

V2270

**Vehicle and Dummy Kinematics
in a Controlled Rollover Crash
1989 Nissan Pickup Truck**

**Prepared by:
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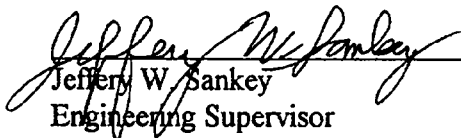
**April - May 1995
Test Report**

**Prepared for:
Systems Research Laboratories
2800 Indian Ripple Road
Dayton, OH 45440**

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Section 1.0

Purpose and Test Summary

Purpose and Test Summary

This rollover crash test has the main objective to investigate both vehicle and occupant dynamics during automobile rollover crashes.

This test was conducted with a 1989 Nissan pickup truck on the NHTSA rollover cart moving at 30 mph, releasing the vehicle with its roll axis perpendicular to the direction of rollover cart motion, and first contacting the passenger's side. The test vehicle contained an instrumented Part 572 E dummy restrained with a three-point unbelt.

Section 2.0

Summary of Rollover Crash Test

Summary of Rollover Crash Test

A 1989 Nissan pickup truck, containing one instrumented Part 572 E test dummy was placed upon the rollover test device at 30 degrees above the horizontal and was released at 30 mph. The device was attached to the tow cable of the drive system. After the vehicle had been released the device was brought to a stop with an auxiliary brake system. After release the vehicle impacted the ground on its right side. The vehicle made two rolls and came to rest on its wheels. The rollover crash test was conducted by Transportation Research Center Inc. (TRC) in East Liberty, Ohio, on April 20, 1995.

The Part 572 E 50th percentile adult male anthropomorphic test device (dummy) was placed in the driver's designated seating position according to the placement procedure specified in Appendix B and Optional Appendix C of Laboratory Procedure TP-208-09. The dummy was instrumented with a nine-accelerometer array in the head, chest and pelvis triaxial accelerometers, head and chest triaxial angular velocity sensors, a six-axis neck load cell, and a chest deflection potentiometer.

The vehicle was instrumented with fifteen (15) accelerometers, three (3) rate gyroscopes, three (3) angular velocity sensors, and four (4) suspension displacement potentiometers. The seat belt was instrumented with shoulder and lap belt load cells and a shoulder belt spoolout potentiometer. The rollover test device was instrumented with three (3) accelerometers, two (2) potentiometers, and two (2) event switches.

The crash event was recorded by sixty-three (63) channels of data on a 14-track tape drive. The analog data was digitally sampled at 8000 samples per second. The data was digitally filtered as per SAE J211 OCT88.

The crash event was filmed by eight (8) high-speed motion picture cameras operating at approximately 500 frames per second and one (1) real-time panning motion picture camera.

Section 3.0 contains the general test and vehicle parameter data. Section 4.0 contains the occupant information. Appendix A contains the pre- and post-test still photographs. Appendix B contains the final test data plots. Appendix C contains the pre- and post-test dummy certification data. Appendix D contains miscellaneous test information which includes the pre-test and post-test IPMD vehicle data sheets.

Table 1 Roll Cart Instrumentation Locations and Data Summary

TEST NUMBER: 950420							
No. LOCATION	X	Y	Z	POSITIVE DIRECTION		NEGATIVE DIRECTION	
1 CENTER OF GRAVITY ACCELERATION	39.5 in	3.0 in	7.5 in				
LONGITUDINAL				1.6 g	@ 355.5 ms	3.5 g	@ 484.5 ms
LATERAL				2.8 g	@ 493.6 ms	0.9 g	@ 155.6 ms
VERTICAL				6.3 g	@ 495.4 ms	3.4 g	@ 505.5 ms
RESULTANT				6.7 g	@ 484.9 ms		
2 PLATFORM DISPLACEMENT	68.1 in	-25.2 in	28.0 in				
LEFT SIDE				25.3 in	@1544.5 ms	0.0 in	@ 6.1 ms
RIGHT SIDE				25.1 in	@1544.8 ms	0.0 in	@ 8.1 ms
3 VEHICLE/ROLLOVER	NA	NA	NA				
CART SEPARATION TIMES							
UPPER SWITCH					346.9 ms		
LOWER SWITCH					716.4 ms		

REFERENCE: X: + FORWARD FROM ROLLOVER CART
Y: + LEFTWARD FROM ROLLOVER CART CENTERLINE
Z: + UPWARD FROM THE GROUND LEVEL

DISPLACEMENT: + OUTWARD

¹See DATA ACQUISITION EXPLANATIONS

Table 2 Final Resting Place of Vehicle, Parts, and Rollover Cart

Description of Vehicle	X, Distance ¹	Y, Distance ¹
Left rear corner	98.0	2.0
Right rear corner	101.5	-1.0
Left front corner	104.0	9.0
Right front corner	107.0	5.0

Description of Parts

None

Description of Rollover Cart

Left rear corner	49.0	6.0
Right rear corner	49.0	-6.0
Left front corner	54.0	7.0
Right front corner	54.0	-7.0

¹ Reference: +X: Forward From Release Block
+Y: Leftward From Center Release Block

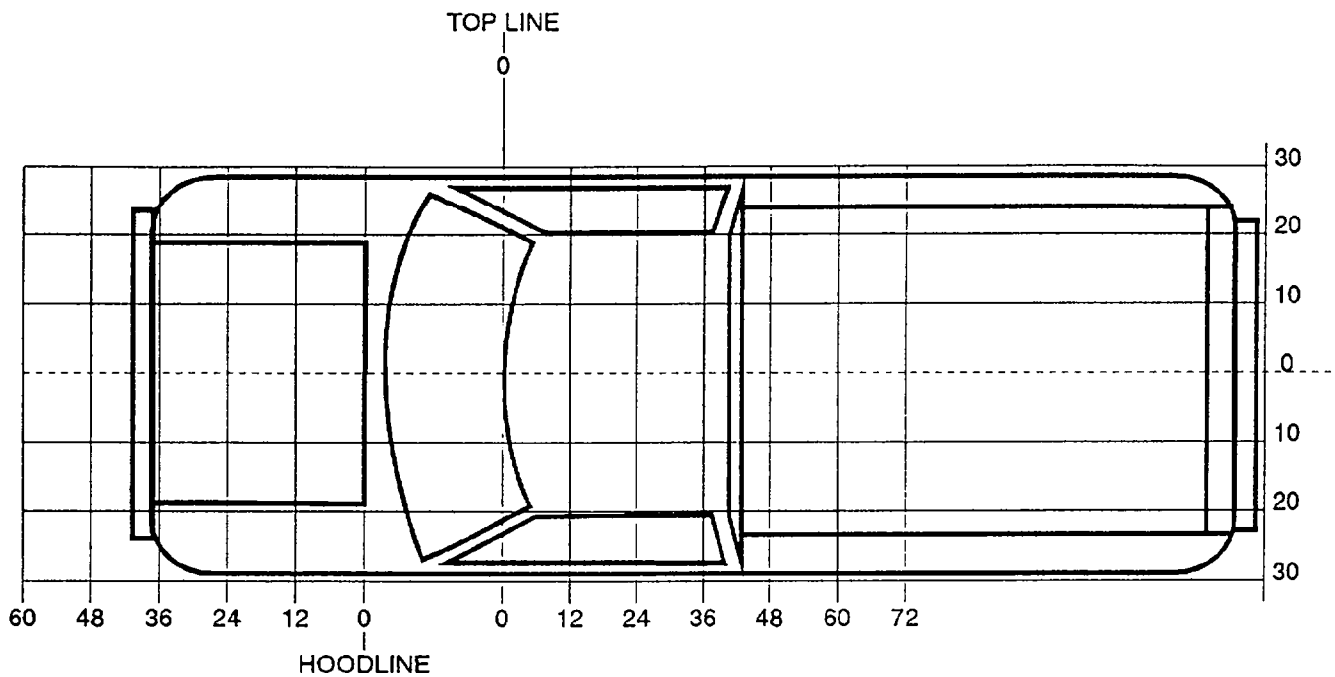
All measurements are in feet.

Table 3 Vehicle Interior Measurements

Description	Pre-Test	Post-Test	Difference
Floor board to top of left "A" post	41.5	40.4	-1.1
Floor board to top of right "A" post	40.9	41.0	0.1
Door sill to top of left "B" post	41.5	38.8	-2.7
Door sill to top of right "B" post	41.9	42.0	0.1
Door sill to top of left door opening	42.0	37.0	-5.0
Door sill to top of right door opening	41.7	41.8	0.1
Floor tunnel to windshield header	35.8	31.5	-4.3
Floor tunnel to center of roof	40.1	29.5	-10.6
Rear of floor tunnel to roof	41.6	28.9	-12.7
Maximum width at "B" post	54.4	62.0	6.6
Maximum width at "A" post	46.3	60.0	13.7
Maximum width at top of door opening	45.8	46.5	0.7

All measurements are in inches.

Figure 1 Hood and Roof Static Crush Locations



HOOD AND ROOF STATIC CRUSH LOCATIONS

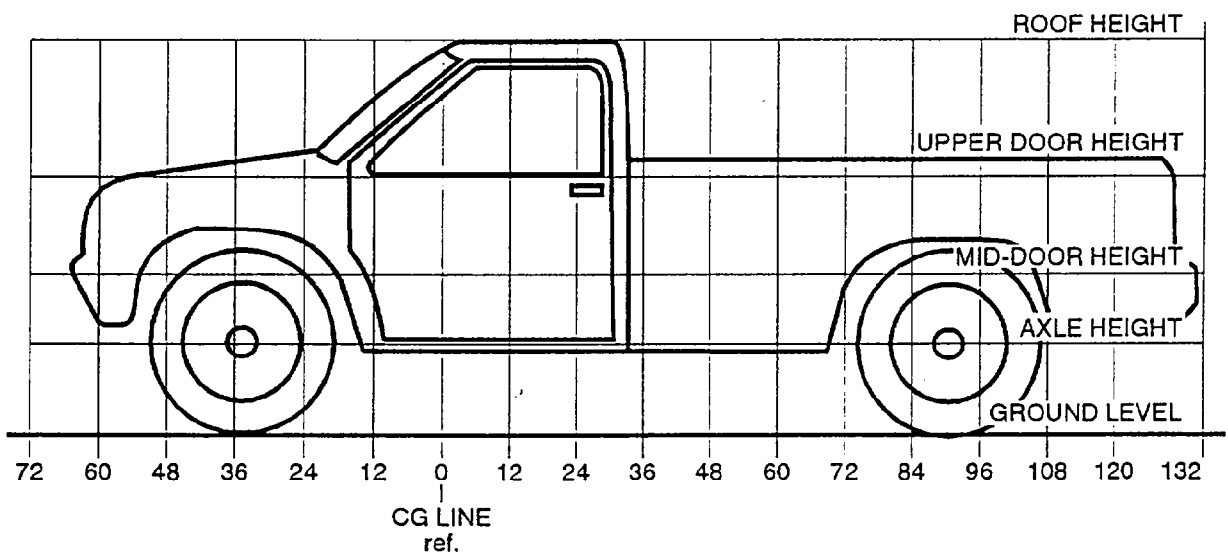


Table 4 Vehicle Hood Exterior Profiles
Zero Distance at Vehicle Hood Centerline¹

Location	30	20	10	0	10	20	30
Pre-Test Profile (Distance in Inches from Reference Plane ²)							
Trailing edge of cowl at centerline	39.8	40.6	40.7	41.2	41.2	40.8	39.6
Trailing edge of cowl + 12 inches ³	X	38.9	39.2	40.0	39.7	39.2	X
Trailing edge of cowl + 24 inches	X	37.0	37.3	37.9	37.8	37.5	X
Trailing edge of cowl + 36 inches	X	X	X	X	X	X	X
Trailing edge of cowl + 48 inches	X	X	X	X	X	X	X

Post-Test Profile (Distance in Inches from Reference Plane ²)							
Trailing edge of cowl at centerline	37.9	38.9	40.2	39.3	38.4	37.9	35.6
Trailing edge of cowl + 12 inches ³	X	34.8	37.6	37.8	37.5	37.0	X
Trailing edge of cowl + 24 inches	X	34.1	34.6	35.1	35.6	35.2	X
Trailing edge of cowl + 36 inches	X	X	X	X	X	X	X
Trailing edge of cowl + 48 inches	X	X	X	X	X	X	X

Static Crush (in.)							
Trailing edge of cowl at centerline							
Trailing edge of cowl + 12 inches ³	-1.9	-1.7	-0.5	-1.9	-2.8	-2.9	-4.0
Trailing edge of cowl + 24 inches	X	-4.1	-1.6	-2.2	-2.2	-2.2	X
Trailing edge of cowl + 36 inches	X	-2.9	-2.7	-2.8	-2.2	-2.3	X
Trailing edge of cowl + 48 inches	X	X	X	X	X	X	X

¹ Column readings are left to right from left to right on vehicle.

² Reference plane is a horizontal plane at ground level.

³ Longitudinal distance from trailing edge of cowl at centerline forward to measurement plane.

+ Static crush means vehicle structure is bowed upward.

- Static crush means vehicle structure is crushed.

Table 5 Vehicle Roof Exterior Profiles
Zero Distance at Vehicle Roof Centerline¹

Location	20	10	0	10	20
Pre-Test Profile (Distance in Inches from Reference Plane²)					
Longitudinal center of gravity - 12 inches	58.3	58.8	59.2	58.8	57.9
Longitudinal center of gravity	59.6	60.1	60.0	60.2	59.0
Longitudinal center of gravity + 12 inches ³	59.5	60.4	60.5	60.6	59.8
Longitudinal center of gravity + 24 inches	X	X	X	X	X
Longitudinal center of gravity + 36 inches	X	X	X	X	X
Longitudinal center of gravity + 48 inches	X	X	X	X	X

Post-Test Profile (Distance in Inches from Reference Plane²)					
Longitudinal center of gravity - 12 inches	43.9	47.0	50.3	52.9	53.1
Longitudinal center of gravity	48.0	46.1	47.1	50.3	54.8
Longitudinal center of gravity + 12 inches ³	51.7	48.0	49.6	52.1	54.9
Longitudinal center of gravity + 24 inches	X	X	X	X	X
Longitudinal center of gravity + 36 inches	X	X	X	X	X
Longitudinal center of gravity + 48 inches	X	X	X	X	X

Static Crush (in.)					
Longitudinal center of gravity - 12 inches	-14.4	-11.8	-8.9	-5.9	-4.8
Longitudinal center of gravity	-11.6	-14.0	-12.9	-9.9	-4.2
Longitudinal center of gravity + 12 inches ³	-7.8	-12.4	-10.9	-8.5	-4.9
Longitudinal center of gravity + 24 inches	X	X	X	X	X
Longitudinal center of gravity + 36 inches	X	X	X	X	X
Longitudinal center of gravity + 48 inches	X	X	X	X	X

¹ Column readings are left to right from left to right on vehicle.

² Reference plane is a horizontal plane at ground level.

³ Longitudinal distance from center of gravity rearward to measurement plane.

+ Static crush means vehicle structure is bowed upward.

- Static crush means vehicle structure is crushed.

Table 6 Vehicle Left Side Exterior Profiles and Static Crush
Zero Distance at Driver's Seating Reference Point¹

Location	Height (in)	72	60	48	36	24	12	0	12	24	36	48	60	72	84	96
Pre-test Profile (Distance in inches from reference plane ²)																
Roof height	60.2	X	X	X	X	X	23.7	24.0	23.8	X	X	X	X	X	X	X
Upper door	39.6	X	18.2	17.8	17.5	17.4	17.2	17.2	17.0	17.2	17.2	17.2	17.2	17.1	17.3	X
Mid door	27.2	17.7	X	X	15.8	15.7	15.6	15.7	15.5	15.7	15.6	X	X	15.6	15.8	X
Axle height	14.8	X	X	X	X	17.8	17.8	17.9	17.8	17.8	17.8	X	X	X	X	X
Post-test Profile (Distance in inches from reference plane ²)																
Roof height	60.2	X	X	X	X	X	34.7	34.7	34.5	X	X	X	X	X	X	X
Upper door	39.6	X	22.3	21.2	20.0	20.7	19.4	19.1	18.8	18.5	18.4	18.9	19.1	19.3	19.7	X
Mid door	27.2	18.6	X	X	17.2	16.9	16.5	16.1	15.8	15.7	16.0	X	X	16.3	16.6	X
Axle height	14.8	X	X	X	X	17.6	17.5	17.4	17.3	16.9	16.8	X	X	X	X	X
Static Crush (in)																
Roof height	60.2	X	X	X	X	X	11.0	10.7	10.7	X	X	X	X	X	X	X
Upper door	39.6	X	4.1	3.4	2.5	3.3	2.2	1.9	1.8	1.3	1.2	1.7	1.9	2.2	2.4	X
Mid door	27.2	0.9	X	X	1.4	1.2	0.9	0.4	0.3	0.0	0.4	X	X	0.7	0.8	X
Axle height	14.8	X	X	X	X	-0.2	-0.3	-0.5	-0.5	-0.9	-1.0	X	X	X	X	X

¹ Driver's seating reference point is located 51.7 inches rearward of vehicle front wheels.

Centerline column readings are left to right from front to rear on vehicle.

² Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

+ Static crush means that vehicle structure is crushed.

- Static crush means that vehicle structure is bowed outward.

Table 7 Vehicle Right Side Exterior Profiles and Static Crush
Zero Distance at Driver's Seating Reference Point¹

Location	Height (in)	72	60	48	36	24	12	0	12	24	36	48	60	72	84	96
Pre-test Profile (Distance in inches from reference plane ²)																
Roof height	60.2	X	X	X	X	X	23.3	23.4	23.2	X	X	X	X	X	X	X
Upper door	39.6	X	17.5	17.3	17.0	16.9	17.2	17.0	17.0	17.1	17.0	17.0	17.2	17.3	17.2	X
Mid door	27.2	16.9	X	X	15.7	15.7	15.9	15.8	15.8	15.9	15.8	X	X	16.4	16.2	X
Axle height	14.8	X	X	X	X	18.0	18.2	18.2	18.3	18.3	18.3	X	X	X	X	X
Post-test Profile (Distance in inches from reference plane ²)																
Roof height	60.2	X	X	X	X	X	18.9	18.2	17.5	X	X	X	X	X	X	X
Upper door	39.6	X	15.8	15.3	15.0	14.8	14.3	14.1	13.5	15.8	15.7	16.1	15.7	15.6	15.7	X
Mid door	27.2	16.3	X	X	14.7	14.4	14.3	13.8	13.5	15.4	15.5	X	X	15.7	15.7	X
Axle height	14.8	X	X	X	X	18.1	18.3	18.3	19.5	18.9	19.3	X	X	X	X	X
Static Crush (in)																
Roof height	60.2	X	X	X	X	X	-4.4	-5.2	-5.7	X	X	X	X	X	X	X
Upper door	39.6	X	-1.7	-2.0	-2.0	-2.1	-2.9	-2.9	-3.5	-1.3	-1.3	-0.9	-1.5	-1.7	-1.5	X
Mid door	27.2	-0.6	X	X	-1.0	-1.3	-1.6	-2.0	-2.3	-0.5	-0.3	X	X	-0.7	-0.5	X
Axle height	14.8	X	X	X	X	0.1	0.1	0.1	1.2	0.6	1.0	X	X	X	X	X

¹ Driver's seating reference point is located 51.7 inches rearward of vehicle front wheels.

Centerline column readings are left to right from front to rear on vehicle.

² Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

+ Static crush means that vehicle structure is crushed.

- Static crush means that vehicle structure is bowed outward.

Figure 2 Vehicle Pre-Test and Post-Test Measurement Points

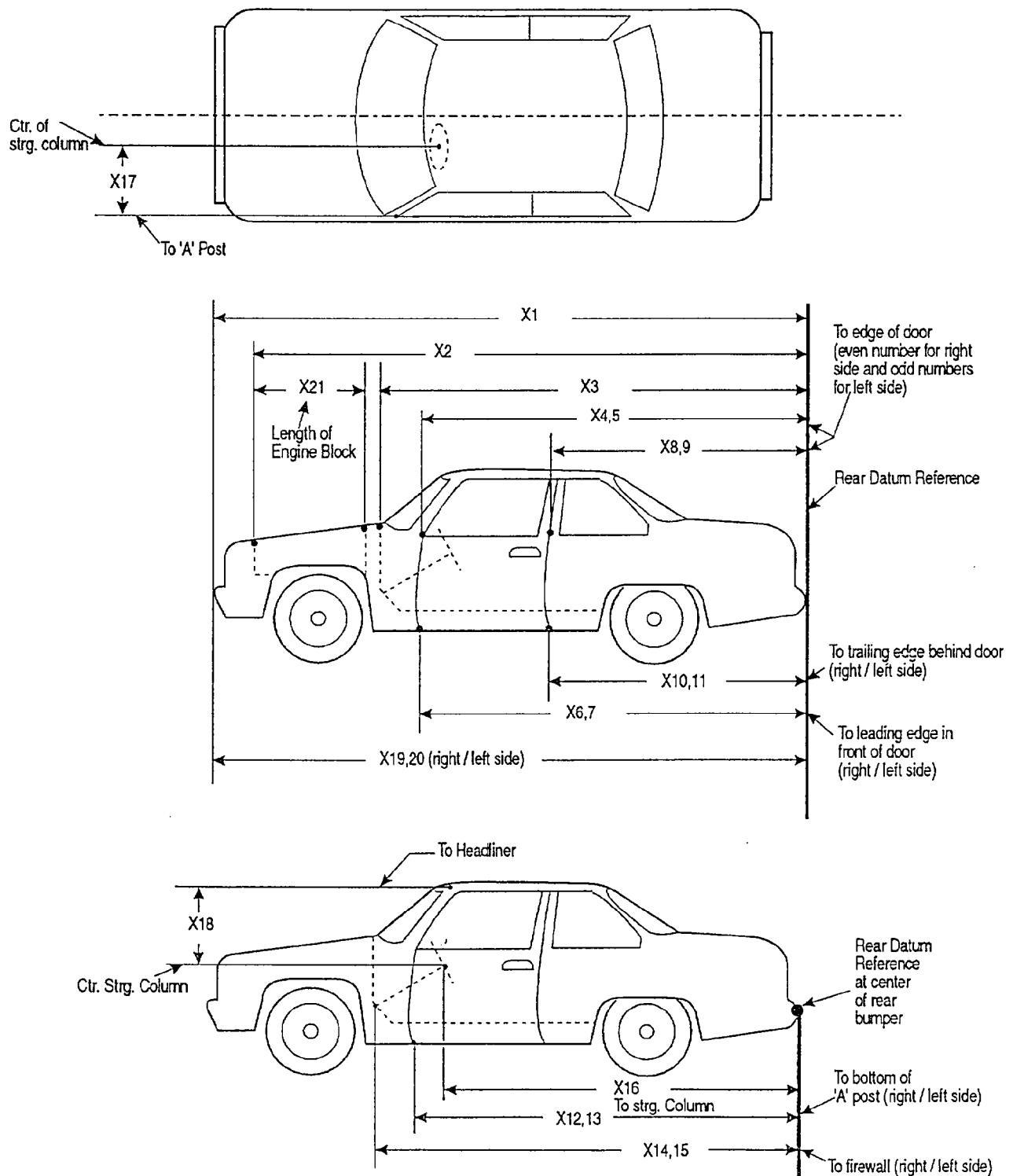


Table 8 Impacted Vehicle Measurements

Vehicle: 1989 Nissan pickup truck

Test Number: 950420

No.	Type of Measurement	Pre-test	Post-test	Difference
X1	Total length of vehicle at centerline	174.4 in	174.3 in	0.1 in
X2	Rear surface of vehicle to front of engine block	157.4 in	158.4 in	-1.0 in
X3	Rear surface of vehicle to firewall	136.5 in	136.4 in	0.1 in
X4	Rear surface of vehicle to upper leading edge of right door	128.1 in	128.3 in	-0.2 in
X5	Rear surface of vehicle to upper leading edge of left door	127.9 in	127.2 in	0.7 in
X6	Rear surface of vehicle to lower leading edge of right door	126.3 in	125.9 in	0.4 in
X7	Rear surface of vehicle to lower leading edge of left door	126.1 in	125.4 in	0.7 in
X8	Rear surface of vehicle to upper trailing edge of right door	82.0 in	82.4 in	-0.4 in
X9	Rear surface of vehicle to upper trailing edge of left door	82.0 in	81.9 in	0.1 in
X10	Rear surface of vehicle to lower trailing edge of right door	82.1 in	81.5 in	0.6 in
X11	Rear surface of vehicle to lower trailing edge of left door	81.9 in	81.1 in	0.8 in
X12	Rear surface of vehicle to bottom of "A" post on right side	126.8 in	125.8 in	1.0 in
X13	Rear surface of vehicle to bottom of "A" post on left side	126.8 in	124.8 in	2.0 in
X14	Rear surface of vehicle to firewall - right side	136.2 in	137.9 in	-1.7 in
X15	Rear surface of vehicle to firewall - left side	136.1 in	135.2 in	0.9 in
X16	Rear surface of vehicle to steering wheel center	107.2 in	108.1 in	-0.9 in
X17	Center of steering column to "A" post	11.9 in	5.7 in	6.2 in
X18	Center of steering column to headliner	17.4 in	7.2 in	10.2 in
X19	Rear surface of vehicle to right side of front bumper	172.9 in	173.9 in	-1.0 in
X20	Rear surface of vehicle to left side of front bumper	173.2 in	173.3 in	-0.1 in
X21	Length of engine block	18.0 in	18.0 in	0.0 in

Data Acquisition Explanations

The driver's head position 1 Z-axis accelerometer, HD1ZG1, recorded intermittent spikes throughout the data.

The driver's head X-axis angular velocity sensor, HEDXV1, exceeded the data channel's full scale at 1747 milliseconds.

The driver's head Z-axis angular velocity sensor, HEDZV1, exceeded the data channel's full scale at 1126 milliseconds.

The driver's neck moment about X-axis load cell recorded a spike at 1050 milliseconds and lost data between 1130 and 1140 milliseconds.

The driver's lap belt outboard force load cell, LBOF1, recorded intermittent spikes throughout the data.

The vehicle C.G. Z-axis angular velocity, VCGZVA, recorded intermittent spikes throughout the data.

The right rear suspension displacement data channel, SRRD1, lost data after 1950 milliseconds.

Table 9 Event Times

Test Date: April 20, 1995

Event Description	Time, Sec.
Contact Release Block	0.4
Start Collecting Data	-0.171
Stop Collecting Data	3.65
Zero Time For Data	0.0
Strobe Lights Flash	0.4
Camera Led Goes Off	0.4 ¹
Pin Releases (Rollover Cart)	-0.429 ²
Cylinders Start (Rollover Cart)	0.129

¹ Locate frame where event LED stripe ends. ^{.4 sec} Put projector into reverse mode and go backwards four frames. This frame is ~~Zero~~ for the data.

² Release time as setup on rollover cart control panel and as setup by position of rollover cart cycle start switch and release block. Cycle start switch was 35 feet in front of release block.

Section 3.0

General Test and Vehicle Parameter Data

The following data sheets describe the General Test and Vehicle parameter data.

Table 10 Test Vehicle Information

Vehicle: 1989 Nissan pickup
Color: Blue
VIN: 1N6ND11S0KC308784
Engine data:
Placement: Longitudinal
Cylinders: 4
Displacement: 2.4 liters
Transmission data: 5 speed, X manual, ___ automatic, ___ overdrive
Final drive: ___ fwd, X rwd, ___ 4wd
Date vehicle received: 04/11/95
Odometer reading: 110,595
Dealer's name and address: NA

Accessories:

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

Certification data from vehicle's label:

Vehicle manufactured by: Nissan Motor Co., Ltd.
Date of manufacture: 10/88
VIN: 1N6ND11S0KC308784
GVWR: 4400 lbs.
GAWR: Front: 2200 lbs.
Rear: 2544 lbs.

Table 10 Test Vehicle Information, Cont'd.

Size of tires on vehicle: P195/60SR14

Spare tire: Spacesaver

Type of seats:

Front: Bench

Rear: NA

Tire & capacity data from vehicle's label:

Recommended tire size: P195/75R14

Recommended cold tire pressure:

Front: 26 psi

Rear: 34 psi

Designated seating capacity:

Front: NA

Rear: NA

Total: NA

Vehicle capacity weight: NA

Test vehicle attitudes:

Delivered attitude: LF: 27.1 in. RF: 26.8 in. LR: 29.5 in. RR: 28.9 in.

Pre-test attitude: LF: 27.5 in. RF: 27.3 in. LR: 27.8 in. RR: 27.5 in.

Post-test attitude: LF: 27.0 in. RF: 21.8 in. LR: 29.6 in. RR: 23.0 in.

Table 10 Test Vehicle Information, Cont'd.

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

Right front	816 lbs.	Right rear	647 lbs.
Left front	800 lbs.	Left rear	546 lbs.
Total front weight	1616 lbs.	(57.5% of total vehicle weight)	
Total rear weight	1193 lbs.	(42.5% of total vehicle weight)	
Total delivered weight	2809 lbs.		

Calculation of test vehicle's target test weight:

RCLW¹ = Rated Cargo and Luggage Weight

UDW = Unloaded Delivered Weight (2809 lbs.)

VCW = Vehicle Capacity Weight (NA)

DSC = Designated Seating Capacity (3)

RCLW¹ = VCW - 150 (DSC) = 300

Target Test Weight = UDW + RCLW¹ + (No. of Hybrid III dummies X 167 lbs. per dummy)

Target Test Weight = 2809 + 300 + 167

Target Test Weight = 3276 lbs.

Weight of test vehicle with required dummies and 300 lbs. of cargo weight:

Right front	818 lbs.	Right rear	787 lbs.
Left front	835 lbs.	Left rear	836 lbs.
Total front weight	1653 lbs.	(50.4% of total vehicle weight)	
Total rear weight	1623 lbs.	(49.6% of total vehicle weight)	
Total test weight	3276 lbs.		

Weight of ballast secured in vehicle: 0 lbs.

Components removed to meet target test weight: None

CG rearward of front wheel centerline: 51.8 in.

Vehicle Wheelbase: 104.3 in.

¹ Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

Table 11 Test Conditions

Test Number: 950420
Date of Test: 04/20/95
Time of Test: 16:48

Ambient Temperature at Impact Area: 60° F
Temperature in Occupant Compartment: 68° F
Driver Dummy Temperature: 68° F

Vehicle and Roll Cart Data

	<u>Actual</u>	<u>Intended</u>
Vehicle Test Weight (lbs.):	3276	3276
Vehicle Orientation (deg) ¹ :	30	30
Impact Side:	Right	Right
Roll Cart Weight (lbs.):	3347	3347
Roll Cart Crabbed Angle (deg.) ² :	0	0
Roll Cart Velocity (mph) ³ :	30.0	30.0

Vehicle Measurements:

Maximum Length:	174.4
Maximum Width:	66.2
Wheelbase:	104.3
Top Width:	62.0
C.G. Rearward of Front Wheel Centerline:	51.8
C.G. Height Above Ground Level:	22.2

¹ As measured on the roll cart with cylinder in rest position.

² As measured from roll cart's centerline to direction of travel (positive is clockwise).

³ As measured over final one foot of travel.

All measurements are in inches.

Table 11 Test Conditions, Cont'd.

Vehicle Information:

Left Front:	Door	-	Unlocked	Window	-	Closed
Left Rear:	Door	-	NA	Window	-	NA
Right Front	Door	-	Unlocked	Window	-	Closed
Right Rear	Door	-	NA	Window	-	NA
Emergency Brake:	Released					
Transmission:	Neutral					
Headrests:	Driver	-	Uppermost	Passenger	-	Uppermost
Tire Pressure:	Front	-	26 psi	Rear	-	34 psi

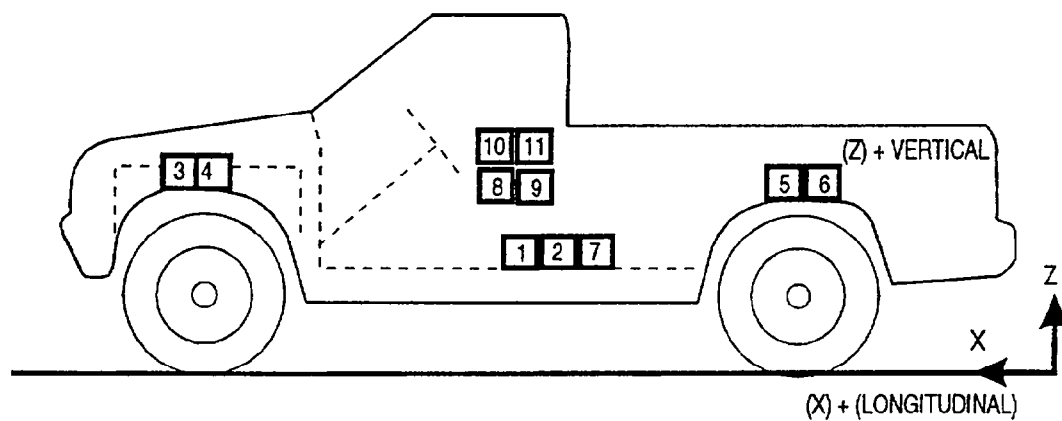
Dummy Information:

Type:	Part 572 E
Position:	Left Front
Serial No.:	043

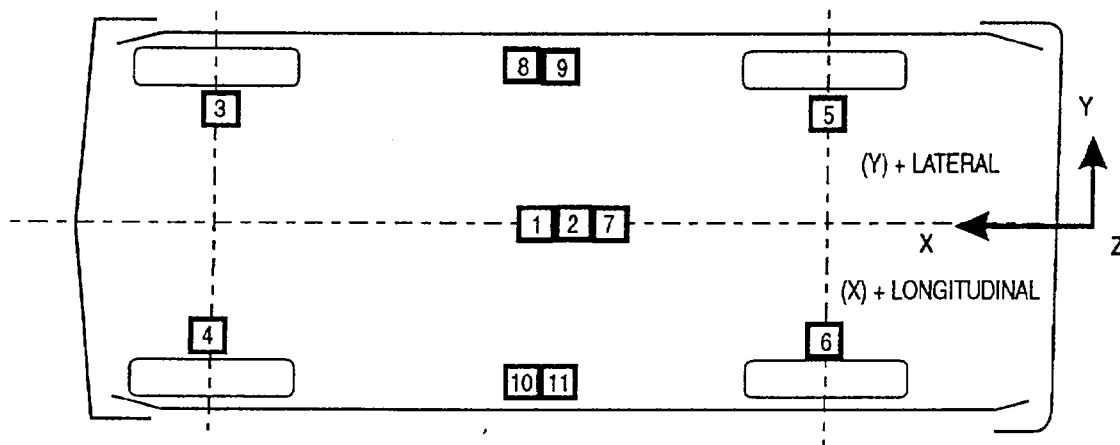
Instrumentation:

Head Accelerometers:	9
Head Angular Velocity Sensors:	3
Neck Load Cells:	6
Chest Accelerometers:	3
Chest Deflection Potentiometers:	1
Chest Angular Velocity Sensors:	3
Pelvis Accelerometers:	3
Restraint System:	Three-Point Unibelt

Figure 3 Vehicle Instrumentation Locations



SIDE VIEW



BOTTOM VIEW

Table 12 Vehicle Instrumentation Locations and Data Summary

TEST NUMBER: 950420				POSITIVE	NEGATIVE
No. LOCATION	X	Y	Z	DIRECTION	DIRECTION
1 CENTER OF GRAVITY	67.2 in	1.5 in	27.6 in		
ACCELERATION					
LONGITUDINAL				5.8 g @1015.1 ms	7.9 g @1738.4 ms
LATERAL				25.0 g @1729.9 ms	10.9 g @1745.1 ms
VERTICAL				12.3 g @1701.1 ms	27.5 g @1050.8 ms
RESULTANT				28.2 g @1050.8 ms	
2 CENTER OF GRAVITY	69.2 in	1.5 in	23.6 in		
ANGULAR VELOCITY					
ROLL (X-AXIS)				381.7 deg/see1699.3 ms	5.0 deg/see 8.1 ms
PITCH (Y-AXIS)				110.5 deg/see1718.5 ms	113.3 deg/see1027.1 ms
YAW (Z-AXIS)				220.5 deg/see1053.4 ms	124.4 deg/see1752.4 ms
3 LEFT FRONT SUSPENSION	146.1 in	-24.0 in	31.0 in		
DISPLACEMENT					
VERTICAL				1.0 in @1551.6 ms	5.8 in @2492.1 ms
4 RIGHT FRONT SUSPENSION	144.5 in	23.5 in	33.0 in		
DISPLACEMENT					
VERTICAL				0.5 in @3136.8 ms	7.2 in @2556.4 ms
5 LEFT REAR SUSPENSION	42.6 in	-23.5 in	36.0 in		
DISPLACEMENT					
VERTICAL				2.3 in @1739.6 ms	7.1 in @3237.3 ms

Table 12 Vehicle Instrumentation Locations and Data Summary, Cont'd.

TEST NUMBER: 950420						POSITIVE		NEGATIVE	
No. LOCATION		X	Y	Z		DIRECTION		DIRECTION	
6 RIGHT REAR SUSPENSION		42.8 in	24.5 in	35.0 in					
DISPLACEMENT									
VERTICAL ¹						---		---	
7 CENTER OF GRAVITY		69.2 in	1.5 in	23.6 in					
ANGULAR VELOCITY									
LONGITUDINAL					152.6 deg/s@1225.0 ms			197.8 deg/s@2551.3 ms	
LATERAL					130.6 deg/s@1728.8 ms			111.9 deg/s@1745.6 ms	
VERTICAL ¹					46.4 deg/s@3077.9 ms			131.4 deg/s@3141.6 ms	
8 LEFT INNER DOOR		86.8 in	-27.2 in	29.3 in					
PANEL ACCELERATION									
LONGITUDINAL					21.9 g @1121.6 ms			21.4 g @2447.1 ms	
LATERAL					32.1 g @1043.5 ms			19.2 g @1118.3 ms	
VERTICAL					28.2 g @1122.3 ms			76.5 g @1045.6 ms	
RESULTANT					79.4 g @1045.4 ms				
9 LEFT B-PILLAR		82.3 in	-26.8 in	25.0 in					
ACCELERATION									
LONGITUDINAL					27.5 g @1046.3 ms			15.2 g @1130.6 ms	
LATERAL					38.5 g @1042.0 ms			90.8 g @1127.0 ms	
VERTICAL					23.6 g @1127.1 ms			90.0 g @1042.5 ms	
RESULTANT					98.1 g @1042.4 ms				
10 RIGHT INNER		86.2 in	28.0 in	29.0 in					
LONGITUDINAL					7.6 g @1068.5 ms			13.5 g @2467.0 ms	
LATERAL					19.5 g @1726.4 ms			17.0 g @1073.5 ms	
VERTICAL					22.2 g @1721.0 ms			29.9 g @1001.9 ms	
RESULTANT					30.2 g @1003.0 ms				

Table 12 Vehicle Instrumentation Locations and Data Summary, Cont'd.

TEST NUMBER: 950420					
No. LOCATION	X	Y	Z	POSITIVE DIRECTION	NEGATIVE DIRECTION
11 RIGHT B-PILLAR	81.1 in	26.8 in	25.0 in		
ACCELERATION					
LONGITUDINAL				8.2 g	9.4 g
LATERAL				17.1 g	16.6 g
VERTICAL				21.7 g	49.6 g
RESULTANT				49.8 g	@ 997.6 ms

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

ROLL: + TO RIGHT
PITCH: + NOSE DOWNWARD
YAW: + COUNTERCLOCKWISE
DISPLACEMENT: + OUTWARD
¹See DATA ACQUISITION EXPLANATIONS

Figure 4 Stadia Pole Layout and Numbering System

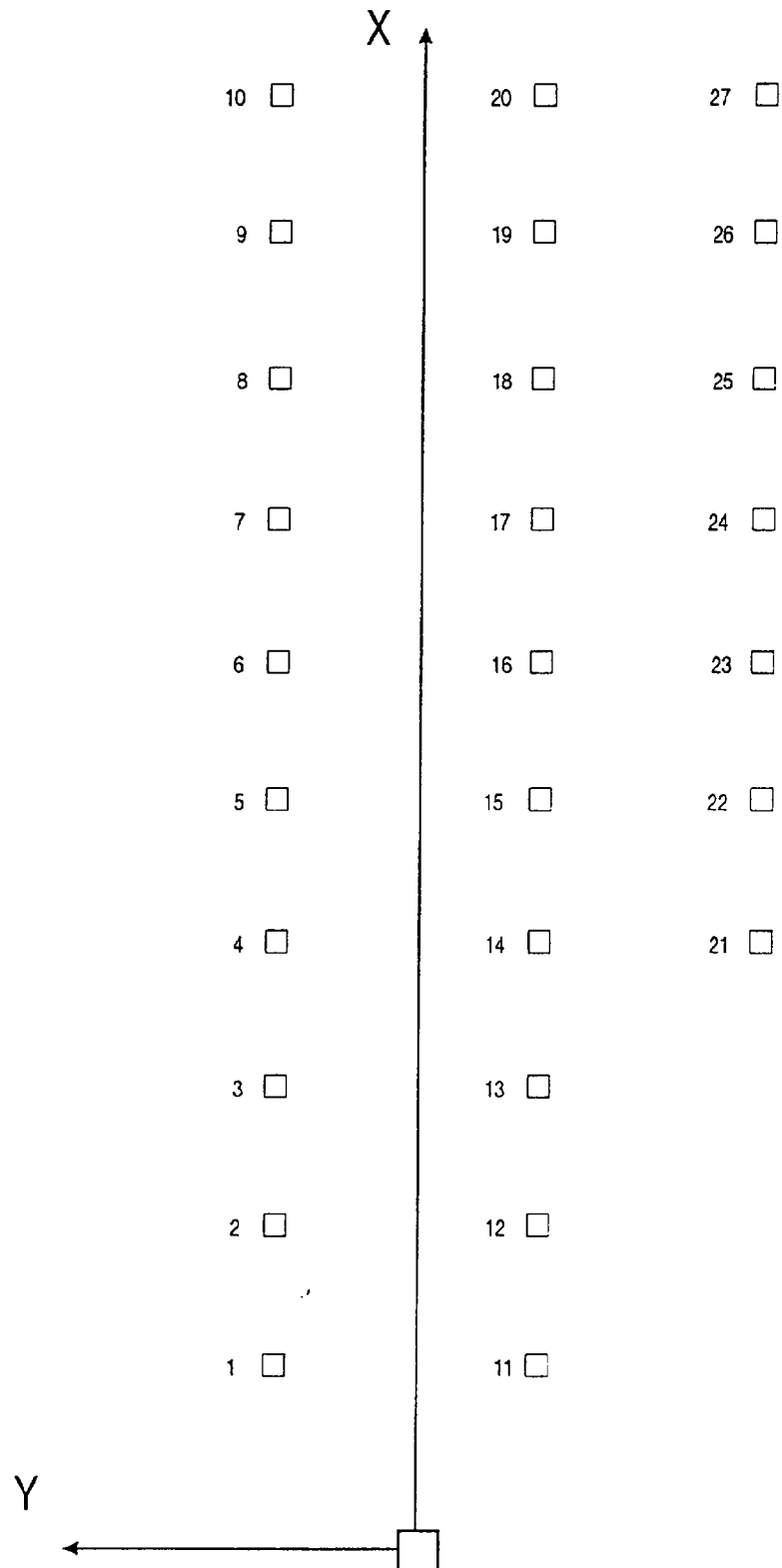


Table 13 Stadia Pole Locations

Pole No.	X Distance ¹	Y Distance ¹
1	35.0	8.0
2	43.0	8.0
3	51.0	8.0
4	59.0	8.0
5	67.0	8.0
6	75.0	8.0
7	83.0	8.0
8	91.0	8.0
9	99.0	8.0
10	107.0	8.0
11	35.0	-8.0
12	43.0	-8.0
13	51.0	-8.0
14	59.0	-8.0
15	67.0	-8.0
16	75.0	-8.0
17	83.0	-8.0
18	91.0	-8.0
19	99.0	-8.0
20	107.0	-8.0
21	59.0	-18.0
22	67.0	-18.0
23	75.0	-18.0
24	83.0	-18.0
25	91.0	-18.0
26	99.0	-18.0
27	107.0	-18.0

¹ Reference: +X: Forward From Release Block
+Y: Leftward From Center Release Block

All measurements are in feet.

Figure 5 Camera Locations

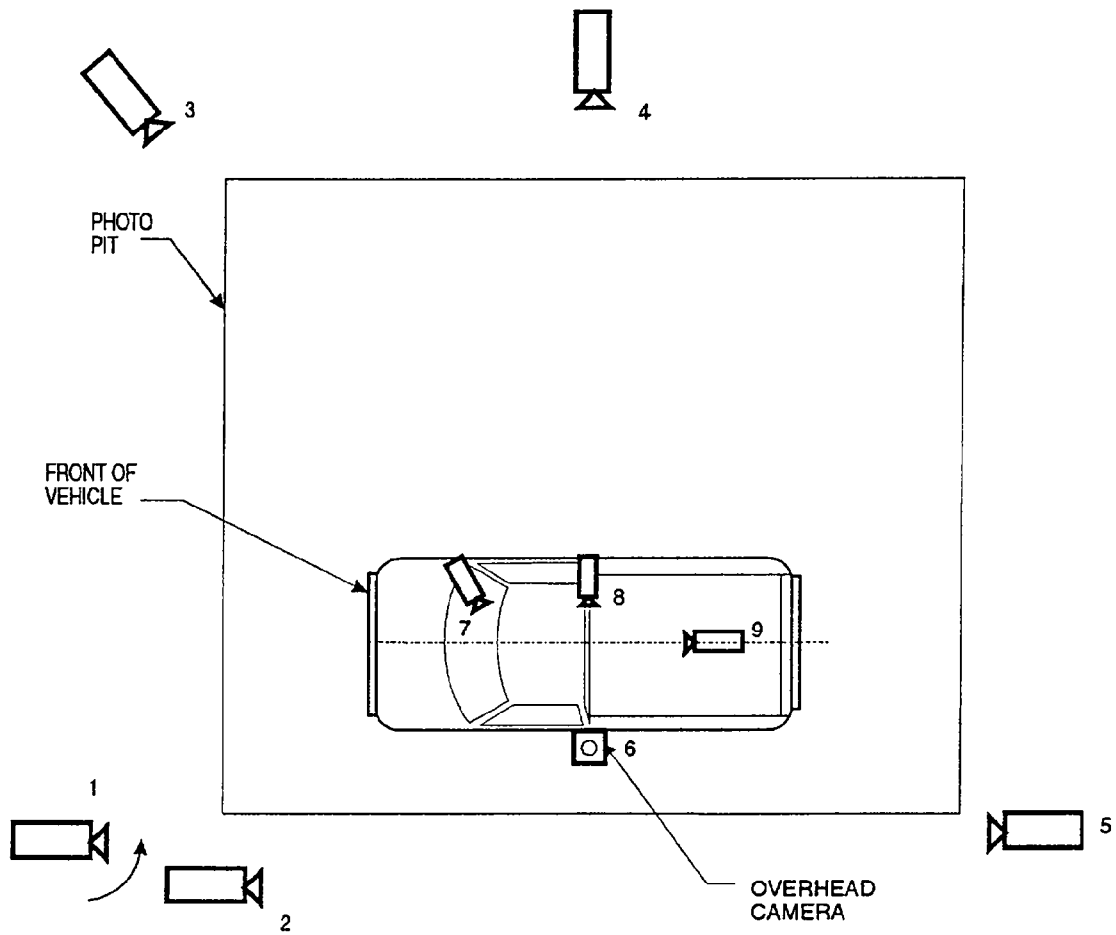


Table 14 High-Speed Camera Locations

<u>Offboard</u>			
Camera No.	X ¹	Y ¹	Z ¹
2	96.0	195.0	5.5
3	250.0	125.0	4.0
4	210.0	0.0	3.0
5	55.0	-72.0	3.0

¹Reference:

+X: Forward from release block

+Y: Leftward from the centerline of the release block

+Z: Upward from the ground level

<u>Onboard</u>			
Camera No.	X ²	Y ²	Z ²
7	0.4	-1.4	2.8
8	1.8	-1.3	1.5
9	-5.6	0.0	2.5

² Reference:

+X: Forward from the C. G. of vehicle

+Y: Leftward from the centerline of the vehicle

+Z: Upward from the ground level

All measurements are in feet.

Table 15 Motion Picture Camera Information

Camera Number	Location	Type	Lens (mm)	Speed (fps)	Purpose of Camera Data
1	Left panning	Bolex	16	24	Real-time documentation
2	Left wide	Photosonic	13	498	Vehicle dynamics
3	Left angle	Photosonic	13	498	Vehicle dynamics
4	Downstream	Photosonic	25	505	Vehicle dynamics
5	Right wide	Photosonic	13	502	Vehicle dynamics
6	Overhead	Photosonic	8.5	500	Vehicle dynamics
7	Onboard-front	Photosonic	8	498	Dummy kinematics
8	Onboard-rear	Photosonic	8	502	Dummy kinematics
9	Onboard-bed	Photosonic	8	498	Roof crush

Section 4.0

Occupant Information

Table 16 Dummy Data Summary

TEST NUMBER: 950420

DRIVER DUMMY SERIAL NUMBER: 43

POSITIVE
DIRECTION

NEGATIVE
DIRECTION

HEAD ACCELERATION

LONGITUDINAL	19.9 g	@1114.8 ms	30.4 g	@1133.5 ms
LATERAL	45.4 g	@2451.6 ms	21.8 g	@1191.4 ms
VERTICAL	19.6 g	@1133.6 ms	42.1 g	@1045.6 ms
RESULTANT	57.0 g	@2451.6 ms		
HIC	109 from 1042.6 to 1069.8 ms			

HEAD ARRAY 1 ACCELERATION

LONGITUDINAL	26.9 g	@1196.6 ms	37.2 g	@1778.9 ms
VERTICAL ¹	426.2 g	@2522.3 ms	407.9 g	@ 178.1 ms

HEAD ARRAY 2 ACCELERATION

LATERAL	50.1 g	@1778.8 ms	16.0 g	@1046.9 ms
VERTICAL	29.1 g	@1125.5 ms	54.5 g	@1052.6 ms

HEAD ARRAY 3 ACCELERATION

LONGITUDINAL	27.4 g	@1146.1 ms	41.4 g	@1778.8 ms
LATERAL	73.2 g	@1832.5 ms	54.5 g	@1125.4 ms

HEAD ANGULAR VELOCITY

LONGITUDINAL ¹	1027.1 deg/s	@1128.8 ms	1137.4 deg/s	@1750.5 ms
LATERAL	841.7 deg/s	@1092.3 ms	1005.6 deg/s	@1052.3 ms
VERTICAL ¹	1308.3 deg/s	@1129.5 ms	1220.8 deg/s	@1247.0 ms

NECK FORCES

LONGITUDINAL	376.6 lb	@1131.8 ms	278.5 lb	@2465.9 ms
LATERAL	675.6 lb	@2466.6 ms	123.3 lb	@1192.3 ms
VERTICAL	302.6 lb	@1834.1 ms	2252.8 lb	@1061.6 ms

NECK MOMENT

ABOUT LONG.	132.3 lb-ft	@2465.8 ms	66.5 lb-ft	@1132.5 ms
ABOUT LATERAL ¹	30.9 lb-ft	@1105.6 ms	94.4 lb-ft	@1063.8 ms
ABOUT VERTICAL	30.0 lb-ft	@1201.3 ms	15.6 lb-ft	@2465.0 ms

CHEST ACCELERATION

LONGITUDINAL	10.2 g	@1136.3 ms	9.5 g	@1050.6 ms
LATERAL	11.9 g	@1816.9 ms	10.6 g	@1194.6 ms
VERTICAL	9.0 g	@1139.1 ms	34.1 g	@1051.1 ms
RESULTANT	35.8 g	@1051.1 ms		
3 MSEC	34.5 g			

Table 16 Dummy Data Summary, Cont'd.

TEST NUMBER: 950420

DRIVER DUMMY SERIAL NUMBER: 43

		POSITIVE DIRECTION	Negative DIRECTION
<u>CHEST ANGULAR VELOCITY</u>			
LONGITUDINAL	284.8 deg/s @1086.5 ms	653.9 deg/s @1802.4 ms	
LATERAL	230.1 deg/s @2564.1 ms	402.1 deg/s @1079.8 ms	
VERTICAL	246.9 deg/s @1797.0 ms	210.6 deg/s @1061.4 ms	
<u>CHEST DEFLECTION</u>			
LONGITUDINAL	0.1 in @1150.6 ms	0.2 in @1824.1 ms	
<u>PELVIS ACCELERATION</u>			
LONGITUDINAL	18.1 g @2793.5 ms	19.7 g @2460.9 ms	
LATERAL	27.0 g @1819.0 ms	15.5 g @2793.5 ms	
VERTICAL	16.4 g @ 203.0 ms	26.4 g @1050.3 ms	
RESULTANT	32.9 g @2793.5 ms		
<u>POSITIVE DIRECTION</u>		<u>NEGATIVE DIRECTION</u>	
LONGITUDINAL:	FORWARD	LONGITUDINAL:	REARWARD
LATERAL:	LEFTWARD	LATERAL:	RIGHTWARD
VERTICAL:	UPWARD	VERTICAL:	DOWNWARD
FORCE:	OUTWARD	FORCE:	INWARD

¹ See DATA ACQUISITION EXPLANATIONS

Table 17 Post-Impact Dummy/Vehicle Data

Visible Dummy Contact Points:

	<u>Driver #043</u>	<u>Passenger # NA</u>
Head	Headliner	
Chest	Door panel	
Abdomen	None	
Left knee	None	
Right knee	None	

Door Opening:

	<u>Left</u>	<u>Right</u>
Front	Tools required	Tools required
Rear	NA	NA

Seat Movement:

	<u>Seat Back Failure</u>	<u>Seat Shift</u>
Front	None	None
Rear	NA	NA

Glazing Damage:

The entire windshield cracked. Left portion broken out.
Both door glasses and rear glass shattered.

Other Notable Impact Effects:

Both of the right tires were flattened.

Kinematic Summary

The truck struck the ground at the junction of the roof and the passenger's side A-pillar and B-pillar and rolled onto its roof. Simultaneously, the driver dummy's torso leaned to the right and to the left and the dummy's head impacted the roof and left side header as the roof collapsed onto the dummy. The driver's and passenger's side window glasses and rear window glass broke out at this time. The truck then rolled onto its left side and continued to roll onto its tires. The dummy's arms rose with the left arm protruding out the window and the right arm striking the roof as the truck bounced onto its roof and hood. The dummy's head rotated toward the left and struck the roof again. The truck then rolled onto its left side and bounced onto its right tires, flattening both right tires. The vehicle rolled a total of 720°. The dummy was restrained with a 3-point unbelt. The dummy's HIC was 109 and its maximum chest resultant acceleration with 3 milliseconds minimum duration was 34.5 g.

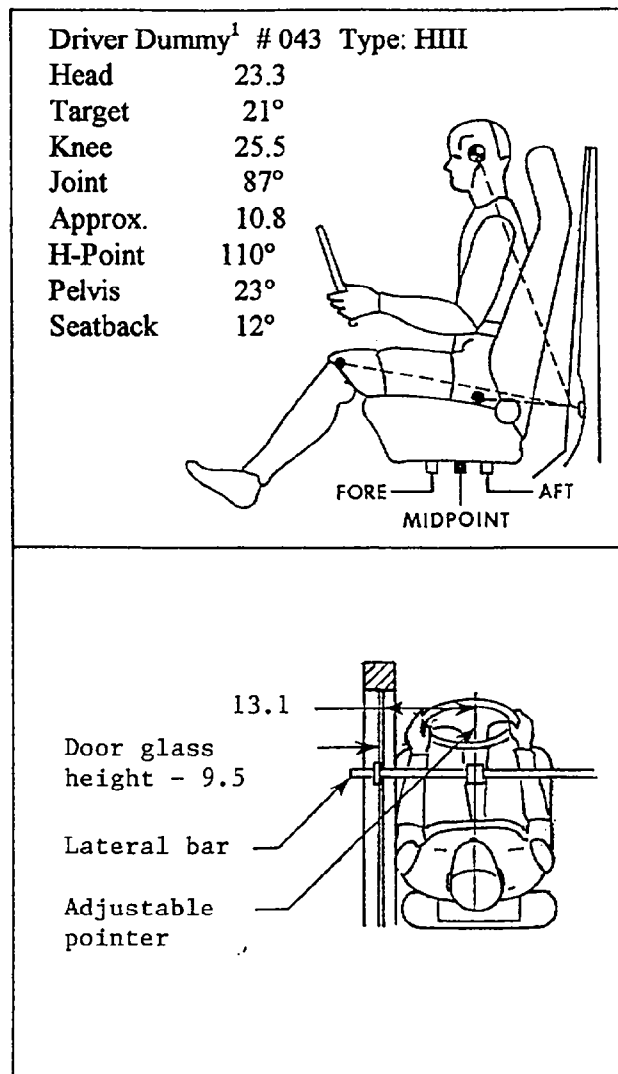
Dummy Temperature Control and Positioning

The vehicle and dummy were left inside the temperature controlled building eight hours prior to the time the dummy was loaded into the vehicle. After the vehicle had been positioned on the rollover device it was towed outside for launch.

One Part 572 E dummy was instrumented for this test. The dummy instrumentation consisted of triaxial accelerometers in the head, chest, and pelvis, a deflection potentiometer in the chest, and six load cells in the neck. The head and chest were also instrumented with angular velocity sensors. The head was instrumented with six (6) additional accelerometers to form a 9-accelerometer array. Prior to seating the dummy, the driver's seat was positioned in the mid-adjustment notch of the seat track. The seat back angle was not adjustable. The dummy was positioned in the seat according to the dummy placement procedure specified in Appendix B and Optional Appendix C of Laboratory Procedure TP-208-09. The H-point location of the seat was obtained by using the SAE J211 OCT88 H-point machine. The driver dummy was restrained with a three-point unbelt.

Figure 6 Dummy and Seat Positioning Data

Vehicle: 1989 Nissan pickup truck
 Seat Type: Bench
 Adjuster Type: Manual
 Bucket Seat Back Type: Non-adjustable
 Technicians: B. Crabtree, R. Cribley
 Positioning Date: 04/20/95
 Ambient Temperature: 60° F
 Time: 12:30

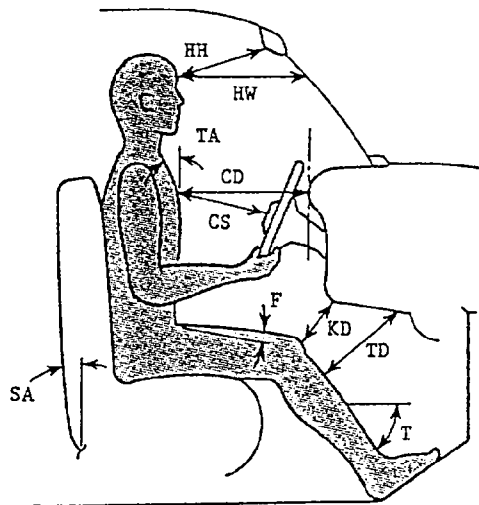


¹ Dummy measurements are referenced to top of striker bolt and all angles are referenced to vertical
 All distance measurements are in inches.

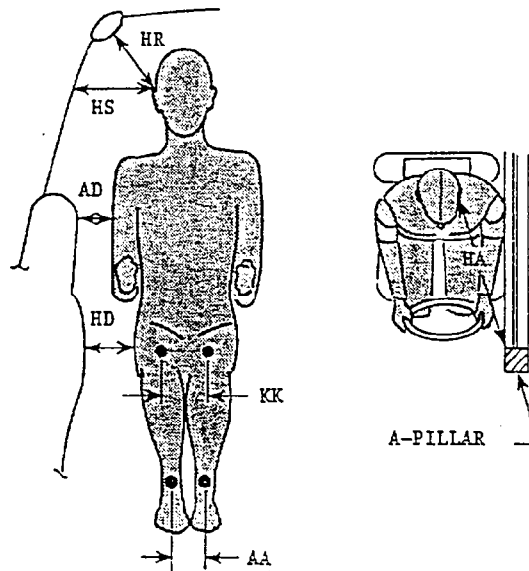
Figure 7 Dummy In-Vehicle Positioning Data

Driver #043

HH	15.6
HW	21.4
CD	22.4
CS	11.9
KDL	5.2
KDR	5.5
FL	18°
FR	19°
TDL	4.6
TDR	4.8
TL	42°
TR	41°



HR	8.7
HS	10.1
AD	0.8
HD	5.1
HZ	5.8

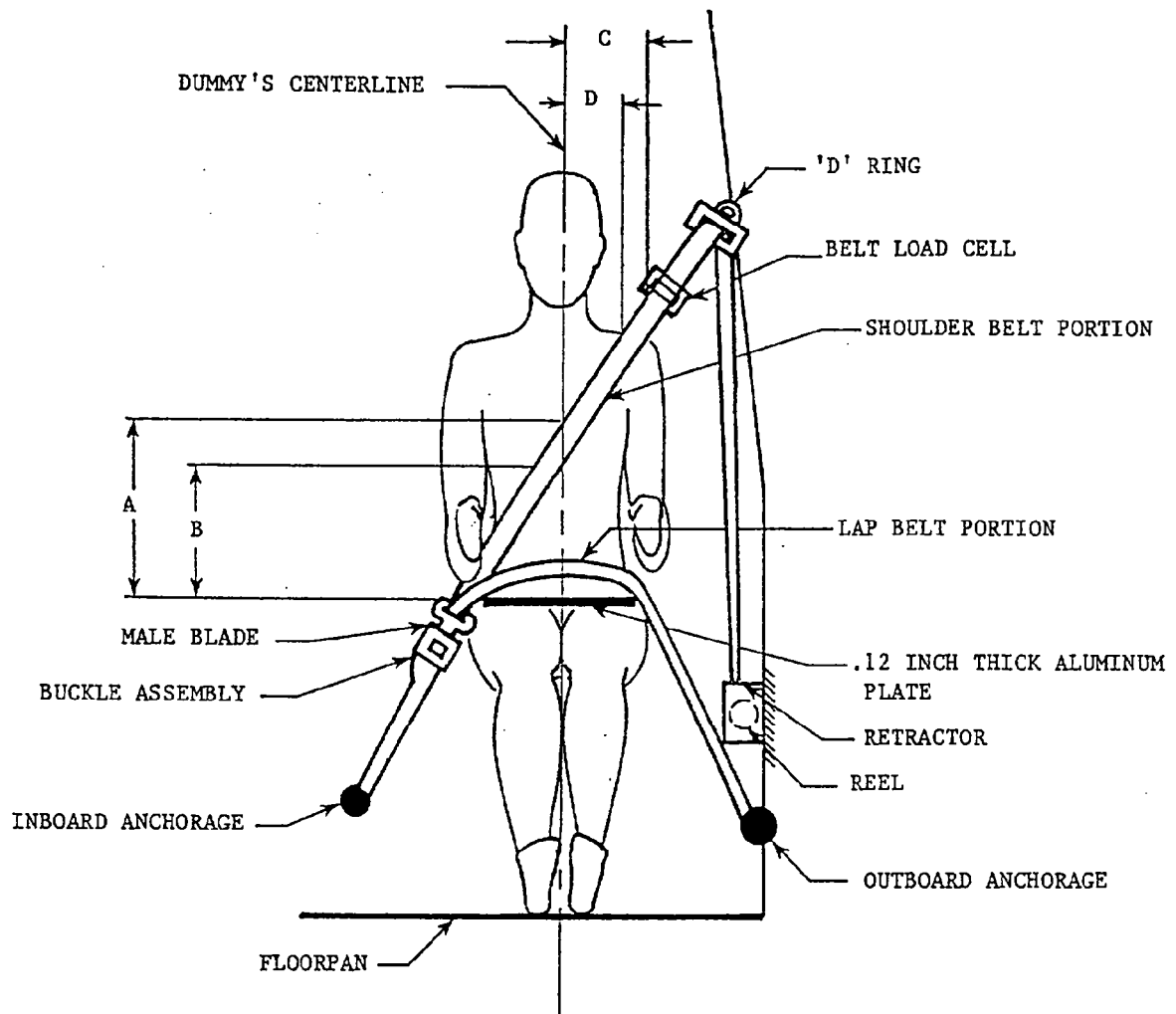


HH = Head to windshield header
 HW = Head to windshield
 CD = Chest to dash
 CS = Chest to steering wheel
 KD = Knee to dash
 TA = Torso angle
 SA = Seat back angle
 HSW = Head to steering wheel

HR = Head C.G. target to side roof header
 HS = Head C.G. target to side window
 AD = Arm to door
 HD = Hip to door
 KK = Knee to knee
 AA = Ankle to ankle
 HA = Head C.G. target to A-pillar

All distance measurements are in inches.

Figure 8 Seat Belt Positioning Data



Driver #043

A - Top Surface of Aluminum Plate to Belt Upper Edge	12.3
B - Top Surface of Aluminum Plate to Belt Lower Edge	9.1
C - Dummy Centerline to Outer Edge of Belt at Chest Flesh Top	5.5
D - Dummy Centerline to Inner Edge of Belt at Chest Flesh Top	2.9
Lap Belt Tension (lbs.)	4.0
Shoulder Belt Tension (lbs.)	4.0

All distance measurements are in inches.

Appendix A

Photographs



Figure A-1 Pre-Test Front View



Figure A-2 Pre-Test Rear View



Figure A-3 Pre-Test Right Side View



Figure A-4 Pre-Test Driver Dummy - View 1



Figure A-5 Pre-Test Driver Dummy - View 2



Figure A-6 Pre-Test Left Front Suspension String Potentiometer View



Figure A-7 Pre-Test Right Front Suspension String Potentiometer View



Figure A-8 Pre-Test Left Rear Suspension String Potentiometer View



Figure A-9 Pre-Test Right Rear Suspension String Potentiometer View



Figure A-10 Pre-Test Vehicle Center of Gravity Instrumentation View

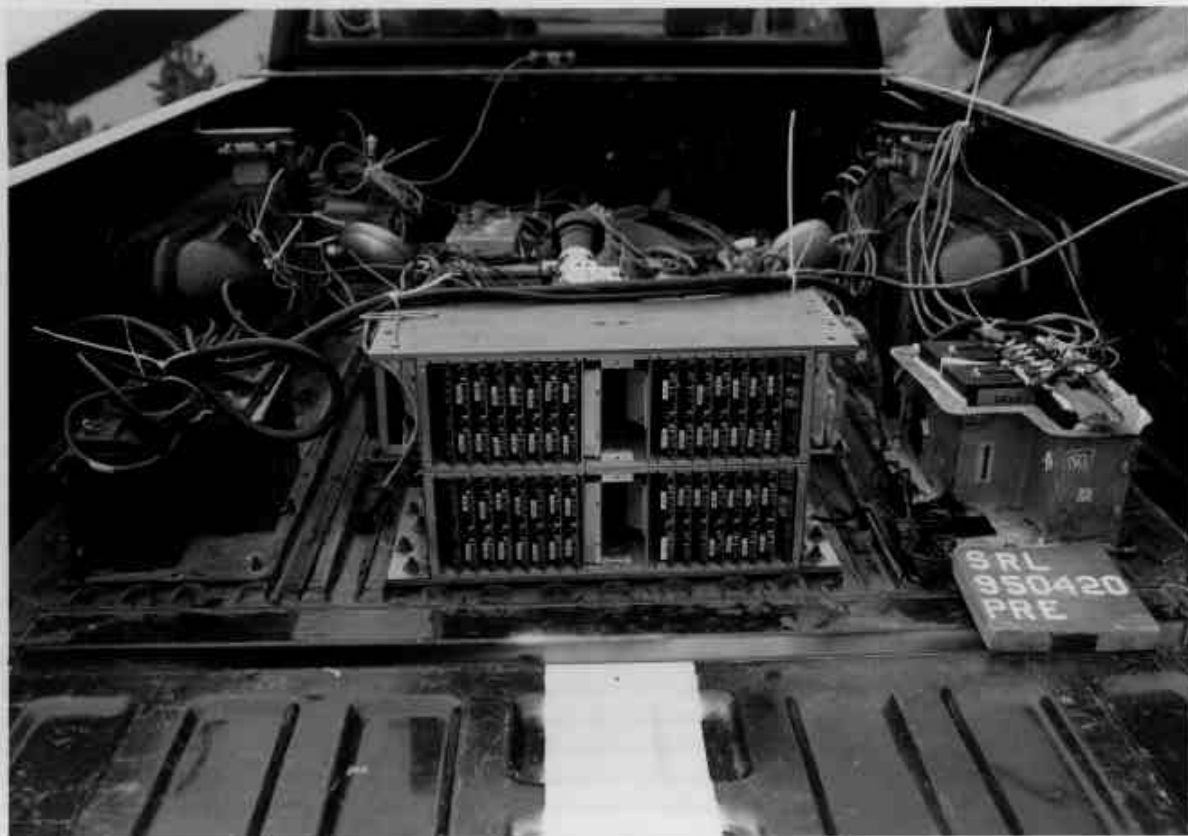


Figure A-11 Pre-Test Vehicle Instrumentation And Ballast Location View



Figure A-12 Post-Test Front View



Figure A-13 Post-Test Left Side View



Figure A-14 Post-Test Rear View



Figure A-15 Post-Test Right Side View



Figure A-16 Post-Test Dummy And Vehicle - View 1



Figure A-17 Post-Test Dummy And Vehicle - View 2



Figure A-18 Post-Test Dummy And Vehicle - View 3



Figure A-19 Post-Test Dummy Damage View



Figure A-20 Post-Test Initial Contact Point View



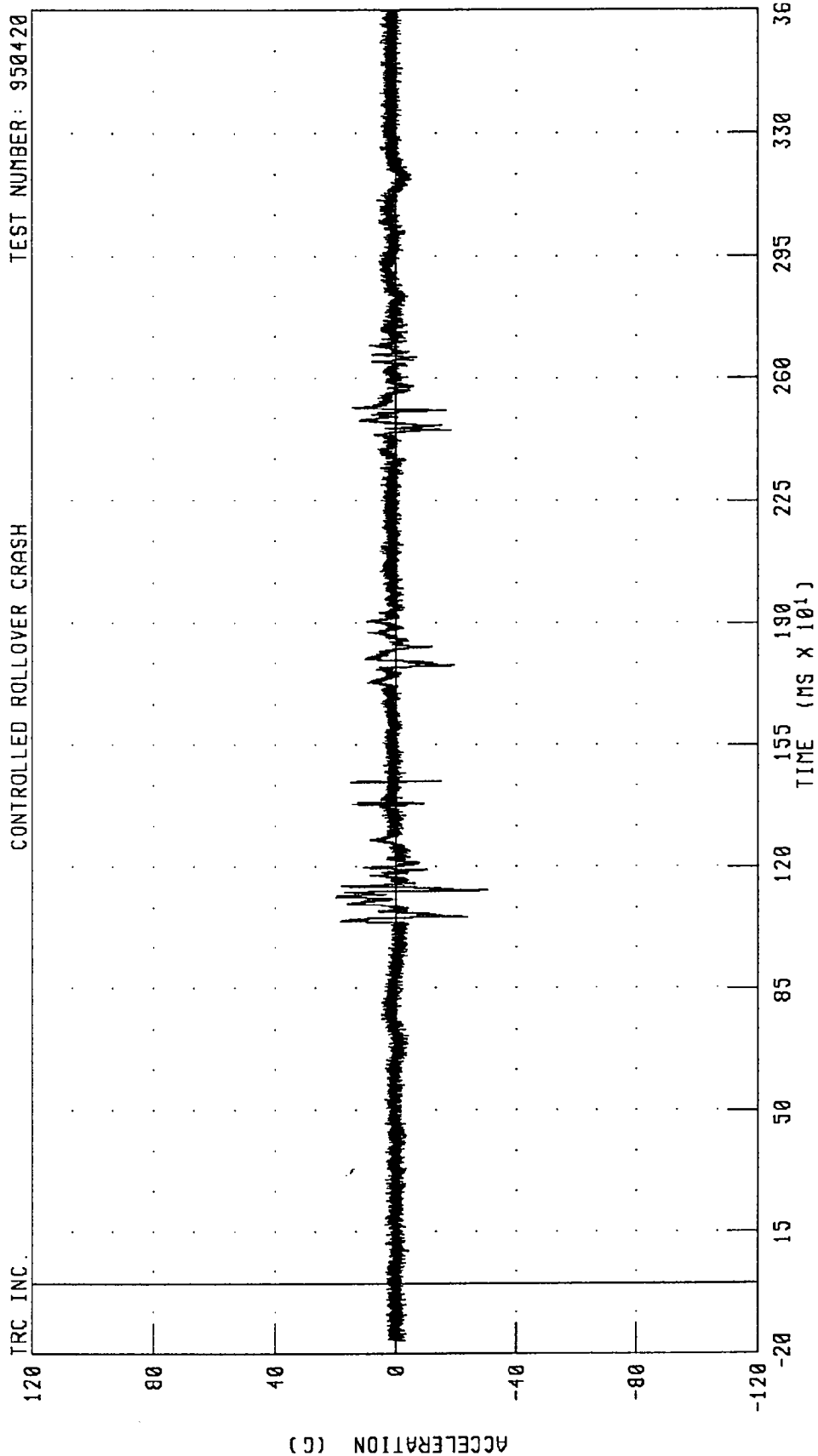
Figure A-21 Post-Test Second Roll Contact Point View

Appendix B

Data Plots

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD X-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

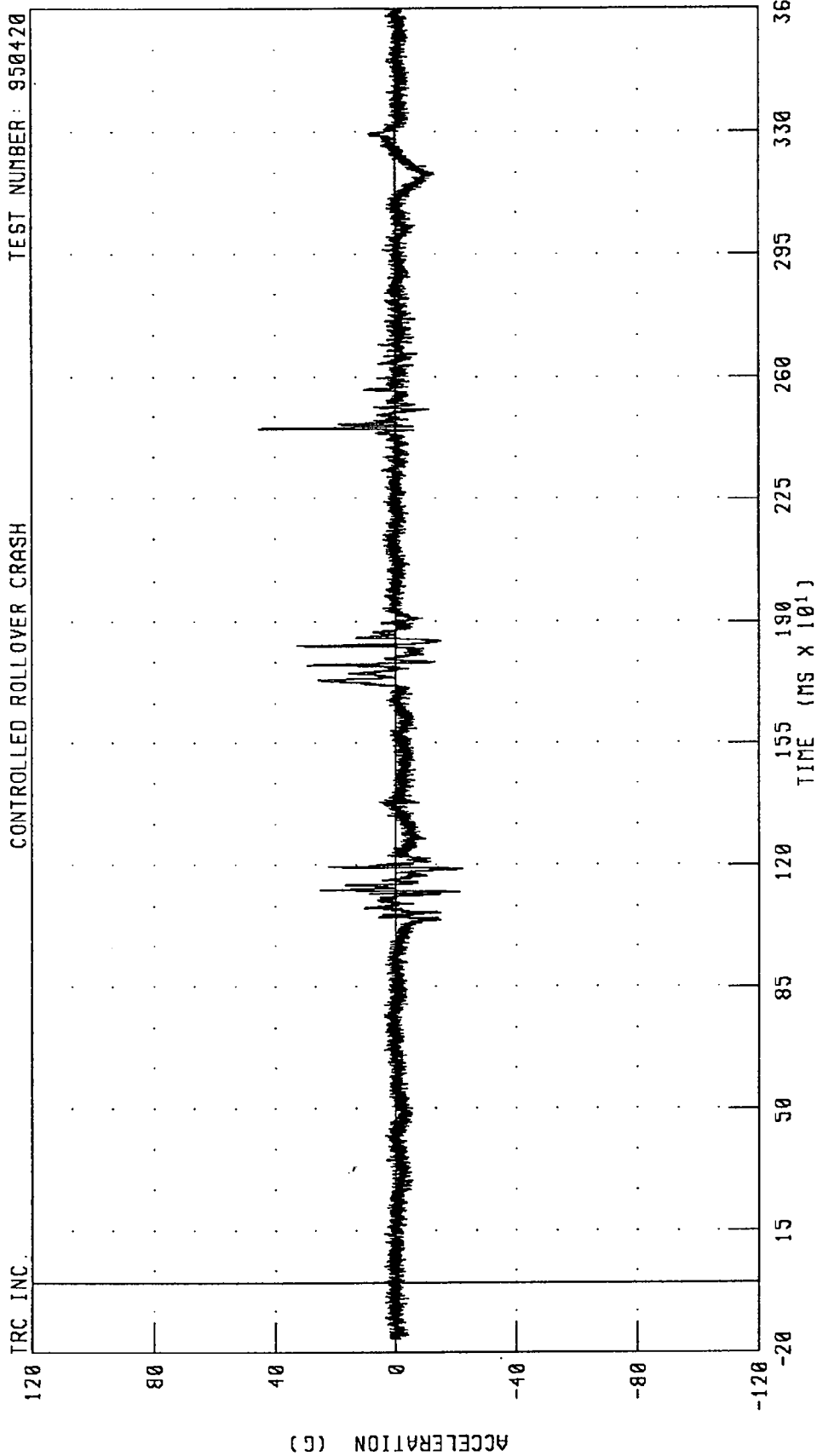


CHANNEL: HEDXG1 FILTER: CH. CLASS 1000

PEAK DATA: 19.92 G @ 1114.75 MS; -30.44 G @ 1133.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 DRIVER HEAD Y-AXIS ACCELERATION
 CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



CHANNEL: HEDYG1 FILTER: CH. CLASS 1000

PEAK DATA: 45.43 G @ 2451.63 MS; -21.83 G @ 1191.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD Z-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.

120

80

40

ACCELERATION (G)

-40

-80

-120

-20

15

50

85

120

155

190

225

260

295

330

365

TIME (MS X 10¹)

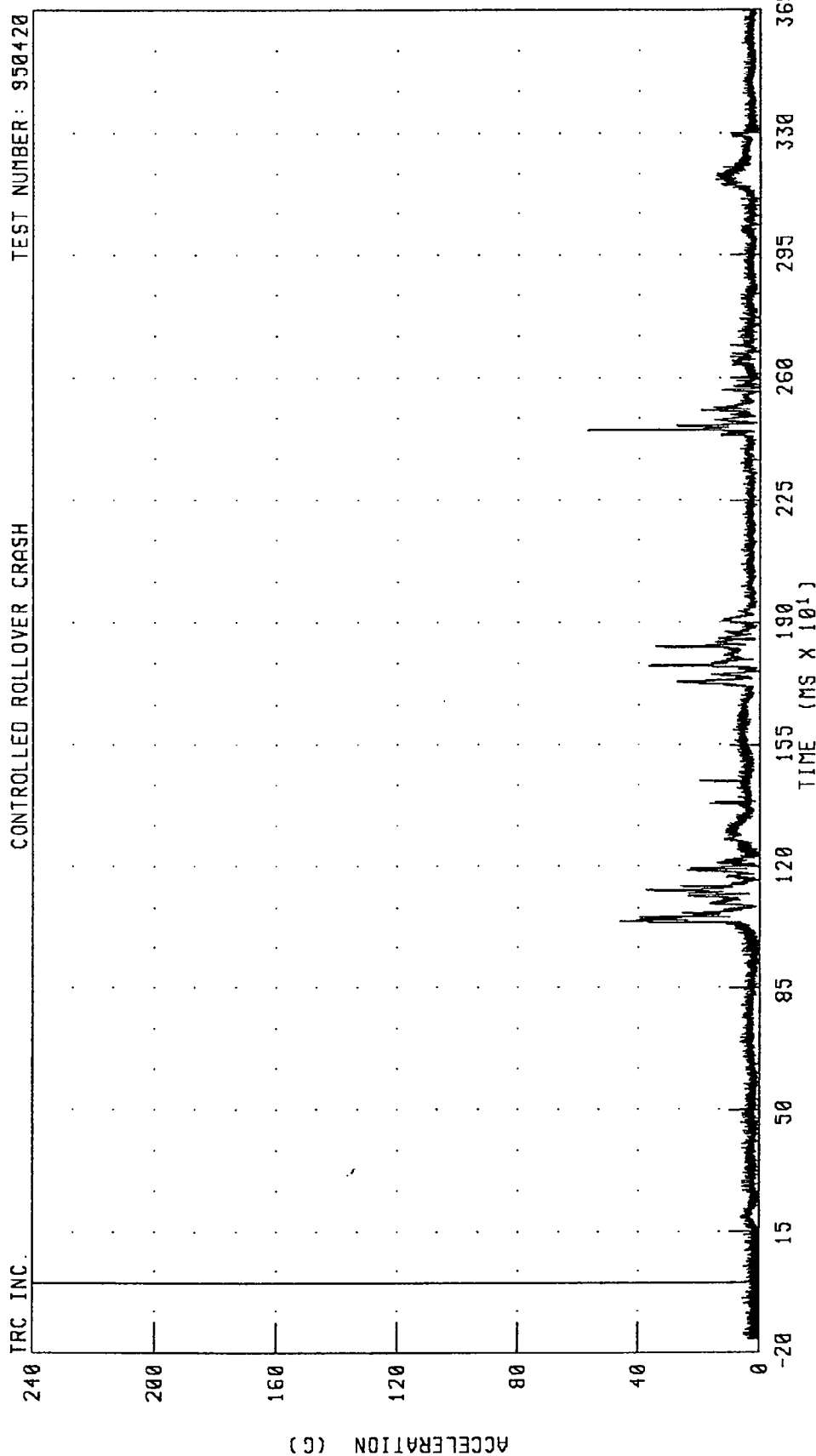
CHANNEL: HEDZG1 FILTER: CH. CLASS 1000

PEAK DATA: 19.57 G @ 1133.63 MS; -42.10 G @ 1045.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 DRIVER HEAD RESULTANT ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



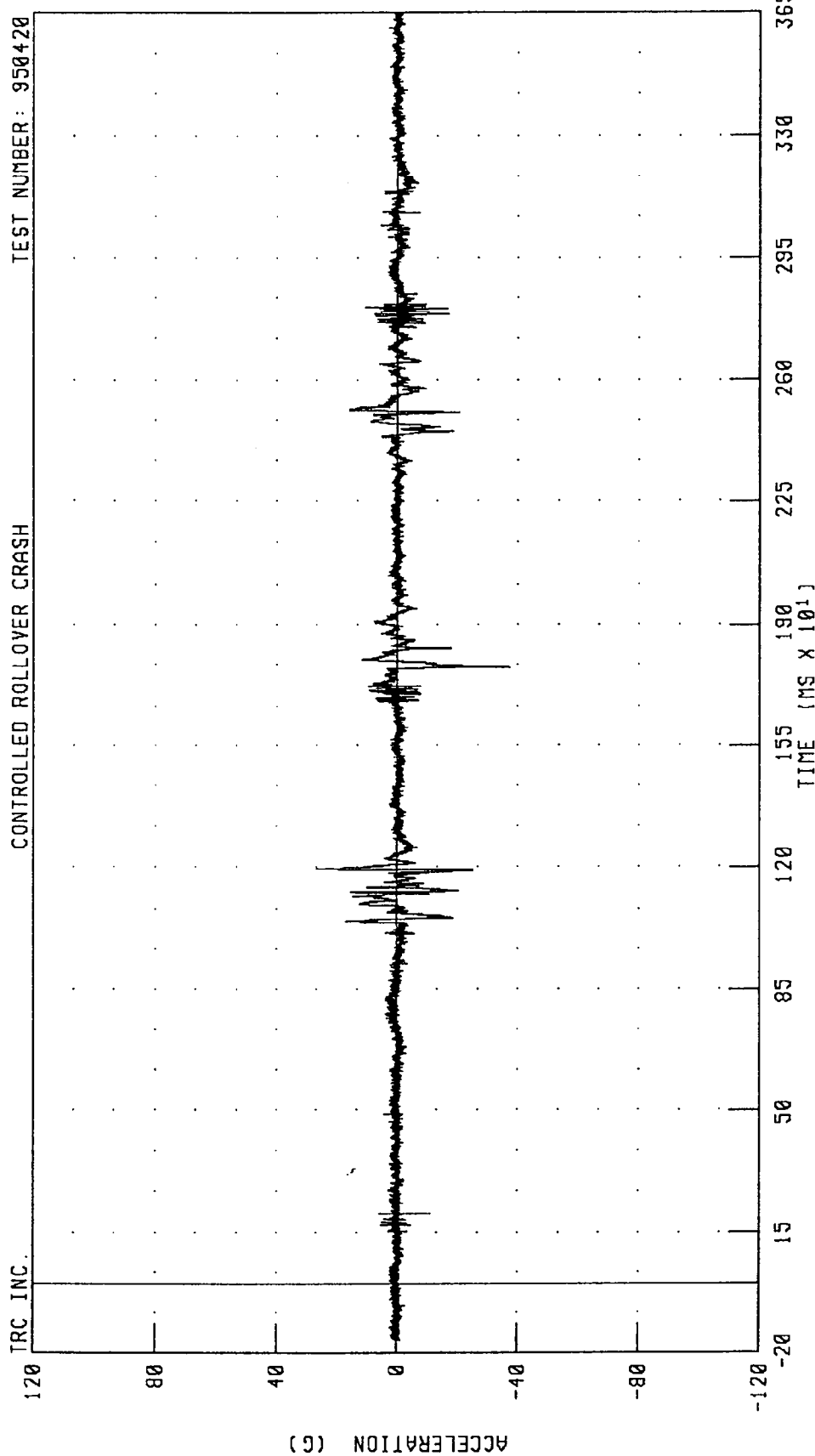
CHANNEL: HEDRG1 FILTER: CH. CLASS 1000

PEAK DATA: 57.04 G @ 2451.63 MS; 0.11 G @ 69.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD POSITION 1 X-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



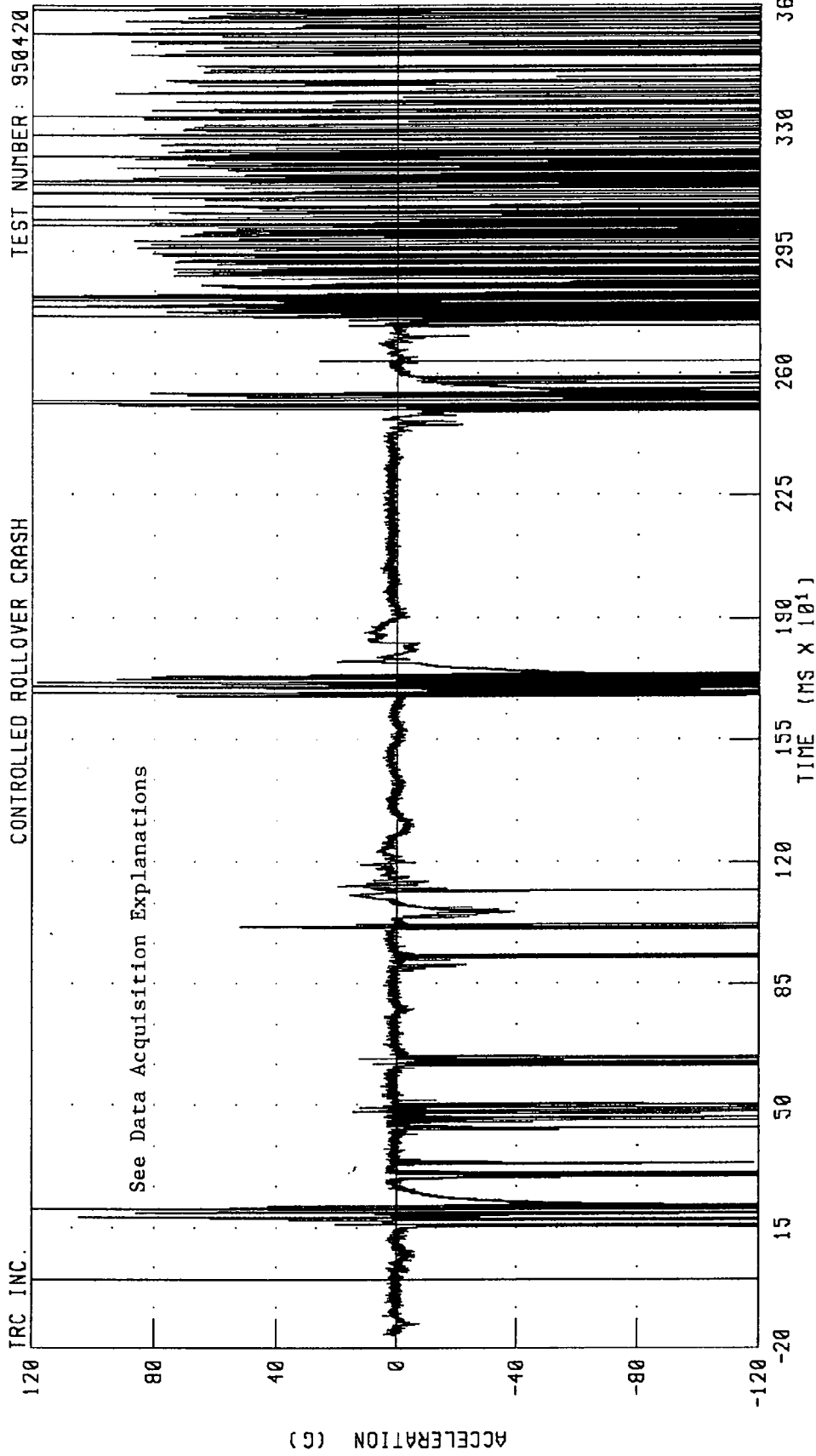
CHANNEL: HD1XG1 FILTER: CH. CLASS 1000

PEAK DATA: 26.85 G @ 1196.63 MS; -37.19 G @ 1778.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD POSITION 1 Z-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



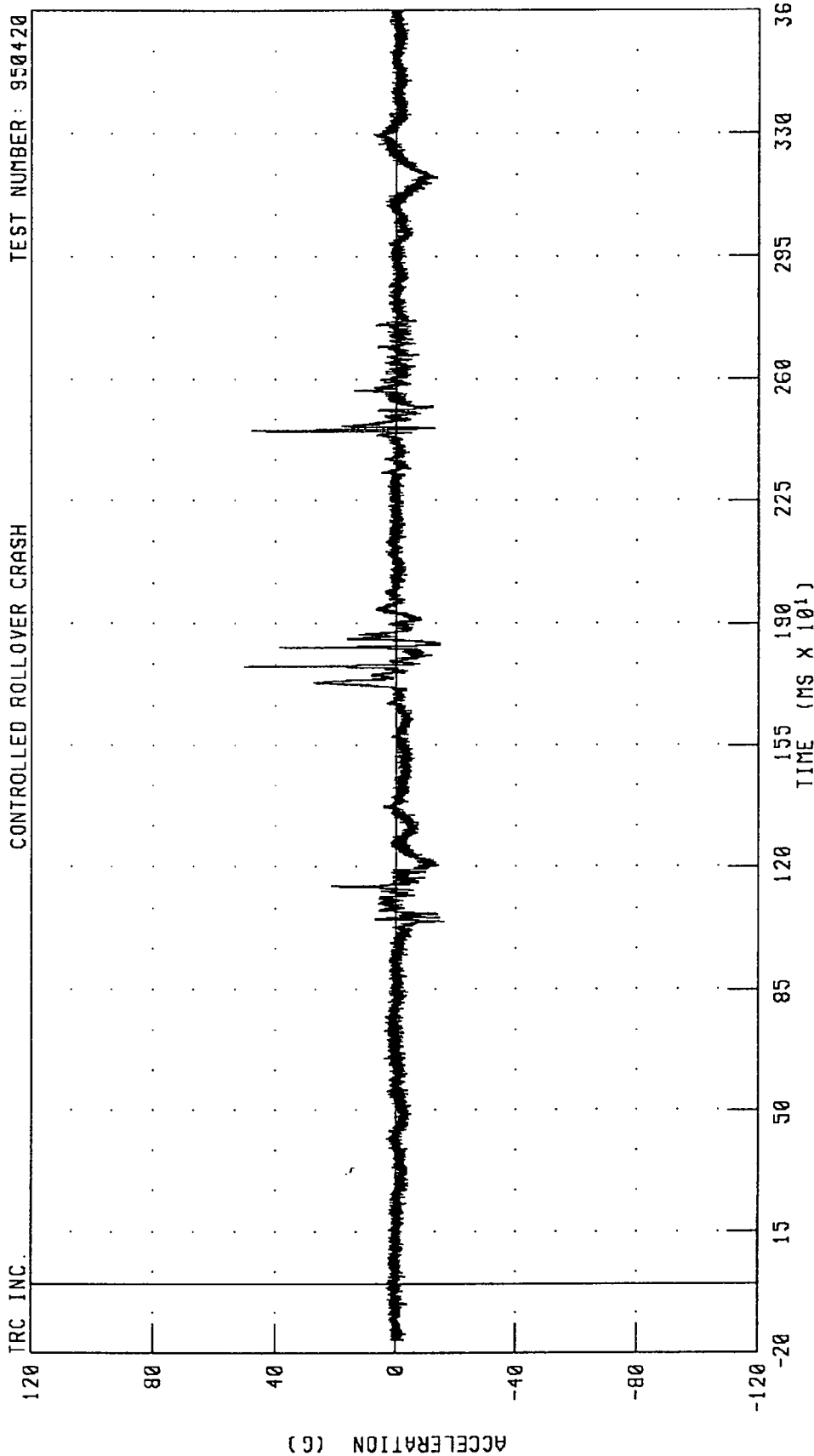
CHANNEL: HD1ZG1 FILTER: CH. CLASS 1000

PEAK DATA: 426.17 G @ 2522.25 MS; -407.93 G @ 178.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD POSITION 2 Y-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



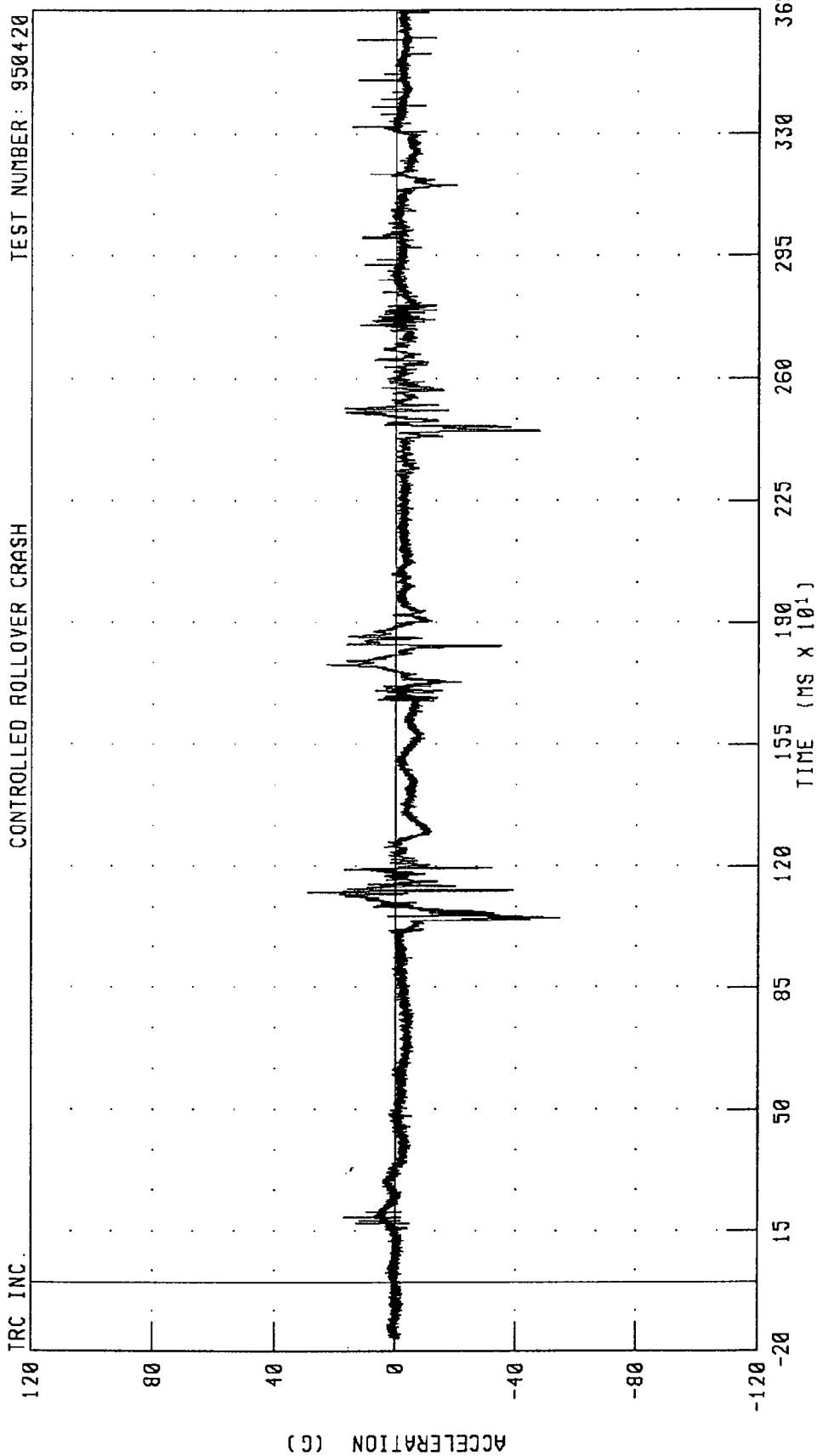
CHANNEL: HD2YG1 FILTER: CH. CLASS 1000

PEAK DATA: 50.09 G @ 1778.75 MS, -16.02 G @ 1046.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD POSITION 2 Z-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



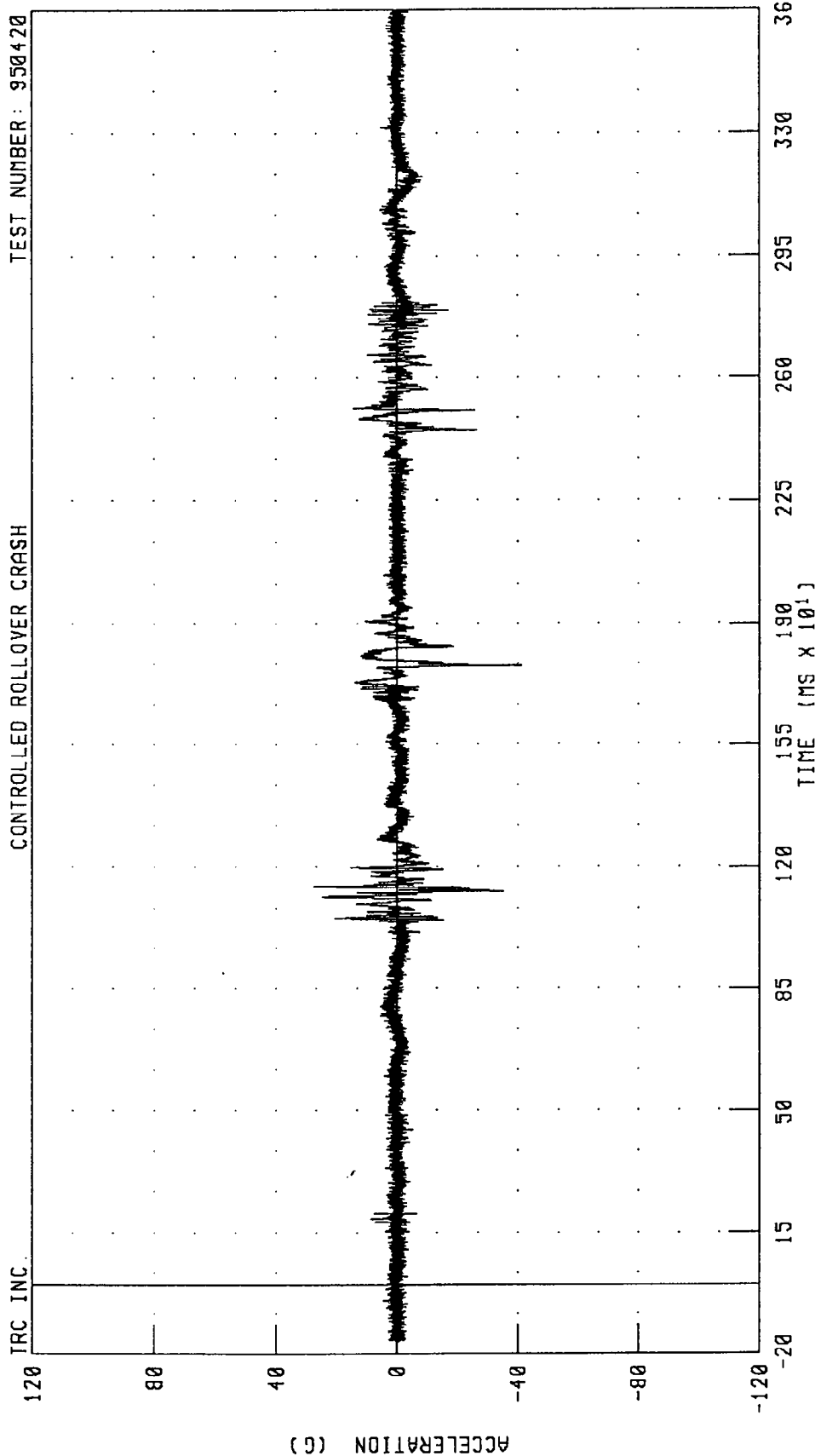
CHANNEL: HD2ZG1 FILTER: CH. CLASS 1000

PEAK DATA: 29.14 G @ 1125.50 MS, -54.52 G @ 1052.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD POSITION 3 X-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

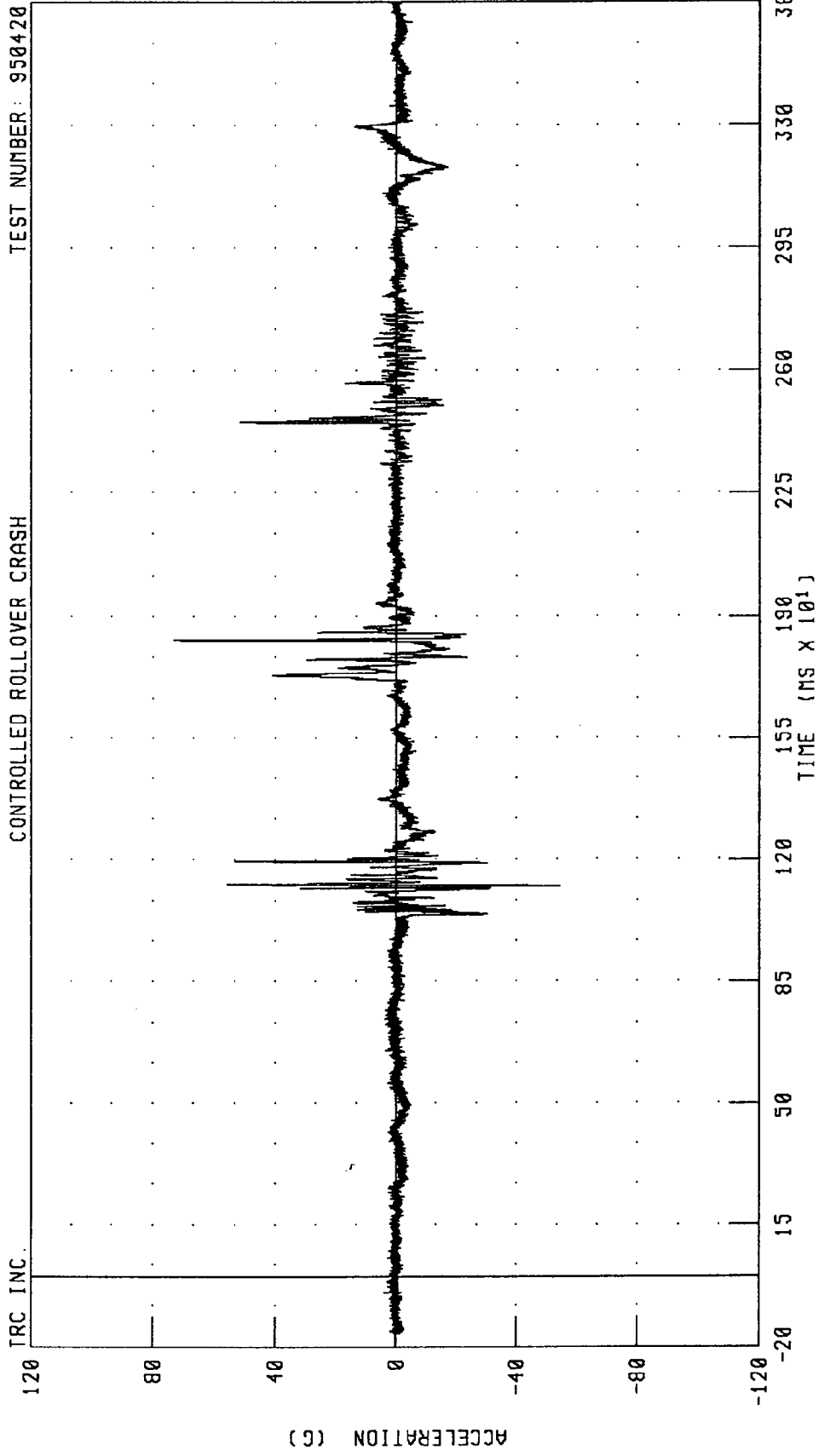


CHANNEL: HD3XG1 FILTER: CH. CLASS 1000 PEAK DATA: 27.38 G @ 1146.13 MS; -41.45 G @ 1778.75 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD POSITION 3 Y-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

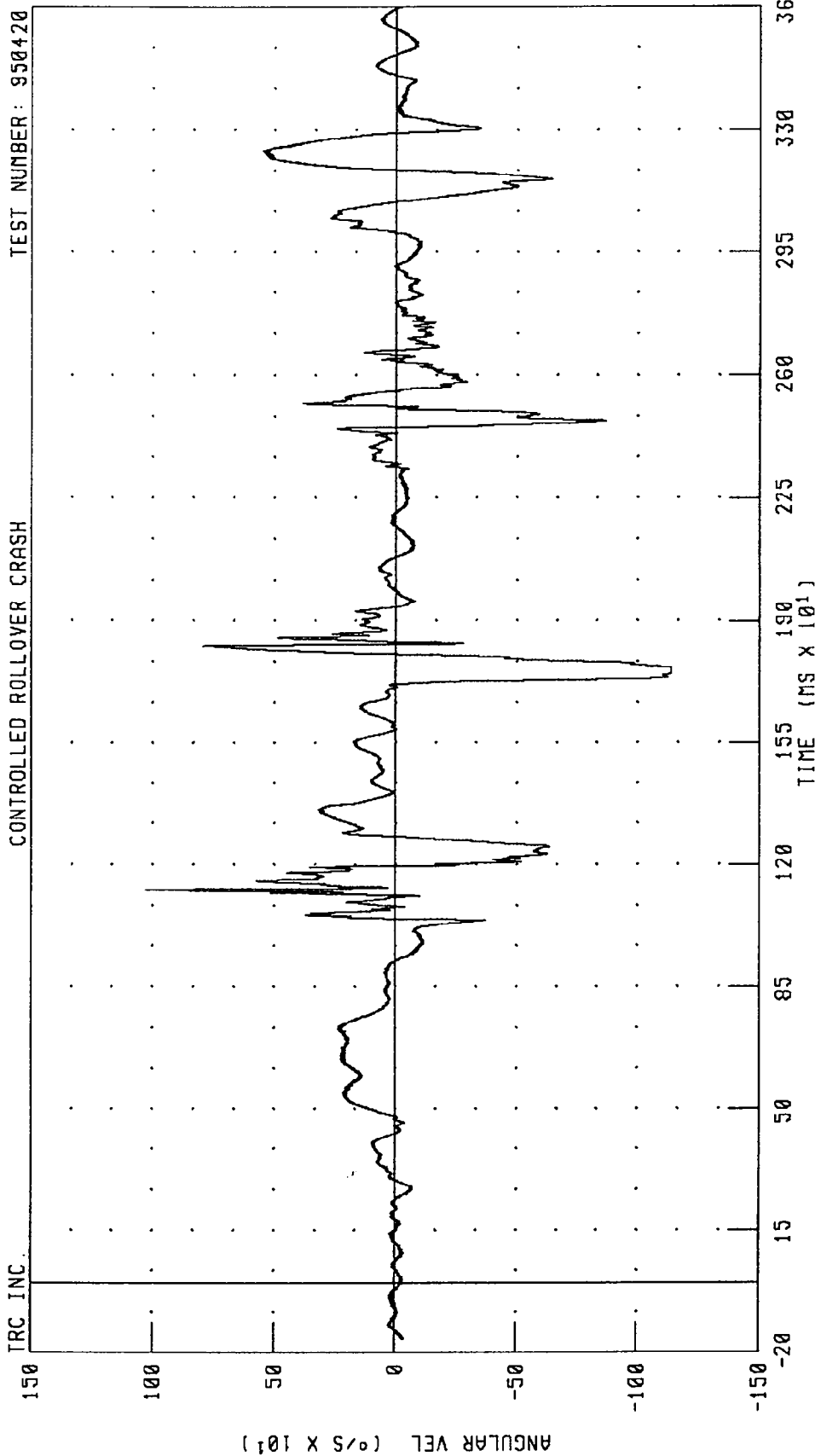


CHANNEL: HD3YG1 FILTER: CH. CLASS 1000

PEAK DATA: 73.23 G @ 1832.50 MS; -54.47 G @ 1125.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD X-AXIS ANGULAR VELOCITY
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



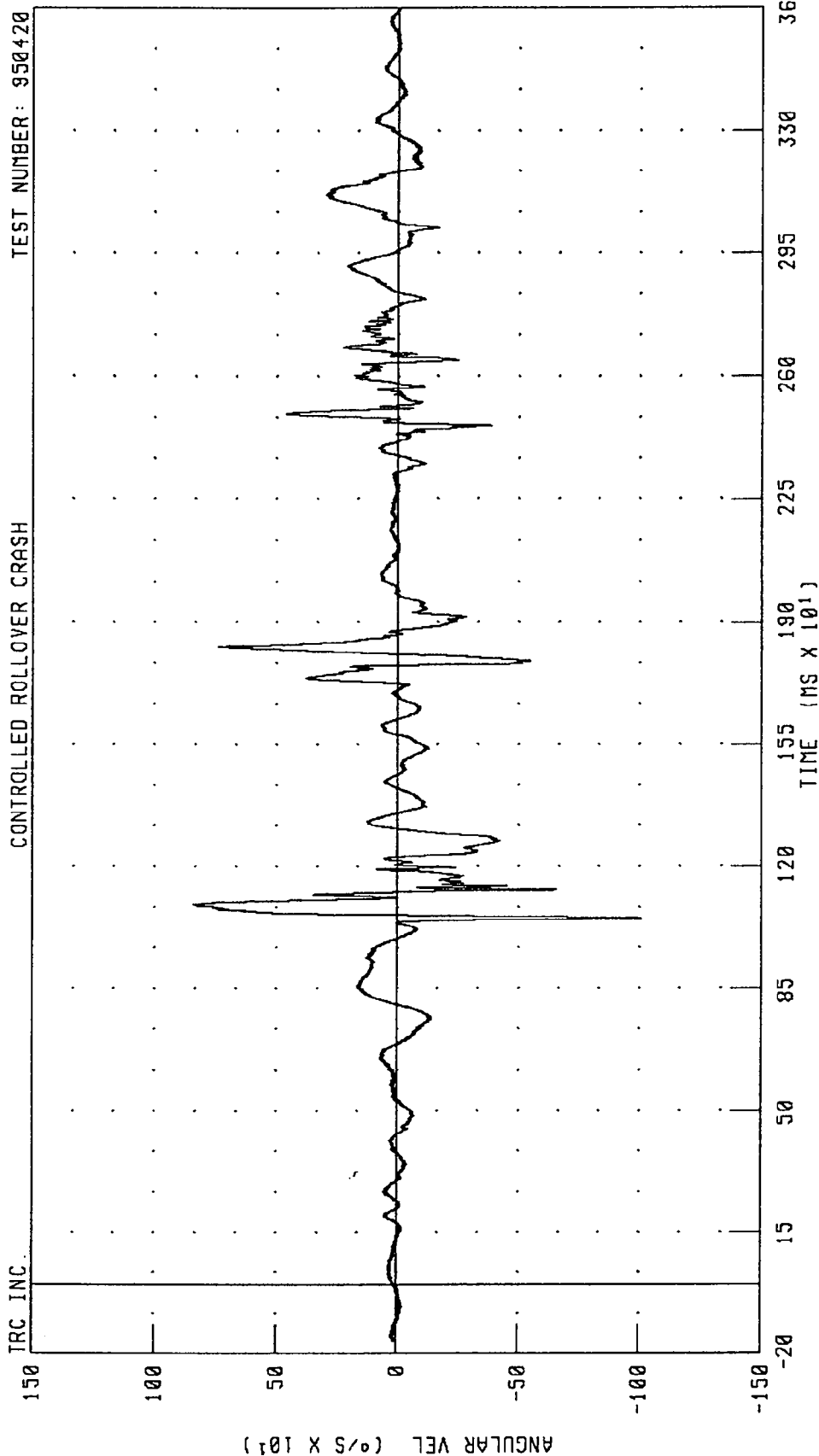
CHANNEL: HEDXV1 FILTER: CH. CLASS 1000

PEAK DATA: 1027.08 $^{\circ}/S$ @ 1128.75 MS; -1137.35 $^{\circ}/S$ @ 1750.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER HEAD Y-AXIS ANGULAR VELOCITY

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

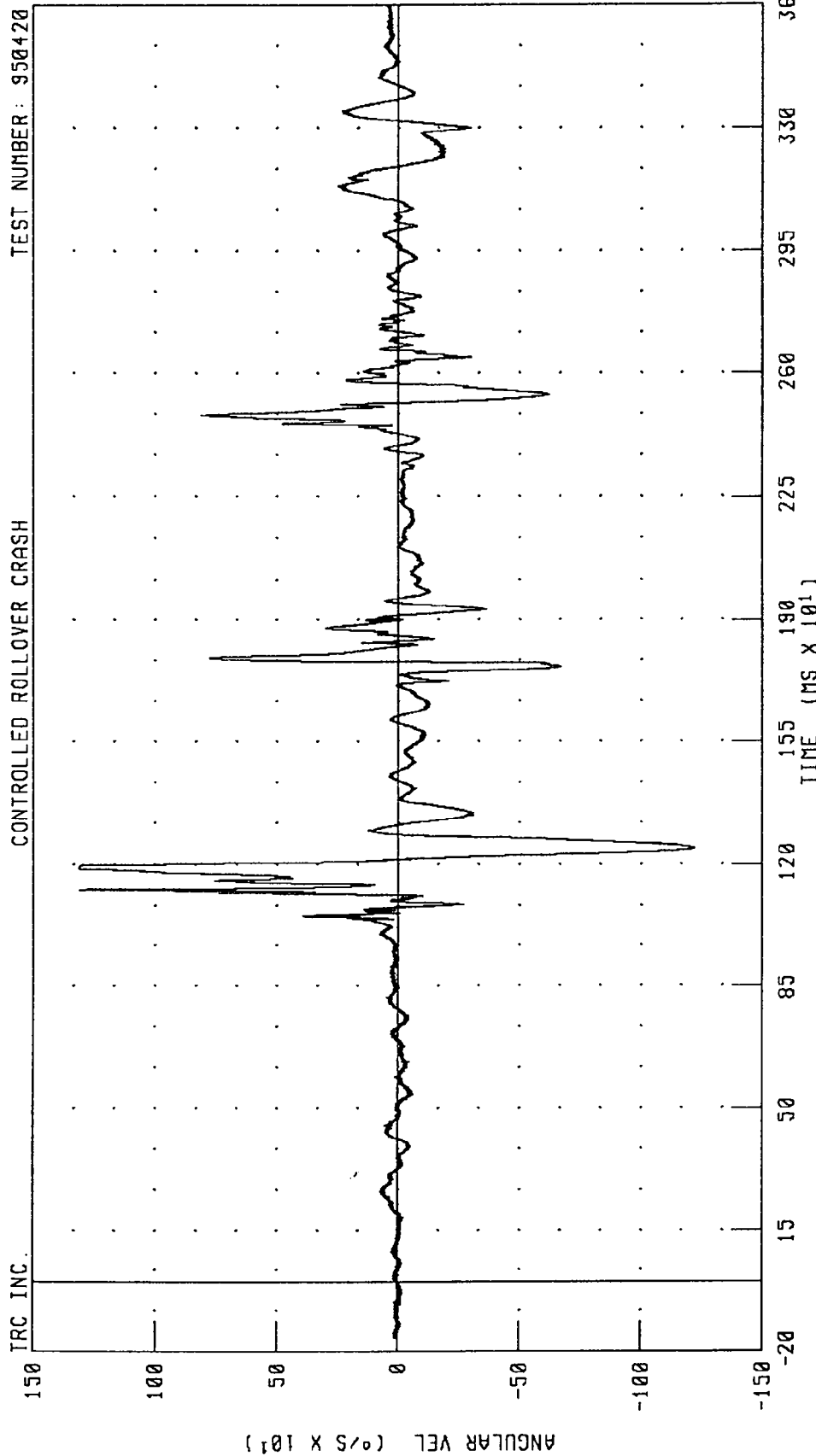


CHANNEL: HEDYV1 FILTER: CH. CLASS 1000
PEAK DATA: 841.74 °/S @ 1092.25 MS; -1005.64 °/S @ 1052.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 DRIVER HEAD Z-AXIS ANGULAR VELOCITY

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

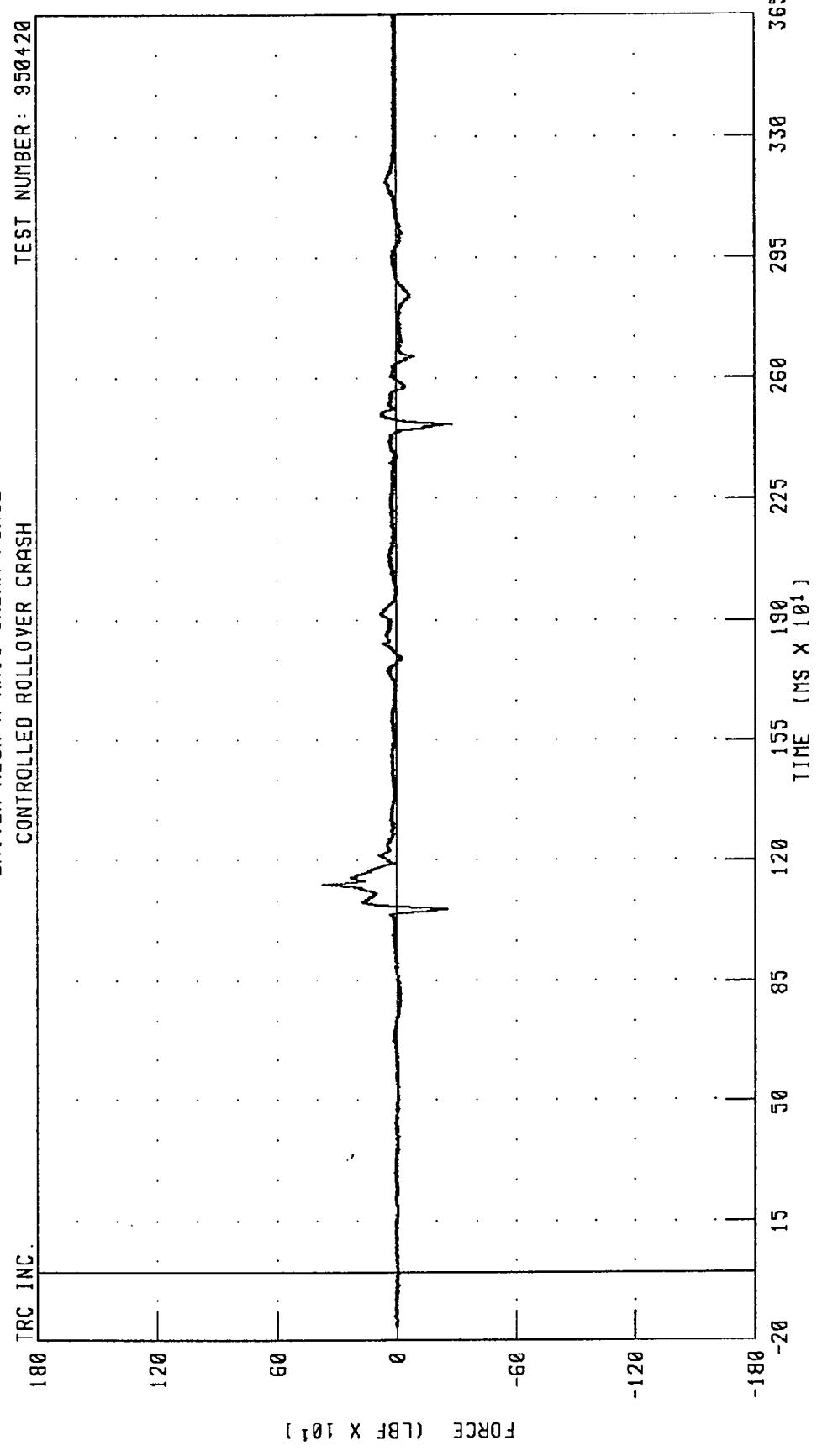


PEAK DATA: 1308.31 °/S @ 1129.50 MS; -1220.79 °/S @ 1247.00 MS

CHANNEL: HEDZV1 FILTER: CH. CLASS 1000

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER NECK X-AXIS SHEAR FORCE
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

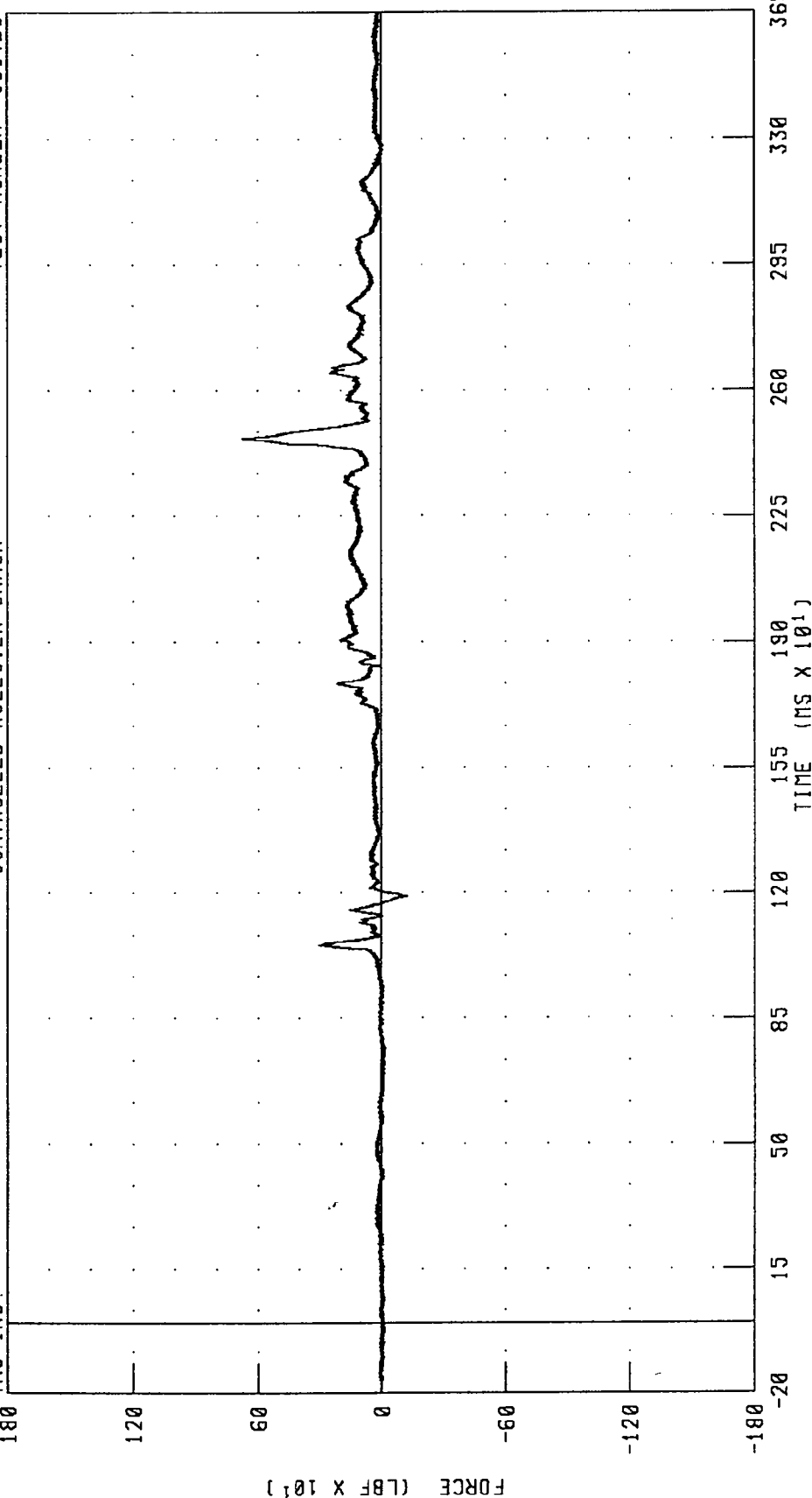


CHANNEL: NEKXF1 FILTER: CH. CLASS 1000
PEAK DATA: 376.59 LBF @ 113.75 MS; -278.51 LBF @ 2465.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER NECK Y-AXIS SHEAR FORCE
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.



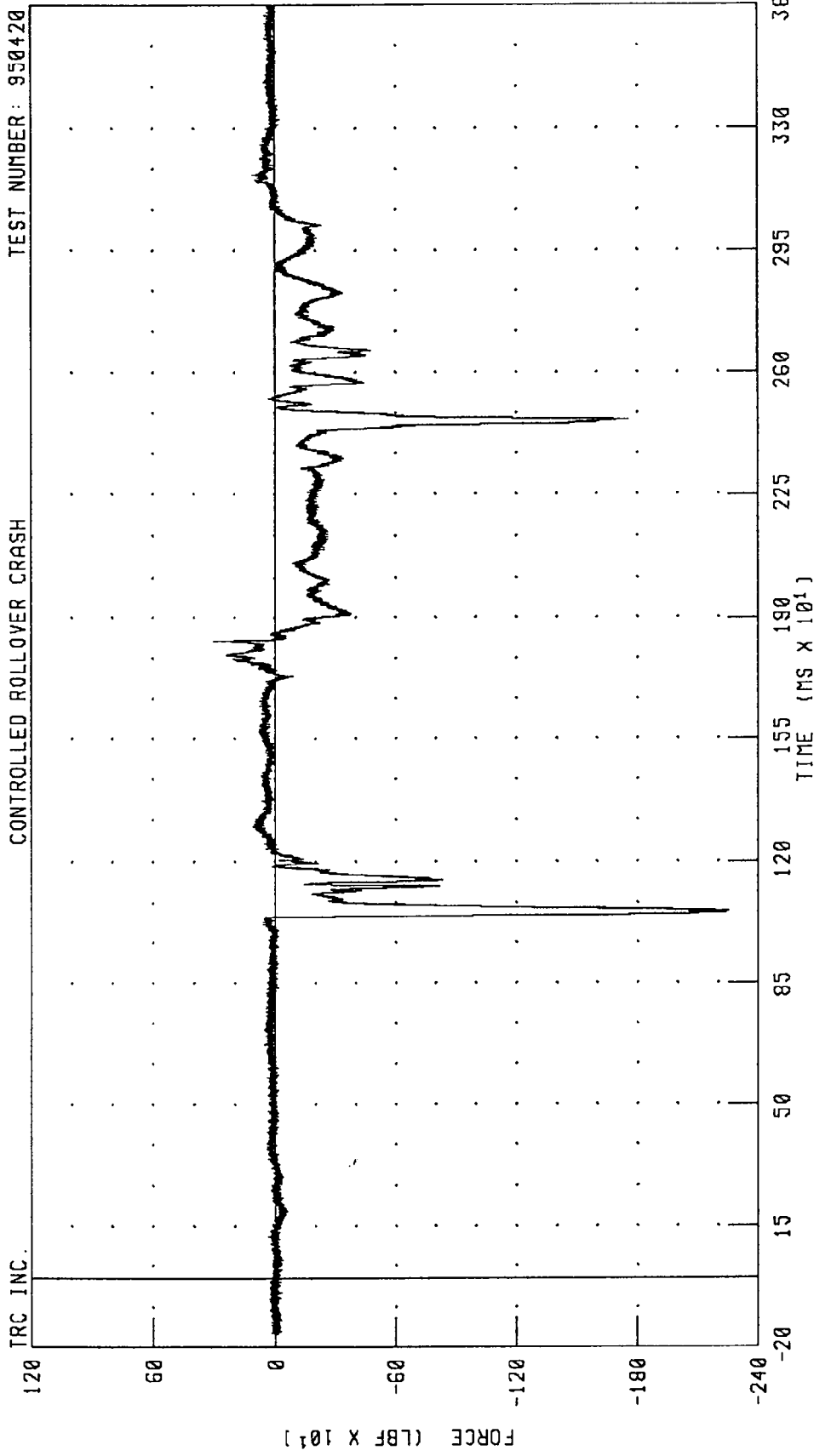
CHANNEL: NEKYF1 FILTER: CH. CLASS 1000

TIME (MS X 10¹)

PEAK DATA: 675.57 LBF @ 2466.63 MS; -123.33 LBF @ 1192.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 DRIVER NECK Z-AXIS AXIAL FORCE
 CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

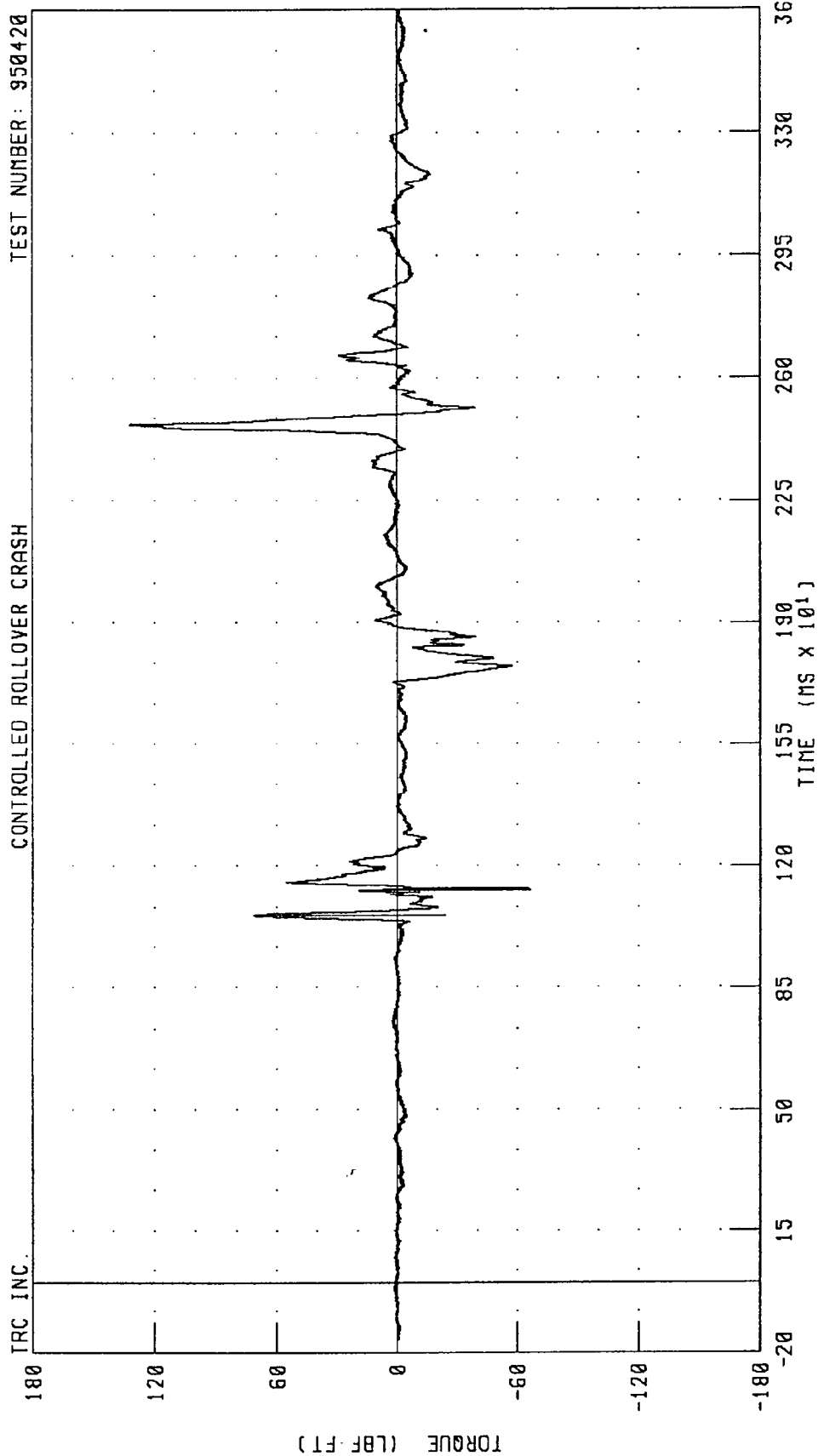


CHANNEL: NEKZF1 FILTER: CH. CLASS 1000

PEAK DATA: 302.59 LBF @ 1834.13 MS; -2252.75 LBF @ 1061.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER NECK MOMENT ABOUT X AXIS
CONTROLLED ROLLOVER CRASH

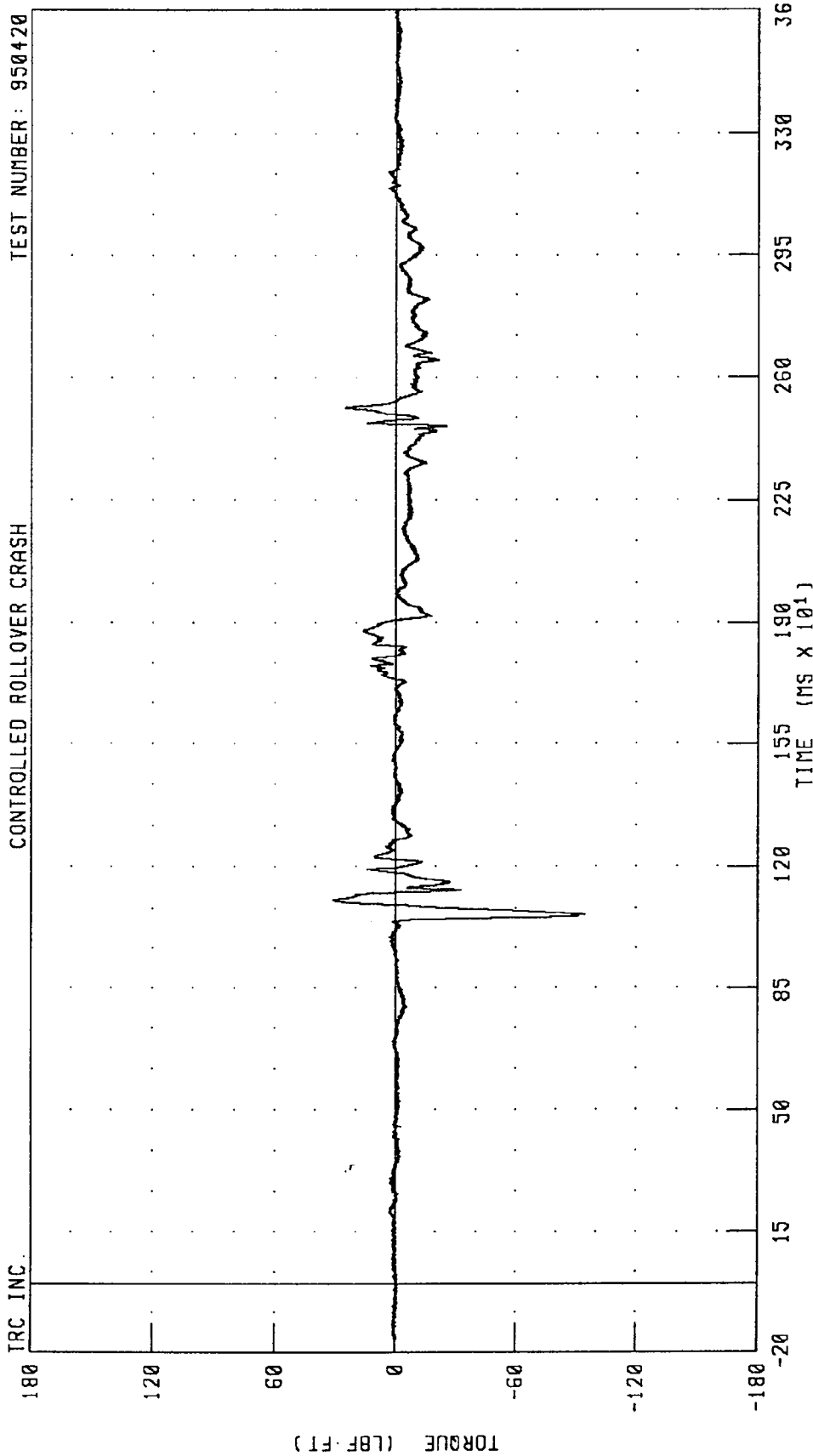
TEST NUMBER: 950420



CHANNEL: NEKXM1 FILTER: CH. CLASS 600 PEAK DATA: 132.26 LBF-FT @ 2465.75 MS; -66.51 LBF-FT @ 1132.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER NECK MOMENT ABOUT Y AXIS
CONTROLLED ROLLOVER CRASH

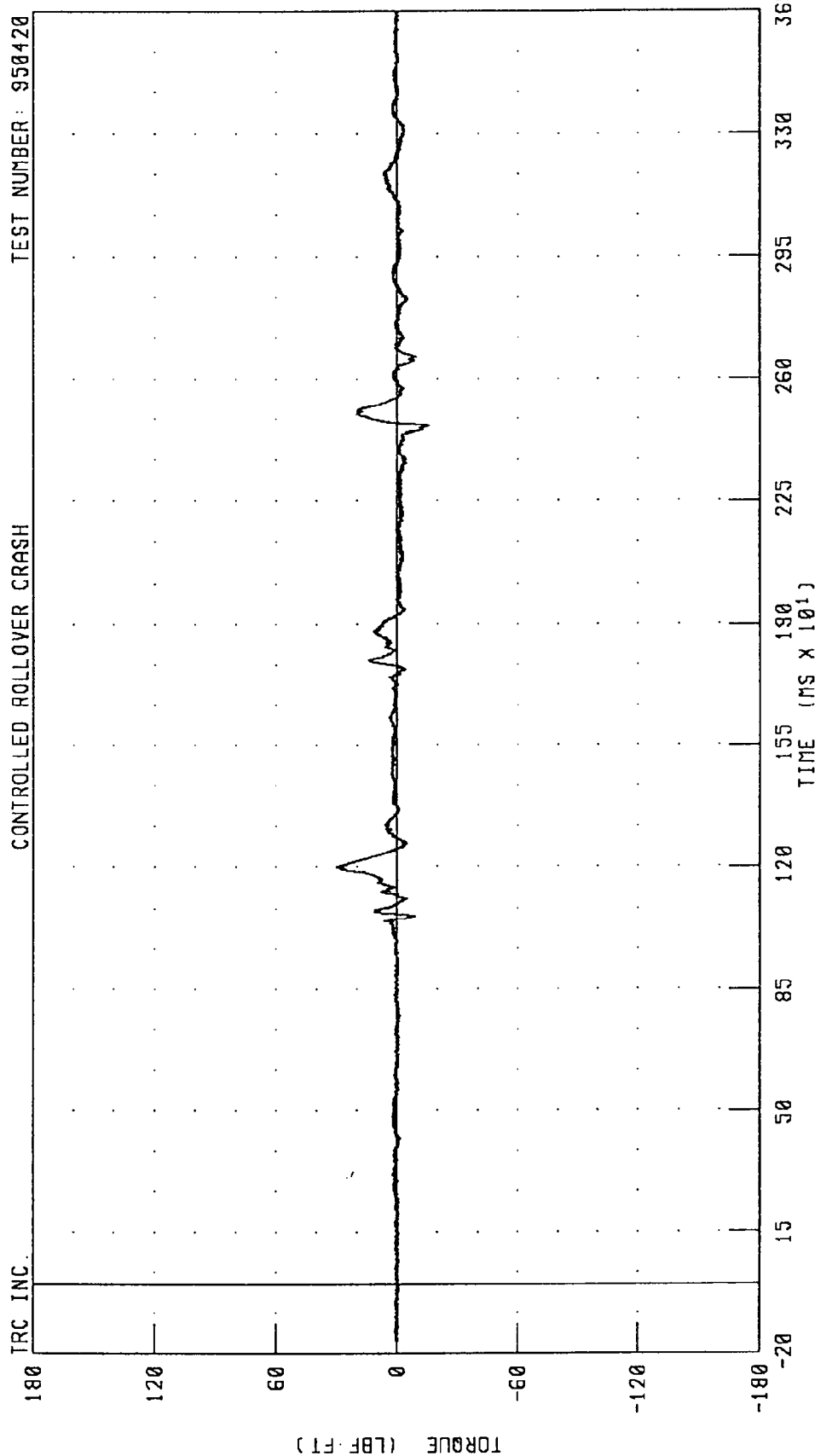
TEST NUMBER: 950420



CHANNEL: NEKYM1 FILTER: CH. CLASS 600 PEAK DATA: 30.92 LBF-FT @ 1105.63 MS; -94.44 LBF-FT @ 1063.75 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER NECK MOMENT ABOUT Z AXIS
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

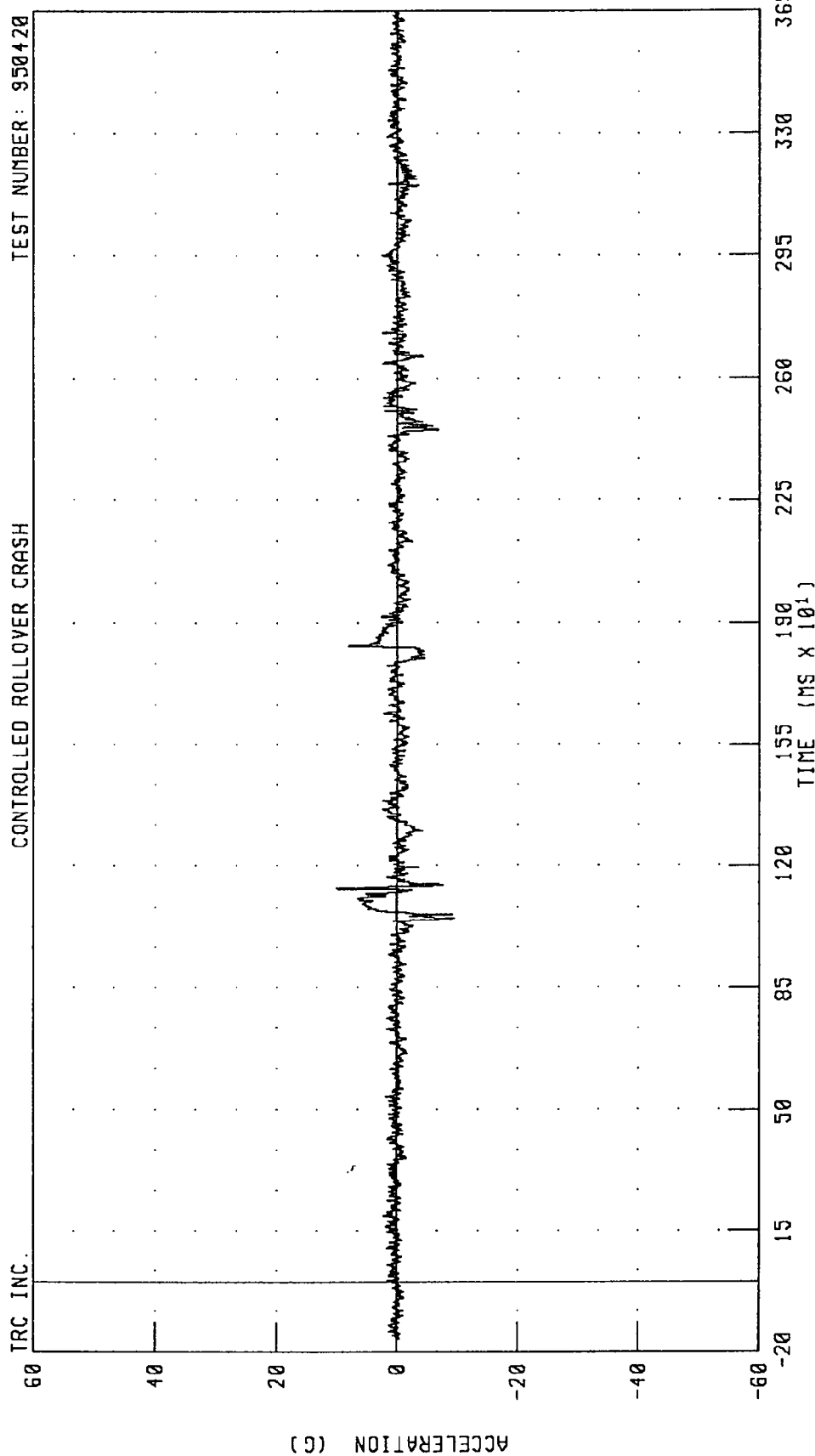


CHANNEL: NEKZM1 FILTER: CH. CLASS 600 PEAK DATA: 30.00 LBF-FT @ 1201.25 MS; -15.56 LBF-FT @ 2465.00 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST X-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



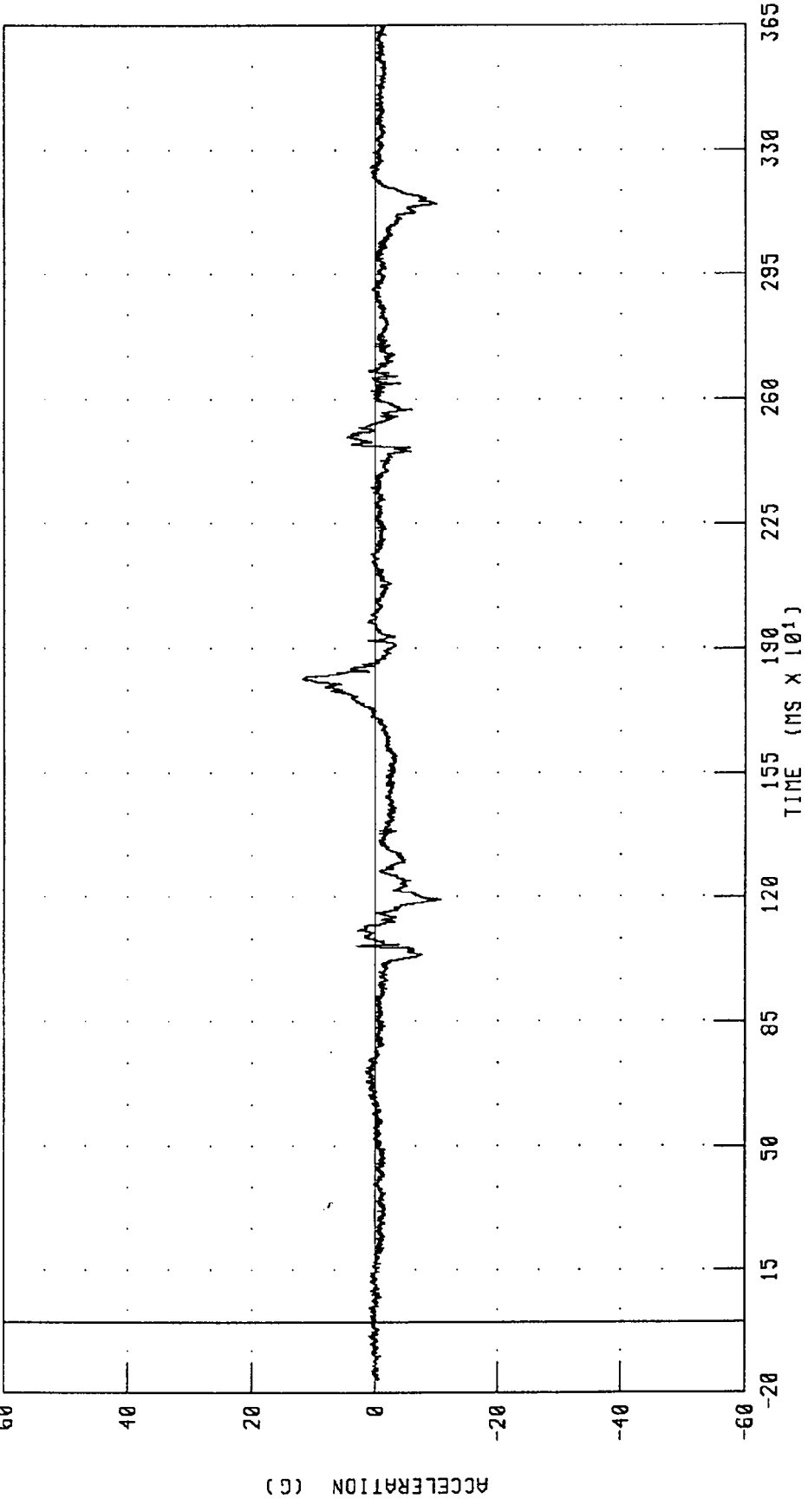
CHANNEL: CSTXG1 FILTER: CH. CLASS 180

PEAK DATA: 10.16 G @ 1136.25 MS; -9.48 G @ 1050.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST Y-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.

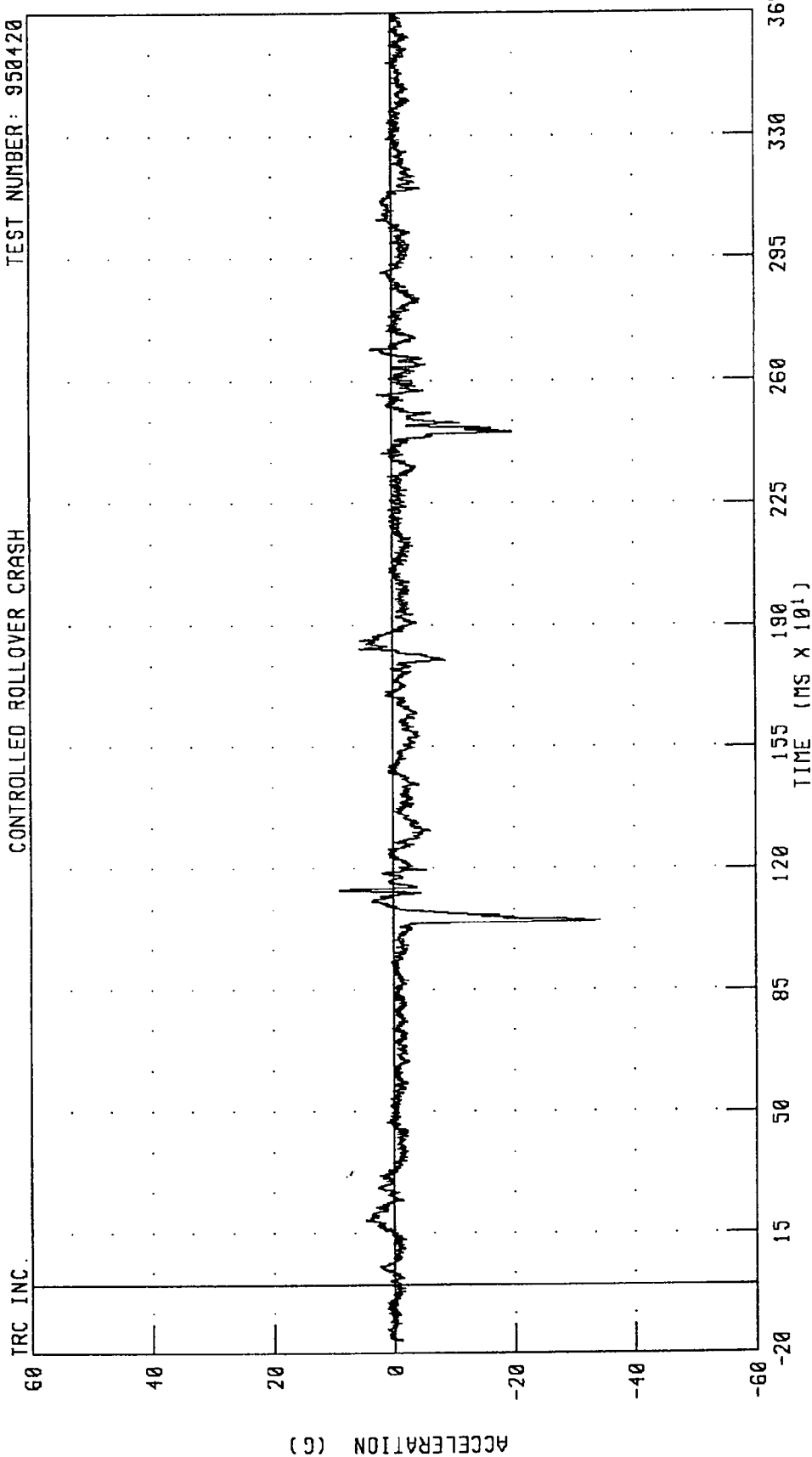


CHANNEL: CSTYG1 FILTER: CH. CLASS 180

PEAK DATA: 11.88 G @ 1816.88 MS; -10.59 G @ 1194.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST Z-AXIS ACCELERATION

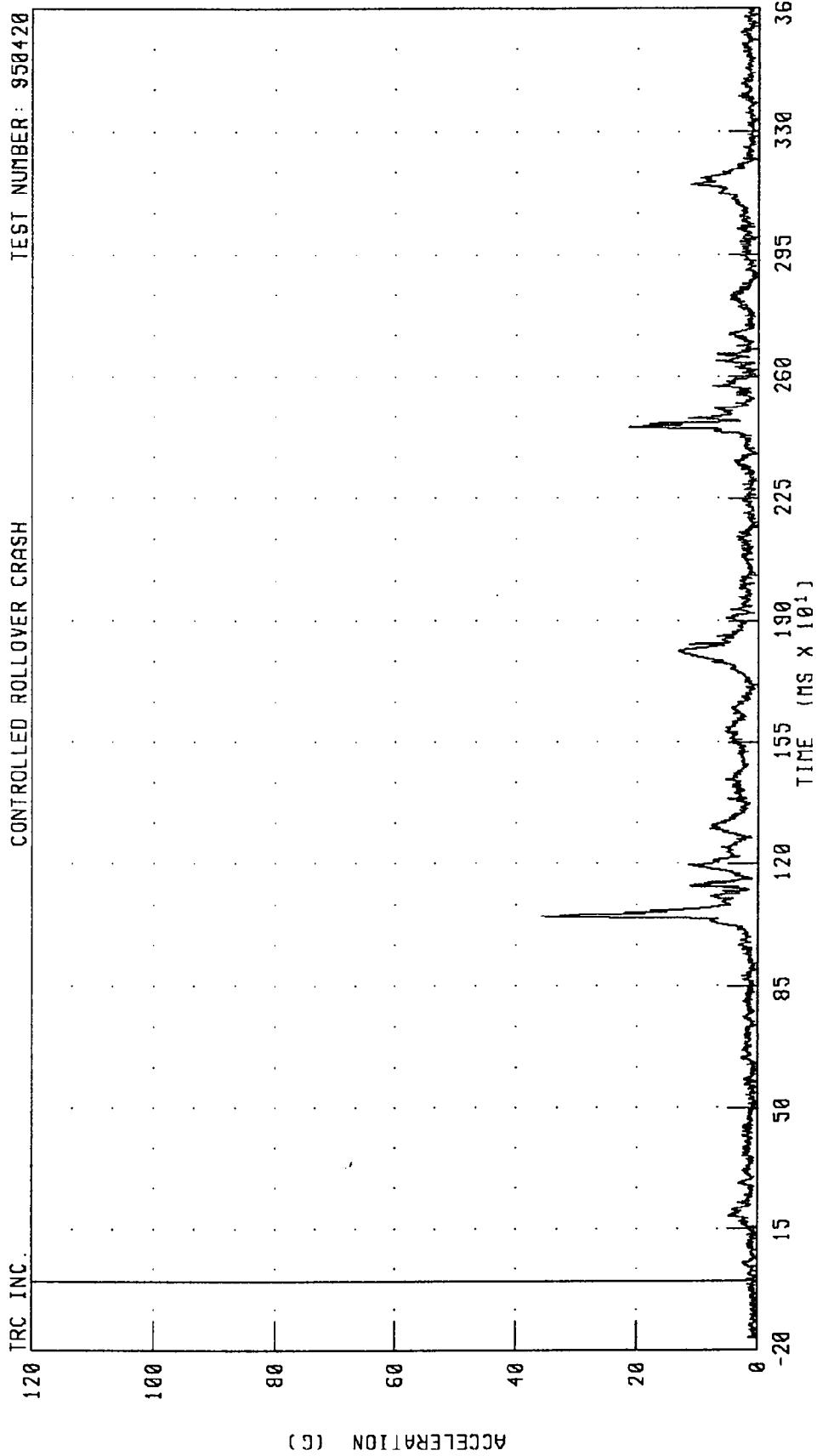
CONTROLLED ROLLOVER CRASH TEST NUMBER: 950420



CHANNEL: CSTZG1 FILTER: CH. CLASS 180

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST RESULTANT ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

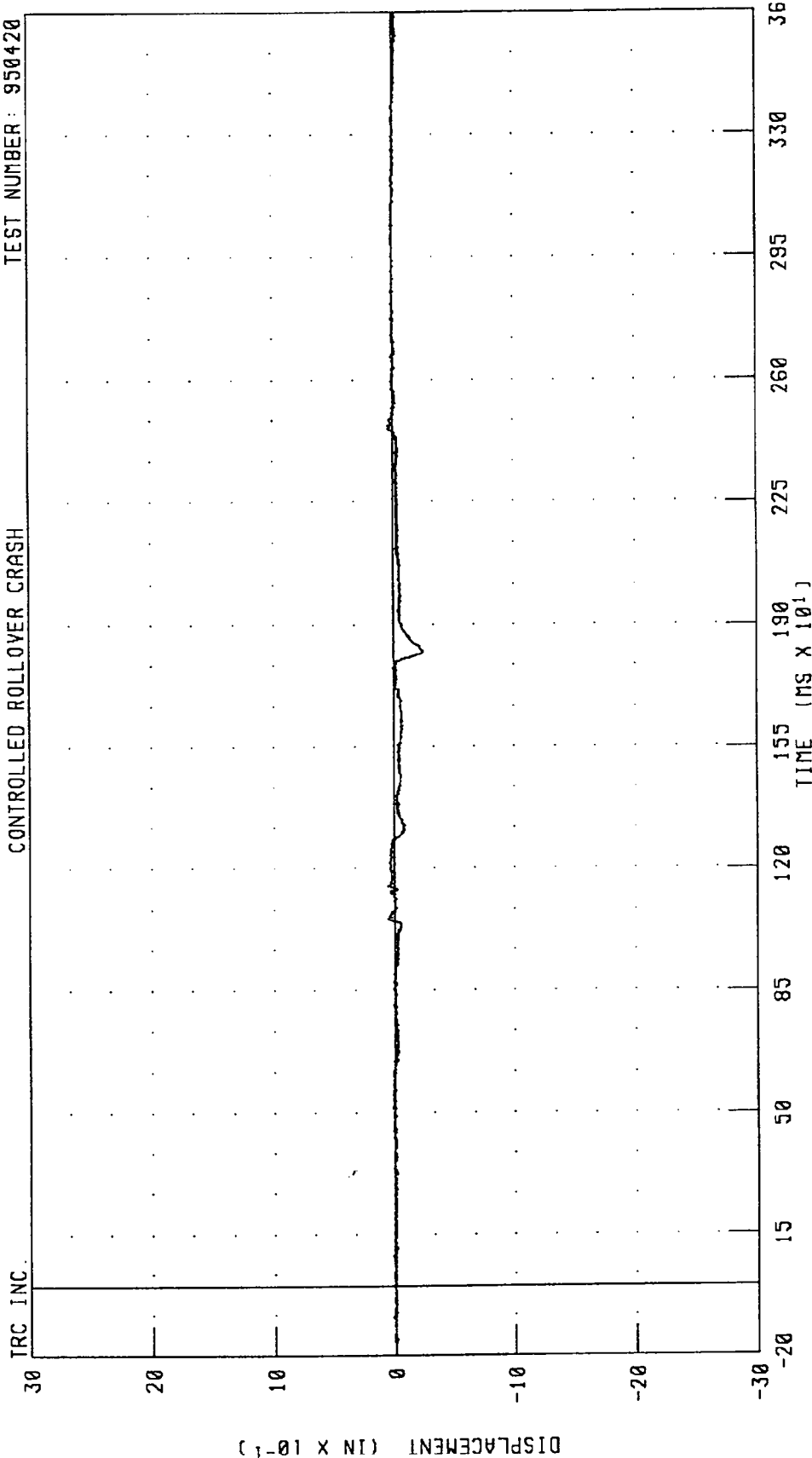


CHANNEL: CSTRG1 FILTER: CH. CLASS 180

PEAK DATA: 35.78 G @ 1051.13 MS; 0.08 G @ -114.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 DRIVER CHEST DEFLECTION
 CONTROLLED ROLLOVER CRASH

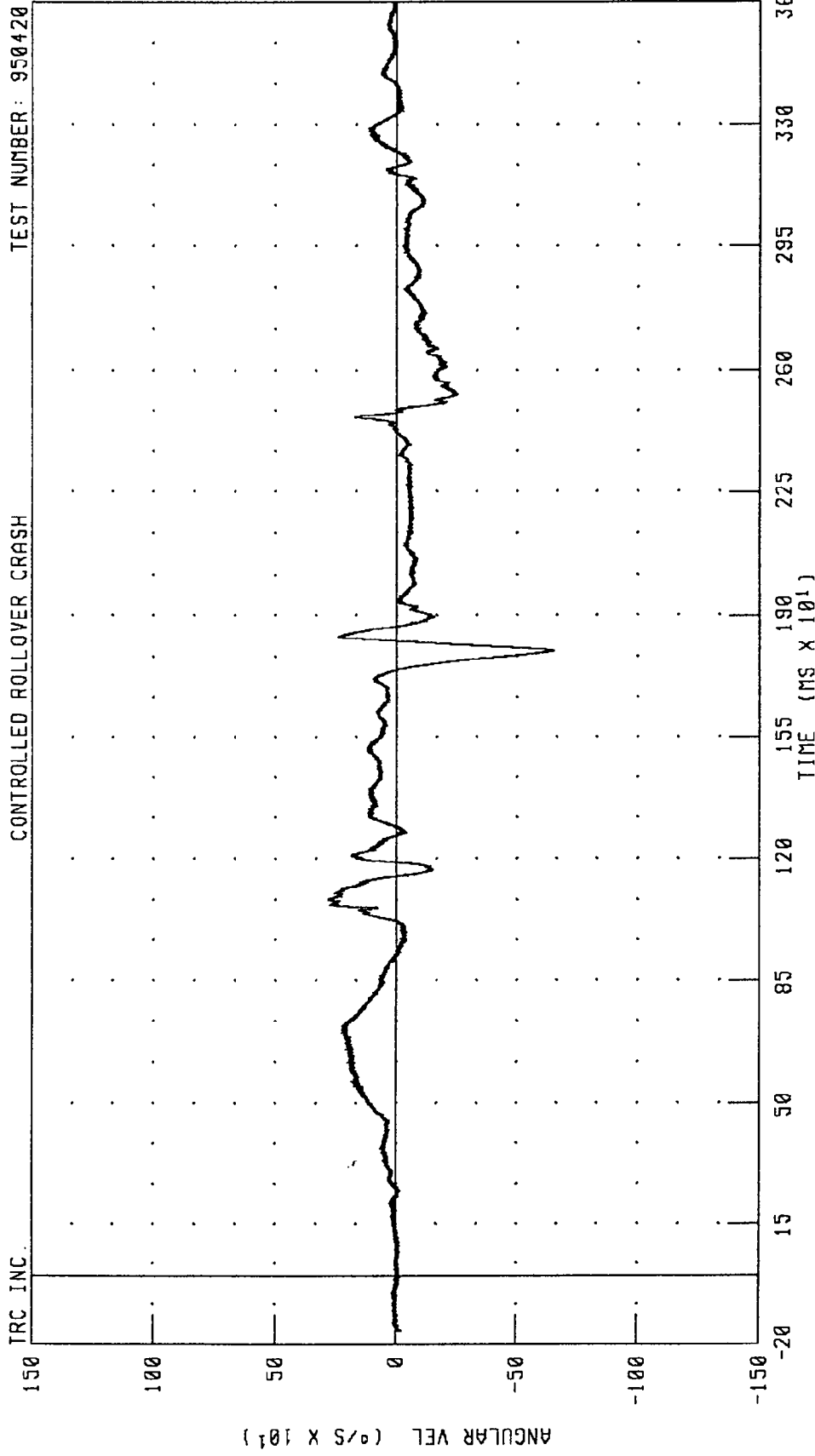
TEST NUMBER: 950420



CHANNEL: CSTXD1 FILTER: CH. CLASS 180

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST X-AXIS ANGULAR VELOCITY

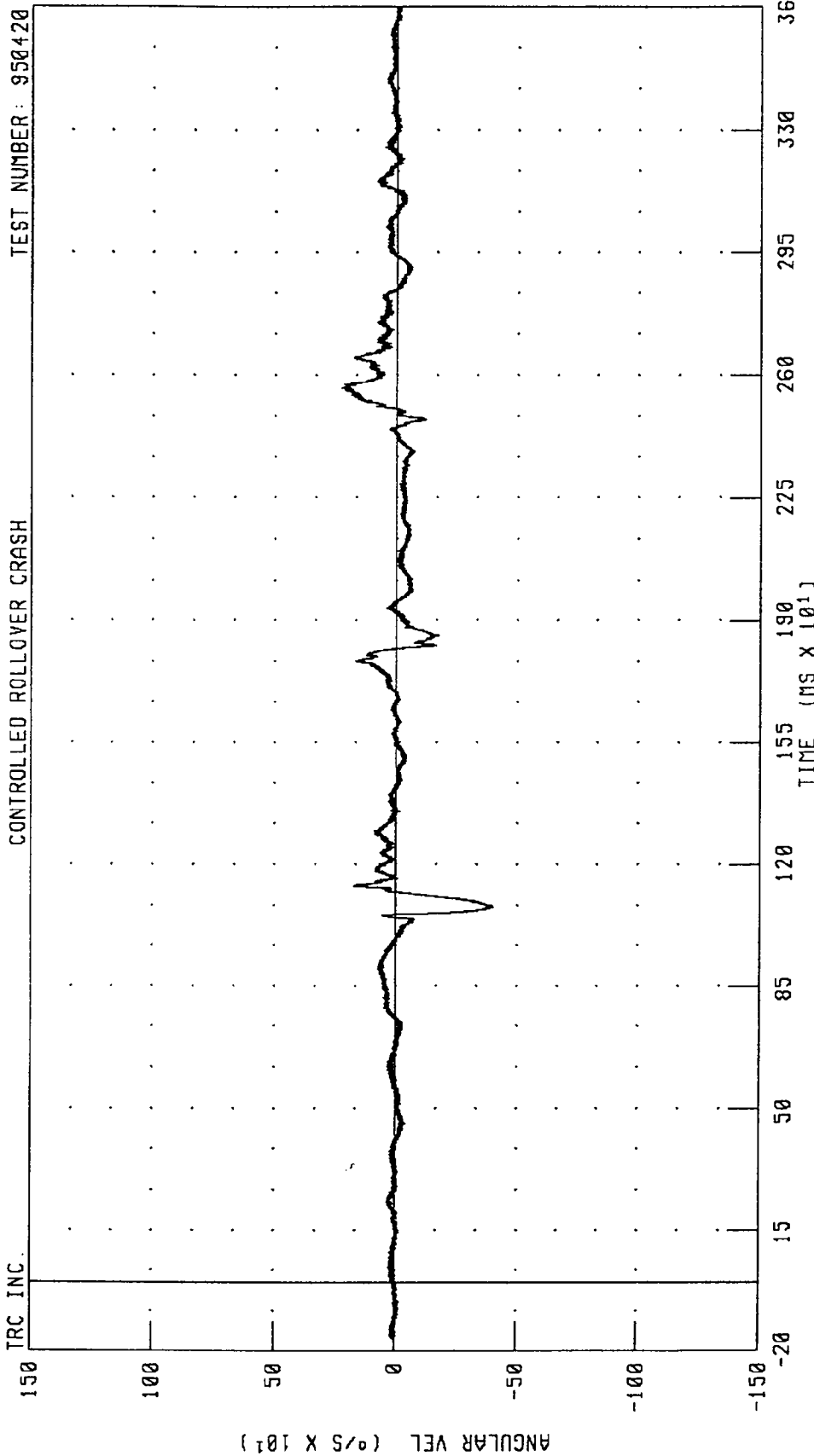
CONTROLLED ROLLOVER CRASH TEST NUMBER: 950420



CHANNEL: CSTXV1 FILTER: CH. CLASS 1000 PEAK DATA: 284.81 °/S @ 1086.50 MS; -653.94 °/S @ 1002.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST Y-AXIS ANGULAR VELOCITY

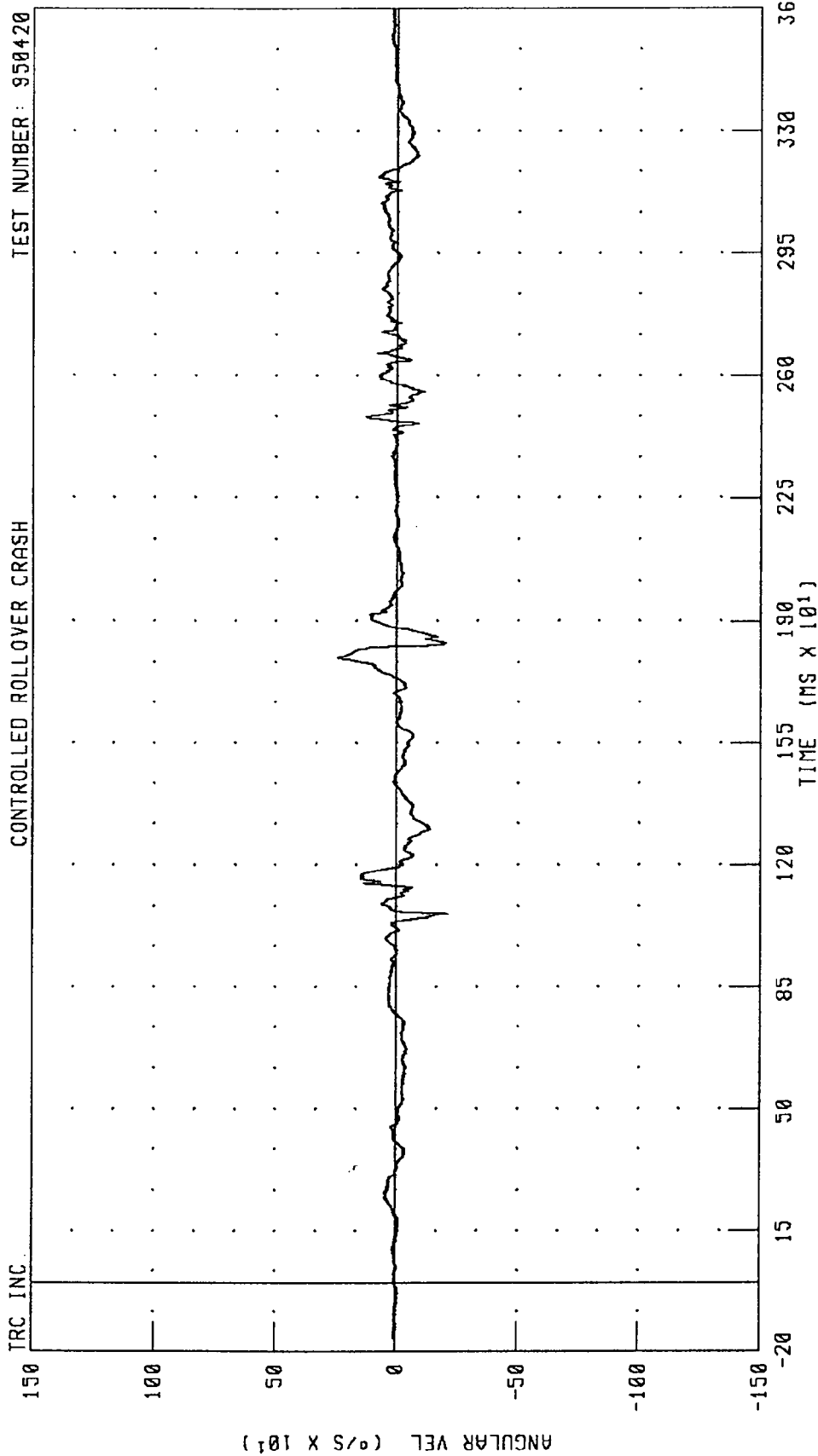
TRC INC. CONTROLLED ROLLOVER CRASH TEST NUMBER: 950420



CHANNEL: CSTYV1 FILTER: CH CLASS 1000 PEAK DATA: 230.14 °/S @ 2564.13 MS; -402.12 °/S @ 1079.75 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER CHEST Z-AXIS ANGULAR VELOCITY

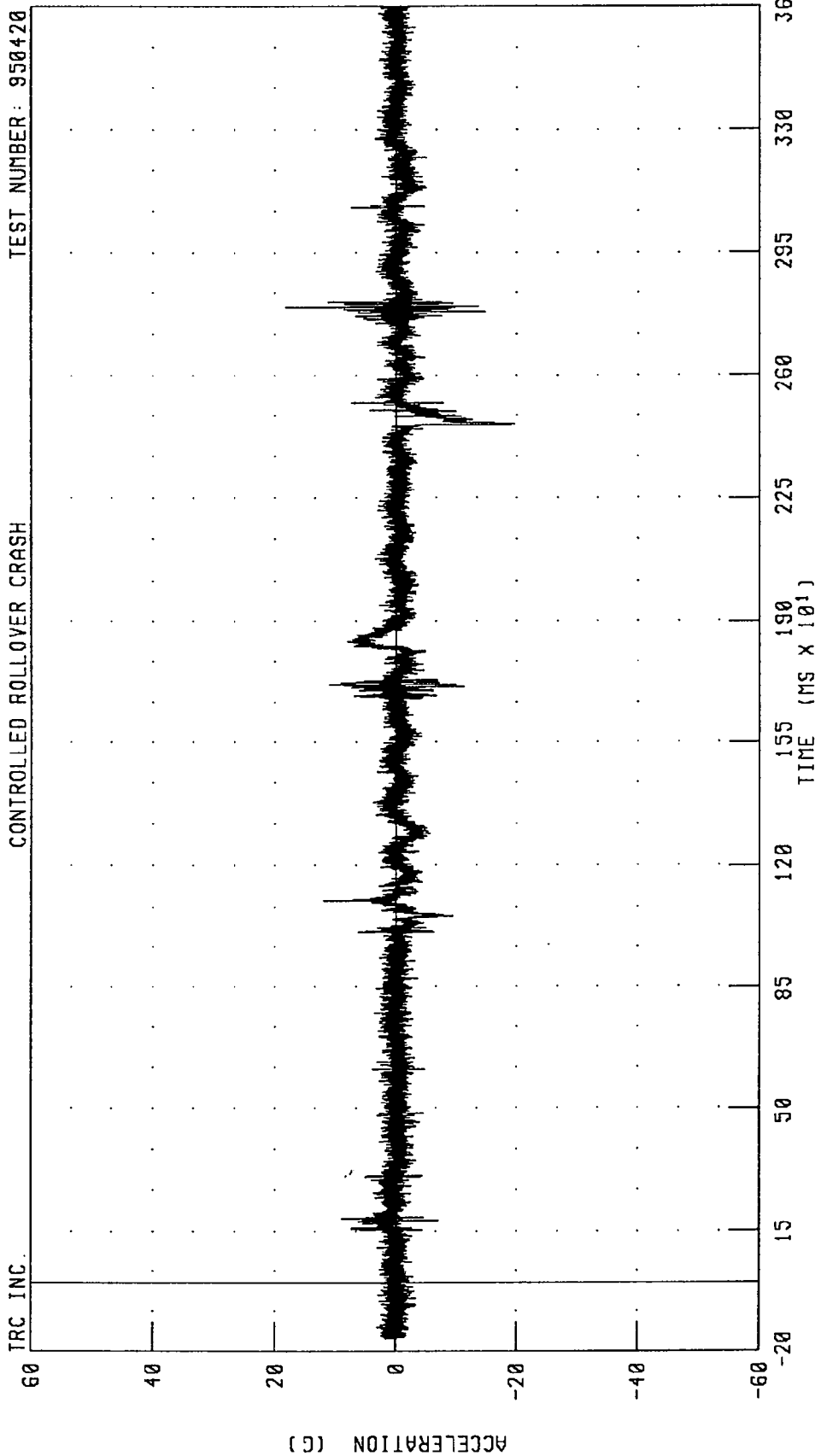
CONTROLLED ROLLOVER CRASH TEST NUMBER: 950420



CHANNEL: CSTZV1 FILTER: CH. CLASS 1000 PEAK DATA: 246.85 $^{\circ}/S$ @ 1797.00 MS, -210.63 $^{\circ}/S$ @ 1061.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER PELVIS X-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



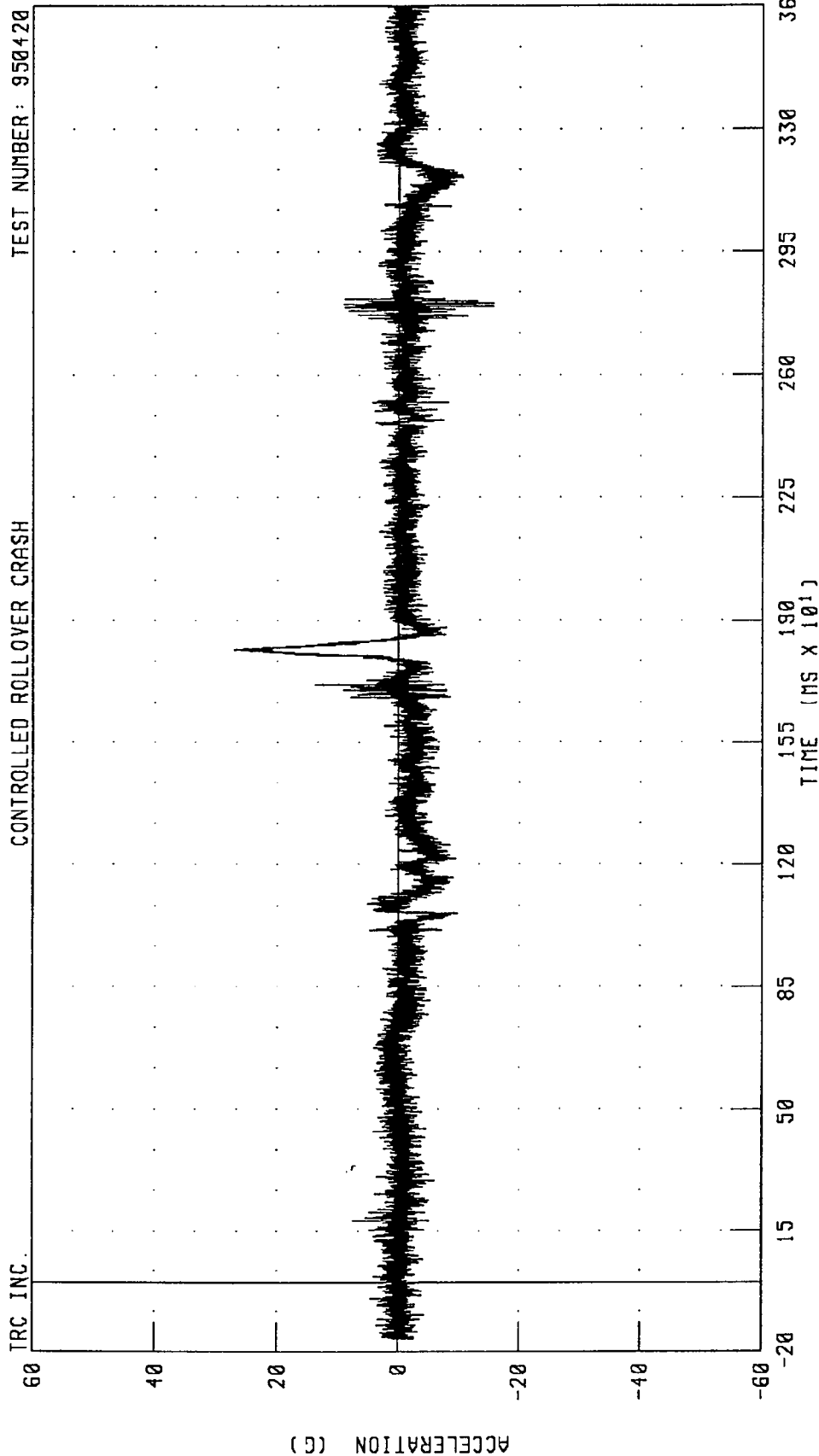
CHANNEL: PEVXG1 FILTER: CH. CLASS 1000

PEAK DATA: 18.06 G @ 2793.50 MS; -19.66 G @ 2460.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER PELVIS Y-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.

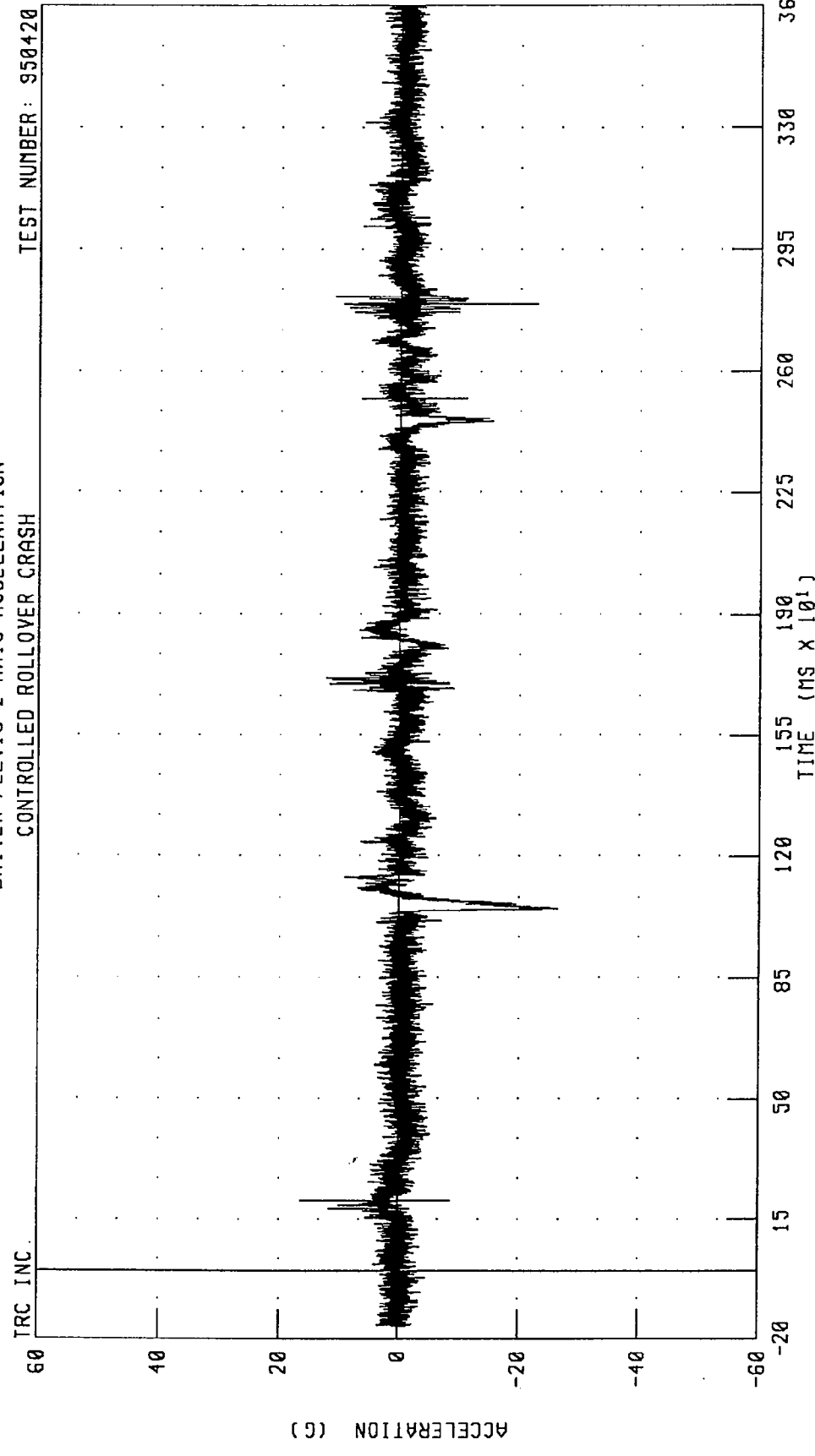


CHANNEL: PEVYG1 FILTER: CH. CLASS 1000

PEAK DATA: 27.04 G @ 1819.00 MS; -15.51 G @ 2793.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER PELVIS Z-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



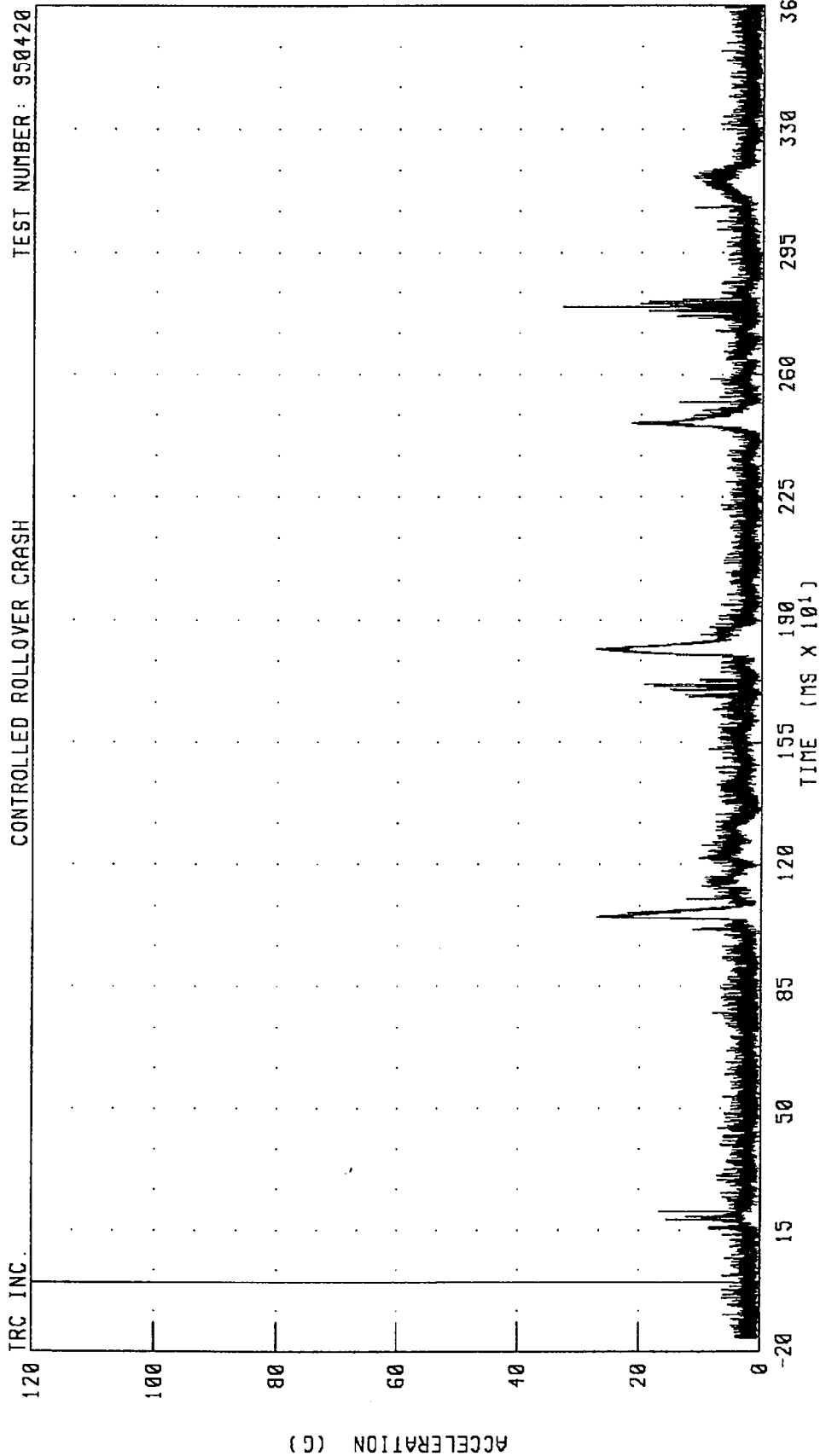
CHANNEL: PEVZG1 FILTER: CH. CLASS 1000

PEAK DATA: 16.36 G @ 203.00 MS, -26.40 G @ 1050.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER PELVIS RESULTANT ACCELERATION

TEST NUMBER: 950420

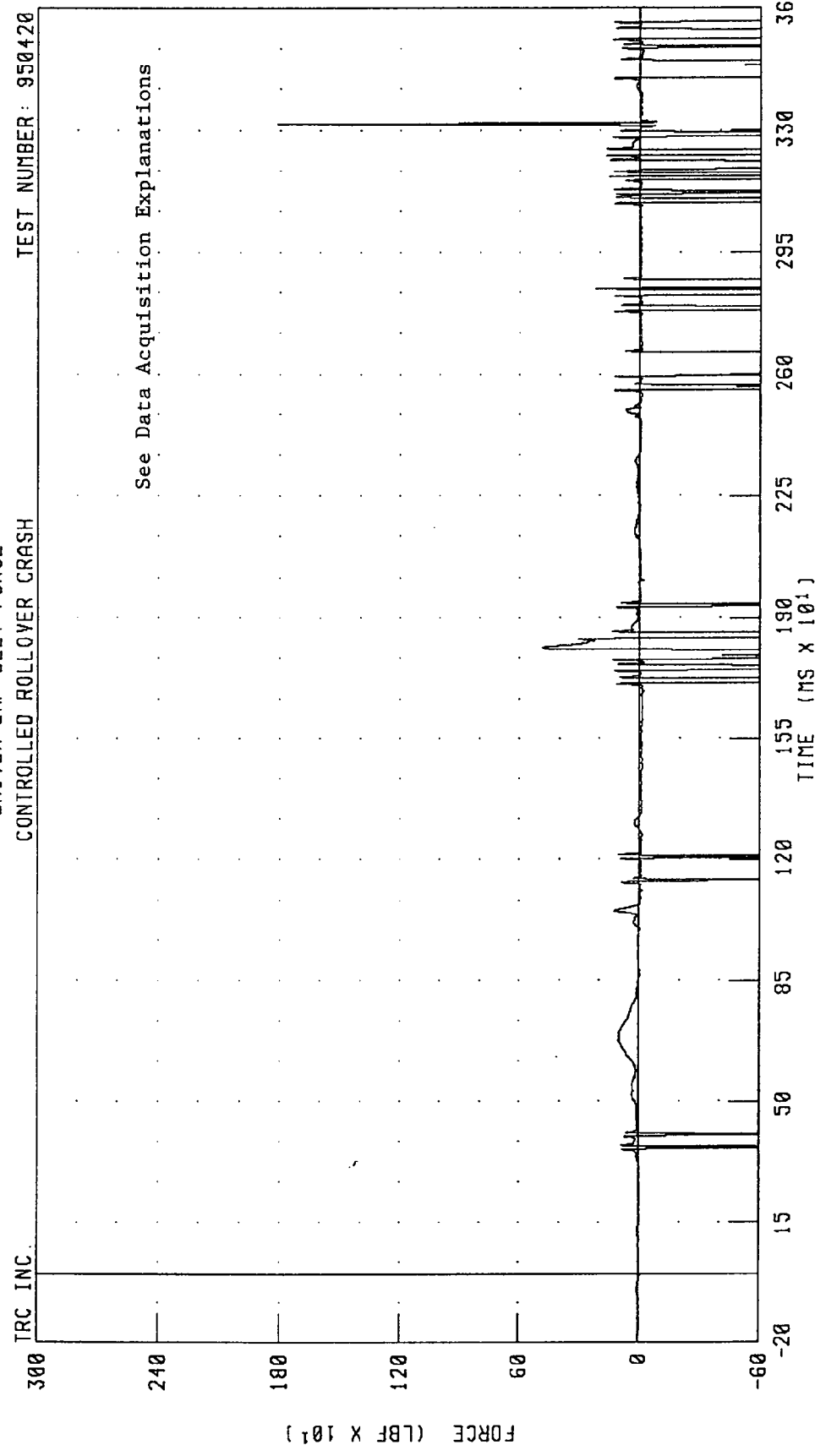
CONTROLLED ROLLOVER CRASH



CHANNEL: PEVRG1 FILTER: CH. CLASS 1000

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER LAP BELT FORCE
CONTROLLED ROLLOVER CRASH

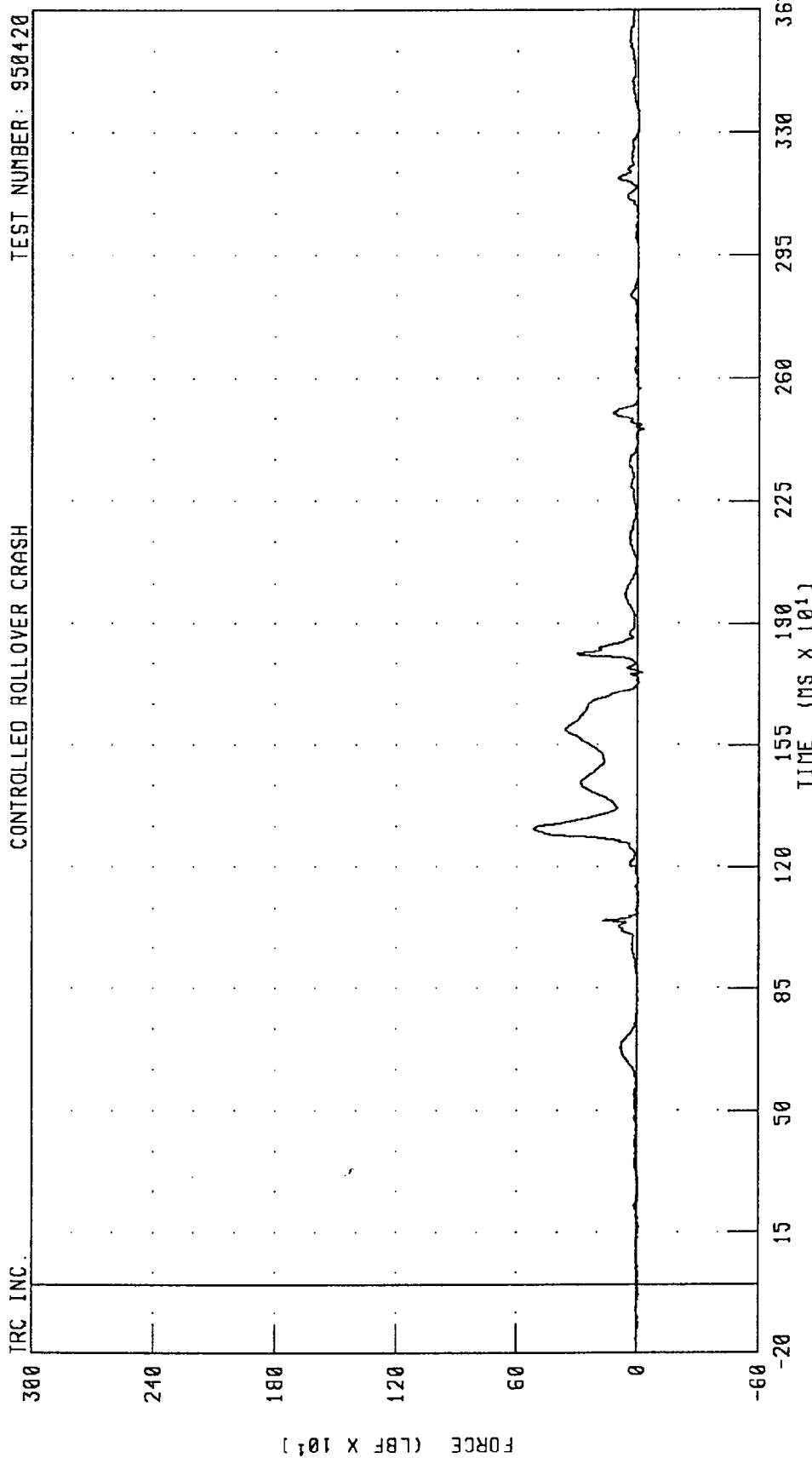
TEST NUMBER: 950420



CHANNEL: LBOF1 FILTER: CH. CLASS 60 PEAK DATA: 1815.21 LBF @ 3317.88 MS; -4086.07 LBF @ 3099.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER SHOULDER BELT FORCE
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



CHANNEL: SHBF1 FILTER: CH. CLASS 60

PEAK DATA: 513.77 LBF @ 1311.88 MS; -29.11 LBF @ 2455.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
DRIVER SHOULDER BELT DISPLACEMENT
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.

150

120

90

60

30

0

-30

DISPLACEMENT (IN X 10⁻¹)

-20

15

50

85

120

155

190

225

260

295

330

365

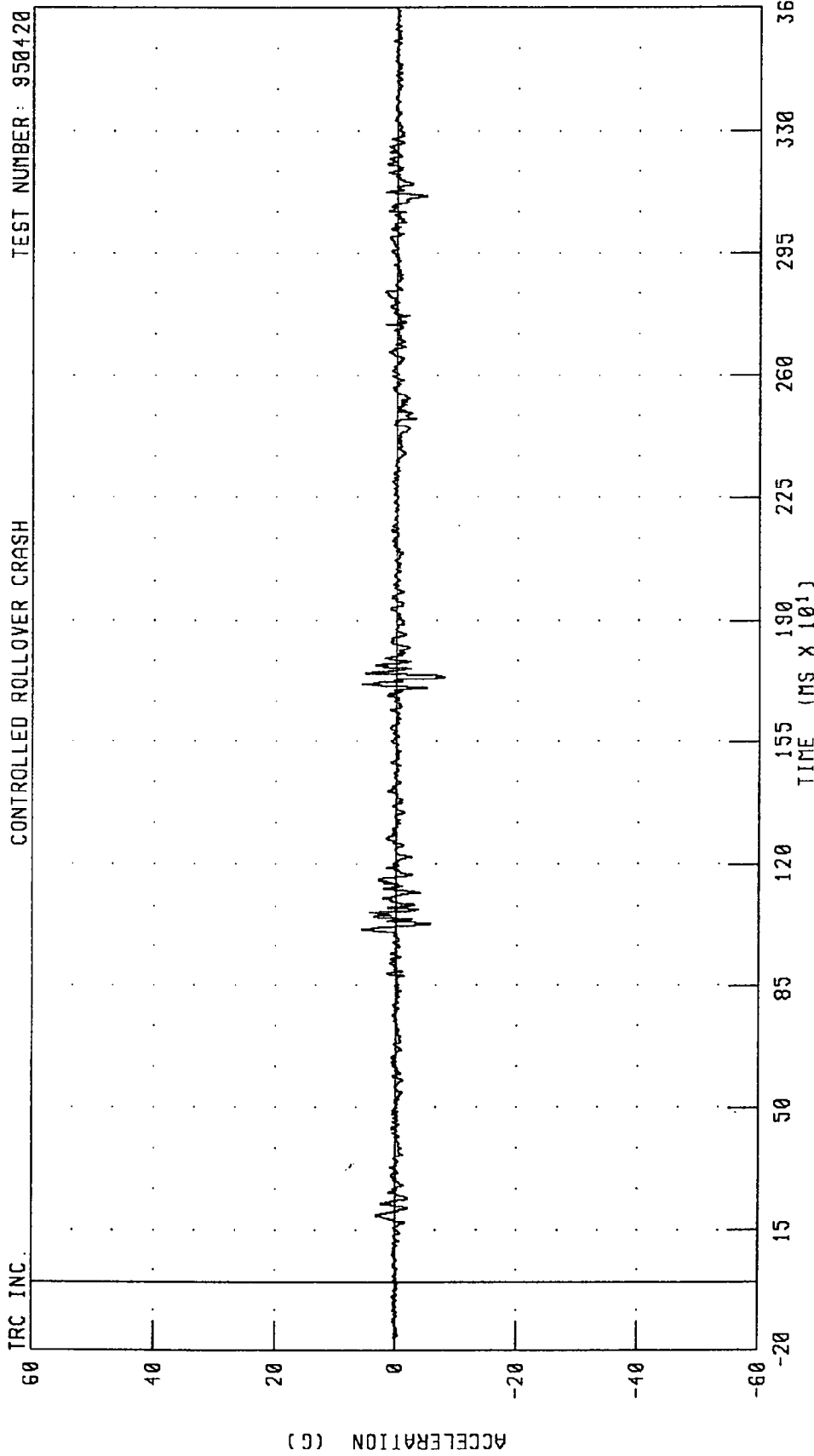
TIME (MS X 10¹)

CHANNEL: SHB01 FILTER: CH. CLASS 60

PEAK DATA: 0.46 IN @ 769.38 MS; -2.07 IN @ 1196.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE CENTER OF GRAVITY X-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

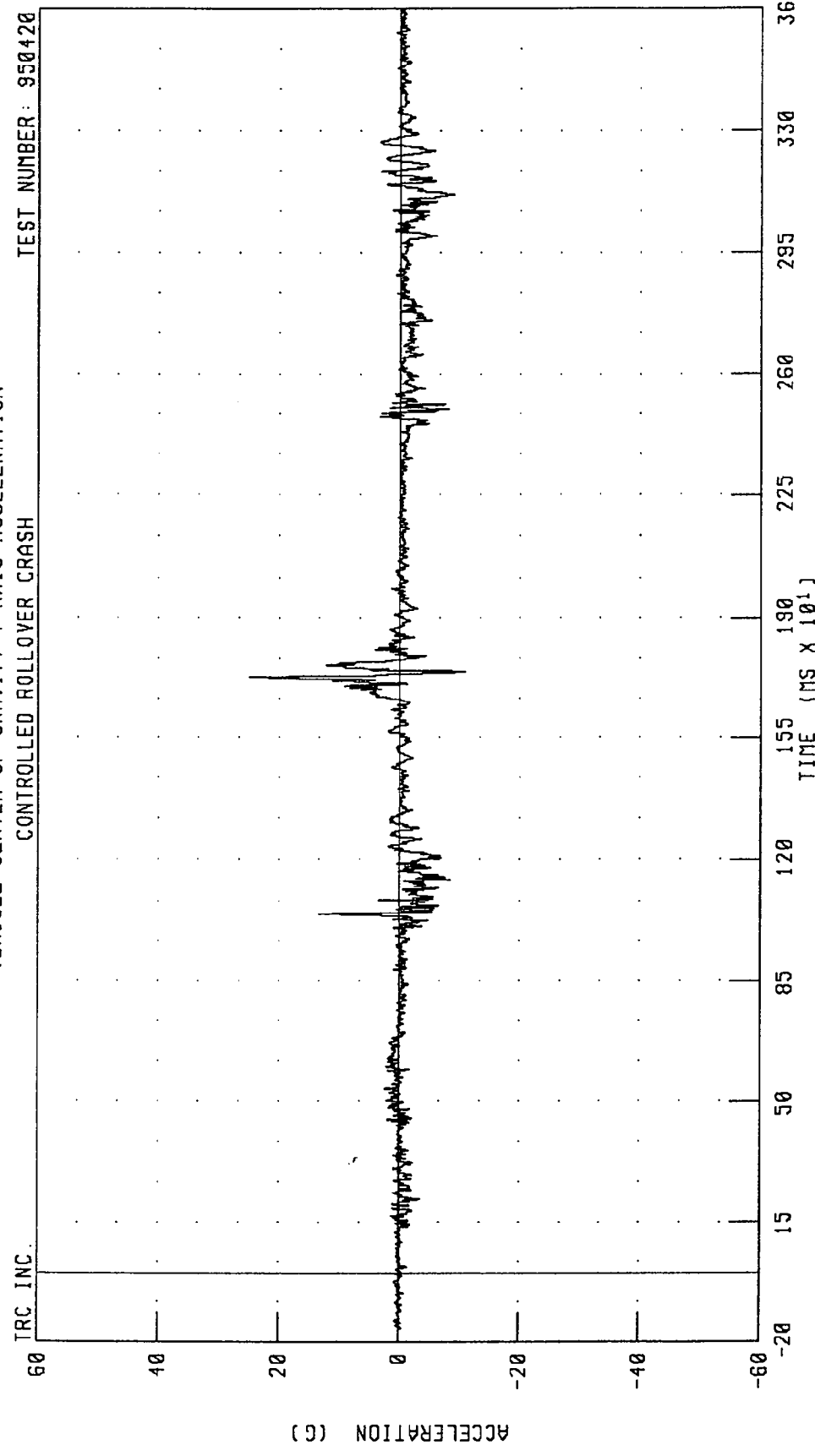


CHANNEL: VCGXG1 FILTER: CH. CLASS 60

PEAK DATA: 5.85 G @ 1015.13 MS; -7.94 G @ 1738.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE CENTER OF GRAVITY Y-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

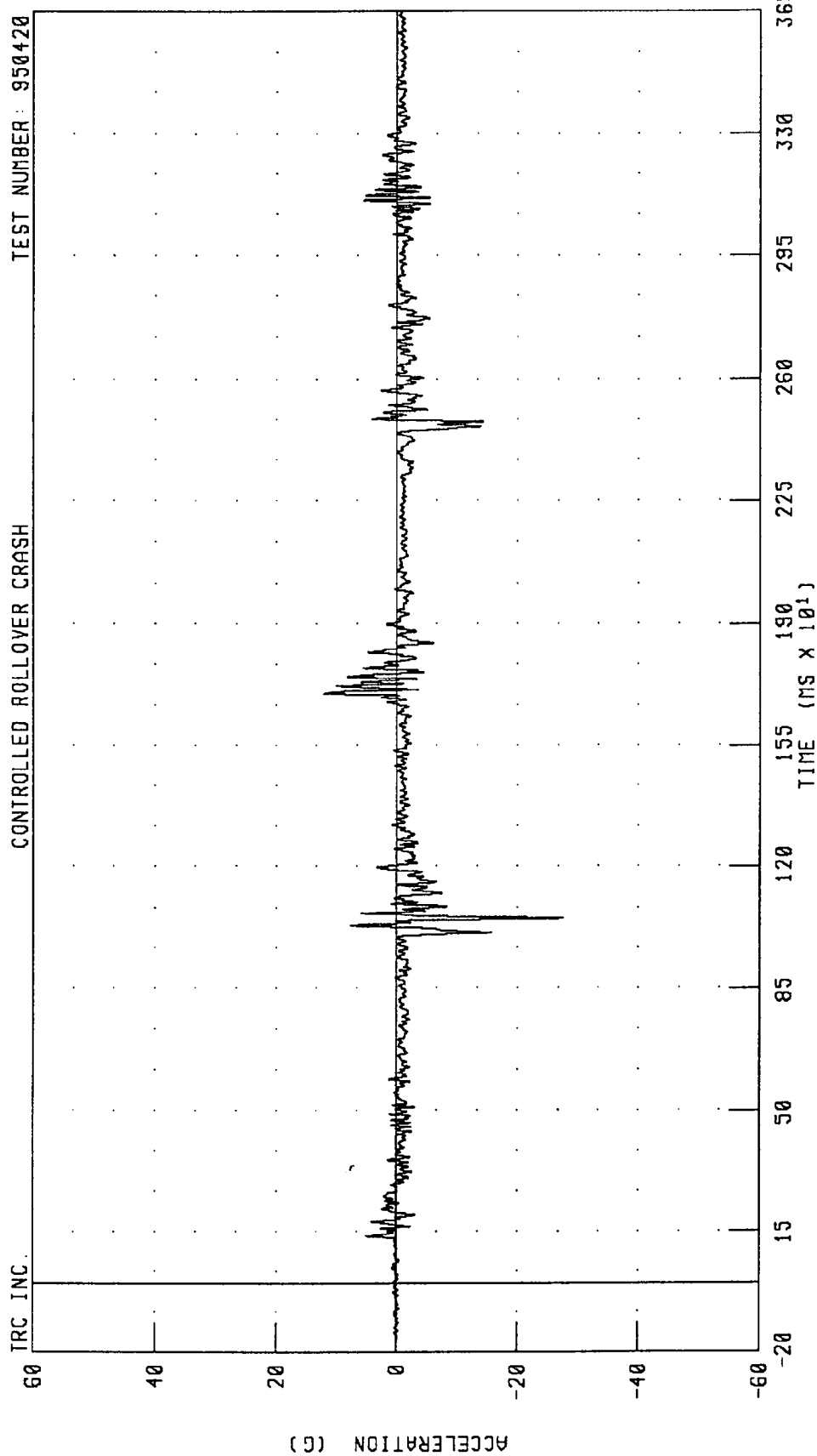


CHANNEL: VCCYG1 FILTER: CH. CLASS 60
PEAK DATA: 24.96 G @ 1729.88 MS; -10.85 G @ 1745.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE CENTER OF GRAVITY Z-AXIS ACCELERATION

TEST NUMBER: 950420

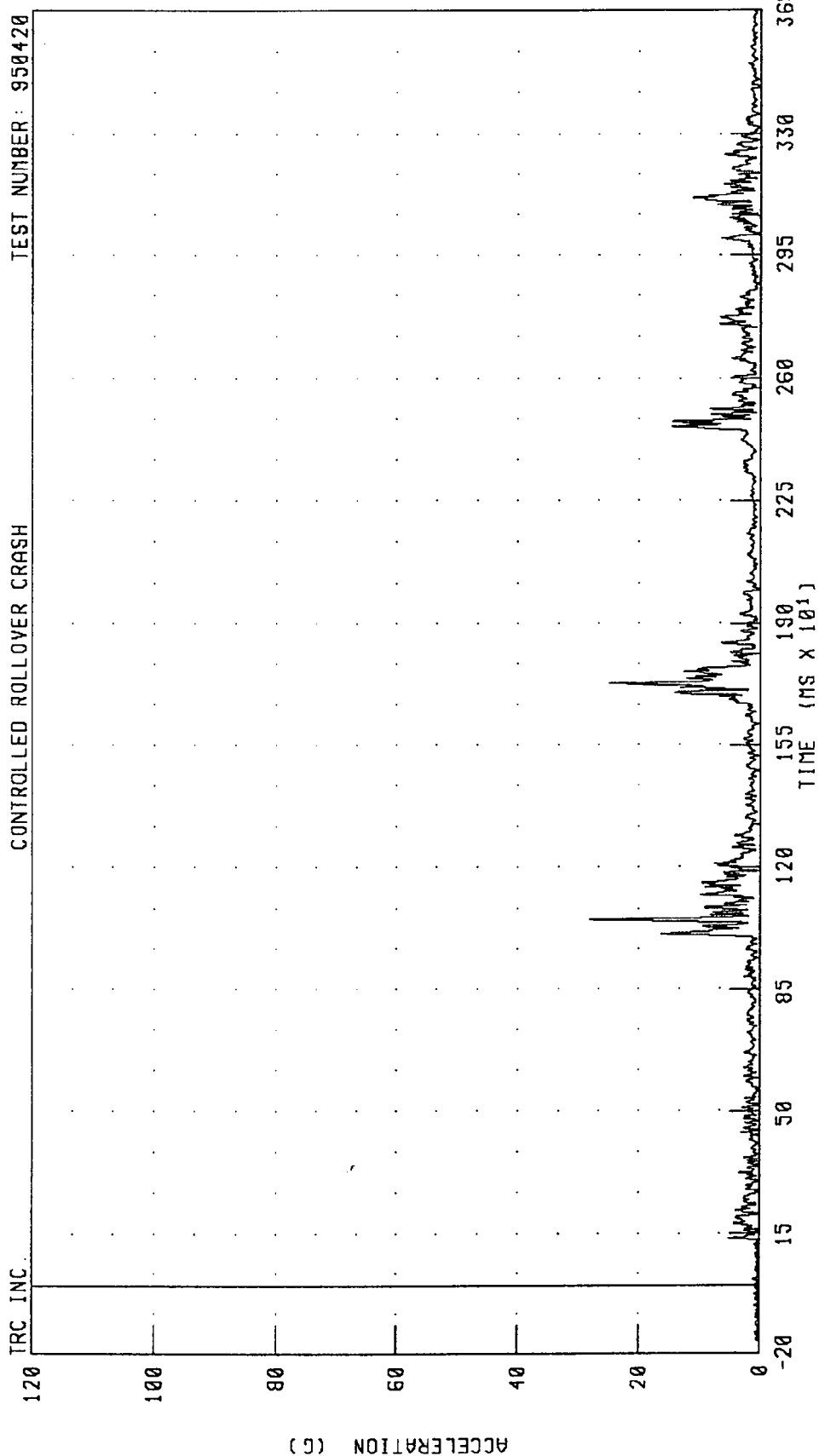
CONTROLLED ROLLOVER CRASH



MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE CENTER OF GRAVITY RESULTANT ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



CHANNEL: VCGRG1 FILTER: CH. CLASS 60

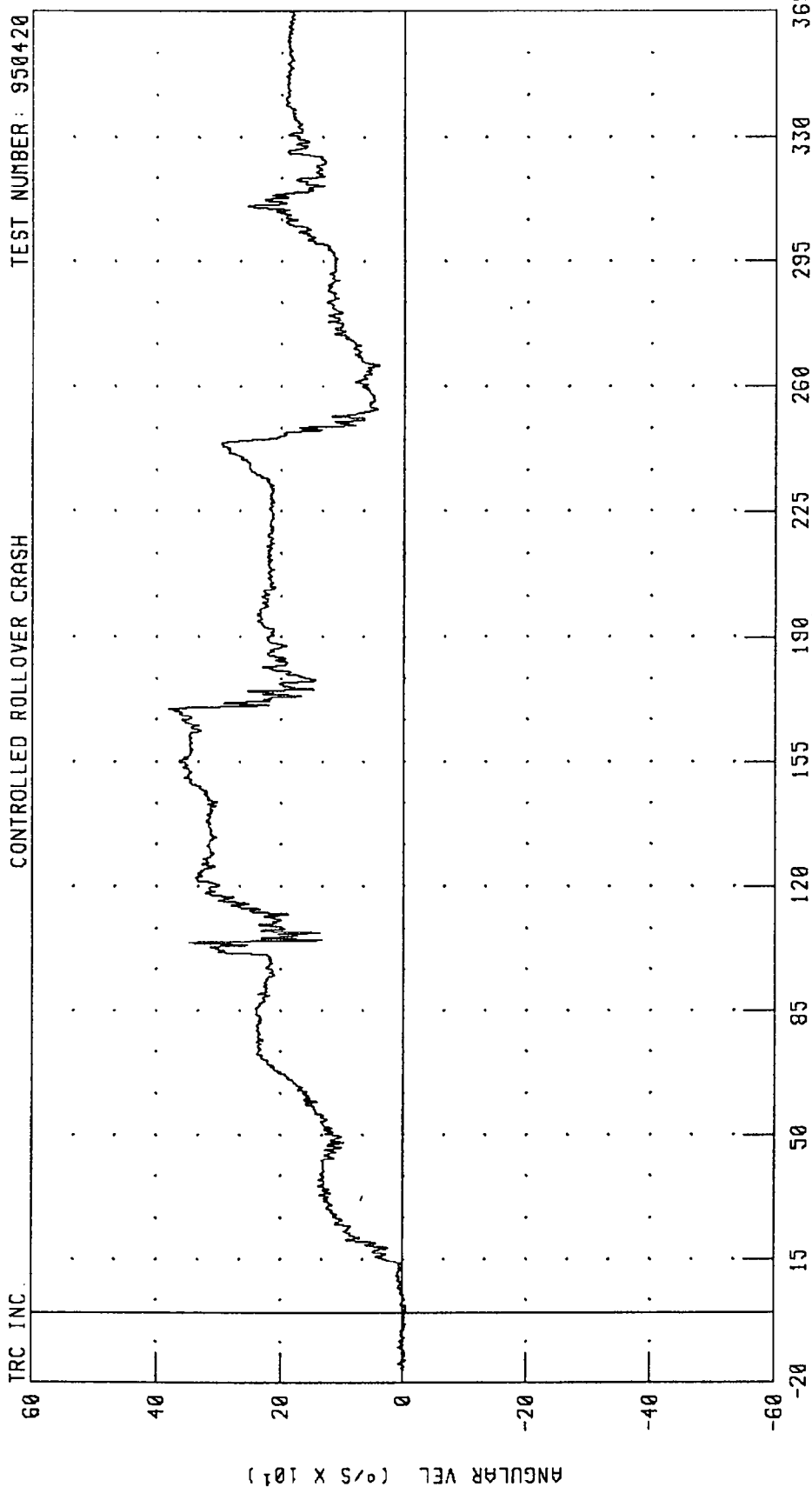
PEAK DATA: 28.24 G @ 1050.75 MS; 0.07 G @ 298.75 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH

VEHICLE ROLL RATE

CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



CHANNEL: VCGXV1 FILTER: CH. CLASS 60

PEAK DATA: 381.67 $^{\circ}/S$ @ 1699.25 MS; -5.00 $^{\circ}/S$ @ 8.13 MS

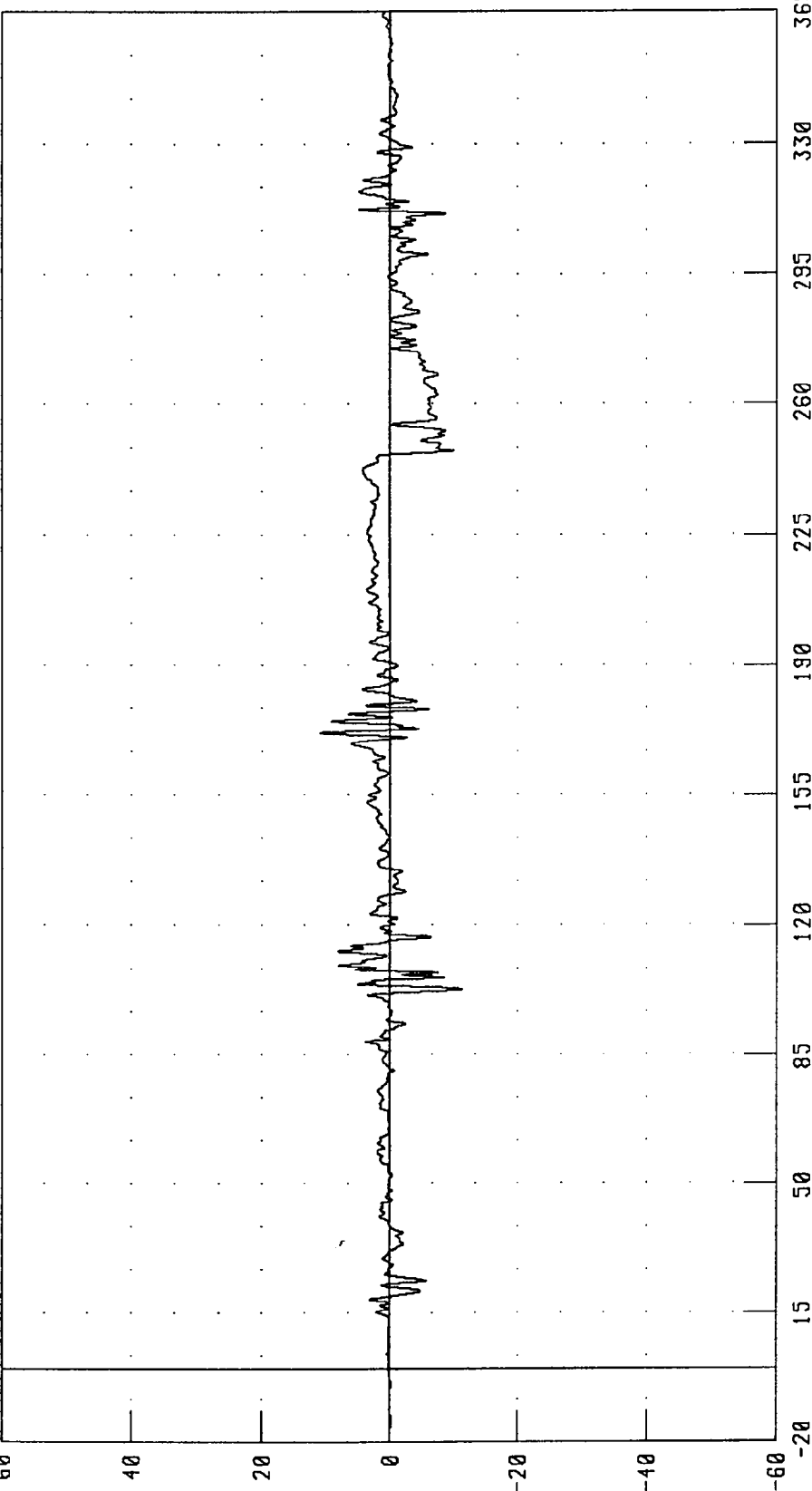
MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE PITCH RATE

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

TRC INC.

ANGULAR VEL (°/S X 10¹)



CHANNEL: VCGYV1 FILTER: CH. CLASS 60

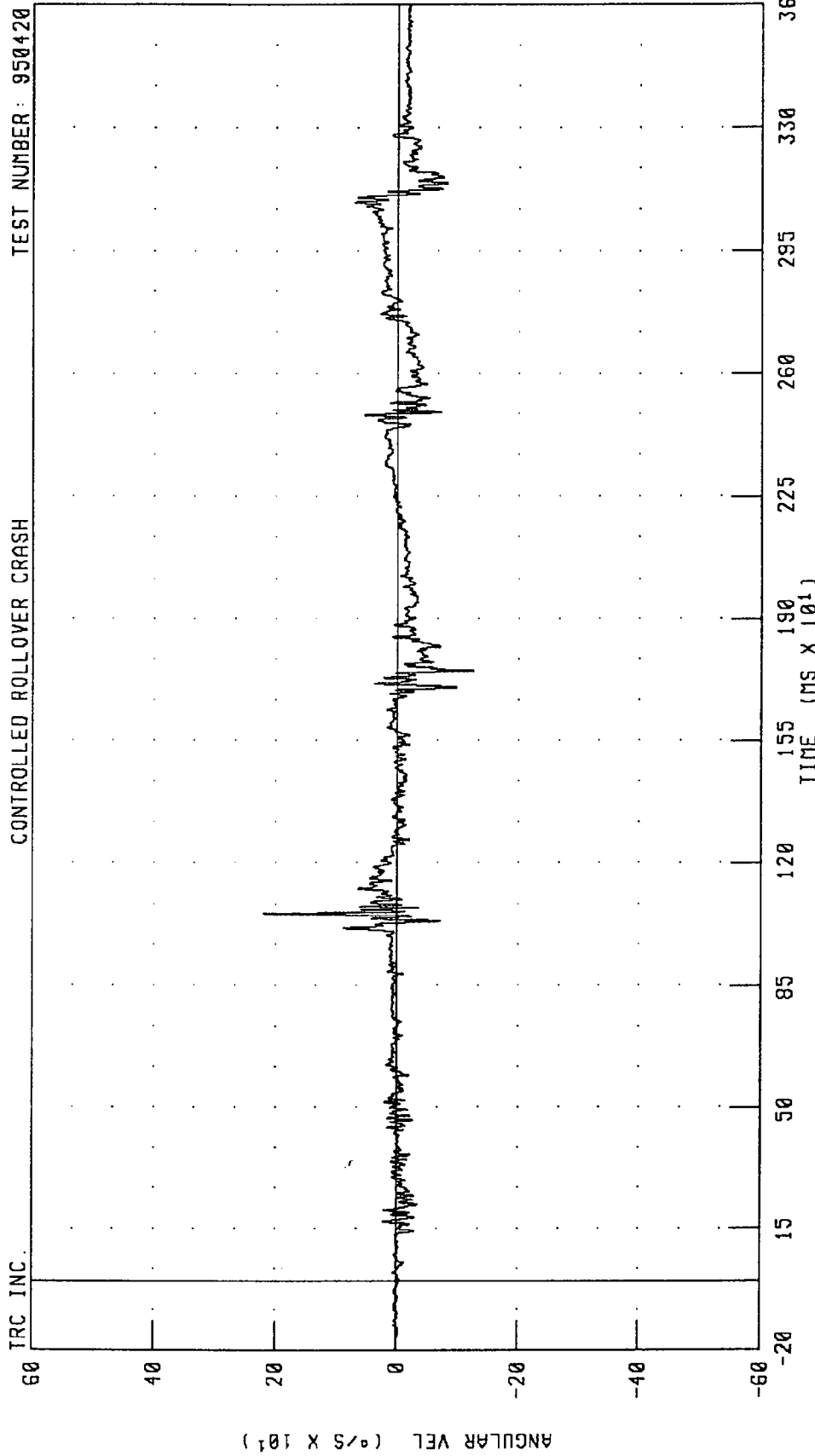
TIME (MS X 10¹)

PEAK DATA: 110.47 °/S @ 1718.50 MS; -113.26 °/S @ 1027.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE YAW RATE

CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

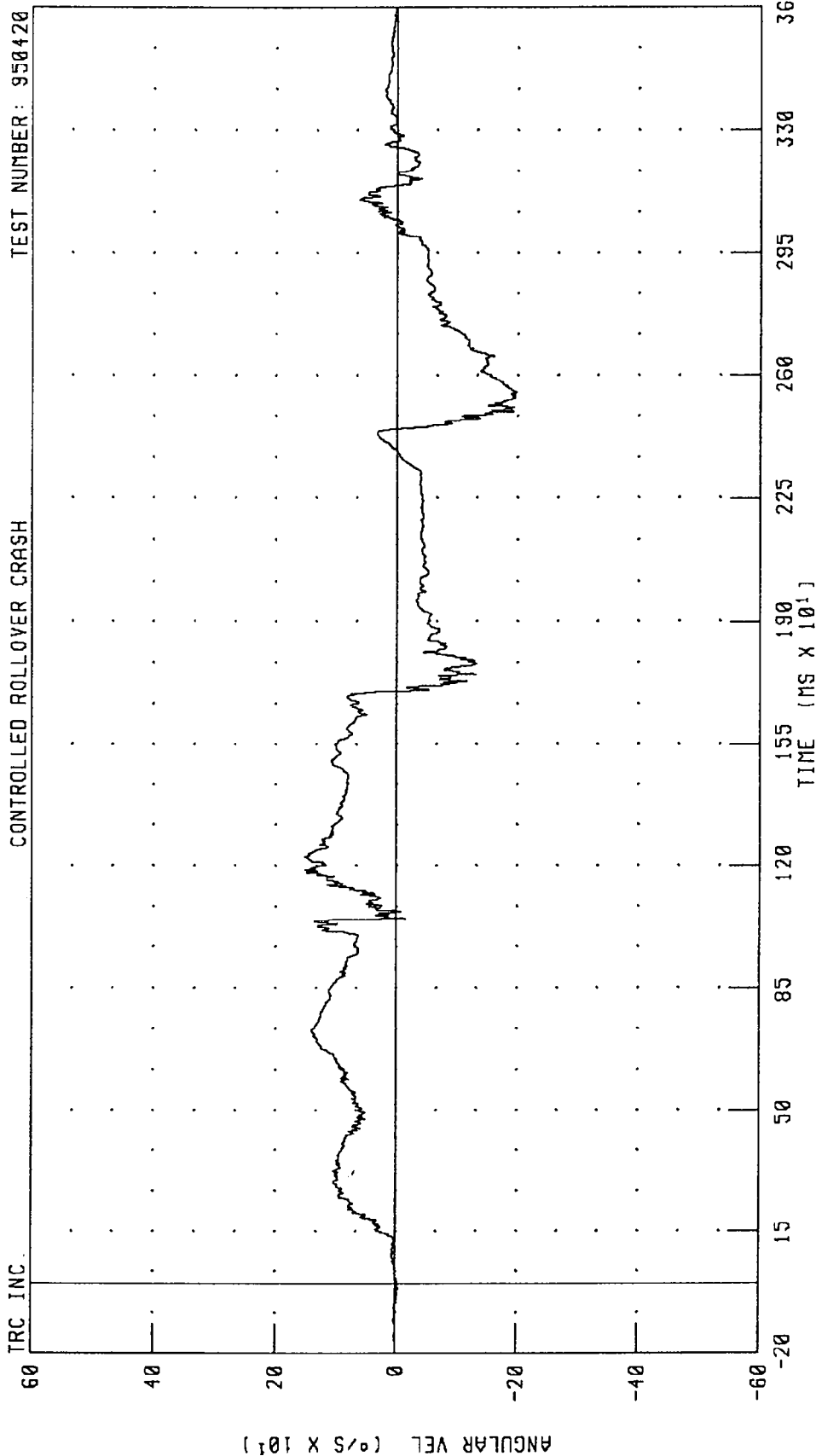


CHANNEL: VCGZV1 FILTER: CH. CLASS 60

PEAK DATA: 220.50 $^{\circ}/S$ @ 1053.38 MS; -124.44 $^{\circ}/S$ @ 1752.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE X-AXIS ANGULAR VELOCITY
CONTROLLED ROLLOVER CRASH

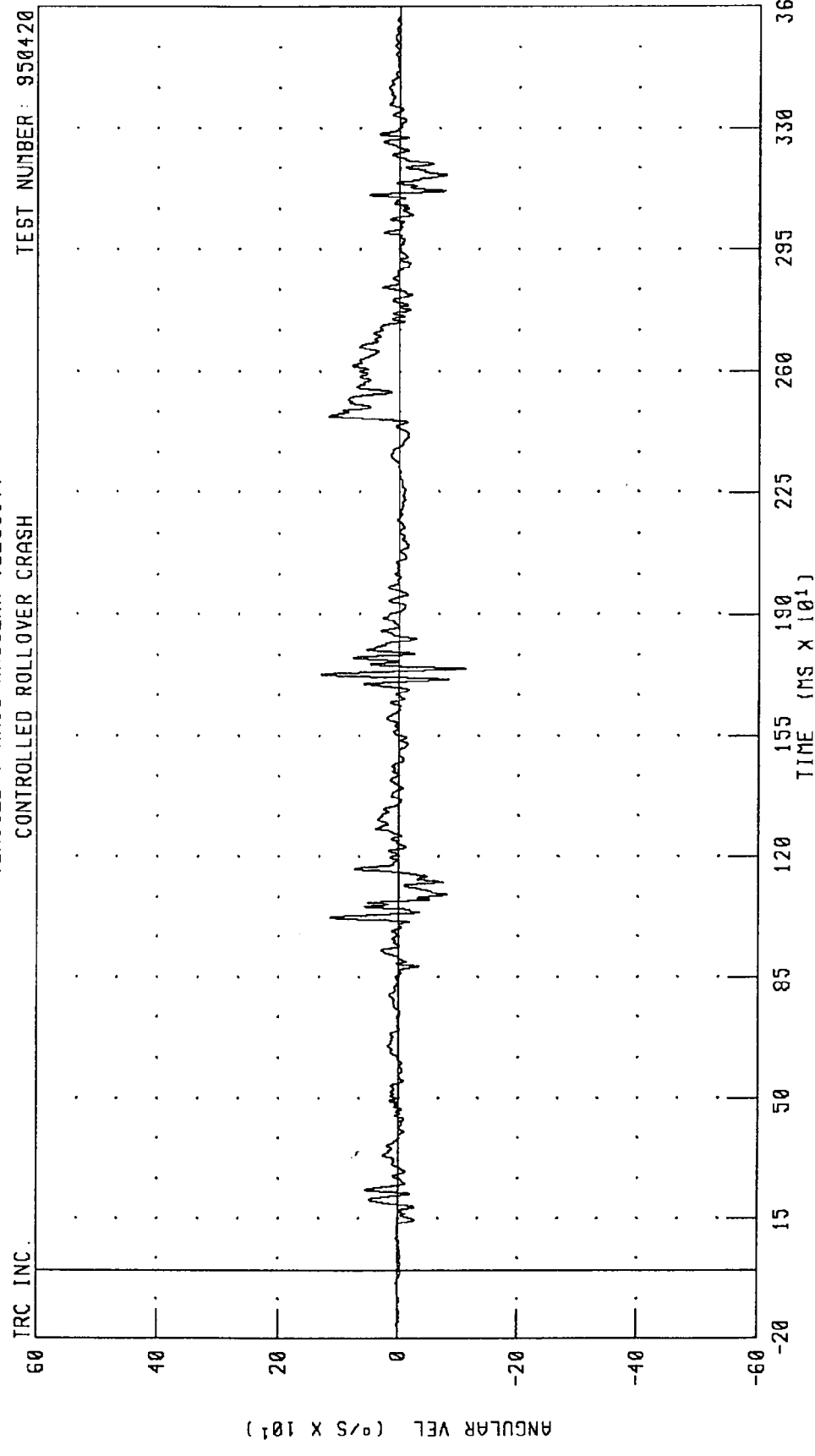
TEST NUMBER: 950420



CHANNEL: VCGXVA FILTER: CH. CLASS 60
PEAK DATA: 152.56 $^{\circ}/S$ @ 1225.00 MS; -197.77 $^{\circ}/S$ @ 2551.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE Y-AXIS ANGULAR VELOCITY
CONTROLLED ROLLOVER CRASH

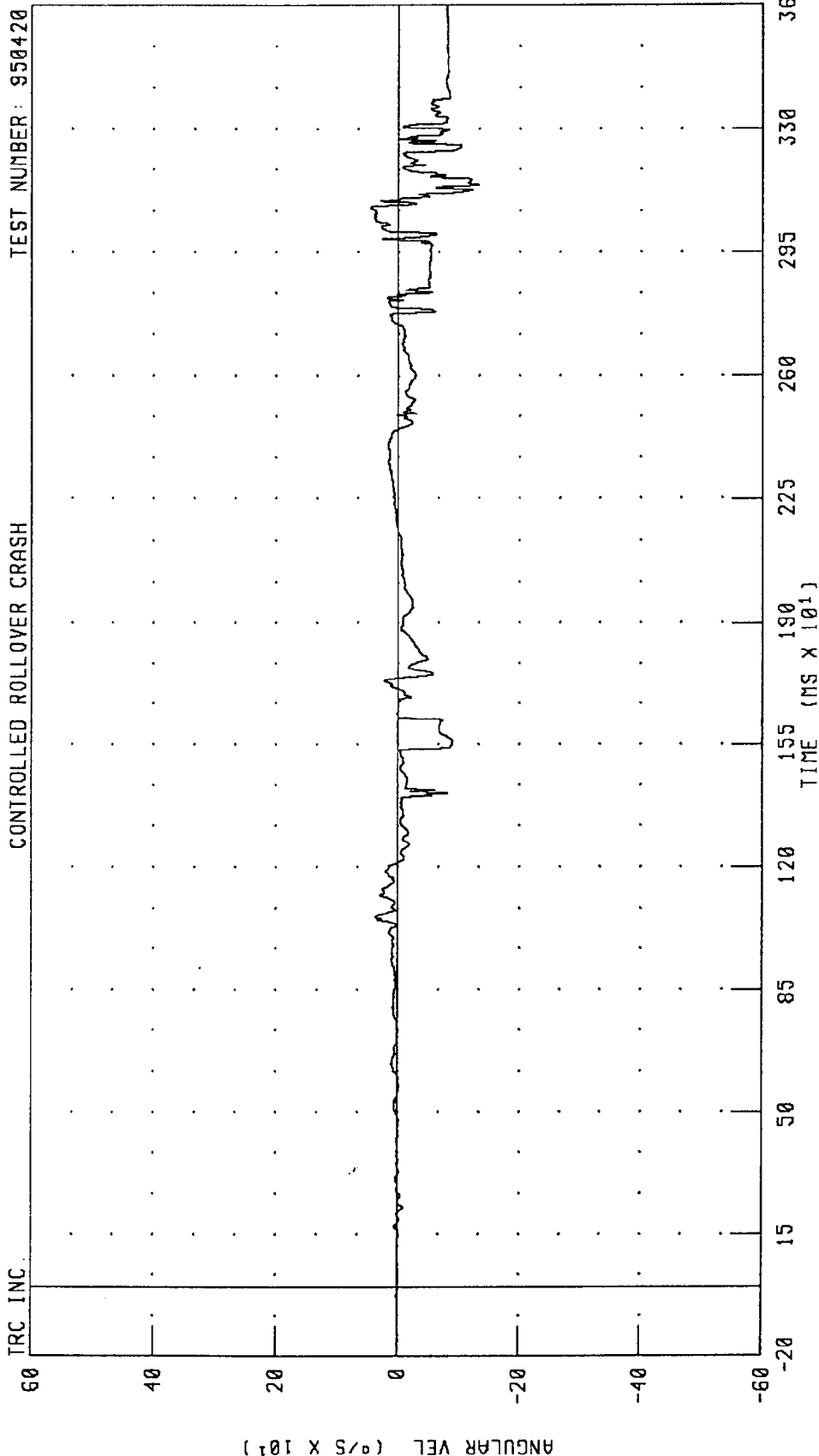
TEST NUMBER: 950420



CHANNEL: VCGYVA FILTER: CH. CLASS 60
PEAK DATA: 130.56 °/S @ 1728.75 MS; -111.93 °/S @ 1745.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE Z-AXIS ANGULAR VELOCITY
CONTROLLED ROLLOVER CRASH

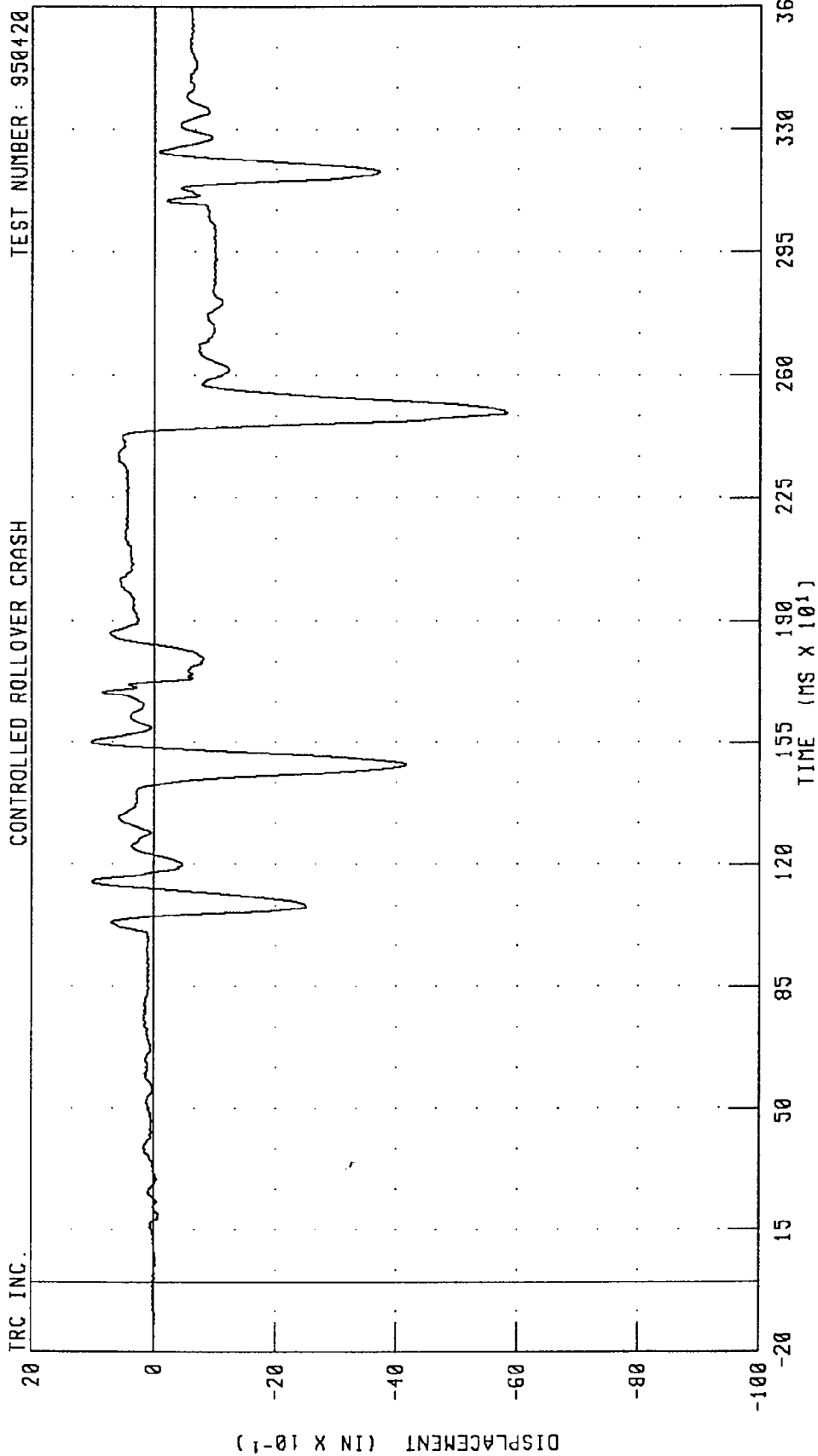
TEST NUMBER: 950420



CHANNEL: VCGZVA FILTER: CH. CLASS 60
PEAK DATA: 46.42 °/S @ 3077.88 MS; -131.41 °/S @ 3141.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE LEFT FRONT SUSPENSION DISPLACEMENT
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



CHANNEL: SFLOI FILTER: CH. CLASS 60

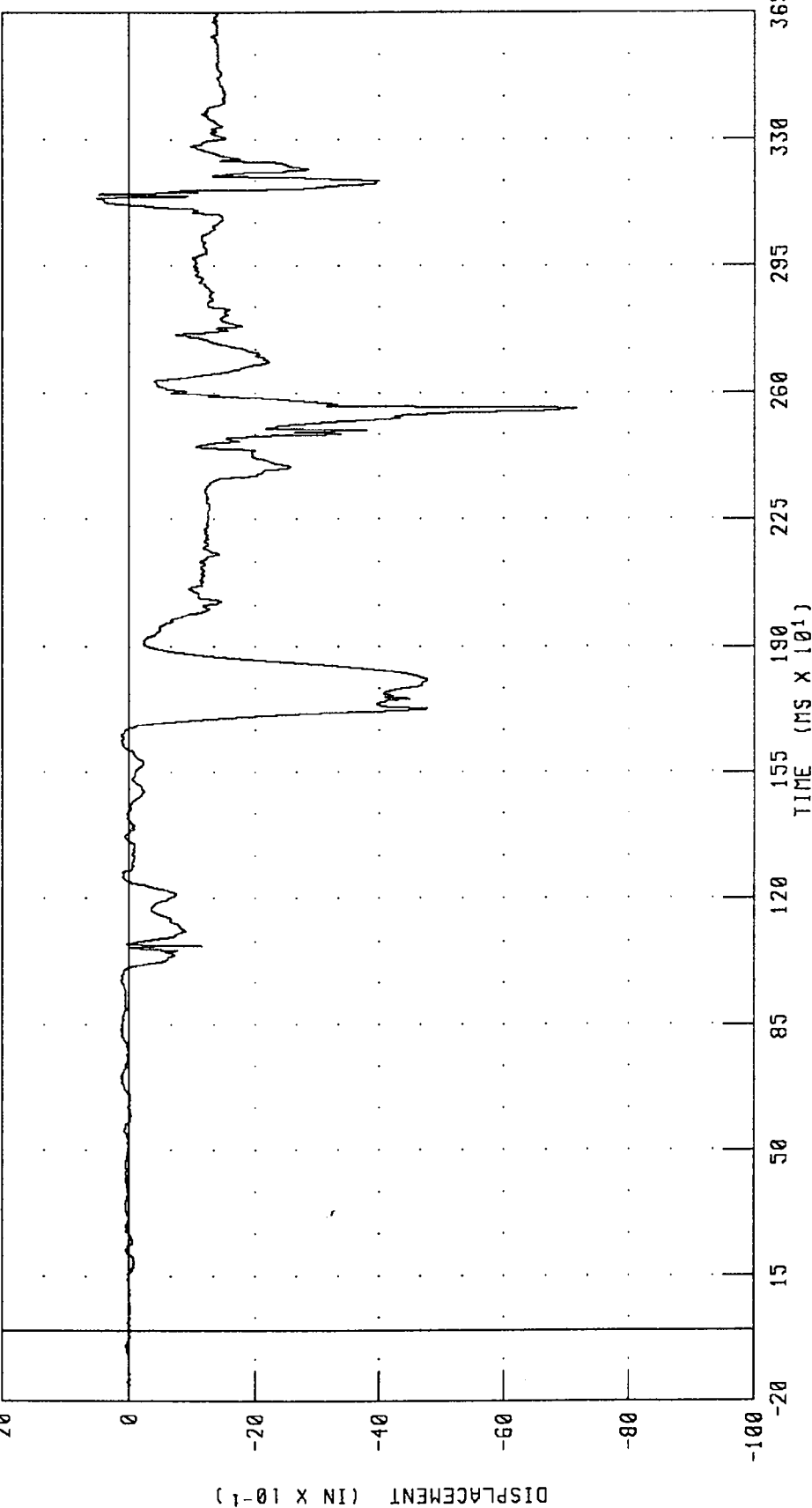
PEAK DATA: 1.03 IN @ 1551.63 MS; -5.83 IN @ 2492.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE RIGHT FRONT SUSPENSION DISPLACEMENT

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

TRC INC.

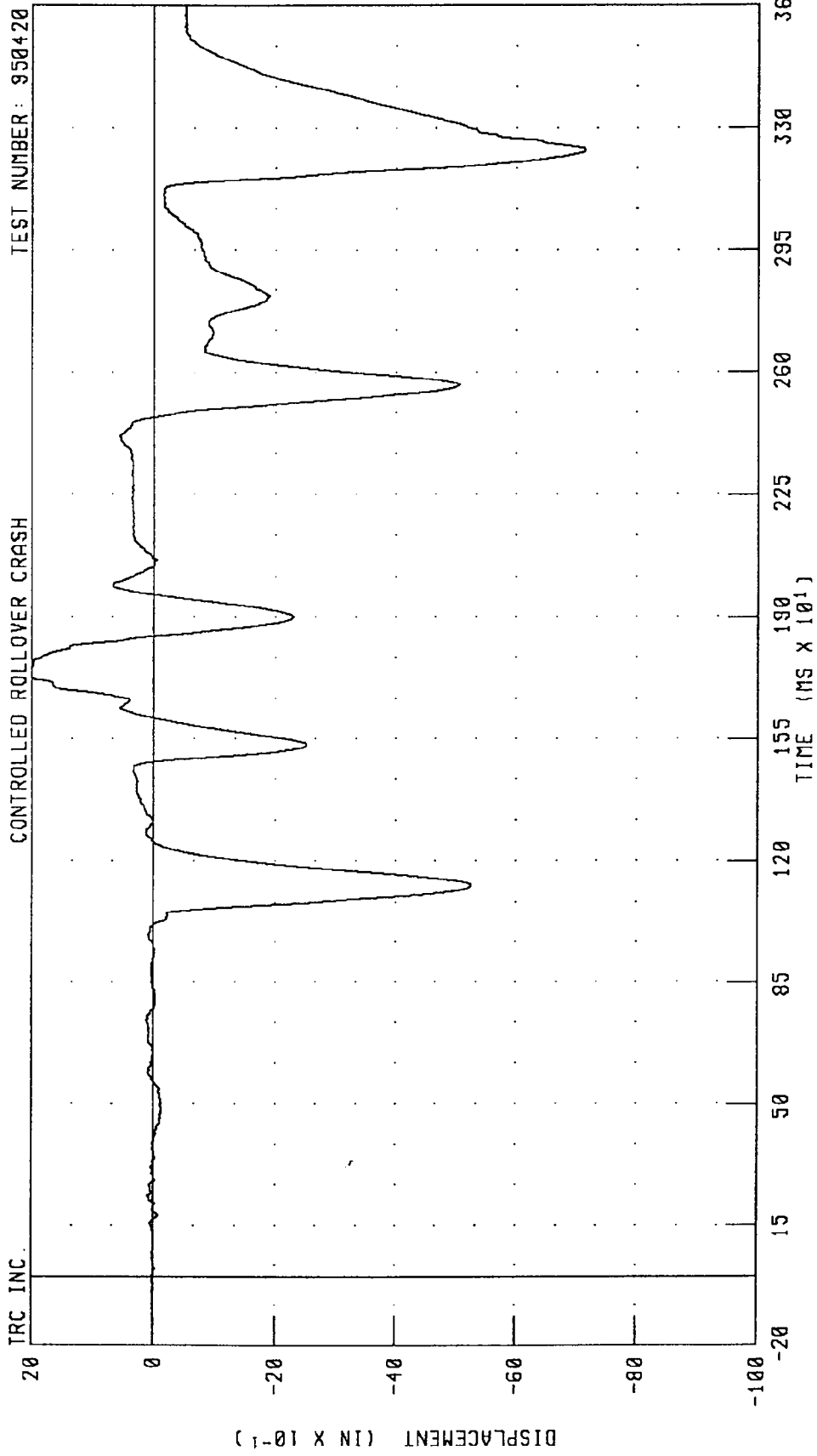


CHANNEL: SFR01 FILTER: CH. CLASS 60

PEAK DATA: 0.50 IN @ 3136.75 MS; -7.16 IN @ 2556.38 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE LEFT REAR SUSPENSION DISPLACEMENT
CONTROLLED ROLLOVER CRASH

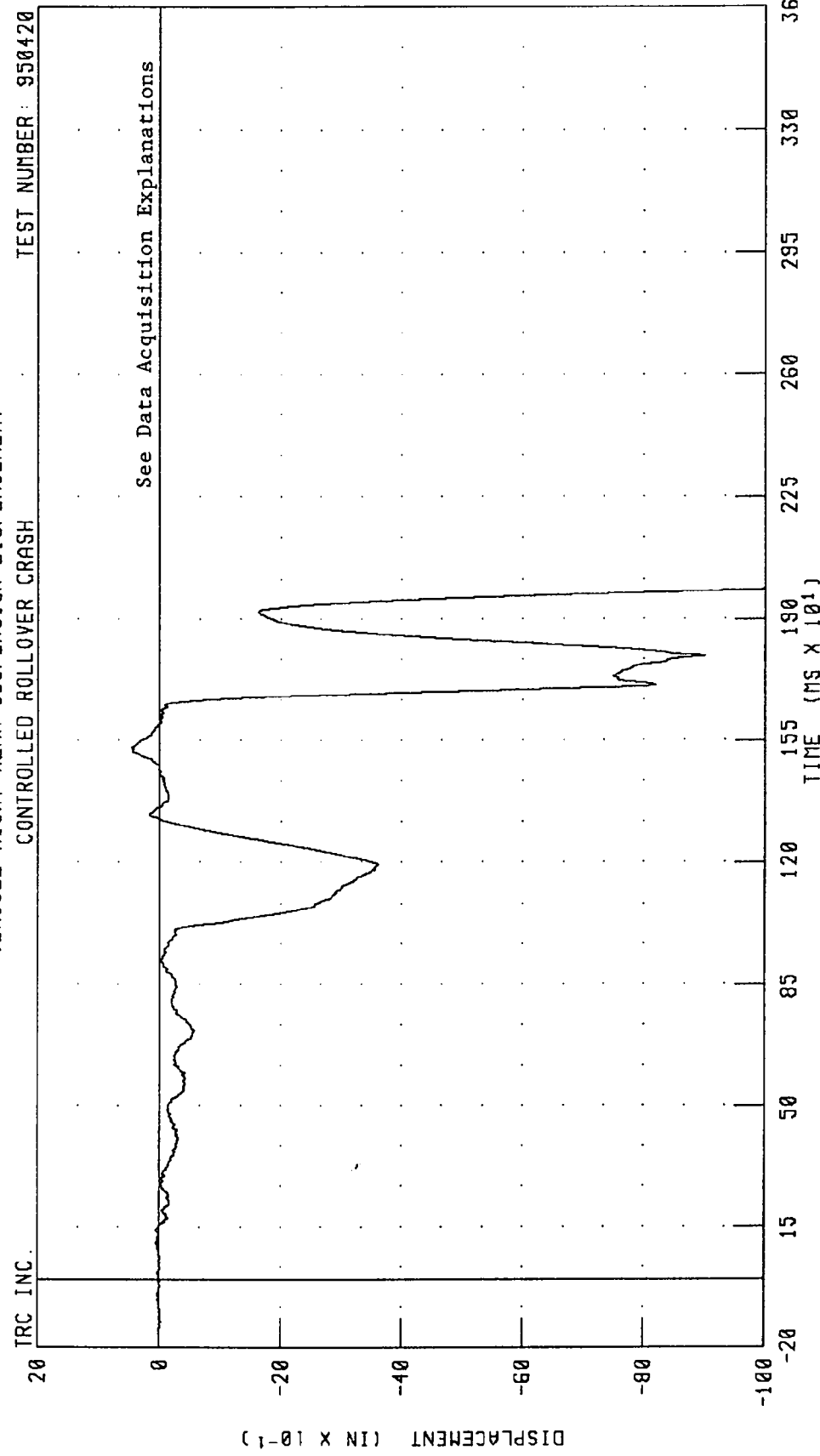
TEST NUMBER: 950420



CHANNEL: SRLO1 FILTER: CH. CLASS 60

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
VEHICLE RIGHT REAR SUSPENSION DISPLACEMENT
CONTROLLED ROLLOVER CRASH

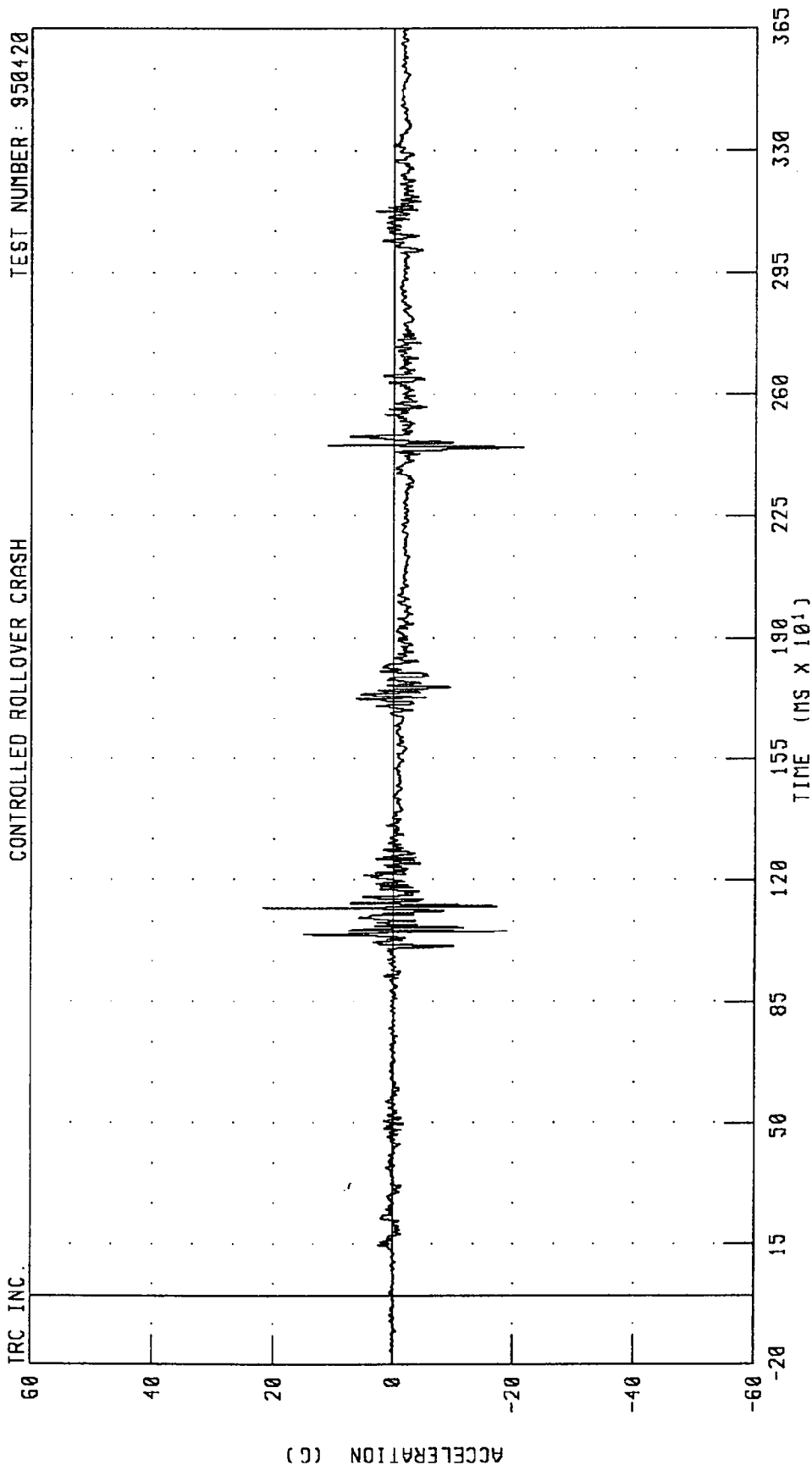
TEST NUMBER: 950420



CHANNEL: SRRD1 FILTER: CH. CLASS 60 PEAK DATA: 0.45 IN @ 1530.13 MS; -25.66 IN @ 2996.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT DOOR AT LATCH X-AXIS ACCELERATION

TRC INC. CONTROLLED ROLLOVER CRASH TEST NUMBER: 950420



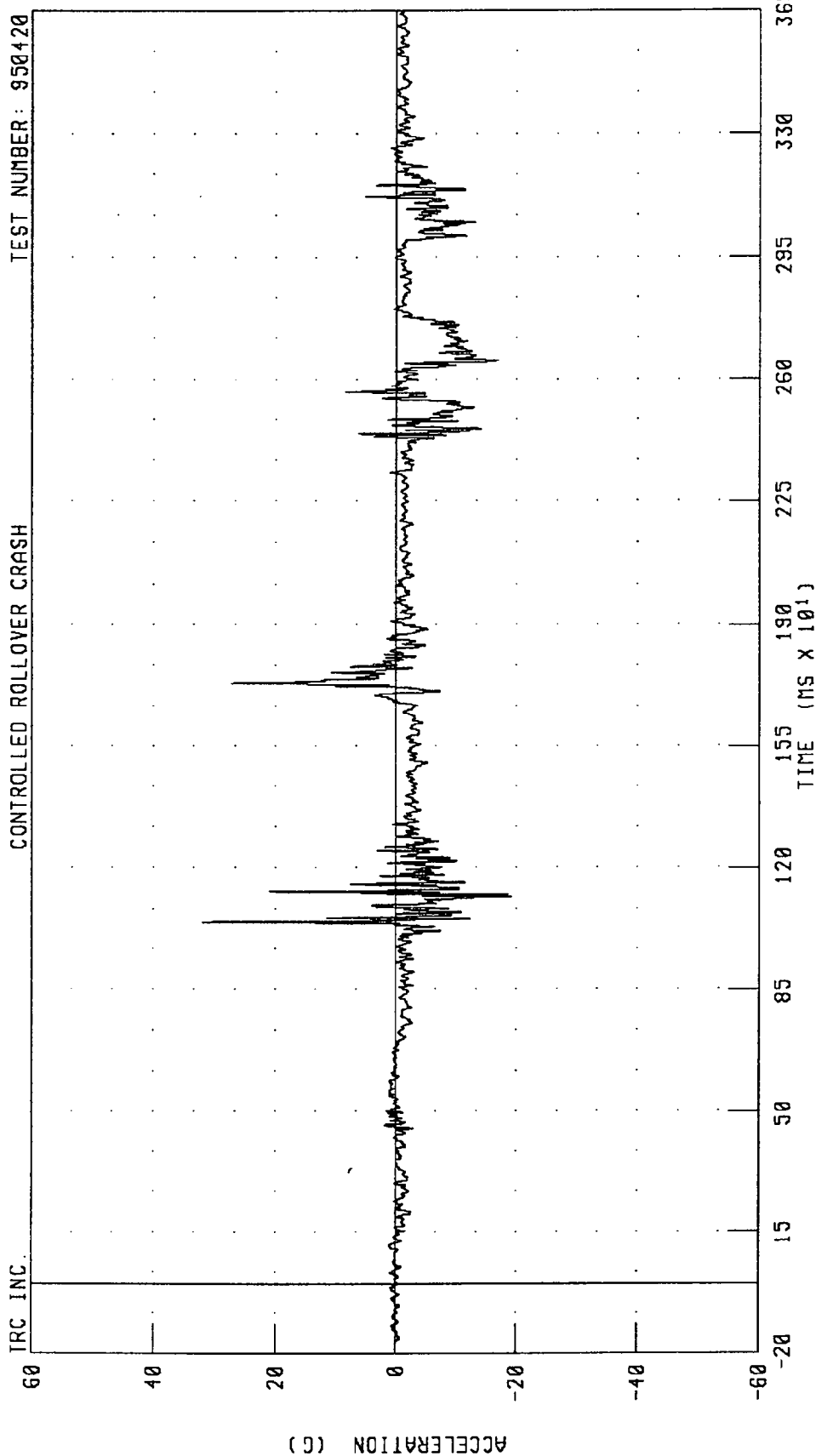
CHANNEL: LFDXG1 FILTER: CH. CLASS 60

PEAK DATA: 21.89 G @ 1121.63 MS; -21.43 G @ 2447.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT DOOR AT LATCH Y-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



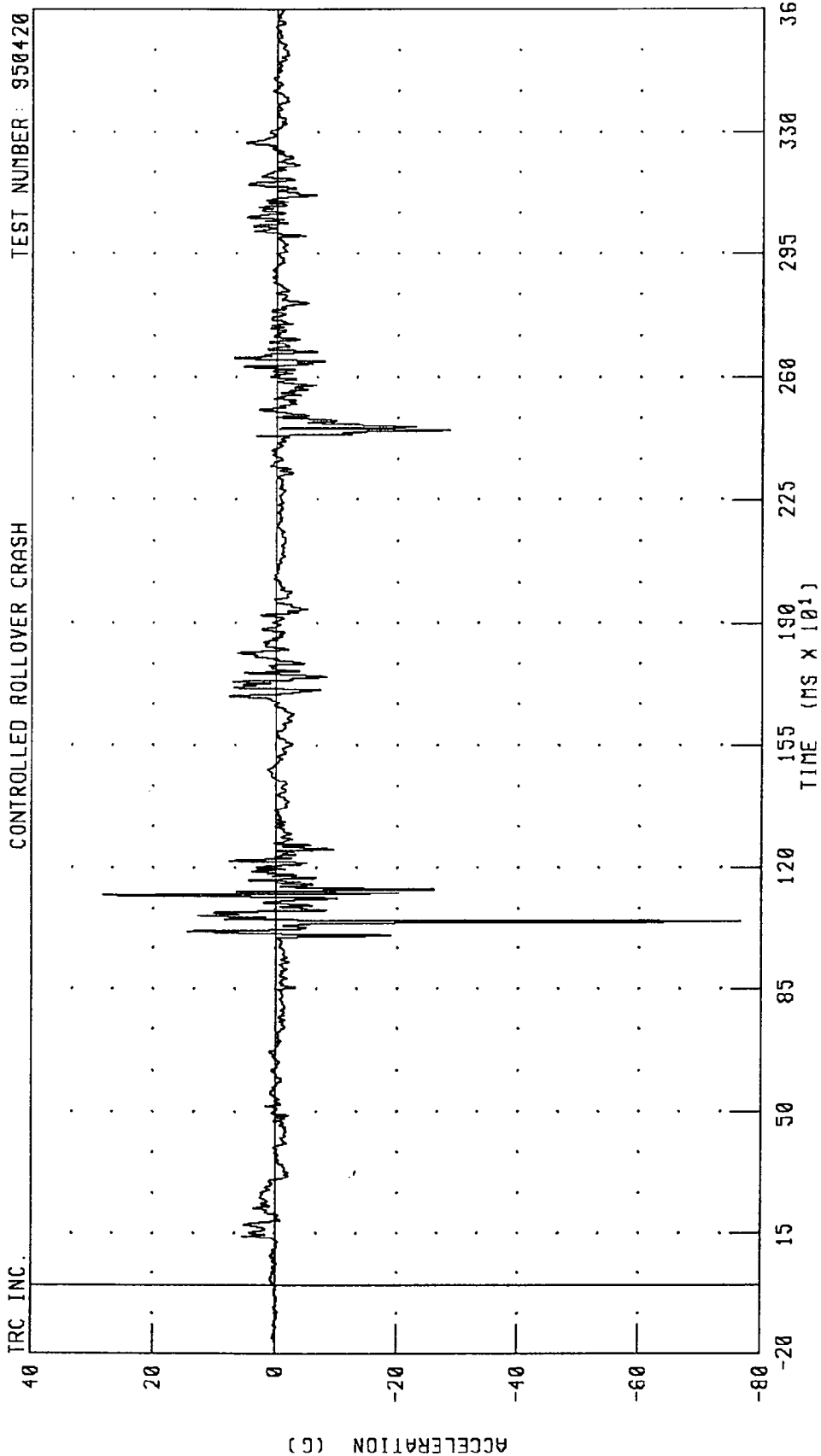
CHANNEL: LFOYG1 FILTER: CH. CLASS 60

PEAK DATA: 32.08 G @ 1043.50 MS; -19.20 G @ 1118.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT DOOR AT LATCH Z-AXIS ACCELERATION

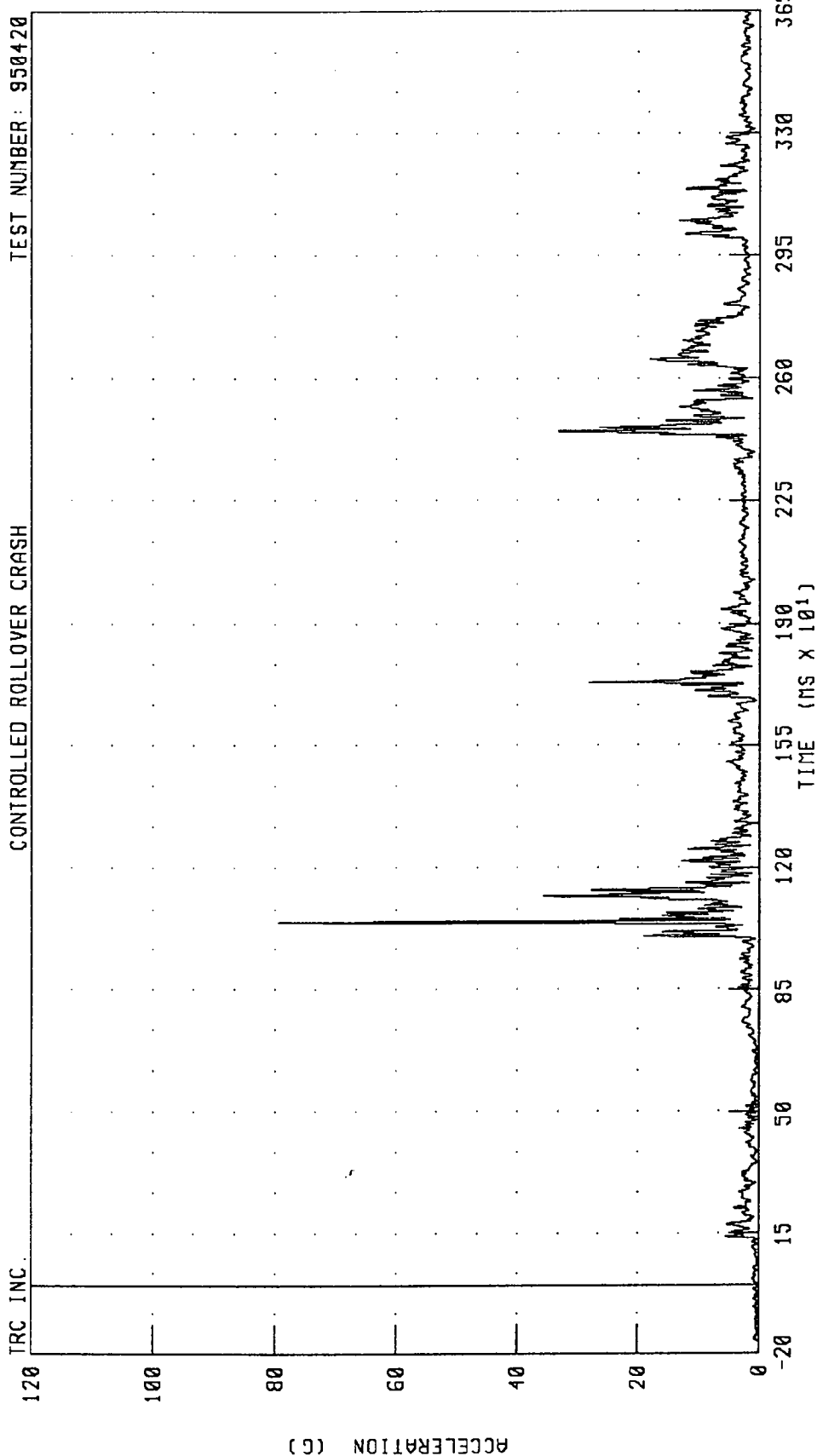
TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT DOOR AT LATCH RESULTANT ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



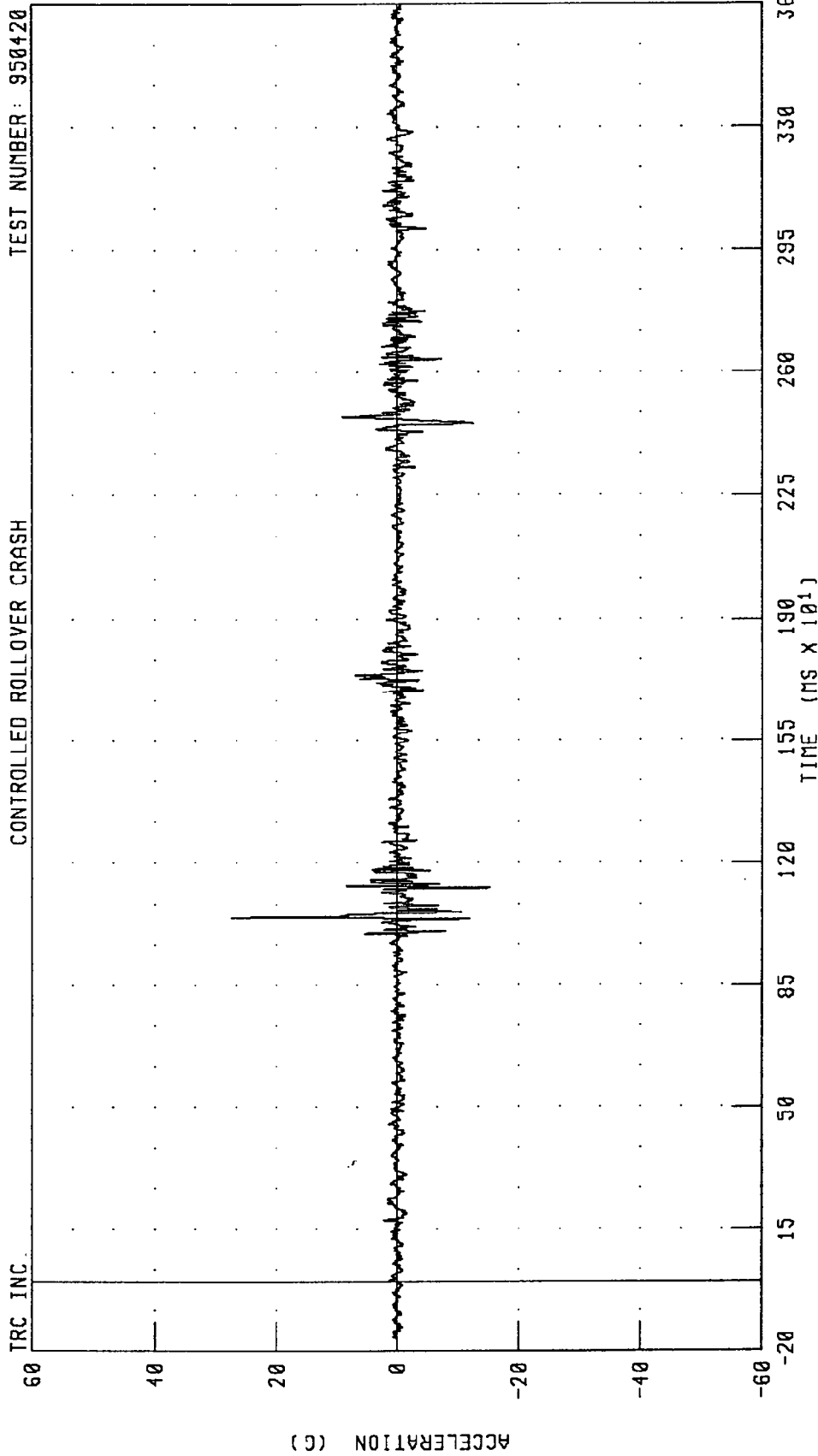
CHANNEL: LFORG1 FILTER: CH. CLASS 60

PEAK DATA: 79.43 G @ 1045.38 MS; 0.05 G @ -3.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT B-PILLAR X-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



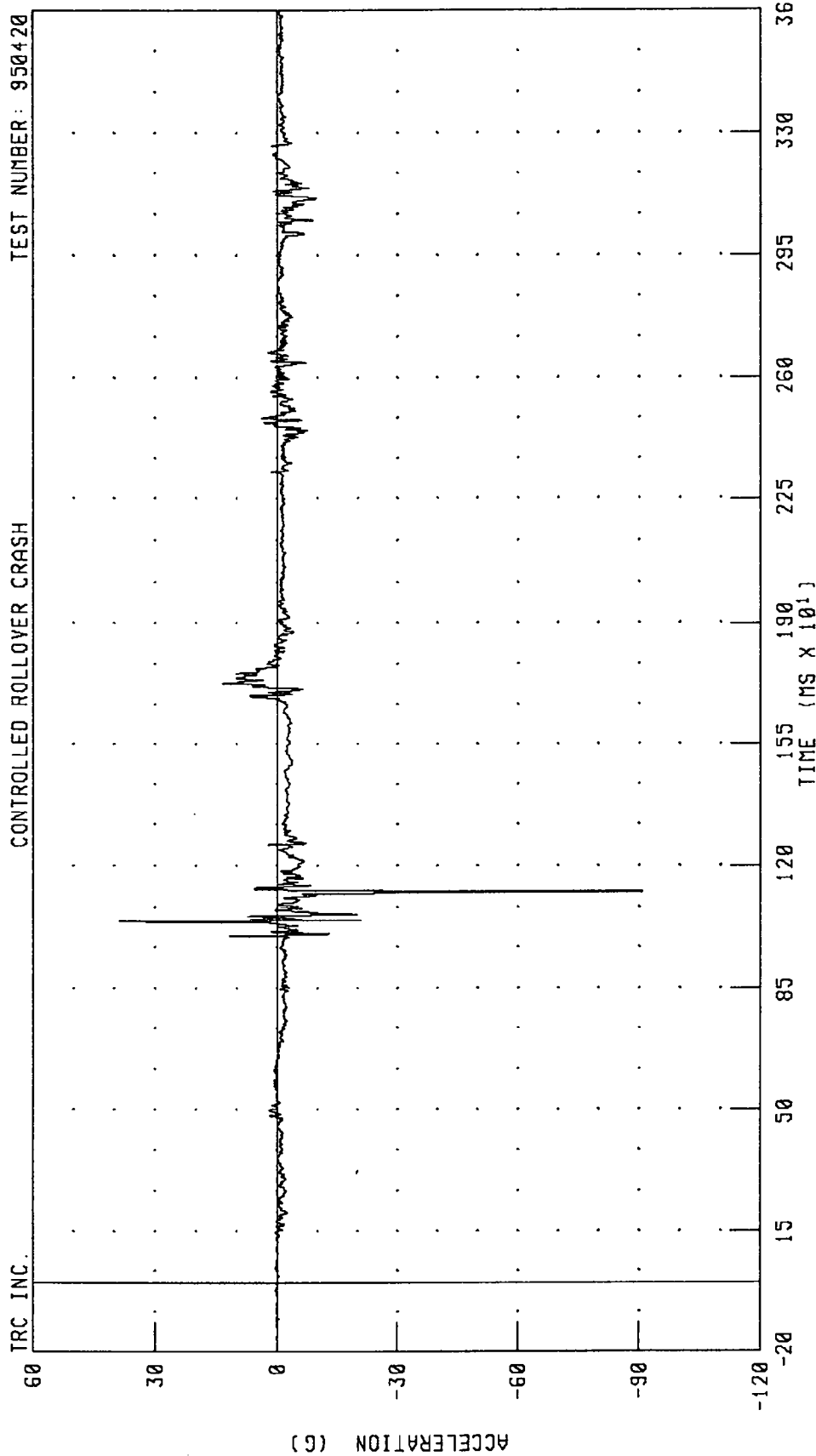
CHANNEL: LPBXG1 FILTER: CH. CLASS 60

PEAK DATA: 27.50 G @ 1046.25 MS; -15.20 G @ 1130.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT B-PILLAR Y-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

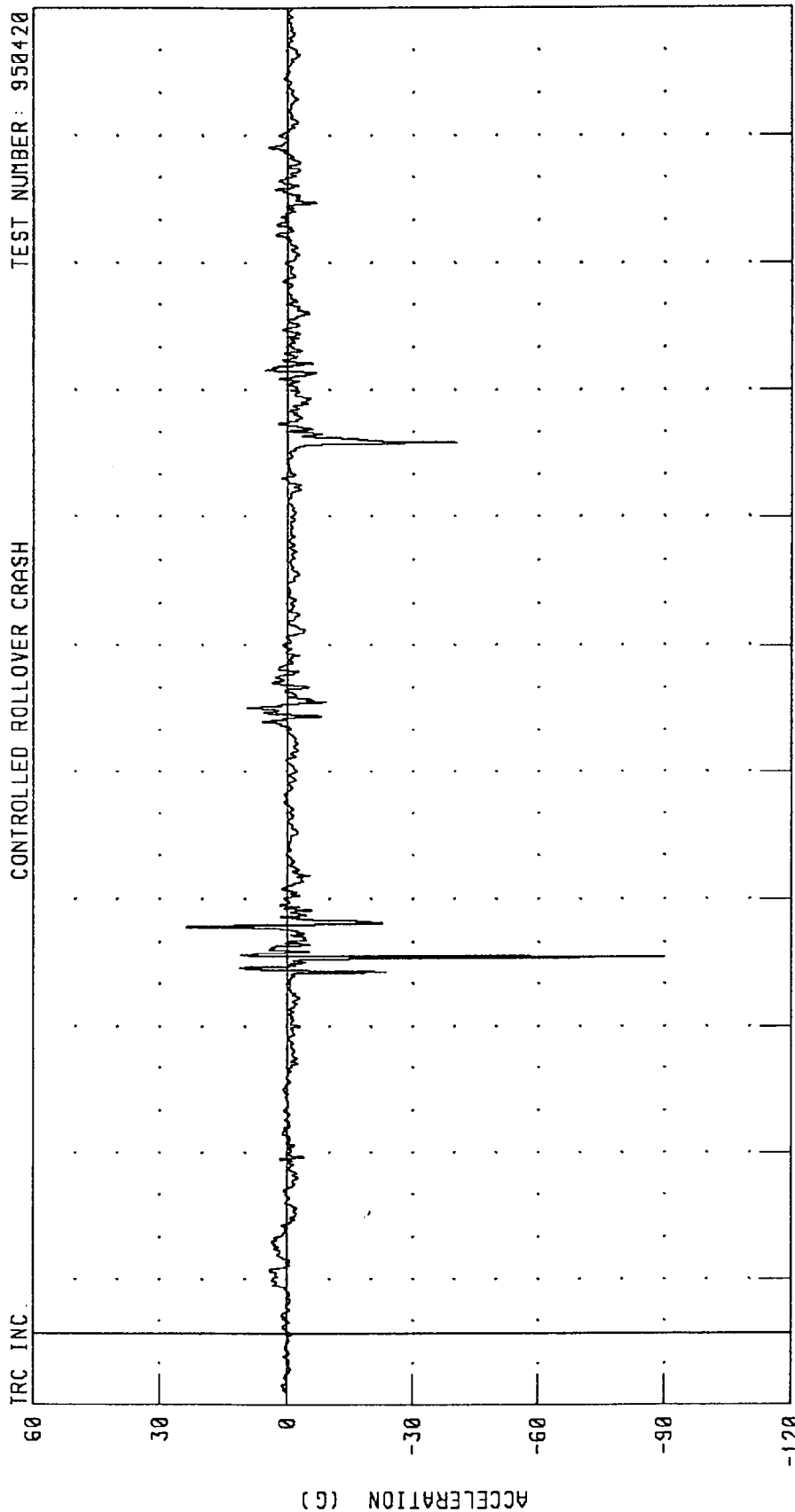


CHANNEL: LPBYG1 FILTER: CH. CLASS 60 PEAK DATA: 38.54 G @ 1042.00 MS, -90.77 G @ 1127.00 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT B-PILLAR Z-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



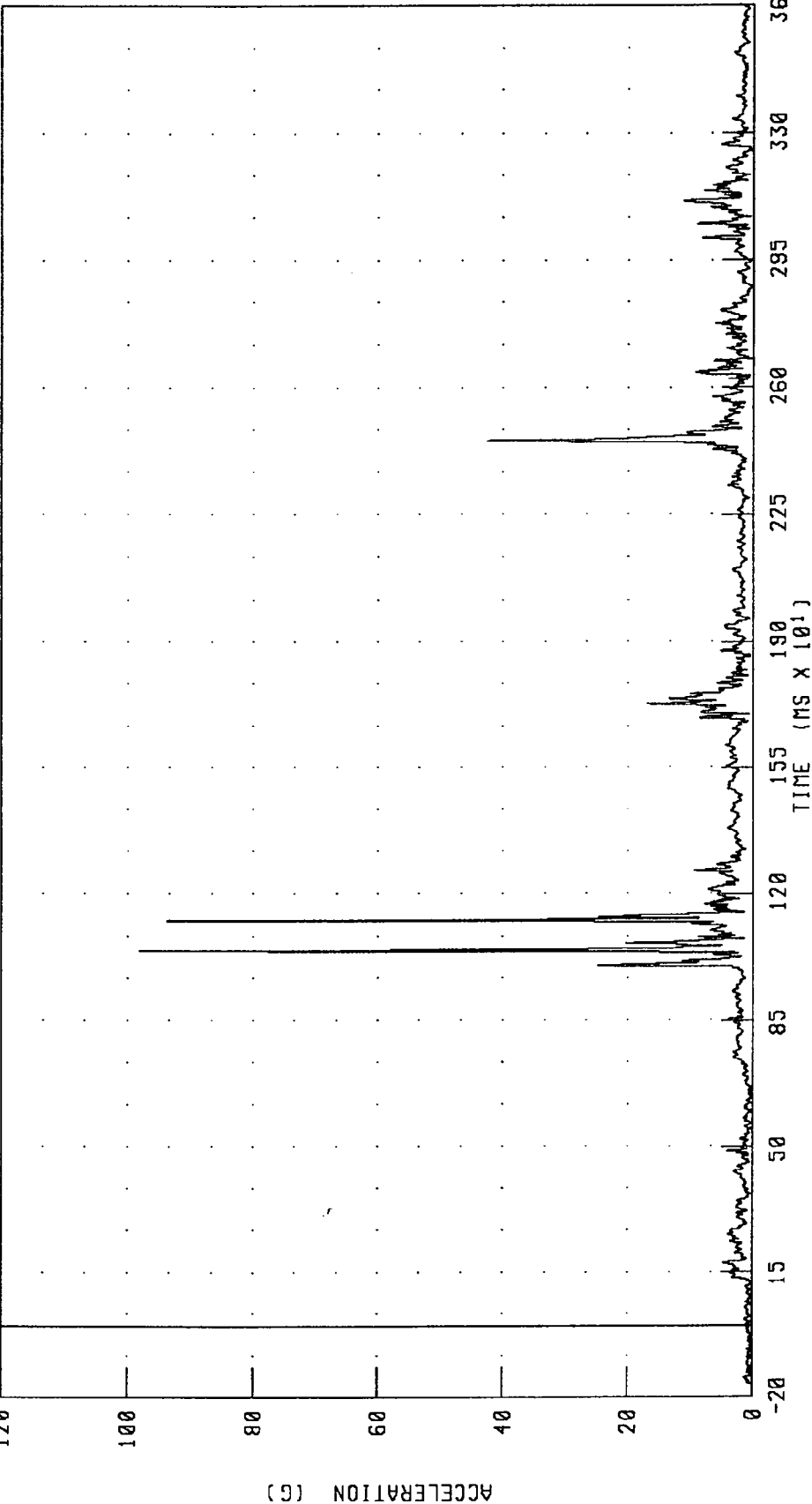
CHANNEL: LPBZG1 FILTER: CH. CLASS 60
PEAK DATA: 23.57 G @ 1127.13 MS; -90.04 G @ 1042.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
LEFT B-PILLAR RESULTANT ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

IRC INC.



CHANNEL: LPBRG1 FILTER: CH. CLASS 60

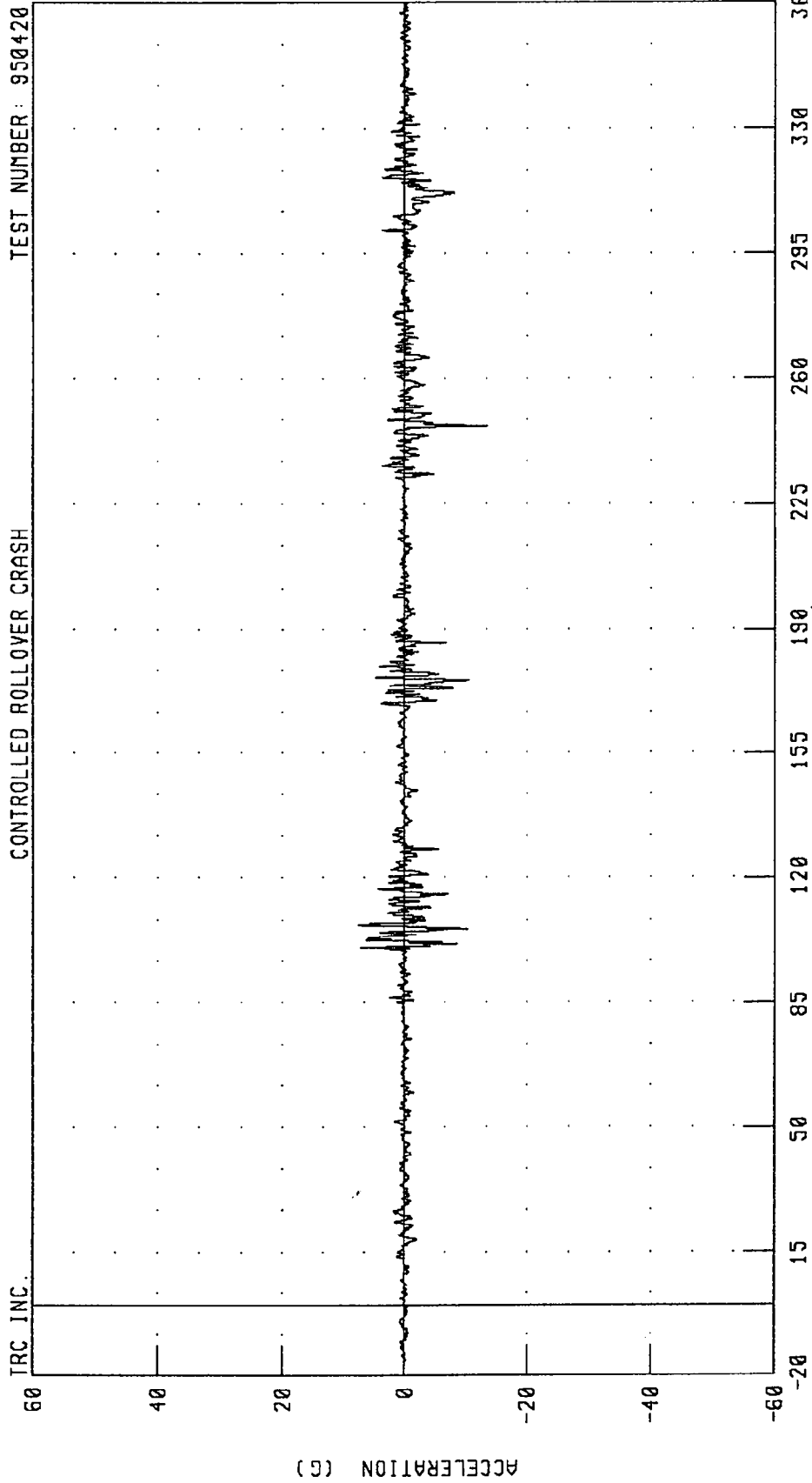
PEAK DATA: 98.11 G @ 1042.38 MS; 0.05 G @ 2873.75 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT DOOR AT LATCH X-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

TRC INC.



CHANNEL: RFDXG1 FILTER: CH. CLASS 60

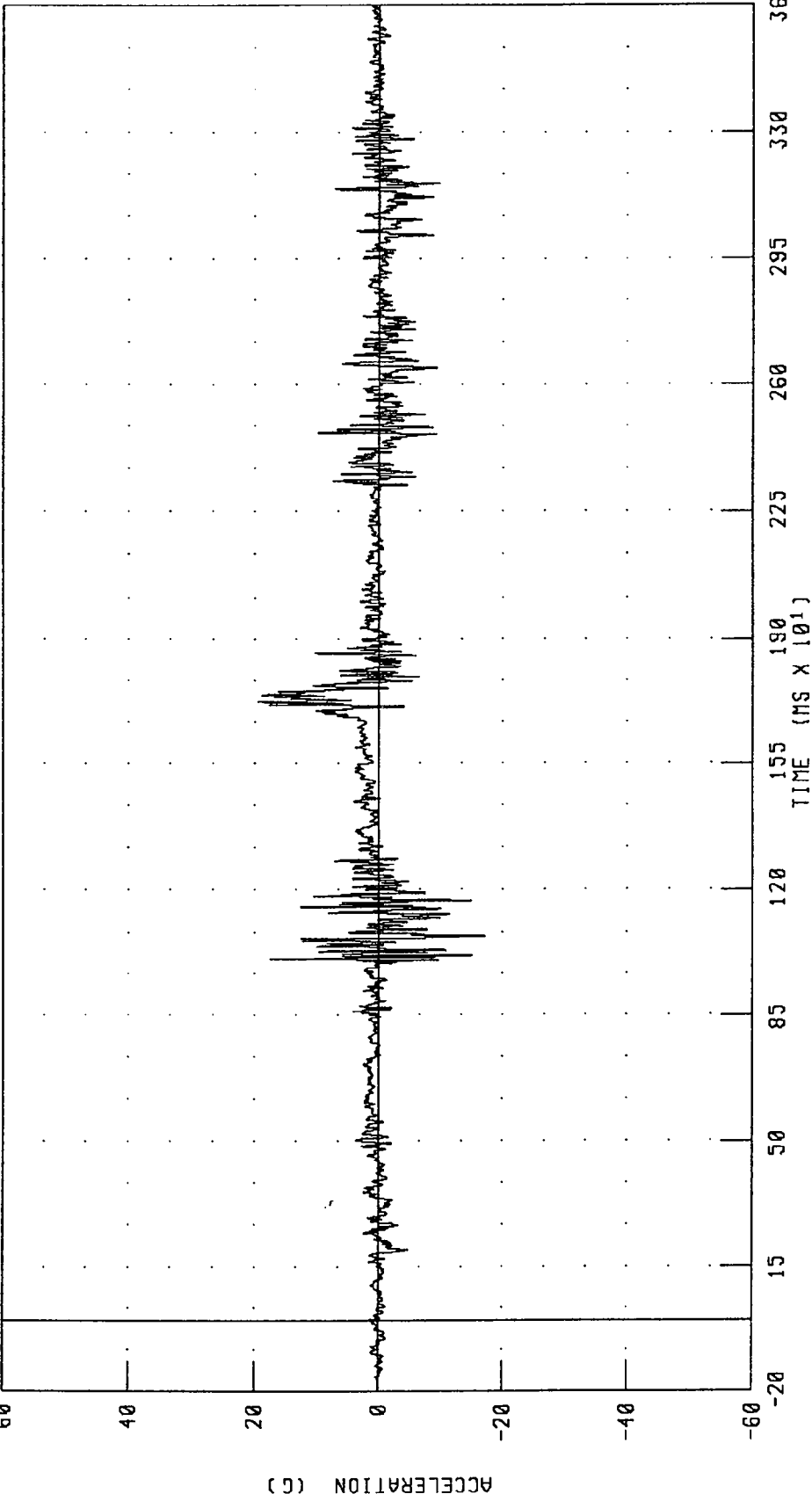
PEAK DATA: 7.65 G @ 1068.50 MS; -13.55 G @ 2467.00 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT DOOR AT LATCH Y-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

TRC INC.



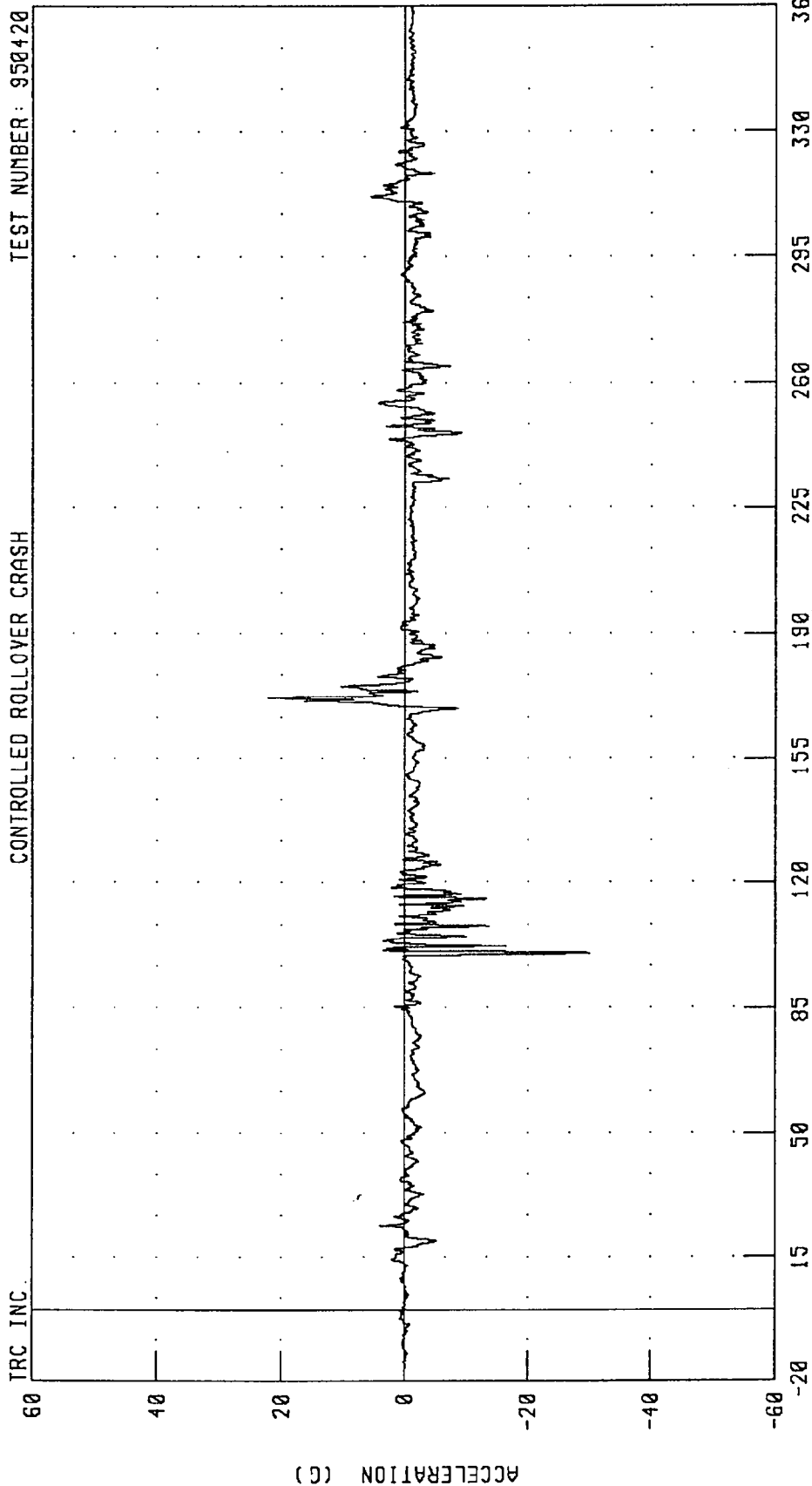
CHANNEL: RFDYG1 FILTER: CH. CLASS 60

PEAK DATA: 19.47 G @ 1726.38 MS; -17.04 G @ 1073.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT DOOR AT LATCH Z-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.



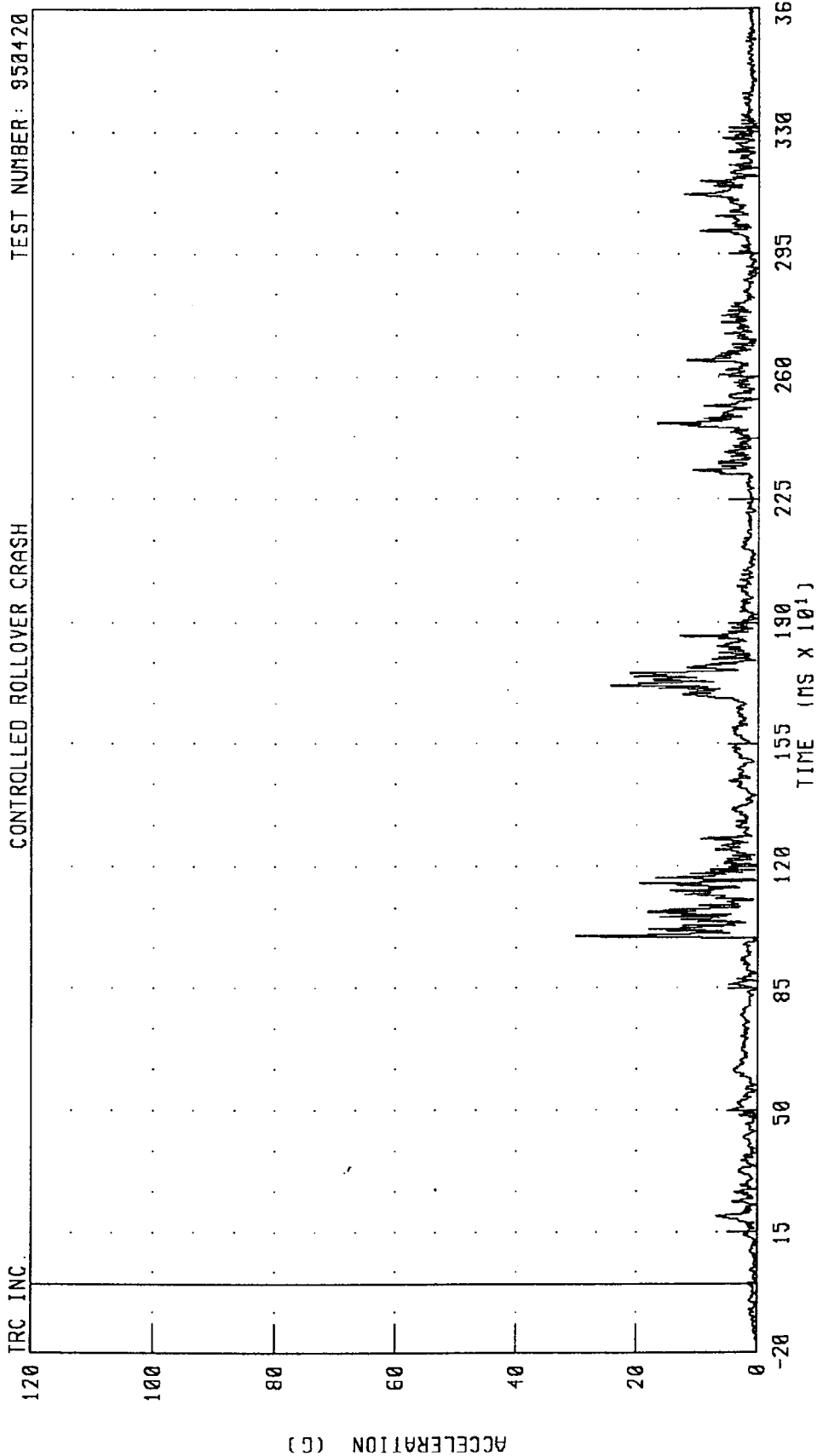
CHANNEL: RFDZG1 FILTER: CH. CLASS 60

TIME (MS X 10¹)

PEAK DATA: 22.15 G @ 1721.00 MS, -29.93 G @ 1001.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT DOOR AT LATCH RESULTANT ACCELERATION

TRC INC. CONTROLLED ROLLOVER CRASH TEST NUMBER: 950420



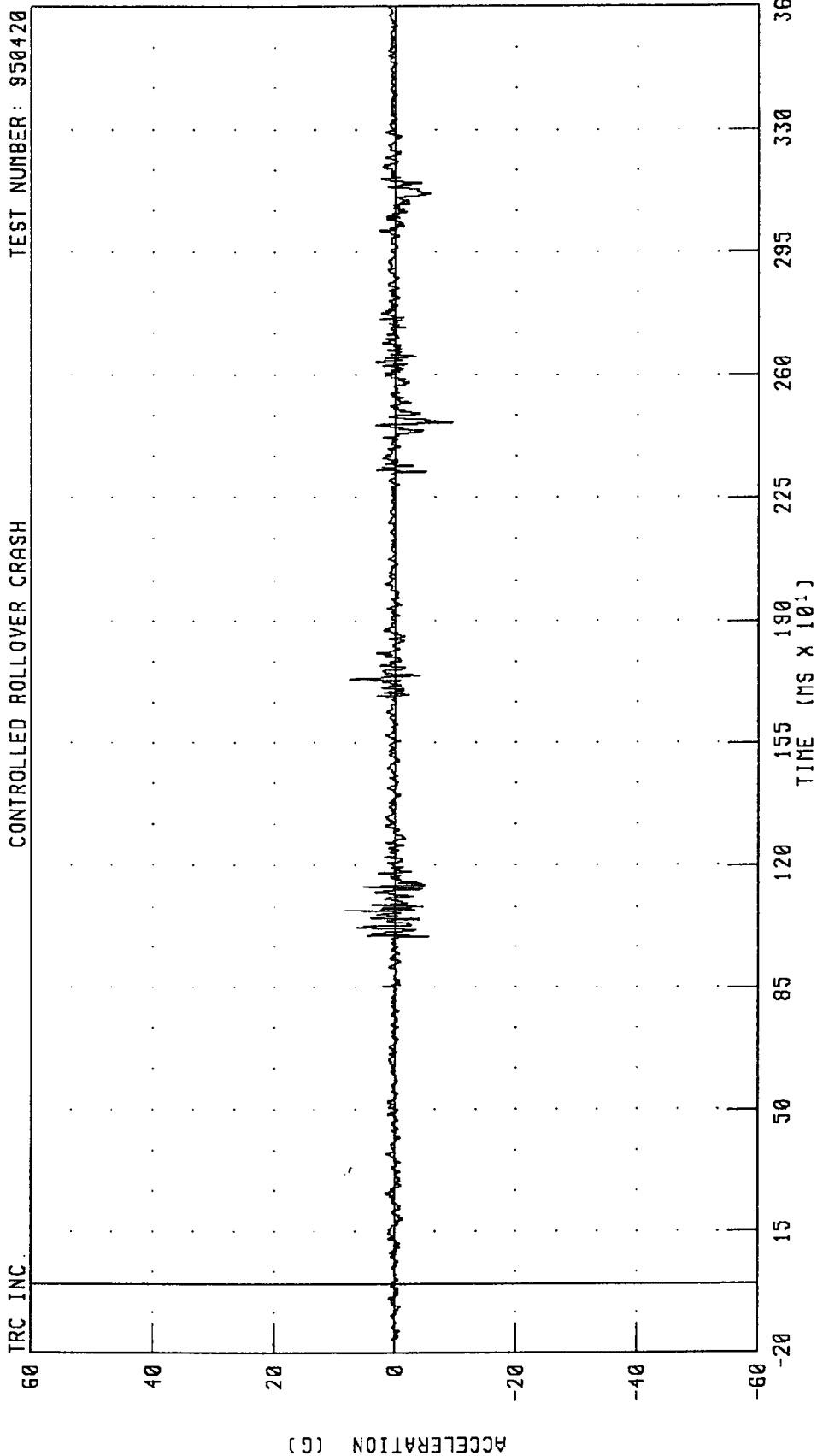
CHANNEL: RFDRG1 FILTER: CH. CLASS 60

PEAK DATA: 30.21 G @ 1003.00 MS; 0.09 G @ 2907.00 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT B-PILLAR X-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.

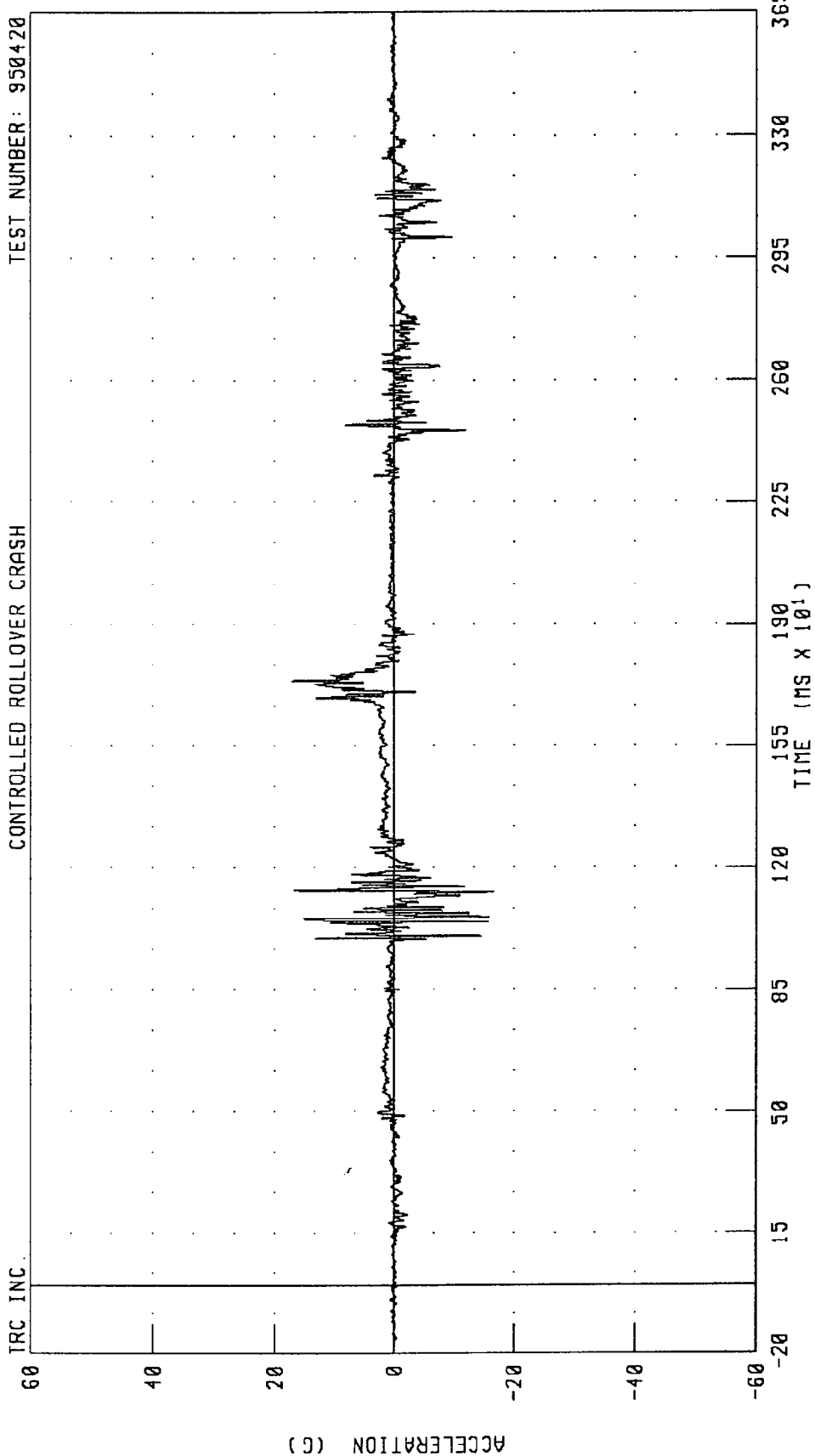


CHANNEL: RPBXG1 FILTER: CH. CLASS 60

PEAK DATA: 8.23 G @ 1072.00 MS; -9.45 G @ 2463.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 RIGHT B-PILLAR Y-AXIS ACCELERATION
 CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

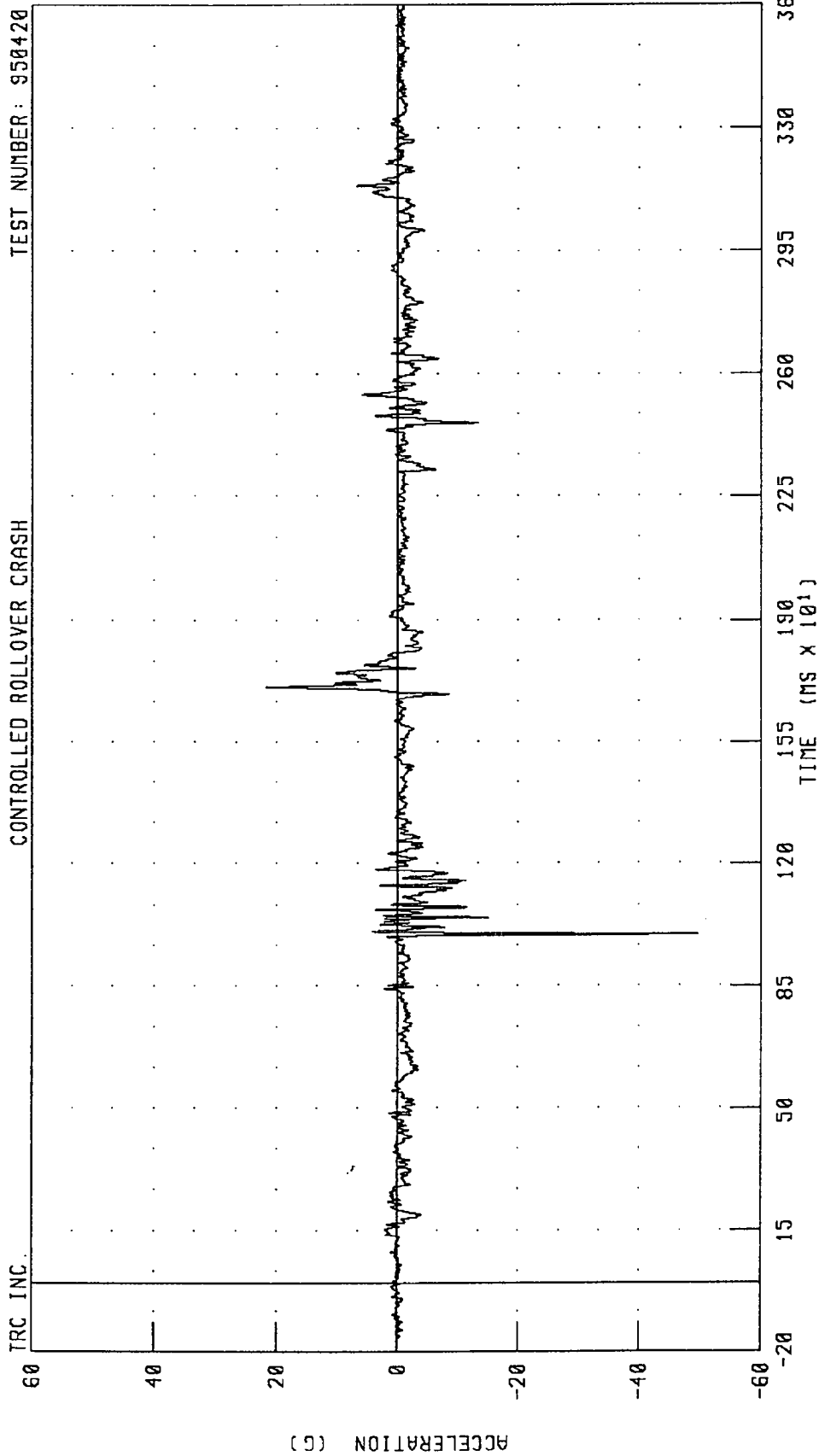


CHANNEL: RPBYG1 FILTER: CH. CLASS 60 PEAK DATA: 17.09 G @ 1740.00 MS; -16.62 G @ 1130.88 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT B-PILLAR Z-AXIS ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.

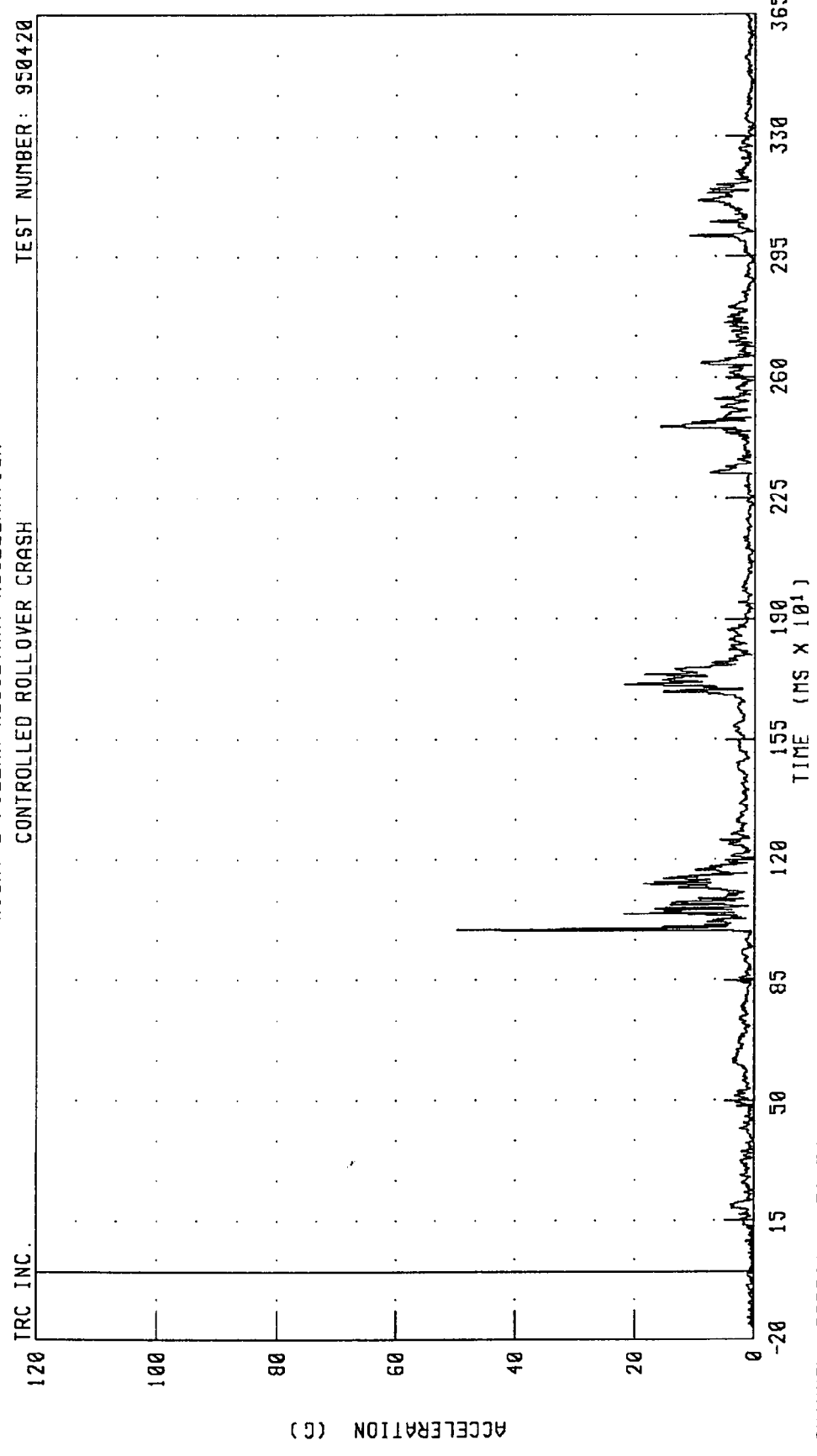


CHANNEL: RPBZG1 FILTER: CH. CLASS 60

PEAK DATA: 21.68 G @ 171.00 MS; -49.64 G @ 997.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
RIGHT B-PILLAR RESULTANT ACCELERATION
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

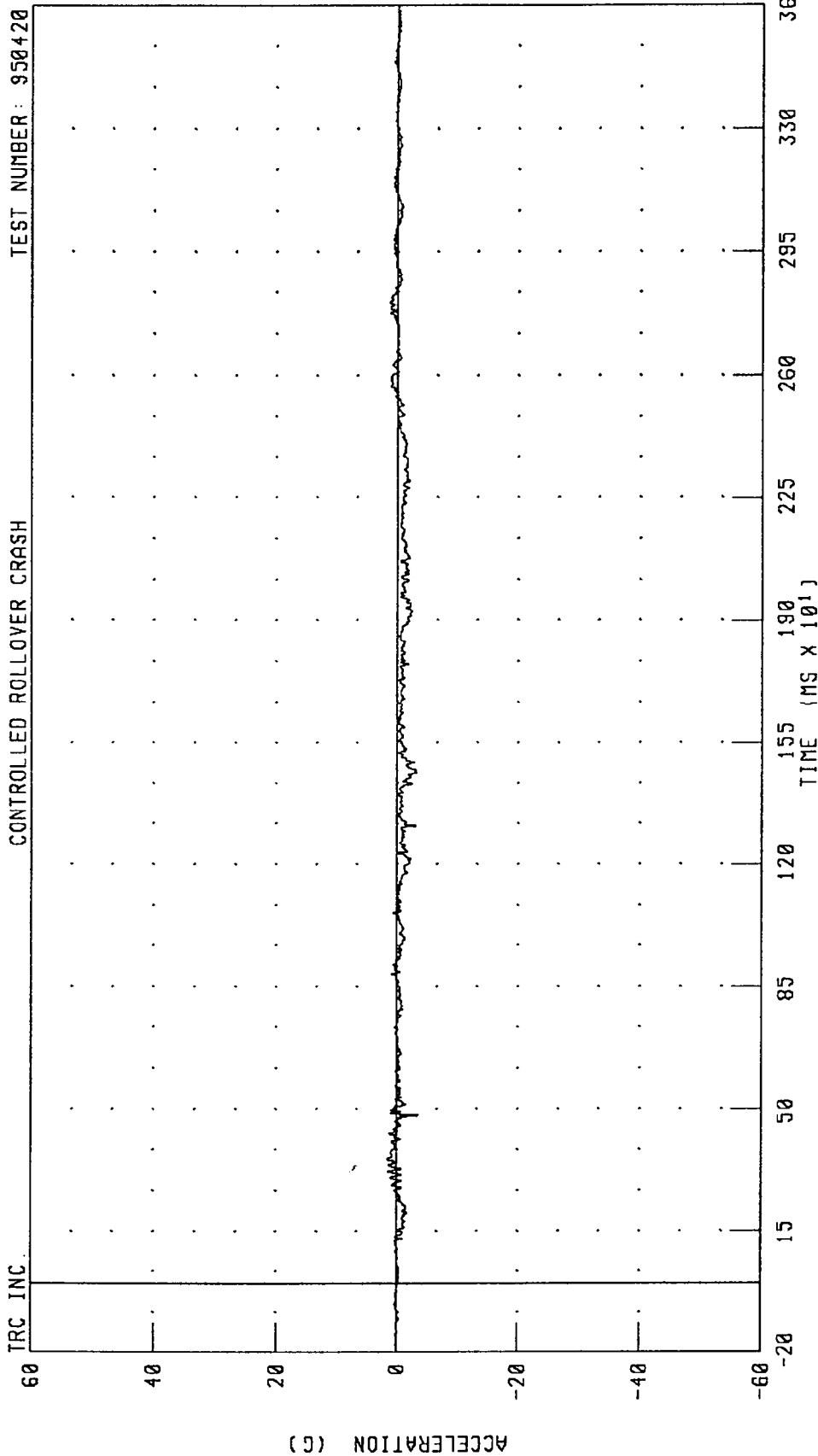


CHANNEL: RPBRG1 FILTER: CH. CLASS 60 PEAK DATA: 49.84 G @ 997.63 MS; 0.05 G @ 15.25 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 ROLL CART CENTER OF GRAVITY X-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



CHANNEL: VCGXG2 FILTER: CH. CLASS 60

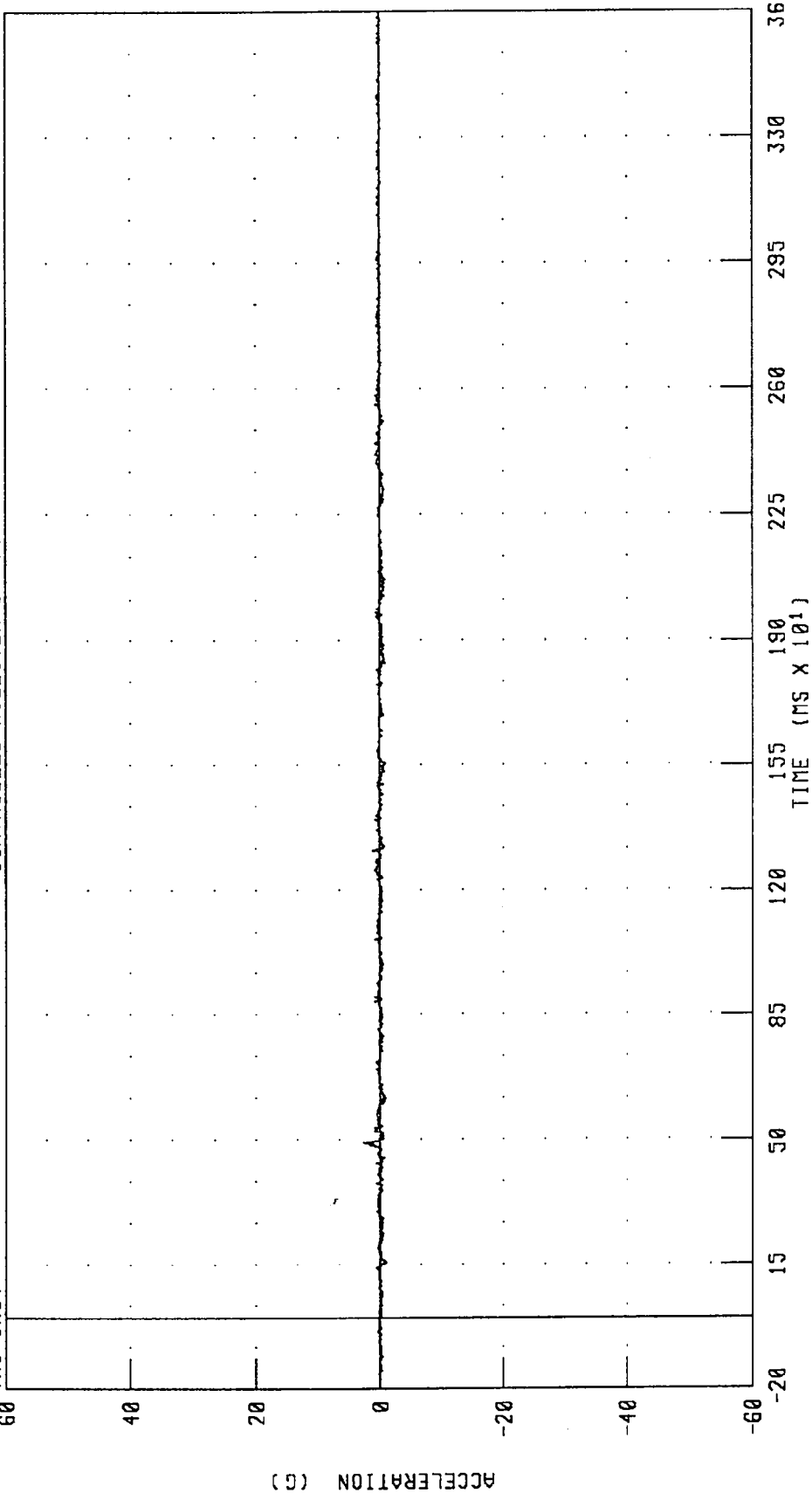
PEAK DATA: 1.60 G @ 355.50 MS; -3.47 G @ 484.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
ROLL CART CENTER OF GRAVITY Y-AXIS ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

TRC INC.

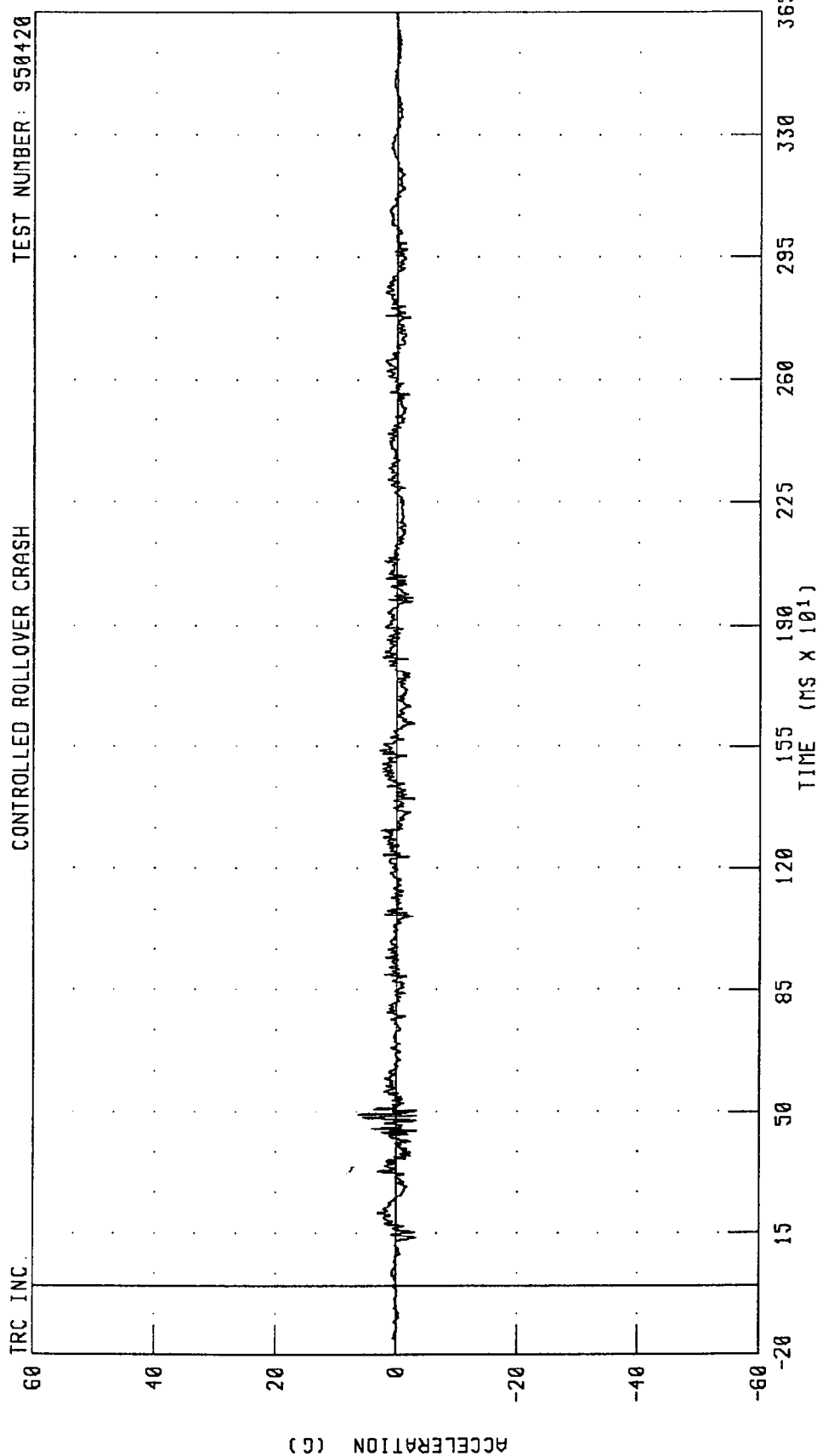


CHANNEL: VCGYG2 FILTER: CH. CLASS 60

PEAK DATA: 2.76 G @ 493.63 MS; -0.85 G @ 155.63 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 ROLL CART CENTER OF GRAVITY Z-AXIS ACCELERATION
 CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420



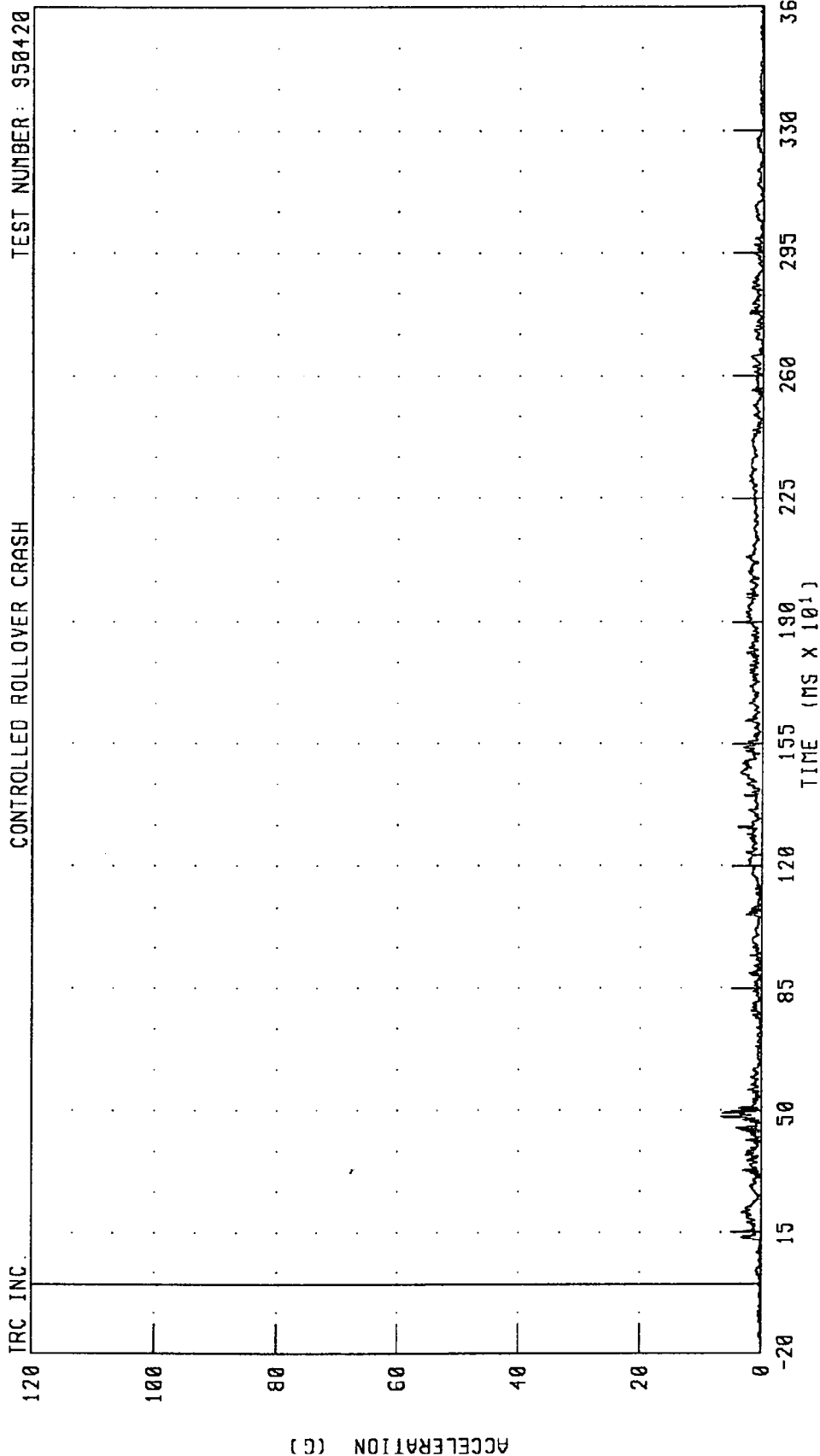
CHANNEL: VCCZG2 FILTER: CH. CLASS 60

PEAK DATA: 6.30 G @ 495.38 MS, -3.40 G @ 505.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 ROLL CART CENTER OF GRAVITY RESULTANT ACCELERATION

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



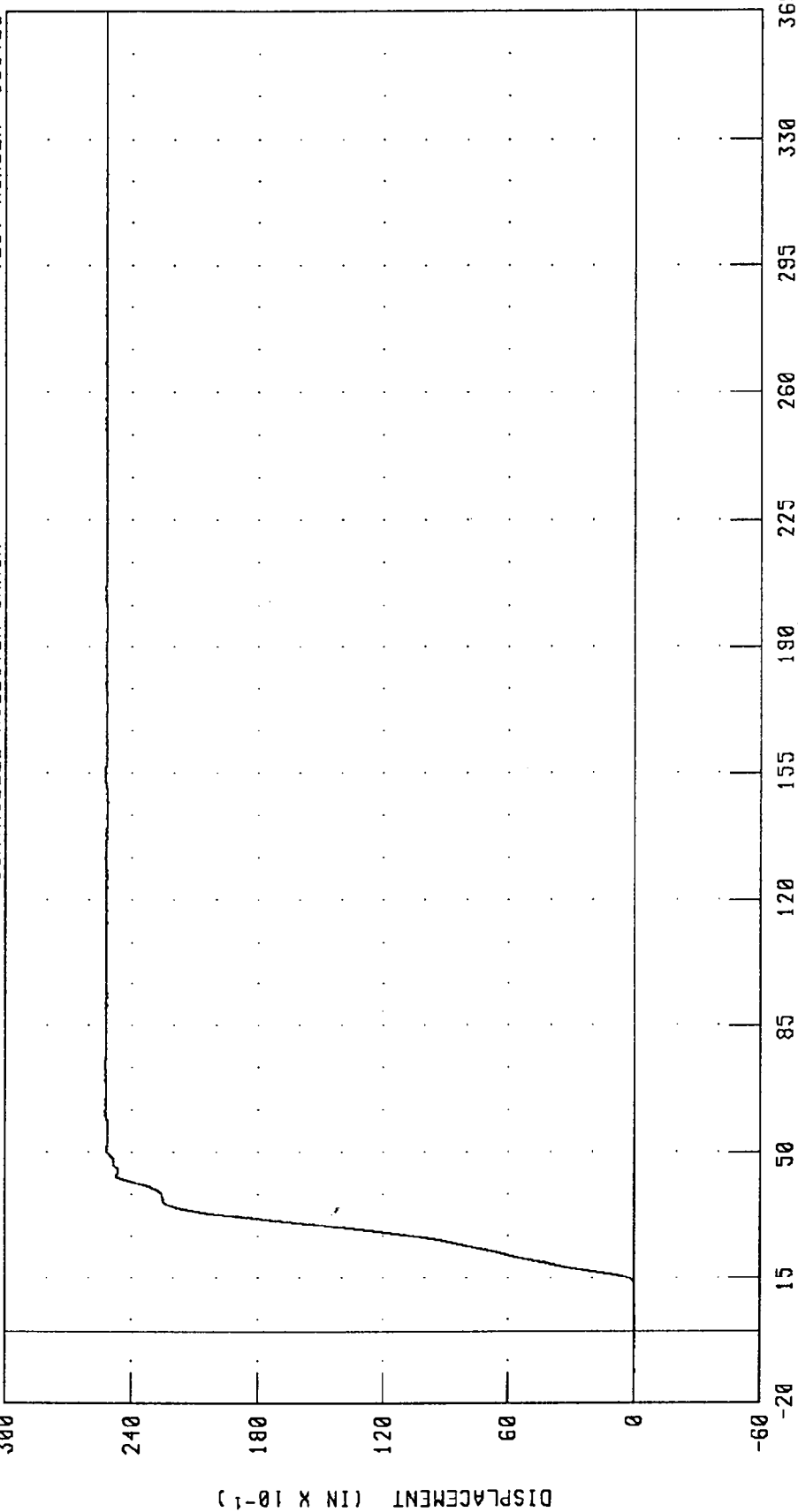
CHANNEL: VCGRG2 FILTER: CH. CLASS 60

PEAK DATA: 6.67 G @ 484.88 MS; 0.01 G @ -130.50 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 ROLL CART LEFT CYLINDER DISPLACEMENT
 CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

IRC INC.



CHANNEL: RCPDL FILTER: CH. CLASS 60

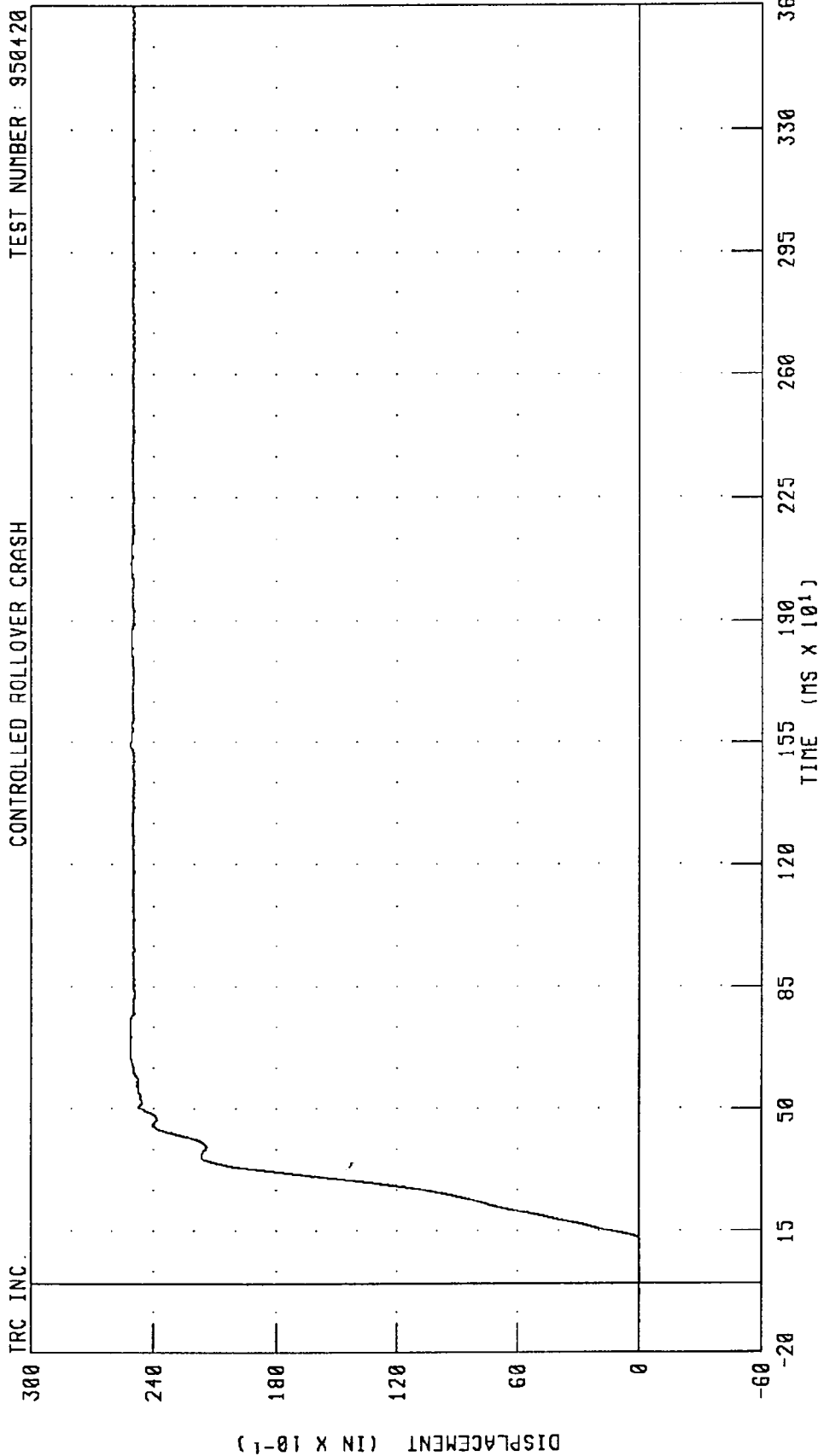
TIME (MS $\times 10^1$)

PEAK DATA: 25.29 IN @ 1544.50 MS; -0.02 IN @ 6.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
ROLL CART RIGHT CYLINDER DISPLACEMENT
CONTROLLED ROLLOVER CRASH

TEST NUMBER: 950420

TRC INC.



CHANNEL: RCPOR FILTER: CH. CLASS 60

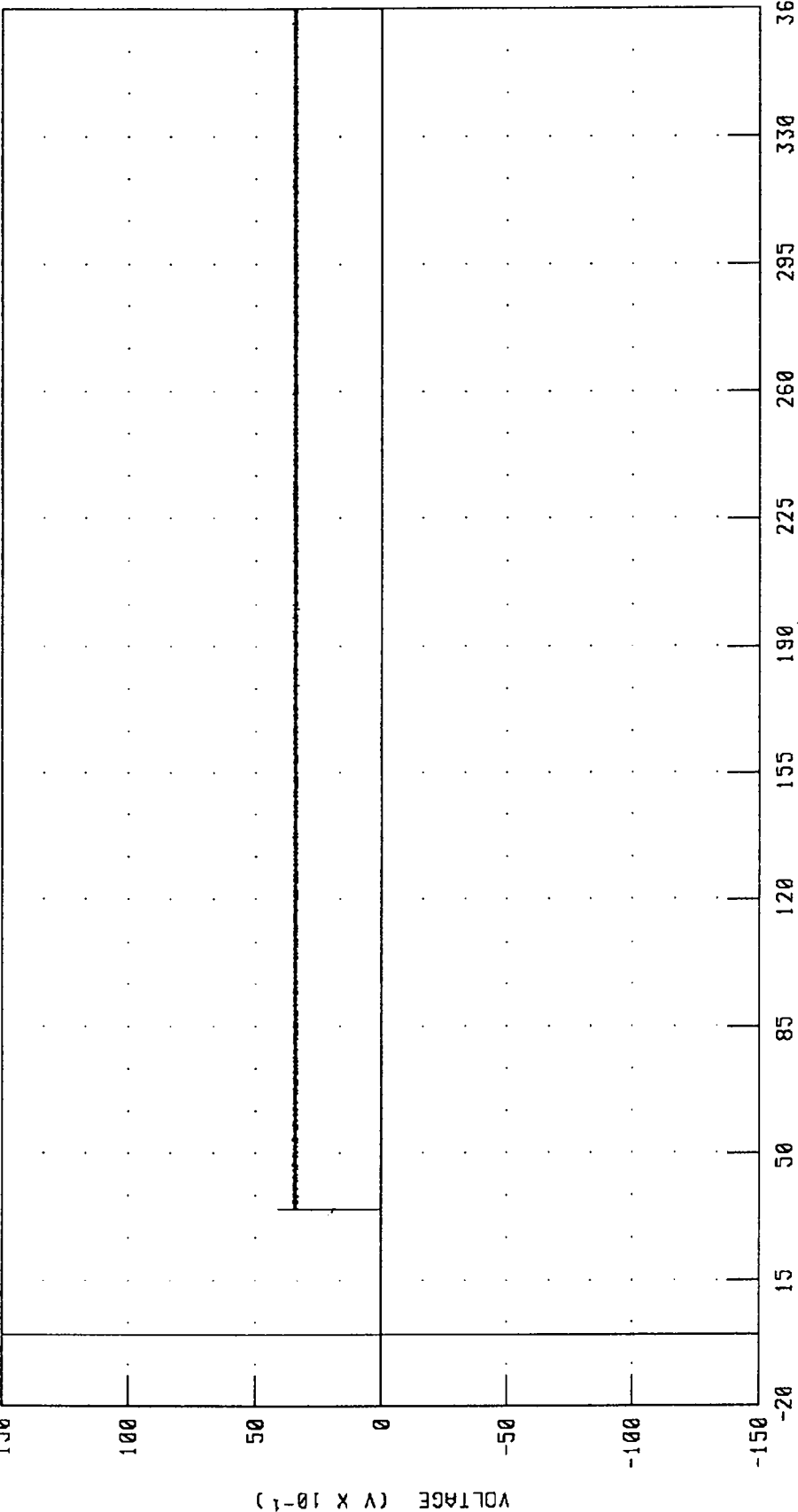
PEAK DATA: 25.14 IN @ 1544.75 MS; -0.02 IN @ 8.13 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 VEHICLE/ROLL CART SEPARATION TIME - UPPER SWITCH

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH

IRC INC.



CHANNEL: 0TH1

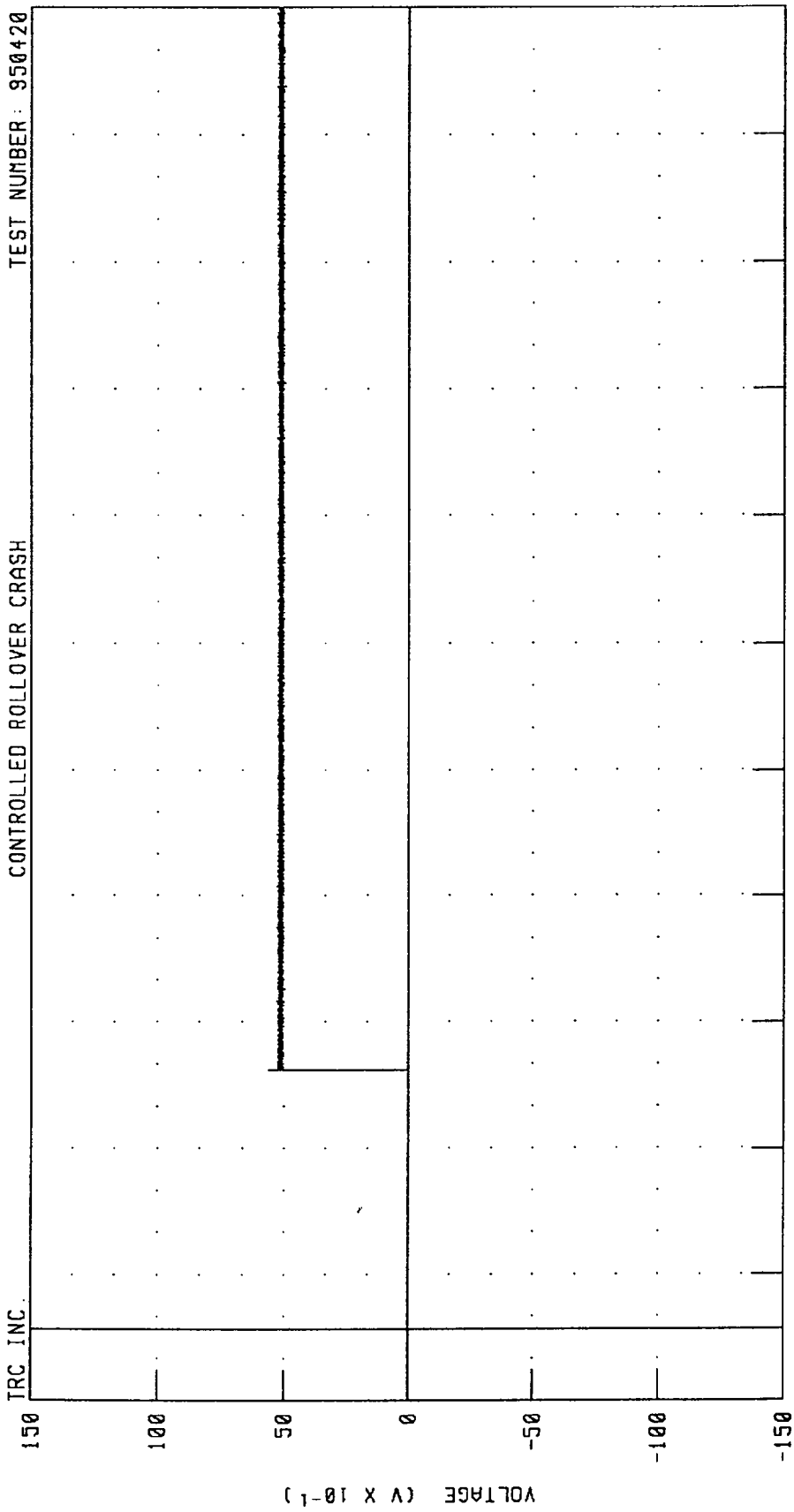
FILTER: CH. CLASS 1000

PEAK DATA: 4.12 V @ 346.88 MS; 0.00 V @ -160.00 MS

MODIFIED 1989 NISSAN PICKUP TRUCK RIGHT SIDE ROLLOVER OFF OF ROLLOVER CART AT 30 MPH
 VEHICLE/ROLL CART SEPARATION TIME - LOWER SWITCH

TEST NUMBER: 950420

CONTROLLED ROLLOVER CRASH



TIME (MS X 10¹)

PEAK DATA: 5.59 V @ 716.38 MS; 0.00 V @ -160.00 MS

CHANNEL: 0TH2 FILTER: CH. CLASS 1000

Appendix C

Dummy Certification Data

Pre-Test Certification Data

Driver Dummy S/N 043

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS

043 HUMANOID

04-APR-95

TRC INC. TEST NO: 43C11ED1 572E SN043 EXT.DIMENSION CAL11

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		16.9 - 17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)		8.9 - 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE	(Y)	38.2 - 39.4 IN	39.3 IN
WAIST CIRCUMFERENCE	(Z)	32.9 - 34.1 IN	33.7 IN
CHEST DEPTH	(O)	8.4 - 9.0 IN	8.7 IN
H-POINT HEIGHT	(C)	3.3 - 3.5 IN	3.5 IN
H-POINT FROM SEATBACK	(D)	5.3 - 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE	(H)	1.6 - 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT	(A)	34.6 - 35.0 IN	34.7 IN
THIGH CLEARANCE	(F)	5.5 - 6.1 IN	6.1 IN
BUTTOCK KNEE LENGTH	(K)	22.8 - 23.8 IN	23.6 IN
BUTTOCK POPLITEAL LENGTH	(N)	17.8 - 18.8 IN	18.6 IN
POPLITEAL HEIGHT	(L)	16.9 - 17.9 IN	16.9 IN
KNEE PIVOT HEIGHT	(M)	19.1 - 19.7 IN	19.4 IN
FOOT LENGTH	(P)	9.9 - 10.5 IN	10.3 IN
FOOT BREADTH	(W)	3.6 - 4.2 IN	4.0 IN
SHOULDER PIVOT FROM BACKLINE	(E)	3.3 - 3.7 IN	3.7 IN
SHOULDER BREADTH	(V)	16.6 - 17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT	(B)	19.9 - 20.5 IN	20.2 IN
ELBOW REST HEIGHT	(J)	7.5 - 8.3 IN	8.0 IN
SHOULDER-ELBOW LENGTH	(I)	13.0 - 13.6 IN	13.3 IN
BACK OF ELBOW TO WRIST PIVOT	(G)	11.4 - 12.0 IN	11.5 IN

DUMMY MEETS SPECIFICATIONS
TECHNICIAN R. F. S.

RUN NUMBER: 040495.1315

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

04-APR-95

TRC INC.

TEST NO: 43C11HD1

572E SN43 HEAD DROP CAL 11

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	264.21 G
PEAK LATERAL ACCELERATION	15 G MAX	-7.06 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

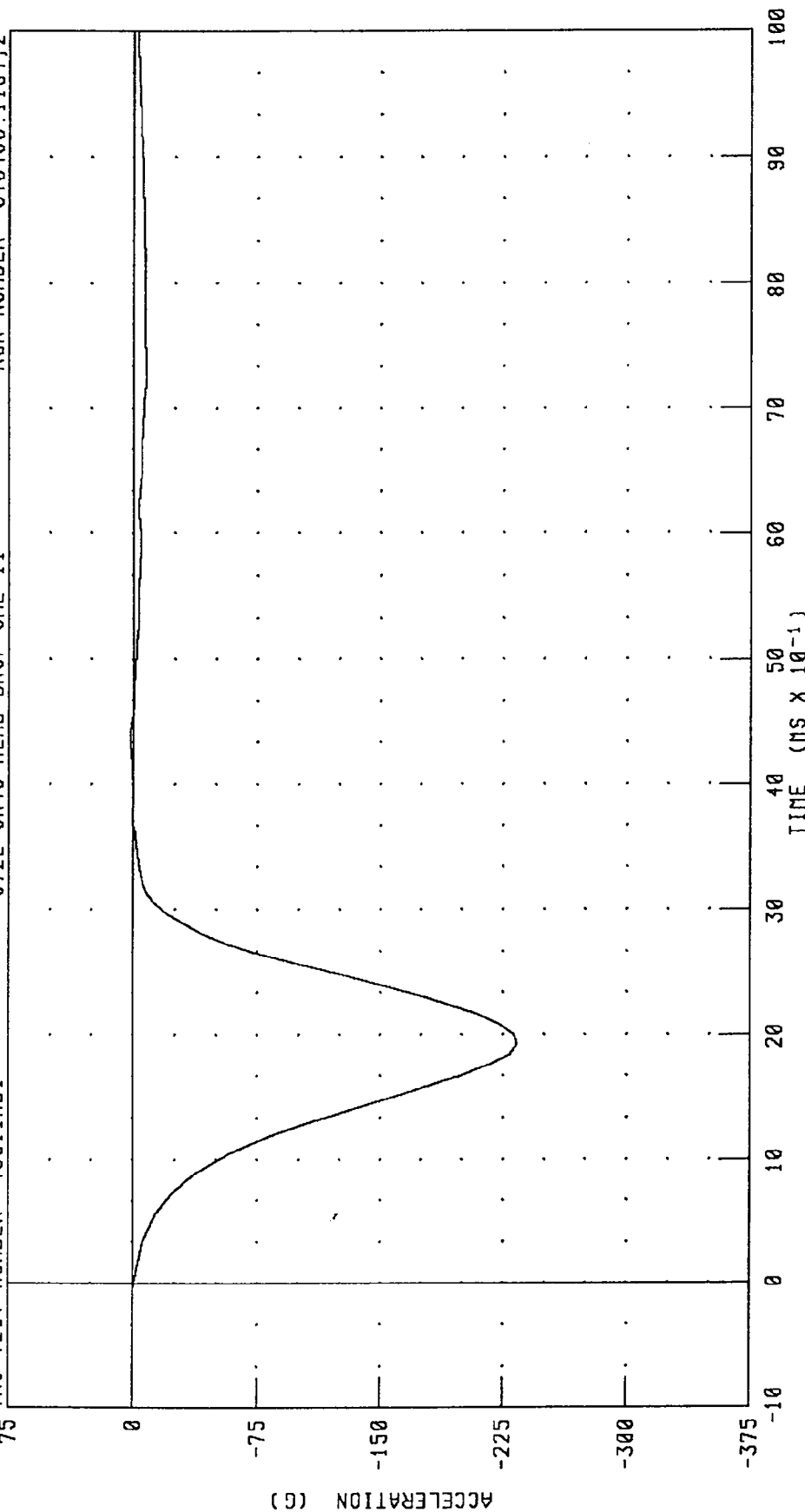
TEST MEETS SPECIFICATIONS

TECHNICIAN *Pete F. [signature]*

RUN NUMBER: 040495.1134;2

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

TRC TEST NUMBER: 43C11HD1 572E SN43 HEAD DROP CAL 11 RUN NUMBER: 040495.1134;2



CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 2.05 G @ 4.40 MS; -234.04 G @ 1.92 MS

PART 572-E HYBRID III HEAD CALIBRATION
 HEAD ACCELERATION Y AXIS
 572E SN43 HEAD DROP CAL 11

TRC TEST NUMBER: 43C11HD1

RUN NUMBER: 040495.1134;2

225

150

75

0

-75

-150

-225

ACCELERATION (G)

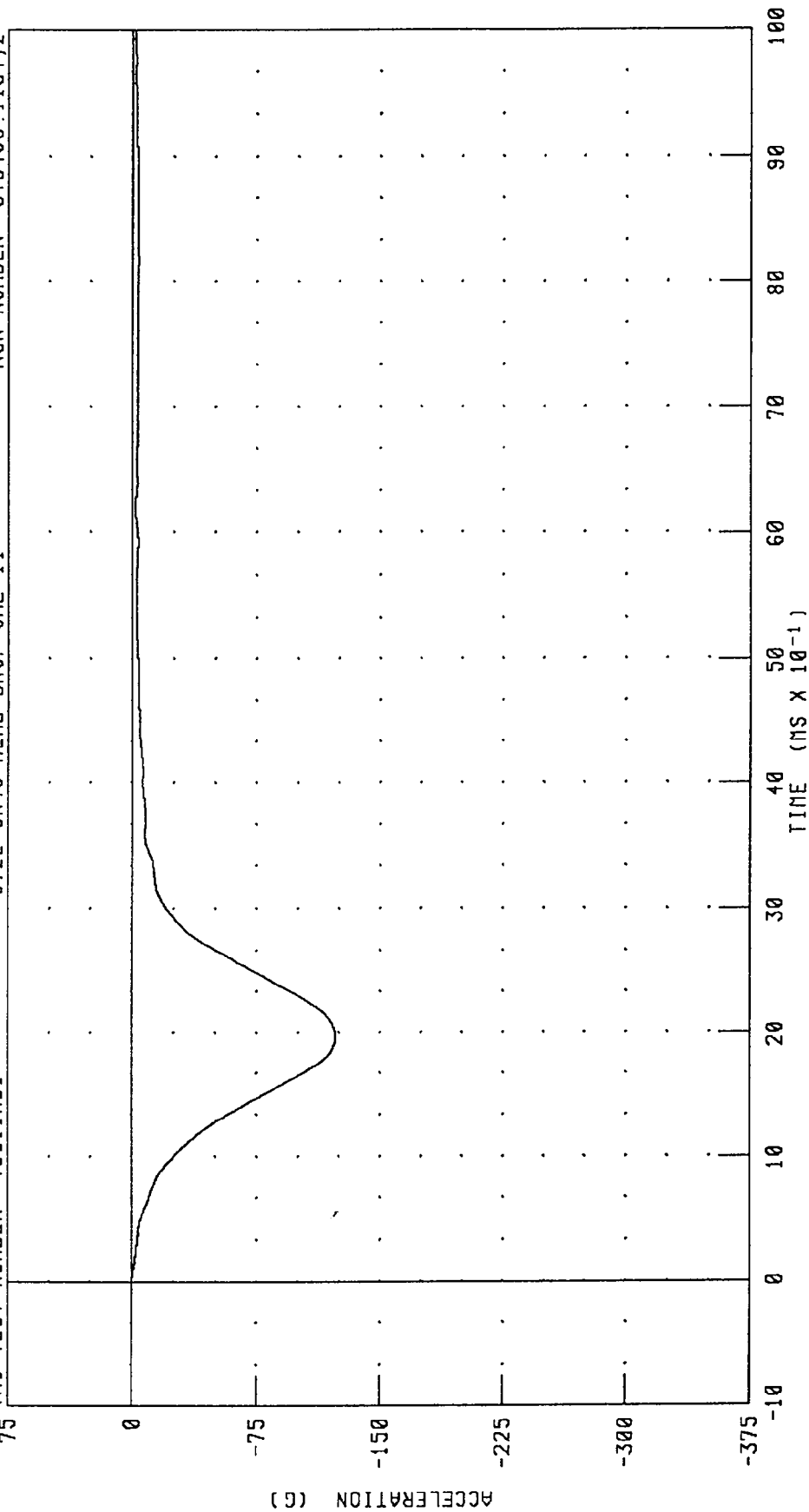
-10 0 10 20 30 40 50 60 70 80 90 100
 TIME (MS X 10⁻¹)

CHANNEL: HEDYG FILTER: CH. CLASS 1000

PEAK DATA: 2.36 G @ 4.72 MS; -7.06 G @ 2.00 MS

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

TRC TEST NUMBER: 43C11HD1 572E SN43 HEAD DROP CAL 11 RUN NUMBER: 040495.1134;2

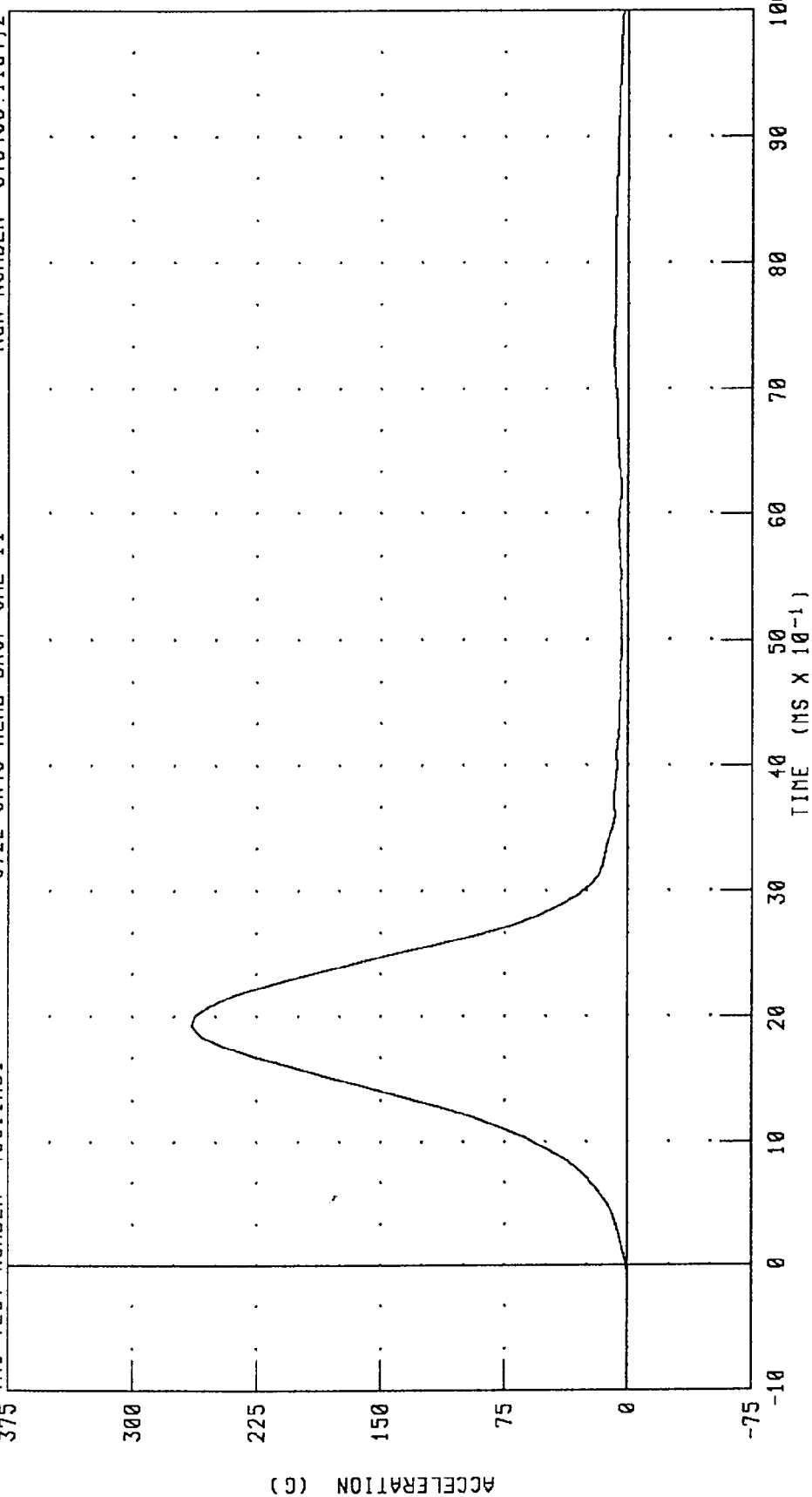


CHANNEL: HEDZG FILTER: CH. CLASS 1000

PEAK DATA: -0.03 G @ -0.32 MS; -122.62 G @ 2.00 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 43C11HD1 572E SN43 HEAD DROP CAL 11 RUN NUMBER: 040495.1134,2



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 264.21 G @ 1.92 MS; 0.04 G @ -0.72 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

04-APR-95

TRC INC. TEST NO: 43C11NF1 572E SN43 NECK FLEXION CAL11

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10 - 70 %	50.0 %
IMPACT VELOCITY		22.6 - 23.4 FT/S	23.15 FT/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.55 G
	20 MS	17.60 - 22.60 G	19.79 G
	30 MS	12.50 - 18.50 G	15.43 G
MAX PENDULUM G		29 G MAX	22.62 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	15.39 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	39.36 MS
D PLANE	MAX	64 - 78 DEG.	70.02 DEG.
ROTATION	TIME	57 - 64 MS	61.20 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.LB	72.06 FT.LB
	TIME	47 - 58 MS	52.40 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	117.20 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	98.80 MS

TEST MEETS SPECIFICATIONS

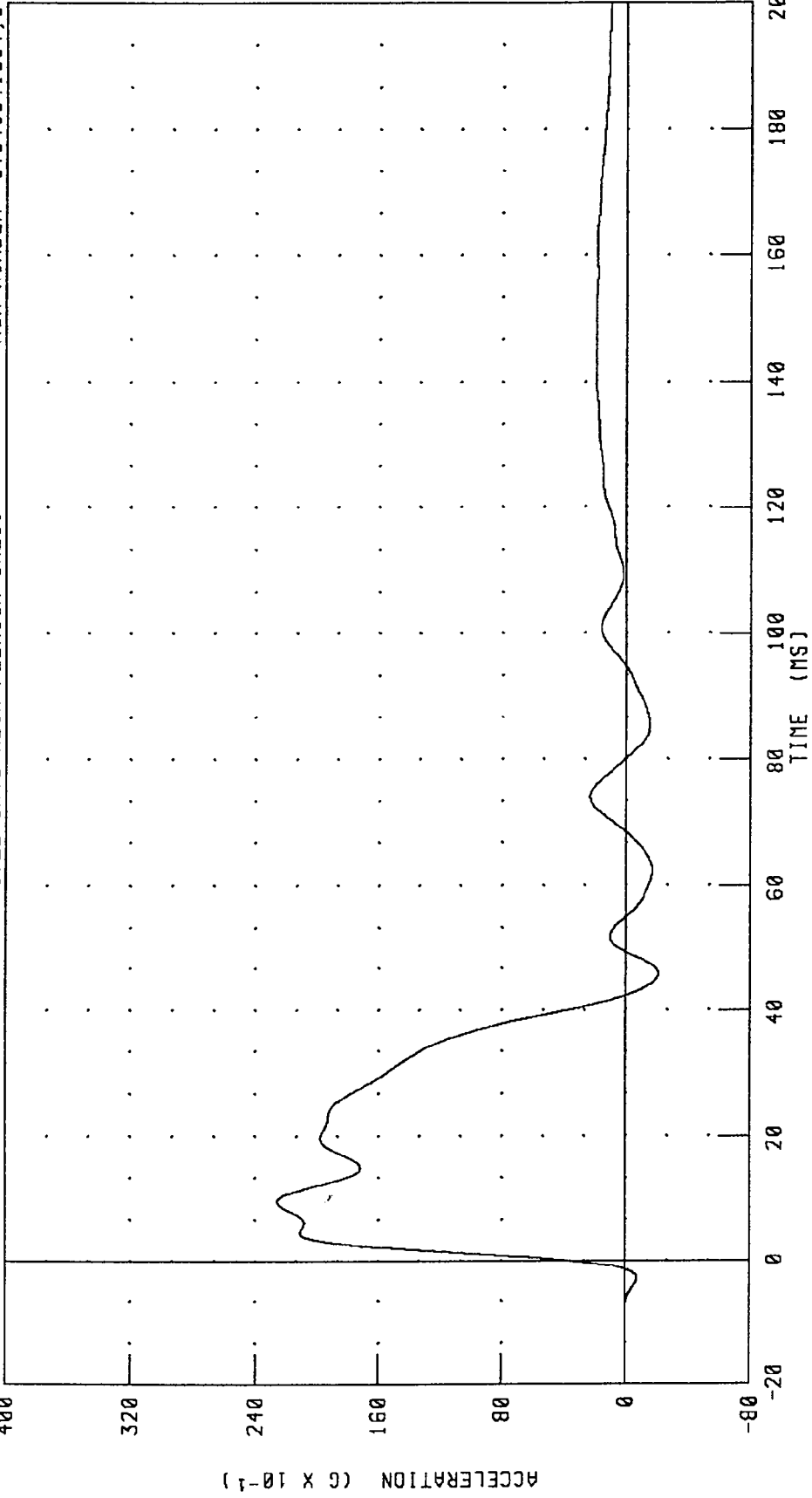
TECHNICIAN

Pete F. S.

RUN NUMBER: 040495.1053;8

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

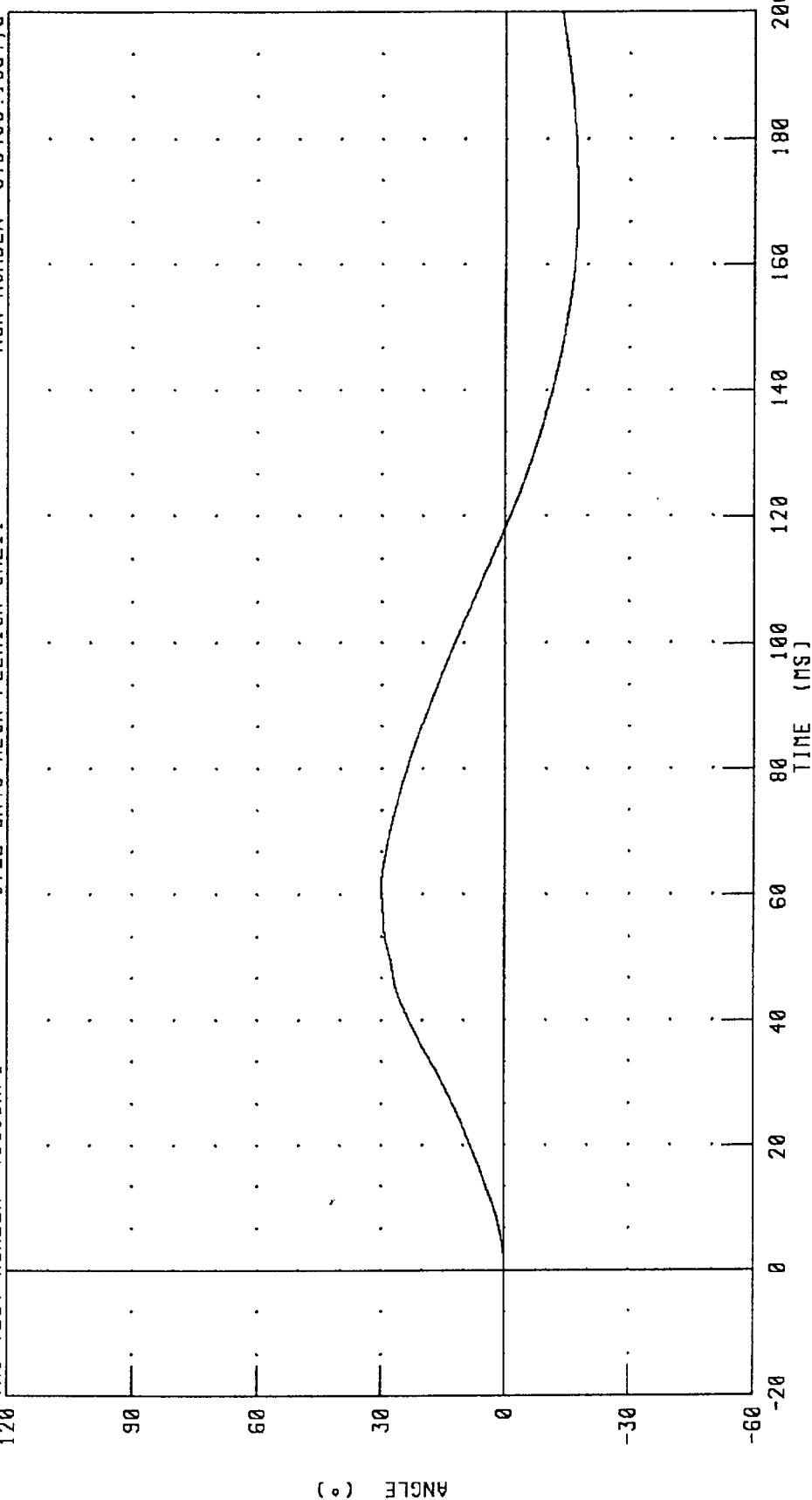
TRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 22.63 G @ 9.60 MS; -2.10 G @ 45.84 MS

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

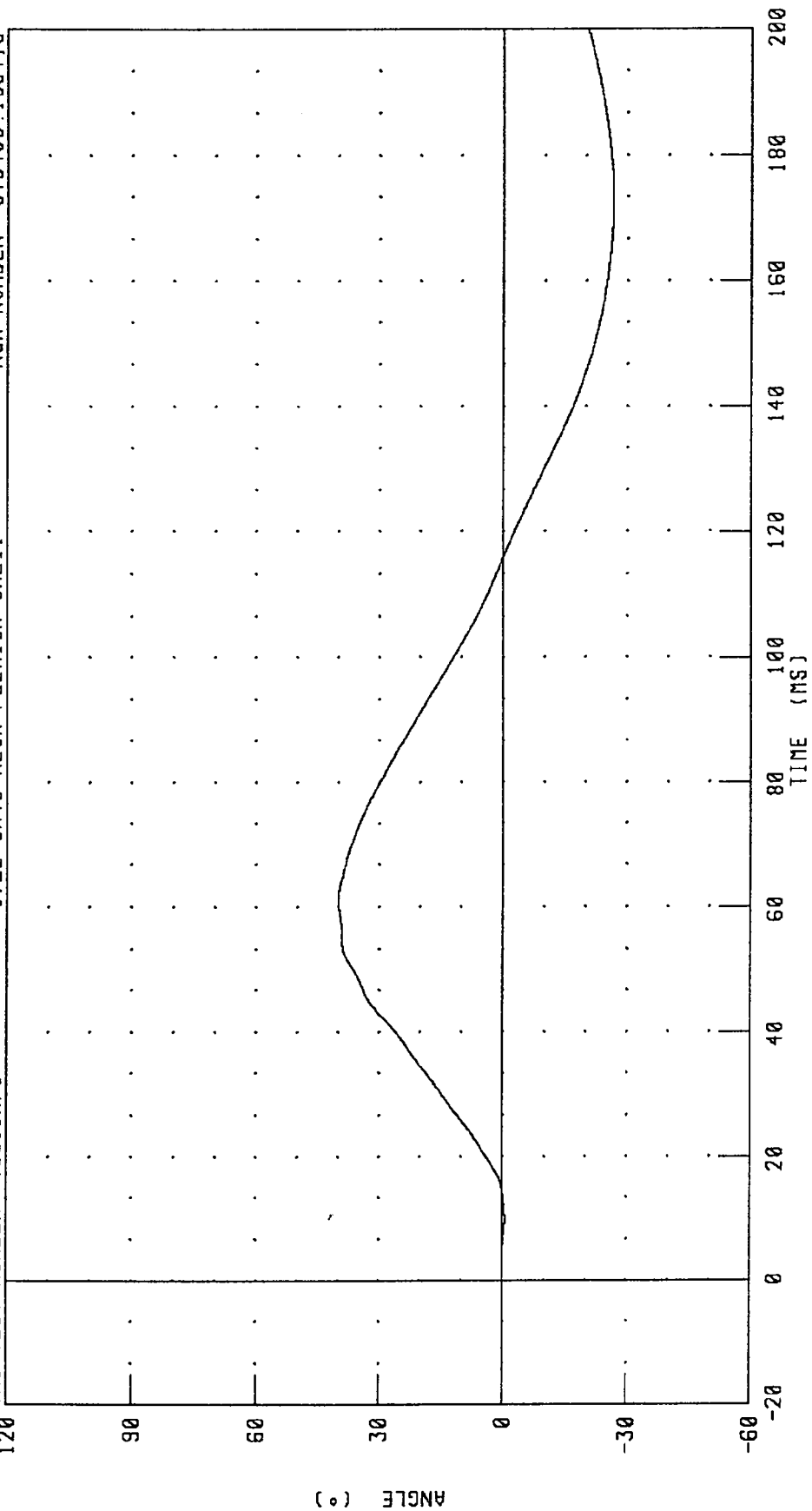
TRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 30.01 ° @ 61.20 MS; -17.52 ° @ 170.72 MS

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

TRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8

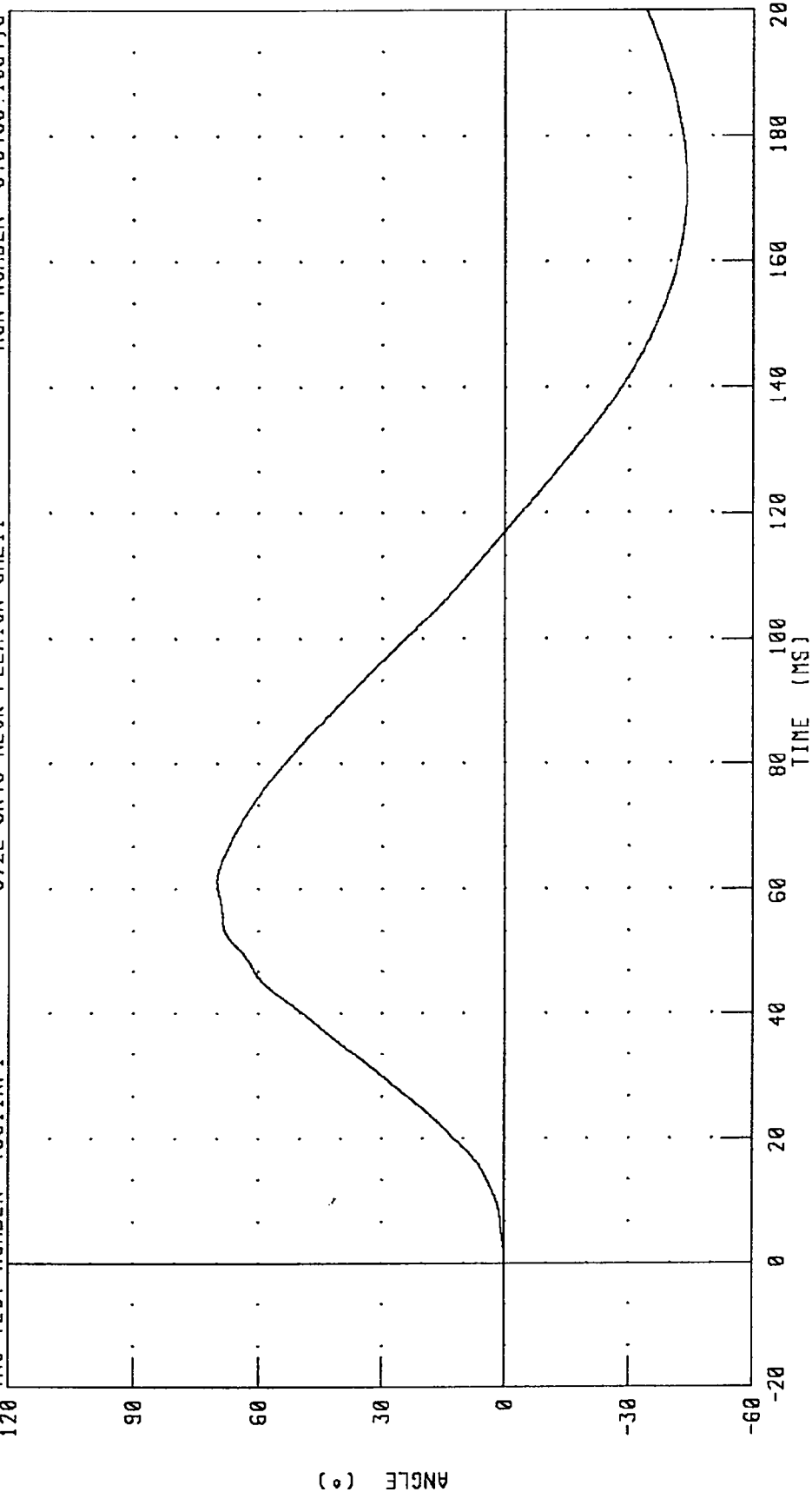


CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 40.02 ° @ 61.20 MS; -26.46 ° @ 172.72 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION

IRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8

TOTAL ROTATION

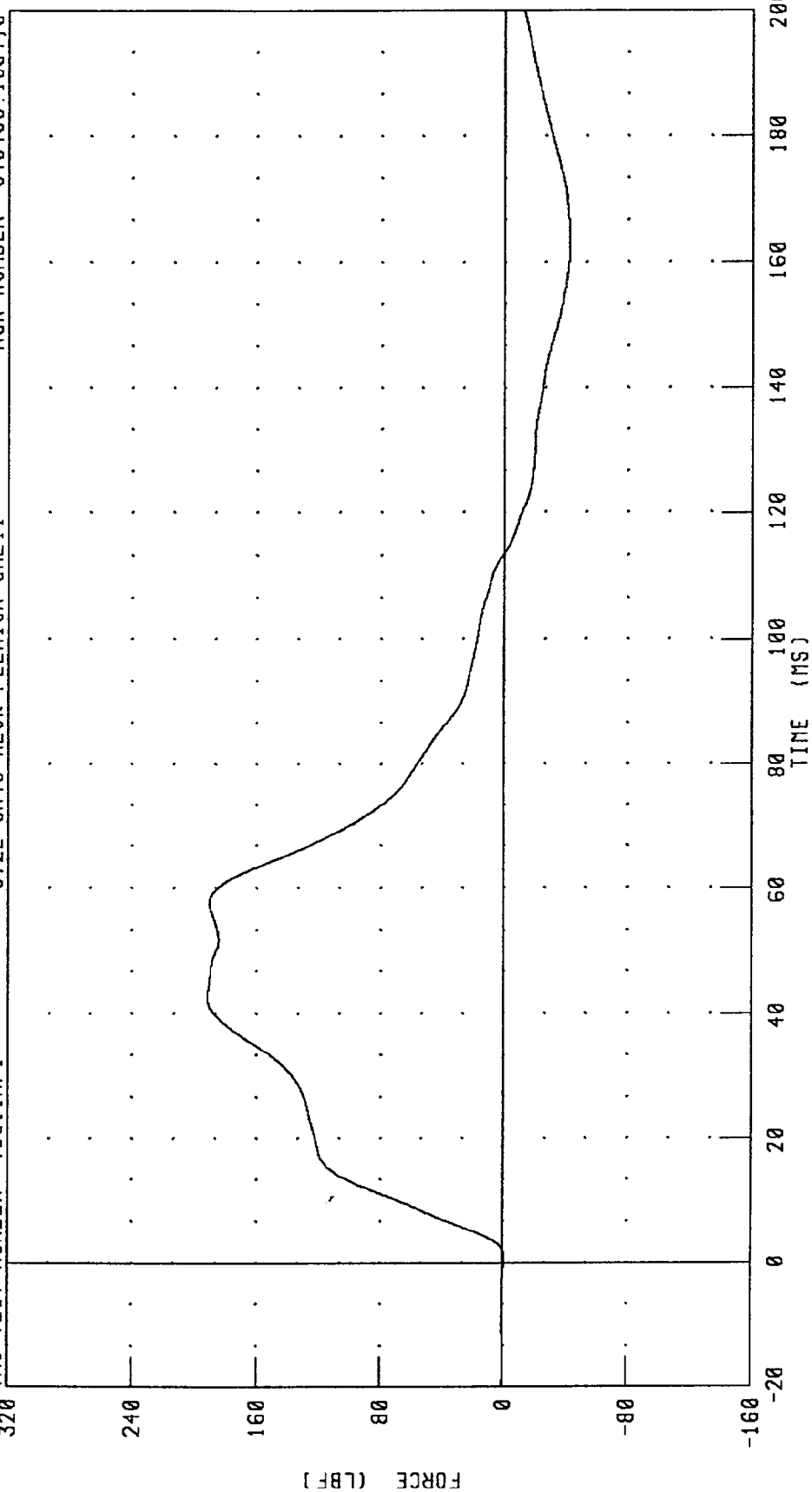


CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 70.03 ° @ 61.20 MS; -43.96 ° @ 171.60 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS

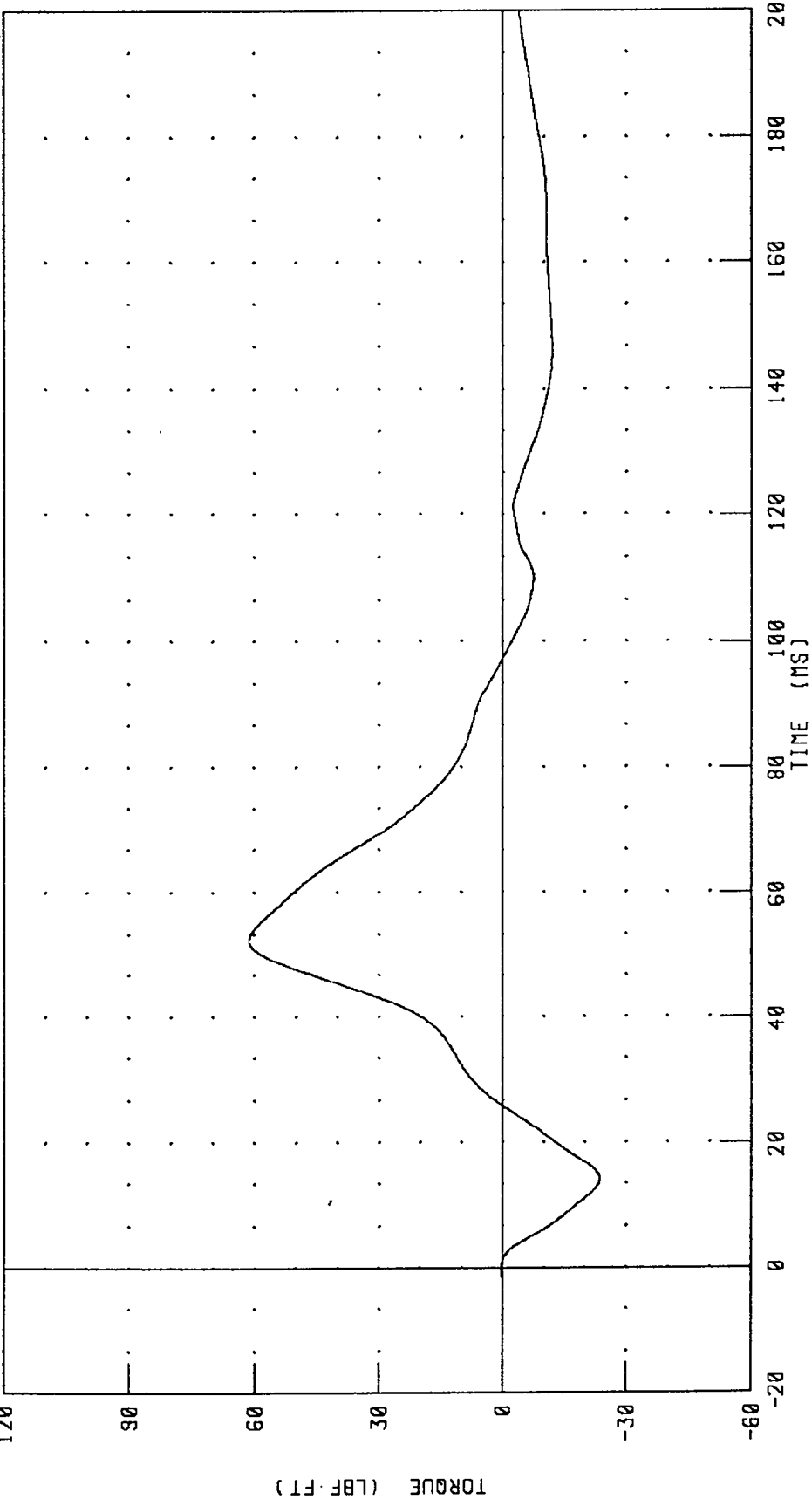
TRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 191.97 LBF @ 42.56 MS; -42.20 LBF @ 162.96 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

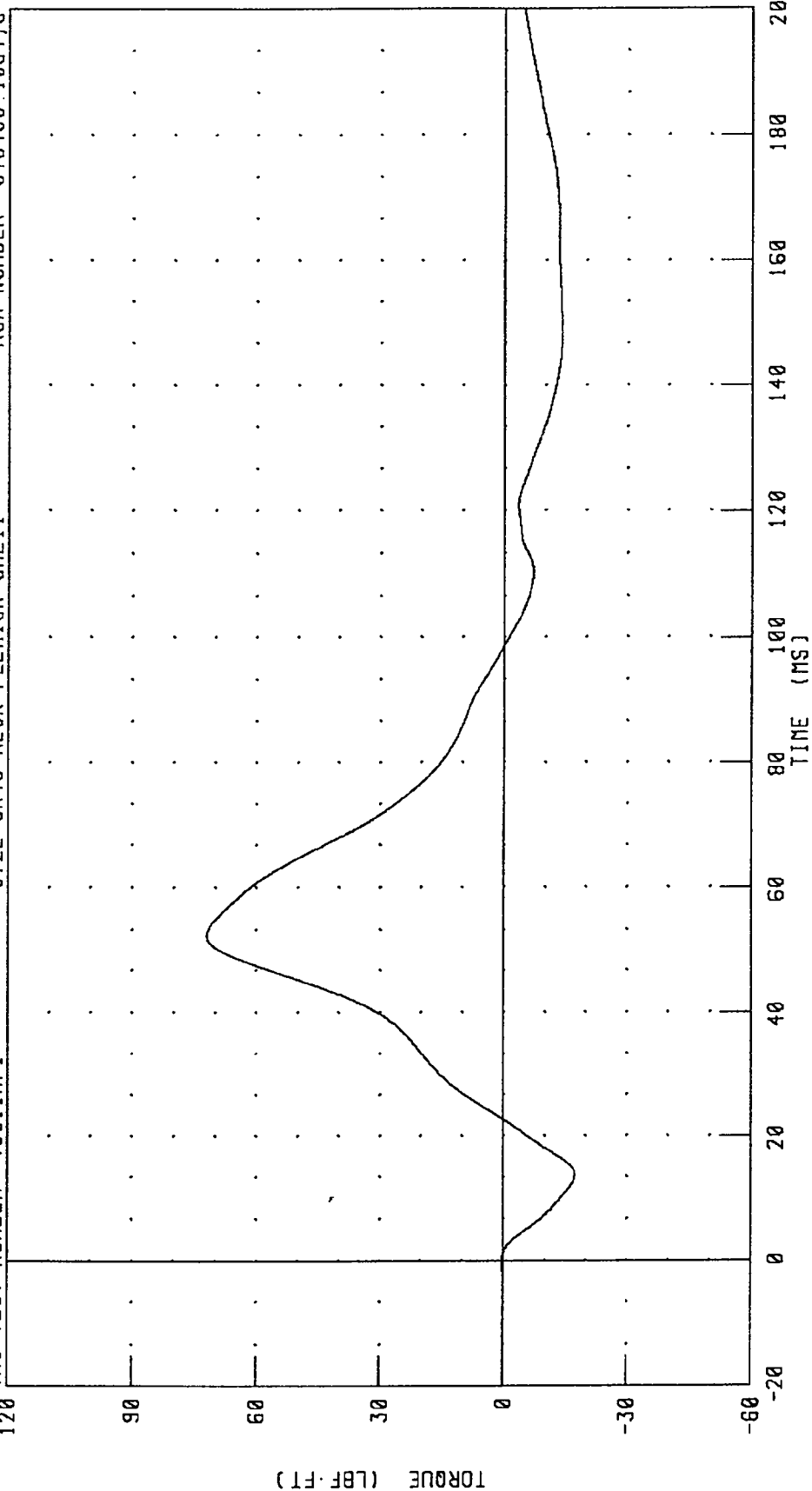
TRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 61.28 LBF·FT @ 52.32 MS; -23.55 LBF·FT @ 14.08 MS

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

TRC TEST NUMBER: 43C11NF1 572E SN43 NECK FLEXION CAL11 RUN NUMBER: 040495.1054;8



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 72.06 LBF·FT @ 52.40 MS; -17.37 LBF·FT @ 13.68 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

04-APR-95

TRC INC.

TEST NO: 43C11NE1

572E SN43 NECK EXT. CAL11

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10 - 70 %	50.0 %
IMPACT VELOCITY		19.5 - 20.3 FT/S	19.84 FT/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.55 G
	20 MS	14.00 - 19.00 G	15.89 G
	30 MS	11.00 - 16.00 G	13.73 G
MAX PENDULUM G		22 G MAX	18.69 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	13.68 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	38.80 MS
D PLANE	MAX	81 - 106 DEG.	93.17 DEG.
ROTATION	TIME	72 - 82 MS	74.72 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-59.0/-39.0 FT.LB	-46.51 FT.LB
	TIME	65 - 79 MS	69.12 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	156.72 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	134.96 MS

TEST MEETS SPECIFICATIONS

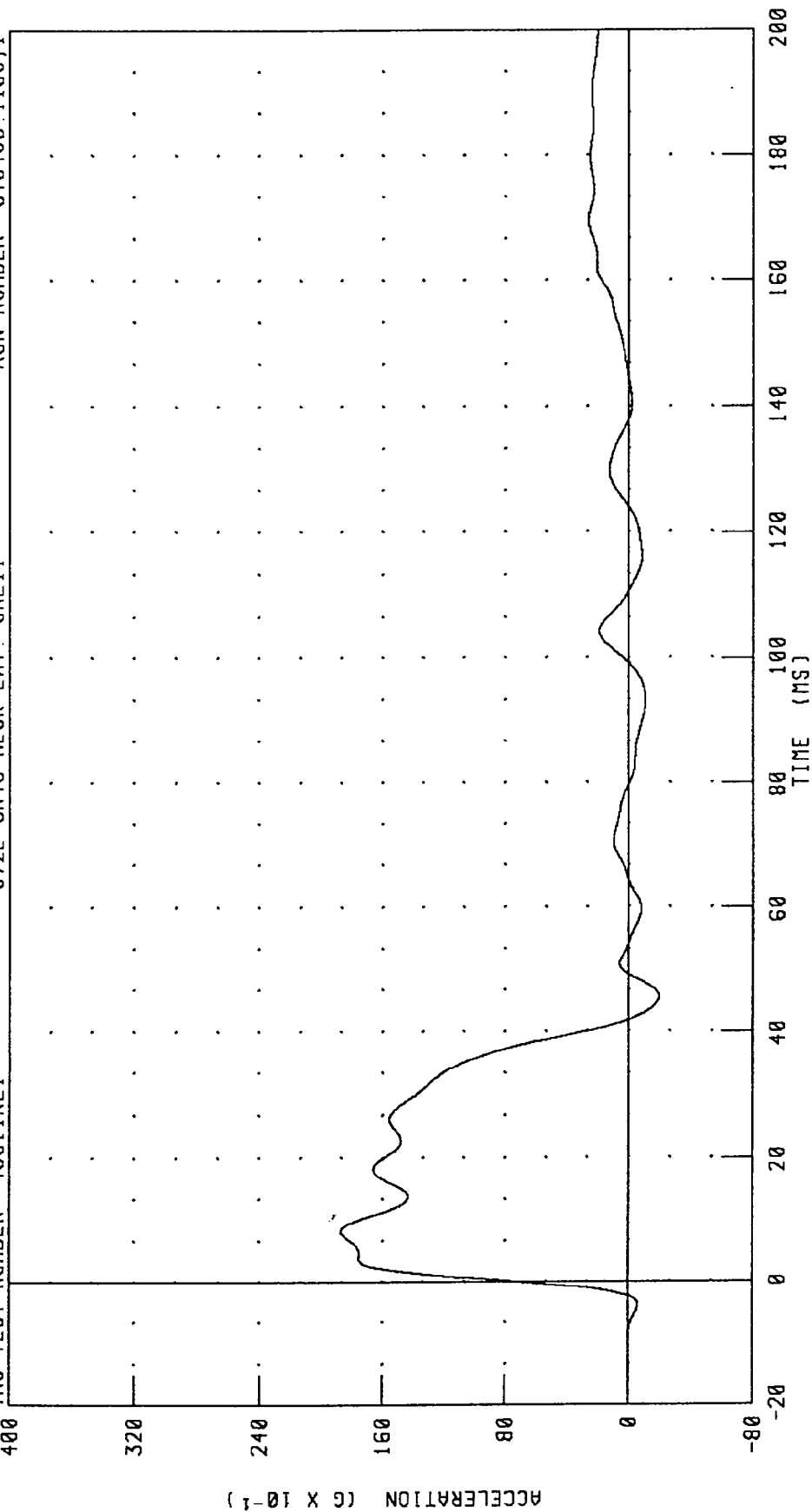
TECHNICIAN

Pete F. J.

RUN NUMBER: 040495.1107;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 PENDULUM DECELERATION

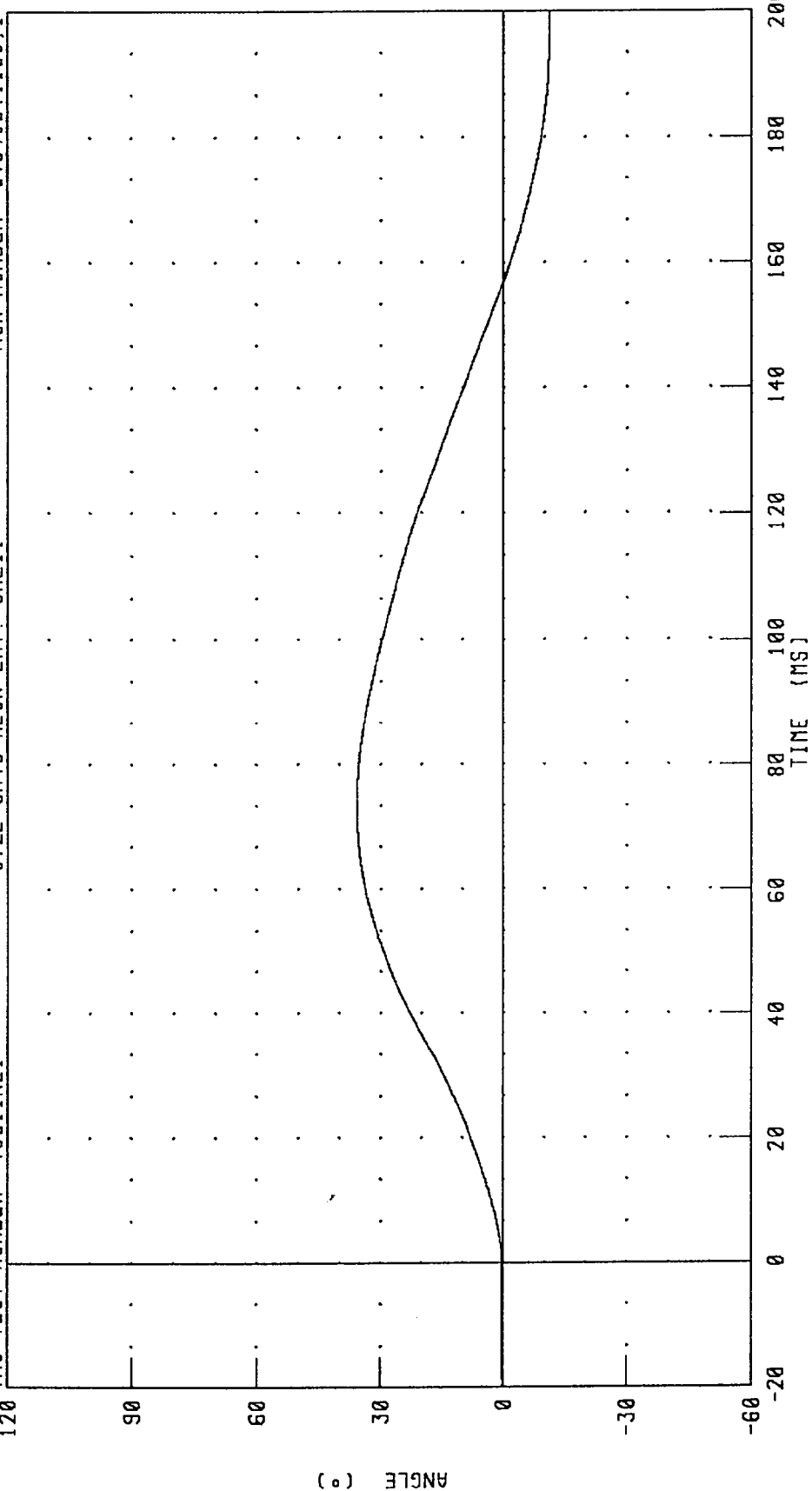
TRC TEST NUMBER: 43C11NE1 572E SN43 NECK EXT. CAL11 RUN NUMBER: 040495.1108;1



CHANNEL: PENXC FILTER: CH. CLASS 60 PEAK DATA: 18.70 G @ 8.24 MS; -1.95 G @ 45.60 MS

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

TRC TEST NUMBER: 43C11NE1 572E SN43 NECK EXT. CAL11 RUN NUMBER: 040495.1108;1



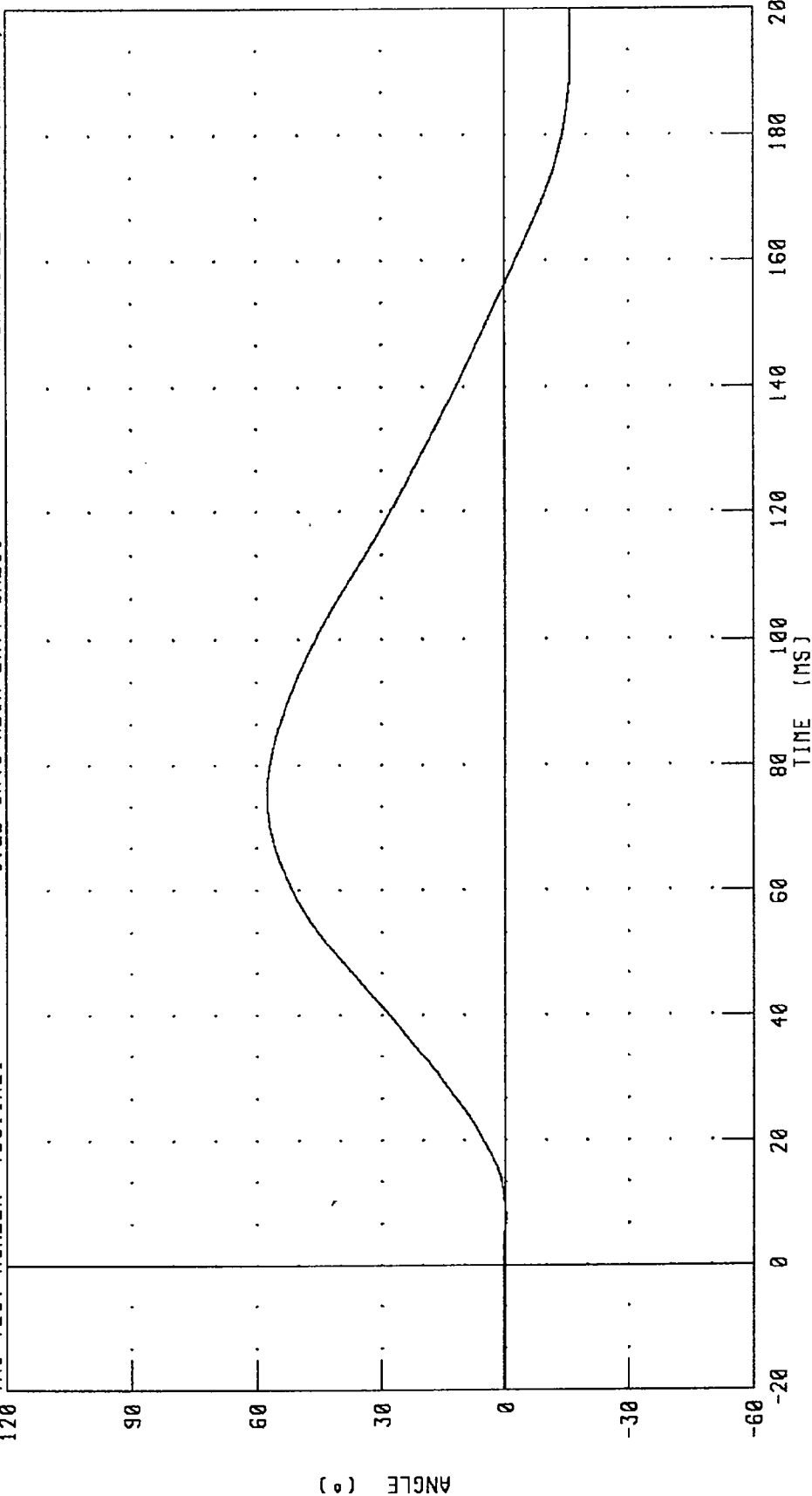
CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 35.68 ° @ 72.64 MS; -11.03 ° @ 198.56 MS

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

TRC TEST NUMBER: 43CI1NE1

572E SN43 NECK EXT. CAL11

RUN NUMBER: 040495.1108.11



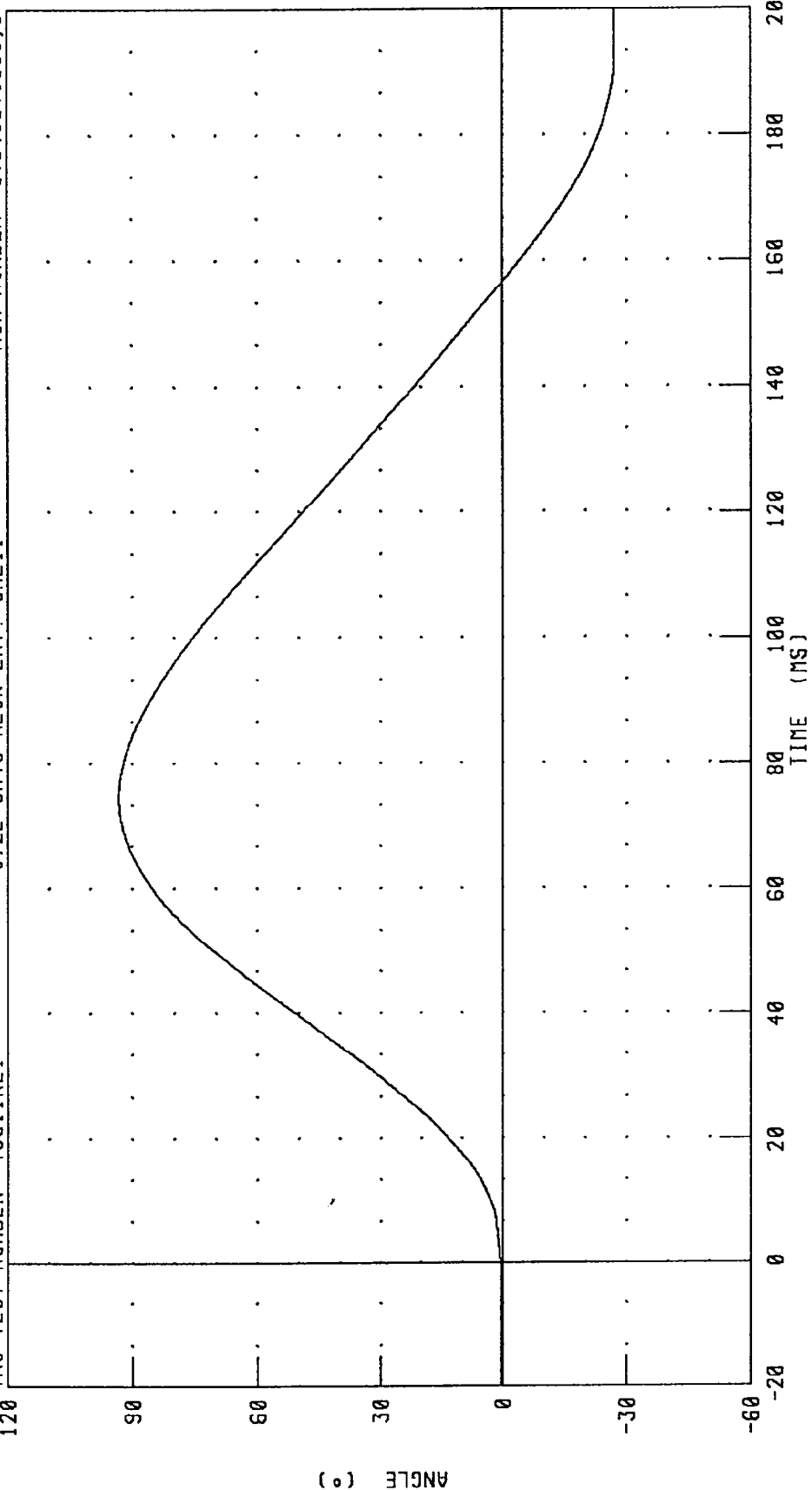
PEAK DATA: 57.58 ° @ 75.44 MS; -15.95 ° @ 190.72 MS

CHANNEL: THETA FILTER: CH. CLASS 60

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TRC TEST NUMBER: 43C11NE1 572E SN43 NECK EXT. CAL11 RUN NUMBER: 040495.1108.1

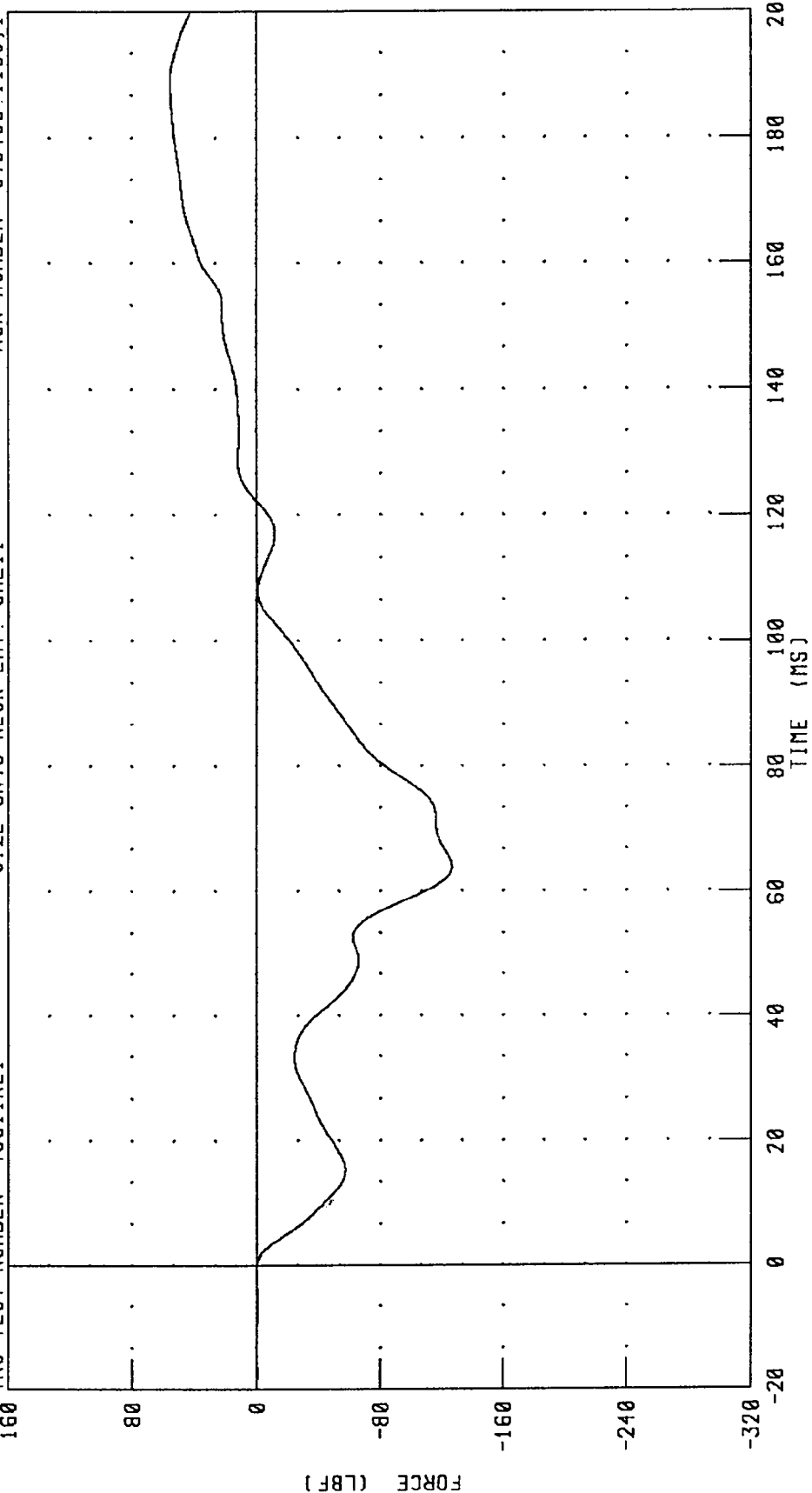
TOTAL ROTATION



CHANNEL: TOTAL FILTER: CH. CLASS 60 PEAK DATA: 93.18 ° @ 74.72 MS; -26.98 ° @ 197.76 MS

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

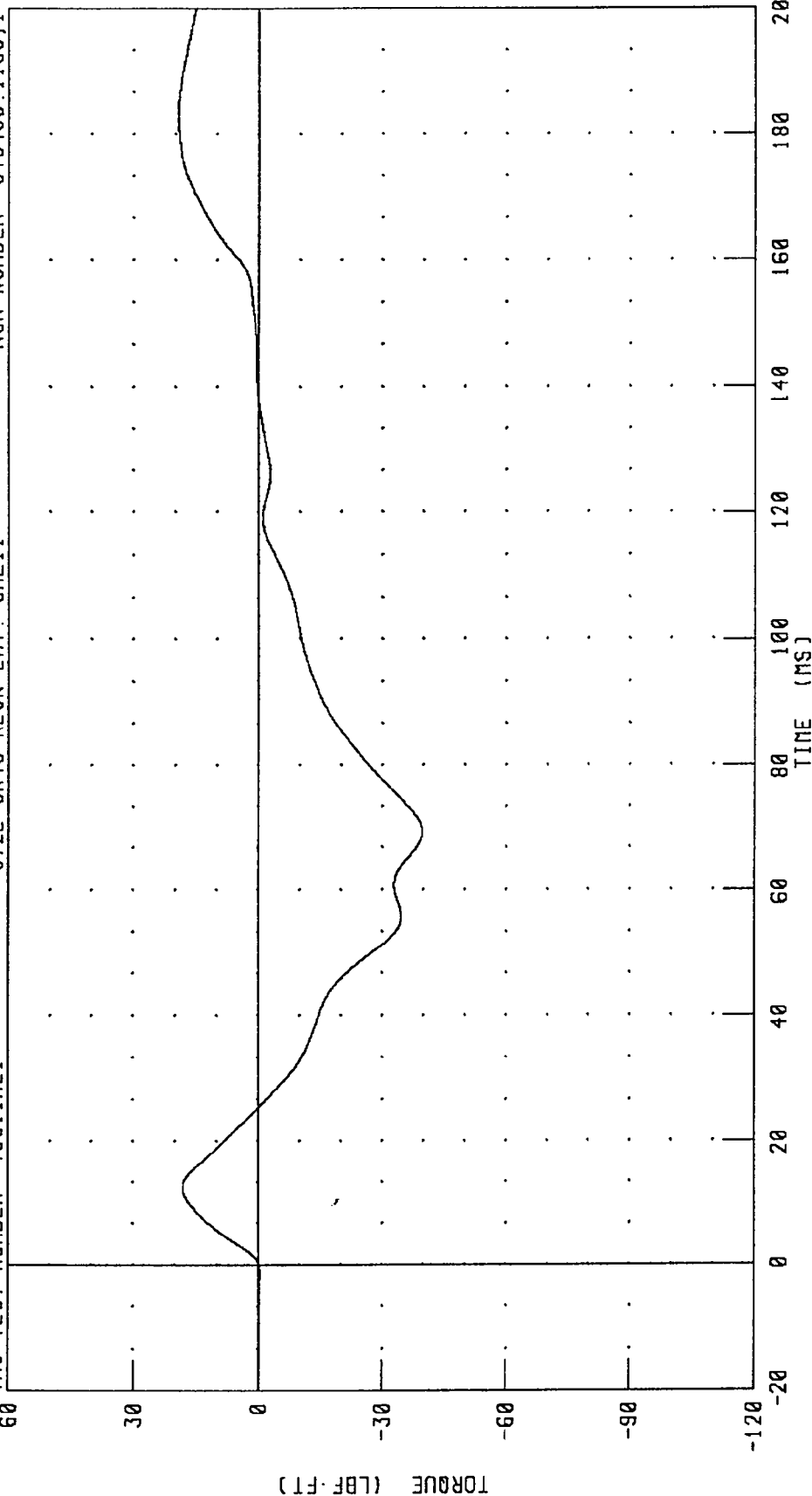
TRC TEST NUMBER: 43C11NE1 572E SN43 NECK EXT. CAL11 RUN NUMBER: 040495.1108.1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 55.48 LBF @ 188.72 MS; -126.48 LBF @ 63.84 MS

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

TRC TEST NUMBER: 43C11NE1 572E SN43 NECK EXT. CAL11 RUN NUMBER: 040495.1108;1



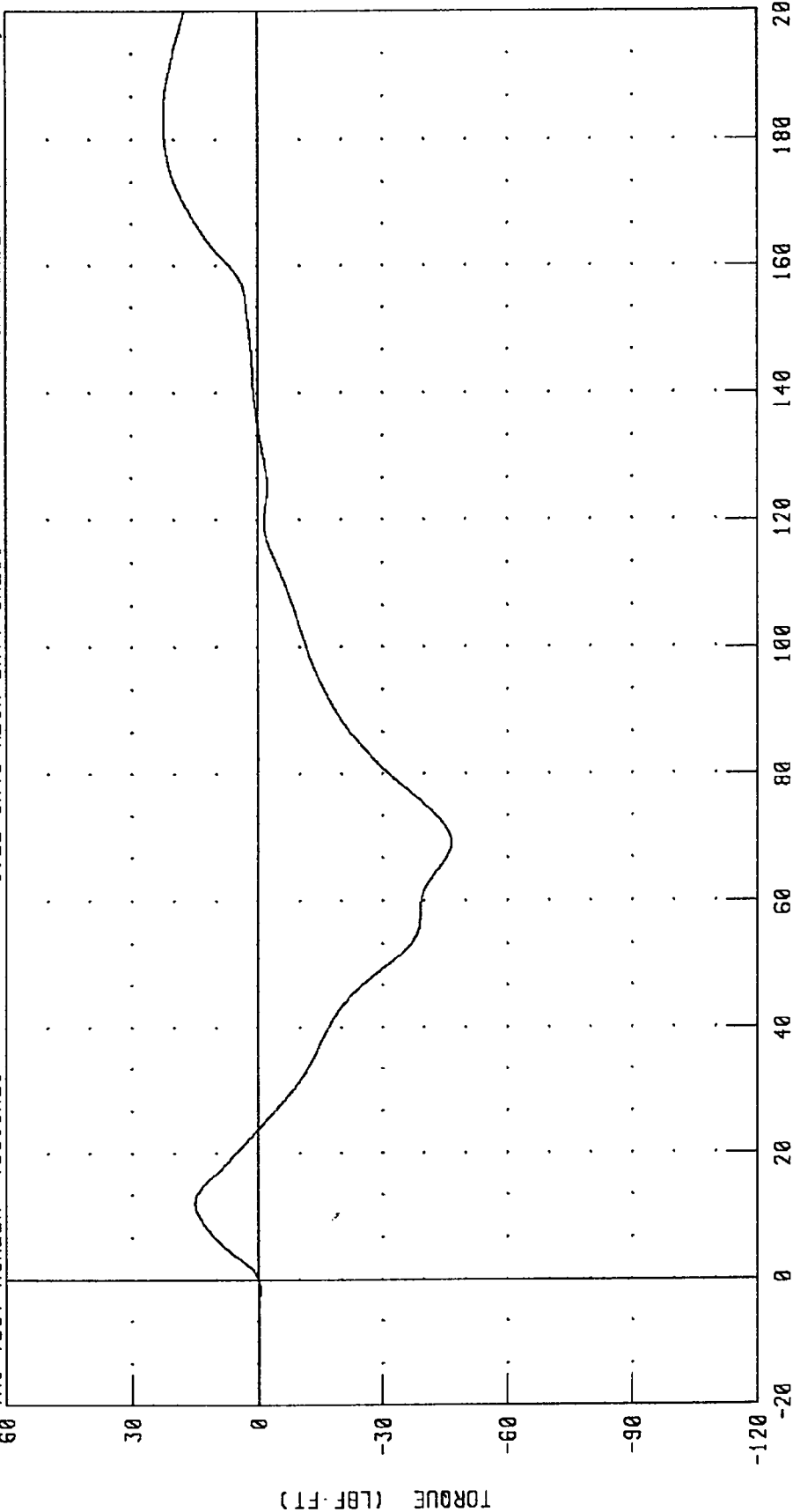
CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 19.30 LBF·FT @ 183.12 MS; -39.70 LBF·FT @ 69.28 MS

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

TRC TEST NUMBER: 43C11NE1

572E SN43 NECK EXT. CAL11

RUN NUMBER: 040495.1108;1



PEAK DATA: 22.46 LBF-FT @ 183.44 MS; -46.51 LBF-FT @ 69.12 MS

CHANNEL: NEKOM FILTER: CH. CLASS 60

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

04-APR-95

TRC INC.

TEST NO: 43C11TH1

572E SN43 H.S.THORAX CAL11

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PENDULUM VELOCITY	21.6-22.4 FT/S	21.92 FT/S
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.64 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LB	1265.5 LB
INTERNAL HYSTERESIS	69% - 85%	72.5%

TEST MEETS SPECIFICATIONS

TECHNICIAN Rita F. S.

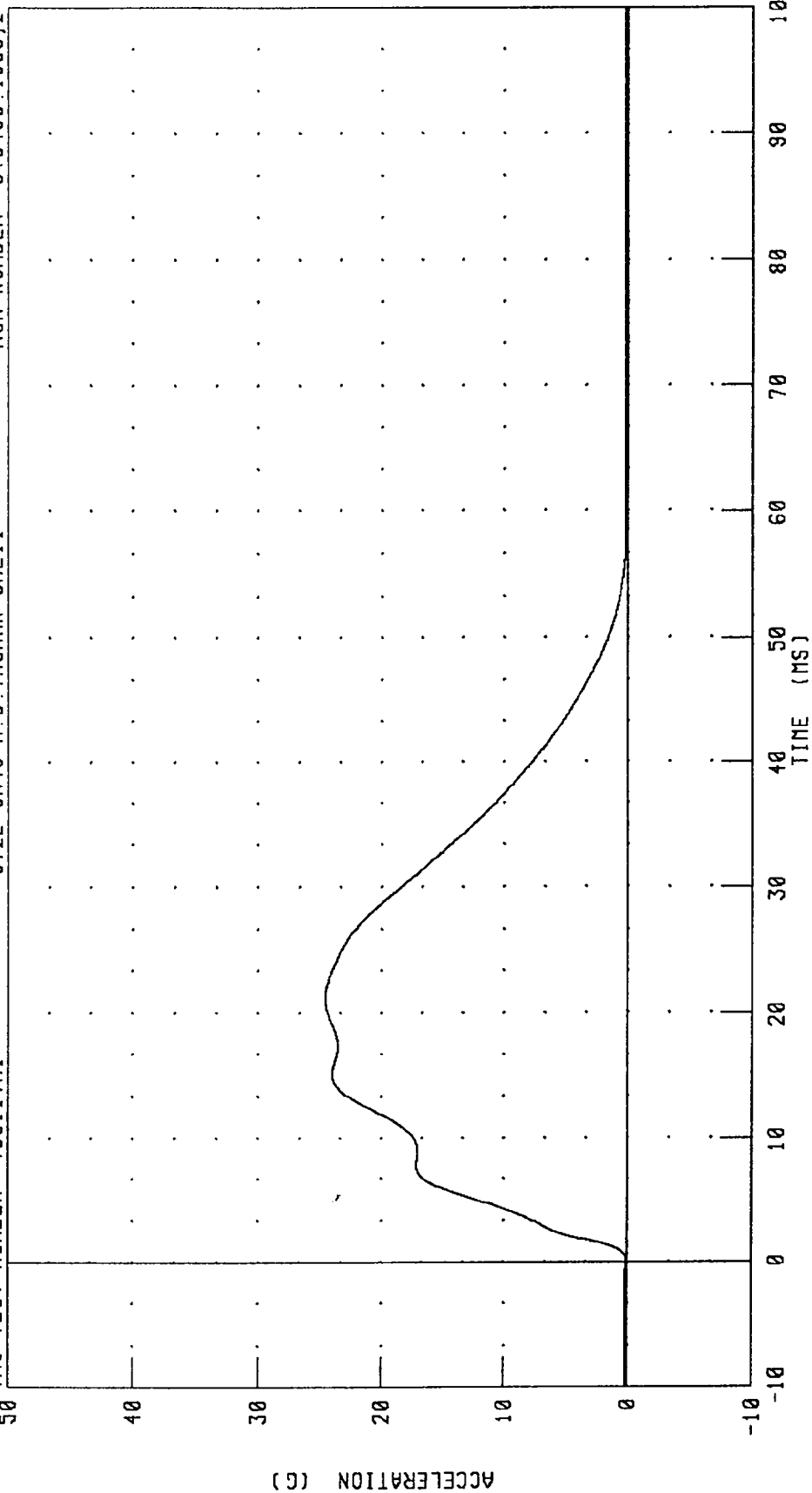
RUN NUMBER: 040495.1338;2

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

TRC TEST NUMBER: 43C11TH1

572E SN43 H.S. THORAX CAL11

RUN NUMBER: 040495.1338;2

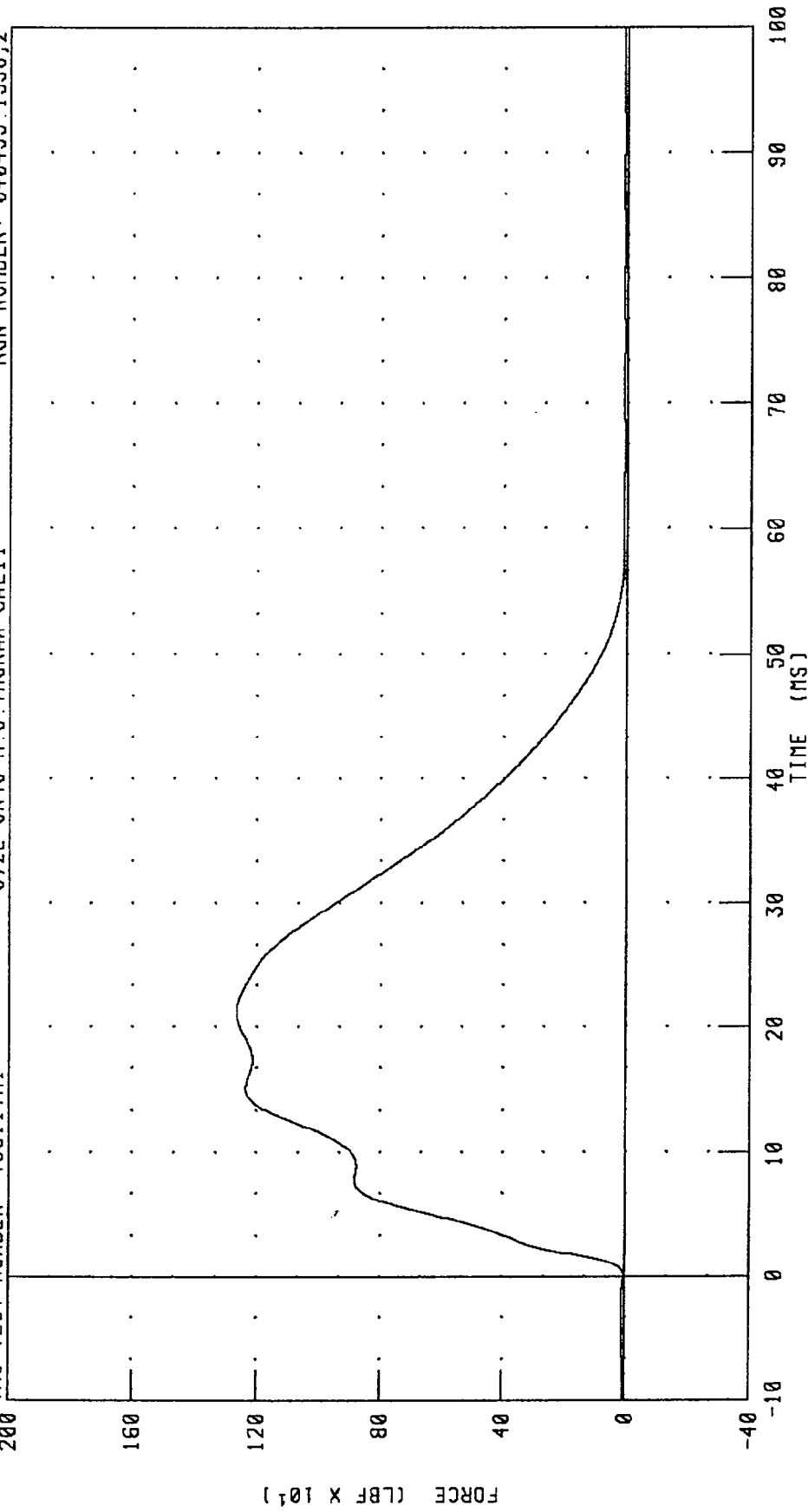


CHANNEL: PENXG FILTER: CH. CLASS 180

PEAK DATA: 24.57 G @ 21.20 MS; 0.09 G @ 0.08 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

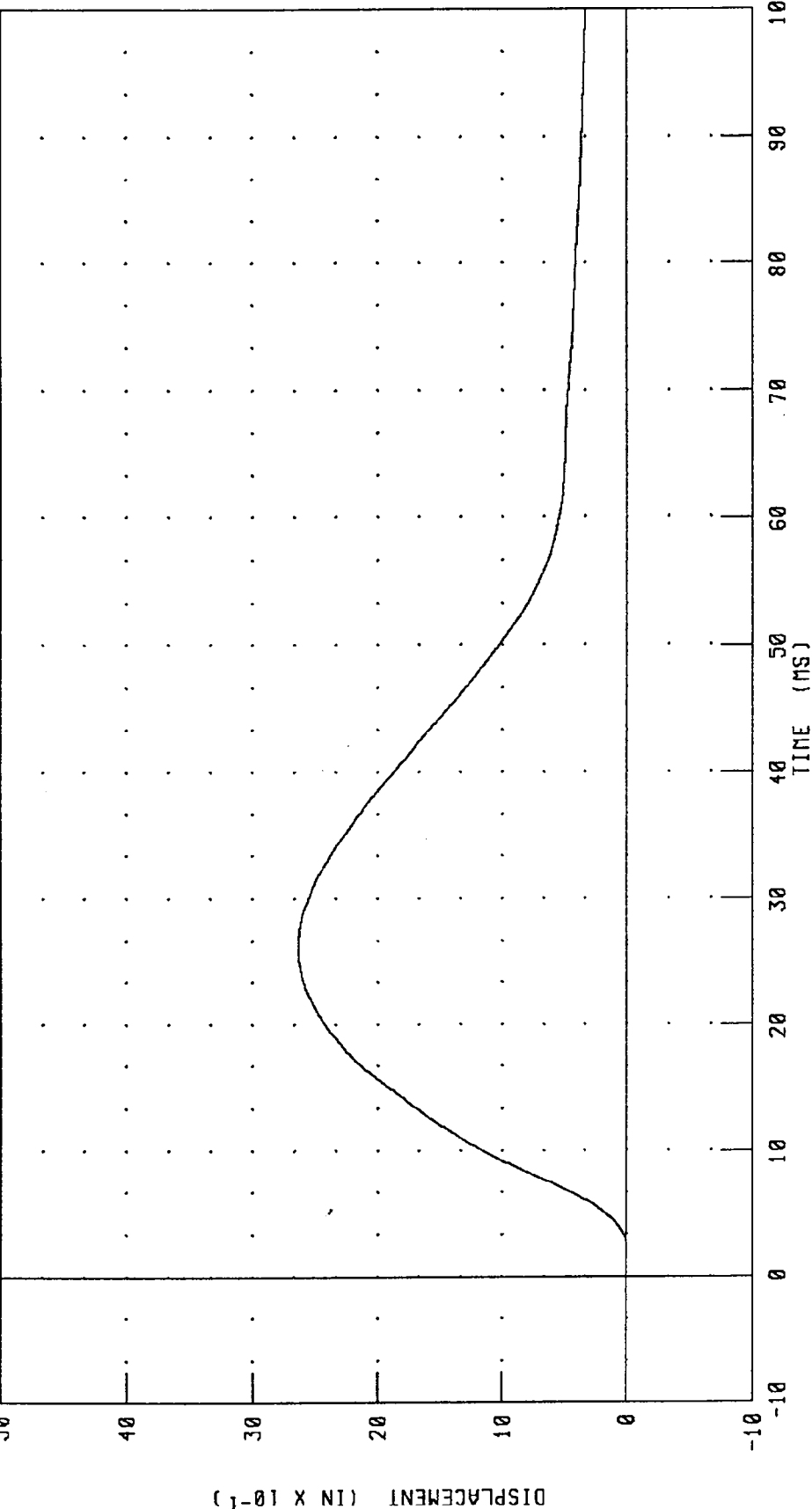
TRC TEST NUMBER: 43C11TH1 572E SN43 H.S. THORAX CAL11 RUN NUMBER: 040495.1338;2



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 1265.58 LBF @ 21.20 MS; 4.43 LBF @ 0.08 MS

PART 572-E HYBRID III THORAX CALIBRATION
 STERNUM DISPLACEMENT

TRC TEST NUMBER: 43C11TH1 572E SN43 H.S. THORAX CAL11 RUN NUMBER: 040495.1338;2



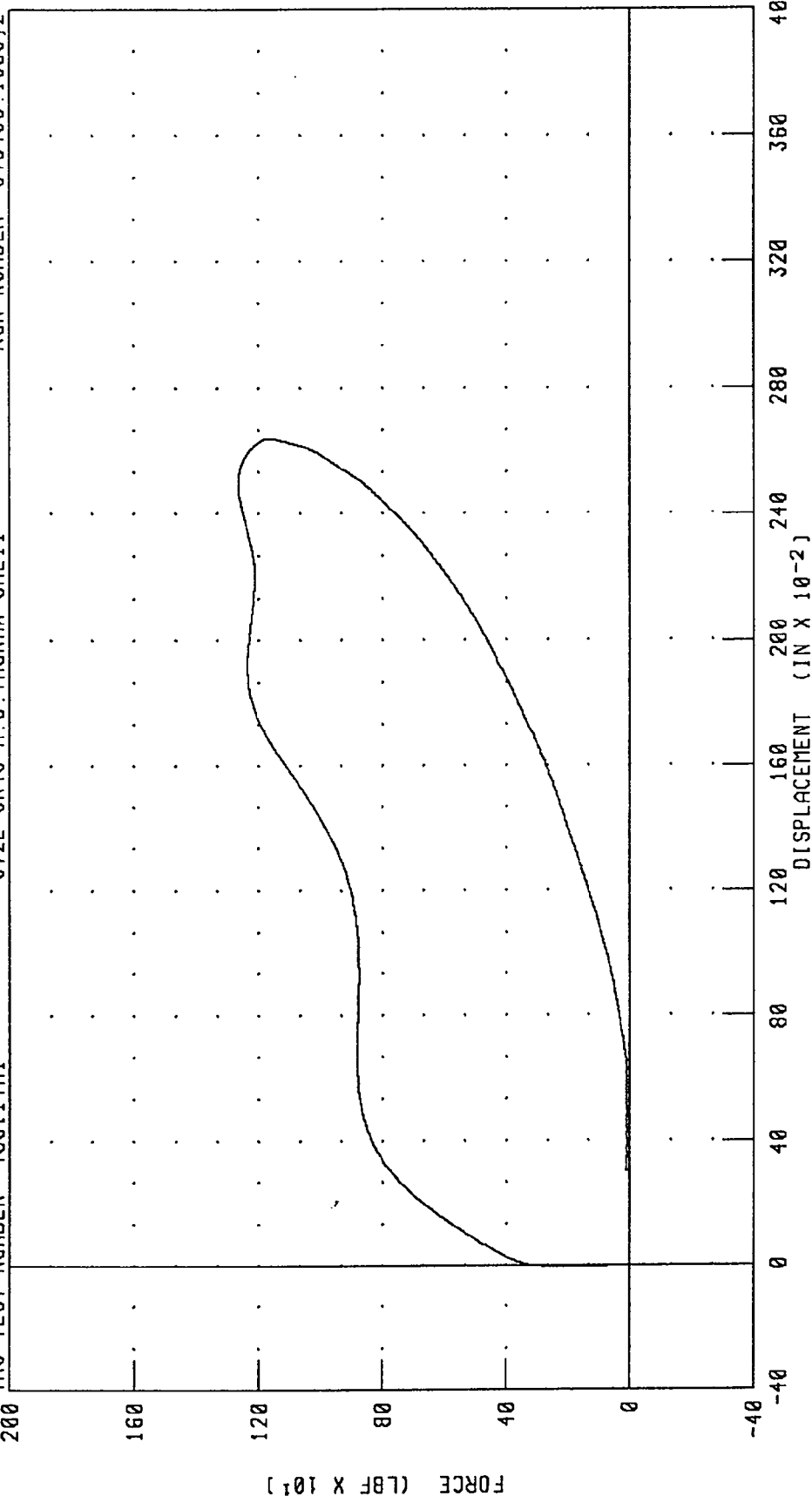
CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 2.64 IN @ 26.00 MS; 0.00 IN @ 1.92 MS

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

TRC TEST NUMBER: 43CL11TH1

572E SN43 H.S.THORAX CAL11

RUN NUMBER: 040495.1338;2



CHANNEL: CSTXD
PENXF

FILTER: CH. CLASS 180
CH. CLASS 180

PEAK DATA: 1265.58 LBF @ 21.20 MS; 4.43 LBF @ 0.08 MS

2.64 IN @ 26.00 MS; 0.00 IN @ 1.92 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

04-APR-95

TRC INC.

TEST NO: 43C11RK1

572E SN43 RIGHT KNEE CAL 11

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PROBE VELOCITY	6.8 - 7.0 FT/S	6.92 FT/S
PEAK KNEE IMPACT FORCE 11.0 LB PENDULUM	1060 - 1300 LB	1193.28 LB

TEST MEETS SPECIFICATIONS

TECHNICIAN

Pete F. S.

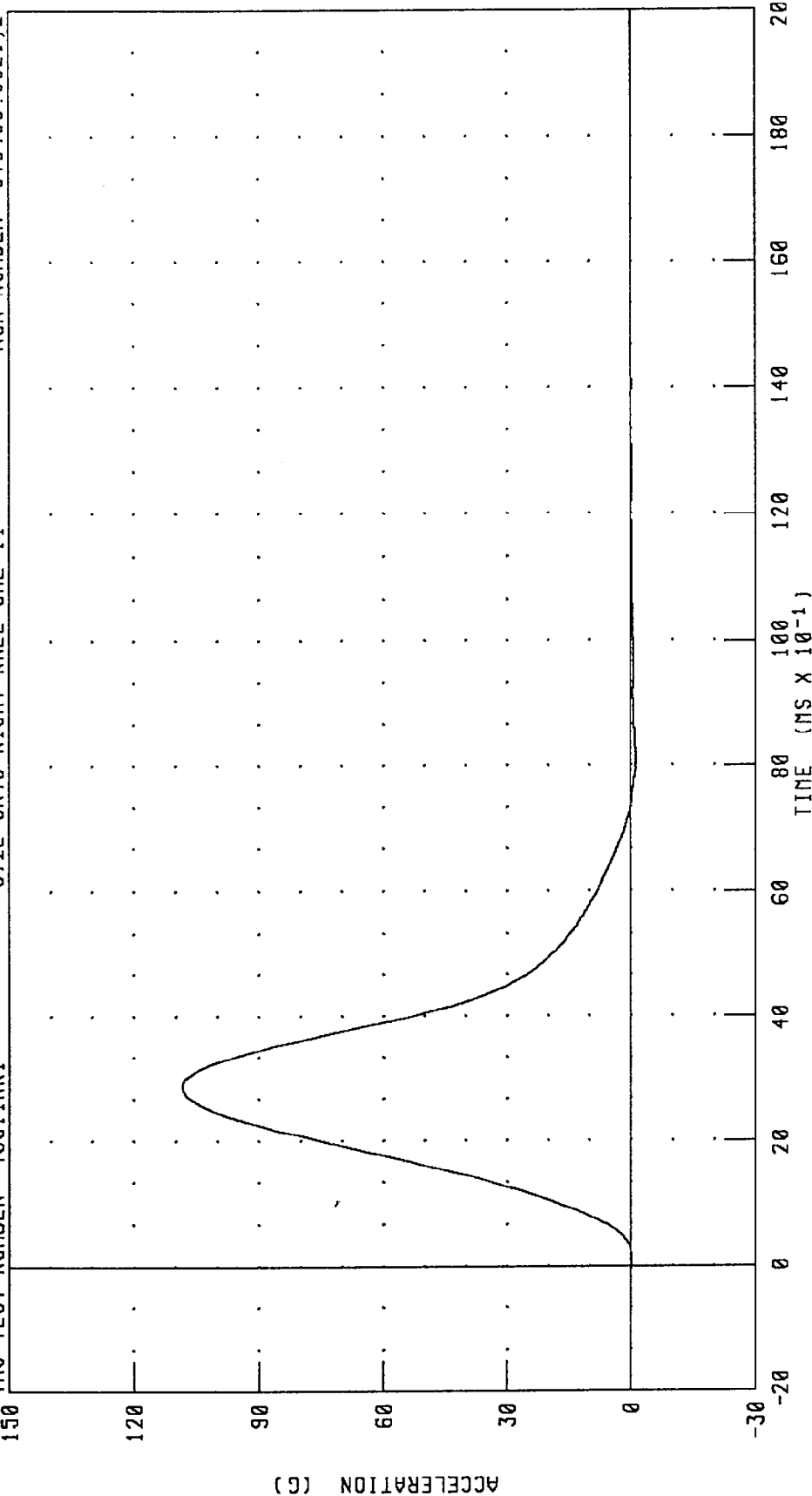
RUN NUMBER: 040495.0821;2

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (11 LB PEND.)

TRC TEST NUMBER: 43C11RK1

572E SN43 RIGHT KNEE CAL 11

RUN NUMBER: 040495.0821;2



CHANNEL: PENXG FILTER: CH. CLASS 600

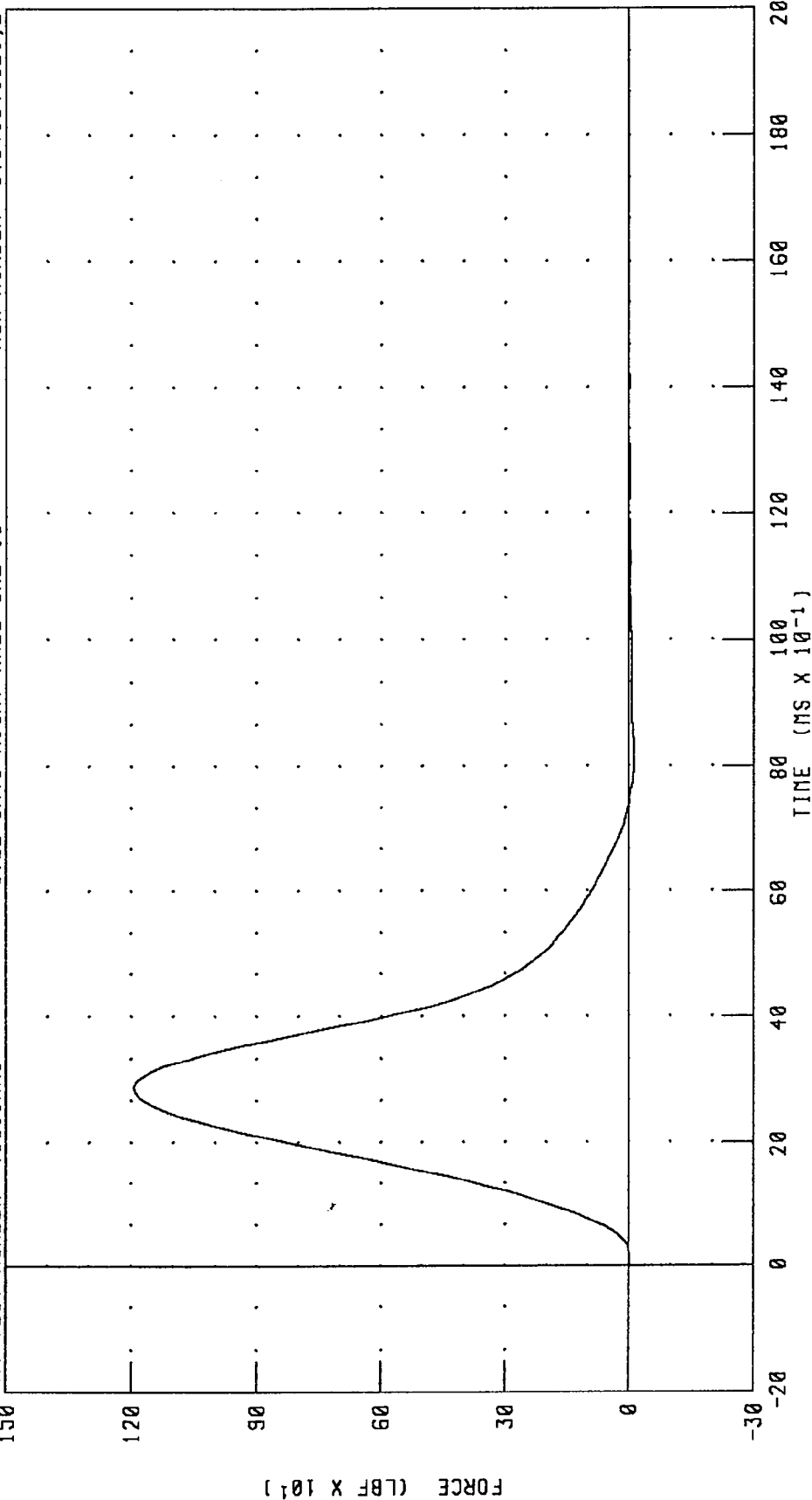
PEAK DATA: 108.48 G @ 2.88 MS; -1.20 G @ 8.08 MS

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
 PENDULUM FORCE (11 LB PEND.)

IRC TEST NUMBER: 43C11RK1

572E SN43 RIGHT KNEE CAL 11

RUN NUMBER: 040495.0821;2



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 1193.29 LBF @ 2.88 MS; -13.22 LBF @ 8.08 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

04-APR-95

TRC INC.

TEST NO: 43C11LK1

572E SN43 LEFT KNEE CAL 11

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	50.0 %
PROBE VELOCITY	6.8 - 7.0 FT/S	6.90 FT/S
PEAK KNEE IMPACT FORCE 11.0 LB PENDULUM	1060 - 1300 LB	1186.68 LB

TEST MEETS SPECIFICATIONS

TECHNICIAN

Pete F. S.

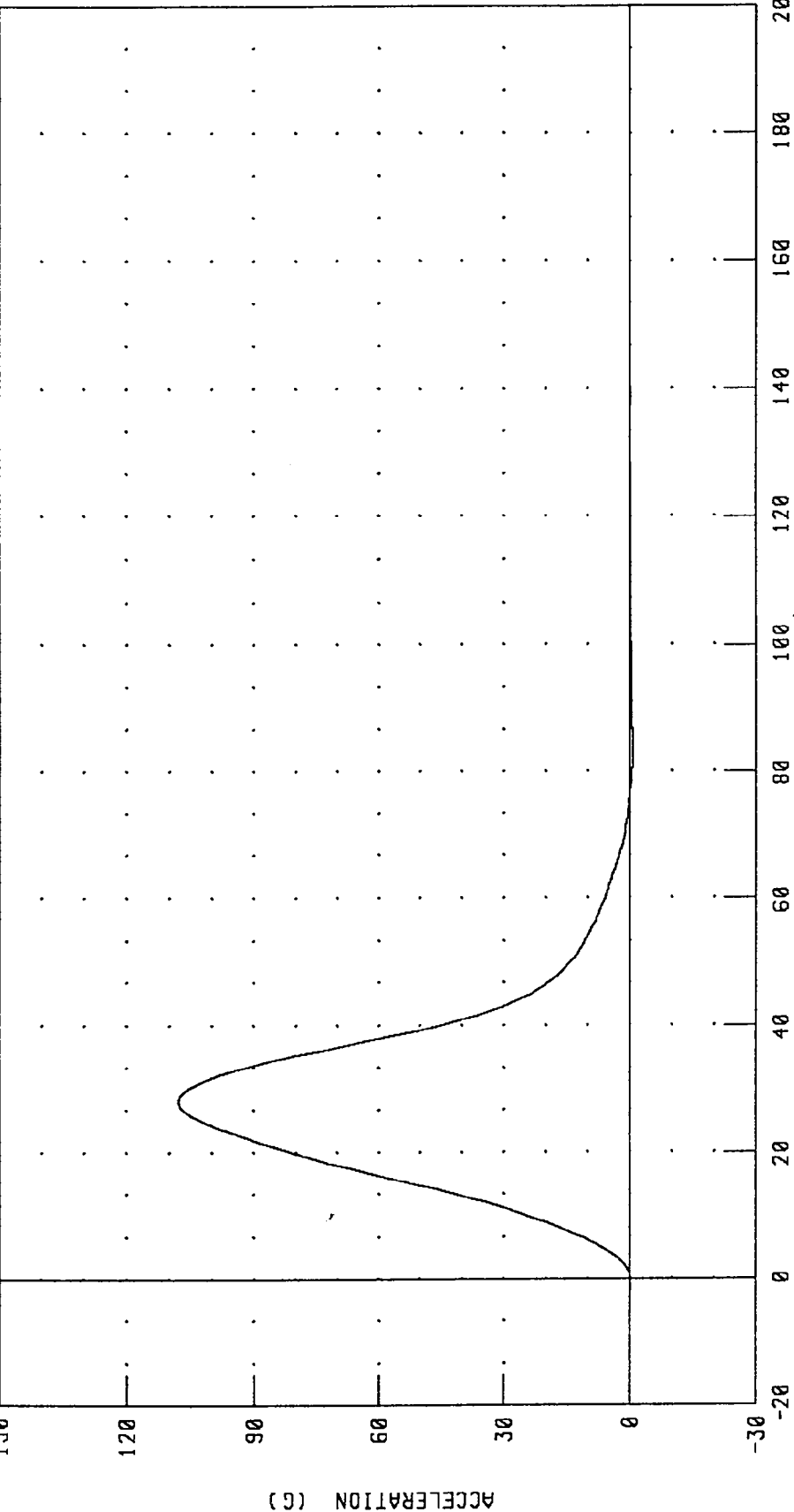
RUN NUMBER: 040495.0747;1

PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM DECELERATION (11 LB PEND.)

TRC TEST NUMBER: 43C11LK1

572E SN43 LEFT KNEE CAL 11

RUN NUMBER: 040495.0750,1



CHANNEL: PENXG FILTER: CH. CLASS 600

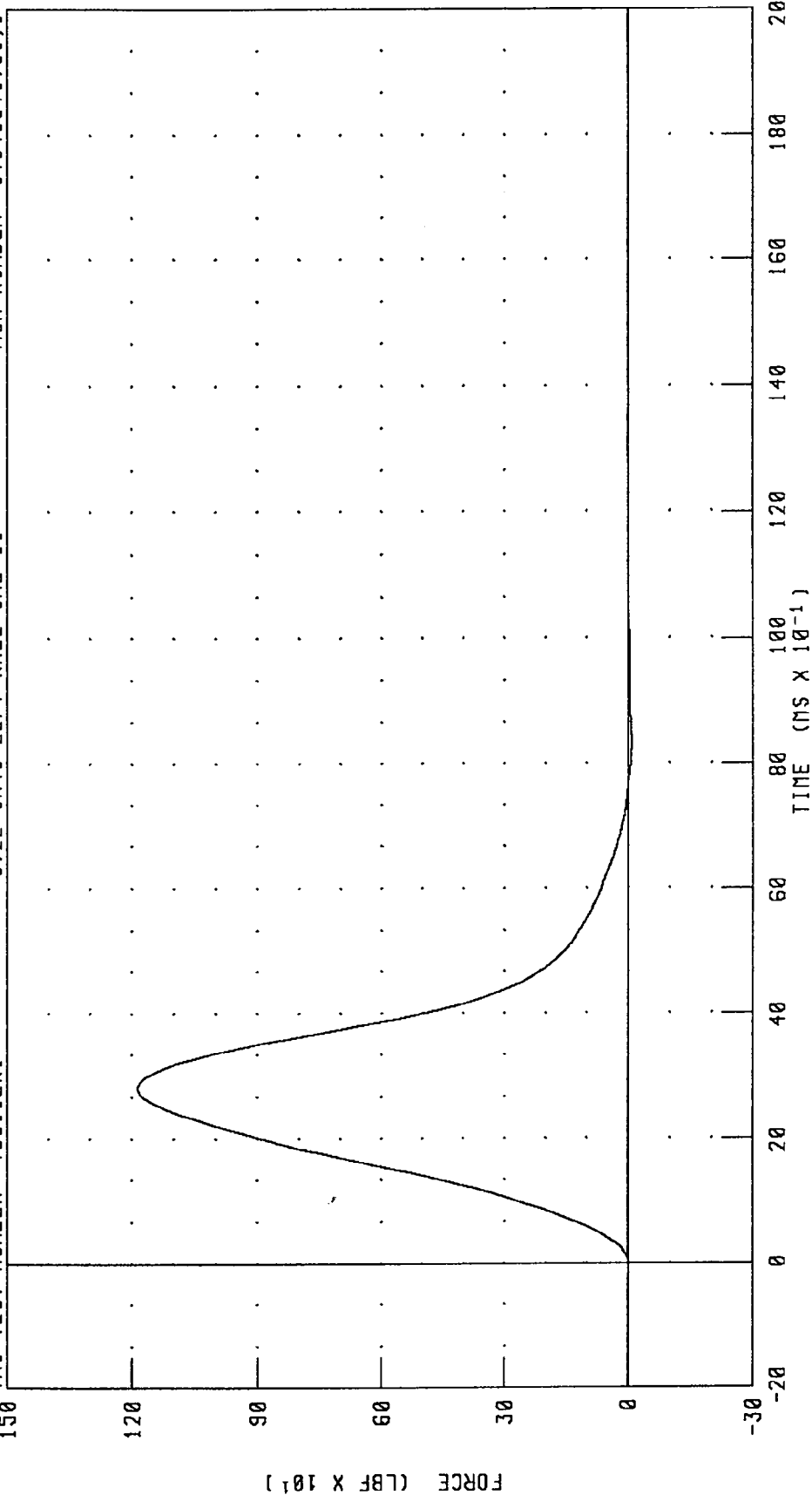
PEAK DATA: 107.88 G @ 2.80 MS; -0.77 G @ 8.32 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM FORCE (11 LB PEND.)

TRC TEST NUMBER: 43C11LK1

572E SN43 LEFT KNEE CAL 11

RUN NUMBER: 040495.0750.1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 1186.69 LBF @ 2.80 MS; -8.50 LBF @ 8.32 MS

Post-Test Certification Data

Driver Dummy S/N 043

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
043 HUMANOID

26-APR-95

TRC INC. TEST NO: 43C12ED1 572E SN43 EXT.DIMENSION CAL12

TEST PARAMETER	(DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)		16.9 - 17.1 IN	17.0 IN
LOCATION FOR WAIST CIRCUMFERENCE (BB)		8.9 - 9.1 IN	9.0 IN
CHEST CIRCUMFERENCE	(Y)	38.2 - 39.4 IN	39.3 IN
WAIST CIRCUMFERENCE	(Z)	32.9 - 34.1 IN	33.7 IN
CHEST DEPTH	(O)	8.4 - 9.0 IN	8.7 IN
H-POINT HEIGHT	(C)	3.3 - 3.5 IN	3.5 IN
H-POINT FROM SEATBACK	(D)	5.3 - 5.5 IN	5.4 IN
SKULL CAP TO BACKLINE	(H)	1.6 - 1.8 IN	1.7 IN
TOTAL SITTING HEIGHT	(A)	34.6 - 35.0 IN	34.7 IN
THIGH CLEARANCE	(F)	5.5 - 6.1 IN	6.1 IN
BUTTOCK KNEE LENGTH	(K)	22.8 - 23.8 IN	23.6 IN
BUTTOCK POPLITEAL LENGTH	(N)	17.8 - 18.8 IN	18.6 IN
POPLITEAL HEIGHT	(L)	16.9 - 17.9 IN	16.9 IN
KNEE PIVOT HEIGHT	(M)	19.1 - 19.7 IN	19.4 IN
FOOT LENGTH	(P)	9.9 - 10.5 IN	10.3 IN
FOOT BREADTH	(W)	3.6 - 4.2 IN	4.0 IN
SHOULDER PIVOT FROM BACKLINE	(E)	3.3 - 3.7 IN	3.7 IN
SHOULDER BREADTH	(V)	16.6 - 17.2 IN	16.8 IN
SHOULDER PIVOT HEIGHT	(B)	19.9 - 20.5 IN	20.2 IN
ELBOW REST HEIGHT	(J)	7.5 - 8.3 IN	8.0 IN
SHOULDER-ELBOW LENGTH	(I)	13.0 - 13.6 IN	13.3 IN
BACK OF ELBOW TO WRIST PIVOT	(G)	11.4 - 12.0 IN	11.5 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Rita Fort

RUN NUMBER: 042795.1000

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III

26-APR-95

TRC INC.

TEST NO: 43C12HD1

572E SN43 HEAD DROP CAL 12

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	42.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	289.15 G *
PEAK LATERAL ACCELERATION	15 G MAX	-8.67 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

* TEST DOES NOT MEET SPECIFICATIONS

TECHNICIAN Pete F. A.

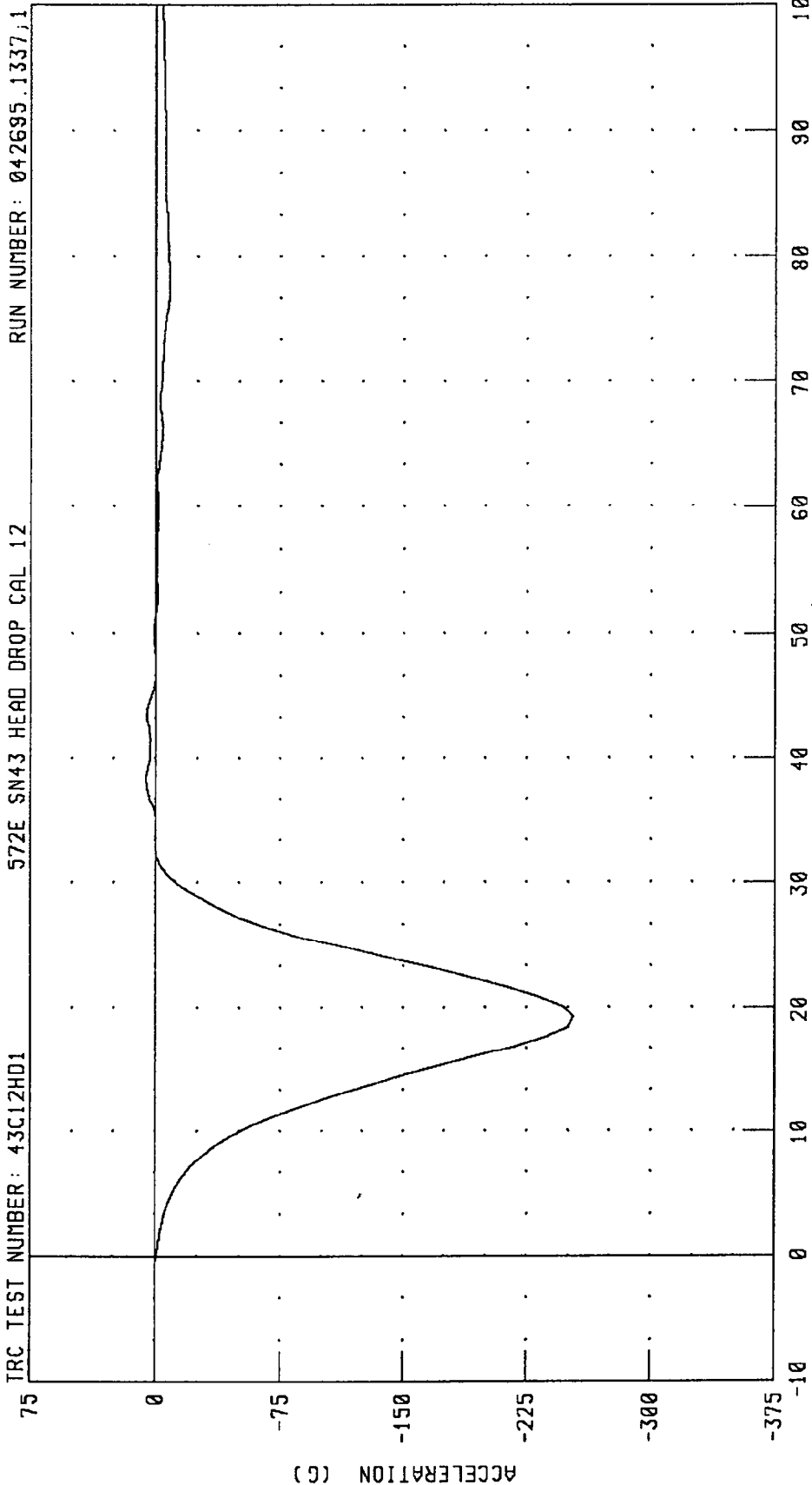
RUN NUMBER: 042695.1334;1

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

TRC TEST NUMBER: 43C12HD1

572E SN43 HEAD DROP CAL 12

RUN NUMBER: 042695.1337,1

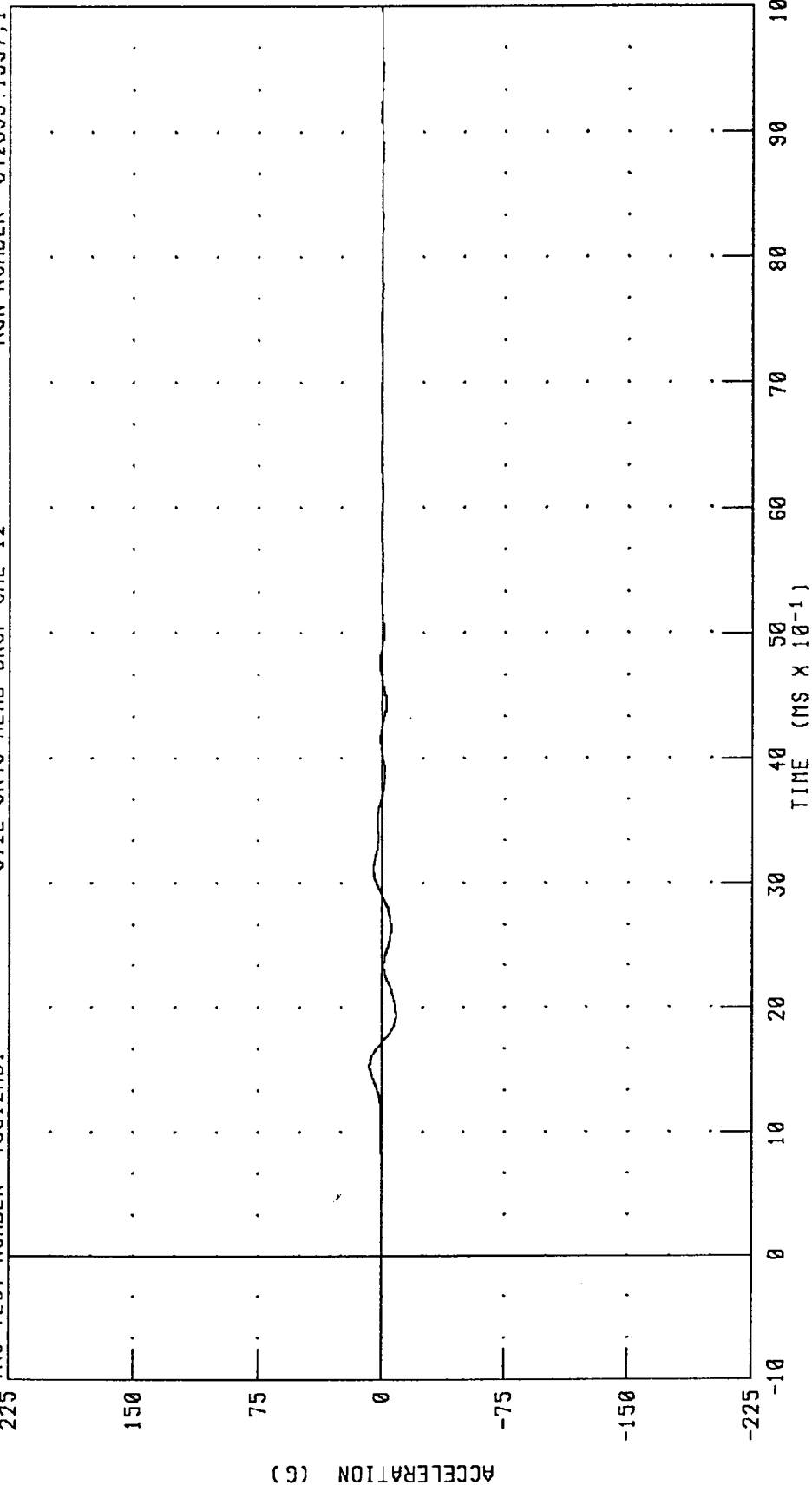


CHANNEL: HEDXC FILTER: CH. CLASS 1000

PEAK DATA: 5.37 G @ 3.84 MS; -253.68 G @ 1.92 MS

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

TRC TEST NUMBER: 43C12HD1 572E SN43 HEAD DROP CAL 12 RUN NUMBER: 042695 1337,1



CHANNEL: HEDYG FILTER: CH. CLASS 1000

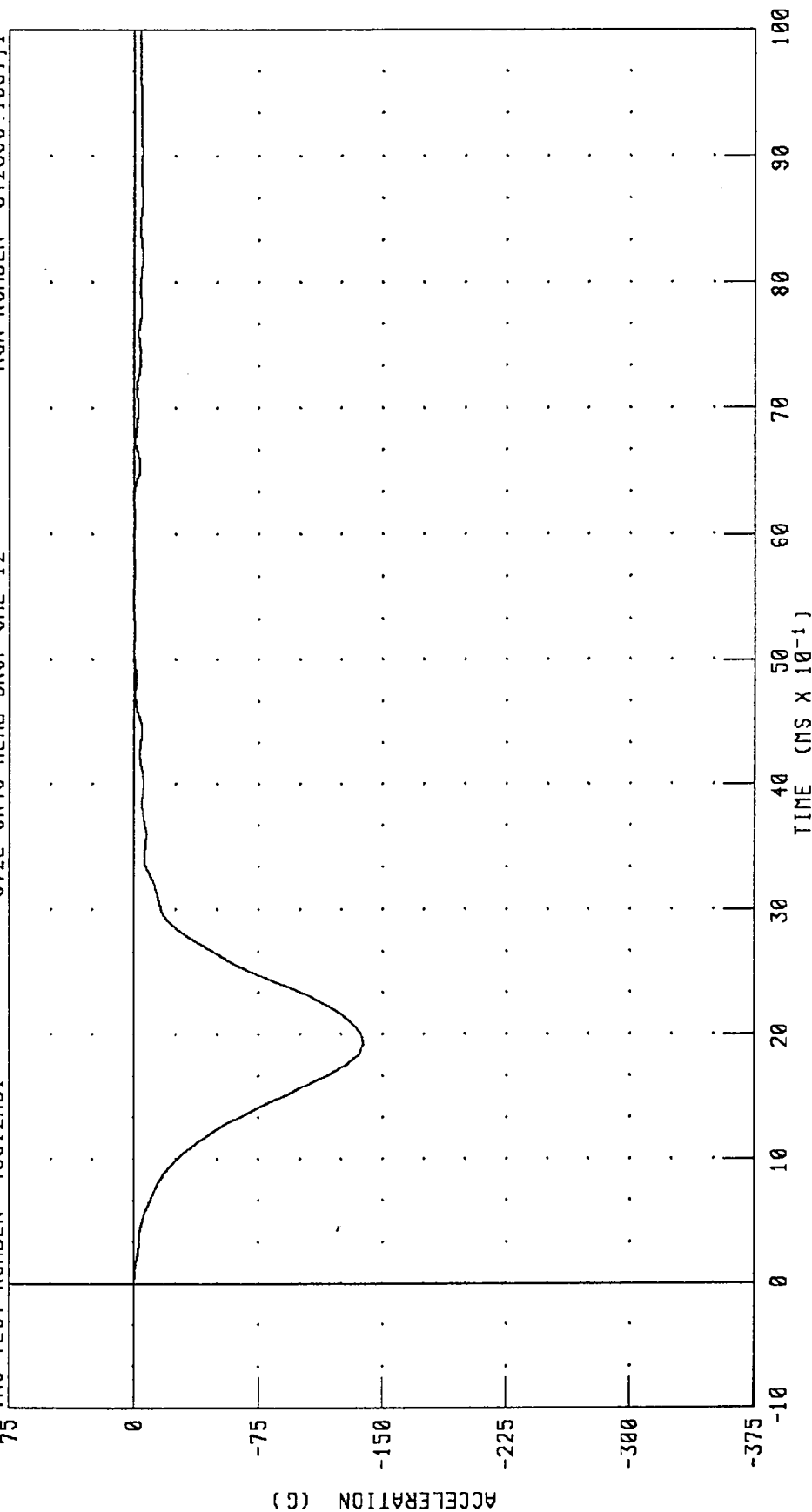
PEAK DATA: 7.50 G @ 1.52 MS; -8.68 G @ 1.92 MS

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

TRC TEST NUMBER: 43C12HD1

572E SN43 HEAD DROP CAL 12

RUN NUMBER: 042695.1337.1

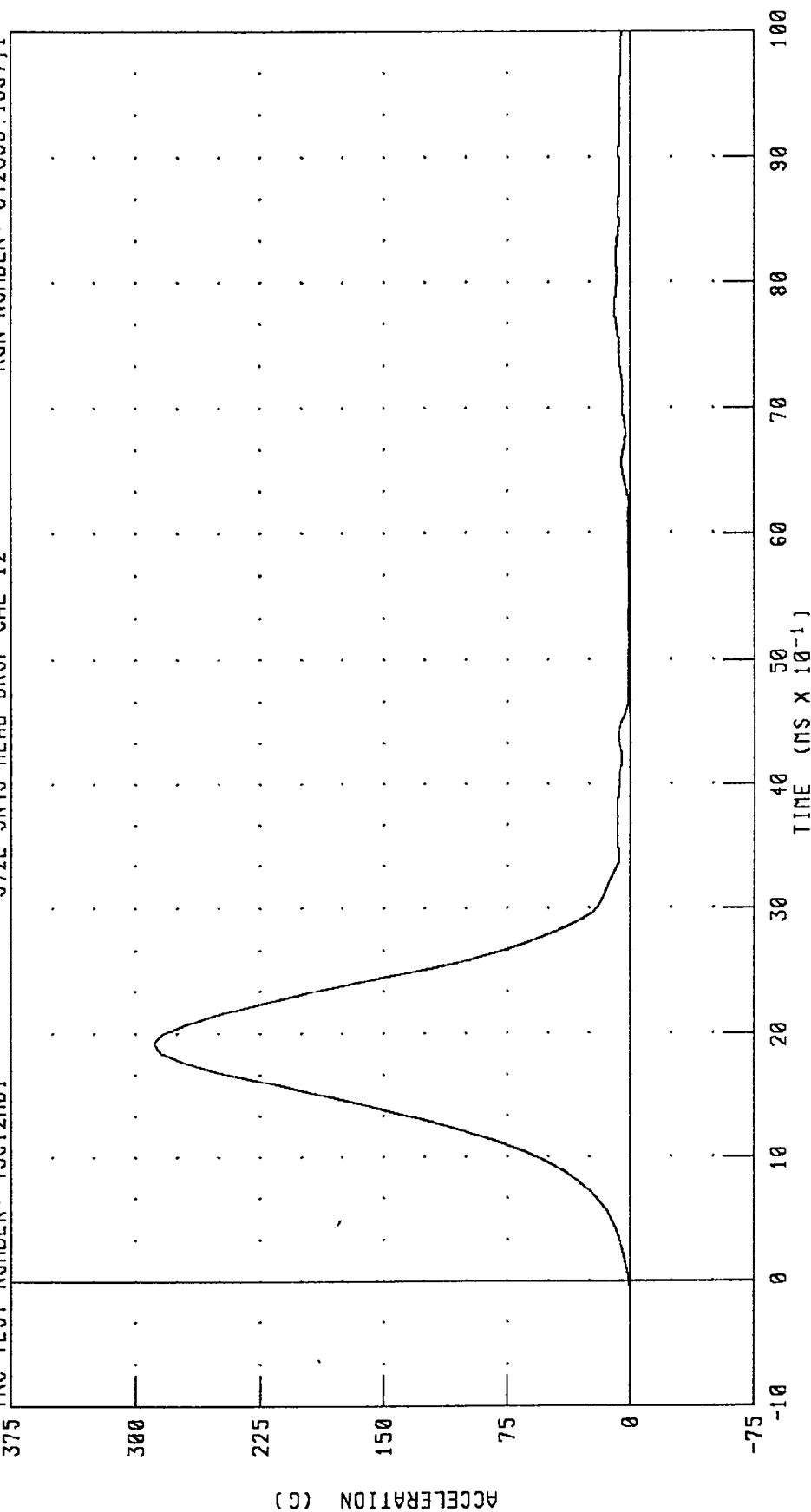


CHANNEL: HEDZG FILTER: CH. CLASS 1000

PEAK DATA: 0.35 G @ 5.44 MS; -138.49 G @ 1.92 MS

PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION

TRC TEST NUMBER: 43C12HD1 572E SN43 HEAD DROP CAL 12 RUN NUMBER: 042695.1337;1



CHANNEL: HEDRG FILTER: CH. CLASS 1000 PEAK DATA: 289.15 G @ 1.92 MS; 0.07 G @ -0.88 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

27-APR-95

TRC INC. TEST NO: 43C12NF1 572E SN43 NECK FLEXION CAL12

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10 - 70 %	45.0 %
IMPACT VELOCITY		22.6 - 23.4 FT/S	23.15 FT/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	22.51 G
	20 MS	17.60 - 22.60 G	20.78 G
	30 MS	12.50 - 18.50 G	15.06 G
MAX PENDULUM G		29 G MAX	22.74 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	15.03 G
DECELERATION-TIME CURVE DECAY TIME TO 5 C		34 - 42 MS	38.08 MS
D PLANE	MAX	64 - 78 DEG.	66.58 DEG.
ROTATION	TIME	57 - 64 MS	59.52 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	65 - 80 FT.LB	69.83 FT.LB
	TIME	47 - 58 MS	50.80 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	116.08 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	97.76 MS

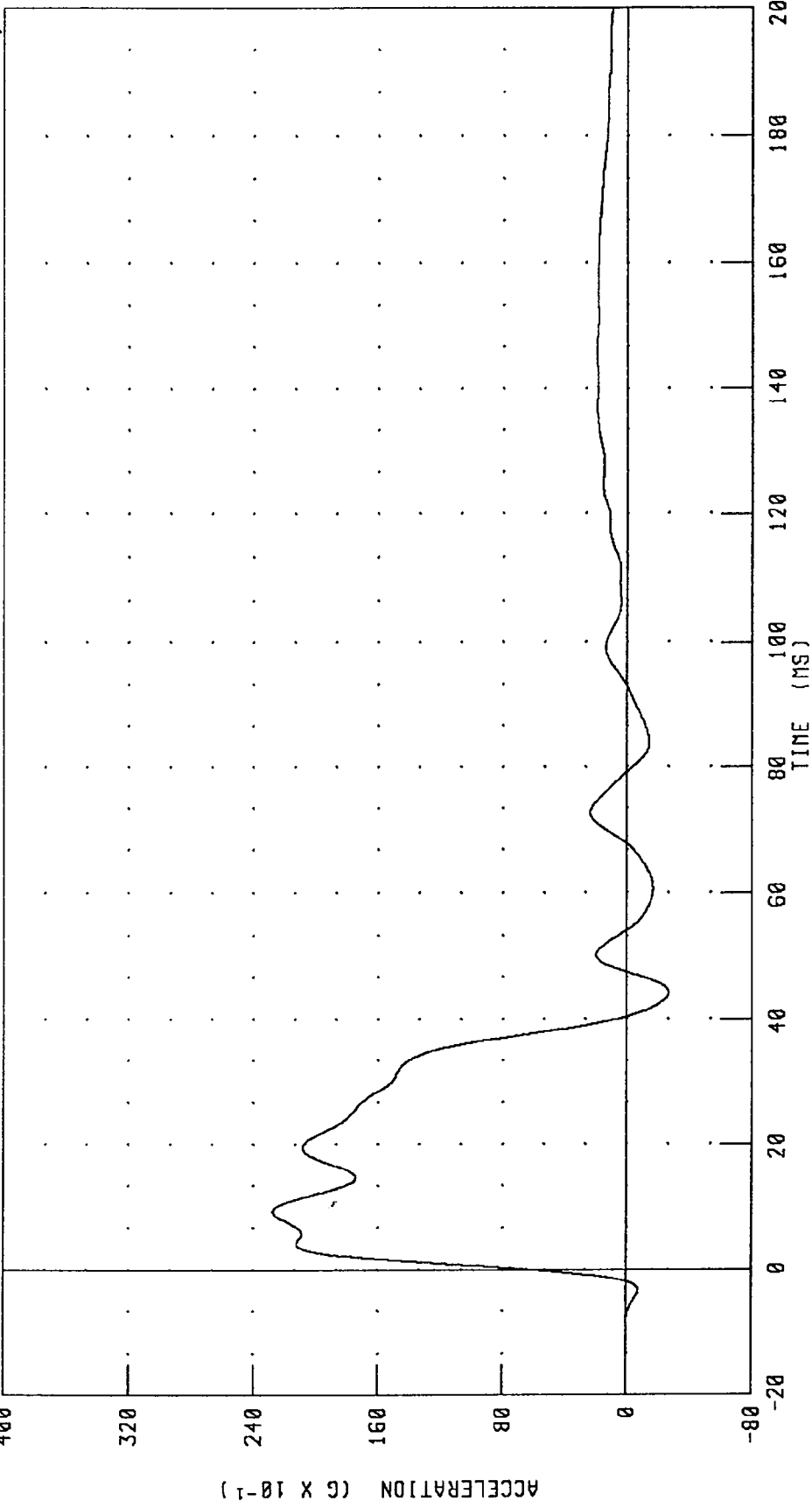
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete F. S.

RUN NUMBER: 042795.0738;1

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION

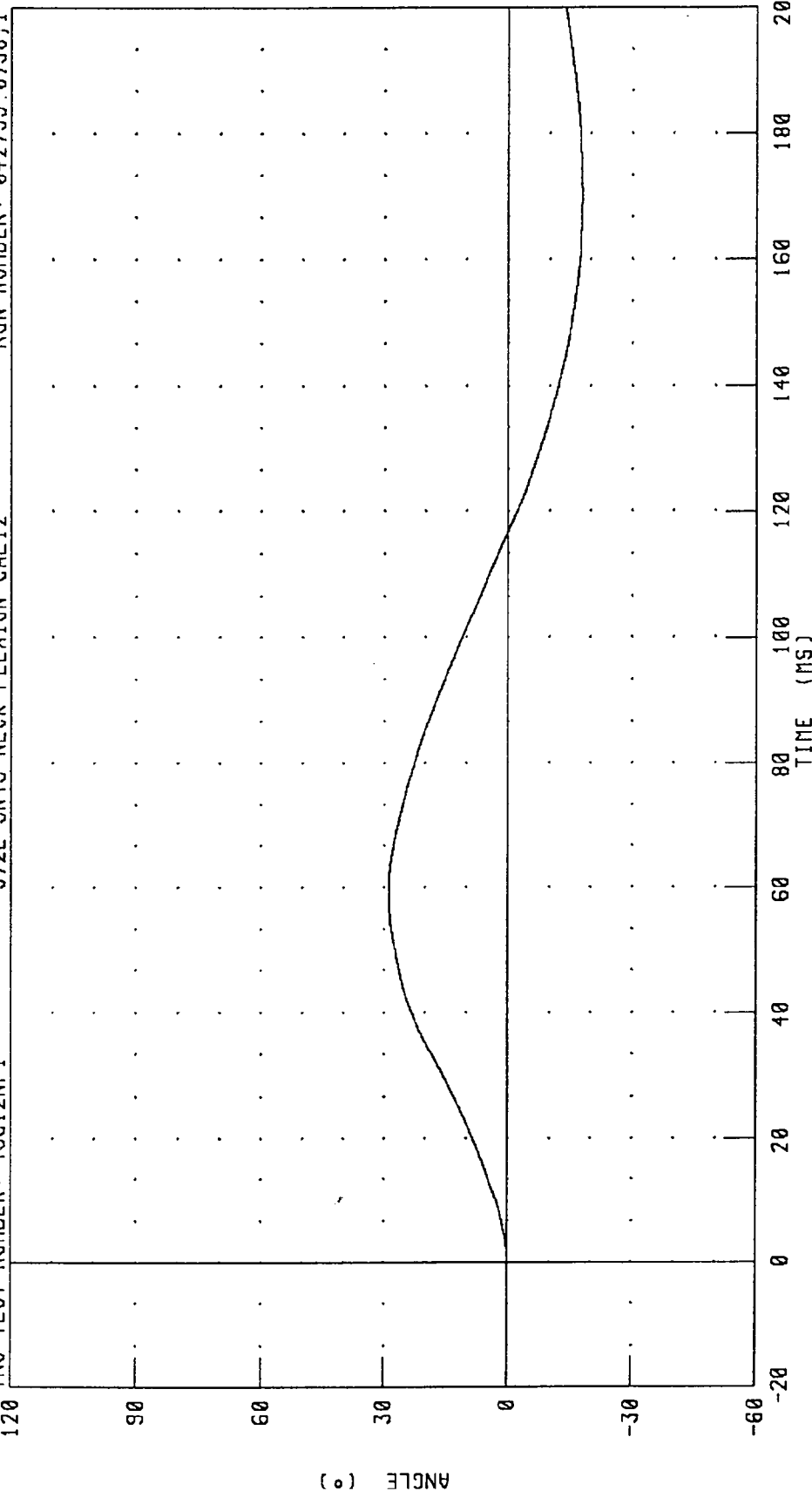
TRC TEST NUMBER: 43C12NF1 572E SN43 NECK FLEXION CAL12 RUN NUMBER: 042795.0738;1



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 22.74 G @ 9.28 MS; -2.69 G @ 44.24 MS

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

TRC TEST NUMBER: 43C12NF1 572E SN43 NECK FLEXION CAL12 RUN NUMBER: 042795.0738.1



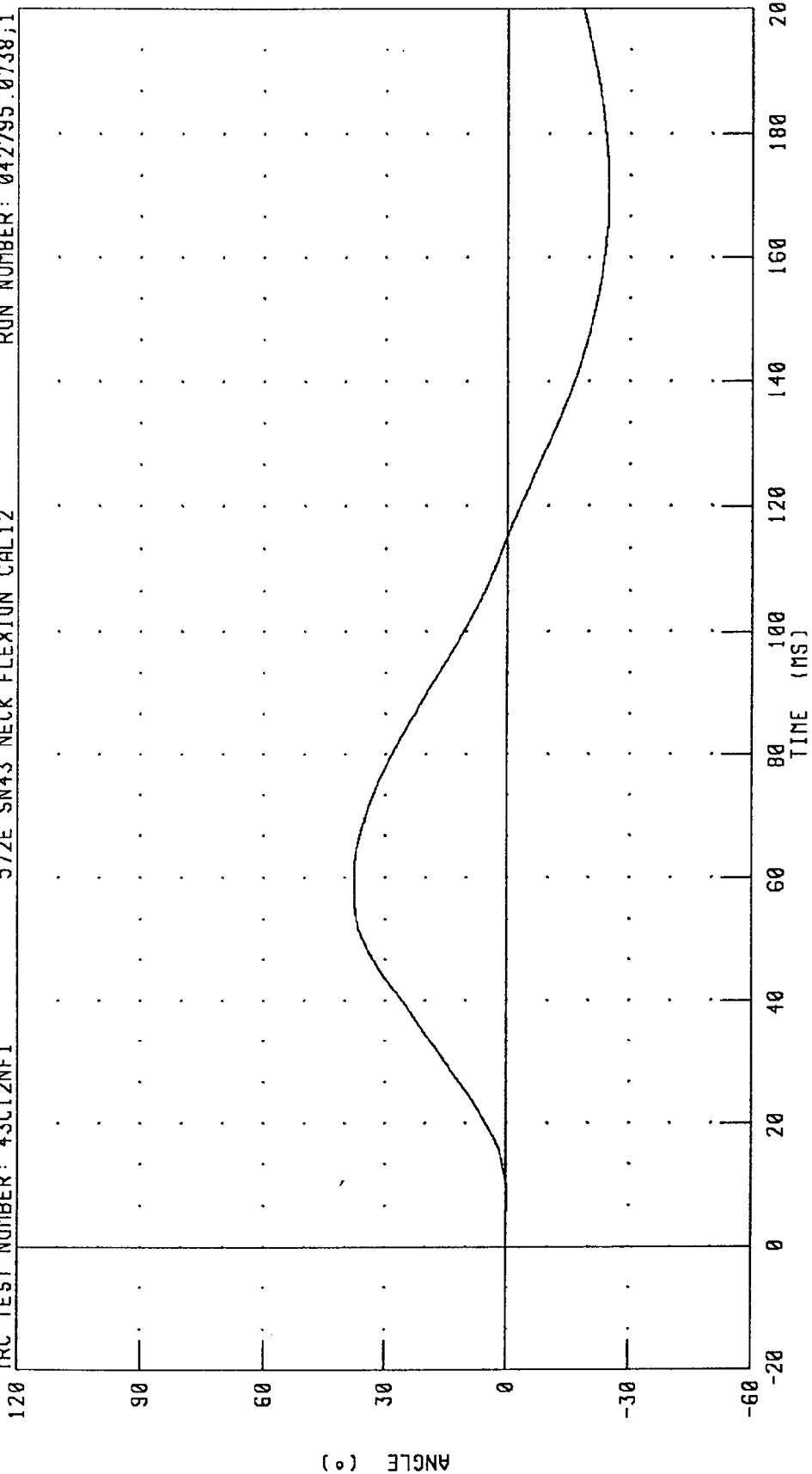
CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 28.84 ° @ 59.52 MS; -17.90 ° @ 170.00 MS

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

TRC TEST NUMBER: 43C12NF1

572E SN43 NECK FLEXION CAL12

RUN NUMBER: 042795.0738;1

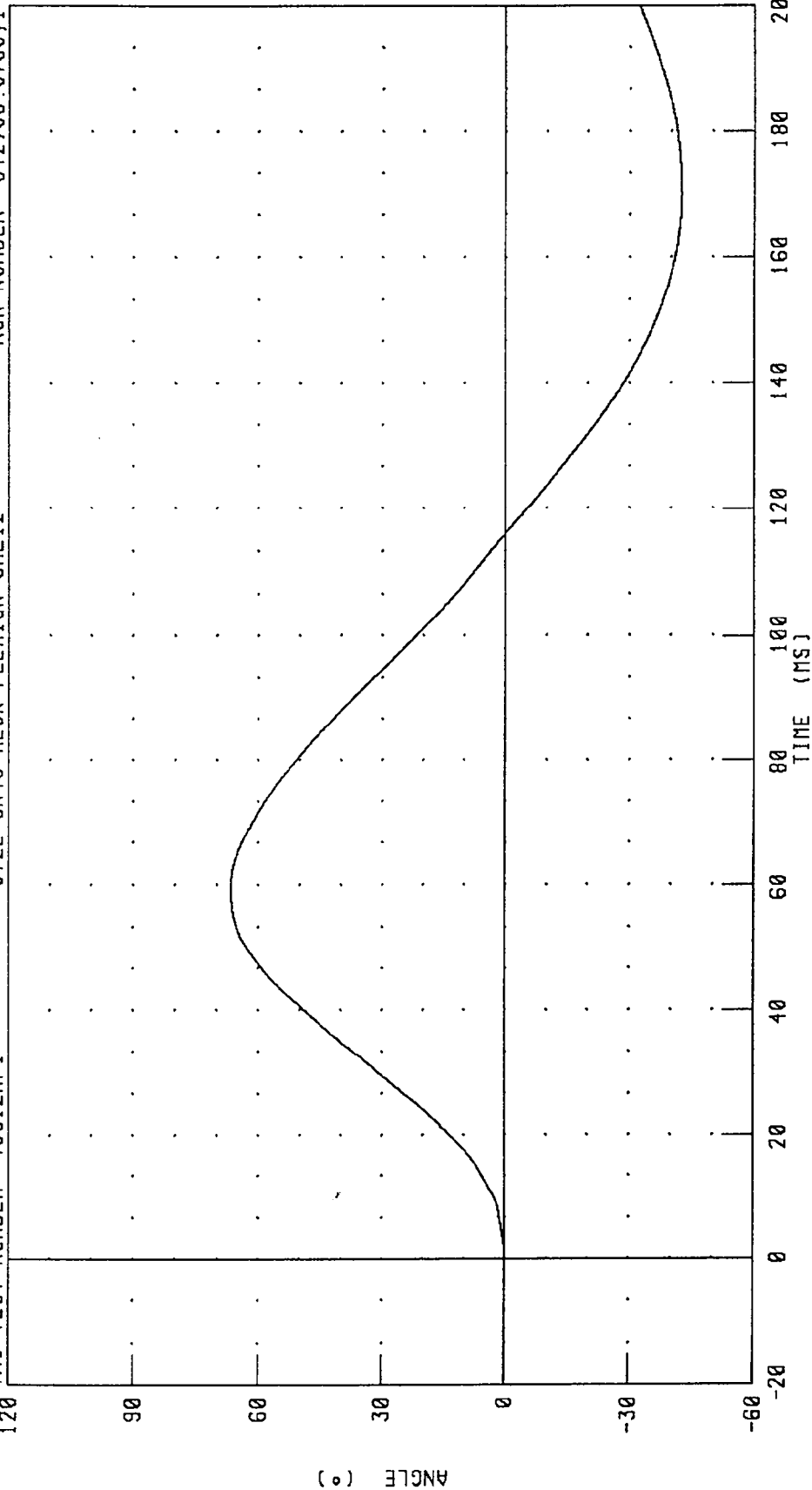


CHANNEL: THETA FILTER: CH. CLASS 60

PEAK DATA: 37.74 ° @ 59.28 MS; -24.62 ° @ 167.92 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION

TRC TEST NUMBER: 43C12NF1 572E SN43 NECK FLEXION CAL12 RUN NUMBER: 042795.0738;1

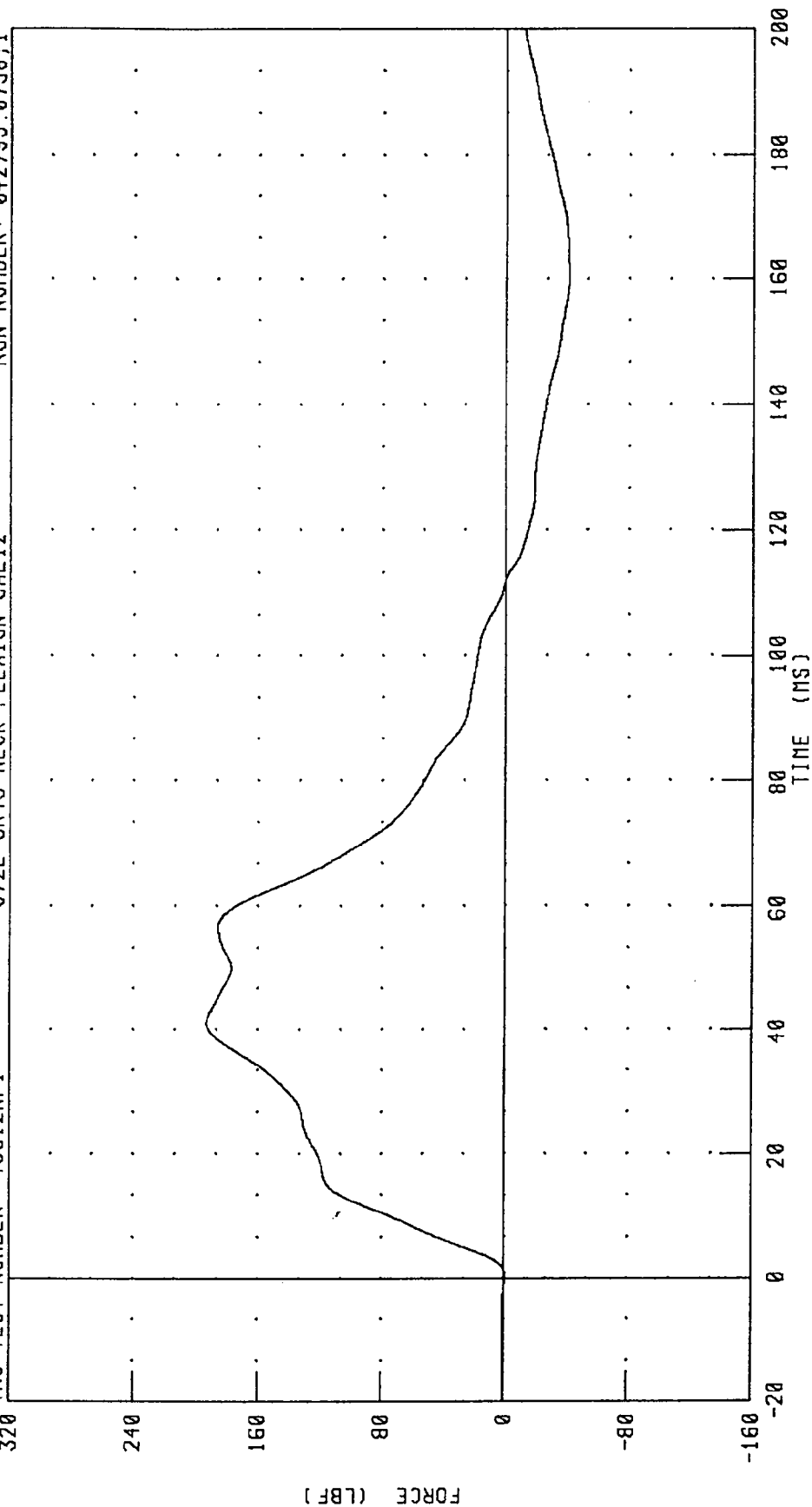


CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 66.58 ° @ 59.52 MS; -42.51 ° @ 169.92 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS

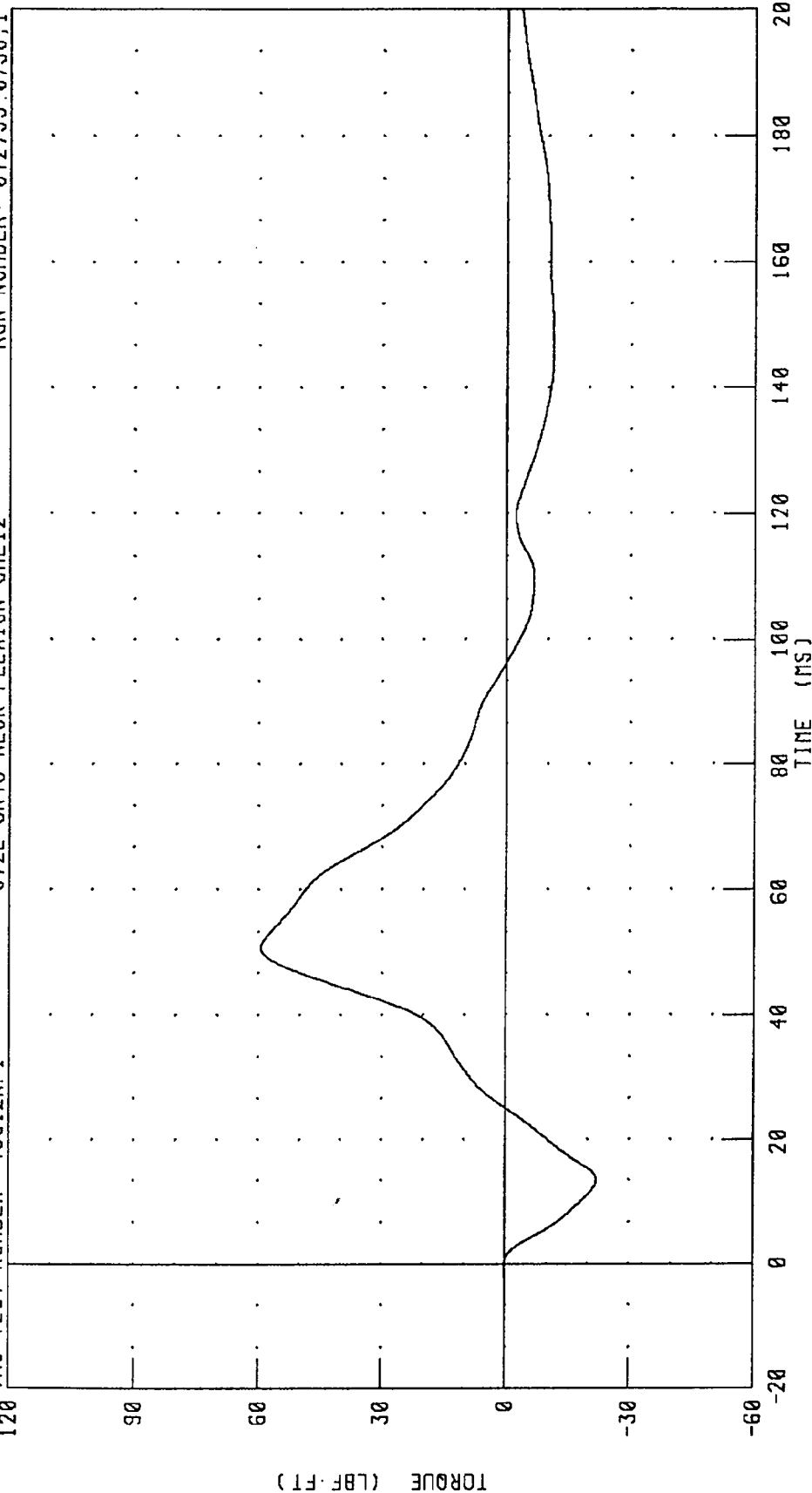
TRC TEST NUMBER: 43C12NF1 572E SN43 NECK FLEXION CAL12 RUN NUMBER: 042795.0738;1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 192.90 LBF @ 41.04 MS; -41.09 LBF @ 160.64 MS

PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS

IRC TEST NUMBER: 43C12NF1 572E SN43 NECK FLEXION CAL12 RUN NUMBER: 042795.0738;1

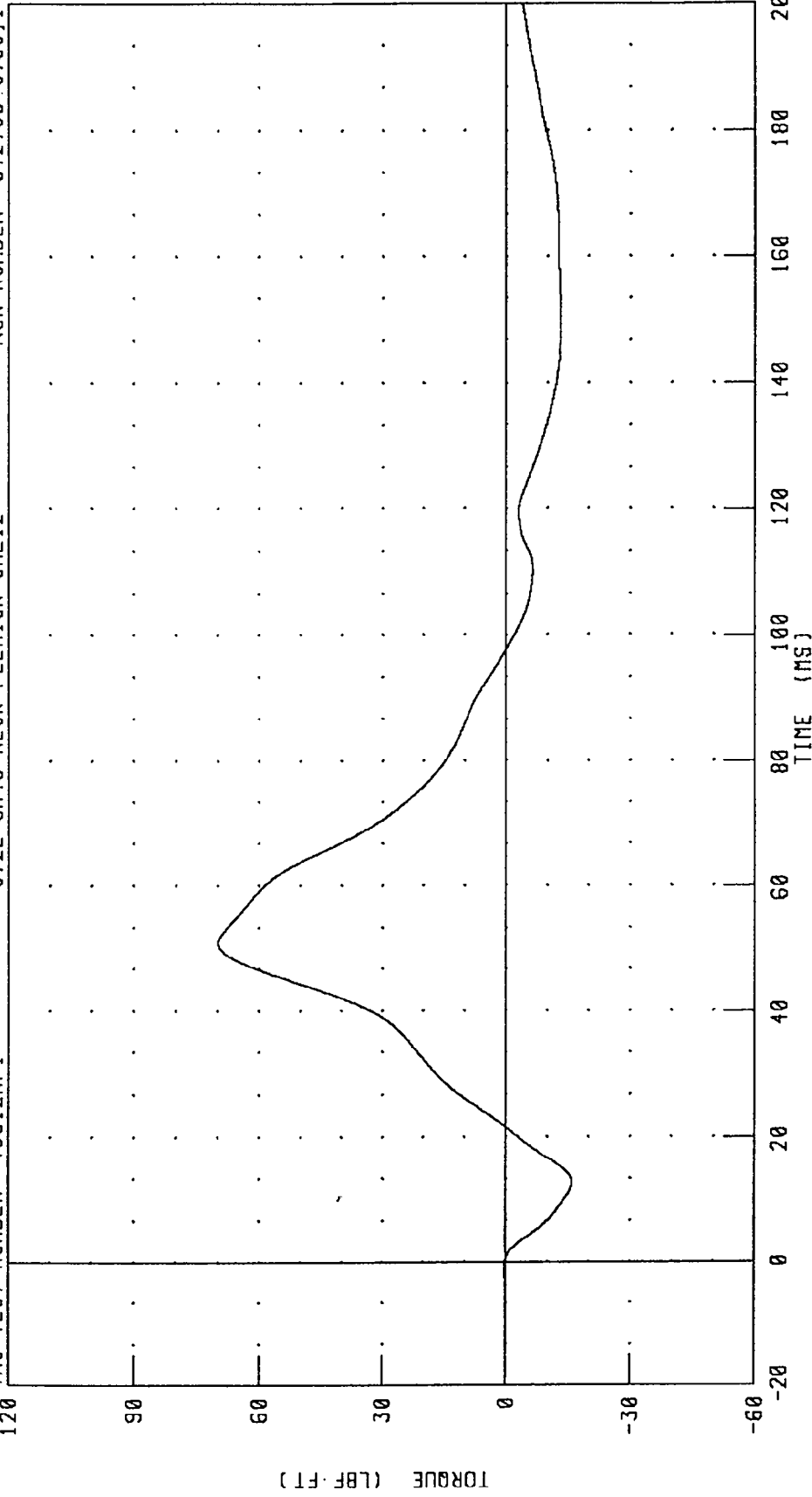


CHANNEL: NEKYM FILTER: CH. CLASS 60

PEAK DATA: 59.46 LBF·FT @ 50.72 MS; -22.07 LBF·FT @ 13.36 MS

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

TRC TEST NUMBER: 43C12NF1 572E SN43 NECK FLEXION CAL12 RUN NUMBER: 042795 0738.1



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 69.83 LBF·FT @ 50.80 MS; -15.94 LBF·FT @ 12.80 MS

TRANSPORTATION RESEARCH CENTER INC.
NECK EXTENSION TEST - 6 CHANNEL TRANSDUCER

HYBRID III

27-APR-95

TRC INC. TEST NO: 43C12NE1 572E SN43 NECK EXT. CAL12

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY		10 - 70 %	45.0 %
IMPACT VELOCITY		19.5 - 20.3 FT/S	19.69 FT/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.45 G
	20 MS	14.00 - 19.00 G	16.37 G
	30 MS	11.00 - 16.00 G	12.66 G
MAX PENDULUM G		22 G MAX	18.01 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	12.71 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	39.52 MS
D PLANE	MAX	81 - 106 DEG.	90.36 DEG.
ROTATION	TIME	72 - 82 MS	74.72 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-59.0/-39.0 FT.LB	-45.51 FT.LB
	TIME	65 - 79 MS	69.76 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	156.72 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	135.28 MS

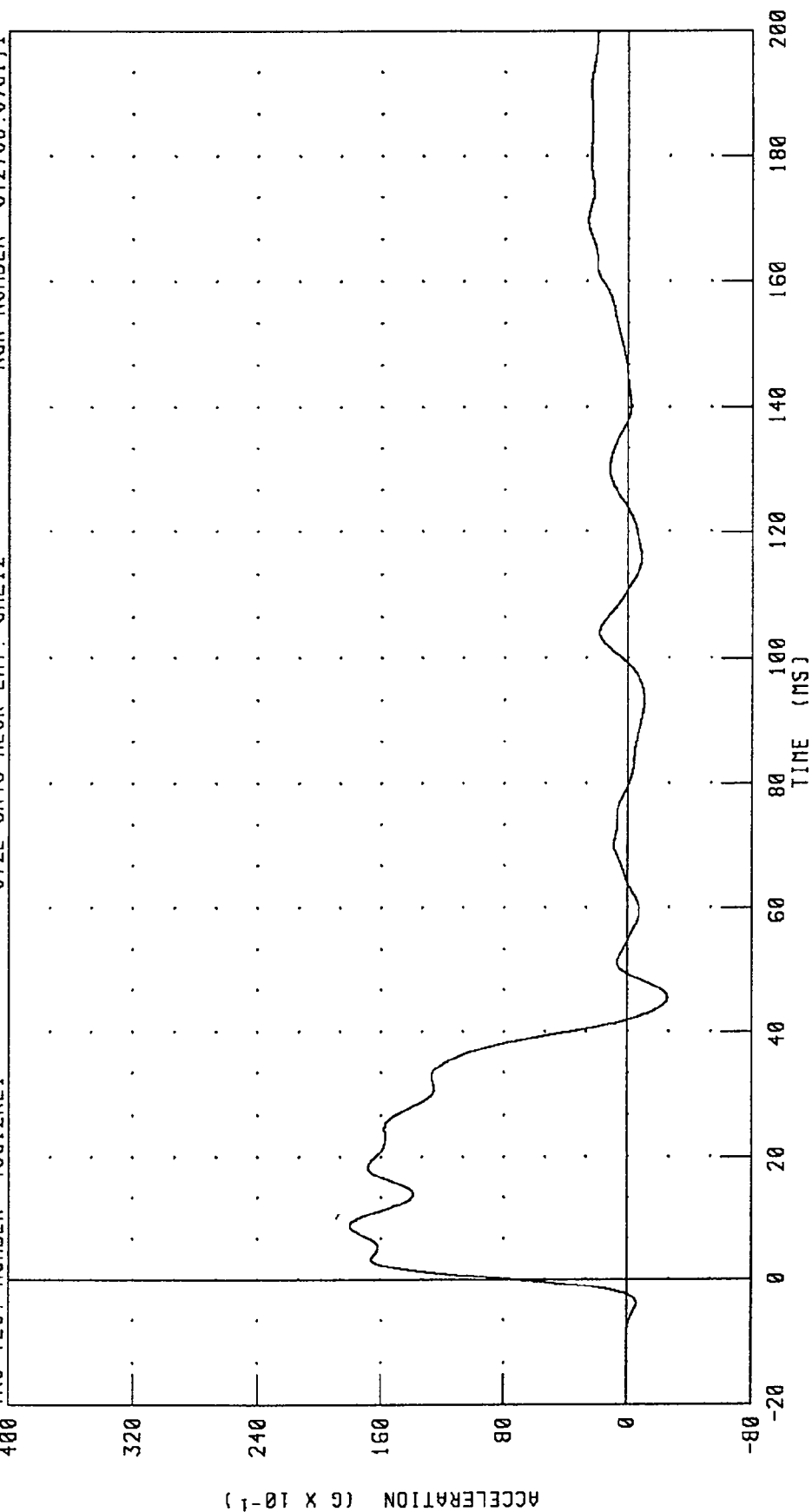
TEST MEETS SPECIFICATIONS

TECHNICIAN Peter F. S.

RUN NUMBER: 042795.0750;1

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION

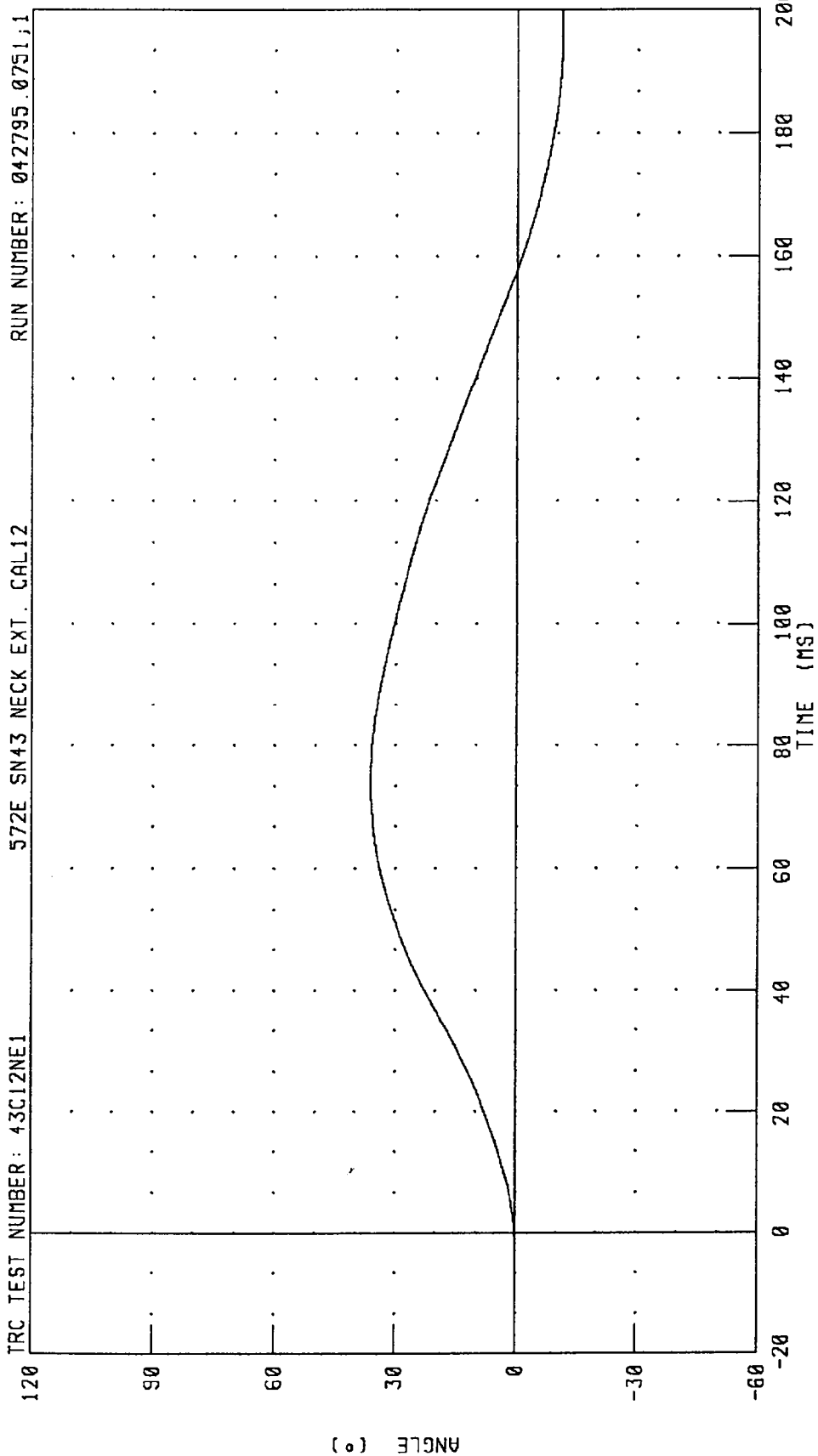
TRC TEST NUMBER: 43C12NE1 572E SN43 NECK EXT. CAL12 RUN NUMBER: 042795.0751;1



CHANNEL: PENXG FILTER: CH. CLASS 60 PEAK DATA: 18.01 G @ 8.80 MS; -2.59 G @ 45.52 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
 ROTATION ABOUT BASE OF NECK
 572E SN43 NECK EXT. CAL12

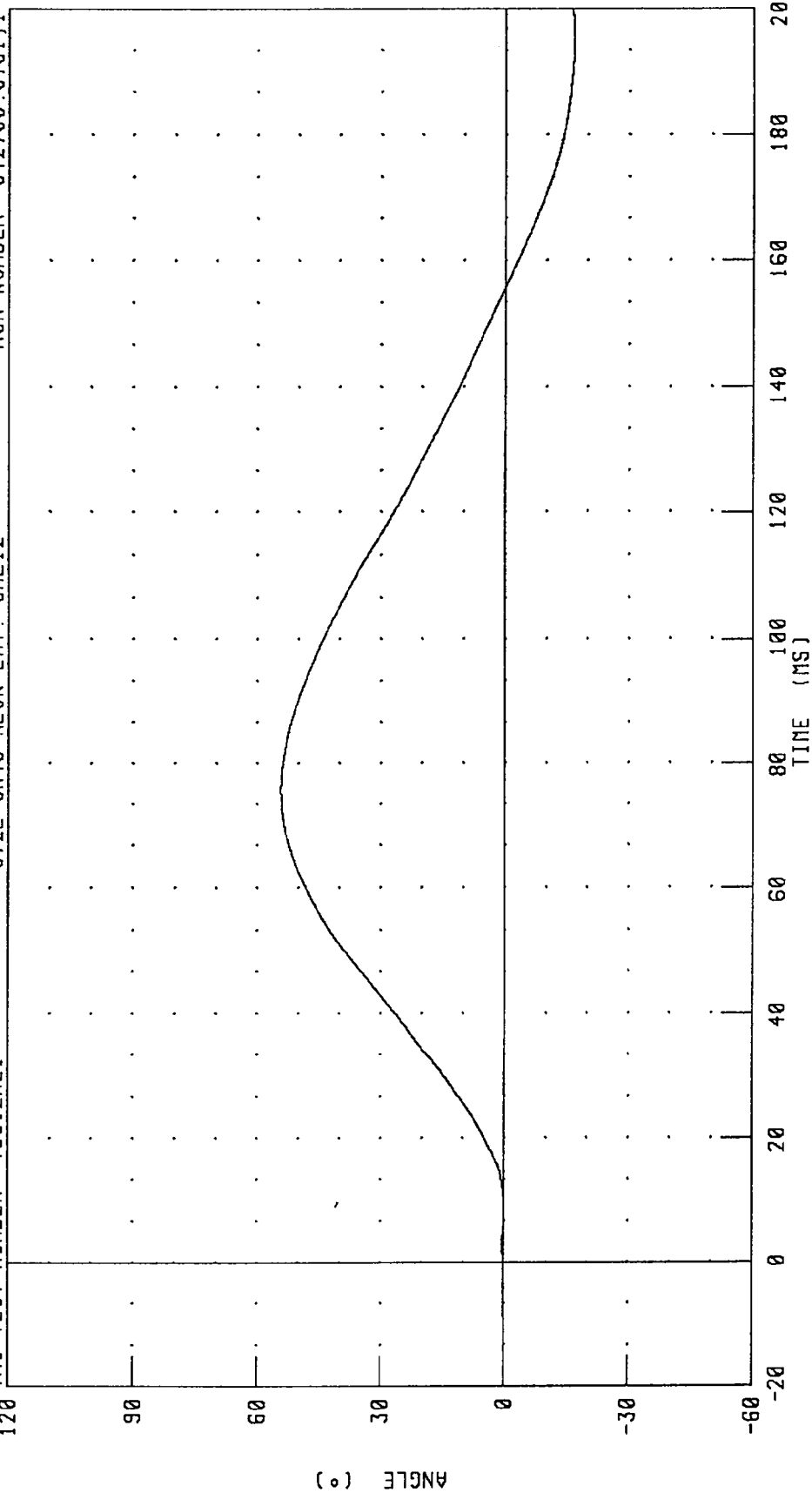
TRC TEST NUMBER: 43C12NE1 RUN NUMBER: 042795.0751;1



CHANNEL: BETA FILTER: CH. CLASS 60 PEAK DATA: 36.11 ° @ 73.84 MS; -11.21 ° @ 199.28 MS

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

TRC TEST NUMBER: 43C12NE1 572E SN43 NECK EXT. CAL12 RUN NUMBER: 042795.0751;1



CHANNEL: THETA FILTER: CH. CLASS 60 PEAK DATA: 54.28 ° @ 75.68 MS; -16.39 ° @ 193.76 MS

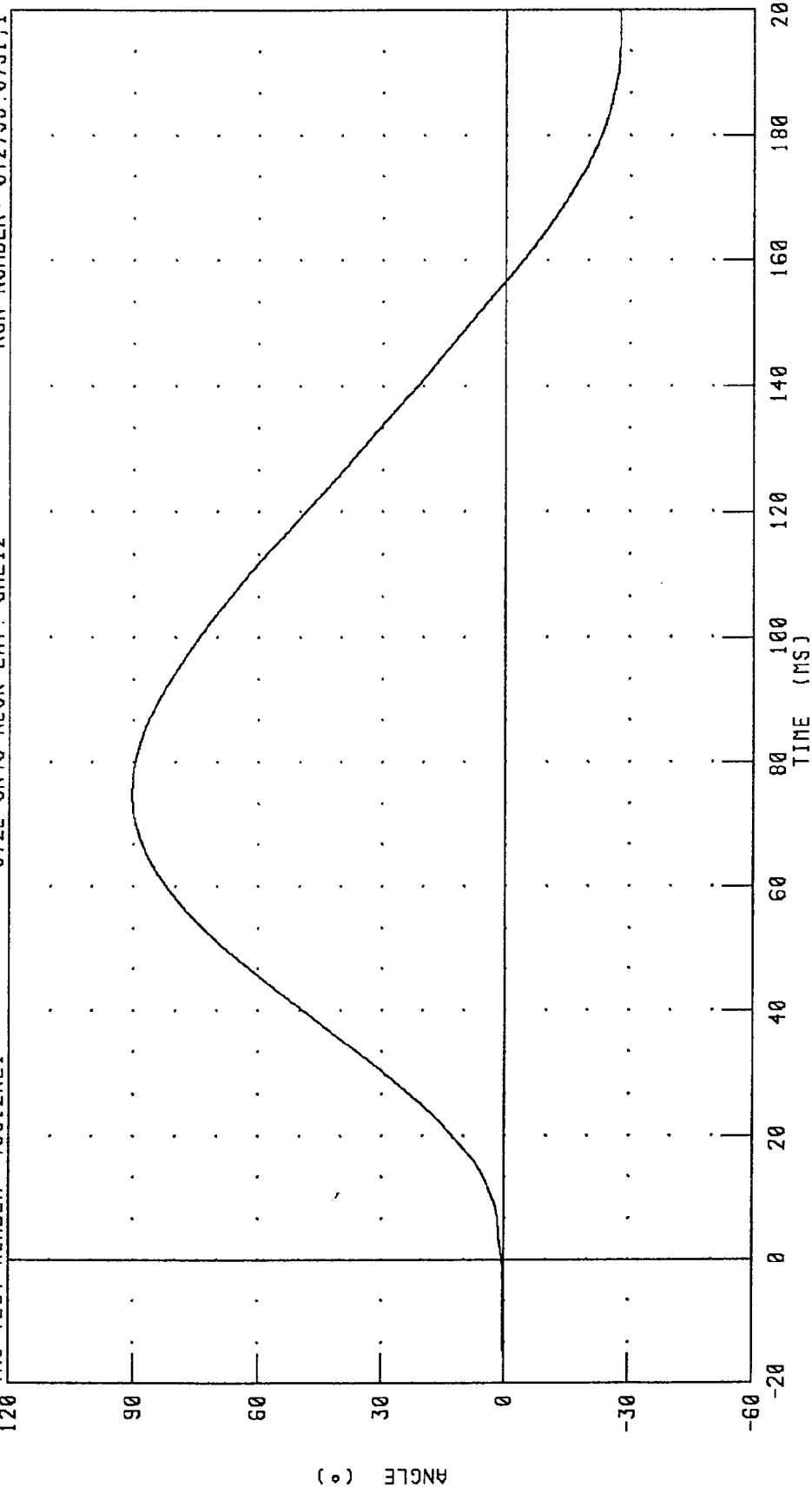
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER: 43C12NE1

572E SN43 NECK EXT. CAL12

RUN NUMBER: 042795.0751,1



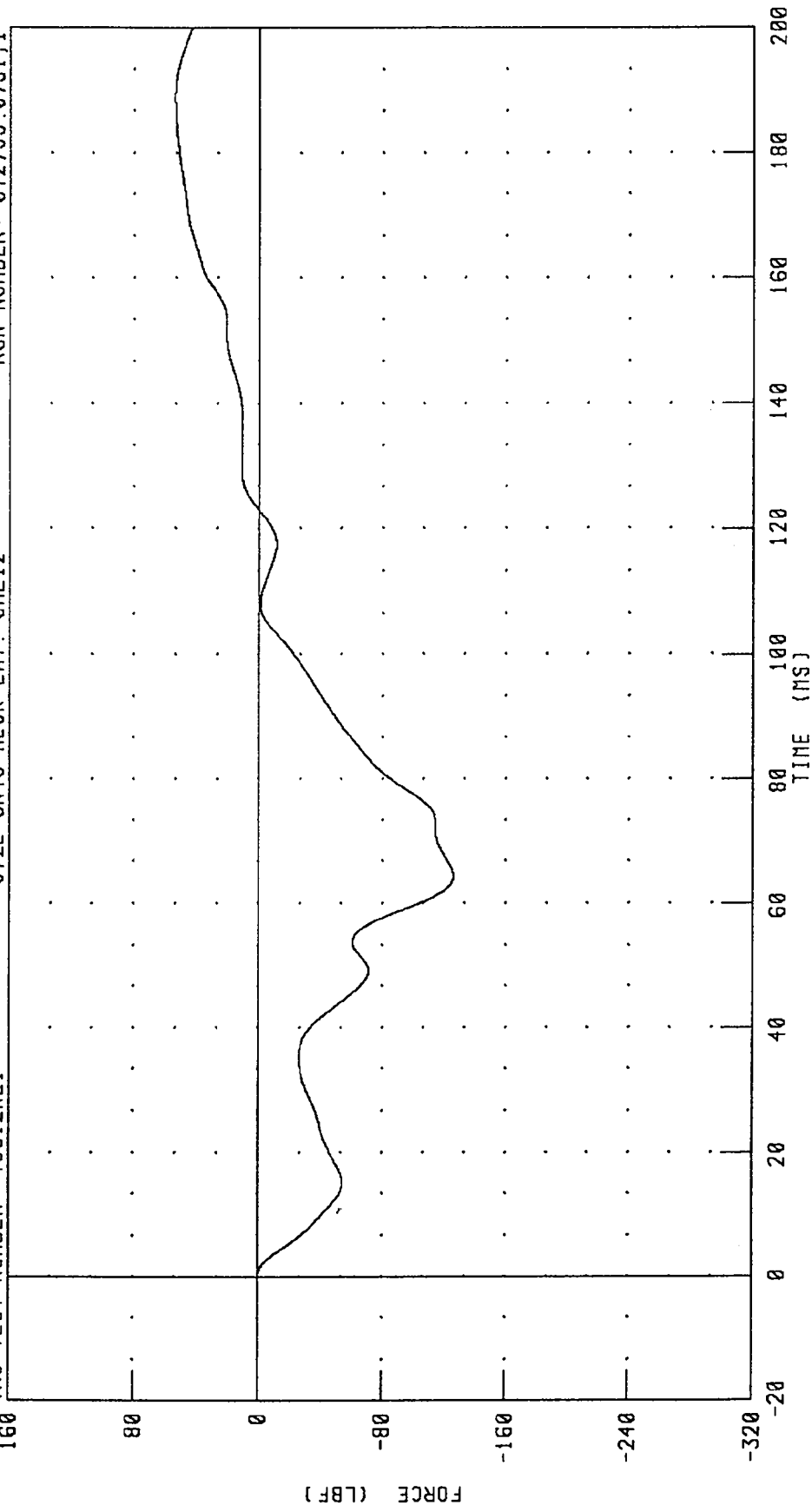
CHANNEL: TOTAL FILTER: CH. CLASS 60

PEAK DATA: 90.37 ° @ 74.72 MS; -27.59 ° @ 197.36 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK FORCE X AXIS

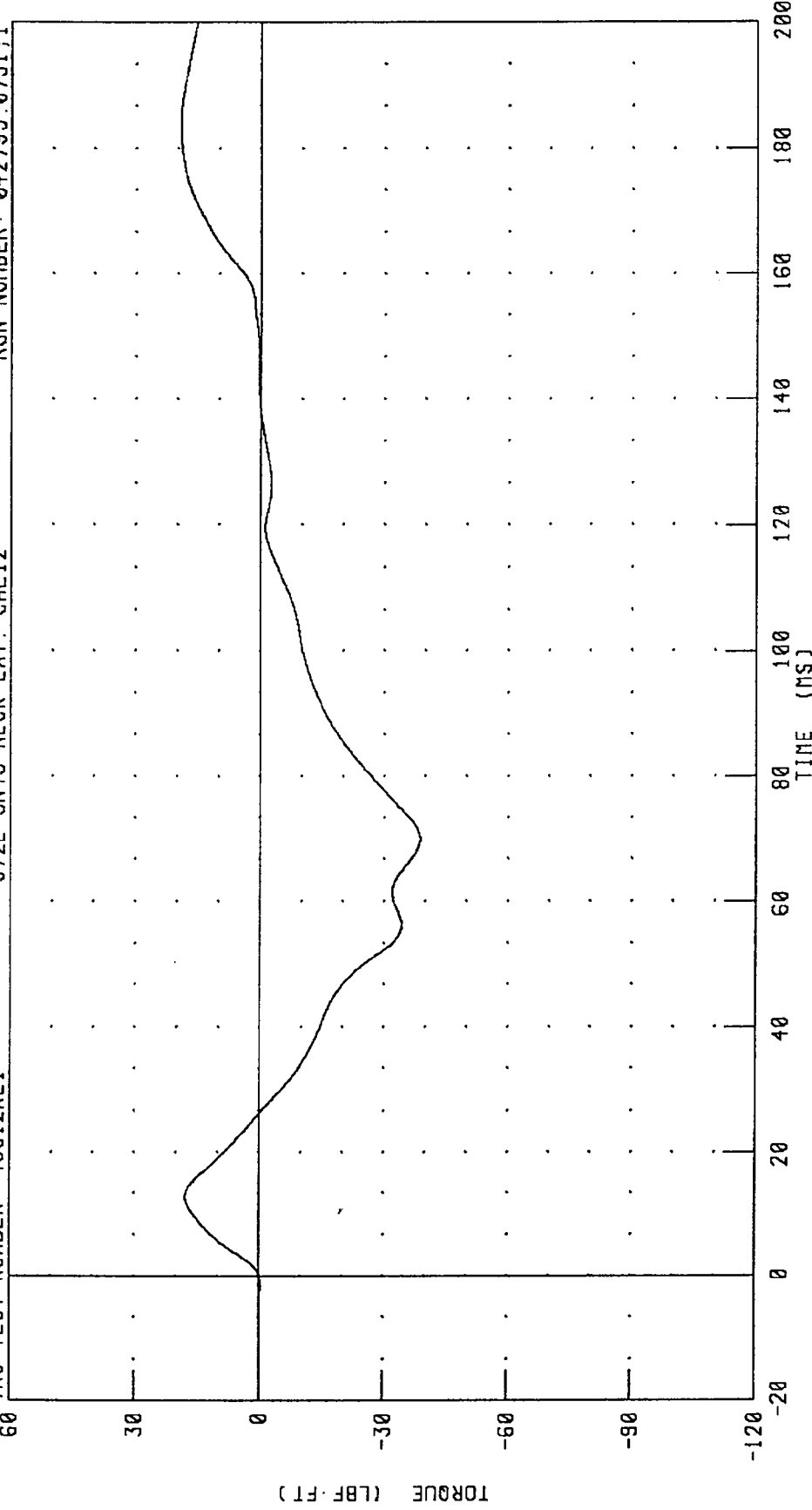
TRC TEST NUMBER: 43C12NE1 572E SN43 NECK EXT. CAL12 RUN NUMBER: 042795.0751,1



CHANNEL: NEKXF FILTER: CH. CLASS 60 PEAK DATA: 53.87 LBF @ 188.80 MS, -125.95 LBF @ 64.24 MS

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

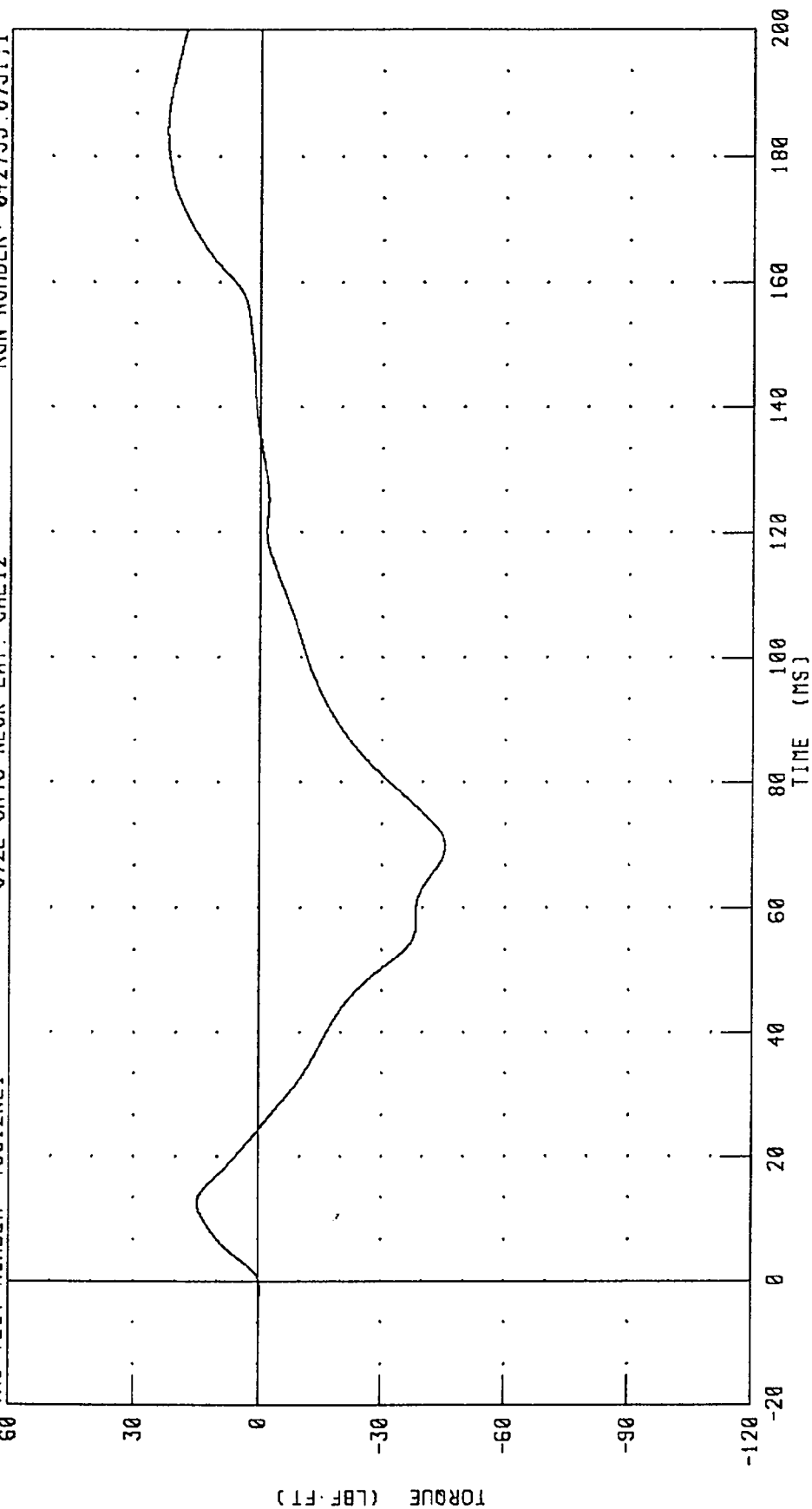
TRC TEST NUMBER: 43C12NE1 572E SN43 NECK EXT. CAL12 RUN NUMBER: 042795.0751;1



CHANNEL: NEKYM FILTER: CH. CLASS 60 PEAK DATA: 19.40 LBF·FT @ 183.60 MS; -38.77 LBF·FT @ 69.92 MS

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

TRC TEST NUMBER: 43C12NE1 572E SN43 NECK EXT. CAL12 RUN NUMBER: 042795.0751;1



CHANNEL: NEKOM FILTER: CH. CLASS 60 PEAK DATA: 22.48 LBF·FT @ 183.92 MS; -45.51 LBF·FT @ 69.76 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

HYBRID III

27-APR-95

TRC INC.

TEST NO: 43C12TH1

572E SN43 H.S.THORAX CAL12

TEST PARAMETER	HIGH SPEED TEST	TEST RESULTS
	SPECIFICATION	
TEMPERATURE	69 - 72 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	45.0 %
PENDULUM VELOCITY	21.6-22.4 FT/S	21.92 FT/S
MAXIMUM DEFLECTION	2.50 - 2.86 IN	2.71 IN
MAXIMUM RESISTIVE FORCE	1160 - 1325 LB	1255.4 LB
INTERNAL HYSTERESIS	69% - 85%	71.7%

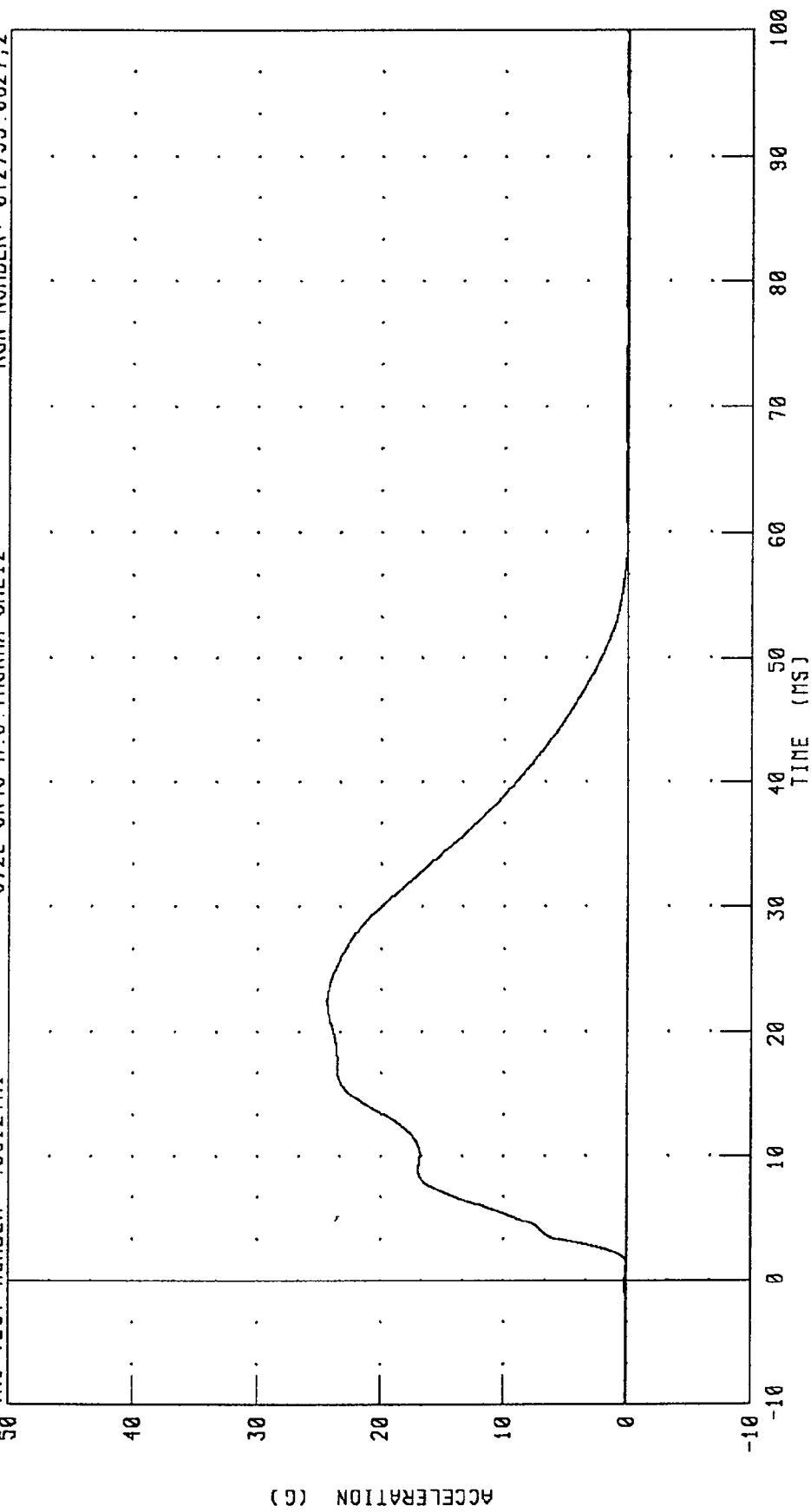
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete G. J.

RUN NUMBER: 042795.0826;2

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION

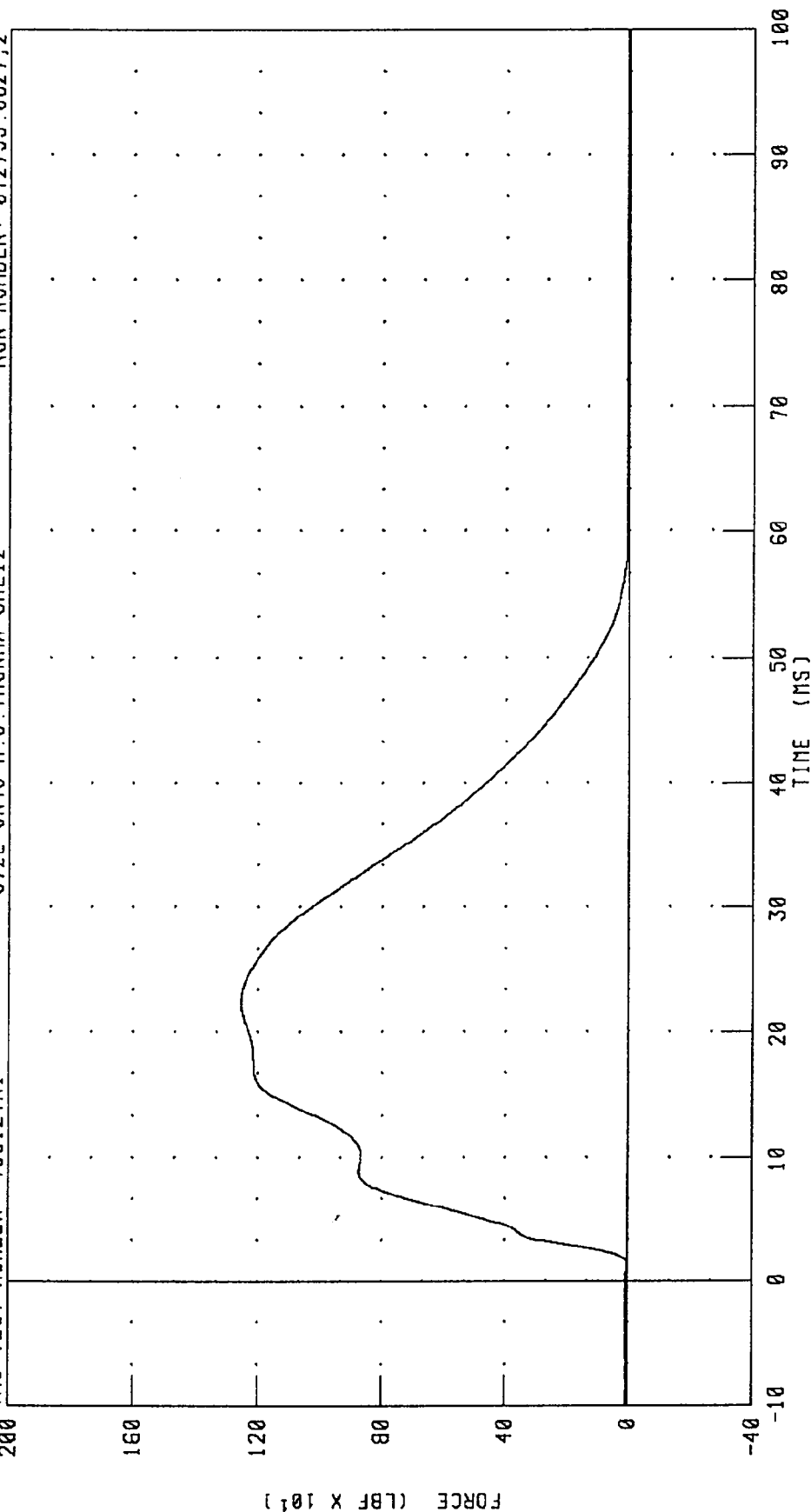
TRC TEST NUMBER: 43C12TH1 572E SN43 H.S. THORAX CAL12 RUN NUMBER: 042795 0827;2



CHANNEL: PENXC FILTER: CH. CLASS 180 PEAK DATA: 24.38 G @ 22.32 MS; 0.05 G @ 1.28 MS

PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM FORCE

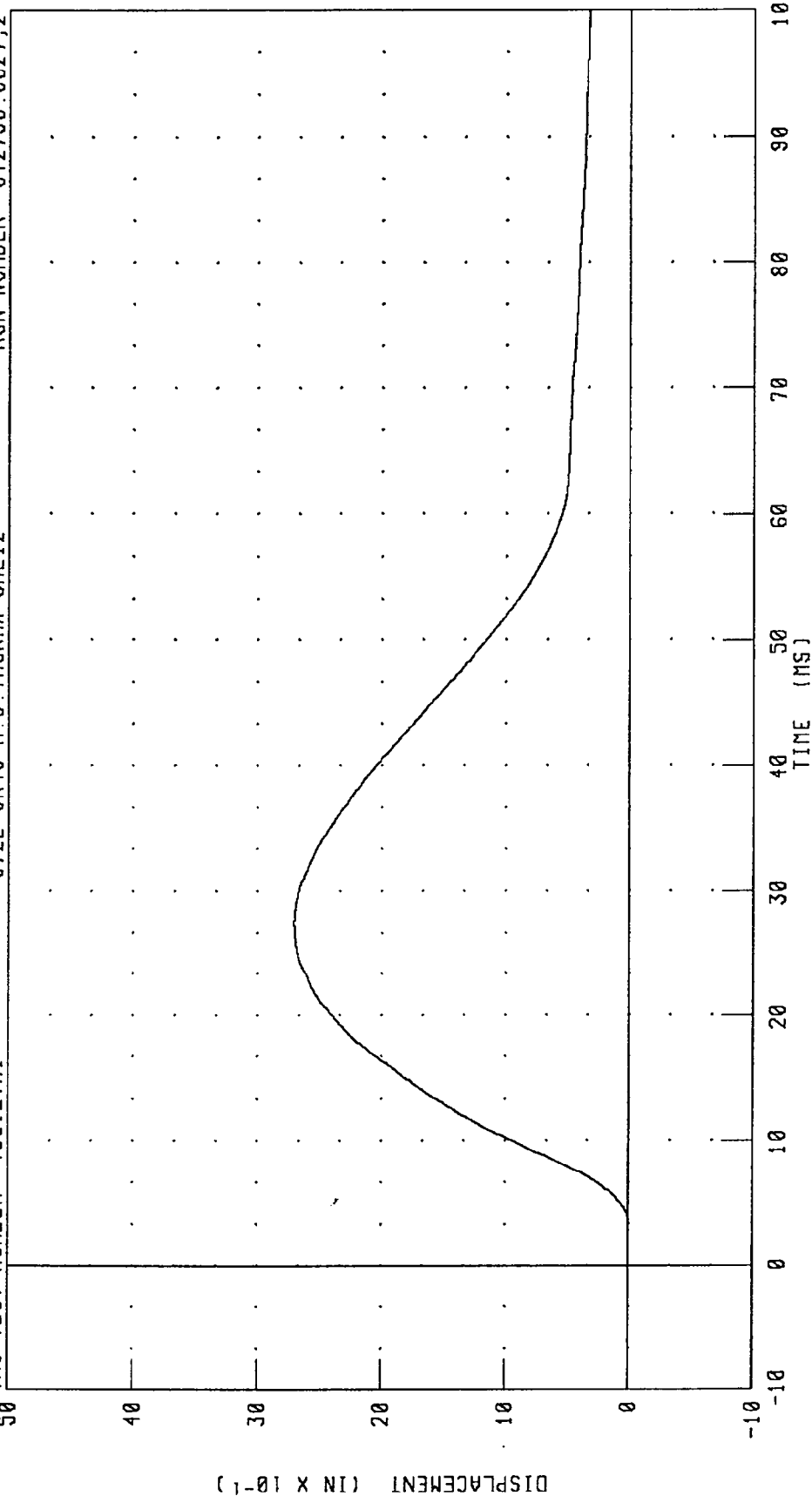
TRC TEST NUMBER: 43C12TH1 572E SN43 H.S. THORAX CAL12 RUN NUMBER: 042795.0027;2



CHANNEL: PENXF FILTER: CH. CLASS 180 PEAK DATA: 1255.42 LBF @ 22.32 MS; 2.75 LBF @ 1.28 MS

PART 572-E HYBRID III THORAX CALIBRATION
 STERNUM DISPLACEMENT

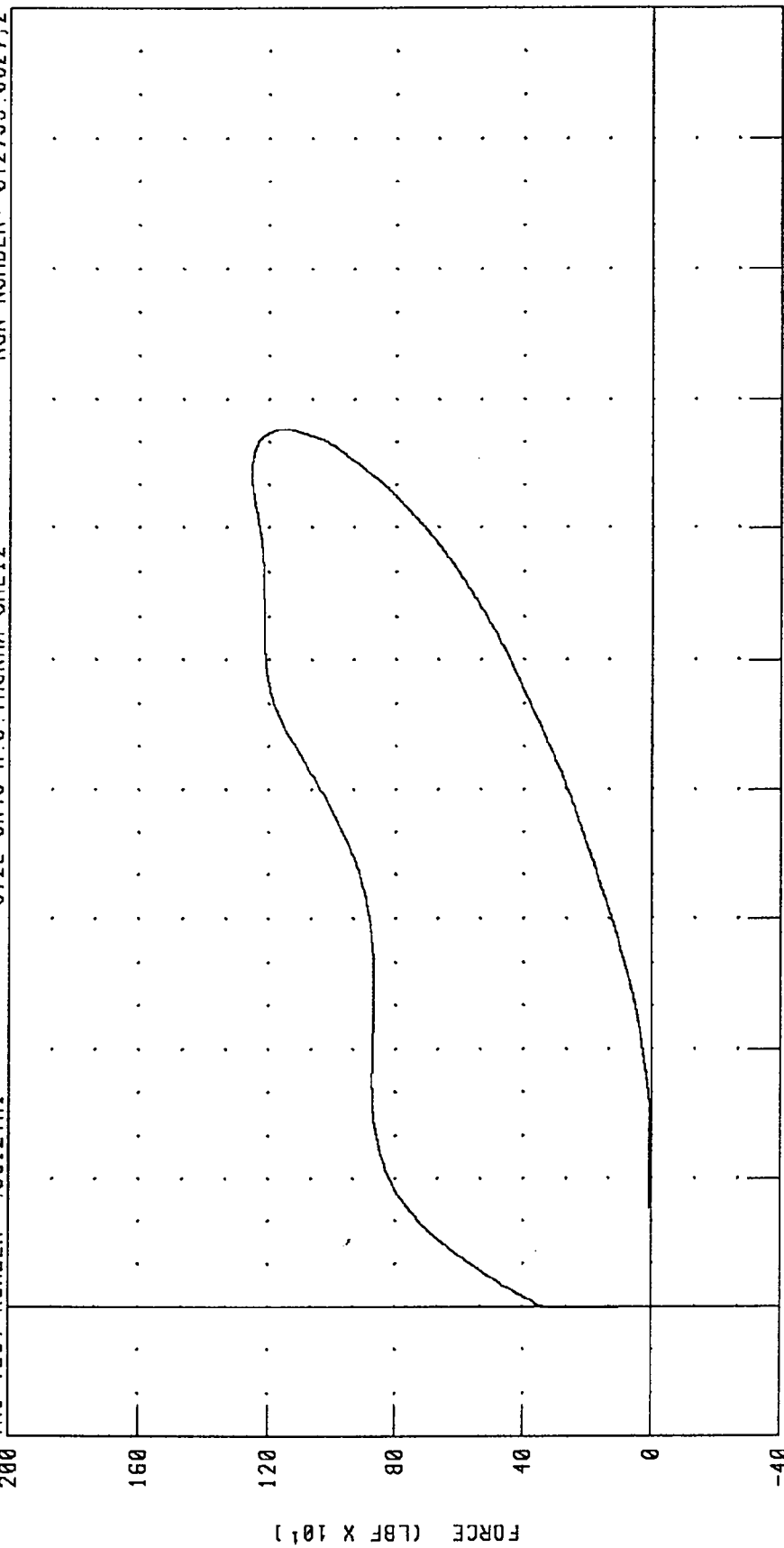
TRC TEST NUMBER: 43C12TH1 572E SN43 H.S. THORAX CAL12 RUN NUMBER: 042795.0027;2



CHANNEL: CSTXD FILTER: CH. CLASS 180 PEAK DATA: 2.71 IN @ 27.44 MS; 0.00 IN @ 3.12 MS

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

TRC TEST NUMBER: 43C12TH1 572E SN43 H.S. THORAX CAL12 RUN NUMBER: 042795.0827;2



CHANNEL: CSTXD FILTER: CH. CLASS 180
PENXF CH. CLASS 180
PEAK DATA: 2.71 IN @ 27.44 MS; 0.00 IN @ 3.12 MS
1255.42 LBF @ 22.32 MS; 2.75 LBF @ 1.28 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III

26-APR-95

TRC INC.

TEST NO: 43C12RK1

572E SN43 RIGHT KNEE CAL 12

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	42.0 %
PROBE VELOCITY	6.8 - 7.0 FT/S	6.94 FT/S
PEAK KNEE IMPACT FORCE 11.0 LB PENDULUM	1060 - 1300 LB	1199.45 LB

TEST MEETS SPECIFICATIONS

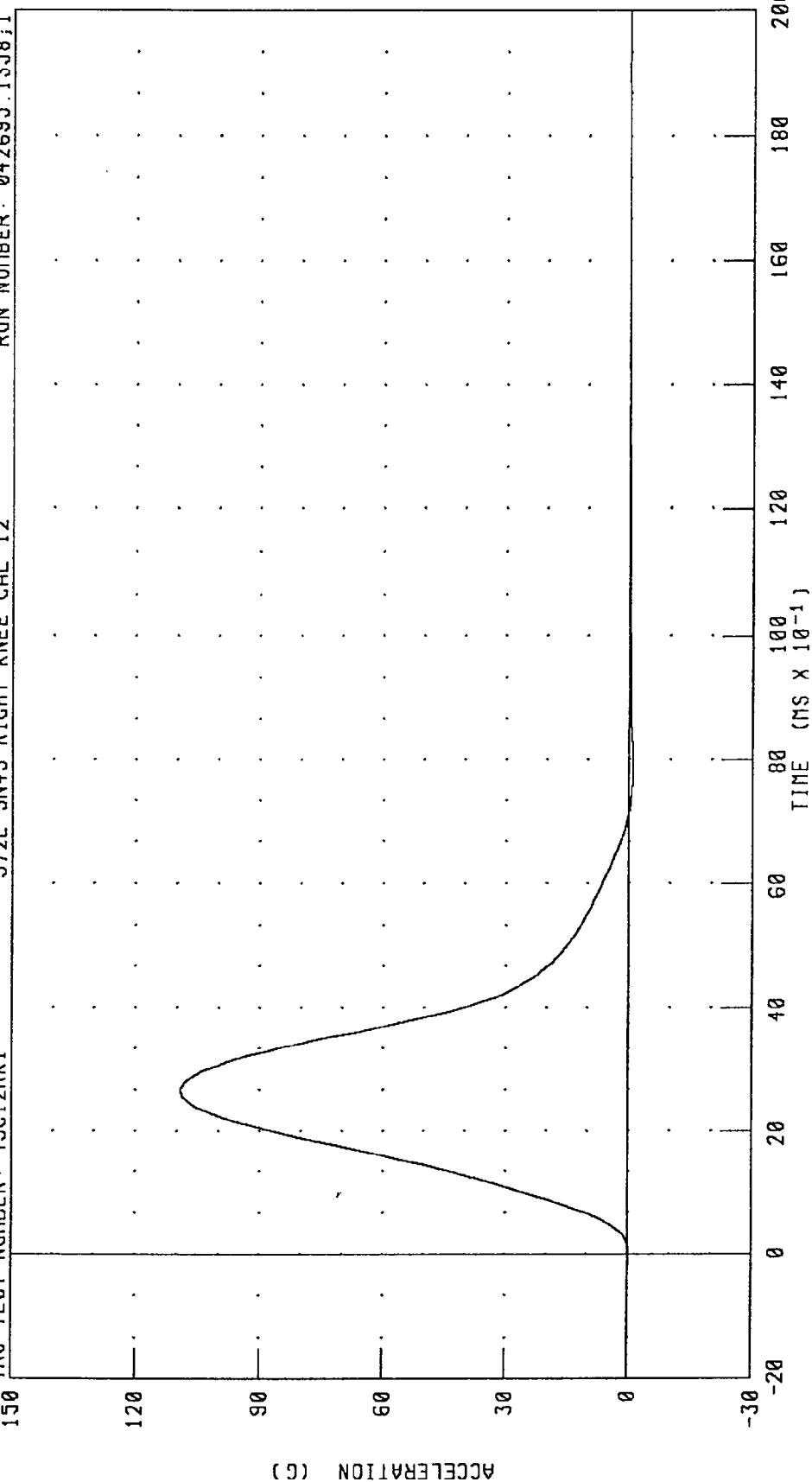
TECHNICIAN

Pete F. St.

RUN NUMBER: 042695.1358;1

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (11 LB PEND.)

TRC TEST NUMBER: 43C12RK1 572E SN43 RIGHT KNEE CAL 12 RUN NUMBER: 042695.1358;1

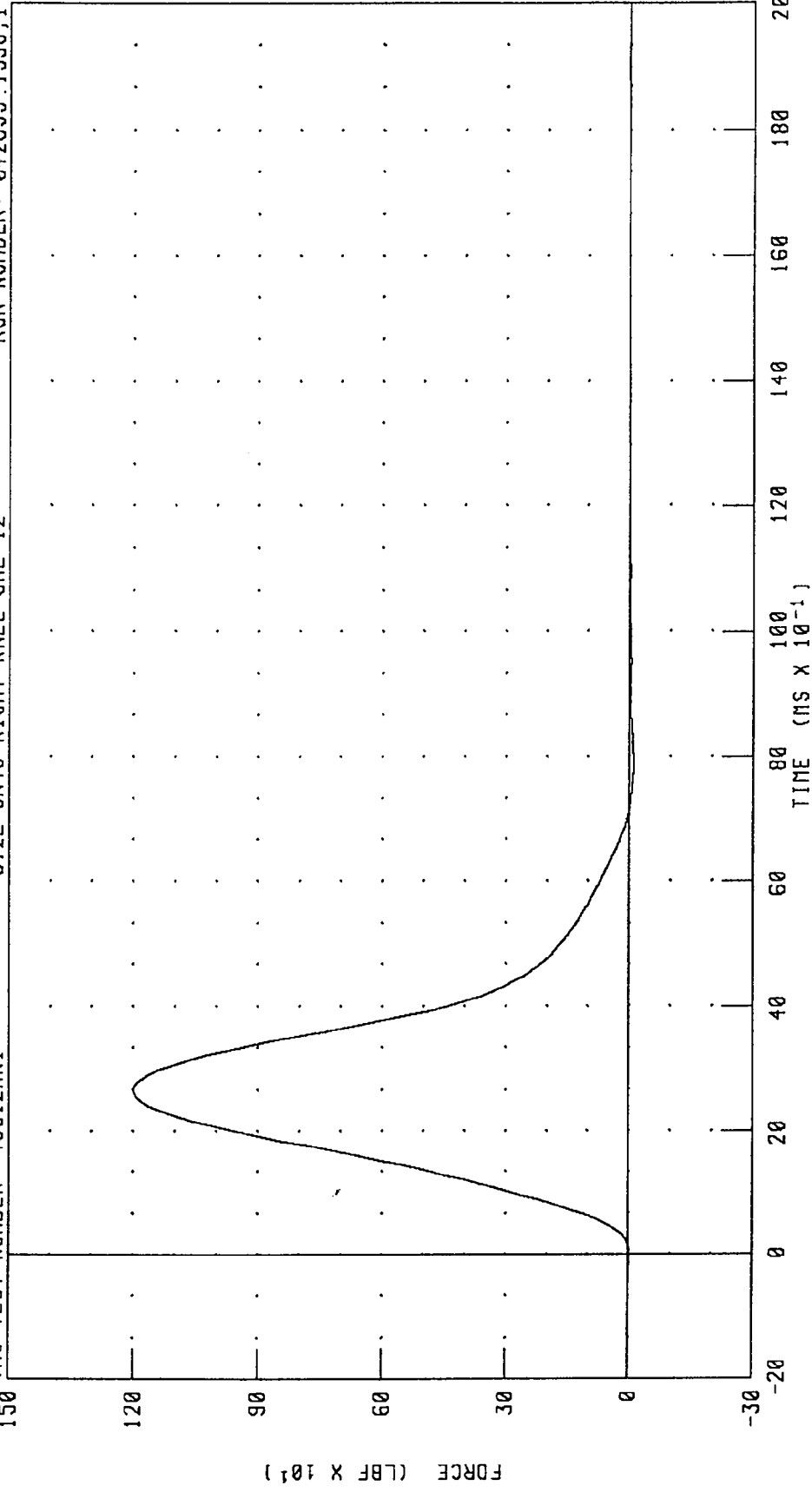


CHANNEL: PENXG FILTER: CH. CLASS 600

PEAK DATA: 109.04 G @ 2.64 MS; -1.03 G @ 7.92 MS

PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM FORCE (11 LB PEND.)

TRC TEST NUMBER: 43C12RK1 572E SN43 RIGHT KNEE CAL 12 RUN NUMBER: 042695.1358;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 1199.46 LBF @ 2.64 MS; -11.29 LBF @ 7.92 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

HYBRID III

26-APR-95

TRC INC.

TEST NO: 43C12LK1

572E SN43 LEFT KNEE CAL 12

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	66 - 78 DEG. F	70.0 DEG. F
RELATIVE HUMIDITY	10 - 70 %	42.0 %
PROBE VELOCITY	6.8 - 7.0 FT/S	6.91 FT/S
PEAK KNEE IMPACT FORCE 11.0 LB PENDULUM	1060 - 1300 LB	1267.71 LB

TEST MEETS SPECIFICATIONS

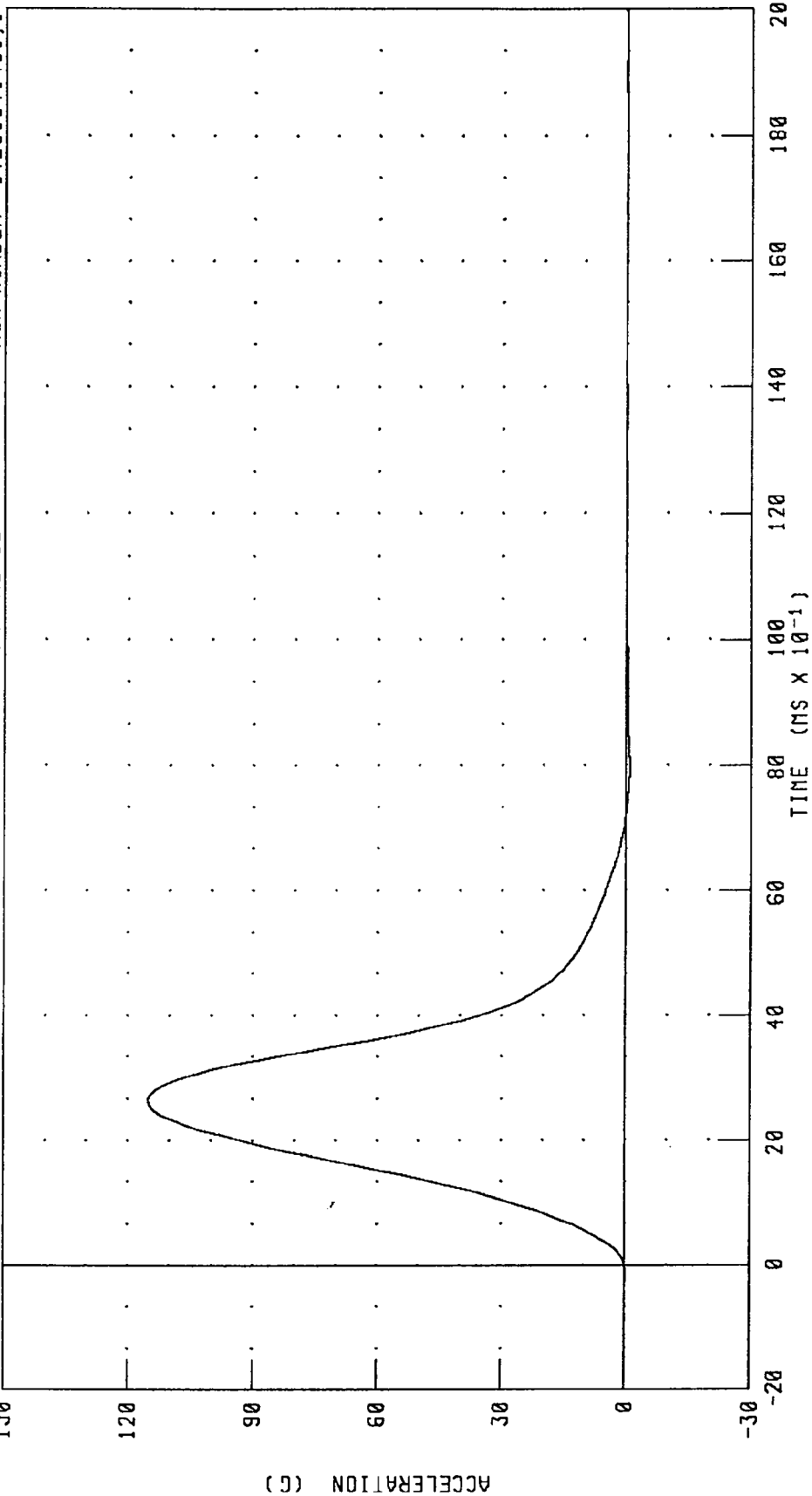
TECHNICIAN

Pete F. SA

RUN NUMBER: 042695.1404;1

PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (11 LB PEND.)

TRC TEST NUMBER: 43C12LK1 572E SN43 LEFT KNEE CAL 12 RUN NUMBER: 042695.1405;1

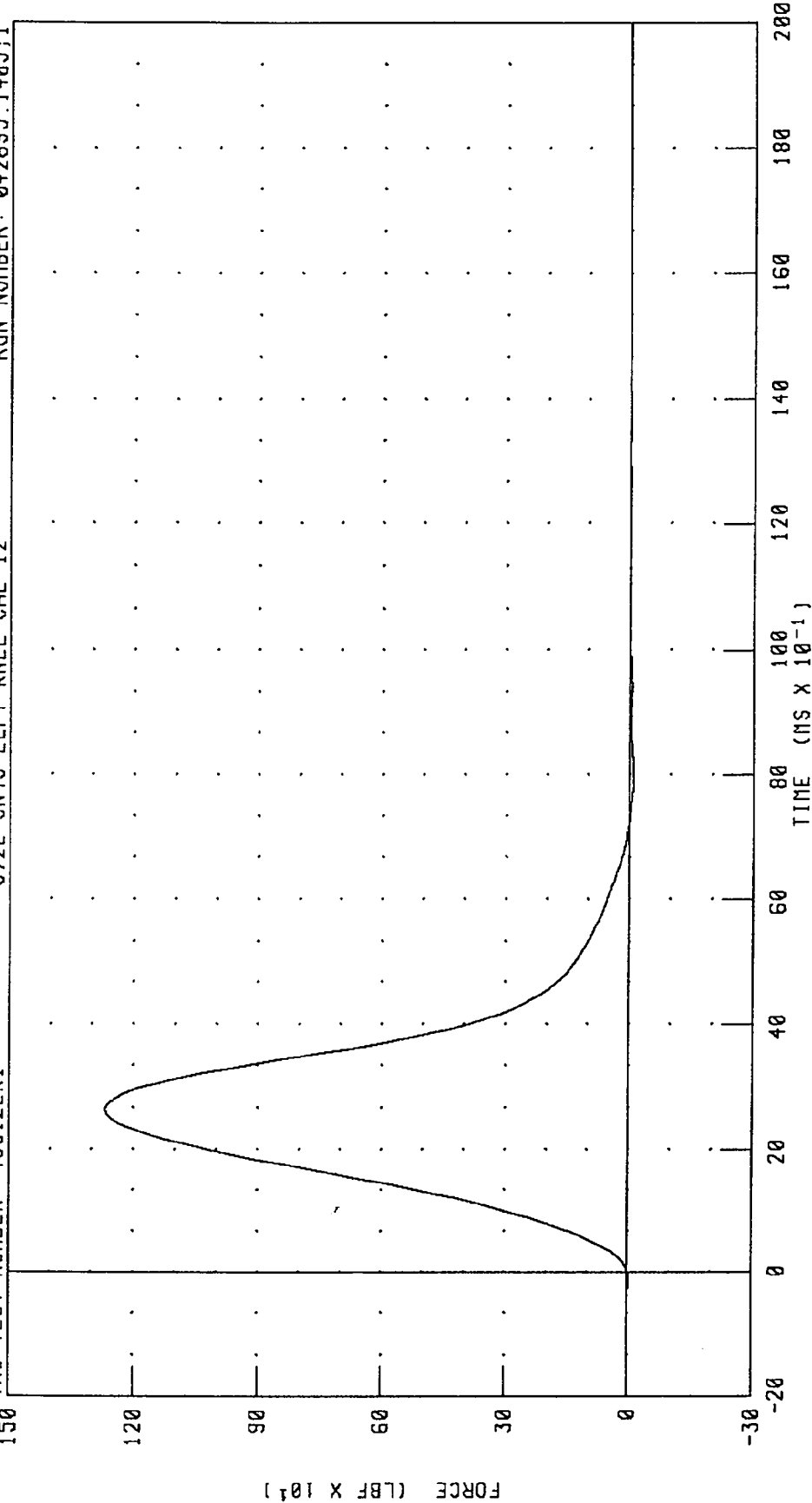


CHANNEL: PENXC FILTER: CH. CLASS 600

PEAK DATA: 115.25 G @ 2.64 MS; -0.87 G @ 7.92 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION
 PENDULUM FORCE (11 LB PEND.)

TRC TEST NUMBER: 43C12LK1 572E SN43 LEFT KNEE CAL 12 RUN NUMBER: 042695.1405;1



CHANNEL: PENXF FILTER: CH. CLASS 600

PEAK DATA: 1267.72 LBF @ 2.64 MS; -9.62 LBF @ 7.92 MS

Appendix D

Miscellaneous Test Information

Test No.: T56001

IPMD Vehicle Data Sheet

Filled out by: Steve Marsh

Date: April 14, 1995

Vehicle Data

Vehicle make and model (in full): Nissan hardbody pickup truck

VRTC ID code (7 characters): TS6001

Model year (2 characters): 89

Mfg. date: 10/88

Vehicle make code (2 characters): 15

See attached list. 99 = other (specify): _____

Vehicle model code (2 characters): 29

See posted list. 99 = other (specify): _____

Body Style (2 characters): PU

See attached list. OT = other (specify): _____

VIN (17 characters): 1N6ND11S0KC308784

Odometer reading (miles): 110,604

Thousands of miles: 110

Note - Adjust tires to vehicle manufacturer's specs (see door pillar decal or ref. book) and make any necessary fuel level and loading configuration adjustments before taking any measurements.

Fuel level: Near empty

Loading configuration: 50 percentile male driver

Overall length (in): 175.0 (in) x 25.4 = 4445 mm

Wheelbase (in): 104.4 (in) x 25.4 = 2652 mm

Roof height (in): 59.8 (in) x 25.4 = 1519 mm

Front track width (in): 59.8 (in) x 25.4 = 1519 mm
(Average front & rear surfaces of tire)

Rear track width: 58.6 (in) x 25.4 = 1488 mm

Roof Height: 60.5 (in) x 25.4 = 1537 mm

Note: A copy of this data sheet to be submitted, fully completed, along with Winslow scales printout and other relevant data, to keeper of the IPMD data base at VRTC.

Tire loadings as measured at specified load configuration*:

Test No.: TS6001

Device used for weight measurement: Windslow scales at Bldg. 60

LF weight (lbs):	840	(lbs)	x	4.45	=	3738	N
RF weight (lbs):	800	(lbs)	x	4.45	=	3560	N
LR weight (lbs):	799	(lbs)	x	4.45	=	3556	N
RR weight (lbs):	817	(lbs)	x	4.45	=	3637	N
Vehicle Test Weight (lbs):	3255	(lbs)	x	4.45	=	14485	N

Lateral and longitudinal center-of-gravity location (computed):

From front axle (in): 51.831 (in) x 25.4 = 1317 mm

From center line (in): -0.188 (in) x 25.4 = -5 mm

Interramp distance (in): 48.7

Ultrasonic offset (in): 7.1

Weights Used - C.G. Empty Platform				Weights Used - C.G. Vehicle			
1) 0	5) 38	2) 15	6) 38124	1) 0	5) 812	2) 69	6) 812713
3) 1929	7) 0	4) 0		3) 69511	7) 0	4) 0	

From vehicle door sticker:

G.V.W.R. (lbs): 4400 / (kg): (lbs) x 4.45 = 19580 N

Front G.A.W.R. (lbs): 2200 / (kg): (lbs) x 4.45 = 9790 N

Rear G.A.W.R. (lbs): 2544 / (kg): (lbs) x 4.45 = 11321 N

Engine Displacement (cu in): 145.8 (cu in) x 0.0164 = 2.4 L

L3 F4 V6

Engine Type (2 characters): L4

L4 F6 V8

OT = other (specify):

L5 V4

L6 RT (Rotary)

		Option	Yes	No
Engine Location (1 character): F	[F = Front M = Mid R = Rear]	P.B.	[✓]	[]
Engine Orientation (1 character): L	[L = Longitudinal T = Transverse]	P.S.	[]	[✓]
Transmission Type: (1 character): M	[M = Manual A = Automatic]	A.C	[]	[✓]
Drive Axle (1 character): R	[F = Front R = Rear 4 = Four Wheel Drive]	HD Susp.	[]	[]

Vehicle or test comments (30 characters): This vehicle was equipped with after-market tires and rims as specified on the following two pages. Factory specifications called for P195/75R14 tires.

*Values are measured at vehicle curb weight (full fuel tank, no occupants) unless otherwise specified on p.1.

Front Suspension

Suspension number (4 characters): F

Front/rear flag (1 character): F

Axle type (1 character): I

I = Independent S = Solid

Suspension type (1 character): A

OT = Other: _____

A	=	Unequal A-arm	S	=	Strut
L	=	Leaf	T	=	Semi-Trailing Arm
M	=	Multiple Link	W	=	Twist
Q	=	Torque Arm	4	=	4-Link

3	=	3-Link
I	=	Twin I=Beam

Spring type (2 characters): TB

OT = Other: _____

CO	=	Coil	TB	=	Torsion Bar
LL	=	Longitudinal Leaf	TL	=	Transverse Leaf

Brake type (2 characters): DI

OT = Other: _____

DI	=	Disk	LT	=	Leading-Trailer Shoe
DS	=	Duo-Servo Shoe			

Suspension modified (1 character): N

Suspension modification (1 character): (1) _____ (2) _____

OT = other (specify): _____

R	=	Raised	L	=	Lowered
S	=	Stiffened	W	=	Widened

Tire manufacturer (10 characters): BF Goodrich

Tire size code (10 characters): P195/60R14

Tire construction (2 characters): SB

OT = other (specify): _____

BB	=	Bias Belted	GP	=	Glass Belted Radial
BP	=	Bias Ply	SB	=	Steel Belted Radial

Tire Rim width (in): 7.0 (in) x 25.4 = 178 mm

Axle Height (in): 10.6 (in) x 25.4 = 269 mm

Tire Pressure (in): 32.0 (psi) x 6.897 = 221 kpa

Test No.: TS6001

Rear Suspension

Suspension number (4 characters): R

Front/rear flag (1 character): R

Axle type (1 character): S

I = Independent S = Solid

Suspension type (1 character): L

OT = Other: _____

A = Unequal A-arm
L = Leaf
M = Multiple Link
Q = Torque Arm

S = Strut
T = Semi-Trailing Arm
W = Twist
4 = 4-Link

3 = 3-Link
1 = Twin I=Beam

Spring type (2 characters): LL

OT = Other: _____

CO = Coil
LL = Longitudinal Leaf

TB = Torsion Bar
TL = Transverse Leaf

Brake type (2 characters): LT

OT = Other: _____

DI = Disk
DS = Duo-Servo Shoe

LT = Leading-Trailer Shoe

Suspension modified (1 character): NO

Suspension modification (1 character): (1) _____ (2) _____

OT = other (specify): _____

R = Raised
S = Stiffened

L = Lowered
W = Widened

Tire Manufacturer (10 characters): BF Goodrich

Tire Size Code (10 characters): P195/60R14

Tire Construction (2 characters): SB

OT = other (specify): _____

BB = Bias Belted
BP = Bias Ply

GP = Glass Belted Radial
SB = Steel Belted Radial

Tire Rim width (in): 7.0 (in) x 25.4 = 178 mm

Axle Height (in): 10.6 (in) x 25.4 = 269 mm

Tire Pressure (in): 32.0 (psi) x 6.897 = 221 kpa

Test No.: T56001

VEHICLE MAKE CODES:

American Motors	= 11	Delorean	= 38	Lectric	= 59	Pontiac	= 03
Audi	= 12	Dodge	= 07	Lincoln	= 13	Renault	= 17
Batronics	= 53	Eva	= 58	Mazda	= 18	Saab	= 30
BMW	= 27	Fiat	= 19	Mercedes	= 28	Subaru	= 26
Buick	= 04	Ford	= 02	Mercury	= 09	Suzuki	= 33
Cadillac	= 10	GMC	= 40	MG	= 25	Toyota	= 16
Champion	= 35	Honda	= 23	Mitsubishi	= 62	Triumph	= 31
Checker	= 36	Hyundai	= 34	NHTSA	= 32	UM	= 56
Chevrolet	= 01	IH	= 41	Nissan	= 15	Volkswagen	= 08
Chinook	= 37	Isuzu	= 42	Odyssey	= 48	Volvo	= 20
Chrysler	= 21	Jeep	= 44	Oldsmobile	= 06	Winnebago	= 60
Comuta	= 29	Jet	= 54	Peugeot	= 14	Yugo	= 24
Daihatsu	= 39	Lectra	= 22	Plymouth	= 05		
Datsun	= 15						

Other = 99 (and specify in appropriate blank on p. 1.)

VEHICLE MODEL CODES:

See the NHTSA Data Codes List (excerpts) posted at the IPMD or refer to the 1988 (or latest)

NHTSA Data Tape Reference Guide - Vol. III: Component Data Base.

BODY STYLE CODES:

2-Door Coupe	= 2C	4-door Sedan	= 4S	Pickup Truck	= PU	Bus	= BU
2-Door Sedan	= 2S	5-Door Hatchback	= 5H	Truck	= TR	Multipurpose Veh.	= MP
3-Door Hatchback	= 3H	Station Wagon	= SW	Van	= VN	Utility Veh.	= UT

Other = OH (and specify in appropriate blank on p. 1.)

VRTC Weigh Program V1.35

Date: 02-23-1995 Time: 02:3-:24

T56001 Nissan pickup C308784

Testing Org./Proj.# :

Vehicle Number:

Vehicle Year: 0

Vehicle Make:

Vehicle Model:

Body Style:

Wheelbase (in.): 0

Vehicle was oriented with passenger's door facing wall.

Comments:

	LF (lb)	RF (lb)	LR (lb)	RR (lb)	FRONT (lb)	REAR (lb)	TOTAL (lb)	R/f (%)
Current Weight:	840	800	799	818	1639	1617	3256	49.7
Stored Weight:	840	800	799	817	1639	1616	3255	49.6
Autobal. Vals:	2	3	2	2				

I P M D M E A S U R E D D A T A Version 3.00

Vehicle # and Run # 56001 Date: 04/14/1995 Time: 12:16
 Vehicle Type: 1989 Nissan Hardbody Pickup Fuel: Empty
 Load: 50% Male Driver and Misc. Instruments
 Weight (lb): 3255 Wheelbase (in): 104.4 Roof Hgt (in): 59.80
 Ramp Distance (in): 48.70 UltraSonic Offset (in): 7.10
 Vehicle Lateral CG (in): -0.20 Front axle to CG (in): 51.80

IPMD Calibration Check (no Vehicle)

Applied Weight (lbs.)	Schaevitz Output (Deg.)	System C.G. Pivot
0	-0.06	0.00
60	-4.28	33.61
134	-8.51	33.69
0	-0.07	0.00
61	4.16	33.95
133	8.37	33.94
0	-0.06	0.00

Average System C.G. Pivot (in): 33.80

C.G. Height:

Applied Weight (lbs.)	Schaevitz Output (Deg)	Resultant Longitudinal Movement (In.)	Individual C.G. Calc
0	-0.11	0.000	0.00
86	-4.71	0.053	22.22
166	-8.42	0.118	22.14
0	-0.15	0.018	0.00
81	4.30	-0.047	22.15
161	8.04	-0.112	22.13
0	-0.05	-0.012	0.00

Average calculated C.G. Height (in): 22.16

Page #2

Vehicle # and Run # 56001 Date: 04/14/1995 Time: 12:16
Vehicle Type: 1989 Nissan Hardbody Pickup Fuel: Empty
Load: 50% Male Driver and Misc. Instruments
Weight (lb): 3255 Wheelbase (in): 104.4 Roof Hgt (in): 59.80
Ramp Distance (in): 48.70 UltraSonic Offset (in): 7.10
Vehicle Lateral CG (in): -0.20 Front axle to CG (in): 51.80

Pitch Inertia:

Run #	Period (sec)	Platform Ampl (Deg)	Relative Ampl (In)	Individual Pitch Calc
1	3.639	3.94	0.036	1845.6
2	3.640	3.98	0.035	1849.0
3	3.641	3.93	0.037	1846.6

Average Pitch Inertia (ft. lb. sec²): 1847.0

Roll Inertia:

Run #	Period (sec)	Platform Ampl (Deg)	Relative Ampl (In)	Individual Roll Calc
1	2.388	3.37	0.027	318.9
2	2.390	3.43	0.025	322.0
3	2.389	3.38	0.023	321.5

Average Roll Inertia (ft. lb. sec²): 320.8

Yaw Inertia:

Run #	Period (sec)	Platform Ampl (Deg)	Relative Ampl (Deg)	Individual Yaw Calc
1	2.425	5.29	0.04	1899.1
2	2.429	5.74	0.04	1907.7
3	2.427	5.30	0.04	1903.0

Average Yaw Inertia (ft. lb. sec²): 1903.3

Test No.: T56002

IPMD Vehicle Data Sheet

Filled out by: Steve Marsh

Date: April 24, 1995

Vehicle Data

Vehicle make and model (in full): Nissan hardbody pickup truck

VRTC ID code (7 characters): TS6002

Model year (2 characters): 89

Mfg. date: 10/88

Vehicle make code (2 characters): 15

See attached list. 99 = other (specify): _____

Vehicle model code (2 characters): 29

See posted list. 99 = other (specify): _____

Body Style (2 characters): PU

See attached list. OT = other (specify): _____

VIN (17 characters): 1N6ND11S0KC308784

Odometer reading (miles): 110,604

Thousands of miles: 110

Note - Adjust tires to vehicle manufacturer's specs (see door pillar decal or ref. book) and make any necessary fuel level and loading configuration adjustments before taking any measurements.

Fuel level: Near empty

Loading configuration: 50 percentile male driver

Overall length (in): 175.0 (in) x 25.4 = 4445 mm

Wheelbase (in): 104.3 (in) x 25.4 = 2649 mm

Roof height (in): 54.5 (in) x 25.4 = 1384 mm

Front track width (in): 58.5 (in) x 25.4 = 1486 mm
(Average front & rear surfaces of tire)

Rear track width: 58.0 (in) x 25.4 = 1473 mm

Roof Height: 60.5 (in) x 25.4 = 1537 mm

Note: A copy of this data sheet to be submitted, fully completed, along with Winslow scales printout and other relevant data, to keeper of the IPMD data base at VRTC.

Tire loadings as measured at specified load configuration*:

Test No.: TS6002

Device used for weight measurement: Windslow scales at Bldg. 60

LF weight (lbs):	777	(lbs)	x	4.45	=	3458	N
RF weight (lbs):	829	(lbs)	x	4.45	=	3689	N
LR weight (lbs):	676	(lbs)	x	4.45	=	3008	N
RR weight (lbs):	932	(lbs)	x	4.45	=	4147	N
Vehicle Test Weight (lbs):	3214	(lbs)	x	4.45	=	14302	N

Lateral and longitudinal center-of-gravity location (computed):

From front axle (in):	52.182	(in)	x	25.4	=	1325	mm
From center line (in):	2.791	(in)	x	25.4	=	71	mm
C.G. height (in):	19.95						

Interramp distance (in): 48.7

Ultrasonic offset (in): 5.2

Weights Used - C.G. Empty Platform				Weights Used - C.G. Vehicle			
1) 0	5) 47	---		1) 0	5) 1213	---	
2) 26	6) 4738	---		2) 1011	6) 1213148		
3) 2615	7) 0	---		3) 101195	7) 0		
4) 0				4) 0			

From vehicle door sticker:

G.V.W.R. (lbs):	4400	/ (kg):	_____	(lbs)	x	4.45	=	19580	N
Front G.A.W.R. (lbs):	2200	/ (kg):	_____	(lbs)	x	4.45	=	9790	N
Rear G.A.W.R. (lbs):	2544	/ (kg):	_____	(lbs)	x	4.45	=	11321	N
Engine Displacement (cu in):	145.8	(cu in)	x	0.0164	=	2.4	L		

L3 F4 V6

Engine Type (2 characters): L4

L4 F6 V8

OT = other (specify): _____

L5 V4

L6 RT (Rotary)

	Option	Yes	No
Engine Location (1 character): F [F = Front M = Mid R = Rear]	P.B.	[☒]	[☐]
Engine Orientation (1 character): L [L = Longitudinal T = Transverse]	P.S.	[☐]	[☒]
Transmission Type: (1 character): M [M = Manual A = Automatic]	A.C	[☐]	[☒]
Drive Axle (1 character): R [F = Front R = Rear 4 = Four Wheel Drive]	HD Susp.	[☐]	[☐]

Vehicle or test comments (30 characters): This vehicle was equipped with after-market tires and rims. Both right tires were flattened and the rims were damaged in the rollover test that preceeded these measurements.

*Values are measured at vehicle curb weight (full fuel tank, no occupants) unless otherwise specified on p.1.

I P M D M E A S U R E D D A T A Version 3.00

Vehicle # and Run # 56002 Date: 04/25/1995 Time: 09:45
 Vehicle Type: 1989 Nissan Hardbody Pickup Fuel: Empty
 Load: 50% Male Driver and Misc. Instruments
 Weight (lb): 3214 Wheelbase (in): 104.3 Roof Hgt (in): 54.50
 Ramp Distance (in): 48.70 UltraSonic Offset (in): 5.20
 Vehicle Lateral CG (in): 2.80 Front axle to CG (in): 52.20

IPMD Calibration Check (no Vehicle)

Applied Weight (lbs.)	Schaevitz Output (Deg.)	System C.G. Pivot
0	-0.07	0.00
62	-4.37	33.72
122	-7.86	33.72
0	-0.07	0.00
59	4.07	33.90
119	7.60	33.89
0	-0.07	0.00

Average System C.G. Pivot (in): 33.81

C.G. Height:

Applied Weight (lbs.)	Schaevitz Output (Deg)	Resultant Longitudinal Movement (In.)	Individual C.G. Calc
0	0.03	0.000	0.00
91	-4.60	0.090	20.09
174	-8.23	0.160	20.03
0	-0.07	0.049	0.00
93	4.70	-0.059	19.87
175	8.27	-0.118	19.83
0	0.02	0.001	0.00

Average calculated C.G. Height (in): 19.95

Page #2

Vehicle # and Run # 56002 Date: 04/25/1995 Time: 09:45
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Load: 50% Male Driver and Misc. Instruments
Weight (lb): 3214 Wheelbase (in): 104.3 Roof Hgt (in): 54.50
Ramp Distance (in): 48.70 UltraSonic Offset (in): 5.20
Vehicle Lateral CG (in): 2.80 Front axle to CG (in): 52.20

Pitch Inertia:

Run #	Period (sec)	Platform Ampl (Deg)	Relative Ampl (In)	Individual Pitch Calc
1	3.533	3.70	0.033	1836.9
2	3.535	3.75	0.030	1844.7
3	3.533	3.70	0.031	1840.4

Average Pitch Inertia (ft. lb. sec²): 1840.7

Roll Inertia:

Run #	Period (sec)	Platform Ampl (Deg)	Relative Ampl (In)	Individual Roll Calc
1	2.318	3.79	0.020	305.3
2	2.319	3.89	0.022	306.5
3	2.319	3.82	0.021	305.6

Average Roll Inertia (ft. lb. sec²): 305.8

Yaw Inertia:

Run #	Period (sec)	Platform Ampl (Deg)	Relative Ampl (Deg)	Individual Yaw Calc
1	2.429	6.43	0.04	1909.6
2	2.427	6.27	0.04	1906.2
3	2.424	6.00	0.04	1901.3

Average Yaw Inertia (ft. lb. sec²): 1905.7

Dummy Instrumentation Placement

Dummy Manufacturer/Serial Number: Humanetics/043

Seating Position: Driver

Location	Axis	Mfr	Model	S/N	Orientation (+ Sensing)
Head Acceleration	X	Endevco	7264	DG70J	Front
Head Acceleration	Y	Endevco	7264	DC68J	Left
Head Acceleration	Z	Endevco	7264	DG05J	Up
Head 1 Acceleration	X	Endevco	7264	DP98J	Front
Head 1 Acceleration	Z	Endevco	7264	DE69J	Up
Head 2 Acceleration	Y	Endevco	7264	BE50J	Left
Head 2 Acceleration	Z	Endevco	7264	DG06J	Up
Head 3 Acceleration	X	Endevco	7264	EJ62J	Front
Head 3 Acceleration	Y	Endevco	7264	EH85J	Left
Head Angular Velocity	X	ATA	ARS-01	193	Rear
Head Angular Velocity	Y	ATA	ARS-01	194	Right
Head Angular Velocity	Z	ATA	ARS-01	195	Up
Neck Force	X	Denton	1716	0452	*
Neck Force	Y	Denton	1716	0452	*
Neck Force	Z	Denton	1716	0452	*
Neck Moment	X	Denton	1716	0452	*
Neck Moment	Y	Denton	1716	0452	*
Neck Moment	Z	Denton	1716	0452	*
Chest Acceleration	X	Endevco	7264	DC72J	Front
Chest Acceleration	Y	Endevco	7264	BC26J	Left
Chest Acceleration	Z	Endevco	7264	DG50J	Up
Chest Angular Velocity	X	ATA	ARS-01	177	Front
Chest Angular Velocity	Y	ATA	ARS-01	179	Left
Chest Angular Velocity	Z	ATA	ARS-01	161	Down
Chest Deflection	X	Vernitech	81422-A	043	Outward
Pelvis Acceleration	X	Endevco	7264	BF42J	Rear
Pelvis Acceleration	Y	Endevco	7264	FJ66J	Left
Pelvis Acceleration	Z	Endevco	7264	DG56J	Up

*See Sign Convention sheet for positive sensing orientation of neck load channels.

Vehicle Instrumentation Placement

Location	Axis	Mfr	Model	S/N	Orientation (+ Sensing)
Center of Gravity Accelerometer	X	Endevco	7264	AGRM8	Front
Center of Gravity Accelerometer	Y	Endevco	7264	AGRK0	Right
Center of Gravity Accelerometer	Z	Endevco	7264	FH09J	Up
Center of Gravity Roll	X	Humphrey	RG28-0128-1	H-21	Left
Center of Gravity Pitch	Y	Humphrey	RG28-0128-1	H-19	Down
Center of Gravity Yaw	Z	Humphrey	RG28-0128-1	H-14	Right
Center of Gravity Angular Velocity	X	ATA	ARS-09	137	Front
Center of Gravity Angular Velocity	Y	ATA	ARS-09	138	Right
Center of Gravity Angular Velocity	Z	ATA	ARS-09	136	Up
Left B-Pillar	X	Endevco	7264	DW34JC	Front
	Y	Endevco	7264	AJ781	Right
	Z	Endevco	7264	DR49J7	Up
Right B-Pillar	X	Endevco	7264	AMRN9	Front
	Y	Endevco	7264	AMTA4	Left
	Z	Endevco	7264	AGRG6	Up
Left Front Door Latch	X	Endevco	7264	CR81H	Rear
	Y	Endevco	7264	CY78H	Right
	Z	Endevco	7264	AC8P6	Up
Right Front Door Latch	X	Endevco	7264	DW19J	Front
	Y	Endevco	7264	DR10JT	Left
	Z	Endevco	7264	CP56H	Down
Driver's Shoulder Belt Displacement		Celesco	PT-101-0040 111-5110	A128	Outward
Driver's Shoulder Belt Force		Lebow	3419	612	Tension
Driver's Lap Belt Outboard Force		Lebow	3419	127	Tension
Left Front Suspension Displacement		Celesco	PT-101-50A	0586135	Outward
Right Front Suspension Displacement		Celesco	PT-101-40A	A12889	Outward
Left Rear Suspension Displacement		Celesco	PT-101-40A	A02465	Outward
Right Rear Suspension Displacement		Celesco	PT-101-40A	52	Outward

Roll Cart Instrumentation Placement

Location	Axis	Mfr	Model	S/N	Orientation (+ Sensing)
Center of Gravity	X	Endevco	7264	CG13H	Rear
Center of Gravity	Y	Endevco	7264	CF08H	Left
Center of Gravity	Z	Endevco	7264	FJ03J	Up
Left Cylinder Displacement		Celesco	PT-101-60A	A23305	Outward
Right Cylinder Displacement		Celesco	PT-101-60A	A23306	Outward
Vehicle/Roll Cart Separation Upper Switch	NA	NA	NA	NA	NA
Vehicle/Roll Cart Separation Lower Switch	NA	NA	NA	NA	NA

Sign Convention

Accelerometers:

+X: Forward
+Y: Leftward
+Z: Upward

Potentiometers:

+Chest Displacement: Outward
+Seat Belt Displacement: Outward
+Seat Belt Extension: Elongation
+Vehicle Displacement: Outward

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: Head Rotating Forward
+Z Moment: Chin Rotating to Left Shoulder

Gyroscopes:

+X Roll: To Right
+Y Pitch: Front Down
+Z Yaw: Counterclockwise