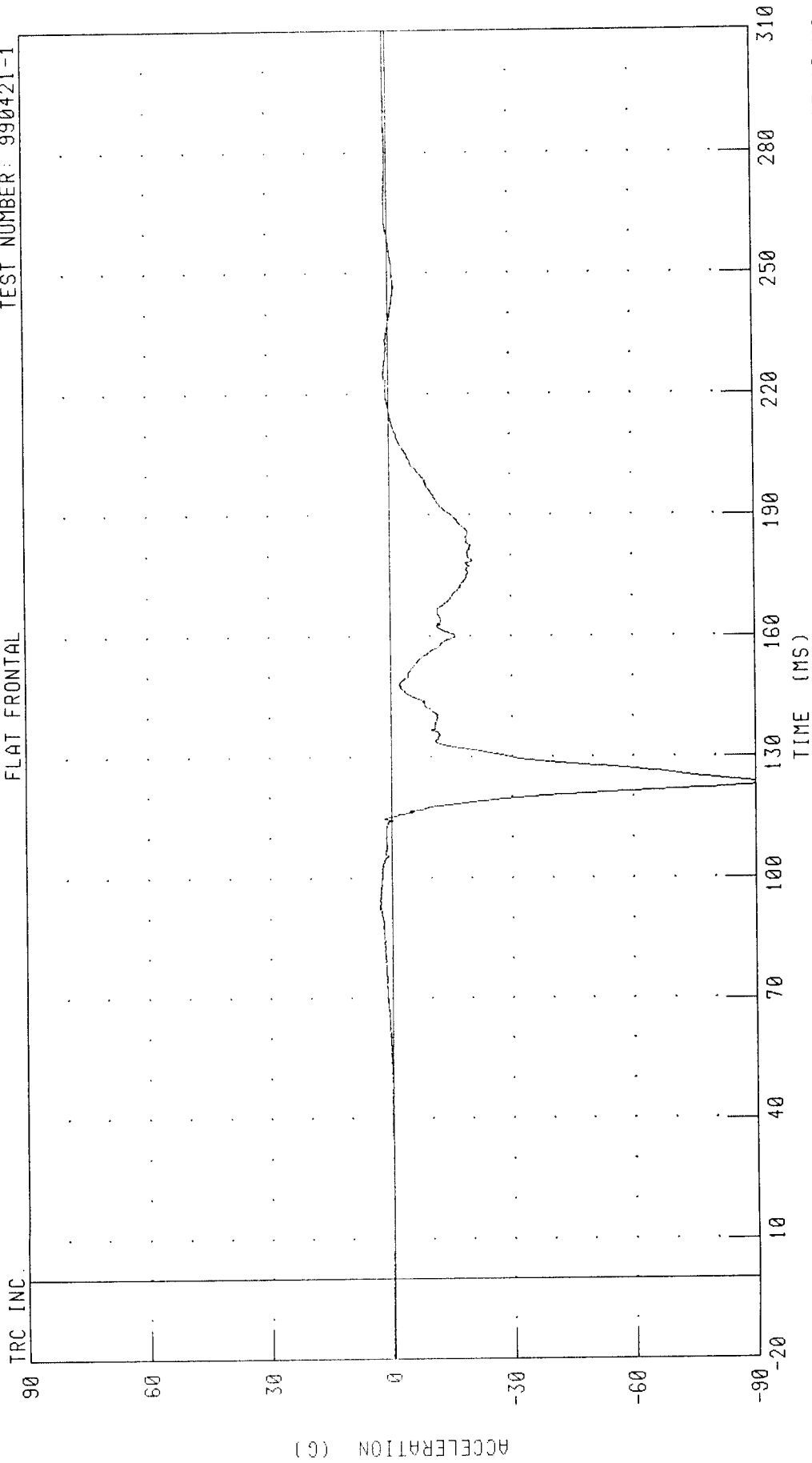
TEST NUMBER: 990421-1



CHANNEL: RFMF4 FILTER: CH. CLASS 600 PEAK DATA: 506.24 N @ 199.44 MS; -2769.00 N @ 93.12 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 HEAD X-AXIS ACCELERATION

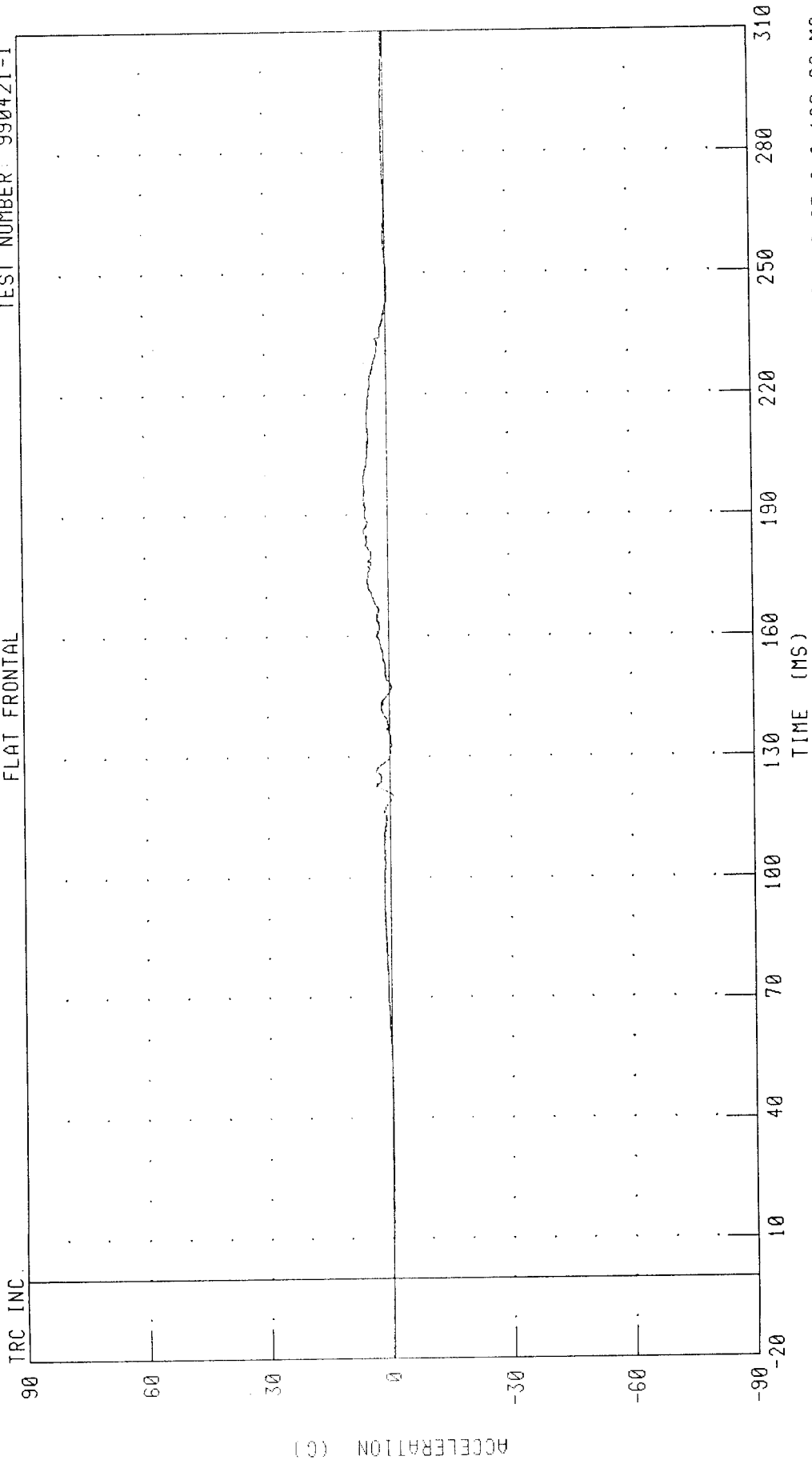
FLAT FRONTAL TEST NUMBER: 990421-1



CHANNEL: HEDXC5 FILTER: CH. CLASS 1000 PEAK DATA: 3.09 G @ 92.32 MS; -91.91 G @ 123.12 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 HEAD Y-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: HEDYCS FILTER: CH. CLASS 1000

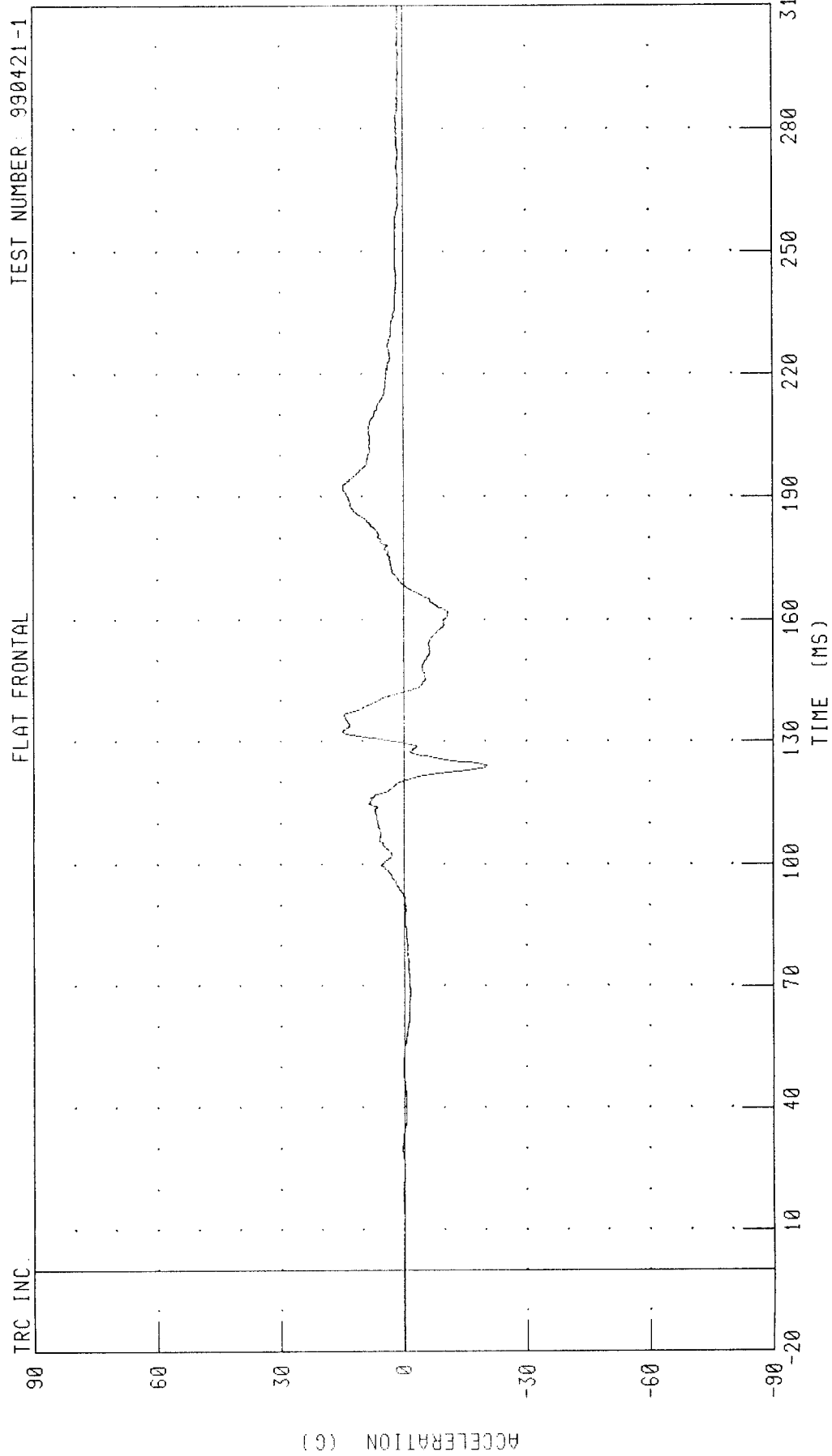
PEAK DATA: 5.81 G @ 198.48 MS; -0.83 G @ 120.08 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 HEAD Z-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

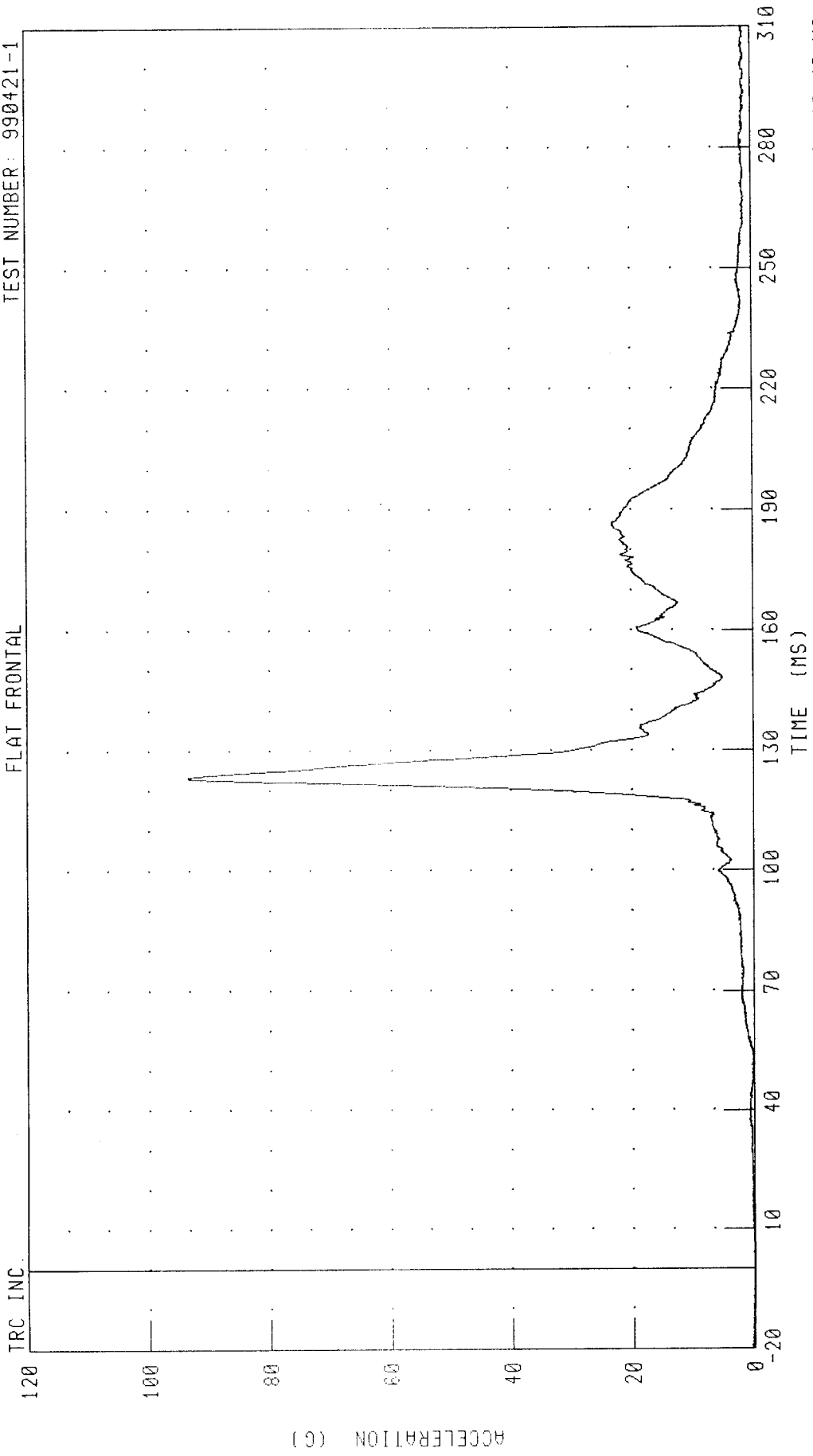
TRC INC.



CHANNEL: HEDZ05 FILTER: CH. CLASS 1000 PEAK DATA: 14.93 G @ 132.32 MS; -20.43 G @ 123.92 MS

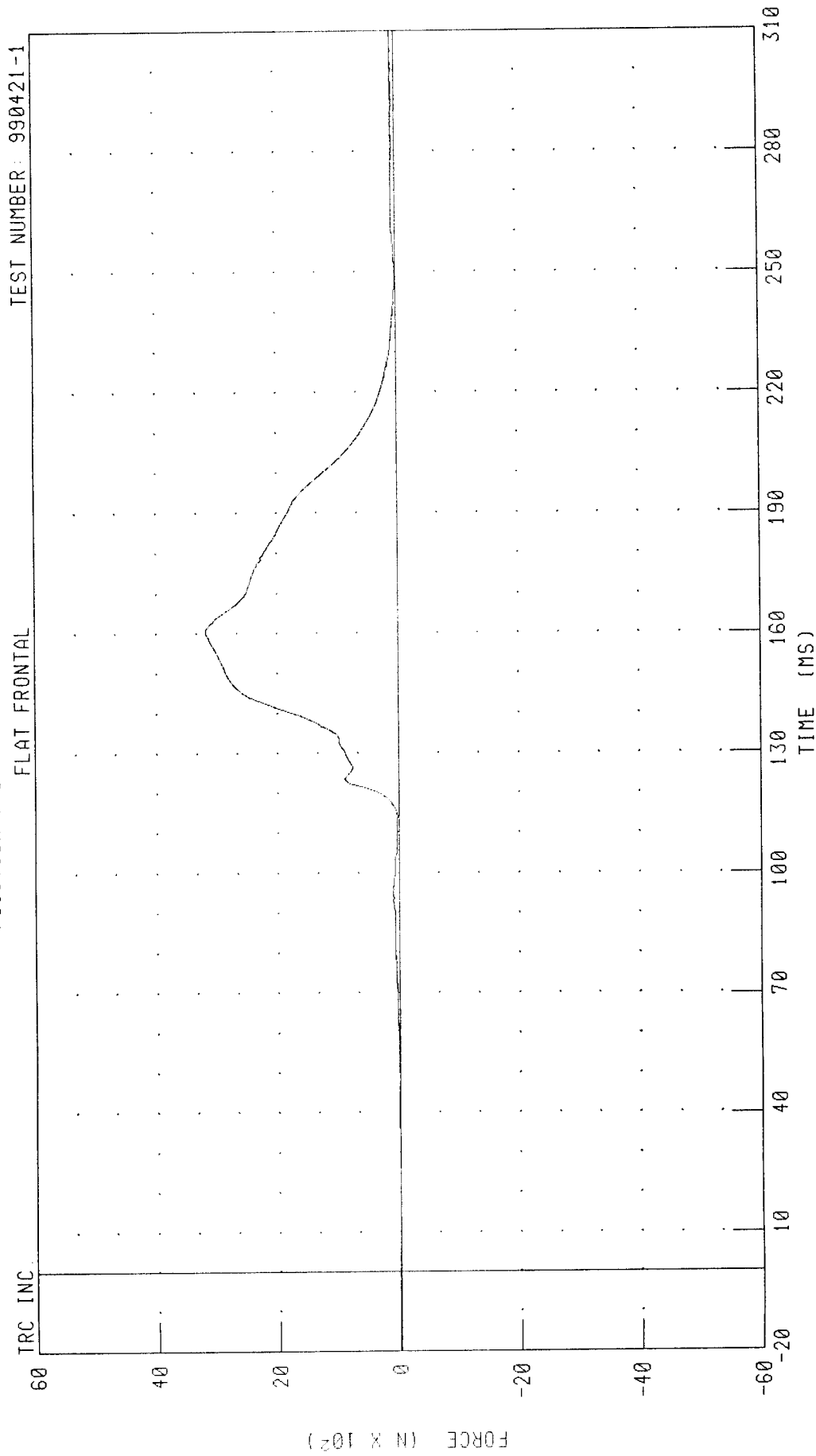
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 HEAD RESULTANT ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: HEDRG5 FILTER: CH. CLASS 1000 PEAK DATA: 93.68 G @ 123.44 MS; 0.10 G @ -12.40 MS

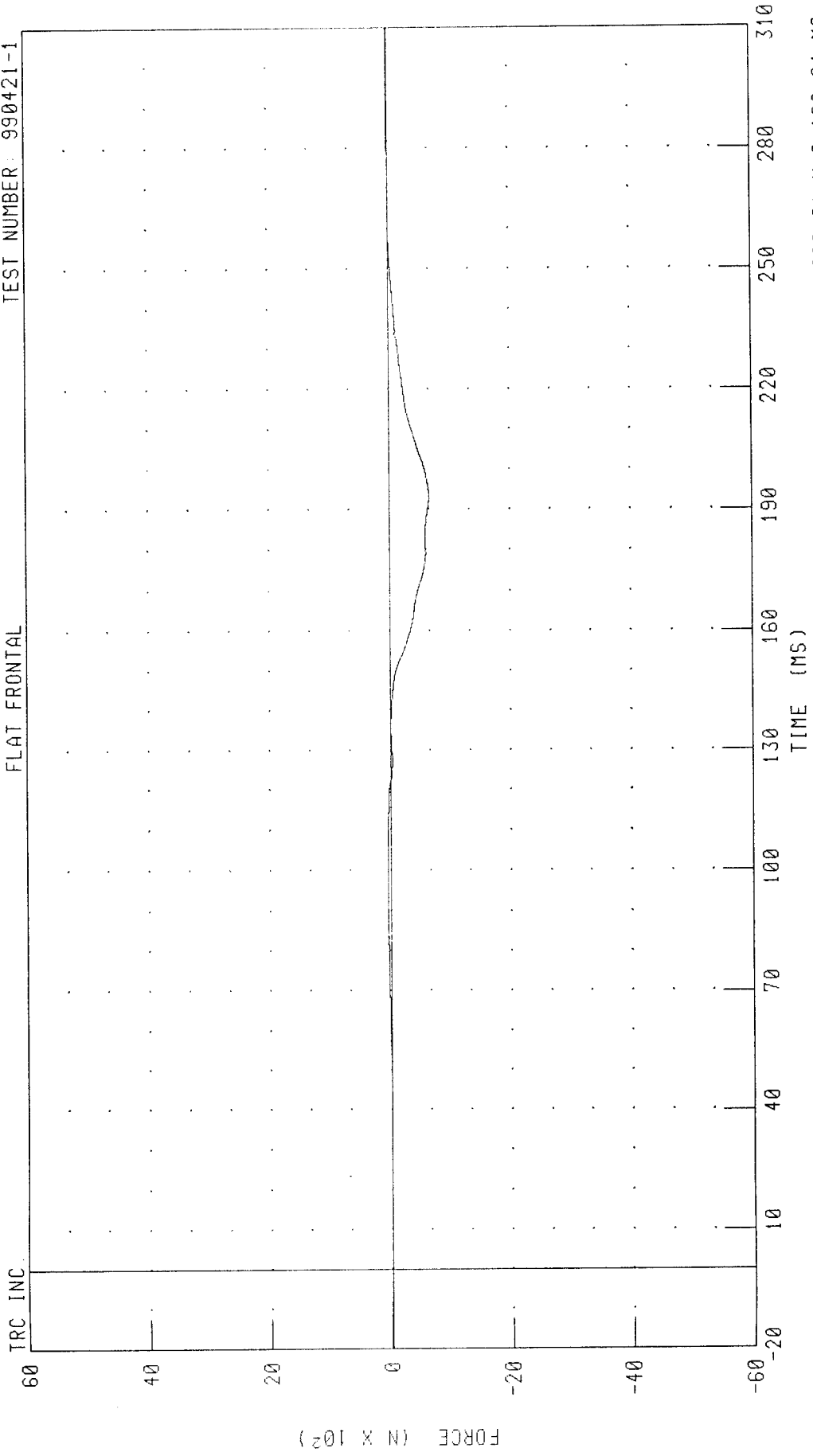
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK X-AXIS SHEAR FORCE



CHANNEL: NEKXF5 FILTER: CH. CLASS 1000 PEAK DATA: 3182.09 N @ 160.16 MS, -4.02 N @ 9.28 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK Y-AXIS SHEAR FORCE
FLAT FRONTAL

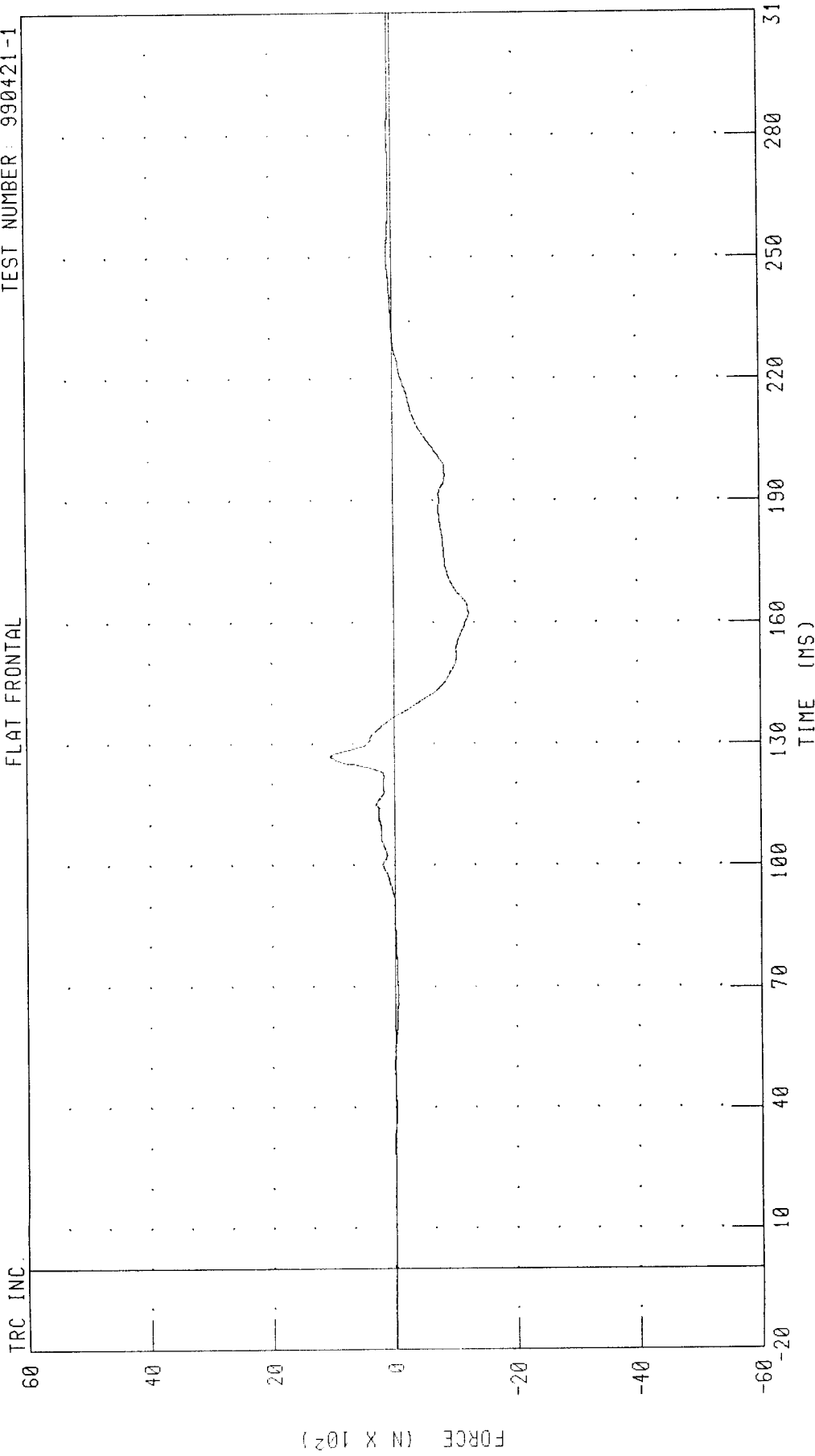
TEST NUMBER: 990421-1



CHANNEL: NEKYF5 FILTER: CH. CLASS 1000 PEAK DATA: 49.72 N @ 97.12 MS, -666.91 N @ 192.64 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK Z-AXIS AXIAL FORCE

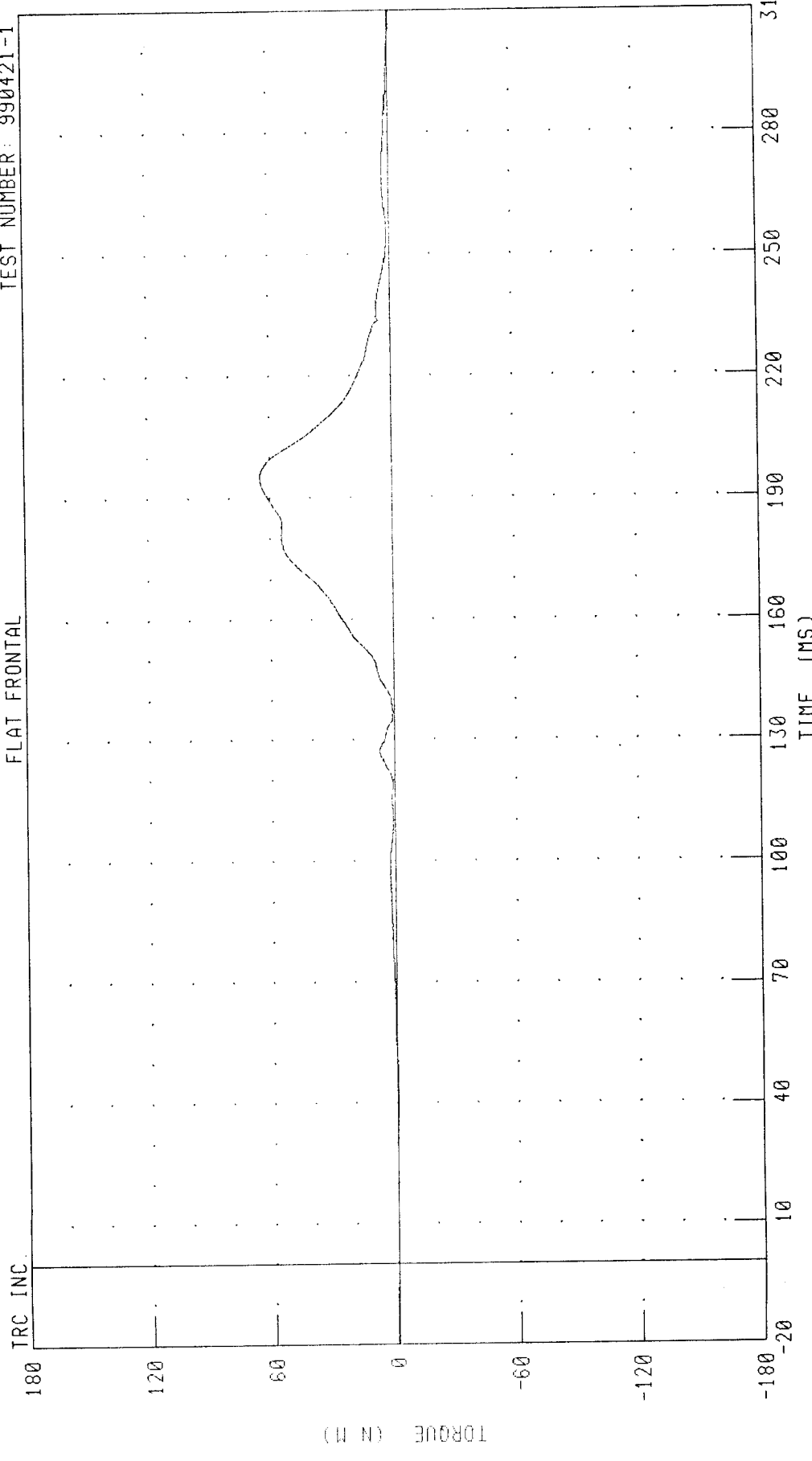
TEST NUMBER: 990421-1



CHANNEL: NEKZF5 FILTER: CH. CLASS 1000 PEAK DATA: 1034.38 N @ 126.80 MS; -1246.67 N @ 162.16 MS

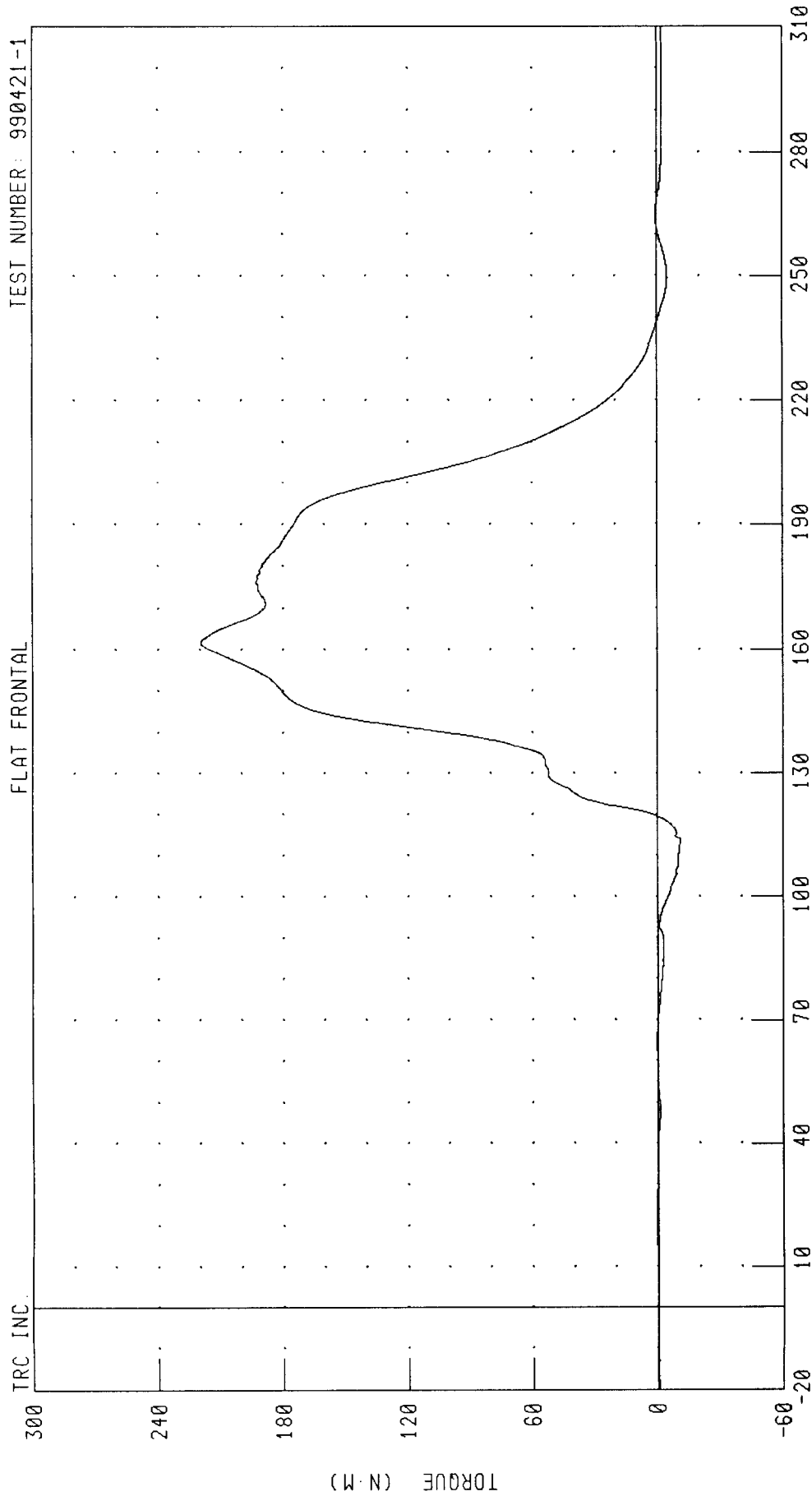
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK MOMENT ABOUT X AXIS
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: NEKXMS FILTER: CH. CLASS 600 PEAK DATA: 64.90 N.M @ 194.96 MS; -1.05 N.M @ 44.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK MOMENT ABOUT Y AXIS

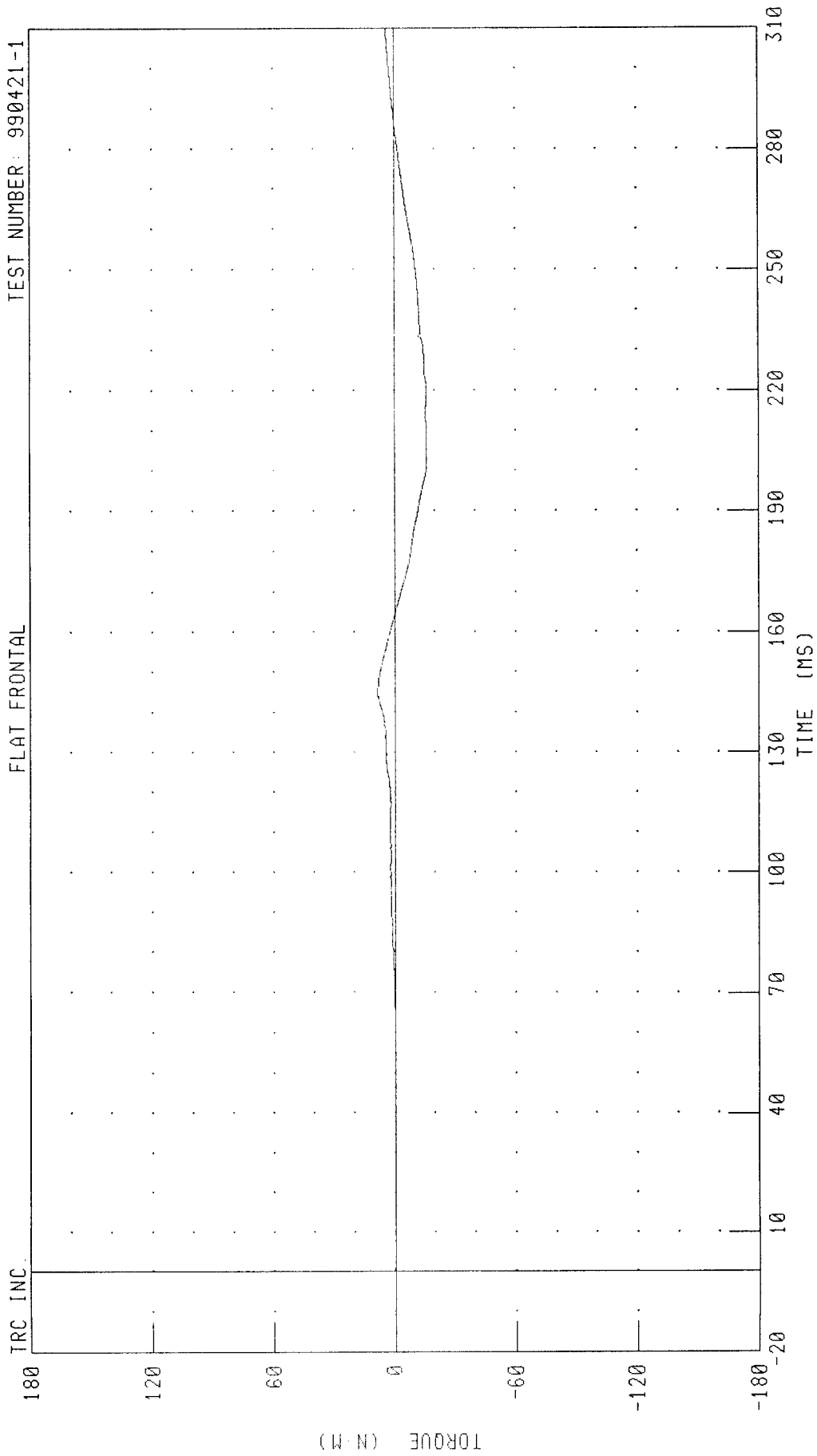


CHANNEL: NEKYMS FILTER: CH. CLASS 600
TIME (MS)
PEAK DATA: 219.40 N·M @ 161.76 MS; -10.76 N·M @ 114.08 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK MOMENT ABOUT Z AXIS

TEST NUMBER: 990421-1

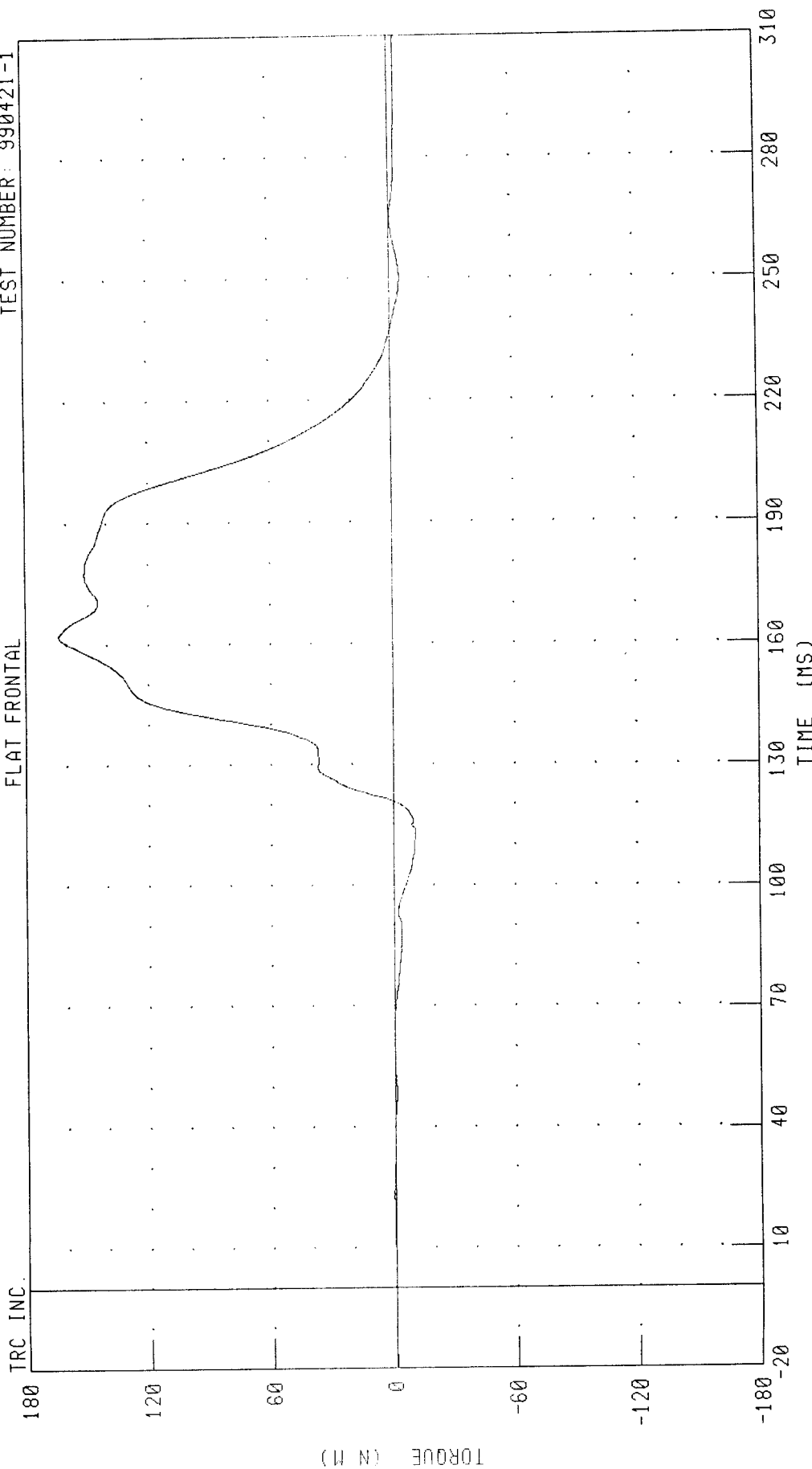
FLAT FRONTAL



CHANNEL: NEKZM5 FILTER: CH. CLASS 600

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 NECK OCCIPITAL CONDYLE
FLAT FRONTAL

TEST NUMBER: 990421-1

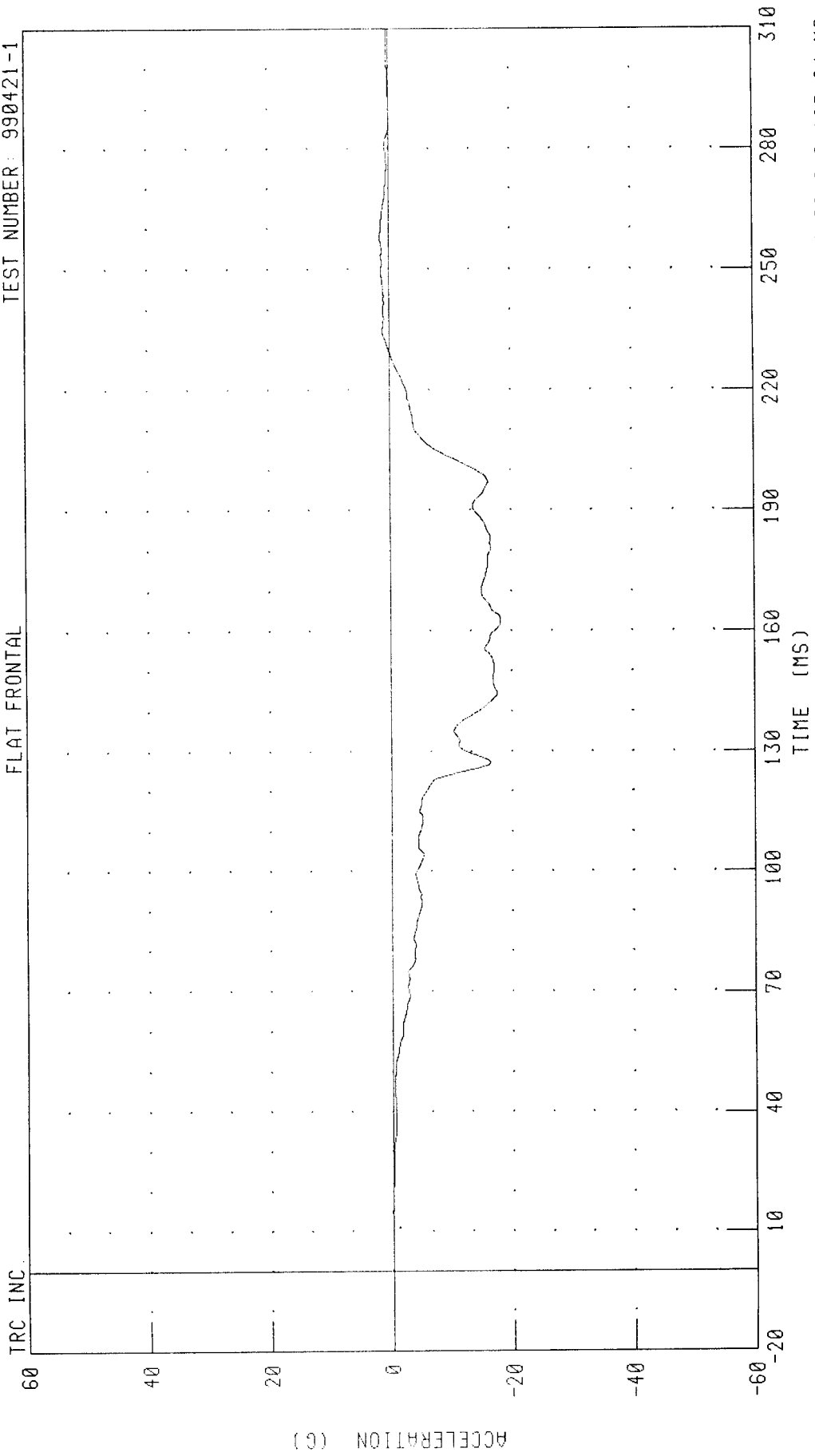


CHANNEL: NEKOM5 FILTER: CH. CLASS 600

PEAK DATA: 163.78 N.M @ 162.32 MS; -10.99 N.M @ 113.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 CHEST X-AXIS ACCELERATION
FLAT FRONTAL

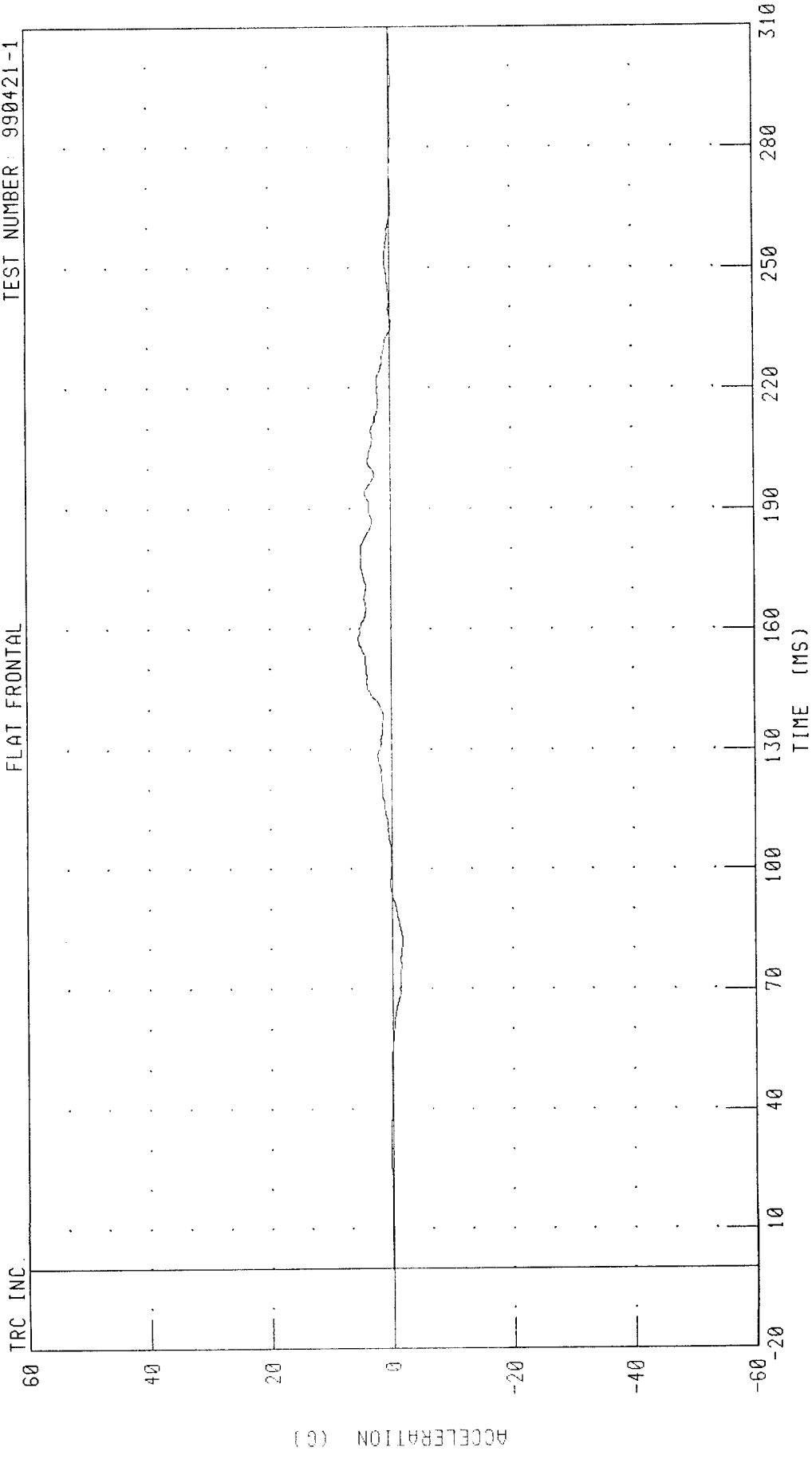
TEST NUMBER: 990421-1



CHANNEL: CSTXG5 FILTER: CH. CLASS 180 PEAK DATA: 1.43 G @ 258.16 MS, -18.26 G @ 163.04 MS

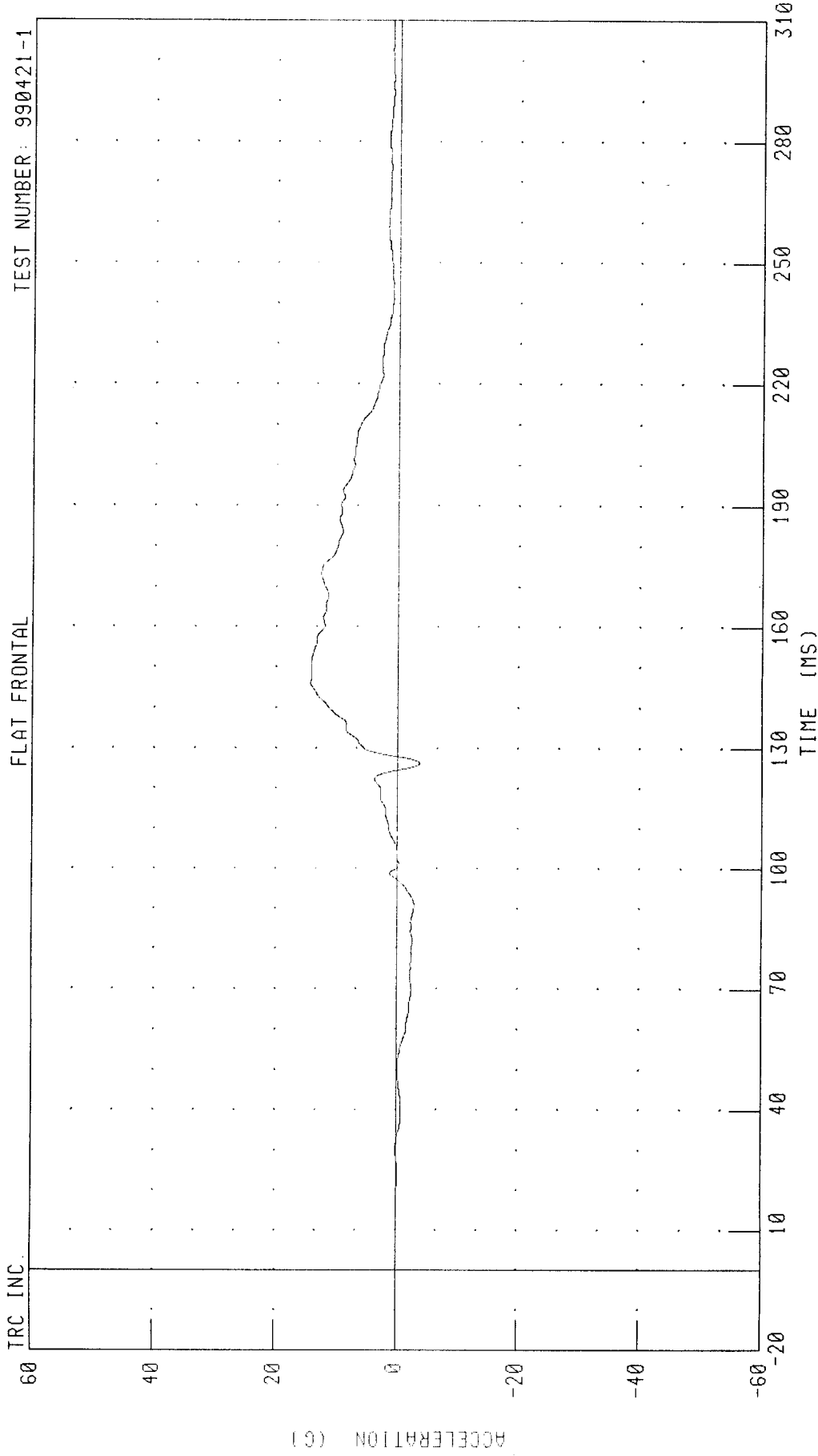
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 CHEST Y-AXIS ACCELERATION
FLAT FRONTAL

TEST NUMBER: 990421-1



CHANNEL: CSTYC5 FILTER: CH. CLASS 180 PEAK DATA: 5.36 G @ 157.68 MS; -1.79 G @ 82.88 MS

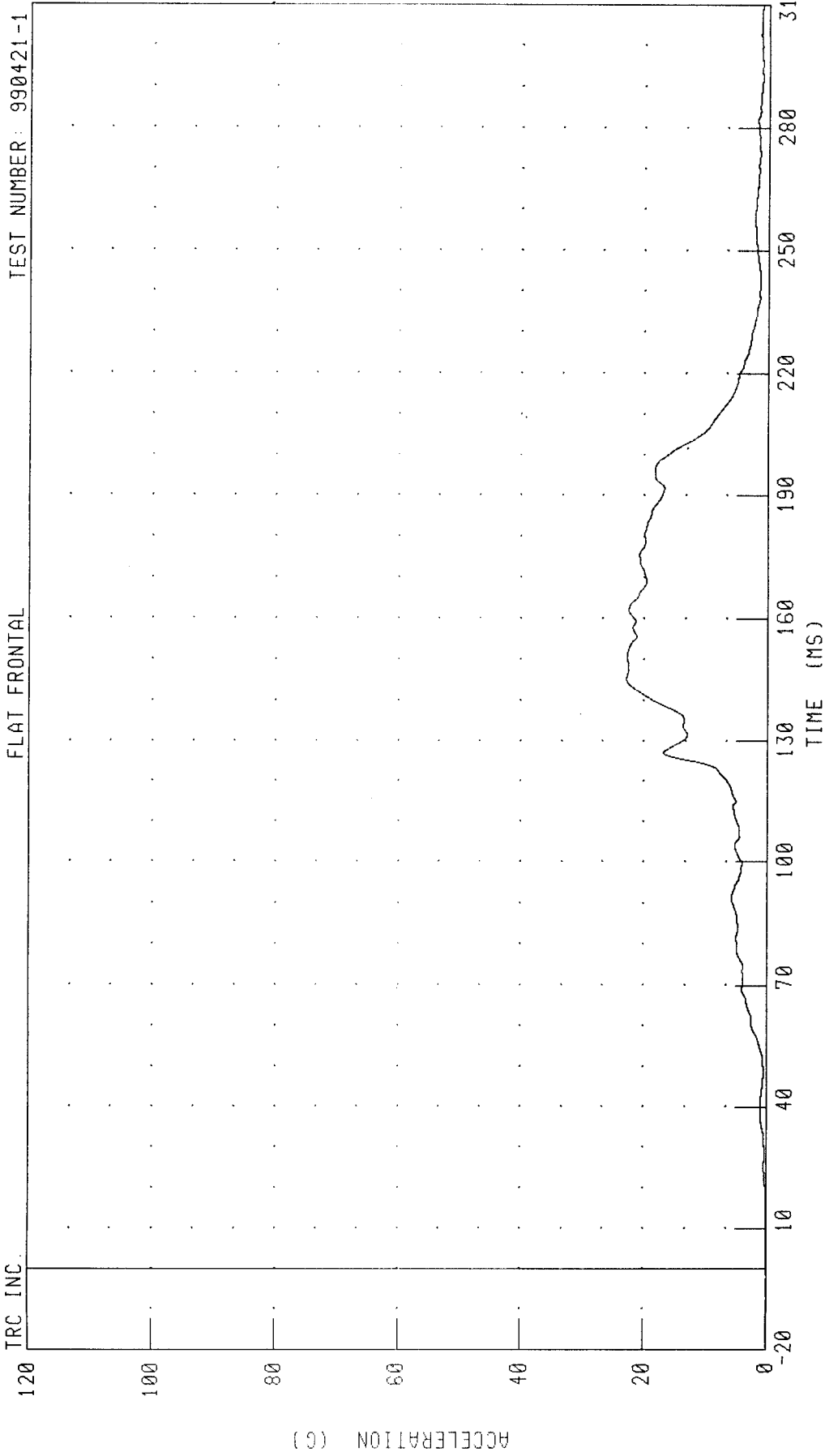
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 CHEST Z-AXIS ACCELERATION
FLAT FRONTAL



CHANNEL: CSTZG5 FILTER: CH. CLASS 180 PEAK DATA: 14.36 G @ 146.08 MS, -3.72 G @ 126.40 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 CHEST RESULTANT ACCELERATION
FLAT FRONTAL

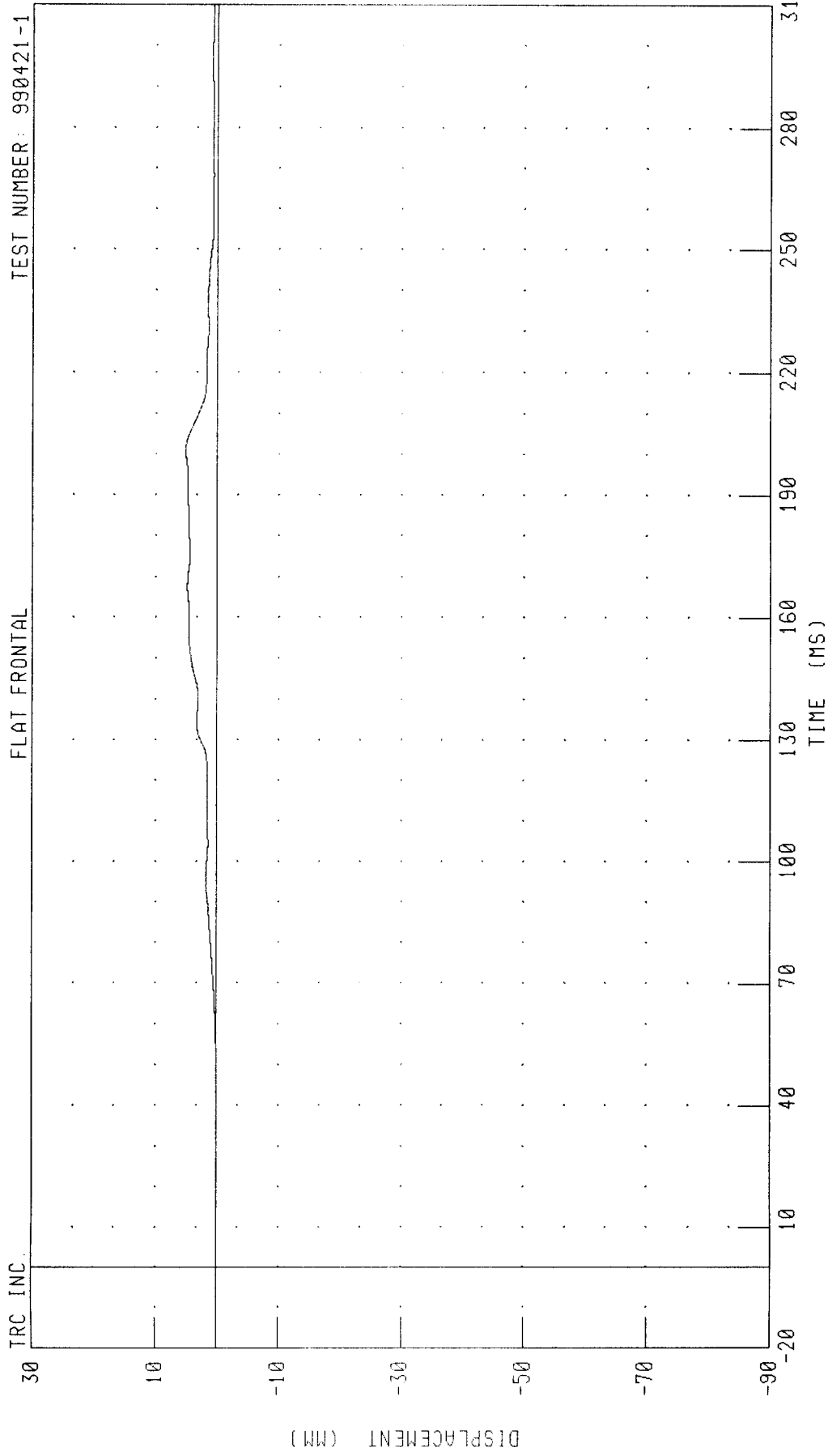
TRC INC. TEST NUMBER: 990421-1



CHANNEL: CSTRG5 FILTER: CH. CLASS 180 PEAK DATA: 22.80 G @ 145.28 MS; 0.01 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 CHEST DEFLECTION

TRC INC. TEST NUMBER: 990421-1

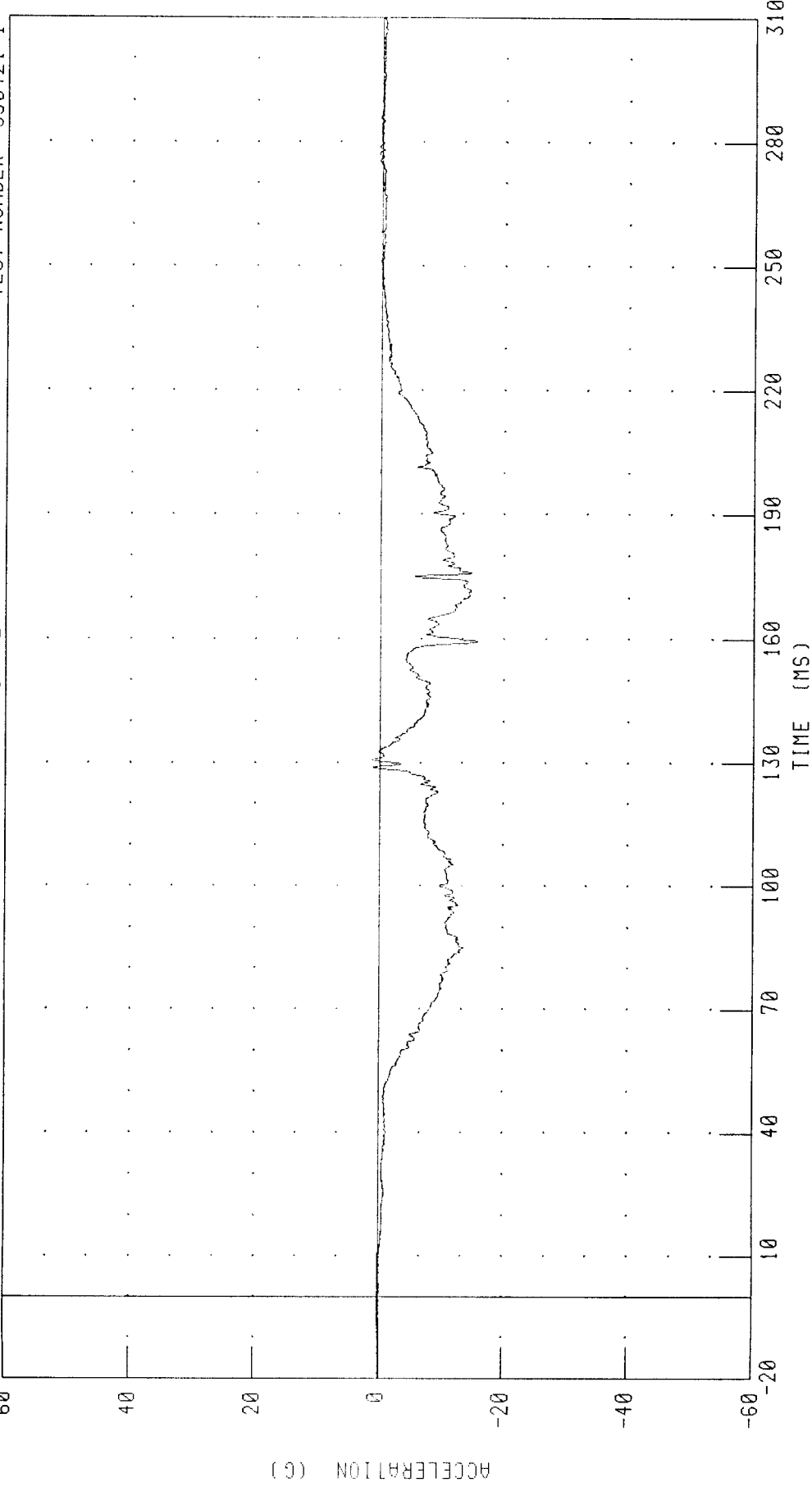


CHANNEL: CSTXD5 FILTER: CH. CLASS 180 PEAK DATA: 5.16 MM @ 201.20 MS, -0.01 MM @ 7.76 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 PELVIS X-AXIS ACCELERATION
FLAT FRONTAL

TRC INC.

TEST NUMBER: 990421-1



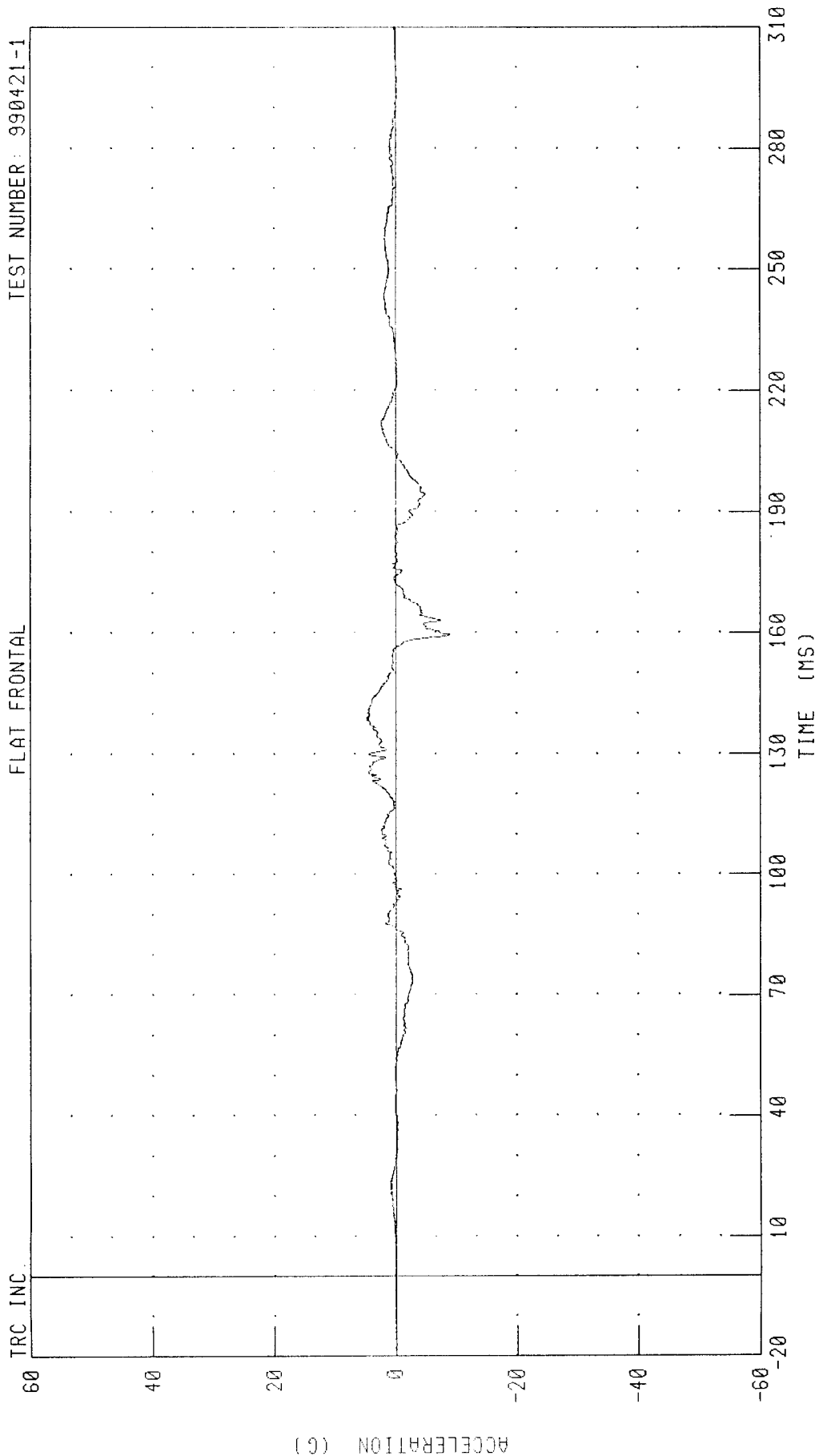
CHANNEL: PEVXG5 FILTER: CH. CLASS 1000

PEAK DATA: 1.21 G @ 130.80 MS; -15.82 G @ 159.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 990421-1

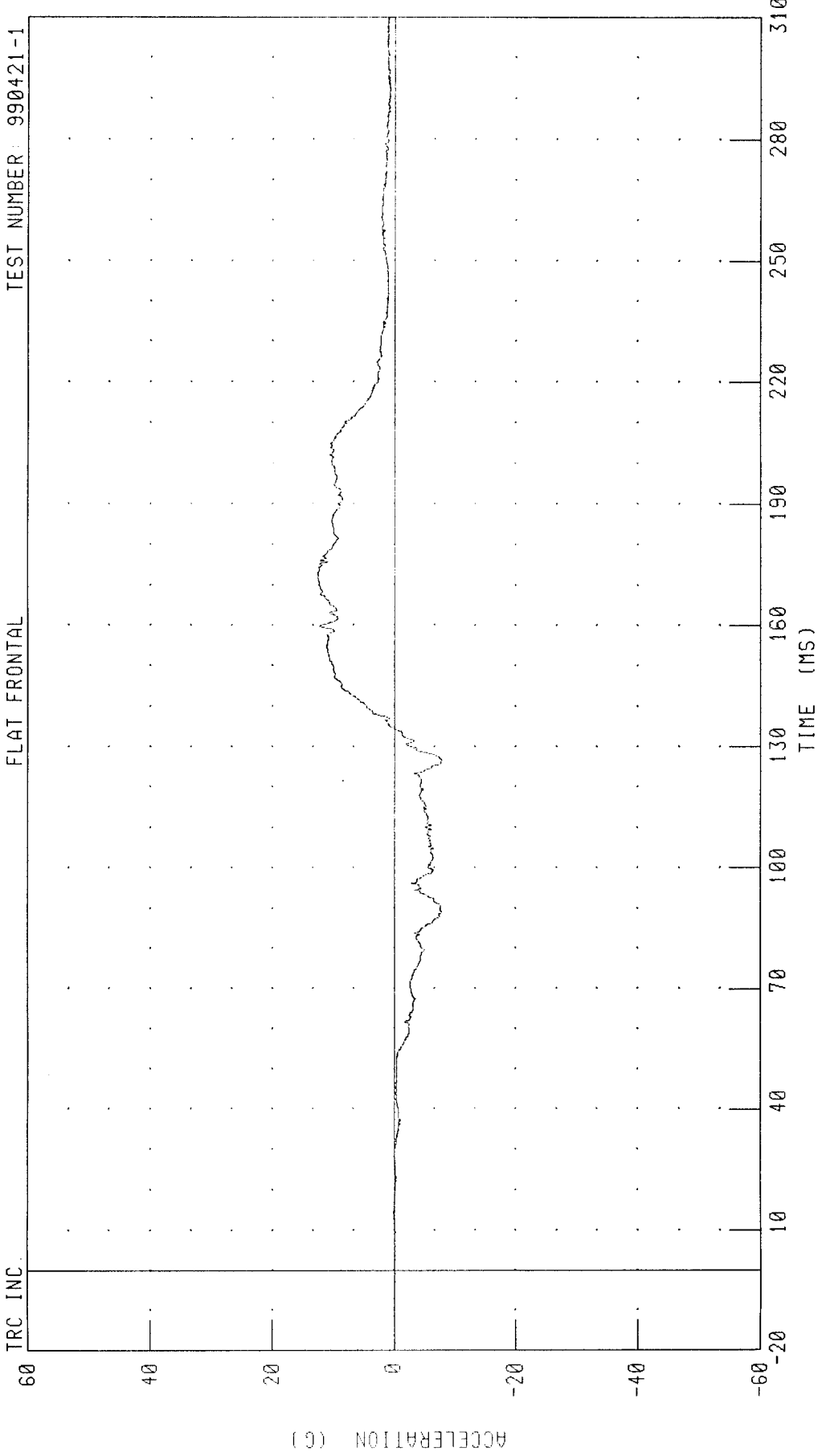
FLAT FRONTAL



CHANNEL: PEVYCS FILTER: CH. CLASS 1000

PEAK DATA: 4.59 G @ 138.24 MS, -9.08 G @ 159.60 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 PELVIS Z-AXIS ACCELERATION



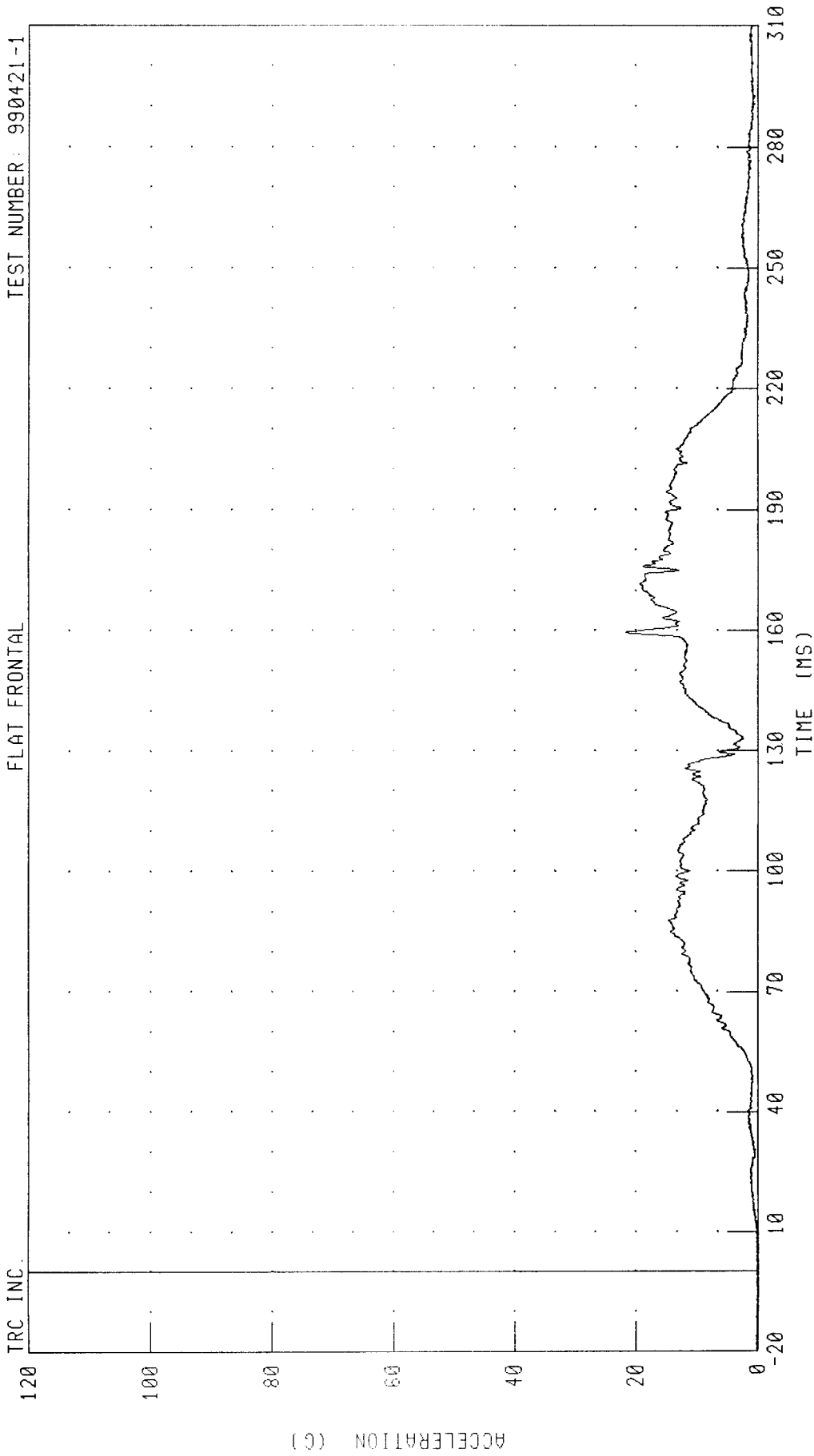
CHANNEL: PEVZG5 FILTER: CH. CLASS 1000 PEAK DATA: 12.69 G @ 171.68 MS; -7.88 G @ 88.88 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 PELVIS RESULTANT ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

TRC INC.



PEAK DATA: 21.64 G @ 159.60 MS, 0.11 G @ -14.00 MS

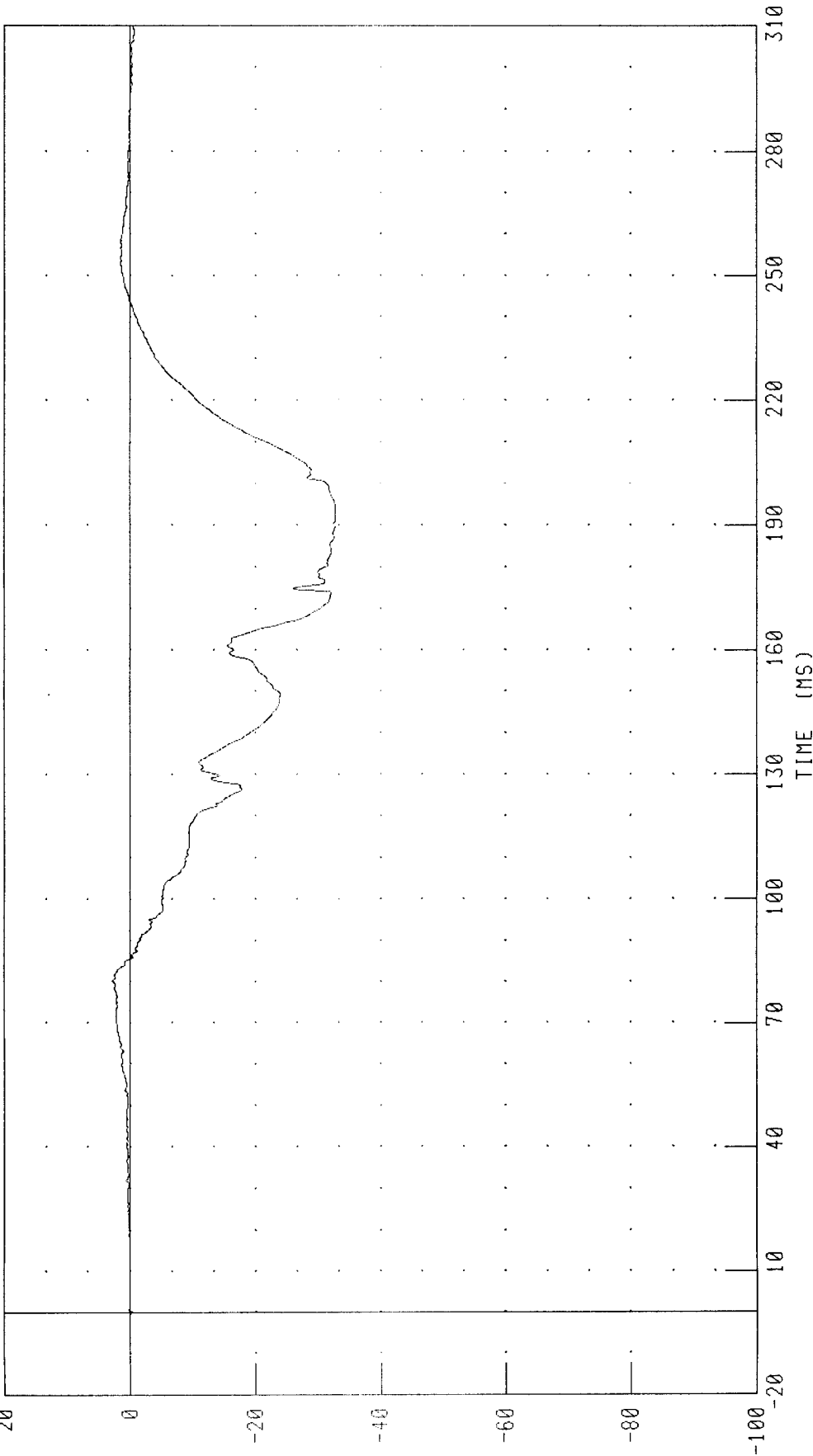
CHANNEL: PEVRG5 FILTER: CH. CLASS 1000

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 LEFT FEMUR FORCE

TEST NUMBER: 990421-1

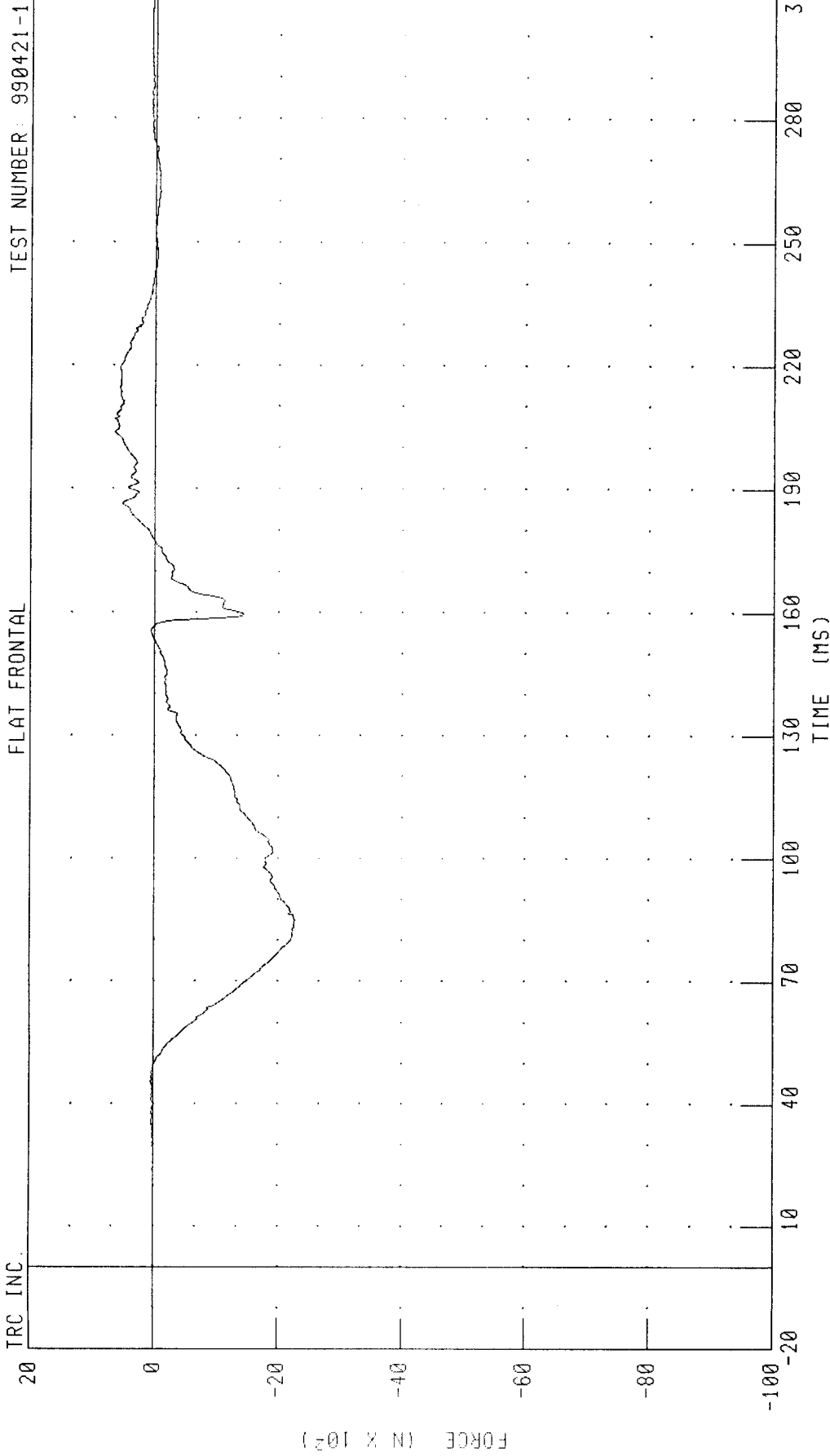
FLAT FRONTAL

TRC INC.



CHANNEL: LFMF5 FILTER: CH. CLASS 600 PEAK DATA: 286.65 N @ 80.32 MS, -3287.42 N @ 191.84 MS

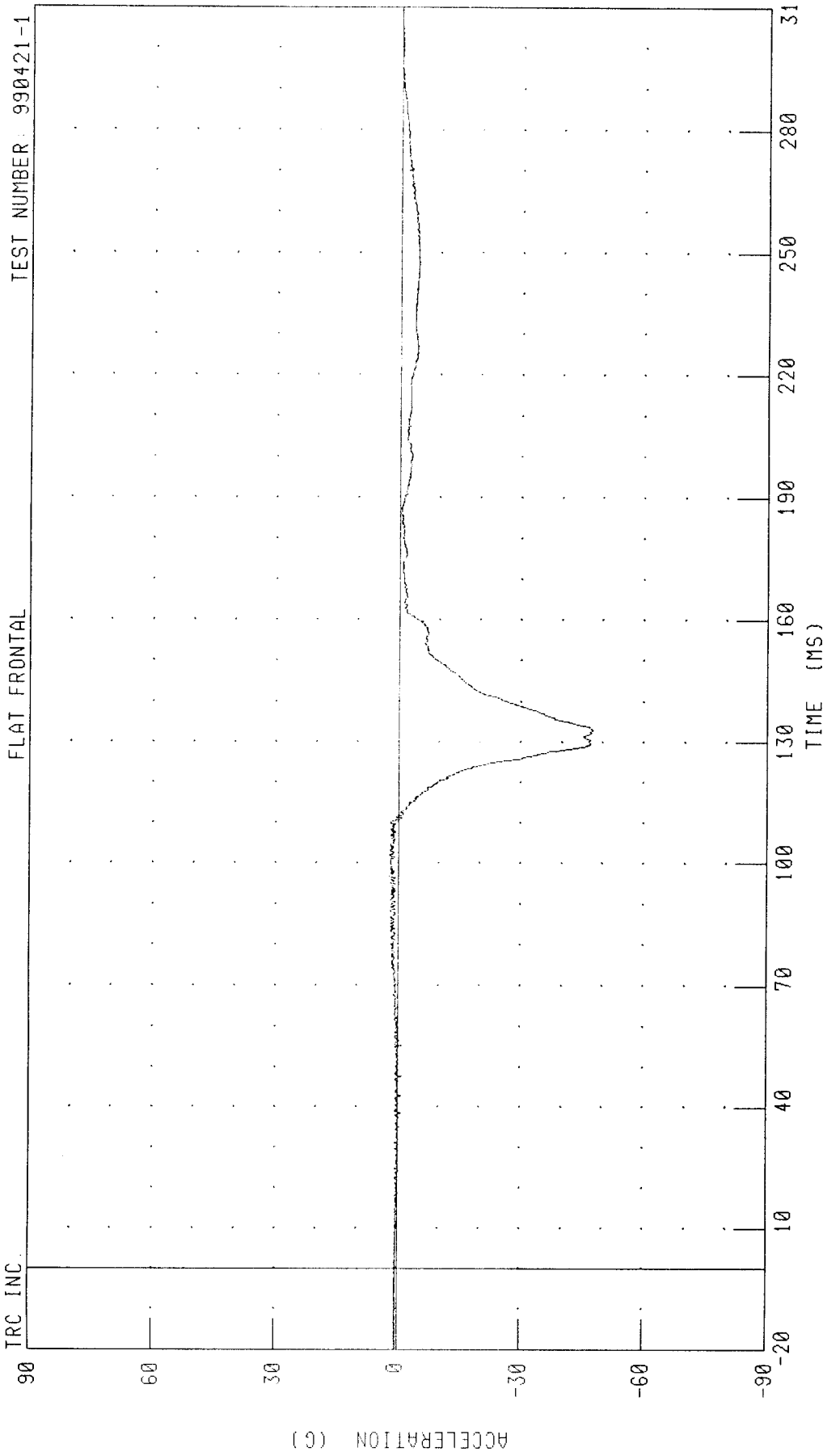
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 5 RIGHT FEMUR FORCE
FLAT FRONTAL



CHANNEL: RFMF5 FILTER: CH. CLASS 600 PEAK DATA: 642.73 N @ 203.76 MS; -2273.55 N @ 85.04 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 HEAD X-AXIS ACCELERATION

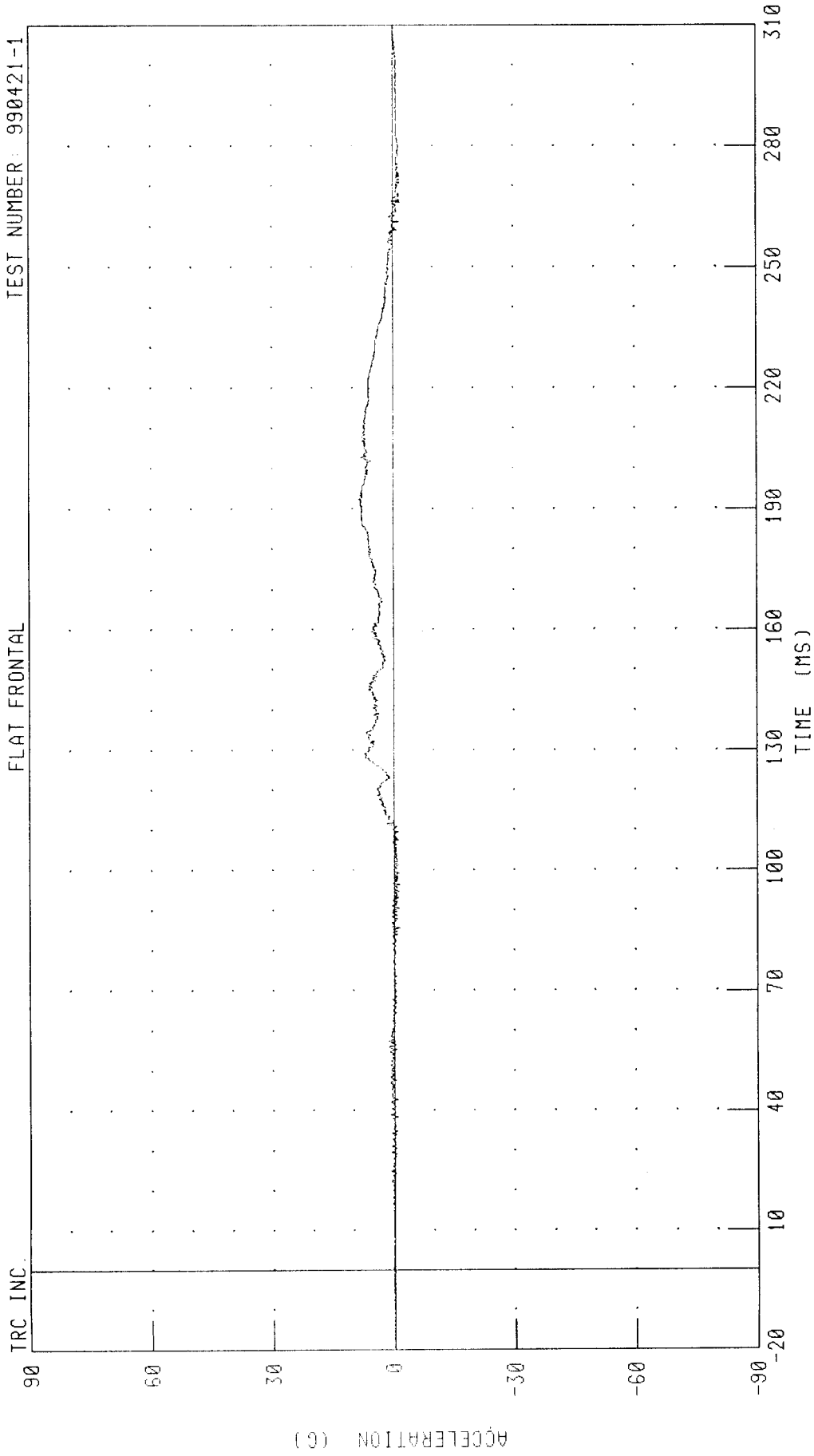
TRC INC. TEST NUMBER: 990421-1



CHANNEL: HEDX66 FILTER: CH. CLASS 1000 PEAK DATA: 2.13 G @ 96.80 MS; -47.73 G @ 132.96 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 HEAD Y-AXIS ACCELERATION
FLAT FRONTAL

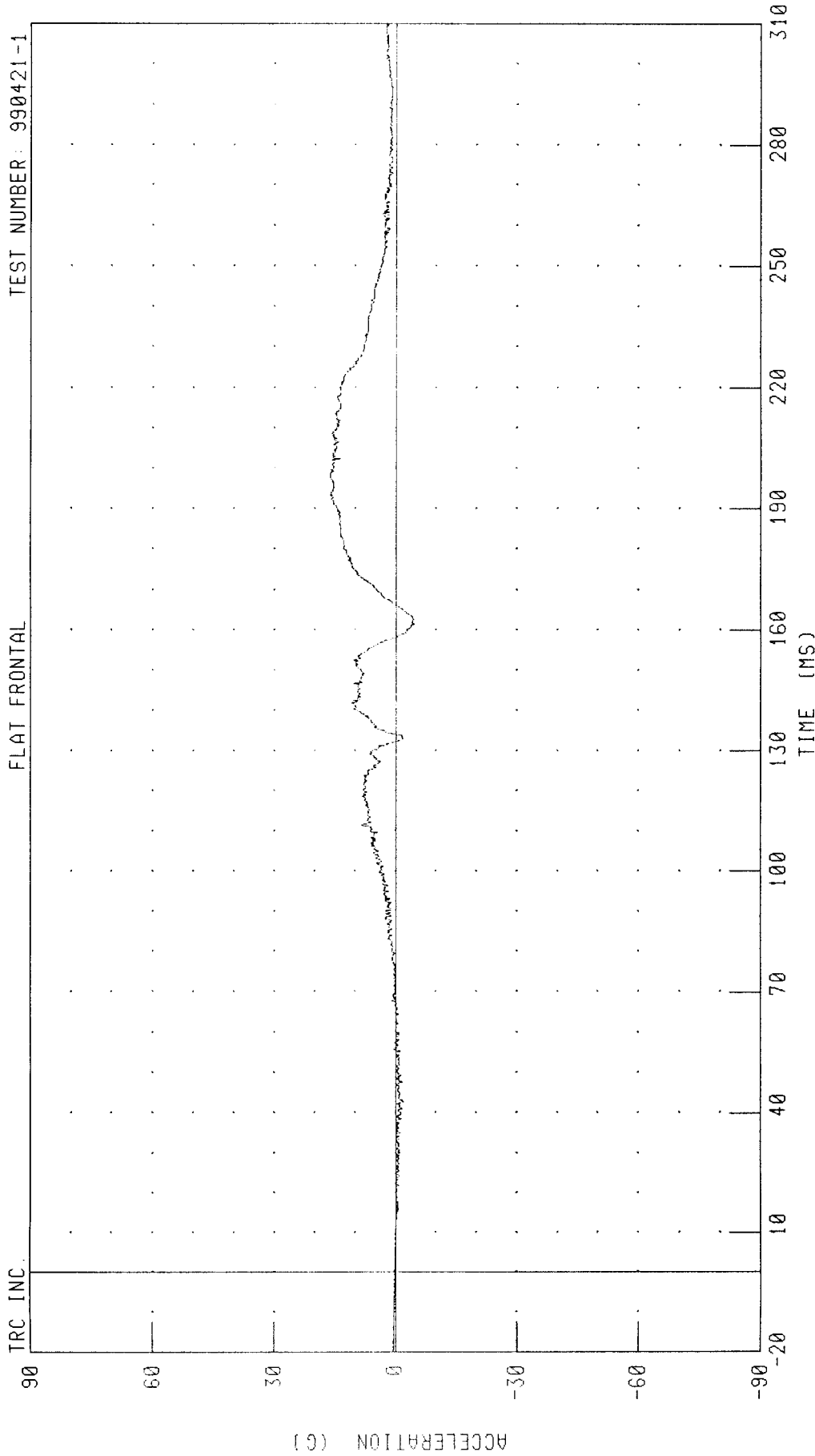
TEST NUMBER: 990421-1



CHANNEL: HEDY66 FILTER: CH. CLASS 1000

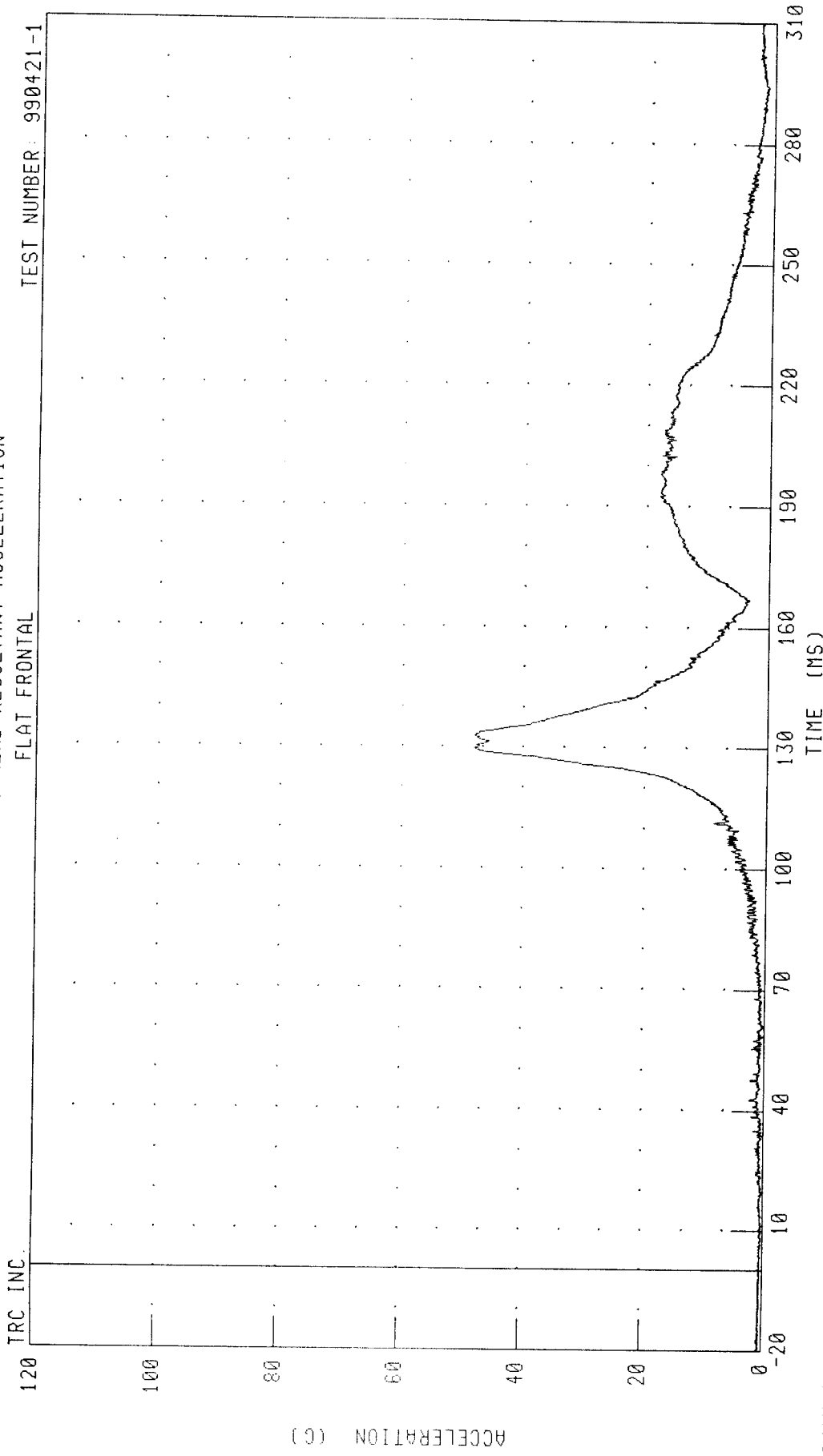
PEAK DATA: 8.41 G @ 192.48 MS; -2.35 G @ 266.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 HEAD Z-AXIS ACCELERATION



CHANNEL: HEDZG6 FILTER: CH. CLASS 1000 PEAK DATA: 16.27 G @ 197.76 MS, -4.69 G @ 161.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 HEAD RESULTANT ACCELERATION

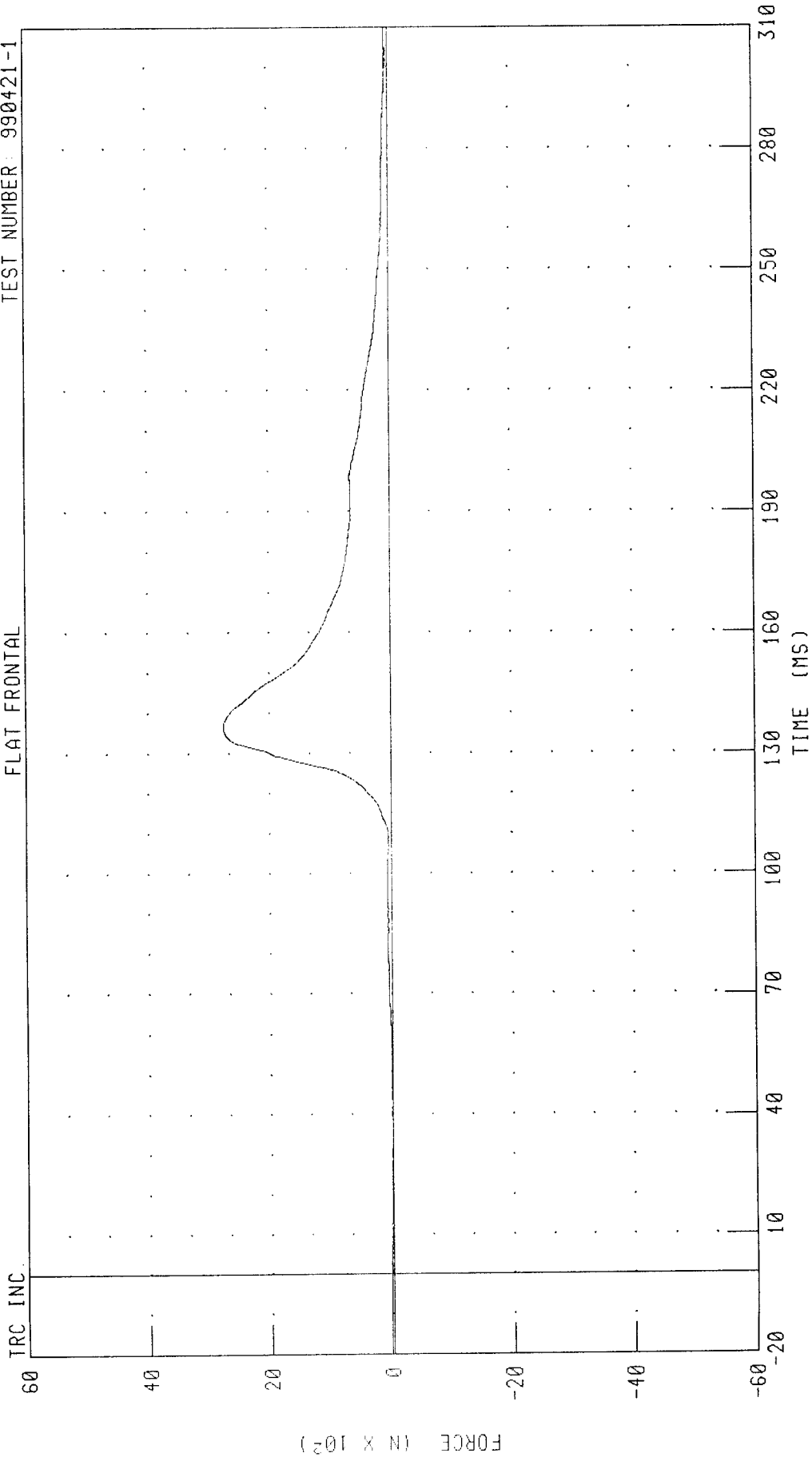


CHANNEL: HEDRG6 FILTER: CH. CLASS 1000 PEAK DATA: 48.13 G @ 132.96 MS, 0.17 G @ 9.92 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK X-AXIS SHEAR FORCE

TEST NUMBER: 990421-1

FLAT FRONTAL

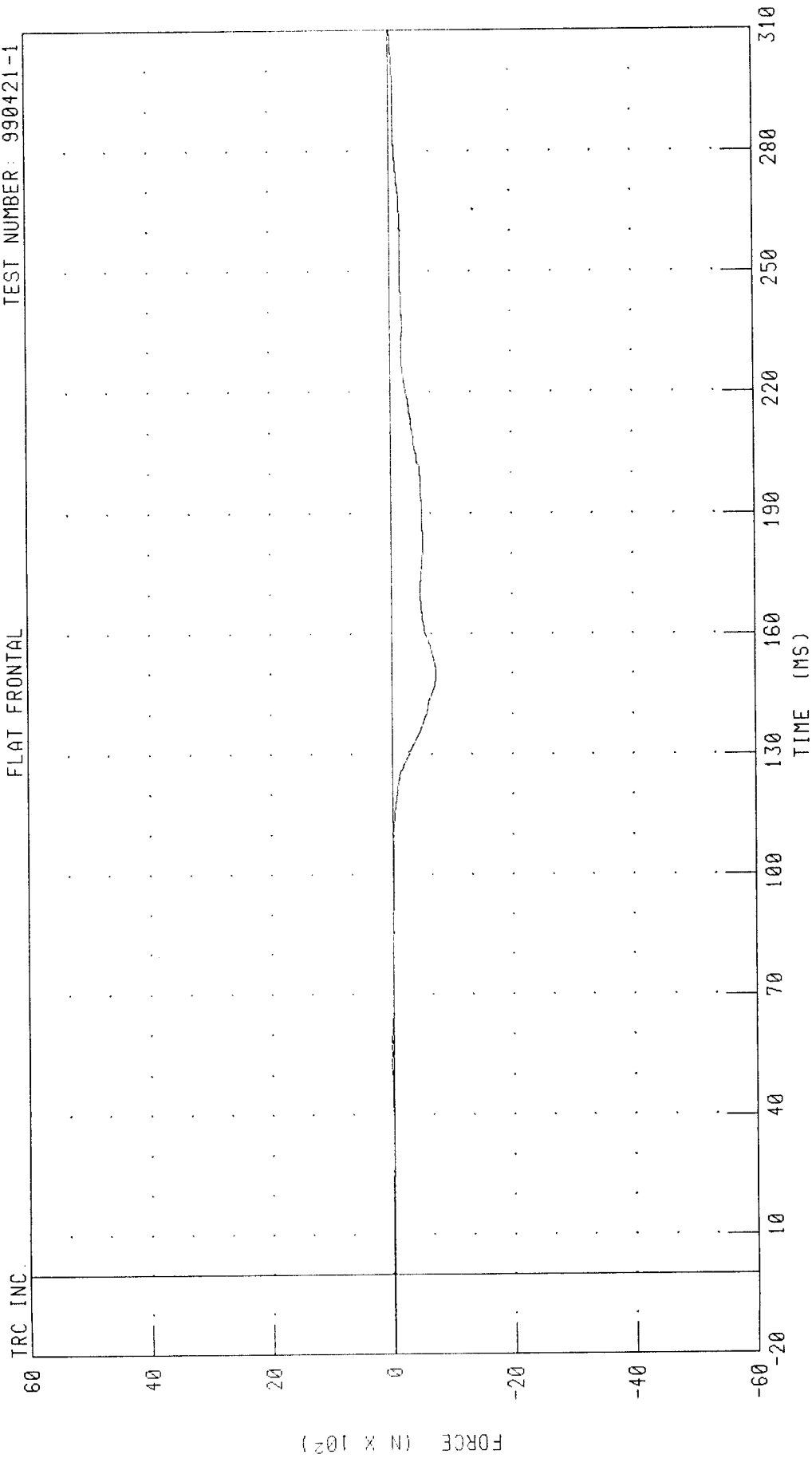


CHANNEL: NEKXF6 FILTER: CH. CLASS 1000 PEAK DATA: 2759.34 N @ 136.56 MS; -7.39 N @ 35.20 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK Y-AXIS SHEAR FORCE

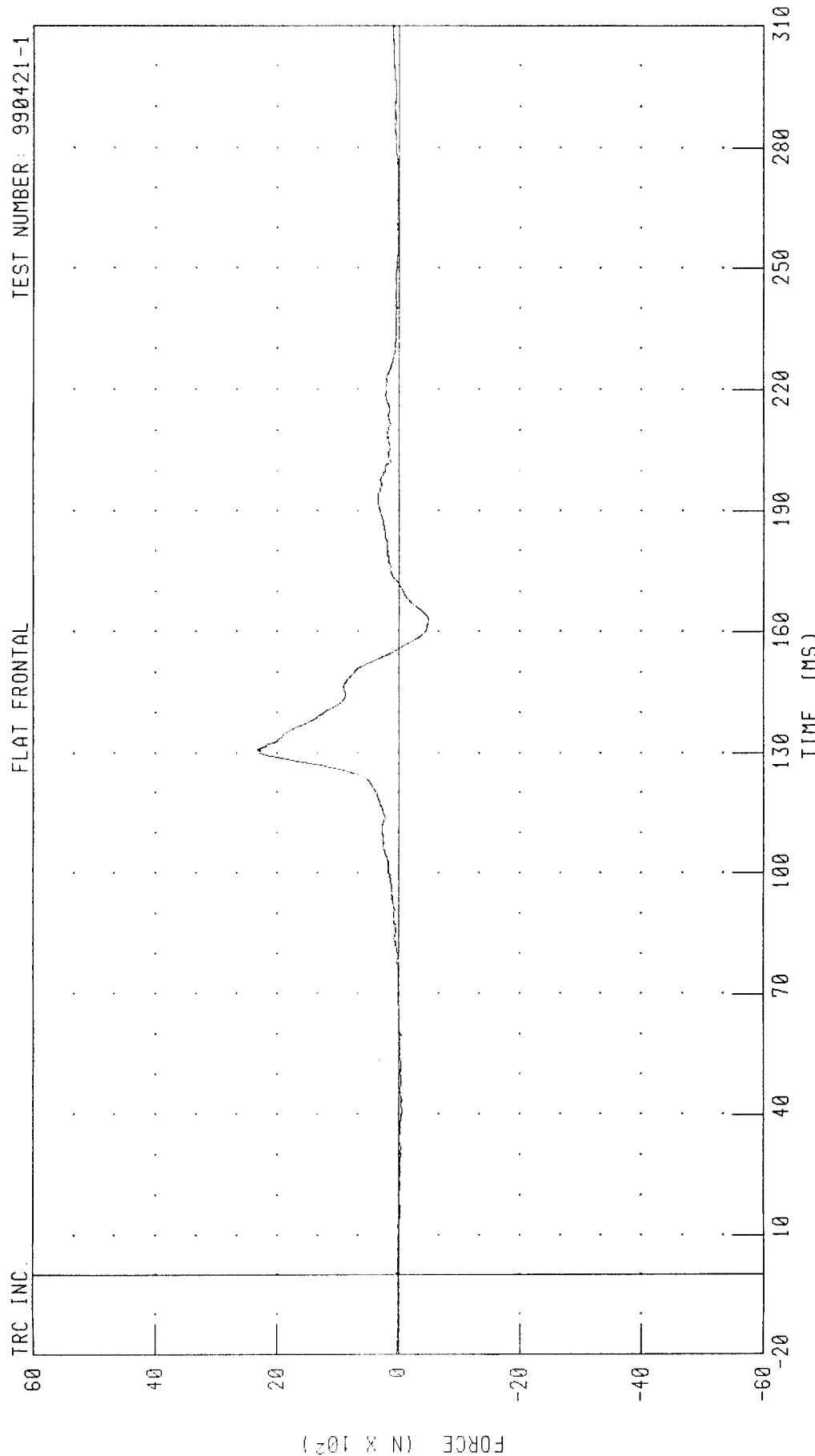
TEST NUMBER: 990421-1

FLAT FRONTAL



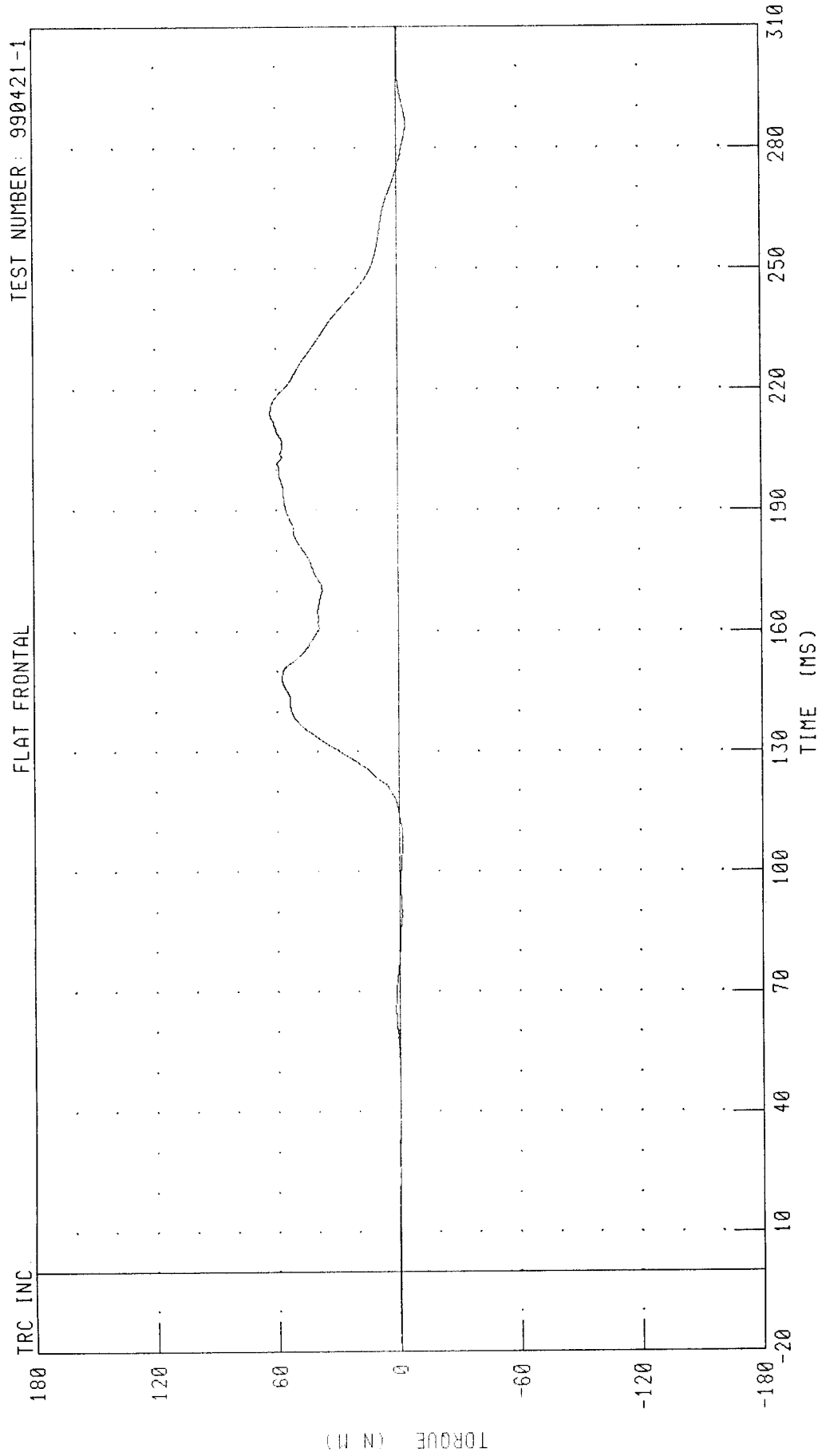
CHANNEL: NEKYF6 FILTER: CH. CLASS 1000
PEAK DATA: 35.23 N @ 0.08 MS, -742.51 N @ 149.36 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK Z-AXIS AXIAL FORCE



CHANNEL: NEKZF6 FILTER: CH. CLASS 1000
PEAK DATA: 2323.31 N @ 130.88 MS; -497.51 N @ 162.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK MOMENT ABOUT X AXIS



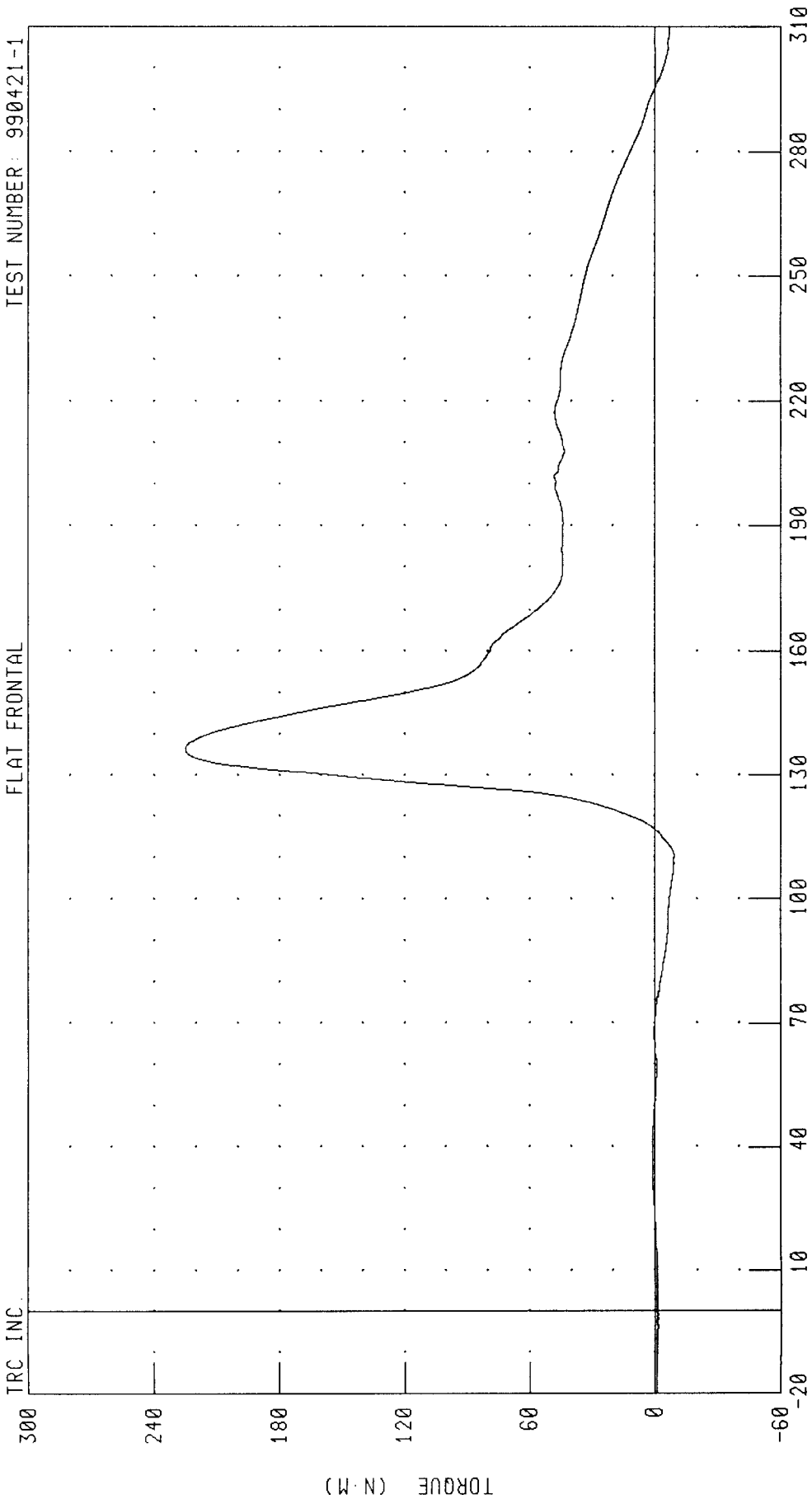
CHANNEL: NEKXMG FILTER: CH. CLASS 600
PEAK DATA: 63.20 N.M @ 214.16 MS, -4.84 N.M @ 285.92 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK MOMENT ABOUT Y AXIS

TEST NUMBER: 990421-1

FLAT FRONTAL

TRC INC.

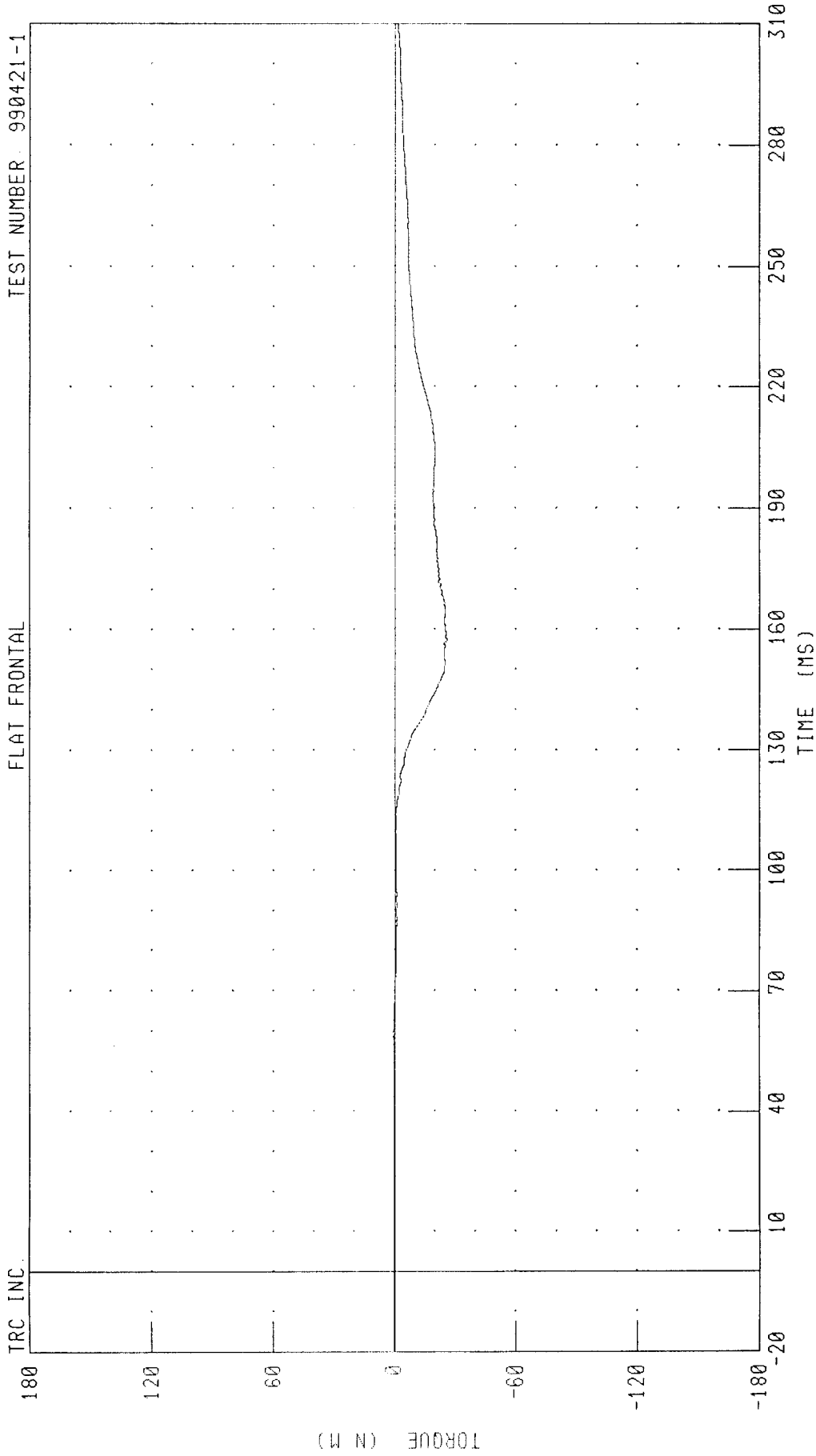


TIME (MS)

PEAK DATA: 225.15 N.M @ 136.40 MS; -9.19 N.M @ 110.48 MS

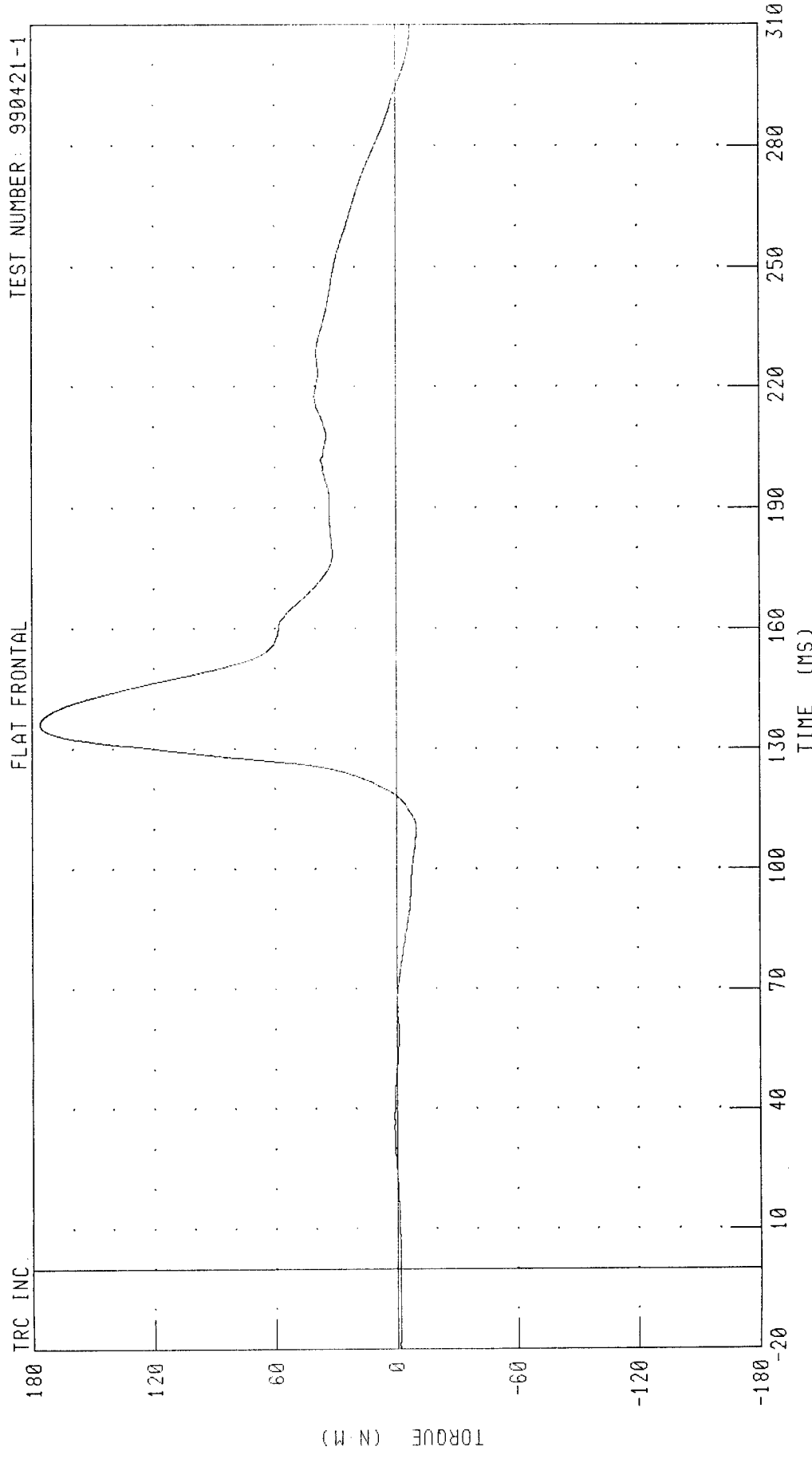
CHANNEL: NEKYM6 FILTER: CH. CLASS 600

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK MOMENT ABOUT Z AXIS



CHANNEL: NEKZM6 FILTER: CH. CLASS 600 PEAK DATA: 0.58 N.M @ 59.76 MS; -26.27 N.M @ 157.36 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 NECK OCCIPITAL CONDYLE

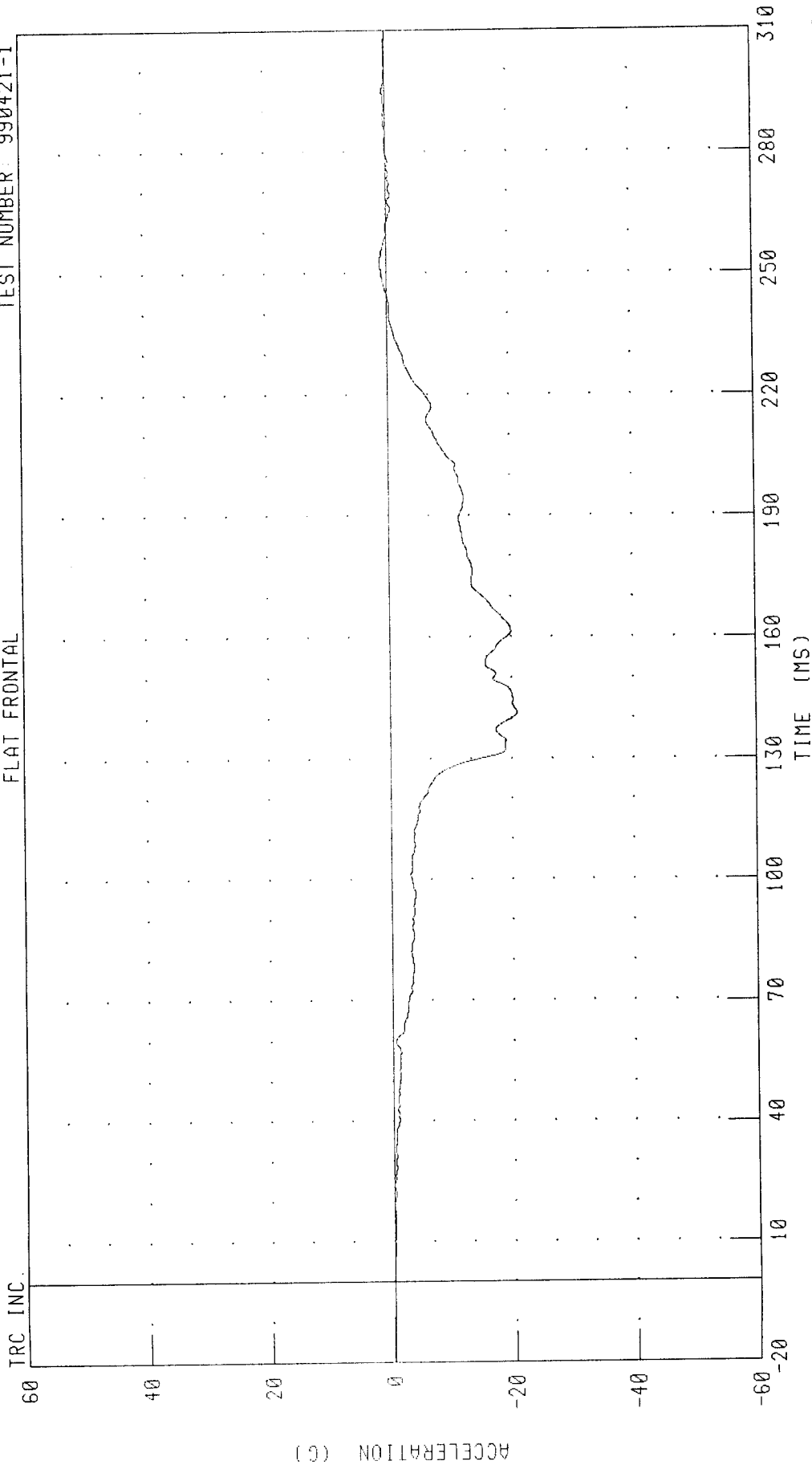


CHANNEL: NEK0MG FILTER: CH. CLASS 600
PEAK DATA: 176.16 N·M @ 136.24 MS, -10.00 N·M @ 110.56 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 CHEST X-AXIS ACCELERATION

TEST NUMBER: 990421-1

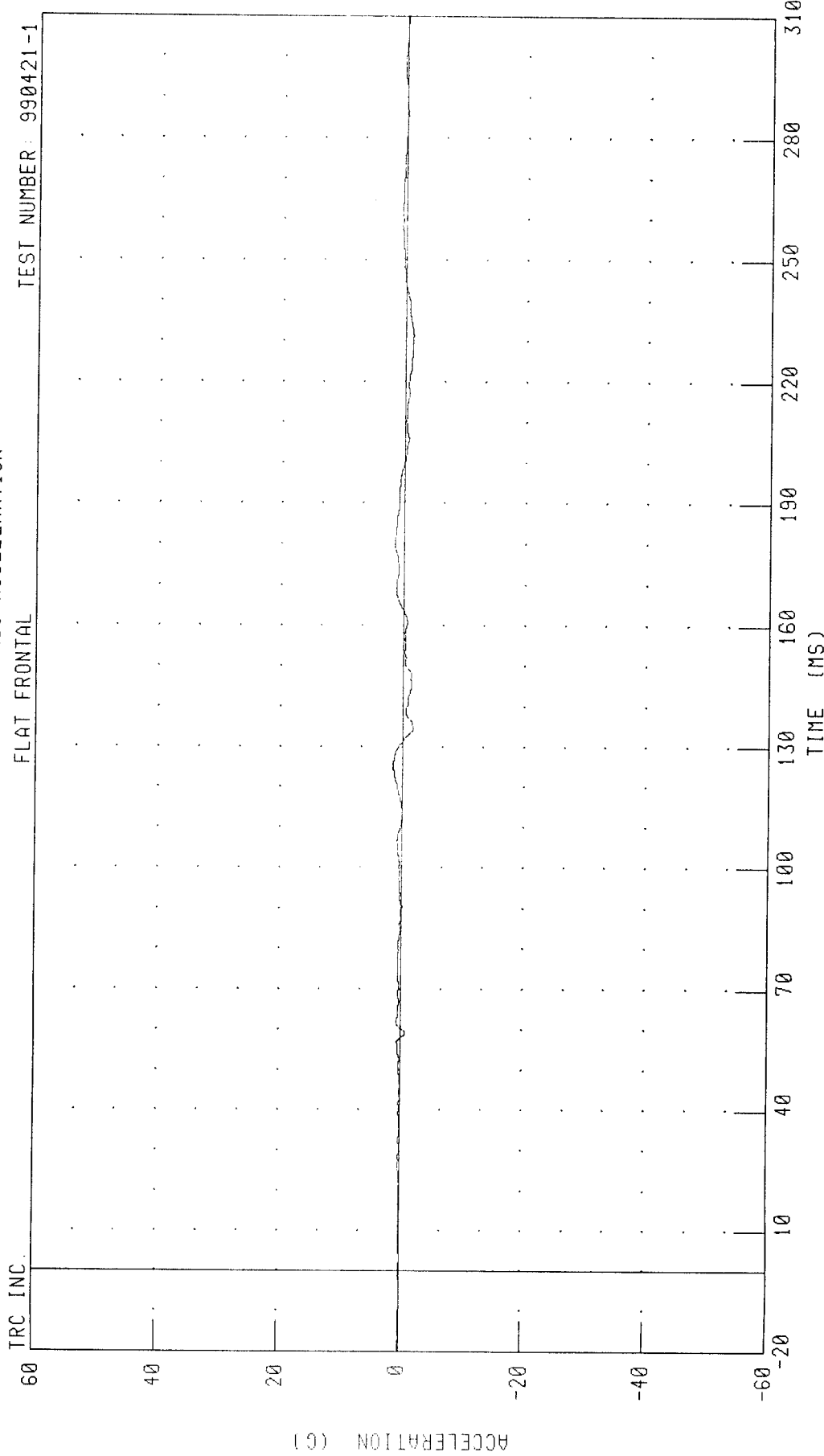
FLAT FRONTAL



CHANNEL: CSTXG6 FILTER: CH. CLASS 180

PEAK DATA: 0.92 G @ 252.40 MS, -20.94 G @ 141.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 CHEST Y-AXIS ACCELERATION

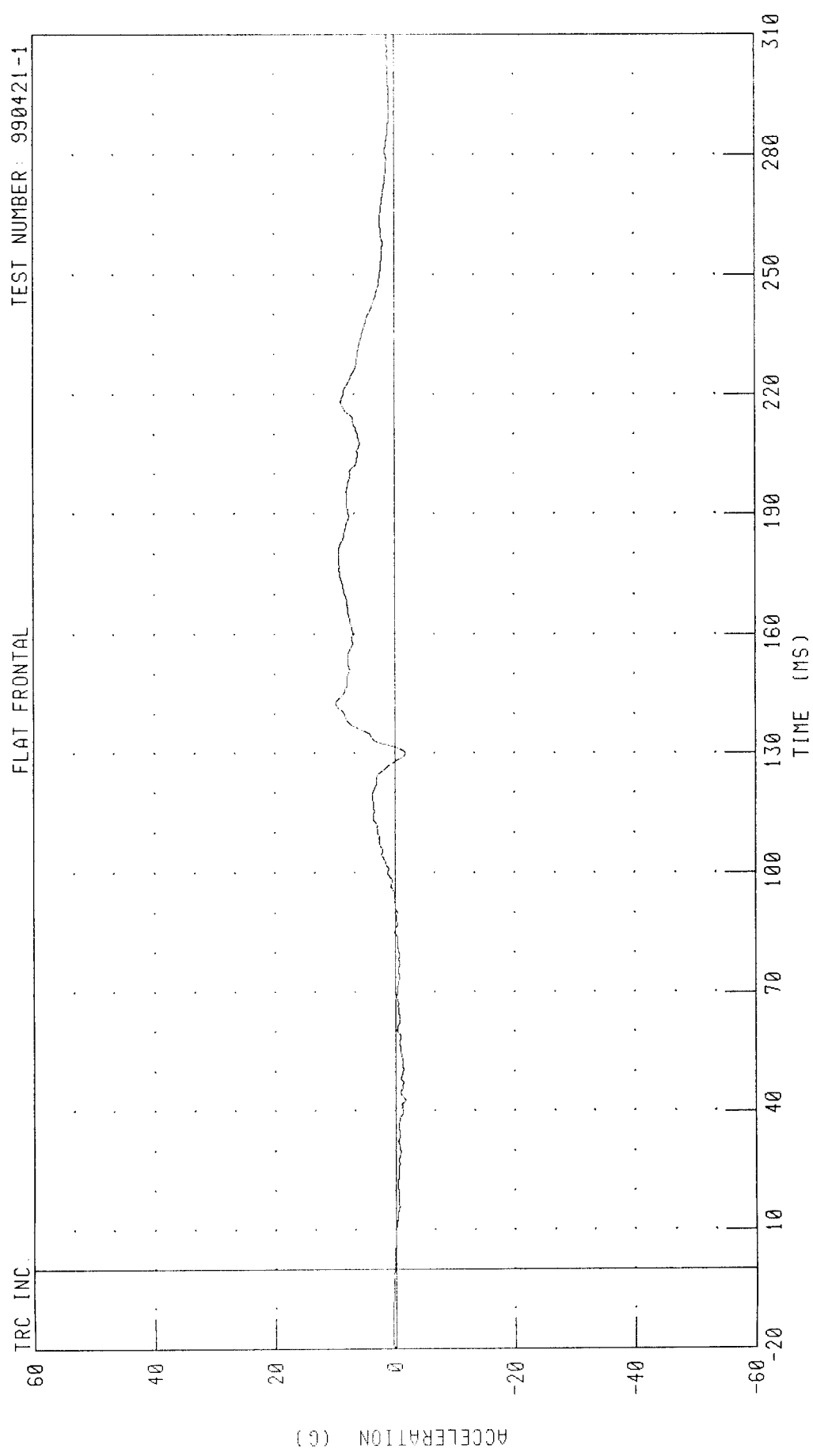


CHANNEL: CSTYGG FILTER: CH. CLASS 180 PEAK DATA: 1.50 G @ 124.80 MS, -1.84 G @ 134.72 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 CHEST Z-AXIS ACCELERATION

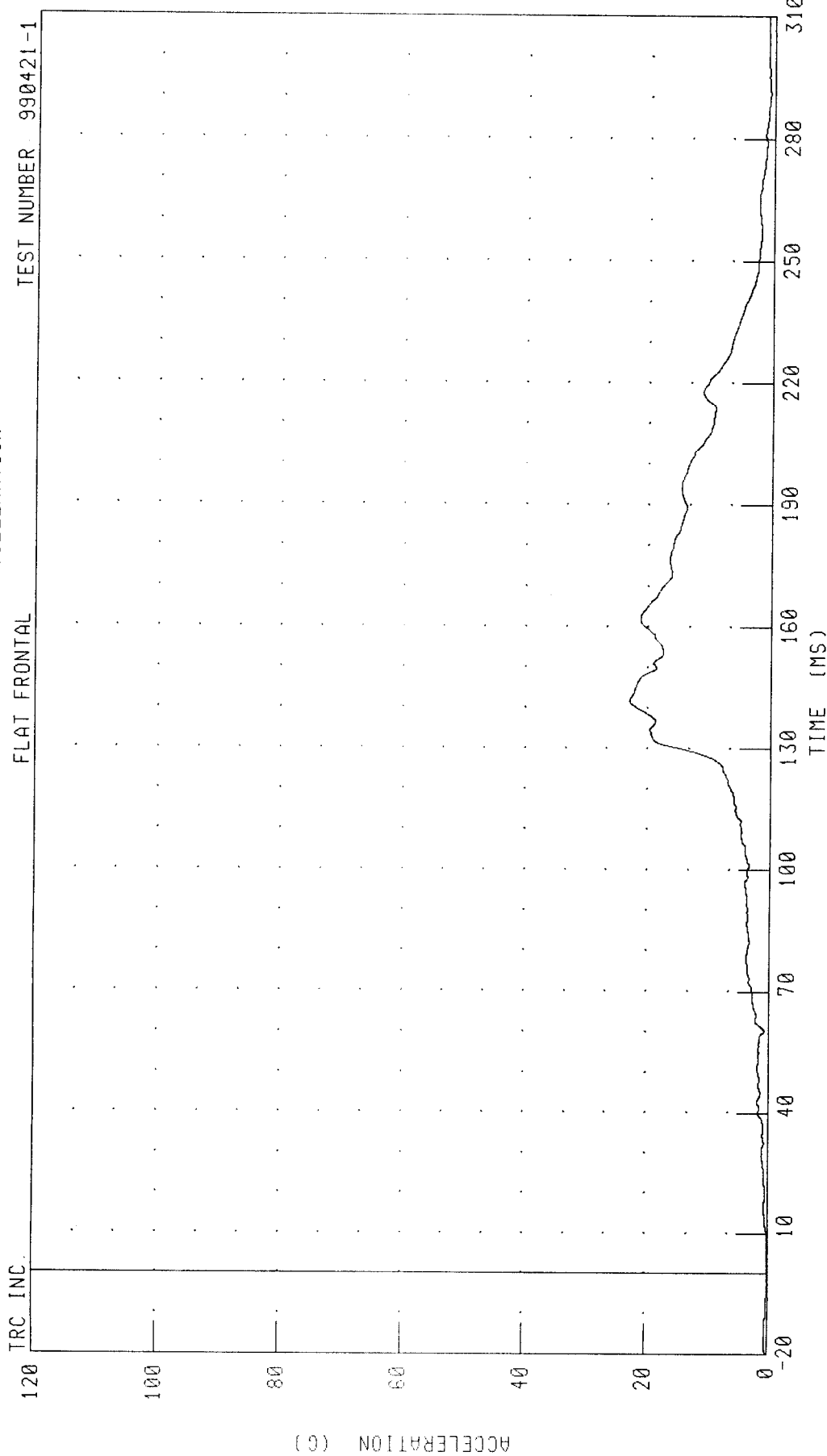
TEST NUMBER: 990421-1

FLAT FRONTAL



CHANNEL: CSTZG6 FILTER: CH. CLASS 180 PEAK DATA: 9.74 G @ 142.80 MS; -1.78 G @ 130.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 CHEST RESULTANT ACCELERATION



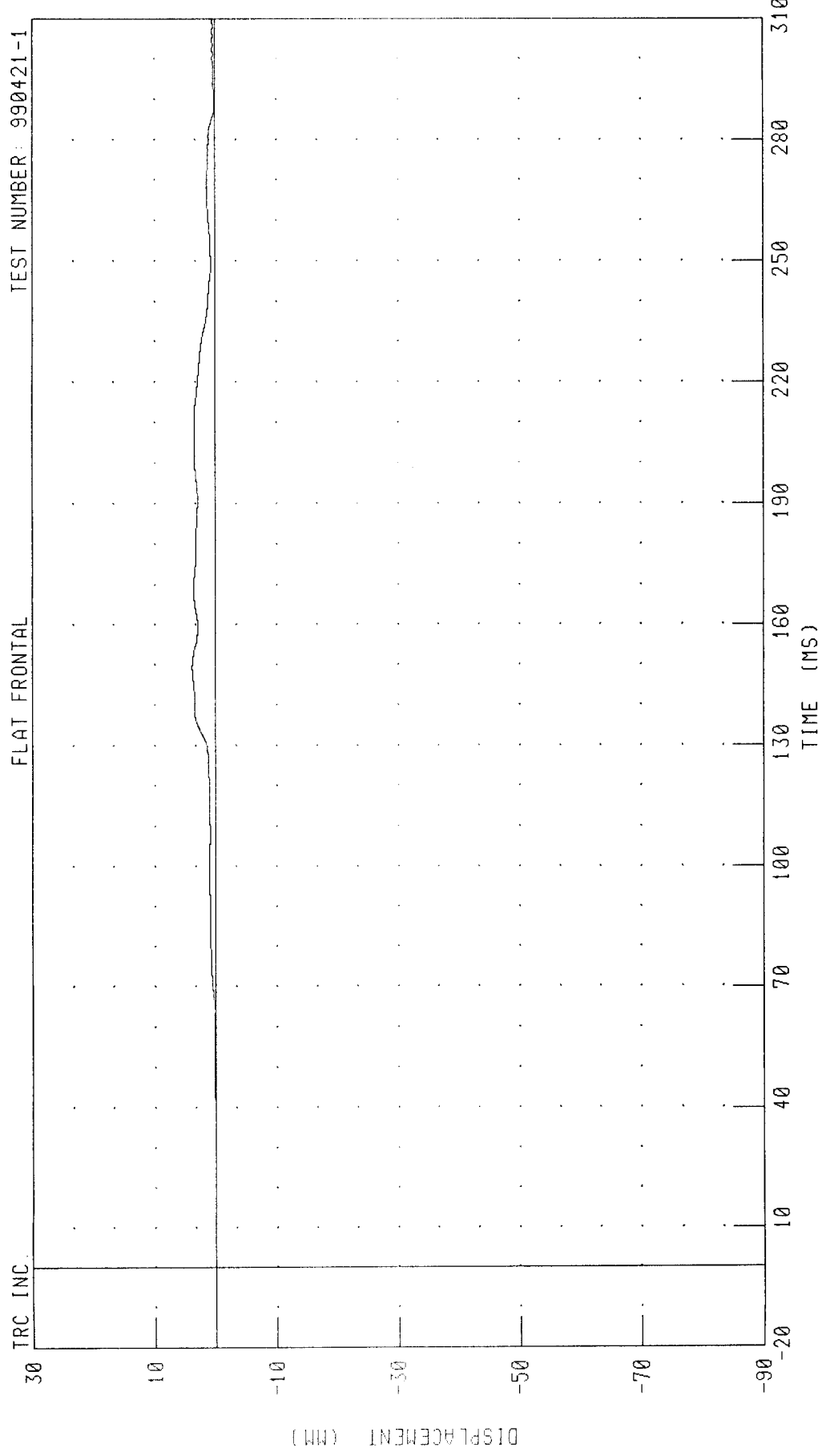
CHANNEL: CSTRG6 FILTER: CH. CLASS 180 PEAK DATA: 22.93 G @ 141.68 MS; 0.03 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER

POSITION # 6 CHEST DEFLECTION

TEST NUMBER: 990421-1

FLAT FRONTAL



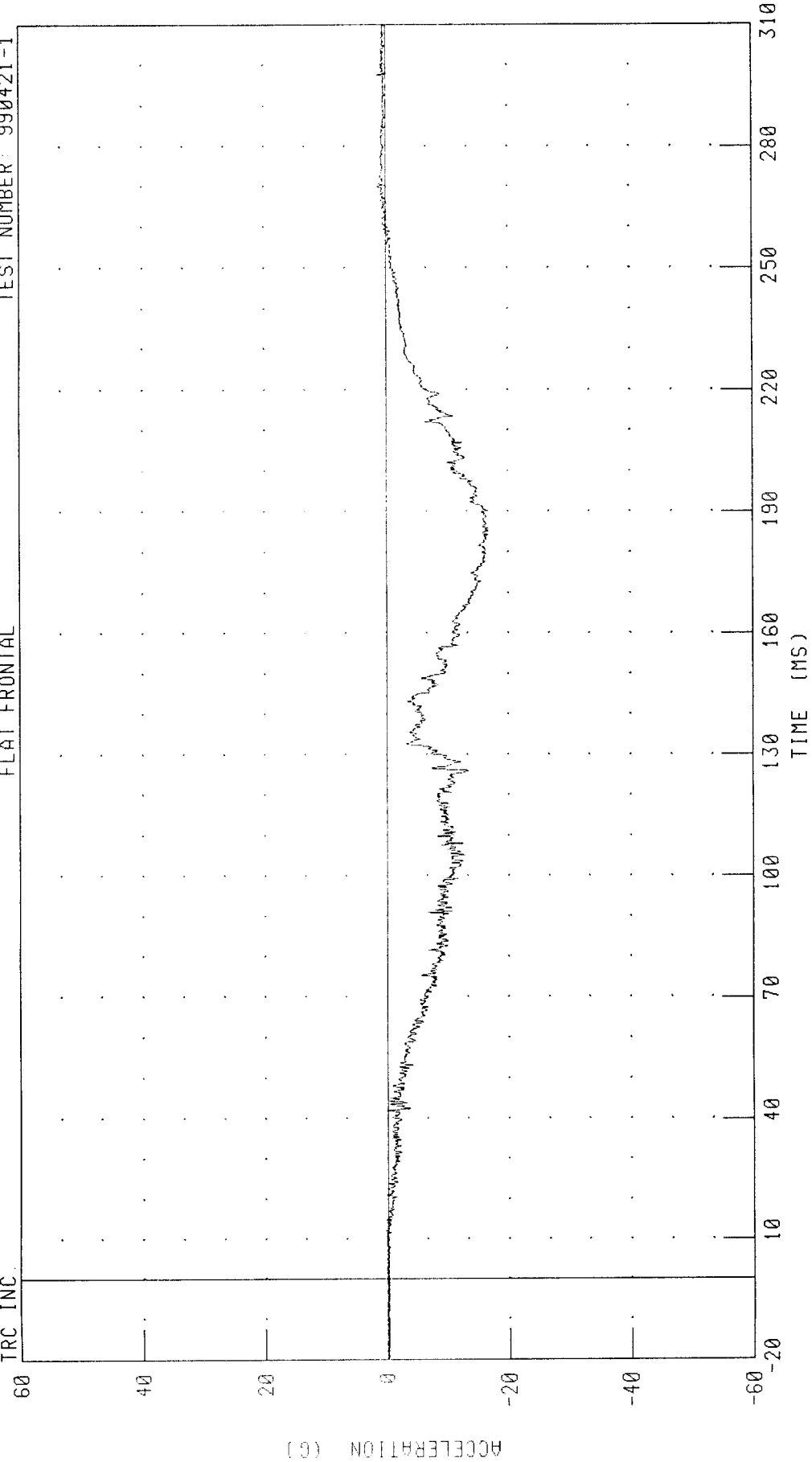
CHANNEL: CSTXD6 FILTER: CH. CLASS 180 PEAK DATA: 3.90 MM @ 149.36 MS, -0.01 MM @ -14.48 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 PELVIS X-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

TRC INC.



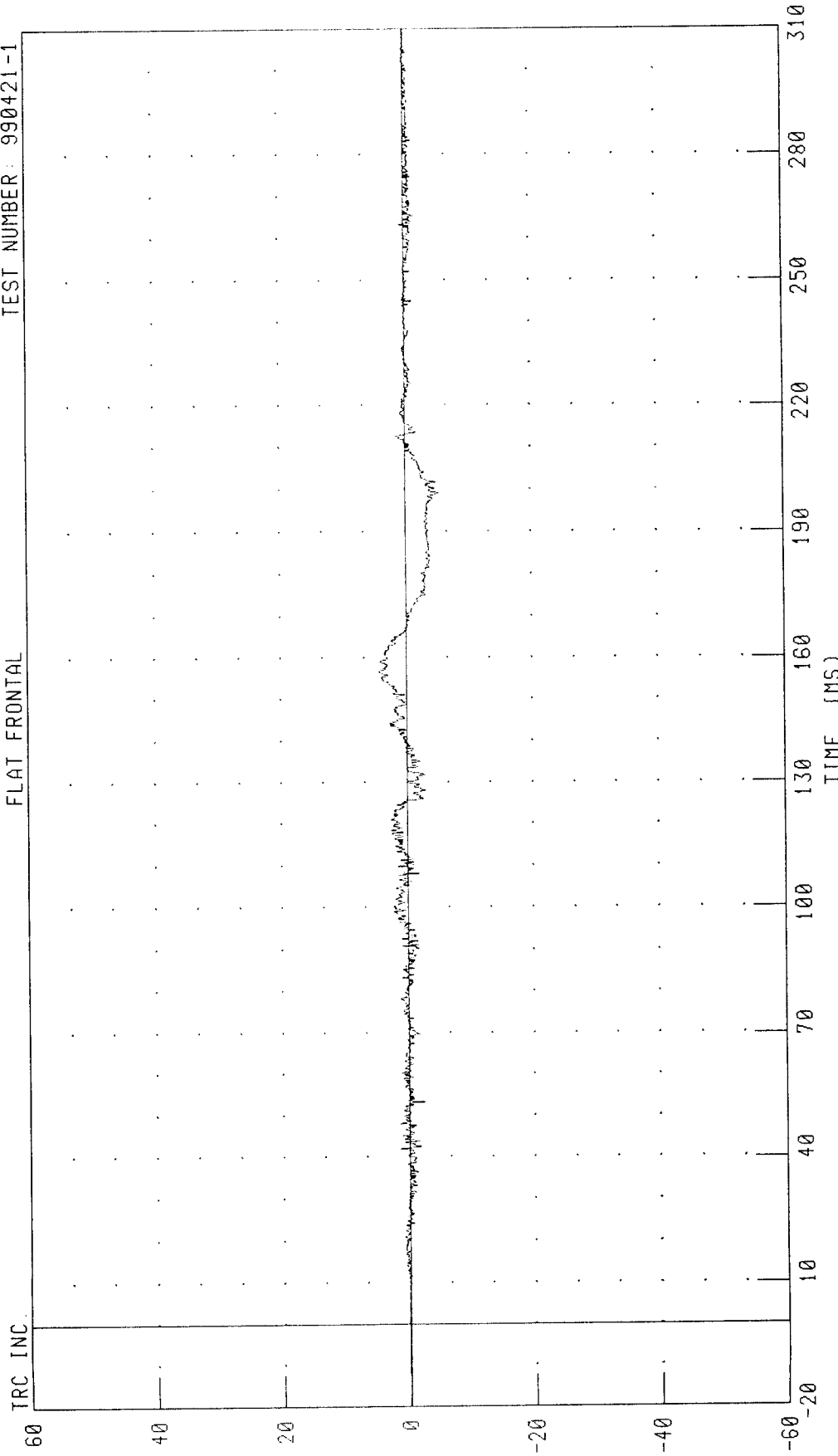
CHANNEL: PEVX06 FILTER: CH. CLASS 1000

PEAK DATA: 1.40 G @ 270.00 MS, -16.77 G @ 184.32 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 PELVIS Y-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

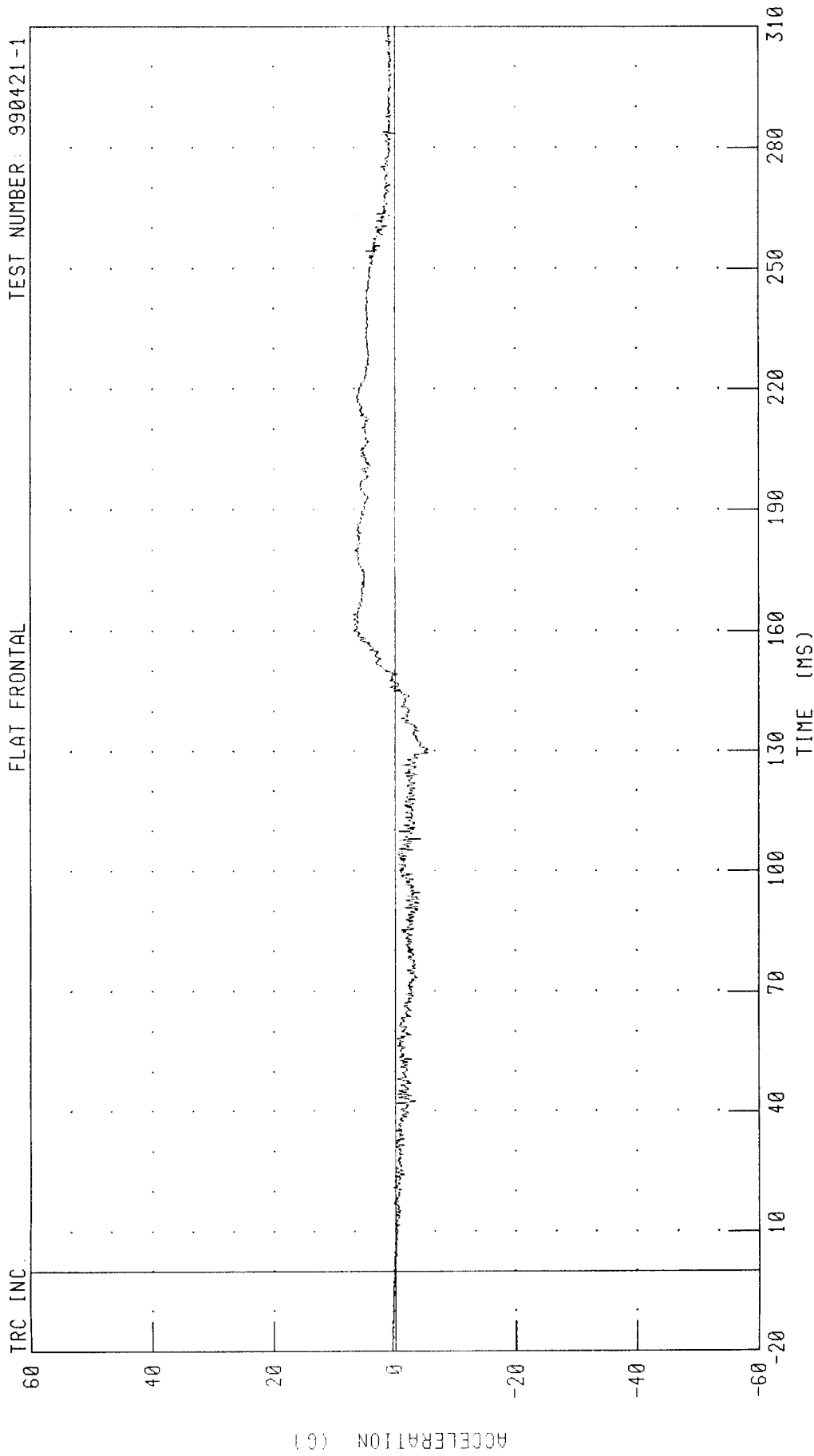


CHANNEL: PEVY66 FILTER: CH. CLASS 1000 PEAK DATA: 4.36 G @ 156.64 MS; -5.42 G @ 199.20 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 PELVIS Z-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

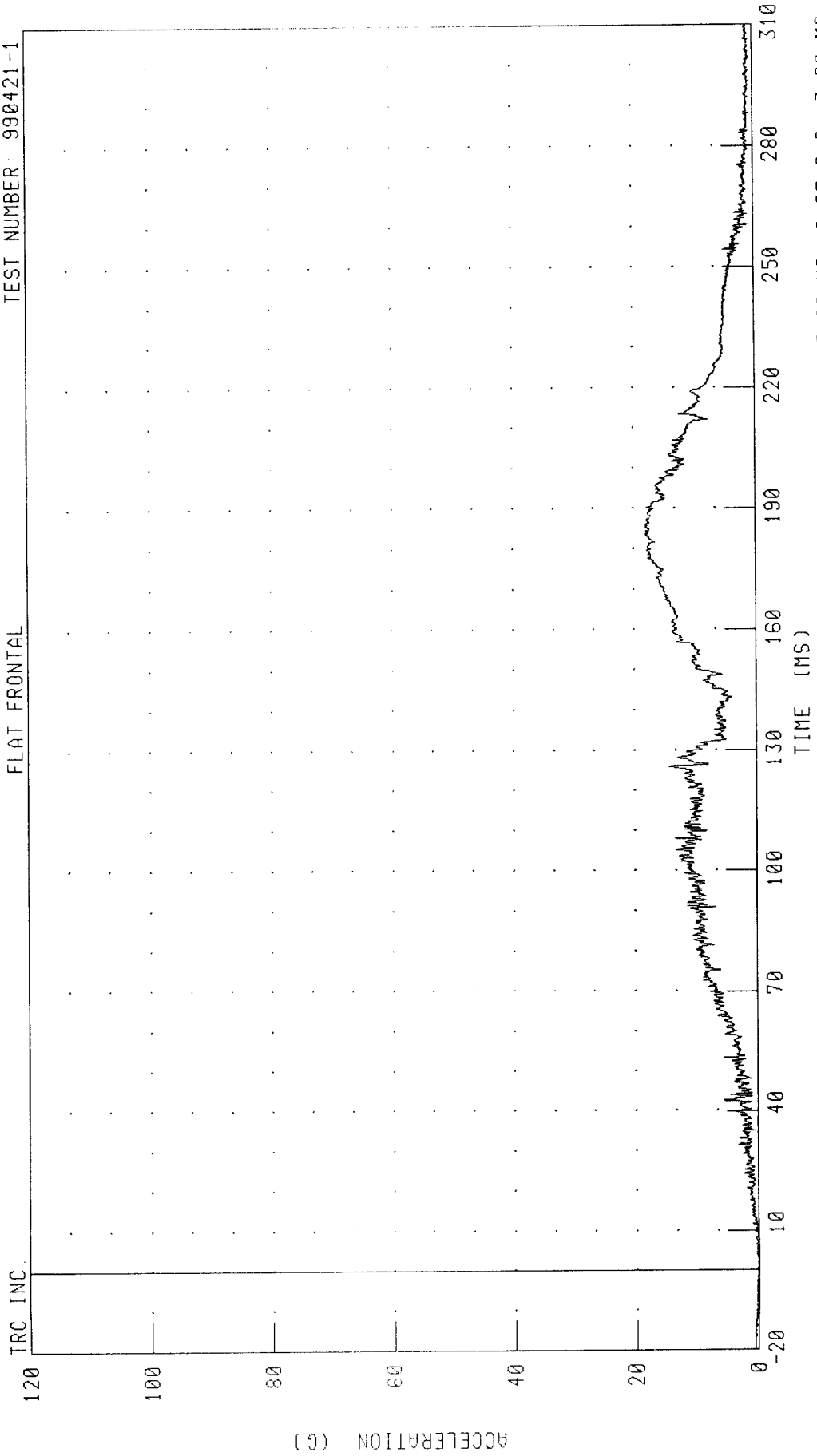


CHANNEL: PEVZG6 FILTER: CH. CLASS 1000

PEAK DATA: 6.84 G @ 164.16 MS; -5.44 G @ 129.68 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 PELVIS RESULTANT ACCELERATION
FLAT FRONTAL

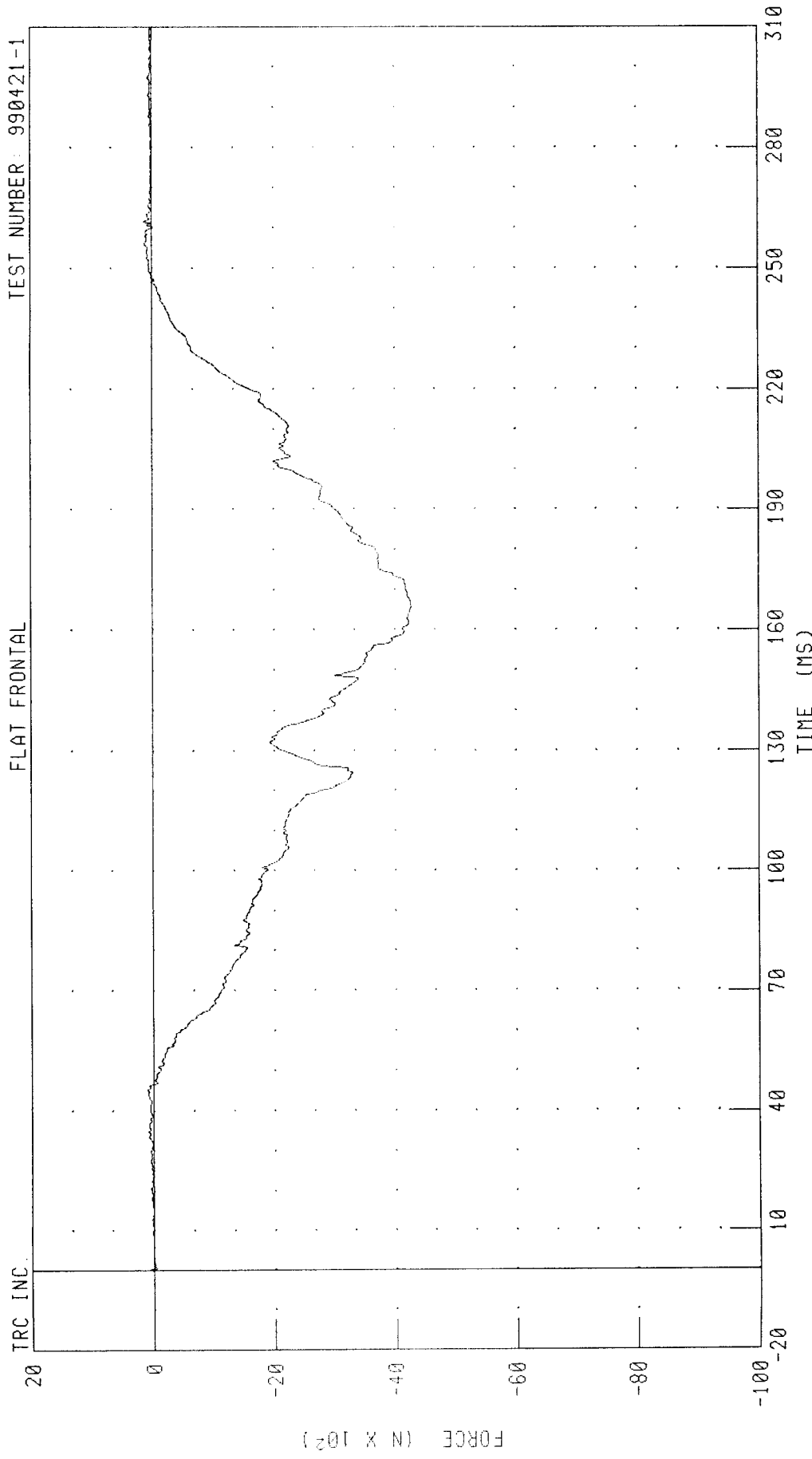
TEST NUMBER: 990421-1



CHANNEL: PEVRG6 FILTER: CH. CLASS 1000 PEAK DATA: 18.18 G @ 185.92 MS; 0.07 G @ -3.20 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 LEFT FEMUR FORCE
FLAT FRONTAL

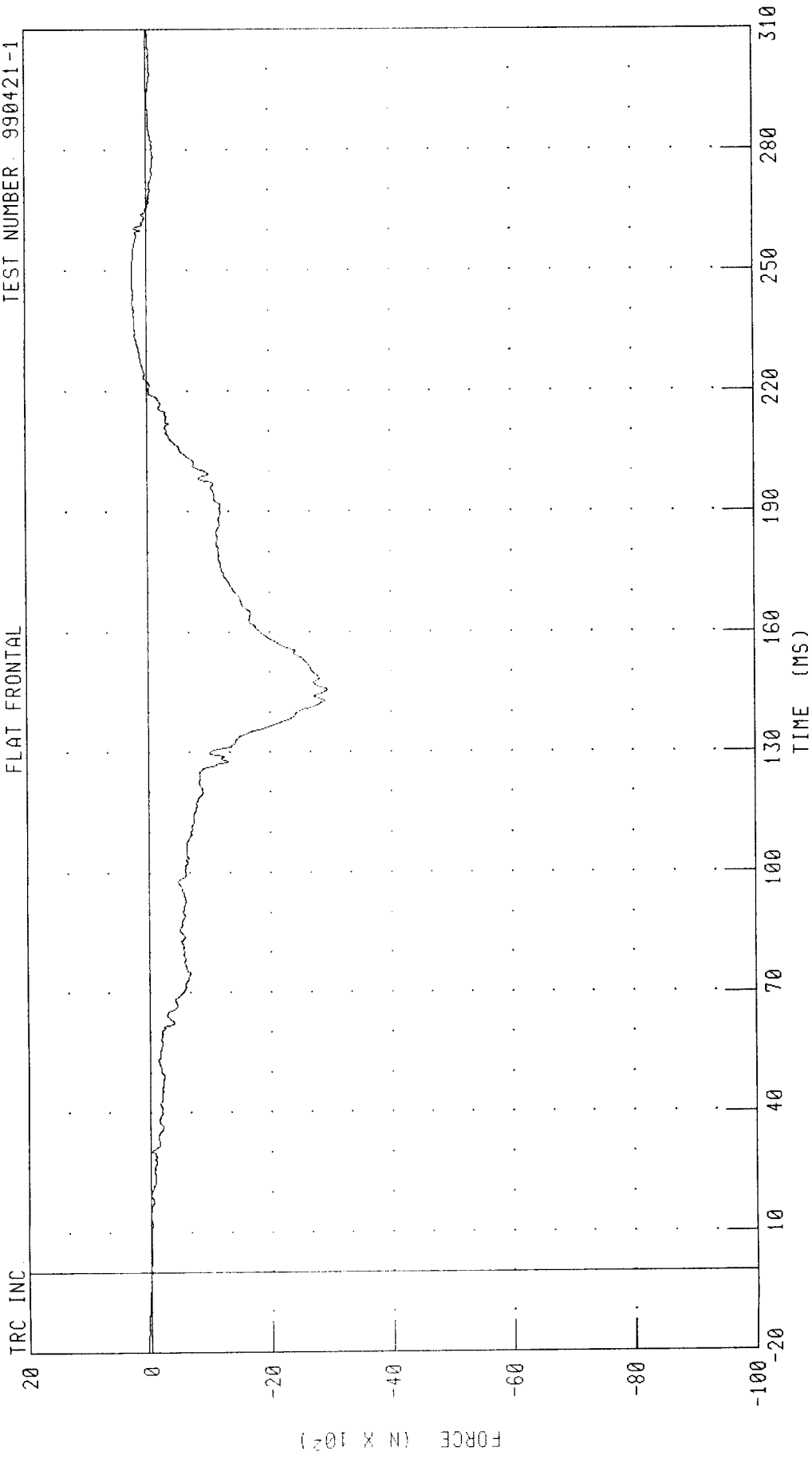
TEST NUMBER: 990421-1



CHANNEL: LFMF6 FILTER: CH CLASS 600
PEAK DATA: 145.62 N @ 261.68 MS; -4271.27 N @ 165.84 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
POSITION # 6 RIGHT FEMUR FORCE

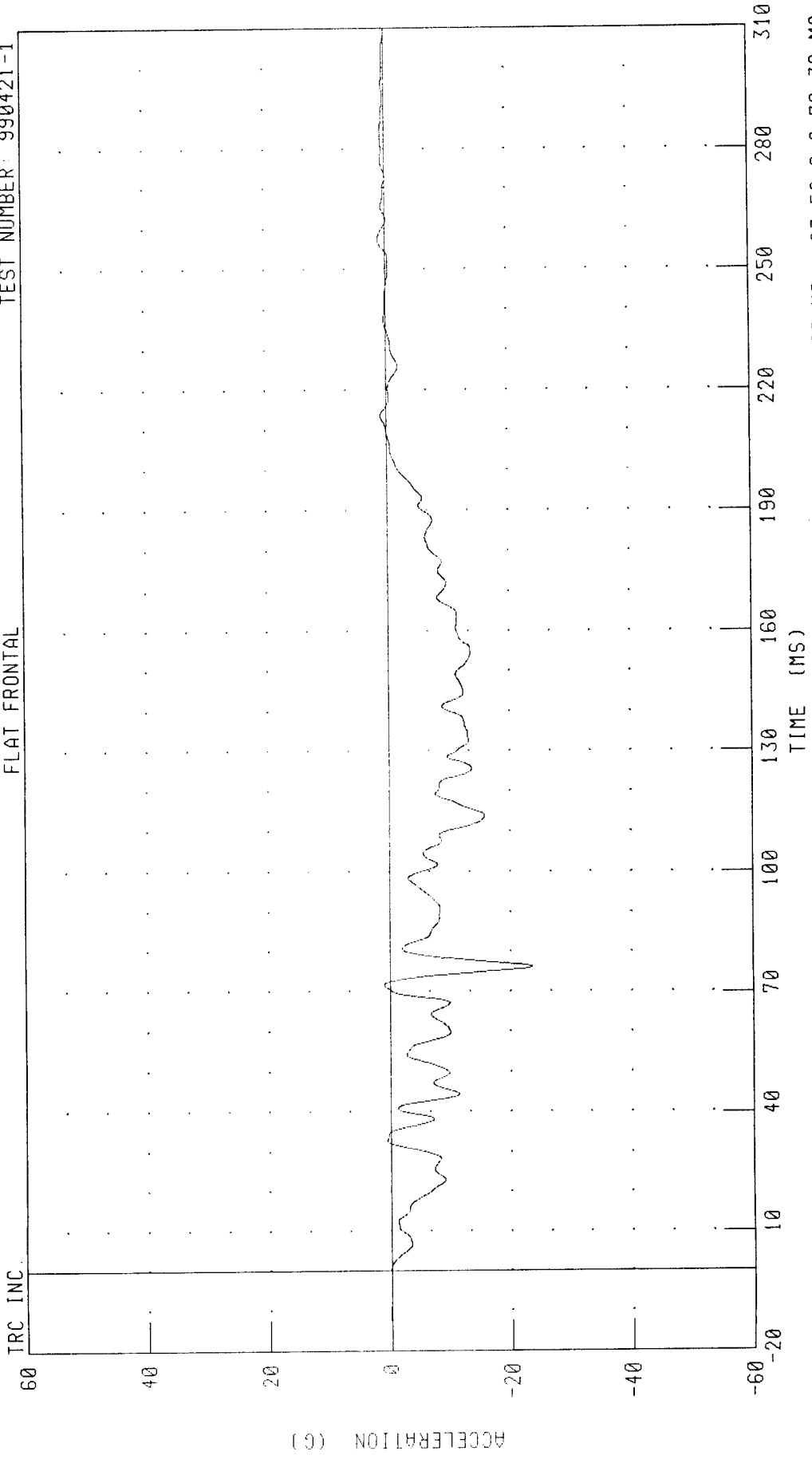
FLAT FRONTAL TEST NUMBER: 990421-1



CHANNEL: RFMF6 FILTER: CH. CLASS 600 PEAK DATA: 250.22 N @ 250.00 MS; -2955.63 N @ 145.76 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL X-AXIS ACCELERATION #1
FLAT FRONTAL

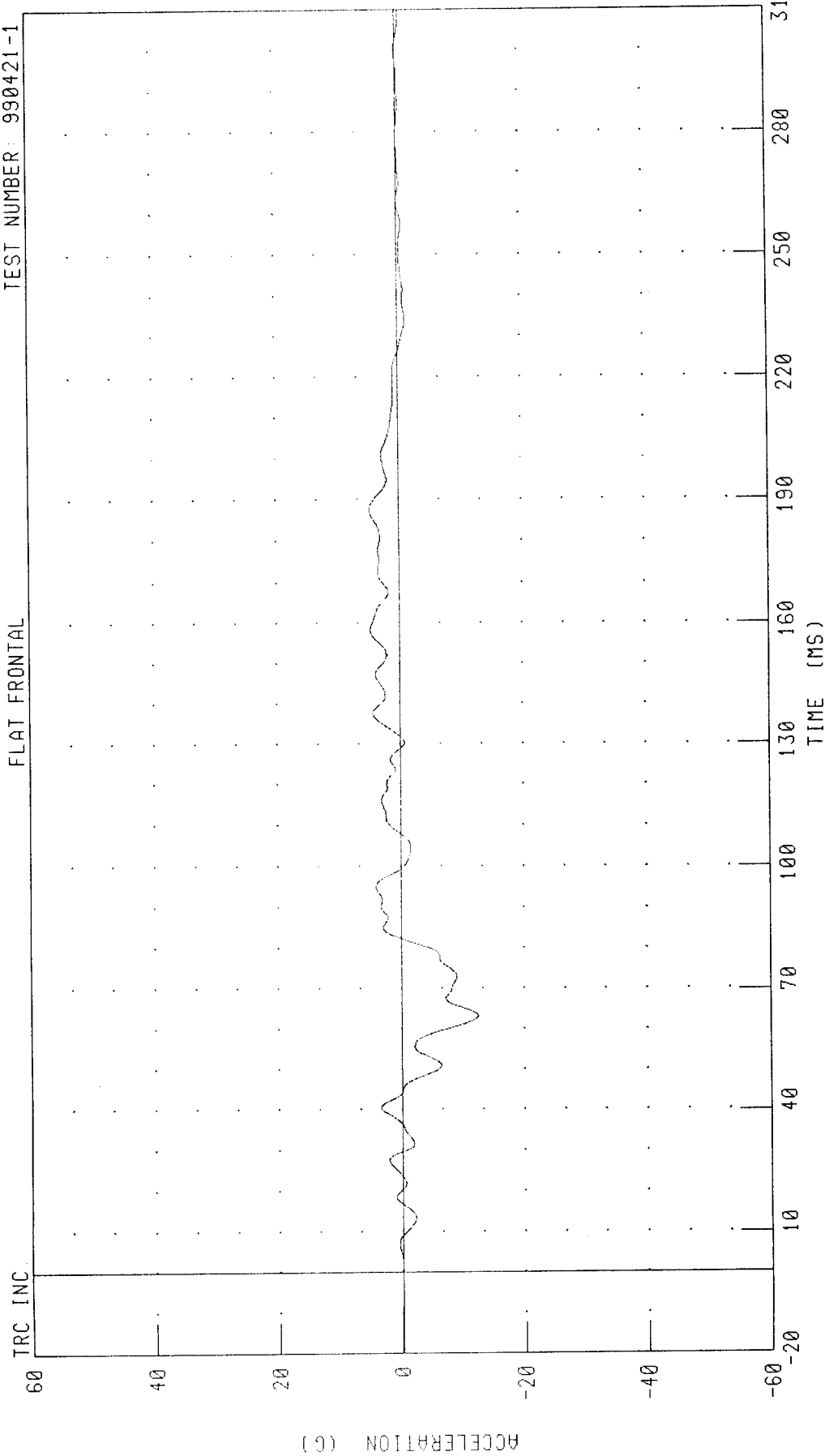
TEST NUMBER: 990421-1



CHANNEL: FTUXG1 FILTER: CH. CLASS 60 PEAK DATA: 1.14 G @ 257.28 MS, -23.58 G @ 76.32 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL Y-AXIS ACCELERATION #1

TEST NUMBER: 990421-1



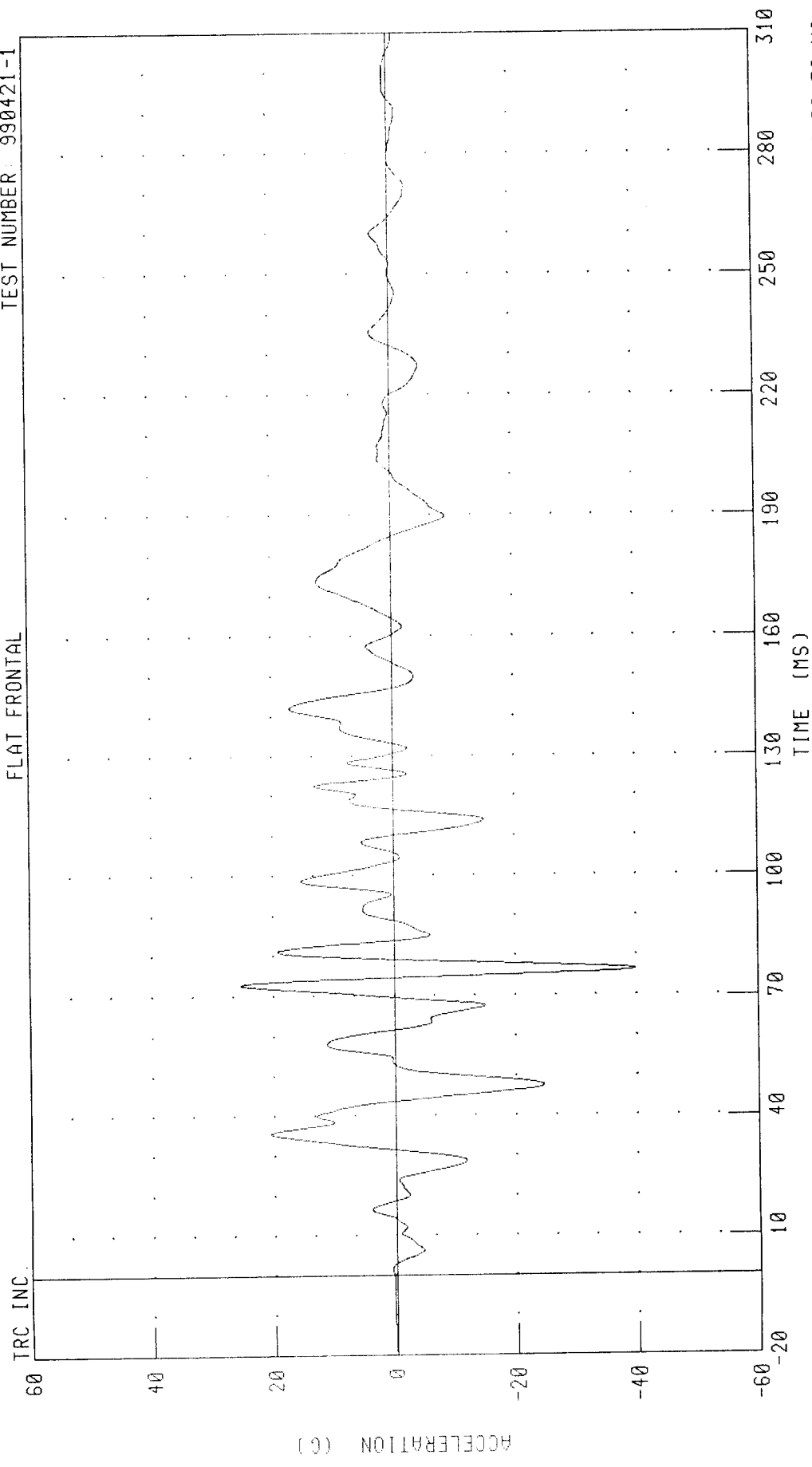
CHANNEL: FTUYC1 FILTER: CH. CLASS 60

PEAK DATA: 4.66 G @ 187.60 MS, -12.54 G @ 63.20 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL Z-AXIS ACCELERATION #1

TEST NUMBER: 990421-1

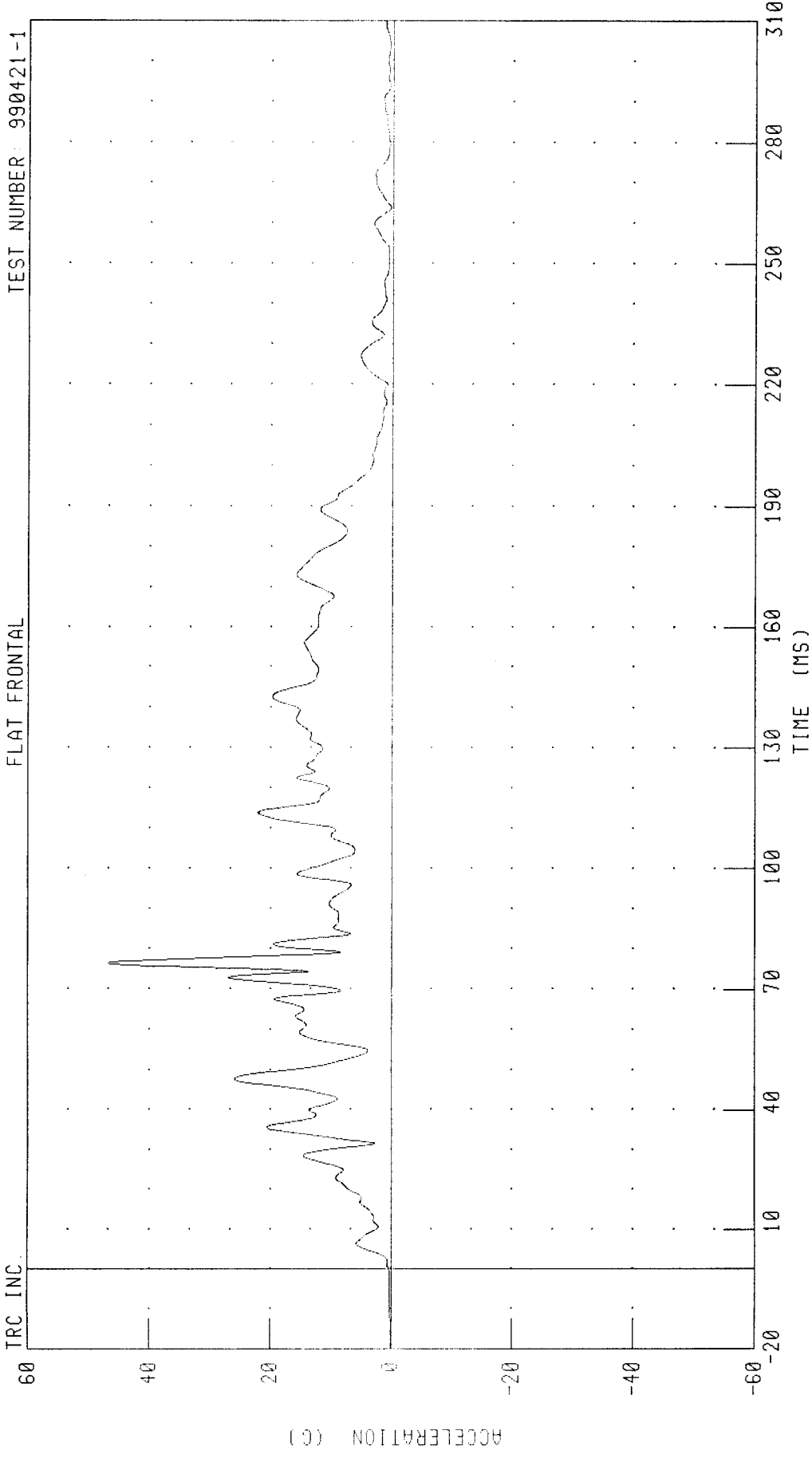
FLAT FRONTAL



PEAK DATA: 25.36 G @ 72.88 MS, -39.95 G @ 76.56 MS

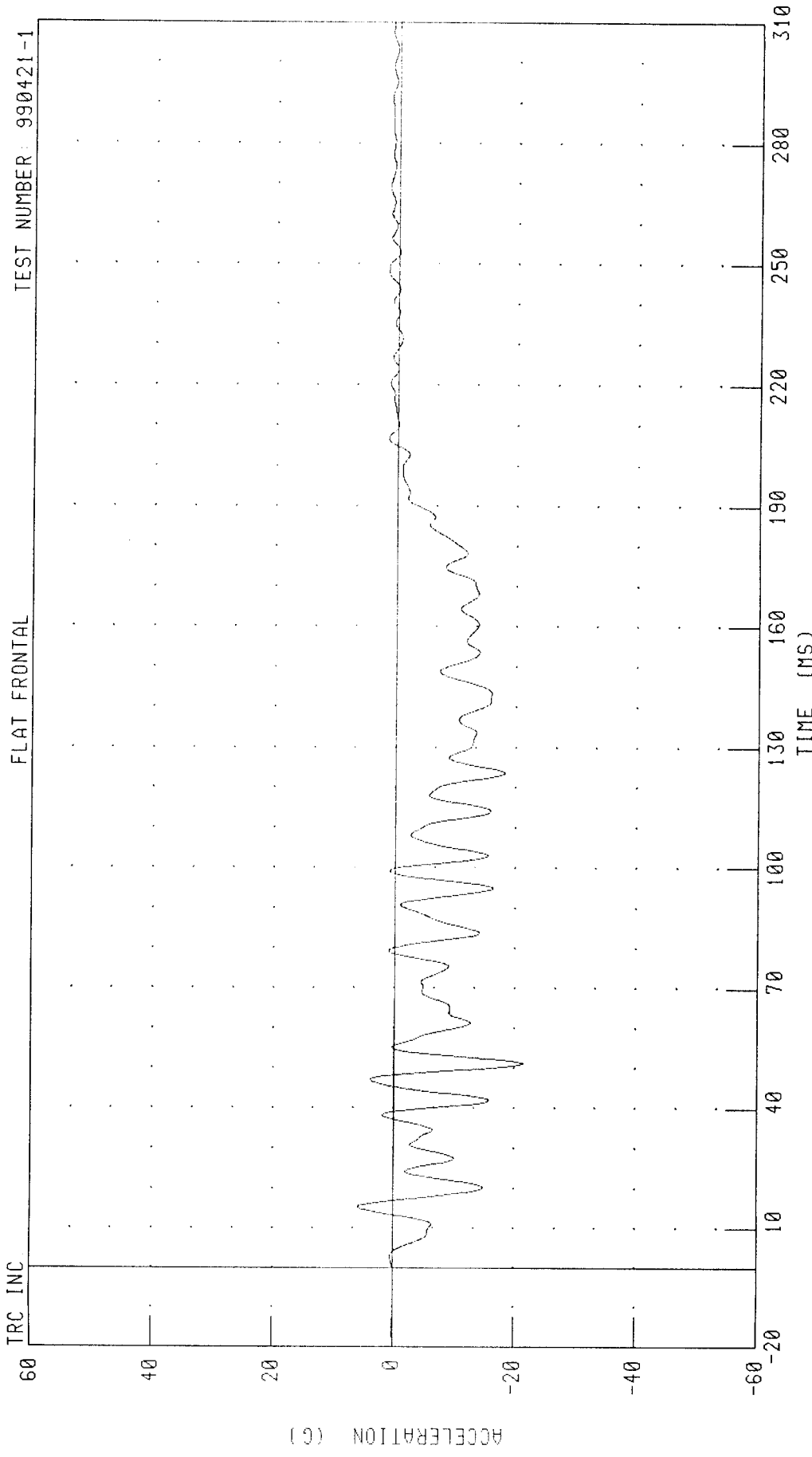
CHANNEL: FTUZG1 FILTER: CH. CLASS 60

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL RESULTANT ACCELERATION #1
FLAT FRONTAL



CHANNEL: FTURG1 FILTER: CH. CLASS 60 PEAK DATA: 46.73 G @ 76.48 MS, 0.01 G @ -19.84 MS

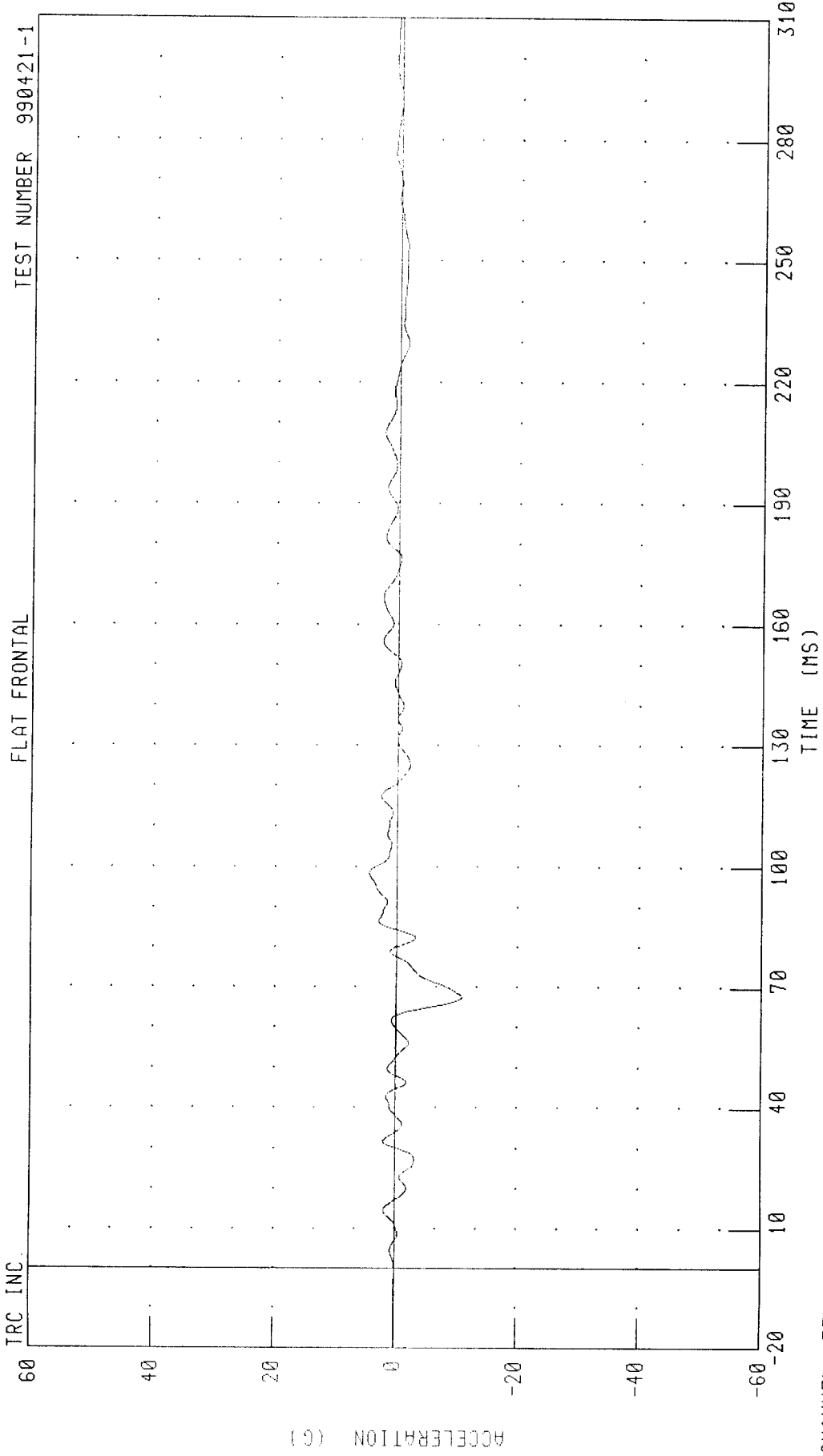
1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL X-AXIS ACCELERATION #2



CHANNEL: FTUXG2 FILTER: CH. CLASS 60

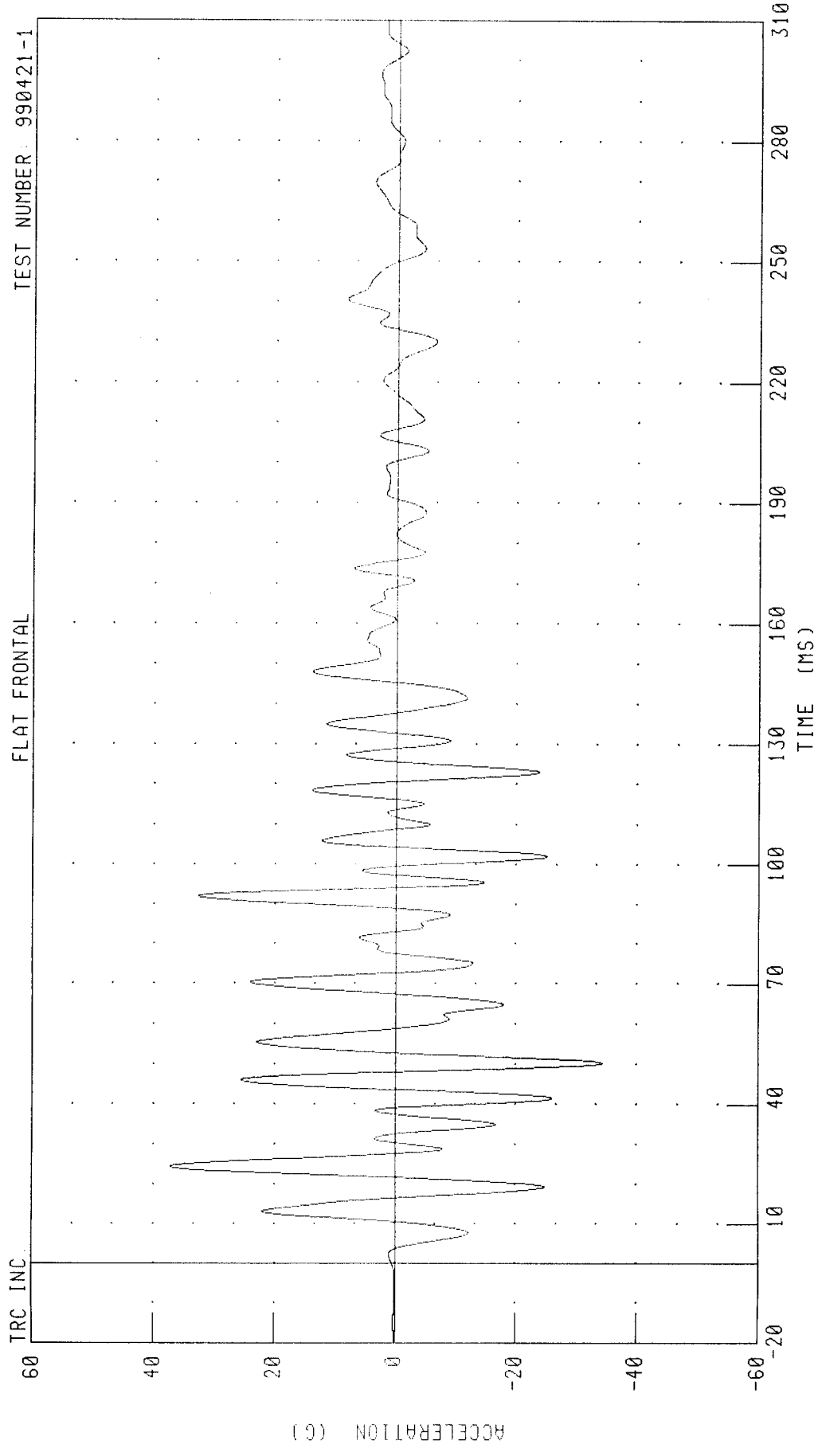
PEAK DATA: 5.81 G @ 15.44 MS, -21.40 G @ 51.12 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL Y-AXIS ACCELERATION #2

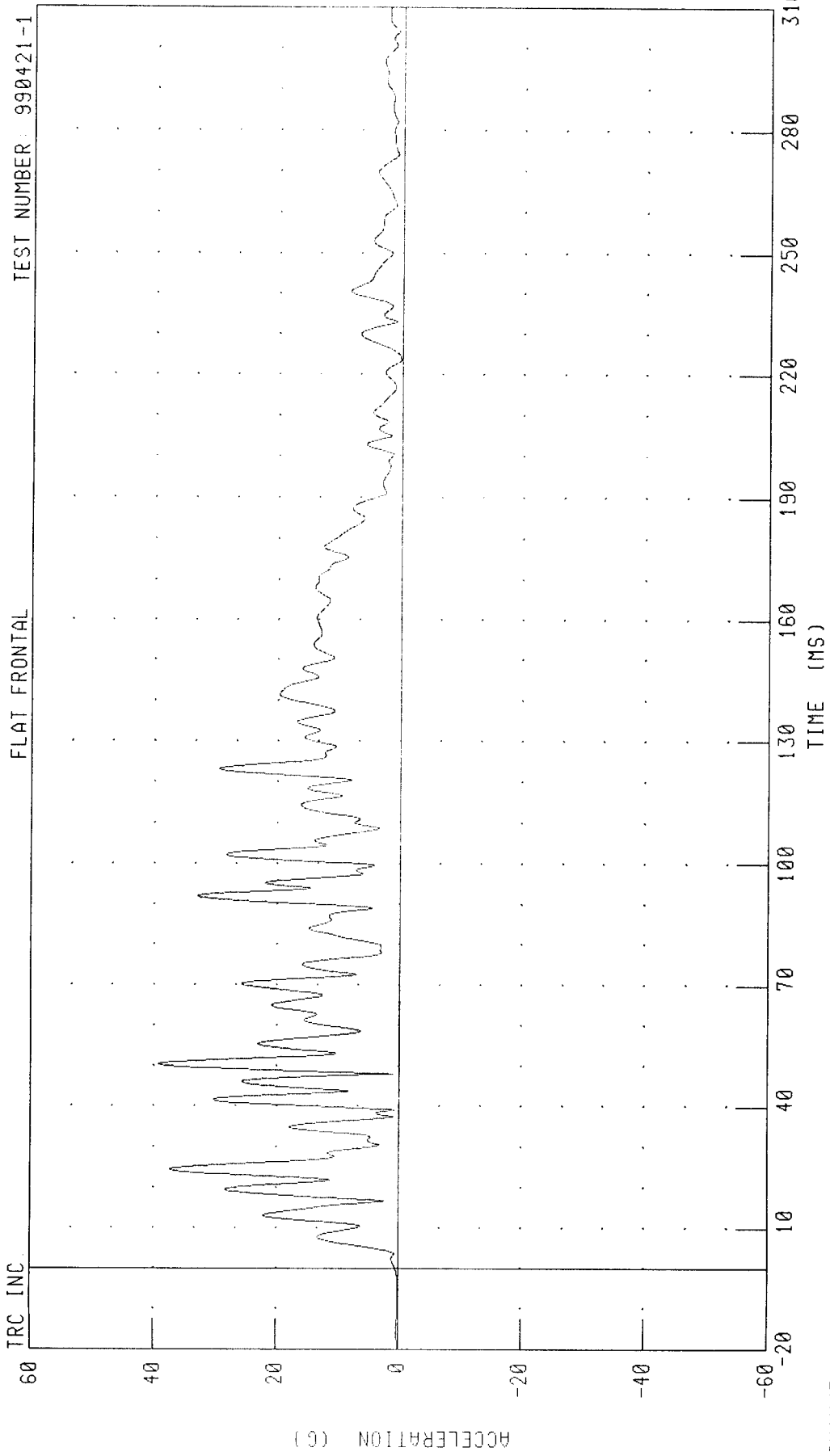


CHANNEL: FTUYG2 FILTER: CH CLASS 60
PEAK DATA: 4.43 G @ 98.56 MS; -10.85 G @ 67.52 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL Z-AXIS ACCELERATION #2

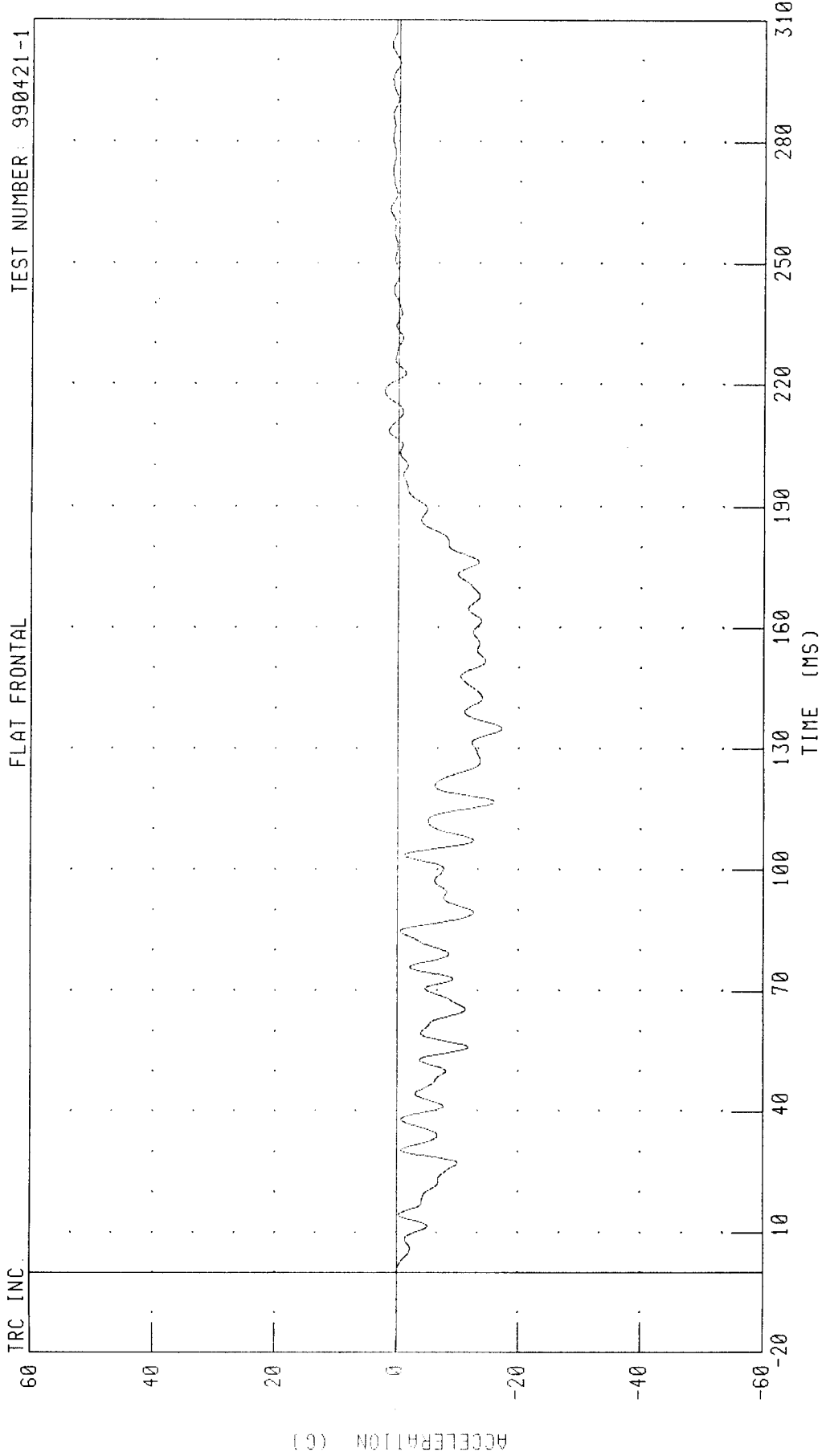


1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL RESULTANT ACCELERATION #2



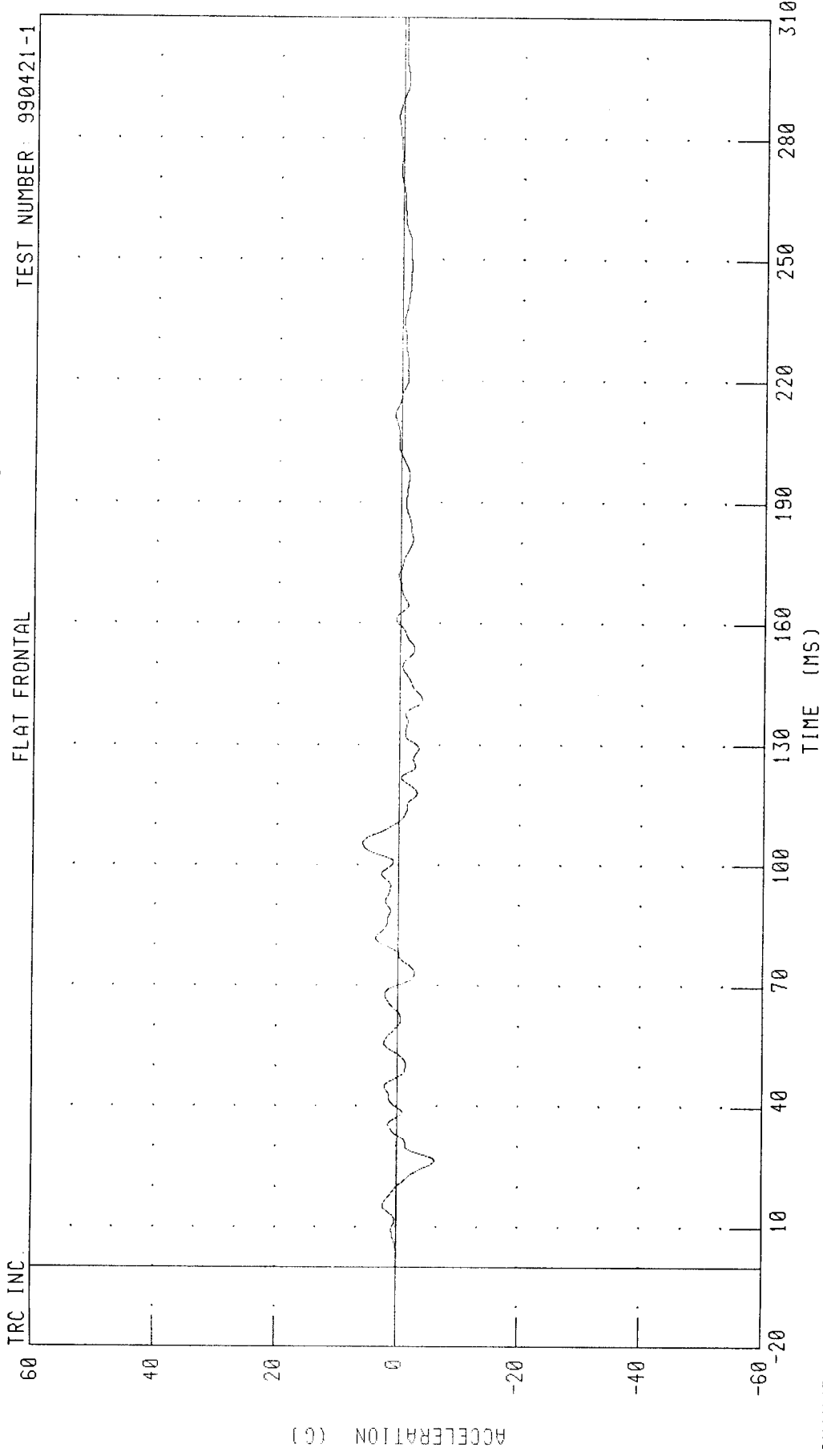
CHANNEL: FTURC2 FILTER: CH. CLASS 60
PEAK DATA: 39.23 G @ 50.48 MS; 0.01 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL X-AXIS ACCELERATION #3



CHANNEL: FTUXG3 FILTER: CH. CLASS 60 PEAK DATA: 2.13 G @ 218.24 MS; -17.26 G @ 135.04 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL Y-AXIS ACCELERATION #3

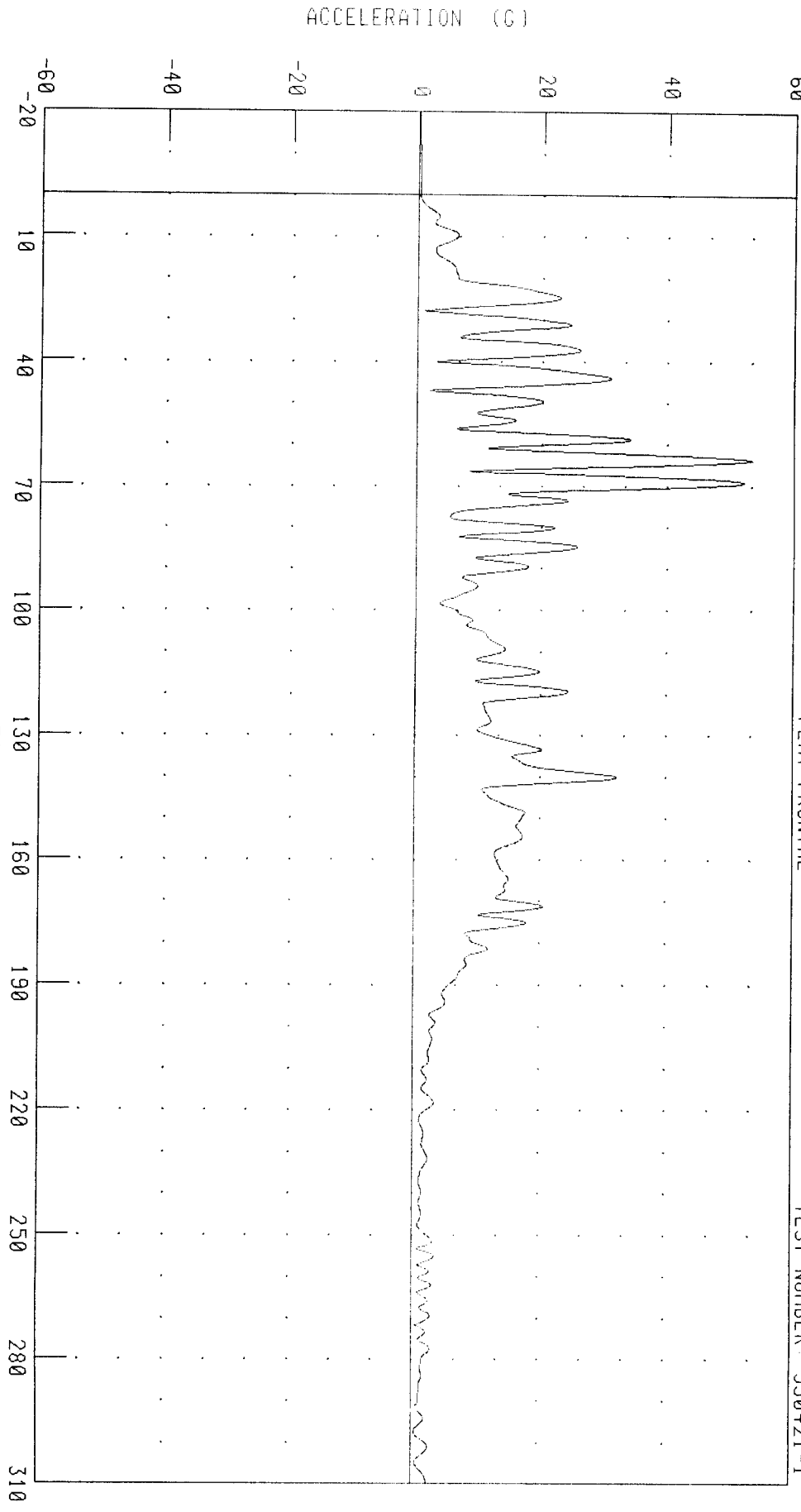


CHANNEL: FTUYG3 FILTER: CH. CLASS 60 PEAK DATA: 5.82 G @ 105.60 MS; -6.28 G @ 26.56 MS

TRC INC.

TEST NUMBER: 990421-1

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
VEHICLE CENTER OF GRAVITY RESULTANT ACCELERATION
FLAT FRONTAL



CHANNEL: VCGRG1

FILTER: CH. CLASS 60

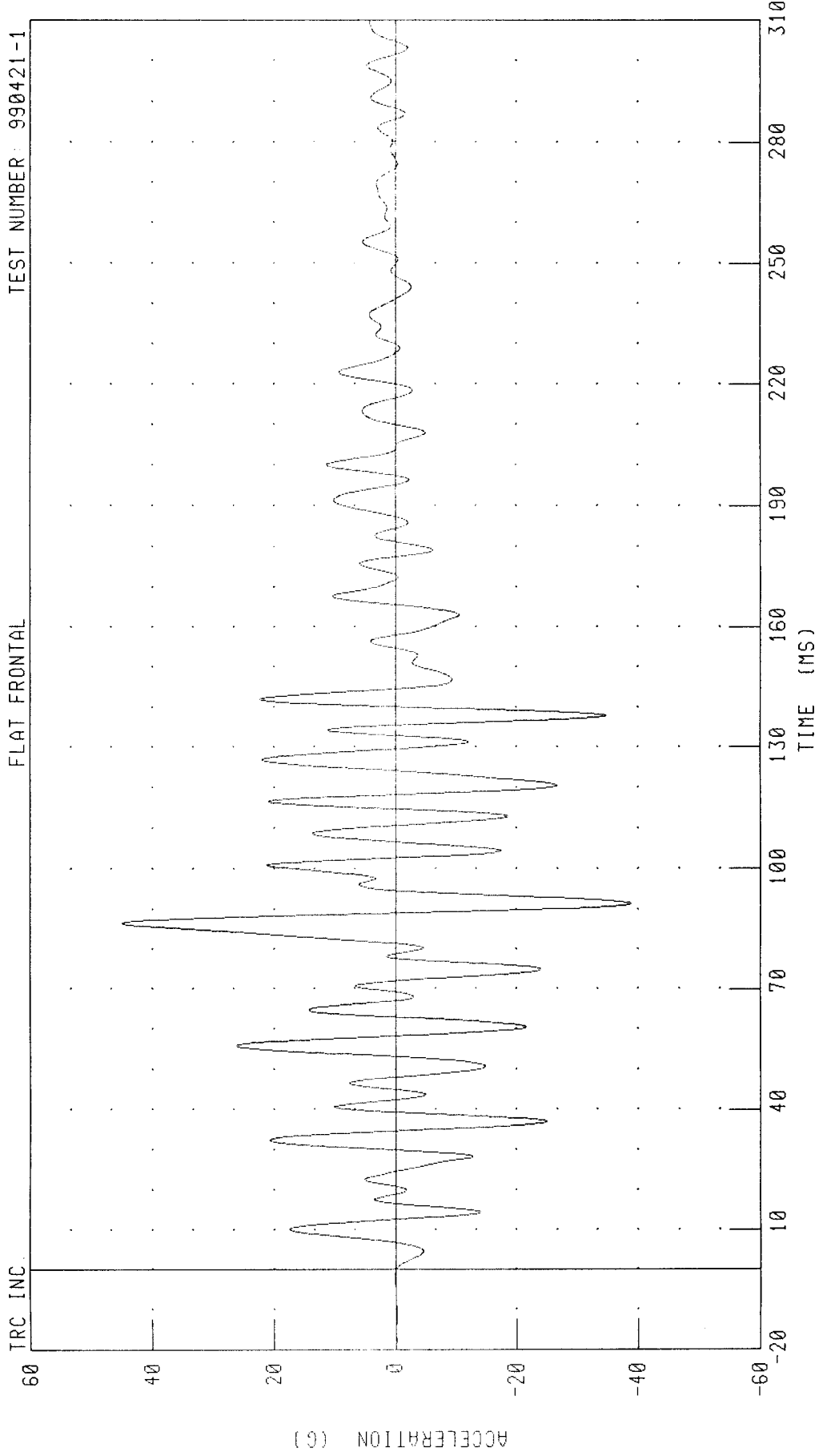
TIME (MS)

PEAK DATA: 53.37 G @ 63.92 MS, 0.02 G @ -19.84 MS

Dummy Certification

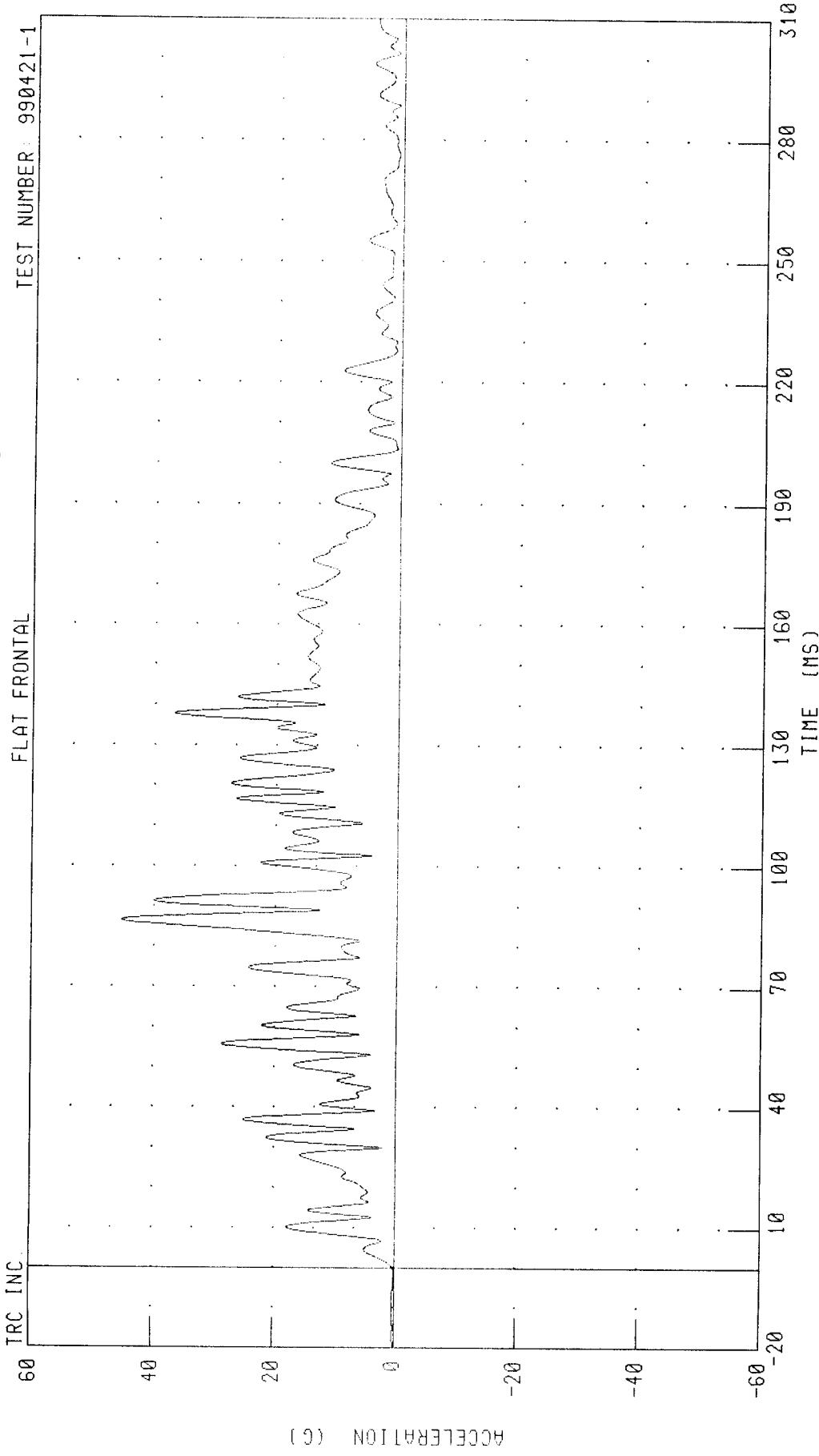
Appendix C

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL Z-AXIS ACCELERATION #3



CHANNEL: FTUZC3 FILTER: CH. CLASS 60 PEAK DATA: 44.90 G @ 86.56 MS; -38.87 G @ 91.44 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
FLOOR TUNNEL RESULTANT ACCELERATION #3



CHANNEL: FTURC3 FILTER: CH. CLASS 60

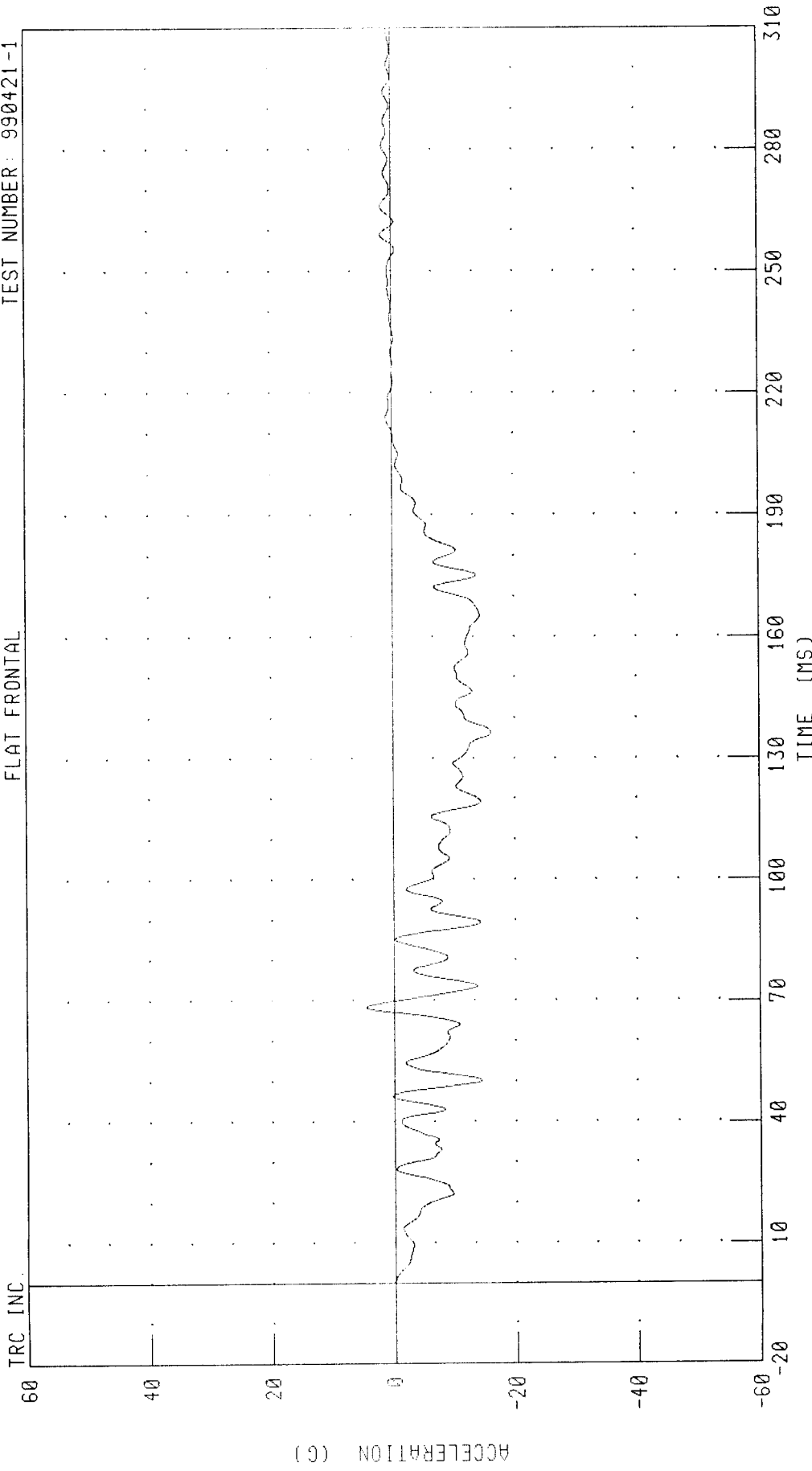
PEAK DATA: 45.29 G @ 86.64 MS, 0.11 G @ -20.00 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
VEHICLE CENTER OF GRAVITY X-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL

TRC INC.

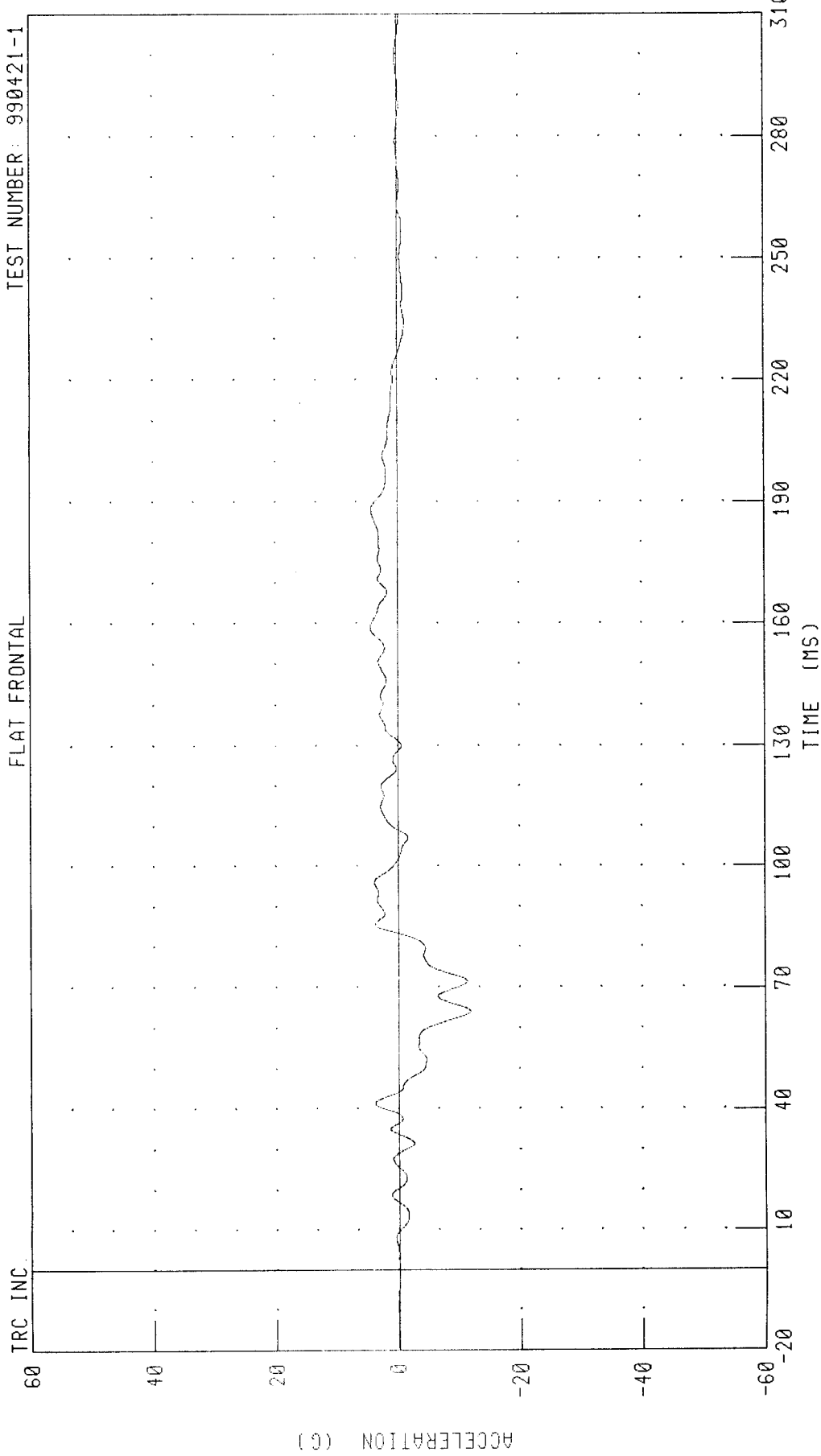


CHANNEL: VCGXG1 FILTER: CH. CLASS 60 PEAK DATA: 4.47 G @ 68.40 MS, -16.24 G @ 136.48 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
VEHICLE CENTER OF GRAVITY Y-AXIS ACCELERATION

TEST NUMBER: 990421-1

FLAT FRONTAL



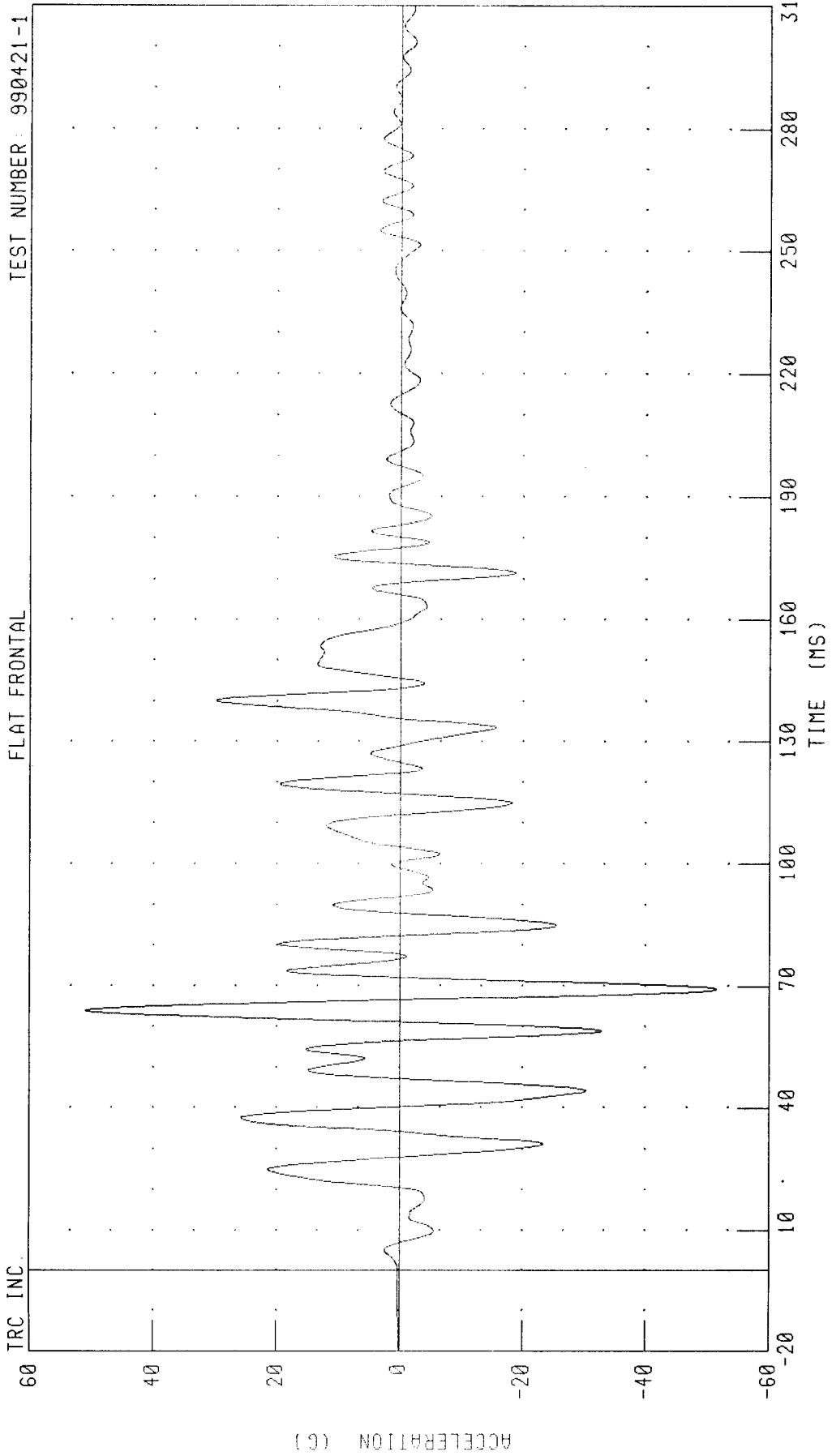
CHANNEL: VCCYG1 FILTER: CH. CLASS 60 PEAK DATA: 4.38 G @ 159.12 MS; -11.89 G @ 64.08 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
VEHICLE CENTER OF GRAVITY Z-AXIS ACCELERATION

TEST NUMBER: 990421-1

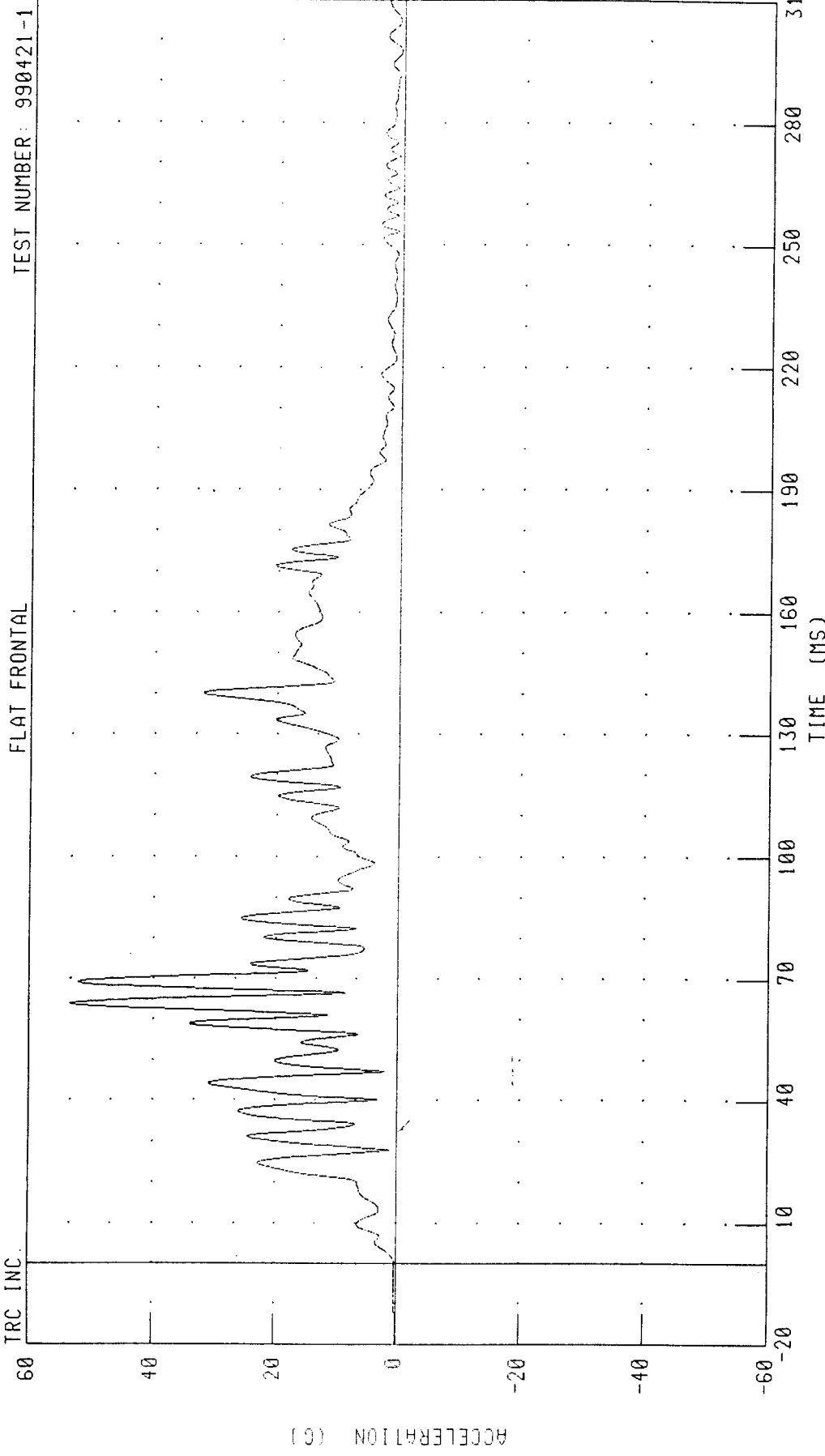
FLAT FRONTAL

TRC INC.



CHANNEL: VCGZG1 FILTER: CH. CLASS 60 PEAK DATA: 50.90 G @ 63.92 MS, -51.38 G @ 69.28 MS

1997 THOMAS BUILT BUS INTO FLAT FRONTAL BARRIER
VEHICLE CENTER OF GRAVITY RESULTANT ACCELERATION



CHANNEL: VCCRG1 FILTER: CH. CLASS 60 PEAK DATA: 53.37 G @ 63.92 MS; 0.02 G @ -19.84 MS

Pre-Test Dummy Certification

Hybrid III 50th Male Dummy S/N 045

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III 50th

15-APR-99

TRC INC.

TEST NO: 45C38HD1

572E SN045 HEAD DROP CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	244.28 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.76 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

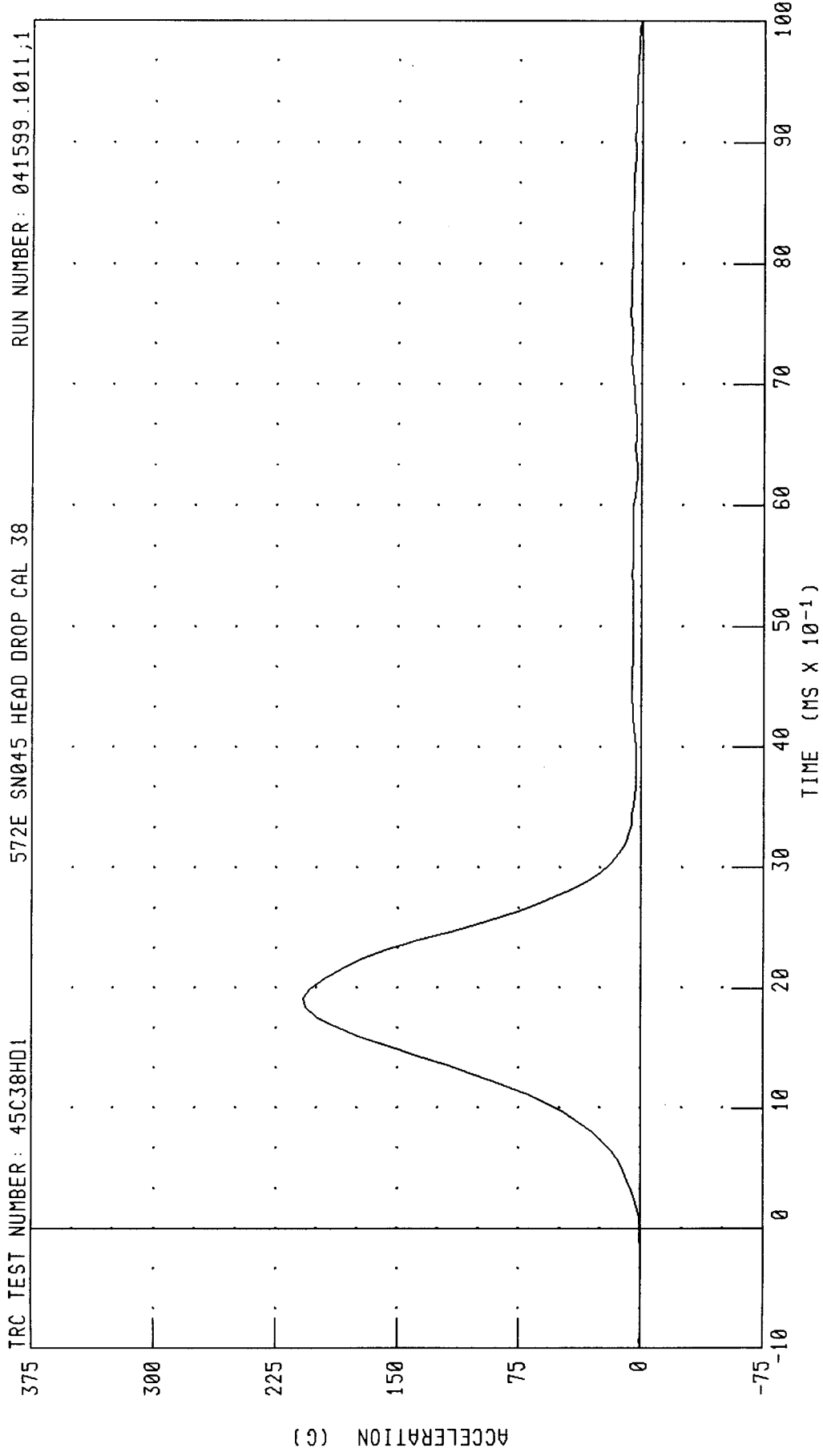
TECHNICIAN

By Cult

RUN NUMBER: 041599.1011;1

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

TRC TEST NUMBER: 45C38HD1
572E SN045 HEAD DROP CAL 38
RUN NUMBER: 041599.1011;1



CHANNEL: HEDXC FILTER: CH. CLASS 1000
PEAK DATA: 207.92 G @ 1.92 MS; -0.01 G @ -0.88 MS

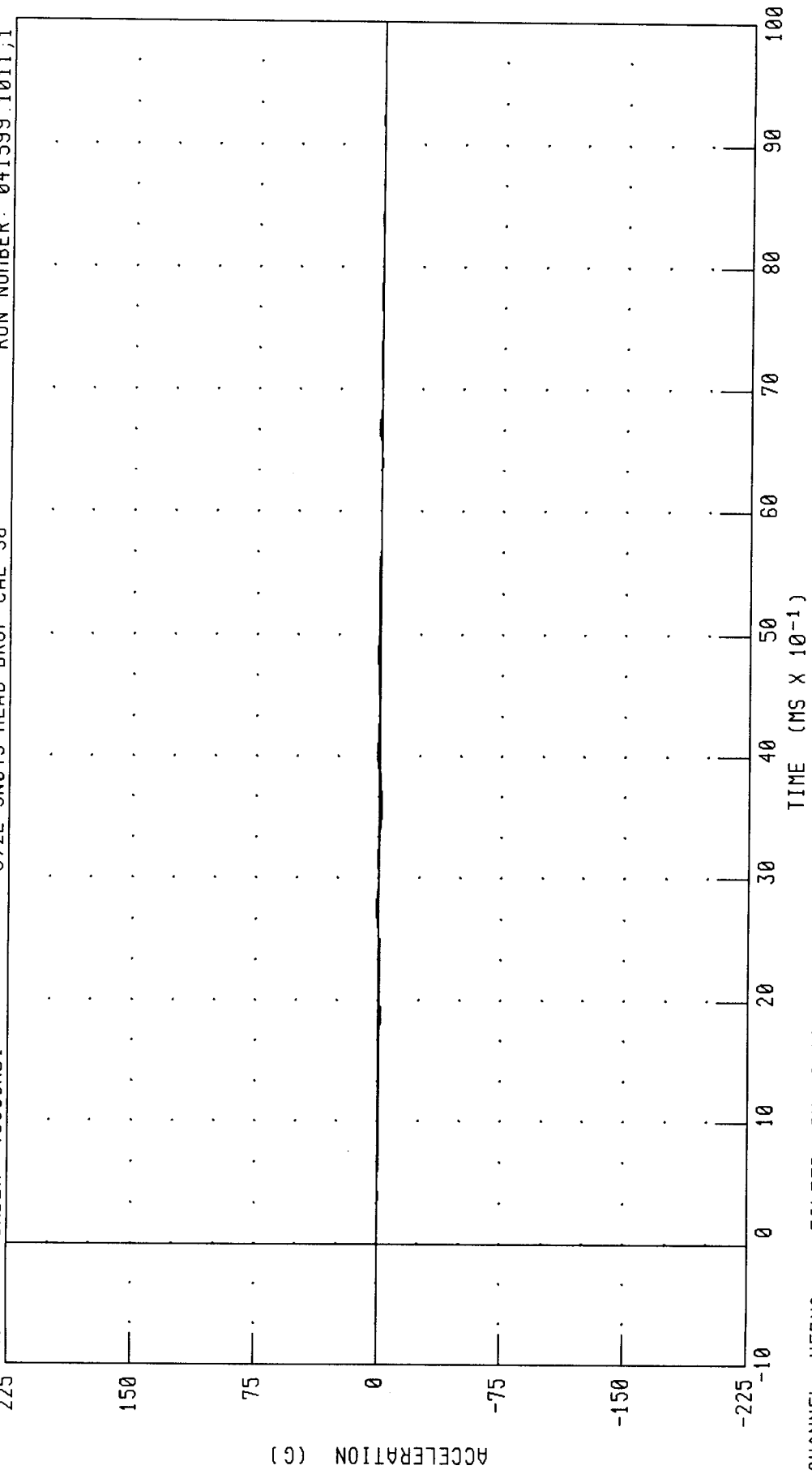
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 45C38HD1

572E SN045 HEAD DROP CAL 38

RUN NUMBER: 041599.1011.1



CHANNEL: HEDYC FILTER: CH. CLASS 1000 PEAK DATA: 0.98 G @ 4.88 MS; -1.76 G @ 3.60 MS

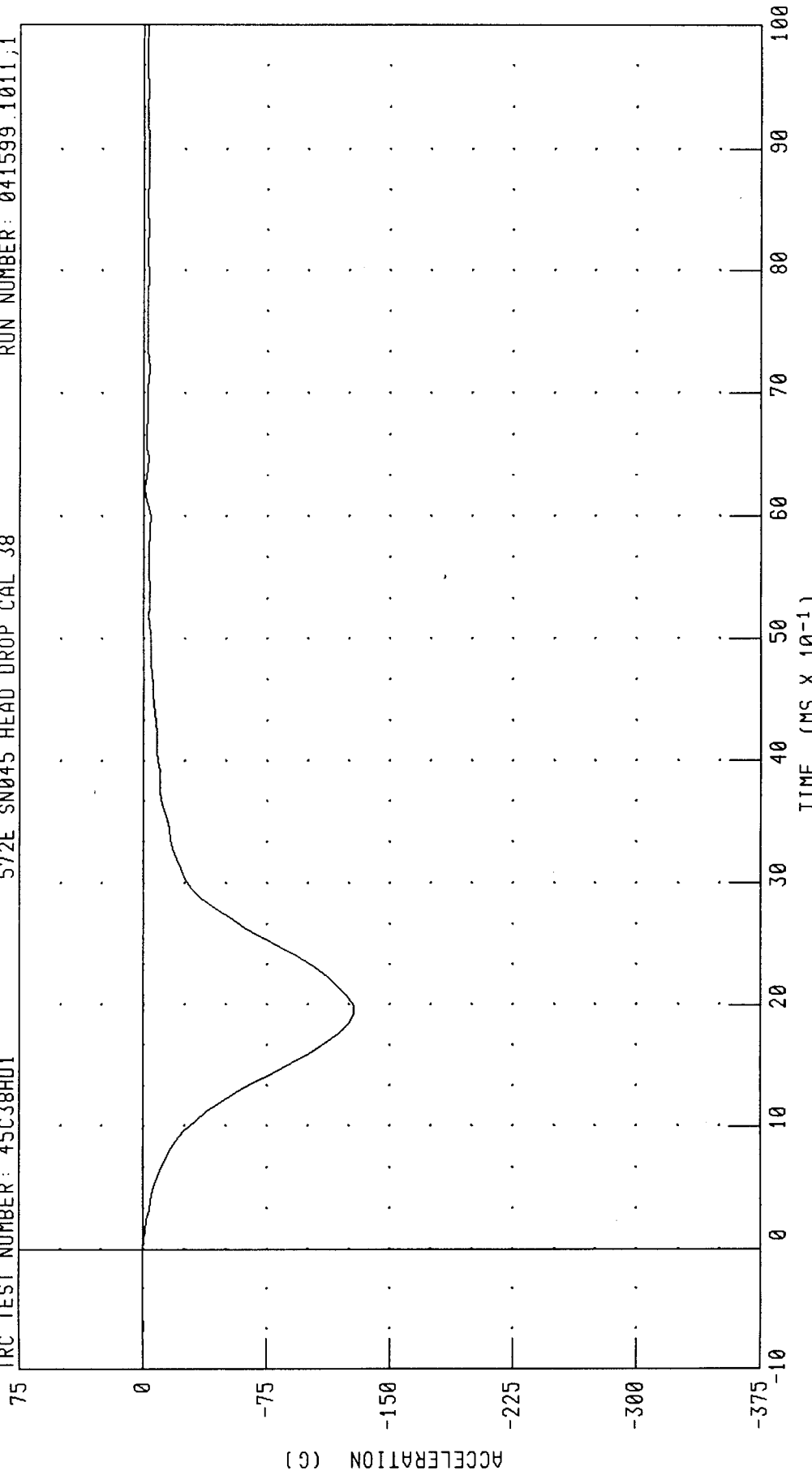
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 45C38HD1

572E SN045 HEAD DROP CAL 38

RUN NUMBER: 041599.1011;1



CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: 0.01 G @ -0.96 MS; -128.22 G @ 1.92 MS

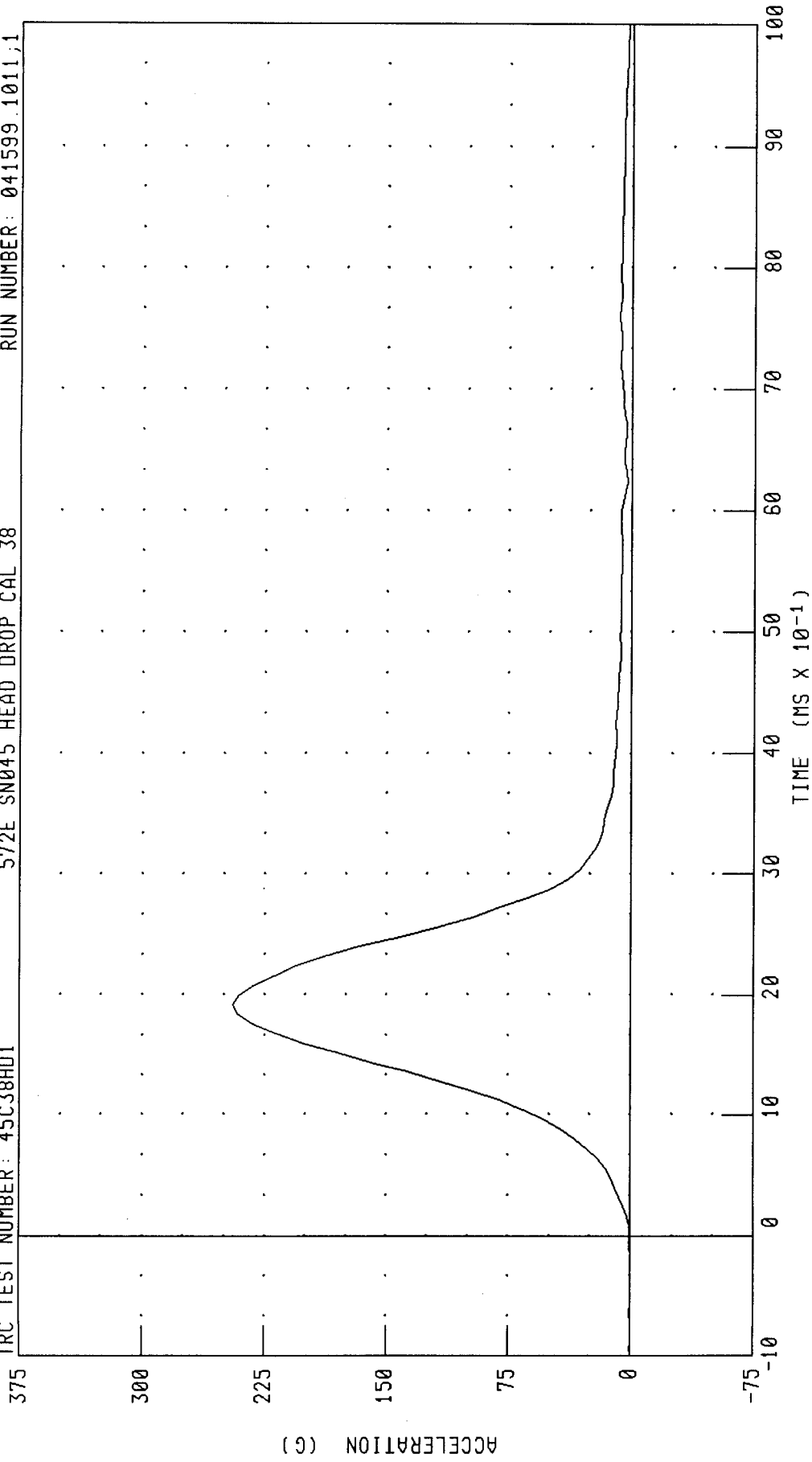
PART 572-E HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 45C38HD1

572E SN045 HEAD DROP CAL 38

RUN NUMBER: 041599.1011;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 244.29 G @ 1.92 MS; 0.01 G @ -0.88 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th

15-APR-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 45C38NF1 572E SN045 NECK FLEXION CAL38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	6.93 M/S
PENDULUM DECELERATION	10 MS 22.50 - 27.50 G	23.54 G
	20 MS 17.60 - 22.60 G	22.29 G
	30 MS 12.50 - 18.50 G	15.54 G
MAX PENDULUM G	29 G MAX	24.04 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	15.50 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	38.16 MS
D PLANE	MAX 64 - 78 DEG.	70.26 DEG.
ROTATION	TIME 57 - 64 MS	62.48 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX 88.2 - 108.5 NM	91.94 NM
	TIME 47 - 58 MS	53.12 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	120.88 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	103.84 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

B. G. Calt

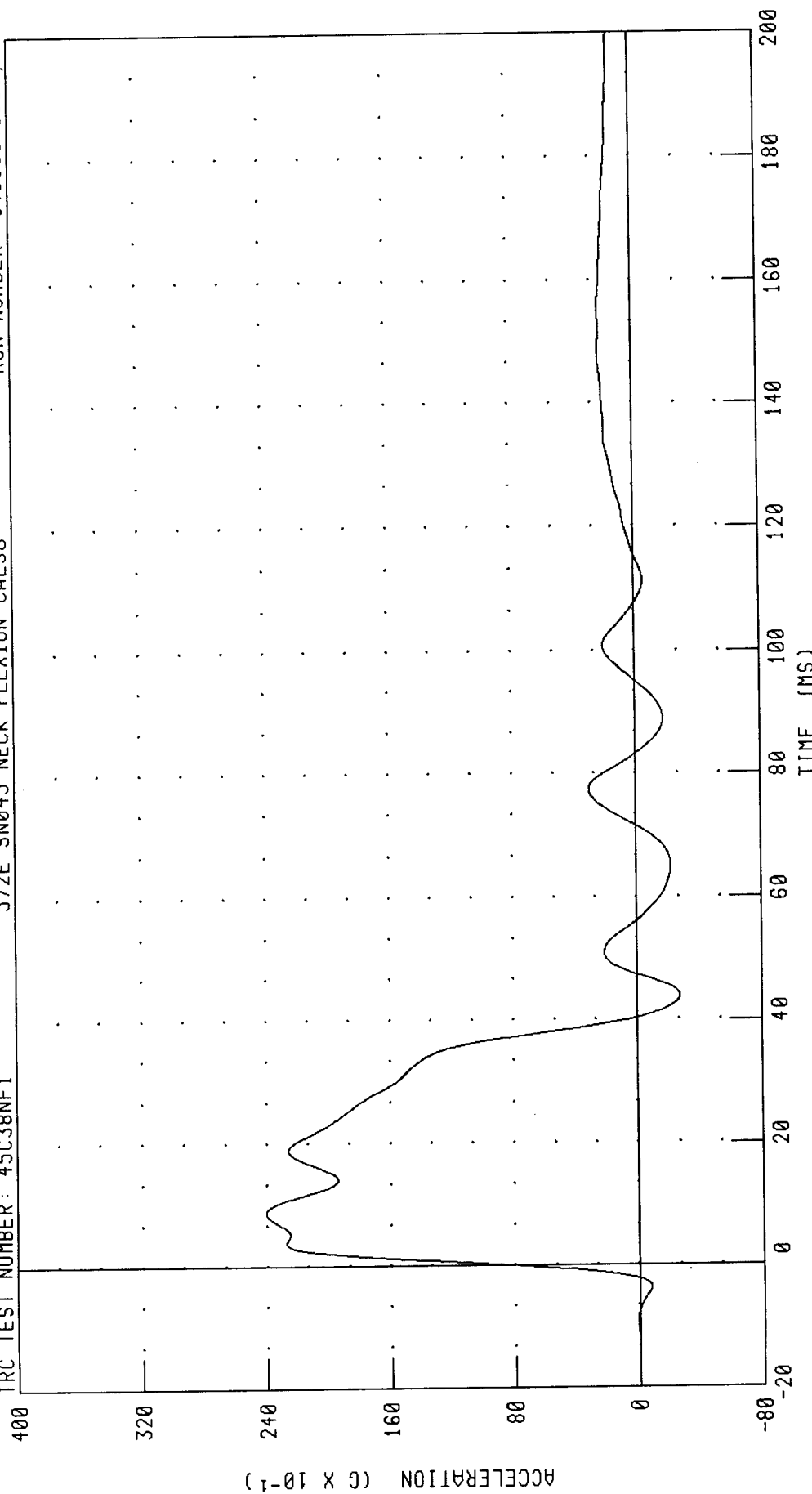
RUN NUMBER: 041599.1014;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 45C38NF1

572E SN045 NECK FLEXION CAL38

RUN NUMBER: 041599.1015;1



CHANNEL: PENXC FILTER: CH. CLASS 60

PEAK DATA: 24.05 G @ 8.80 MS; -2.75 G @ 43.92 MS

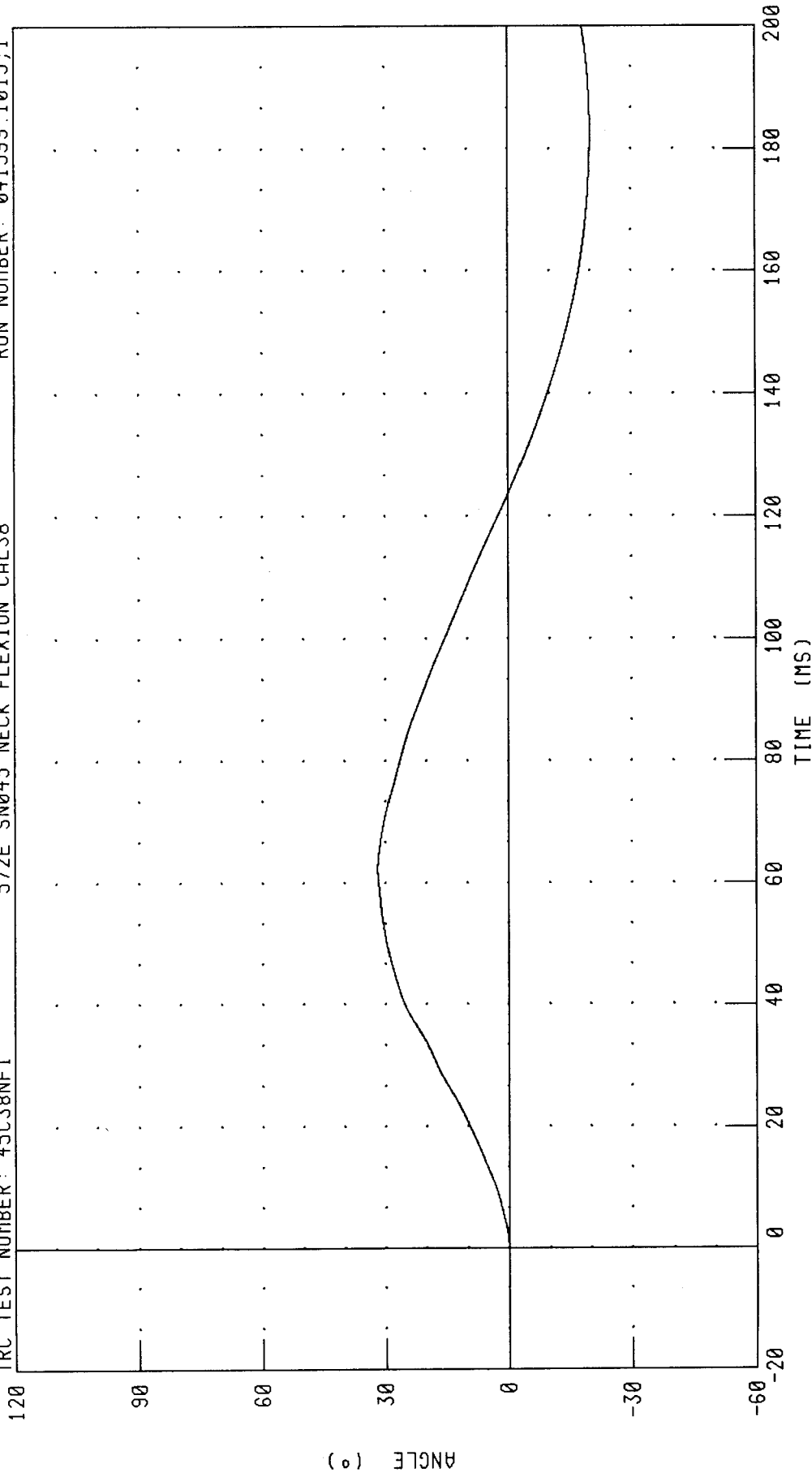
PART 572-E HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 45C38NF1

572E SN045 NECK FLEXION CAL38

RUN NUMBER: 041599.1015;1

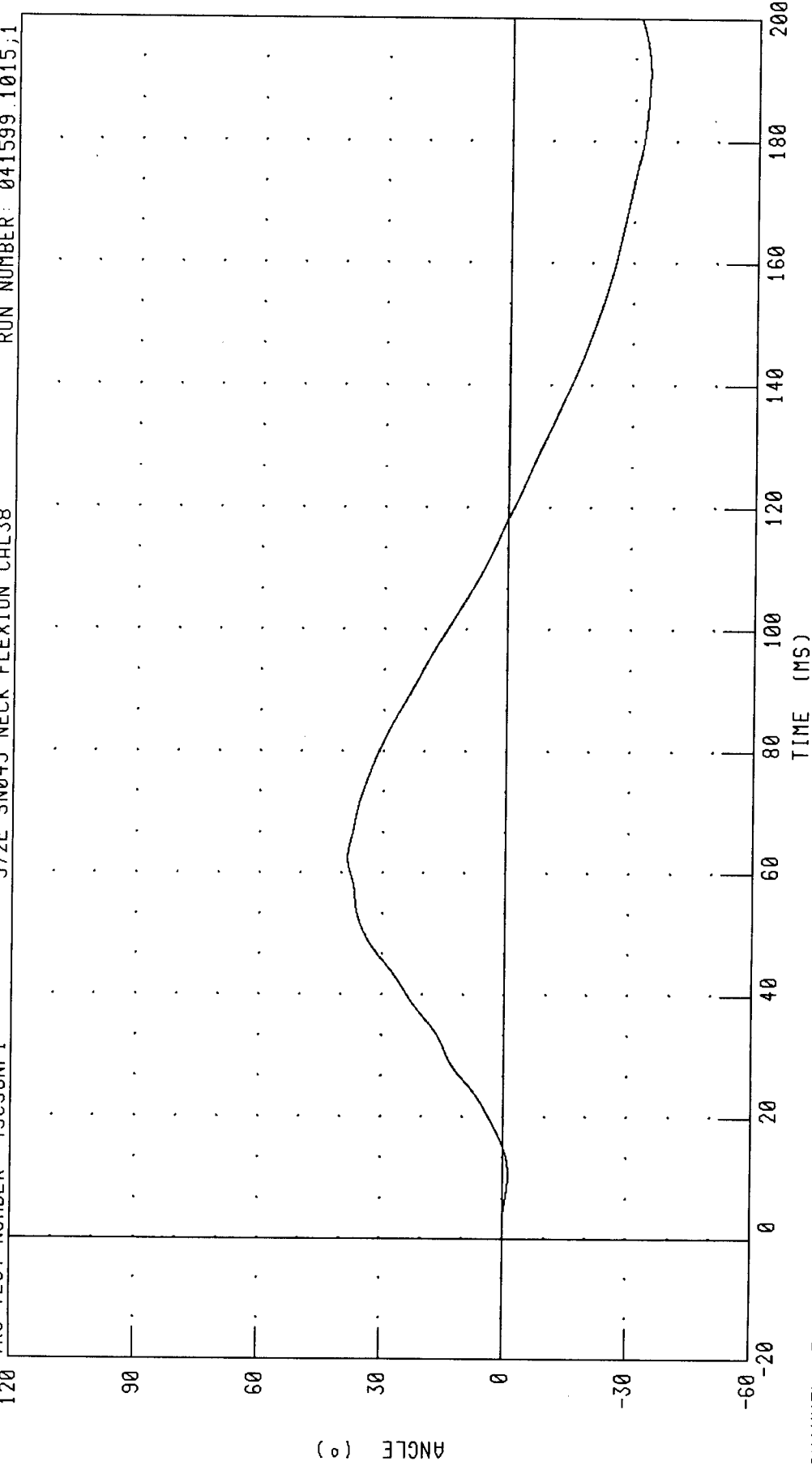


CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 31.81 ° @ 62.32 MS; -20.08 ° @ 182.32 MS

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

TRC TEST NUMBER: 45C38NF1 572E SN045 NECK FLEXION CAL38 RUN NUMBER: 041599.1015;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 38.46 ° @ 62.56 MS; -33.50 ° @ 191.04 MS

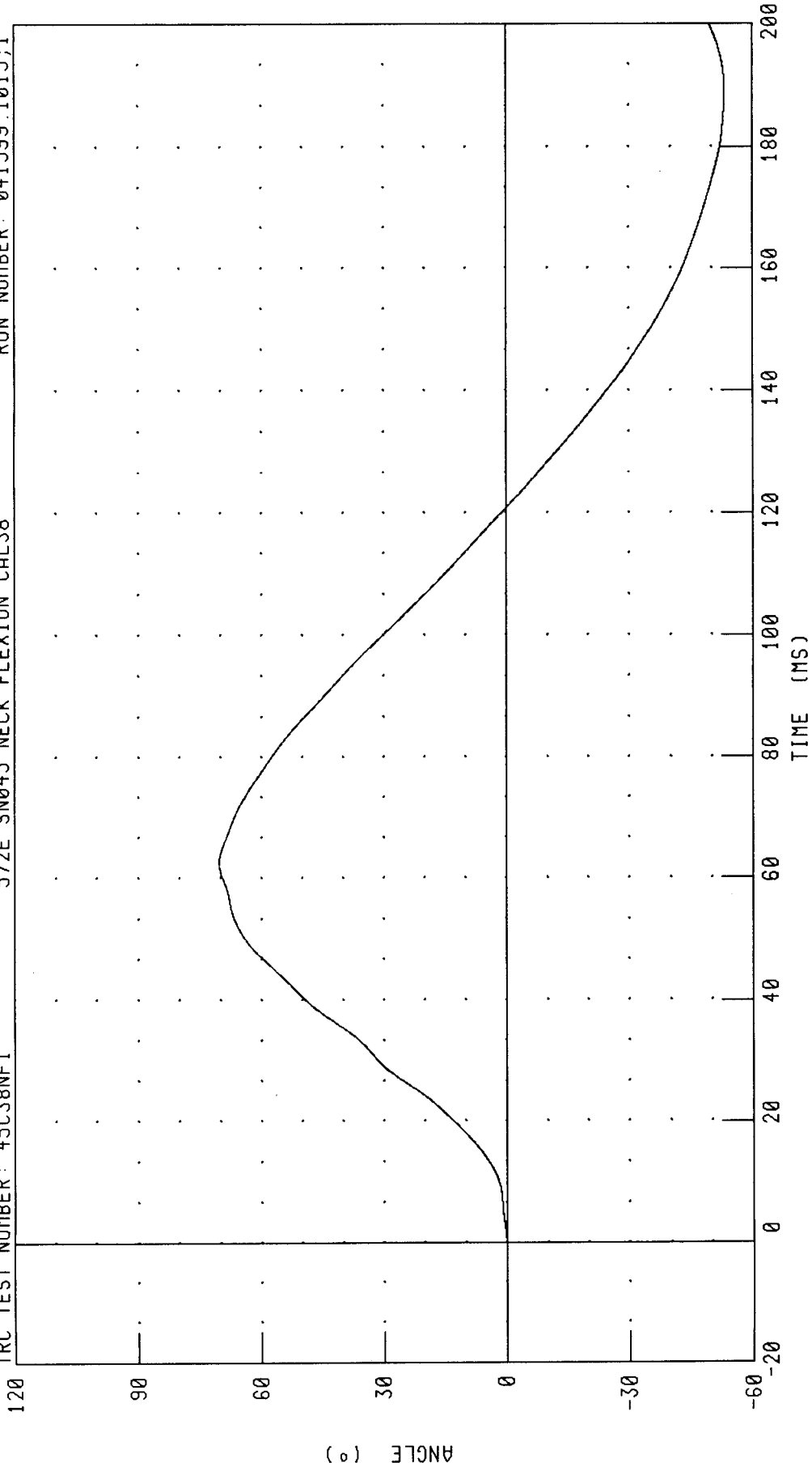
PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 45C38NF1

572E SN045 NECK FLEXION CAL38

RUN NUMBER: 041599.1015;1



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 70.27 ° @ 62.48 MS; -53.23 ° @ 188.96 MS

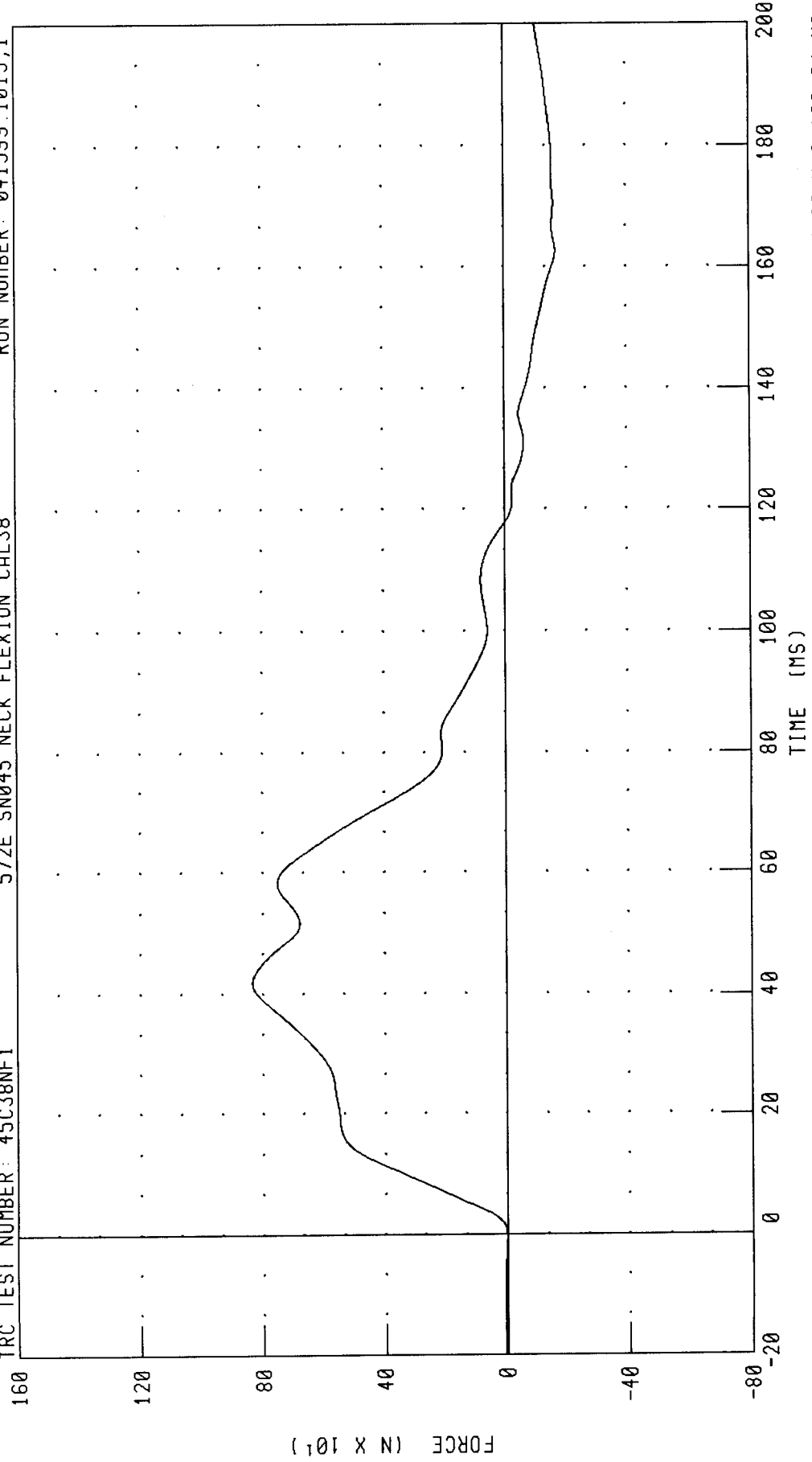
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 45C38NF1

572E SN045 NECK FLEXION CAL38

RUN NUMBER: 041599.1015.1



CHANNEL: NEKXF FILTER: CH. CLASS 60

PEAK DATA: 833.78 N @ 41.84 MS, -169.02 N @ 162.64 MS

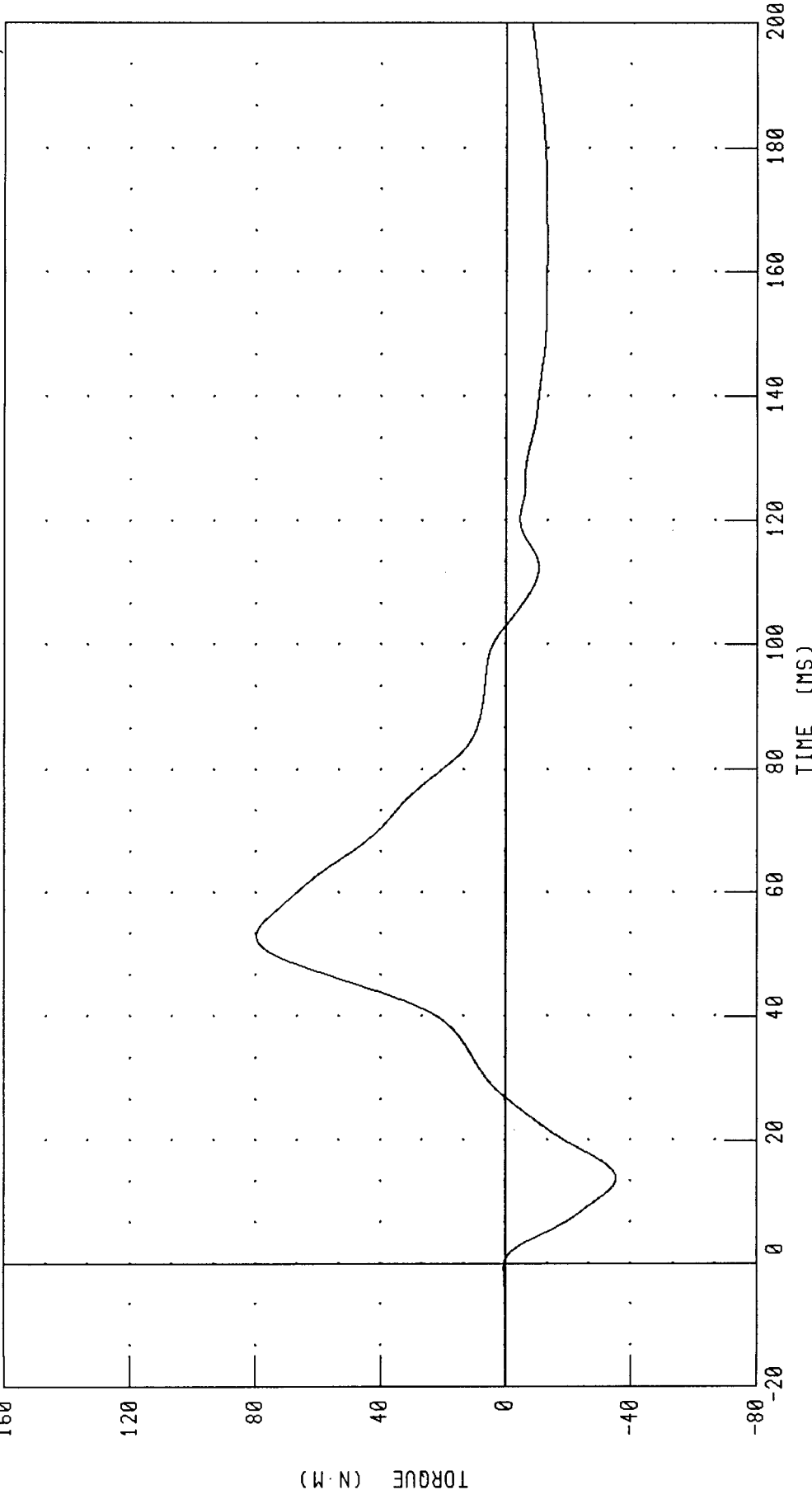
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 45C38NF1

572E SN045 NECK FLEXION CAL38

RUN NUMBER: 041599.1015;1

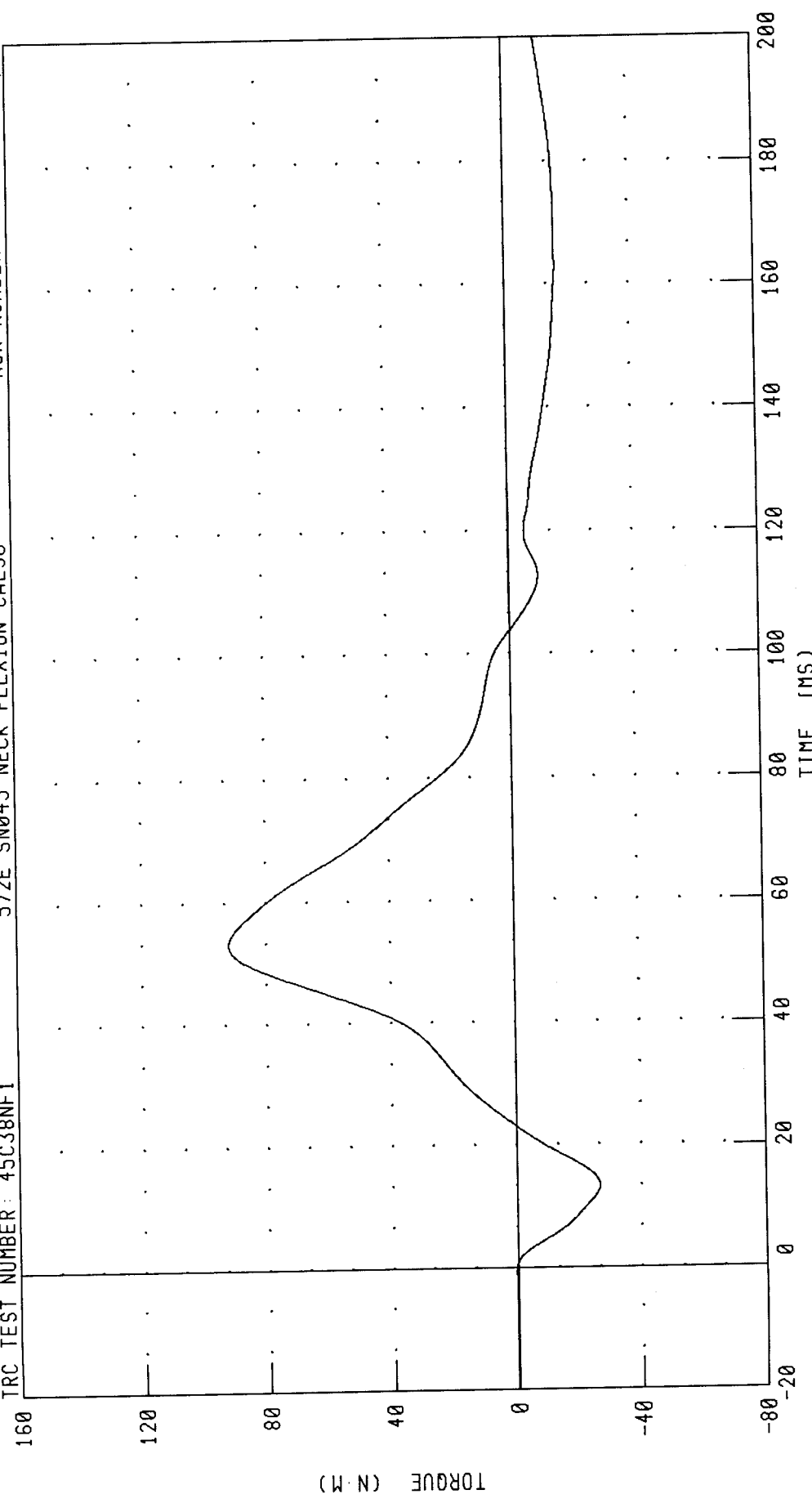


CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 79.75 N·M @ 52.96 MS; -35.41 N·M @ 13.76 MS

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

TRC TEST NUMBER: 45C38NF1
RUN NUMBER: 041599.1015;1

572E SN045 NECK FLEXION CAL38



PEAK DATA: 91.94 N-M @ 53.12 MS; -26.84 N-M @ 13.28 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th

15-APR-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 45C38NE2 572E SN045 NECK EXT CAL38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	5.95 M/S
PENDULUM DECELERATION	10 MS 17.20 - 21.20 G	18.53 G
	20 MS 14.00 - 19.00 G	17.93 G
	30 MS 11.00 - 16.00 G	14.12 G
MAX PENDULUM G	22 G MAX	18.63 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	14.09 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	42.00 MS
D PLANE	MAX 81 - 106 DEG.	105.41 DEG.
ROTATION	TIME 72 - 82 MS	76.32 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN -80.0/-52.9 NM	-68.41 NM
	TIME 65 - 79 MS	72.08 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	160.32 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	143.04 MS

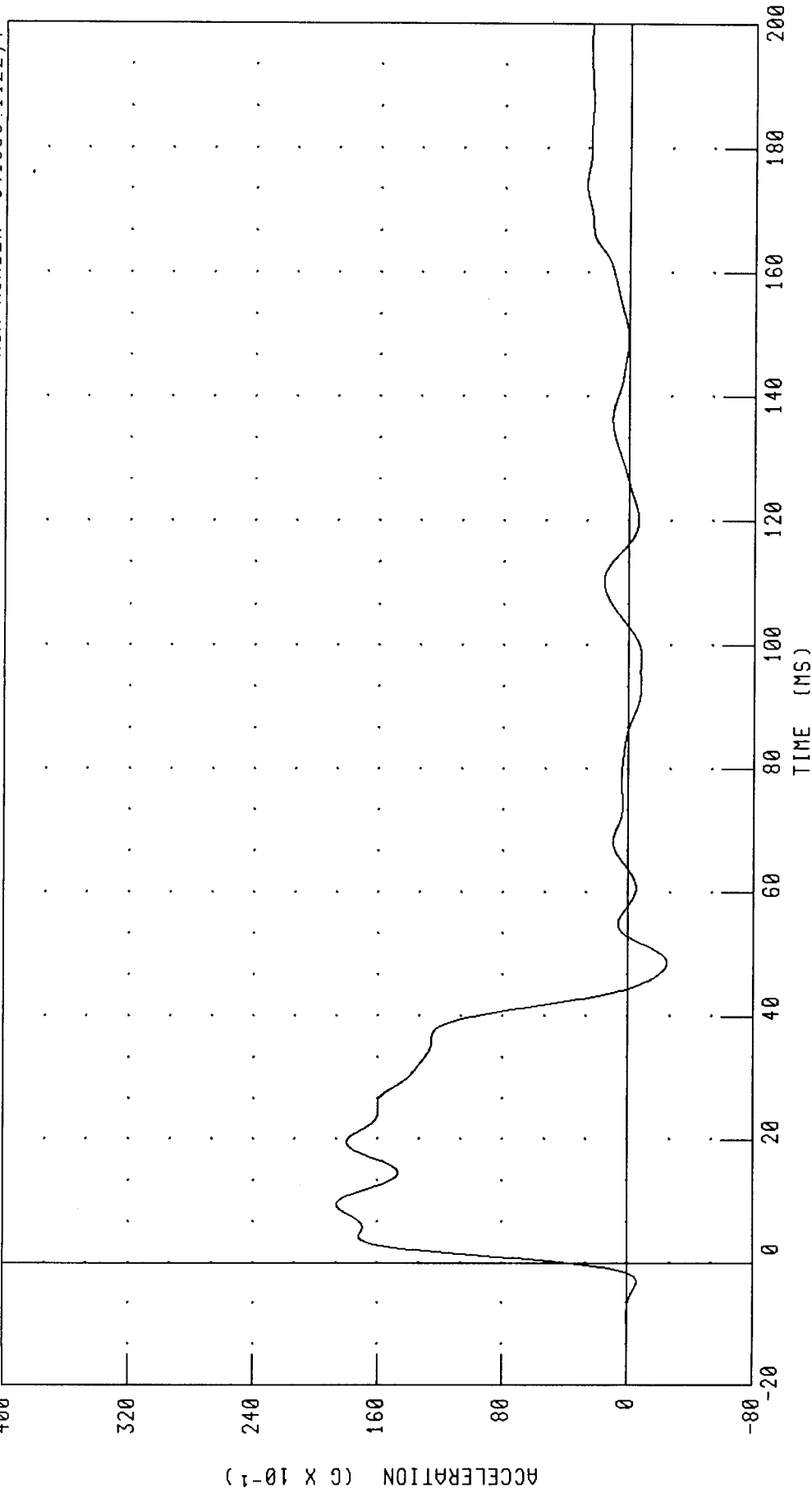
TEST MEETS SPECIFICATIONS

TECHNICIAN Beuth

RUN NUMBER: 041599.1121;4

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 45C38NE2 572E SN045 NECK EXT CAL38 RUN NUMBER: 041599.1122,4



CHANNEL: PENXC FILTER: CH. CLASS 60 PEAK DATA: 18.63 G @ 9.52 MS, -2.49 G @ 48.64 MS

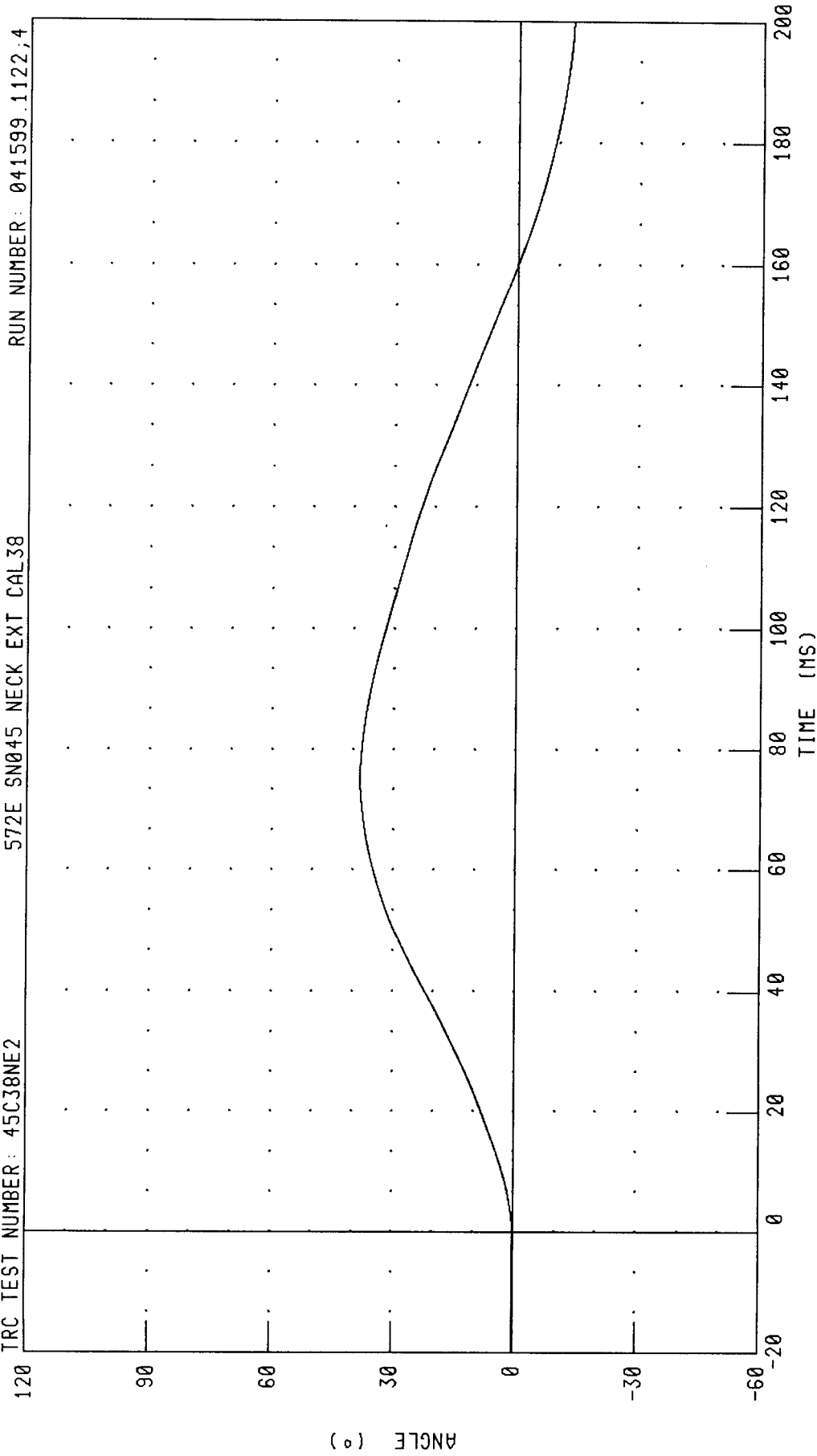
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 45C38NE2

572E SN045 NECK EXT CAL38

RUN NUMBER: 041599.1122,4

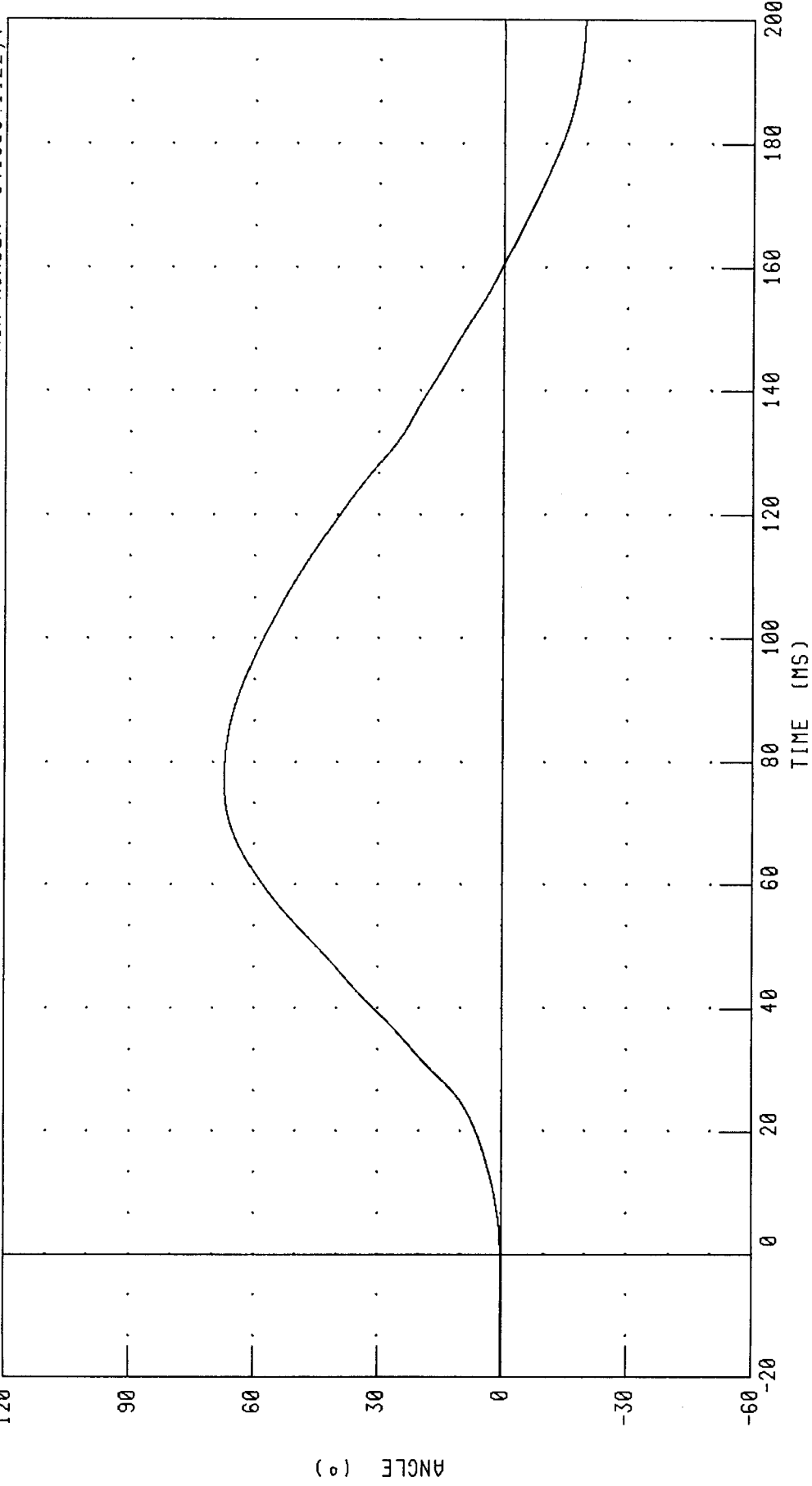


CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 38.22 ° @ 75.44 MS; -13.48 ° @ 200.00 MS

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

TRC TEST NUMBER: 45C38NE2 572E SN045 NECK EXT CAL38 RUN NUMBER: 041599.1122,4



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 67.22 ° @ 77.20 MS, -19.58 ° @ 200.00 MS

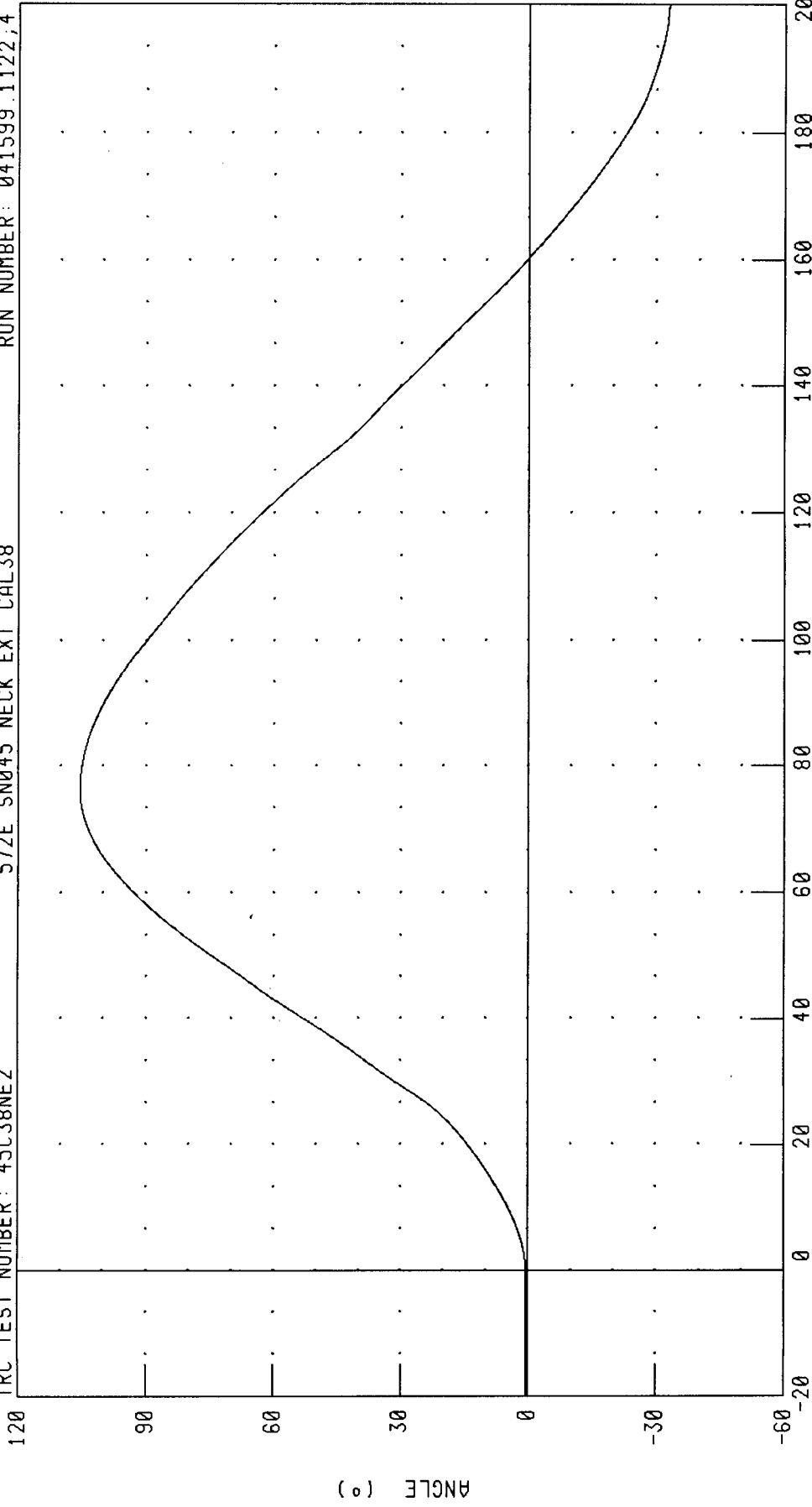
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 45C38NE2

572E SN045 NECK EXT CAL38

RUN NUMBER: 041599.1122,4



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 105.41 ° @ 76.32 MS; -33.06 ° @ 200.00 MS

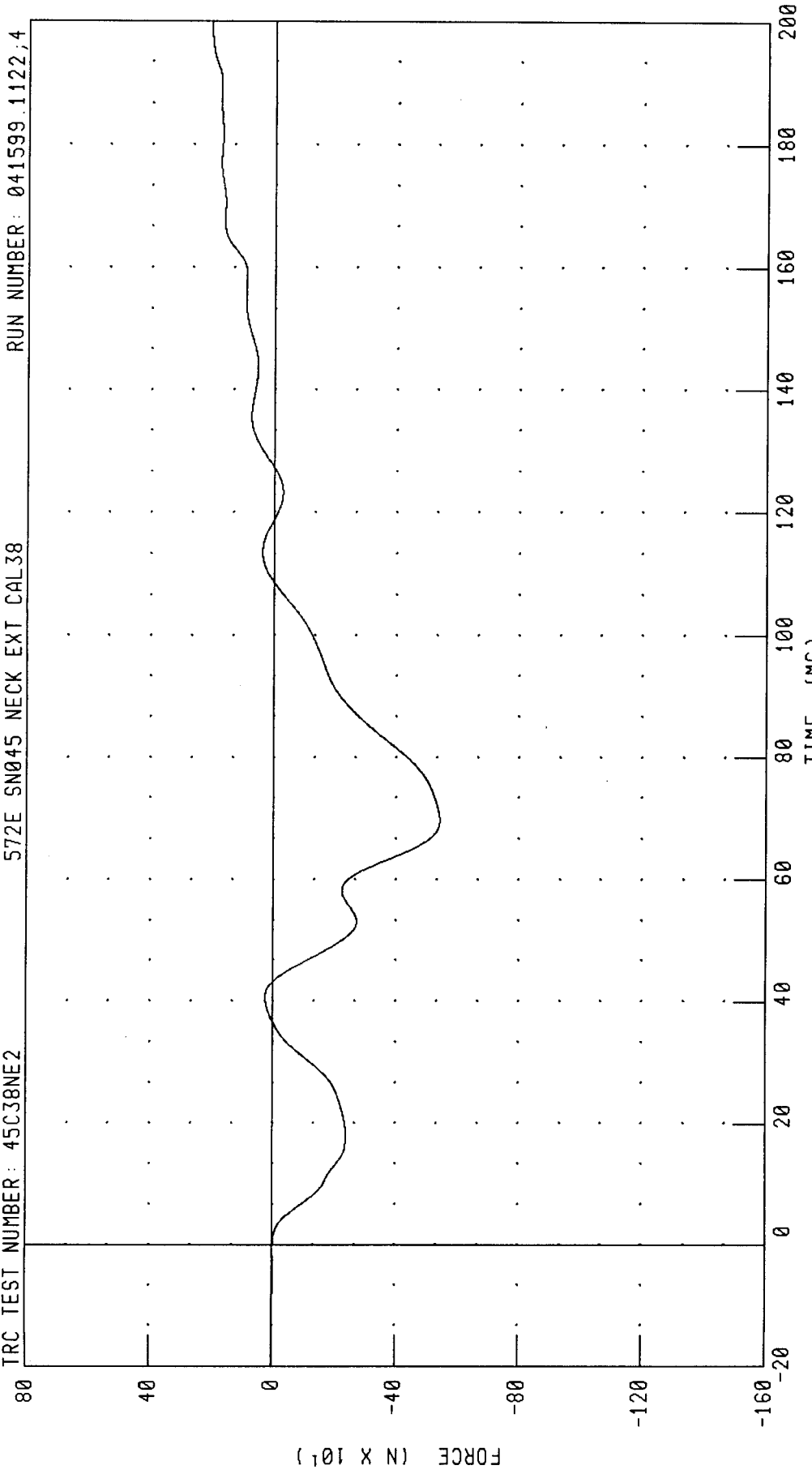
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 45C38NE2

572E SN045 NECK EXT CAL38

RUN NUMBER: 041599.1122,4



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 208.47 N @ 199.68 MS, -542.37 N @ 69.68 MS

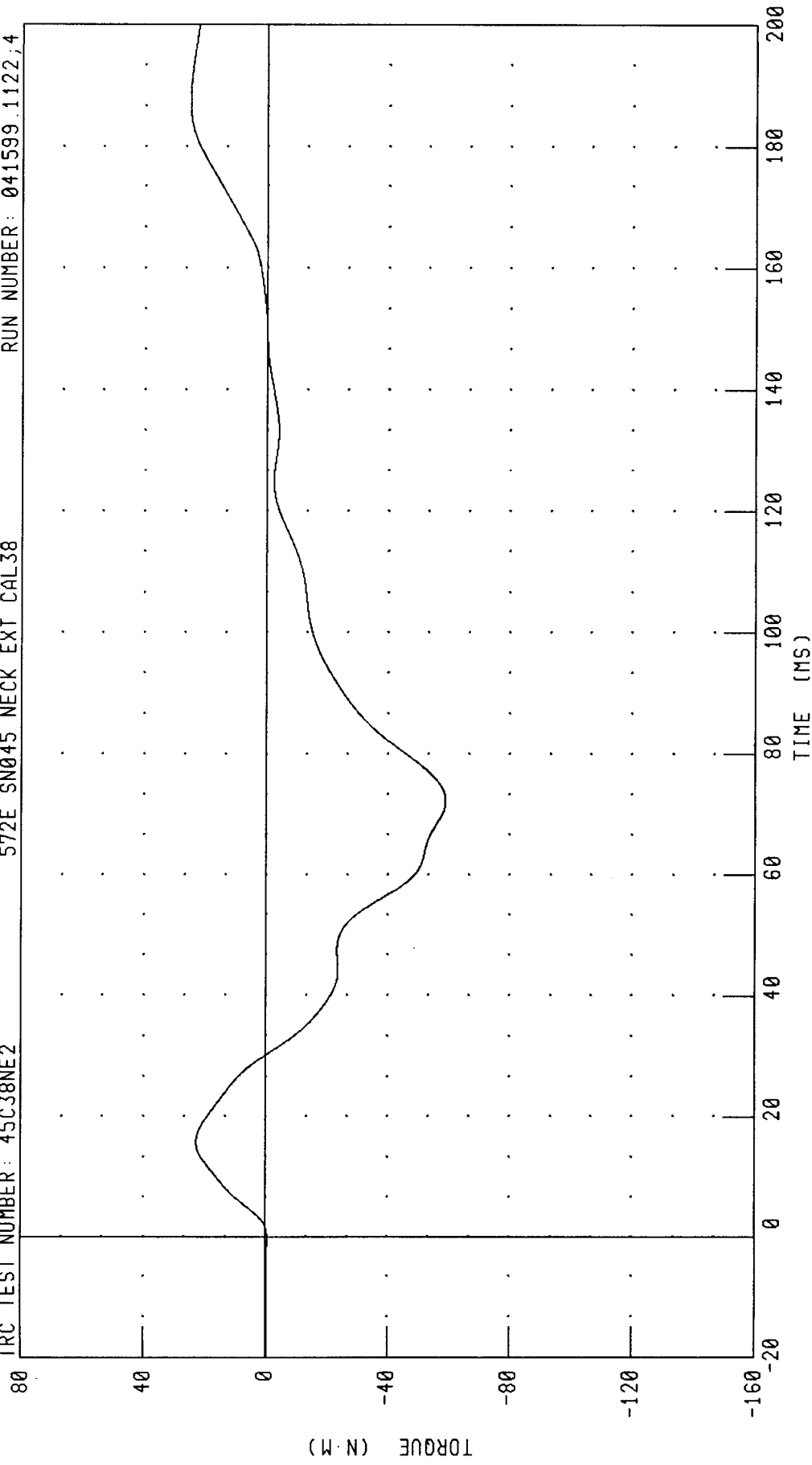
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 45C38NE2

572E SN045 NECK EXT CAL38

RUN NUMBER: 041599.1122;4



CHANNEL: NEKYM FILTER: CH. CLASS 60

PEAK DATA: 25.34 N.M @ 187.52 MS; -58.94 N.M @ 72.32 MS

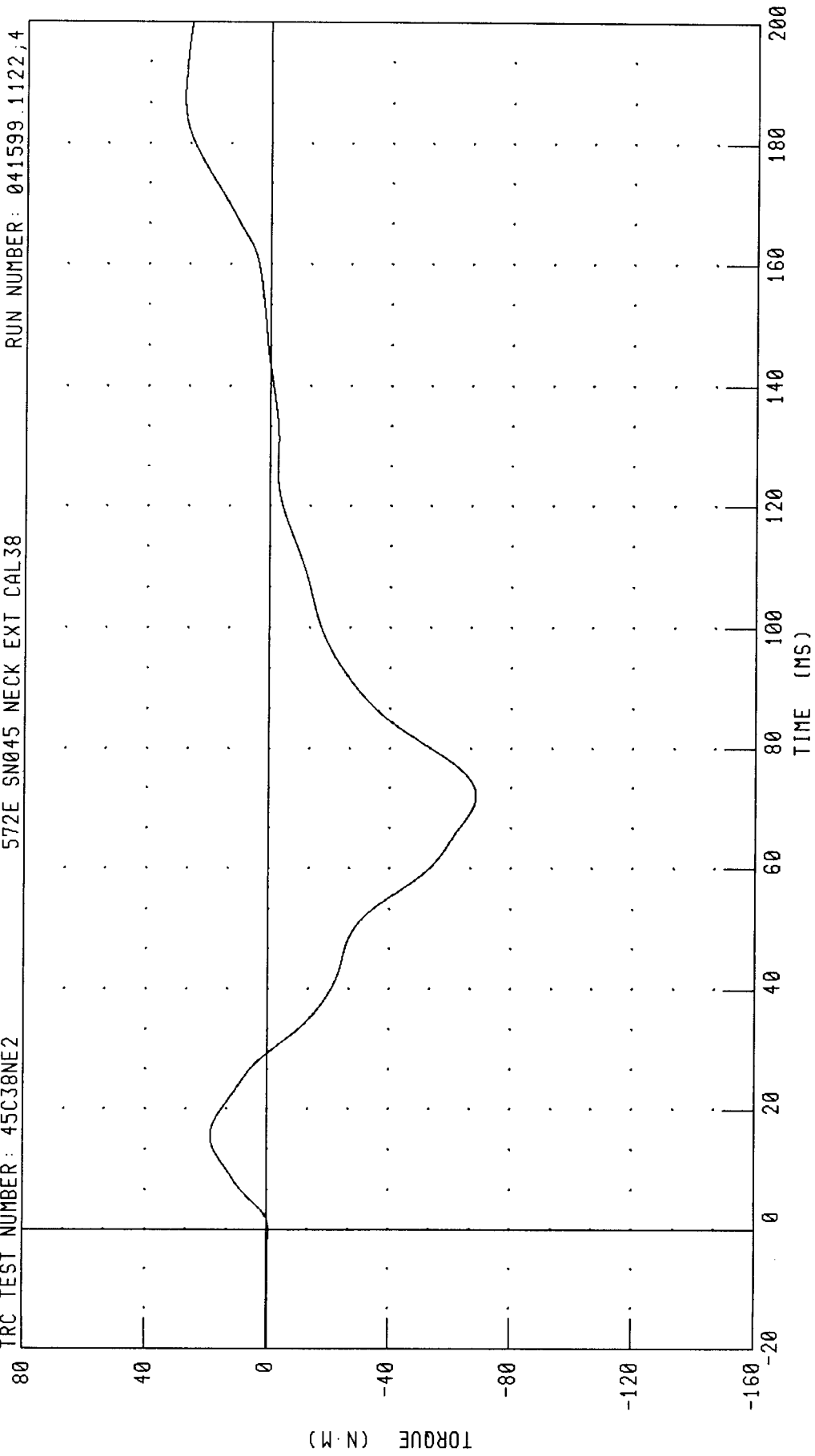
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 45C38NE2

572E SN045 NECK EXT CAL38

RUN NUMBER: 041599.1122,4



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 28.51 N·M @ 187.52 MS; -68.41 N·M @ 72.08 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III 50th

15-APR-99

TRC INC.

TEST NO: 45C38TH2

572E SN045 H.S.THORAX CAL38

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.68 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	63.7 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5635. N
INTERNAL HYSTERESIS	69% - 85%	72.7%

TEST MEETS SPECIFICATIONS

TECHNICIAN

Kevin Watkins

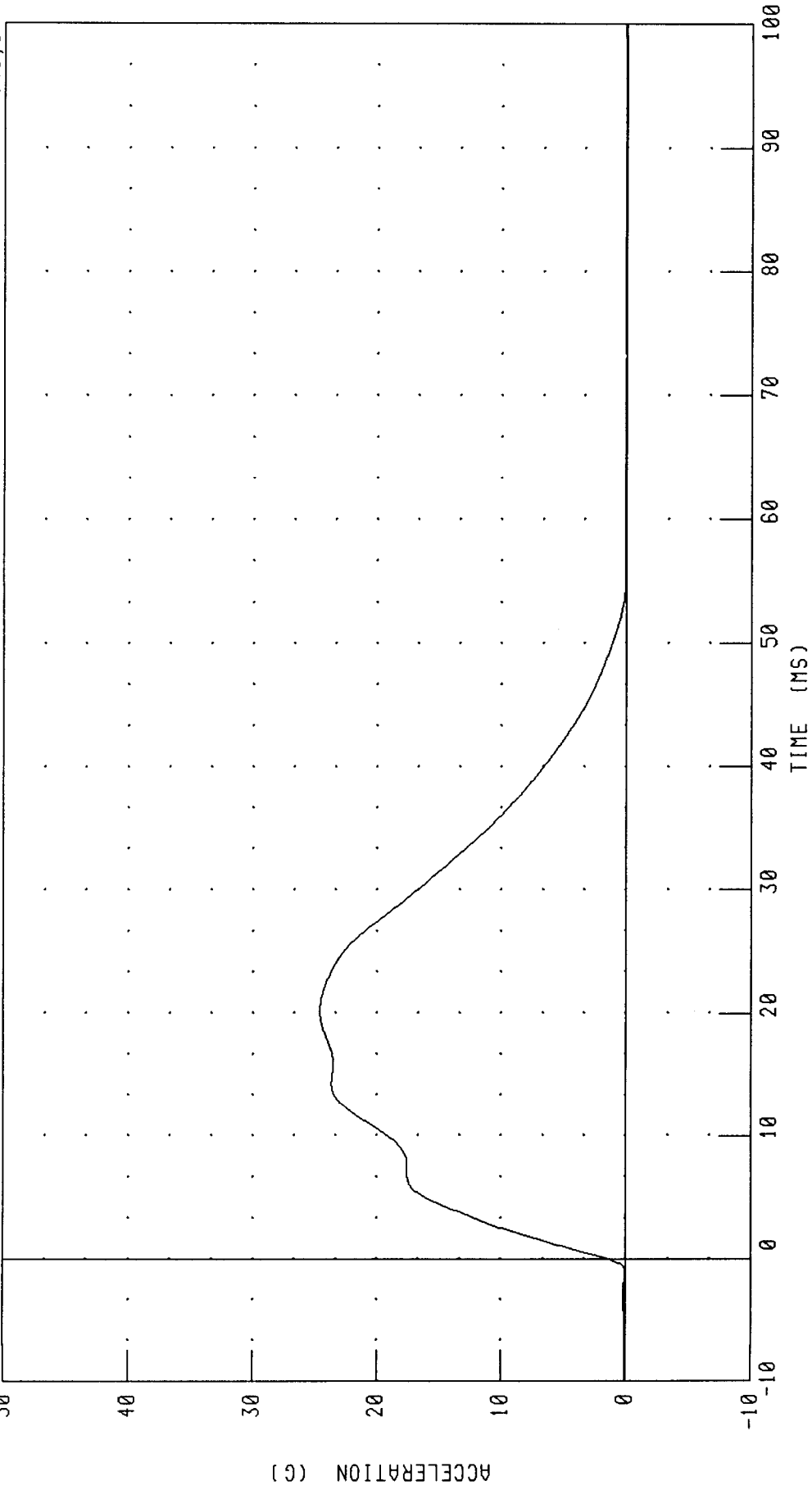
RUN NUMBER: 041599.1347;3

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 45C38TH2

572E SN045 H.S. THORAX CAL38

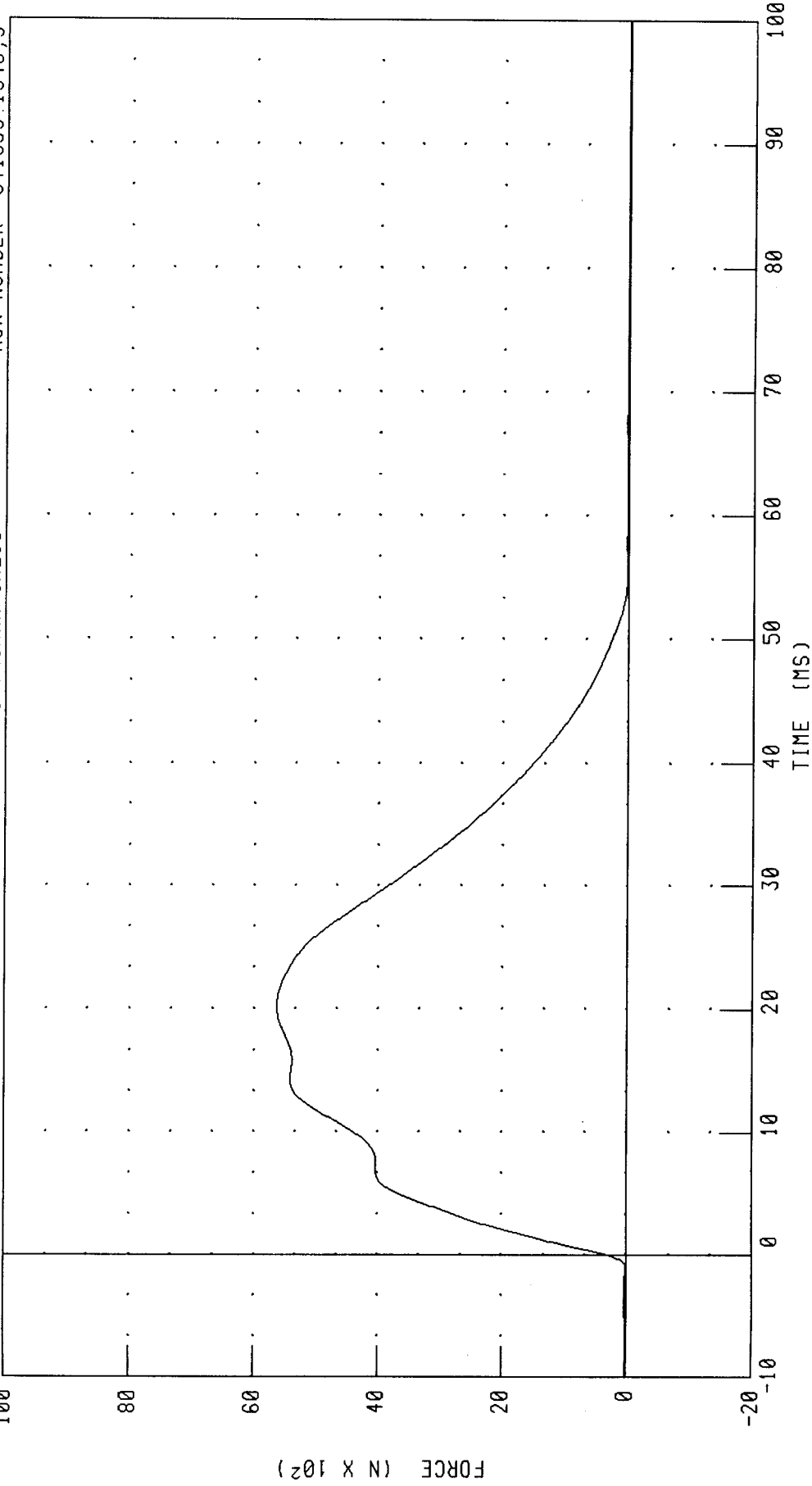
RUN NUMBER: 041599.1348,3



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 24.60 G @ 20.24 MS; 0.02 G @ 73.20 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 45C38TH2 572E SN045 H.S. THORAX CAL38 RUN NUMBER: 041599.1348,3



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 5635.40 N @ 20.24 MS; 5.51 N @ 73.20 MS

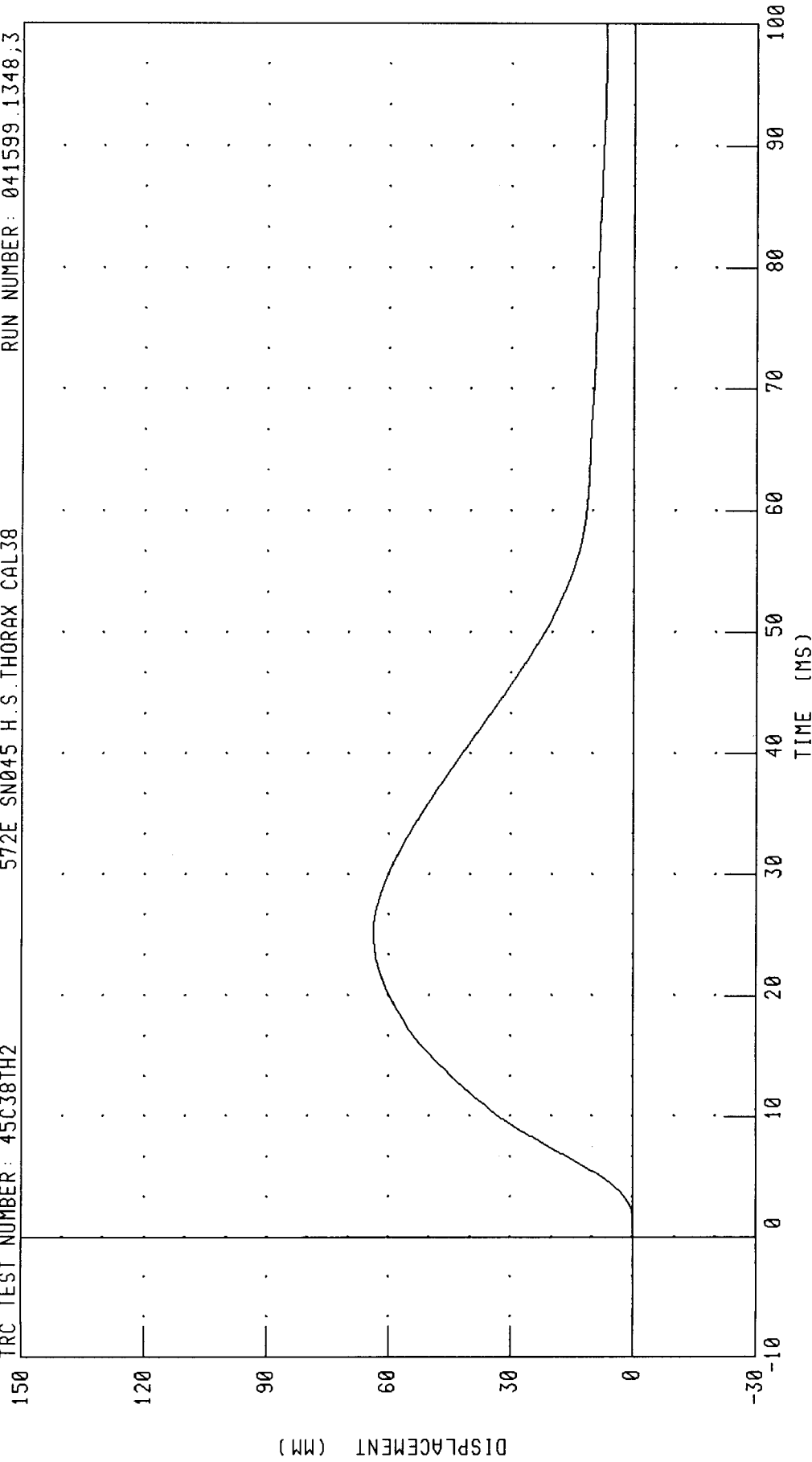
PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 45C38TH2

572E SN045 H.S. THORAX CAL38

RUN NUMBER: 041599.1348,3



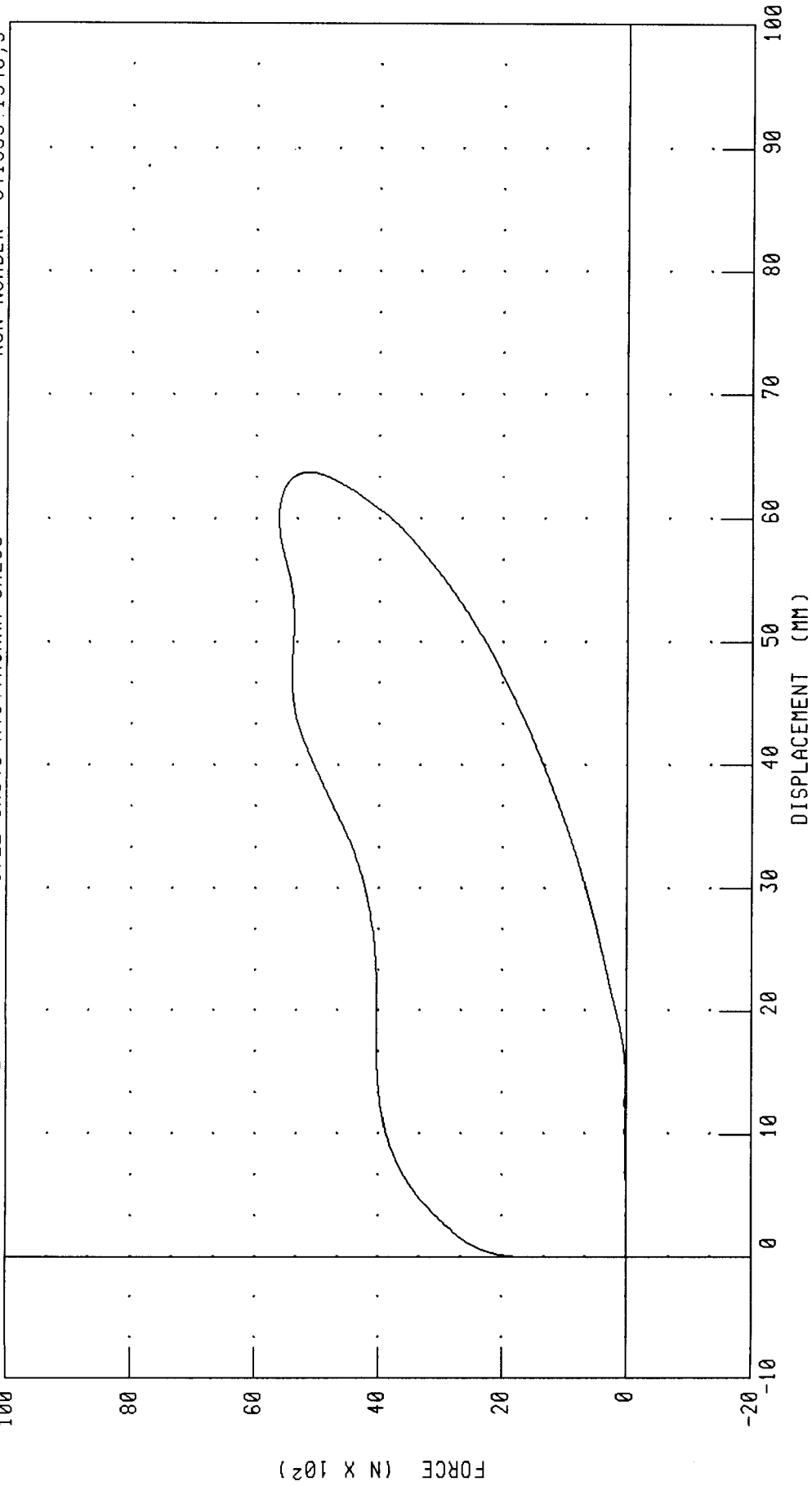
CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 63.76 MM @ 25.20 MS, -0.05 MM @ 1.28 MS

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

TRC TEST NUMBER: 45C38TH2

572E SN045 H.S. THORAX CAL38

RUN NUMBER: 041599.1348,3



CHANNEL: CSTXD
PENXF
FILTER: CH. CLASS 180
CH. CLASS 180
PEAK DATA: 63.76 MM @ 25.20 MS; -0.05 MM @ 1.28 MS
5635.40 N @ 20.24 MS; 5.51 N @ 73.20 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E

15-APR-99

TRC INC.

TEST NO: 45C38HR3

572E SN 045 HIPFLEX CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	88.6 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	40.3 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN

By cult

RUN NUMBER: 041599.0958;1

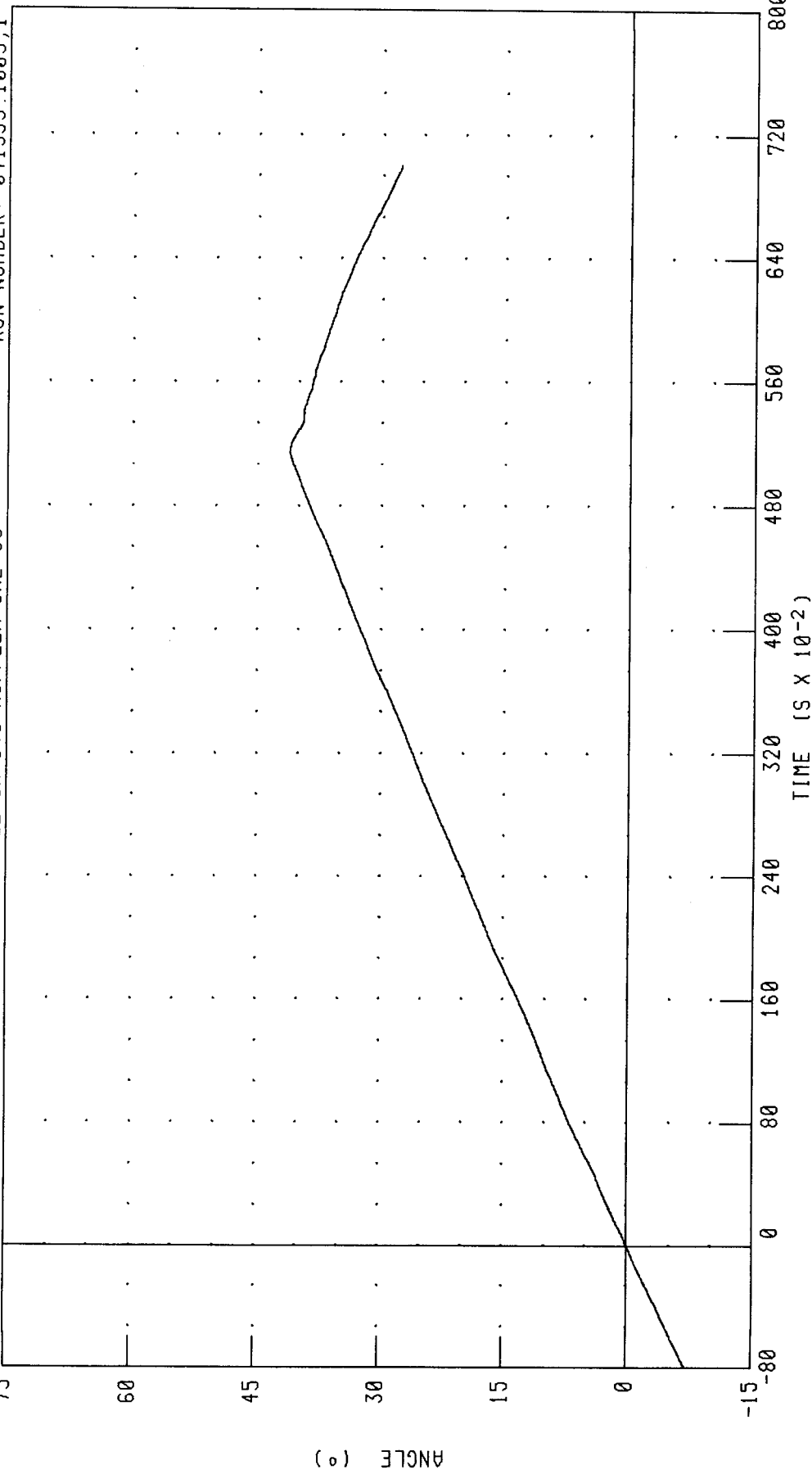
HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION ROTATION

TRC TEST NUMBER: 45C38HR3

572E SN 045 HIPFLEX CAL 38

RUN NUMBER: 041599.1005;1



CHANNEL: RHPXD FILTER: CH. CLASS 60

PEAK DATA: 41.14 ° @ 5.17 S; -10.08 ° @ -1.00 S

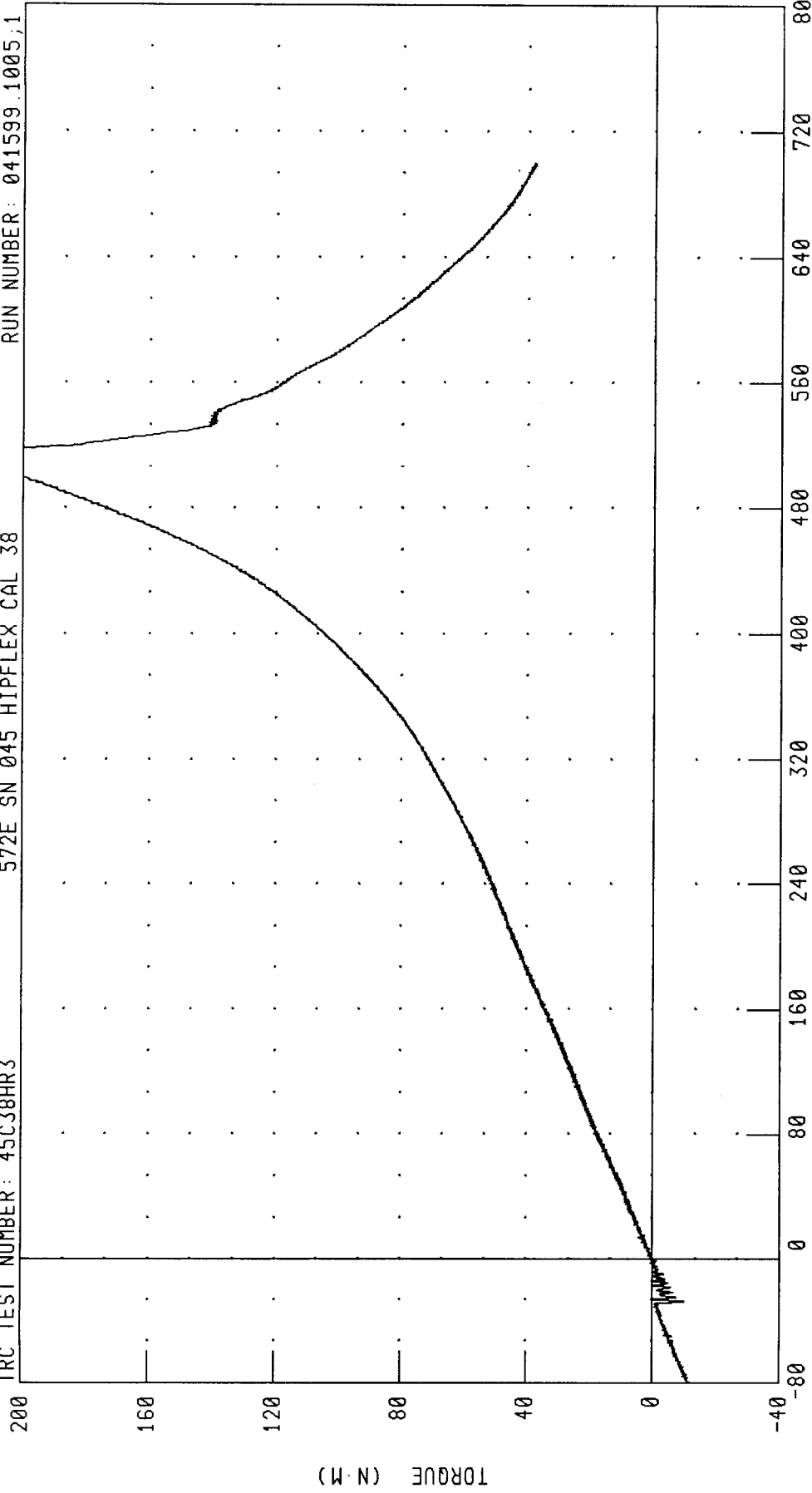
HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION MOMENT

572E SN 045 HIPFLEX CAL 38

TRC TEST NUMBER: 45C38HR3

RUN NUMBER: 041599.1005;1



TIME (S X 10⁻²)

PEAK DATA: 220.98 N·M @ 5.13 S; -16.46 N·M @ -1.00 S

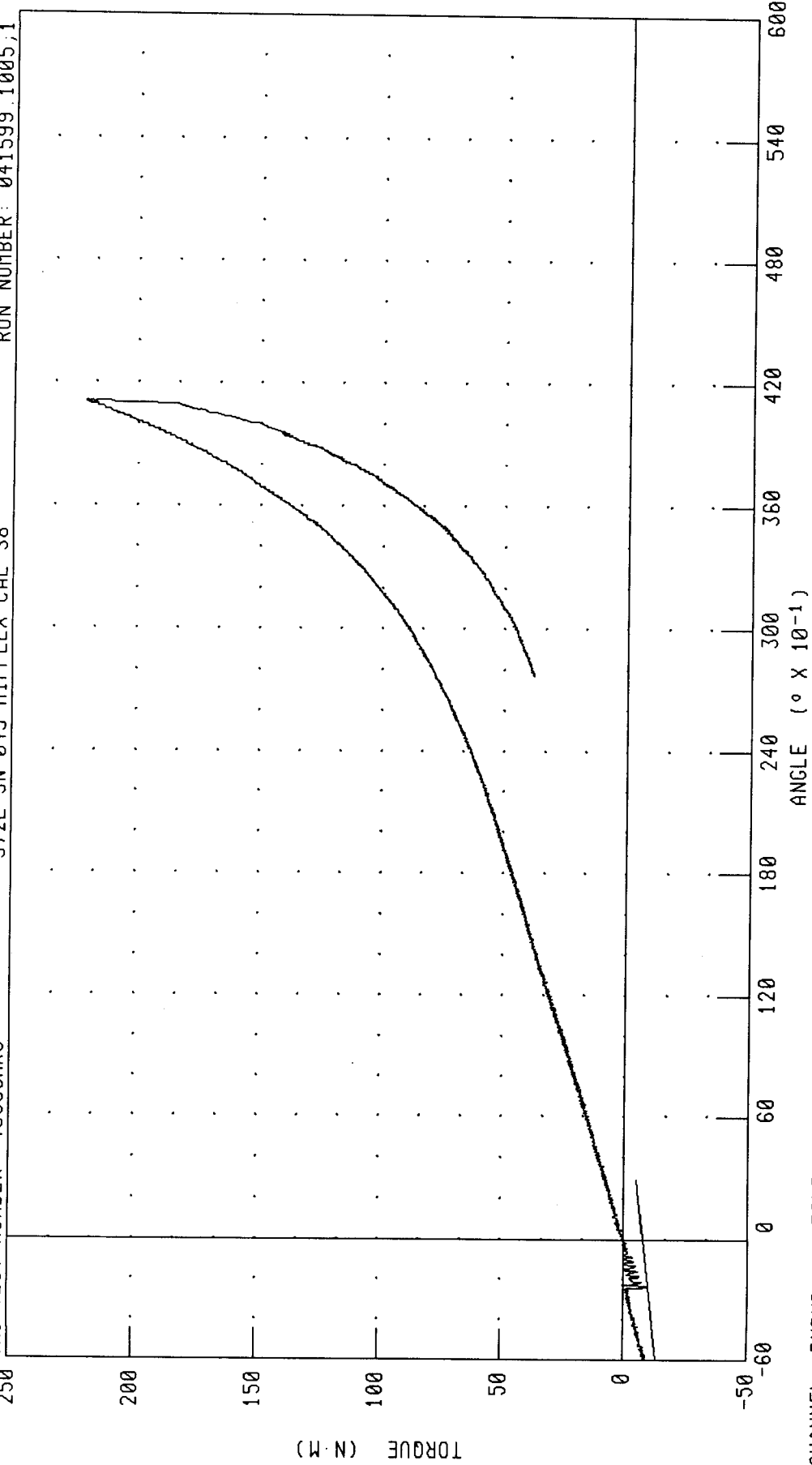
CHANNEL: RHPYM FILTER: CH. CLASS 60

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
RIGHT HIP FLEXION MOMENT VS ROTATION ANGLE

TRC TEST NUMBER: 45C38HR3

572E SN 045 HIPFLEX CAL 38

RUN NUMBER: 041599.1005,1



CHANNEL: RHPXD
RHPYM

FILTER: CH: CLASS 60
CH: CLASS 60

ANGLE (° X 10⁻¹)

PEAK DATA: 41.14 ° @ 5.17 S; -10.08 ° @ -1.00 S
220.98 N.M @ 5.13 S; -16.46 N.M @ -1.00 S

TRANSPORTATION RESEARCH CENTER INC.

LEFT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E

16-APR-99

TRC INC.

TEST NO: 45C38HL1

572E SN 045 HIPFLEX CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	93.6 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	40.6 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN

Bj cult

RUN NUMBER: 041599.0826;2

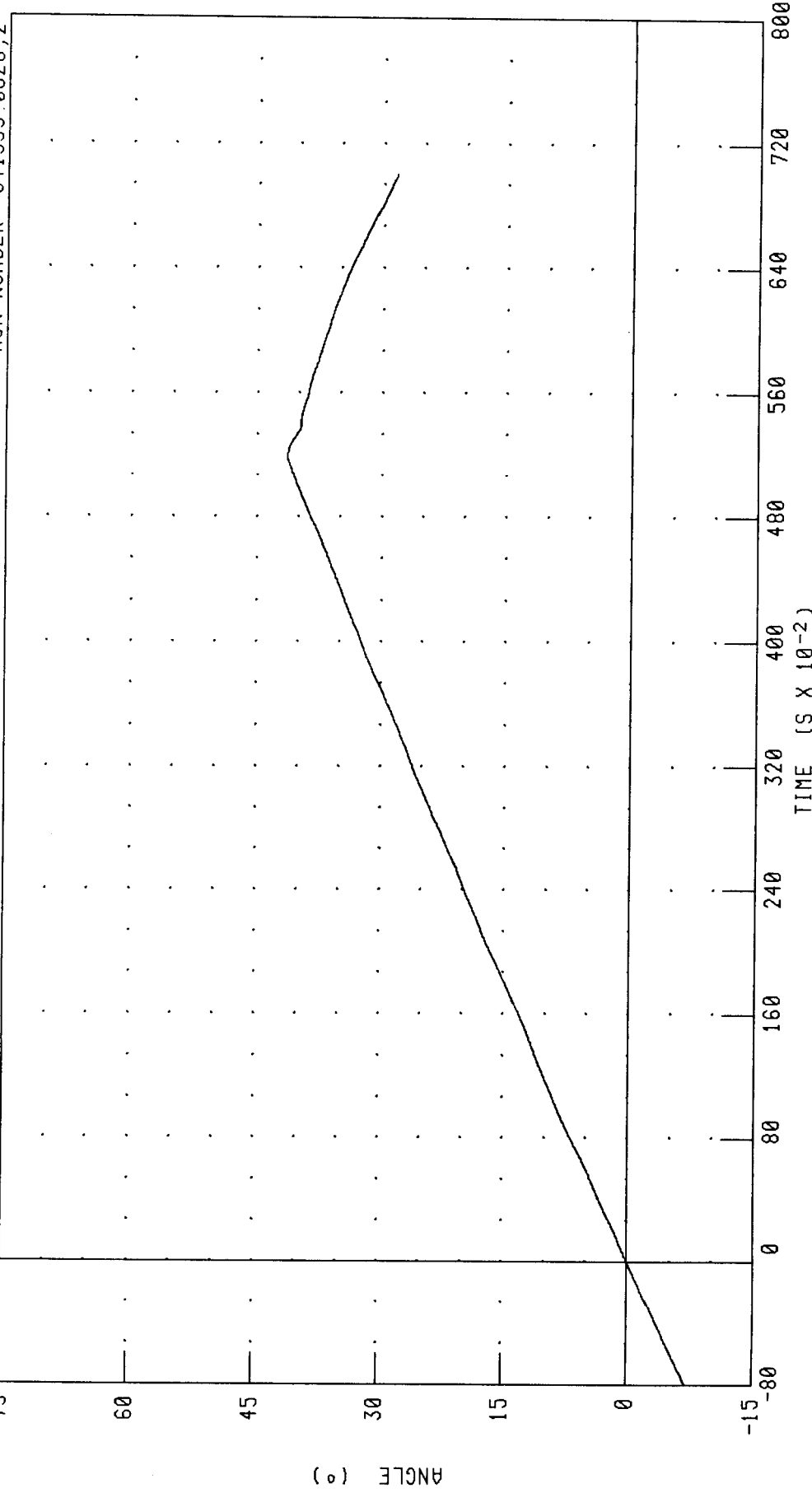
HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

LEFT HIP FLEXION ROTATION

TRC TEST NUMBER: 45C38HL1

572E SN 045 HIPFLEX CAL 38

RUN NUMBER: 041599.0826,2

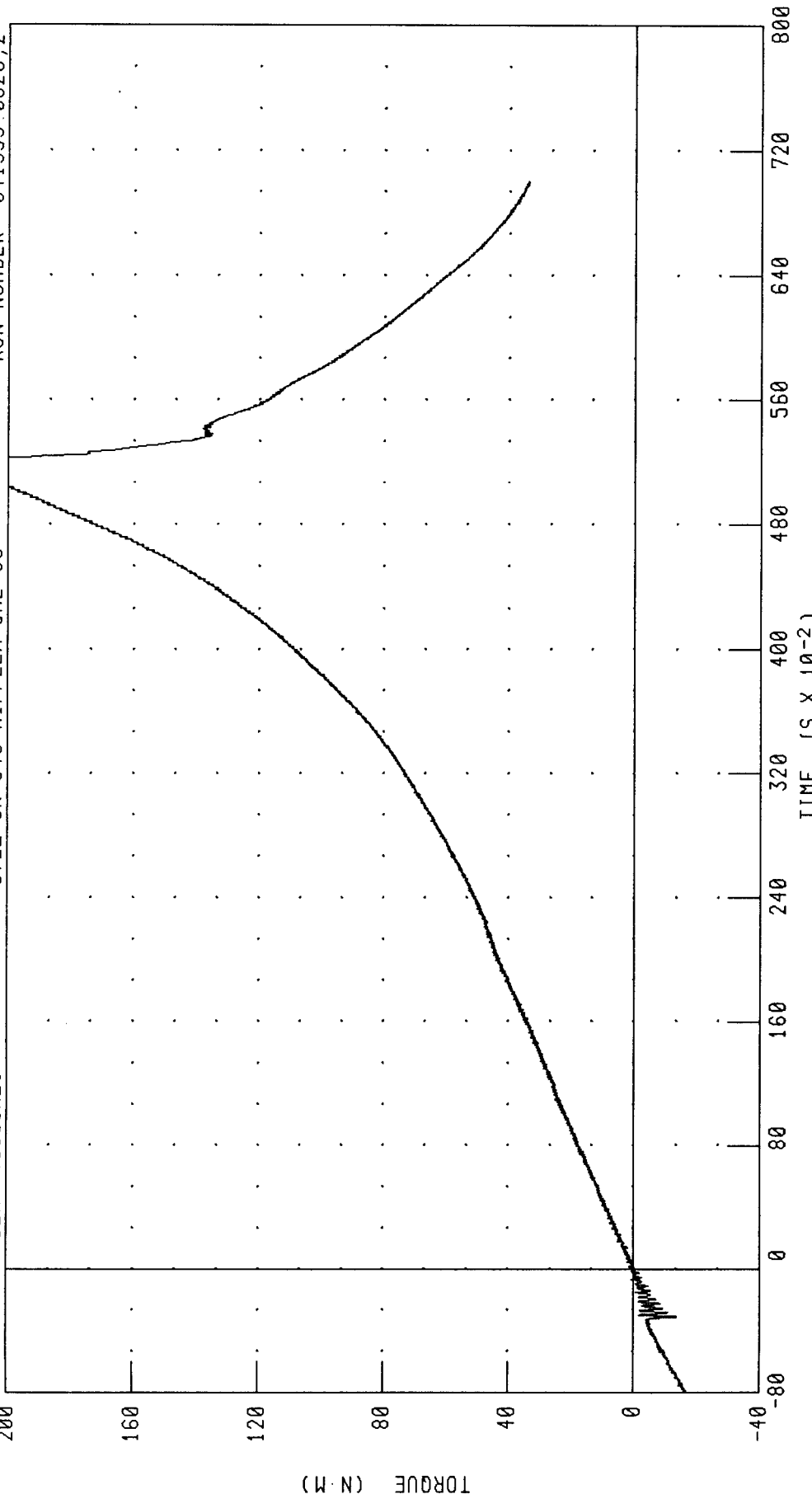


CHANNEL: LHPXD FILTER: CH. CLASS 60

PEAK DATA: 41.43 ° @ 5.20 S; -10.05 ° @ -1.00 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT

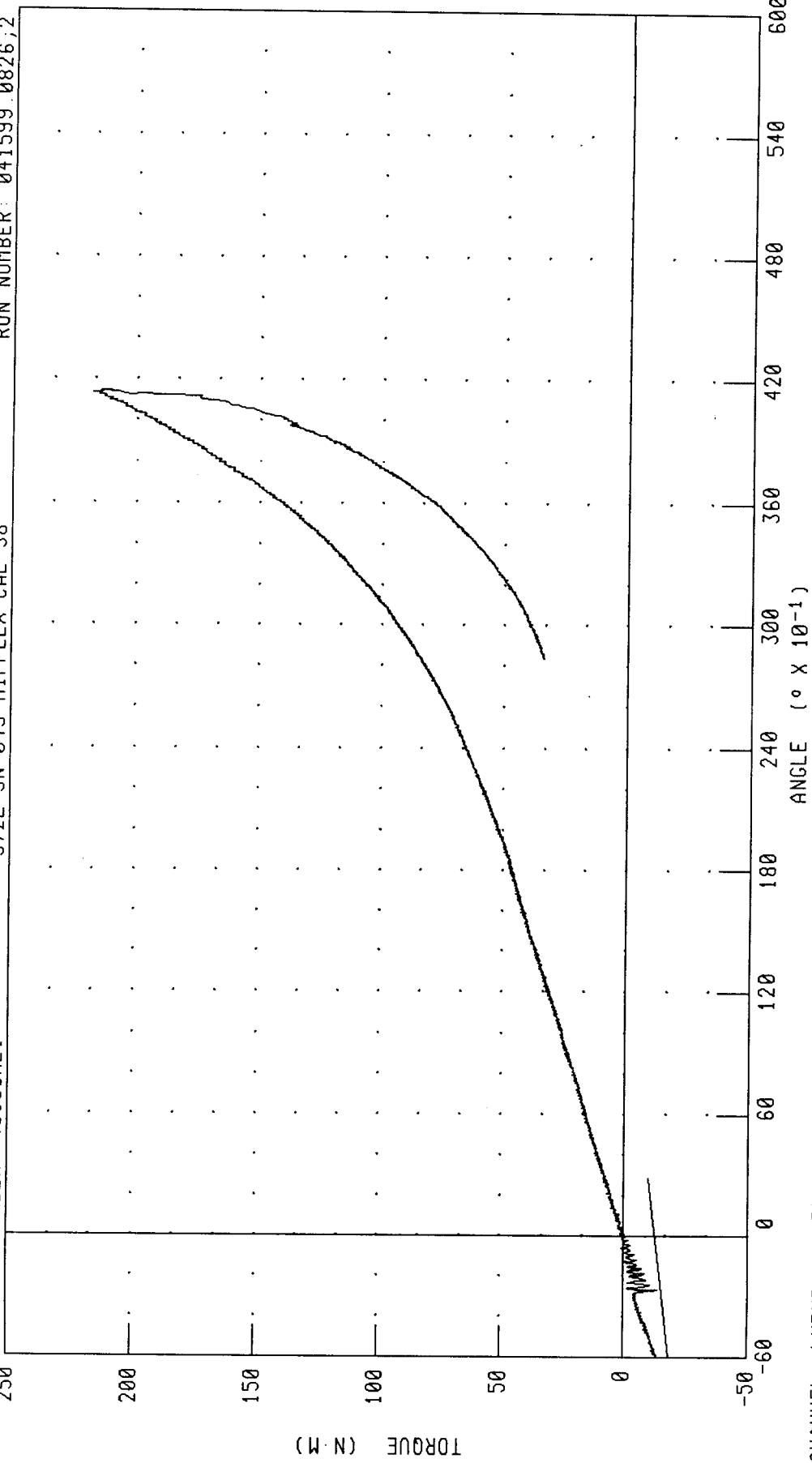
TRC TEST NUMBER: 45C38HL1 572E SN 045 HIPFLEX CAL 38 RUN NUMBER: 041599.0826;2



CHANNEL: LHPYM FILTER: CH. CLASS 60 PEAK DATA: 217.73 N·M @ 5.17 S; -22.47 N·M @ -1.00 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT VS ROTATION ANGLE

TRC TEST NUMBER: 45C38HL1 572E SN 045 HIPFLEX CAL 38 RUN NUMBER: 041599.0826;2



CHANNEL: LHPXD FILTER: CH: CLASS 60
 LHPYM CH: CLASS 60
 PEAK DATA: 41.43 ° @ 5.20 S; -10.05 ° @ -1.00 S
 217.73 N·M @ 5.17 S; -22.47 N·M @ -1.00 S

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III 50th

16-APR-99

TRC INC.

TEST NO: 45C38RK1

572E SN045 RIGHT KNEE CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5128.3 N

TEST MEETS SPECIFICATIONS

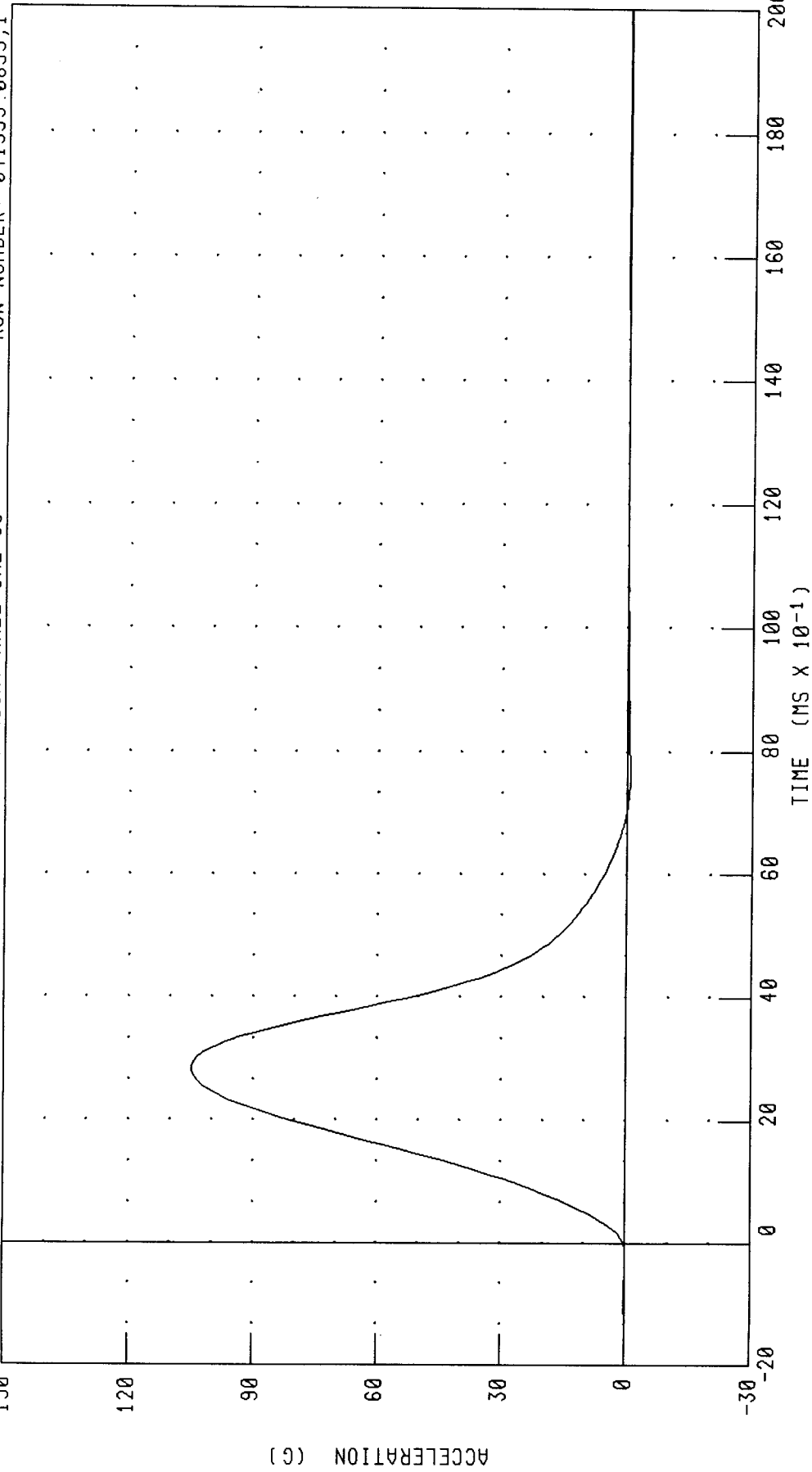
TECHNICIAN

R. C. [Signature]

RUN NUMBER: 041599.0839;1

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

TRC TEST NUMBER: 45C38RK1 572E SN045 RIGHT KNEE CAL 38 RUN NUMBER: 041599.0839;1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 104.81 G @ 2.88 MS; -0.91 G @ 7.60 MS

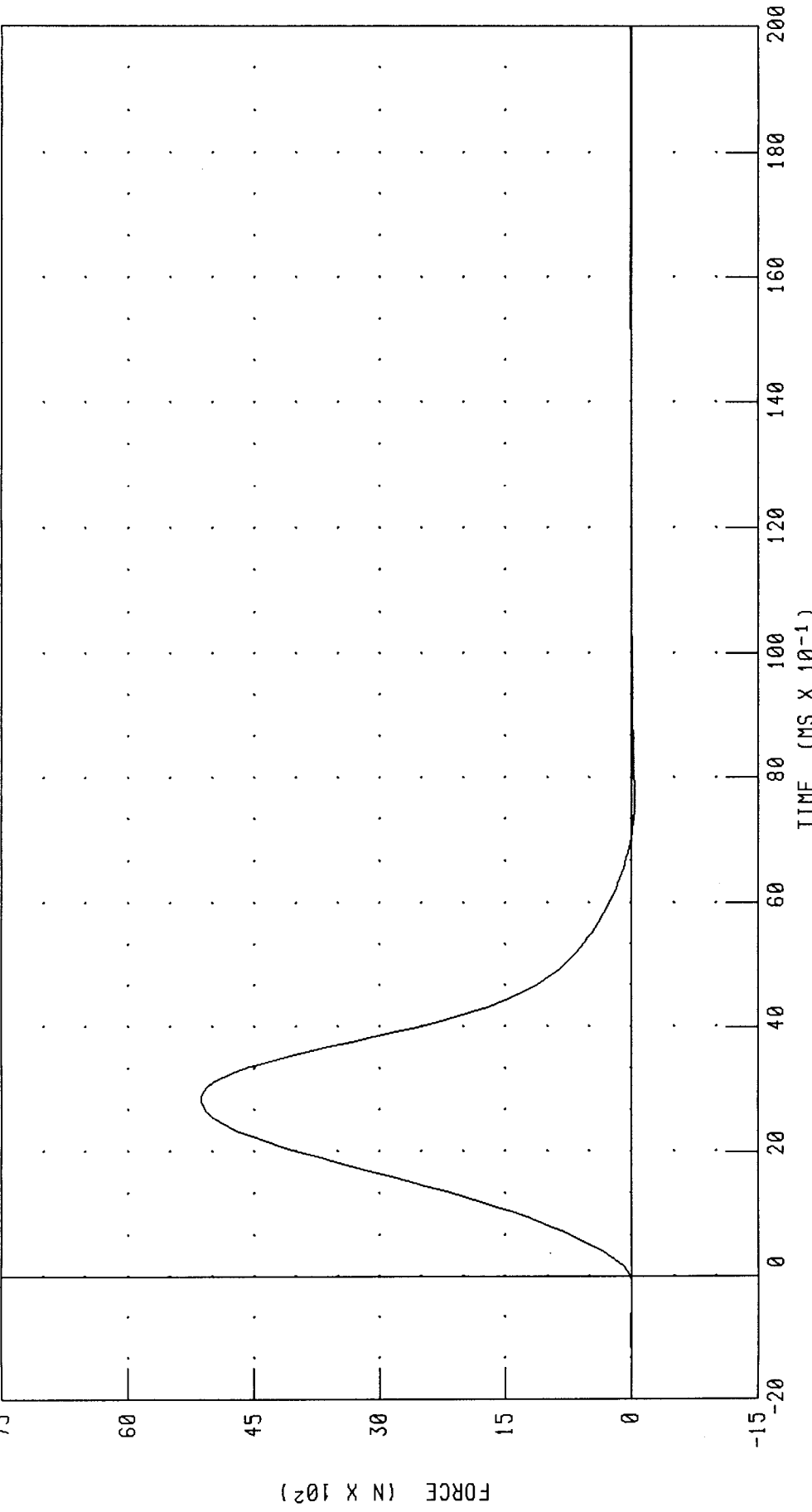
PART 572-E HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 45C38RK1

572E SN045 RIGHT KNEE CAL 38

RUN NUMBER: 041599.0839;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5128.35 N @ 2.88 MS, -44.53 N @ 7.60 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III 50th

16-APR-99

TRC INC.

TEST NO: 45C38LK1

572E SN045 LEFT KNEE CAL 38

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5379.2 N

TEST MEETS SPECIFICATIONS

TECHNICIAN By *clt*

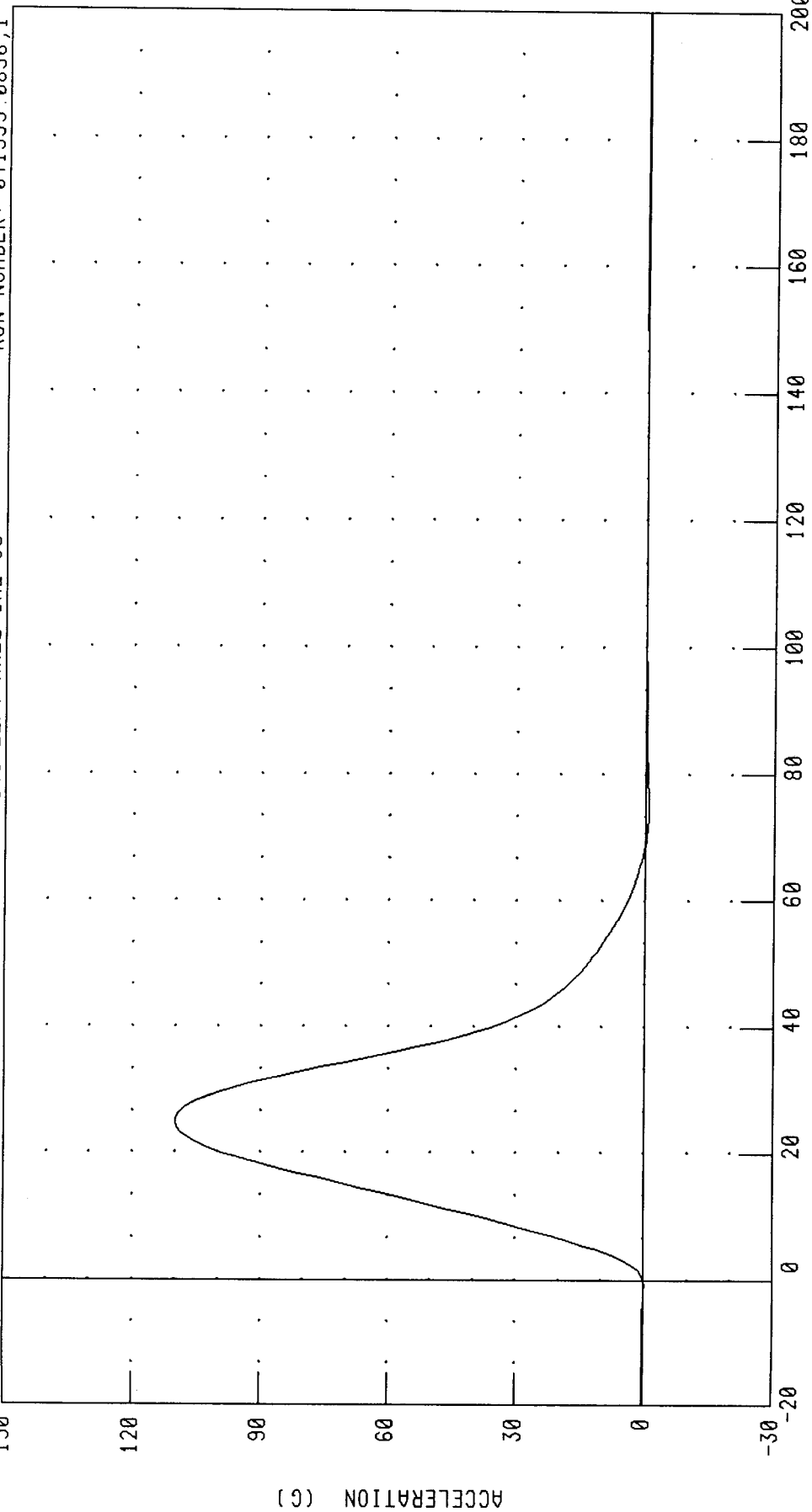
RUN NUMBER: 041599.0836;1

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

TRC TEST NUMBER: 45C38LK1

572E SN045 LEFT KNEE CAL 38

RUN NUMBER: 041599 0836;1



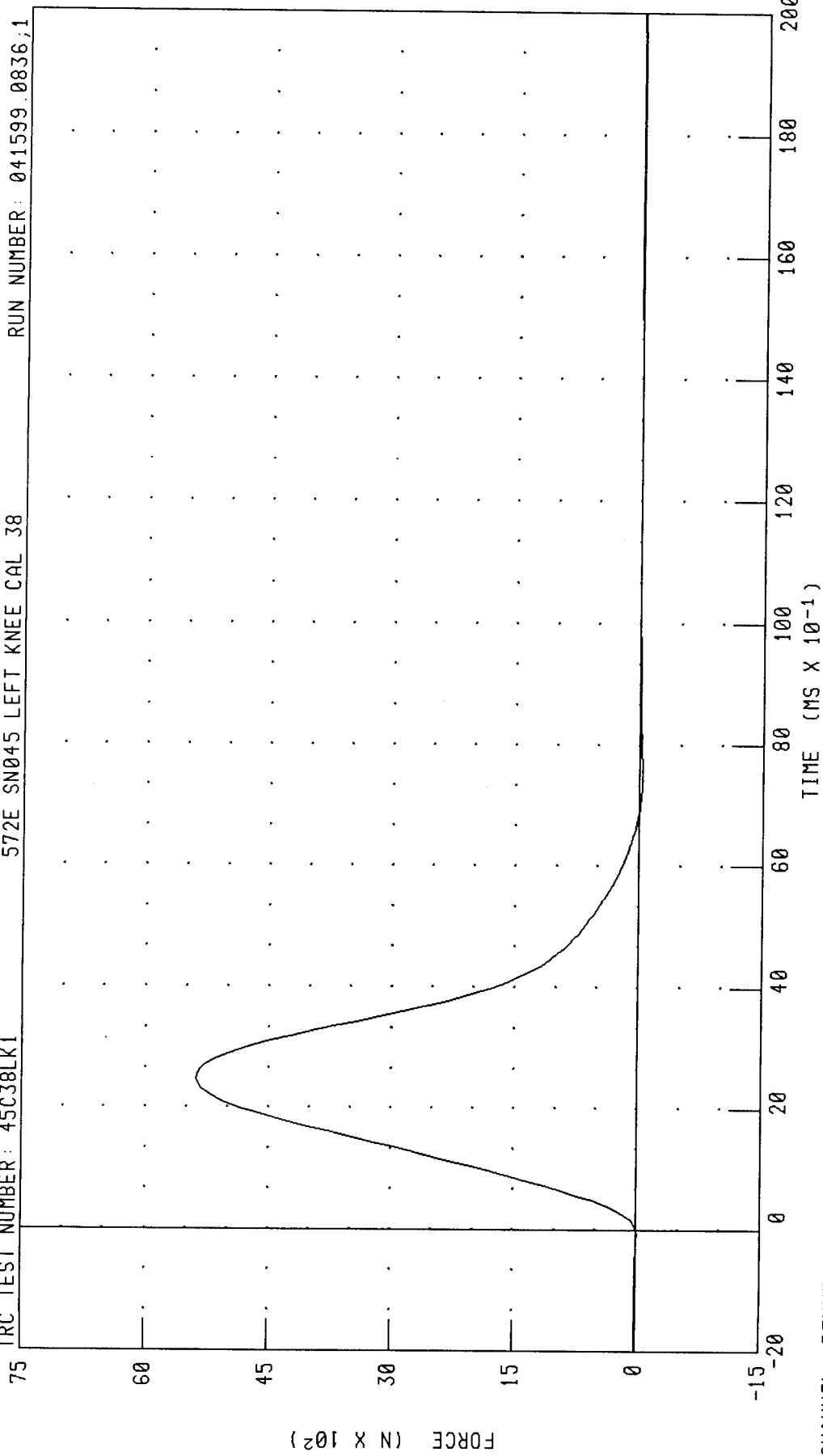
CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 109.94 G @ 2.48 MS; -0.87 G @ 7.44 MS

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

TRC TEST NUMBER: 45C38LK1

572E SN045 LEFT KNEE CAL 38

RUN NUMBER: 041599.0836,1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5379.21 N @ 2.48 MS; -42.36 N @ 7.44 MS

Pre-Test Dummy Certification

Hybrid III 6 Year Old Dummy S/N 27

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SIX YEAR OLD

16-APR-99

TRC INC.

TEST NO: 27C9HD1

H/3 6YR.SN27 HEAD DROP CAL9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PEAK RESULTANT ACCELERATION	245 - 300 G	266.35 G
PEAK LATERAL ACCELERATION	15 G MAX	-3.56 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

By cult

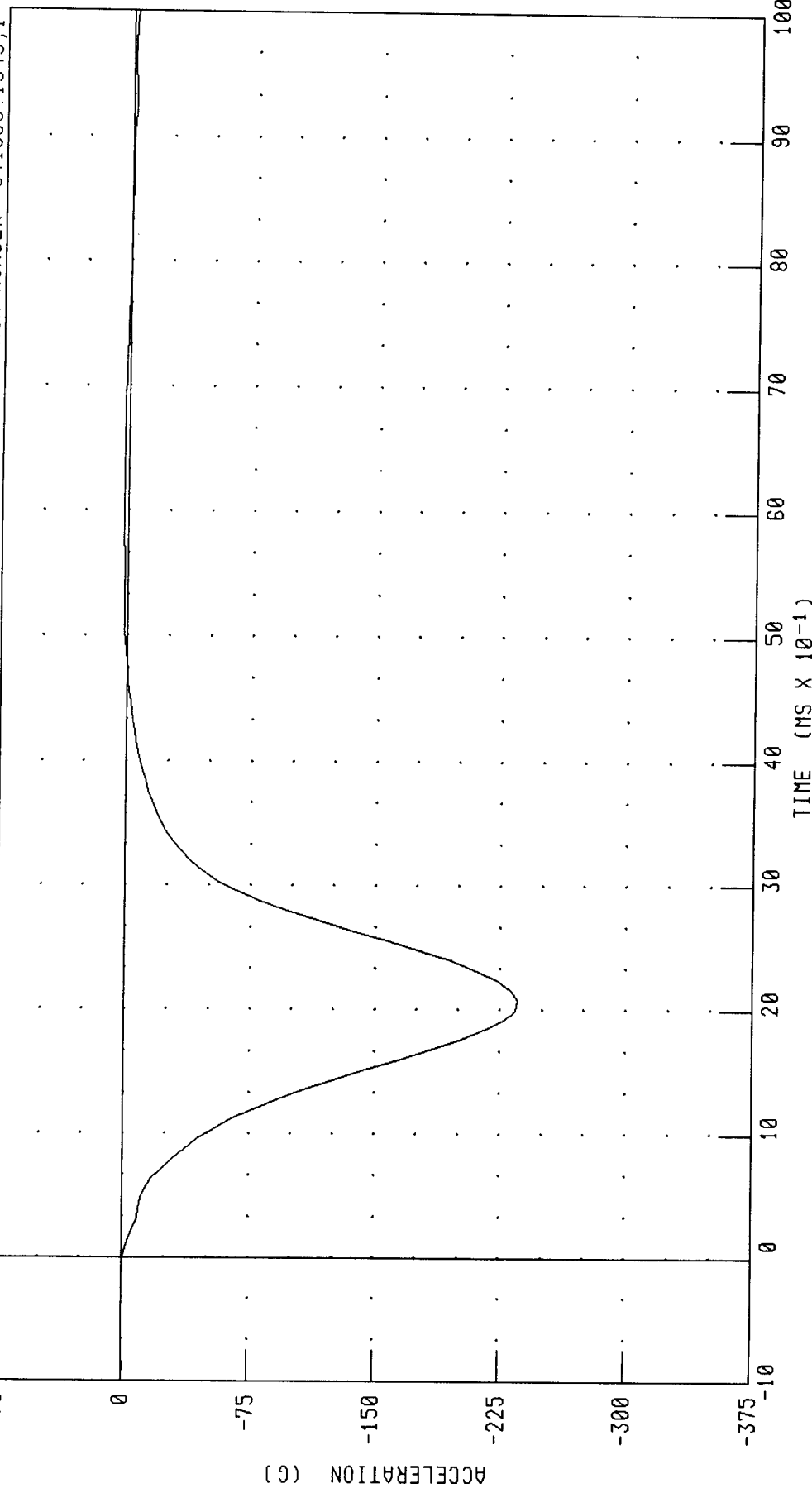
RUN NUMBER: 041999.1342;1

HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 27C9HD1

H/3 6YR .SN27 HEAD DROP CAL9

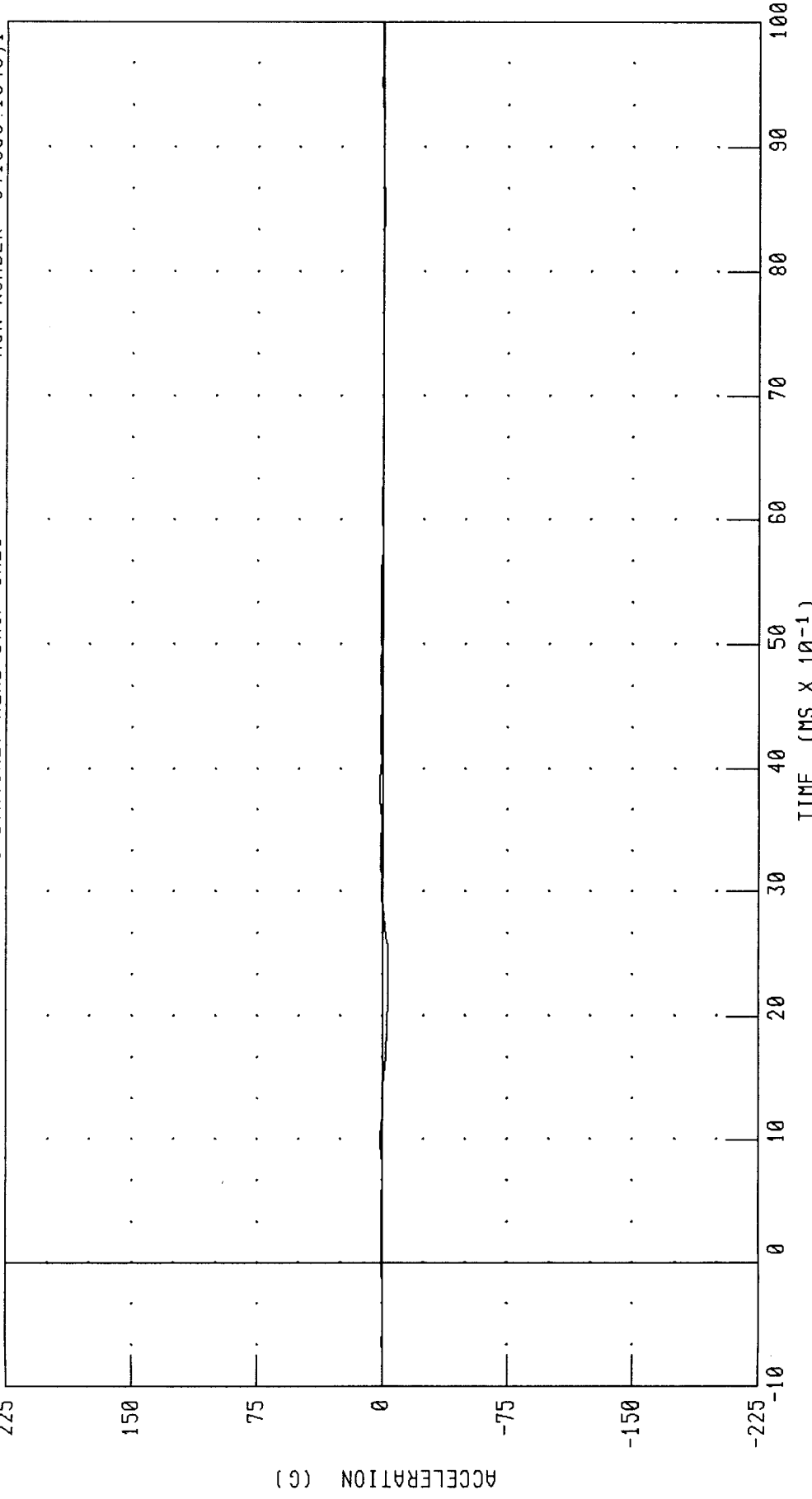
RUN NUMBER: 041999.1343,1



CHANNEL: HEDXC FILTER: CH. CLASS 1000 PEAK DATA: 2.98 G @ 5.92 MS; -235.63 G @ 2.08 MS

HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION Y AXIS

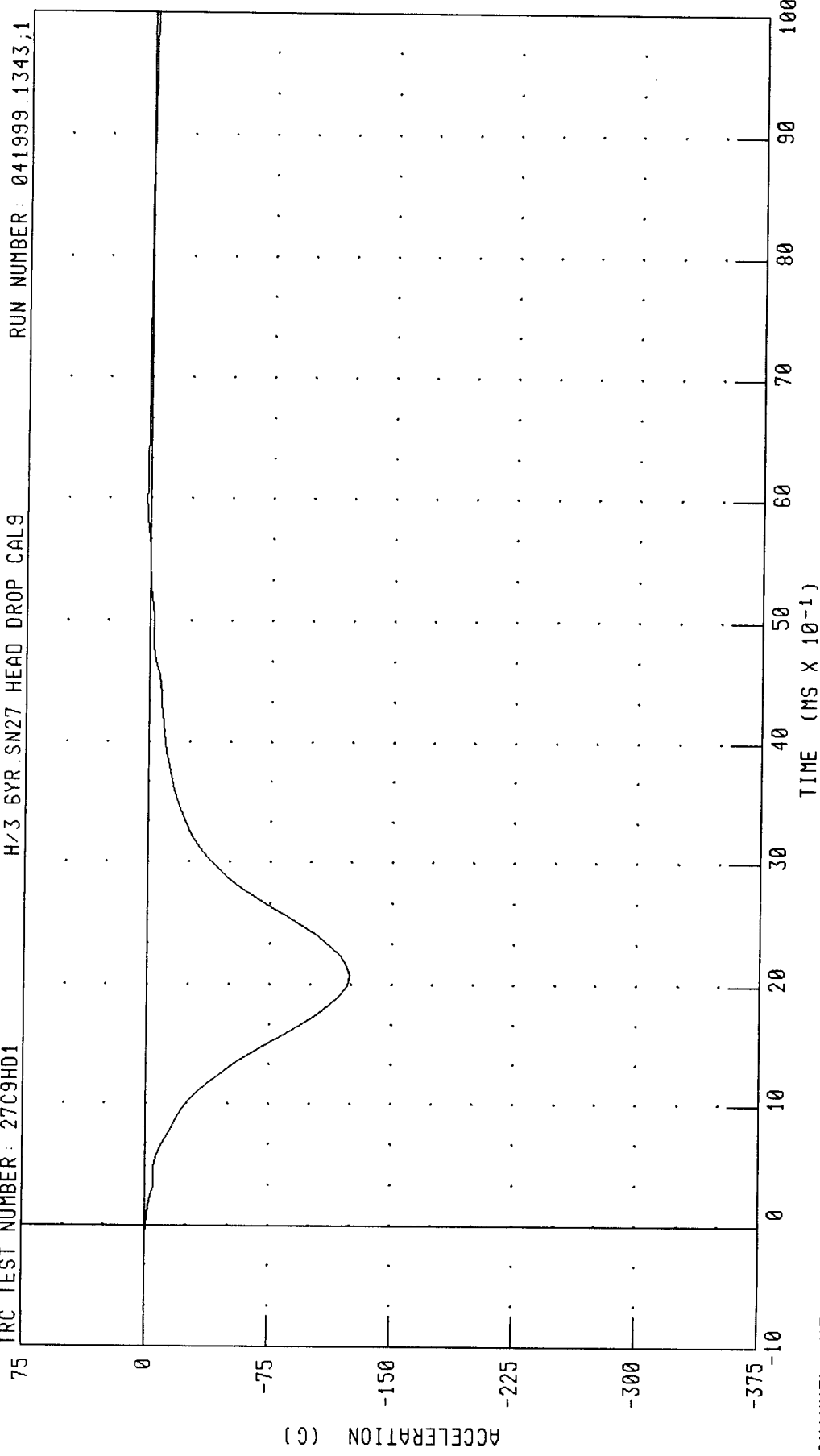
TRC TEST NUMBER: 27C9HD1 H/3 6YR.SN27 HEAD DROP CAL9 RUN NUMBER: 041999.1343,1



CHANNEL: HEDYC FILTER: CH. CLASS 1000 PEAK DATA: 1.72 G @ 3.84 MS; -3.57 G @ 2.16 MS

HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 27C9HD1 H/3 6YR SN27 HEAD DROP CAL9 RUN NUMBER: 041999.1343.1



CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: 2.52 G @ 6.00 MS; -124.14 G @ 2.08 MS

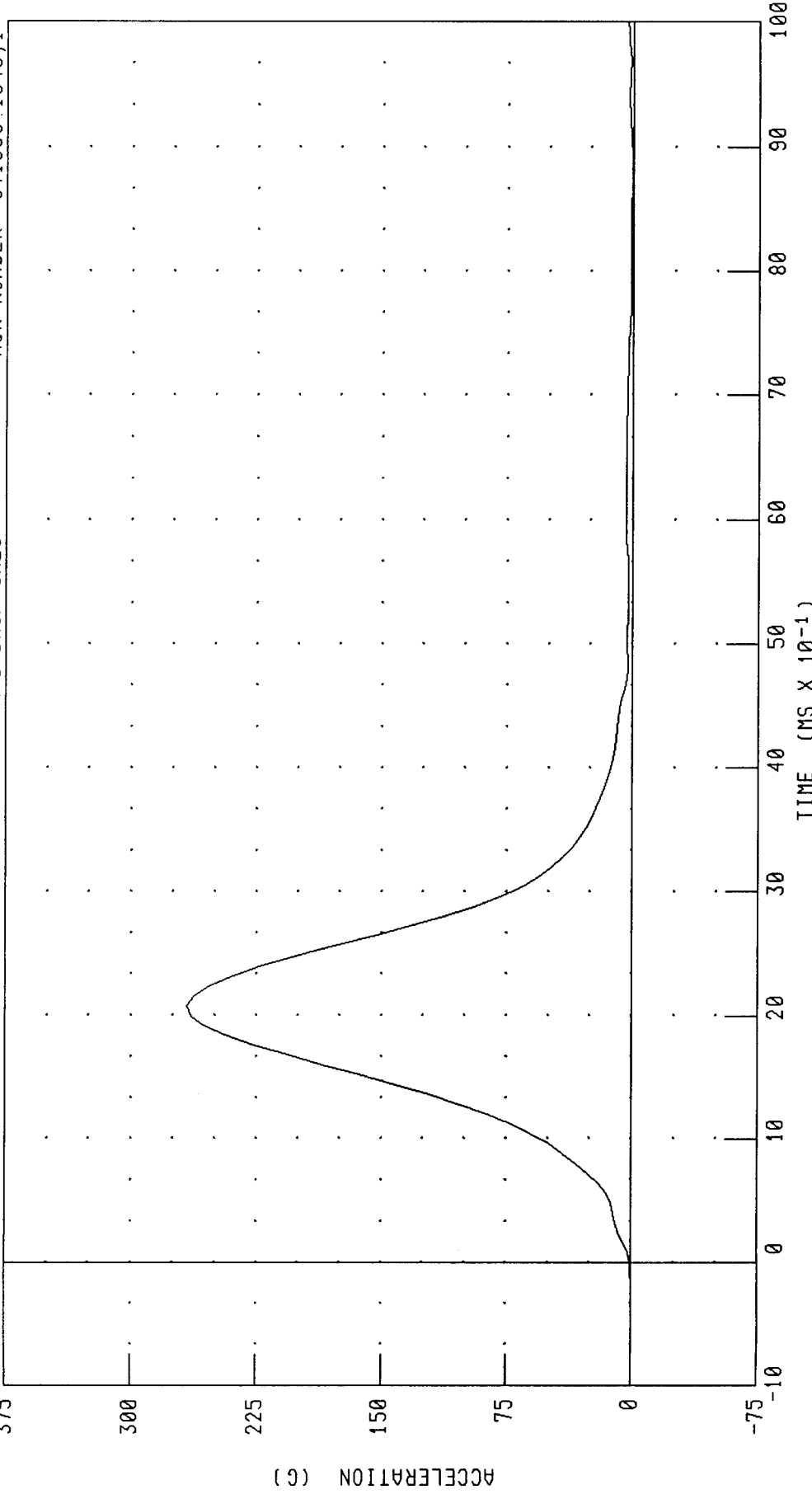
HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 27C9HD1

H/3 6YR SN27 HEAD DROP CAL9

RUN NUMBER: 041999.1343,1



CHANNEL: HEDRG FILTER: CH. CLASS 1000

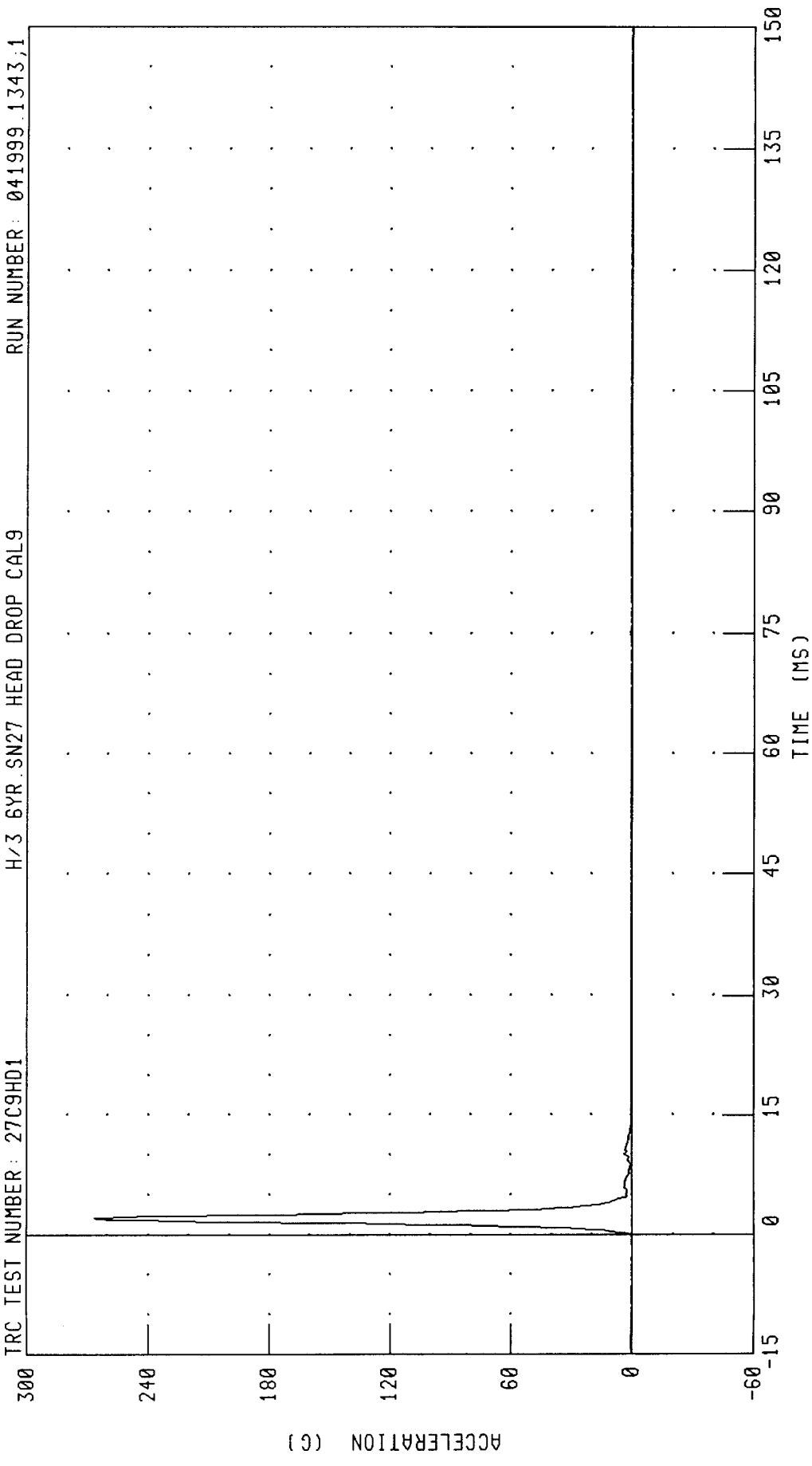
PEAK DATA: 266.35 G @ 2.08 MS; 0.07 G @ -0.96 MS

HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION
CHECK PLOT - HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 27C9HD1

H/3 6YR SN27 HEAD DROP CAL9

RUN NUMBER: 041999.1343.1



CHANNEL: HEDRC FILTER: CH. CLASS 1000

PEAK DATA: 266.35 G @ 2.08 MS; 0.07 G @ -14.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SIX YEAR OLD

19-APR-99

NECK FLEXION TEST

TRC INC. TEST NO: 27C9NF1 H/3 6YR.SN27 NECK FLEX.CAL9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	4.83 - 5.07 M/S	5.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.2 - 1.6 M/S	1.59 M/S
	20 MS 2.4 - 3.4 M/S	3.13 M/S
	30 MS 3.8 - 5.0 M/S	4.59 M/S
PEAK D-PLANE ROTATION	74 - 92 DEG.	76.94 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	27 - 33 NM	30.90 NM
POSITIVE MOMENT DECAY TIME FROM PEAK TO 5 NM	103 - 123 MS	112.08 MS

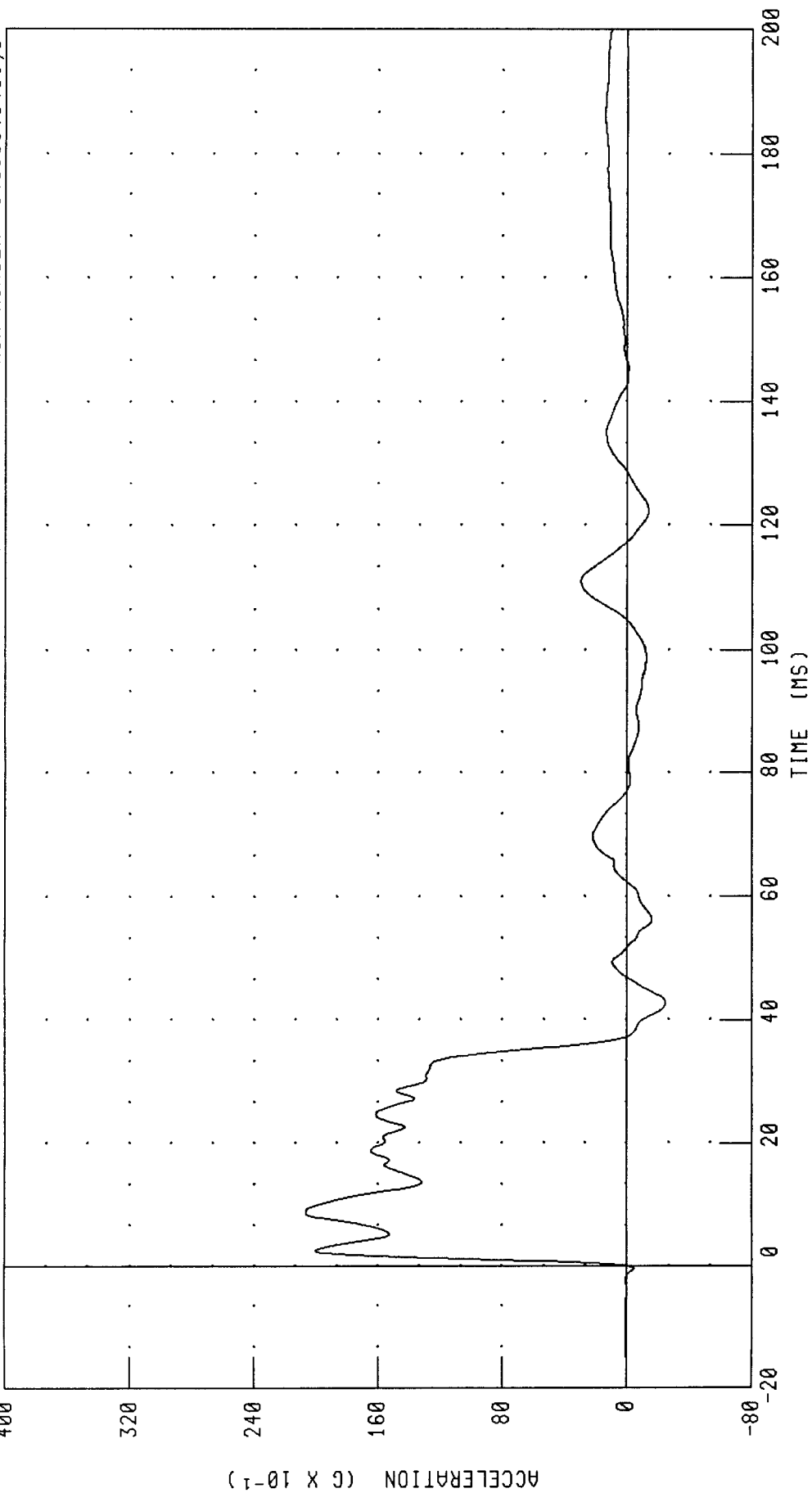
TEST MEETS SPECIFICATIONS

TECHNICIAN By Carl

RUN NUMBER: 041999.1357;1

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 27C9NF1 H/3 6YR SN27 NECK FLEX CAL9 RUN NUMBER: 041999.1401;1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 20.67 G @ 8.72 MS; -2.45 G @ 42.80 MS

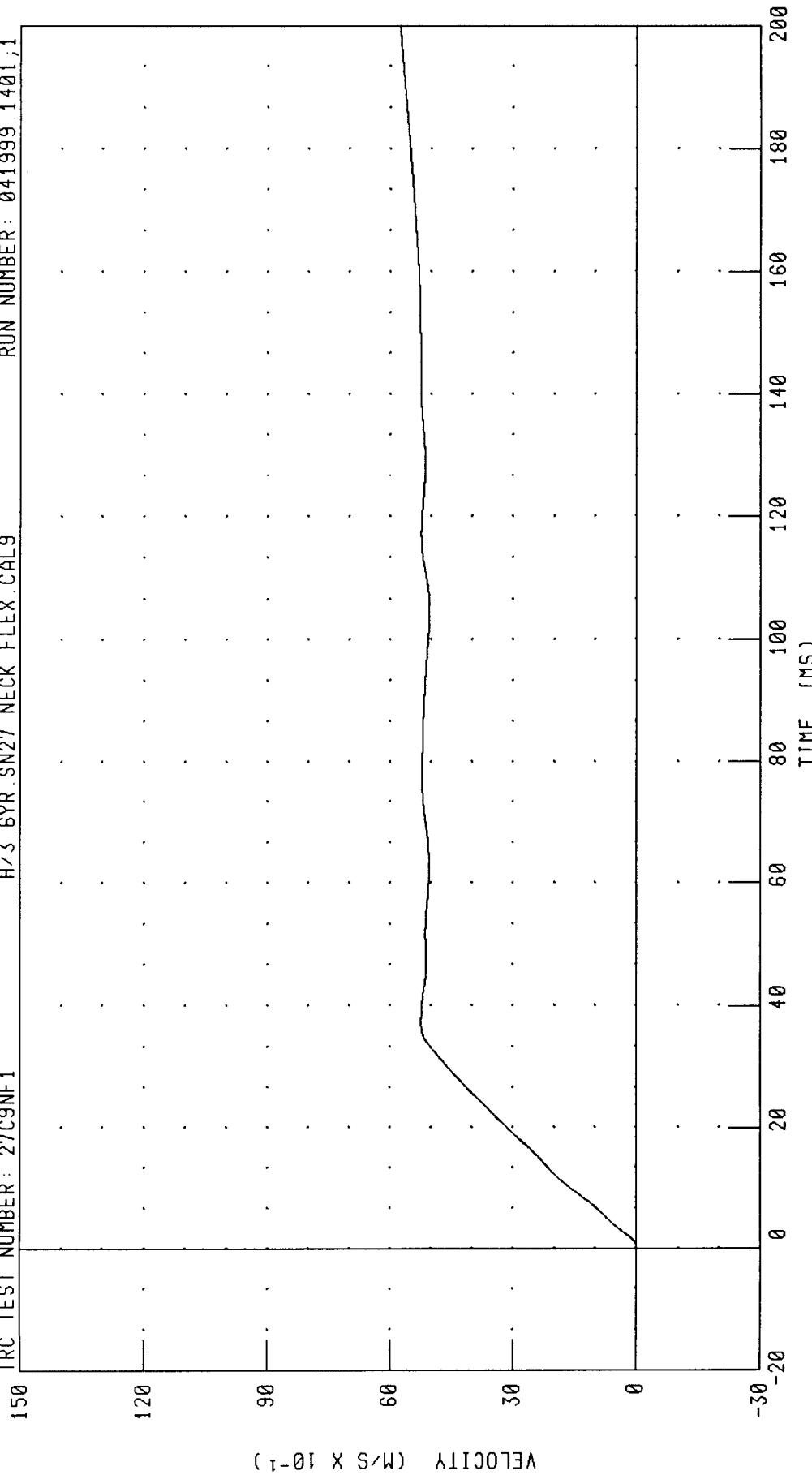
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

INTEGRATED PENDULUM VELOCITY

TRC TEST NUMBER: 27C9NF1

H/3 6YR SN27 NECK FLEX CAL9

RUN NUMBER: 041999.1401.1

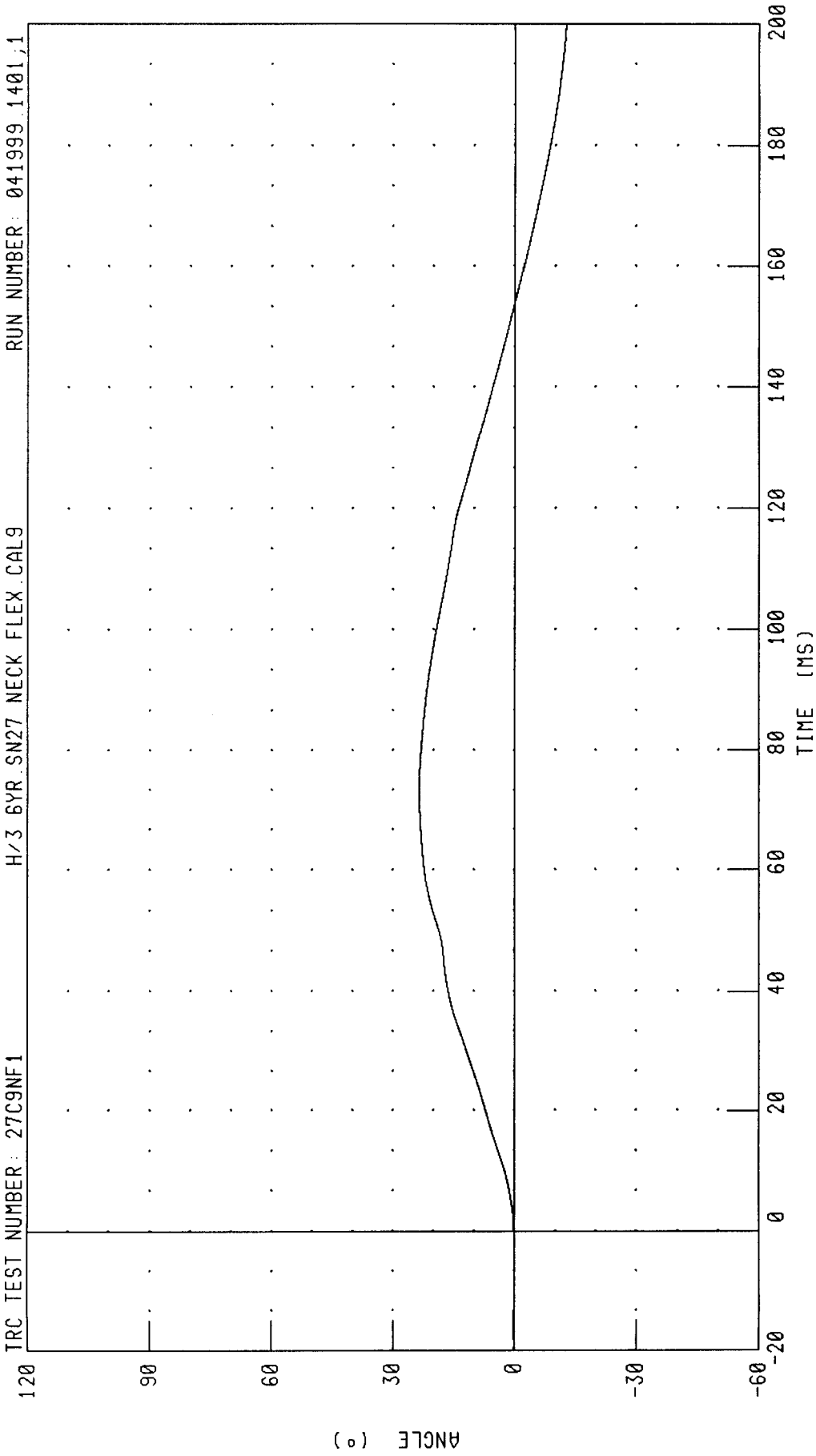


CHANNEL: PENXVI FILTER: CH. CLASS 180 PEAK DATA: 5.76 M/S @ 200.00 MS; -0.01 M/S @ -20.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 27C9NF1 H/3 BYR SN27 NECK FLEX CAL9 RUN NUMBER: 041999.1401.1

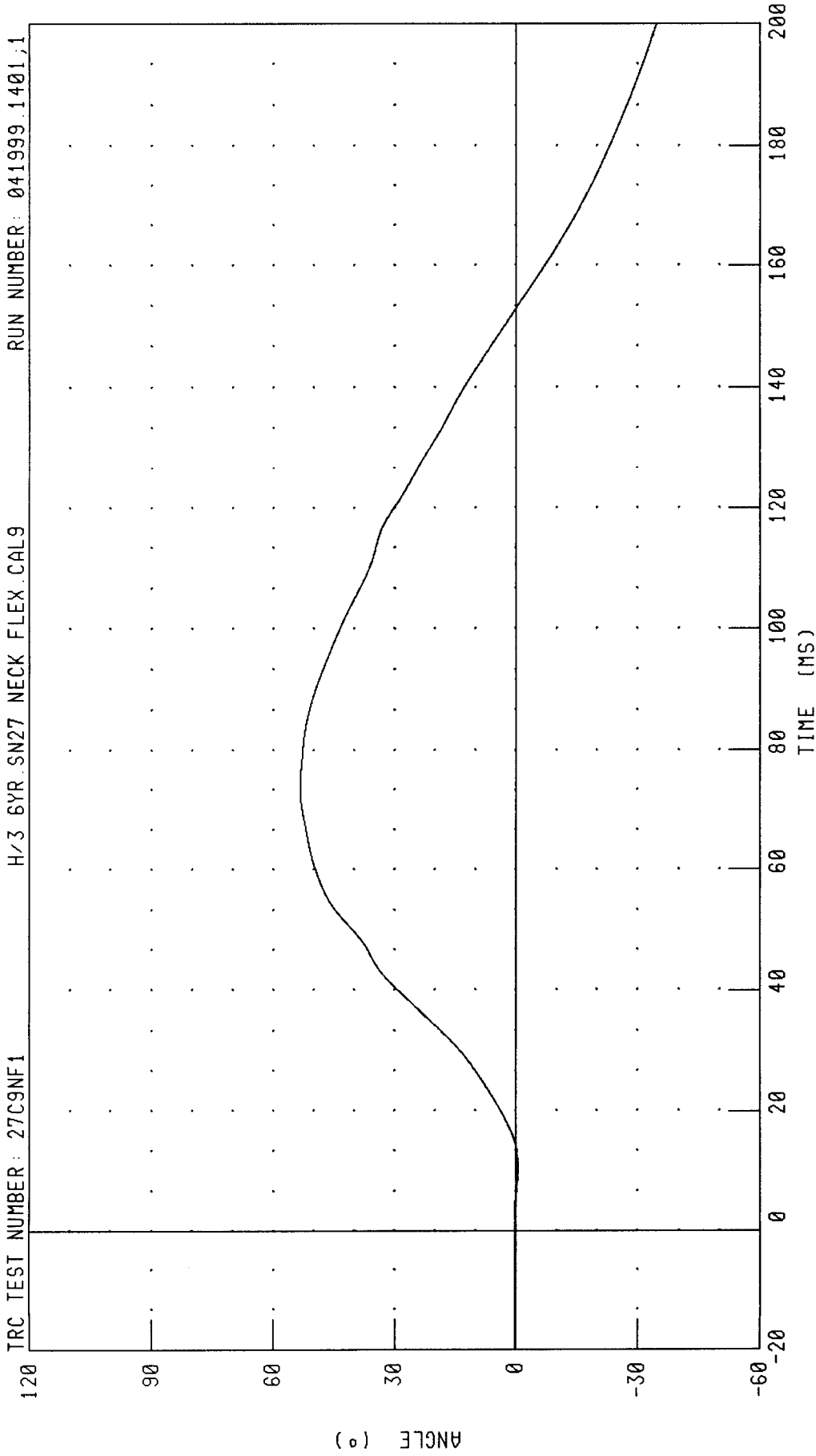


CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 23.57 ° @ 73.28 MS; -12.77 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 27C9NF1 RUN NUMBER: 041999.1401.1

H/3 6YR.SN27 NECK FLEX.CAL9

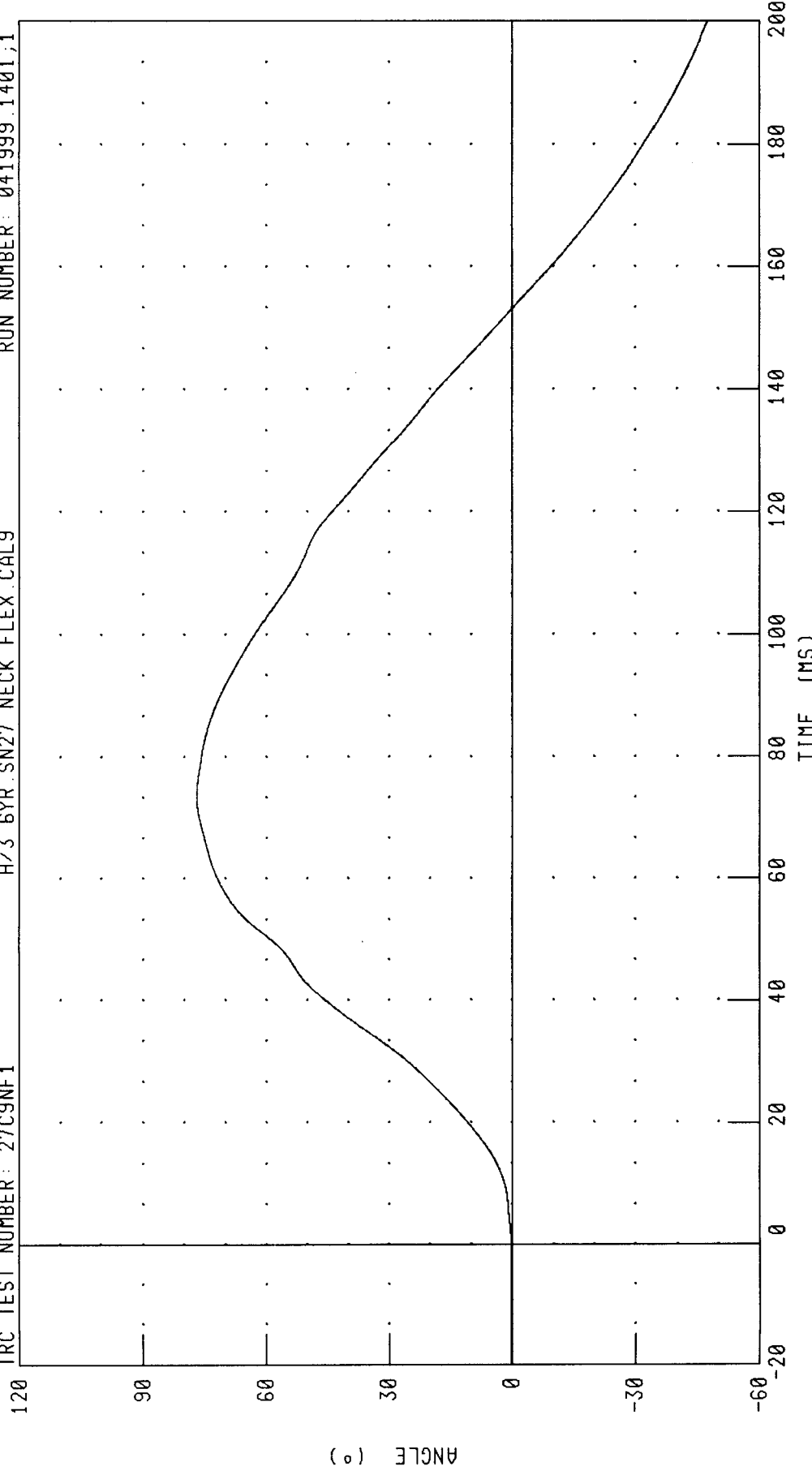


CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 53.38 ° @ 73.92 MS; -34.61 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 27C9NF1 H/3 6YR.SN27 NECK FLEX.CAL9 RUN NUMBER: 041999.1401.1

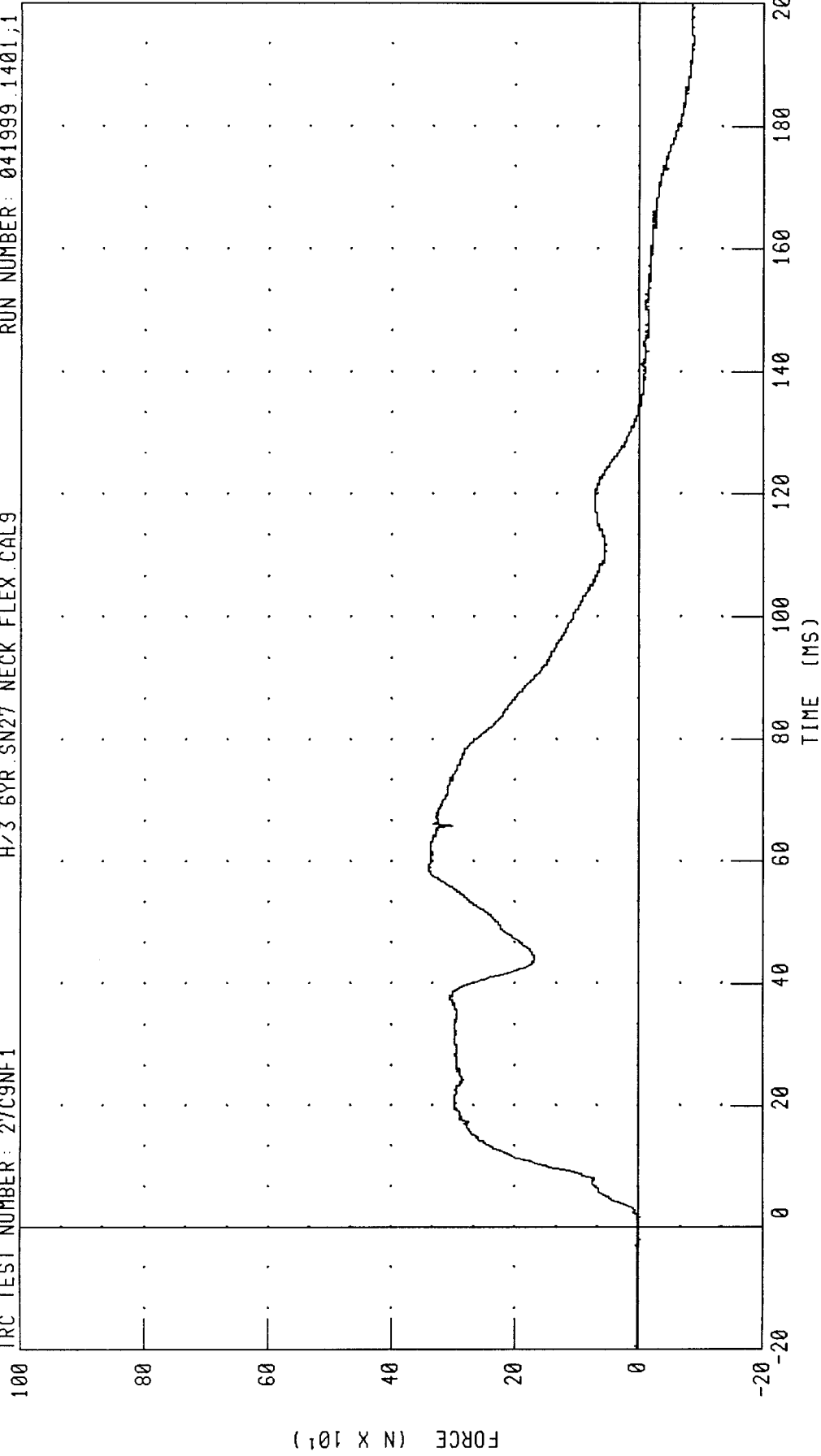


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 76.94 ° @ 73.76 MS, -47.38 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER : 27C9NF1 H/3 6YR SN27 NECK FLEX CAL9 RUN NUMBER : 041999.1401.1



CHANNEL : NEKXF FILTER : CH. CLASS 1000 PEAK DATA : 340.66 N @ 58.40 MS; -89.18 N @ 192.48 MS

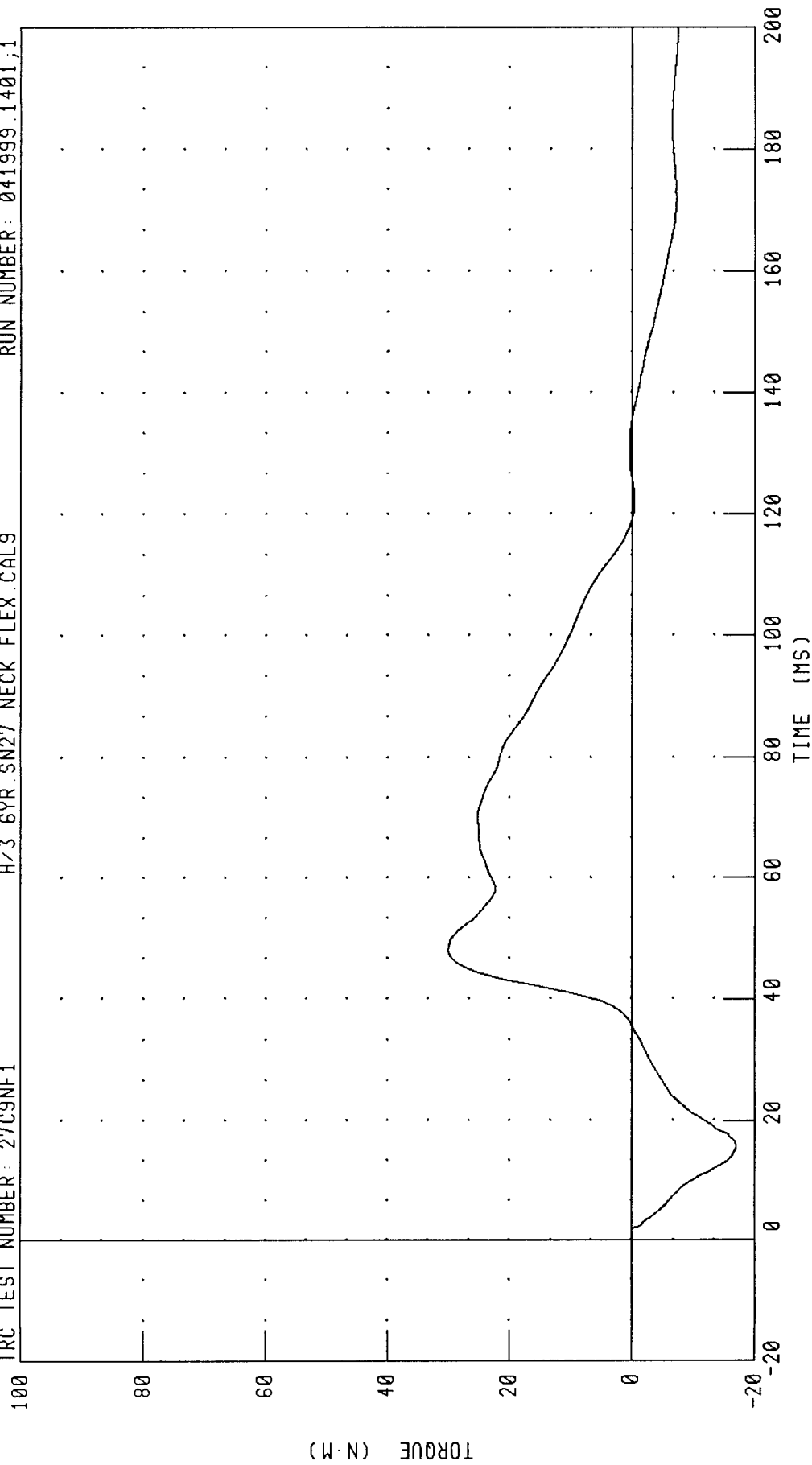
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 27C9NF1

H/3 6YR SN27 NECK FLEX CAL9

RUN NUMBER: 041999.1401.1



CHANNEL: NEKYM FILTER: CH. CLASS 600

PEAK DATA: 30.04 N·M @ 48.00 MS, -16.95 N·M @ 15.60 MS

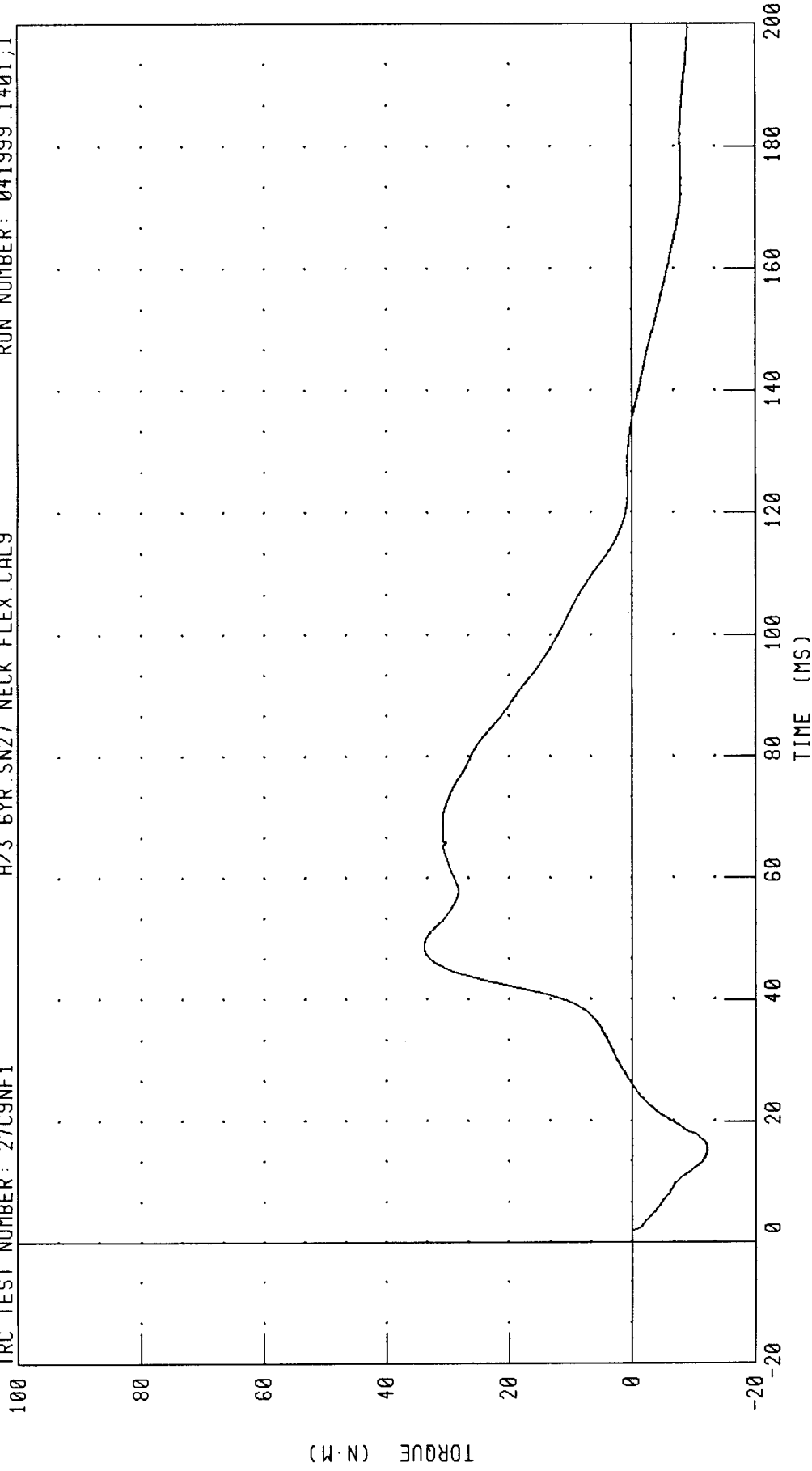
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 27C9NF1

H/3 6YR.SN27 NECK FLEX.CAL9

RUN NUMBER: 041999.1401.1



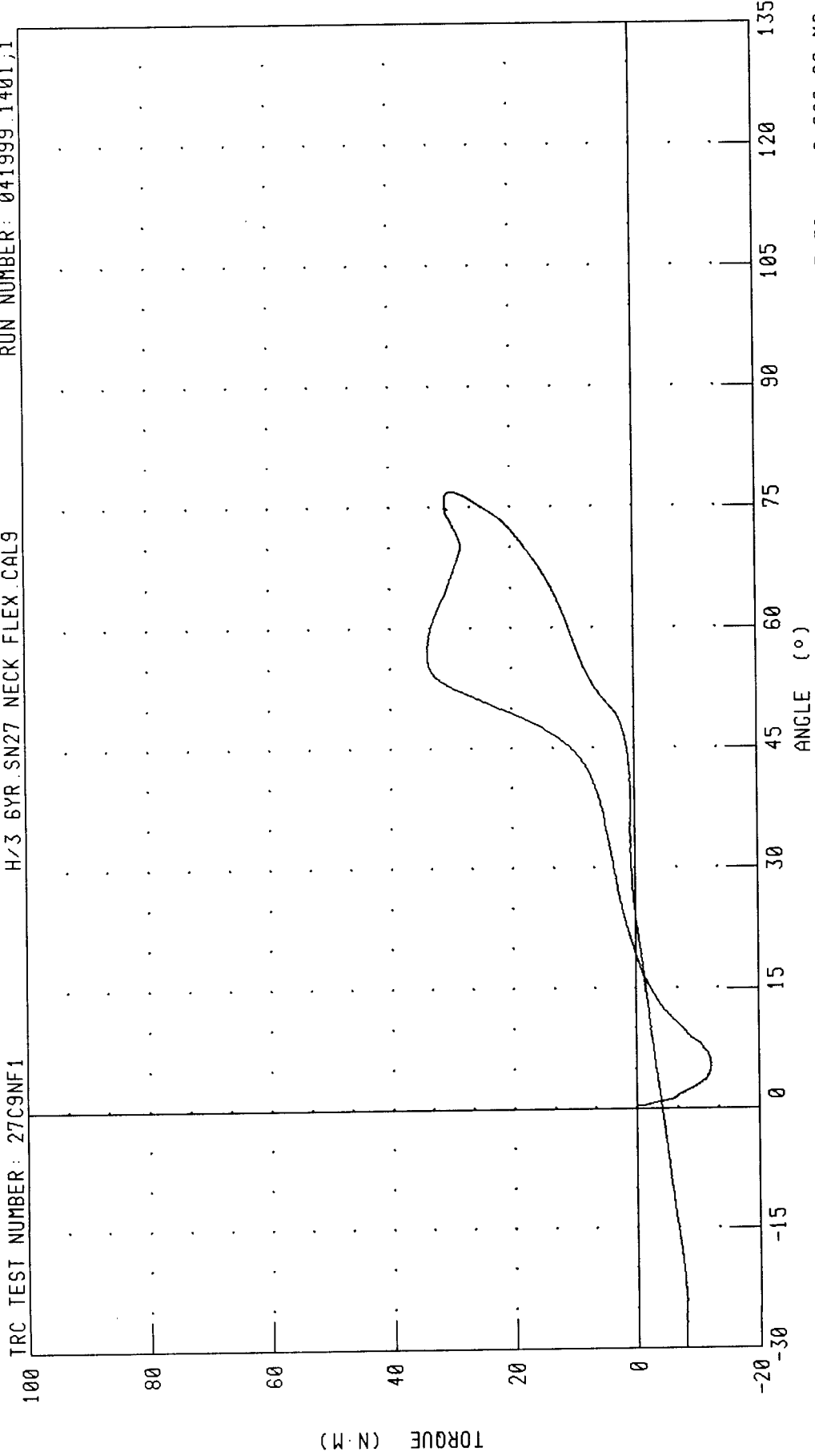
CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 33.87 N.M @ 48.64 MS, -12.15 N.M @ 15.20 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT

TRC TEST NUMBER: 27C9NF1

RUN NUMBER: 041999.1401.1



CHANNEL: TOTAN
NEKOM
FILTER: CH. CLASS 60
CH. CLASS 600
PEAK DATA: 76.94 ° @ 73.76 MS; -47.38 ° @ 200.00 MS
33.87 N.M @ 48.64 MS; -12.15 N.M @ 15.20 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SIX YEAR OLD

19-APR-99

NECK EXTENSION TEST

TRC INC. TEST NO: 27C9NE1 H/3 6YR.SN027 NECK EXT.CAL09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	4.18 - 4.42 M/S	4.30 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.0 - 1.4 M/S	1.23 M/S
	20 MS 2.2 - 3.0 M/S	2.42 M/S
	30 MS 3.2 - 4.2 M/S	3.52 M/S
PEAK D-PLANE ROTATION	94 - 106 DEG.	96.45 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	-19 / -24 NM	-20.05 NM
NEGATIVE MOMENT DECAY TIME FROM PEAK TO -5 NM	127 - 147 MS	135.12 MS

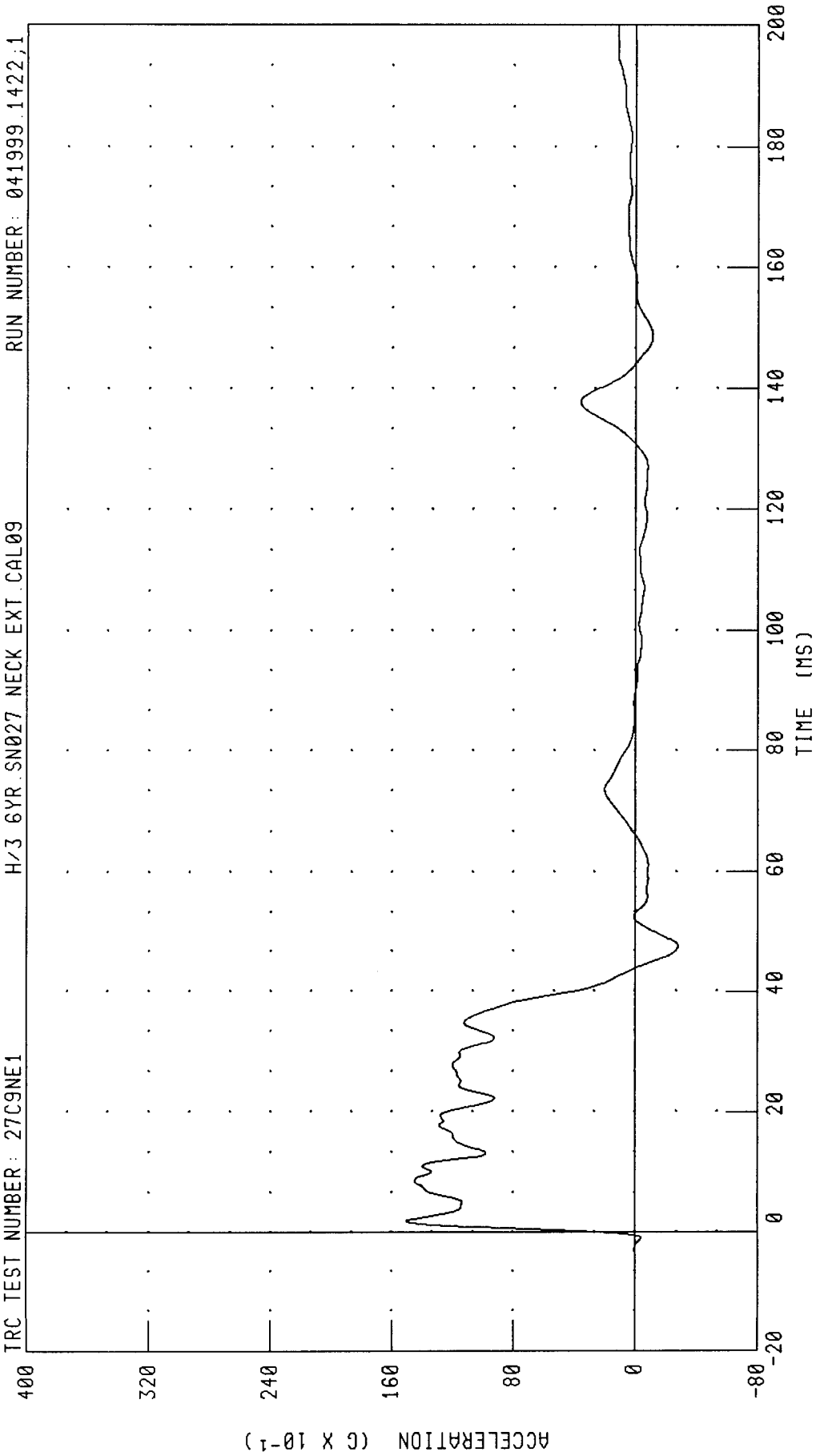
TEST MEETS SPECIFICATIONS

TECHNICIAN *g. calt*

RUN NUMBER: 041999.1422;1

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 27C9NE1 H/3 6YR SN027 NECK EXT. CAL09 RUN NUMBER: 041999.1422;1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 15.04 G @ 1.76 MS; -2.77 G @ 47.60 MS

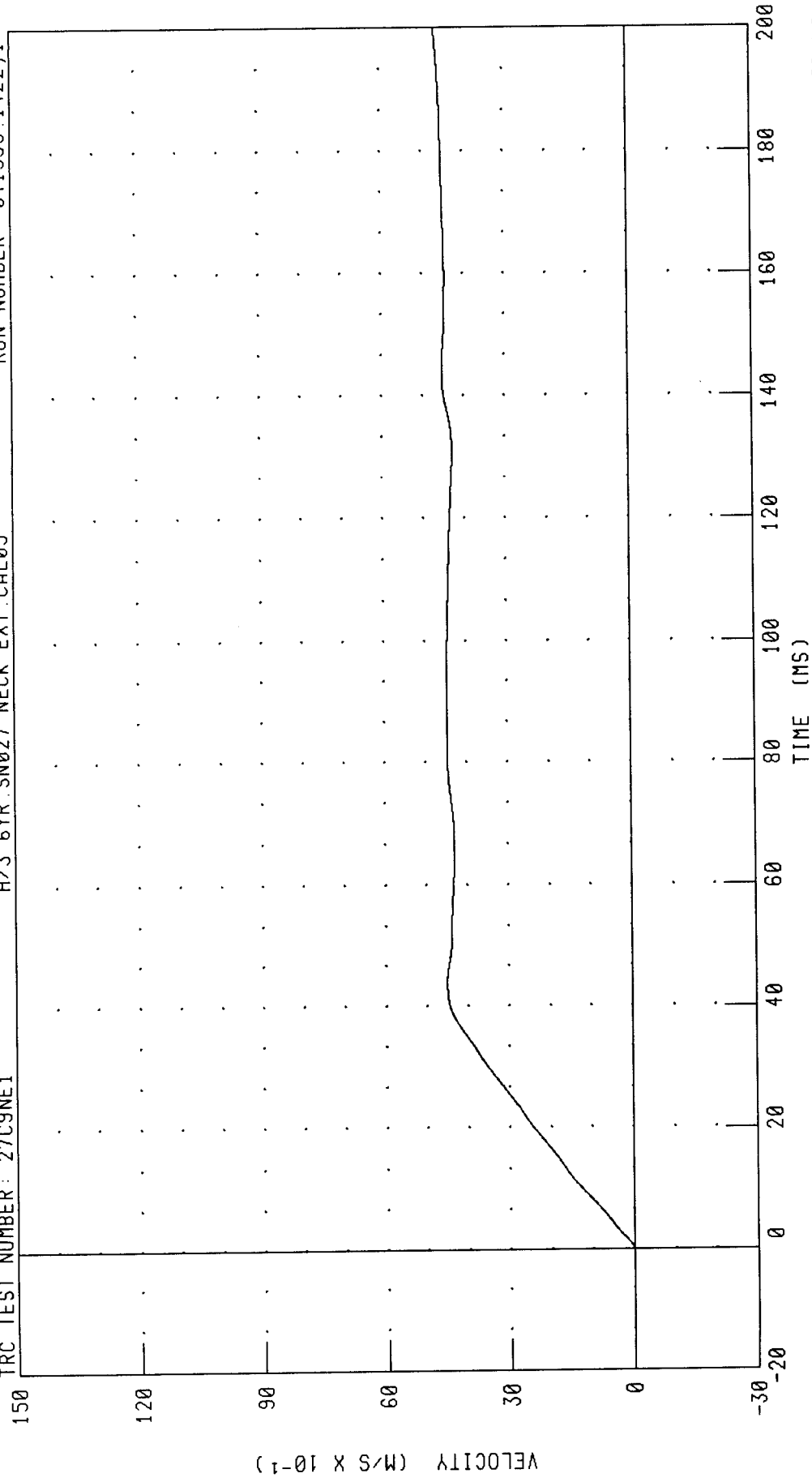
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

INTEGRATED PENDULUM VELOCITY

TRC TEST NUMBER: 27C9NE1

H/3 6YR SN027 NECK EXT. CAL09

RUN NUMBER: 041999.1422,1



CHANNEL: PENXVI FILTER: CH. CLASS 180

PEAK DATA: 4.67 M/S @ 200.00 MS; 0.00 M/S @ -0.56 MS

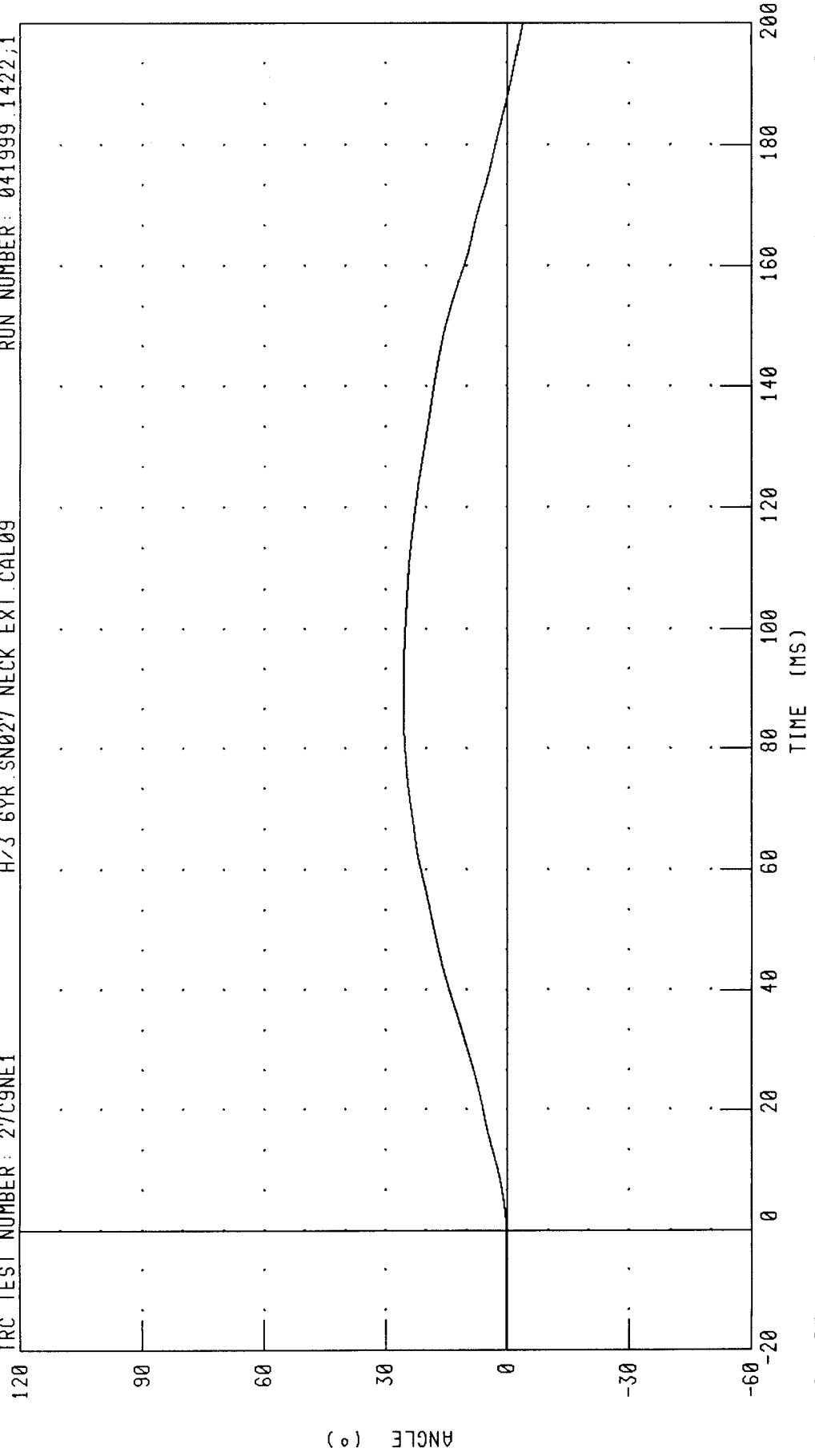
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 27C9NE1

H/3 6YR SN027 NECK EXT. CAL09

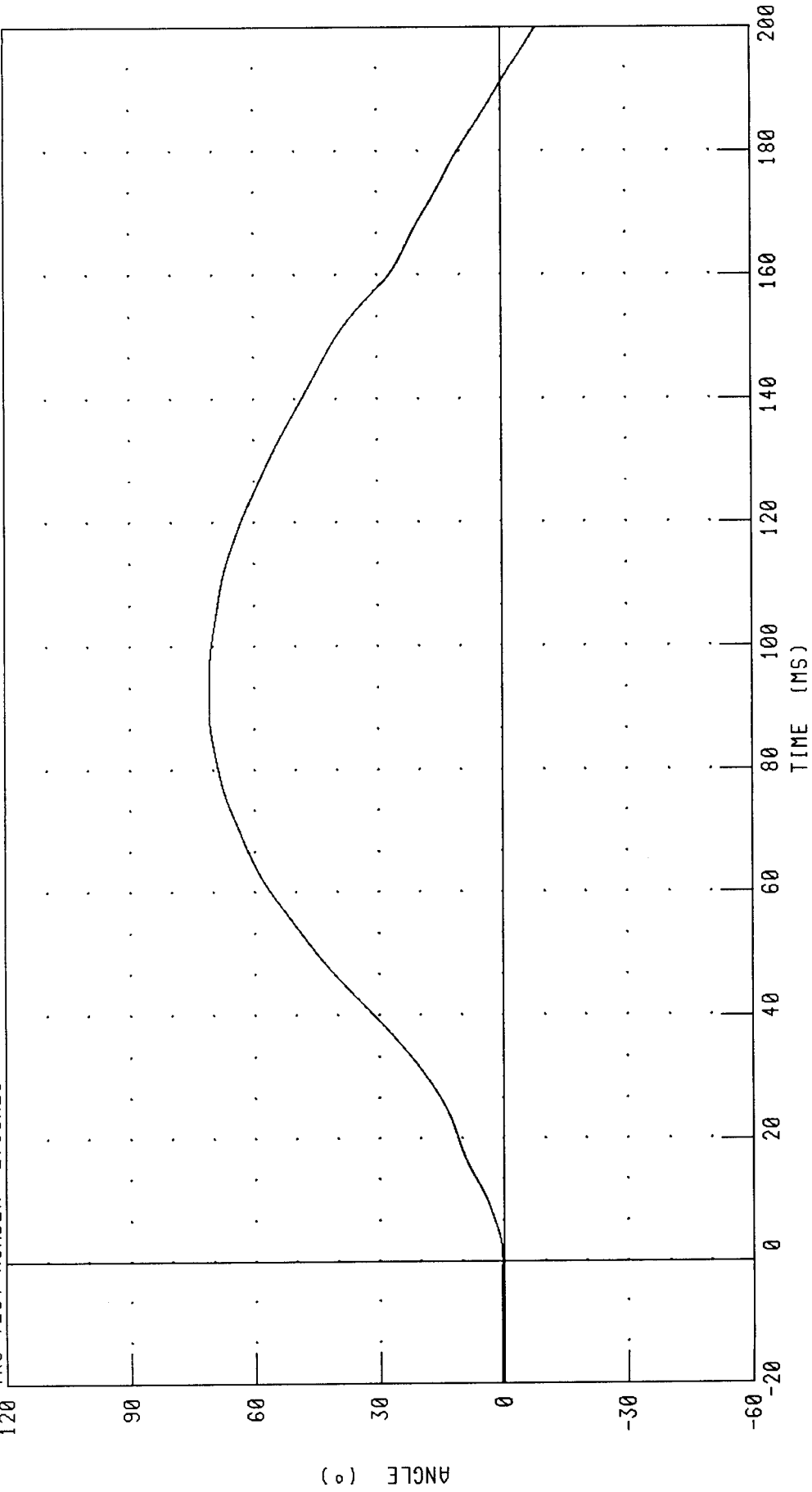
RUN NUMBER: 041999.1422;1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 25.57 ° @ 87.52 MS; -3.84 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 27C9NE1 H/3 6YR SN027 NECK EXT CAL09 RUN NUMBER: 041999.1422;1



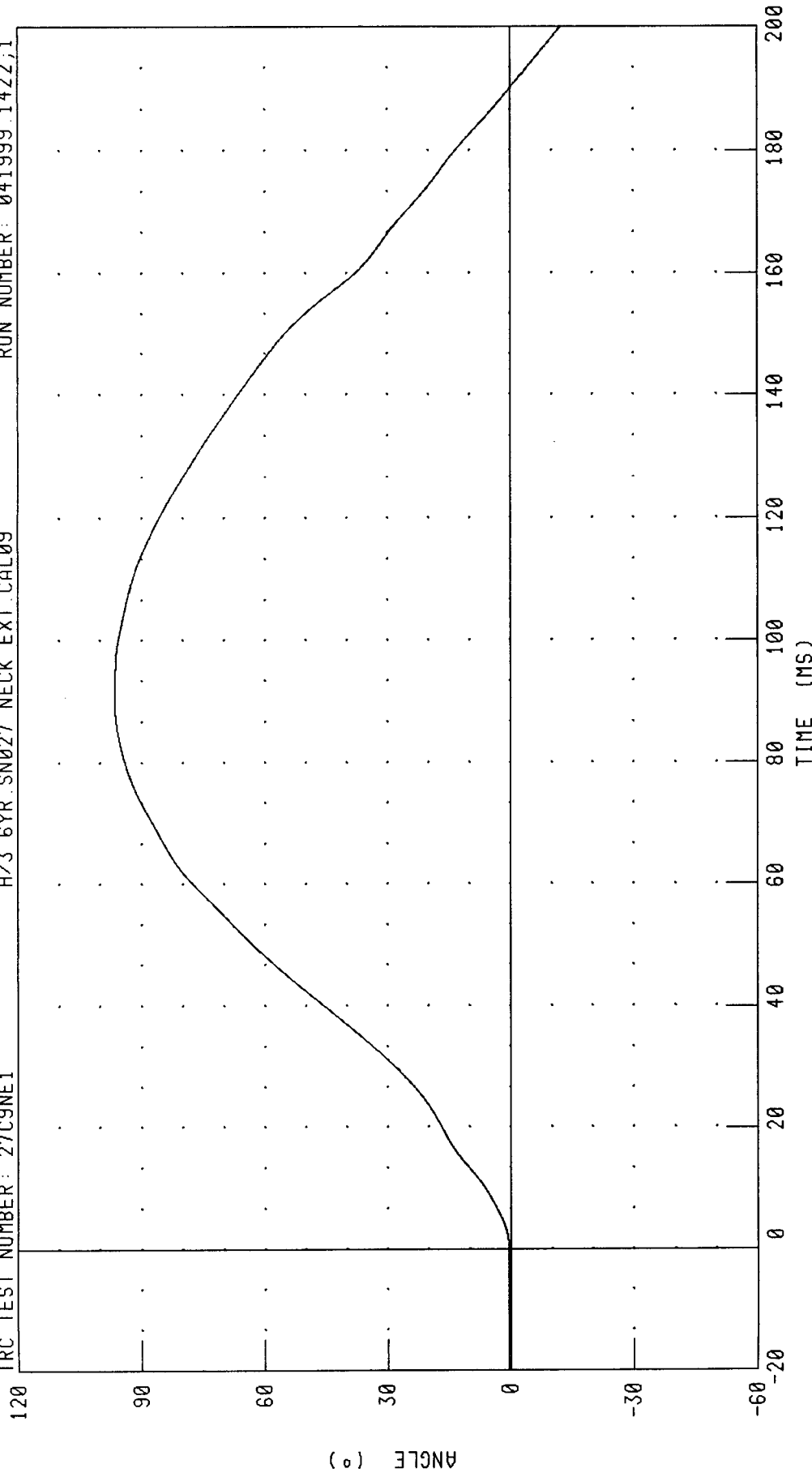
CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 70.91 ° @ 91.20 MS; -8.54 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

TRC TEST NUMBER: 27C9NE1 H/3 6YR SN027 NECK EXT CAL09 RUN NUMBER: 041999.1422,1

TOTAL ROTATION

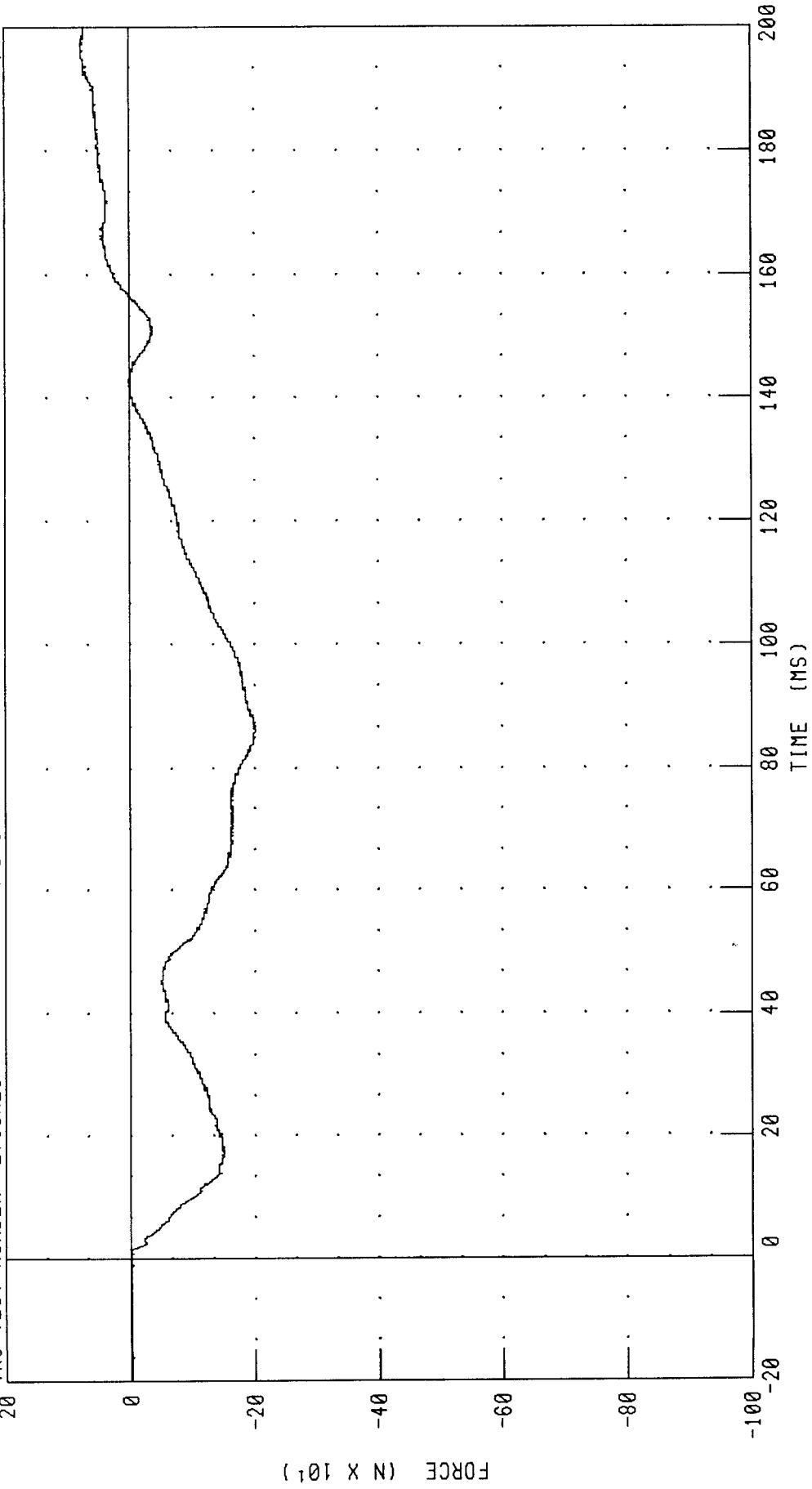


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 96.46 ° @ 90.64 MS, -12.38 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 27C9NE1 H/3 6YR SN027 NECK EXT CAL09 RUN NUMBER: 041999.1422;1

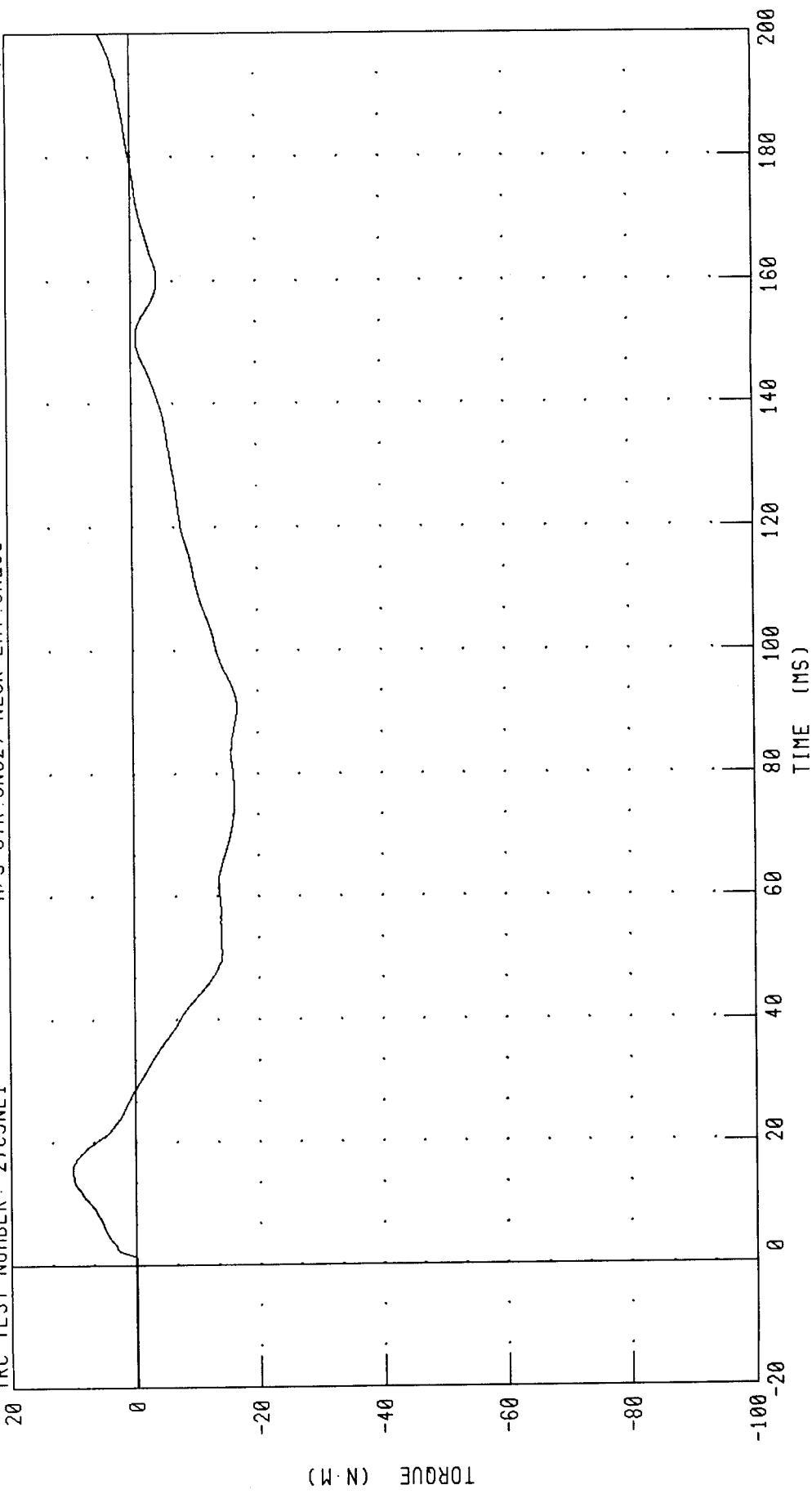


CHANNEL: NEKXF FILTER: CH CLASS 1000 PEAK DATA: 76.82 N @ 194.96 MS; -200.73 N @ 85.12 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 27C9NE1 H/3 6YR SN027 NECK EXT CAL09 RUN NUMBER: 041999.1422,1



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 10.01 N·M @ 16.00 MS; -16.69 N·M @ 90.24 MS

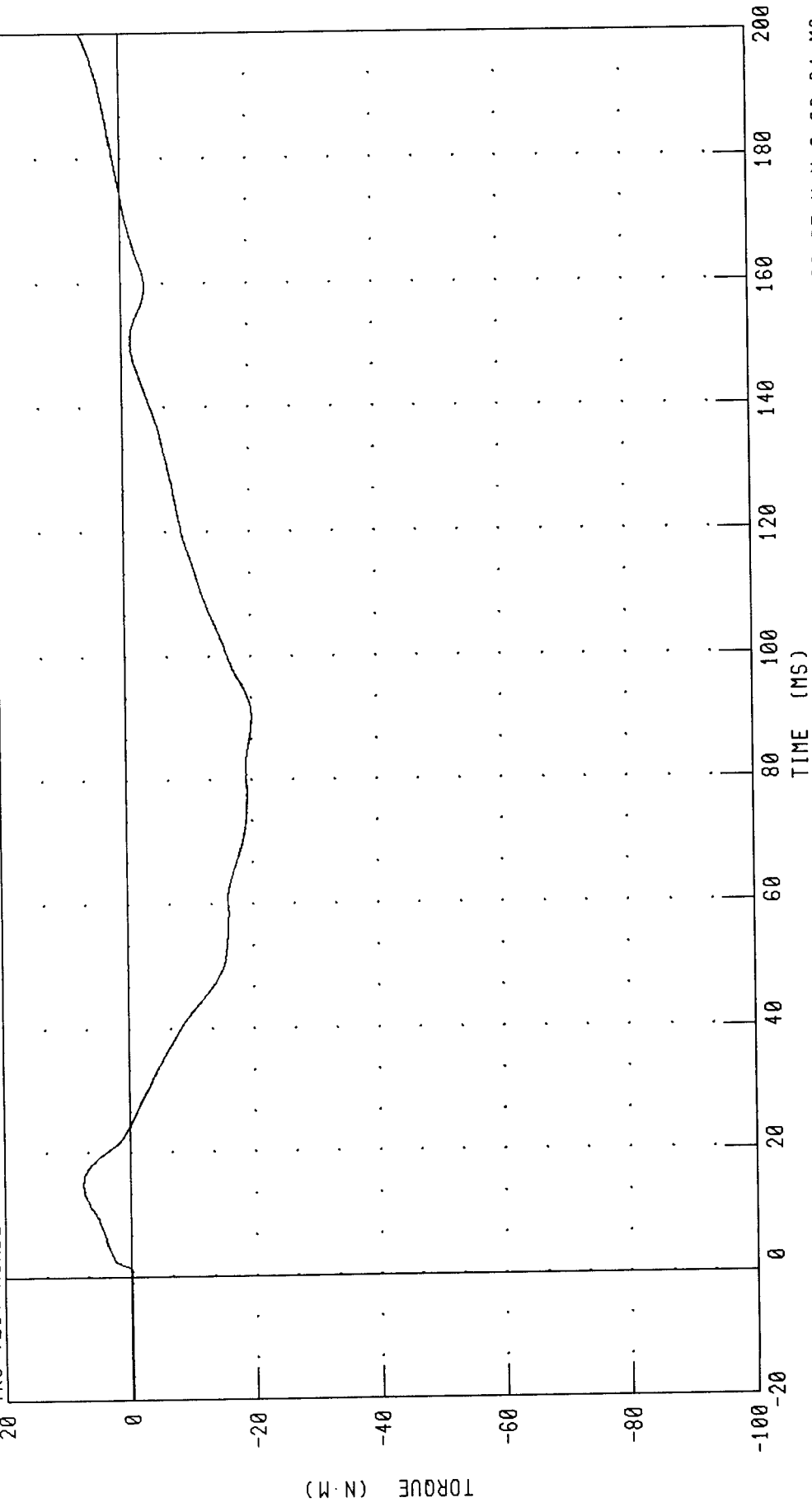
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 27C9NE1

H/3 6YR SN027 NECK EXT CAL09

RUN NUMBER: 041999.1422,1



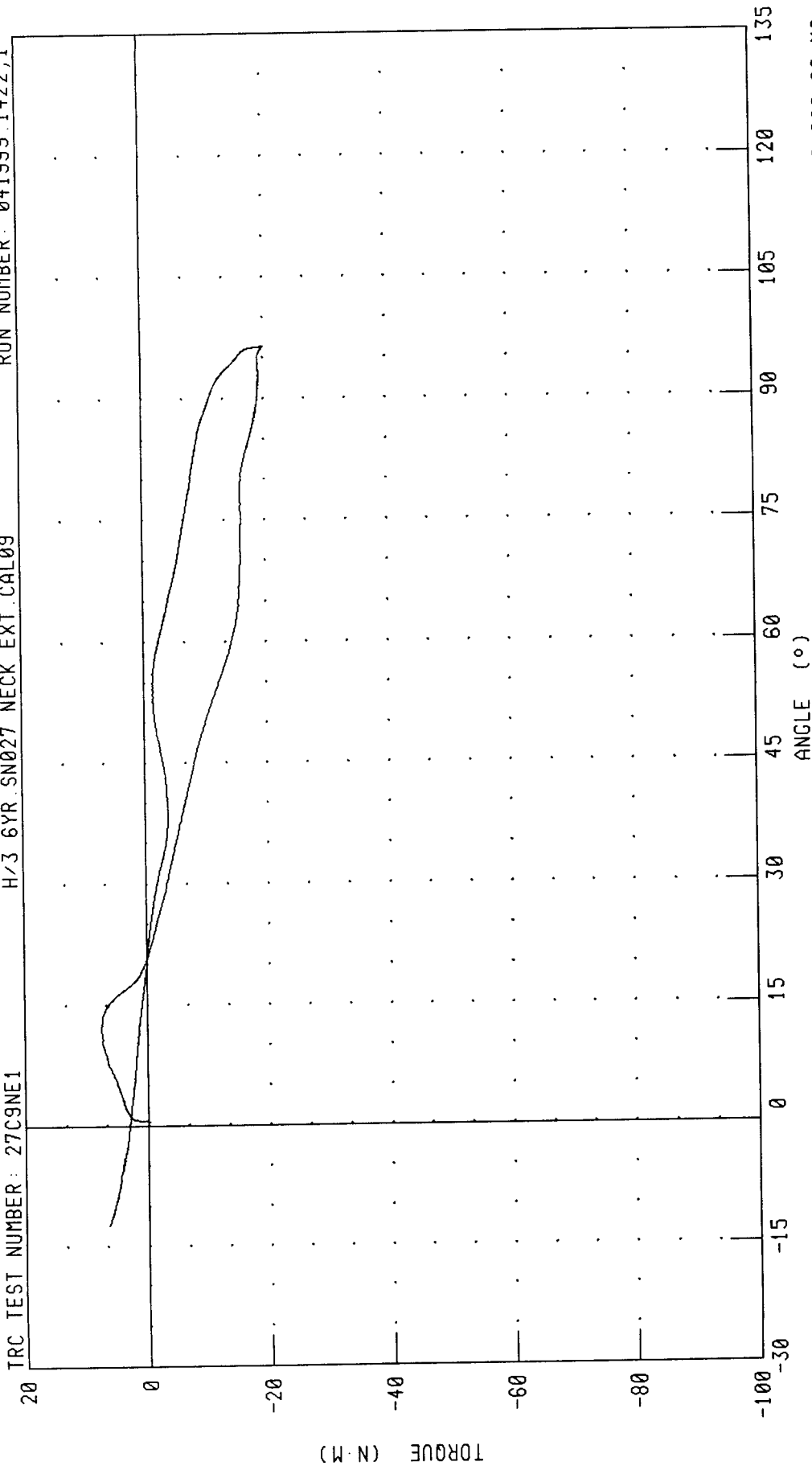
CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 7.48 N·M @ 14.96 MS; -20.05 N·M @ 90.24 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT

TRC TEST NUMBER: 27C9NE1

H/3 6YR SN027 NECK EXT CAL09

RUN NUMBER: 041999.1422;1



CHANNEL: TOTAN
NEKOM

FILTER: CH: CLASS 60
CH: CLASS 600

ANGLE (°)

PEAK DATA: 96.46 ° @ 90.64 MS; -12.38 ° @ 200.00 MS
7.48 N·M @ 14.96 MS; -20.05 N·M @ 90.24 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SIX YEAR OLD

16-APR-99

TRC INC.

TEST NO: 27C9TH1

H/3 6YR. SN027 H.S.THORAX CAL9

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.72 M/S
MAXIMUM DEFLECTION	38 - 44 MM	34.3 MM *
MAXIMUM RESISTIVE FORCE	1150 - 1300 N	1503. N *
INTERNAL HYSTERESIS	69% - 85%	80.8%

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN By Calt

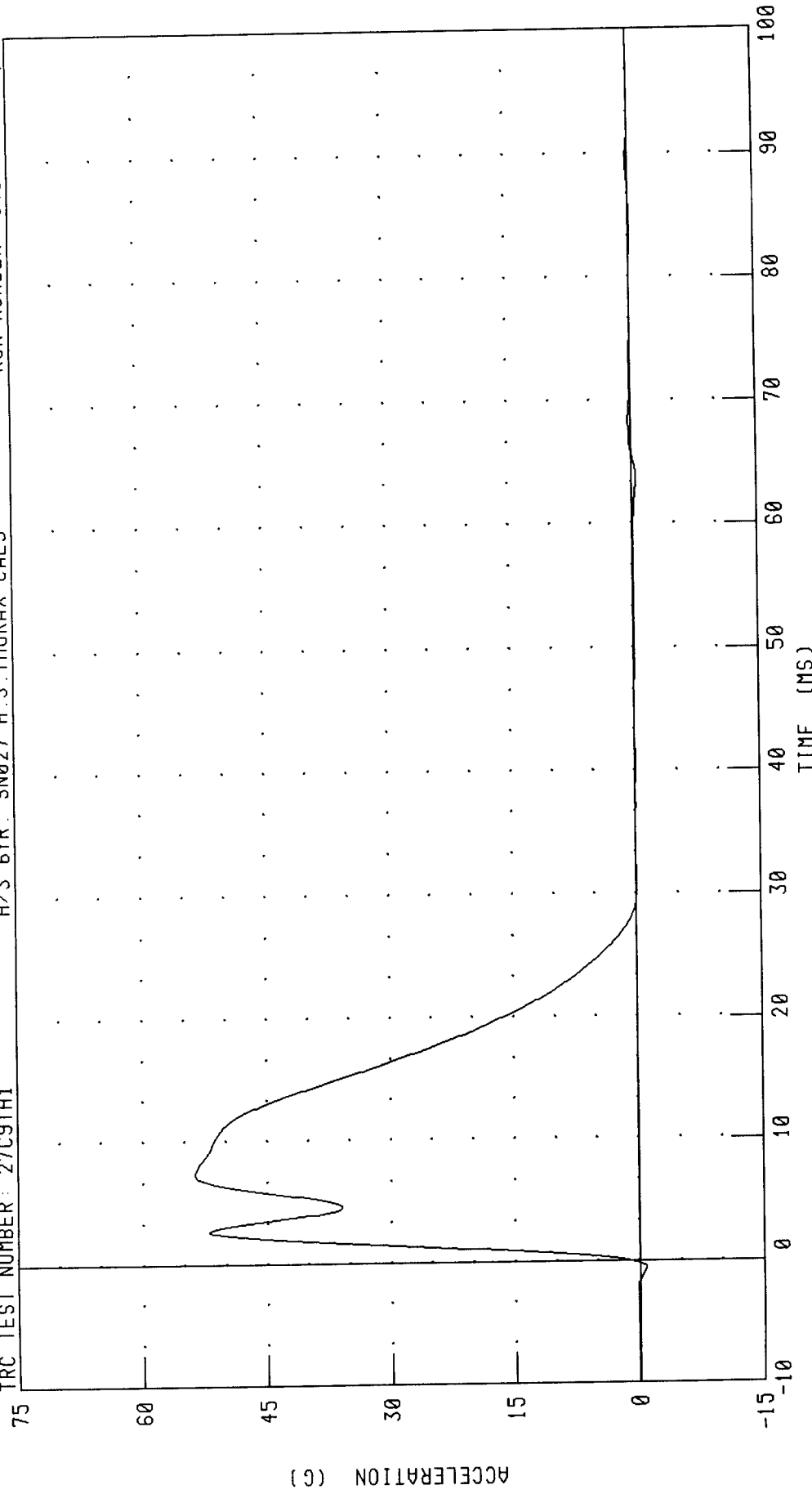
RUN NUMBER: 041699.1318;1

HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 27C9TH1

H/3 6YR. SN027 H.S.THORAX CAL9

RUN NUMBER: 041999.1352;2

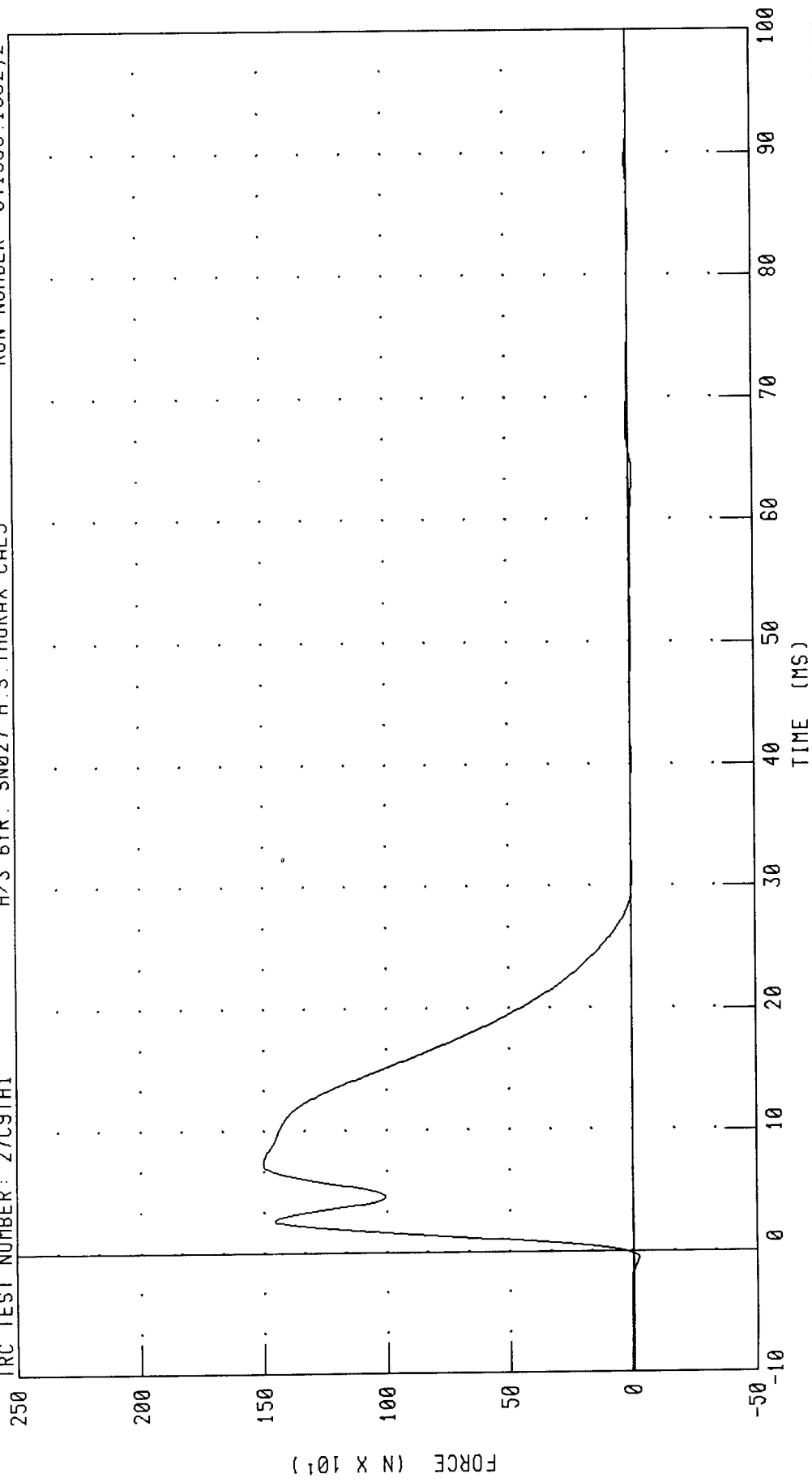


CHANNEL: PENXC FILTER: CH. CLASS 180

PEAK DATA: 53.66 G @ 7.36 MS; -0.78 G @ -0.64 MS

HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 27C9TH1 H/3 6YR SN027 H.S. THORAX CAL9 RUN NUMBER: 041999.1352;2



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 1503.89 N @ 7.36 MS; -21.91 N @ -0.64 MS

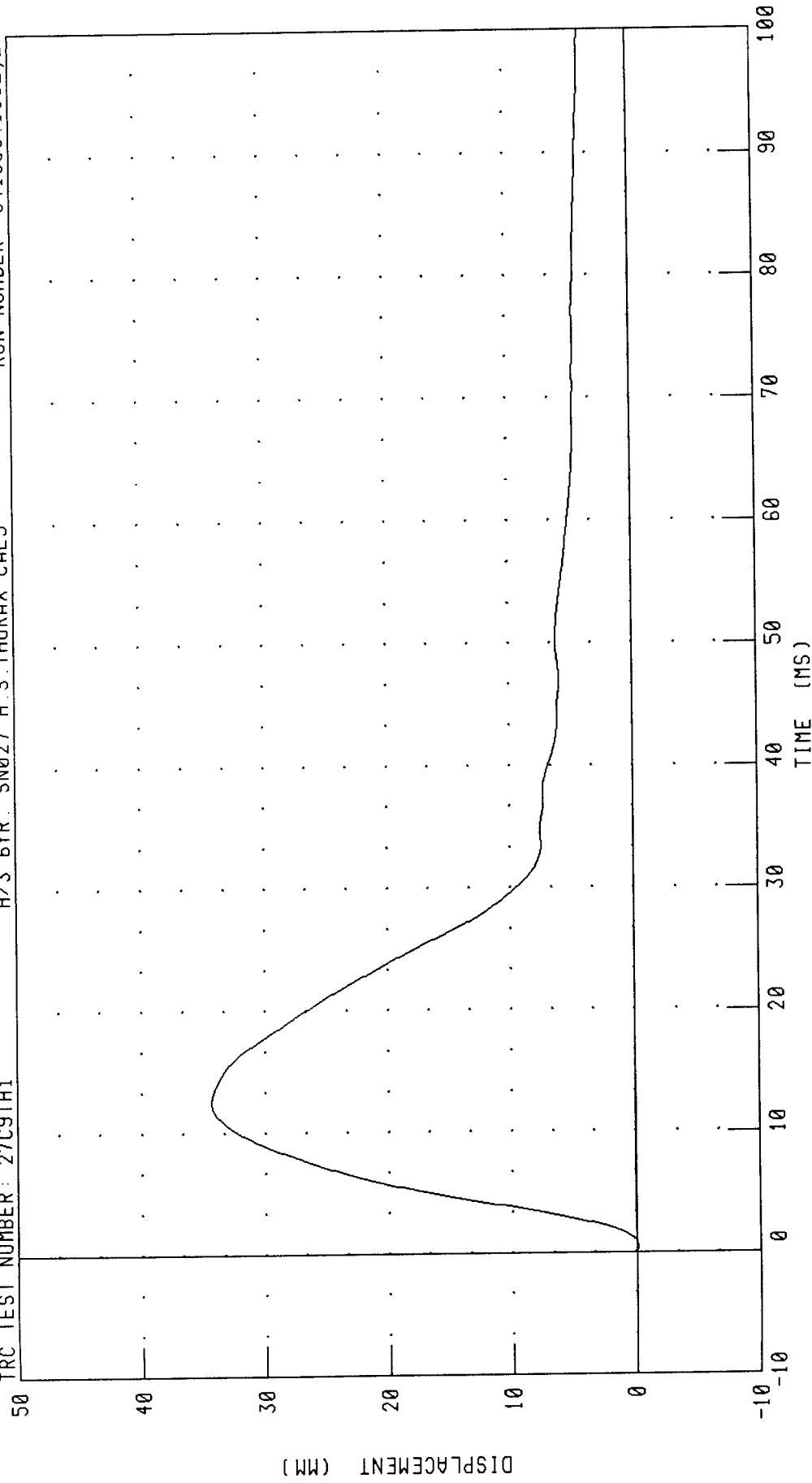
HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 27C9TH1

H/3 6YR SN027 H.S. THORAX CAL9

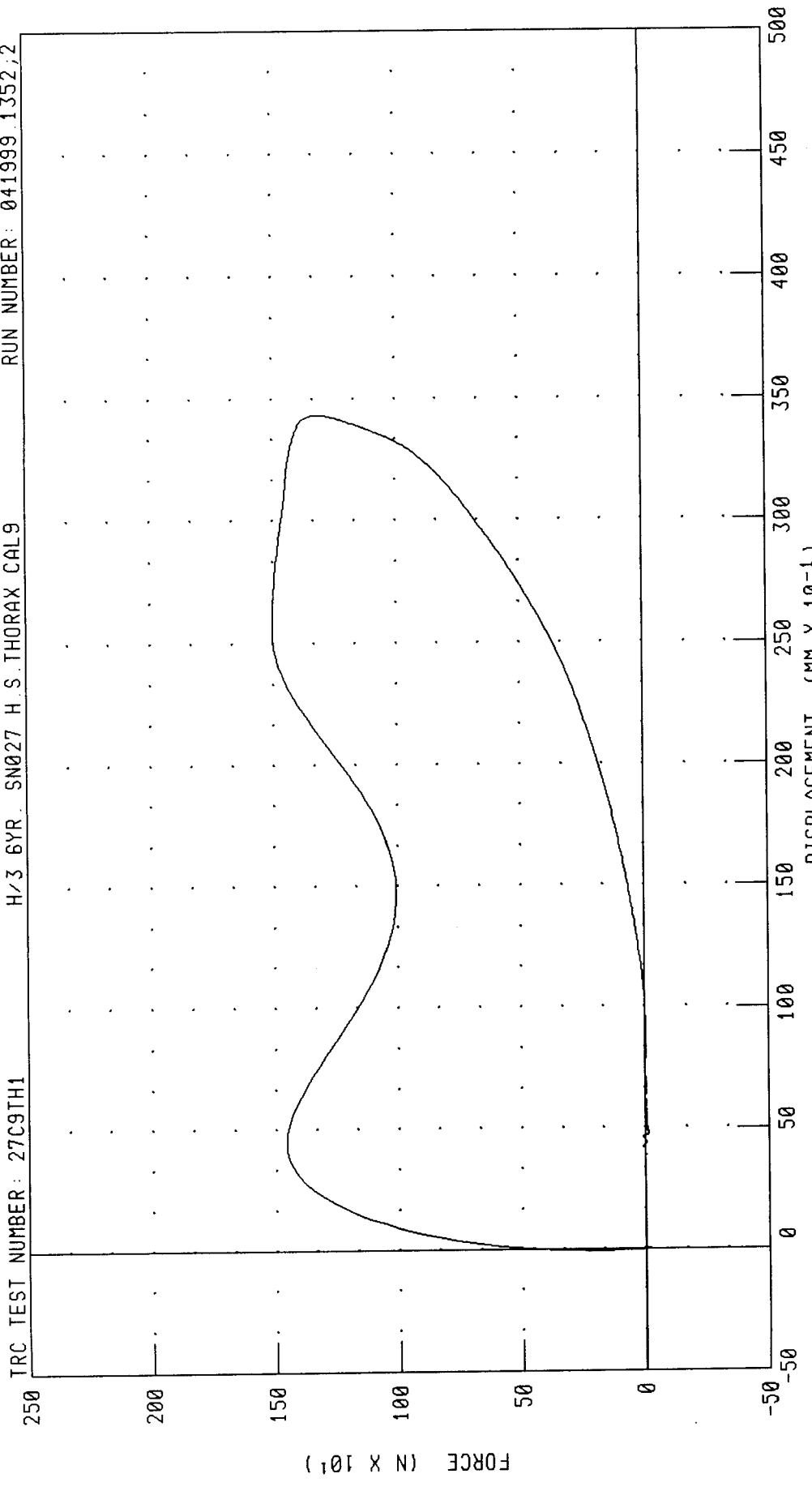
RUN NUMBER: 041999.1352;2



CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 34.34 MM @ 12.56 MS; -0.08 MM @ 0.48 MS

HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION
 CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 27C9TH1
 H/3 6YR. SN027 H.S. THORAX CAL9
 RUN NUMBER: 041999.1352;2



CHANNEL: CSTXD
 FILTER: CH: CLASS 180
 PENXF CH: CLASS 180
 DISPLACEMENT (MM X 10⁻¹)
 PEAK DATA: 34.34 MM @ 12.56 MS; -0.08 MM @ 0.48 MS
 1503.89 N @ 7.36 MS; -21.91 N @ -0.64 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SIX YEAR OLD

19-APR-99

TRC INC.

TEST NO: 27C9RK1

H/3 6YR.SN27 RIGHT KNEE CAL9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 0.82 KG PENDULUM	1800 - 2800 N	2642.1 N

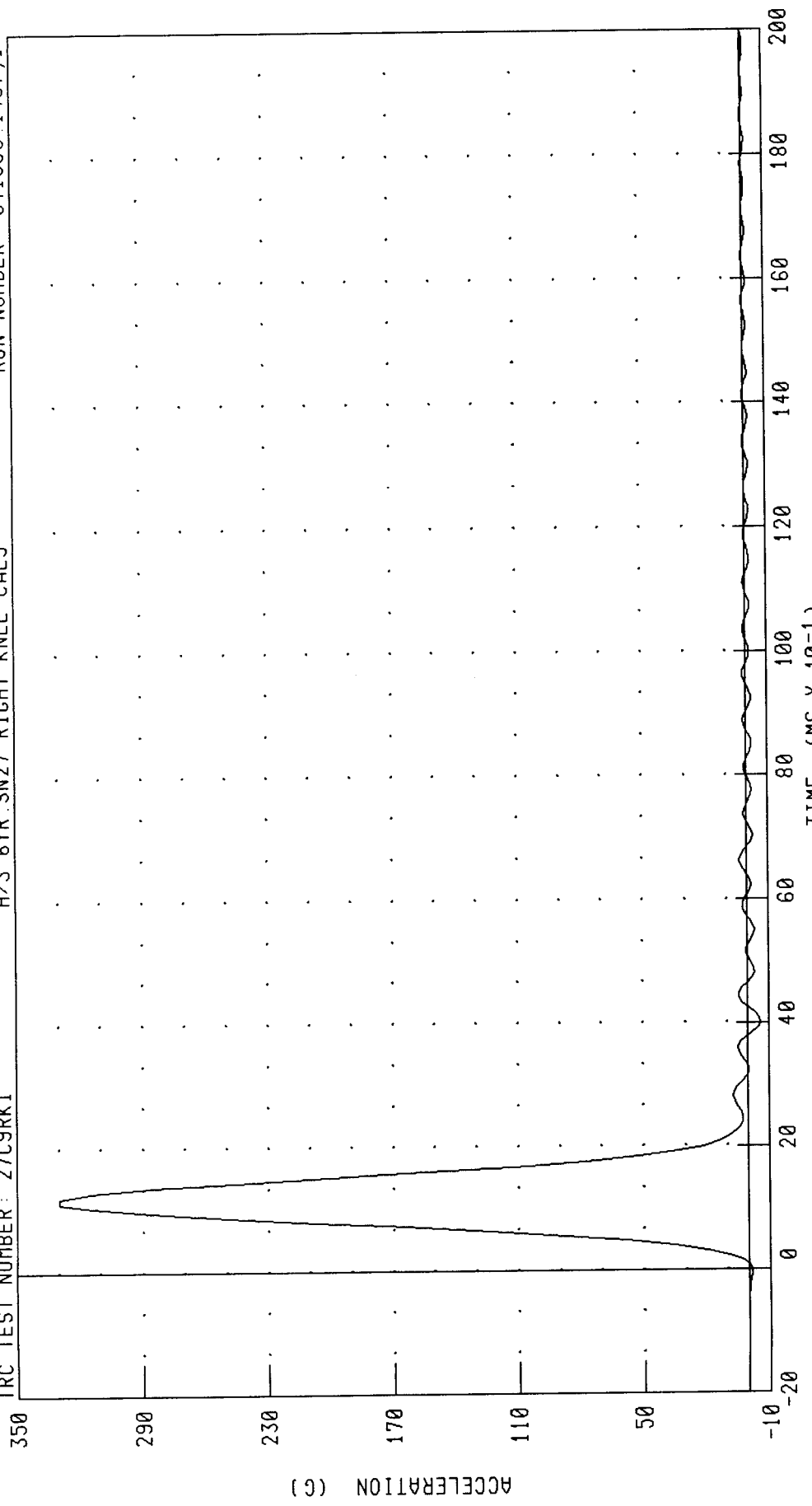
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins

RUN NUMBER: 041999.1456;1

HYBRID III SIX YEAR OLD CHILD DUMMY RIGHT KNEE CALIBRATION
PENDULUM DECELERATION

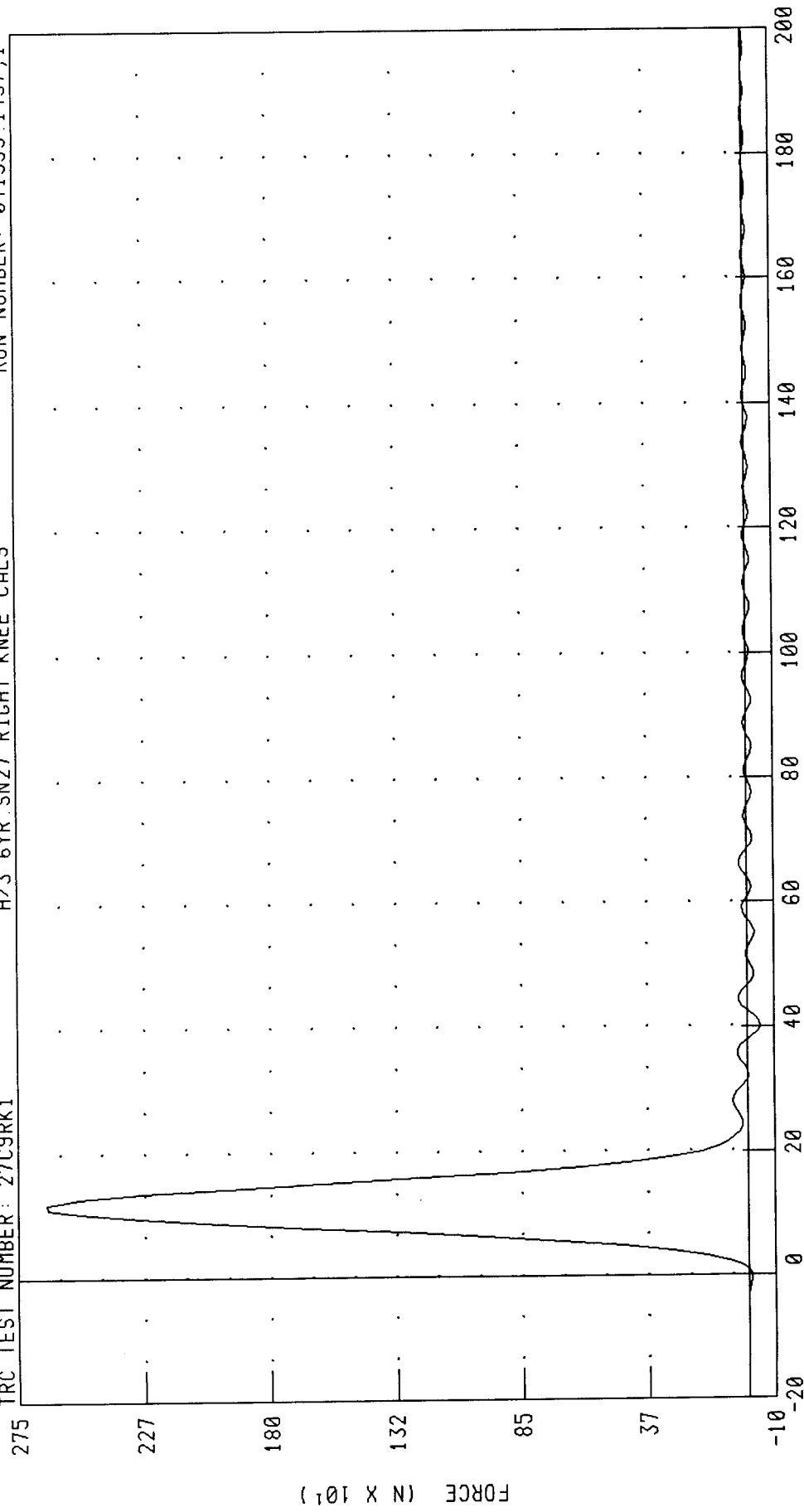
TRC TEST NUMBER: 27C9RK1 H/3 6YR SN27 RIGHT KNEE CAL9 RUN NUMBER: 041999 1457;1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 330.01 G @ 1.20 MS; -6.14 G @ 4.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY RIGHT KNEE CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 27C9RK1 H/3 6YR SN27 RIGHT KNEE CAL9 RUN NUMBER: 041999 1457;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 2642.17 N @ 1.20 MS; -49.18 N @ 4.00 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SIX YEAR OLD

19-APR-99

TRC INC.

TEST NO: 27C9LK1

H/3 6YR. SN027 LEFT KNEE CAL09

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 0.82 KG PENDULUM	1800 - 2800 N	2635.9 N

TEST MEETS SPECIFICATIONS

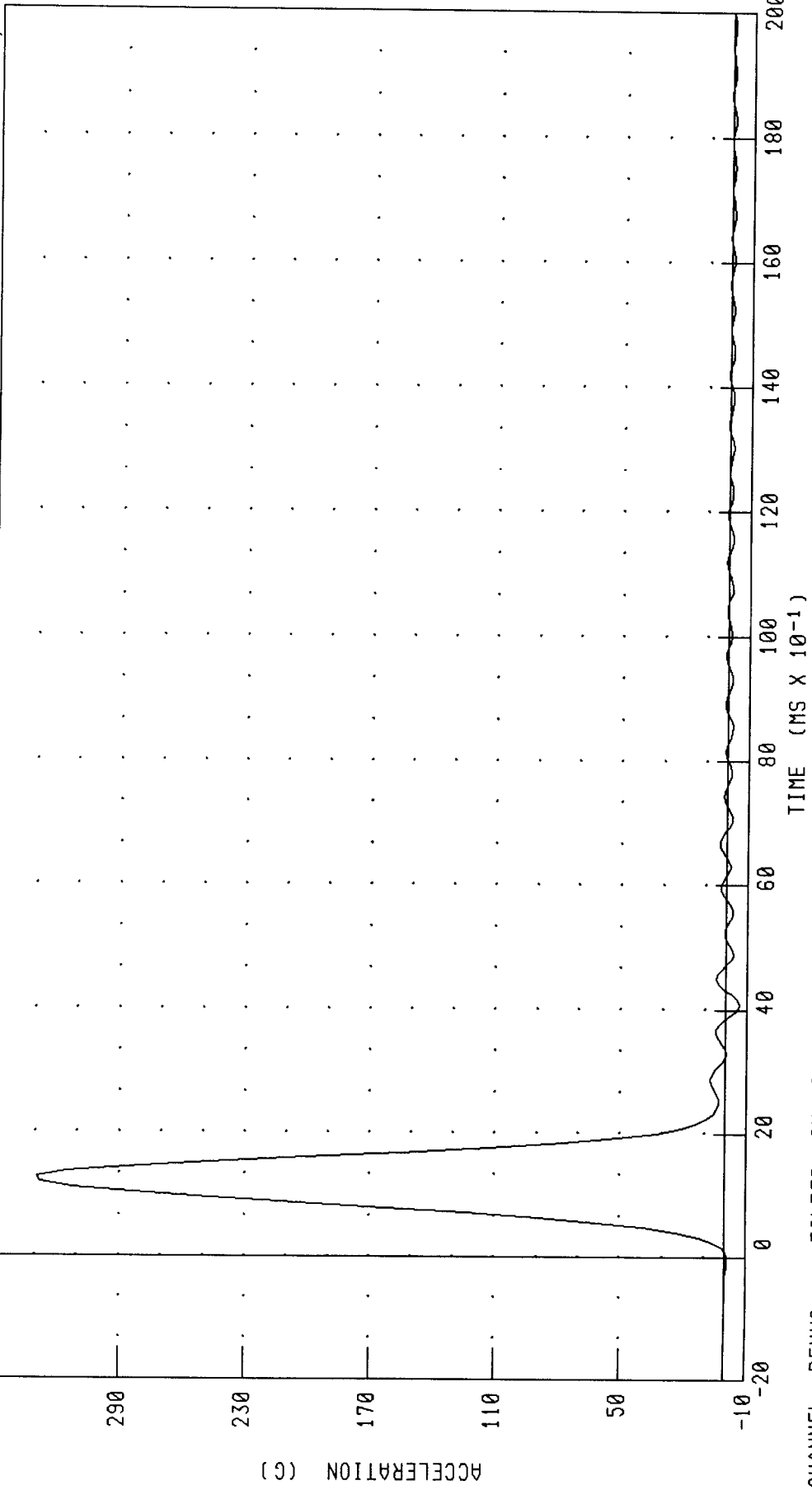
TECHNICIAN

B. Calt

RUN NUMBER: 041999.1450;1

HYBRID III SIX YEAR OLD CHILD DUMMY LEFT KNEE CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 27C9LK1 H/3 6YR. SN027 LEFT KNEE CAL09 RUN NUMBER: 041999.1450,1

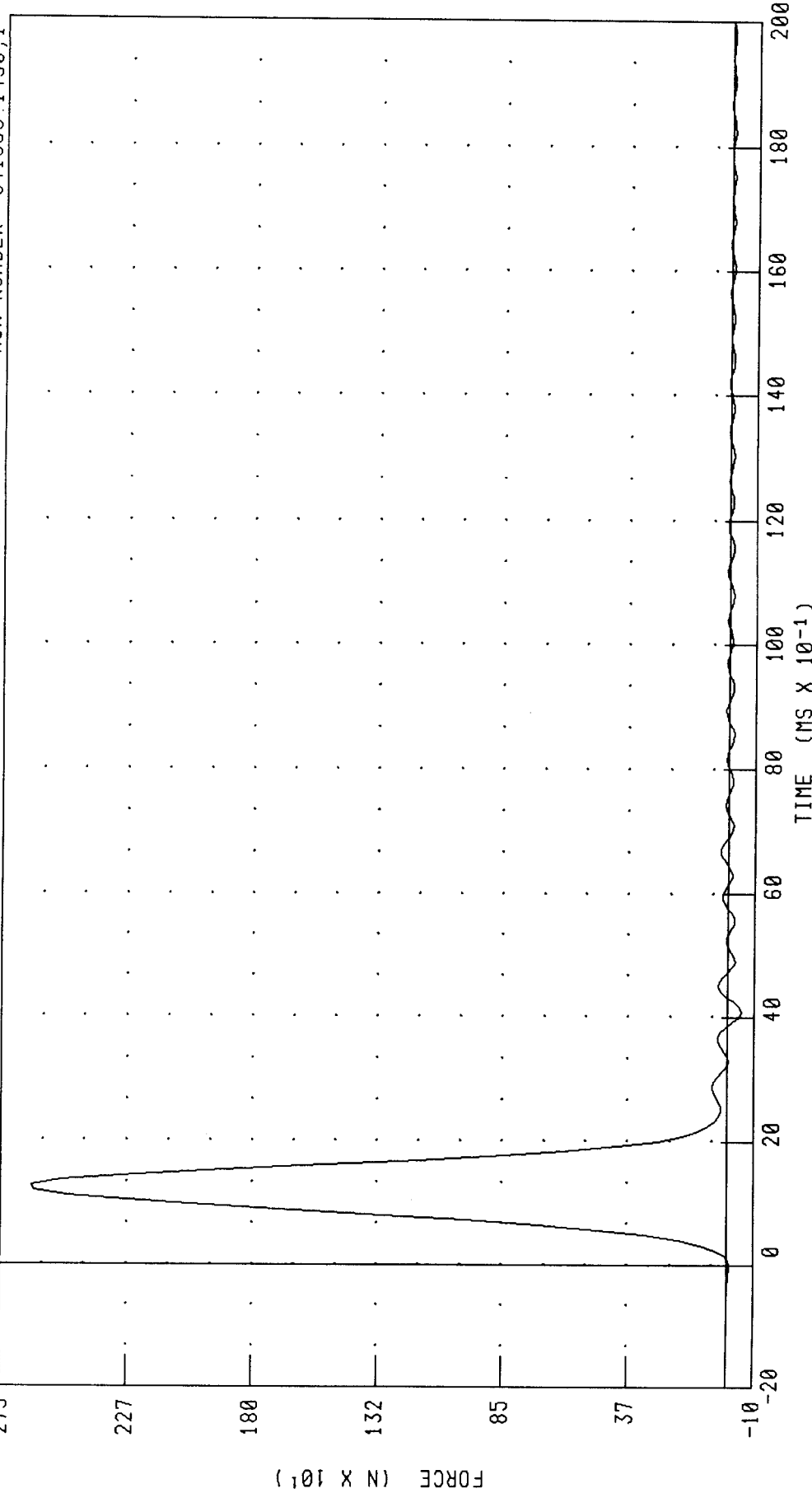


CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 329.23 G @ 1.28 MS; -6.28 G @ 4.08 MS

HYBRID III SIX YEAR OLD CHILD DUMMY LEFT KNEE CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 27C9LK1 H/3 6YR. SN027 LEFT KNEE CAL09 RUN NUMBER: 041999.1450;1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 2635.96 N @ 1.28 MS; -50.29 N @ 4.08 MS

Pre-Test Dummy Certification

Hybrid III 6 Year Old Dummy S/N 88

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SIX YEAR OLD

16-APR-99

TRC INC.

TEST NO: 88C2HD1

H/3 6YR.SN88 HEAD DROP CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PEAK RESULTANT ACCELERATION	245 - 300 G	295.21 G
PEAK LATERAL ACCELERATION	15 G MAX	-4.57 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN By *Calt*

RUN NUMBER: 041699.1429;1

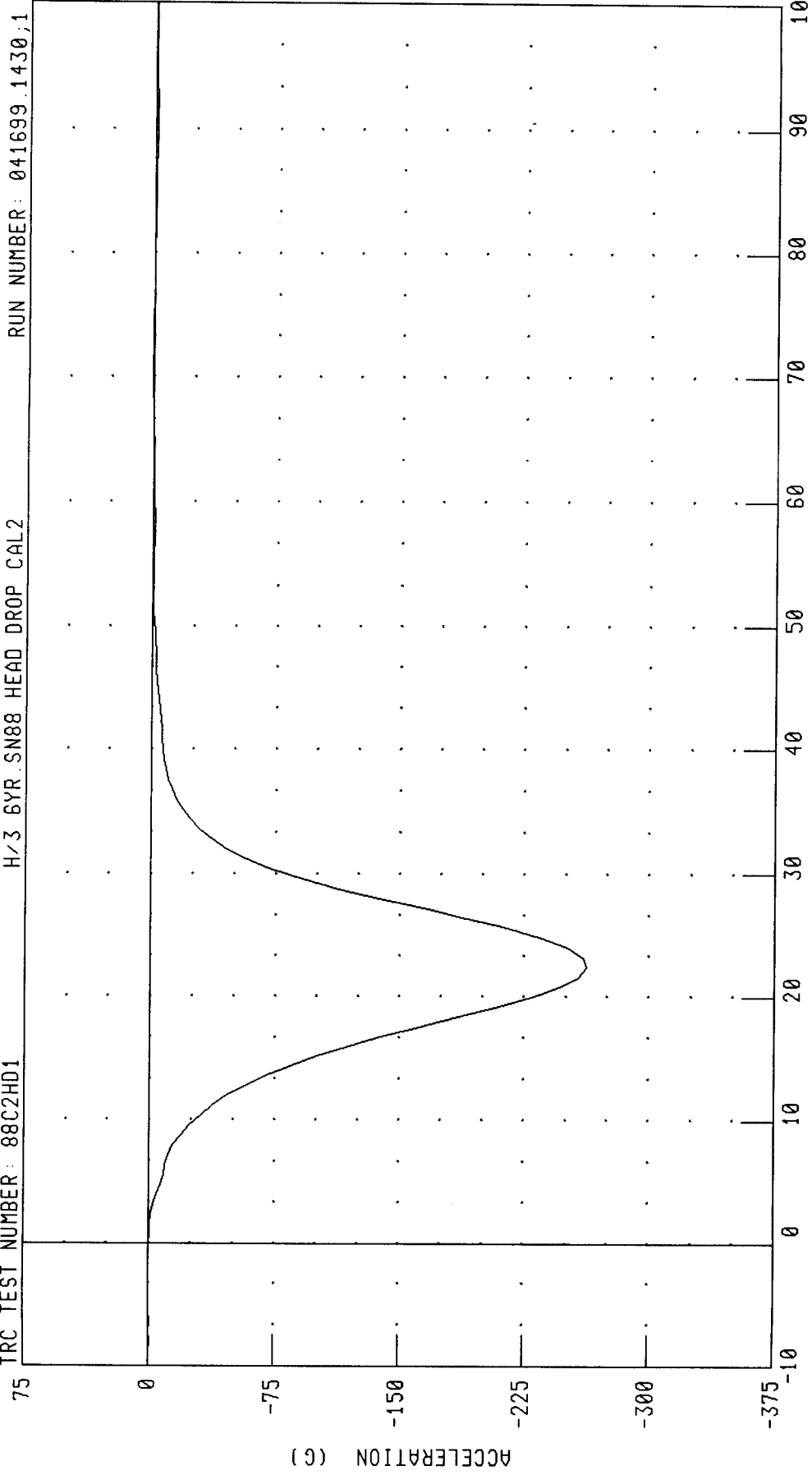
HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD ACCELERATION X AXIS

H/3 6YR SN88 HEAD DROP CAL2

TRC TEST NUMBER: 88C2HD1

RUN NUMBER: 041699.1430;1



CHANNEL: HEDXC FILTER: CH. CLASS 1000 PEAK DATA: 0.98 G @ 7.04 MS; -262.64 G @ 2.24 MS

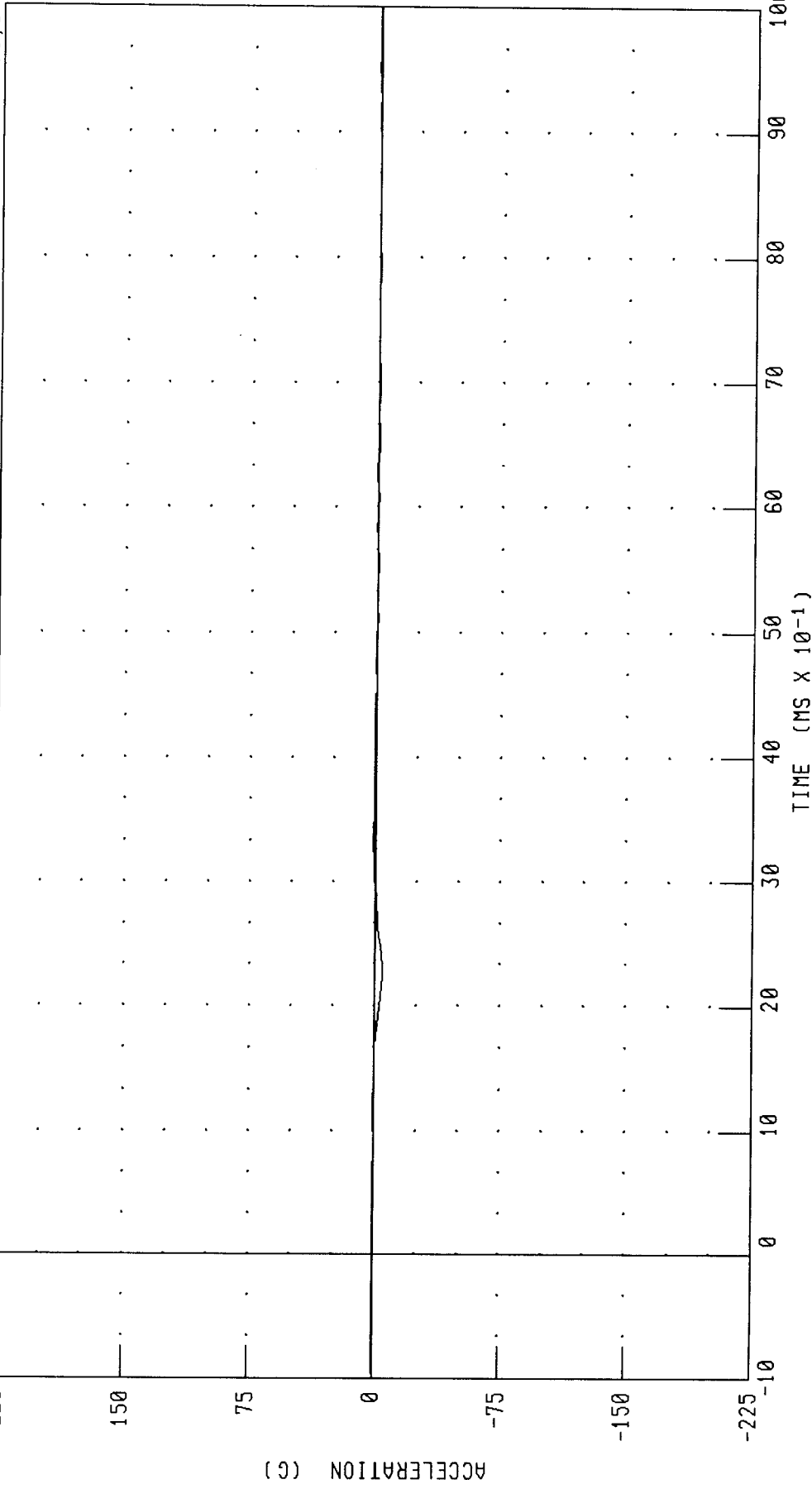
HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 88C2HD1

H/3 6YR SN88 HEAD DROP CAL2

RUN NUMBER: 041699.1430.1



CHANNEL: HEDYG FILTER: CH. CLASS 1000 PEAK DATA: 0.71 G @ 3.28 MS; -4.58 G @ 2.24 MS

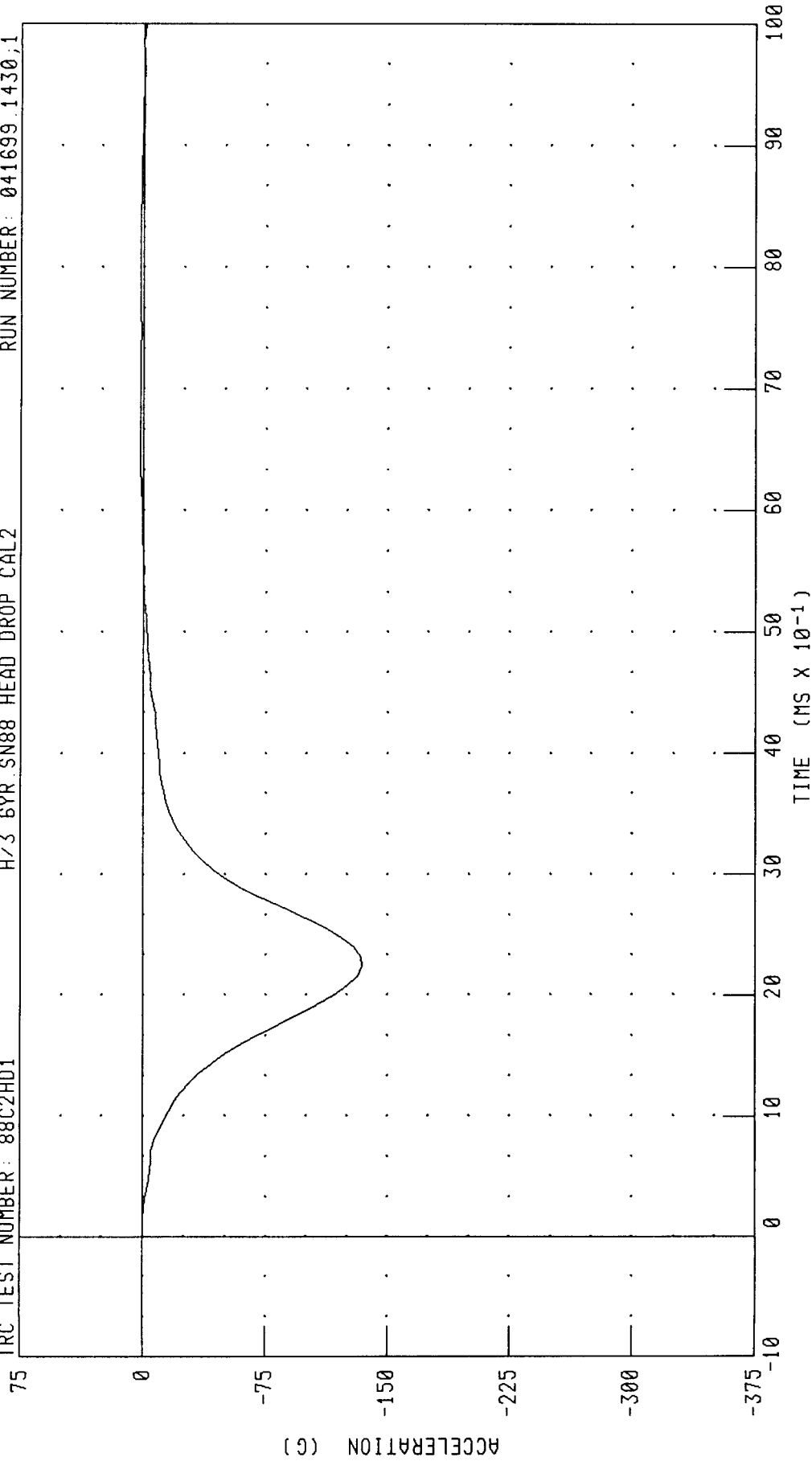
HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 88C2HD1

H/3 6YR SN88 HEAD DROP CAL2

RUN NUMBER: 041699.1430.1



CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: 2.15 G @ 6.56 MS; -134.72 G @ 2.24 MS

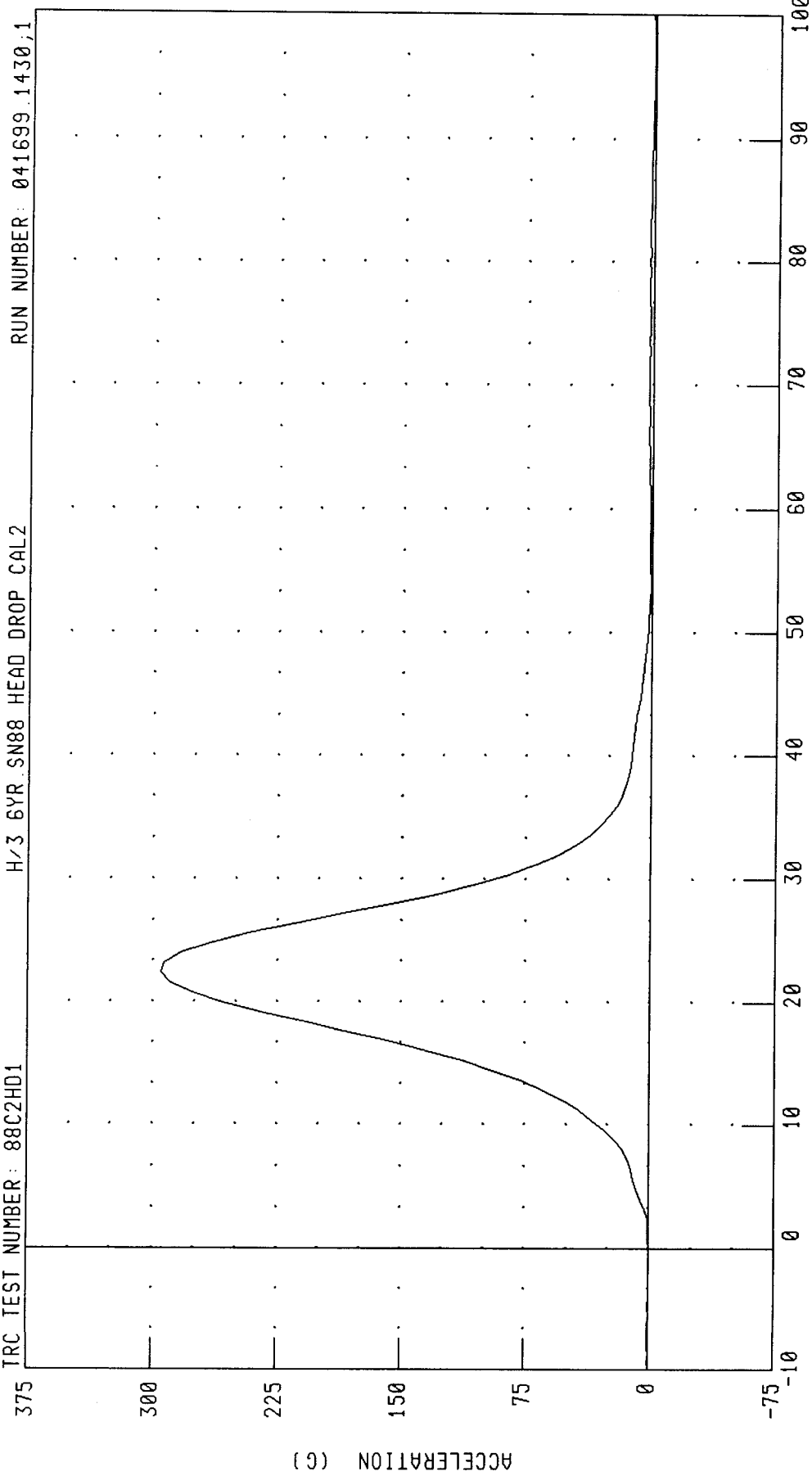
HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 88C2HD1

H/3 6YR SN88 HEAD DROP CAL2

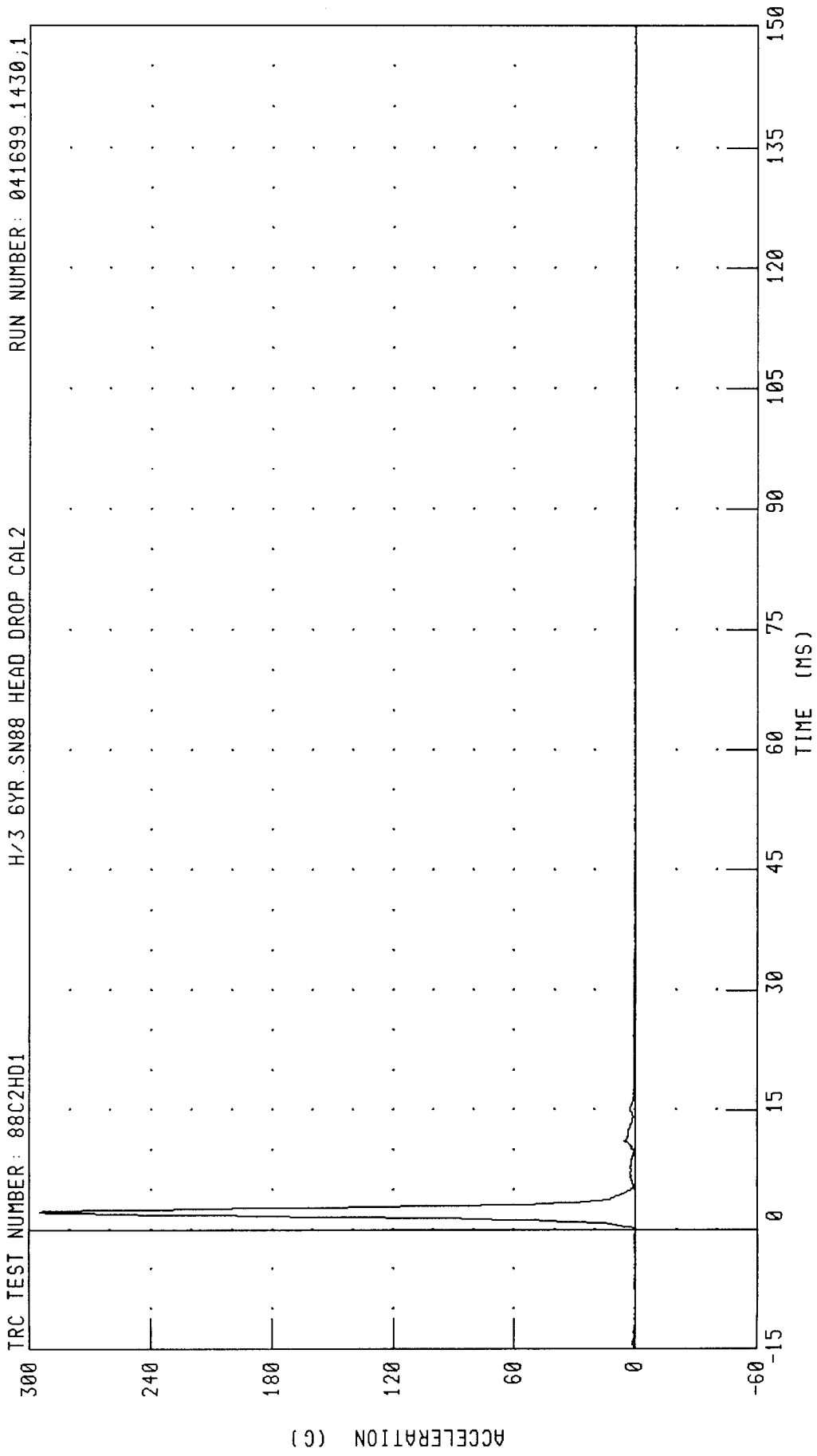
RUN NUMBER: 041699.1430;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 295.22 G @ 2.24 MS; 0.12 G @ -0.88 MS

HYBRID III SIX YEAR OLD CHILD DUMMY HEAD CALIBRATION
CHECK PLOT - HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 88C2HD1 H/3 6YR SN88 HEAD DROP CAL2 RUN NUMBER: 041699.1430;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 295.22 G @ 2.24 MS; 0.08 G @ -14.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SIX YEAR OLD

20-APR-99

NECK FLEXION TEST

TRC INC. TEST NO: 88C2NF1 H/3 6YR.SN30 NECK FLEX.CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	4.83 - 5.07 M/S	5.01 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.2 - 1.6 M/S	1.55 M/S
	20 MS 2.4 - 3.4 M/S	3.02 M/S
	30 MS 3.8 - 5.0 M/S	4.37 M/S
PEAK D-PLANE ROTATION	74 - 92 DEG.	76.98 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	27 - 33 NM	32.06 NM
POSITIVE MOMENT DECAY TIME FROM PEAK TO ZERO	103 - 123 MS	106.24 MS

TEST MEETS SPECIFICATIONS

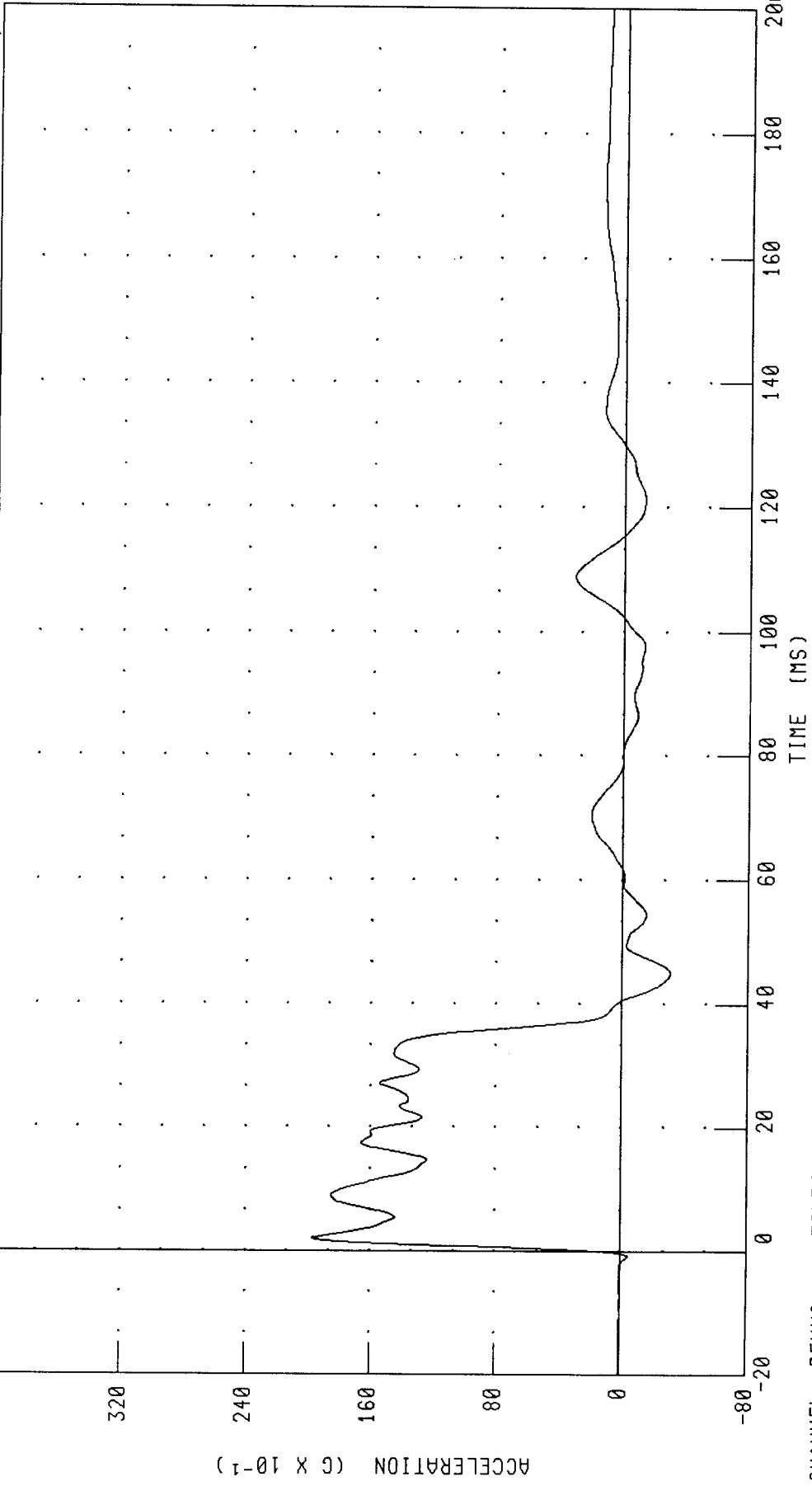
TECHNICIAN

Bjelt

RUN NUMBER: 042099.0838;1

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 88C2NF1 H/3 6YR SN30 NECK FLEX CAL2 RUN NUMBER: 042099 0839,1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 19.69 G @ 2.00 MS; -3.07 G @ 45.04 MS

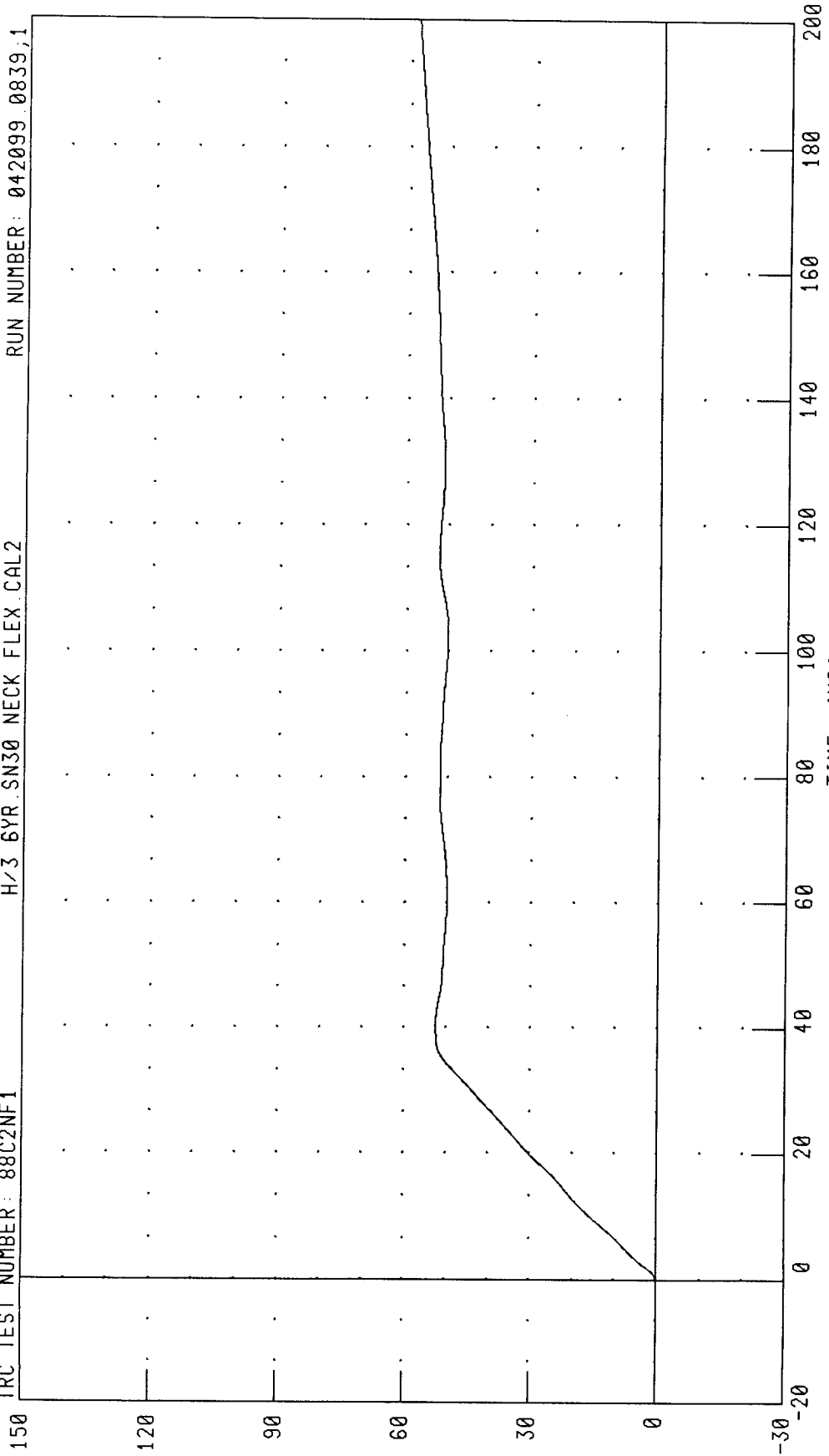
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

INTEGRATED PENDULUM VELOCITY

TRC TEST NUMBER: 88C2NF1

H/3 6YR.SN30 NECK FLEX.CAL2

RUN NUMBER: 042099.0839.1



VELOCITY (M/S X 10⁻¹)

TIME (MS)

CHANNEL: PENXVI FILTER: CH. CLASS 180 PEAK DATA: 5.80 M/S @ 200.00 MS; -0.01 M/S @ -20.00 MS

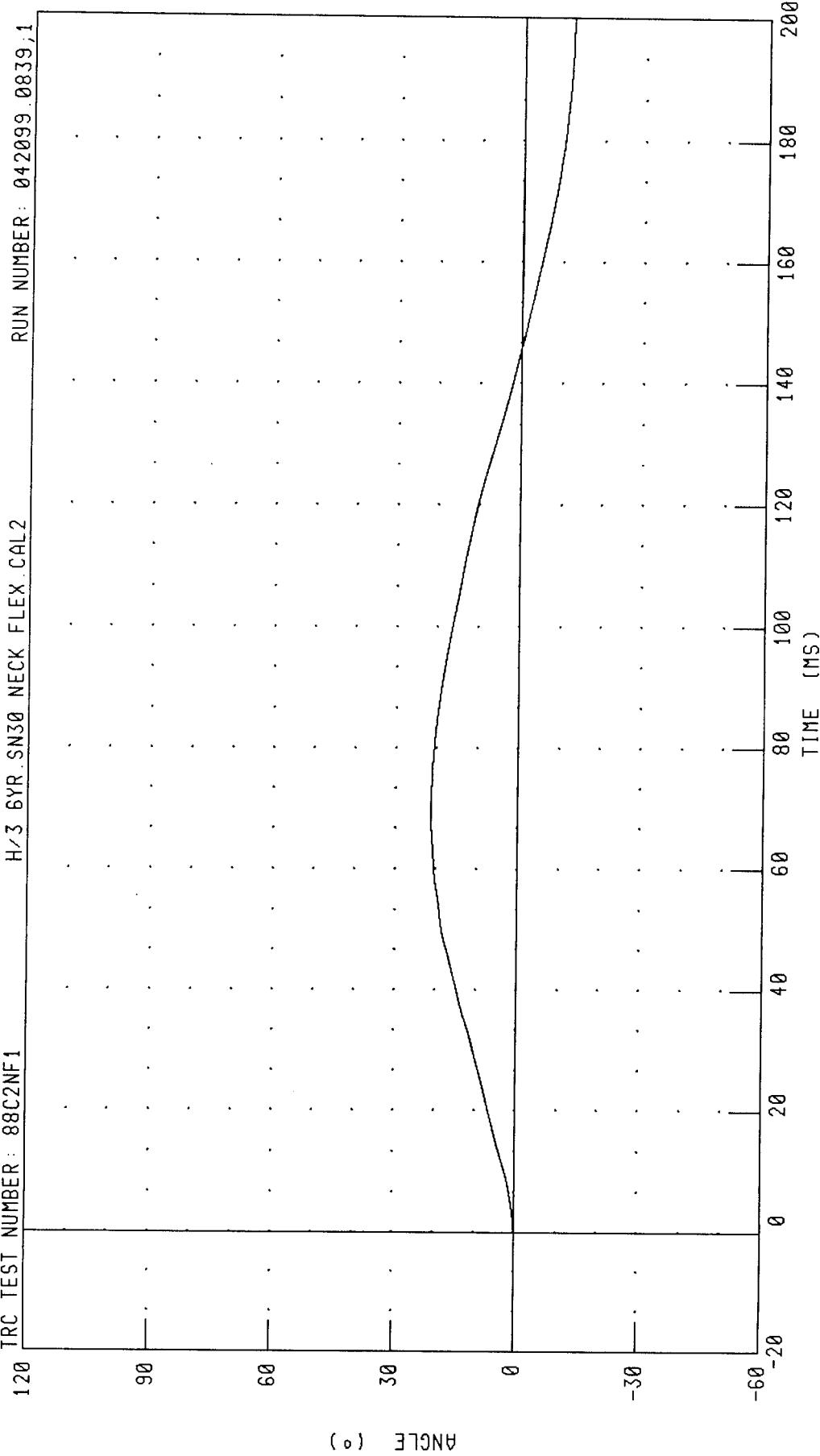
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 88C2NF1

H/3 6YR SN30 NECK FLEX CAL2

RUN NUMBER: 042099.0839,1



CHANNEL: BETA FILTER: CH. CLASS 60

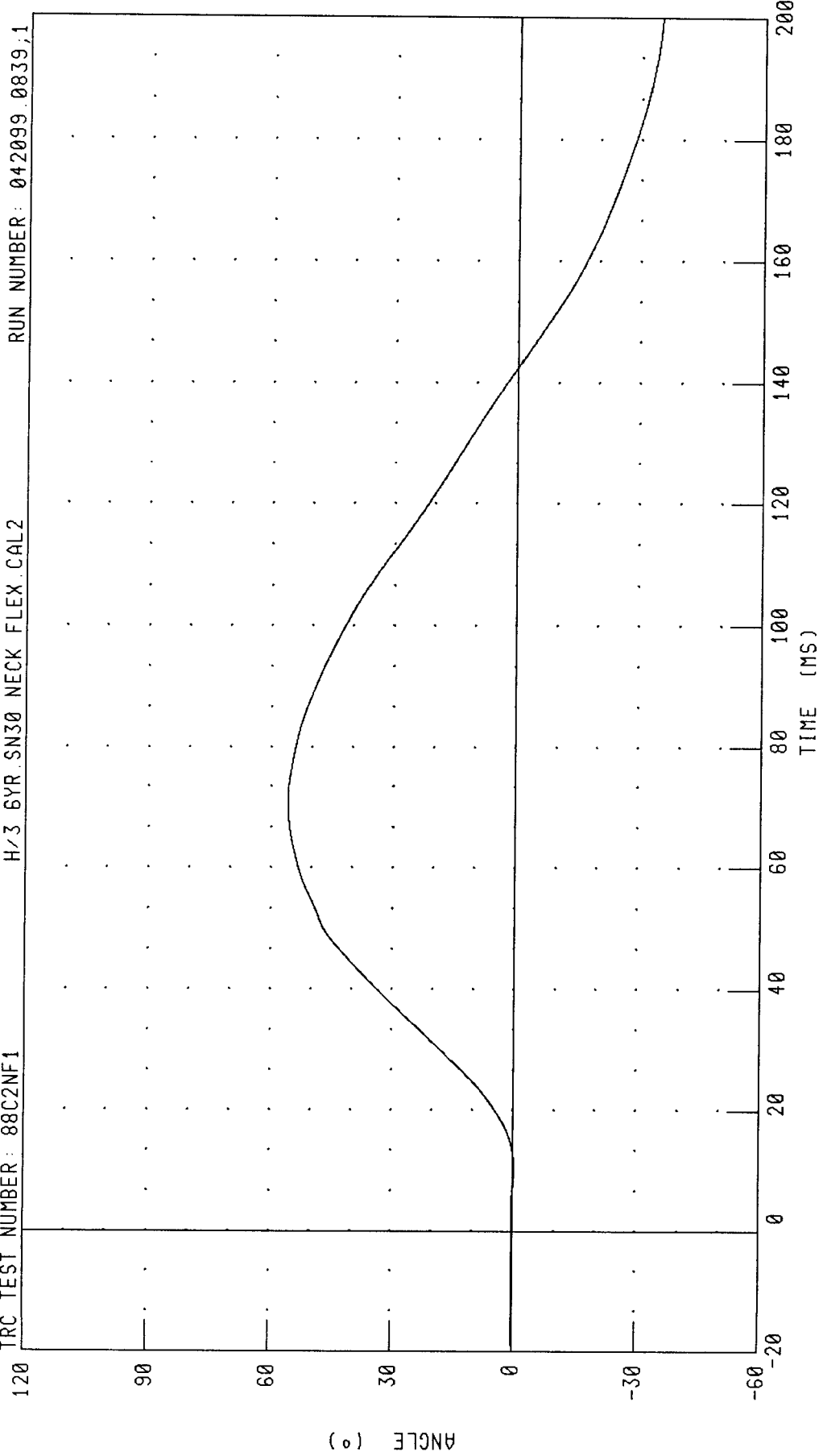
PEAK DATA: 21.20 ° @ 68.40 MS; -12.30 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 88C2NF1

H/3 6YR SN30 NECK FLEX.CAL2

RUN NUMBER: 042099.0839,1

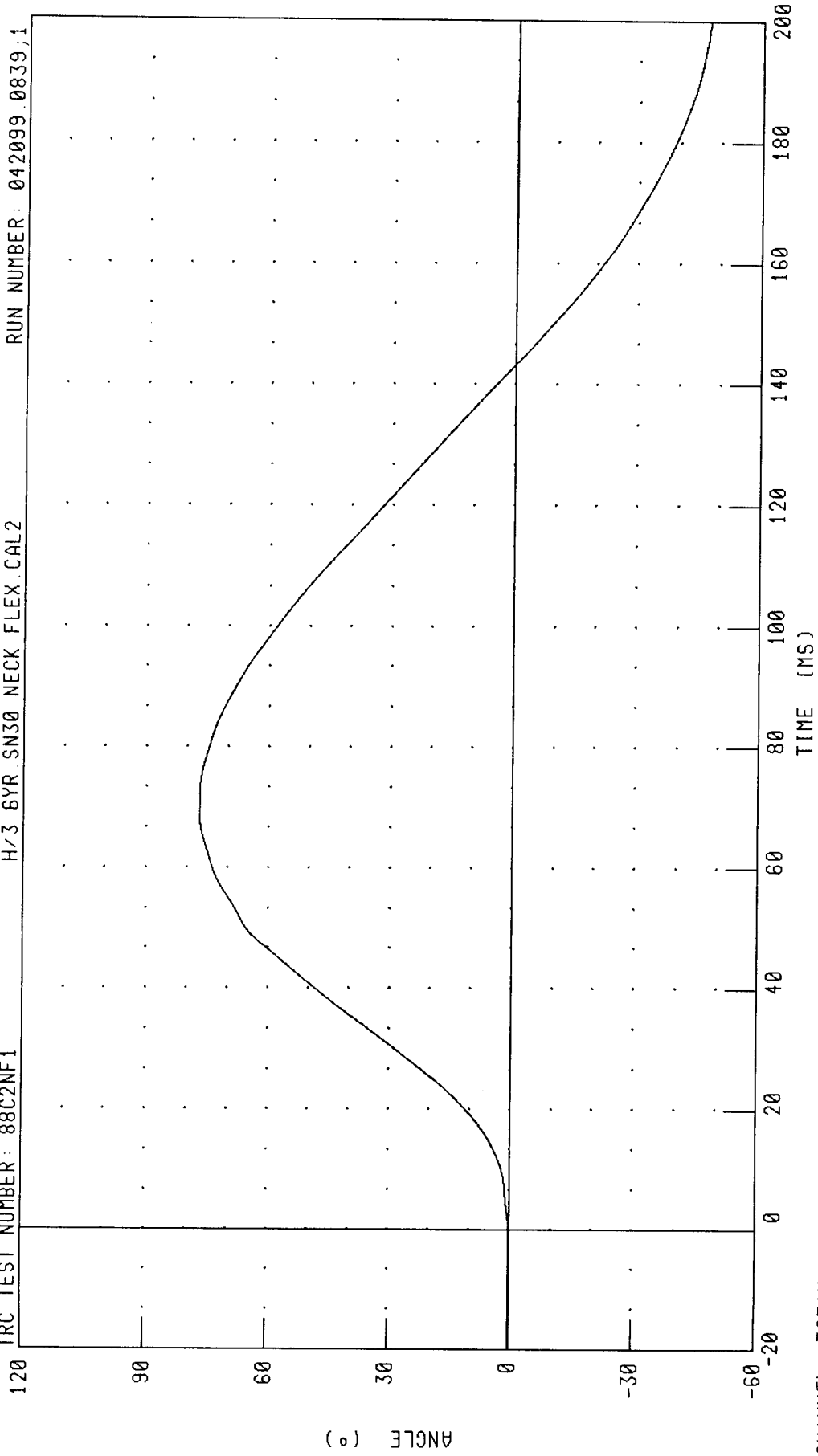


CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 55.82 ° @ 71.12 MS; -34.88 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

TRC TEST NUMBER: 88C2NF1 H/3 6YR SN30 NECK FLEX CAL2 RUN NUMBER: 042099.0839;1

TOTAL ROTATION



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 76.98 ° @ 70.24 MS; -47.18 ° @ 200.00 MS

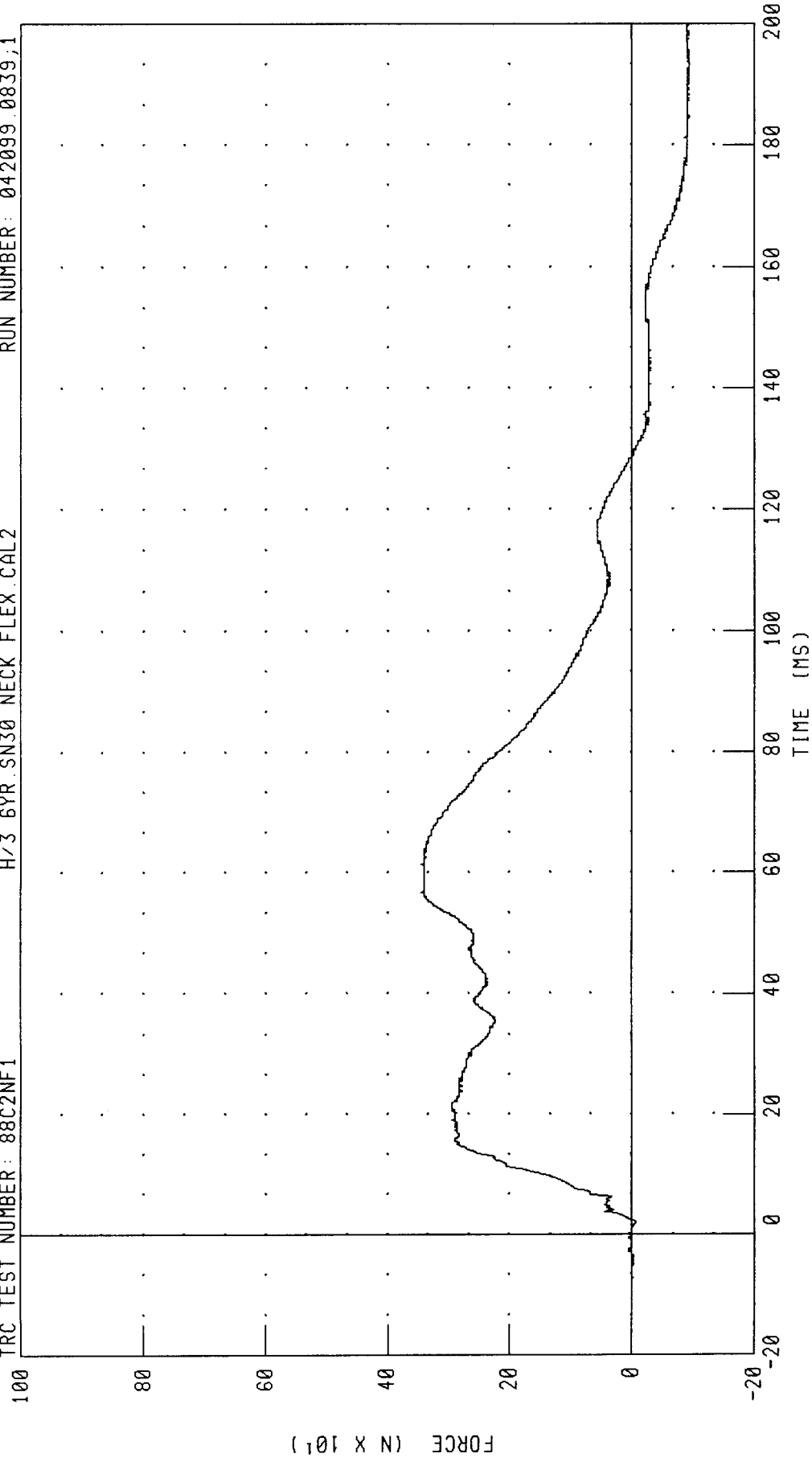
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER : 88C2NF1

H/3 6YR SN30 NECK FLEX .CAL2

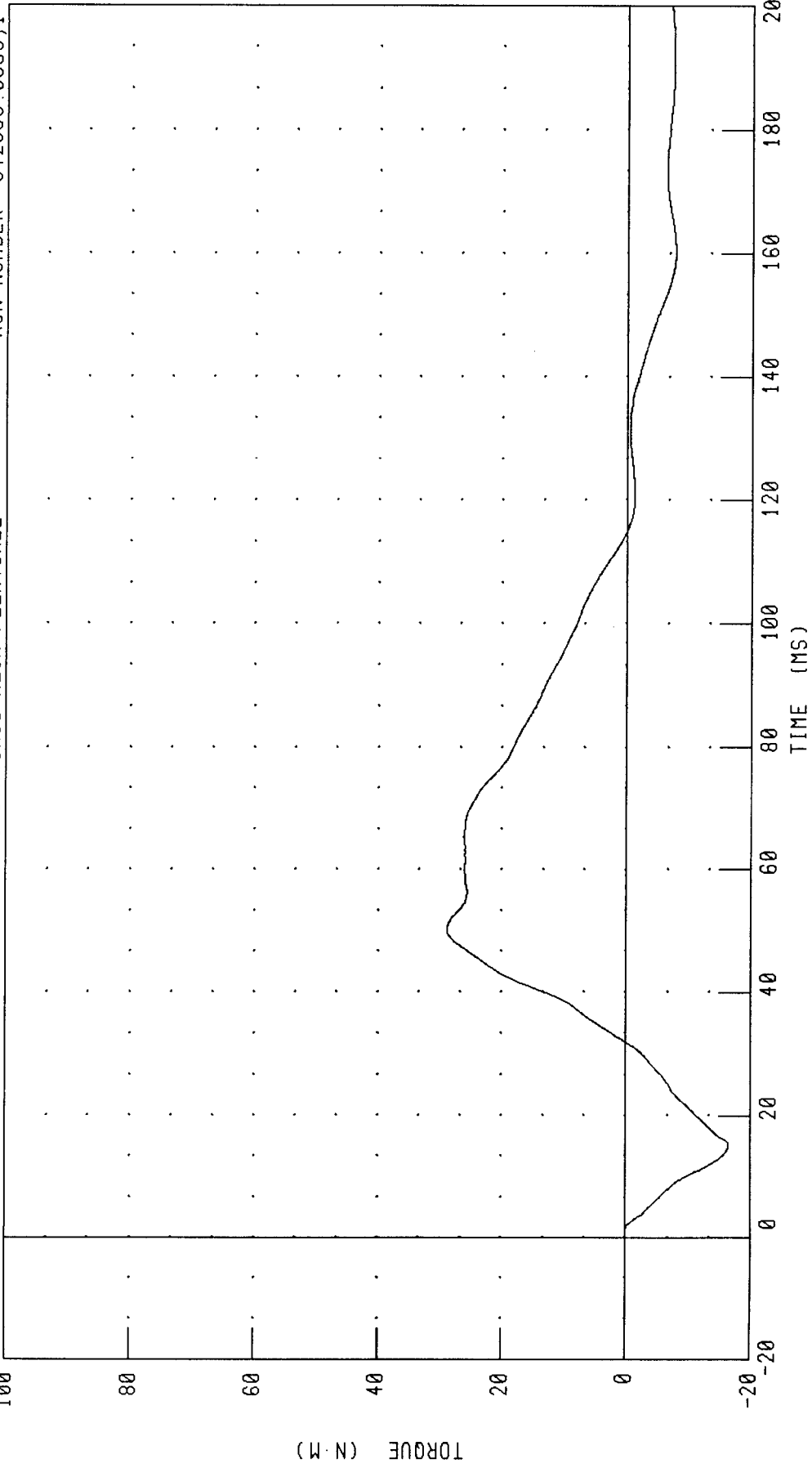
RUN NUMBER : 042099.0839;1



CHANNEL : NEKXF FILTER : CH. CLASS 1000 PEAK DATA : 344.62 N @ 56.72 MS; -93.52 N @ 184.48 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

TRC TEST NUMBER: 88C2NF1 H/3 6YR SN30 NECK FLEX CAL2 RUN NUMBER: 042099.0839;1



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 28.84 N·M @ 50.40 MS; -16.44 N·M @ 152.28 MS

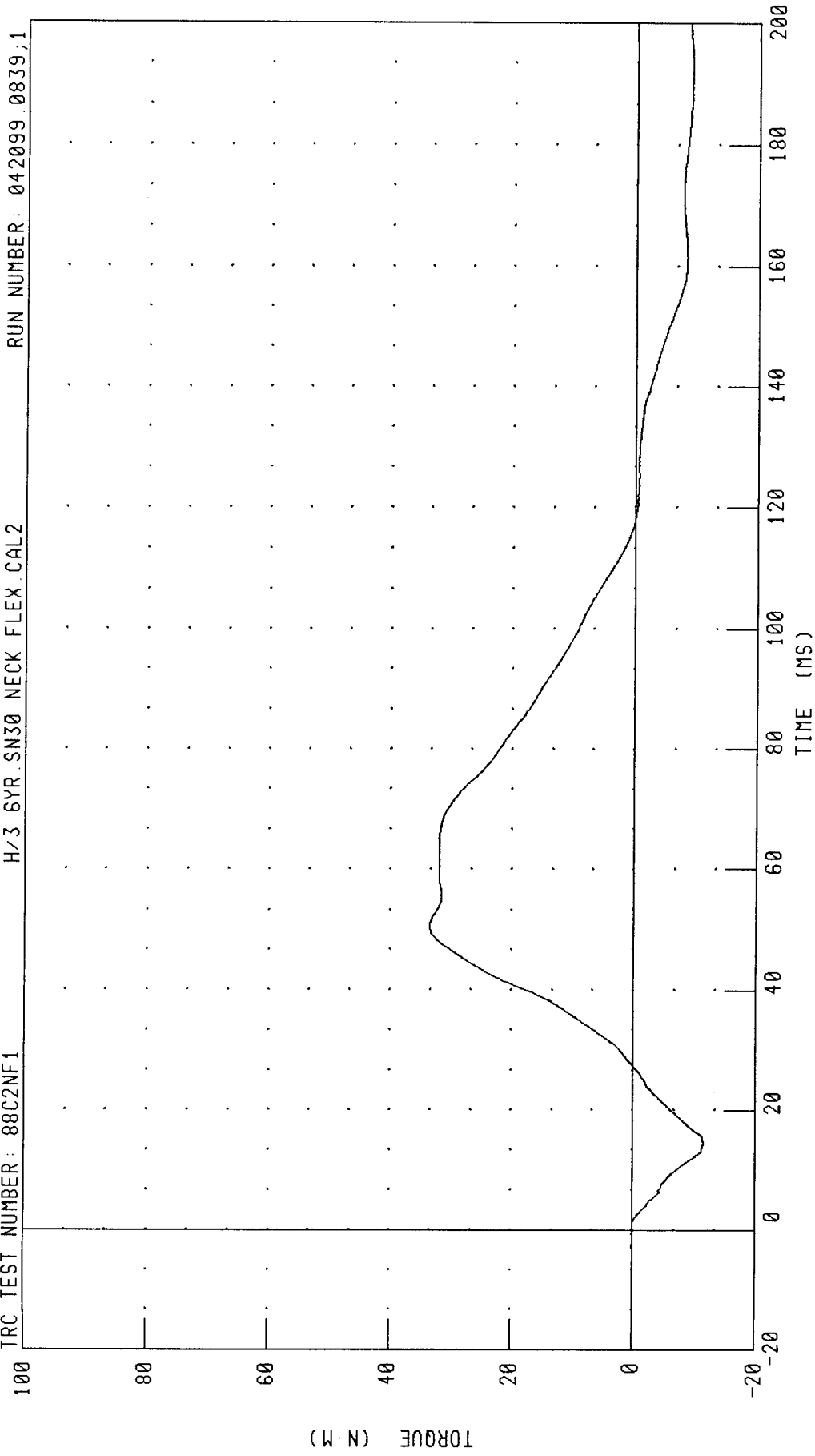
HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 88C2NF1

H/3 6YR SN30 NECK FLEX CAL2

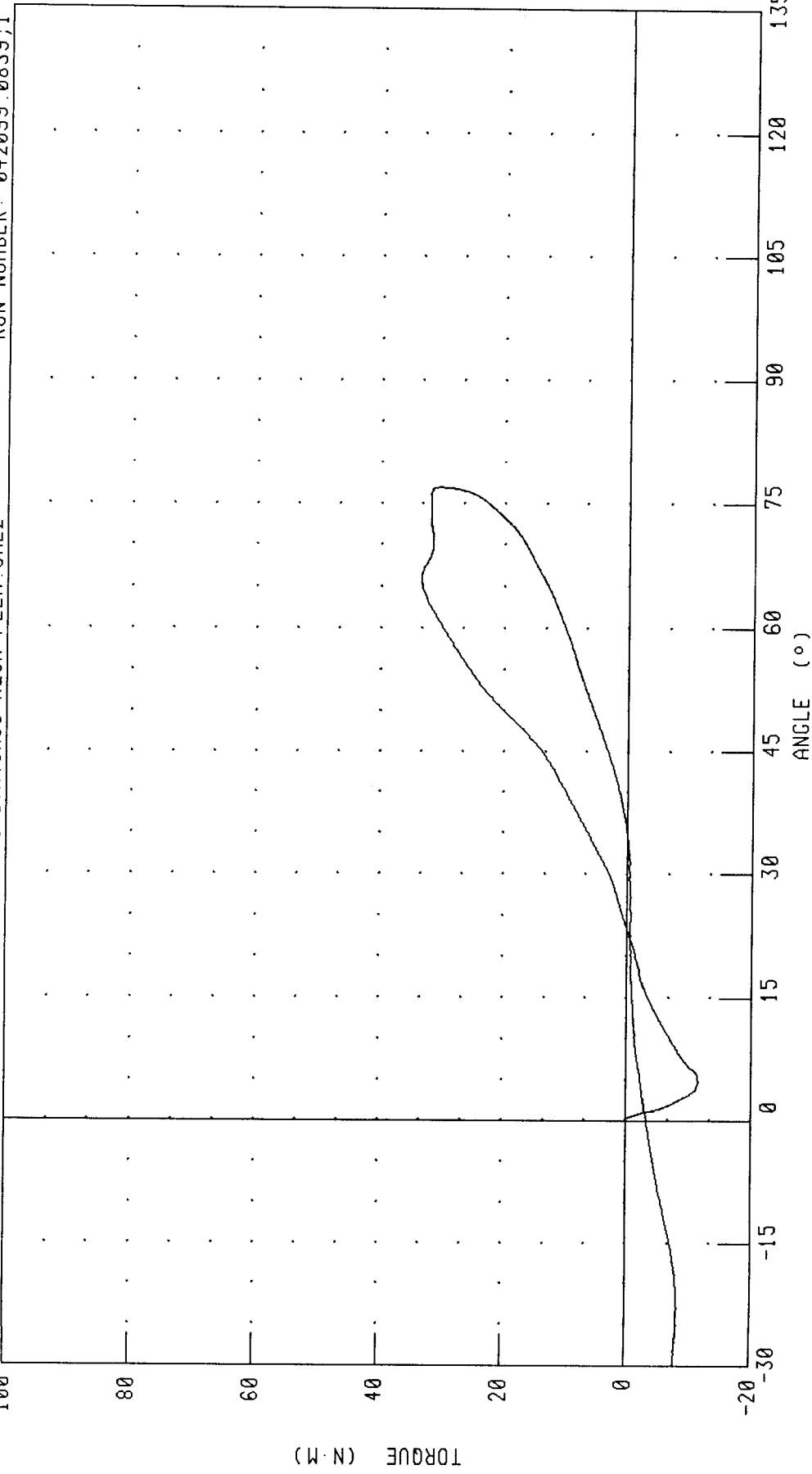
RUN NUMBER: 042099.0839,1



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 33.53 N·M @ 50.64 MS; -11.59 N·M @ 14.56 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK FLEXION CALIBRATION
TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT

TRC TEST NUMBER : 88C2NF1 H/3 6YR SN30 NECK FLEX CAL2 RUN NUMBER : 042099 0839,1



CHANNEL : TOTAN FILTER : CH : CLASS 60
NEKOM CH : CLASS 600
PEAK DATA : 76.98 ° @ 70.24 MS; -47.18 ° @ 200.00 MS
33.53 N.M @ 50.64 MS; -11.59 N.M @ 14.56 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SIX YEAR OLD

20-APR-99

NECK EXTENSION TEST

TRC INC. TEST NO: 88C2NE3 H/3 6YR.SN088 NECK EXT.CAL02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	4.18 - 4.42 M/S	4.40 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.0 - 1.4 M/S	1.16 M/S
	20 MS 2.2 - 3.0 M/S	2.28 M/S
	30 MS 3.2 - 4.2 M/S	3.41 M/S
PEAK D-PLANE ROTATION	94 - 106 DEG.	94.24 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	-19 / -24 NM	-21.83 NM
NEGATIVE MOMENT DECAY TIME FROM PEAK TO -5 NM	127 - 147 MS	130.72 MS

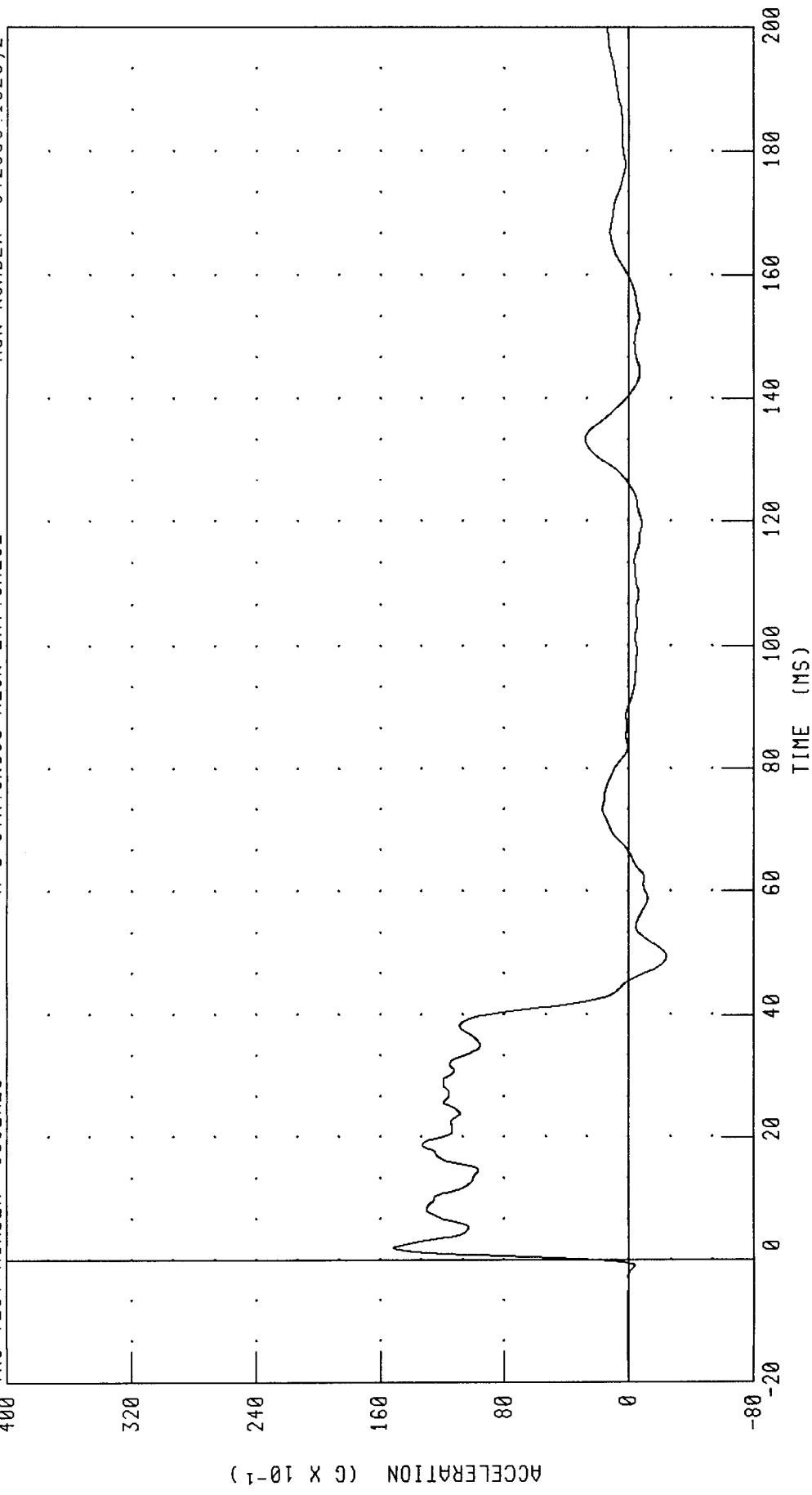
TEST MEETS SPECIFICATIONS

TECHNICIAN By Calt

RUN NUMBER: 042099.1023;2

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 88C2NE3 H/3 6YR SN088 NECK EXT CAL02 RUN NUMBER: 042099.1023,2



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 15.14 G @ 1.92 MS; -2.41 G @ 49.36 MS

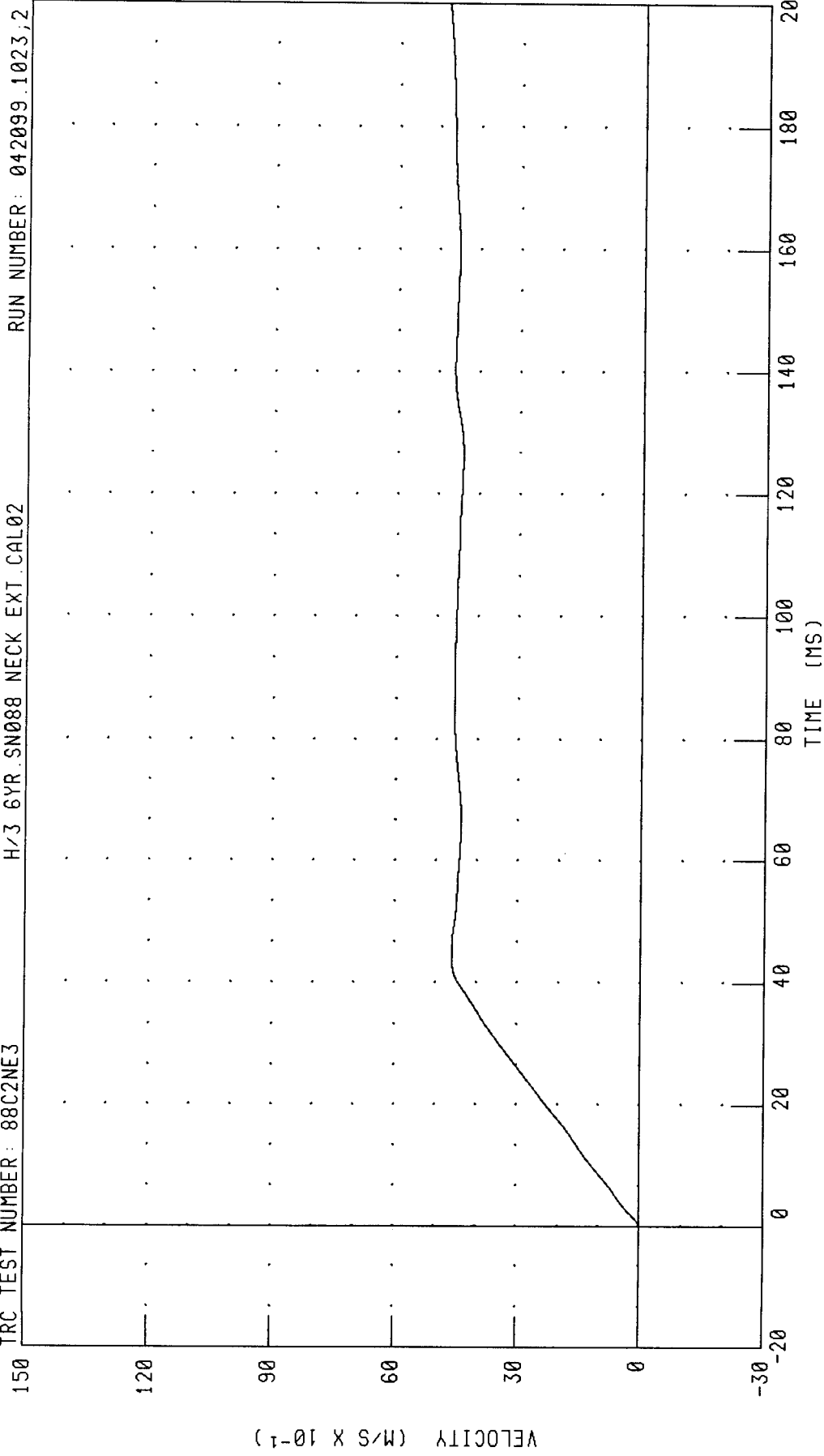
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

INTEGRATED PENDULUM VELOCITY

TRC TEST NUMBER: 88C2NE3

H/3 6YR SN088 NECK EXT CAL02

RUN NUMBER: 042099.1023;2



CHANNEL: PENXVI FILTER: CH. CLASS 180

PEAK DATA: 4.80 M/S @ 200.00 MS; 0.00 M/S @ -0.56 MS

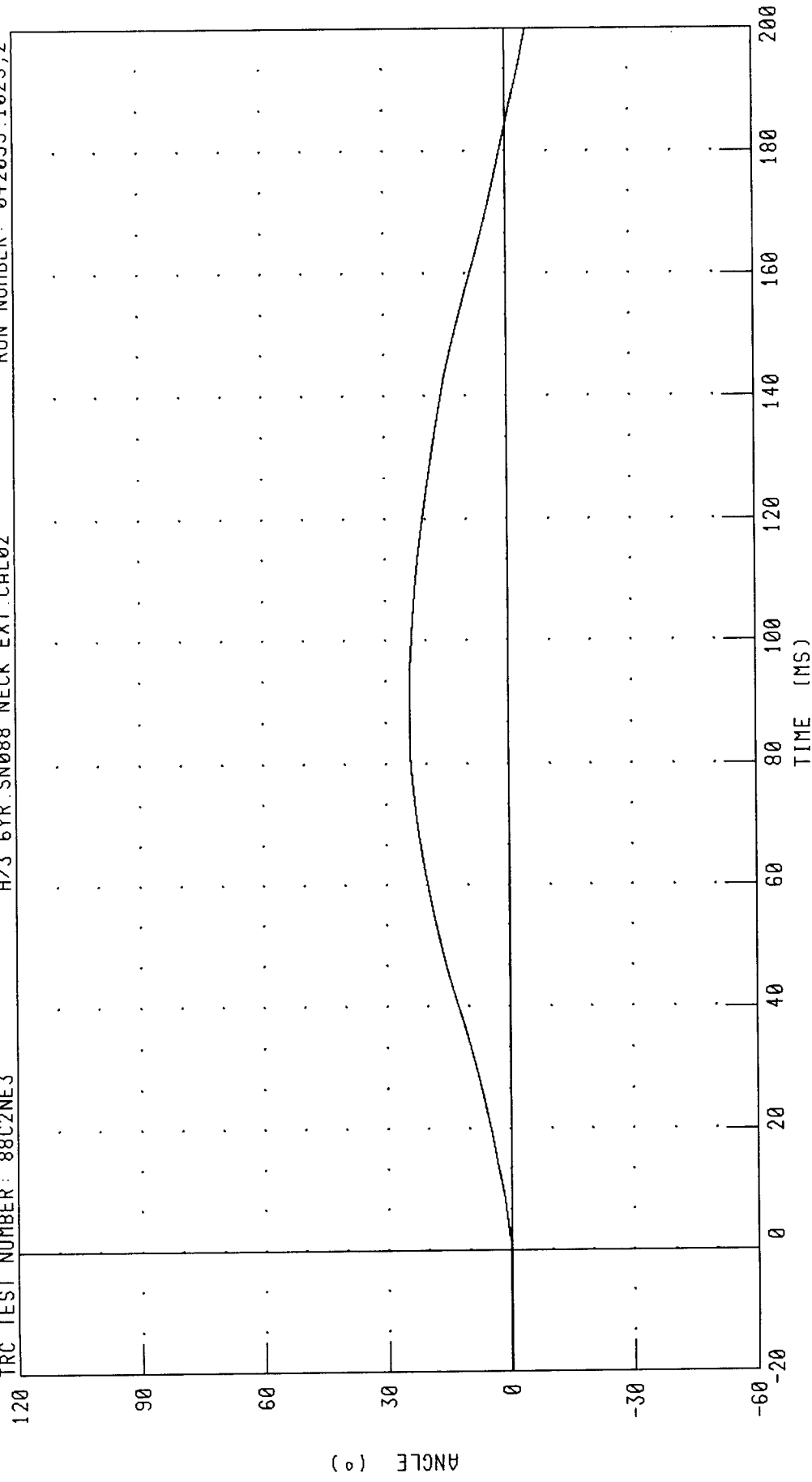
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

H/3 6YR SN088 NECK EXT CAL02

TRC TEST NUMBER: 88C2NE3

RUN NUMBER: 042099.1023;2



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 24.15 ° @ 87.44 MS; -5.10 ° @ 200.00 MS

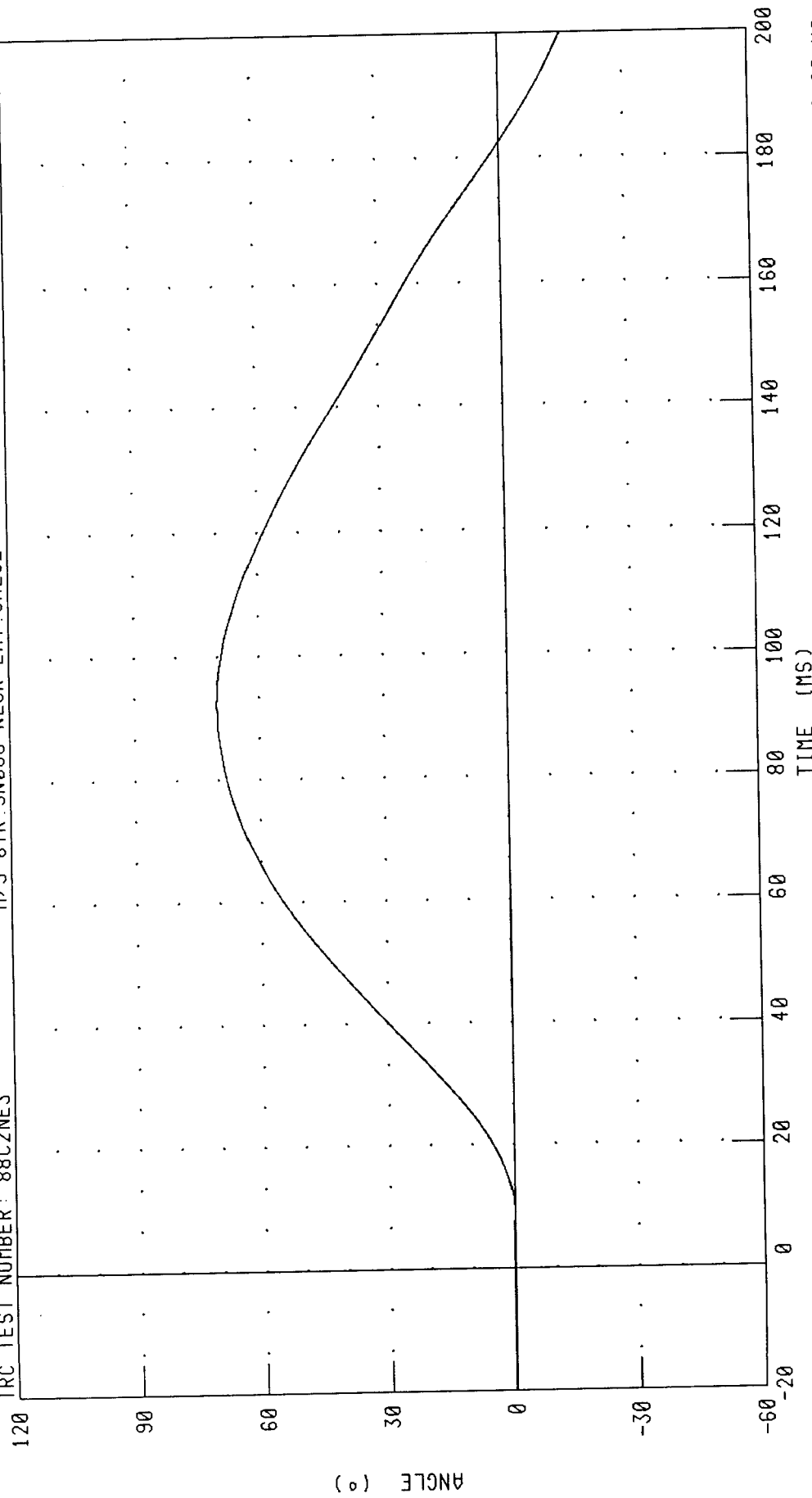
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

RUN NUMBER: 042099.1023;2

TRC TEST NUMBER: 88C2NE3

H/3 6YR SN088 NECK EXT CAL02



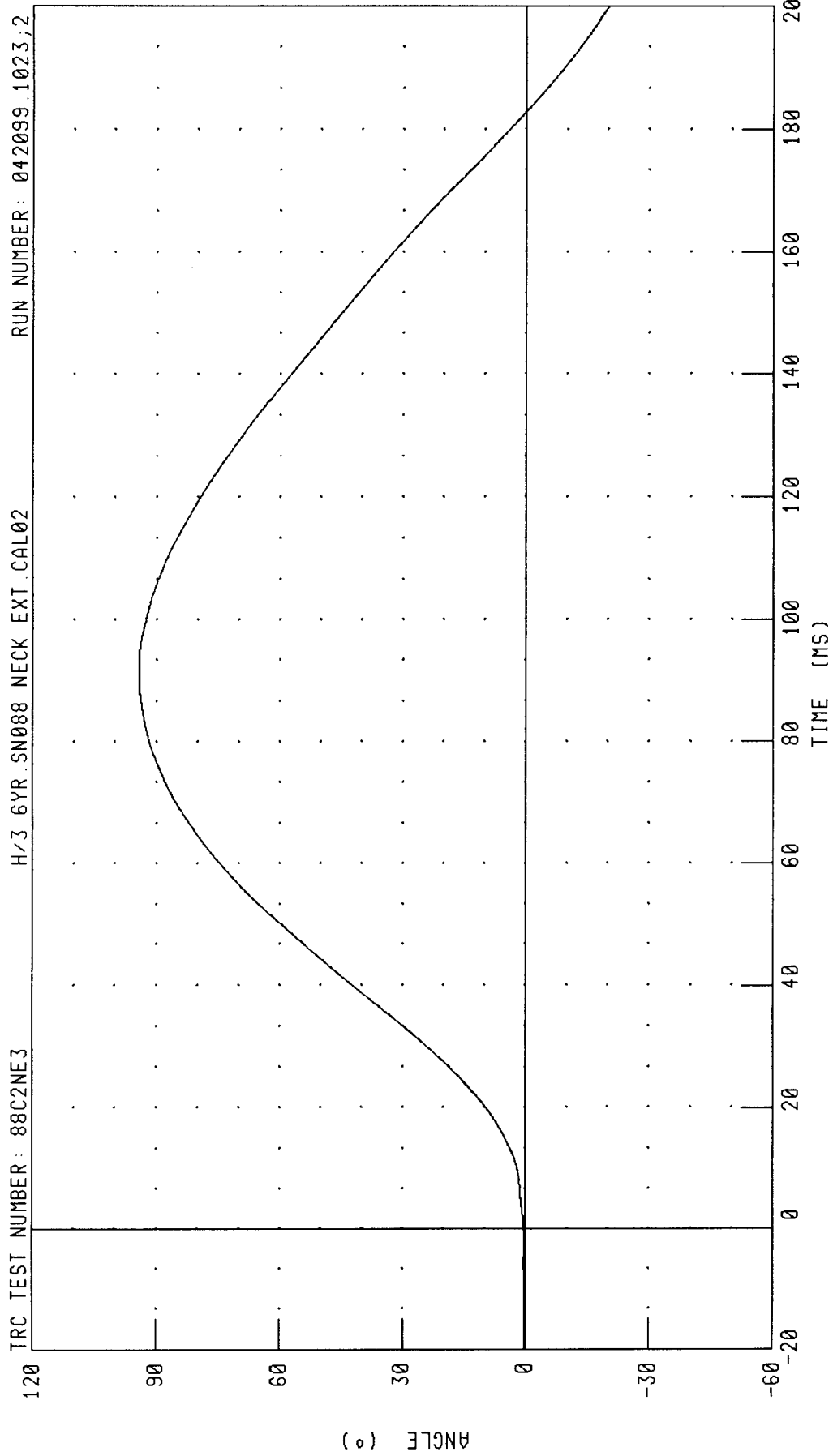
PEAK DATA: 70.15 ° @ 92.24 MS; -15.18 ° @ 200.00 MS

CHANNEL: THETA FILTER: CH. CLASS 60

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 88C2NE3 H/3 6YR SN088 NECK EXT CAL02 RUN NUMBER: 042099.1023;2

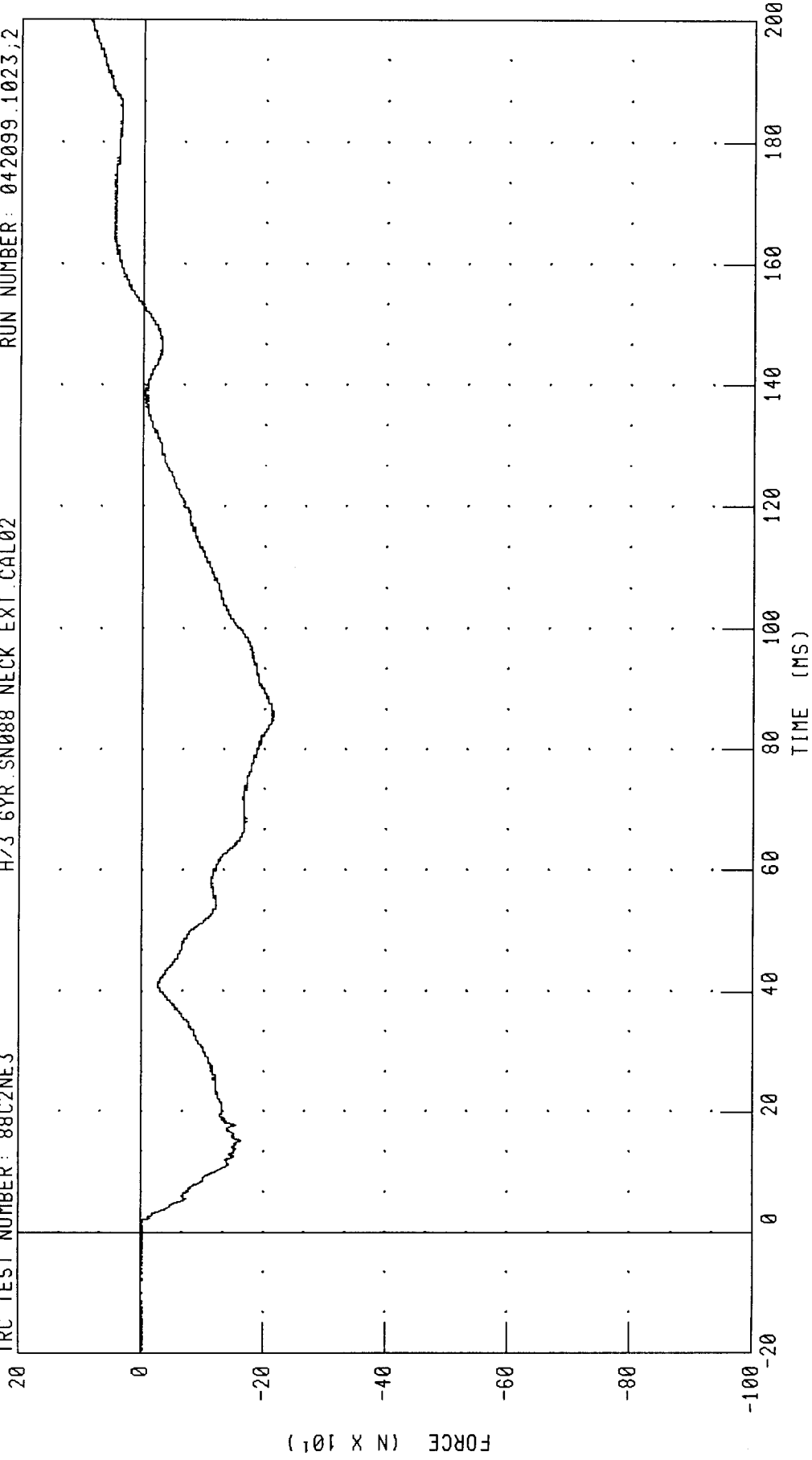


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 94.24 ° @ 91.44 MS; -20.28 ° @ 200.00 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 88C2NE3 H/3 6YR SN088 NECK EXT CAL02 RUN NUMBER: 042099.1023;2



CHANNEL: NEKXF FILTER: CH. CLASS 1000 PEAK DATA: 86.82 N @ 200.00 MS, -214.40 N @ 84.88 MS

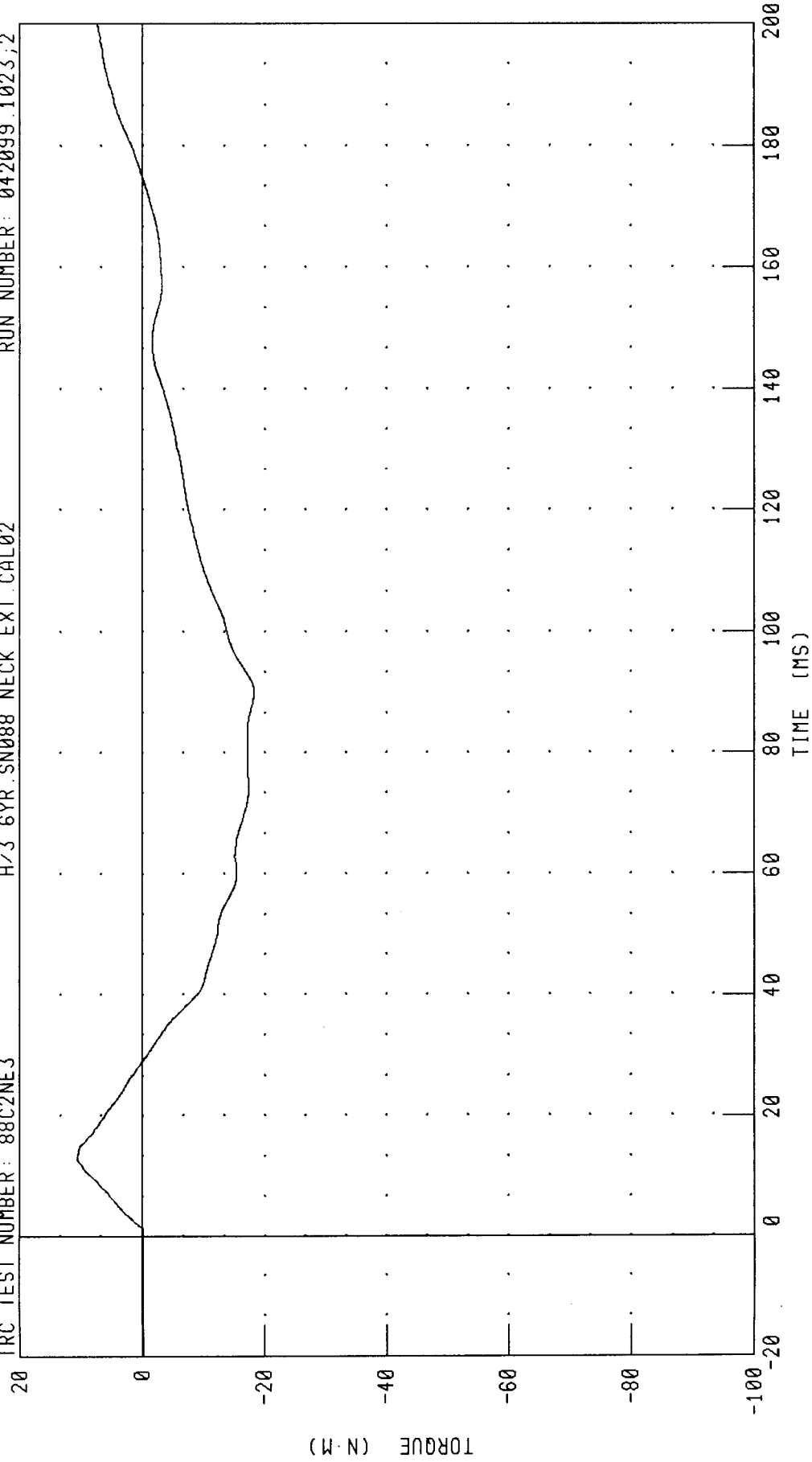
HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 88C2NE3

H/3 6YR SN088 NECK EXT CAL02

RUN NUMBER: 042099.1023;2

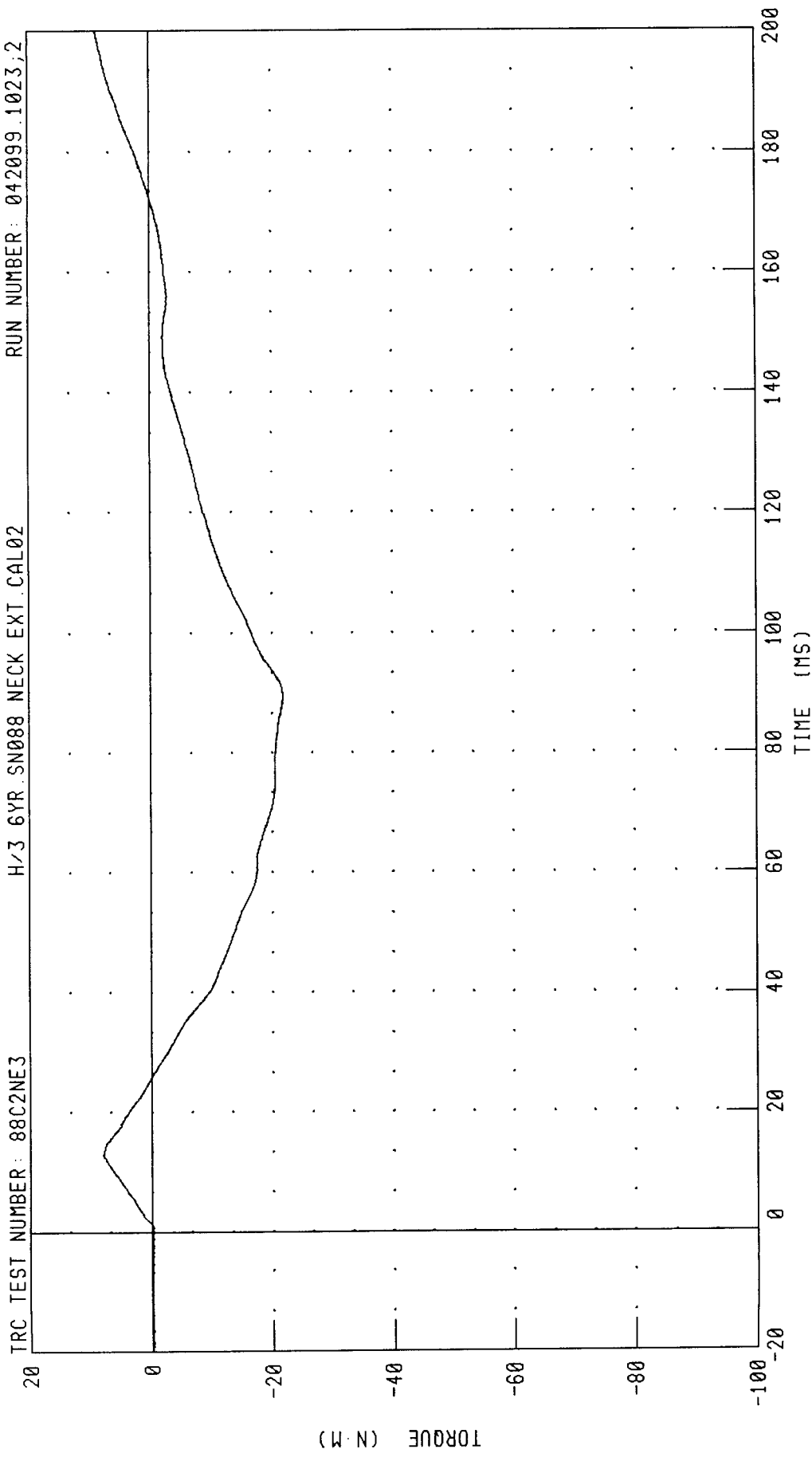


CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 10.53 N.M @ 12.96 MS, -18.23 N.M @ 89.44 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

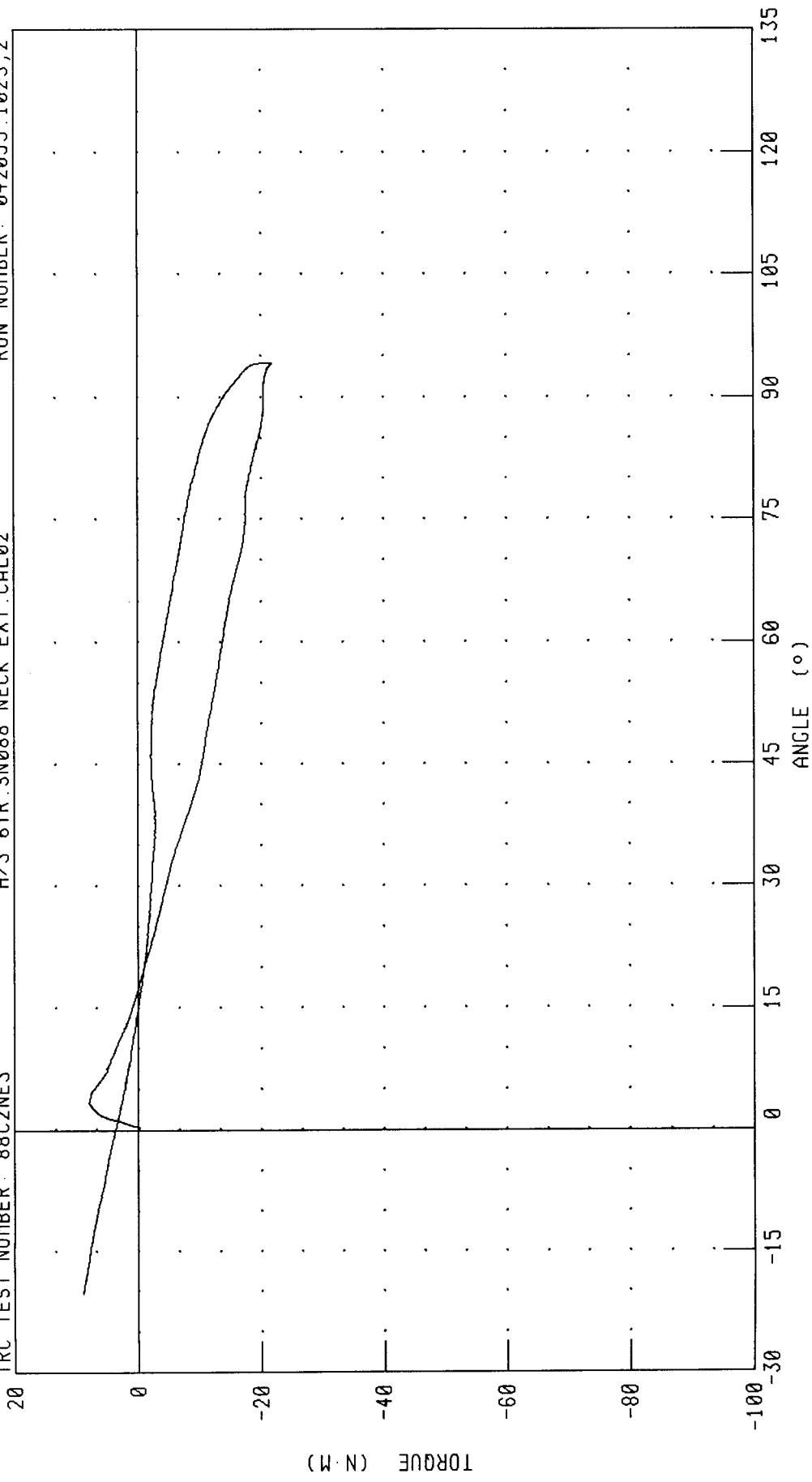
TRC TEST NUMBER: 88C2NE3 H/3 6YR SN088 NECK EXT CAL02 RUN NUMBER: 042099.1023;2



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 8.87 N·M @ 200.00 MS; -21.83 N·M @ 89.36 MS

HYBRID III SIX YEAR OLD CHILD DUMMY NECK EXTENSION CALIBRATION
 TOTAL ROTATION VS OCCIPITAL CONDYLAR MOMENT

TRC TEST NUMBER: 88C2NE3 H/3 6YR SN088 NECK EXT CAL02 RUN NUMBER: 042099.1023;2



CHANNEL: TOTAN FILTER: CH CLASS 60
 NEKOM CH CLASS 600
 ANGLE (°)
 PEAK DATA: 94.24 ° @ 91.44 MS; -20.28 ° @ 200.00 MS
 8.87 N·M @ 200.00 MS; -21.83 N·M @ 89.36 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SIX YEAR OLD

16-APR-99

TRC INC.

TEST NO: 88C2TH2

H/3 6YR. SN088 H.S.THORAX CAL2

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.72 M/S
MAXIMUM DEFLECTION	38.1 - 45.7 MM	36.6 MM *
MAXIMUM RESISTIVE FORCE	1510 - 1690 N	1387. N *
INTERNAL HYSTERESIS	69% - 85%	78.0%

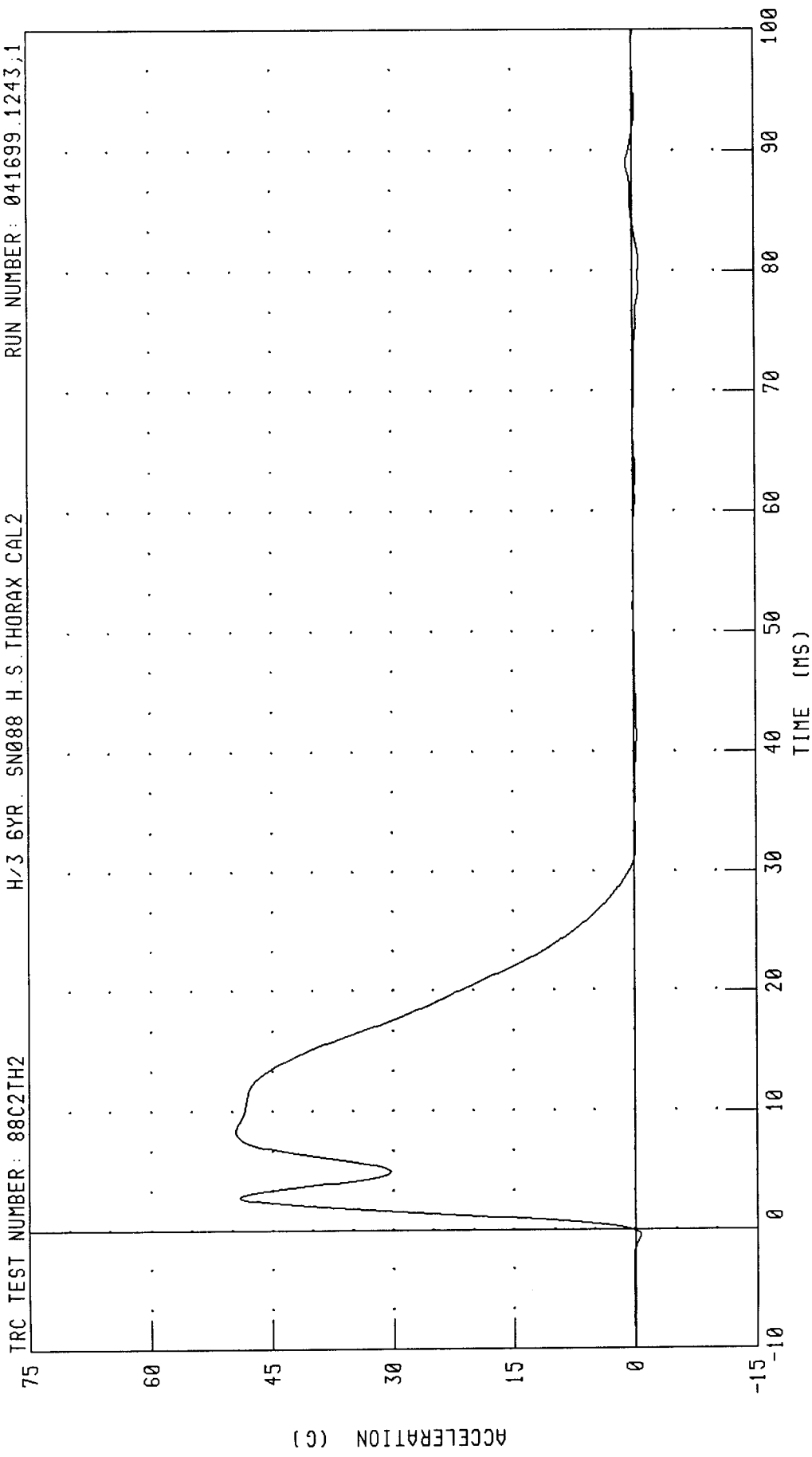
* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN By Calh

RUN NUMBER: 041699.1243;1

HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 88C2TH2 H/3 6YR SN088 H.S. THORAX CAL2 RUN NUMBER: 041699.1243.1



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 49.50 G @ 8.40 MS, -0.81 G @ 80.80 MS

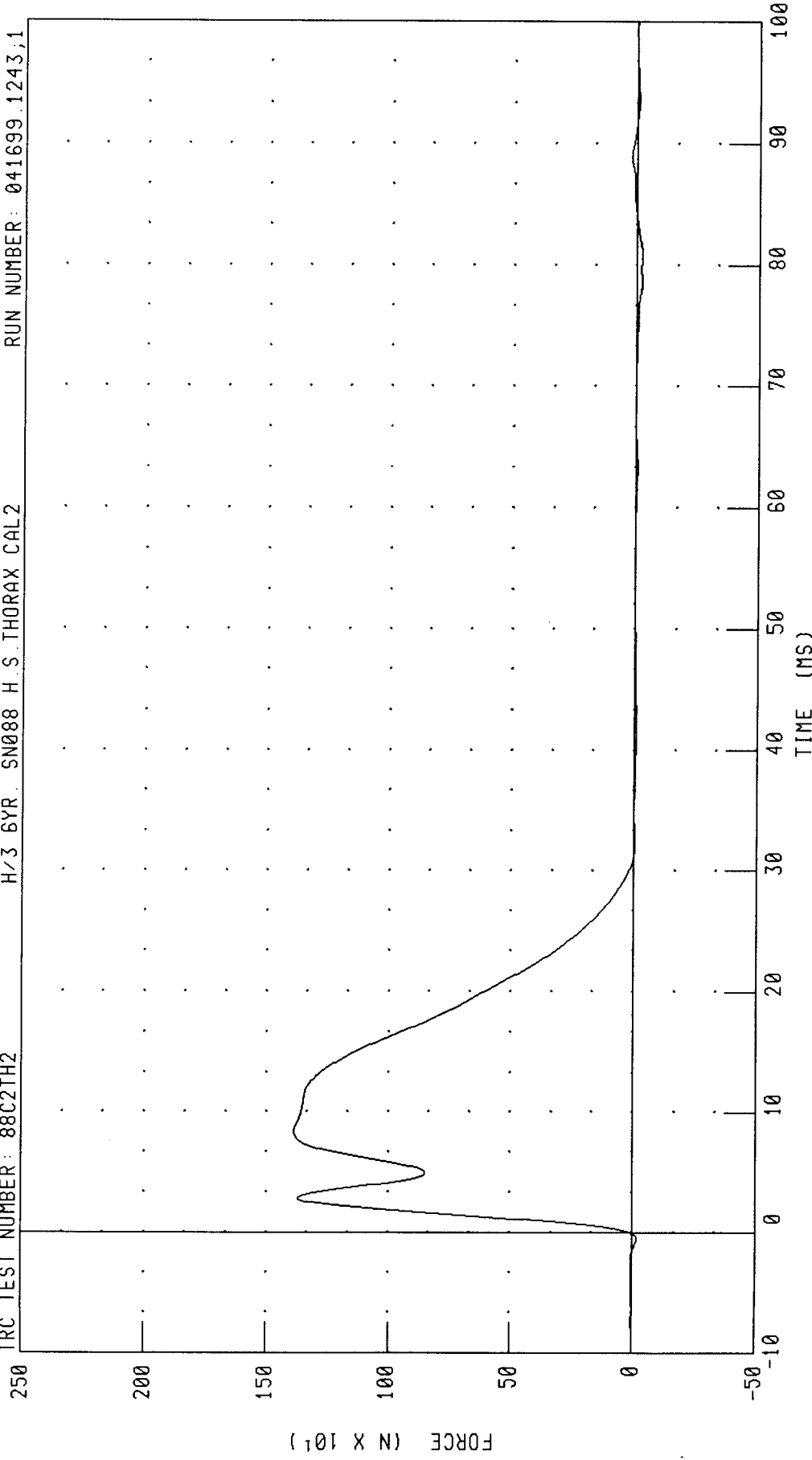
HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 88C2TH2

H/3 6YR SN088 H S THORAX CAL2

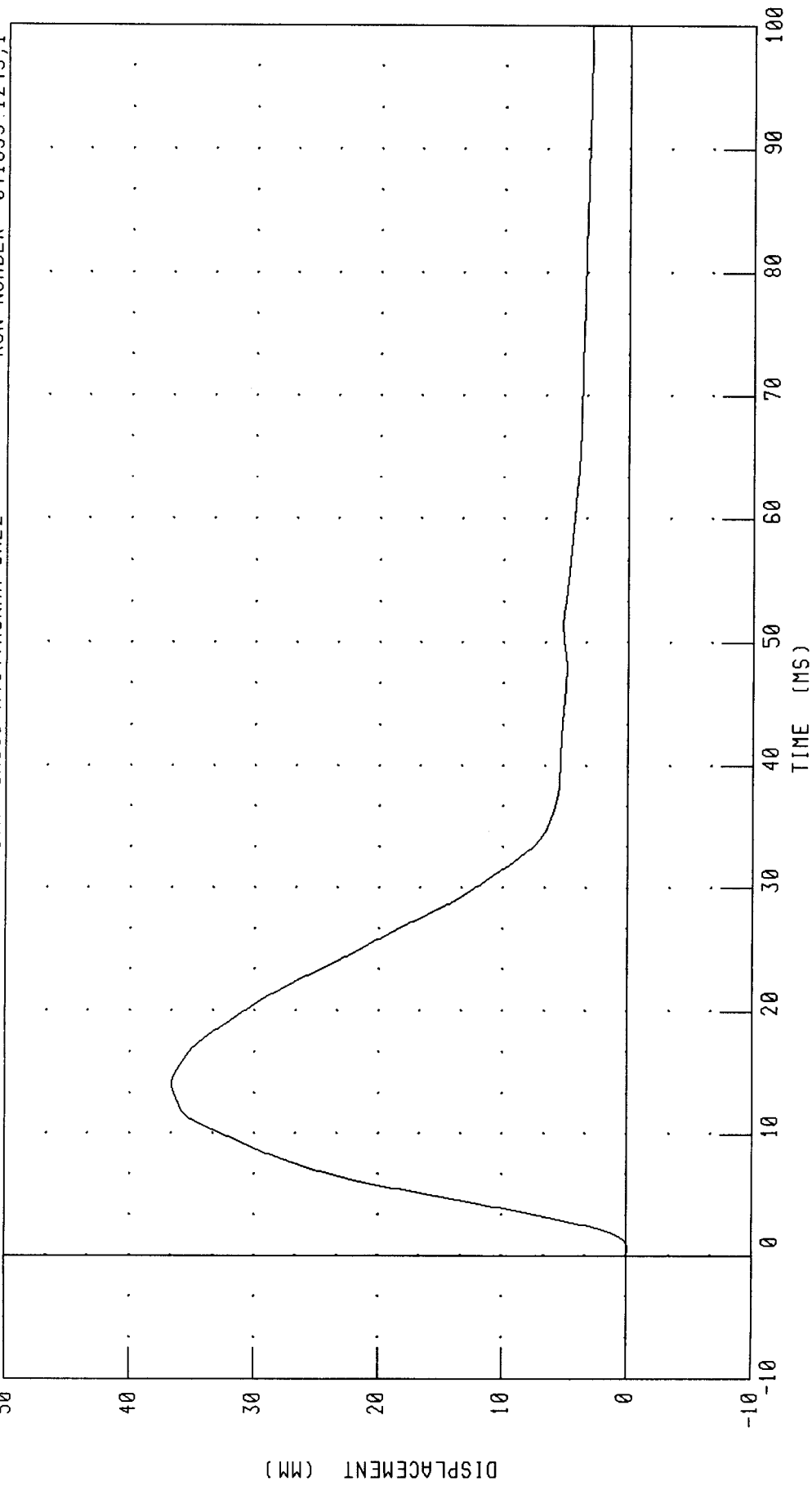
RUN NUMBER: 041699.1243.1



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 1387.14 N @ 8.40 MS; -22.69 N @ 80.80 MS

HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 88C2TH2 H/3 6YR. SN088 H.S. THORAX CAL2 RUN NUMBER: 041699.1243.1



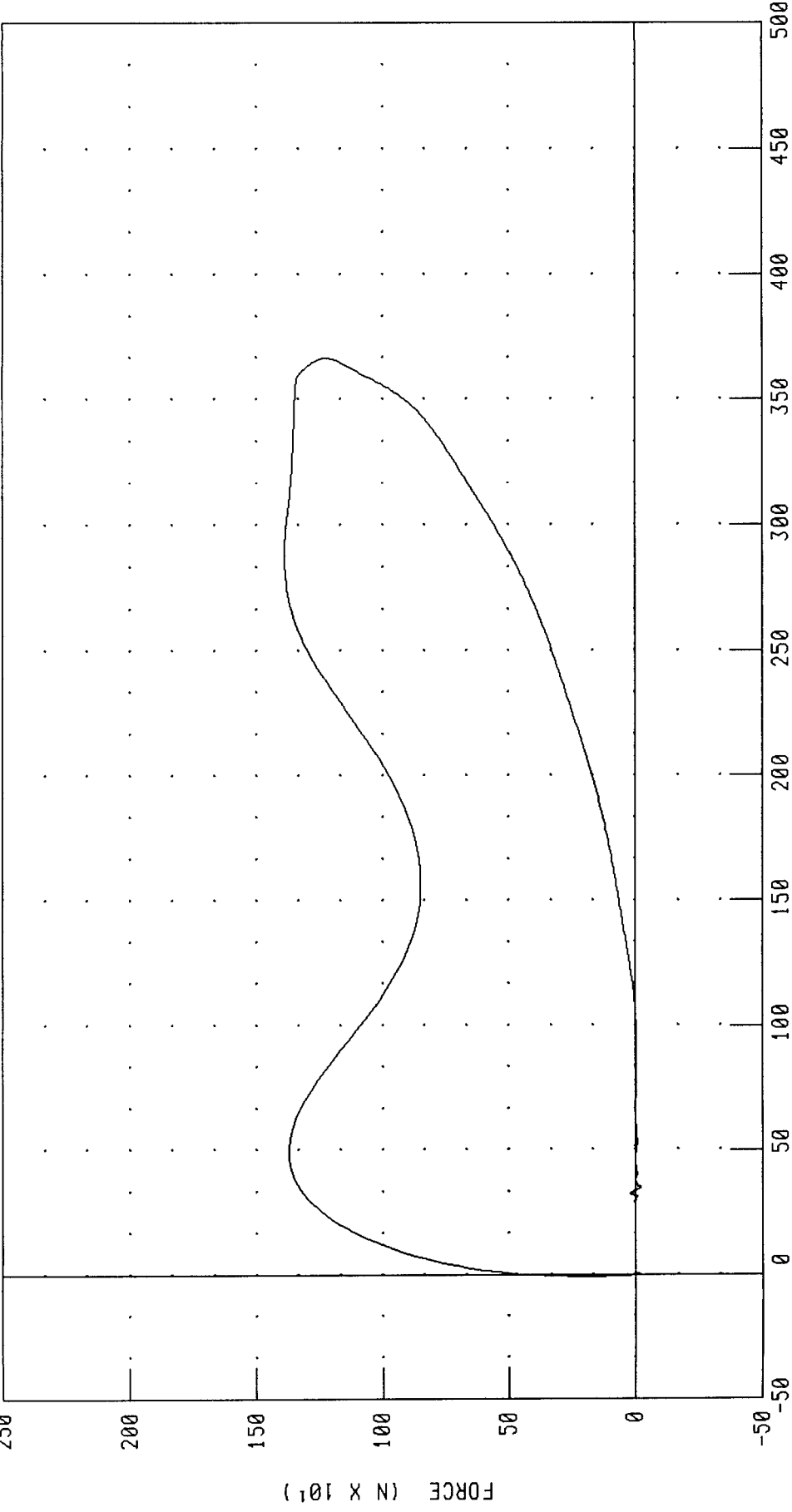
CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 36.65 MM @ 14.08 MS; -0.08 MM @ 0.64 MS

HYBRID III SIX YEAR OLD CHILD DUMMY THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER : 88C2TH2

H/3 6YR SN088 H.S. THORAX CAL2

RUN NUMBER : 041699.1243.1



CHANNEL : CSTXD
PENXF
FILTER : CH. CLASS 180
CH. CLASS 180
DISPLACEMENT (MM X 10⁻¹)
PEAK DATA : 36.65 MM @ 14.08 MS; -0.08 MM @ 0.64 MS
1387.14 N @ 8.40 MS; -22.69 N @ 80.80 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SIX YEAR OLD

19-APR-99

TRC INC.

TEST NO: 88C2RK1

H/3 6YR.SN88 RIGHT KNEE CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.11 M/S
PEAK KNEE IMPACT FORCE 0.82 KG PENDULUM	1800 - 2800 N	2644.4 N

TEST MEETS SPECIFICATIONS

TECHNICIAN By *Cult*

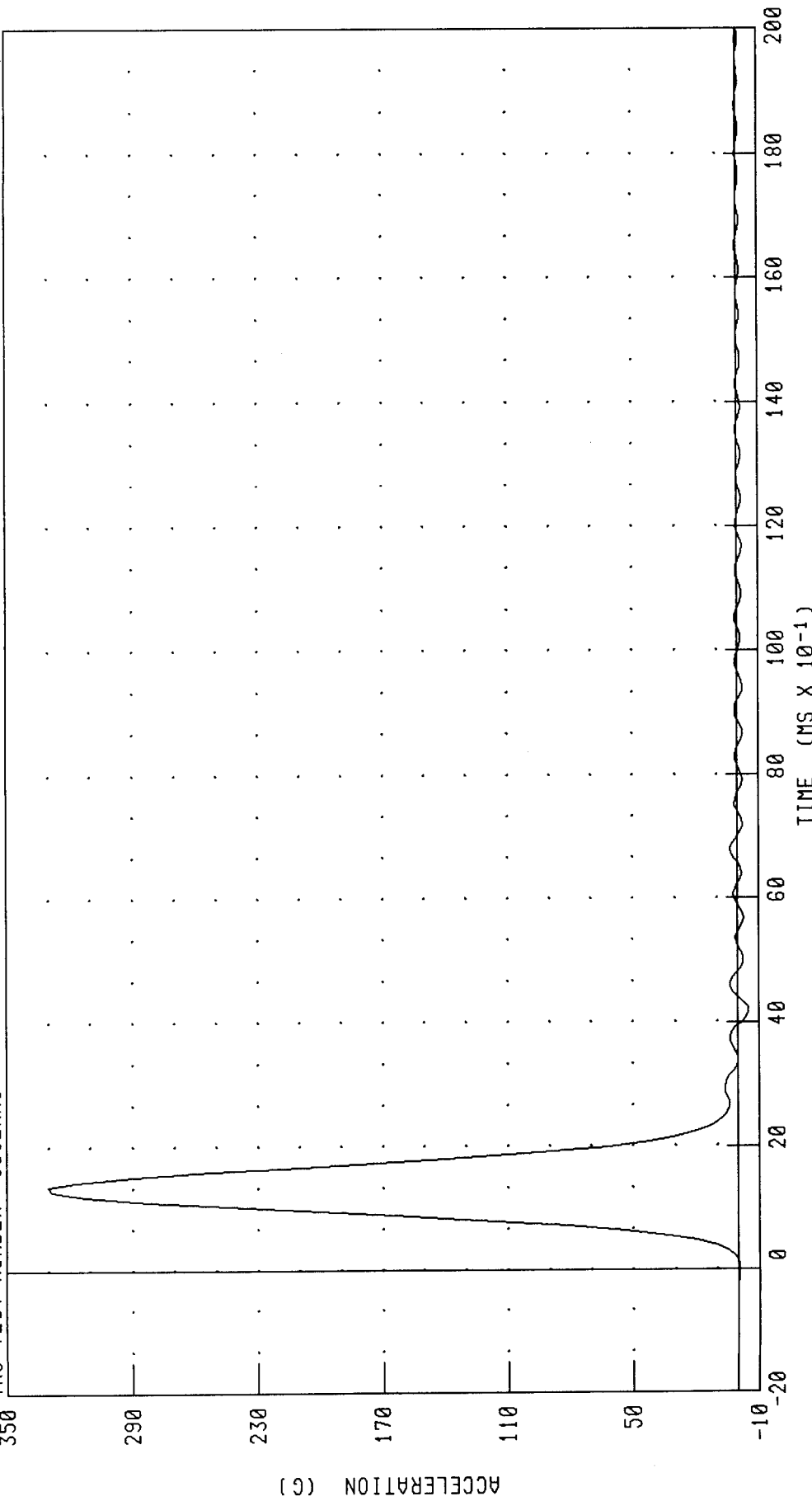
RUN NUMBER: 041999.1442;1

HYBRID III SIX YEAR OLD CHILD DUMMY RIGHT KNEE CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 88C2RK1

H/3 6YR SN88 RIGHT KNEE CAL2

RUN NUMBER: 041999.1442;1



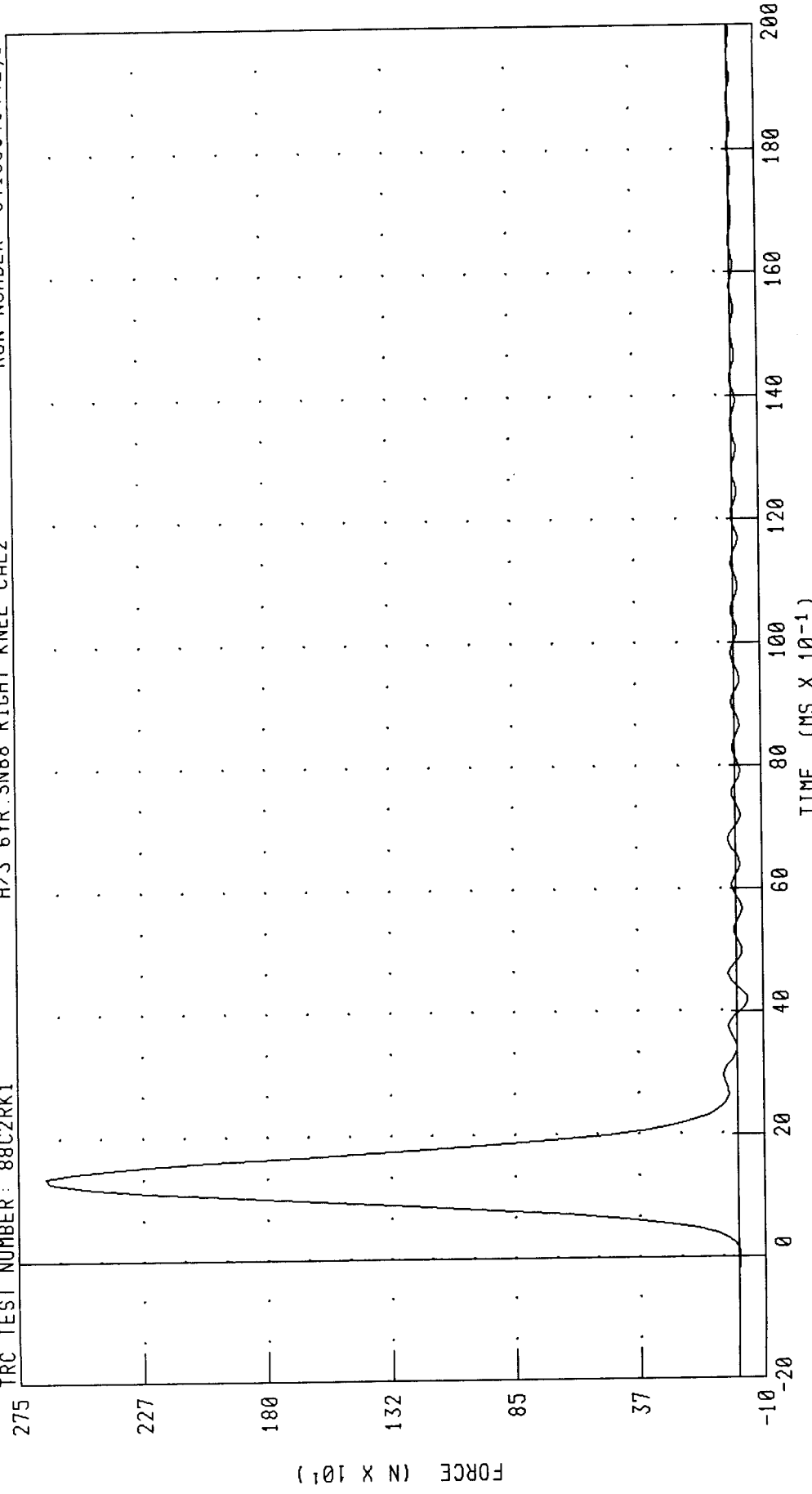
CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 330.30 G @ 1.36 MS; -5.20 G @ 4.16 MS

HYBRID III SIX YEAR OLD CHILD DUMMY RIGHT KNEE CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 88C2RK1

H/3 6YR SN88 RIGHT KNEE CAL2

RUN NUMBER: 041999.1442.1



PEAK DATA: 2644.50 N @ 1.36 MS; -41.63 N @ 4.16 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SIX YEAR OLD

19-APR-99

TRC INC.

TEST NO: 88C2LK1

H/3 6YR. SN088 LEFT KNEE CAL02

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 0.82 KG PENDULUM	1800 - 2800 N	2619.6 N

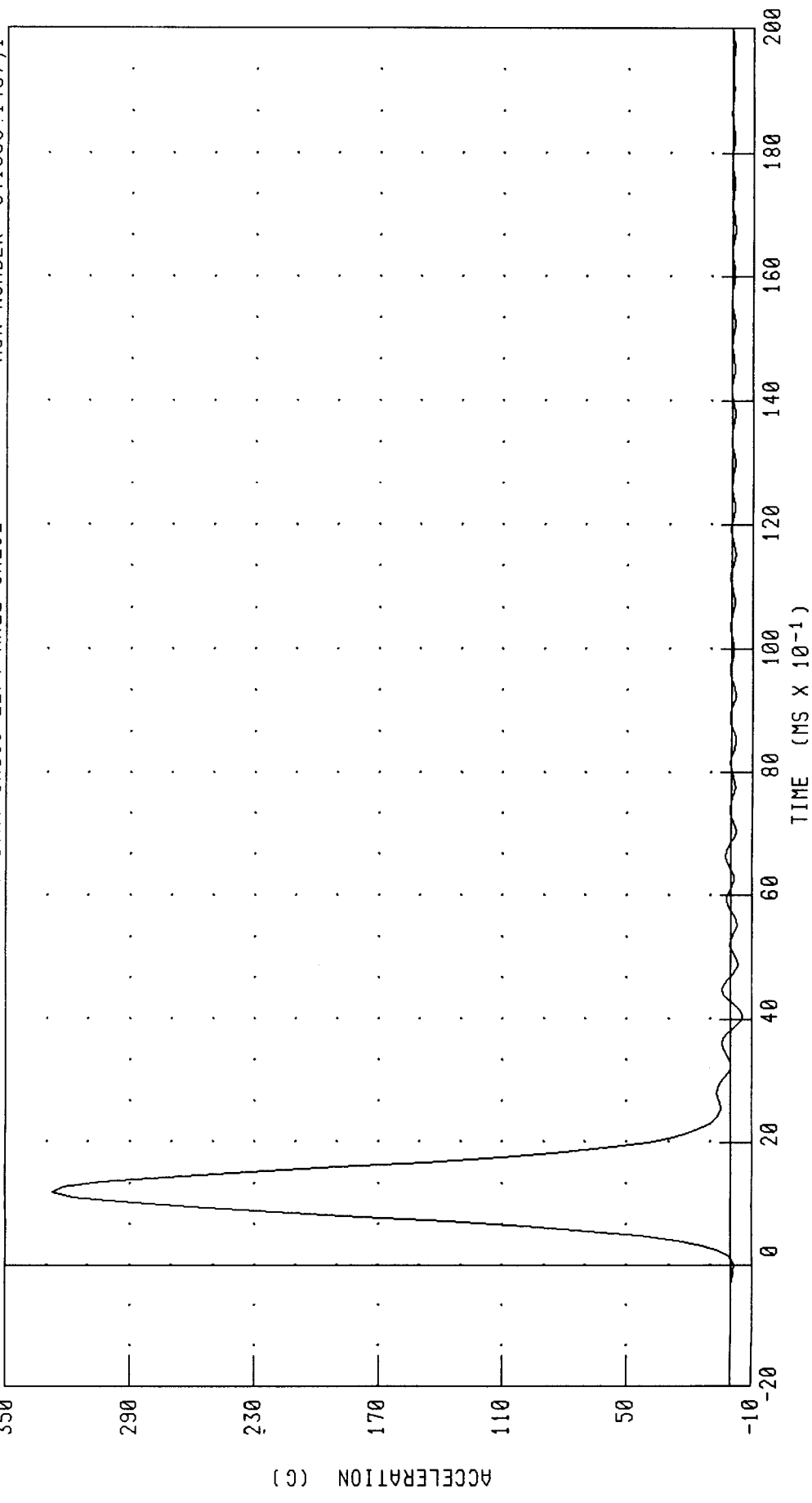
TEST MEETS SPECIFICATIONS

TECHNICIAN B. J. Calhoun

RUN NUMBER: 041999.1437;1

HYBRID III SIX YEAR OLD CHILD DUMMY LEFT KNEE CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 88C2LK1 H/3 6YR. SN088 LEFT KNEE CAL02 RUN NUMBER: 041999.1437.1



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 327.20 G @ 1.20 MS, -5.66 G @ 4.08 MS

HYBRID III SIX YEAR OLD CHILD DUMMY LEFT KNEE CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 88C2LK1 H/3 6YR SN088 LEFT KNEE CAL02 RUN NUMBER: 041999.1437;1

275

227

180

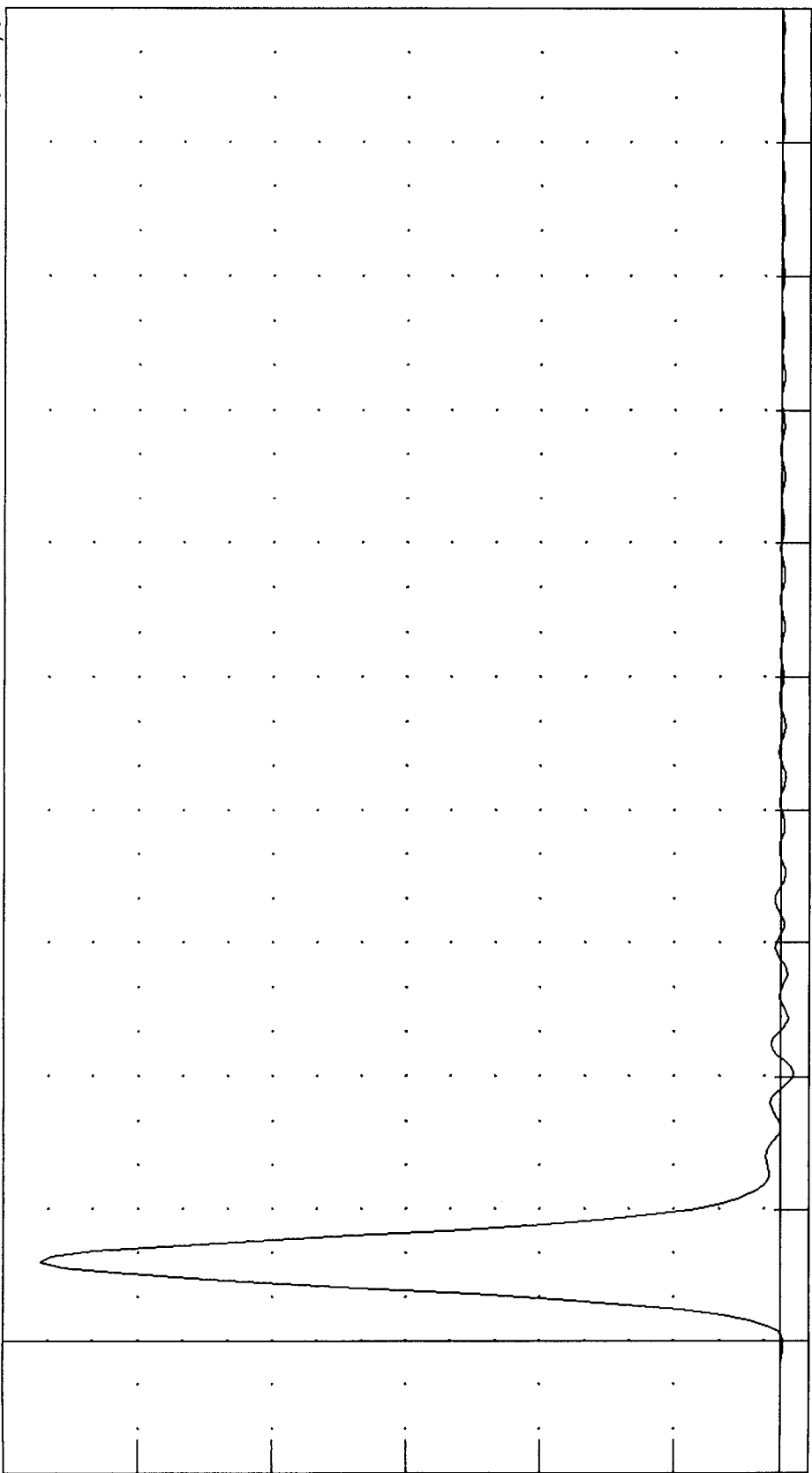
132

85

37

-10

FORCE (N X 10¹)



TIME (MS X 10⁻¹)

CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 2619.68 N @ 1.20 MS; -45.33 N @ 4.08 MS

Pre-Test Dummy Certification

Hybrid III 5th Female Dummy S/N 289

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

08-APR-99

TRC INC.

TEST NO: 289C5HD1

S.FEMALE SN289 HEAD DROP CAL5

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	22.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	269.78 G
PEAK LATERAL ACCELERATION	15 G MAX	1.36 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

By cult

RUN NUMBER: 040899.1119;1

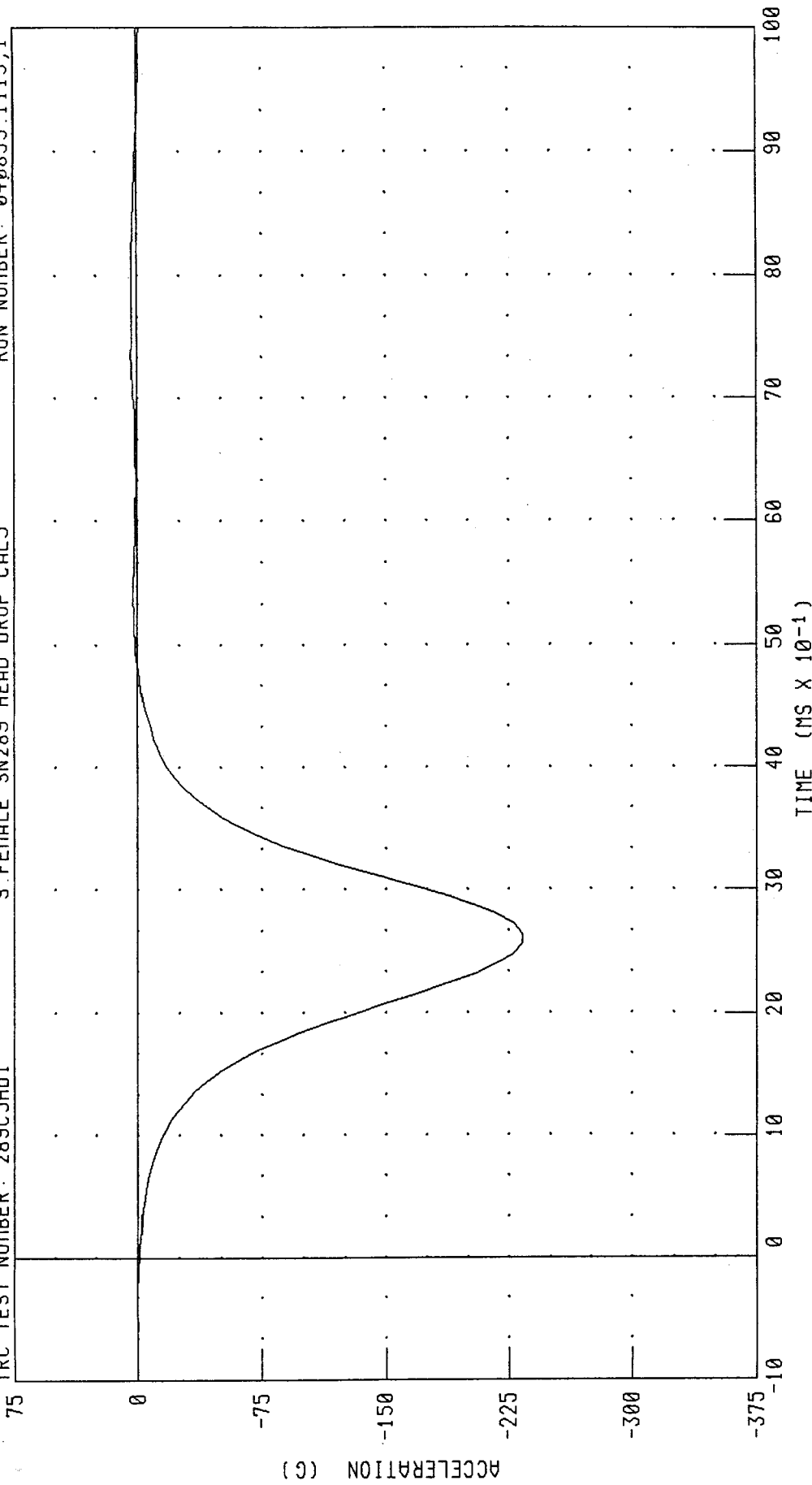
SMALL FEMALE HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 289C5HD1

S. FEMALE SN289 HEAD DROP CAL5

RUN NUMBER: 040899.1119;1



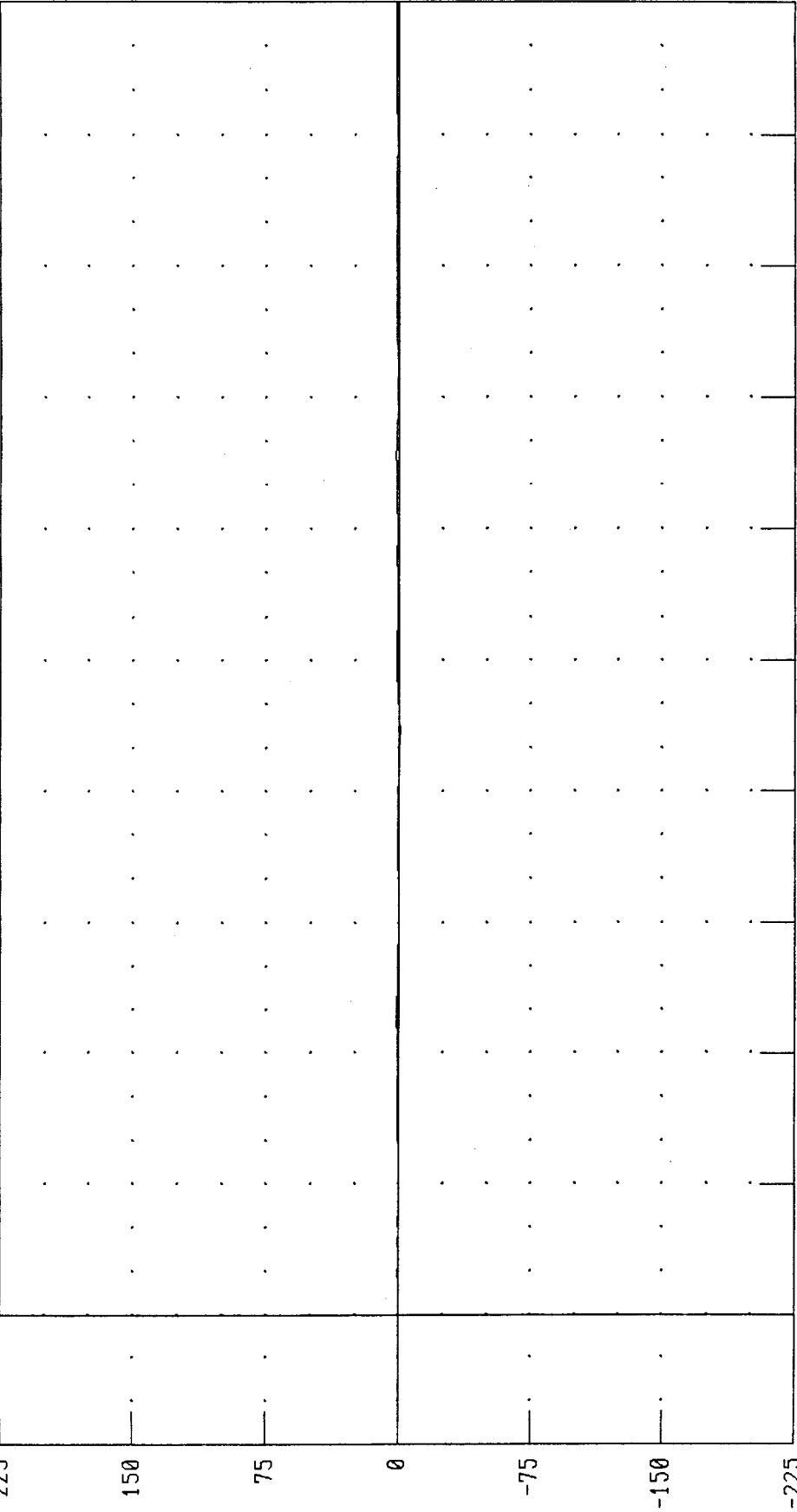
CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 3.72 G @ 7.36 MS; -233.52 G @ 2.64 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
 HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 289C5HD1 S. FEMALE SN289 HEAD DROP CALS RUN NUMBER: 040899.1119;1

225



150
75
0
-75
-150
-225

ACCELERATION (G)

0 10 20 30 40 50 60 70 80 90 100

TIME (MS X 10⁻¹)

CHANNEL: HEDYC FILTER: CH. CLASS 1000

PEAK DATA: 1.36 G @ 6.56 MS; -0.59 G @ 4.40 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION

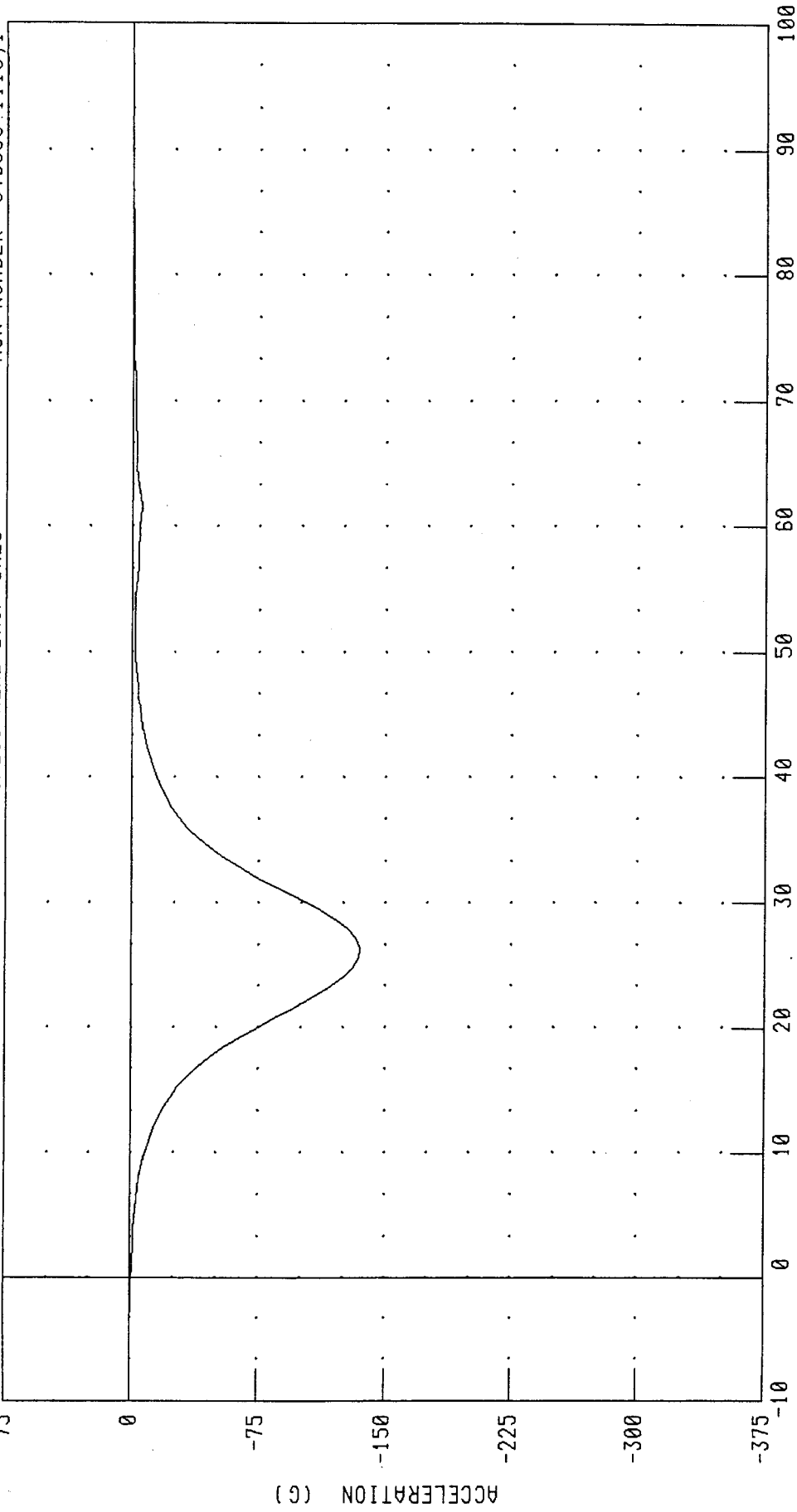
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 289C5HD1

S. FEMALE SN289 HEAD DROP CAL5

RUN NUMBER: 040899.1119.1

75



CHANNEL: HEDZG

FILTER: CH. CLASS 1000

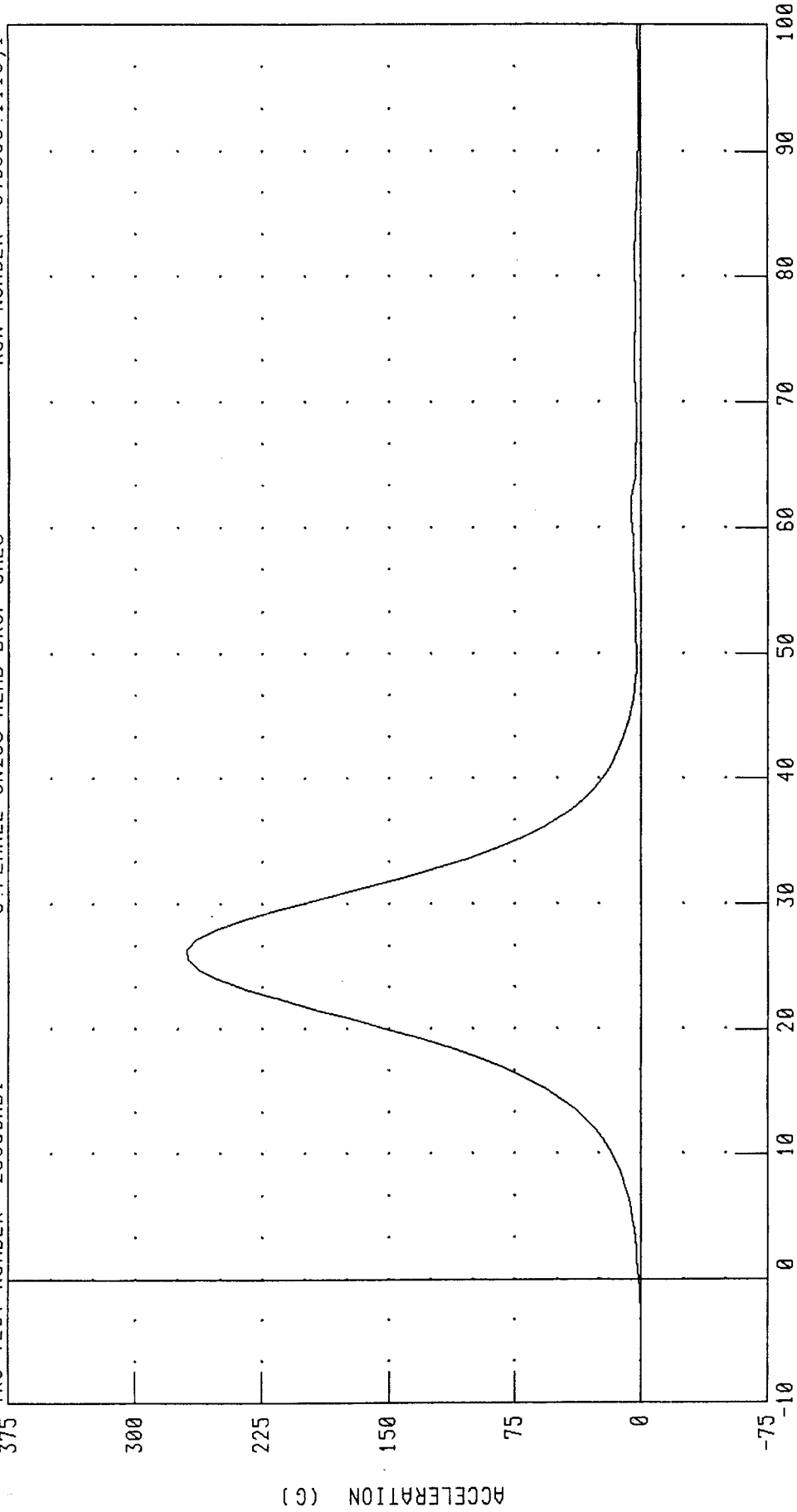
PEAK DATA: 0.40 G @ 9.12 MS; -135.10 G @ 2.64 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 289C5HDI

S. FEMALE SN289 HEAD DROP CAL5

RUN NUMBER: 040899.1119,1



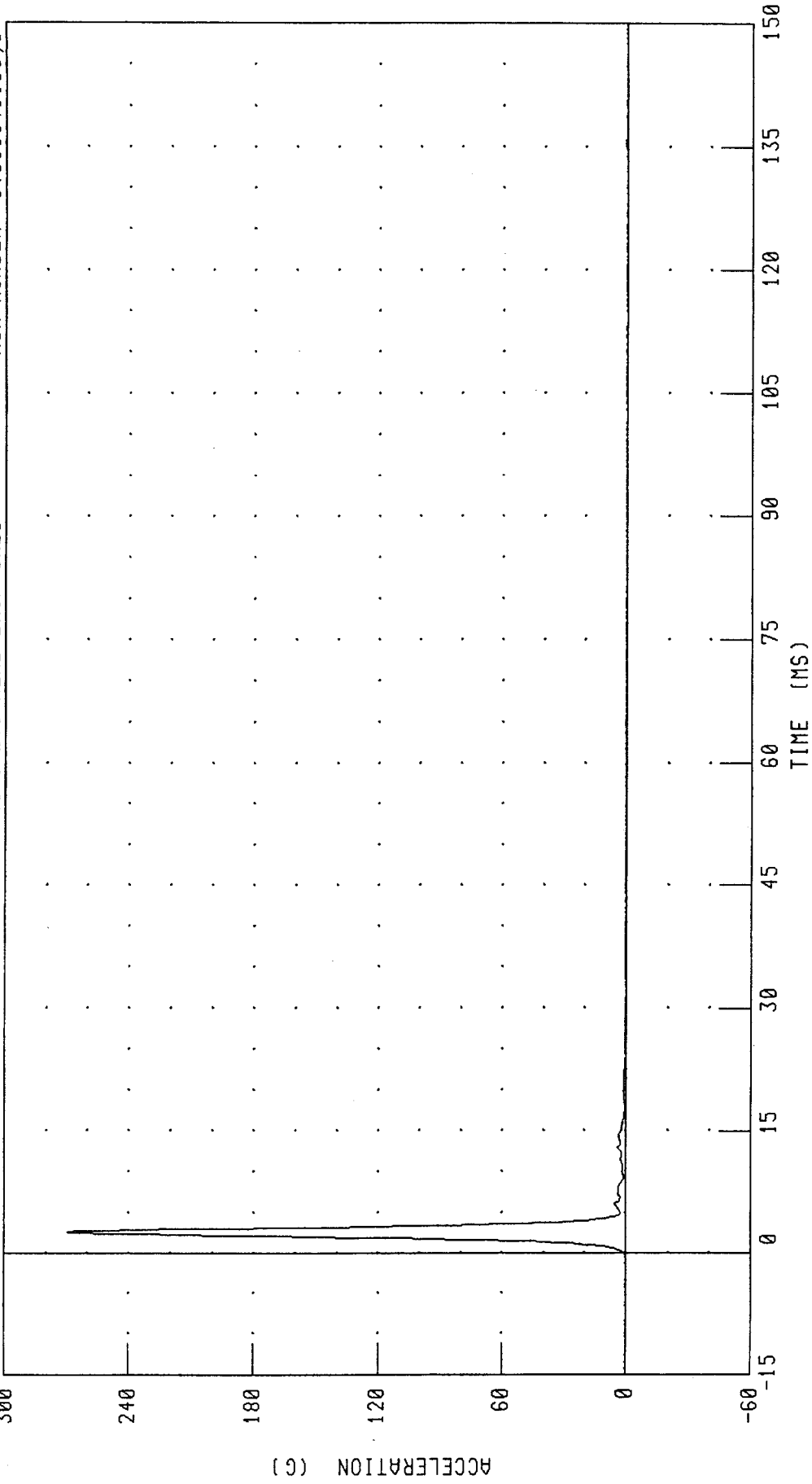
CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 269.78 G @ 2.64 MS; 0.01 G @ -0.96 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
CHECK PLOT - HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 289C5HDI

S. FEMALE SN289 HEAD DROP CAL5

RUN NUMBER: 040899.1119,1



CHANNEL: HEDRC FILTER: CH. CLASS 1000

PEAK DATA: 269.78 G @ 2.64 MS; 0.01 C @ -14.88 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

08-APR-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 289C5NF1 S.FEMALE SN289 NECK FLEX. CAL5

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	22.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	7.06 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 2.1 - 2.5 M/S	2.37 M/S
	20 MS 4.0 - 5.0 M/S	4.66 M/S
	30 MS 5.8 - 7.0 M/S	6.49 M/S
PEAK D-PLANE ROTATION	80 - 92 DEG.	83.38 DEG.
PEAK MOMENT DURING ROTATION INTERVAL	69 - 83 NM	71.68 NM
POSITIVE MOMENT DECAY TIME TO 10NM	80 -100 MS	88.00 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN Bj cult

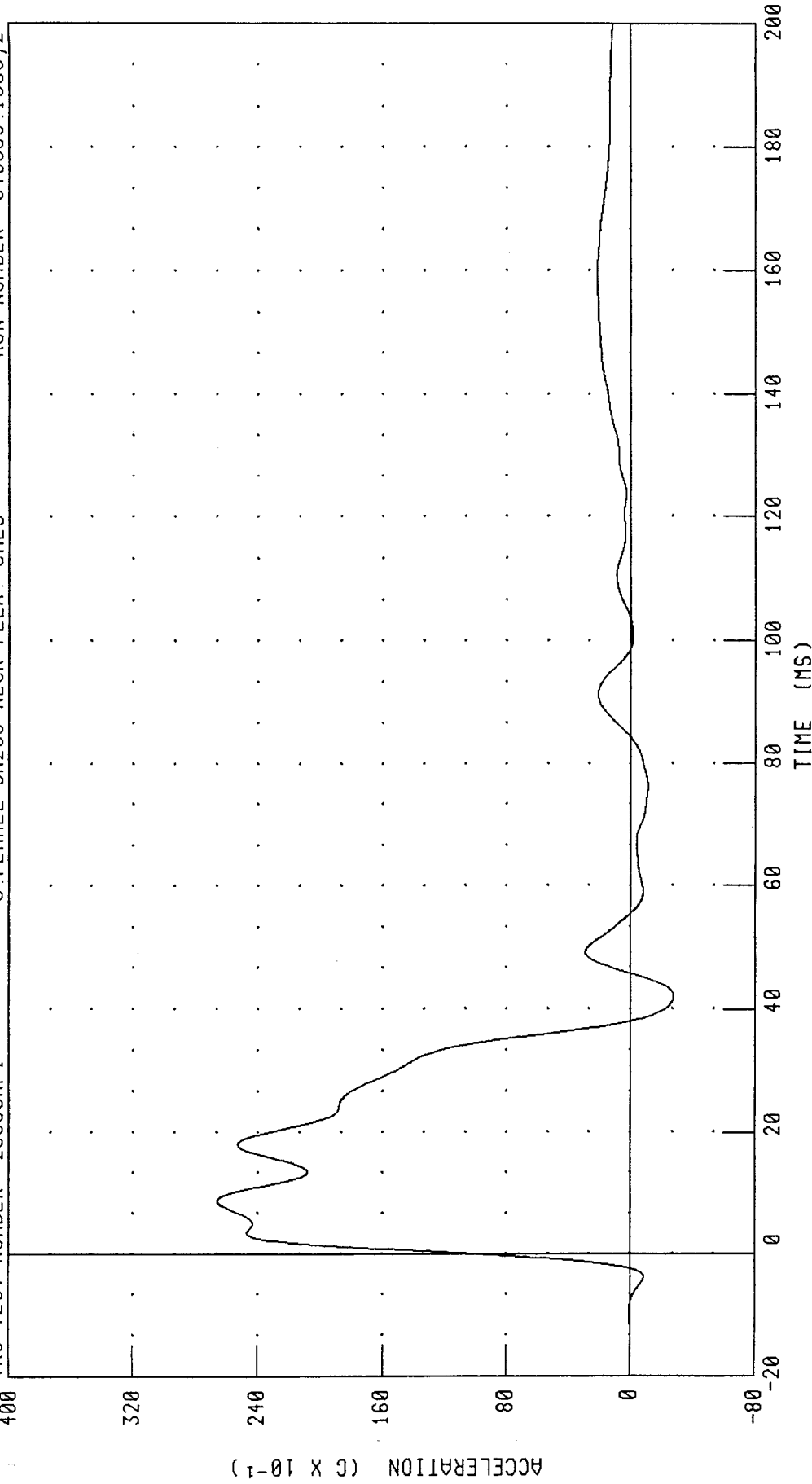
RUN NUMBER: 040899.1307;2

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 289C5NF1

S. FEMALE SN289 NECK FLEX. CAL5

RUN NUMBER: 040899.1308,2



CHANNEL: PENXC FILTER: CH. CLASS 60

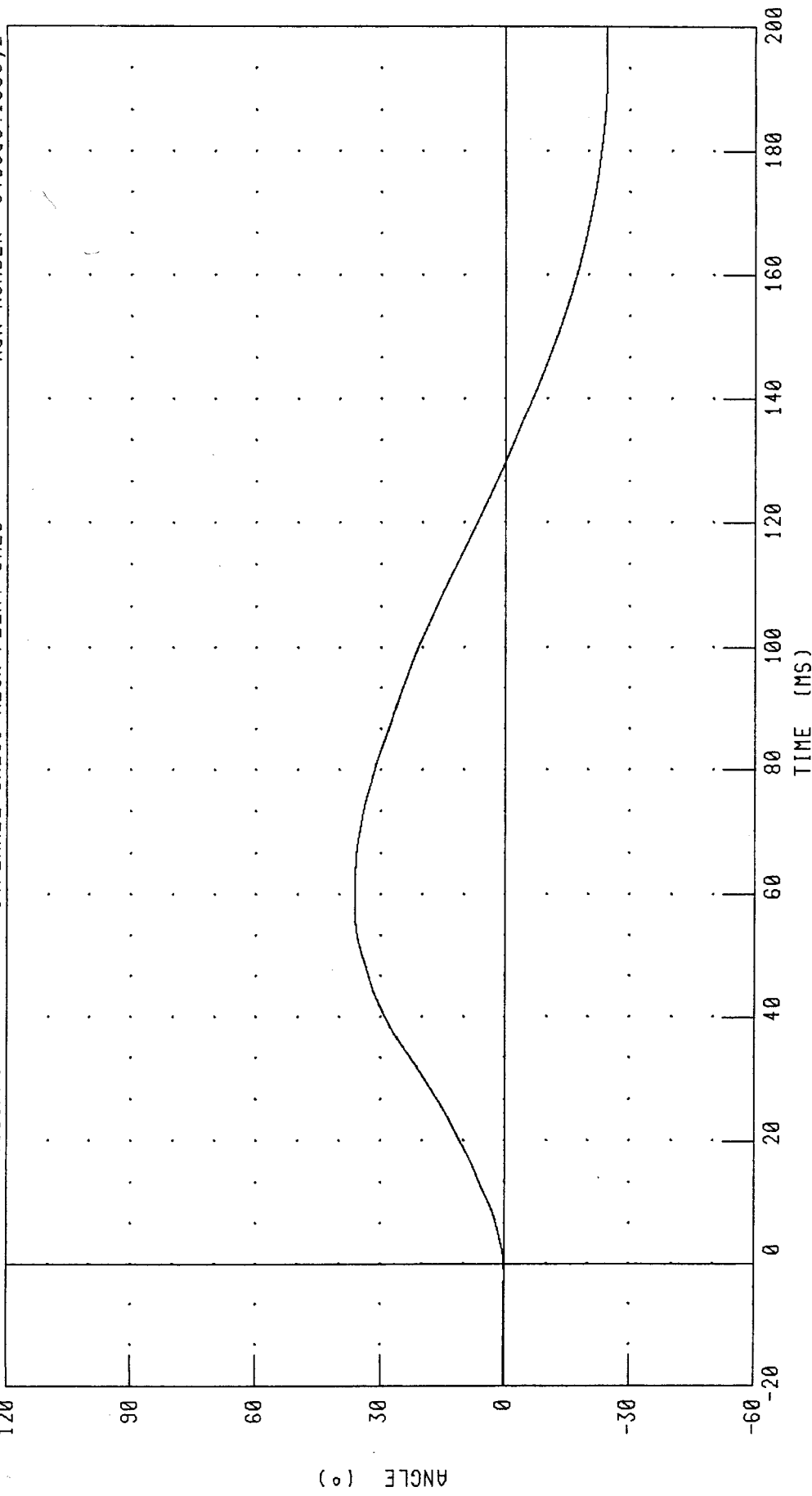
PEAK DATA: 26.60 G @ 8.72 MS; -2.74 G @ 42.08 MS

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 289C5NF1

S. FEMALE SN289 NECK FLEX. CAL5

RUN NUMBER: 040899.1308;2



CHANNEL: BETA FILTER: CH. CLASS 60

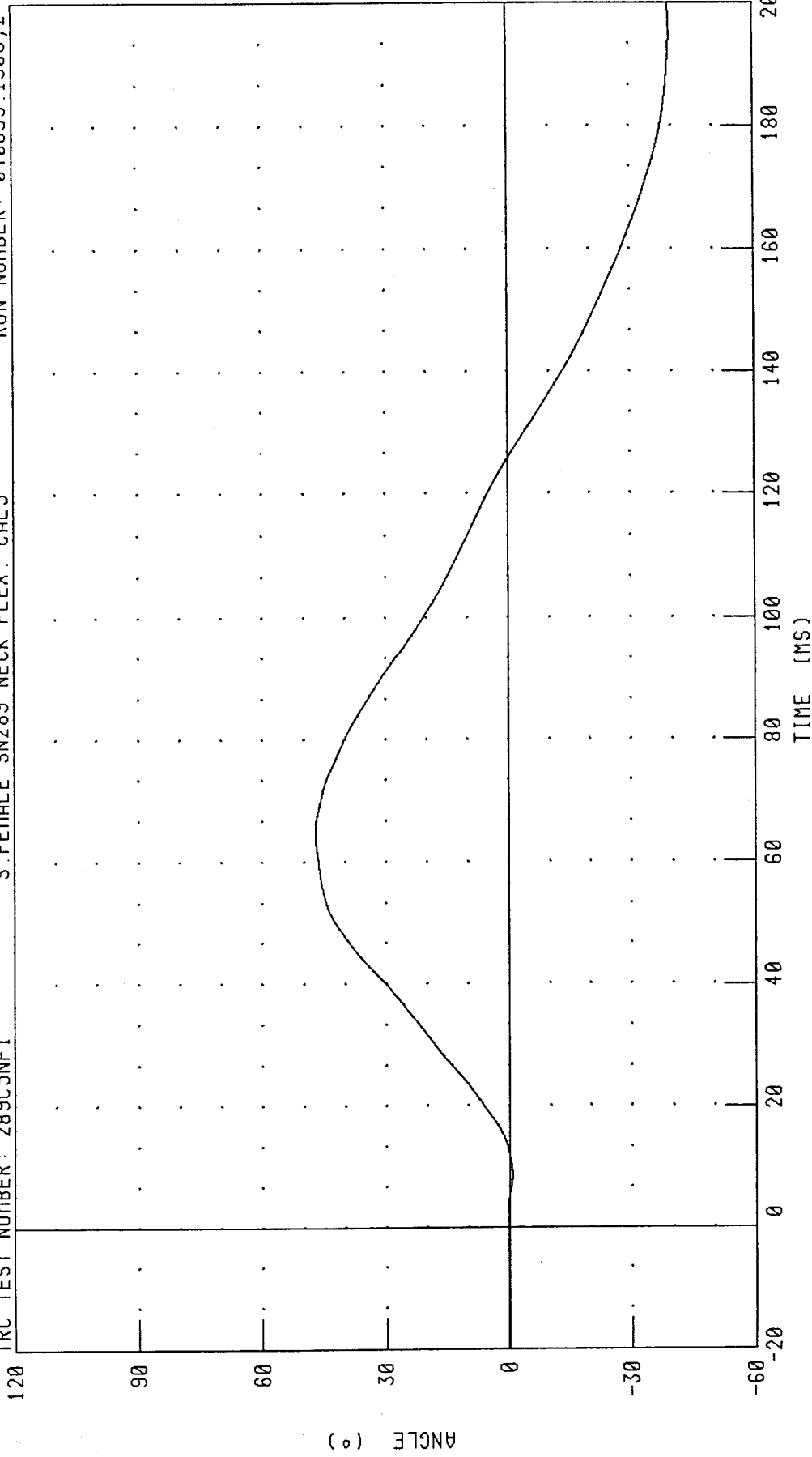
PEAK DATA: 36.30 ° @ 57.84 MS; -24.57 ° @ 196.16 MS

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 289C5NF1

S. FEMALE SN289 NECK FLEX. CAL5

RUN NUMBER: 040899.1308;2



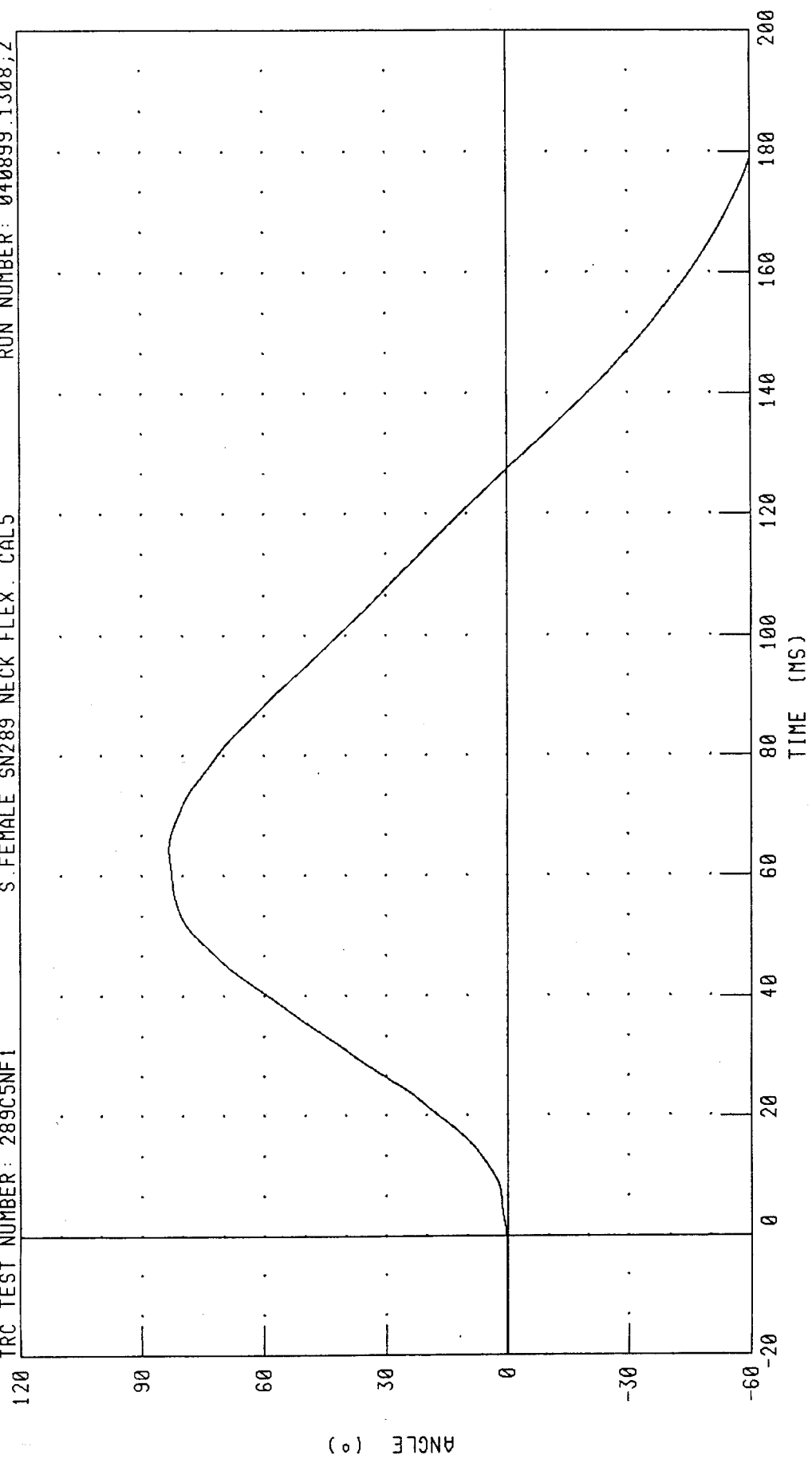
CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 47.28 ° @ 64.72 MS; -39.67 ° @ 196.32 MS

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 289C5NF1 S. FEMALE SN289 NECK FLEX. CAL5 RUN NUMBER: 040899.1308;2



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 83.39 ° @ 64.32 MS; -64.24 ° @ 196.24 MS

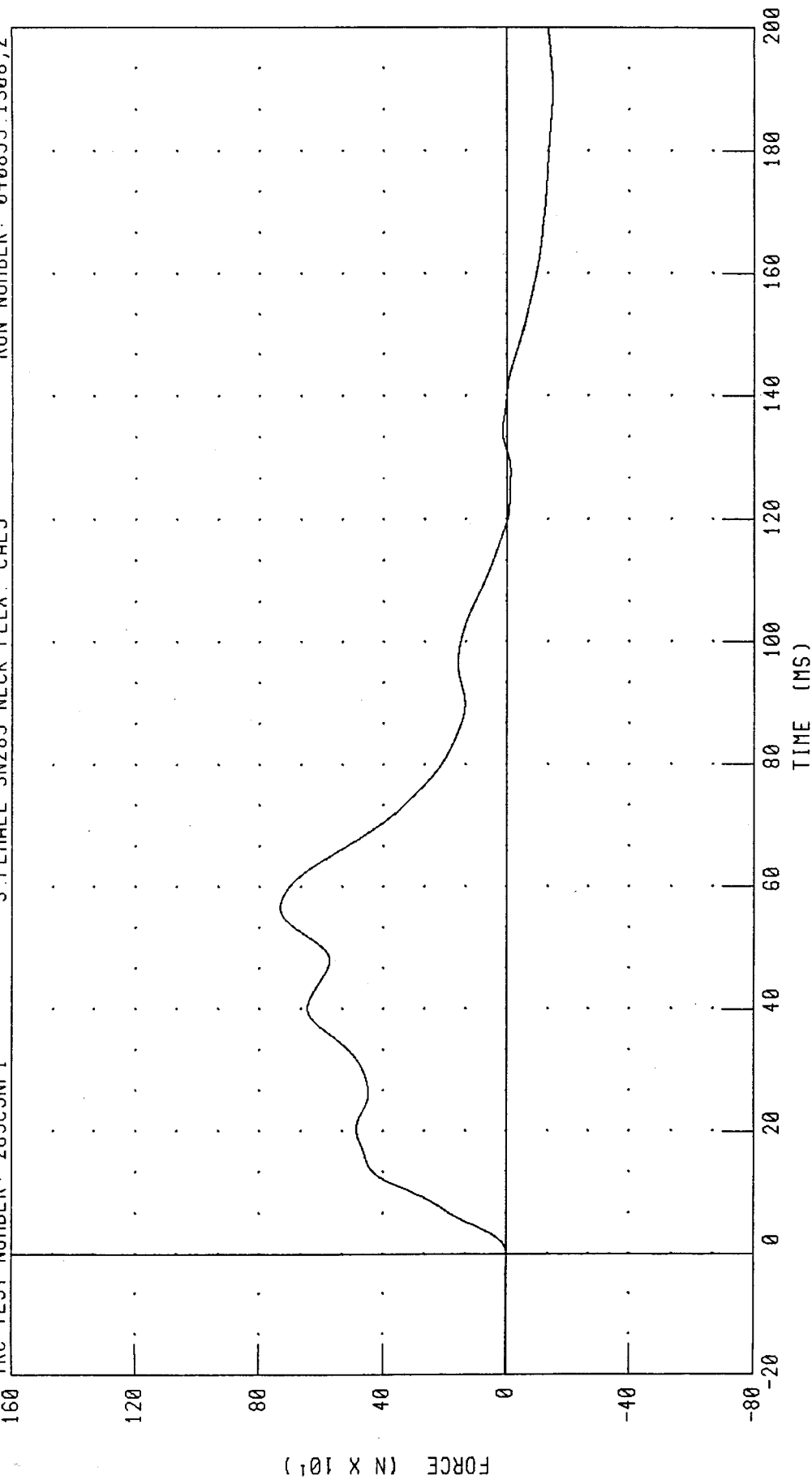
SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 289C5NF1

S. FEMALE SN289 NECK FLEX. CAL5

RUN NUMBER: 040899.1308;2



CHANNEL: NEKXF FILTER: CH. CLASS 60

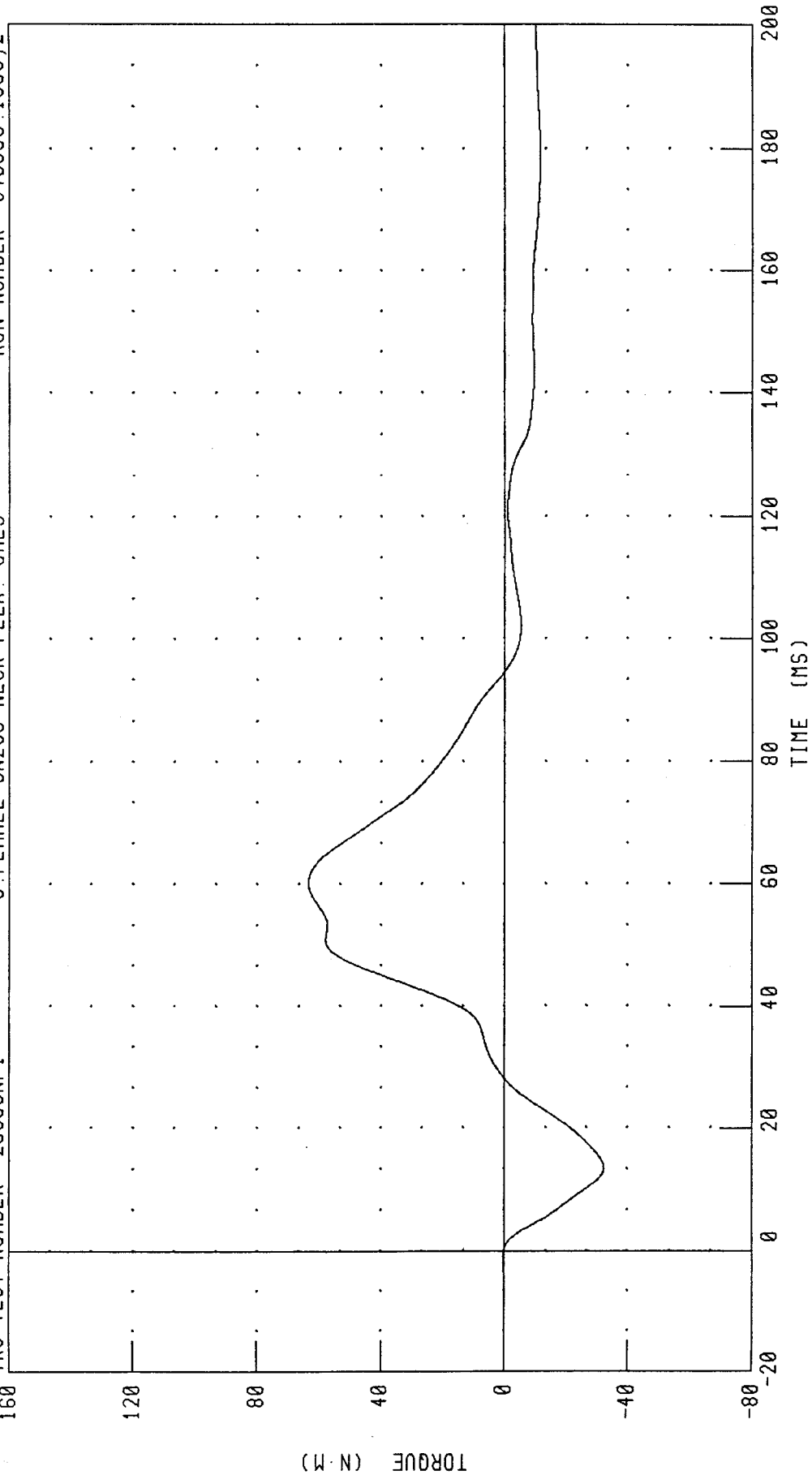
PEAK DATA: 733.54 N @ 56.64 MS; -150.05 N @ 190.08 MS

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

TRC TEST NUMBER: 289C5NF1

S. FEMALE SN289 NECK FLEX. CAL5

RUN NUMBER: 040899.1308;2



CHANNEL: NEKYM FILTER: CH. CLASS 60

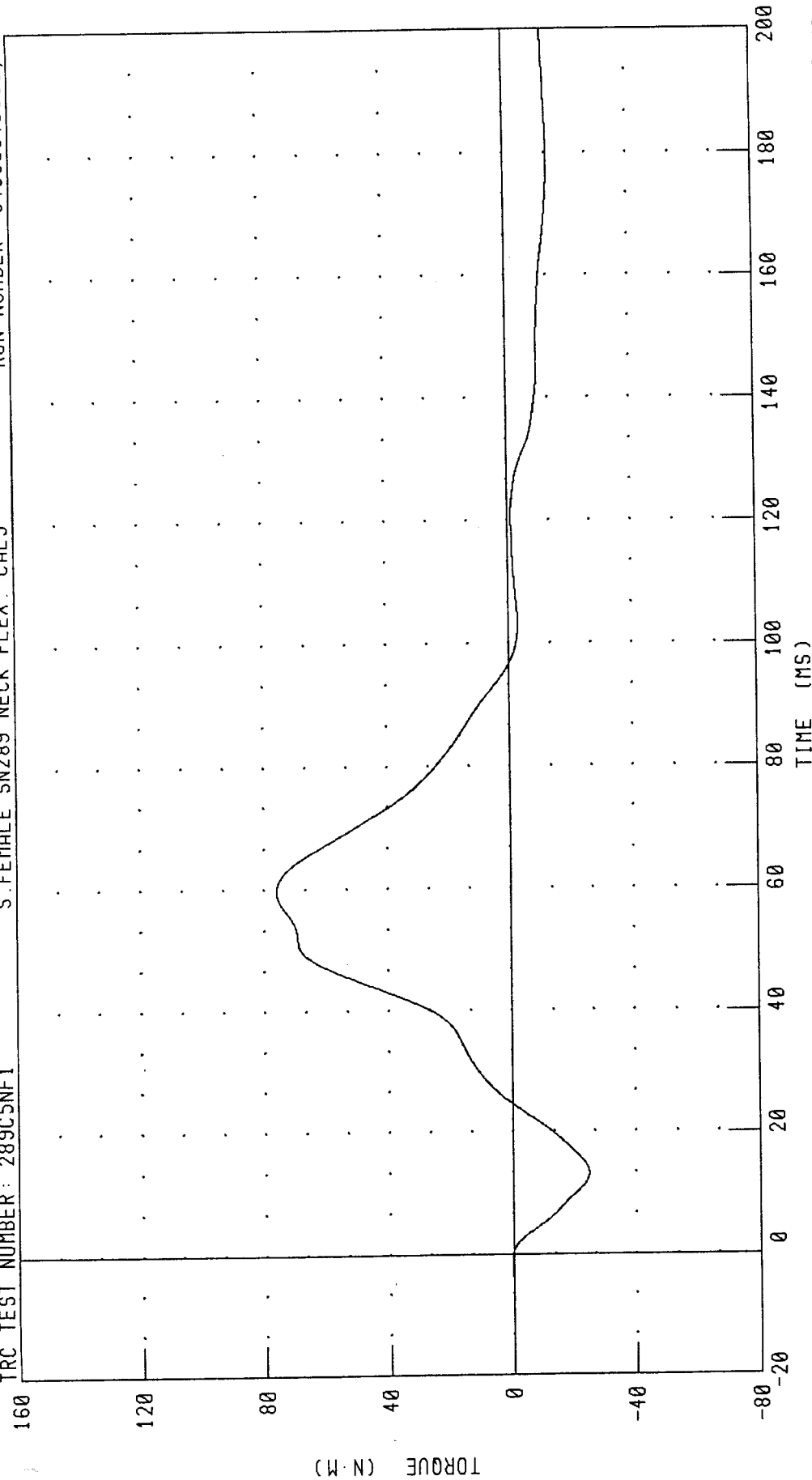
PEAK DATA: 63.57 N·M @ 60.24 MS; -32.39 N·M @ 13.52 MS

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 289C5NF1

S. FEMALE SN289 NECK FLEX. CAL5

RUN NUMBER: 040899.1308;2



CHANNEL: NEKOM FILTER: CH. CLASS 60

PEAK DATA: 76.12 N.M @ 59.76 MS; -24.72 N.M @ 13.12 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

08-APR-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 289C5NE2 S.FEMALE SN289 NECK EXT. CAL5

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	22.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.5 - 1.9 M/S	1.78 M/S
	20 MS 3.1 - 3.9 M/S	3.58 M/S
	30 MS 4.6 - 5.6 M/S	5.30 M/S
PEAK D-PLANE ROTATION	97 - 109 DEG.	105.65 DEG.
PEAK MOMENT DURING ROTATION INTERVAL	- 55 - -69 NM	-55.77 NM
NEGATIVE MOMENT DECAY TIME FROM PEAK TO -10 NM LEVEL	94 - 114 MS	98.08 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN By Carl

RUN NUMBER: 040899.1443;1

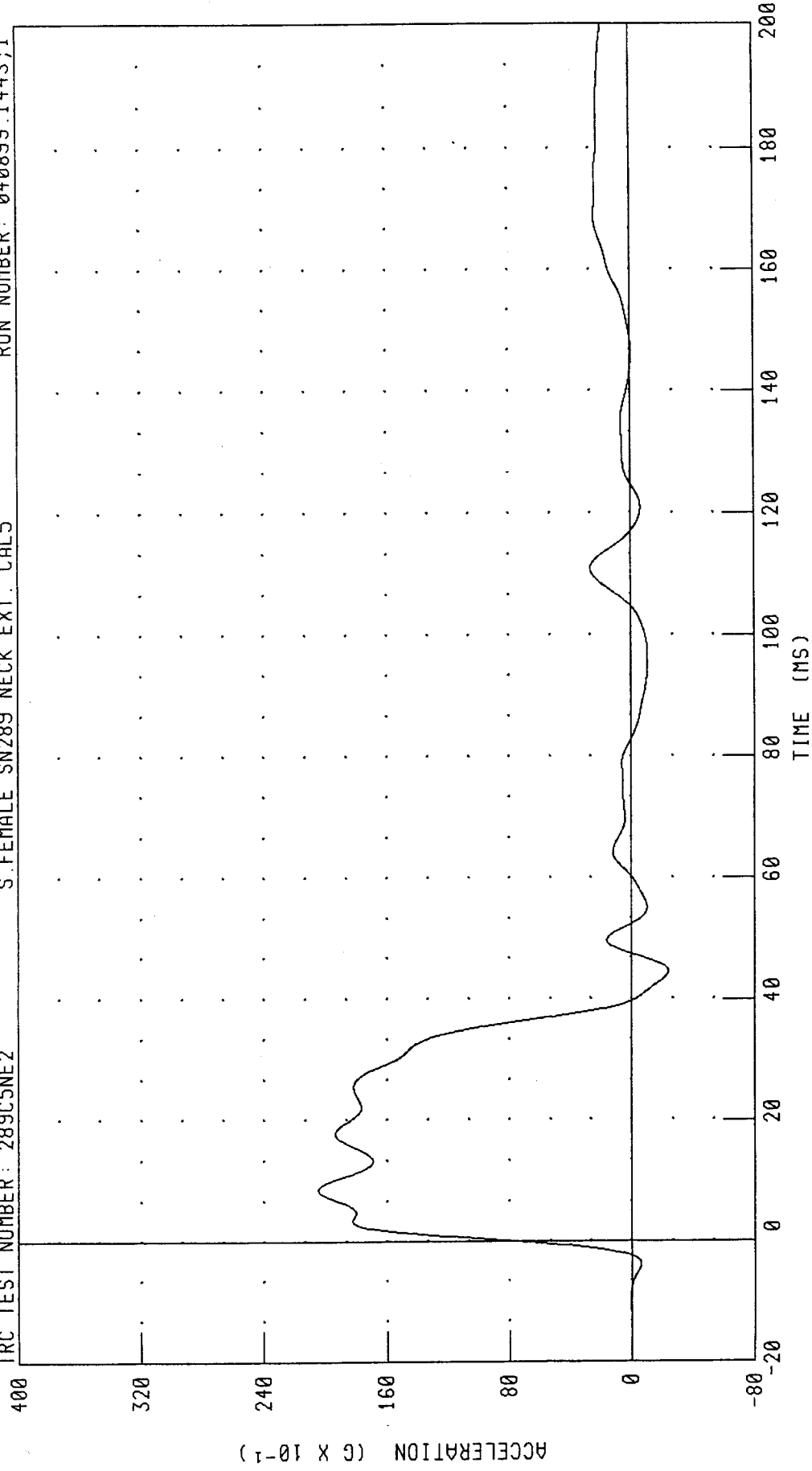
SMALL FEMALE NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 289C5NE2

S. FEMALE SN289 NECK EXT. CAL5

RUN NUMBER: 040899.1443.1



CHANNEL: PENXC FILTER: CH. CLASS 60

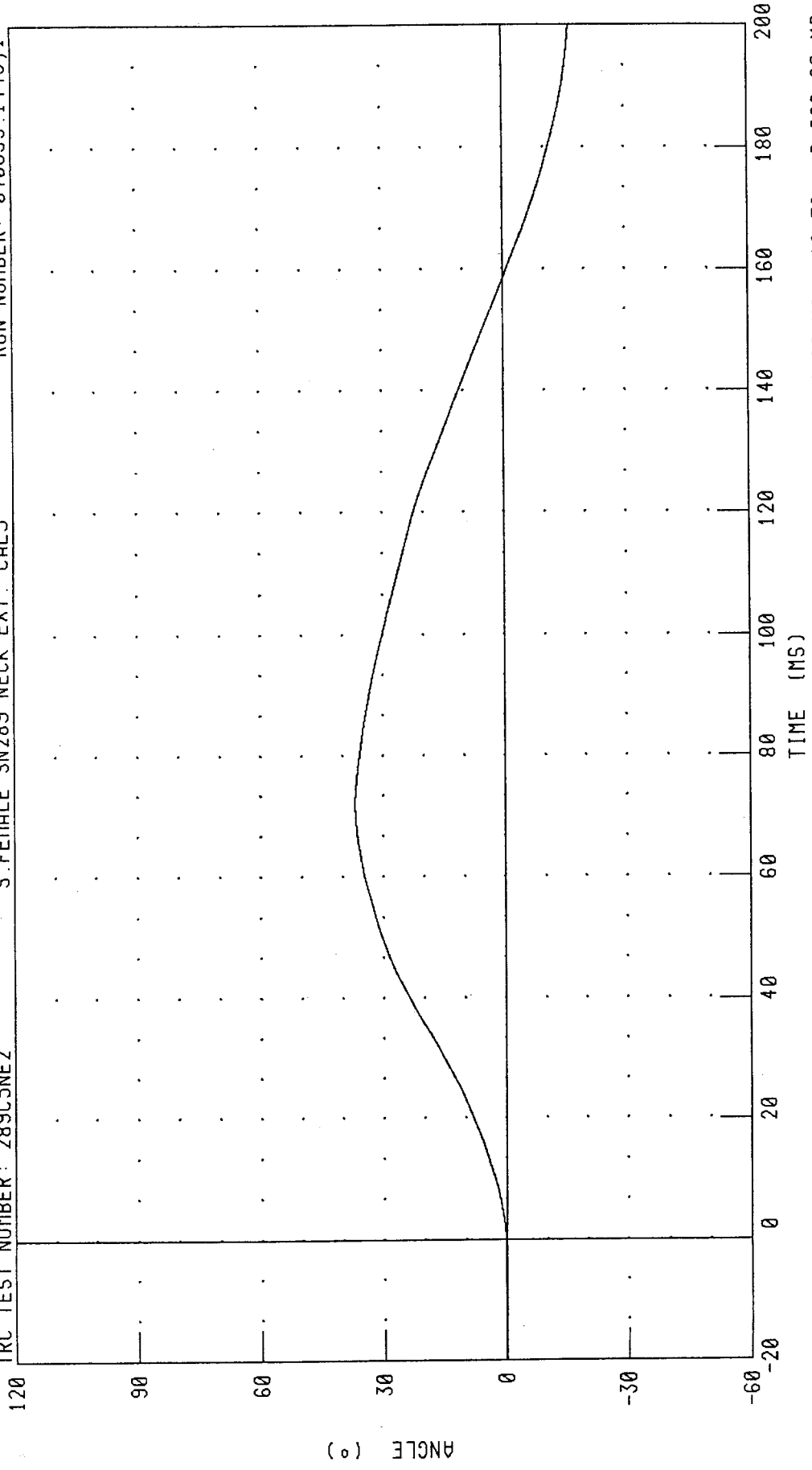
PEAK DATA: 20.48 G @ 8.64 MS; -2.38 G @ 44.48 MS

SMALL FEMALE NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER : 289C5NE2

S.FEMALE SN289 NECK EXT. CAL5

RUN NUMBER : 040899.1443,1

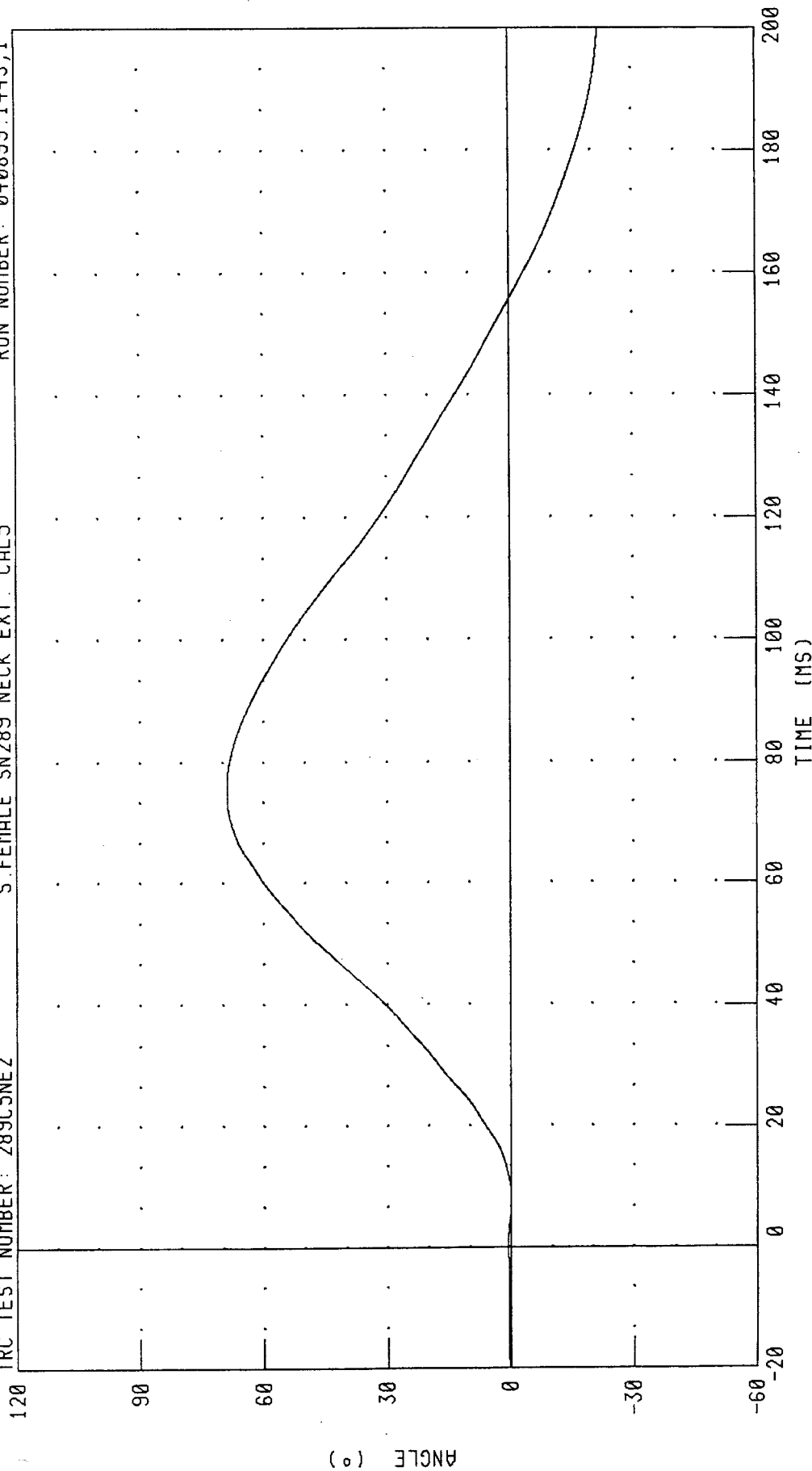


CHANNEL : BETA FILTER : CH. CLASS 60 PEAK DATA : 36.91 ° @ 72.00 MS ; -16.56 ° @ 200.00 MS

SMALL FEMALE NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
S. FEMALE SN289 NECK EXT. CAL5

TRC TEST NUMBER: 289C5NE2

RUN NUMBER: 040899.1443,1



CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 68.86 ° @ 74.88 MS; -21.95 ° @ 200.00 MS

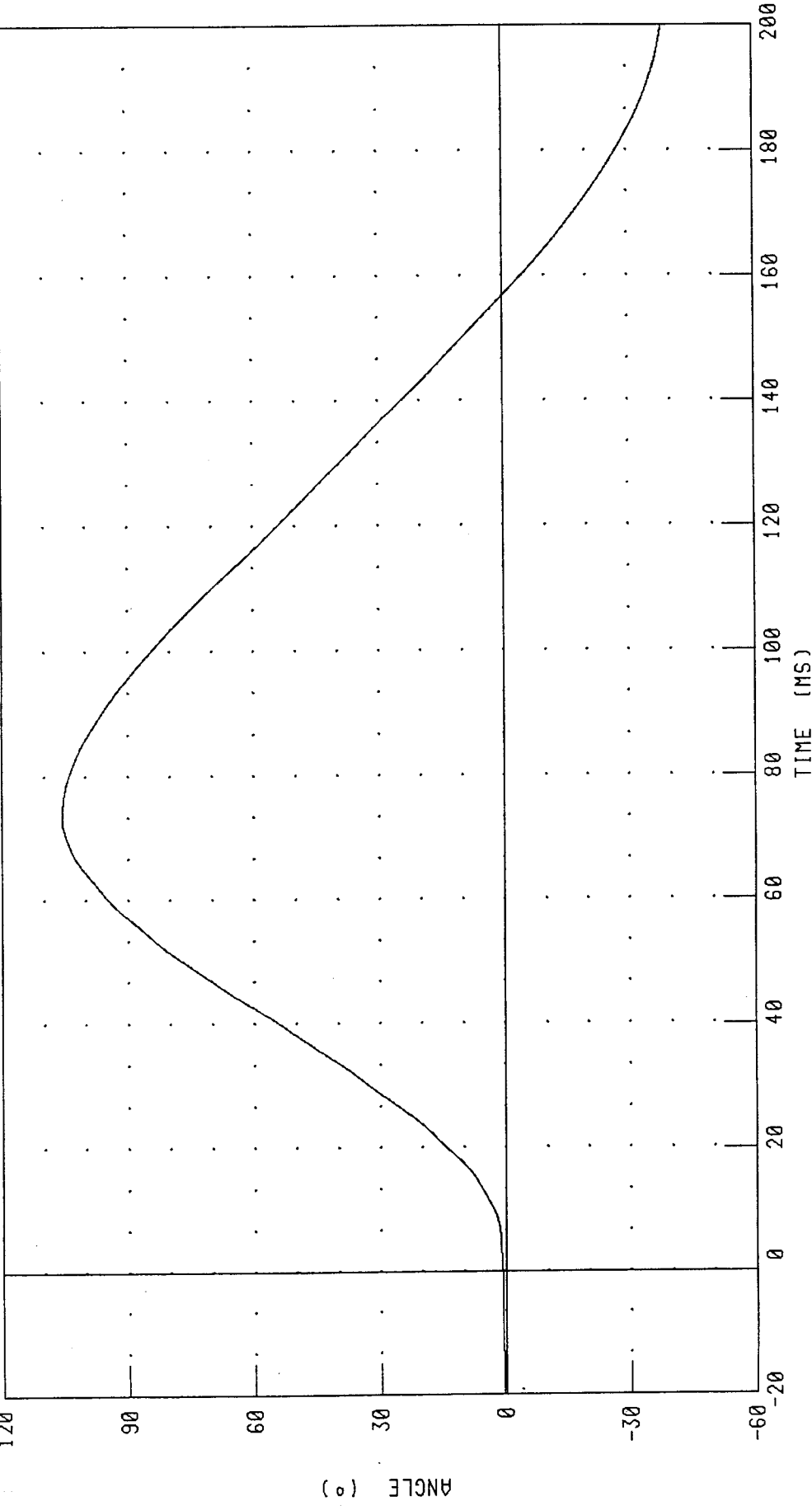
SMALL FEMALE NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 289C5NE2

S. FEMALE SN289 NECK EXT. CAL5

RUN NUMBER: 040899.1443;1



CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 105.66 ° @ 73.52 MS; -38.51 ° @ 200.00 MS

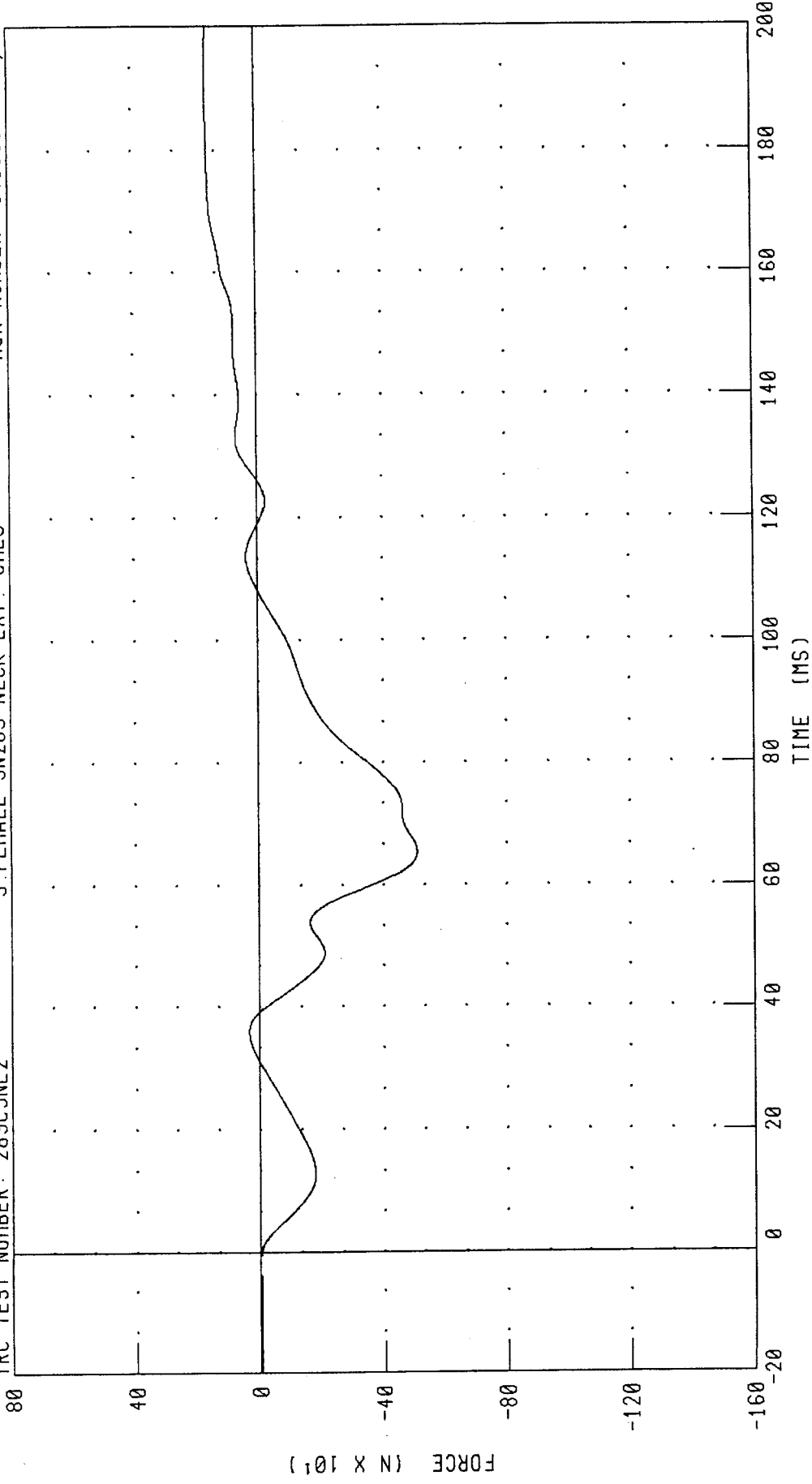
SMALL FEMALE NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 289C5NE2

S. FEMALE SN289 NECK EXT. CAL5

RUN NUMBER: 040899.1443;1



CHANNEL: NEKXF FILTER: CH. CLASS 60

PEAK DATA: 162.30 N @ 192.08 MS; -508.43 N @ 65.44 MS

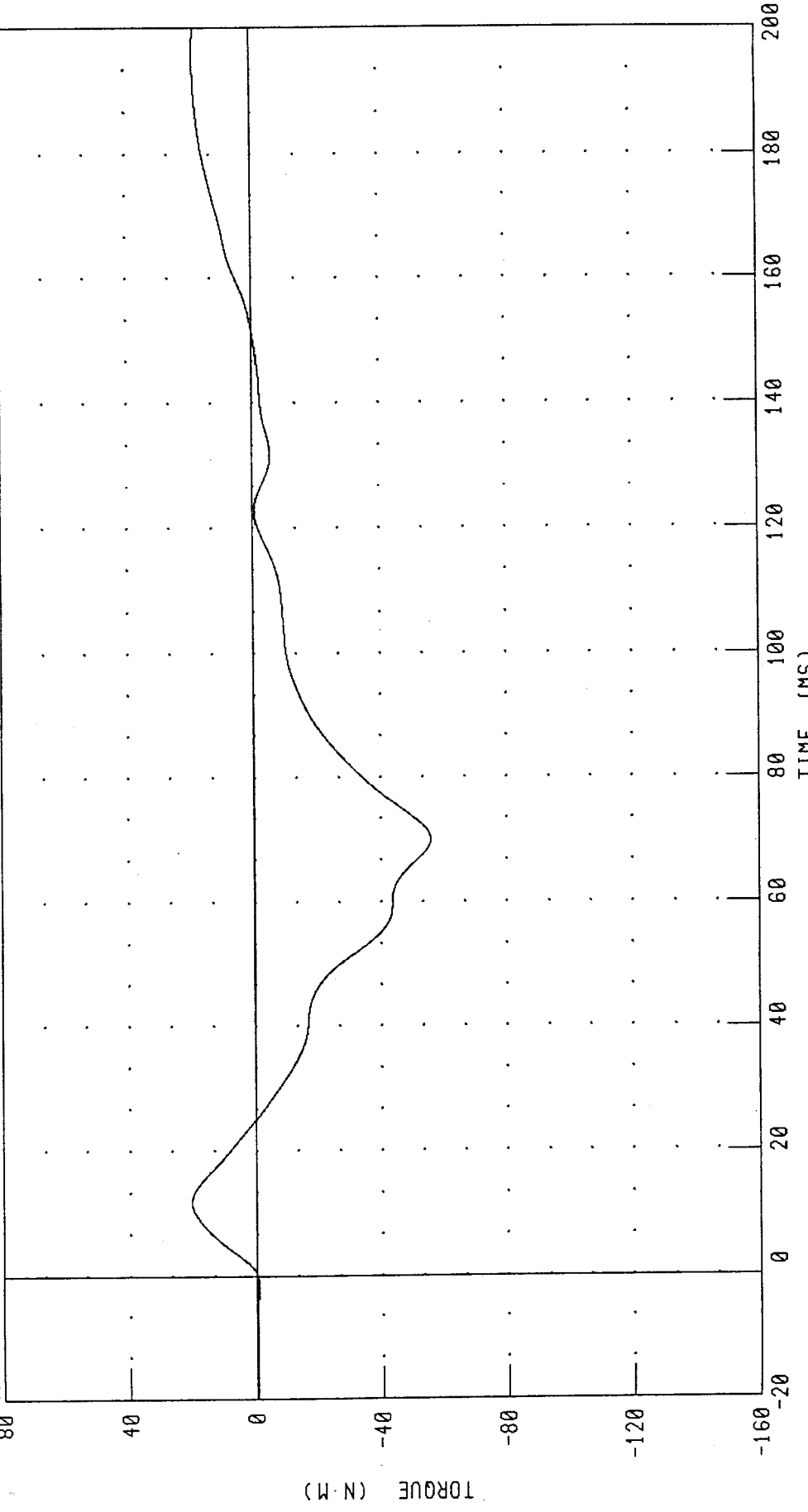
SMALL FEMALE NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 289C5NE2

S. FEMALE SN289 NECK EXT. CAL5

RUN NUMBER: 040899.1443;1



CHANNEL: NEKYM FILTER: CH. CLASS 60

PEAK DATA: 20.48 N·M @ 11.84 MS; -55.78 N·M @ 70.00 MS

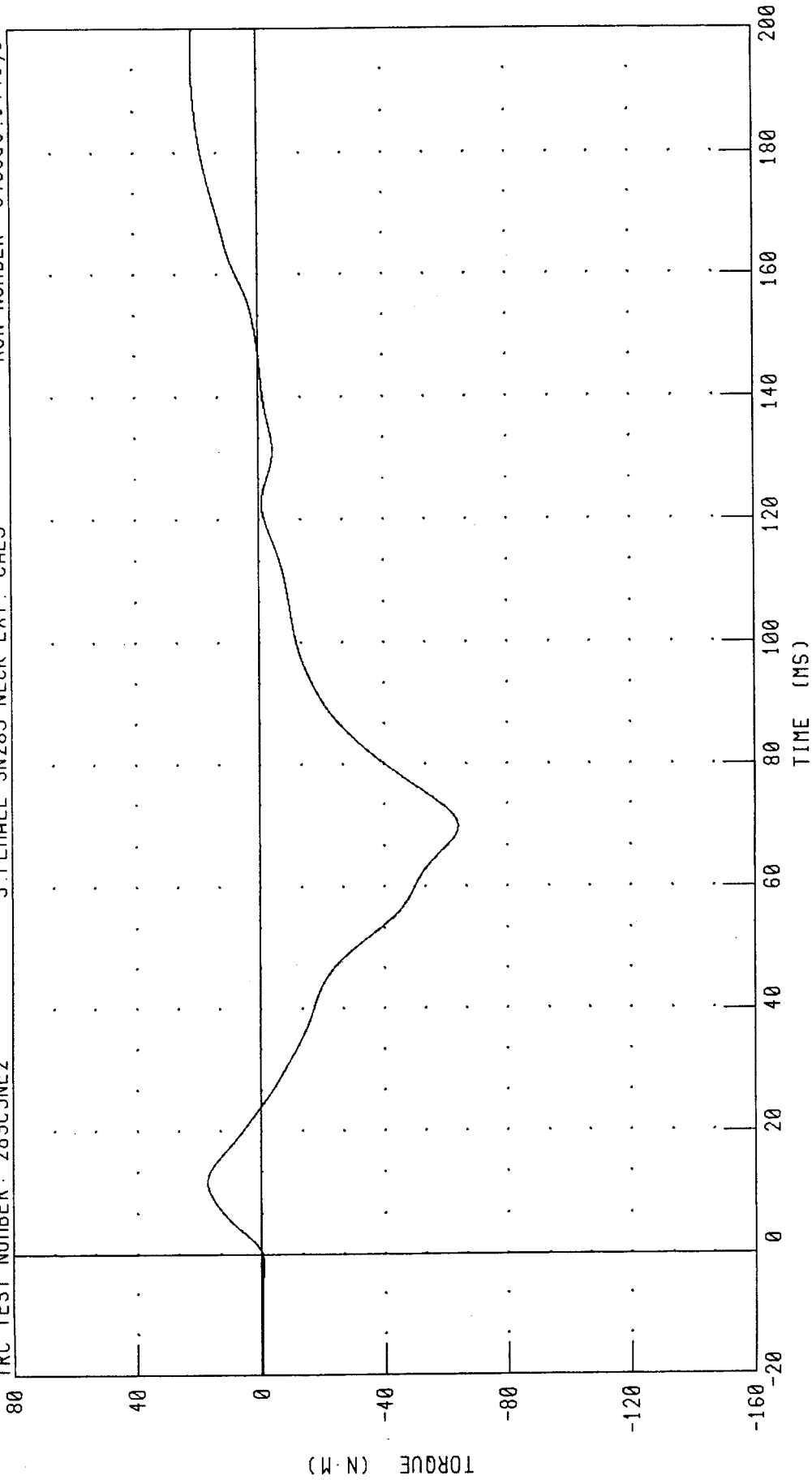
SMALL FEMALE NECK EXTENSION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 289C5NE2

S. FEMALE SN289 NECK EXT. CAL5

RUN NUMBER: 040899.1443,1



CHANNEL: NEKOM FILTER: CH. CLASS 60

PEAK DATA: 21.24 N·M @ 195.20 MS; -64.05 N·M @ 69.84 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

08-APR-99

TRC INC.

TEST NO: 289C5TH1

S.FEMALE SN289 THORAX CAL05

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	22.2 DEG. C
RELATIVE HUMIDITY	10 - 70 %	22.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.65 M/S
MAXIMUM DEFLECTION WITHIN DEFLECTION CORRIDOR	48 - 55 MM	51.7 MM
MAXIMUM RESISTIVE FORCE	3900 - 4400 N	4361. N
INTERNAL HYSTERESIS	69% - 85%	75.3%

TEST MEETS SPECIFICATIONS

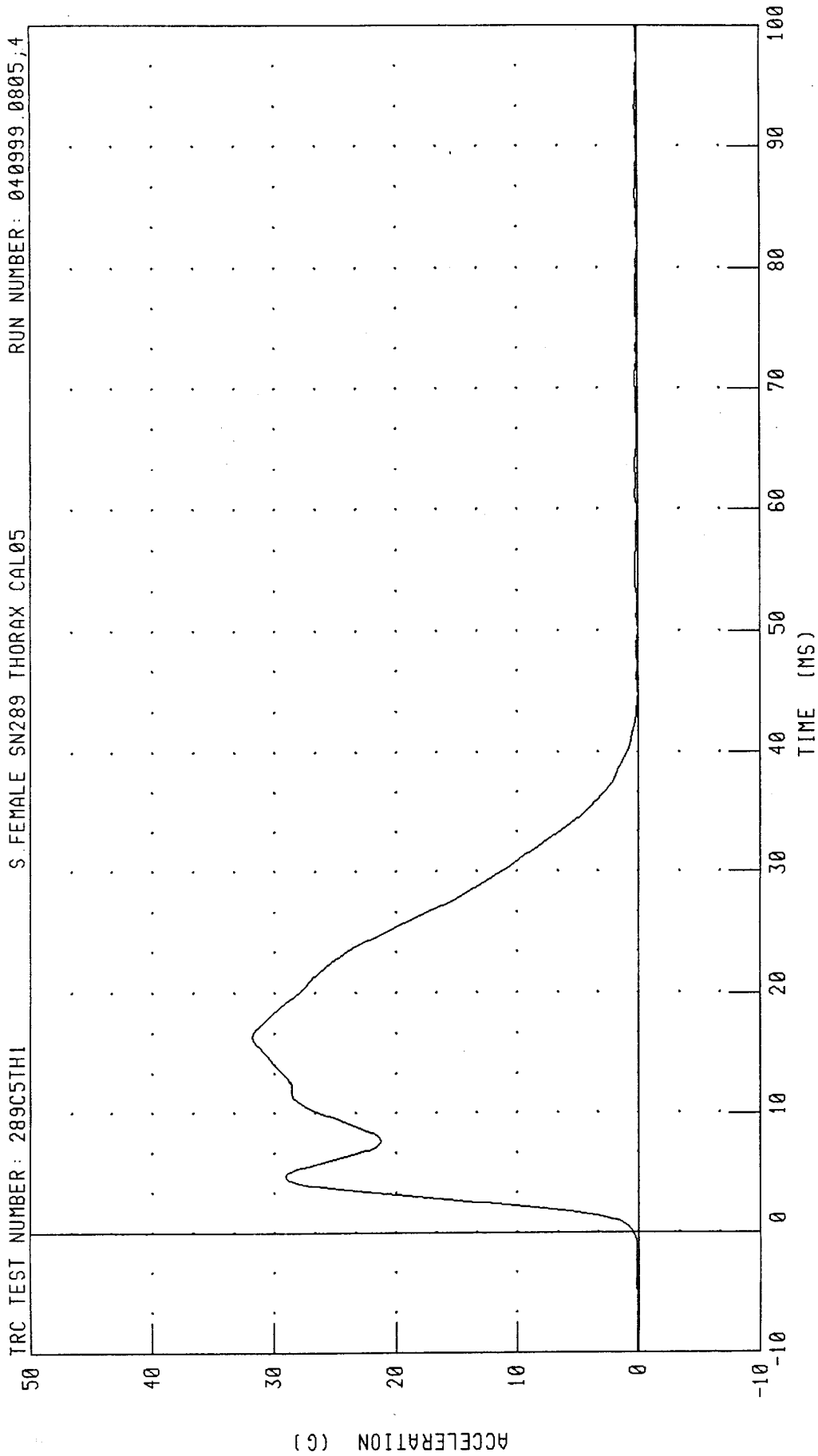
TECHNICIAN

By Cult

RUN NUMBER: 040899.1640;4

SMALL FEMALE THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 28905TH1 S. FEMALE SN289 THORAX CAL05 RUN NUMBER: 040999.0805,4



CHANNEL: PENXC FILTER: CH. CLASS 180

PEAK DATA: 31.78 G @ 16.40 MS; -0.01 G @ 82.00 MS

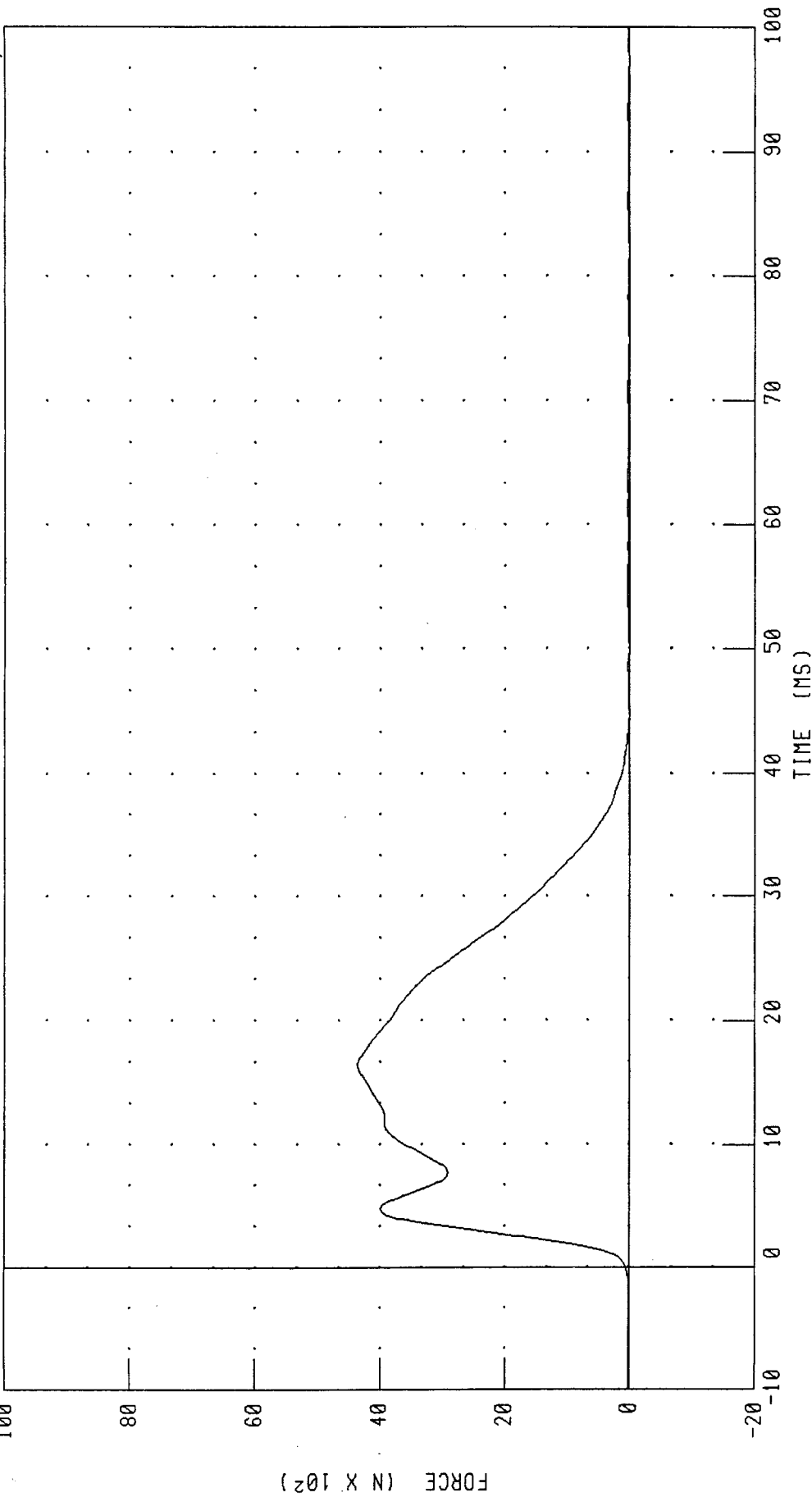
SMALL FEMALE THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 289C5TH1

S. FEMALE SN289 THORAX CAL05

RUN NUMBER: 040999.0805;4



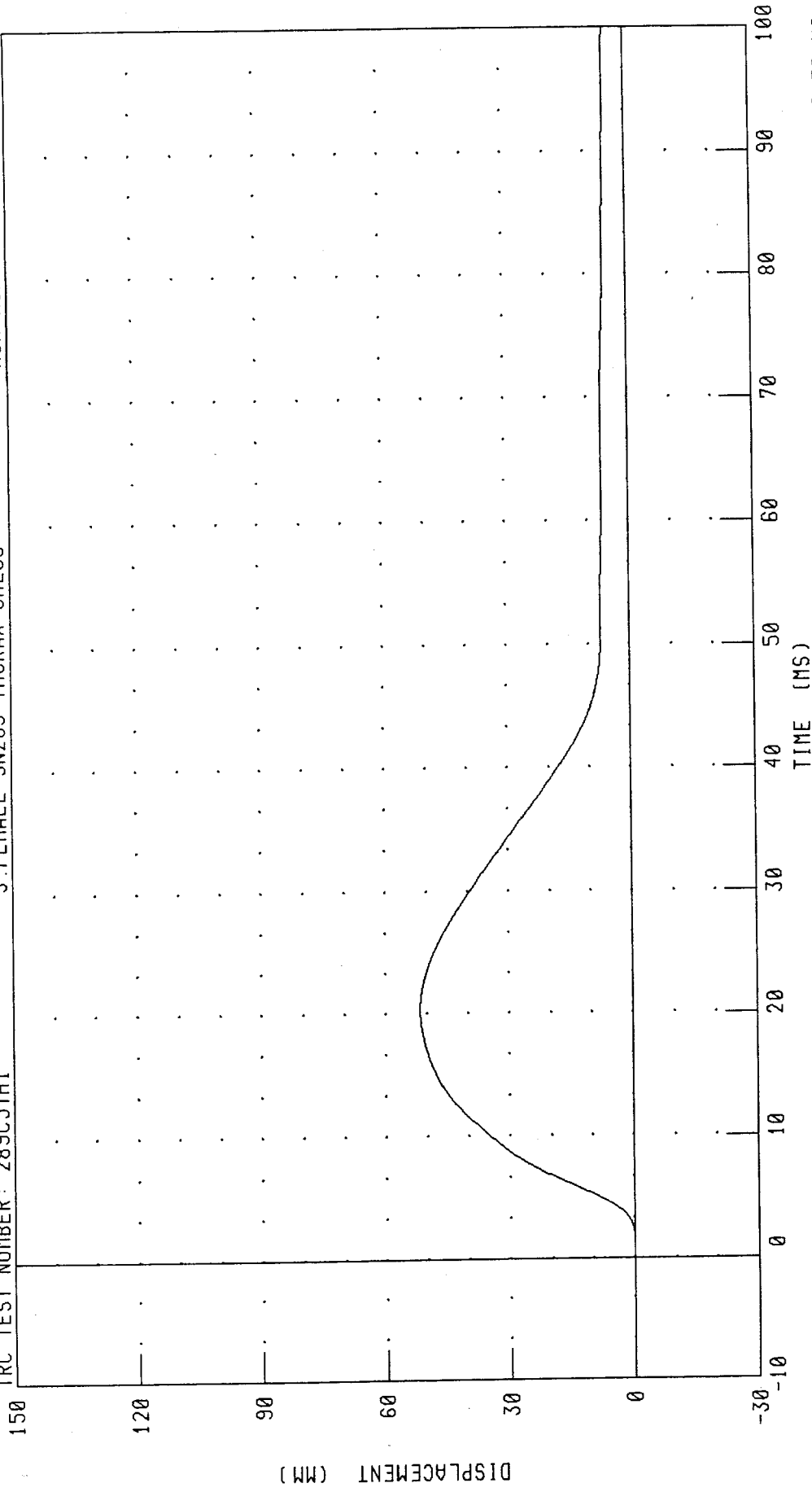
CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 4361.41 N @ 16.40 MS; -1.46 N @ 82.00 MS

SMALL FEMALE THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 289C5TH1

S. FEMALE SN289 THORAX CAL05

RUN NUMBER: 040999.0805;4

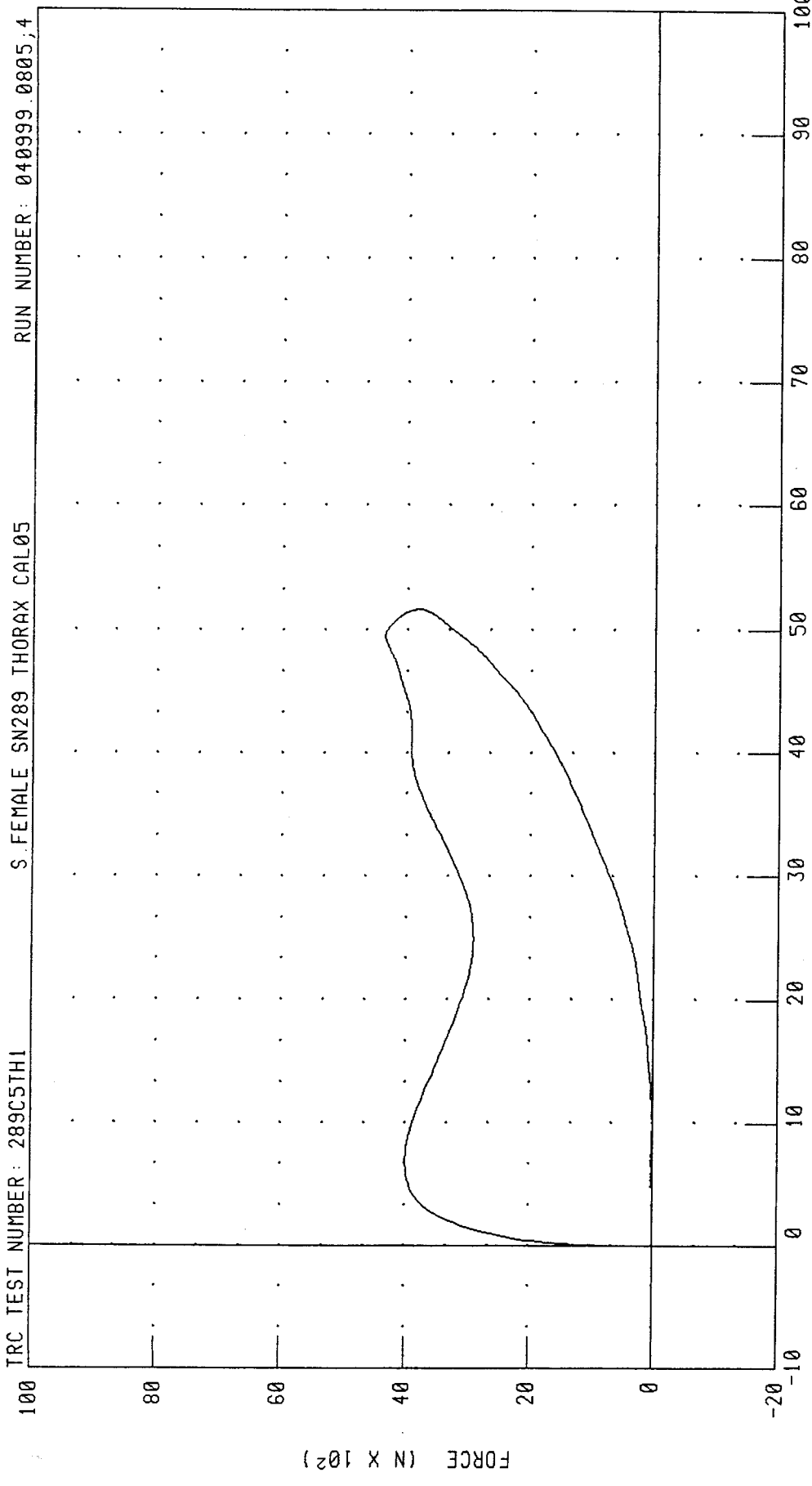


CHANNEL: CSTXD FILTER: CH. CLASS 180

PEAK DATA: 51.70 MM @ 20.32 MS, -0.01 MM @ -2.56 MS

SMALL FEMALE THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 289C5TH1
S. FEMALE SN289 THORAX CAL05
RUN NUMBER: 040999.0805;4



CHANNEL: CSTXD
PENXF
FILTER: CH: CLASS 180
CH: CLASS 180
PEAK DATA: 51.70 MM @ 20.32 MS; -0.01 MM @ -2.56 MS
4361.41 N @ 16.40 MS; -1.46 N @ 82.00 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

08-APR-99

TRC INC.

TEST NO: 289C5RK1

S.FEMALE SN289 R.KNEE CAL5

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	22.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.13 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	4040.0 N

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

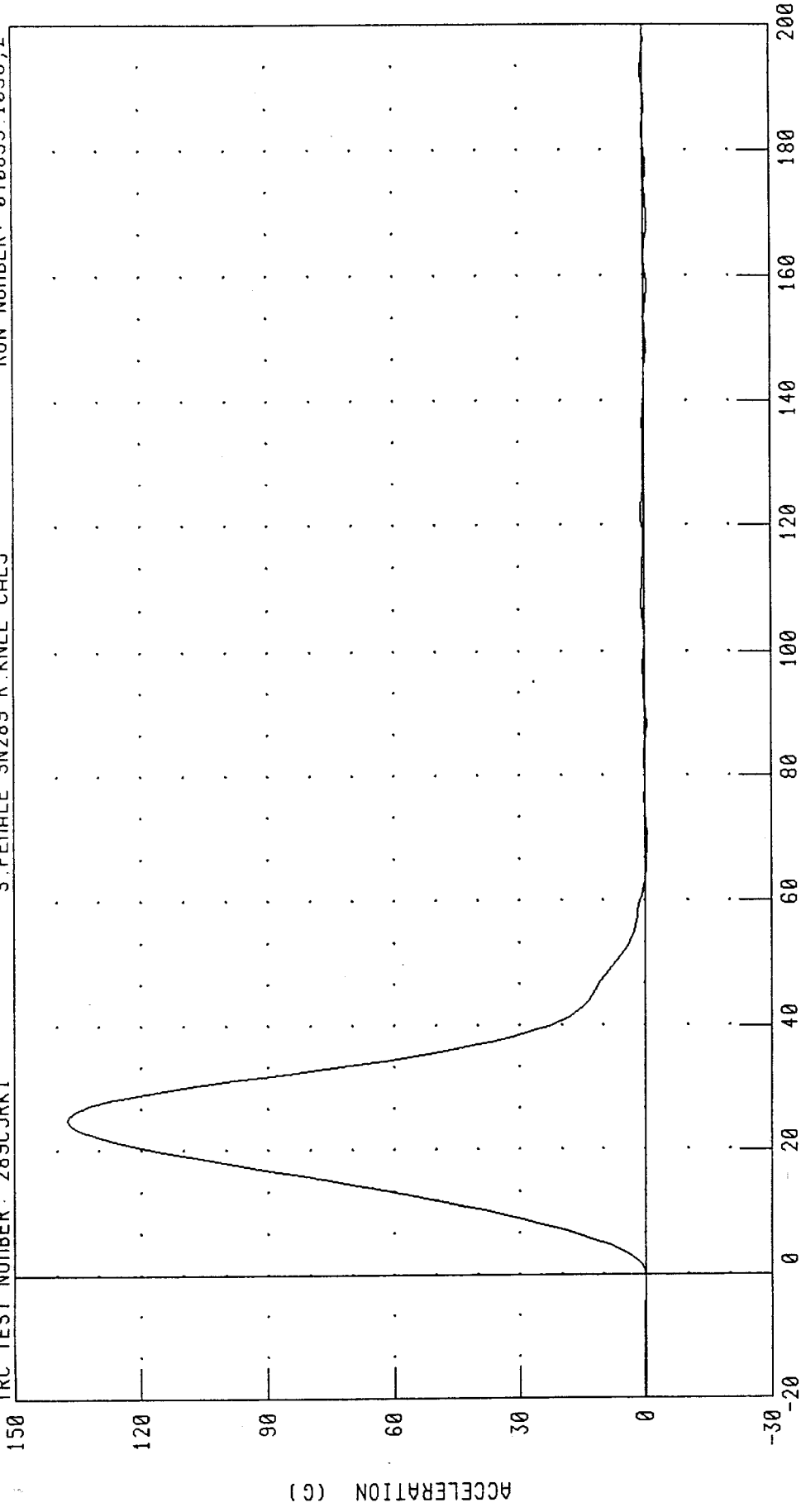
RUN NUMBER: 040899.1037;2

SMALL FEMALE HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 289C5RK1

S. FEMALE SN289 R. KNEE CAL5

RUN NUMBER: 040899.1038,2



TIME (MS X 10⁻¹)

CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 137.62 G @ 2.48 MS; -0.88 G @ 16.88 MS

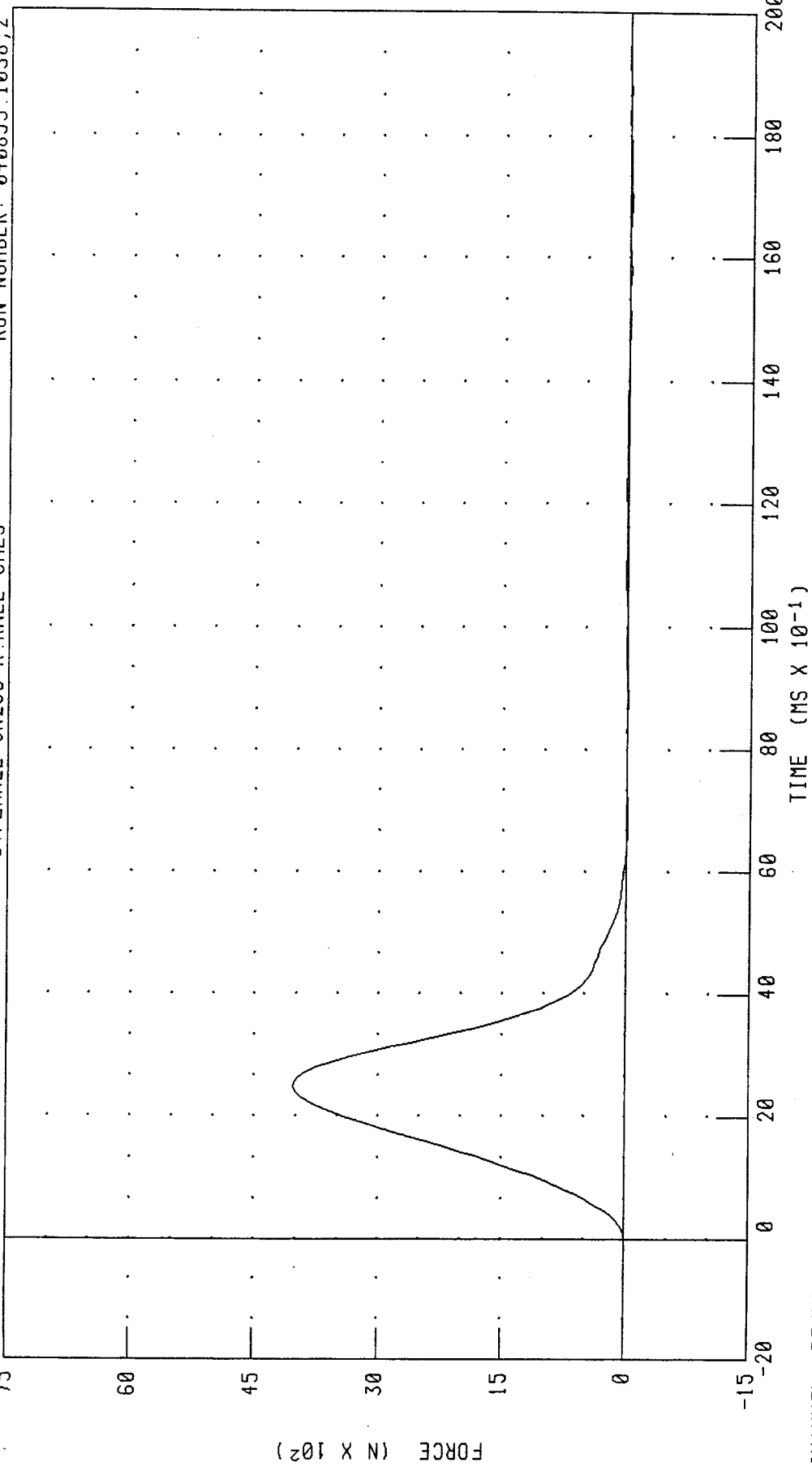
SMALL FEMALE HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KC PEND.)

TRC TEST NUMBER: 289C5RK1

S. FEMALE SN289 R. KNEE CAL5

RUN NUMBER: 040899.1038;2



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 4040.02 N @ 2.48 MS; -25.79 N @ 16.88 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

08-APR-99

TRC INC.

TEST NO: 289C5LK1

S.FEMALE SN289 LEFT KNEE CAL5

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	22.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.13 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3897.8 N

TEST MEETS SPECIFICATIONS

TECHNICIAN _____

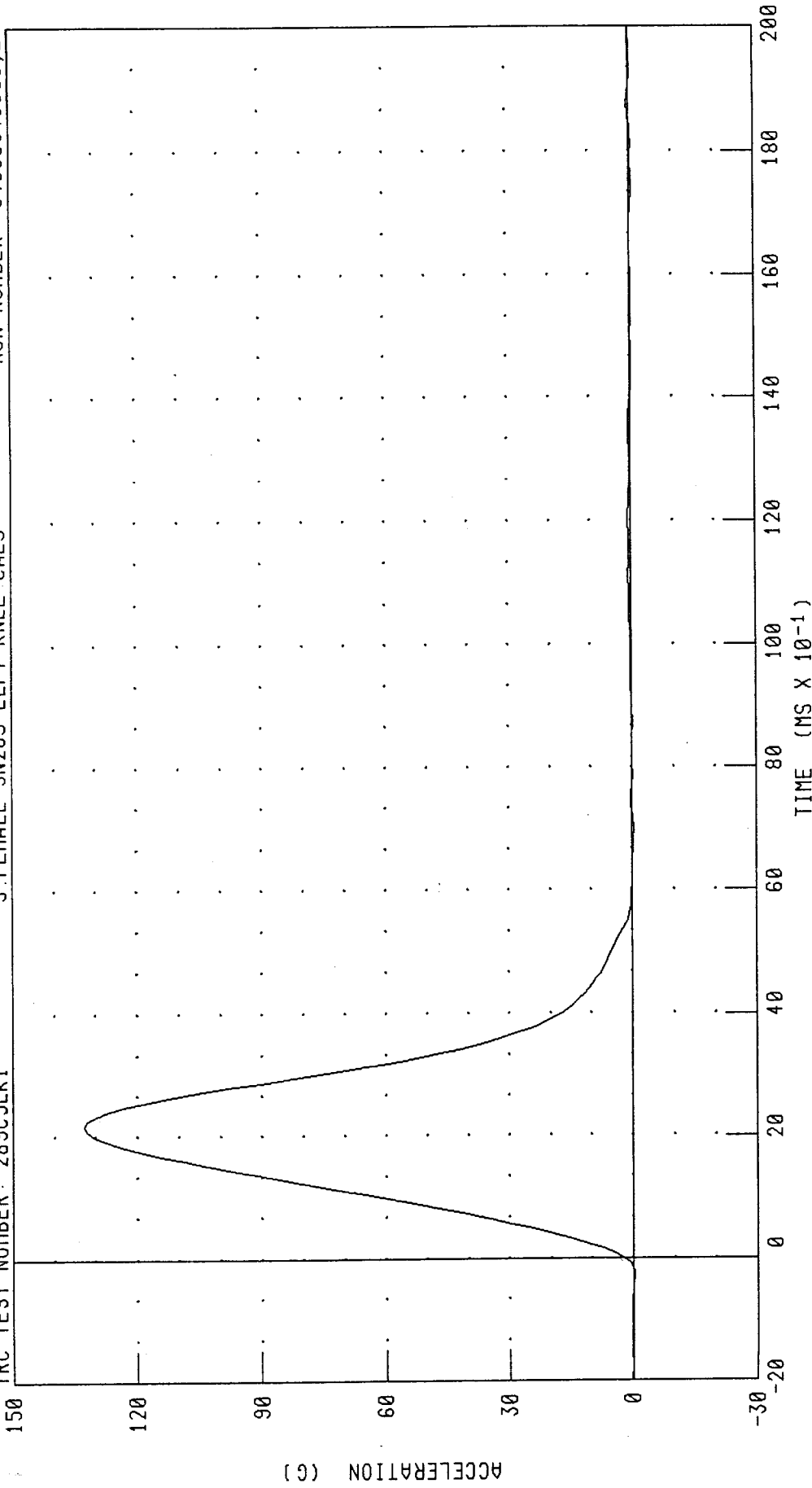
RUN NUMBER: 040899.1038;2

SMALL FEMALE HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 289C5LK1

S.FEMALE SN289 LEFT KNEE CAL5

RUN NUMBER: 040899.1038;2



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 132.78 G @ 2.16 MS; -0.61 G @ 17.44 MS

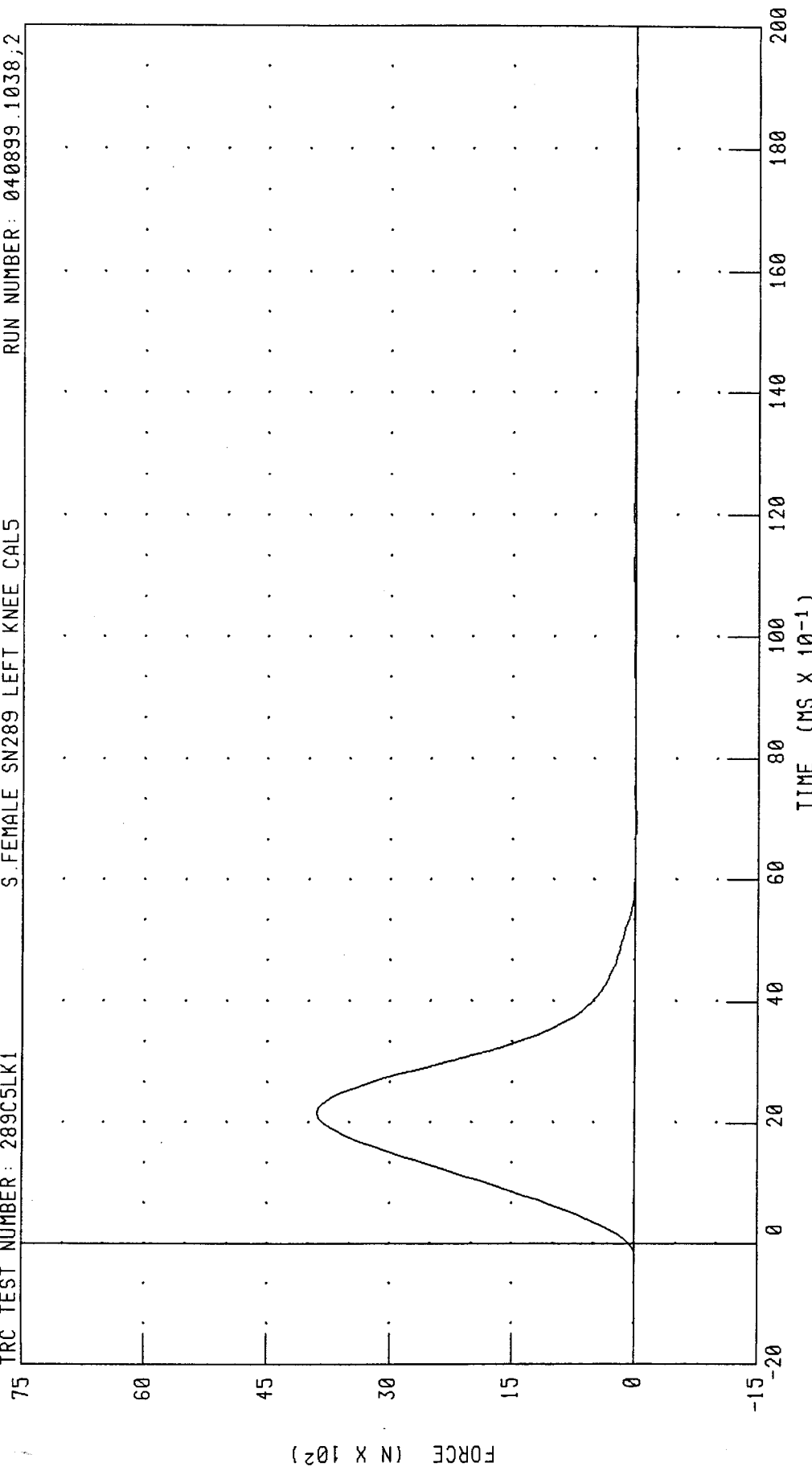
SMALL FEMALE HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 289C5LK1

S. FEMALE SN289 LEFT KNEE CAL5

RUN NUMBER: 040899.1038,2



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 3897.89 N @ 2.16 MS; -17.87 N @ 17.44 MS

Pre-Test Dummy Certification

Hybrid III 5th Female Dummy S/N 329

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

19-APR-99

TRC INC.

TEST NO: 329C2HD1

S.FEMALE SN329 HEAD DROP CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	276.74 G
PEAK LATERAL ACCELERATION	15 G MAX	-4.44 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

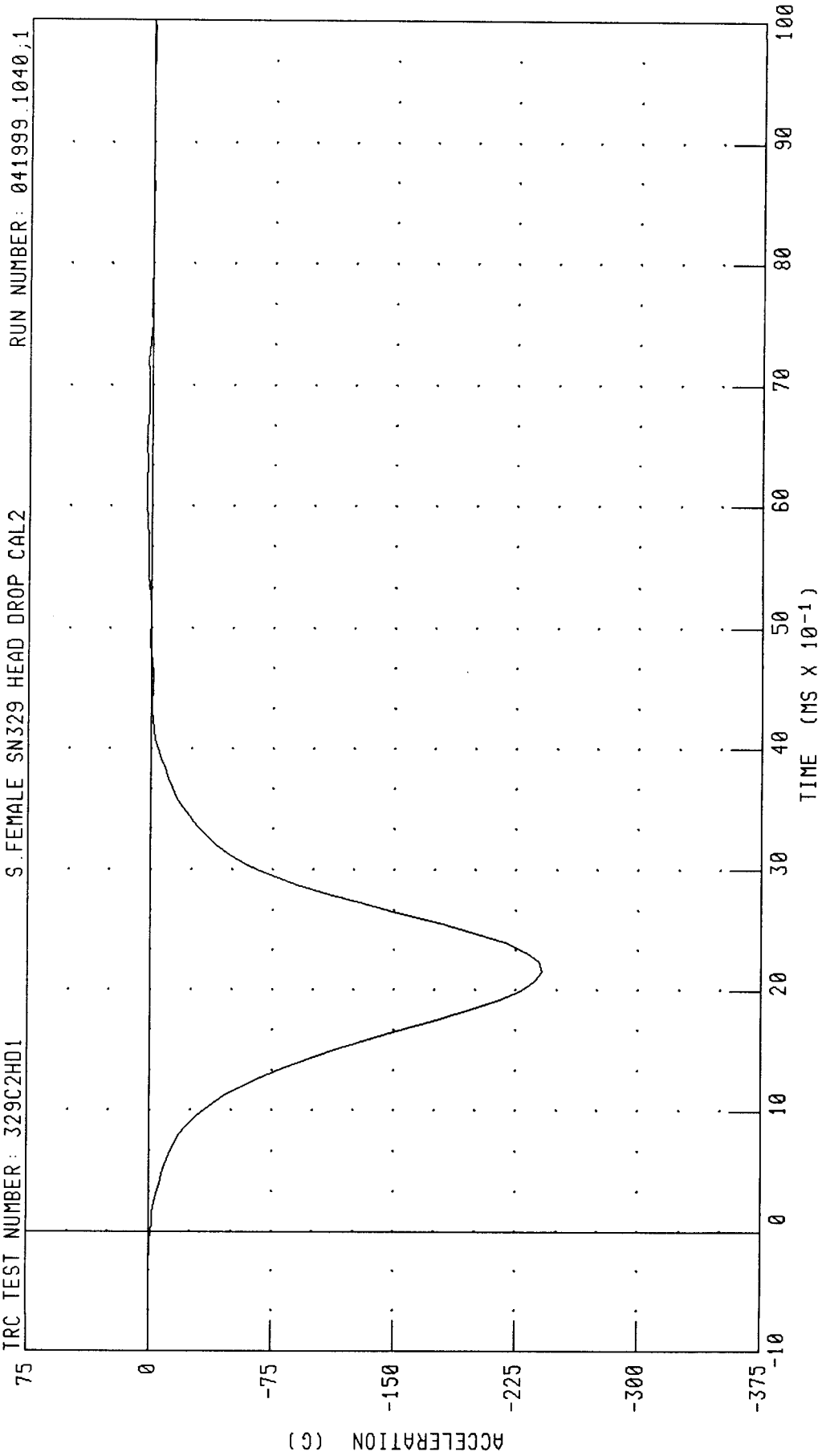
TECHNICIAN

B. J. Calhoun

RUN NUMBER: 041999.1039;1

SMALL FEMALE HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS

TRC TEST NUMBER : 329C2HD1 S.FEMALE SN329 HEAD DROP CAL2 RUN NUMBER: 041999.1040;1

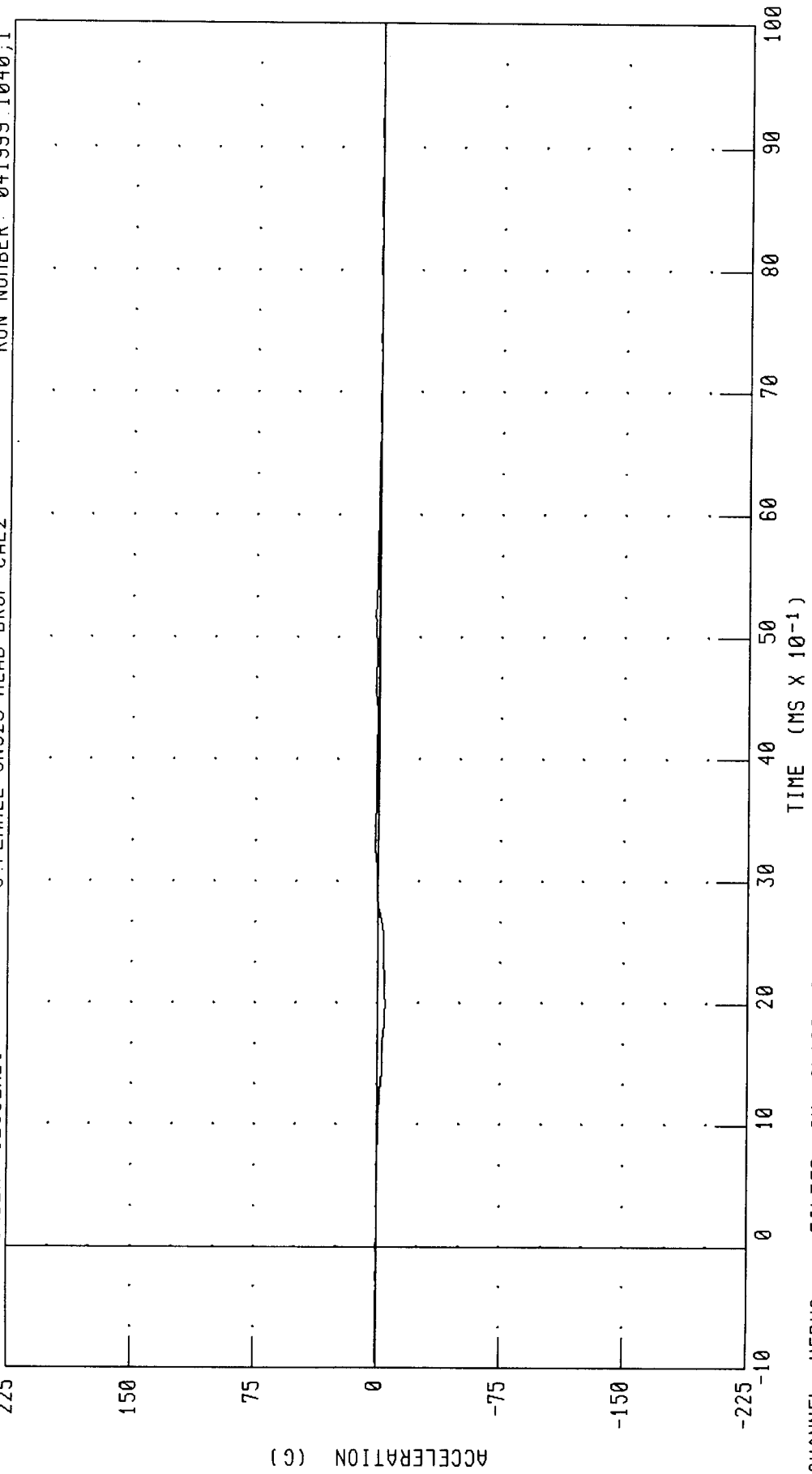


CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 3.28 G @ 6.00 MS; -240.81 G @ 2.16 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS

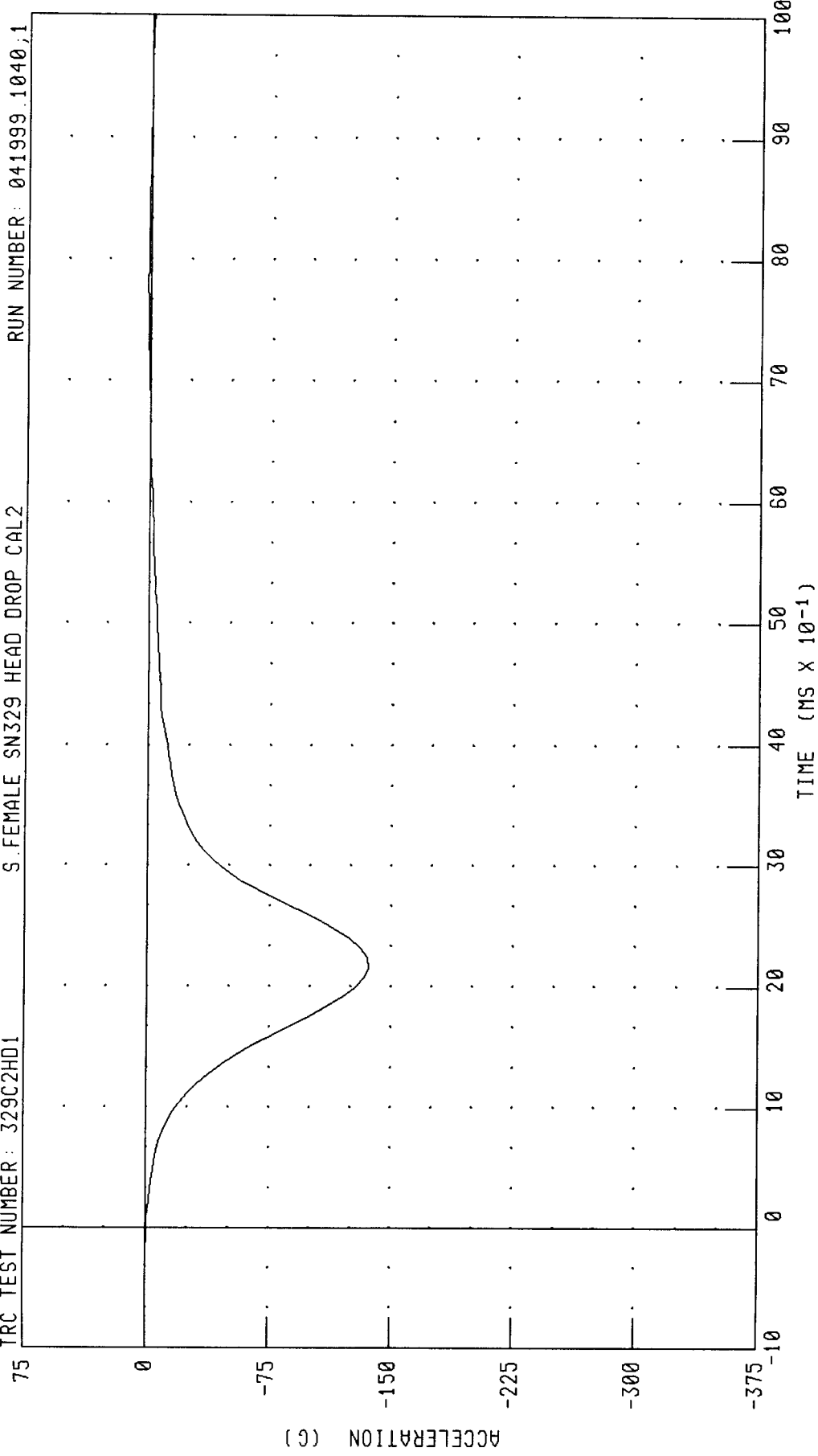
TRC TEST NUMBER: 329C2HD1 S. FEMALE SN329 HEAD DROP CAL2 RUN NUMBER: 041999.1040;1



CHANNEL: HEDYC FILTER: CH. CLASS 1000 PEAK DATA: 2.02 G @ 5.20 MS; -4.44 G @ 2.00 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER : 329C2HD1 S. FEMALE SN329 HEAD DROP CAL2 RUN NUMBER : 041999.1040,1



CHANNEL : HEDZG FILTER : CH. CLASS 1000

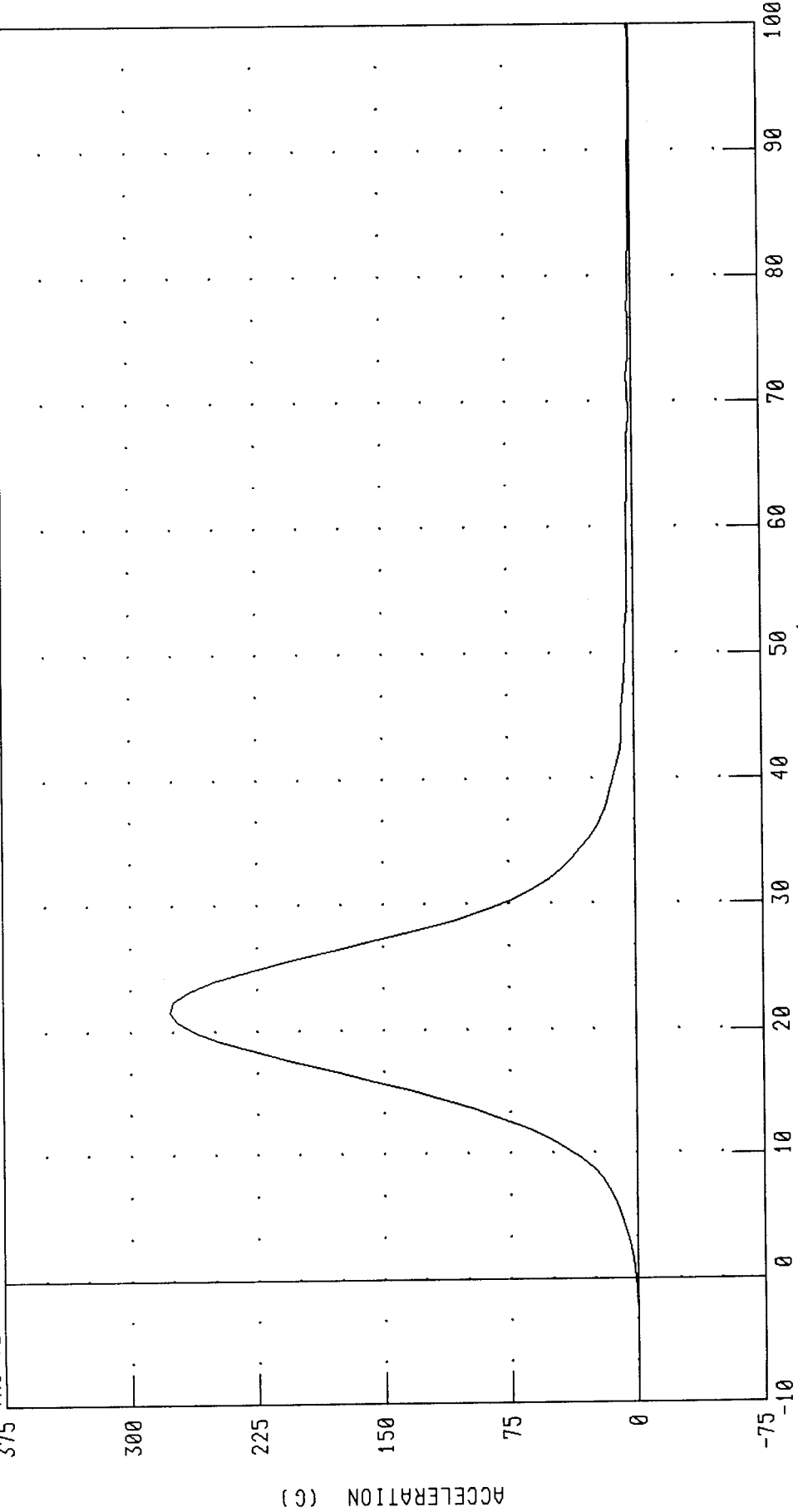
PEAK DATA : 1.92 G @ 7.76 MS; -136.33 G @ 2.16 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 329C2HD1

S. FEMALE SN329 HEAD DROP CAL2

RUN NUMBER: 041999.1040;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000

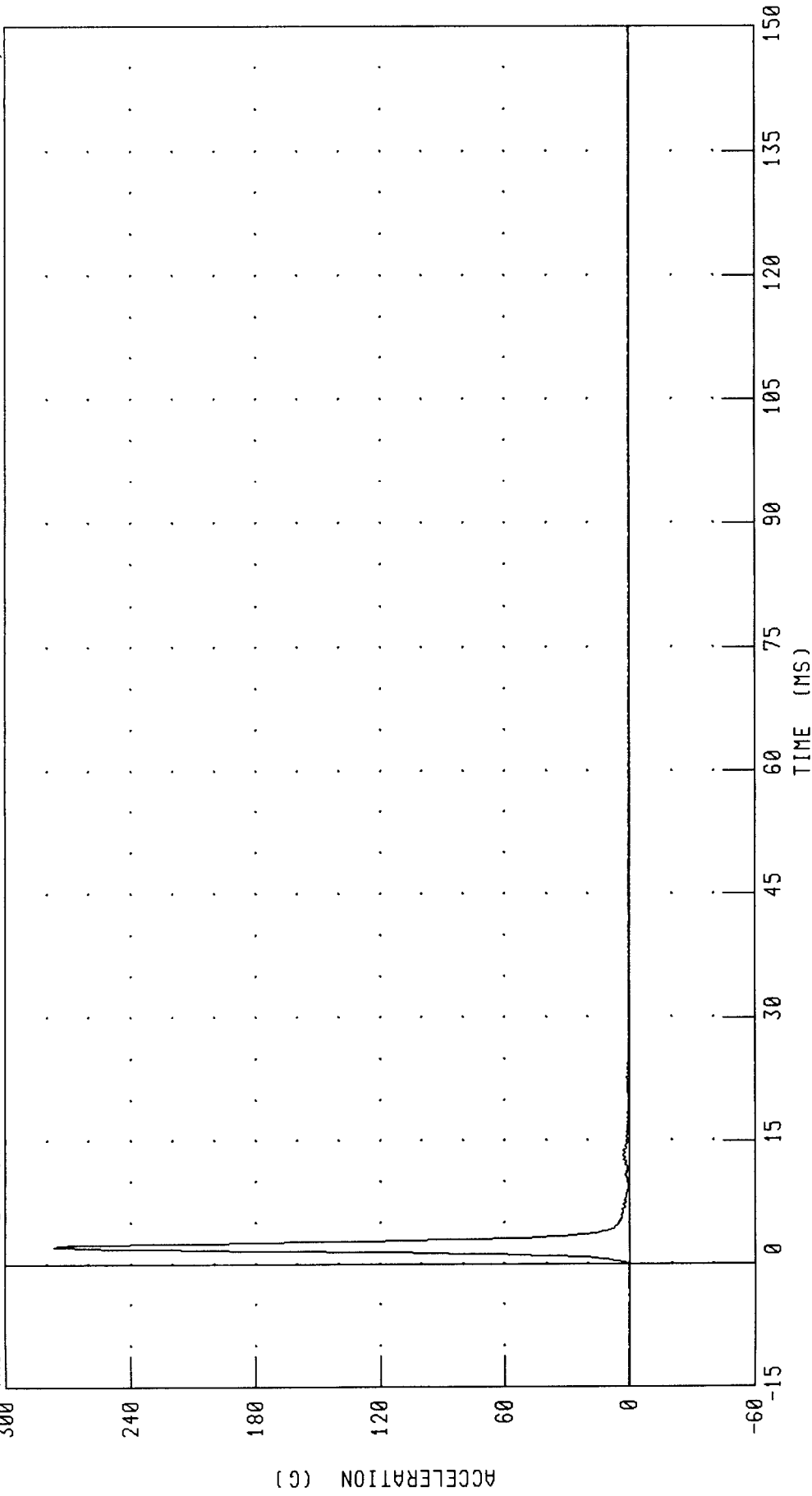
PEAK DATA: 276.75 G @ 2.16 MS; 0.09 G @ -0.96 MS

SMALL FEMALE HYBRID III HEAD CALIBRATION
CHECK PLOT - HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 329C2HD1

S. FEMALE SN329 HEAD DROP CAL2

RUN NUMBER: 041999.1040,1



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 276.75 G @ 2.16 MS; 0.09 G @ -14.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

20-APR-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 329C2NF1 S.FEMALE SN329 NECK FLEX. CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	7.06 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 2.1 - 2.5 M/S	2.29 M/S
	20 MS 4.0 - 5.0 M/S	4.49 M/S
	30 MS 5.8 - 7.0 M/S	6.47 M/S
PEAK D-PLANE ROTATION	80 - 92 DEG.	81.34 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	69 - 83 NM	70.72 NM
POSITIVE MOMENT DECAY TIME FROM PEAK TO 10 NM	80 - 100 MS	85.84 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN By Carl A

RUN NUMBER: 042099.1123;1

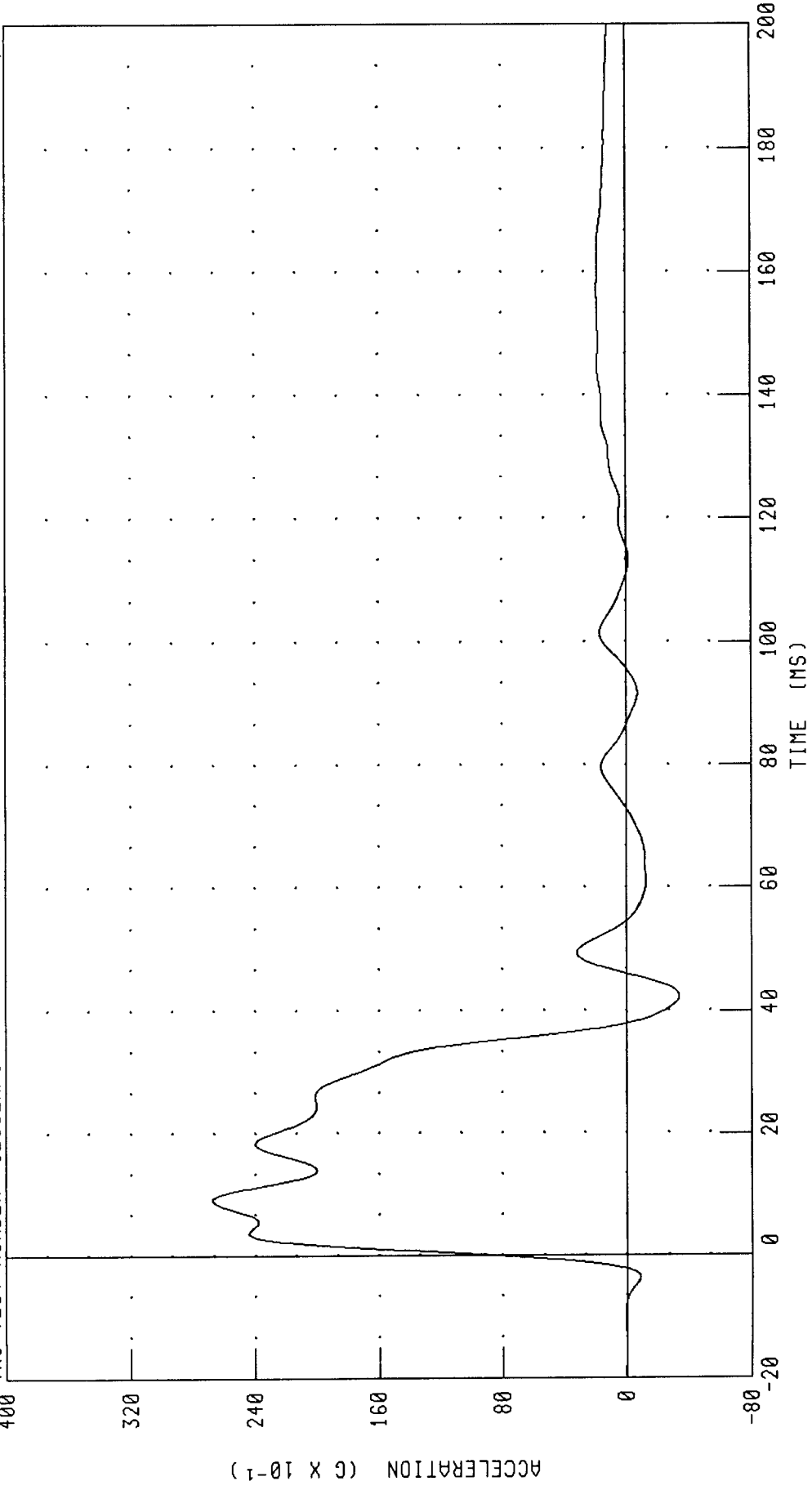
SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 329C2NF1

S. FEMALE SN329 NECK FLEX. CAL2

RUN NUMBER: 042099.1123,1



CHANNEL: PENXC FILTER: CH. CLASS 60

PEAK DATA: 26.74 G @ 9.12 MS; -3.36 G @ 42.40 MS

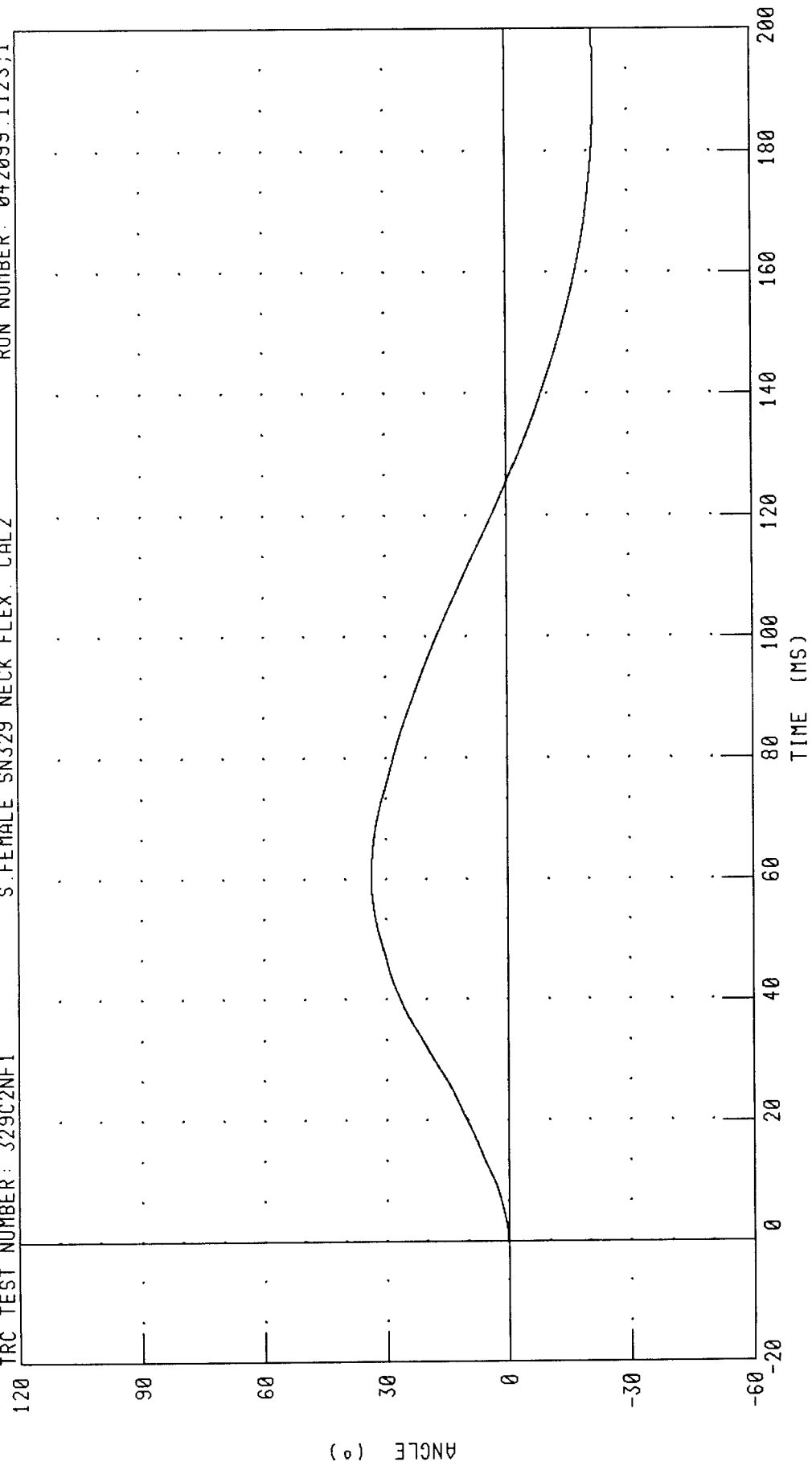
SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 329C2NF1

S. FEMALE SN329 NECK FLEX. CAL2

RUN NUMBER: 042099.1123.1

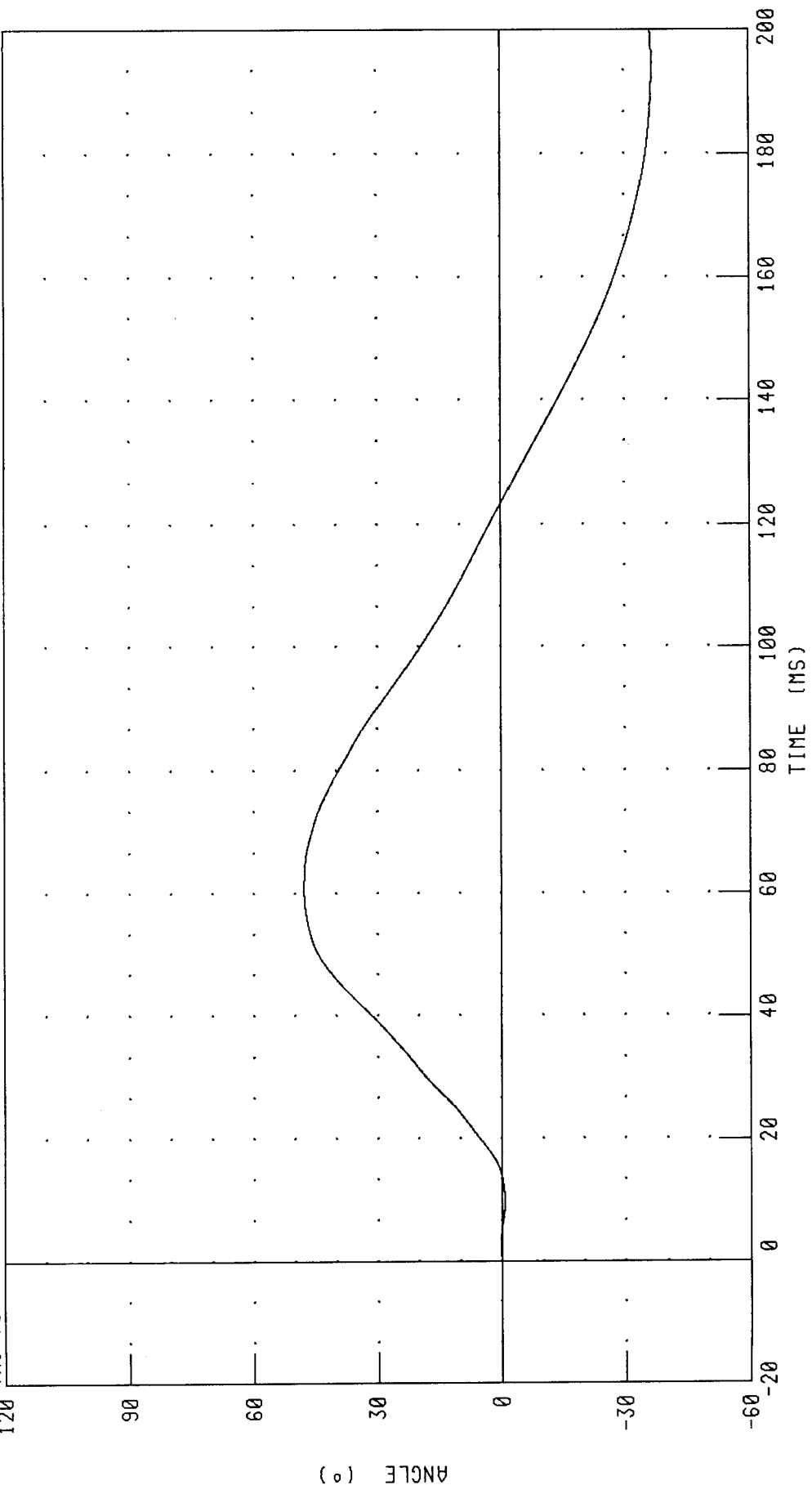


PEAK DATA: 33.52 ° @ 60.08 MS; -21.69 ° @ 190.00 MS

CHANNEL: BETA FILTER: CH. CLASS 60

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 329C2NF1 S. FEMALE SN329 NECK FLEX. CAL2 RUN NUMBER: 042099.1123.1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 47.83 ° @ 60.88 MS; -36.60 ° @ 194.16 MS

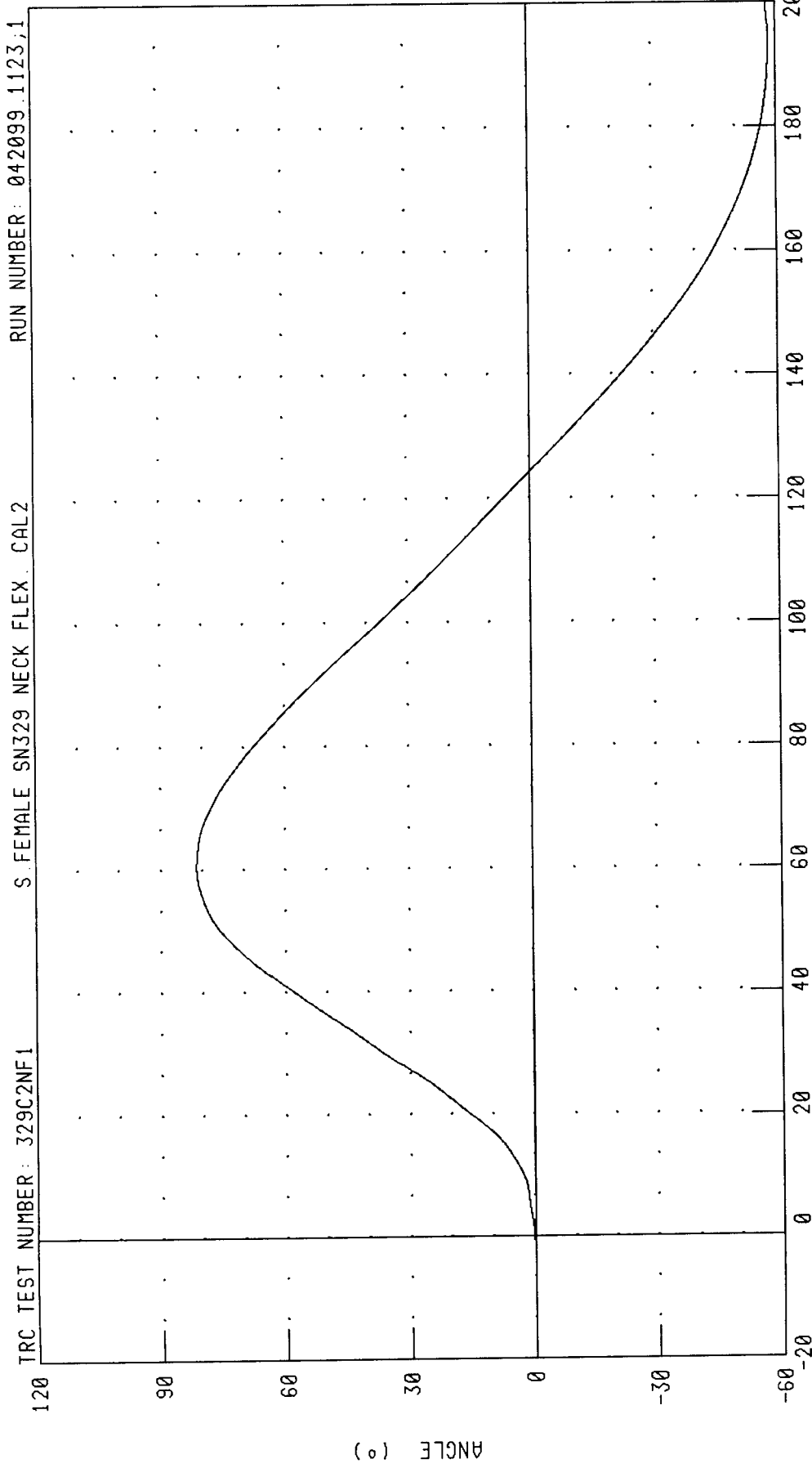
SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 329C2NF1

S. FEMALE SN329 NECK FLEX. CAL2

RUN NUMBER: 042099.1123,1



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 81.35 ° @ 60.48 MS; -58.24 ° @ 193.28 MS

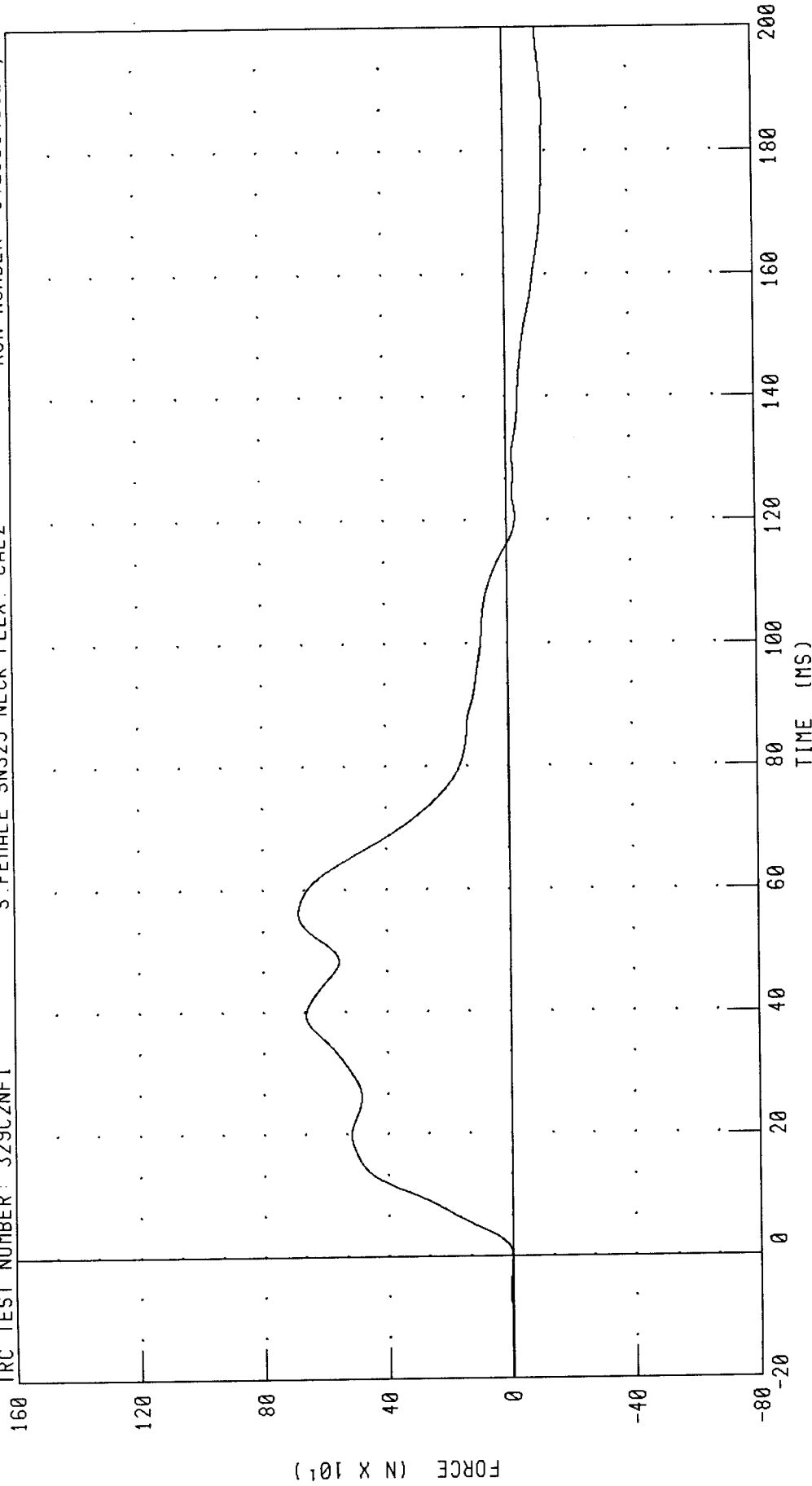
SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 329C2NF1

S. FEMALE SN329 NECK FLEX. CAL2

RUN NUMBER: 042099.1123.1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 685.27 N @ 56.40 MS; -125.57 N @ 186.80 MS

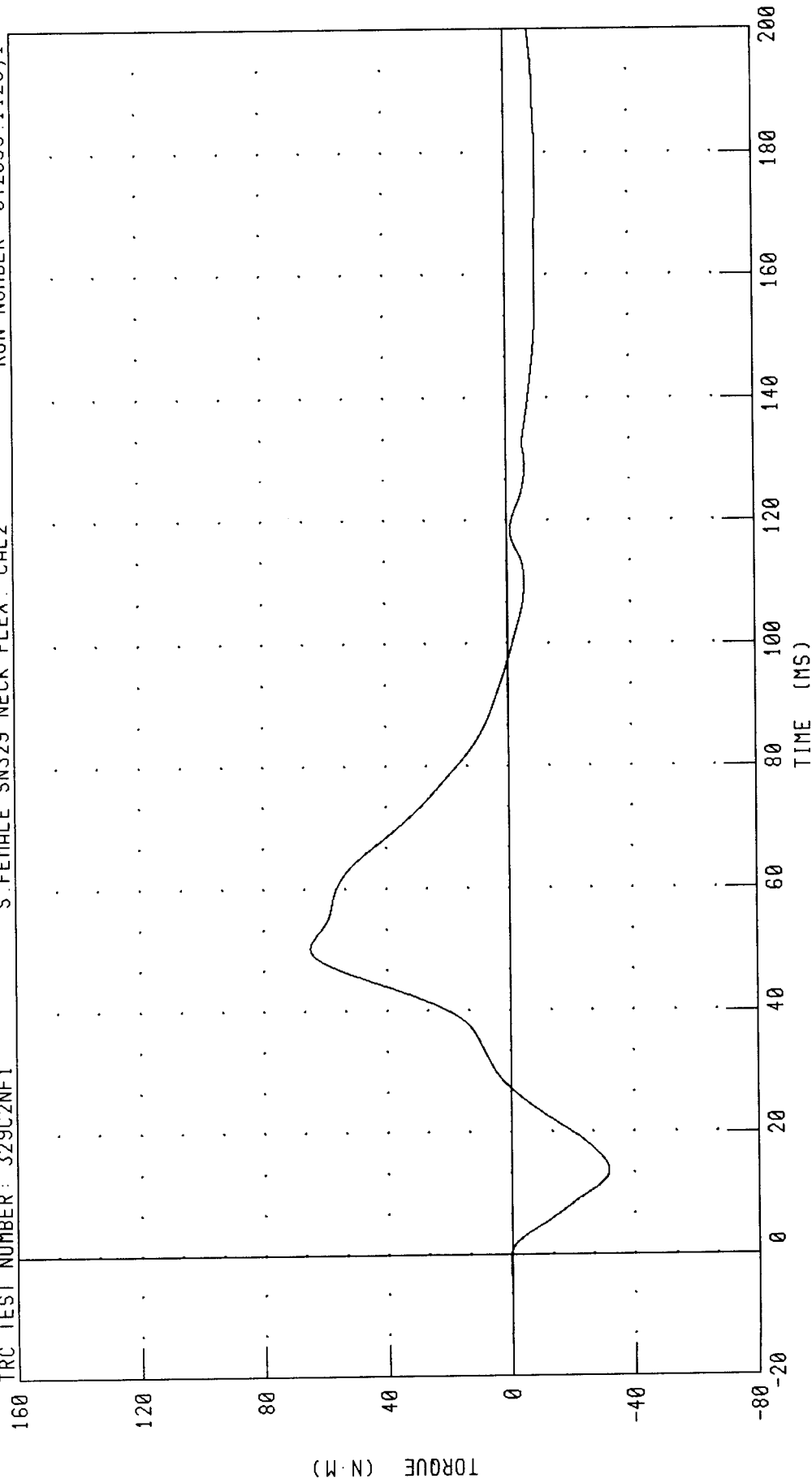
SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 329C2NF1

S. FEMALE SN329 NECK FLEX. CAL2

RUN NUMBER: 042099.1123,1



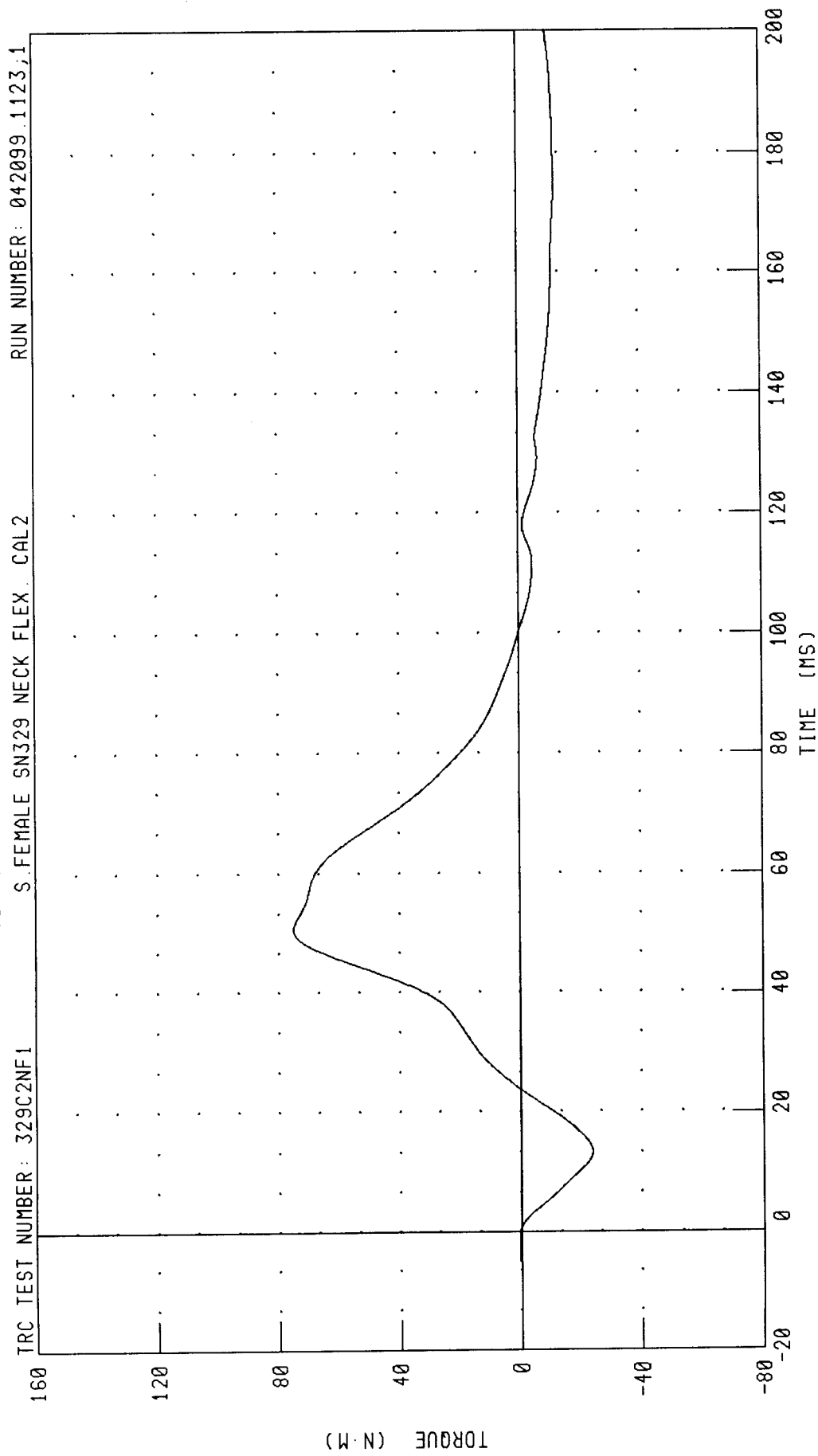
CHANNEL: NEKYM FILTER: CH. CLASS 60

PEAK DATA: 64.76 N·M @ 50.40 MS; -31.77 N·M @ 13.76 MS

SMALL FEMALE HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 329C2NF1 RUN NUMBER: 042099.1123.1

S. FEMALE SN329 NECK FLEX. CAL2



PEAK DATA: 75.07 N.M @ 50.72 MS; -23.73 N.M @ 13.36 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

20-APR-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 329C2NE3 S.FEMALE SN329 NECK EXT. CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.00 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.5 - 1.9 M/S	1.63 M/S
	20 MS 3.1 - 3.9 M/S	3.24 M/S
	30 MS 4.6 - 5.6 M/S	4.79 M/S
PEAK D-PLANE ROTATION	97 - 109 DEG.	108.39 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE	-55 - -69 NM	-55.13 NM
NEGATIVE MOMENT DECAY TIME TO -10 NM LEVEL	94 - 114 MS	105.28 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN By [Signature]

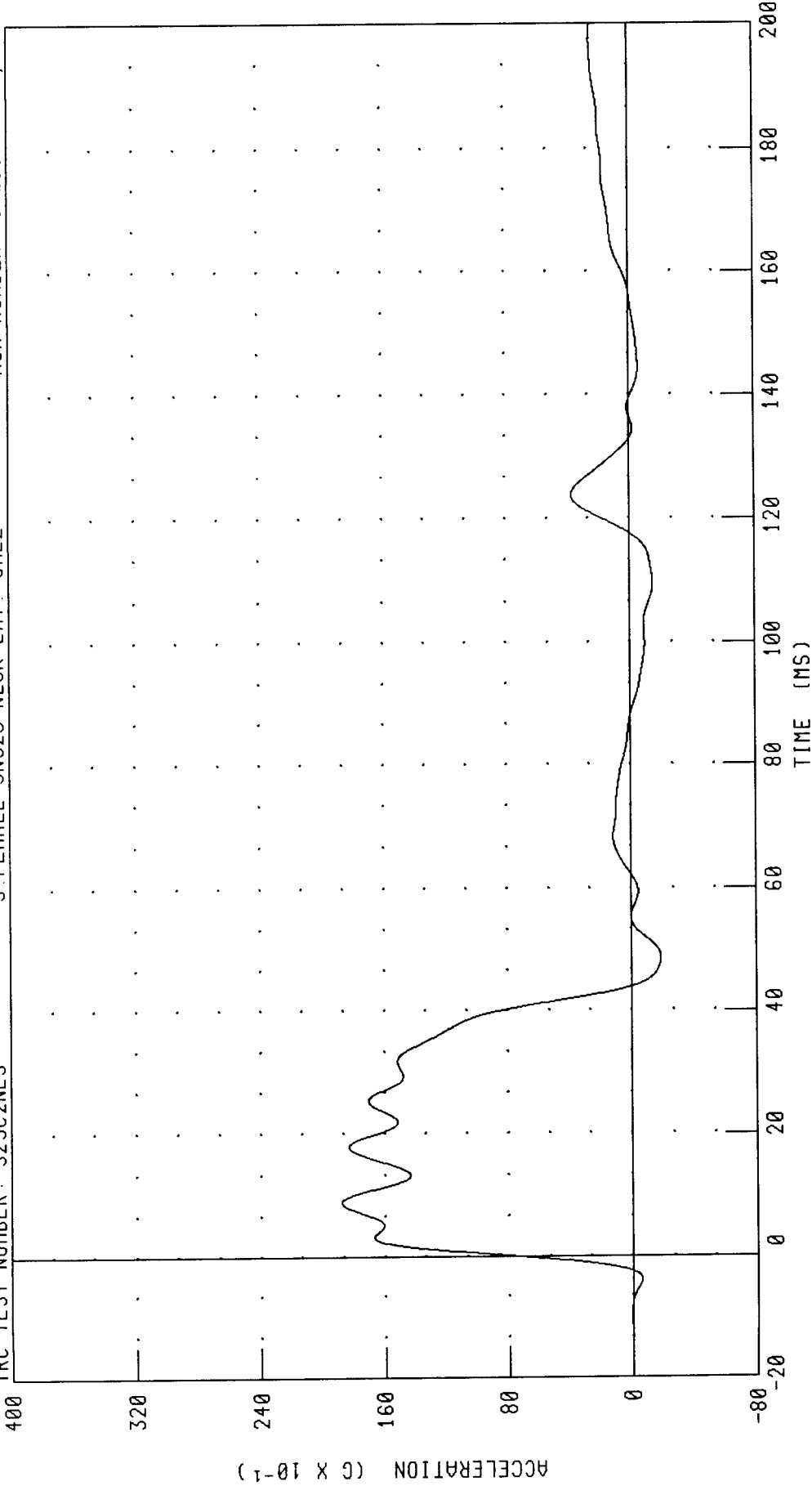
RUN NUMBER: 042099.1355;16

SMALL FEMALE NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 329C2NE3

S. FEMALE SN329 NECK EXT. CAL2

RUN NUMBER: 042099.1358,16



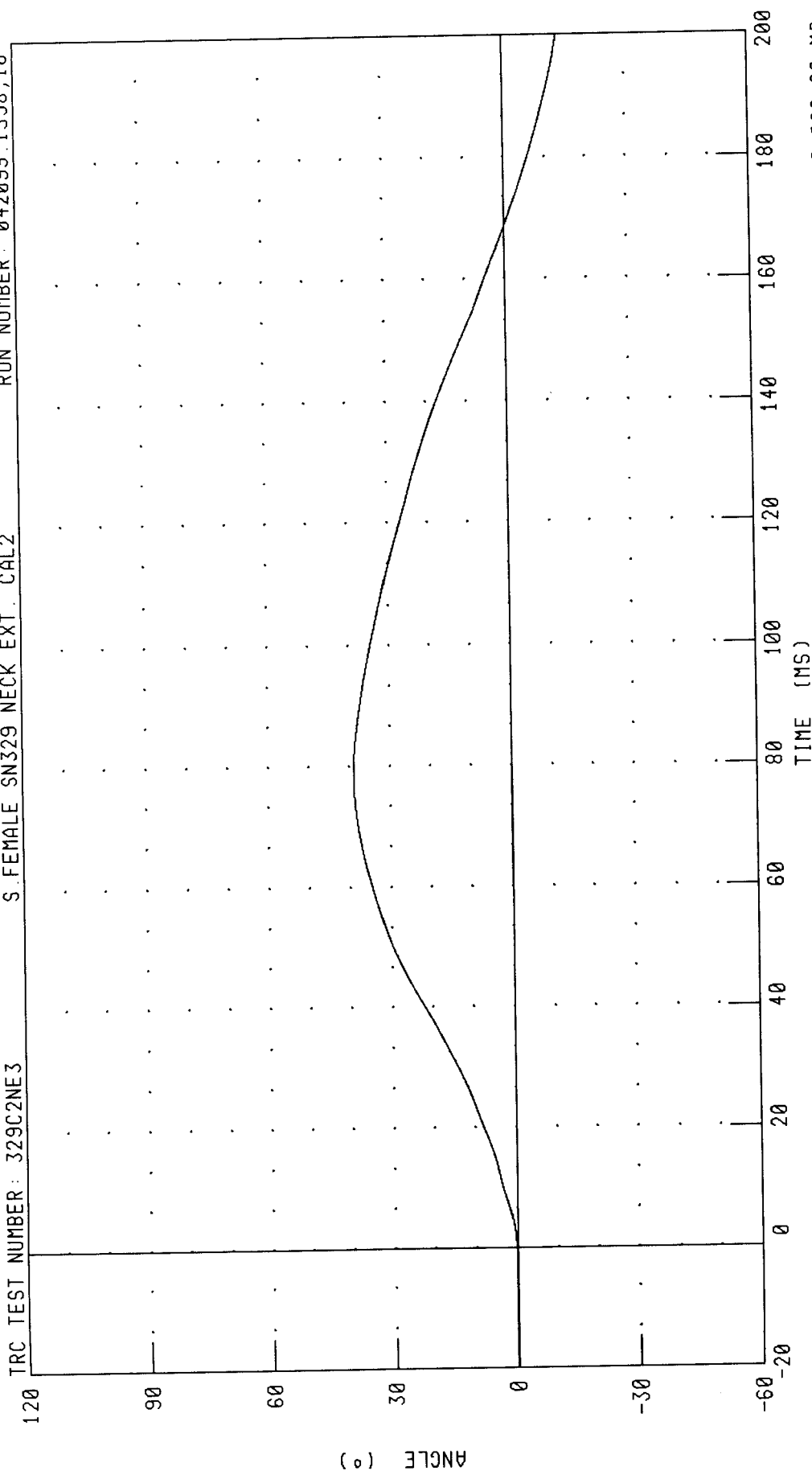
CHANNEL: PENXC FILTER: CH. CLASS 60

PEAK DATA: 18.76 G @ 8.96 MS; -1.87 G @ 48.72 MS

SMALL FEMALE NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK
S. FEMALE SN329 NECK EXT. CAL2

TRC TEST NUMBER: 329C2NE3

RUN NUMBER: 042099.1358;16



PEAK DATA: 38.82 ° @ 78.48 MS; -13.43 ° @ 200.00 MS

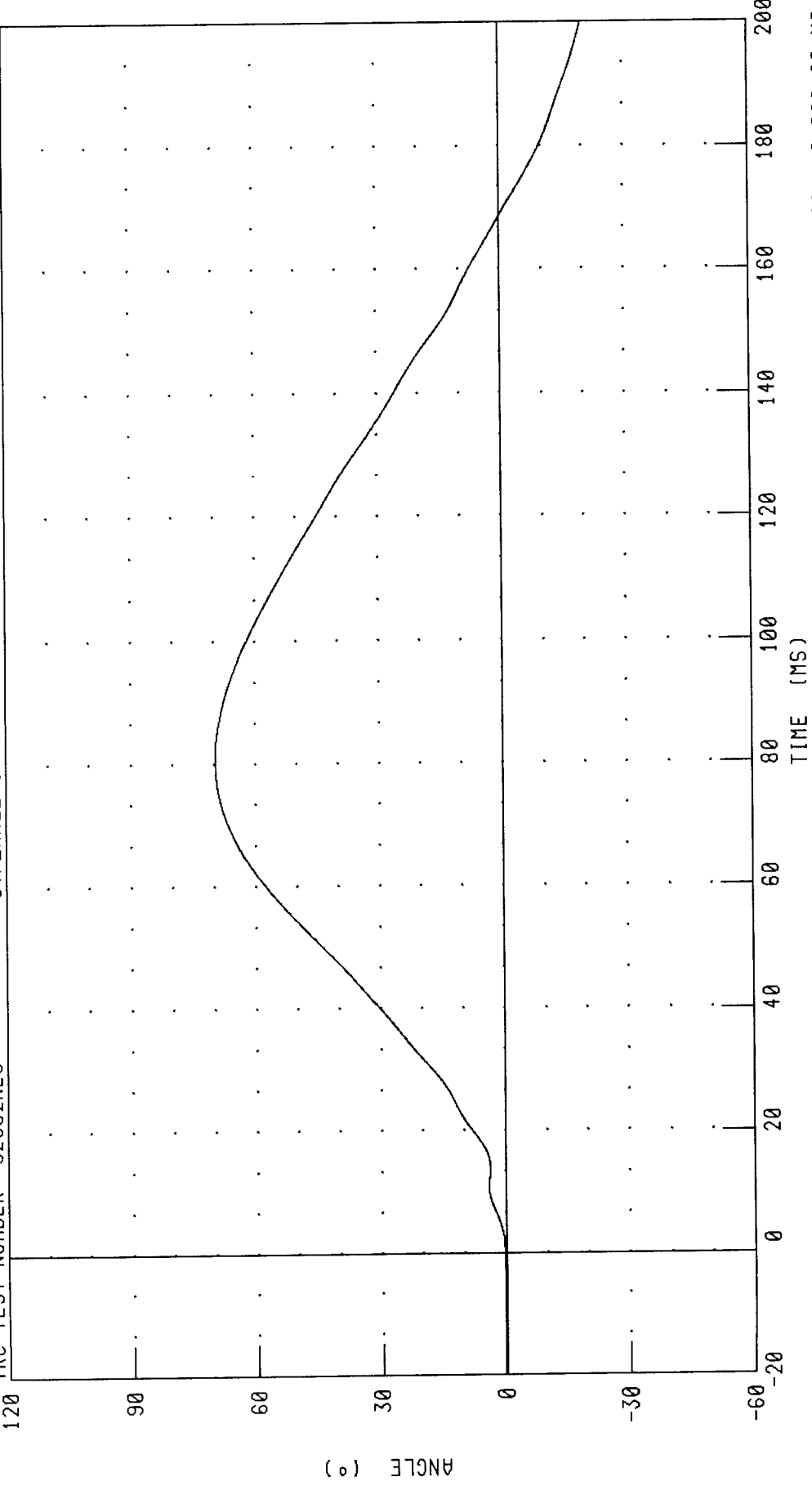
CHANNEL: BETA FILTER: CH. CLASS 60

SMALL FEMALE NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 329C2NE3

S. FEMALE SN329 NECK EXT. CAL2

RUN NUMBER: 042099.1358,16



CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 69.61 ° @ 80.72 MS; -20.08 ° @ 200.00 MS

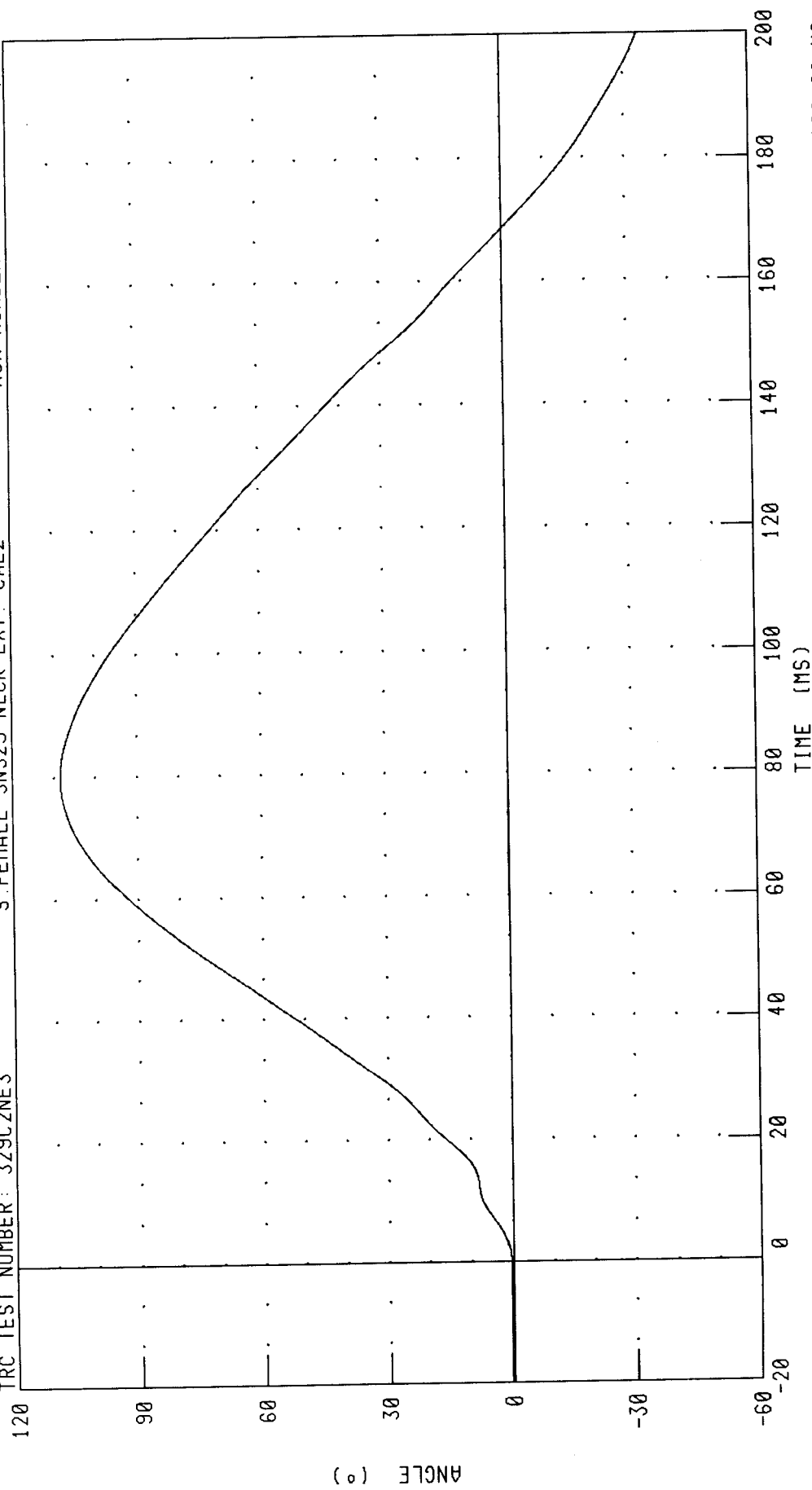
SMALL FEMALE NECK EXTENSION CALIBRATION

TOTAL ROTATION

RUN NUMBER: 042099.1358;16

S. FEMALE SN329 NECK EXT. CAL2

TRC TEST NUMBER: 329C2NE3



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 108.39 ° @ 79.92 MS; -33.51 ° @ 200.00 MS

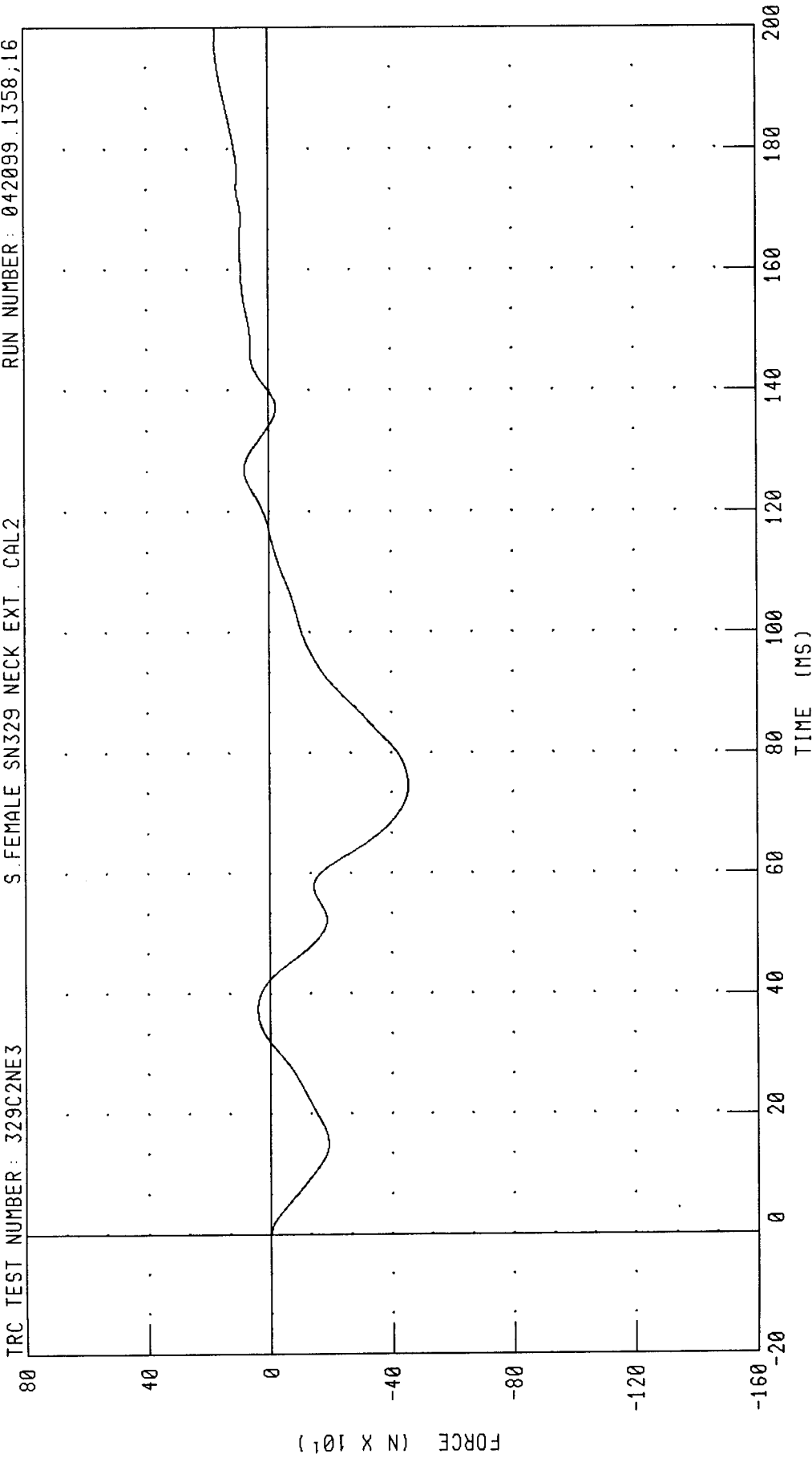
SMALL FEMALE NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 329C2NE3

S.FEMALE SN329 NECK EXT. CAL2

RUN NUMBER: 042099.1358.16



CHANNEL: NEKXF FILTER: CH. CLASS 60

PEAK DATA: 175.77 N @ 198.80 MS, -455.57 N @ 74.56 MS

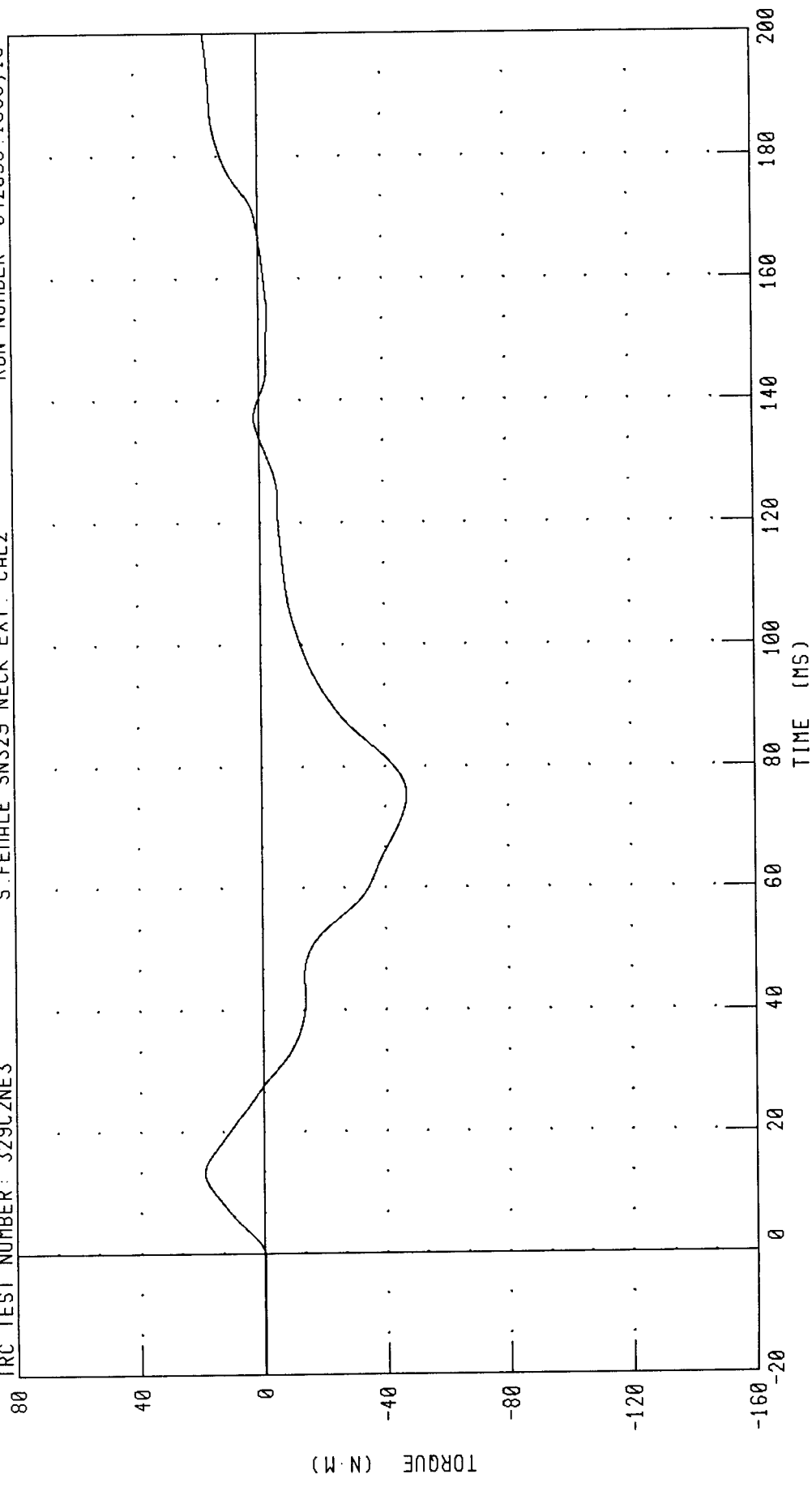
SMALL FEMALE NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 329C2NE3

S. FEMALE SN329 NECK EXT. CAL2

RUN NUMBER: 042099.1358;16



PEAK DATA: 19.15 N·M @ 13.28 MS; -47.04 N·M @ 75.36 MS

CHANNEL: NEKYM FILTER: CH. CLASS 60

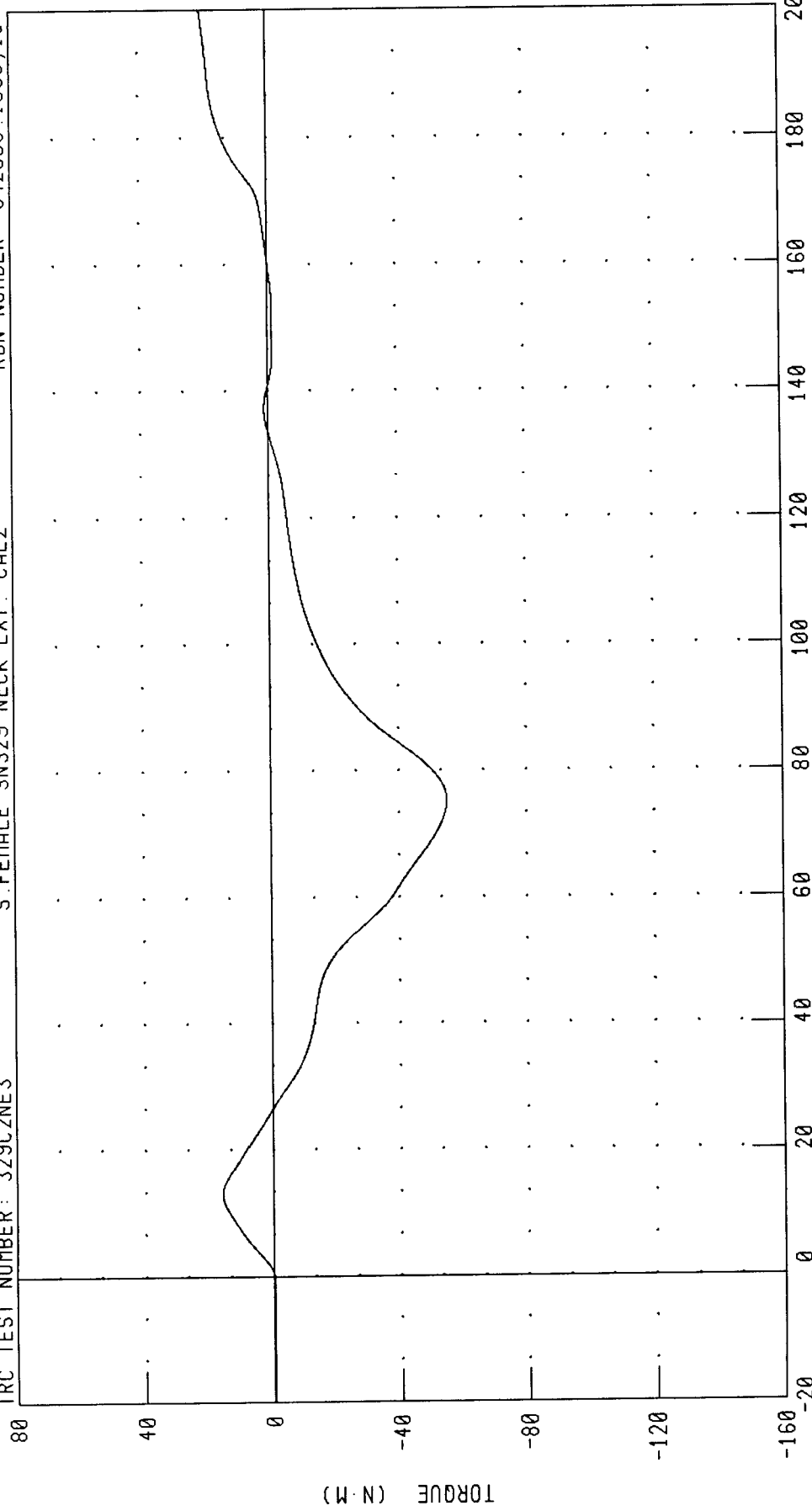
SMALL FEMALE NECK EXTENSION CALIBRATION

TOTAL MOMENT ABOUT OCCIPITAL CONDYLE

S. FEMALE SN329 NECK EXT. CAL2

RUN NUMBER: 042099.1358.16

TRC TEST NUMBER: 329C2NE3



TIME (MS)

PEAK DATA: 20.74 N·M @ 200.00 MS; -55.13 N·M @ 75.28 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

20-APR-99

TRC INC.

TEST NO: 329C2TH2

S.FEMALE SN329 THORAX CAL2

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	48 - 55 MM	54.6 MM
MAXIMUM RESISTIVE FORCE	3900 - 4400 N	4118. N
INTERNAL HYSTERESIS	69% - 85%	71.6%

TEST MEETS SPECIFICATIONS

TECHNICIAN

B. Cabt

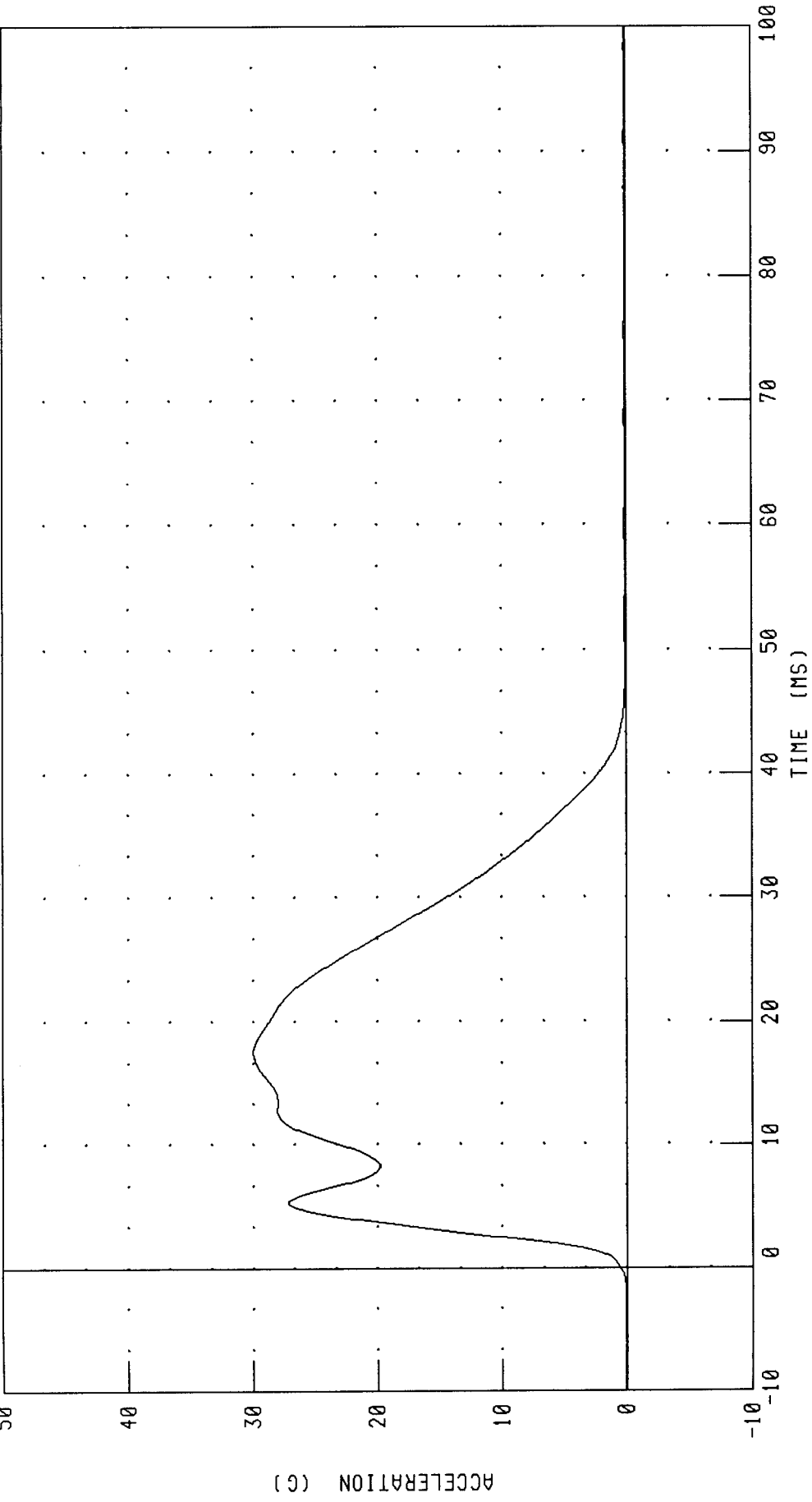
RUN NUMBER: 042099.1547;5

SMALL FEMALE THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 329C2TH2

S.FEMALE SN329 THORAX CAL2

RUN NUMBER: 042099 1549,5



CHANNEL: PENXG FILTER: CH. CLASS 180

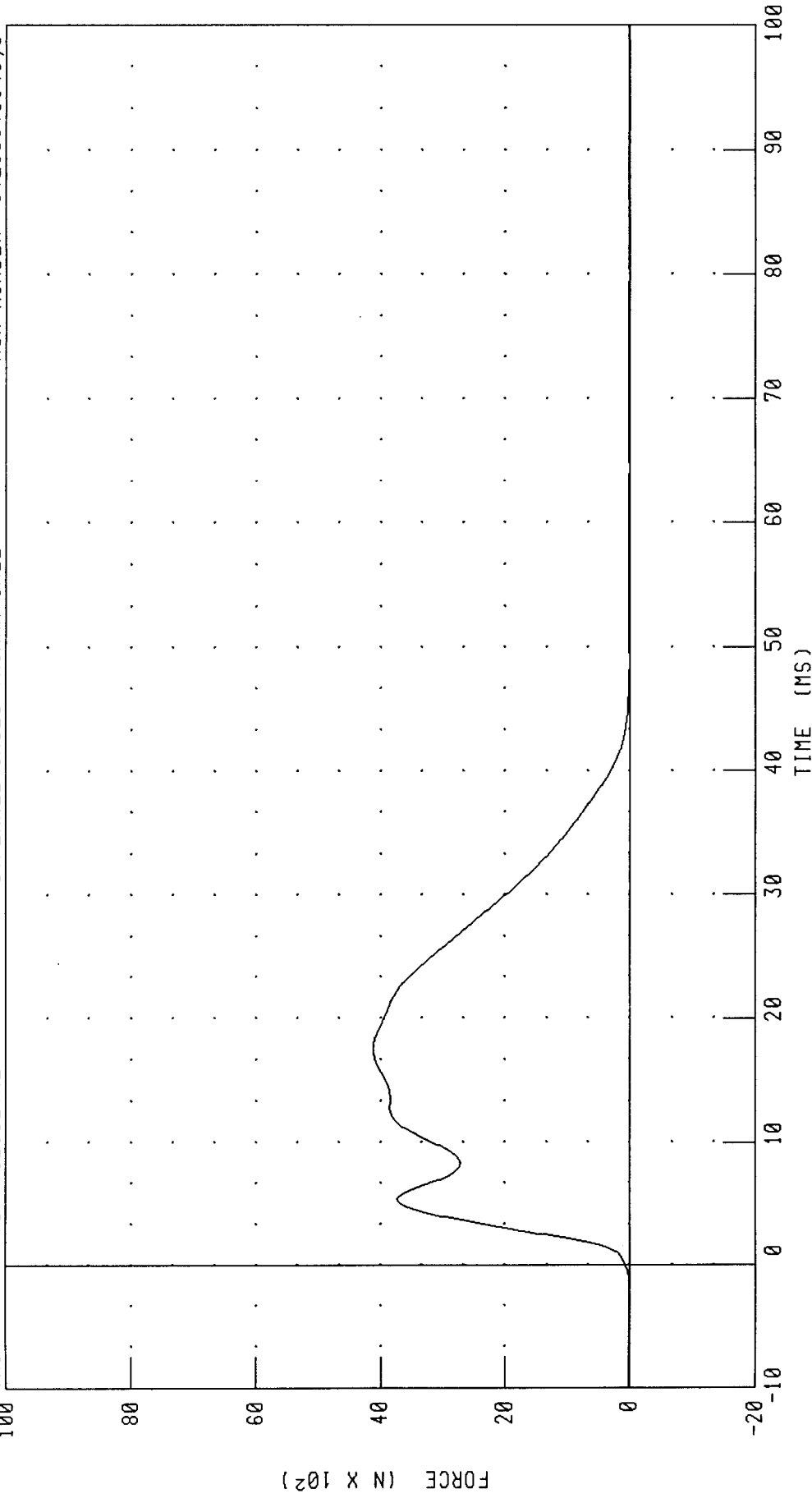
PEAK DATA: 30.01 G @ 17.60 MS; 0.03 G @ 49.20 MS

SMALL FEMALE THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 329C2TH2

S. FEMALE SN329 THORAX CAL2

RUN NUMBER: 042099.1549.5

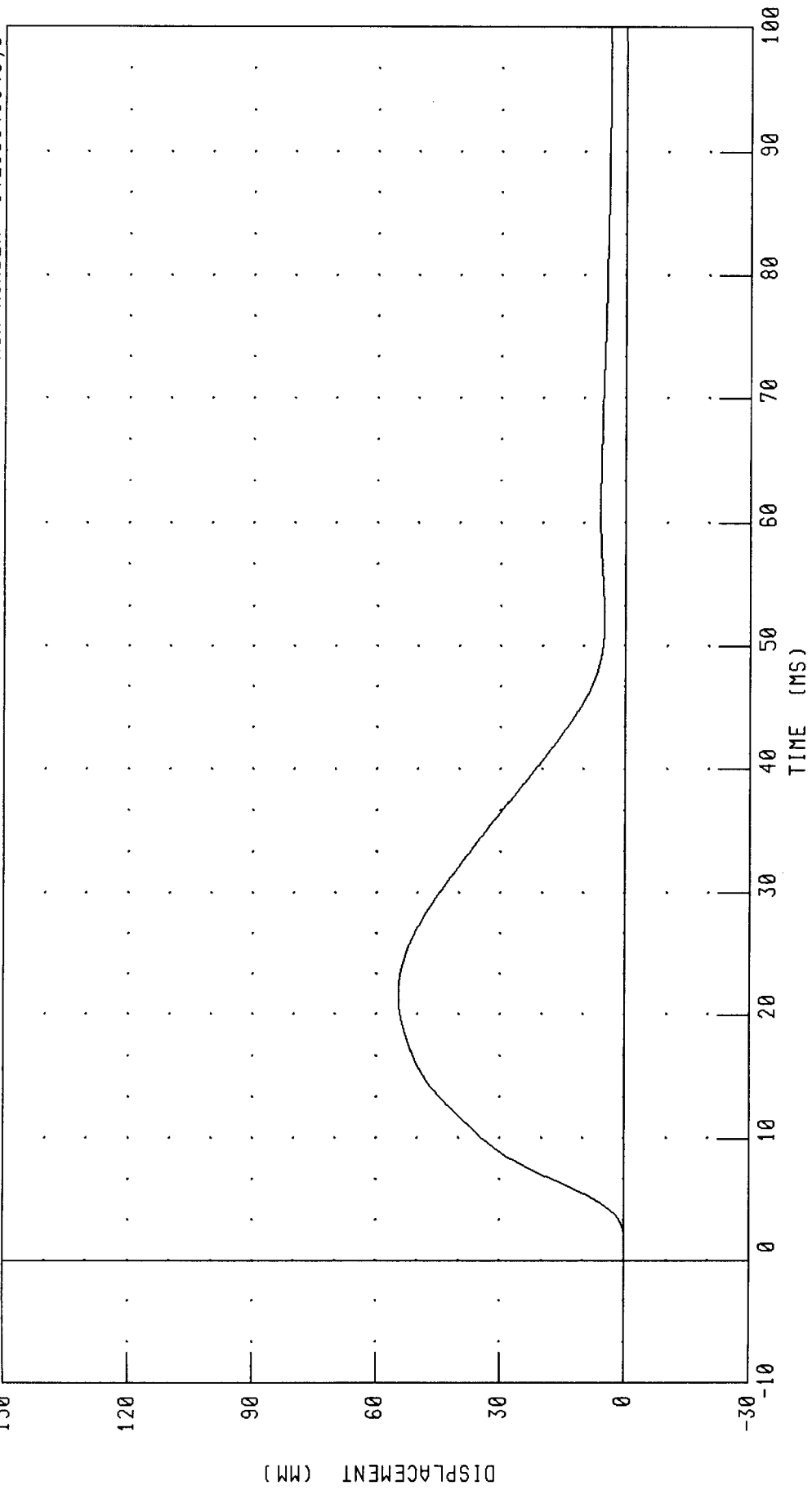


CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 4118.18 N @ 17.60 MS; 3.54 N @ 49.20 MS

SMALL FEMALE THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 329C2TH2 S. FEMALE SN329 THORAX CAL2 RUN NUMBER: 042099.1549,5

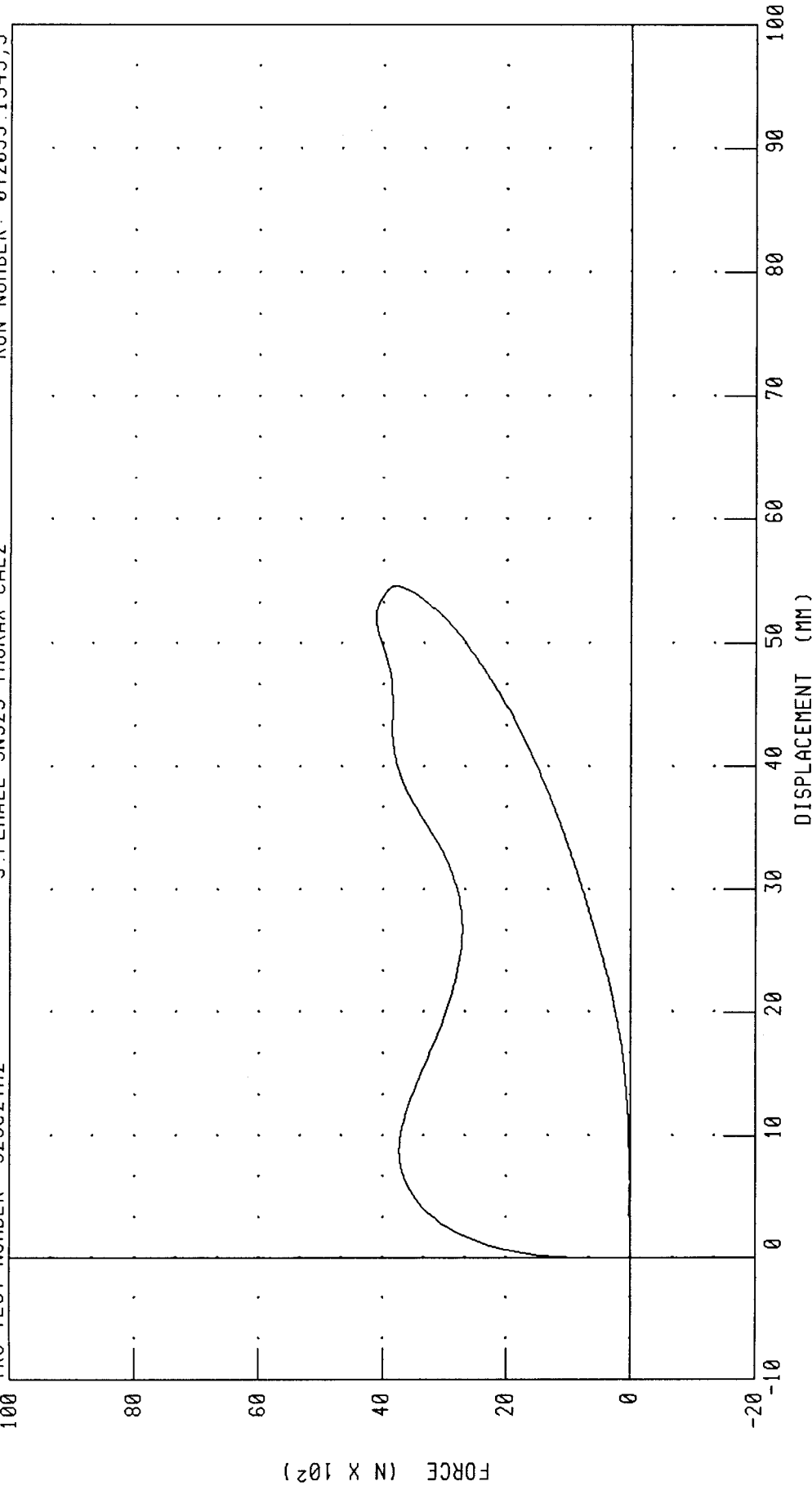


CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 54.68 MM @ 21.68 MS; -0.04 MM @ 1.60 MS

SMALL FEMALE THORAX CALIBRATION
CHEST DISPLACEMENT VS PENDULUM FORCE

TRC TEST NUMBER: 329C2TH2 RUN NUMBER: 042099.1549,5

S.FEMALE SN329 THORAX CAL2



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

PEAK DATA: 54.68 MM @ 21.68 MS; -0.04 MM @ 1.60 MS
4118.18 N @ 17.60 MS; 3.54 N @ 49.20 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

19-APR-99

TRC INC.

TEST NO: 329C2RK1

S.FEMALE SN329 R.KNEE CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.13 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3899.2 N

TEST MEETS SPECIFICATIONS

TECHNICIAN

By Cult

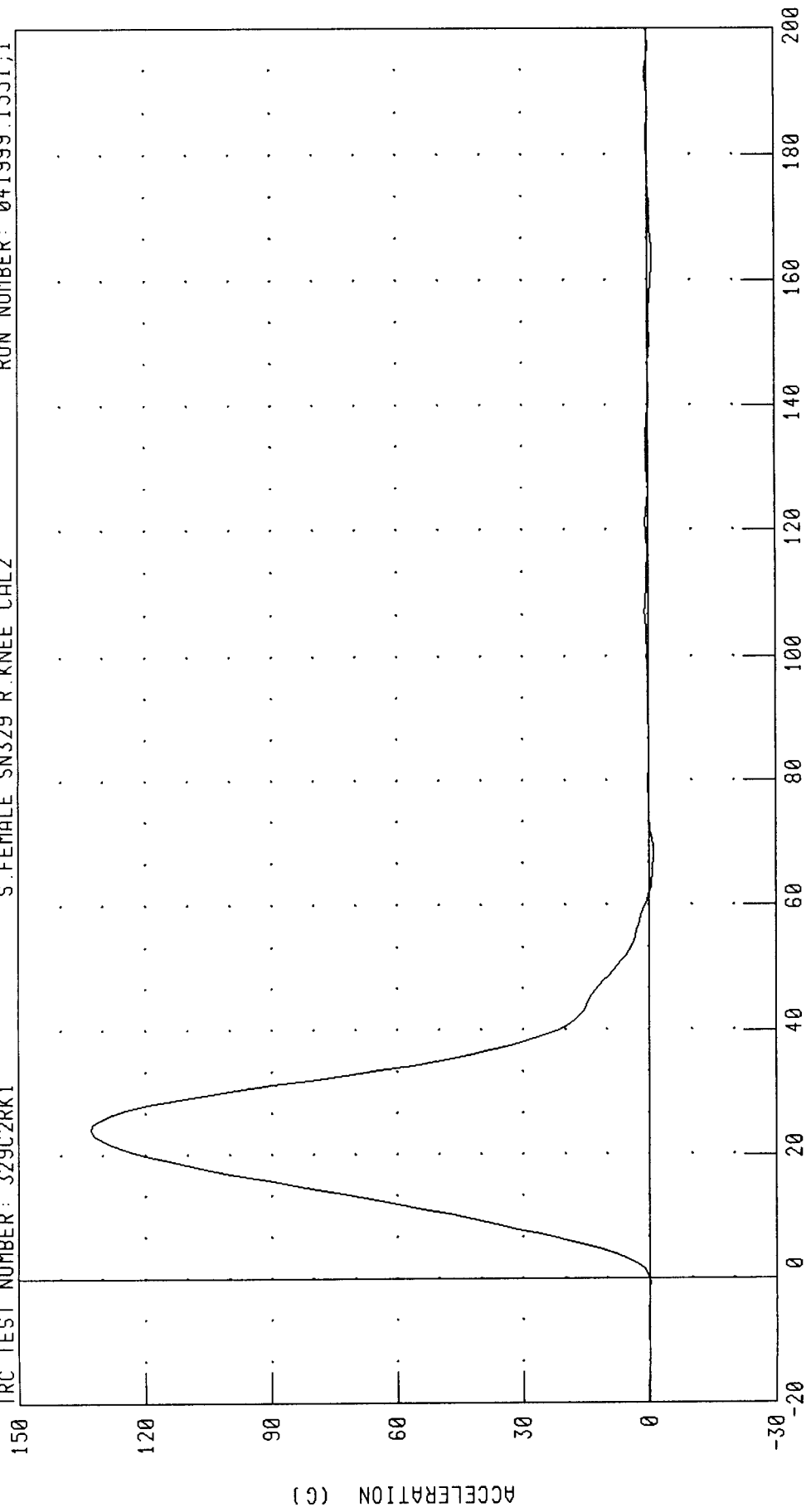
RUN NUMBER: 041999.1551;1

SMALL FEMALE HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 329C2RK1

S. FEMALE SN329 R. KNEE CAL2

RUN NUMBER: 041999.1551;1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 132.82 G @ 2.40 MS; -1.16 G @ 16.40 MS

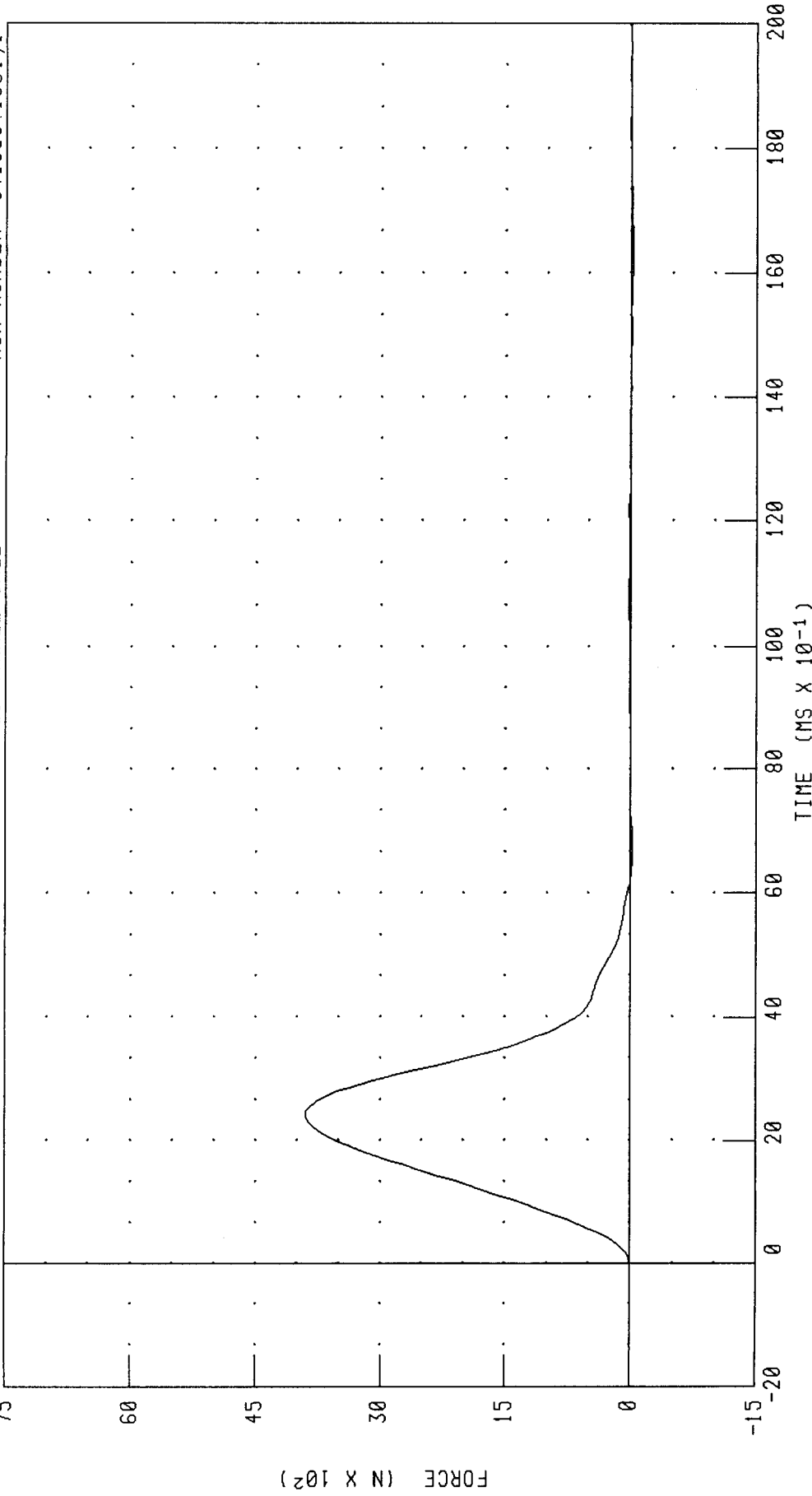
SMALL FEMALE HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER : 329C2RK1

S. FEMALE SN329 R. KNEE CAL2

RUN NUMBER : 041999.1551,1



CHANNEL : PENXF FILTER : CH. CLASS 600

PEAK DATA : 3899.27 N @ 2.40 MS, -33.99 N @ 16.40 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

19-APR-99

TRC INC.

TEST NO: 329C2LK1

S.FEMALE SN329 LEFT KNEE CAL2

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.13 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	4089.2 N *

TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN

By Cabot

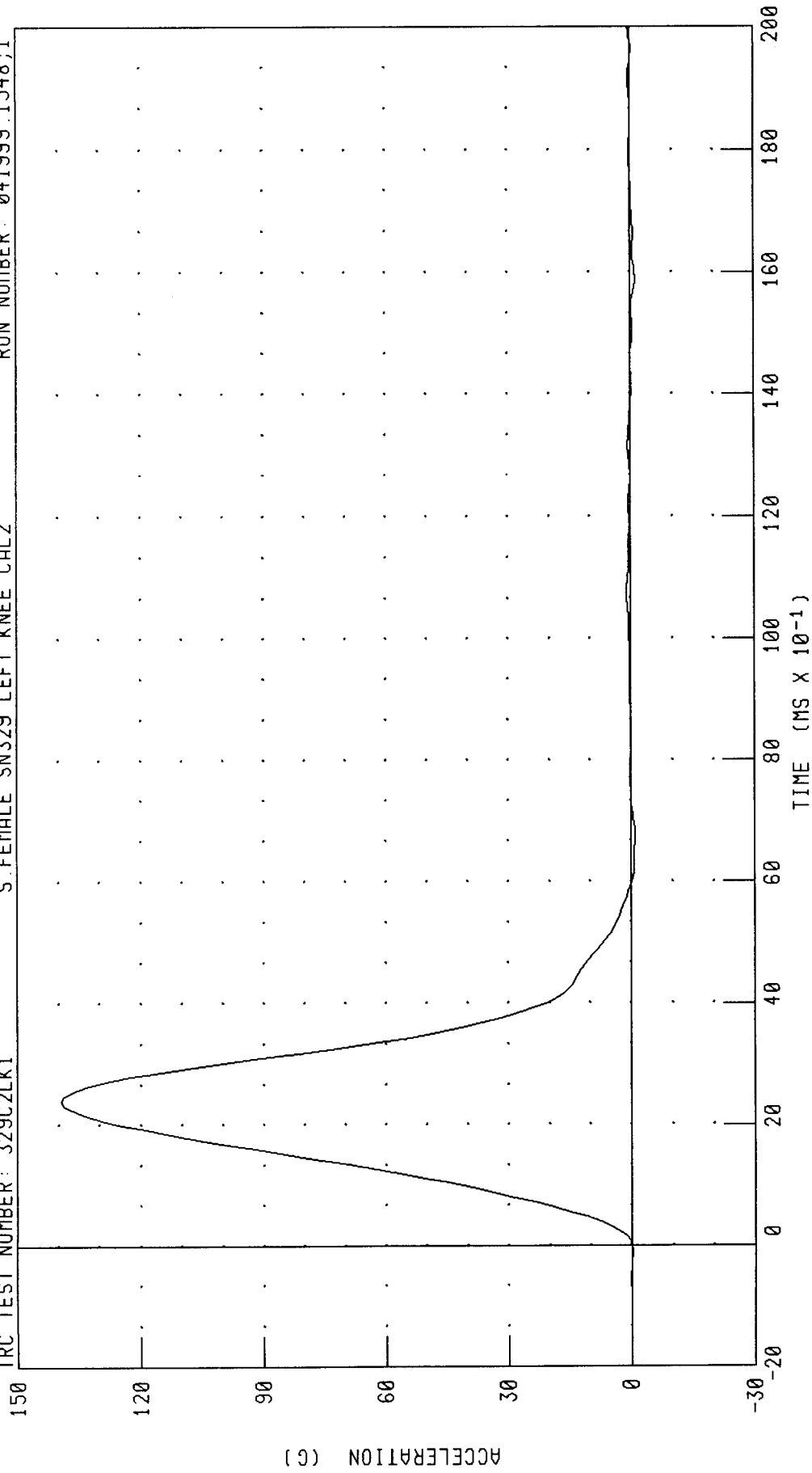
RUN NUMBER: 041999.1548;1

SMALL FEMALE HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

TRC TEST NUMBER: 329C2LK1

S. FEMALE SN329 LEFT KNEE CAL2

RUN NUMBER: 041999.1548;1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 139.30 G @ 2.40 MS; -1.26 G @ 15.92 MS

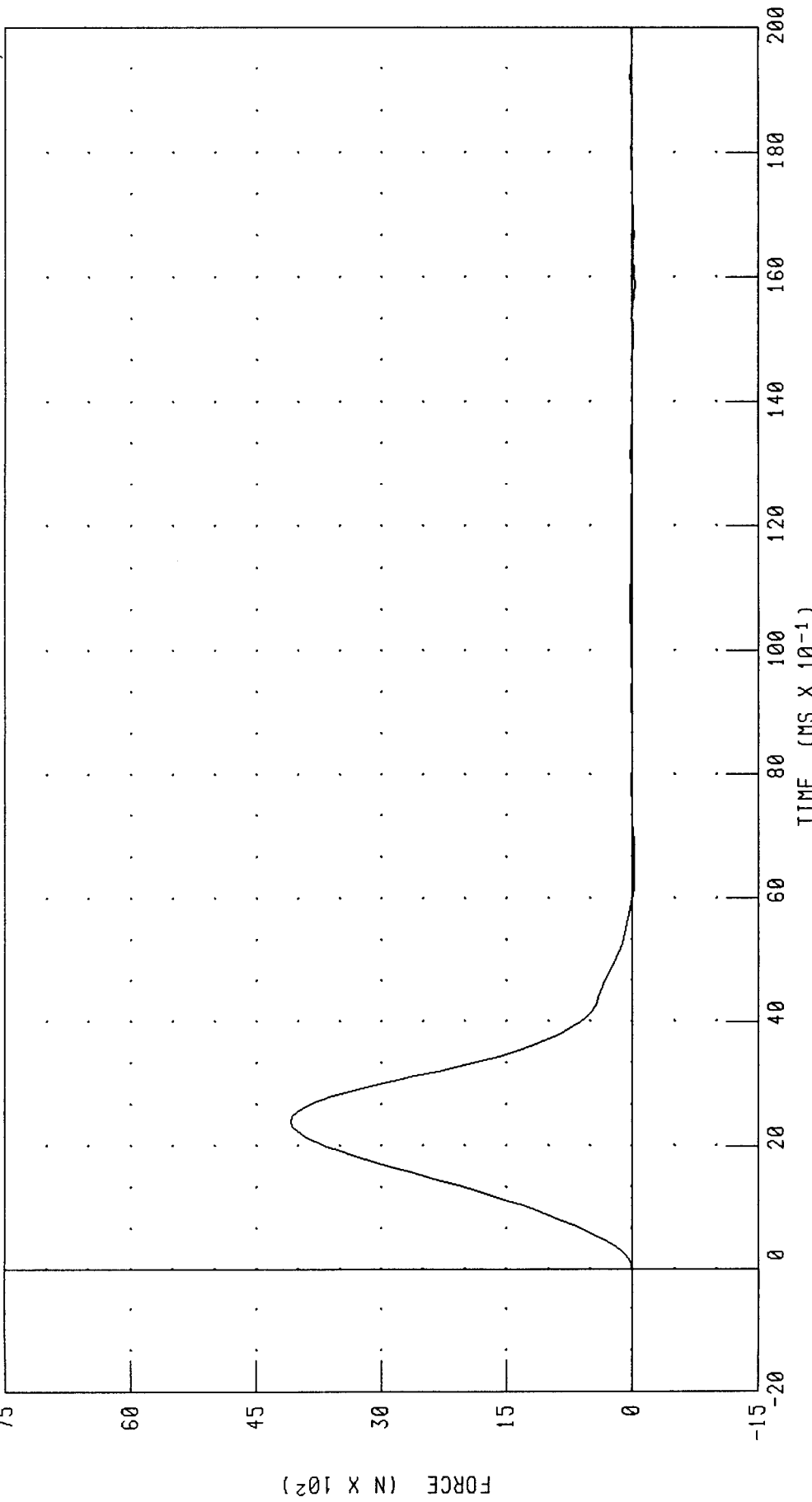
SMALL FEMALE HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

S. FEMALE SN329 LEFT KNEE CAL2

TRC TEST NUMBER: 329C2LK1

RUN NUMBER: 041999.1548,1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 4089.26 N @ 2.40 MS; -36.93 N @ 15.92 MS

Pre-Test Dummy Certification

Hybrid III 50th Male Dummy S/N 90

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III 50th

16-APR-99

TRC INC.

TEST NO: 90C25HD1

572E SN 90 HEAD DROP CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	253.48 G
PEAK LATERAL ACCELERATION	15 G MAX	2.54 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

B. J. C. D.

RUN NUMBER: 041599.1042;1

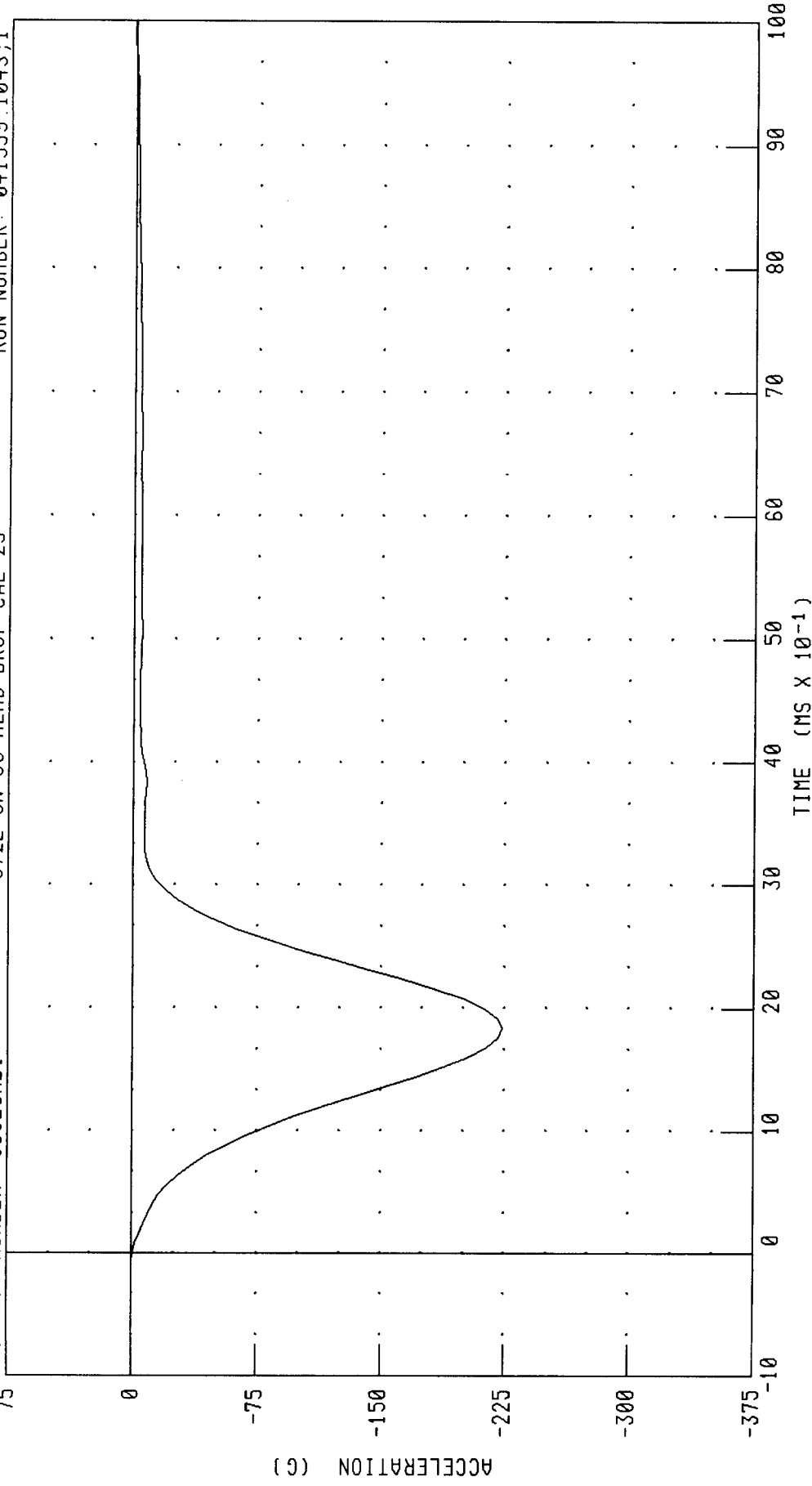
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

572E SN 90 HEAD DROP CAL 25

TRC TEST NUMBER: 90C25HD1

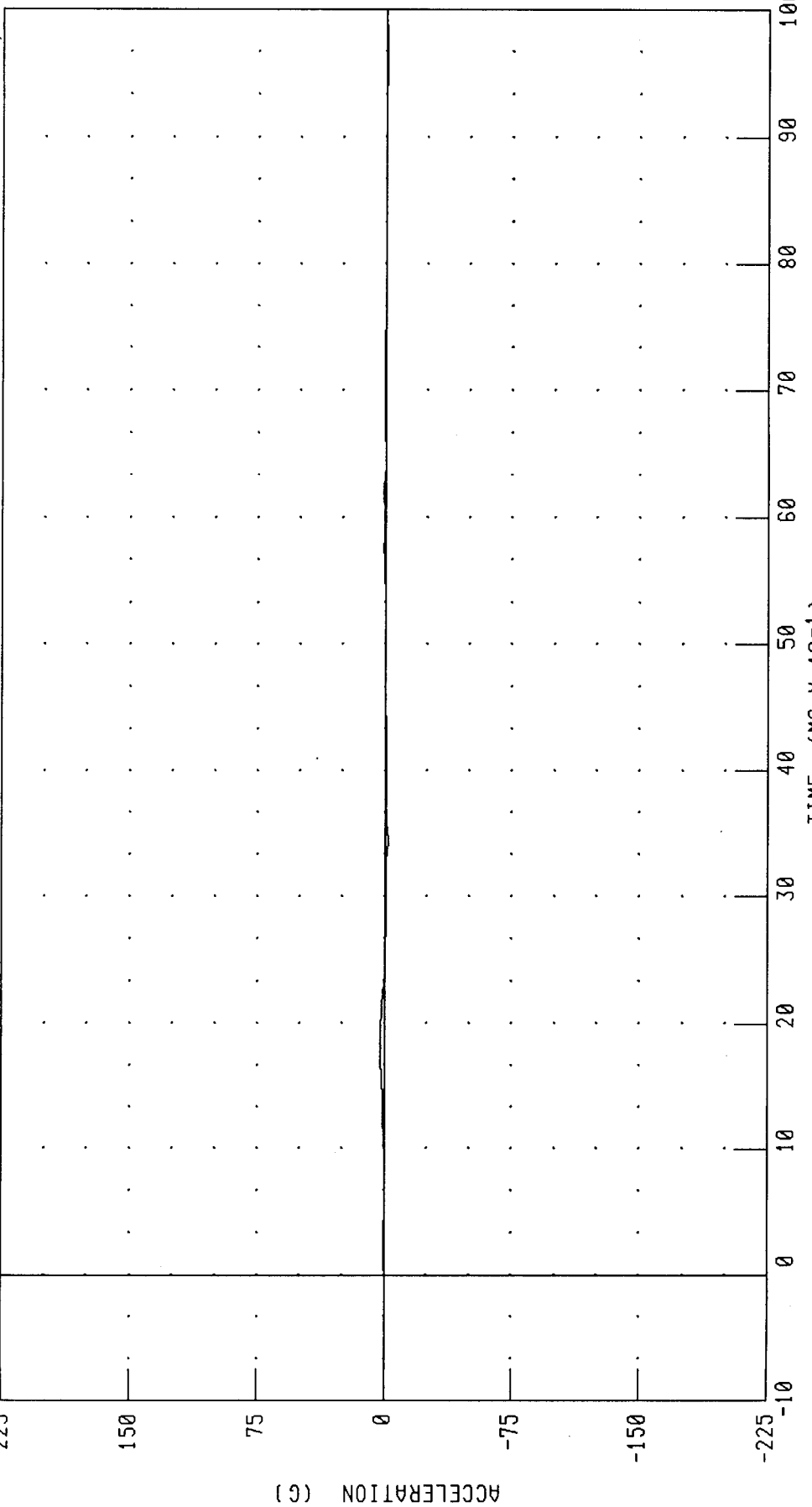
RUN NUMBER: 041599.1043,1



CHANNEL: HEDXC FILTER: CH. CLASS 1000 PEAK DATA: 0.74 G @ 10.00 MS; -223.99 G @ 1.84 MS

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

TRC TEST NUMBER: 90C25HD1 572E SN 90 HEAD DROP CAL 25 RUN NUMBER: 041599.1043.1



CHANNEL: HEDYC FILTER: CH. CLASS 1000 PEAK DATA: 2.54 G @ 1.84 MS; -2.15 G @ 3.44 MS

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

TRC TEST NUMBER: 90C25HD1 RUN NUMBER: 041599.1043;1

572E SN 90 HEAD DROP CAL 25

75

0

-75

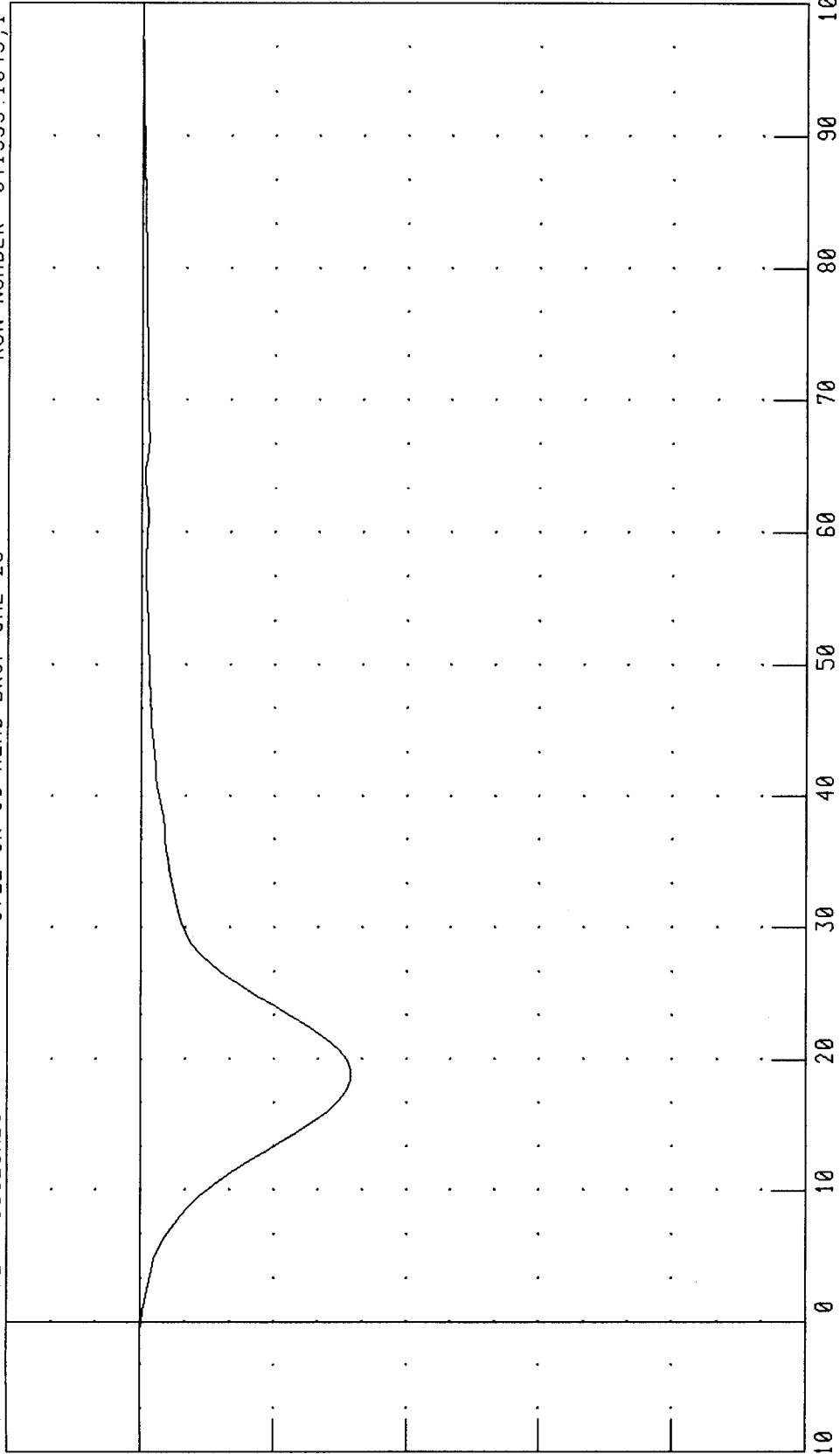
-150

-225

-300

-375

ACCELERATION (G)



TIME (MS X 10⁻¹)

CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: 0.36 G @ 10.00 MS; -118.83 G @ 1.92 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 90C25HD1

572E SN 90 HEAD DROP CAL 25

RUN NUMBER: 041599.1043.1

375

300

225

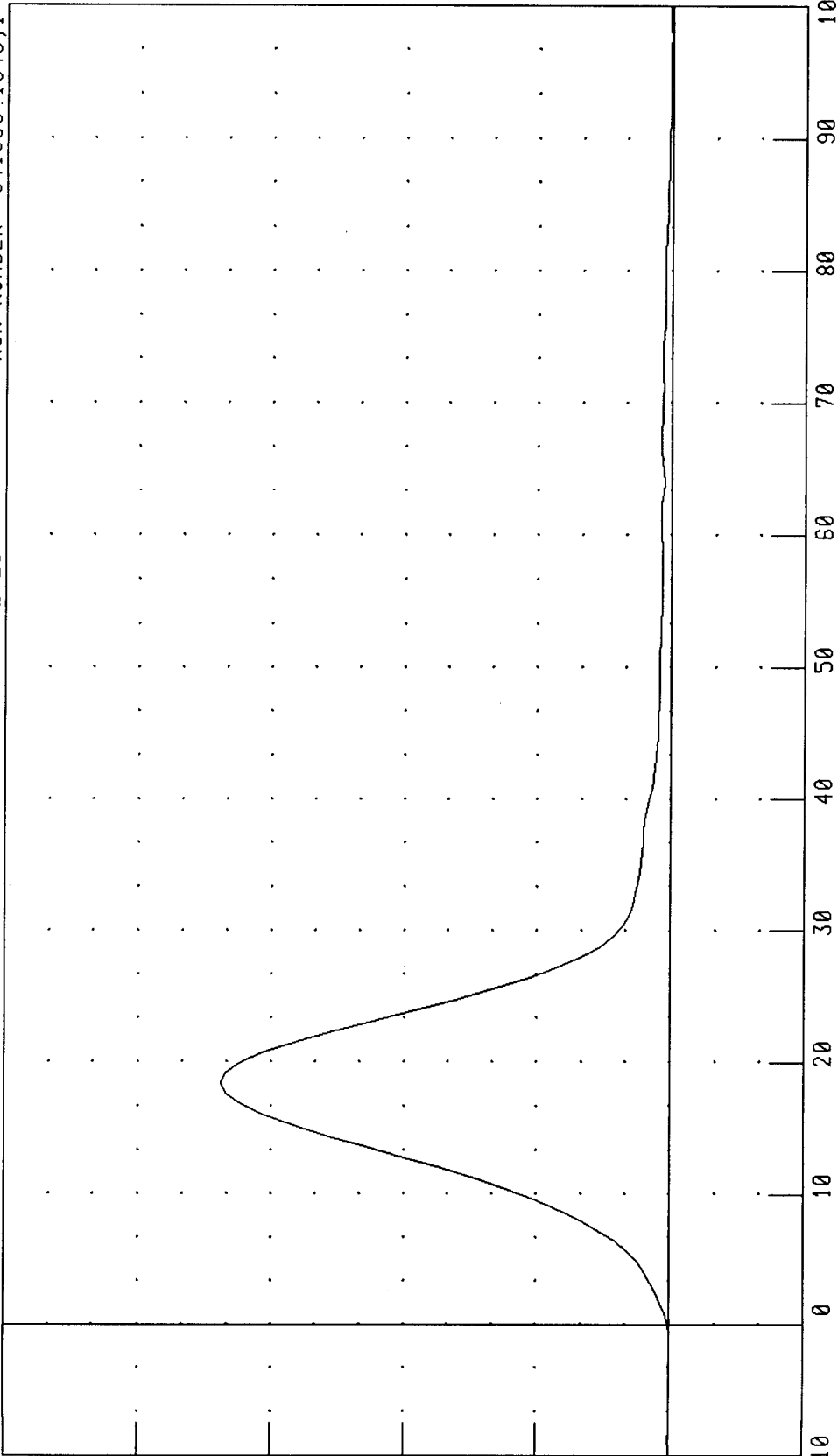
150

75

0

-75

ACCELERATION (G)



TIME (MS X 10⁻¹)

CHANNEL: HEDRC FILTER: CH. CLASS 1000

PEAK DATA: 253.48 G @ 1.84 MS; 0.05 G @ -0.80 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th

15-APR-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 90C25NF2 572E SN 90 NECK FLEXION CAL25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	6.89 - 7.13 M/S	6.99 M/S
PENDULUM DECELERATION	10 MS 22.50 - 27.50 G	23.86 G
	20 MS 17.60 - 22.60 G	20.43 G
	30 MS 12.50 - 18.50 G	17.34 G
MAX PENDULUM G	29 G MAX	24.59 G
MAX PENDULUM G ABOVE 30 MS	29 G MAX	17.31 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	34 - 42 MS	37.92 MS
D PLANE	MAX 64 - 78 DEG.	74.53 DEG.
ROTATION	TIME 57 - 64 MS	61.60 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX 88.2 - 108.5 NM	92.44 NM
	TIME 47 - 58 MS	51.76 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	113 - 128 MS	120.64 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	97 - 107 MS	104.64 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN

Bjelt

RUN NUMBER: 041599.1235;1

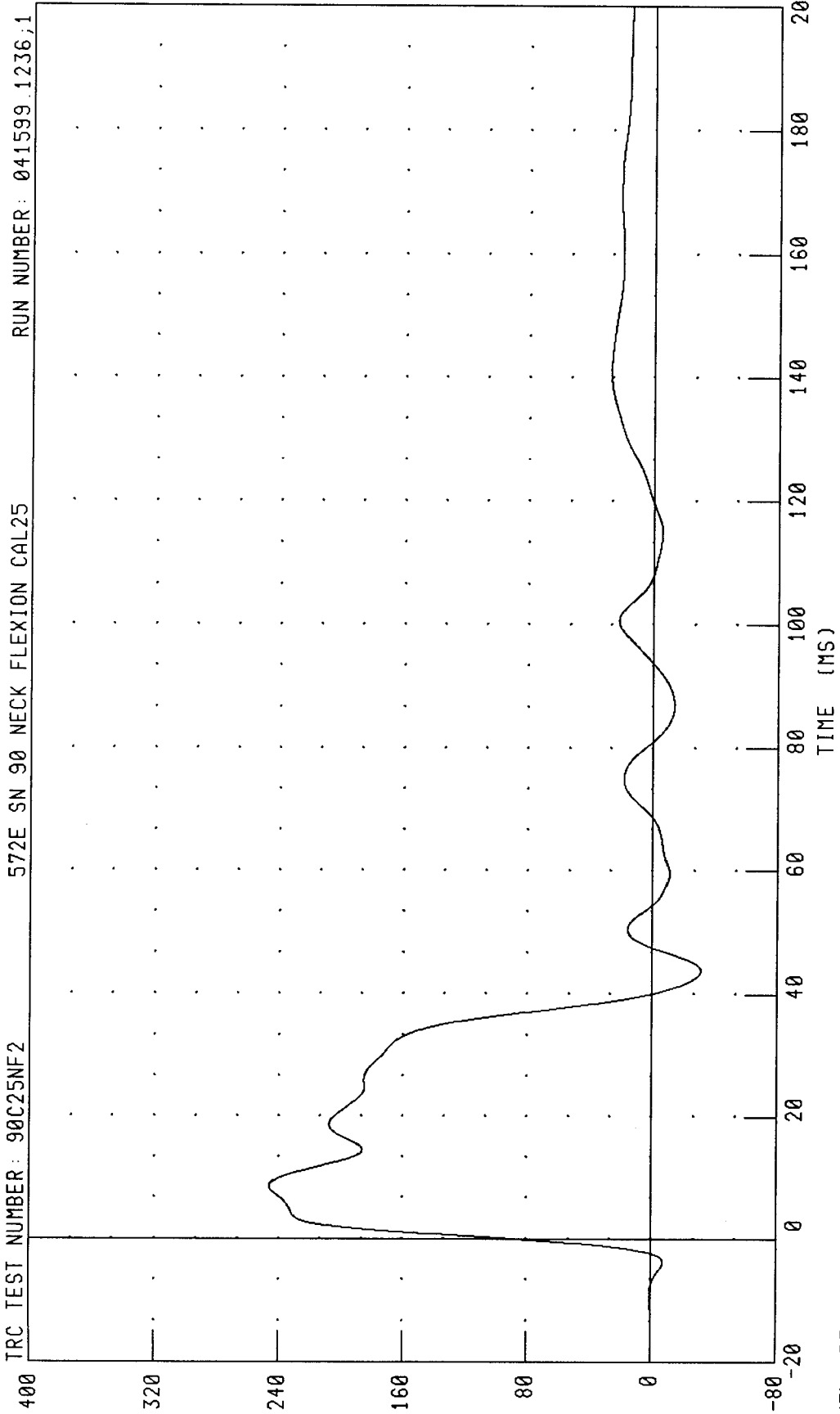
PART 572-E HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 90C25NF2

572E SN 90 NECK FLEXION CAL25

RUN NUMBER: 041599.1236;1



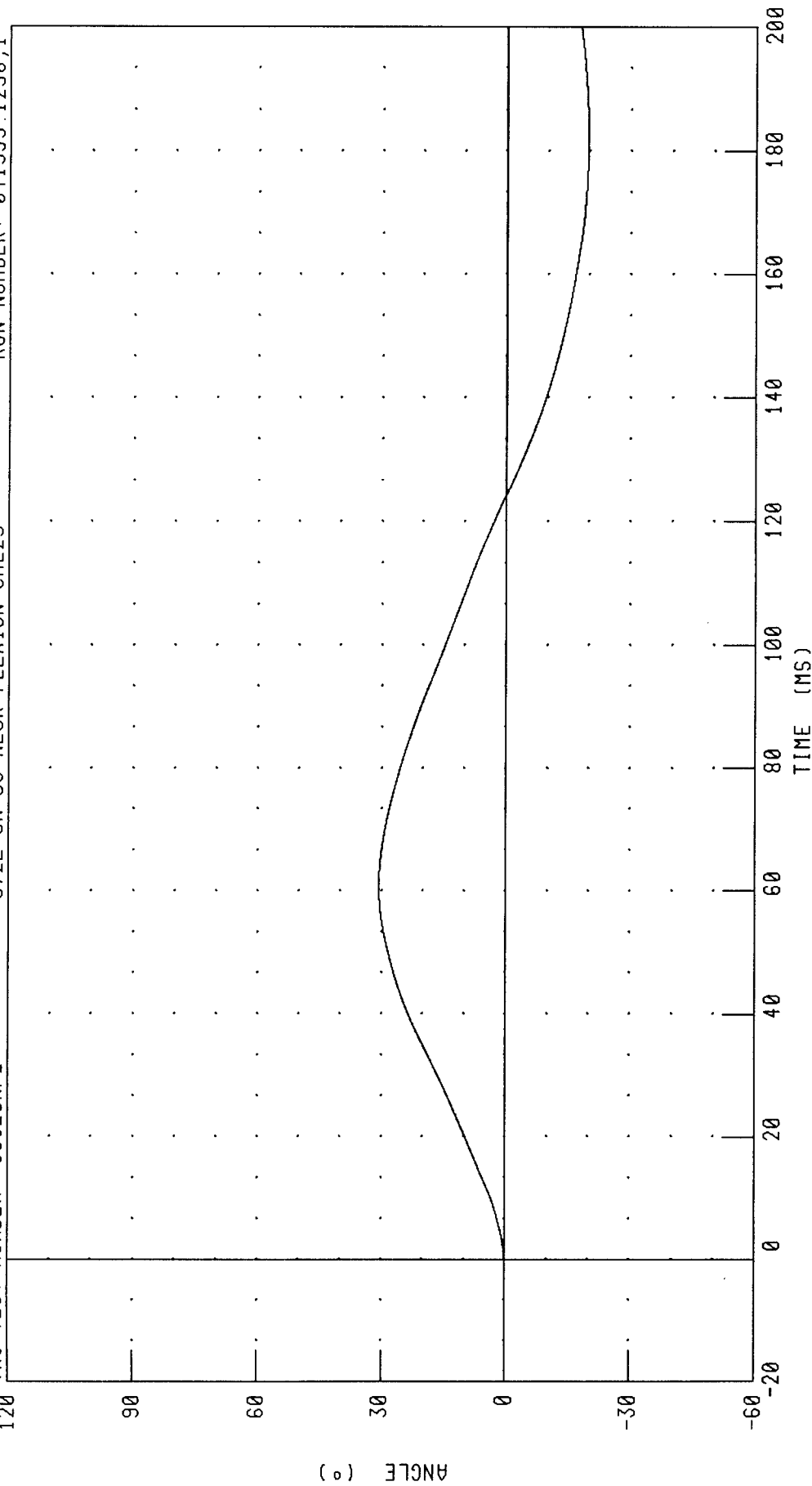
CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 24.59 G @ 8.48 MS; -3.13 G @ 43.84 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 90C25NF2

572E SN 90 NECK FLEXION CAL25

RUN NUMBER: 041599.1236;1

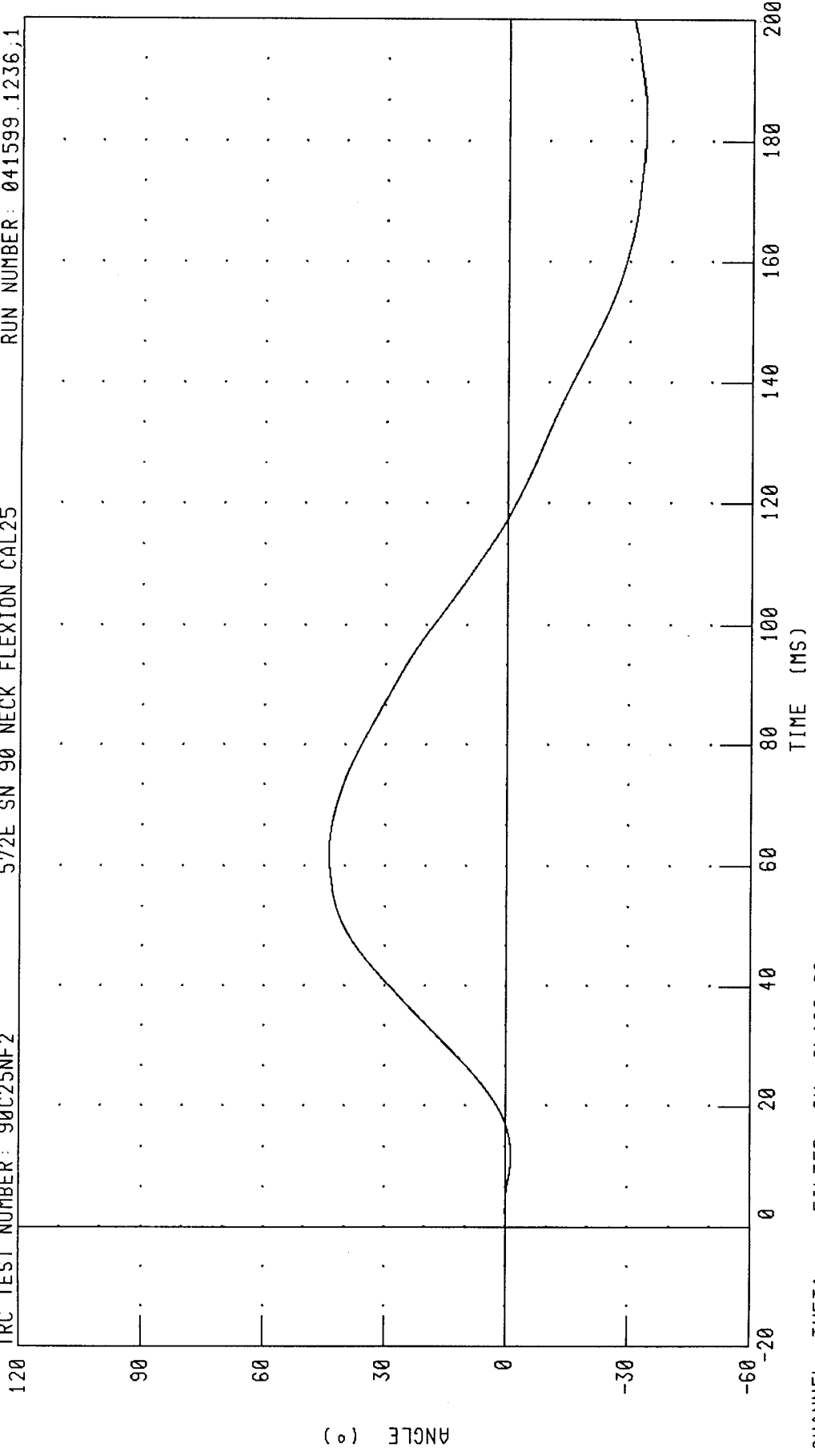


CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 30.66 ° @ 60.96 MS; -19.64 ° @ 181.28 MS

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

TRC TEST NUMBER: 90C25NF2 572E SN 90 NECK FLEXION CAL25 RUN NUMBER: 041599.1236,1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 43.89 ° @ 62.00 MS; -33.68 ° @ 183.84 MS

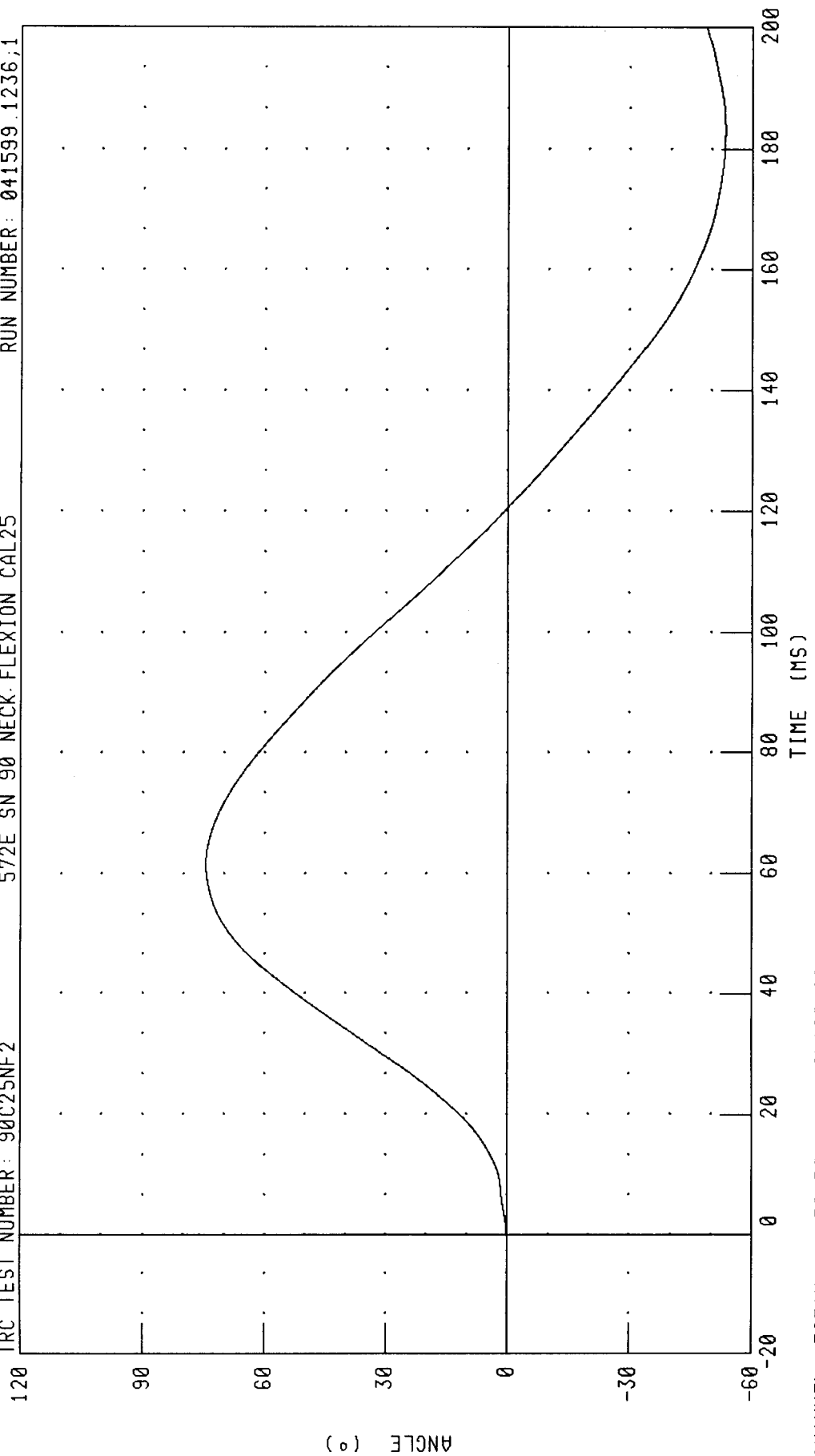
PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 90C25NF2

572E SN 90 NECK-FLEXION CAL25

RUN NUMBER: 041599.1236,1



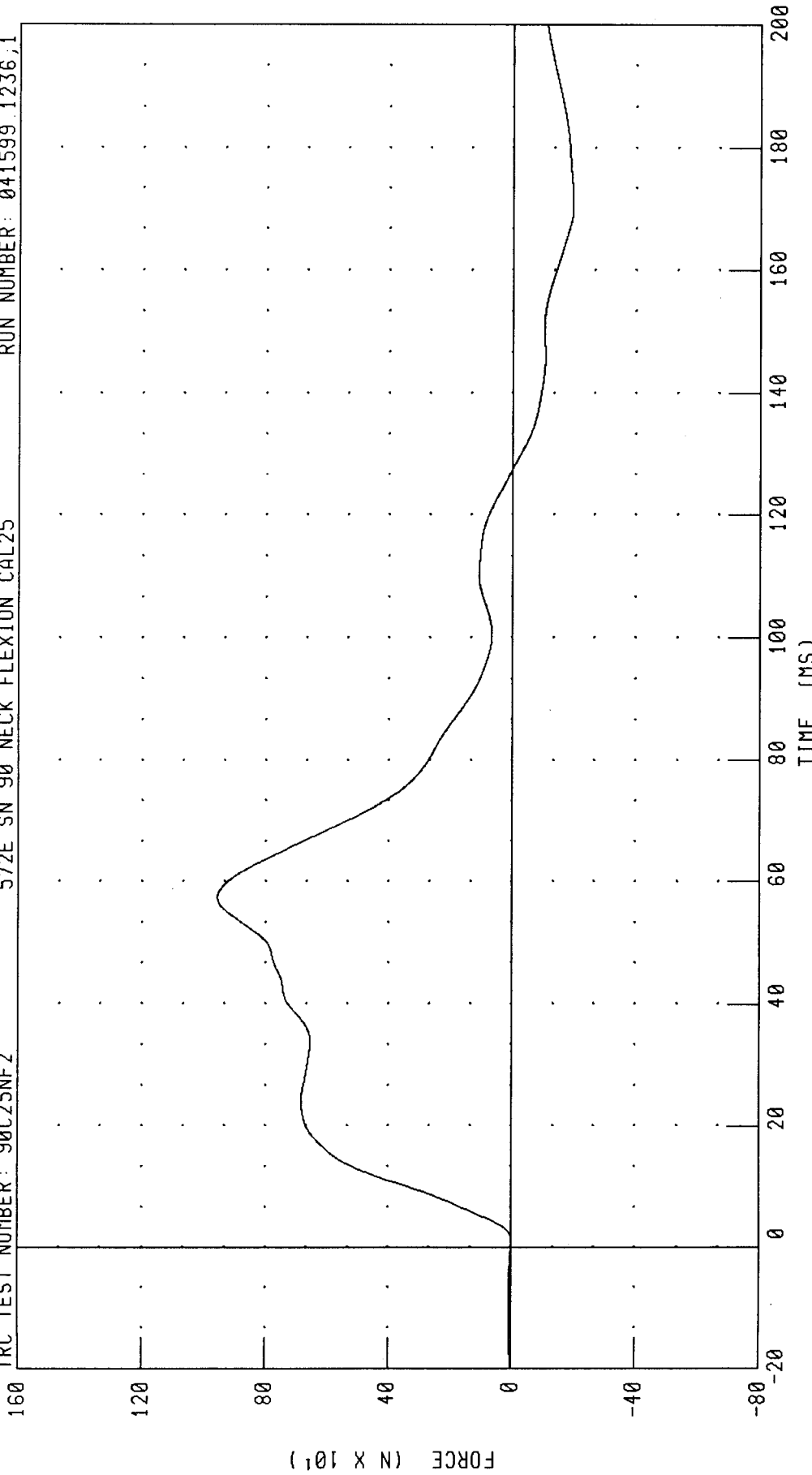
CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 74.54 ° @ 61.60 MS; -53.31 ° @ 183.20 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 90C25NF2 572E SN 90 NECK FLEXION CAL25 RUN NUMBER: 041599.1236,1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 956.24 N @ 57.36 MS; -195.65 N @ 170.56 MS

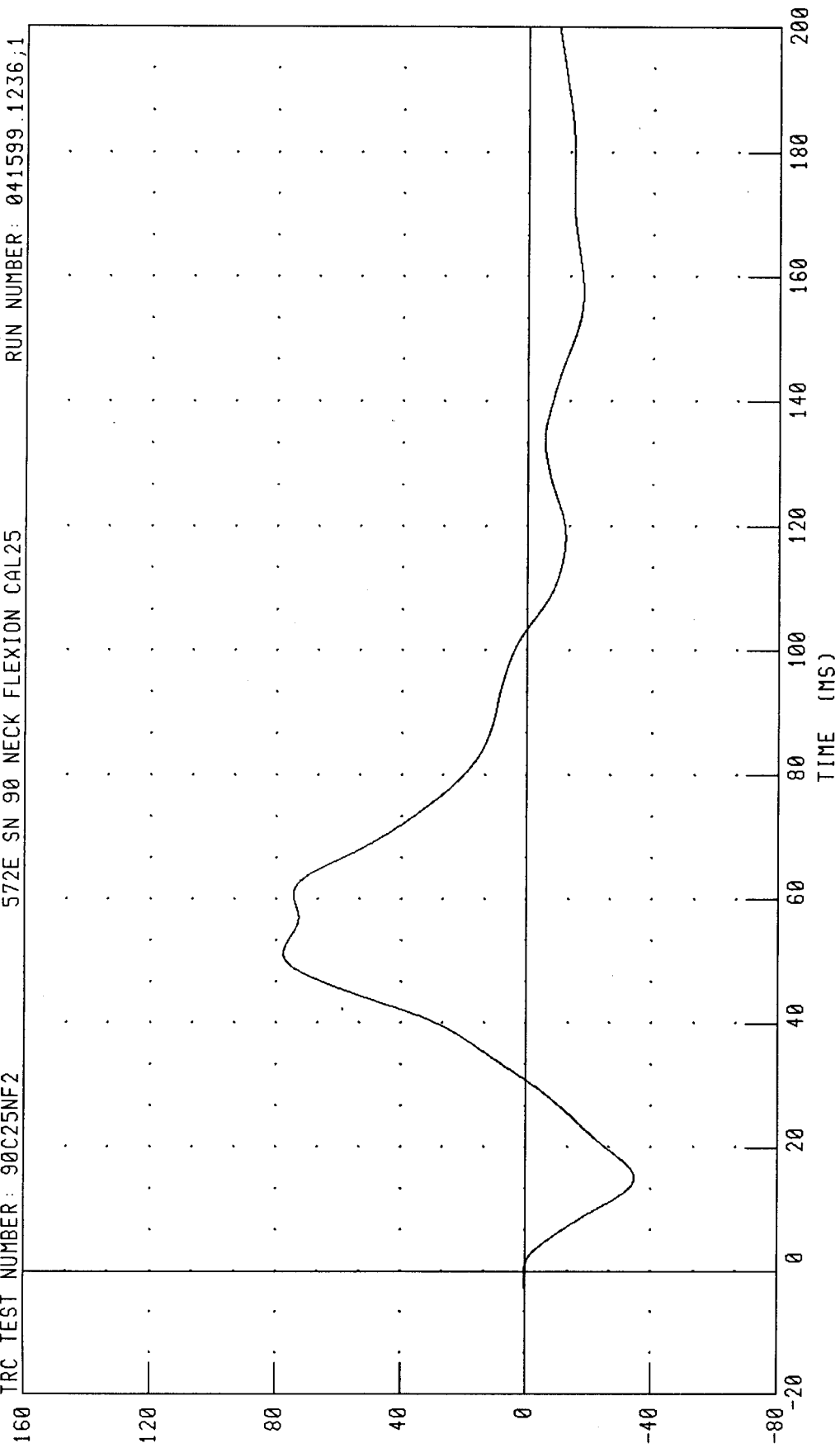
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 90C25NF2

572E SN 90 NECK FLEXION CAL25

RUN NUMBER: 041599.1236;1

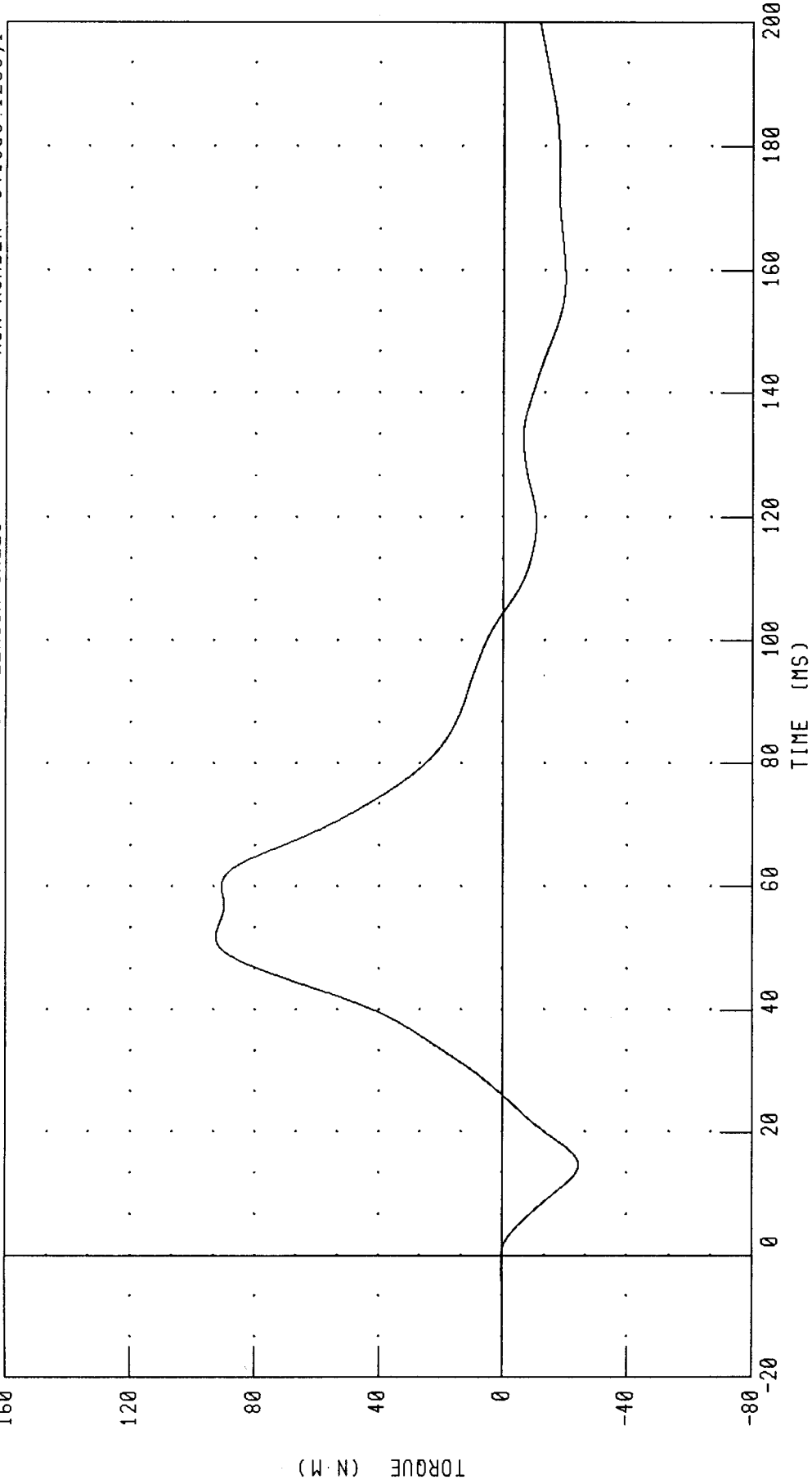


CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 77.74 N·M @ 51.28 MS; -34.71 N·M @ 15.12 MS

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

TRC TEST NUMBER: 90C25NF2 RUN NUMBER: 041599.1236.1

572E SN 90 NECK FLEXION CAL25



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 92.44 N·M @ 51.76 MS; -24.53 N·M @ 14.64 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III 50th

16-APR-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 90C25NE1 572E SN 90 NECK EXT. CAL25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.05 M/S
PENDULUM	10 MS 17.20 - 21.20 G	18.88 G
DECELERATION	20 MS 14.00 - 19.00 G	17.83 G
	30 MS 11.00 - 16.00 G	13.34 G
MAX PENDULUM G	22 G MAX	19.50 G
MAX PENDULUM G ABOVE 30 MS	22 G MAX	13.29 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G	38 - 46 MS	41.44 MS
D PLANE	MAX 81 - 106 DEG.	100.80 DEG.
ROTATION	TIME 72 - 82 MS	78.00 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN -80.0/-52.9 NM	-69.23 NM
	TIME 65 - 79 MS	73.68 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO	147 - 174 MS	162.88 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO	120 - 148 MS	142.00 MS

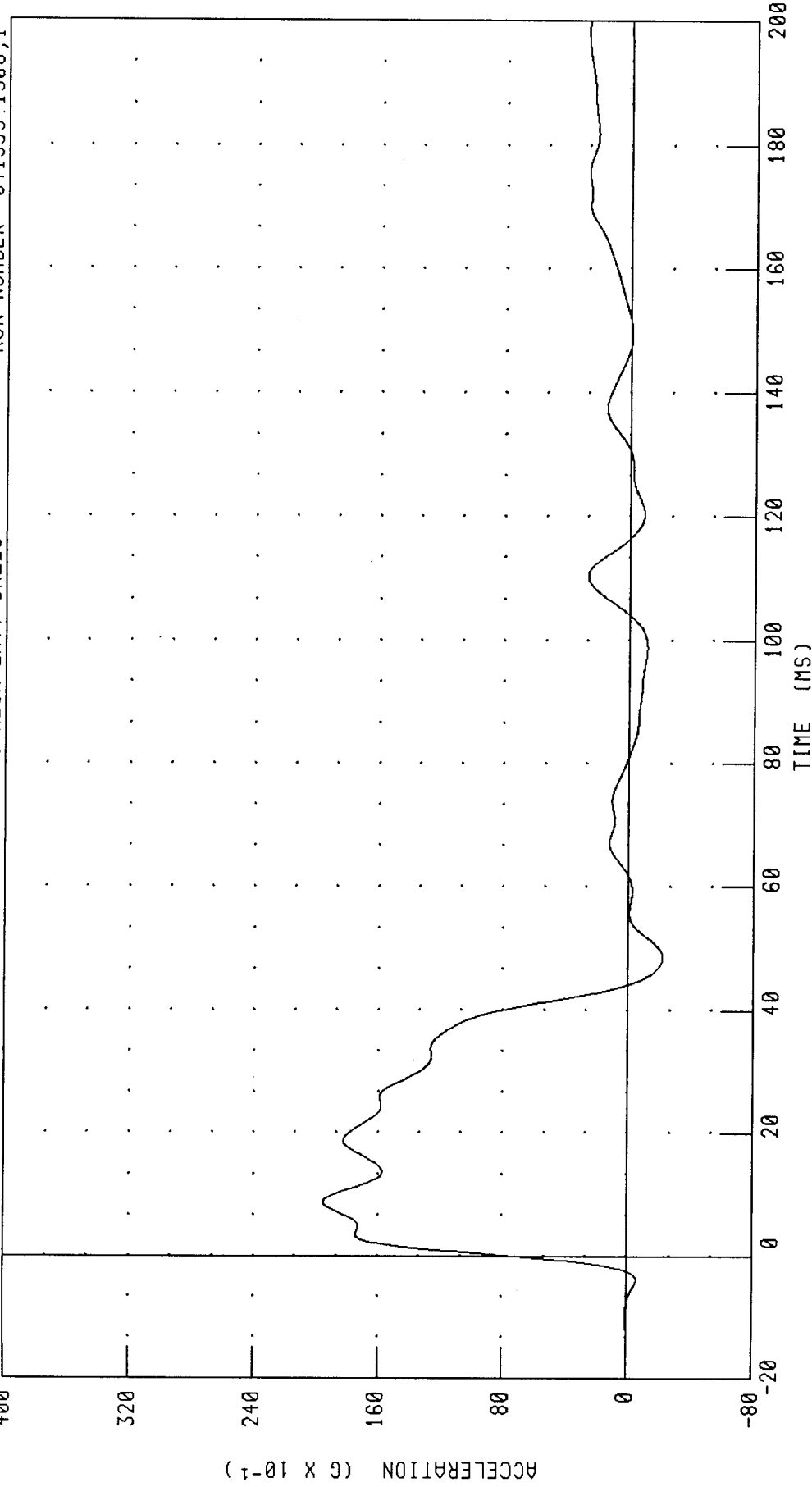
TEST MEETS SPECIFICATIONS

TECHNICIAN By Calt

RUN NUMBER: 041599.1307;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 90C25NE1 572E SN 90 NECK EXT. CAL25 RUN NUMBER: 041599.1308,1



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 19.50 G @ 8.80 MS; -2.21 G @ 48.56 MS

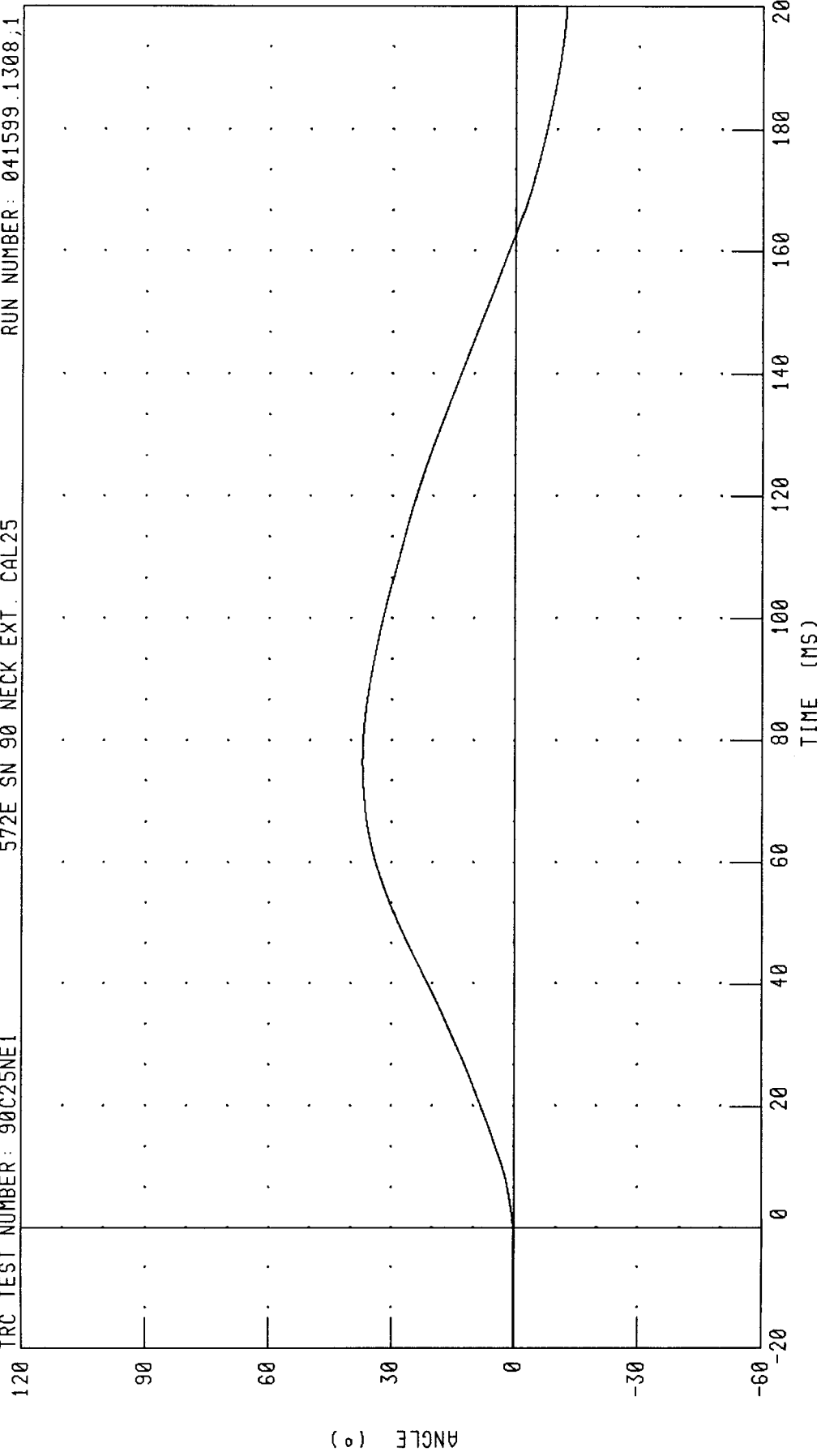
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 90C25NE1

572E SN 90 NECK EXT. CAL25

RUN NUMBER: 041599.1308,1



CHANNEL: BETA FILTER: CH. CLASS 60

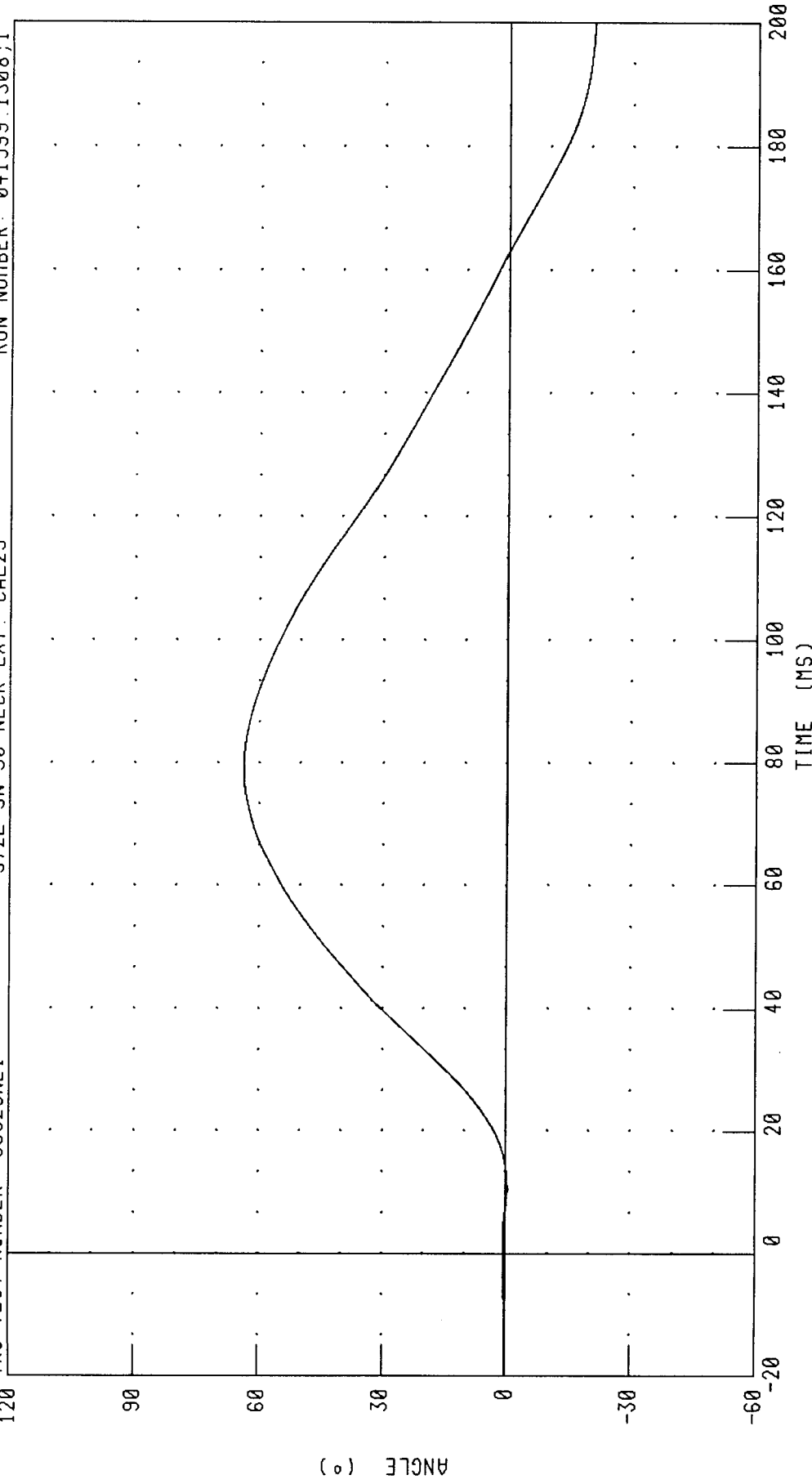
PEAK DATA: 37.14 ° @ 76.40 MS; -12.42 ° @ 200.00 MS

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

TRC TEST NUMBER: 90C25NE1

572E SN 90 NECK EXT. CAL25

RUN NUMBER: 041599.1308;1



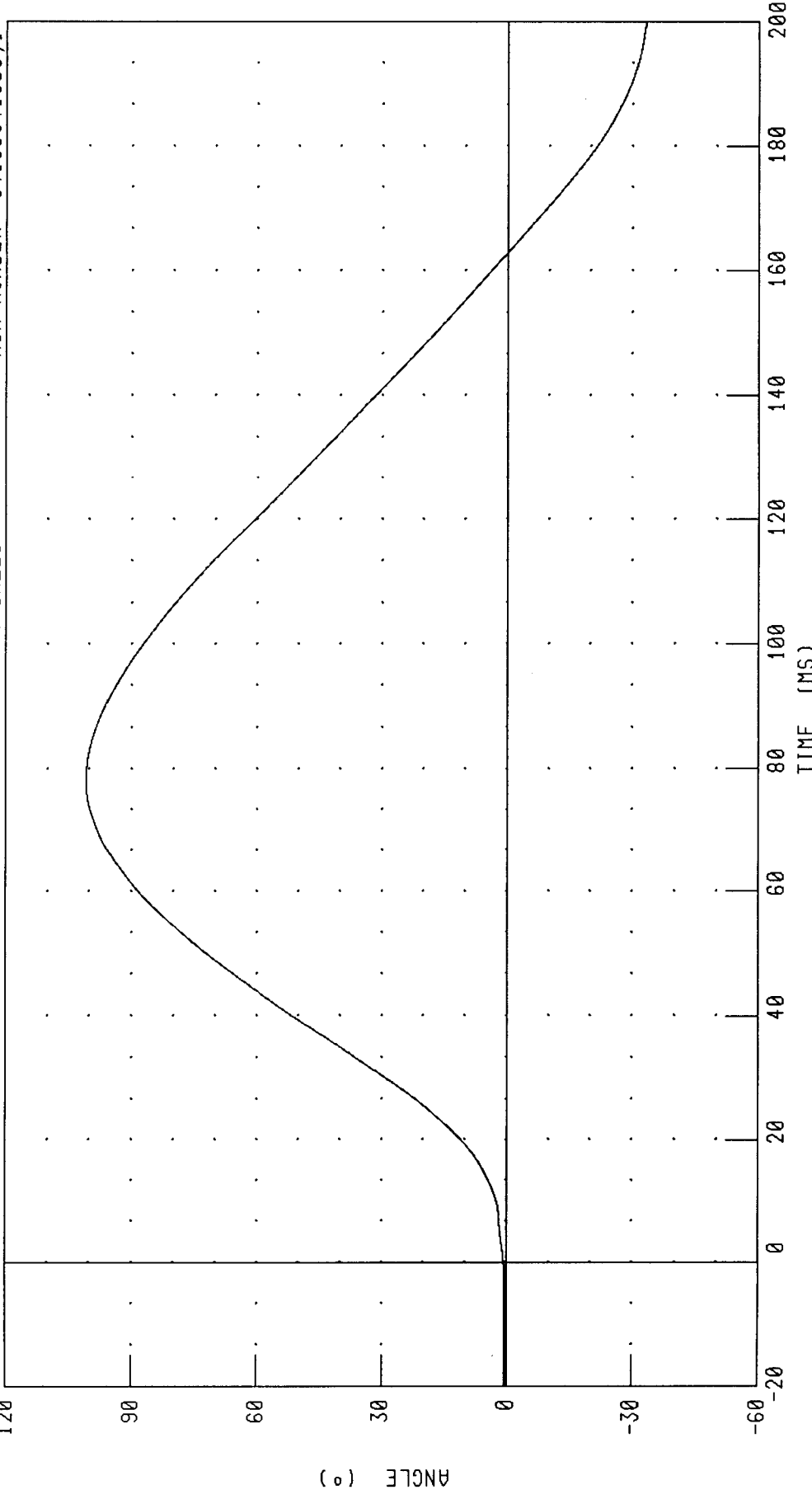
CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 63.71 ° @ 78.88 MS; -20.76 ° @ 200.00 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 90C25NE1 572E SN 90 NECK EXT. CAL25 RUN NUMBER: 041599.1308;1

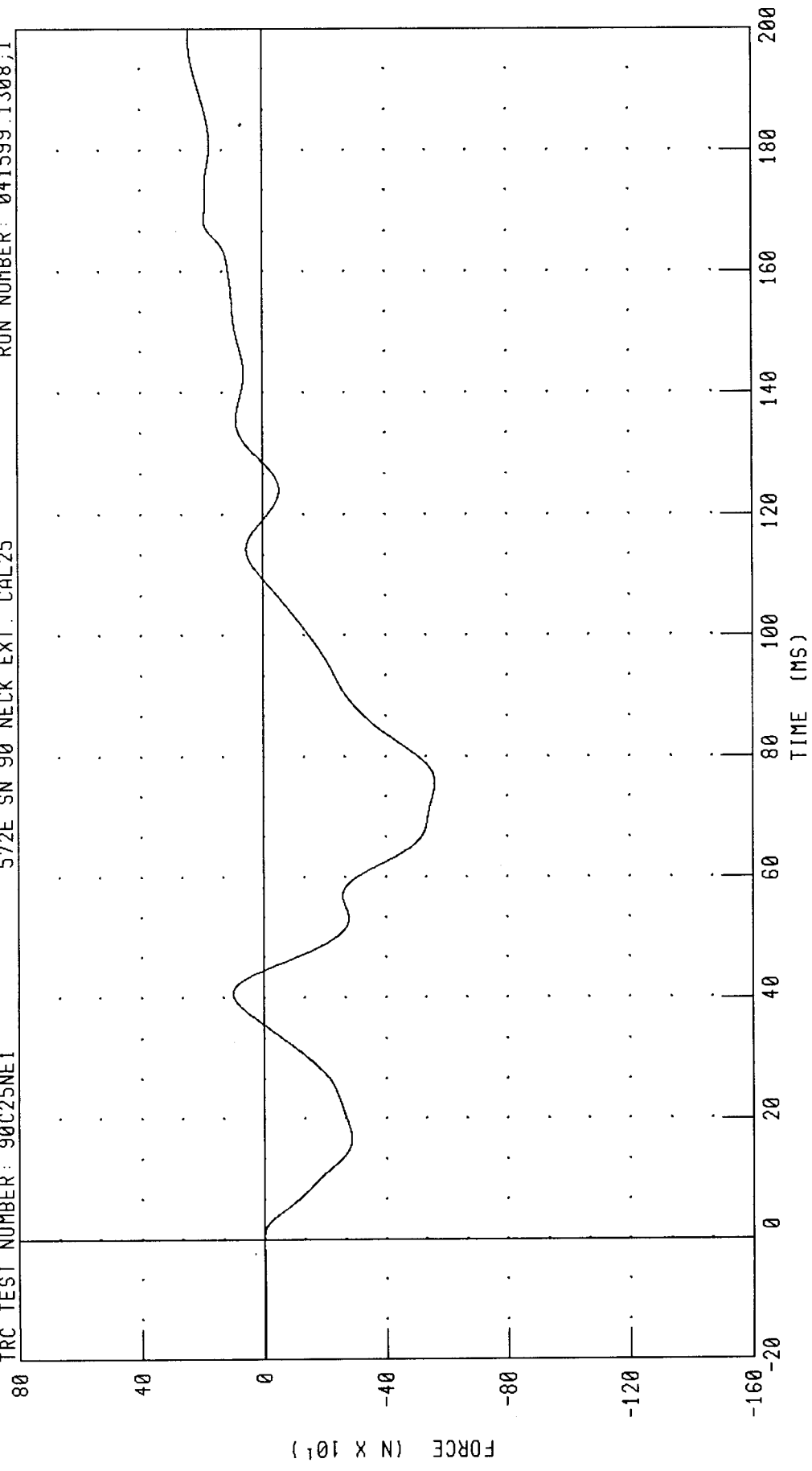


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 100.81 ° @ 78.00 MS; -33.18 ° @ 200.00 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 90C25NE1 572E SN 90 NECK EXT. CAL25 RUN NUMBER: 041599.1308;1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 242.96 N @ 199.76 MS, -561.80 N @ 75.68 MS

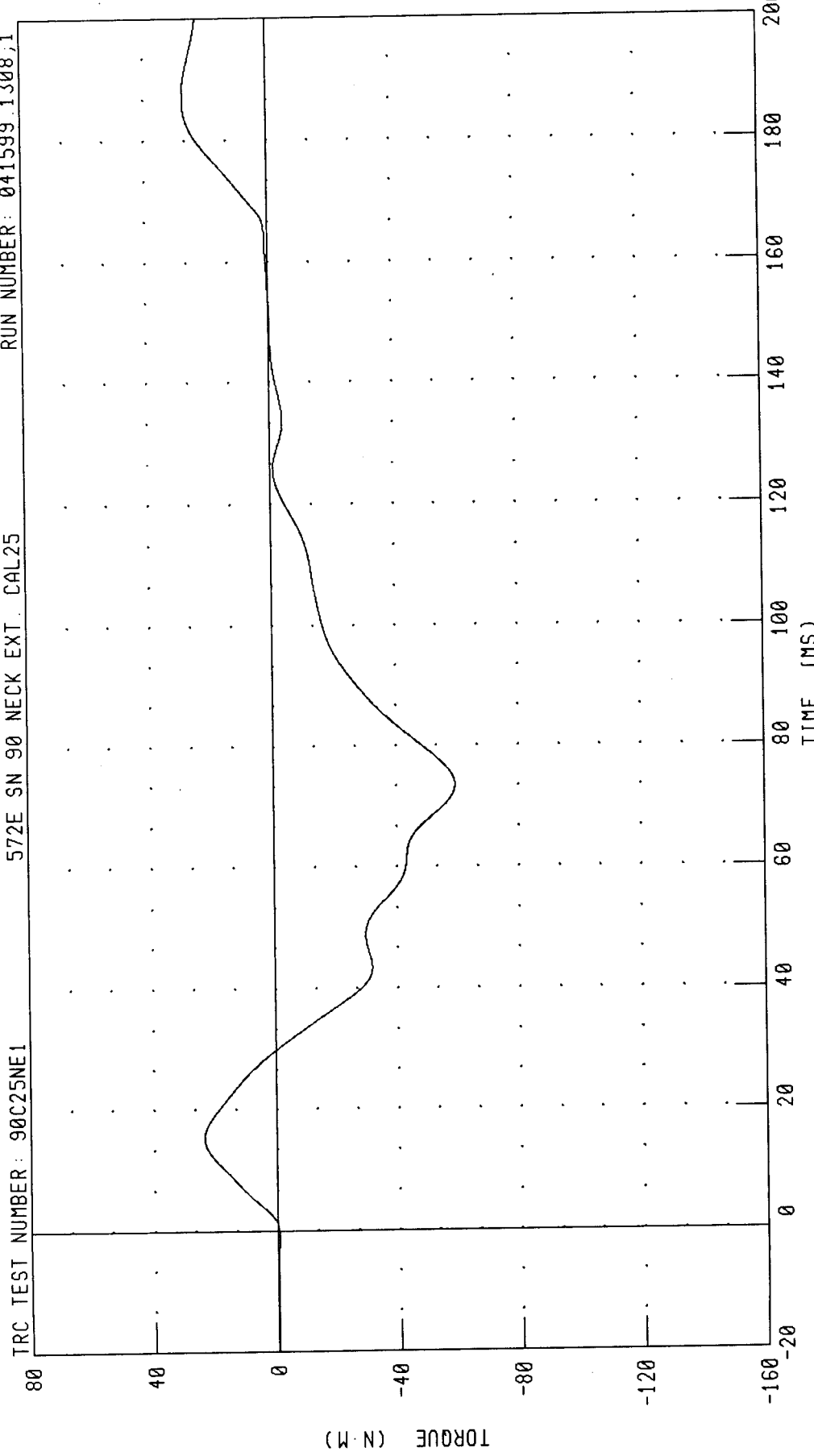
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

572E SN 90 NECK EXT. CAL25

RUN NUMBER: 041599.1308,1

TRC TEST NUMBER: 90C25NE1



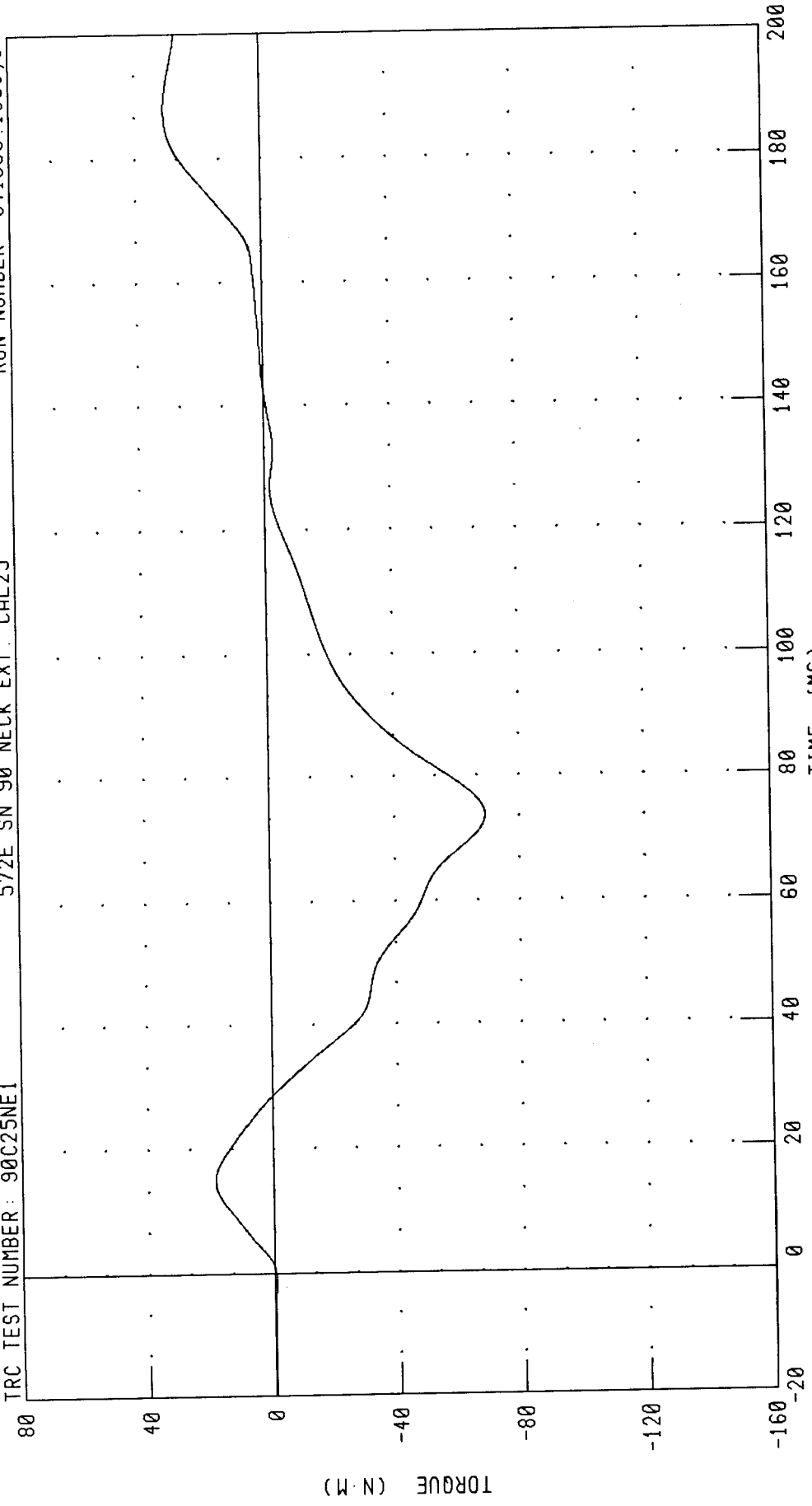
CHANNEL: NEKYM FILTER: CH. CLASS 60

TIME (MS)

PEAK DATA: 27.38 N·M @ 187.04 MS; -59.36 N·M @ 73.52 MS

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

TRC TEST NUMBER: 90C25NE1
572E SN 90 NECK EXT. CAL25
RUN NUMBER: 041599.1308,1



PEAK DATA: 30.84 N·M @ 187.92 MS; -69.23 N·M @ 73.68 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III 50th

16-APR-99

TRC INC.

TEST NO: 90C25TH1

572E SN 90 H.S.THORAX CAL25

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.68 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	69.6 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5542. N
INTERNAL HYSTERESIS	69% - 85%	73.1%

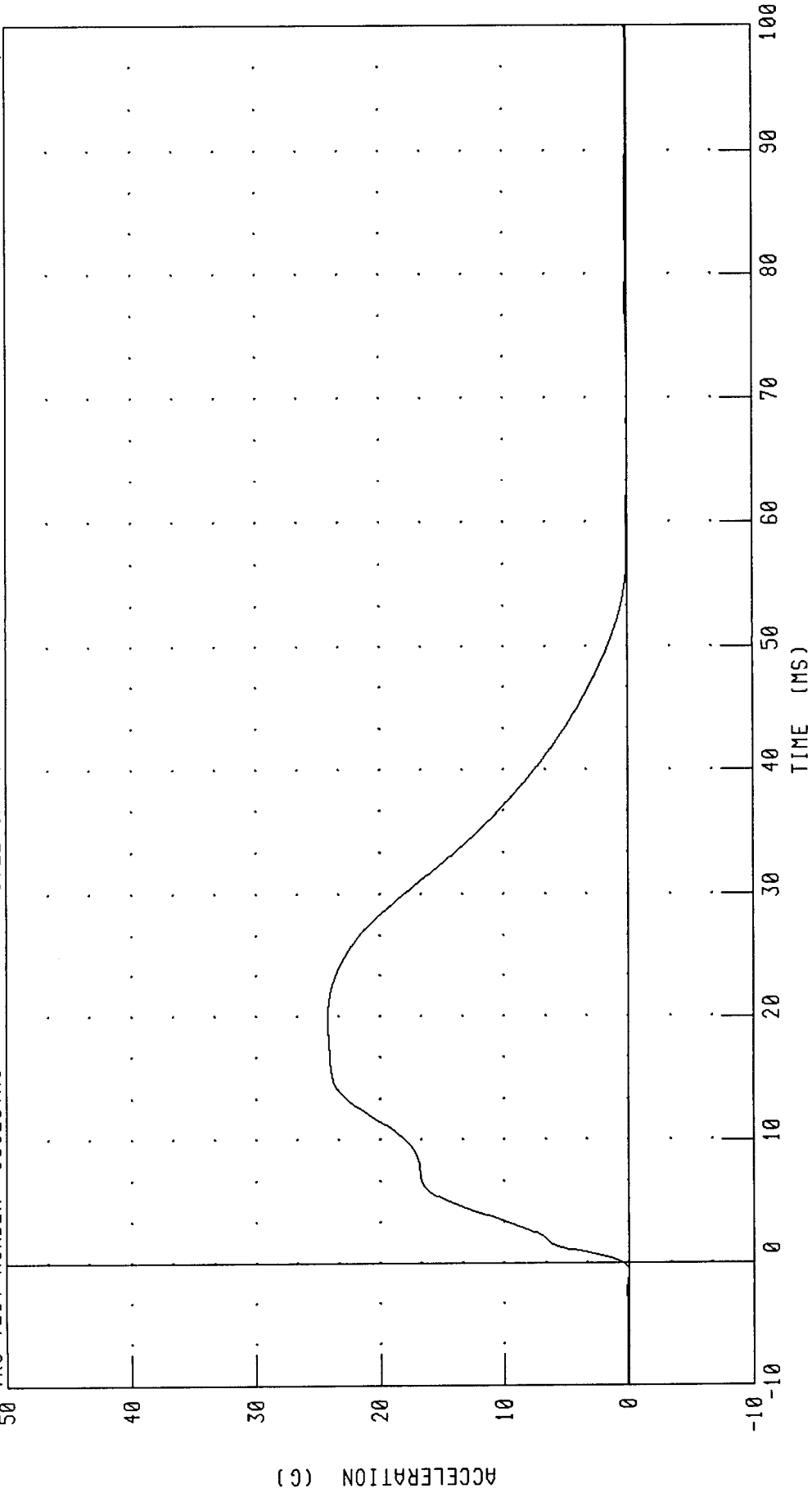
TEST MEETS SPECIFICATIONS

TECHNICIAN Kevin Watkins

RUN NUMBER: 041599.1451;4

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

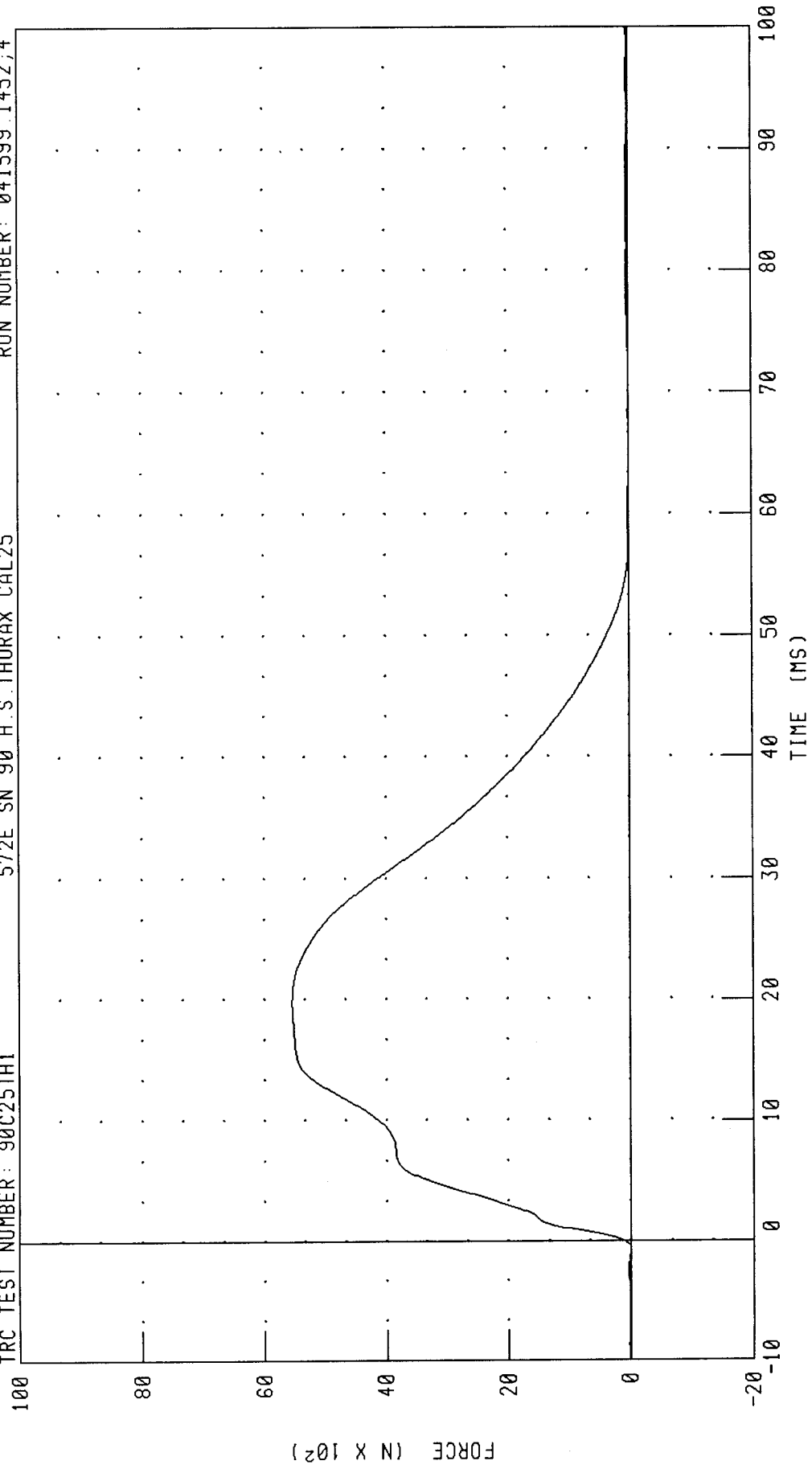
TRC TEST NUMBER: 90C25TH1 572E SN 90 H.S. THORAX CAL25 RUN NUMBER: 041599.1452;4



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 24.19 G @ 19.76 MS; -0.03 G @ -0.72 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 90C25TH1 572E SN 90 H.S. THORAX CAL25 RUN NUMBER: 041599.1452,4



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 5542.64 N @ 19.76 MS; -6.97 N @ -0.72 MS

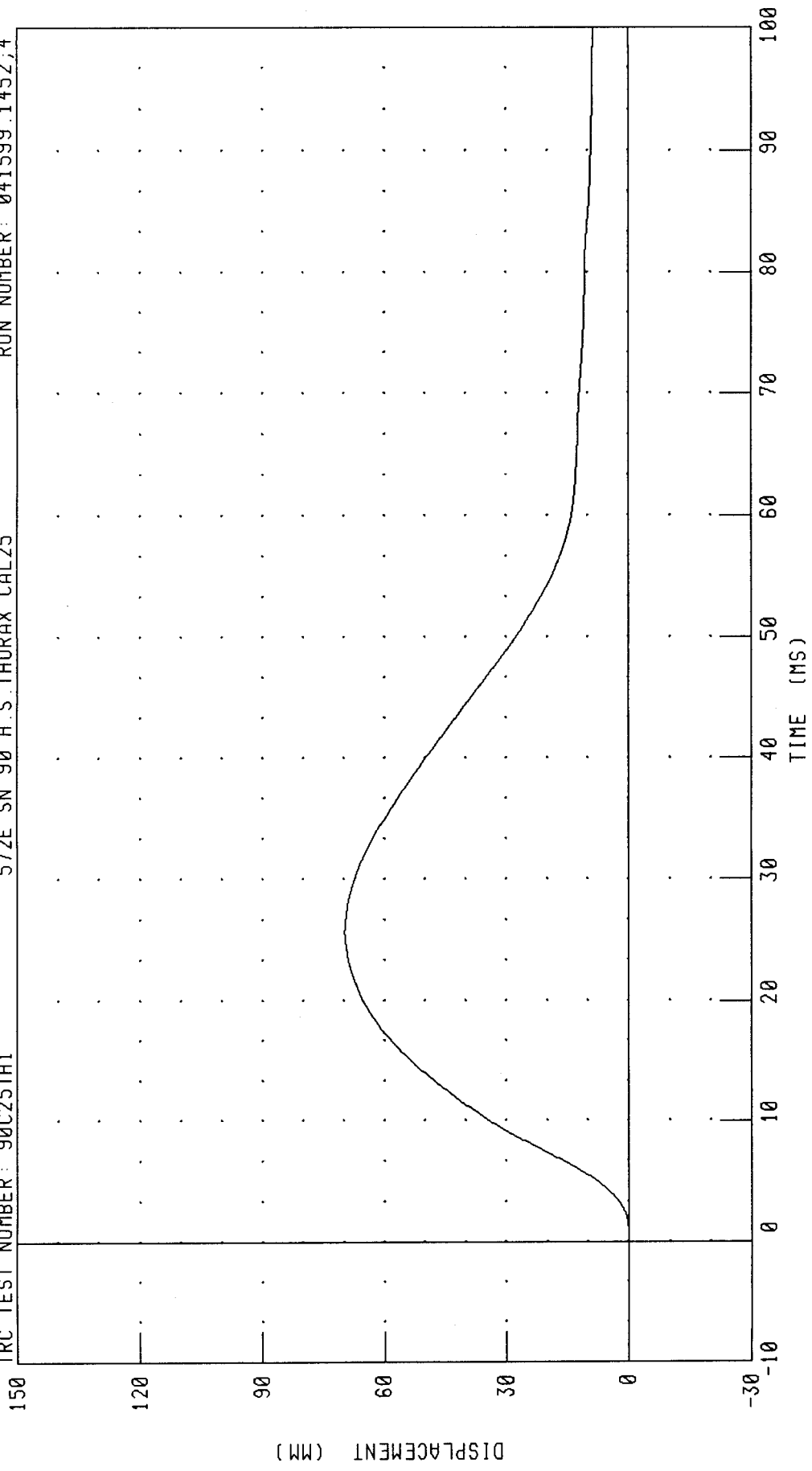
PART 572-E HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 90C25TH1

572E SN 90 H.S. THORAX CAL25

RUN NUMBER: 041599.1452,4



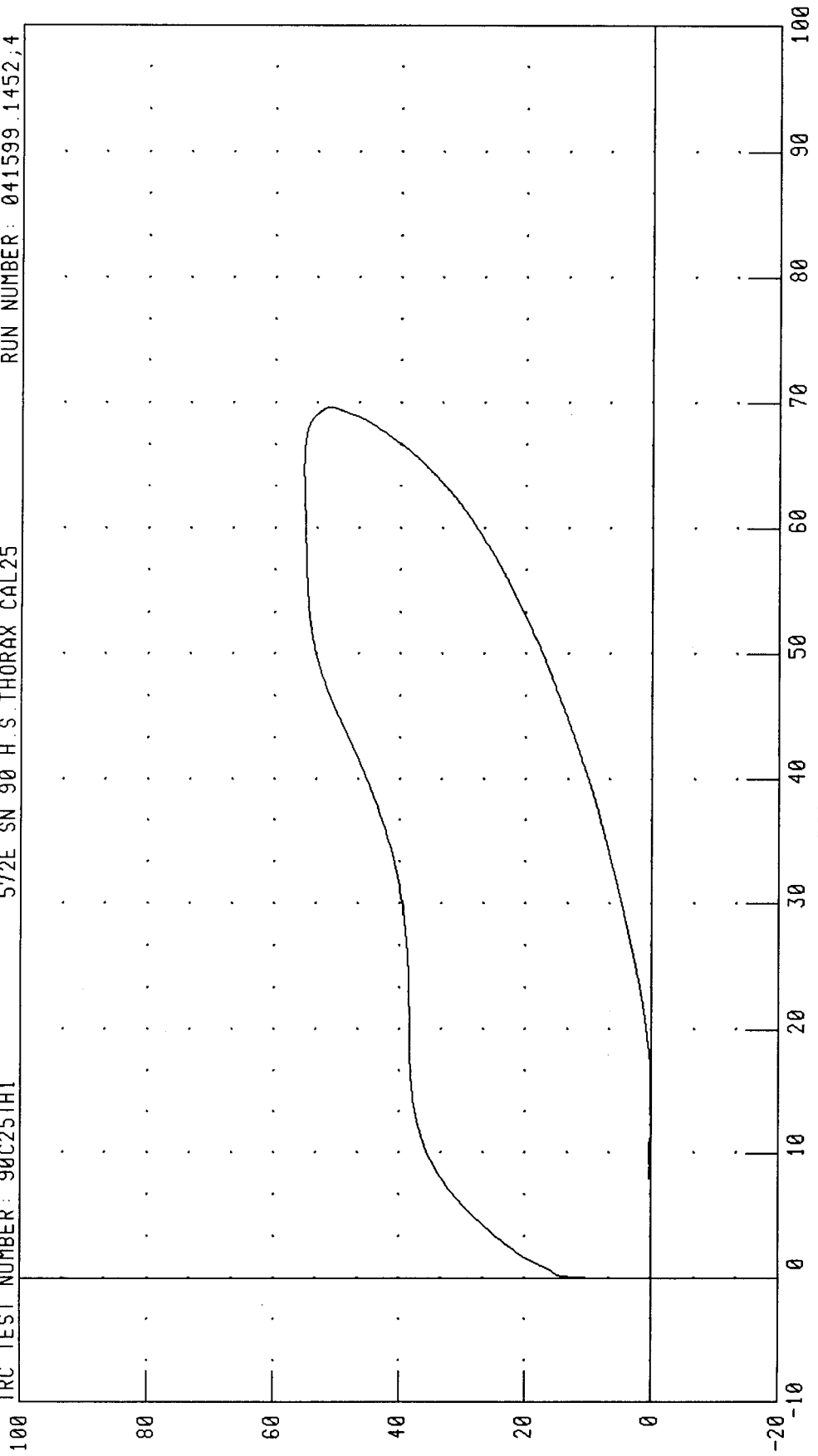
CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 69.68 MM @ 25.68 MS; -0.02 MM @ 0.48 MS

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

TRC TEST NUMBER: 90C25TH1

572E SN 90 H.S. THORAX CAL25

RUN NUMBER: 041599.1452;4



CHANNEL: CSTXD FILTER: CH. CLASS 180
PENXF CH. CLASS 180
PEAK DATA: 69.68 MM @ 25.68 MS; -0.02 MM @ 0.48 MS
5542.64 N @ 19.76 MS; -6.97 N @ -0.72 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E

16-APR-99

TRC INC.

TEST NO: 90C25HR1

572E SN 090 HIPFLEX CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	83.0 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	42.0 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN

By *cult*

RUN NUMBER: 041599.1116;1

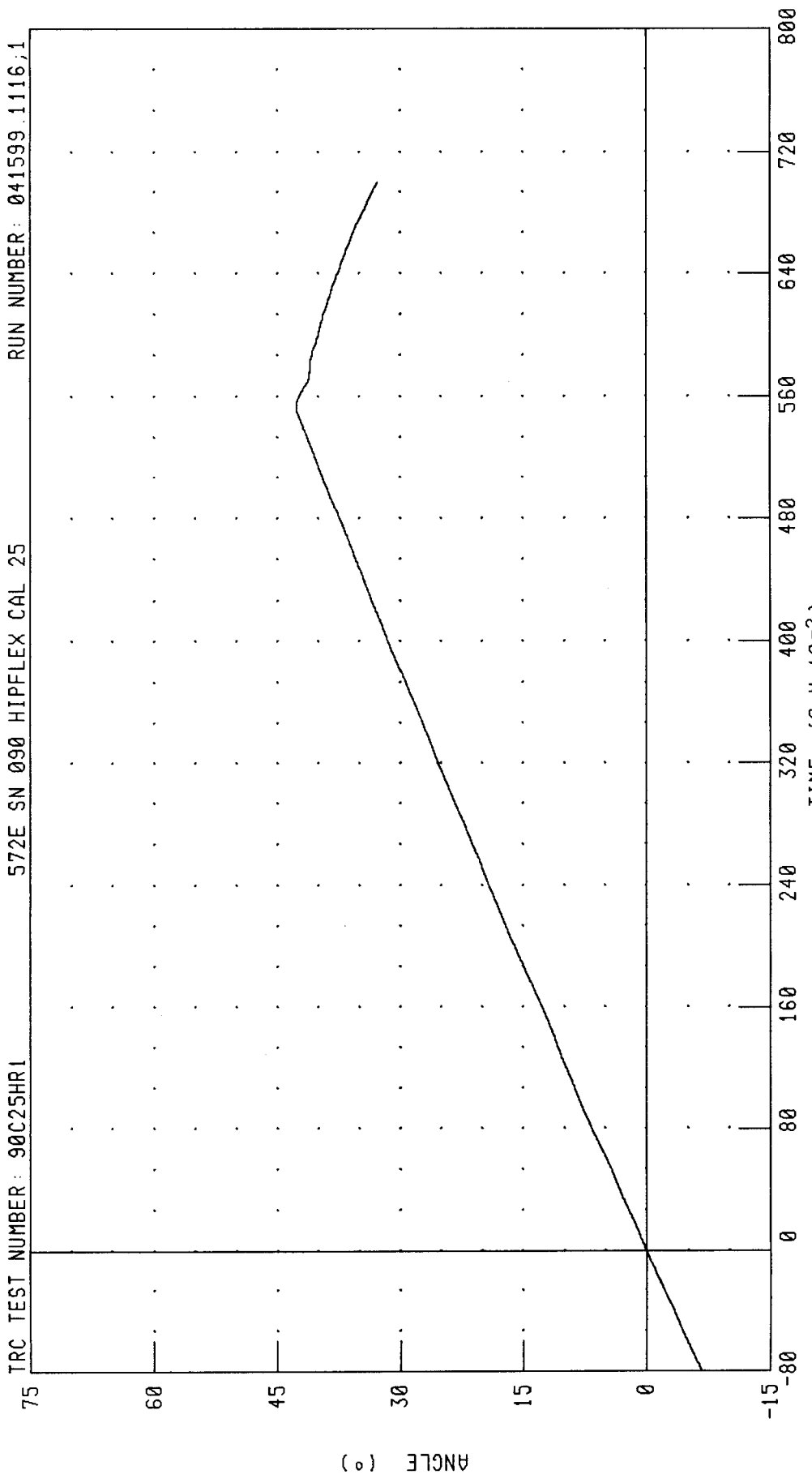
HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION ROTATION

TRC TEST NUMBER: 90C25HRI

572E SN 090 HIPFLEX CAL 25

RUN NUMBER: 041599.1116;1



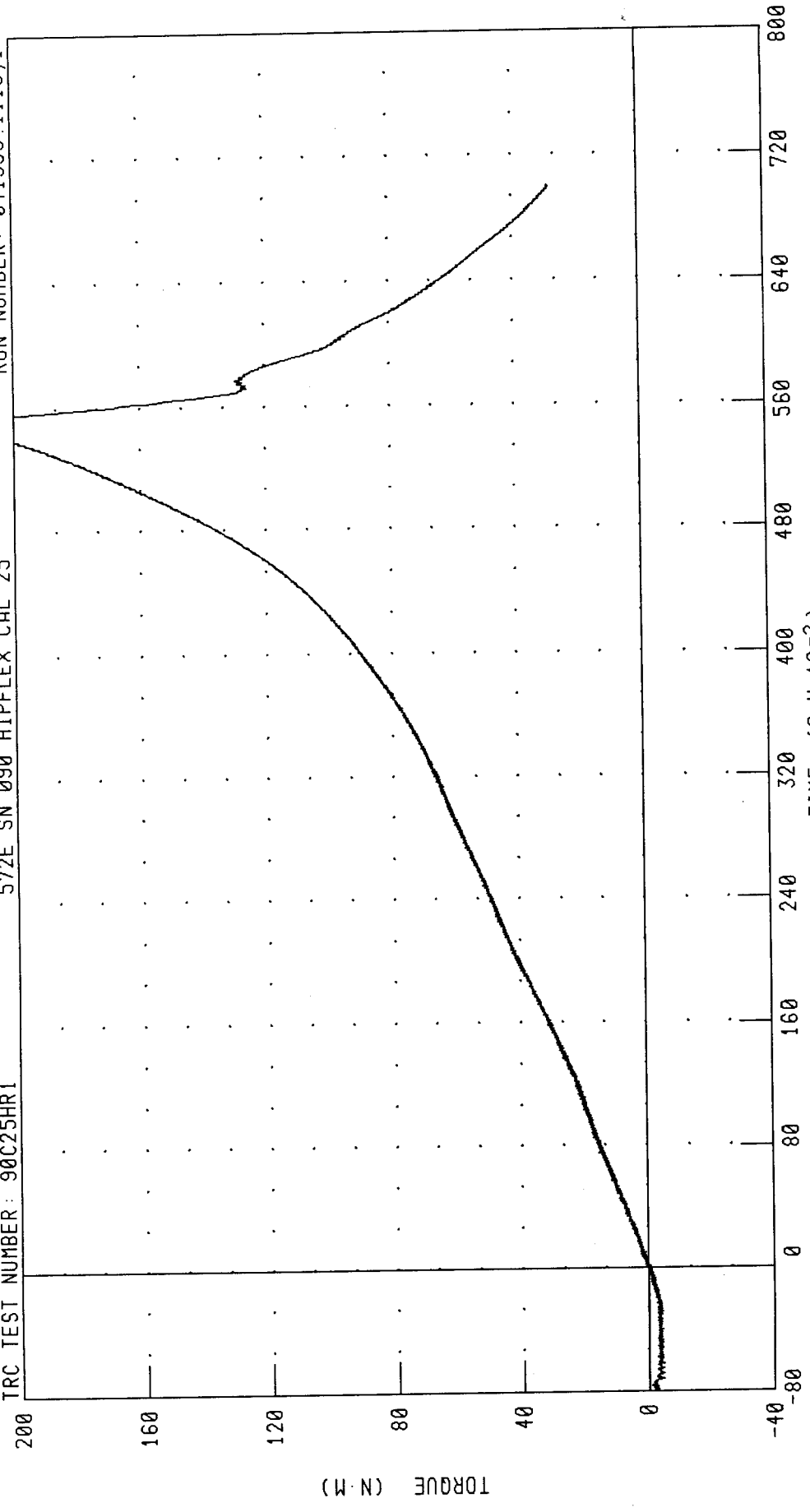
CHANNEL: RHPXD FILTER: CH. CLASS 60 PEAK DATA: 42.69 ° @ 5.56 S; -9.67 ° @ -1.00 S

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

RIGHT HIP FLEXION MOMENT
572E SN 090 HIPFLEX CAL 25

RUN NUMBER: 041599.1116;1

TRC TEST NUMBER: 90C25HR1



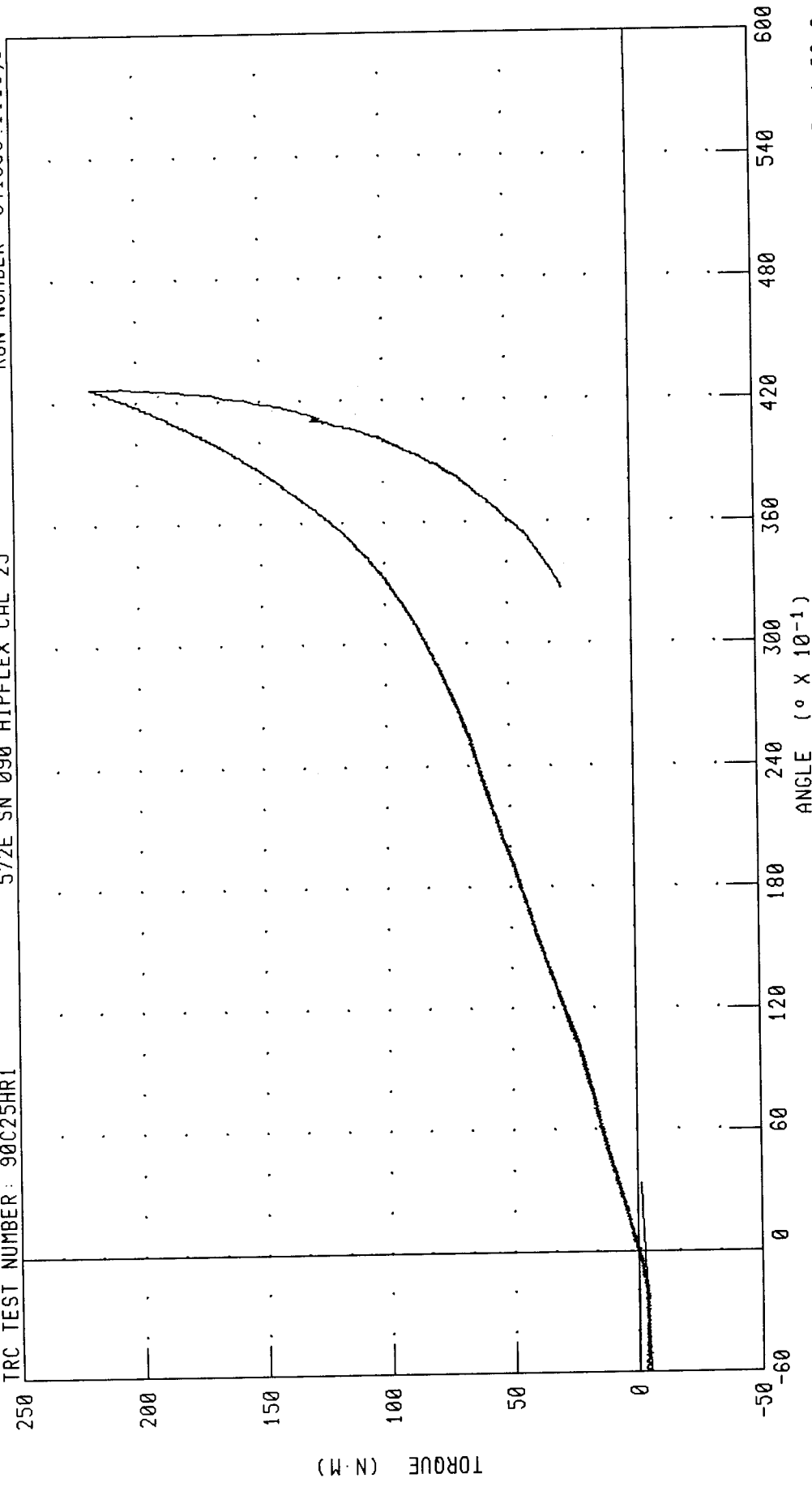
TIME (S X 10⁻²)

PEAK DATA: 218.65 N·M @ 5.51 S; -6.73 N·M @ -0.99 S

CHANNEL: RHPYM FILTER: CH. CLASS 60

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
 RIGHT HIP FLEXION MOMENT VS ROTATION ANGLE

TRC TEST NUMBER: 90C25HR1
 572E SN 090 HIPFLEX CAL 25
 RUN NUMBER: 041599.1116;1



CHANNEL: RHPXD
 RHPYM
 FILTER: CH: CLASS 60
 CH: CLASS 60
 PEAK DATA: 42.69 ° @ 5.56 S; -9.67 ° @ -1.00 S
 218.65 N·M @ 5.51 S; -6.73 N·M @ -0.99 S

TRANSPORTATION RESEARCH CENTER INC.

LEFT HIP JOINT FEMUR FLEXION TEST

HYBRID III PART 572E

16-APR-99

TRC INC.

TEST NO: 90C25HL1

572E SN 090 HIPFLEX CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
ROTATION RATE	5 - 10 deg/sec	YES
TORQUE @ 30 deg ROTATION	<= 94.9 Nm	81.7 Nm
ROTATION @ 203.4 Nm TORQUE	40 - 50 deg.	41.2 deg.

TEST MEETS SPECIFICATIONS

TECHNICIAN

By *Calt*

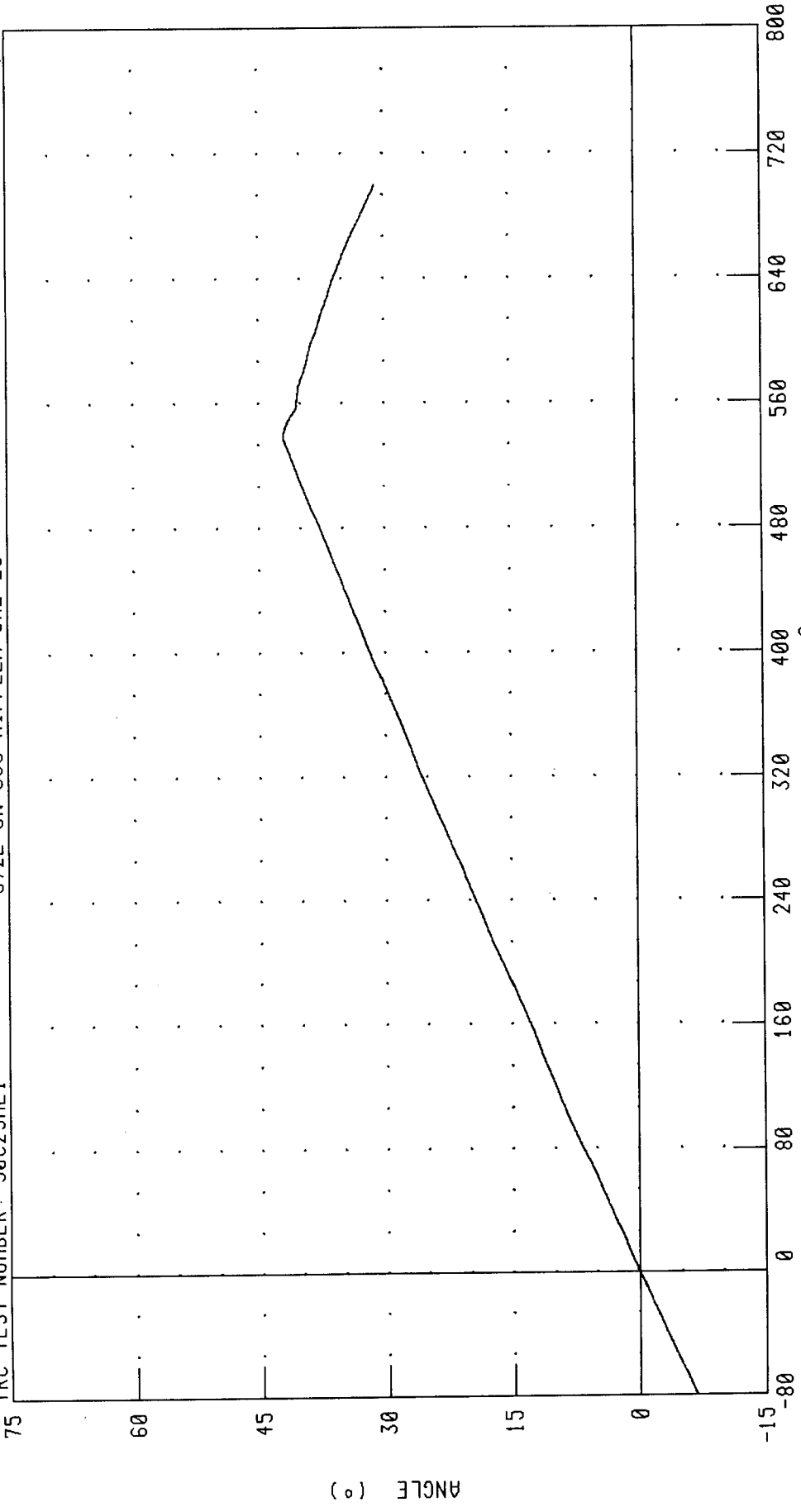
RUN NUMBER: 041599.1118;1

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION ROTATION

TRC TEST NUMBER: 90C25HL1

572E SN 090 HIPFLEX CAL 25

RUN NUMBER: 041599.1119;1



PEAK DATA: 42.05 ° @ 5.40 S; -9.83 ° @ -1.00 S

CHANNEL: LHPXD FILTER: CH. CLASS 60

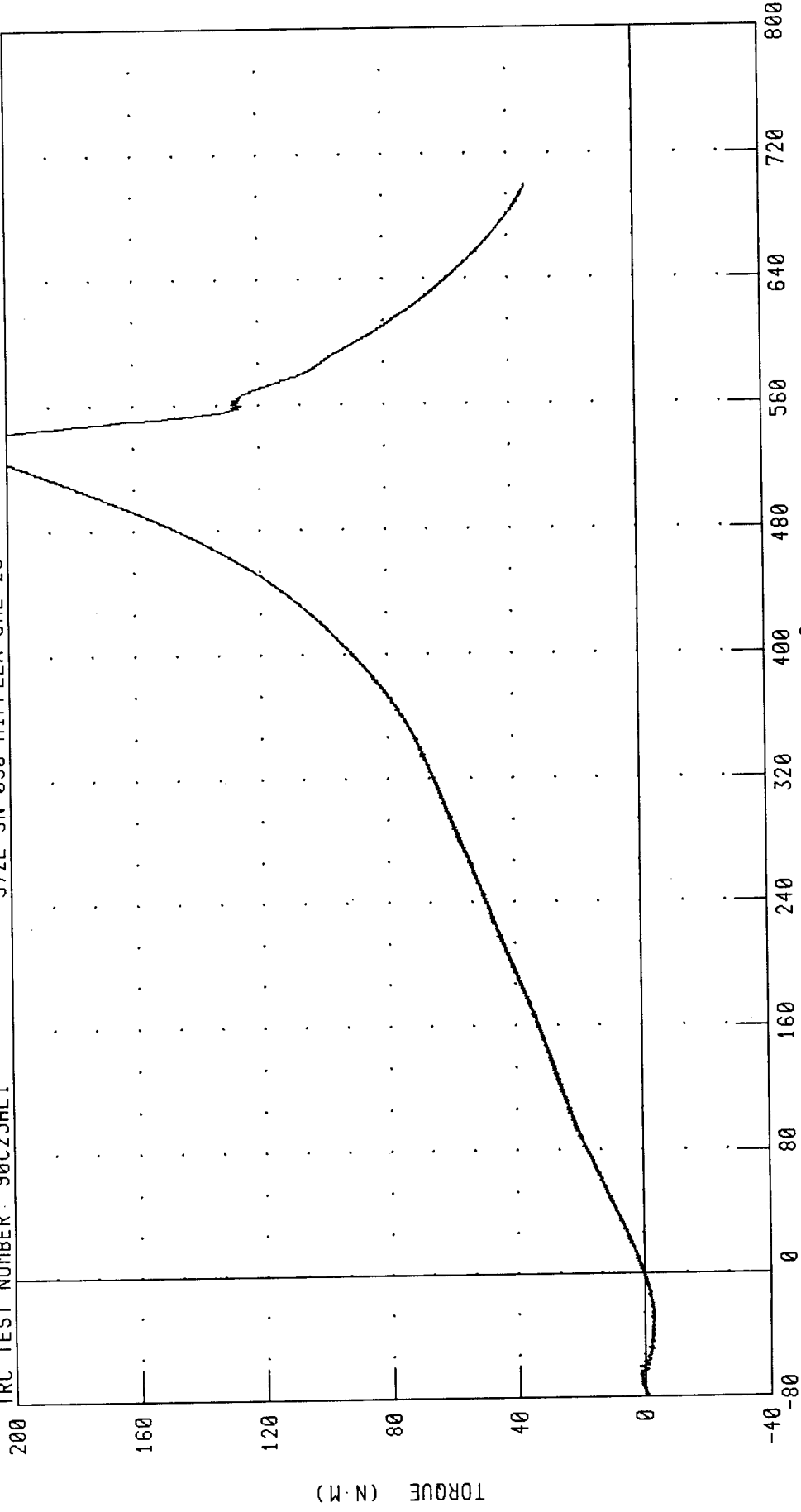
HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES

LEFT HIP FLEXION MOMENT

TRC TEST NUMBER: 90C25HL1

572E SN 090 HIPFLEX CAL 25

RUN NUMBER: 041599.1119;1



TIME (S X 10⁻²)

PEAK DATA: 221.01 N·M @ 5.37 S; -5.89 N·M @ -1.00 S

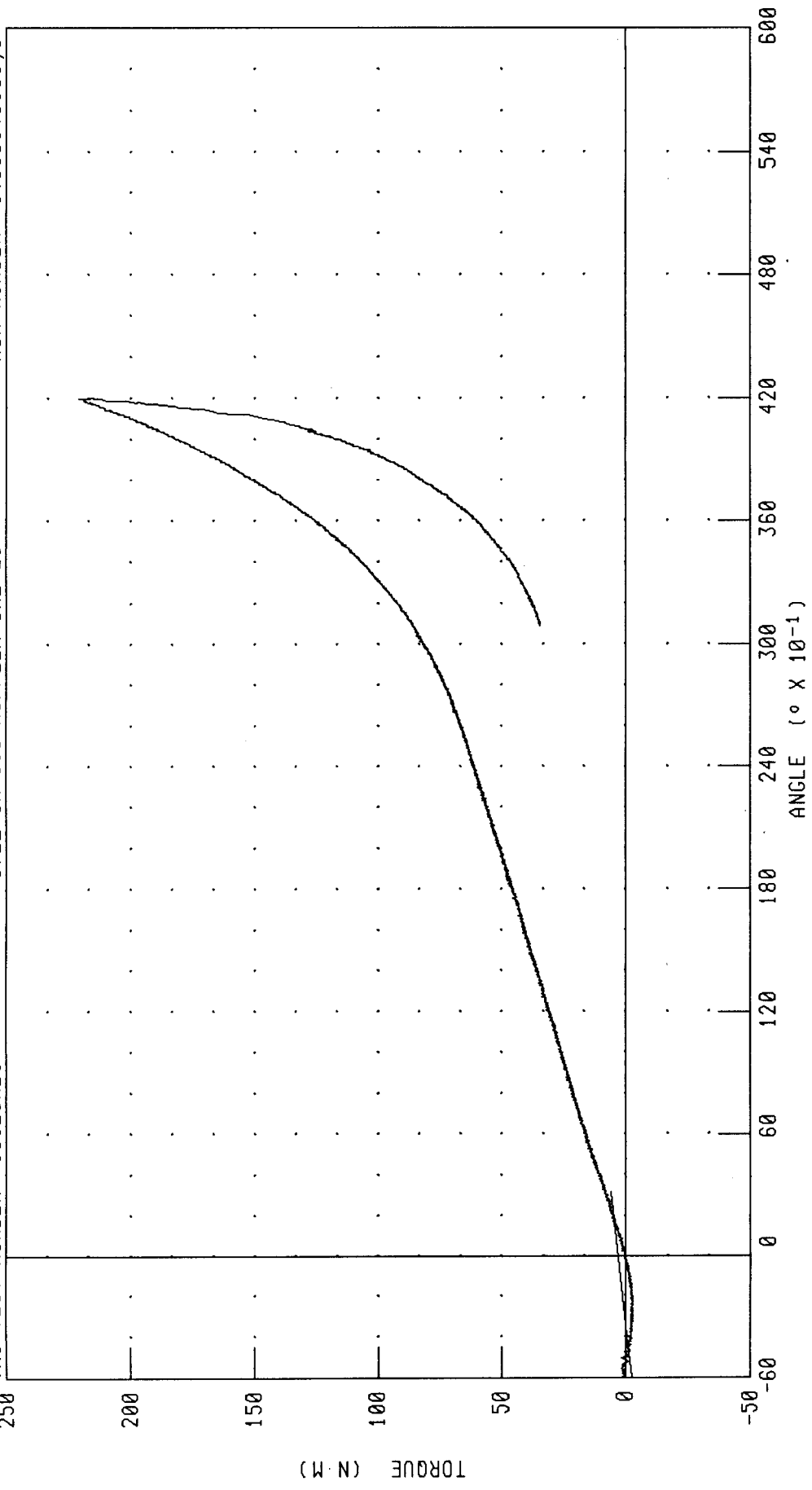
CHANNEL: LHPYM FILTER: CH. CLASS 60

HYBRID III HIP FLEXION VERIFICATION - 0 DEGREES
LEFT HIP FLEXION MOMENT VS ROTATION ANGLE

TRC TEST NUMBER: 90C25HL1

572E SN 090 HIPFLEX CAL 25

RUN NUMBER: 041599.1119;1



CHANNEL: LHPXD FILTER: CH: CLASS 60
LHPYH CH: CLASS 60

PEAK DATA: 42.05 ° @ 5.40 S; -9.83 ° @ -1.00 S
221.01 N·M @ 5.37 S; -5.89 N·M @ -1.00 S

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III 50th

16-APR-99

TRC INC.

TEST NO: 90C25RK1

572E SN 90 RIGHT KNEE CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5525.8 N

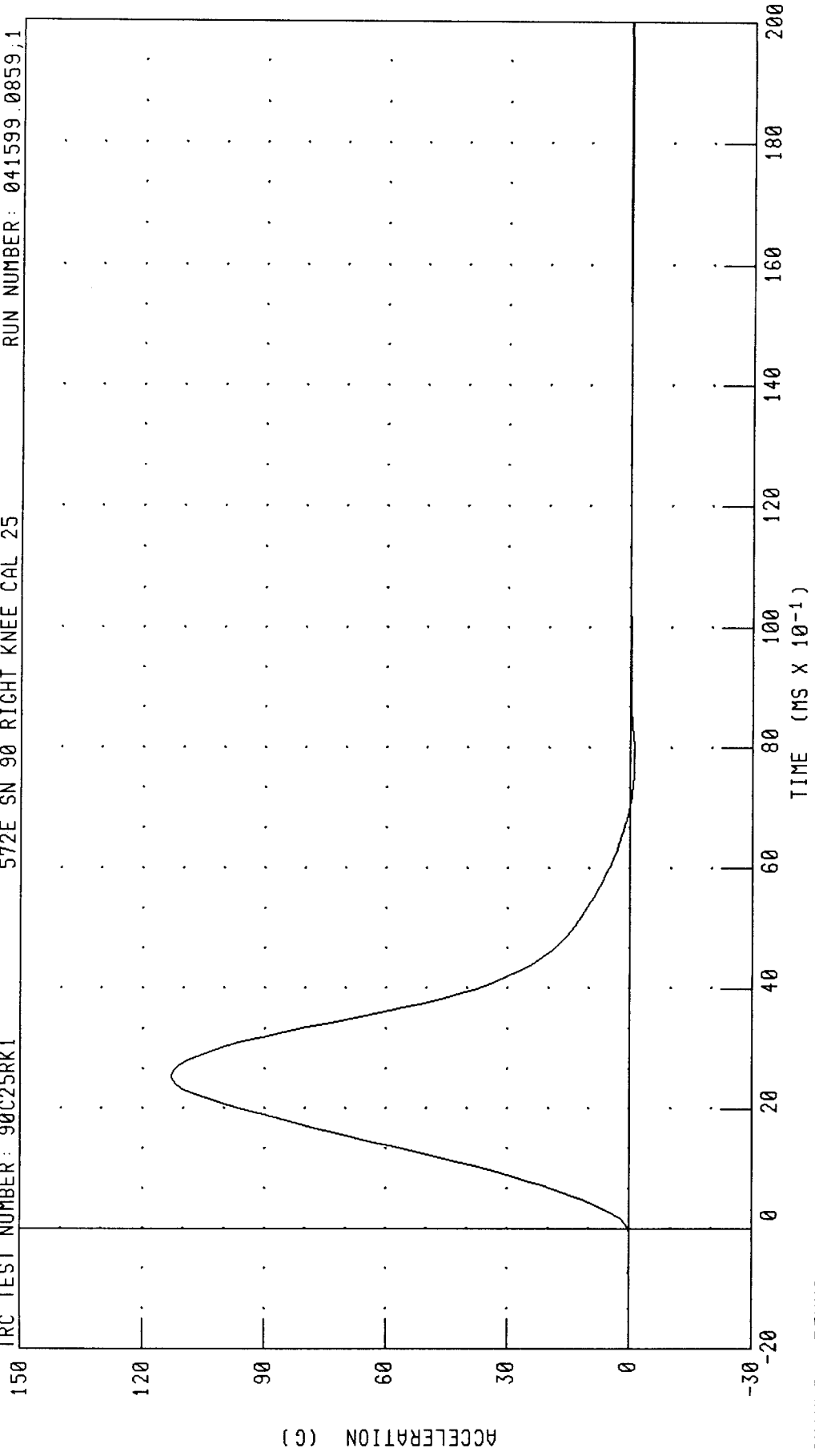
TEST MEETS SPECIFICATIONS

TECHNICIAN By cult

RUN NUMBER: 041599.0859;1

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

TRC TEST NUMBER: 90C25RK1 572E SN 90 RIGHT KNEE CAL 25 RUN NUMBER: 041599 0859,1



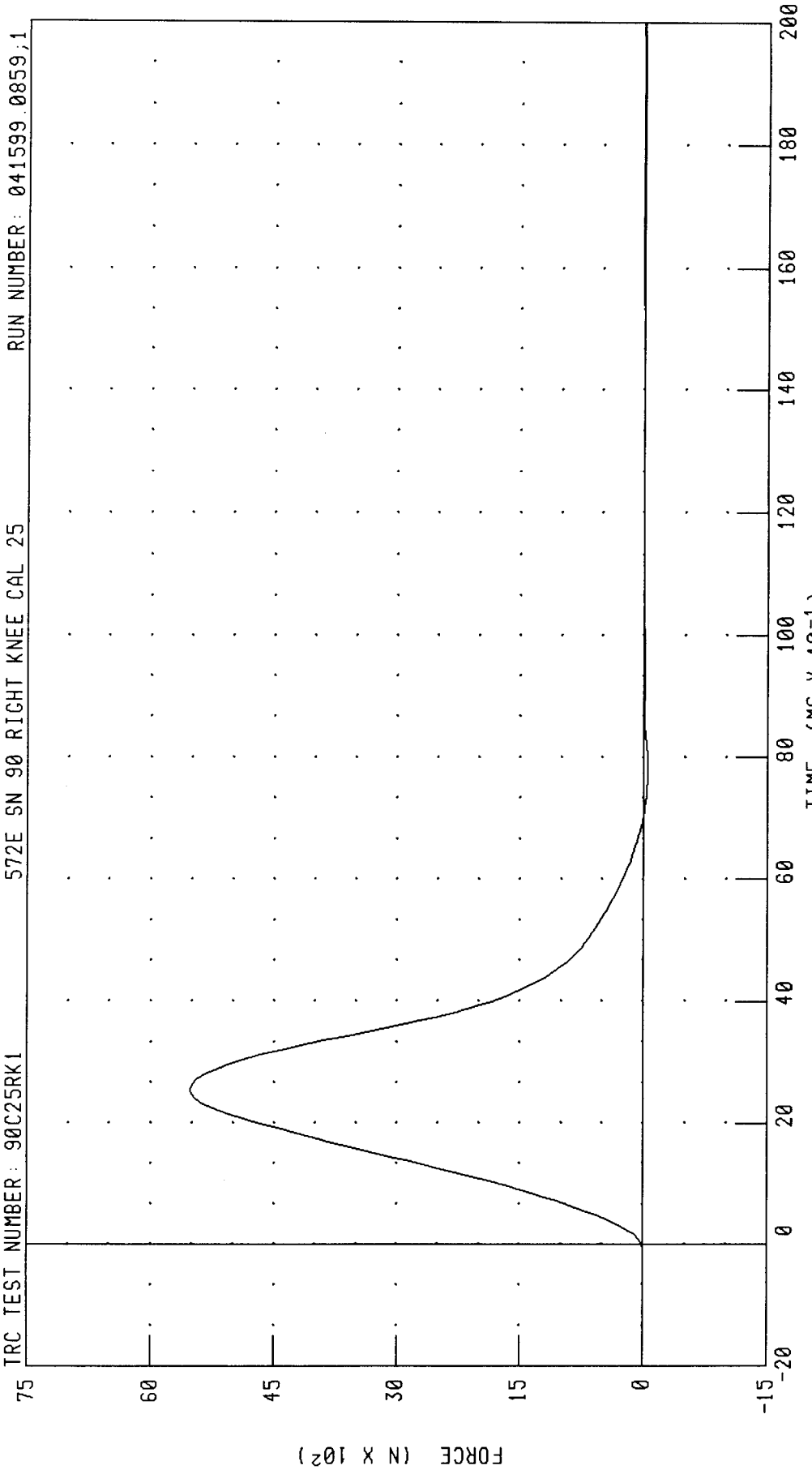
CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 112.94 G @ 2.56 MS; -1.18 G @ 7.84 MS

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

TRC TEST NUMBER: 90C25RK1

572E SN 90 RIGHT KNEE CAL 25

RUN NUMBER: 041599.0859,1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 5525.90 N @ 2.56 MS; -57.93 N @ 7.84 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III 50th

16-APR-99

TRC INC.

TEST NO: 90C25LK2

572E SN 90 LEFT KNEE CAL 25

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	33.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 5.0 KG PENDULUM	4715 - 5782 N	5084.5 N

TEST MEETS SPECIFICATIONS

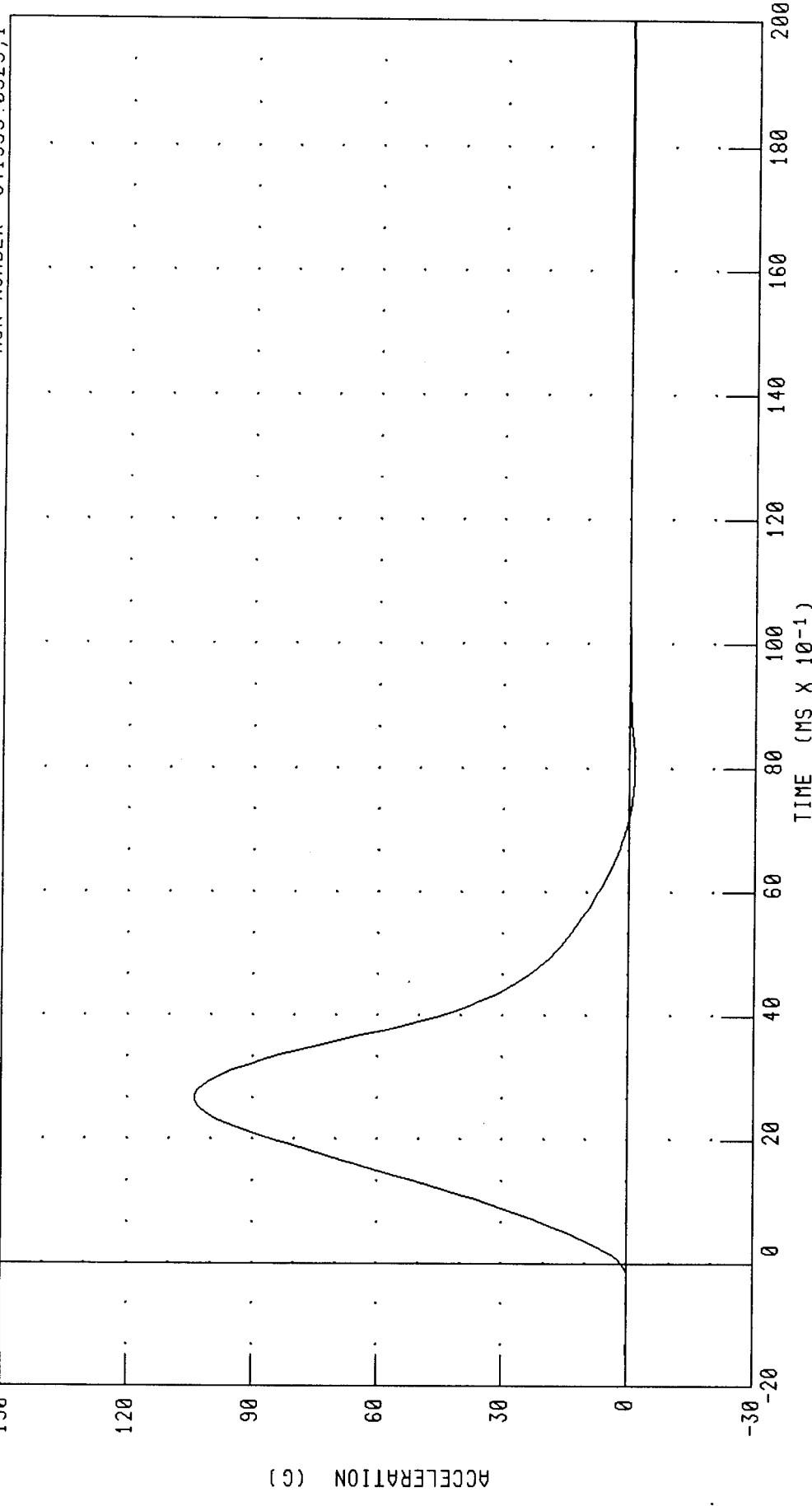
TECHNICIAN

Ry Cabot

RUN NUMBER: 041599.0923;1

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

TRC TEST NUMBER: 90C25LK2 572E SN 90 LEFT KNEE CAL 25 RUN NUMBER: 041599 0925;1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 103.92 G @ 2.64 MS, -1.39 G @ 8.08 MS

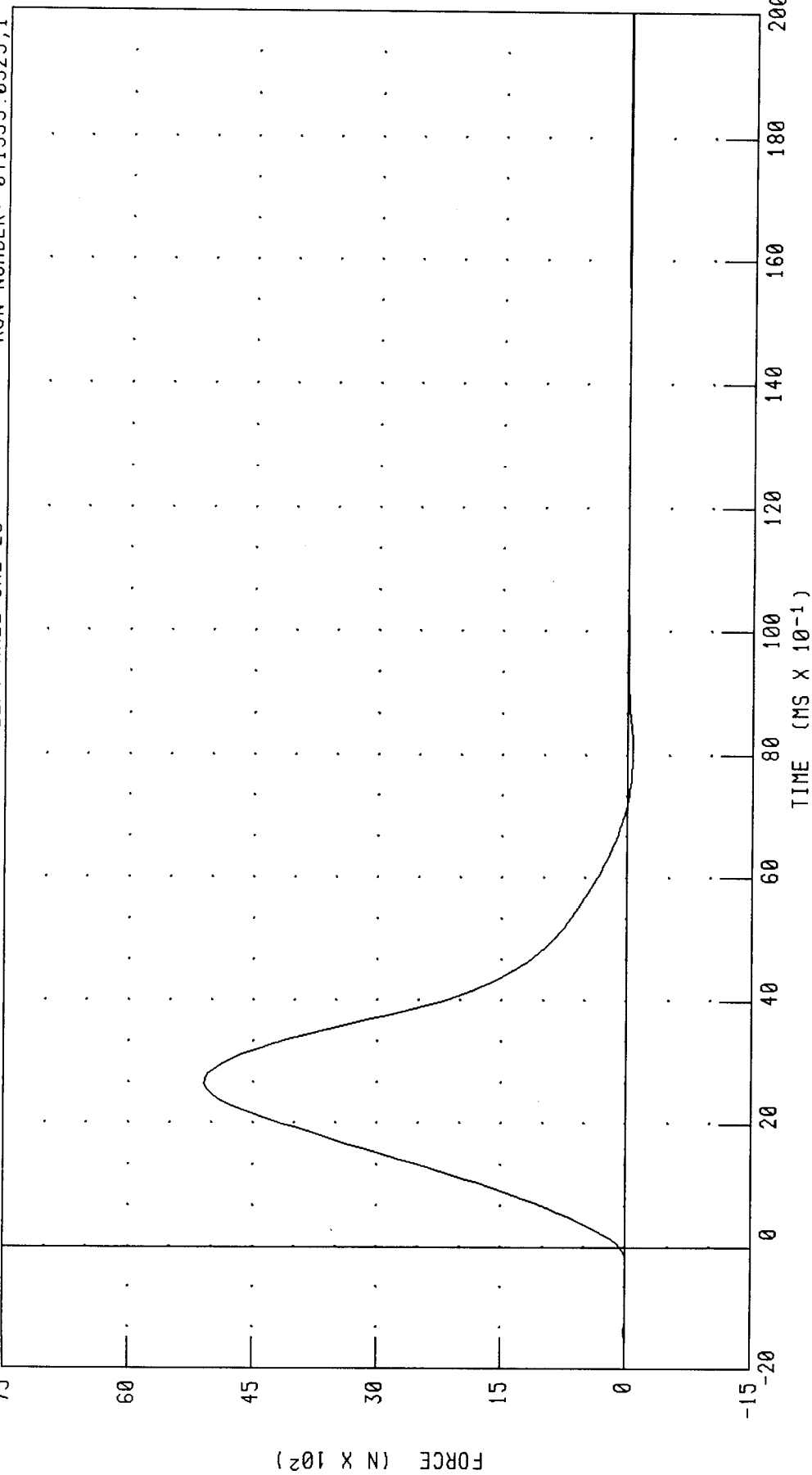
PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 90C25LK2

572E SN 90 LEFT KNEE CAL 25

RUN NUMBER: 041599.0925;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 5084.57 N @ 2.64 MS; -68.20 N @ 8.08 MS

Appendix D

Miscellaneous Test Information

Dummy Sign Convention

Accelerometers:

+X: Forward
+Y: Rightward
+Z: Upward

Potentiometers:

+Chest longitudinal deflection: Outward

Load cells:

+Femur force: Tension

Neck load cells:

+X force: Head rearward
+Y force: Head leftward
+Z force: Head upward (tension on neck)
+X moment: Left ear rotating toward left shoulder
+Y moment: Chin rotating toward chest
+Z moment: Chin rotating toward left shoulder

Filtering Data

J211 MAR95

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

Dummy Instrumentation Placement

Dummy Manufacturer and S/N: Humanetics/45

Seating position: Position #1 (50th)

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Orientation (+ Sensing)</u>
HEDXG1	Head	X	Endevco	7264-2000T	AJ4L1	Rear
HEDYG1	Head	Y	Endevco	7264-2000T	J23996	Left
HEDZG1	Head	Z	Endevco	7264-2000T	EJ97J	Up
NEKXF1	Neck	X	Denton	1716A	851FX	Head forward
NEKYF1	Neck	Y	Denton	1716A	851FY	Head leftward
NEKZF1	Neck	Z	Denton	1716A	851FZ	Head upward (tension)
NEKXM1	Neck	X	Denton	1716A	851MX	Right ear to Right shoulder
NEKYM1	Neck	Y	Denton	1716A	851MY	Chin to chest
NEKZM1	Neck	Z	Denton	1716A	851MZ	Chin to left shoulder
CSTXG1	Chest	X	Endevco	7264-2000T	AJ7W9	Rearward
CSTYG1	Chest	Y	Endevco	7264-2000T	J21989	Left
CSTZG1	Chest	Z	Endevco	7264-2000T	BE95J	Down
CSTXD1	Chest	X	Servo	14CB1-2897	86696-1	Outward
PEVXG1	Pelvis	X	Endevco	7264-2000T	AJ4F8	Rearward
PEVYG1	Pelvis	Y	Endevco	7264-2000T	AJ7G7	Left
PEVZG1	Pelvis	Z	Endevco	7264-2000T	J19338	Up
LFMZ1	Left femur	Z	Denton	1914A	363FZ	Tension
RFMZ1	Right femur	Z	Denton	1914A	362FZ	Tension

Dummy Instrumentation Placement, Cont'd.

Dummy Manufacturer and S/N: First Technologies/027

Seating position: Position #2 (6YO)

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Orientation (+ Sensing)</u>
HEDXG2	Head	X	Endevco	7264-2000T	AJ4N7	Forward
HEDYG2	Head	Y	Endevco	7264-2000T	J22038	Right
HEDZG2	Head	Z	Endevco	7264-2000T	ALAB9	Up
NEKXF2	Neck	X	Denton	1716A	810FX	Head forward
NEKYF2	Neck	Y	Denton	1716A	810FY	Head leftward
NEKZF2	Neck	Z	Denton	1716A	810FZ	Head upward (tension)
NEKXM2	Neck	X	Denton	1716A	810MX	Right ear to Right shoulder
NEKYM2	Neck	Y	Denton	1716A	810MY	Chin to chest
NEKZM2	Neck	Z	Denton	1716A	810MZ	Chin to left shoulder
CSTXG2	Chest	X	Endevco	7264-2000T	J23941	Forward
CSTYG2	Chest	Y	Endevco	7264-2000T	J14190	Left
CSTZG2	Chest	Z	Endevco	7264-2000T	BD15J	Down
CSTXD2	Chest	X	Servo	14CB1-2897	027	Outward
PEVXG2	Pelvis	X	Endevco	7264-2000T	J23944	Forward
PEVYG2	Pelvis	Y	Endevco	7264-2000T	J20047	Left
PEVZG2	Pelvis	Z	Endevco	7264-2000T	J23805	Up
LFMZF2	Left femur	Z	Denton	T11654	005	Tension
RFMZF2	Right femur	Z	Denton	T11654	008	Tension

Dummy Instrumentation Placement, Cont'd.

Dummy Manufacturer and S/N: First Technologies/088

Seating position: Position #3 (6YO)

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Orientation (+ Sensing)</u>
HEDXG3	Head	X	Endevco	7264-2000T	J23803	Forward
HEDYG3	Head	Y	Endevco	7264-2000T	J23947	Right
HEDZG3	Head	Z	Endevco	7264-2000T	AJ451	Up
NEKXF3	Neck	X	Denton	1716A	798FX	Head forward
NEKYF3	Neck	Y	Denton	1716A	798FY	Head leftward
NEKZF3	Neck	Z	Denton	1716A	798FZ	Head upward (tension)
NEKXM3	Neck	X	Denton	1716A	798MX	Right ear to Right shoulder
NEKYM3	Neck	Y	Denton	1716A	798MY	Chin to chest
NEKZM3	Neck	Z	Denton	1716A	798MZ	Chin to left shoulder
CSTXG3	Chest	X	Endevco	7264-2000T	ACC65	Forward
CSTYG3	Chest	Y	Endevco	7264-2000T	DW83J	Left
CSTZG3	Chest	Z	Endevco	7264-2000T	AJ4L3	Down
CSTXD3	Chest	X	Servo	14CB1-2897	088	Outward
PEVXG3	Pelvis	X	Endevco	7264-2000T	J23998	Forward
PEVYG3	Pelvis	Y	Endevco	7264-2000T	J23832	Left
PEVZG3	Pelvis	Z	Endevco	7264-2000T	AJ4J6	Up
LFMZF3	Left femur	Z	Denton	2090	125	Tension
RFMZF3	Right femur	Z	Denton	2090	126	Tension

Dummy Instrumentation Placement, Cont'd.

Dummy Manufacturer and S/N: First Technologies/289

Seating position: Position #4 (5th)

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Orientation (+ Sensing)</u>
HEDXG4	Head	X	Endevco	7264-2000T	J20165	Forward
HEDYG4	Head	Y	Endevco	7264-2000T	J19865	Right
HEDZG4	Head	Z	Endevco	7264-2000T	J19934	Up
NEKXF4	Neck	X	Denton	1716	0425FX	Head forward
NEKYF4	Neck	Y	Denton	1716	0425FY	Head leftward
NEKZF4	Neck	Z	Denton	1716	0425FZ	Head upward (tension)
NEKXM4	Neck	X	Denton	1716	0425MX	Right ear to Right shoulder
NEKYM4	Neck	Y	Denton	1716	0425MY	Chin to chest
NEKZM4	Neck	Z	Denton	1716	0425MZ	Chin to left shoulder
CSTXG4	Chest	X	Endevco	7264-2000T	J20599	Forward
CSTYG4	Chest	Y	Endevco	7264-2000T	J20580	Left
CSTZG4	Chest	Z	Endevco	7264-2000T	EH88J	Up
CSTXD4	Chest	X	Servo	14CB1-2897	019	Outward
PEVXG4	Pelvis	X	Endevco	7264-2000T	CY06H	Rearward
PEVYG4	Pelvis	Y	Endevco	7264-2000T	AGAC4	Left
PEVZG4	Pelvis	Z	Endevco	7264-2000T	BF65J	Up
LFMZF4	Left femur	Z	Denton	1914	0259FZ	Tension
RFMZF4	Right femur	Z	Denton	1914	0257FZ	Tension

Dummy Instrumentation Placement, Cont'd.

Dummy Manufacturer and S/N: First Technologies/329

Seating position: Position #5 (5th)

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Orientation (+ Sensing)</u>
HEDXG5	Head	X	Entran	EGE-73BQ-2000B	98H10-F16	Rear
HEDYG5	Head	Y	Entran	EGE-73BQ-2000B	98H14-K2	Left
HEDZG5	Head	Z	Entran	EGE-73BQ-2000B	98H13-F04	Up
NEKXF5	Neck	X	Denton	1716A	1039FX	Head forward
NEKYF5	Neck	Y	Denton	1716A	1039FY	Head leftward
NEKZF5	Neck	Z	Denton	1716A	1039FZ	Head upward (tension)
NEKXM5	Neck	X	Denton	1716A	1039MX	Right ear to Right shoulder
NEKYM5	Neck	Y	Denton	1716A	1039MY	Chin to chest
NEKZM5	Neck	Z	Denton	1716A	1039MZ	Chin to left shoulder
CSTXG5	Chest	X	Entran	EGE-73BQ-2000B	98H13-F05	Forward
CSTYG5	Chest	Y	Entran	EGE-73BQ-2000B	98H13-F07	Left
CSTZG5	Chest	Z	Entran	EGE-73BQ-2000B	98H10-F10	Down
CSTXD5	Chest	X	Servo	14CB1-2897	329F	Outward
PEVXG5	Pelvis	X	Entran	EGE-73BQ-2000B	98H10-F19	Rearward
PEVYG5	Pelvis	Y	Entran	EGE-73BQ-2000B	98H10-F12	Left
PEVZG5	Pelvis	Z	Entran	EGE-73BQ-2000B	98H13-F01	Up
LFMZF5	Left femur	Z	Denton	1914A	376FZ	Tension
RFMZF5	Right femur	Z	Denton	1914A	383FZ	Tension

Dummy Instrumentation Placement, Cont'd.

Dummy Manufacturer and S/N: Alderson Research Laboratories/90

Seating position: Position #6 (50th)

<u>Mnemonic</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>Serial Number</u>	<u>Orientation (+ Sensing)</u>
HEDXG6	Head	X	Endevco	7264-2000T	J23802	Rear
HEDYG6	Head	Y	Endevco	7264-2000T	J23911	Left
HEDZG6	Head	Z	Endevco	7264-2000T	J23942	Up
NEKXF6	Neck	X	Denton	1716A	852FX	Head forward
NEKYF6	Neck	Y	Denton	1716A	852FY	Head leftward
NEKZF6	Neck	Z	Denton	1716A	852FZ	Head upward (tension)
NEKXM6	Neck	X	Denton	1716A	852MX	Right ear to Right shoulder
NEKYM6	Neck	Y	Denton	1716A	852MY	Chin to chest
NEKZM6	Neck	Z	Denton	1716A	852MZ	Chin to left shoulder
CSTXG6	Chest	X	Endevco	7264-2000T	J24017	Forward
CSTYG6	Chest	Y	Endevco	7264-2000T	J23759	Left
CSTZG6	Chest	Z	Endevco	7264-2000T	J18664	Up
CSTXD1	Chest	X	Servo	14CB1-2897	83672-14	Outward
PEVXG6	Pelvis	X	Endevco	7264-2000T	AJ7R1	Rearward
PEVYG6	Pelvis	Y	Endevco	7264-2000T	J23913	Left
PEVZG6	Pelvis	Z	Endevco	7264-2000T	J21963	Up
LFMZF6	Left femur	Z	Denton	1914	0260FZ	Tension
RFMZF6	Right femur	Z	Denton	1914	0261FZ	Tension

Vehicle Instrumentation Placement

Test Number 990421-1

<u>Number</u>	<u>Location</u>	<u>Axis</u>	<u>Manufacturer</u>	<u>Model</u>	<u>S/N</u>	<u>Orientation (+ Sensing)</u>
1	Floor Tunnel #1	X	Endevco	7264-2000T	J22653	Forward
		Y	Endevco	7264-2000T	J27944	Left
		Z	Endevco	7264-2000T	J27651	Up
2	Vehicle Center of Gravity	X	Endevco	7264-2000T	J25465	Forward
		Y	Endevco	7264-2000T	J27797	Left
		Z	Endevco	7264-2000T	J23898	Up
3	Floor Tunnel #2	X	Endevco	7264-2000T	J21532	Forward
		Y	Endevco	7264-2000T	J27892	Left
		Z	Endevco	7264-2000T	J27800	Up
4	Floor Tunnel #3	X	Endevco	7264-2000T	J28468	Forward
		Y	Endevco	7264-2000T	J27947	Left
		Z	Endevco	7264-2000T	J22740	Up

Report Sign Convention and NHTSA Data Tape Reference Guide

Accelerometers:
+X: Forward
+Y: Leftward
+Z: Upward

Potentiometers:
+Chest longitudinal deflection: Outward
+Chest lateral deflection: Leftward
+Seat belt displacement: Outward
+Seat belt extension: Elongation
+Knee slider displacement: Distance between femur and tibia increased (in relation to a seated dummy)

Load cells:
+Femur force: Tension
+Seat belt force: Tension
+Barrier force: Tension

Neck load cells:
+X force: Head pushed forward
+Y force: Head pushed leftward
+Z force: Head pulled 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

Tibia load cells:
+X force: Ankle forward, knee rearward
+Y force: Ankle rightward, knee leftward
+Z force: Tension
+X moment: Bottom of tibia moving leftward
+Y moment: Bottom of tibia moving rearward

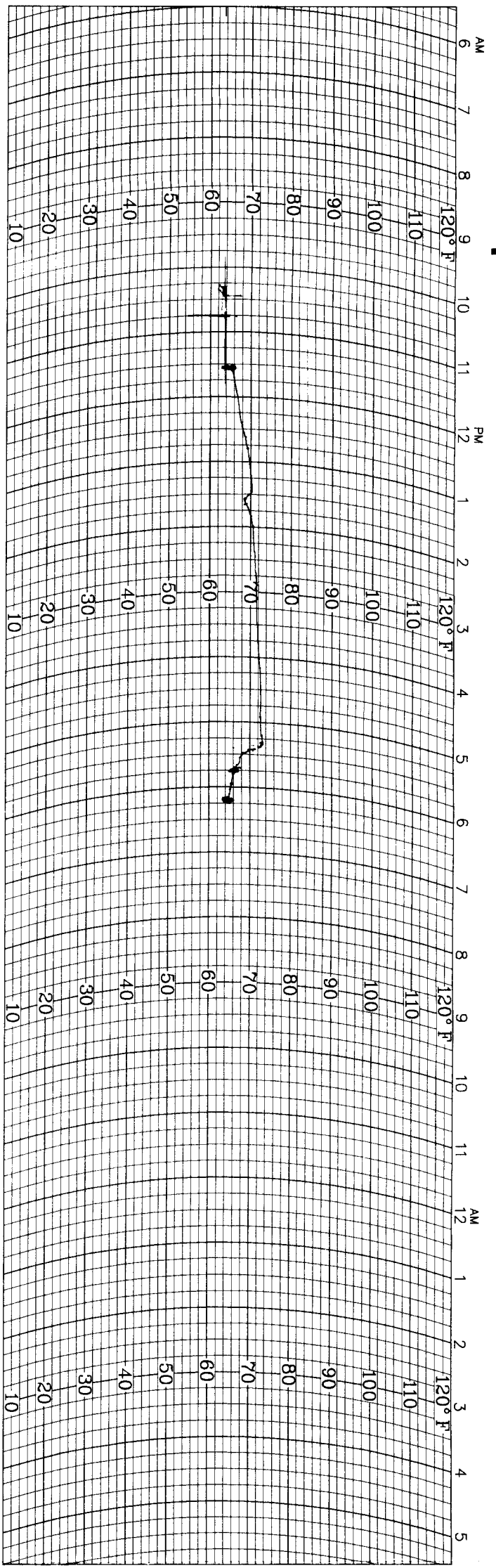
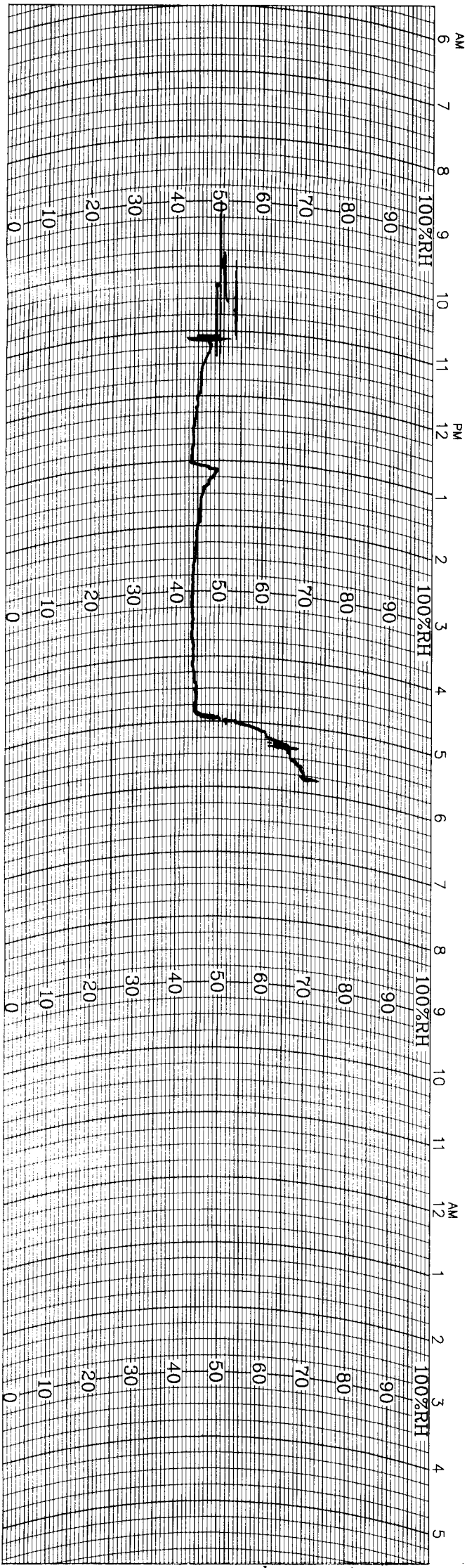
Description Of Timing Marks On TRC High-Speed Film

All TRC high-speed cameras are equipped with red LED's, 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.



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HYGROTHERMOGRAPH
 1 DAY

CHART NO. M699123
 C311-D-HF
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 6-9-87

STATION _____ DATE ON _____ DATE OFF _____