

V3212

**2000 Mercury Sable
into a Flat Frontal Barrier
TRC Test Number: 991116-2**

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Section 1.0

Purpose and Test Procedure

Purpose and Test Summary

This 30 mph flat frontal barrier impact test has as the main objective to investigate both vehicle and occupant dynamics during a flat frontal barrier test. A secondary objective is to gather information on depowered airbags.

This test was conducted with a 2000 Mercury Sable that impacted a flat frontal barrier. The test vehicle contained two instrumented Hybrid III 5th percentile adult female 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 and four (4) airbag squib circuits to measure airbag fire times. The vehicle's specified impact velocity range was 47.8 to 49.4 kph. The vehicle impacted a flat frontal barrier.

The test vehicle contained two (2) Hybrid III 5th percentile adult female anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to SAE's recommended practice (Hybrid III Small Female Dummy Seating Procedure).

Both dummies were instrumented with head and chest 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 forty-six (46) 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. Appendix D contains miscellaneous test information.

Test Results Summary

This flat frontal barrier test was conducted at TRC on November 16, 1999.

The test vehicle, a 2000 Mercury Sable, was equipped with airbags at the driver's and right front passenger's seating positions. The vehicle's test weight was 1695.7 kilograms. The vehicle's impact speed was 48.4 kph. The vehicle's maximum static crush was 250 millimeters.

The driver's 15-millisecond HIC was 85 and its 36-millisecond HIC was 189. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 47.0 g. The driver's chest deflection was 54 millimeters. The driver's left and right femur maximum compressive forces were 3612 N and 4379 N, respectively.

The right front passenger's 15-millisecond HIC was 316 and its 36-millisecond HIC was 438. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 68.6 g. The passenger's chest deflection was 12 millimeters. The right front passenger's left and right femur maximum compressive forces were 3247 N and 4186 N, respectively.

Table 1 Crash Test Summary

Test type:	Frontal barrier impact
Test date:	11/16/99
Test time:	1629
Ambient temperature at impact area:	22° C
Vehicle year/make/ model/body style:	2000/Mercury/Sable/Sedan
Vehicle test weight:	1695.7 kg
Impact angle ¹ :	0°
Impact velocity ² :	
Primary:	48.4 kph
Secondary:	48.4 kph
Maximum static crush:	250 mm
Average rebound:	1613 mm
Number of cameras:	
Real-time:	1
High-speed:	14
Door opening data:	
Left-front:	Easy
Right-front:	Easy

¹ With respect to tow track centerline.

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

Table 1 Crash Test Summary, Cont'd.

Dummies:	<u>Driver #369</u>	<u>Passenger #283</u>
Type:	Hybrid III 5 th percentile adult female	Hybrid III 5th percentile adult female
Location:	Left front	Right front
Restraint:	Airbag	Airbag
Number of data channels:	15	15
Front seat data:		
Seat track failure:	None	None
Seat back failure:	None	None
Visible dummy contact points:		
Head:	Airbag/head rest	Airbag
Chest:	Airbag	Airbag
Abdomen:	None	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/
model/body style: 2000/Mercury/Sable/Sedan

Color: Black

VIN: 1MEFM55S9YG600023

Engine data:

Placement: Transverse

Cylinders: V-6

Displacement: 3.0 liters

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

Final drive: X fwd, rwd, 4wd

Date vehicle received: N/A

Odometer reading: 7 miles

Dealer's name and address: N/A

Accessories:

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

Certification data from vehicle's label:¹

Vehicle manufactured by:

Date of manufacture:

VIN:

GVWR: kg

GAWR: Front: kg

Rear: kg

¹The vehicle did not contain a label stating the certification data.

Table 2 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P215/60R16
Spare tire: Space saver
Type of front seats: Bucket

Tire & capacity data from vehicle's label:¹

Recommended tire size:

Recommended cold tire pressure:

Front:

Rear:

Designated Seating Capacity:

Front

Rear

Total

Vehicle Cargo Weight:² 90.7 kg

Test vehicle attitudes:

Delivered attitude:	LF: 723 mm	RF: 725 mm	LR: 706 mm	RR: 711 mm
Fully loaded attitude:	LF: 714 mm	RF: 716 mm	LR: 658 mm	RR: 661 mm
Pre-test attitude:	LF: 715 mm	RF: 722 mm	LR: 663 mm	RR: 674 mm
Post-test attitude:	LF: 703 mm	RF: 718 mm	LR: 665 mm	RR: 658 mm

¹The vehicle did not contain a label stating tire and capacity data.

²Cargo weight was taken from previous VRTC data.

Table 2 Test Vehicle Information, Cont'd.

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

Right front	488.0 kg	Right rear	268.9 kg
Left front	475.7 kg	Left rear	281.6 kg
Total front weight	963.7 kg	(63.6% of total vehicle weight)	
Total rear weight	550.5 kg	(36.4% of total vehicle weight)	
Total delivered weight	1514.2 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (1514.2 kg)

DSC = Designated Seating Capacity (5)

RCLW = 90.7 kg

Target test weight = UDW + RCLW + (number of Hybrid III Dummies x 47.6 kg per dummy)

Target test weight = 1514.2 + 90.7 + 95.2 = 1700.1 kg

Weight of test vehicle with required dummies and 37.2 kg of cargo weight:

Right front	517.0 kg	Right rear	326.5 kg
Left front	501.6 kg	Left rear	350.6 kg
Total front weight	1018.6 kg	(60.1% of total vehicle weight)	
Total rear weight	677.1 kg	(39.9% of total vehicle weight)	
Total test weight	1695.7 kg	(0.3% under target test weight)	

Weight of ballast secured in vehicle: 38 lbs in engine and 12 lbs behind the driver's seat

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 1097 mm

Vehicle Wheelbase: 2750 mm

Table 3 Post-Impact Data

Test number: 991116-2
Test date: 11/16/99
Test time: 1629
Test type: Frontal barrier impact
Impact angle: 0°
Ambient temperature
at impact area: 22° C
Temperature in
occupant compartment: 24° C

Impact velocity:
Primary: 48.4 kph
Secondary: 48.4 kph
Specified range: 47.8 to 49.4 kph

Distance from vehicle to barrier:

Entering velocity trap: 356 mm
Exiting velocity trap: 51 mm

Test vehicle static crush:

Overall length of test vehicle:

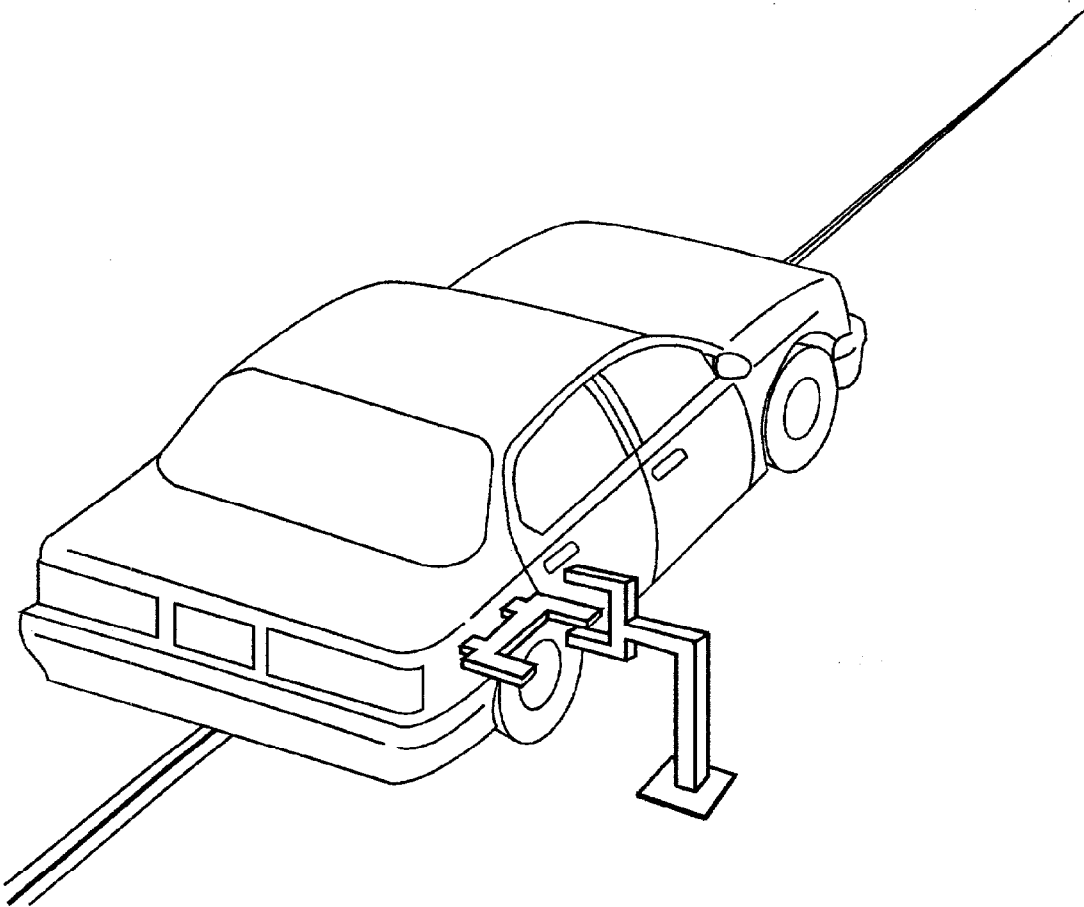
Pre-test:	L: 4924 mm	C: 5110 mm	R: 4924 mm
Post-test:	L: 4699 mm	C: 4860 mm	R: 4700 mm
Total crush:	L: 225 mm	C: 250 mm	R: 224 mm
Average crush:	233 mm		

Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L: 1670 mm	C: 1607 mm	R: 1623 mm
Average rebound:	1633 mm		

Figure 1 Impact Velocity Measurement System



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

The vanes have 305-millimeter spacing.

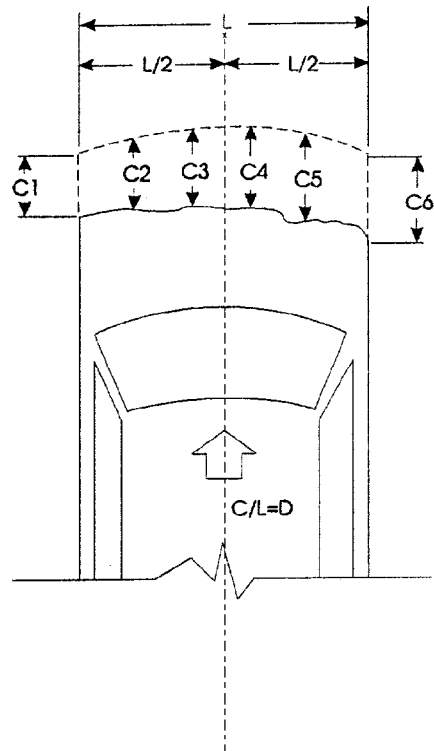
Figure 2 Accident Investigation Division Data for 30 mph Frontal Barrier Impact

Test date: 11/16/99
 Vehicle year/make/model/body style: 2000/Mercury/Sable/Sedan
 VIN: 1MEFM55S9YG600023
 Build date: N/A
 Test weight: 1695.7 kg
 Vehicle wheelbase: 2750 mm
 Maximum width: 1841 mm
 Front overhang: 1050 mm

Collision Deformation
 Classification (CDC) Code: 12FDAW2

Crush depth measurements:

C1:	225 mm
C2:	232 mm
C3:	230 mm
C4:	230 mm
C5:	204 mm
C6:	224 mm



Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 1524 mm

Figure 3 Vehicle Accelerometer Placement

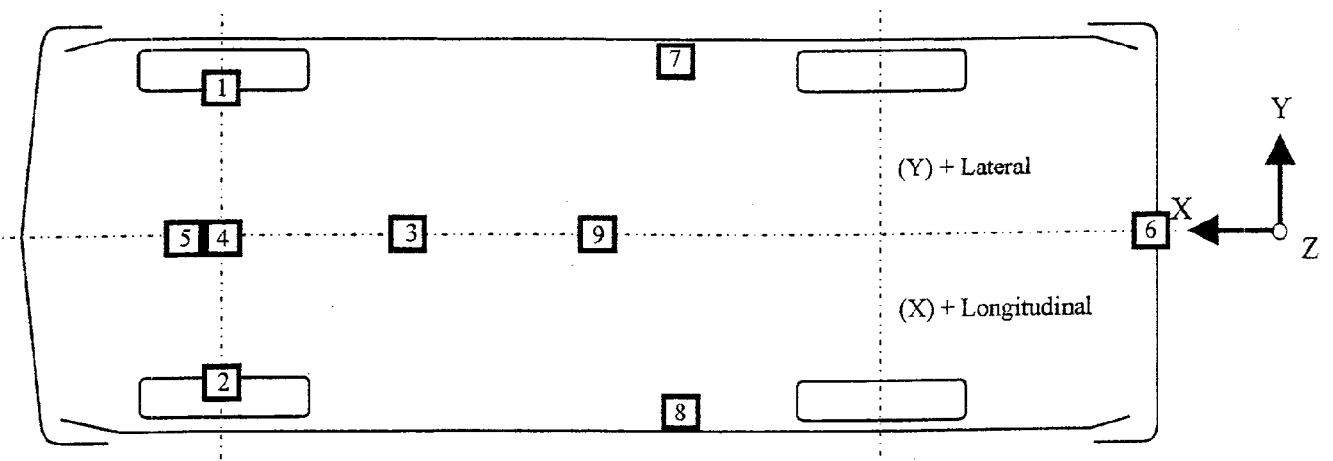
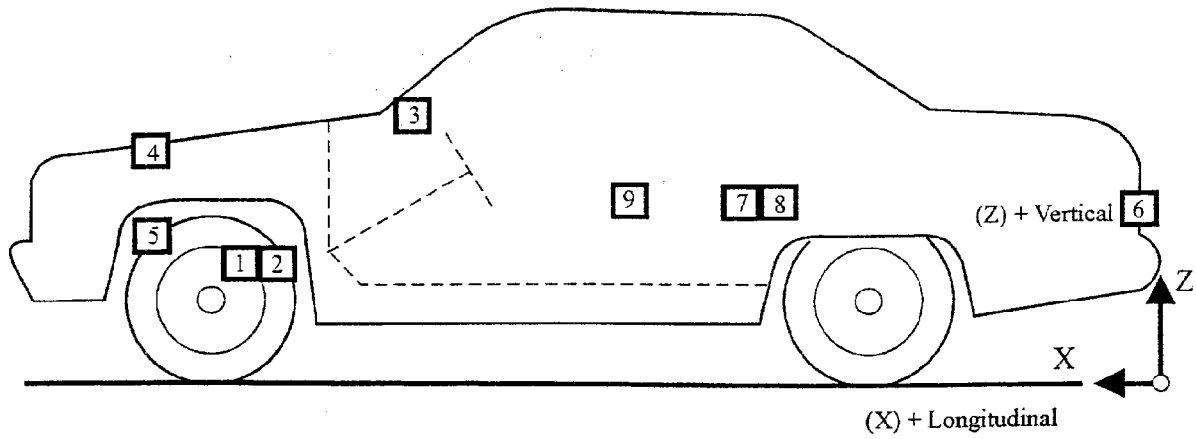


Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 991116-2		X		Y		Z		POSITIVE DIRECTION	NEGATIVE DIRECTION
No. LOCATION									
1	LEFT BRAKE CALIPER	PRE	4175 mm	695 mm	285 mm	NA	17.2 g	@ 71.0 ms	77.4 g @ 35.8 ms
	LONGITUDINAL	POST	4128 mm	710 mm	NA				
2	RIGHT BRAKE CALIPER	PRE	4175 mm	-695 mm	285 mm	NA	39.1 g	@ 51.3 ms	59.7 g @ 29.8 ms
	LONGITUDINAL	POST	4115 mm	-680 mm	NA				
3	INSTRUMENT PANEL	PRE	3420 mm	0 mm	982 mm	NA	16.7 g	@ 25.8 ms	39.0 g @ 20.2 ms
	CENTER	POST	3412 mm	-10 mm	NA				
4	ENGINE TOP	PRE	4350 mm	-312 mm	735 mm	NA	19.3 g	@ 52.4 ms	98.7 g @ 29.4 ms
	LONGITUDINAL	POST	4151 mm	-300 mm	NA				
5	ENGINE BOTTOM	PRE	4285 mm	-105 mm	160 mm	NA	22.7 g	@ 49.8 ms	63.3 g @ 30.6 ms
	LONGITUDINAL	POST	4086 mm	-92 mm	NA				

Table 4 Vehicle Accelerometer Locations and Data Summary, Cont'd.

TEST NUMBER: 991116-2		X		Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
No. LOCATION									
6 REAR VEHICLE CENTERLINE	PRE	410 mm	0 mm	0 mm	480 mm				
	POST	410 mm	0 mm	0 mm	NA				
	LONGITUDINAL					2.7 g	@ 96.9 ms	29.9 g	@ 40.7 ms
	LATERAL					5.1 g	@ 61.6 ms	3.8 g	@ 71.9 ms
	VERTICAL					22.8 g	@ 96.8 ms	14.4 g	@ 61.4 ms
RESULTANT						30.4 g	@ 55.8 ms		
7 LEFT REAR SEAT	PRE	2170 mm	533 mm	533 mm	325 mm				
	POST	2169 mm	533 mm	533 mm	NA				
LONGITUDINAL						1.1 g	@ 102.7 ms	32.5 g	@ 40.2 ms
8 RIGHT REAR SEAT	PRE	2170 mm	-500 mm	-500 mm	328 mm				
	POST	2167 mm	-500 mm	-500 mm	NA				
LONGITUDINAL						1.6 g	@ 100.0 ms	33.4 g	@ 54.0 ms
9 VEHICLE CENTER OF GRAVITY	PRE	2930 mm	0 mm	0 mm	317 mm				
	POST	2930 mm	0 mm	0 mm	NA				
LONGITUDINAL						1.7 g	@ 99.3 ms	35.4 g	@ 55.1 ms
LATERAL						5.2 g	@ 47.4 ms	9.1 g	@ 41.7 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
Driver	-38.0 g	-18.2 g	14.2 g	42.3 g	-46.0 g	2.8 g	13.6 g
Passenger	-43.4 g	-43.3 g	-33.5 g	61.0 g	-75.1 g	-7.4 g	24.3 g

	<u>Maximum Femur Compressive Force</u>	
	Left Femur	Right Femur
Driver	3612 N	4379 N
Passenger	3247 N	4186 N

	<u>15-Millisecond Head Injury Criteria¹</u>		
	HIC	Time t ₁	Time t ₂
Driver	85	95.0 ms	110.0 ms
Passenger	316	61.4 ms	76.5 ms

	<u>36 millisecond Head Injury Criteria</u>		
	HIC	Time t ₁	Time t ₂
Driver	189	52.7 ms	88.7 ms
Passenger	438	55.8 ms	91.8 ms

	<u>Chest Maximum Resultant Acceleration²</u>		
	Acceleration	Time t ₁	Time t ₂
Driver	47.0 g	76.9 ms	78.9 ms
Passenger	68.6 g	77.4 ms	80.4 ms

	<u>Maximum Chest Deflection</u>
Driver	54 mm
Passenger	12 mm

¹ As defined in FMVSS No. 208

² Defined as equal to or exceeding 0.003 sec. duration

Dummy Kinematic Summary

Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's face impacted the airbag. The dummy's head was restrained by the airbag. The dummy's abdomen impacted the steering wheel. The dummy's head and upper torso rotated rearward into the seat back. The dummy came to rest in a seated position.

Right Front Passenger Dummy

Upon impact, the passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head and chest impacted the airbag. The dummy's head and chest were restrained by the airbag. The dummy's head and upper torso rotated to the right. The dummy came to rest in a seated position, with its head against the headrest, its upper back contacting the seat back, and its left knee contacting the instrument panel.

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 4 Pre-test and Post-test Measurement Points

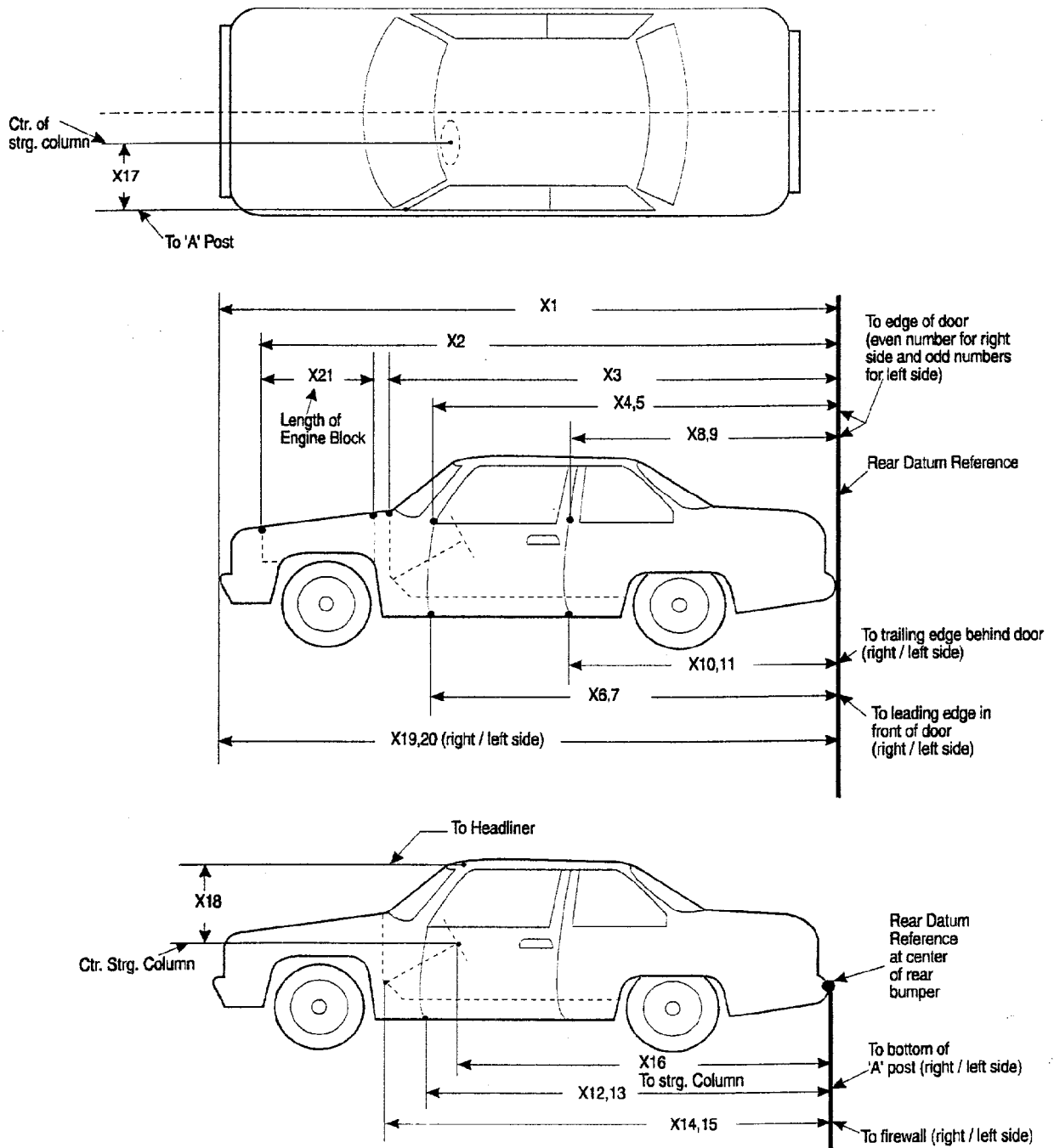


Table 6 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 2000/Mercury/Sable/Sedan

Test Number: 991116-2

No.	Type of measurement	Pre-Test	Post-Test	Difference
X1	Total Length of Veh. at Centerline	5110	4860	250
X2	Rear Surface of Veh. to Front of Engine Block	4570	4434	136
X3	Rear Surface of Veh. to Firewall	3977	3971	6
X4	Rear Surface of Veh. to Upper Leading Edge of Right Door	3527	3518	9
X5	Rear Surface of Veh. to Upper Leading Edge of Left Door	3531	3525	6
X6	Rear Surface of Veh. to Lower Leading Edge of Right Door	3503	3488	15
X7	Rear Surface of Veh. to Lower Leading Edge of Left Door	3508	3500	8
X8	Rear Surface of Veh. to Upper Trailing Edge of Right Door	2505	2500	5
X9	Rear Surface of Veh. to Upper Trailing Edge of Left Door	2509	2499	10
X10	Rear Surface of Veh. to Lower Trailing Edge of Right Door	2483	2470	13
X11	Rear Surface of Veh. to Lower Trailing Edge of Left Door	2487	2479	8
X12	Rear Surface of Veh. to Bottom of " A " Post on Right Side	3510	3511	-1
X13	Rear Surface of Veh. to Bottom of " A " Post on Left Side	3510	3512	-2
X14	Rear Surface of Veh. to Firewall--Right Side	3964	3891	73
X15	Rear Surface of Vehicle to Firewall --Left Side	3945	3908	37
X16	Rear Surface of Veh. to Steering Wheel Center	3065	3150	-85
X17	Center of Steering Column to " A " Post	297	300	-3
X18	Center of Steering Column to Headliner	400	444	-44
X19	Rear Surface of Veh. to Right Side of Front Bumper	4924	4700	224
X20	Rear Surface of Veh. to Left Side of Front Bumper	4924	4699	225
X21	Length of Engine Block	450	450	0

Figure 5 Vehicle Target Locations

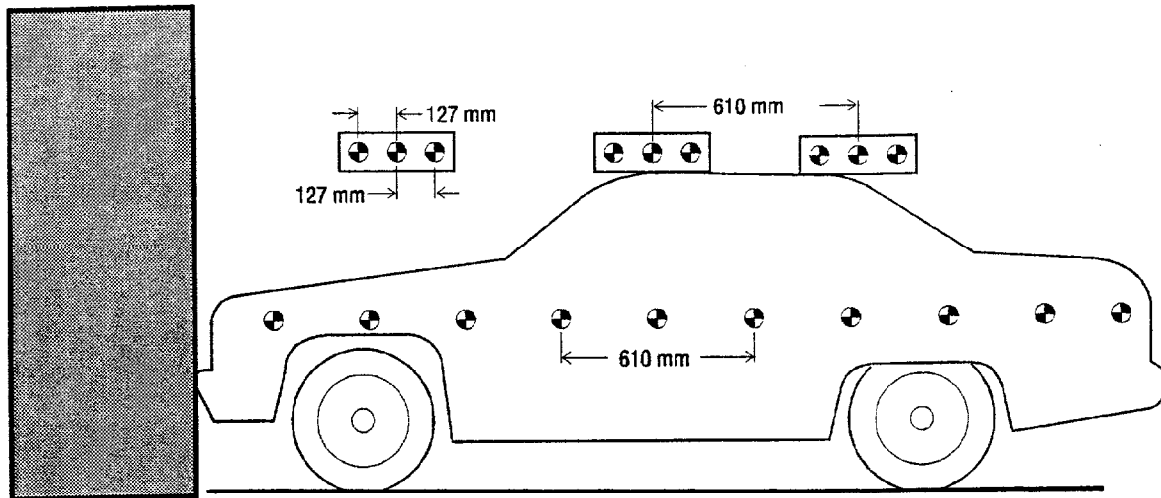


Figure 6 Dummy Measurement Locations for Front Seat Occupants

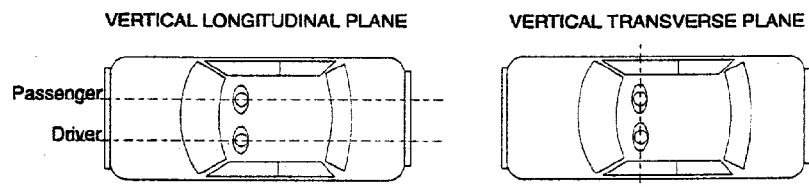
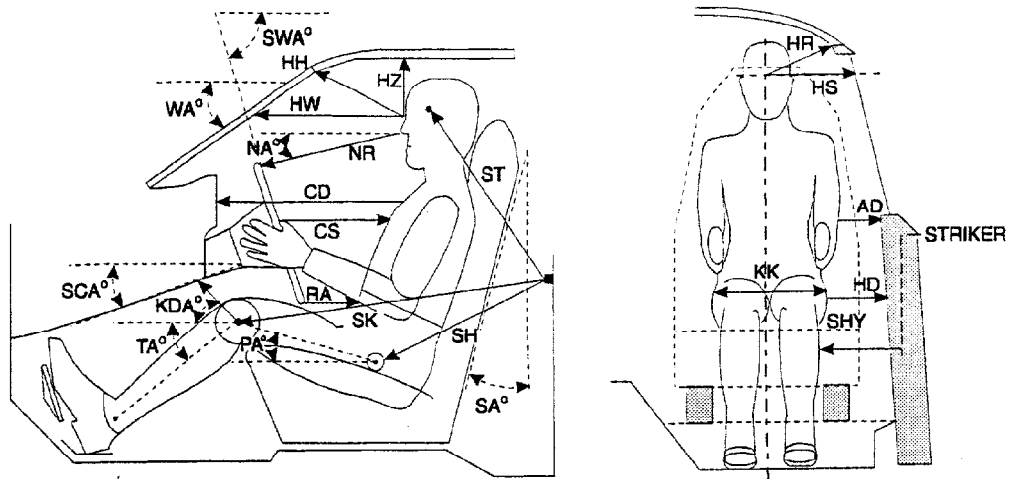


Table 7 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #369)	Passenger (Serial #283)
WA	Windshield angle	27°	27°
SWA	Steering wheel angle	70°	N/A
SCA	Steering column angle	20°	N/A
SA	Seat back angle	17°	17°
HZ	Head to roof	173 mm	165 mm
HH	Head to header	262 mm	244 mm
HW	Head to windshield	525 mm	526 mm
HR	Head to side header	235 mm	235 mm
NR	Nose to rim	240 mm	N/A
NA	Nose to rim angle	8°	N/A
CD	Chest to dash	410 mm	315 mm
CS	Steering wheel to chest	155 mm	N/A
RA	Rim to abdomen	68 mm	N/A
KDL	Left knee to dash	84 mm	71 mm
KDR	Right knee to dash	60 mm	69 mm
KDA	Outboard knee to dash angle	37°	33°
PA	Pelvic angle	23°	22°
TA	Tibial angle	64°	71°
KK	Knee to knee	270 mm	225 mm
ST ¹	Striker to head	508 mm	533 mm
	Striker to head angle	-69°	-64°
SK	Striker to knee	700 mm	703 mm
	Striker to knee angle	2°	0°
SH	Striker to H-point	372 mm	373 mm
	Striker to H-point angle	11°	12°
SHY	Striker to H-point (Y dir.)	282 mm	302 mm
HS	Head to side window	365 mm	360 mm
HD	H-point to door	185 mm	150 mm
AD	Arm to door	150 mm	184 mm

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

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

Figure 7 Camera Positions

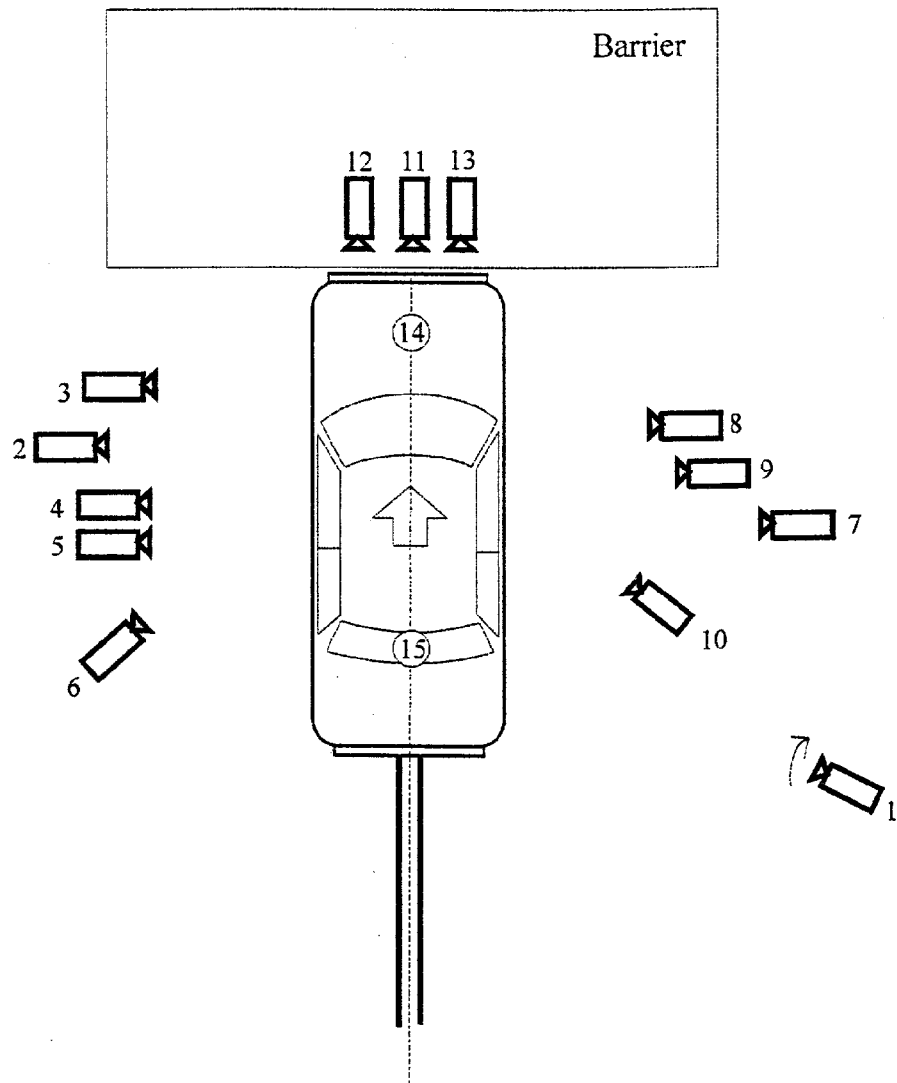


Table 8 Motion Picture Camera Locations

Vehicle year/make/model/body style: 2000/Mercury/Sable/Sedan

Test number: 991116-2

Camera Number	View	Camera Positions ¹			Camera Angle ²	Film Plane to Head Target	Camera Lens	Film Speed
		X	Y	Z				
1	Real-time panning	NA	NA	NA	NA	NA	16 mm	24 frames/s
2	Left vehicle crush	1321 mm	6553 mm	1499 mm	0°	6920 mm	25 mm	987 frames/s
3	Left windshield intrusion	1219 mm	6401 mm	1181 mm	0°	7340 mm	50 mm	995 frames/s
4	Steering column motion	3251 mm	8534 mm	1765 mm	-13.6°	6710 mm	25 mm	995 frames/s
5	Steering column motion	3251 mm	8534 mm	2718 mm	-5.8°	6600 mm	25 mm	1000 frames/s
6	Driver kinematics	4267 mm	2438 mm	2007 mm	-20.4°	3060 mm	25 mm	997 frames/s
7	Right overall	1626 mm	-6401 mm	1499 mm	0°	6130 mm	13 mm	1002 frames/s
8	Right windshield intrusion	1219 mm	-6401 mm	1219 mm	0°	7574 mm	50 mm	987 frames/s
9	Passenger kinematics	2743 mm	-7925 mm	838 mm	-15.8°	3090 mm	25 mm	1002 frames/s
10	Passenger kinematics	4267 mm	-1981 mm	2083 mm	-3.3°	6874 mm	25 mm	1000 frames/s
11	Windshield front view	0 mm	0 mm	2311 mm	-61.6	NA	8.5 mm	990 frames/s
12	Driver - front view	0 mm	305 mm	2311 mm	-55.3°	NA	13 mm	1002 frames/s
13	Passenger - front view	0 mm	-305 mm	2311 mm	-58.4°	NA	13 mm	1005 frames/s
14	Pit - front position	1549 mm	0 mm	-2743 mm	90°	NA	13 mm	887 frames/s
15	Pit - rear position	2540 mm	0 mm	-2743 mm	90°	NA	13 mm	1002 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

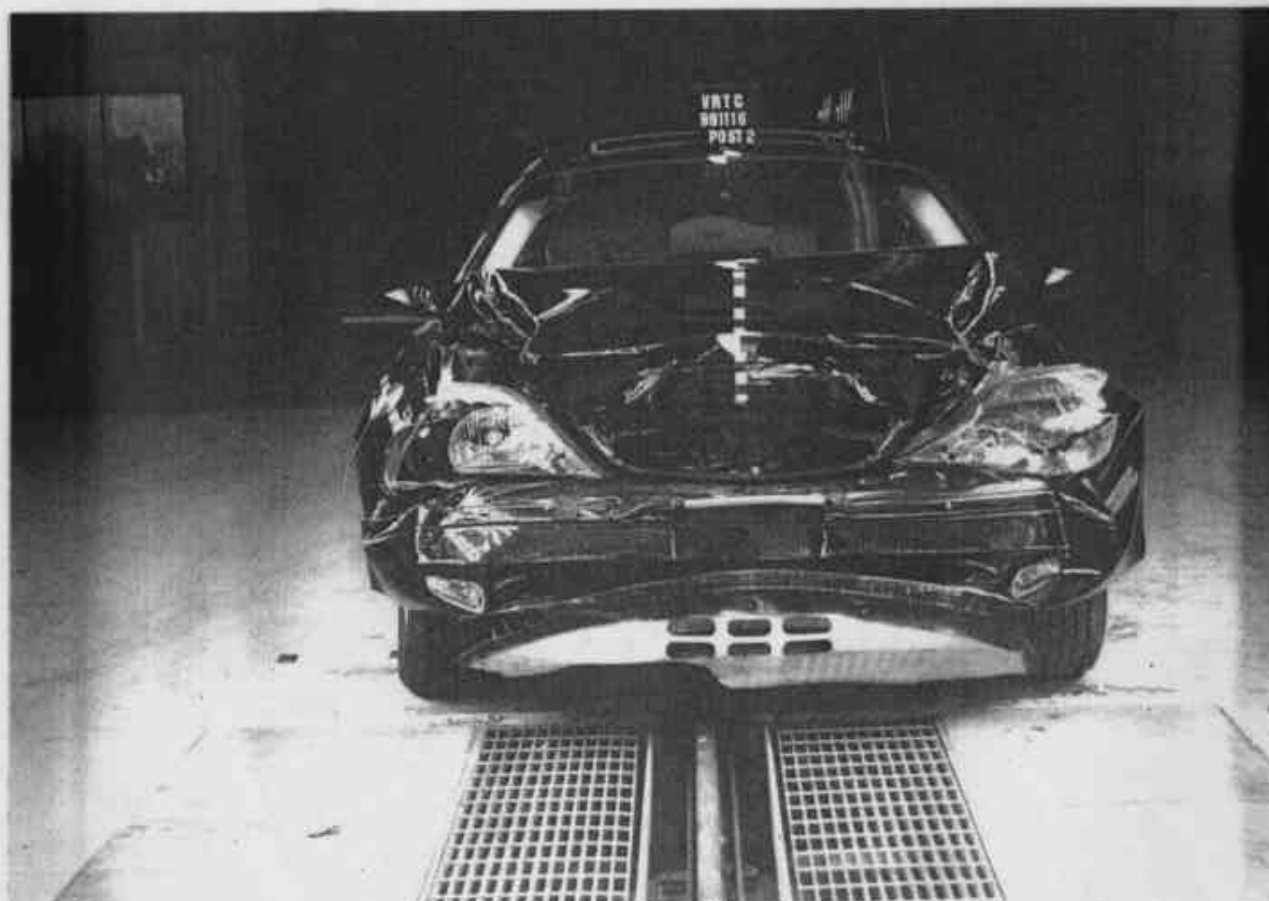


Figure A-2 Post-Test Front View



Figure A-3 Pre-Test Left Side View



Figure A-4 Post-Test Left Side View



Figure A-5 Pre-Test Left Rear Three-Quarter View



Figure A-6 Post-Test Left Rear Three-Quarter View



Figure A-7 Pre-Test Rear View

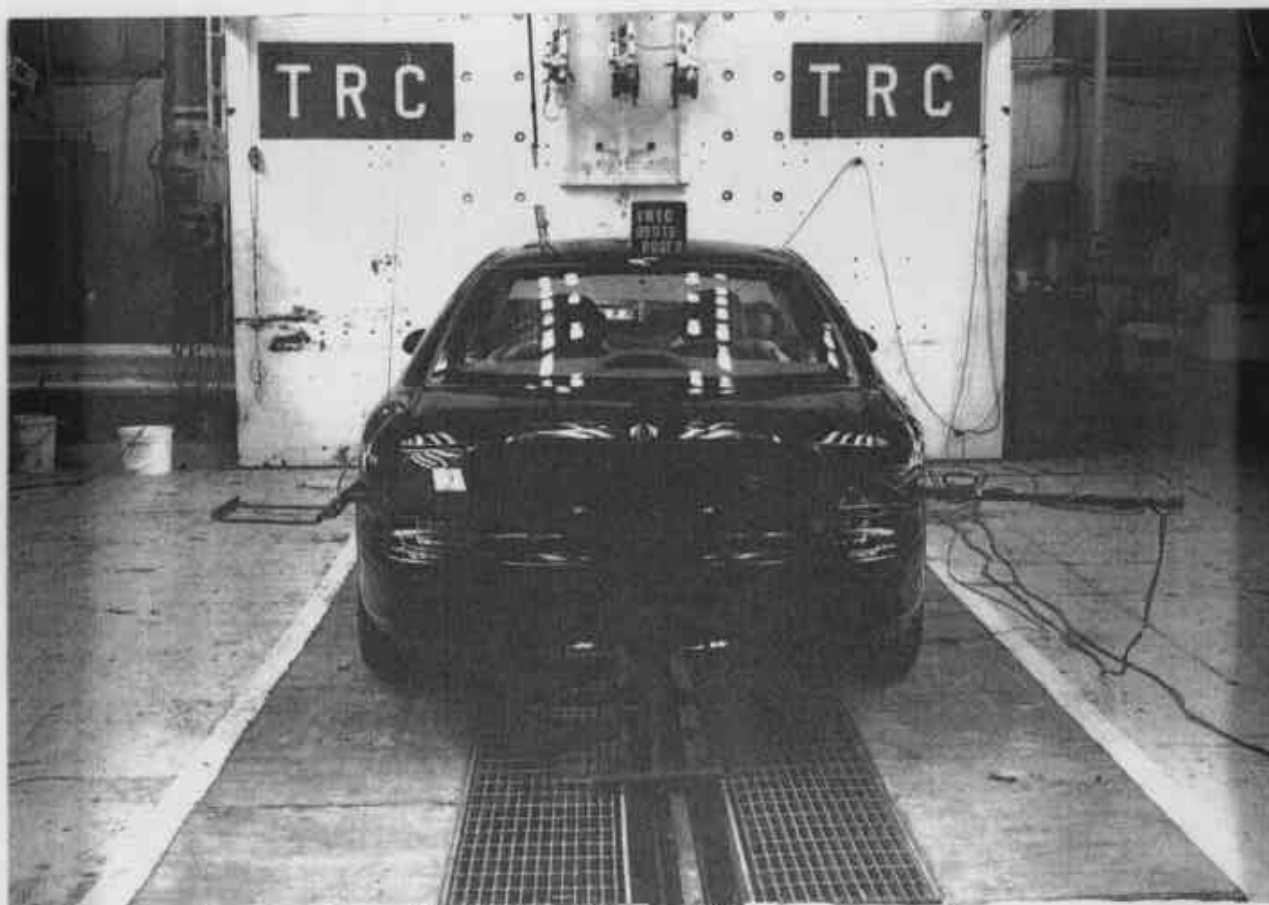


Figure A-8 Post-Test Rear View



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

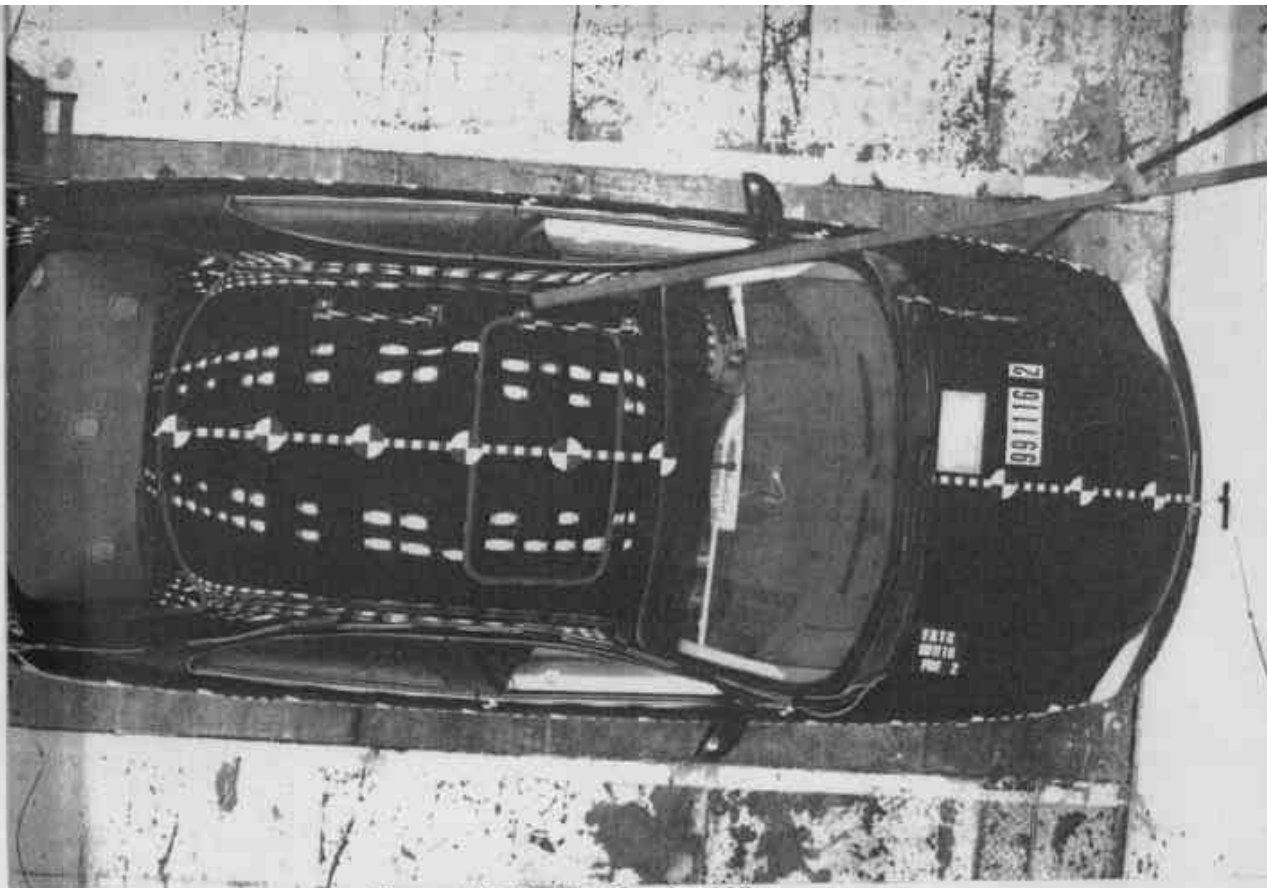


Figure A-13 Pre-Test Overhead View

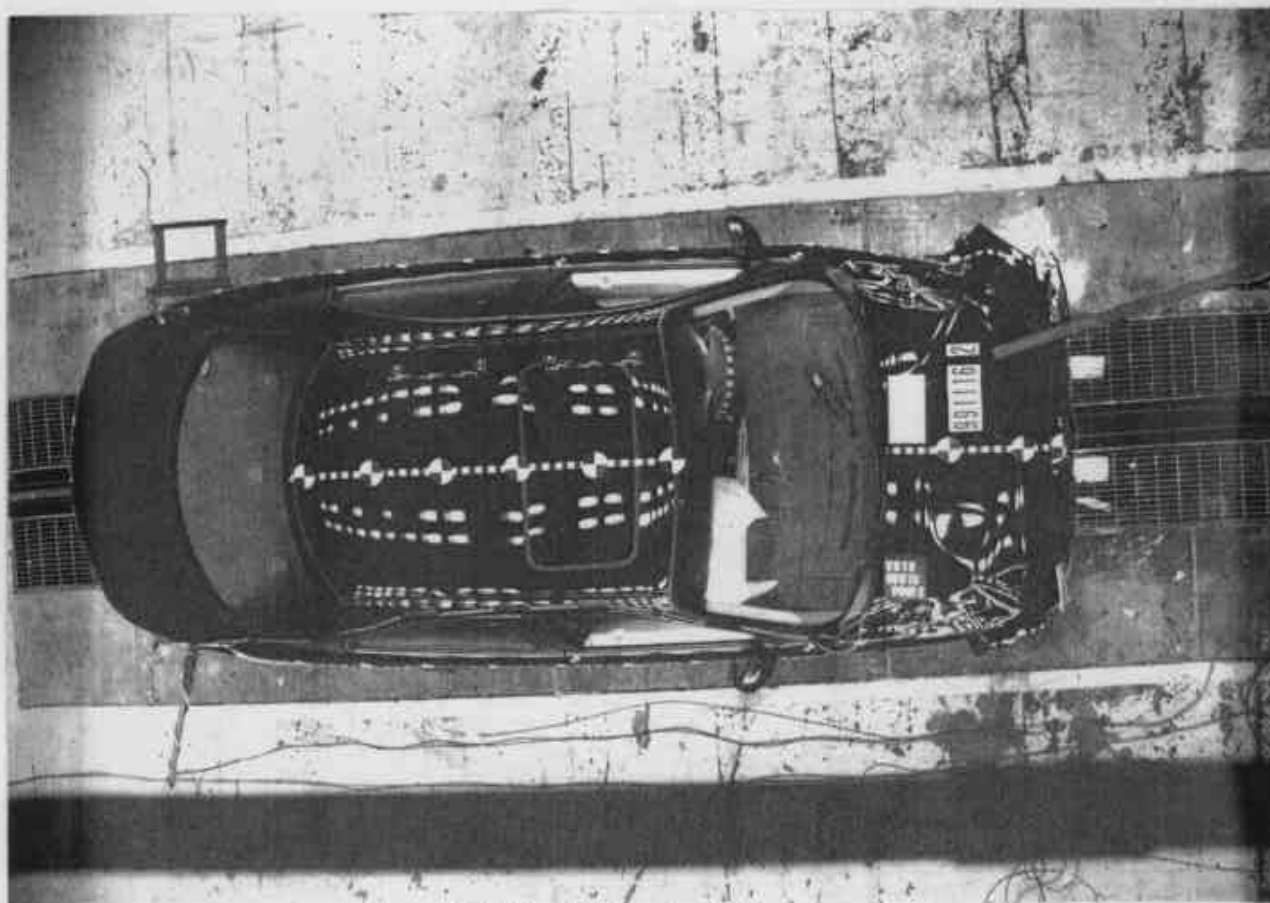


Figure A-14 Post-Test Overhead View

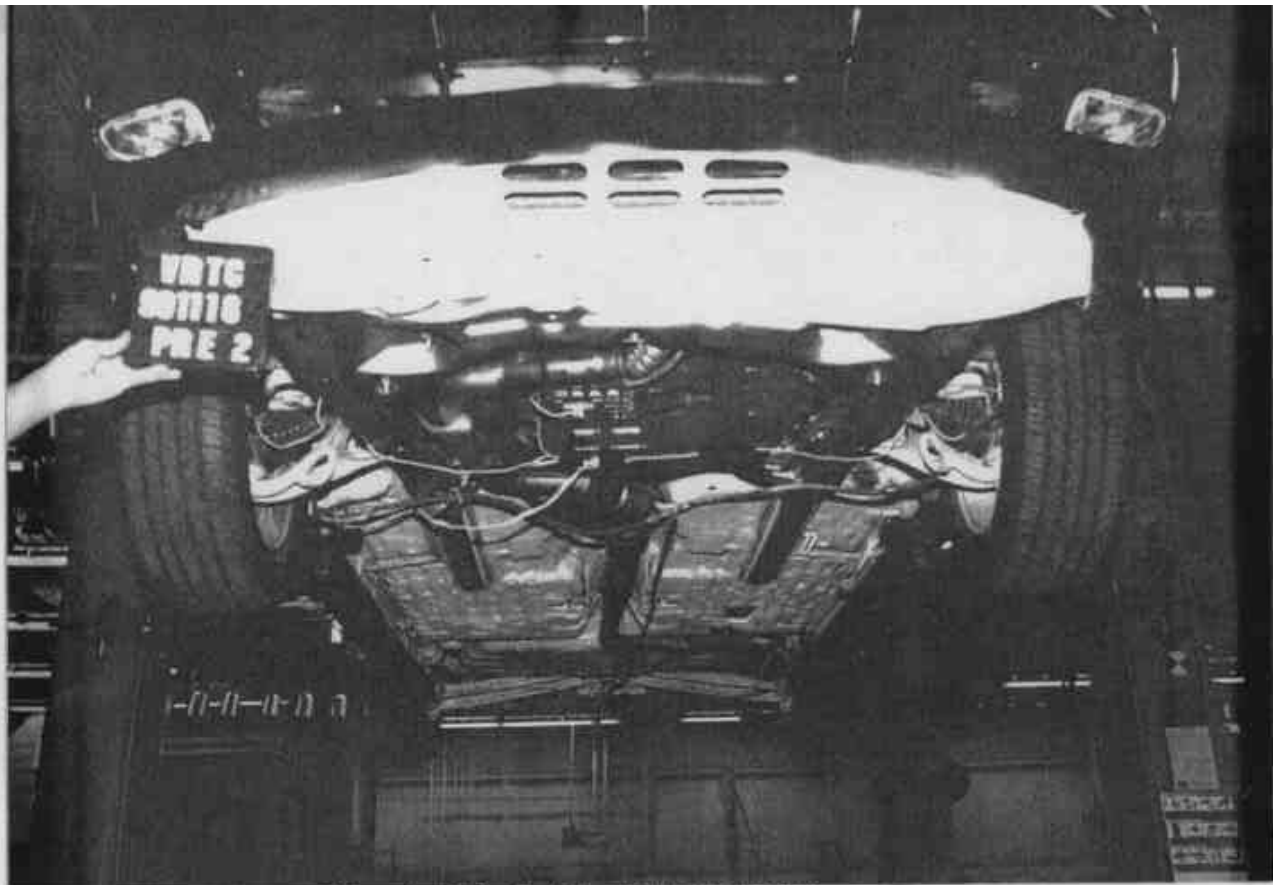


Figure A-15 Pre-Test Front Underbody View

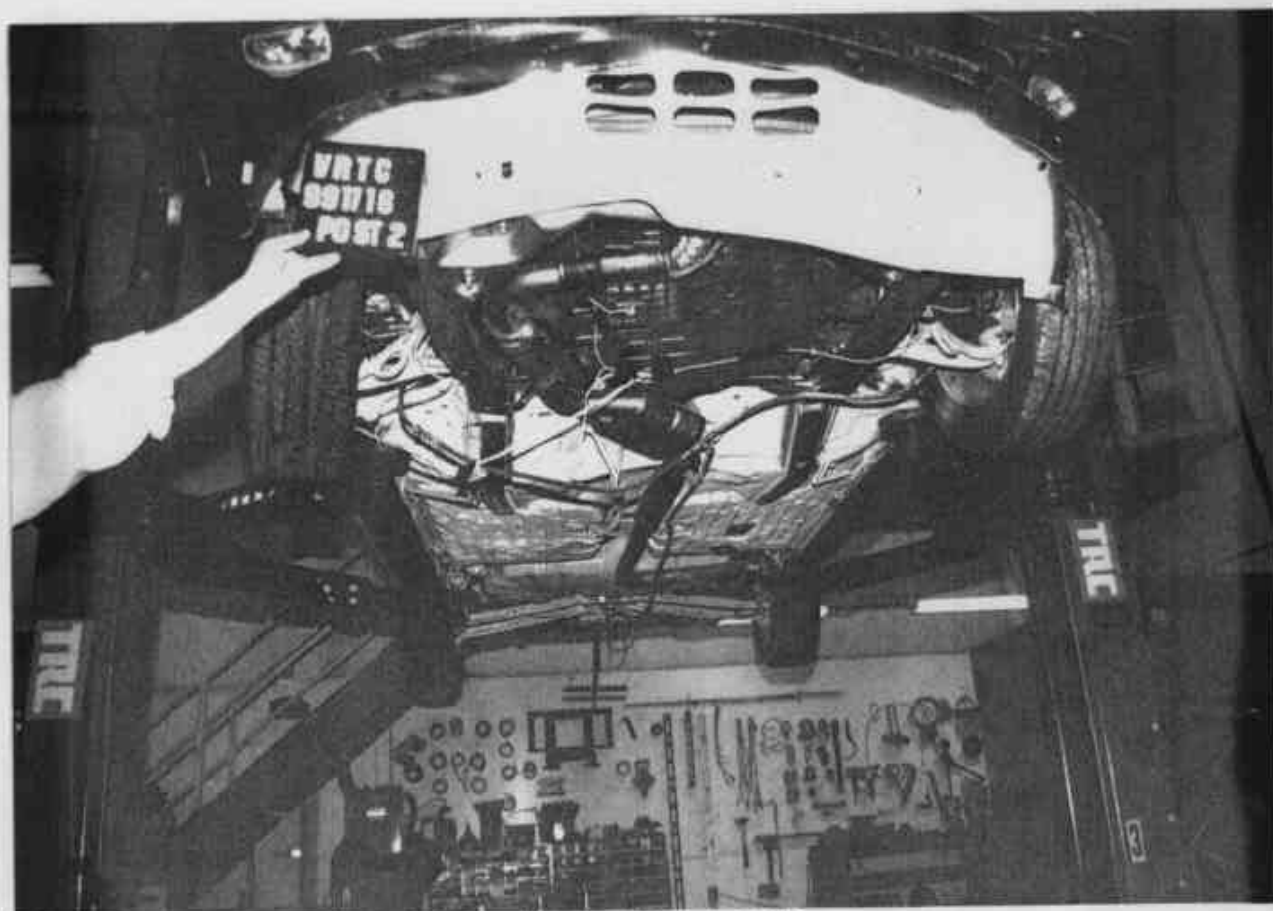


Figure A-16 Post-Test Front Underbody View

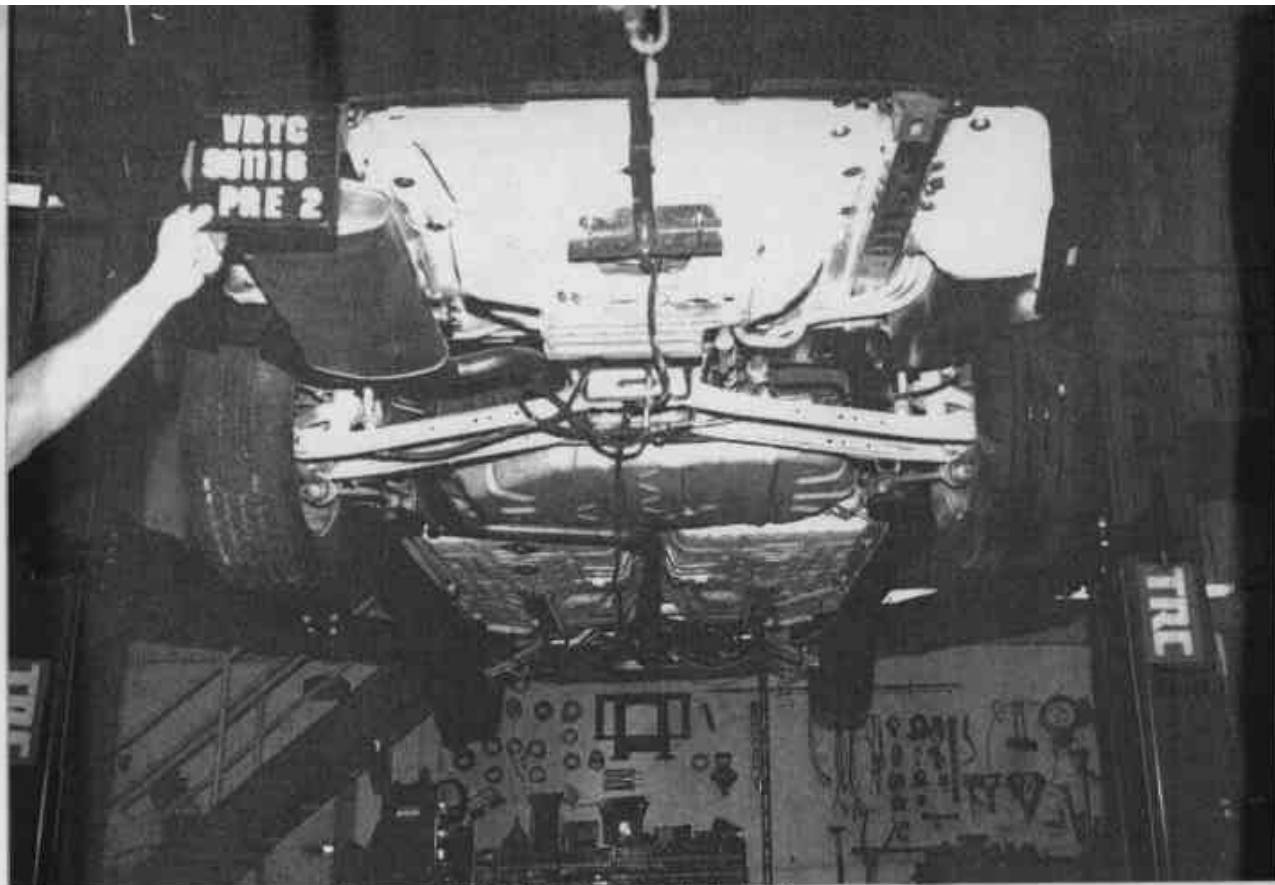


Figure A-17 Pre-Test Rear Underbody View

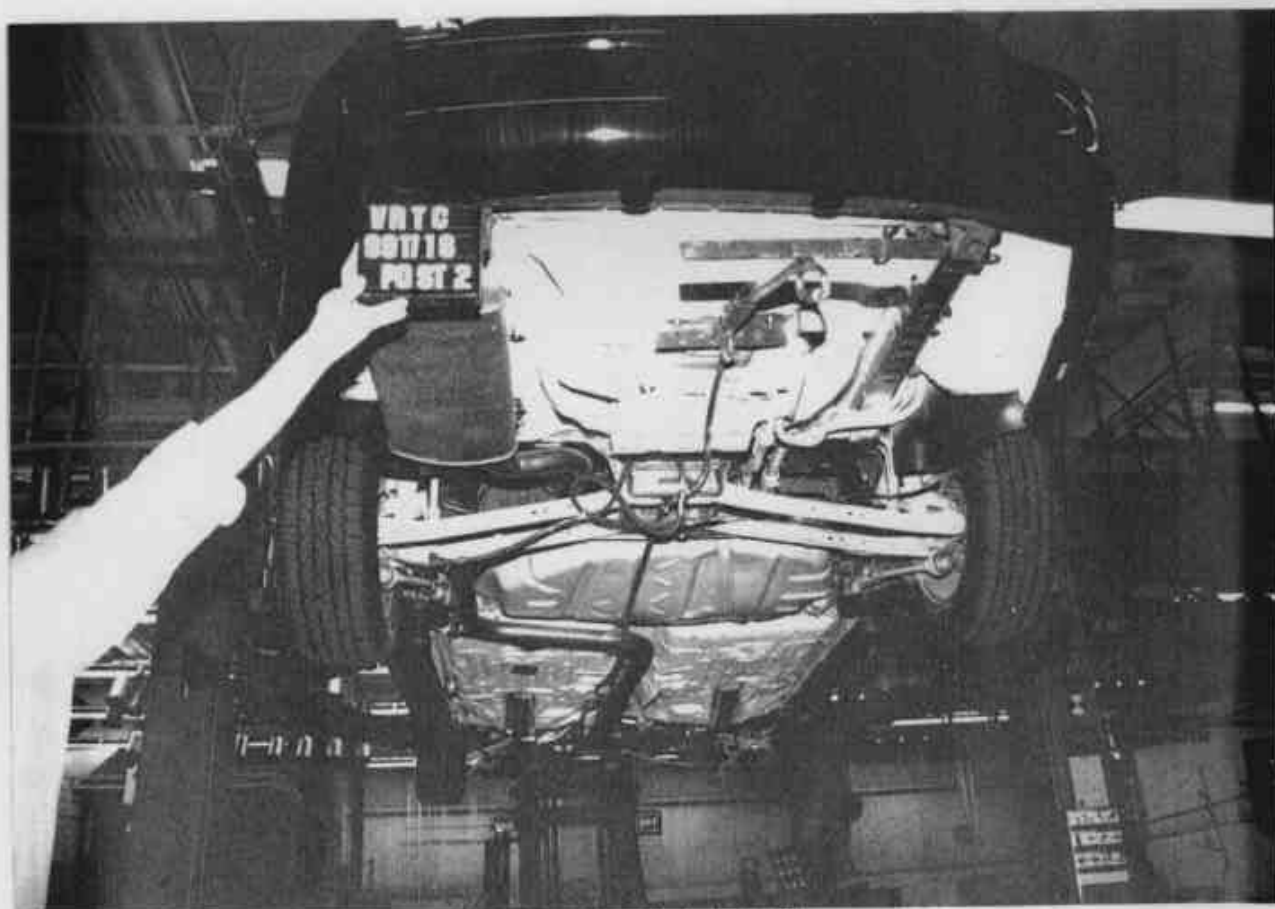


Figure A-18 Post-Test Rear Underbody View

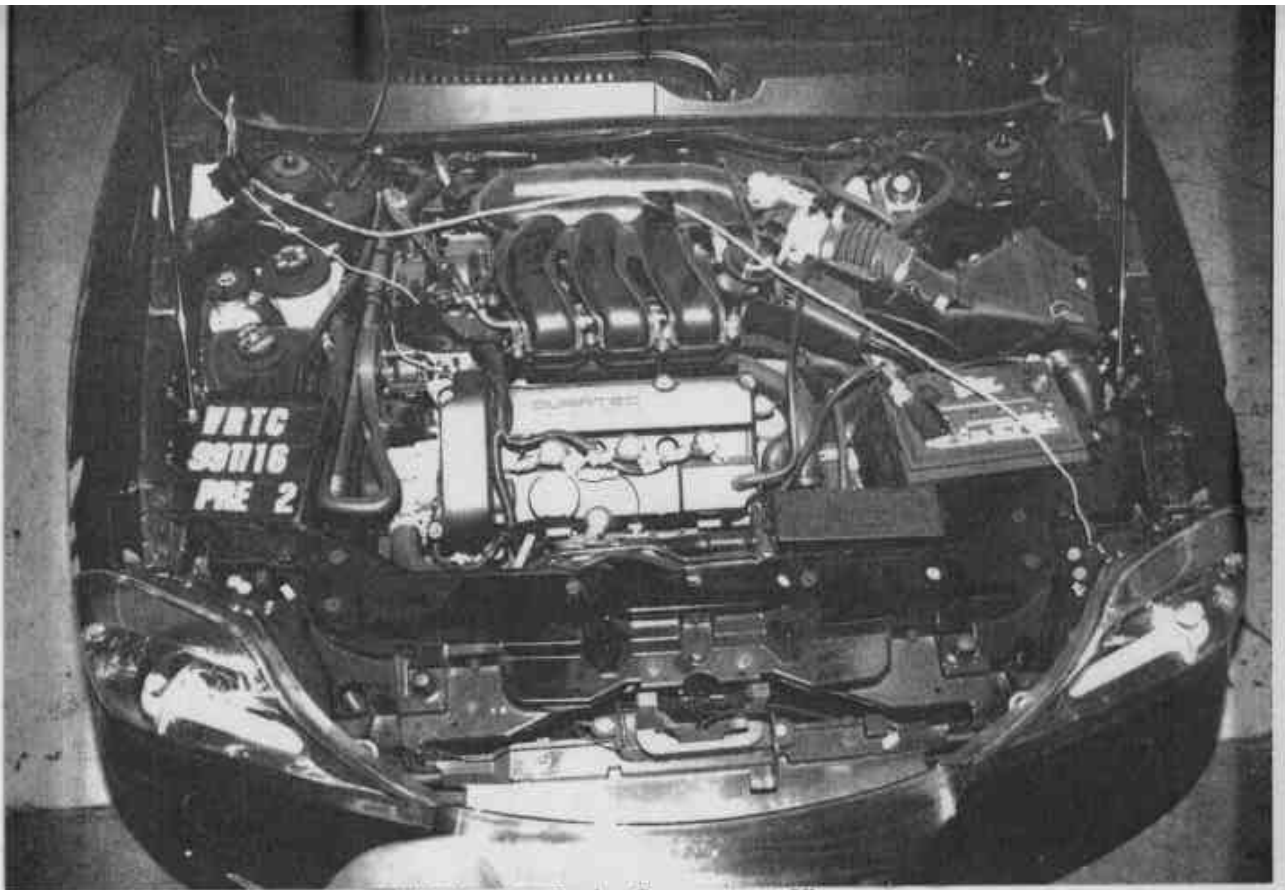


Figure A-19 Pre-Test Engine Compartment View

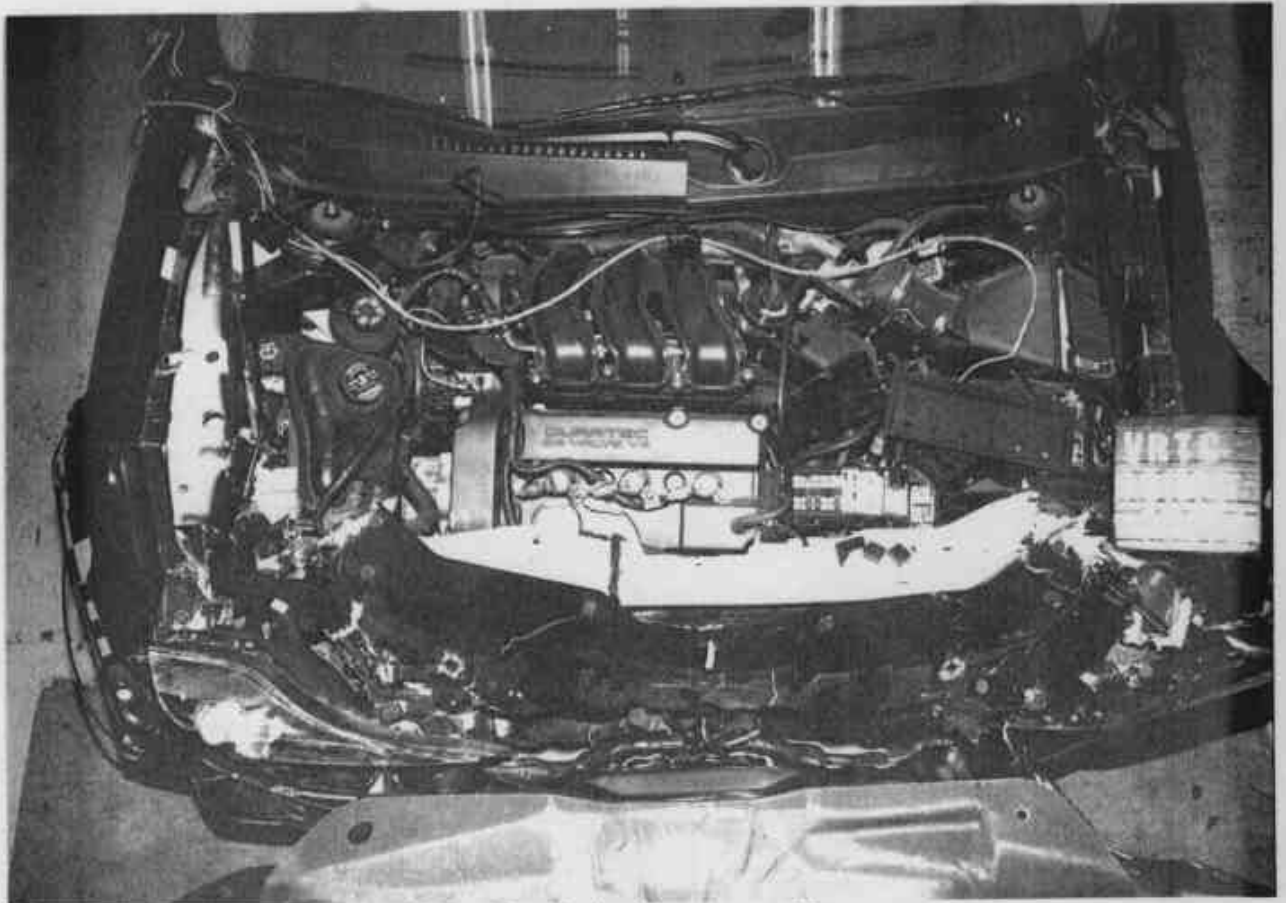


Figure A-20 Post-Test Engine Compartment View

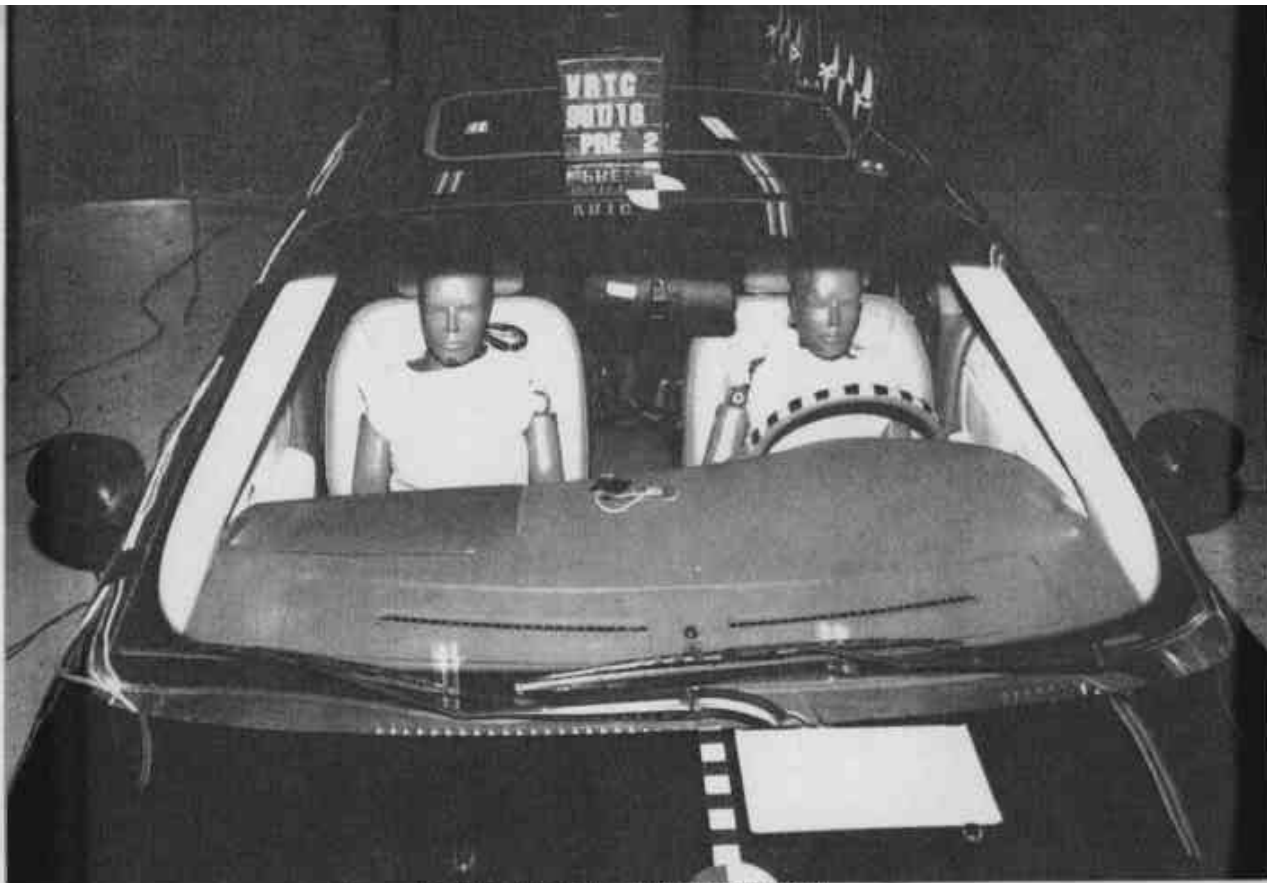


Figure A-21 Pre-Test Front Windshield View



Figure A-22 Post-Test Front Windshield View

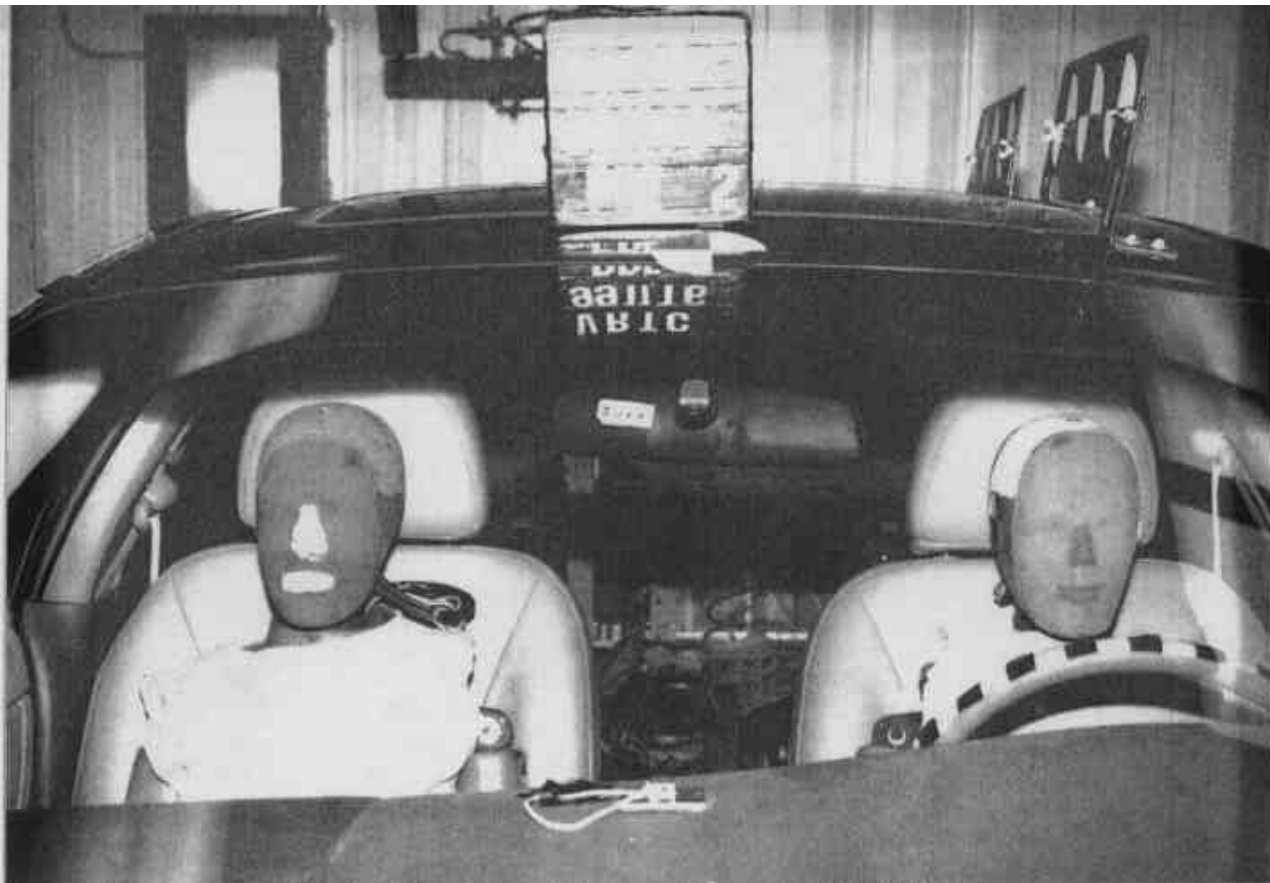


Figure A-23 Pre-Test Driver and Passenger Dummy Windshield View

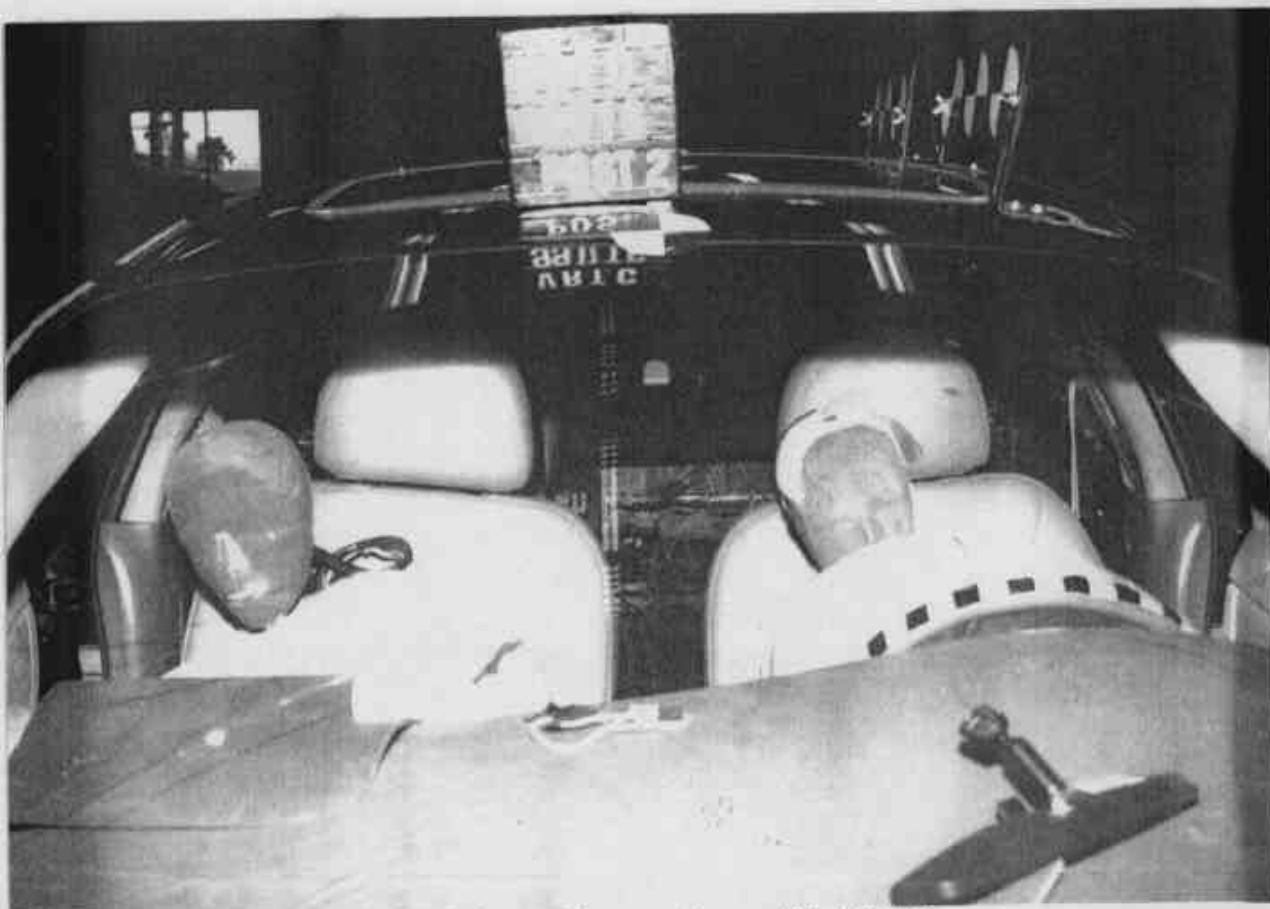


Figure A-24 Post-Test Driver and Passenger Dummy Windshield View

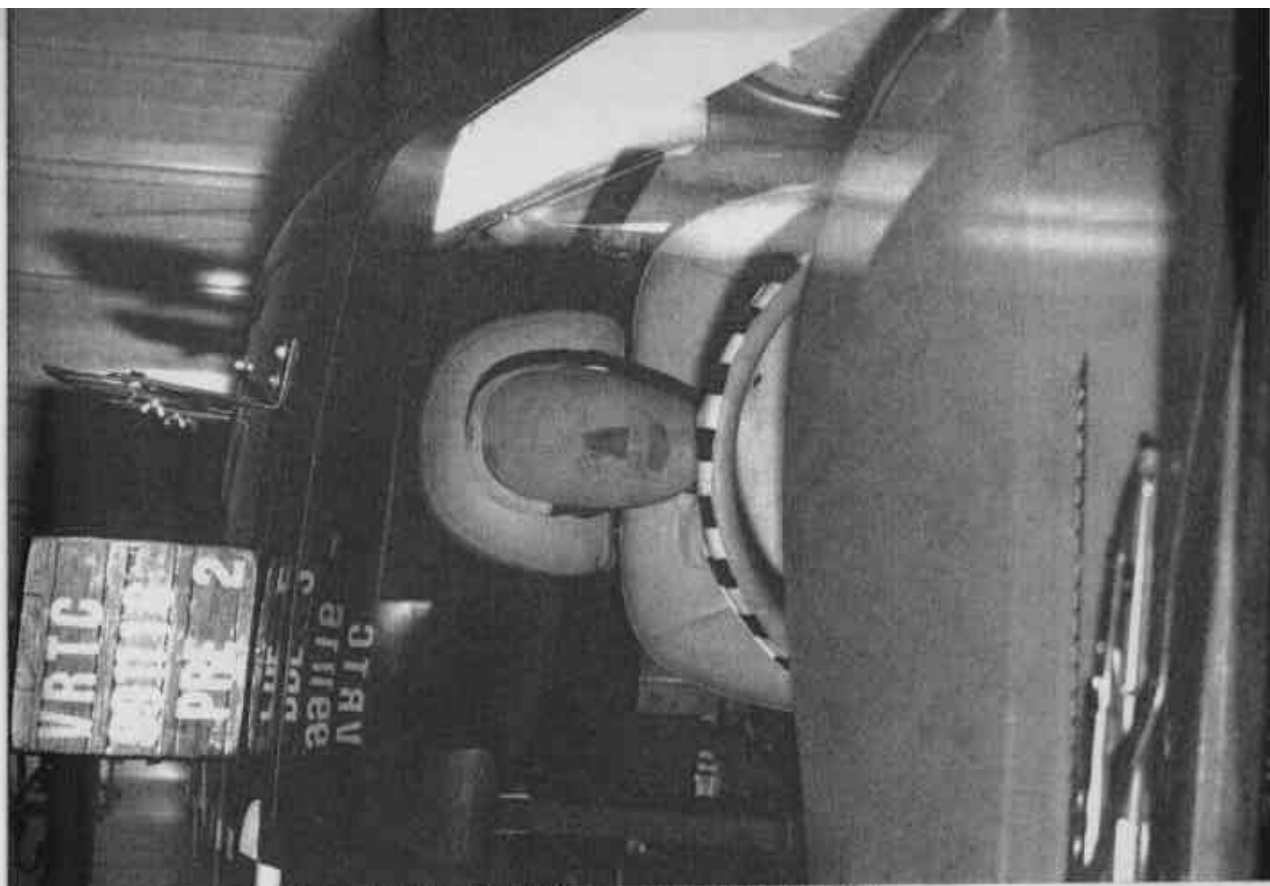


Figure A-25 Pre-Test Driver Dummy Windshield View

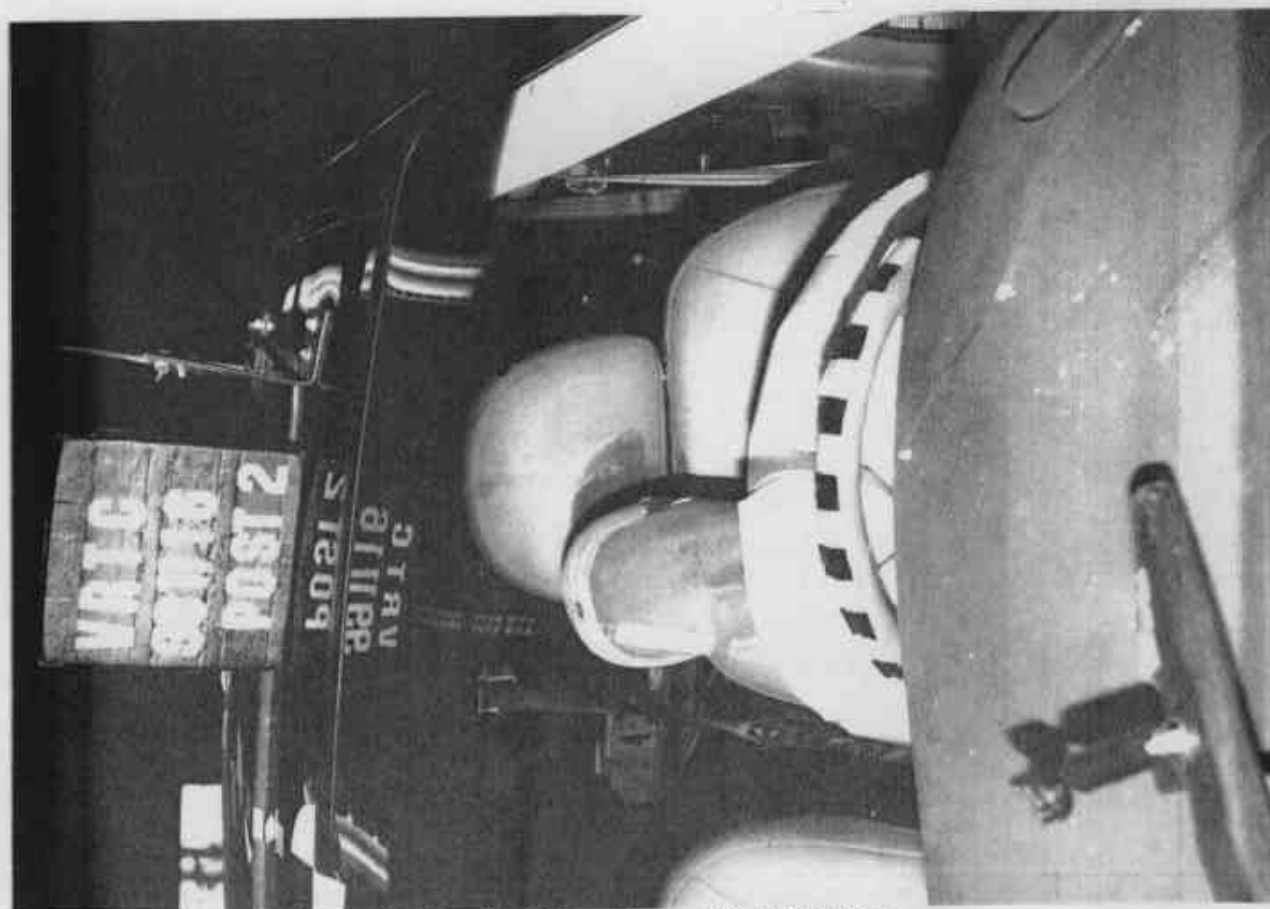


Figure A-26 Post-Test Driver Dummy Windshield View

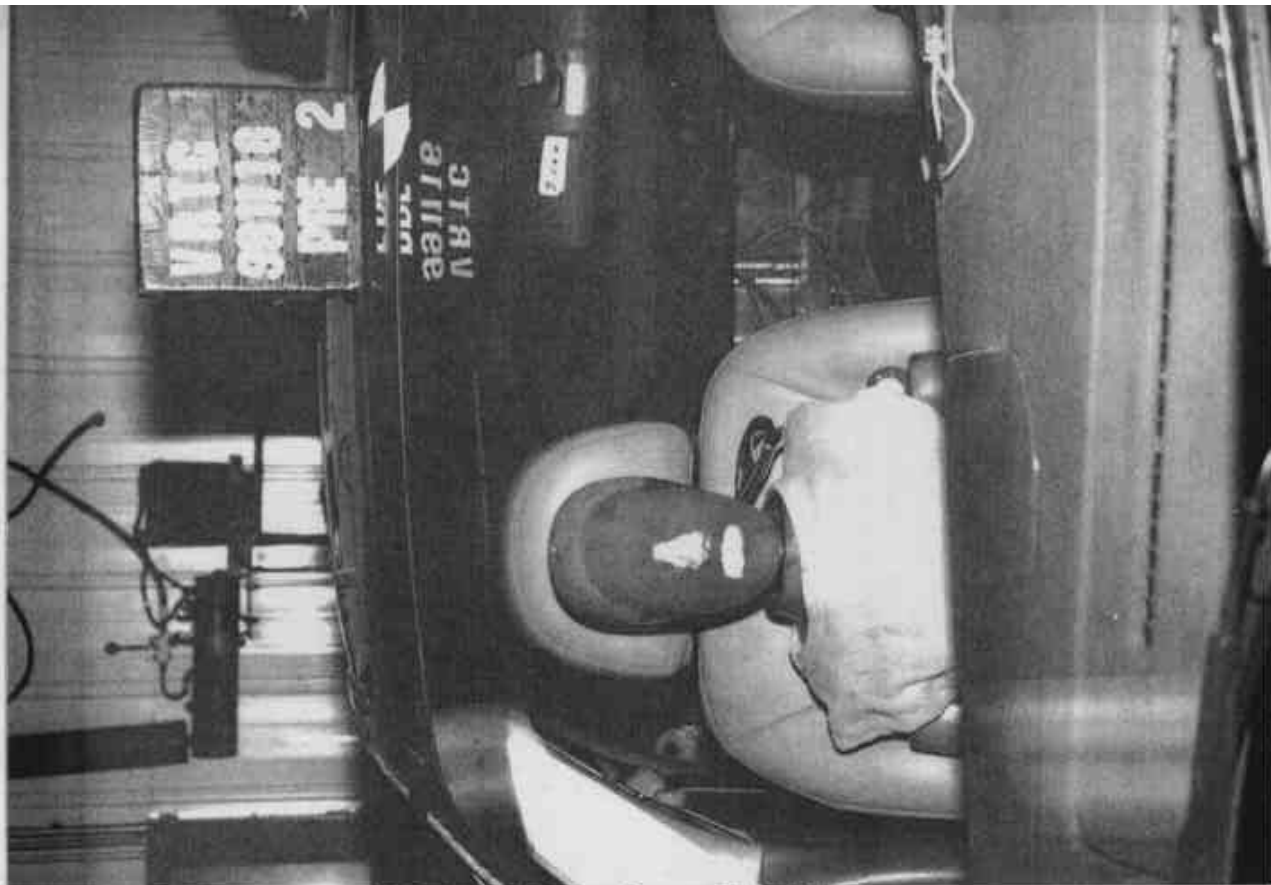


Figure A-27 Pre-Test Passenger Dummy Windshield View

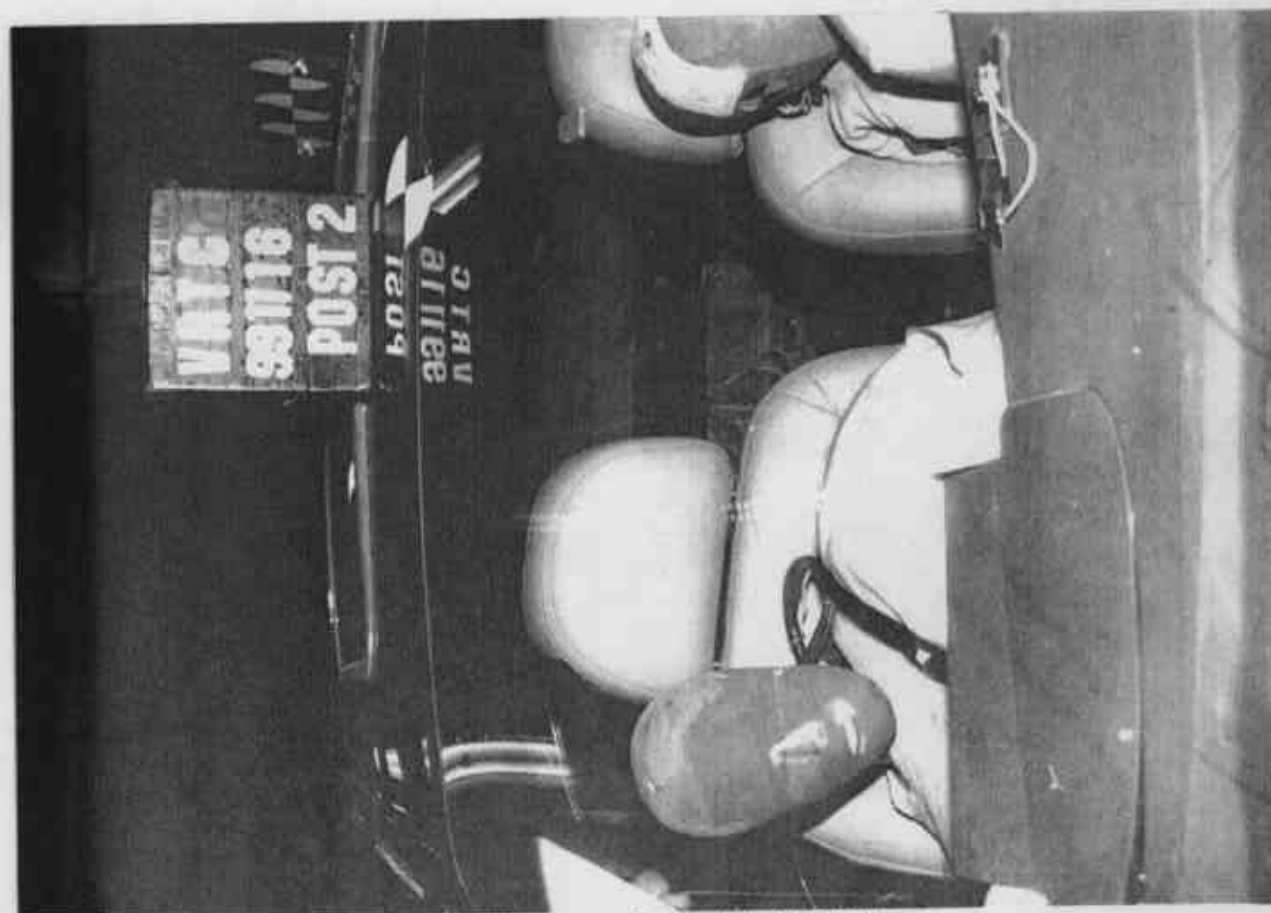


Figure A-28 Post-Test Passenger Dummy Windshield View



Figure A-29 Pre-Test Driver Dummy Position - View 1



Figure A-30 Post-Test Driver Dummy Position - View 1



Figure A-31 Pre-Test Driver Dummy Position - View 2

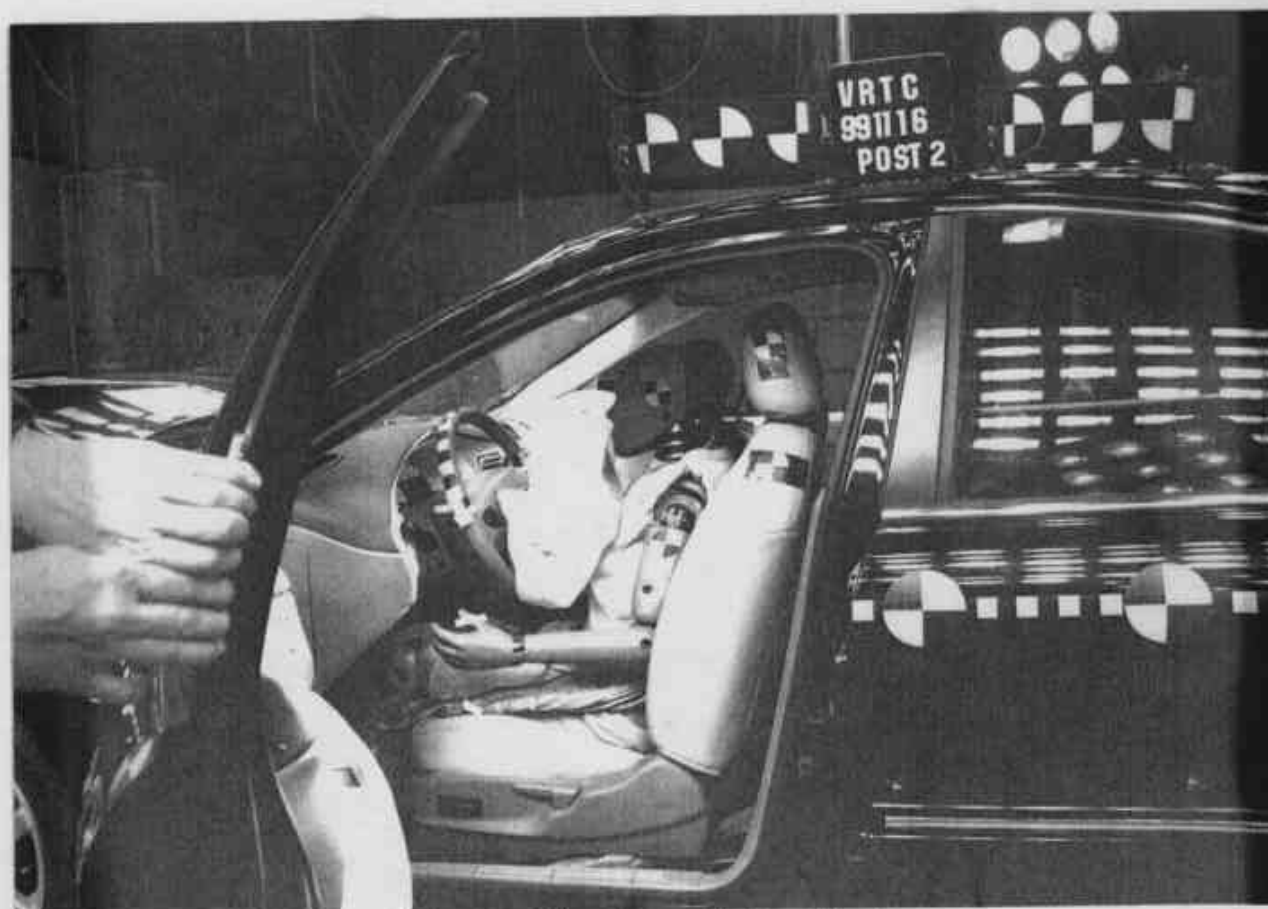


Figure A-32 Post-Test Driver Dummy Position - View 2



Figure A-33 Pre-Test Driver Dummy Position - View 3



Figure A-34 Post-Test Driver Dummy Position - View 3



Figure A-35 Pre-Test Passenger Dummy Position - View 1



Figure A-36 Post-Test Passenger Dummy Position - View 1



Figure A-37 Pre-Test Passenger Dummy Position - View 2

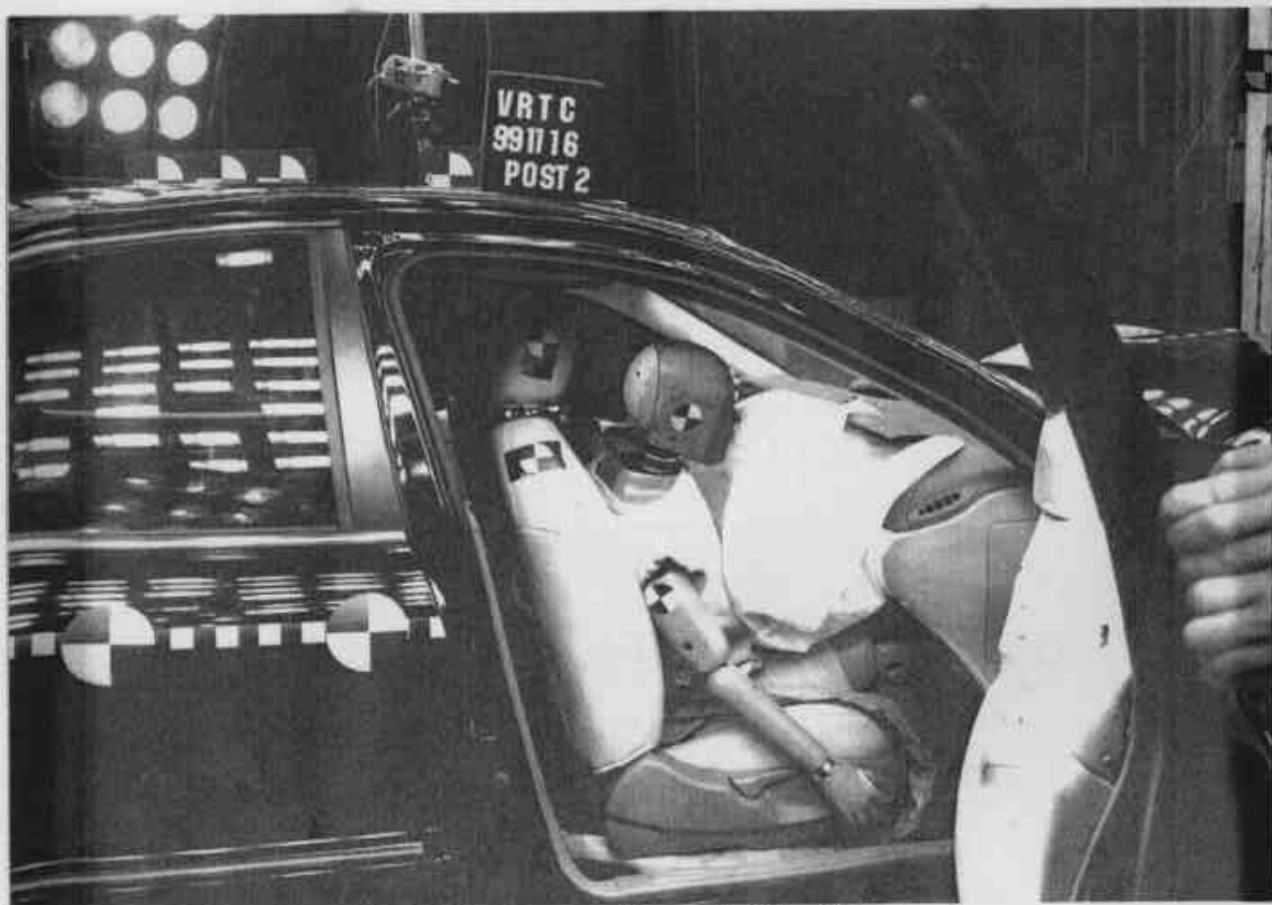


Figure A-38 Post-Test Passenger Dummy Position - View 2



Figure A-39 Pre-Test Passenger Dummy Position - View 3



Figure A-40 Post-Test Passenger Dummy Position - View 3

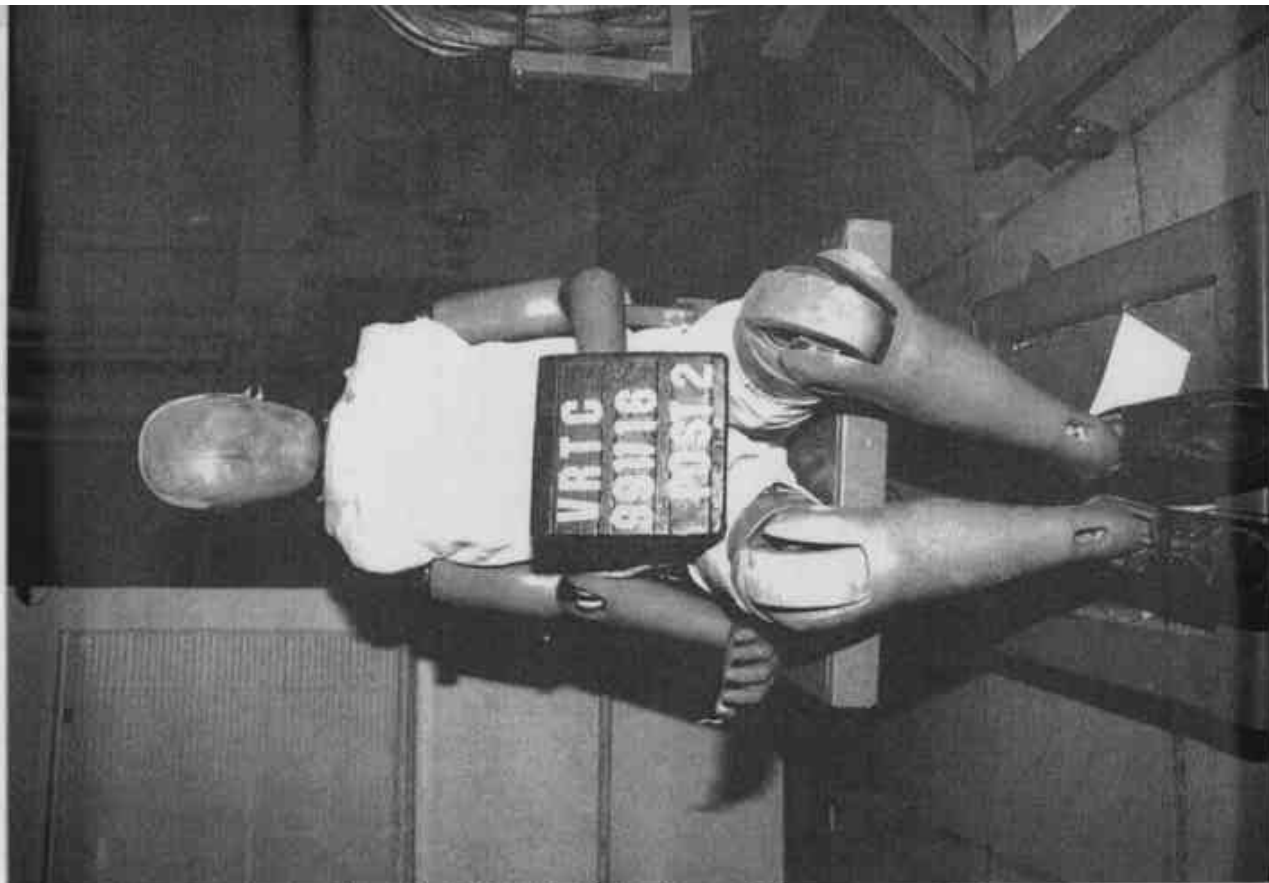


Figure A-41 Post-Test Driver Dummy View



Figure A-42 Post-Test Driver Dummy Head Contact - View 1



Figure A-43 Post-Test Driver Dummy Head Contact - View 2

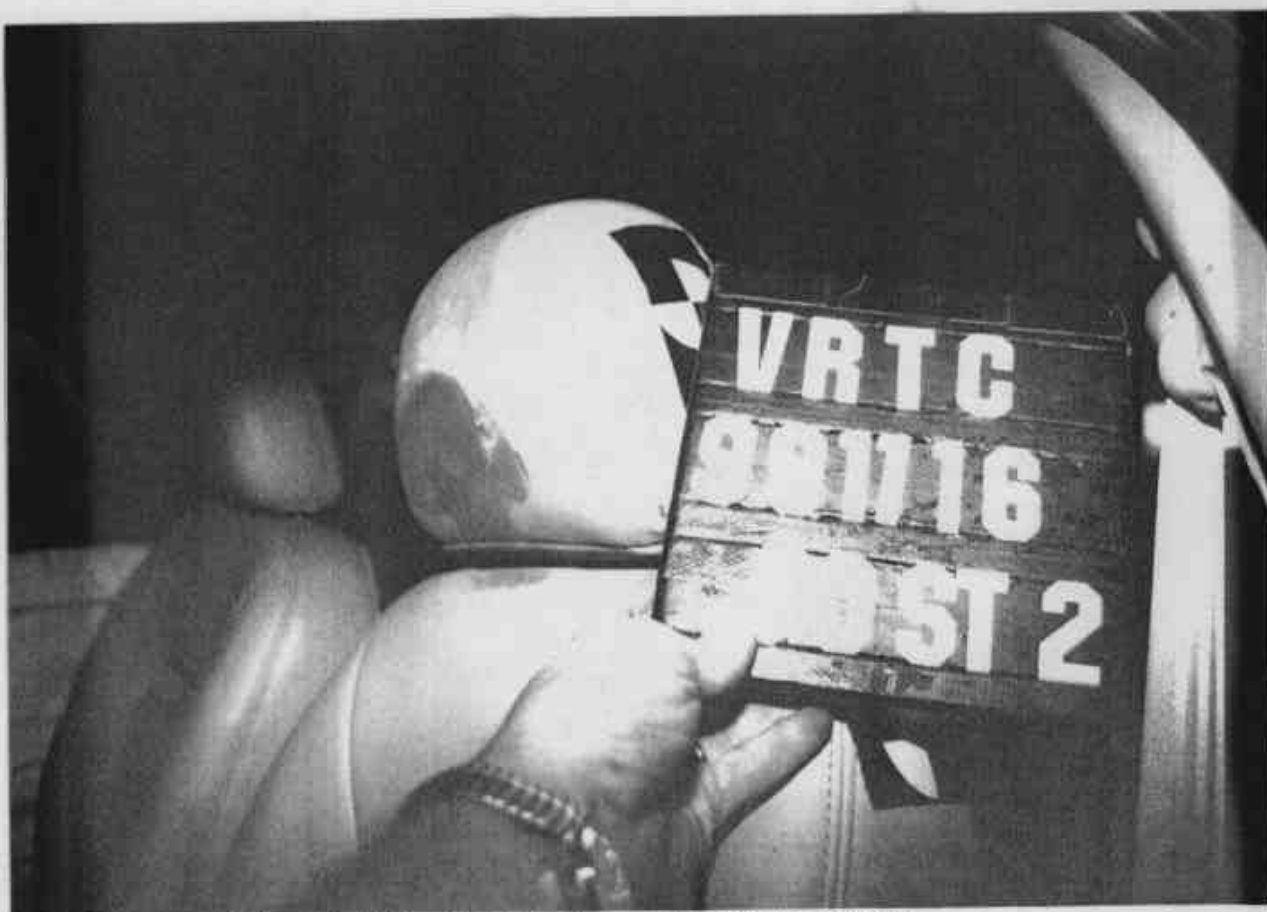


Figure A-44 Post-Test Driver Dummy Head Contact - View 3



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



Figure A-46 Post-Test Driver Dummy Knee Contact - View 2

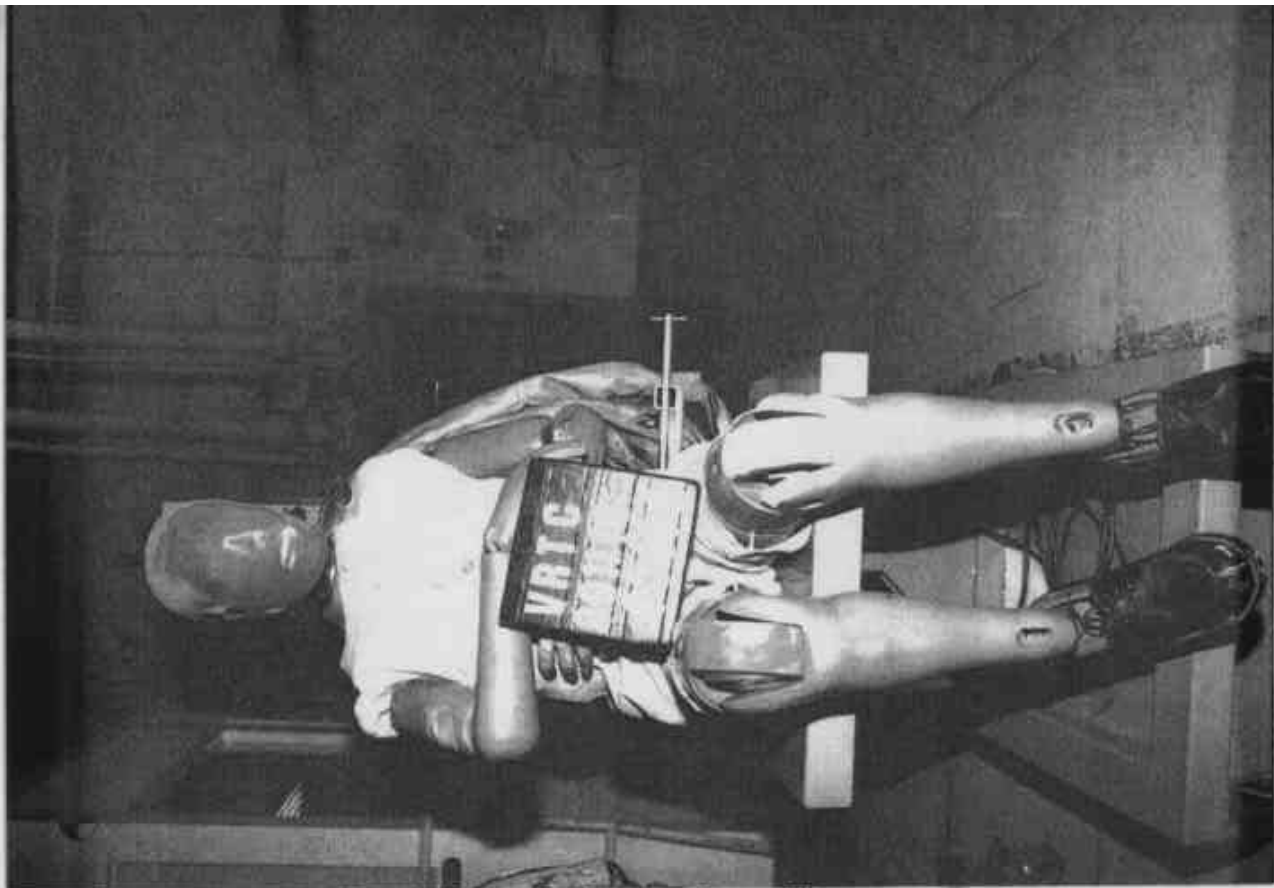


Figure A-47 Post-Test Passenger Dummy View



Figure A-48 Post-Test Passenger Dummy Head Contact - View 1



Figure A-49 Post-Test Passenger Dummy Head Contact - View 2

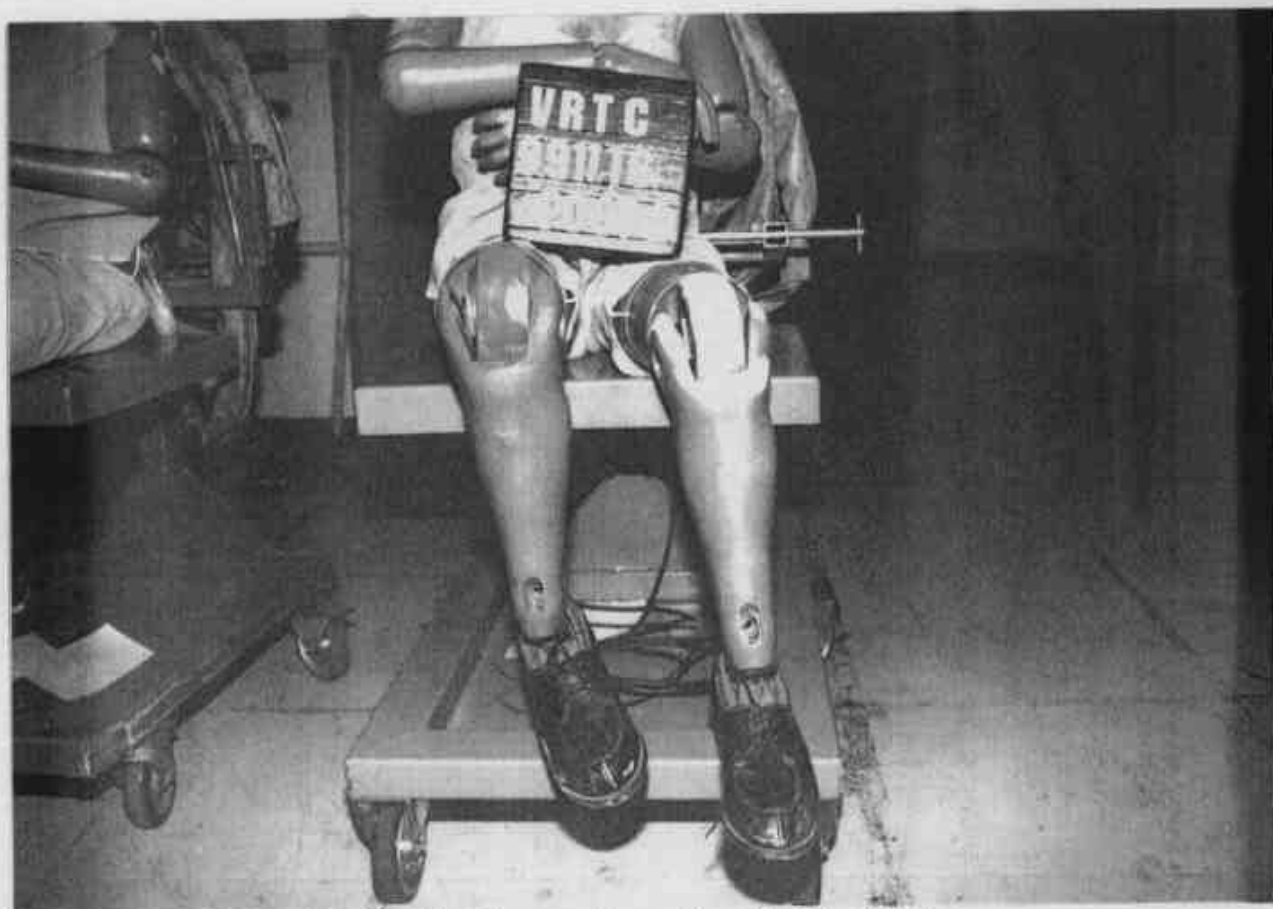


Figure A-50 Post-Test Passenger Dummy Knee Contact - View 1



Figure A-51 Post-Test Passenger Dummy Knee Contact - View 2

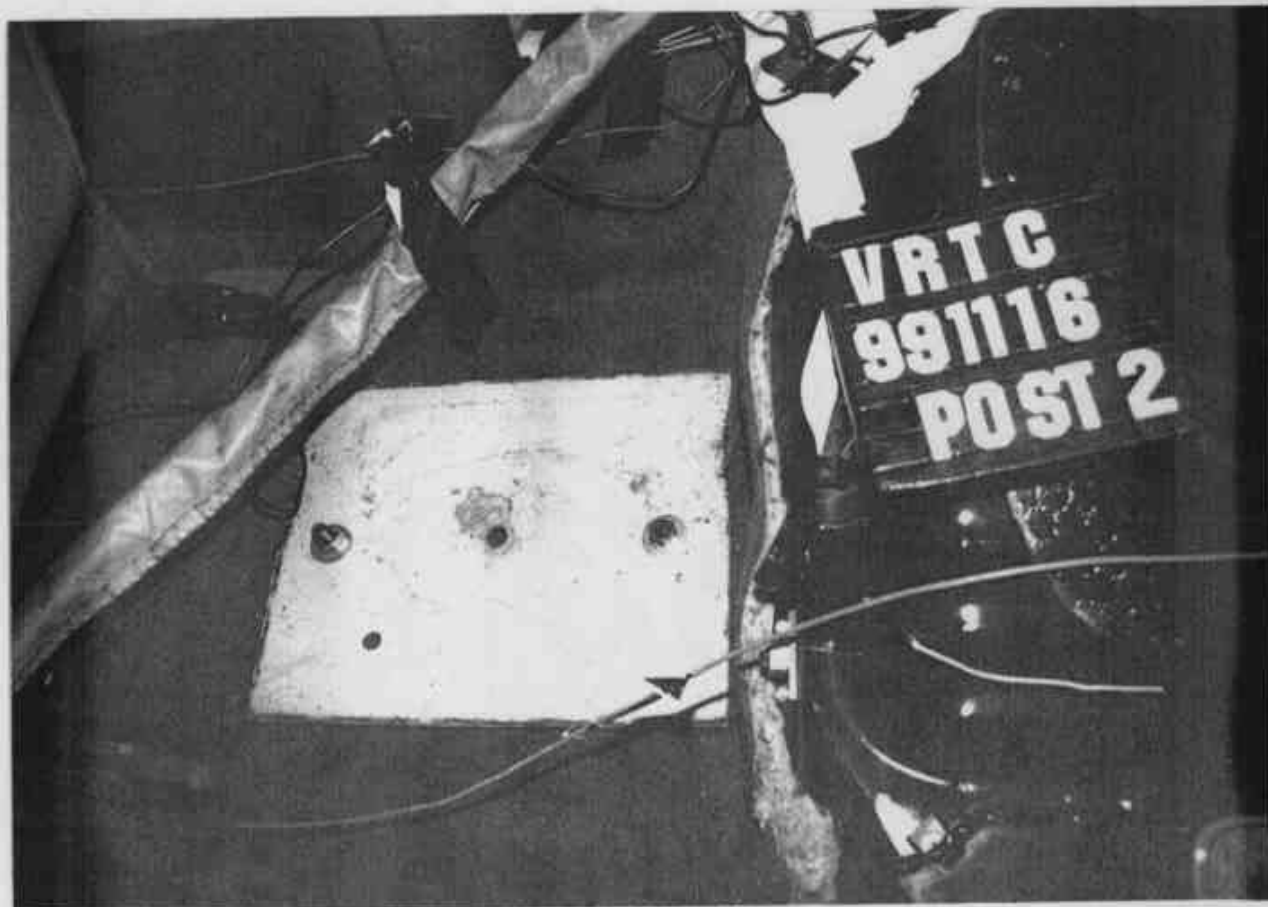


Figure A-52 Post-Test Ballast View

Appendix B

Data Plots

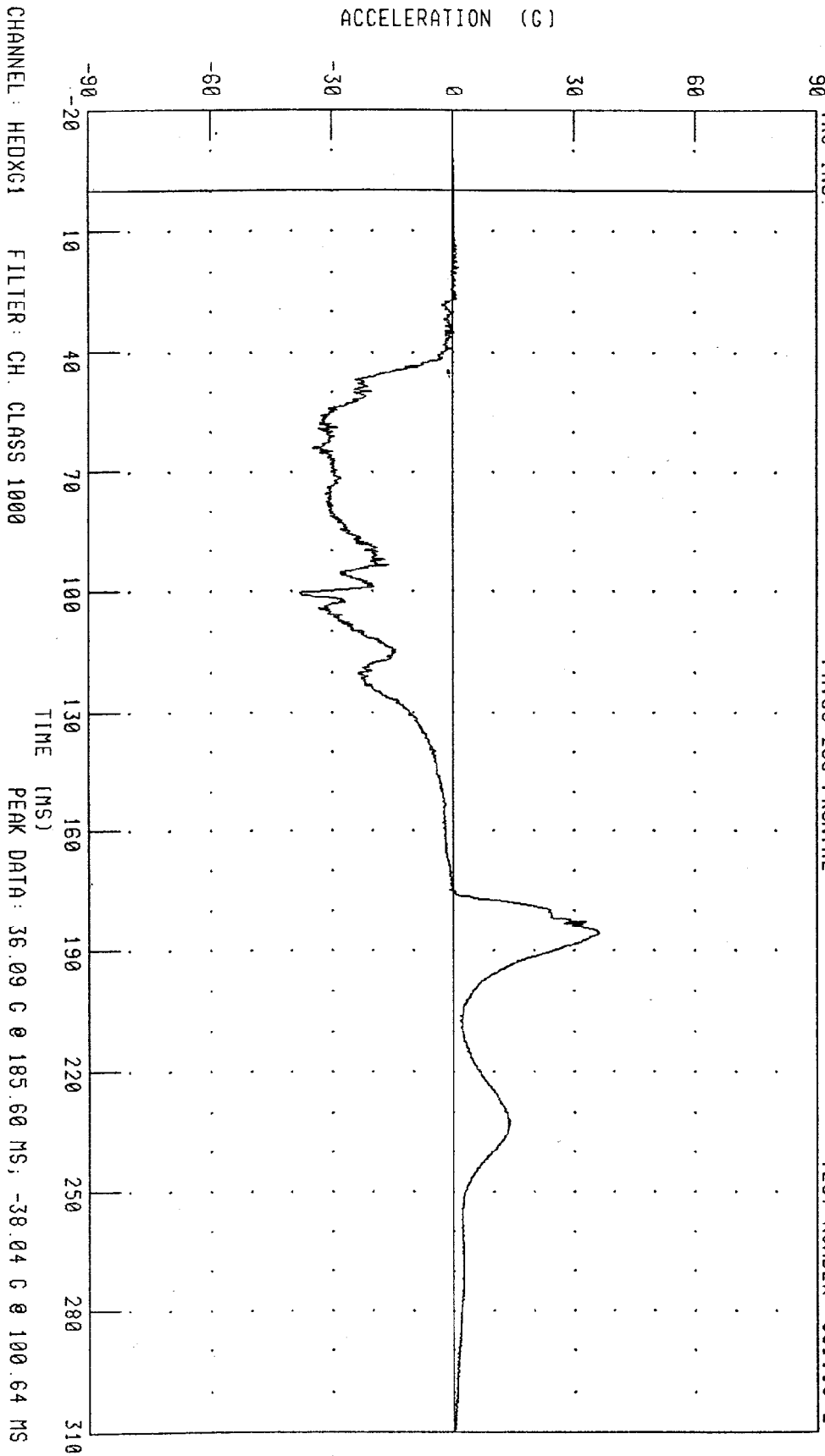
TRC INC.

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

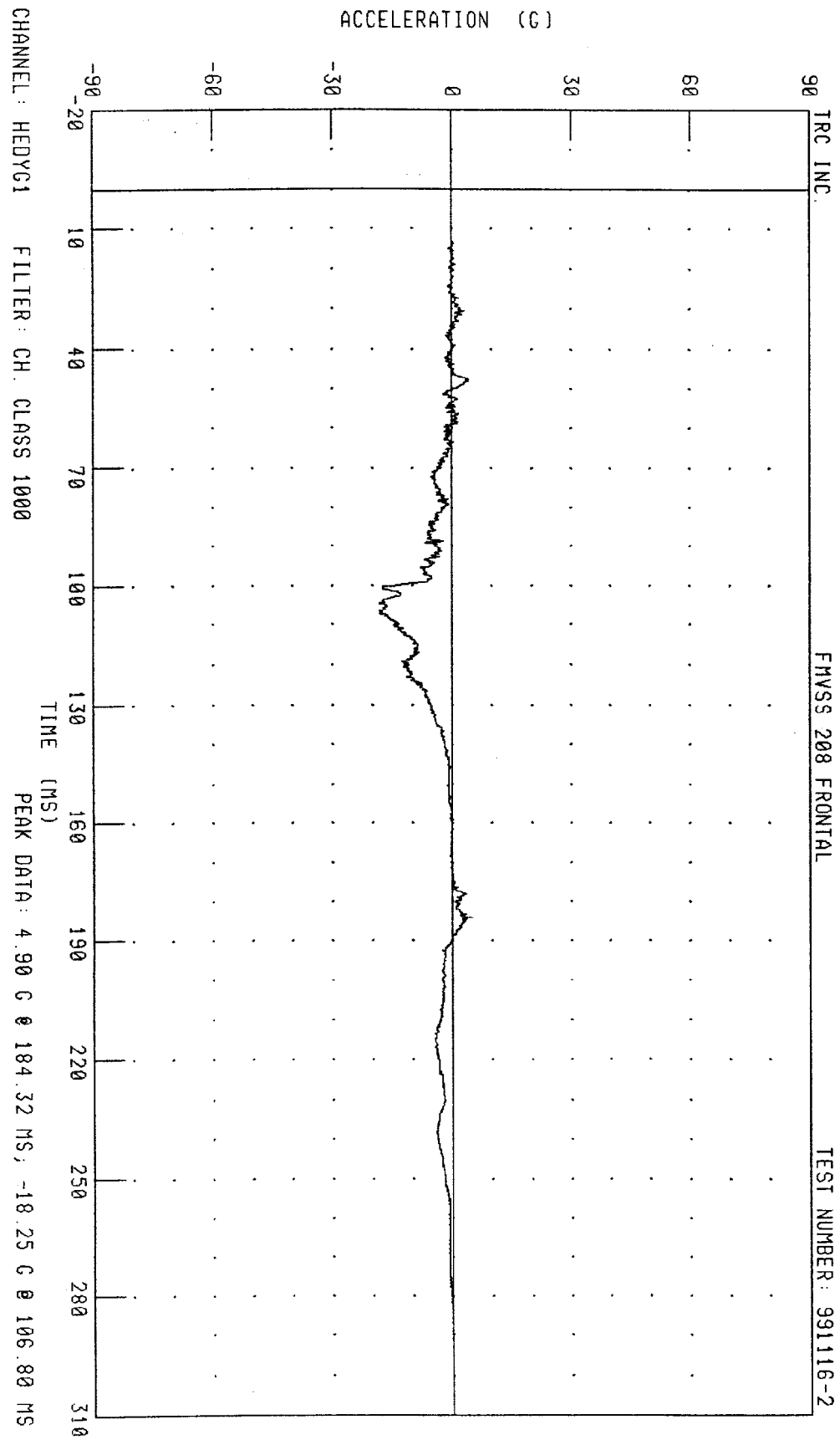
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH

DRIVER HEAD X-AXIS ACCELERATION



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD Y-AXIS ACCELERATION
FMVSS 208 FRONTAL

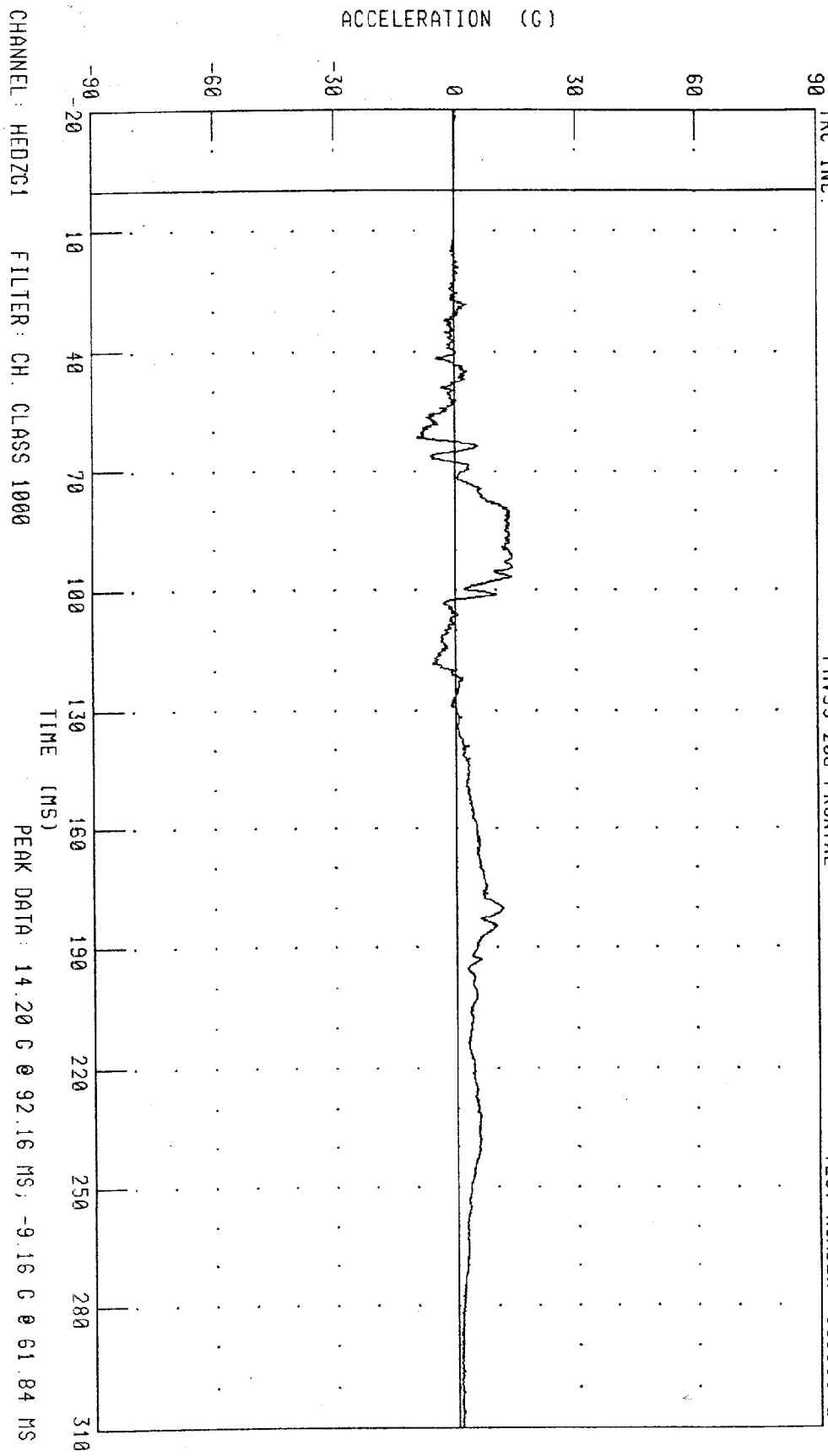
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD Z-AXIS ACCELERATION
FMVSS 208 FRONTAL

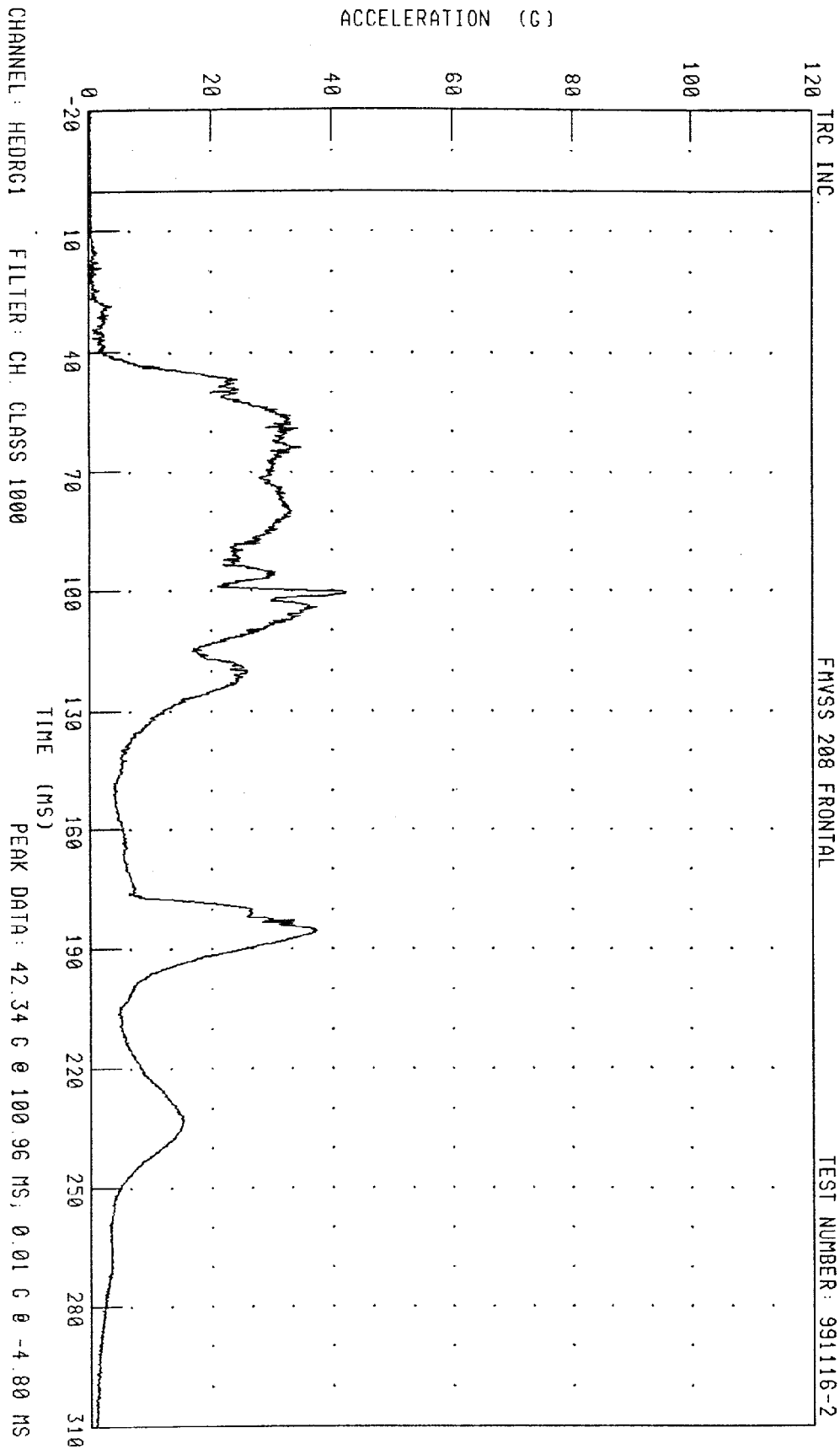
TEST NUMBER: 991116-2

TRC INC.



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD RESULTANT ACCELERATION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



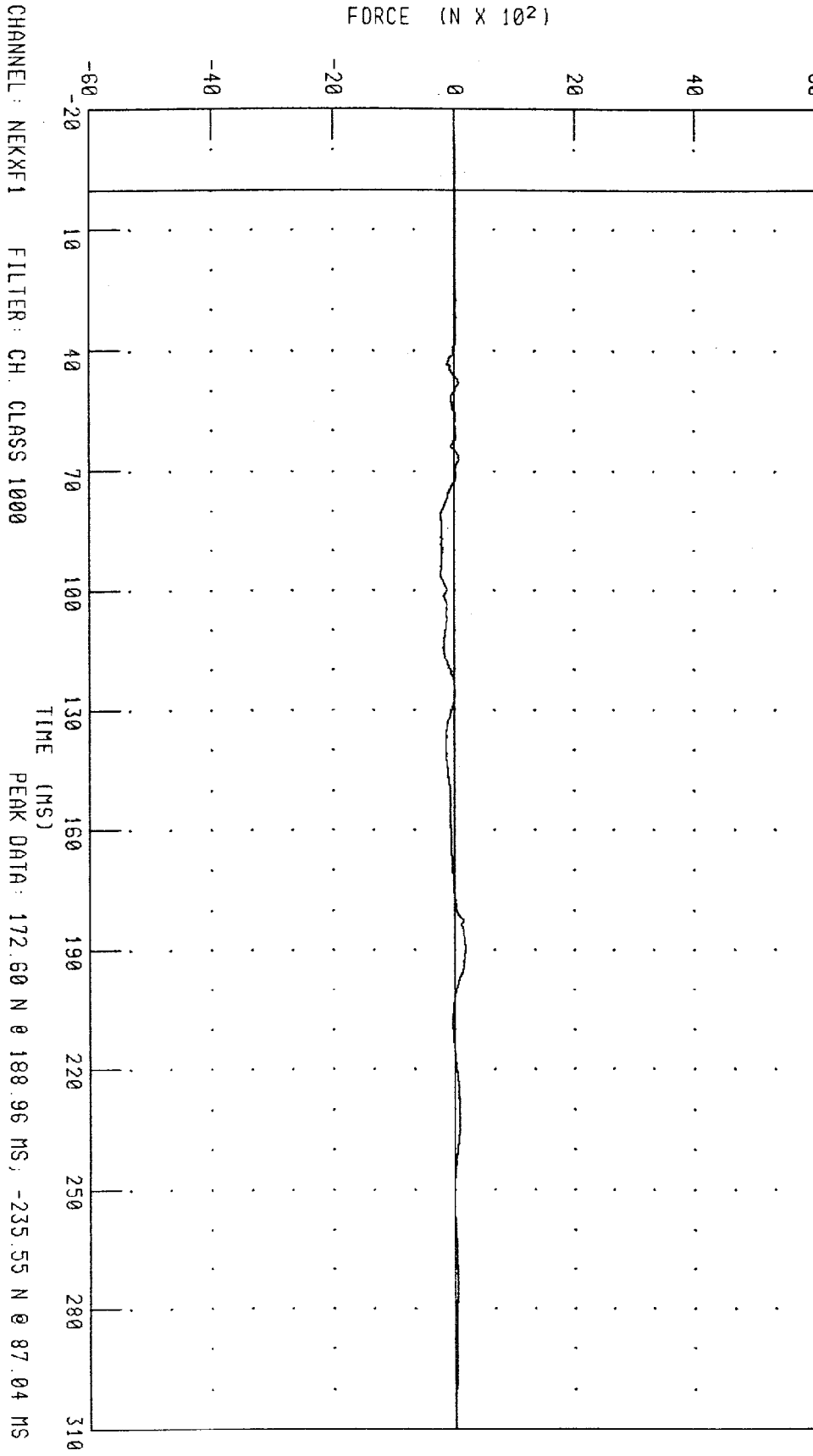
TRC INC.

FHYSS 208 FRONTAL

TEST NUMBER: 991116-2

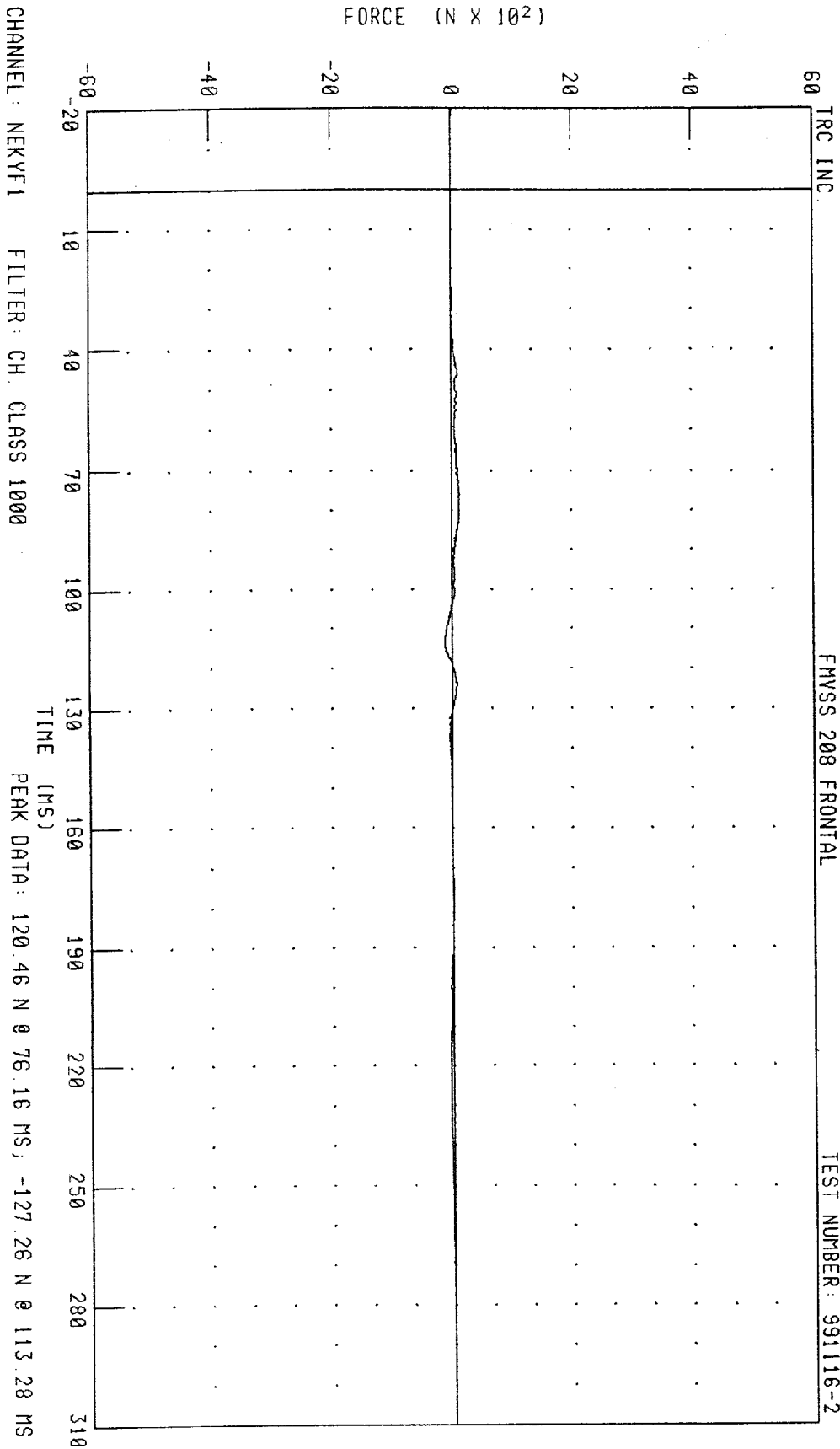
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH

DRIVER NECK X-AXIS SHEAR FORCE



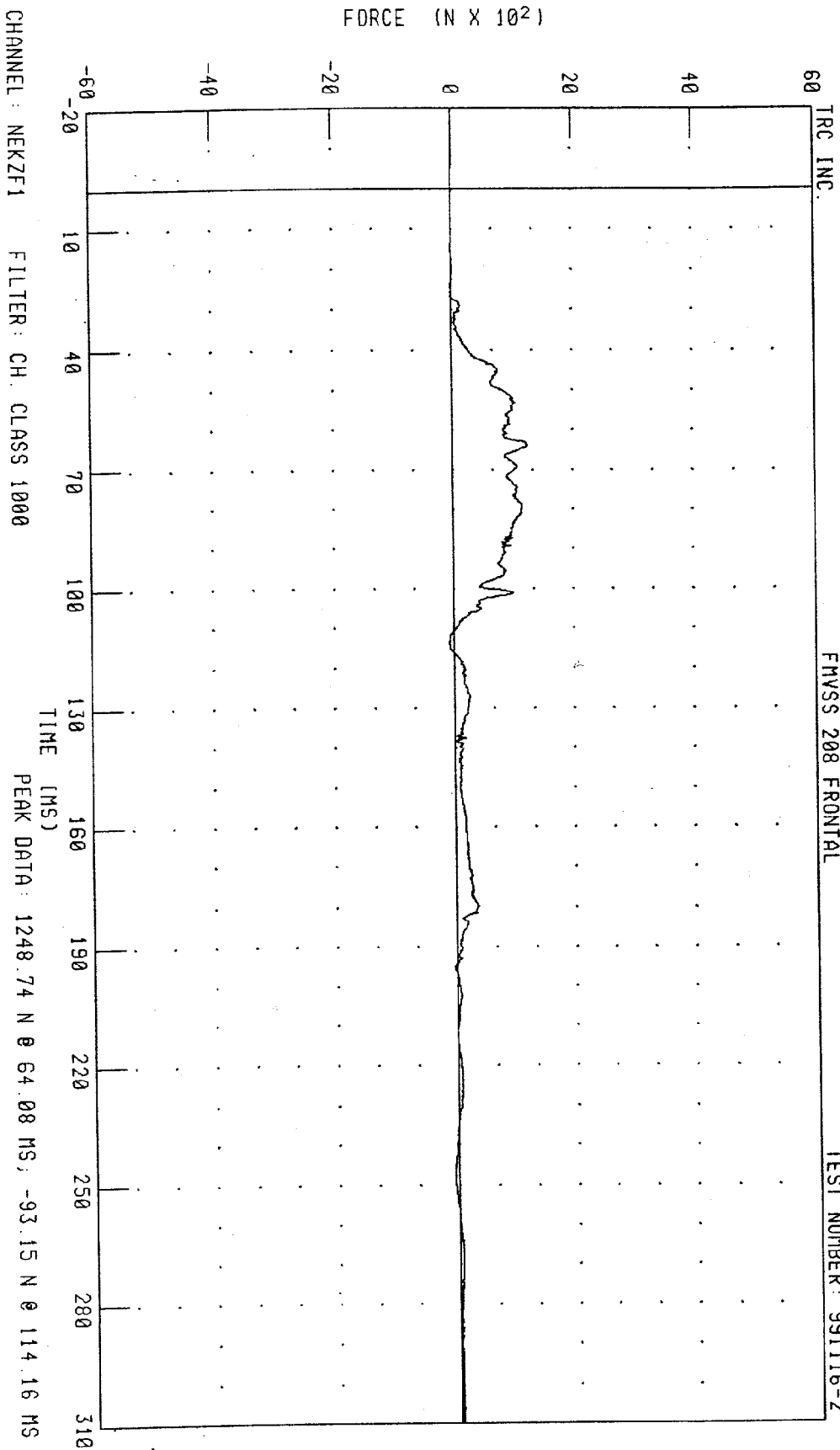
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK Y-AXIS SHEAR FORCE
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



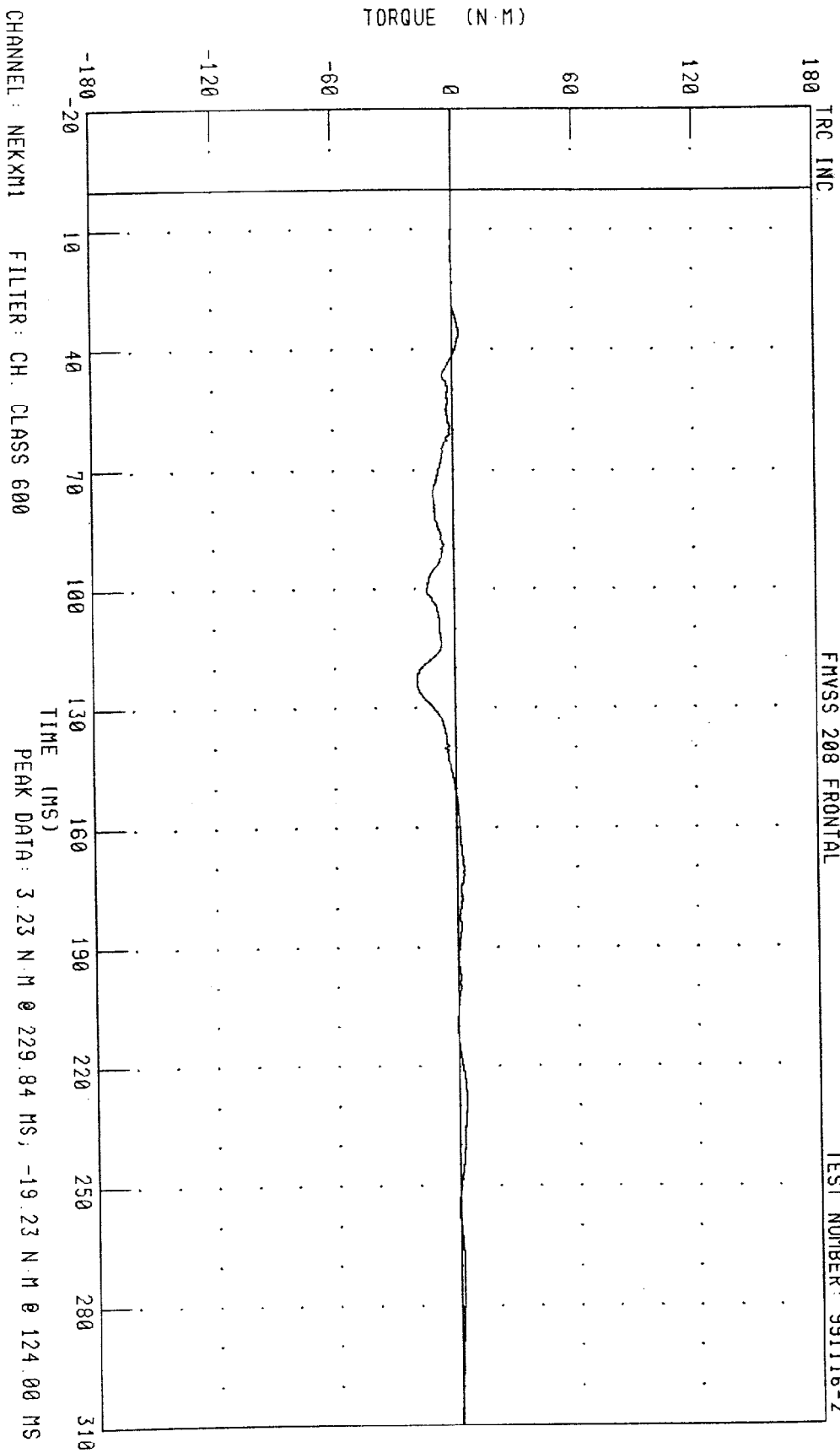
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK Z-AXIS AXIAL FORCE
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



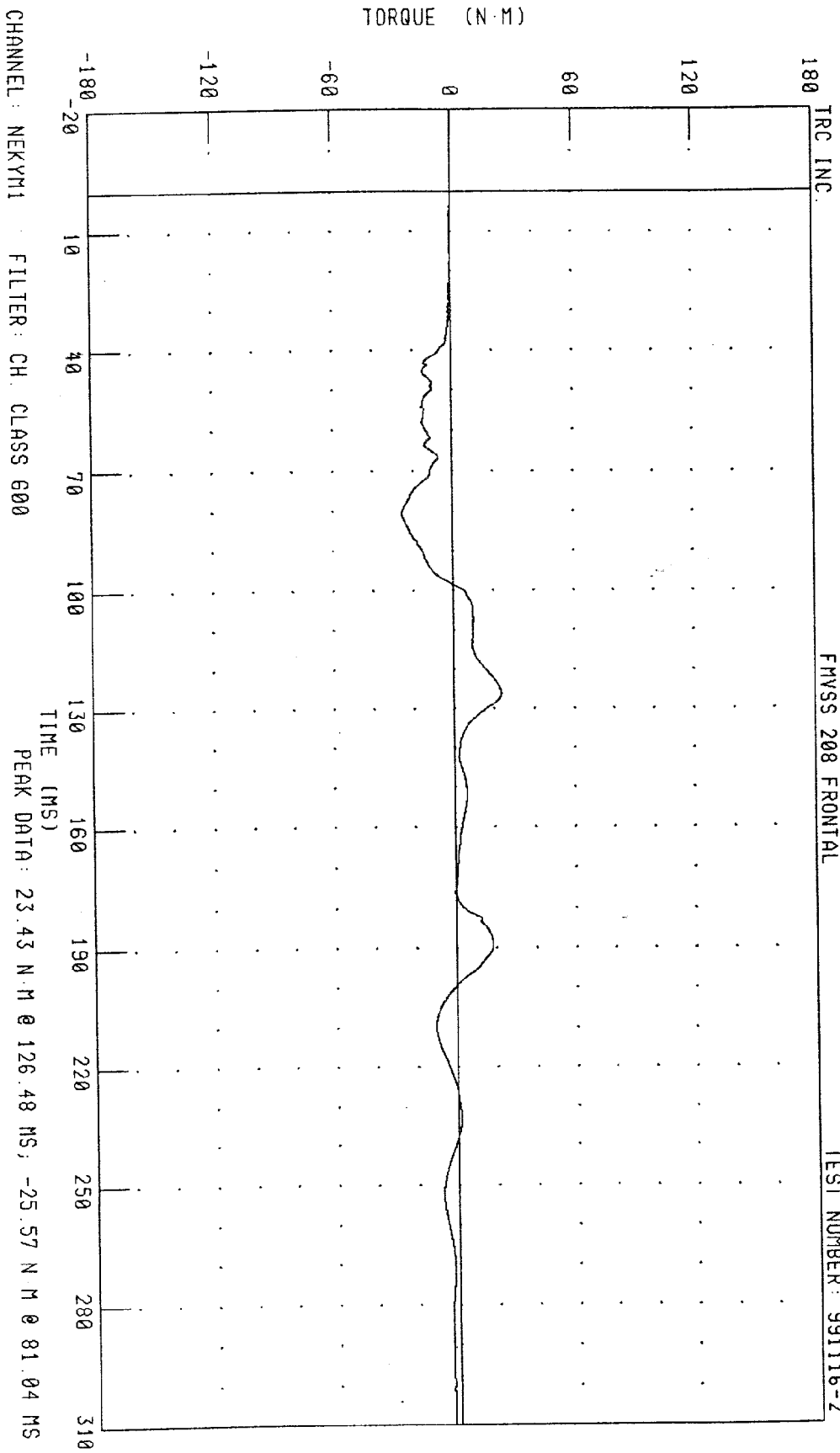
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK MOMENT ABOUT X AXIS
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK MOMENT ABOUT Y AXIS
FMVSS 208 FRONTAL

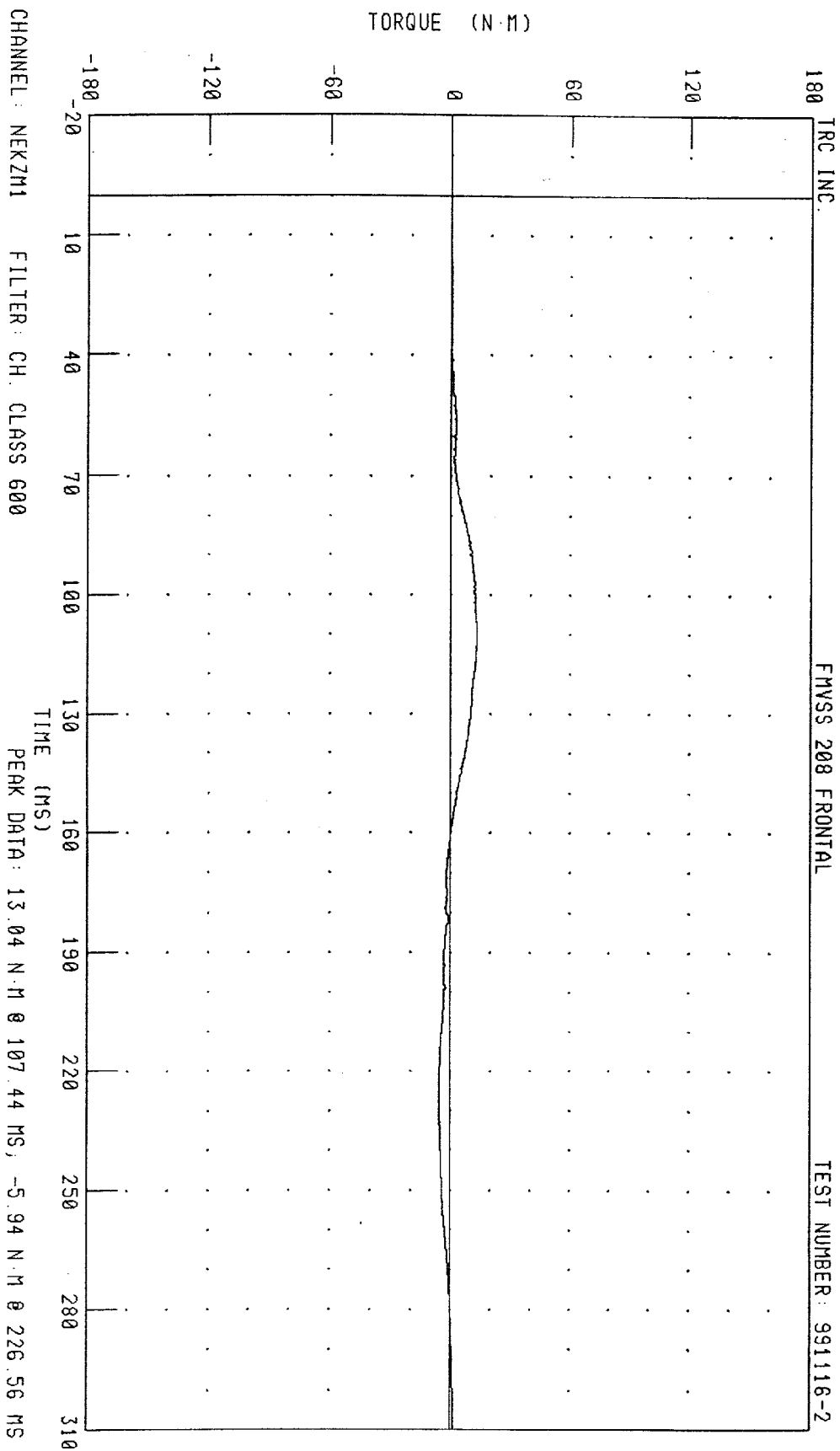
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK MOMENT ABOUT Z AXIS

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

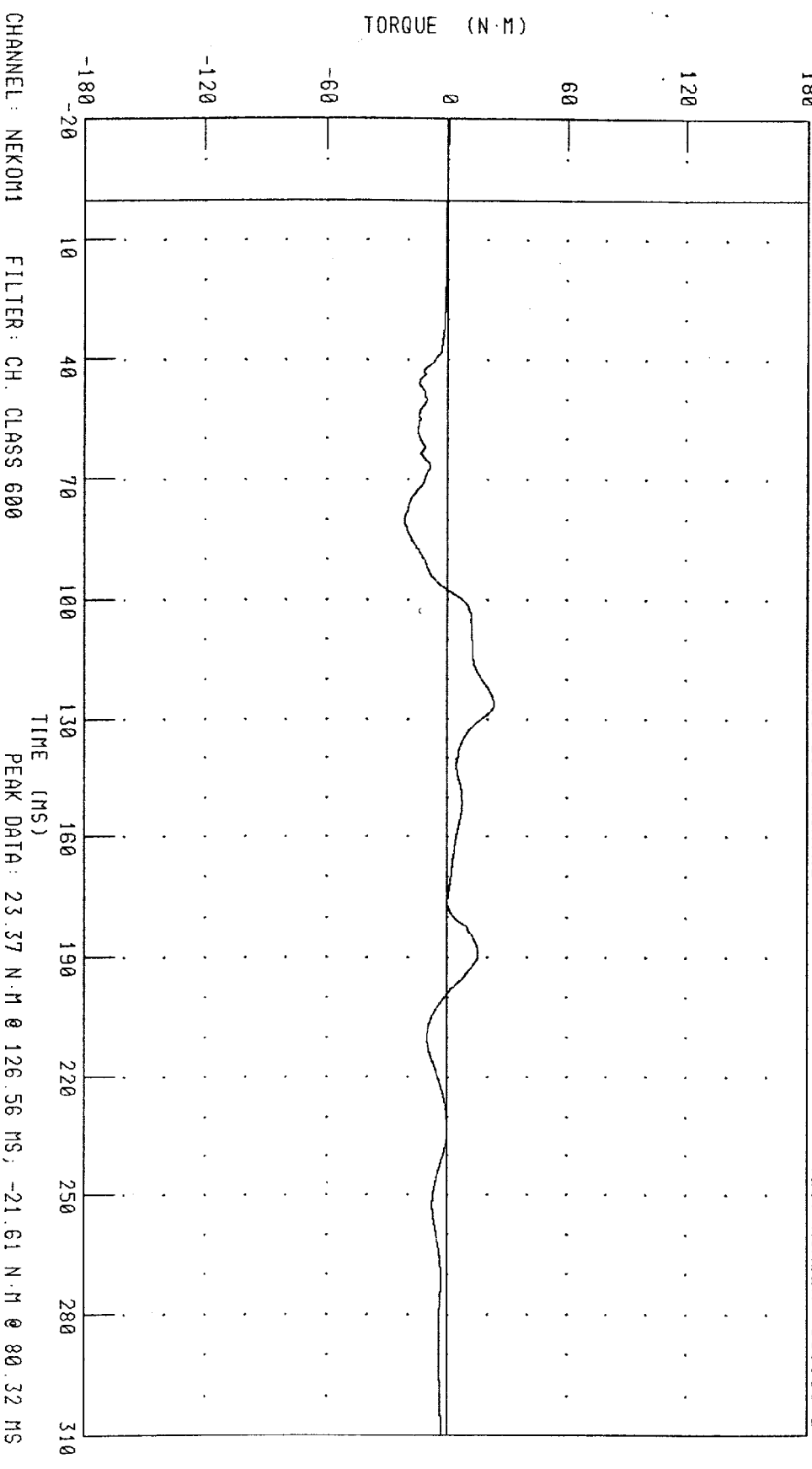


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS

TRC INC.

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



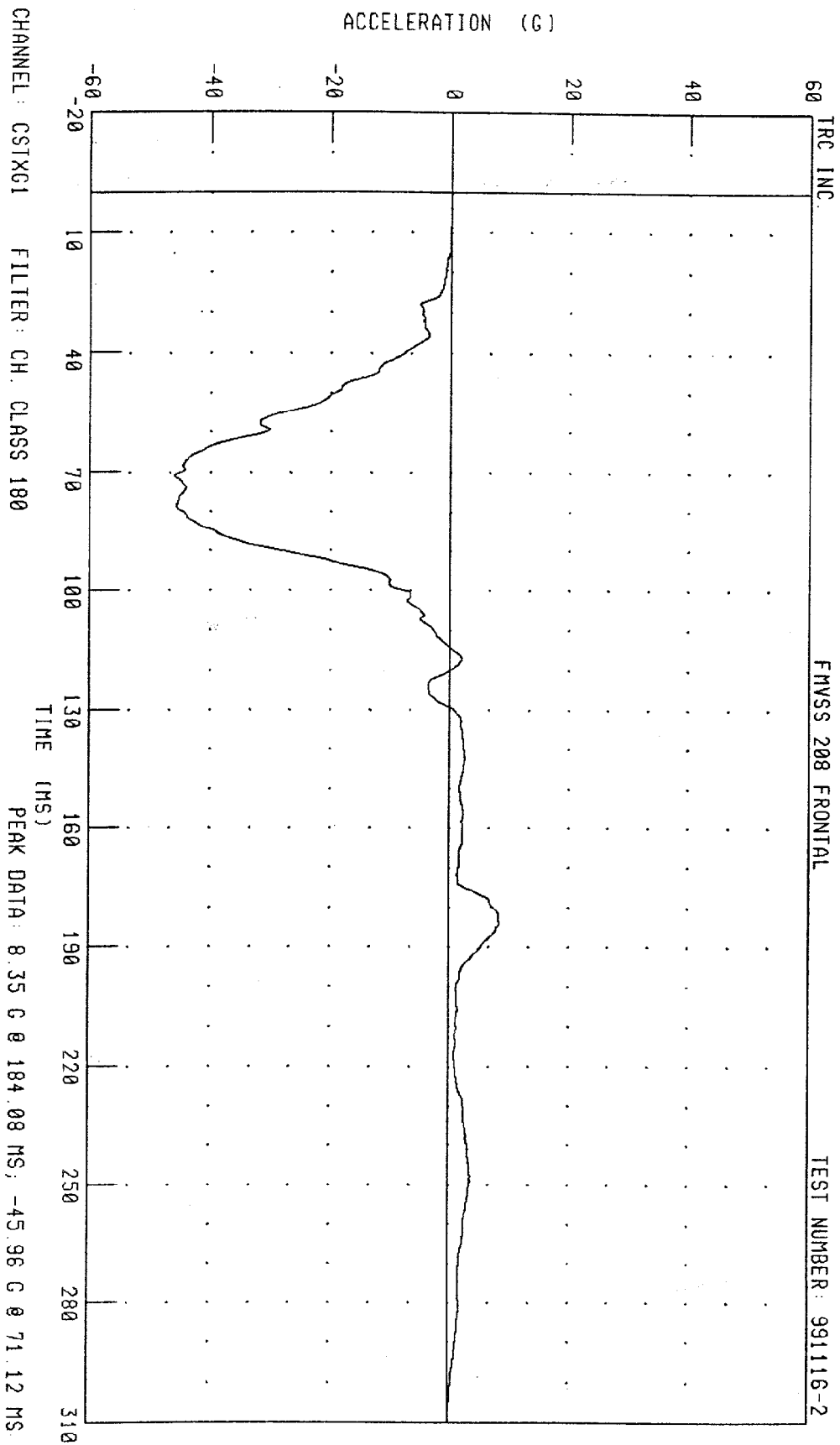
CHANNEL: NEKOM1 FILTER: CH. CLASS 600

TIME (MS)
PEAK DATA: 23.37 N-M @ 126.56 MS, -21.61 N-M @ 80.32 MS

2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST X-AXIS ACCELERATION

FMVSS 208 FRONTAL

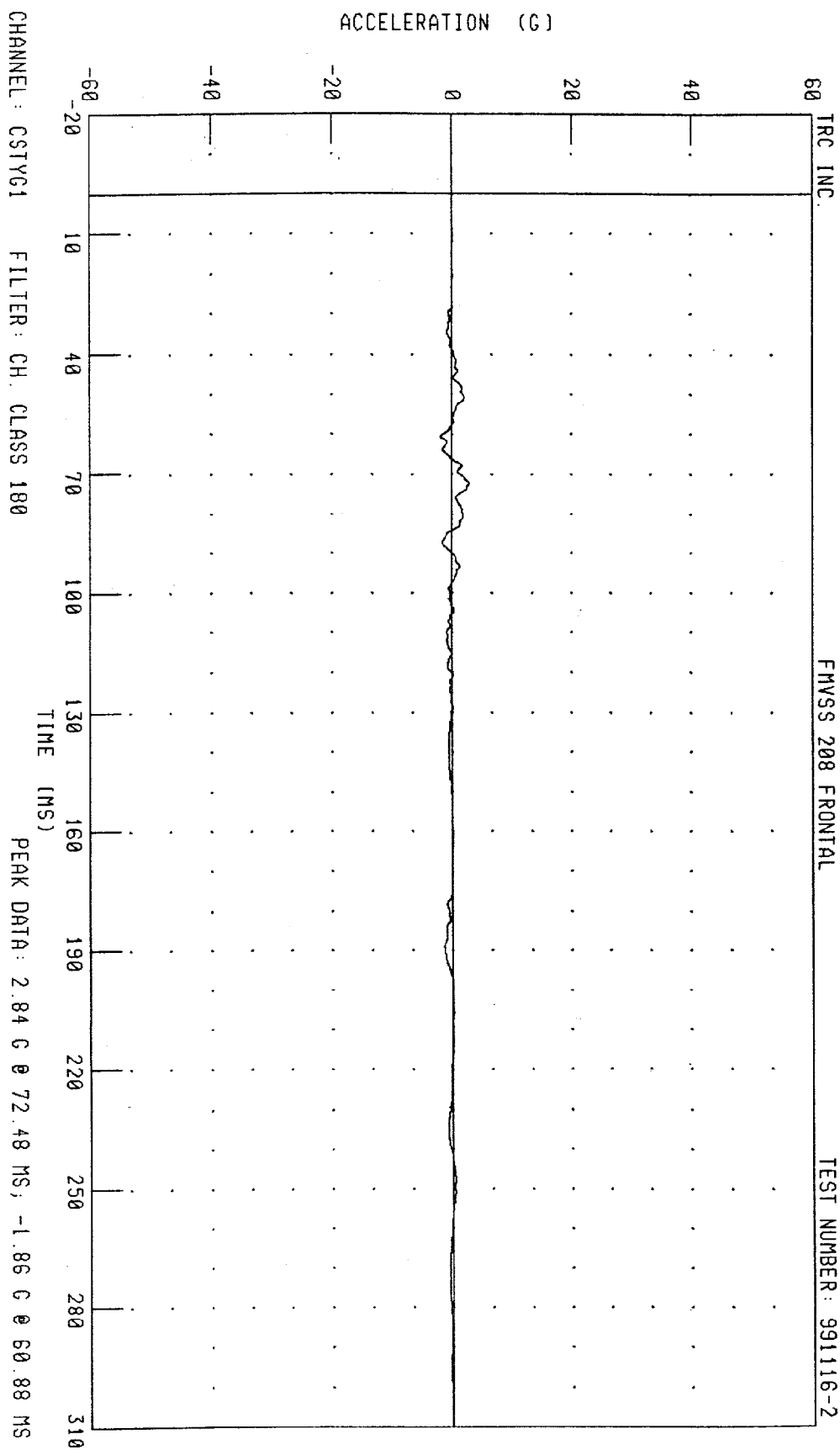
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST Y-AXIS ACCELERATION

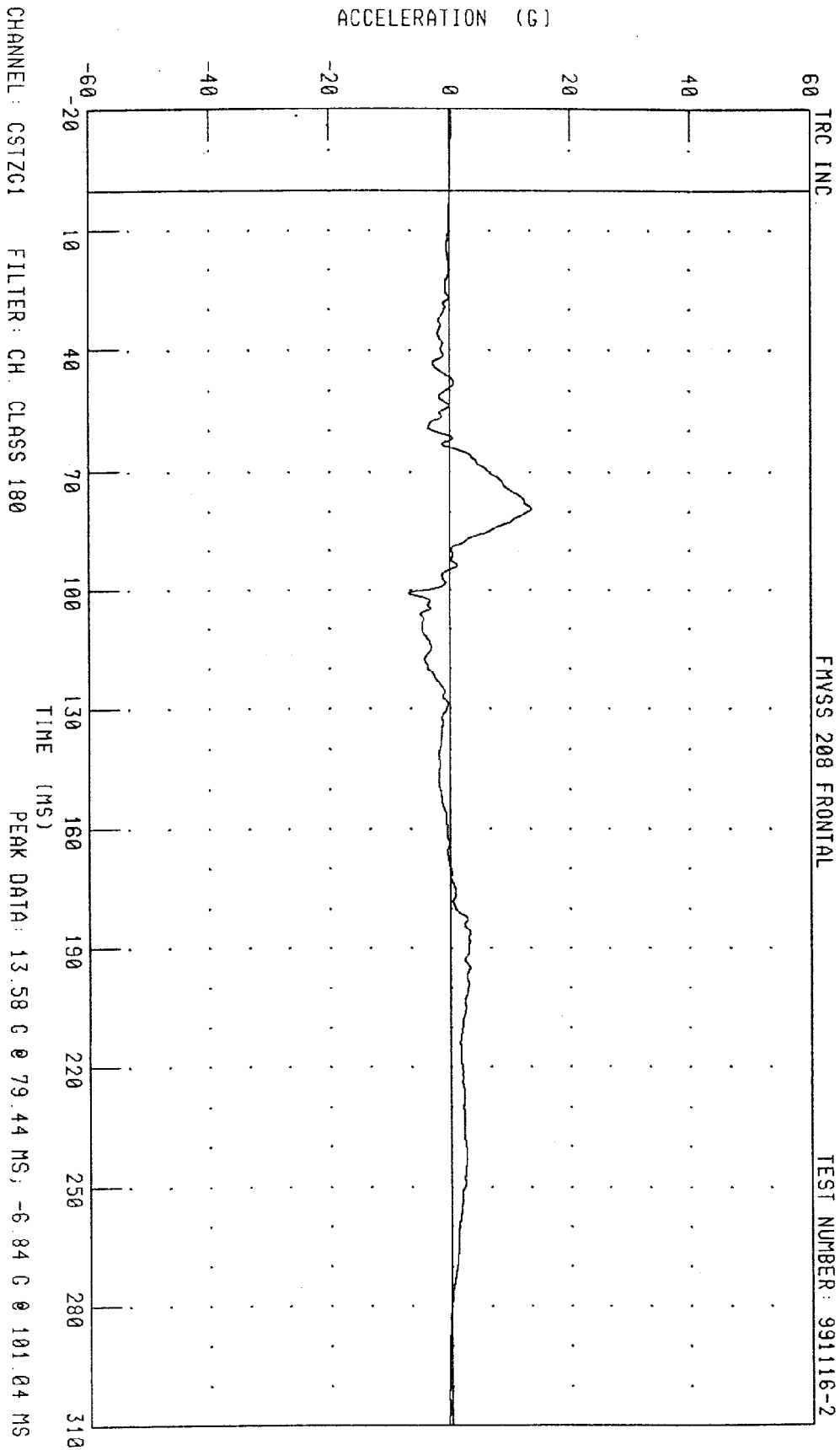
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



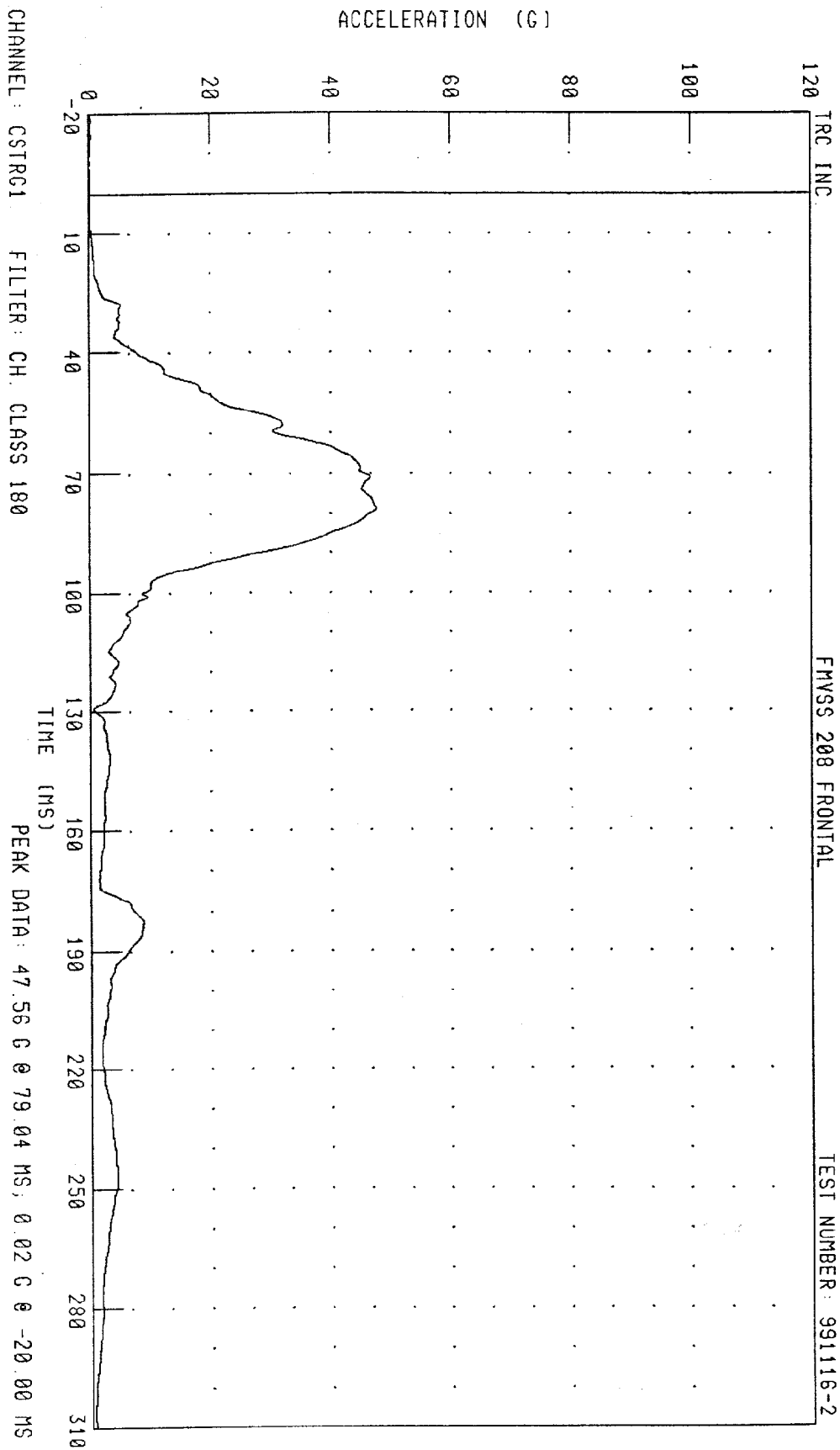
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST Z-AXIS ACCELERATION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



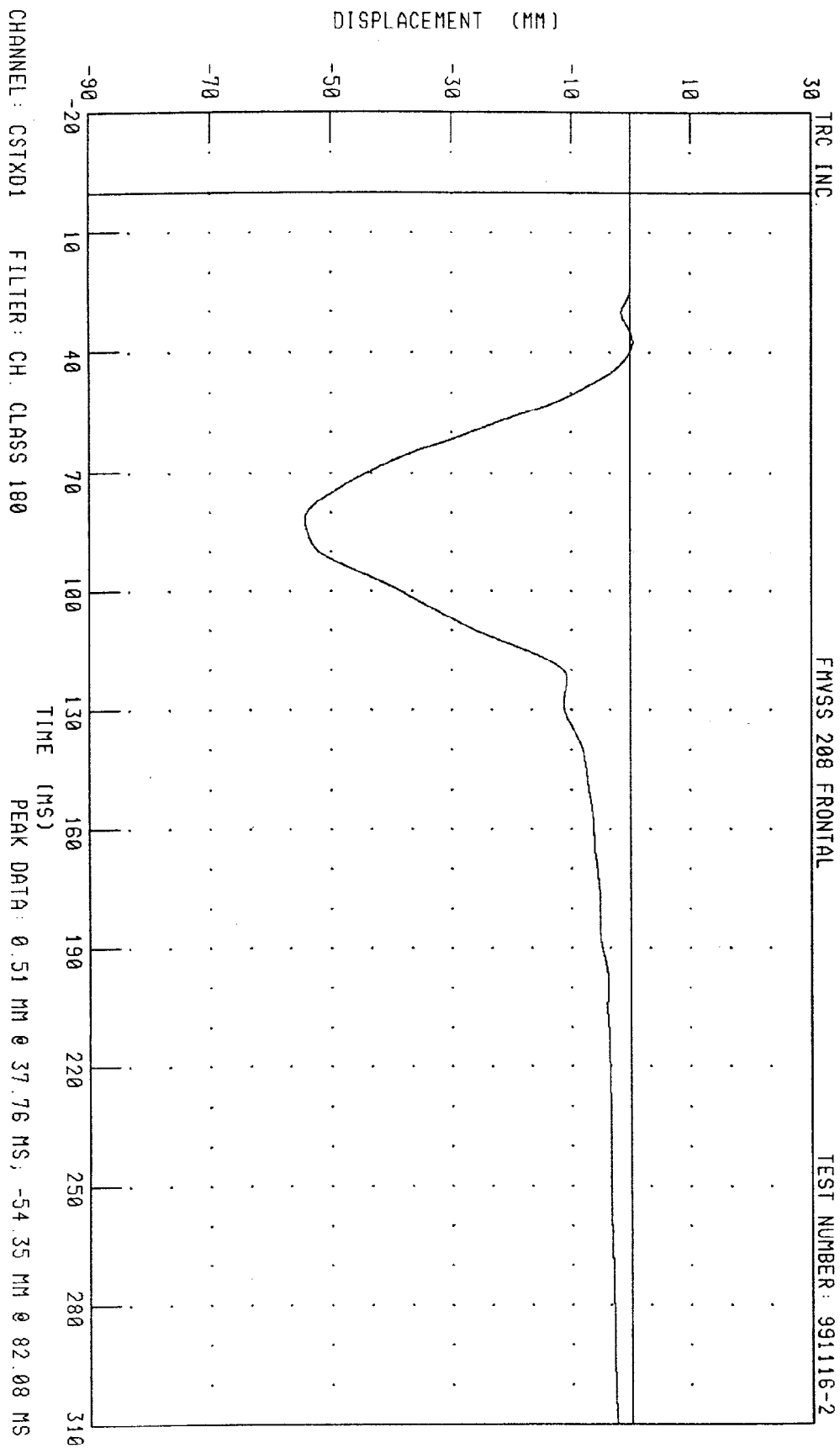
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST RESULTANT ACCELERATION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



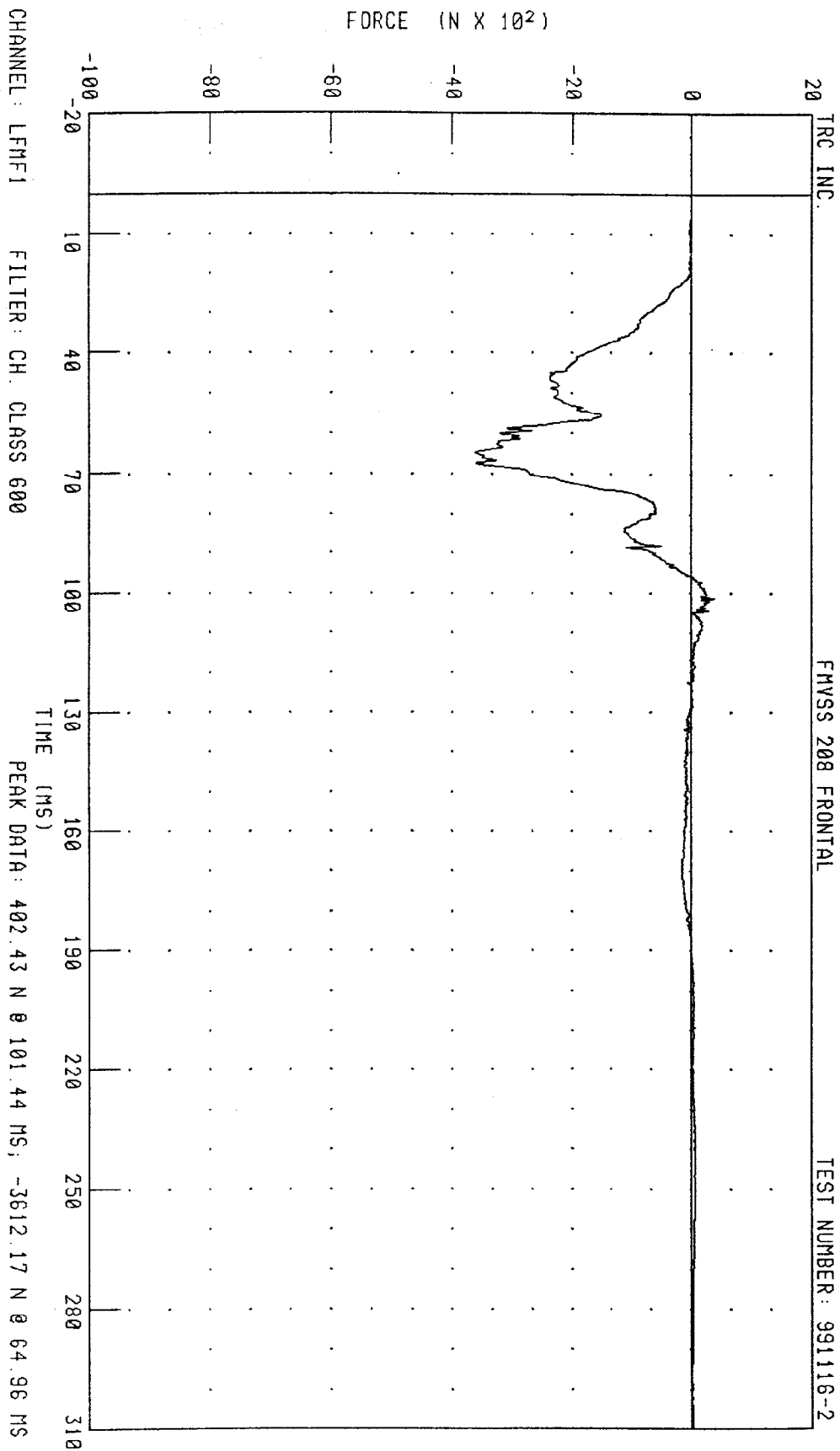
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST DEFLECTION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



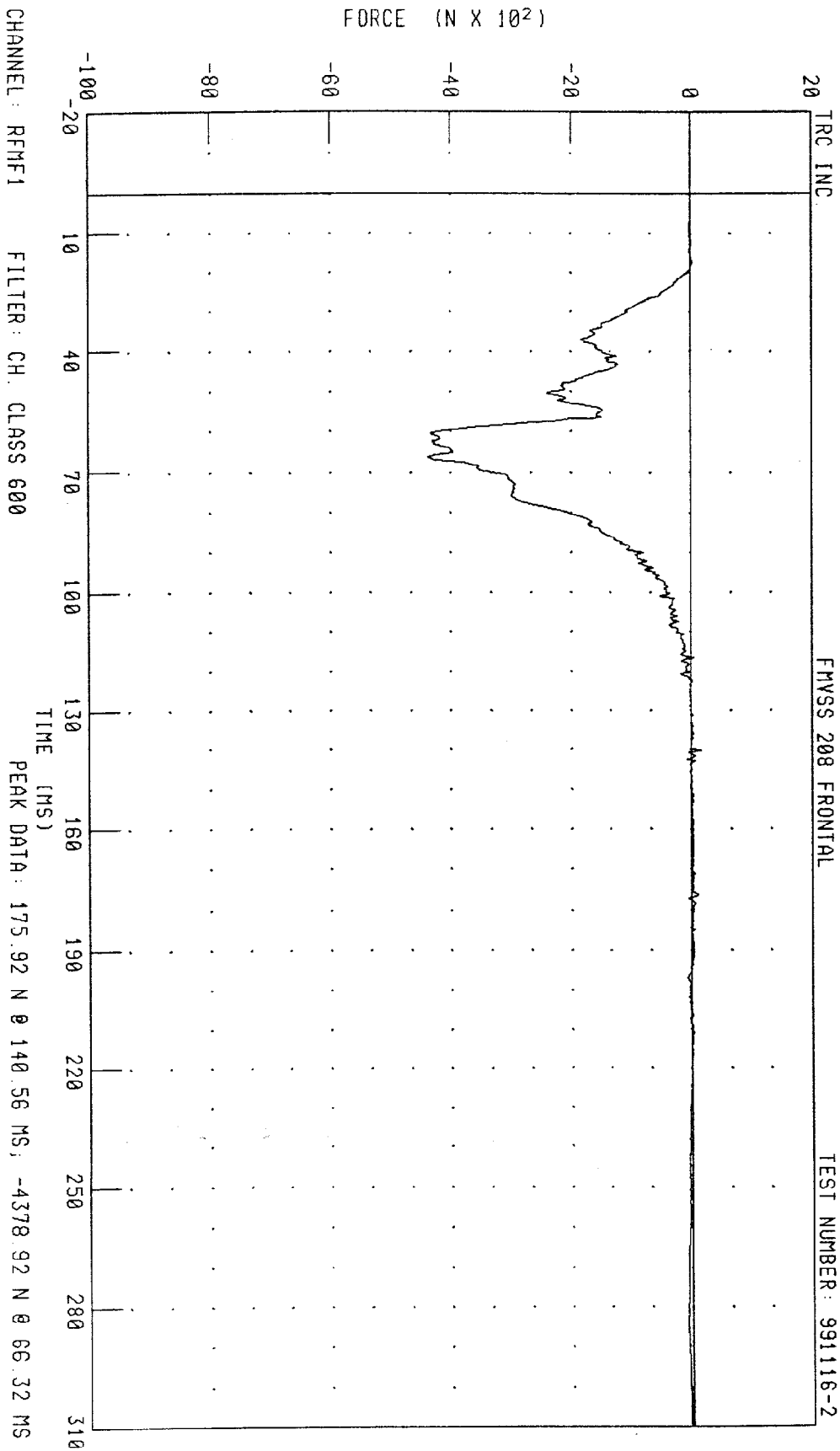
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER LEFT FEMUR FORCE
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER RIGHT FEMUR FORCE
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

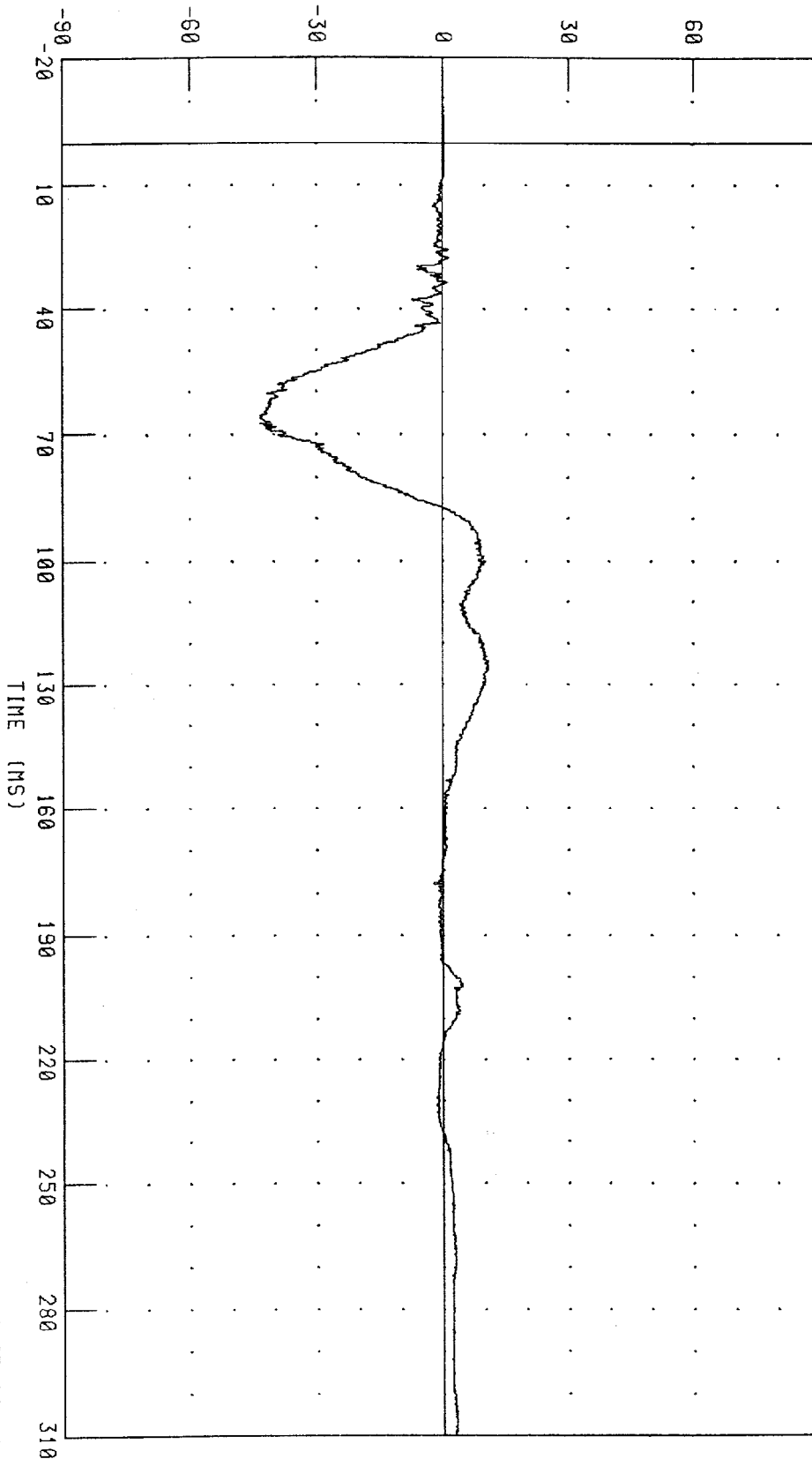


TRC INC.

2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

ACCELERATION (G)



CHANNEL: HEDXC2 FILTER: CH CLASS 1000

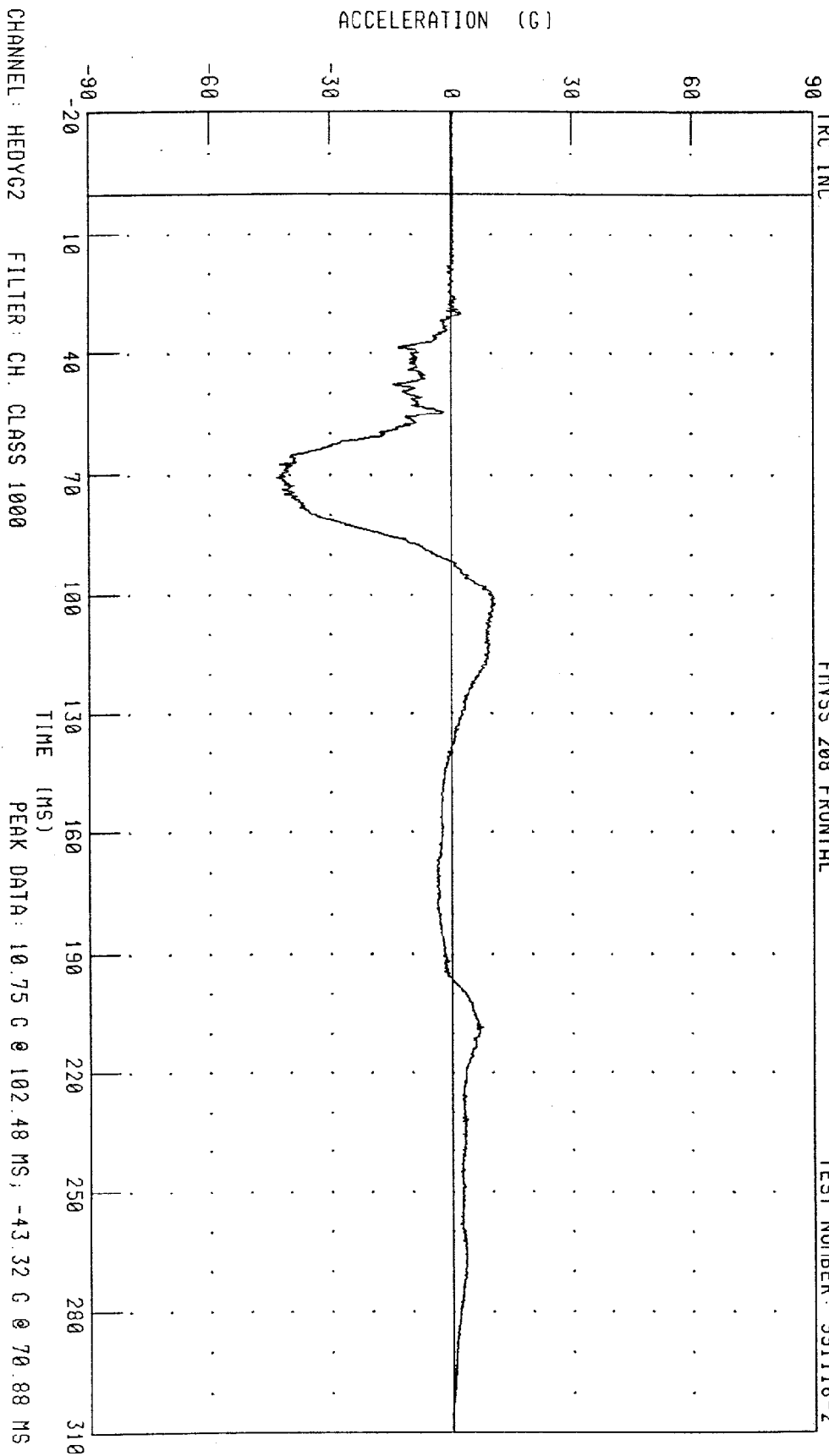
PEAK DATA: 10.90 G @ 124.56 MS, -43.38 G @ 67.60 MS

2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

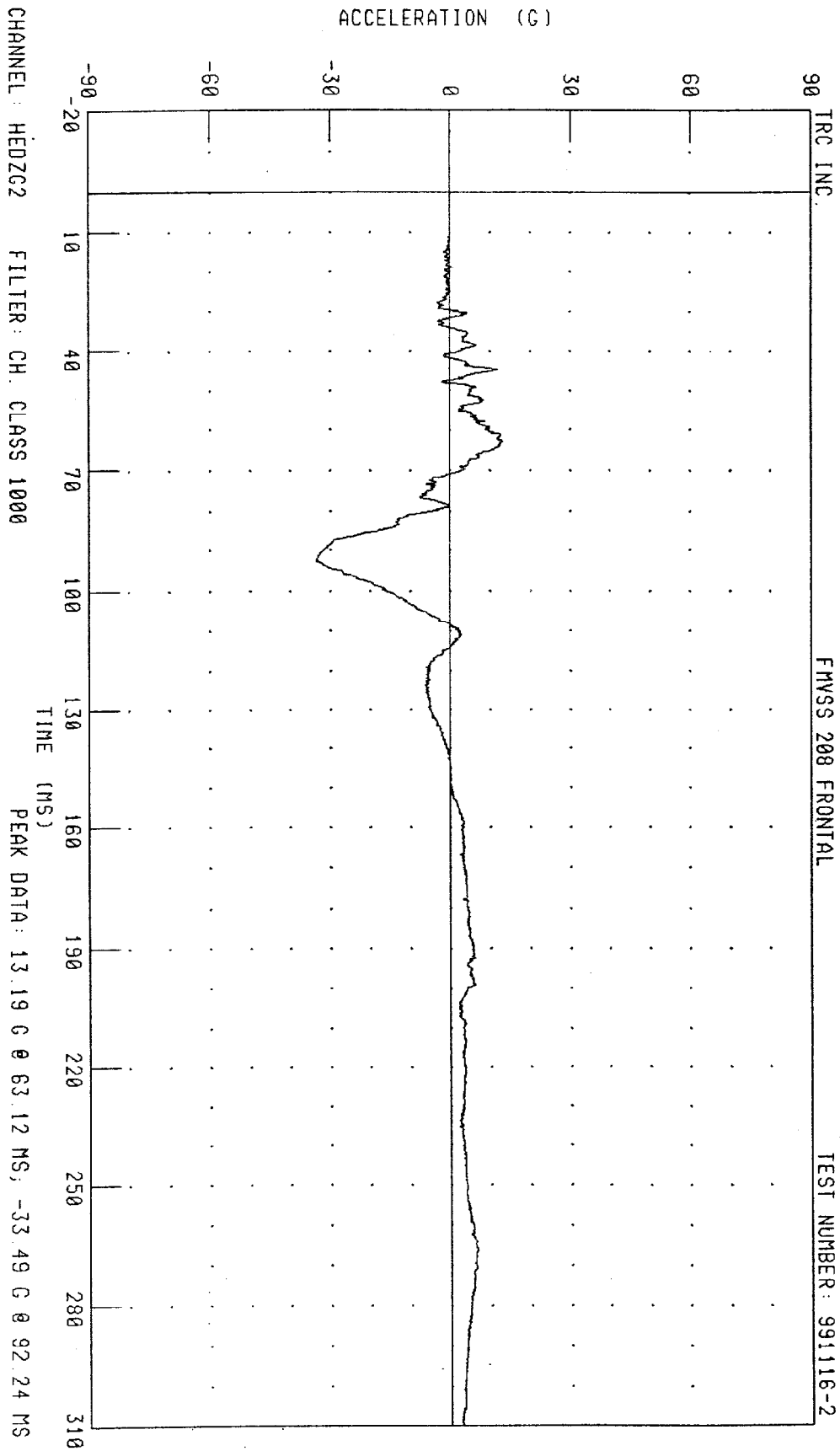
TRC INC



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION

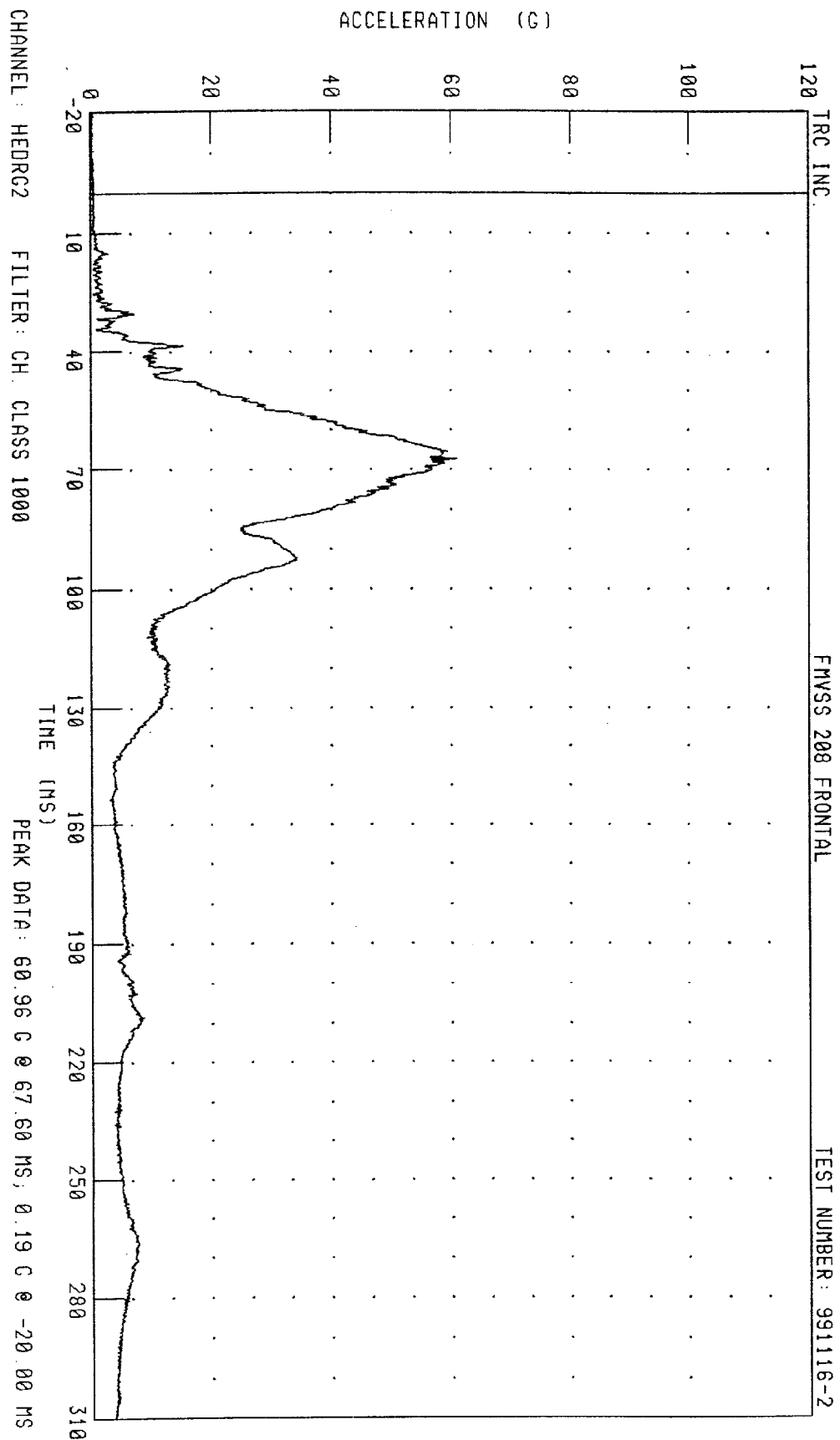
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
FMVSS 208 FRONTAL

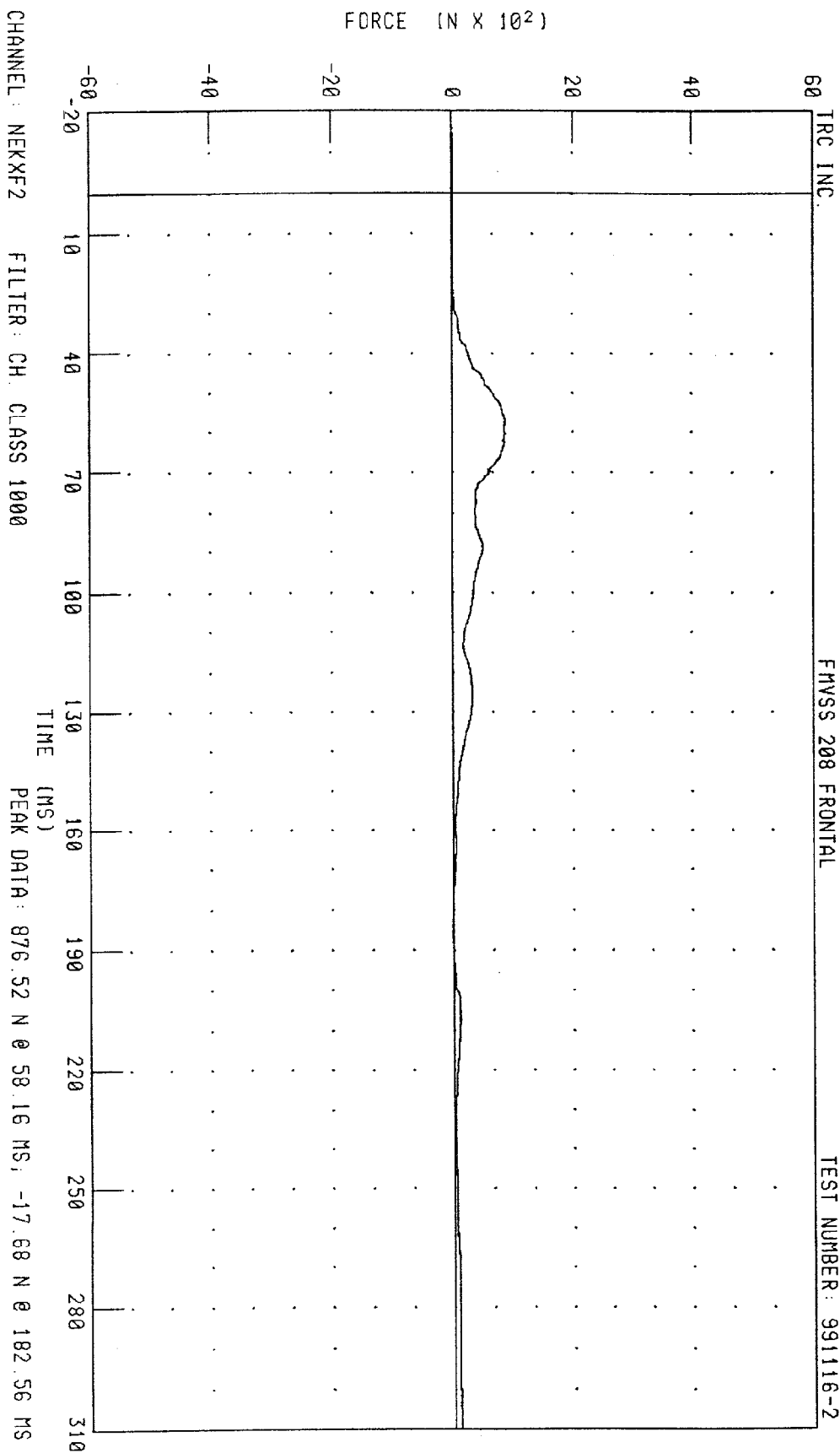
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK X-AXIS SHEAR FORCE

FHVSS 208 FRONTAL

TEST NUMBER: 991116-2

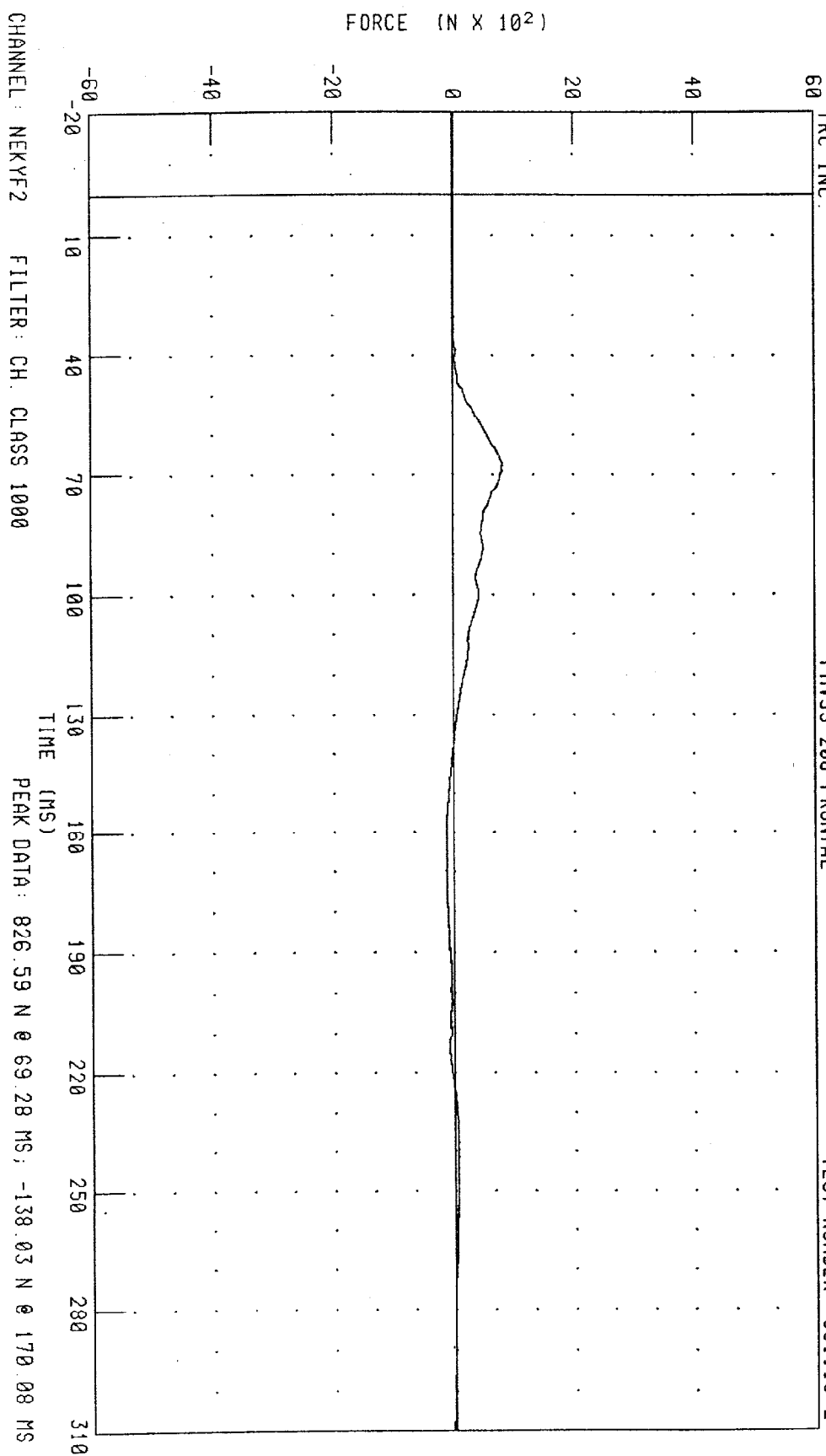


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK Y-AXIS SHEAR FORCE

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

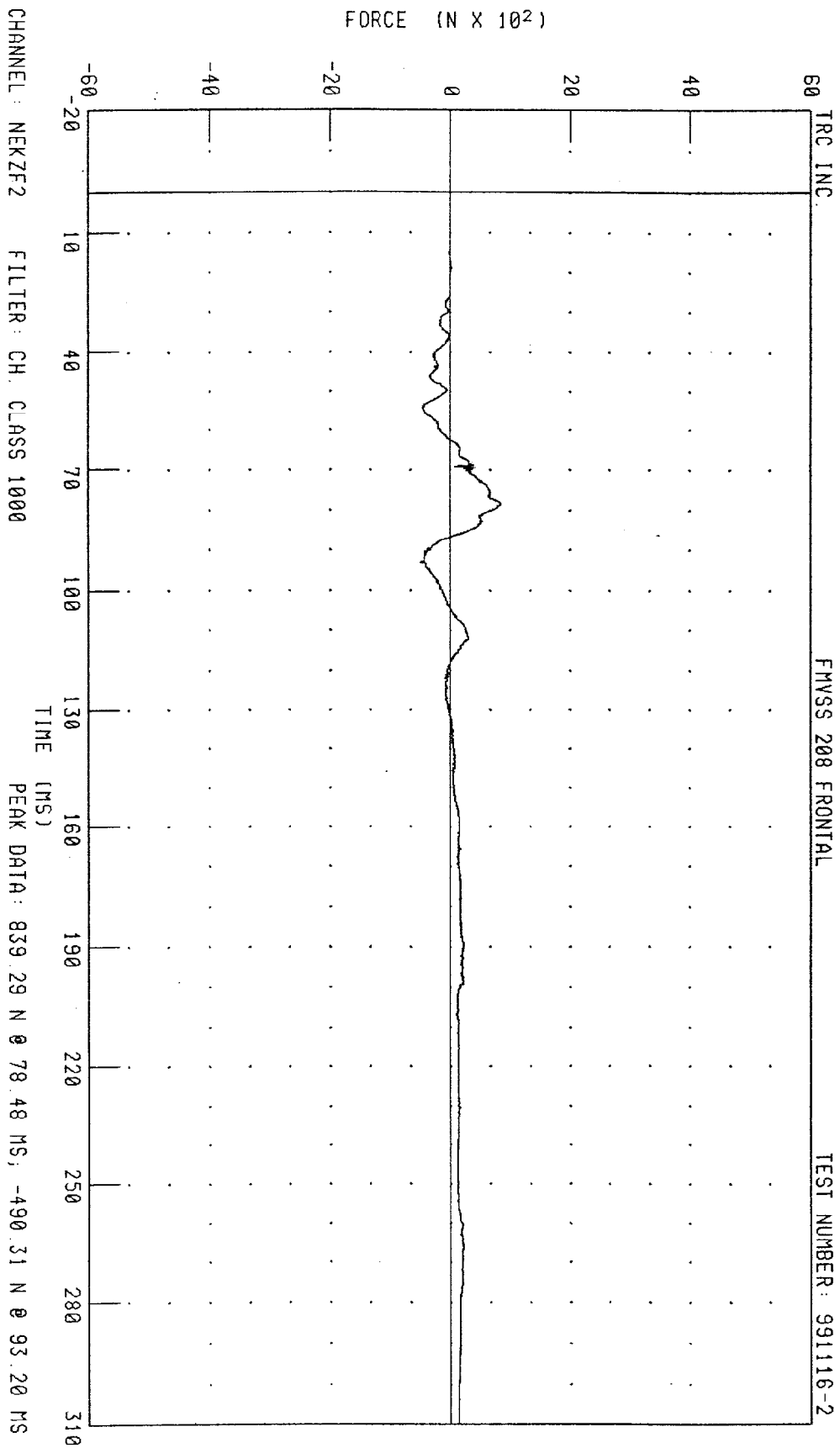
TRC INC.



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK Z-AXIS AXIAL FORCE

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

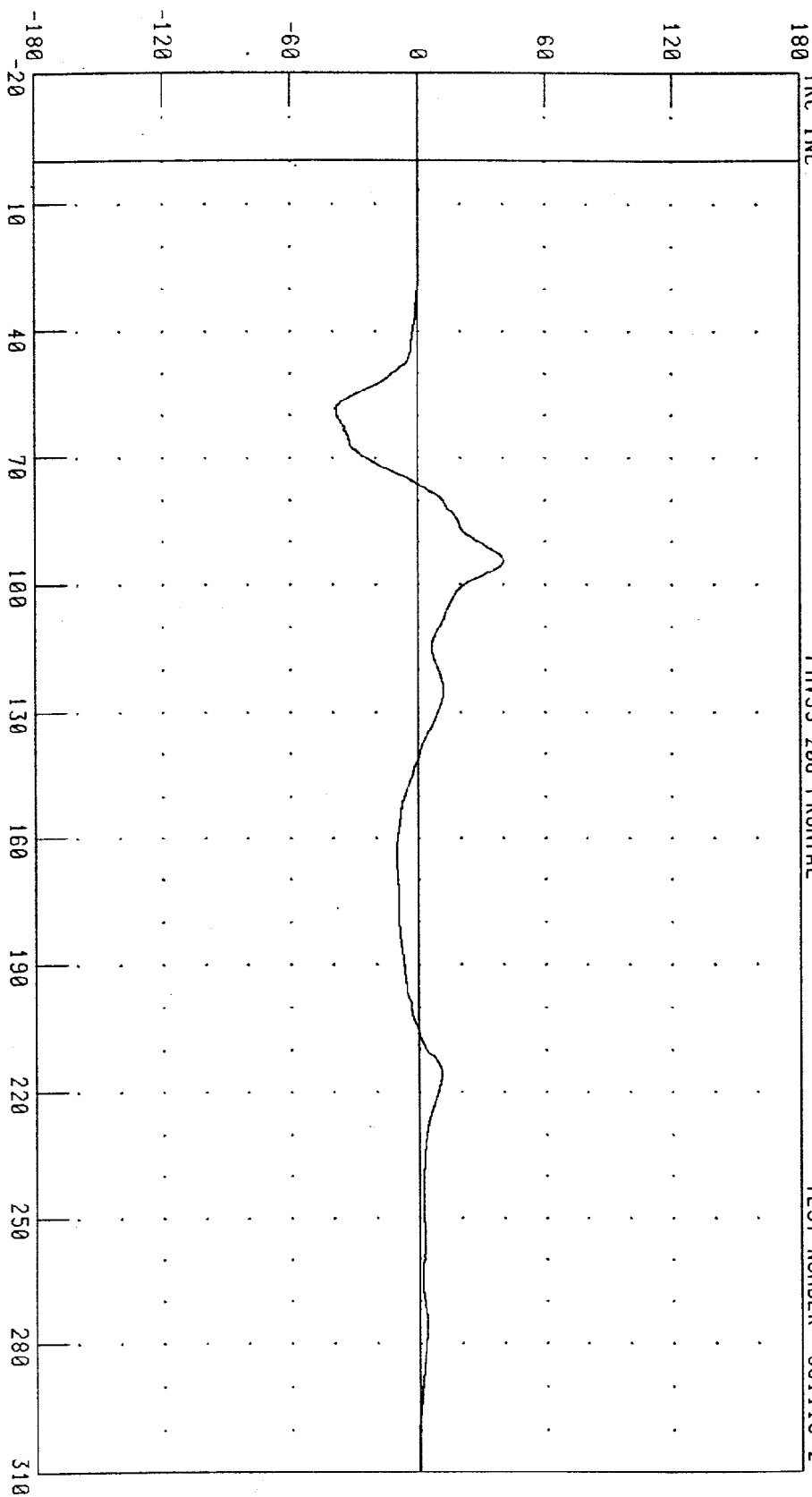


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK MOMENT ABOUT X AXIS
FMVSS 208 FRONTAL

TRC INC

TEST NUMBER: 991116-2

TORQUE (N·M)



CHANNEL: NEKXN2

FILTER: CH CLASS 600

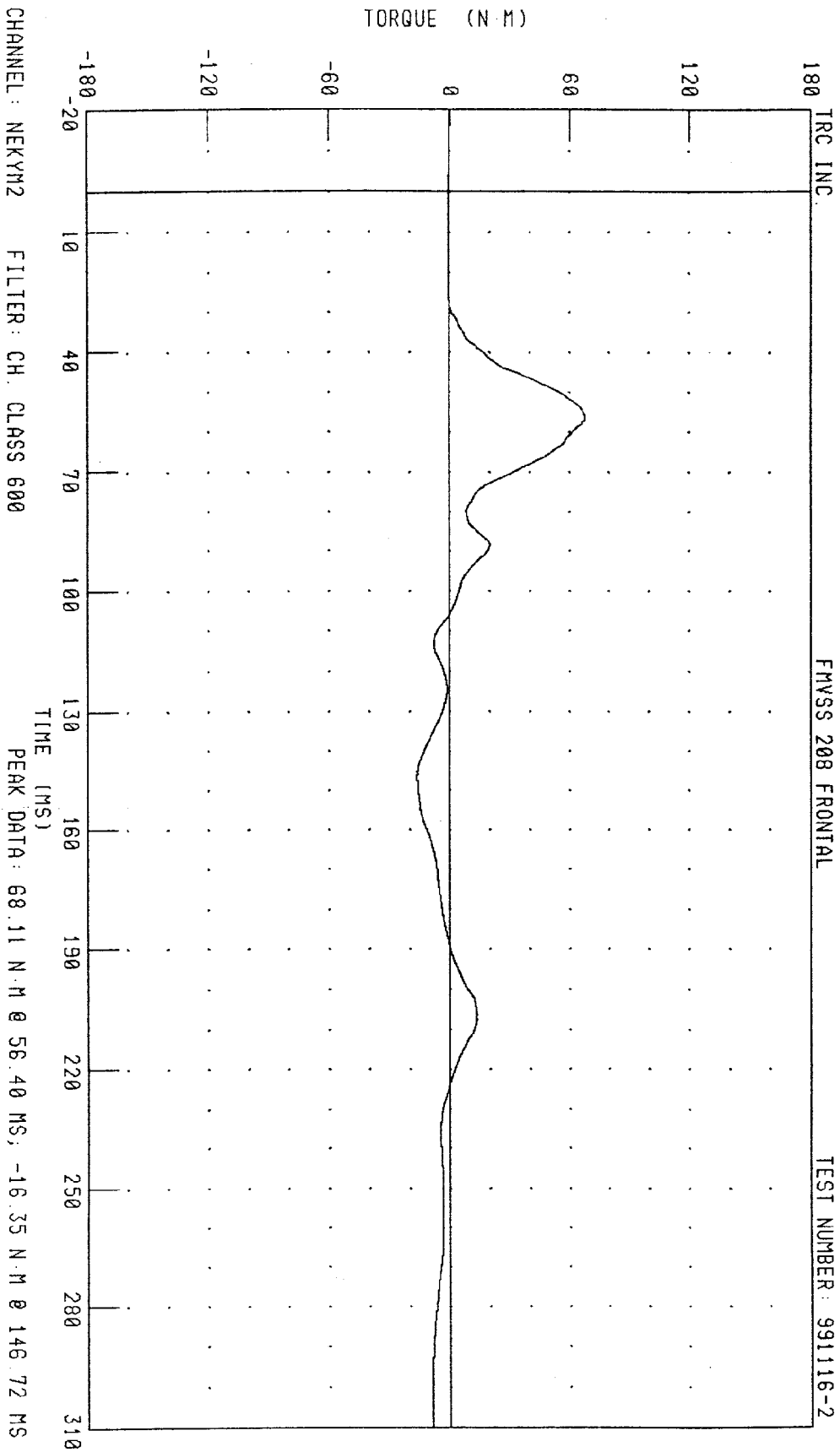
TIME (MS)

PEAK DATA: 40.26 N·M @ 94.64 MS, -38.60 N·M @ 58.64 MS

2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y AXIS

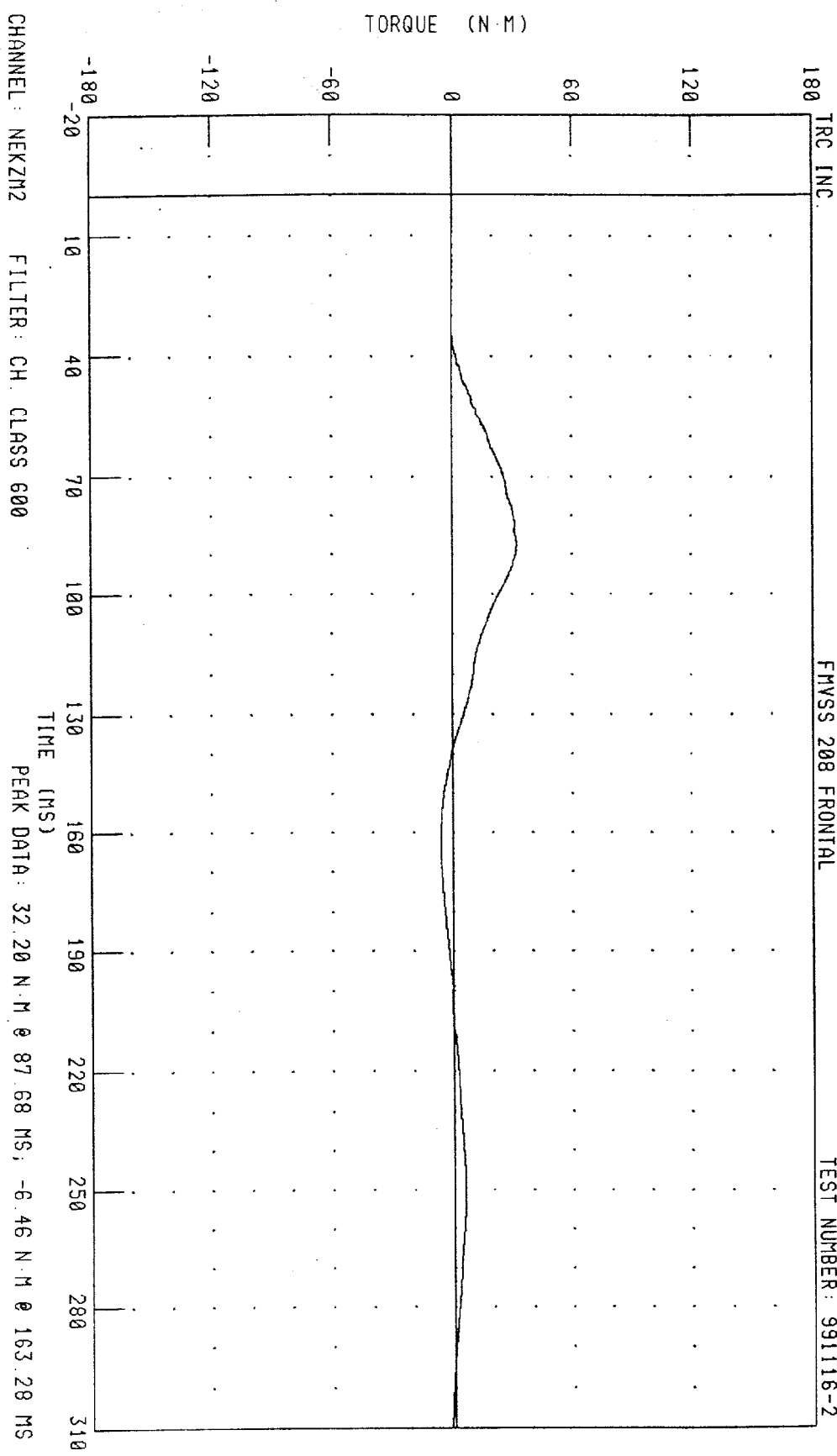
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Z AXIS
FMVSS 208 FRONTAL

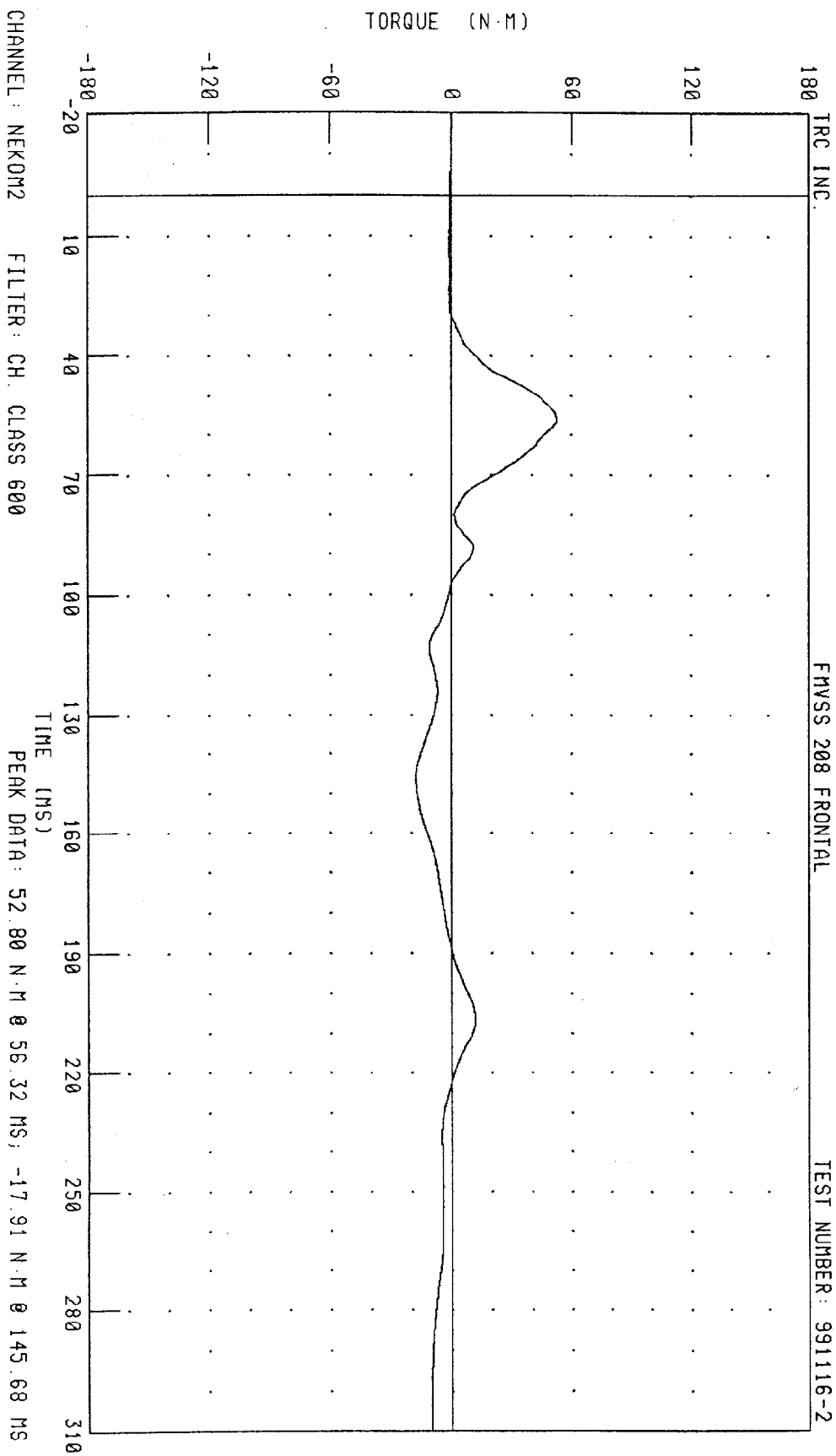
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS

FMVSS 208 FRONTAL

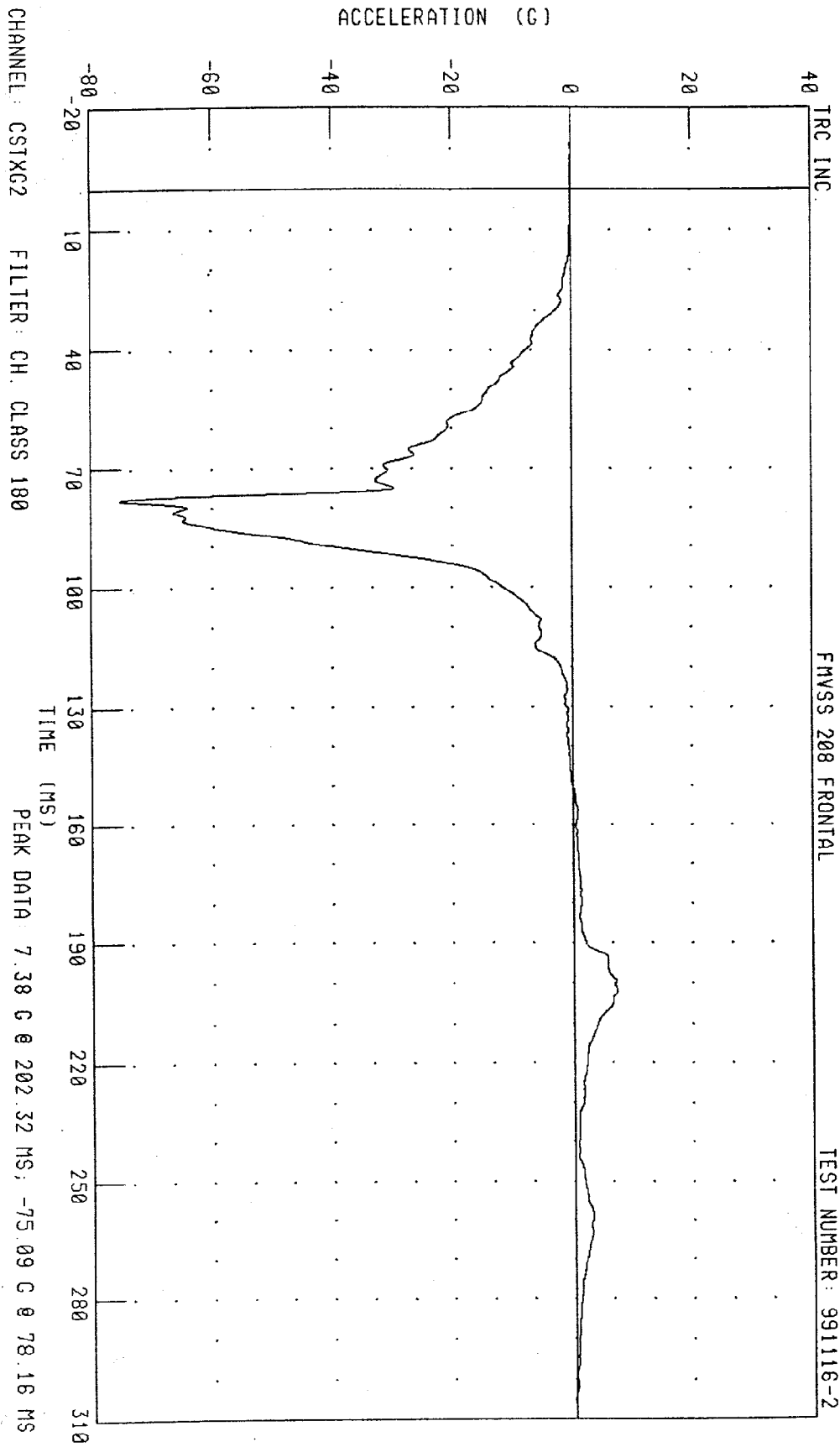
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION

FMVSS 208 FRONTAL

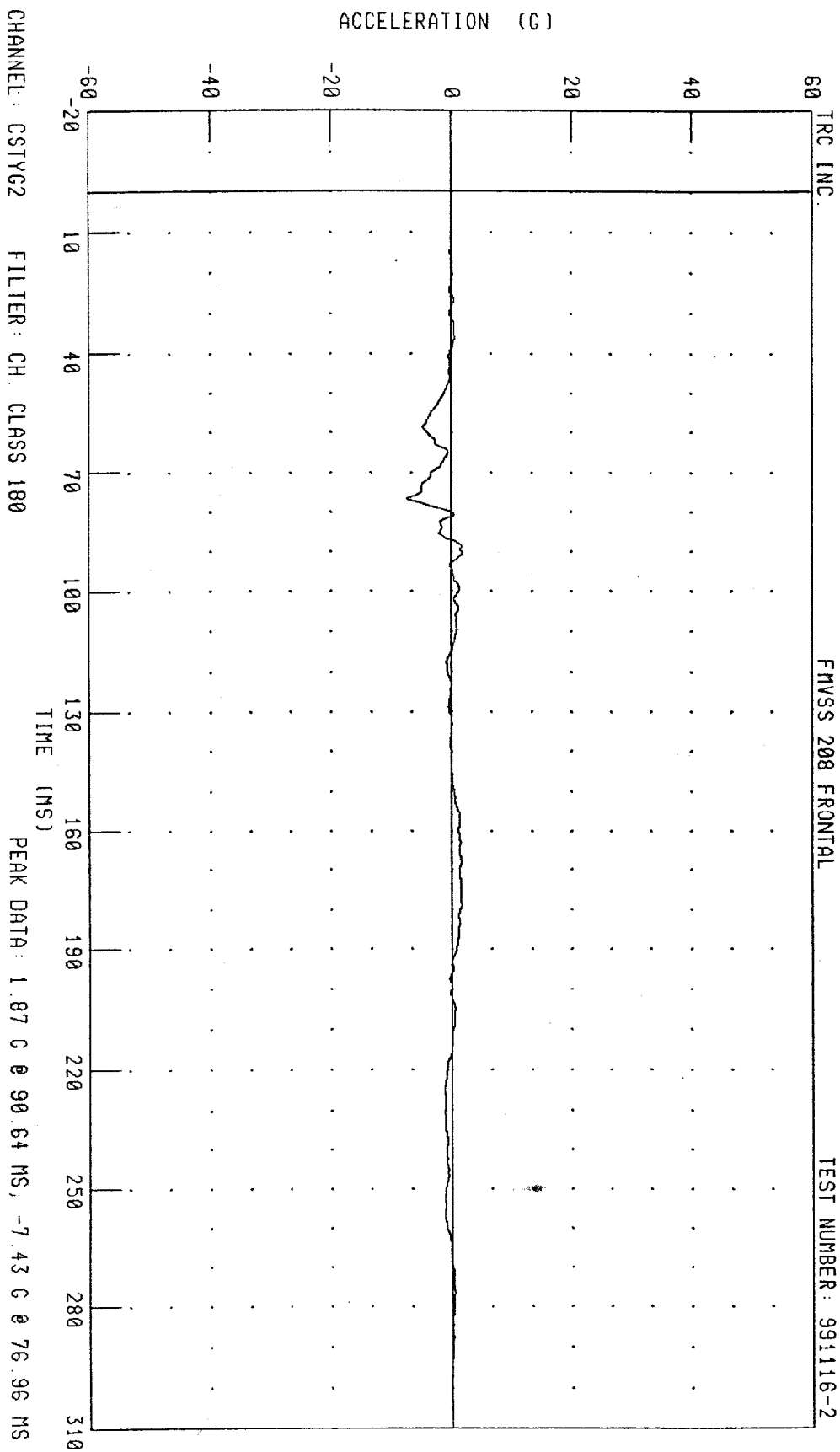
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

FMVSS 208 FRONTAL

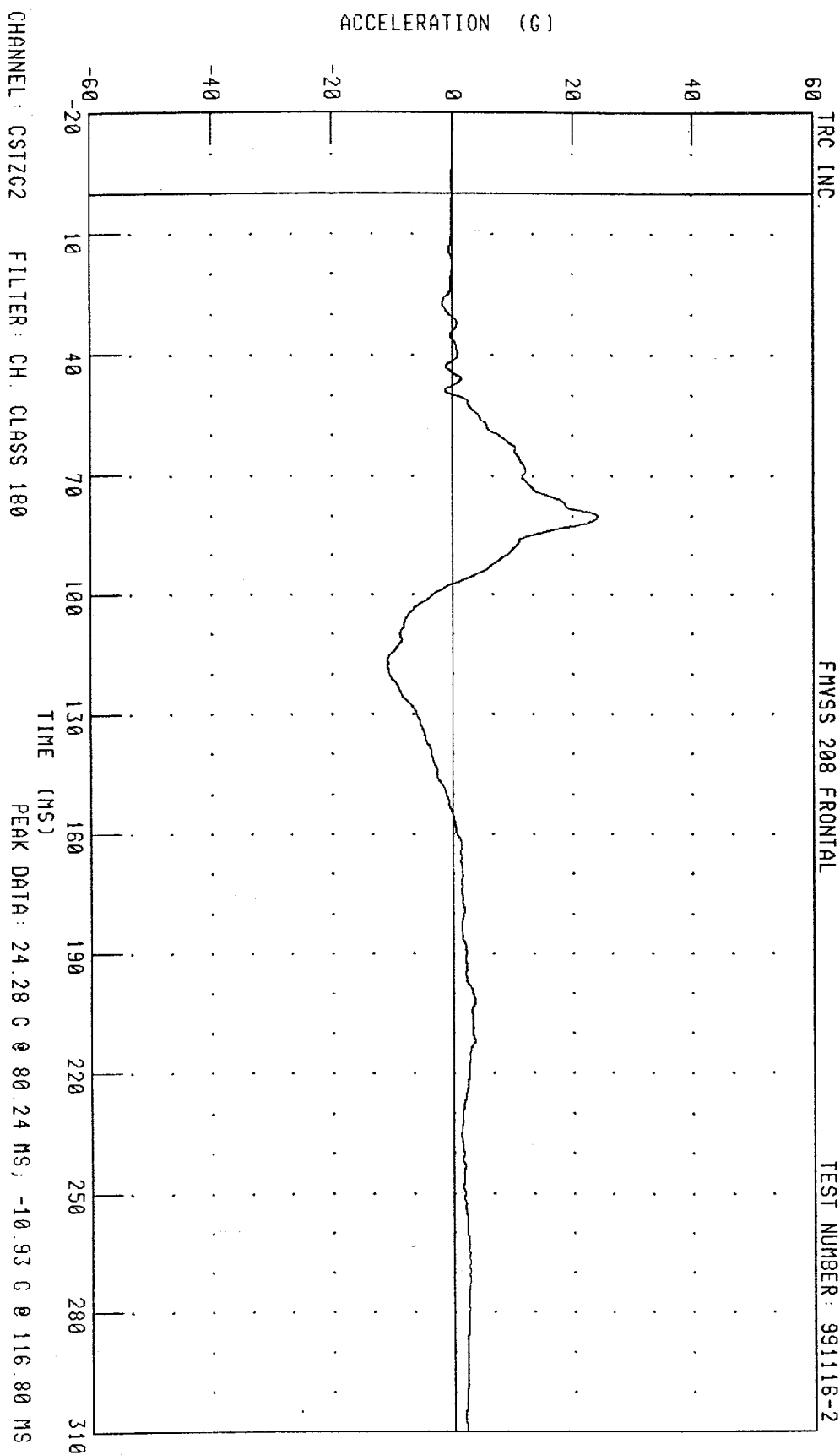
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

FMVSS 208 FRONTAL

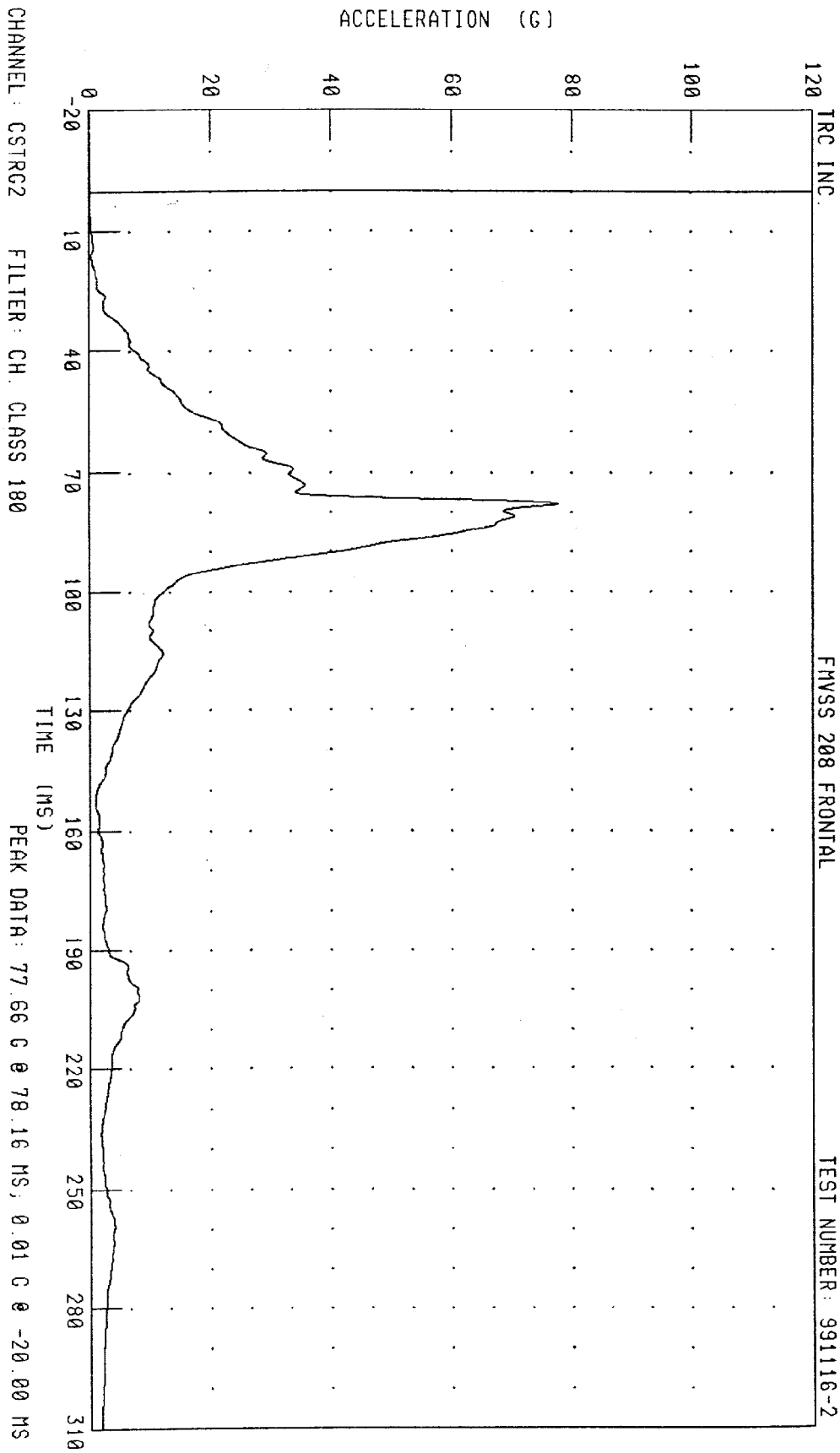
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

FHVS 208 FRONTAL

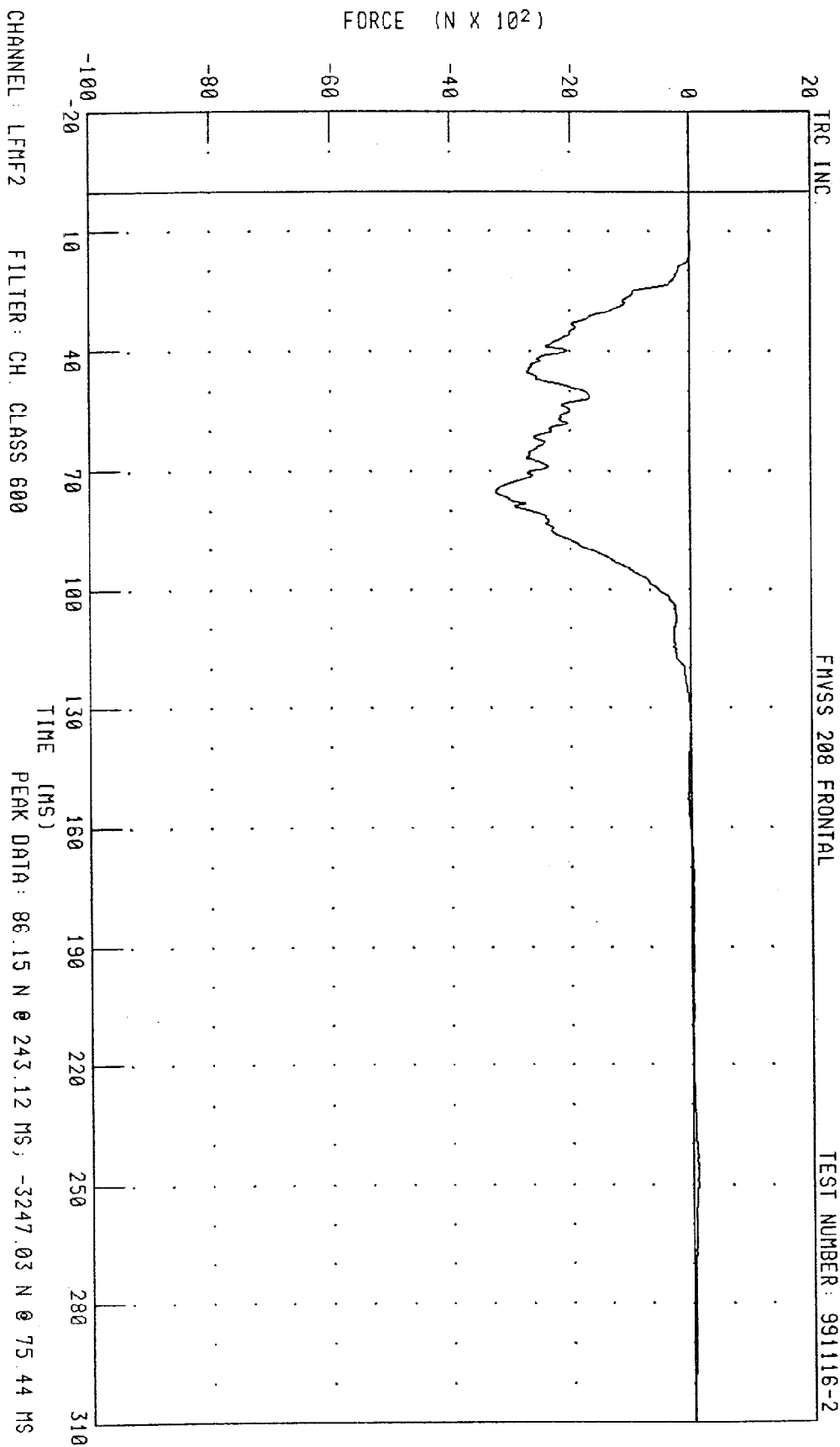
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

FMVSS 208 FRONTAL

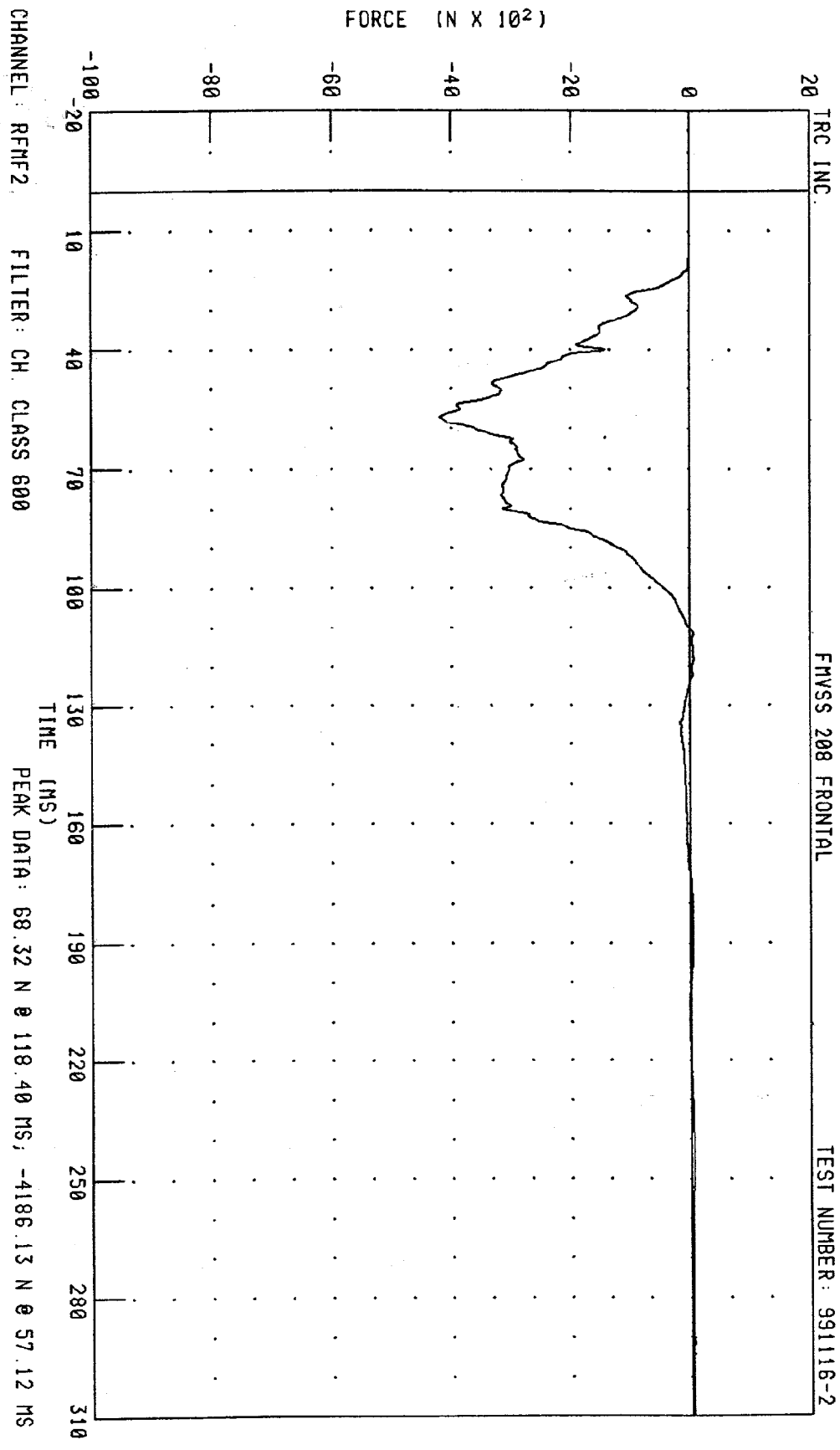
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

FMVSS 208 FRONTAL

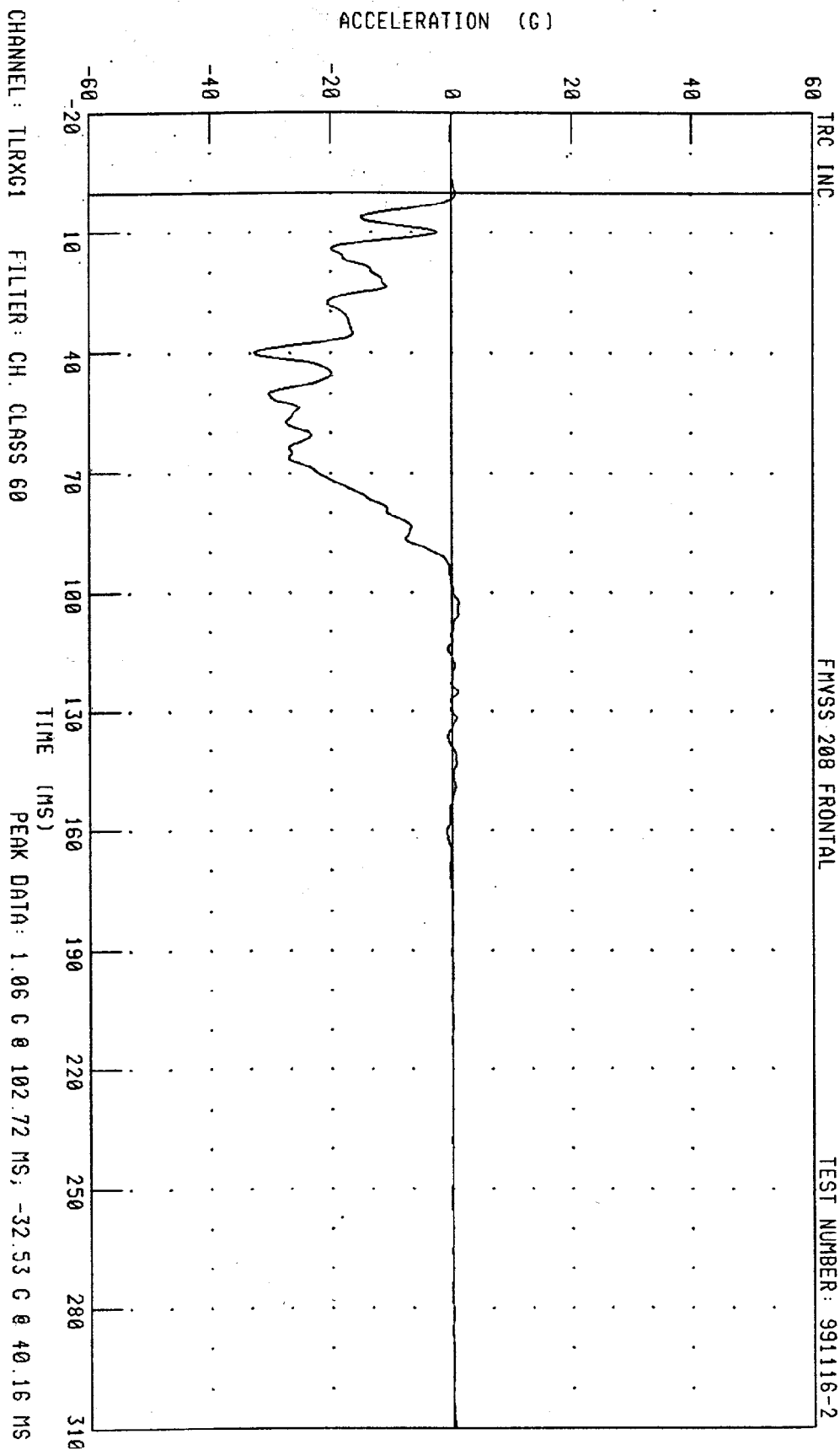
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
LEFT REAR SEAT X-AXIS ACCELERATION

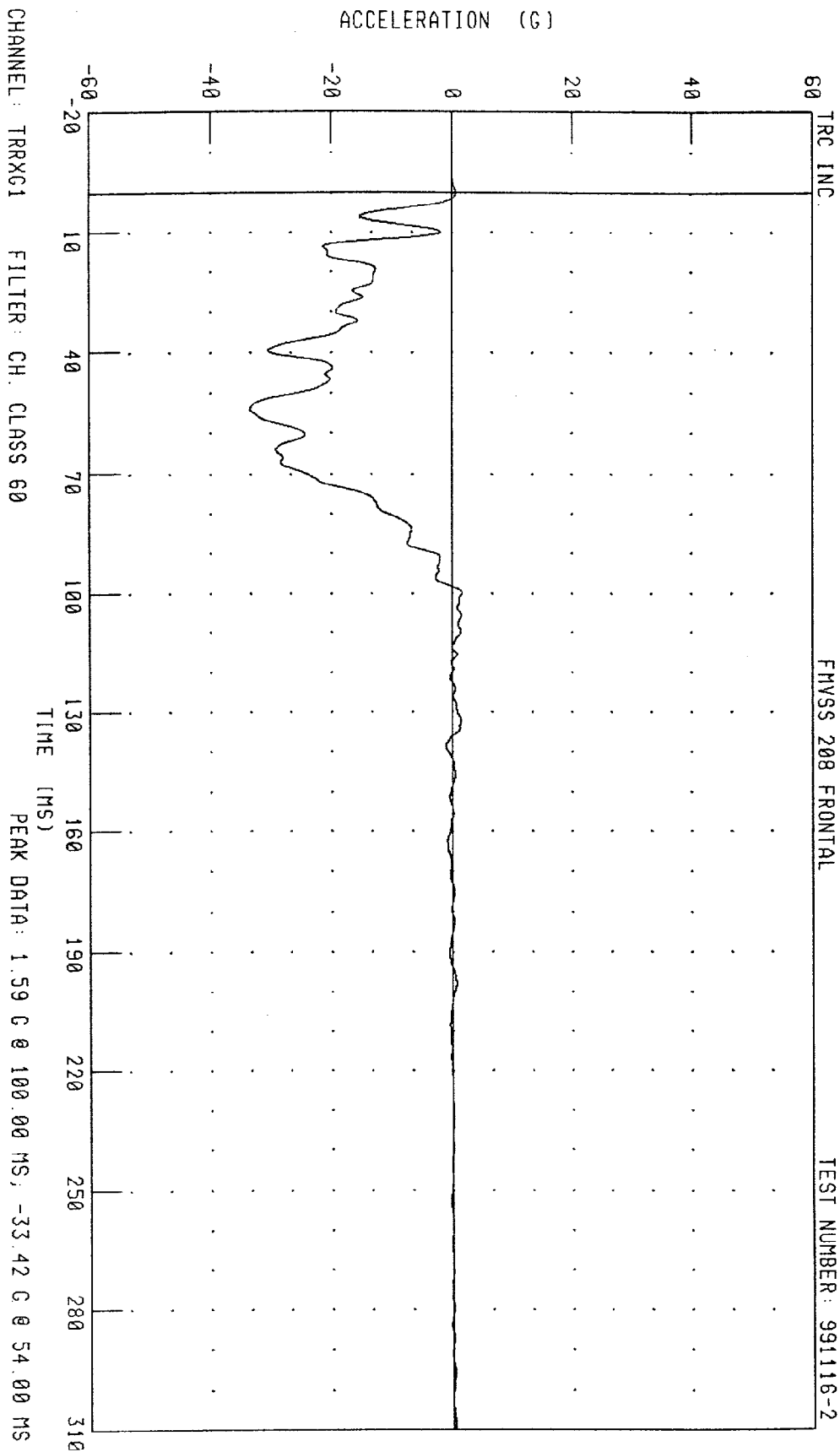
FHVS 208 FRONTAL

TEST NUMBER: 991116-2



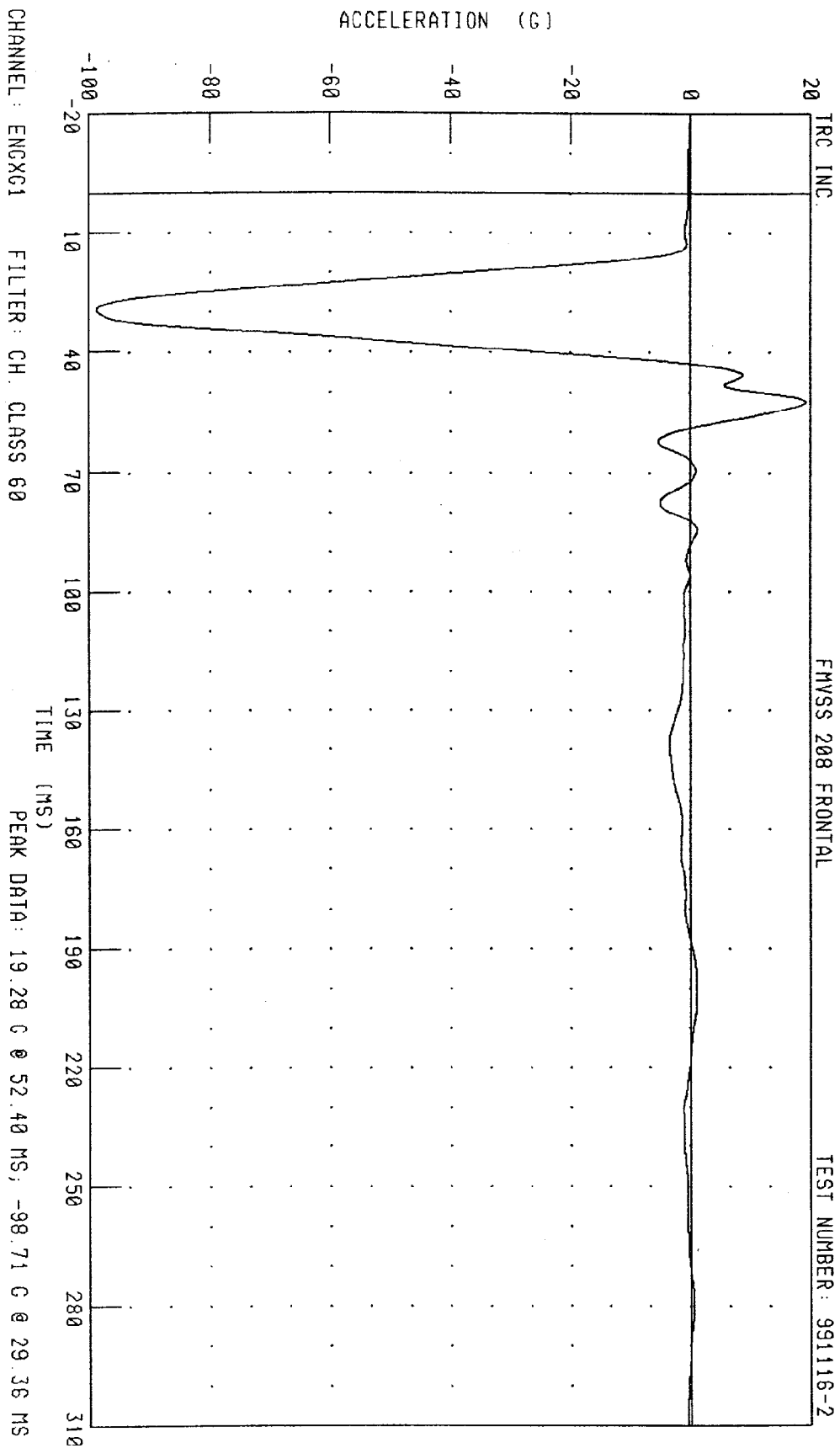
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT REAR SEAT X-AXIS ACCELERATION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



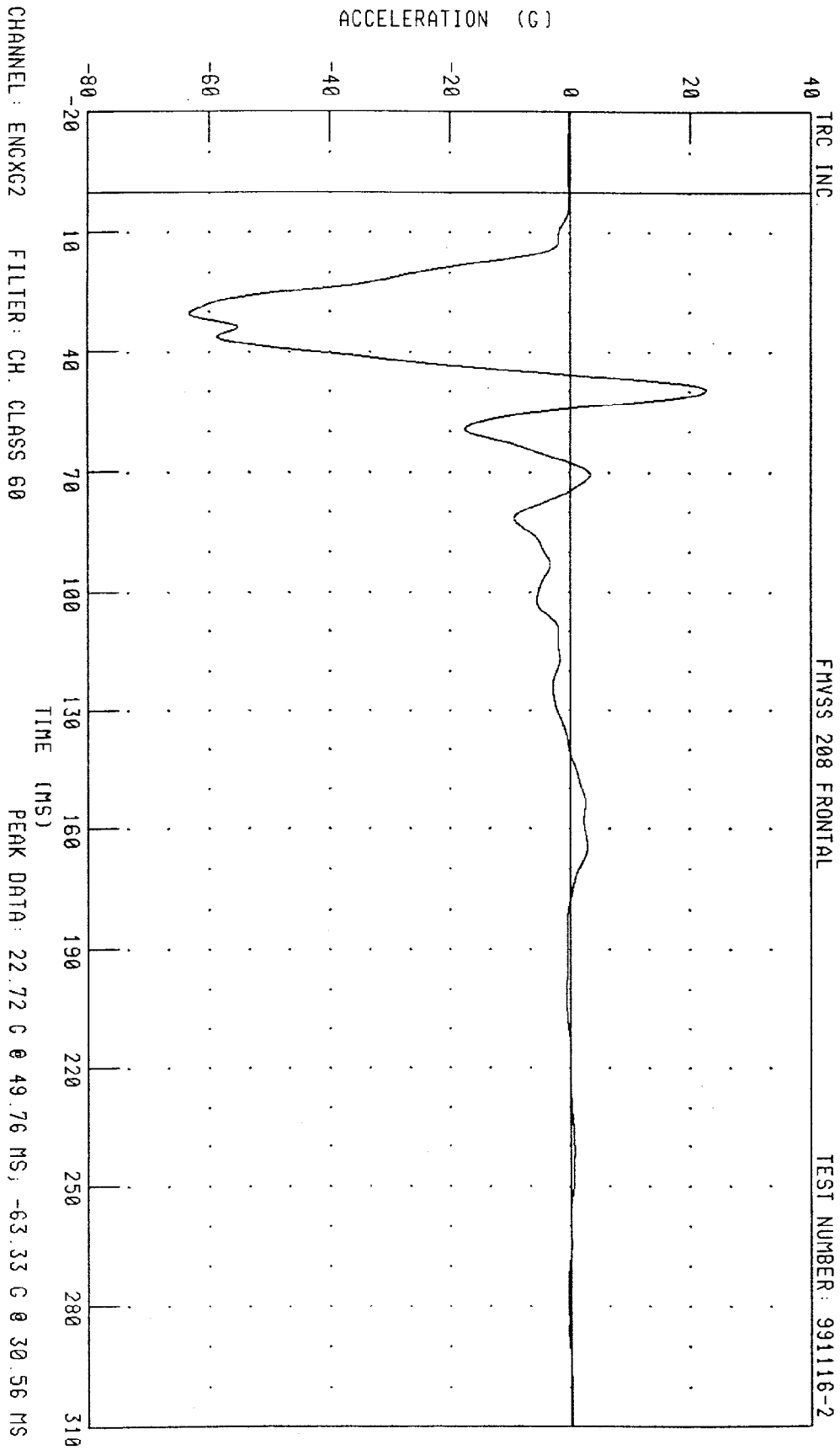
2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
ENGINE TOP X-AXIS ACCELERATION
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
ENGINE BOTTOM X-AXIS ACCELERATION
FMVSS 208 FRONTAL

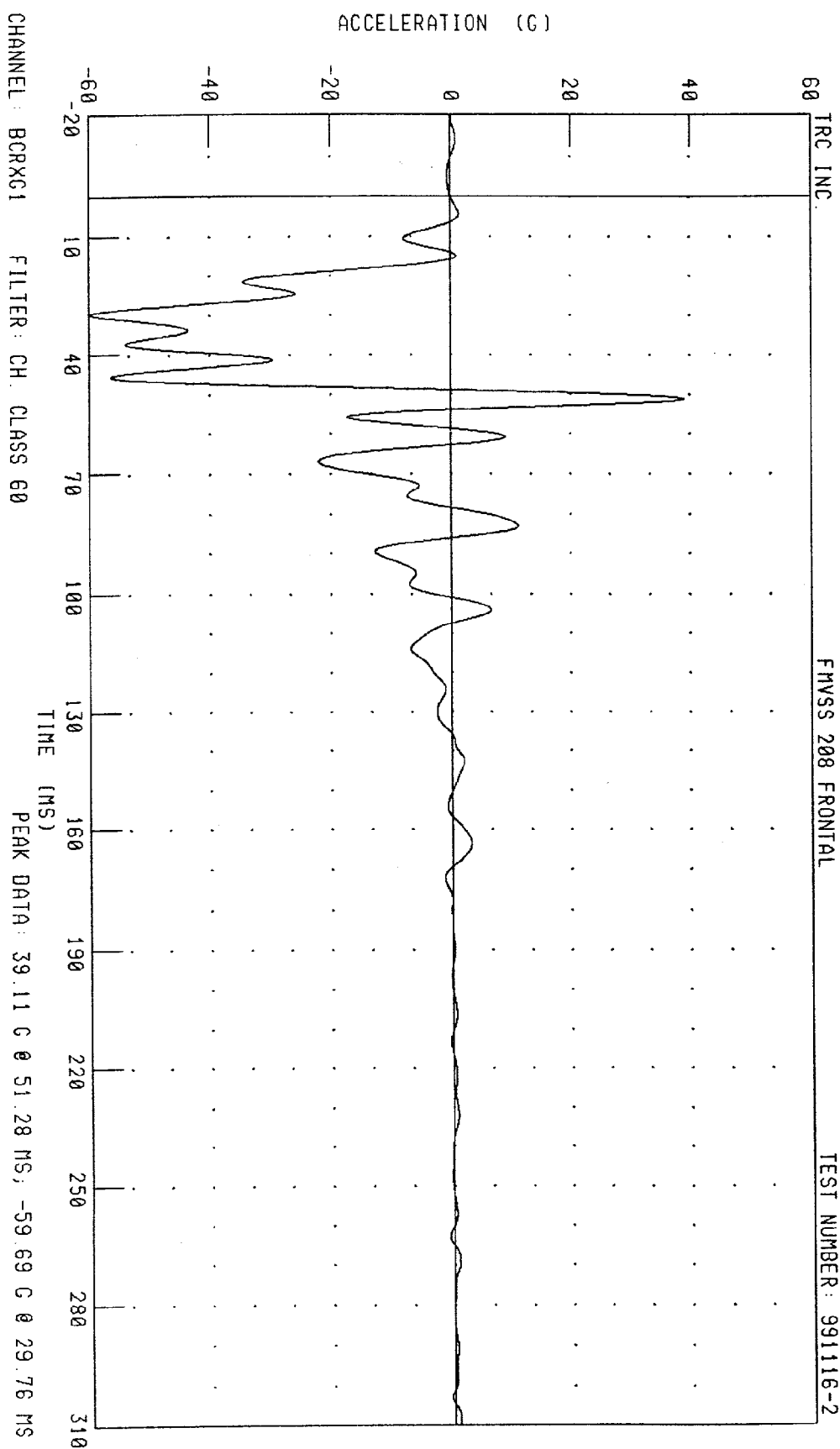
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT BRAKE CALIPER X-AXIS ACCELERATION

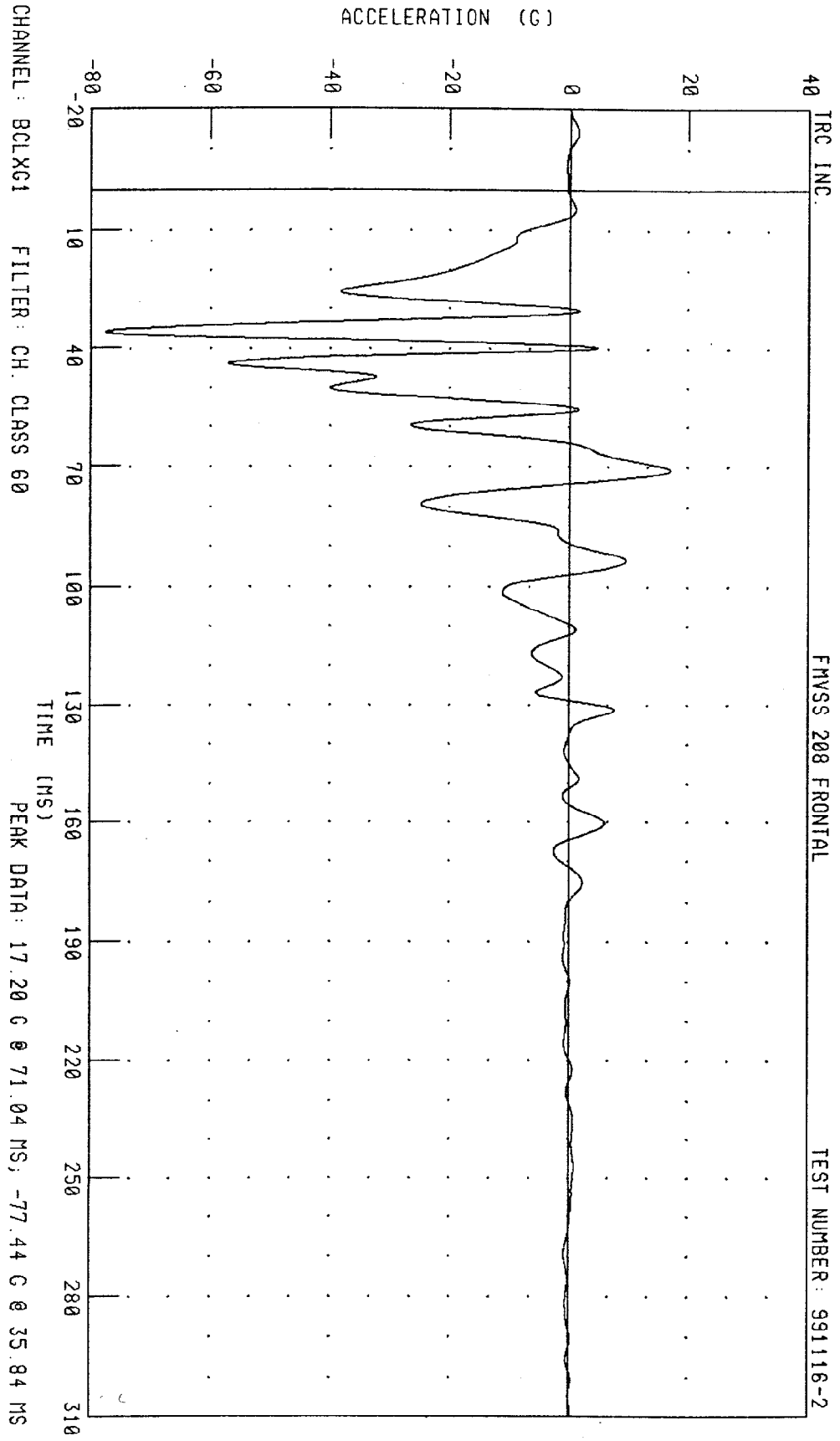
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
LEFT BRAKE CALIPER X-AXIS ACCELERATION
FMVSS 208 FRONTAL

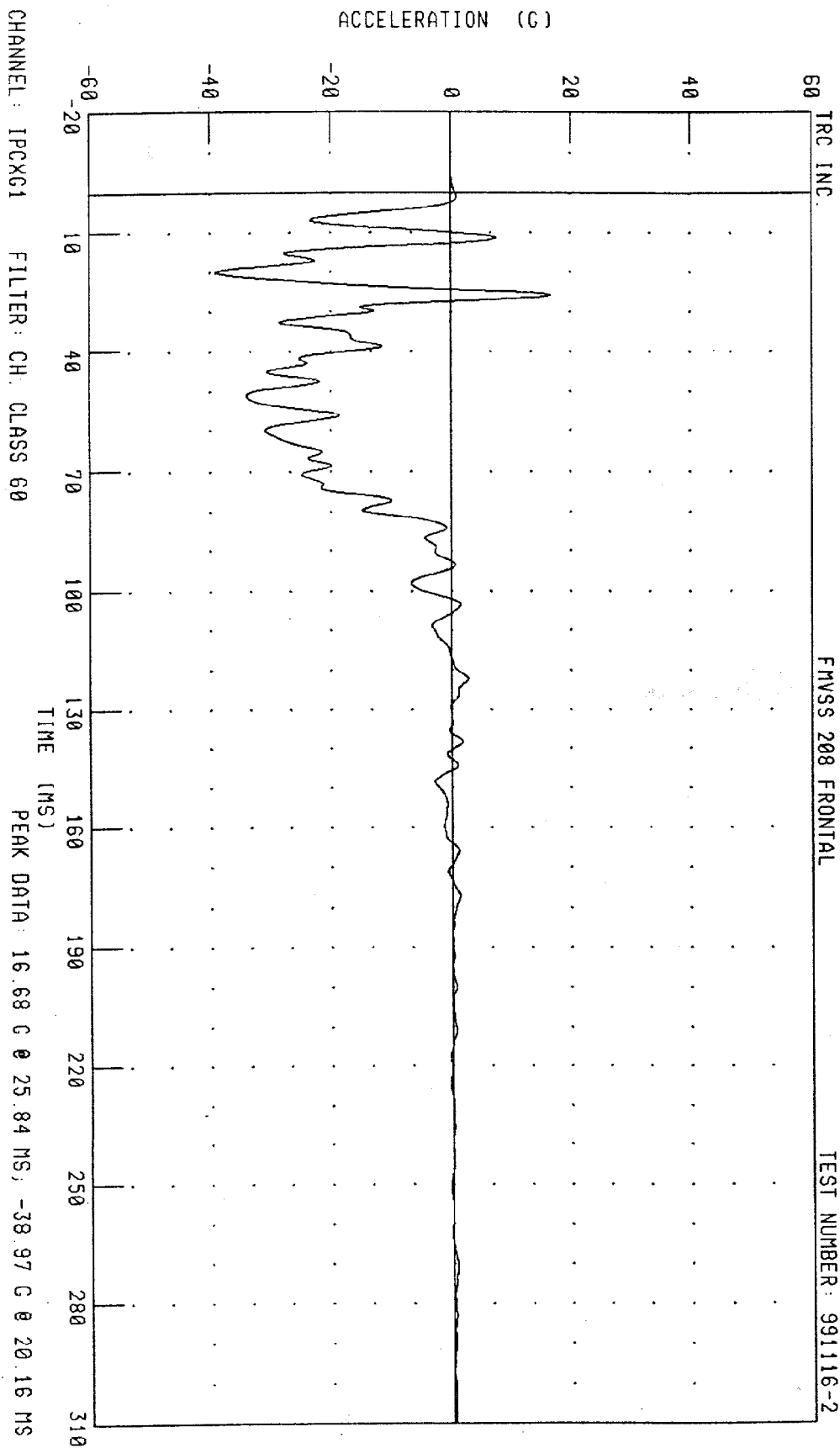
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION

FMVSS 208 FRONTAL

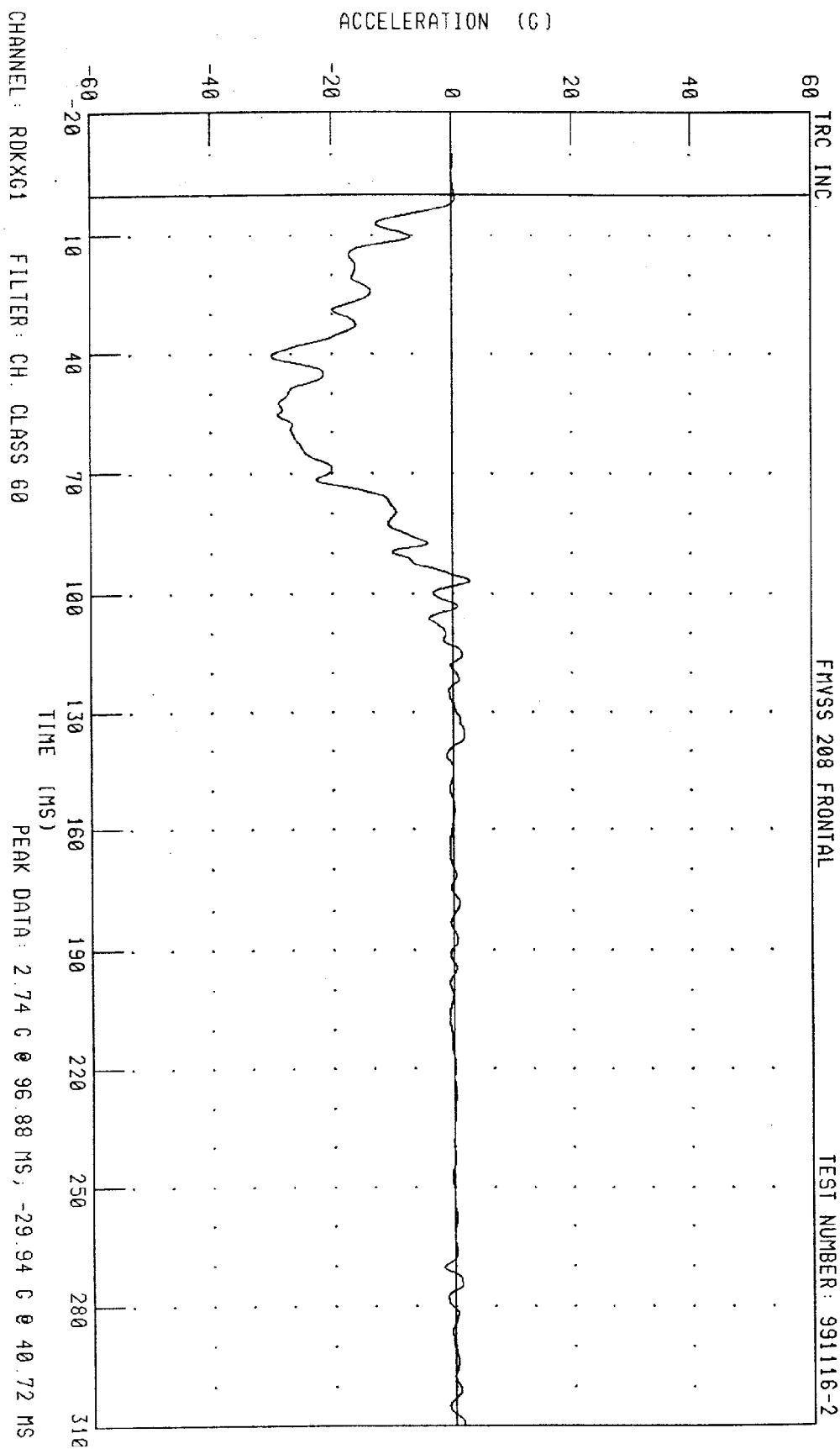
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER X-AXIS ACCELERATION

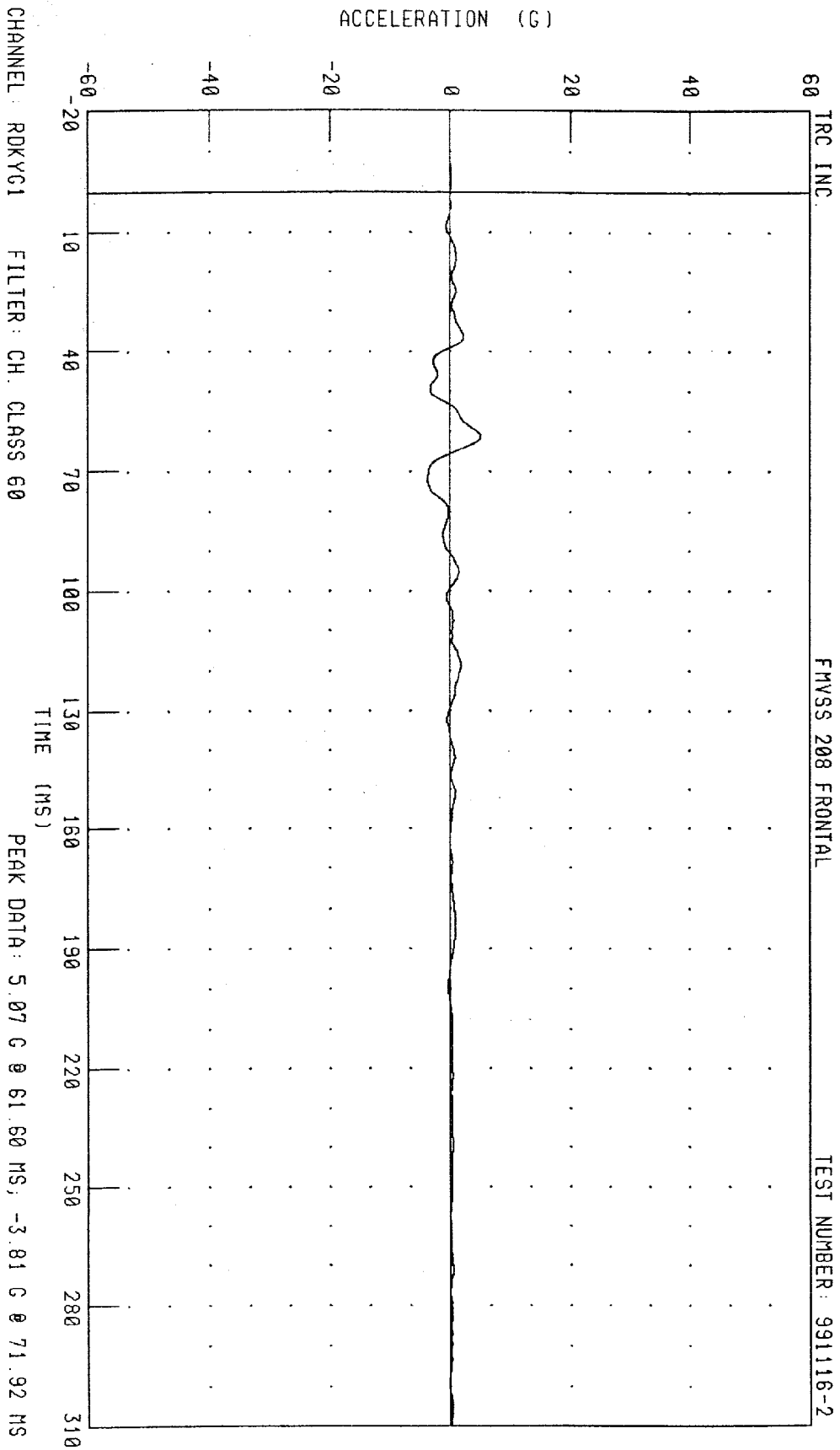
FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER Y-AXIS ACCELERATION
FMVSS 208 FRONTAL

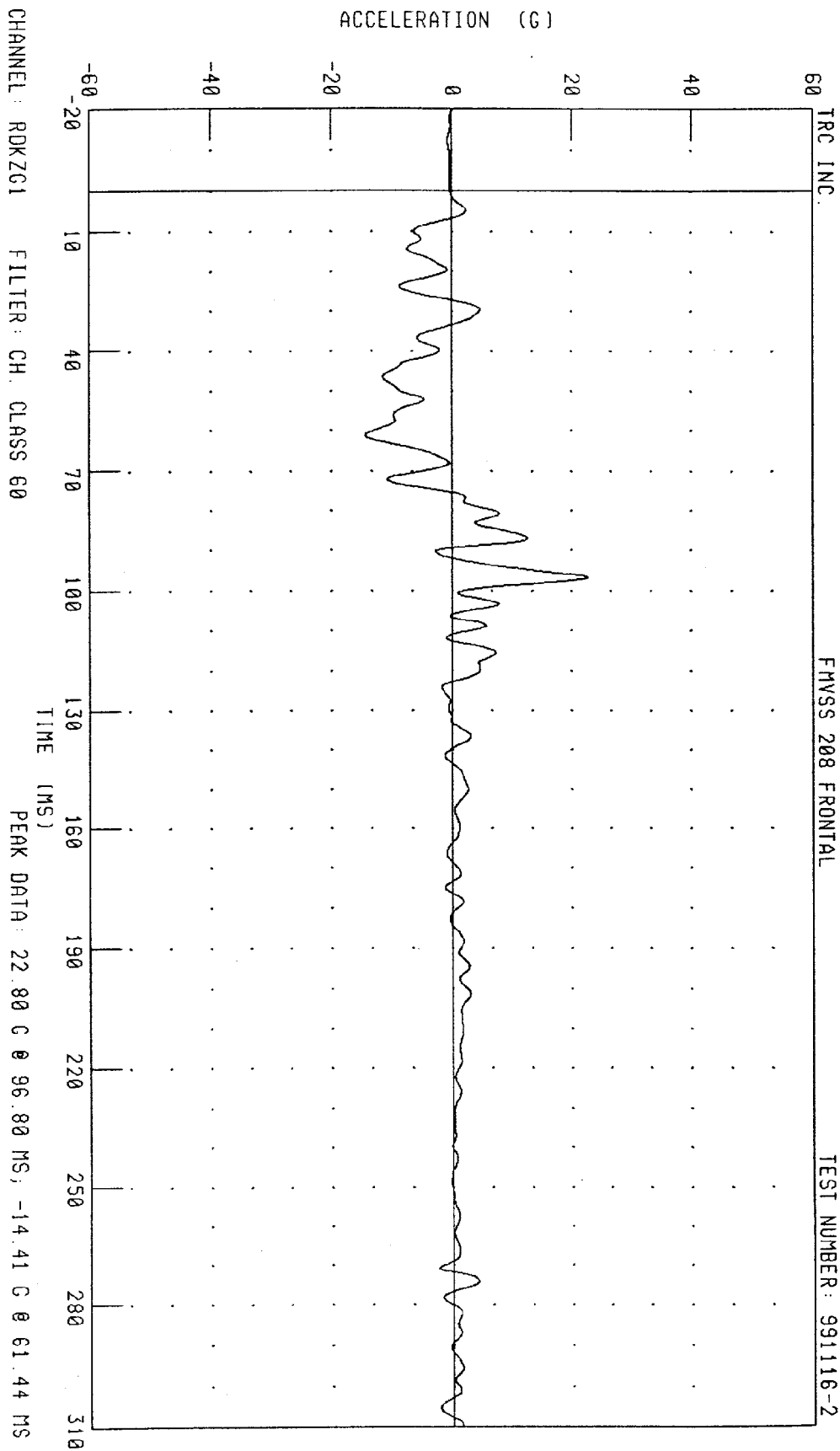
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER Z-AXIS ACCELERATION

FMVSS 208 FRONTAL

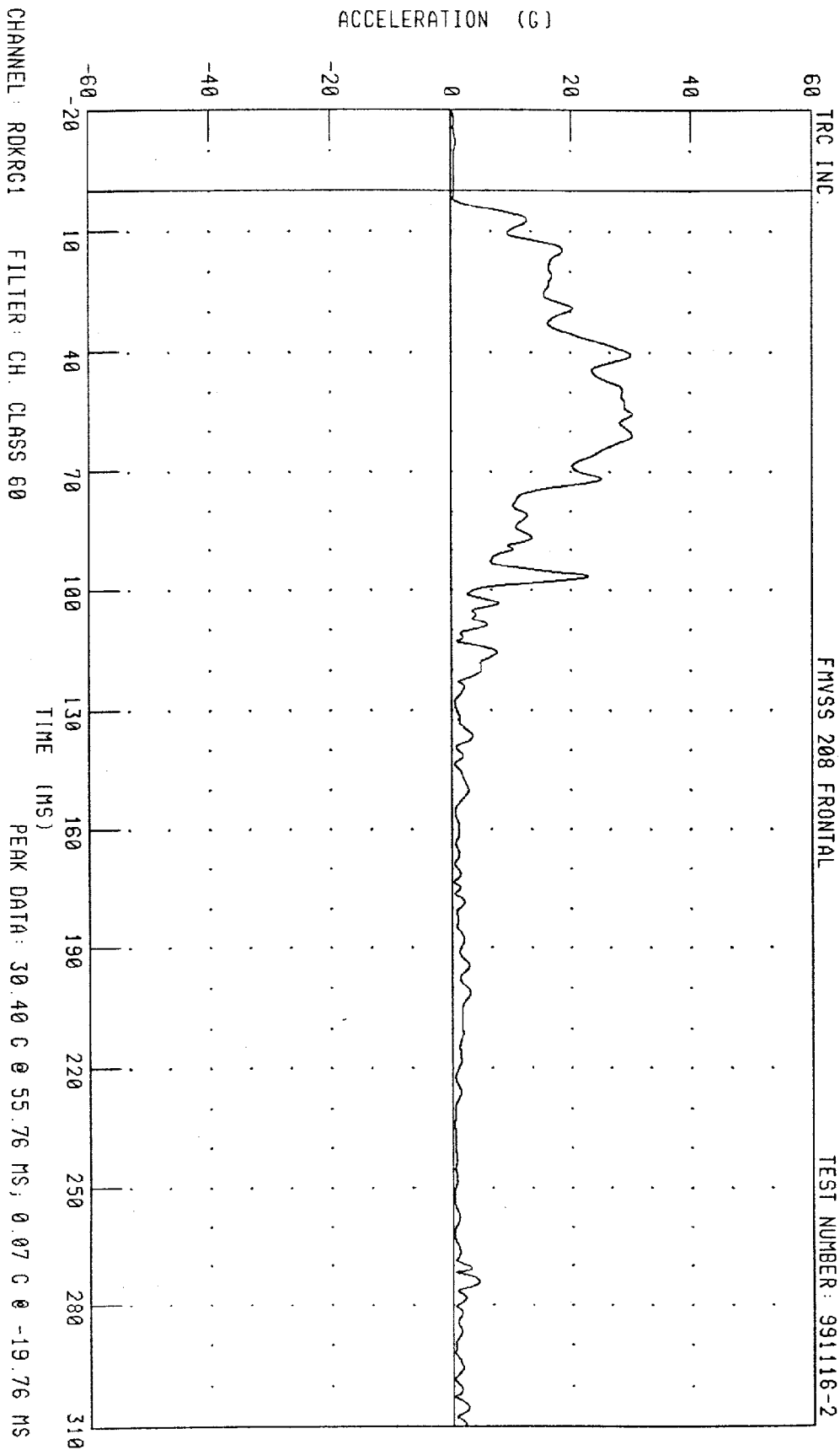
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER RESULTANT ACCELERATION

FMVSS 208 FRONTAL

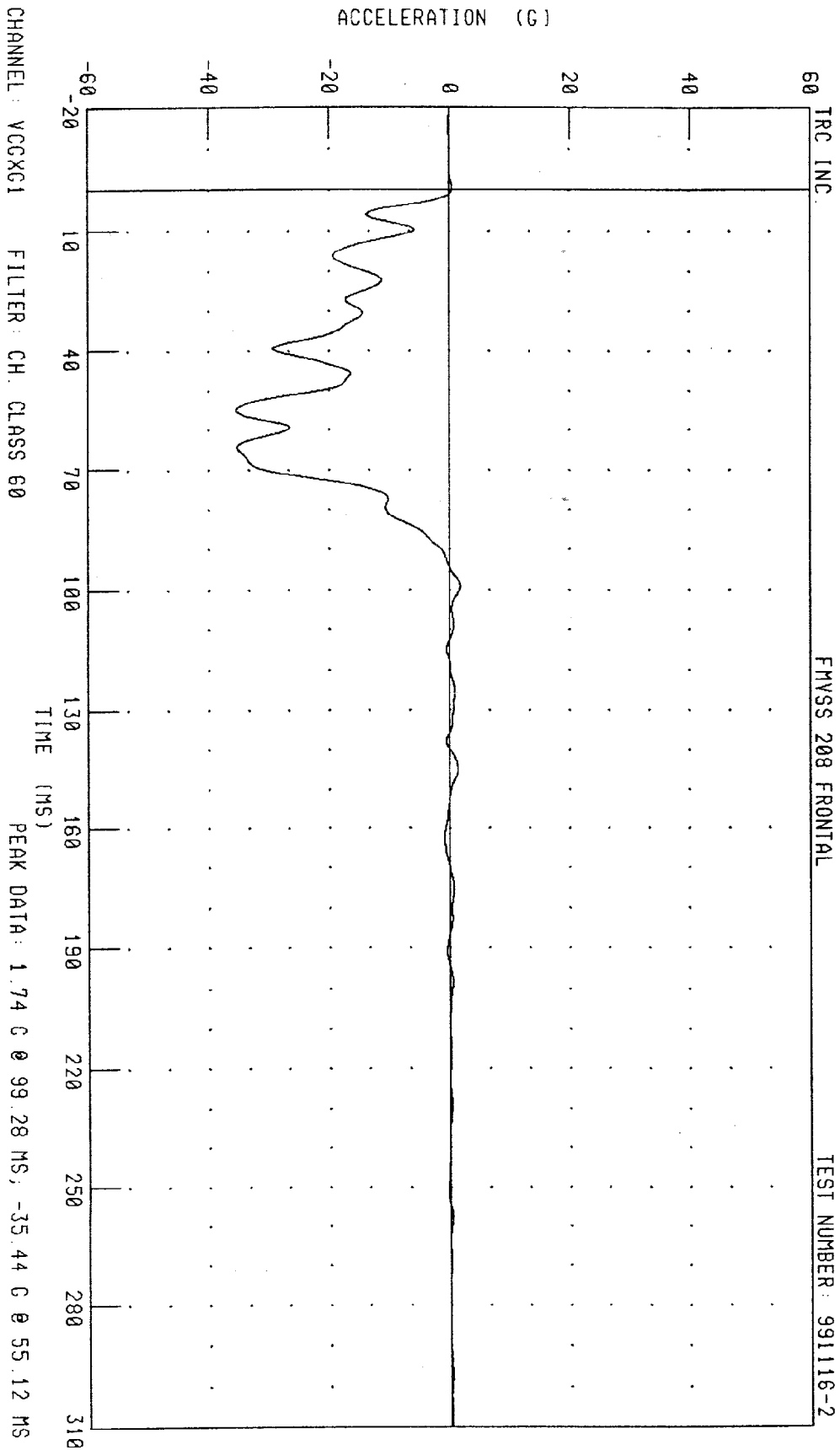
TEST NUMBER: 991116-2



2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE CENTER OF GRAVITY X-AXIS ACCELERATION

FMYSS 208 FRONTAL

TEST NUMBER: 991116-2

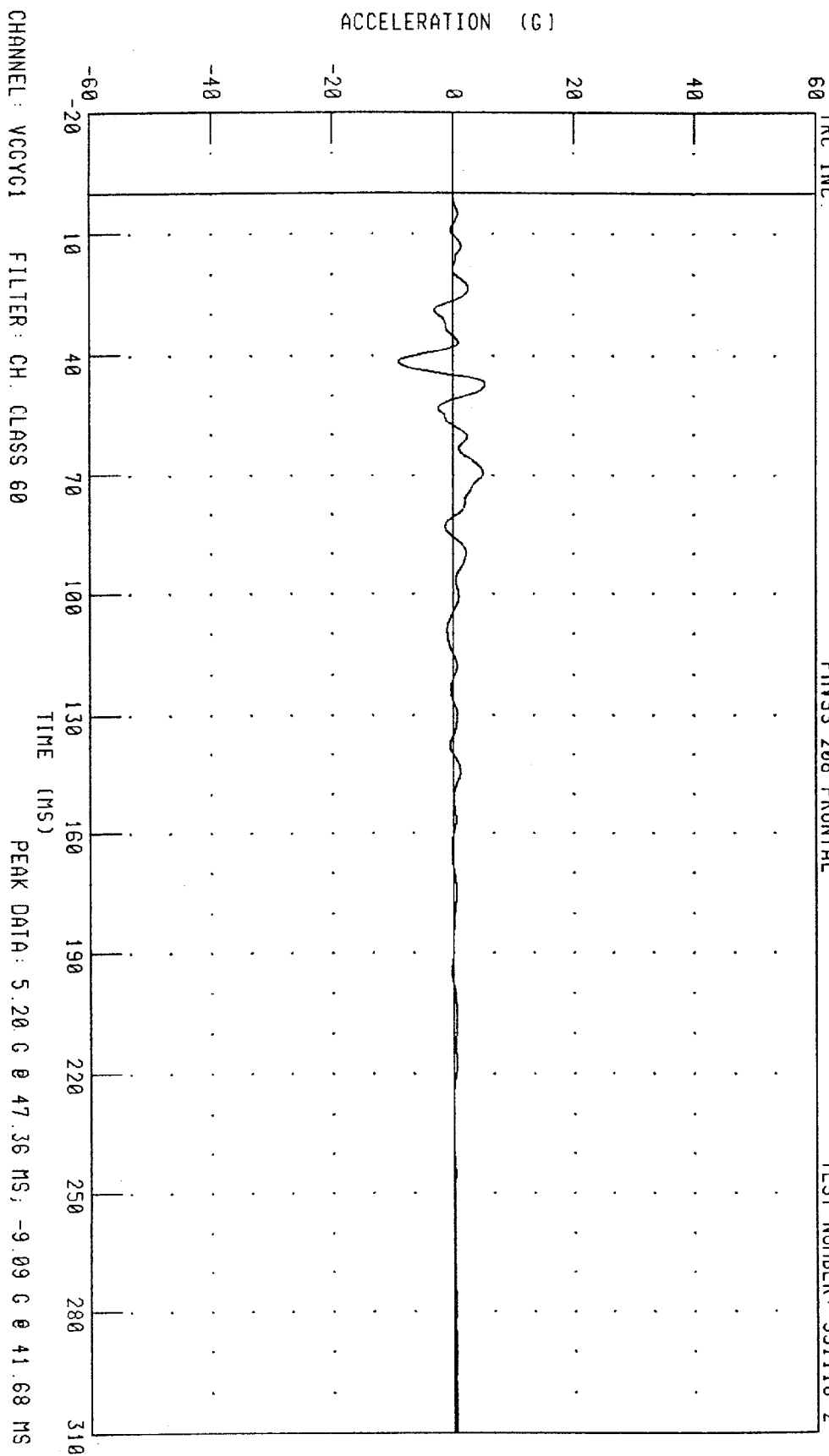


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE CENTER OF GRAVITY Y-AXIS ACCELERATION

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

TRC INC.

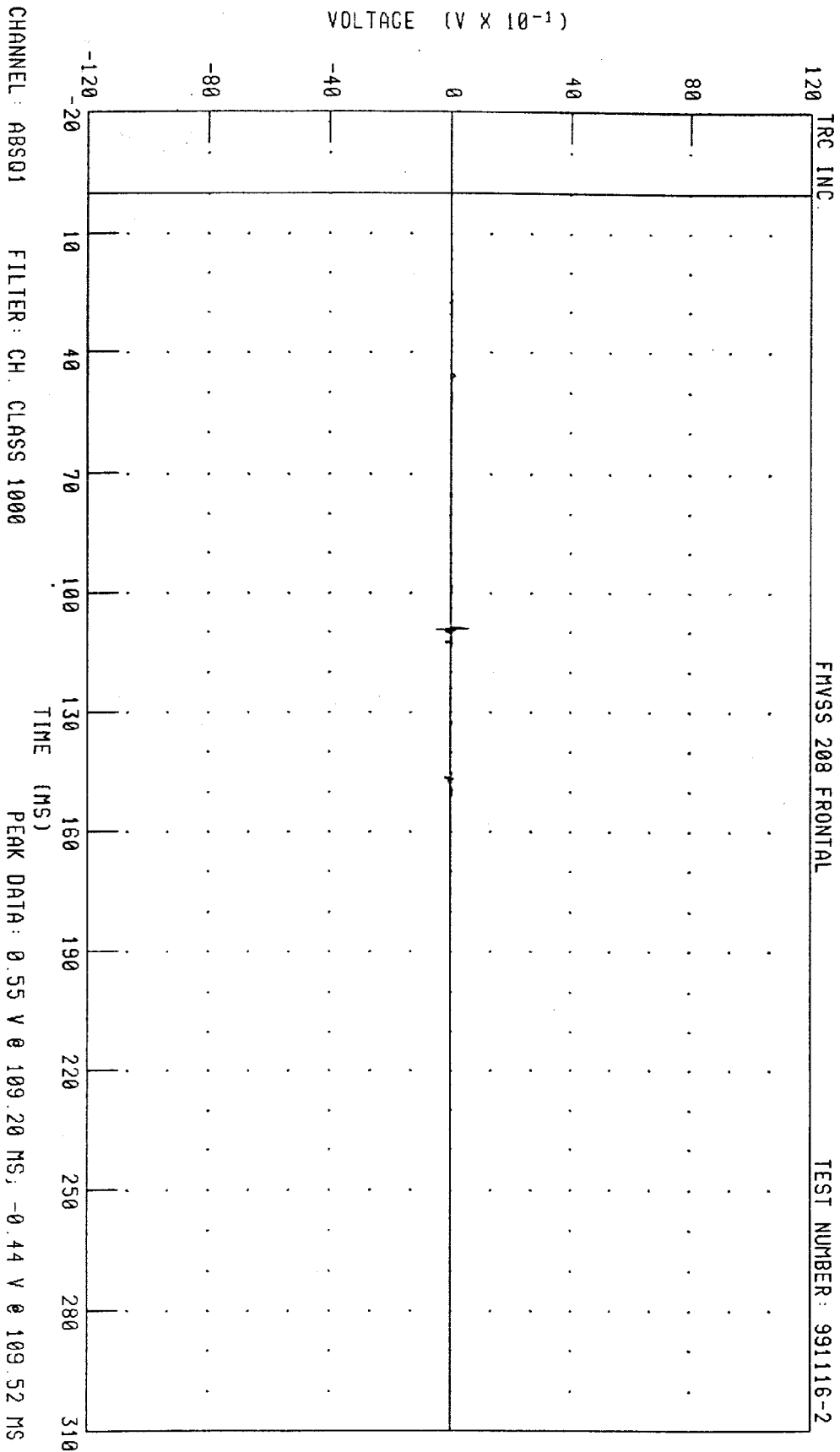


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH

DRIVER STAGE 1

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

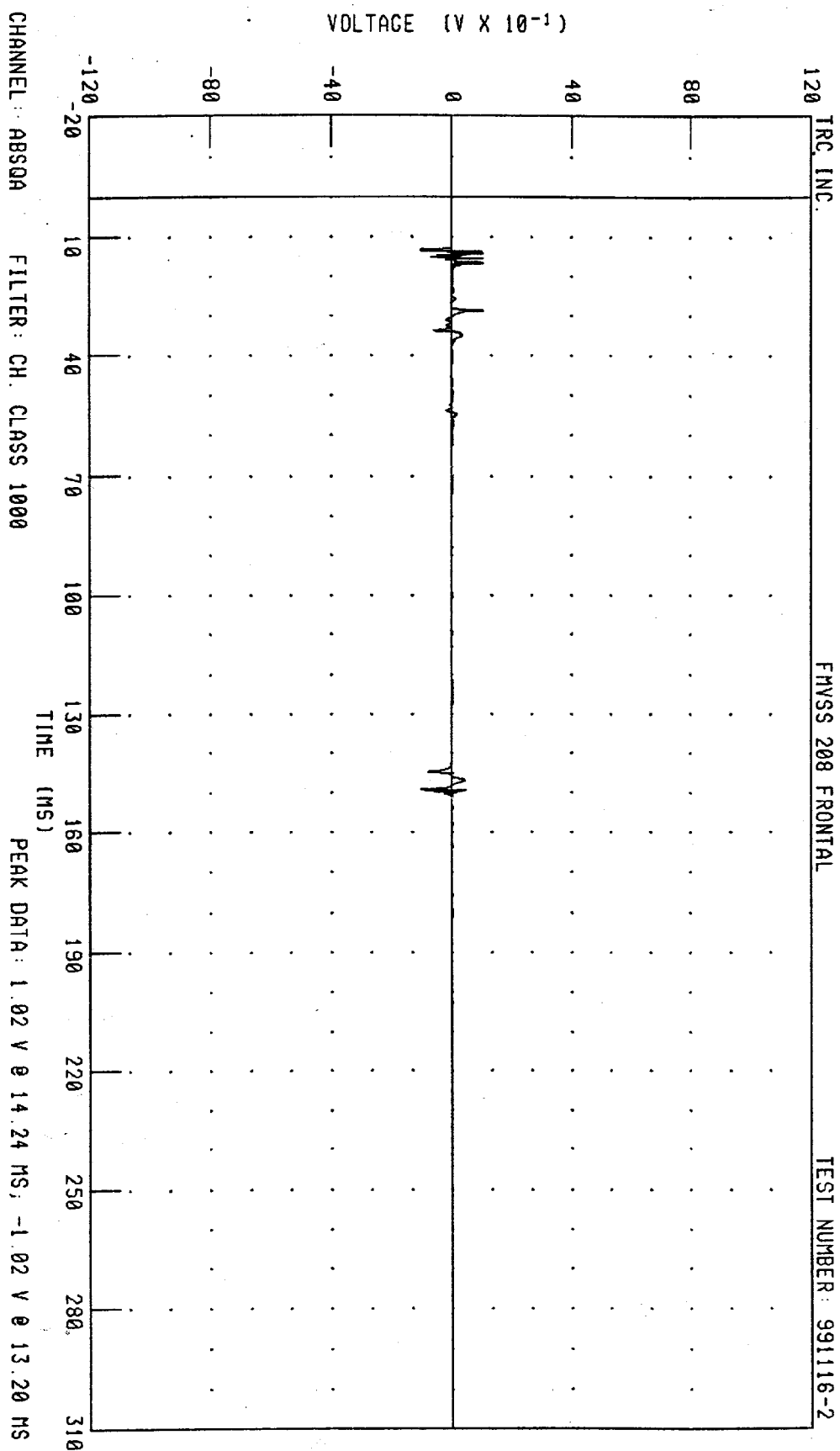


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH

DRIVER STAGE 2

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

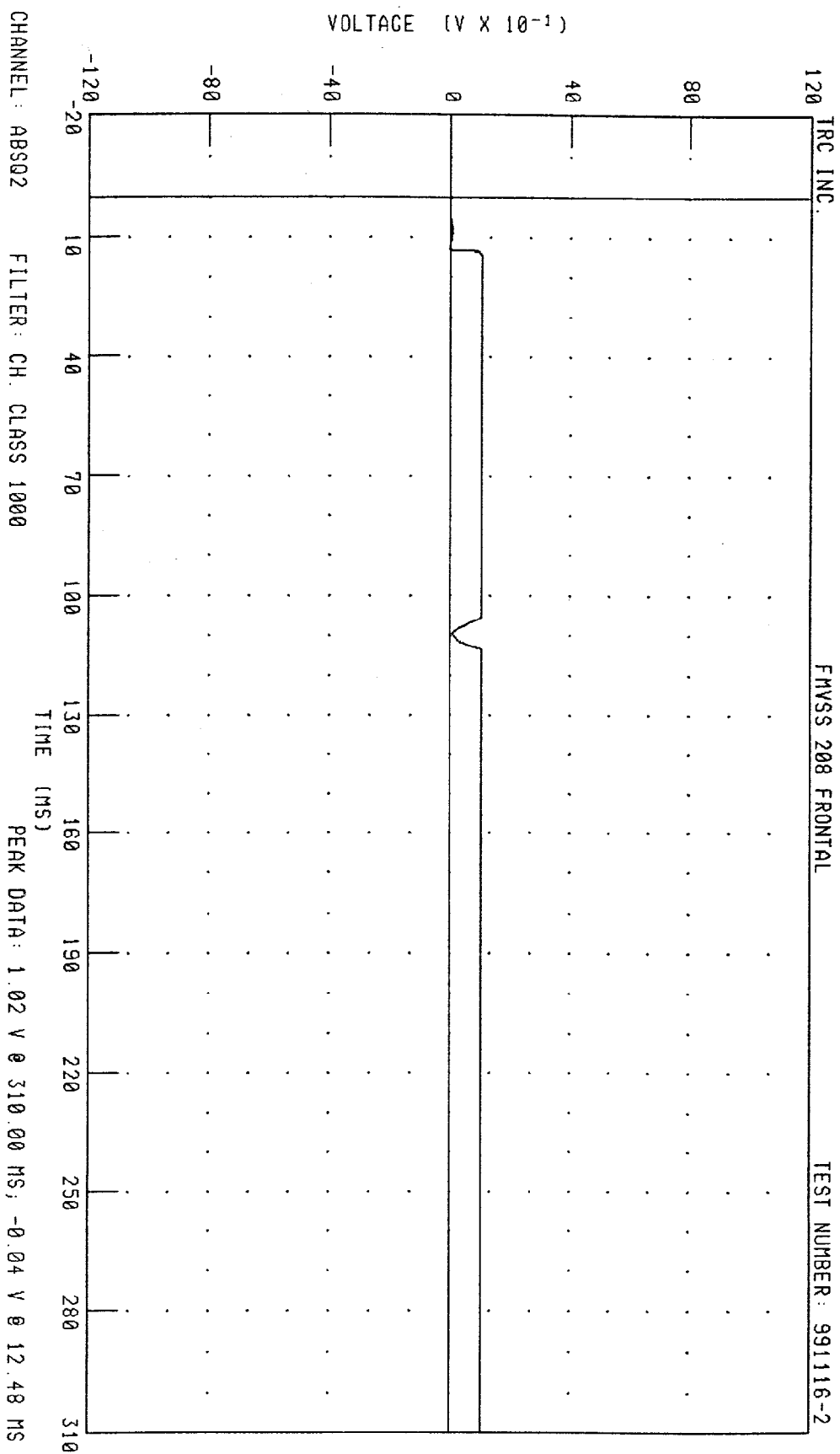


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH

PASSENGER STAGE 1

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2

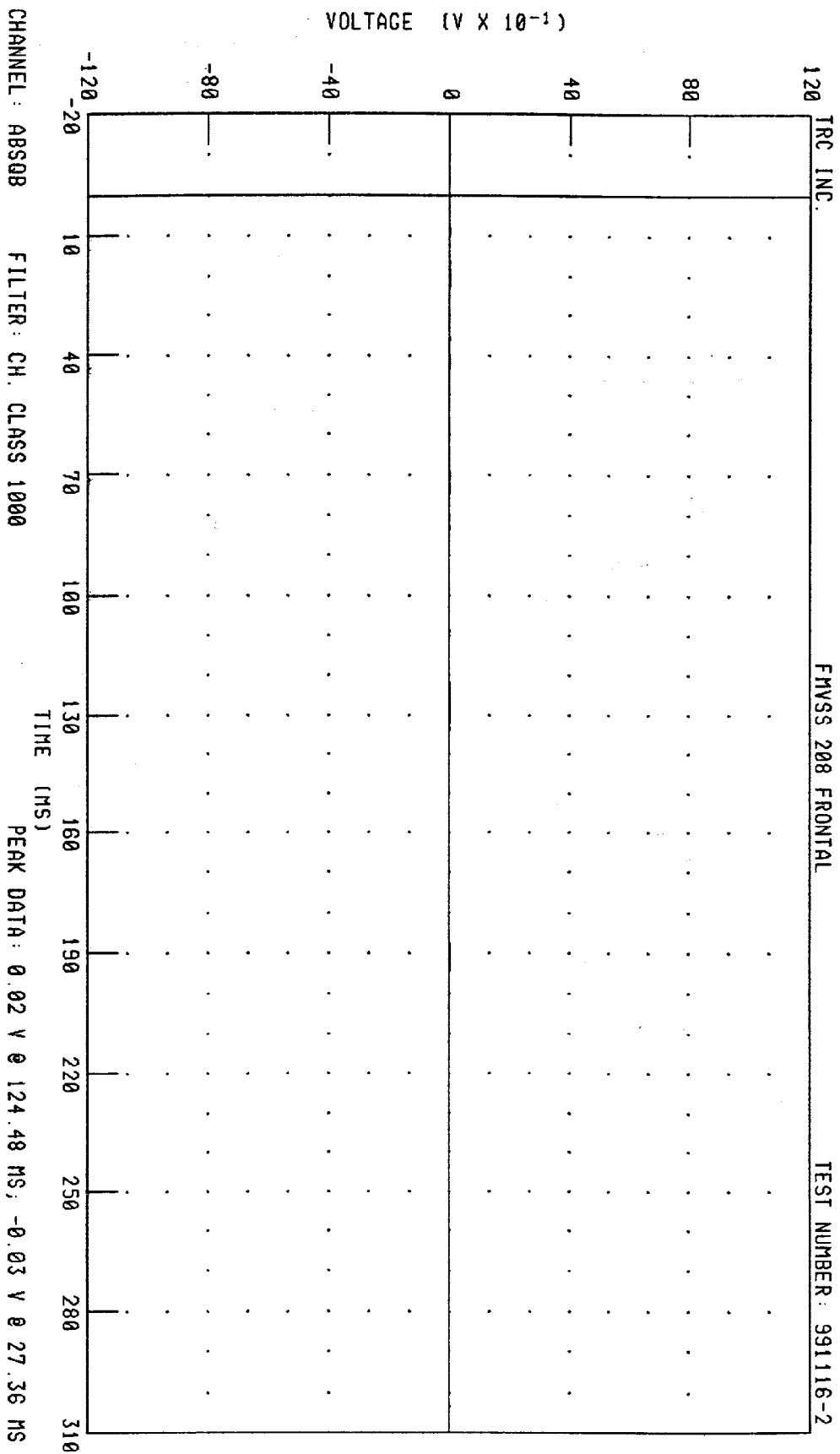


2000 MERCURY SABLE INTO A FLAT FRONTAL BARRIER AT 30 MPH

PASSENGER STAGE 2

FMVSS 208 FRONTAL

TEST NUMBER: 991116-2



Appendix C

Dummy Certification

Pre-Test Dummy Certification

Driver Dummy S/N 369

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
SN369 TRC.

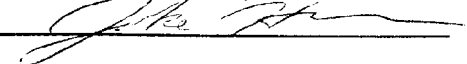
09-NOV-99

TRC INC. TEST NO: 369C7ED 572 0 SN369 EXT DIMENSIONS

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		300 - 310 MM	305. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		160 - 170 MM	165. MM
CHEST CIRCUMFERENCE (X)		851 - 881 MM	869. MM
WAIST CIRCUMFERENCE (Y)		757 - 787 MM	775. MM
CHEST DEPTH (O)		183 - 199 MM	183. MM
H-POINT HEIGHT (C)		81.5 - 86.5 MM	85.09 MM
H-POINT FROM SEATBACK (D)		144.5-149.5 MM	147.3. MM
SKULL CAP TO BACKLINE (H)		43.2 - 48.2 MM	46. MM
TOTAL SITTING HEIGHT (A)		775 - 800 MM	775. MM
THIGH CLEARANCE (F)		114 - 130 MM	127. MM
BUTTOCK KNEE LENGTH (K)		508.5-533.5 MM	528. MM
BUTTOCK POPLITEAL LENGTH (N)		414.0-439.4 MM	427. MM
POPLITEAL HEIGHT (L)		348.5-373.5 MM	366. MM
KNEE TO FLOOR HEIGHT (M)		394 - 419 MM	406. MM
FOOT LENGTH (P)		216 - 232 MM	228.6 MM
FOOT BREADTH (R)		76 - 92 MM	86. MM
SHOULDER PIVOT FROM BACKLINE (E)		71 - 81 MM	76. MM
SHOULDER BREADTH (V)		348 - 364 MM	358. MM
SHOULDER PIVOT HEIGHT (B)		434 - 450 MM	436. MM
ELBOW REST HEIGHT (J)		183 - 203 MM	185. MM
SHOULDER-ELBOW LENGTH (I)		279 - 297 MM	290. MM
BACK OF ELBOW TO FINGER TIP (G)		244 - 259 MM	251. MM
HIP WIDTH AT H-POINT (W)		272 - 287 MM	282. MM

HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
DUMMY MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 121799.1231

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

09-NOV-99

TRC INC.

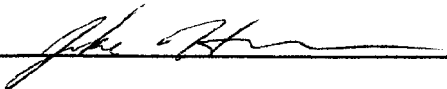
TEST NO: 369C7HD1

572 0 SN369 HEAD DROP CAL 7

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	276.95 G
PEAK LATERAL ACCELERATION	15 G MAX	3.82 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN

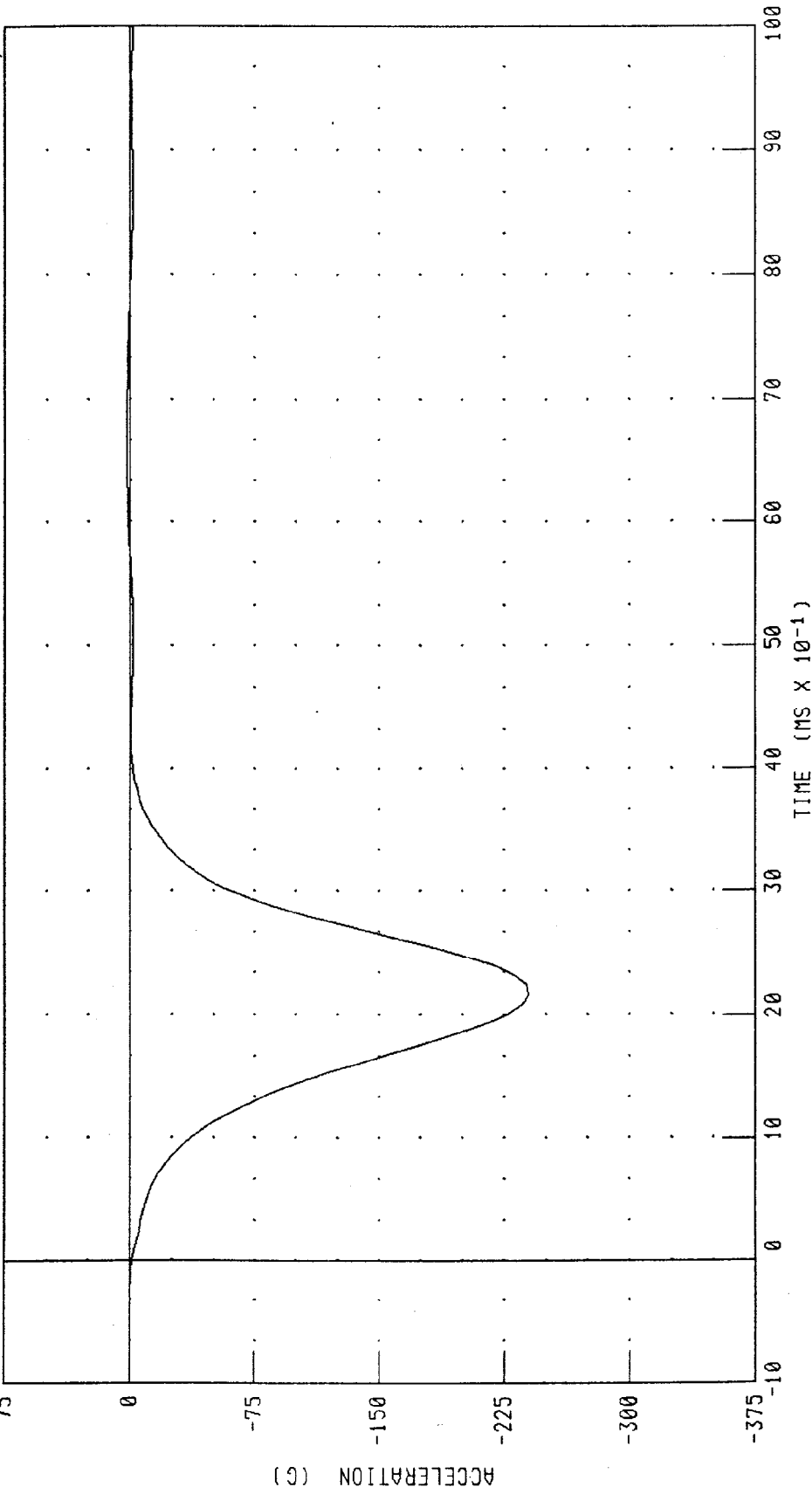


RUN NUMBER: 110999.0833;1

PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

75 IRC TEST NUMBER: 369C7HD1 572 0 SN369 HEAD DROP CAL 7 RUN NUMBER: 110999.0034,1



CHANNEL: HEDXC FILTER: CH. CLASS 1000 PEAK DATA: 2.02 G @ 6.40 MS; -240.03 G @ 2.16 MS

PART 572-0 HYBRID III HEAD CALIBRATION

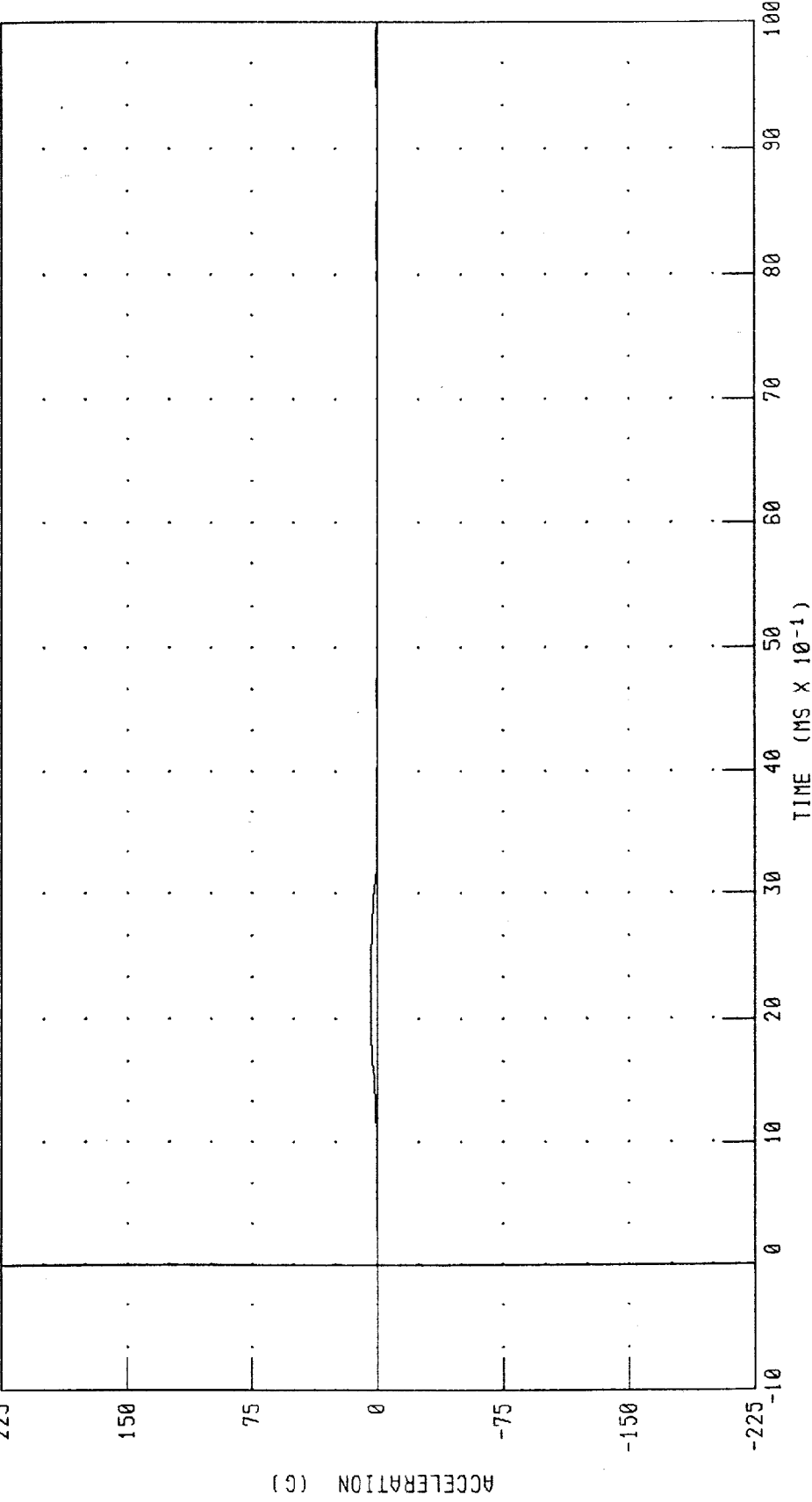
HEAD ACCELERATION Y AXIS

572 0 SN369 HEAD DROP CAL 7

TRC TEST NUMBER: 369C7HD1

225

RUN NUMBER: 110999.0834,1



CHANNEL: HEDYC FILTER: CH. CLASS 1000

PEAK DATA: 3.83 G @ 2.32 MS; -0.20 G @ 4.16 MS

PART 572-0 HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

TRC TEST NUMBER: 369C7HD1

572 0 SN369 HEAD DROP CAL 7

RUN NUMBER: 110999 0834;1

375

300

225

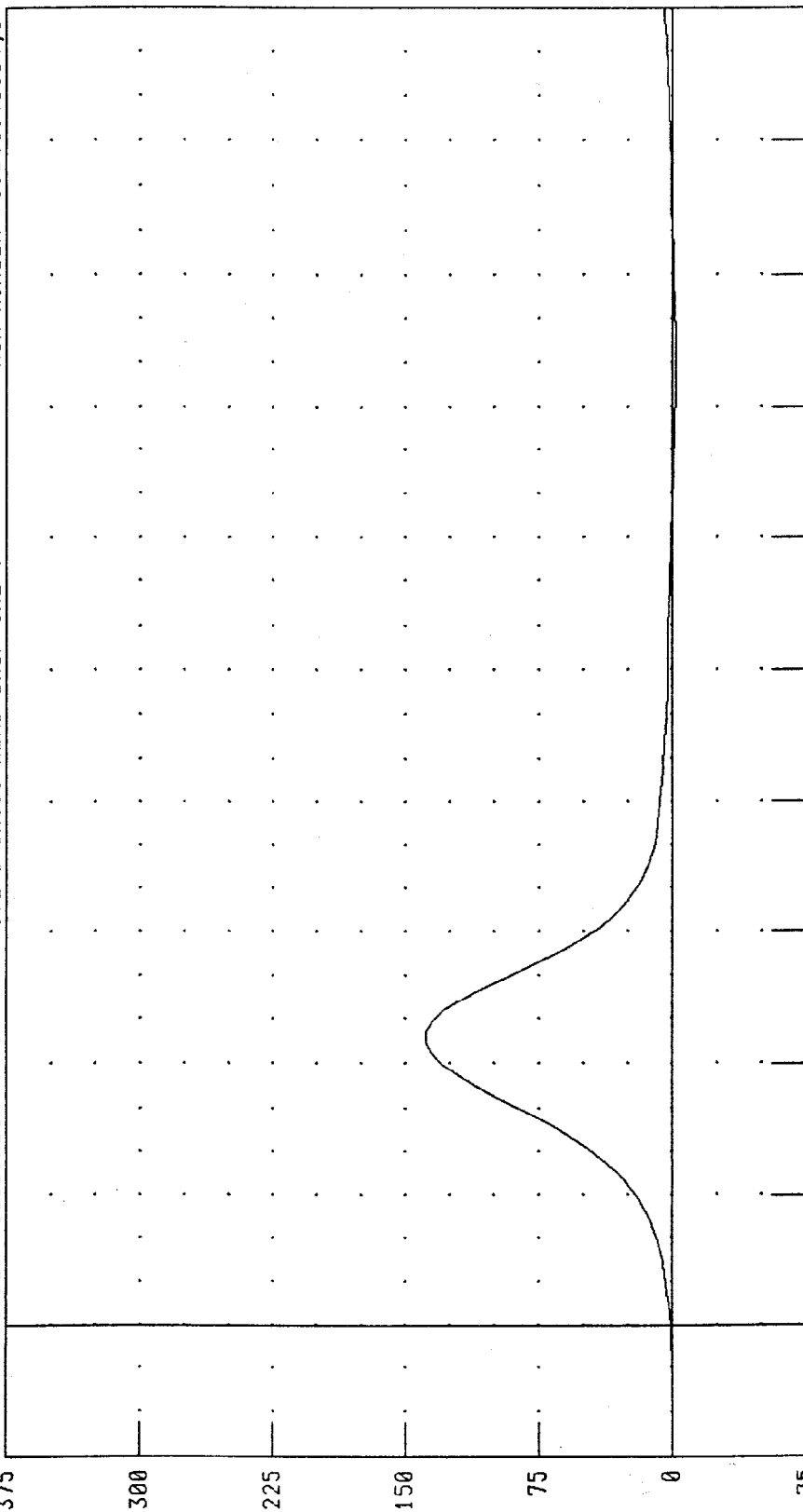
150

75

0

-75

ACCELERATION (G)

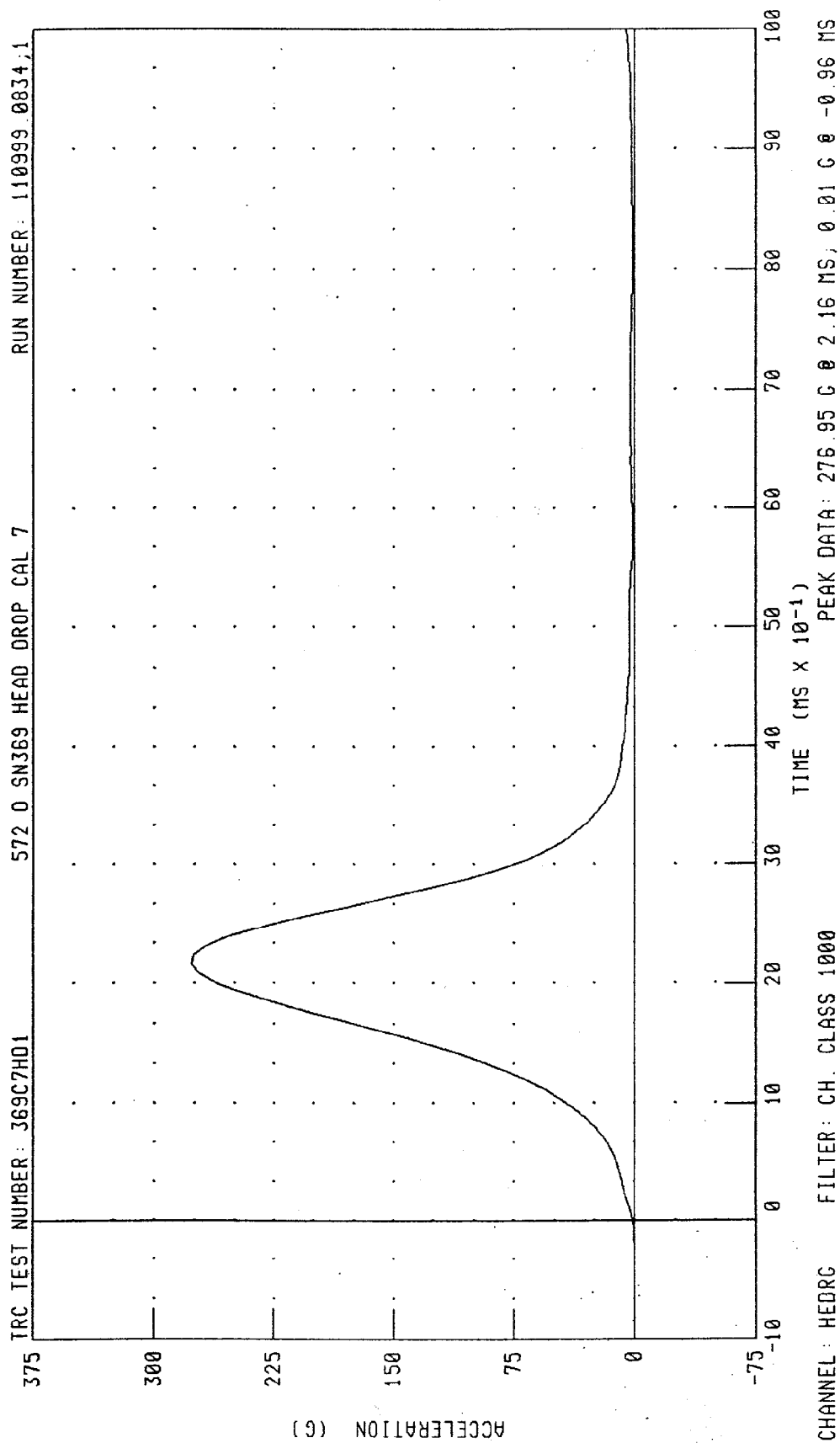


TIME (MS X 10⁻¹)

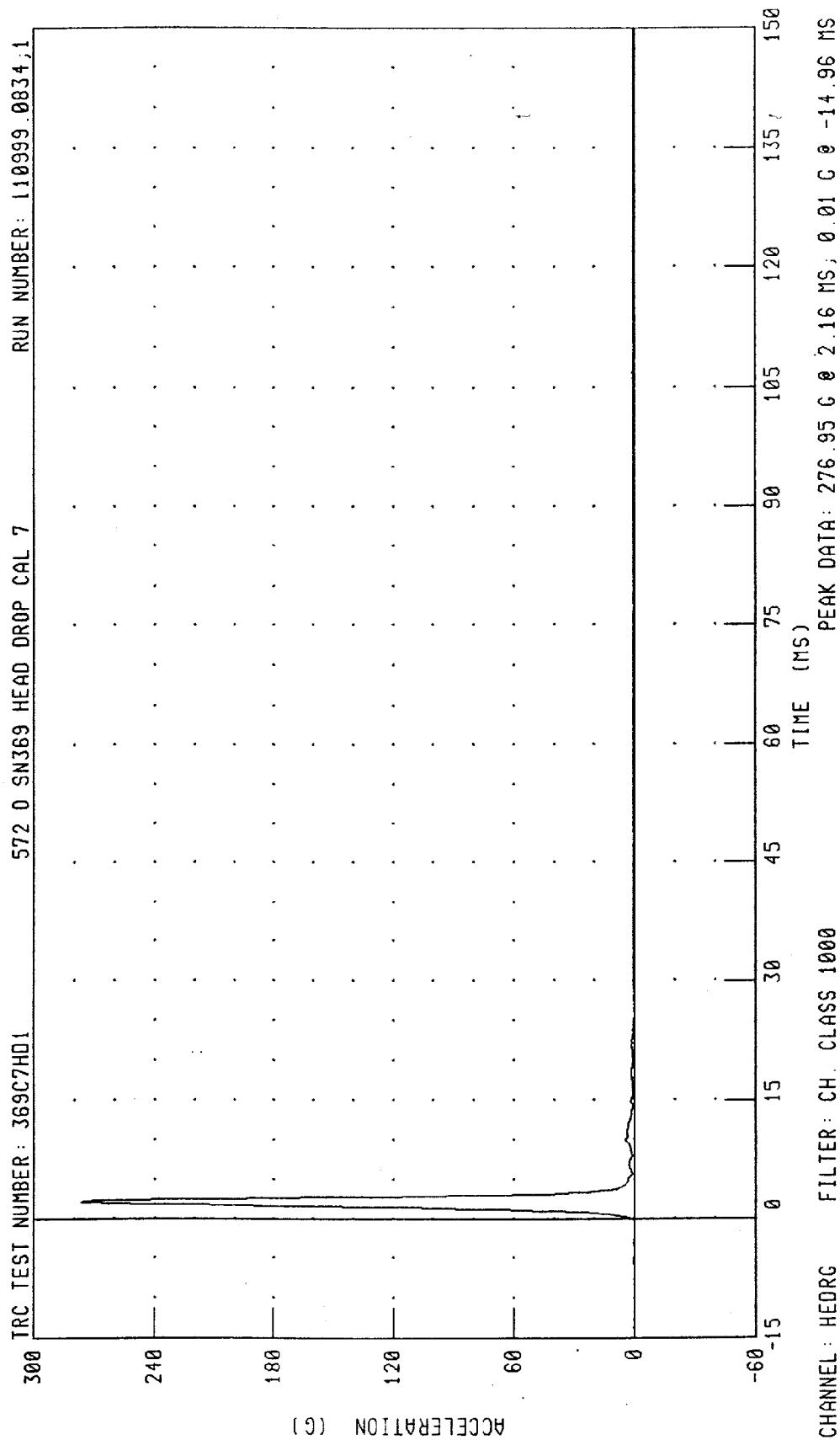
PEAK DATA: 138.12 G @ 2.16 MS; -1.83 G @ 7.04 MS

CHANNEL: HEDZG FILTER: CH. CLASS 1000

PART 572-0 HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION



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



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

09-NOV-99

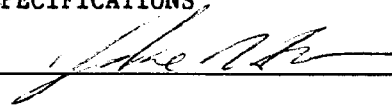
NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C7NF2 572 O SN369 NECK FLEX. CAL7

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.12 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.1 - 2.5 M/S	2.24 M/S
	20 MS	4.0 - 5.0 M/S	4.50 M/S
	30 MS	5.8 - 7.0 M/S	6.74 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	83.08 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT		69 - 83 NM	81.43 NM
POSITIVE MOMENT DECAY TIME FROM TO TO 10 NM		80 - 100 MS	88.88 MS

TEST MEETS SPECIFICATIONS

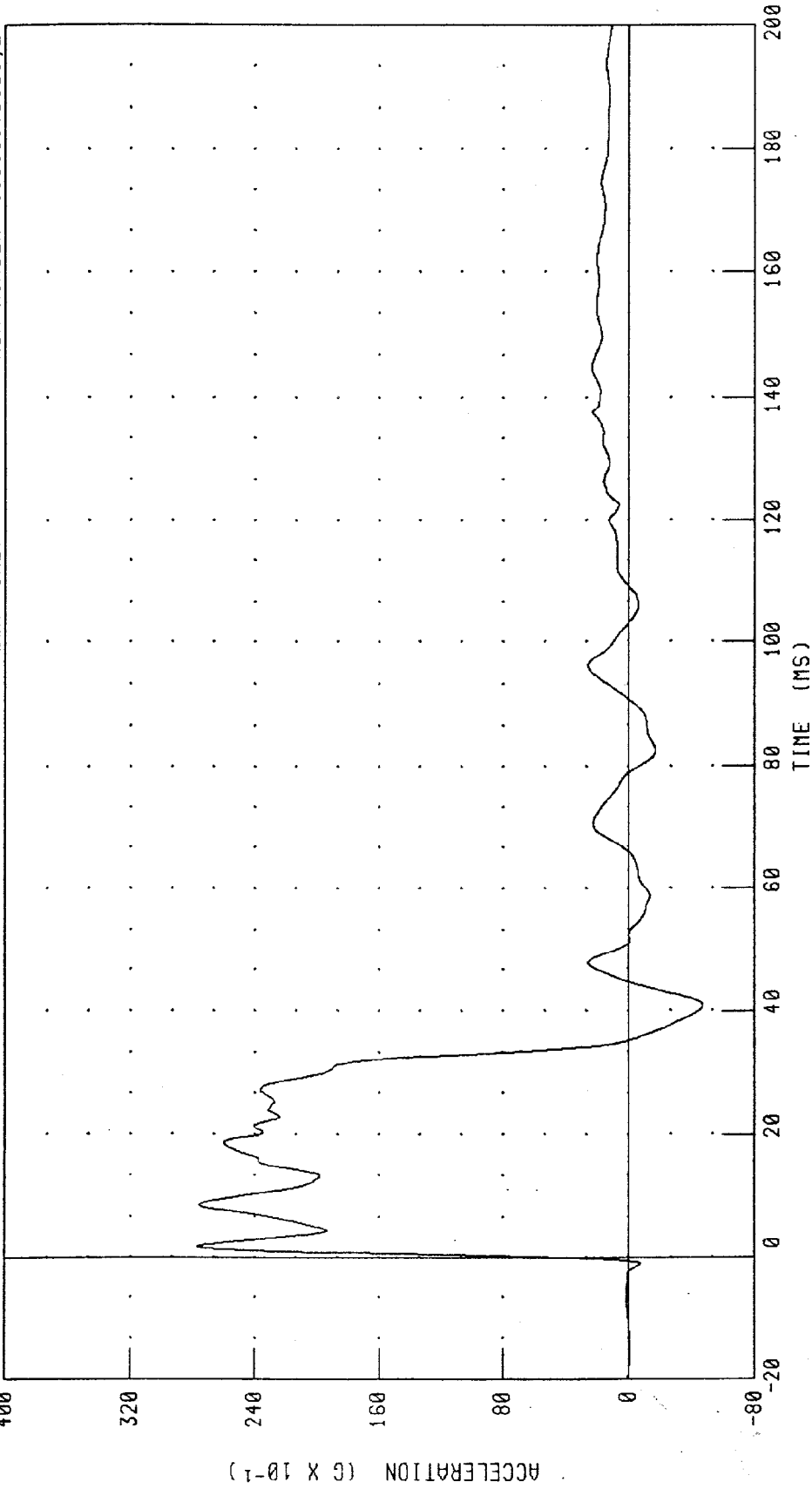
TECHNICIAN



RUN NUMBER: 110999.1127;2

PART 572-0 HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 369C7NF2 572 0 SN369 NECK FLEX. CAL7 RUN NUMBER: 110999.1133;2



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 27.76 C @ 1.76 MS; -4.72 C @ 40.96 MS

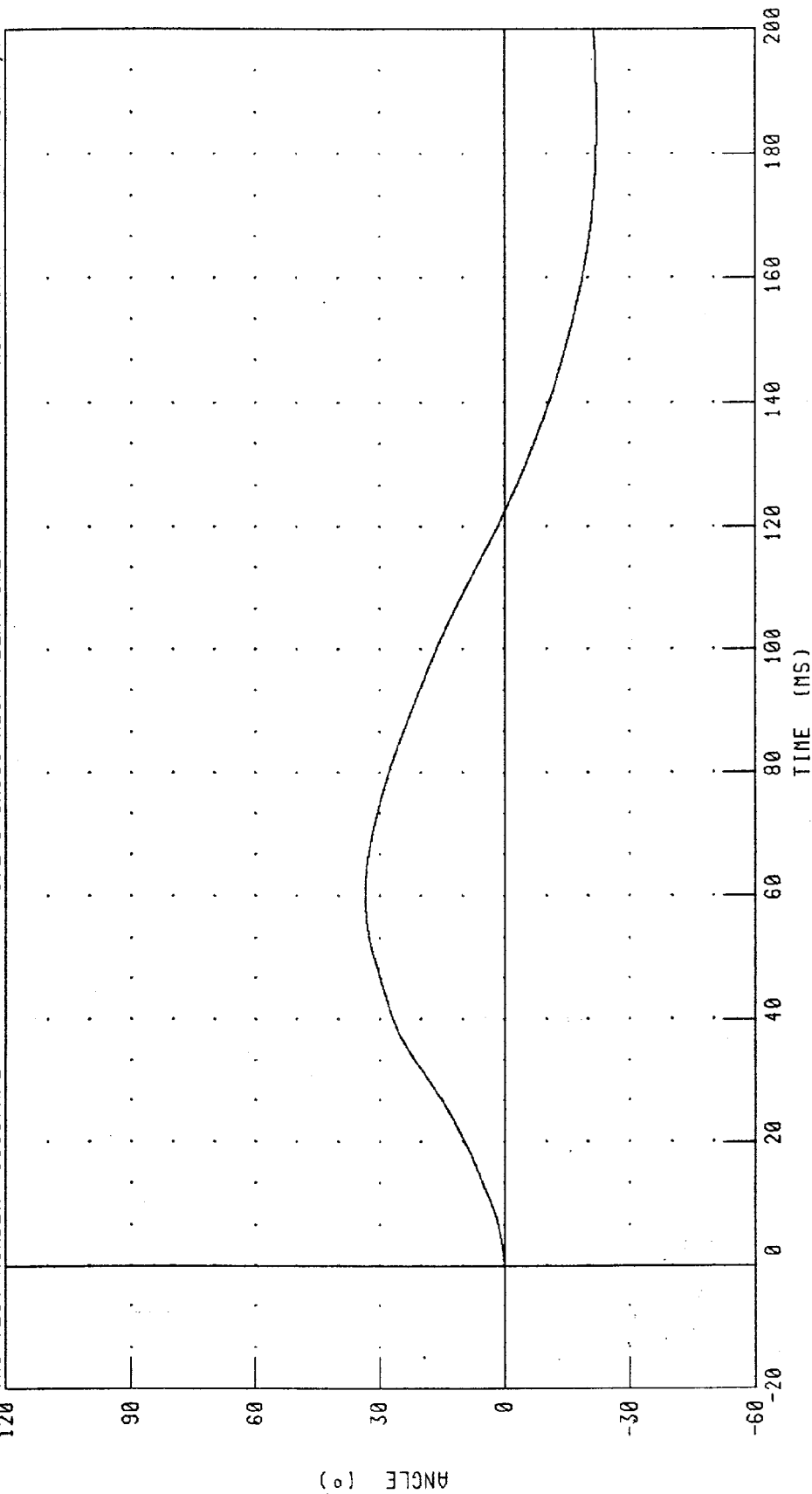
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 369C7NF2

572 0 SN369 NECK FLEX. CAL7

RUN NUMBER: 110999.1133;2



PEAK DATA: 33.43 ° @ 60.24 MS, -22.14 ° @ 186.16 MS

FILTER: CH. CLASS 60

CHANNEL: BETA

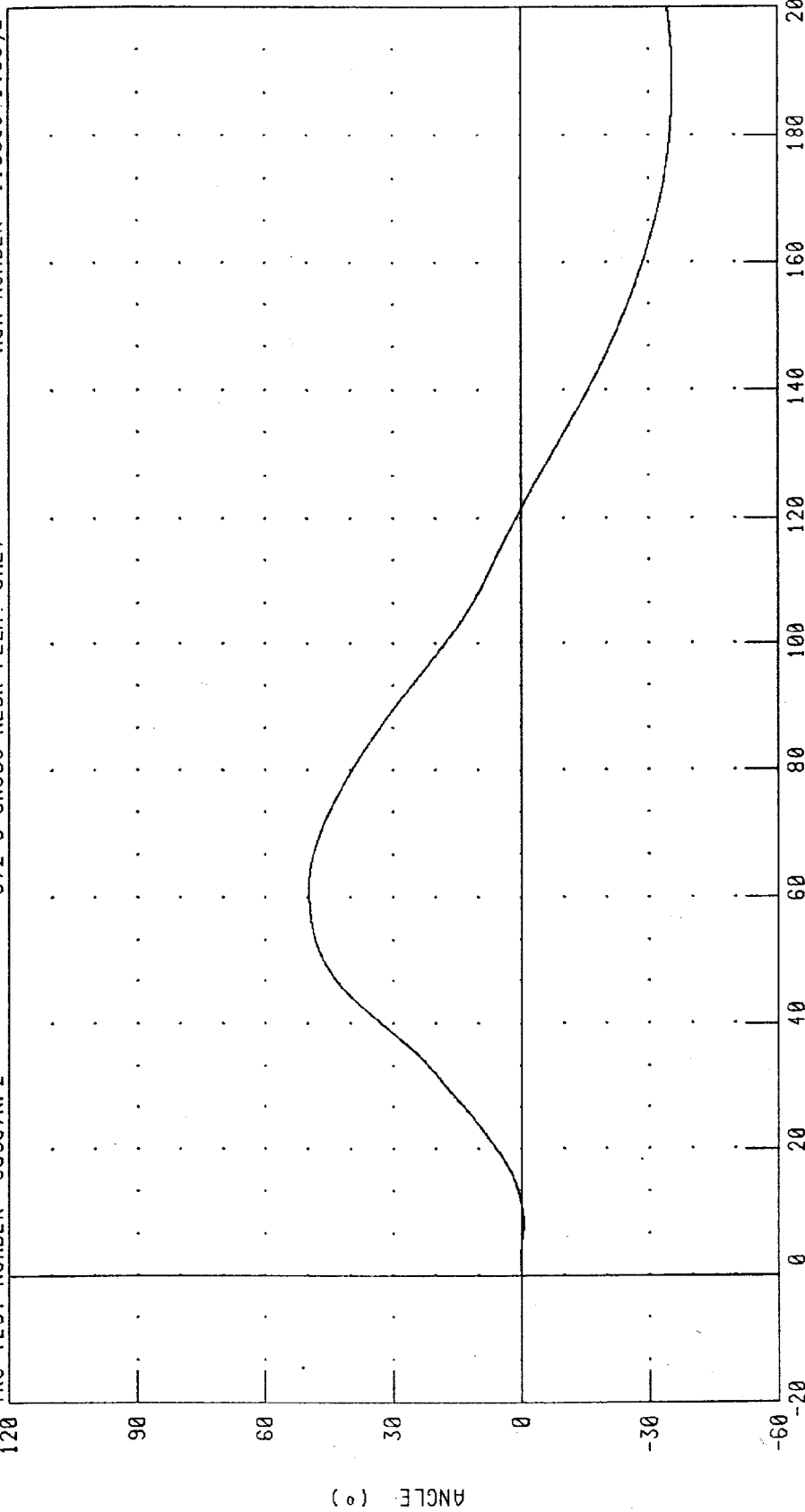
PART 572-0 HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 369C7NF2

572 0 SN369 NECK FLEX. CAL7

RUN NUMBER: 110999.1133;2

120



CHANNEL: THETA

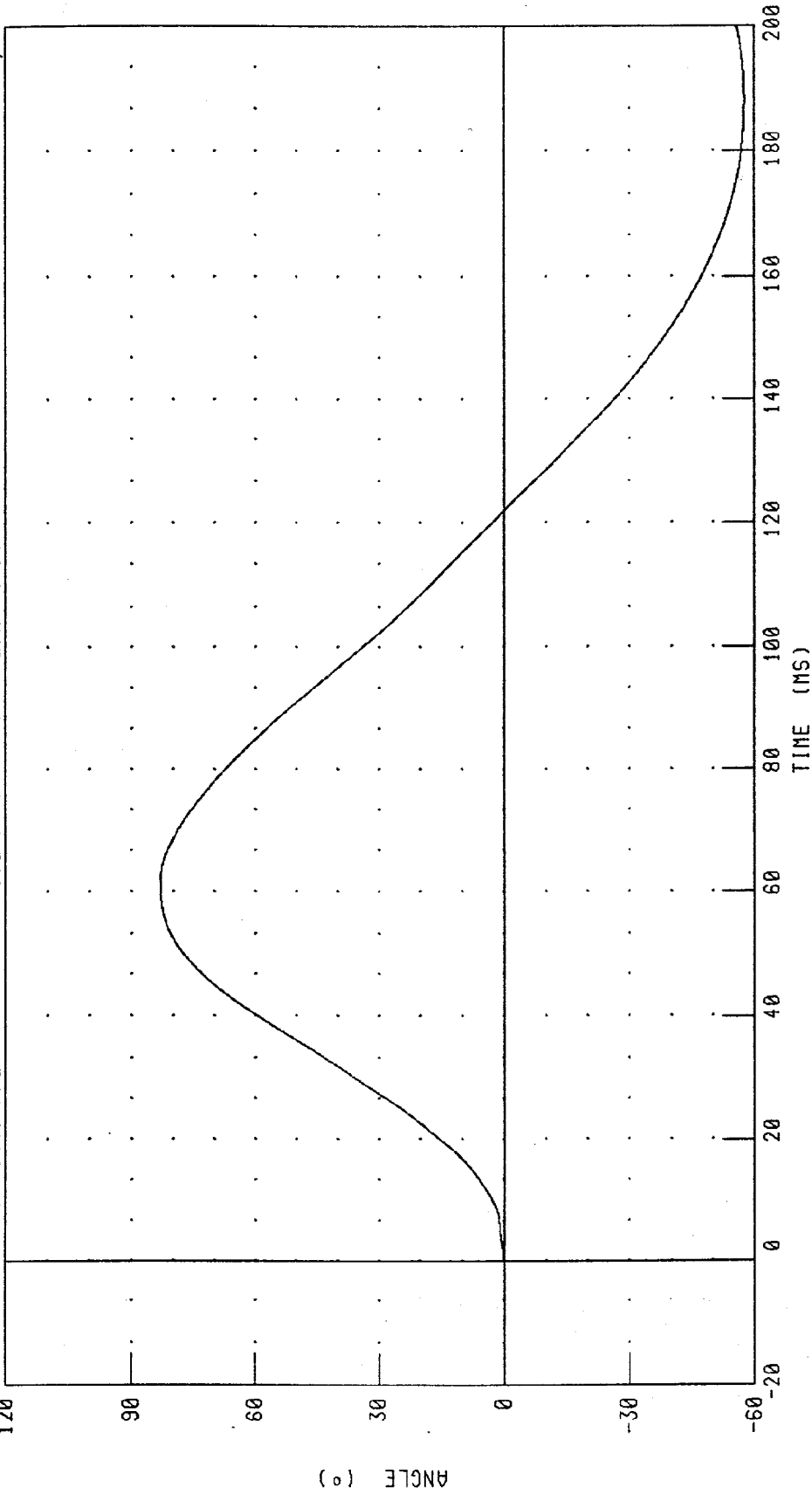
FILTER: CH. CLASS 60

PEAK DATA: 49.67 ° @ 61.44 MS; -35.49 ° @ 188.80 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 369C7NF2 572 0 SN369 NECK FLEX. CAL7 RUN NUMBER: 110999.1133,2



PEAK DATA: 83.08 ° @ 61.04 MS, -57.61 ° @ 188.08 MS

FILTR: CH. CLASS 60

CHANNEL: TOTAN

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 369C7NF2

572 0 SN369 NECK FLEX. CAL7

RUN NUMBER: 110999 1133;2

80

40

0

-40

-80

-120

-160

FORCE (N X 10¹)

TIME (MS)

200

180

160

140

120

100

80

60

40

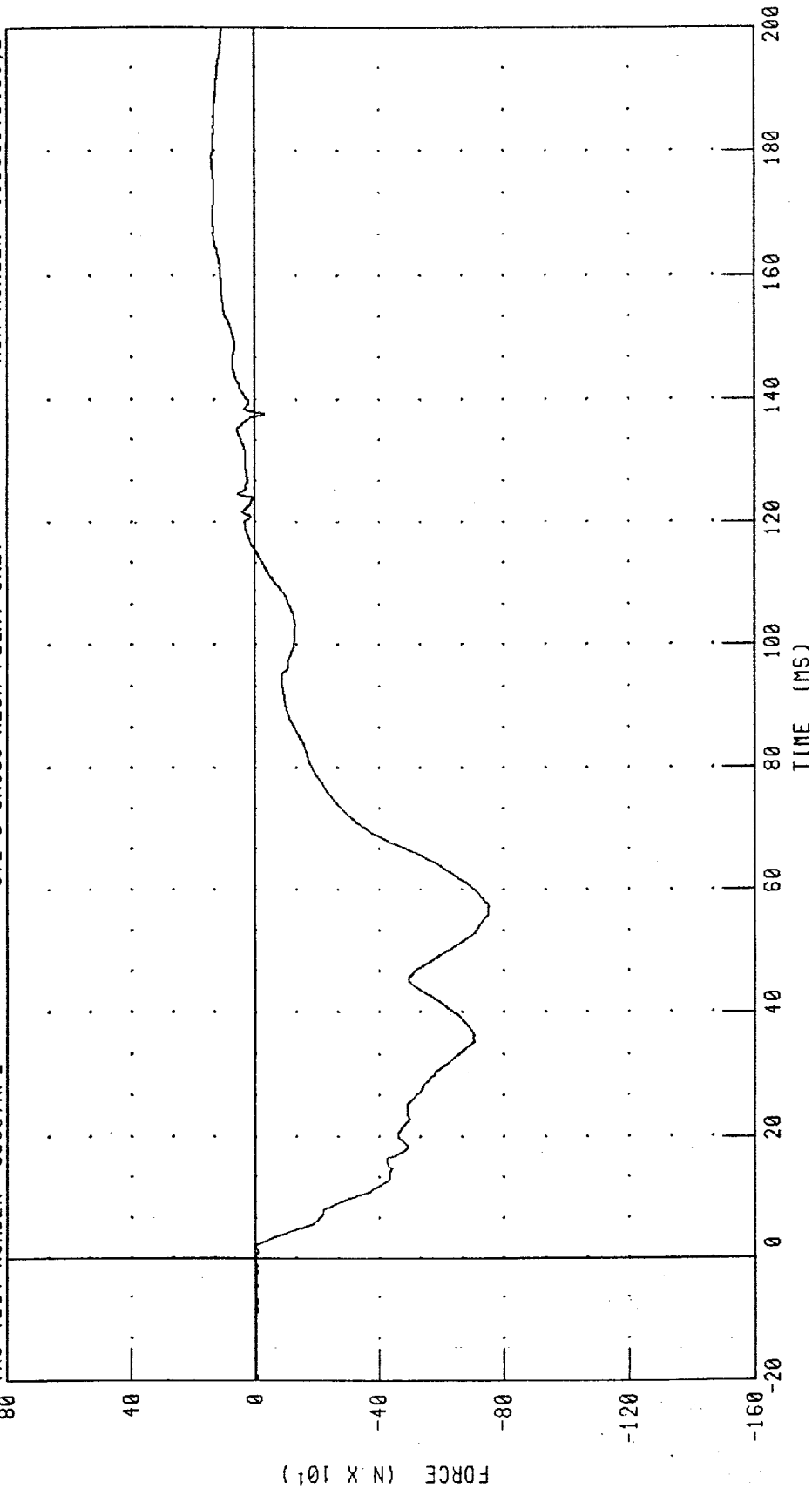
20

0

PEAK DATA: 142.31 N @ 177.44 MS; -752.52 N @ 56.24 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

PART 572-0 HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION
TRC TEST NUMBER: 369C7NF2 572 0 SN389 NECK FLEX. CAL7 RUN NUMBER: 110999.1133;2



CHANNEL: NEKXFC FILTER: CH. CLASS 600 PEAK DATA: 142.48 N @ 179.04 MS; -752.09 N @ 57.36 MS

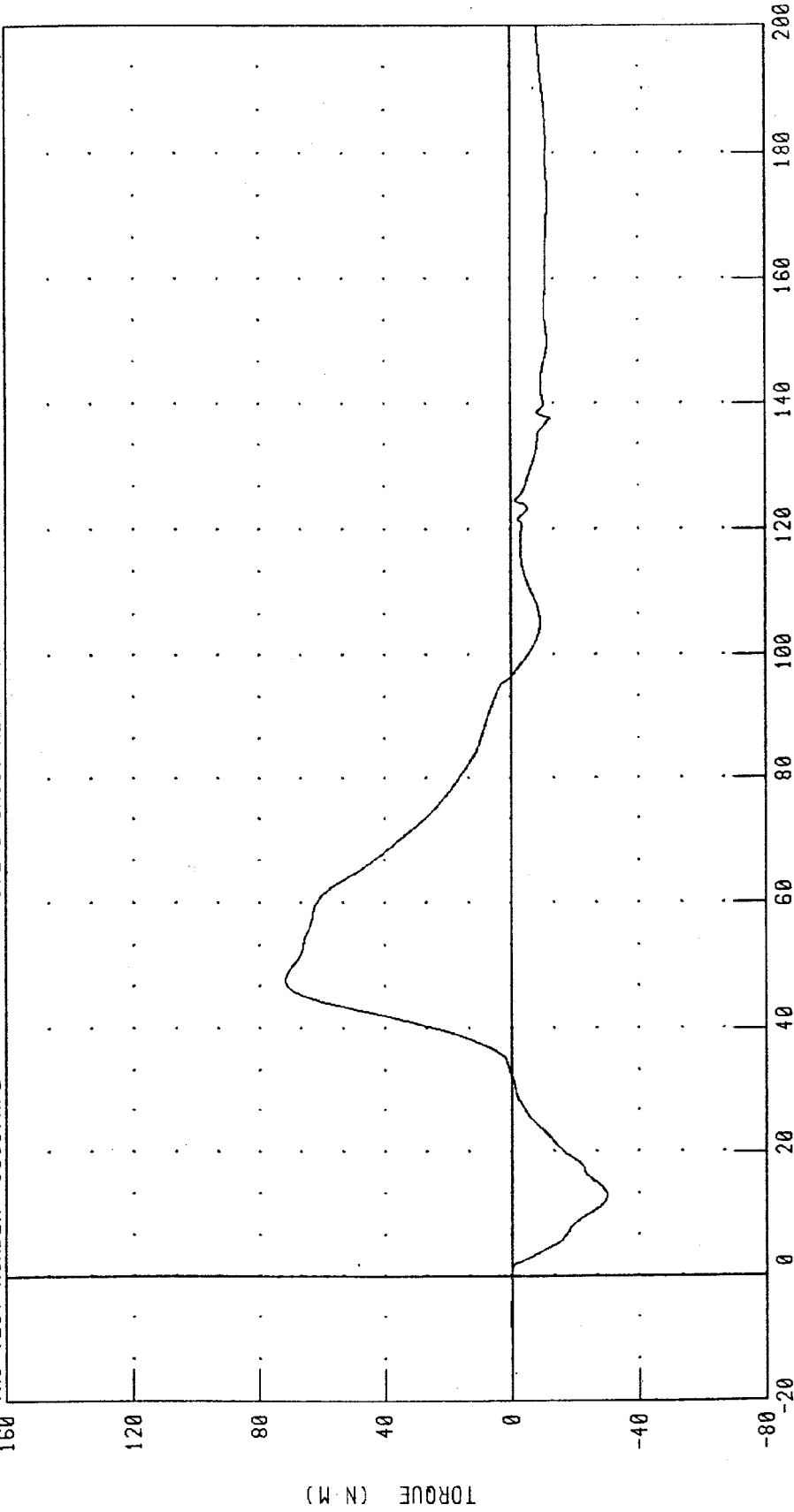
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 369C7NF2

572 0 SN369 NECK FLEX. CAL7

RUN NUMBER: 110999.1133,2



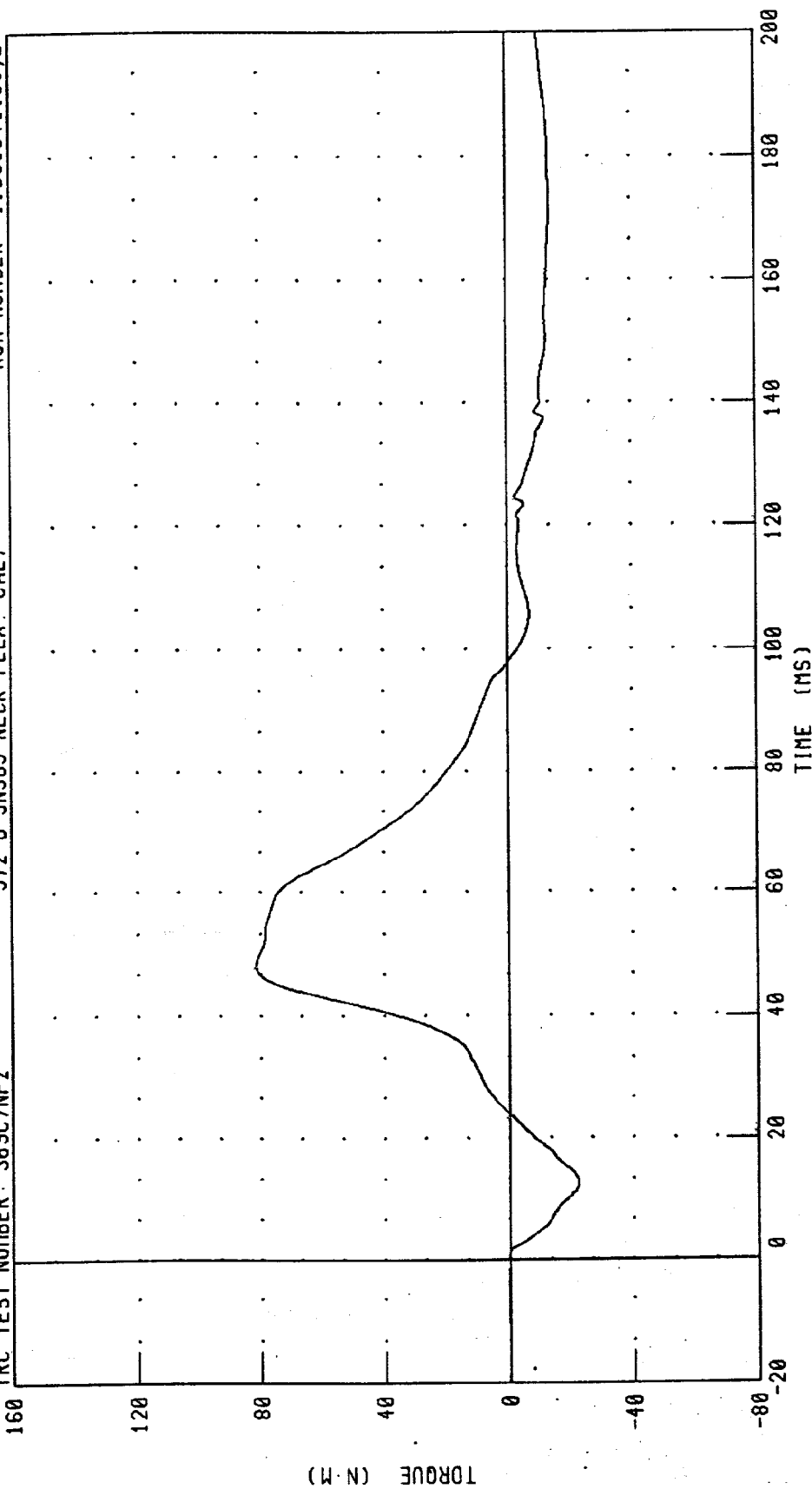
CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 71.58 N-M @ 47.68 MS, -29.95 N-M @ 13.04 MS

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

TRC TEST NUMBER: 369C7NF2

572 0 SN369 NECK FLEX. CAL7

RUN NUMBER: 110999.1133;2



CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 81.43 N·M @ 48.00 MS, -22.29 N·M @ 12.80 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

09-NOV-99

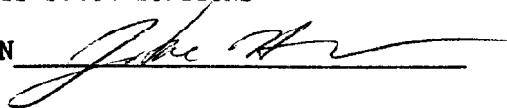
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C7NE1 572 0 SN369 NECK EXT. CAL 7

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.5 - 1.9 M/S	1.79 M/S
	20 MS 3.1 - 3.9 M/S	3.49 M/S
	30 MS 4.6 - 5.6 M/S	5.22 M/S
PEAK D-PLANE ROTATION	97 - 109 DEG.	104.42 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT	-55 / -69 NM	-56.38 NM
NEGATIVE MOMENT DECAY TIME FROM TO / -10 NM LEVEL	94 - 114 MS	108.32 MS

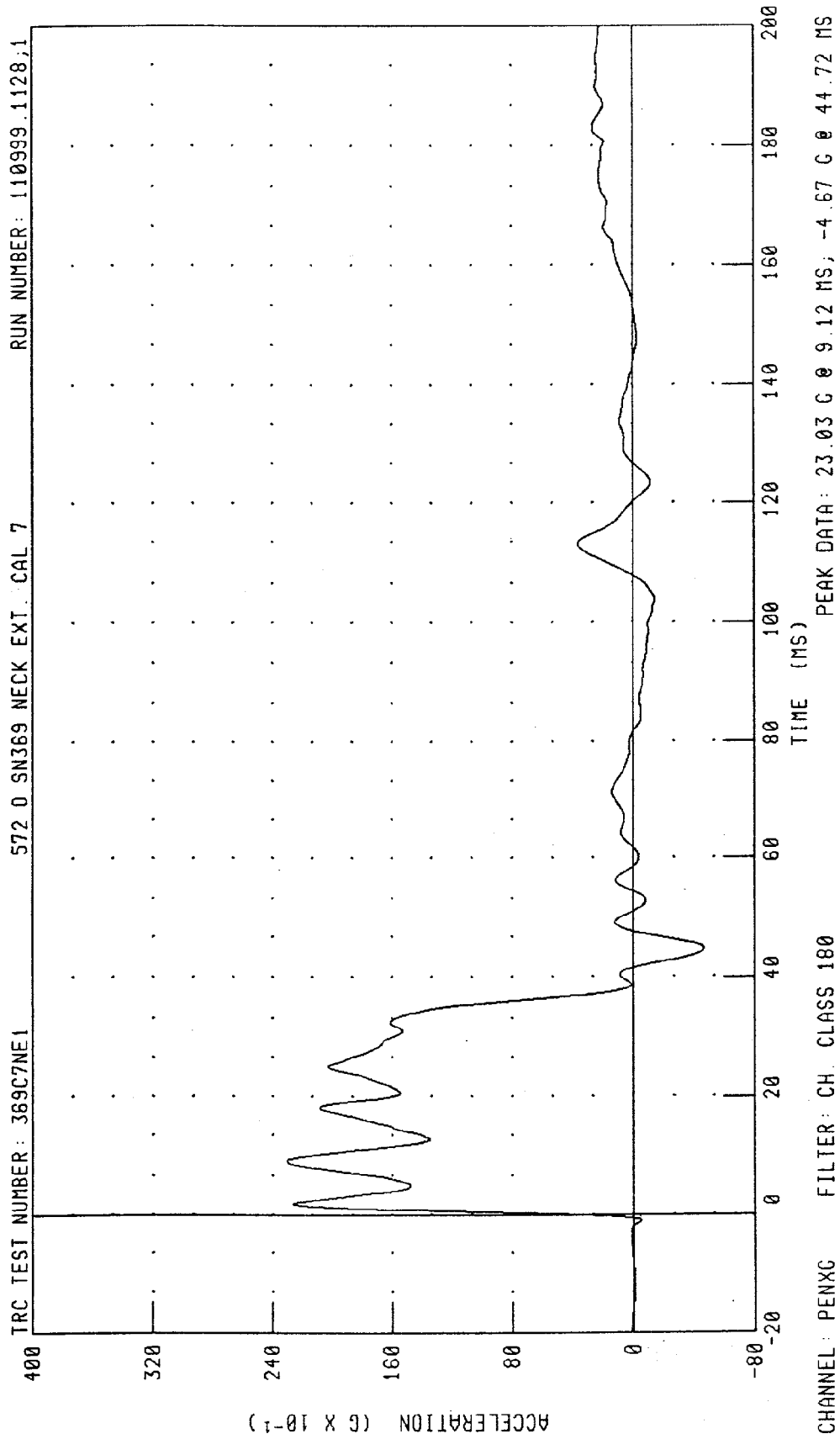
TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 110999.1052;1

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION



PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

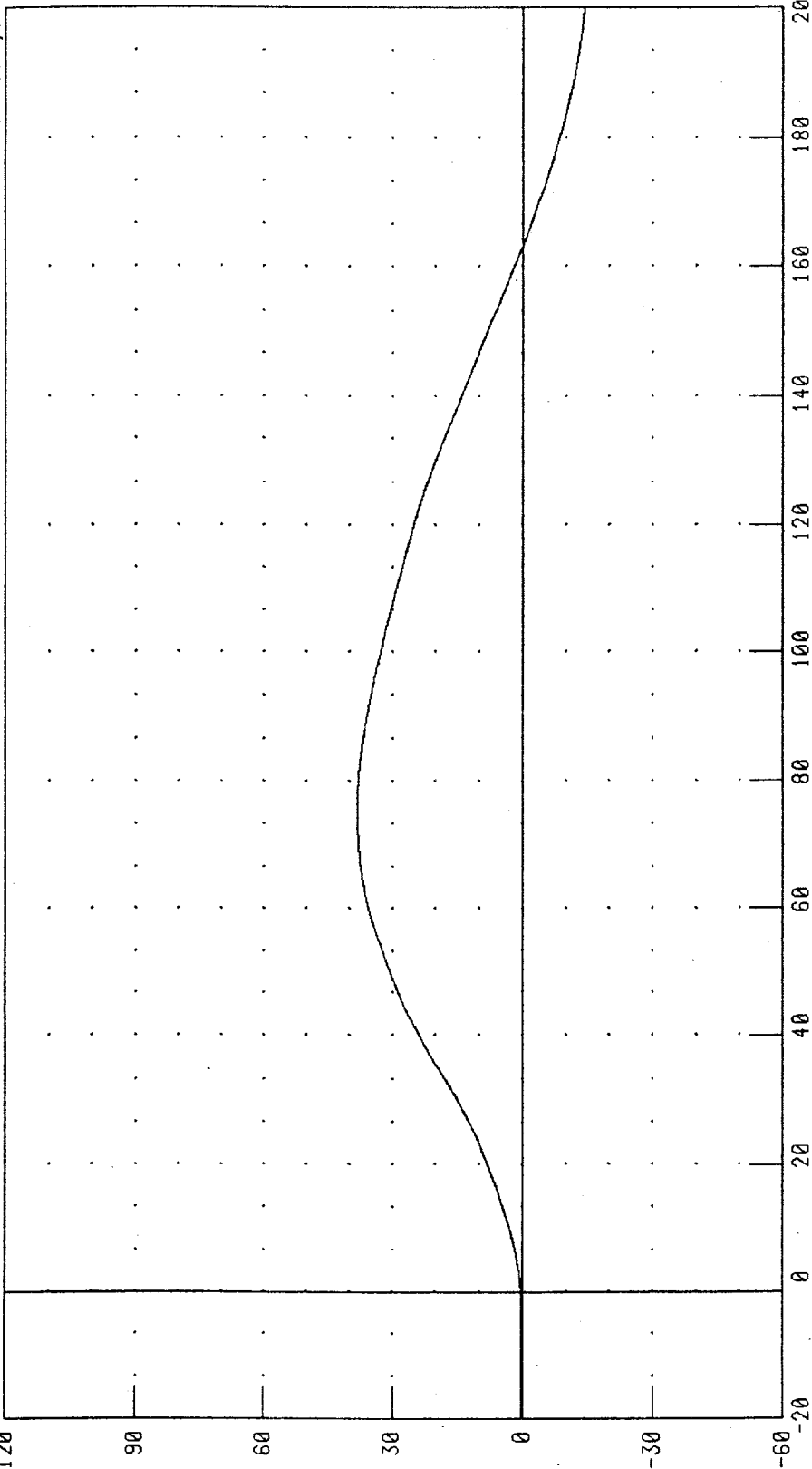
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 369C7NE1

572 0 SN369 NECK EXT. CAL 7

RUN NUMBER: 110999.1128.1

120

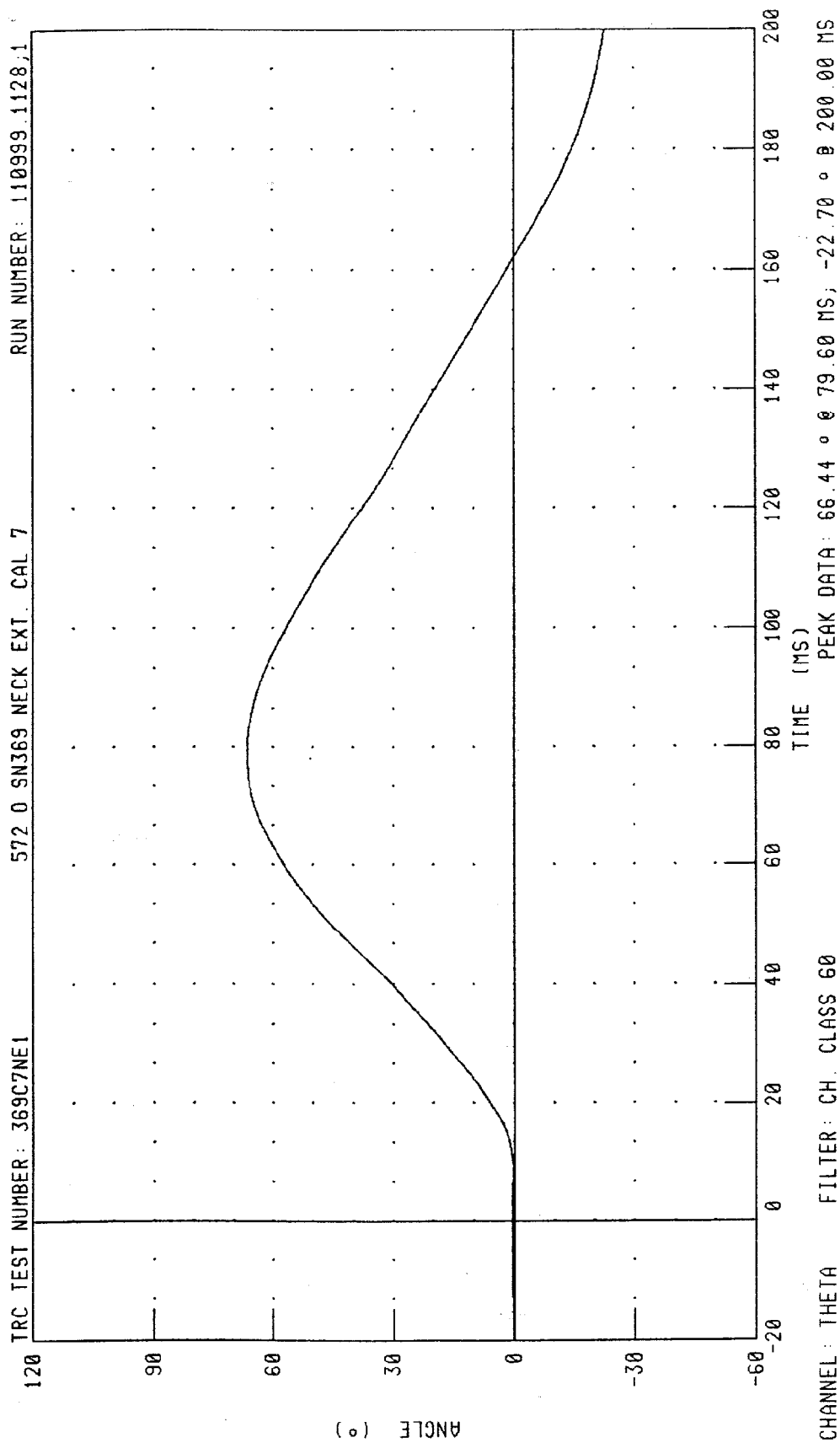


CHANNEL: BETA

FILTER: CH. CLASS 60

PEAK DATA: 38.09 ° @ 75.44 MS; -14.31 ° @ 200.00 MS

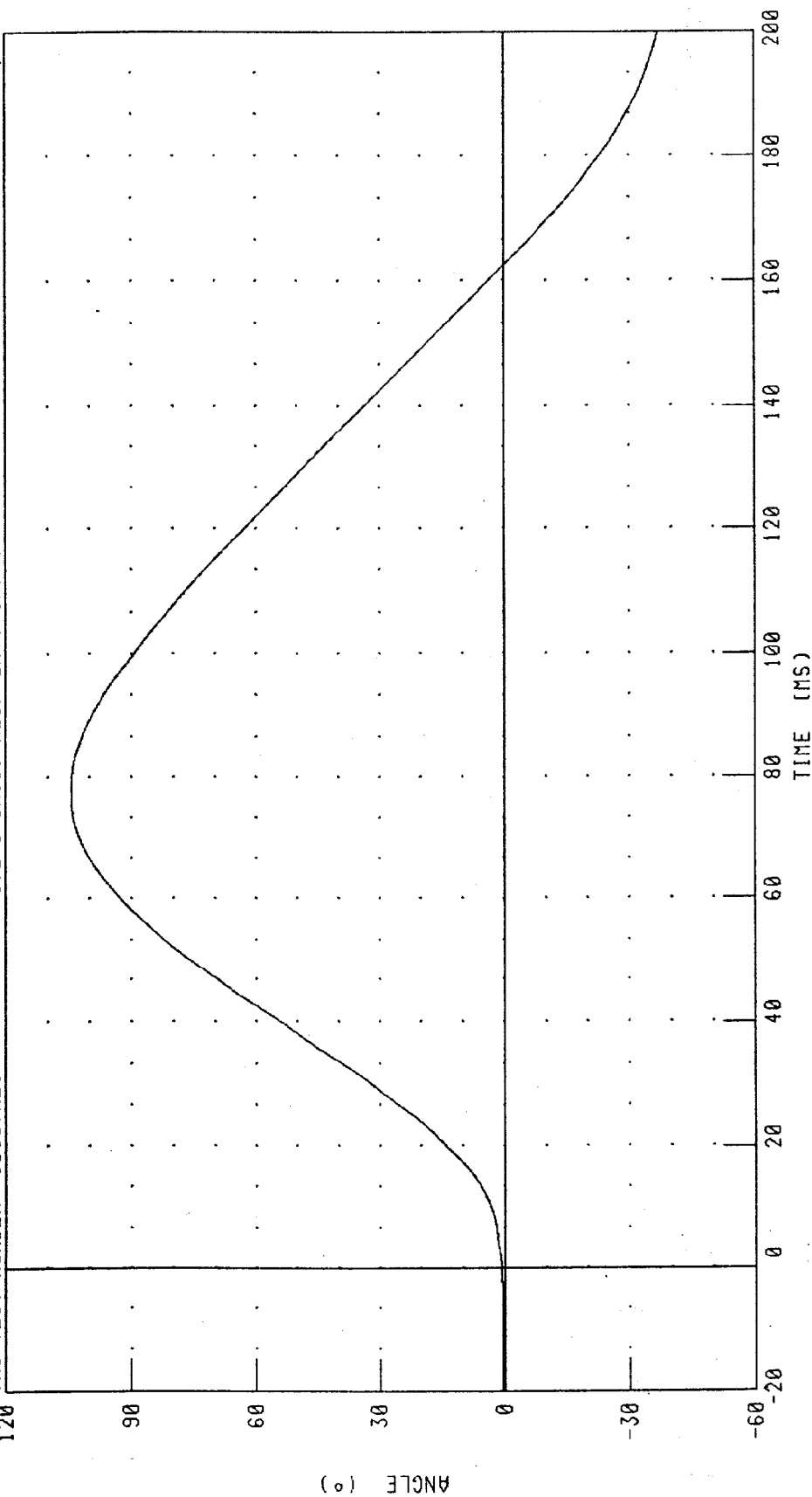
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE



PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 369C7NE1 572 0 SN369 NECK EXT. CAL 7 RUN NUMBER: 110999.1128.1



PEAK DATA: 104.43 ° @ 77.28 MS, -37.01 ° @ 200.00 MS

FILTER: CH. CLASS 60

CHANNEL: TOTAL

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 369C7NE1

572 0 SN369 NECK EXT. CAL 7

RUN NUMBER: 110999.1128.1

160

120

80

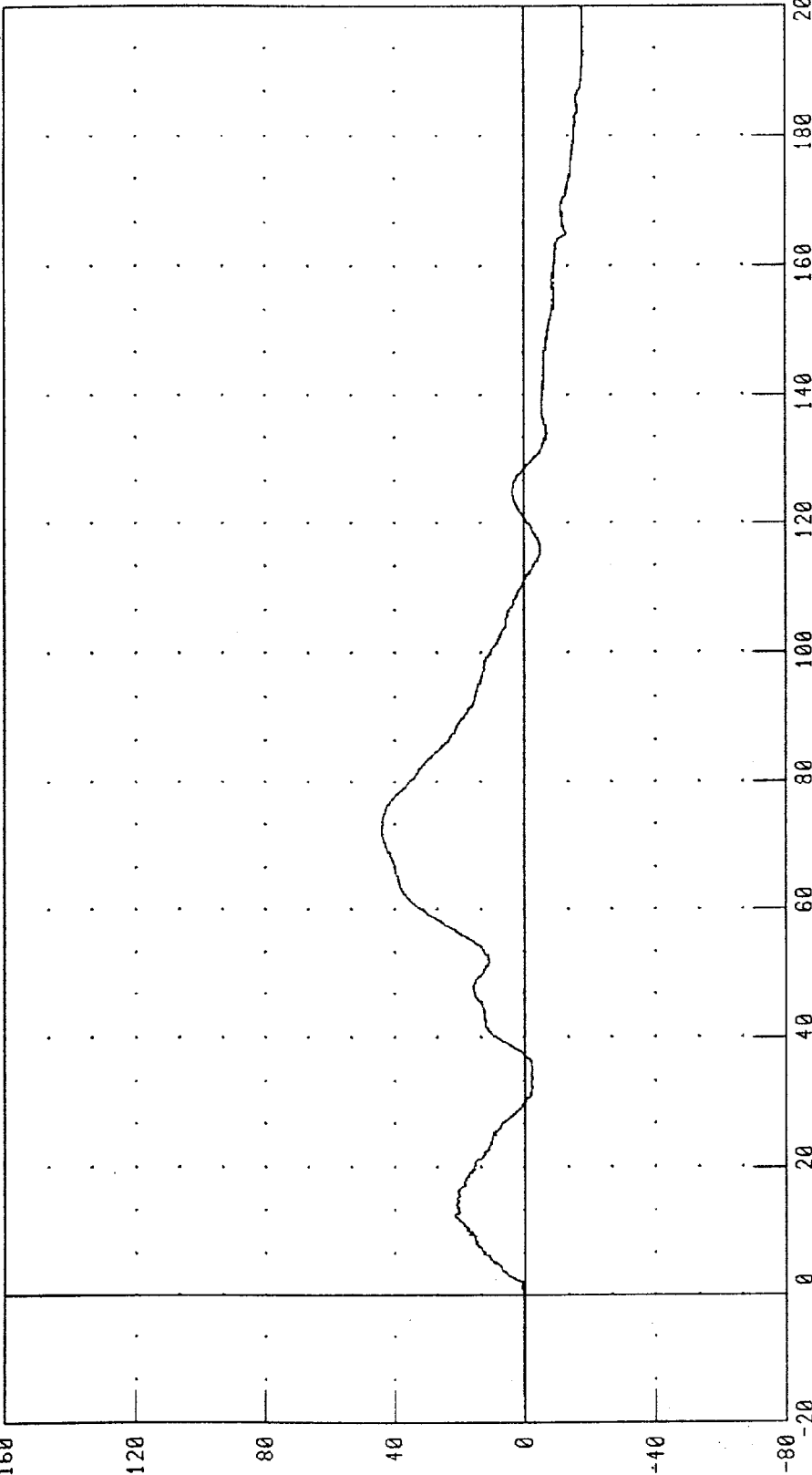
40

0

-40

-80

FORCE (N X 10¹)

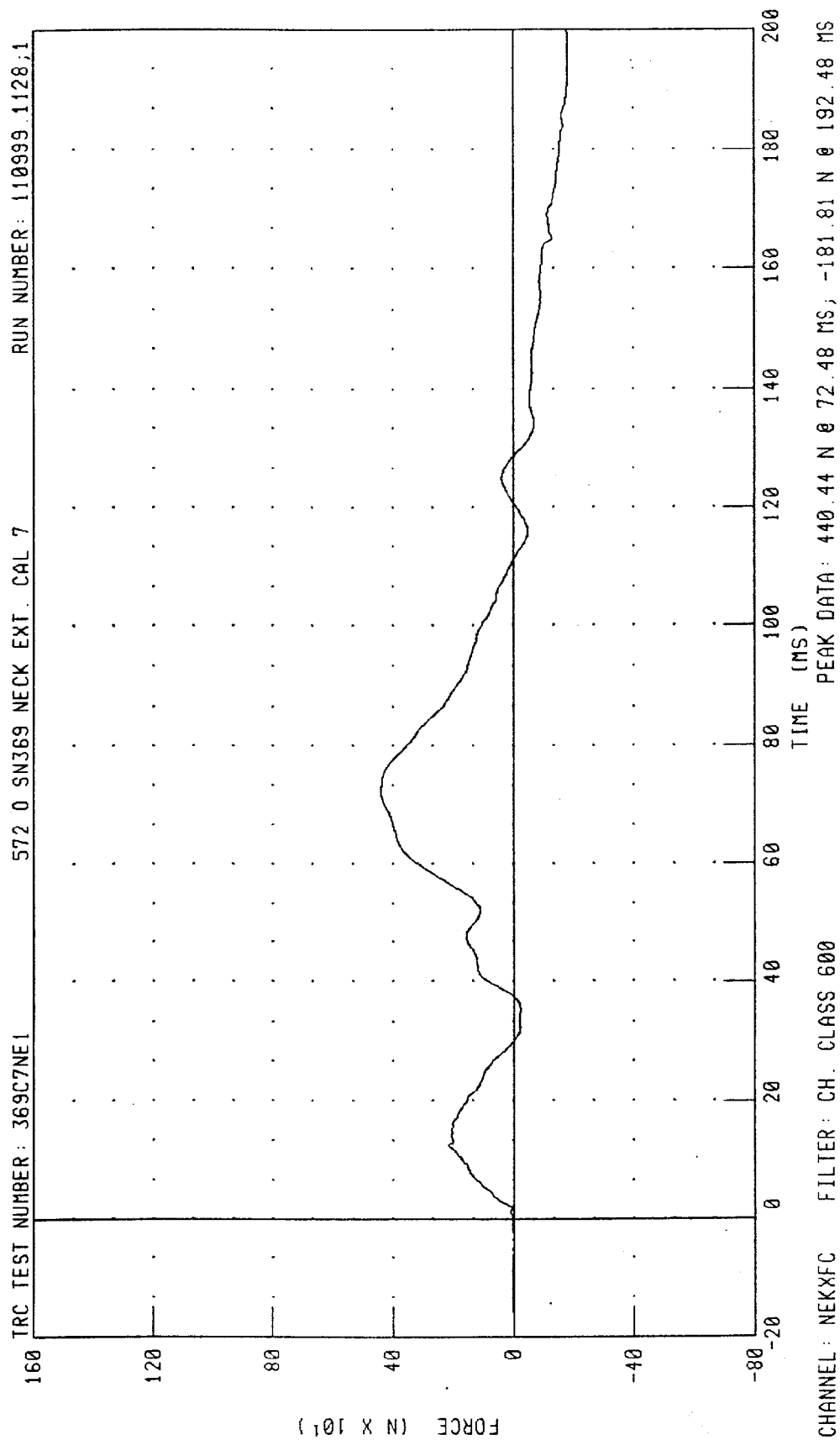


TIME (MS)

PEAK DATA: 440.36 N @ 71.68 MS, -184.86 N @ 192.40 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

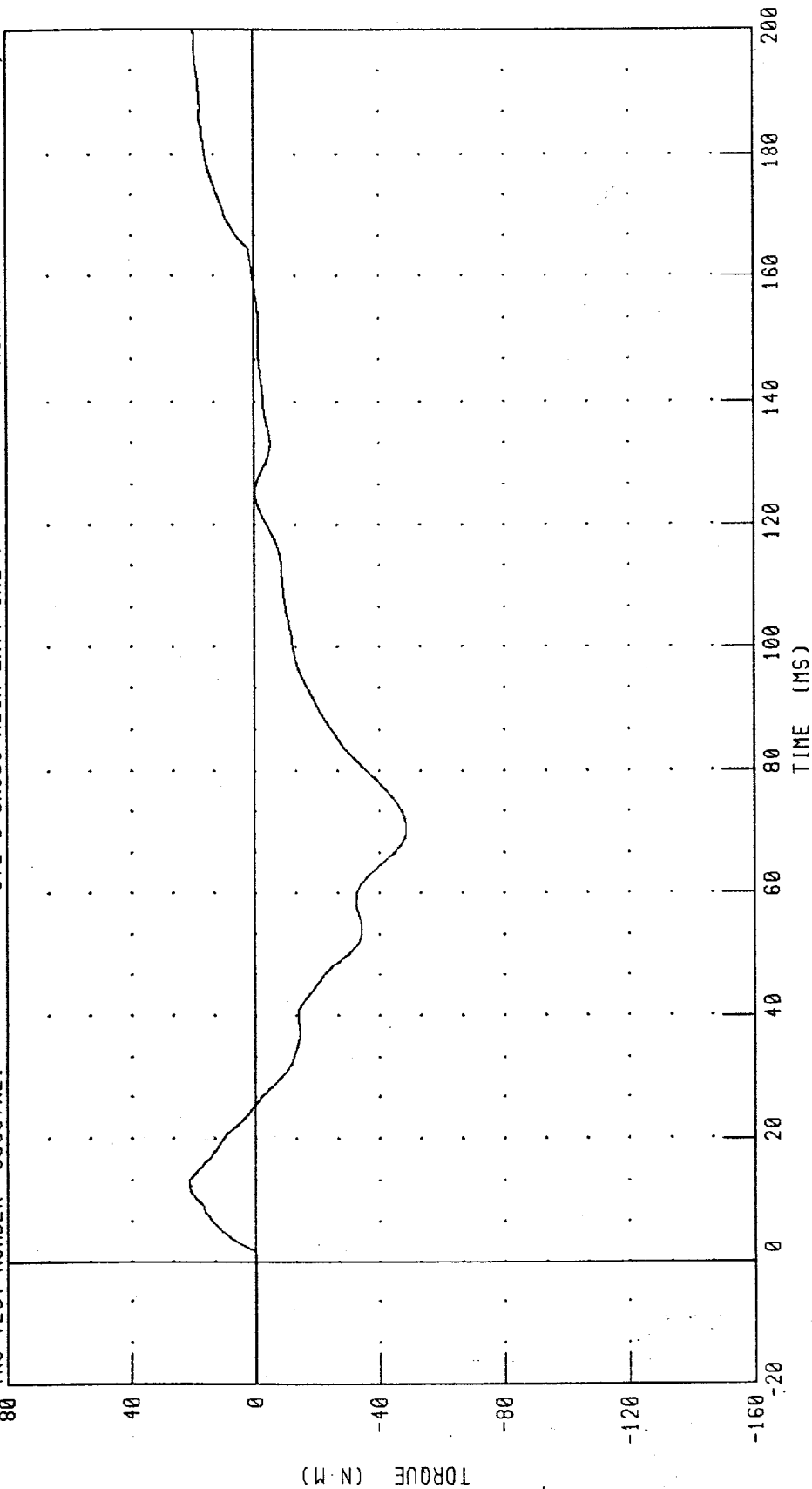
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION



PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

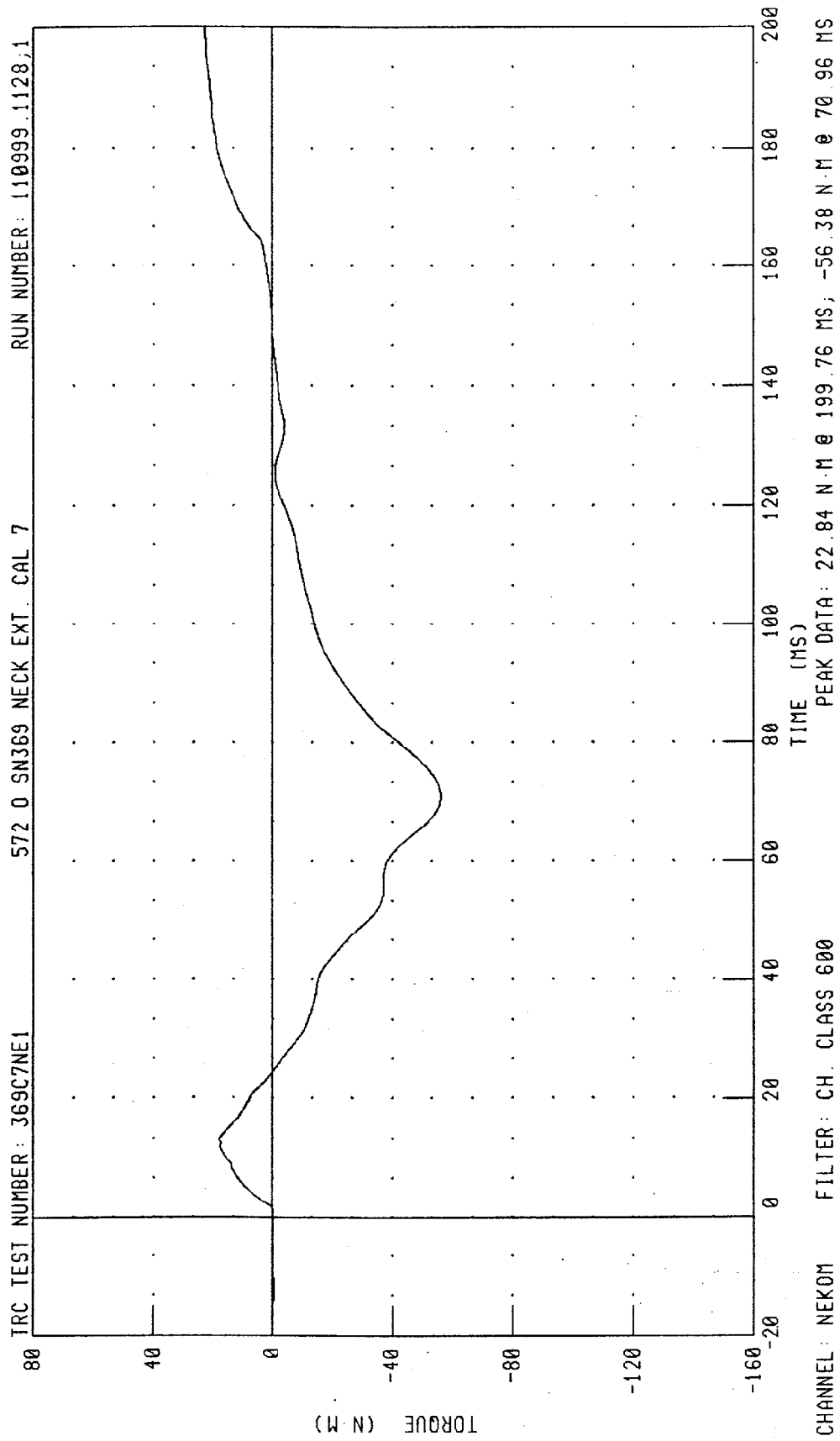
TRC TEST NUMBER: 369C7NE1 572 0 SN369 NECK EXT. CAL 7 RUN NUMBER: 110999.1128.1



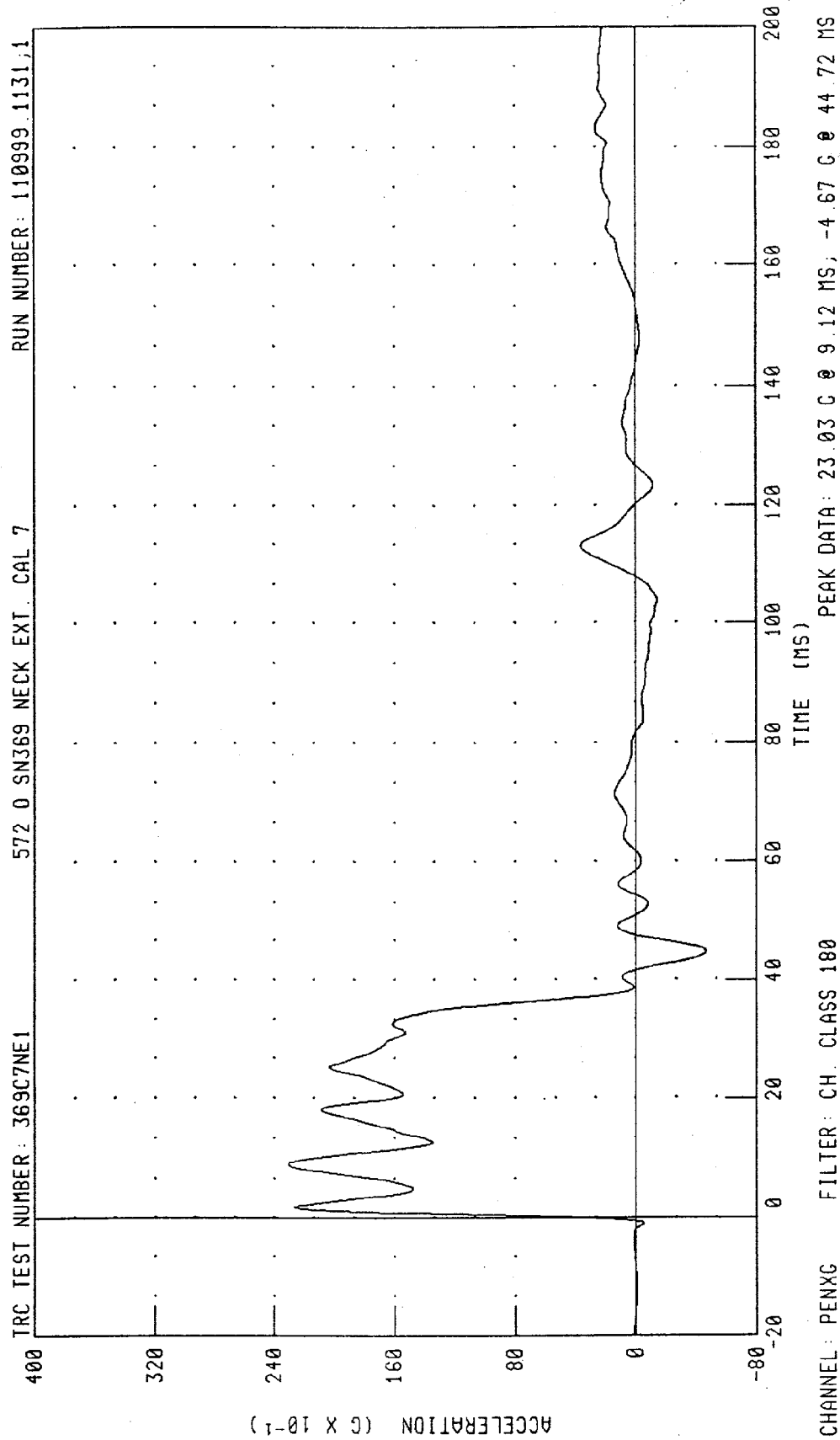
PEAK DATA: 21.60 N·M @ 13.12 MS; -48.69 N·M @ 70.88 MS

CHANNEL: NEKYM FILTER: CH. CLASS 600

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



PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION



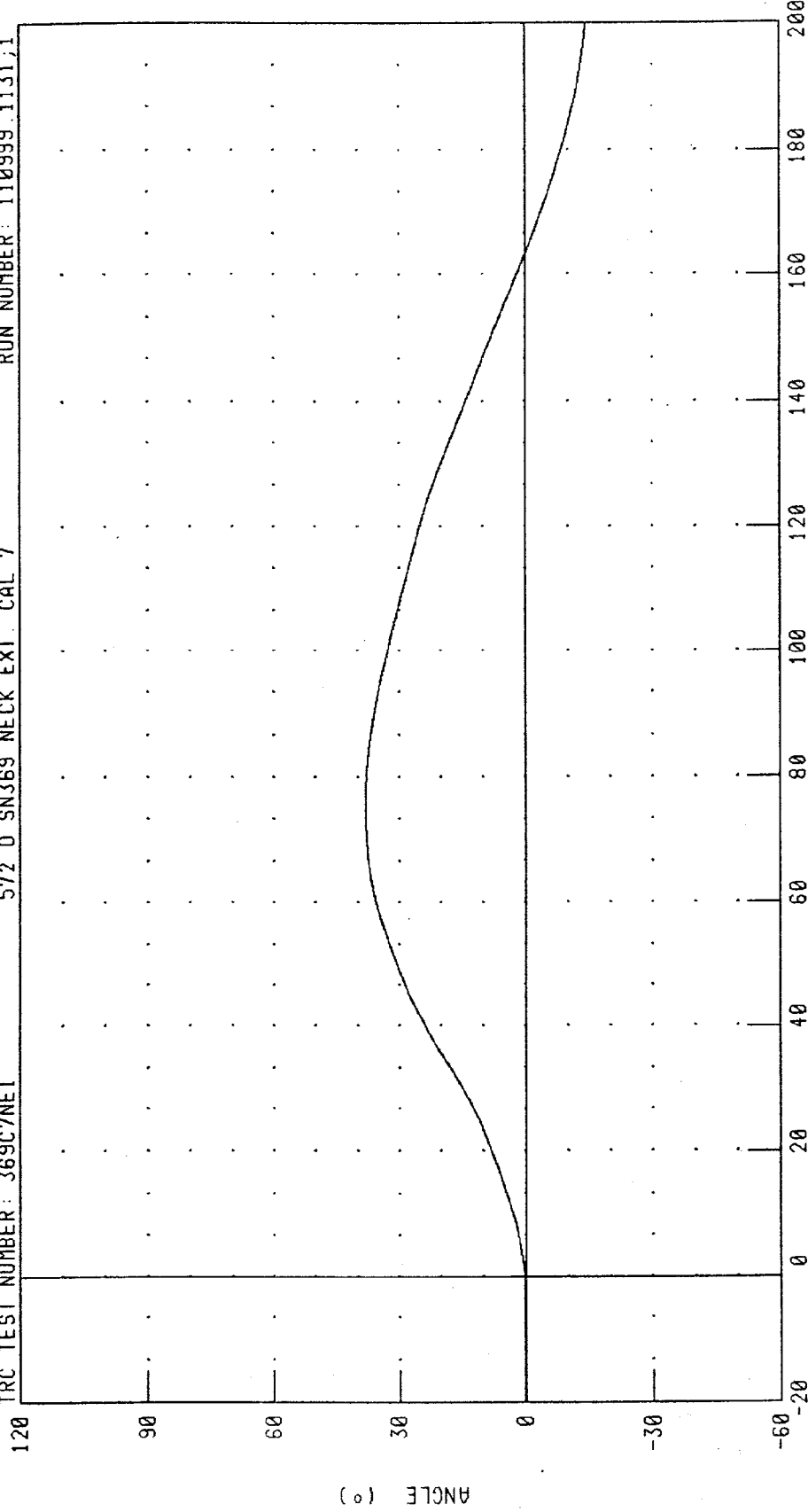
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572 0 SN369 NECK EXT. CAL 7

RUN NUMBER: 110999.1131;1

TRC TEST NUMBER: 369C7NE1

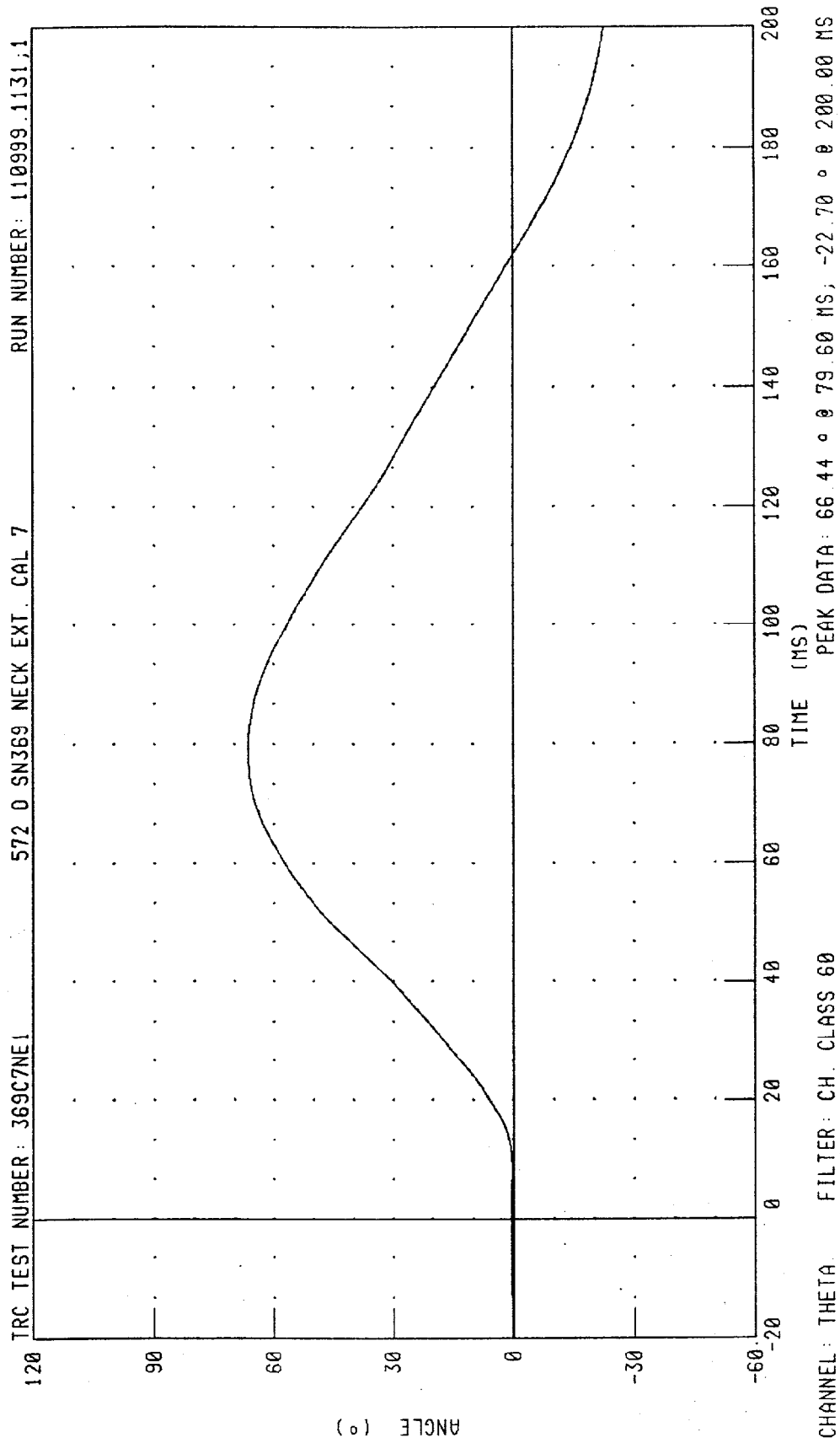


PEAK DATA: 38.09 ° @ 75.44 MS; -14.31 ° @ 200.00 MS

FILTER: CH. CLASS 60

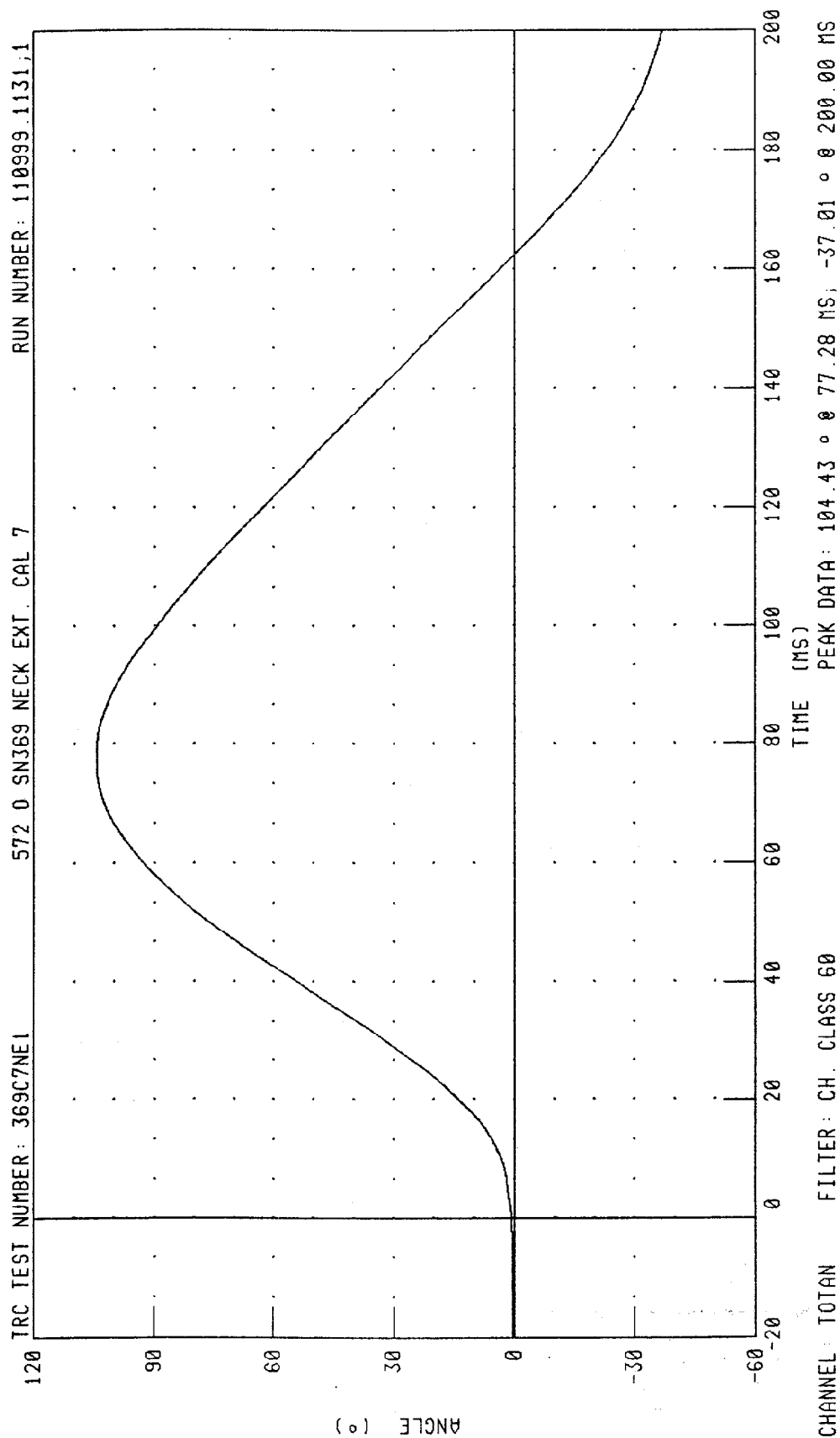
CHANNEL: BETA

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

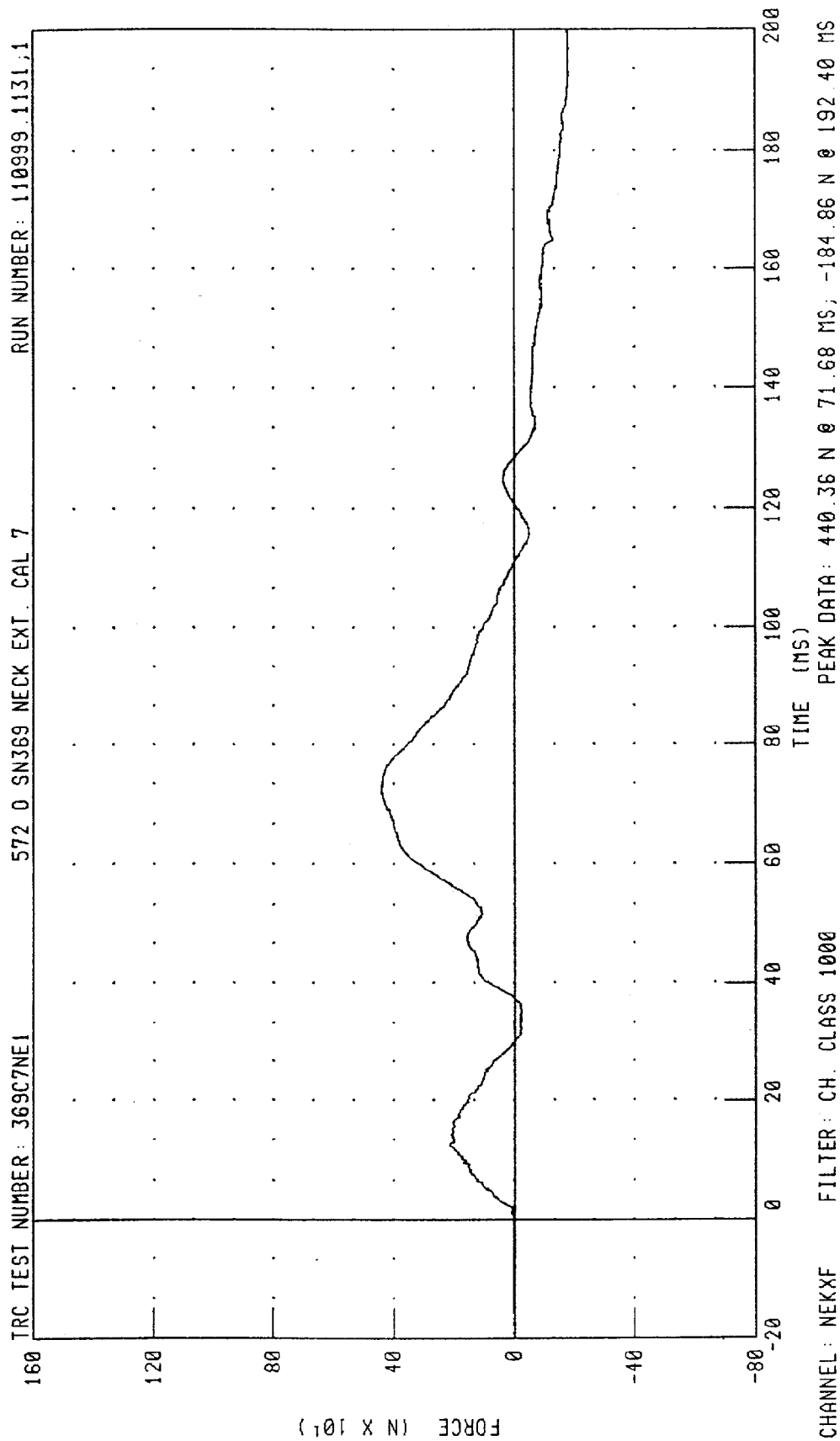


PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION



PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS

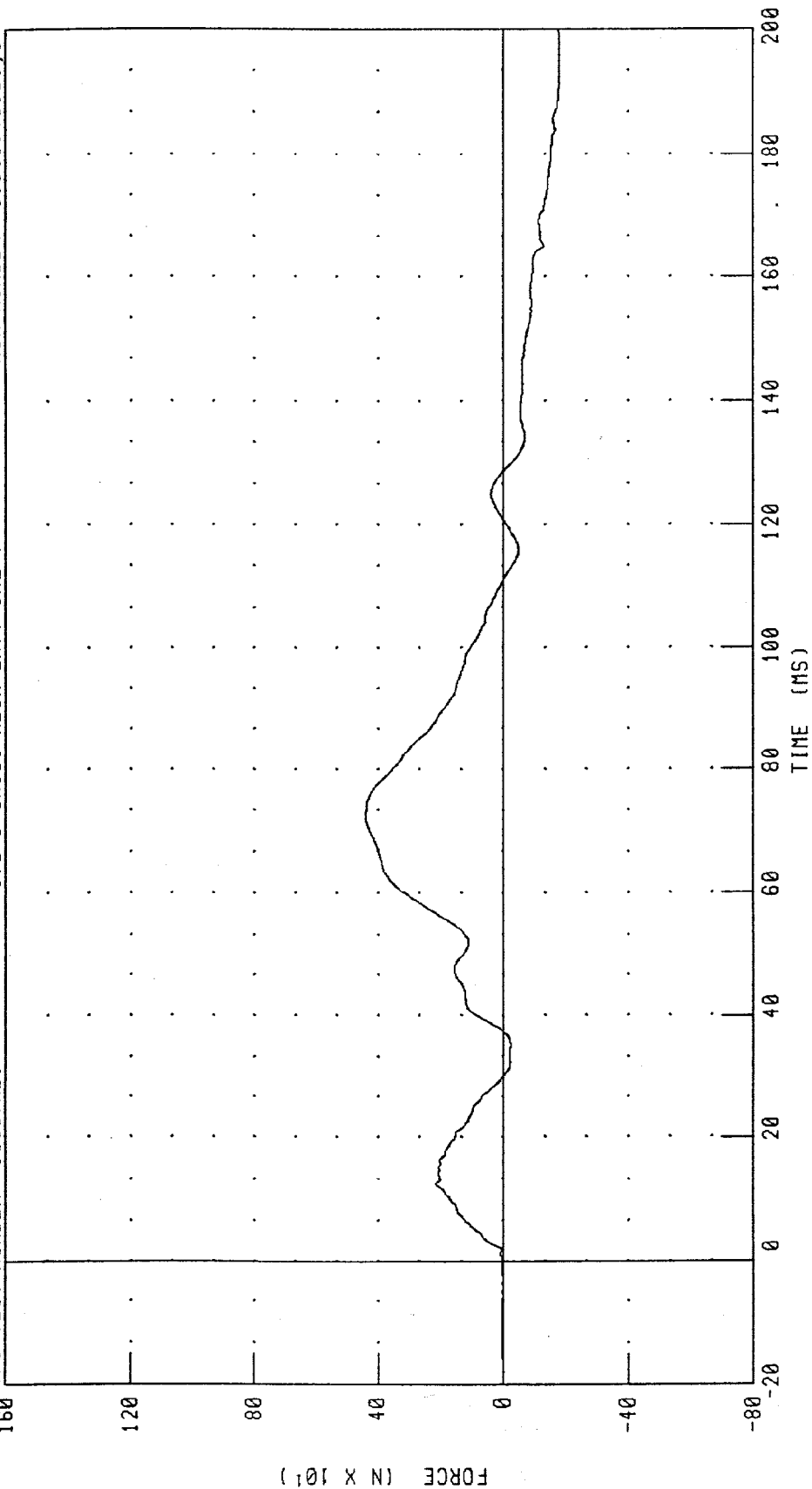


PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 369C7NE1

572 0 SN369 NECK EXT. CAL 7

RUN NUMBER: 110999.1131.1

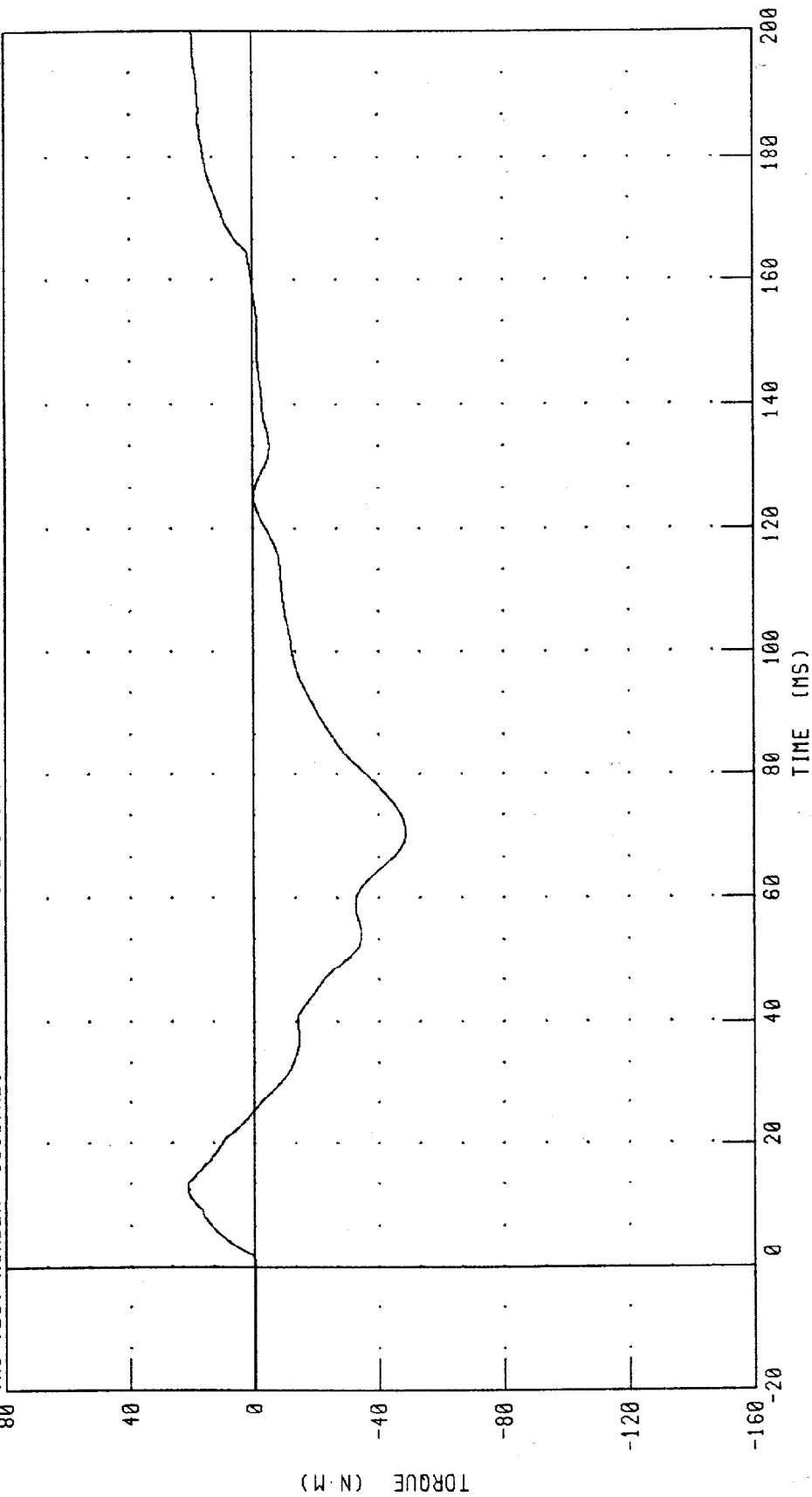


CHANNEL: NEKXFC FILTER: CH. CLASS 600 PEAK DATA: 440.44 N 0 72.48 MS, -181.81 N 0 192.48 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

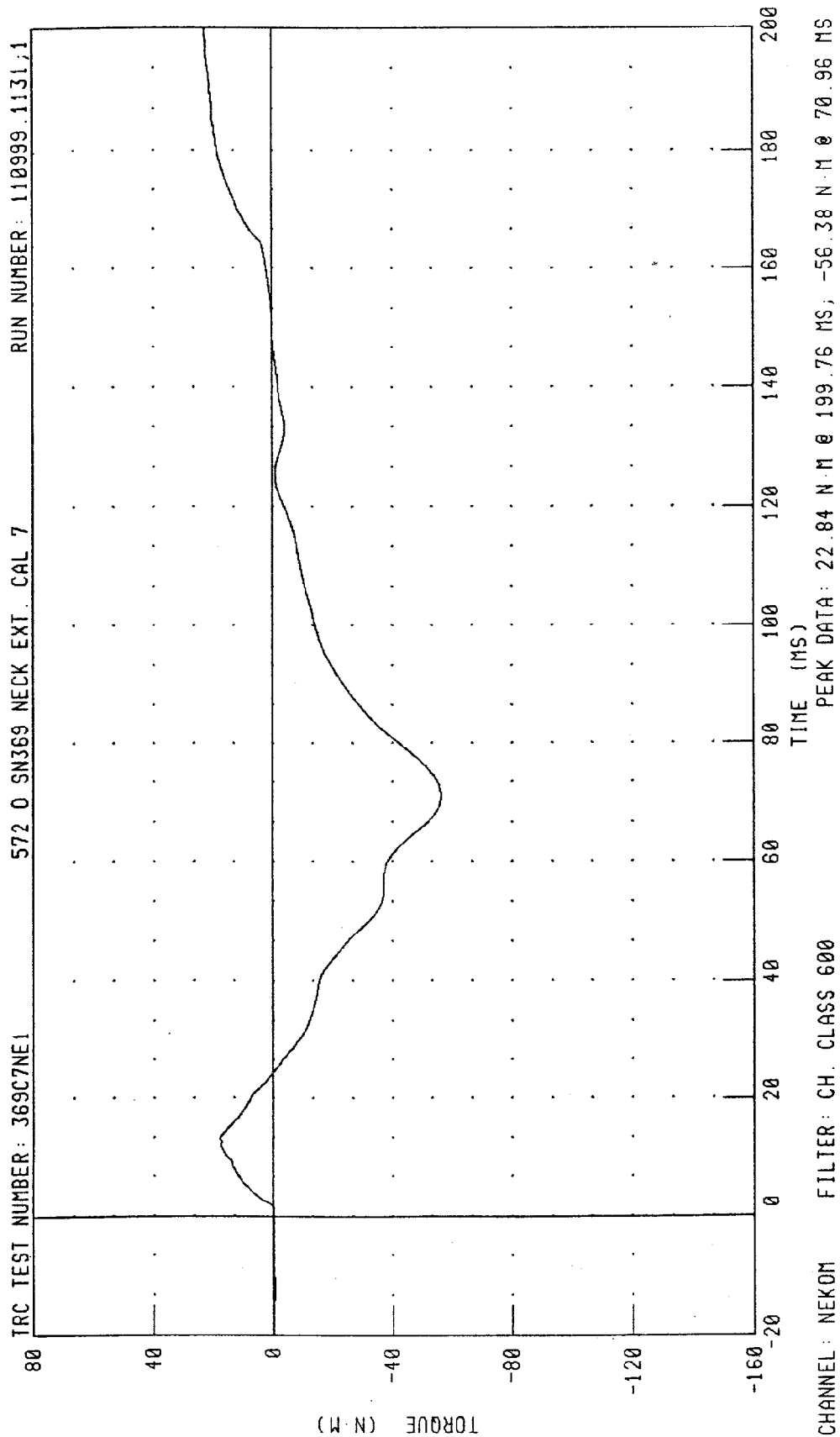
TRC TEST NUMBER: 369C7NE1 572 0 SN369 NECK EXT. CAL 7 RUN NUMBER: 110999.1131.1



PEAK DATA: 21.60 N-M @ 13.12 MS, -48.69 N-M @ 70.88 MS

CHANNEL: NEKYM FILTER: CH. CLASS 600

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



TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

15-NOV-99

TRC INC.

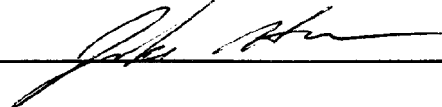
TEST NO: 369C7TH3

572 0 SN369 THORAX CAL7

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	48 - 55 MM	52.2 MM
MAXIMUM RESISTIVE FORCE WITHIN DEFLECTION CORRIDOR	3900 - 4400 N	4420. N *
INTERNAL HYSTERESIS	69% - 85%	69.8%

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 111599.1020;1

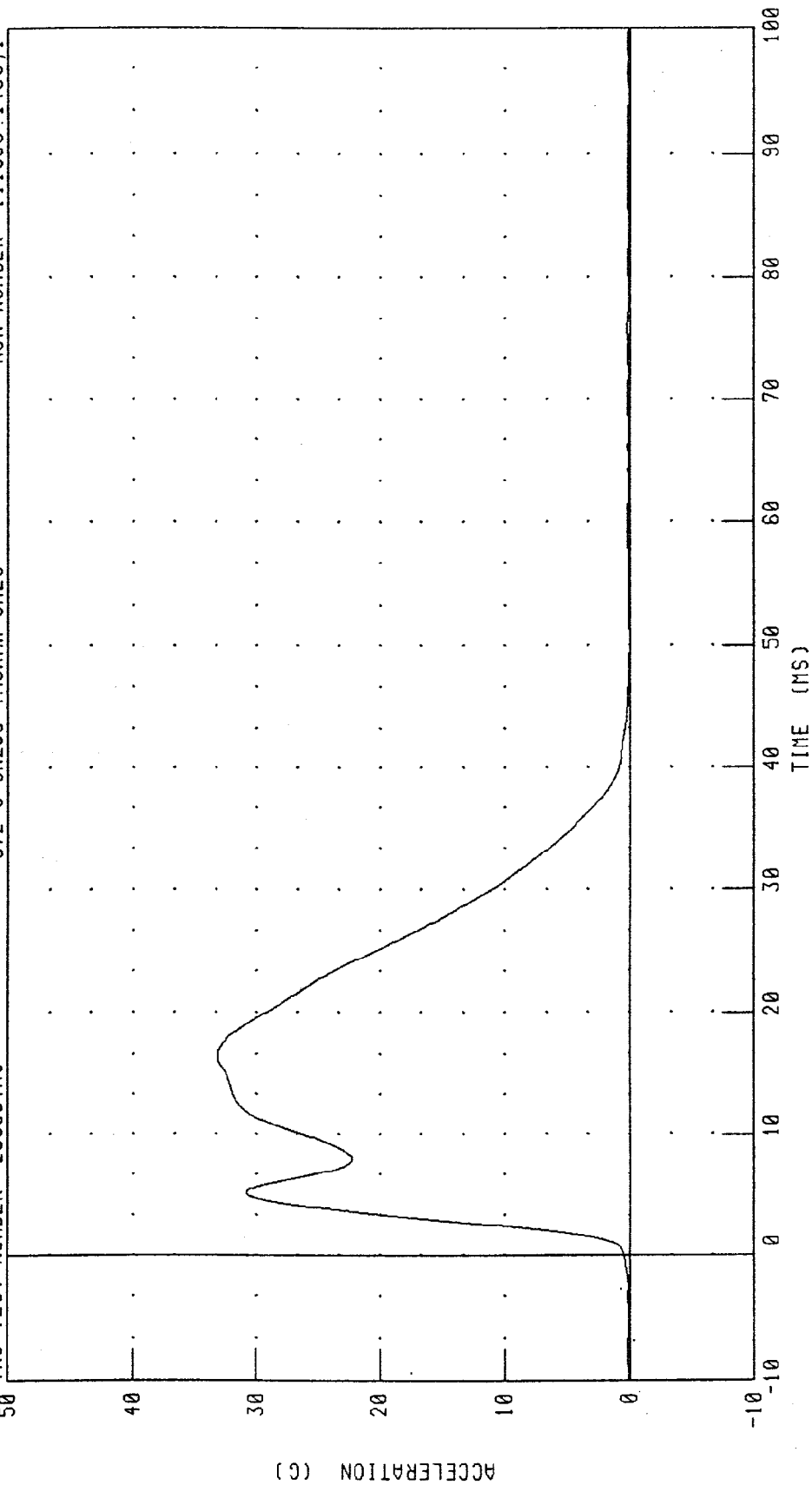
PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 283C8TH3

572 0 SN283 THORAX CAL8

RUN NUMBER: 111599.1456;1



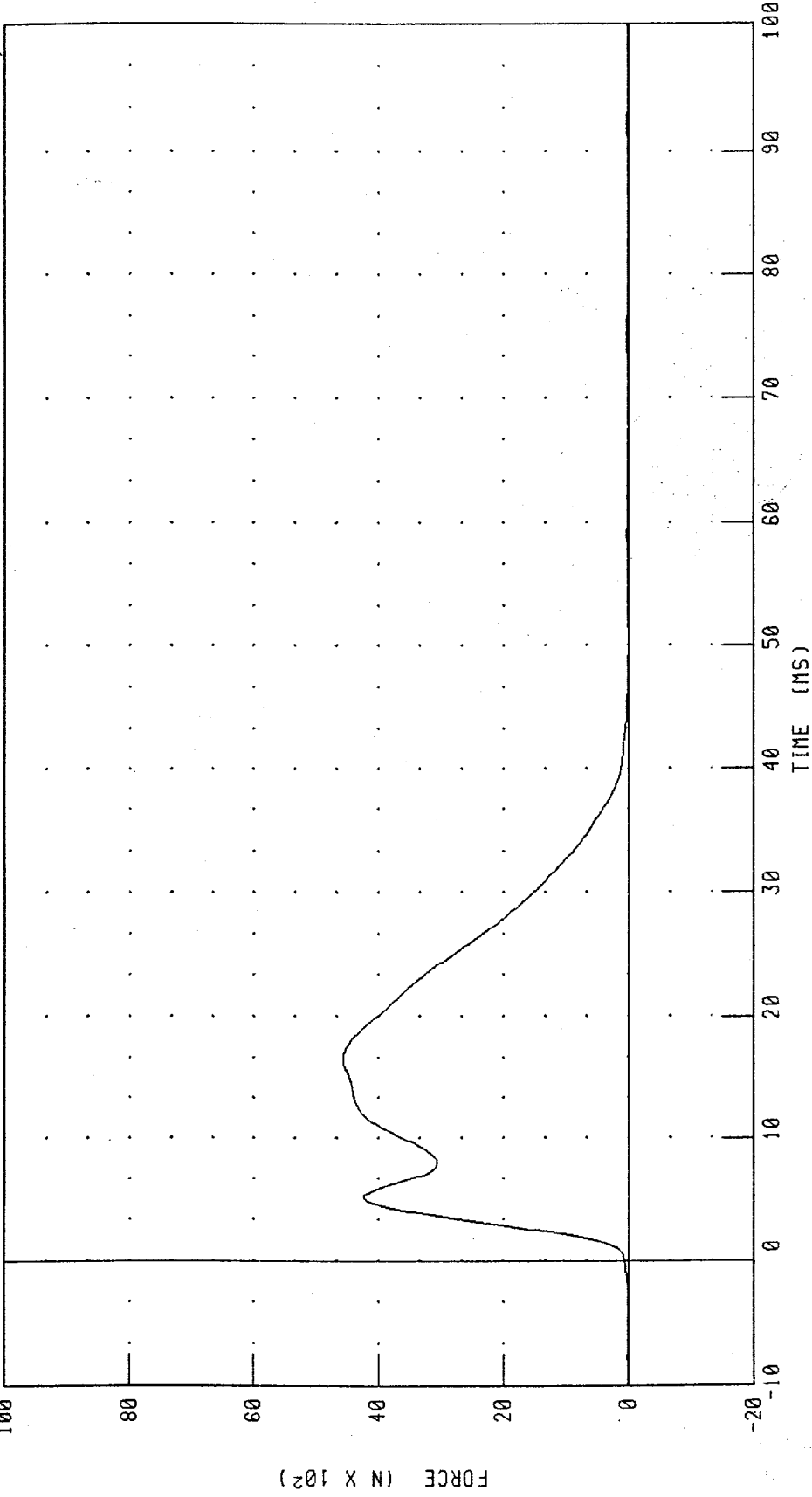
PEAK DATA: 33.21 G @ 16.56 MS; 0.00 G @ 50.48 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 283C8TH3 572 0 SN283 THORAX CAL8 RUN NUMBER: 111599.1456,1



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 4557.23 N @ 16.56 MS; -0.04 N @ 50.48 MS

PART 572-0 HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 283CBTH3

572 0 SN283 THORAX CAL8

RUN NUMBER: 111599.1456,1

150

120

90

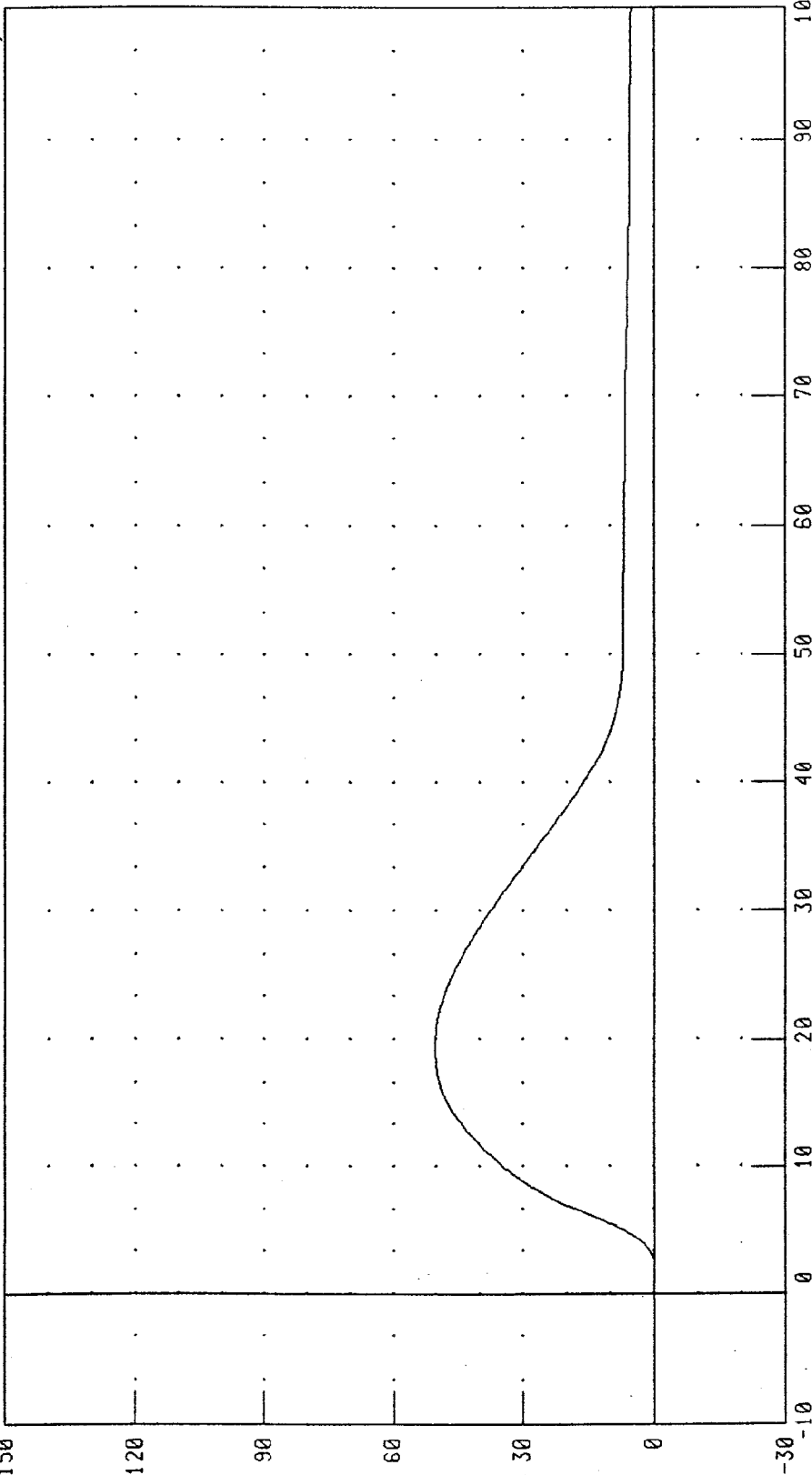
60

30

0

-30
-10

DISPLACEMENT (MM)



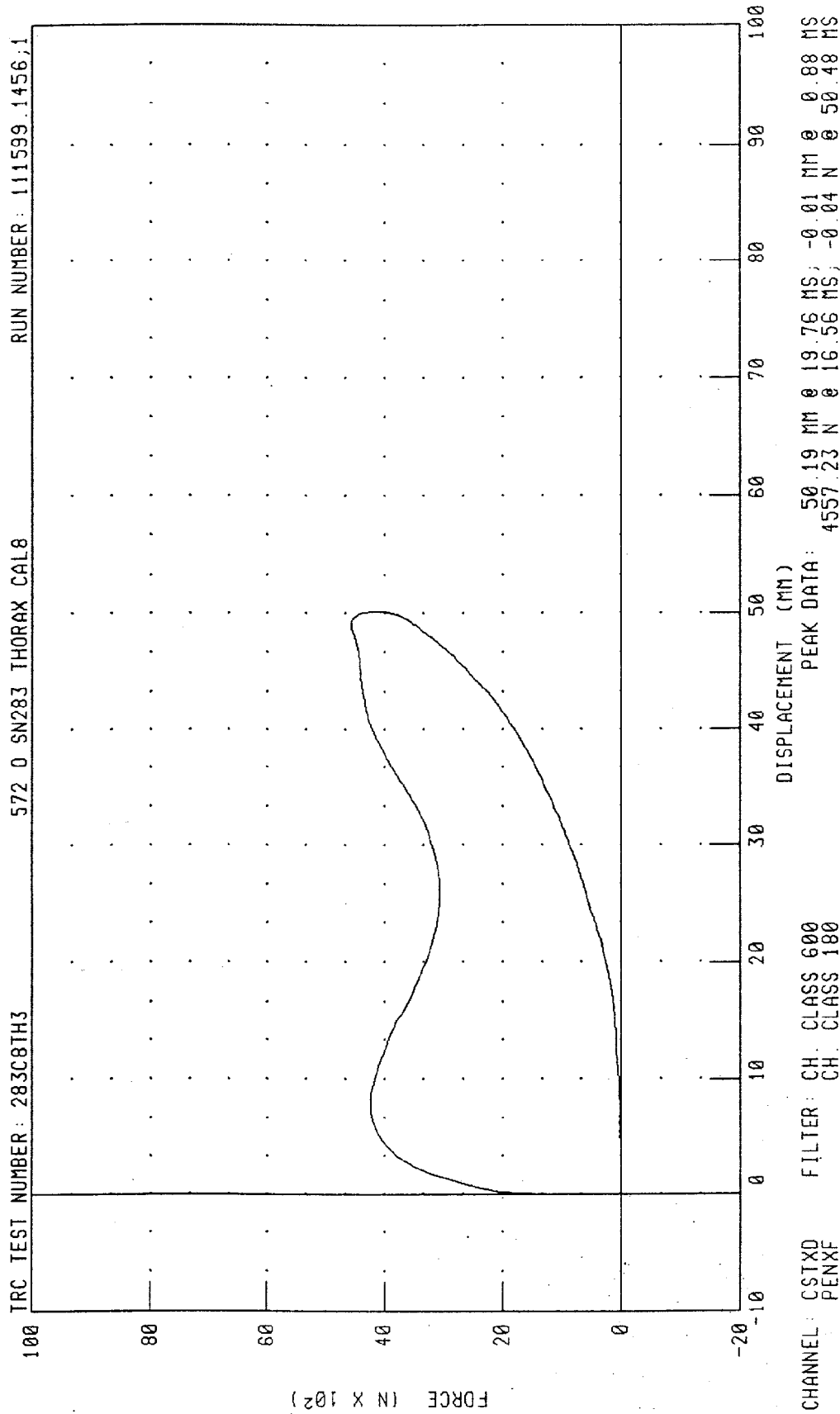
TIME (MS)

CHANNEL: CSTXD

FILTER: CH. CLASS 600

PEAK DATA: 50.19 MM @ 19.76 MS; -0.01 MM @ 0.88 MS

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



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

09-NOV-99

TRC INC.

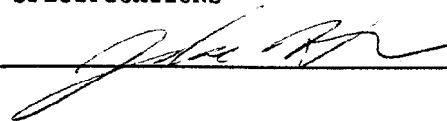
TEST NO: 369C7RK1

572 0 SN369 R.KNEE CAL7

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.08 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3556.9 N

TEST MEETS SPECIFICATIONS

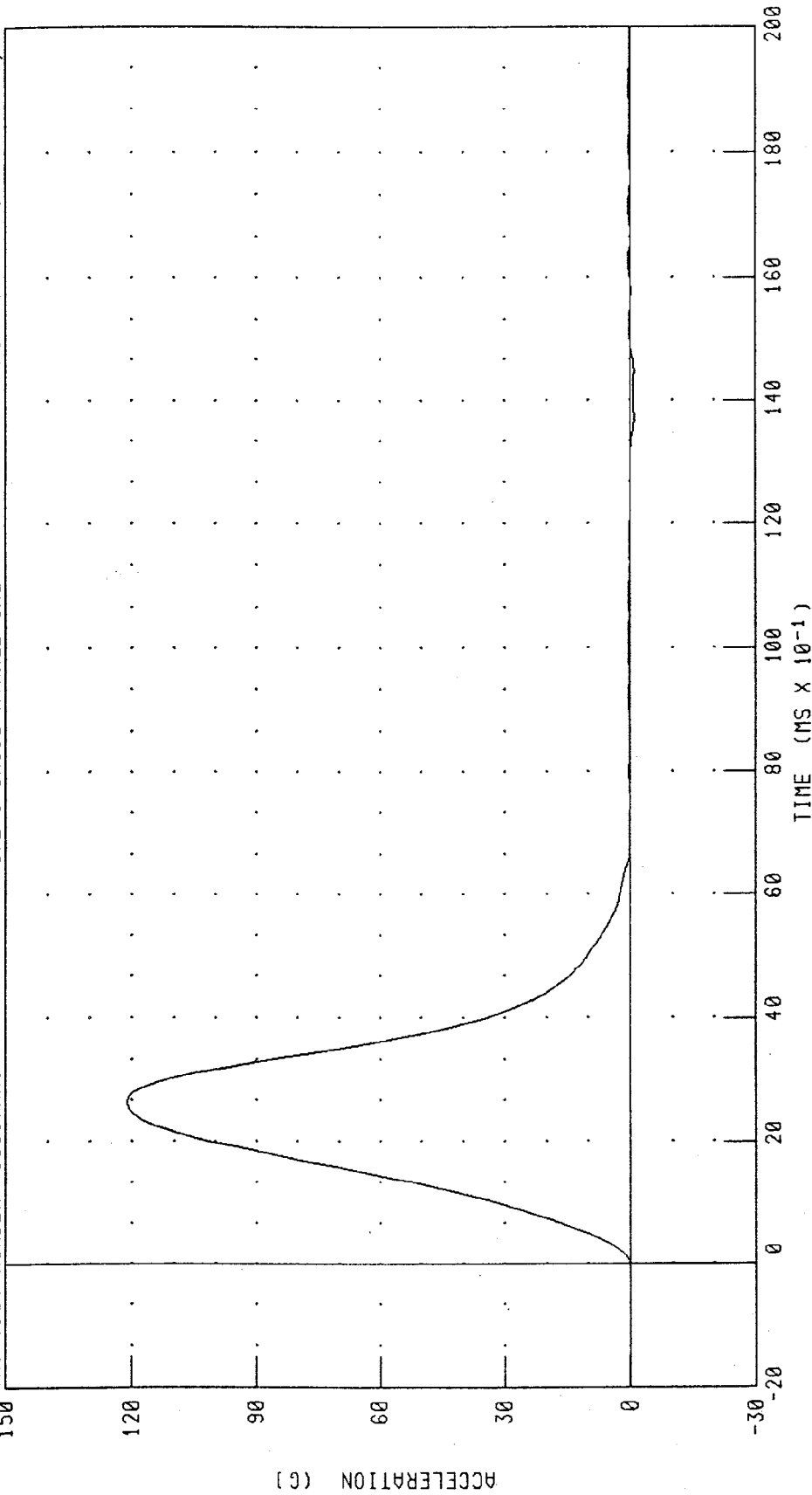
TECHNICIAN



RUN NUMBER: 110999.0826;1

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

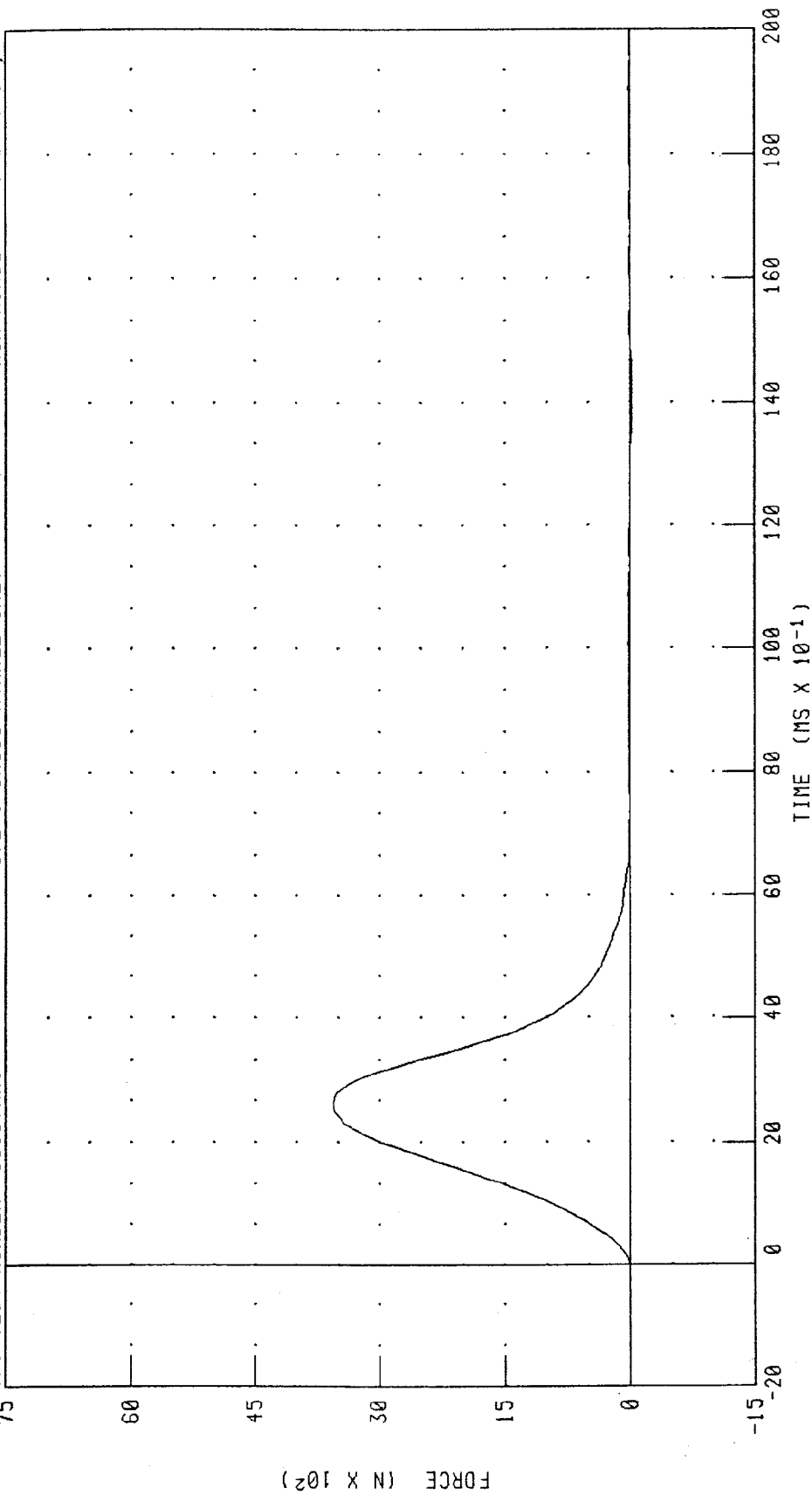
TRC TEST NUMBER: 369C7RK1 572 0 SN369 R KNEE CAL7 RUN NUMBER: 110999.0828;1



CHANNEL: PENXC FILTER: CH. CLASS 600 PEAK DATA: 121.16 G @ 2.64 MS; -0.96 G @ 14.48 MS

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

TRC TEST NUMBER: 369C7RK1 572 0 SN369 R KNEE CAL7 RUN NUMBER: 110999 0828;1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 3556.91 N @ 2.64 MS; -28.32 N @ 14.48 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

09-NOV-99

TRC INC.

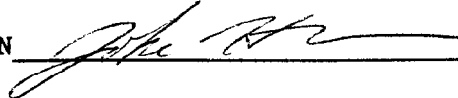
TEST NO: 369C7LK1

572 0 SN369 LEFT KNEE CAL7

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.07 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3415.3 N

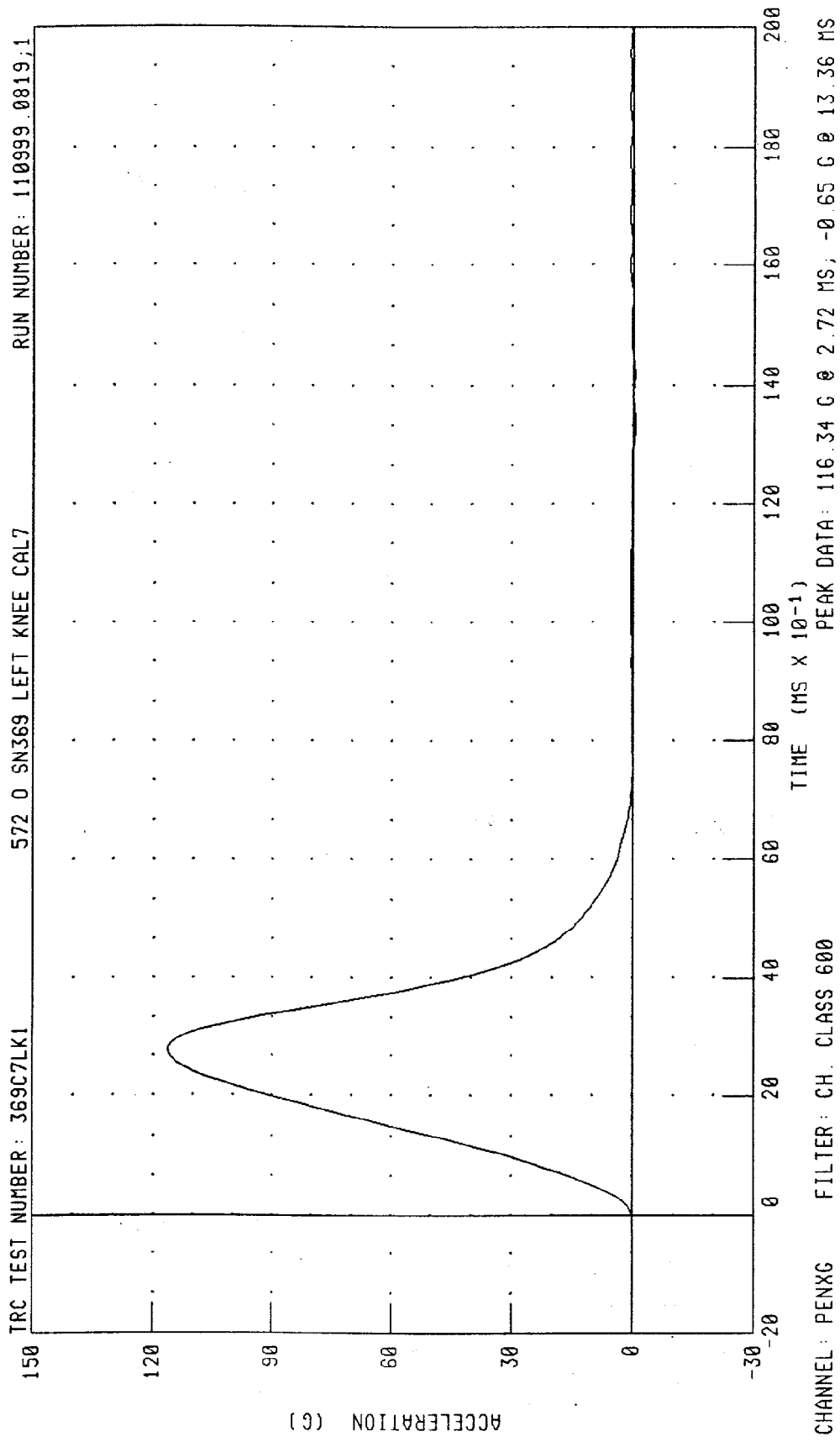
TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 110999.0818;1

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



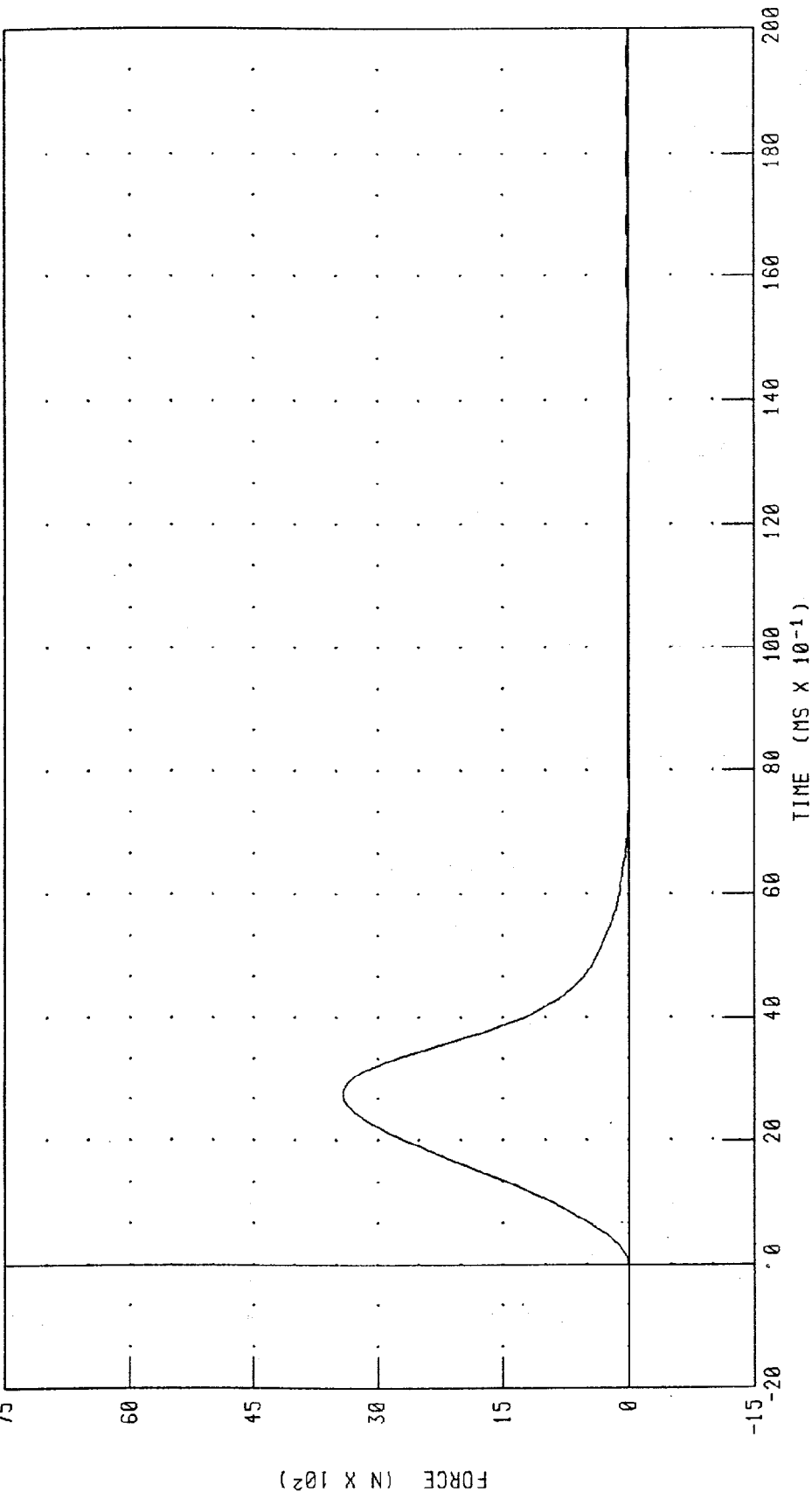
PART 572-0 HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

572 0 SN369 LEFT KNEE CAL7

TRC TEST NUMBER: 369C7LK1

RUN NUMBER: 110999.0819,1



PEAK DATA: 3415.33 N @ 2.72 MS, -18.94 N @ 13.36 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

Pre-Test Dummy Certification

Passenger Dummy S/N 283

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
SN283 TRC.

09-NOV-99

TRC INC.

TEST NO: 283C8ED

572 0 SN283 EXT DIMENSIONS

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		300 - 310 MM	305. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		160 - 170 MM	163. MM
CHEST CIRCUMFERENCE (X)		851 - 881 MM	871. MM
WAIST CIRCUMFERENCE (Y)		757 - 787 MM	775. MM
CHEST DEPTH (O)		183 - 199 MM	183. MM
H-POINT HEIGHT (C)		81.5 - 86.5 MM	83. MM
H-POINT FROM SEATBACK (D)		144.5-149.5 MM	147. MM
SKULL CAP TO BACKLINE (H)		43.2 - 48.2 MM	45.7 MM
TOTAL SITTING HEIGHT (A)		775 - 800 MM	775. MM
THIGH CLEARANCE (F)		114 - 130 MM	127. MM
BUTTOCK KNEE LENGTH (K)		508.5-533.5 MM	533. MM
BUTTOCK POPLITEAL LENGTH (N)		414.0-439.4 MM	419. MM
POPLITEAL HEIGHT (L)		348.5-373.5 MM	361. MM
KNEE TO FLOOR HEIGHT (M)		394 - 419 MM	411. MM
FOOT LENGTH (P)		216 - 232 MM	224. MM
FOOT BREADTH (R)		76 - 92 MM	86. MM
SHOULDER PIVOT FROM BACKLINE (E)		71 - 81 MM	79. MM
SHOULDER BREADTH (V)		348 - 364 MM	361. MM
SHOULDER PIVOT HEIGHT (B)		434 - 450 MM	434. MM
ELBOW REST HEIGHT (J)		183 - 203 MM	183. MM
SHOULDER-ELBOW LENGTH (I)		279 - 297 MM	284. MM
BACK OF ELBOW TO FINGER TIP (G)		244 - 259 MM	251. MM
HIP WIDTH AT H-POINT (W)		272 - 287 MM	279. MM

HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

RUN NUMBER: 121799.1205

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

09-NOV-99

TRC INC.

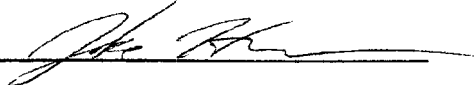
TEST NO: 283C8HD1

572 0 SN283 HEAD DROP CAL 8

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	279.03 G
PEAK LATERAL ACCELERATION	15 G MAX	-1.81 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 110999.0857;1

PART 572-0 HYBRID III HEAD CALIBRATION

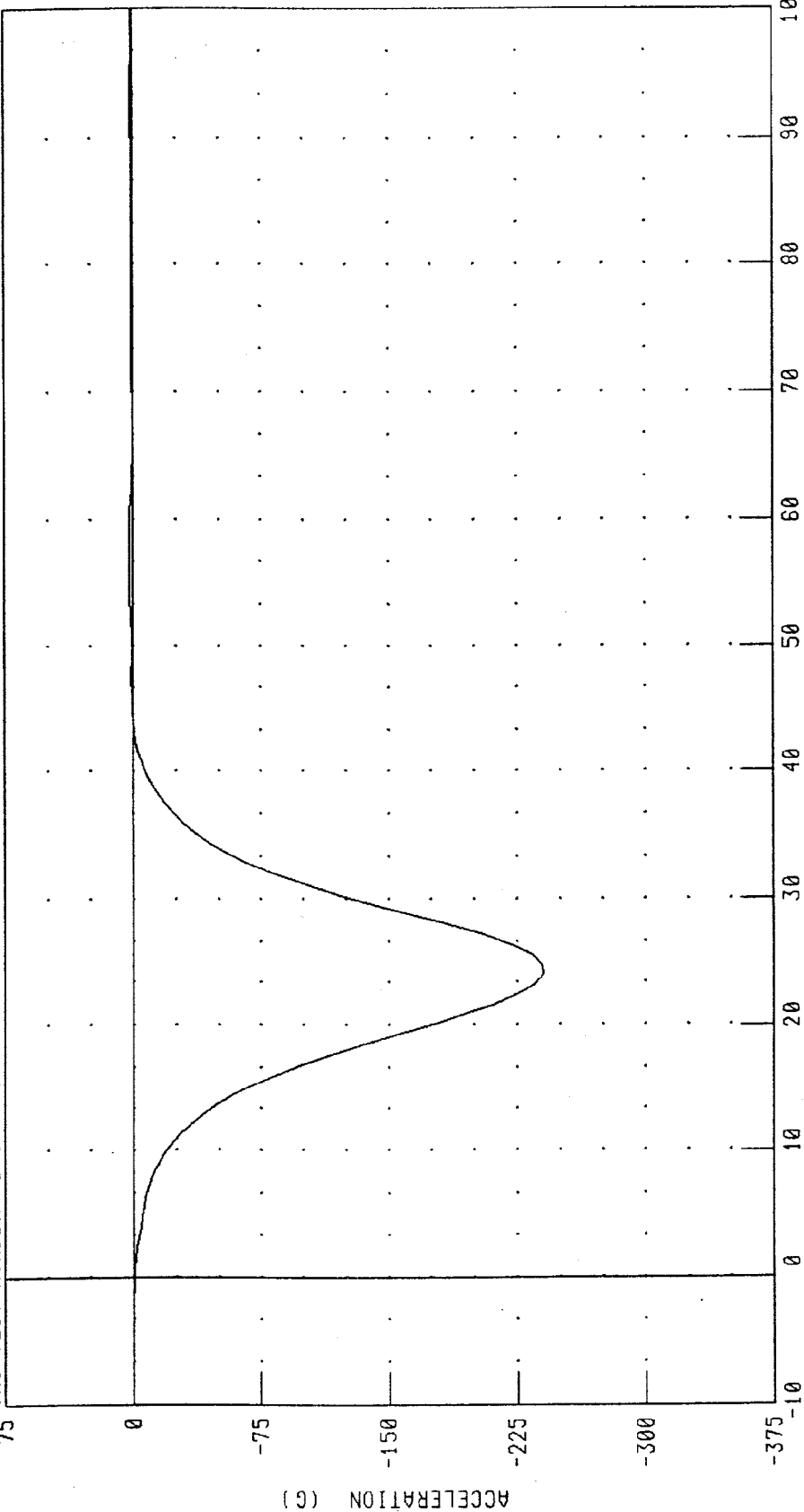
HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 283C8HD1

572 0 SN283 HEAD DROP CAL 8

RUN NUMBER: 110999.0858,1

75



TIME (NS X 10⁻¹)

CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 2.41 G @ 5.44 MS, -240.44 G @ 2.40 MS

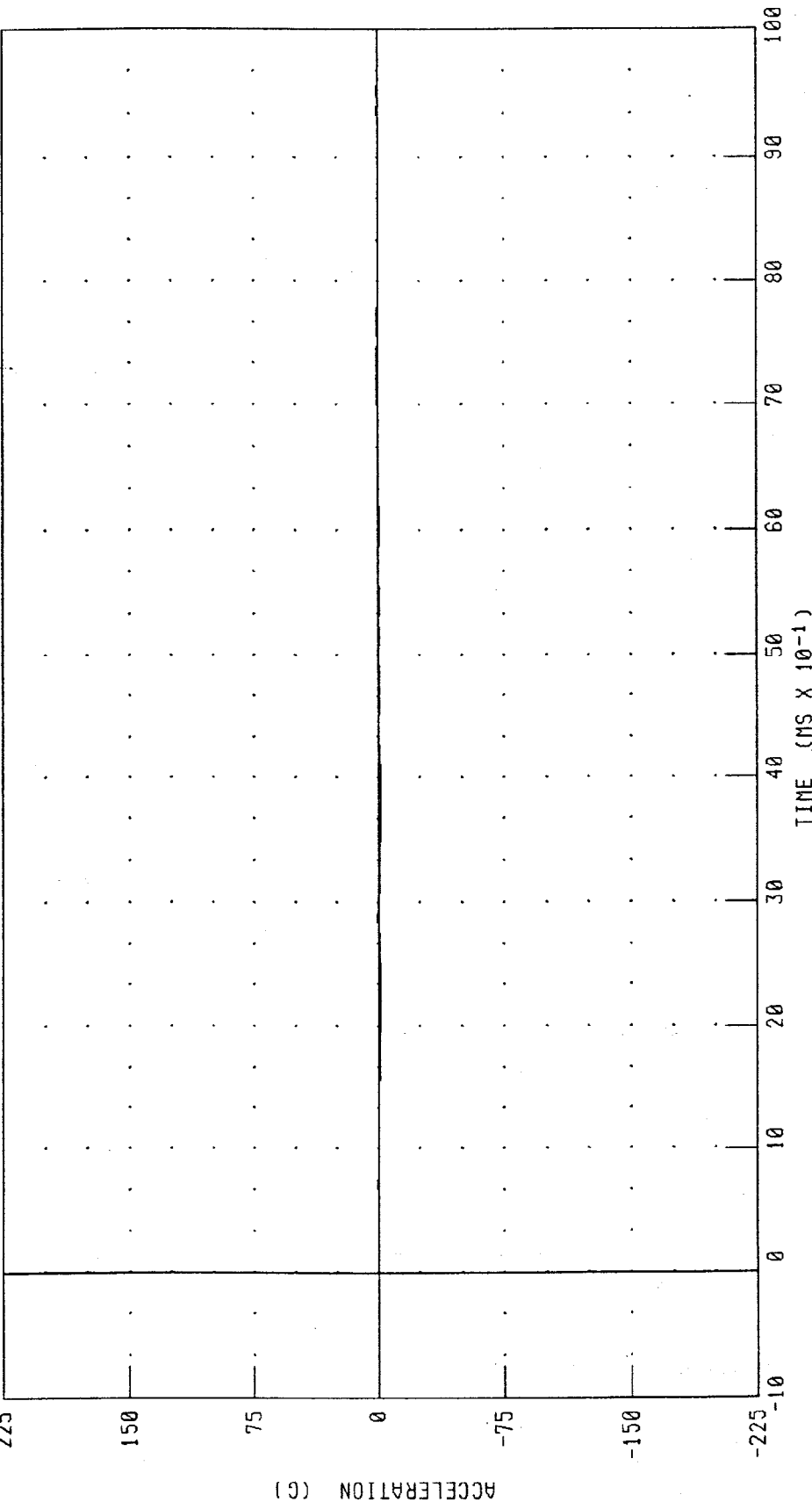
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 283C8HD1

572 0 SN283 HEAD DROP CAL 8

RUN NUMBER: 110999.0858,1



PEAK DATA: 0.40 G @ 7.20 MS, -1.81 G @ 2.24 MS

CHANNEL: HEDYC FILTER: CH. CLASS 1000

PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

572 0 SN283 HEAD DROP CAL 8

RUN NUMBER: 110999.0858;1

TRC TEST NUMBER: 283C8HD1

375

300

225

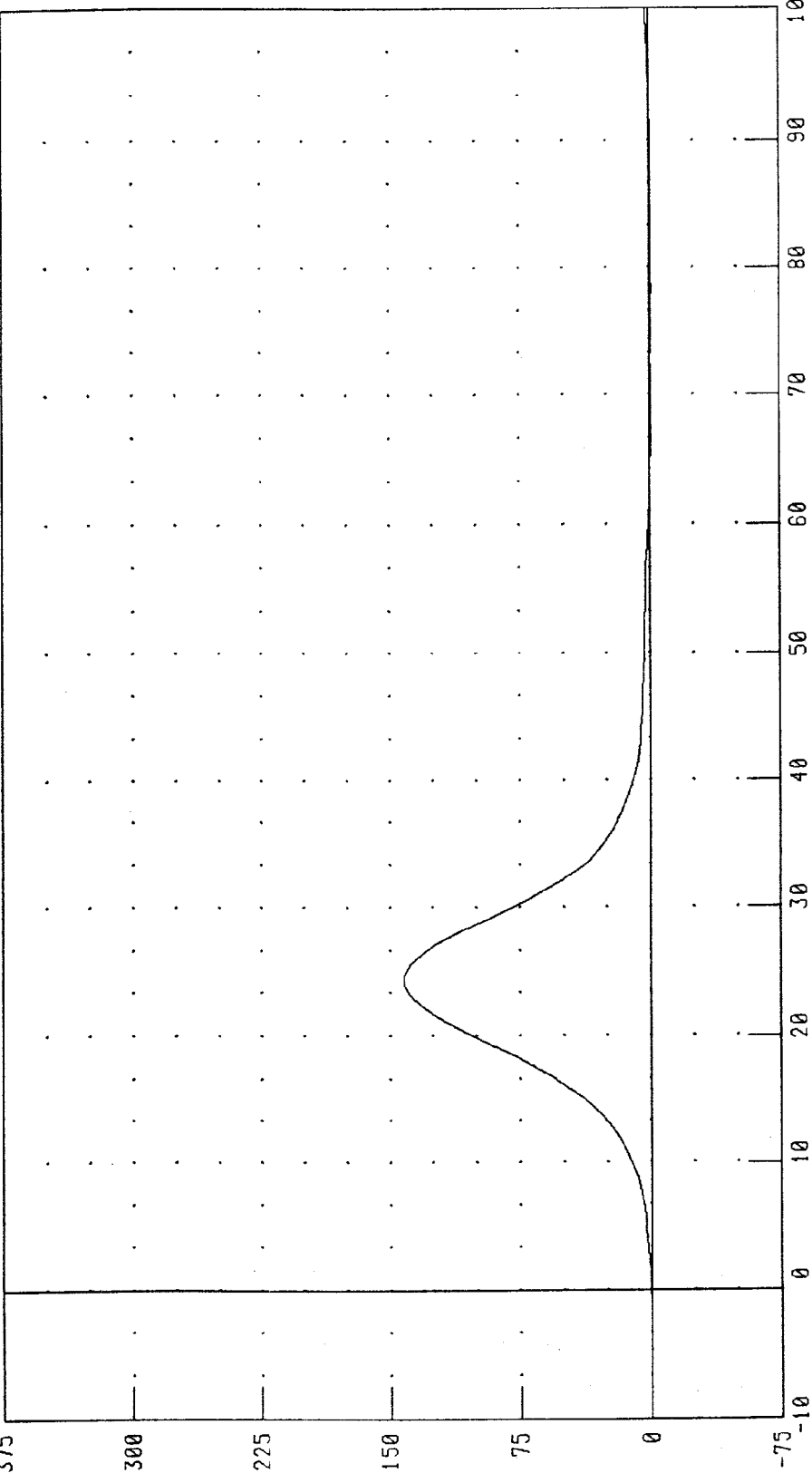
150

75

0

-75

ACCELERATION (G)



TIME (MS X 10⁻¹)

CHANNEL: HEDZC FILTER: CH. CLASS 1000

PEAK DATA: 141.58 G @ 2.40 MS, -1.19 G @ 7.84 MS

PART 572-0 HYBRID III HEAD CALIBRATION

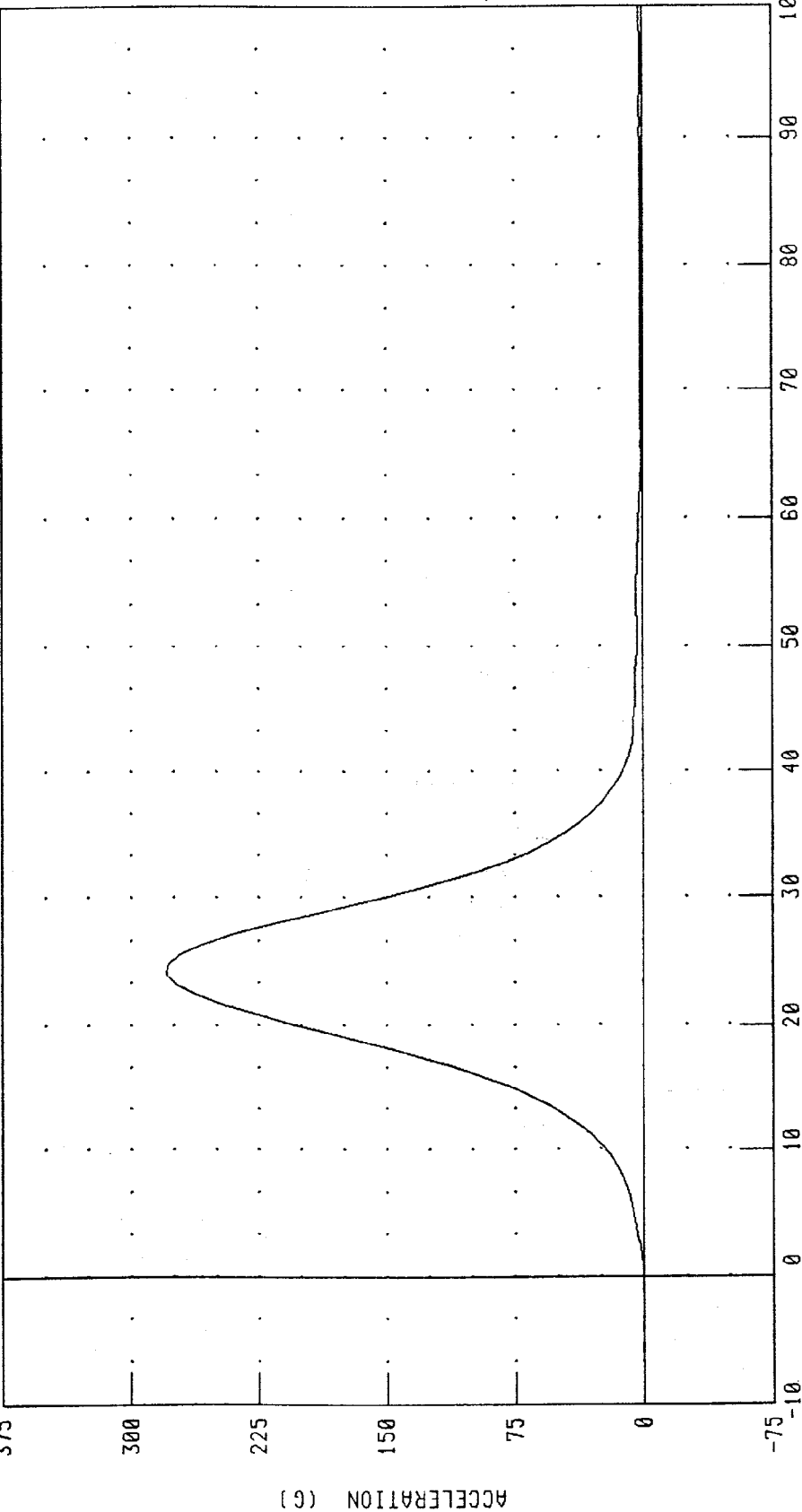
HEAD RESULTANT ACCELERATION

572 0 SN283 HEAD DROP CAL 8

TRC TEST NUMBER: 283C8HD1

375

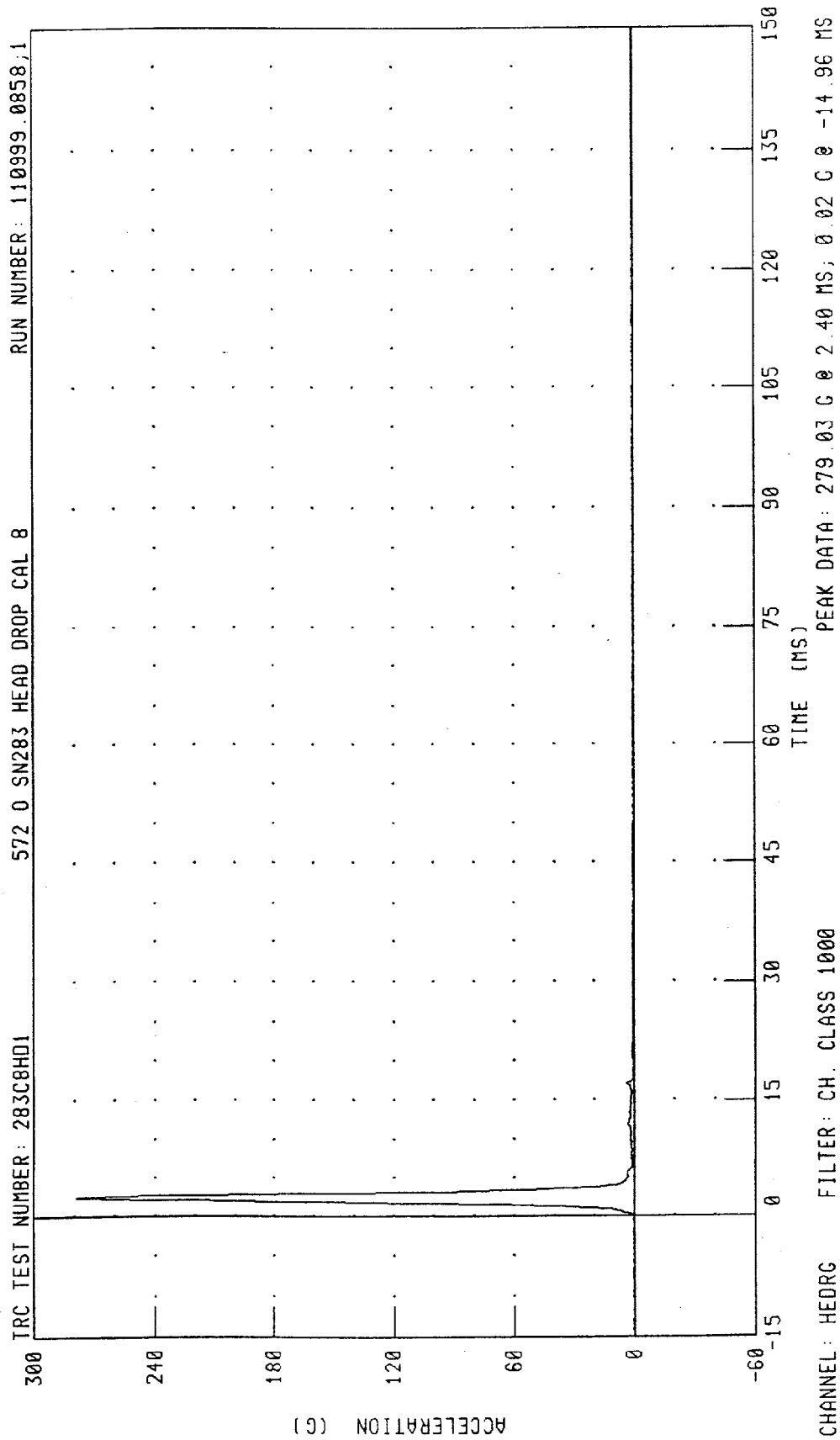
RUN NUMBER: 110999.0858;1



CHANNEL: HEDRC FILTER: CH. CLASS 1000

PEAK DATA: 279.03 G @ 2.40 MS; 0.02 G @ -0.96 MS

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



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

09-NOV-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 283C8NF3 572 0 SN283 NECK FLEX. CAL8

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.1 - 2.5 M/S	2.18 M/S
	20 MS	4.0 - 5.0 M/S	4.26 M/S
	30 MS	5.8 - 7.0 M/S	6.33 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	91.80 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT		69 - 83 NM	71.15 NM
POSITIVE MOMENT DECAY TIME FROM TO / 10 NM		80 - 100 MS	94.08 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 110999.1405;1

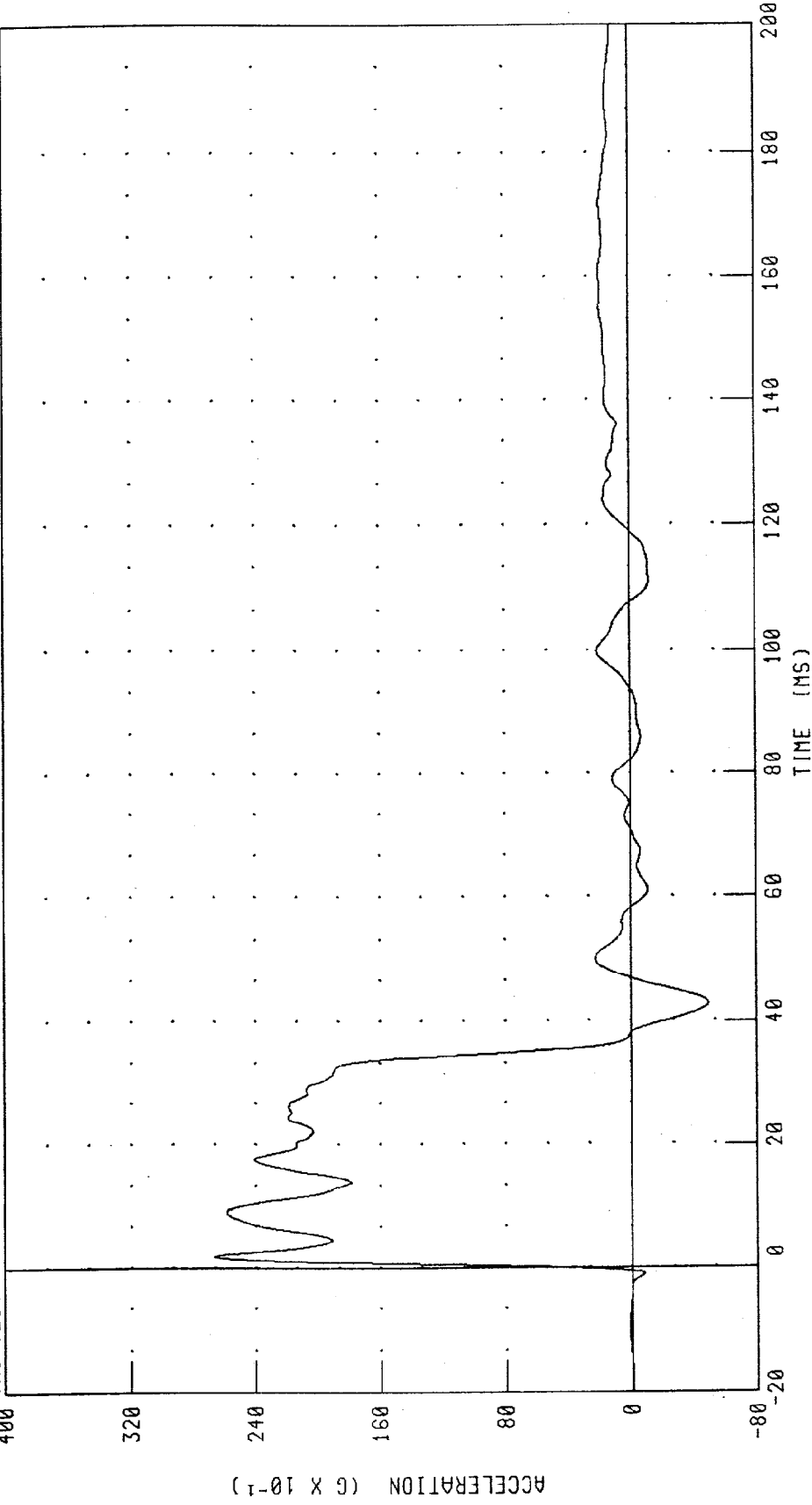
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

RUN NUMBER: 110999 1410,1



PEAK DATA: 26.66 G @ 1.76 MS, -4.93 G @ 42.80 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

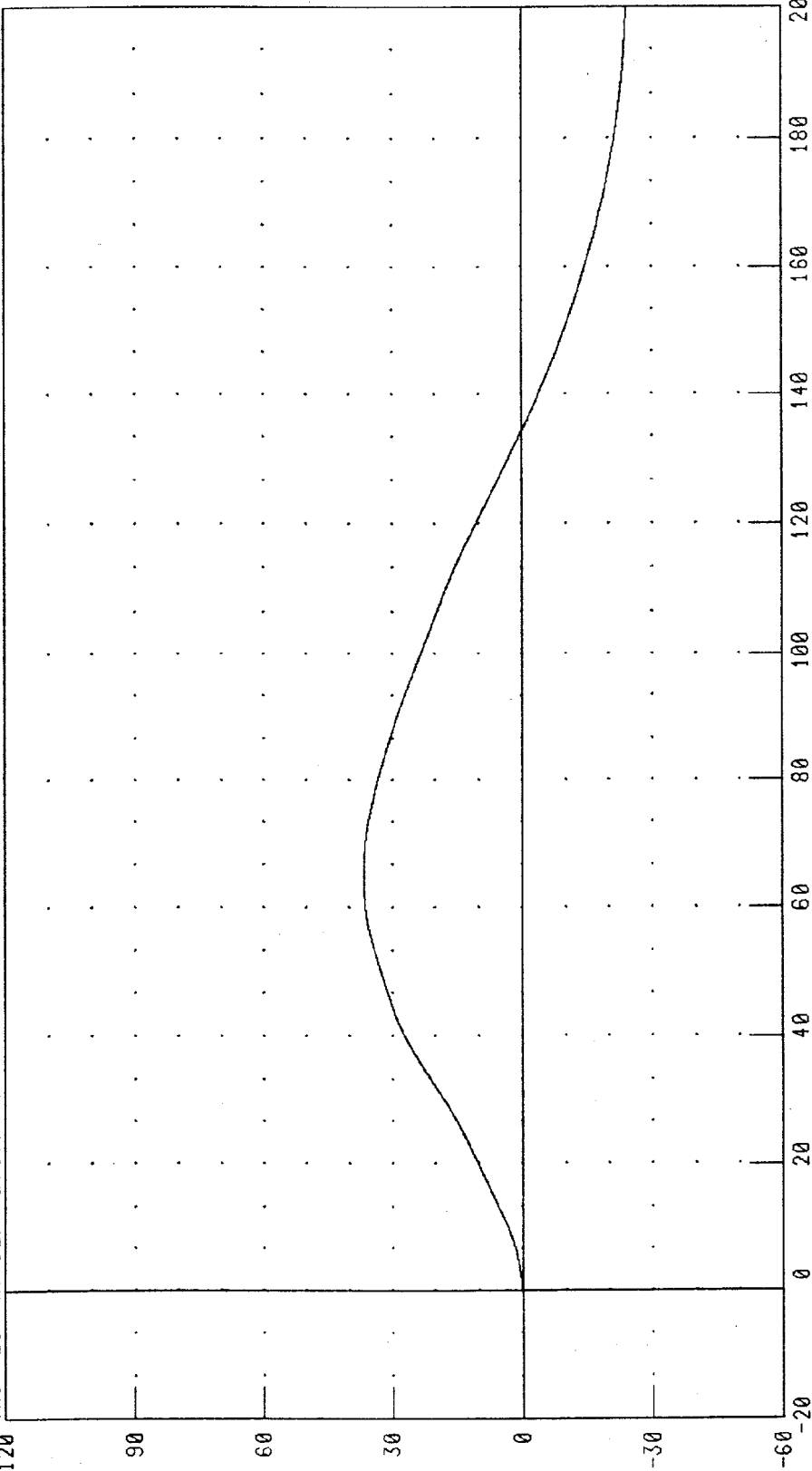
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

RUN NUMBER: 110999.1410.1

120



ANGLE (°)

TIME (MS)

CHANNEL: BETA

FILTER: CH. CLASS 60

PEAK DATA: 36.61 ° @ 64.80 MS, -24.21 ° @ 200.00 MS

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

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

RUN NUMBER: 110999.1410.1

120

90

60

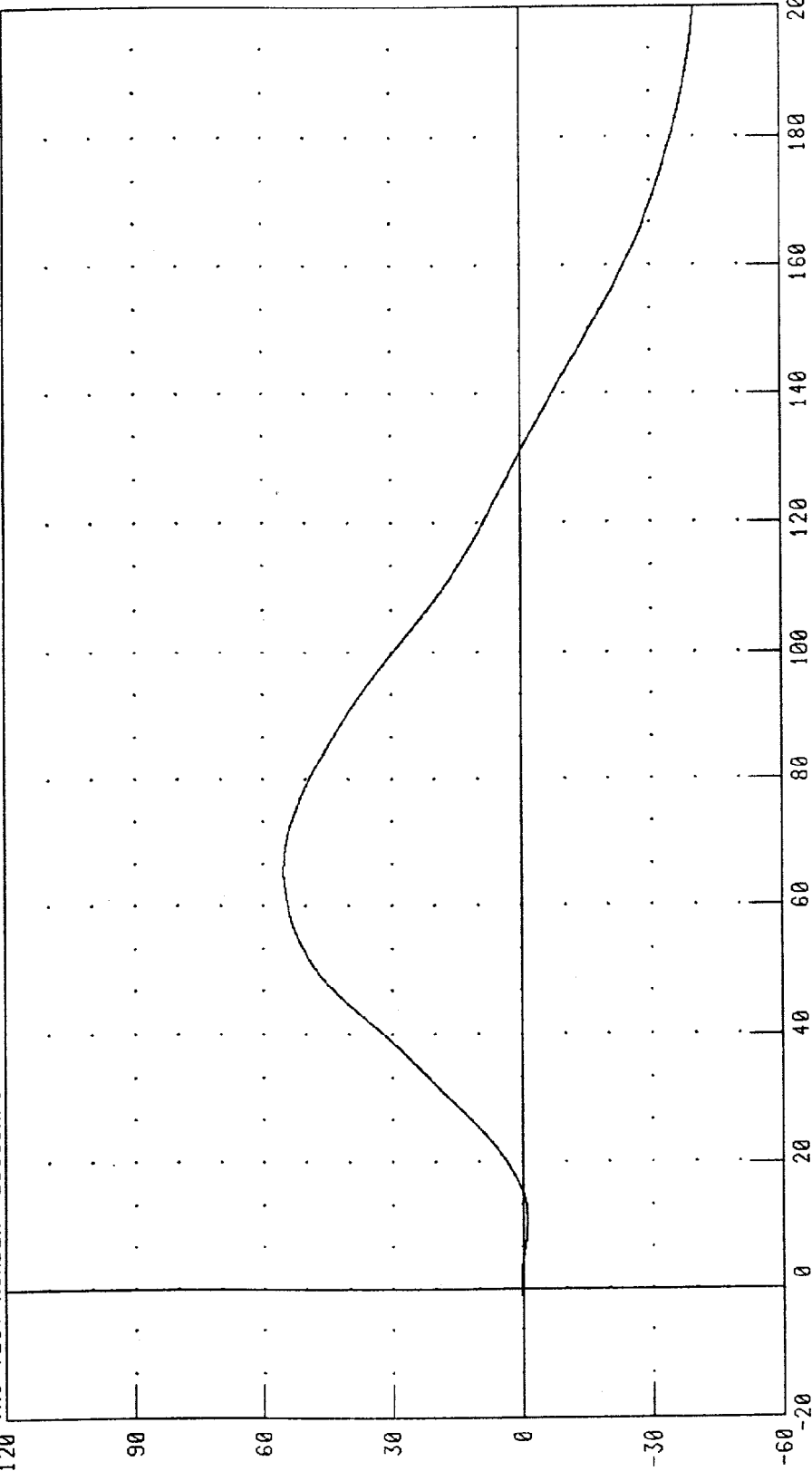
30

0

-30

-60

ANGLE (°)



TIME (MS)

CHANNEL: THETA

FILTER: CH. CLASS 60

PEAK DATA: 55.20 ° @ 65.52 MS, -40.31 ° @ 200.00 MS

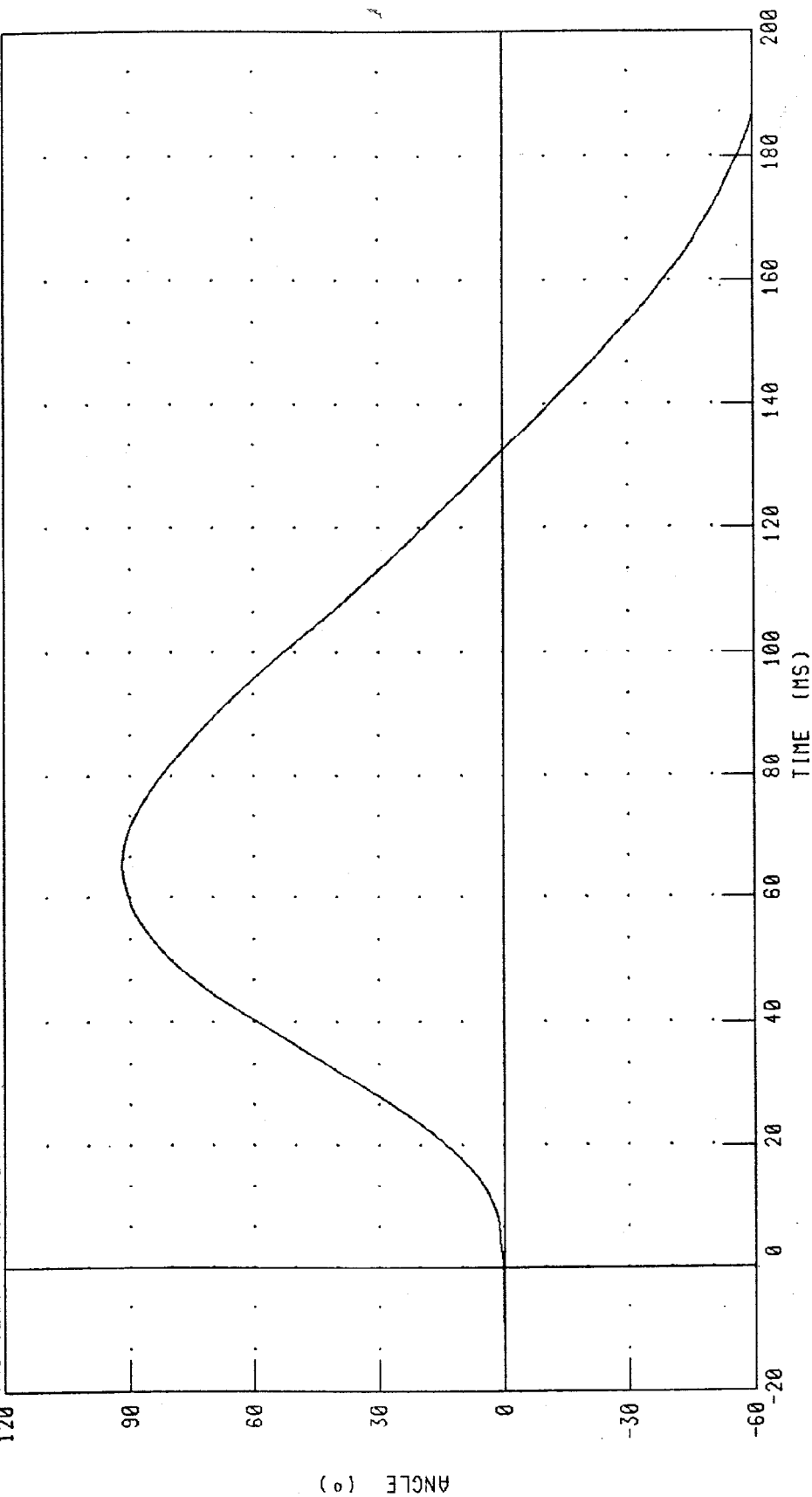
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

RUN NUMBER: 110999.1410.1



PEAK DATA: 91.80 ° @ 65.28 MS, -64.51 ° @ 200.00 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

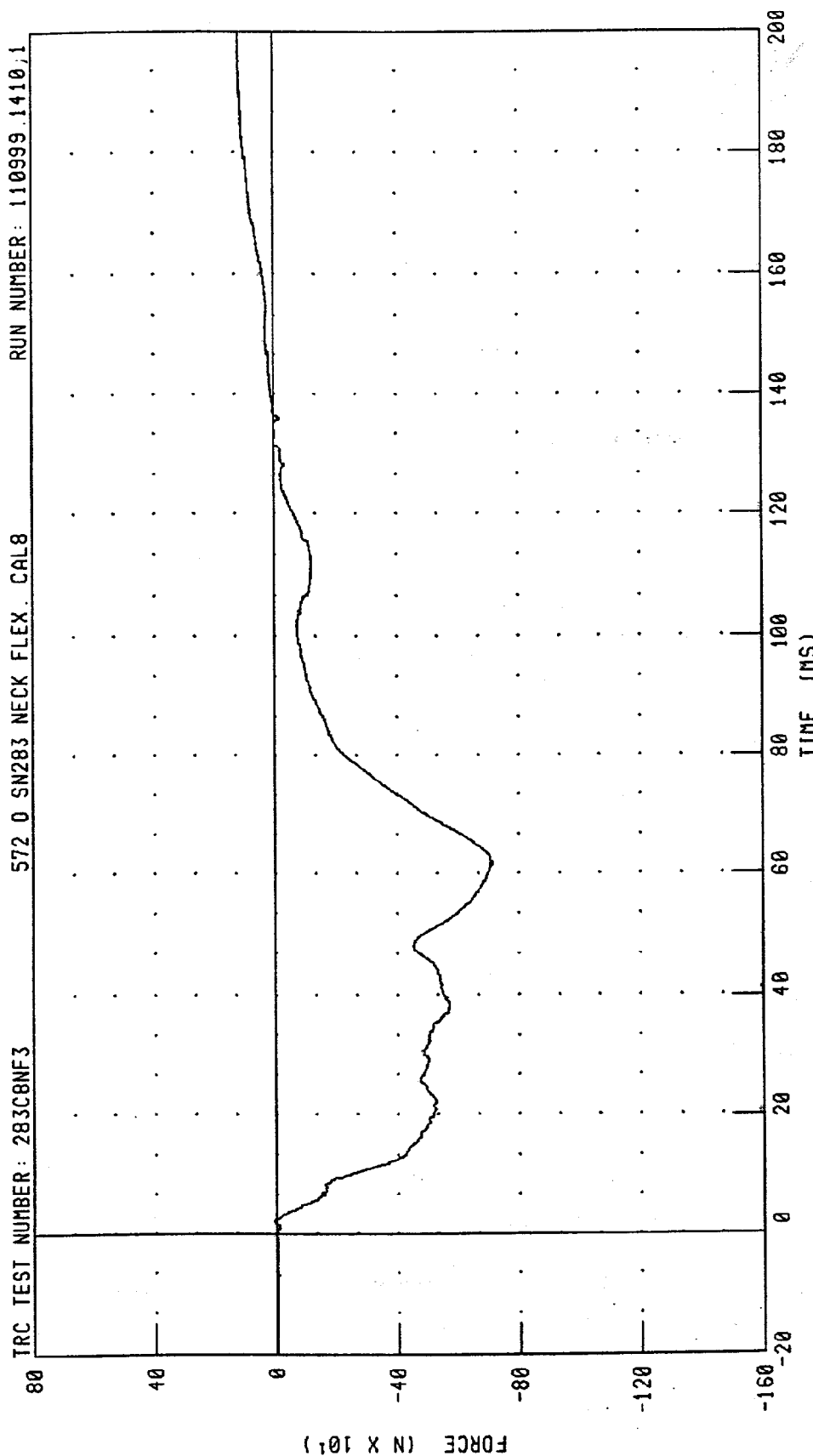
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

RUN NUMBER: 110999.1410,1



PEAK DATA: 121.79 N @ 196.48 MS, -711.32 N @ 61.36 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

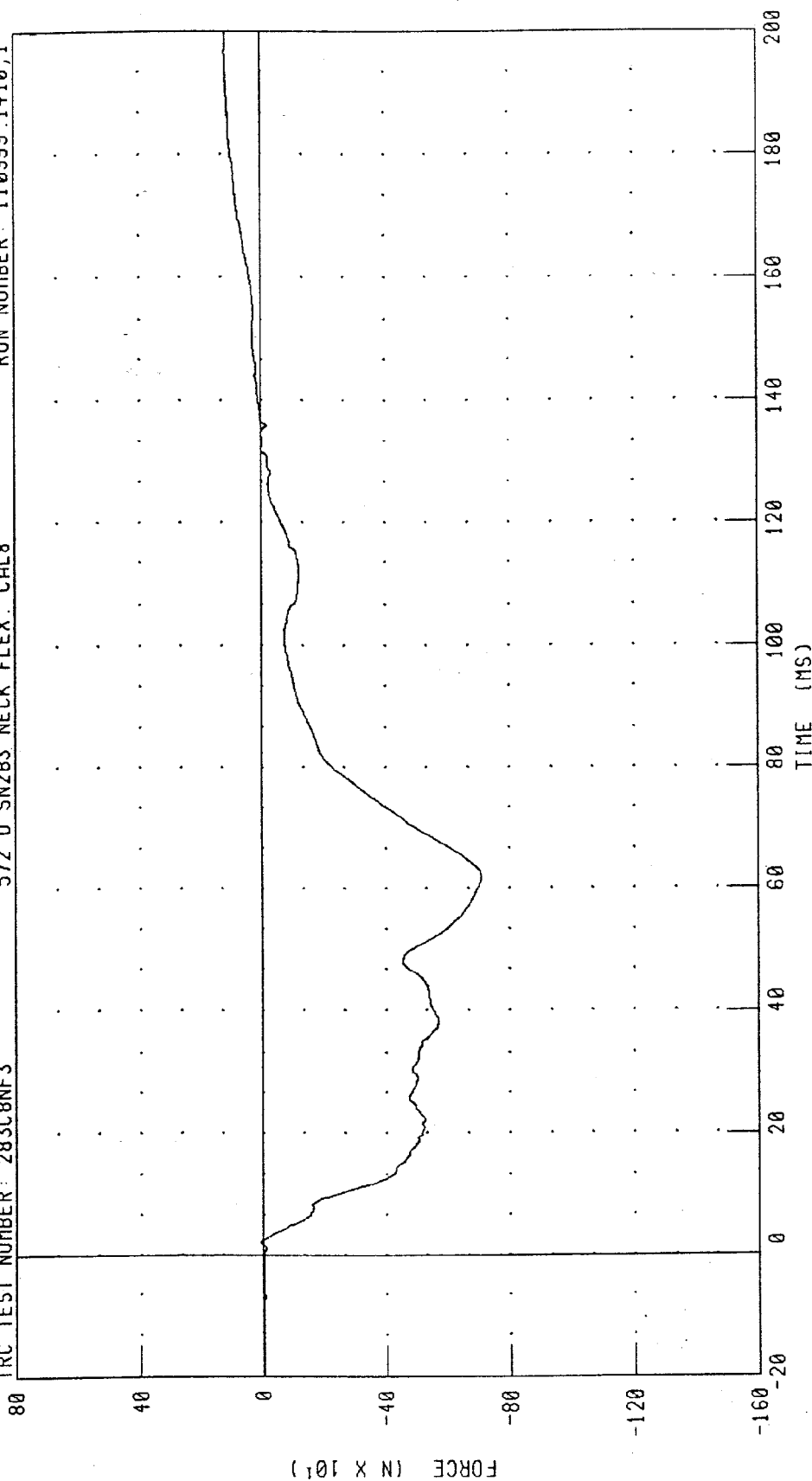
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

RUN NUMBER: 110999.1410.1



CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 118.75 N @ 196.48 MS, -710.51 N @ 62.00 MS

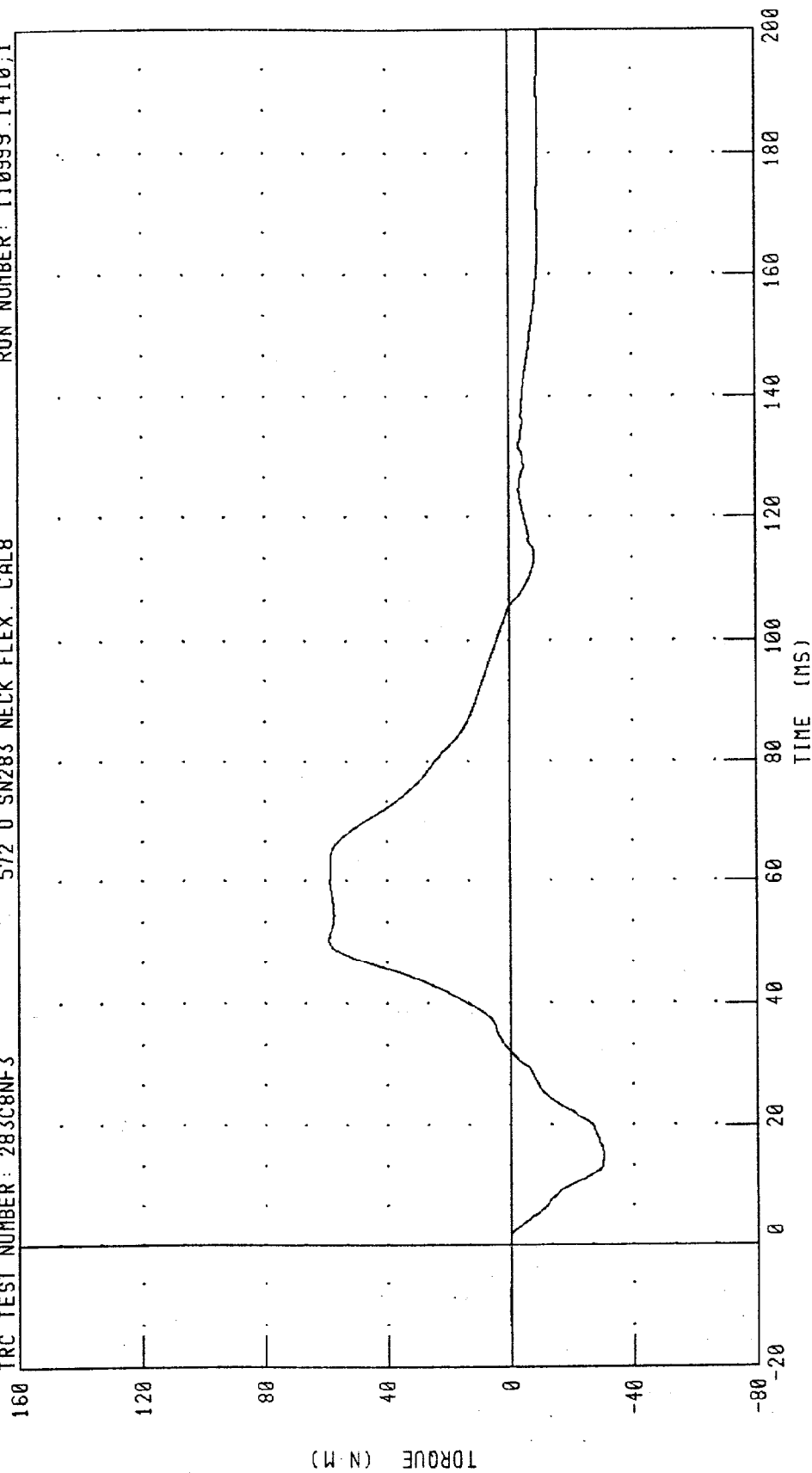
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 283C8NF3

572 0 SN283 NECK FLEX. CAL8

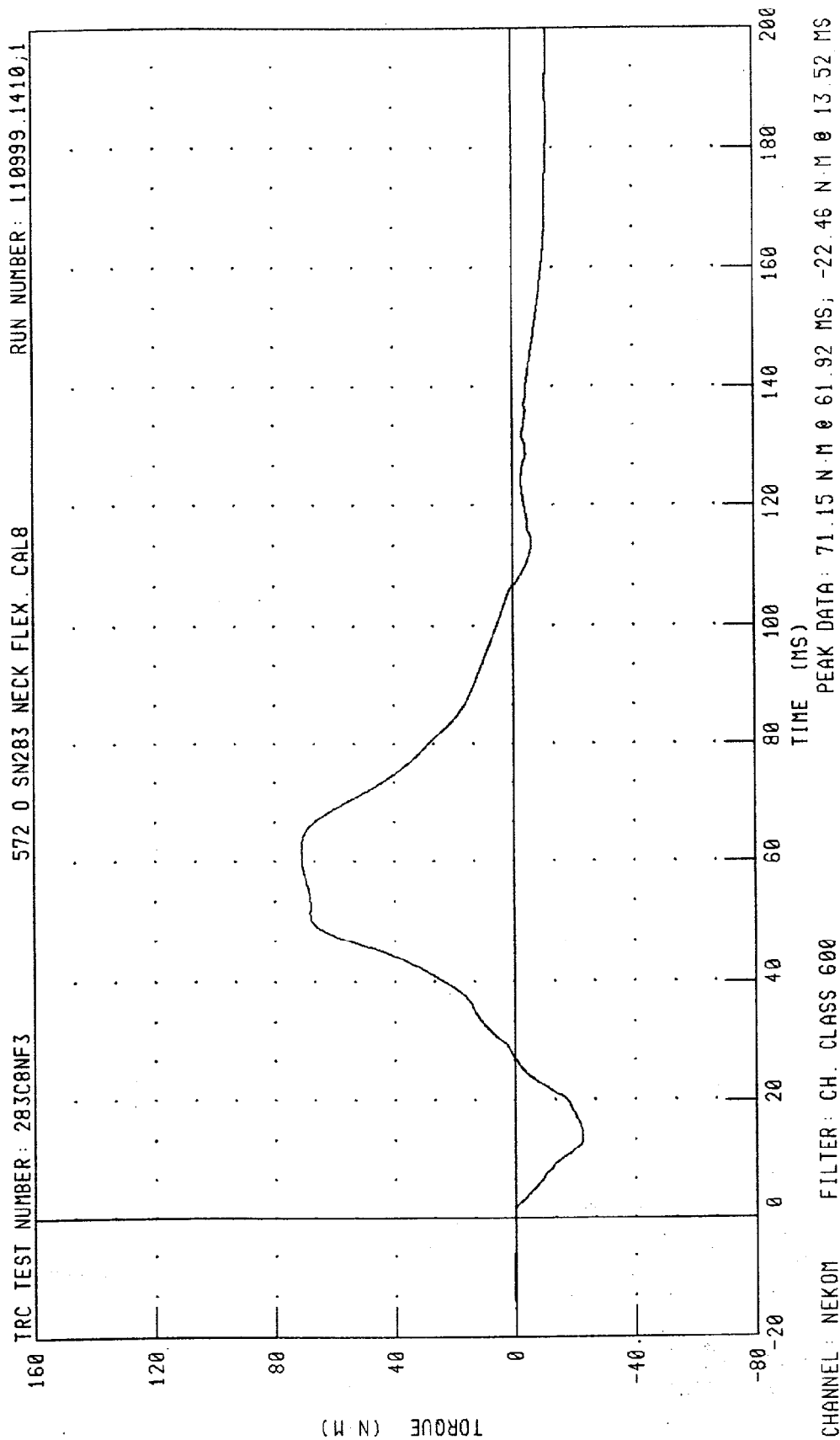
RUN NUMBER: 110999.1410;1



PEAK DATA: 59.11 N-M @ 50.32 MS; -30.31 N-M @ 15.20 MS

CHANNEL: NEKYM FILTER: CH. CLASS 600

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



CHANNEL: NEKOM FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

09-NOV-99

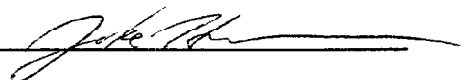
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 283C8NE4 572 0 SN283 NECK EXT. CAL 8

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.10 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	1.5 - 1.9 M/S	1.59 M/S
	20 MS	3.1 - 3.9 M/S	3.20 M/S
	30 MS	4.6 - 5.6 M/S	4.70 M/S
PEAK D-PLANE ROTATION		97 - 109 DEG.	113.96 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT		-55 / -69 NM	-61.79 NM
NEGATIVE MOMENT DECAY TIME FROM TO / -10 NM LEVEL		94 - 114 MS	109.2 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 110999.1611;2

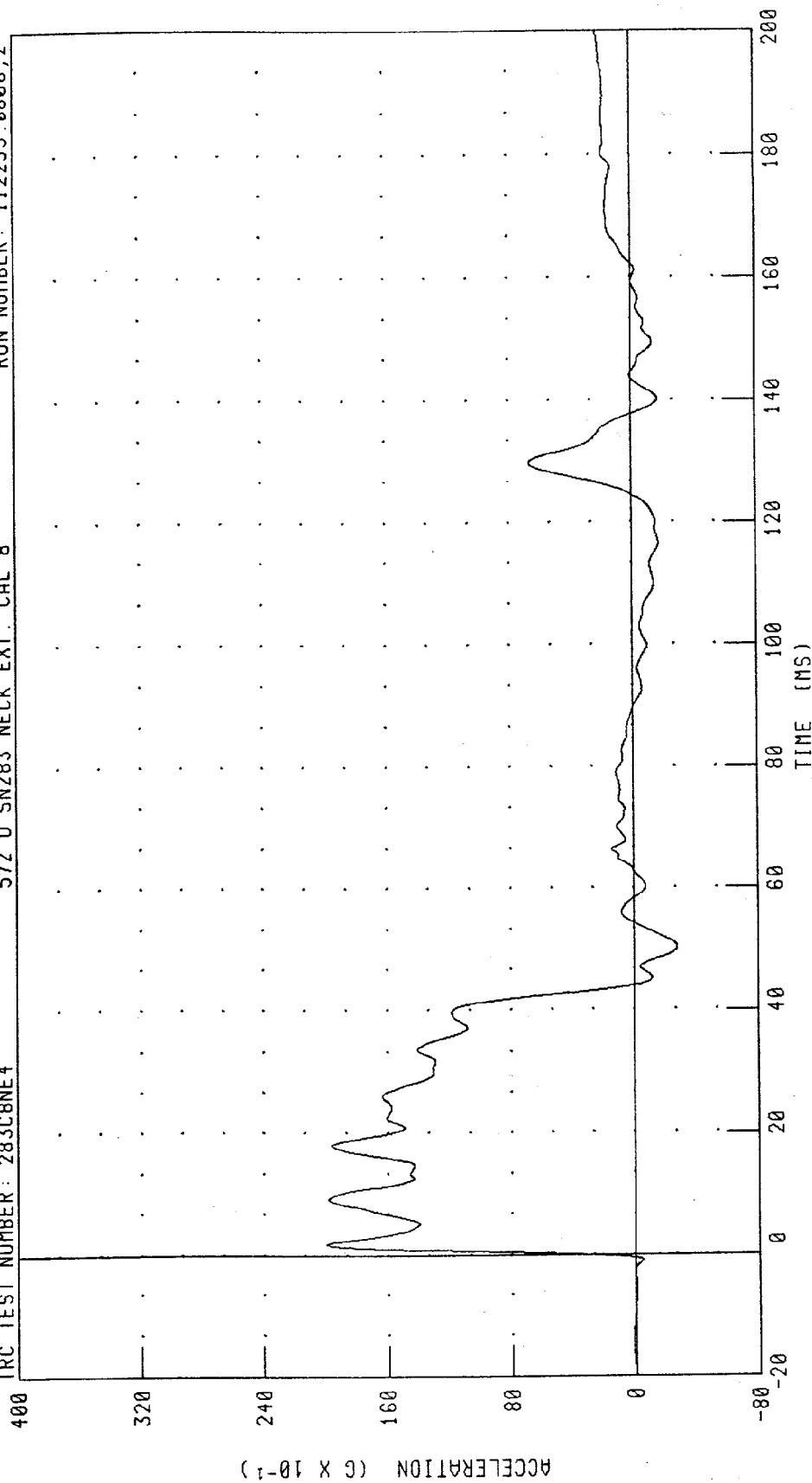
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 283C8NE4

572 0 SN283 NECK EXT. CAL 8

RUN NUMBER: 112299.0806;2



PEAK DATA: 19.97 G @ 1.76 MS, -2.82 G @ 50.40 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572 0 SN283 NECK EXT. CAL 8

RUN NUMBER: 112299.0806;2

TRC TEST NUMBER: 283C8NE4

120

90

60

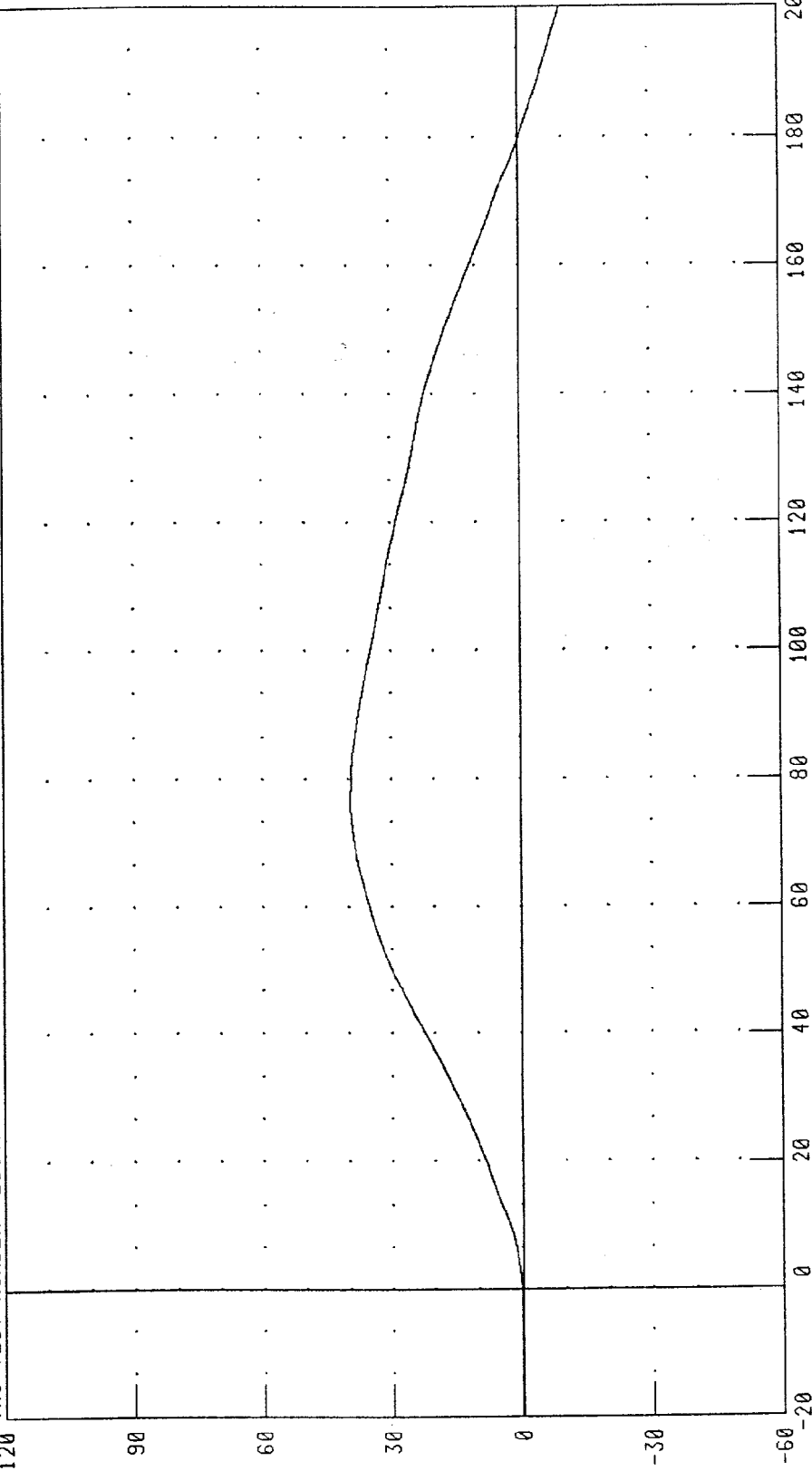
30

0

-30

-60

ANGLE (°)



TIME (MS)

CHANNEL: BETA

FILTER: CH. CLASS 60

PEAK DATA: 39.48 ° @ 76.40 MS, -9.90 ° @ 200.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

572 0 SN283 NECK EXT. CAL 8

TRC TEST NUMBER: 283C8NE4

120

90

60

30

0

-30

-60

ANGLE (°)

0

20

40

60

80

100

120

140

160

180

200

TIME (MS)

PEAK DATA: 75.35 ° @ 86.72 MS, -21.42 ° @ 200.00 MS

CHANNEL: THETA

FILTER: CH. CLASS 60

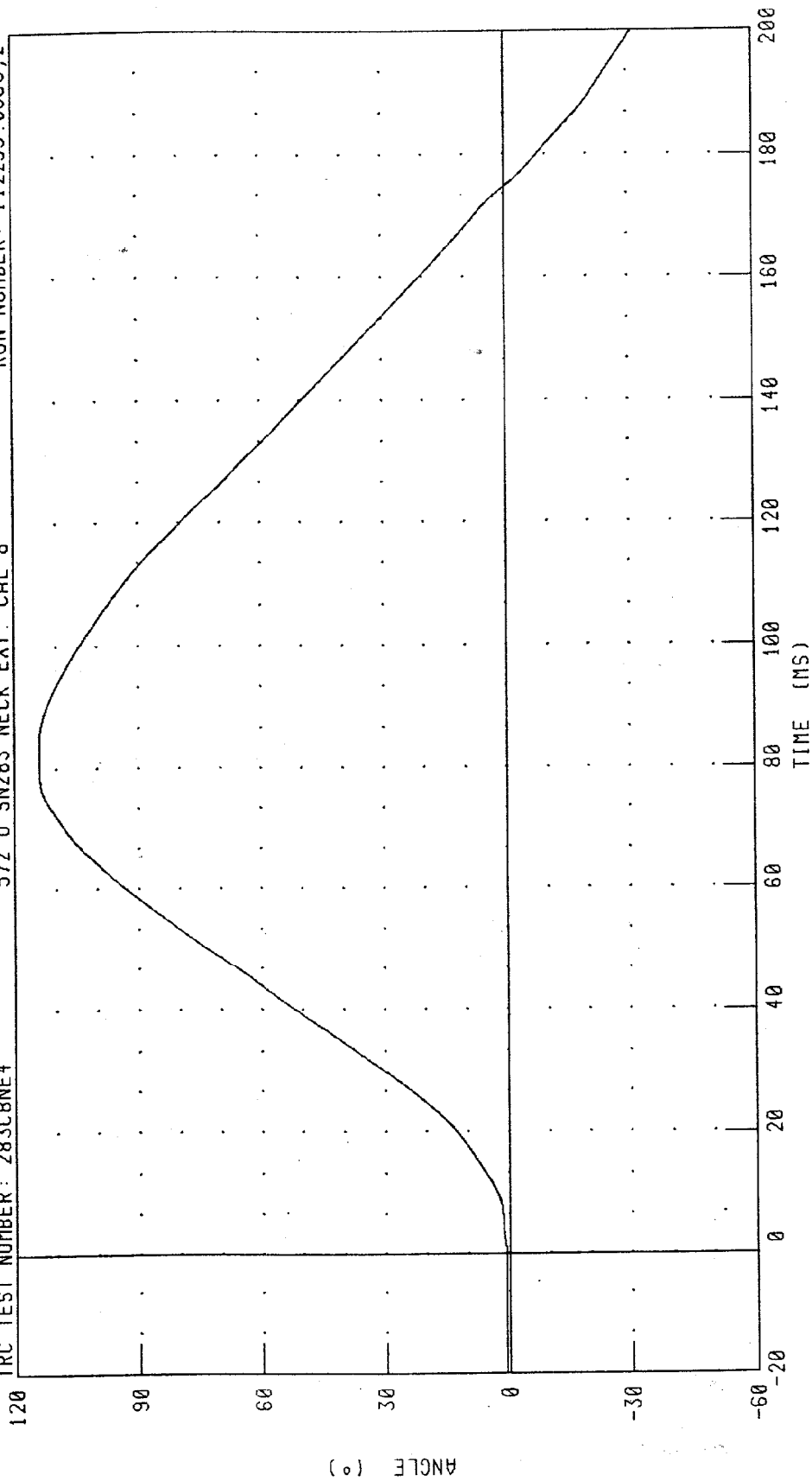
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 283CBNE4

572 0 SN283 NECK EXT. CAL 8

RUN NUMBER: 112299.0806;2



CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 113.97 ° @ 81.12 MS, -31.32 ° @ 200.00 MS

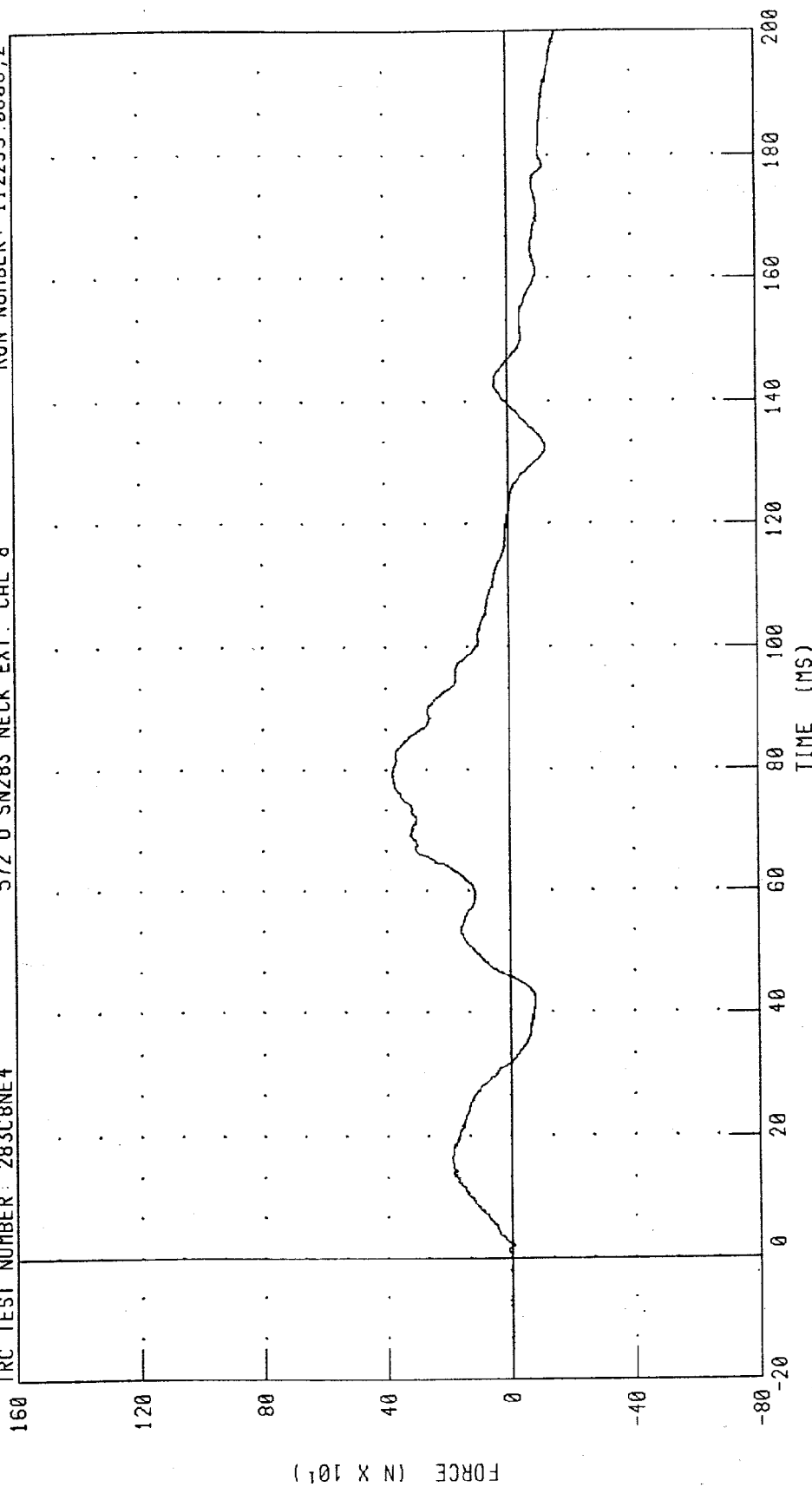
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 283C8NE4

572 0 SN283 NECK EXT. CAL 8

RUN NUMBER: 112299.0806;2

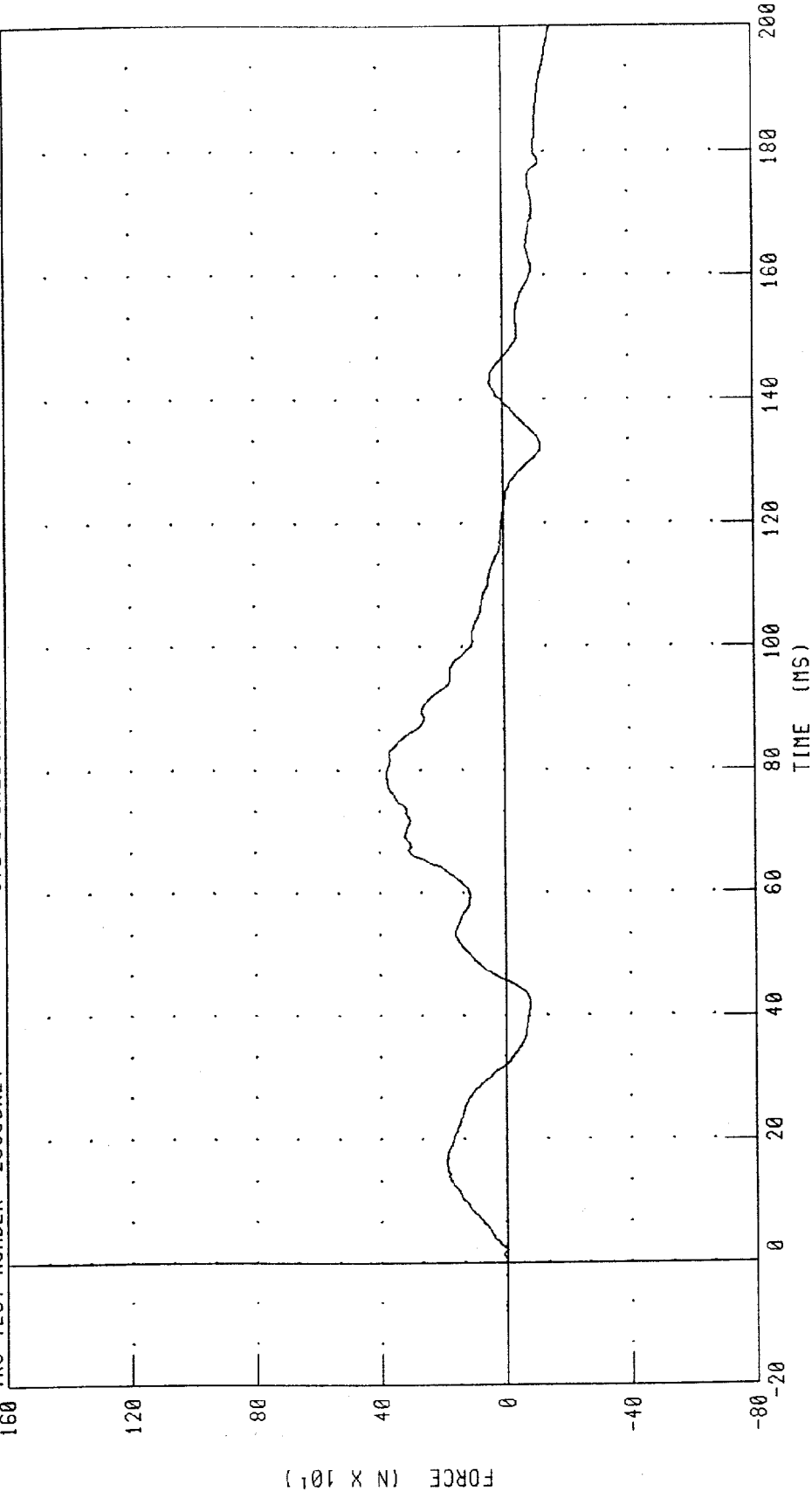


PEAK DATA: 379.68 N @ 78.80 MS, -160.09 N @ 200.00 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

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

TRC TEST NUMBER: 283CBNE4 572 0 SN283 NECK EXT. CAL 8 RUN NUMBER: 112299.080672



CHANNEL: NEKXFC FILTER: CH. CLASS 600 PEAK DATA: 379.48 N @ 79.44 MS; -157.82 N @ 200.00 MS

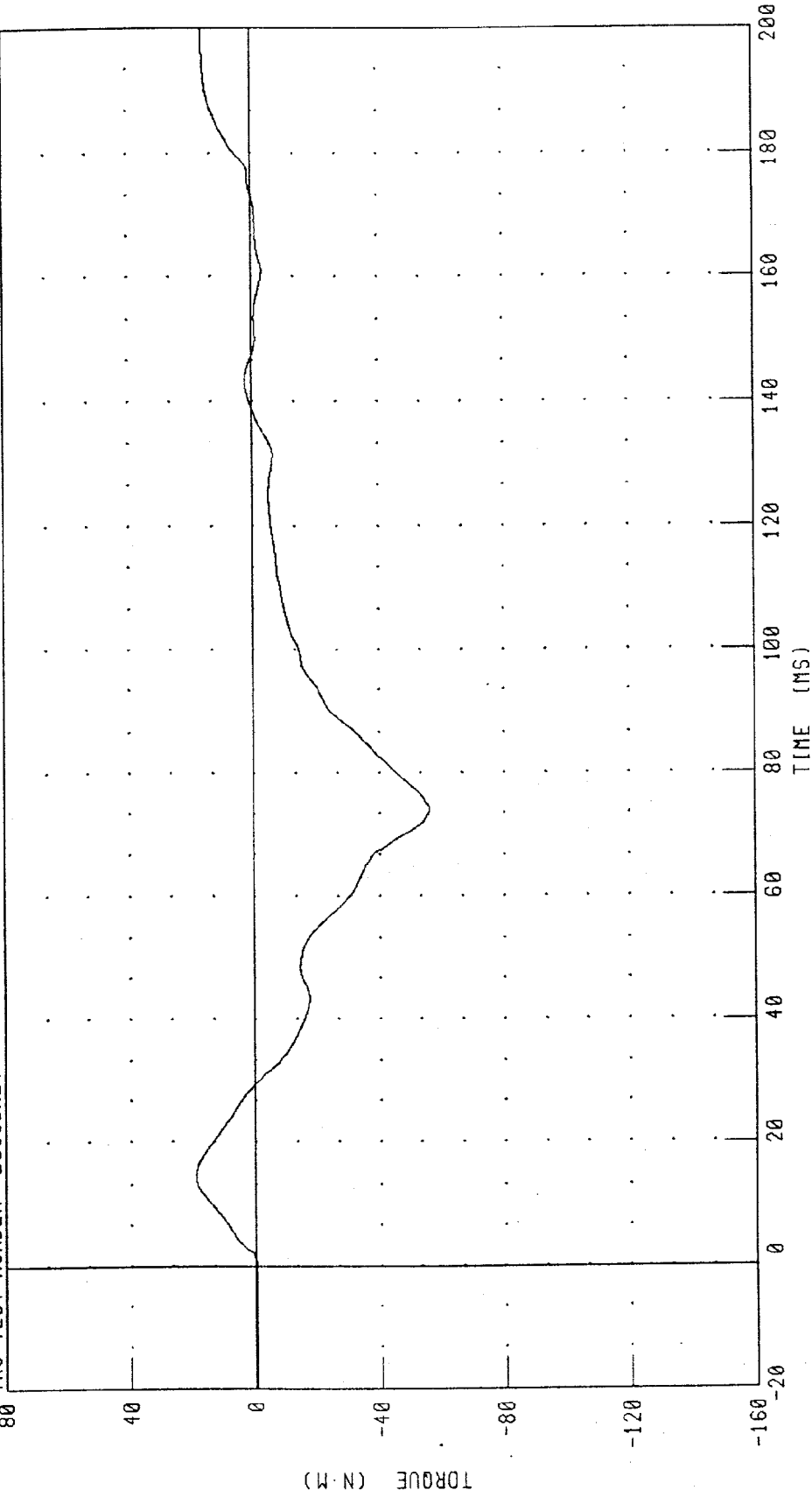
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 283C8NE4

572 0 SN283 NECK EXT. CAL 8

RUN NUMBER: 112299.0806;2



PEAK DATA: 19.12 N-M @ 14.96 MS; -56.14 N-M @ 74.08 MS

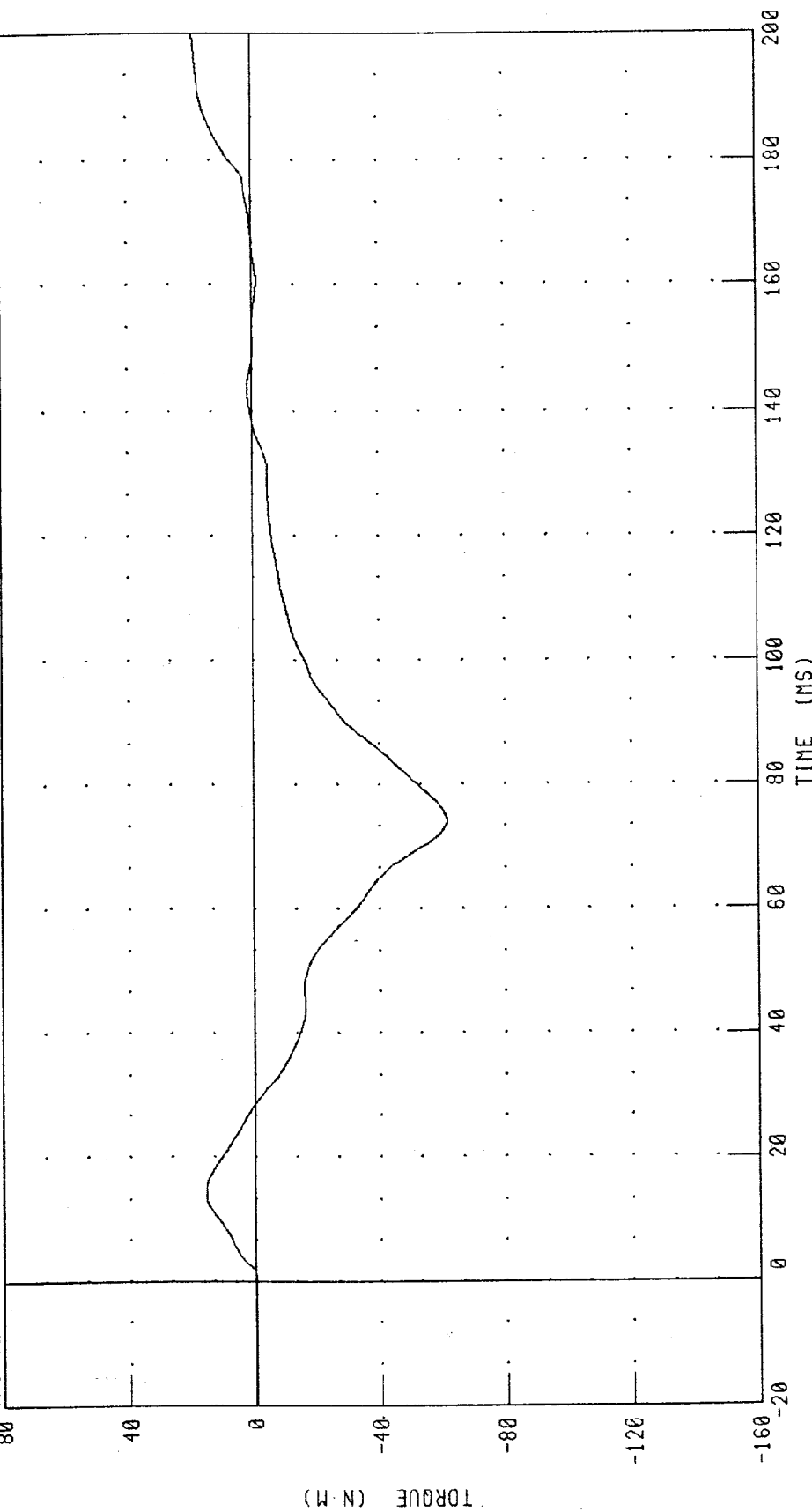
CHANNEL: NEKYM FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 283CBNE4

572 0 SN283 NECK EXT. CAL 8

RUN NUMBER: 112299.0806;2



PEAK DATA: 18.70 N-M @ 200.00 MS, -61.79 N-M @ 74.24 MS

CHANNEL: NEKOM FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

15-NOV-99

TRC INC.

TEST NO: 283C8TH1

572 0 SN283 THORAX CAL8

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	48 - 55 MM	50.1 MM
MAXIMUM RESISTIVE FORCE WITHIN DEFLECTION CORRIDOR	3900 - 4400 N	4515. N *
INTERNAL HYSTERESIS	69% - 85%	76.1%

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 111599.1109;1

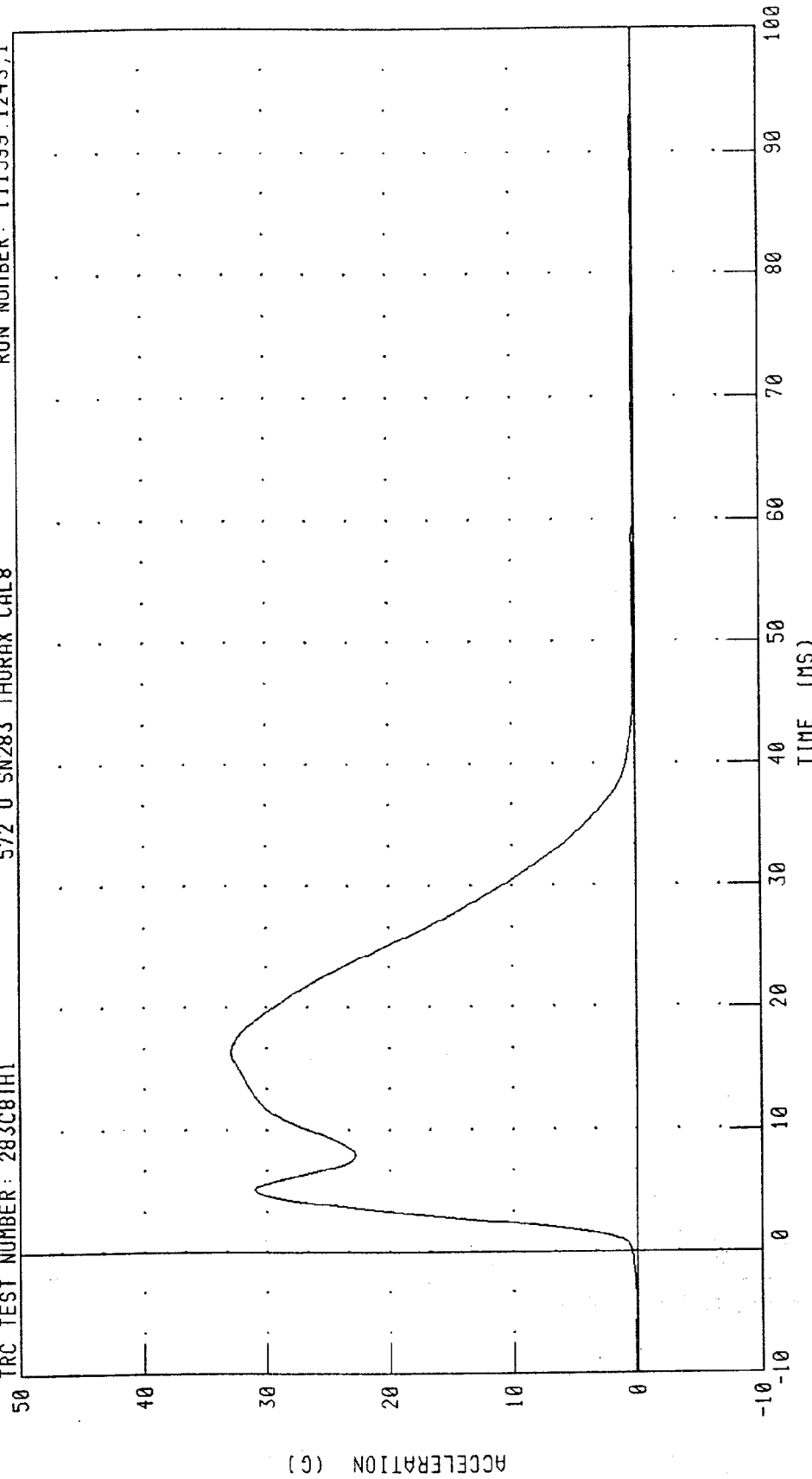
PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM DECELERATION

572 0 SN283 THORAX CAL8

RUN NUMBER: 111599.1243,1

TRC TEST NUMBER: 283C8TH1



PEAK DATA: 32.90 G @ 16.32 MS; 0 03 G @ 50.32 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

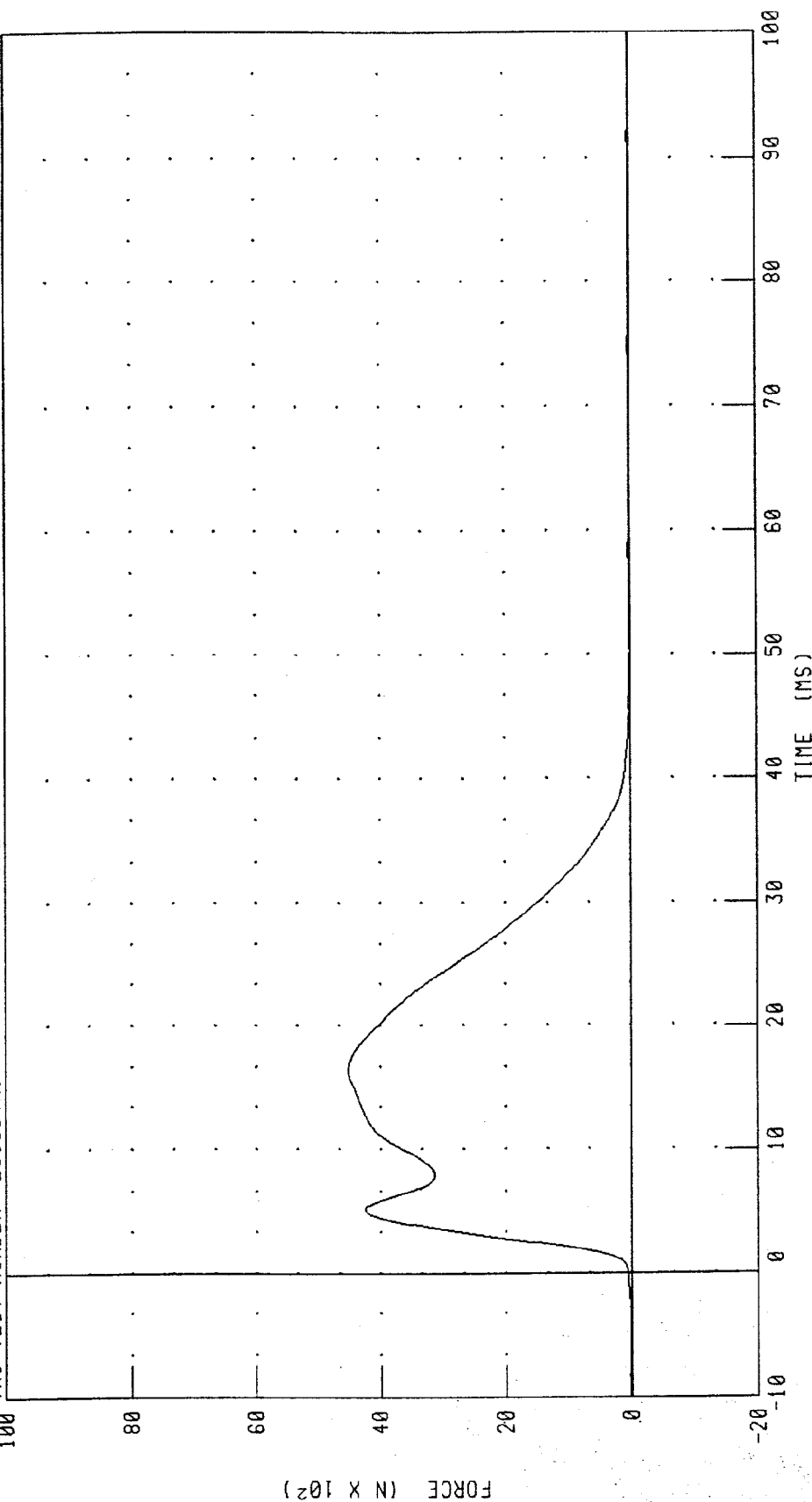
PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 283CBTH1

572 0 SN283 THORAX CAL8

RUN NUMBER: 111599.1243;1



CHANNEL: PENXF

FILTER: CH. CLASS 180

PEAK DATA: 4515.32 N @ 16.32 MS; 4.54 N @ 50.32 MS

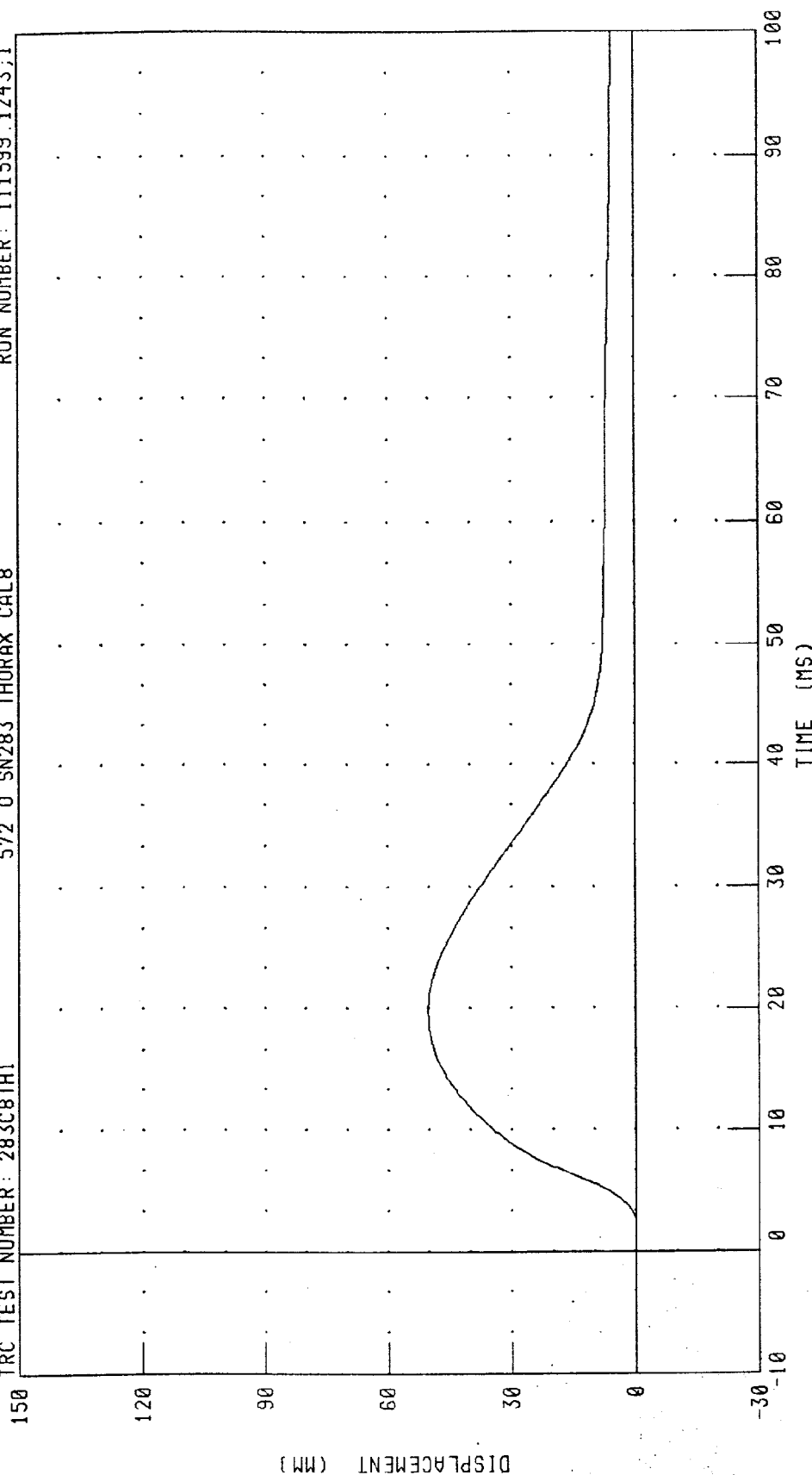
PART 572-0 HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

TRC TEST NUMBER: 283C8TH1

572 0 SN283 THORAX CAL8

RUN NUMBER: 111599.1243;1



CHANNEL: CSTXD FILTER: CH. CLASS 600

PEAK DATA: 50.15 MM @ 19.84 MS; -0.02 MM @ -0.24 MS

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

572 0 SN283 THORAX CAL8

IRC TEST NUMBER: 283C8TH1

100

80

60

40

20

0

-20

-10

0

10

20

30

40

50

60

70

80

90

100

RUN NUMBER: 111599.1243,1

DISPLACEMENT (MM)

PEAK DATA:

50.15 MM @ 19.84 MS

4515.32 N @ 16.32 MS

-0.02 MM @ -0.24 MS

4.54 N @ 50.32 MS

CHANNEL: CSTXD

PENXF

FILTER: CH. CLASS 600

CH. CLASS 180

FORCE (N X 10²)

0

20

40

60

80

100

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

09-NOV-99

TRC INC.

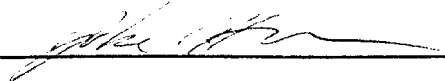
TEST NO: 283C8RK1

572 0 SN283 R.KNEE CAL8

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.09 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3479.7 N

TEST MEETS SPECIFICATIONS

TECHNICIAN



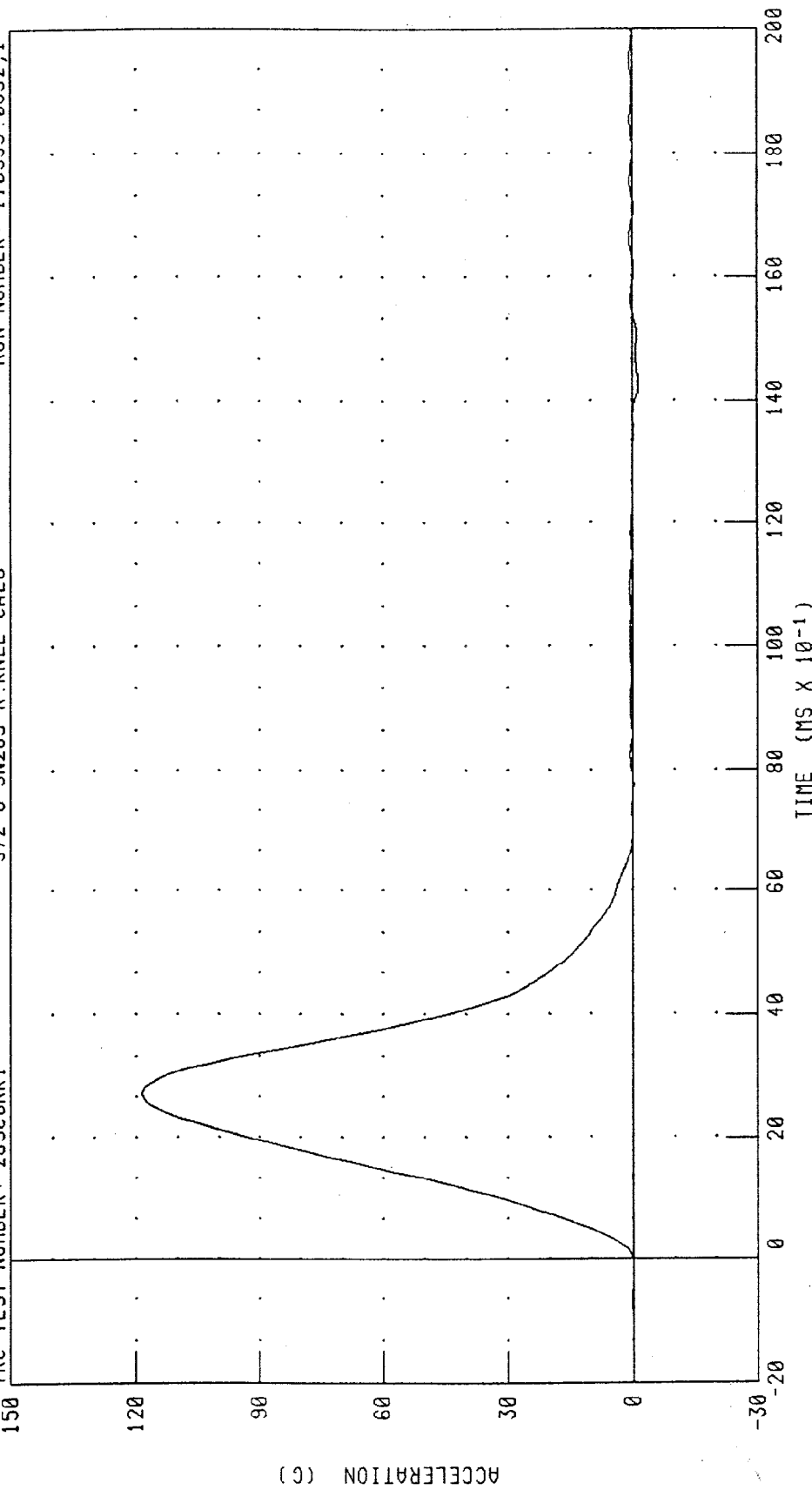
RUN NUMBER: 110999.0851;1

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

TRC TEST NUMBER: 283C8RK1

572 0 SN283 R.KNEE CAL8

RUN NUMBER: 110999.0852;1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 118.53 G @ 2.72 MS, -1.42 G @ 14.32 MS

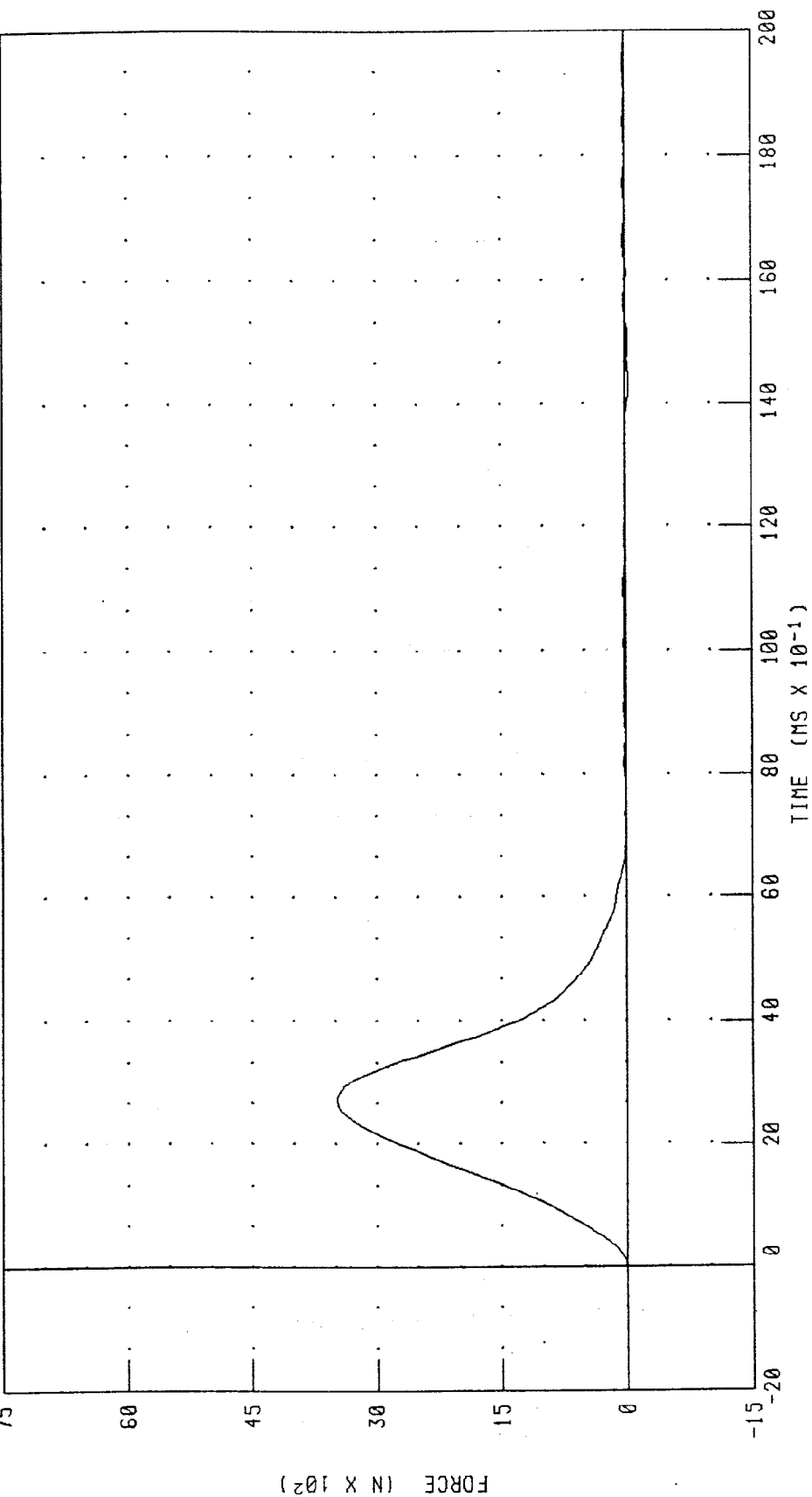
PART 572-0 HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 283C8RK1

572 0 SN283 R.KNEE CAL8

RUN NUMBER: 110999.0852;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 3479.75 N @ 2.72 MS; -41.82 N @ 14.32 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

09-NOV-99

TRC INC.

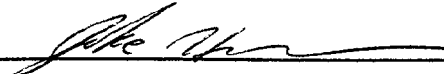
TEST NO: 283C8LK1

572 0 SN283 LEFT KNEE CAL8

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.08 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3851.1 N

TEST MEETS SPECIFICATIONS

TECHNICIAN



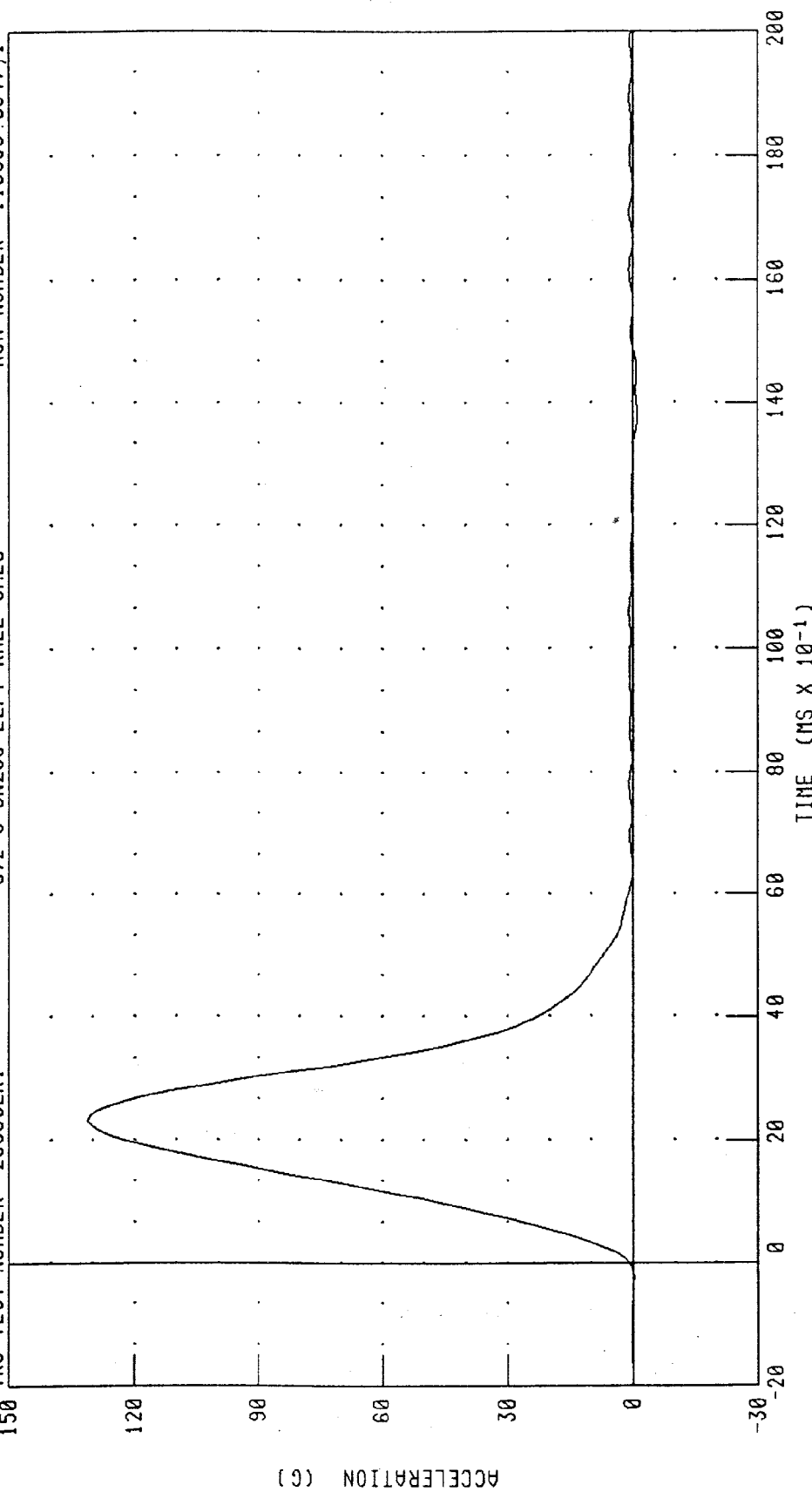
RUN NUMBER: 110999.0846;1

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

TRC TEST NUMBER: 283C8LK1

572 0 SN283 LEFT KNEE CAL8

RUN NUMBER: 110999.0847, 1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 131.18 G @ 2.32 MS; -1.15 G @ 13.84 MS

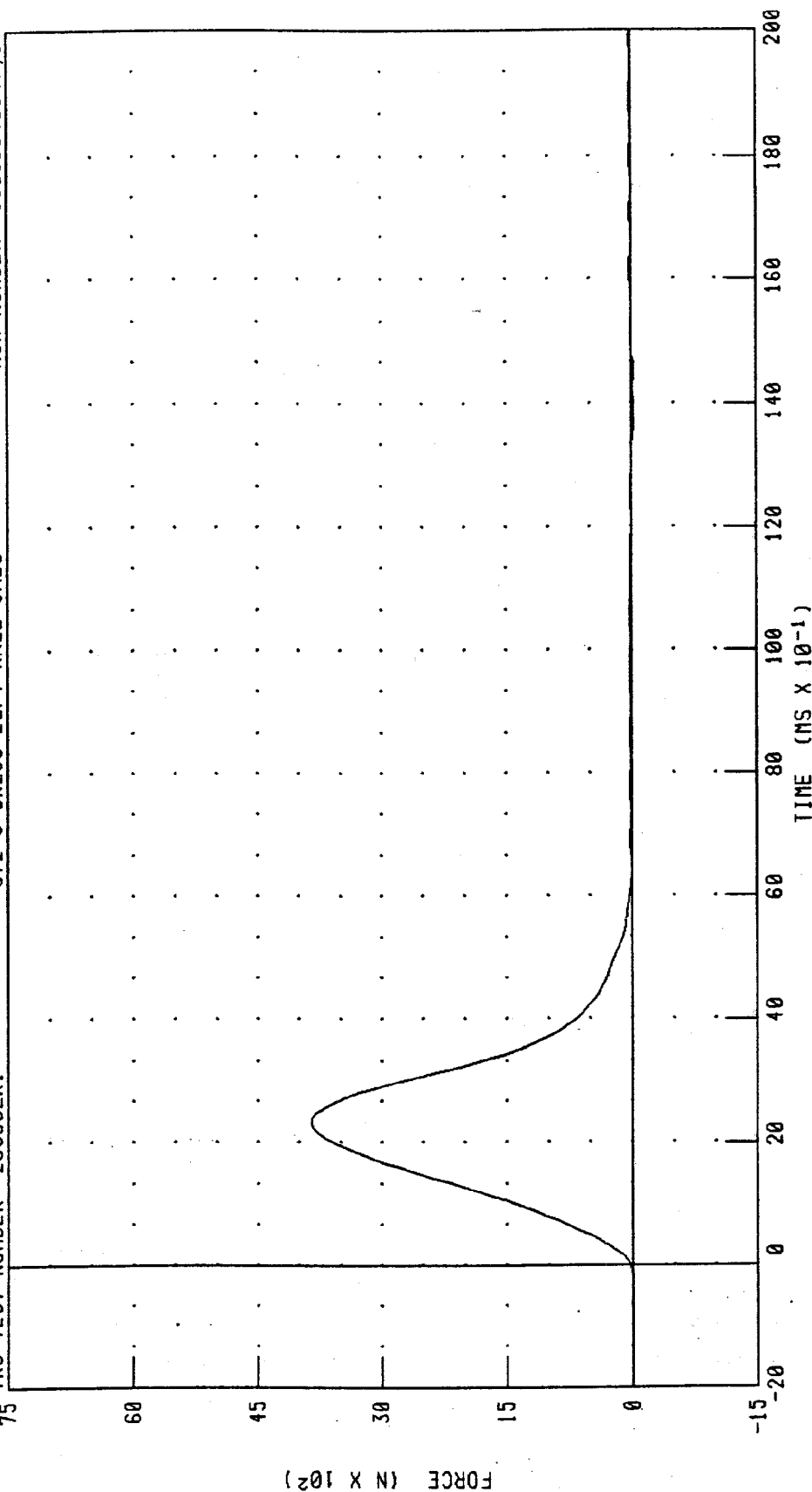
PART 572-0 HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 283C8LK1

572 0 SN283 LEFT KNEE CAL8

RUN NUMBER: 110999 0847,1



CHANNEL: PENXF

FILTER: CH. CLASS 600

PEAK DATA: 3851.10 N @ 2.32 MS; -33.90 N @ 13.84 MS

Post-Test Dummy Certification

Driver Dummy S/N 369

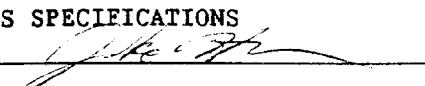
TRANSPORTATION RESEARCH CENTER INC.
HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
SN369 TRC.

06-DEC-99

TRC INC. TEST NO: 369C8ED 570 0 SN369 EXT DIMENSION

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		300 - 310 MM	305. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		160 - 170 MM	165. MM
CHEST CIRCUMFERENCE (X)		851 - 881 MM	869. MM
WAIST CIRCUMFERENCE (Y)		757 - 787 MM	775. MM
CHEST DEPTH (O)		183 - 199 MM	183. MM
H-POINT HEIGHT (C)		81.5 - 86.5 MM	81. MM
H-POINT FROM SEATBACK (D)		144.5-149.5 MM	150. MM
SKULL CAP TO BACKLINE (H)		43.2 - 48.2 MM	46. MM
TOTAL SITTING HEIGHT (A)		775 - 800 MM	775. MM
THIGH CLEARANCE (F)		114 - 130 MM	127. MM
BUTTOCK KNEE LENGTH (K)		508.5-533.5 MM	528. MM
BUTTOCK POPLITEAL LENGTH (N)		414.0-429.4 MM	427. MM
POPLITEAL HEIGHT (L)		348.5-373.5 MM	366. MM
KNEE TO FLOOR HEIGHT (M)		394 - 419 MM	406. MM
FOOT LENGTH (P)		216 - 232 MM	226. MM
FOOT BREADTH (R)		76 - 92 MM	86. MM
SHOULDER PIVOT FROM BACKLINE (E)		71 - 81 MM	76. MM
SHOULDER BREADTH (V)		348 - 364 MM	358. MM
SHOULDER PIVOT HEIGHT (B)		434 - 450 MM	436.8. MM
ELBOW REST HEIGHT (J)		183 - 203 MM	185. MM
SHOULDER-ELBOW LENGTH (I)		279 - 297 MM	290. MM
BACK OF ELBOW TO FINGER TIP (G)		244 - 259 MM	251. MM
HIP WIDTH AT H-POINT (W)		272 - 287 MM	287. MM

HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
DUMMY MEETS SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 121799.1123

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

06-DEC-99

TRC INC.

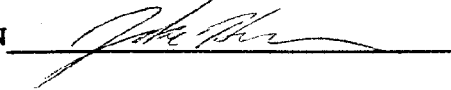
TEST NO: 369C8HD1

572 0 SN369 HEAD DROP CAL 8

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	280.63 G
PEAK LATERAL ACCELERATION	15 G MAX	10.28 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120699.0934;1

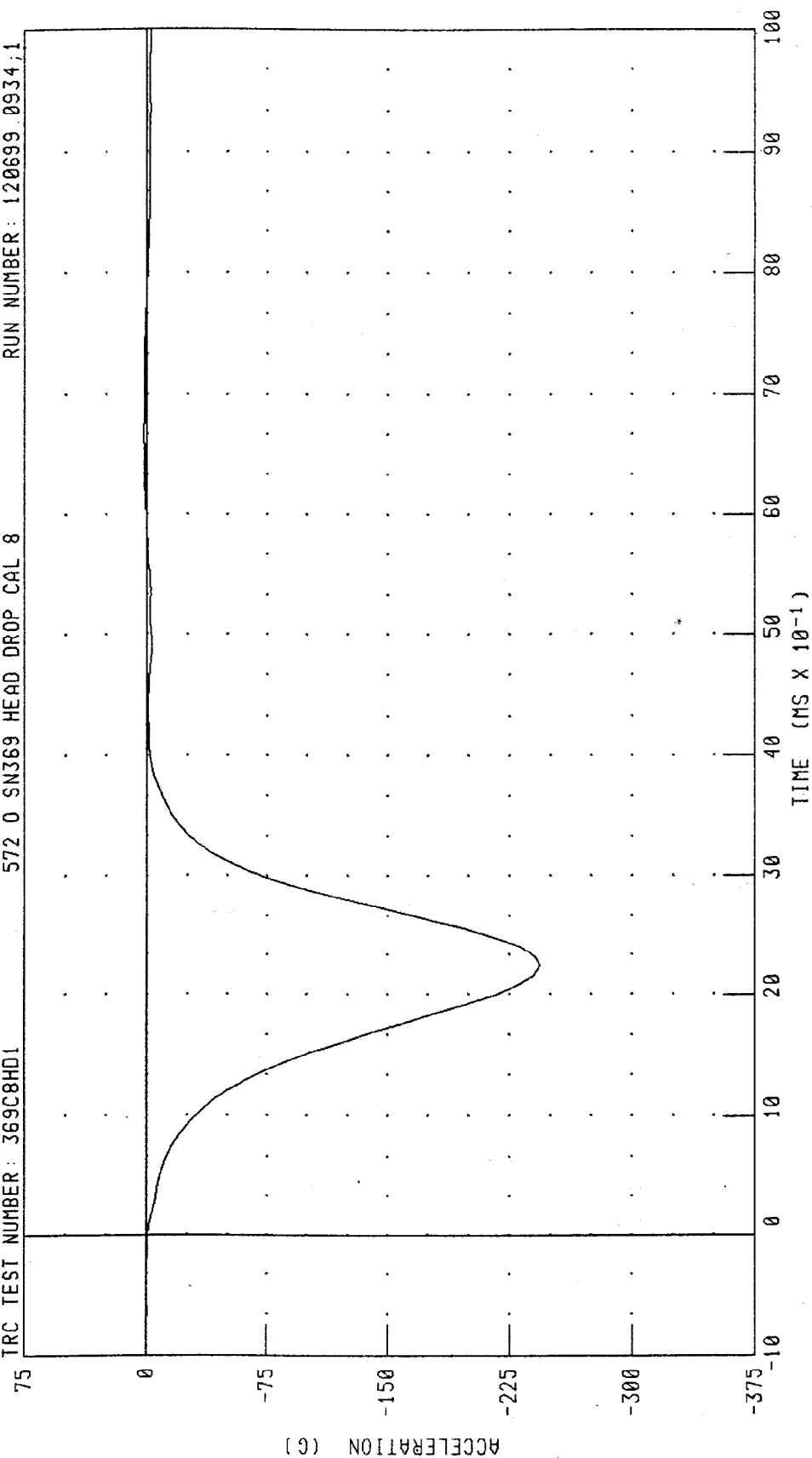
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

572 0 SN369 HEAD DROP CAL 8

RUN NUMBER: 120699 0934;1

TRC TEST NUMBER: 369C8HD1



CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 1.89 G @ 6.64 MS, -243.61 G @ 2.24 MS

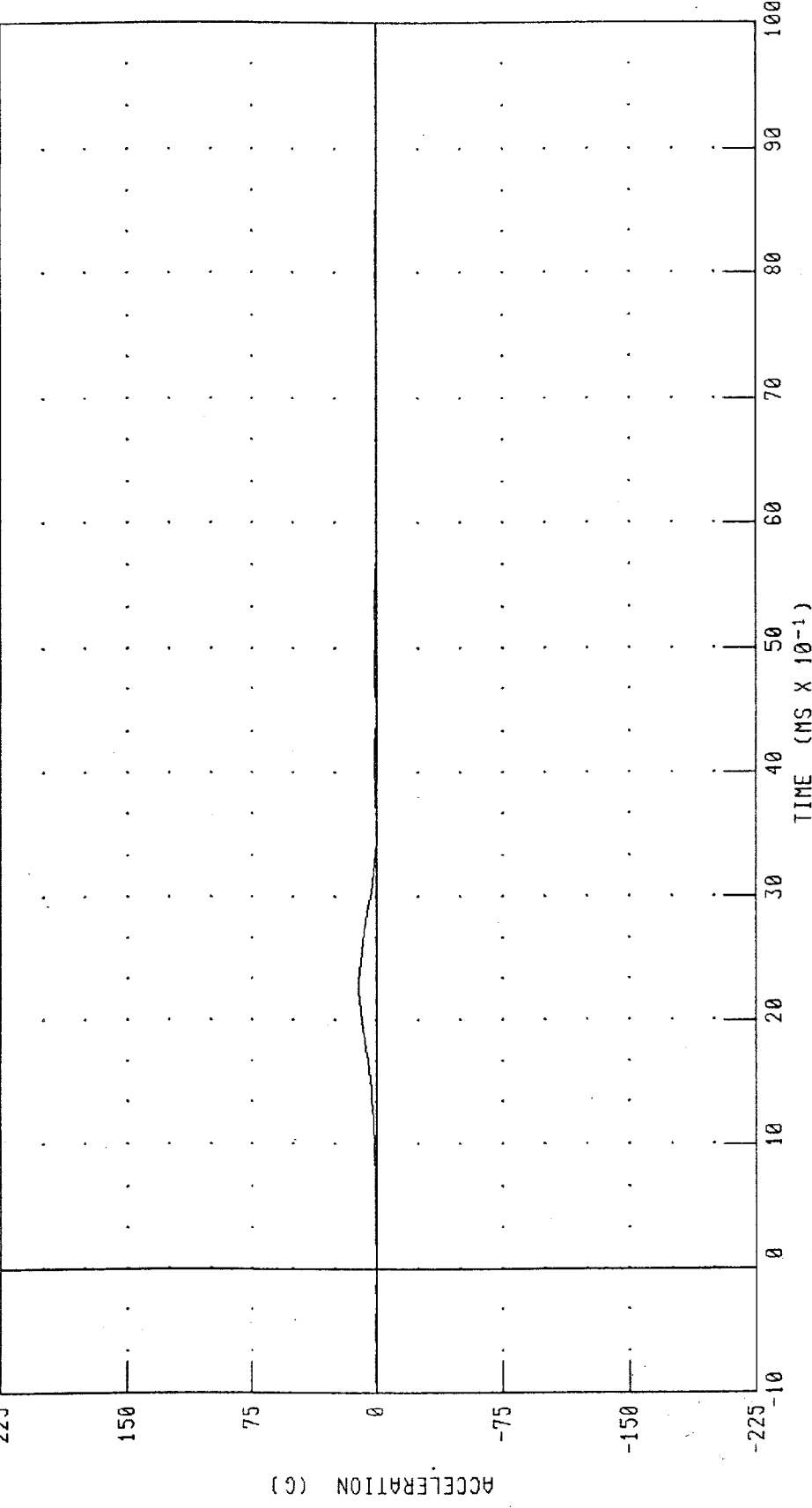
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 369C8HD1

572 0 SN369 HEAD DROP CAL 8

RUN NUMBER: 120699 0934;1



PEAK DATA: 10.28 G @ 2.24 MS, -0.54 G @ 4.48 MS

CHANNEL: HEDYC FILTER: CH. CLASS 1000

PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Z AXIS

572 0 SN369 HEAD DROP CAL 8

RUN NUMBER: 120639.0934,1

TRC TEST NUMBER: 369C8HD1

375

300

225

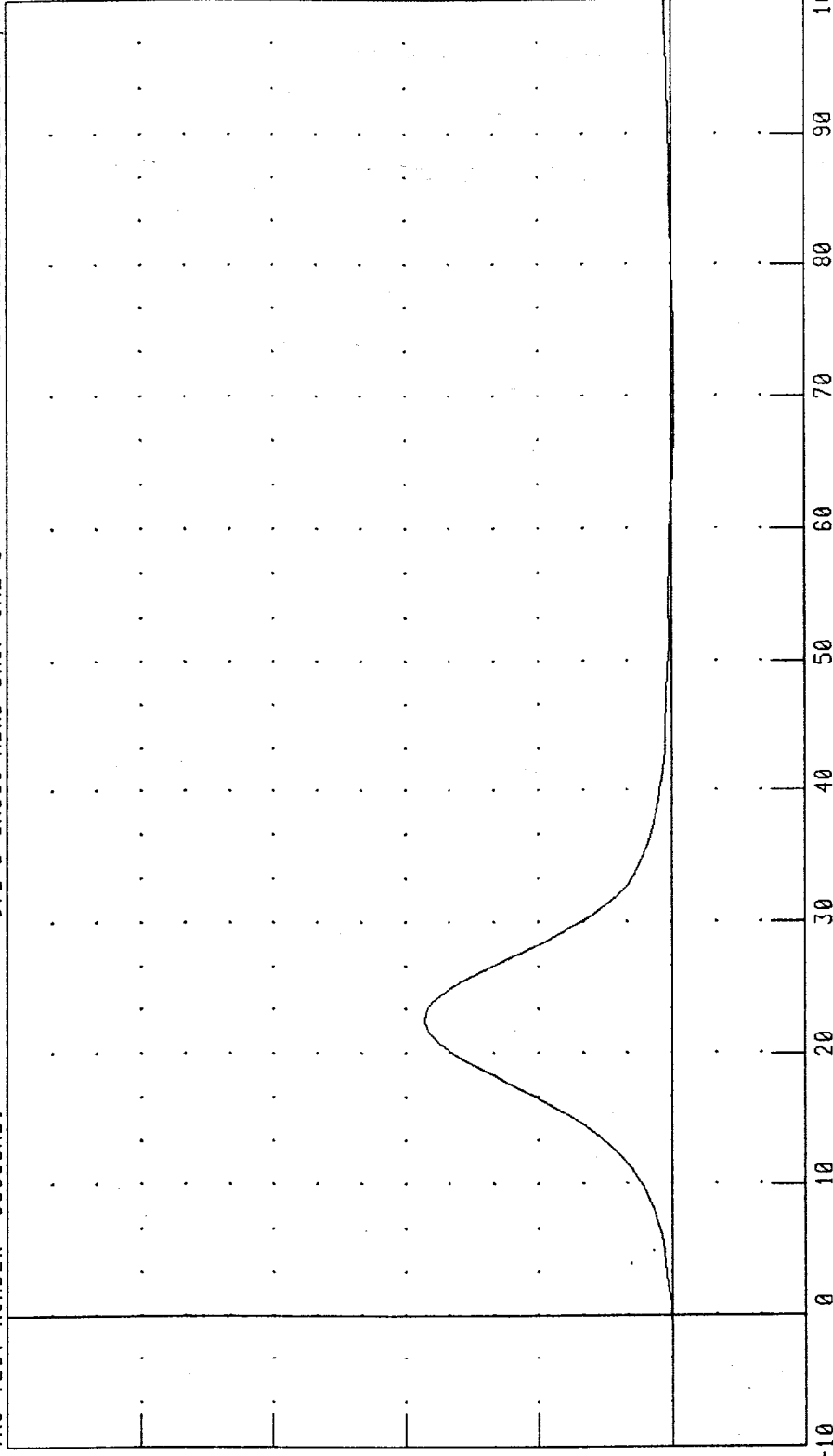
150

75

0

-75

ACCELERATION (G)



TIME (MS X 10⁻¹)

PEAK DATA: 138.93 G @ 2.24 MS; -1.46 G @ 7.04 MS

CHANNEL: HEDZG FILTER: CH. CLASS 1000

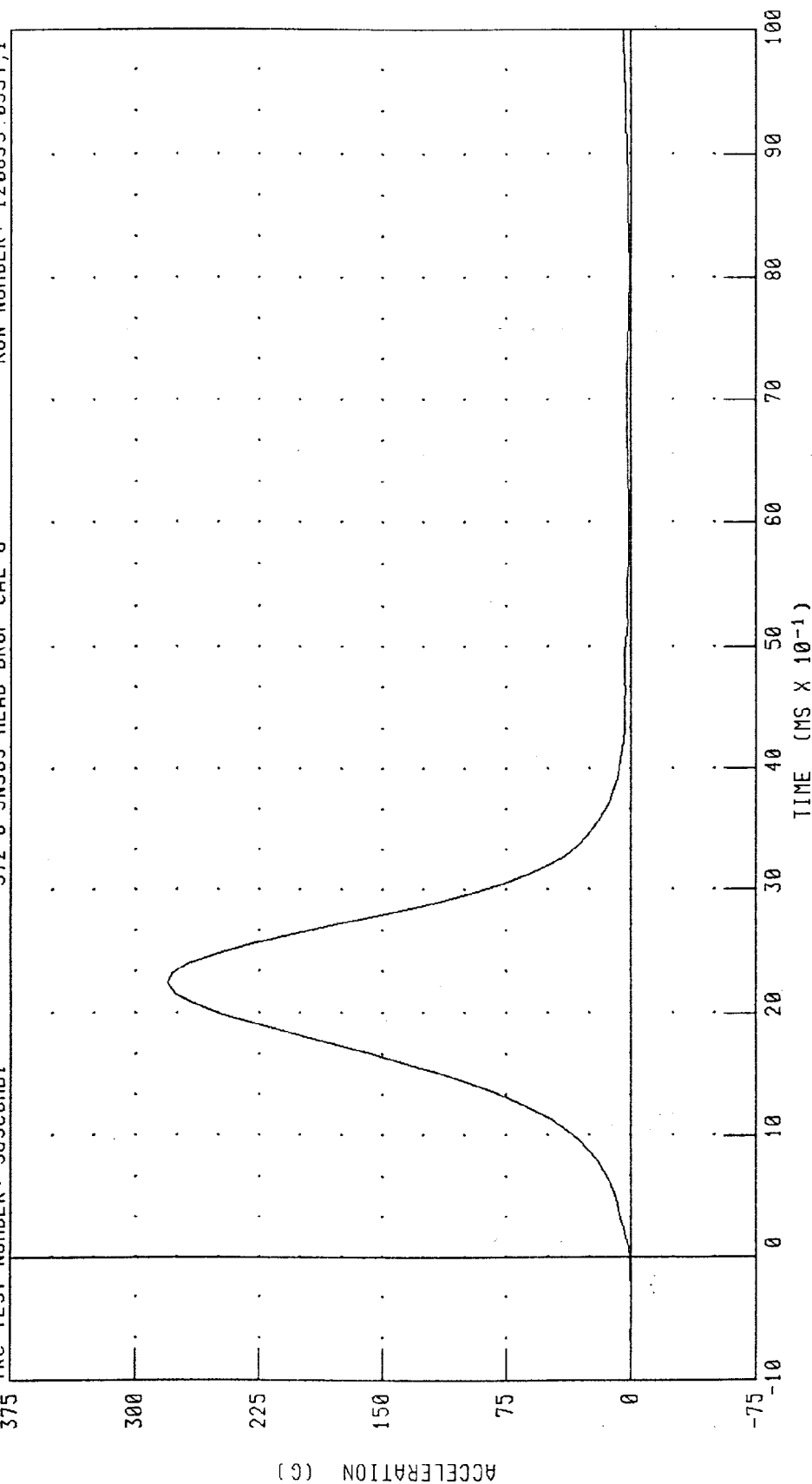
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572 0 SN369 HEAD DROP CAL 8

TRC TEST NUMBER: 369C8HDI

RUN NUMBER: 120699 0934;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000

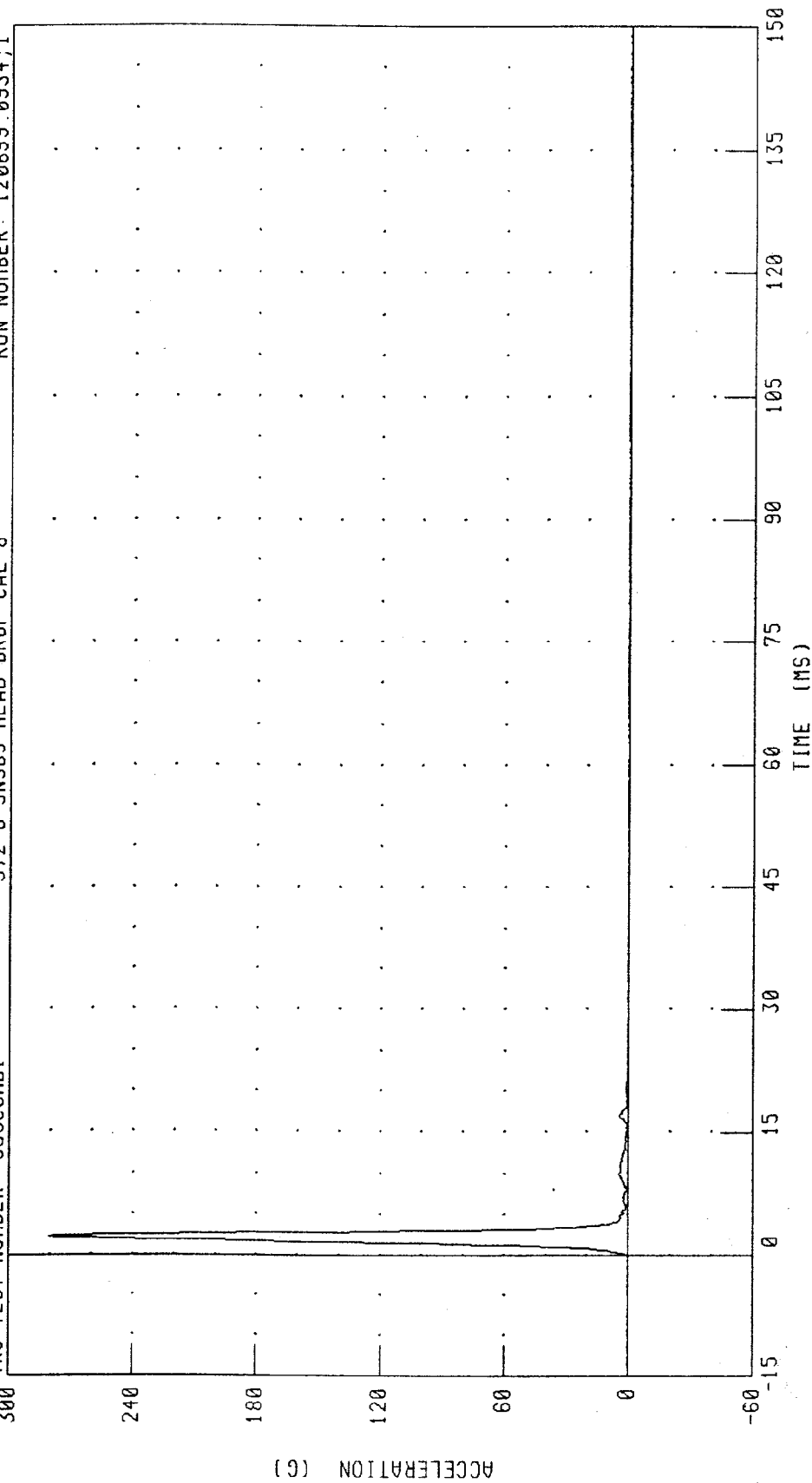
PEAK DATA: 280.63 G @ 2.24 MS; 0.09 G @ -0.88 MS

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

TRC TEST NUMBER: 369C8HDI

572 0 SN369 HEAD DROP CAL 8

RUN NUMBER: 120699.0934,1



CHANNEL: HEDRC FILTER: CH. CLASS 1000

PEAK DATA: 280.63 G @ 2.24 MS, 0.09 G @ -14.88 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

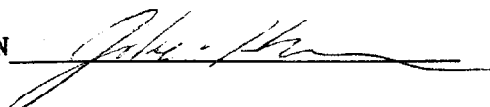
06-DEC-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C8NF2 572 O SN369 NECK FLEX. CAL8

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.12 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.1 - 2.5 M/S	2.15 M/S
	20 MS	4.0 - 5.0 M/S	4.26 M/S
	30 MS	5.8 - 7.0 M/S	6.32 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	83.62 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT		69 - 83 NM	78.16 NM
POSITIVE MOMENT DECAY TIME FROM TO / 10 NM		80 - 100 MS	87.6 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 120699.1515;1

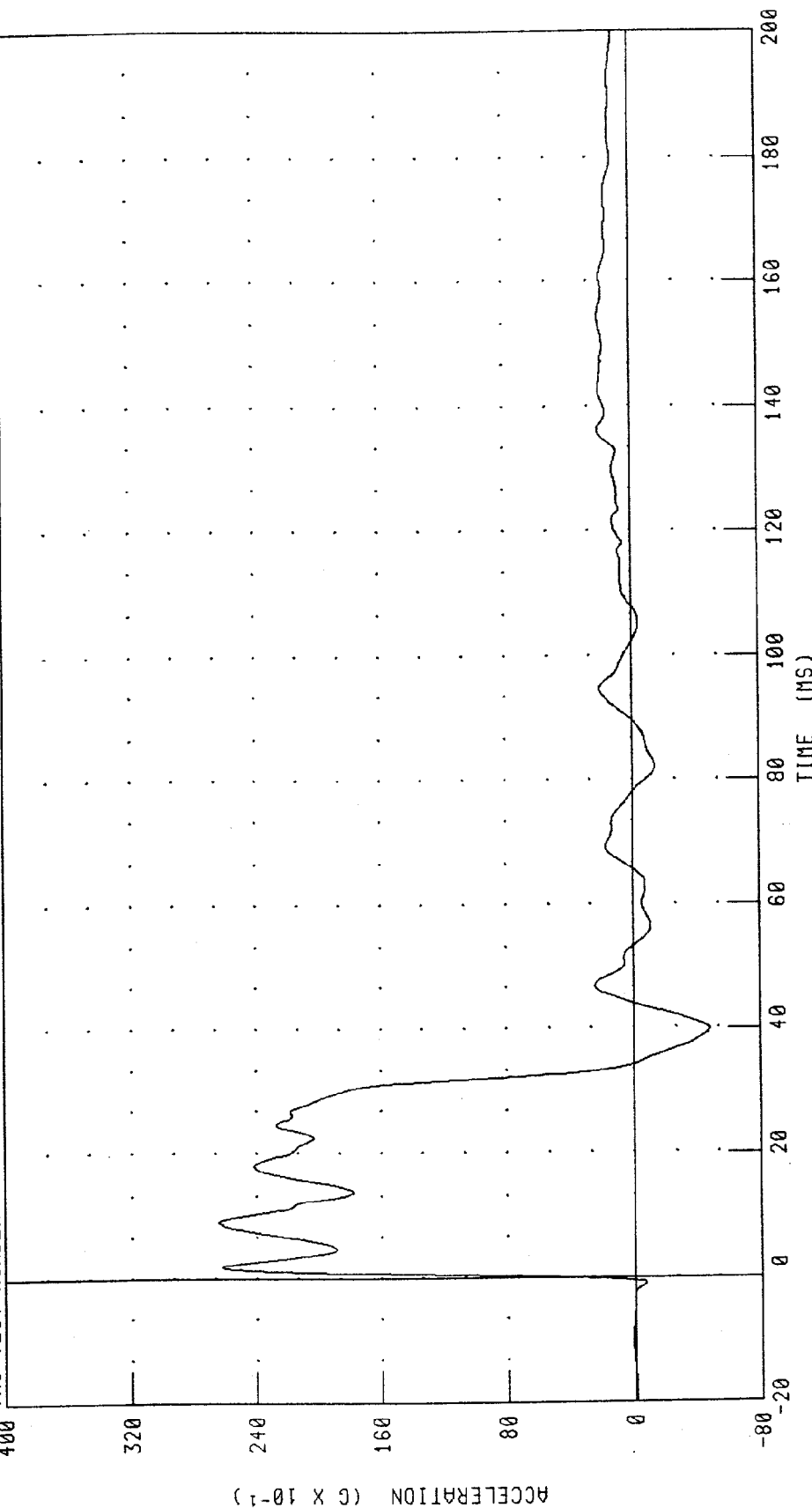
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 369C8NF2

572 0 SN369 NECK FLEX. CAL8

RUN NUMBER: 120699.1522;1



CHANNEL: PENXC FILTER: CH. CLASS 180

PEAK DATA: 26.46 C @ 9.12 MS, -4.81 C @ 39.84 MS

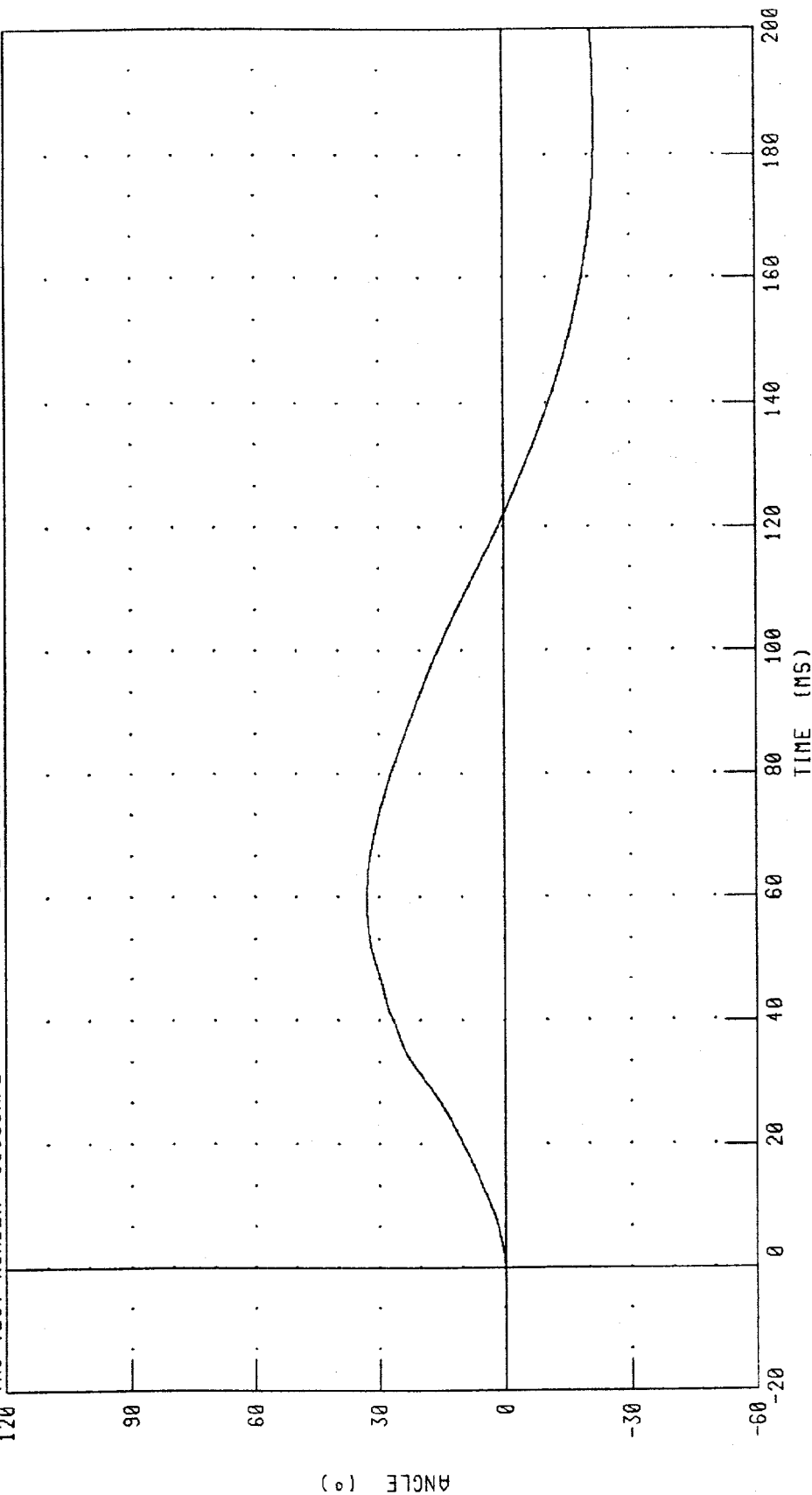
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

572 0 SN369 NECK FLEX. CAL8

RUN NUMBER: 120699.1522,1

TRC TEST NUMBER: 369C8NF2



CHANNEL: BETA

FILTER: CH. CLASS 60

PEAK DATA: 32.92 ° @ 59.04 MS, -21.61 ° @ 184.40 MS

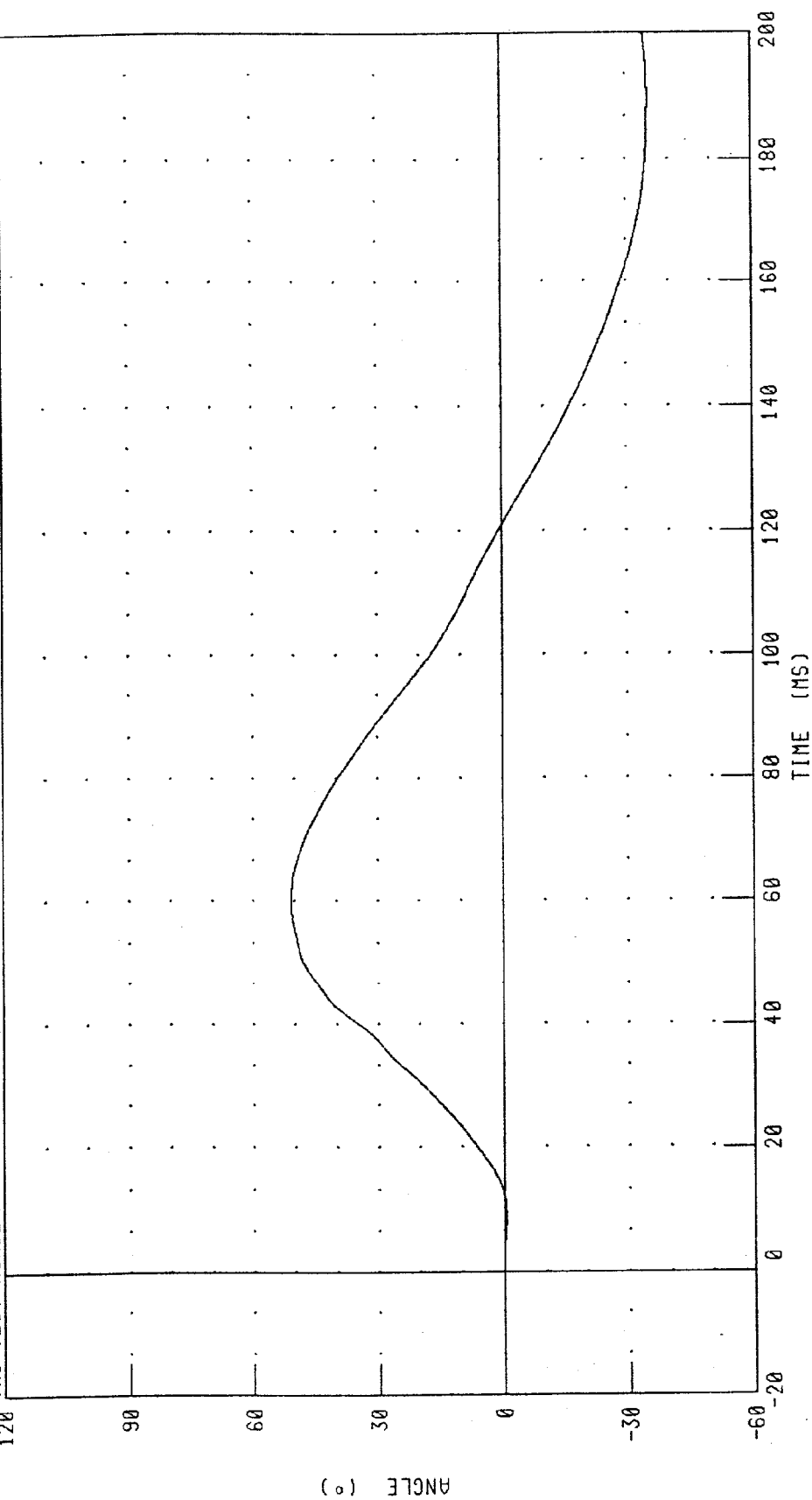
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

572 0 SN369 NECK FLEX. CAL8

RUN NUMBER: 120699.1522,1

TRC TEST NUMBER: 369C8NF2



PEAK DATA: 50.71 ° @ 59.60 MS, -35.27 ° @ 189.68 MS

CHANNEL: THETA FILTER: CH. CLASS 60

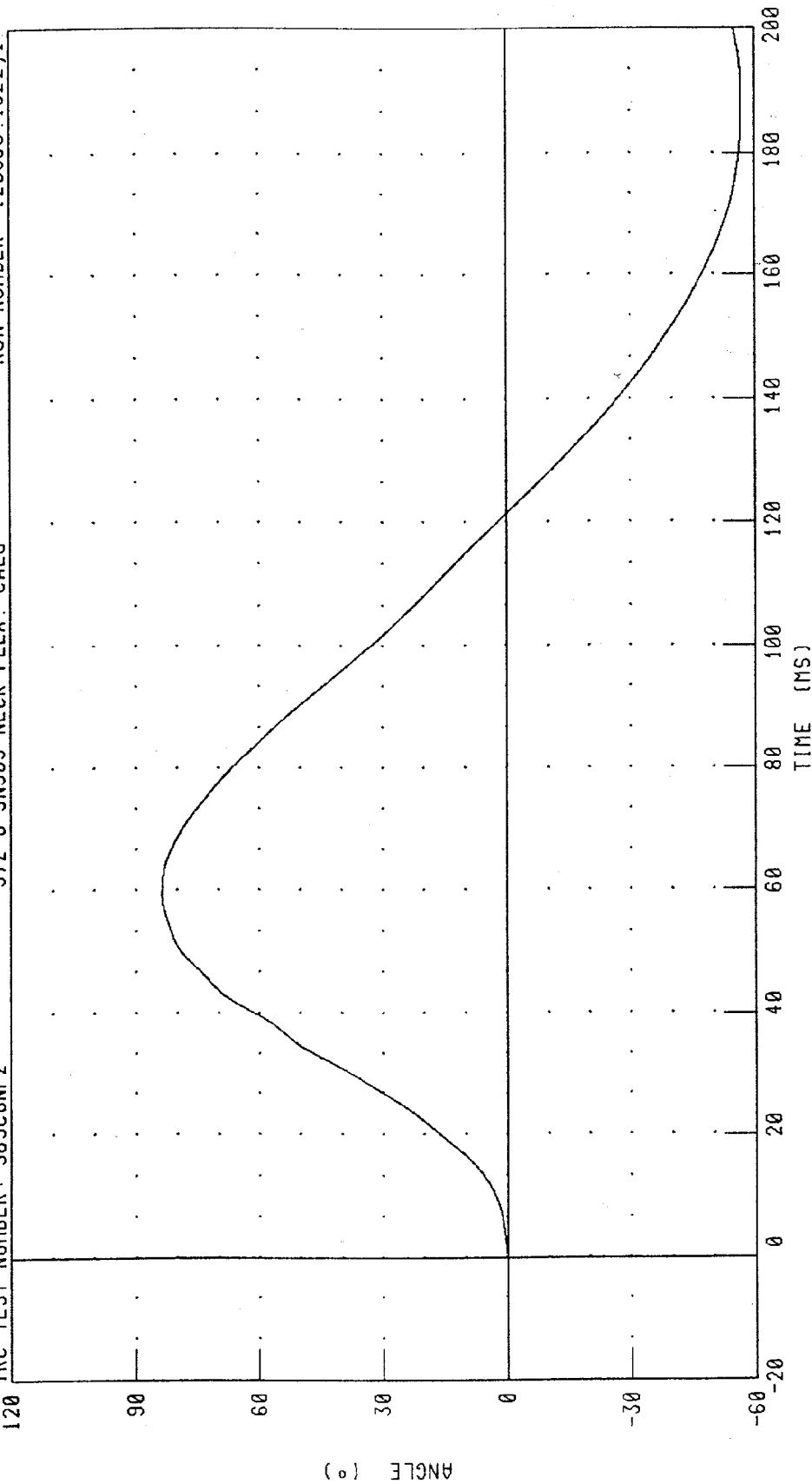
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 369C8NF2

572 0 SN369 NECK FLEX. CAL8

RUN NUMBER: 120699.1522;1



CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 83.63 ° @ 59.36 MS; -56.82 ° @ 187.68 MS

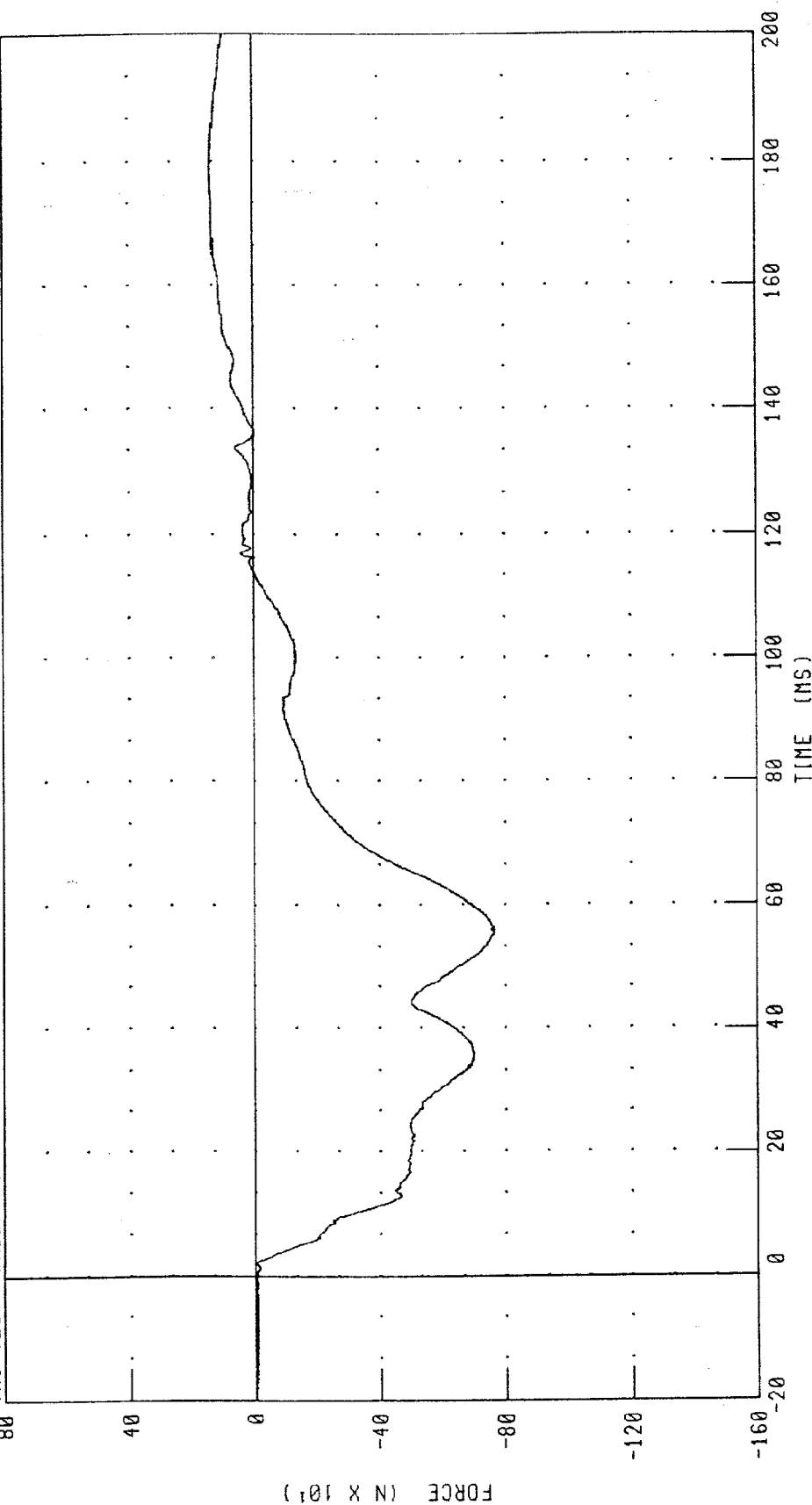
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 369C8NF2

572 0 SN369 NECK FLEX. CAL8

RUN NUMBER: 120699.1522;1



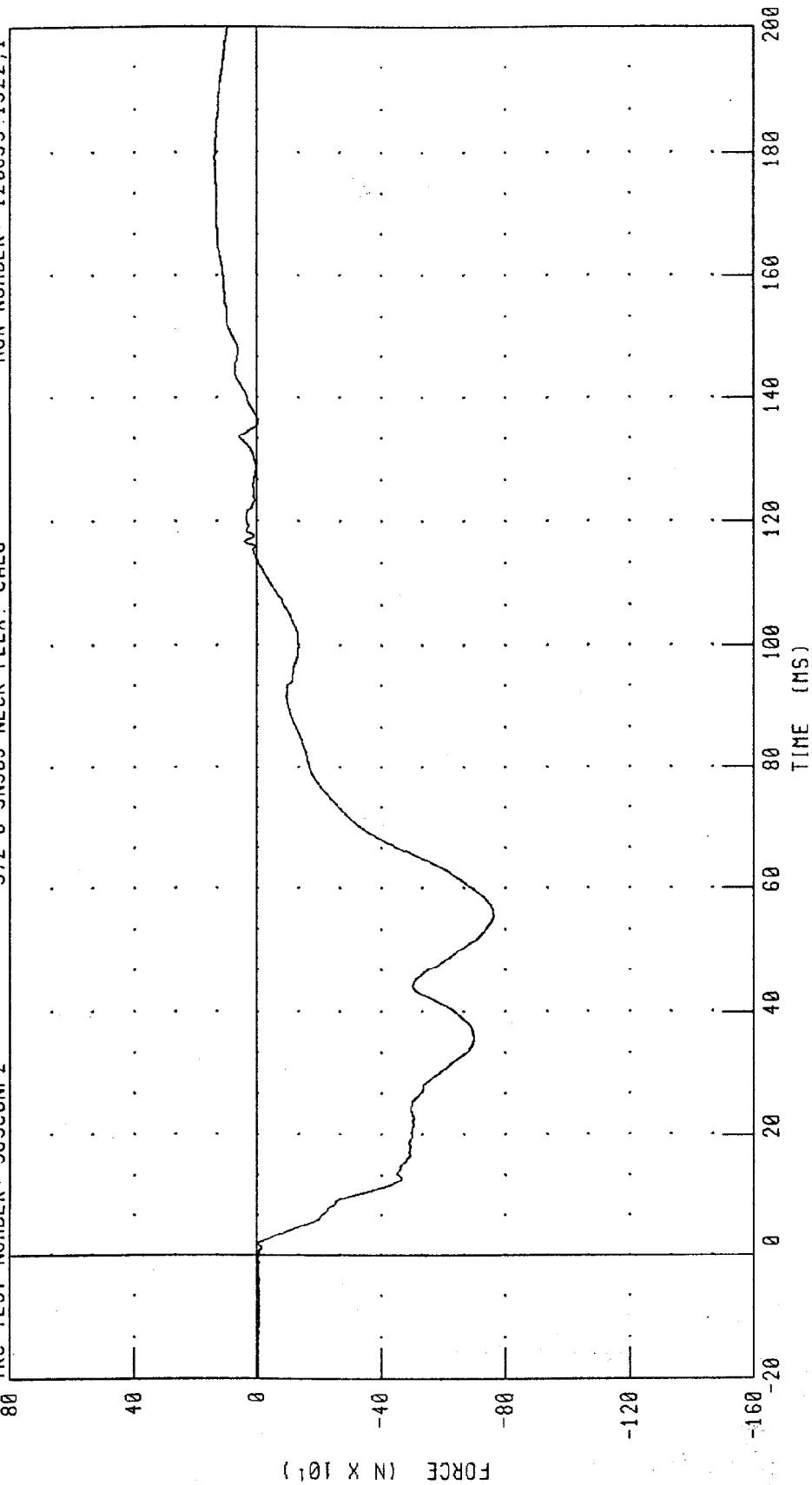
CHANNEL: NEKXF FILTER: CH. CLASS 1000

PEAK DATA: 140.19 N @ 176.96 ms; -762.46 N @ 55.20 ms

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 369C8NF2 572 0 SN369 NECK FLEX. CAL8 RUN NUMBER: 120699.1522;1



PEAK DATA: 139.56 N @ 179.20 MS, -762.55 N @ 55.44 MS

CHANNEL: NEKXFC FILTER: CH. CLASS 600

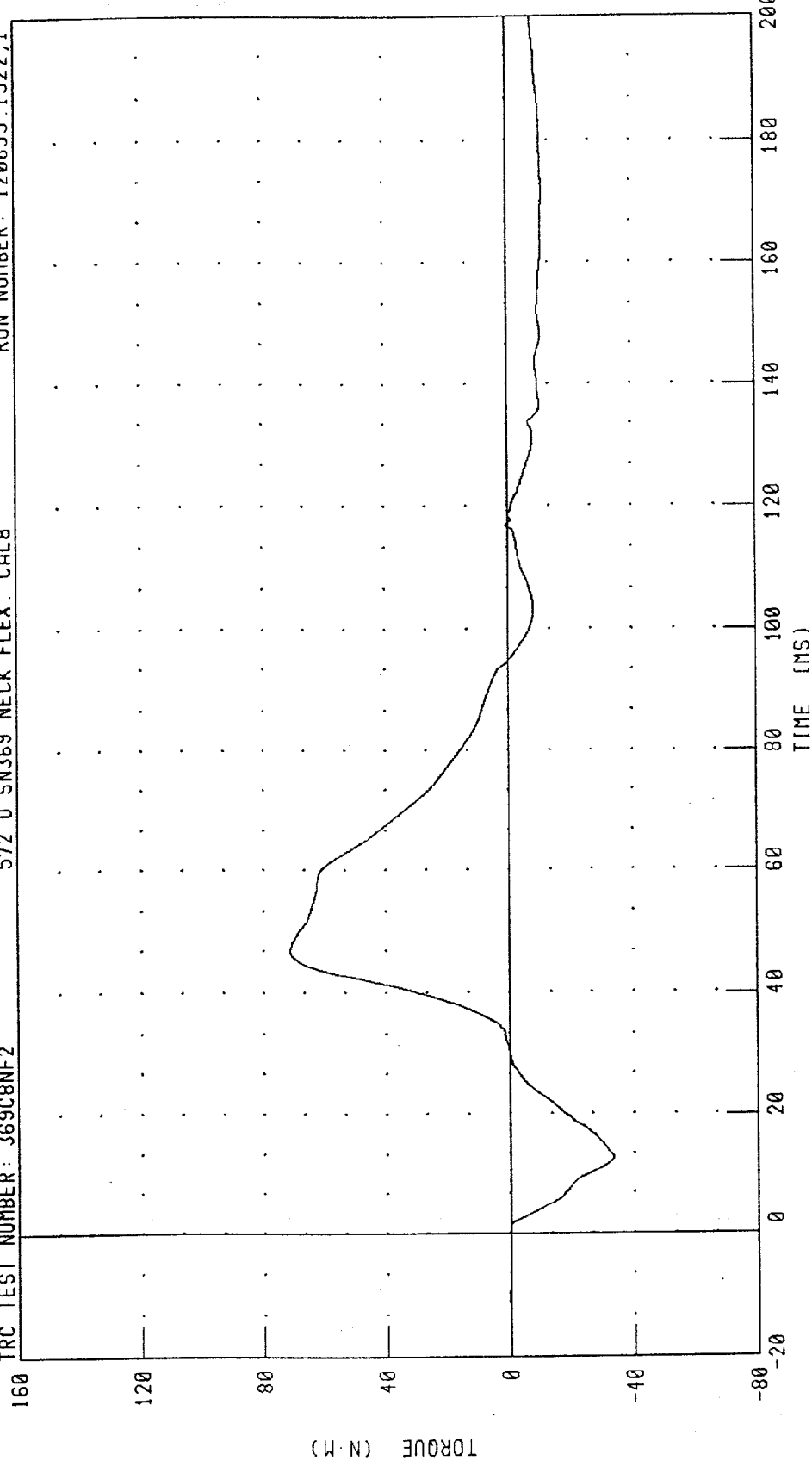
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

RUN NUMBER: 120699.1522,1

572 0 SN369 NECK FLEX. CAL8

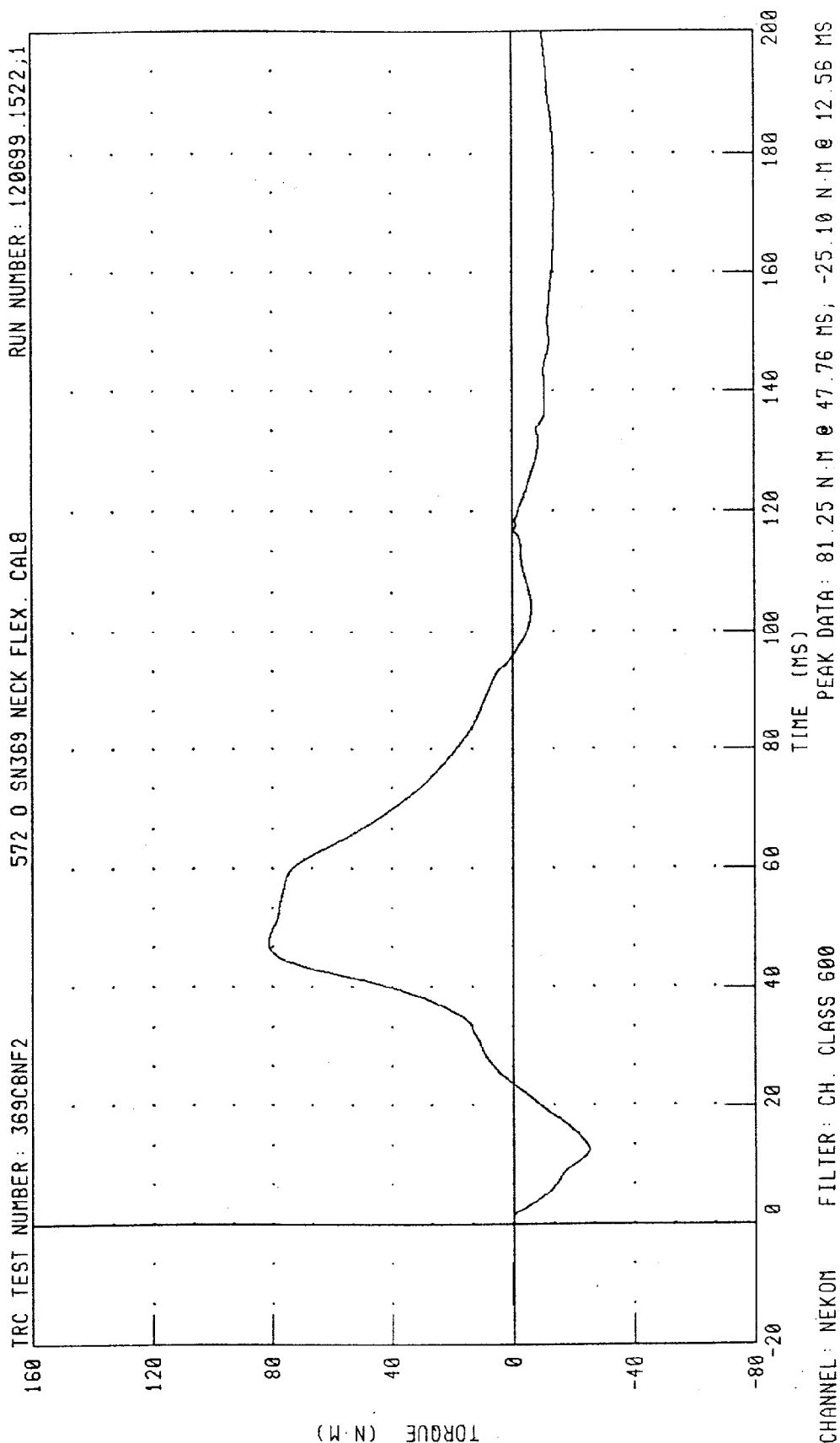
TRC TEST NUMBER: 369C8NF2



PEAK DATA: 71.26 N·M @ 46.80 MS, -33.32 N·M @ 12.64 MS

CHANNEL: NEKYM FILTER: CH. CLASS 600

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



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

07-DEC-99

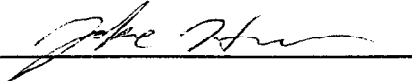
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C8NE1 572 0 SN369 NECK EXT. CAL 8

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	1.5 - 1.9 M/S	1.71 M/S
	20 MS	3.1 - 3.9 M/S	3.44 M/S
	30 MS	4.6 - 5.6 M/S	5.05 M/S
PEAK D-PLANE ROTATION		97 - 109 DEG.	103.24 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT		-55 / -69 NM	-56.79 NM
NEGATIVE MOMENT DECAY TIME FROM TO \ -10 NM		94 - 114 MS	107.2 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120799.0741;1

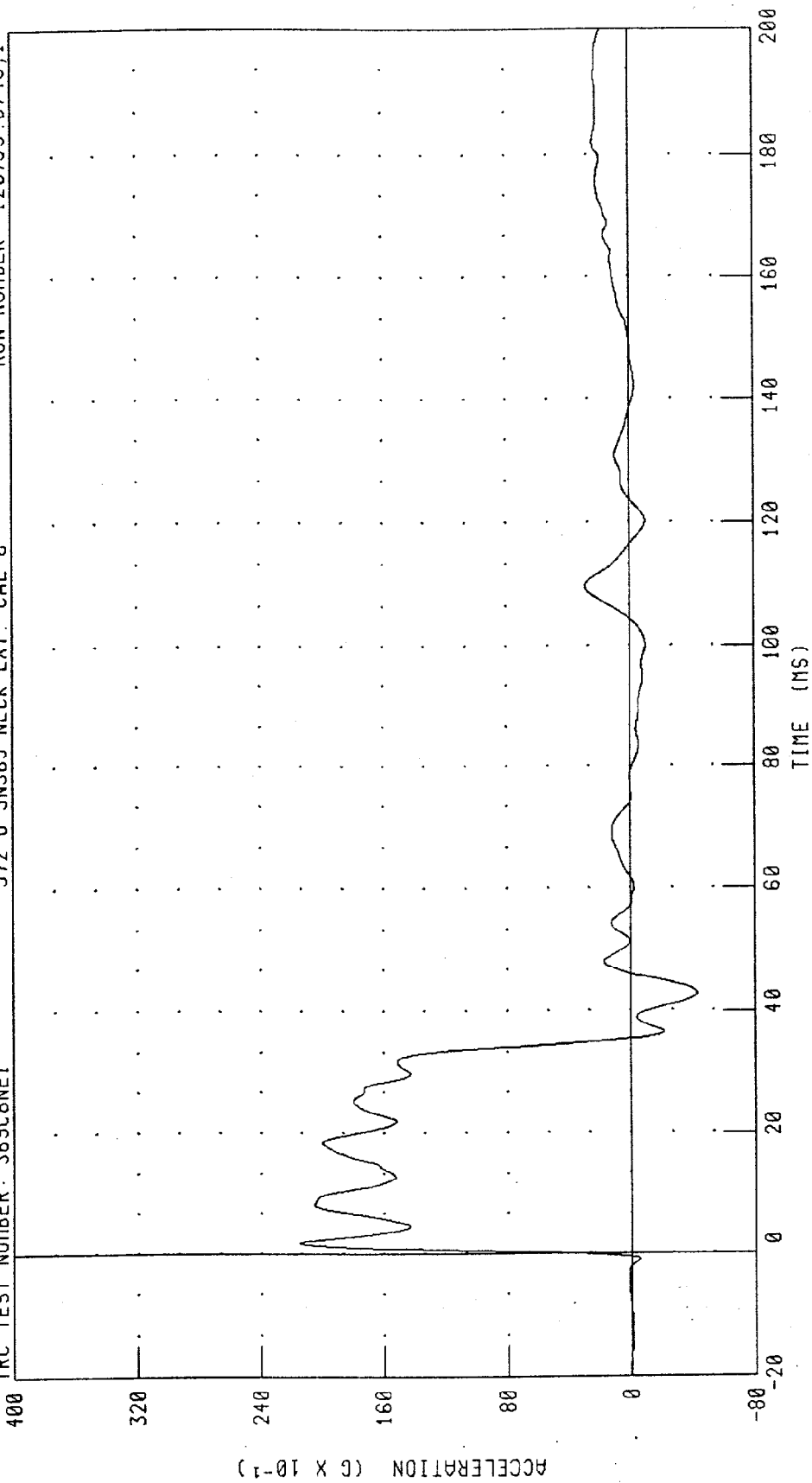
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 369C8NE1

572 0 SN369 NECK EXT. CAL 8

RUN NUMBER: 120799.0748,1



CHANNEL: PENXG FILTER: CH. CLASS 180

PEAK DATA: 21.51 G @ 1.76 MS; -4.29 G @ 42.80 MS

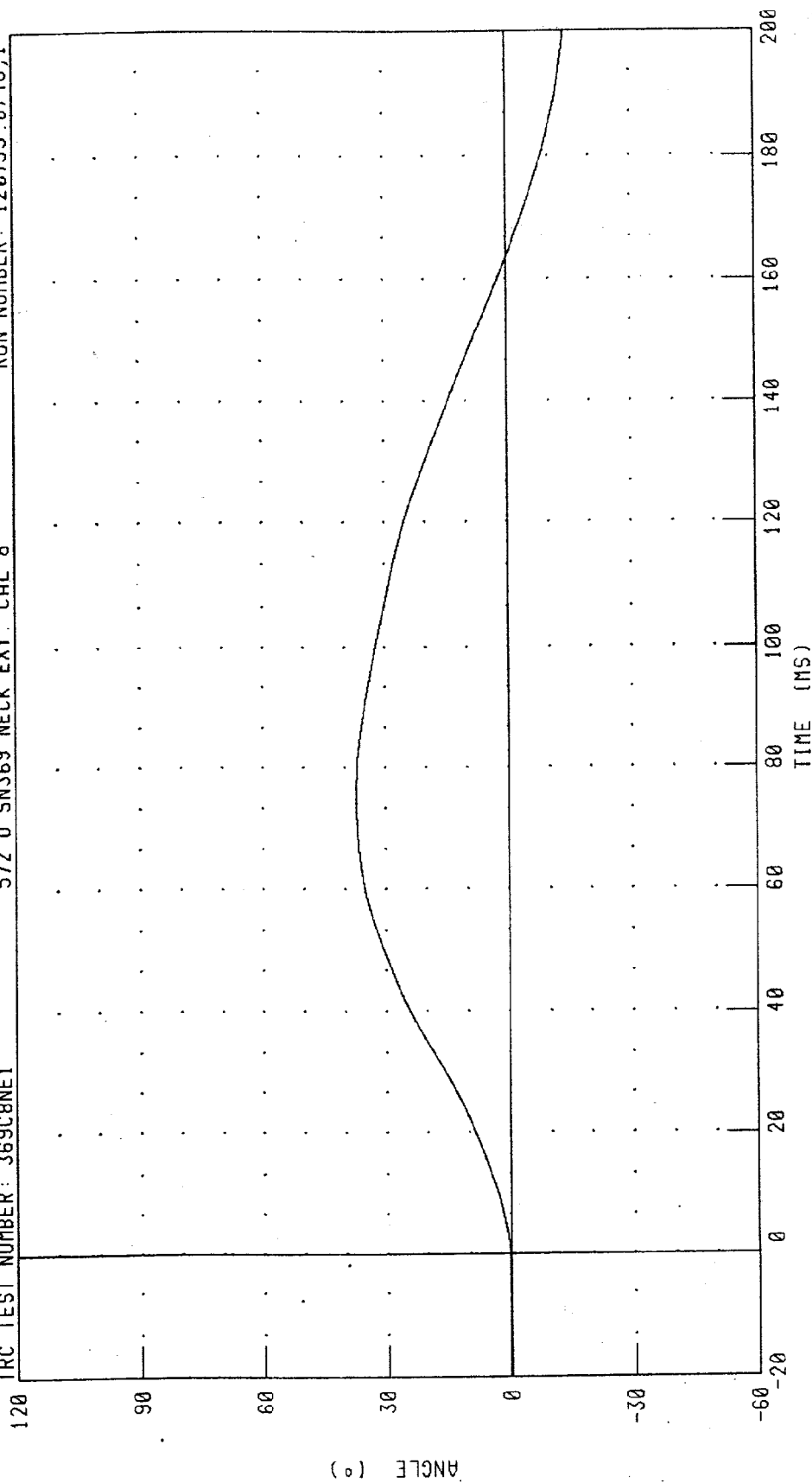
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572 0 SN369 NECK EXT. CAL 8

RUN NUMBER: 120799.0748,1

TRC TEST NUMBER: 369C8NE1



PEAK DATA: 36.97 ° @ 74.56 MS; -14.14 ° @ 200.00 MS

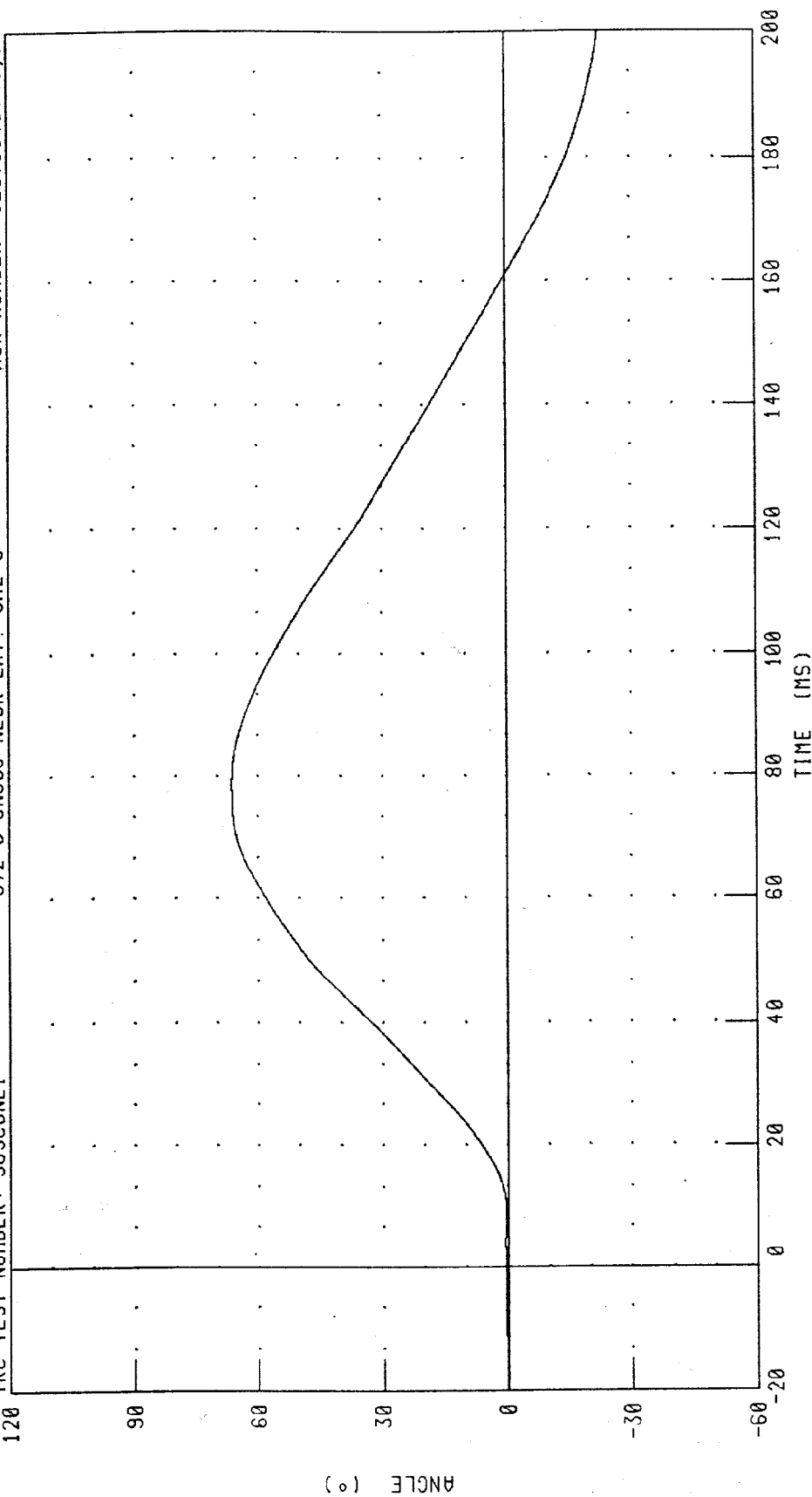
CHANNEL: BETA FILTER: CH. CLASS 60

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

TRC TEST NUMBER: 369C8NE1

572 0 SN369 NECK EXT. CAL 8

RUN NUMBER: 120799.0748.1



CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 66.35 ° @ 78.64 MS; -22.62 ° @ 200.00 MS

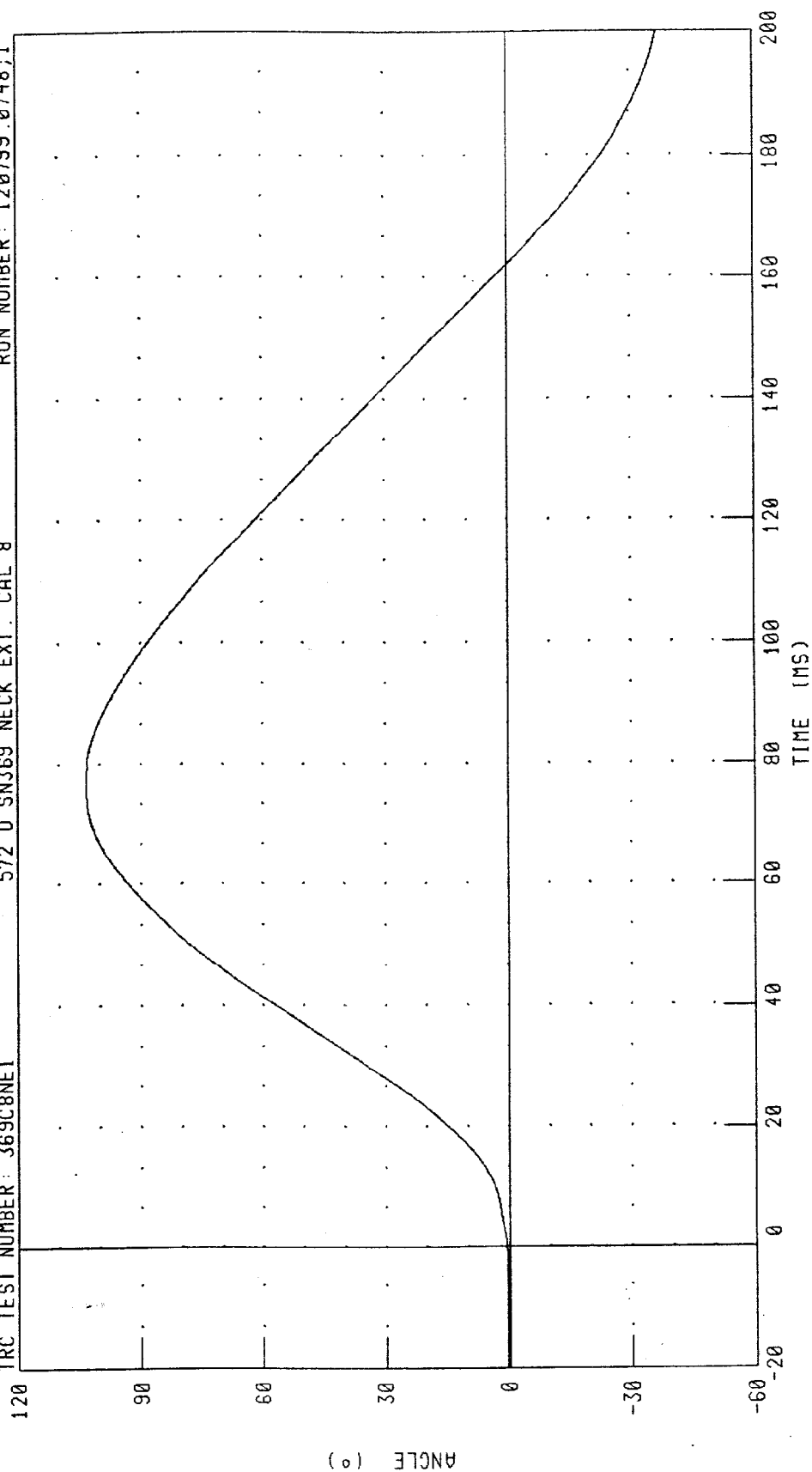
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 369C8NE1

572 0 SN369 NECK EXT. CAL 8

RUN NUMBER: 120799.0748.1



CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 103.25 ° @ 76.56 MS, -36.76 ° @ 200.00 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

07-DEC-99

TRC INC.

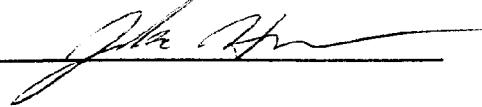
TEST NO: 369C8TH1

572 0 SN369 THORAX CAL8

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	48 - 55 MM	51.3 MM
MAXIMUM RESISTIVE FORCE WITHIN DEFLECTION CORRIDOR	3900 - 4400 N	4224. N
INTERNAL HYSTERESIS	69% - 85%	70.9%

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120799.0848;1

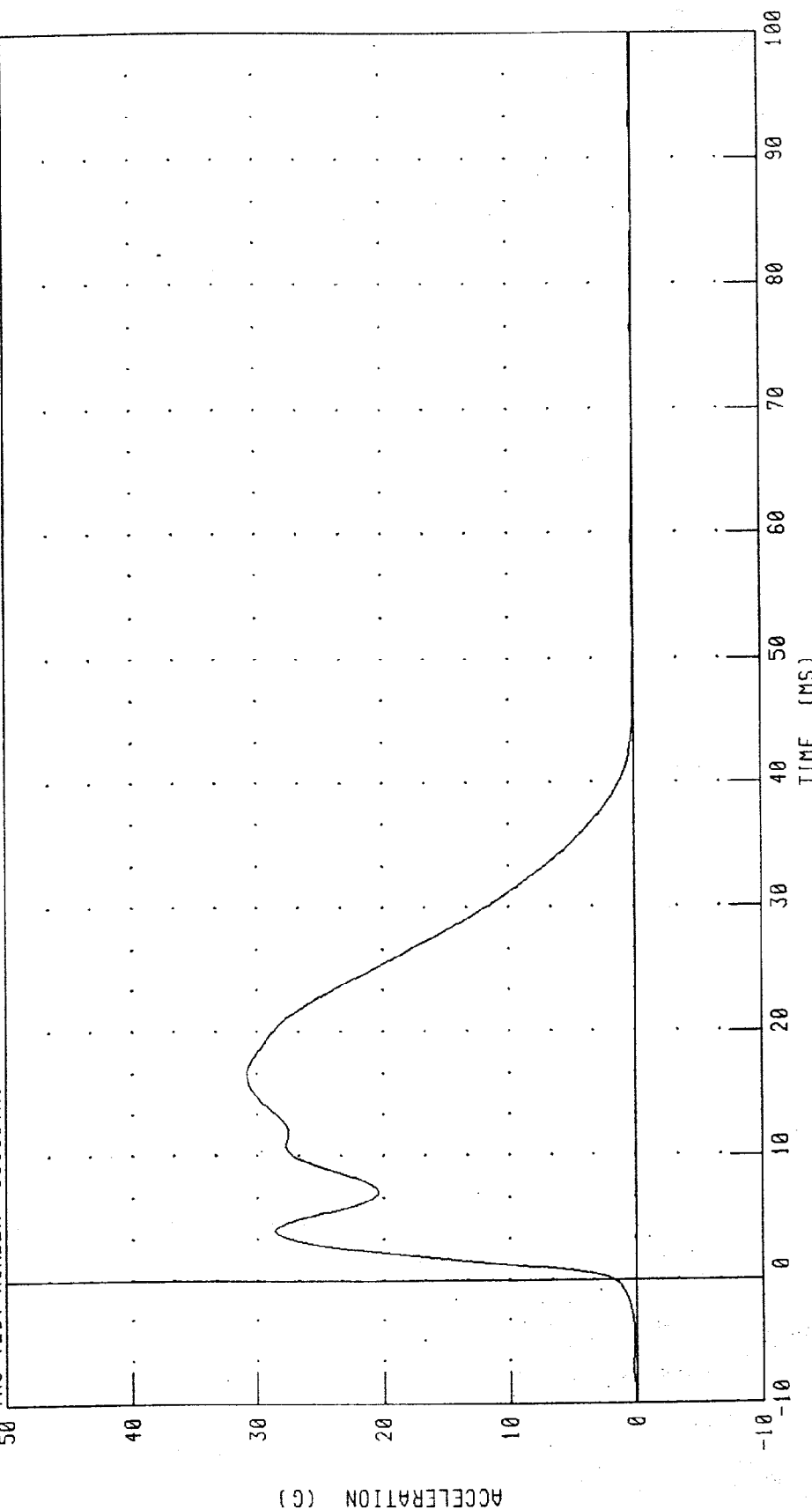
PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM DECELERATION

572 0 SN369 THORAX CAL8

RUN NUMBER: 120799.0851;1

TRC TEST NUMBER: 369C8TH1



PEAK DATA: 30.78 G @ 16.64 MS, -0.05 G @ 68.32 MS

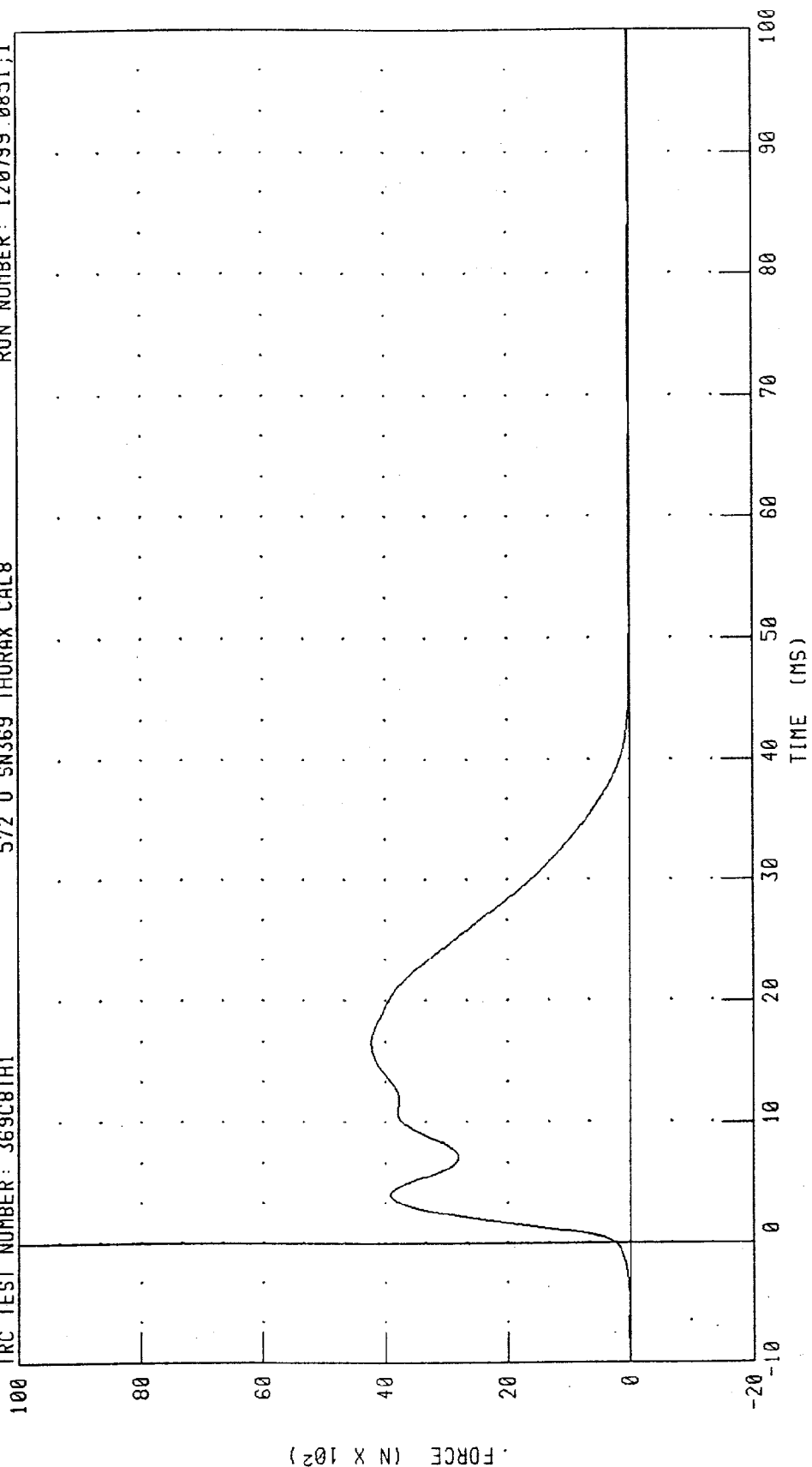
CHANNEL: PENXC FILTER: CH. CLASS 180

PART 572-0 HYBRID III THORAX CALIBRATION
PENDULUM FORCE

TRC TEST NUMBER: 369C8TH1

572 0 SN369 THORAX CAL8

RUN NUMBER: 120799.0851;1



CHANNEL: PENXF

FILTER: CH. CLASS 180

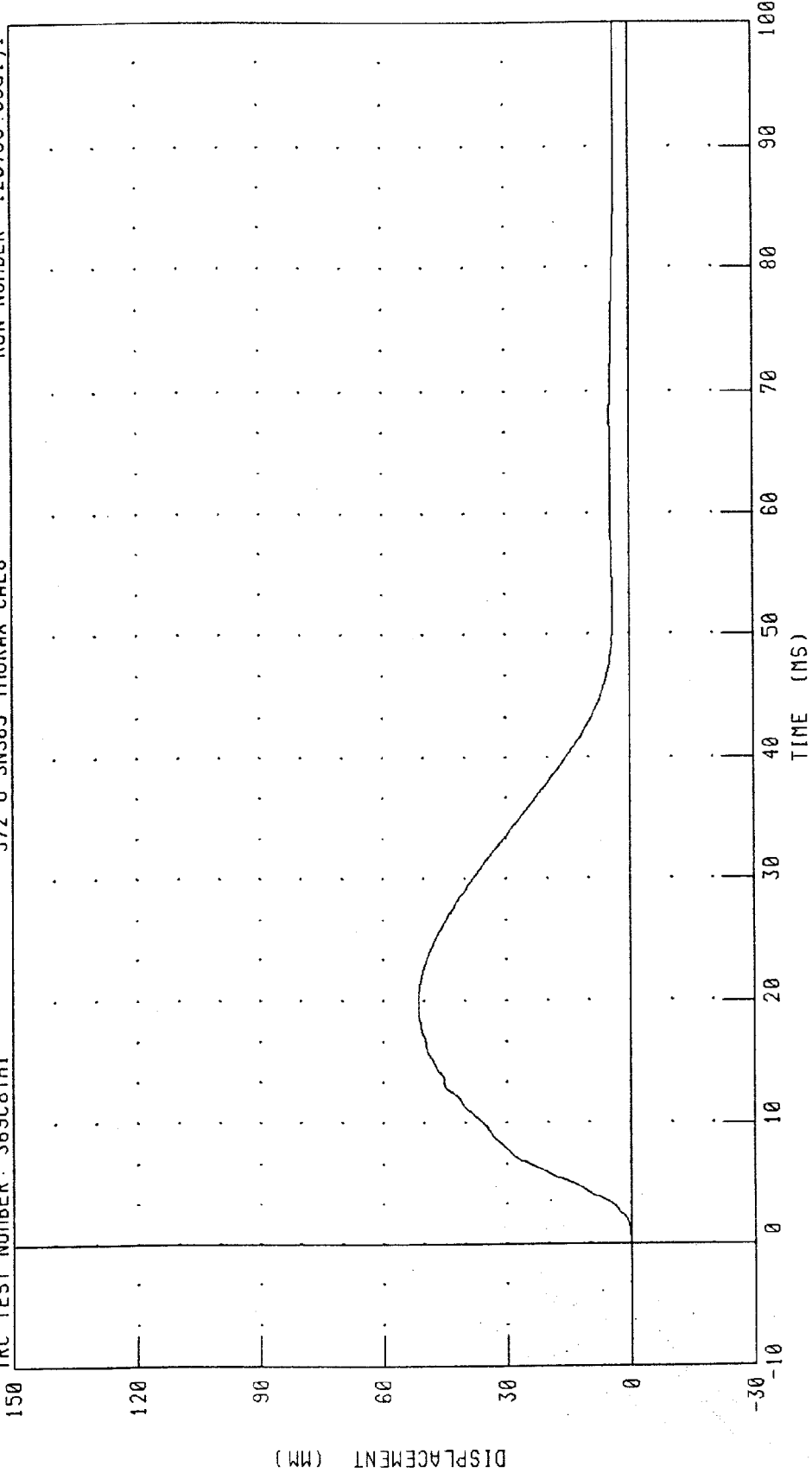
PEAK DATA: 4224.46 N @ 16.64 MS; -7.09 N @ 68.32 MS

PART 572-0 HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 369C8TH1

572 0 SN369 THORAX CAL8

RUN NUMBER: 120799 0851;1



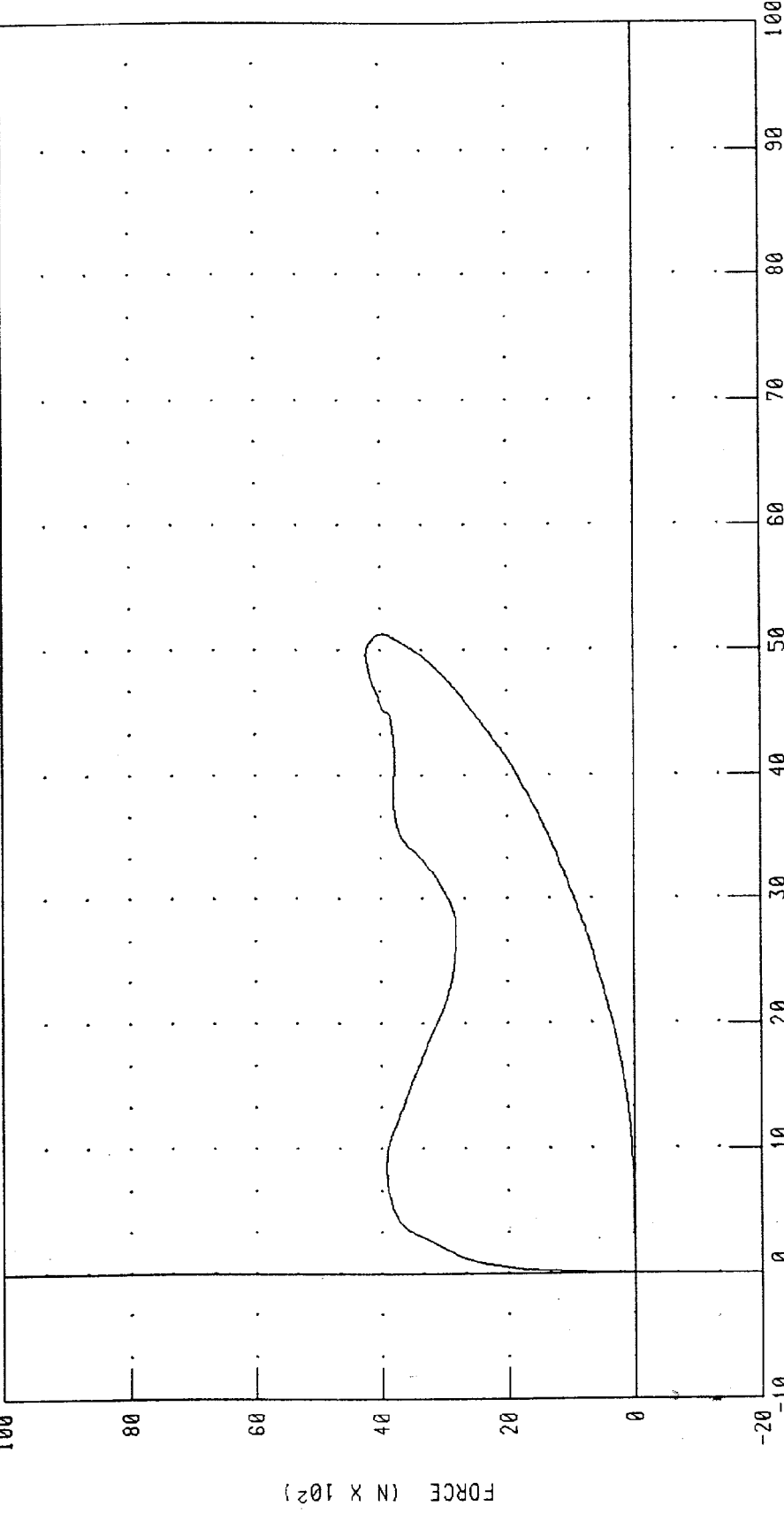
CHANNEL: CSTXD FILTER: CH. CLASS 600 PEAK DATA: 51.33 MM @ 20.00 MS, -0.01 MM @ -6.08 MS

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

TRC TEST NUMBER: 369C8TH1

572 0 SN369 THORAX CAL8

RUN NUMBER: 120799.0851;1



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

DISPLACEMENT (MM)

PEAK DATA:

51.33 MM @ 20.00 MS; -0.01 MM @ -6.08 MS
4224.46 N @ 16.64 MS; -7.09 N @ 68.32 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

06-DEC-99

TRC INC.

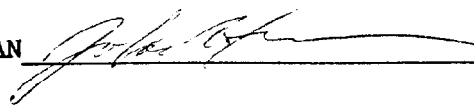
TEST NO: 369C8RK1

572 0 SN369 R.KNEE CAL8

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3725.1 N

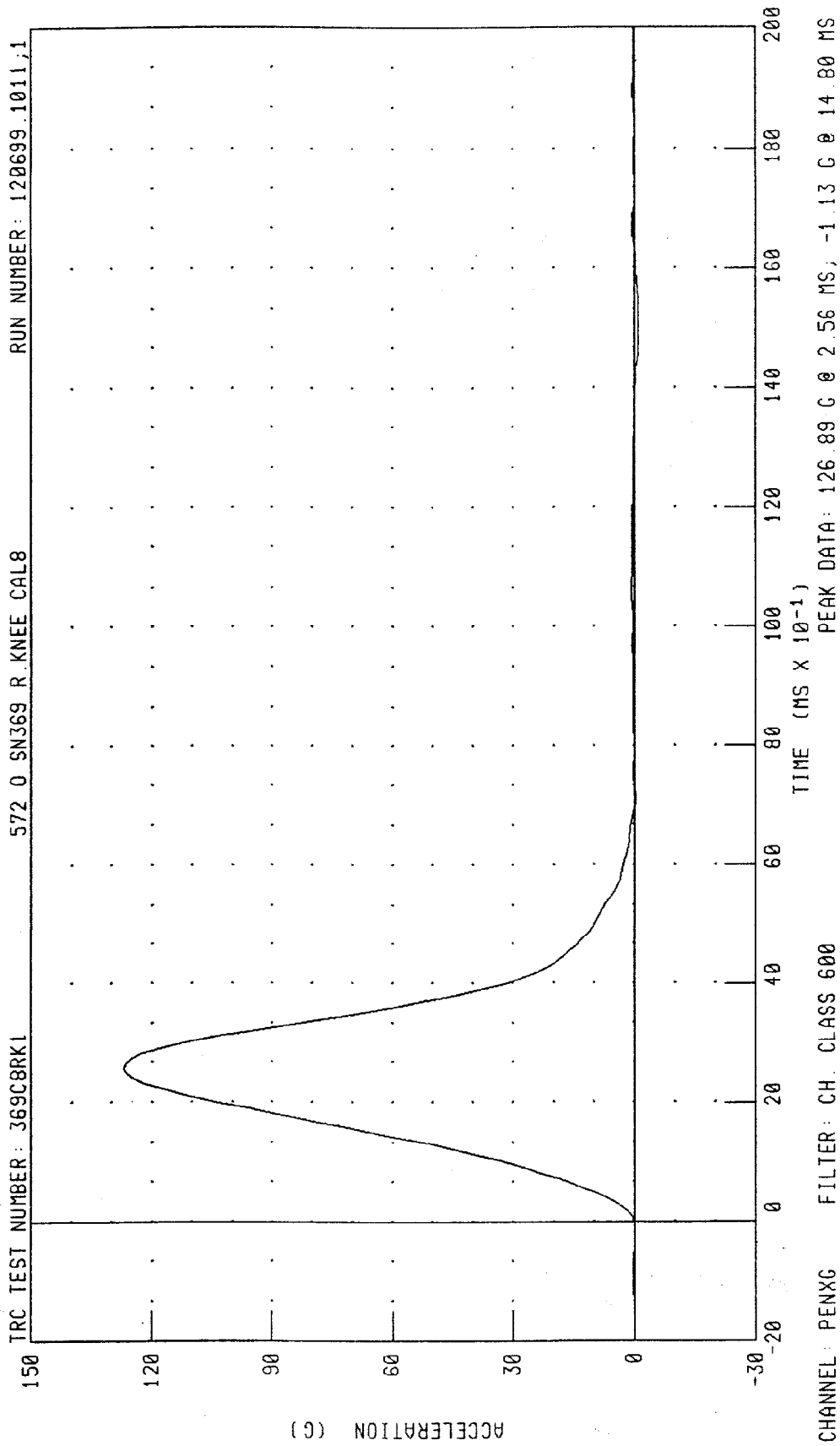
TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120699.1011;1

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



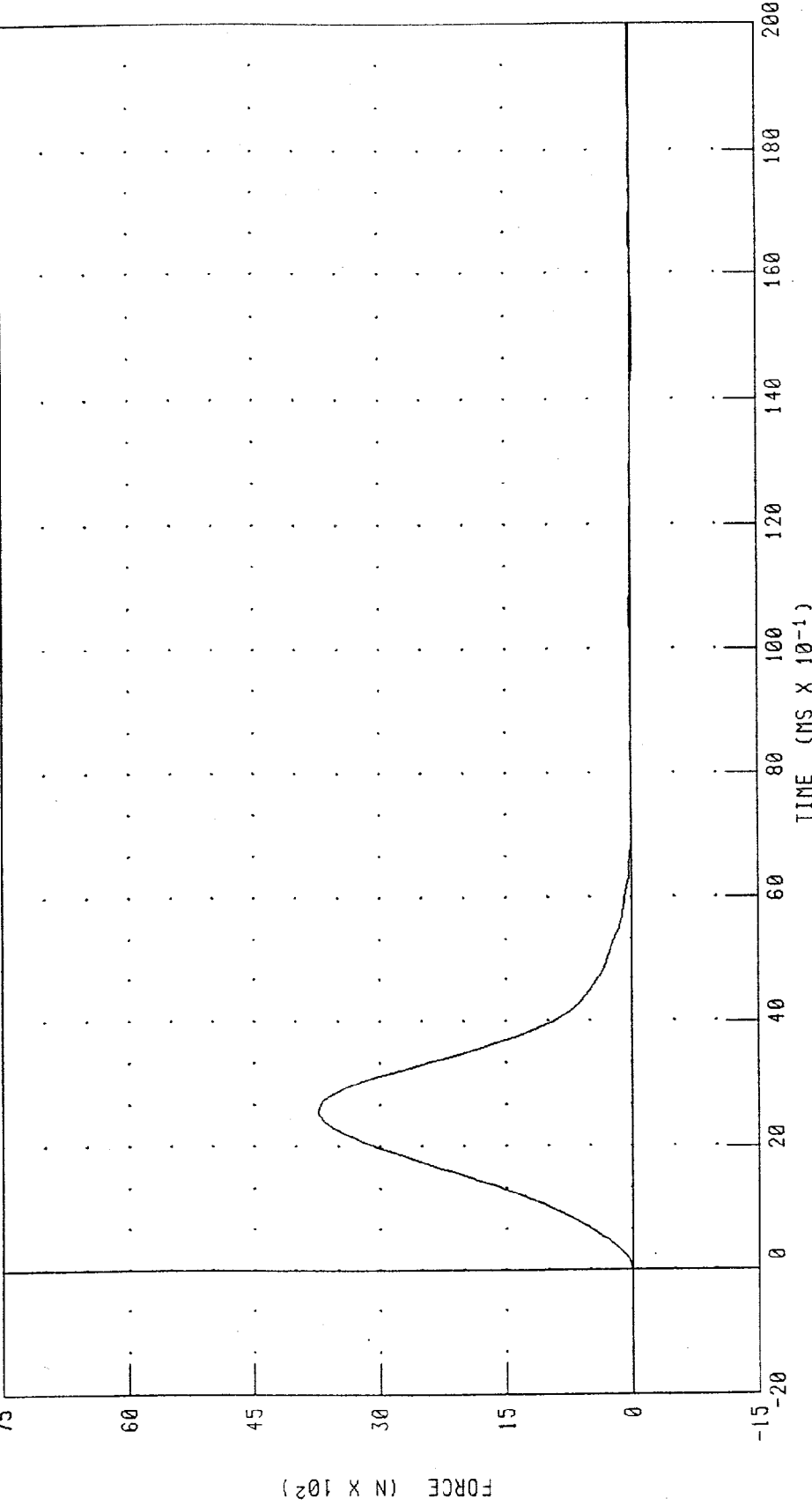
PART 572-0 HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 369C8RK1

572 0 SN369 R.KNEE CAL8

RUN NUMBER: 120699.1011;1



PEAK DATA: 3725.12 N @ 2.56 MS; -33.11 N @ 14.80 MS

CHANNEL: PENXF FILTER: CH. CLASS 600

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

06-DEC-99

TRC INC.

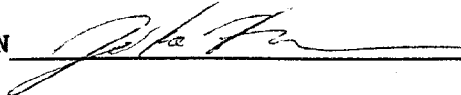
TEST NO: 369C8LK1

572 0 SN369 LEFT KNEE CAL8

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3435.4 N

TEST MEETS SPECIFICATIONS

TECHNICIAN



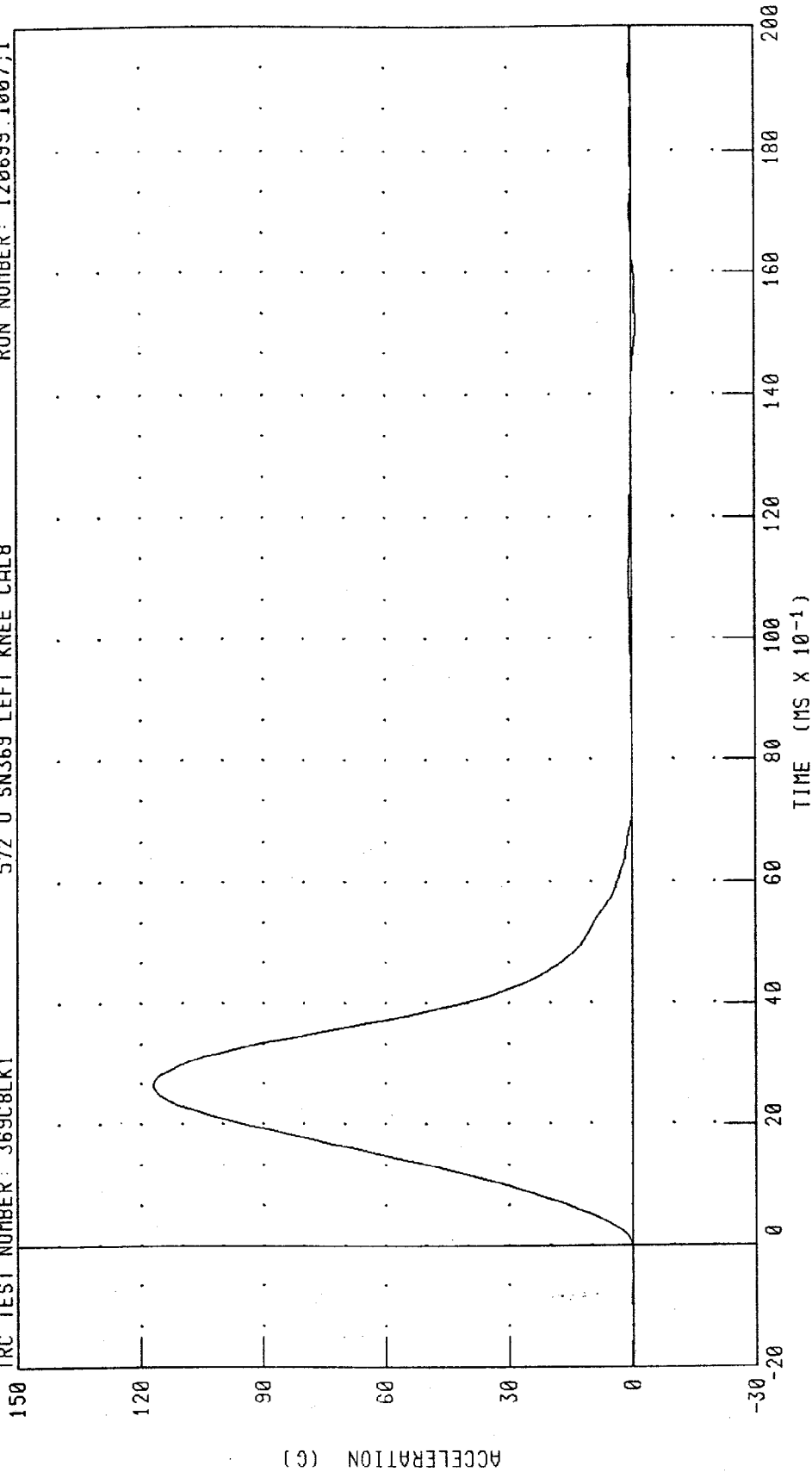
RUN NUMBER: 120699.1006;1

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

TRC TEST NUMBER: 369C8LK1

572 0 SN369 LEFT KNEE CAL8

RUN NUMBER: 120699.1007;1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 117.02 G @ 2.64 MS; -1.17 G @ 15.12 MS

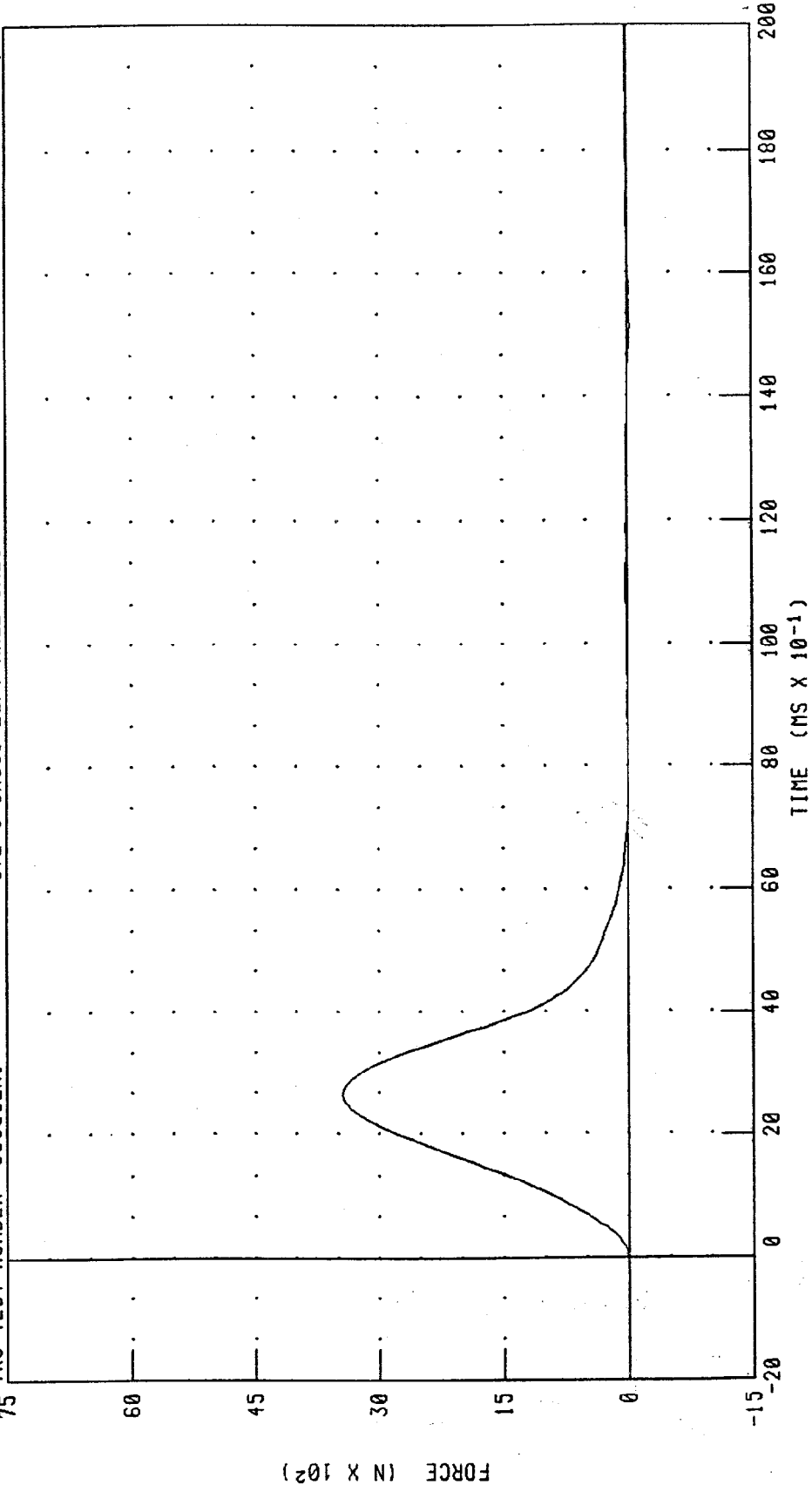
PART 572-0 HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KC PEND.)

TRC TEST NUMBER: 369C8LK1

572 0 SN369 LEFT KNEE CAL8

RUN NUMBER: 120699.1007;1



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 3435.44 N @ 2.64 MS; -34.32 N @ 15.12 MS

Post-Test Dummy Certification

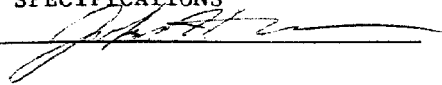
Passenger Dummy S/N 283

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
TRC. SN283

06-DEC-99

TRC INC. TEST NO: 283C9ED 572 0 SN283 EXT. DIMENSIONS

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		300 - 310 MM	305. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)		160 - 170 MM	163. MM
CHEST CIRCUMFERENCE (X)		851 - 881 MM	871. MM
WAIST CIRCUMFERENCE (Y)		757 - 787 MM	775. MM
CHEST DEPTH (O)		183 - 199 MM	183. MM
H-POINT HEIGHT (C)		81.5 - 86.5 MM	81. MM
H-POINT FROM SEATBACK (D)		144.5-149.5 MM	147. MM
SKULL CAP TO BACKLINE (H)		43.2 - 48.2 MM	45.7 MM
TOTAL SITTING HEIGHT (A)		775 - 800 MM	775. MM
THIGH CLEARANCE (F)		114 - 130 MM	127. MM
BUTTOCK KNEE LENGTH (K)		508.5-533.5 MM	533. MM
BUTTOCK POPLITEAL LENGTH (N)		414.0-429.4 MM	419. MM
POPLITEAL HEIGHT (L)		348.5-373.5 MM	361. MM
KNEE TO FLOOR HEIGHT (M)		394 - 419 MM	411. MM
FOOT LENGTH (P)		216 - 232 MM	224. MM
FOOT BREADTH (R)		76 - 92 MM	86.3. MM
SHOULDER PIVOT FROM BACKLINE (E)		71 - 81 MM	79. MM
SHOULDER BREADTH (V)		348 - 364 MM	361. MM
SHOULDER PIVOT HEIGHT (B)		434 - 450 MM	434. MM
ELBOW REST HEIGHT (J)		183 - 203 MM	183. MM
SHOULDER-ELBOW LENGTH (I)		279 - 297 MM	284. MM
BACK OF ELBOW TO FINGER TIP (G)		244 - 259 MM	251. MM
HIP WIDTH AT H-POINT (W)		272 - 287 MM	279. MM

HYBRID III SMALL FEMALE EXTERNAL DIMENSIONS
DUMMY MEETS SPECIFICATIONS
TECHNICIAN 

RUN NUMBER: 121799.1050

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE

06-DEC-99

TRC INC.

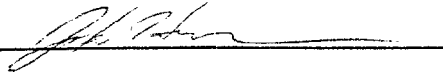
TEST NO: 283C9HD1

572 0 SN283 HEAD DROP CAL 9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PEAK RESULTANT ACCELERATION	250 - 300 G	291.78 G
PEAK LATERAL ACCELERATION	15 G MAX	5.64 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120699.0831;1

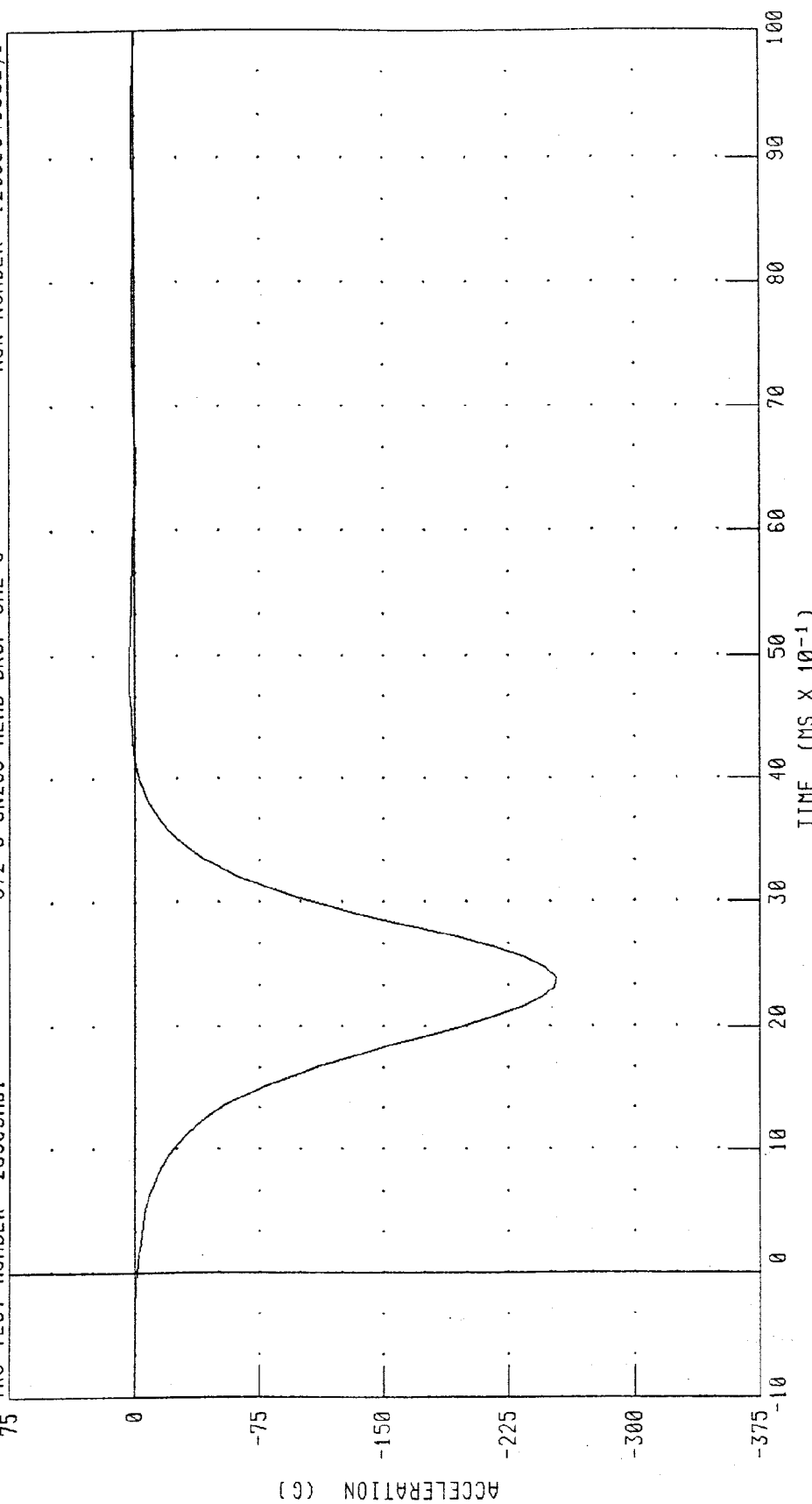
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 283C9HD1

572 0 SN283 HEAD DROP CAL 9

RUN NUMBER: 120699.0832;1



CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 3.63 G @ 4.96 MS; -253.52 G @ 2.40 MS

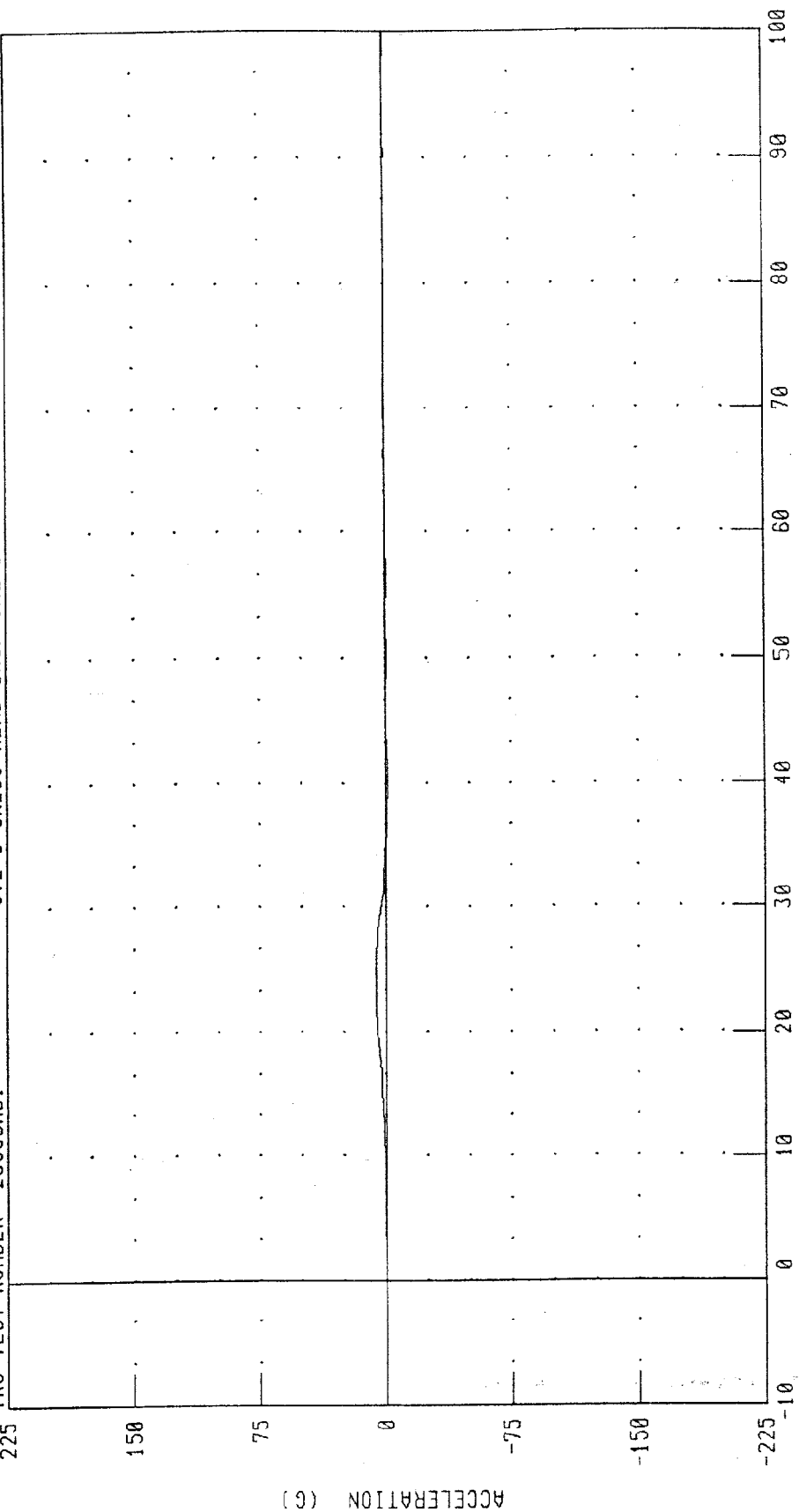
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 283C9HD1

572 0 SN283 HEAD DROP CAL 9

RUN NUMBER: 120699.0832;1



PEAK DATA: 5.64 G @ 2.32 MS; -1.61 G @ 4.00 MS

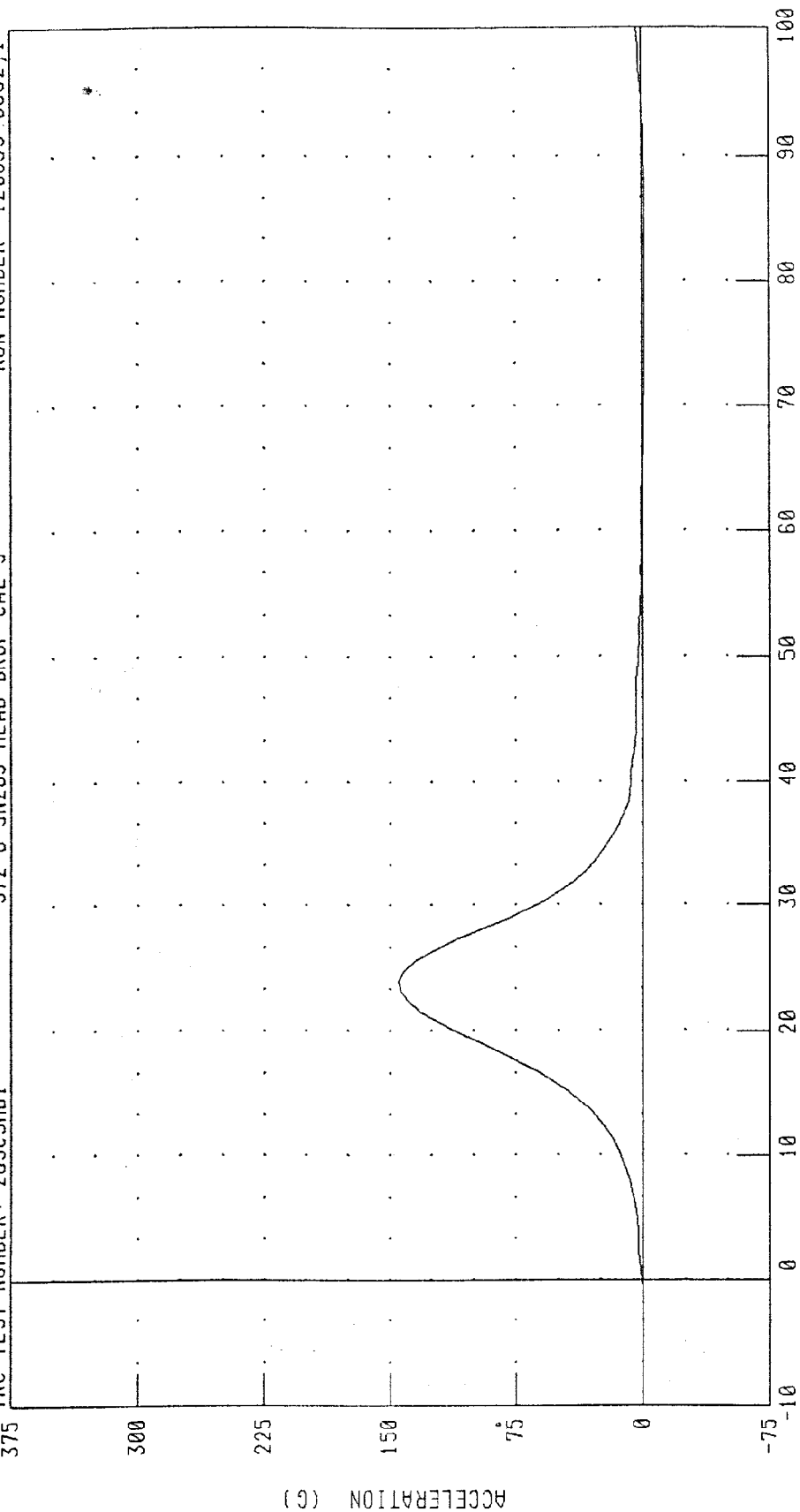
CHANNEL: HEDYC FILTER: CH. CLASS 1000

PART 572-0 HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS

IRC TEST NUMBER: 283C9H01

572 0 SN283 HEAD DROP CAL 9

RUN NUMBER: 120699 0832,1



CHANNEL: HEDZG FILTER: CH. CLASS 1000

TIME (MS X 10⁻¹)

PEAK DATA: 144.34 G @ 2.40 MS, -1.65 G @ 7.44 MS

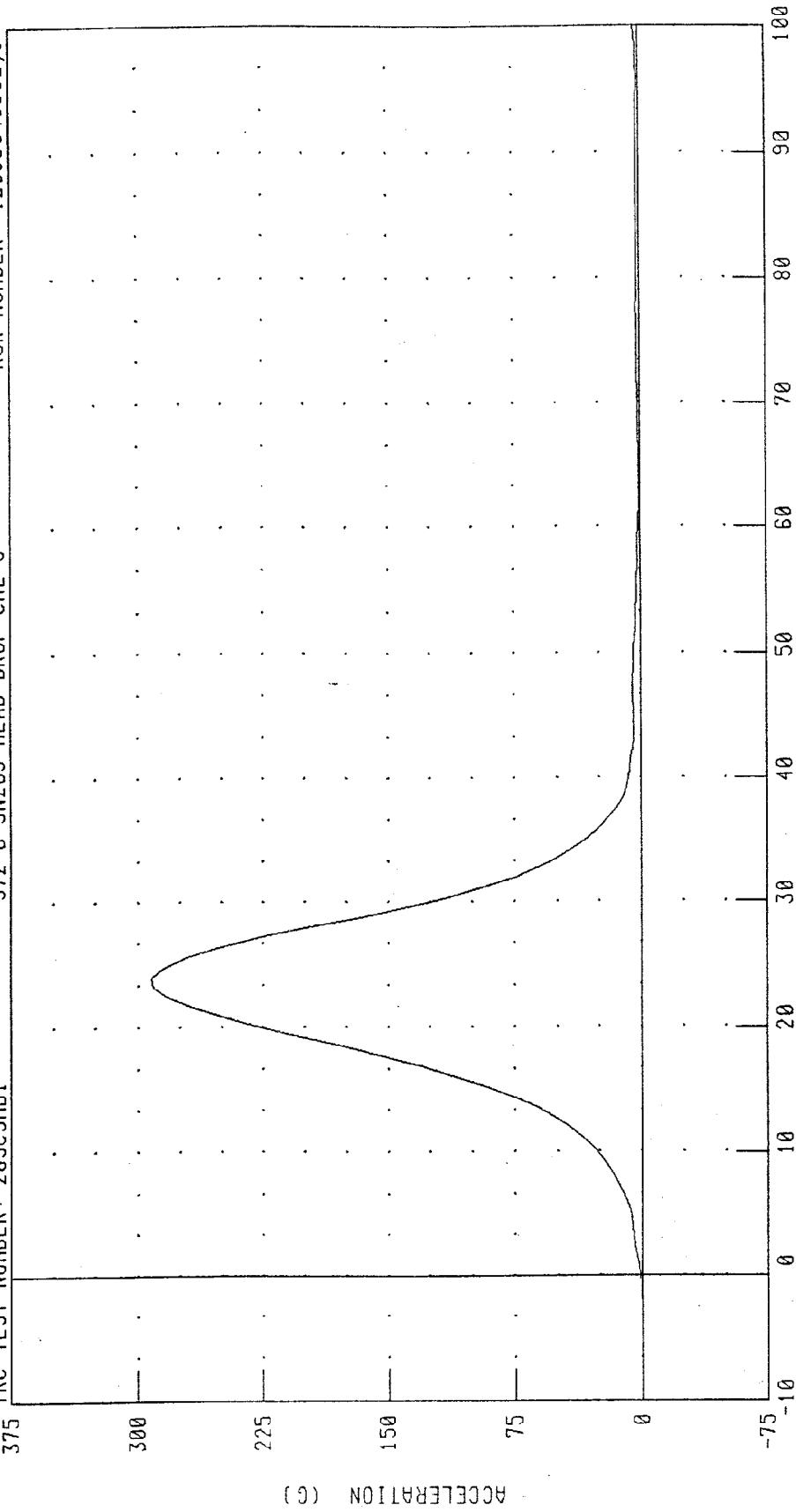
PART 572-0 HYBRID III HEAD CALIBRATION

HEAD RESULTANT ACCELERATION

572 0 SN283 HEAD DROP CAL 9

TRC TEST NUMBER: 283C9HD1

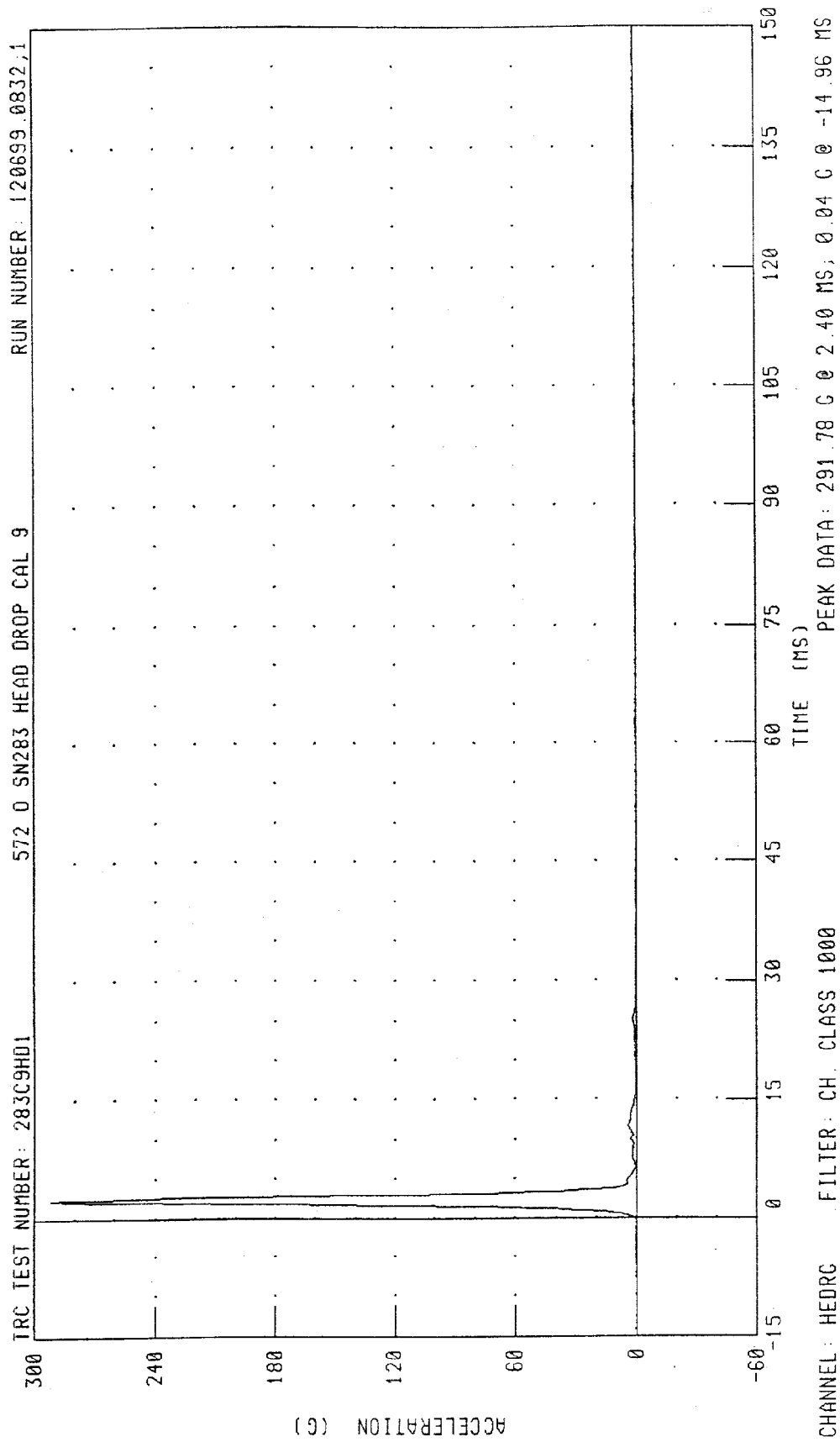
RUN NUMBER: 120699.0832,1



PEAK DATA: 291.78 G @ 2.40 MS, 0.04 G @ -0.96 MS

CHANNEL: HEDRC FILTER: CH. CLASS 1000

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



TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

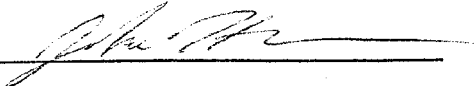
06-DEC-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 283C9NF3 572 0 SN283 NECK FLEX. CAL9

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.1 - 2.5 M/S	2.10 M/S
	20 MS	4.0 - 5.0 M/S	4.07 M/S
	30 MS	5.8 - 7.0 M/S	5.97 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	88.44 DEG.
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT		69 - 83 NM	73.10 NM
POSITIVE MOMENT DECAY TIME FROM TO / 10NM		80 - 100 MS	92.24 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN 

RUN NUMBER: 120699.1217;3

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

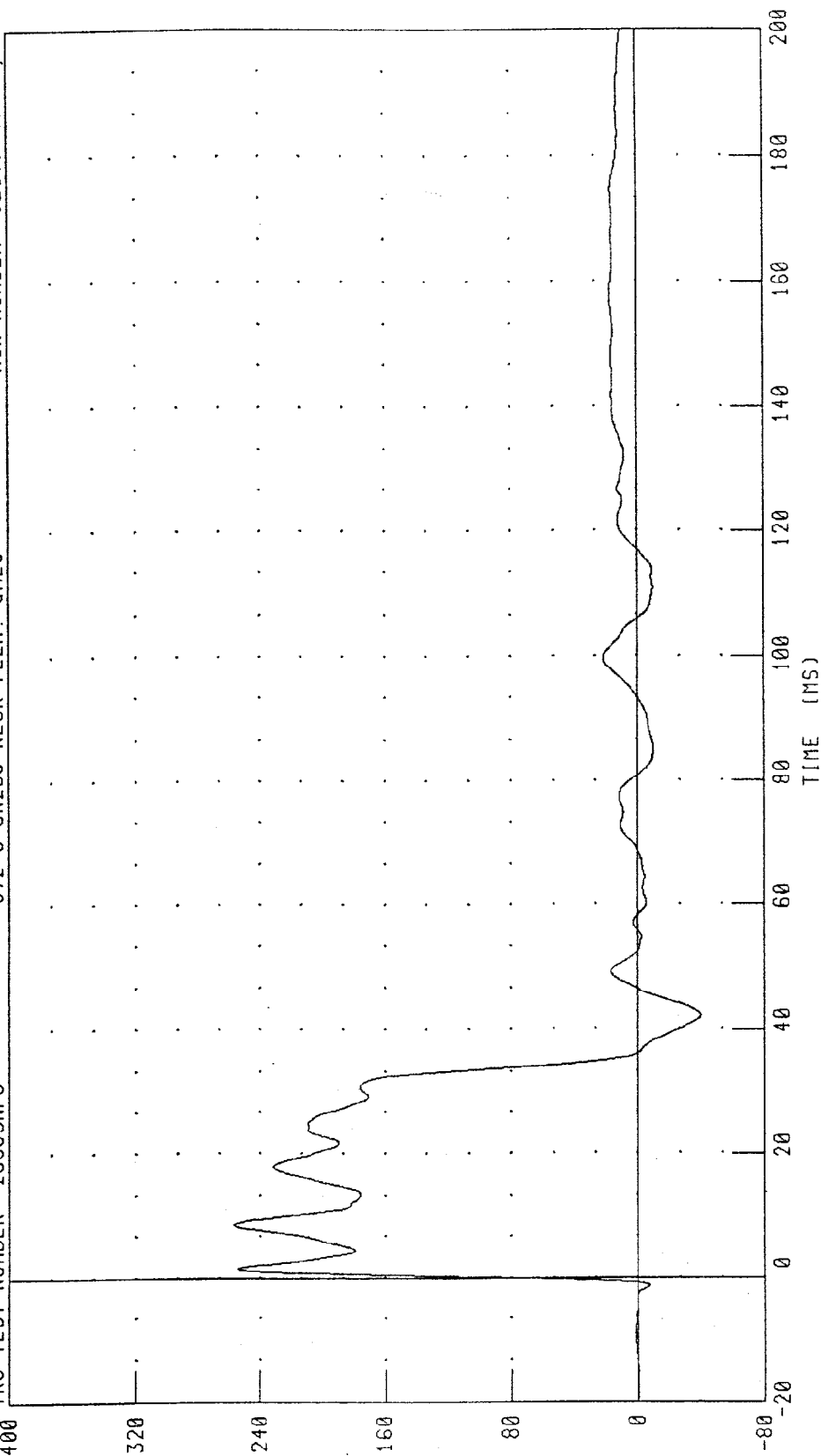
PENDULUM DECELERATION

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699.1218;3

ACCELERATION (G X 10⁻¹)



PEAK DATA: 25.71 G @ 8.56 MS, -3.98 G @ 42.08 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

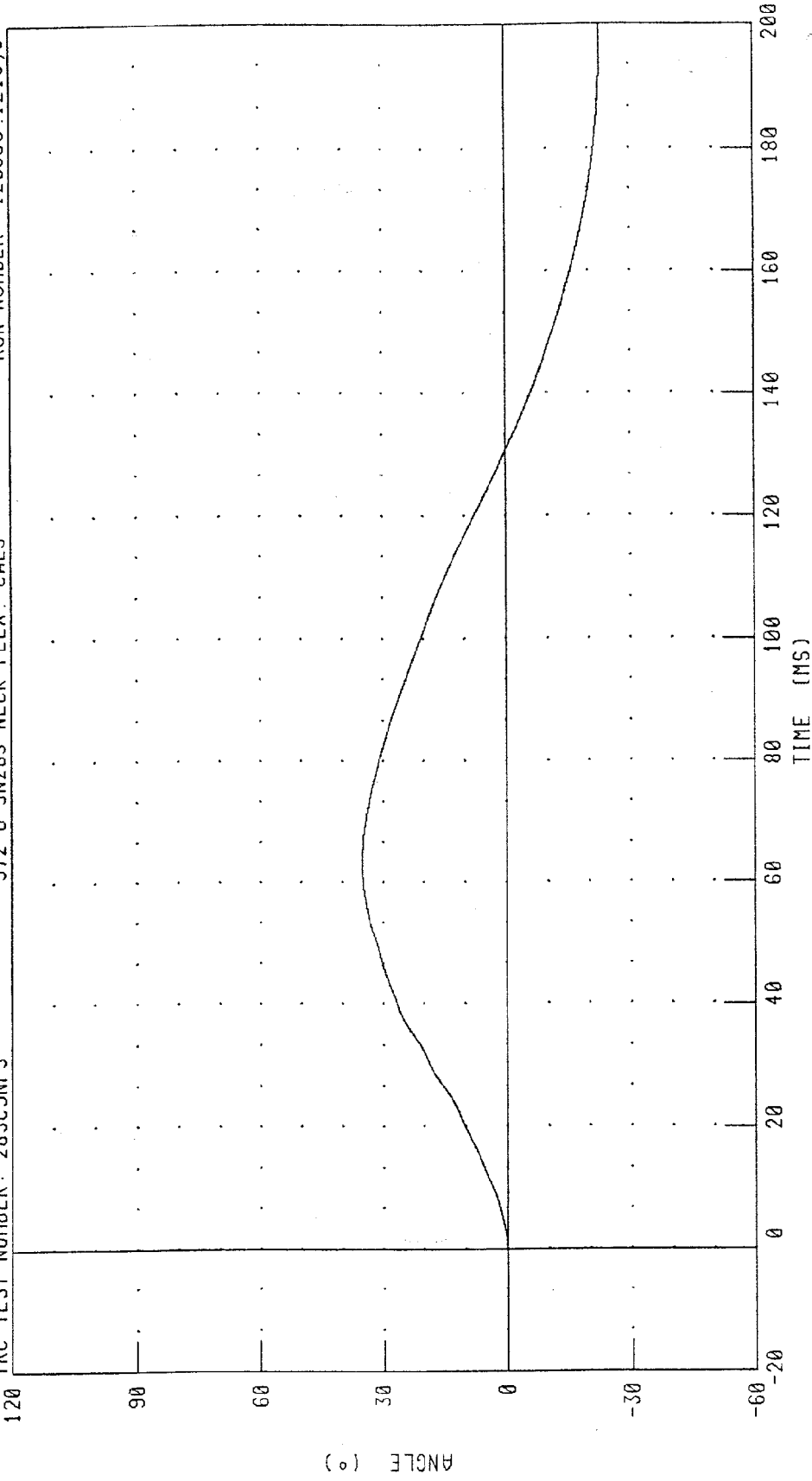
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699.1218,3



CHANNEL: BETA

FILTER: CH. CLASS 60

TIME (MS)

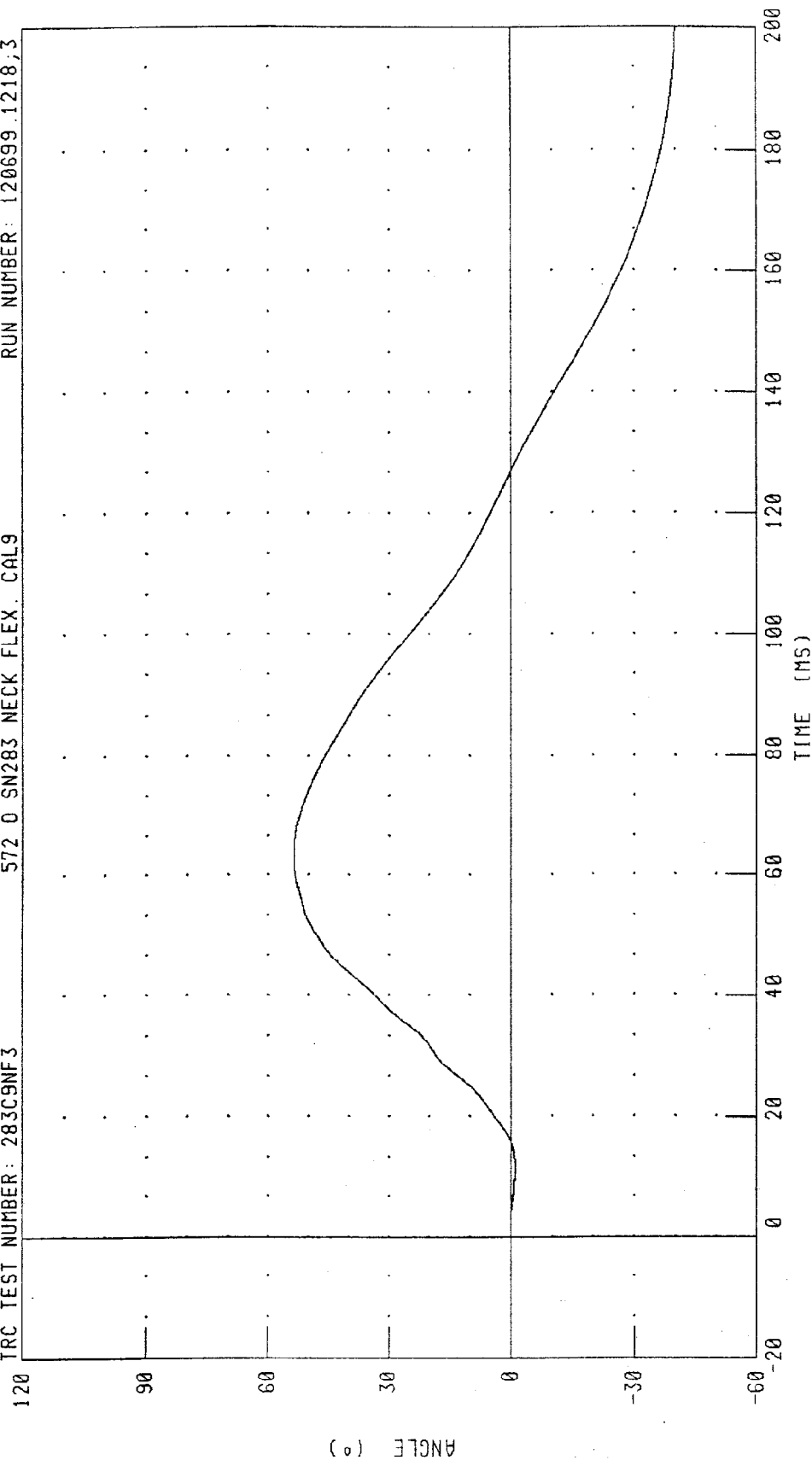
PEAK DATA: 34.92 ° @ 63.04 MS; -22.98 ° @ 199.68 MS

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

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699.1218,3



CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 53.53 ° @ 63.68 MS, -40.13 ° @ 200.00 MS

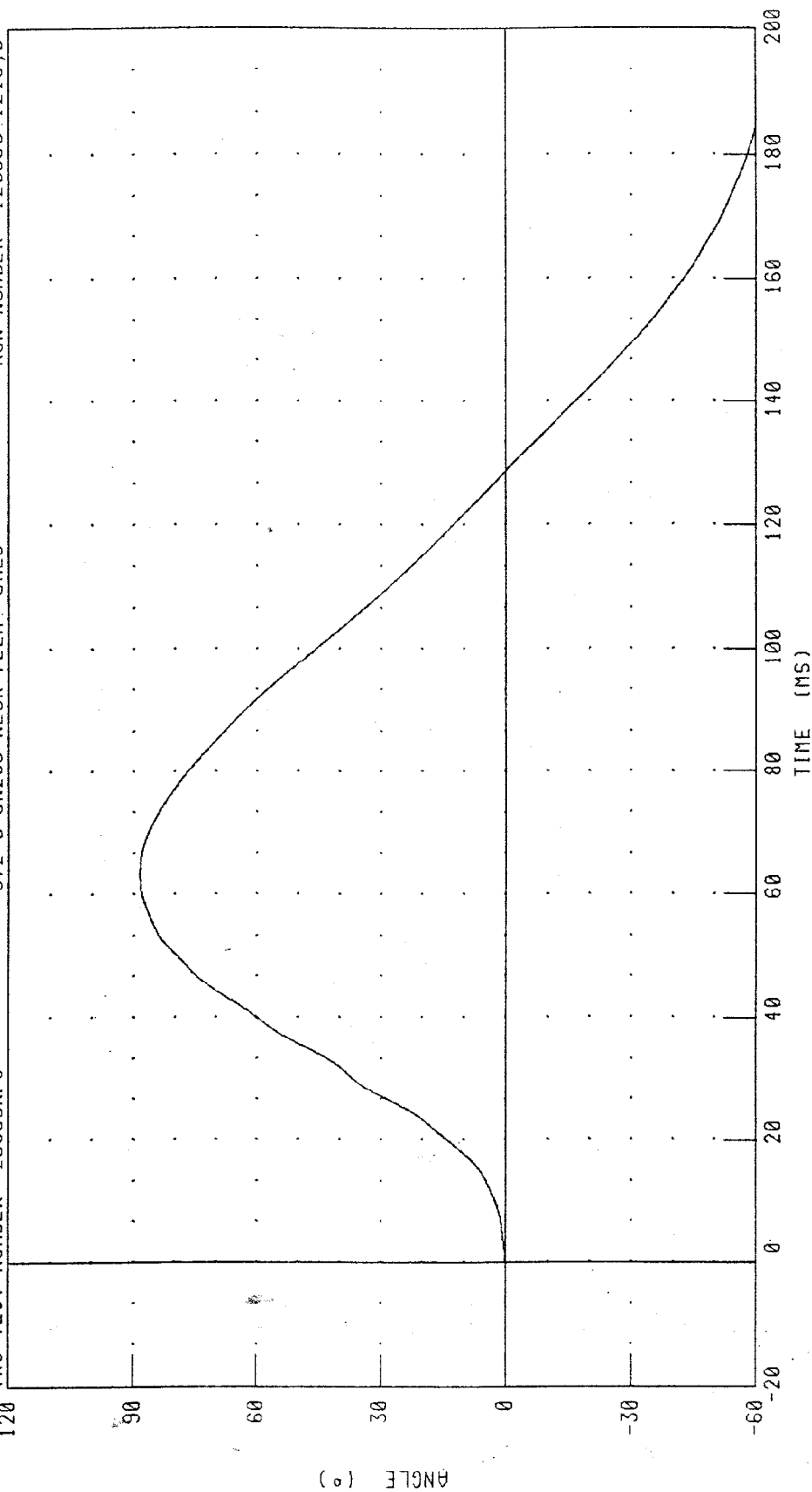
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699.1218;3



PEAK DATA: 88.45 ° @ 63.44 MS, -63.12 ° @ 200.00 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

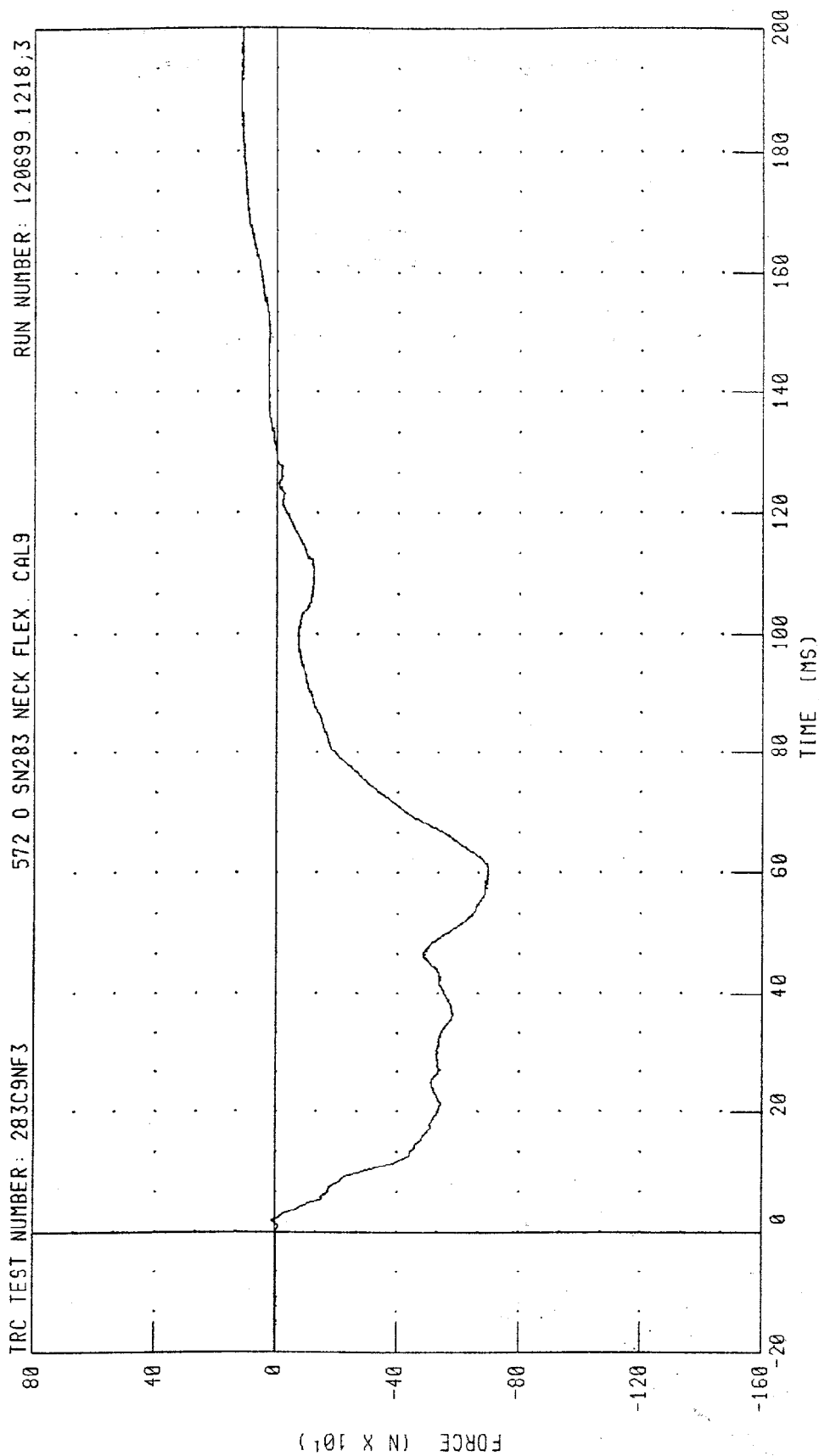
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699 1218,3



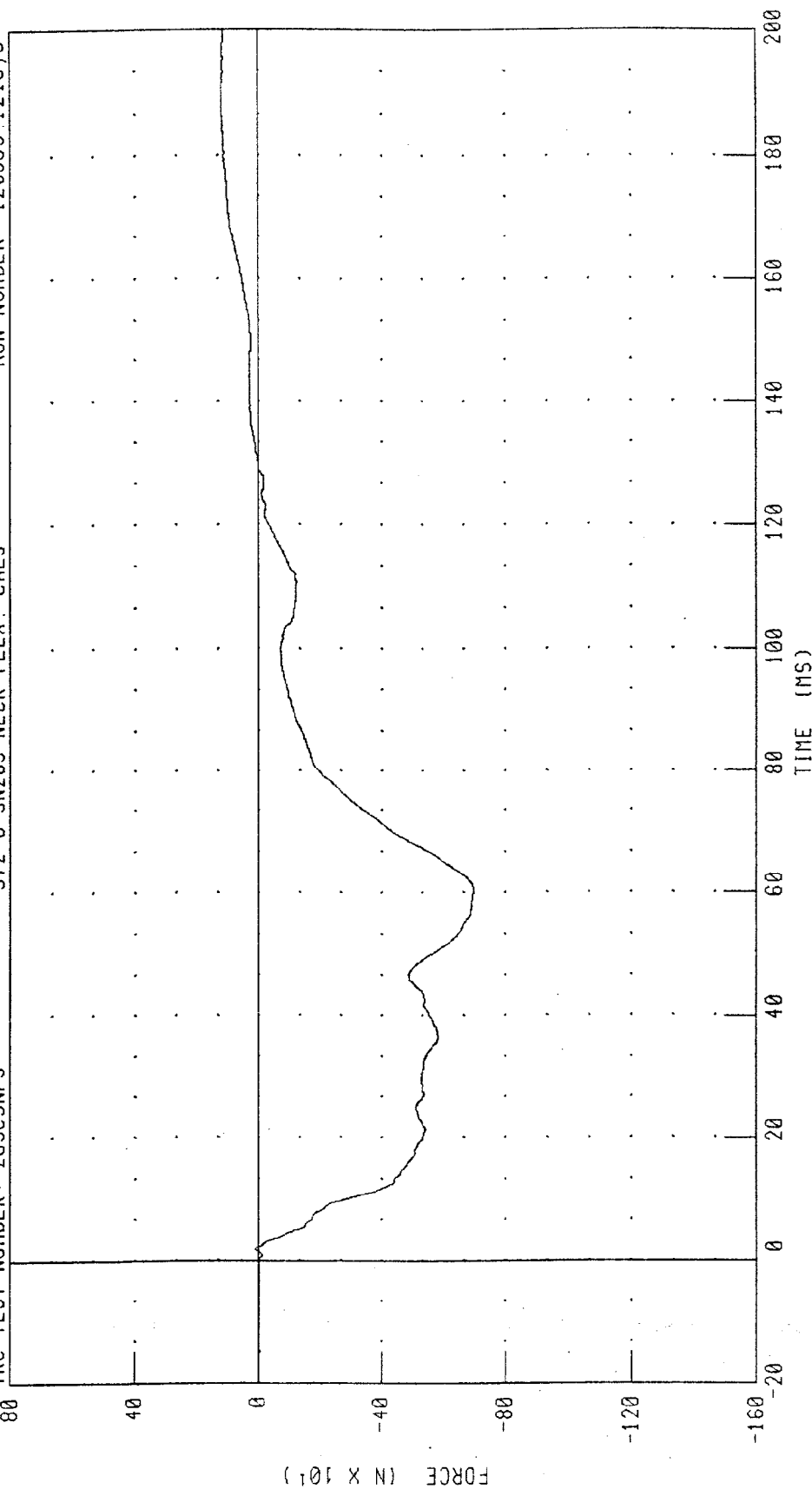
PEAK DATA: 118.82 N @ 184.00 MS, -698.65 N @ 59.12 MS

CHANNEL: NEKXF FILTER: CH. CLASS 1000

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

TRC TEST NUMBER: 283C9NF3 572 0 SN283 NECK FLEX. CAL9 RUN NUMBER: 120699.1218,3



CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 118.92 N @ 191.12 MS; -698.80 N @ 60.72 MS

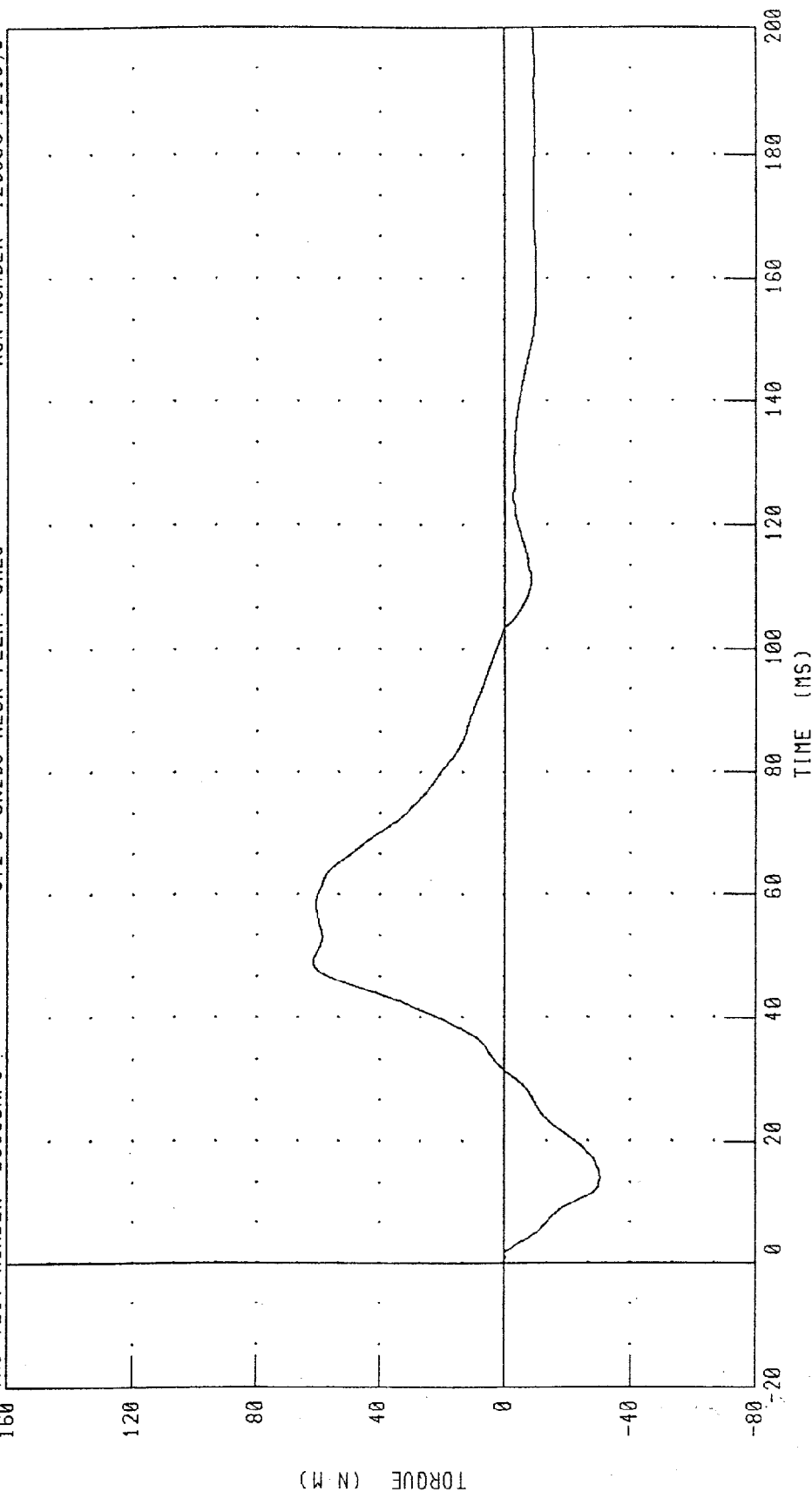
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699.1218,3



PEAK DATA: 61.63 N·M @ 49.20 MS; -30.46 N·M @ 14.08 MS

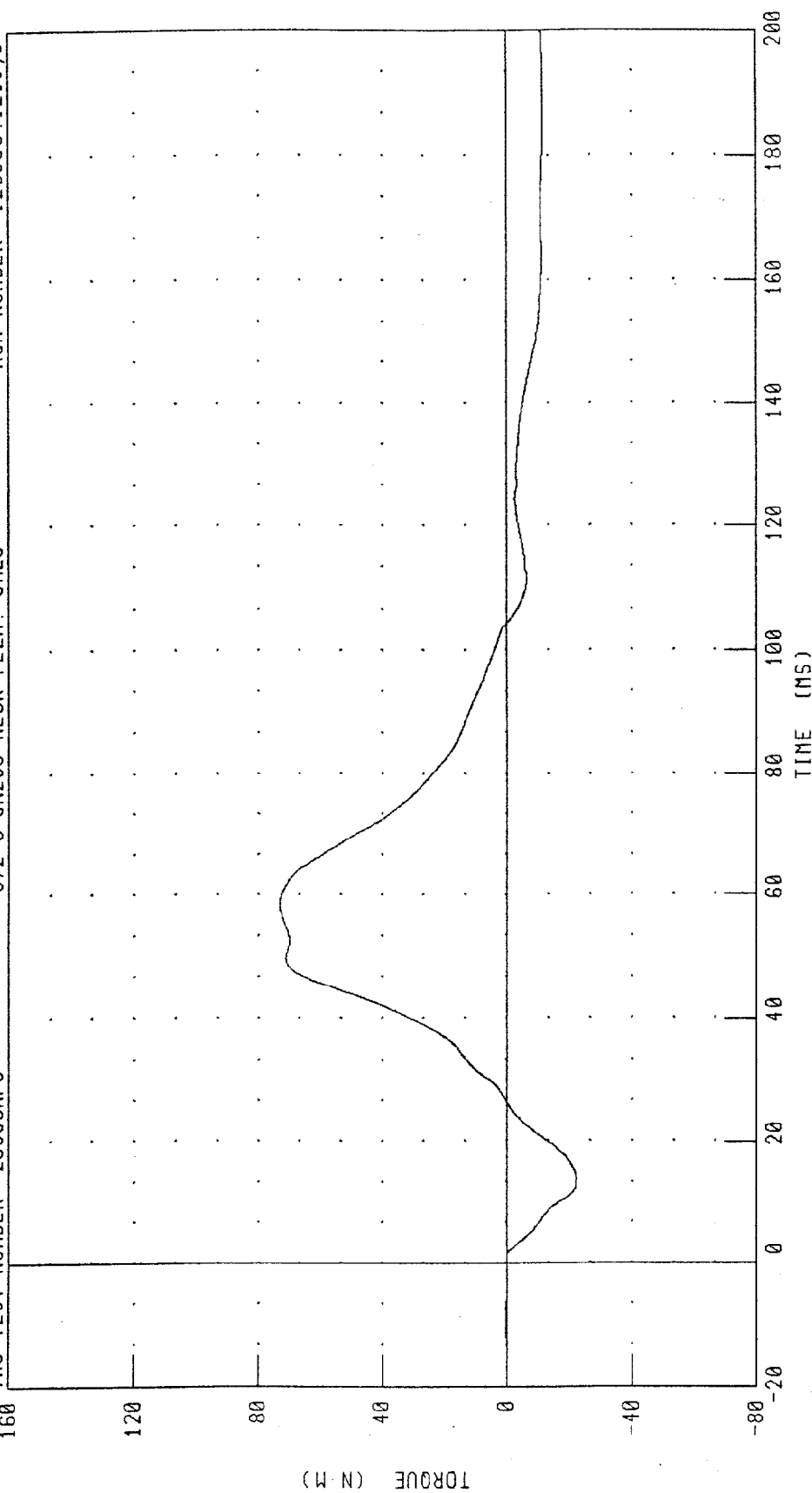
CHANNEL: NEKYM FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 283C9NF3

572 0 SN283 NECK FLEX. CAL9

RUN NUMBER: 120699.1218,3



CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 73.10 N·M @ 58.32 MS; -22.31 N·M @ 14.00 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE

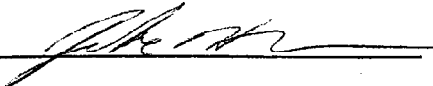
06-DEC-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 283C9NE3 572 0 SN283 NECK EXT. CAL 9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
IMPACT VELOCITY	5.95 - 6.19 M/S	6.05 M/S
INTEGRATED PENDULUM VELOCITY	10 MS 1.5 - 1.9 M/S	1.65 M/S
	20 MS 3.1 - 3.9 M/S	3.31 M/S
	30 MS 4.6 - 5.6 M/S	4.86 M/S
PEAK D-PLANE ROTATION	97 - 109 DEG.	112.69 DEG. *
PEAK MOMENT ABOUT OCCIPITAL CONDYLE DURING ROTATION INT	-55 / -69 NM	-66.96 NM
NEGATIVE MOMENT DECAY TIME FROM TO / -10 NM	94 - 114 MS	105.68 MS

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN  RUN NUMBER: 120699.1341;1

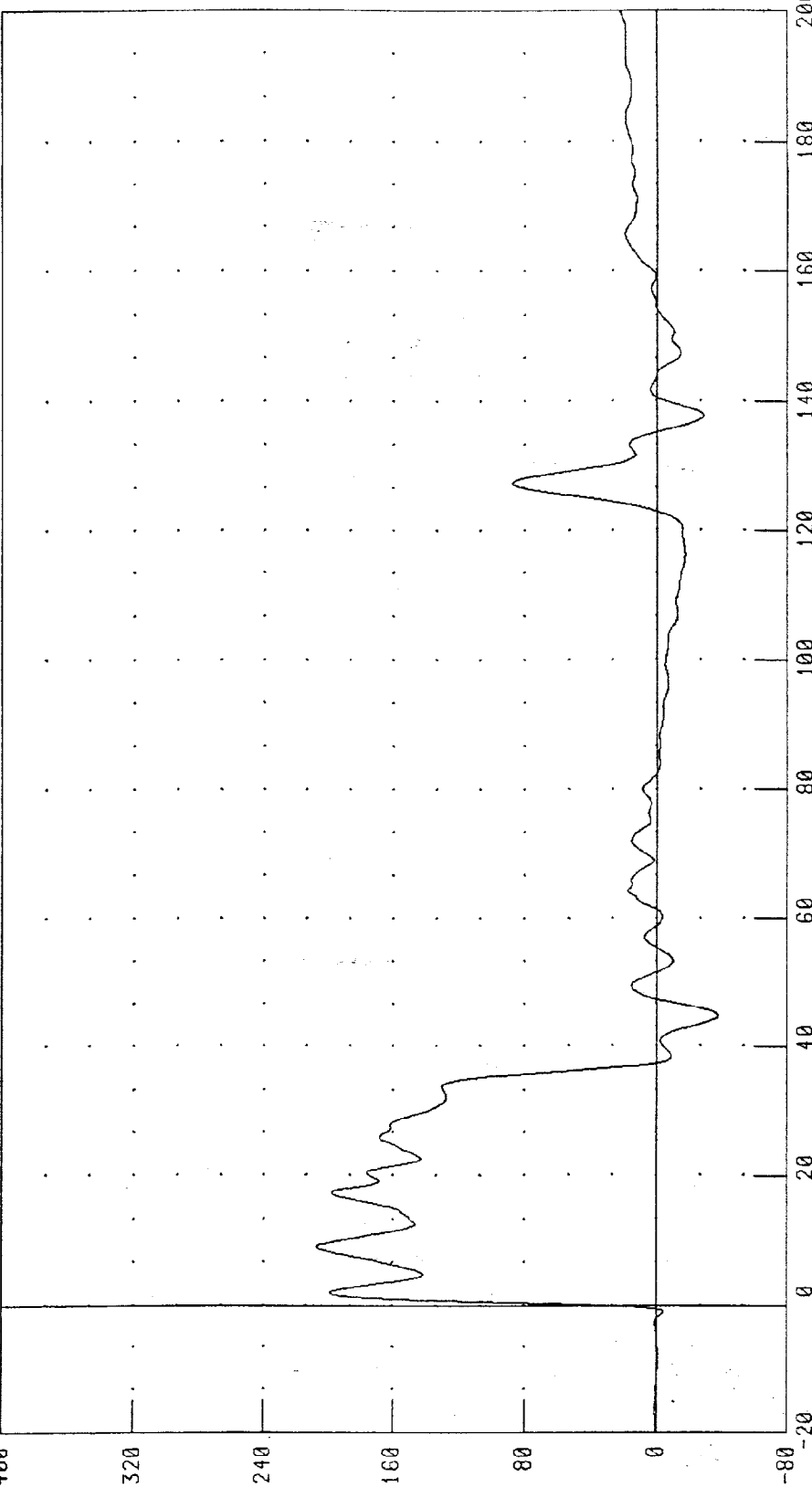
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 283C9NE3

572 0 SN283 NECK EXT. CAL 9

RUN NUMBER: 120699.1356;1



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 20.70 G @ 9.04 MS, -3.71 G @ 44.72 MS

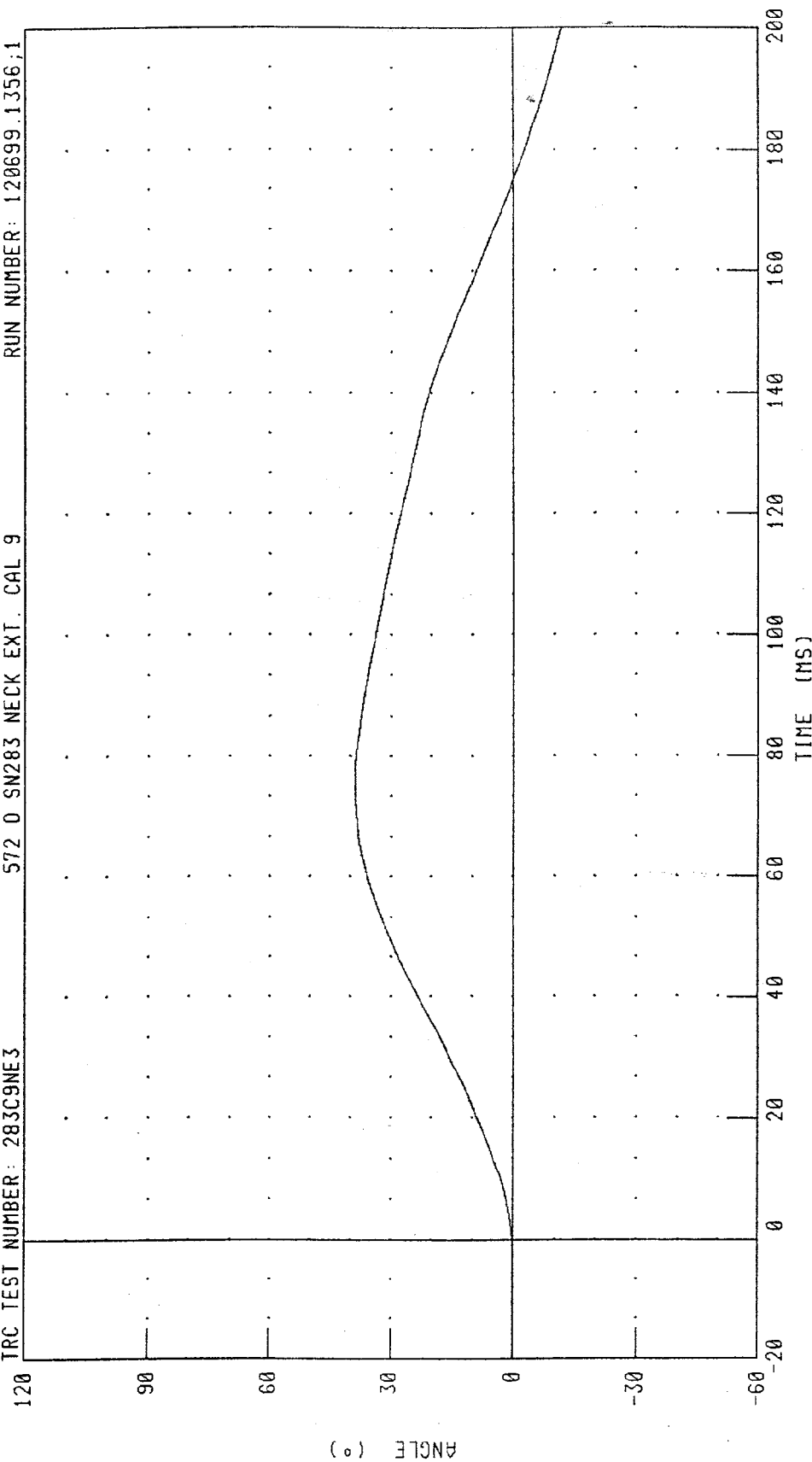
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT BASE OF NECK

572 0 SN283 NECK EXT. CAL 9

TRC TEST NUMBER: 283C9NE3

RUN NUMBER: 120699.1356;1



PEAK DATA: 38.82 ° @ 75.60 MS, -11.83 ° @ 200.00 MS

CHANNEL: BETA FILTER: CH. CLASS 60

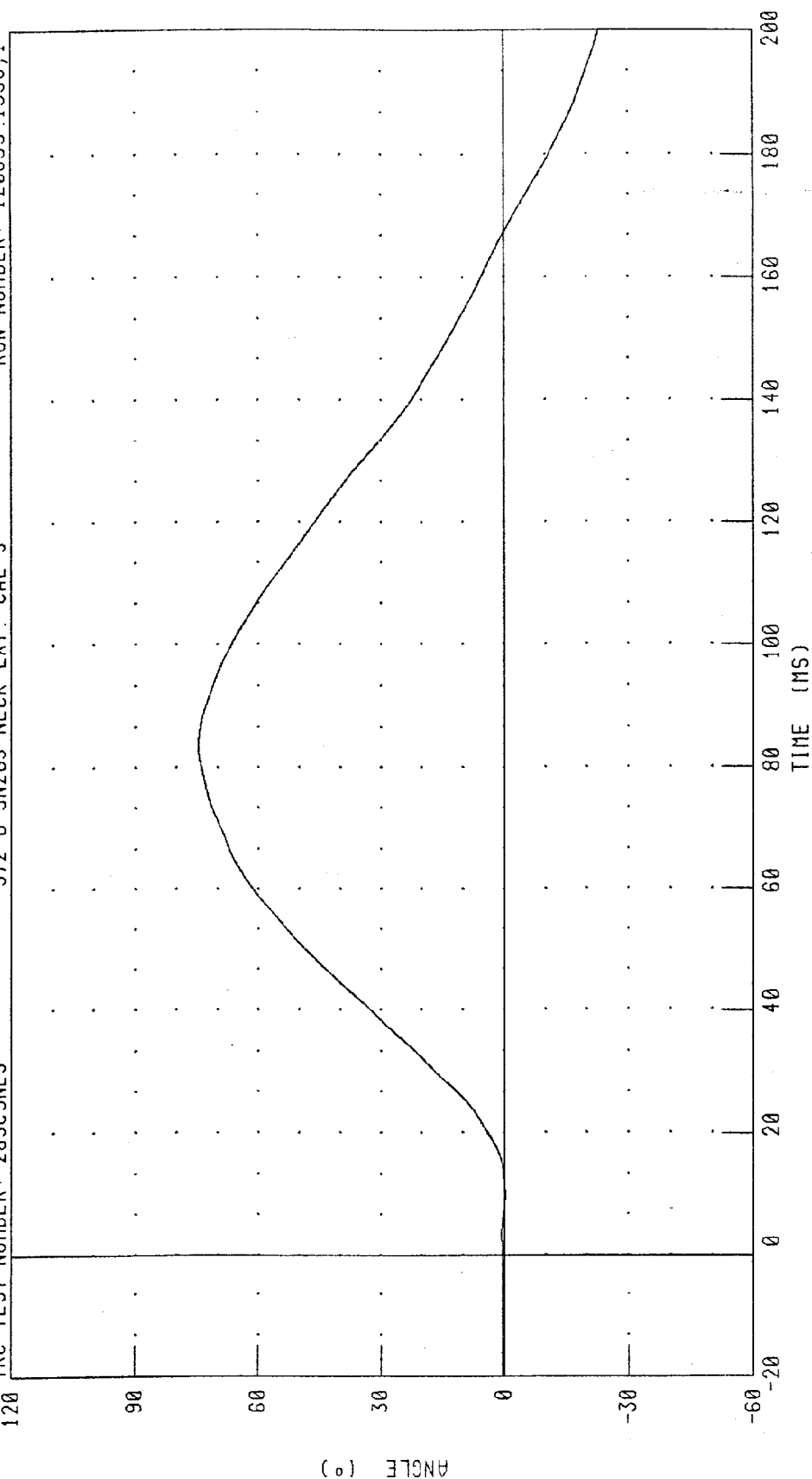
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 283C9NE3

572 0 SN283 NECK EXT. CAL 9

RUN NUMBER: 120699.1356;1



CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 74.61 ° @ 83.52 MS, -23.17 ° @ 200.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

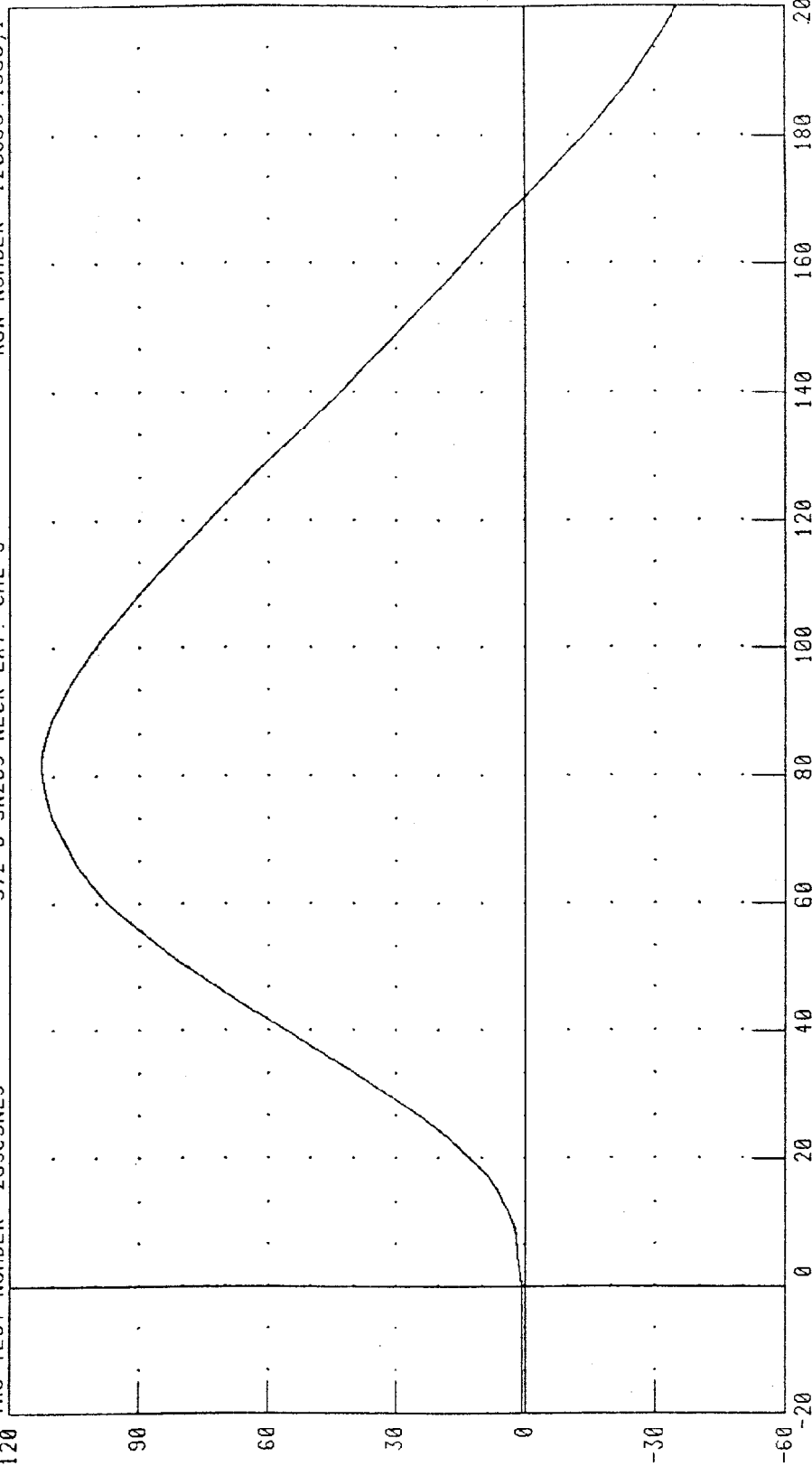
TOTAL ROTATION

TRC TEST NUMBER: 283C9NE3

572 0 SN283 NECK EXT. CAL 9

RUN NUMBER: 120699.1356;1

120



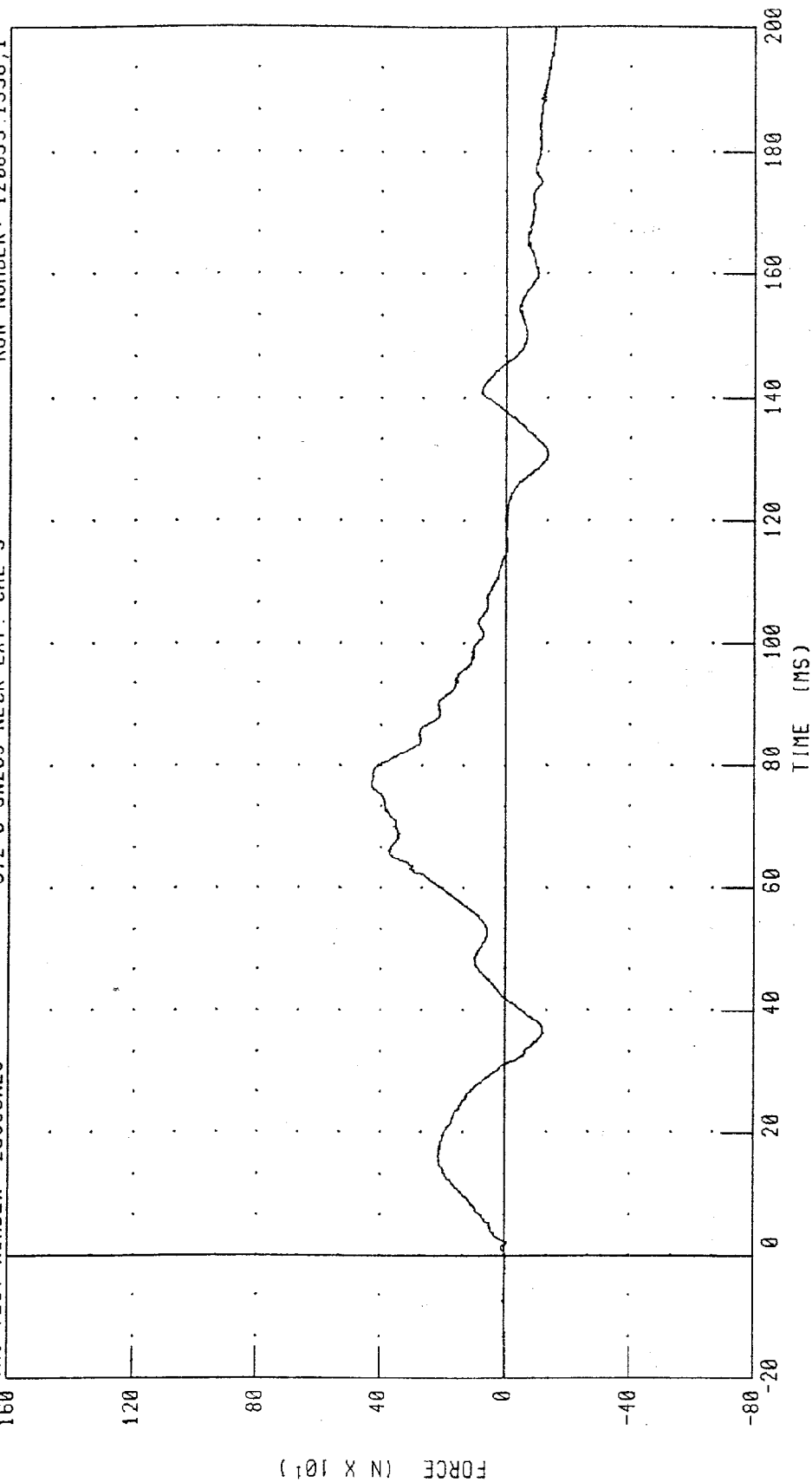
PEAK DATA: 112.69 ° @ 81.92 MS; -35.00 ° @ 200.00 MS

CHANNEL: TOTAL FILTER: CH. CLASS 60

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

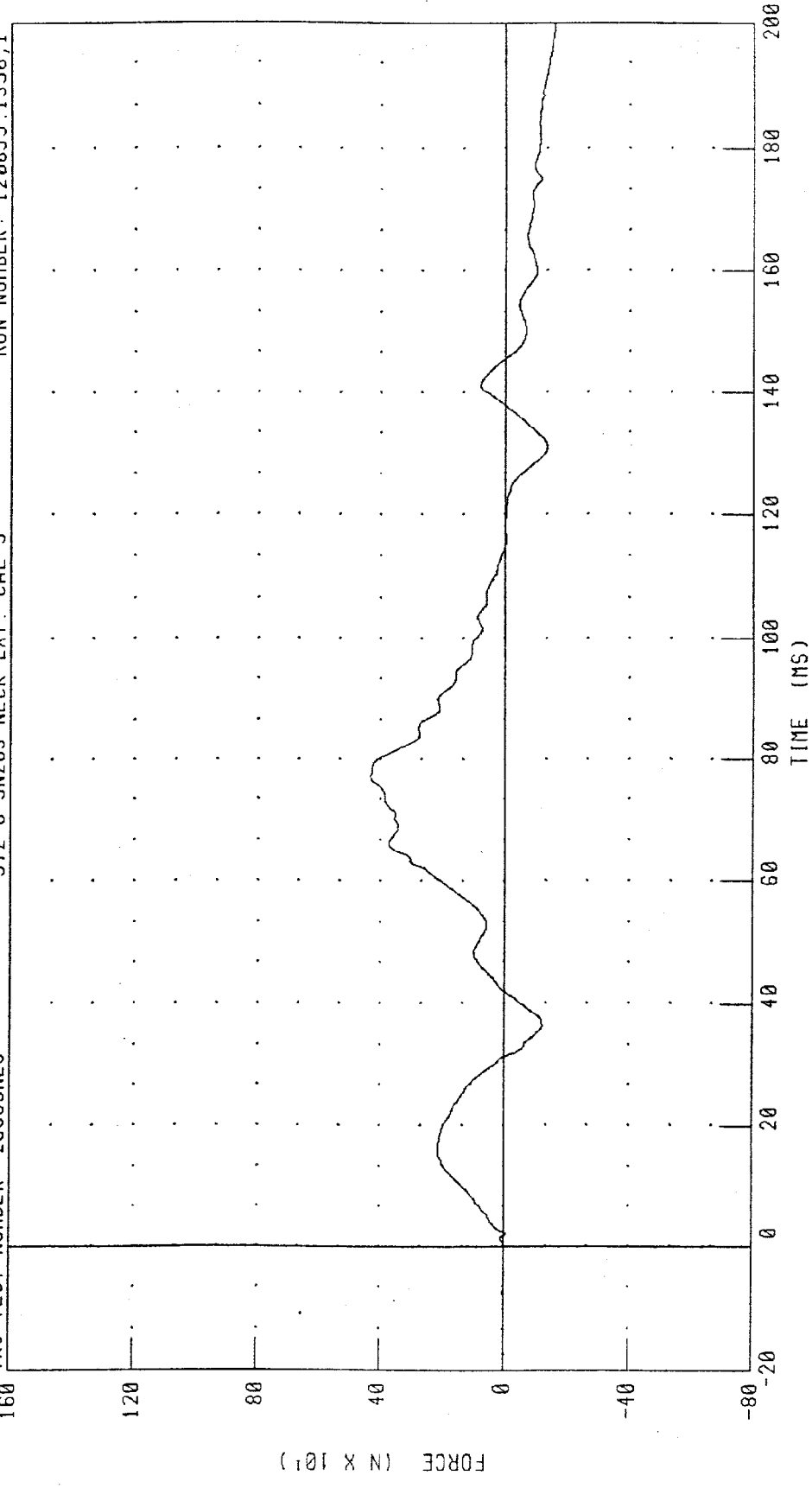
TRC TEST NUMBER: 283C9NE3 572 0 SN283 NECK EXT. CAL 9 RUN NUMBER: 120699 1356;1



CHANNEL: NEKXF FILTER: CH. CLASS 1000 PEAK DATA: 430.65 N @ 76.72 MS, -163.87 N @ 199.44 MS

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

TRC TEST NUMBER: 283C9NE3 572 0 SN283 NECK EXT. CAL 9 RUN NUMBER: 120699.1356;1



CHANNEL: NEKXFC FILTER: CH. CLASS 600 PEAK DATA: 430.93 N @ 77.12 MS; -161.58 N @ 200.00 MS

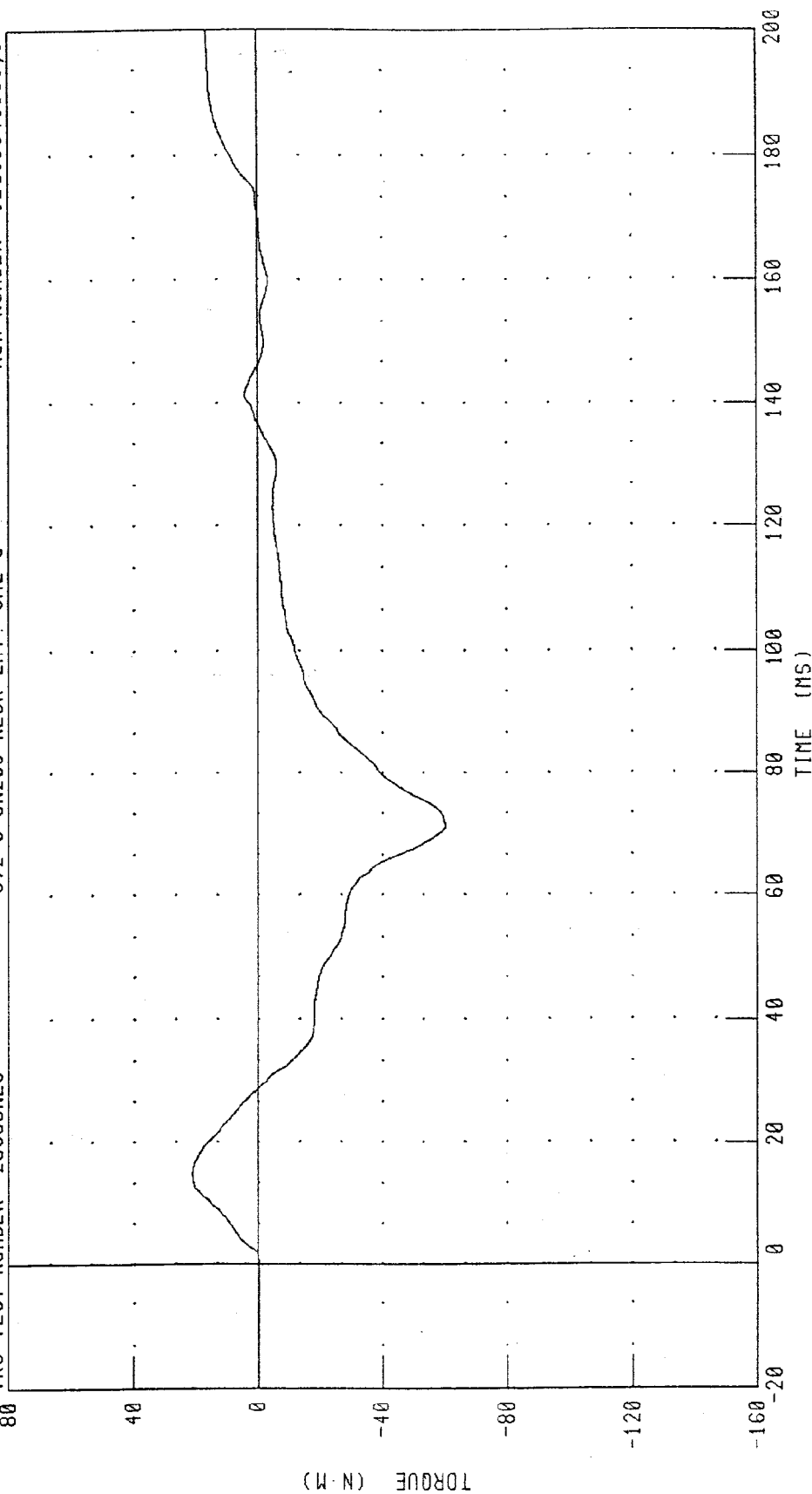
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER: 283C9NE3

572 0 SN283 NECK EXT. CAL 9

RUN NUMBER: 120699.1356,1



PEAK DATA: 21.34 N-M @ 14.96 MS; -60.55 N-M @ 71.44 MS

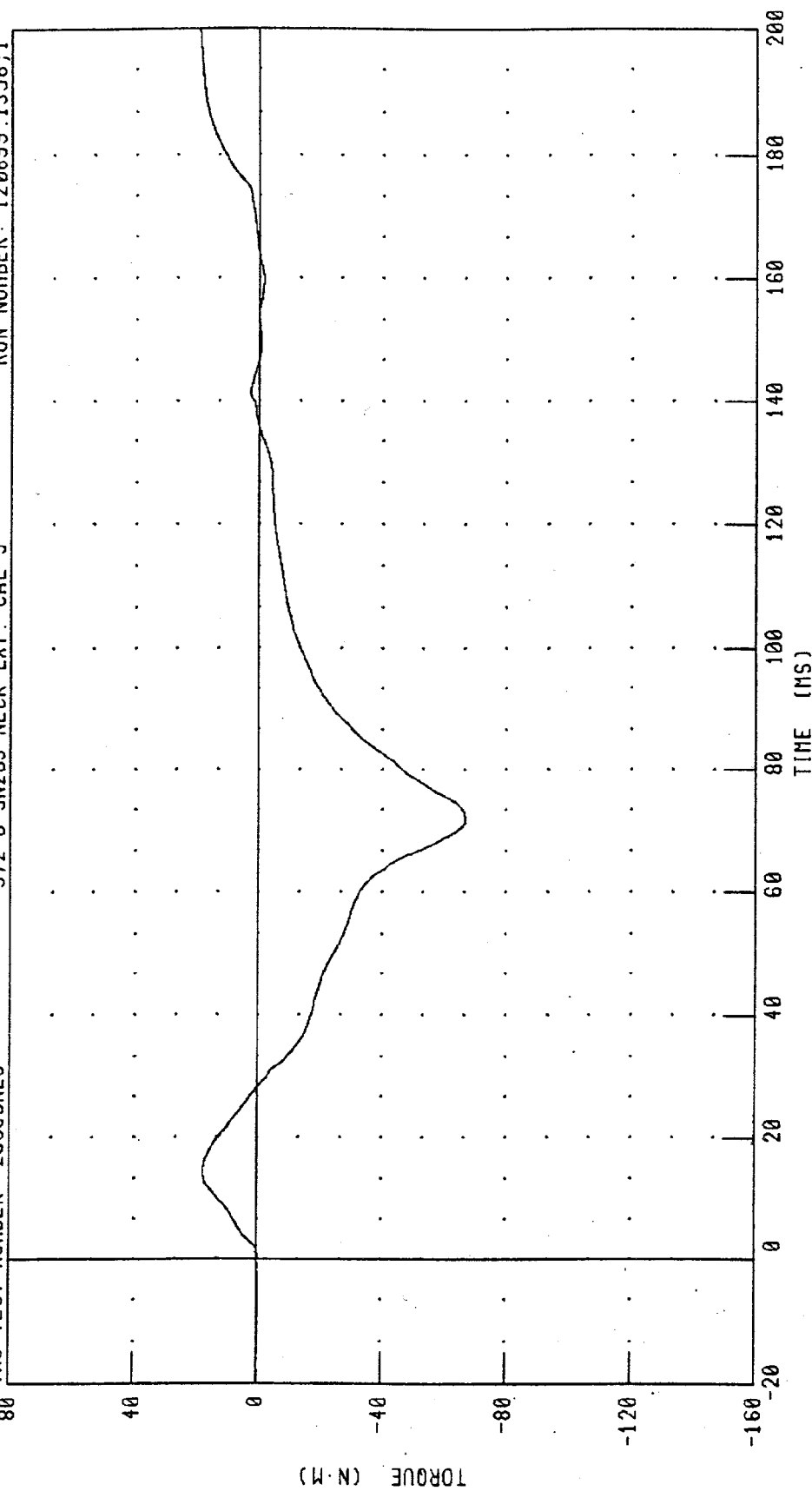
CHANNEL: NEKYM FILTER: CH. CLASS 600

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

TRC TEST NUMBER: 283C9NE3

572 0 SN283 NECK EXT. CAL 9

RUN NUMBER: 120699.1356;1



CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 19.37 N·M @ 200.00 MS; -66.96 N·M @ 71.68 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE

07-DEC-99

TRC INC.

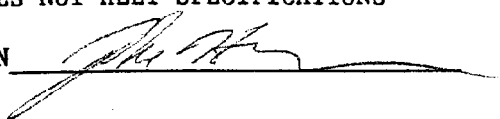
TEST NO: 283C9TH2

572 0 SN283 THORAX CAL9

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	48 - 55 MM	49.1 MM
MAXIMUM RESISTIVE FORCE WITHIN DEFLECTION CORRIDOR	3900 - 4400 N	4472. N *
INTERNAL HYSTERESIS	69% - 85%	74.6%

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120799.0720;1

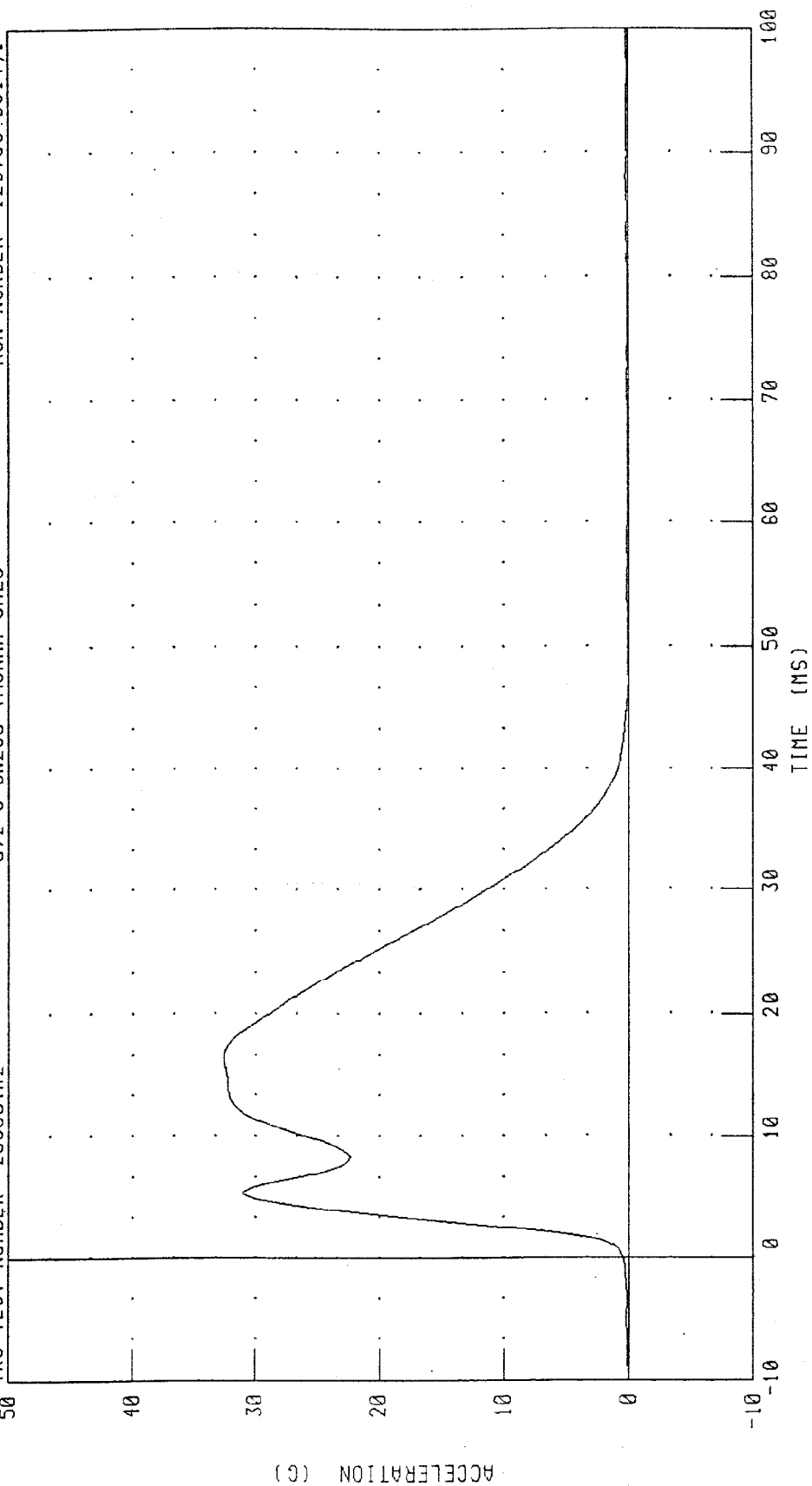
PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 283C9TH2

572 0 SN283 THORAX CAL9

RUN NUMBER: 120799.0014;1

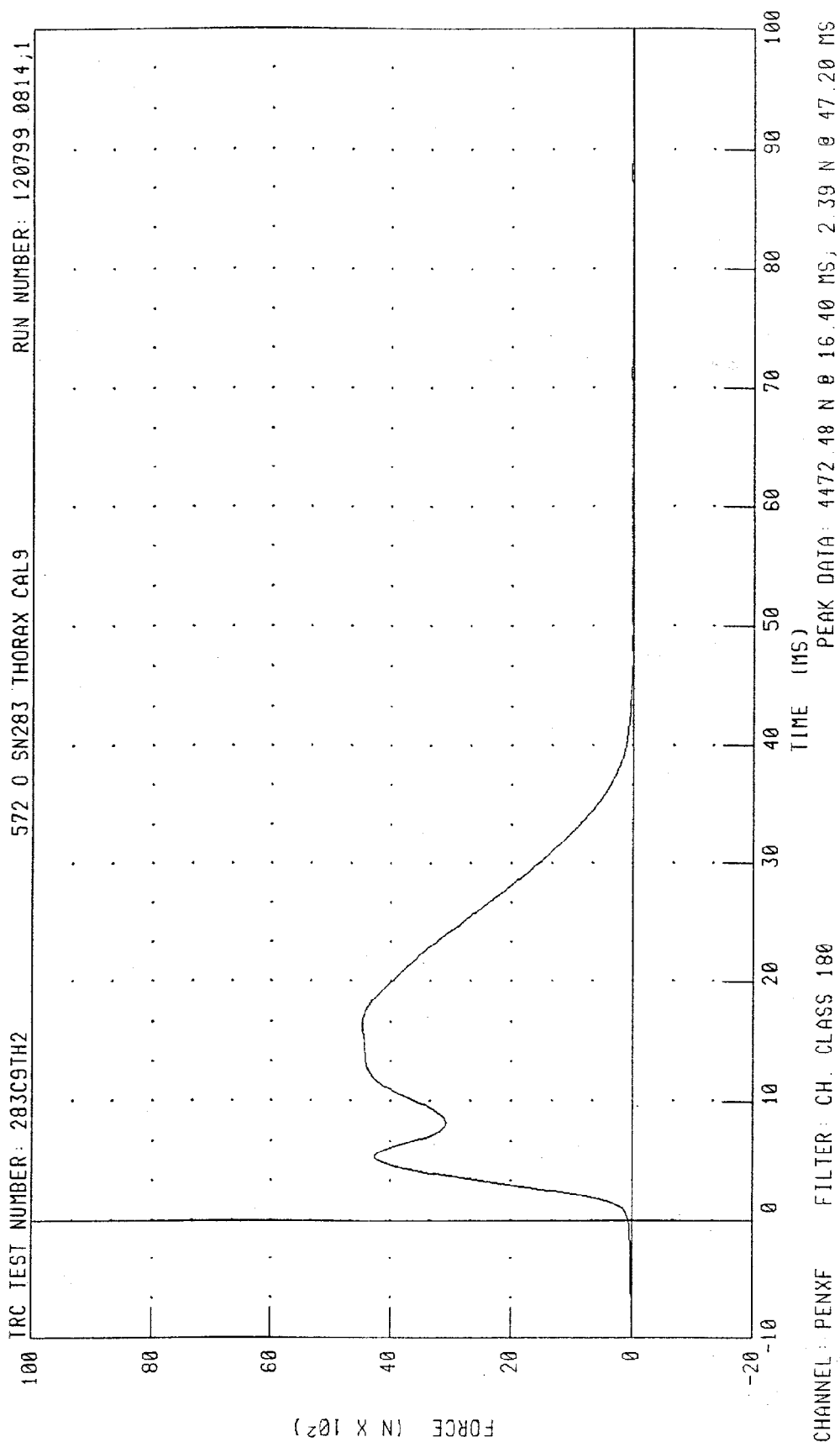


PEAK DATA: 32.59 G @ 16.40 MS; 0.02 G @ 47.20 MS

CHANNEL: PENXC FILTER: CH. CLASS 180

PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM FORCE

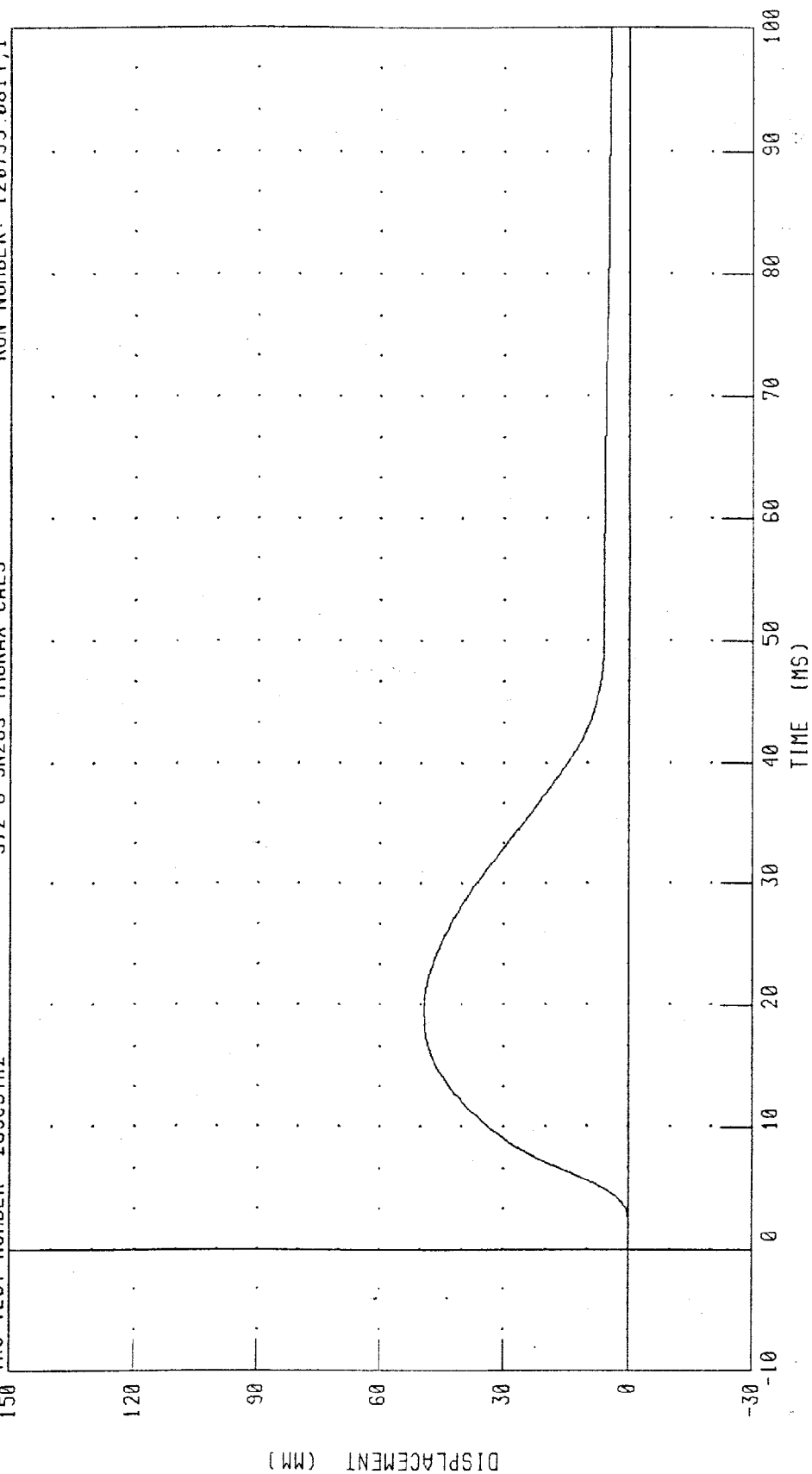


PART 572-0 HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

TRC TEST NUMBER: 283C9TH2

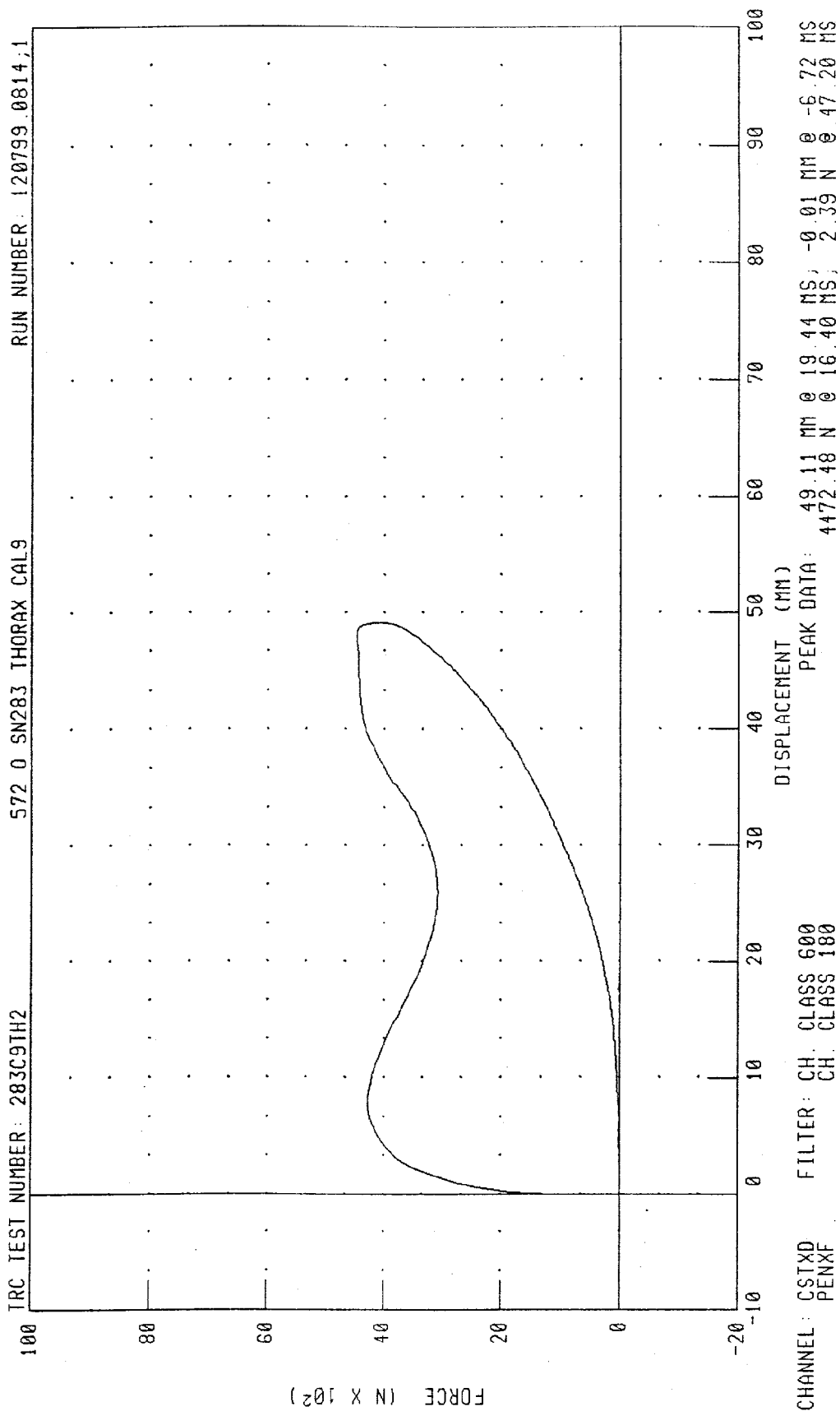
572 0 SN283 THORAX CAL9

RUN NUMBER: 120799.0814,1



CHANNEL: CSTXD FILTER: CH. CLASS 600 PEAK DATA: 49.11 MM @ 19.44 MS, -0.01 MM @ -6.72 MS

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



TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

06-DEC-99

TRC INC.

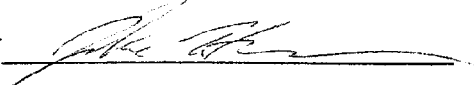
TEST NO: 283C9RK2

572 0 SN283 R.KNEE CAL9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.12 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3451.8 N

TEST MEETS SPECIFICATIONS

TECHNICIAN



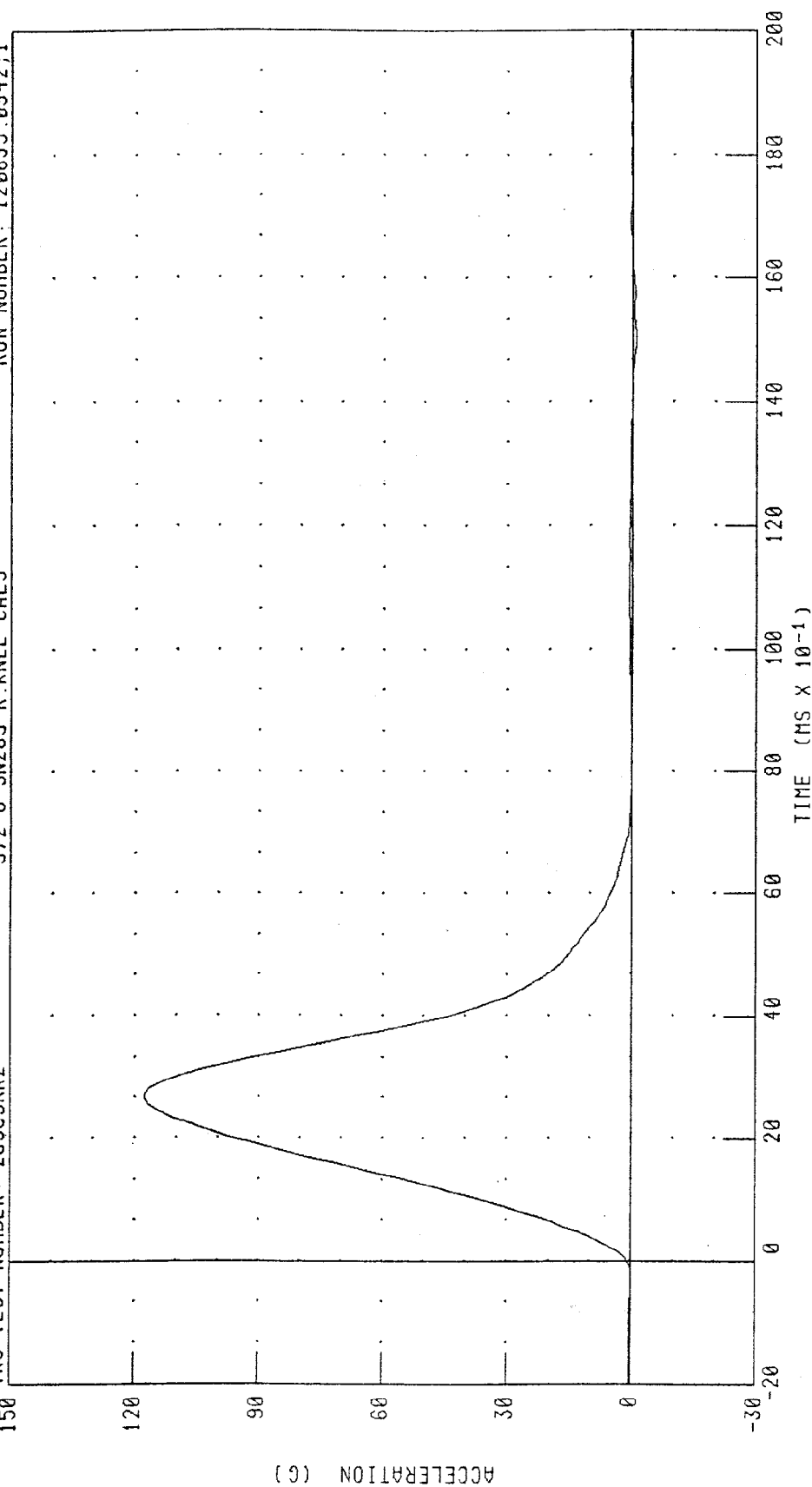
RUN NUMBER: 120699.0942;1

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

TRC TEST NUMBER: 283C9RK2

572 0 SN283 R.KNEE CAL9

RUN NUMBER: 120699.0942,1



CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 117.58 G @ 2.64 MS, -1.10 G @ 15.04 MS

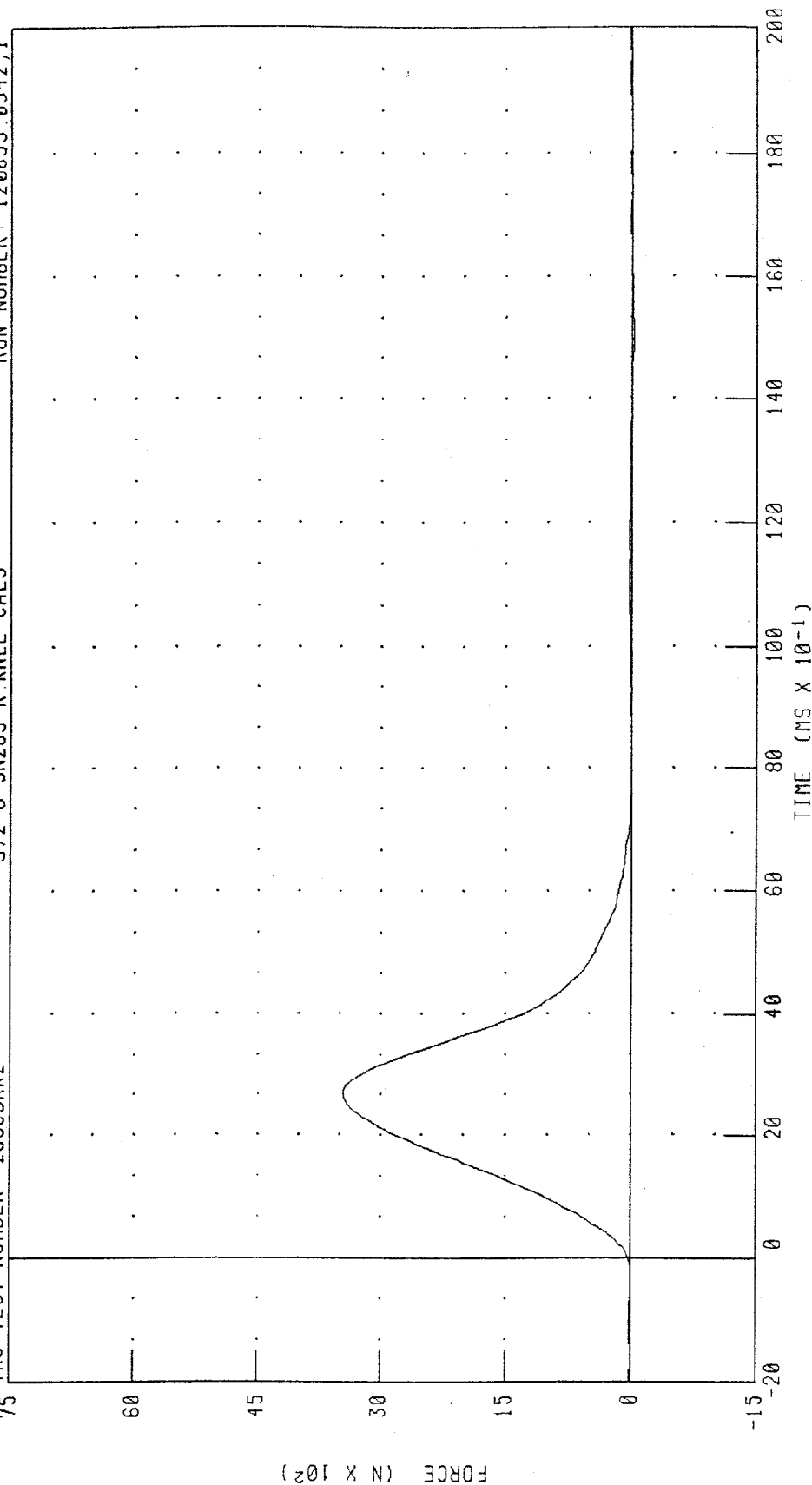
PART 572-0 HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 283C9RK2

572 0 SN283 R KNEE CAL9

RUN NUMBER: 120699.0942,1



CHANNEL: PENXF

FILTER: CH. CLASS 600

TIME (MS X 10⁻¹)

PEAK DATA: 3451.89 N @ 2.64 MS, -32.16 N @ 15.04 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE

06-DEC-99

TRC INC.

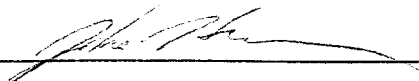
TEST NO: 283C9LK1

572 O SN283 LEFT KNEE CAL9

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.09 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3765.7 N

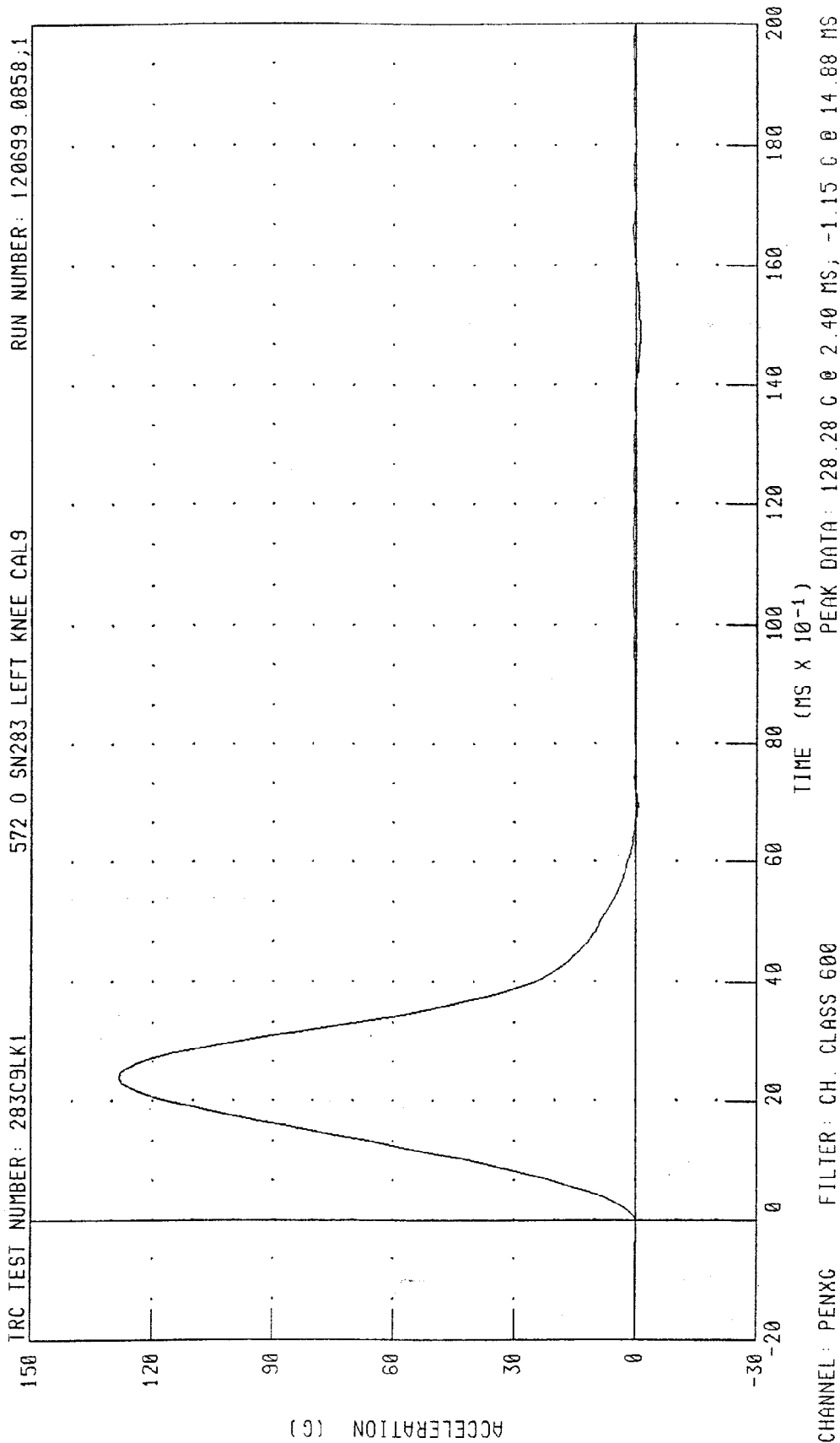
TEST MEETS SPECIFICATIONS

TECHNICIAN



RUN NUMBER: 120699.0858;1

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



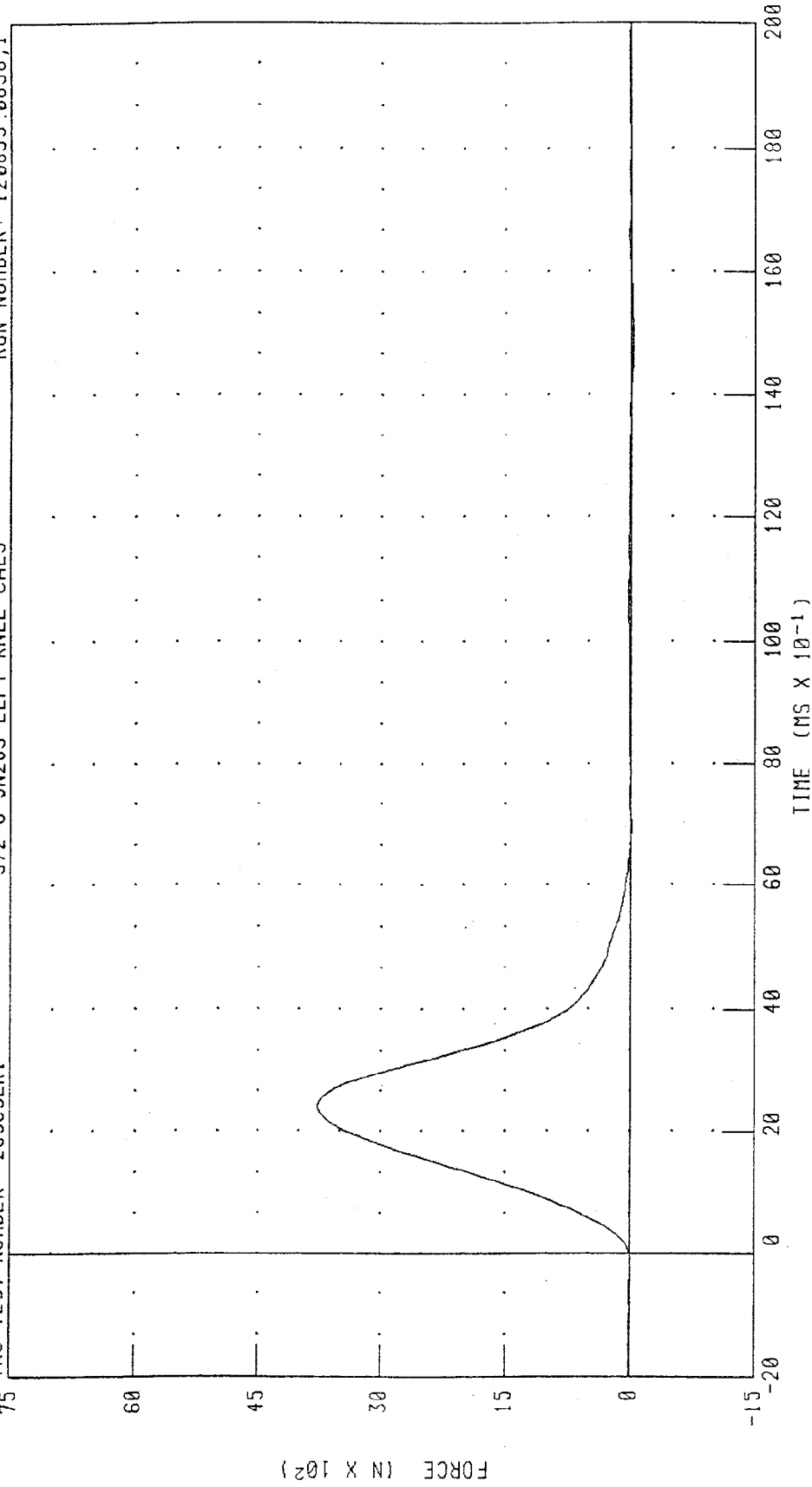
PART 572-0 HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)

TRC TEST NUMBER: 283C9LK1

572 0 SN283 LEFT KNEE CAL9

RUN NUMBER: 120699.0858,1



CHANNEL: PENXF

FILTER: CH. CLASS 600

PEAK DATA: 3765.74 N @ 2.40 MS, -33.71 N @ 14.88 MS

Appendix D

Miscellaneous Test Information

Accelerometer Information

Engineer: Jenkins
 Test Date: 11/16/99-2
 Dummy S/N: 369
 Manufacturer: FTSS
 Type: Hybrid III 5th female
 Seating Position: Driver

Mnemonic Parameter Being Measured	Description	Model Number	Serial Number	Mfr.	Sensitivity Mv/g @10 Volts	Cal Due Date	Full- Scale Desired G	Direction Of Positive Polarity
HEDXG	Head X	7264	A20FJ	Endevco	0.2563	12/02/99	400	Rear
HEDYG	Head Y	7264	A31FJ	Endevco	0.2683	12/02/99	400	Left
HEDZG	Head Z	7264	CL95H	Endevco	0.2822	12/02/99	400	Up
CSTXG	Chest X	7264	A72JJ	Endevco	0.2773	12/02/99	400	Forward
CSTYG	Chest Y	7264	A69JJ	Endevco	0.2702	12/02/99	400	Left
CSTZG	Chest Z	7264	A34FJ	Endevco	0.2565	12/02/99	400	Up

Accelerometer Information

Engineer: Jenkins
 Test Date: 11/16/99-2
 Dummy S/N: 369
 Manufacturer: FTSS
 Type: Hybrid III 5th female
 Seating Position: Driver

Mnemonic Parameter Being Measured	Description	Model Number	Serial Number	Mfr.	Sensitivity (mV/V)	Cal Due Date	Full-Scale Desired	Direction Of Positive Polarity
	Neck Load Cells							
NEKXF	Neck X-force	1716A	0534	Denton	1.7247 @ 2,000 lbs	12/02/99	2000 lbs	Head forward/chest rearward
NEKYF	Neck Y-force	1716A	0534	Denton	1.6643 @ 2,000 lbs	12/02/99	2000 lbs	Head left/chest right
NEKZF	Neck Z-force	1716A	0534	Denton	1.1561 @ 3,000 lbs	12/02/99	3000 lbs	Head up/chest down
NEKXM	Neck X-moment	1716A	0534	Denton	1.6355 @ 2500 in-lbs	12/02/99	200 ft-lbs	Right ear to right shoulder
NEKYM	Neck Y-moment	1716A	0534	Denton	1.6430 @ 2500 in-lbs	12/02/99	200 ft-lbs	Chin forward to sternum
NEKZM	Neck Z-moment	1716A	0534	Denton	2.3186 @ 2500 in-lbs	12/02/99	200 ft-lbs	Chin to left shoulder
	Femur Load Cells							
	Left femur							
LFMF	Left femur force	2430	1006	GSE	0.9459 @ 3000 lbs	12/02/99	3000 lbs	Knee upward/upper femur down
	Right femur							
RFMF	Right femur force	2430	1007	GSE	0.9114 @ 3000 lbs	12/02/99	3000 lbs	Knee upward/upper femur down

Accelerometer Information

Engineer: Jenkins
 Test Date: 11/16/99-2
 Dummy S/N: 369
 Manufacturer: FTSS
 Type: Hybrid III 5th female
 Seating Position: Driver

Mnemonic Parameter Being Measured	Description	Model Number	Serial Number	Mfr.	Sensitivity	Cal Due Date	Full- Scale Desired	Direction Of Positive Polarity
	Chest Pot							
CSTXD	Chest deflection	14CB1-2897	1188	Servo	43.6 mV/V/inch	12/02/99	6 inch	Extension

Accelerometer Information

Engineer: Jenkins
 Test Date: 11/16/99-2
 Dummy S/N: 283
 Manufacturer: FTSS
 Type: Hybrid III 5th female
 Seating Position: Passenger

Mnemonic Parameter Being Measured	Description	Model Number	Serial Number	Mfr.	Sensitivity Mv/g @10 Volts	Cal Due Date	Full- Scale Desired G	Direction Of Positive Polarity
HEDXG	Head X	7264	J26498	Endevco	0.2385	03/30/00	400	Rear
HEDYG	Head Y	7264	J26491	Endevco	0.2527	03/30/00	400	Left
HEDZG	Head Z	7264	J26499	Endevco	0.2571	03/30/00	400	Up
CSTXG	Chest X	7264	J27111	Endevco	0.2109	03/30/00	400	Forward
CSTYG	Chest Y	7264	J20561	Endevco	0.2433	03/30/00	400	Left
CSTZG	Chest Z	7264	J22046	Endevco	0.2684	03/30/00	400	Up

Accelerometer Information

Engineer: Jenkins
 Test Date: 11/16/99-2
 Dummy S/N: 283
 Manufacturer: FTSS
 Type: Hybrid III 5th female
 Seating Position: Passenger

Mnemonic Parameter Being Measured	Description	Model Number	Serial Number	Mfr.	Sensitivity (mV/V)	Cal Due Date	Full-Scale Desired	Direction Of Positive Polarity
	Neck Load Cells							
NEKXF	Neck X-force	1716	0235	Denton	1.7310 @ 2,000 lbs	03/30/00	2000 lbs	Head forward/chest rearward
NEKYF	Neck Y-force	1716	0235	Denton	1.6646 @ 2,000 lbs	03/30/00	2000 lbs	Head left/chest right
NEKZF	Neck Z-force	1716	0235	Denton	1.2439 @ 3,000 lbs	03/30/00	3000 lbs	Head up/chest down
NEKXM	Neck X-moment	1716	0235	Denton	1.6240 @ 2500 in-lbs	03/30/00	200 ft-lbs	Right ear to right shoulder
NEKYM	Neck Y-moment	1716	0235	Denton	1.6485 @ 2500 in-lbs	03/30/00	200 ft-lbs	Chin forward to sternum
NEKZM	Neck Z-moment	1716	0235	Denton	2.3120 @ 2500 in-lbs	03/30/00	200 ft-lbs	Chin to left shoulder
	Femur Load Cells							
	Left femur							
LFMF	Left femur force	2121	0169	GSE	1.3102 @ 3000 lbs	03/30/00	3000 lbs	Knee upward/upper femur down
	Right femur							
RFMF	Right femur force	2121	0170	GSE	1.3078 @ 3000 lbs	03/30/00	3000 lbs	Knee upward/upper femur down

Accelerometer Information

Engineer: Jenkins
 Test Date: 11/16/99-2
 Dummy S/N: 283
 Manufacturer: FTSS
 Type: Hybrid III 5th female
 Seating Position: Passenger

Mnemonic Parameter Being Measured	Description	Model Number	Serial Number	Mfr.	Sensitivity	Cal Due Date	Full- Scale Desired	Direction Of Positive Polarity
CSTXD	Chest Pot Chest deflection	14CB1-2897	283	Servo	42.84 mV/V/inch	03/30/00	6 inch	Extension

Dummy Sign Convention

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

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

Vehicle Instrumentation Placement

Test Number 991116-2

Number	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Left Brake Caliper	X	Entran	EGE-73BQE0-2000	99A28-Z04	Forward
2	Right Brake Caliper	X	Entran	EGE-73BQE0-2000	99A28-Z23	Forward
3	Instrument Panel Center	X	Endevco	7264-2000T	CC11H	Rearward
4	Engine Top	X	Endevco	7264-2000T	J29068	Forward
5	Engine Bottom	X	Entran	EGE-73BQE0-2000	99A28-Z04	Forward
6	Vehicle Rear Center	X	Endevco	7264-2000T	J27329	Forward
		Y	Endevco	7264-2000T	J30425	Left
		Z	Endevco	7264-2000T	J30468	Up
7	Left Rear Seat Crossmember	X	Endevco	7264-2000T	J26497	Forward
8	Right Rear Seat Crossmember	X	Endevco	7264-2000T	J30403	Forward
9	Vehicle Center of Gravity	X	Endevco	7264-2000T	J27720	Forward
		Y	Endevco	7264-2000T	J30405	Left

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

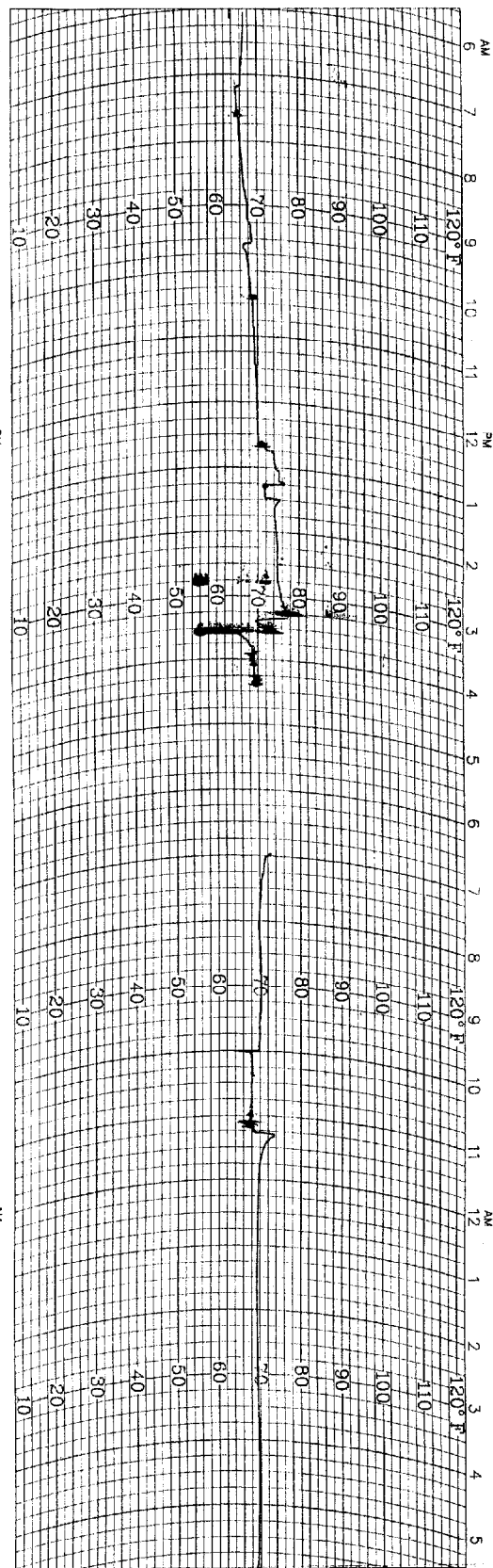
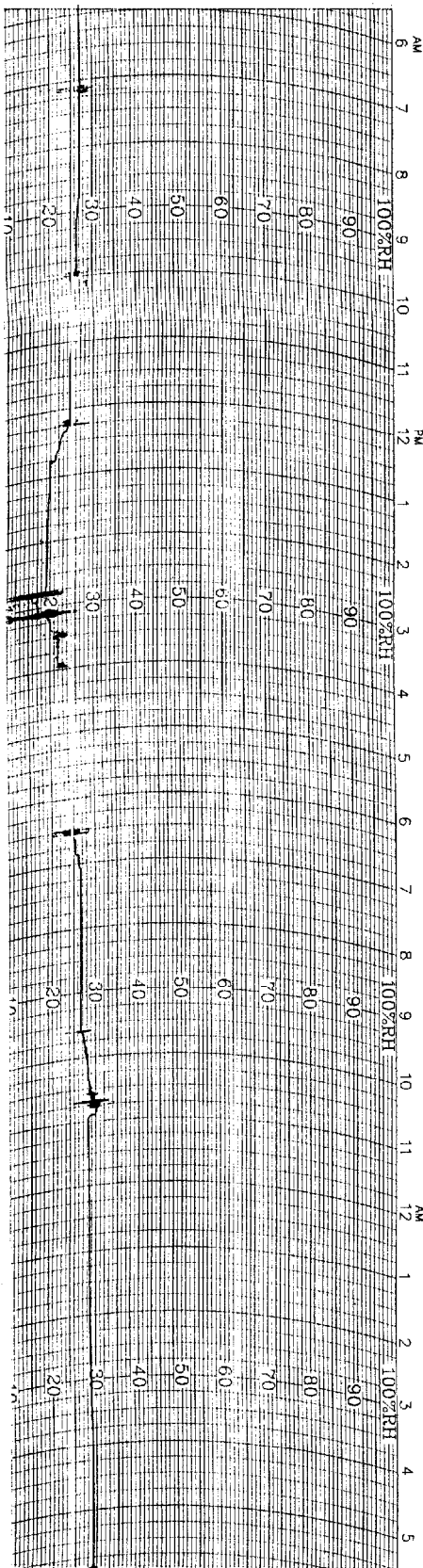
Description Of Timing Marks On TRC High-Speed Film

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

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

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

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



WeatherMeasure
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HYGROTHERMOGRAPH
 1 DAY

CHART NO. M699123
 C311-D-HF
 ECN 2717
 6-9-87

STATION _____ DATE ON _____ DATE OFF _____