V3244

1999 Acura 3.5 RL
into a Flat Frontal Barrier
TRC Test Number: 991213-1

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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 1999 Acura 3.5 RL that impacted a flat frontal barrier. The test vehicle contained two instrumented Hybrid III 5th percentile adult female dummies.

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 three (3) 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 a modified version of 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-five (45) 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 December 13, 1999.

The test vehicle, a 1999 Acura 3.5 RL, was equipped with airbags at the driver's and right front passenger's seating positions. The vehicle's test weight was 1863.8 kilograms. The vehicle's impact speed was 48.4 kph. The vehicle's maximum static crush was 568 millimeters.

The driver's 15-millisecond HIC was 68 and its 36-millisecond HIC was 151. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.4 g. The driver's chest deflection was 38.9 millimeters. The driver's left and right femur maximum compressive forces were 3498 N and 5658 N, respectively.

The right front passenger's 15-millisecond HIC was 772 and its 36-millisecond HIC was 914. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 48.7 g. The passenger's chest deflection was 10.5 millimeters. The right front passenger's left and right femur maximum compressive forces were 5947 N and 6439 N, respectively.

Table 1 Crash Test Summary

Test type:	Frontal barrier impact
Test date:	12/13/99
Test time:	1050
Ambient temperature at impact area:	21° C
Vehicle year/make/ model/body style:	1999/Acura/3.5 RL/Sedan
Vehicle test weight:	1863.8 kg
Impact angle[1]:	0°
Impact velocity[2]:	
Primary:	48.4 kph
Secondary:	N/A kph
Maximum static crush:	568 mm
Average rebound:	823 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 (± .08 km/h accuracy)
[3] The secondary light trap did not work properly.

Table 1 Crash Test Summary, Cont'd.

Dummies:	Driver #283	Passenger #369
Type:	Hybrid III 5th 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/Side header
Chest:	Airbag	Airbag
Abdomen:	Steering wheel rim	None
Left knee:	Instrument panel	Instrument panel
Right knee:	Instrument panel	Instrument panel

Table 2 Test Vehicle Information

Vehicle year/make/ model/body style:	1999/Acura/3.5 RL/Sedan			
Color:	Black			
VIN:	JH4KA9635XC012858			
Engine data:				
Placement:	Transverse			
Cylinders:	V-6			
Displacement:	3.5 liters			
Transmission data:	_4_speed,	___manual,	_X_automatic,	_X_overdrive
Final drive:	_X_fwd,	___rwd,	___4wd	
Date vehicle received:	N/A			
Odometer reading:	686			
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	Yes
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:

Vehicle manufactured by:		Japan Honda Motor Co. Ltd.
Date of manufacture:		6/99
VIN:		JH4KA9635XC012858
GVWR:		4830 lbs.
GAWR:	Front:	2570 lbs.
	Rear:	2260 lbs.

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:

Recommended tire size:	P215/60R16
Recommended cold tire pressure:	
Front:	29 psi
Rear:	29 psi
Designated Seating Capacity:	
Front	2
Rear	3
Total	5
Vehicle Cargo Weight:	100 lbs.

Test vehicle attitudes:

Delivered attitude:	LF:	710 mm	RF:	702 mm	LR:	703mm	RR:	703 mm
Fully loaded attitude:	LF:	697 mm	RF:	696 mm	LR:	675 mm	RR:	676 mm
Pre-test attitude:	LF:	697 mm	RF:	669 mm	LR:	676 mm	RR:	674 mm
Post-test attitude:	LF:	750 mm	RF:	738 mm	LR:	670 mm	RR:	676 mm

Table 2 Test Vehicle Information, Cont'd.

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

Right front	499.0 kg	Right rear	356.5 kg
Left front	522.5 kg	Left rear	352.4 kg
Total front weight	1021.5 kg	(59.0% of total vehicle weight)	
Total rear weight	708.9 kg	(41.0% of total vehicle weight)	
Total delivered weight	1730.4 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (1730.4 kg)

DSC = Designated Seating Capacity (5)

RCLW = 45.4 kg

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

Target test weight = 1730.4 + 45.4 + 95.2 = 1871.0 kg

Weight of test vehicle with required dummies and 38.6 kg of cargo weight:

Right front	516.2 kg	Right rear	402.3 kg
Left front	542.5 kg	Left rear	402.8 kg
Total front weight	1058.7 kg	(56.8% of total vehicle weight)	
Total rear weight	805.1 kg	(43.2% of total vehicle weight)	
Total test weight	1863.8 kg	(0.4% under target test weight)	

Weight of ballast secured in vehicle: None

Components removed to meet target test weight: Muffler, Rear Speakers

CG rearward of front wheel centerline: 1253 mm

Vehicle Wheelbase: 2900 mm

Table 3 Post-Impact Data

Test number:	991213-1
Test date:	12/13/99
Test time:	1050
Test type:	Frontal barrier impact
Impact angle:	0°
Ambient temperature at impact area:	21° C
Temperature in occupant compartment:	21° C

Impact velocity:

Primary:	48.4 kph
Secondary	N/A 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:	4935 mm	C: 5150 mm	R:	4930 mm
Post-test:	L:	4607 mm	C: 4582 mm	R:	4592 mm
Total crush:	L:	328 mm	C 568 mm	R:	338 mm
Average crush:	411 mm				

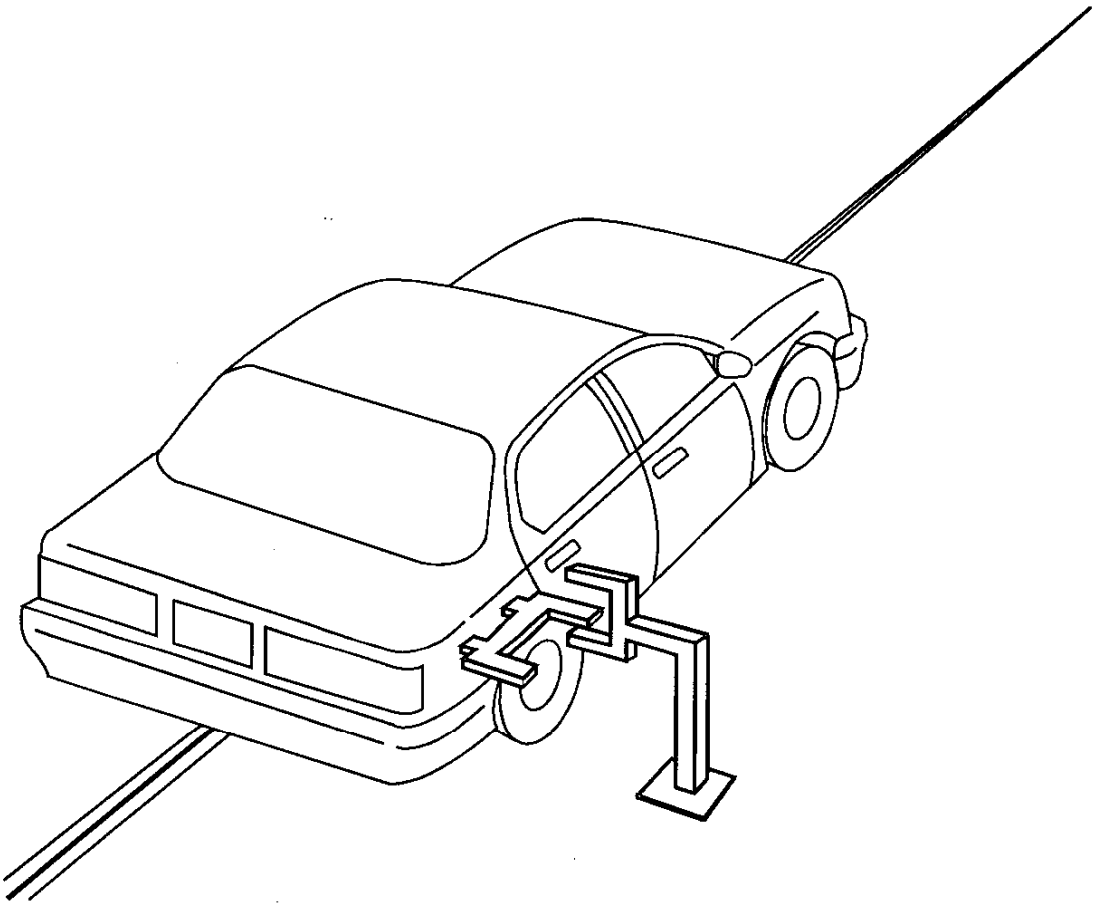
Test vehicle rebound from flat barrier:

Distance from test vehicle to barrier:

Post-test:	L:	880 mm	C: 760 mm	R:	830 mm
Average rebound:	823 mm				

[1] The secondary light trap did not work properly.

Figure 1 Impact Velocity Measurement System

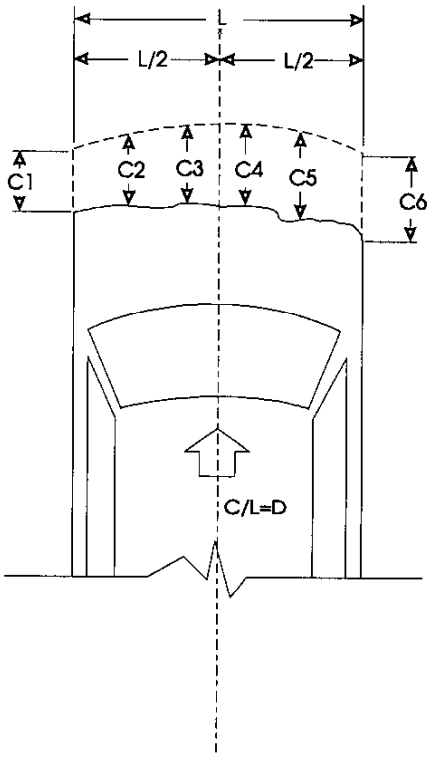


The final vane clears the final emitter/receiver pair 51 millimeters before impact.

The vanes have 305-millimeter spacing.

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

Test date:	12/13/99
Vehicle year/make/ model/body style:	1999/Acura/3.5 RL/Sedan
VIN:	JH4KA9635XC012858
Build date:	9/98
Test weight:	1863.8 kg
Vehicle wheelbase:	2900 mm
Maximum width:	1818 mm
Front overhang:	928 mm



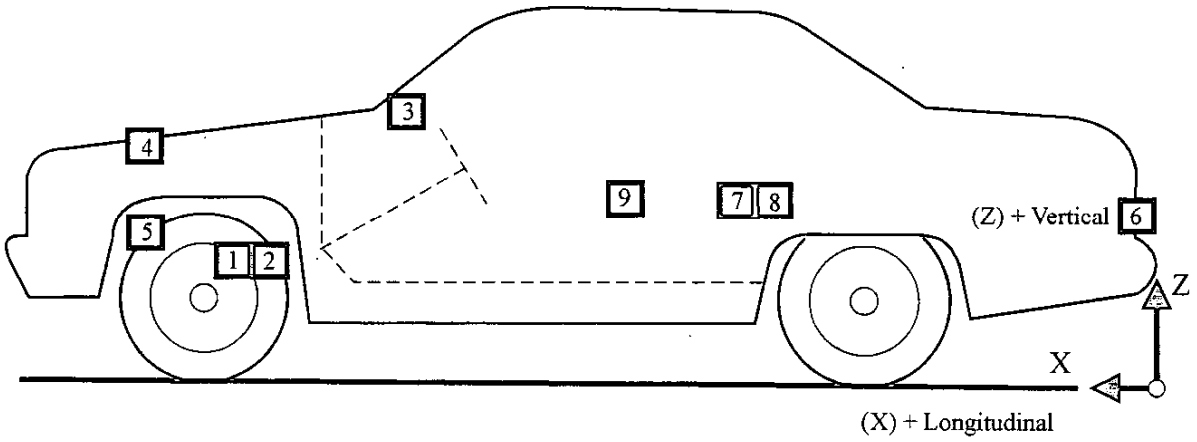
Collision Deformation Classification (CDC) Code: 12FDAW2

Crush depth measurements:	C1: 328 mm
	C2: 430 mm
	C3: 520 mm
	C4: 531 mm
	C5: 454 mm
	C6: 338 mm

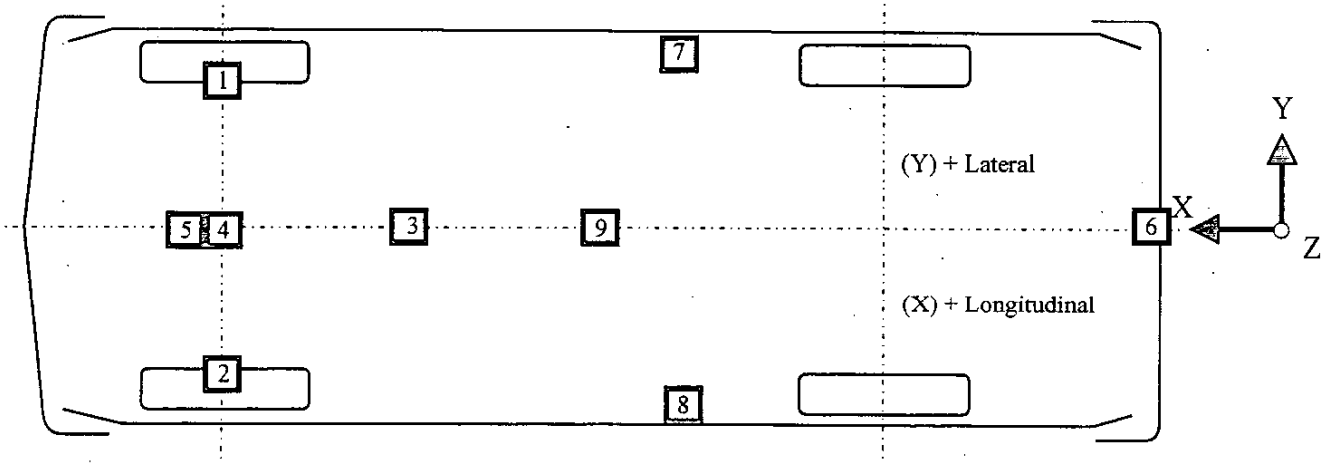
Midpoint of damage: D: Vehicle Longitudinal Centerline

Length of damaged region: L: 1525 mm

Figure 3 Vehicle Accelerometer Placement



Side View



Bottom View

Table 4 Vehicle Accelerometer Locations and Data Summary

TEST NUMBER: 991213-1 No. LOCATION		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 LEFT BRAKE CALIPER	PRE	3930 mm	700 mm	356 mm				
	POST	3858 mm	720 mm	356 mm				
LONGITUDINAL					22.8 g	@ 68.3 ms	64.2 g	@ 49.3 ms
2 RIGHT BRAKE CALIPER	PRE	3930 mm	-800 mm	360 mm				
	POST	3863 mm	-690 mm	365 mm				
LONGITUDINAL					37.0 g	@ 70.0 ms	48.6 g	@ 48.0 ms
3 INSTRUMENT PANEL CENTER	PRE	3460 mm	0 mm	966 mm				
	POST	3498 mm	0 mm	978 mm				
LONGITUDINAL					16.6 g	@ 91.0 ms	58.0 g	@ 82.8 ms
4 ENGINE TOP	PRE	4114 mm	0 mm	897 mm				
	POST	4048 mm	0 mm	910 mm				
LONGITUDINAL					37.5 g	@ 32.7 ms	69.3 g	@ 52.1 ms
5 ENGINE BOTTOM	PRE	4090 mm	-75 mm	174 mm				
	POST	4013 mm	-75 mm	238 mm				
LONGITUDINAL					17.8 g	@ 61.0 ms	73.3 g	@ 46.1 ms

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

TEST NUMBER: 991213-1 No. LOCATION		X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
6 REAR VEHICLE	PRE	425 mm	0 mm	568 mm				
CENTERLINE	POST	425 mm	0 mm	567 mm				
LONGITUDINAL					6.3 g	@ 100.6 ms	34.8 g	@ 69.6 ms
LATERAL					4.2 g	@ 46.1 ms	3.9 g	@ 40.0 ms
VERTICAL					15.3 g	@ 88.6 ms	12.1 g	@ 76.3 ms
RESULTANT					35.2 g	@ 66.5 ms		
7 LEFT REAR SEAT	PRE	2115 mm	590 mm	397 mm				
	POST	2115 mm	590 mm	382 mm				
LONGITUDINAL					2.5 g	@ 97.8 ms	35.0 g	@ 63.4 ms
8 RIGHT REAR SEAT	PRE	2115 mm	-590 mm	395 mm				
	POST	2115 mm	-590 mm	380 mm				
LONGITUDINAL					2.1 g	@ 97.9 ms	36.0 g	@ 62.6 ms
9 VEHICLE CENTER	PRE	2900 mm	10 mm	505 mm				
OF GRAVITY	POST	2900 mm	10 mm	518 mm				
LONGITUDINAL					6.9 g	@ 82.1 ms	72.0 g	@ 54.3 ms
LATERAL					12.4 g	@ 56.3 ms	8.7 g	@ 80.3 ms

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

Table 5 Dummy Injury Criteria

Maximum Acceleration

	Head				Chest		
	X	Y	Z	R	X	Y	Z
Driver	-33.6 g	10.6 g	-16.5 g	34.0 g	-50.4 g	3.7 g	-9.8 g
Passenger	-62.7 g	54.7 g	-272.0 g	279.5 g	-48.8 g	-17.5 g	17.5 g

Maximum Femur Compressive Force

	Left Femur	Right Femur
Driver	3498 N	5658 N
Passenger	5947 N	6439 N

15-Millisecond Head Injury Criteria[1]

	HIC	Time t_1	Time t_2
Driver	68	50.0 ms	65.0 ms
Passenger	772	80.8 ms	95.8 ms

36 millisecond Head Injury Criteria

	HIC	Time t_1	Time t_2
Driver	151	49.7 ms	85.7 ms
Passenger	914	70.1 ms	96.1 ms

Chest Maximum Resultant Acceleration[2]

	Acceleration	Time t_1	Time t_2
Driver	48.4 g	69.7 ms	72.7 ms
Passenger	48.7 g	88.2 ms	91.2 ms

Maximum Chest Deflection

Driver	38.9 mm
Passenger	10.5 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's head rotated to the right. The dummy came to rest in a slightly submarined position leaning to the right.

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/neck extended backward and rotated left approximately 90°. The dummy's head returned to forward position as the dummy rebounded backward. The dummy leaned left as it rebounded. The dummy came to rest in a seated position leaning to the right.

Section 4.0

Vehicle, Occupant, and Camera Measurements

Figure 4 Pre-test and Post-test Measurement Points

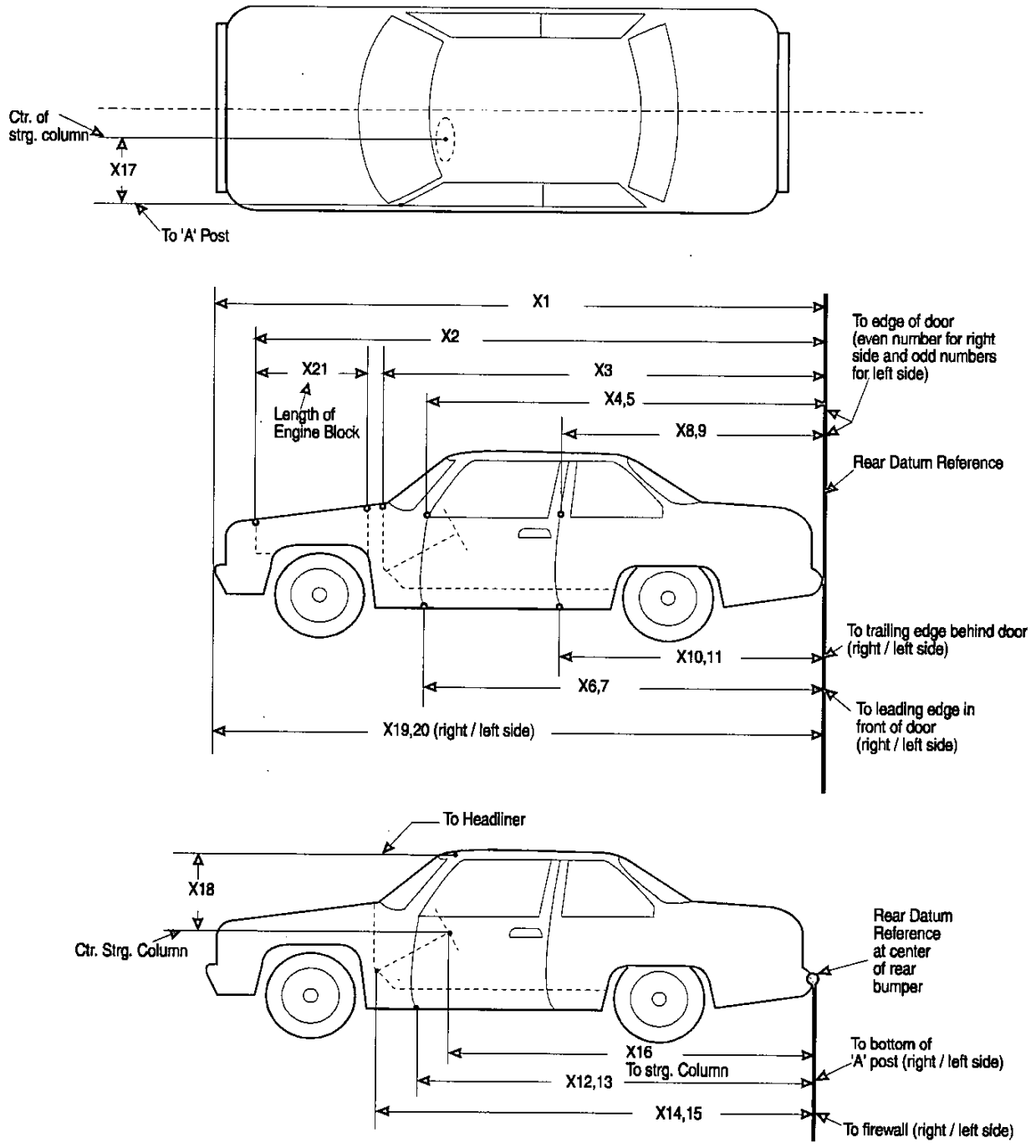


Table 6 Impacted Vehicle Measurements

Vehicle year/make/model/body style: 1999/Acura/3.5 RL/Sedan

Test Number: 991213-1

No.	Type of measurement	Pre-Test	Post-Test	Difference
X1	Total Length of Veh. at Centerline	5150	4582	568
X2	Rear Surface of Veh. to Front of Engine Block	4459	4348	111
X3	Rear Surface of Veh. to Firewall	3884	3835	49
X4	Rear Surface of Veh. to Upper Leading Edge of Right Door	3506	3310	196
X5	Rear Surface of Veh. to Upper Leading Edge of Left Door	3510	3505	5
X6	Rear Surface of Veh. to Lower Leading Edge of Right Door	3520	3517	3
X7	Rear Surface of Veh. to Lower Leading Edge of Left Door	3525	3521	4
X8	Rear Surface of Veh. to Upper Trailing Edge of Right Door	2494	2498	-4
X9	Rear Surface of Veh. to Upper Trailing Edge of Left Door	2499	2496	3
X10	Rear Surface of Veh. to Lower Trailing Edge of Right Door	2498	2497	1
X11	Rear Surface of Veh. to Lower Trailing Edge of Left Door	2504	2496	8
X12	Rear Surface of Veh. to Bottom of " A " Post on Right Side	3535	3535	0
X13	Rear Surface of Veh. to Bottom of " A " Post on Left Side	3538	3530	8
X14	Rear Surface of Veh. to Firewall--Right Side	3906	3913	-7
X15	Rear Surface of Vehicle to Firewall --Left Side	3815	3818	-3
X16	Rear Surface of Veh. to Steering Wheel Center	3110	3095	15
X17	Center of Steering Column to " A " Post	440	385	55
X18	Center of Steering Column to Headliner	400	395	5
X19	Rear Surface of Veh. to Right Side of Front Bumper	4930	4592	338
X20	Rear Surface of Veh. to Left Side of Front Bumper	4935	4607	328
X21	Length of Engine Block	620	620	0

Figure 5 Vehicle Target Locations

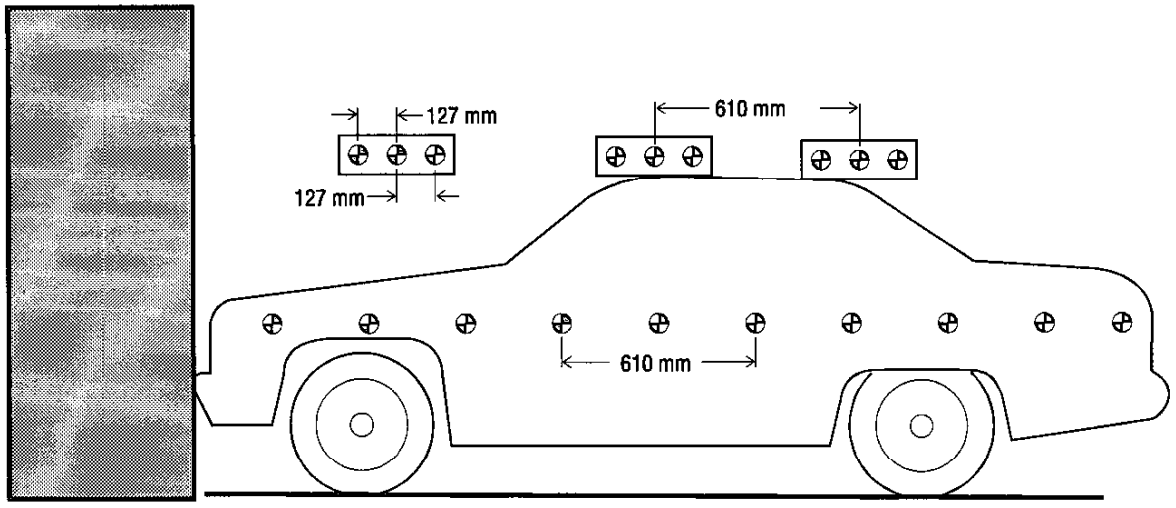


Figure 6 Dummy Measurement Locations for Front Seat Occupants

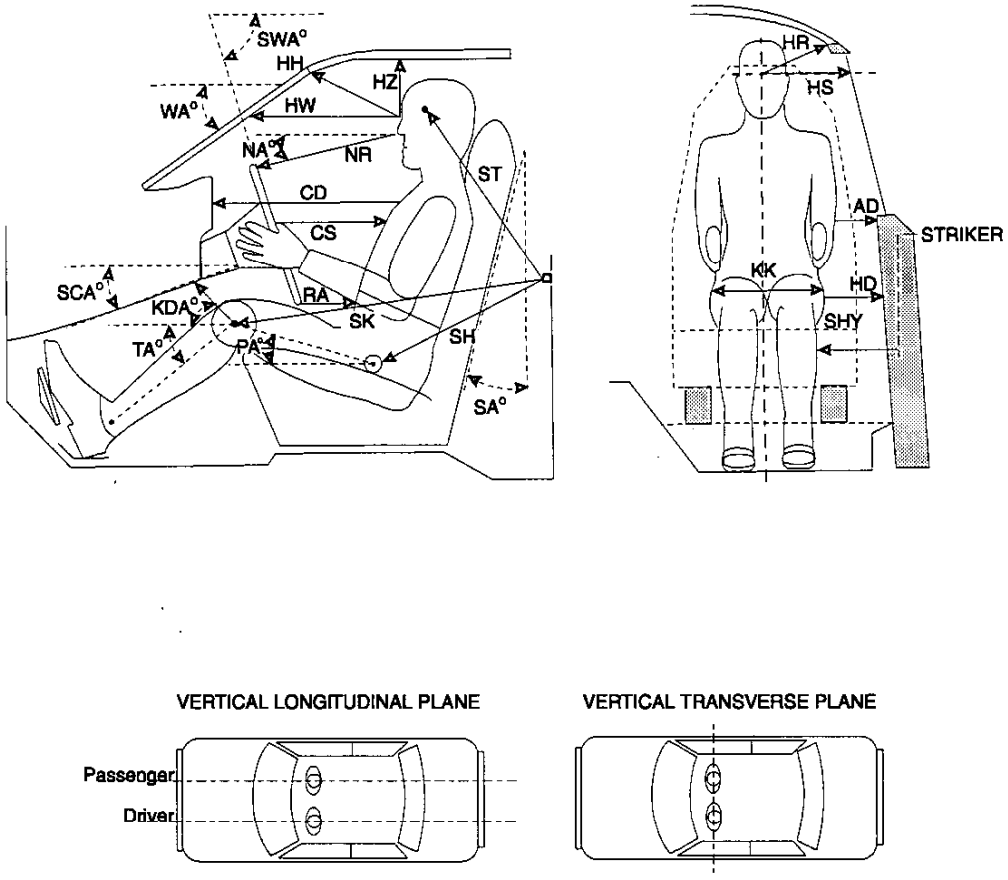


Table 7 Dummy Measurement Data For Front Seat Occupants

Designation	Type of Measurement	Driver (Serial #283)	Passenger (Serial #369)
WA	Windshield angle	29°	29°
SWA	Steering wheel angle	64°	N/A
SCA	Steering column angle	26°	N/A
SA	Seat back angle	14°	13°
HZ	Head to roof	230 mm	238 mm
HH	Head to header	353 mm	353 mm
HW	Head to windshield	577 mm	607 mm
HR	Head to side header	267 mm	270 mm
NR	Nose to rim	373 mm	N/A
NA	Nose to rim angle	-3°	N/A
CD	Chest to dash	528 mm	480 mm
CS	Steering wheel to chest	294 mm	N/A
RA	Rim to abdomen	166 mm	N/A
KDL	Left knee to dash	179 mm	201 mm
KDR	Right knee to dash	182 mm	204 mm
KDA	Outboard knee to dash angle	33°	31°
PA	Pelvic angle	22°	20°
TA	Tibial angle	55°	46°
KK	Knee to knee	260 mm	228 mm
ST[1]	Striker to head	425 mm	398 mm
	Striker to head angle	-78°	-76°
SK	Striker to knee	616 mm	591 mm
	Striker to knee angle	-6°	-11°
SH	Striker to H-point	305 mm	322 mm
	Striker to H-point angle	-21°	-35°
SHY	Striker to H-point (Y dir.)	265 mm	265 mm
HS	Head to side window	377 mm	350 mm
HD	H-point to door	153 mm	153 mm
AD	Arm to door	145 mm	137 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

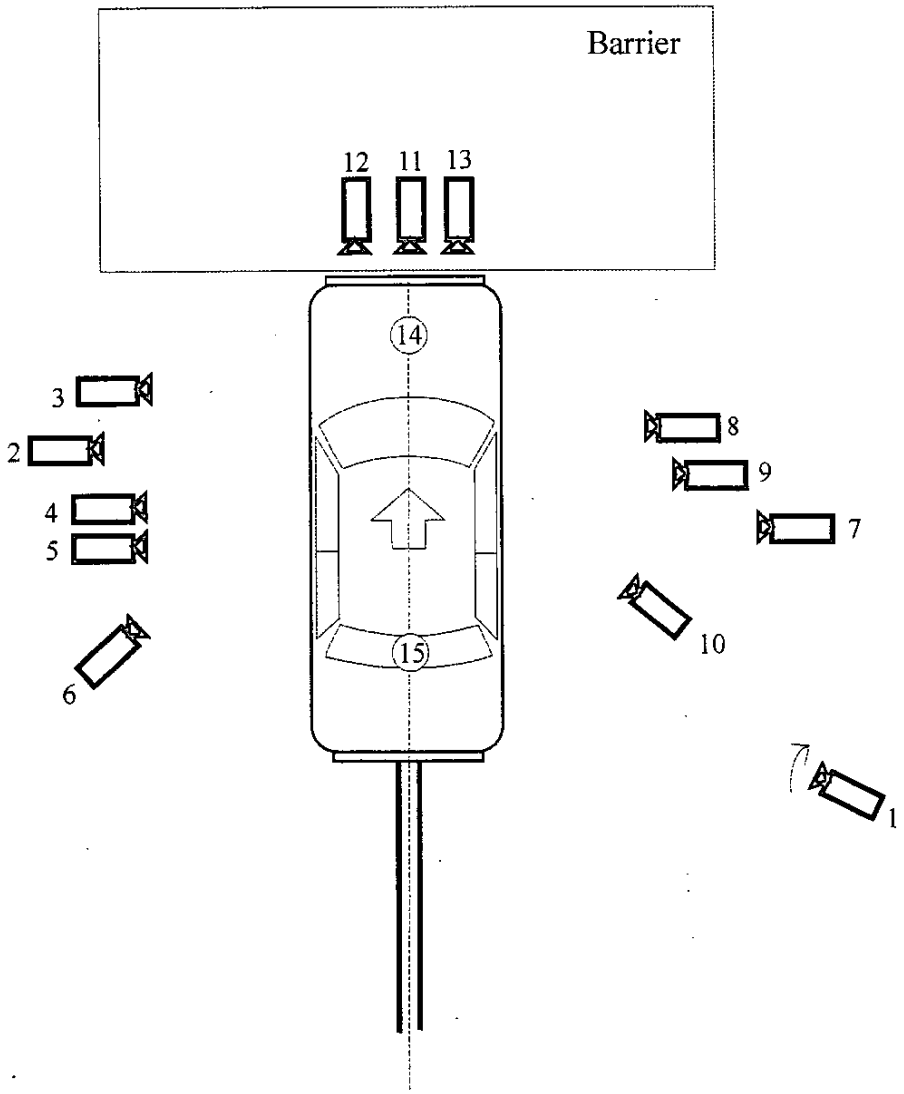


Table 8 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1999/Acura/3.5 RL/ Sedan

Test number: 991213-1

Camera Number	View	Camera Positions[1] X	Y	Z	Camera Angle[2]	Film Plane to Head Target	Camera Lens	Film Speed
1	Real-time panning	NA	NA	NA	NA	NA	16 mm	24 frames/s
2	Left vehicle crush	7468 mm	1549 mm	1461 mm	NA	NA	25 mm	997 frames/s
3	Left windshield intrusion	7010 mm	1701 mm	1168 mm	NA	NA	50 mm	952 frames/s
4	Steering column motion	9627 mm	2667 mm	2705 mm	NA	NA	25 mm	947 frames/s
5	Steering column motion	9627 mm	2667 mm	1740 mm	NA	NA	25 mm	997 frames/s
6	Driver kinematics	2438 mm	3353 mm	1981 mm	NA	NA	25 mm	1000 frames/s
7	Right overall	8229 mm	-2413mm	879 mm	NA	NA	13 mm	1002 frames/s
8	Right windshield intrusion	7620 mm	-1829 mm	1163 mm	NA	NA	50 mm	1000 frames/s
9	Passenger kinematics	7188 mm	-1626 mm	1461mm	NA	NA	25 mm	987 frames/s
10	Passenger kinematics	2438 mm	-3708 mm	2083 mm	NA	NA	25 mm	1002 frames/s
11	Windshield front view	381 mm	0 mm	2540 mm	NA	NA	8.5 mm	1000 frames/s
12	Driver - front view	381 mm	304 mm	2540 mm	NA	NA	17 mm	1002 frames/s
13	Passenger - front view	381 mm	-304mm	2540 mm	NA	NA	17 mm	1000 frames/s
14	Pit - front position	1295 mm	0 mm	-3048 mm	NA	NA	13 mm	1000 frames/s
15	Pit - rear position	2946 mm	0 mm	-2642 mm	NA	NA	13 mm	997 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

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

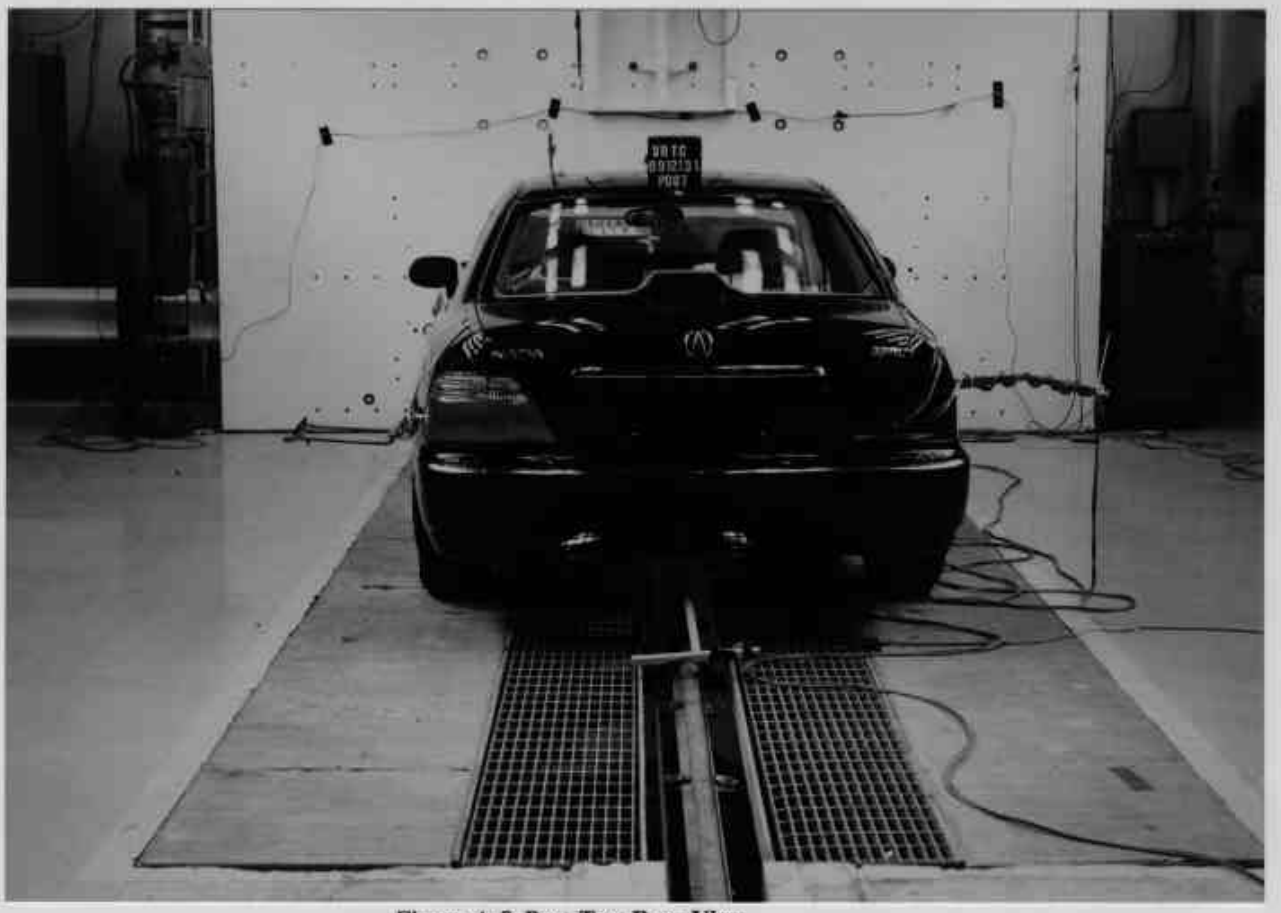


Figure A-8 Post-Test Rear View

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

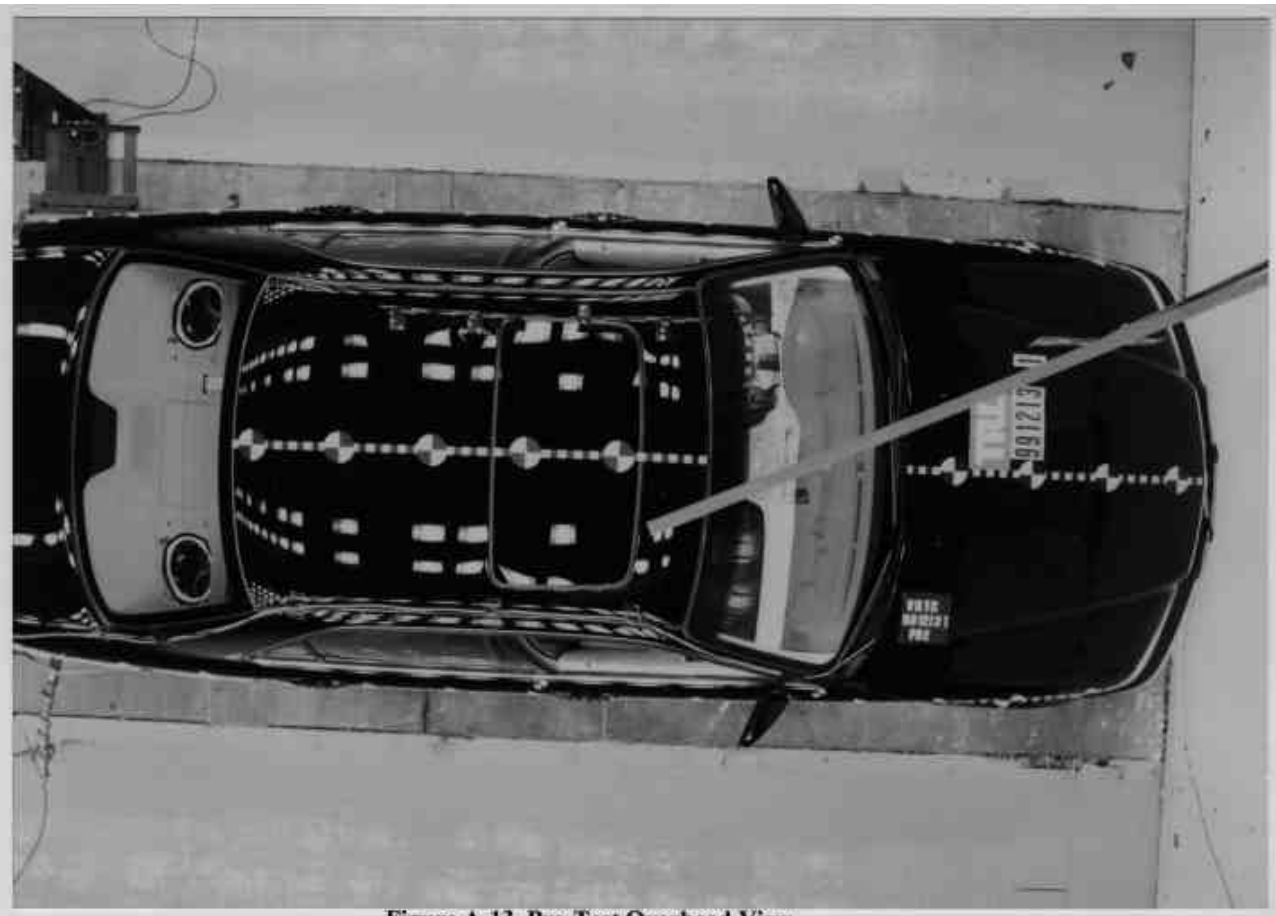


Figure A-13 Pre-Test Overhead View

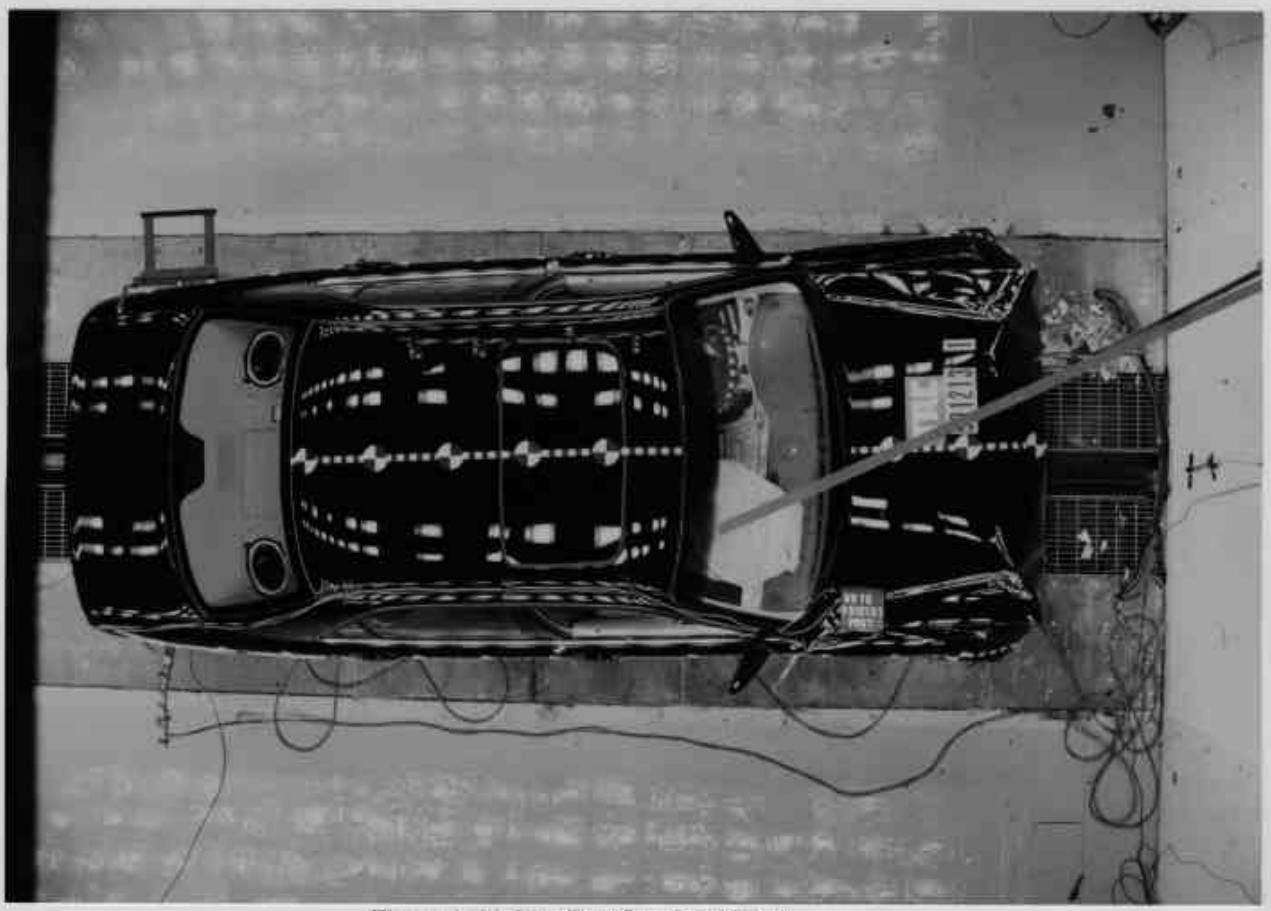


Figure A-14 Post-Test Overhead View

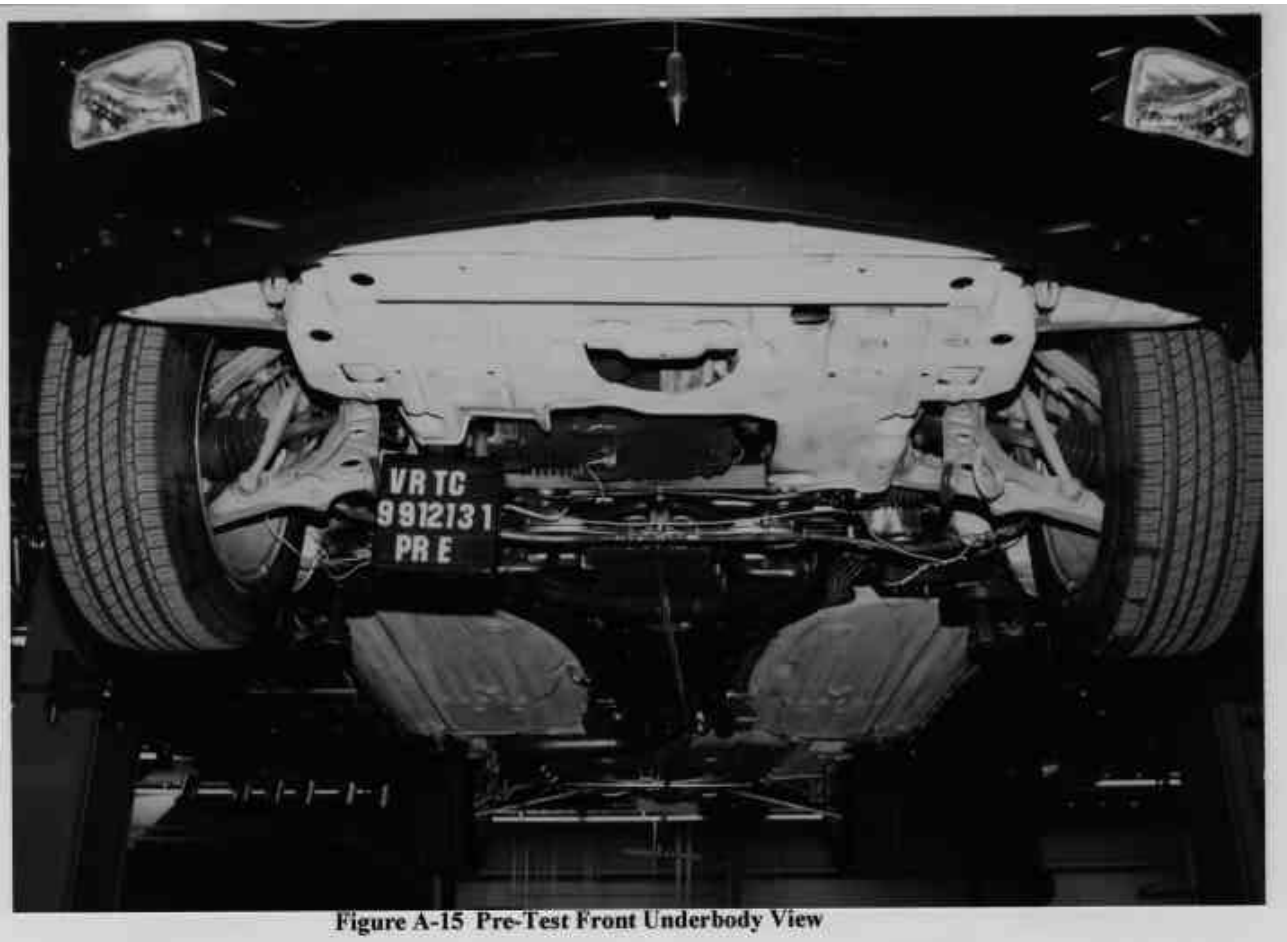


Figure A-15 Pre-Test Front Underbody View

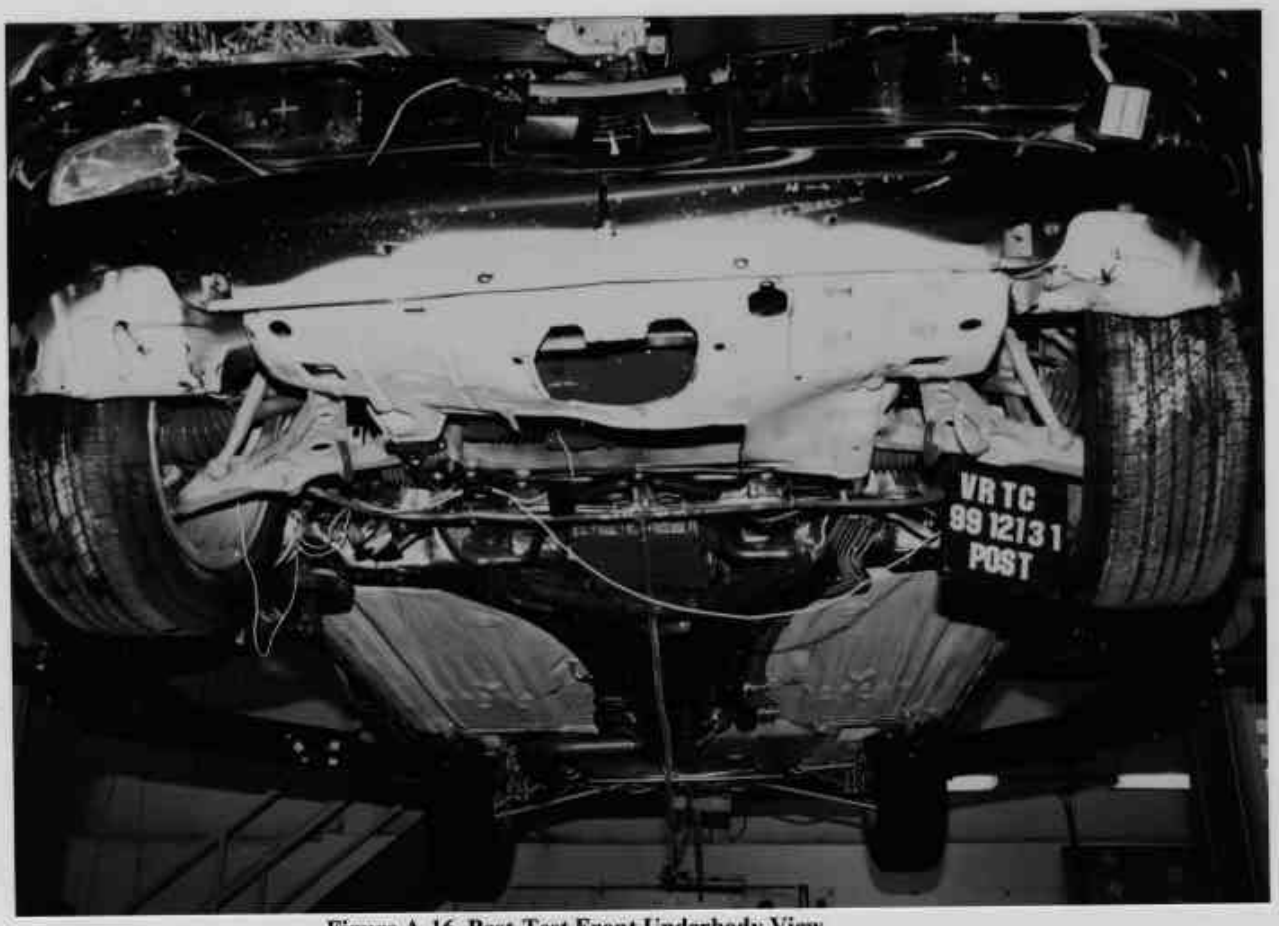


Figure A-16 Post-Test Front Underbody View

Figure A-17 Pre-Test Rear Underbody View

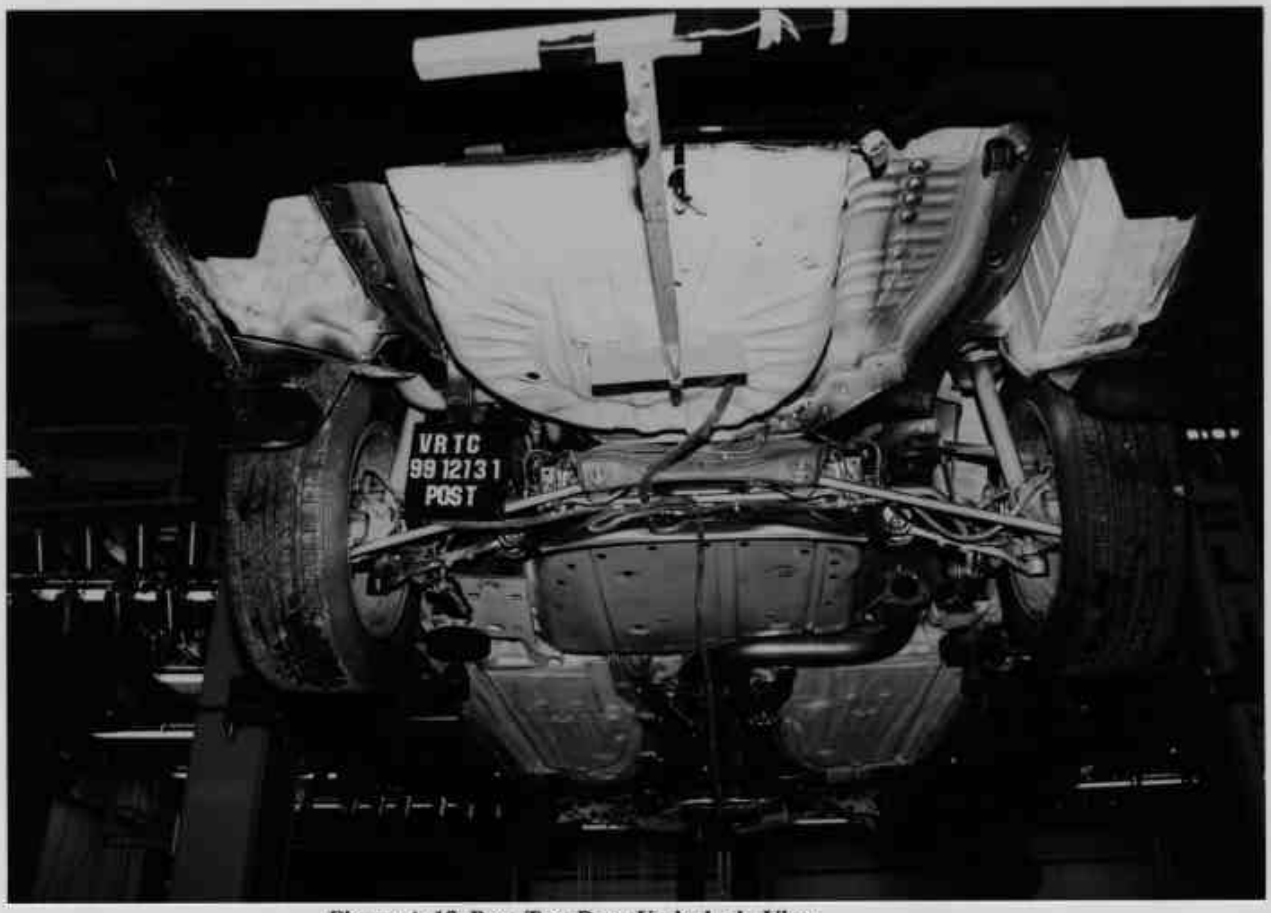


Figure A-18 Post-Test Rear Underbody View

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

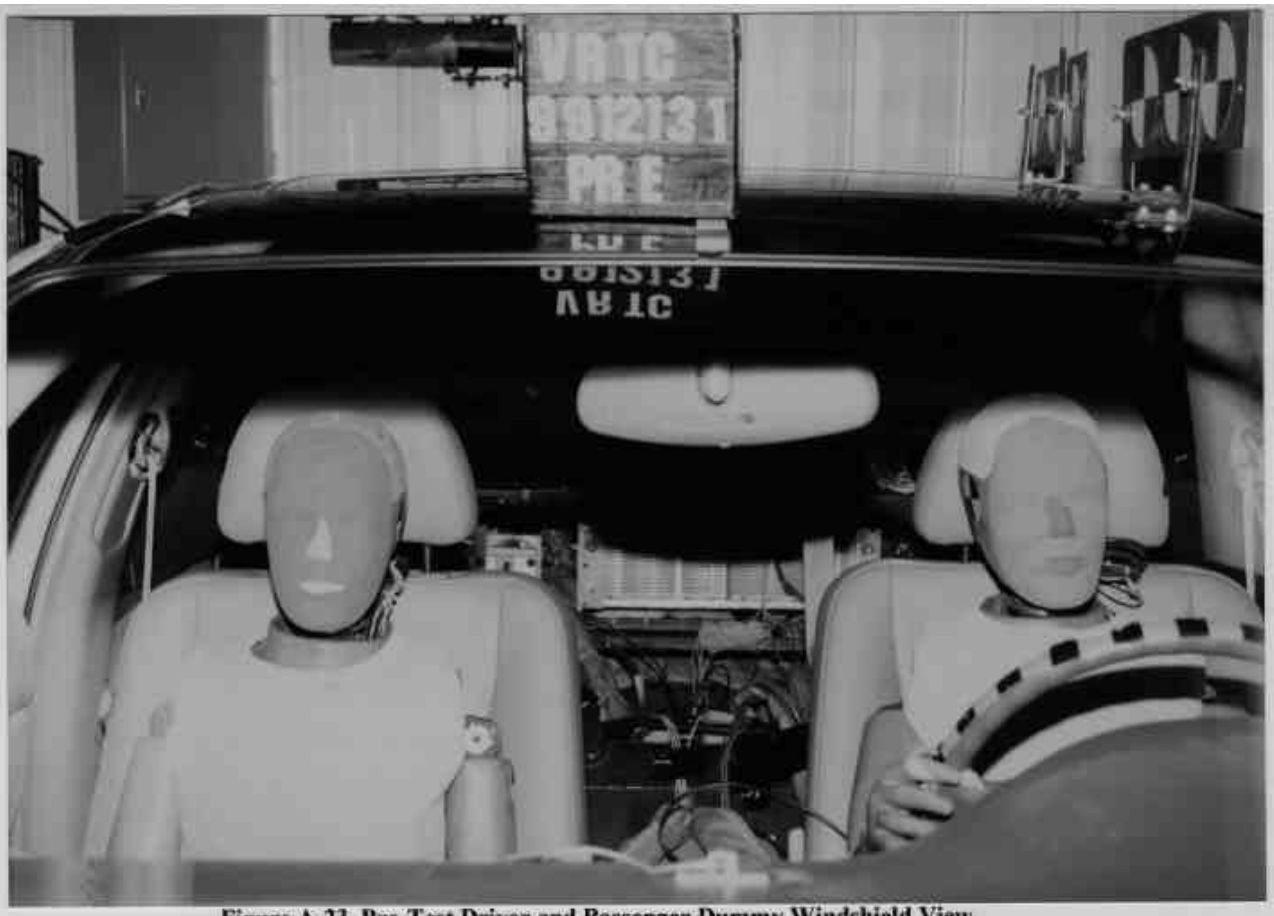


Figure A-23 Pre-Test Driver and Passenger Dummy Windshield View

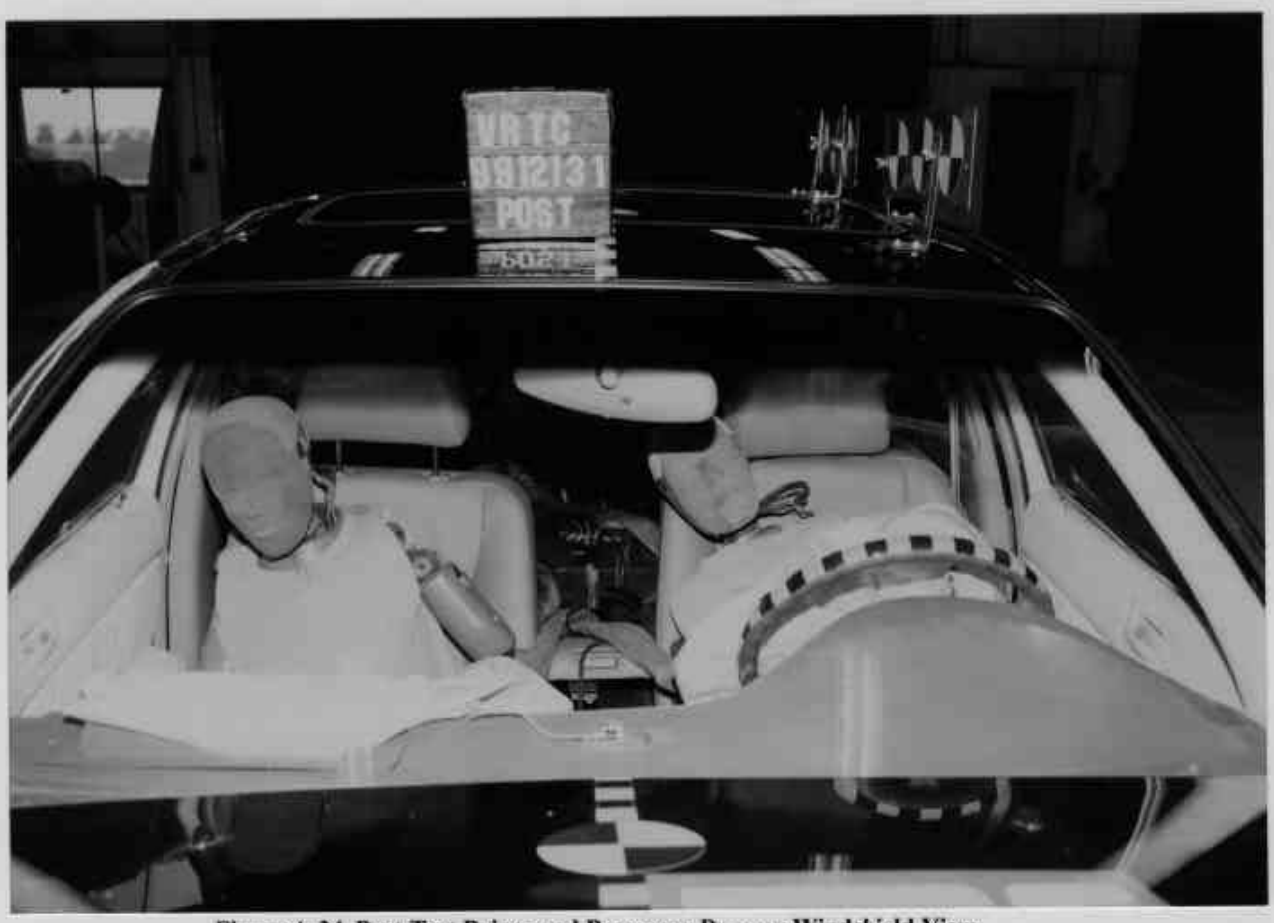


Figure A-24 Post-Test Driver and Passenger Dummy Windshield View

Figure A-25 Pre-Test Driver Dummy Windshield View

Figure A-26 Post-Test Driver Dummy Windshield View

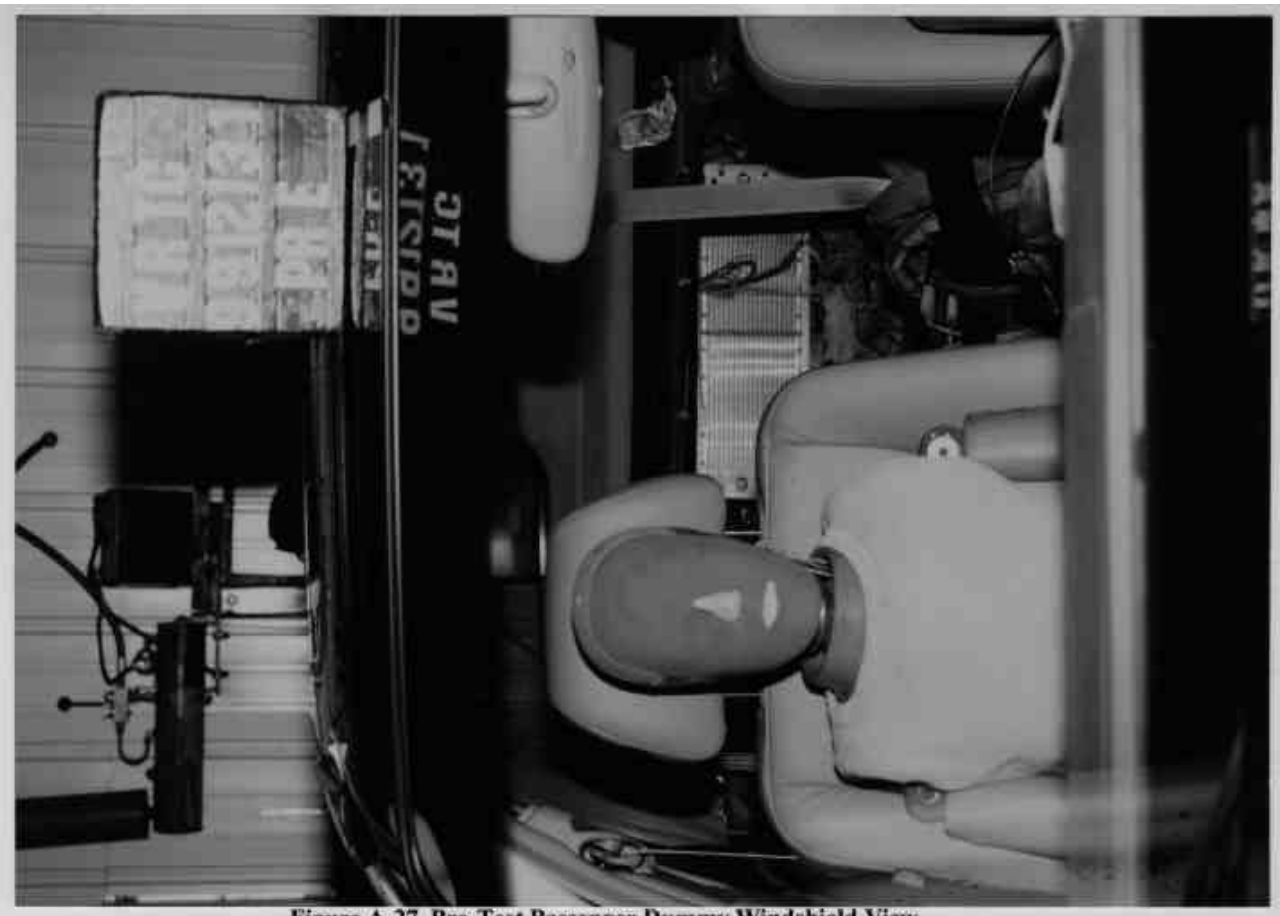


Figure A-27 Pre-Test Passenger Dummy Windshield View

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 Driver Dummy Foot Placement - View 1

Figure A-36 Pre-Test Driver Dummy Foot Placement - View 2

Figure A-37 Pre-Test Passenger Dummy Position - View 1

Figure A-38 Post-Test Passenger Dummy Position - View 1

Figure A-39 Pre-Test Passenger Dummy Position - View 2

Figure A-40 Post-Test Passenger Dummy Position - View 2

Figure A-41 Pre-Test Passenger Dummy Position - View 3

Figure A-42 Post-Test Passenger Dummy Position - View 3

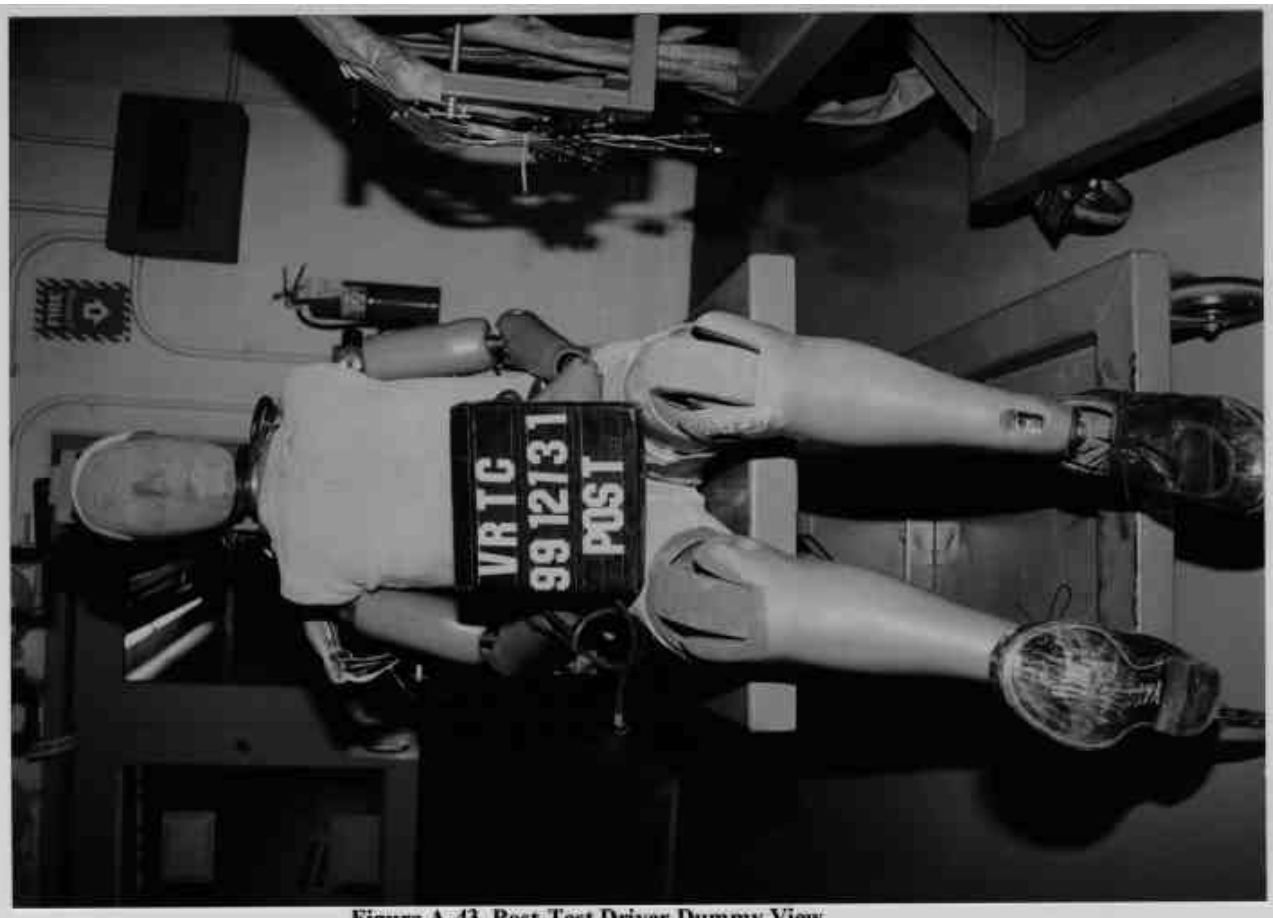


Figure A-43 Post-Test Driver Dummy View

Figure A-44 Post-Test Driver Dummy Head Contact - View 1

Figure A-45 Post-Test Driver Dummy Head Contact - View 2

Figure A-46 Post-Test Driver Dummy Head Contact - View 3

Figure A-47 Post-Test Driver Dummy Knee Contact - View 1

Figure A-48 Post-Test Driver Dummy Knee Contact - View 2

Figure A-49 Post-Test Driver Dummy Knee Contact - View 3

Figure A-50 Post-Test Driver Dummy Damage View

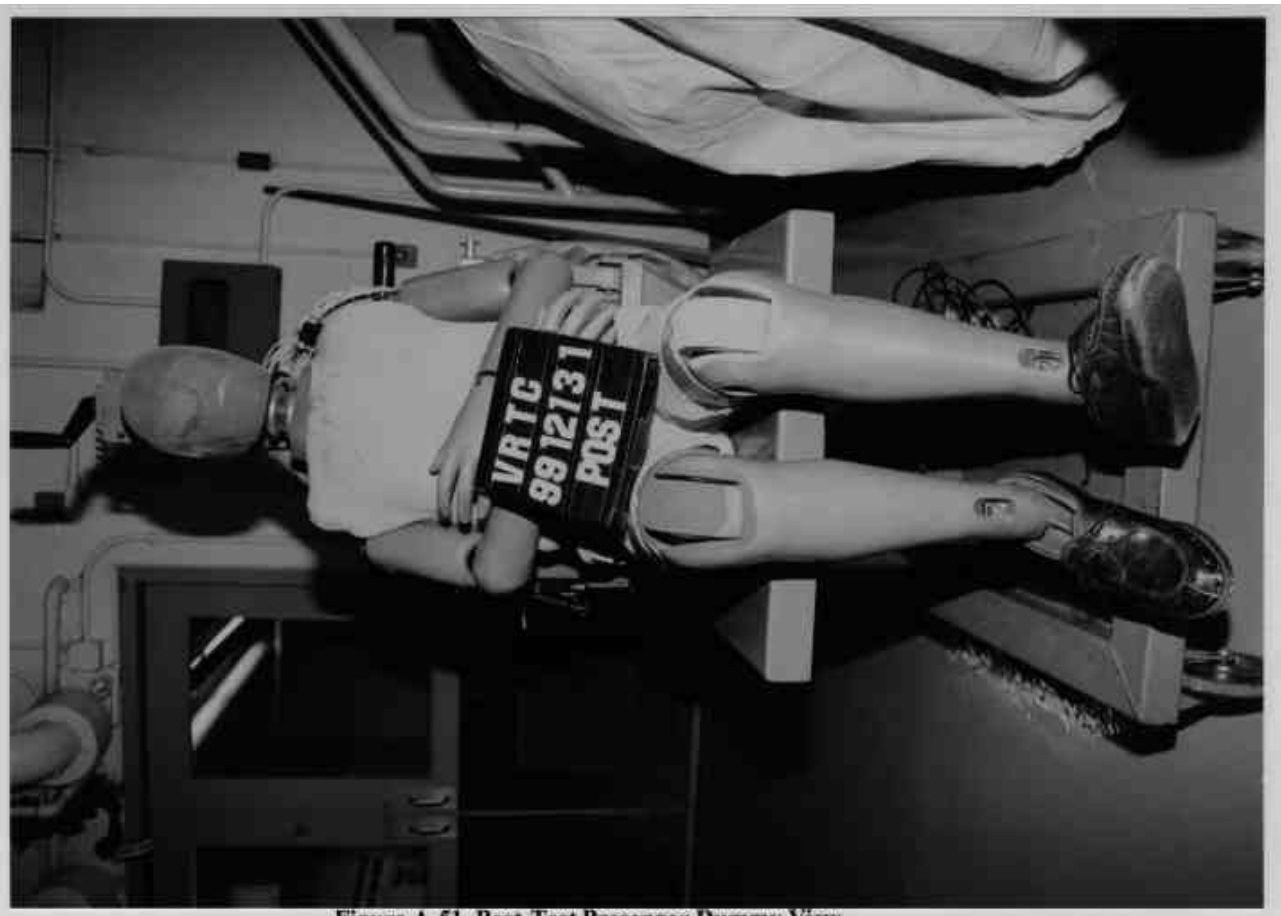


Figure A-51 Post-Test Passenger Dummy View

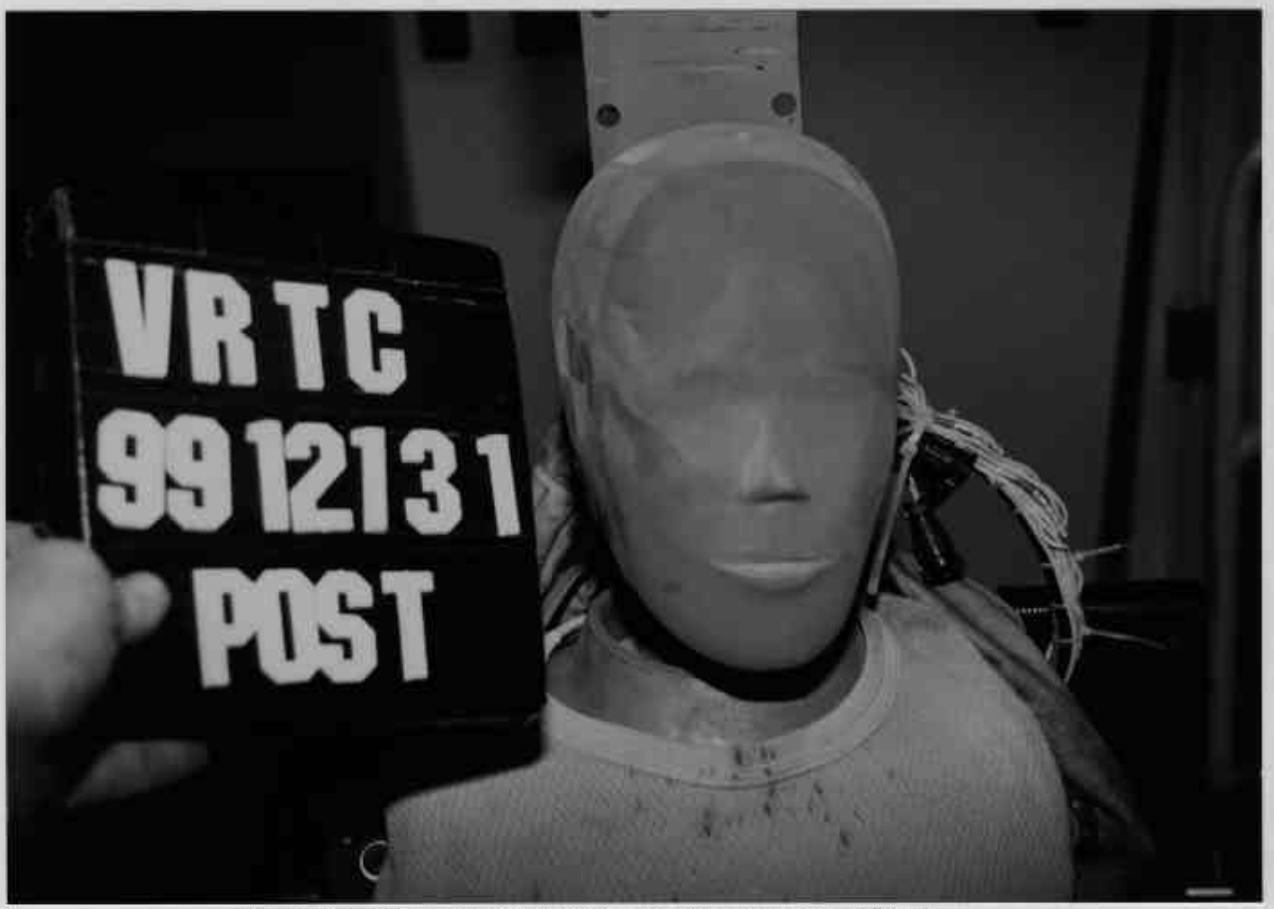


Figure A-52 Post-Test Passenger Dummy Head Contact - View 1

Figure A-53 Post-Test Passenger Dummy Head Contact - View 2

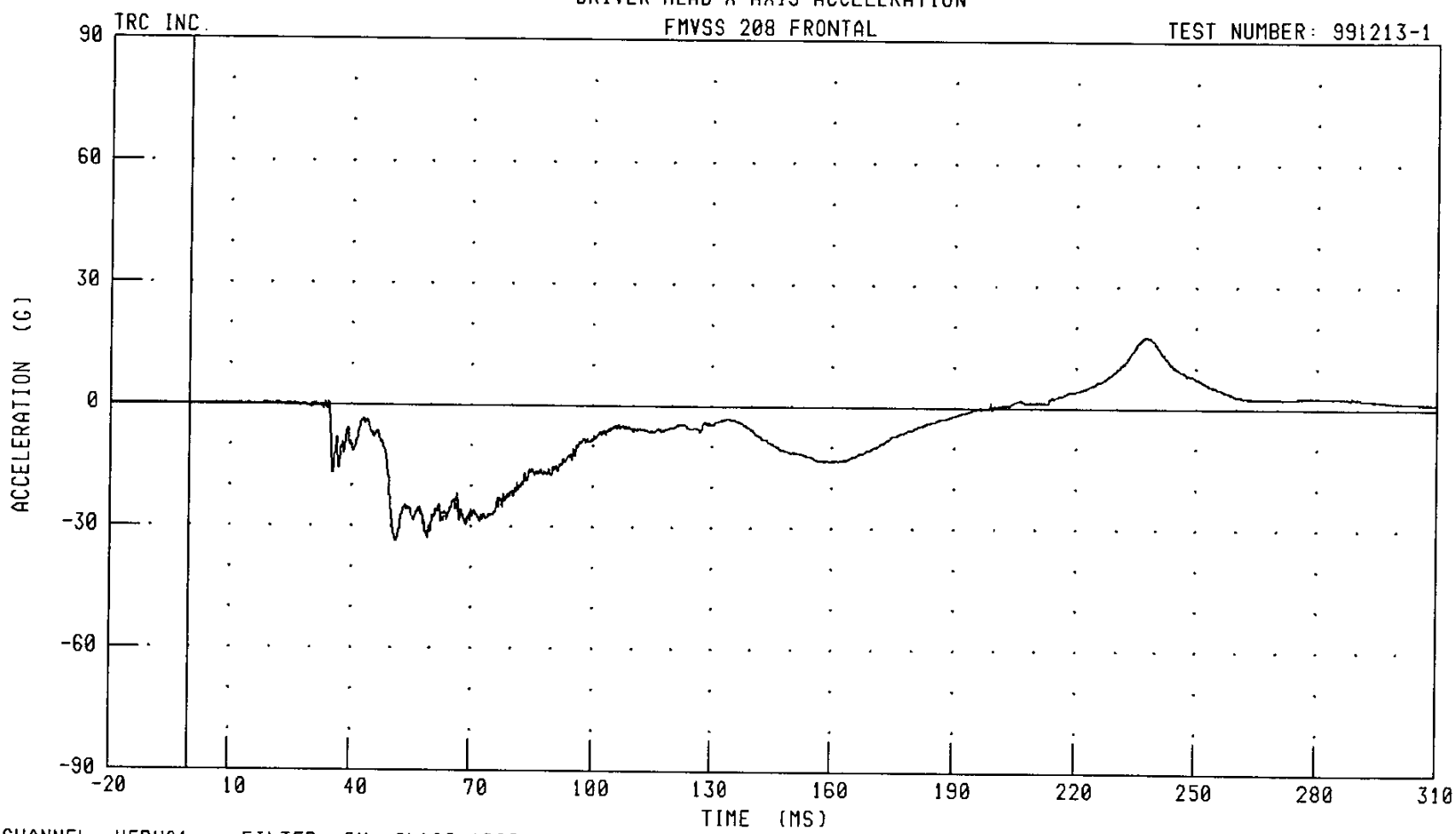
Figure A-54 Post-Test Passenger Dummy Head Contact - View 3

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

Figure A-56 Post-Test Passenger Dummy Knee Contact - View 2

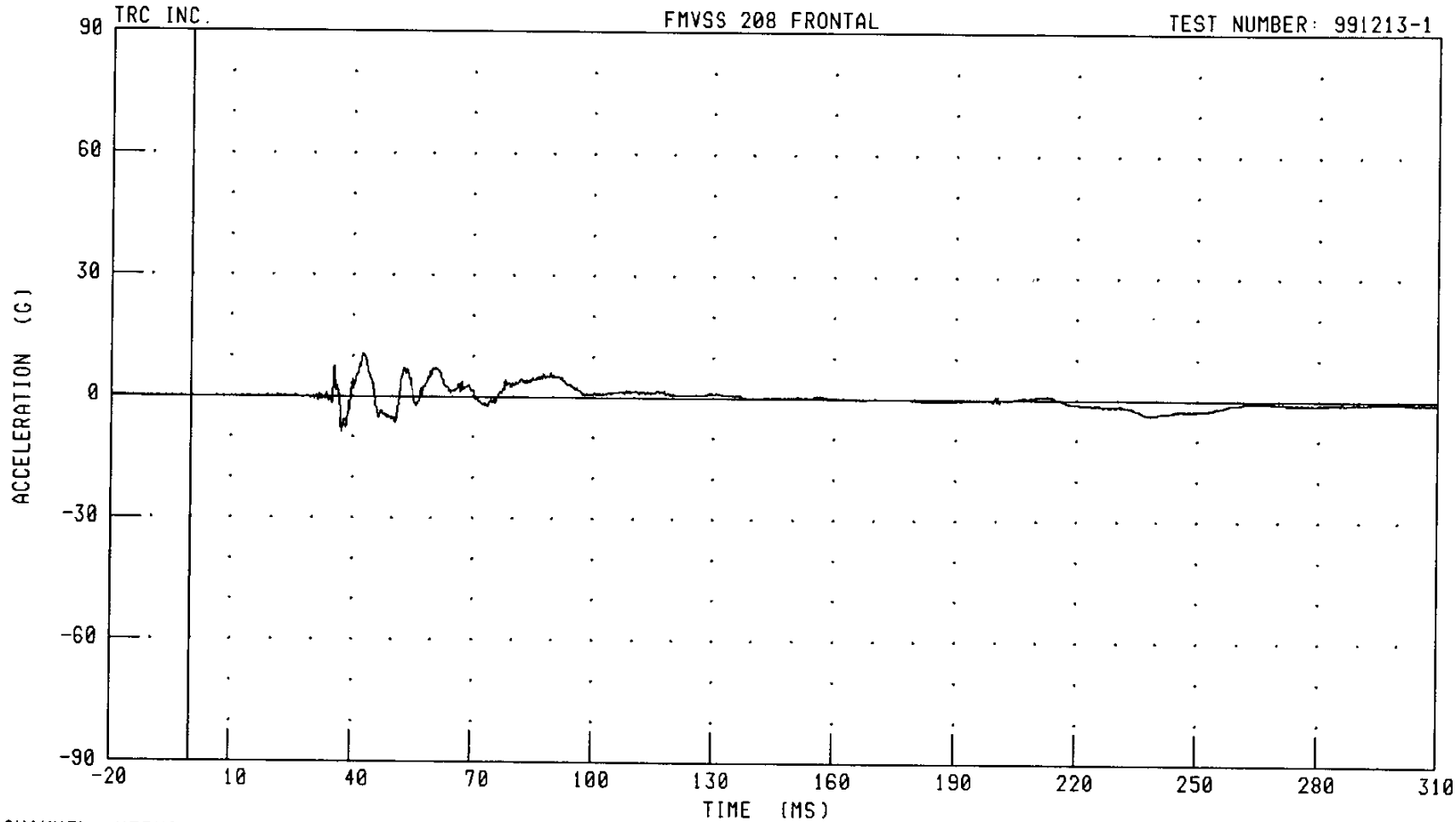
Figure A-57 Pre-Test Vehicle Certification Label View

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD X-AXIS ACCELERATION
FMVSS 208 FRONTAL



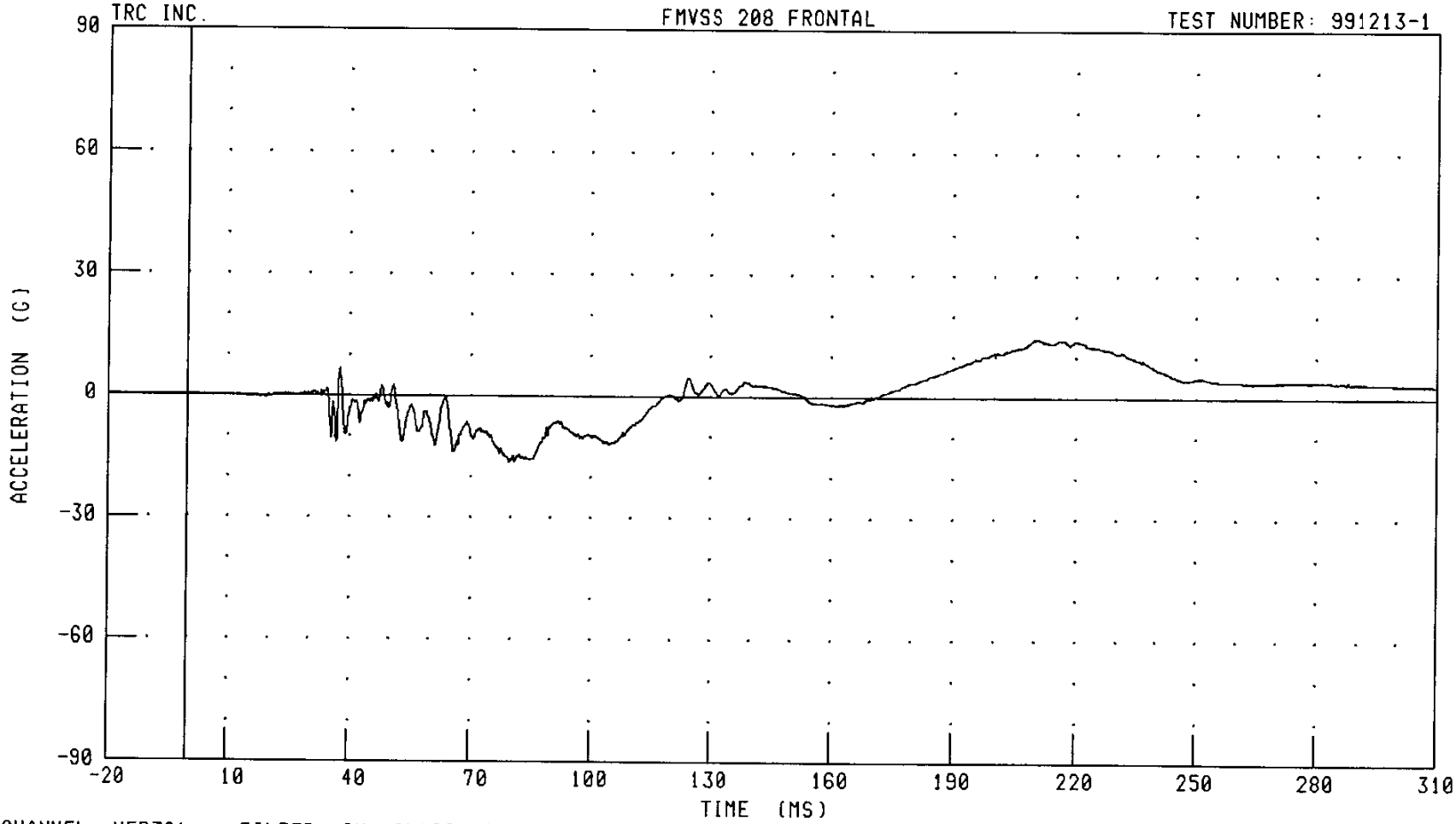
CHANNEL: HEDXG1 FILTER: CH. CLASS 1000 PEAK DATA: -17.74 G @ 237.28 MS; -33.59 G @ 51.20 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD Y-AXIS ACCELERATION
FMVSS 208 FRONTAL



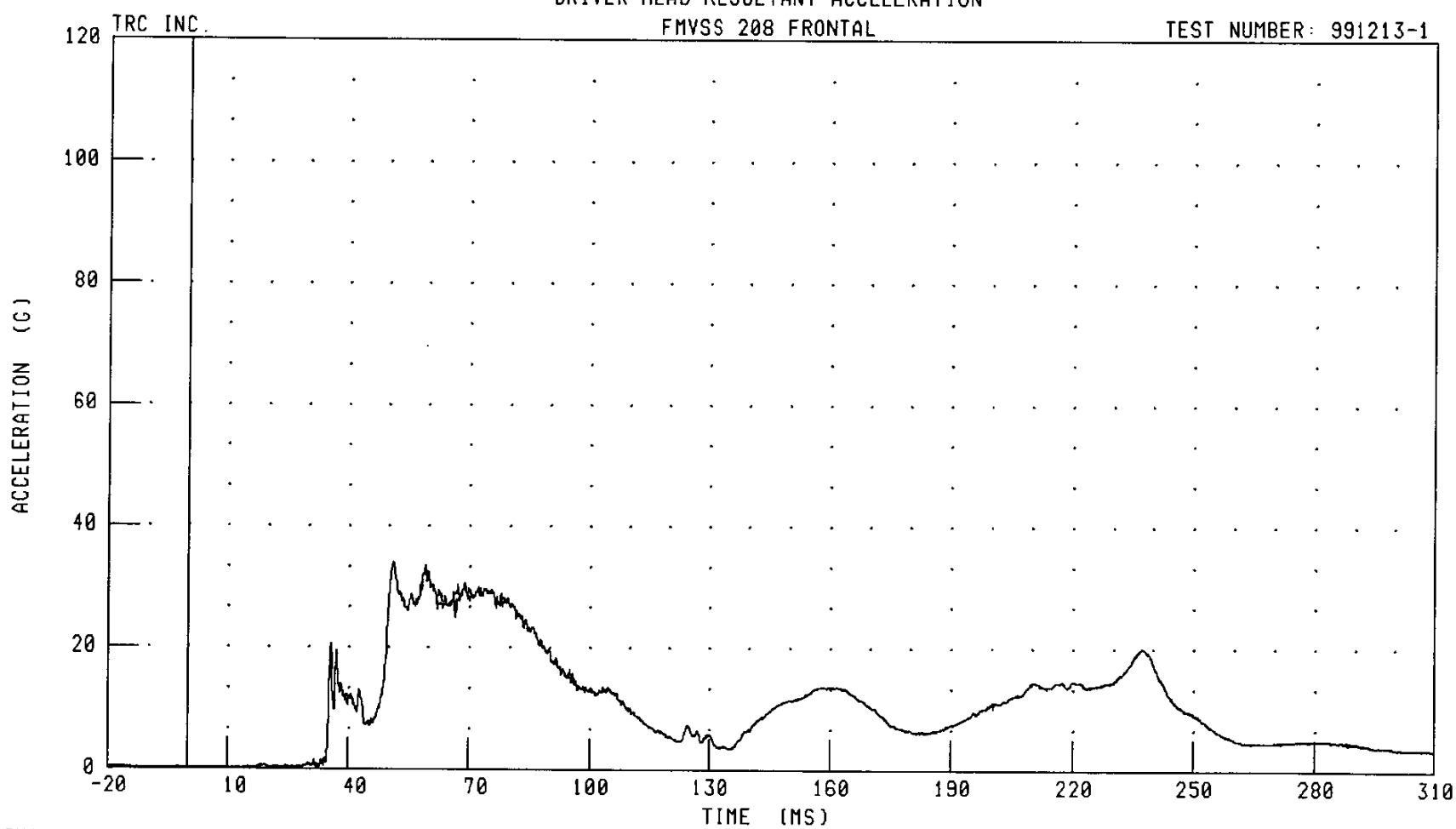
CHANNEL: HEDYG1 FILTER: CH. CLASS 1000 PEAK DATA: 10.56 G @ 42.72 MS; -8.84 G @ 37.36 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD Z-AXIS ACCELERATION



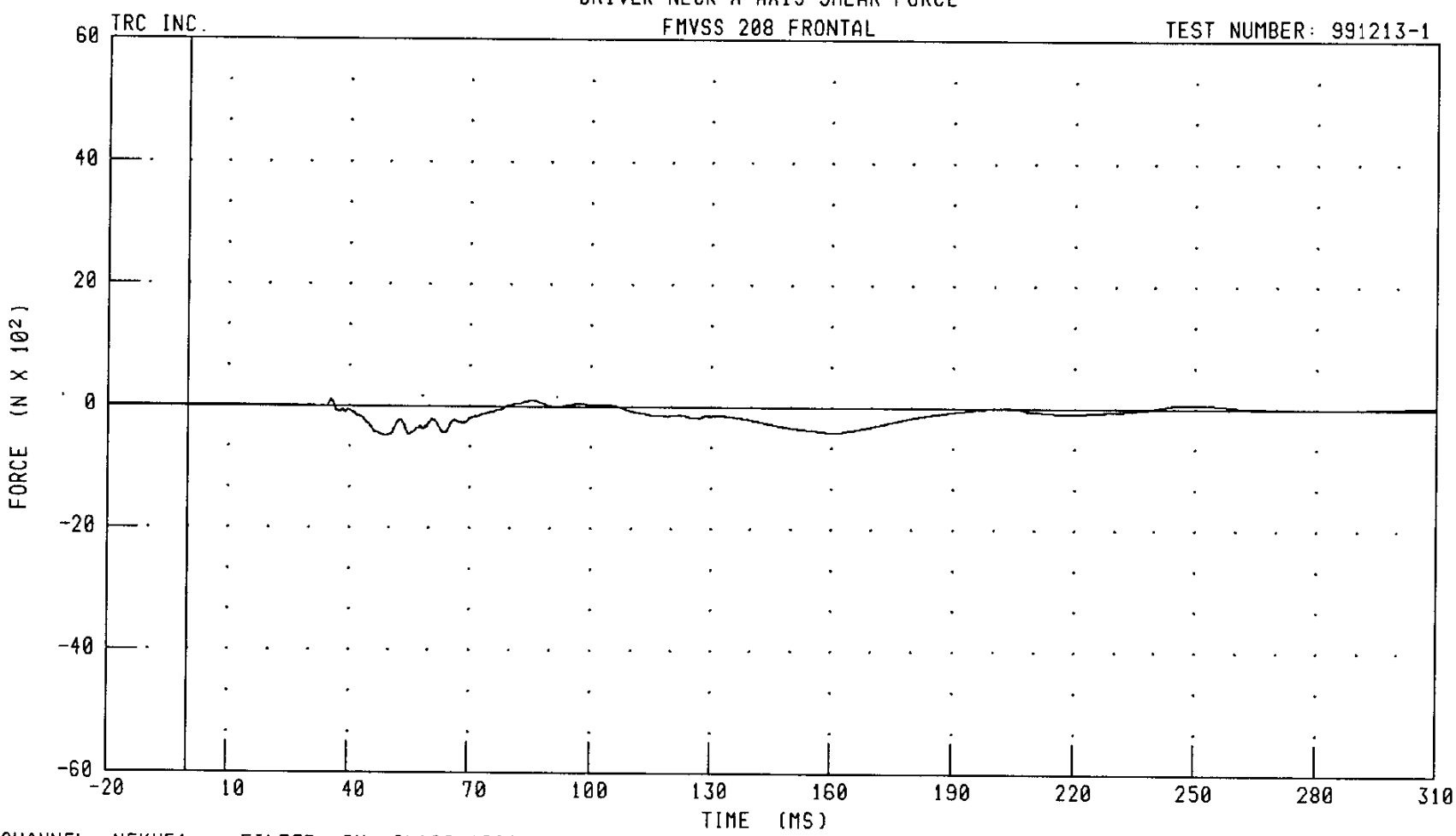
CHANNEL: HEDZG1 FILTER: CH. CLASS 1000 PEAK DATA: 14.25 G @ 209.76 MS; -16.48 G @ 79.68 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER HEAD RESULTANT ACCELERATION



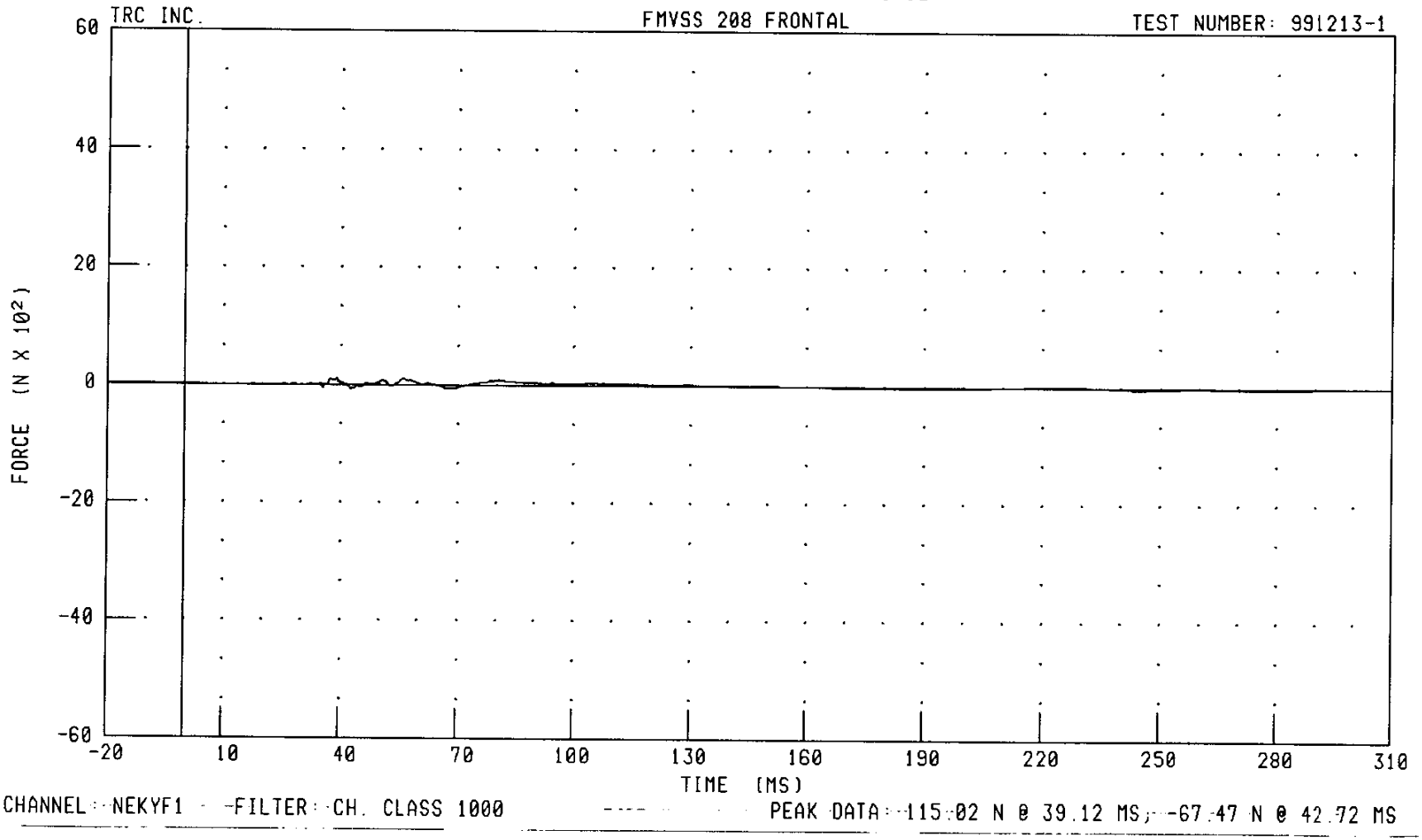
CHANNEL: HEDRG1 FILTER: CH. CLASS 1000 PEAK DATA: 33.97 G @ 51.20 MS; 0.11 G @ -18.88 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK X-AXIS SHEAR FORCE



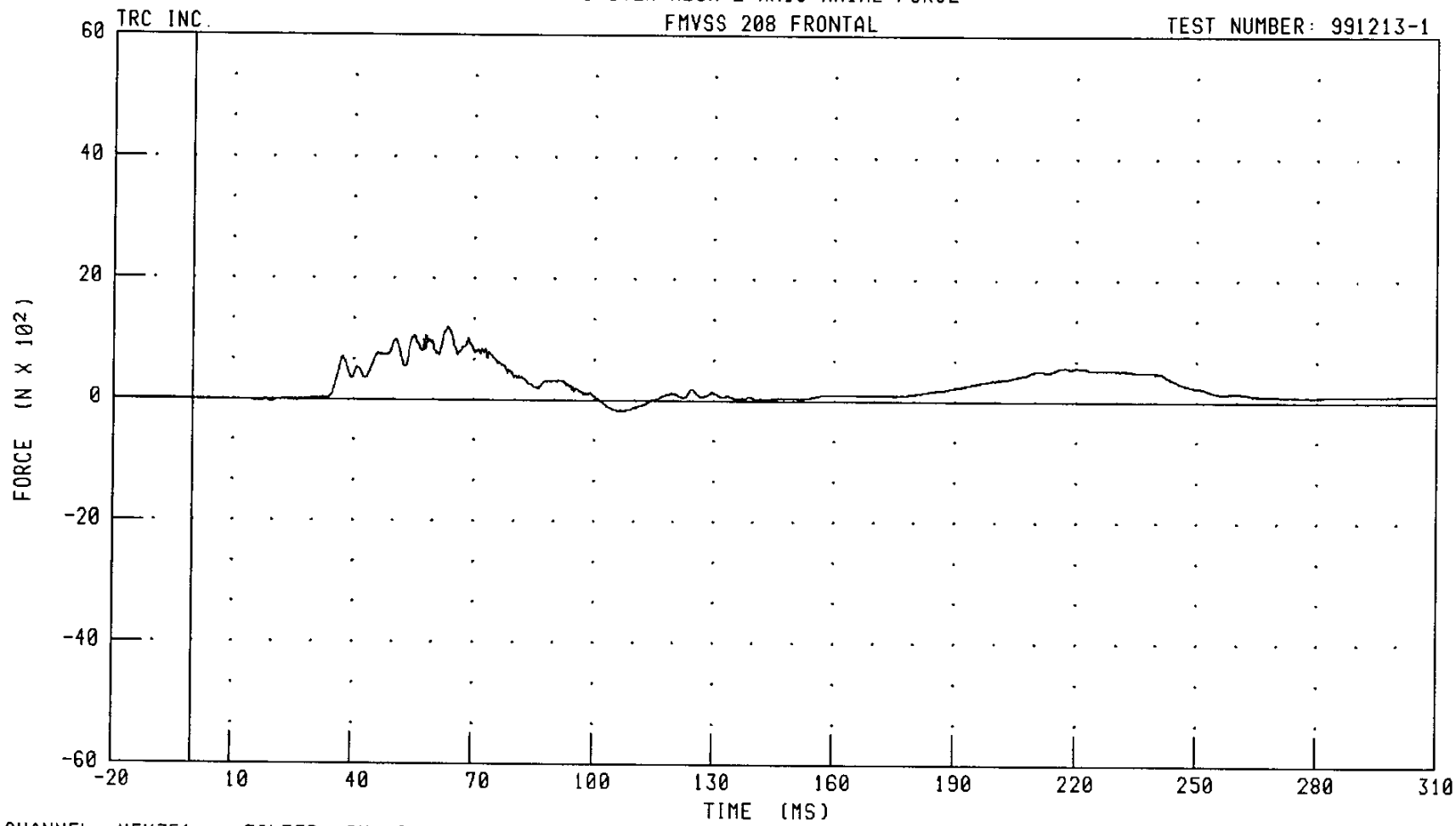
--CHANNEL: NEKXF1 --FILTER: CH. CLASS 1000 -- --PEAK DATA: 106.37 N @ 35.52 MS; -488.32 N @ 48.72 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK Y-AXIS SHEAR FORCE
FMVSS 208 FRONTAL



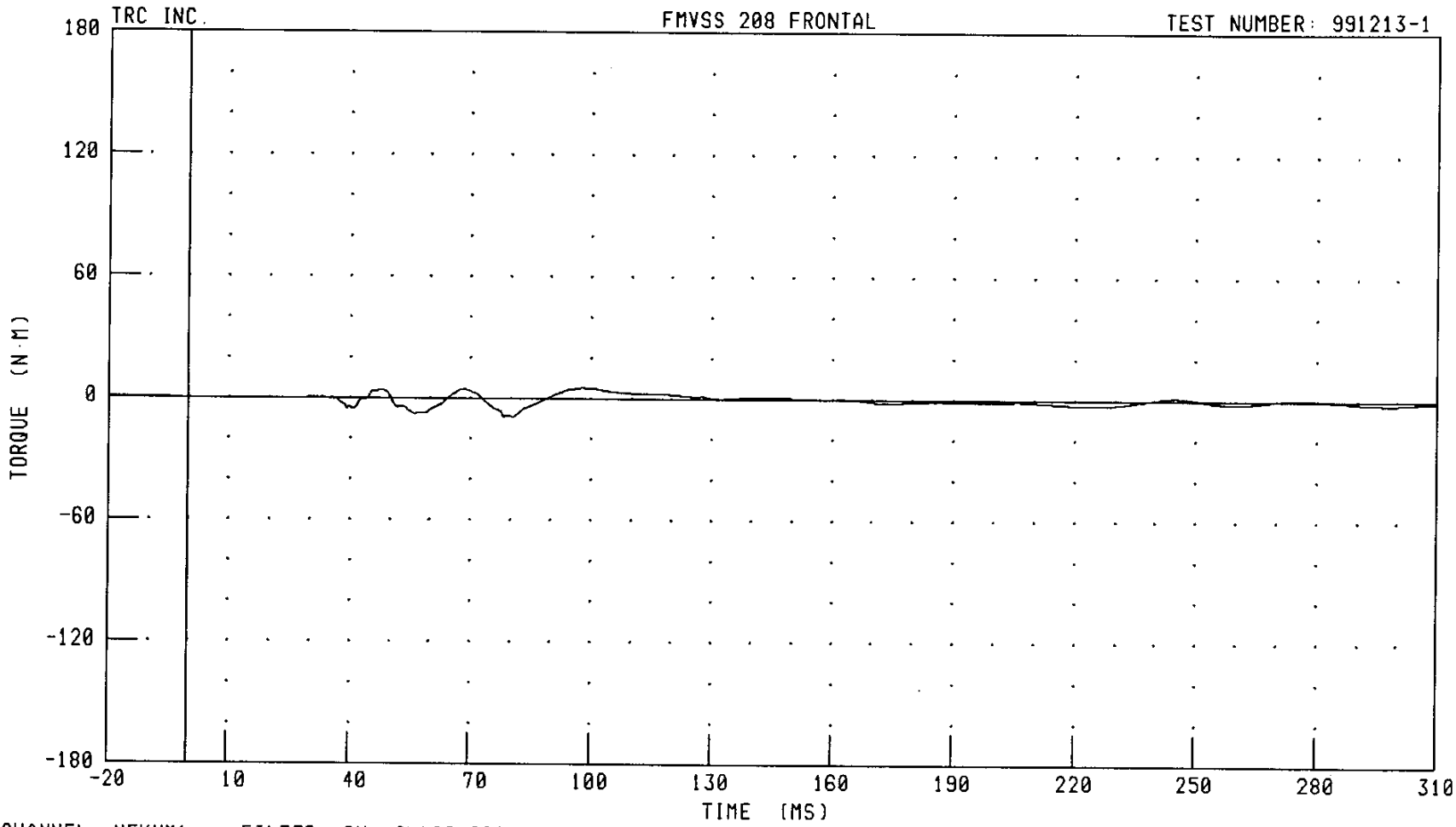
CHANNEL: NEKYF1 FILTER: CH. CLASS 1000 PEAK DATA: 115.02 N @ 39.12 MS; -67.47 N @ 42.72 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK Z-AXIS AXIAL FORCE
FMVSS 208 FRONTAL



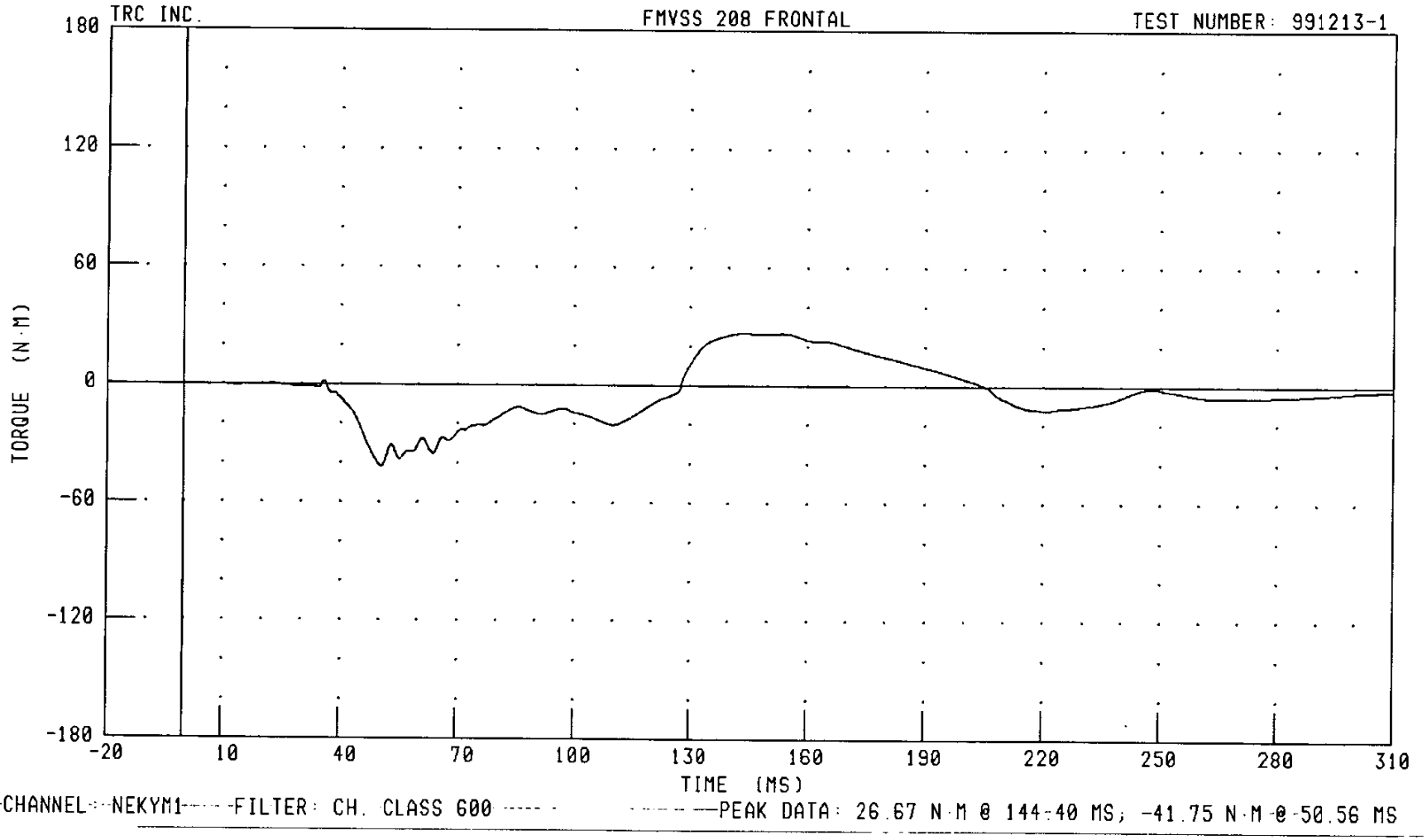
CHANNEL: NEKZF1-- FILTER: CH--CLASS 1000 ----PEAK DATA: 1195.12 N @ 63.68 MS; -180.11 N @ 105.84 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK MOMENT ABOUT X AXIS
FMVSS 208 FRONTAL



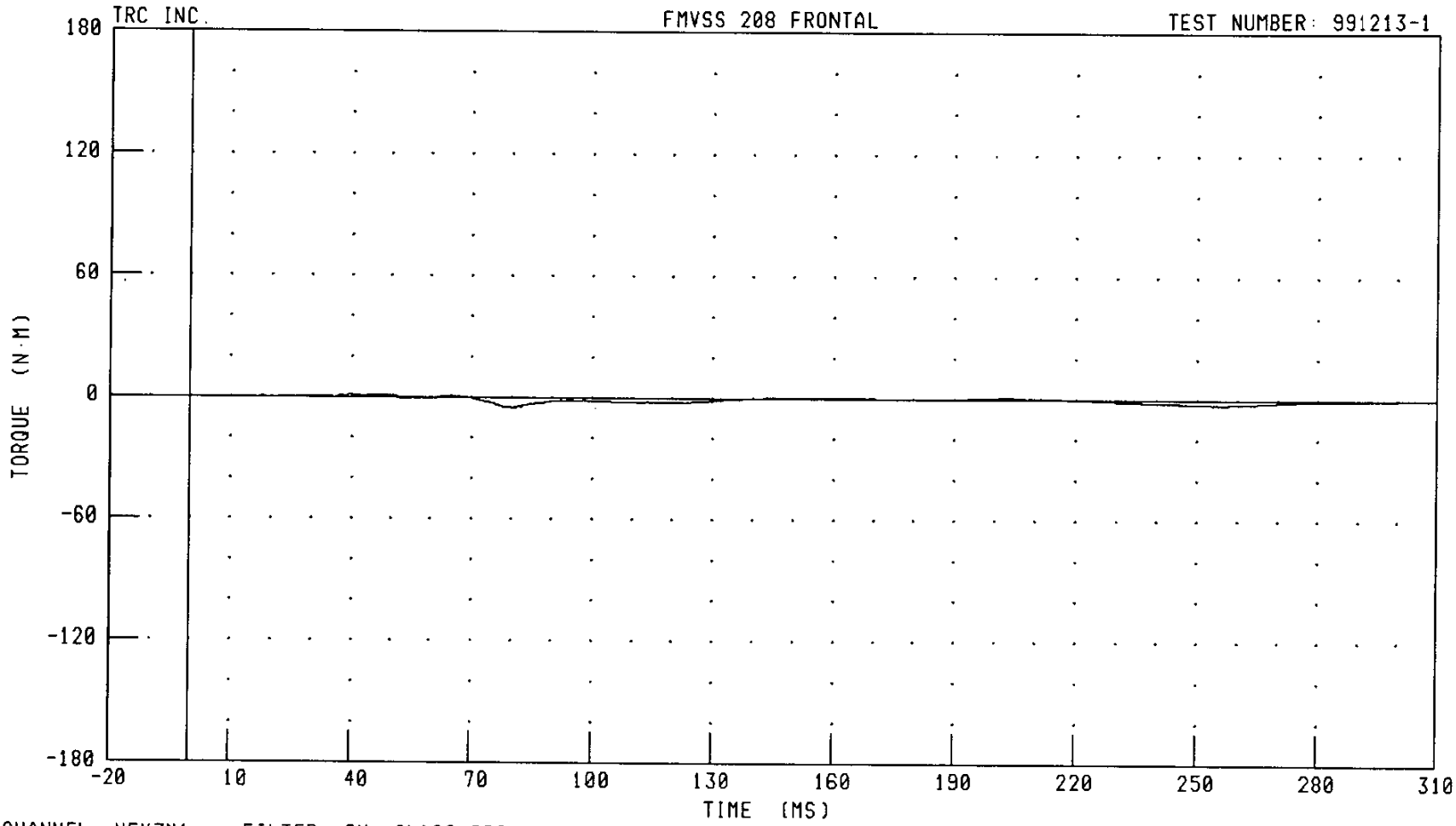
--CHANNEL: NEKXM1 FILTER: CH. CLASS 600 PEAK DATA: 5.11 N-M @ 97.84 MS; -9.23 N-M @ 80.64 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK MOMENT ABOUT Y AXIS



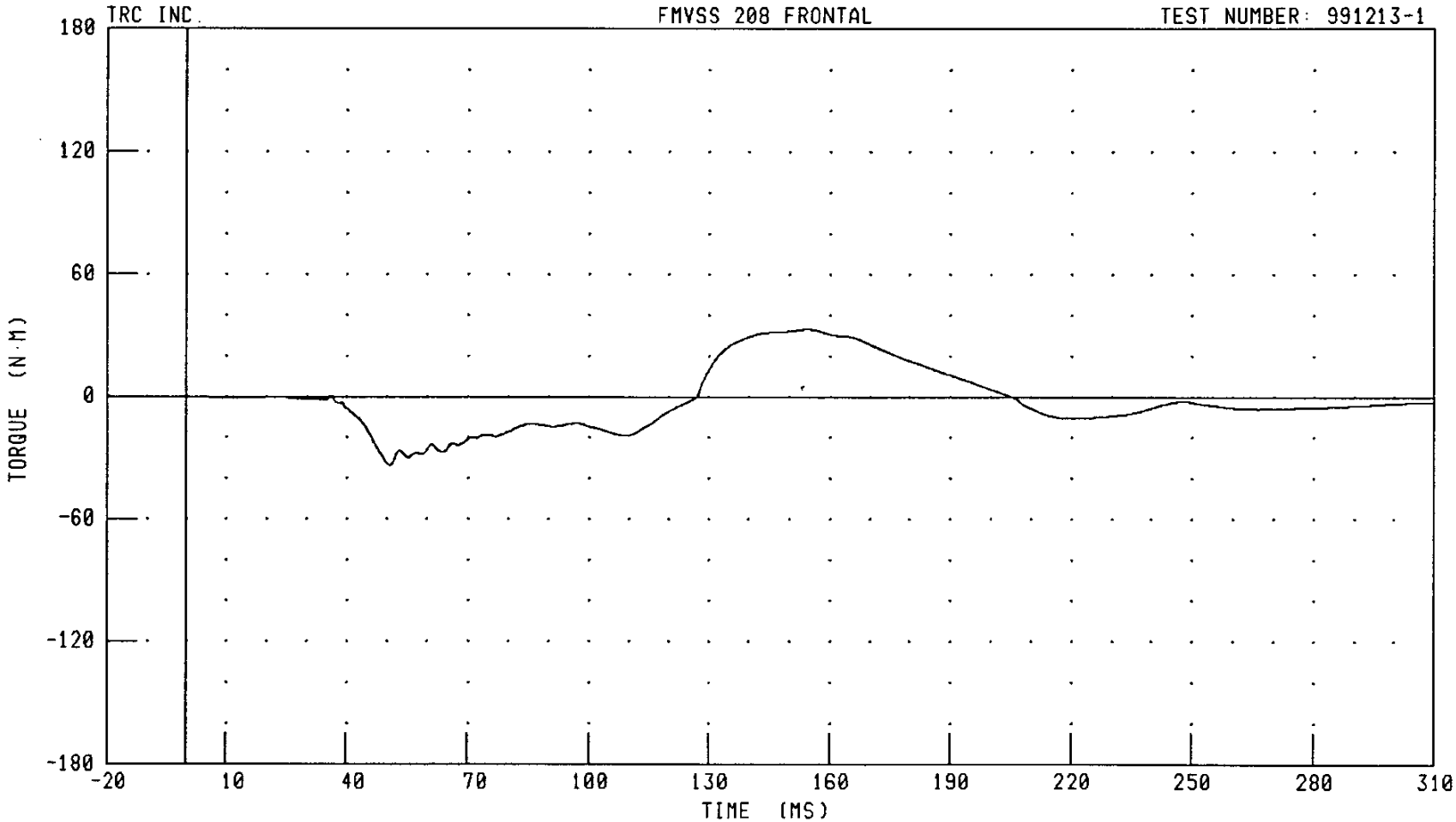
CHANNEL: NEKYM1 FILTER: CH. CLASS 600 PEAK DATA: 26.67 N-M @ 144.40 MS; -41.75 N-M @ 50.56 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK MOMENT ABOUT Z AXIS
FMVSS 208 FRONTAL



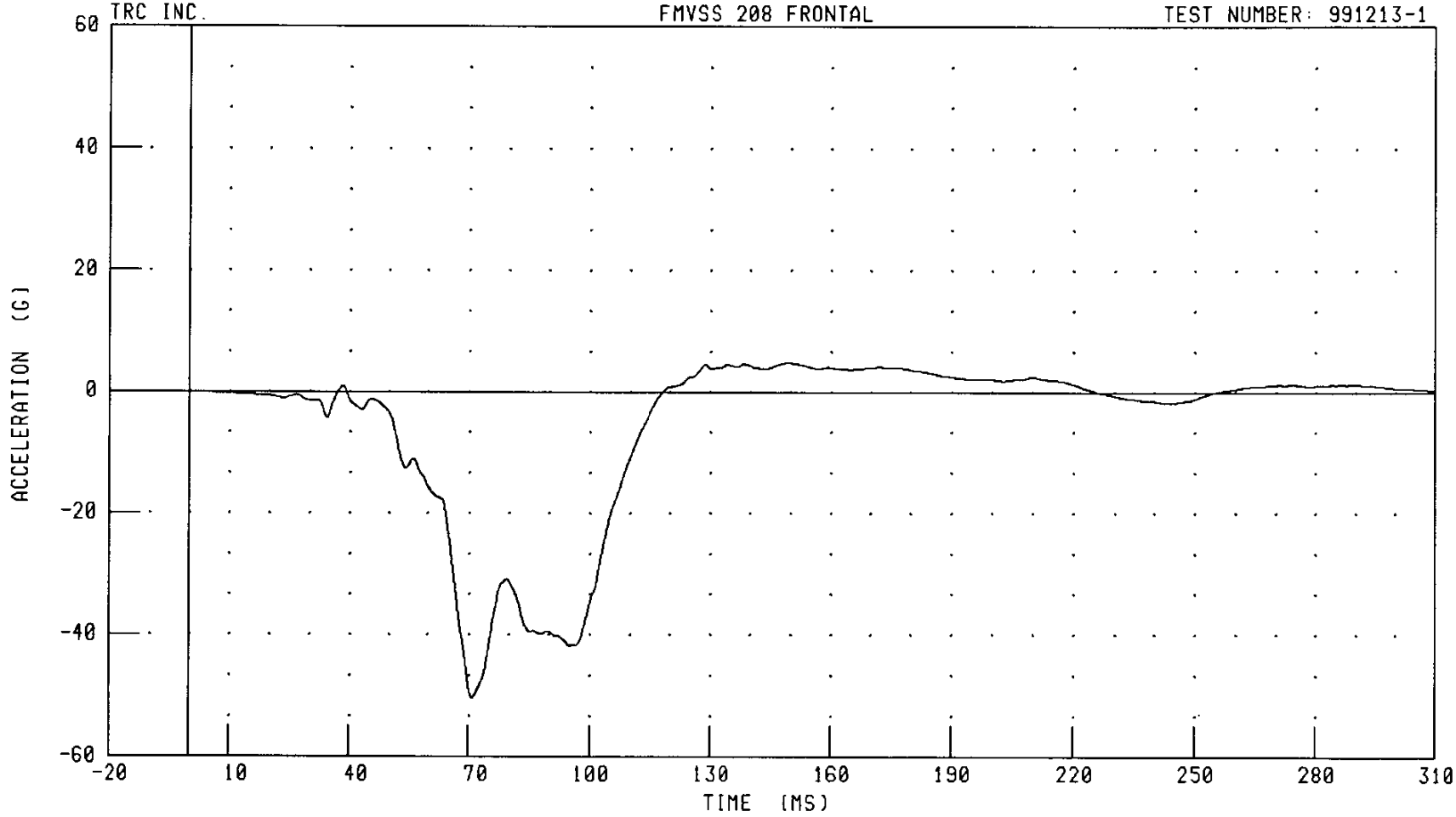
CHANNEL: NEKZM1 FILTER: CH. CLASS 600 PEAK DATA: -1.41 N-M @ 39.68 MS; -5.11 N-M @ 80.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS



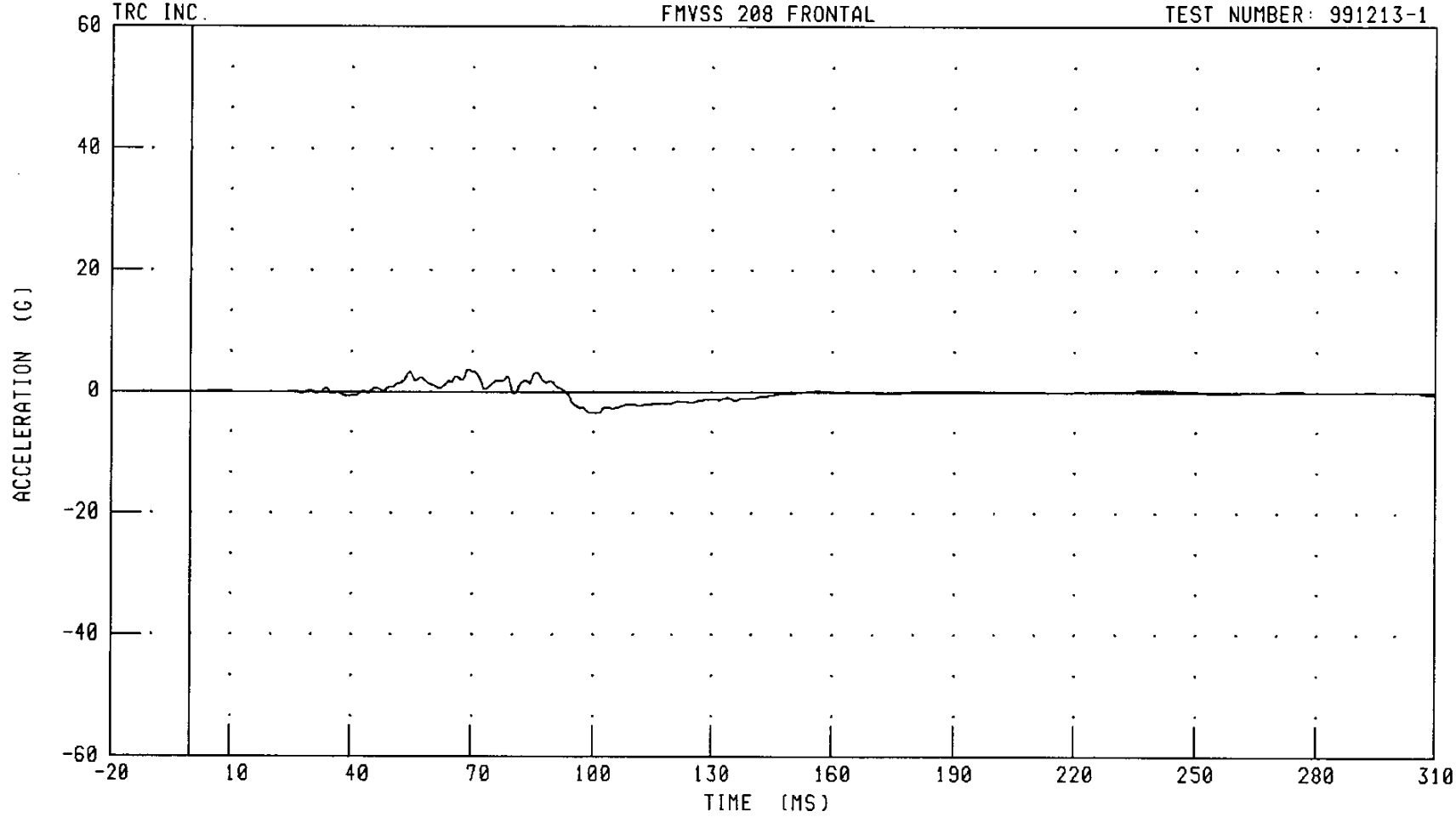
CHANNEL---NEKOM1----FILTER: CH. CLASS 600 ---------- PEAK DATA: 33.14 N-M @ 154.00 MS; -33.81 N-M @ 50.72 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST X-AXIS ACCELERATION



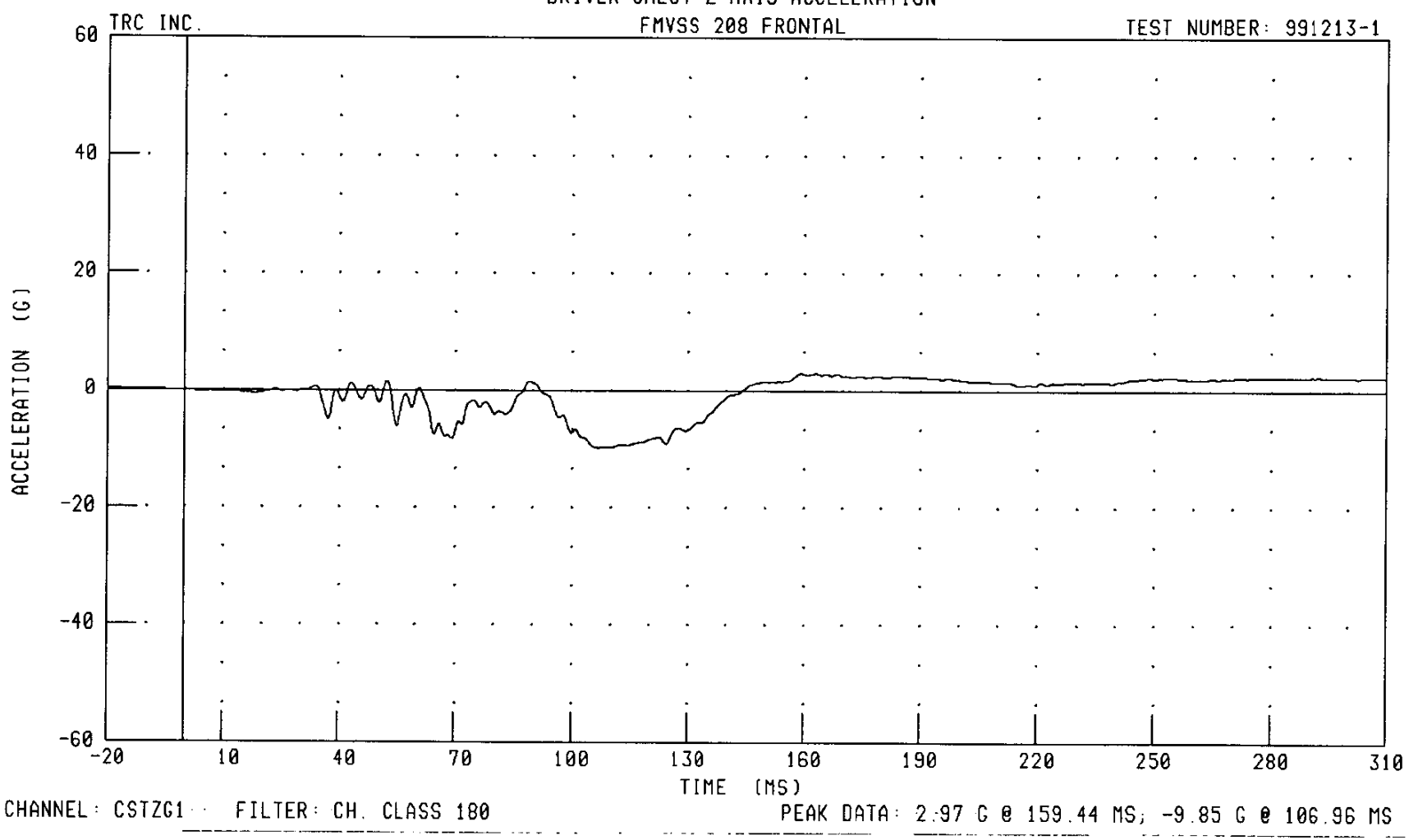
CHANNEL: CSTXG1 FILTER: CH. CLASS 180 PEAK DATA: 4.81 G @ 149.28 MS; -50.44 G @ 70.88 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST Y-AXIS ACCELERATION



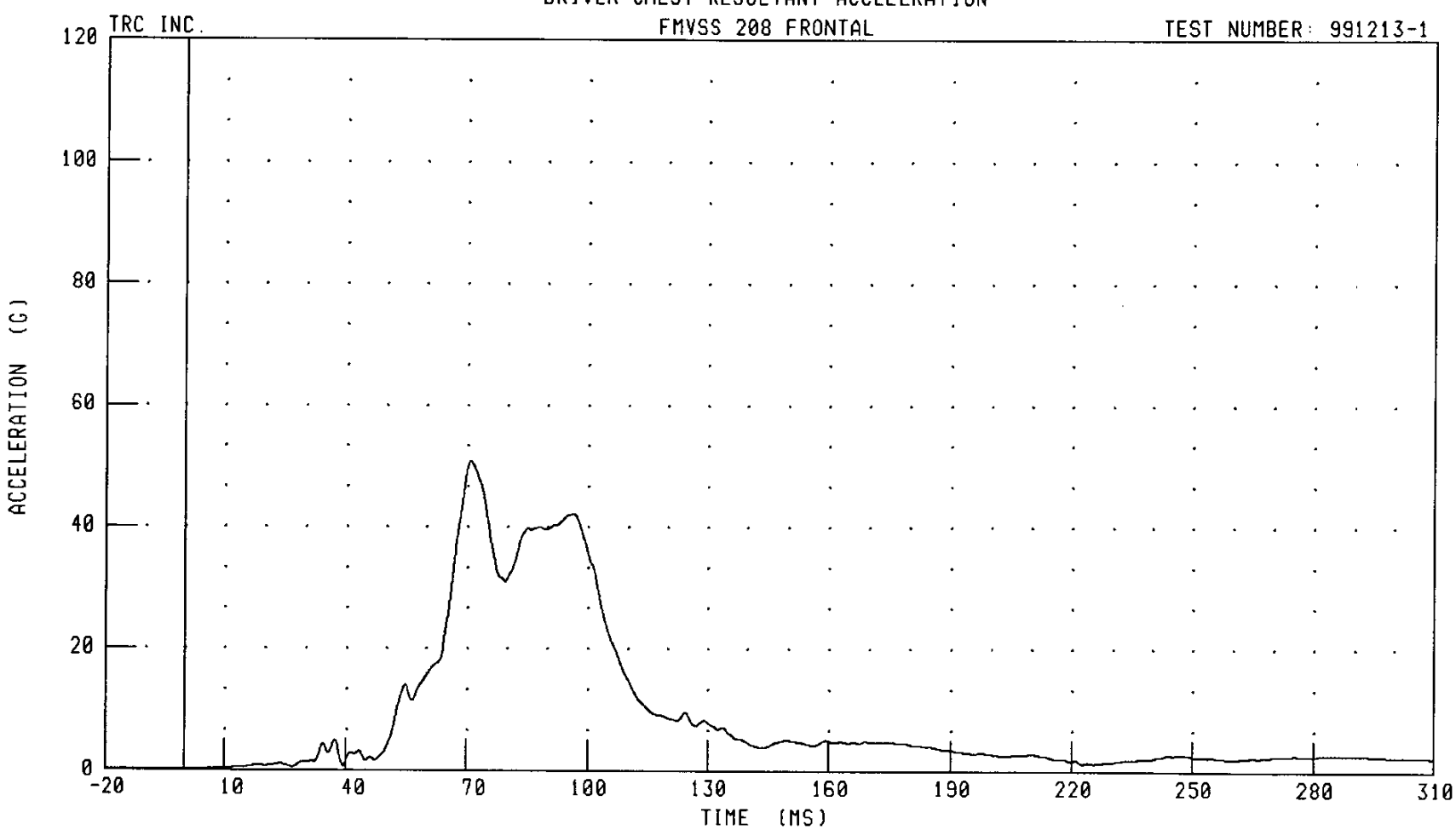
CHANNEL: CSTYG1 FILTER: CH. CLASS 180 PEAK DATA: 3.68 G @ 69.20 MS; -3.50 G @ 100.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST Z-AXIS ACCELERATION



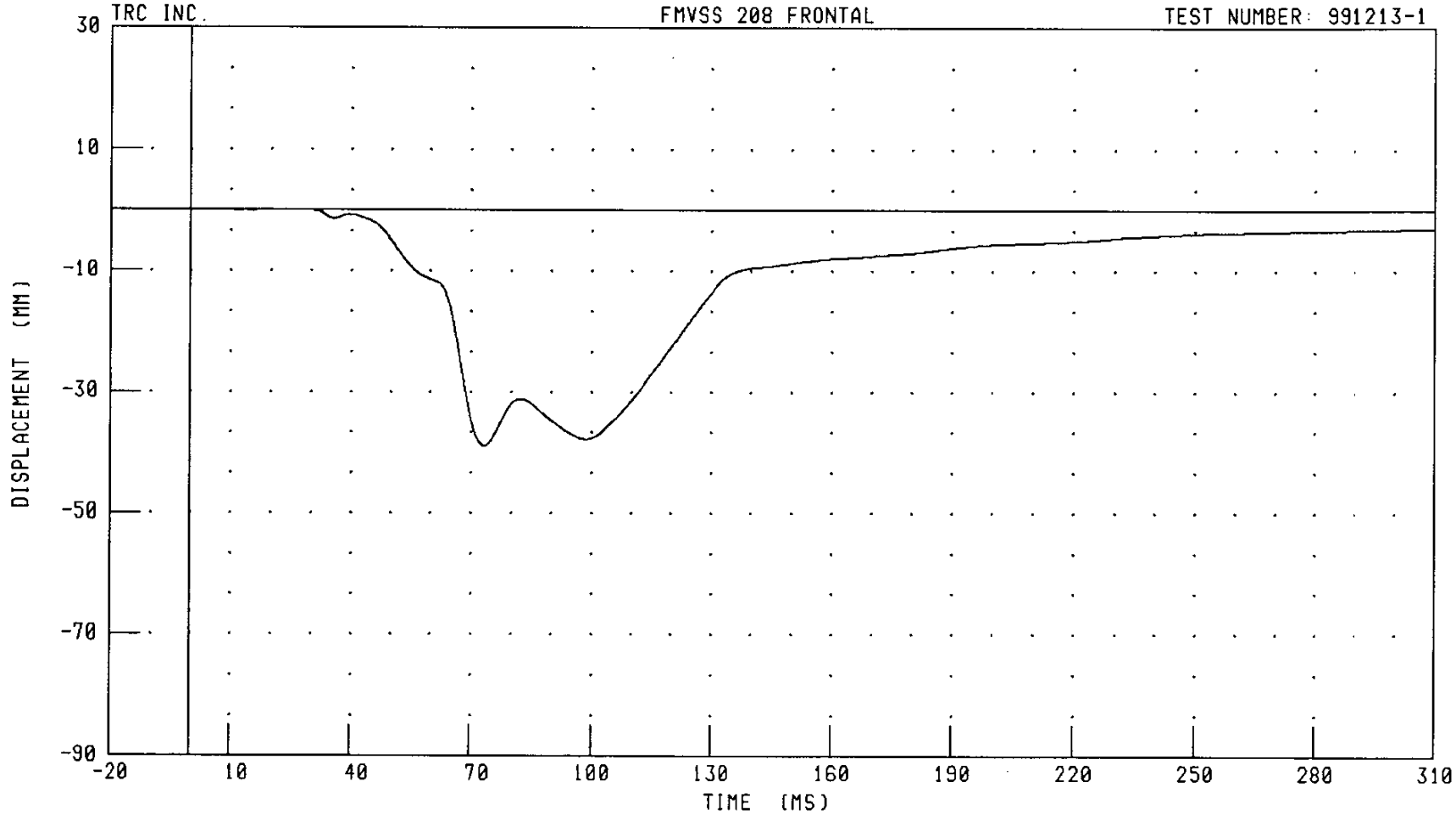
CHANNEL: CSTZG1 FILTER: CH. CLASS 180 PEAK DATA: 2.97 G @ 159.44 MS; -9.85 G @ 106.96 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST RESULTANT ACCELERATION



CHANNEL: CSTRG1 FILTER: CH. CLASS 180 PEAK DATA: 50.82 G @ 70.88 MS; 0.01 G @ -20.00 MS

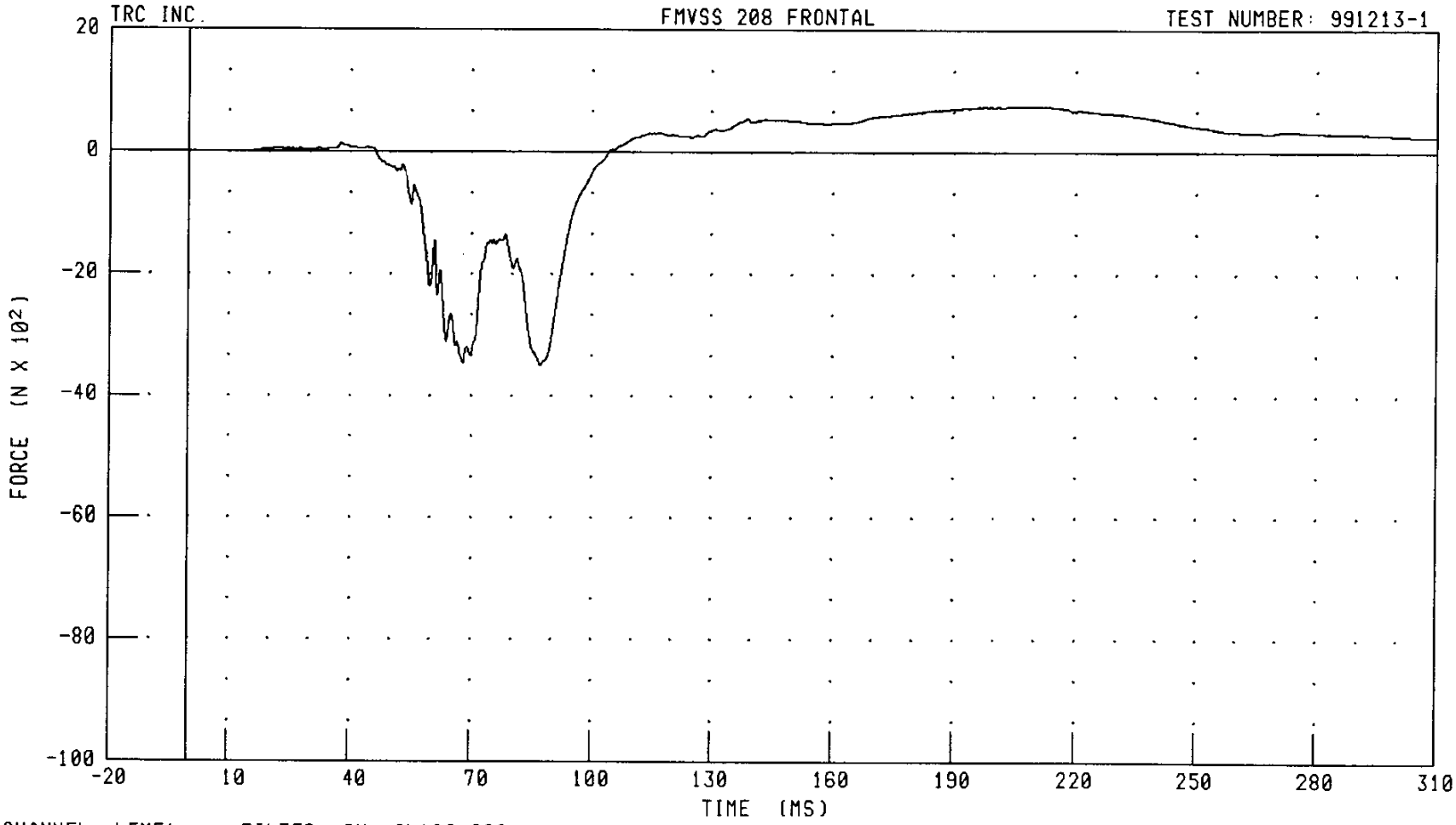
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER CHEST DEFLECTION
FMVSS 208 FRONTAL



CHANNEL: CSTXD1 FILTER: CH. CLASS 180

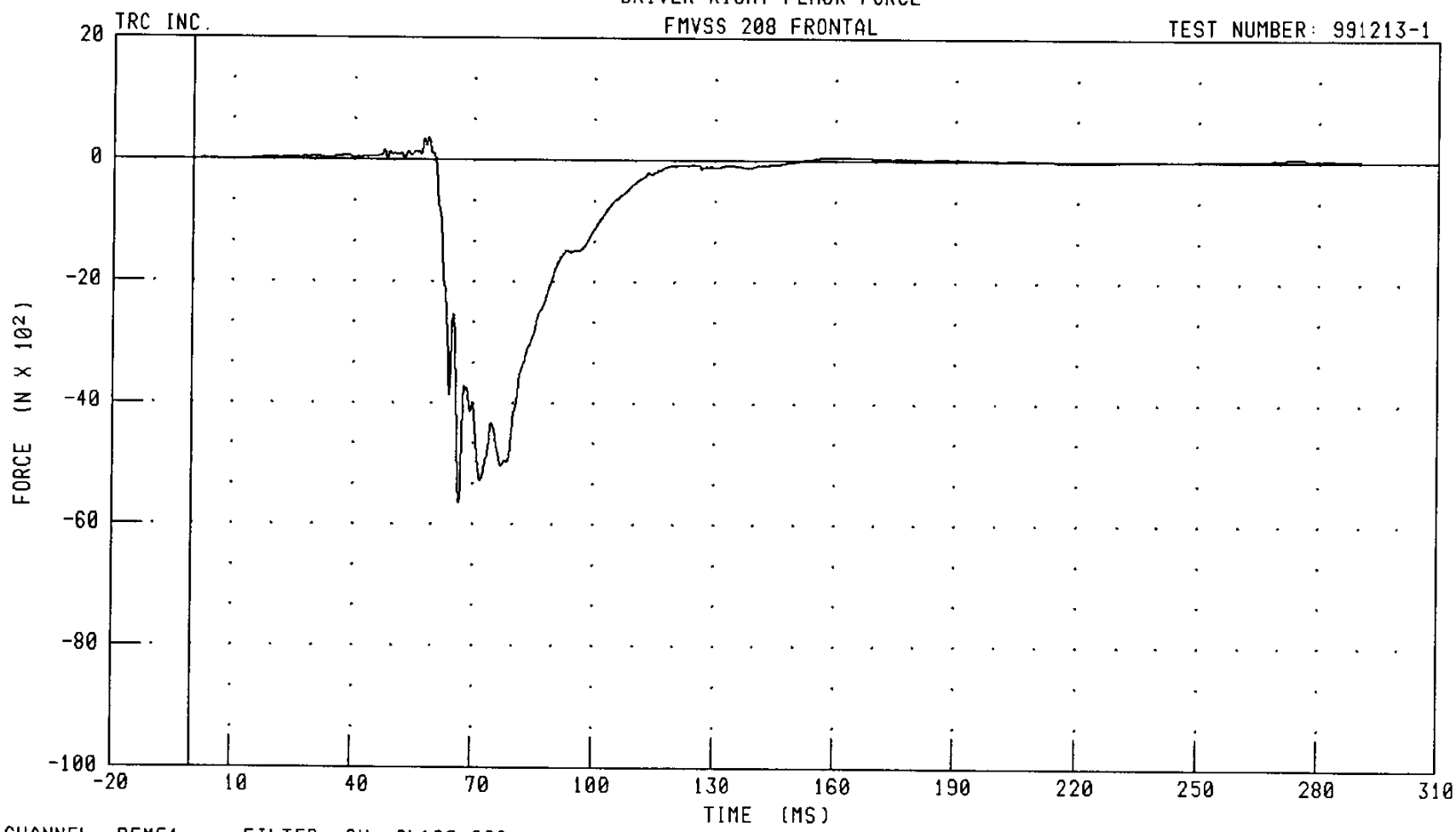
PEAK DATA: 0.03 MM @ 27.36 MS; -38.91 MM @ 73.44 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER LEFT FEMUR FORCE



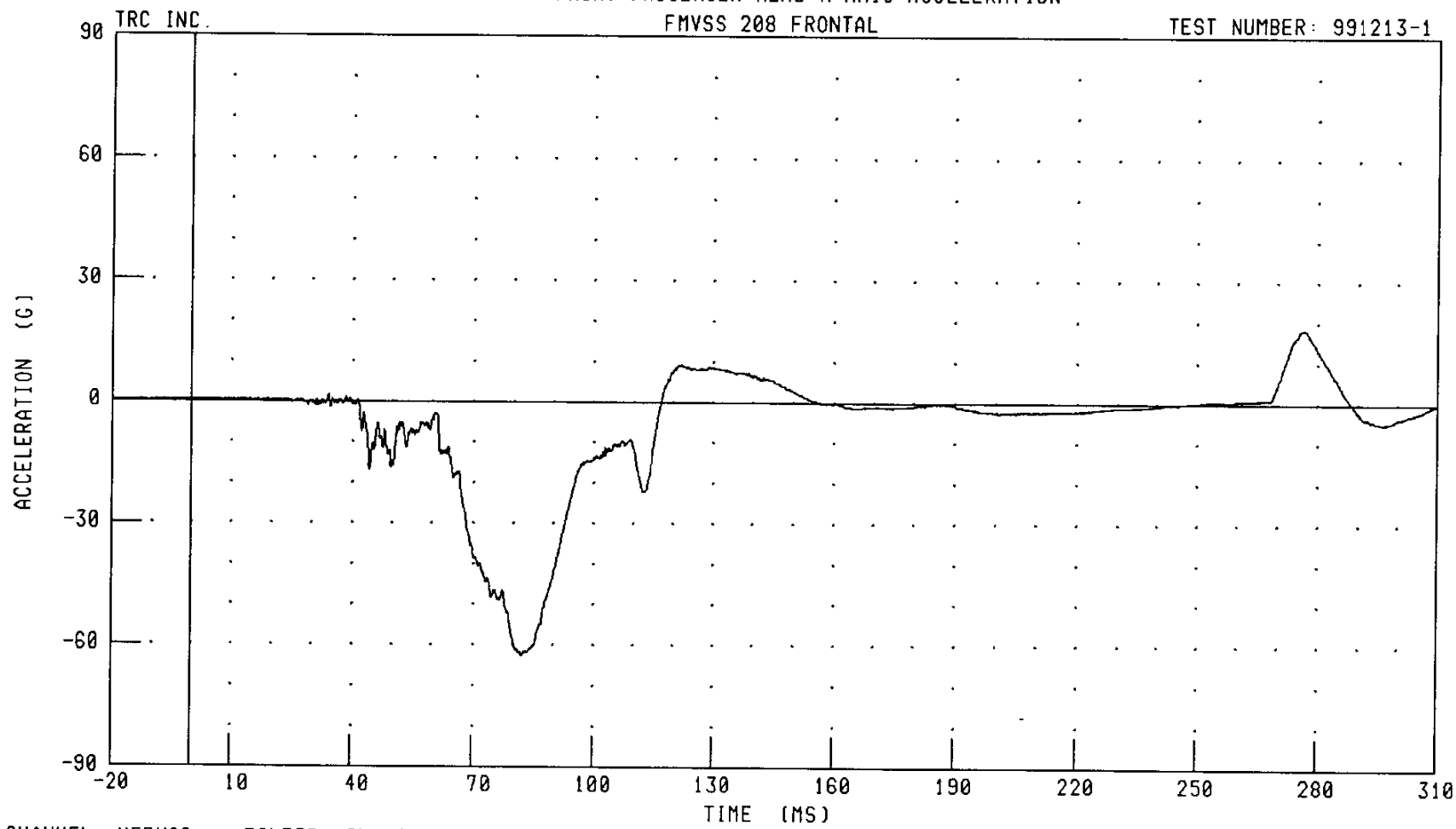
CHANNEL: LFMF1 FILTER: CH. CLASS 600 PEAK DATA: 755.61 N @ 210.24 MS; -3496.77 N @ 87.28 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER RIGHT FEMUR FORCE
FMVSS 208 FRONTAL



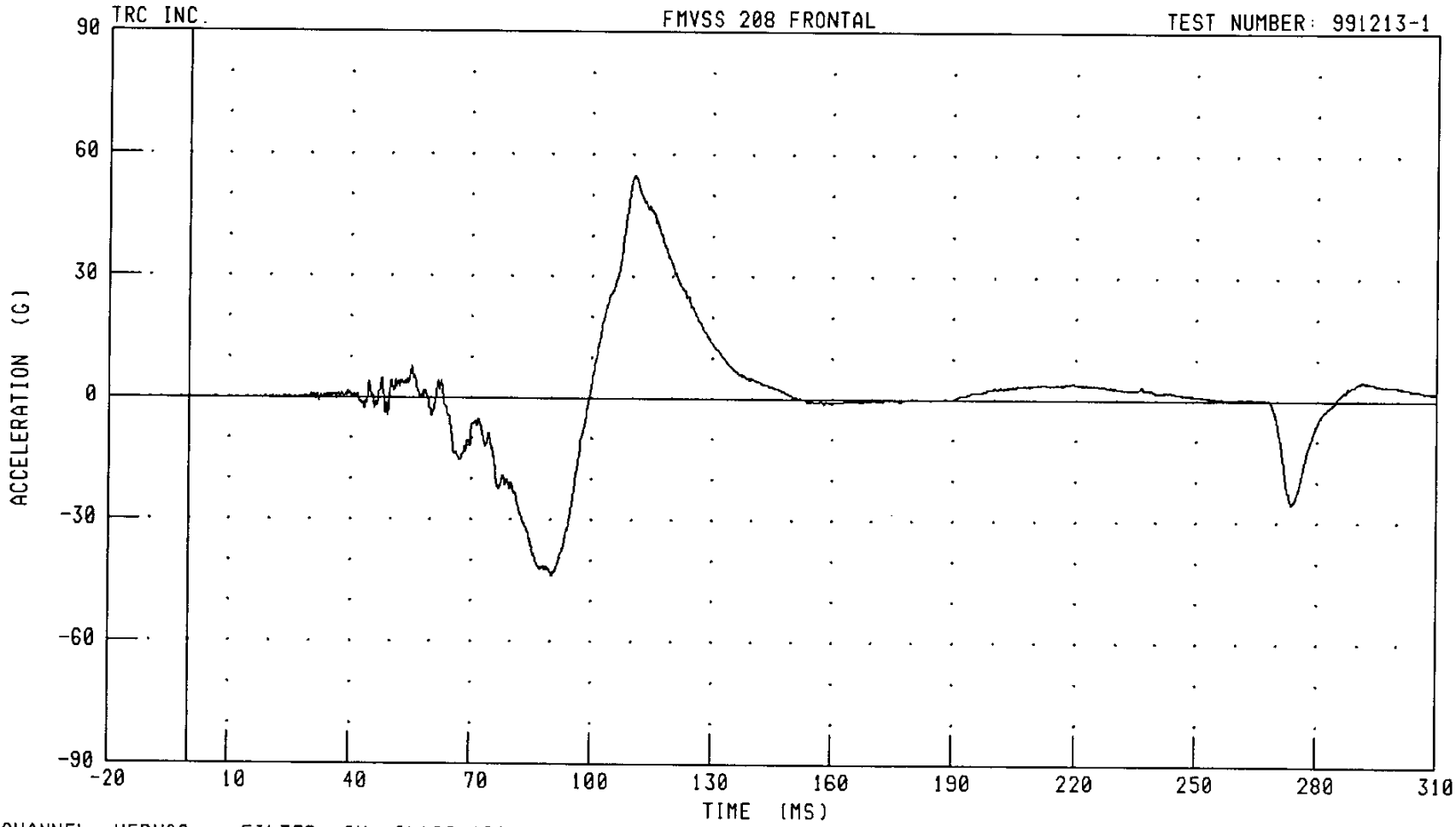
CHANNEL: RFMF1 FILTER: CH. CLASS 600 PEAK DATA: 362.69 N @ 59.12 MS; -5645.11 N @ 66.64 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION



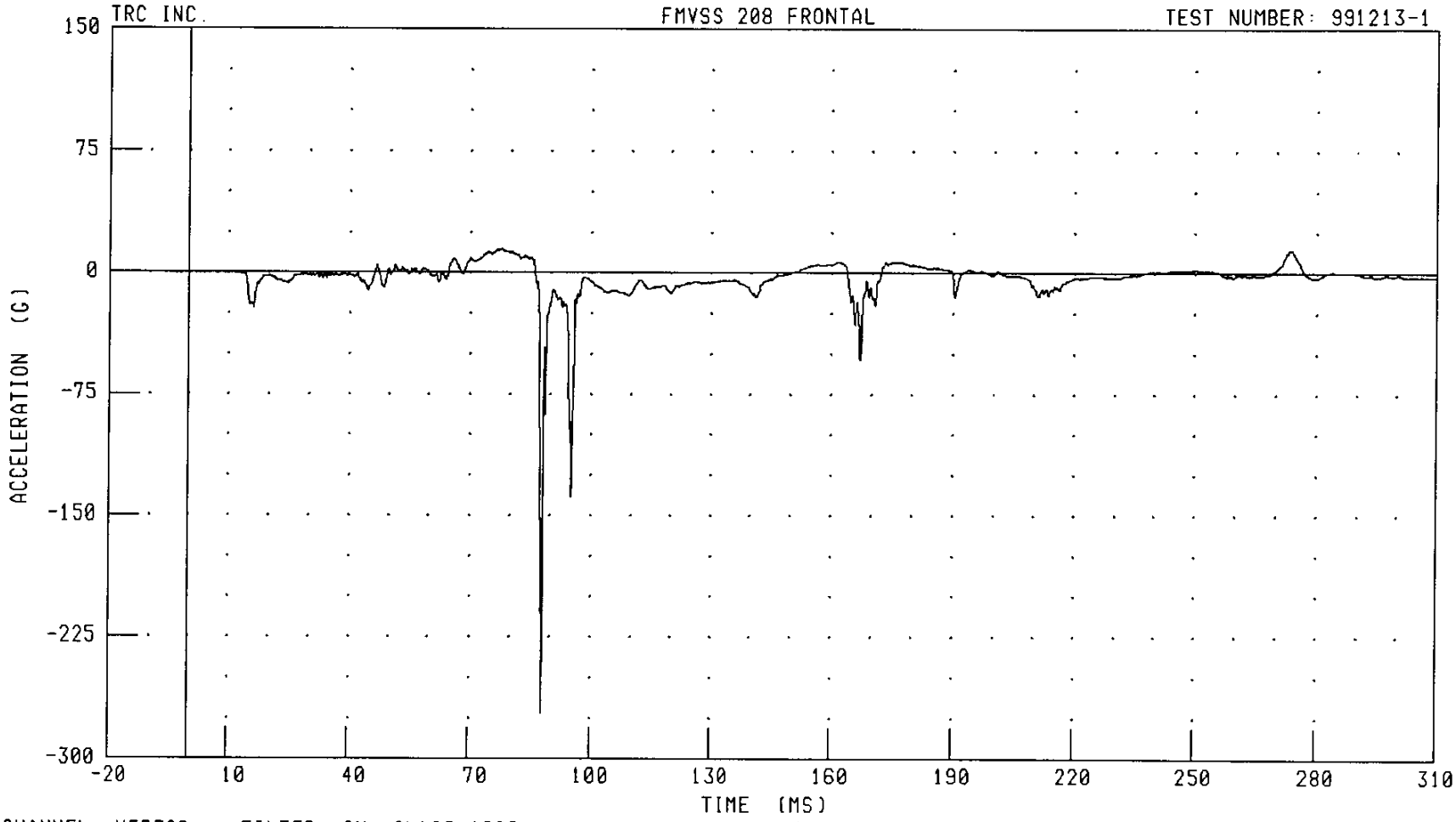
CHANNEL: HEDXG2 FILTER: CH. CLASS 1000 PEAK DATA: 18.46 G @ 276.56 MS; -62.70 G @ 82.24 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION



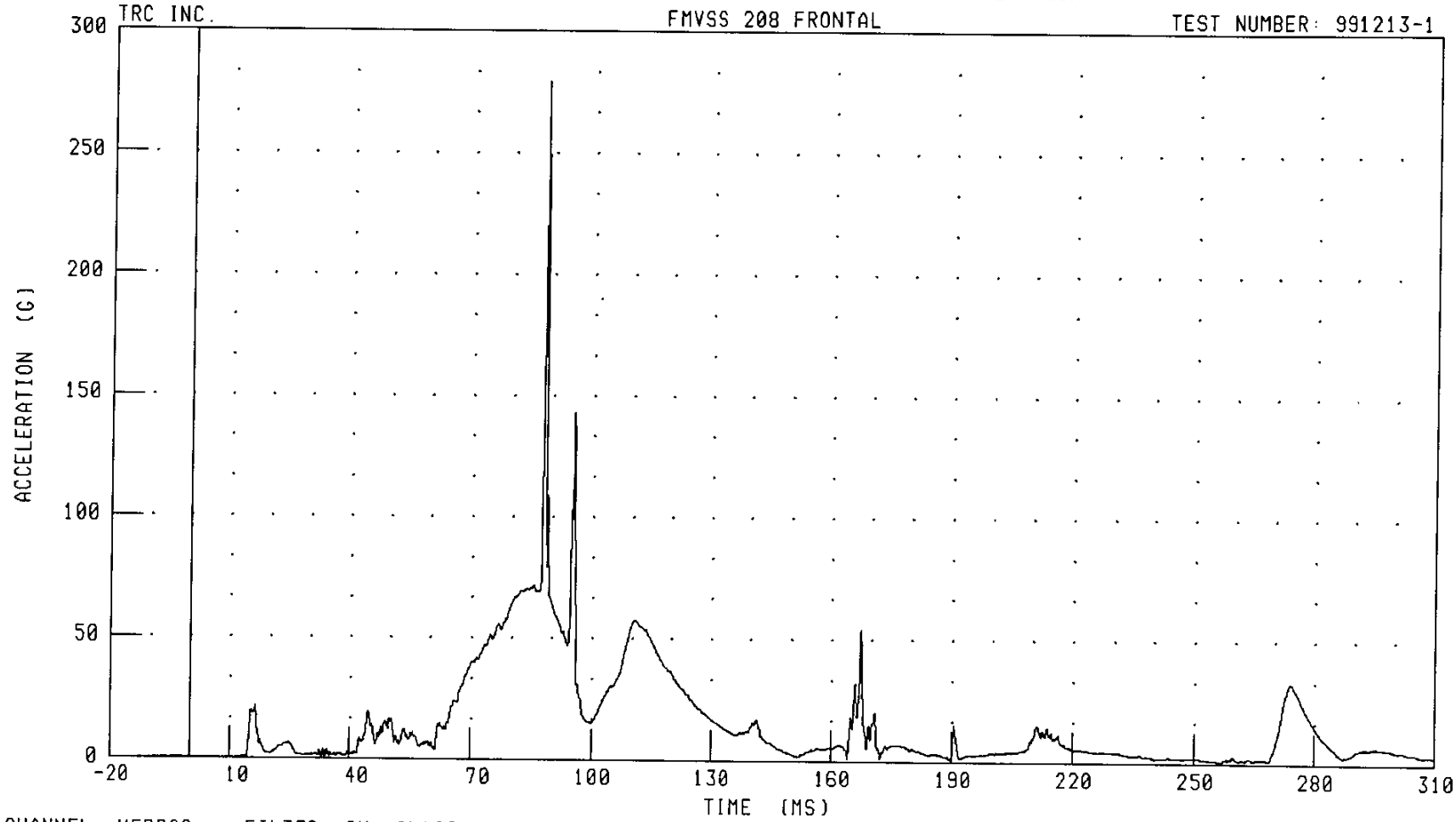
CHANNEL: HEDYG2 FILTER: CH. CLASS 1000 PEAK DATA: 54.73 G @ 110.56 MS; -43.75 G @ 90.24 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION



CHANNEL: HEDZG2 FILTER: CH. CLASS 1000 PEAK DATA: 14.58 G @ 77.92 MS; -272.02 G @ 88.16 MS

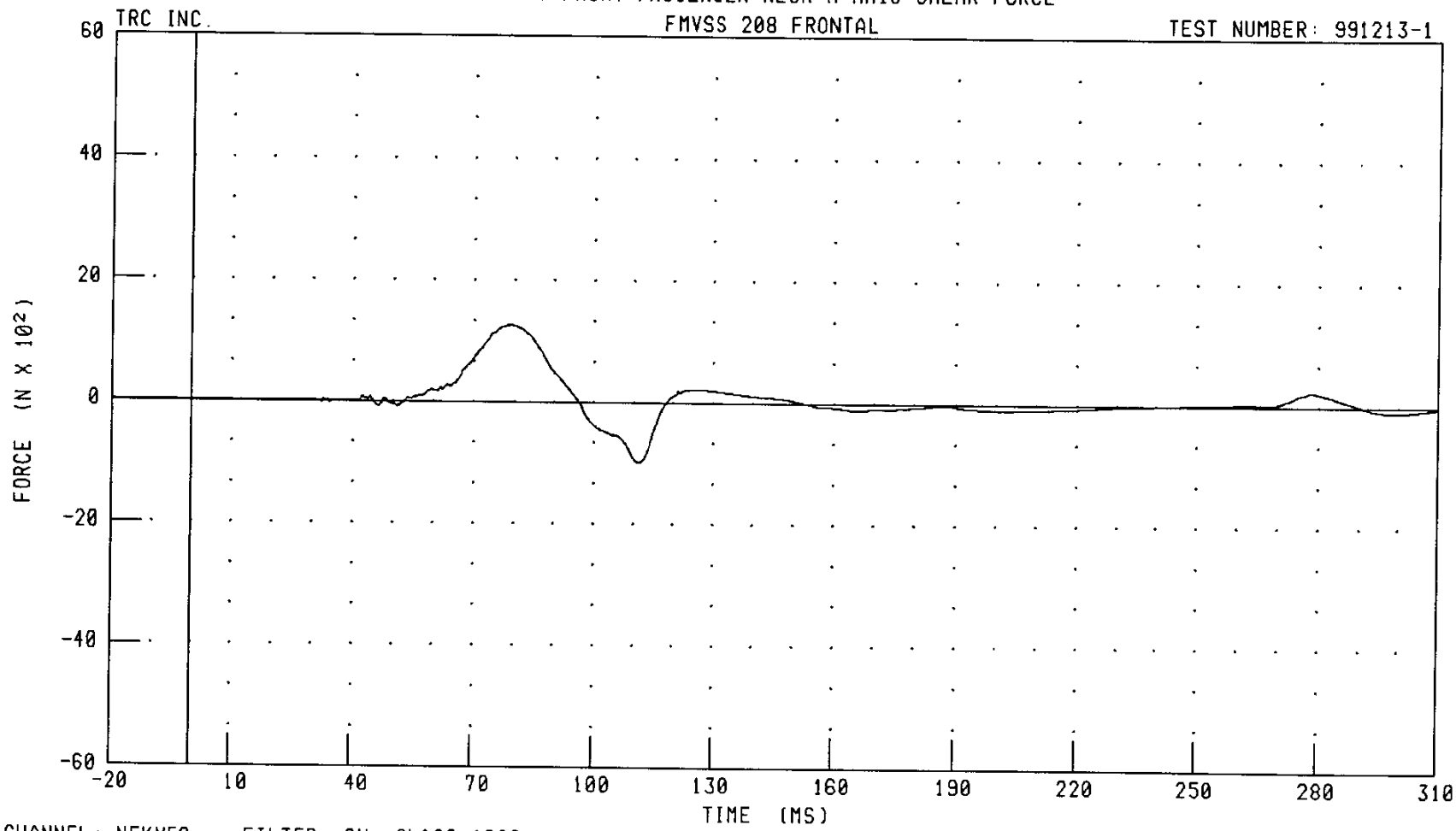
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
FMVSS 208 FRONTAL



CHANNEL: HEDRG2 FILTER: CH. CLASS 1000

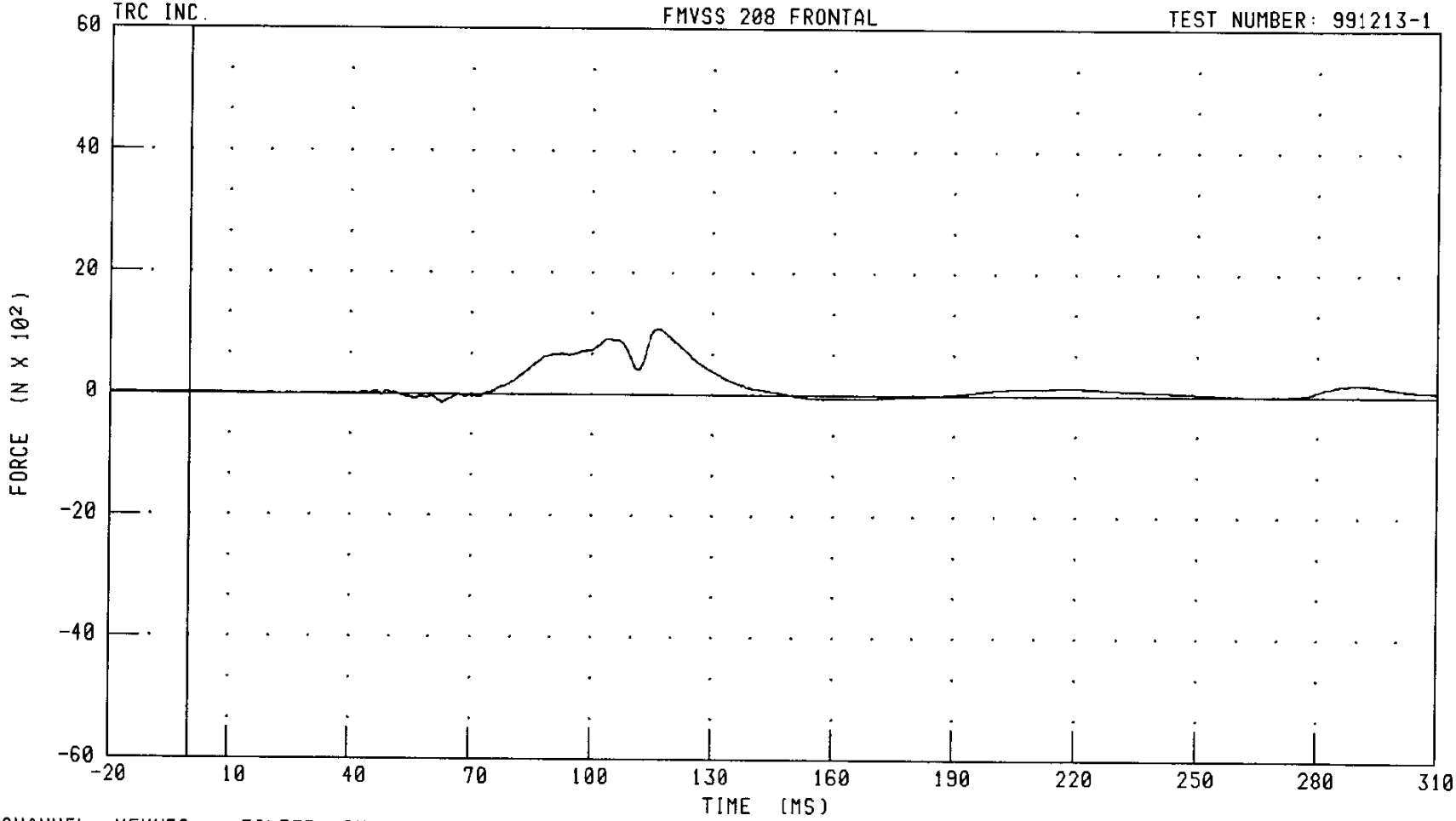
PEAK DATA: 279.51 G @ 88.16 MS; 0.08 G @ -20.00 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK X-AXIS SHEAR FORCE



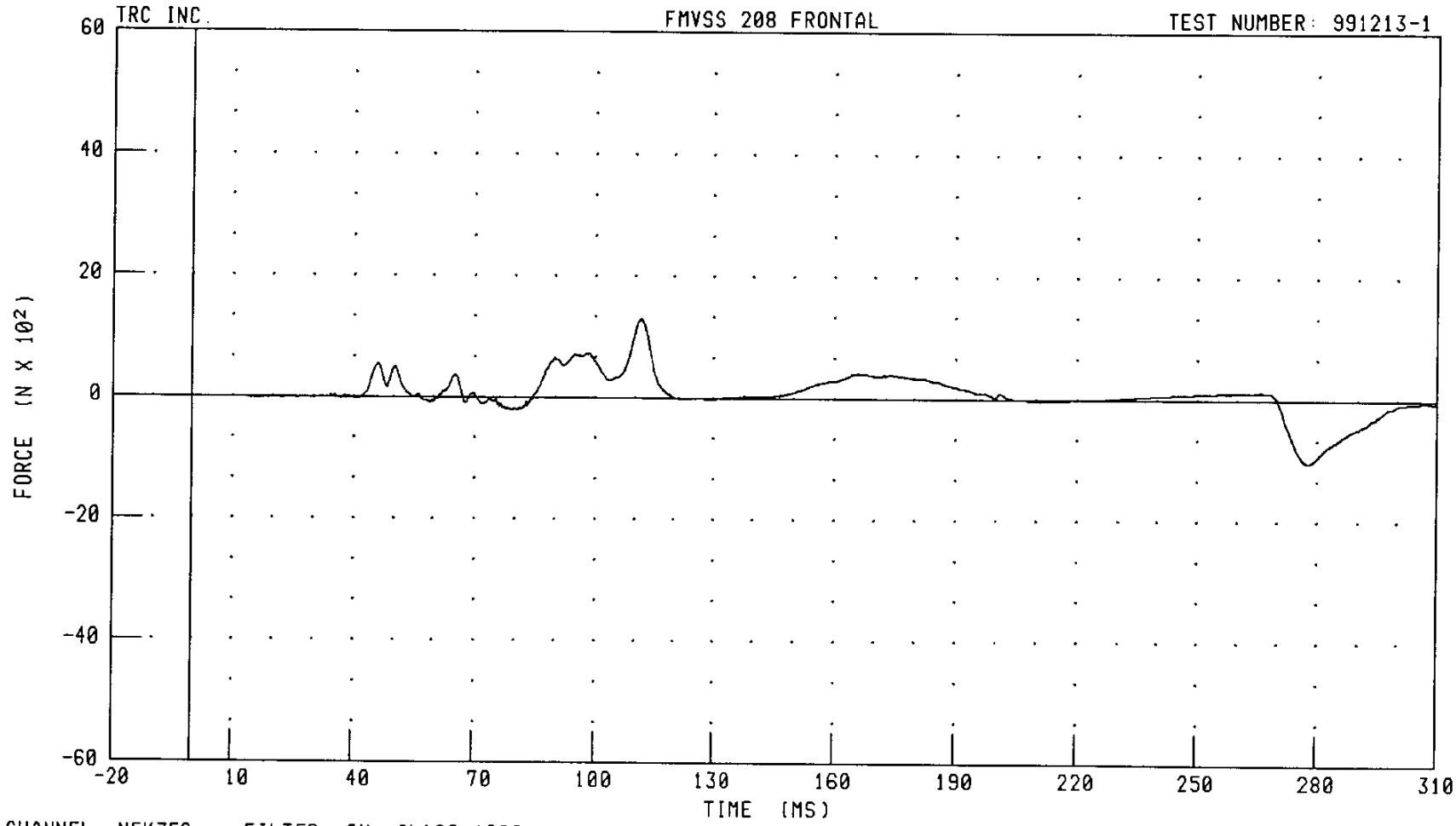
CHANNEL: NEKXF2 FILTER: CH. CLASS 1000 PEAK DATA: 1269.58 N @ 79.12 MS; -992.58 N @ 111.60 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK Y-AXIS SHEAR FORCE



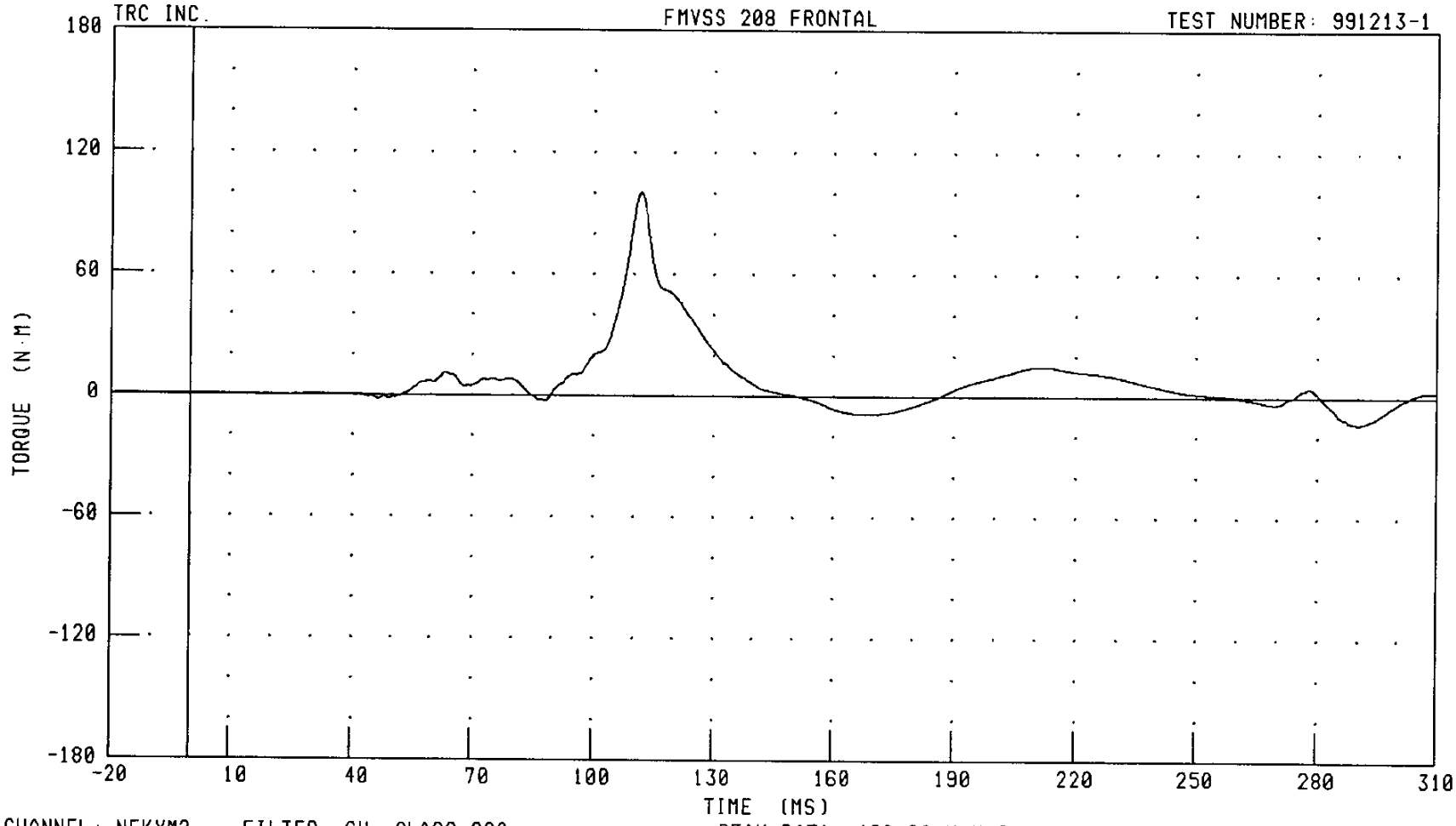
CHANNEL: NEKYF2 -- FILTER: CH. CLASS 1000 PEAK DATA: 1084.08 N @ 116.48 MS; -154.50 N @ 63.04 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK Z-AXIS AXIAL FORCE



CHANNEL: NEKZF2 --FILTER: CH. CLASS 1000---------- PEAK DATA: 1296.60 N @ 111.68 MS; -1041.93 N @ 277.76 MS

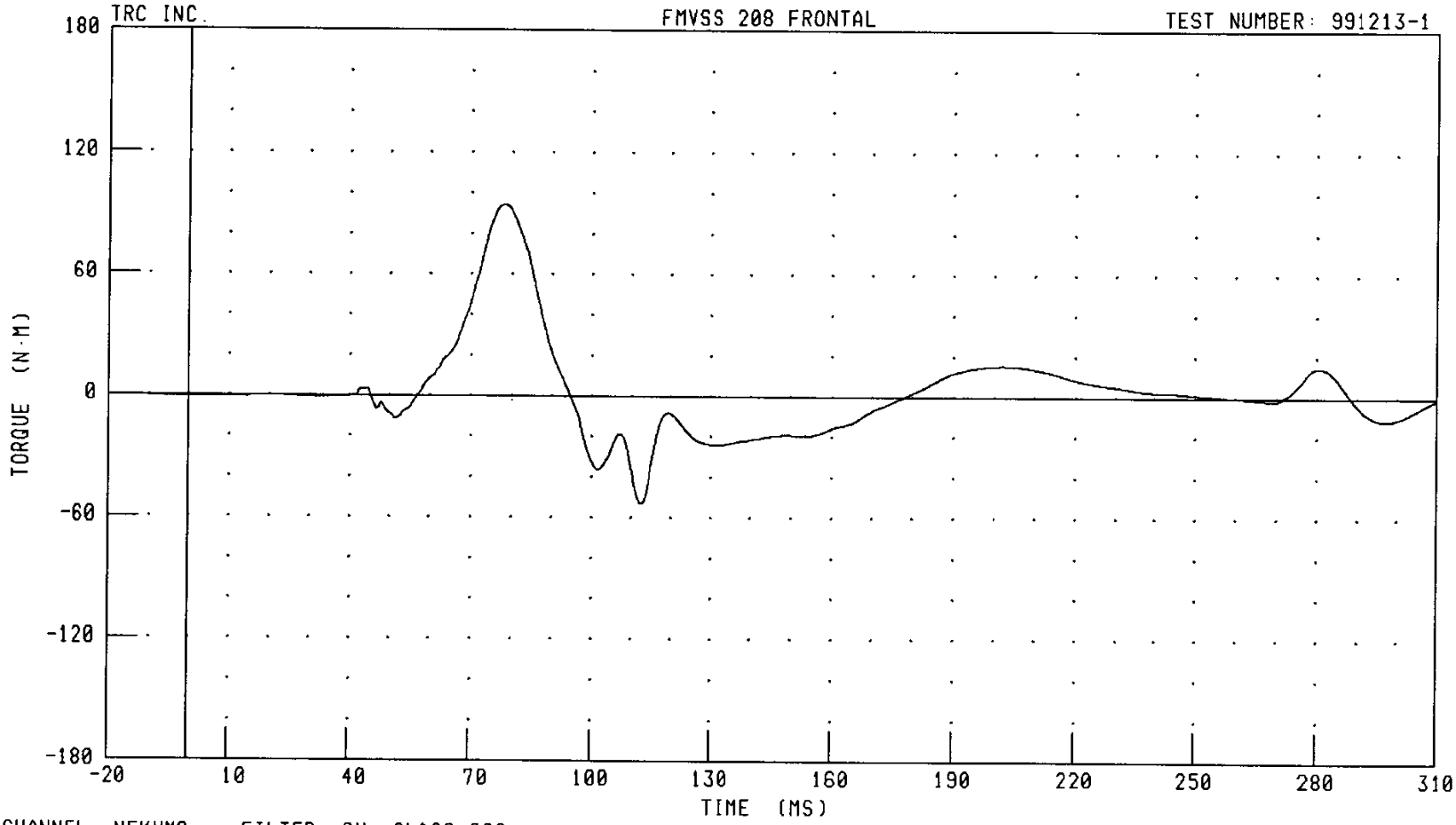
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK MOMENT ABOUT X AXIS



CHANNEL: NEKXM2 FILTER: CH. CLASS 600

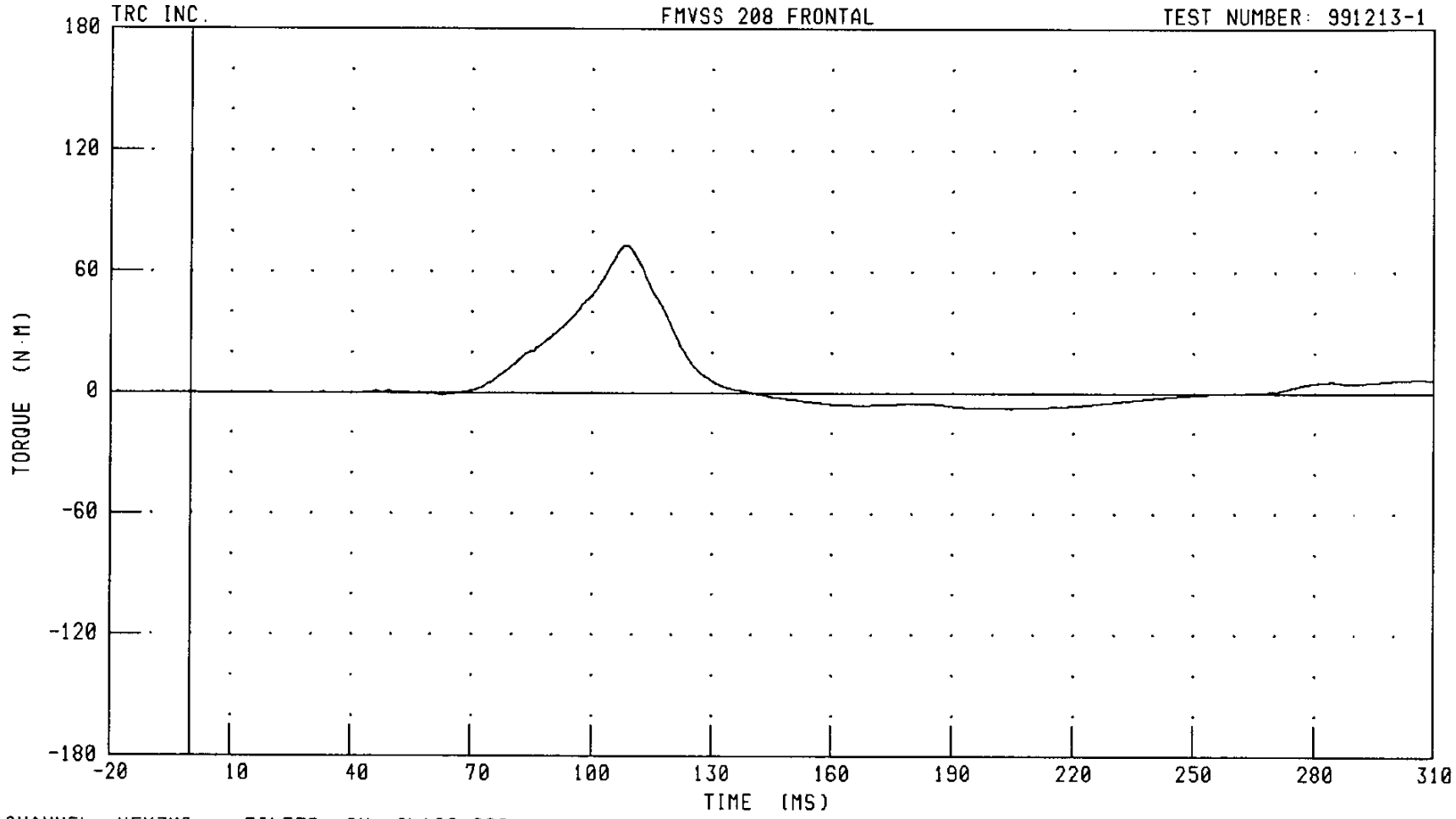
PEAK DATA: 100.20 N-M @ 111.92 MS; -13.29 N-M @ 290.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y AXIS



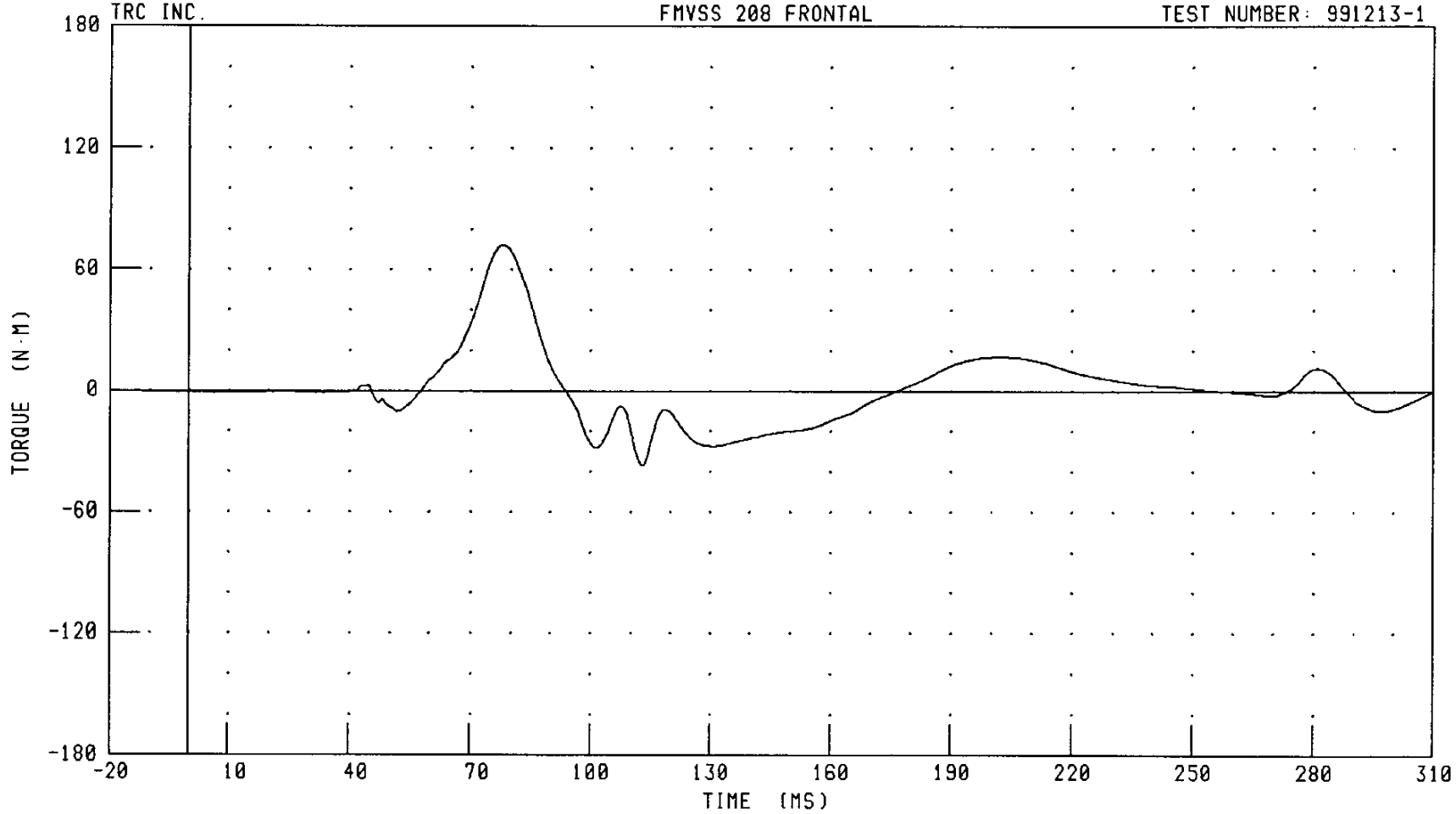
CHANNEL: NEKYM2 FILTER: CH. CLASS 600 PEAK DATA: 94.45 N-M @ 78.24 MS; -53.29 N-M @ 112.72 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Z AXIS



CHANNEL: NEKZM2 FILTER: CH. CLASS 600 PEAK DATA: 73.05 N-M @ 108.80 MS; -7.60 N-M @ 203.28 MS

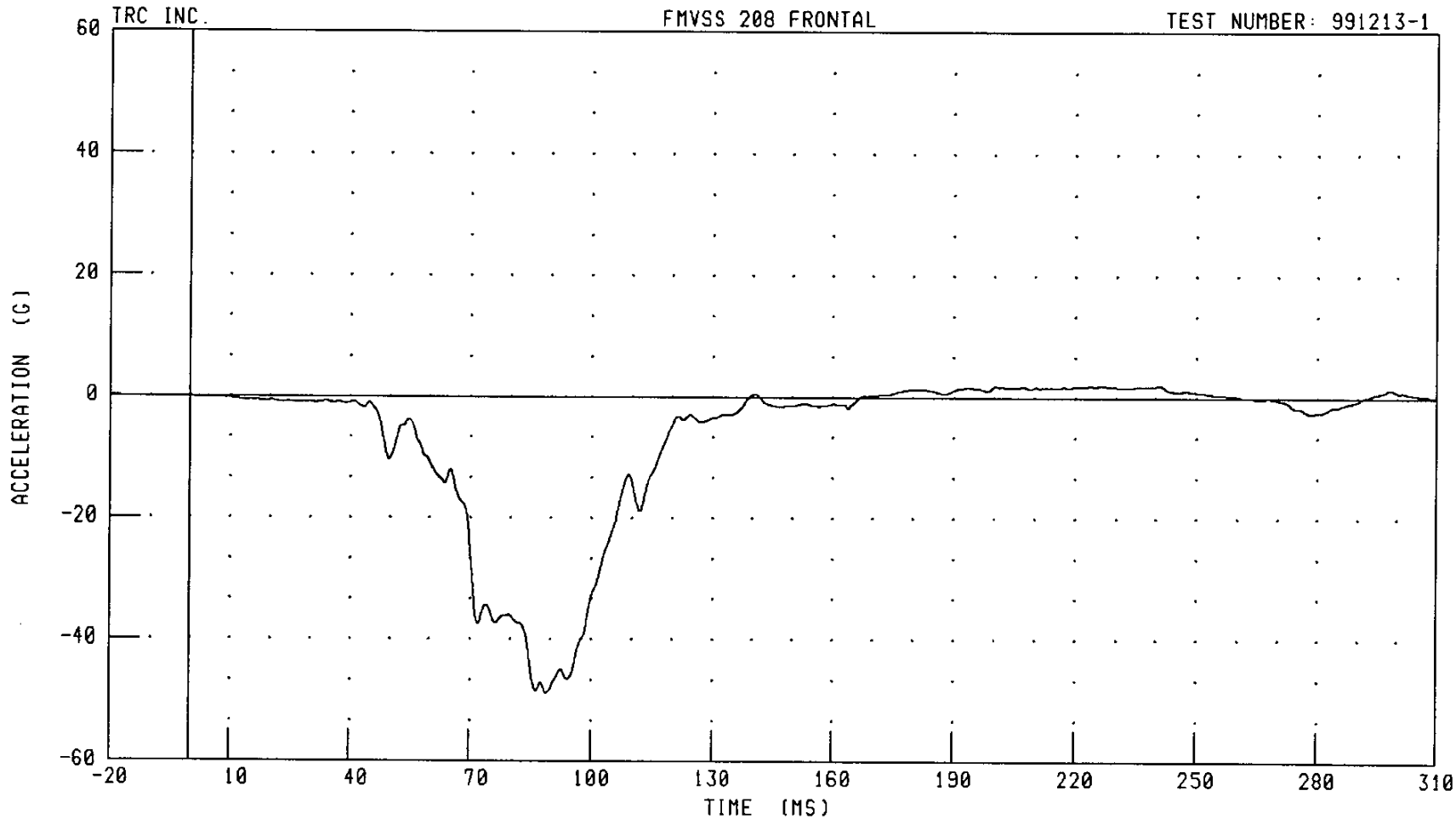
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER NECK OCCIPITAL CONDYLE MOMENT ABOUT Y AXIS



CHANNEL: NEKOM2 ---FILTER: CH. CLASS 600

PEAK DATA: 72.12 N-M @ 78.24 MS; -36.99 N-M @ 113.04 MS

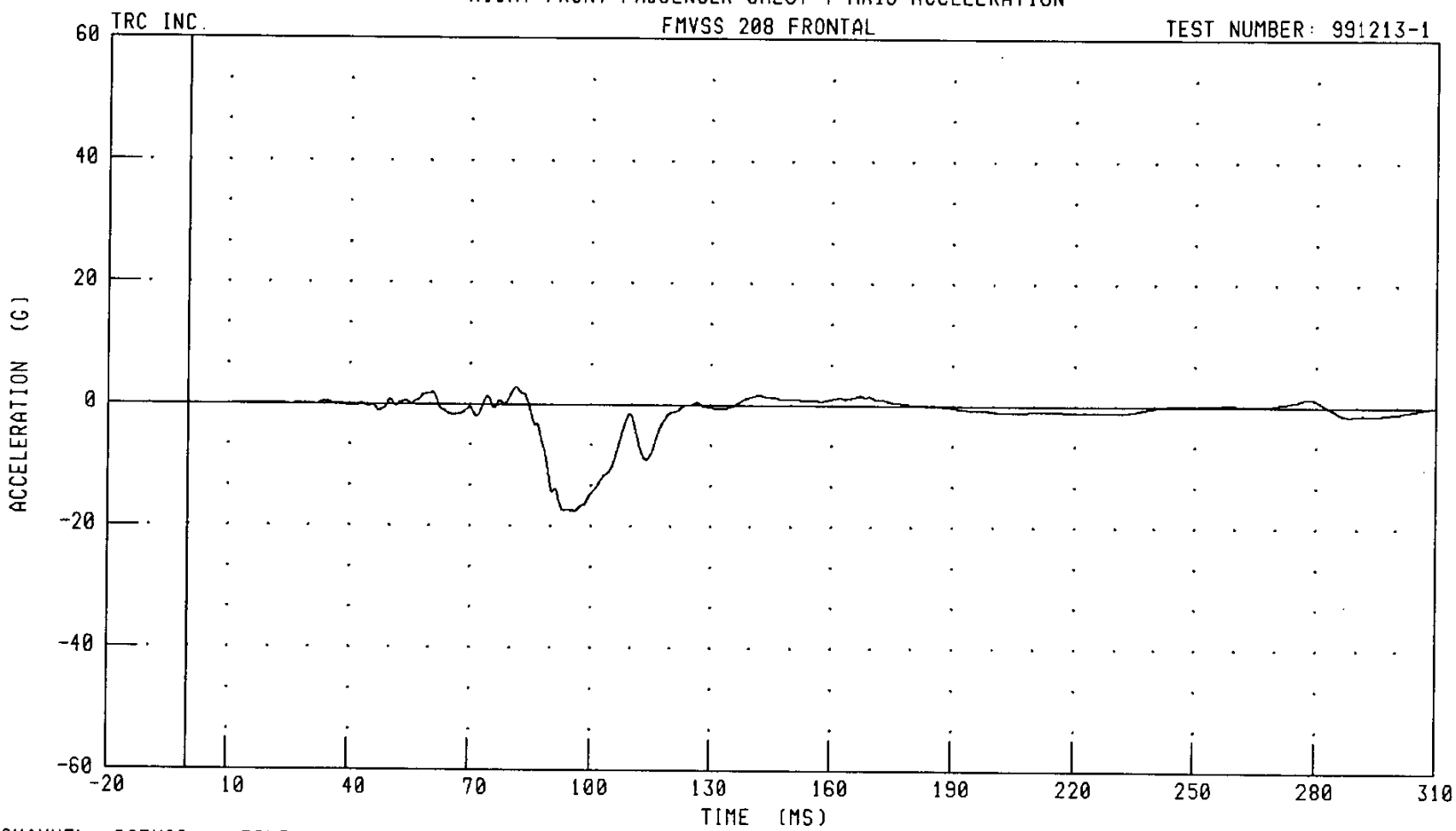
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION



CHANNEL: CSTXC2 - -FILTER: CH. CLASS 180

PEAK DATA: 1.98 G @ 241.04 MS; -48.87 G @ 88.88 MS

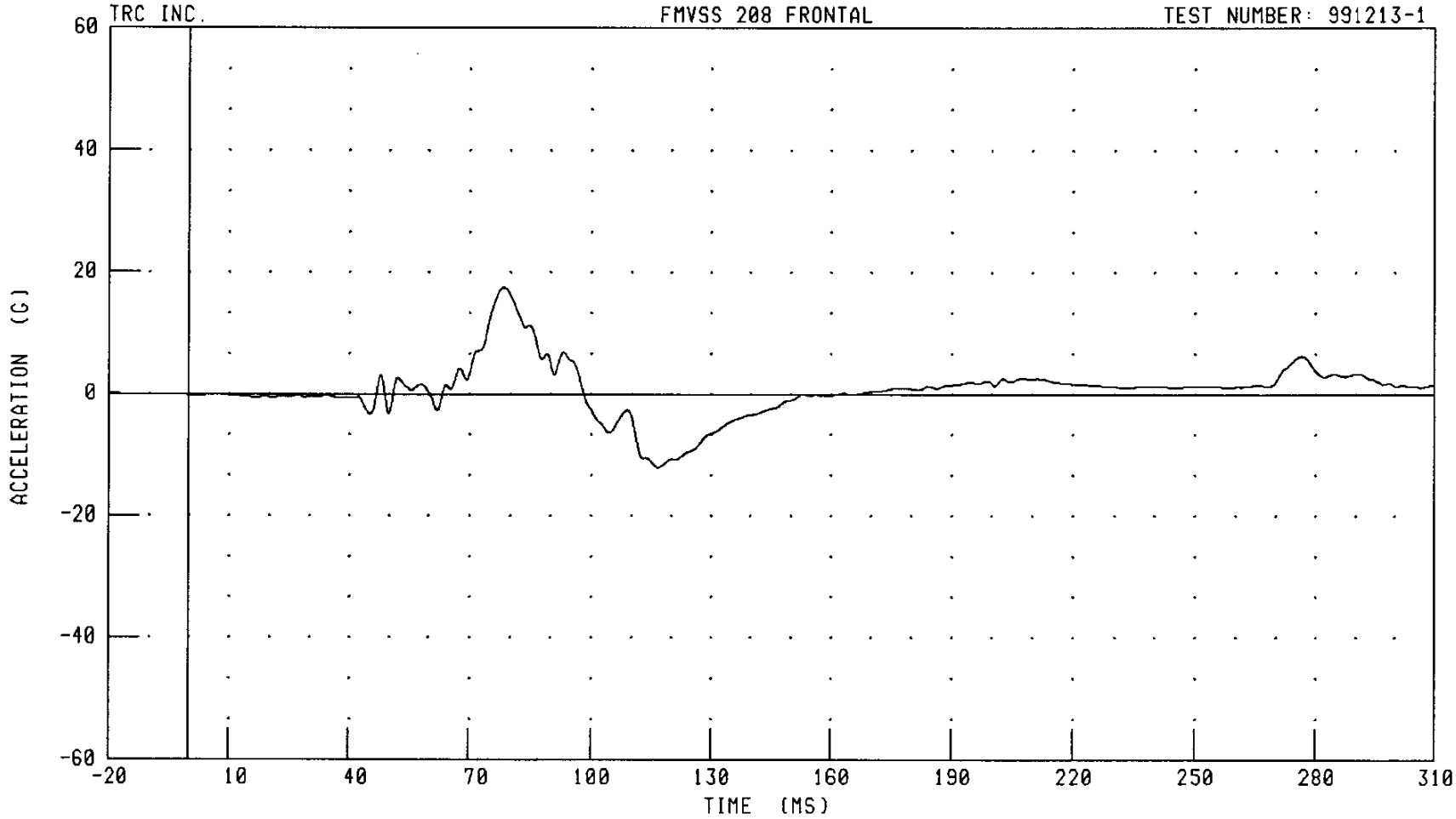
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION



CHANNEL: CSTYG2 ----FILTER: CH: CLASS 180 ----

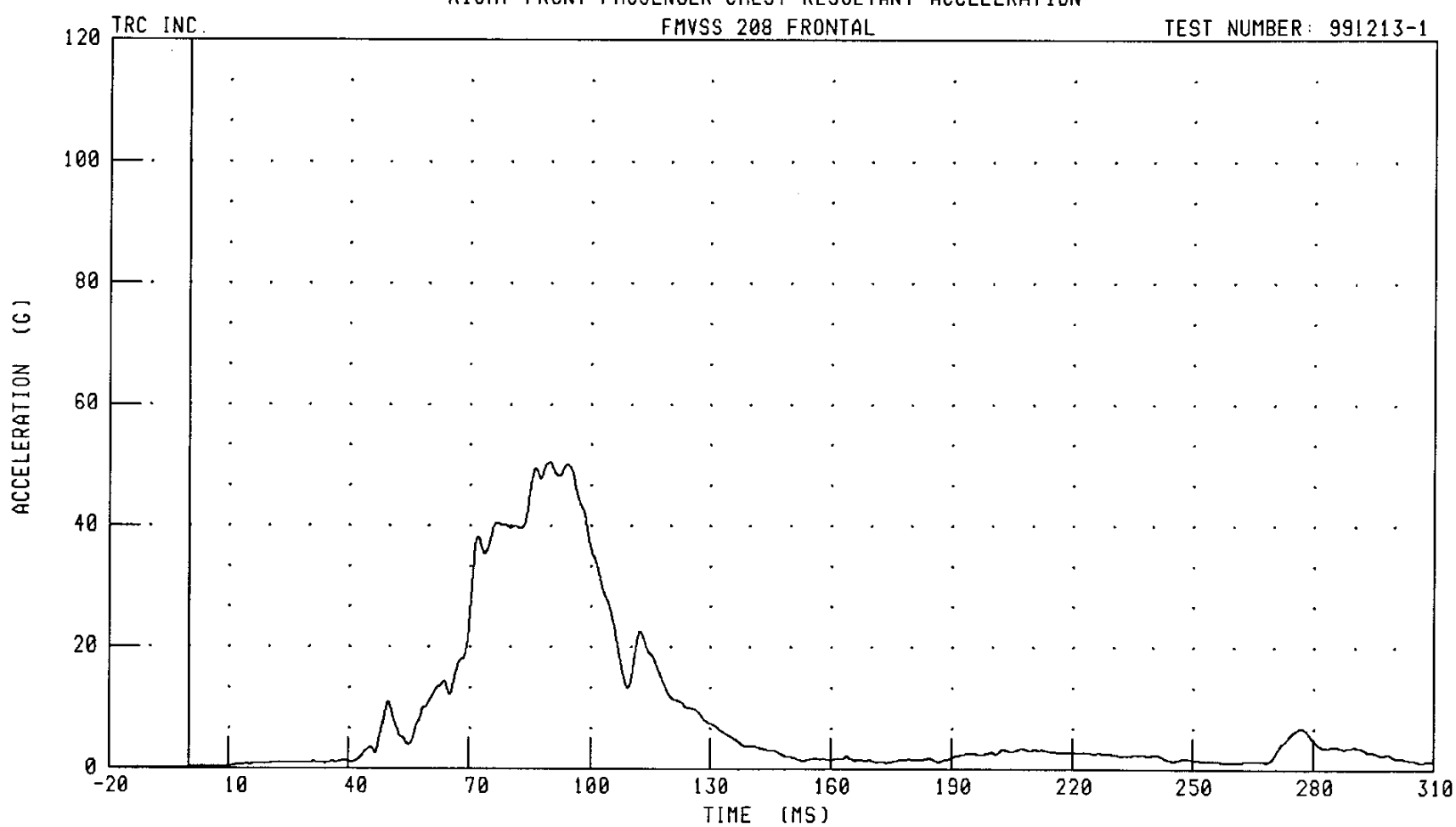
PEAK DATA: -2.81 G @ 81.44 MS; -17.45 G @ 96.24 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION



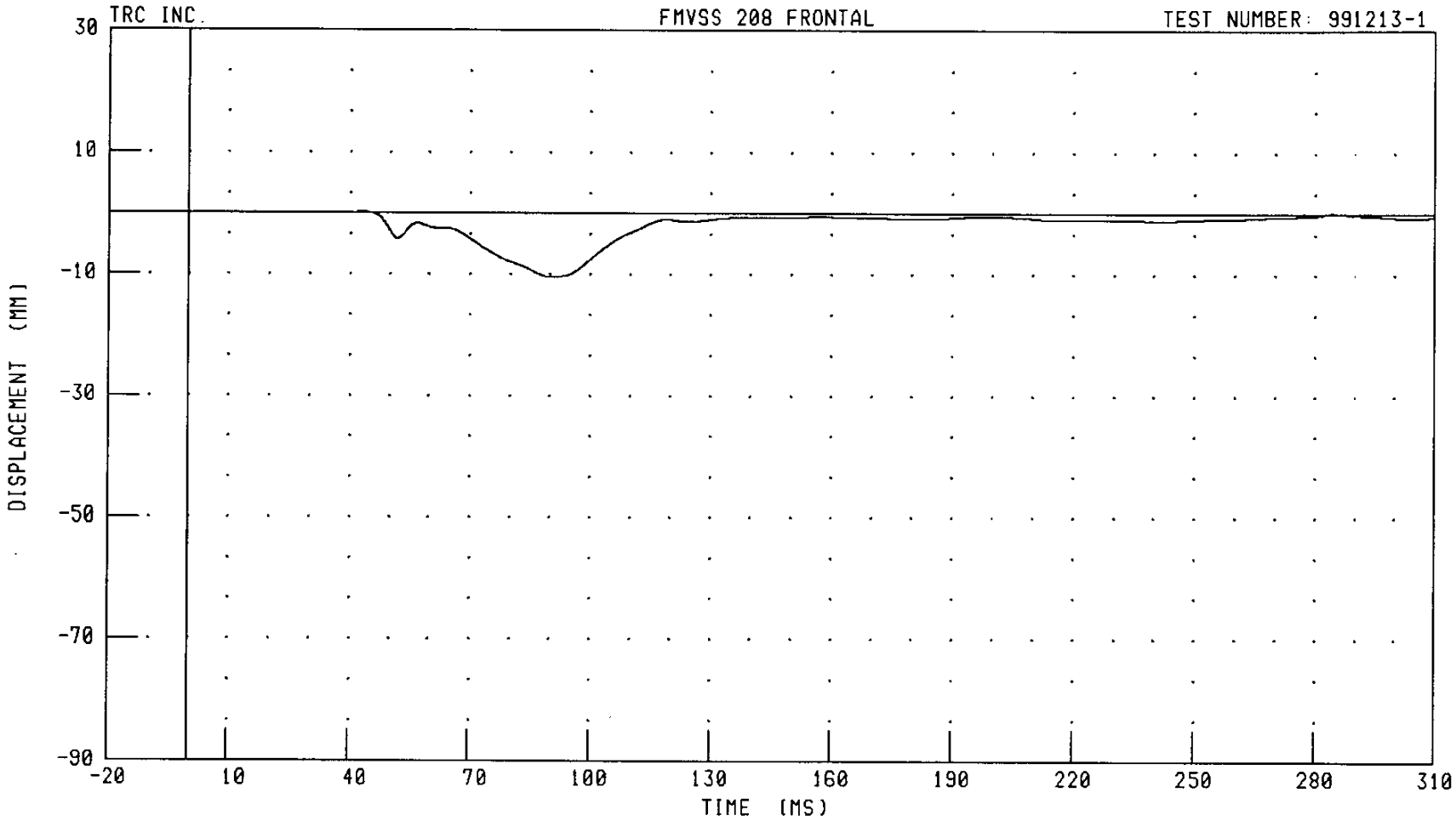
CHANNEL: CSTZG2 FILTER: CH. CLASS 180 PEAK DATA: -17.49 G @ 78.56 MS; -12.06 G @ 116.88 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION

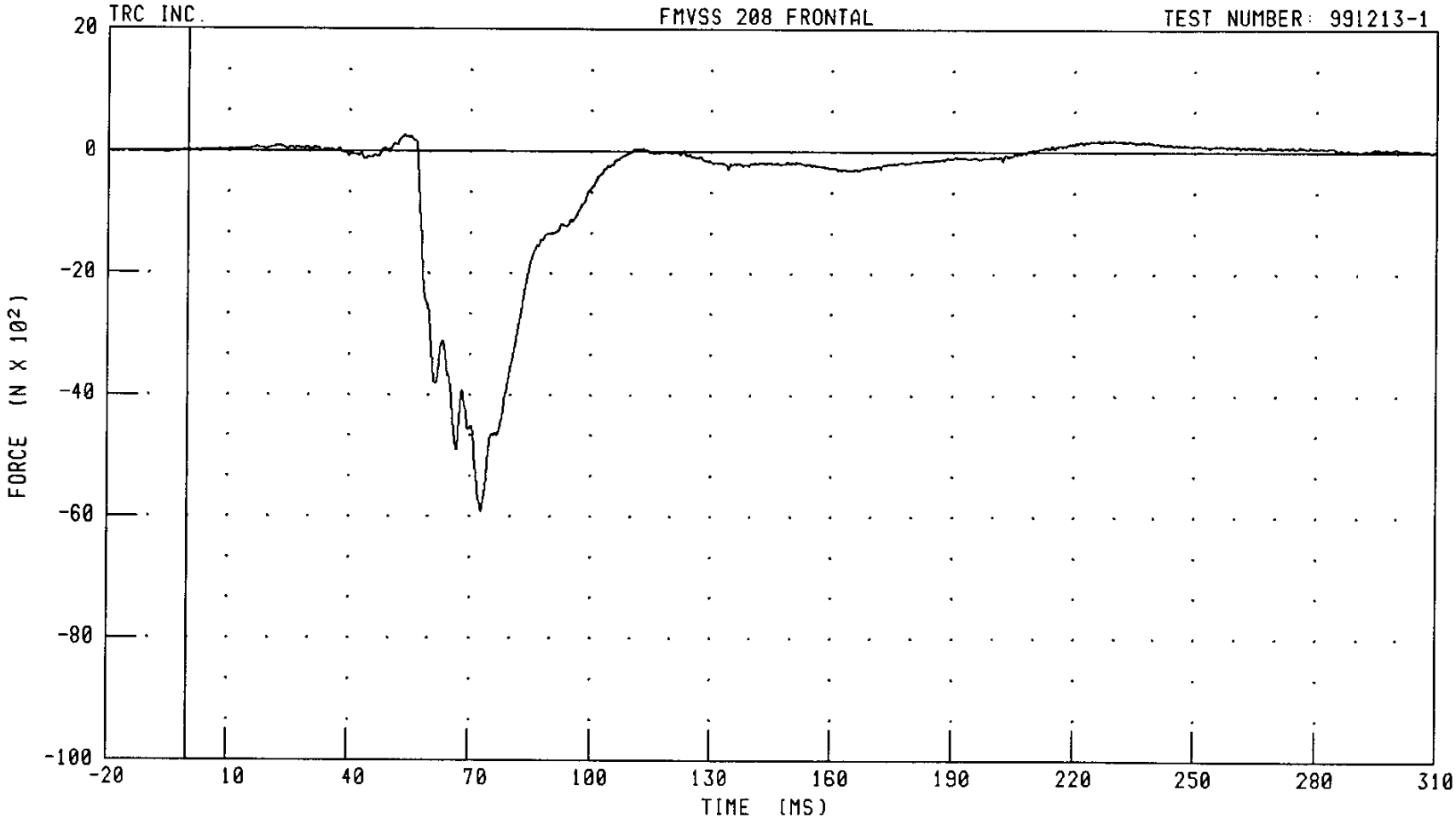


CHANNEL: CSTRG2 FILTER: CH. CLASS 180 PEAK DATA: 50.45 G @ 89.84 MS; 0.01 G @ -20.00 MS

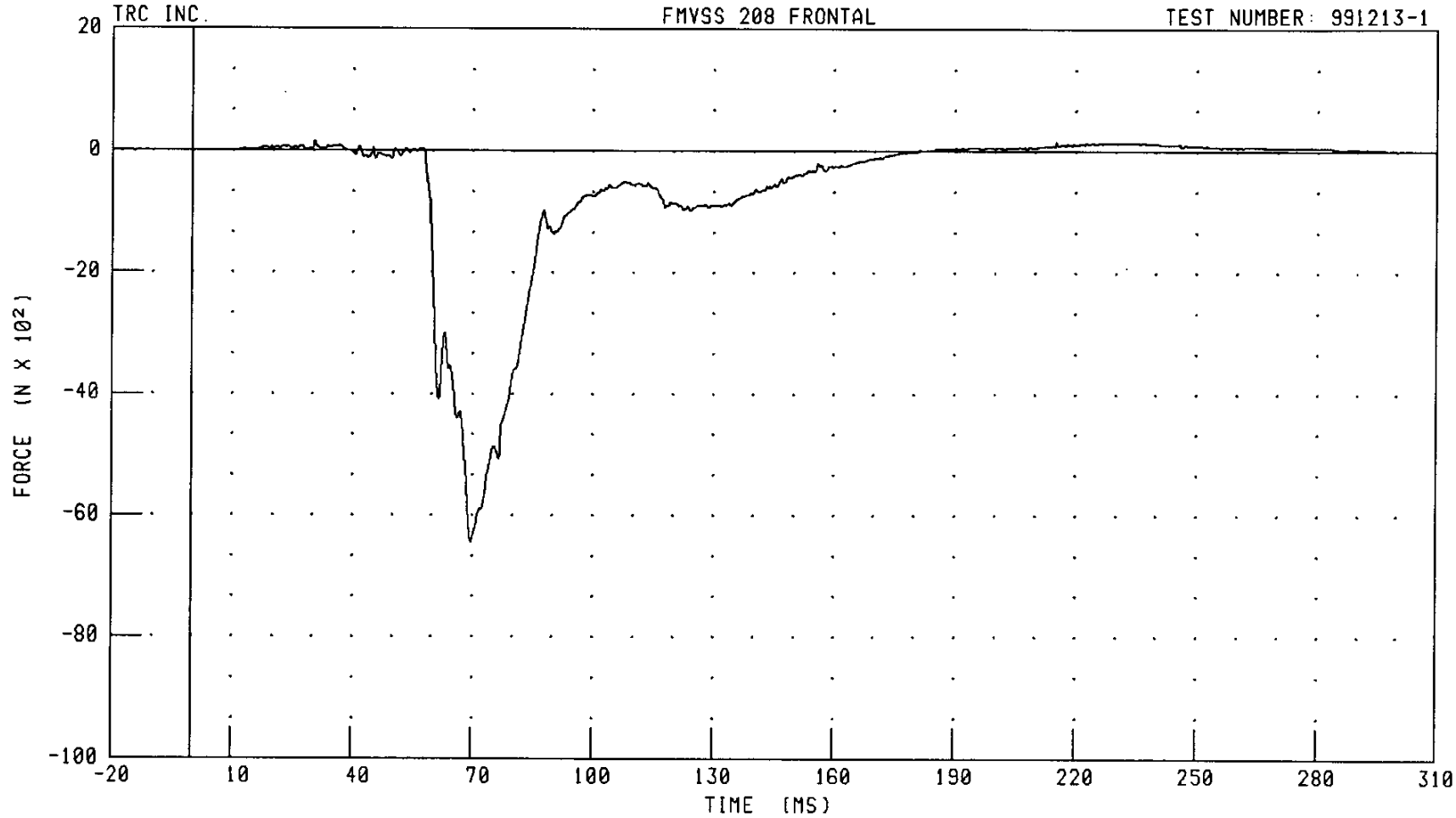
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER CHEST DEFLECTION



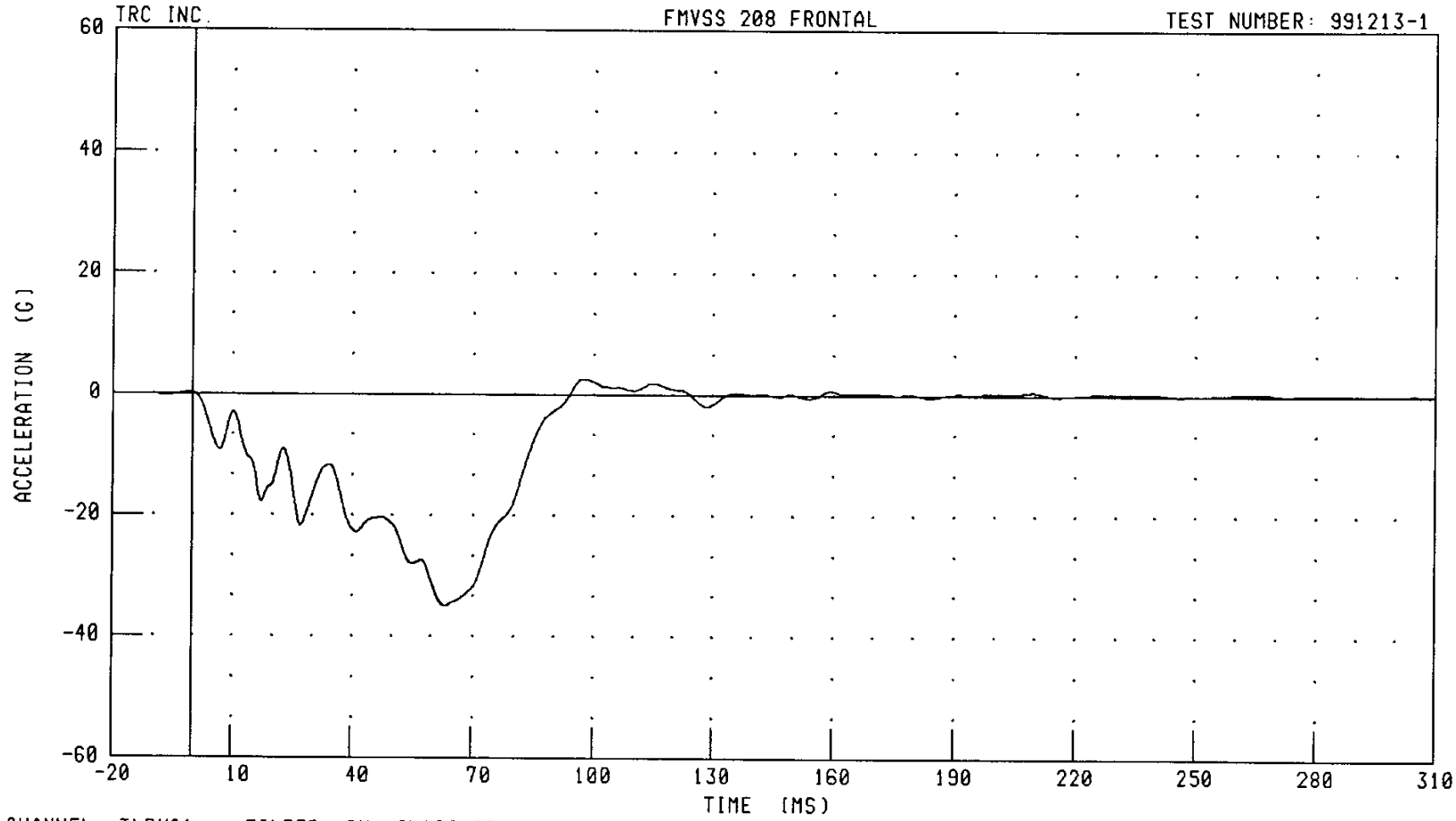
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER LEFT FEMUR FORCE



1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE

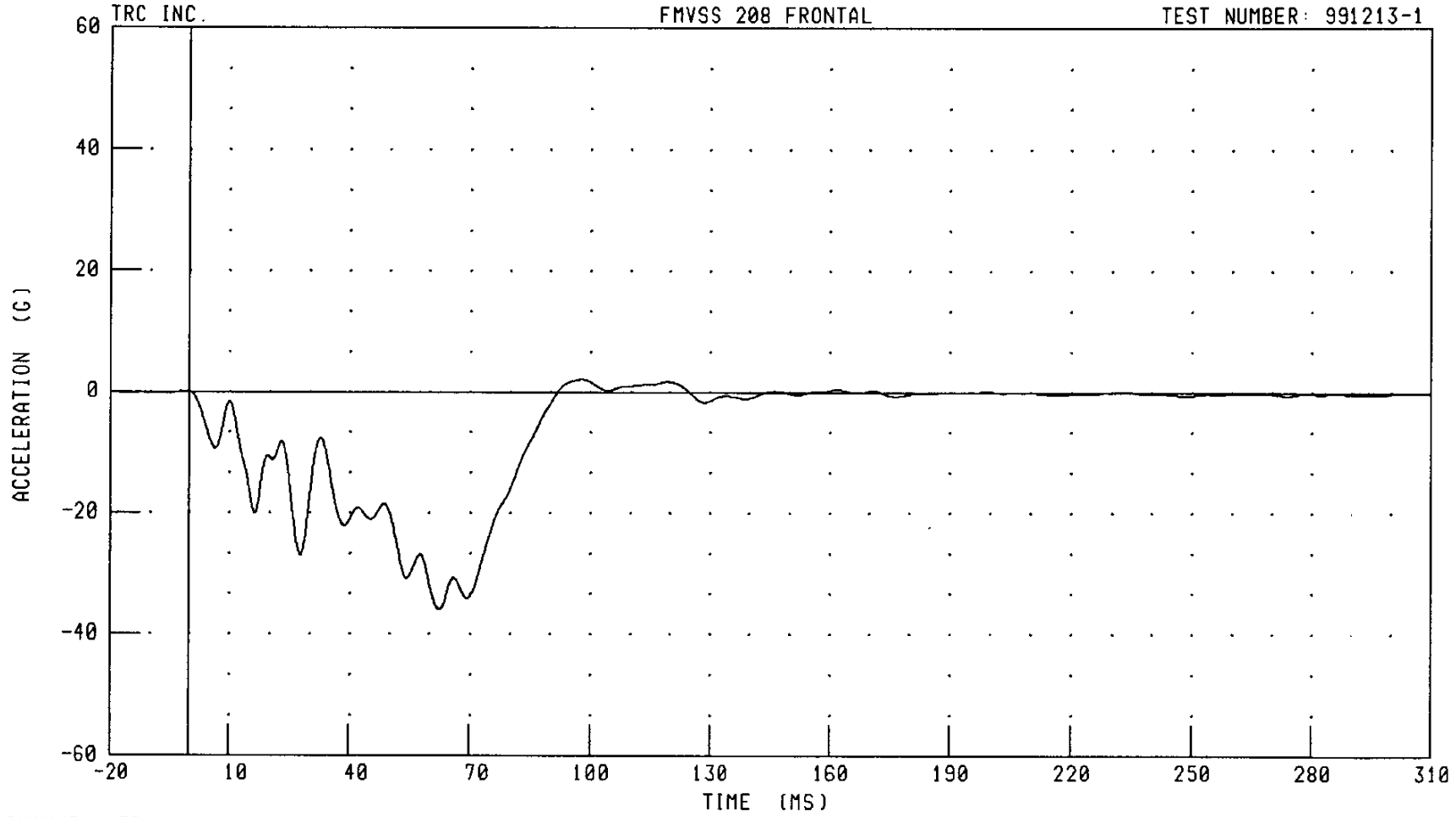


1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
LEFT REAR SEAT X-AXIS ACCELERATION



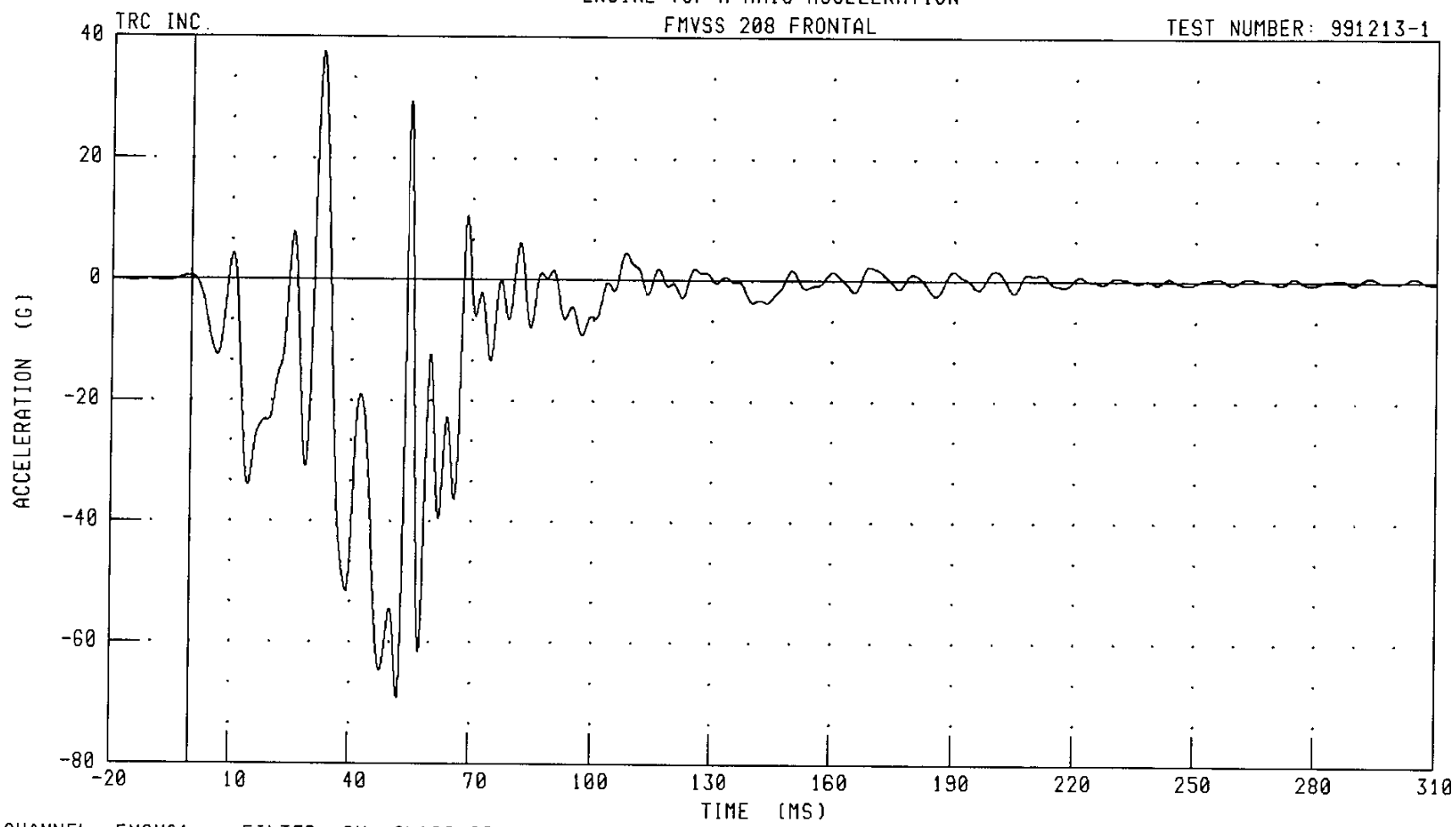
CHANNEL: TLRXG1 FILTER: CH. CLASS 60 PEAK DATA: 2.54 G @ 97.84 MS; -35.01 G @ 63.36 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT REAR SEAT X-AXIS ACCELERATION



CHANNEL: TRRXG1 FILTER: CH. CLASS 60 PEAK DATA: 2.07 G @ 97.92 MS; -35.96 G @ 62.56 MS

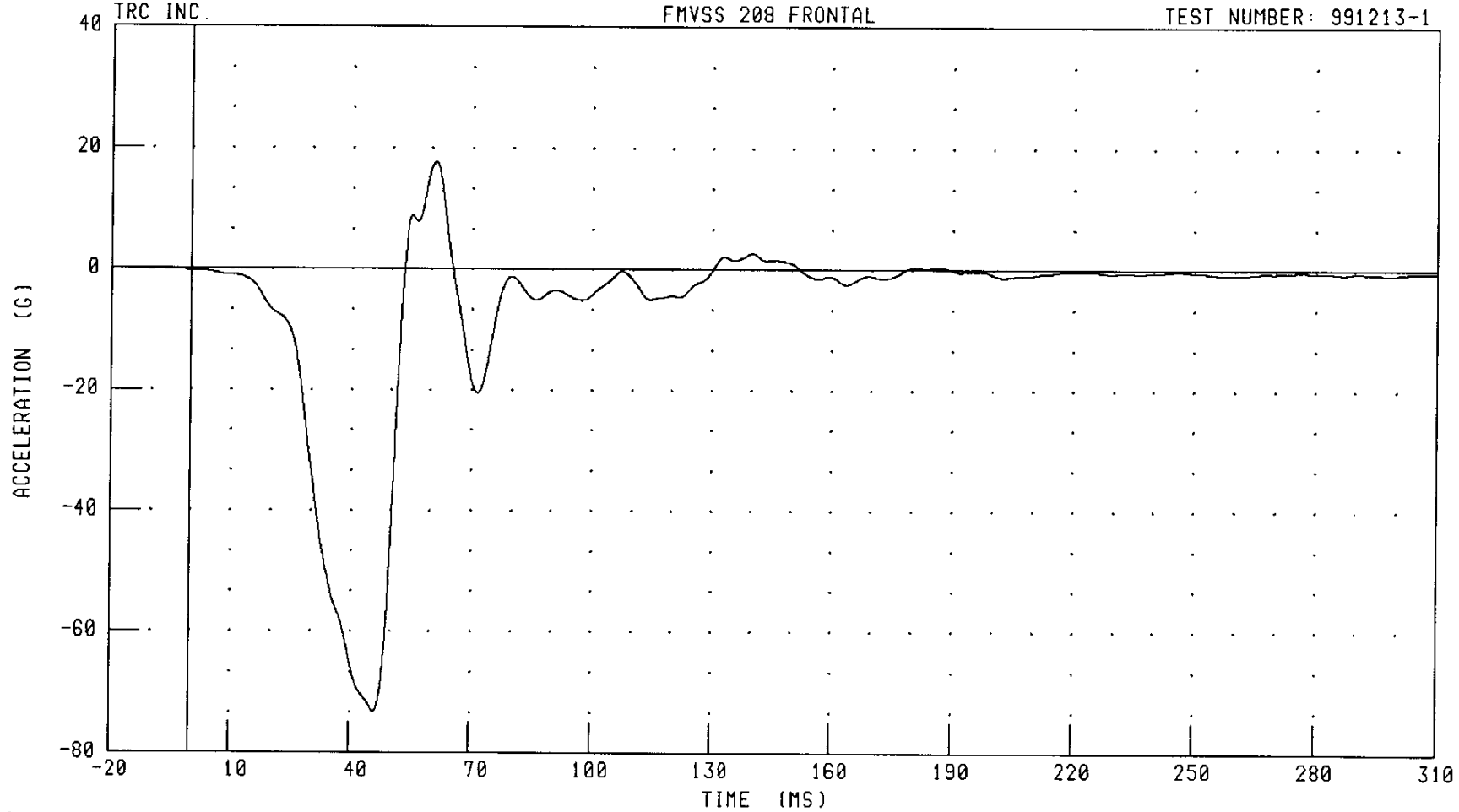
1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
ENGINE TOP X-AXIS ACCELERATION
FMVSS 208 FRONTAL



CHANNEL: ENGXG1 FILTER: CH. CLASS 60

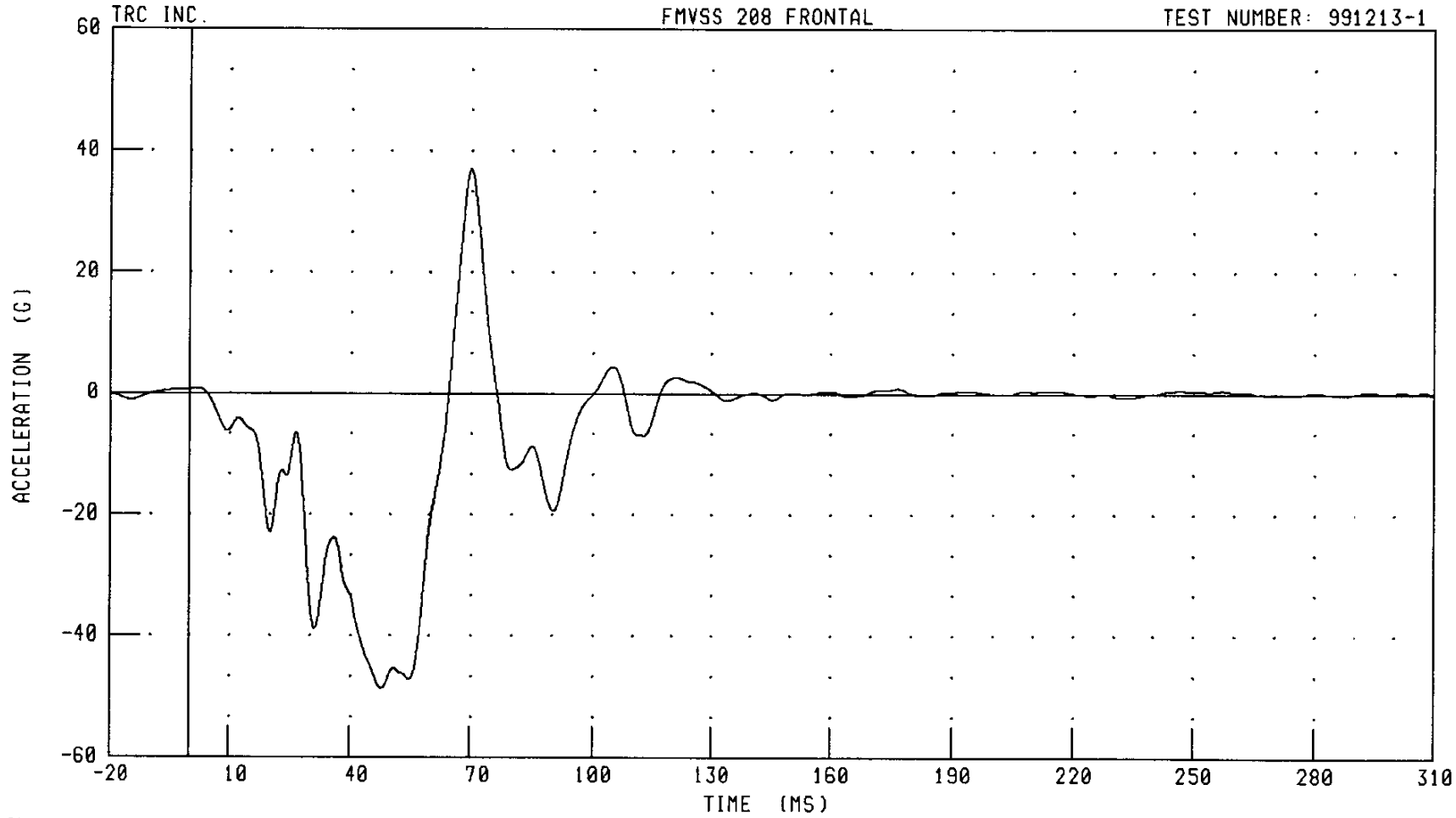
PEAK DATA: 37.50 G @ 32.72 MS; -69.26 G @ 52.08 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
ENGINE BOTTOM X-AXIS ACCELERATION



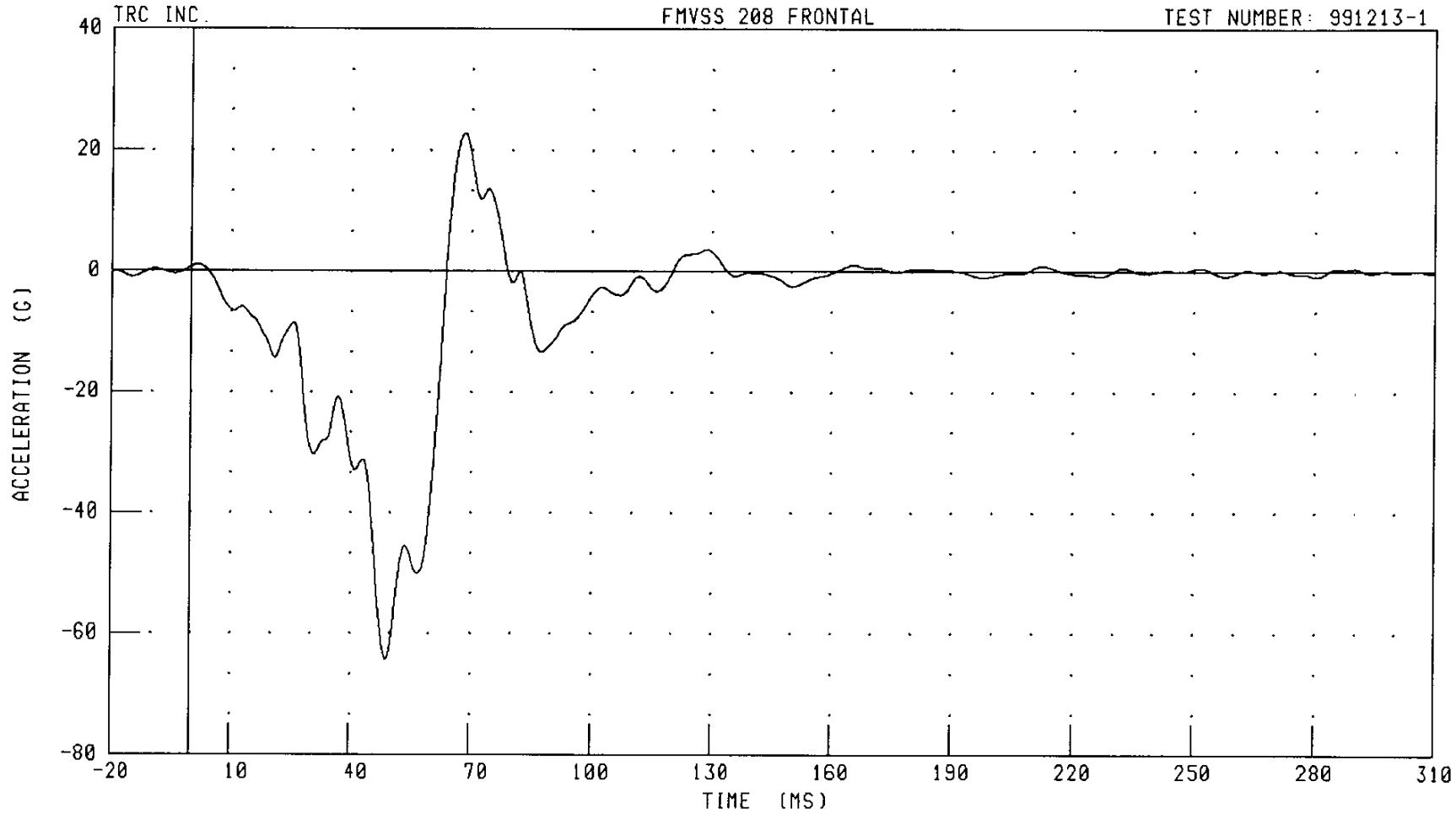
CHANNEL: ENGXC2 FILTER: CH. CLASS 60 PEAK DATA: 17.76 G @ 61.04 MS; -73.26 G @ 46.08 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
RIGHT BRAKE CALIPER X-AXIS ACCELERATION



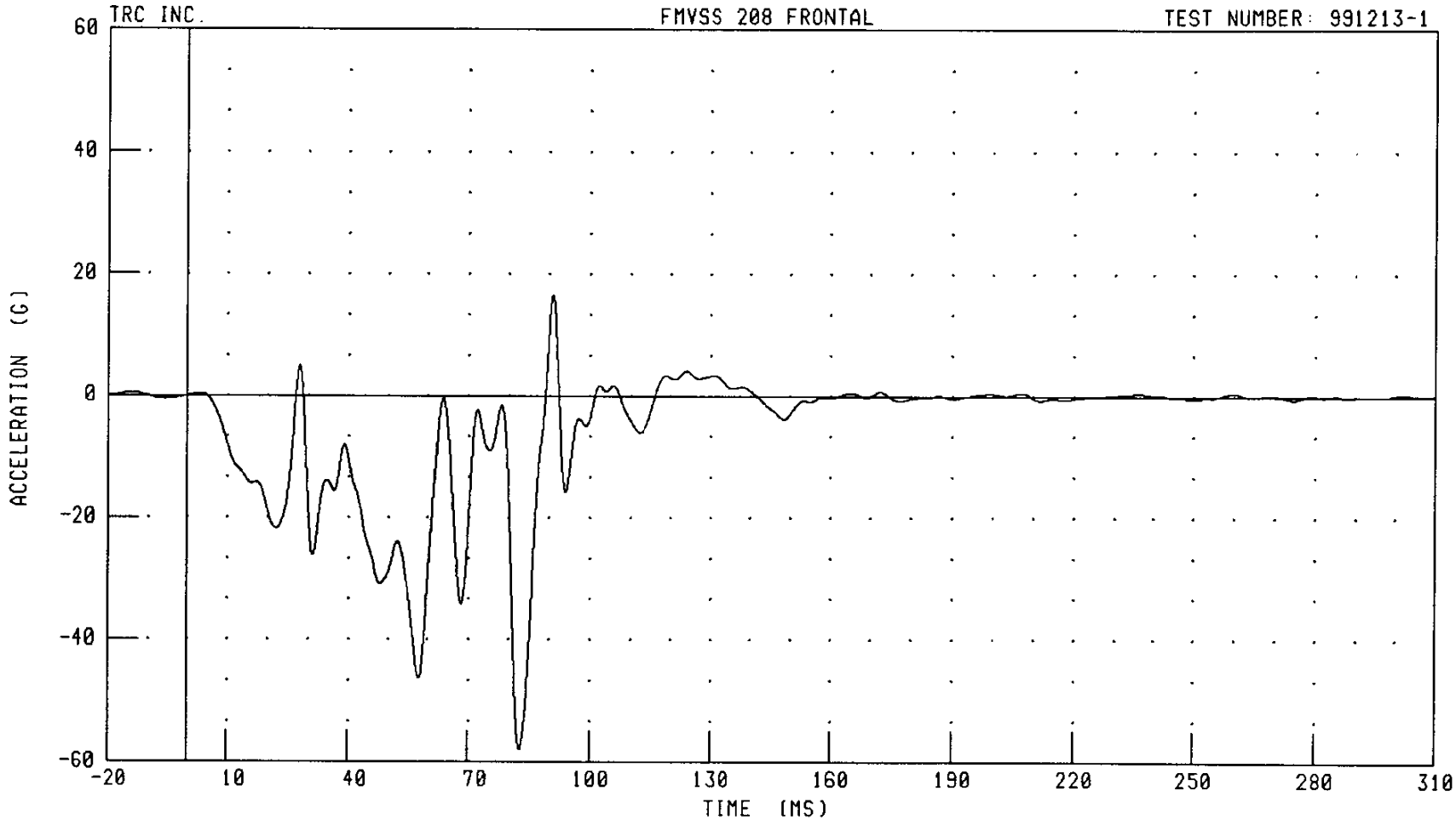
CHANNEL: BCRXG1 FILTER: CH. CLASS 60 PEAK DATA: 36.99 G @ 70.00 MS; -48.64 G @ 48.00 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
LEFT BRAKE CALIPER X-AXIS ACCELERATION



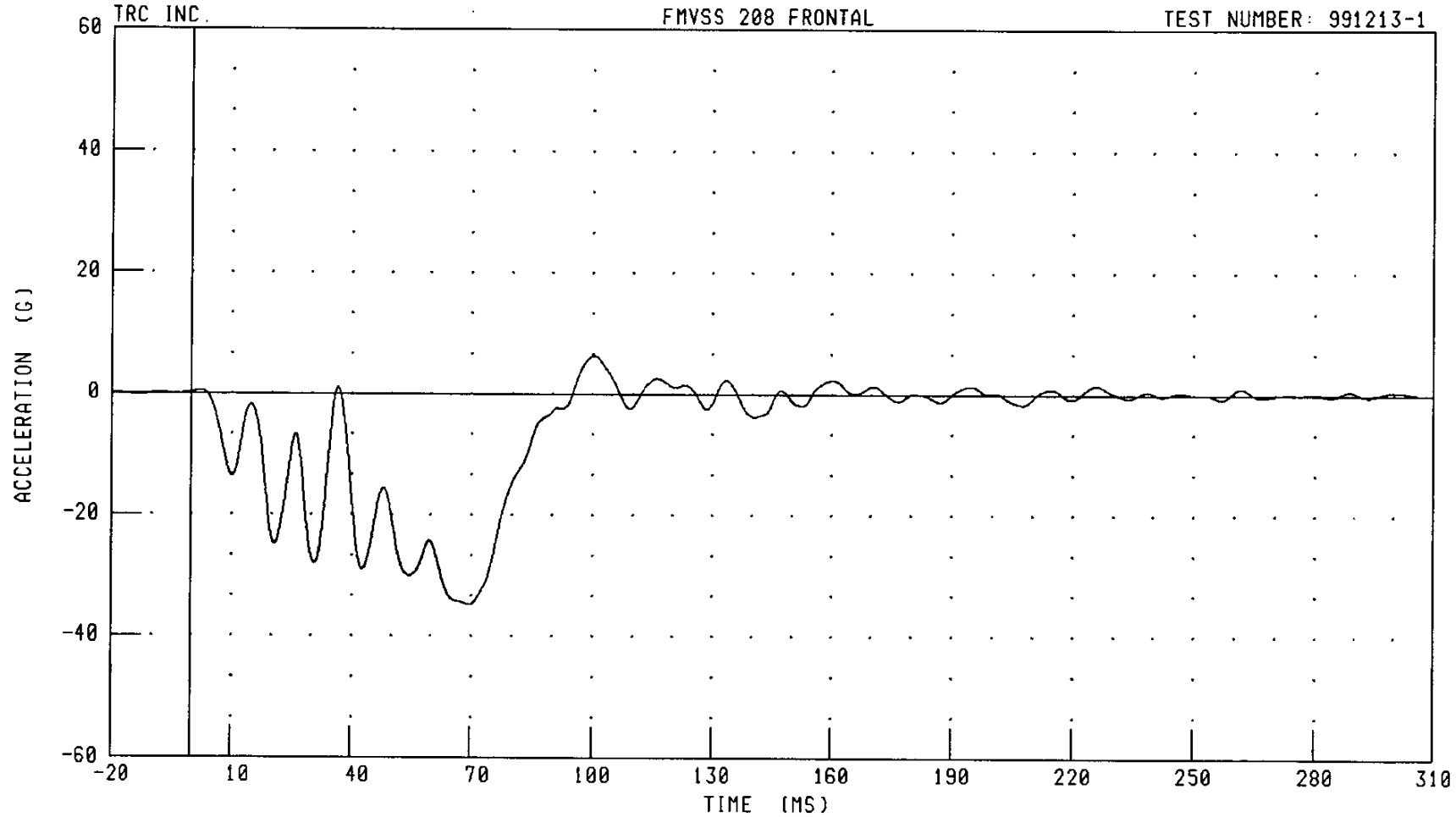
CHANNEL: BCLXG1 FILTER: CH. CLASS 60 PEAK DATA: 22.83 G @ 68.32 MS; -64.24 G @ 49.28 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
INSTRUMENT PANEL CENTER X-AXIS ACCELERATION



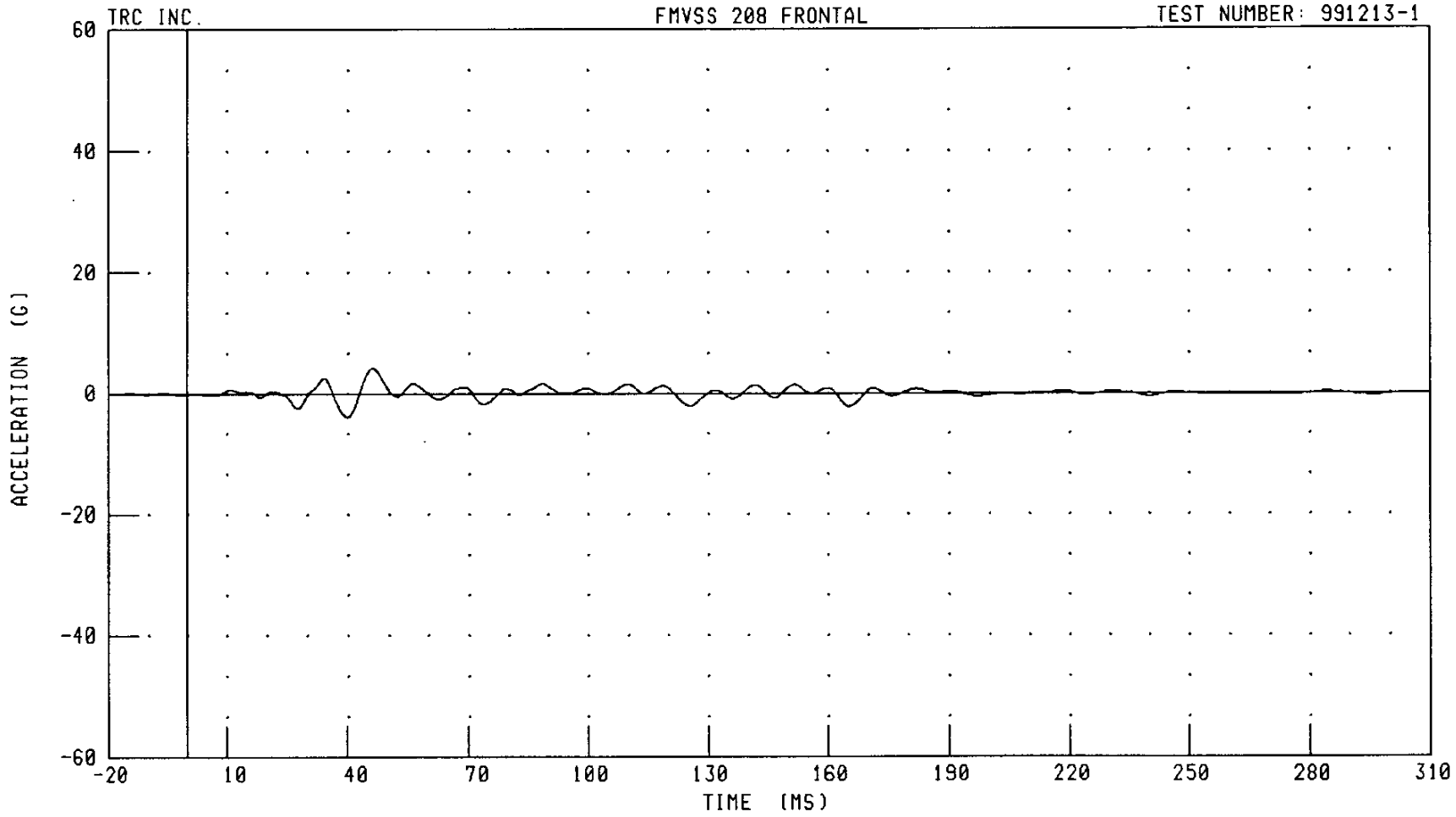
CHANNEL: IPCXG1 FILTER: CH. CLASS 60 PEAK-DATA: 16.57 G @ 90.96 MS; -57.98 G @ 82.80 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER X-AXIS ACCELERATION



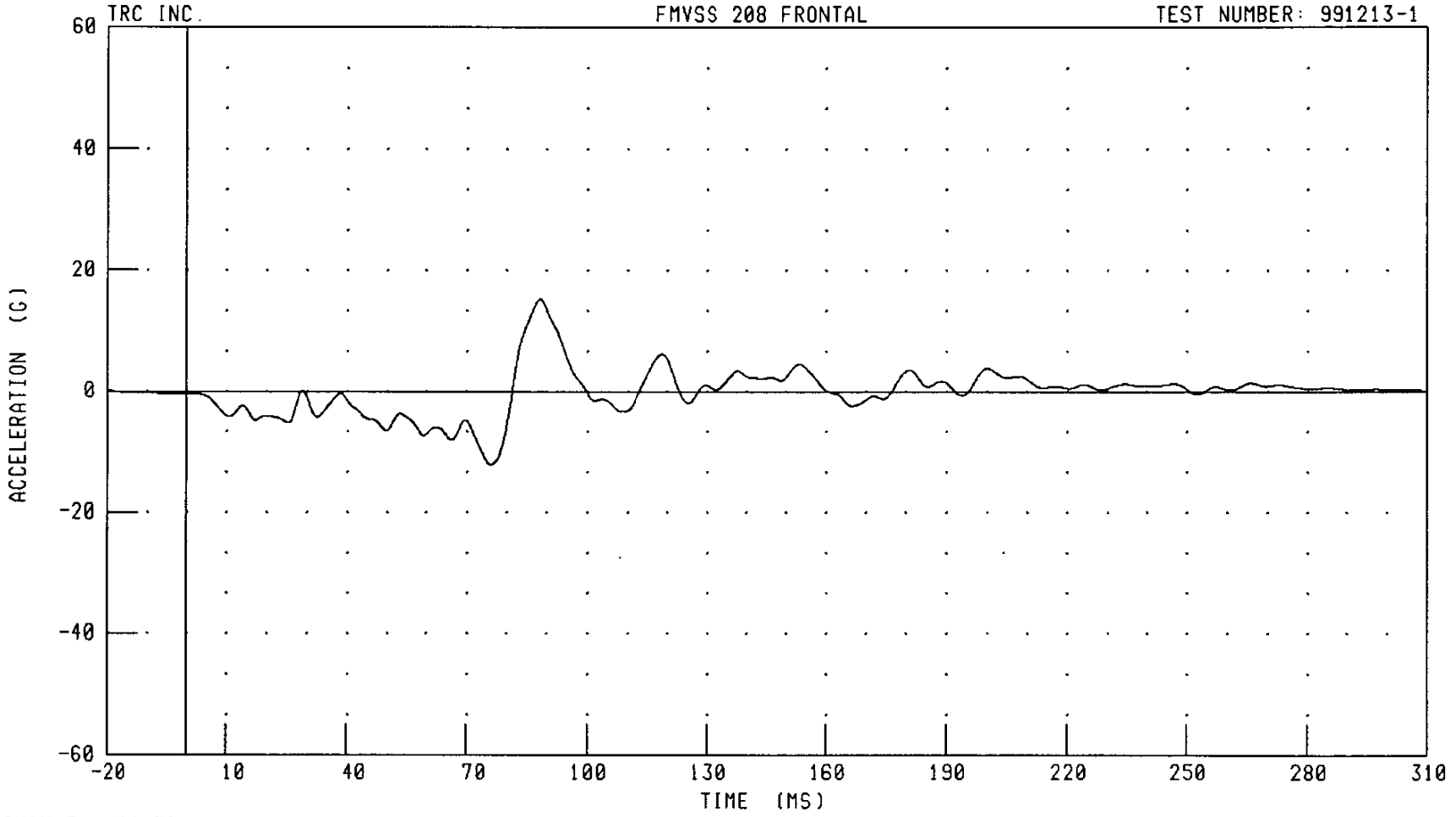
CHANNEL: RDKXG1 FILTER: CH. CLASS 60 PEAK DATA: -6.29 G @ 100.56 MS; -34.84 G @ 69.60 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER Y-AXIS ACCELERATION



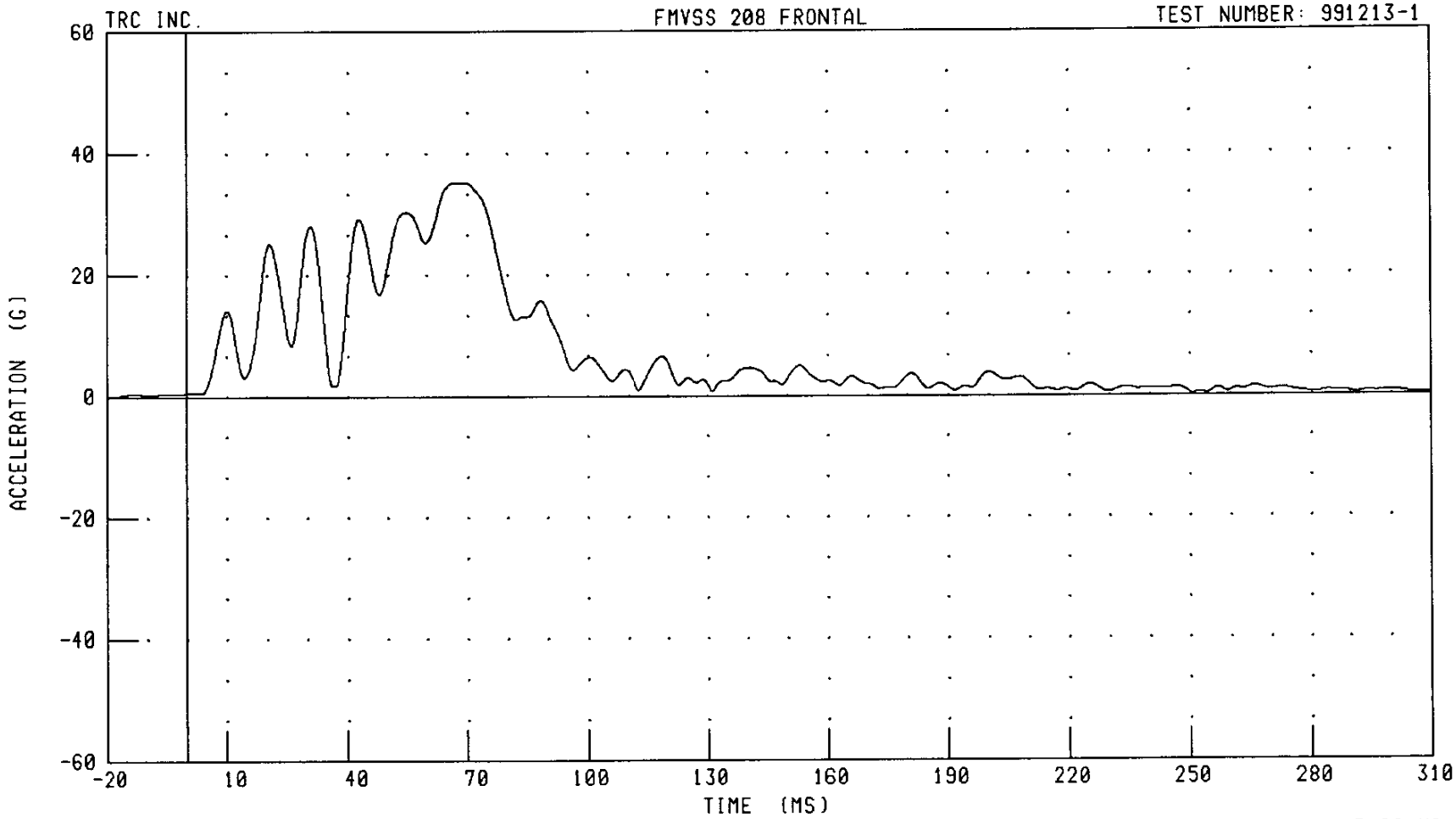
CHANNEL: RDKYG1 FILTER: CH. CLASS 60 PEAK DATA: 4.17 G @ 46.08 MS, -3.90 G @ 40.00 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER Z-AXIS ACCELERATION



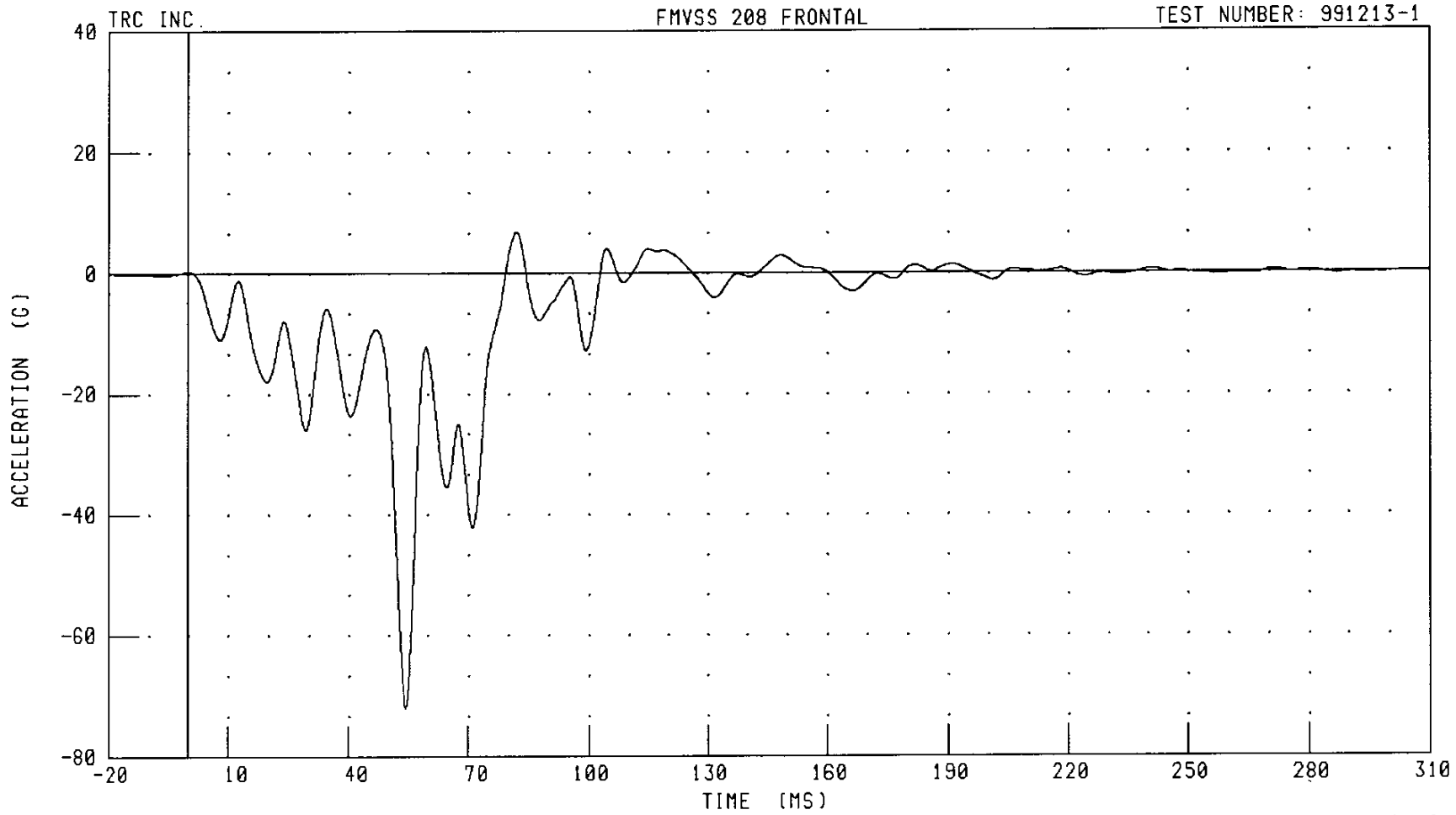
CHANNEL: RDKZG1 FILTER: CH. CLASS 60 PEAK DATA: 15.26 G @ 88.56 MS; -12.10 G @ 76.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE REAR CENTER RESULTANT ACCELERATION



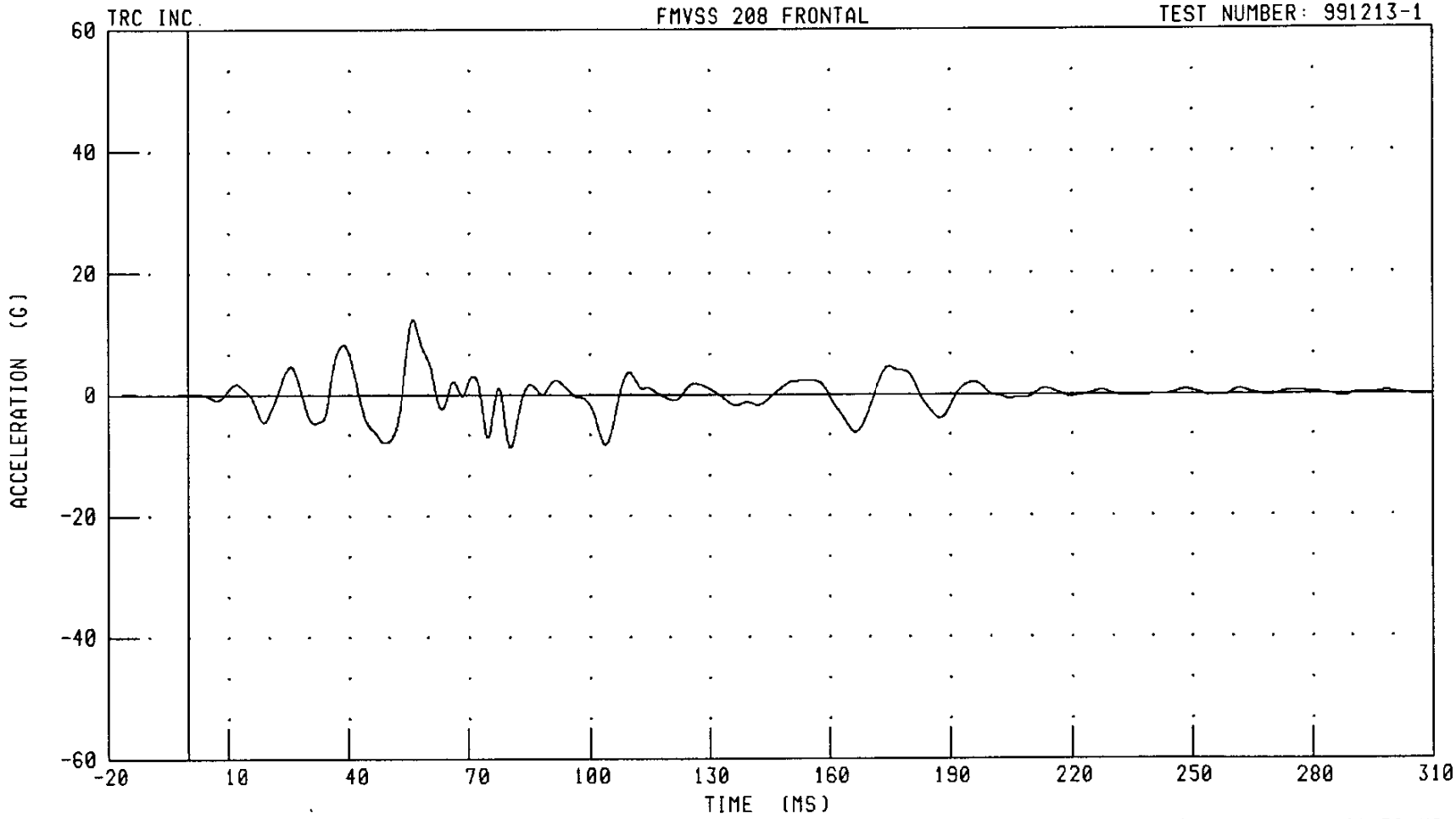
CHANNEL: RDKRG1 FILTER: CH. CLASS 60 PEAK DATA: -35.19 G @ 66.48 MS; 0.11 G @ -17.60 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE CENTER OF GRAVITY X-AXIS ACCELERATION



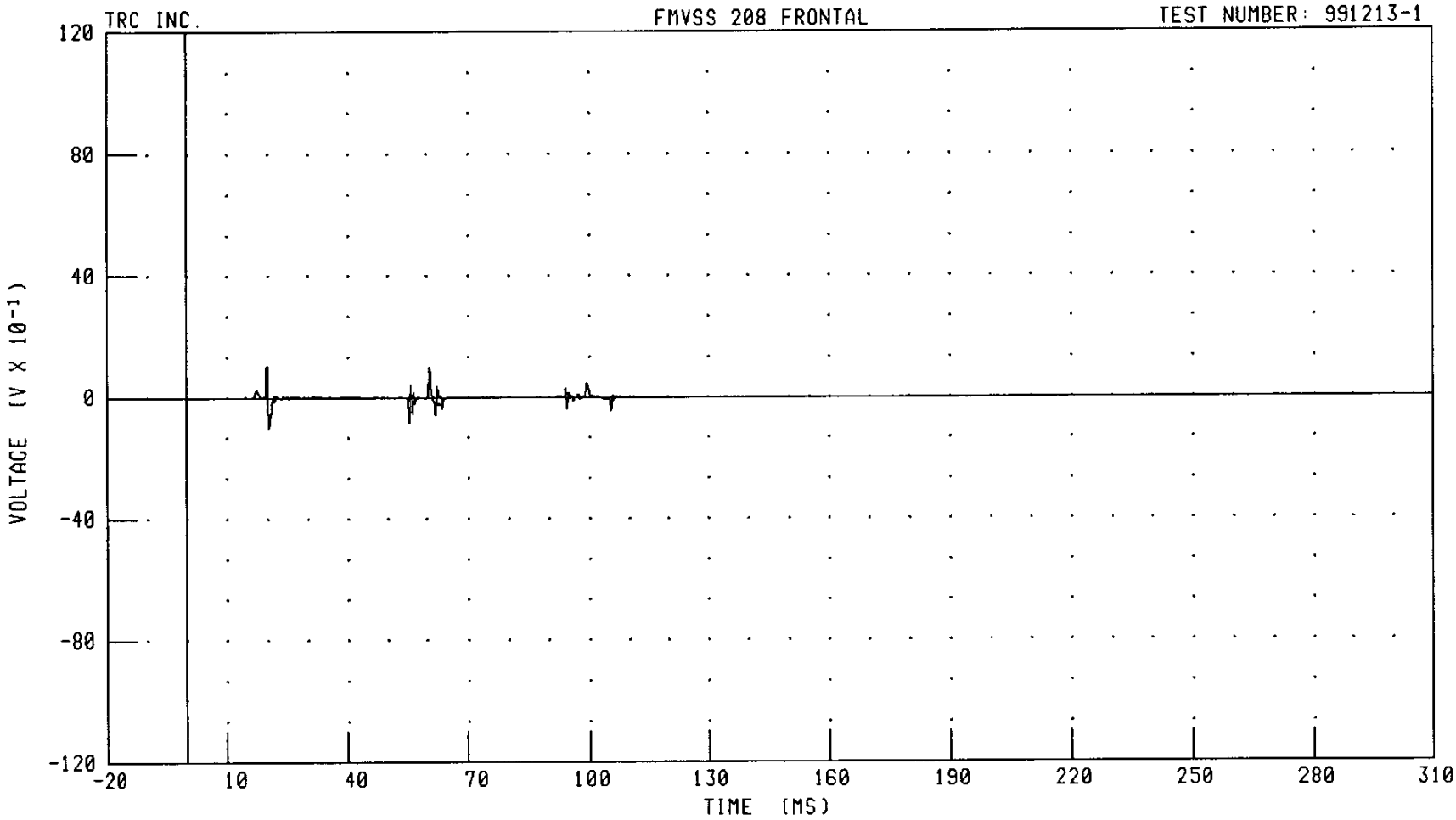
CHANNEL: VCGXG1 FILTER: CH. CLASS 60 PEAK DATA: 6.88 G @ 82.08 MS, -71.99 G @ 54.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
VEHICLE CENTER OF GRAVITY Y-AXIS ACCELERATION



CHANNEL: VCGYG1 FILTER: CH. CLASS 60 PEAK DATA: -12.38 G @ 56.32 MS; -8.73 G @ 80.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
DRIVER STAGE 1

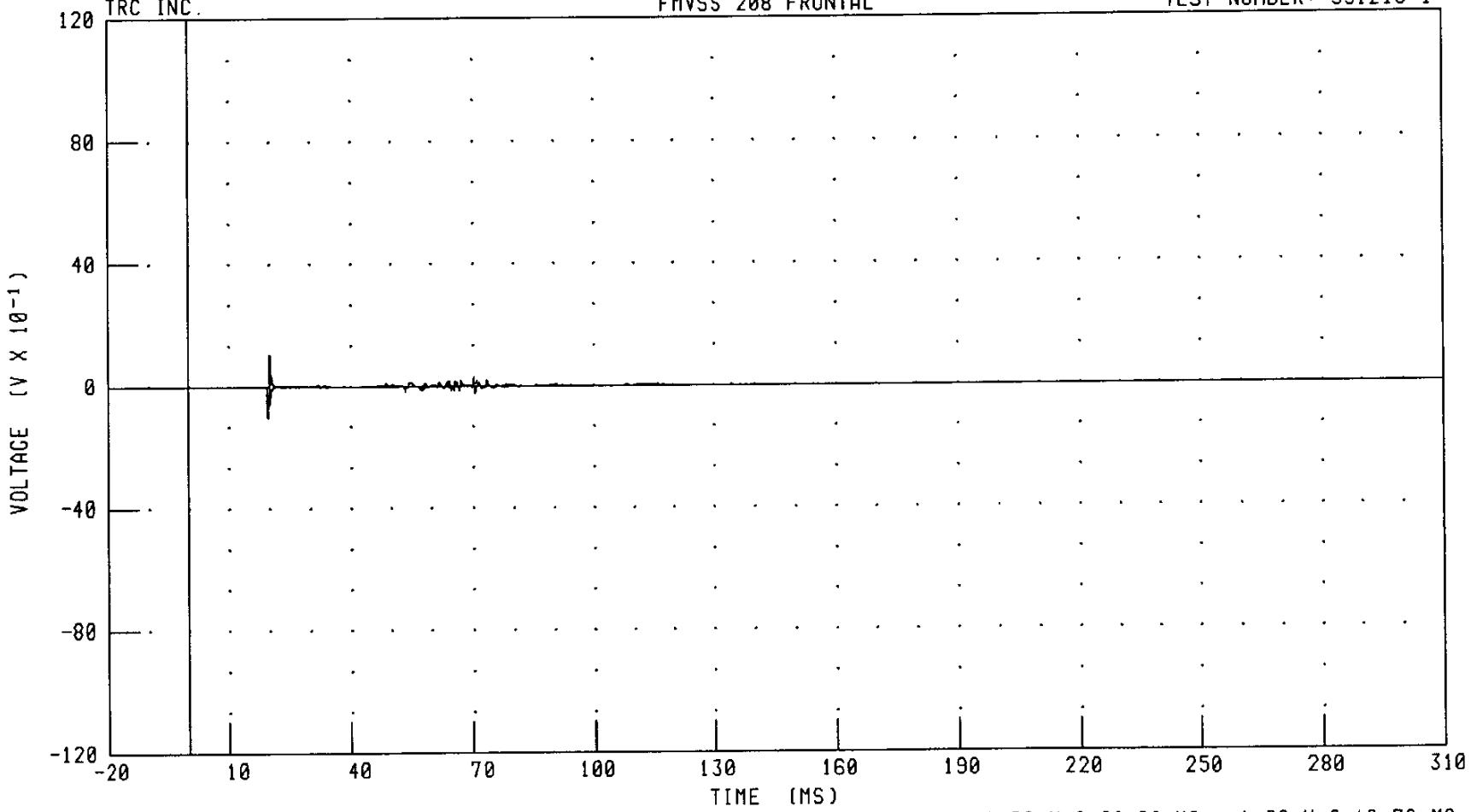


CHANNEL: ABSQ1 FILTER: CH. CLASS 1000 PEAK DATA: 1.02 V @ 19.76 MS; -1.02 V @ 20.32 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
PASSENGER STAGE 1
FMVSS 208 FRONTAL

TRC INC.

TEST NUMBER: 991213-1



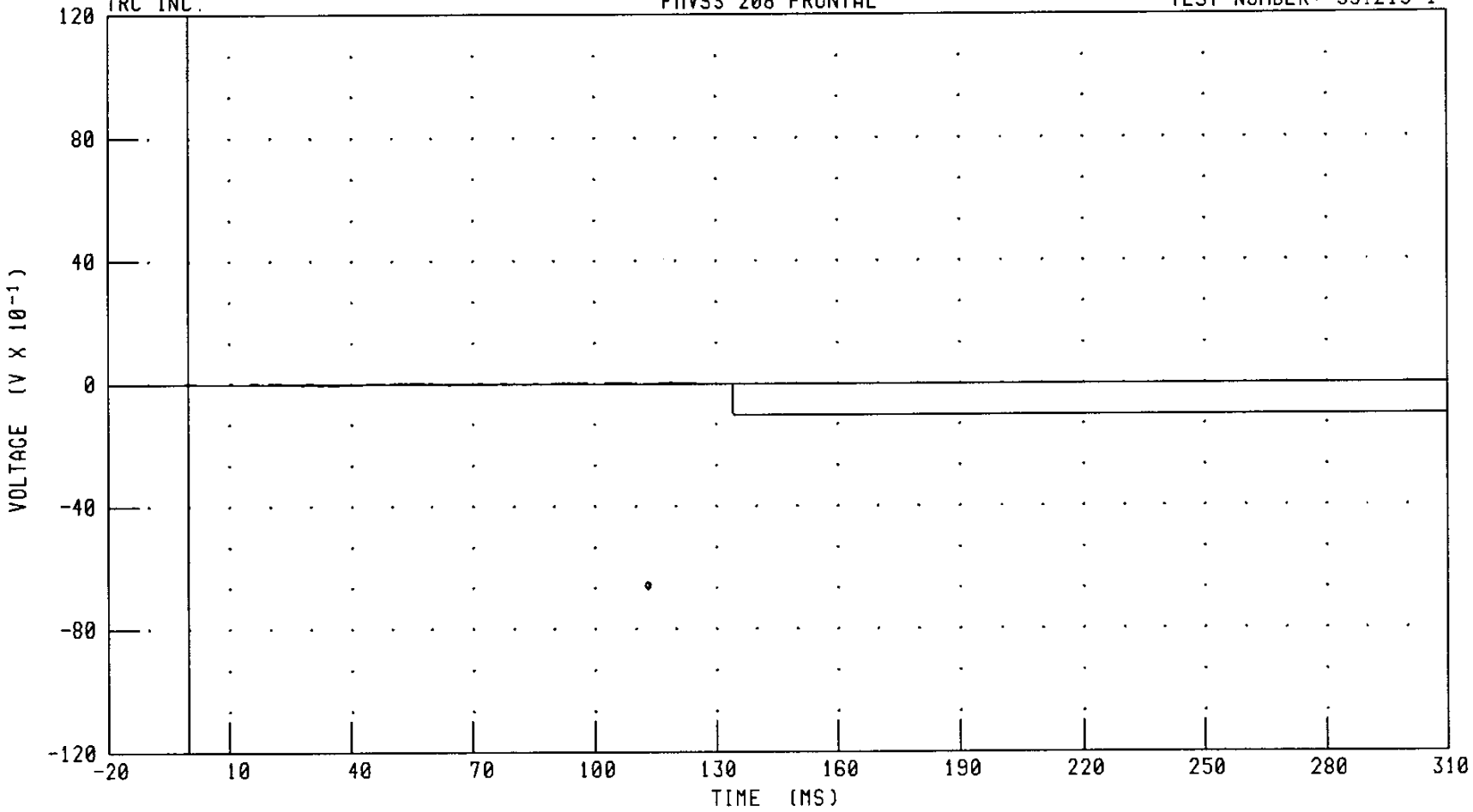
CHANNEL: ABSG2 -- FILTER: CH. CLASS 1000

PEAK DATA: 1.02 V @ 20.08 MS; -1.02 V @ 19.76 MS

1999 ACURA RL INTO A FLAT FRONTAL BARRIER AT 30 MPH
PASSENGER STAGE 2
FMVSS 208 FRONTAL

TRC INC.

TEST NUMBER: 991213-1



CHANNEL: ABSQB FILTER: CH. CLASS 1000

PEAK DATA: 0.04 V @ 119.12 MS; -1.02 V @ 134.56 MS

Pre-Test Dummy Certification

Driver Dummy S/N 283

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

TRC INC. TEST NO: 283C9ED 06-DEC-99
572 O 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

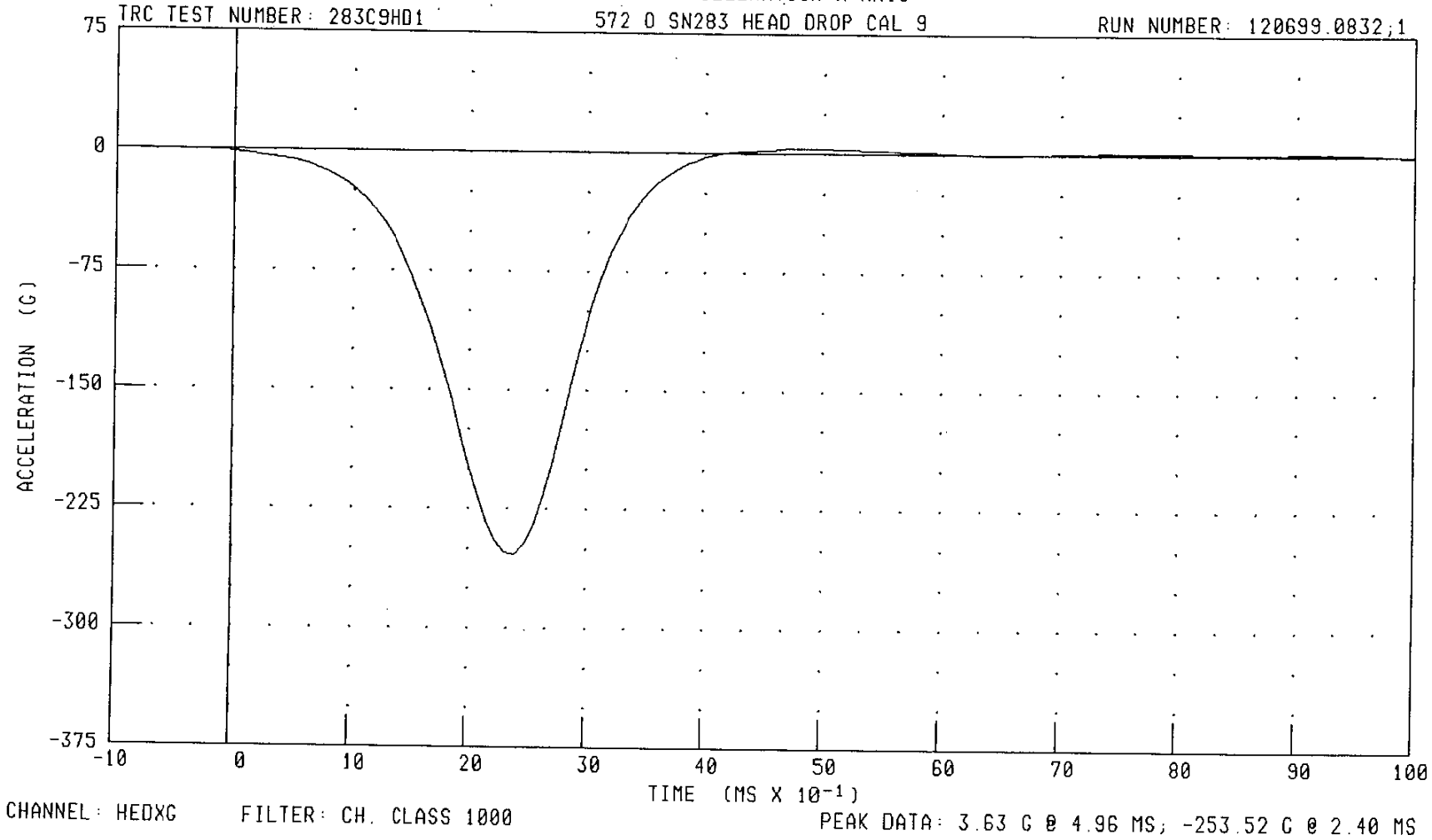
TRC INC. TEST NO: 283C9HD1 572 O SN283 HEAD DROP CAL 9

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

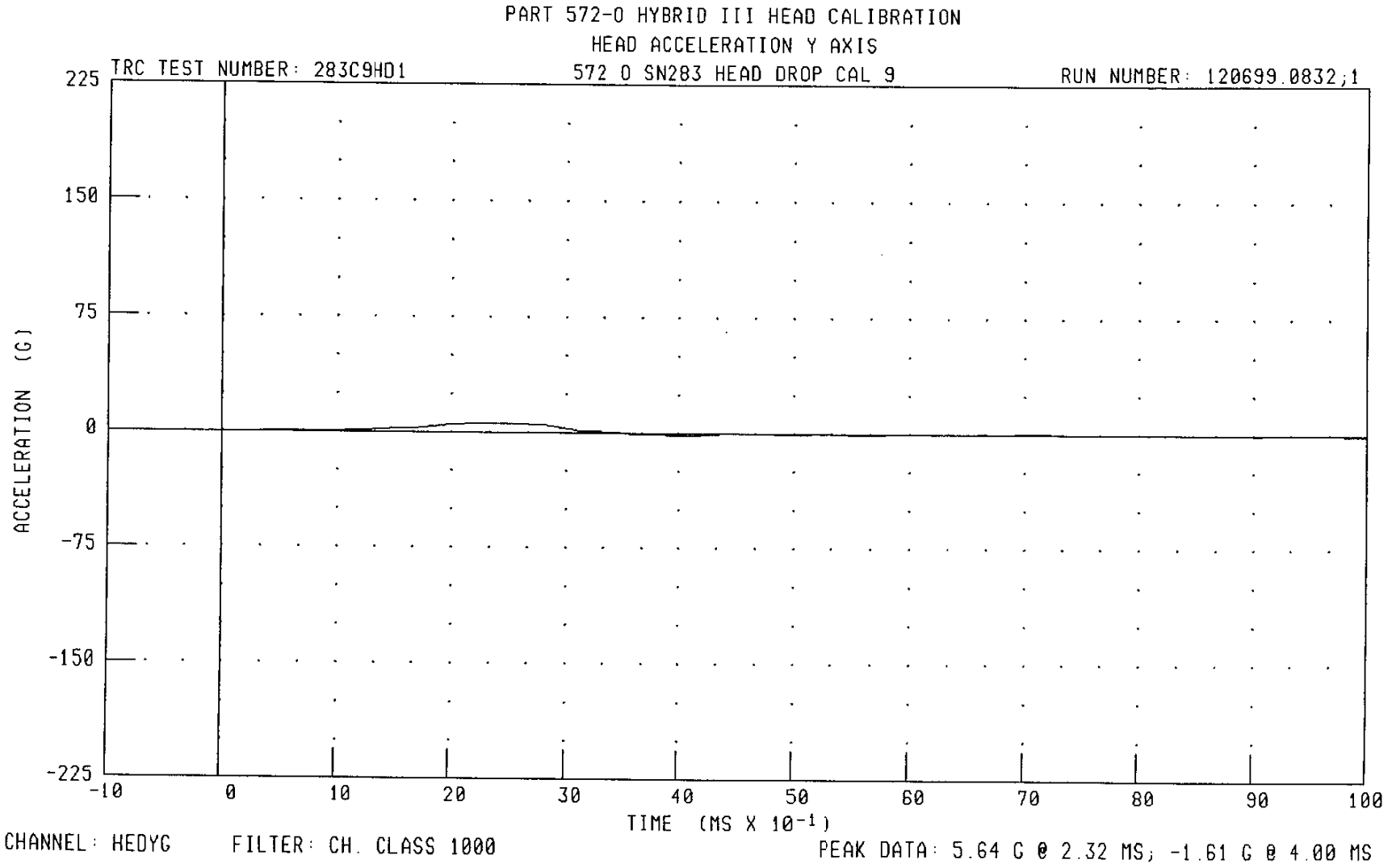
TECHNICIAN _____ RUN NUMBER: 120699.0831;1

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

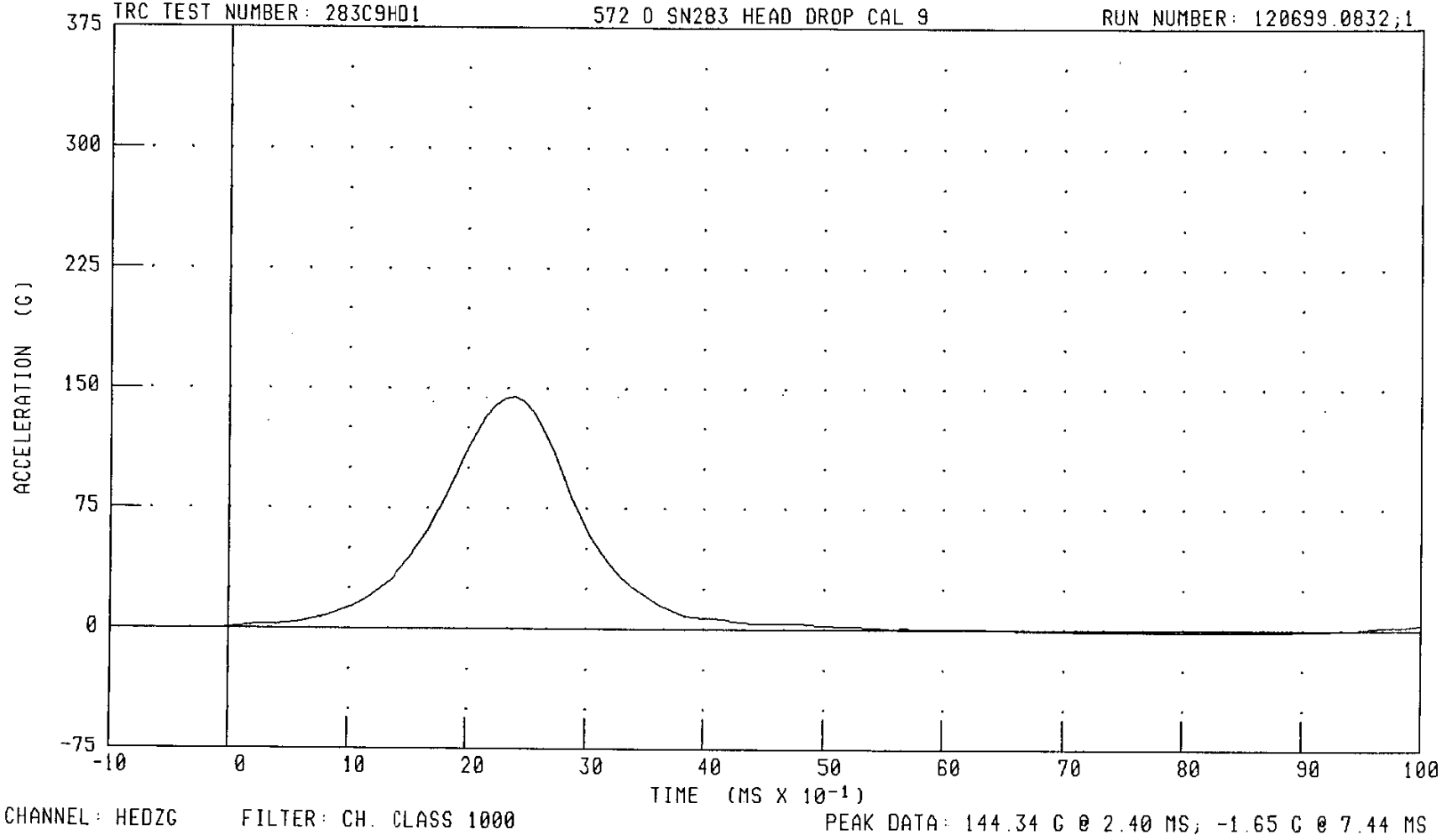


CHANNEL: HEDXC FILTER: CH. CLASS 1000

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


PART 572-O HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 283C9HD1
572 O SN283 HEAD DROP CAL 9
RUN NUMBER: 120699.0832;1
225
150
75
0
-75
-150
-225
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDYG
FILTER: CH. CLASS 1000
PEAK DATA: 5.64 G @ 2.32 MS; -1.61 G @ 4.00 MS

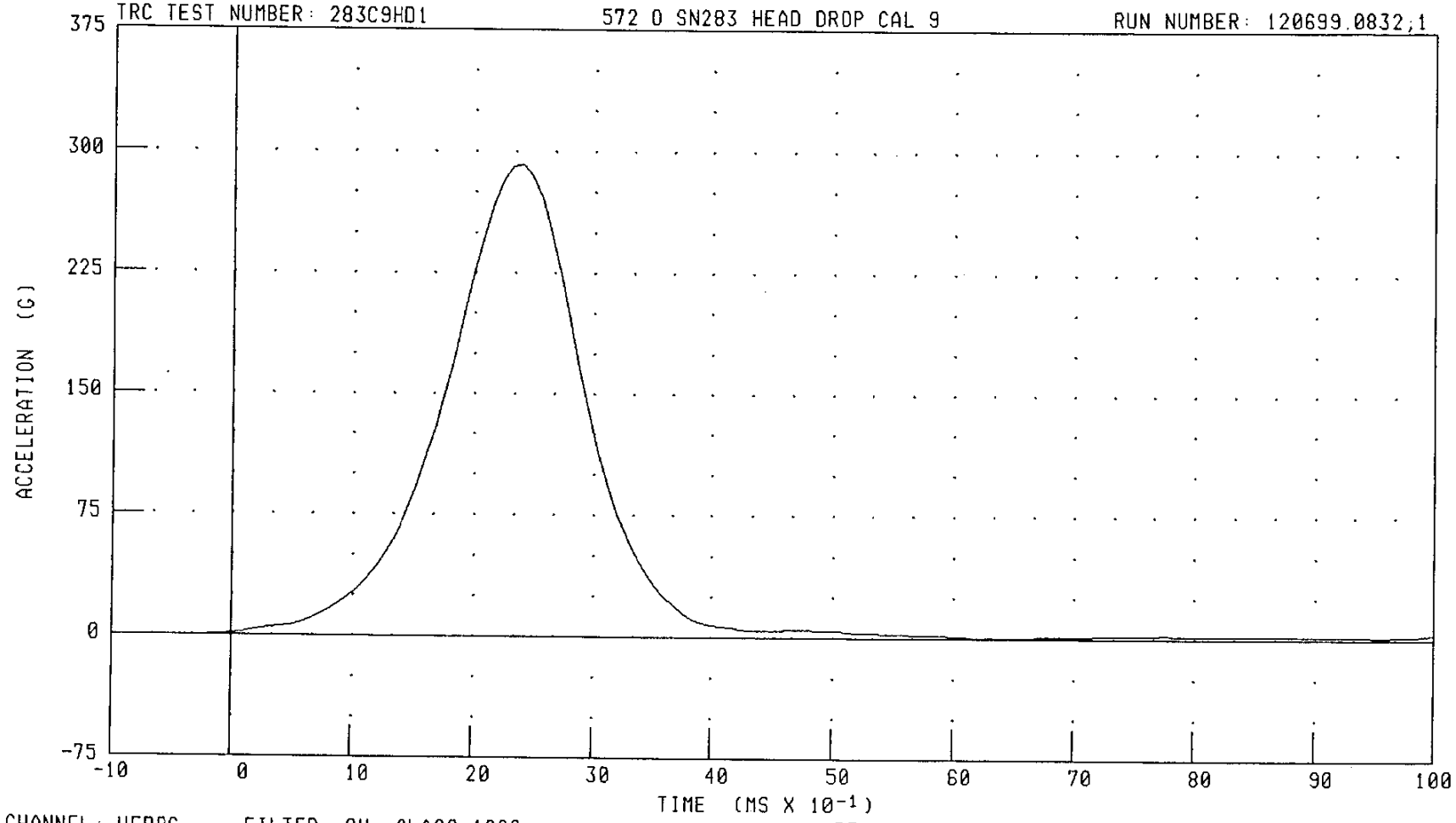
PART 572-O HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS



CHANNEL: HEDZG FILTER: CH. CLASS 1000

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

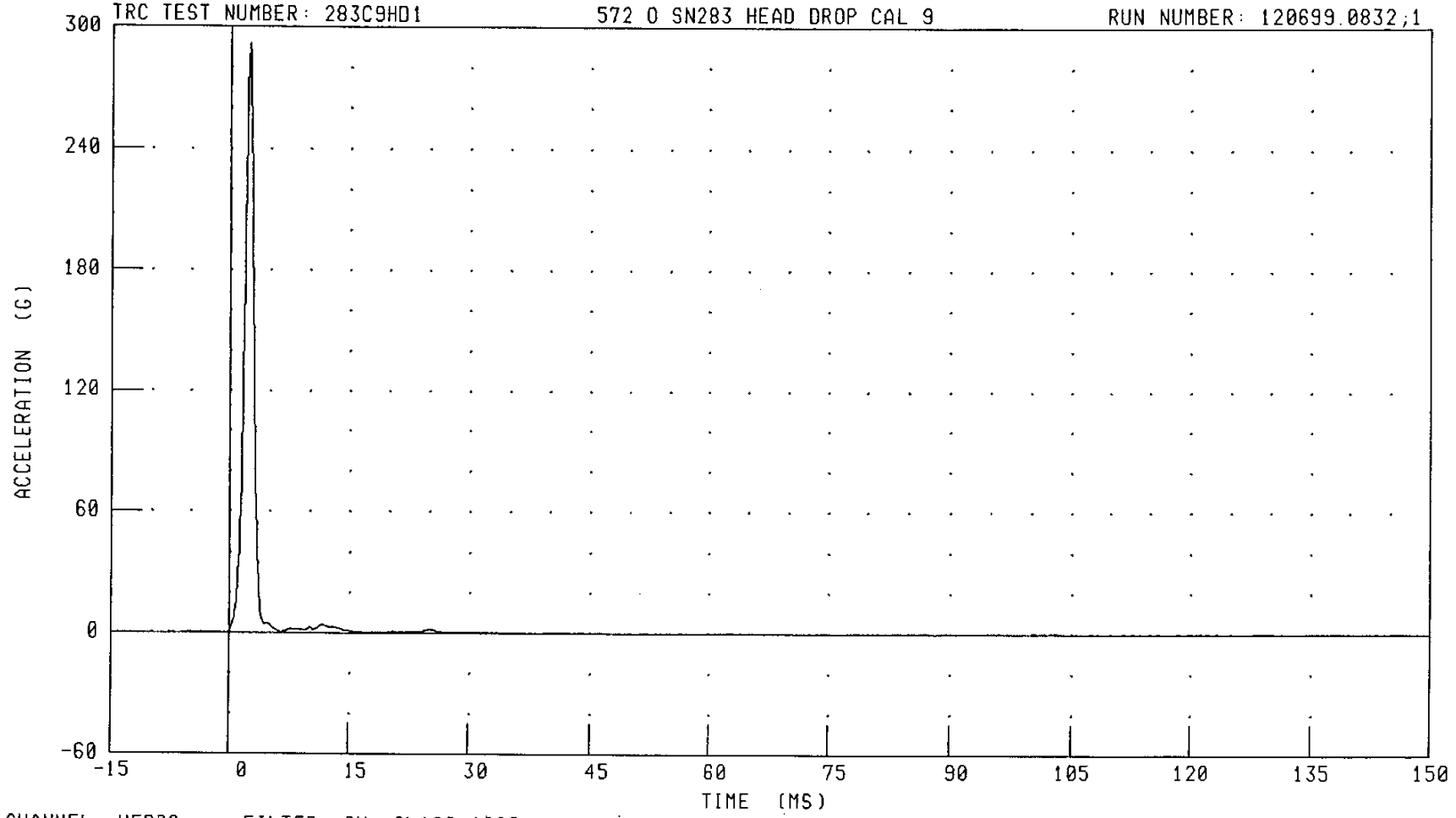
PART 572-0 HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION



CHANNEL: HEDRG FILTER: CH. CLASS 1000

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

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



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 291.78 G @ 2.40 MS; 0.04 G @ -14.96 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE 06-DEC-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

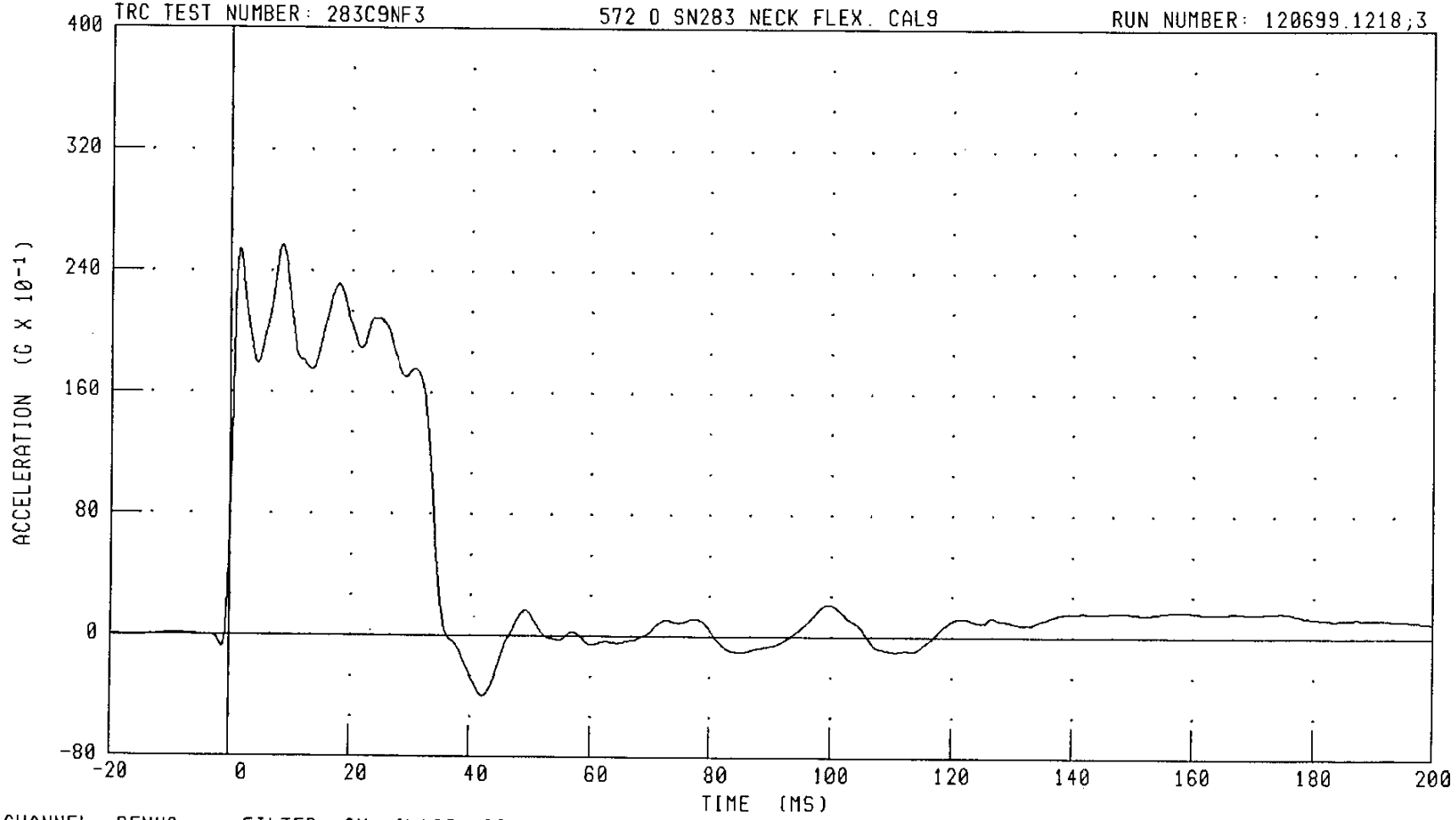
TRC INC. TEST NO: 283C9NF3 572 O SN283 NECK FLEX. CAL9

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

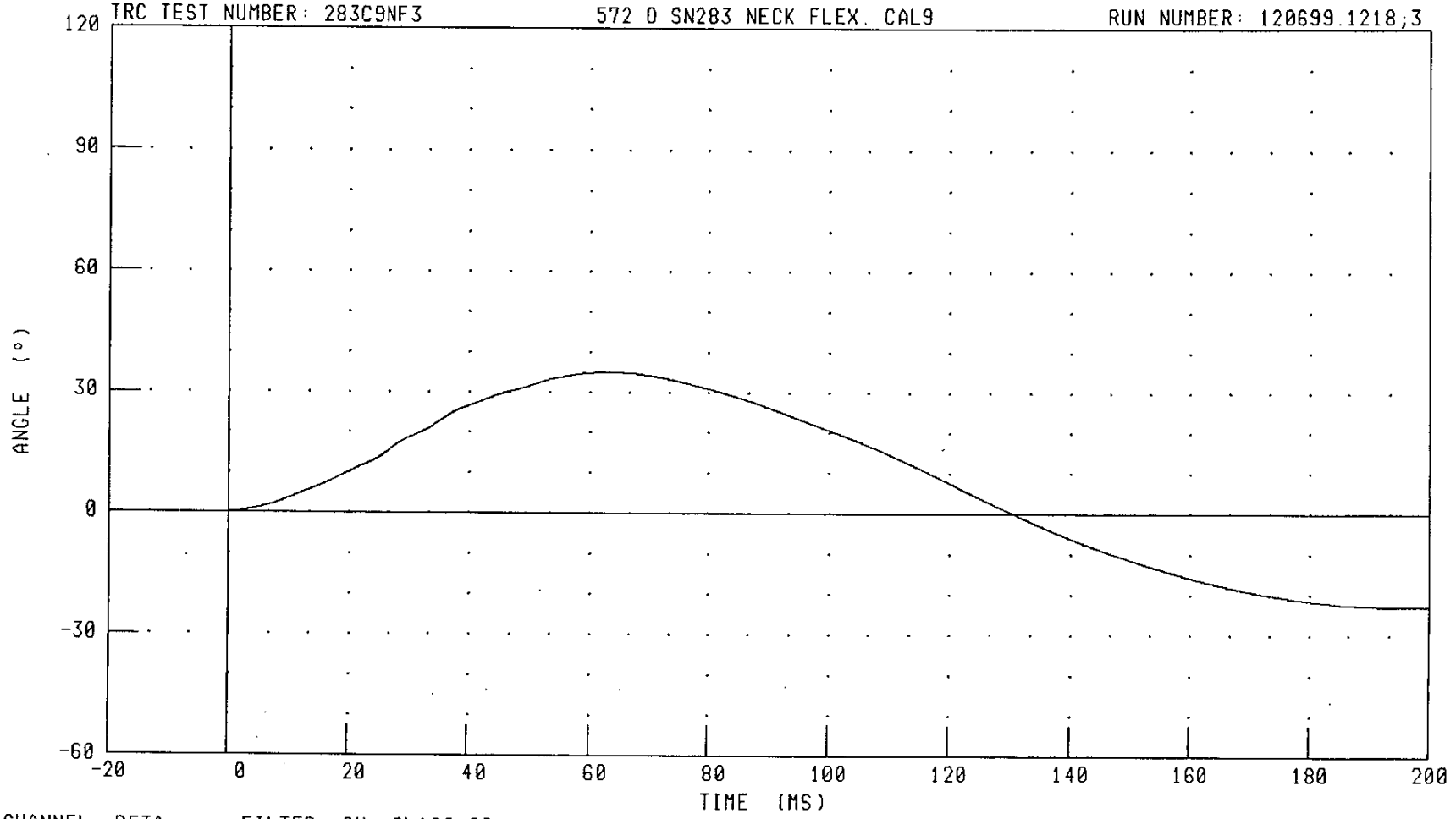


CHANNEL: PENXG FILTER: CH. CLASS 180

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

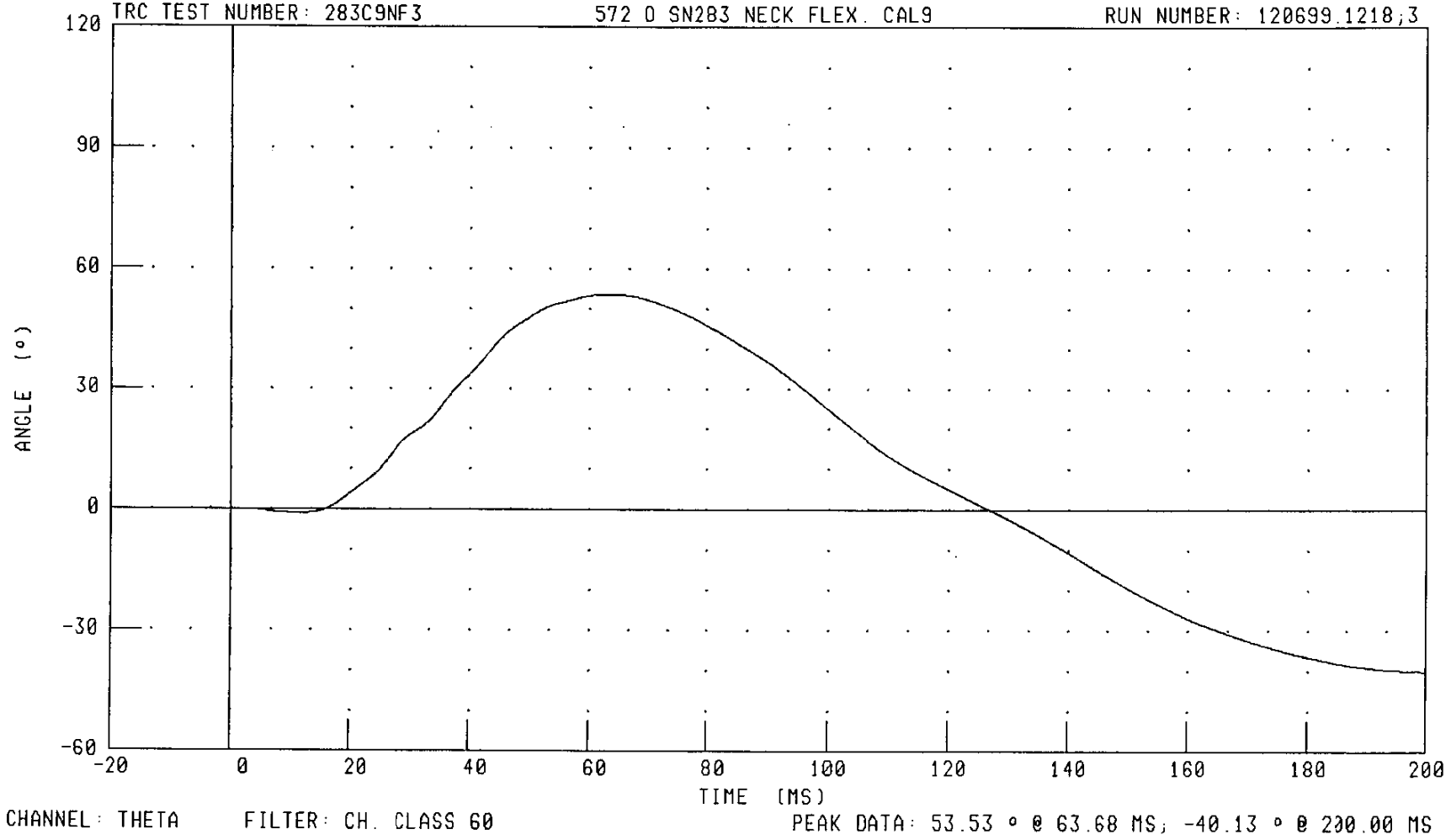
PART 572-0 HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

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



CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 34.92 ° @ 63.04 MS; -22.98 ° @ 199.68 MS

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



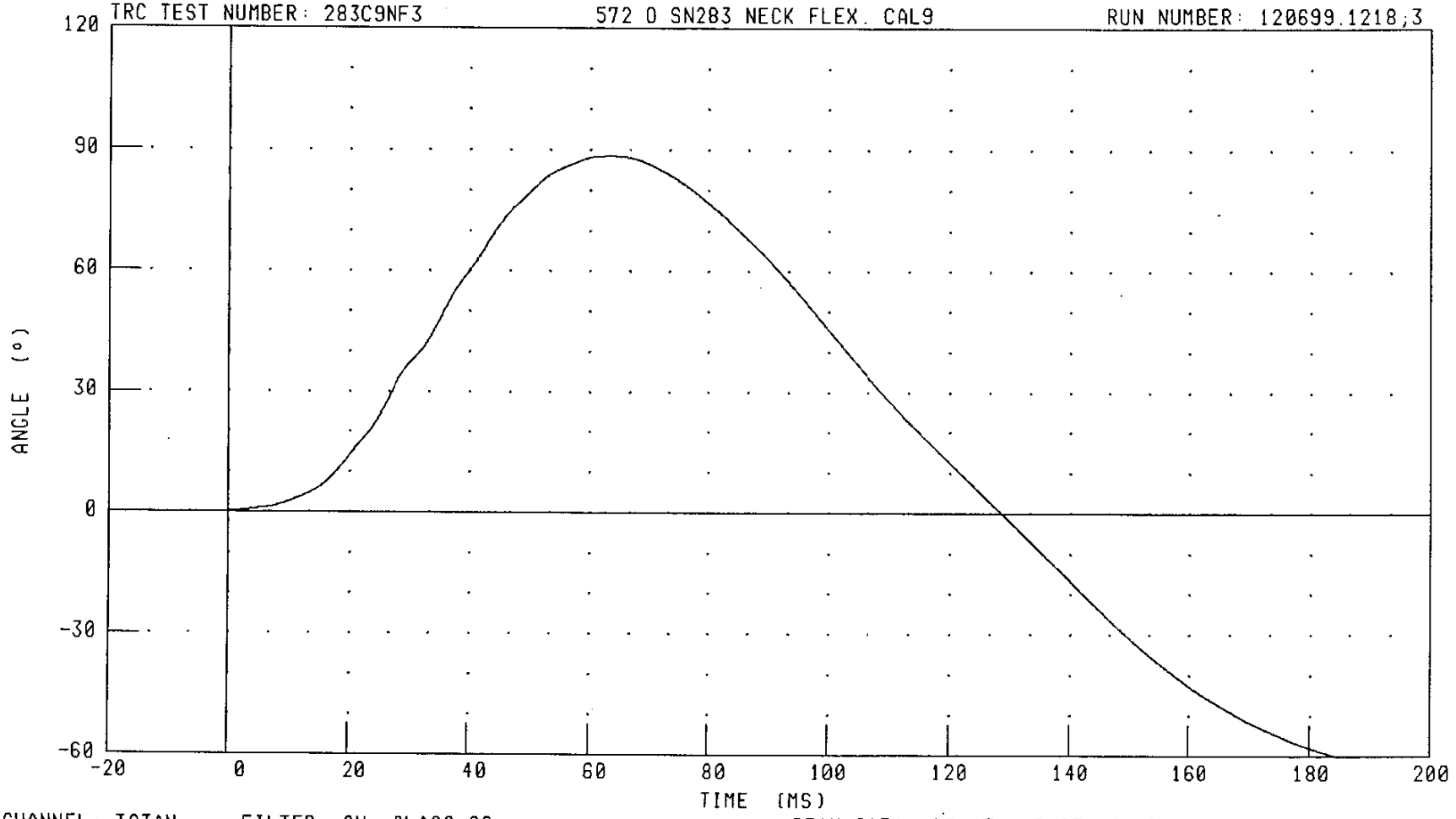
CHANNEL: THETA FILTER: CH. CLASS 60

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

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

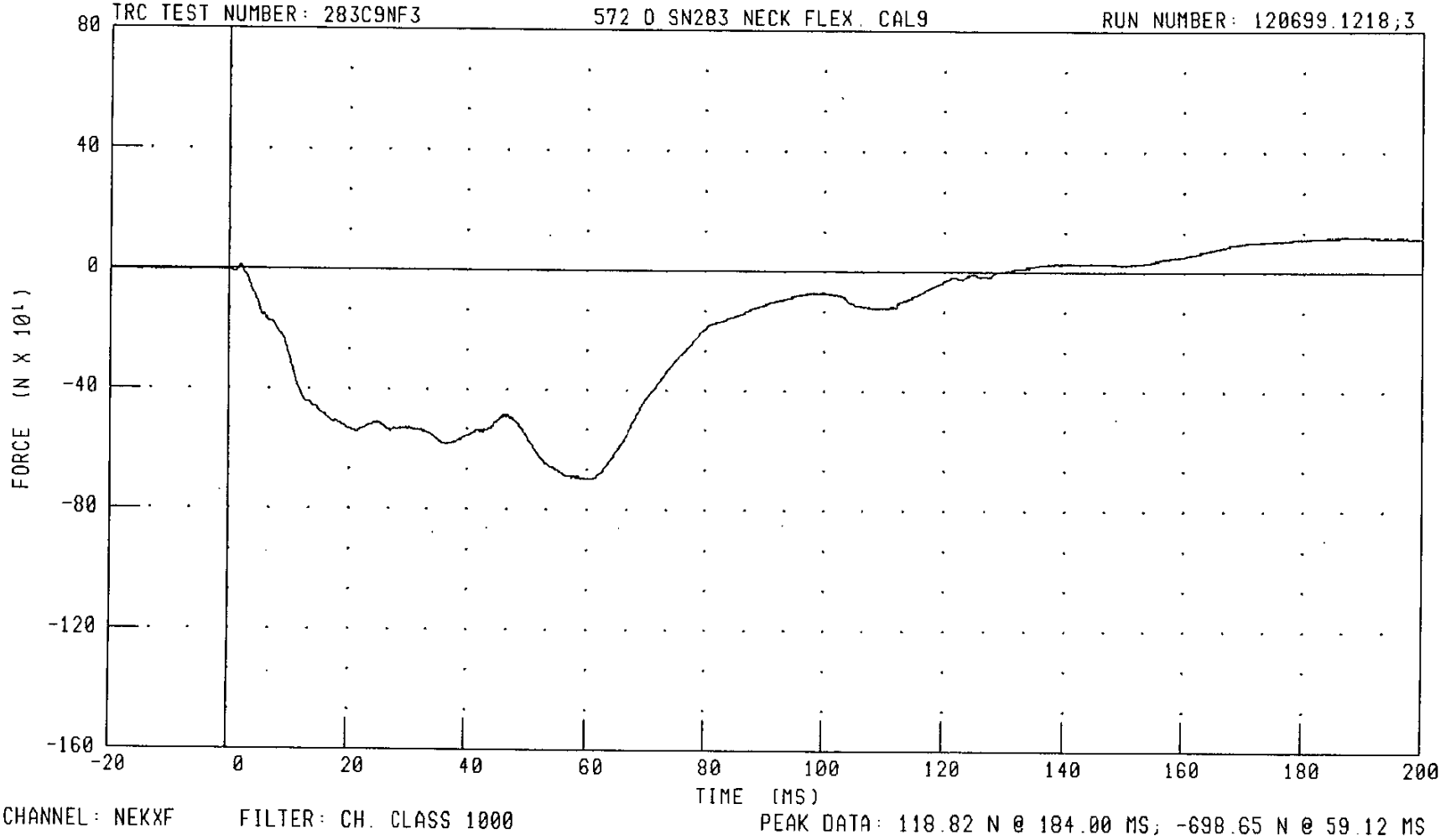
TRC TEST NUMBER: 283C9NF3 572 0 SN283 NECK FLEX. CAL9 RUN NUMBER: 120699.1218;3



CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 88.45 ° @ 63.44 MS; -63.12 ° @ 200.00 MS

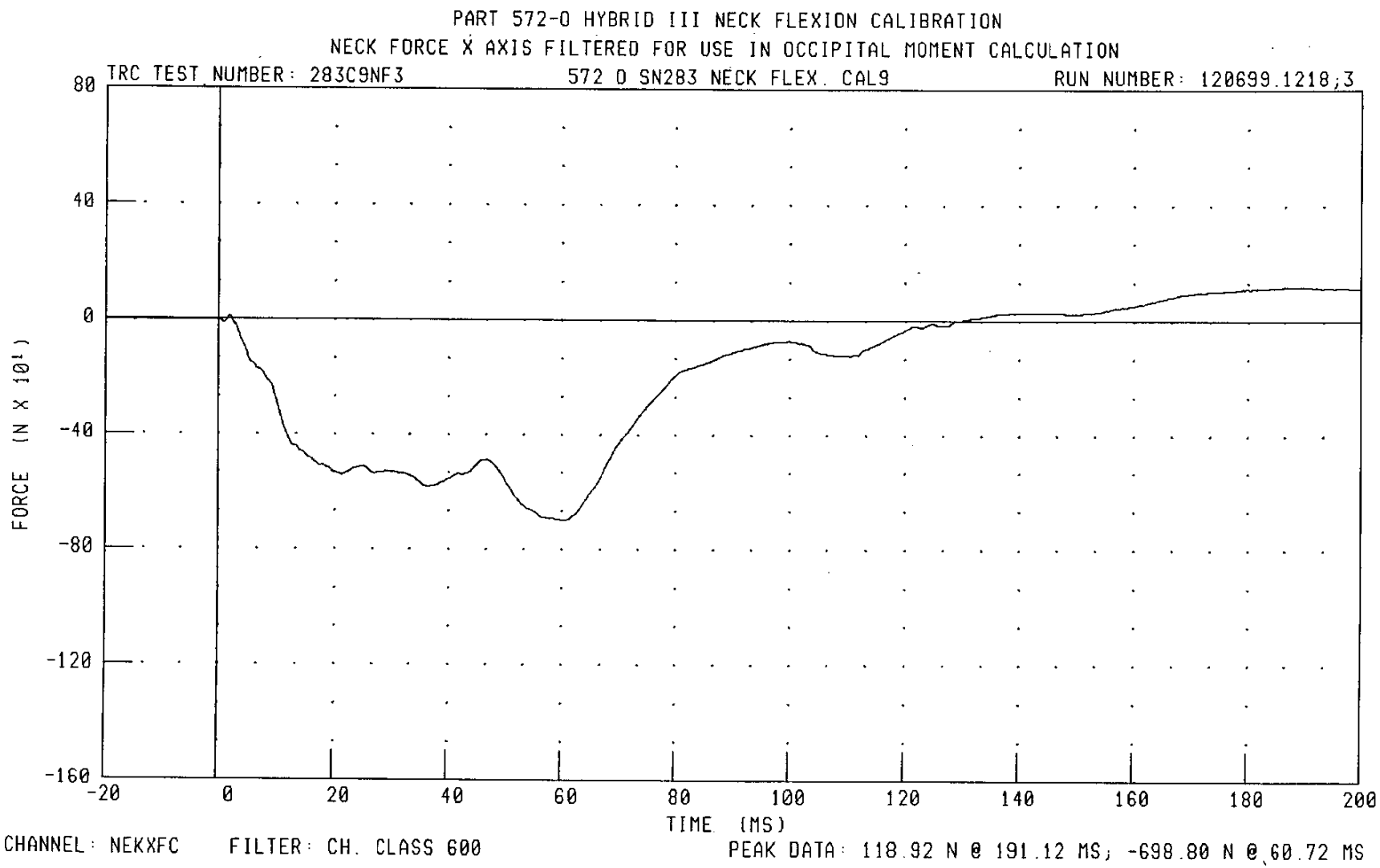
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS



CHANNEL: NEKXF FILTER: CH. CLASS 1000

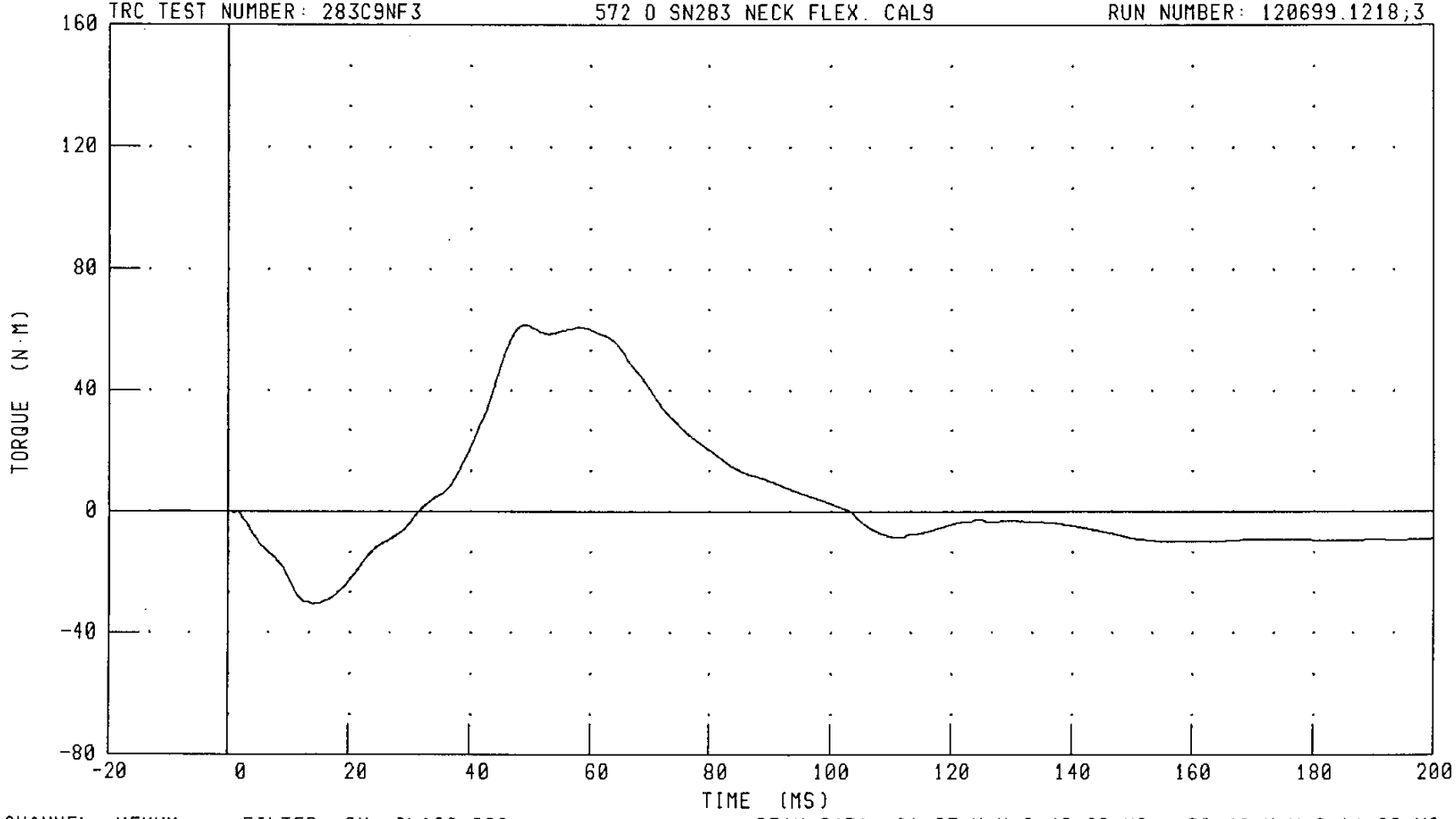
PEAK DATA: 118.82 N @ 184.00 MS; -698.65 N @ 59.12 MS


PART 572-0 HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION
TRC TEST NUMBER: 283C9NF3
572 O SN283 NECK FLEX. CAL9
RUN NUMBER: 120699.1218;3
80
40
0
-40
-80
-120
-160
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
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

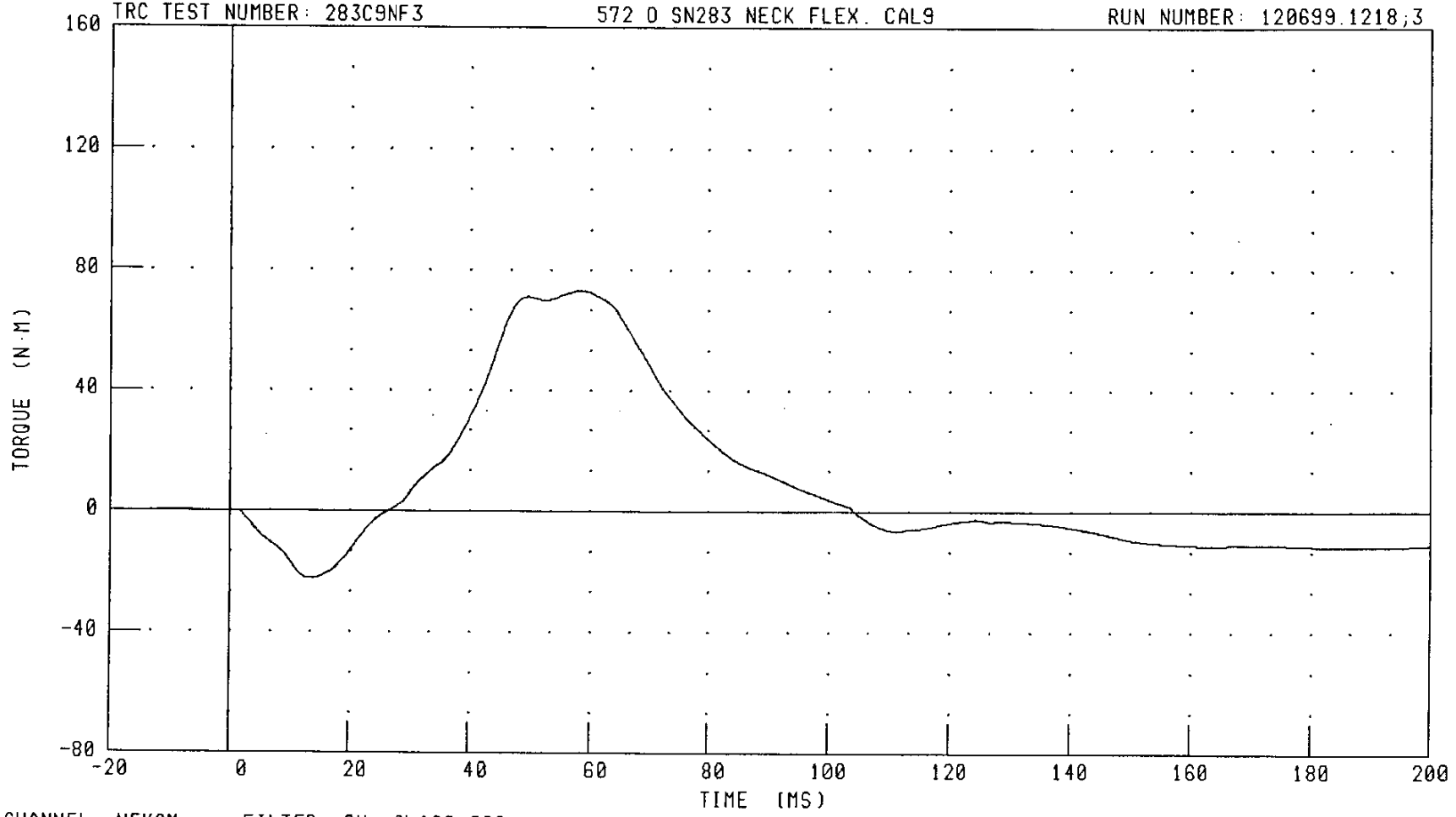
NECK MOMENT Y AXIS

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



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 61.63 N·M @ 49.20 MS; -30.46 N·M @ 14.08 MS

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



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

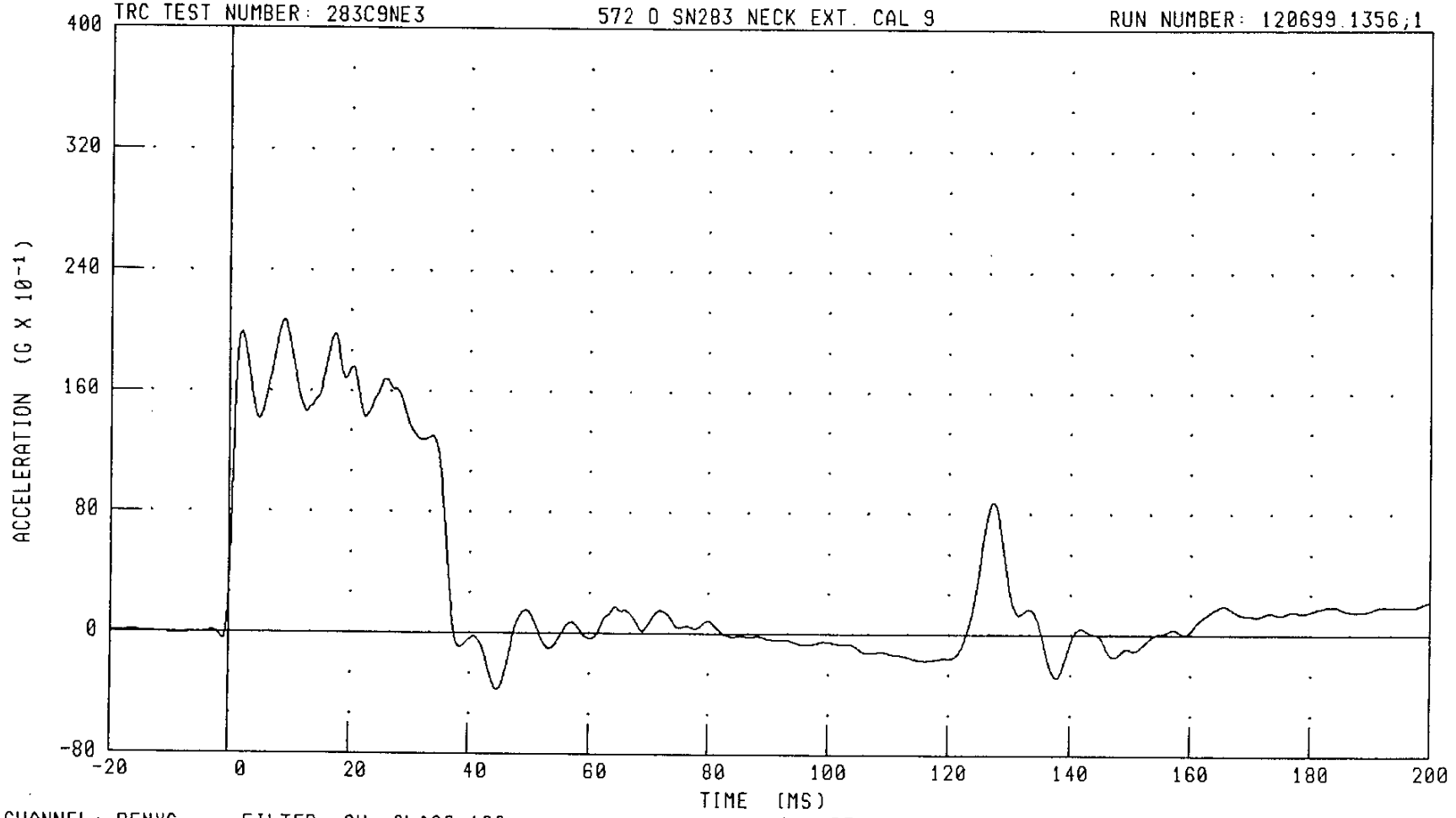
TRC INC. TEST NO: 283C9NE3 572 O SN283 NECK EXT. CAL 9

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

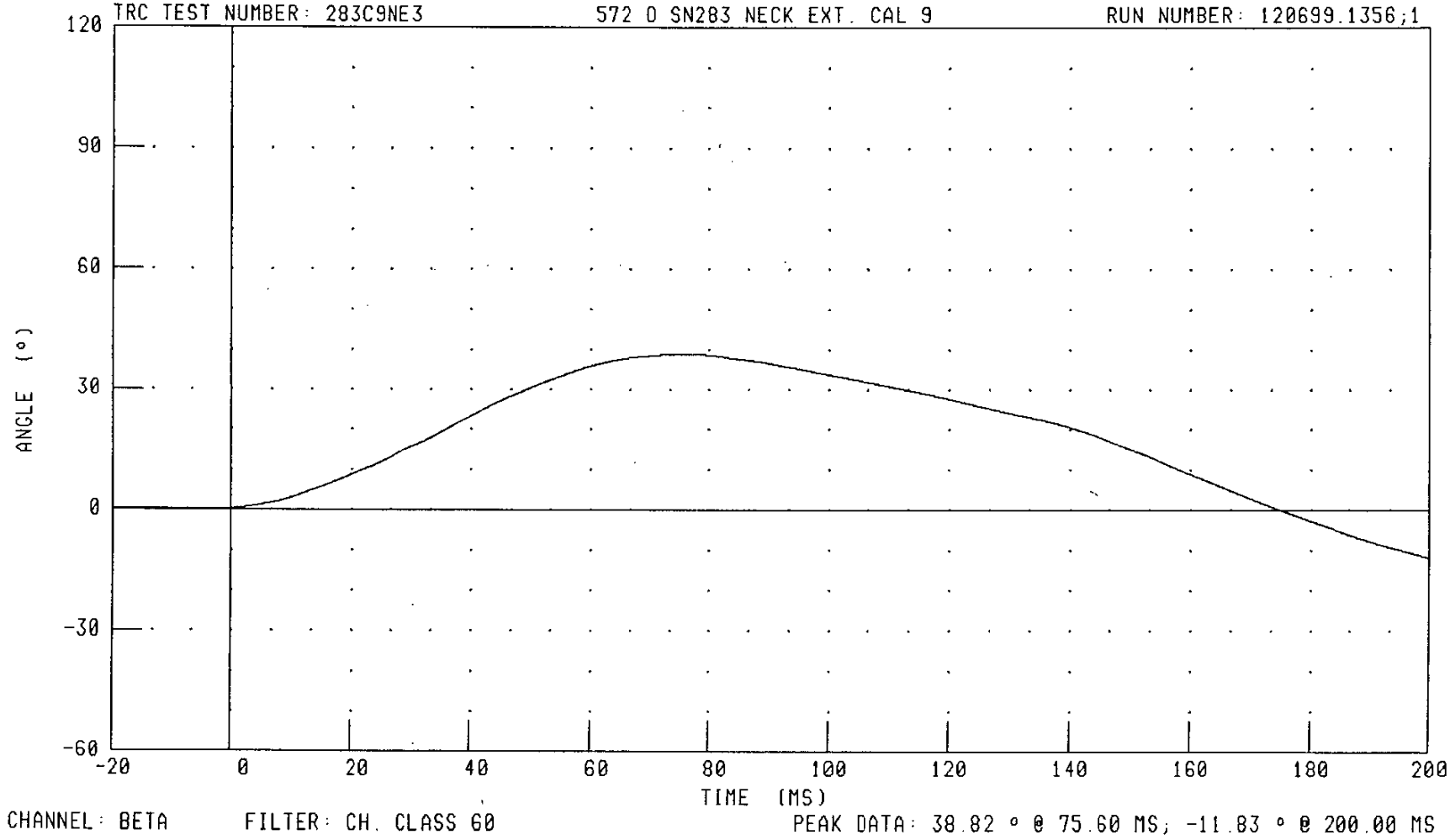
* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN RUN NUMBER: 120699.1341;1

PART 572-D HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

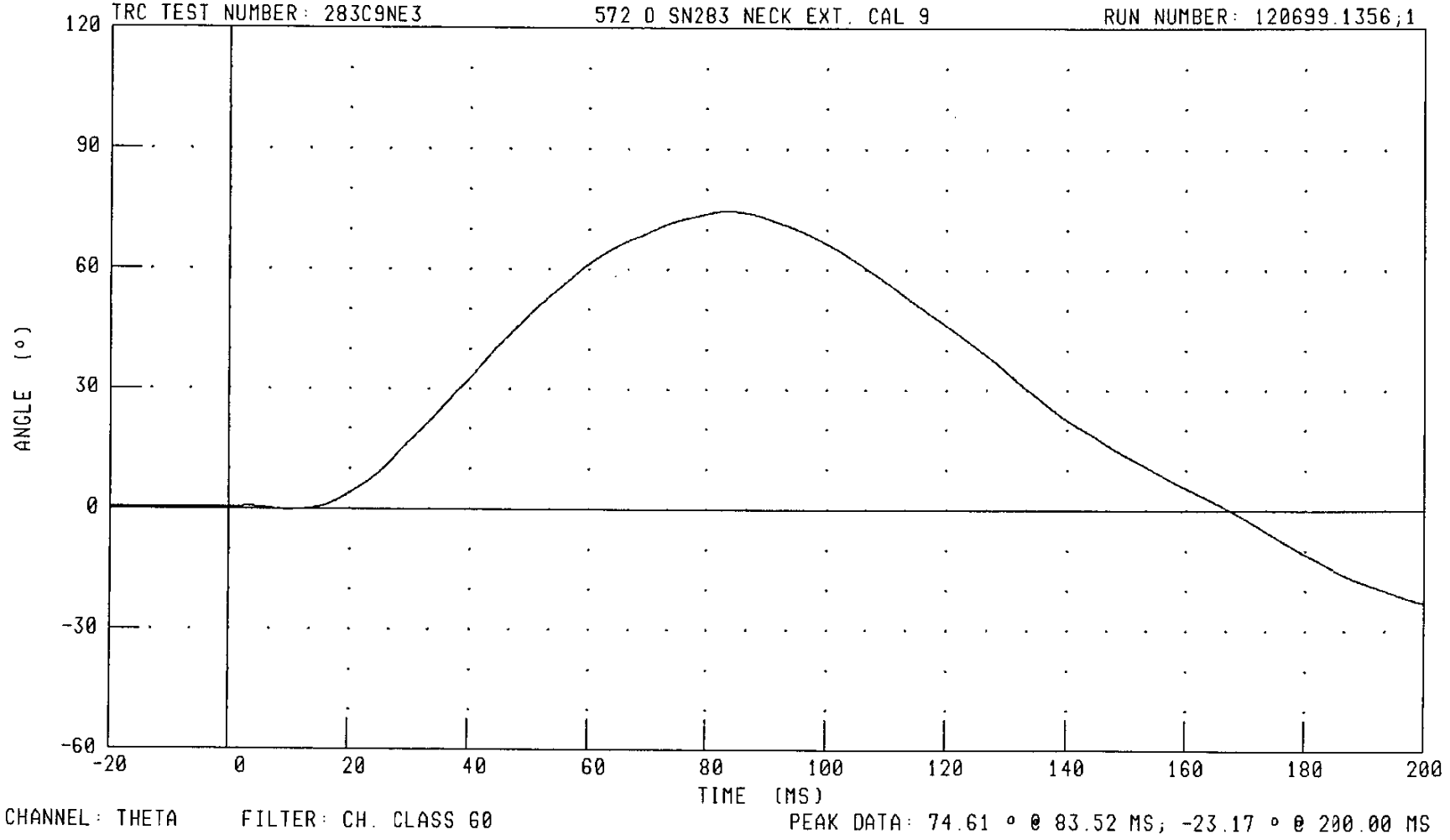


PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 38.82 ° @ 75.60 MS; -11.83 ° @ 200.00 MS

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

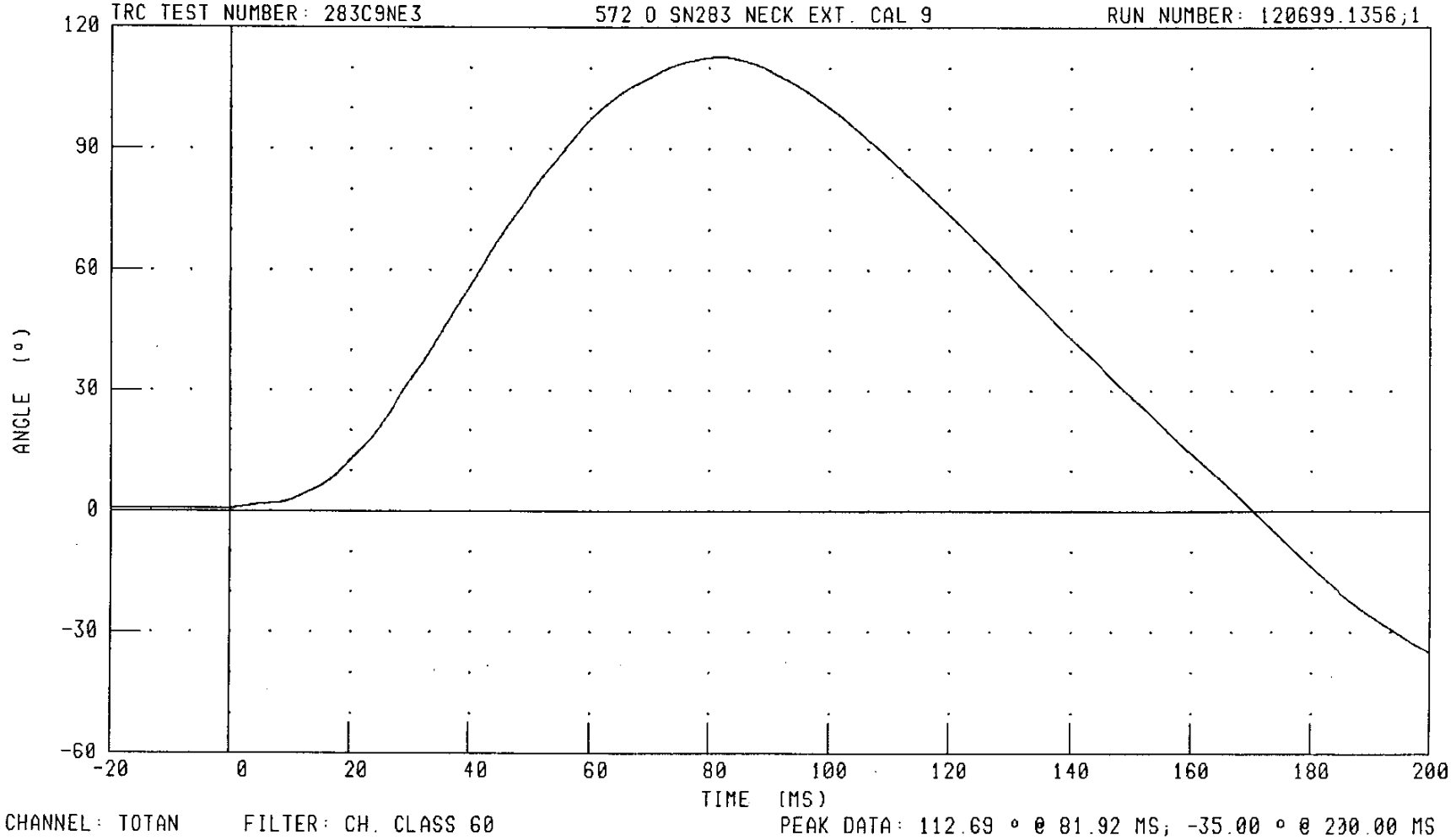


CHANNEL: THETA FILTER: CH. CLASS 60

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

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

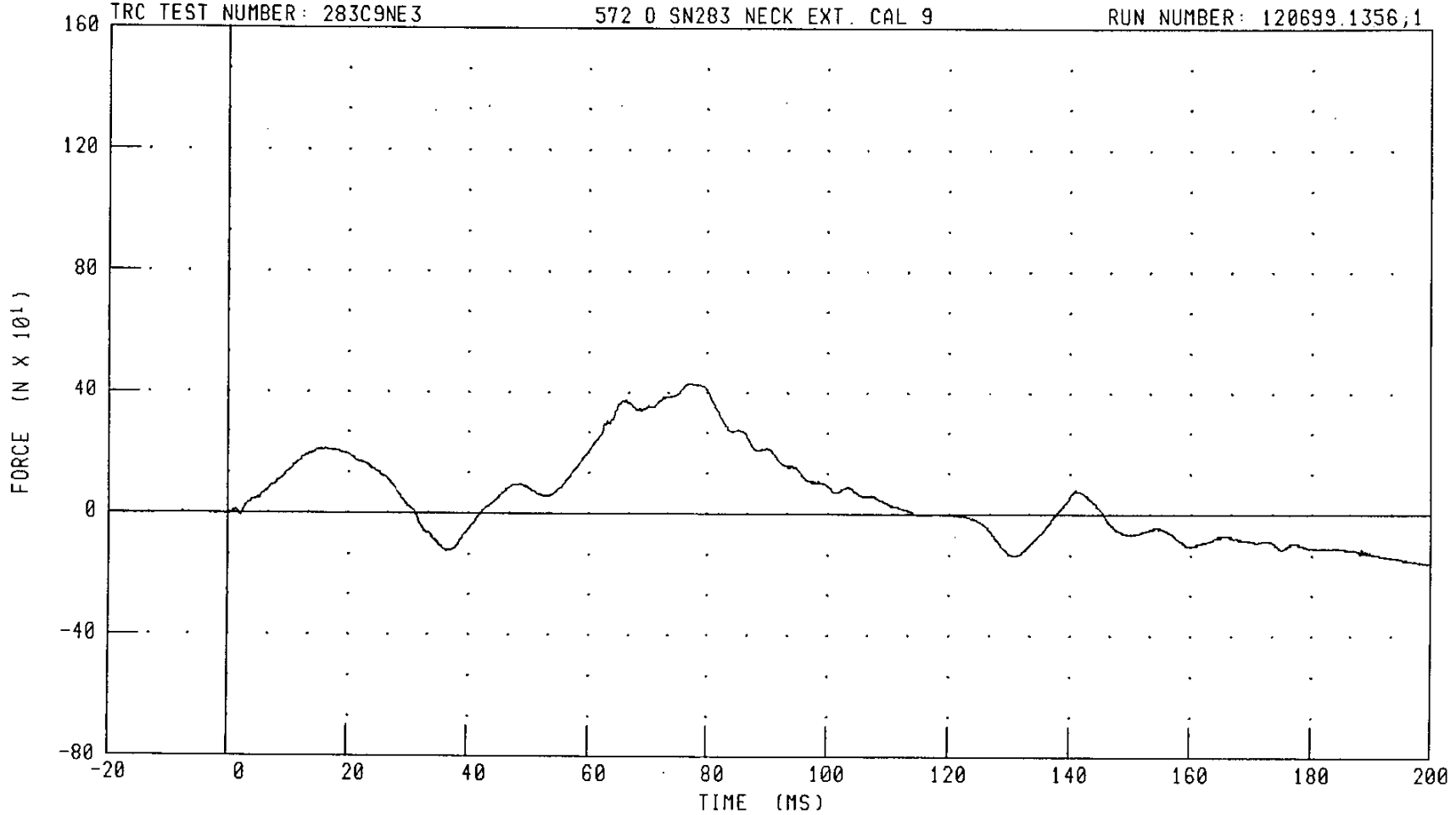


CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 112.69 ° @ 81.92 MS; -35.00 ° @ 230.00 MS

PART 572-D HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

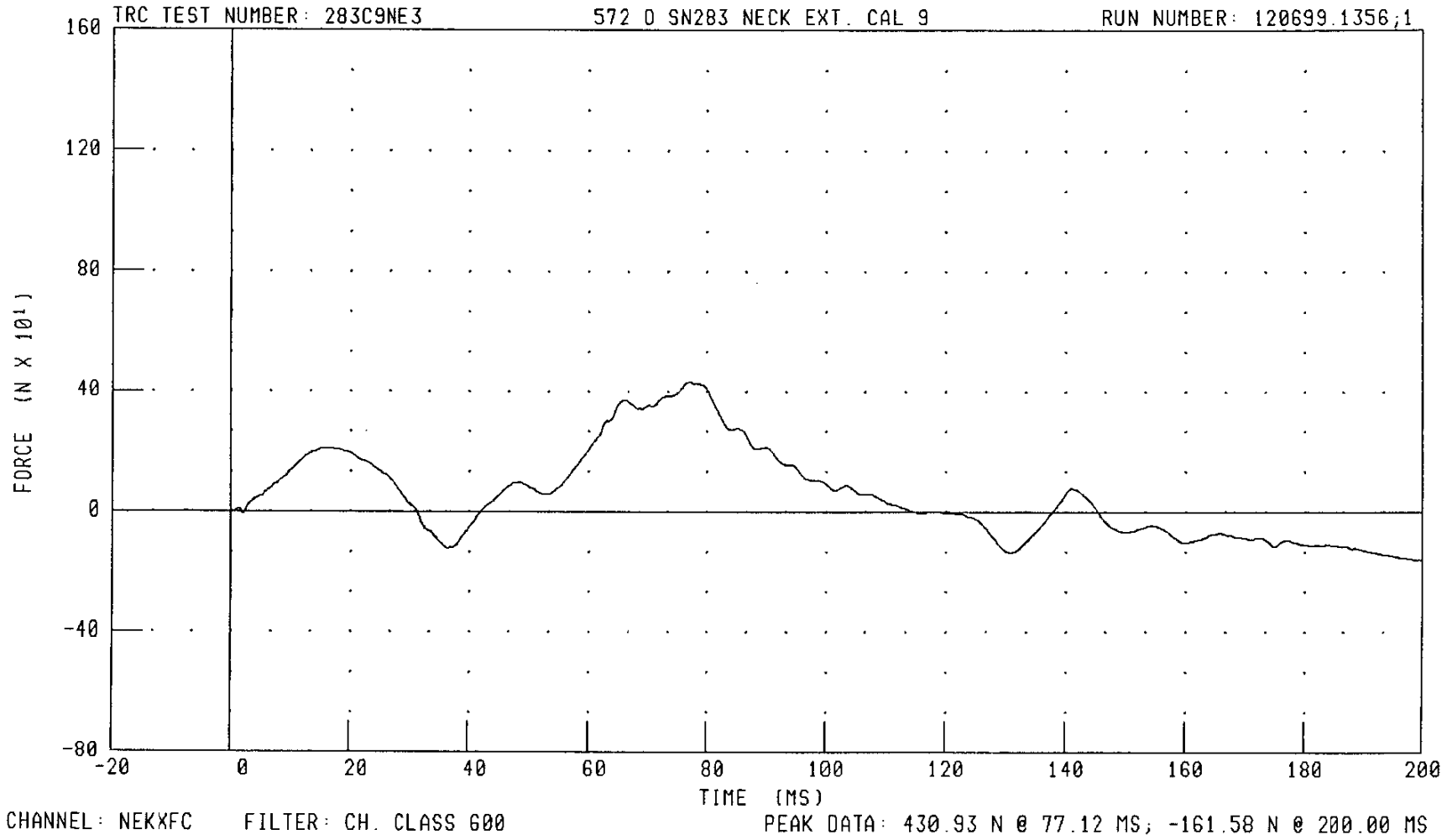


CHANNEL: NEKXF FILTER: CH. CLASS 1000

PEAK DATA: 430.65 N @ 76.72 MS; -163.87 N @ 199.44 MS

PART 572-D HYBRID III NECK EXTENSION CALIBRATION

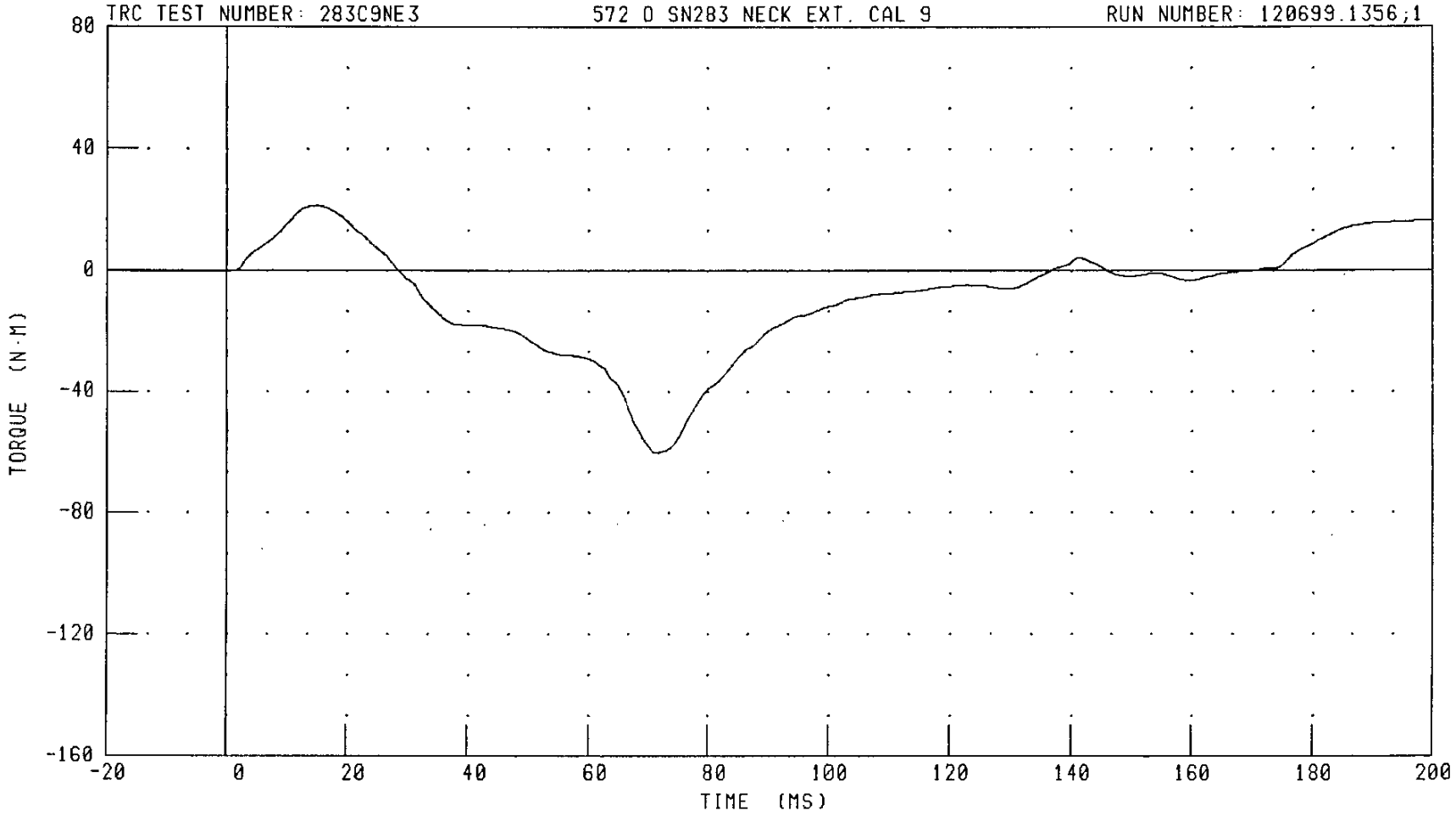
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION



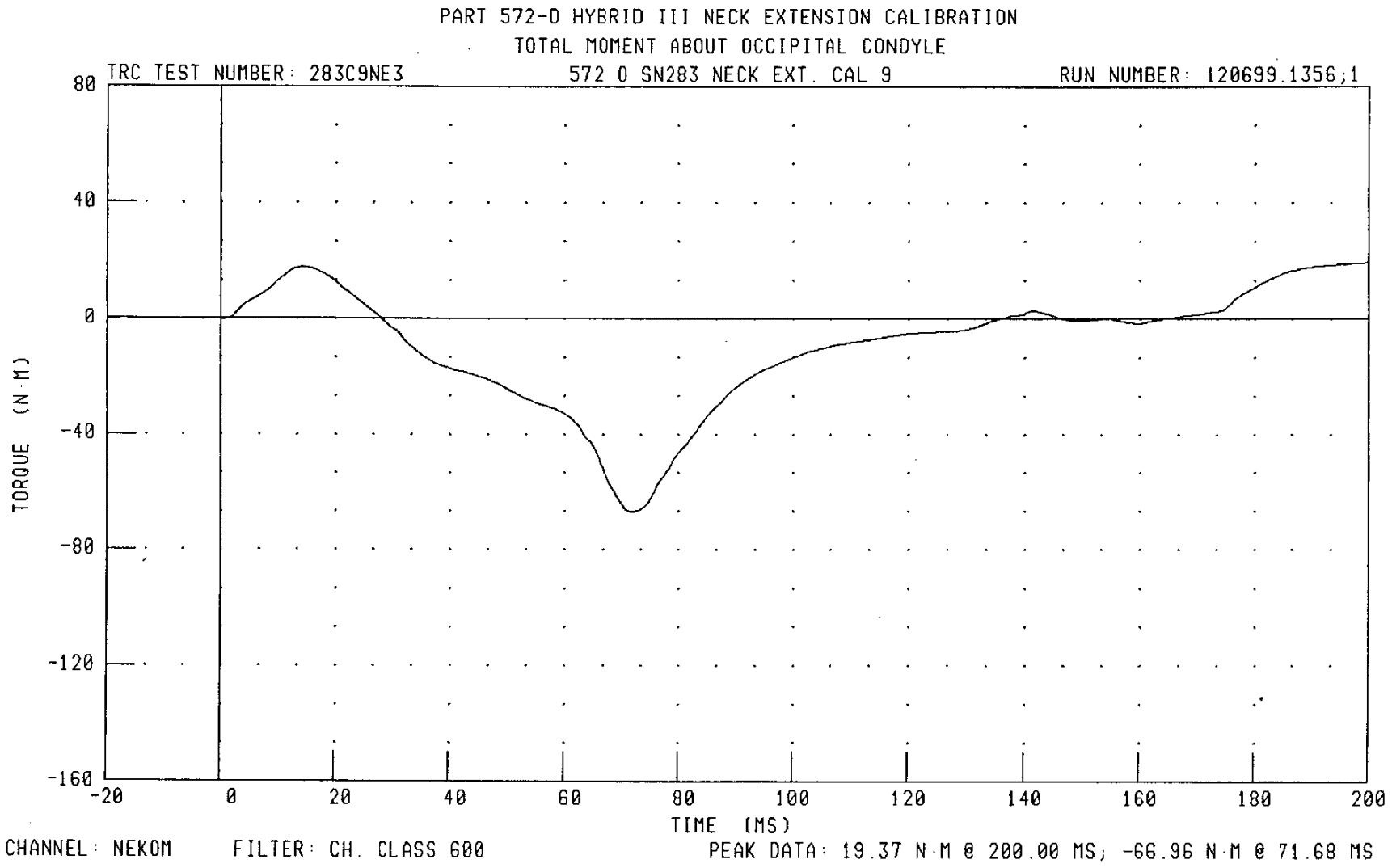
CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 430.93 N @ 77.12 MS; -161.58 N @ 200.00 MS

PART 572-O HYBRID III NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 21.34 N·M @ 14.96 MS; -60.55 N·M @ 71.44 MS


PART 572-O HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 283C9NE3
572 O SN283 NECK EXT. CAL 9
RUN NUMBER: 120699.1356;1
80
40
0
-40
-80
-120
-160
TORQUE (N-M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
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.

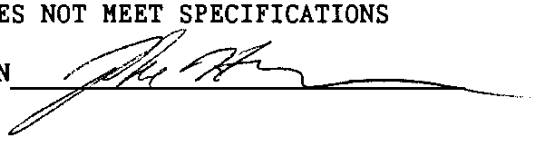
THORAX IMPACT TEST

HYBRID III SMALL FEMALE 07-DEC-99

TRC INC. TEST NO: 283C9TH2 572 O SN283 THORAX CAL9

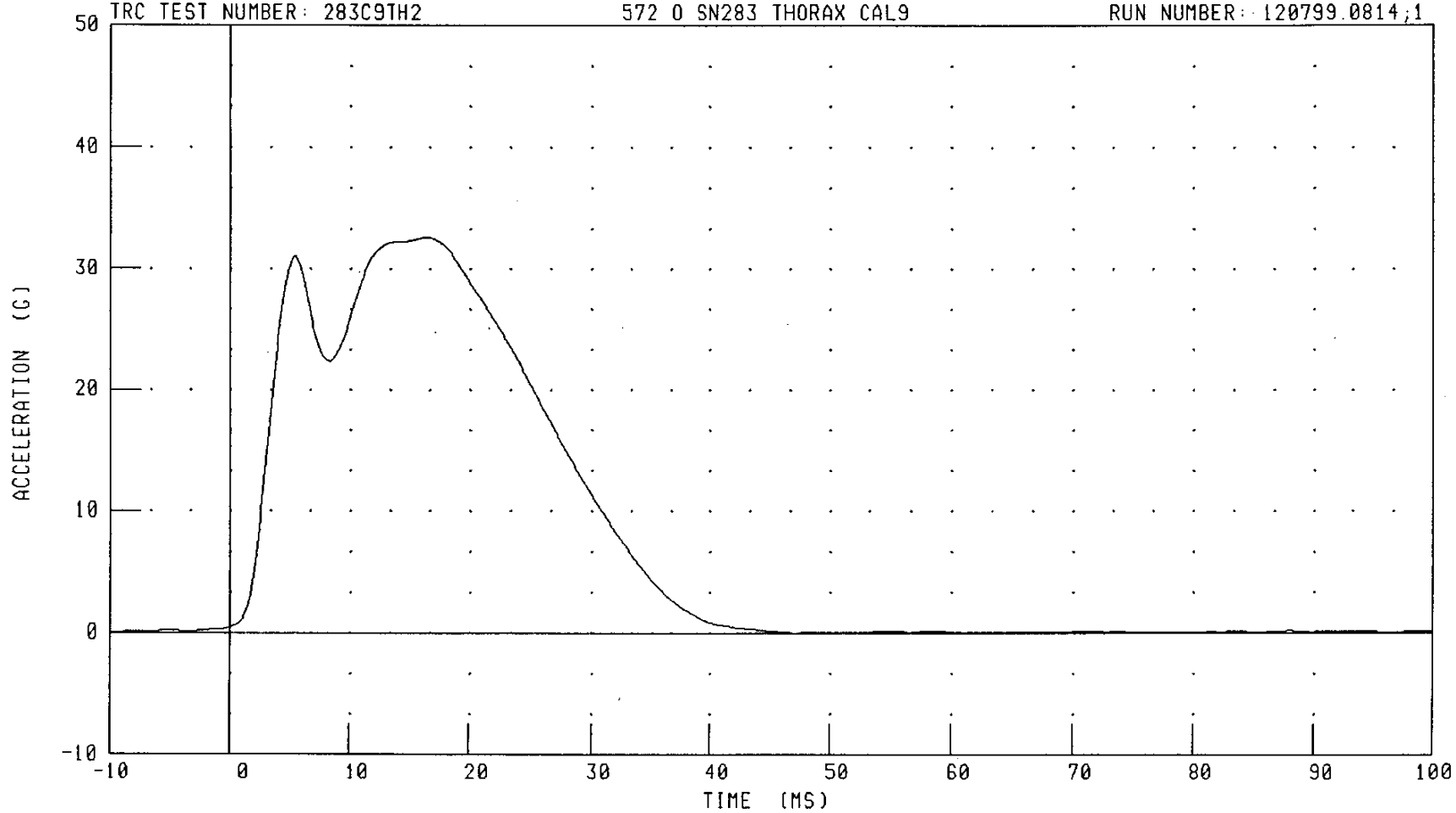
TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.62 M/S
MAXIMUM DEFLECTION	48 - 55 MM	49.1 MM
MAXIMUM RESISTIVE FORCE WITHIN DEFLECTION CORRIDOR	3900 - 4400 N	4472. N *
INTERNAL HYSTERESIS	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: 120799.0814;1

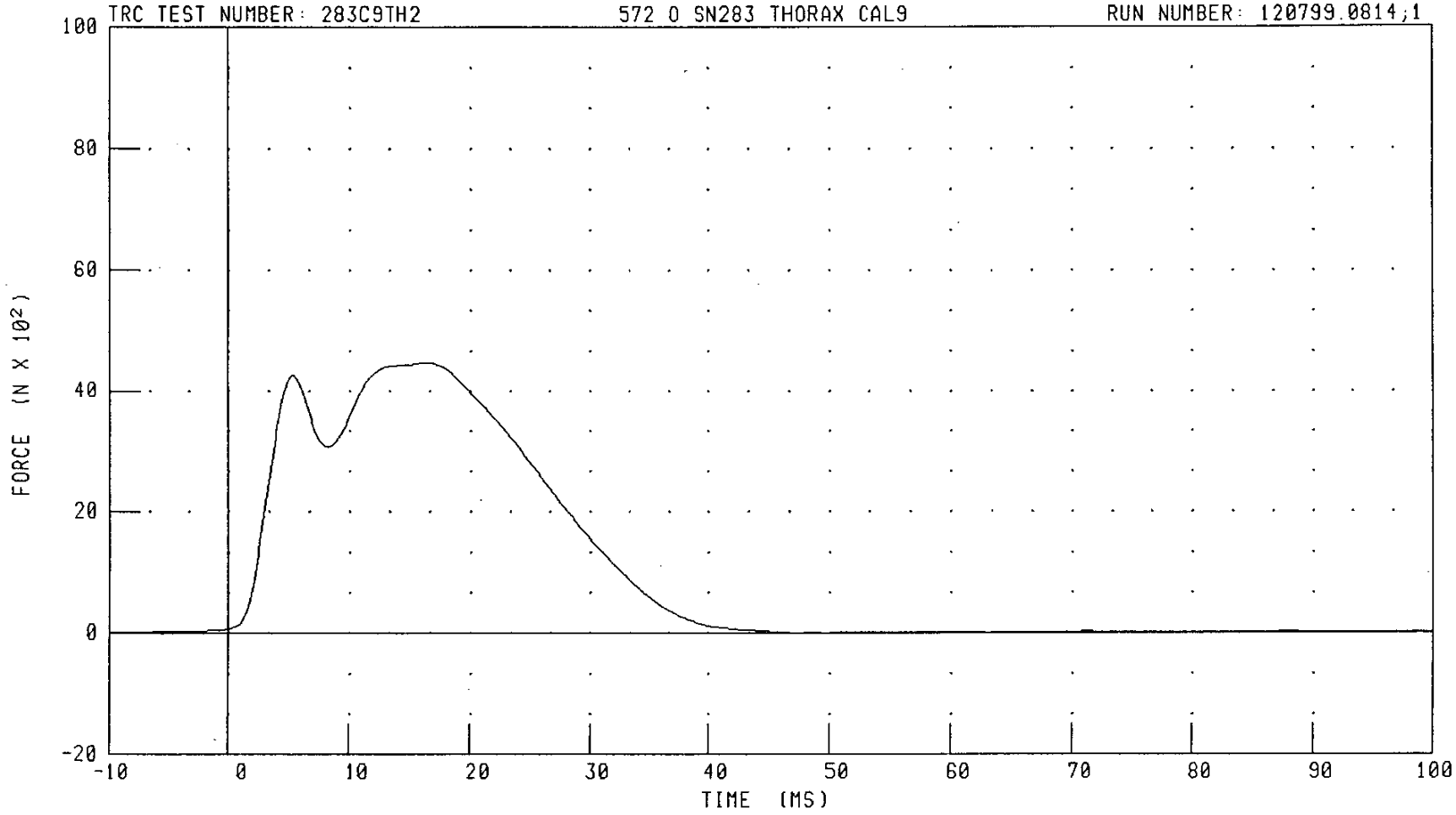


CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 32.59 G @ 16.40 MS; 0.02 G @ 47.20 MS

PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER: 283C9TH2 572 0 SN283 THORAX CAL9 RUN NUMBER: 120799.0814;1

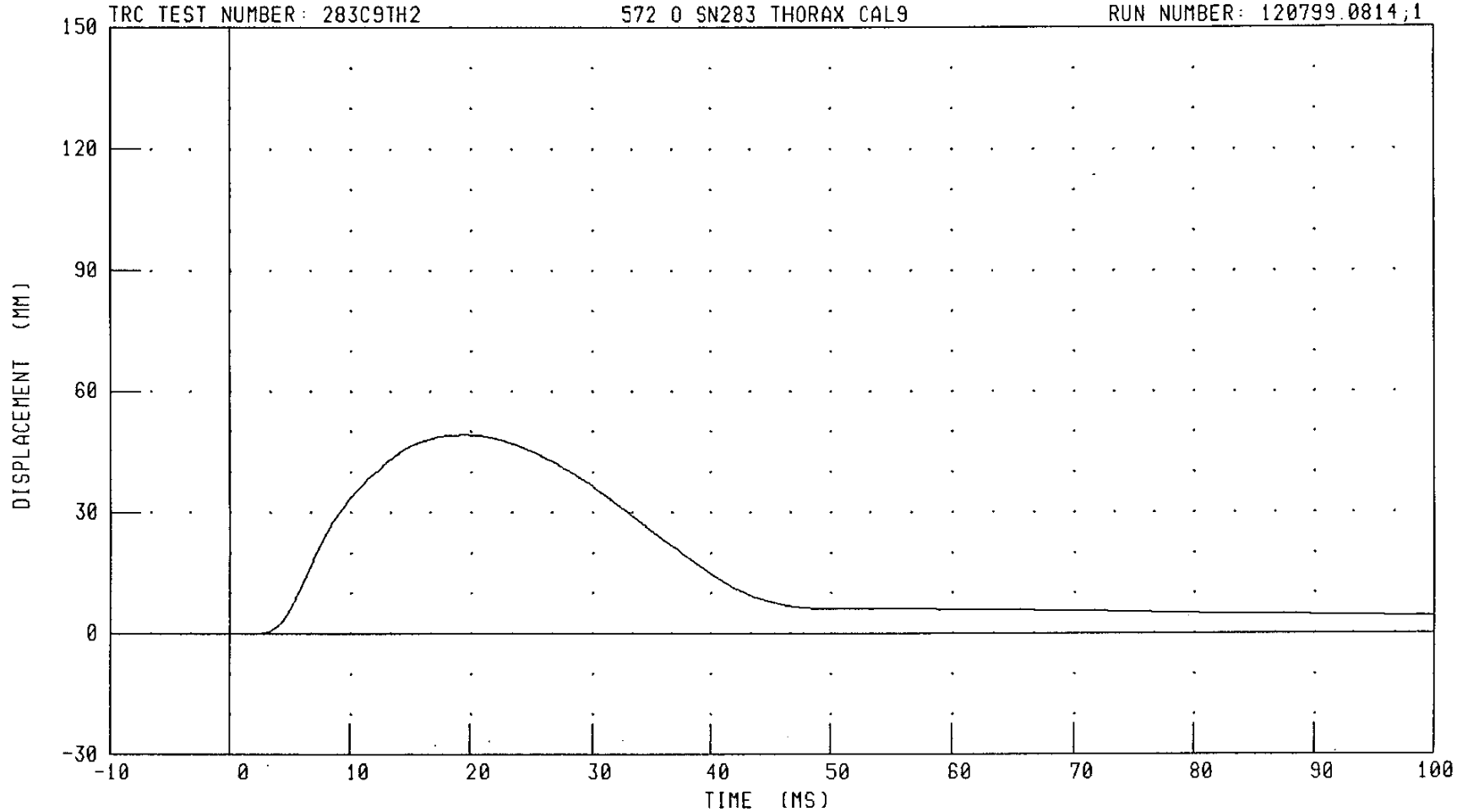


CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 4472.48 N @ 16.40 MS; 2.39 N @ 47.20 MS

PART 572-0 HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

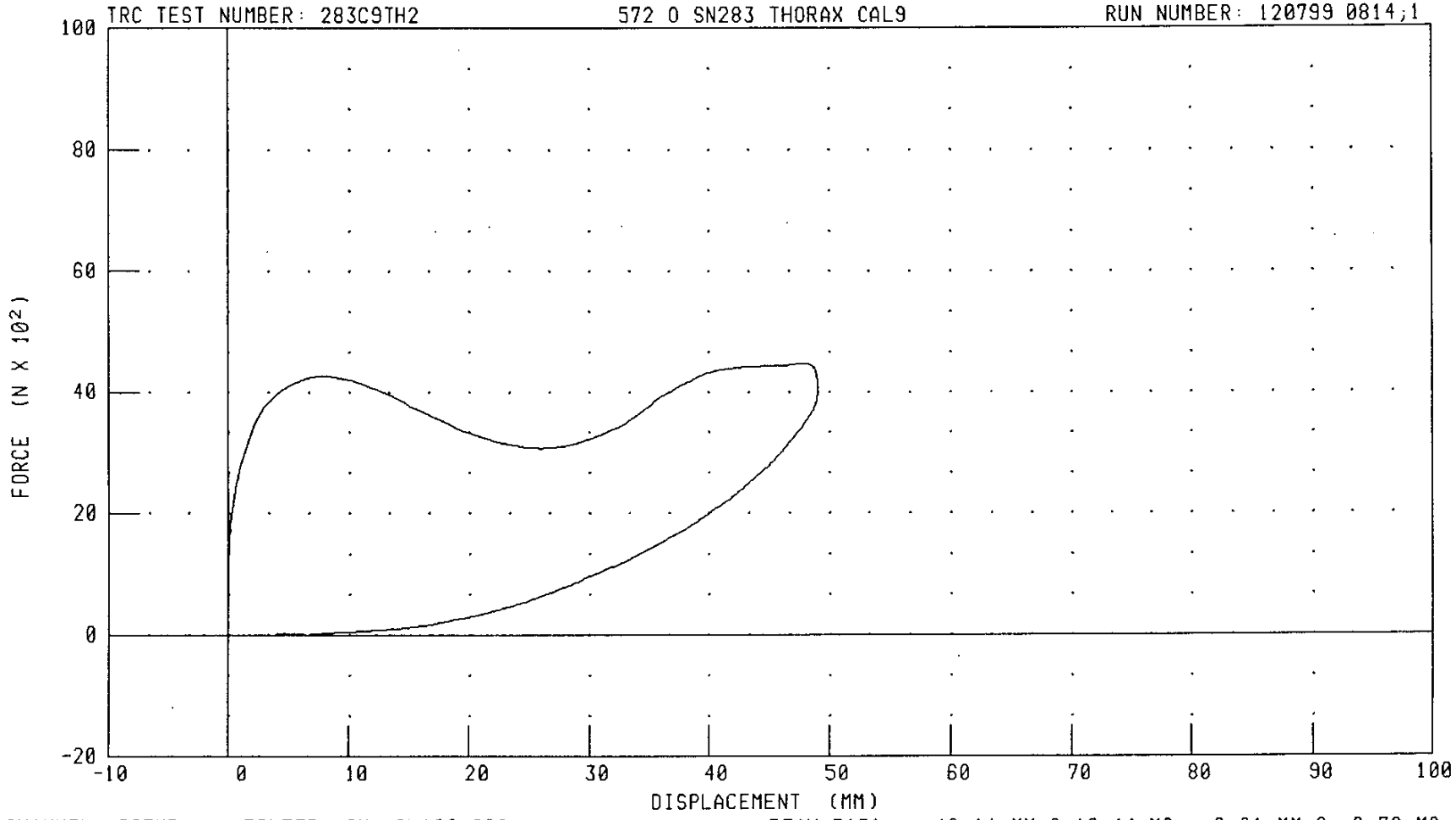
TRC TEST NUMBER: 283C9TH2 572 0 SN283 THORAX CAL9 RUN NUMBER: 120799.0814;1



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

TRC TEST NUMBER: 283C9TH2 572 0 SN283 THORAX CAL9 RUN NUMBER: 120799 0814;1



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

PEAK DATA: 49.11 MM @ 19.44 MS; -0.01 MM @ -6.72 MS
4472.48 N @ 16.40 MS; 2.39 N @ 47.20 MS

TRANSPORTATION RESEARCH CENTER INC.

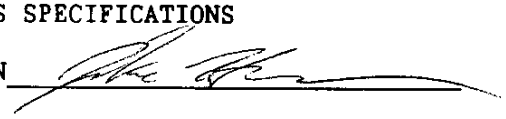
RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 06-DEC-99

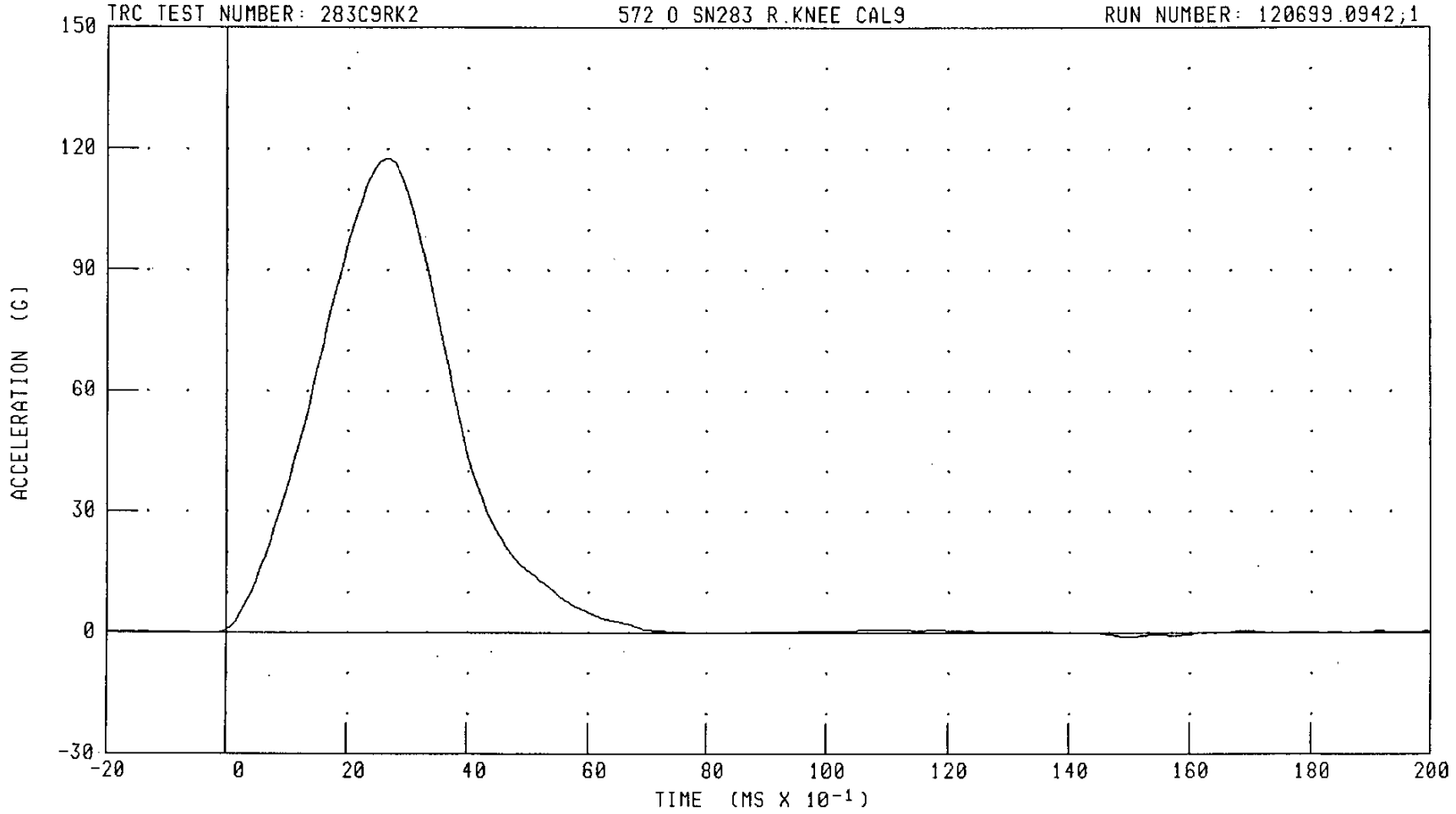
TRC INC. TEST NO: 283C9RK2 572 O SN283 R.KNEE CAL9

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-O HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)

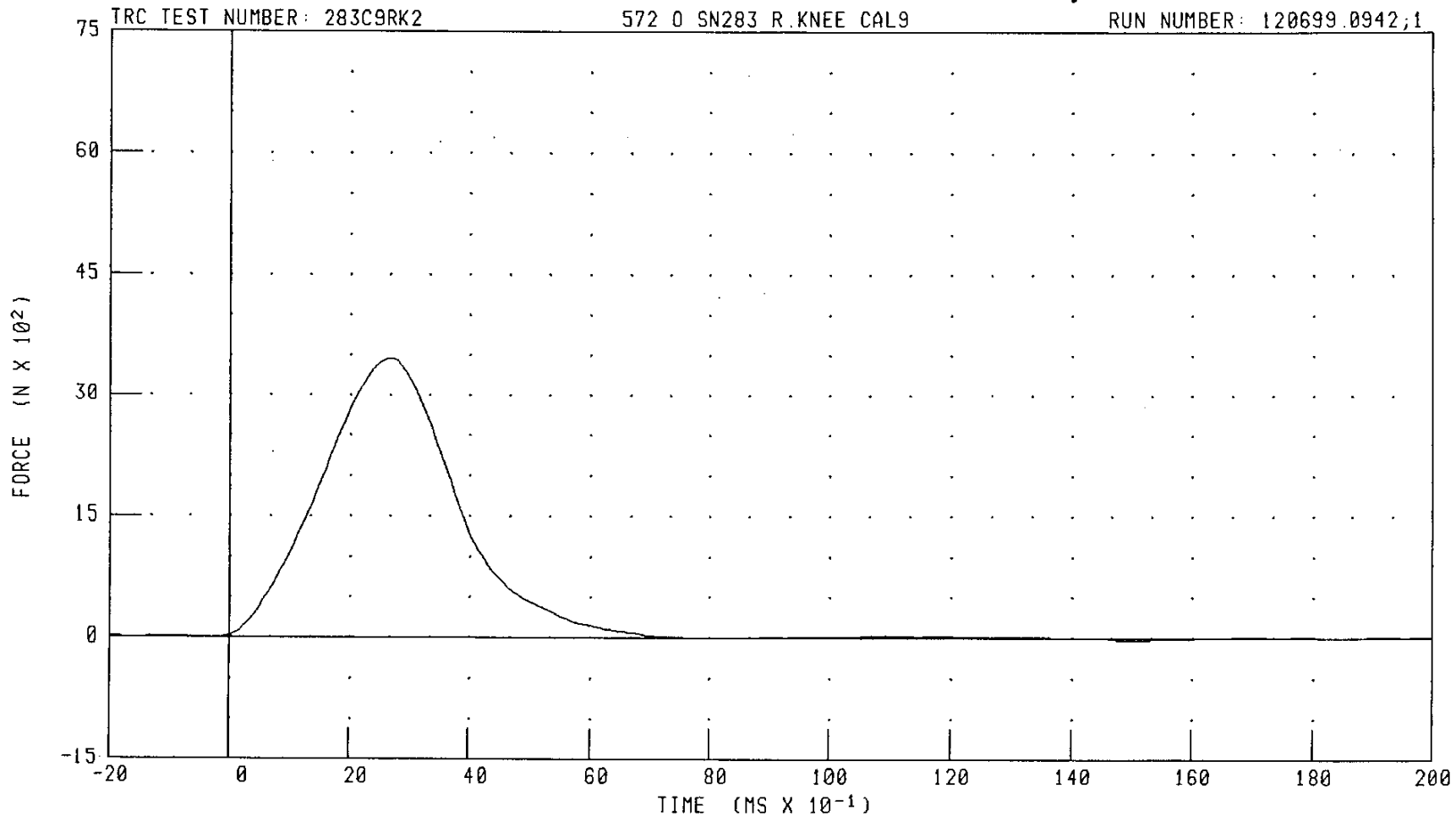


CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 117.58 G @ 2.64 MS; -1.10 G @ 15.04 MS

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

TRANSPORTATION RESEARCH CENTER INC.

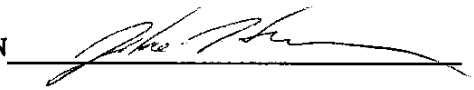
LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 06-DEC-99

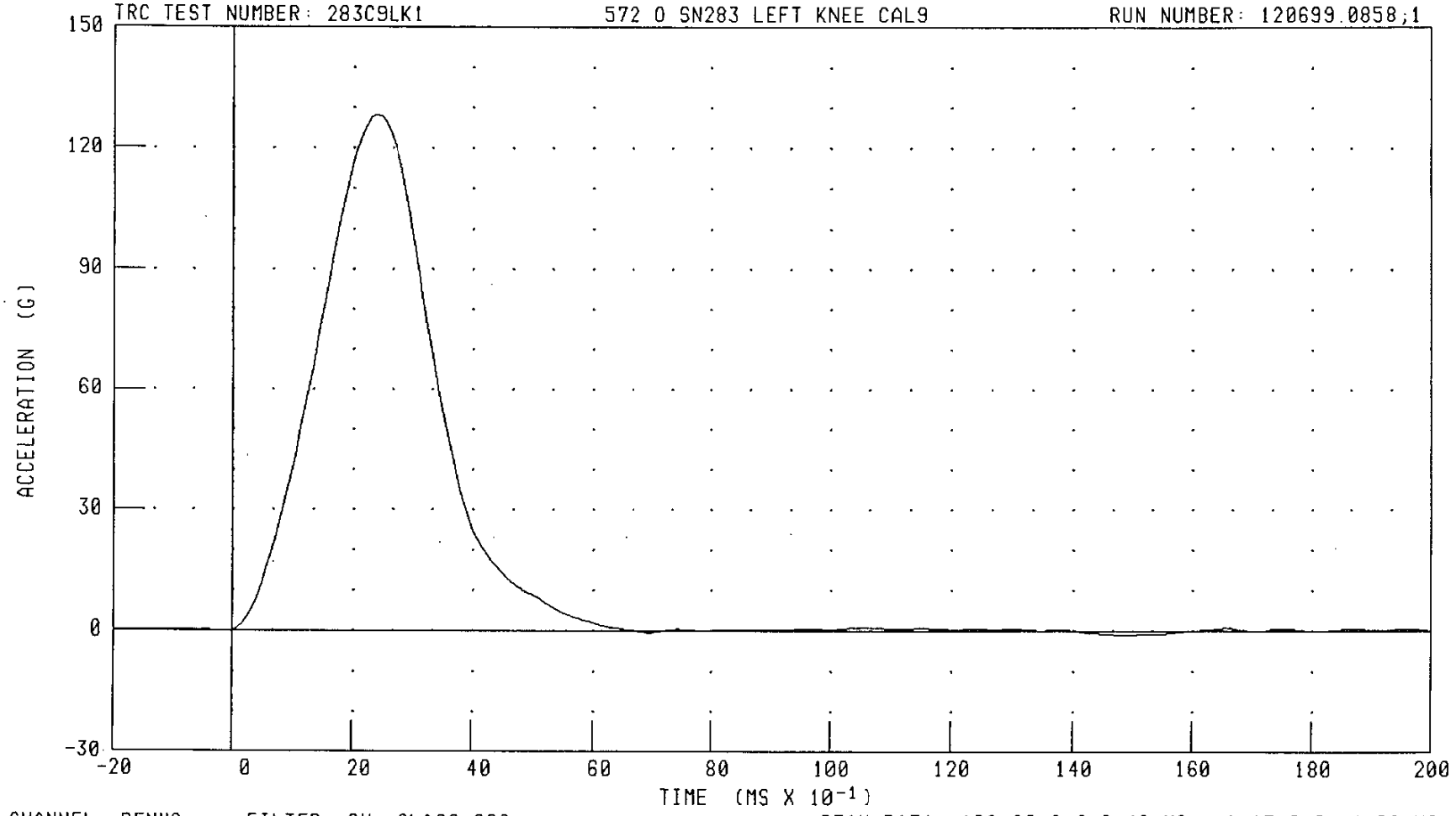
TRC INC. TEST NO: 283C9LK1 572 O SN283 LEFT KNEE CAL9

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

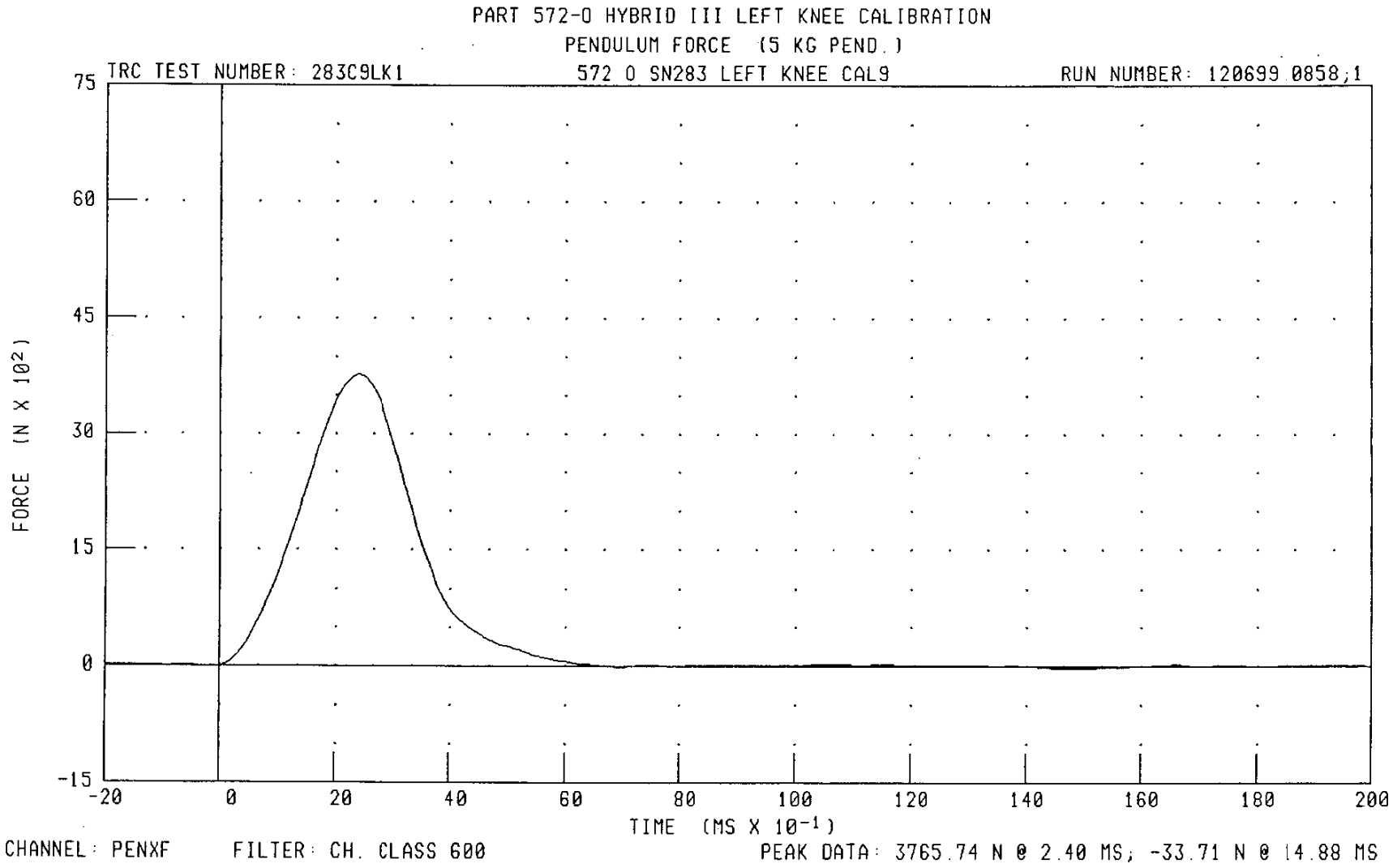
TEST MEETS SPECIFICATIONS

TECHNICIAN  RUN NUMBER: 120699.0858;1

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



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 128.28 G @ 2.40 MS; -1.15 G @ 14.88 MS


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
FORCE (N X 10²)
75
60
45
30
15
0
-15
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10⁻¹)
CHANNEL: PENXF
FILTER: CH. CLASS 600
PEAK DATA: 3765.74 N @ 2.40 MS; -33.71 N @ 14.88 MS

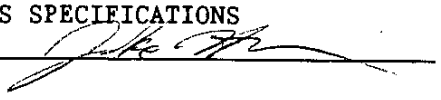
Pre-Test Dummy Certification

Passenger Dummy S/N 369

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

TRC INC. TEST NO: 369C8ED 06-DEC-99
570 O 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

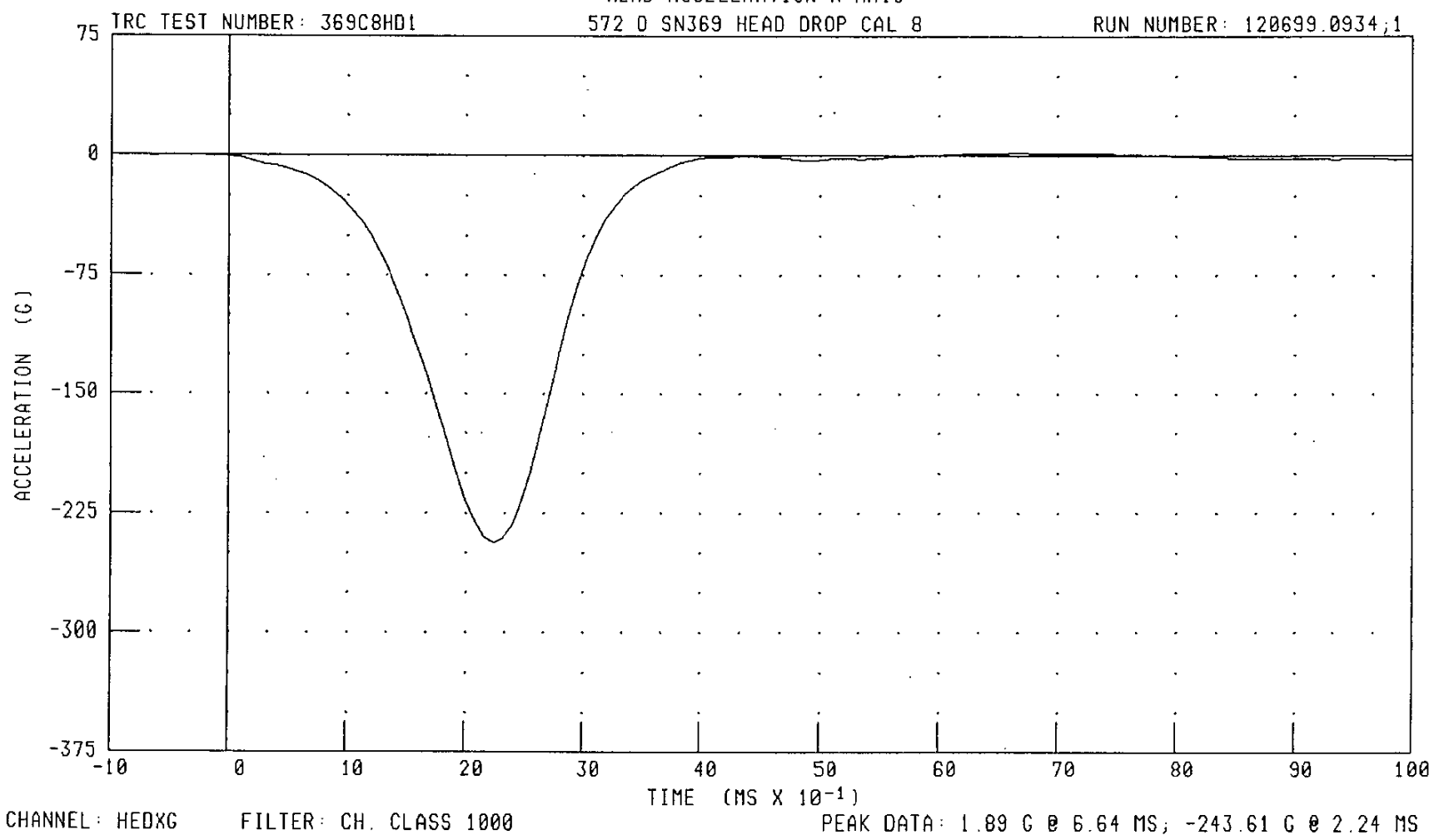
TRC INC. TEST NO: 369C8HD1 572 O SN369 HEAD DROP CAL 8

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

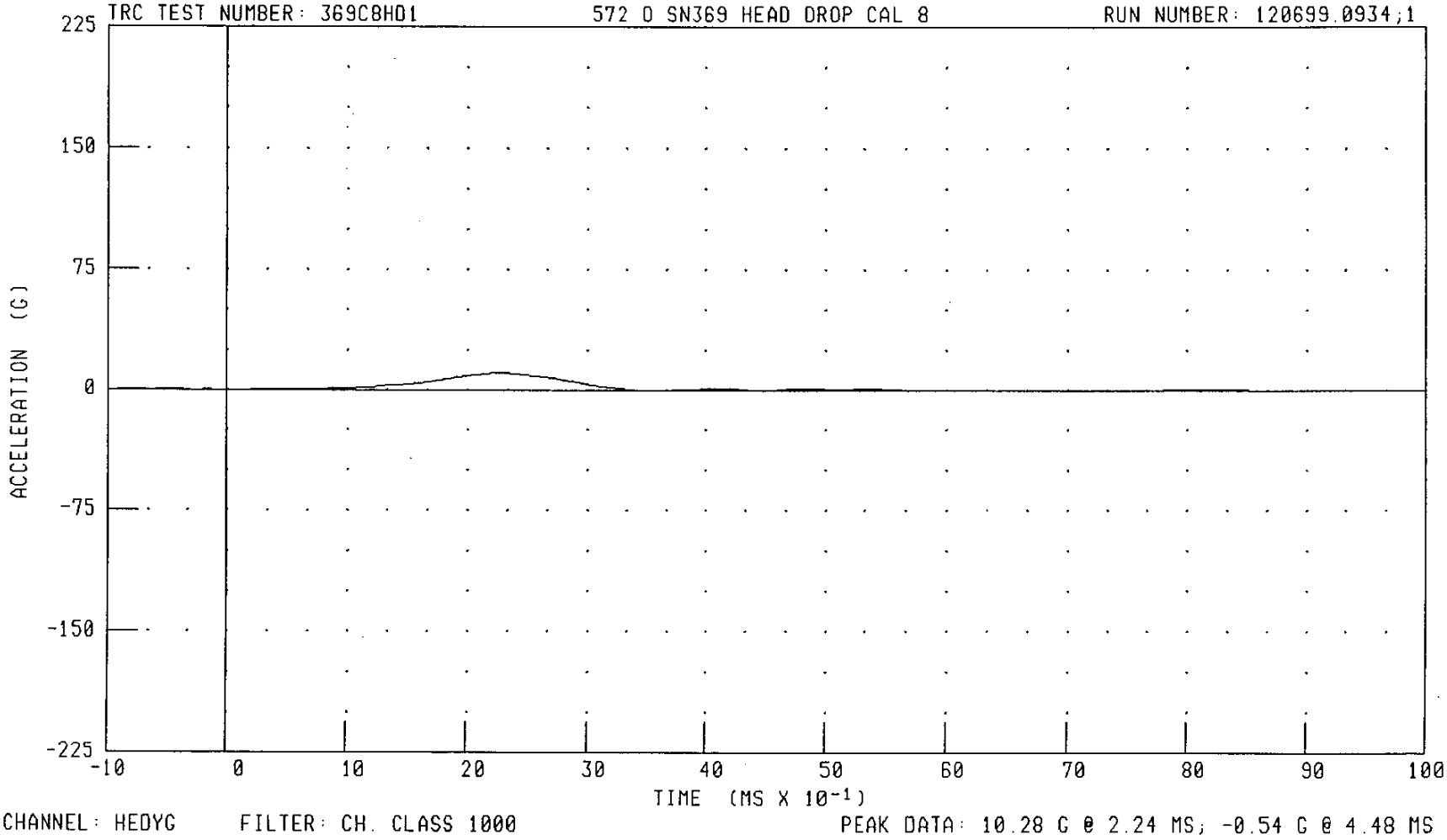
TECHNICIAN _____ RUN NUMBER: 120699.0934;1

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



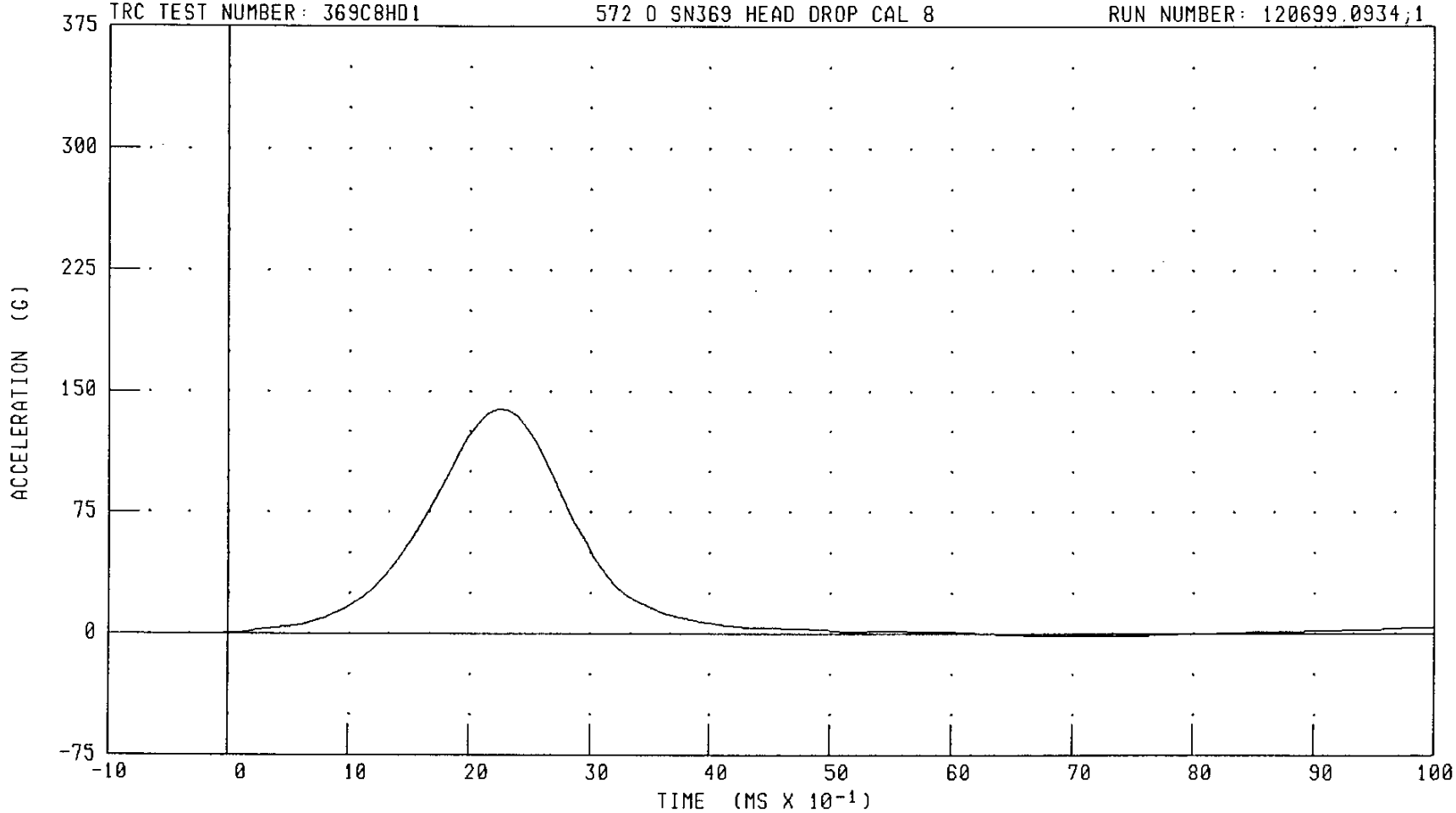
CHANNEL: HEDXG FILTER: CH. CLASS 1000 PEAK DATA: 1.89 G @ 6.64 MS; -243.61 G @ 2.24 MS

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



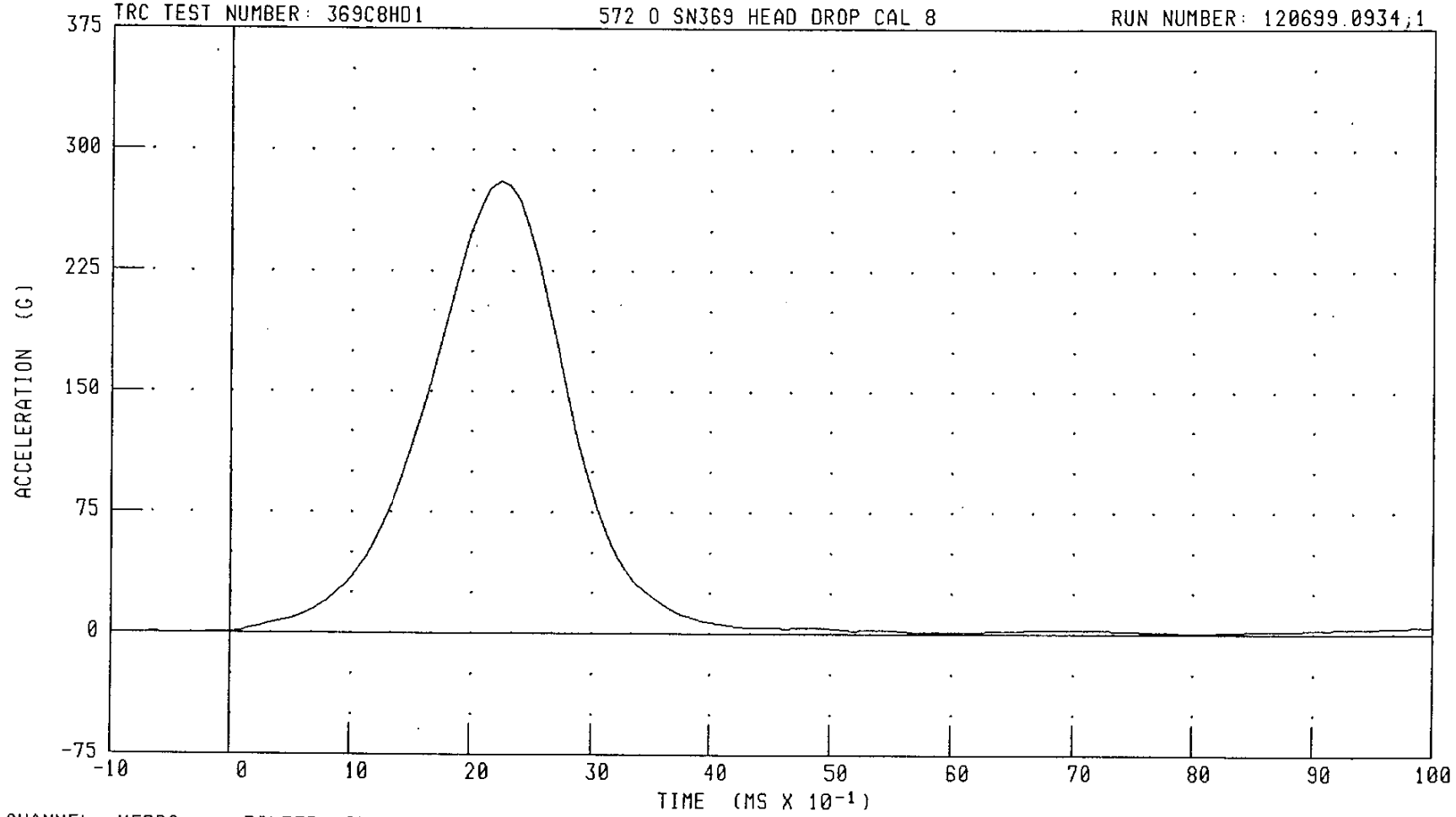
CHANNEL: HEDYG FILTER: CH. CLASS 1000 PEAK DATA: 10.28 G @ 2.24 MS; -0.54 G @ 4.48 MS

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

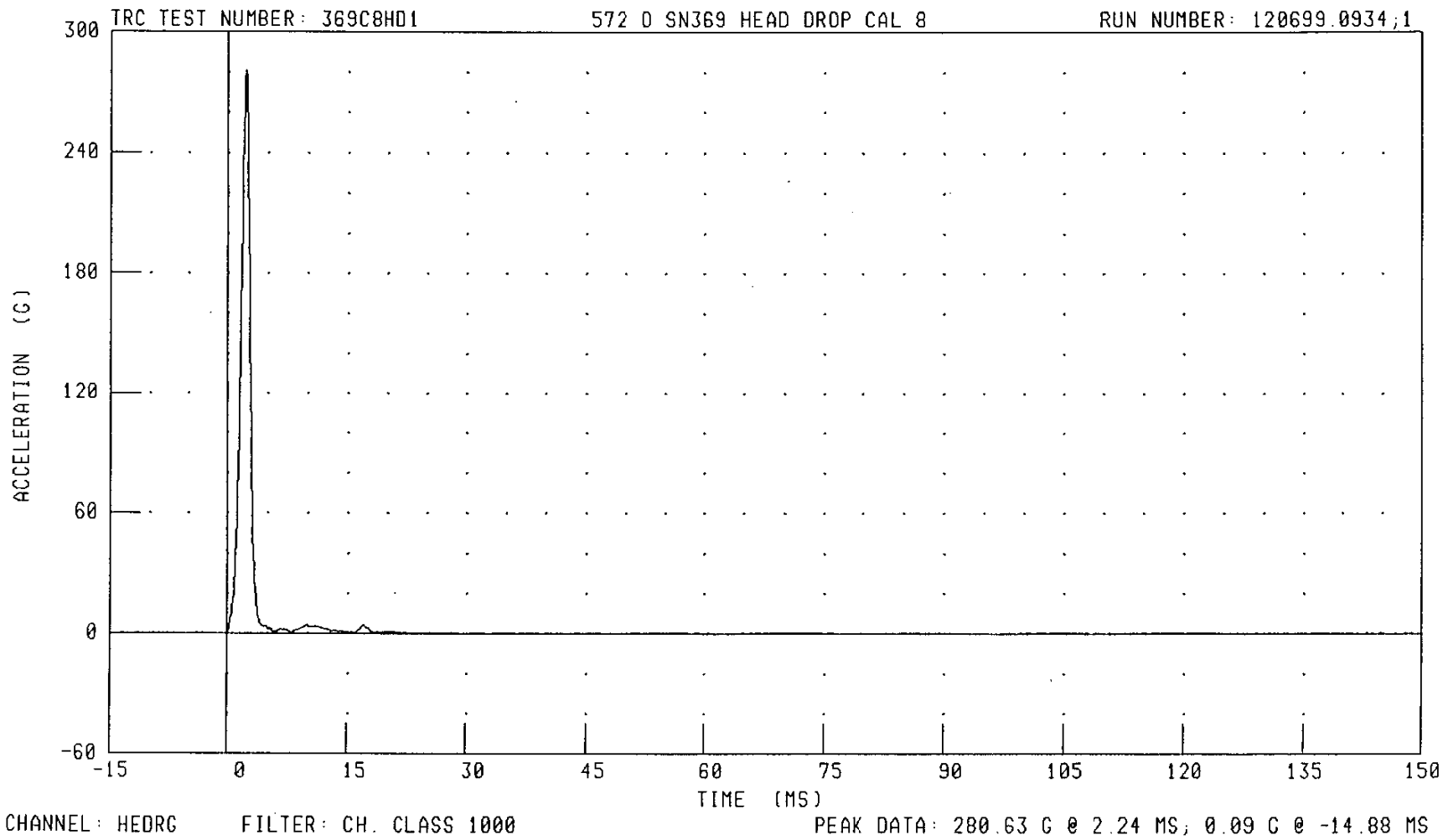


CHANNEL: HEDZC FILTER: CH. CLASS 1000 PEAK DATA: 138.93 G @ 2.24 MS; -1.46 G @ 7.04 MS

PART 572-O HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION



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



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 280.63 G @ 2.24 MS; 0.09 G @ -14.88 MS

TRANSPORTATION RESEARCH CENTER INC.

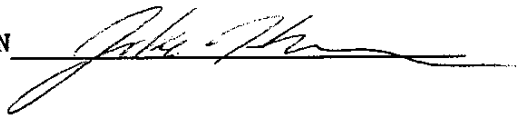
HYBRID III SMALL FEMALE 06-DEC-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

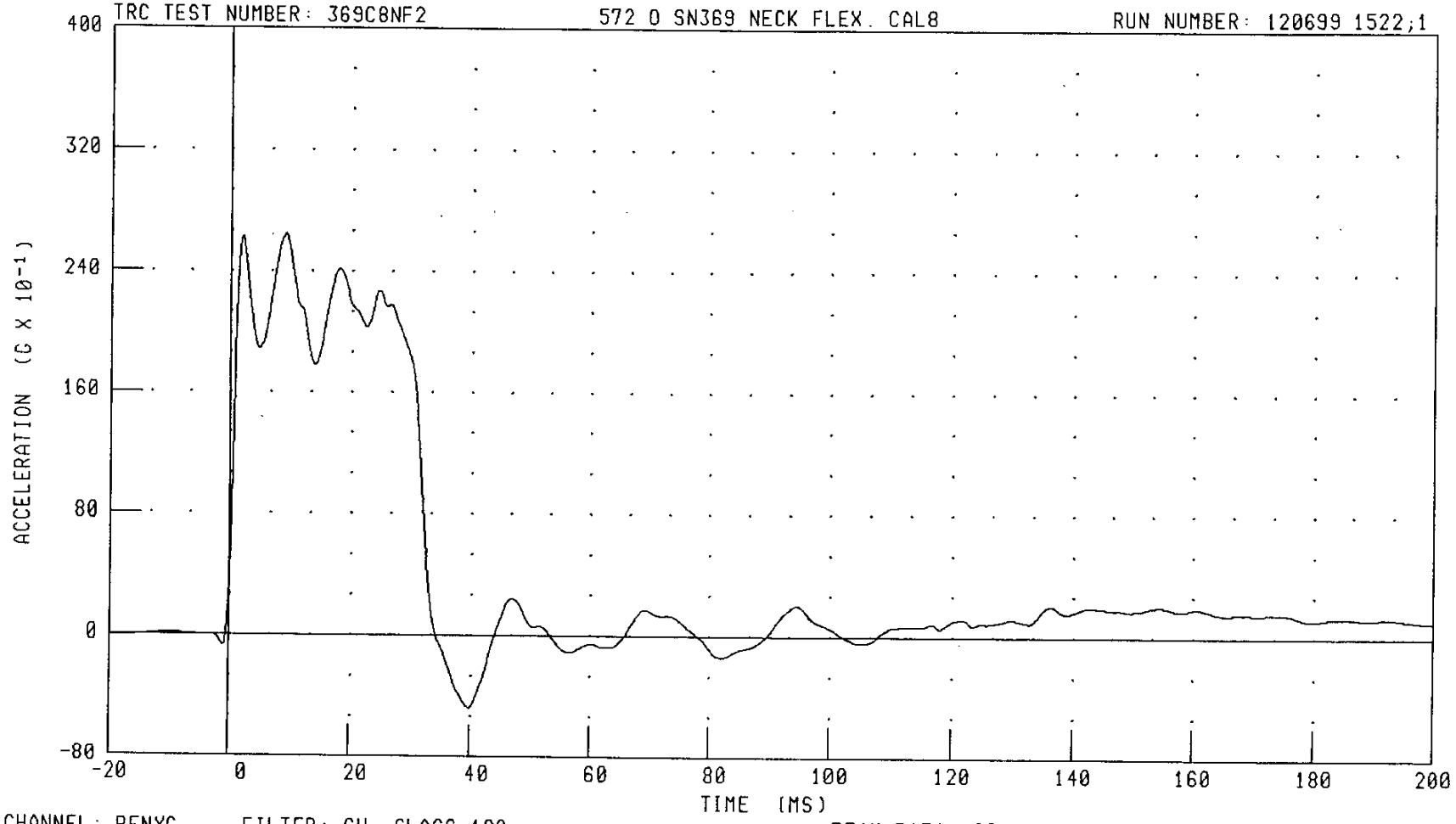
TRC INC. TEST NO: 369C8NF2 572 O SN369 NECK FLEX. CAL8

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

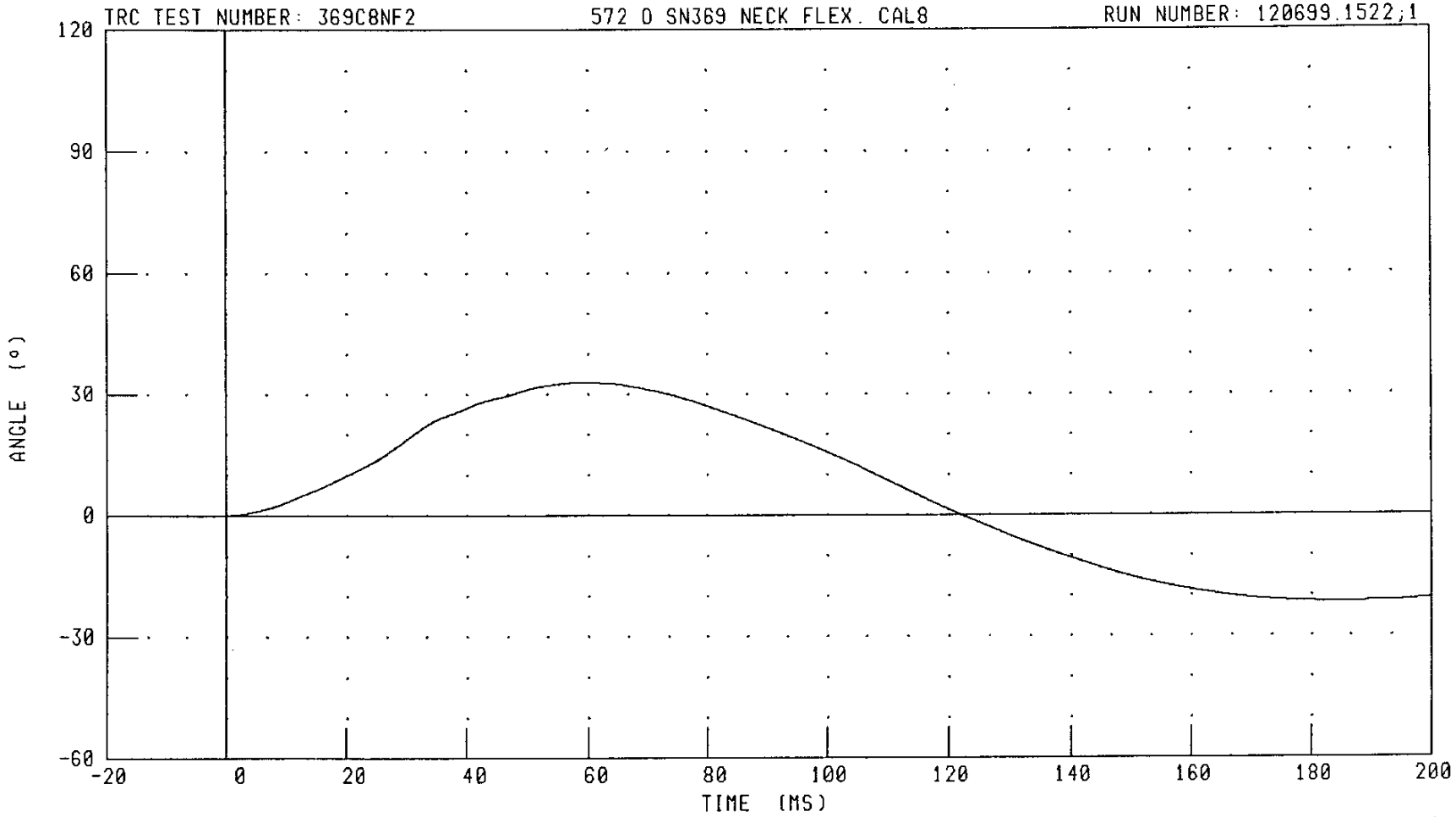
PART 572-0 HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION



CHANNEL: PENXG FILTER: CH. CLASS 180

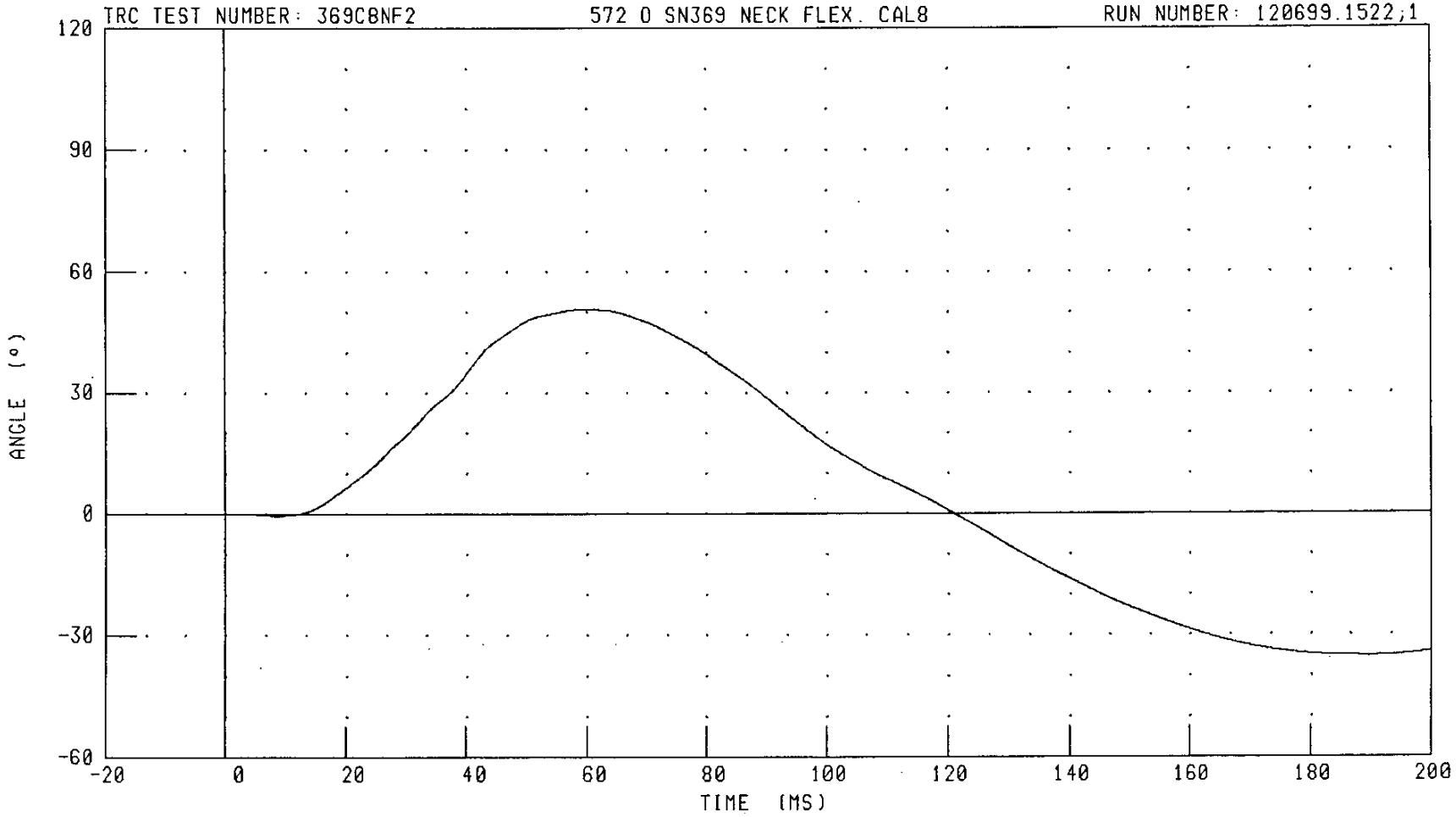
PEAK DATA: 26.46 G @ 9.12 MS; -4.81 G @ 39.84 MS

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



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 32.92 ° @ 59.04 MS; -21.61 ° @ 184.40 MS

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

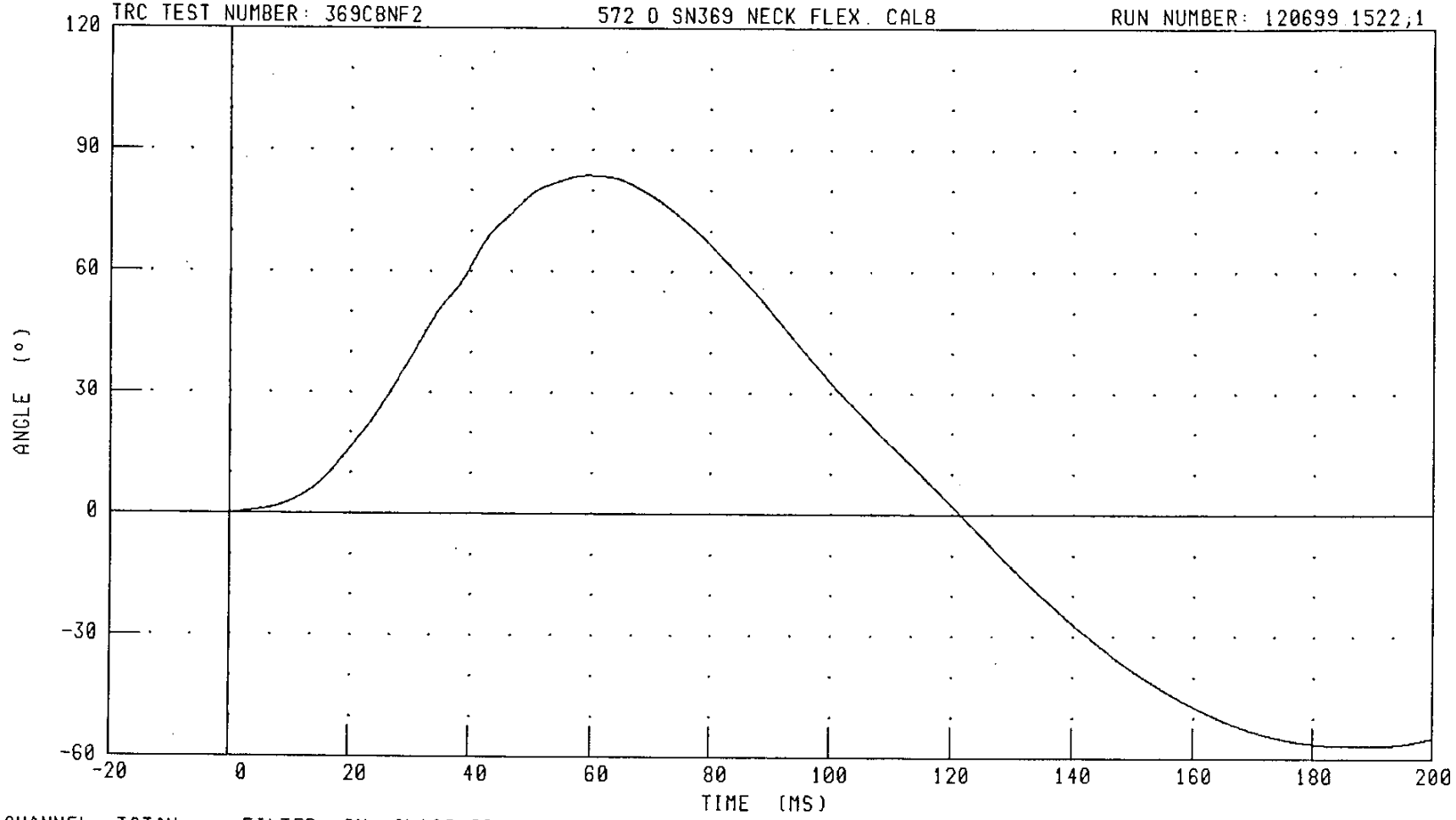


CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 50.71 ° @ 59.60 MS; -35.27 ° @ 189.68 MS

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

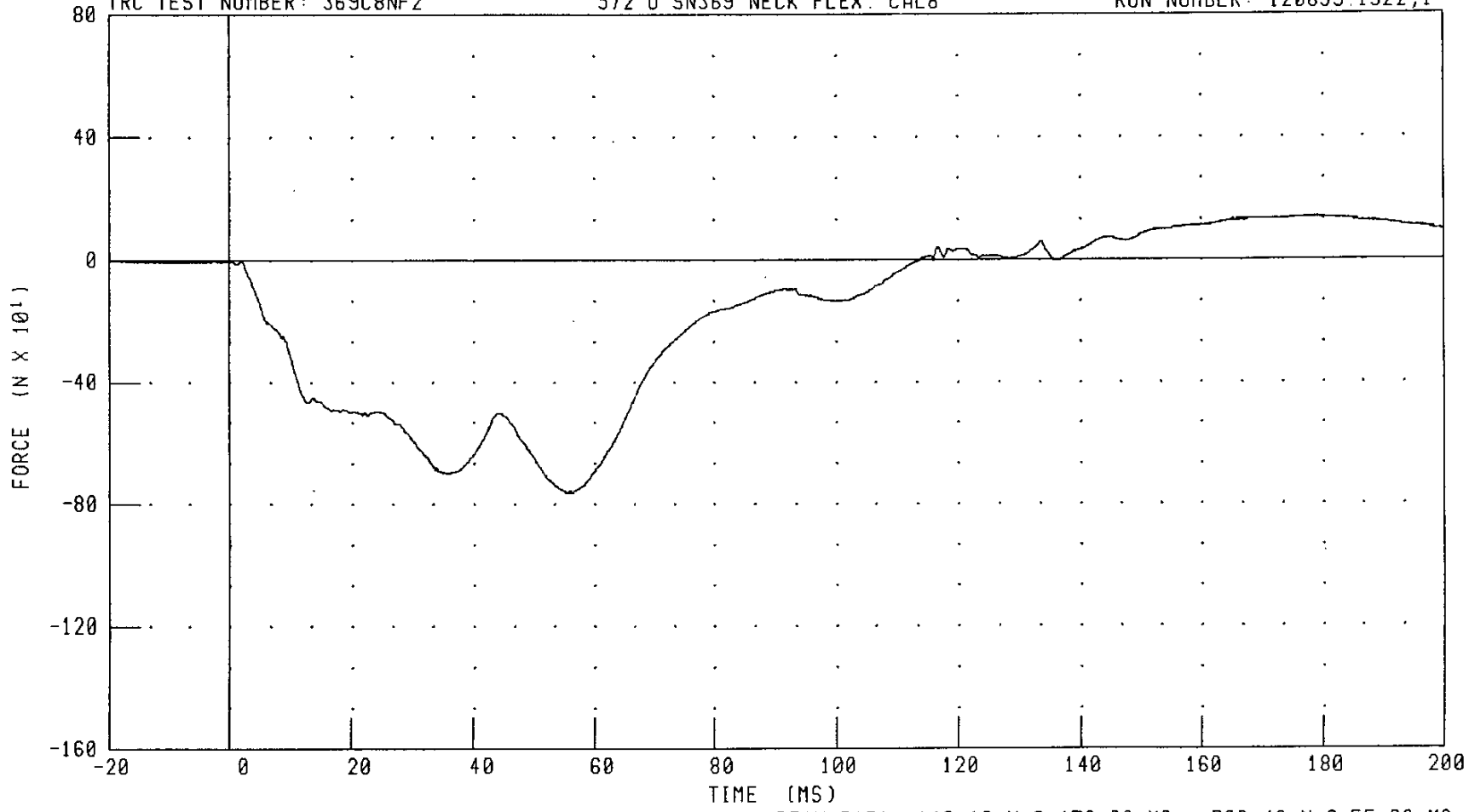


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 83.63 ° @ 59.36 MS; -56.82 ° @ 187.68 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

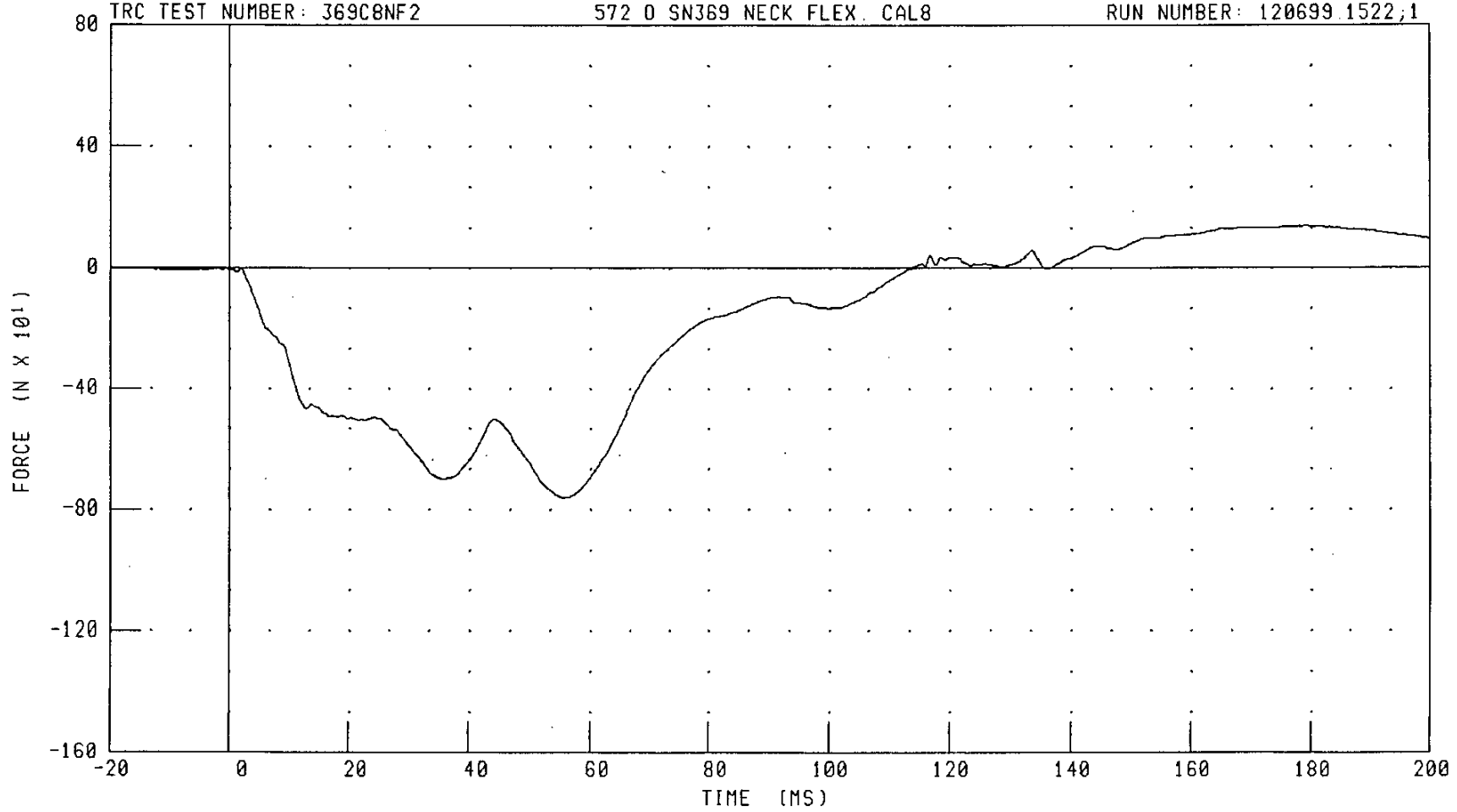
TRC TEST NUMBER: 369C8NF2 572 0 SN369 NECK FLEX. CAL8 RUN NUMBER: 120699.1522;1



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

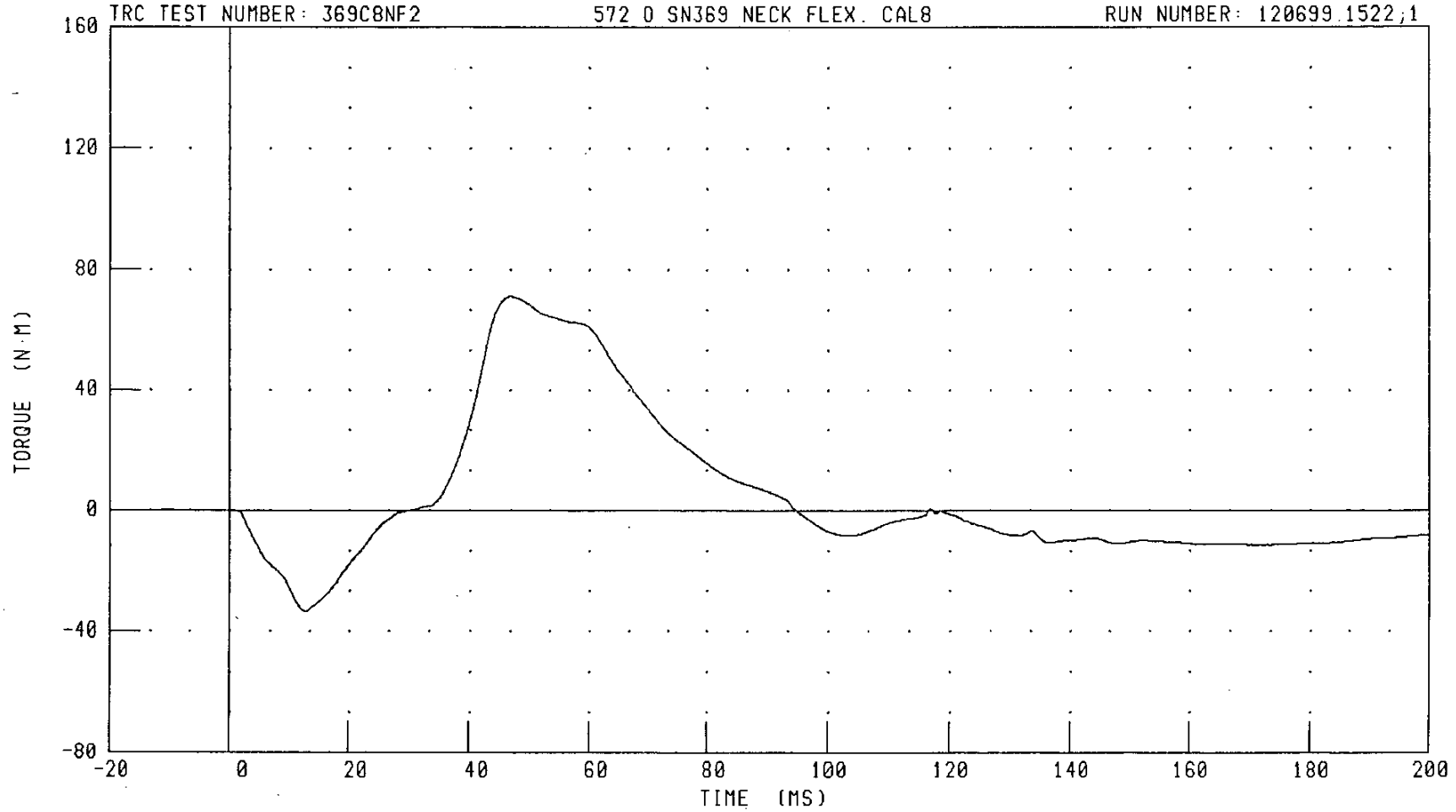


CHANNEL: NEKXFC FILTER: CH. CLASS 600

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

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

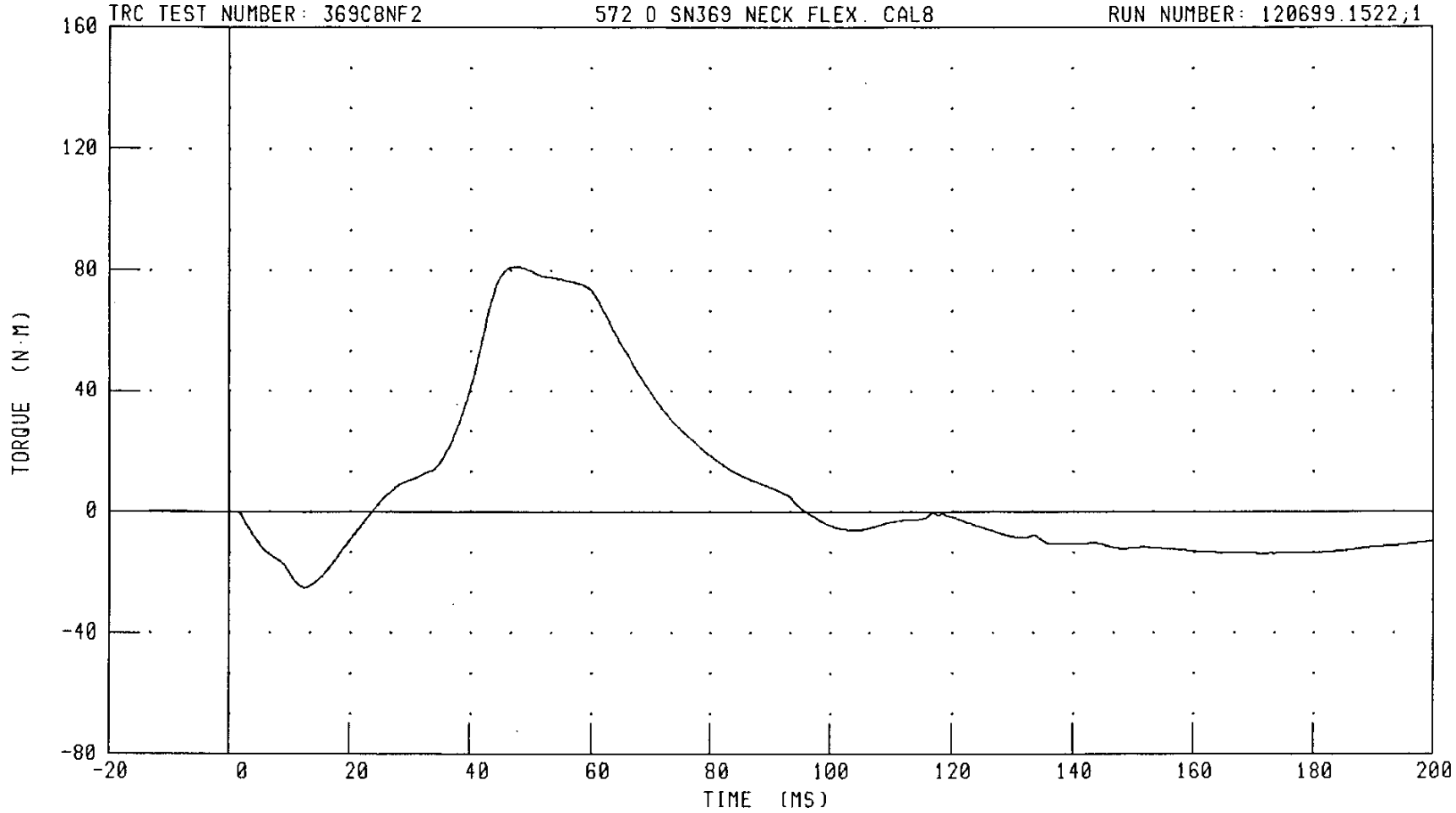
NECK MOMENT Y AXIS



CHANNEL: NEKYM FILTER: CH. CLASS 600

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

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



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 81.25 N·M @ 47.76 MS; -25.10 N·M @ 12.56 MS

TRANSPORTATION RESEARCH CENTER INC.

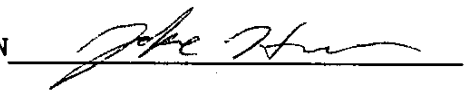
HYBRID III SMALL FEMALE 07-DEC-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C8NE1 572 O 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

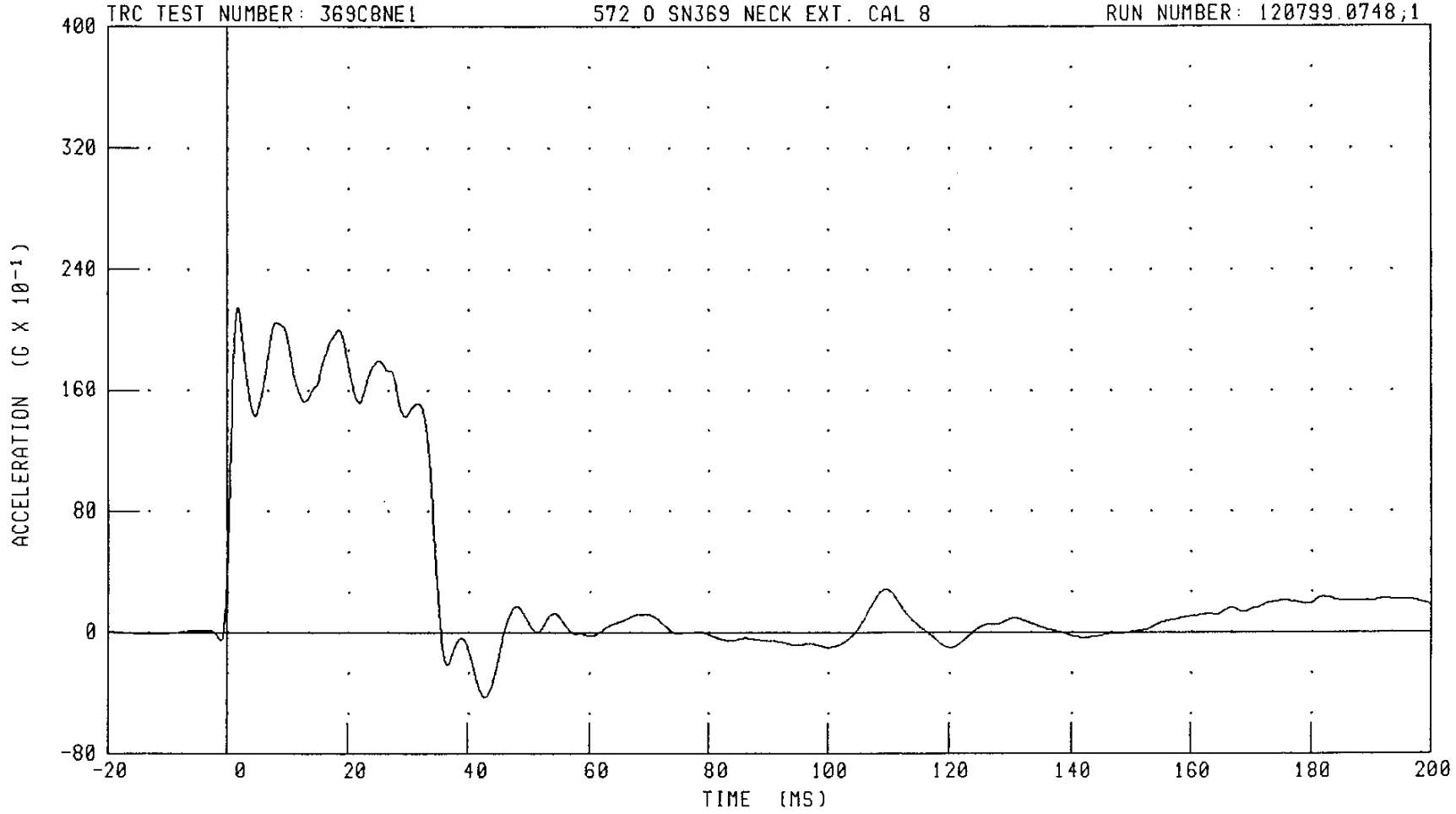
TEST MEETS SPECIFICATIONS

TECHNICIAN  RUN NUMBER: 120799.0741;1

PART 572-O HYBRID III NECK EXTENSION CALIBRATION

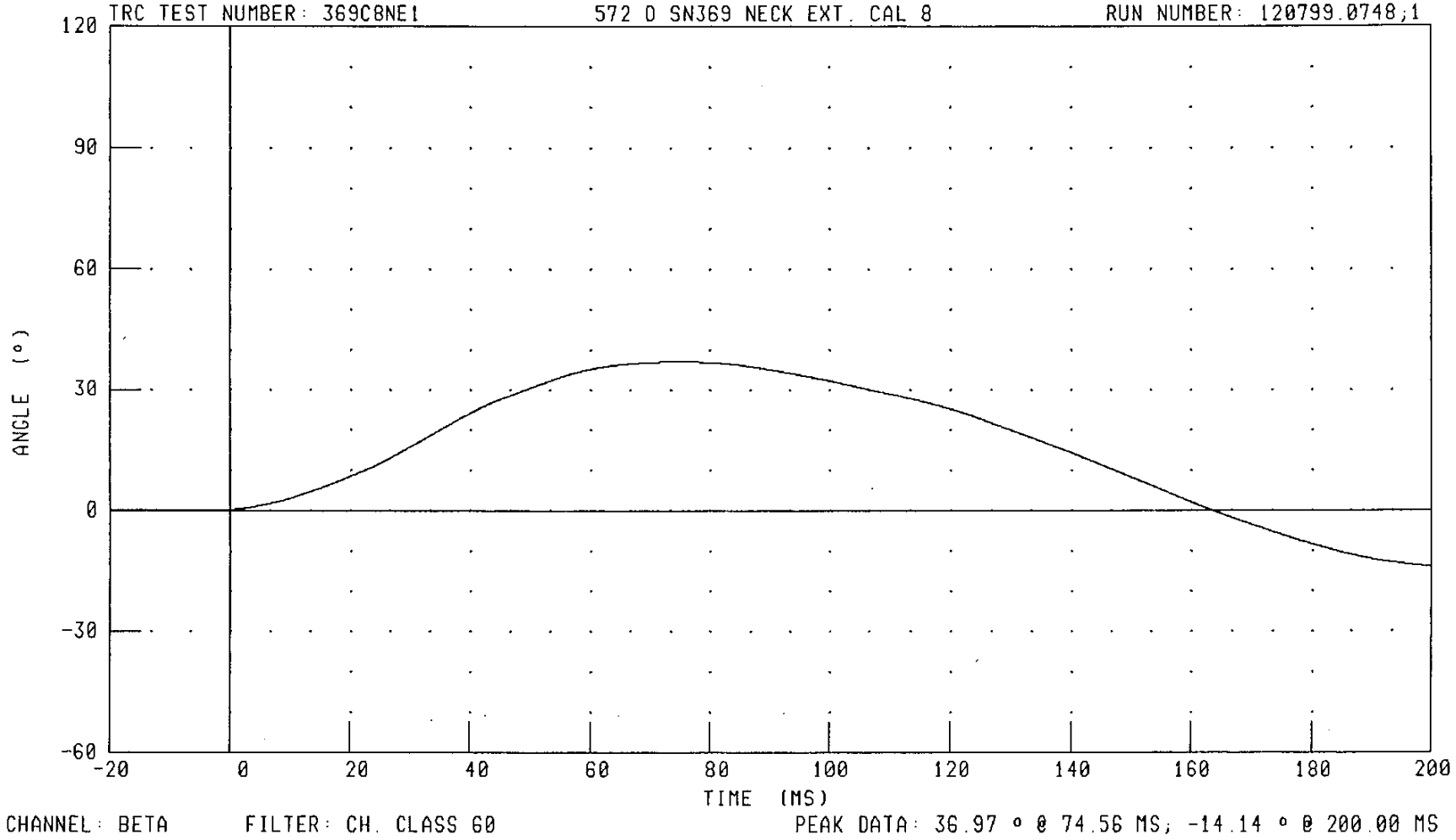
PENDULUM DECELERATION

TRC TEST NUMBER: 369C8NE1 572 O 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

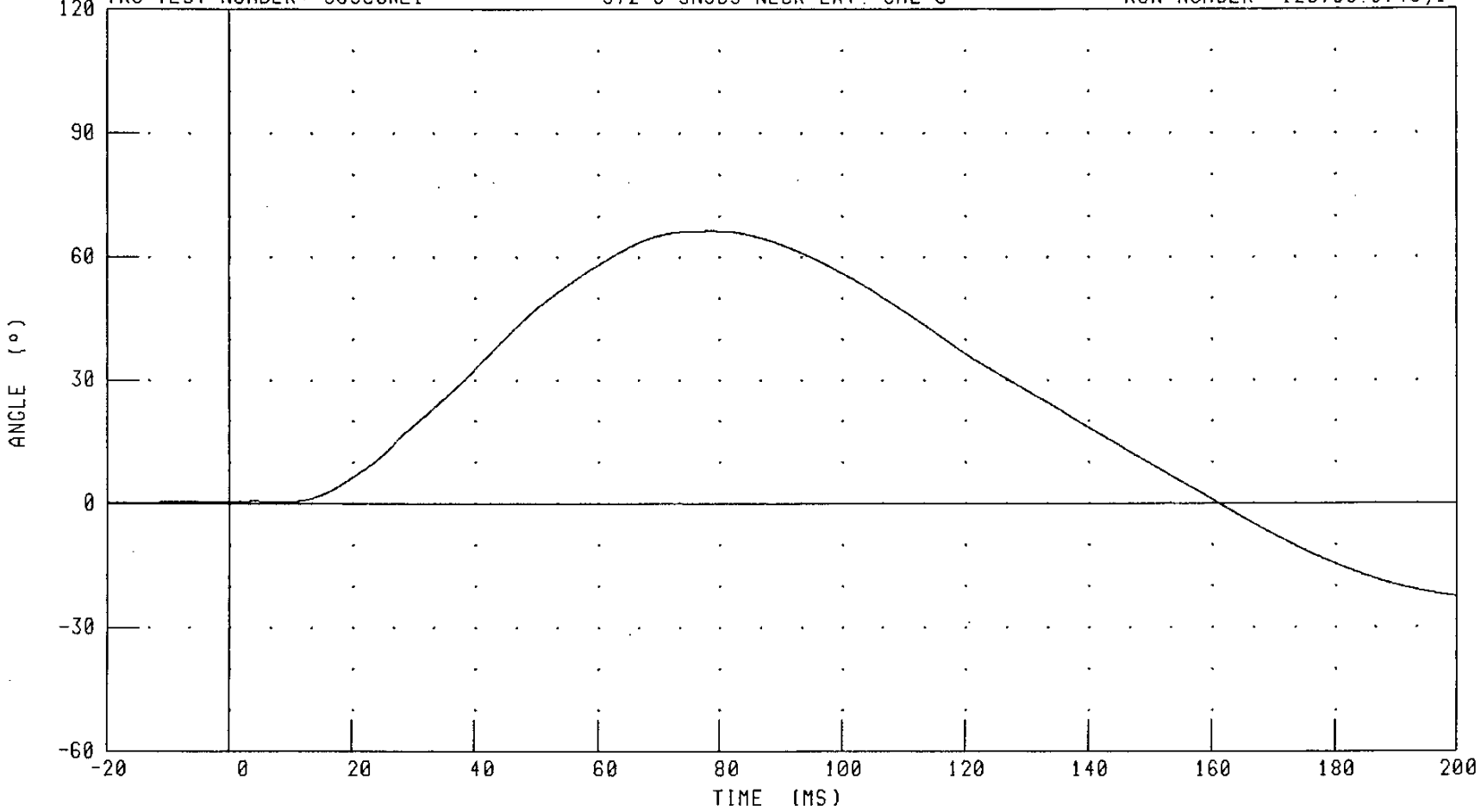
PART 572-O HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 36.97 ° @ 74.56 MS; -14.14 ° @ 200.00 MS

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

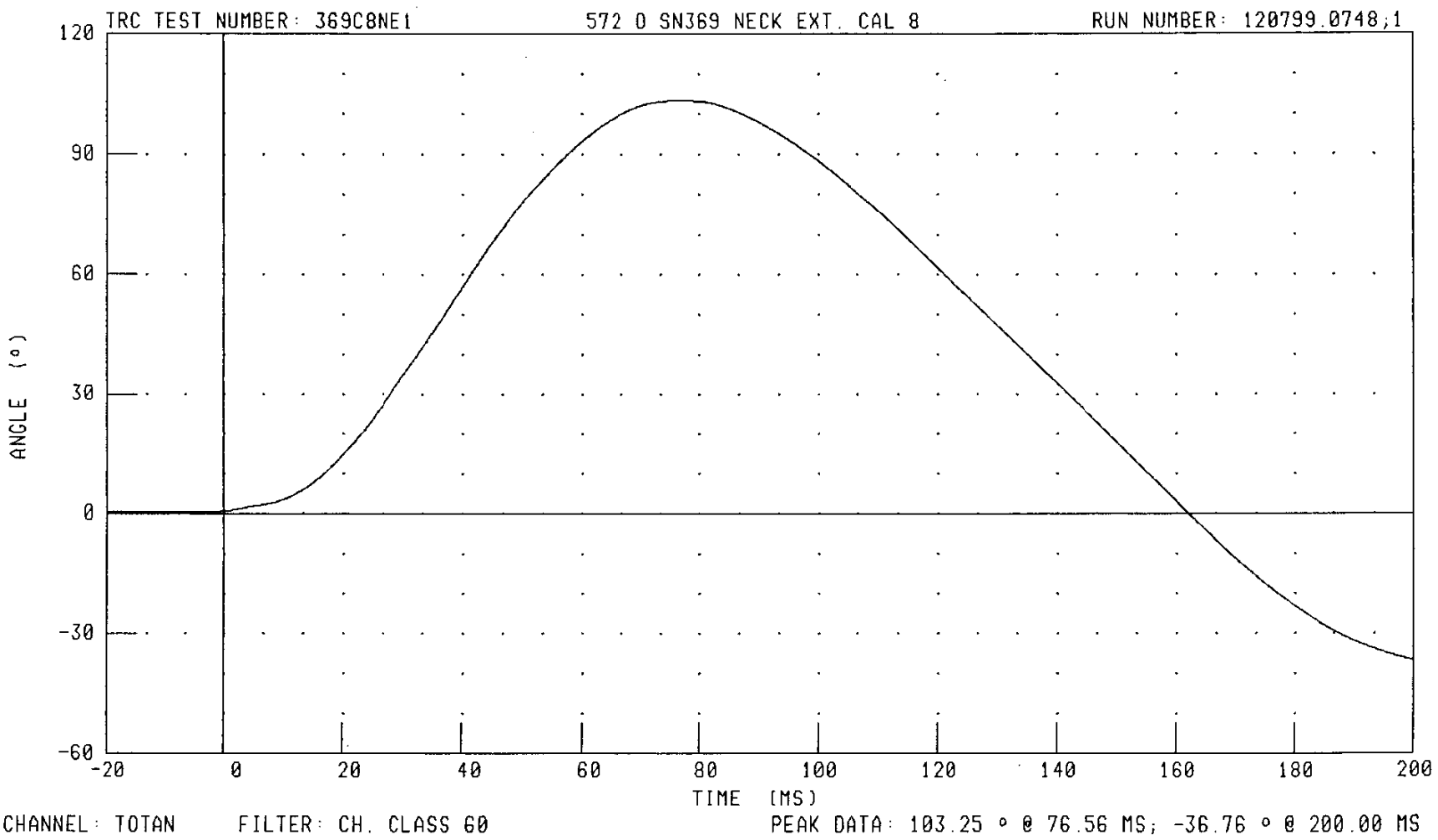
TRC TEST NUMBER: 369C8NE1 572 0 SN369 NECK EXT. CAL 8 RUN NUMBER: 120799.0748;1



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



CHANNEL: TOTAN FILTER: CH. CLASS 60

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

TRANSPORTATION RESEARCH CENTER INC.

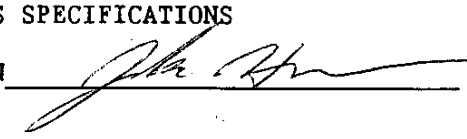
THORAX IMPACT TEST

HYBRID III SMALL FEMALE 07-DEC-99

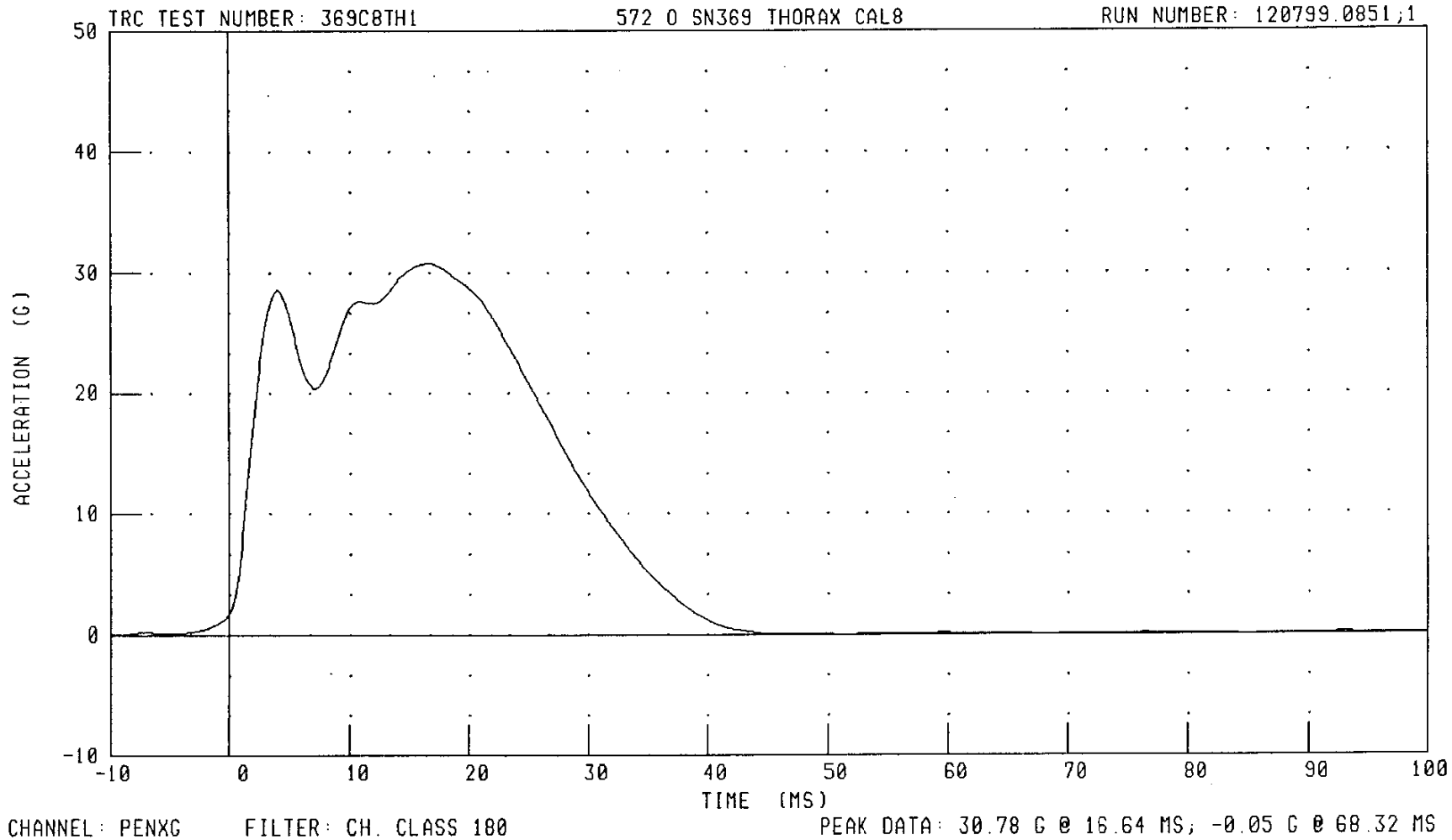
TRC INC. TEST NO: 369C8TH1 572 O SN369 THORAX CAL8

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
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

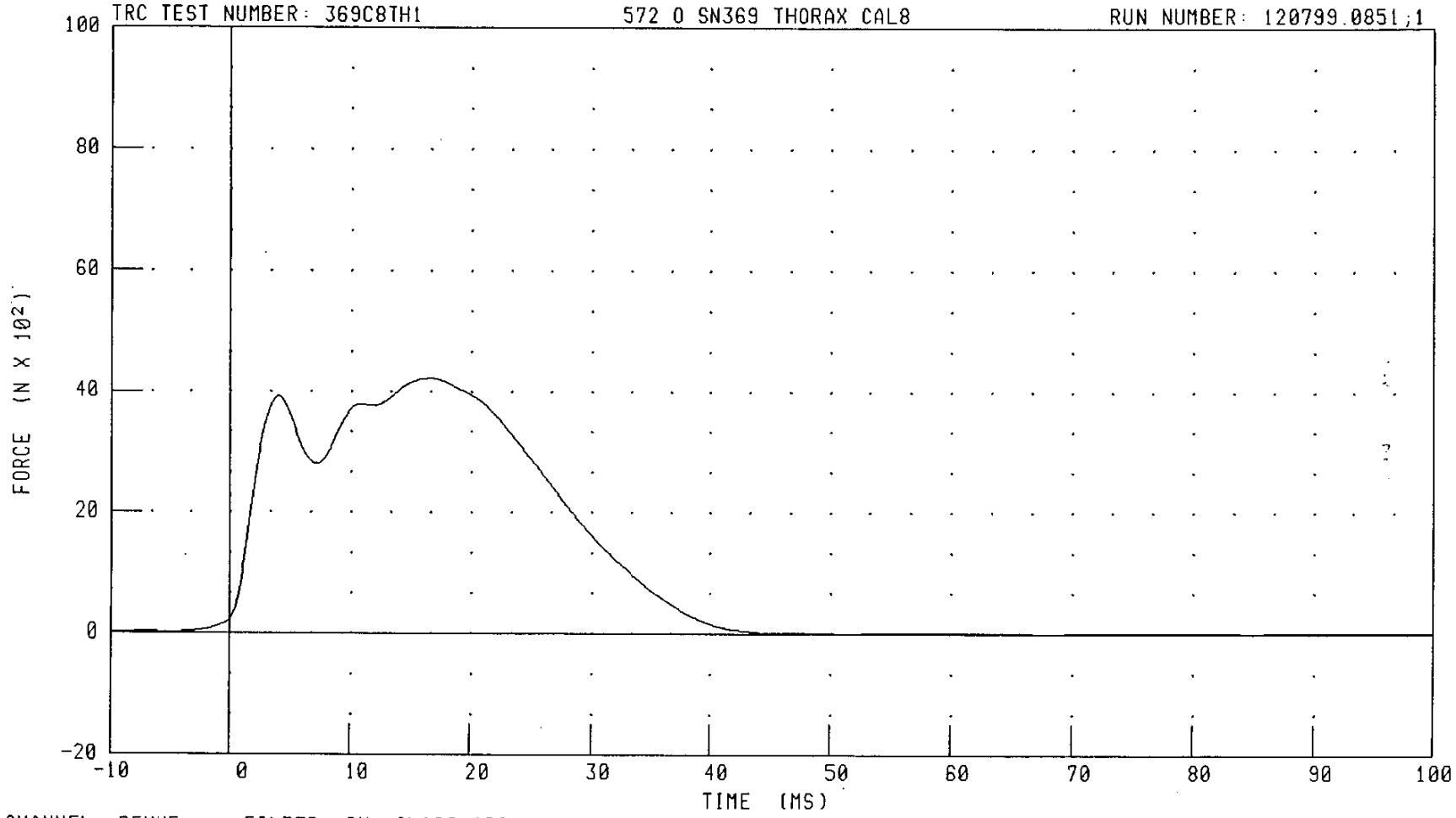
PART 572-O HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 30.78 G @ 16.64 MS; -0.05 G @ 68.32 MS

PART 572-0 HYBRID III THORAX CALIBRATION

PENDULUM FORCE



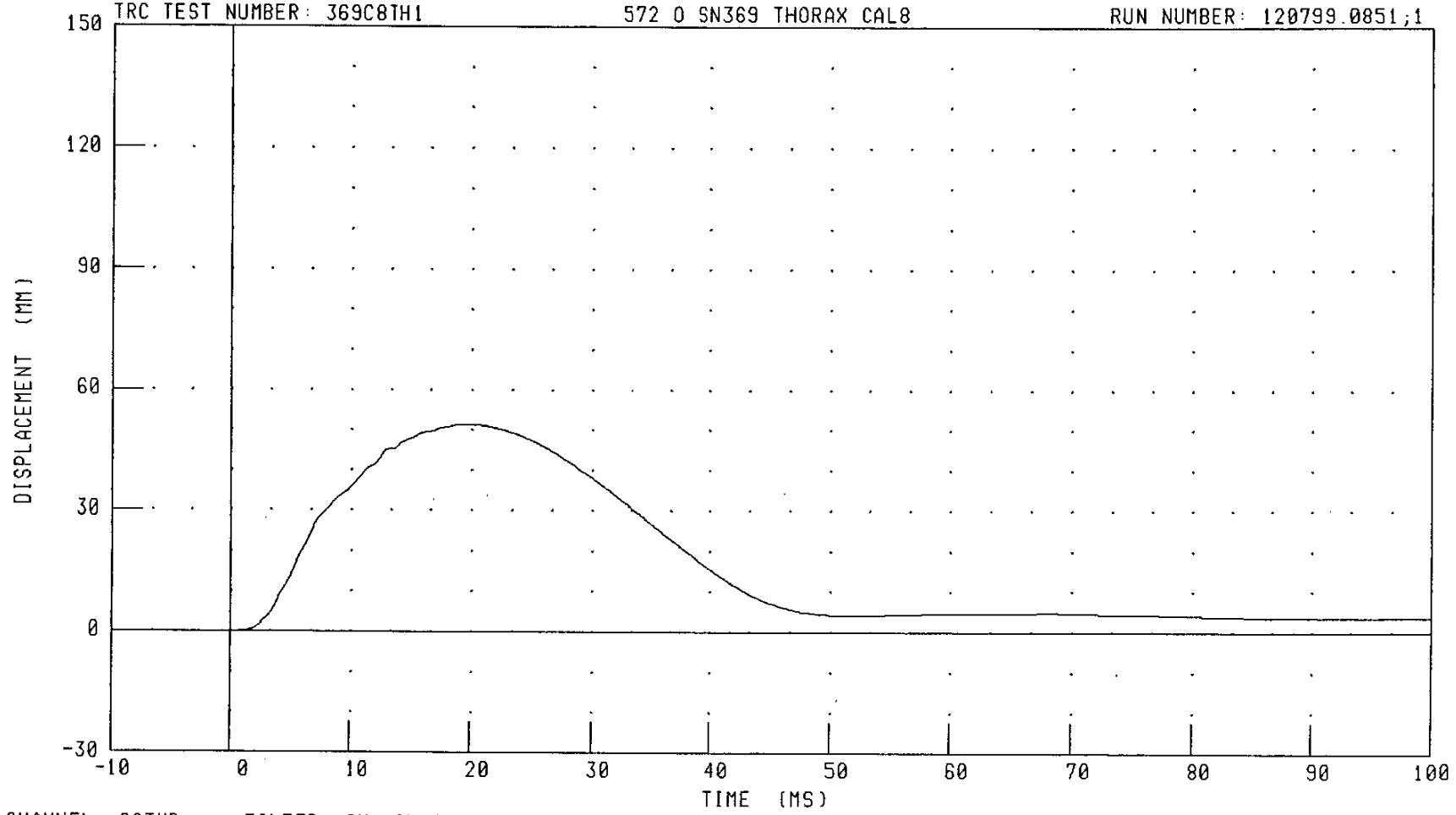
CHANNEL: PENXF FILTER: CH. CLASS 180

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

PART 572-0 HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

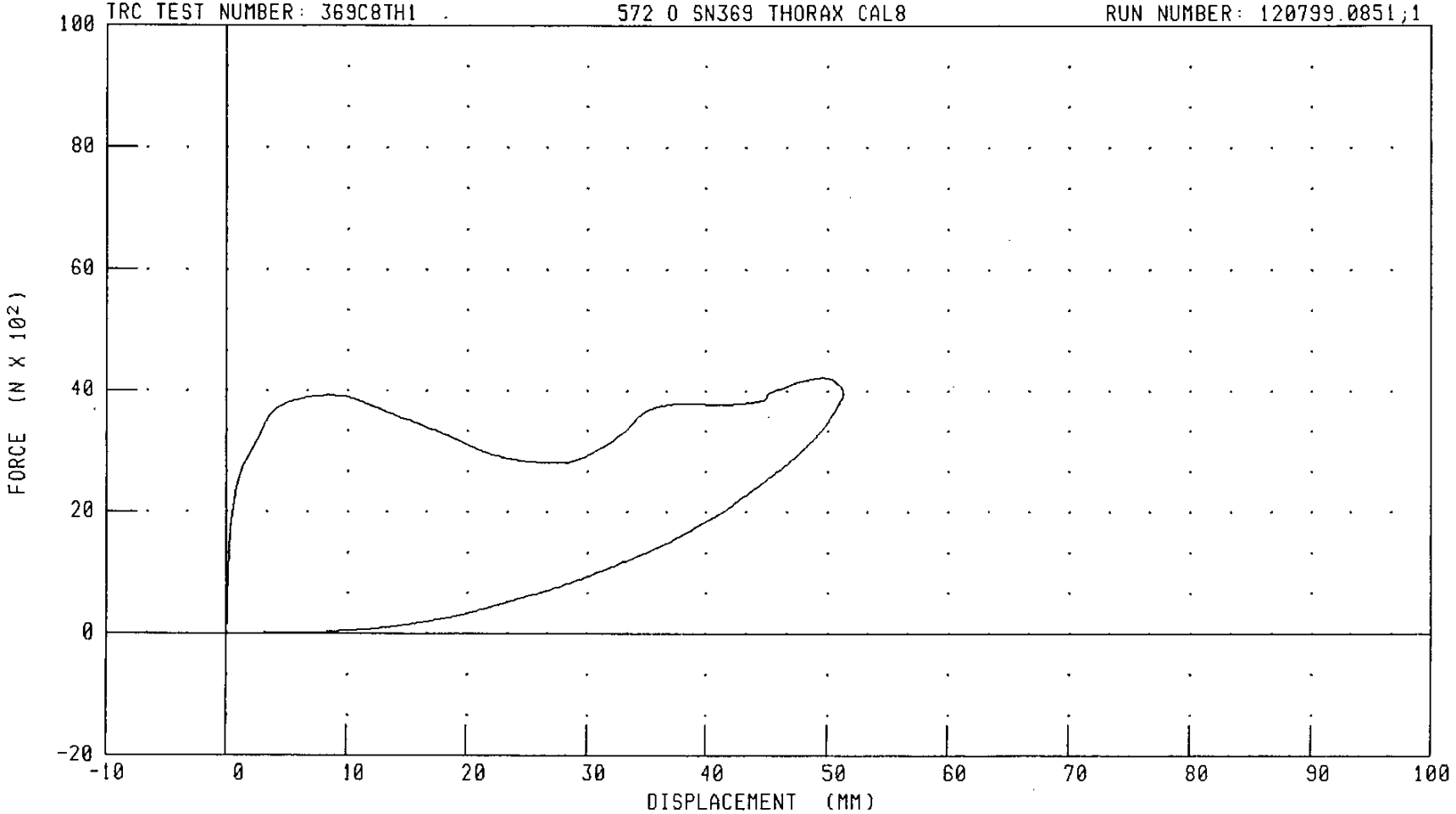
TRC TEST NUMBER: 369C8TH1 572 0 SN369 THORAX CAL8 RUN NUMBER: 120799.0851;1



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

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.

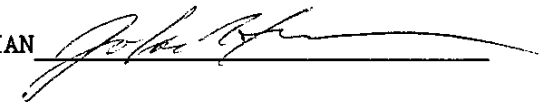
RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 06-DEC-99

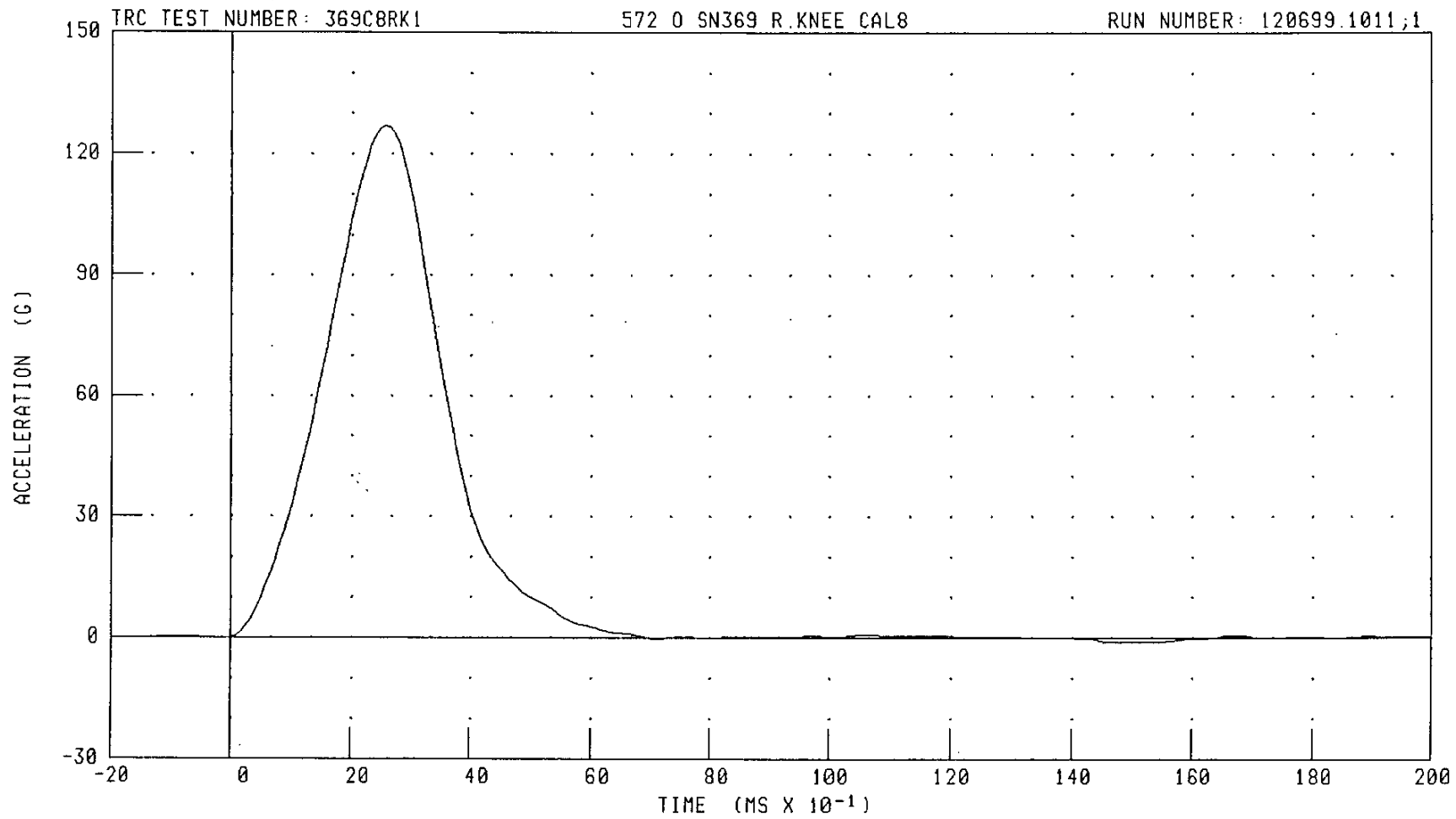
TRC INC. TEST NO: 369C8RK1 572 O SN369 R.KNEE CAL8

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.)

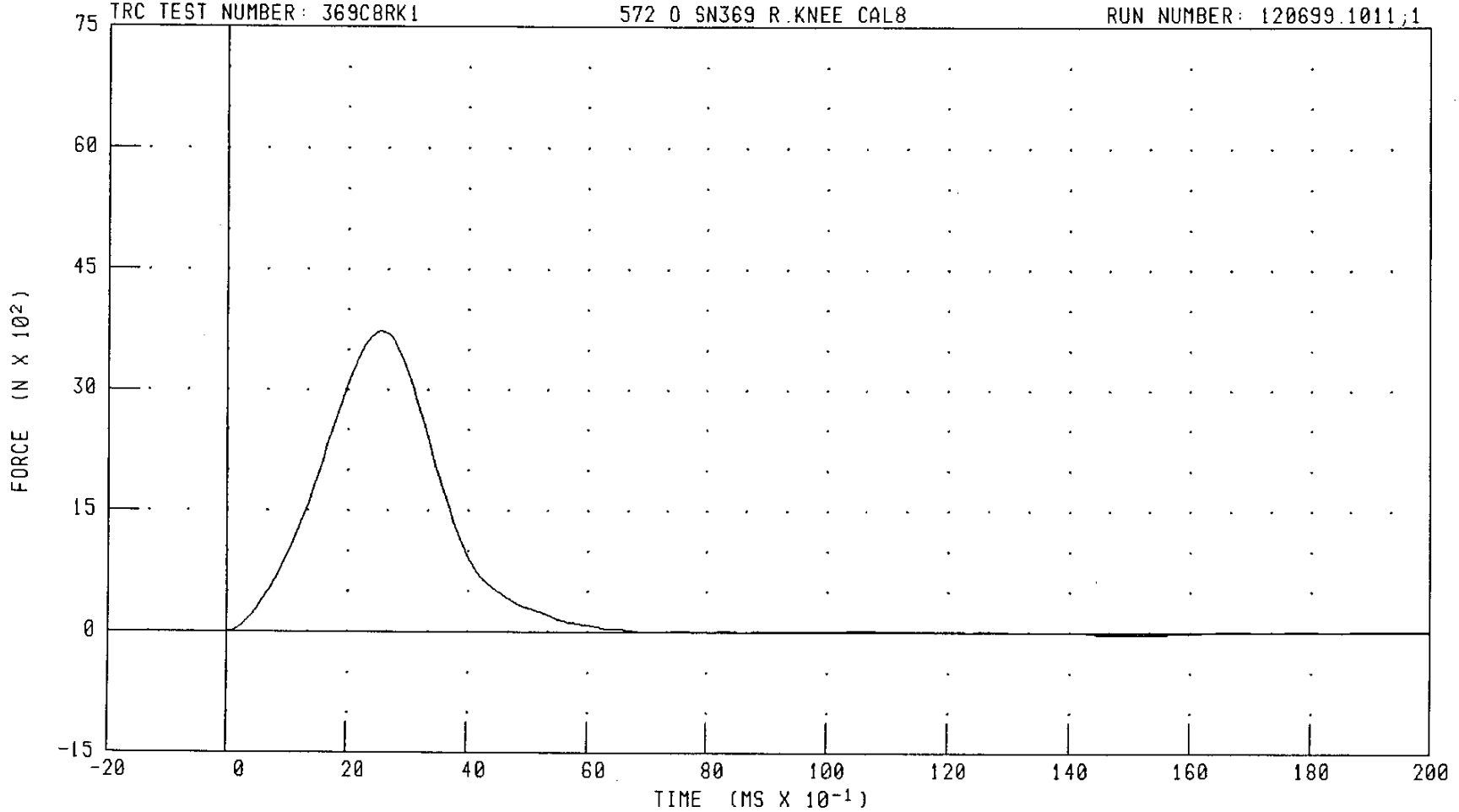


CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 126.89 G @ 2.56 MS; -1.13 G @ 14.80 MS

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



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 3725.12 N @ 2.56 MS; -33.11 N @ 14.80 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 06-DEC-99

TRC INC. TEST NO: 369C8LK1 572 O SN369 LEFT KNEE CAL8

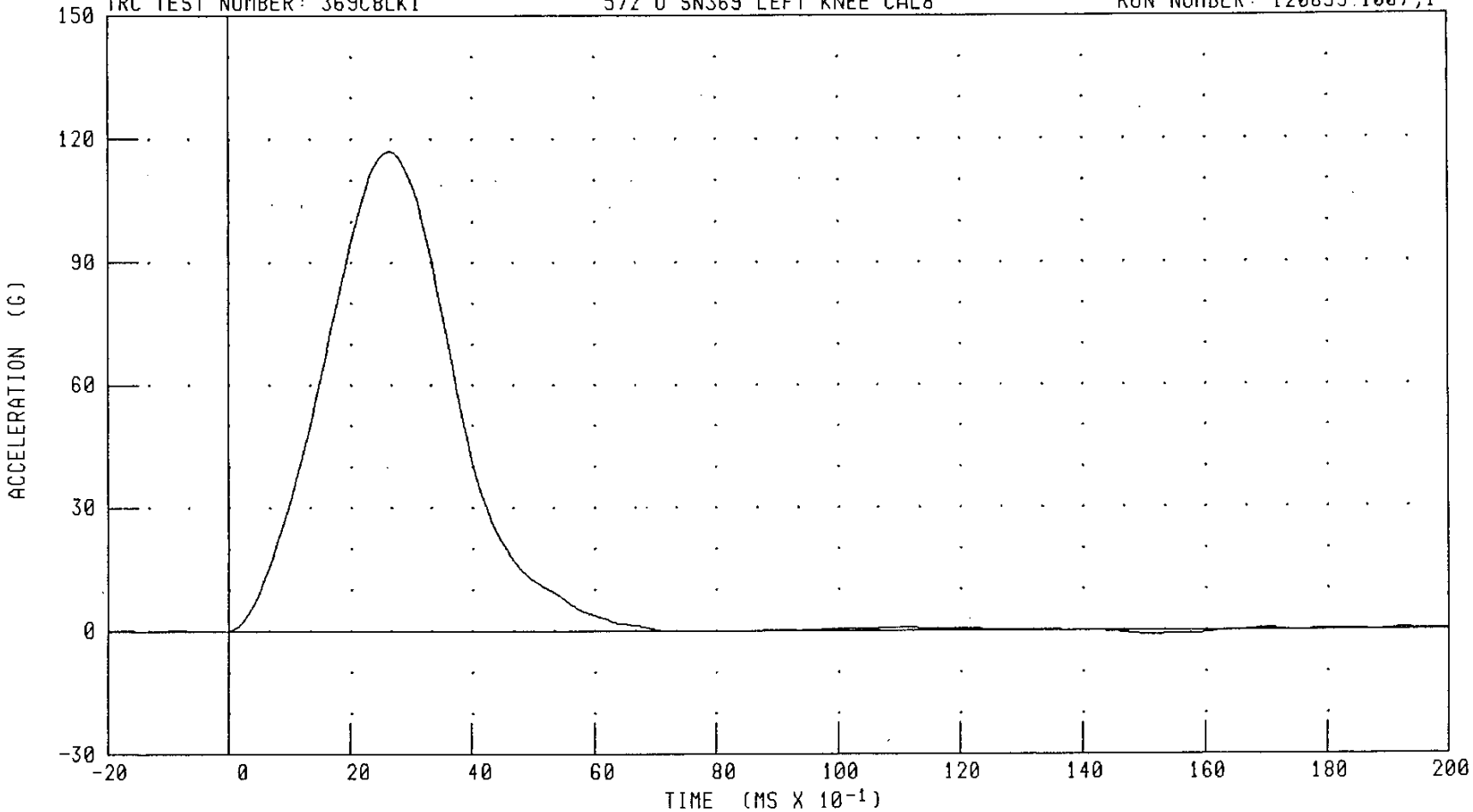
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.10 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3435.4 N

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

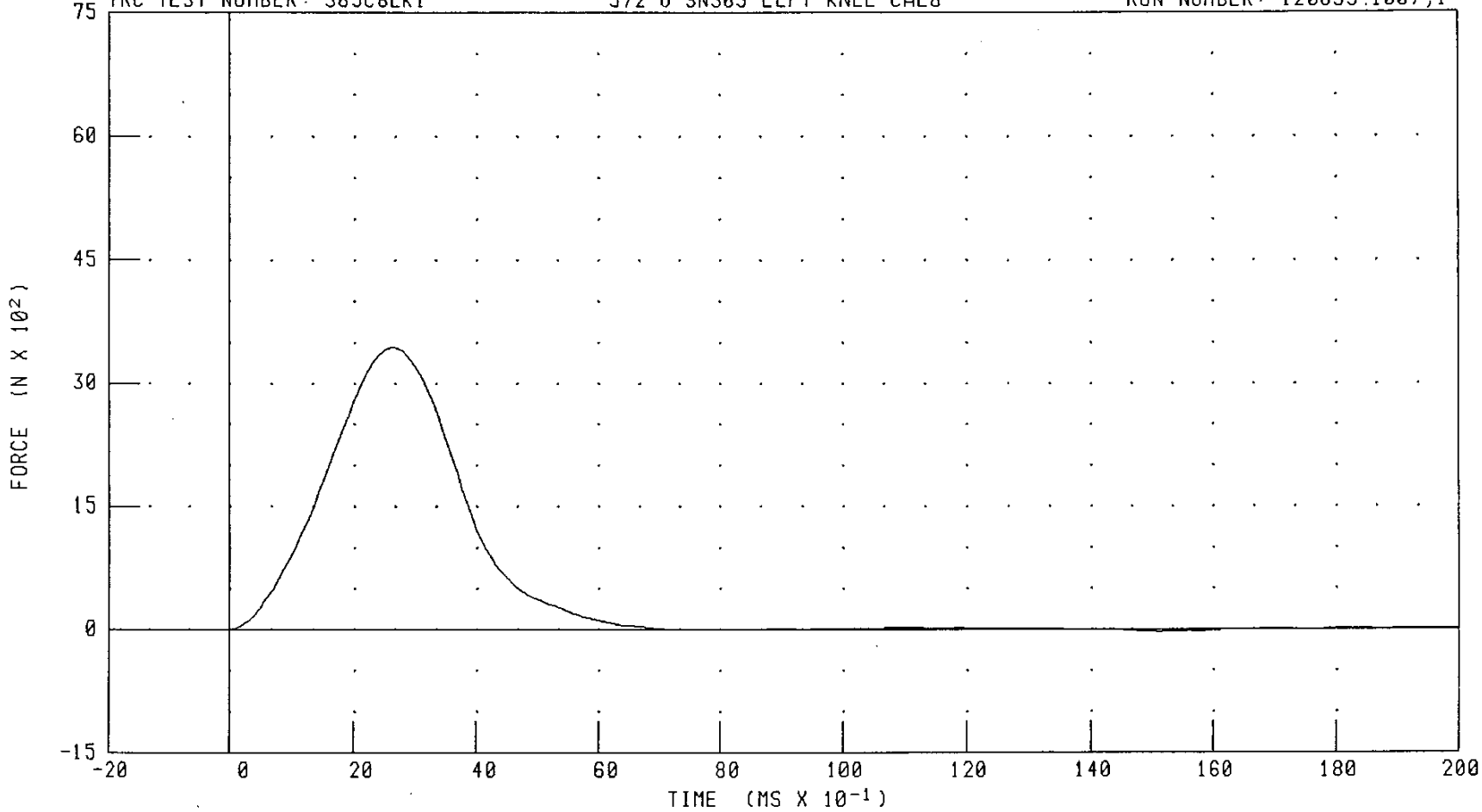


CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 117.02 G @ 2.64 MS; -1.17 G @ 15.12 MS

PART 572-0 HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG 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

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE 23-DEC-99

TRC INC. TEST NO: 283C10HD2 572 O SN283 HEAD DROP CAL 10

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	293.25 G
PEAK LATERAL ACCELERATION	15 G MAX	5.01 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

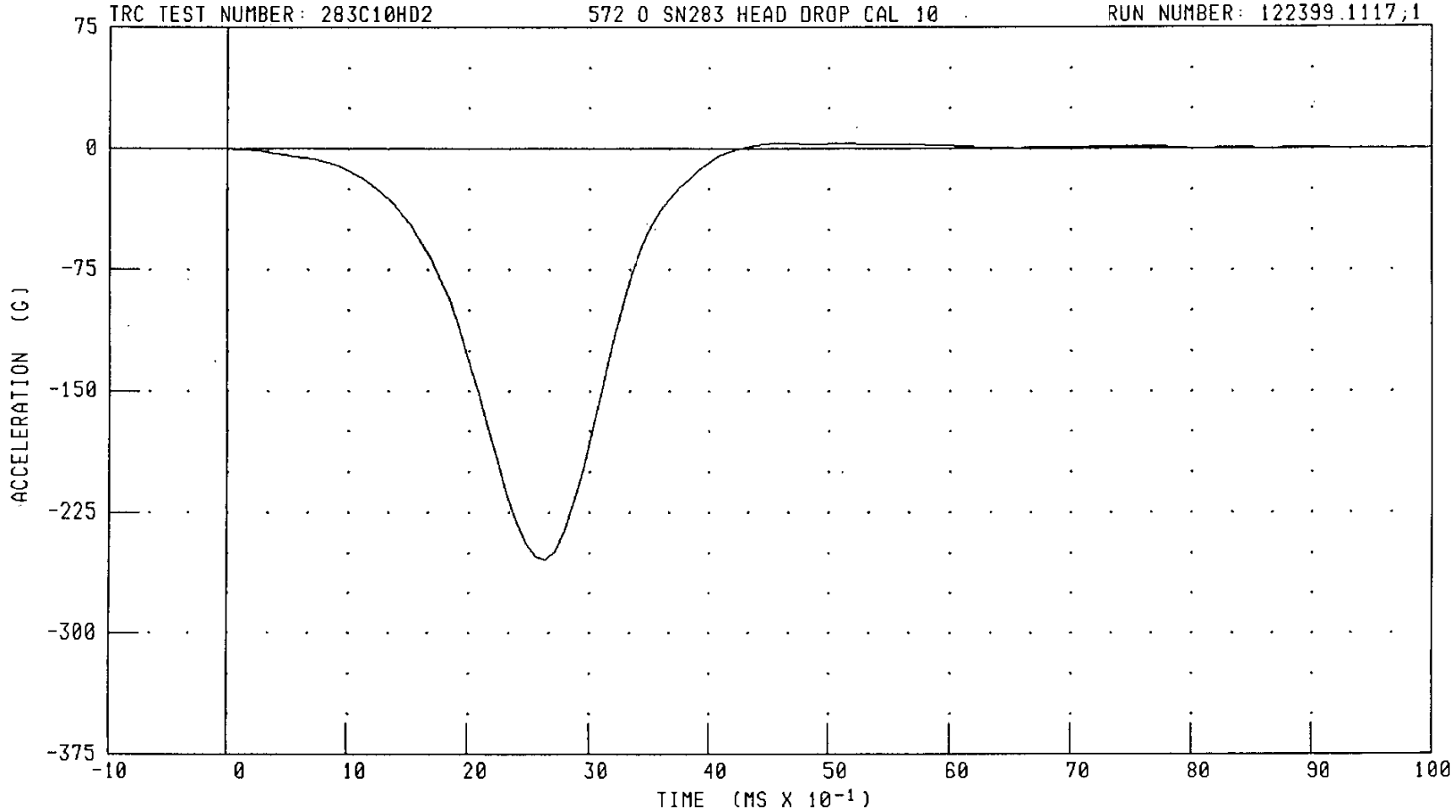
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 122399.1116;1

PART 572-O HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS

TRC TEST NUMBER: 283C10HD2 572 O SN283 HEAD DROP CAL 10 RUN NUMBER: 122399.1117;1

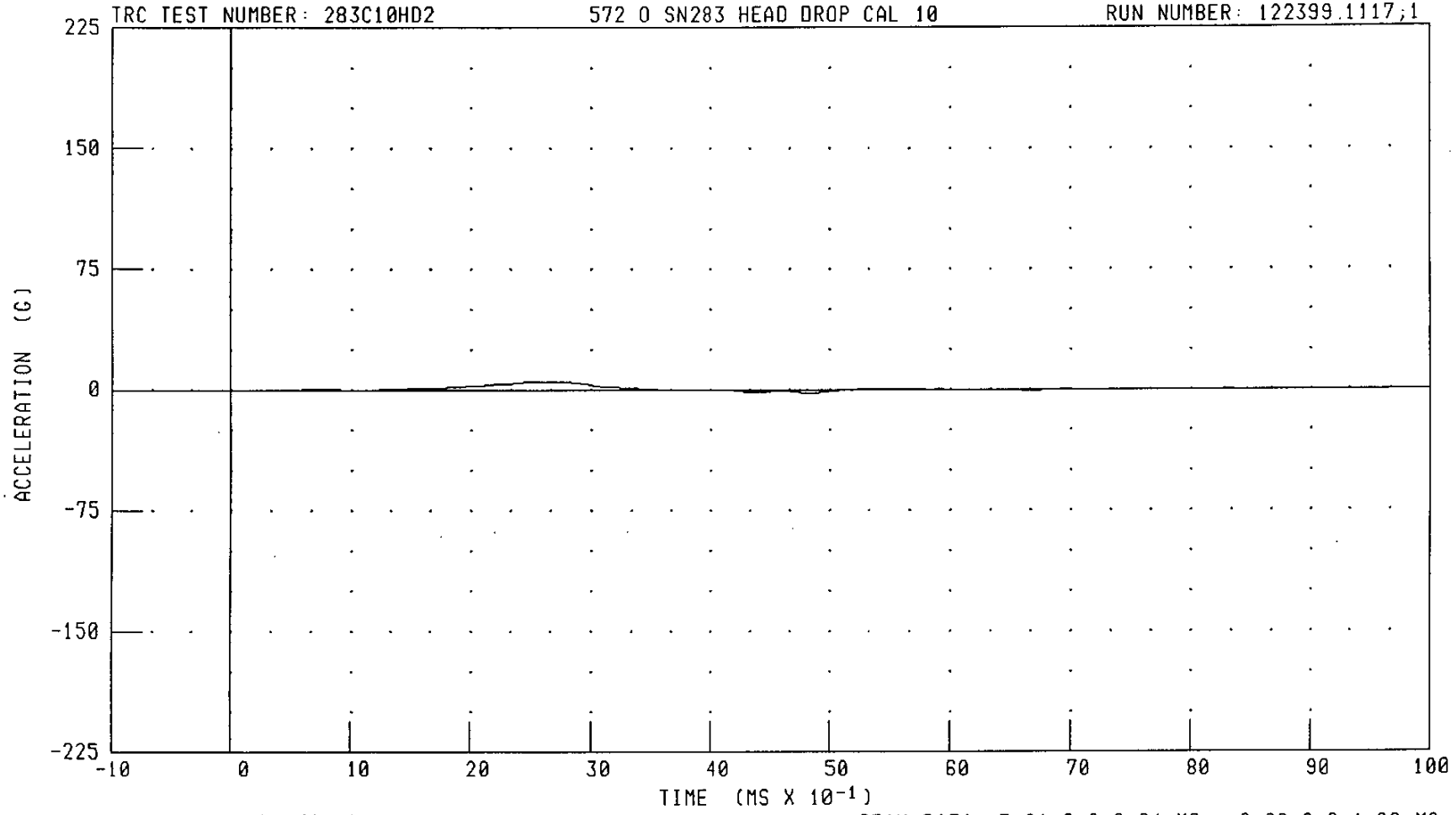


CHANNEL: HEDXG FILTER: CH. CLASS 1000 PEAK DATA: 3.63 G @ 4.64 MS; -254.12 G @ 2.64 MS

PART 572-O HYBRID III HEAD CALIBRATION

HEAD ACCELERATION Y AXIS

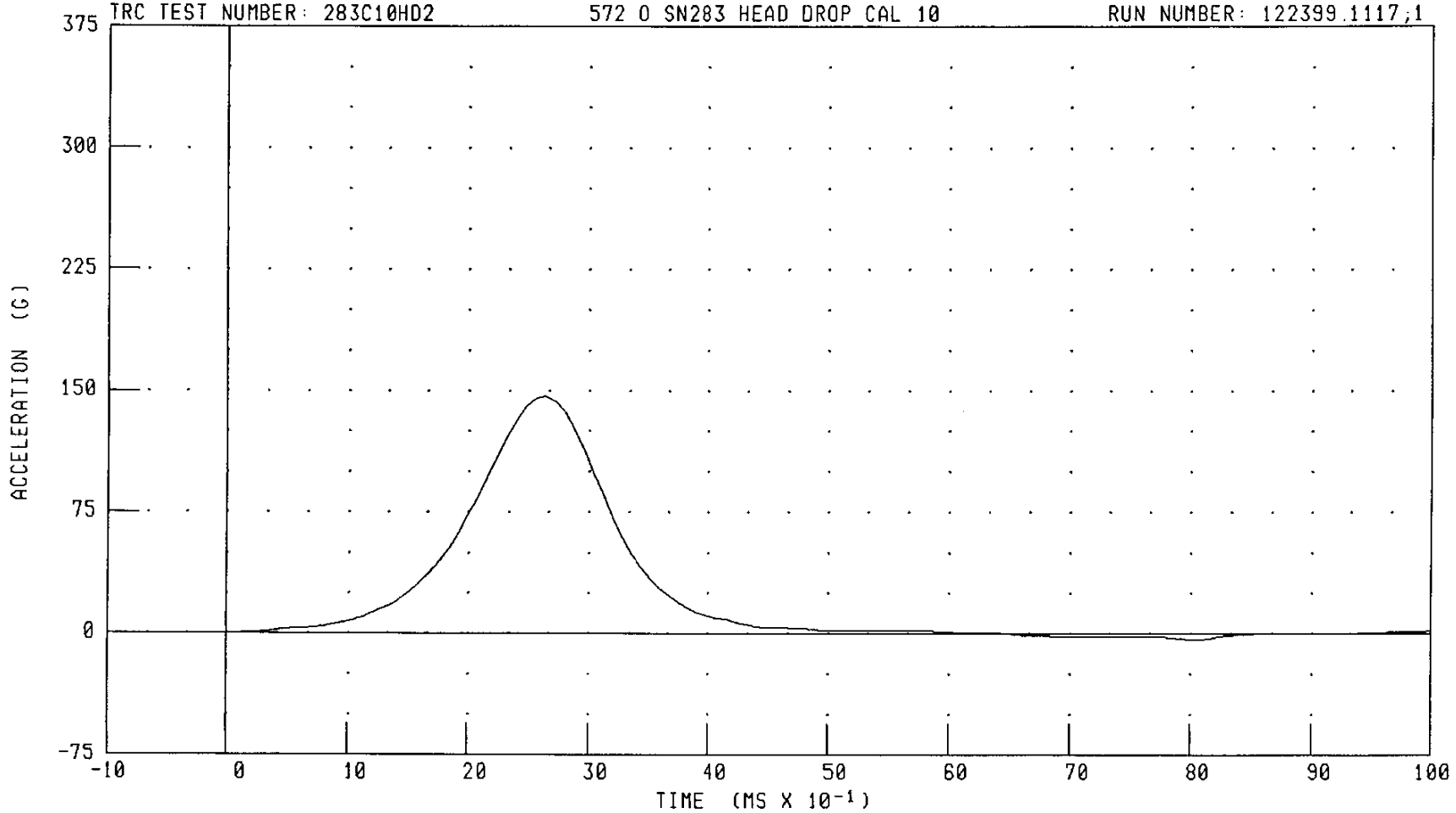
TRC TEST NUMBER: 283C10HD2 572 O SN283 HEAD DROP CAL 10 RUN NUMBER: 122399.1117;1



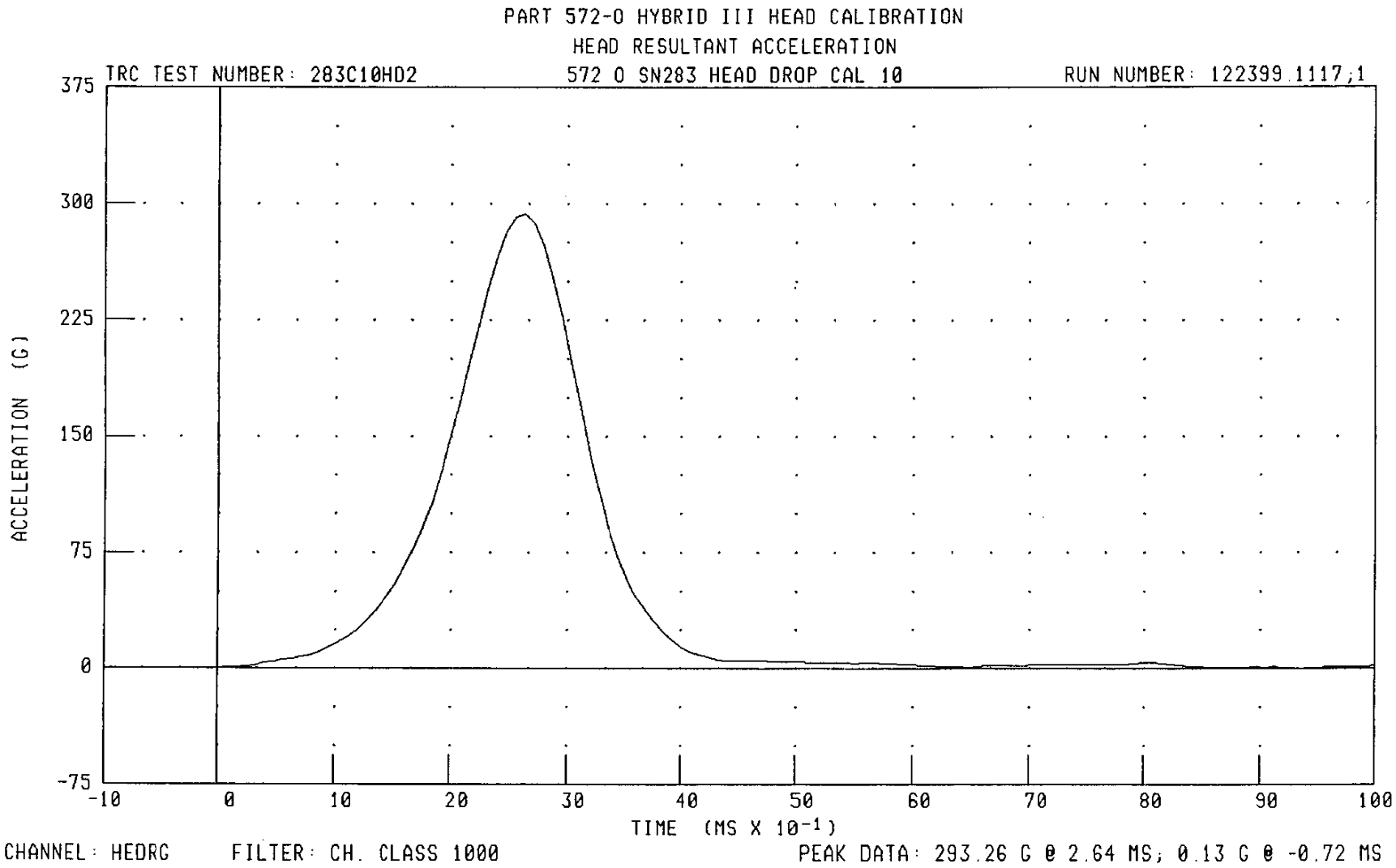
CHANNEL: HEDYG FILTER: CH. CLASS 1000 PEAK DATA: 5.01 G @ 2.64 MS; -2.06 G @ 4.80 MS

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

TRC TEST NUMBER: 283C10HD2 572 O SN283 HEAD DROP CAL 10 RUN NUMBER: 122399.1117;1

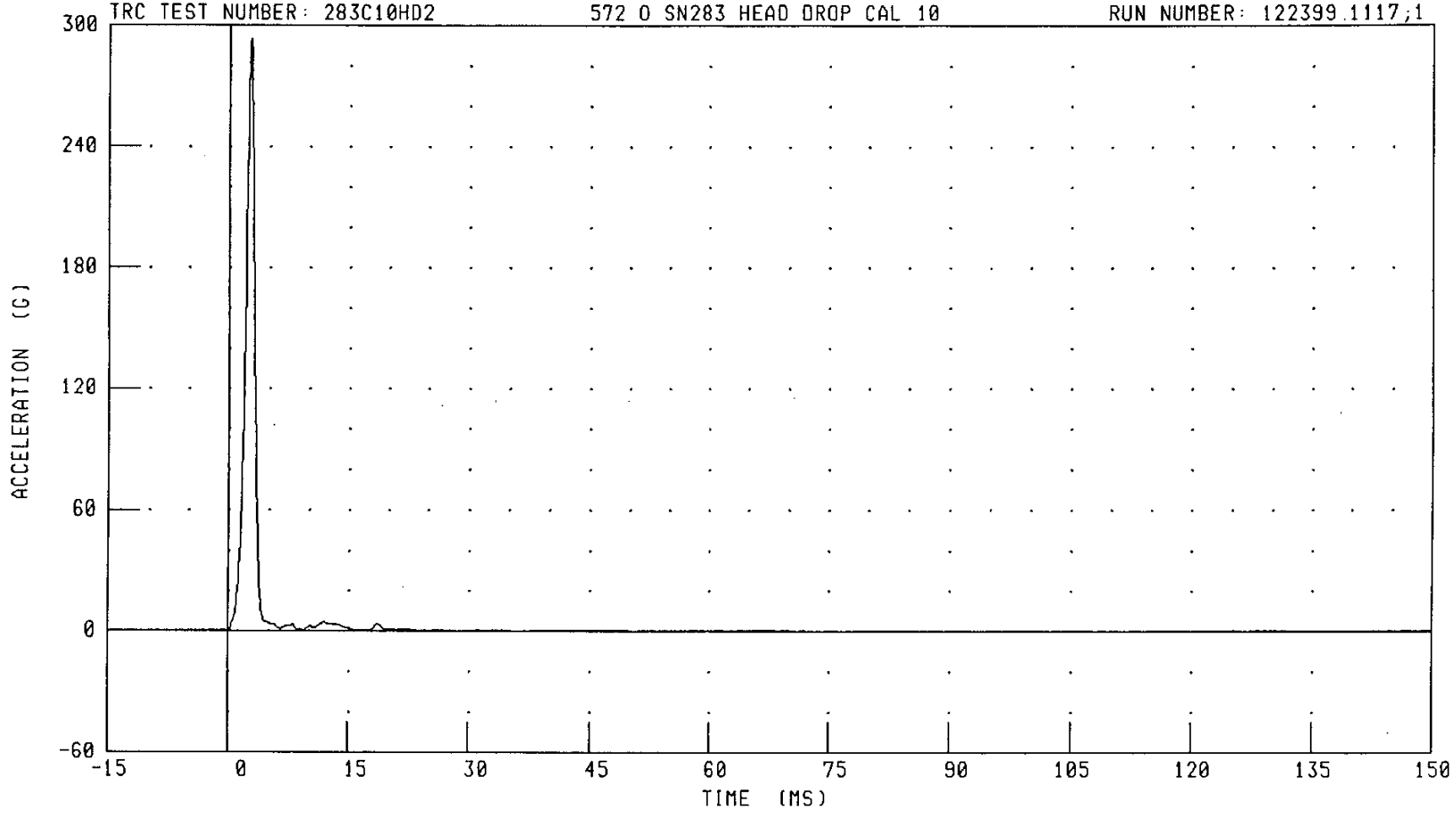


CHANNEL: HEDZG FILTER: CH. CLASS 1000 PEAK DATA: 146.29 G @ 2.64 MS; -3.65 G @ 8.00 MS


PART 572-O HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 283C10HD2
572 O SN283 HEAD DROP CAL 10
RUN NUMBER: 122399.1117;1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL: HEDRG
FILTER: CH. CLASS 1000
PEAK DATA: 293.26 G @ 2.64 MS; 0.13 G @ -0.72 MS

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

TRC TEST NUMBER: 283C10HD2 572 O SN283 HEAD DROP CAL 10 RUN NUMBER: 122399.1117;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 293.26 G @ 2.64 MS; 0.13 G @ -14.48 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE 23-DEC-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 283C10NF2 572 O SN283 NECK FLEX. CAL10

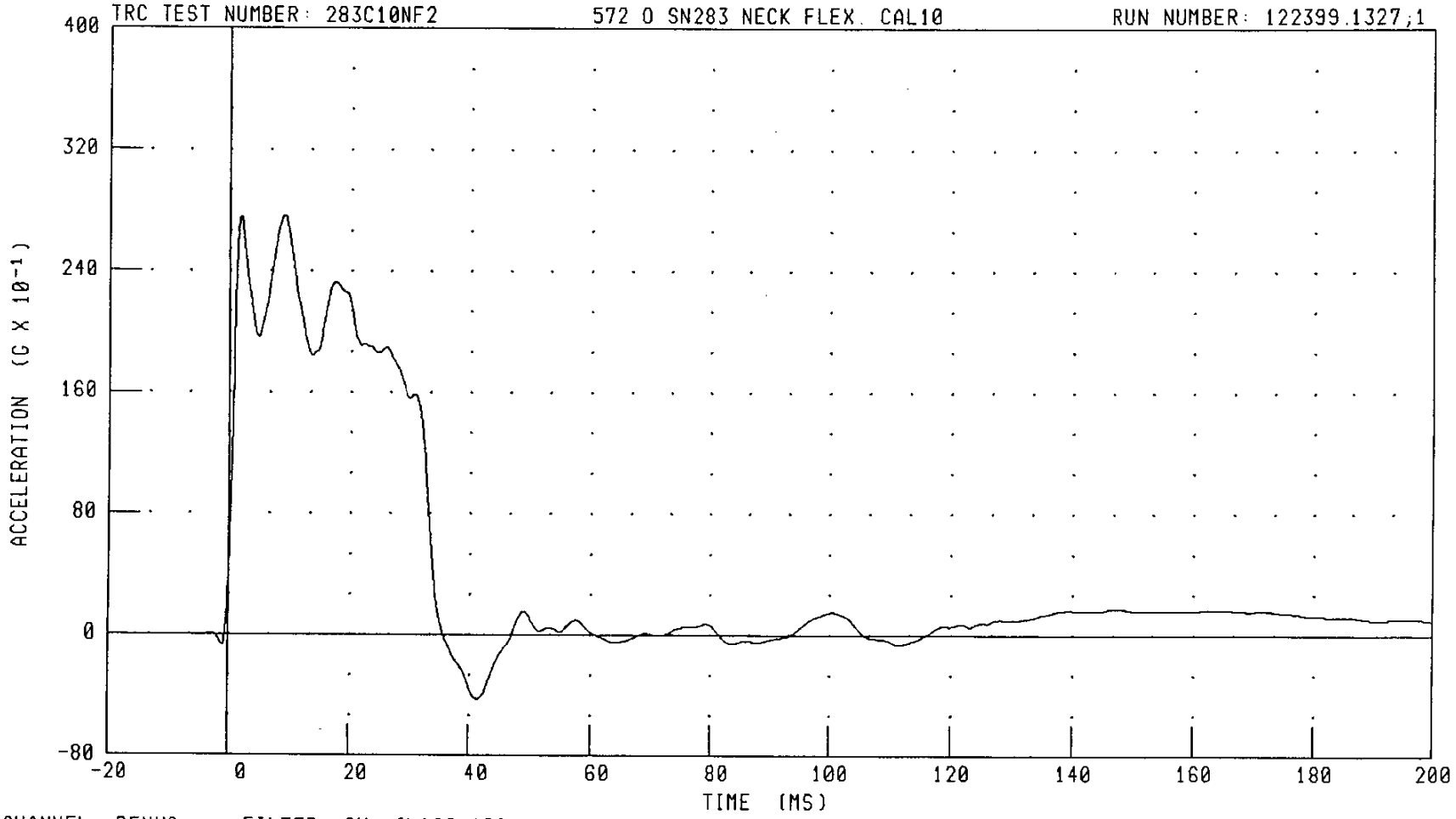
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.12 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.1 - 2.5 M/S	2.25 M/S
	20 MS	4.0 - 5.0 M/S	4.36 M/S
	30 MS	5.8 - 7.0 M/S	6.18 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	88.30 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		69 - 83 NM	74.55 NM
MOMENT DECAY TIME FROM TO TO 10NM		80 - 100 MS	90.56 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 122399.1322;1

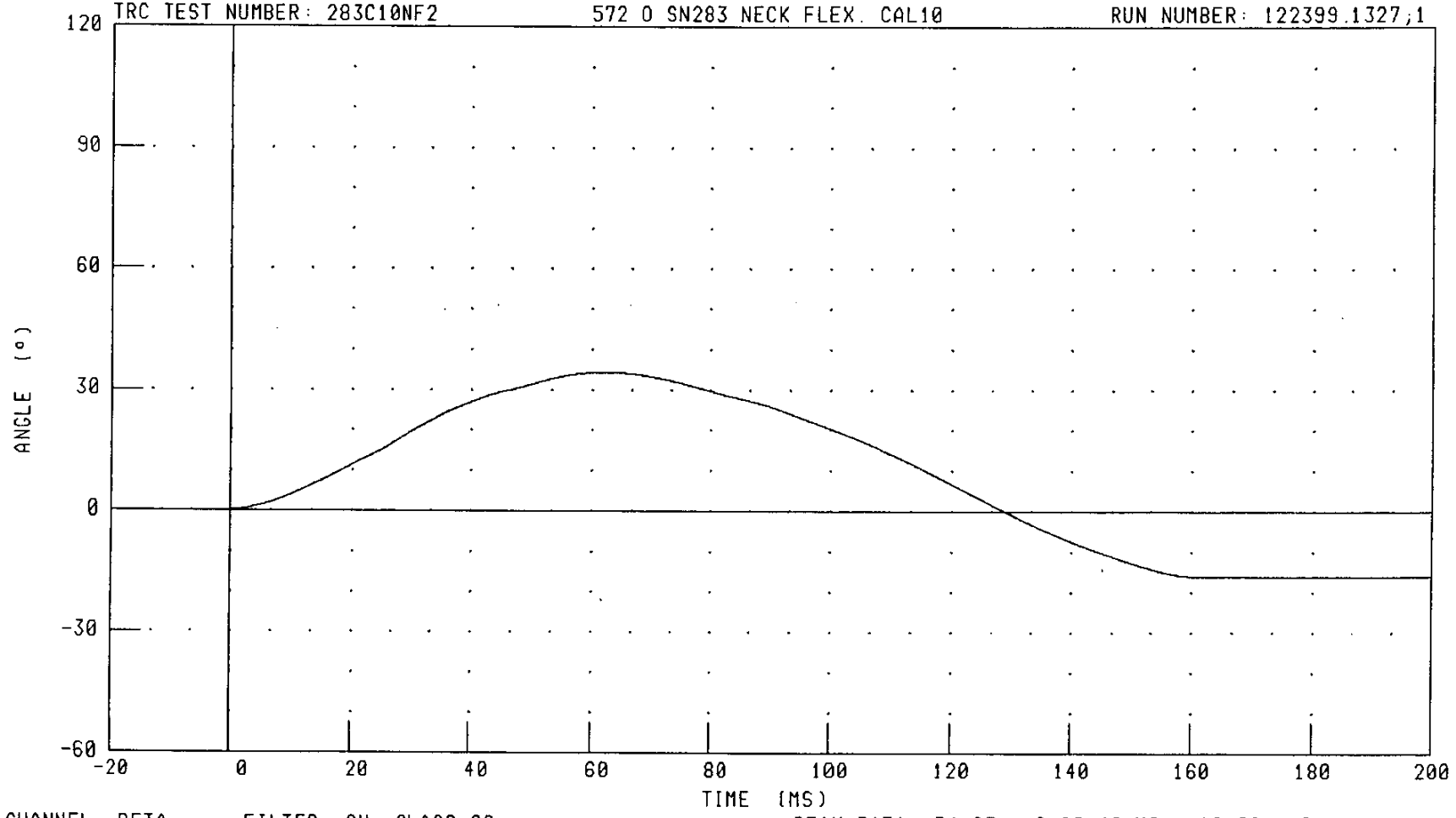
PART 572-O HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION



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

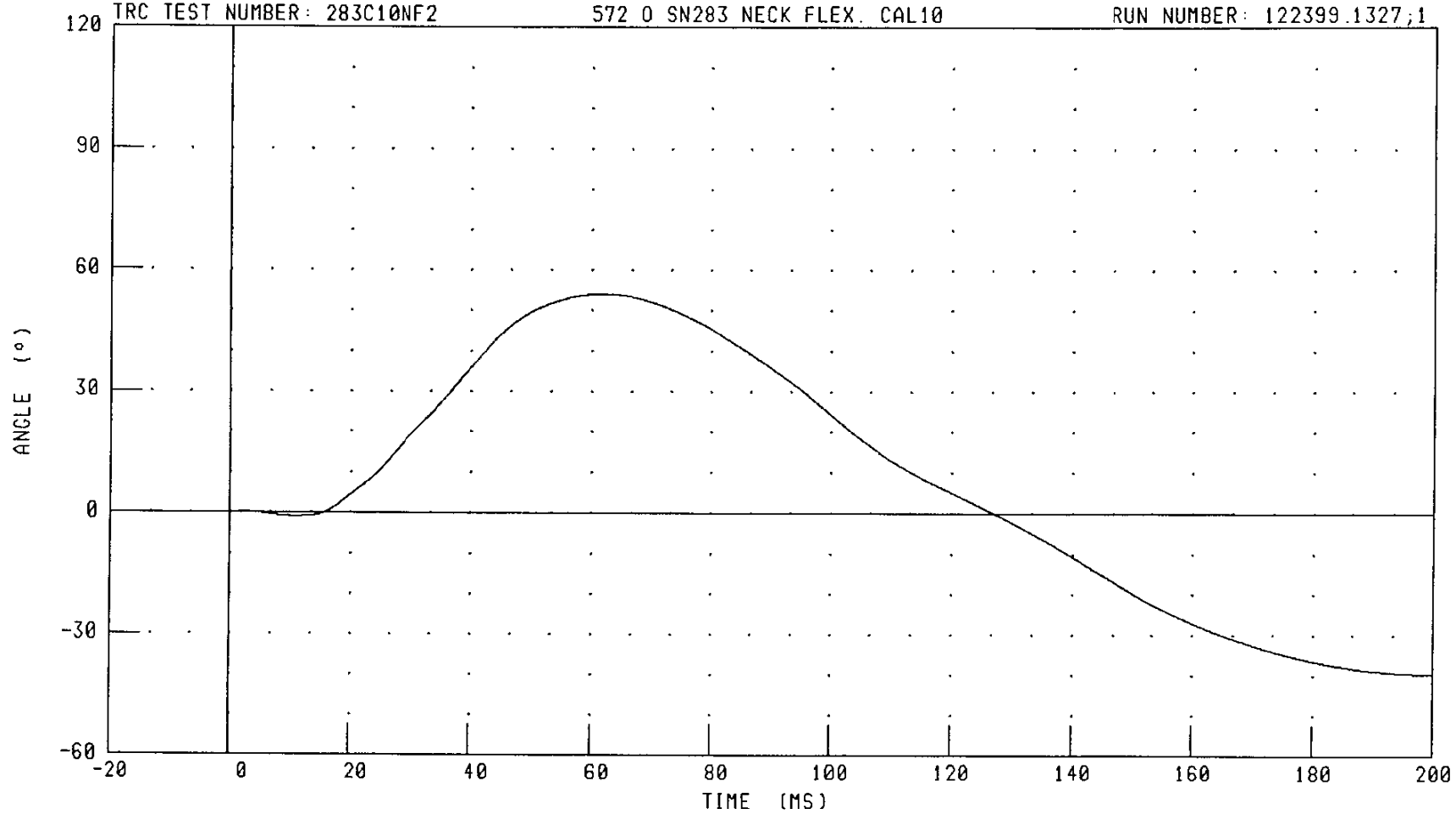
TRC TEST NUMBER: 283C10NF2 572 O SN283 NECK FLEX. CAL10 RUN NUMBER: 122399.1327;1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 34.25 ° @ 62.40 MS; -16.09 ° @ 162.72 MS

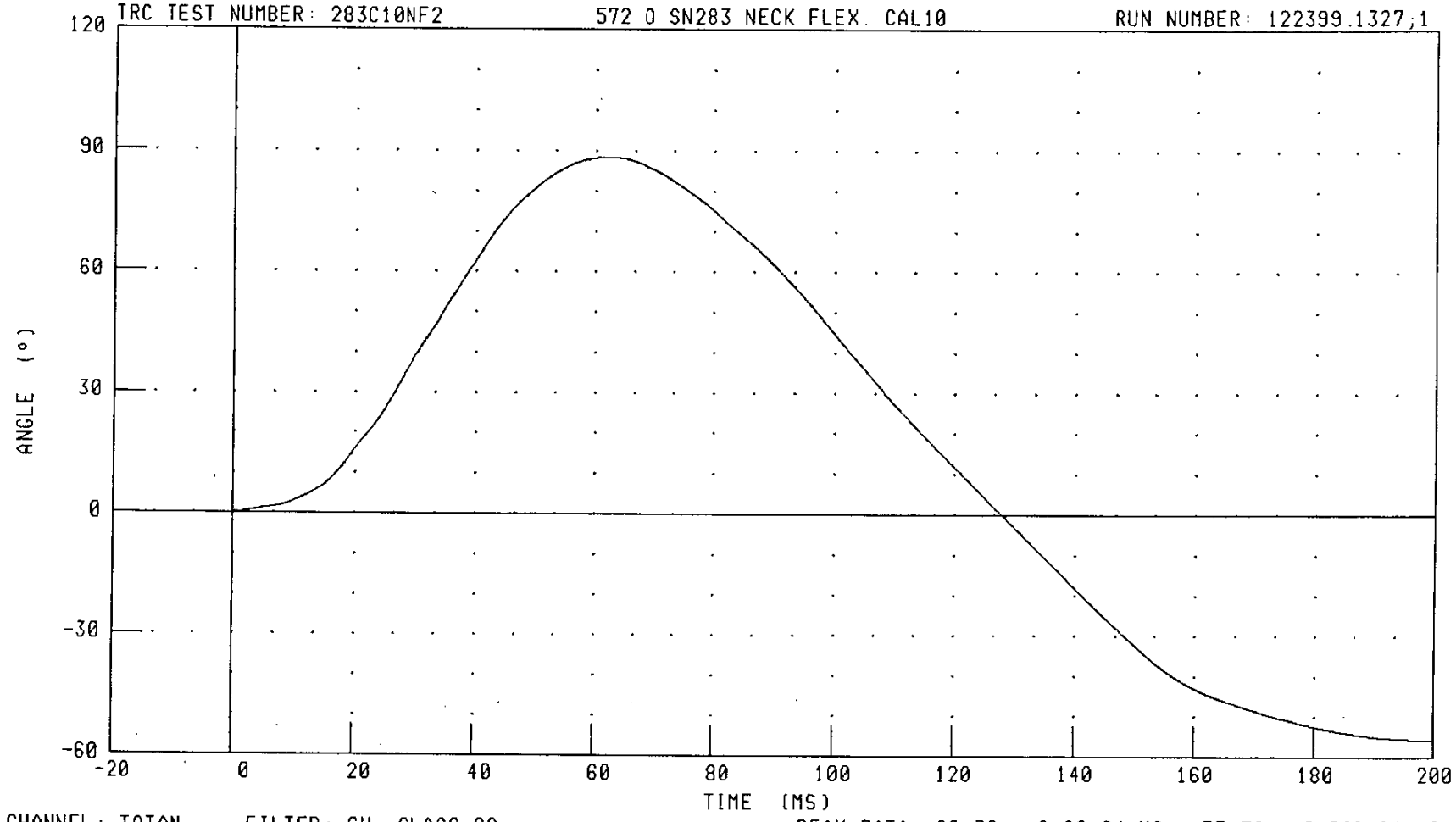
PART 572-0 HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE

TRC TEST NUMBER: 283C10NF2 572 0 SN283 NECK FLEX. CAL10 RUN NUMBER: 122399.1327;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 54.05 ° @ 62.16 MS; -39.72 ° @ 200.00 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION

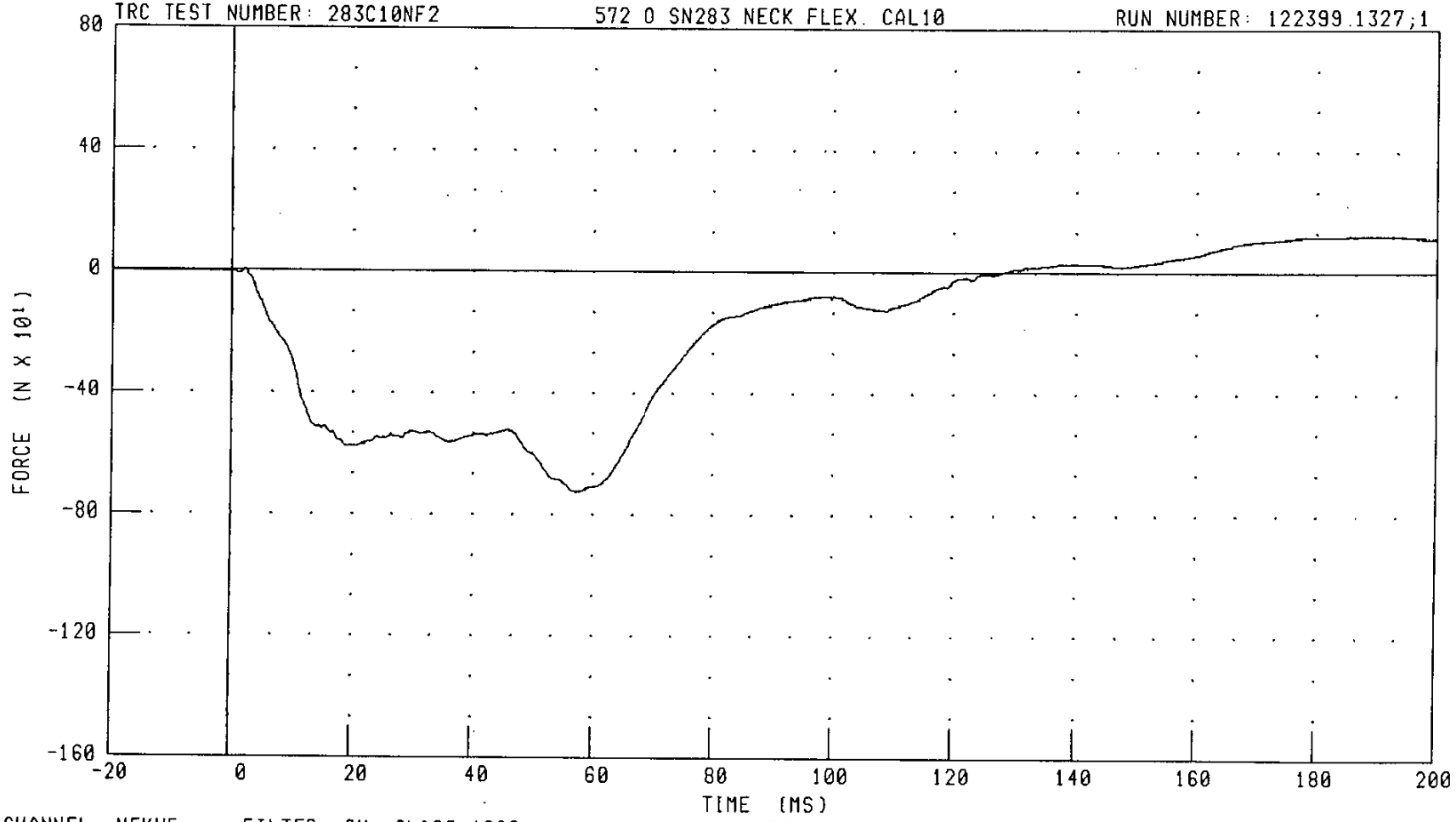


CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 88.30 ° @ 62.24 MS; -55.79 ° @ 200.00 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

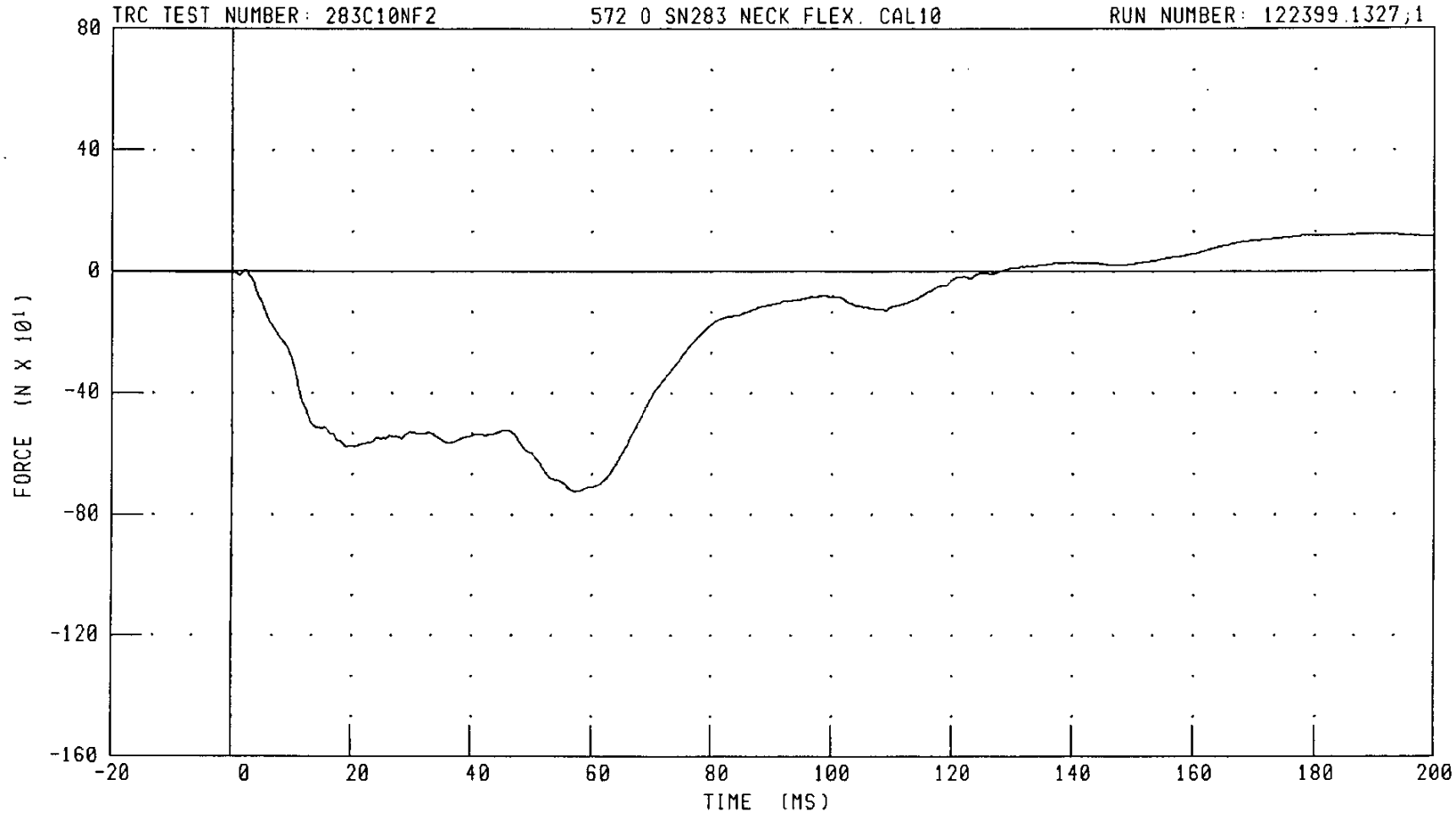


CHANNEL: NEKXF FILTER: CH. CLASS 1000

PEAK DATA: 122.73 N @ 184.80 MS; -726.03 N @ 57.12 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION



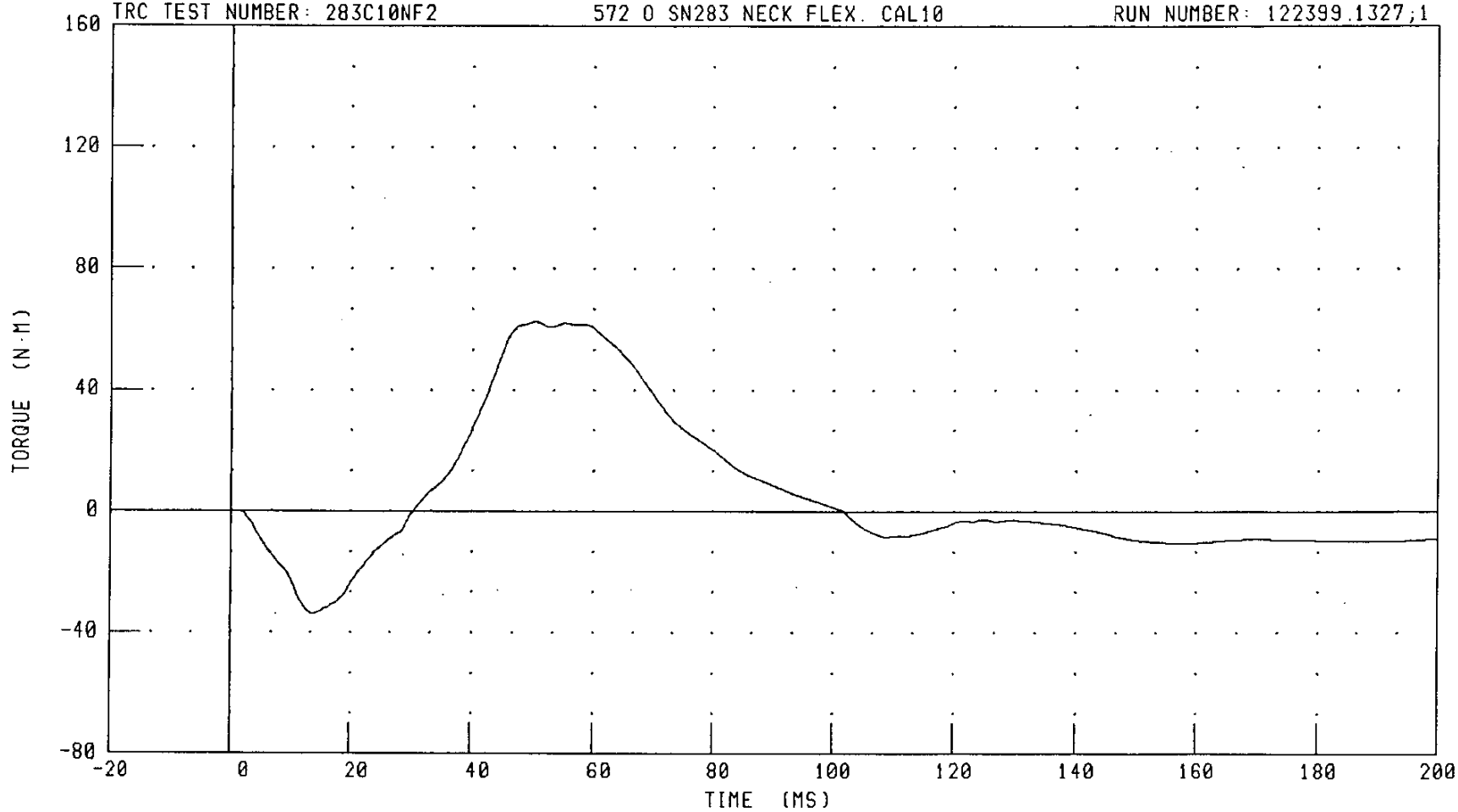
CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 122.88 N @ 185.60 MS; -725.35 N @ 57.28 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

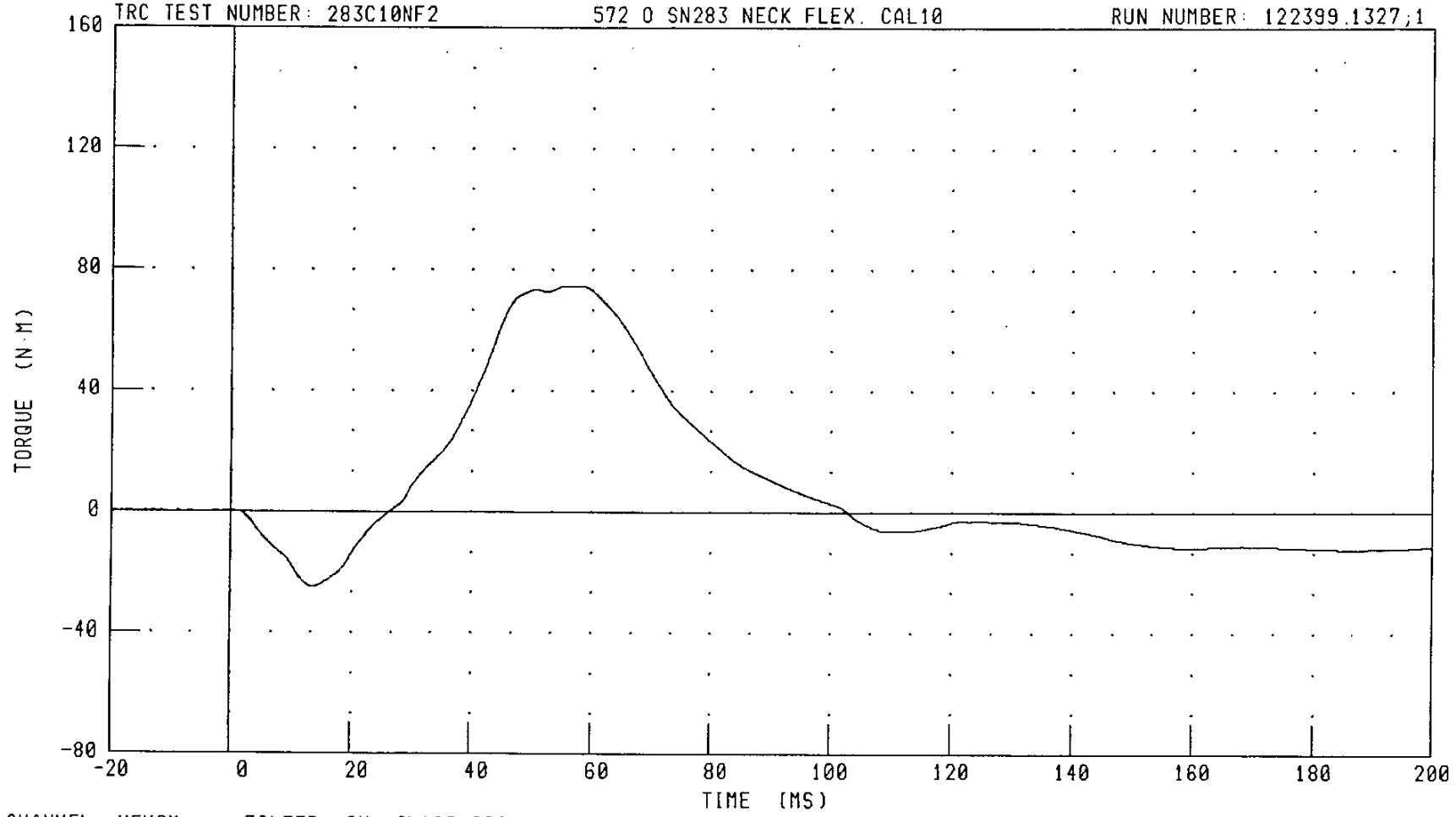
NECK MOMENT Y AXIS

TRC TEST NUMBER: 283C10NF2 572 0 SN283 NECK FLEX. CAL10 RUN NUMBER: 122399.1327;1



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 62.58 N-M @ 50.24 MS; -33.99 N-M @ 13.76 MS

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



CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 74.55 N·M @ 58.00 MS; -24.93 N·M @ 13.60 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE 23-DEC-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 283C10NE1 572 O SN283 NECK EXT. CAL 10

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	6.00 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	3.18 M/S
	30 MS	4.6 - 5.6 M/S	4.63 M/S
PEAK D-PLANE ROTATION		97 - 109 DEG.	108.59 DEG.
PEAK MOMENT DURING ROTAION INTERVAL		-55 / -69 NM	-60.60 NM
MOMENT DECAY TIME FROM PEAK TO -10 NM LEVEL		94 - 114 MS	106.32 MS

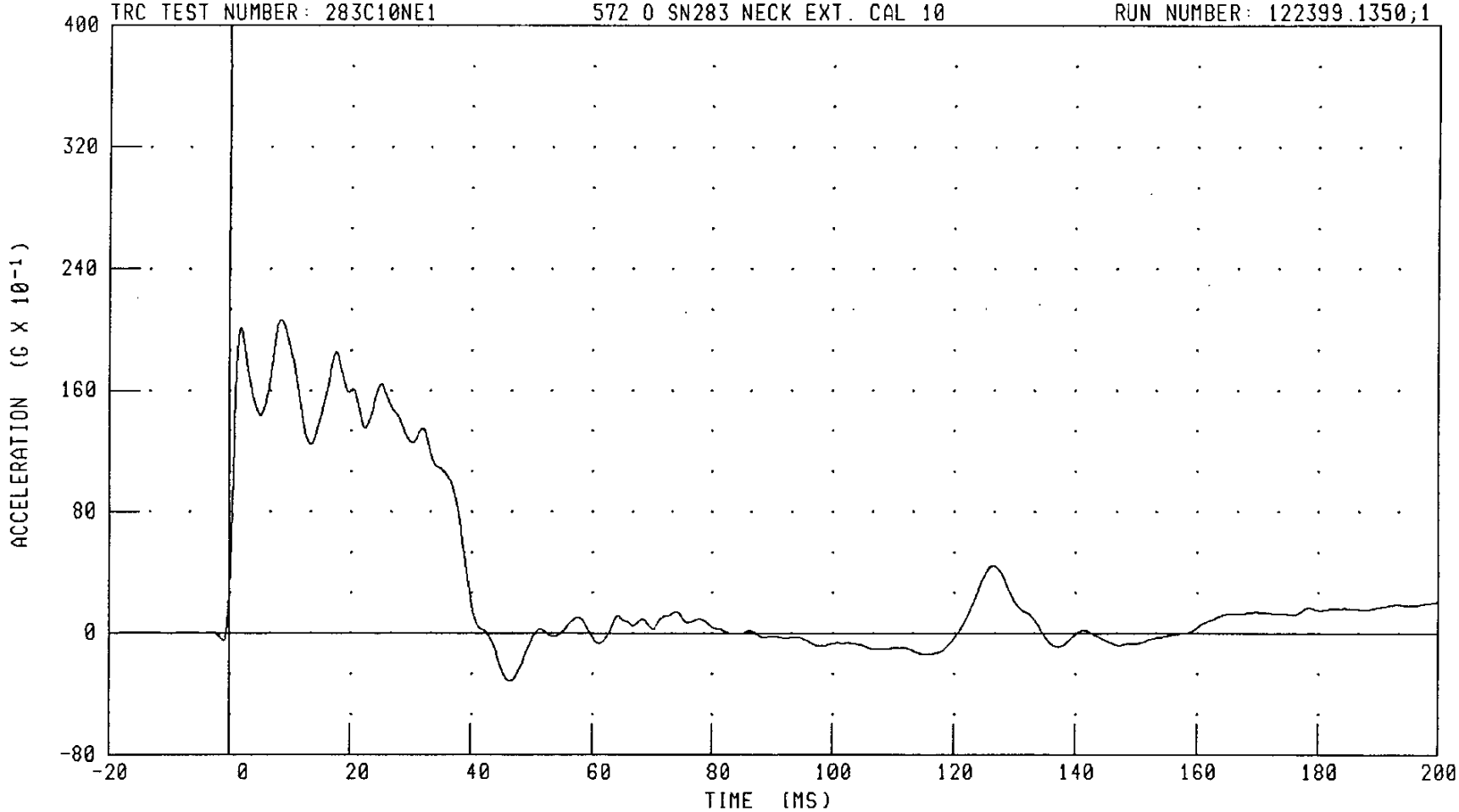
TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 122399.1345;1

PART 572-O HYBRID III NECK EXTENSION CALIBRATION

PENDULUM DECELERATION

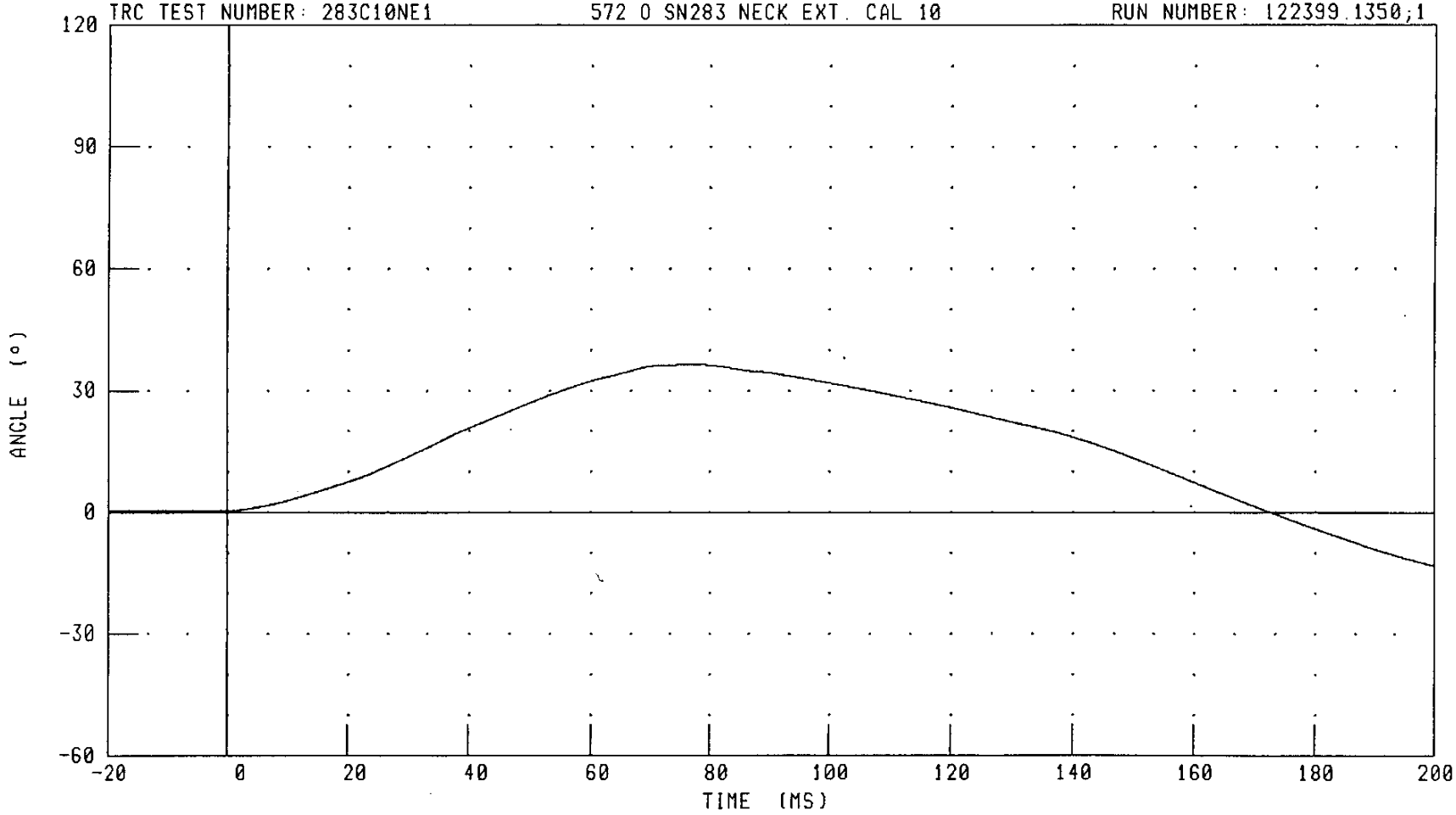
TRC TEST NUMBER: 283C10NE1 572 O SN283 NECK EXT. CAL 10 RUN NUMBER: 122399.1350;1



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 20.64 G @ 8.56 MS; -3.14 G @ 46.48 MS

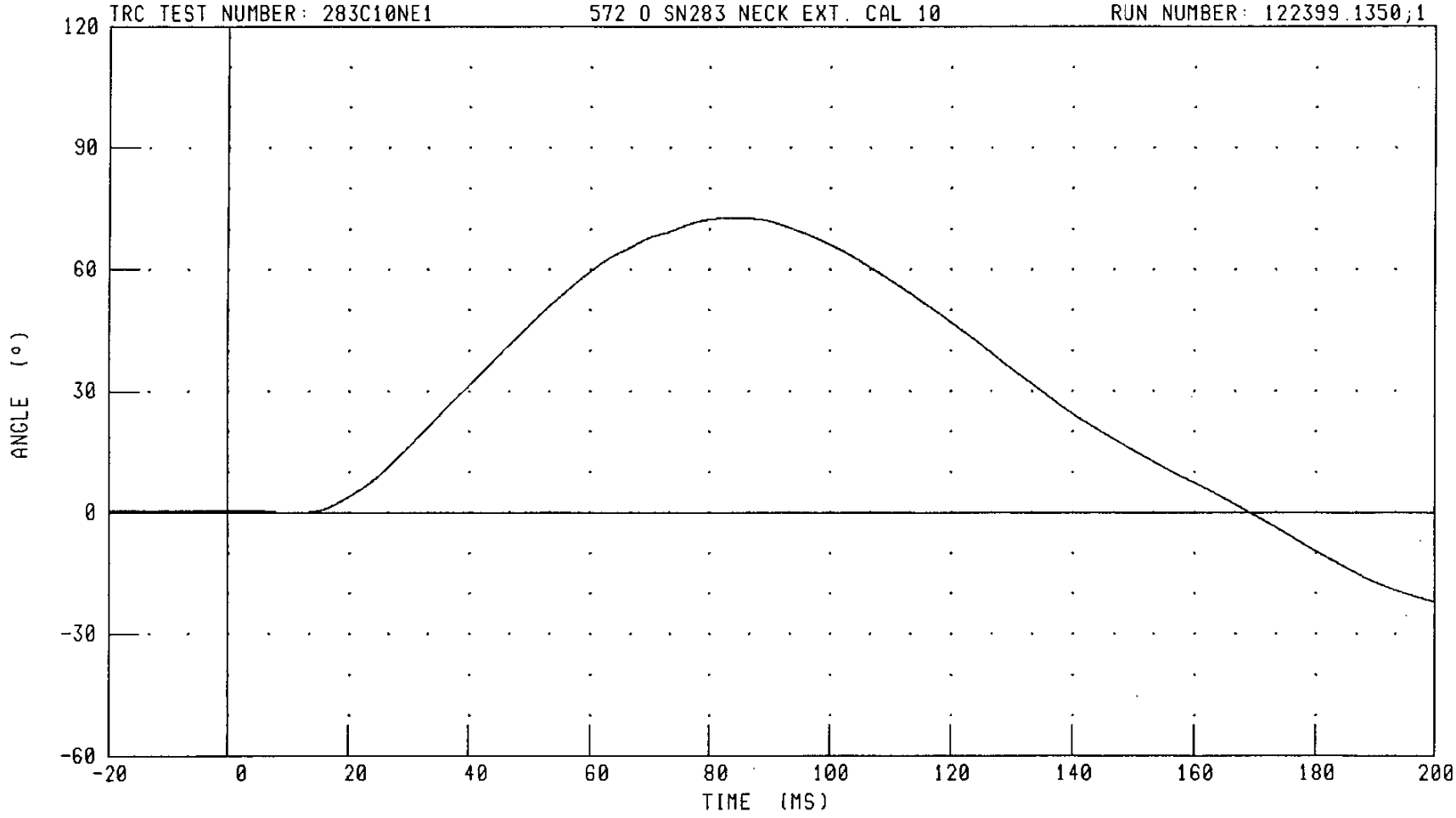
PART 572-O HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 283C10NE1 572 O SN283 NECK EXT. CAL 10 RUN NUMBER: 122399.1350;1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 36.48 ° @ 77.36 MS; -13.24 ° @ 200.00 MS

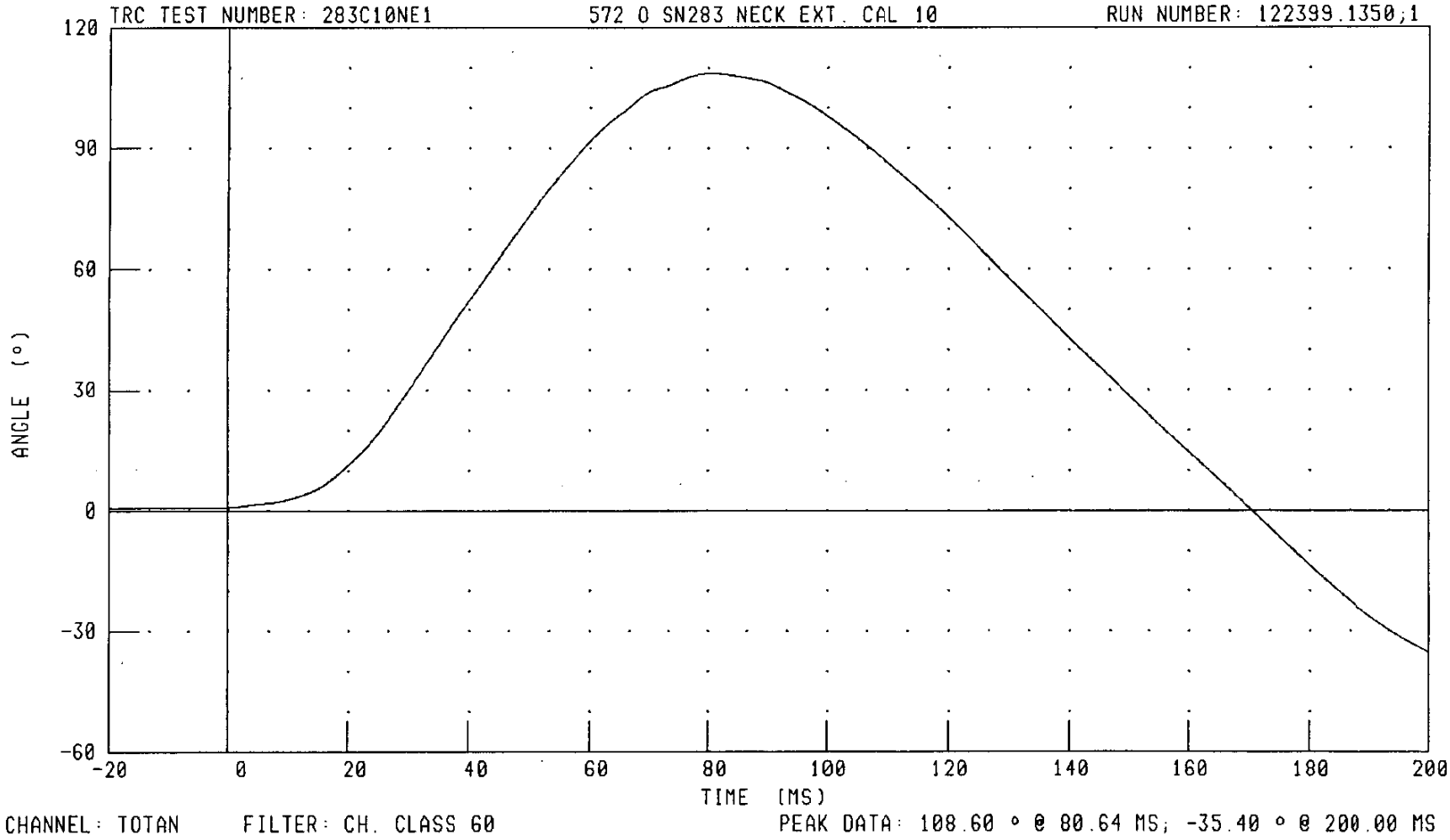
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 72.62 ° @ 84.40 MS; -22.16 ° @ 200.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

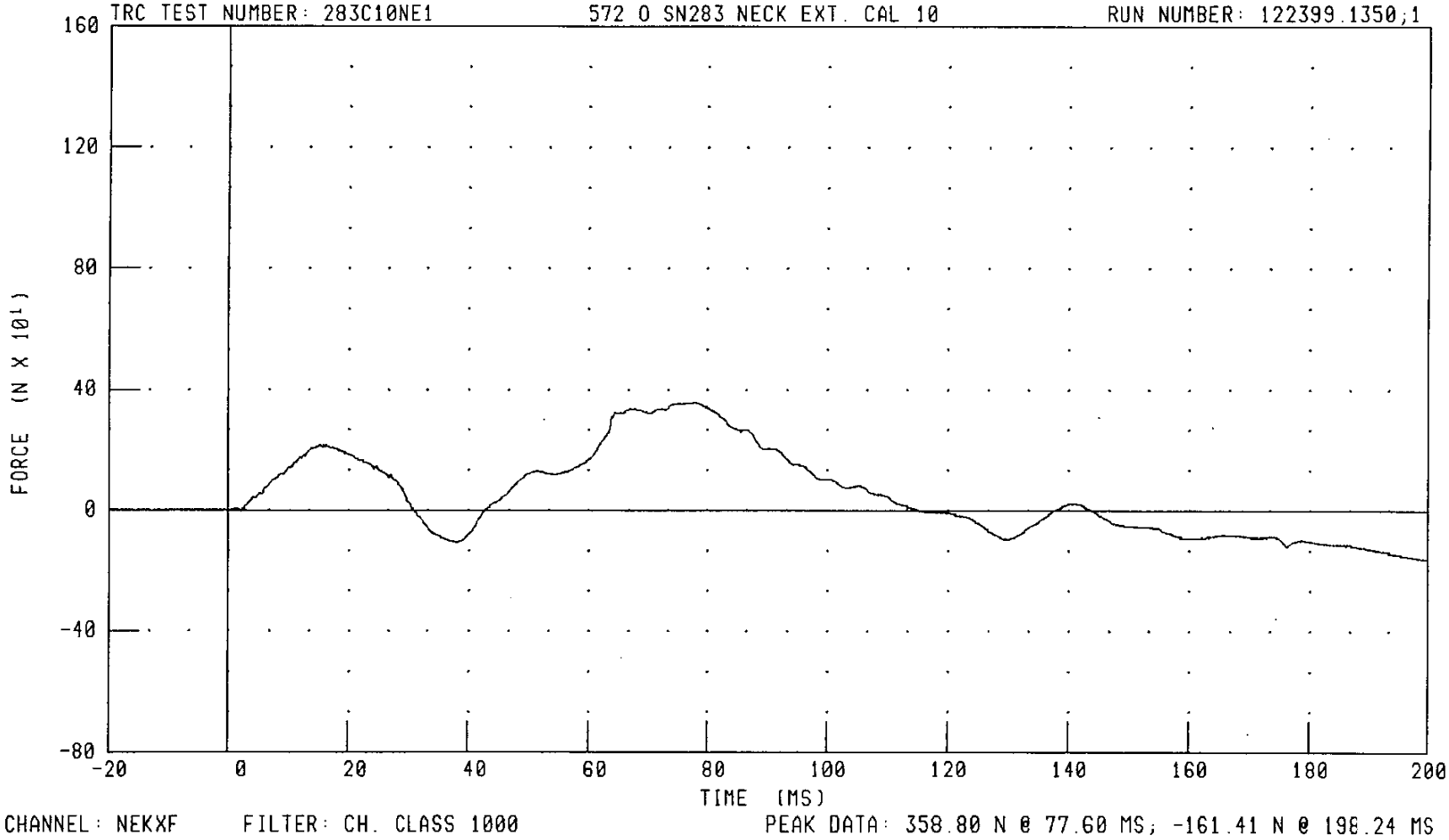


CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 108.60 ° @ 80.64 MS; -35.40 ° @ 200.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

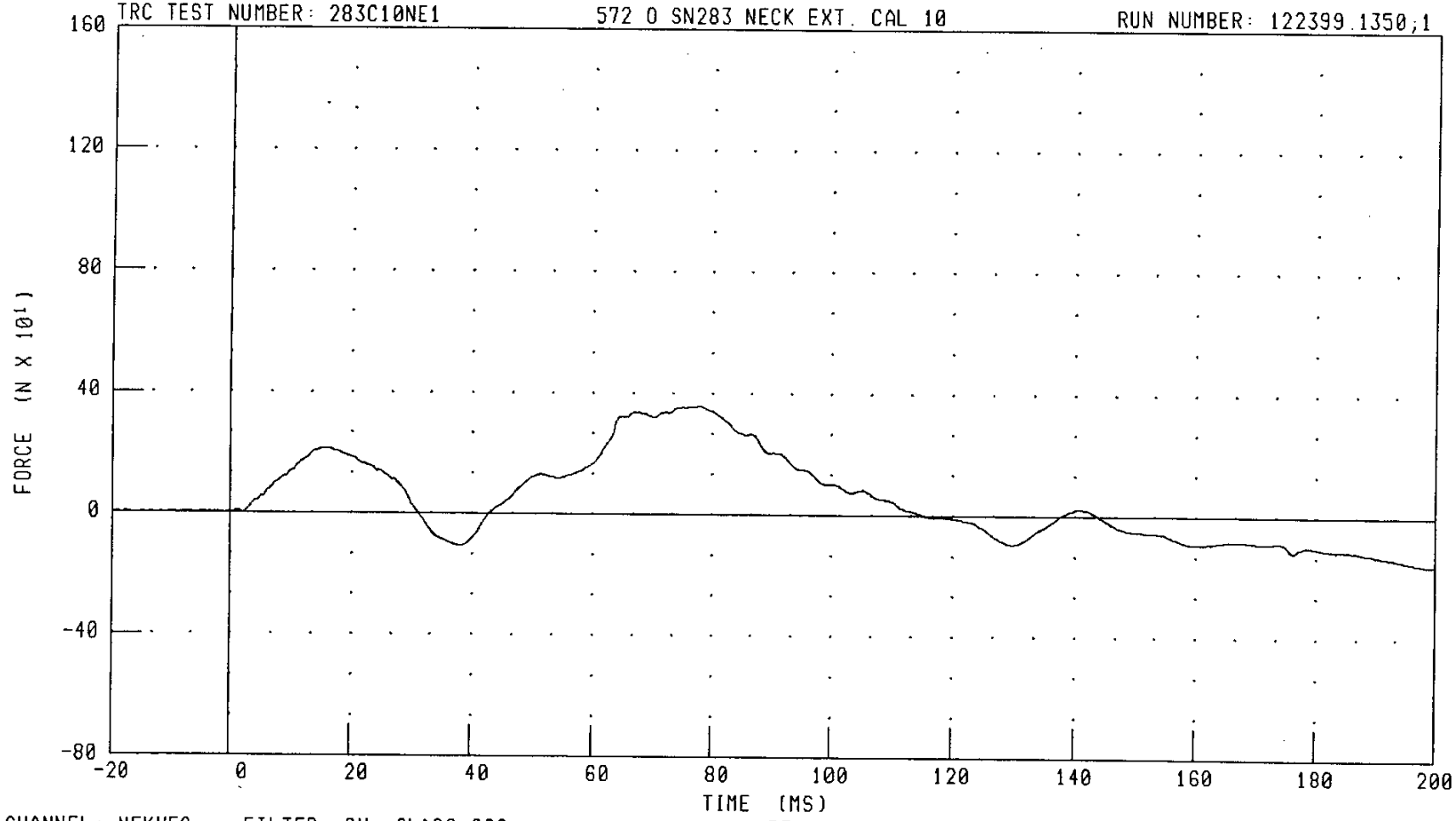
NECK FORCE X AXIS



CHANNEL: NEKXF FILTER: CH. CLASS 1000 PEAK DATA: 358.80 N @ 77.60 MS; -161.41 N @ 198.24 MS

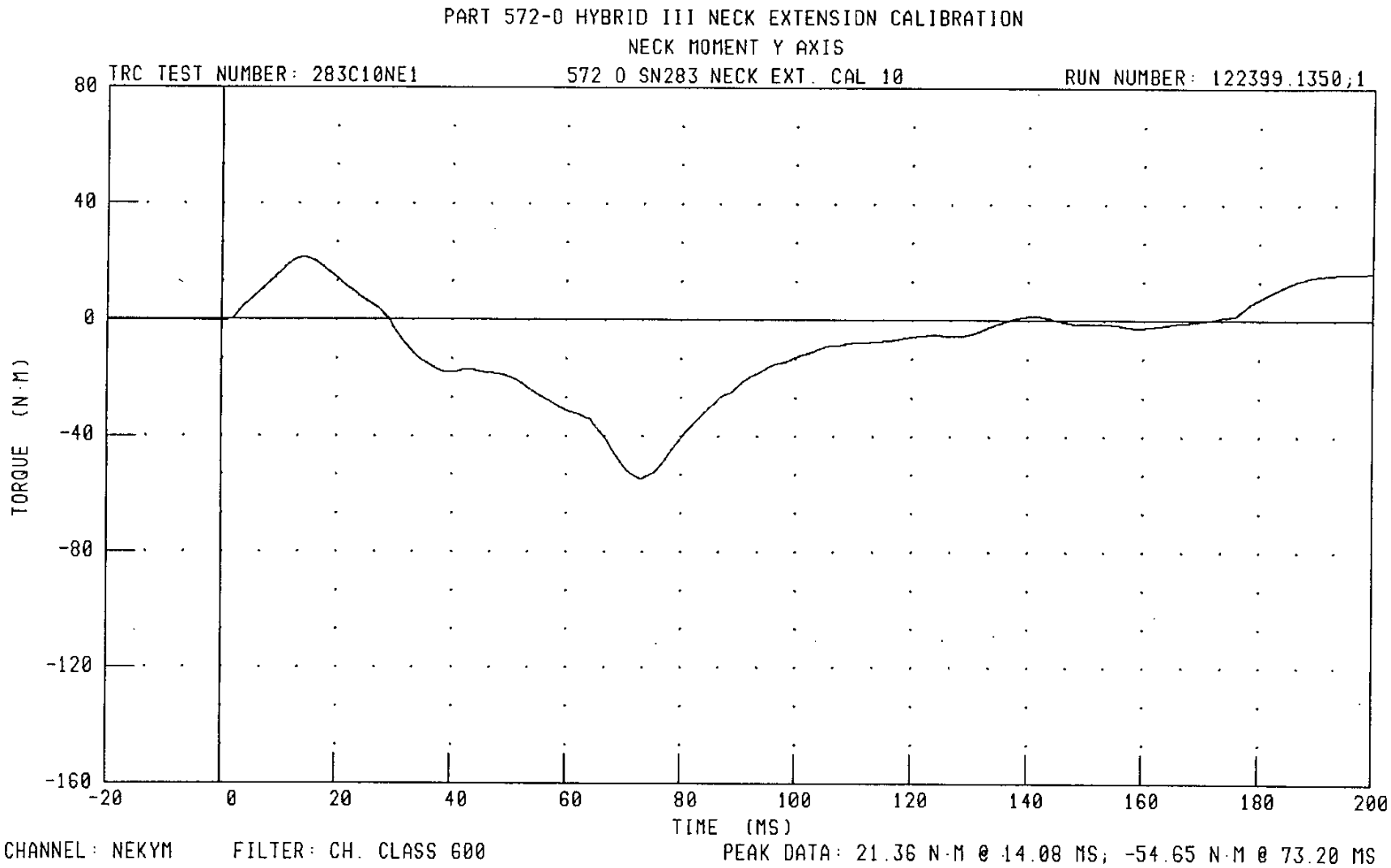
PART 572-D HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION

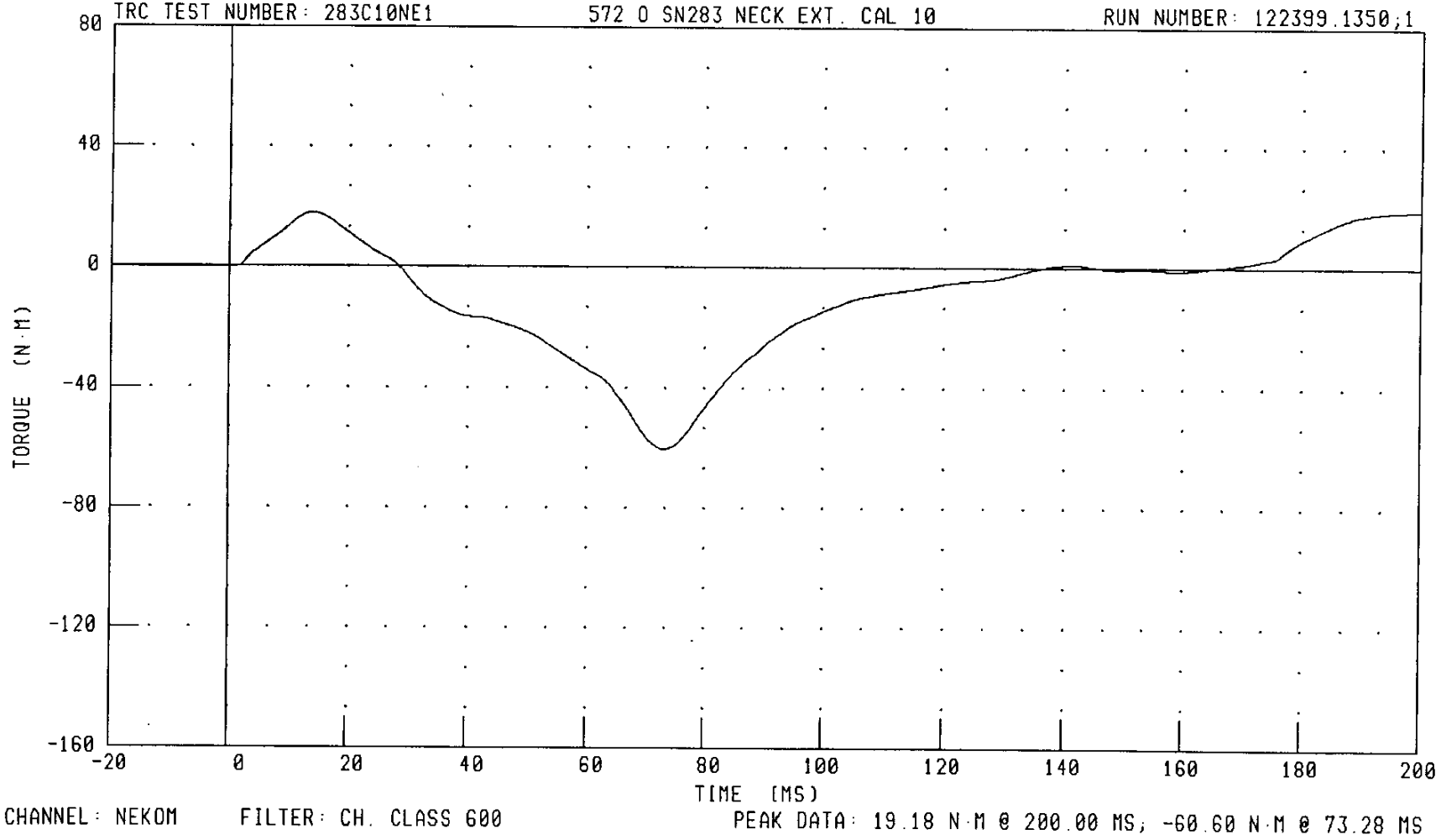


CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 358.50 N @ 77.92 MS; -162.20 N @ 200.00 MS


PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER: 283C10NE1
572 0 SN283 NECK EXT. CAL 10
RUN NUMBER: 122399.1350;1
80
40
0
-40
-80
-120
-160
TORQUE (N-M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKYM
FILTER: CH. CLASS 600
PEAK DATA: 21.36 N-M @ 14.08 MS; -54.65 N-M @ 73.20 MS

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



CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 19.18 N-M @ 200.00 MS; -60.60 N-M @ 73.28 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

TRC INC. TEST NO: 283C10TH2 572 O SN283 THORAX CAL10

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
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	49.2 MM
MAXIMUM RESISTIVE FORCE	3900 - 4400 N	4474. N *
INTERNAL HYSTERESIS	69% - 85%	74.4%

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 122399.1519;1

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

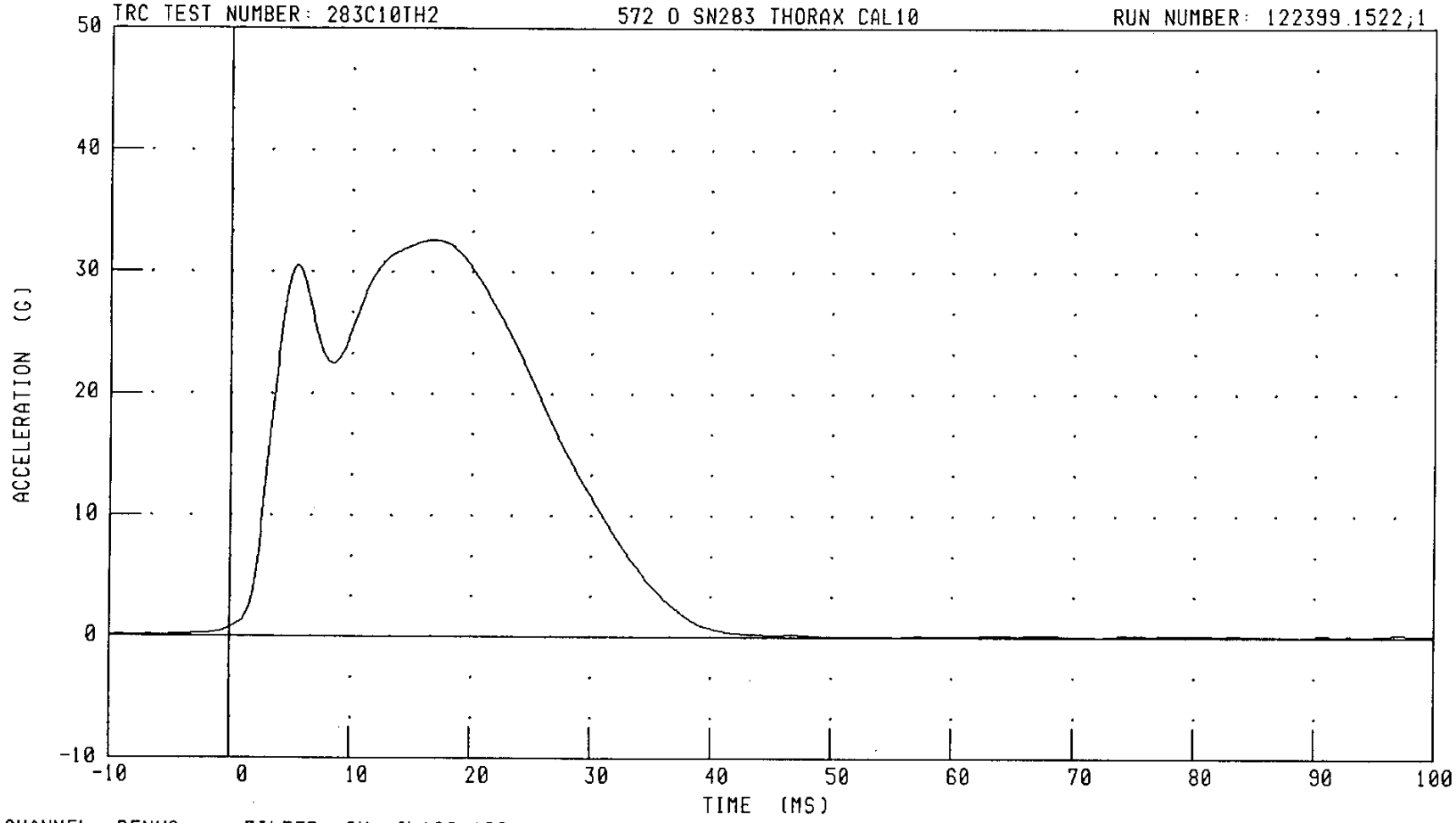
TRC INC. TEST NO: 283C10TH2 572 O SN283 THORAX CAL10

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
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 ~~51 - 58~~ MM	49.2 MM ✓
MAXIMUM RESISTIVE FORCE	3900 - 4400 ~~3800 - 4300~~ N	4474. N *
INTERNAL HYSTERESIS	69% - 85%	74.4%

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN_____ RUN NUMBER: 122399.1519;1

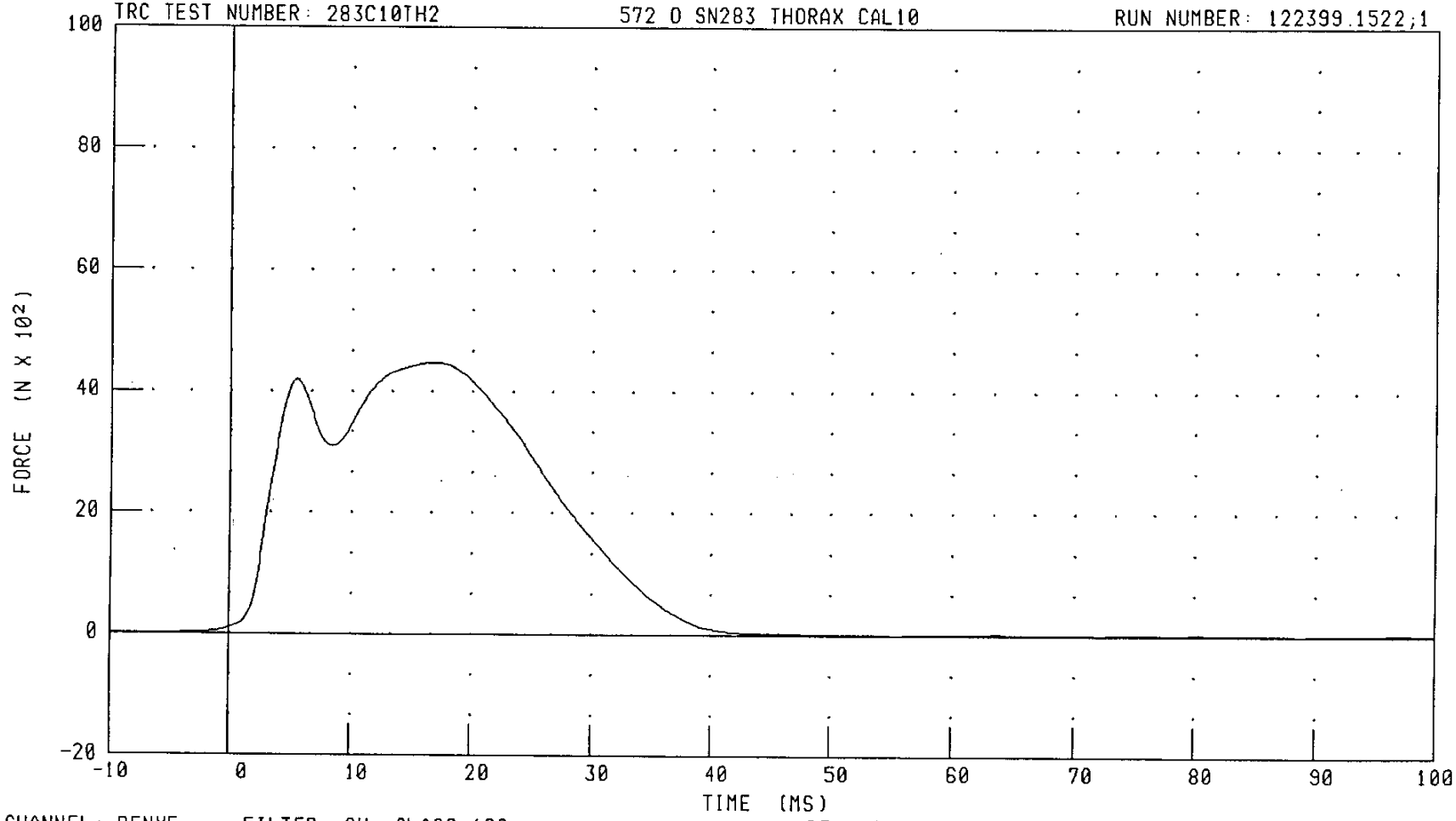
PART 572-O HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 32.61 G @ 16.88 MS; 0.01 G @ 55.60 MS

PART 572-O HYBRID III THORAX CALIBRATION

PENDULUM FORCE



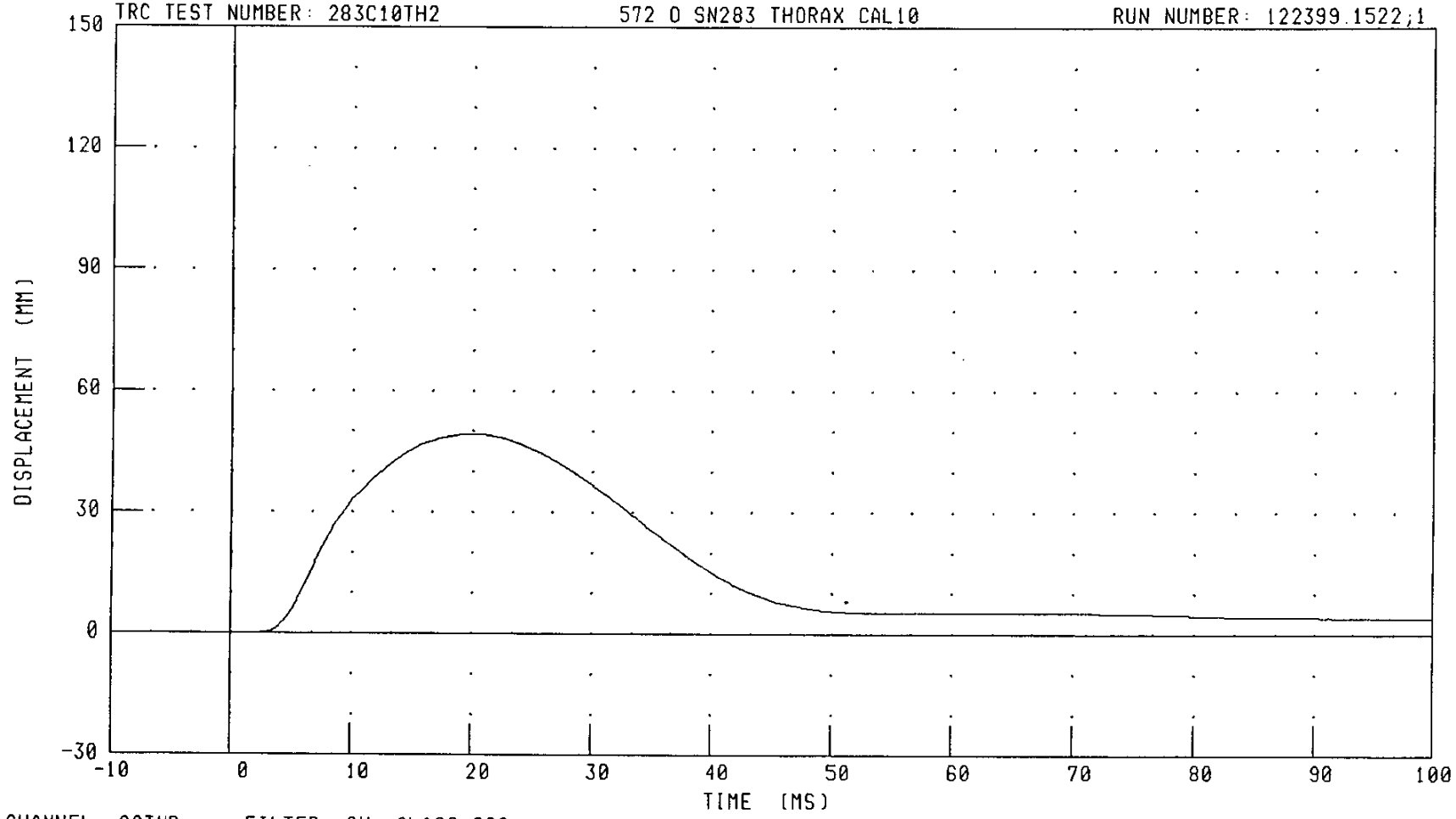
CHANNEL: PENXF FILTER: CH. CLASS 180

PEAK DATA: 4474.85 N @ 16.88 MS; 1.97 N @ 55.60 MS

PART 572-O HYBRID III THORAX CALIBRATION

STERNUM DISPLACEMENT

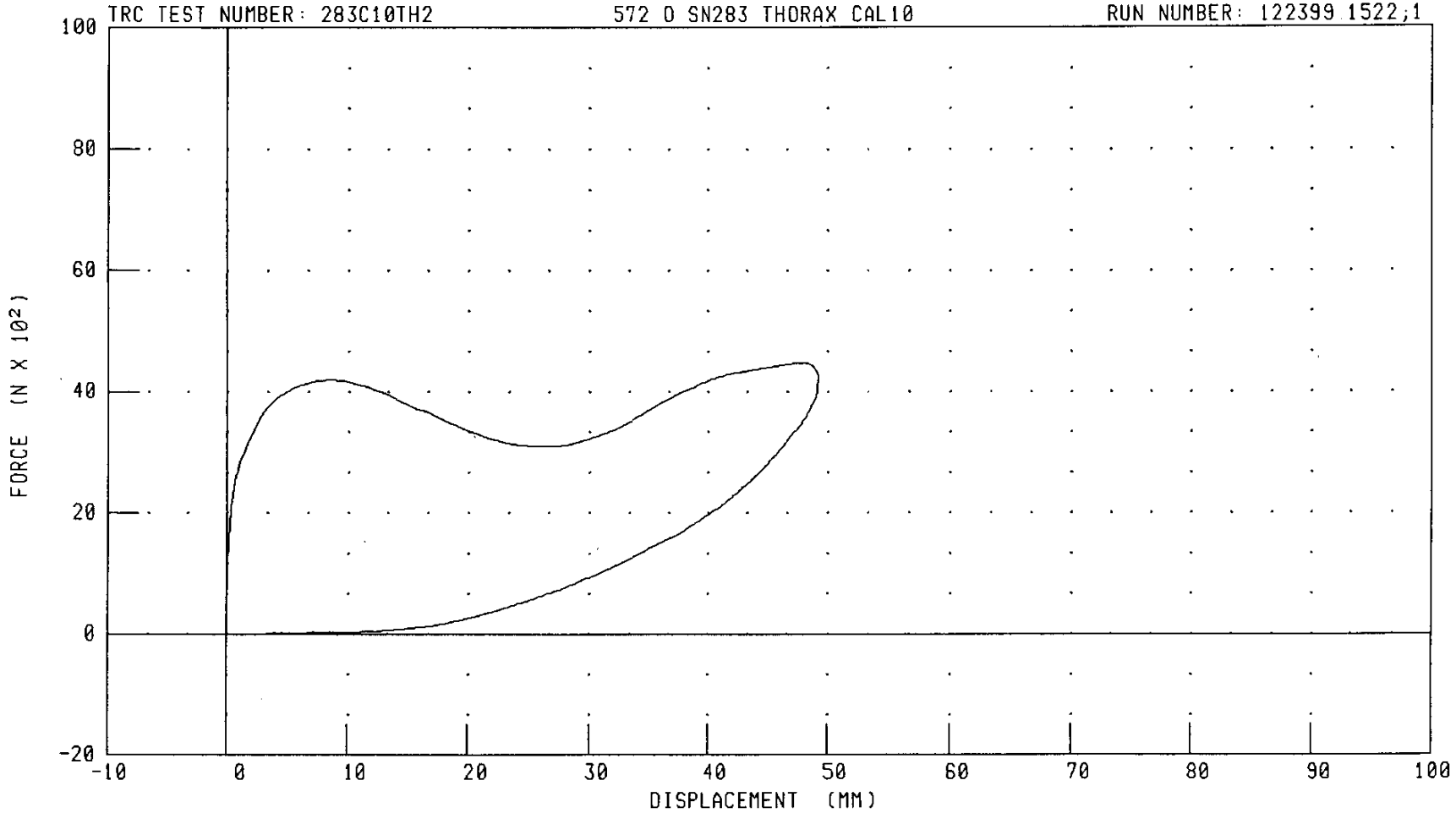
TRC TEST NUMBER: 283C10TH2 572 O SN283 THORAX CAL10 RUN NUMBER: 122399.1522;1



CHANNEL: CSTXD FILTER: CH. CLASS 600 PEAK DATA: 49.25 MM @ 19.68 MS; 0.00 MM @ 1.68 MS

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

TRC TEST NUMBER: 283C10TH2 572 O SN283 THORAX CAL10 RUN NUMBER: 122399.1522;1



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

PEAK DATA: 49.25 MM @ 19.68 MS; 0.00 MM @ 1.68 MS
4474.85 N @ 16.88 MS; 1.97 N @ 55.60 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

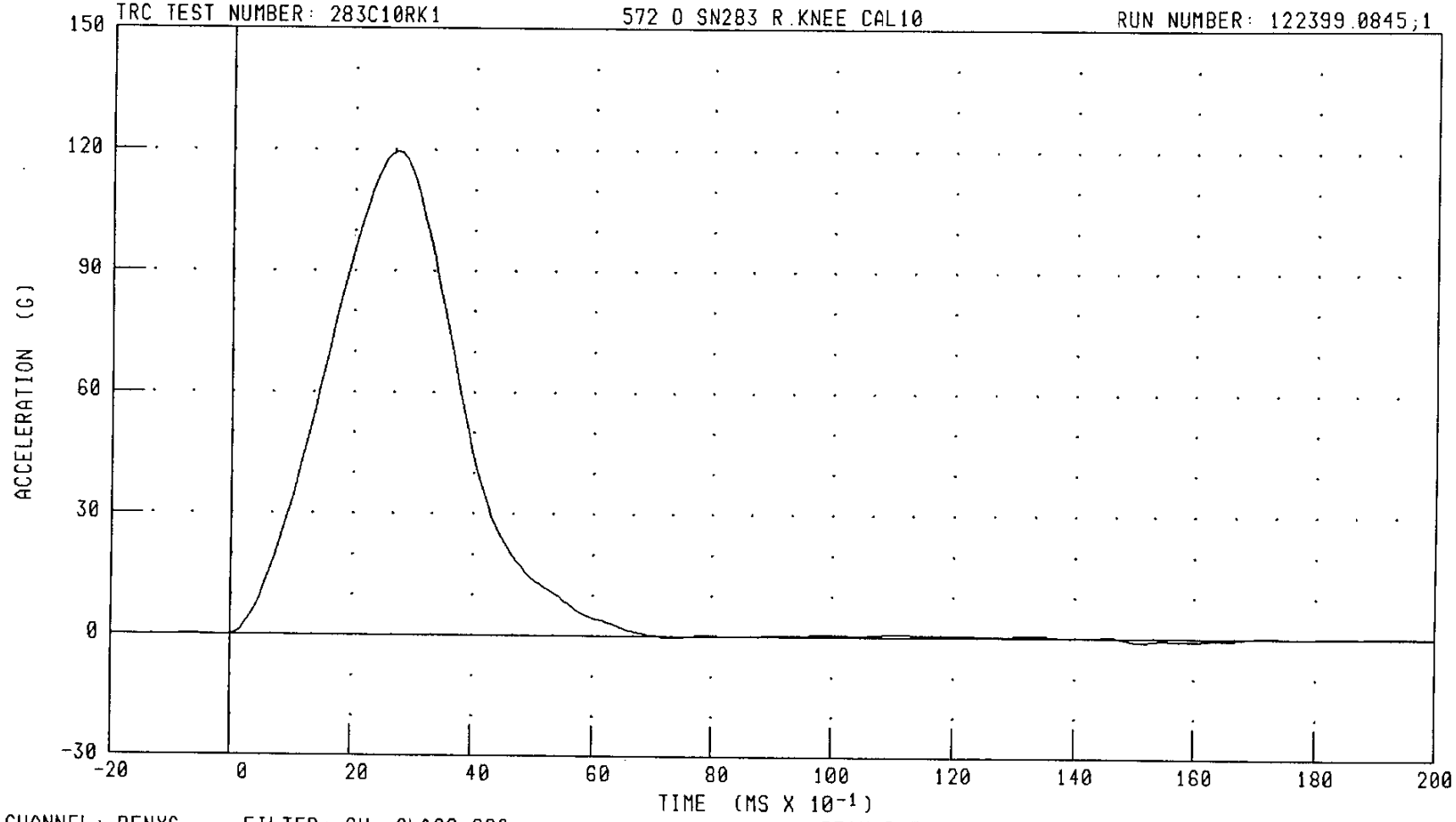
TRC INC. TEST NO: 283C10RK1 572 O SN283 R.KNEE CAL10

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	2.13 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3513.0 N

TEST MEETS SPECIFICATIONS

TECHNICIAN _____ RUN NUMBER: 122399.0845;1

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

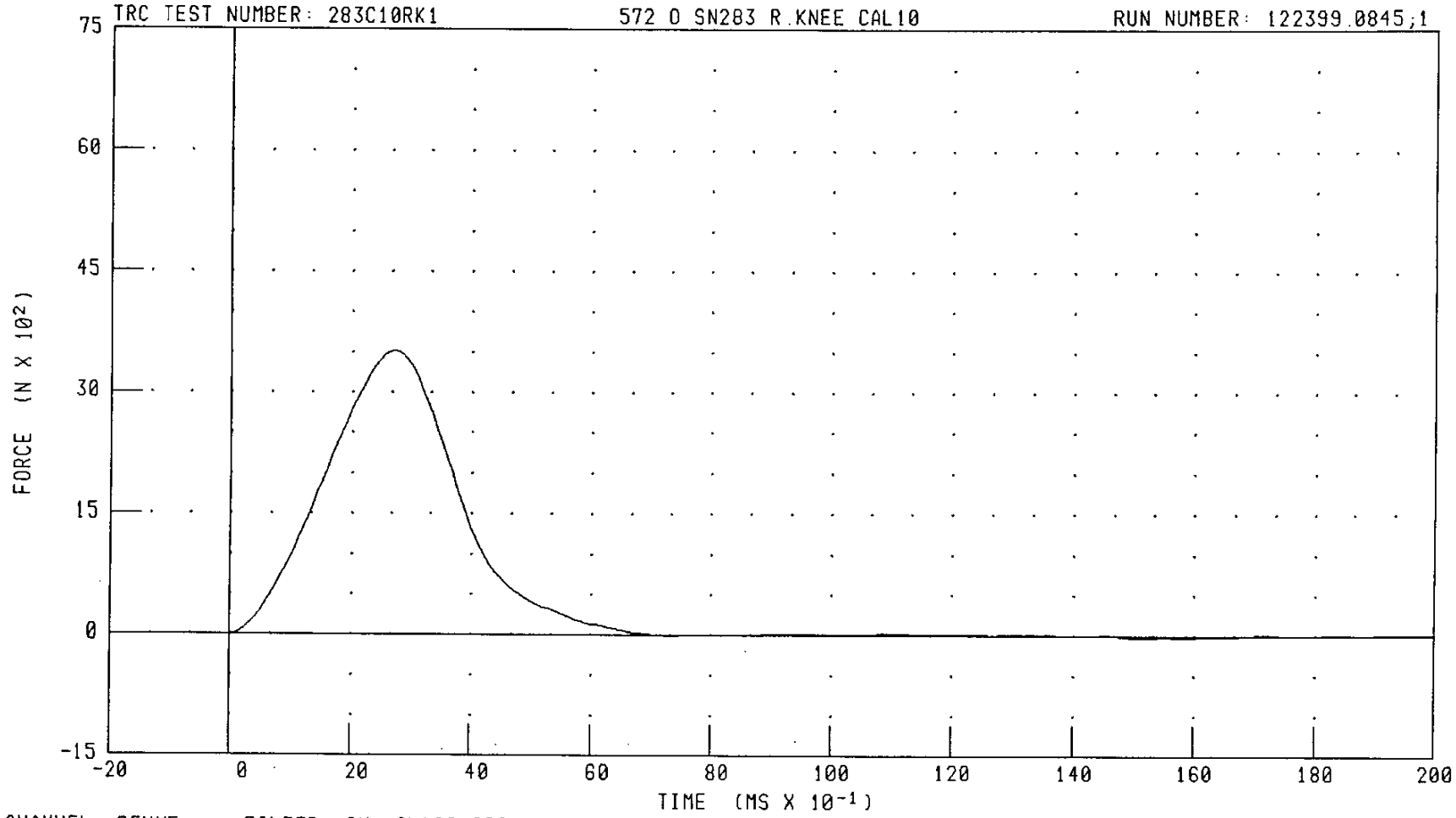


CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 119.67 G @ 2.72 MS; -1.10 G @ 15.12 MS

PART 572-0 HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 3513.01 N @ 2.72 MS; -32.25 N @ 15.12 MS

TRANSPORTATION RESEARCH CENTER INC.

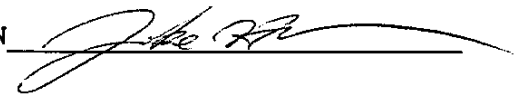
LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

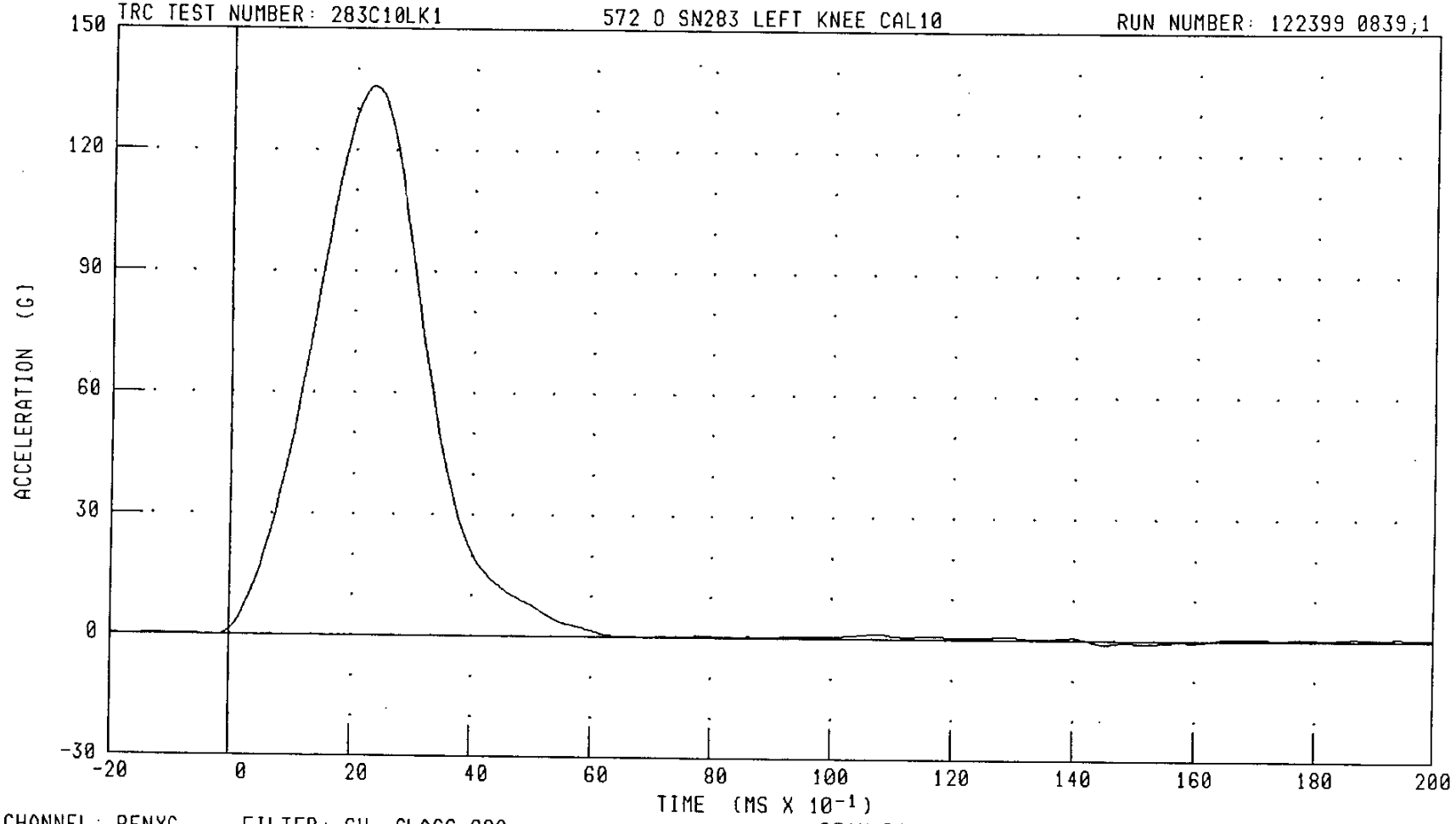
TRC INC. TEST NO: 283C10LK1 572 O SN283 LEFT KNEE CAL10

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	2.13 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3984.9 N

TEST MEETS SPECIFICATIONS

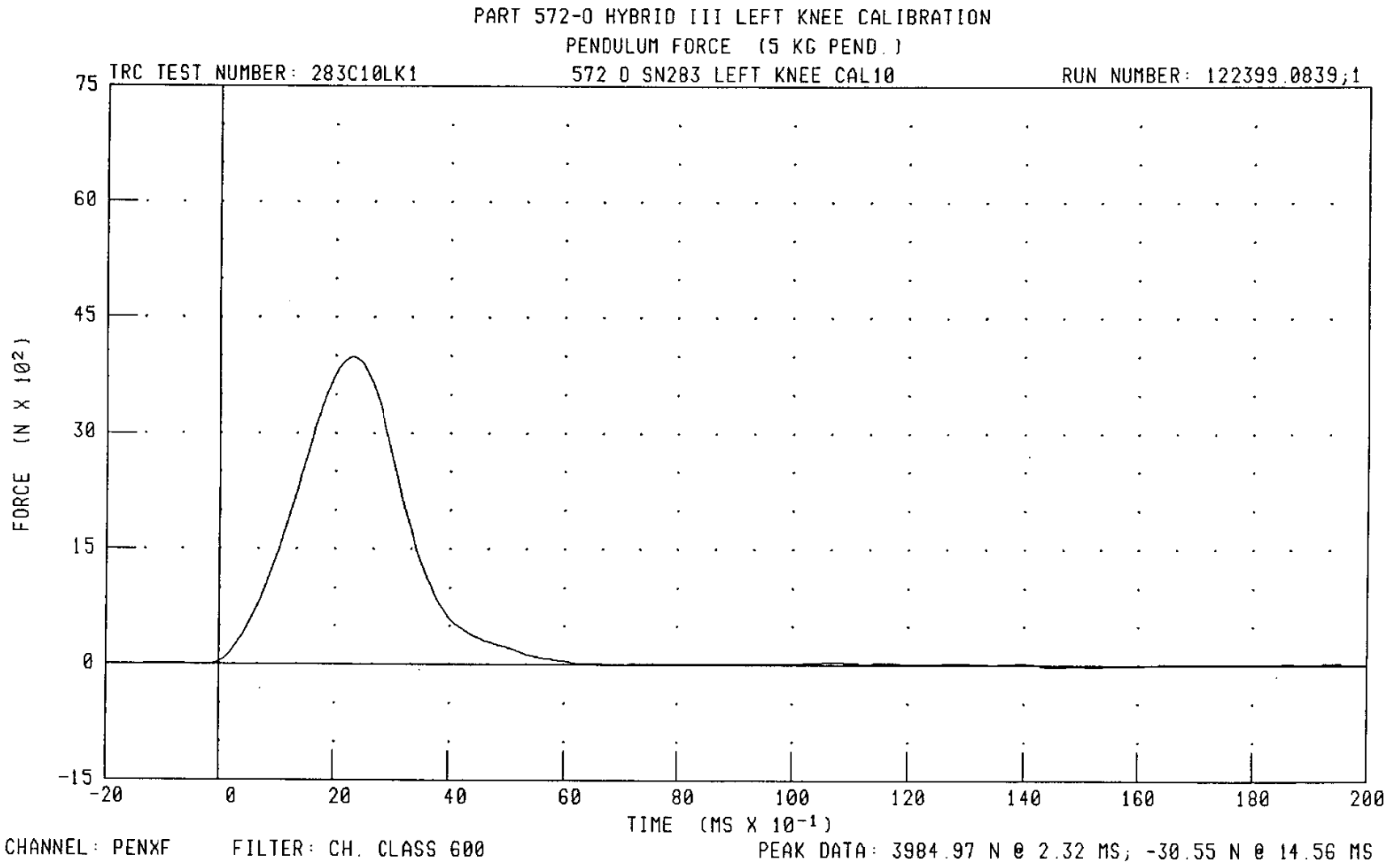
TECHNICIAN  RUN NUMBER: 122399.0838;1

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



CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 135.74 G @ 2.32 MS; -1.04 G @ 14.56 MS


PART 572-O HYBRID III LEFT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)
TRC TEST NUMBER: 283C10LK1
572 O SN283 LEFT KNEE CAL10
RUN NUMBER: 122399.0839;1
FORCE (N X 10²)
75
60
45
30
15
0
-15
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10⁻¹)
CHANNEL: PENXF
FILTER: CH. CLASS 600
PEAK DATA: 3984.97 N @ 2.32 MS; -30.55 N @ 14.56 MS

Post-Test Dummy Certification

Passenger Dummy S/N 369

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III SMALL FEMALE 23-DEC-99

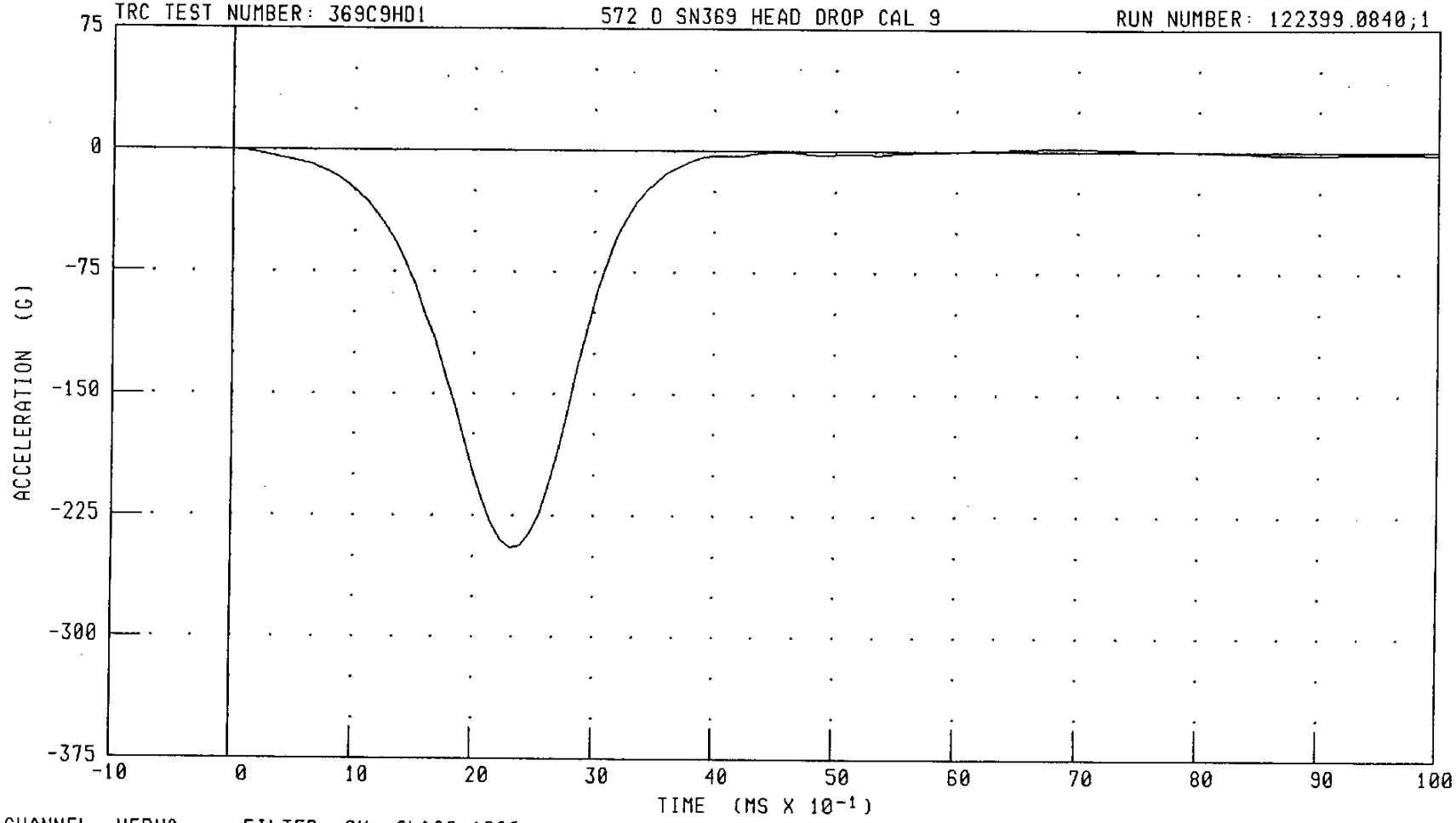
TRC INC. TEST NO: 369C9HD1 572 O SN369 HEAD DROP CAL 9

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	280.17 G
PEAK LATERAL ACCELERATION	15 G MAX	4.78 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

TEST MEETS SPECIFICATIONS

TECHNICIAN Dustin Walkom RUN NUMBER: 122399.0840;1

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



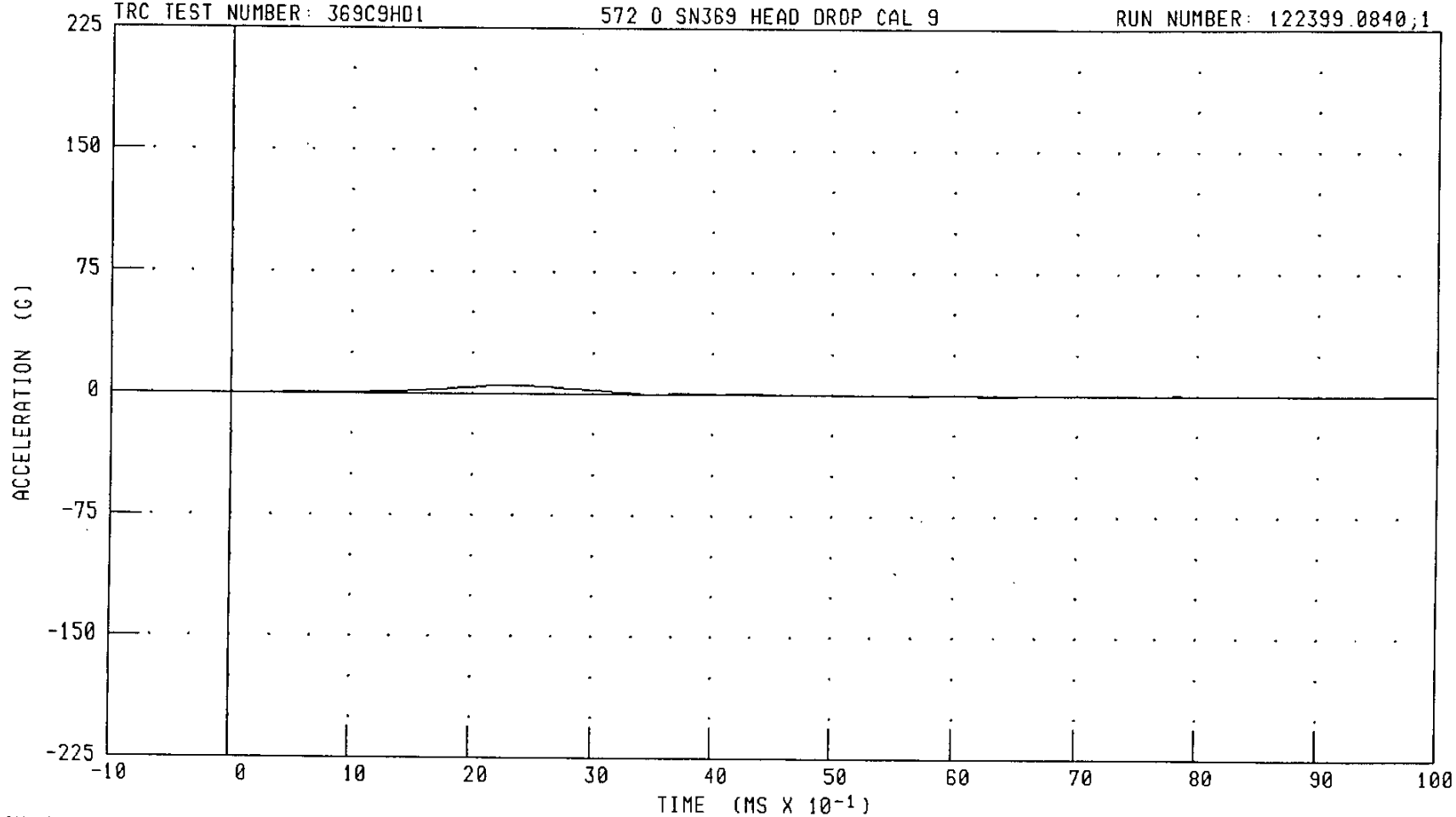
CHANNEL: HEDXG FILTER: CH. CLASS 1000

PEAK DATA: 1.97 G @ 6.72 MS; -245.19 G @ 2.32 MS

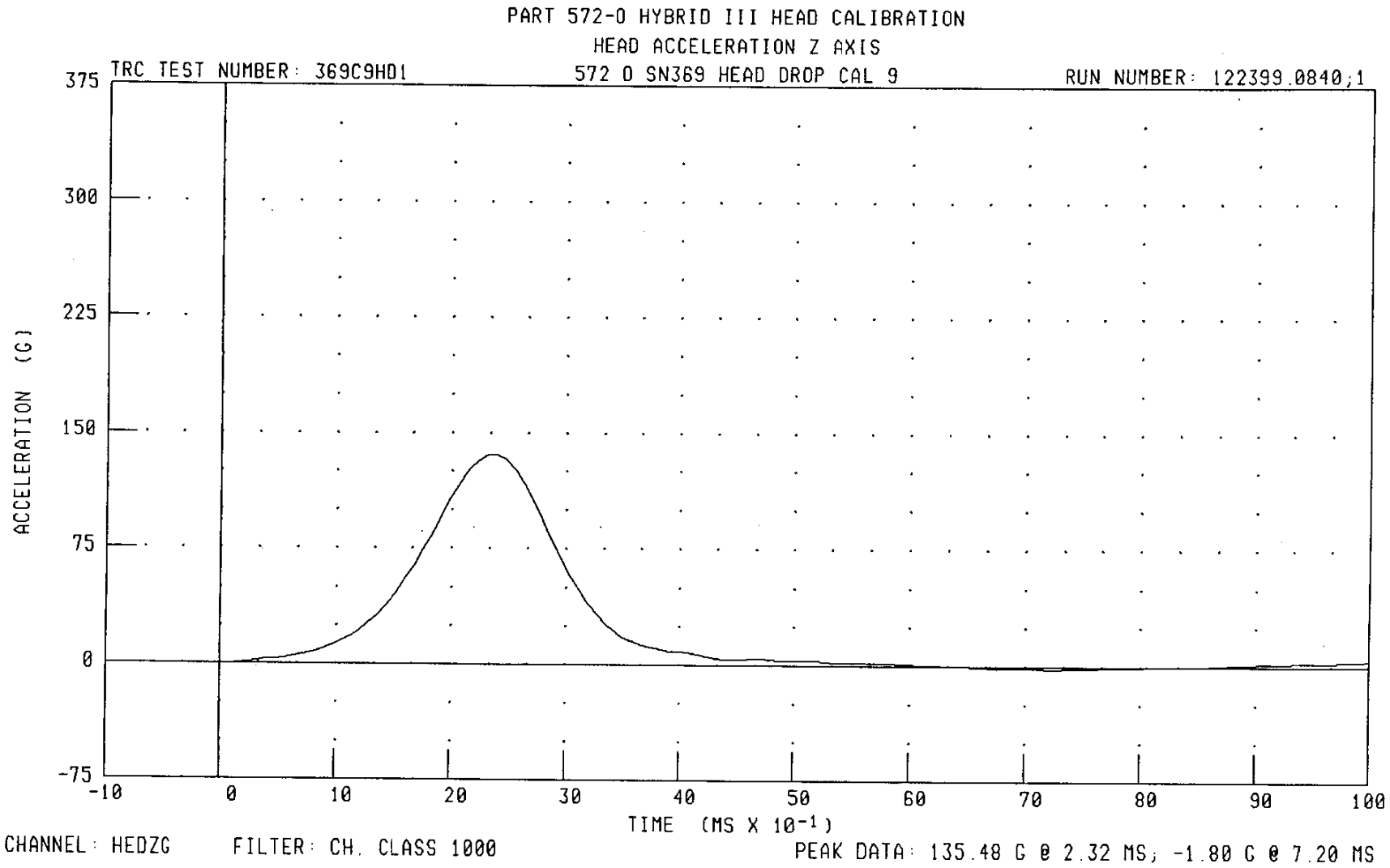
PART 572-O HYBRID III HEAD CALIBRATION

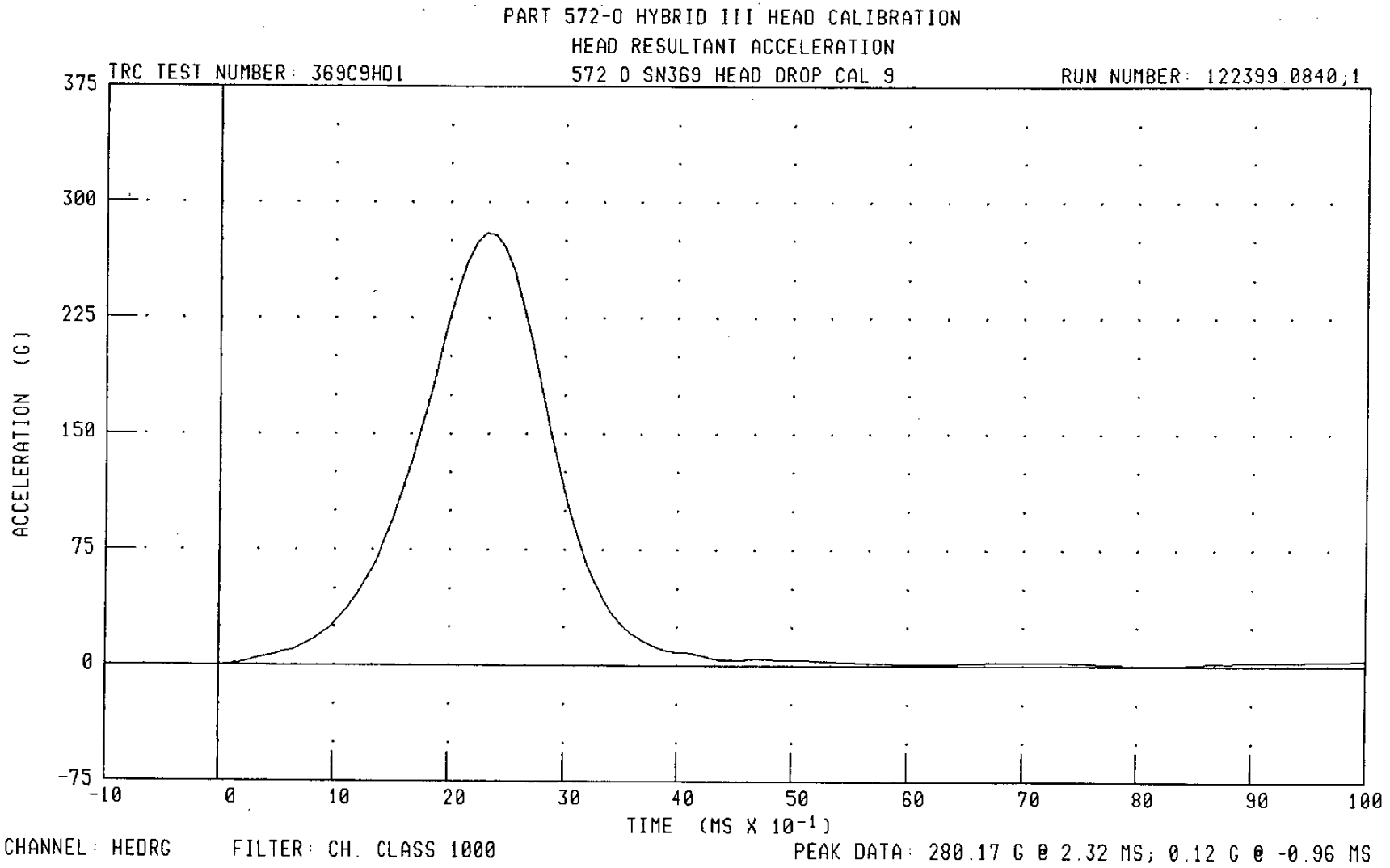
HEAD ACCELERATION Y AXIS

TRC TEST NUMBER: 369C9HD1 572 O SN369 HEAD DROP CAL 9 RUN NUMBER: 122399.0840;1

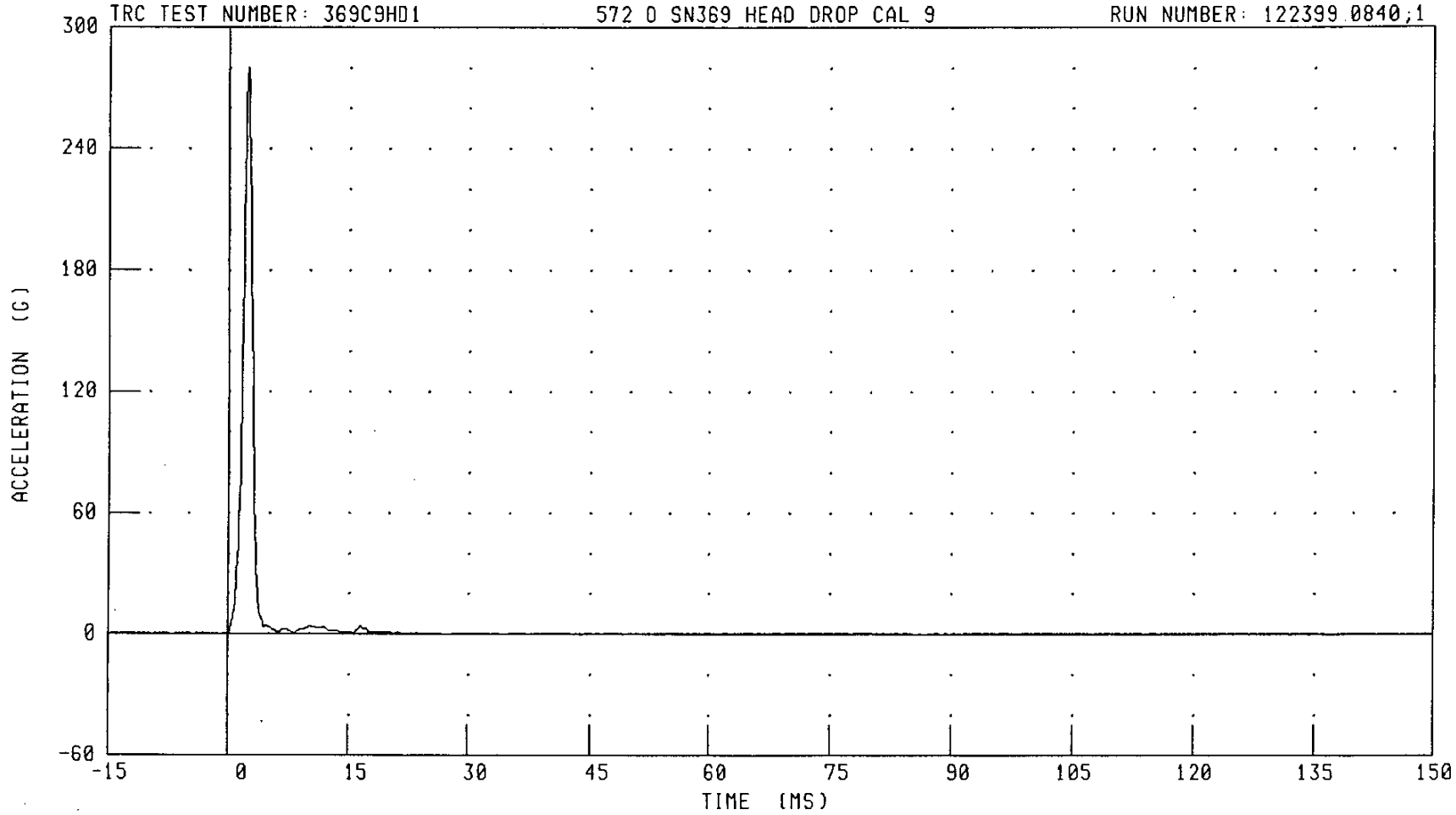


CHANNEL: HEDYG FILTER: CH. CLASS 1000 PEAK DATA: 4.79 G @ 2.24 MS; -0.62 G @ 5.68 MS


PART 572-O HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 369C9HD1
572 O SN369 HEAD DROP CAL 9
RUN NUMBER: 122399.0840;1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDZG
FILTER: CH. CLASS 1000
PEAK DATA: 135.48 G @ 2.32 MS; -1.80 G @ 7.20 MS


PART 572-O HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER: 369C9HD1
572 O SN369 HEAD DROP CAL 9
RUN NUMBER: 122399 0840;1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL: HEDRG
FILTER: CH. CLASS 1000
PEAK DATA: 280.17 G @ 2.32 MS; 0.12 G @ -0.96 MS

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



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 280.17 G @ 2.32 MS; 0.12 G @ -14.88 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE 23-DEC-99

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C9NF1 572 O SN369 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	7.12 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	2.1 - 2.5 M/S	2.13 M/S
	20 MS	4.0 - 5.0 M/S	4.23 M/S
	30 MS	5.8 - 7.0 M/S	6.05 M/S
PEAK D-PLANE ROTATION		80 - 92 DEG.	80.06 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		69 - 83 NM	71.95 NM
MOMENT DECAY TIME FROM TO TO 10NM		80 - 100 MS	86.72 MS

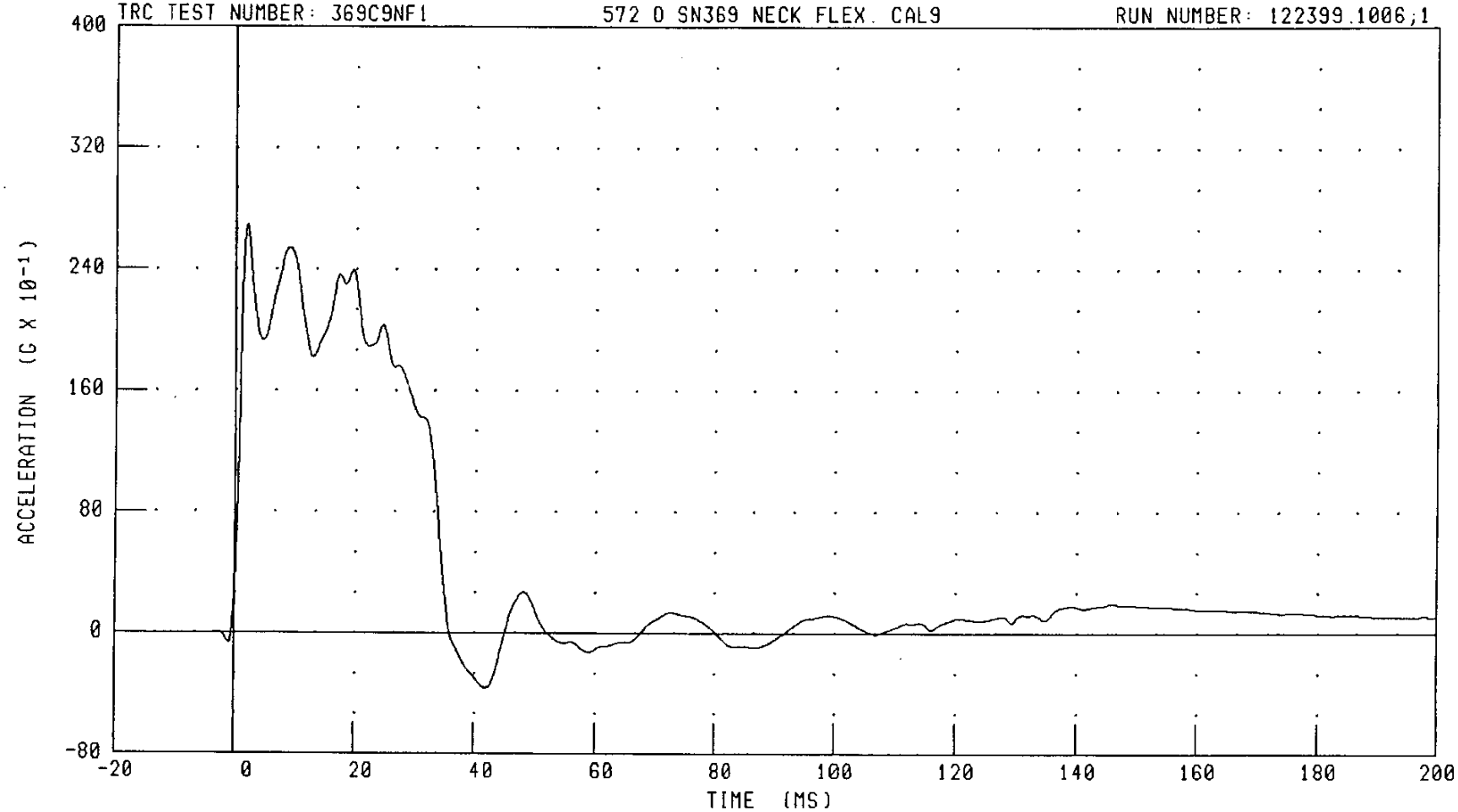
TEST MEETS SPECIFICATIONS

TECHNICIAN Dustin Wallace RUN NUMBER: 122399.1006;1

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

PENDULUM DECELERATION

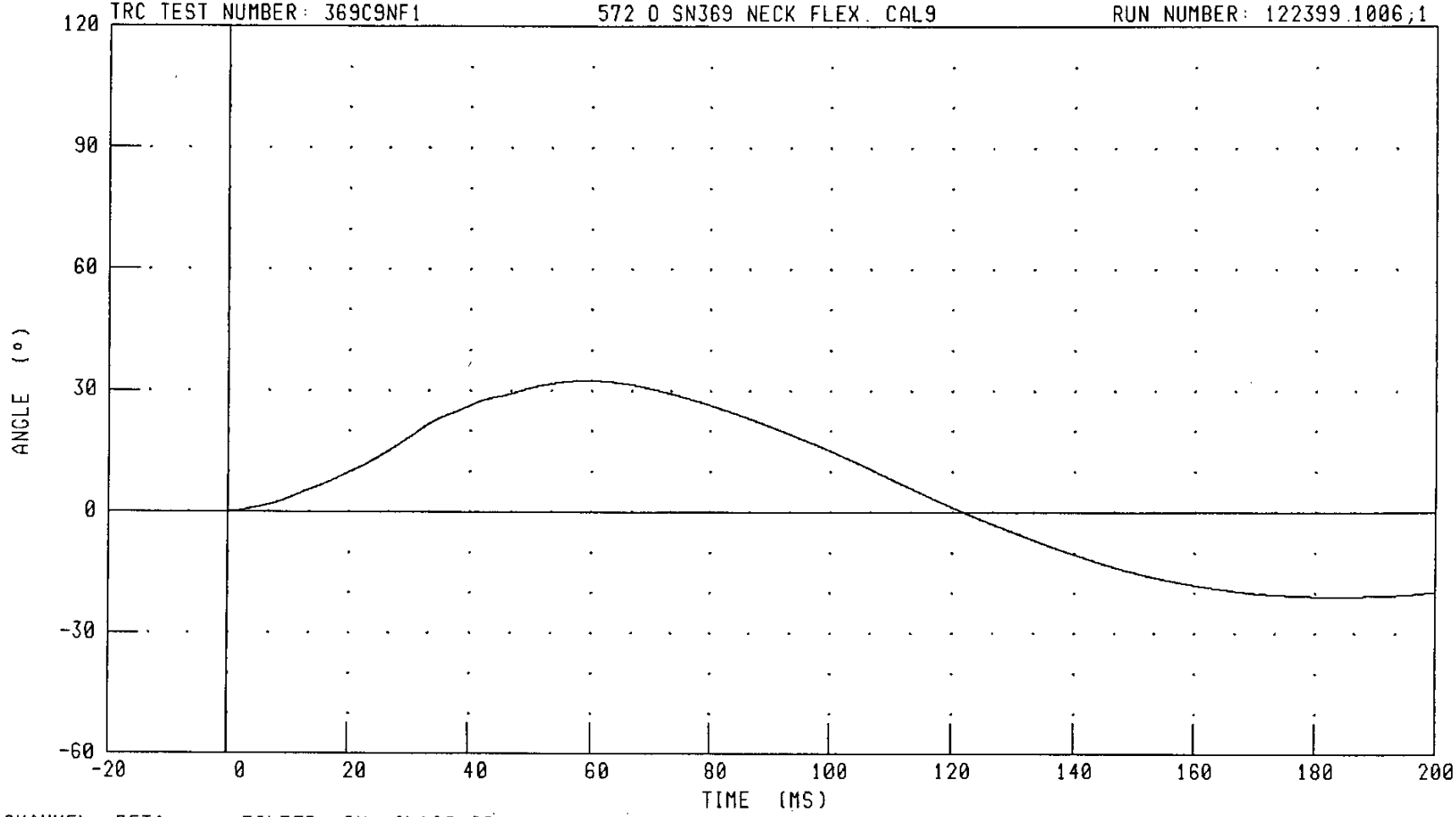
TRC TEST NUMBER: 369C9NF1 572 0 SN369 NECK FLEX. CAL9 RUN NUMBER: 122399.1006;1



CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 26.91 G @ 1.92 MS; -3.66 G @ 41.92 MS

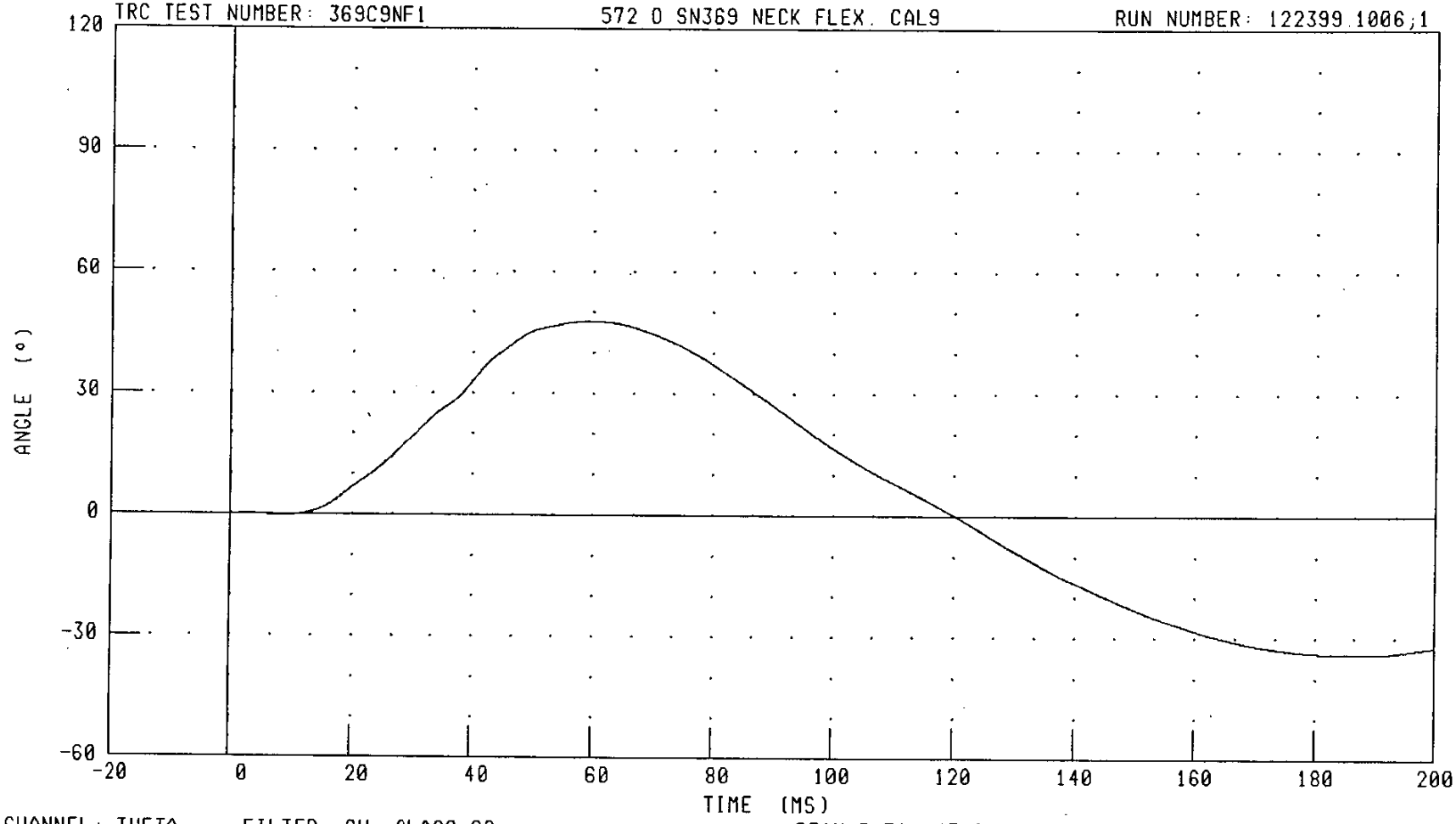
PART 572-O HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

TRC TEST NUMBER: 369C9NF1
572 O SN369 NECK FLEX. CAL9
RUN NUMBER: 122399.1006;1



CHANNEL: BETA
FILTER: CH. CLASS 60
PEAK DATA: 32.40 ° @ 59.04 MS; -20.87 ° @ 183.60 MS

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



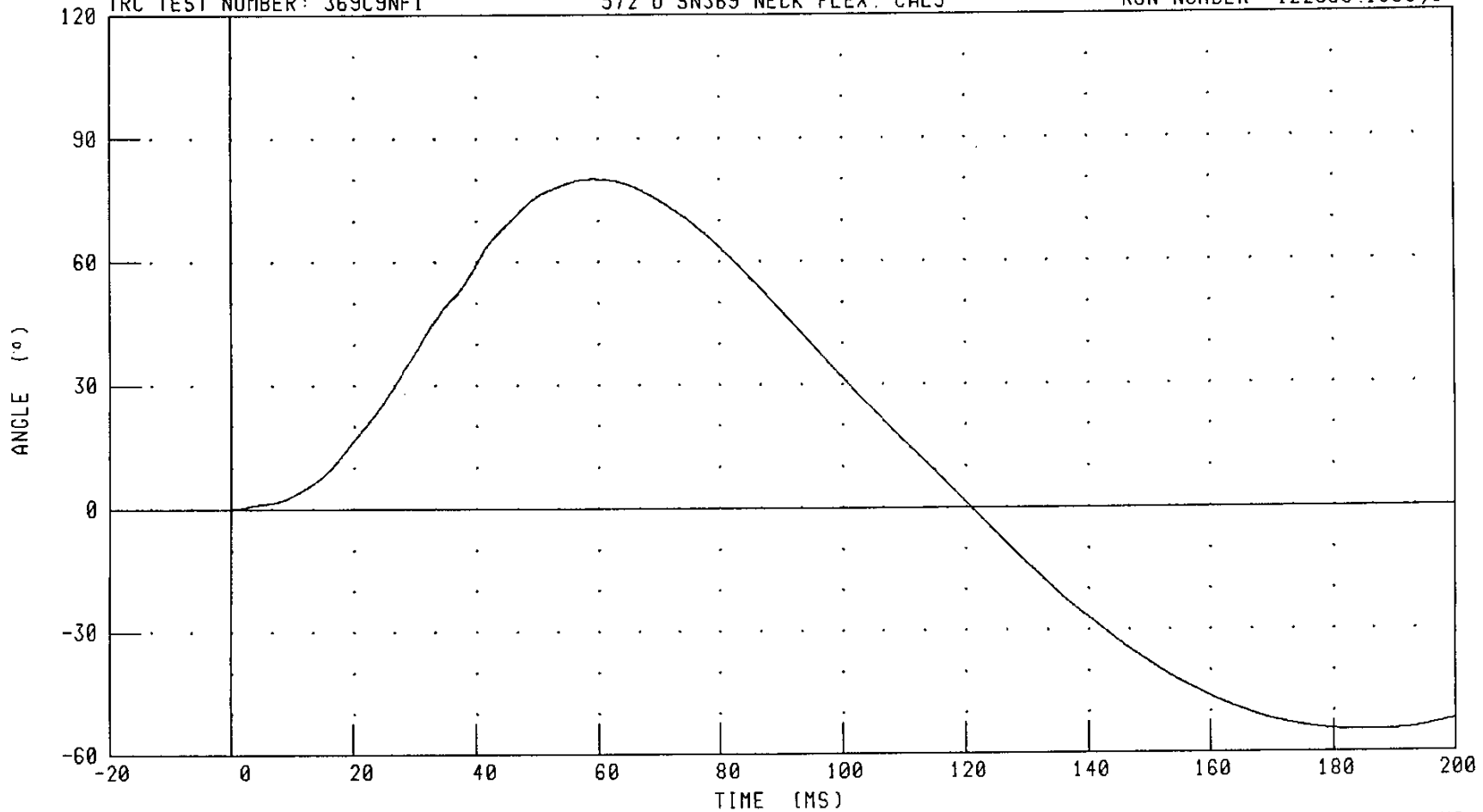
CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 47.67 ° @ 59.36 MS; -33.93 ° @ 186.48 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 369C9NF1 572 0 SN369 NECK FLEX. CAL9 RUN NUMBER: 122399.1006;1

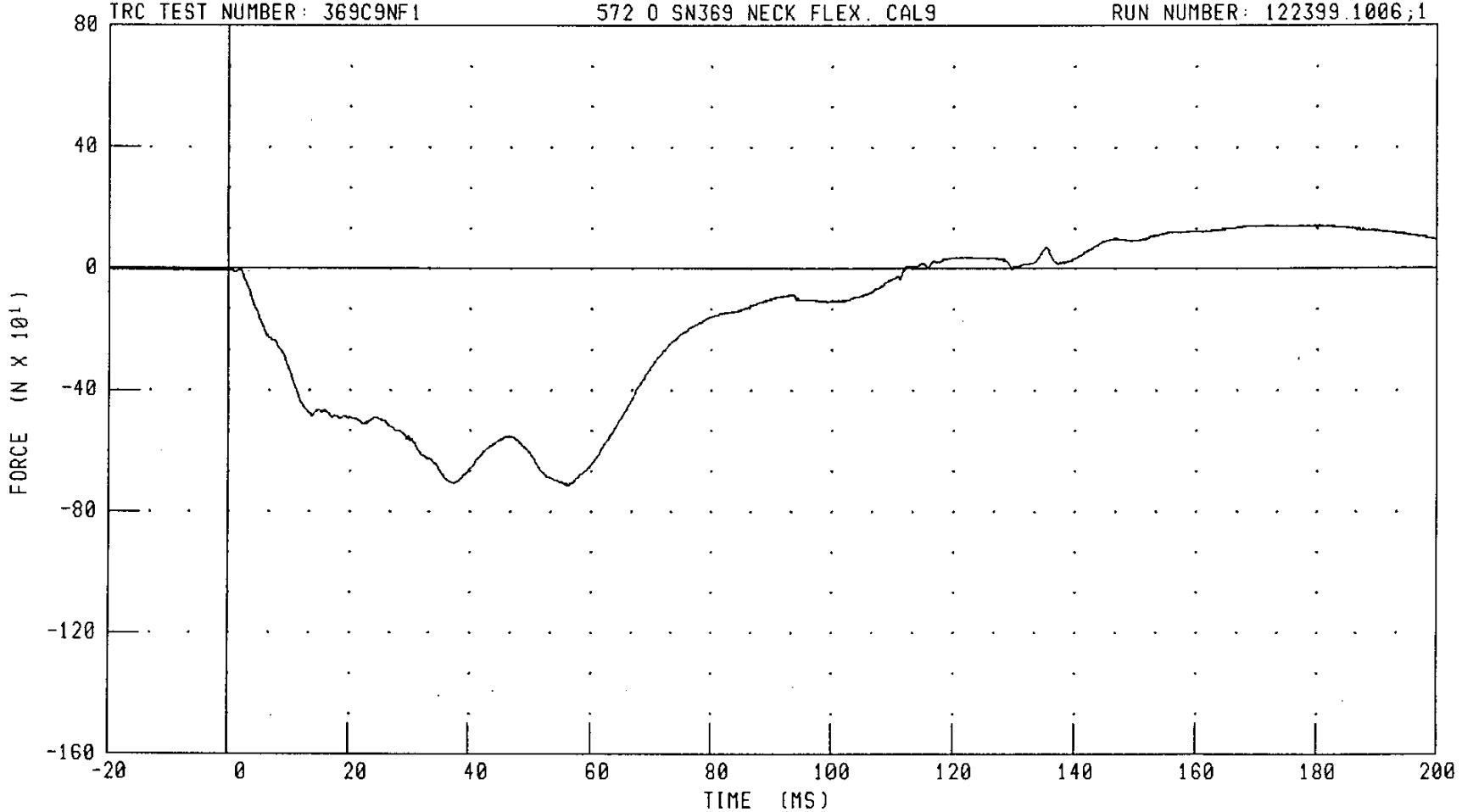


CHANNEL: TOTAN FILTER: CH. CLASS 60 PEAK DATA: 80.06 ° @ 59.20 MS; -54.78 ° @ 185.04 MS

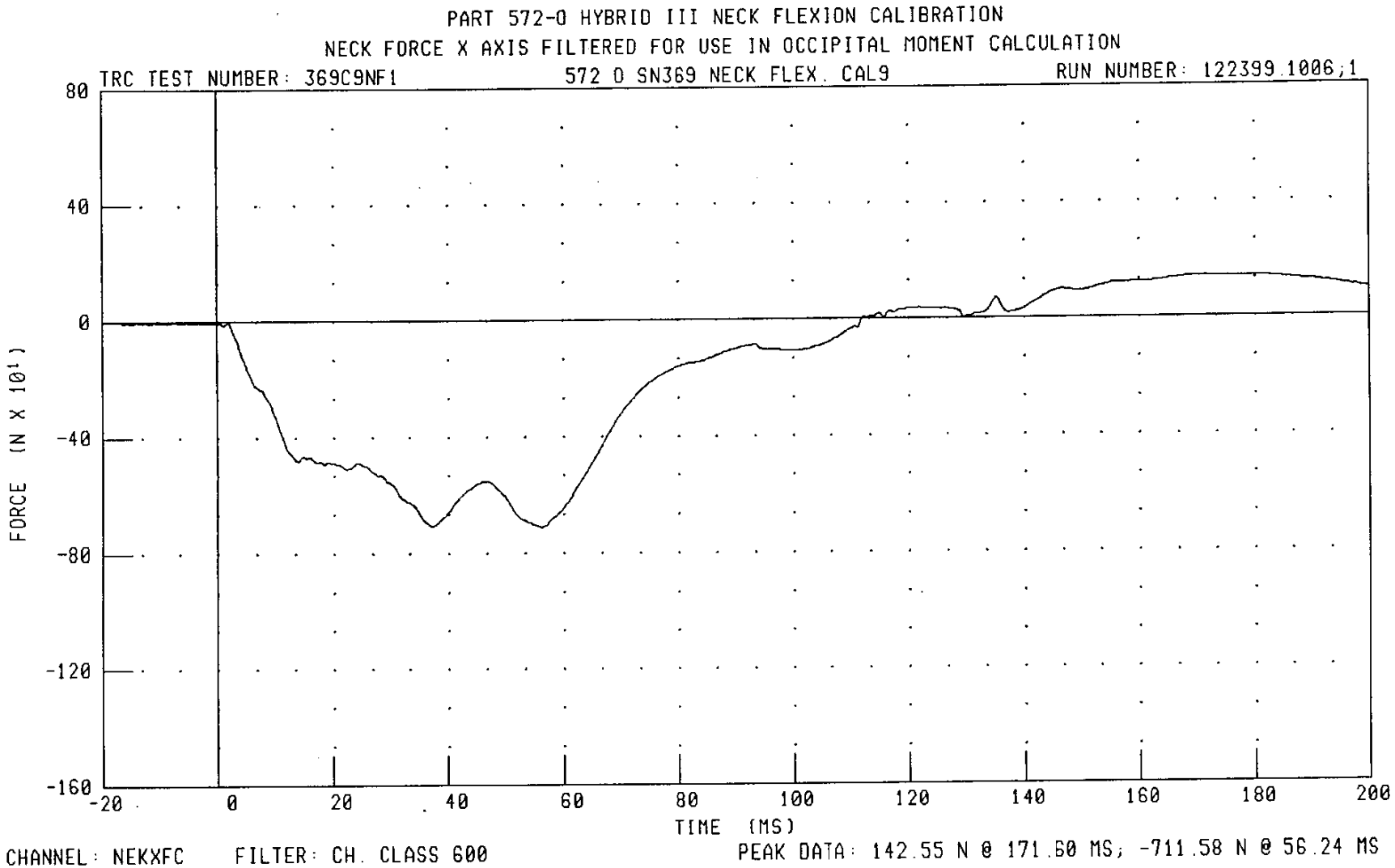
PART 572-0 HYBRID III NECK FLEXION CALIBRATION

NECK FORCE X AXIS

TRC TEST NUMBER: 369C9NF1 572 0 SN369 NECK FLEX. CAL9 RUN NUMBER: 122399.1006;1



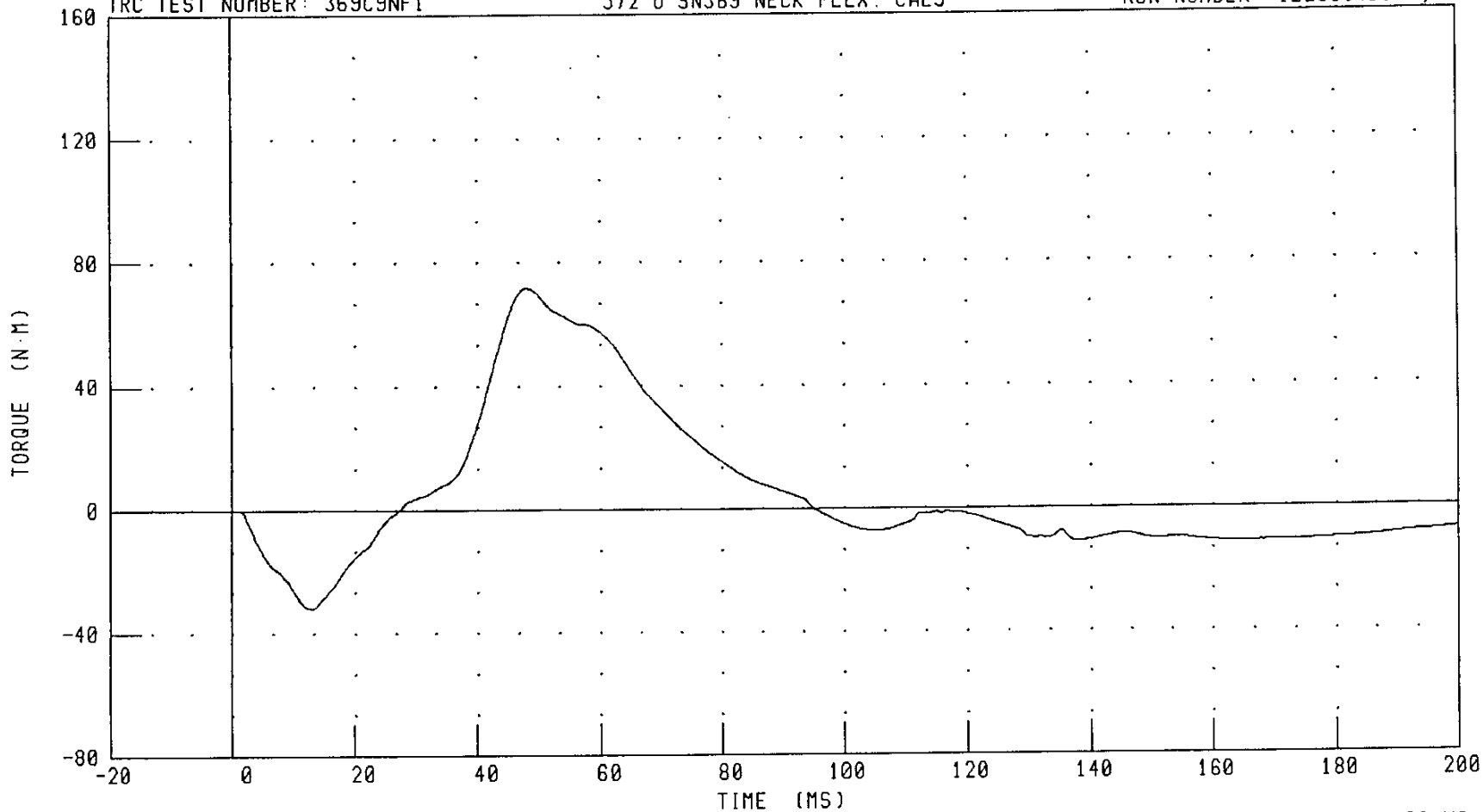
CHANNEL: NEKXF FILTER: CH. CLASS 1000 PEAK DATA: 144.00 N @ 171.44 MS; -711.76 N @ 55.76 MS


PART 572-0 HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION
TRC TEST NUMBER: 369C9NF1
572 0 SN369 NECK FLEX. CAL9
RUN NUMBER: 122399.1006;1
80
40
0
-40
-80
-120
-160
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKXFC
FILTER: CH. CLASS 600
PEAK DATA: 142.55 N @ 171.60 MS; -711.58 N @ 56.24 MS

PART 572-0 HYBRID III NECK FLEXION CALIBRATION

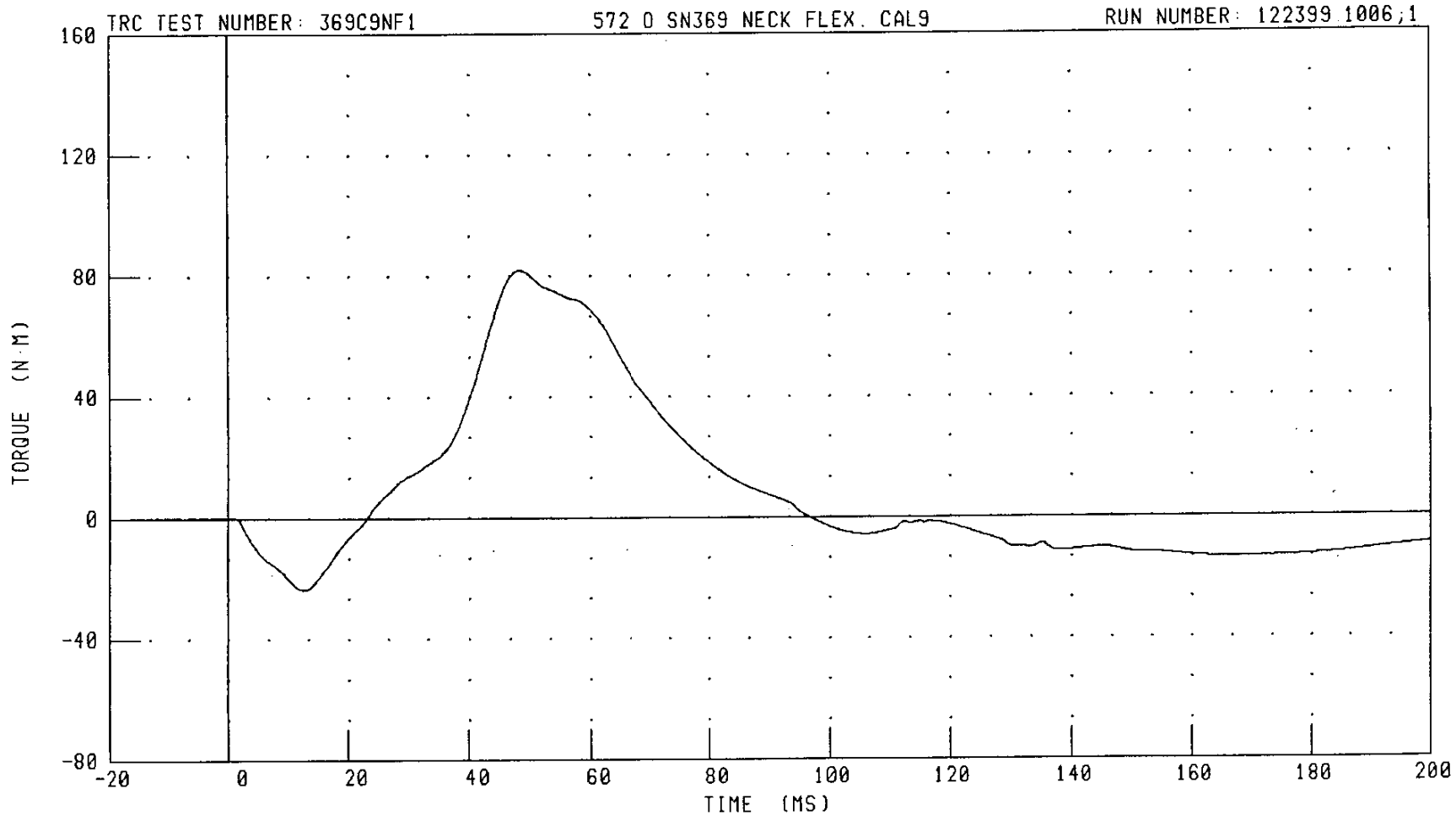
NECK MOMENT Y AXIS

TRC TEST NUMBER: 369C9NF1 572 0 SN369 NECK FLEX. CAL9 RUN NUMBER: 122399.1006;1



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 71.61 N·M @ 48.00 MS; -31.81 N·M @ 13.20 MS

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



CHANNEL: NEKOM FILTER: CH. CLASS 600

PEAK DATA: 81.78 N·M @ 48.48 MS; -23.65 N·M @ 12.48 MS

TRANSPORTATION RESEARCH CENTER INC.

HYBRID III SMALL FEMALE 23-DEC-99

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

TRC INC. TEST NO: 369C9NE1 572 O SN369 NECK EXT. CAL 9

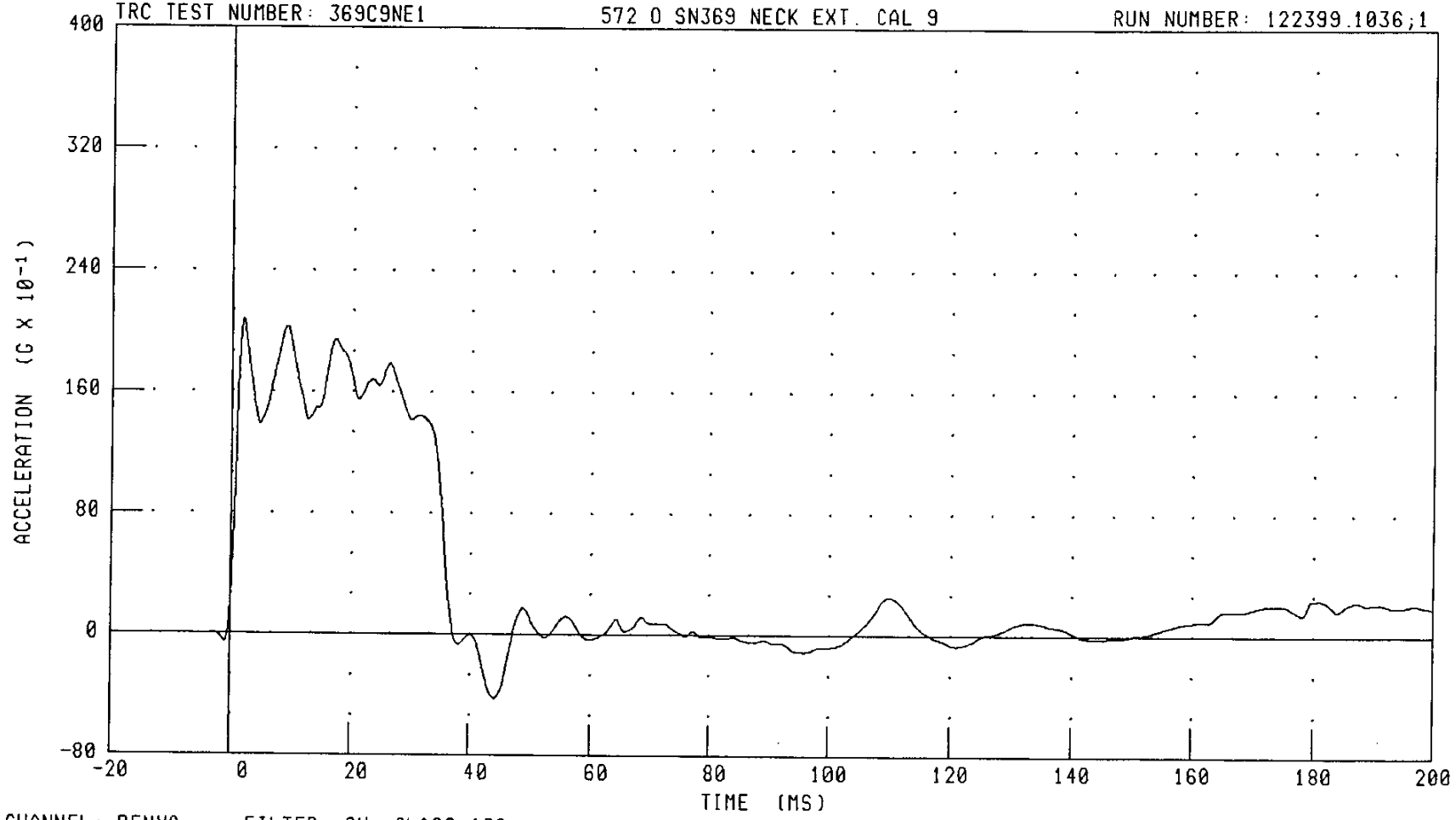
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6 - 22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	44.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.00 M/S
INTEGRATED PENDULUM VELOCITY	10 MS	1.5 - 1.9 M/S	1.62 M/S
	20 MS	3.1 - 3.9 M/S	3.27 M/S
	30 MS	4.6 - 5.6 M/S	4.87 M/S
PEAK D-PLANE ROTATION		97 - 109 DEG.	104.62 DEG.
PEAK MOMENT DURING ROTATION INTERVAL		-55 /-69 NM	-59.42 NM
MOMENT DECAY TIME FROM TO TO -10 NM LEVEL		94 - 114 MS	106.4 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN Dustin Wallace RUN NUMBER: 122399.1033;1

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

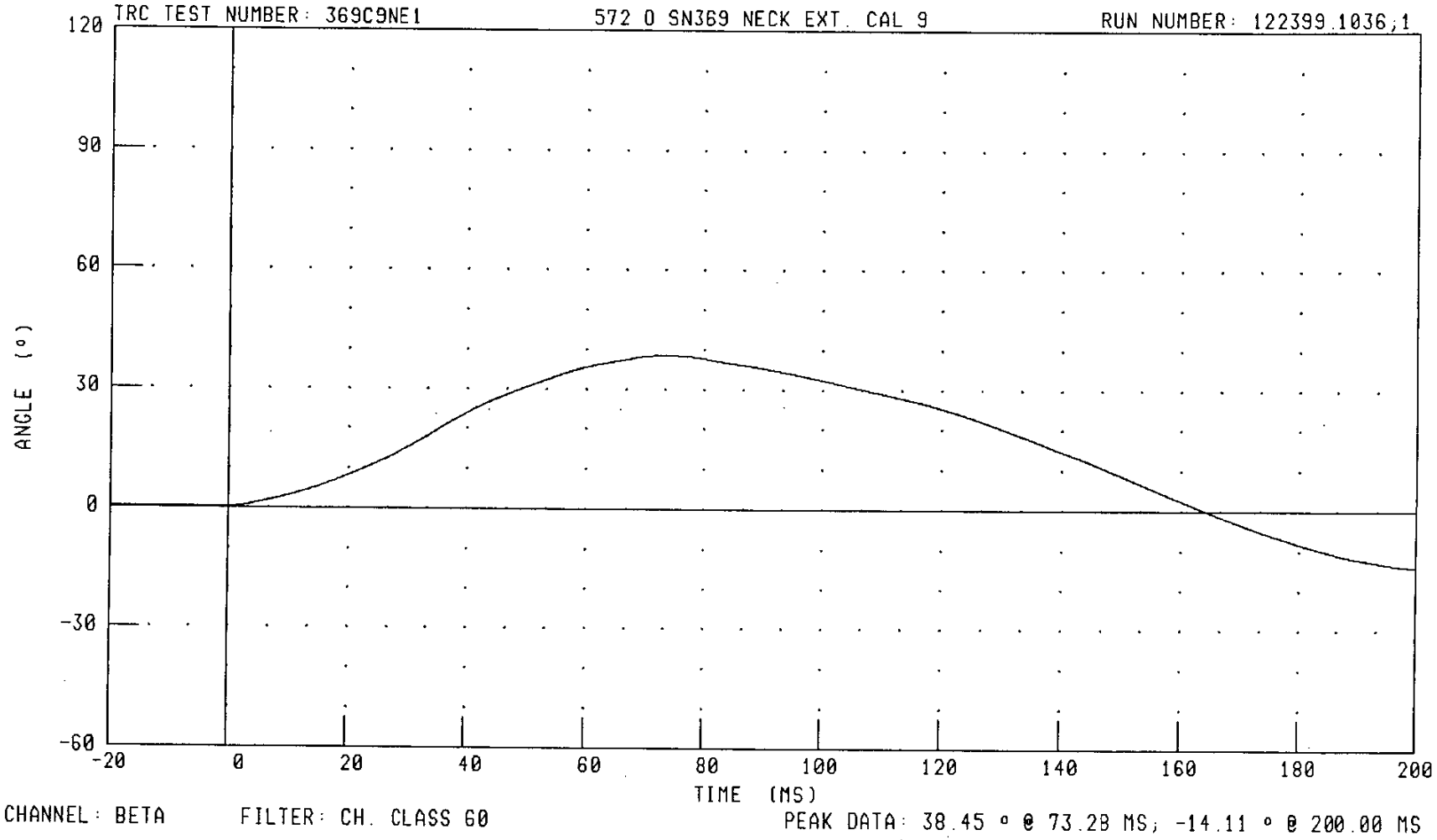
PENDULUM DECELERATION



CHANNEL: PENXG FILTER: CH. CLASS 180

PEAK DATA: 20.75 G @ 1.84 MS; -4.27 G @ 44.24 MS

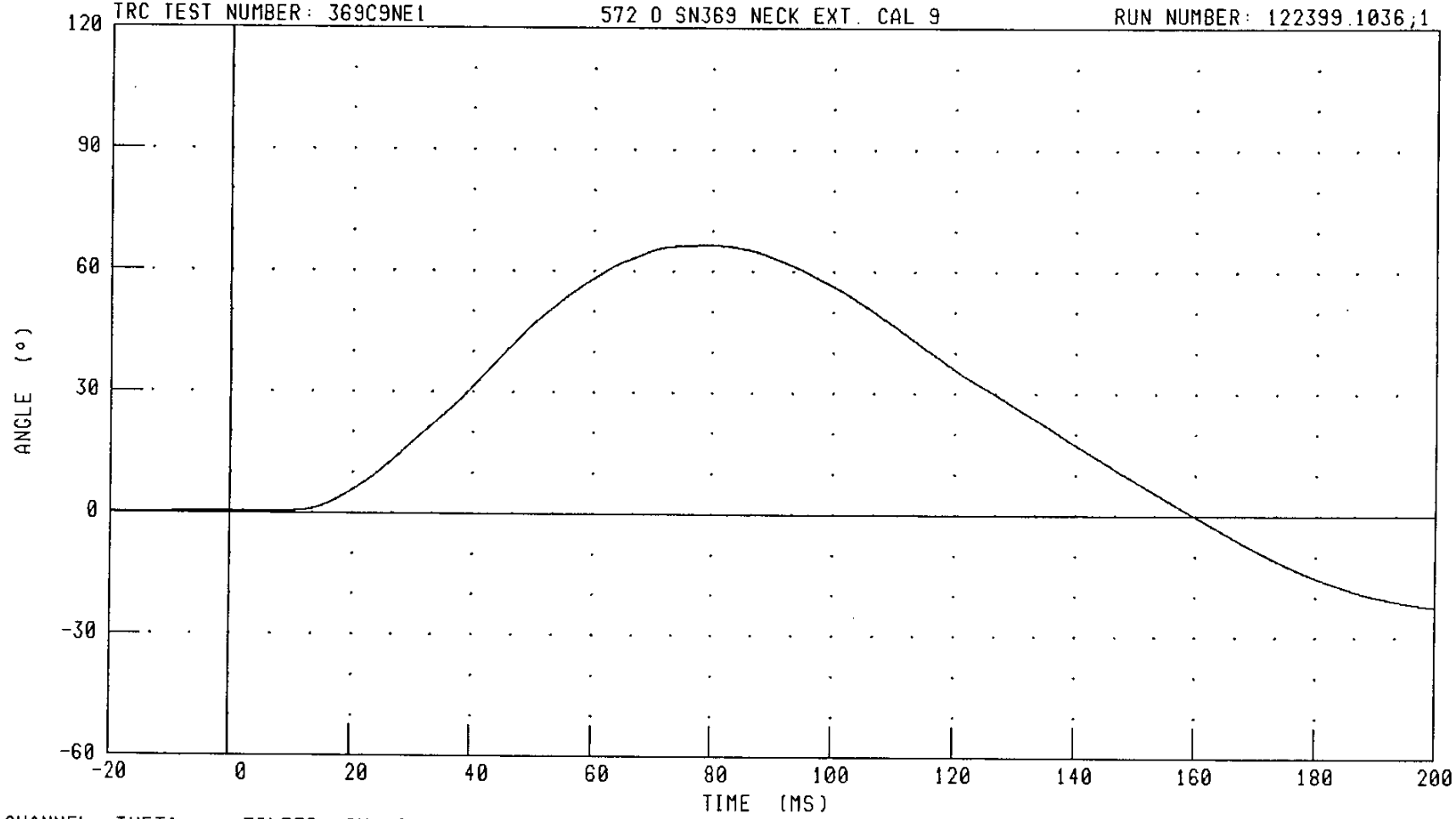
PART 572-0 HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK



CHANNEL: BETA FILTER: CH. CLASS 60

PEAK DATA: 38.45 ° @ 73.28 MS; -14.11 ° @ 200.00 MS

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

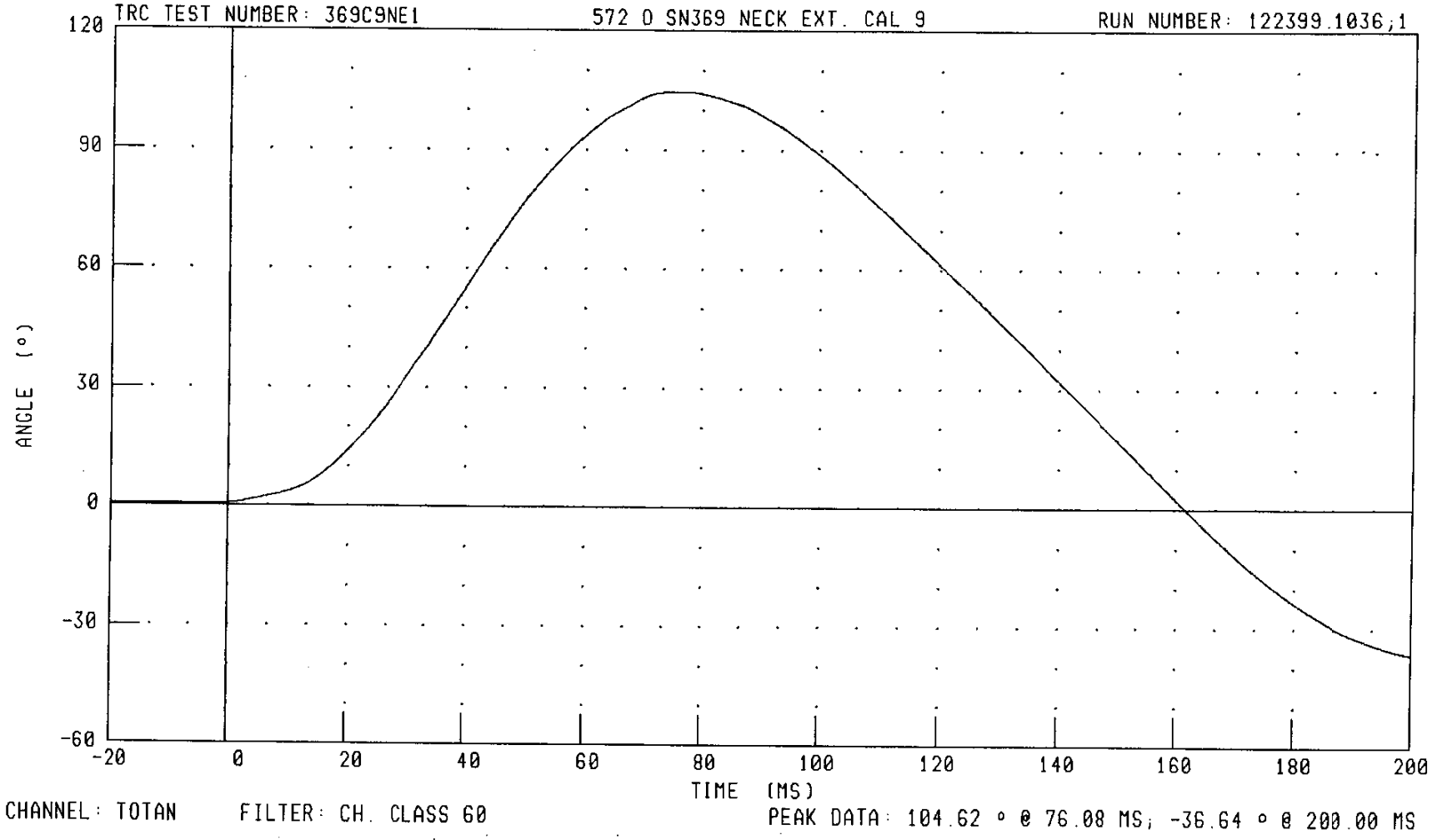


CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 66.41 ° @ 79.76 MS; -22.54 ° @ 200.00 MS

PART 572-O HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION



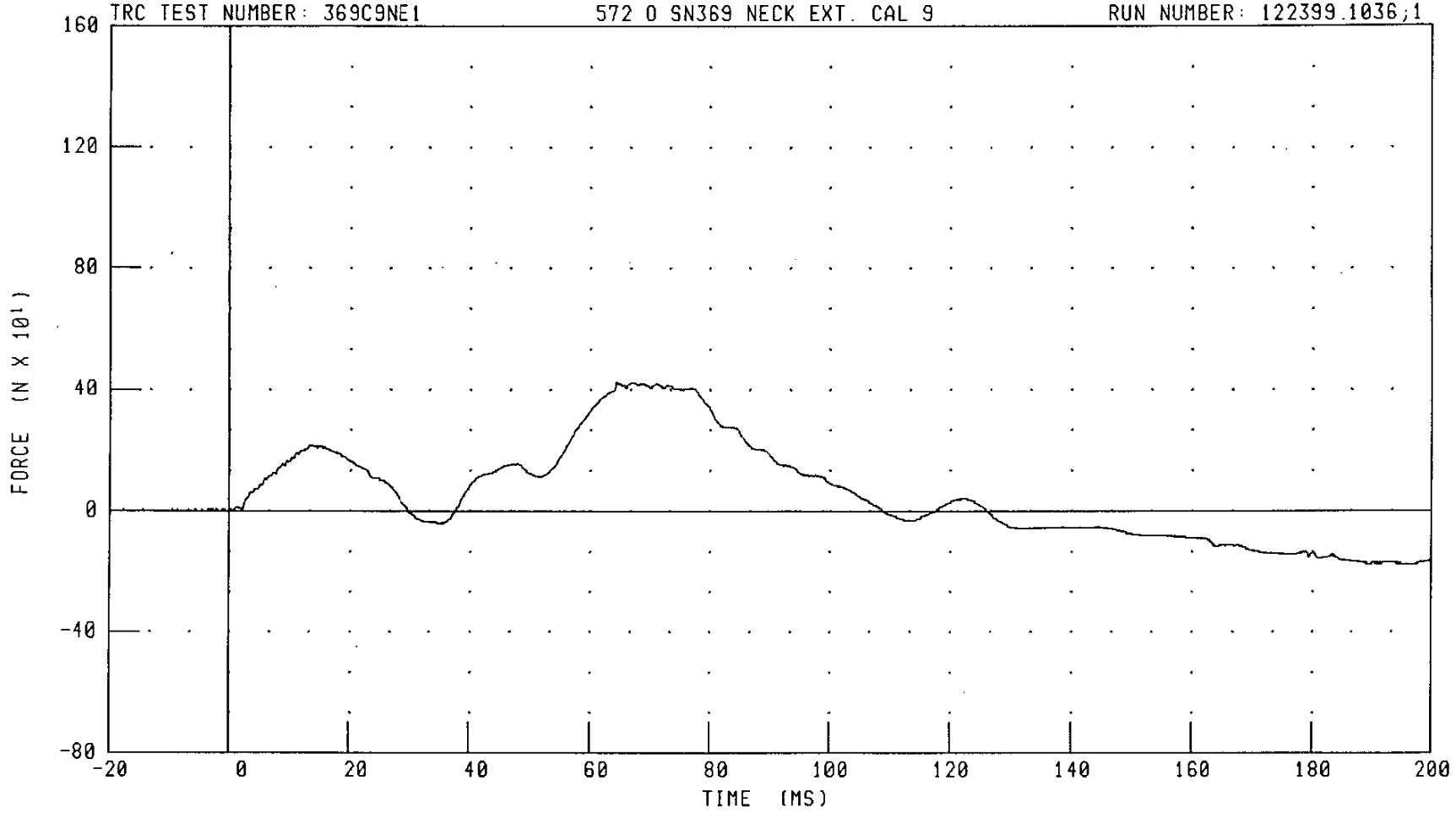
CHANNEL: TOTAN FILTER: CH. CLASS 60

PEAK DATA: 104.62 ° @ 76.08 MS; -36.64 ° @ 200.00 MS

PART 572-0 HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

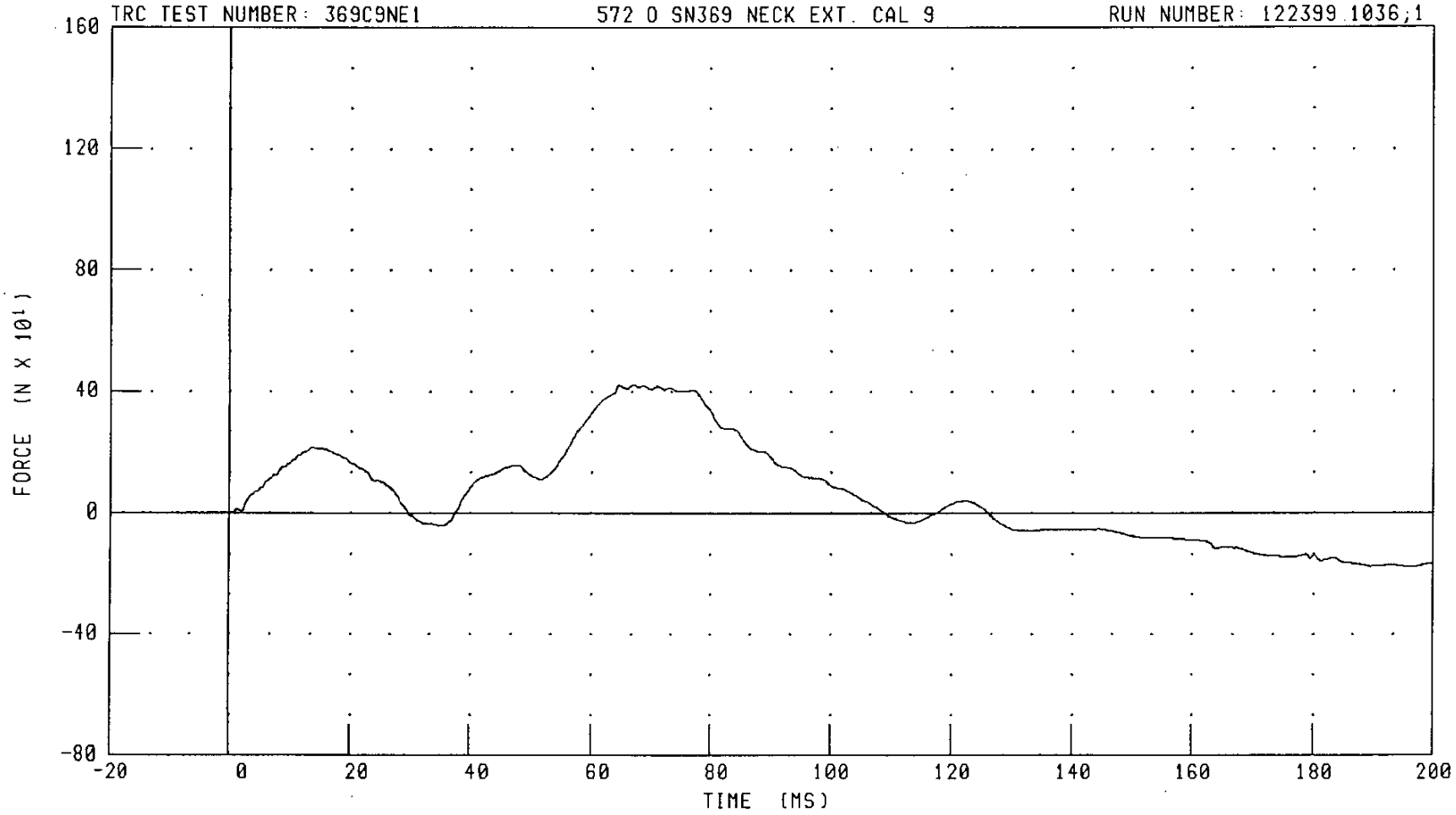
TRC TEST NUMBER: 369C9NE1 572 0 SN369 NECK EXT. CAL 9 RUN NUMBER: 122399.1036;1



CHANNEL: NEKXF FILTER: CH. CLASS 1000 PEAK DATA: 426.00 N @ 64.40 MS; -175.77 N @ 189.04 MS

PART 572-O HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS FILTERED FOR USE IN OCCIPITAL MOMENT CALCULATION



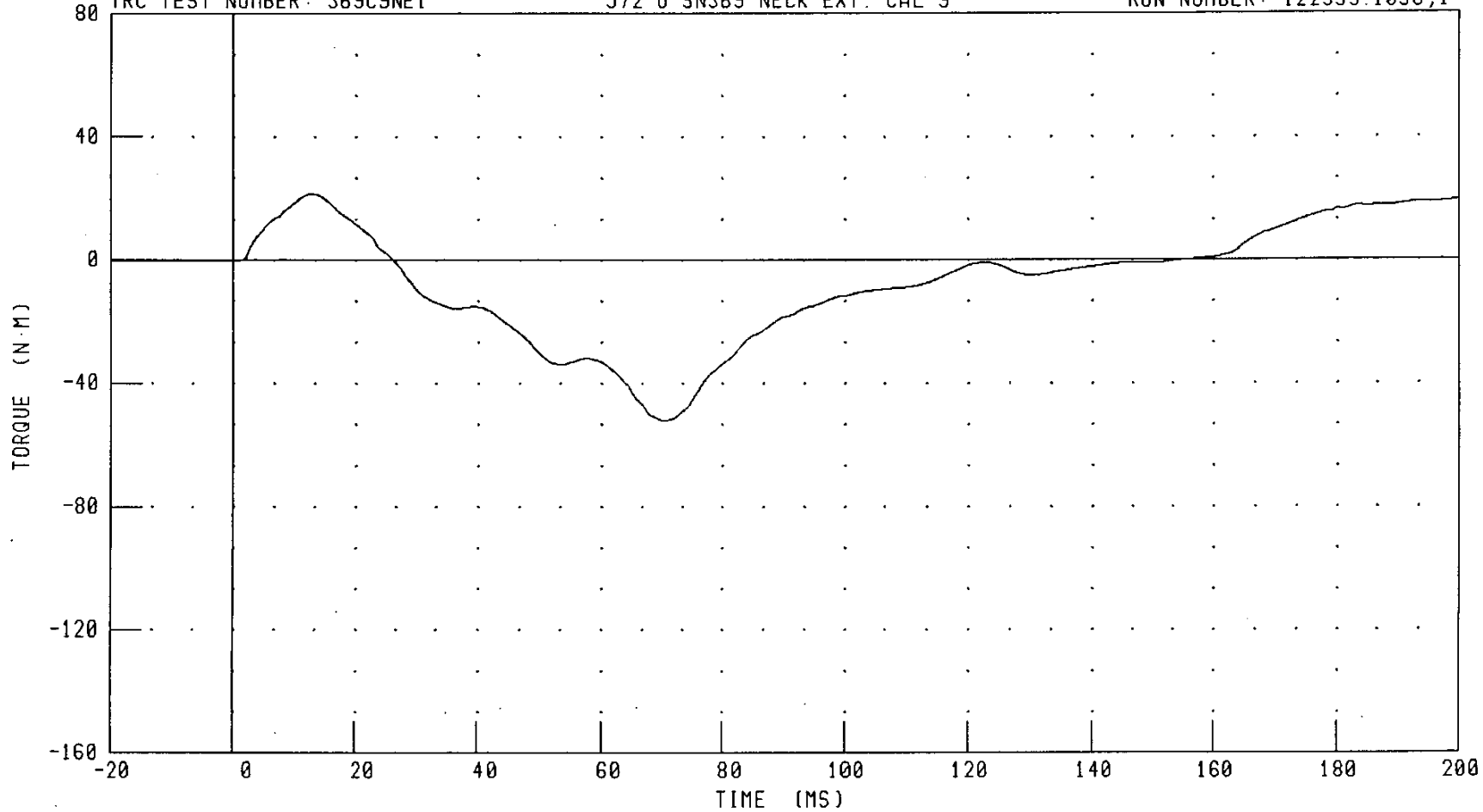
CHANNEL: NEKXFC FILTER: CH. CLASS 600

PEAK DATA: 422.40 N @ 67.12 MS; -175.97 N @ 189.68 MS

PART 572-D HYBRID III NECK EXTENSION CALIBRATION

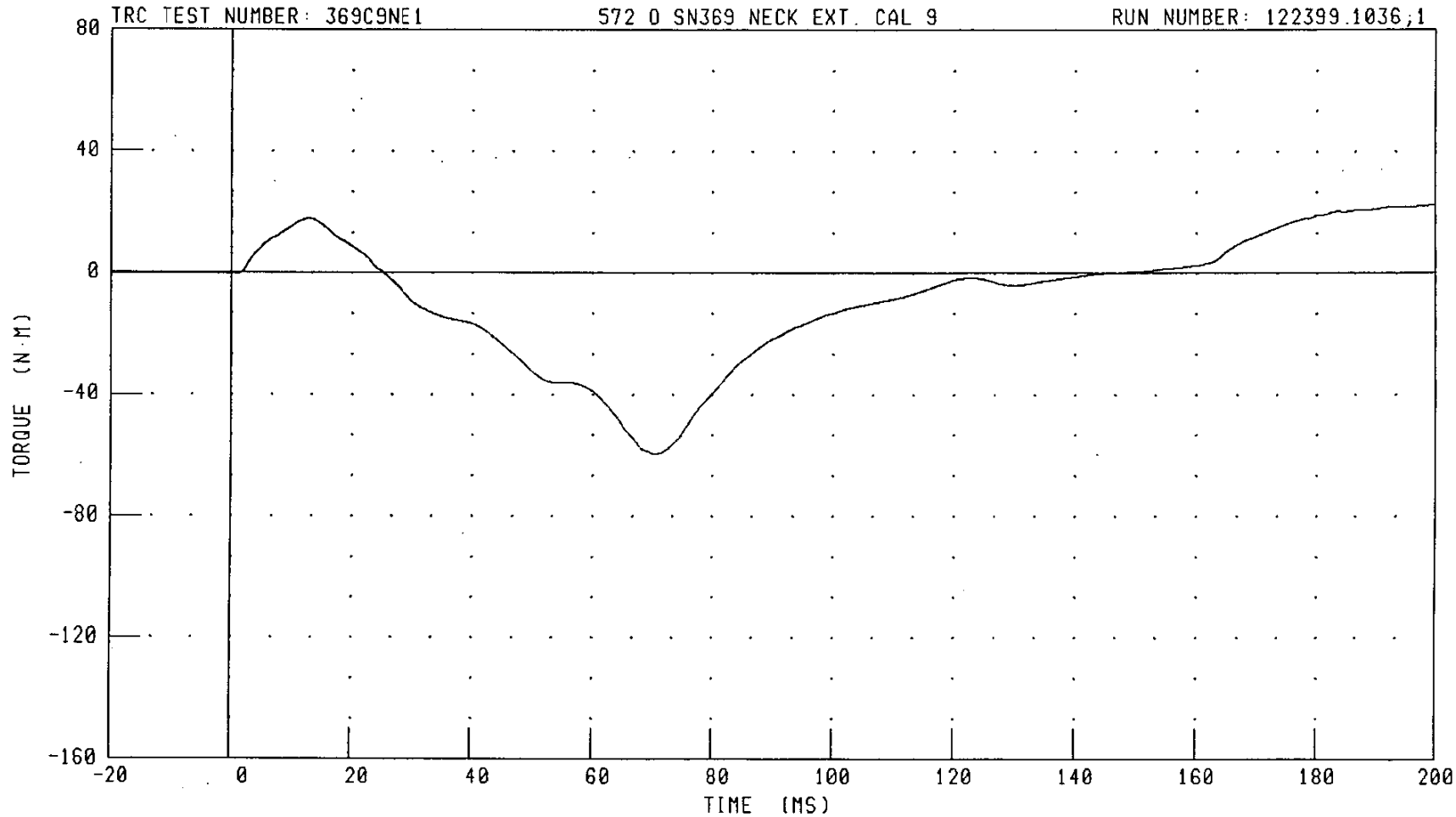
NECK MOMENT Y AXIS

TRC TEST NUMBER: 369C9NE1 572 D SN369 NECK EXT. CAL 9 RUN NUMBER: 122399.1036;1



CHANNEL: NEKYM FILTER: CH. CLASS 600 PEAK DATA: 21.64 N·M @ 13.28 MS; -52.15 N·M @ 70.40 MS

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



CHANNEL: NEKOM FILTER: CH. CLASS 600 PEAK DATA: 22.53 N·M @ 200.00 MS; -59.42 N·M @ 70.48 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

TRC INC. TEST NO: 369C9TH1 572 O SN369 THORAX CAL9

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	44.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.59 M/S
MAXIMUM DEFLECTION	48 - 55 MM	51.8 MM
MAXIMUM RESISTIVE FORCE	3900 - 4400 N	4279. N
INTERNAL HYSTERESIS	69% - 85%	71.5%

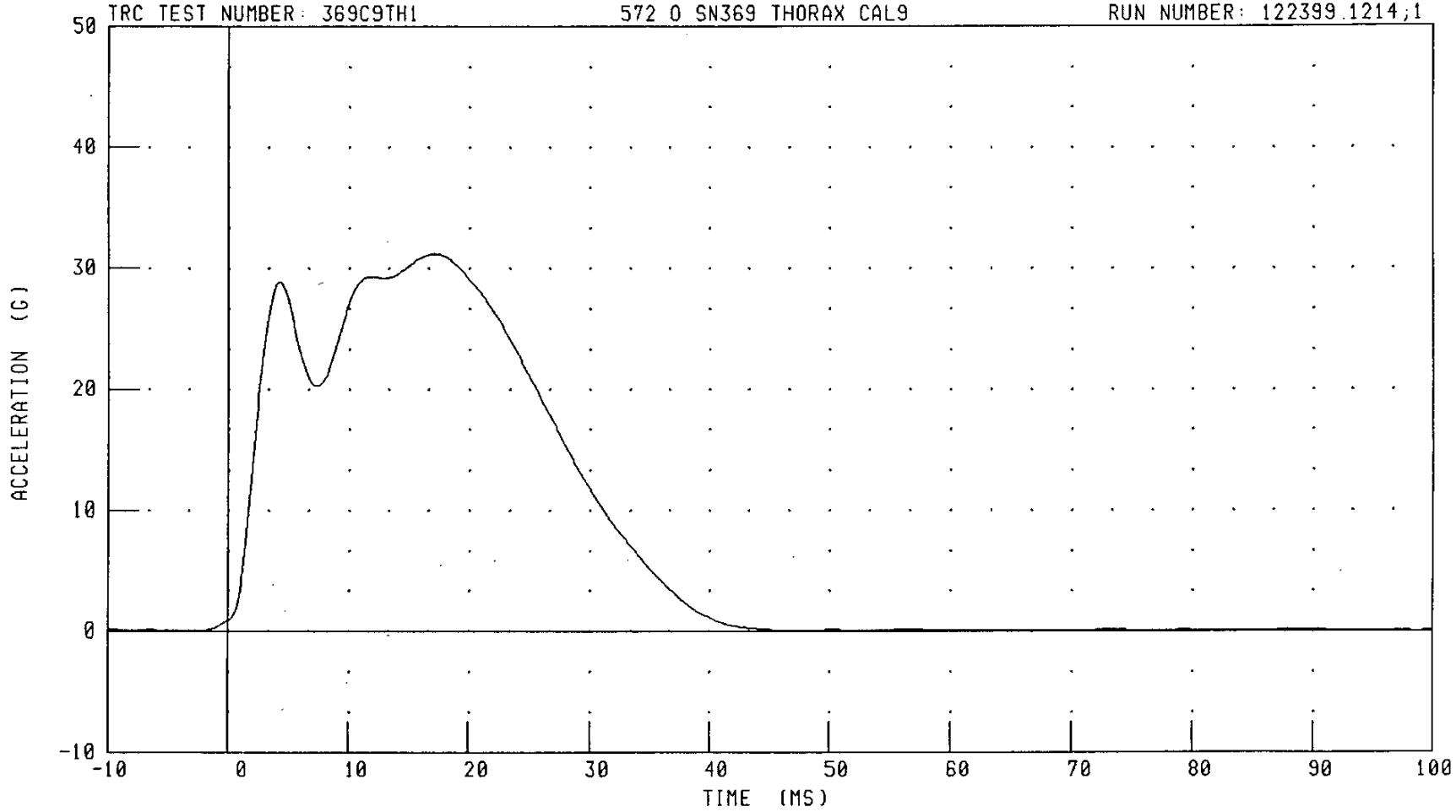
TEST MEETS SPECIFICATIONS

TECHNICIAN Dustin Wallace RUN NUMBER: 122399.1126;1

PART 572-O HYBRID III THORAX CALIBRATION

PENDULUM DECELERATION

TRC TEST NUMBER: 369C9TH1 572 O SN369 THORAX CAL9 RUN NUMBER: 122399.1214;1

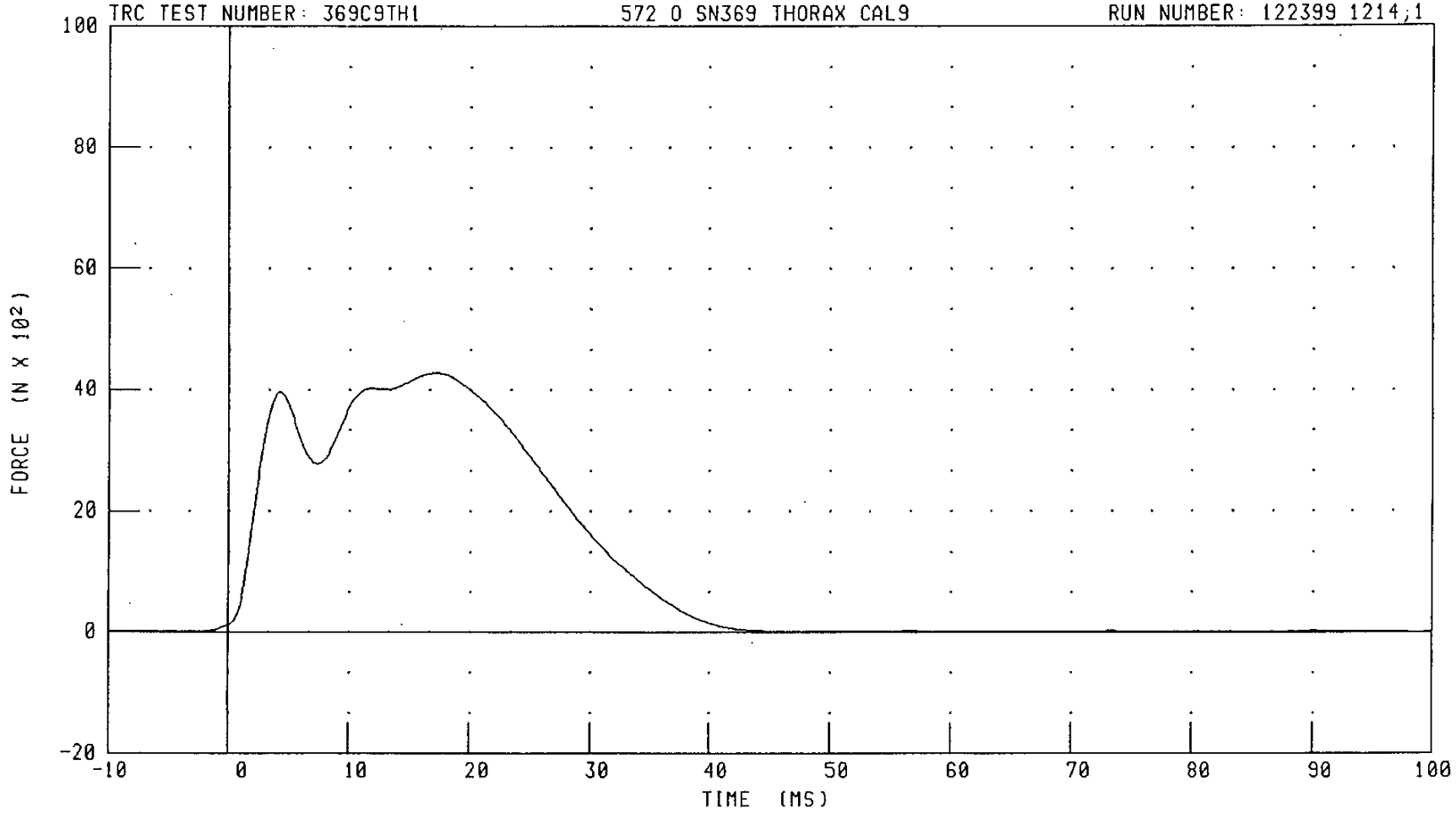


CHANNEL: PENXG FILTER: CH. CLASS 180 PEAK DATA: 31.18 G @ 17.20 MS; 0.00 G @ 98.72 MS

PART 572-0 HYBRID III THORAX CALIBRATION

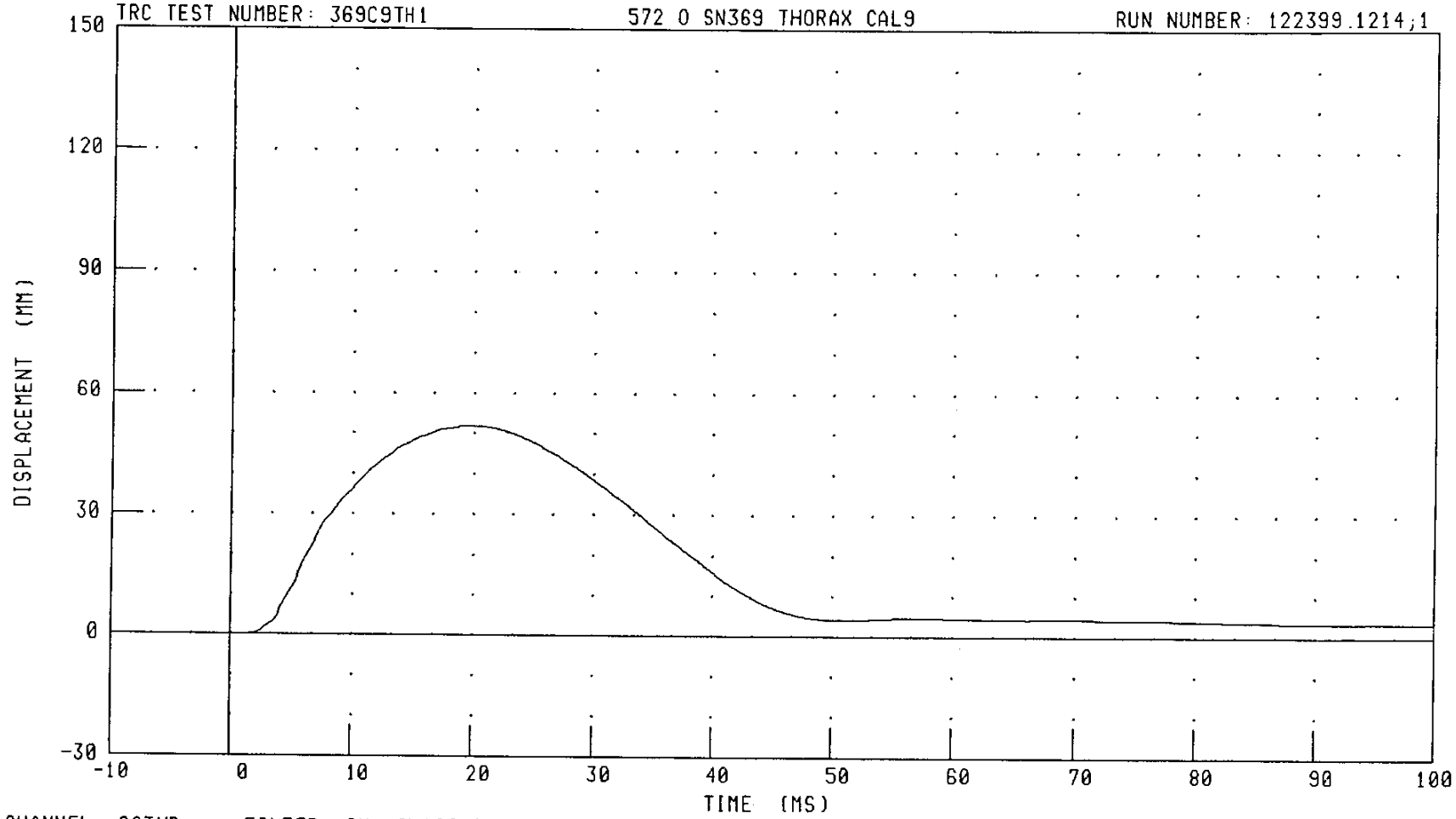
PENDULUM FORCE

TRC TEST NUMBER: 369C9TH1 572 0 SN369 THORAX CAL9 RUN NUMBER: 122399 1214;1



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 4279.00 N @ 17.20 MS; -0.11 N @ 98.72 MS

PART 572-O HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT

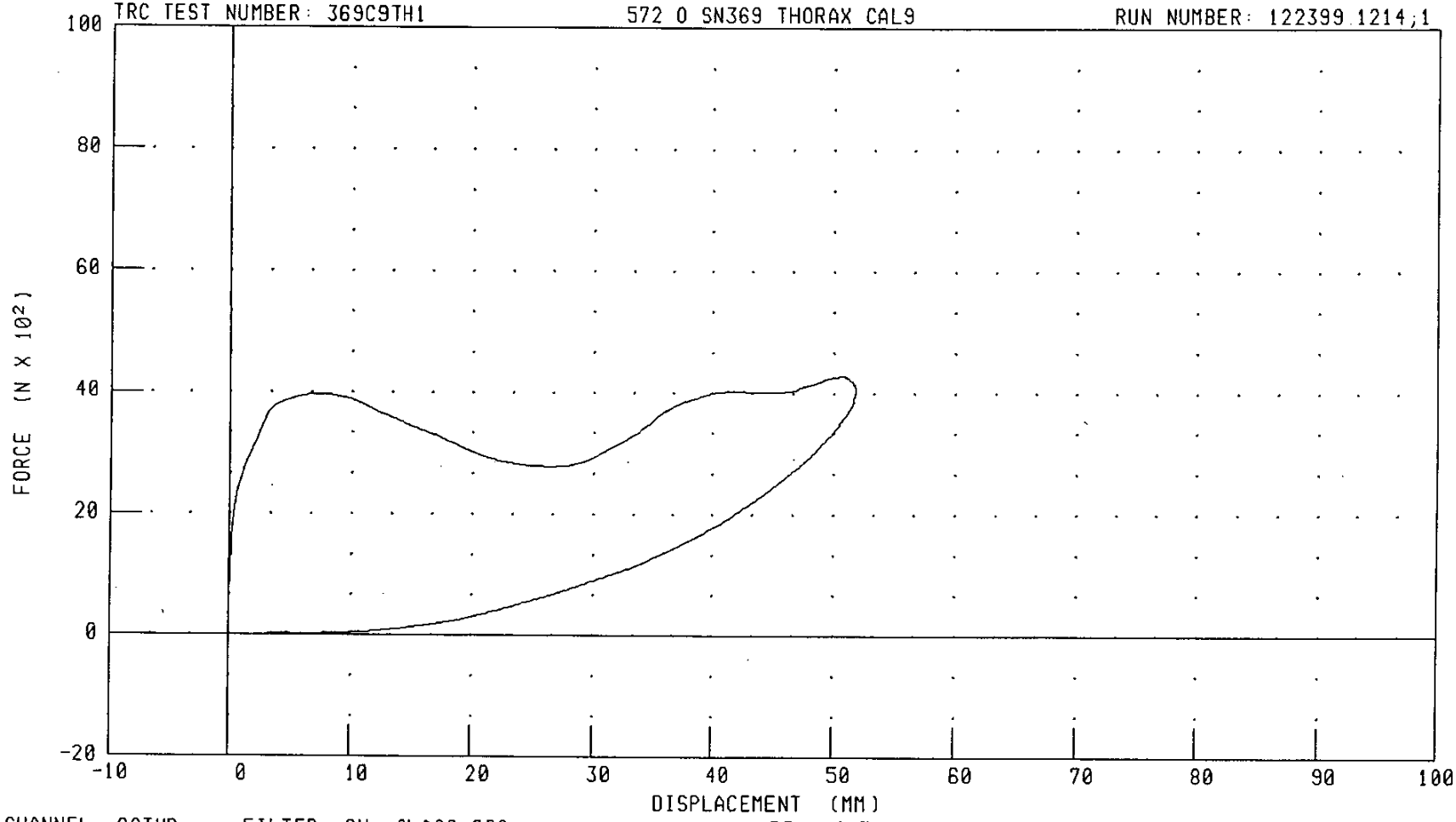


CHANNEL: CSTXD FILTER: CH. CLASS 600

PEAK DATA: 51.88 MM @ 19.76 MS; -0.01 MM @ -3.28 MS

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

TRC TEST NUMBER: 369C9TH1
572 O SN369 THORAX CAL9
RUN NUMBER: 122399.1214;1



CHANNEL: CSTXD
PENXF

FILTER: CH. CLASS 600
CH. CLASS 180

PEAK DATA: 51.88 MM @ 19.76 MS; -0.01 MM @ -3.28 MS
4279.00 N @ 17.20 MS; -0.11 N @ 98.72 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

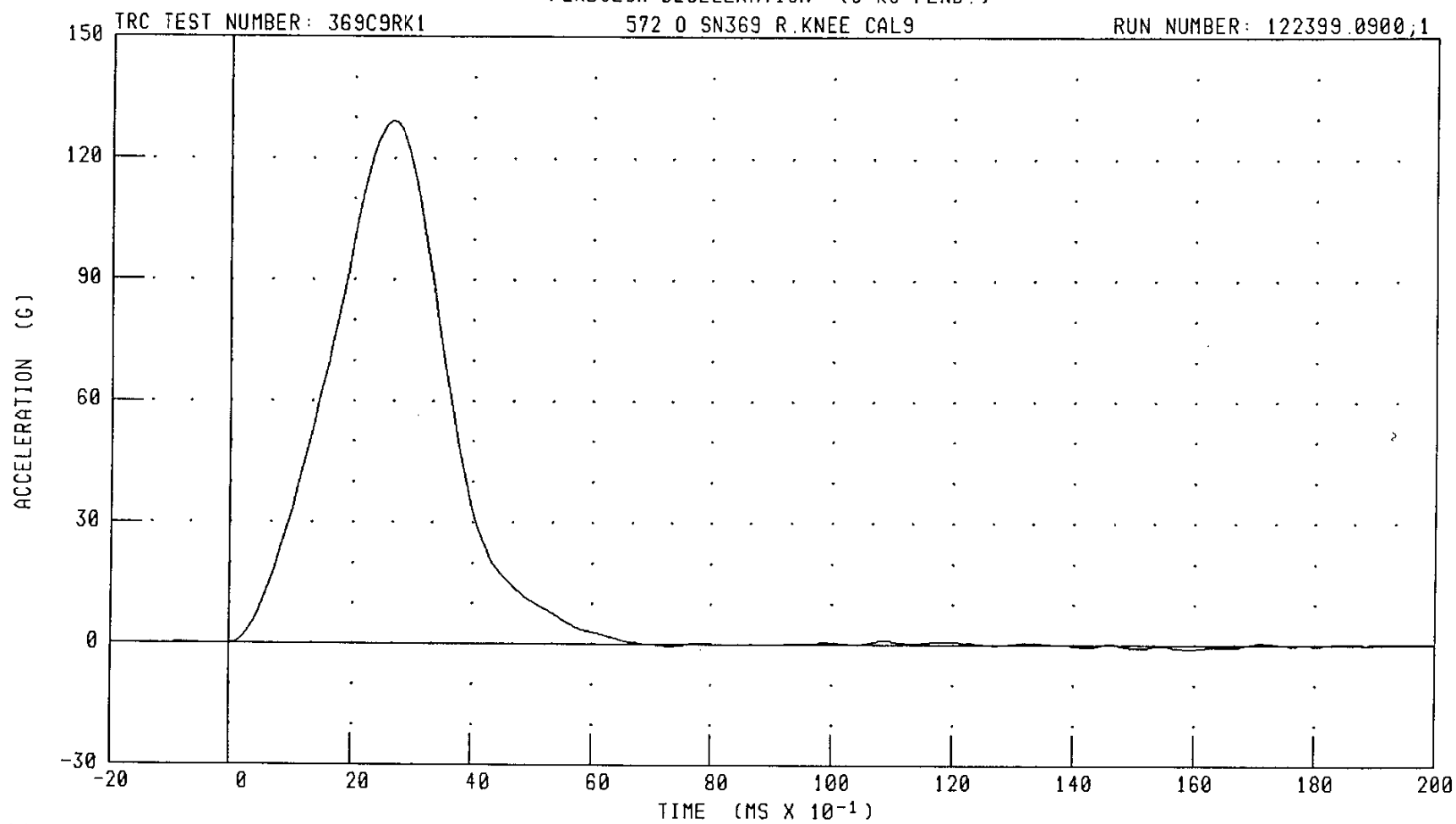
TRC INC. TEST NO: 369C9RK1 572 O SN369 R.KNEE CAL9

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	3791.3 N

TEST MEETS SPECIFICATIONS

TECHNICIAN Dustin Vallom RUN NUMBER: 122399.0900;1

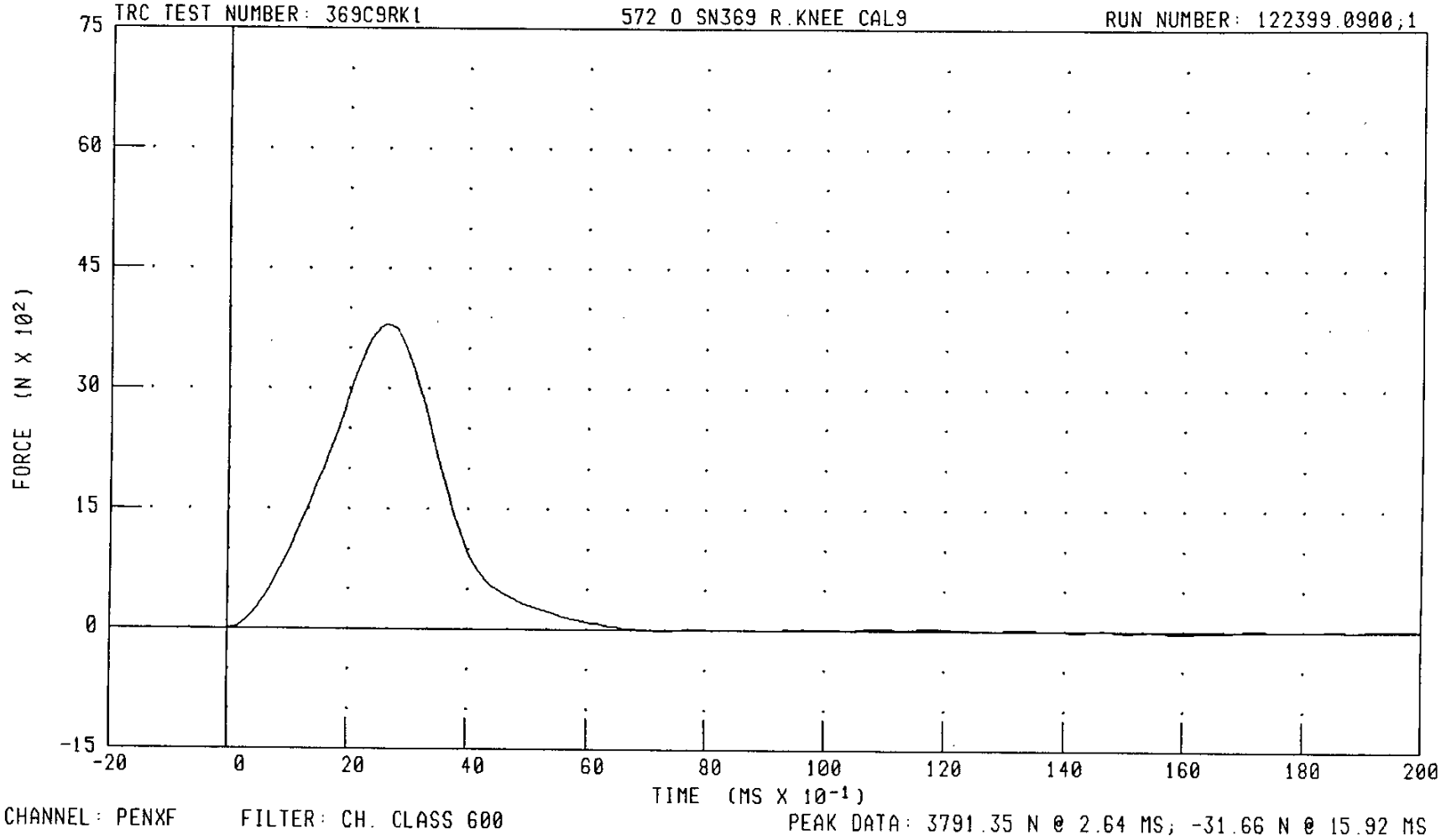
PART 572-0 HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND.)



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 129.15 G @ 2.64 MS; -1.08 G @ 15.92 MS

PART 572-0 HYBRID III RIGHT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND.)



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 3791.35 N @ 2.64 MS; -31.66 N @ 15.92 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III SMALL FEMALE 23-DEC-99

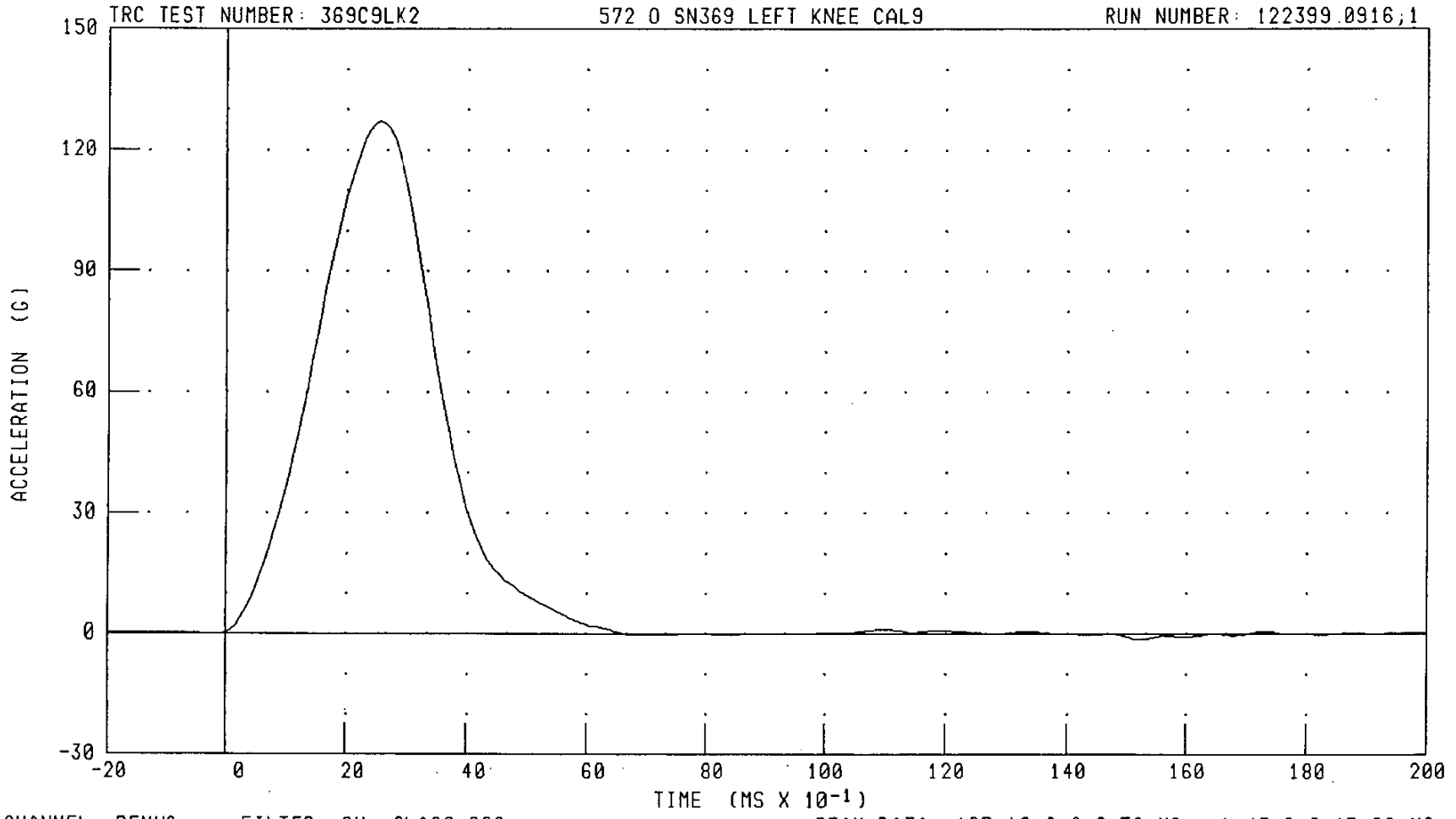
TRC INC. TEST NO: 369C9LK2 572 O SN369 LEFT KNEE CAL9

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	2.12 M/S
PEAK KNEE IMPACT FORCE 3.0 KG PENDULUM	3360 - 4080 N	3732.9 N

TEST MEETS SPECIFICATIONS

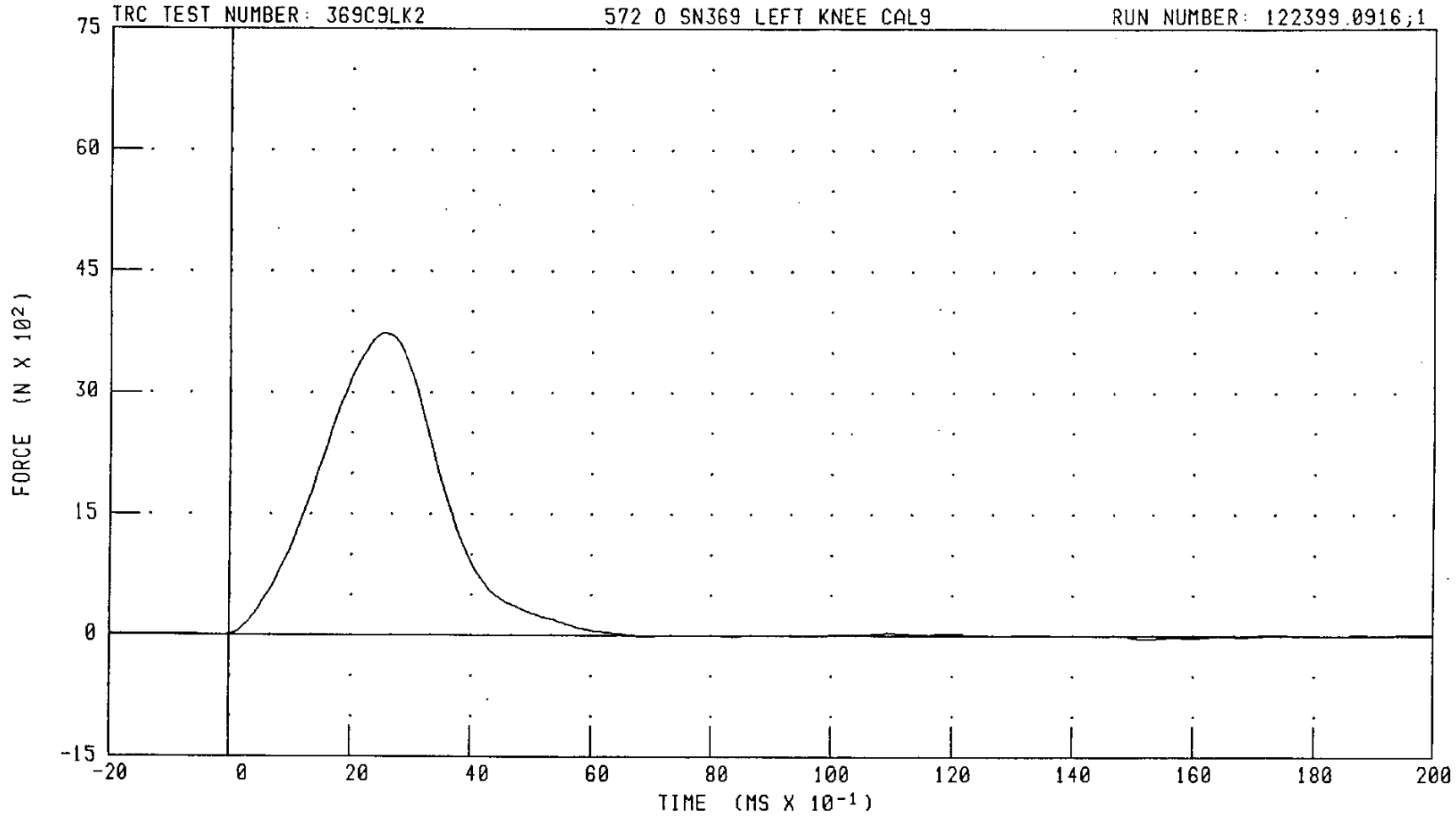
TECHNICIAN Dustin Wallace RUN NUMBER: 122399.0914;1

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



CHANNEL: PENXG FILTER: CH. CLASS 600 PEAK DATA: 127.16 G @ 2.56 MS; -1.43 G @ 15.28 MS

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



CHANNEL: PENXF FILTER: CH. CLASS 600 PEAK DATA: 3732.95 N @ 2.56 MS; -42.03 N @ 15.28 MS

Accelerometer Information

Engineer: Dresback
Test Date: 12/13/99-1
Dummy S/N: 283
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	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: Dresback
Test Date: 12/13/99-1
Dummy S/N: 283
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	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: Dresback
Test Date: 12/13/99-1
Dummy S/N: 283
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	283	Servo	42.84 mV/V/inch	03/30/00	6 inch	Extension

Accelerometer Information

Engineer: Dresback
Test Date: 12/13/99-1
Dummy S/N: 369
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	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: Dresback
Test Date: 12/13/99-1
Dummy S/N: 369
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	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: Dresback
Test Date: 12/13/99-1
Dummy S/N: 369
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
	Chest Pot							
CSTXD	Chest deflection	14CB1-2897	1188	Servo	43.6 mV/V/inch	12/02/99	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 991213-1

Number	Location	Axis	Manufacturer	Model	S/N	Orientation (+ Sensing)
1	Left Brake Caliper	X	Entran	EGE-73BE0QT	99A28-Z23	Rearward
2	Right Brake Caliper	X	Entran	EGE-73BE0QT	99A28-Z15	Forward
3	Instrument Panel Center	X	Endevco	7264-2000T	J30459	Forward
4	Engine Top	X	Entran	EGE-73BE0QT	99A28-Z08	Forward
5	Engine Bottom	X	Entran	EGE-73BE0QT	99A28-Z21	Forward
6	Vehicle Rear Center	X	Endevco	7264-2000T	J28991	Forward
		Y	Endevco	7264-2000T	J29360	Left
		Z	Endevco	7264-2000T	J30477	Down
7	Left Rear Seat Crossmember	X	Endevco	7264-2000T	J29567	Forward
8	Right Rear Seat Crossmember	X	Endevco	7264-2000T	J29035	Forward
9	Vehicle Center of Gravity	X	Endevco	7264-2000T	J27228	Forward
		Y	Endevco	7264-2000T	J30471	Left

Report Sign Convention and NHTSA Data Tape Reference Guide

Accelerometers:	+X: Forward	
	+Y: Leftward	
	+Z: Upward	
Potentiometers:	+Chest longitudinal deflection:	Outward
	+Chest lateral deflection:	Leftward
	+Seat belt displacement:	Outward
	+Seat belt extension:	Elongation
	+Knee slider displacement:	Distance between femur and tibia increased (in relation to a seated dummy)
Load cells:	+Femur force:	Tension
	+Seat belt force:	Tension
	+Barrier force:	Tension
Neck load cells:	+X force:	Head pushed forward
	+Y force:	Head pushed leftward
	+Z force:	Head pulled upward (tension on neck)
	+X moment:	Right ear rotating toward right shoulder
	+Y moment:	Chin rotating toward chest
	+Z moment:	Chin rotating toward left shoulder
Tibia load cells:	+X force:	Ankle forward, knee rearward
	+Y force:	Ankle rightward, knee leftward
	+Z force:	Tension
	+X moment:	Bottom of tibia moving leftward
	+Y moment:	Bottom of tibia moving rearward

Description Of Timing Marks On TRC High-Speed Film

All TRC high-speed cameras are equipped with red 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.

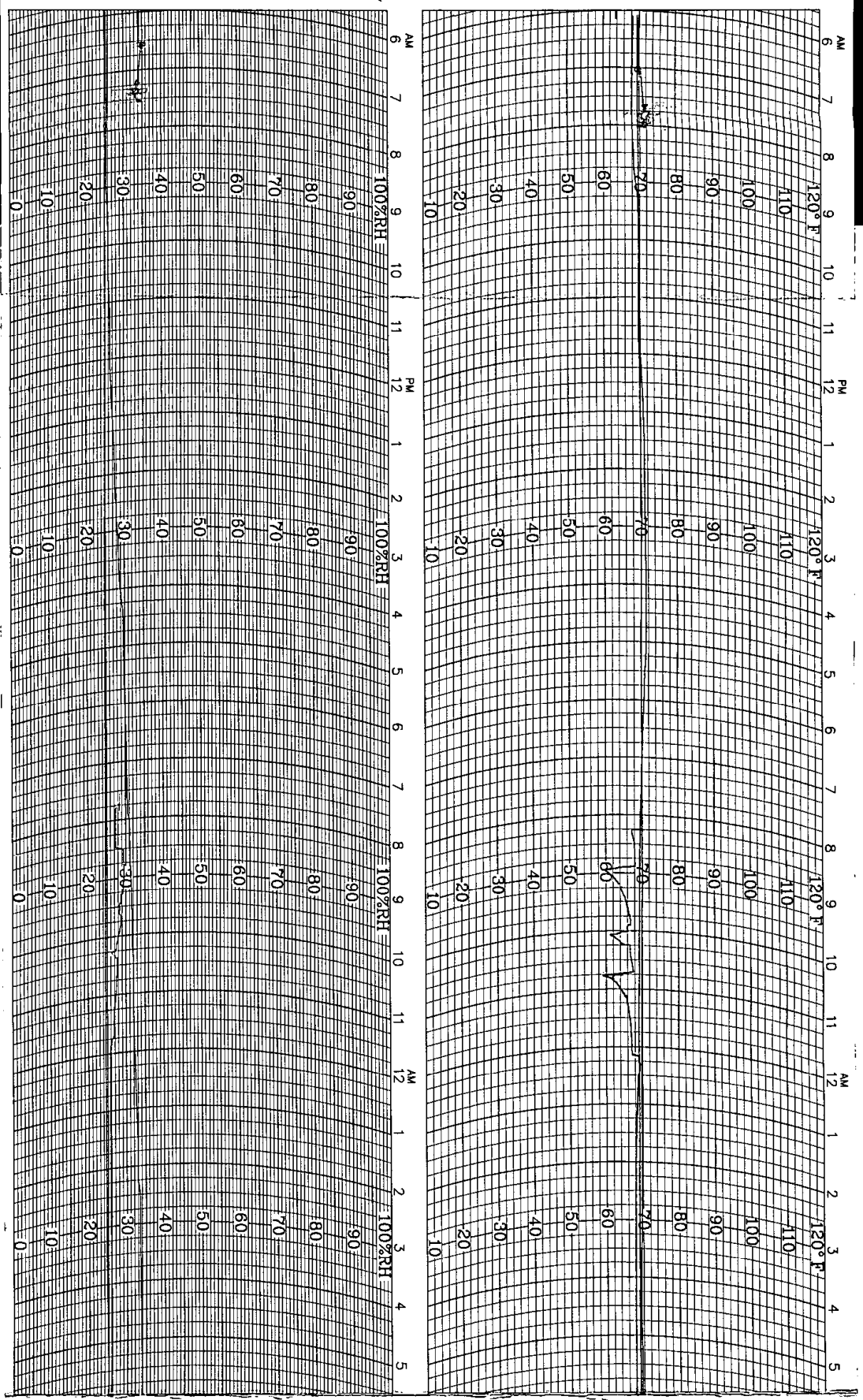
The timing marks appear on the film as small red marks on the right edge of the film. Round marks are left by the Photo-Sonics and Stalex cameras while horizontal bars are left by the Hycam, Locam, and Fastax II cameras.

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.

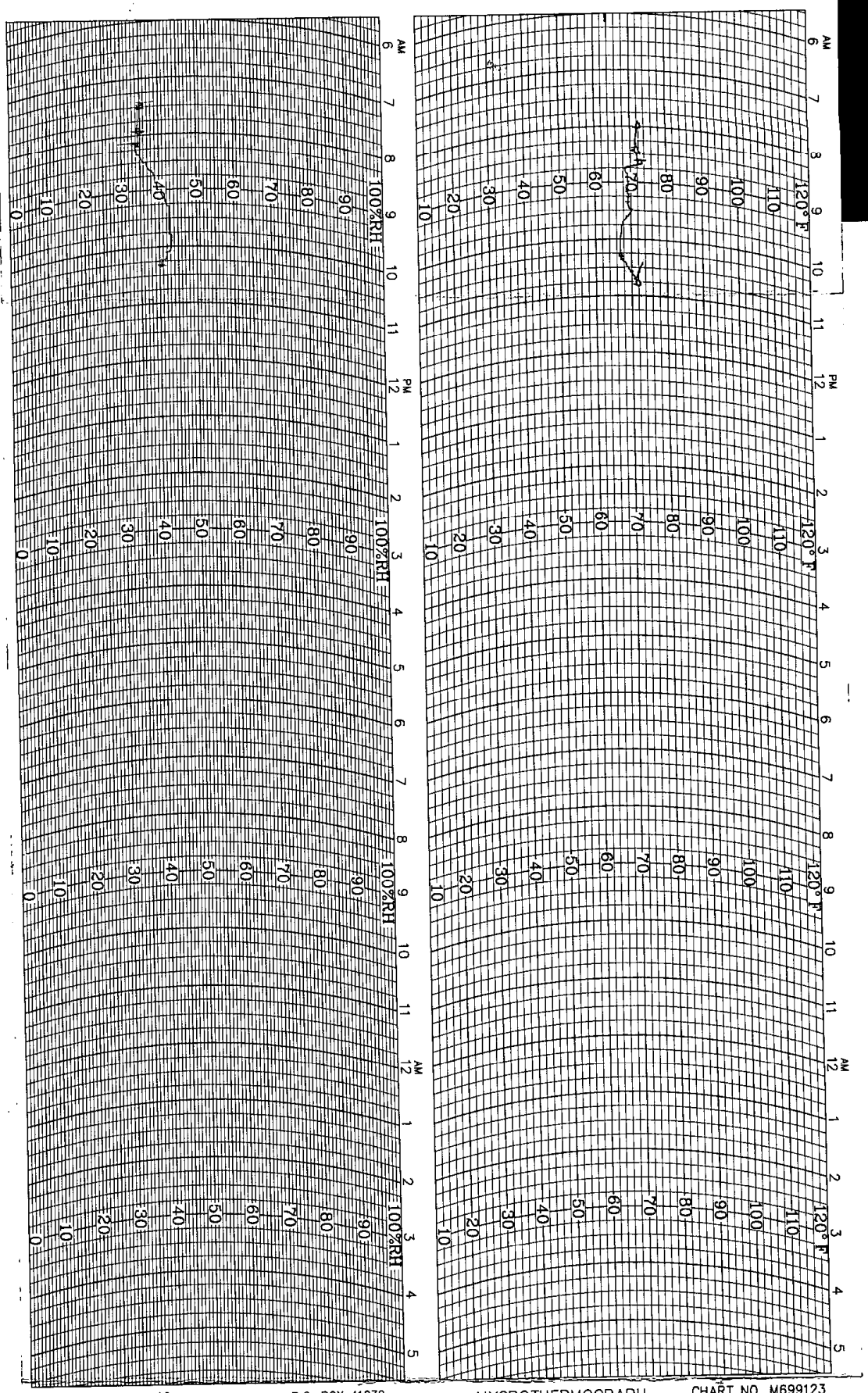


WeatherMeasure
WEATHERtronics
Division of QUALIMETRICS, Inc.
P.O. BOX 41039
SACRAMENTO, CA 95841
PHONE: (916) 923-0055

HYGROTHERMOGRAPH
1 DAY

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

STATION _____ DATE ON 12-10-99 DATE OFF 12-13-99



WeatherMeasure
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SACRAMENTO, CA 95841
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HYGROTHERMOGRAPH
1 DAY

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

STATION_____ DATE ON_____ DATE OFF_____