U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

DOT HS 808 312

December 1993

Final Report

Final Report of a 1993 Sebring Zev into Flat Frontal Barrier

Transportation Research Center Inc. does not endorse or certify products of manufacturers. The manufacturer's name appears solely to identify the test article. Transportation Research Center Inc. assumes no liability for the report or use thereof. It is responsible for the facts and the accuracy of the data presented herein. This report does not constitute a standard, specification, or regulation.

This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 808 312		VRTC-83-0285

4. Title and Subtitle	5. Report Date
Final report of a 1993 Sebring Zev into flat frontal barrier	December 1993
	6. Performing Organization Code: TRC

7. Author(s)	8. Performing Organization Report No.
Craig A. Markusic, Senior Project Engineer, TRC	931129

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
National Highway Traffic Safety Administration Vehicle Research and Test Center P. O. Box 37, East Liberty, OH 43319	11. Contract or Grant No.: DTNH22-88-C-07292

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh St. Washington, DC 20590	Final Report Nov. - Dec. 1993
	14. Sponsoring Agency Code: DOT/NHTSA/VRTC

15. Supplemental Notes

16. Abstract

A 48.3 kph flat frontal barrier impact test was conducted on a 1993 Sebring Zev at Transportation Research Center Inc. on November 29, 1993. This test was conducted to gather data concerning the application of the following Federal Motor Vehicle Safety Standards to electric vehicles: FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; and FMVSS 219 (partial), "Windshield Zone Intrusion."

The impact velocity was 47.2 kph. The vehicle's maximum static crush was 568 millimeters. The ambient temperature was 20° C.

The driver's Head Injury Criteria (HIC) was 364. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.1 g. The driver's chest maximum deflection was 39 millimeters (See Data Acquisition Explanations). The driver's left and right femur maximum axial forces were 3814 N and 6390 N, respectively.

The passenger's HIC was 796. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 36.0 g. The passenger's chest maximum deflection was 55 millimeters (See Data Acquisition Explanations). The passenger's left and right femur maximum axial forces were 2745 N and 2446 N, respectively.

17. Key Words	18. Distribution Statement
48.3 kph Frontal Impact Electric Vehicles FMVSS 208, "Occupant Crash Protection" FMVSS 212, "Windshield Mounting" FMVSS 219 (partial), "Windshield Zone Intrusion"	Document is available to the public from the National Technical Information Service Springfield, VA 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. Number of Pages	22. Price
Unclassified	Unclassified	174	

Form DOT F 1700.0 (8-72) Reproduction of completed page authorized

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF PHOTOGRAPHS, CONT'D.

SECTION 1.0

PURPOSE AND TEST PROCEDURE

PURPOSE

This 48.3 kph flat frontal barrier impact test was conducted for Vehicle Research and Test Center by Transportation Research Center Inc. (TRC). The purpose of this test was to gather data concerning the application of the following Federal Motor Vehicle Safety Standards to electric vehicles: FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Mounting"; FMVSS 219 (partial), "Windshield Zone Intrusion."

TEST PROCEDURE

This test was conducted using NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208-08 as a guideline. Data was obtained relative to FMVSS 208, "Occupant Crash Protection"; FMVSS 212, "Windshield Retention"; and FMVSS 219 (partial), "Windshield Zone Intrusion."

The test vehicle was instrumented with ten (10) accelerometers to measure longitudinal axis accelerations. The vehicle's specified impact velocity range was 46.5 to 48.1 kph. The vehicle impacted a flat frontal barrier.

The test vehicle contained two (2) Part 572E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedures specified in Appendix B and Optional Appendix C of the Laboratory Test Procedure.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations, and with left and right femur load cells to measure axial forces. Each Part 572E dummy's instrumentation also included a chest potentiometer to measure longitudinal deflection.

The twenty-eight (28) data channels were multiplexed and recorded on a 14-track tape drive. The data was digitally sampled at 12,500 samples per second and processed per Sections 12.8 and 12.9 of the Laboratory Test Procedure.

The crash event was recorded by one (1) real-time panning motion picture camera and fourteen (14) high-speed motion picture cameras operating at approximately 1000 frames per second. The pre- and post-test conditions were recorded by one (1) real-time motion picture camera.

The vehicle and occupant data are presented in Section 2.0. The FMVSS 208, 212, and 219 (partial) data are presented in Section 3.0. The vehicle, occupant, and camera measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the dummy certification data. Appendix D contains miscellaneous test information.

SECTION 2.0

FRONTAL BARRIER IMPACT TEST SUMMARY

TEST RESULTS SUMMARY

This flat frontal barrier test was conducted at TRC on November 29, 1993.

The test vehicle, a 1993 Sebring Zev, appeared to comply with the performance requirements of FMVSS 208, 212, and 219 (partial) in the flat frontal barrier impact mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's, and the axial forces transmitted through the upper legs did not exceed 10,008 N as measured by Part 572 E dummies seated in the front outboard designated seating positions. For each Part 572 E dummy, the chest deflection did not exceed 76.2 millimeters. The windshield periphery retention was 100 percent. There was no penetration into any portion of the windshield.

The vehicle's test weight was 1577 kg. The vehicle's impact speed was 47.2 kph. The vehicle sustained 568 millimeters of static crush during the impact.

The driver's HIC was 364. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.1 g(See DATA ACQUISITION EXPLANATIONS). The driver's chest maximum deflection was 39 mm(See DATA ACQUISITION EXPLANATIONS). The driver's left and right femur maximum axial forces were 3814 N and 6390 N, respectively.

The passenger's HIC was 796 (See DATA ACQUISITION EXPLANATIONS). The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 36.0 g (See DATA ACQUISITION EXPLANATIONS). The passenger's chest maximum deflection was 55 mm (See DATA ACQUISITION EXPLANATIONS). The passenger's left and right femur maximum axial forces were 2745 N and 2446 N, respectively.

DATA ACQUISITION EXPLANATIONS

All data channels recorded a questionable data pattern from approximately 280 to 300 milliseconds.

The following data channels did not return to zero following the impact event:

CSTXG1 - Driver's chest X-axis accelerometer
CSTYG1 - Driver's chest Y-axis accelerometer
CSTXD1 - Driver's chest X-axis deflection potentiometer
HEDZG2 - Passenger's head Z-axis accelerometer
CSTXG2 - Passenger's chest X-axis accelerometer
CSTYG2 - Passenger's chest Y-axis accelerometer
CSTZG2 - Passenger's chest Z-axis accelerometer
CSTXD2 - Passenger's chest X-axis deflection potentiometer
TLRXG1 - Left rear seat X-axis accelerometer
TRRXG1 - Right rear seat X-axis accelerometer
ENGXG1 - Motor top X-axis accelerometer
ENGXG2 - Motor bottom X-axis accelerometer
BCRXG1 - Brake caliper right X-axis accelerometer
BCLXG1 - Brake caliper left X-axis accelerometer
DPCXG1 - Dash panel center X-axis accelerometer
OTHXG1 - Left front battery box X-axis accelerometer
OTHXG2 - Right front battery box X-axis accelerometer

The data channels not returning to zero affected the driver's head and passenger's head and chest acceleration resultant calculations.

The driver's and passenger's 3-millisecond chest resultant maximum acceleration and passenger's 36 millisecond Head Injury Criteria (HIC) calculations were also affected.

The right front passenger's head Y-axis accelerometer, HEDYG2, lost data at 73 milliseconds and after as a result of the accelerometer's cable being pinched by the vehicle's crush upon impact. The head Y-axis acceleration data was not used for the resultant or 36-millisecond HIC calculations.

The motor top X-axis accelerometer, ENGXG1, lost data at 36 milliseconds and after as a result of the accelerometer's cable being cut by the vehicle's crush on impact

The left brake caliper X-axis accelerometer, BCLXG1, lost data from 102 to 141 milliseconds as a result of the accelerometer's cable being pinched by the vehicle's crush on impact.

The left front battery box X-axis accelerometer, OTHXG1, recorded questionable data from 37 milliseconds and after as a result of the accelerometer's cable being pinched by the vehicle's crush on impact.

TABLE 1 CRASH TEST SUMMARY

TEST TYPE: Flat frontal barrier impact

TEST DATE: 11/29/93 TEST TIME: 1302 AMBIENT TEMP.: 20° C

VEHICLE YEAR/MAKE/MODEL/BODY STYLE: 1993/Sebring/Zev/2-door coupe

VEHICLE TEST WEIGHT (KG): 1577

IMPACT ANGLE[1] (DEG): 0

IMPACT VELOCITY[2] (KPH): PRIMARY = 47.2 SECONDARY = 47.2

MAXIMUM STATIC CRUSH (MM): 568

AVERAGE REBOUND (MM): 563

DUMMIES:	Driver #177	Passenger #134
TYPE:	Part 572 E	Part 572 E
LOCATION:	Left front	Right front
RESTRAINT:	2-point passive belt	2-point passive belt

NUMBER OF DATA CHANNELS: 28

NUMBER OF CAMERAS: HIGH-SPEED 14 REAL-TIME 1

[1]With respect to tow track centerline.
[2]Speed trap measurement (± .08 kph accuracy)

TABLE 2 TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Mitsubishi Motor Corporation

VEHICLE ALTERED BY: Sebring Auto-Cycle

MAKE/MODEL: Sebring Zev VIN: JB3CA11A3PU010680

BODY STYLE: 2-door coupe MODEL YEAR: 1993

COLOR: Blue

ELECTRIC MOTOR DATA: 120 Volt DC

TRANSMISSION DATA: AUTOMATIC

DATE VEHICLE RECEIVED: 11/22/93 ODOMETER READING: 368

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	No	AUTOMATIC TRANSMISSION	YES
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	No
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	No
RADIO	No	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? No
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

CERTIFICATION DATA FROM VEHICLE'S LABEL:

VEHICLE MANUFACTURED BY: Mitsubishi Motor Corporation

DATE OF MANUFACTURE: 06/92 VIN: JB3CA11A3PU010680

GVWR: 1450 KG

GAWR: FRONT: 830 KG, REAR: 790 KG

TABLE 2 TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Yokohama, Radial 379, P145/80R13

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 240 kPa
REAR: 240 kPa

SPARE TIRE (MFR., SIZE): NA

TYPE OF SEATS: FRONT: Bucket
REAR: Bench

TYPE OF FRONT SEAT BACKS: Manually adjustable

MAXIMUM WIDTH: 1695 MM

WHEELBASE: 2442 MM

LOCATION OF LABEL STATING TIRE DATA:

The label was located on the driver's side B-pillar.

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL:

RECOMMENDED TIRE SIZE: P145/80R13

RECOMMENDED COLD TIRE PRESSURE: FRONT: 210 kPa; REAR: 210 kPa

DESIGNATED SEATING CAPACITY: 2 FRONT 3 REAR
5 TOTAL

VEHICLE CAPACITY WEIGHT: 375 KG

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN MILLIMETERS):

DELIVERED ATTITUDE: LF 641; RF 641; LR 586; RR 586

PRE-TEST ATTITUDE: LF 631; RF 623; LR 572; RR 565

POST-TEST ATTITUDE: LF 613; RF 615; LR 548; RR 549

TABLE 2 TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE AS RECEIVED (WITH MAXIMUM FLUIDS):

RIGHT FRONT	309 KG	RIGHT REAR	376 KG
LEFT FRONT	315 KG	LEFT REAR	371 KG
TOTAL FRONT WEIGHT	624 KG	(45.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	747 KG	(54.5% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	1371 KG		

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 54 KG OF CARGO WEIGHT:

RIGHT FRONT	342 KG	RIGHT REAR	443 KG
LEFT FRONT	348 KG	LEFT REAR	444 KG
TOTAL FRONT WEIGHT	690 KG	(43.8% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	887 KG	(56.2% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	1577 KG		

WEIGHT OF BALLAST SECURED IN VEHICLE: 0 KG

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 1374 MM REARWARD OF FRONT WHEEL CENTERLINE

TABLE 3 POST-IMPACT DATA

TEST NUMBER: 931129

TEST DATE: 11/29/93 TEST TIME: 1302

TEST TYPE: Flat frontal barrier impact IMPACT ANGLE: 0°

AMBIENT TEMPERATURE AT IMPACT AREA: 20° C

TEMPERATURE IN OCCUPANT COMPARTMENT: 20° C

IMPACT VELOCITY: PRIMARY = 47.2 KPH SECONDARY = 47.2 KPH

(SPECIFIED RANGE = 46.5 TO 48.1 KPH)

DISTANCE FROM VEHICLE TO BARRIER: ENTERING VELOCITY TRAP = 381 MM

EXITING VELOCITY TRAP = 51 MM

TEST VEHICLE STATIC CRUSH (ALL MEASUREMENTS ARE IN MILLIMETERS):

OVERALL LENGTH OF TEST VEHICLE: PRE-TEST: L 4132; C 4269; R 4126

POST-TEST: L 3621; C 3701; R 3619

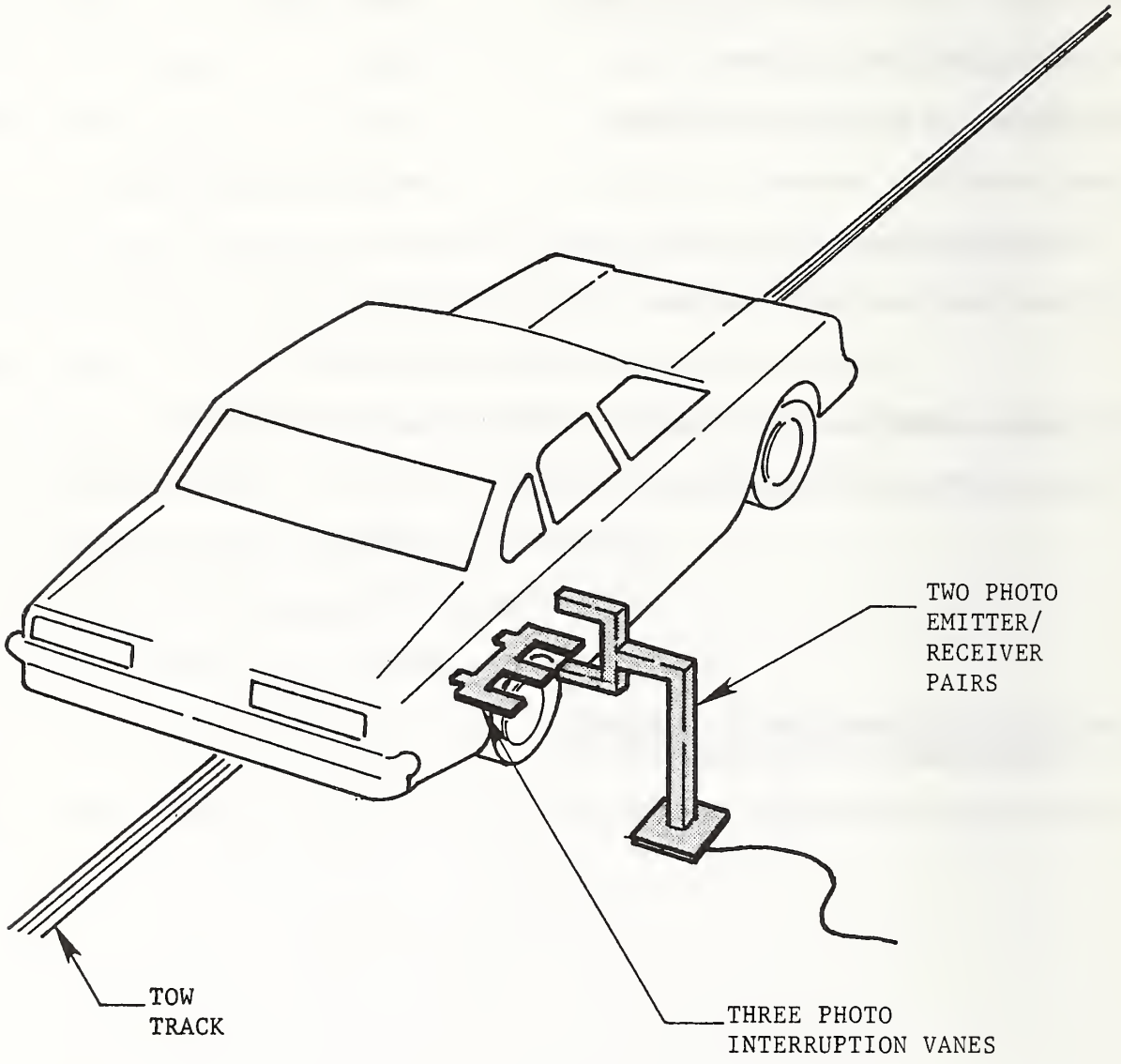
TOTAL CRUSH: L 511; C 568; R 507

AVERAGE CRUSH: 529

TEST VEHICLE REBOUND FROM FLAT BARRIER
(ALL MEASUREMENTS ARE IN MILLIMETERS):

DISTANCE FROM TEST VEHICLE TO BARRIER: L 590; C 520; R 580; AVG. 563

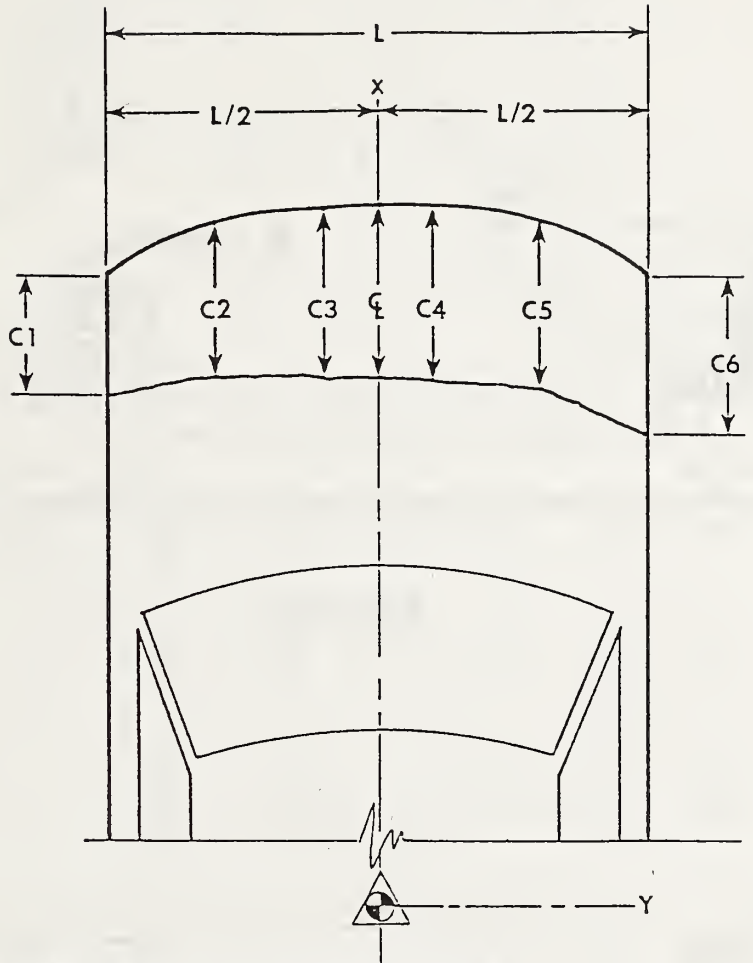
FIGURE 1 IMPACT VELOCITY MEASUREMENT SYSTEM



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

The vanes have 305-millimeter spacing.

FIGURE 2 VEHICLE CRUSH

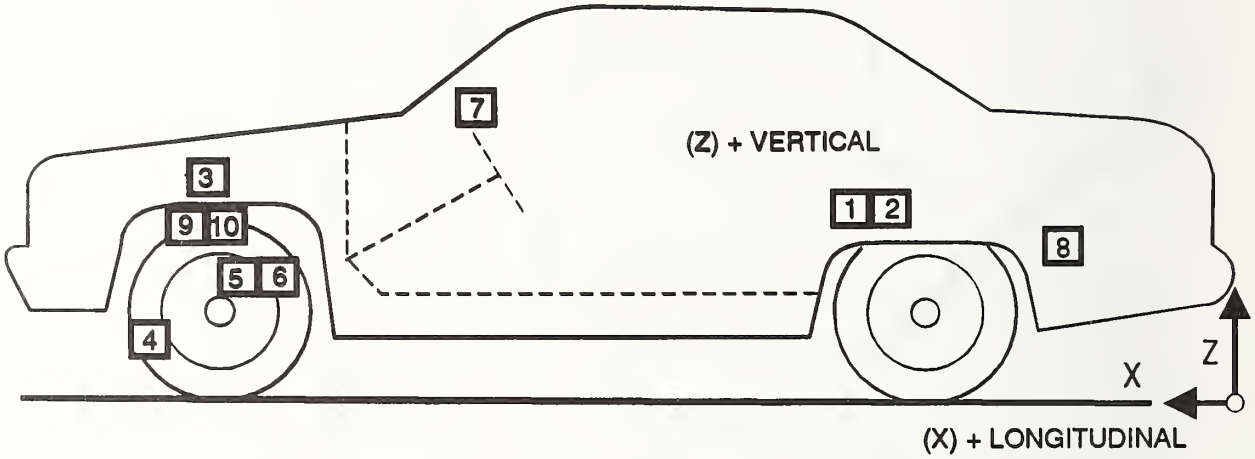


NOTES: L is pre-test length of contact surface.
C1 through C6 are spaced equally apart.
CL is vehicle centerline.
All measurements are in millimeters.

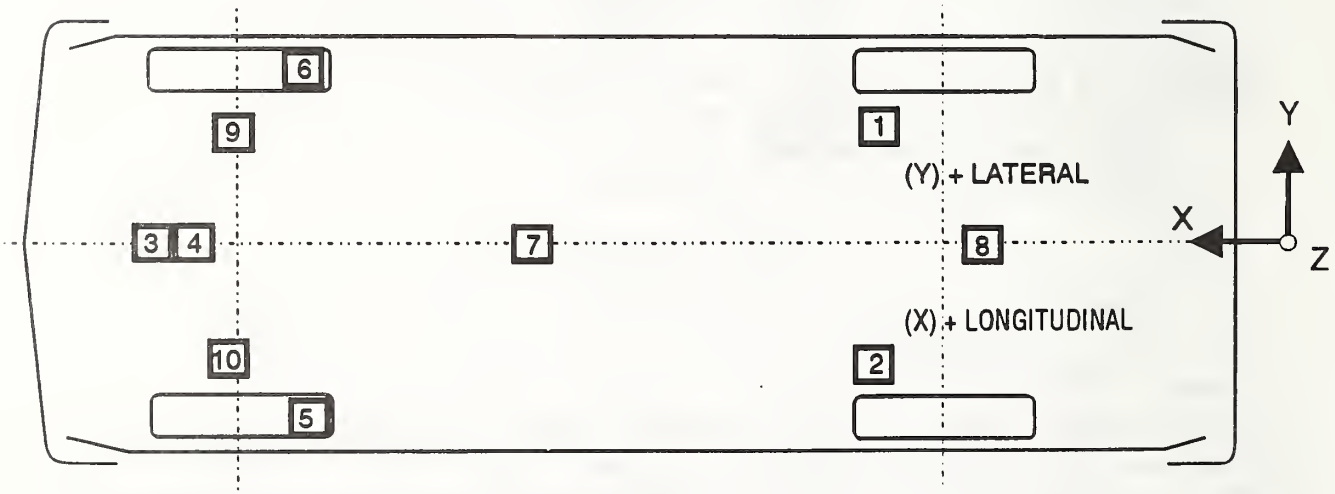
Vehicle Sebring Zev

	PRE-TEST		POST-TEST		CRUSH
L	1290				
C1	4132	C1	3621	C1	511
C2	4211	C2	3646	C2	565
C3	4233	C3	3686	C3	547
C4	4234	C4	3687	C4	547
C5	4205	C5	3676	C5	529
C6	4126	C6	3619	C6	507
CL	4269	CL	3701	CL	568

FIGURE 3 VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 931129

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
1	LEFT REAR SEAT CROSSMEMBER LONGITUDINAL[1]	1596	529	275	7.7	289.6	28.9	46.8
2	RIGHT REAR SEAT CROSSMEMBER LONGITUDINAL[1]	1588	-531	275	15.9	289.2	26.2	33.1
3	MOTOR TOP LONGITUDINAL[1]	3615	108	409	---	---	---	---
4	MOTOR BOTTOM LONGITUDINAL[1]	3568	85	241	46.9	35.2	137.5	28.0
5	RIGHT BRAKE CALIPER LONGITUDINAL[1]	3458	-645	263	50.6	63.9	77.8	36.7
6	LEFT BRAKE CALIPER LONGITUDINAL[1]	3458	645	265	88.6	67.9	119.7	50.4

TABLE 4

VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY CONTINUED

TEST NUMBER 931129

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION MAX G	POSITIVE DIRECTION MSEC	NEGATIVE DIRECTION MAX G	NEGATIVE DIRECTION MSEC
7	DASH PANEL CENTER LONGITUDINAL[1]	2865	37	875	21.3	94.2	34.8	43.2
8	REAR BATTERY BOX LEFT[1]	705	128	600	3.6	25.8	23.4	39.8
9	LEFT FRONT BATTERY BOX RIGHT[1]	3670	145	418	---	---	---	---
10	RIGHT FRONT BATTERY BOX CENTER[1]	3766	-195	525	---	---	---	---

* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN MILLIMETERS.

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

[1] See DATA ACQUISITION EXPLANATIONS

SECTION 3.0

FMVSS 208, 212, AND 219 (PARTIAL) DATA

TABLE 5

DUMMY DATA SUMMARY

TEST NUMBER 931129

	DRIVER DUMMY SN: 177				PASSENGER DUMMY SN: 134			
	POSITIVE DIRECTION		NEGATIVE DIRECTION		POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC	MAX	MSEC	MAX	MSEC
HEAD ACCELERATION (g)								
LONGITUDINAL[1]	3.5	248.5	48.0	94.1	18.8	170.3	80.1	93.6
LATERAL[1]	5.6	38.2	11.1	109.4	443.1	80.2	429.0	74.5
VERTICAL[1]	3.3	18.9	40.3	93.7	2.5	16.2	49.4	78.5
RESULTANT[1]	60.2	93.9			82.4	93.6		
HIC[1]	364 FROM 76.6 TO 112.6				796 FROM 65.0 TO 101.0			
CHEST ACCELERATION (g)								
LONGITUDINAL[1]	0.5	4.6	42.7	74.5	1.9	119.0	34.7	66.6
LATERAL[1]	2.9	56.2	13.0	99.0	5.2	92.2	12.2	289.5
VERTICAL[1]	11.8	99.1	6.1	42.0	25.6	89.2	8.3	41.7
RESULTANT[1]	43.5	74.4			38.9	89.3		
3 MSEC[1]	41.1				36.0			
CHEST DEFLECTION (mm)								
LONGITUDINAL[1]	0.3	27.2	39.1	78.6	0.1	2.6	55.4	78.3

TABLE 5

DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 931129

	DRIVER DUMMY SN: 177				PASSENGER DUMMY SN: 134			
	POSITIVE DIRECTION		NEGATIVE DIRECTION		POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC	MAX	MSEC	MAX	MSEC
FEMUR LOAD (kg)								
LEFT[1]	679.4	109.9	3814.4	60.8	649.8	48.0	2744.9	36.8
RIGHT[1]	384.1	294.3	6389.6	54.5	400.0	44.2	2446.0	68.8

POSITIVE DIRECTION		NEGATIVE DIRECTION	
LONGITUDINAL:	FORWARD	LONGITUDINAL:	REARWARD
LATERAL:	LEFTWARD	LATERAL:	RIGHTWARD
VERTICAL:	UPWARD	VERTICAL:	DOWNWARD
FORCE:	TENSION	FORCE:	COMPRESSION

[1] See DATA ACQUISITION EXPLANATIONS

TABLE 6 POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	DRIVER #177	PASSENGER #134
HEAD	Upper steering wheel rim and hub	Chest
CHEST	None	None
ABDOMEN	Lower steering wheel rim	None
LEFT KNEE	Instrument panel	Instrument panel
RIGHT KNEE	Instrument panel	Instrument panel

DOOR OPENING:

	LEFT	RIGHT
FRONT	Difficult-Required tools	Difficult-required tools
REAR	NA	NA

SEAT MOVEMENT:

	SEAT BACK FAILURE	SEAT SHIFT
FRONT	None	None
REAR	NA	NA

GLAZING DAMAGE:

Entire windshield cracked upon impact.

OTHER NOTABLE IMPACT EFFECTS:

None

DUMMY KINEMATIC SUMMARY

DRIVER DUMMY

Upon impact, the driver dummy translated forward on the seat impacting both knees into the lower instrument panel. The driver dummy's head rotated downward impacting the steering wheel upper rim and hub. The driver dummy was restrained by the two-point passive shouder belt. The dummy rebounded rearward into the seat back as the dummy's head rotated rearward contacting the head restraint. The driver dummy came to rest in the driver's seat restrained by the two-point passive shoulder belt.

RIGHT FRONT PASSENGER DUMMY

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel. The dummy's head rotated downward impacting the dummy's chest. The right front passenger dummy was restrained by the two-point passive shoulder belt. The right front passenger dummy rebounded rearward into the seat back as the dummy's head rotated rearward contacting the head restraint. The right front passenger dummy came to rest in the right front passenger's seat restrained by the two-point passive shoulder belt.

FIGURE 4 FMVSS 212 TEST DATA

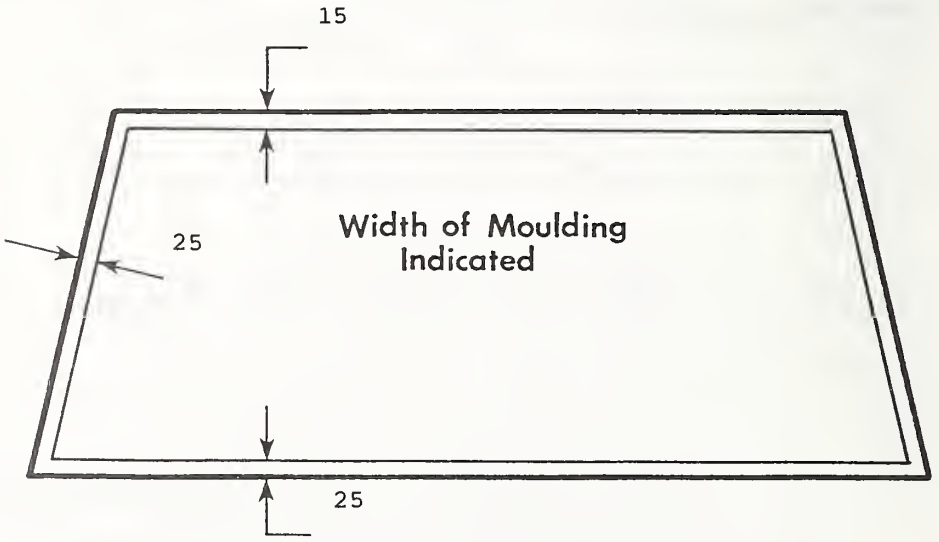
DETAILS OF WINDSHIELD MOUNTING SUCH AS RETENTION METHOD, TRIM TYPE, ETC.:
Plastic trim around outer perimeter, adhesive around inner perimeter.

FMVSS 212 REQUIREMENTS: The post-test periphery retention amount must be at least 75% of the pre-test periphery measurement for vehicles NOT equipped with automatic restraints, and 50% for each side of windshield for vehicles equipped with automatic restraint systems for front occupants.

WINDSHIELD PERIPHERY MEASUREMENTS:

	PRE-TEST	POST-TEST	PERCENT RETENTION
RIGHT SIDE	1977	1977	100.0
LEFT SIDE	1977	1977	100.0
TOTAL	3954	3954	100.0

PRE-TEST WINDSHIELD MOUNTING MATERIAL TEMPERATURE: 20° C



FRONT VIEW OF WINDSHIELD[1]

LOSS OF WINDSHIELD RETENTION LENGTHS: NA

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.
[1]INDICATE AREAS OF LOSS OF RETENTION, IF ANY, ON WINDSHIELD DIAGRAM.

FIGURE 5 FMVSS 219 TEST DATA

PROTECTED ZONE LOWER EDGE REQUIREMENT:

The lower edge of the protected zone is determined by placing a 165-millimeter diameter rigid sphere weighing 6.8 kg in a position such that it simultaneously contacts the inner surface of the windshield and the top surface of the instrument panel including padding. Draw the locus of points on the inner surface of the windshield contactable by the sphere across the width of the instrument panel. From the outermost contactable points, extend the locus line horizontally to the edges of the windshield, and then draw a line on the inner surface of the windshield below and 13 millimeters from the locus line. The LOWER EDGE OF THE PROTECTED ZONE is the longitudinal projection onto the outer surface of the windshield of this line.

WINDSHIELD MEASUREMENTS:

A = 1020

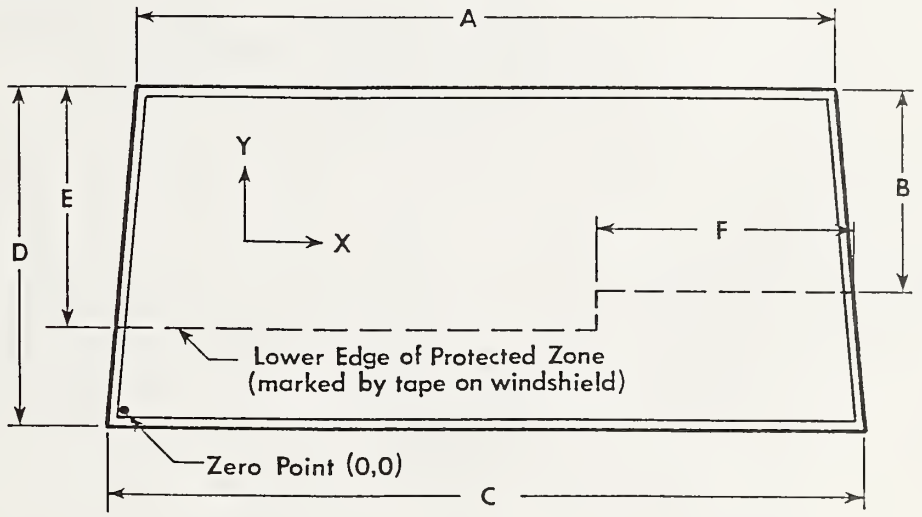
B = 482

C = 1500

D = 788

E = 550

F = 675



FRONT VIEW

METHOD OF ADHERING PROTECTED ZONE TEMPLATE TO WINDSHIELD: NA

AREAS OF WINDSHIELD TEMPLATE PENETRATION GREATER THAN 6.0 MM: NA

	COORDINATES X	Y
1.		
2.		
3.		

AREAS OF WINDSHIELD PENETRATION, BELOW THE PROTECTED ZONE, THROUGH THE INNER SURFACE OF THE WINDSHIELD: None

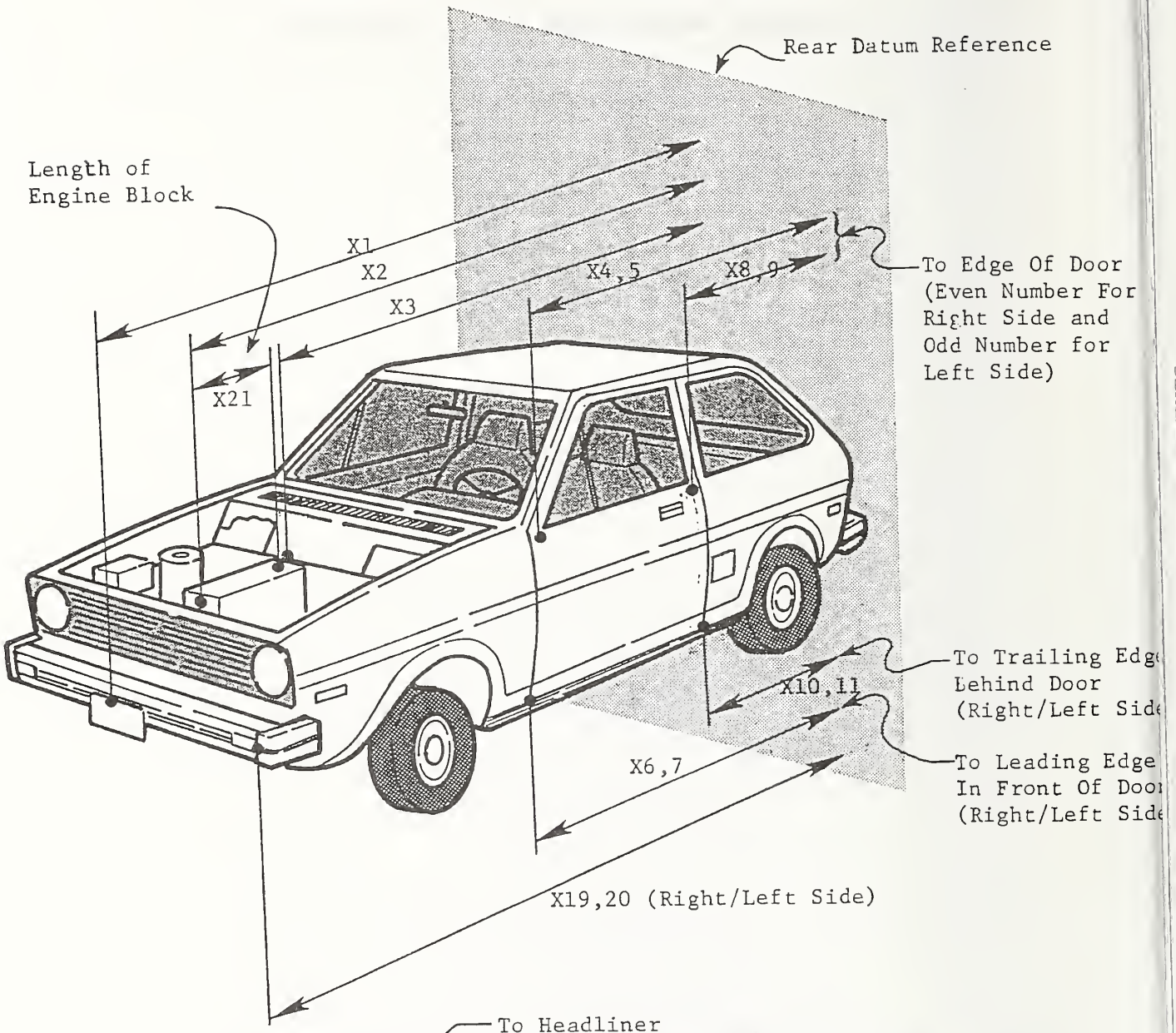
1.
2.
3.

ALL MEASUREMENTS ARE IN MILLIMETERS.

SECTION 4.0

VEHICLE, OCCUPANT, AND CAMERA INFORMATION

FIGURE 6 PRE-TEST AND POST-TEST MEASUREMENTS POINTS



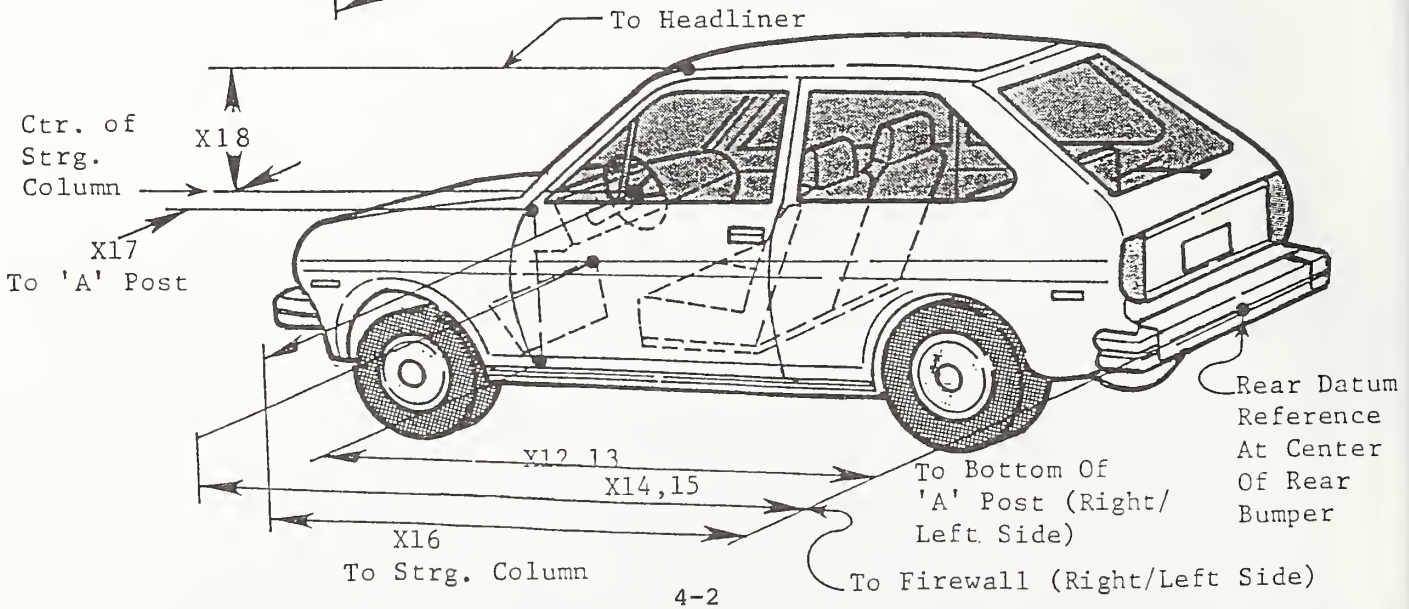


TABLE 7 IMPACTED VEHICLE MEASUREMENTS

VEHICLE MAKE/MODEL: Sebring Zev TEST NUMBER: 931129

NO.	TYPE OF MEASUREMENT	PRE-TEST	POST-TEST	DIFF.
X1	TOTAL LENGTH OF VEHICLE AT CENTERLINE	4269	3701	568
X2	REAR SURFACE OF VEHICLE TO FRONT OF ENGINE BLOCK	3689	3351	338
X3	REAR SURFACE OF VEHICLE TO FIREWALL	3226	3071	155
X4	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF RIGHT DOOR	2908	2830	78
X5	REAR SURFACE OF VEHICLE TO UPPER LEADING EDGE OF LEFT DOOR	2901	2817	84
X6	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF RIGHT DOOR	2918	2812	106
X7	REAR SURFACE OF VEHICLE TO LOWER LEADING EDGE OF LEFT DOOR	2913	2804	109
X8	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF RIGHT DOOR	1656	1683	-27
X9	REAR SURFACE OF VEHICLE TO UPPER TRAILING EDGE OF LEFT DOOR	1653	1720	-67
X10	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF RIGHT DOOR	1731	1641	90
X11	REAR SURFACE OF VEHICLE TO LOWER TRAILING EDGE OF LEFT DOOR	1721	1612	109
X12	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON RIGHT SIDE	2897	2808	89
X13	REAR SURFACE OF VEHICLE TO BOTTOM OF "A" POST ON LEFT SIDE	2897	2787	110
X14	REAR SURFACE OF VEHICLE TO FIREWALL - RIGHT SIDE	3141	3024	117
X15	REAR SURFACE OF VEHICLE TO FIREWALL - LEFT SIDE	3142	3046	96
X16	REAR SURFACE OF VEHICLE TO STEERING WHEEL CENTER	2426	2363	63
X17	CENTER OF STEERING COLUMN TO "A" POST	280	298	-18
X18	CENTER OF STEERING COLUMN TO HEADLINER	447	442	5
X19	REAR SURFACE OF VEHICLE TO RIGHT SIDE OF FRONT BUMPER	4126	3619	507
X20	REAR SURFACE OF VEHICLE TO LEFT SIDE OF FRONT BUMPER	4132	3621	511
X21	LENGTH OF ENGINE BLOCK	360	360	0

All measurements are in millimeters.

FIGURE 7 VEHICLE TARGET LOCATIONS

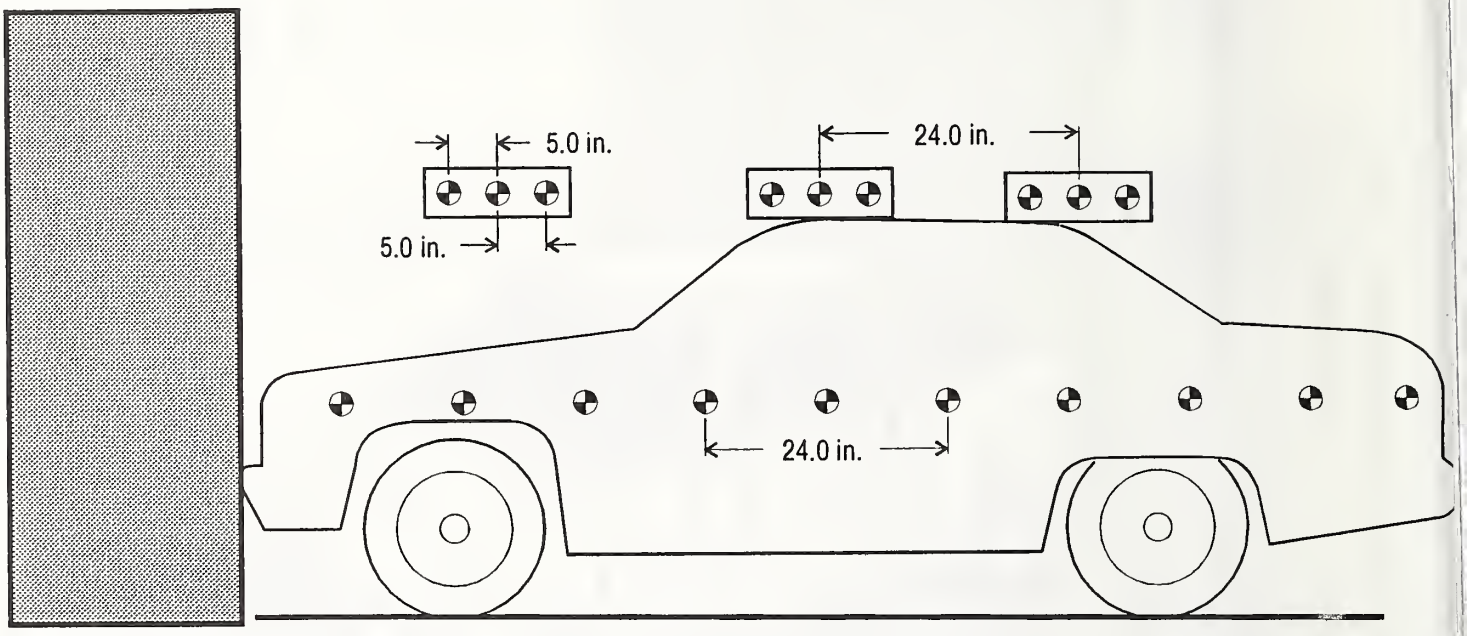
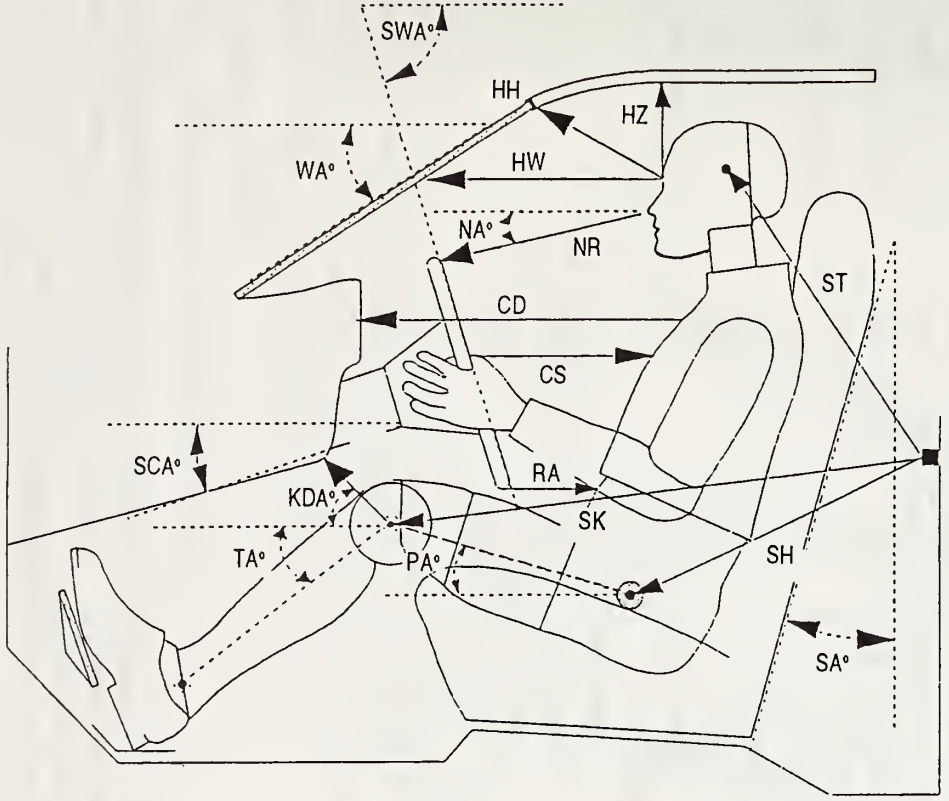
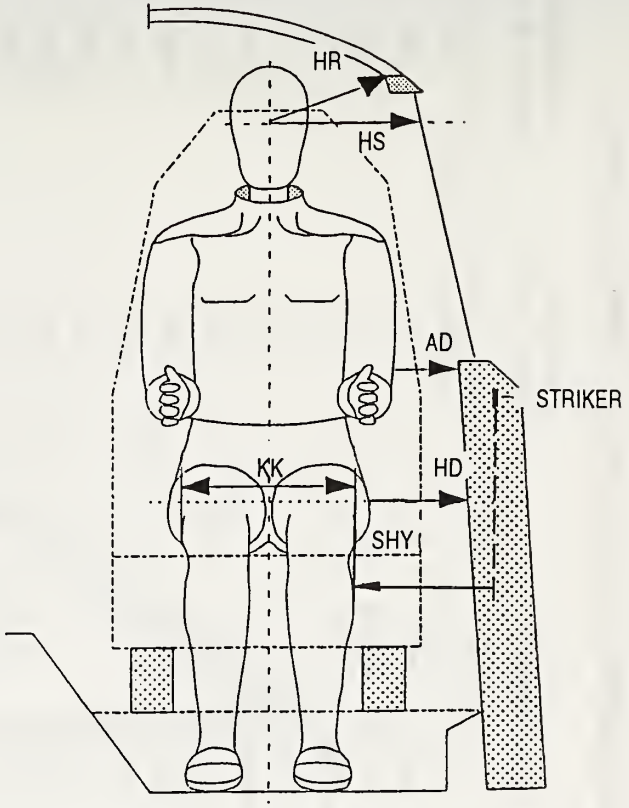
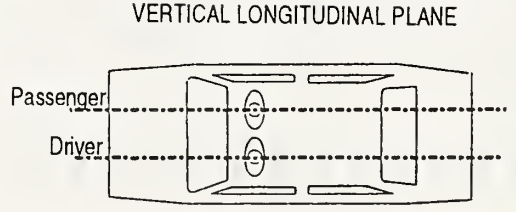


FIGURE 8

DUMMY MEASUREMENT LOCATIONS FOR FRONT SEAT OCCUPANTS







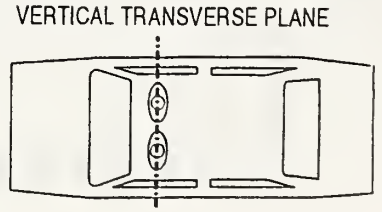
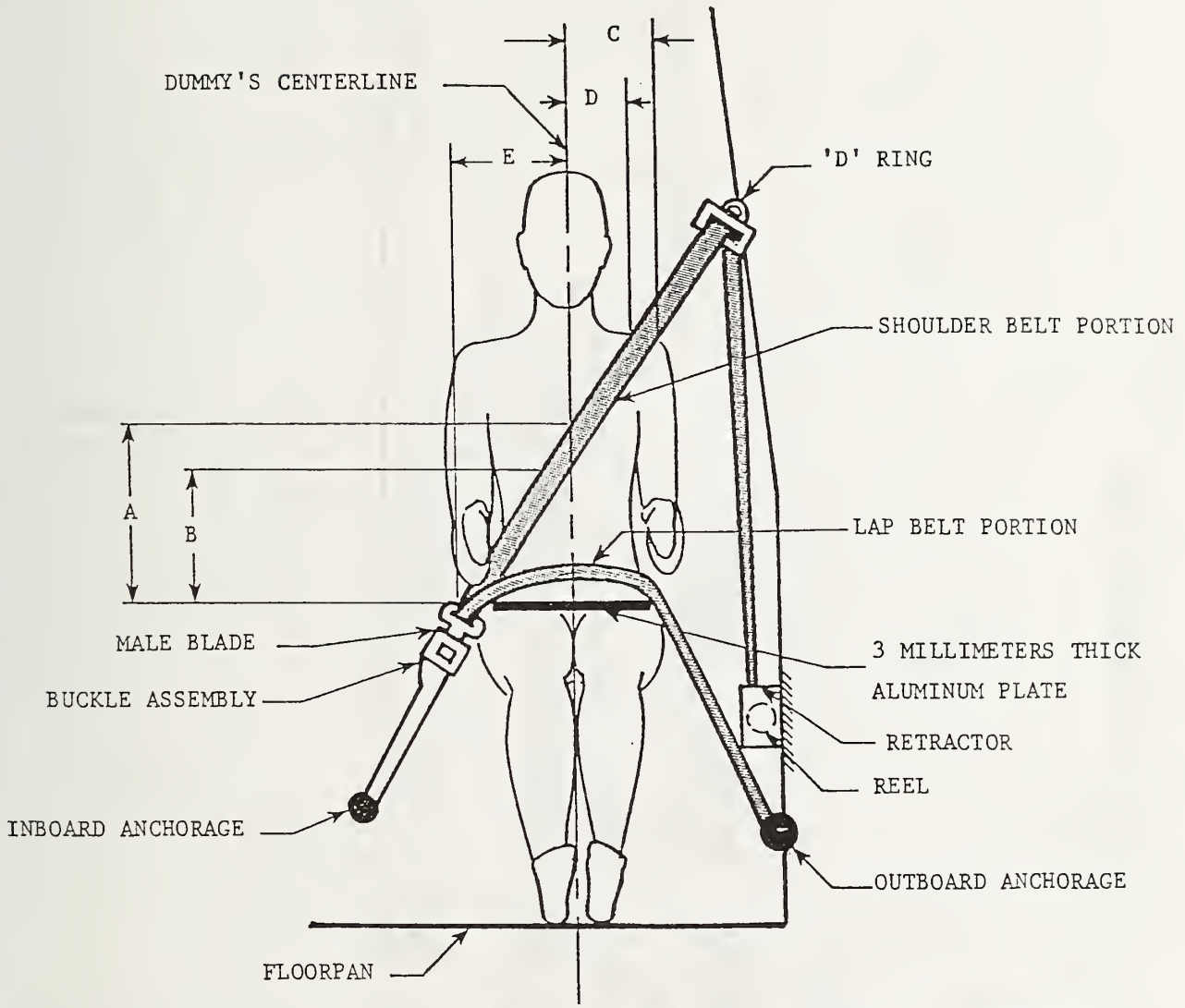


TABLE 8 DUMMY MEASUREMENT DATA FOR FRONT SEAT OCCUPANTS

DESIGNATION	TYPE OF MEASUREMENT	DRIVER (SERIAL #177)	PASSENGER (SERIAL #134)
WA°	WINDSHIELD ANGLE	28	NA
SWA°	STEERING WHEEL ANGLE	23	NA
SCA°	STEERING COLUMN ANGLE	67	NA
SA°	SEAT BACK ANGLE	23	23
HZ	HEAD TO ROOF	159	164
HH	HEAD TO HEADER	317	316
HW	HEAD TO WINDSHIELD	540	543
HR	HEAD TO SIDE HEADER	194	185
NR	NOSE TO RIM	416	NA
NA	NOSE TO RIM ANGLE	12	NA
CD	CHEST TO DASH	536	605
CS	STEERING WHEEL TO CHEST	322	NA
RA	RIM TO ABDOMEN	202	NA
KDL	LEFT KNEE TO DASH	185	180
KDR	RIGHT KNEE TO DASH	182	182
KDA	OUTBOARD KNEE TO DASH ANGLE	24	31
PA°	PELVIC ANGLE	22	24
TA°	TIBIAL ANGLE	31	29
KK	KNEE TO KNEE	270	270
ST	STRIKER TO HEAD	562	565
	STRIKER TO HEAD ANGLE	60	59
SK	STRIKER TO KNEE	771	773
	STRIKER TO KNEE ANGLE	-4	-3
SH	STRIKER TO H-POINT	410	437
	STRIKER TO H-POINT ANGLE	-19	-21
SHY	STRIKER TO H-POINT (Y DIR.)	205	191
HS	HEAD TO SIDE WINDOW	335	302
HD	H-POINT TO DOOR	165	176
AD	ARM TO DOOR	99	104

THE SEAT BACK ANGLE (SA°) IS MEASURED RELATIVE TO VERTICAL, ALL OTHER ANGLES ARE MEASURED RELATIVE TO HORIZONTAL.
ALL ANGLE MEASUREMENTS ARE IN DEGREES.
ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 9 SEAT BELT POSITIONING DATA



	DRIVER	PASSENGER
A - TOP SURFACE OF ALUMINUM PLATE TO BELT UPPER EDGE	334	369
B - TOP SURFACE OF ALUMINUM PLATE TO BELT LOWER EDGE	247	267
C - DUMMY CENTERLINE TO OUTER EDGE OF BELT AT CHEST FLESH TOP	136	125
D - DUMMY CENTERLINE TO INNER EDGE OF BELT AT CHEST FLESH TOP	80	64
E - DUMMY CENTERLINE TO INTERSECTION OF UPPER TORSO BELT AND LAP BELT	NA	NA

ALL DISTANCE MEASUREMENTS ARE IN MILLIMETERS.

FIGURE 10 CAMERA POSITIONS

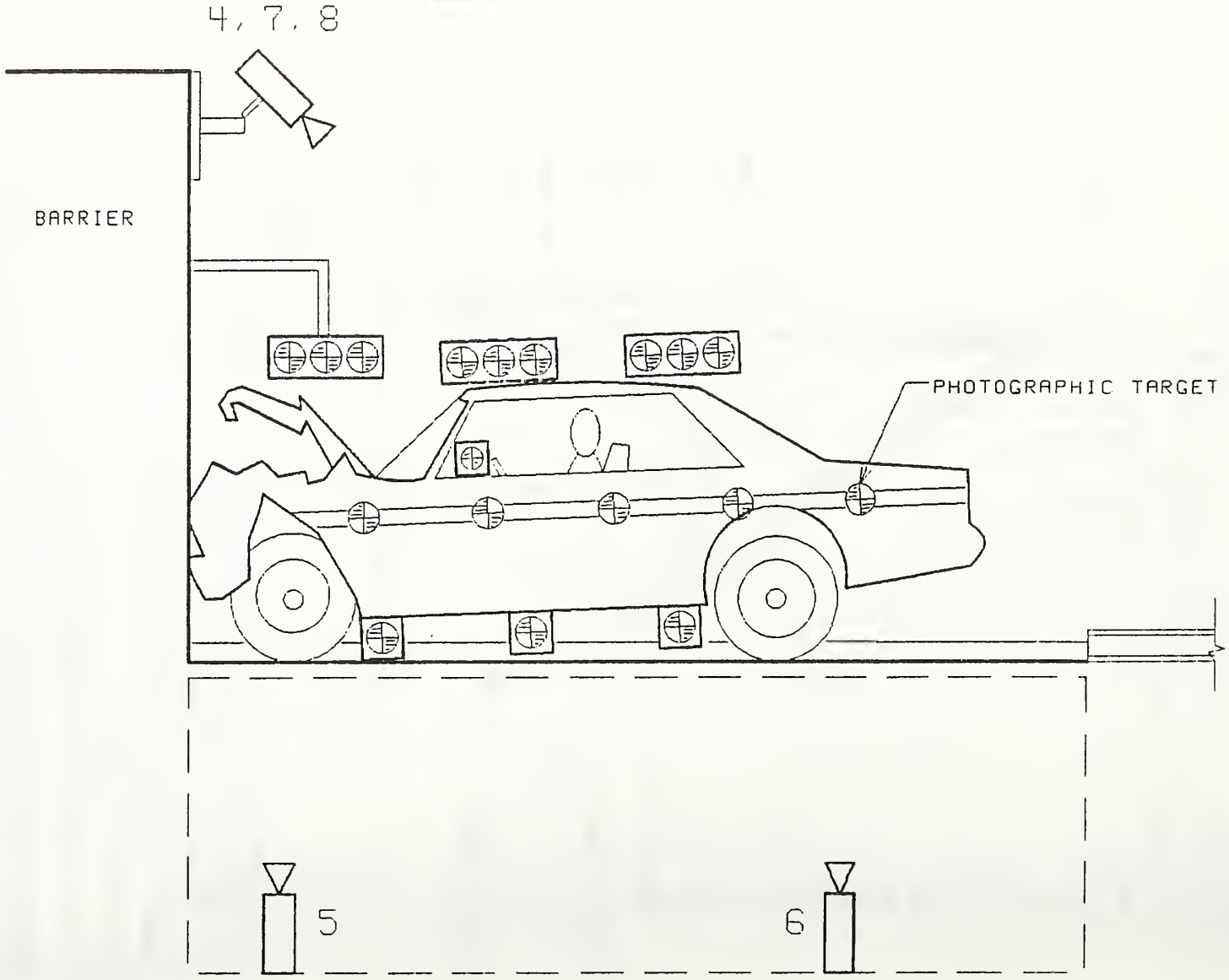


FIGURE 10 CAMERA POSITIONS, CONT'D.

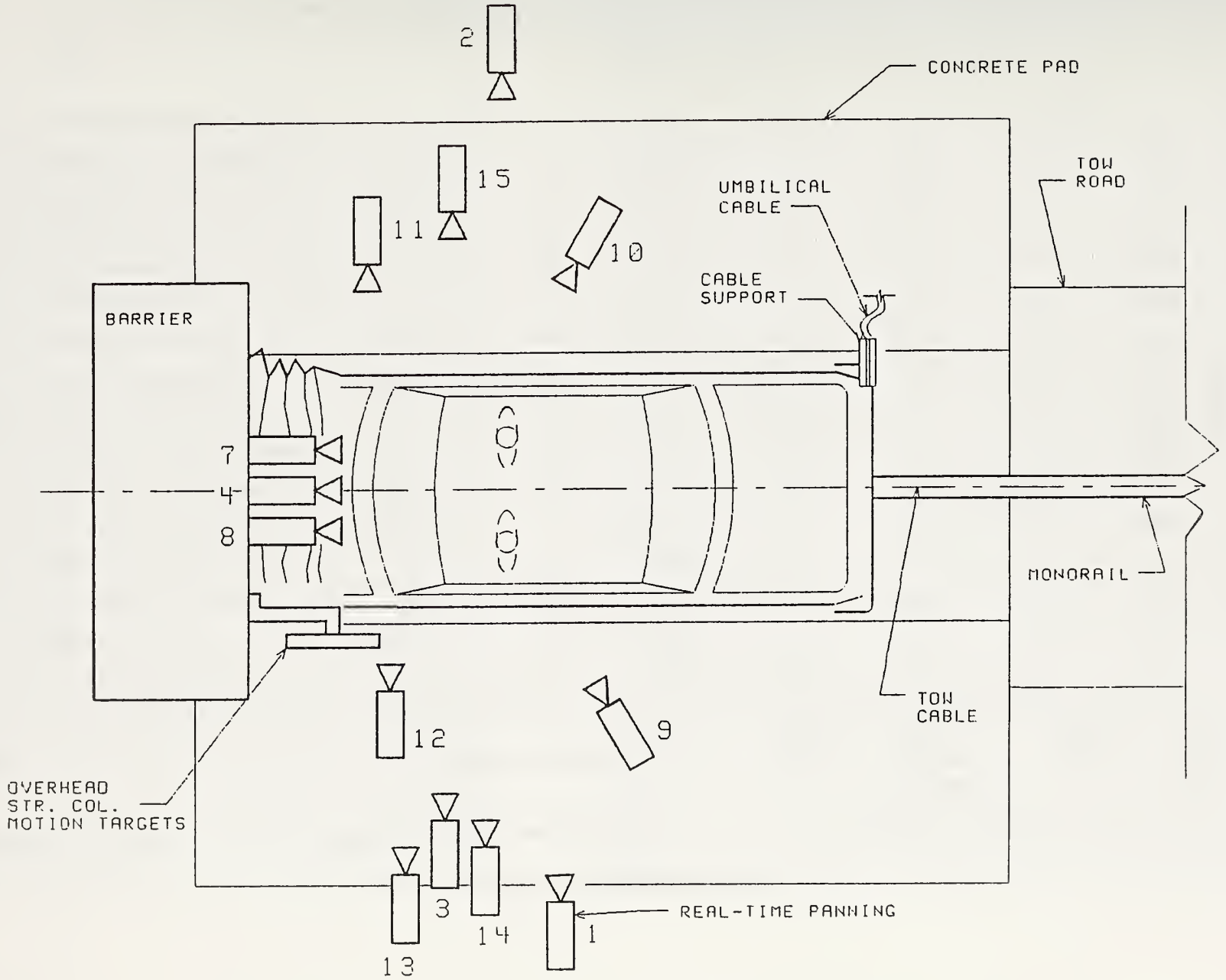


TABLE 9 MOTION PICTURE CAMERA LOCATIONS

TEST NO.: 931129 VEHICLE: 1993 Sebring Zev

CAMERA NO.	VIEW	CAMERA POSITIONS (CM)[1] X	Y	Z	ANGLE[2] (DEG)	FILM PLANE TO HEAD TARGET (CM)	LENS (MM)	FILM SPEED (FPS)
1	Real-time panning	-361	-1280	155	NA	NA	16	24
2	Right overall	-207	-677	94	-2	NA	13	998
3	Left vehicle crush	-105	749	112	-4	572	25	998
4	Windshield front view	-15	0	213	-40	NA	13	1000
5	Pit - front position	-128	0	-235	90	NA	13	1000
6	Pit - rear position	-252	0	-251	90	NA	13	975
7	Passenger - front view	-11	-35	236	-50	NA	17	998
8	Driver - front view	-17	37	236	-50	NA	17	1005
9	Driver kinematics	-400	295	221	-27	303	25	995
10	Passenger kinematics	-386	-295	221	-26	340	25	998
11	Right windshield intrusion	-97	-777	112	0	NA	50	1008
12	Left windshield intrusion	-135	786	107	0	NA	50	1002
13	Steering column motion	-216	726	262	-14	NA	25	1010
14	Steering column motion	-216	726	191	-9	NA	25	1005
15	Passenger kinematics	-99	-744	115	-4	589	25	1022
16	Real-time documentation	NA	NA	NA	NA	NA	12-120	24

[1] +X = Film plane forward of barrier face

+Y = Film plane to left of monorail centerline

+Z = Film plane above ground level

[2] +Angle = Film plane angled upward from horizontal plane

APPENDIX A

PHOTOGRAPHS

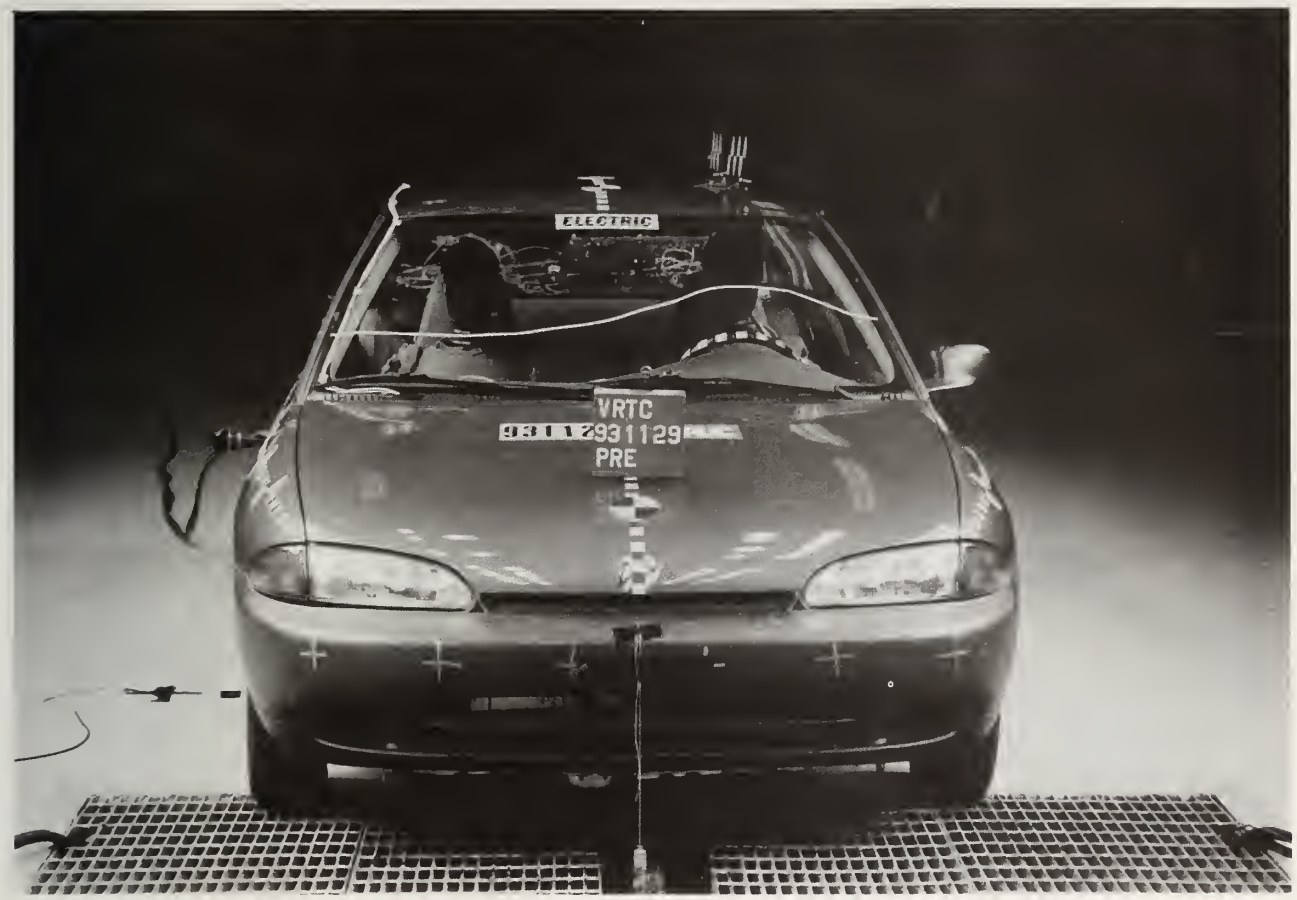


Figure A-1 PRE-TEST FRONT VIEW

Figure A-2 POST-TEST FRONT VIEW

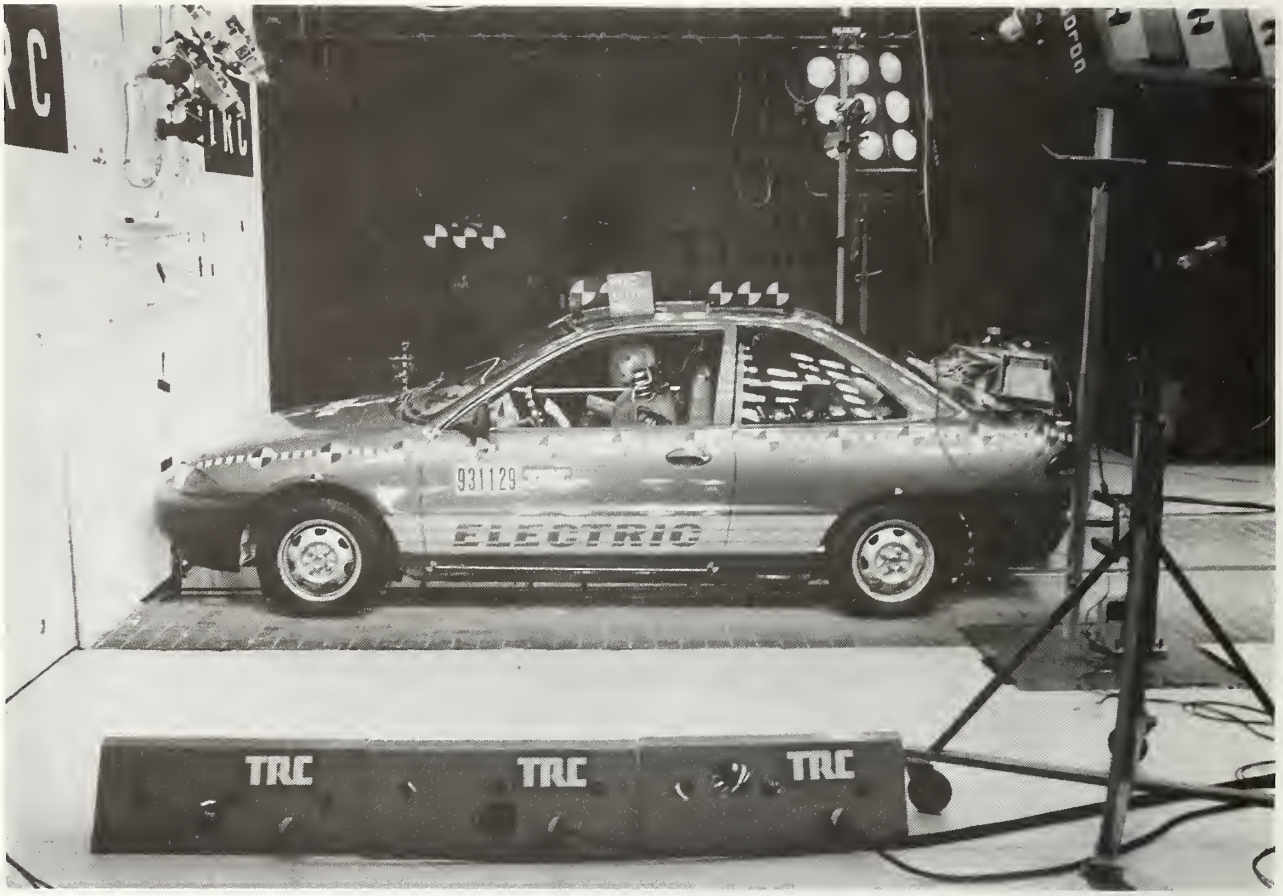


Figure A-3 PRE-TEST LEFT SIDE VIEW

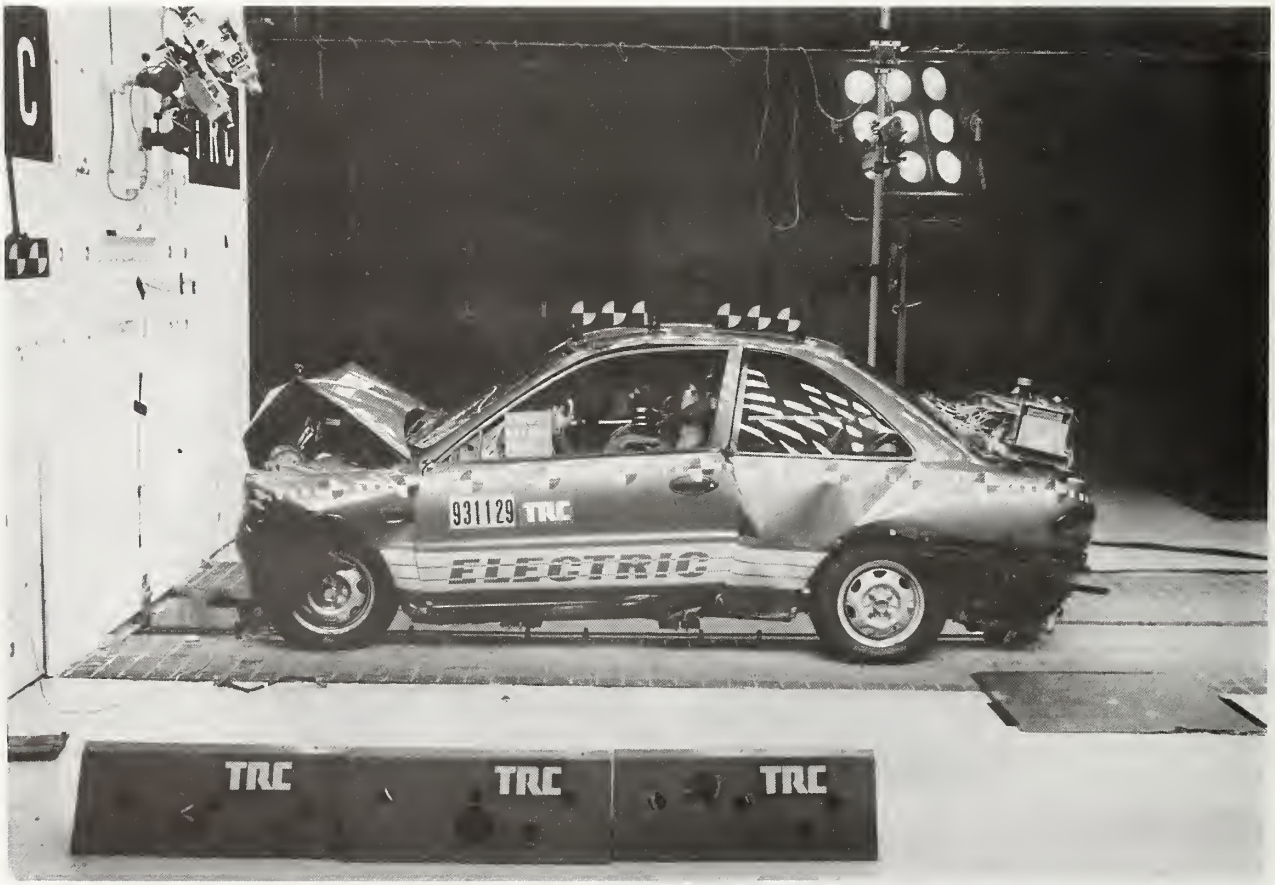


Figure A-4 POST-TEST LEFT SIDE VIEW

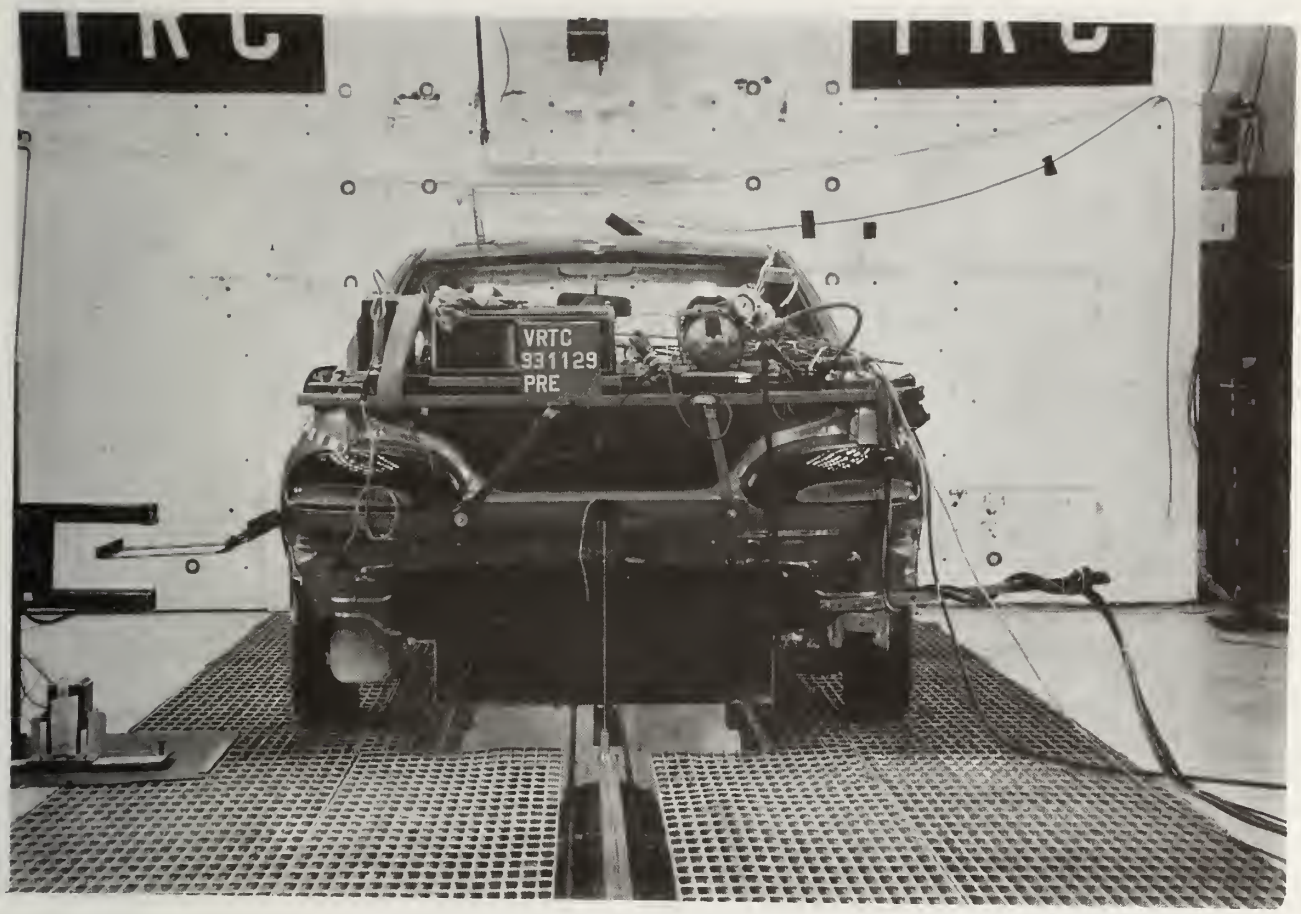


Figure A-5 PRE-TEST REAR VIEW

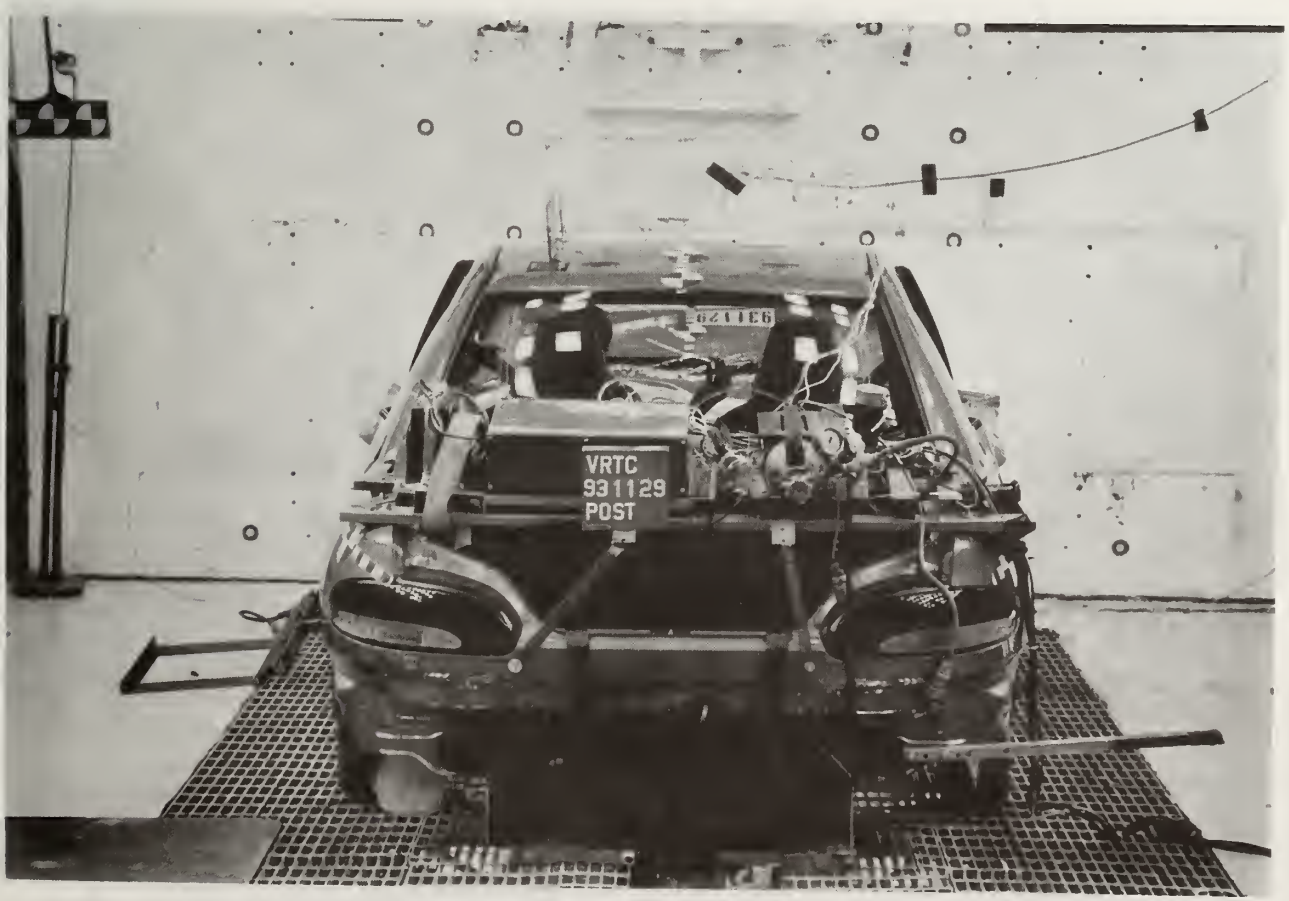


Figure A-6 POST-TEST REAR VIEW

Figure A-7 PRE-TEST RIGHT SIDE VIEW

Figure A-8 POST-TEST RIGHT SIDE VIEW

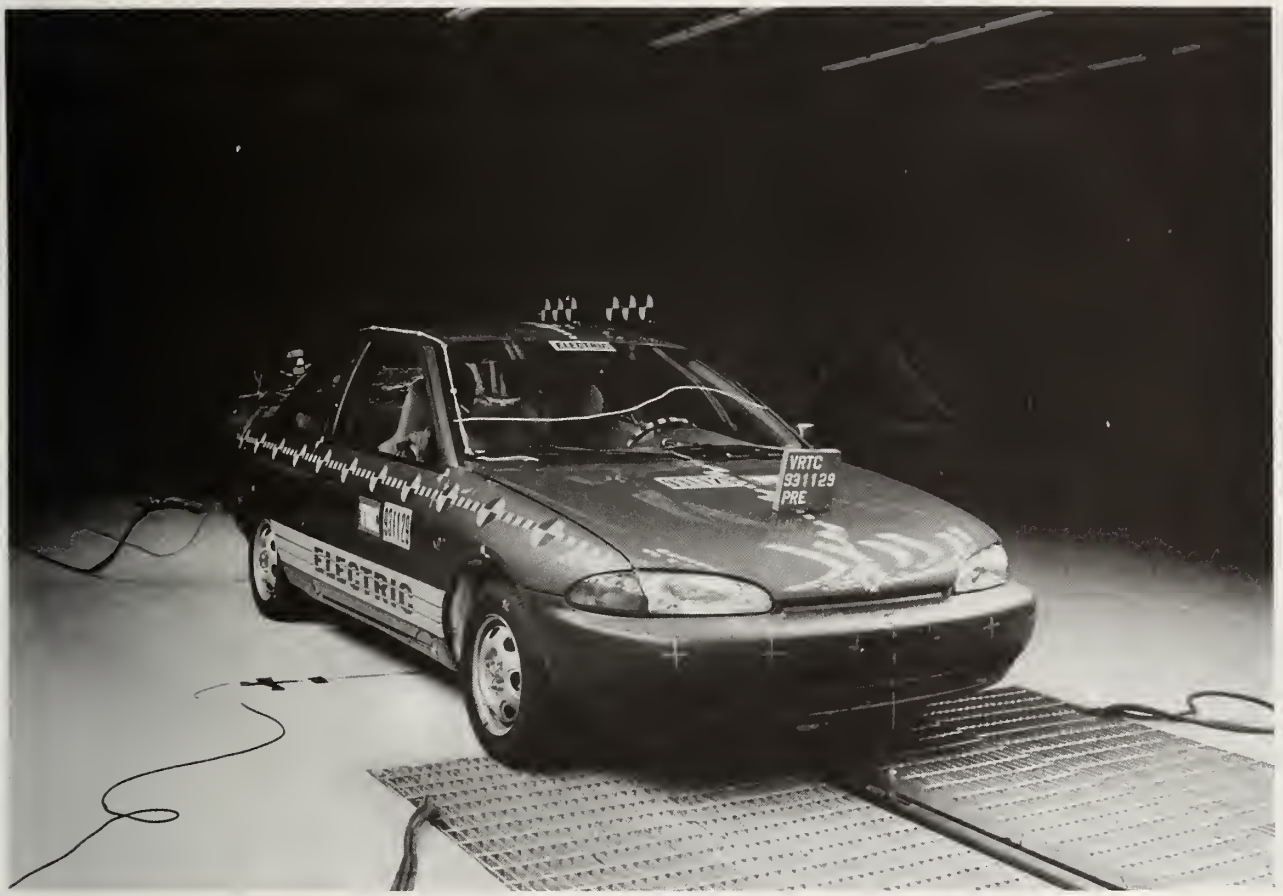


Figure A-9 PRE-TEST RIGHT FRONT THREE-QUARTER VIEW

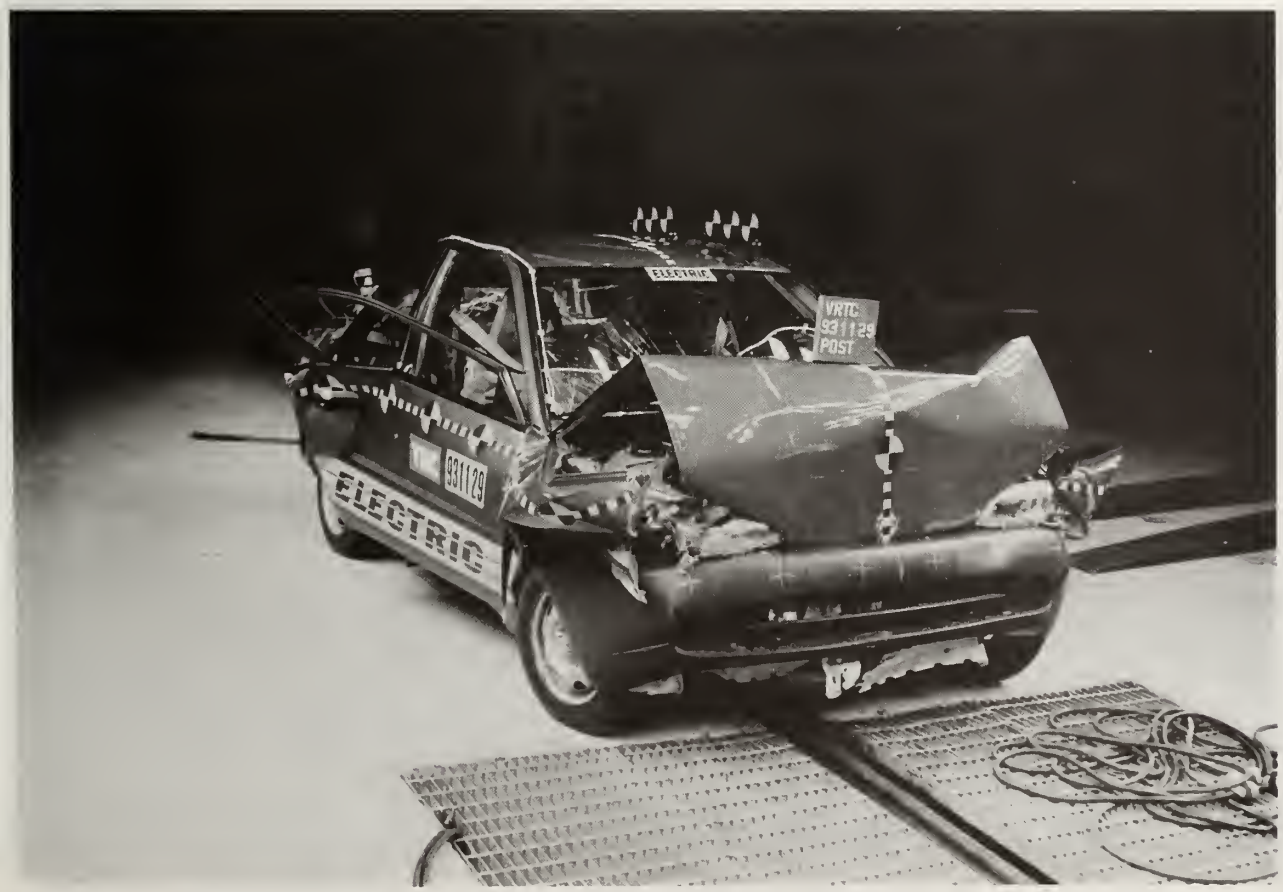


Figure A-10 POST-TEST RIGHT FRONT THREE-QUARTER VIEW

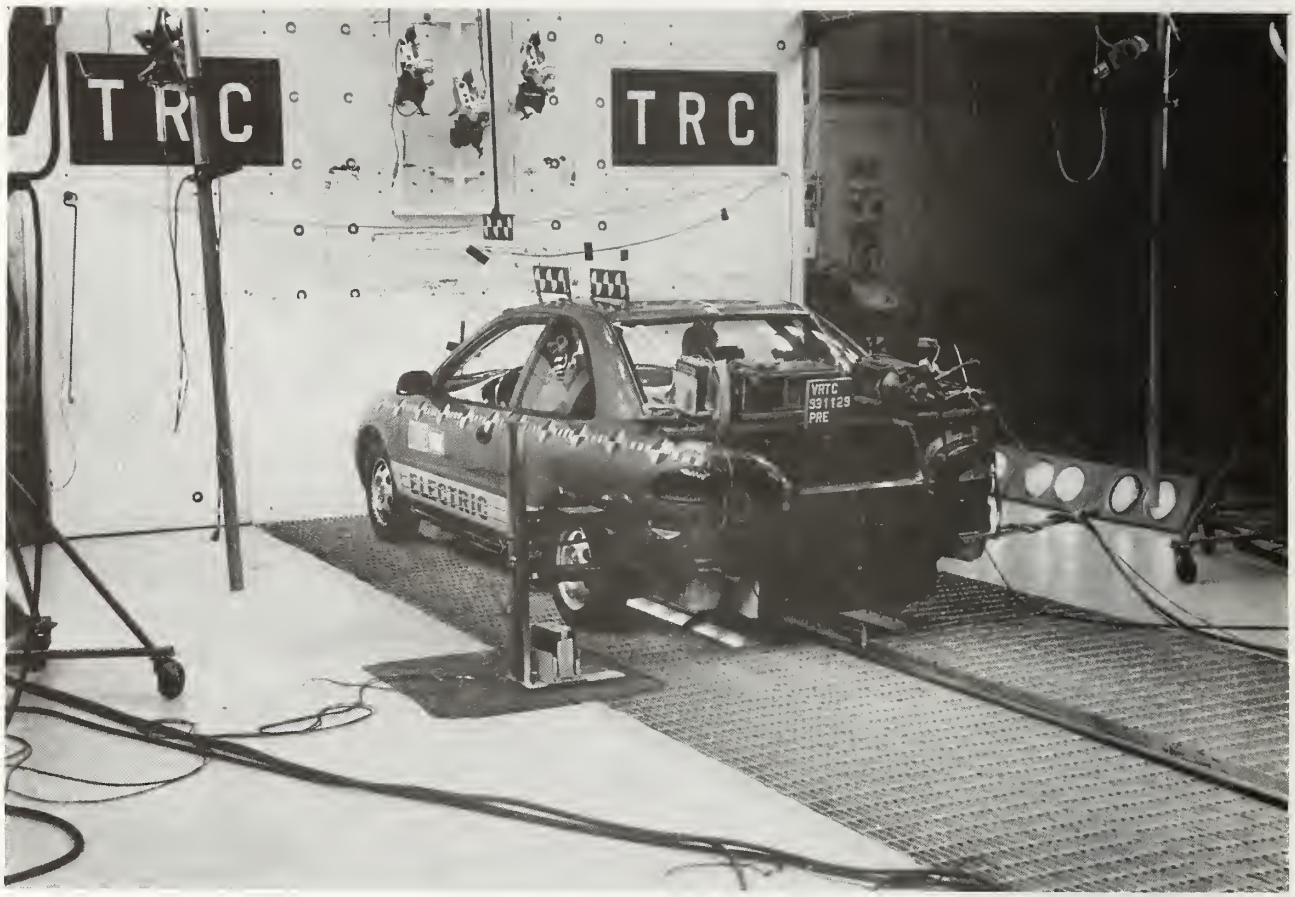


Figure A-11 PRE-TEST LEFT REAR THREE-QUARTER VIEW

Figure A-12 POST-TEST LEFT REAR THREE-QUARTER VIEW

Figure A-13 PRE-TEST WINDSHIELD VIEW

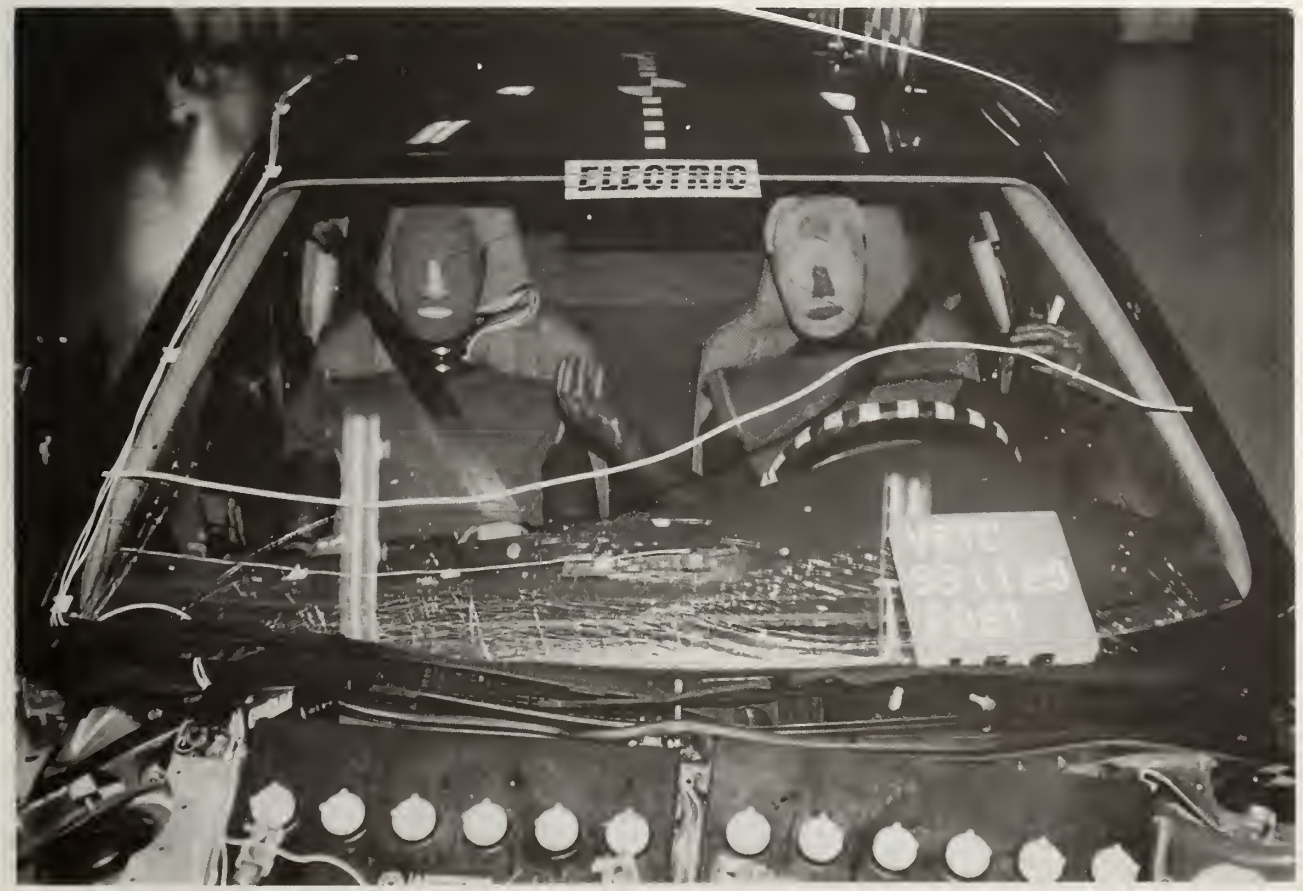


Figure A-14 POST-TEST WINDSHIELD VIEW

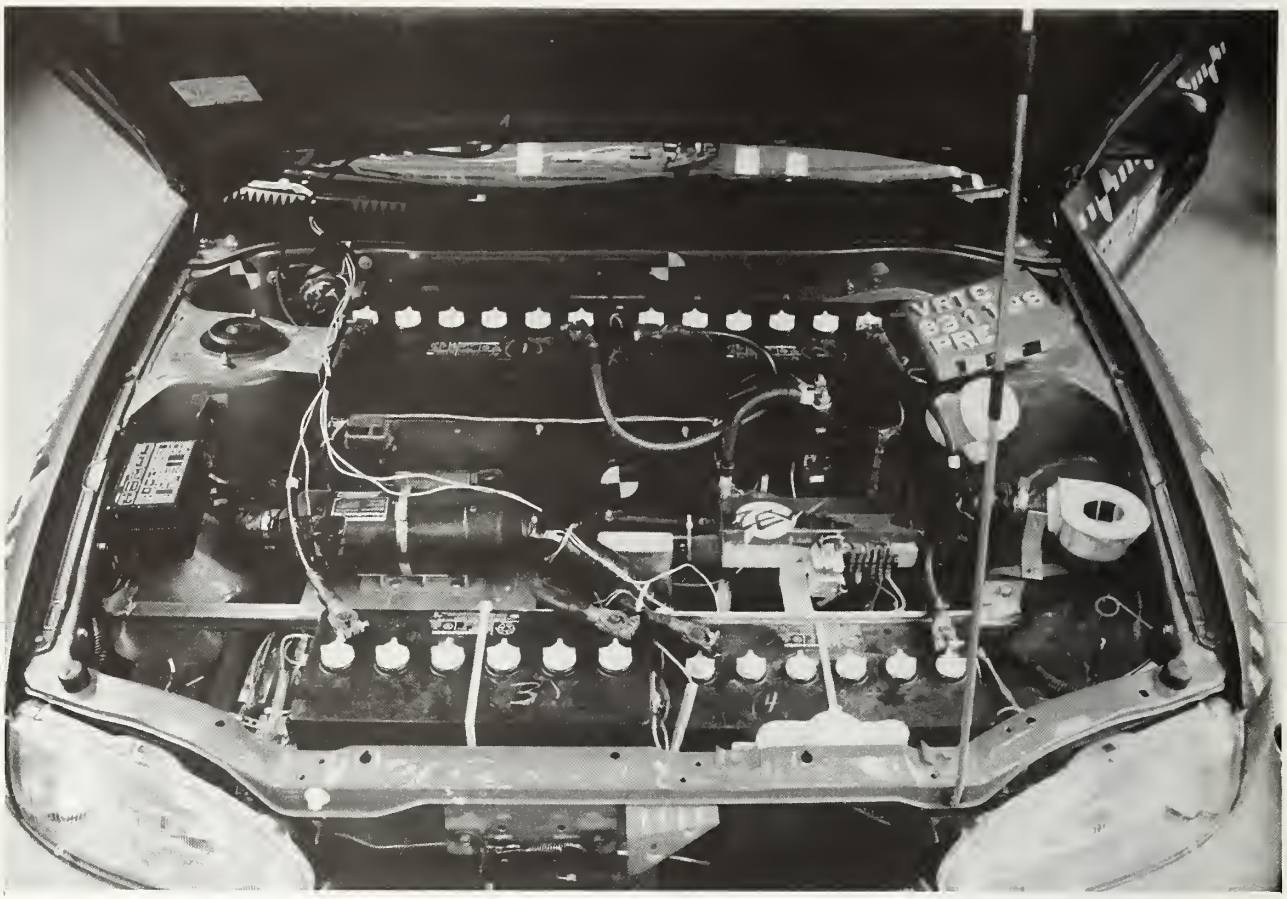


Figure A-15 PRE-TEST FRONT MOTOR/BATTERY COMPARTMENT VIEW

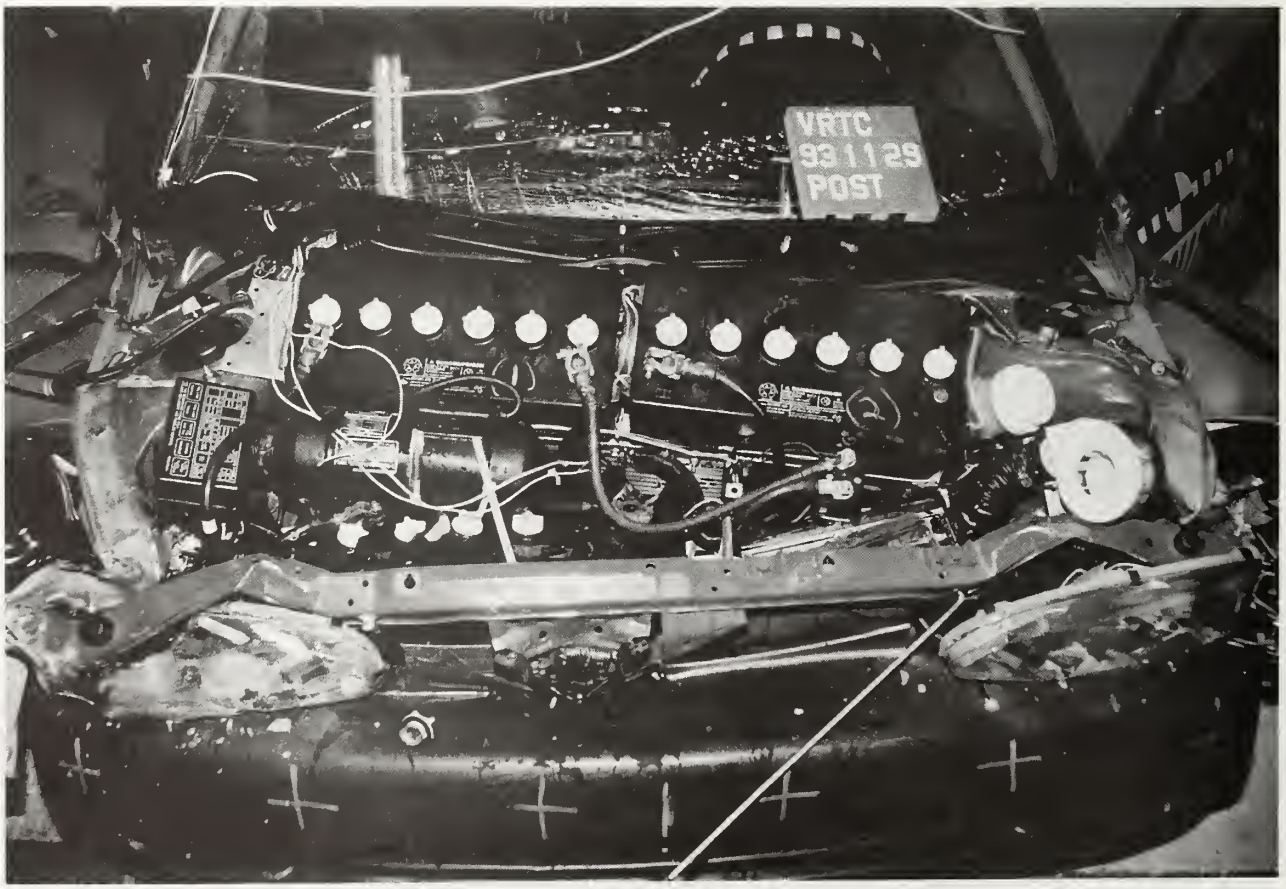


Figure A-16 POST-TEST FRONT MOTOR/BATTERY COMPARTMENT VIEW

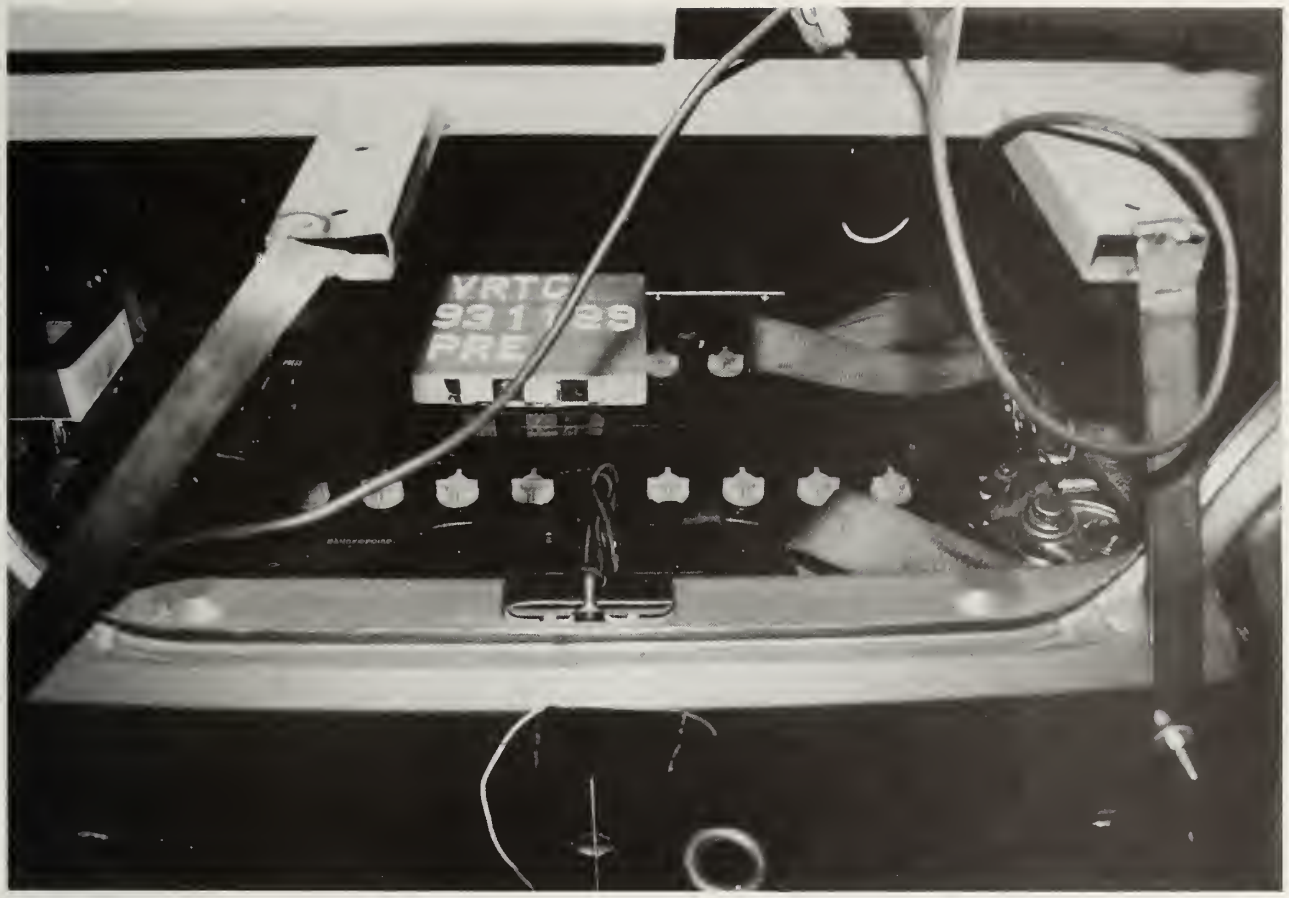


Figure A-17 PRE-TEST REAR BATTERY COMPARTMENT VIEW

Figure A-18 PRE-TEST DIESEL FUEL TANK VIEW

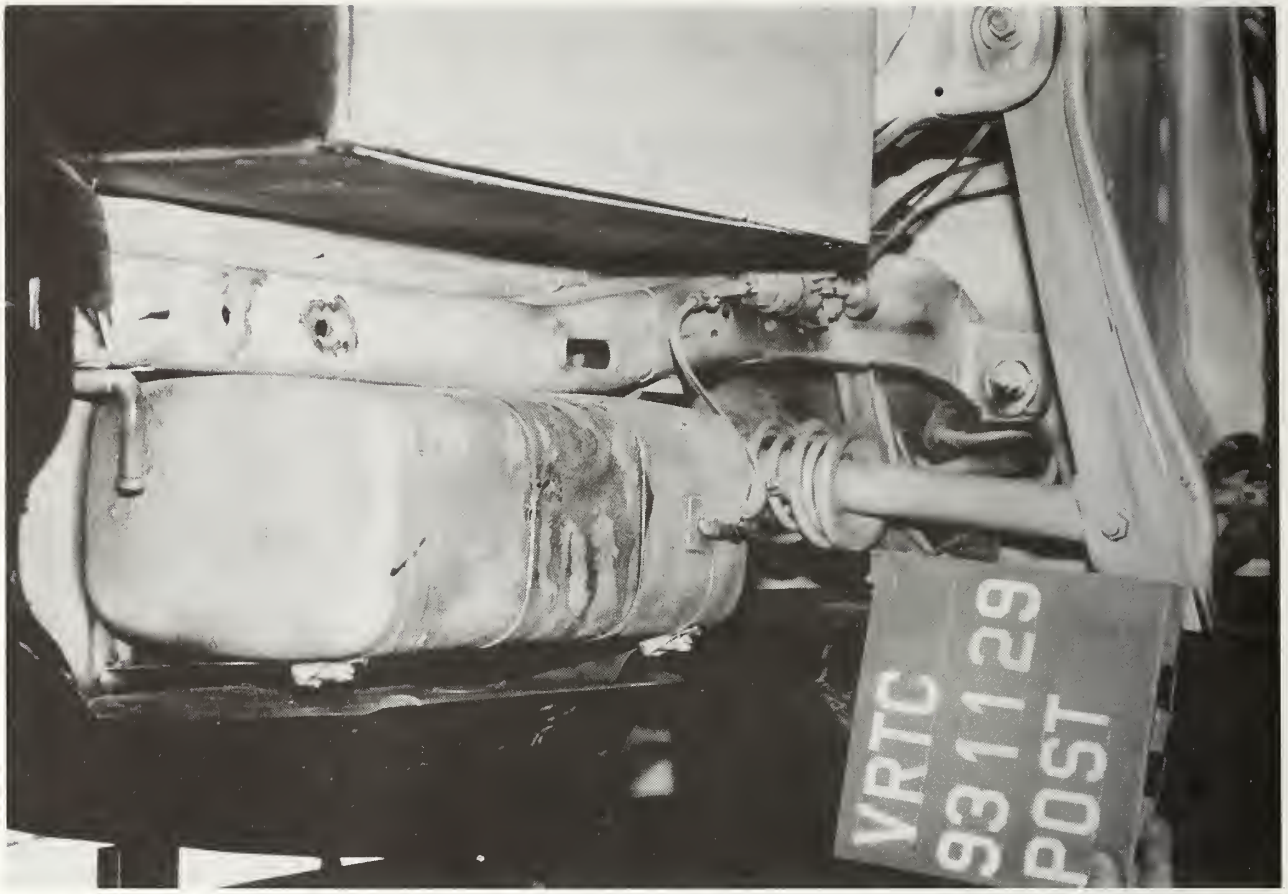


Figure A-19 POST-TEST DIESEL FUEL TANK VIEW

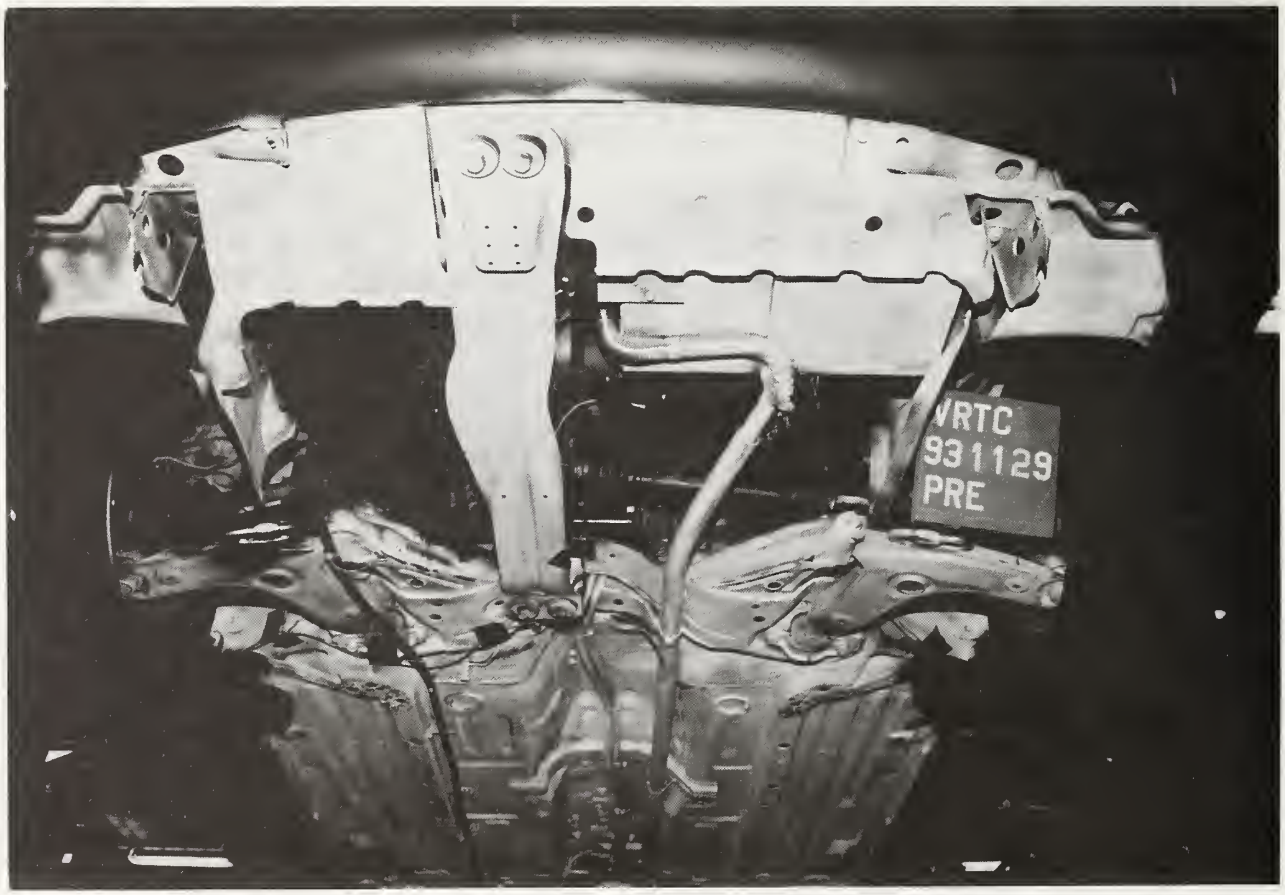


Figure A-20 PRE-TEST FRONT UNDERBODY VIEW

Figure A-21 POST-TEST FRONT UNDERBODY VIEW

Figure A-22 PRE-TEST REAR UNDERBODY VIEW

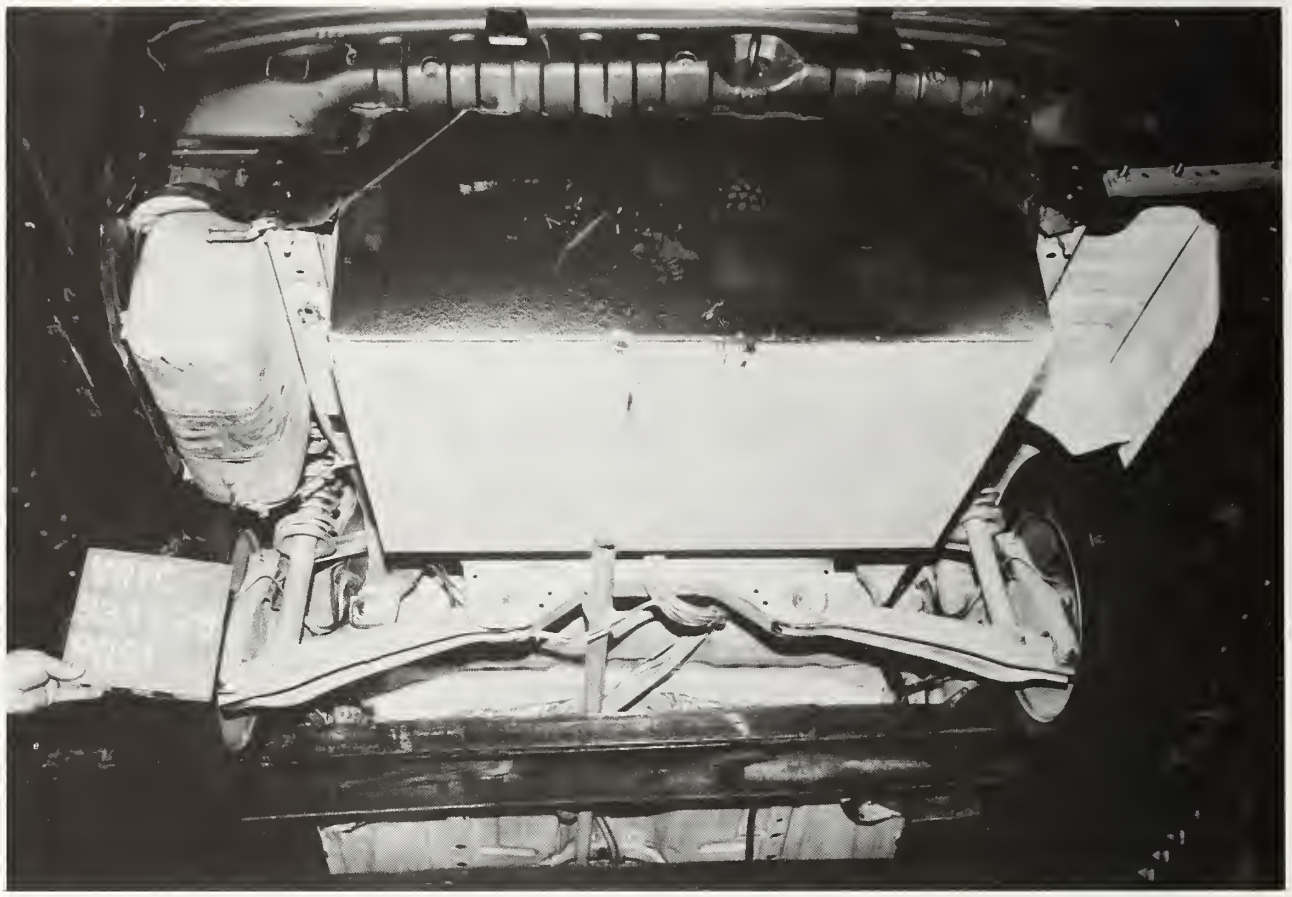


Figure A-23 POST-TEST REAR UNDERBODY VIEW

Figure A-24 PRE-TEST DRIVER DUMMY POSITION VIEW

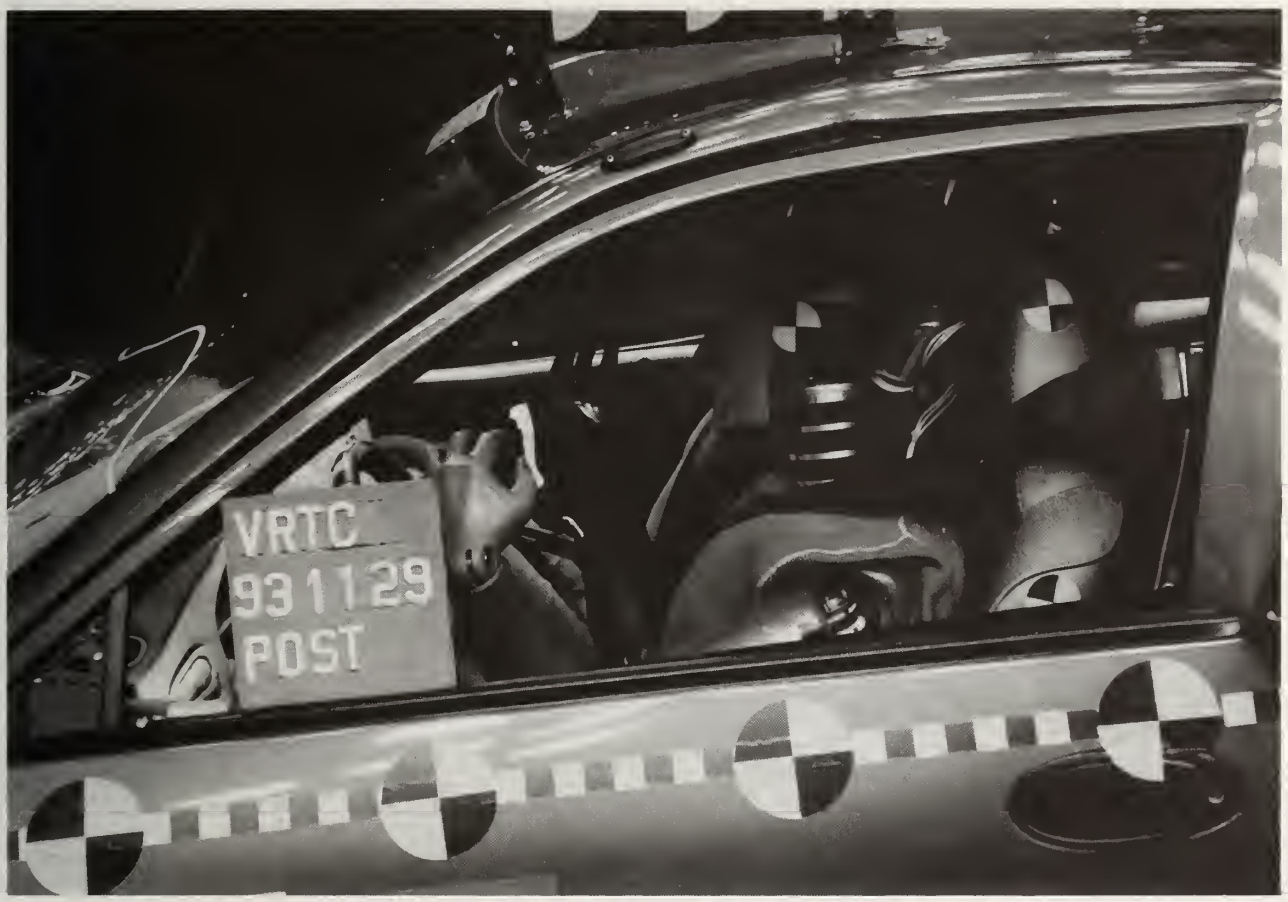


Figure A-25 POST-TEST DRIVER DUMMY POSITION VIEW

Figure A-26 PRE-TEST PASSENGER DUMMY POSITION VIEW

Figure A-27 POST-TEST PASSENGER DUMMY POSITION VIEW

Figure A-28 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

Figure A-29 POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 1

Figure A-30 PRE-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-31 POST-TEST DRIVER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-32 PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

Figure A-33 POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 1

Figure A-34 PRE-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-35 POST-TEST PASSENGER DUMMY & VEHICLE INTERIOR - VIEW 2

Figure A-36 POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 1

Figure A-37 POST-TEST DRIVER DUMMY HEAD CONTACT - VIEW 2

Figure A-38 POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 1

Figure A-39 POST-TEST DRIVER DUMMY KNEE CONTACT - VIEW 2

Figure A-40 POST-TEST PASSENGER DUMMY HEAD CONTACT VIEW

Figure A-41 POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 1

Figure A-42 POST-TEST PASSENGER DUMMY KNEE CONTACT - VIEW 2

Figure A-43 PRE-TEST ORIGINAL MANUFACTURER'S VEHICLE CERTIFICATION LABEL

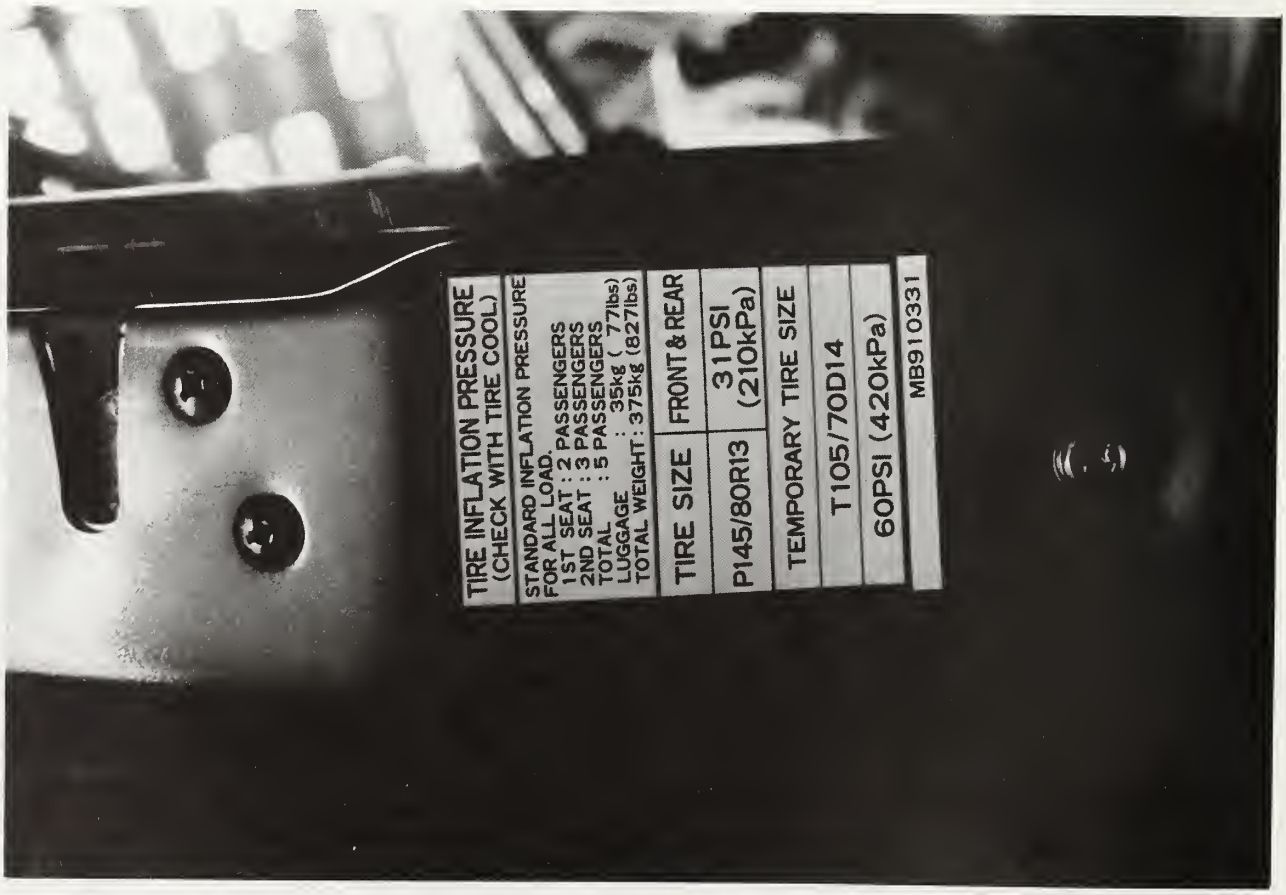


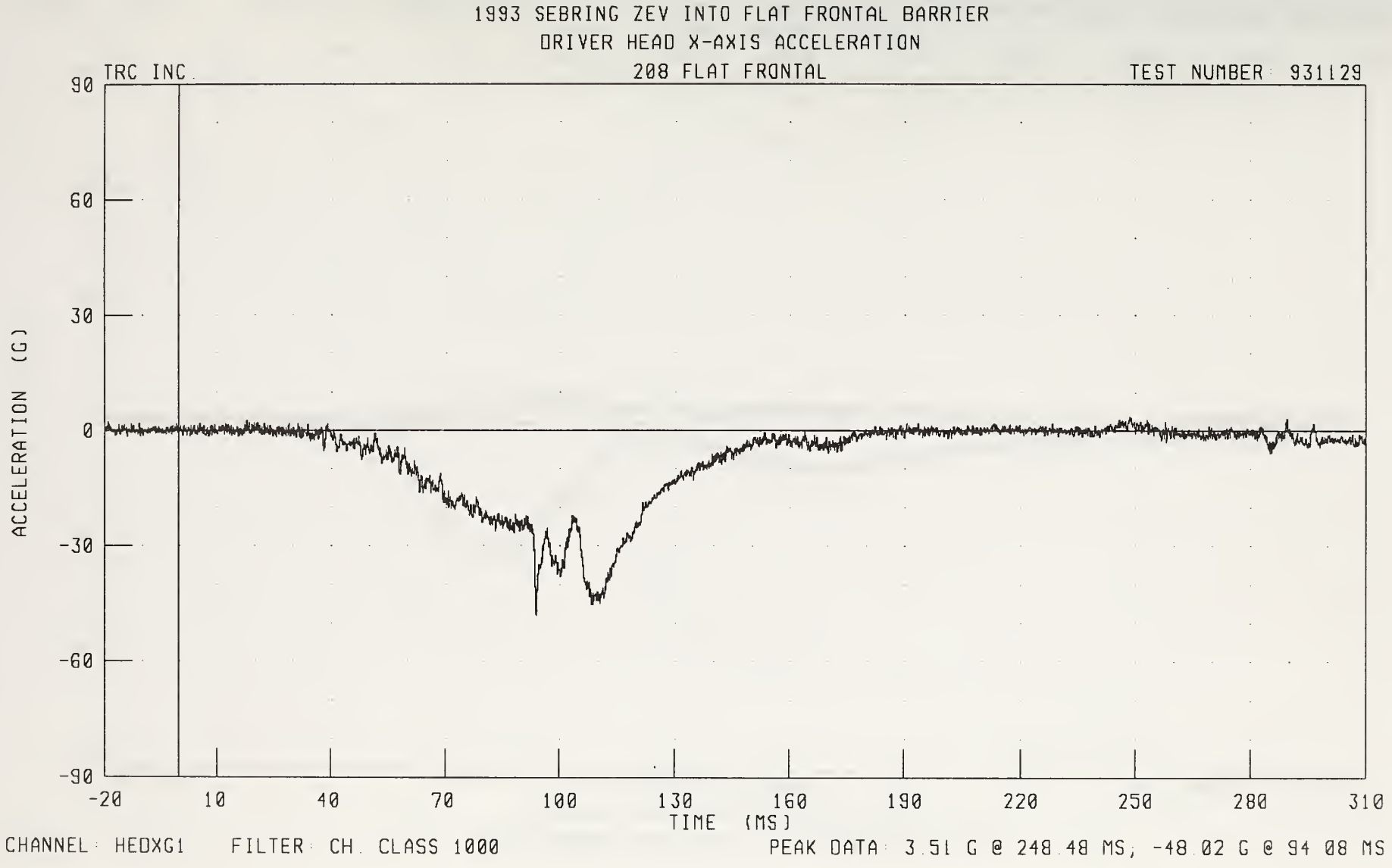
Figure A-44 PRE-TEST ORIGINAL MANUFACTURER'S RECOMMENDED TIRE PRESSURE LABEL

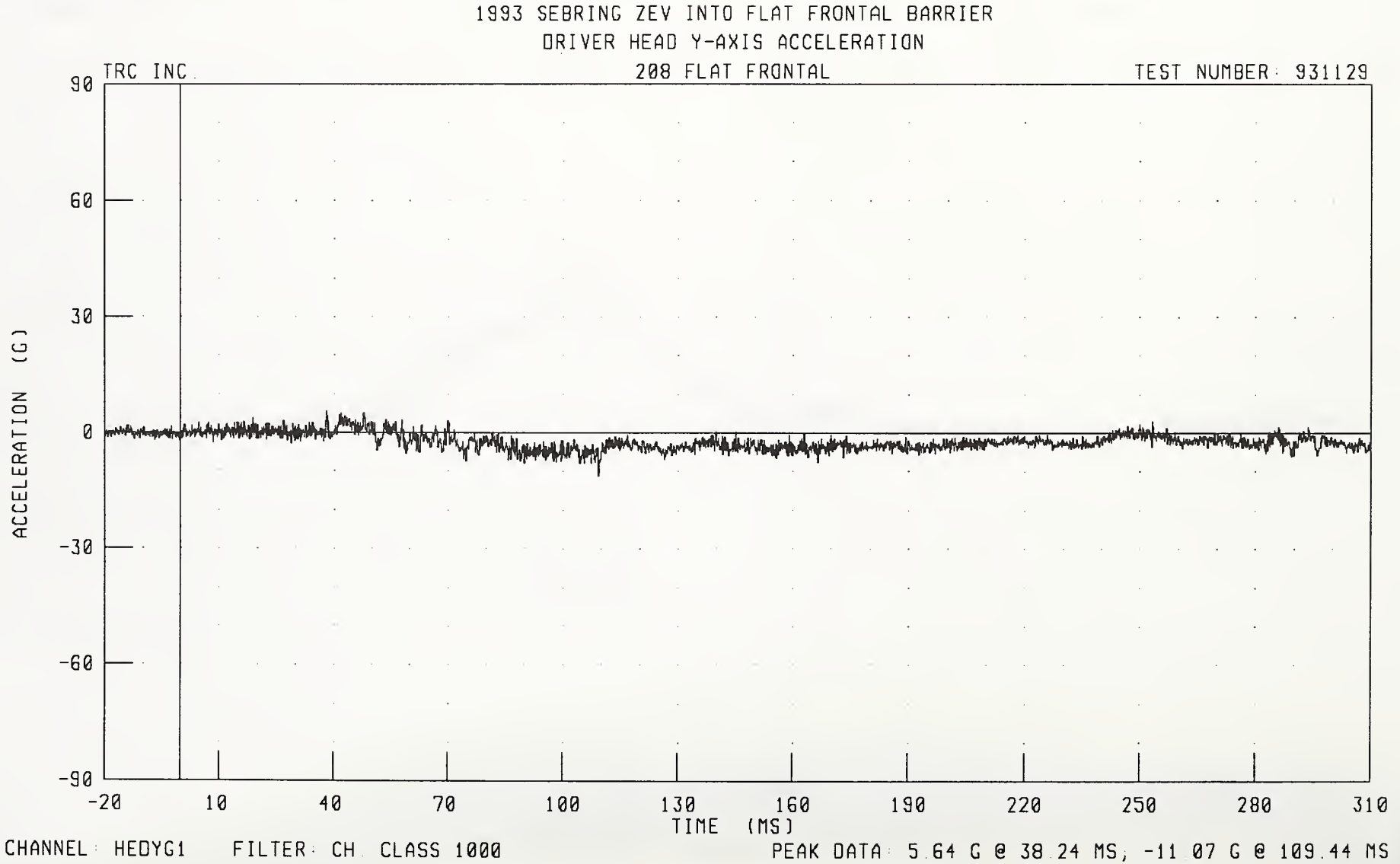
APPENDIX B

DATA PLOTS

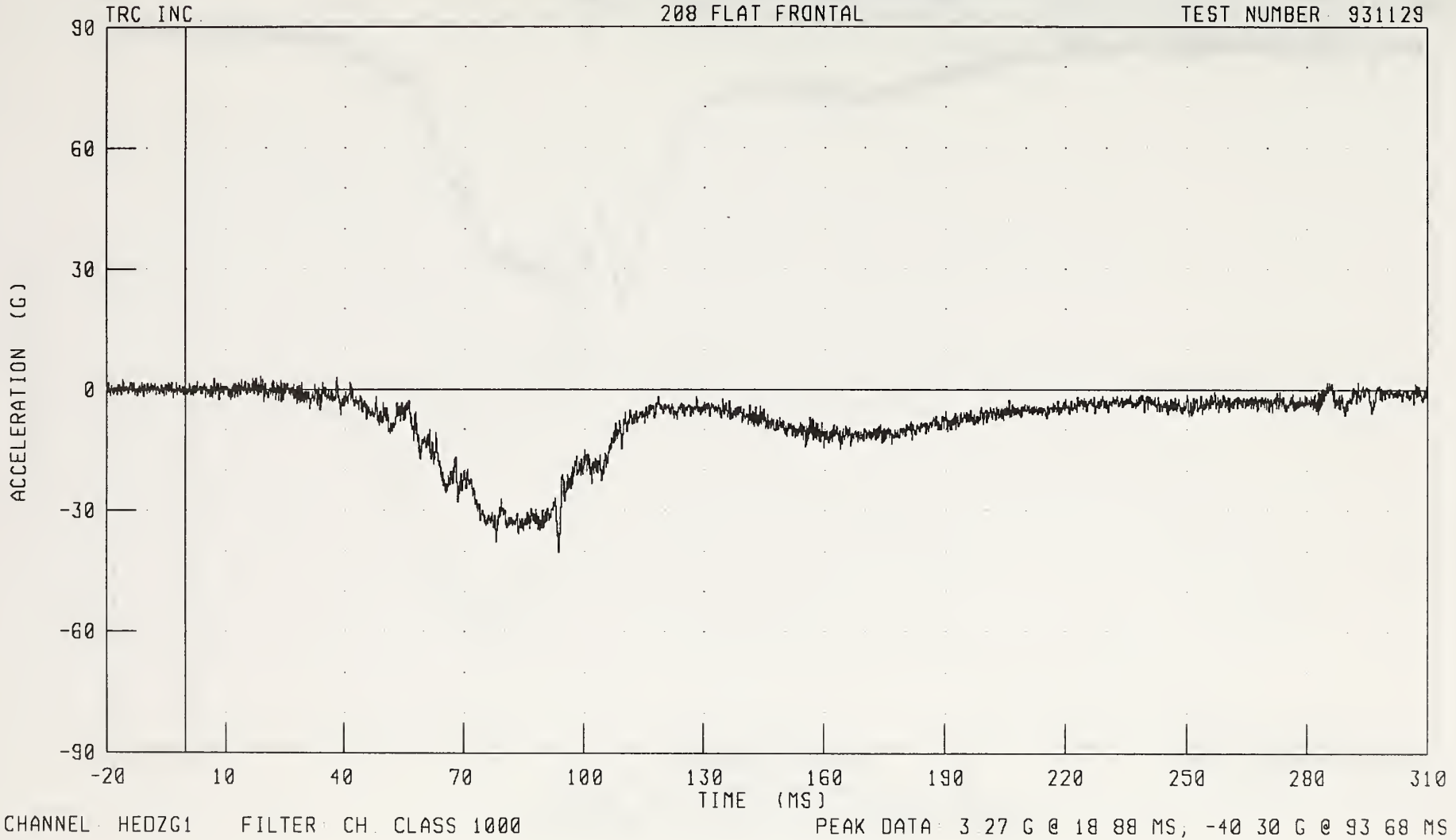
All data channels recorded questionable data from 280 to 300 milliseconds.

See DATA ACQUISITION EXPLANATIONS pages.


1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER HEAD X-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
ACCELERATION (G)
90
60
30
0
-30
-60
-90
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXG1
FILTER: CH. CLASS 1000
PEAK DATA: 3.51 G @ 248.48 MS; -48.02 G @ 94.08 MS


1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER HEAD Y-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
90
60
30
0
-30
-60
-90
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG1
FILTER: CH CLASS 1000
PEAK DATA: 5.64 G @ 38.24 MS, -11.07 G @ 109.44 MS

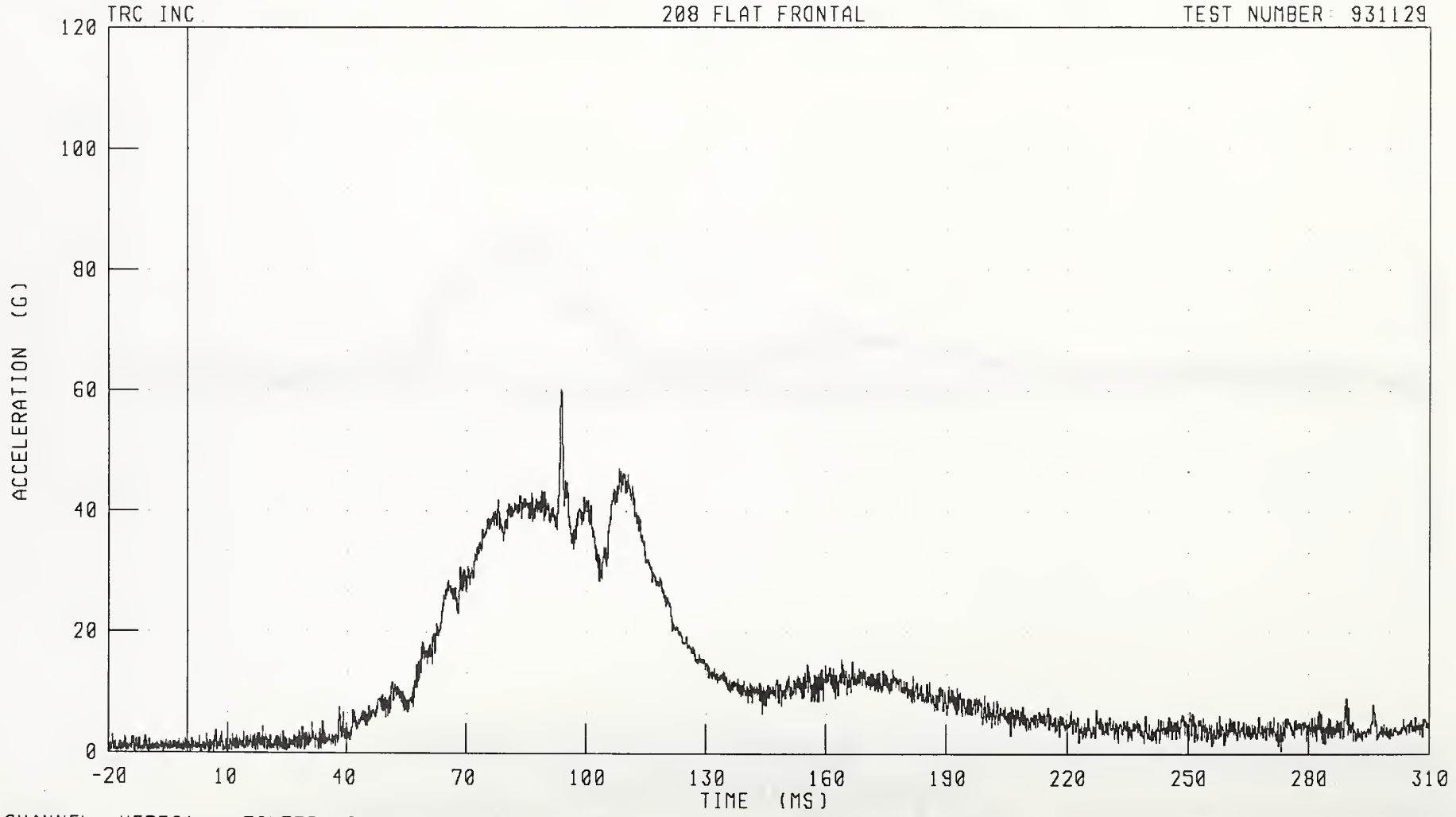
1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER HEAD Z-AXIS ACCELERATION



CHANNEL HEDZG1 FILTER CH CLASS 1000

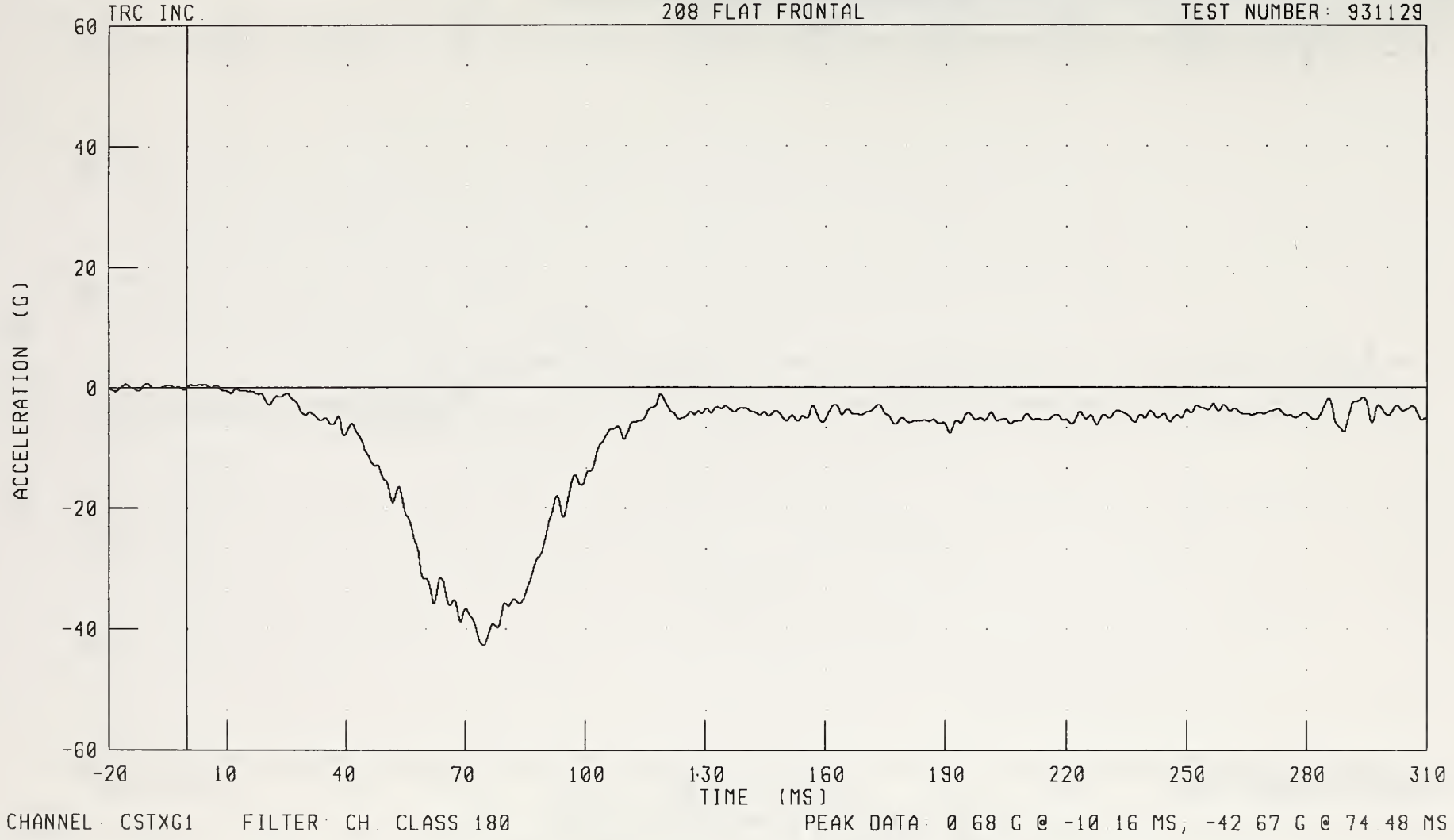
PEAK DATA 3 27 G @ 18 88 MS, -40 30 G @ 93 68 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER HEAD RESULTANT ACCELERATION

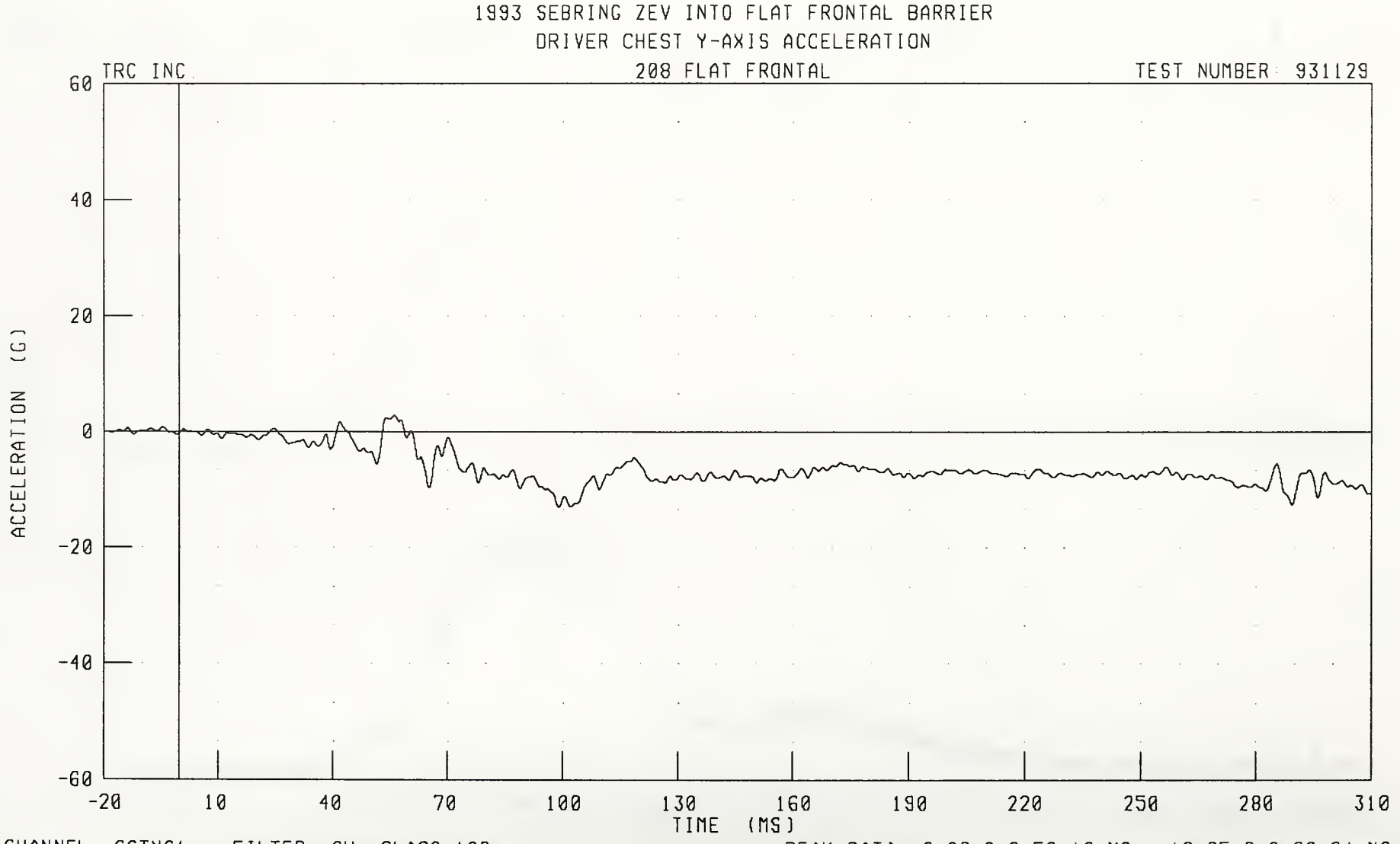


CHANNEL: HEDRG1 FILTER: CH. CLASS 1000 PEAK DATA: 60.21 G @ 93.92 MS, 0.16 G @ 3.28 MS

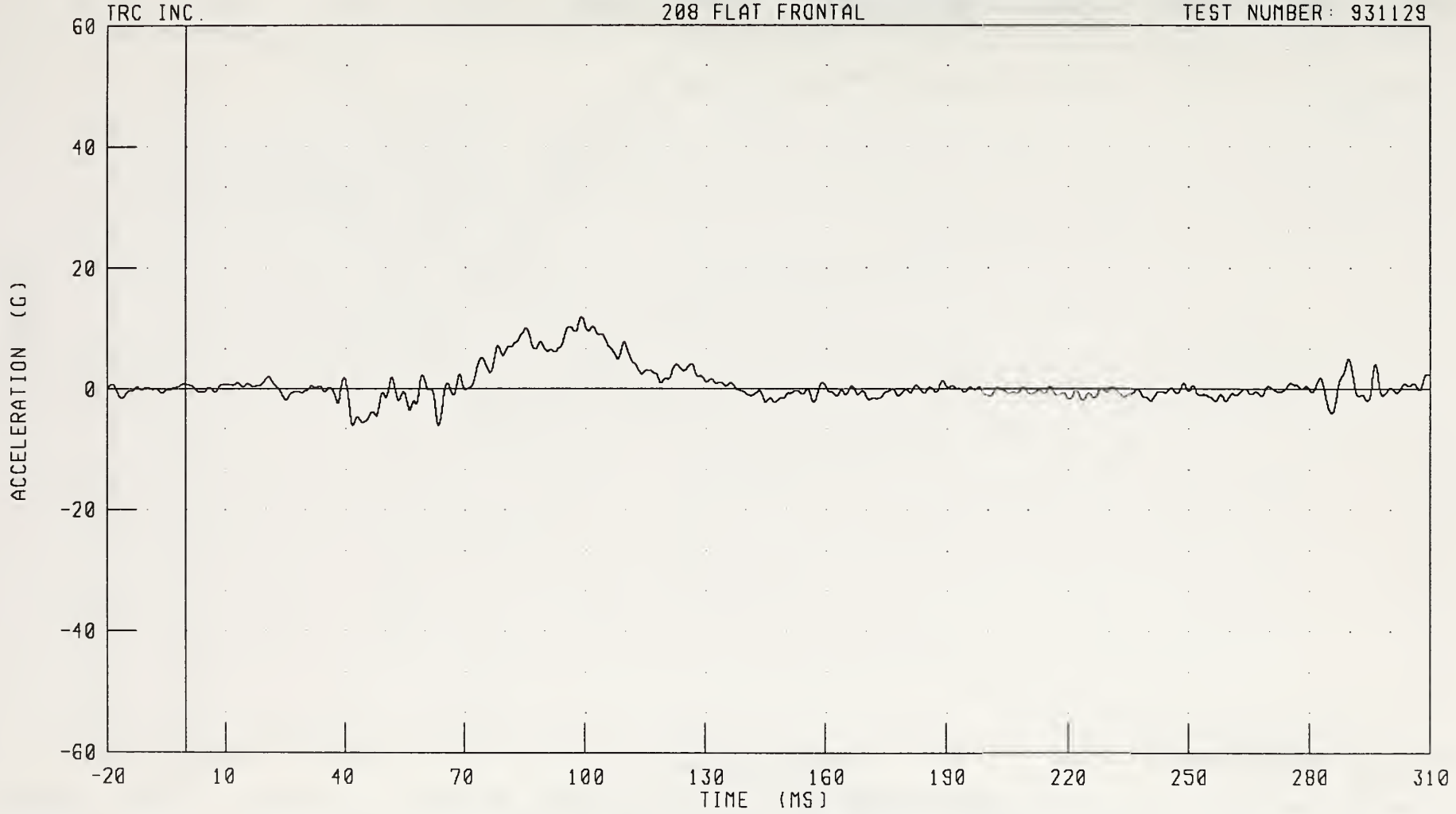
1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER CHEST X-AXIS ACCELERATION



CHANNEL CSTXG1 FILTER CH CLASS 180 PEAK DATA 0 68 G @ -10 16 MS, -42 67 G @ 74 48 MS

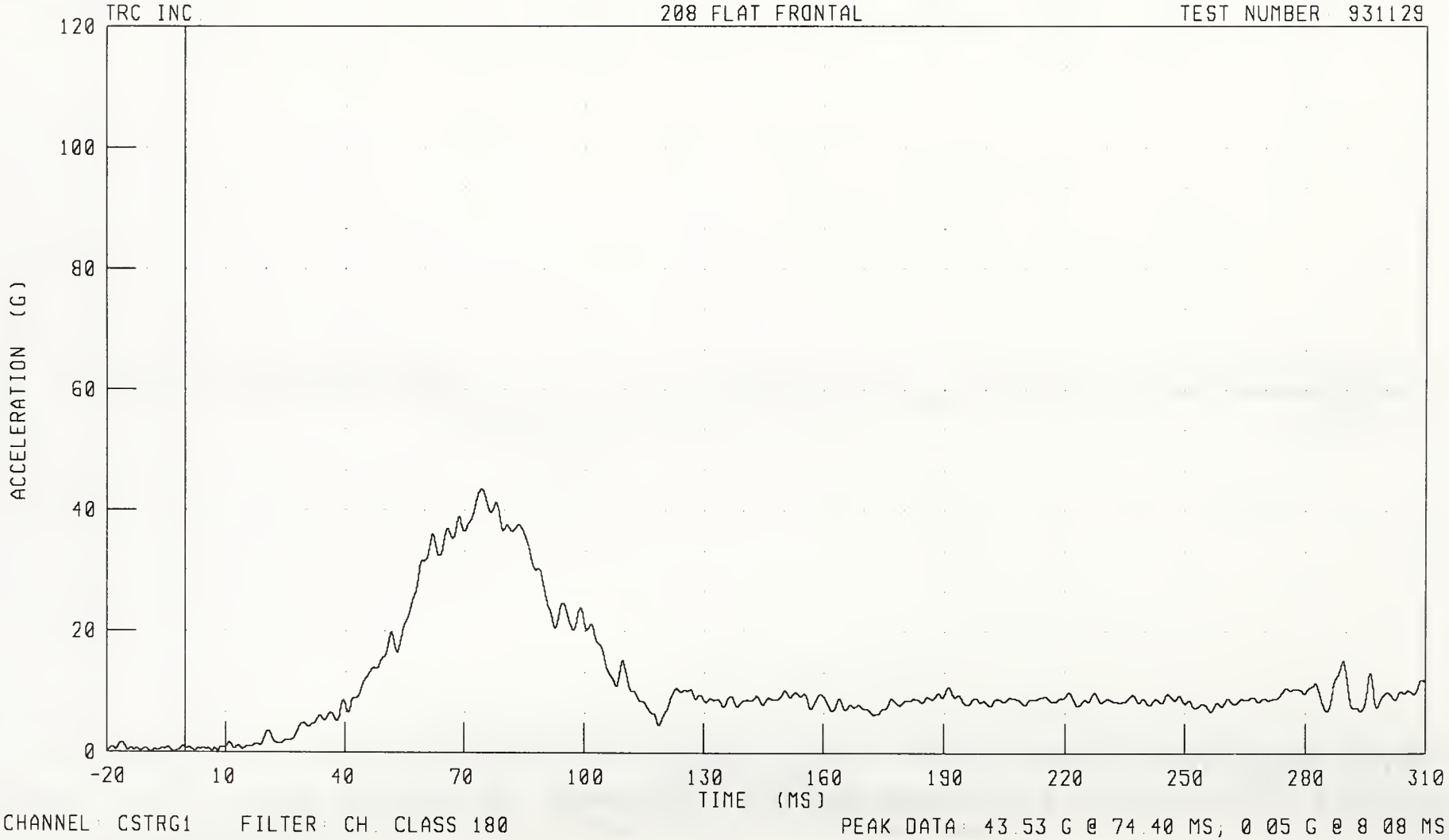

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER CHEST Y-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYG1
FILTER: CH. CLASS 180
PEAK DATA: 2.89 G @ 56.16 MS; -12.95 G @ 99.04 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER CHEST Z-AXIS ACCELERATION

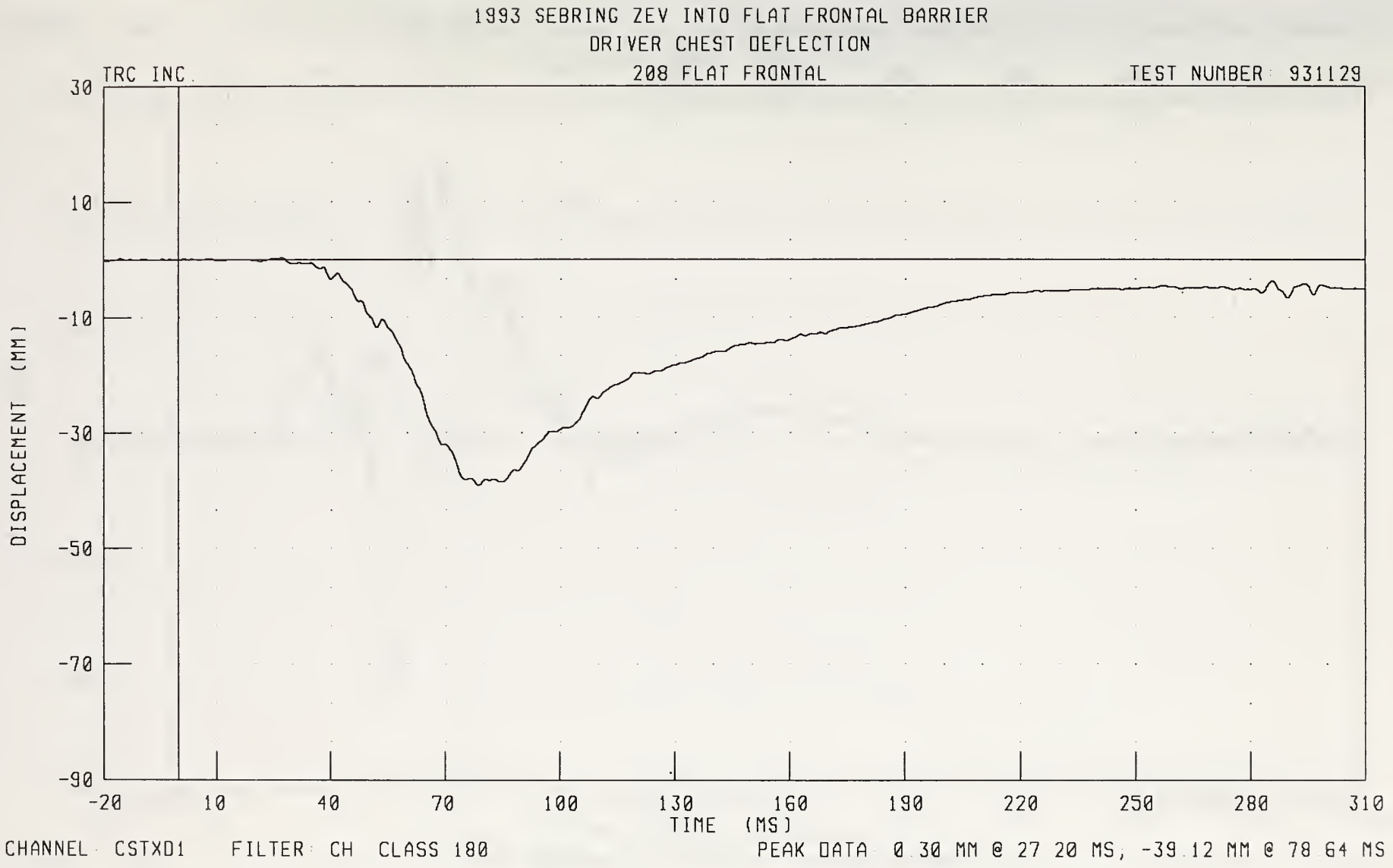


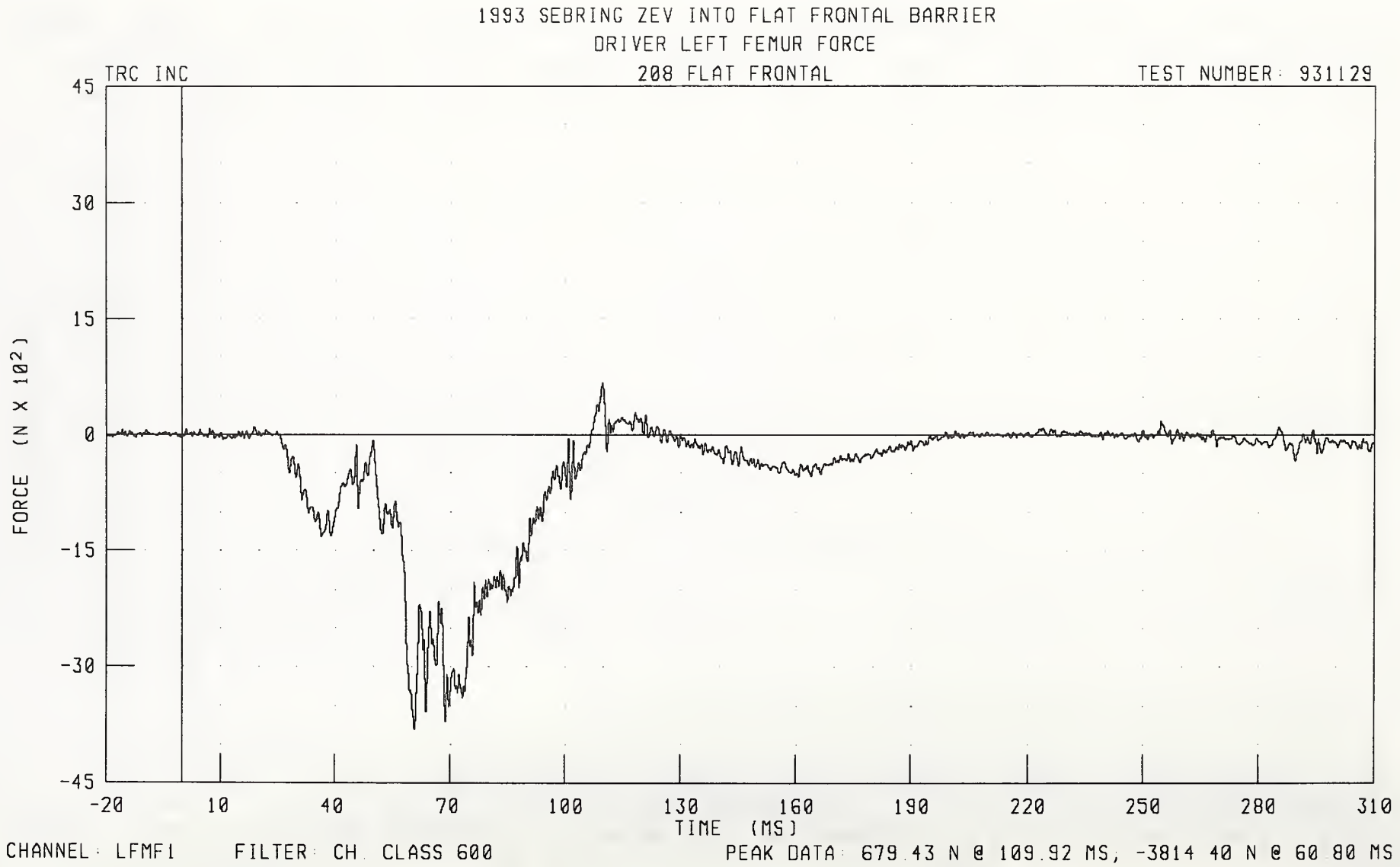
CHANNEL: CSTZG1 FILTER: CH. CLASS 180 PEAK DATA: 11 84 G @ 99 12 MS, -6 13 G @ 42 00 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER CHEST RESULTANT ACCELERATION

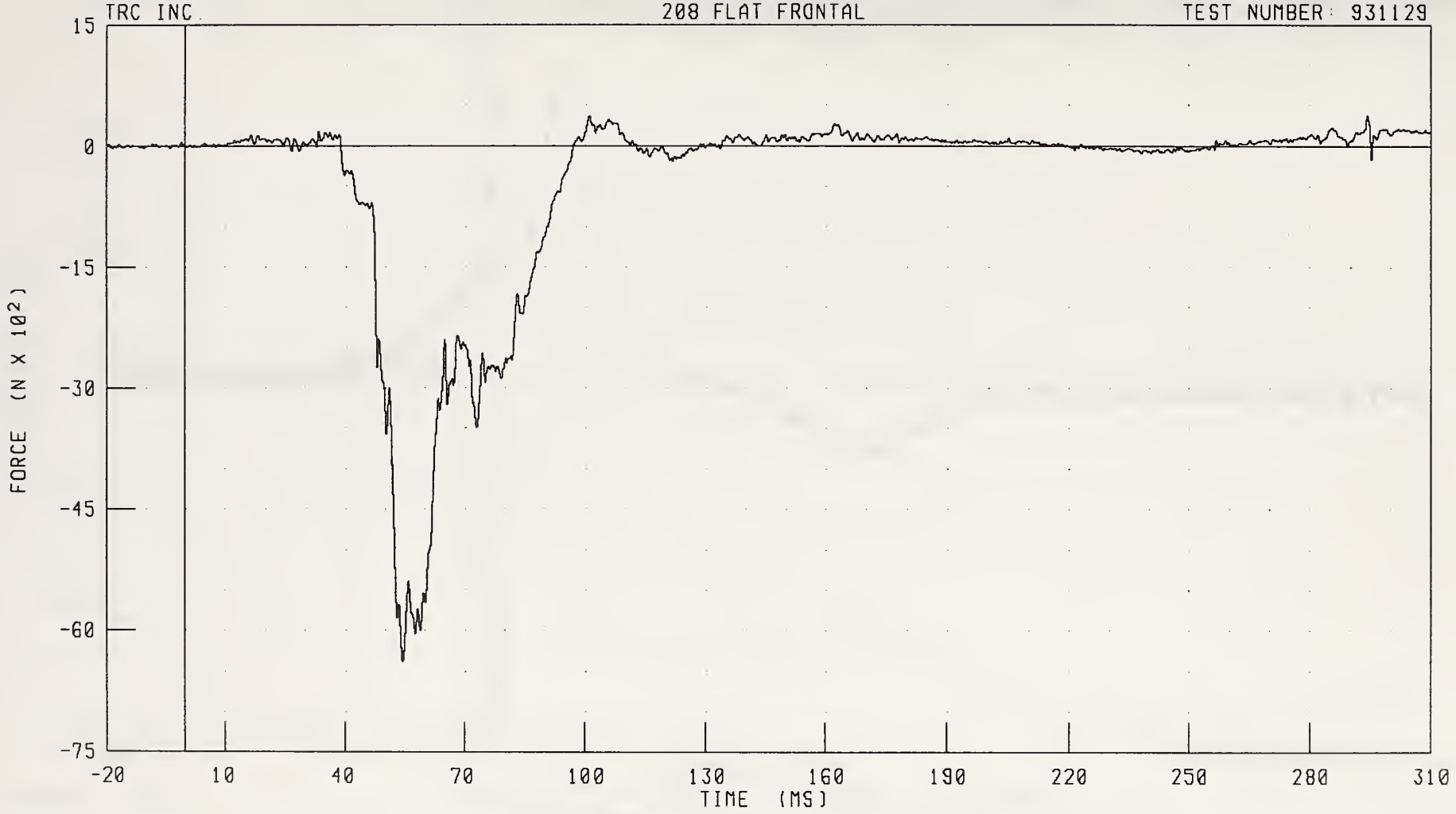


CHANNEL CSTRG1 FILTER CH CLASS 180
PEAK DATA 43.53 G @ 74.40 MS; 0.05 G @ 8.08 MS


1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER CHEST DEFLECTION
TRC INC
208 FLAT FRONTAL
TEST NUMBER 931129
30
10
-10
-30
-50
-70
-90
DISPLACEMENT (MM)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL CSTXD1 FILTER CH CLASS 180
PEAK DATA 0.30 MM @ 27.20 MS, -39.12 MM @ 78.64 MS

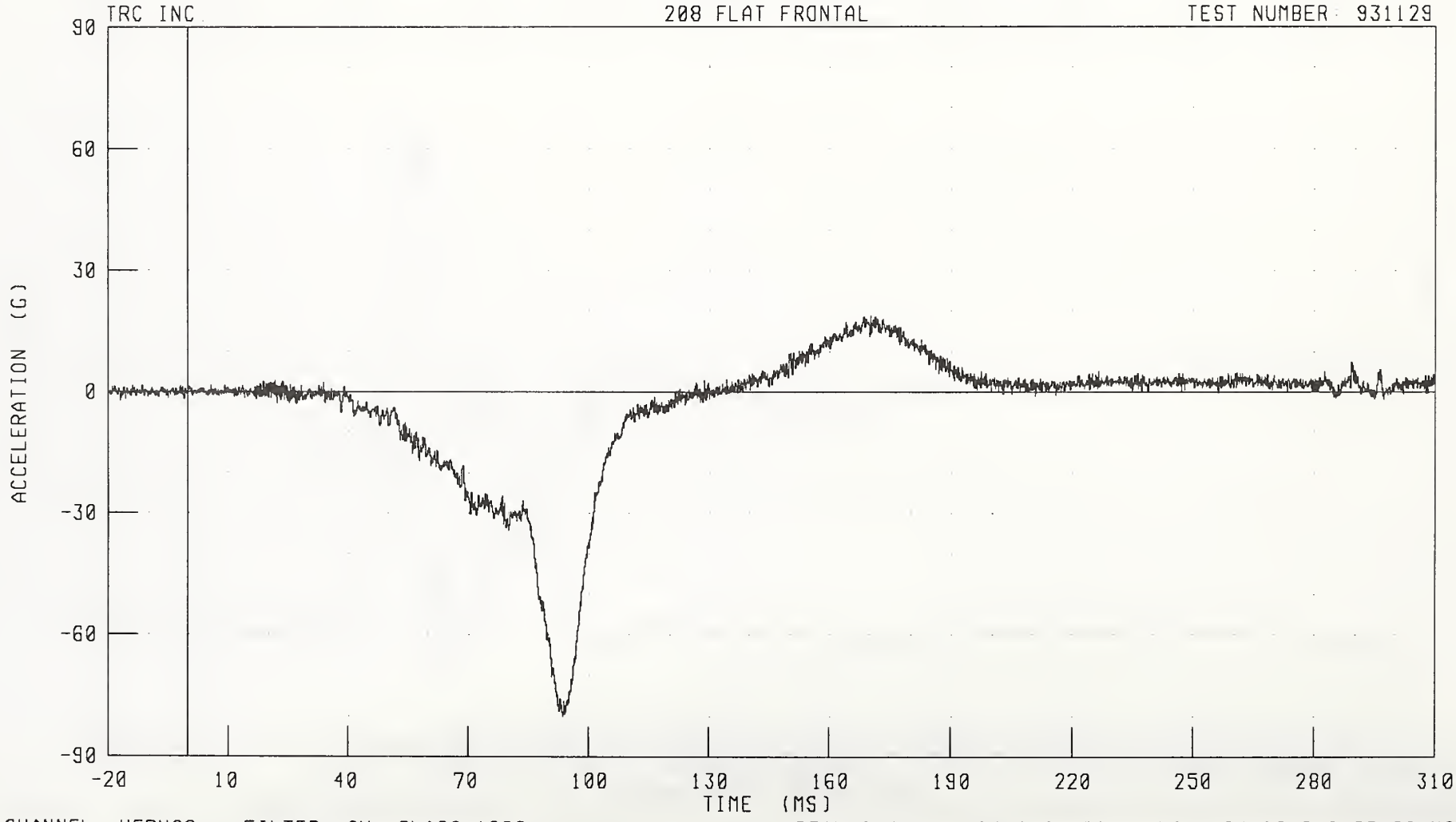

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER LEFT FEMUR FORCE
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
45
30
15
0
-15
-30
-45
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF1
FILTER: CH CLASS 600
PEAK DATA: 679.43 N @ 109.92 MS, -3814.40 N @ 60.80 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DRIVER RIGHT FEMUR FORCE



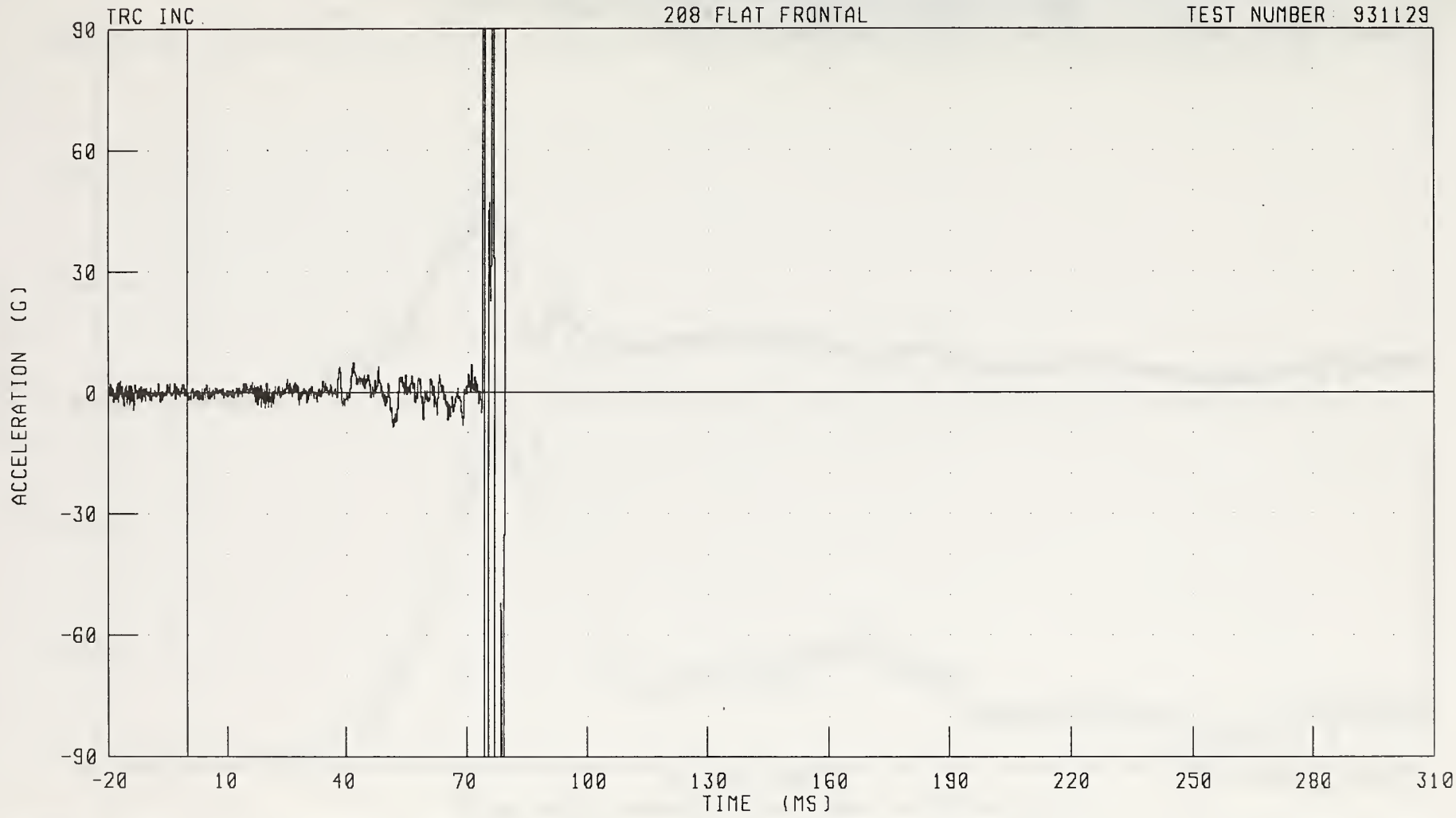
CHANNEL: RFMF1 FILTER: CH CLASS 600 PEAK DATA: 384 06 N @ 294 32 MS, -6389 62 N @ 54 48 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION



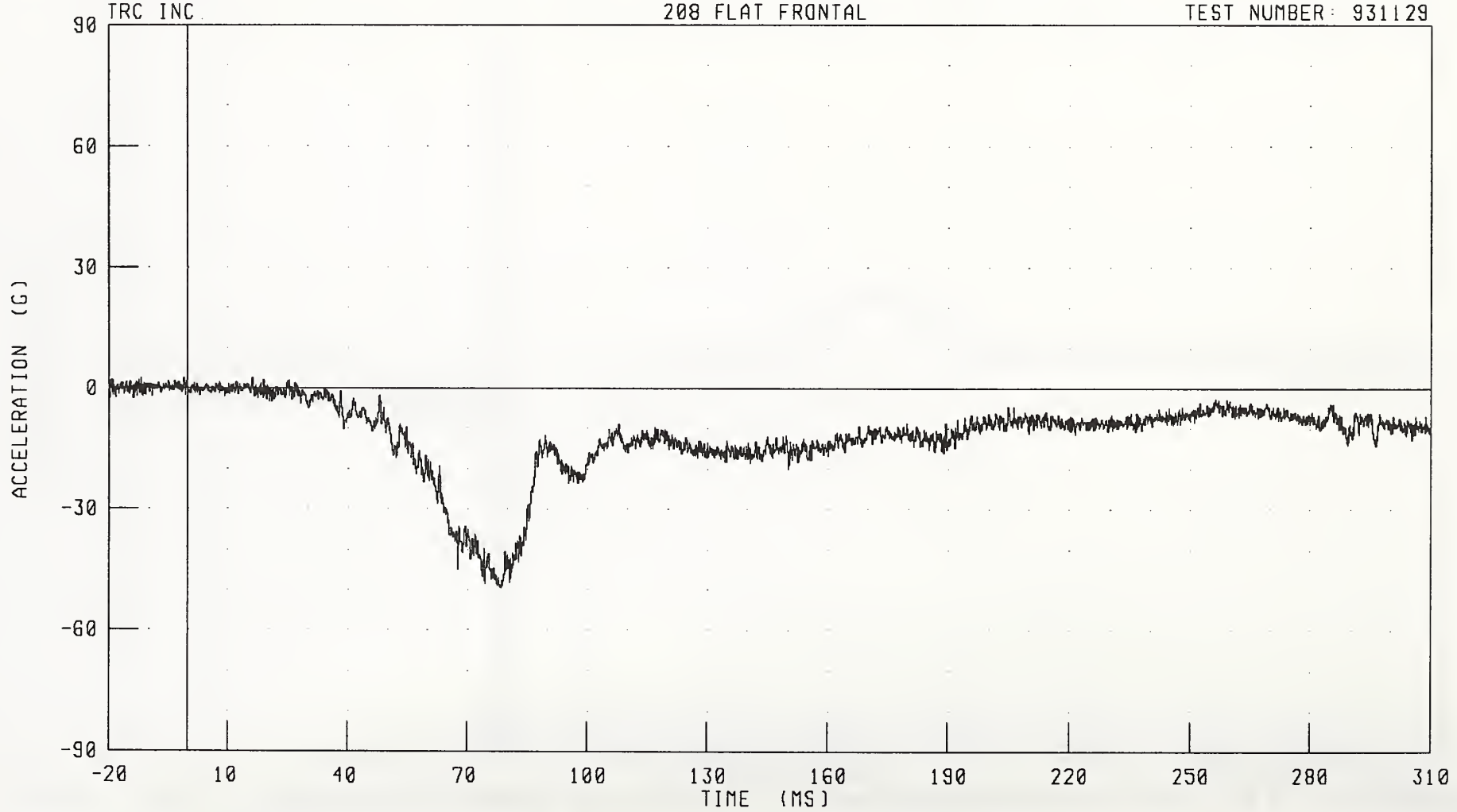
CHANNEL: HEDXG2 FILTER: CH. CLASS 1000 PEAK DATA: 18.78 G @ 170.32 MS, -80.06 G @ 93.60 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION



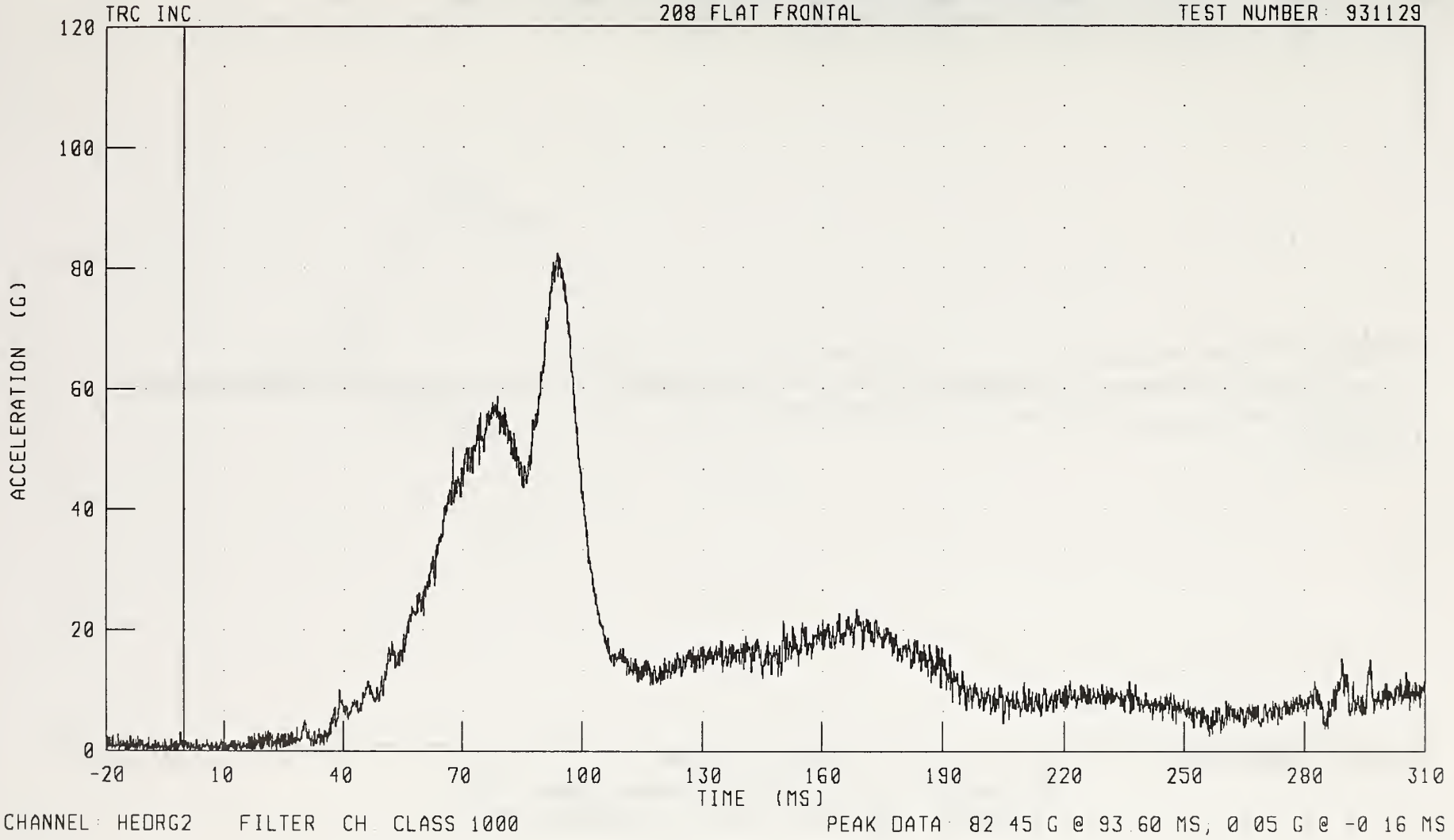
CHANNEL: HEDYG2 FILTER: CH. CLASS 1000 PEAK DATA: 443.10 G @ 80.24 MS; -429.01 G @ 74.48 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION



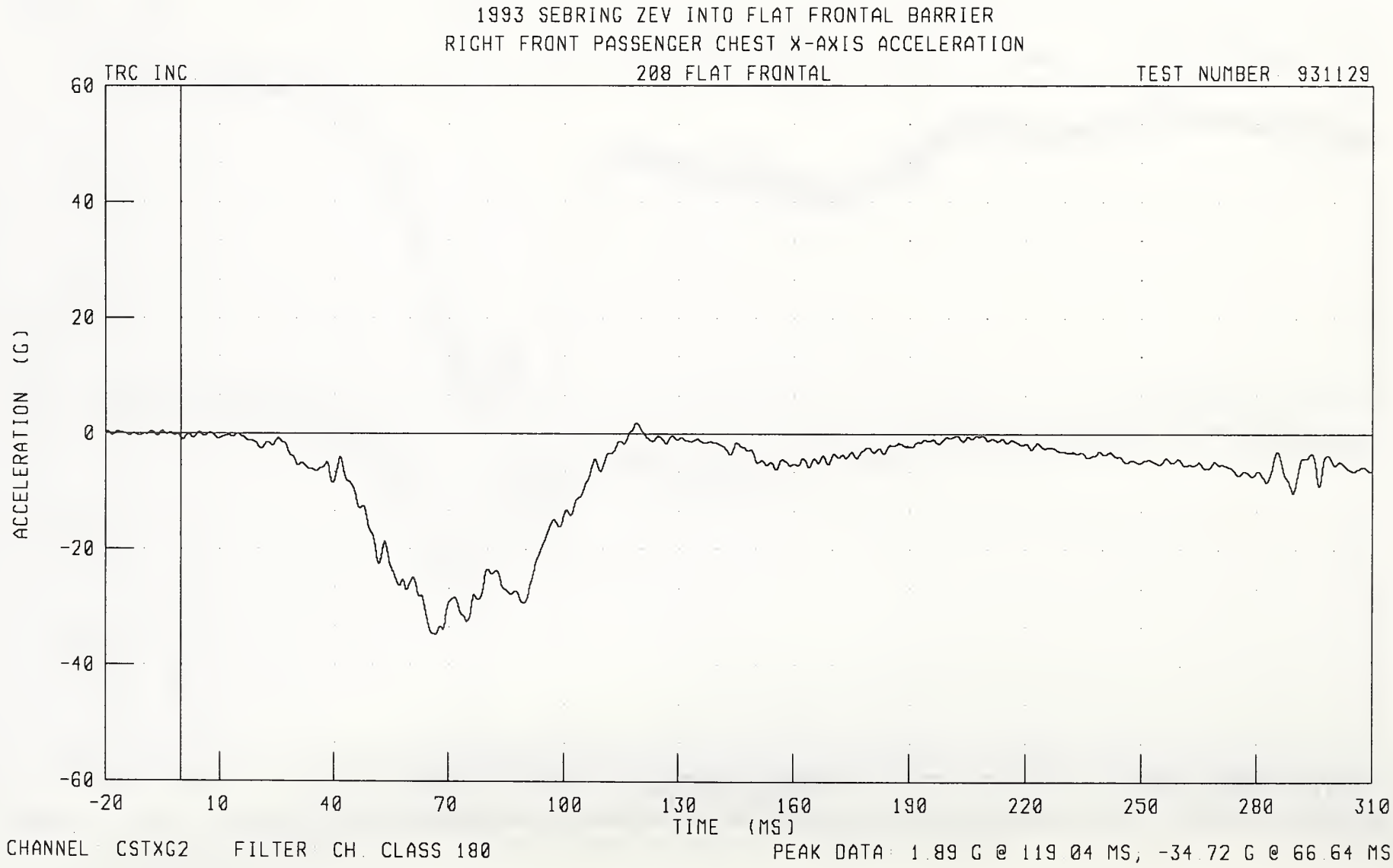
CHANNEL: HEDZG2 FILTER: CH. CLASS 1000 PEAK DATA: 2.60 G @ -1 04 MS, -49.40 G @ 78 48 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION

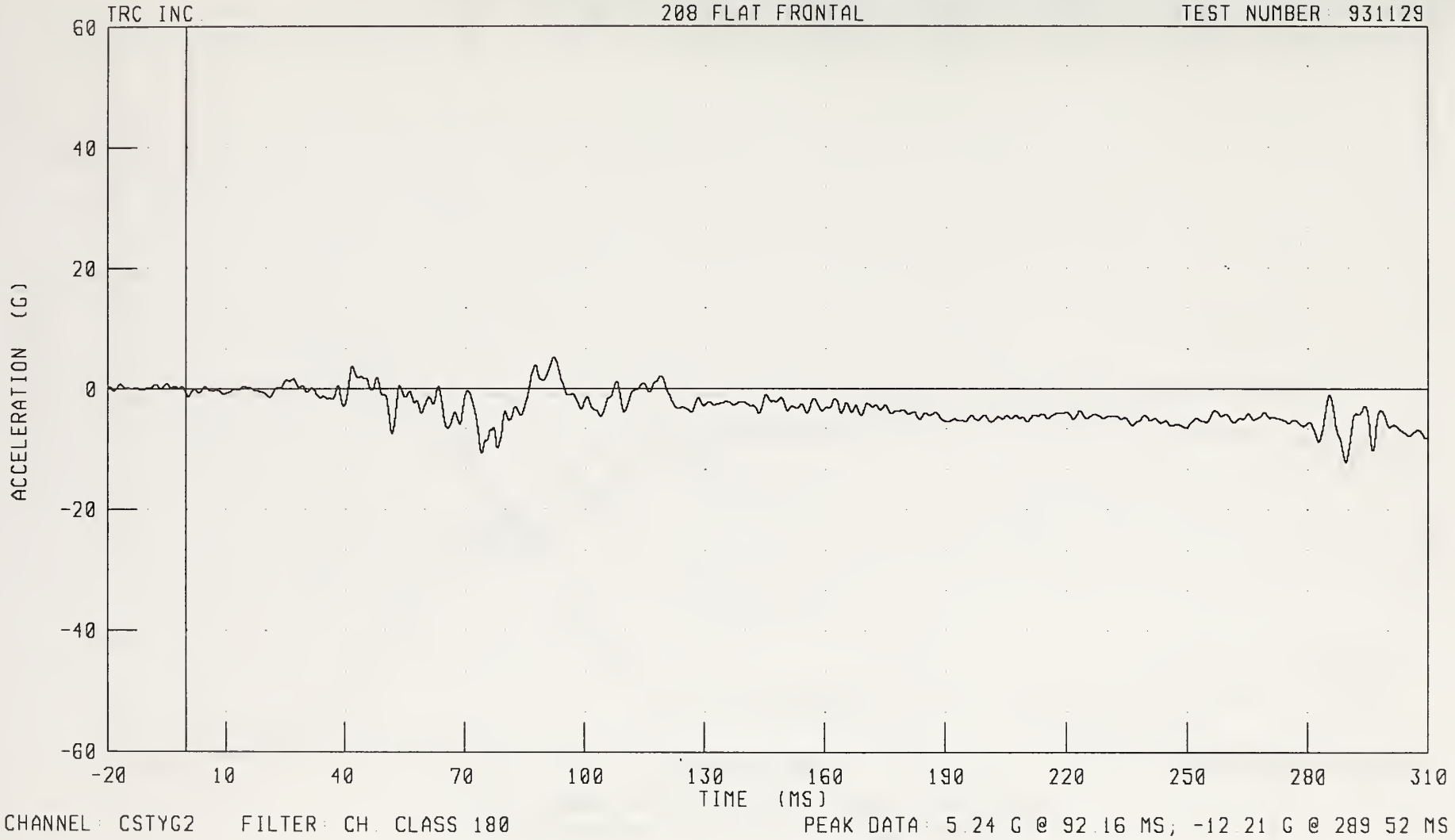


CHANNEL: HEDRG2 FILTER CH CLASS 1000

PEAK DATA: 82.45 G @ 93.60 MS, 0.05 G @ -0.16 MS

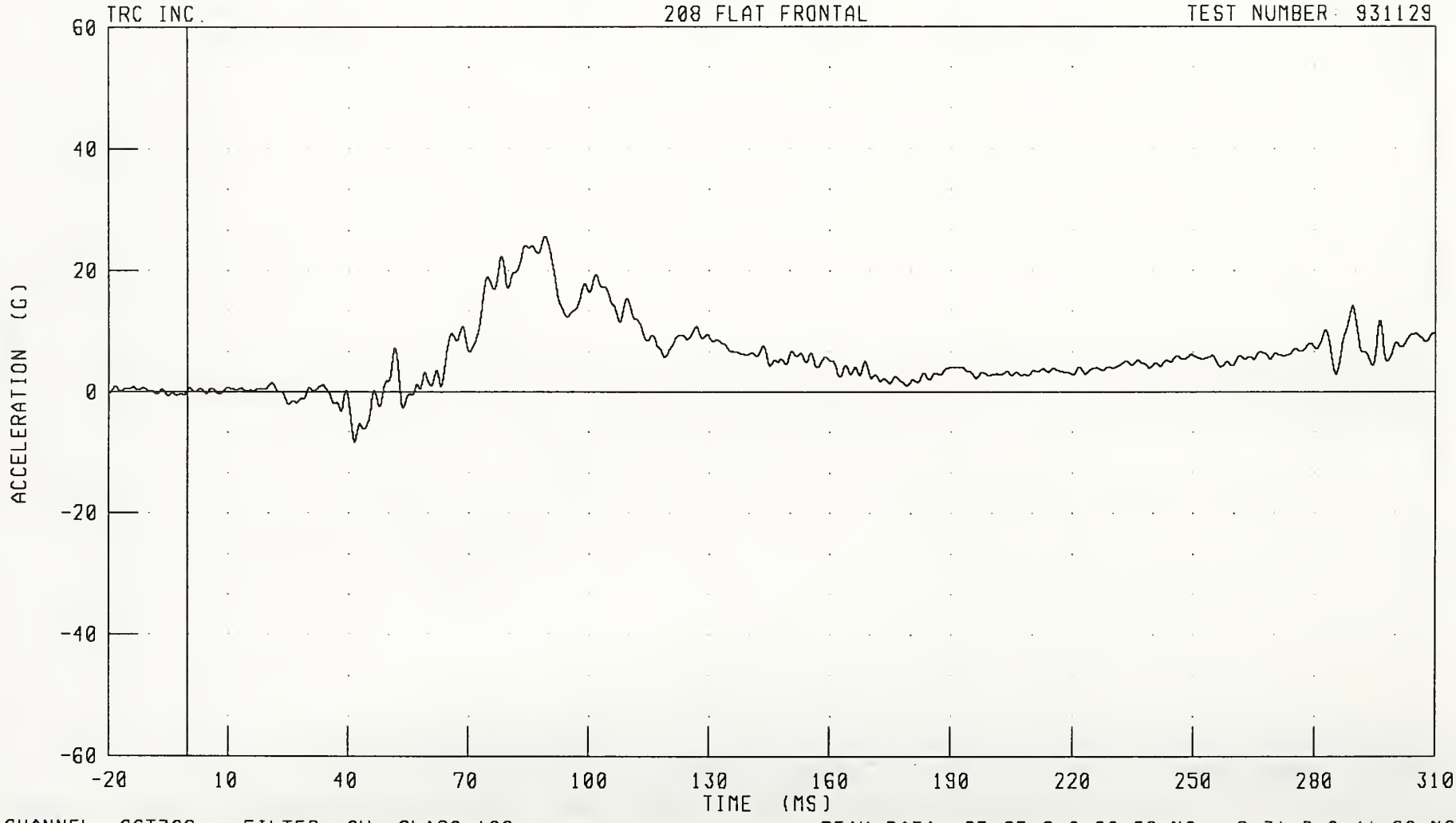

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER 931129
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL CSTXG2 FILTER CH CLASS 180
PEAK DATA 1.89 G @ 119.04 MS, -34.72 G @ 66.64 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION



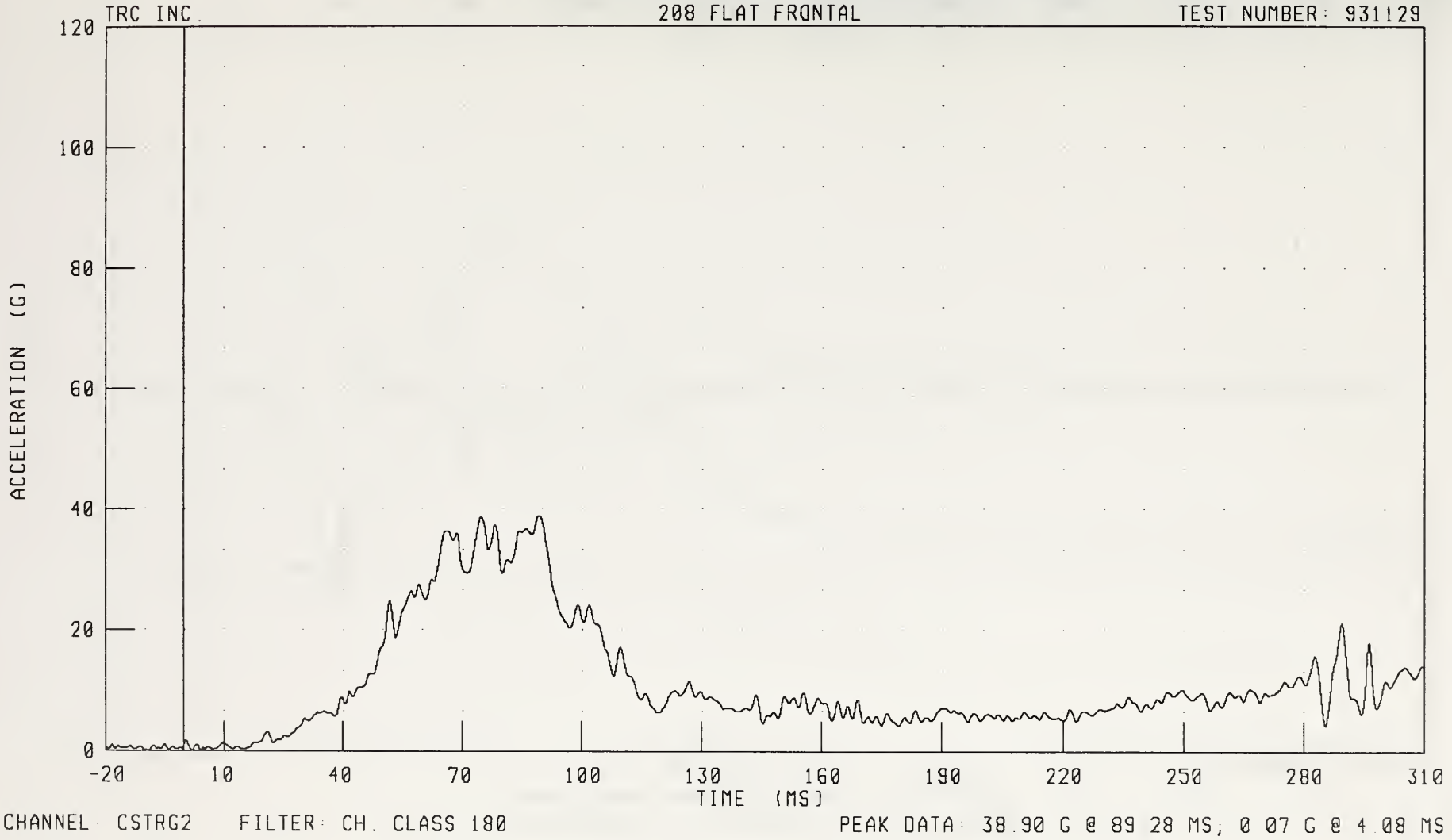
CHANNEL: CSTYG2 FILTER: CH CLASS 180 PEAK DATA: 5.24 G @ 92.16 MS; -12.21 G @ 289.52 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION

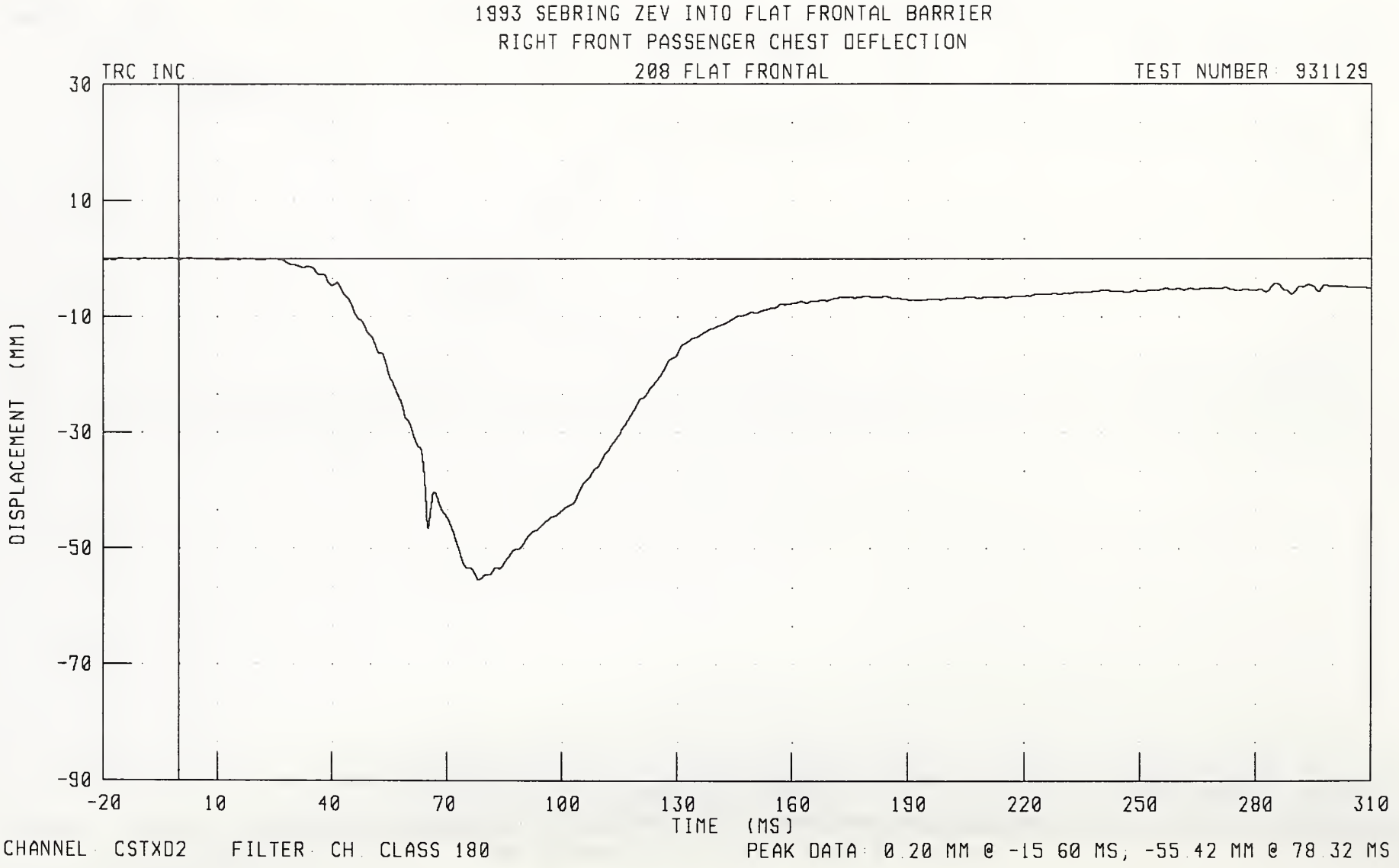


CHANNEL: CSTZG2 FILTER: CH. CLASS 180 PEAK DATA: 25.65 G @ 89.20 MS; -8.31 G @ 41.68 MS

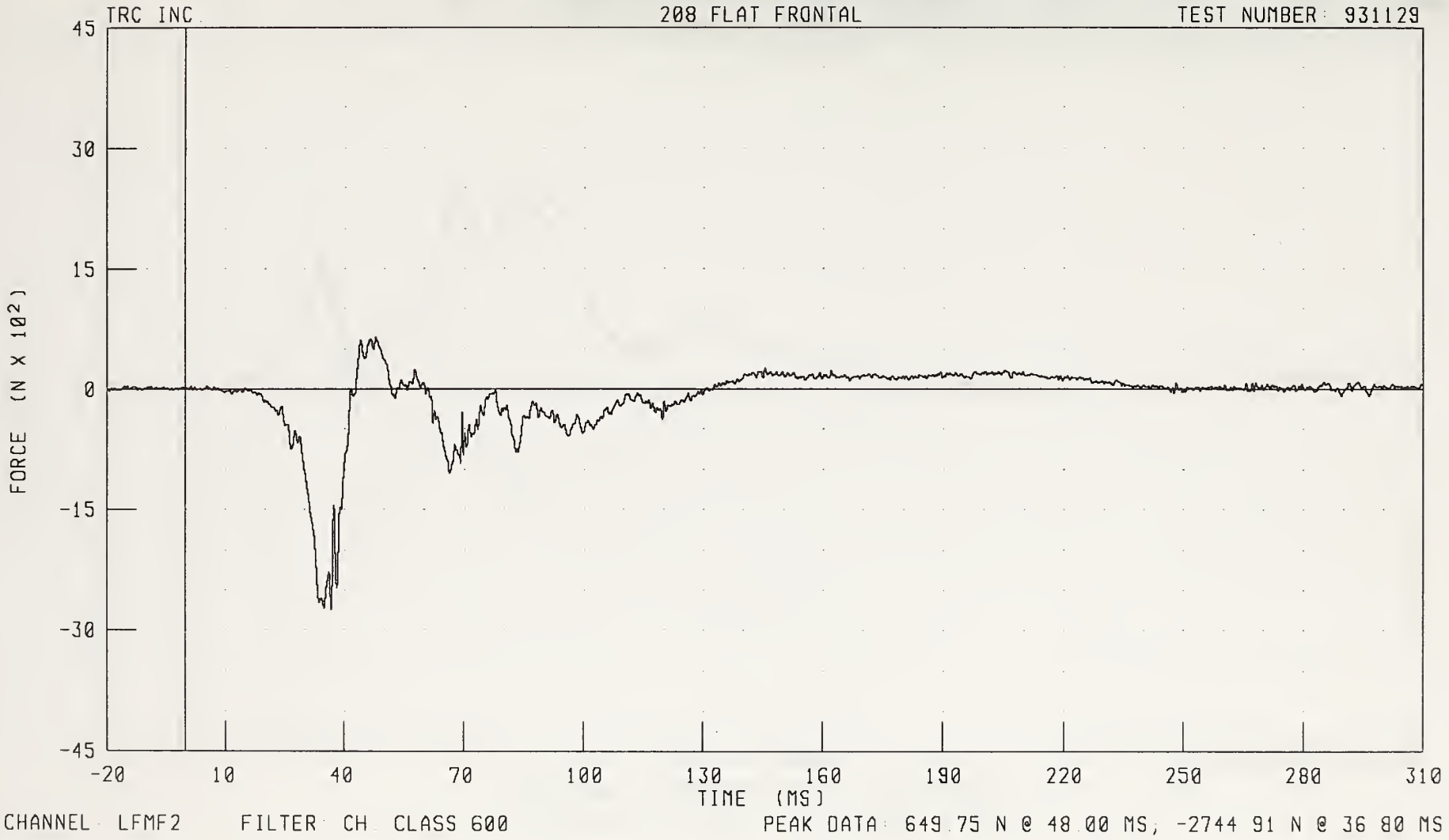
1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION



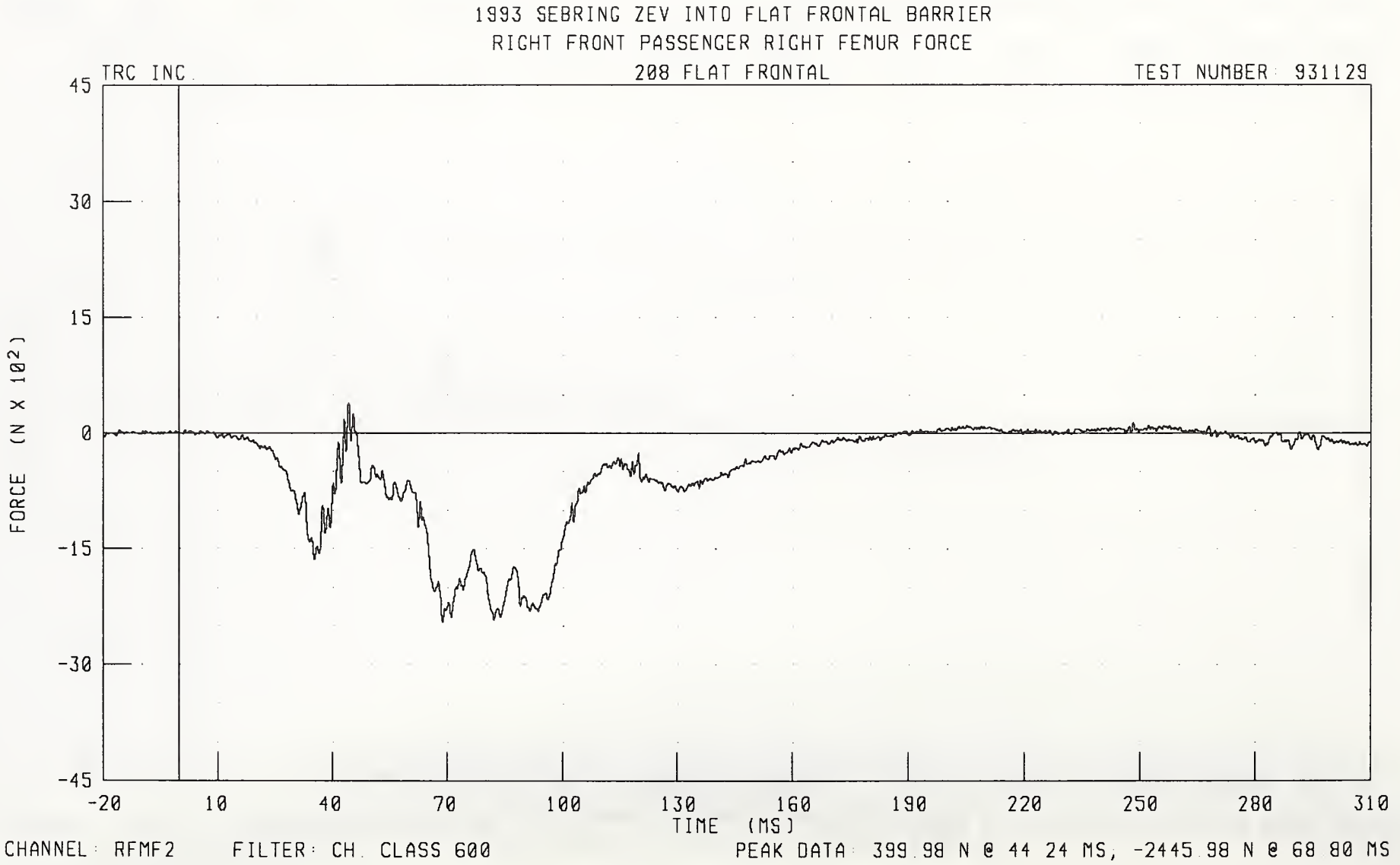
CHANNEL: CSTRG2 FILTER: CH. CLASS 180 PEAK DATA: 38.90 G @ 89.28 MS; 0.07 G @ 4.08 MS

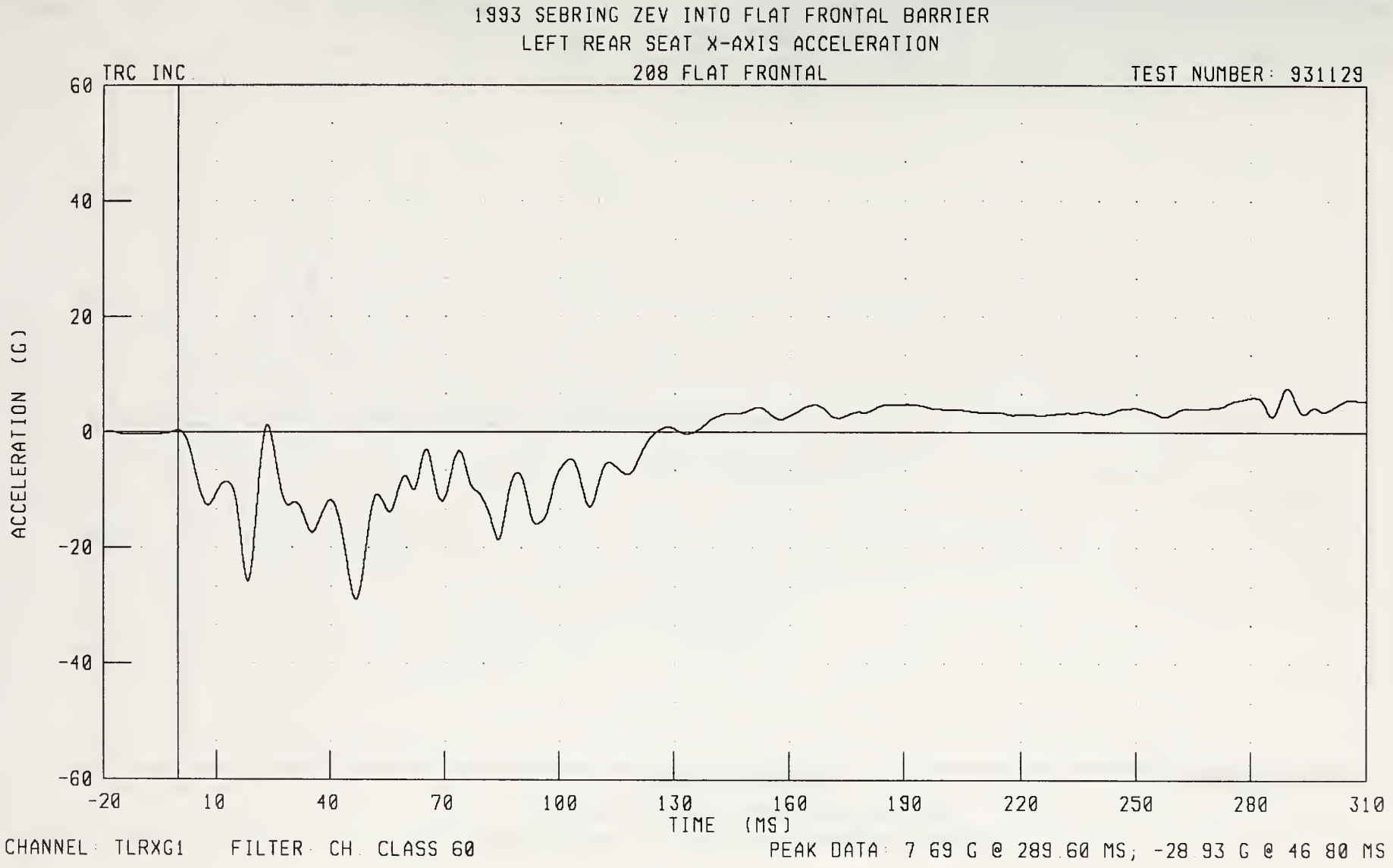

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER CHEST DEFLECTION
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
30
10
-10
-30
-50
-70
-90
DISPLACEMENT (MM)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD2 FILTER: CH CLASS 180
PEAK DATA: 0.20 MM @ -15.60 MS, -55.42 MM @ 78.32 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER LEFT FEMUR FORCE

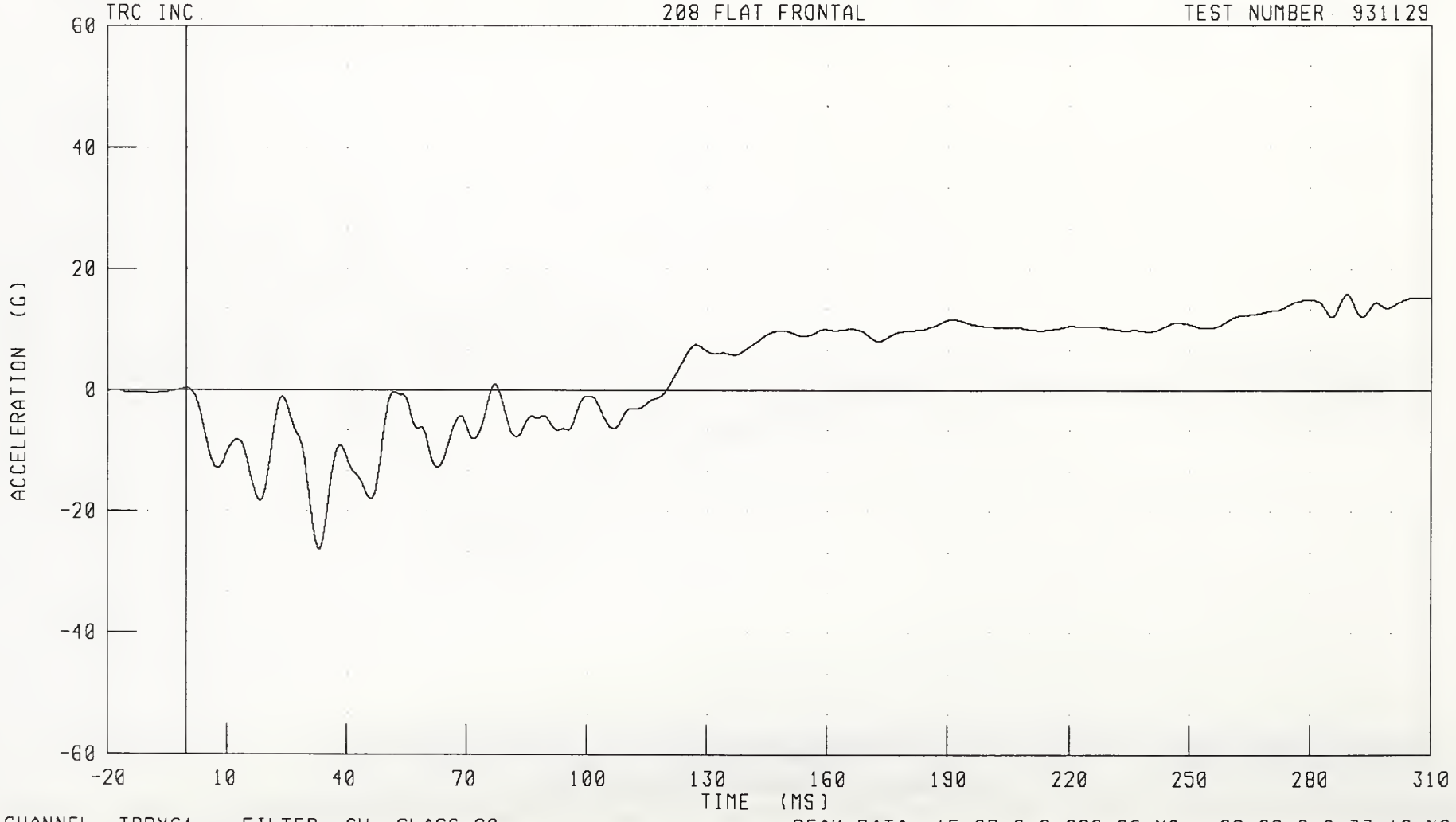


CHANNEL: LFMF2 FILTER: CH CLASS 600 PEAK DATA: 649.75 N @ 48.00 MS, -2744.91 N @ 36.80 MS


1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
45
30
15
0
-15
-30
-45
FORCE (N X 10²)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF2
FILTER: CH. CLASS 600
PEAK DATA: 399.98 N @ 44.24 MS, -2445.98 N @ 68.80 MS

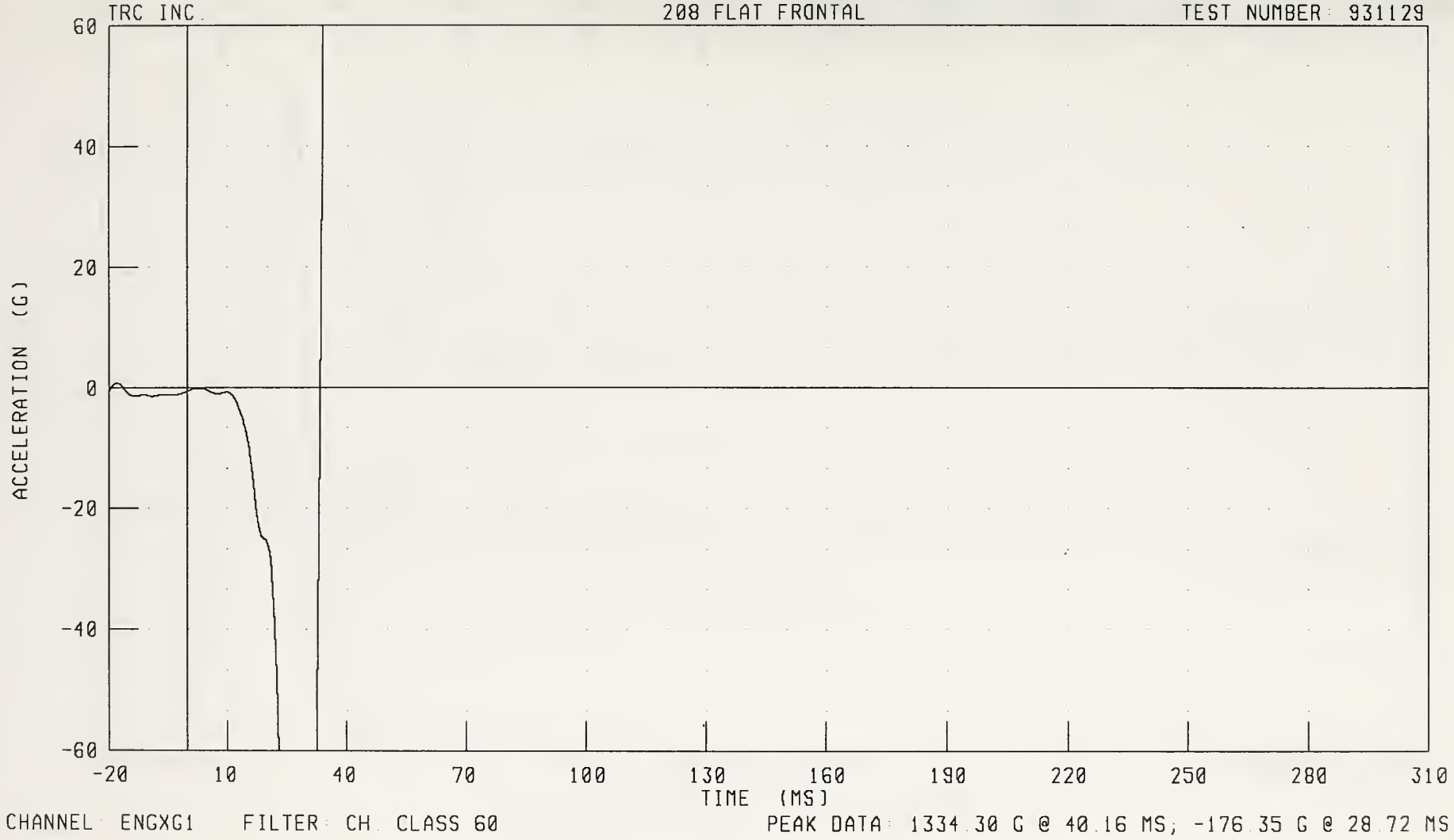

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
LEFT REAR SEAT X-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
60
40
20
0
-20
-40
-60
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: TLRXG1
FILTER: CH CLASS 60
PEAK DATA: 7 69 G @ 289 60 MS; -28 93 G @ 46 80 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT REAR SEAT X-AXIS ACCELERATION

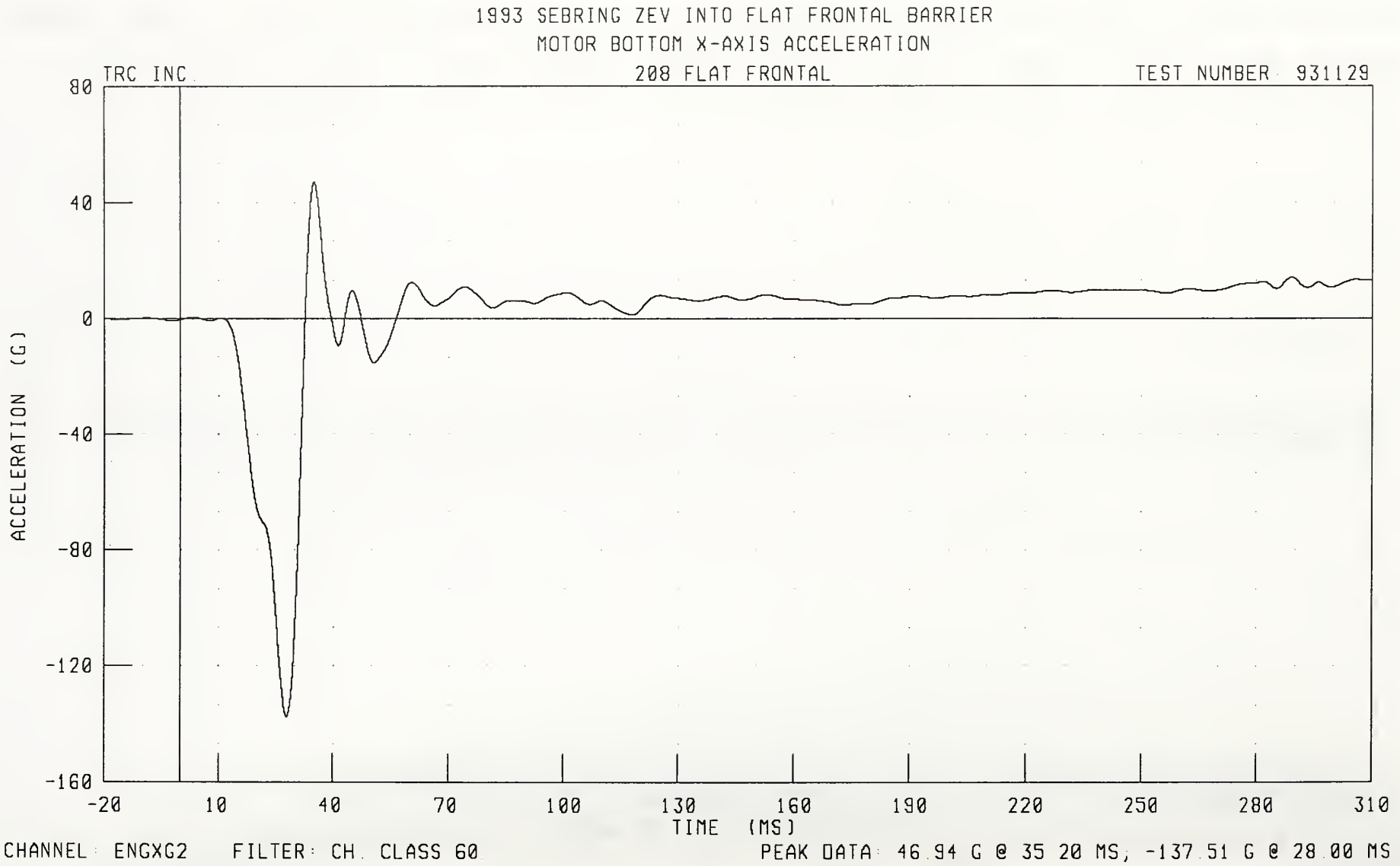


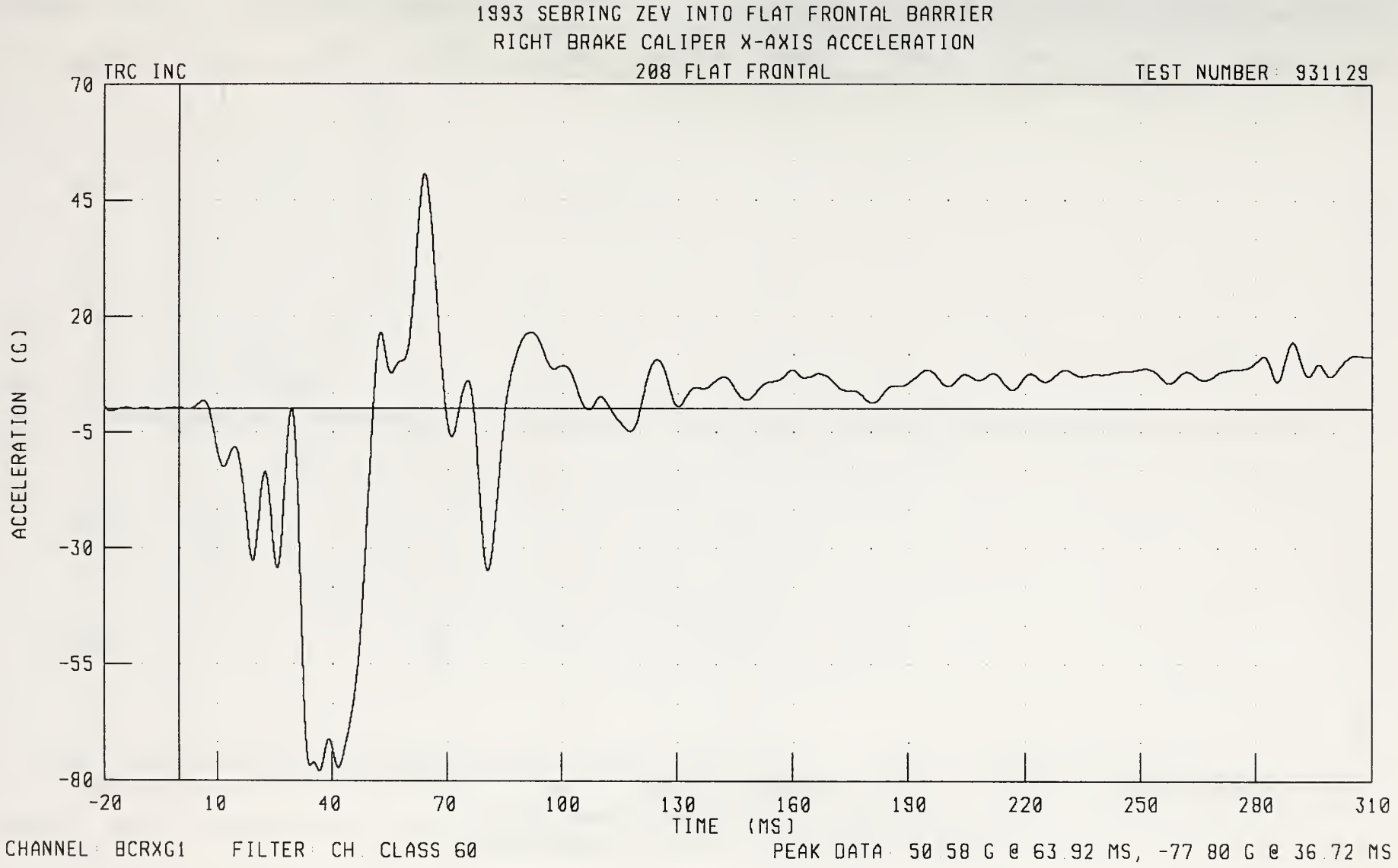
CHANNEL: TRRXG1 FILTER: CH. CLASS 60 PEAK DATA: 15.87 G @ 289.20 MS; -26.22 G @ 33.12 MS

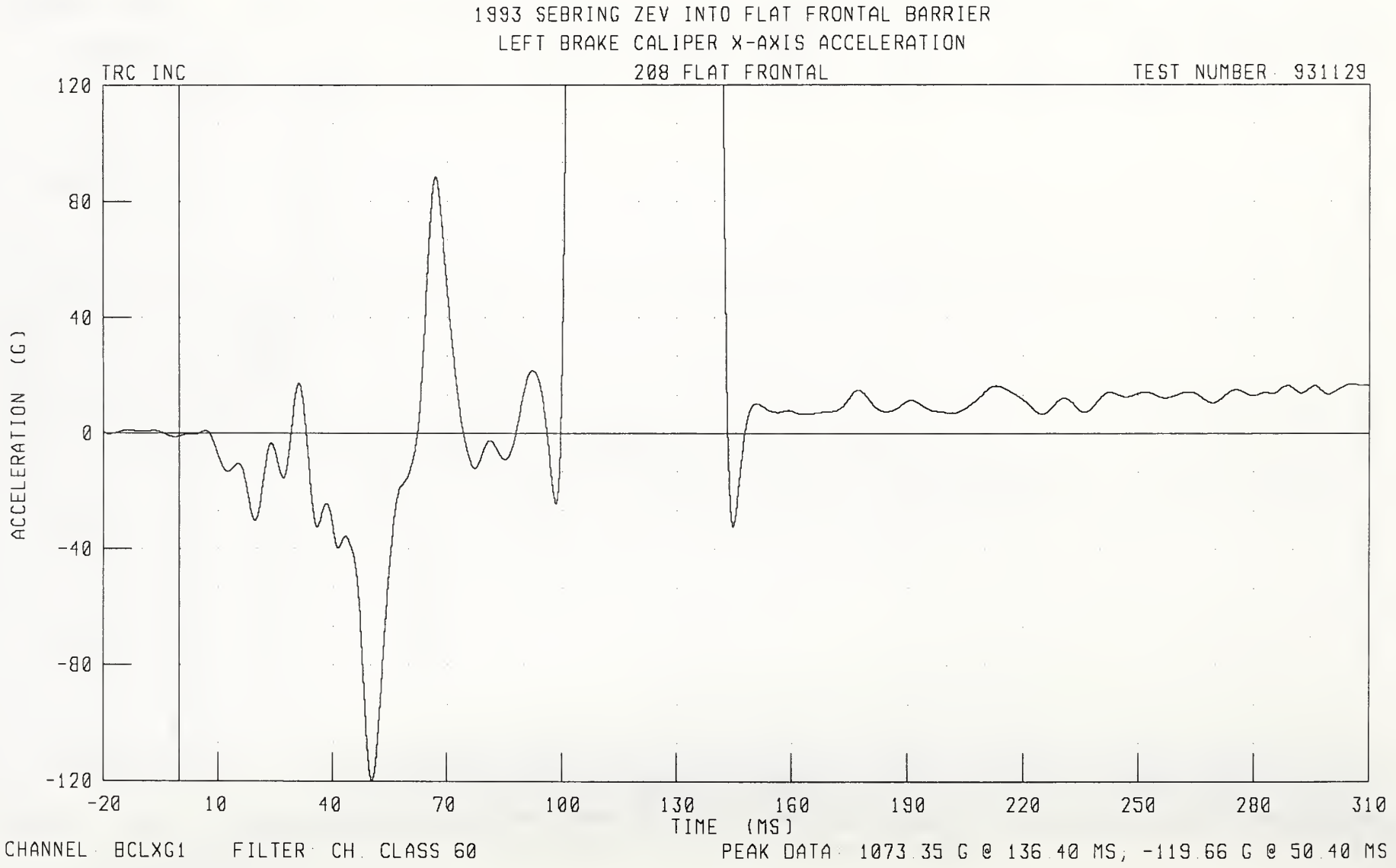
1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
MOTOR TOP X-AXIS ACCELERATION



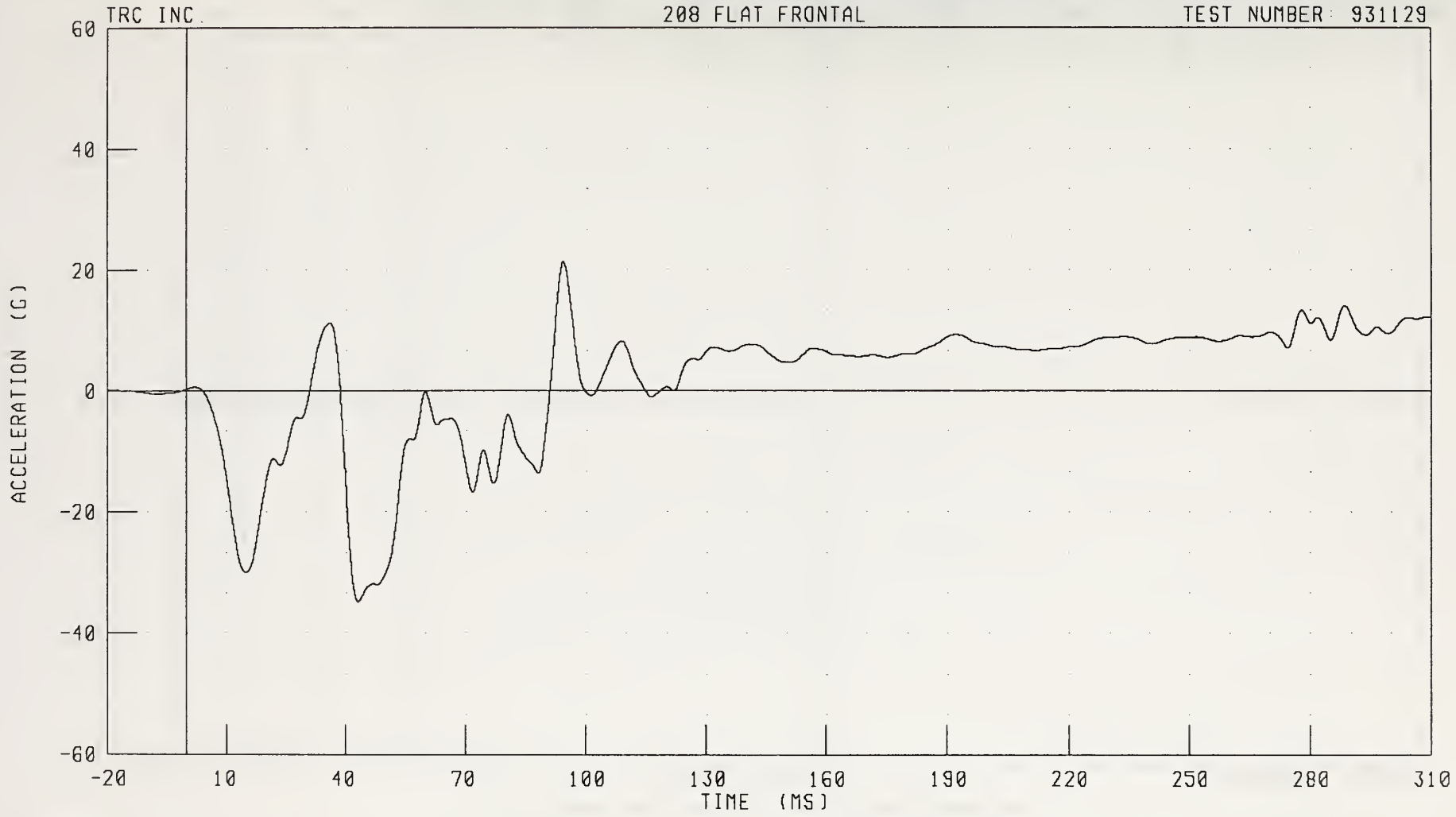
CHANNEL: ENGXG1 FILTER: CH CLASS 60 PEAK DATA: 1334.30 G @ 40.16 MS; -176.35 G @ 28.72 MS


1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
MOTOR BOTTOM X-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER 931129
80
40
0
-40
-80
-120
-160
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL ENGXG2
FILTER: CH CLASS 60
PEAK DATA: 46.94 G @ 35.20 MS, -137.51 G @ 28.00 MS


1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT BRAKE CALIPER X-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER: 931129
70
45
20
-5
-30
-55
-80
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BCRXG1
FILTER: CH CLASS 60
PEAK DATA: 50.58 G @ 63.92 MS, -77.80 G @ 36.72 MS

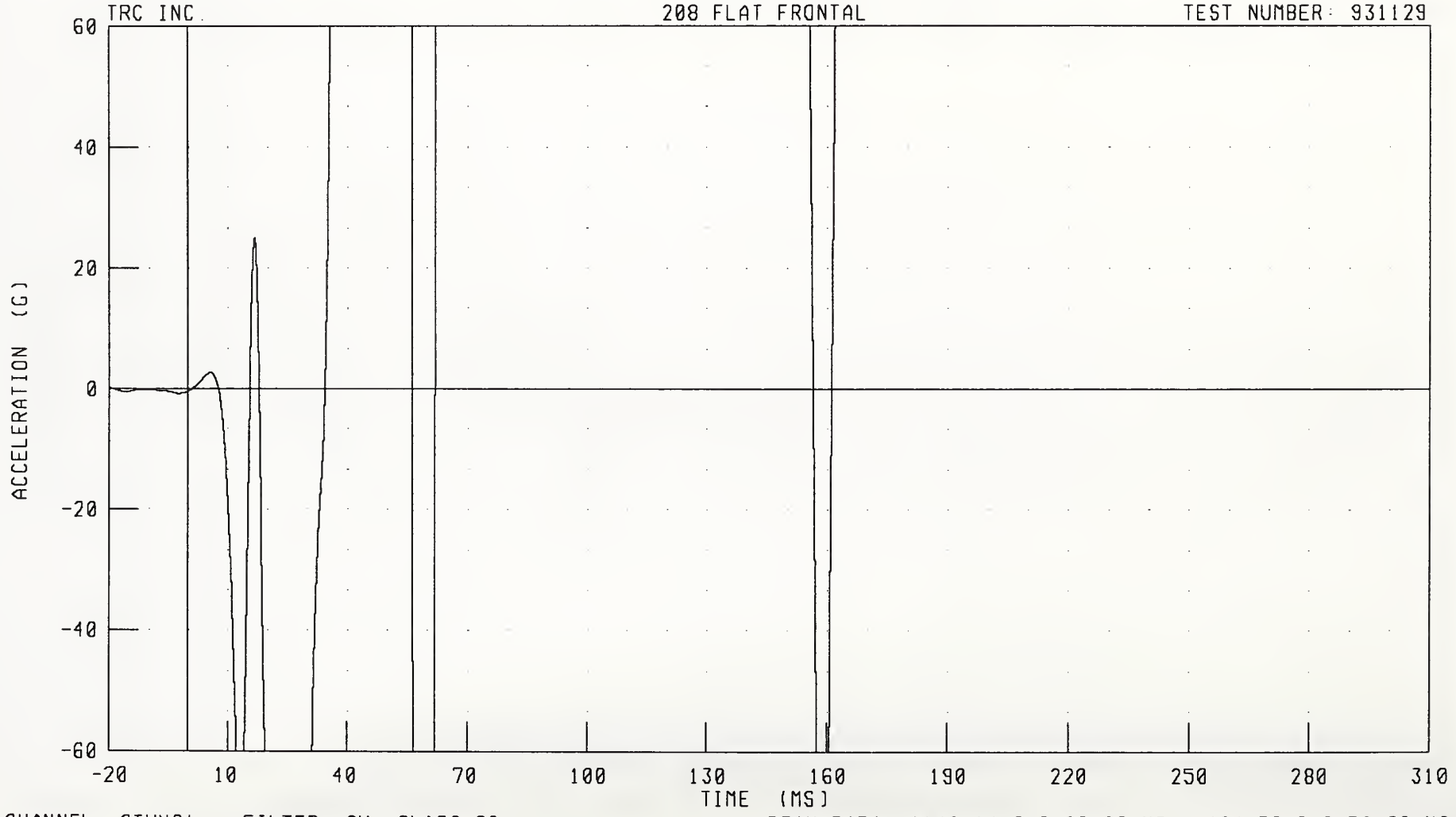

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
LEFT BRAKE CALIPER X-AXIS ACCELERATION
TRC INC
208 FLAT FRONTAL
TEST NUMBER 931129
120
80
40
0
-40
-80
-120
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL BCLXG1
FILTER CH CLASS 60
PEAK DATA 1073.35 G @ 136.40 MS, -119.66 G @ 50.40 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
DASH PANEL CENTER X-AXIS ACCELERATION



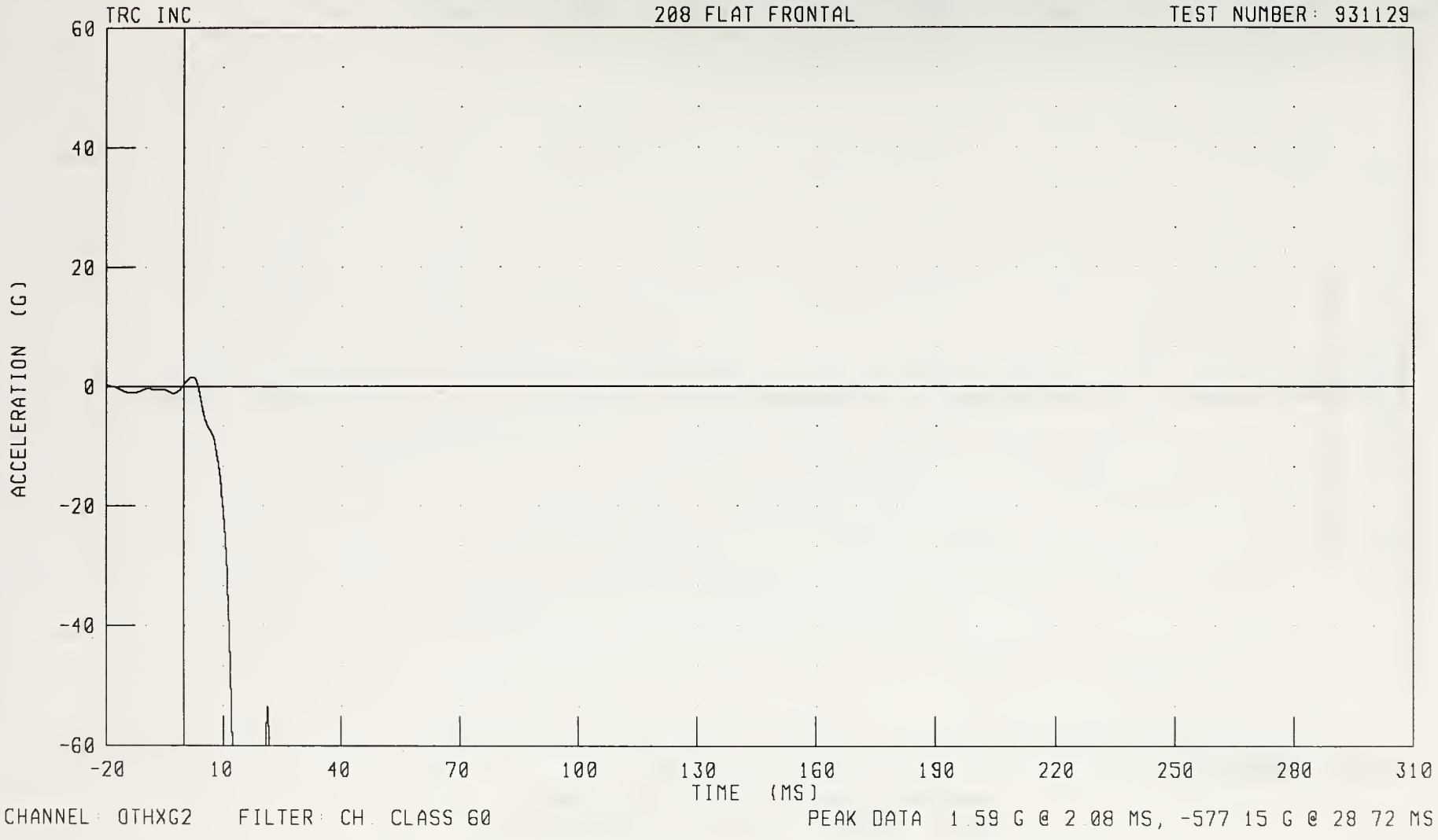
CHANNEL: DPCXG1 FILTER: CH CLASS 60 PEAK DATA: 21.30 G @ 94.24 MS; -34.80 G @ 43.20 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
LEFT FRONT BATTERY BOX X-AXIS ACCELERATION



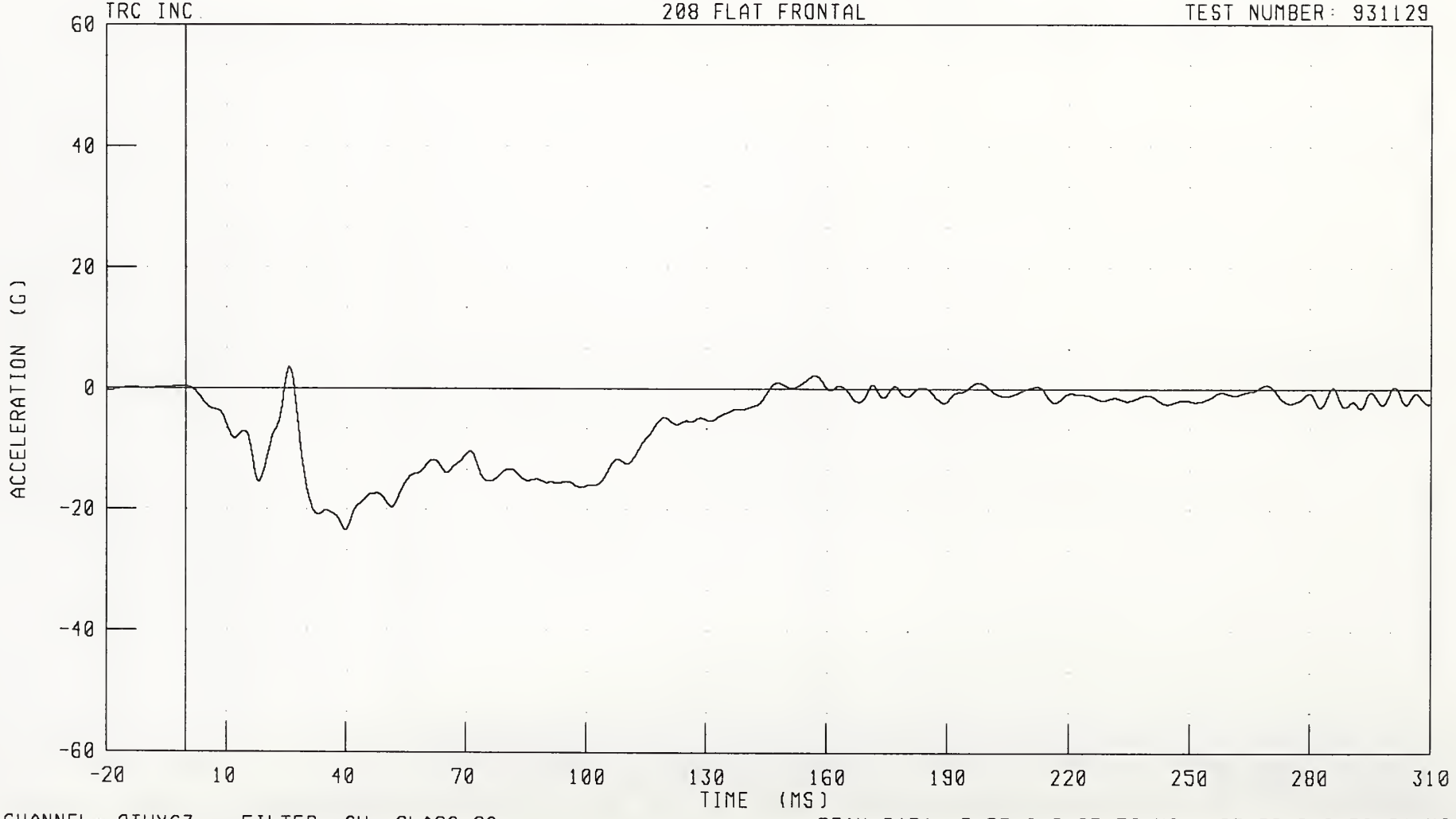
CHANNEL: 0THXG1 FILTER: CH. CLASS 60 PEAK DATA: 1146.14 G @ 66.96 MS; -464.76 G @ 59.60 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
RIGHT FRONT BATTERY BOX X-AXIS ACCELERATION



CHANNEL: 0THXG2 FILTER: CH CLASS 60 PEAK DATA 1.59 G @ 2.08 MS, -577.15 G @ 28.72 MS

1993 SEBRING ZEV INTO FLAT FRONTAL BARRIER
REAR BATTERY BOX X-AXIS ACCELERATION



CHANNEL: 0THXG3 FILTER: CH CLASS 60

PEAK DATA: 3.57 G @ 25.76 MS, -23.39 G @ 39.84 MS

APPENDIX C

DUMMY CERTIFICATION DATA

PRE-TEST CERTIFICATION DATA

DRIVER DUMMY S/N: 177

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
177 ARL 17-NOV-93

TRC INC. 177C51ED1 572E SN177 EXT.DIMENSION CAL51

TEST PARAMETER (DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226 - 231 MM	229. MM
CHEST CIRCUMFERENCE (Y)	970 -1001 MM	983. MM
WAIST CIRCUMFERENCE (Z)	836 - 866 MM	846. MM
CHEST DEPTH (O)	213 - 229 MM	216. MM
H-POINT HEIGHT (C)	84 - 89 MM	86. MM
H-POINT FROM SEATBACK (D)	135 - 140 MM	137. MM
SKULL CAP TO BACKLINE (H)	41 - 46 MM	43. MM
TOTAL SITTING HEIGHT (A)	879 - 889 MM	889. MM
THIGH CLEARANCE (F)	140 - 155 MM	142. MM
BUTTOCK KNEE LENGTH (K)	579 - 605 MM	602. MM
BUTTOCK POPLITEAL LENGTH (N)	452 - 478 MM	475. MM
POPLITEAL HEIGHT (L)	429 - 455 MM	450. MM
KNEE PIVOT HEIGHT (M)	485 - 500 MM	493. MM
FOOT LENGTH (P)	252 - 267 MM	262. MM
FOOT BREADTH (W)	91 - 107 MM	102. MM
SHOULDER PIVOT FROM BACKLINE (E)	84 - 94 MM	91. MM
SHOULDER BREADTH (V)	422 - 437 MM	429. MM
SHOULDER PIVOT HEIGHT (B)	506 - 521 MM	521. MM
ELBOW REST HEIGHT (J)	191 - 211 MM	211. MM
SHOULDER-ELBOW LENGTH (I)	330 - 345 MM	338. MM
BACK OF ELBOW TO WRIST PIVOT (G)	290 - 305 MM	295. MM

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foot

TRANSPORTATION RESEARCH CENTER INC.

HEAD DROP TEST

HYBRID III 17-NOV-93

TRC INC. 177C51HD1 572E SN177 HEAD DROP CAL 51

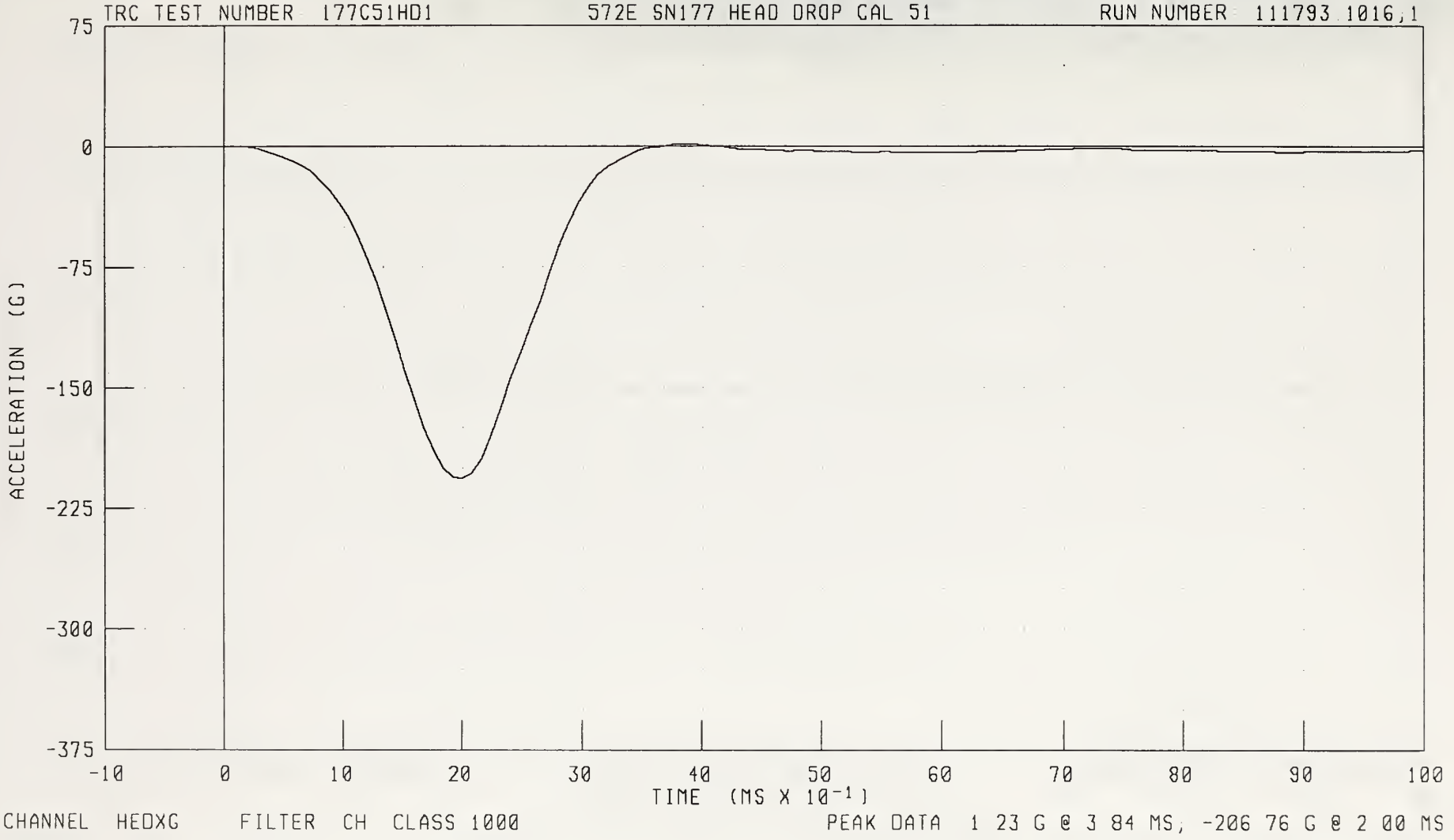
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	241.53 G
PEAK LATERAL ACCELERATION	15 G MAX	1.97 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

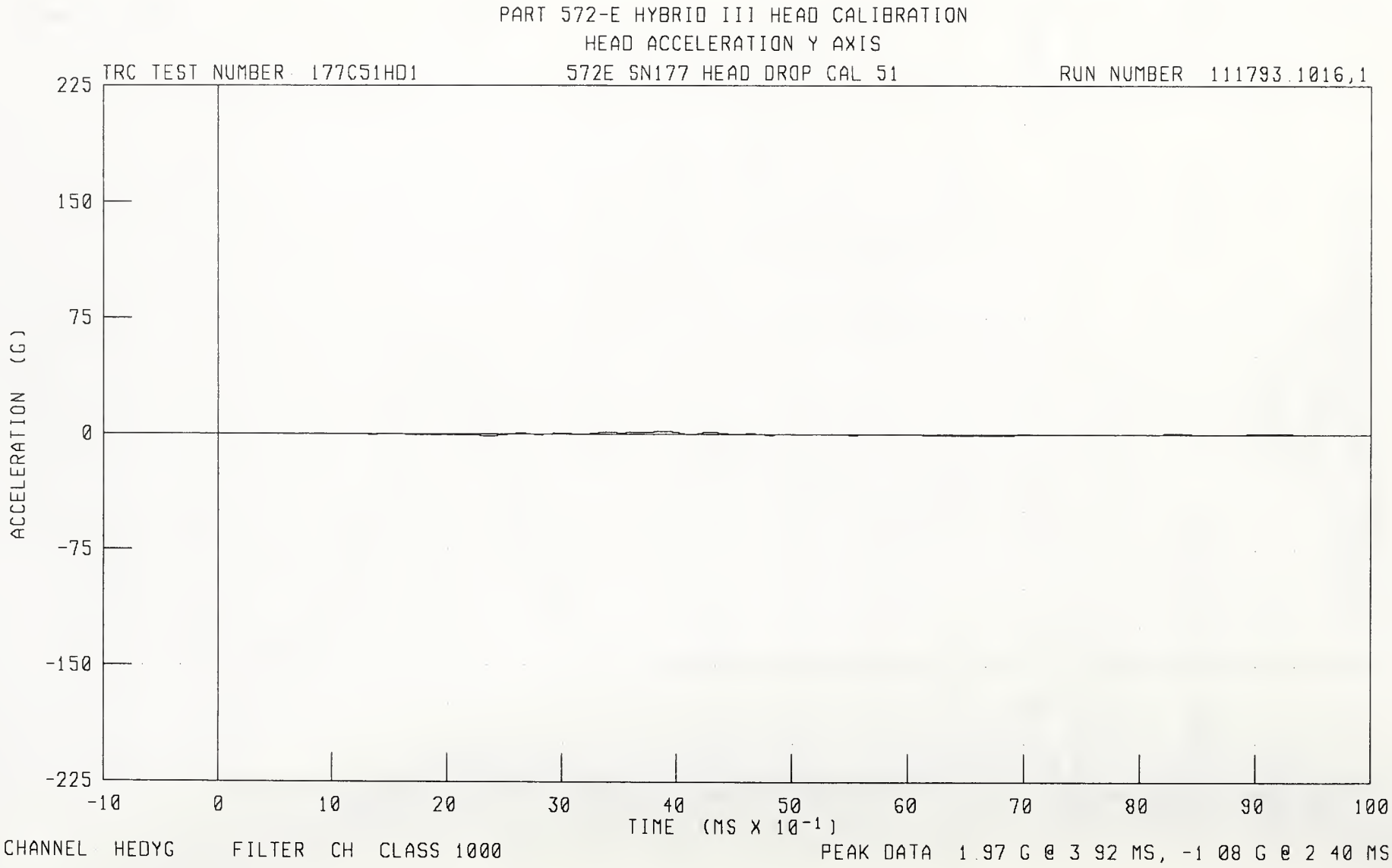
TEST MEETS SPECIFICATIONS

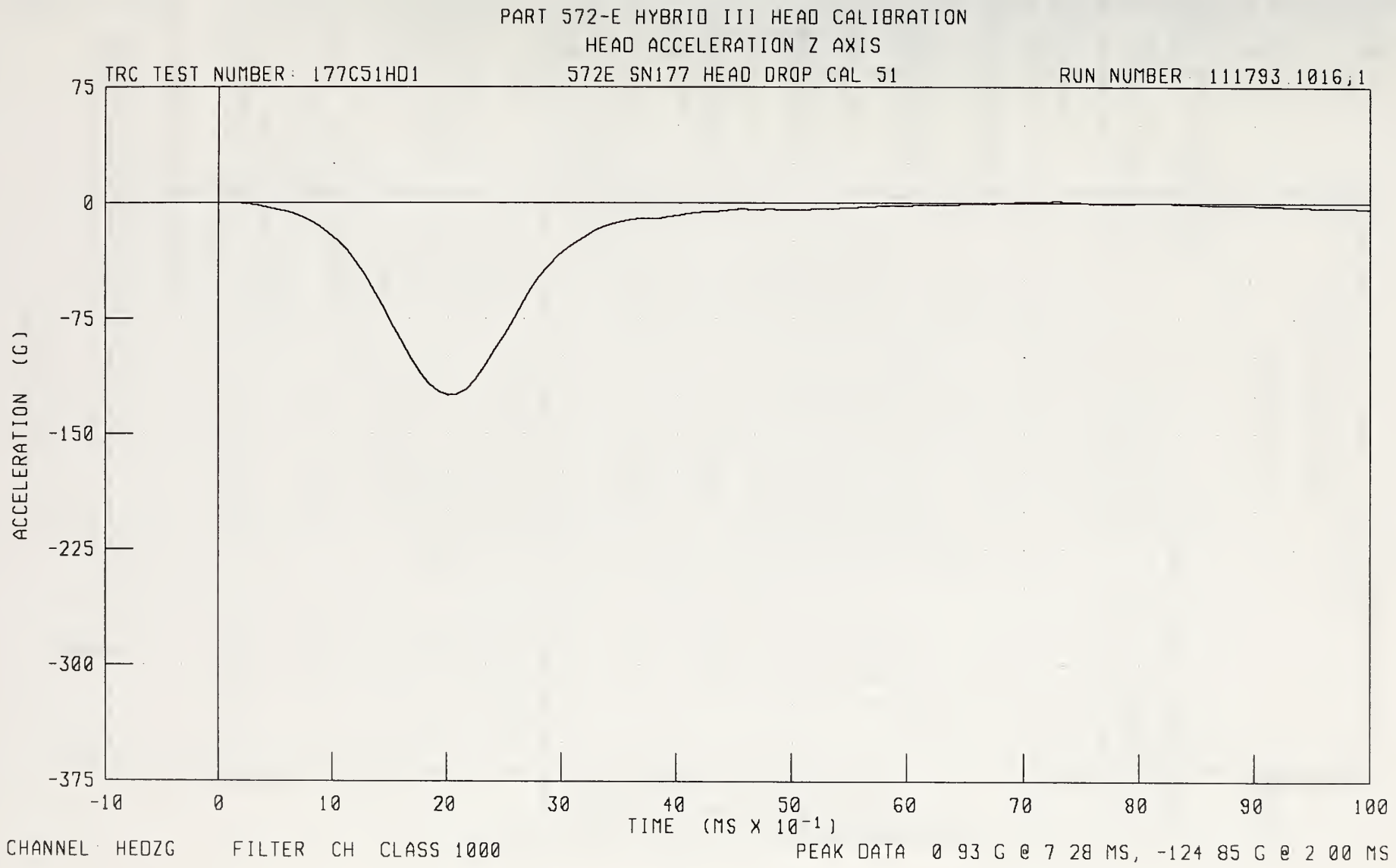
TECHNICIAN Rita Fox

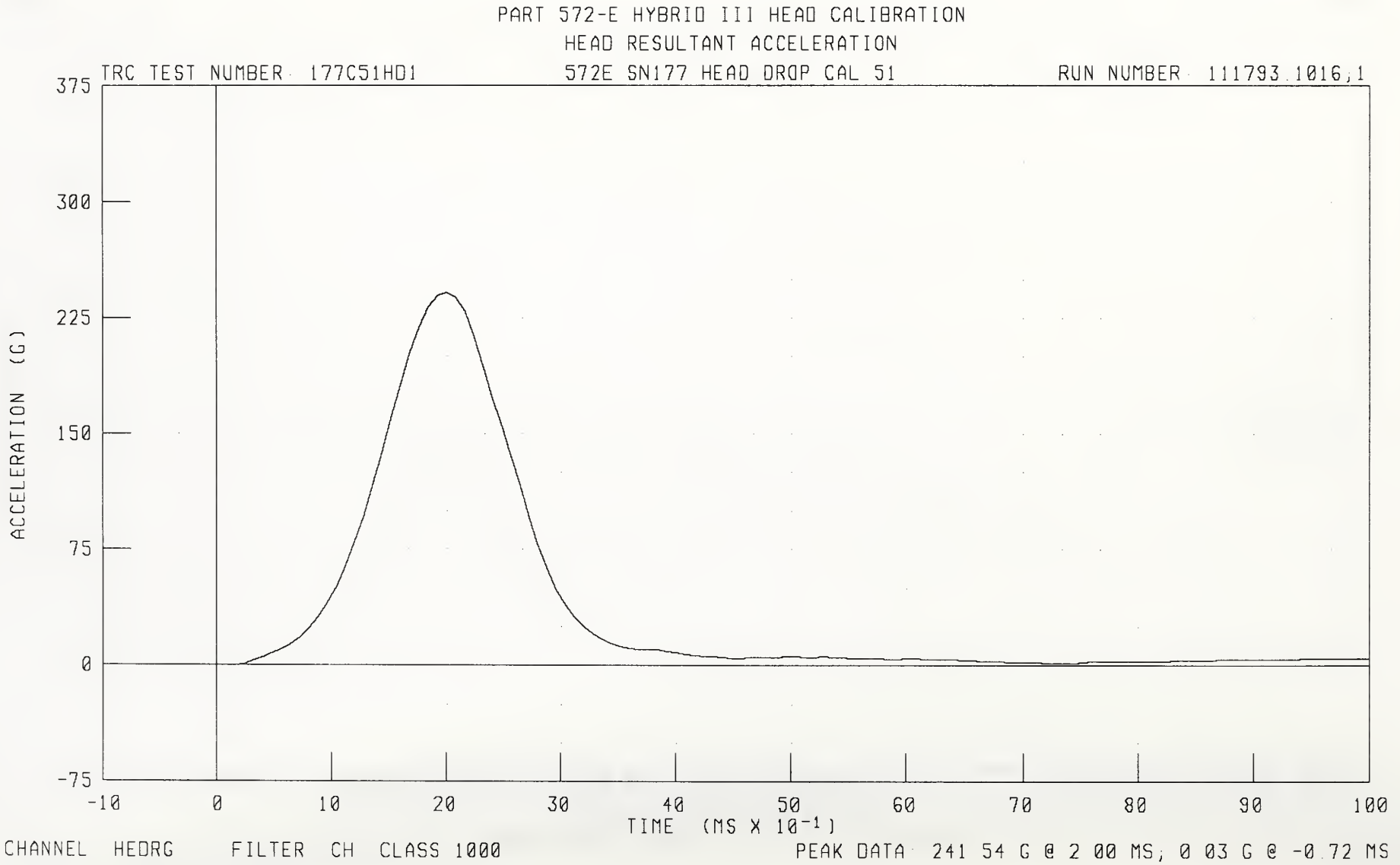
PART 572-E HYBRID III HEAD CALIBRATION

HEAD ACCELERATION X AXIS




PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER 177C51HD1
572E SN177 HEAD DROP CAL 51
RUN NUMBER 111793.1016,1
225
150
75
0
-75
-150
-225
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL HEDYG
FILTER CH CLASS 1000
PEAK DATA 1.97 G @ 3.92 MS, -1.08 G @ 2.40 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER: 177C51HD1
572E SN177 HEAD DROP CAL 51
RUN NUMBER 111793.1016;1
75
0
-75
-150
-225
-300
-375
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL HEDZG
FILTER CH CLASS 1000
PEAK DATA 0 93 G @ 7 28 MS, -124 85 G @ 2 00 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER 177C51HD1
572E SN177 HEAD DROP CAL 51
RUN NUMBER 111793.1016;1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL HEDRG
FILTER CH CLASS 1000
PEAK DATA 241.54 G @ 2.00 MS; 0.03 G @ -0.72 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST

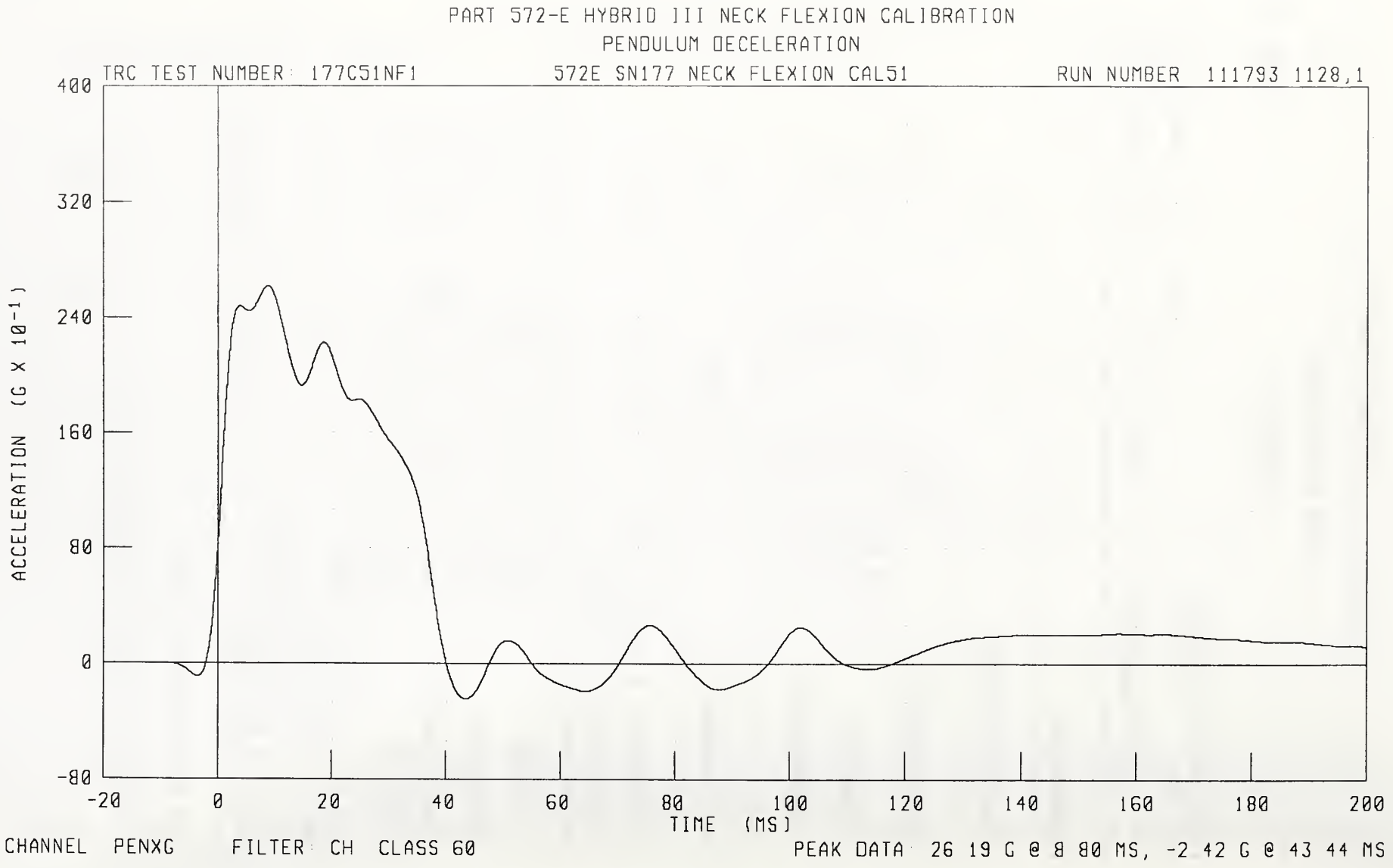
HYBRID III 17-NOV-93

3 AXIS NECK TRANSDUCER
TRC INC. 177C51NF1 572E SN177 NECK FLEXION CAL51

TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	25.48 G
	20 MS	17.60 - 22.60 G	21.38 G
	30 MS	12.50 - 18.50 G	15.51 G
MAX PENDULUM G		29 G MAX	26.19 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	15.47 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.76 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	72.82 DEG.
	TIME	57 - 64 MS	60.64 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	88.31 NM
	TIME	47 - 58 MS	51.60 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	121.04 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	102.56 MS

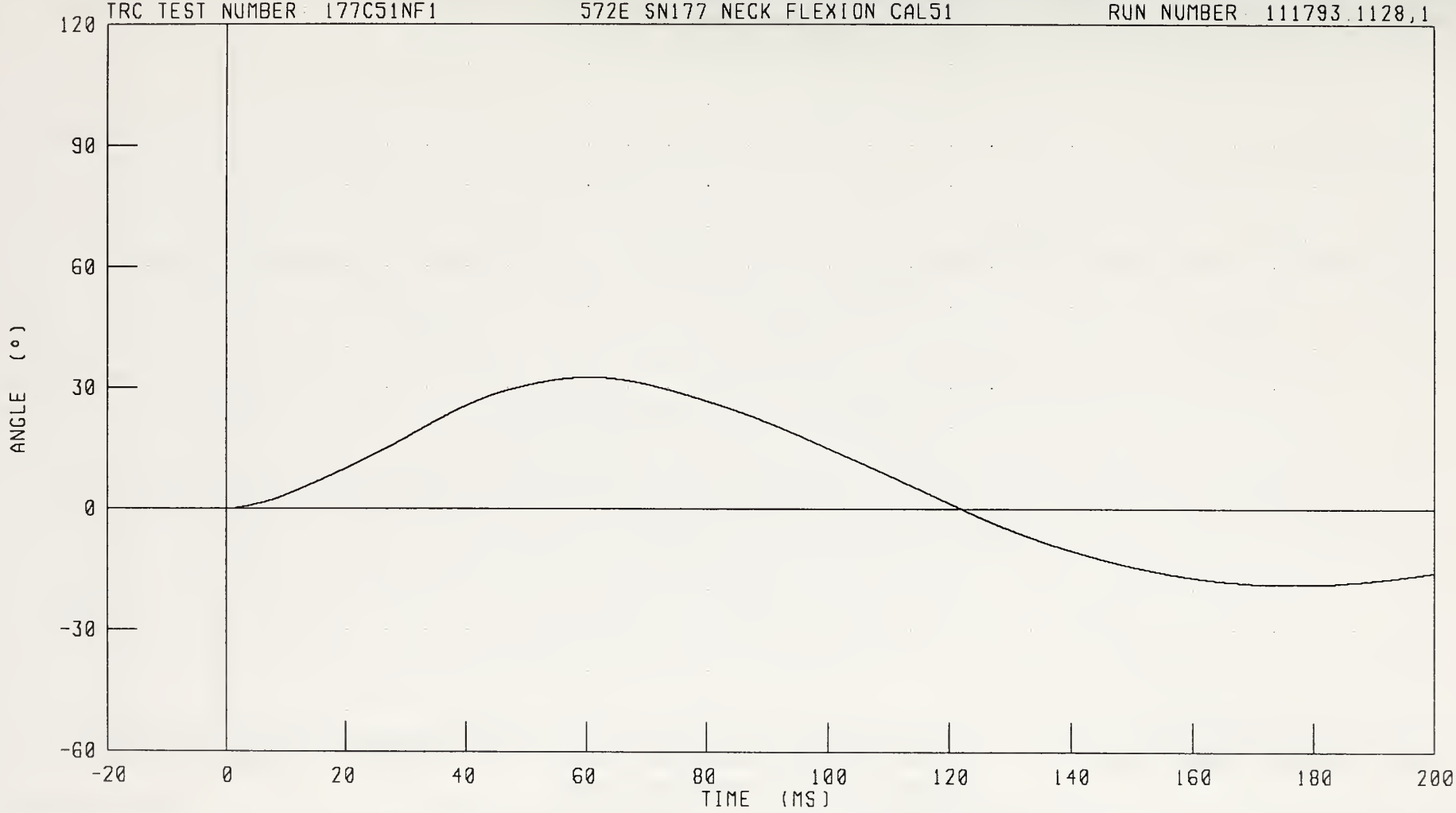
TEST MEETS SPECIFICATIONS

TECHNICIAN 

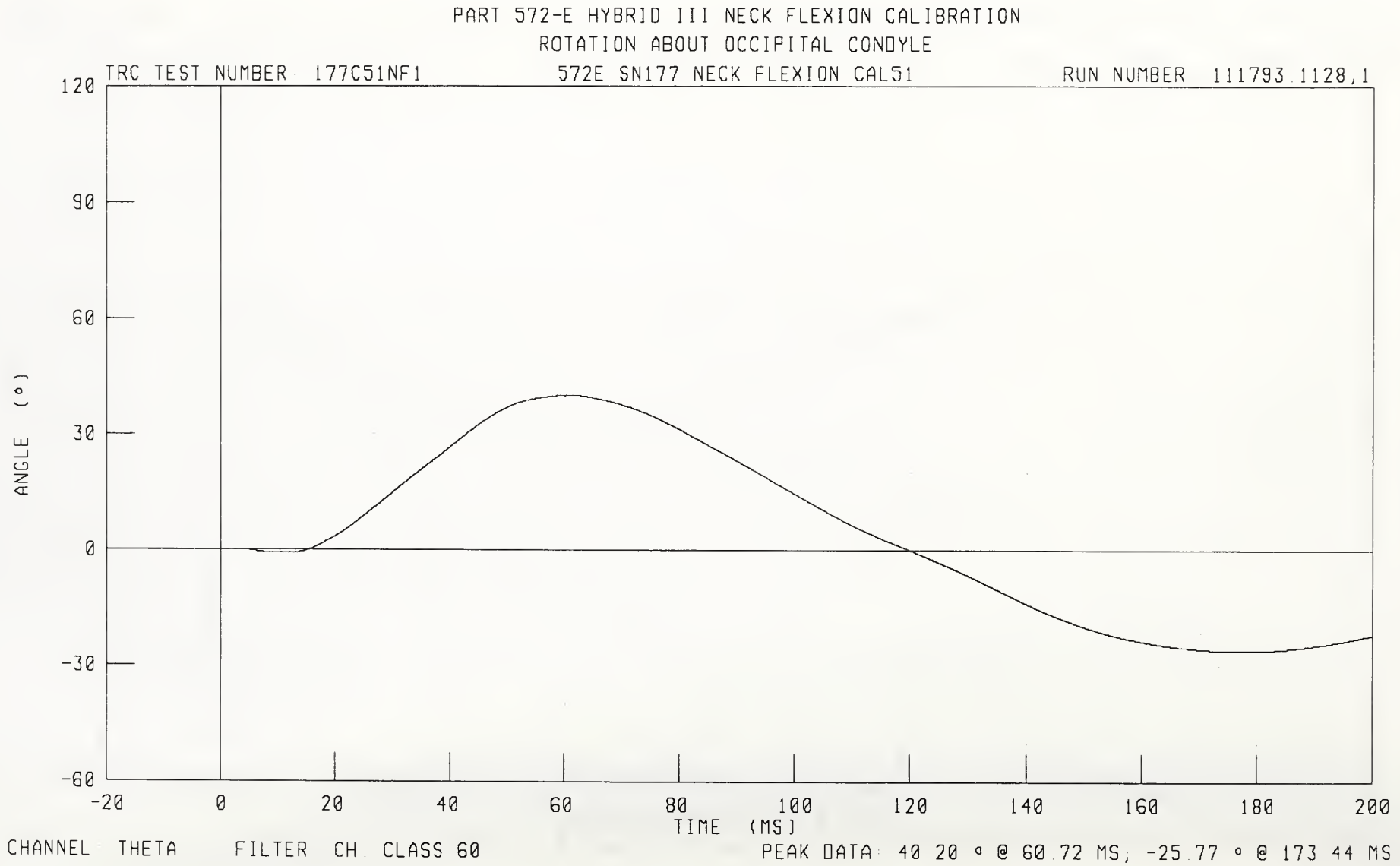

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER: 177C51NF1
572E SN177 NECK FLEXION CAL51
RUN NUMBER 111793 1128,1
400
320
240
160
80
0
-80
ACCELERATION (G X 10⁻¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL PENXG
FILTER: CH CLASS 60
PEAK DATA: 26 19 G @ 8 80 MS, -2 42 G @ 43 44 MS

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

TRC TEST NUMBER 177C51NF1 572E SN177 NECK FLEXION CAL51 RUN NUMBER 111793.1128,1



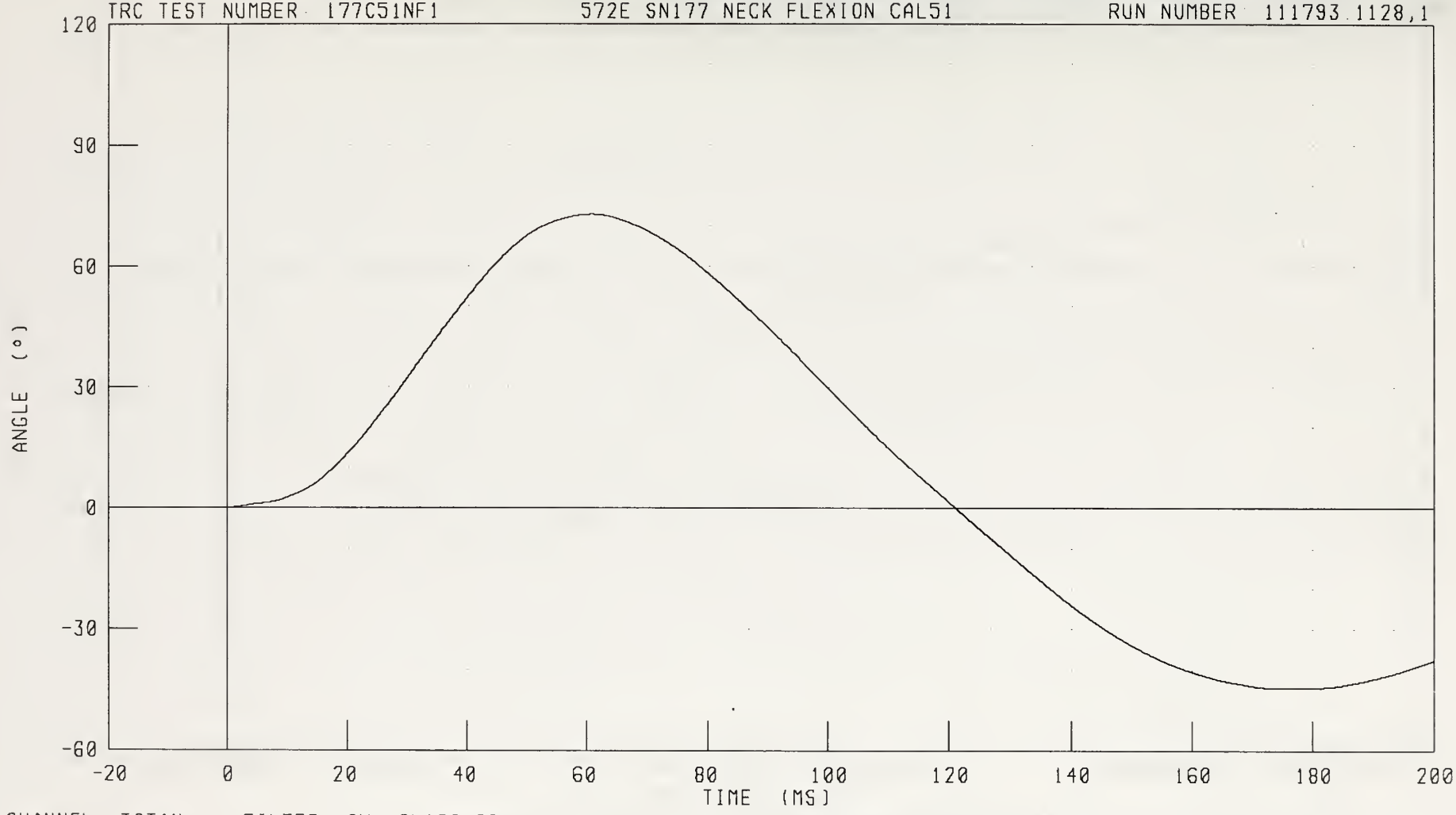
CHANNEL BETA FILTER CH CLASS 60 PEAK DATA 32 62 ° @ 60 56 MS, -18 57 ° @ 179 44 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 177C51NF1
572E SN177 NECK FLEXION CAL51
RUN NUMBER 111793.1128,1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL THETA
FILTER CH CLASS 60
PEAK DATA: 40.20 ° @ 60.72 MS, -25.77 ° @ 173.44 MS

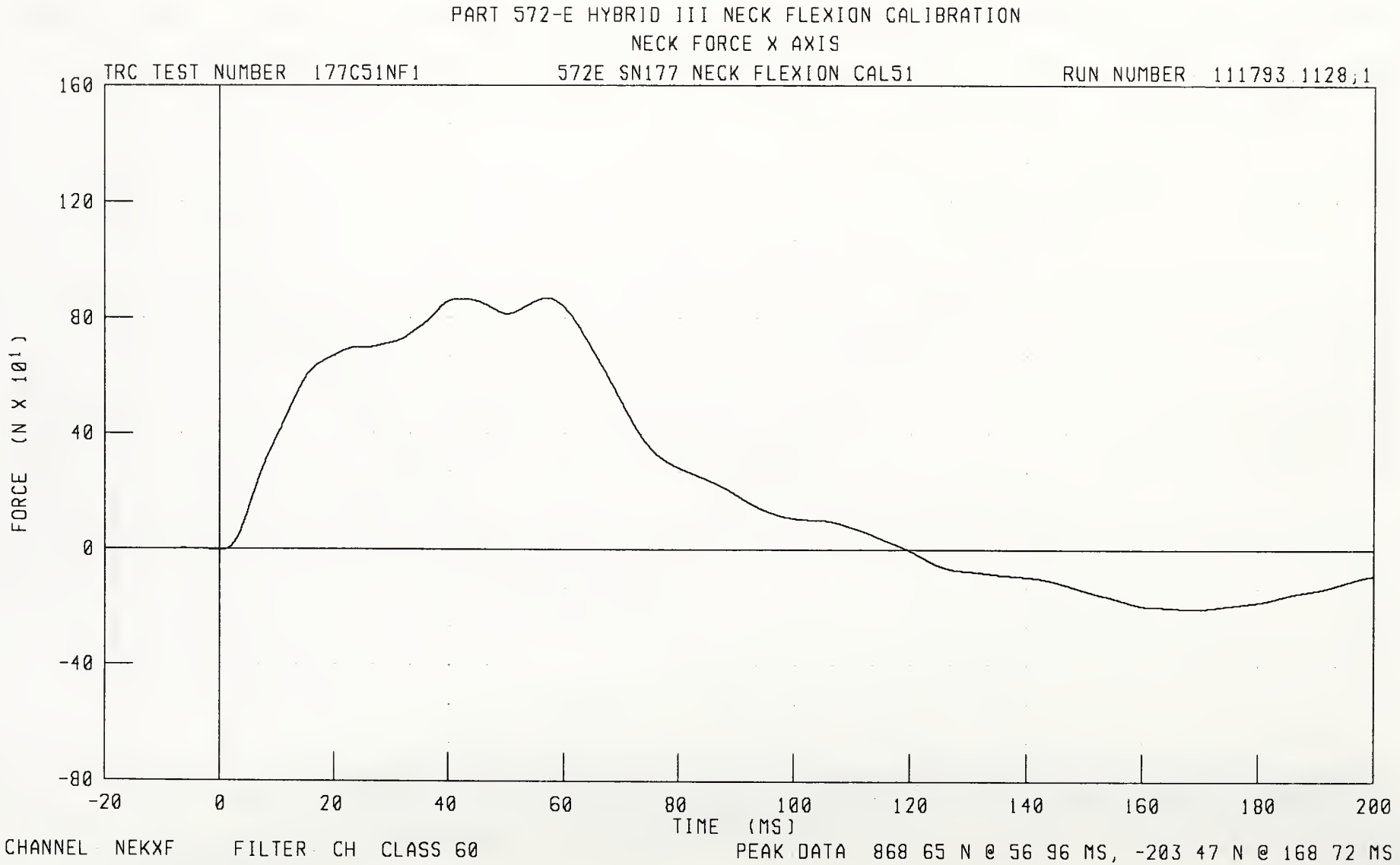
PART 572-E HYBRID III NECK FLEXION CALIBRATION

TOTAL ROTATION

TRC TEST NUMBER 177C51NF1 572E SN177 NECK FLEXION CAL51 RUN NUMBER 111793.1128,1



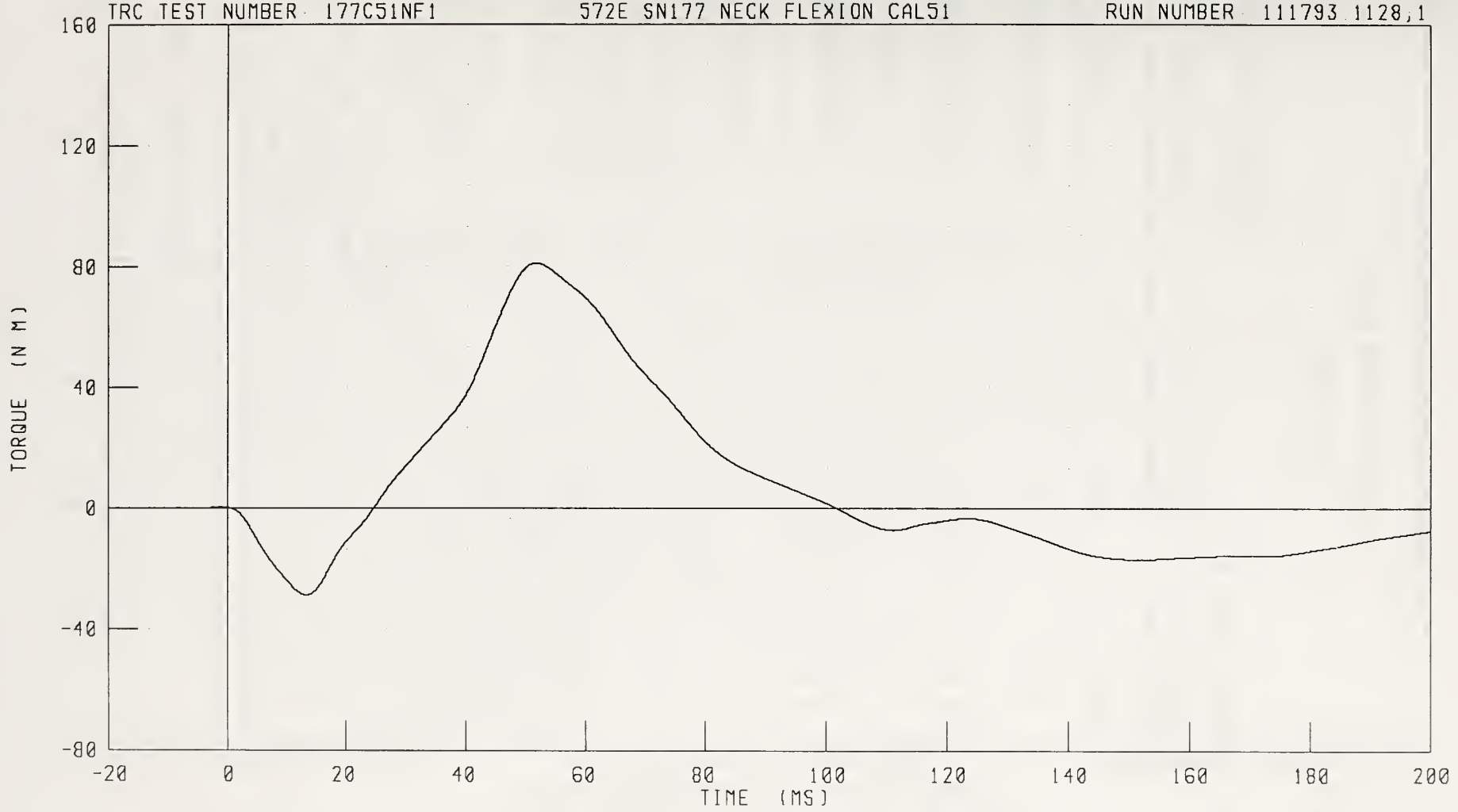
CHANNEL TOTAN FILTER CH CLASS 60 PEAK DATA 72.82 ° @ 60.64 MS; -44.34 ° @ 173.60 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER 177C51NF1
572E SN177 NECK FLEXION CAL51
RUN NUMBER 111793 1128;1
160
120
80
40
0
-40
-80
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKXF
FILTER CH CLASS 60
PEAK DATA 868 65 N @ 56 96 MS, -203 47 N @ 168 72 MS

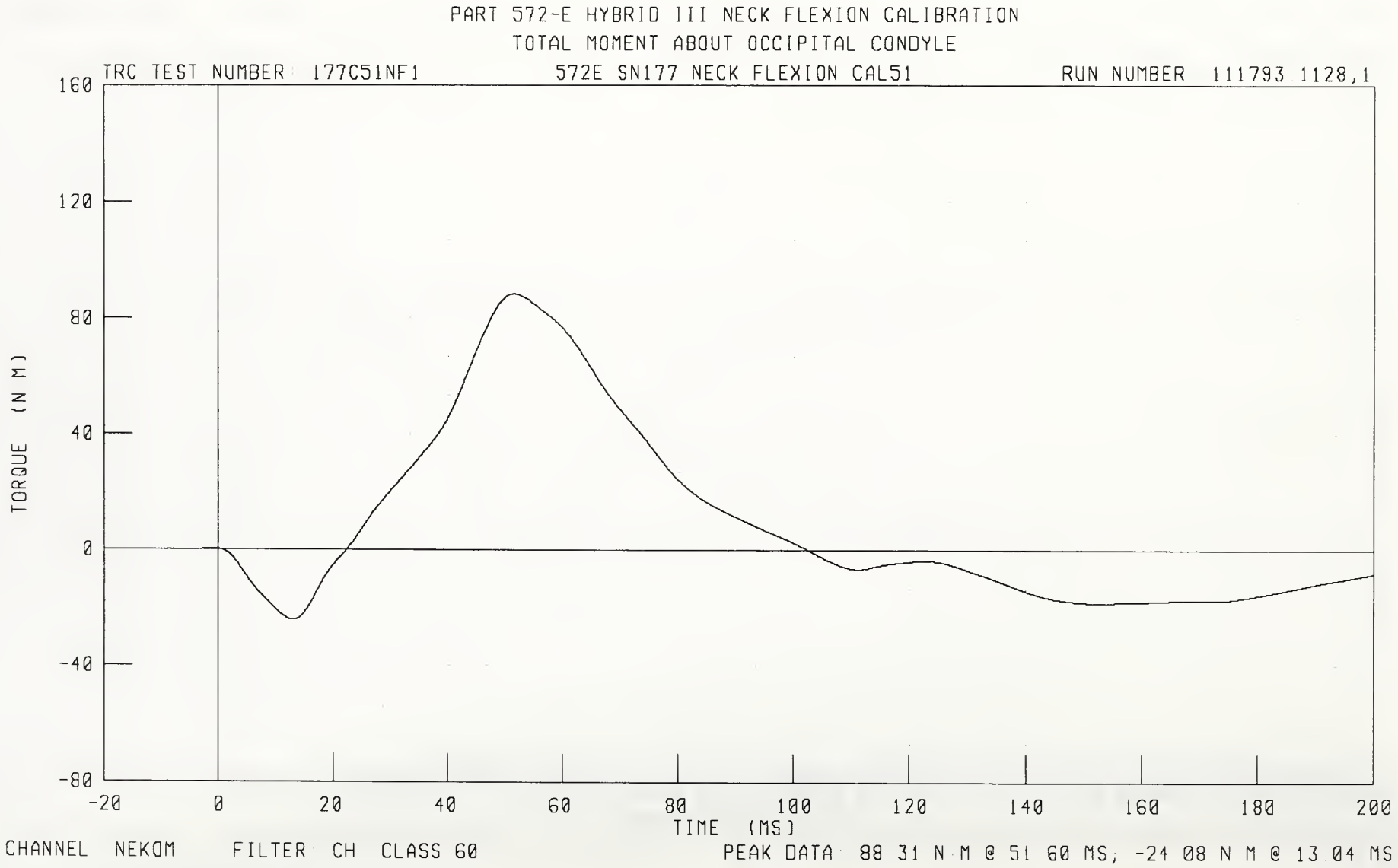
PART 572-E HYBRID III NECK FLEXION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER 177C51NF1 572E SN177 NECK FLEXION CAL51 RUN NUMBER 111793 1128,1



CHANNEL NEKYM FILTER CH CLASS 60 PEAK DATA 81 12 N M @ 51 52 MS, -28 70 N M @ 13 28 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 177C51NF1
572E SN177 NECK FLEXION CAL51
RUN NUMBER 111793 1128,1
TORQUE (N M)
160
120
80
40
0
-40
-80
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKOM
FILTER CH CLASS 60
PEAK DATA 88 31 N M @ 51 60 MS, -24 08 N M @ 13 04 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK EXTENSION TEST

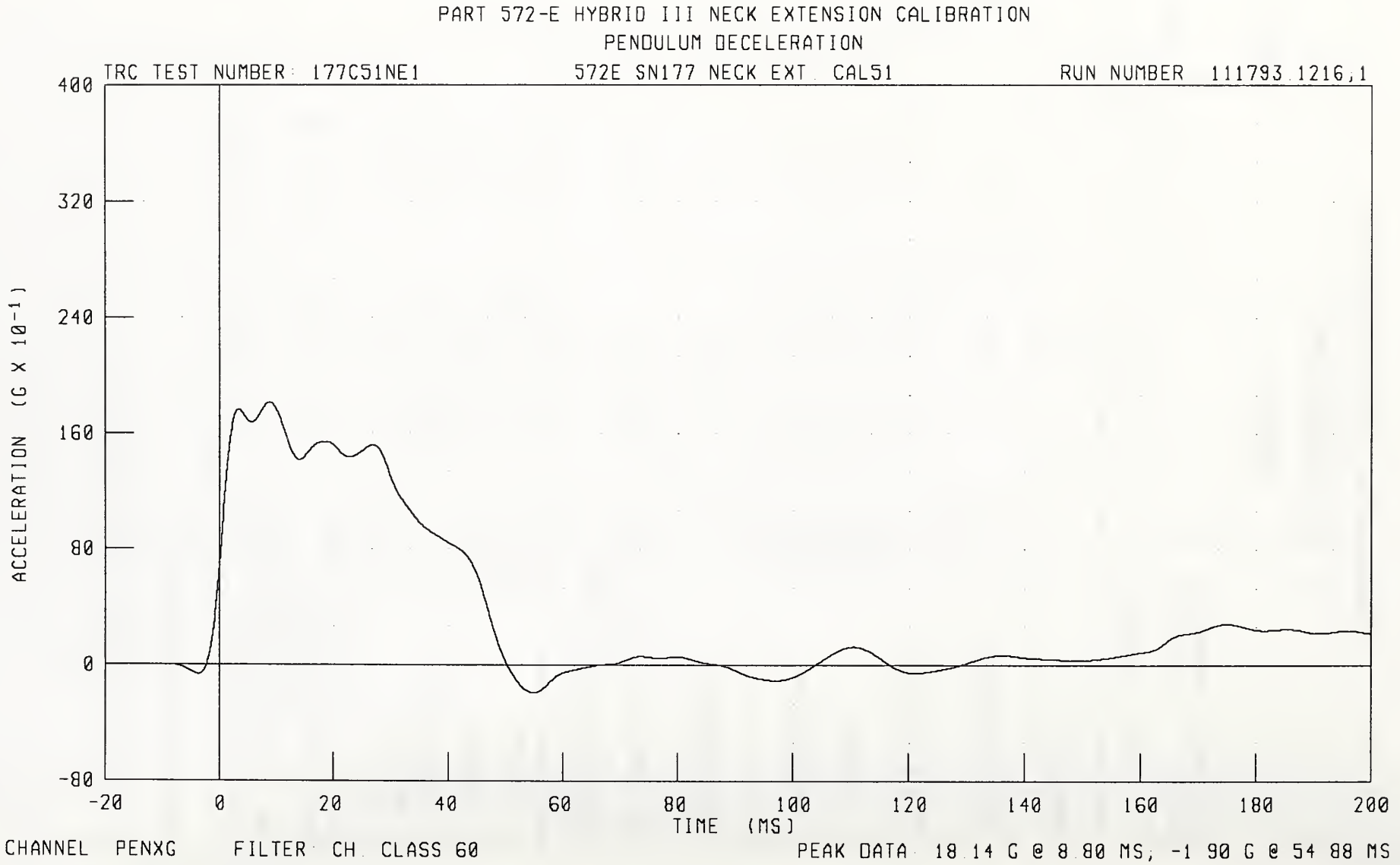
HYBRID III 17-NOV-93

3 AXIS NECK TRANSDUCER
TRC INC. 177C51NE1 572E SN177 NECK EXT. CAL51

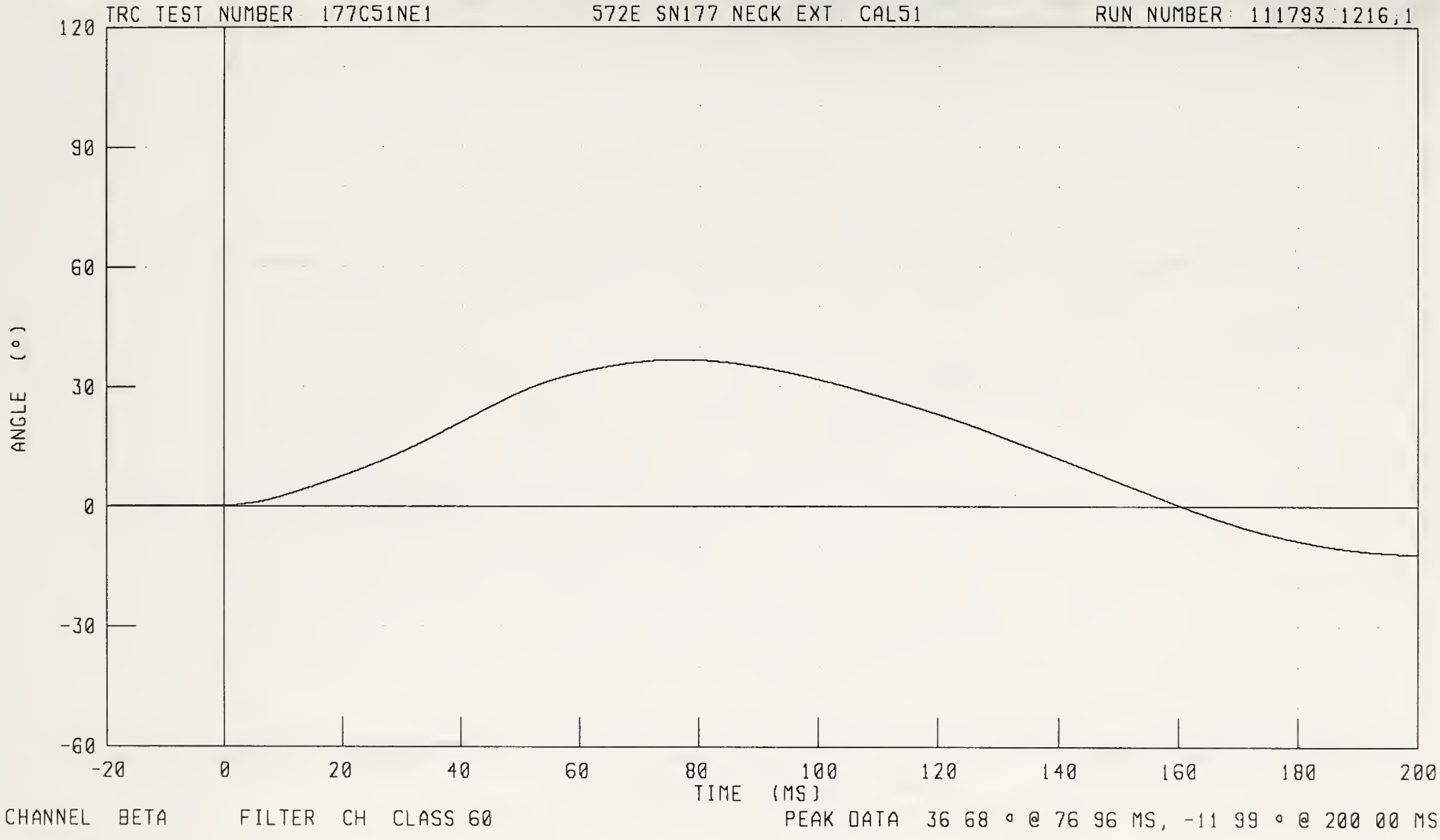
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.02 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	17.65 G
	20 MS	14.00 - 19.00 G	15.20 G
	30 MS	11.00 - 16.00 G	13.03 G
MAX PENDULUM G		22 G MAX	18.13 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	12.94 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	46.00 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	91.34 DEG.
	TIME	72 - 82 MS	79.44 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-56.90 NM
	TIME	65 - 79 MS	66.64 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	159.44 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	141.12 MS

TEST MEETS SPECIFICATIONS

TECHNICIAN 

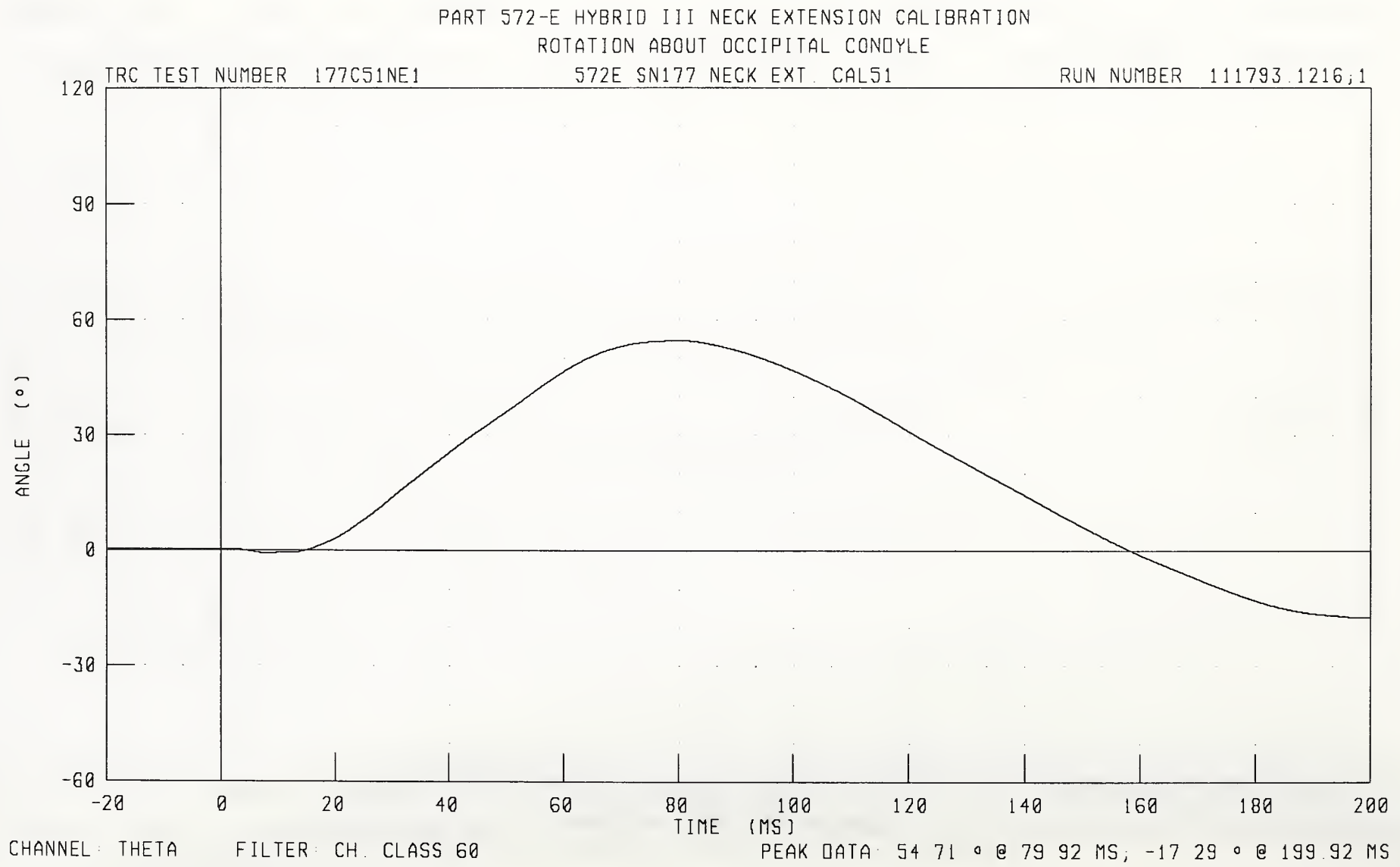

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER 177C51NE1
572E SN177 NECK EXT CAL51
RUN NUMBER 111793.1216,1
400
320
240
160
80
0
-80
ACCELERATION (G X 10-1)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL PENXG
FILTER CH CLASS 60
PEAK DATA 18.14 G @ 8.80 MS, -1.90 G @ 54.88 MS

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



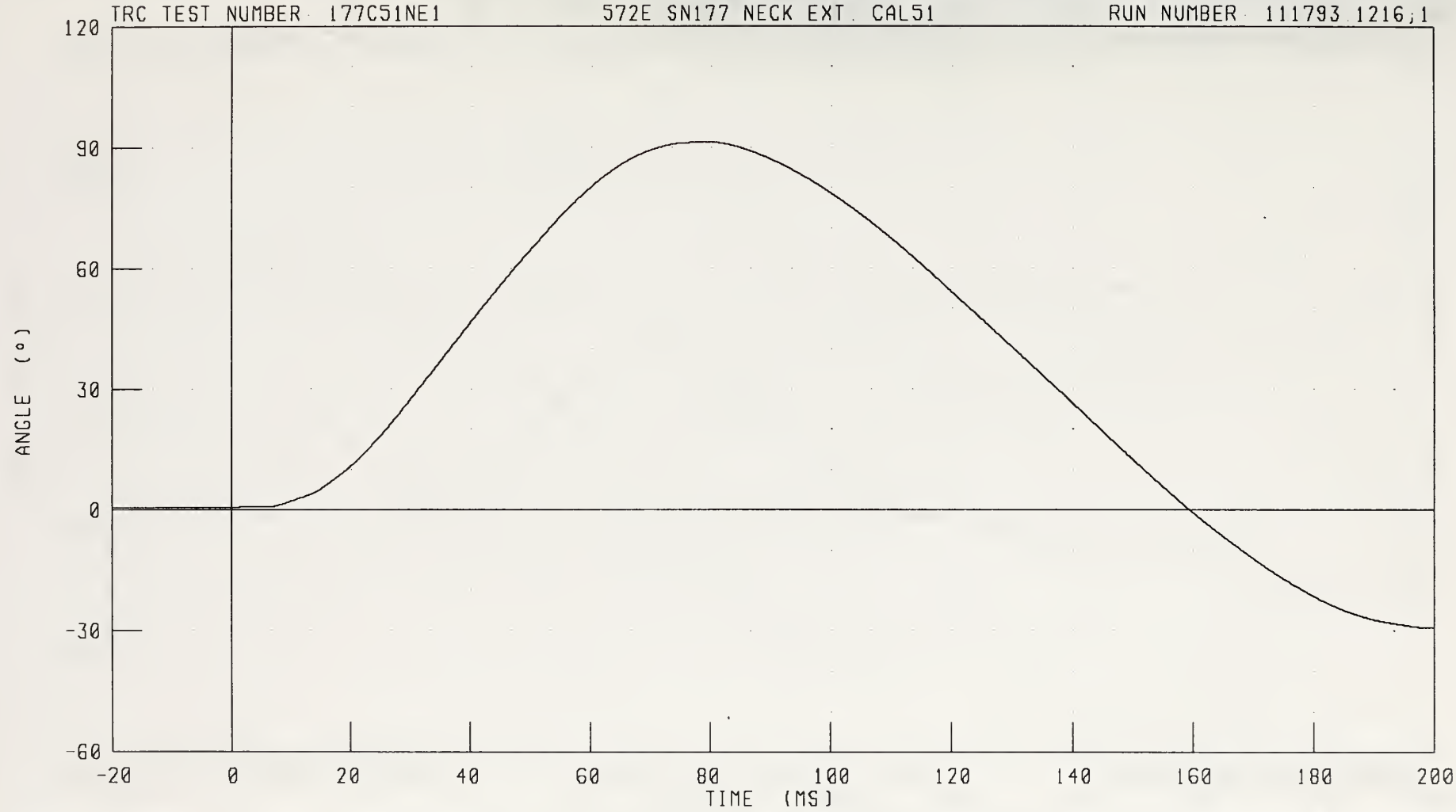
CHANNEL BETA FILTER CH CLASS 60

PEAK DATA 36 68 ° @ 76 96 MS, -11 99 ° @ 200 00 MS

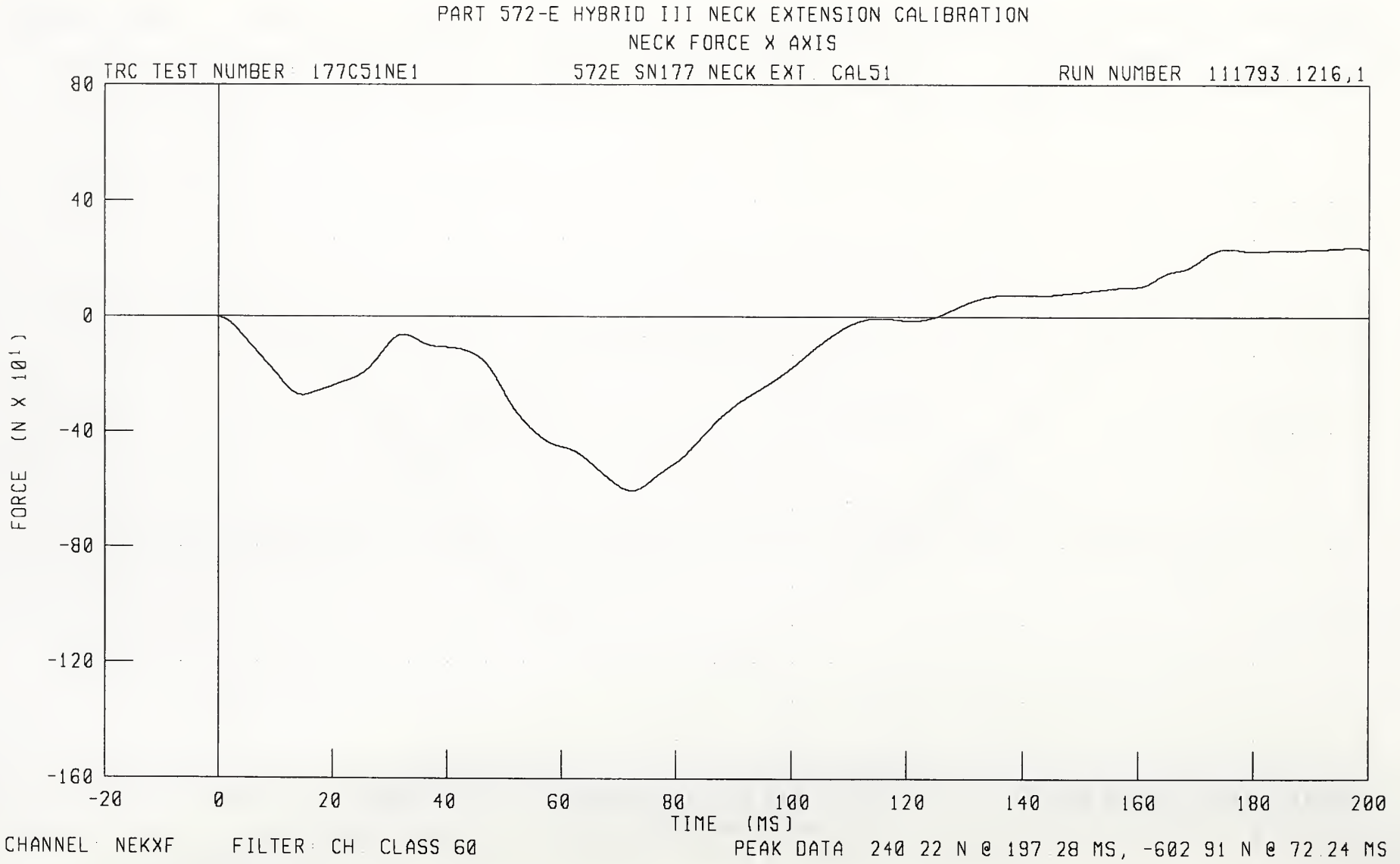

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 177C51NE1
572E SN177 NECK EXT. CAL51
RUN NUMBER 111793.1216;1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: THETA
FILTER: CH. CLASS 60
PEAK DATA: 54.71 ° @ 79.92 MS; -17.29 ° @ 199.92 MS

PART 572-E HYBRID III NECK EXTENSION CALIBRATION

TOTAL ROTATION

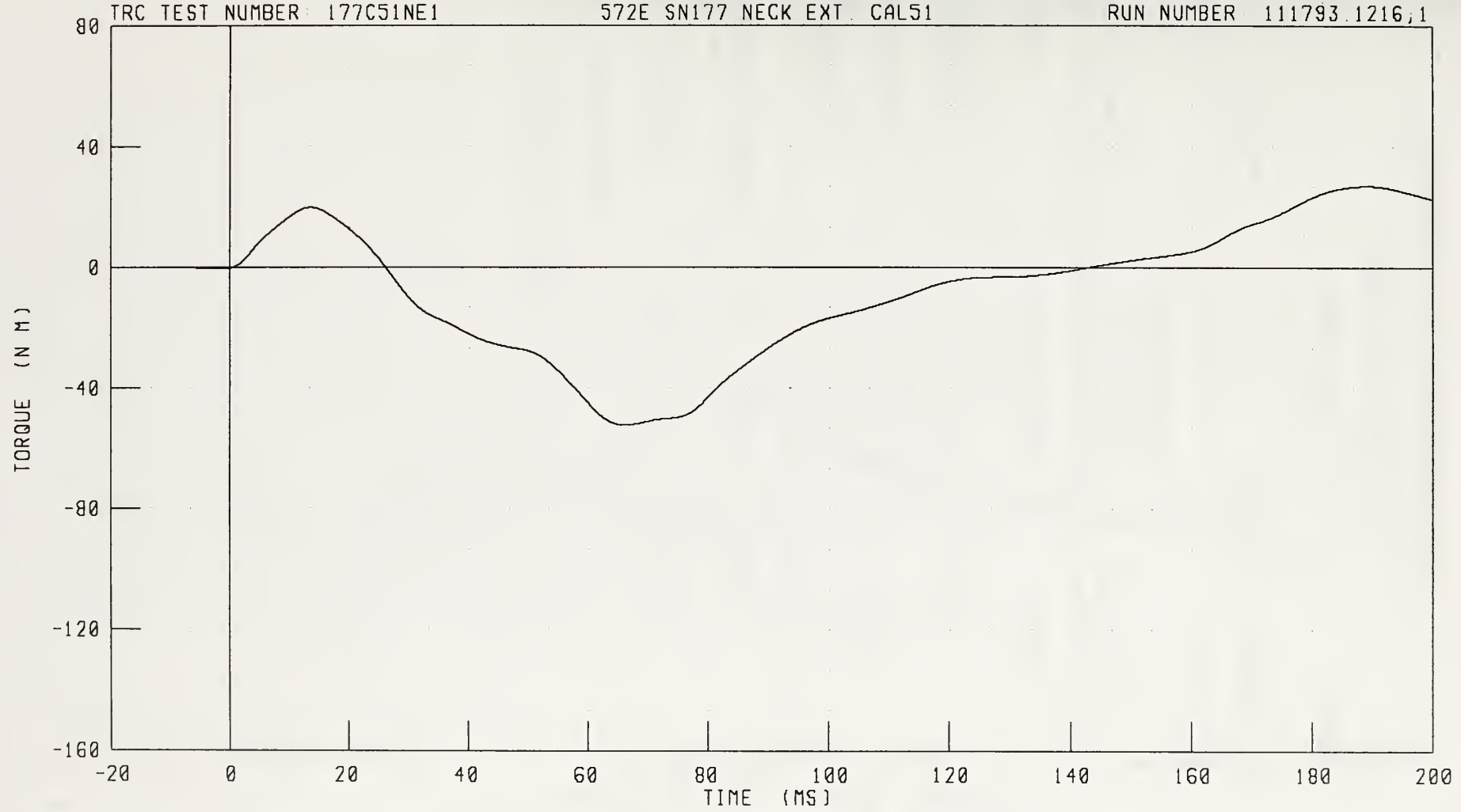


CHANNEL TOTAN FILTER CH CLASS 60 PEAK DATA 91 35 ° @ 79 44 MS, -29 28 ° @ 200 00 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER 177C51NE1
572E SN177 NECK EXT CAL51
RUN NUMBER 111793 1216,1
80
40
0
-40
-80
-120
-160
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKXF
FILTER CH CLASS 60
PEAK DATA 240 22 N @ 197 28 MS, -602 91 N @ 72 24 MS

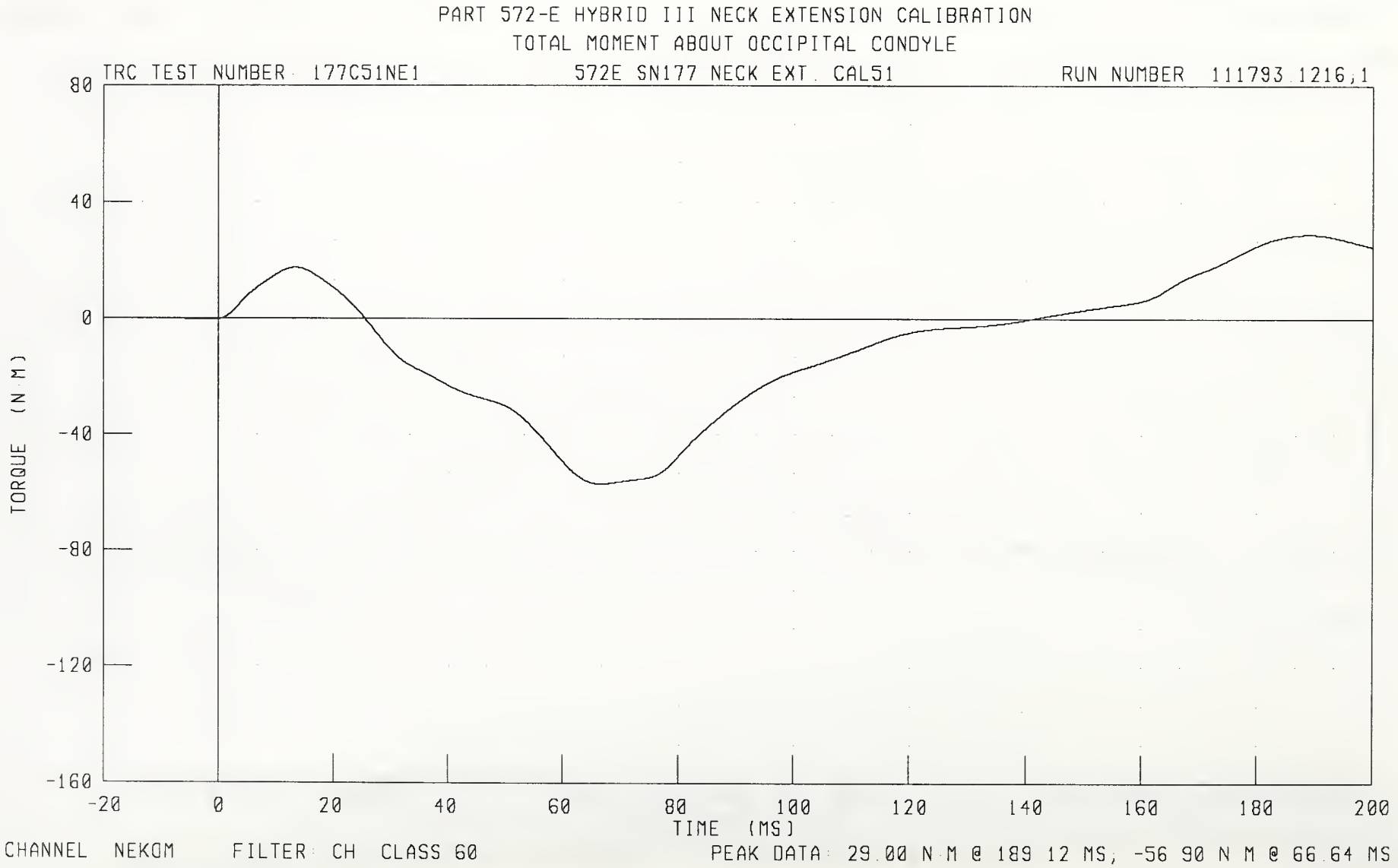
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS



CHANNEL NEKYM FILTER CH CLASS 60

PEAK DATA 26 97 N M @ 189 04 MS, -52 27 N M @ 66 00 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 177C51NE1
572E SN177 NECK EXT. CAL51
RUN NUMBER 111793.1216,1
80
40
0
-40
-80
-120
-160
TORQUE (N-M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKOM
FILTER: CH CLASS 60
PEAK DATA: 29.00 N-M @ 189.12 MS; -56.90 N-M @ 66.64 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

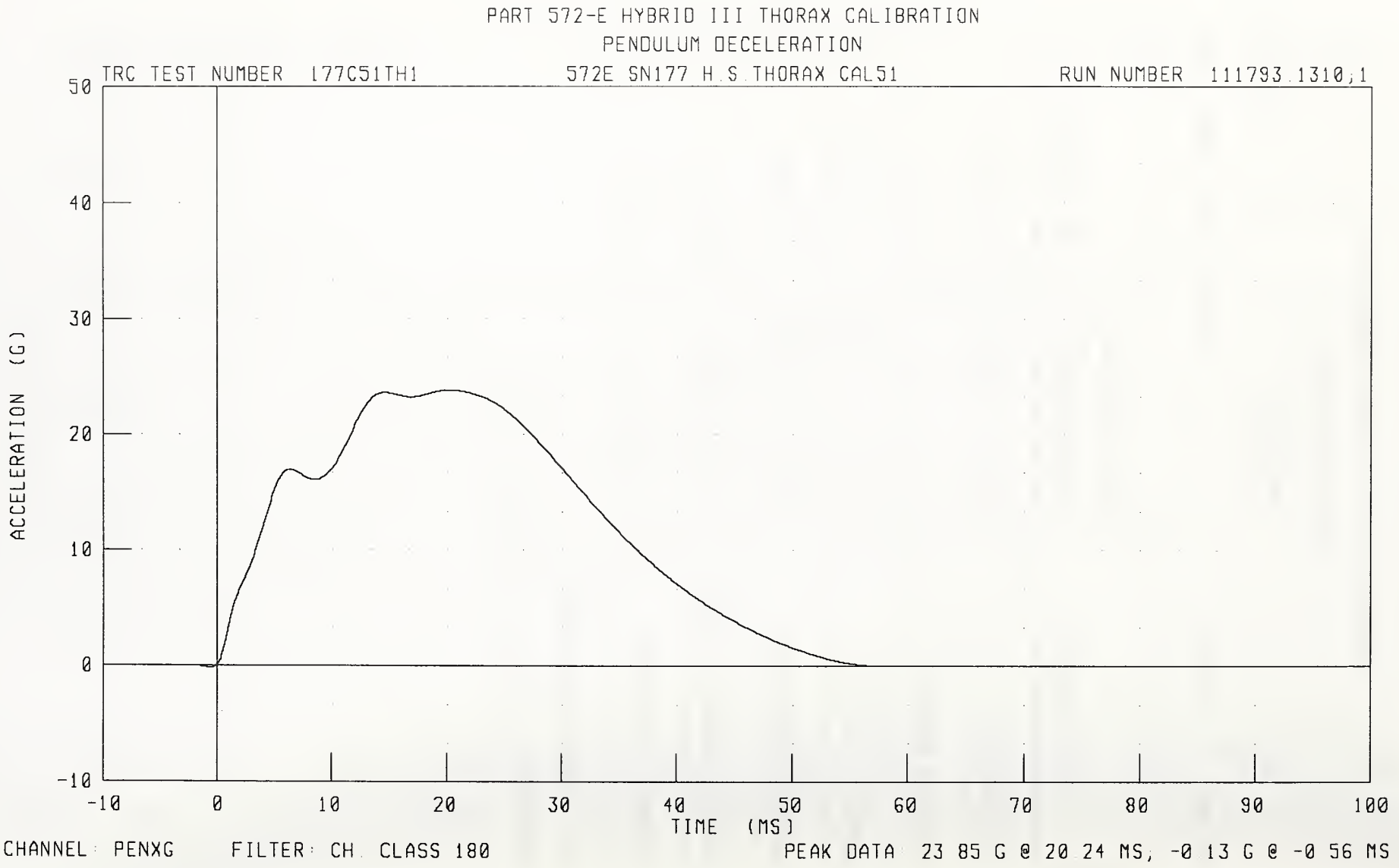
HYBRID III 17-NOV-93

TRC INC. 177C51TH1 572E SN177 H.S.THORAX CAL51

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.65 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	67.4 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5463. N
INTERNAL HYSTERESIS	69% - 85%	72.1%

TEST MEETS SPECIFICATIONS

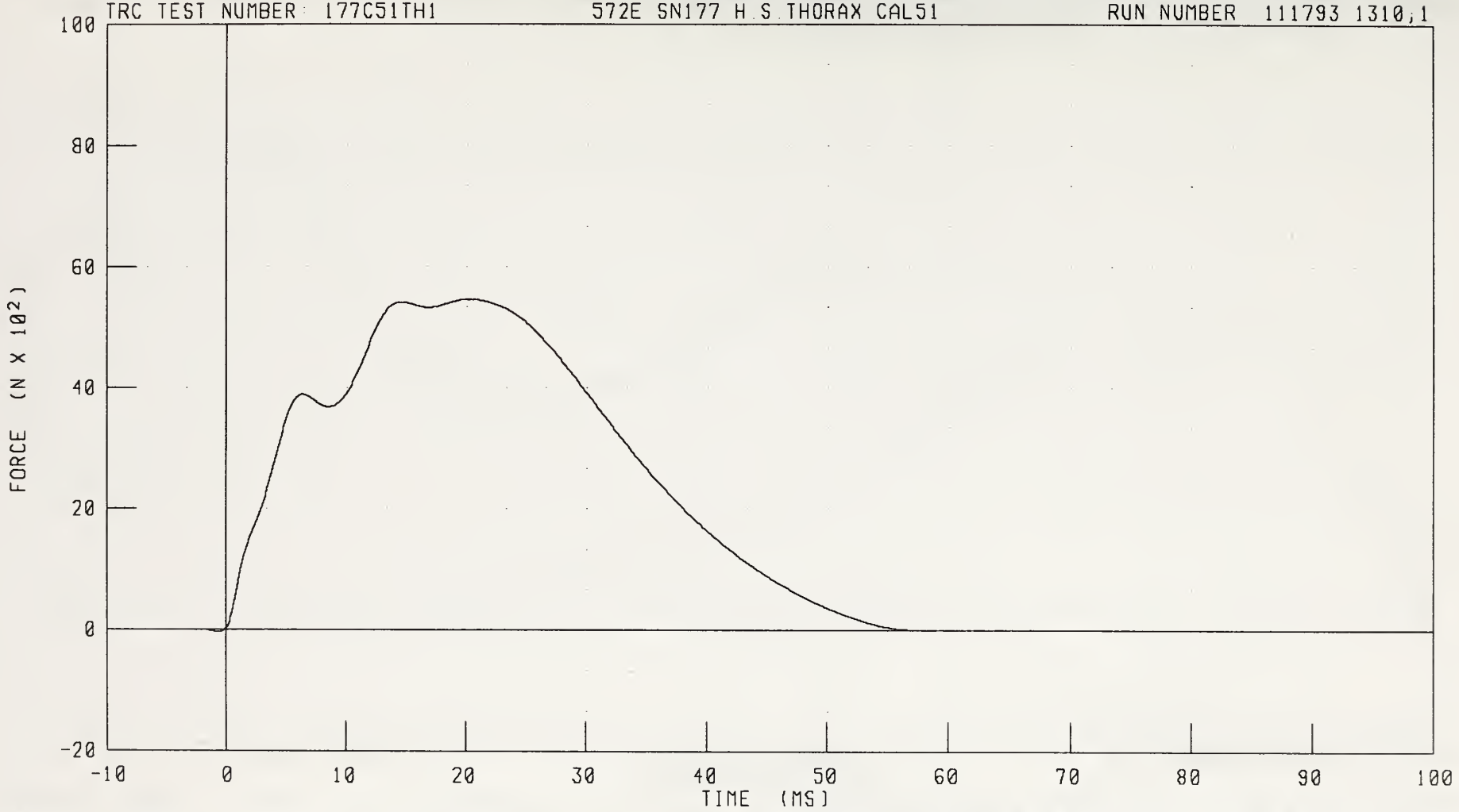
TECHNICIAN Pete F.A


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER 177C51TH1
572E SN177 H.S THORAX CAL51
RUN NUMBER 111793.1310;1
ACCELERATION (G)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL: PENXG
FILTER: CH CLASS 180
PEAK DATA 23 85 G @ 20 24 MS, -0 13 G @ -0 56 MS

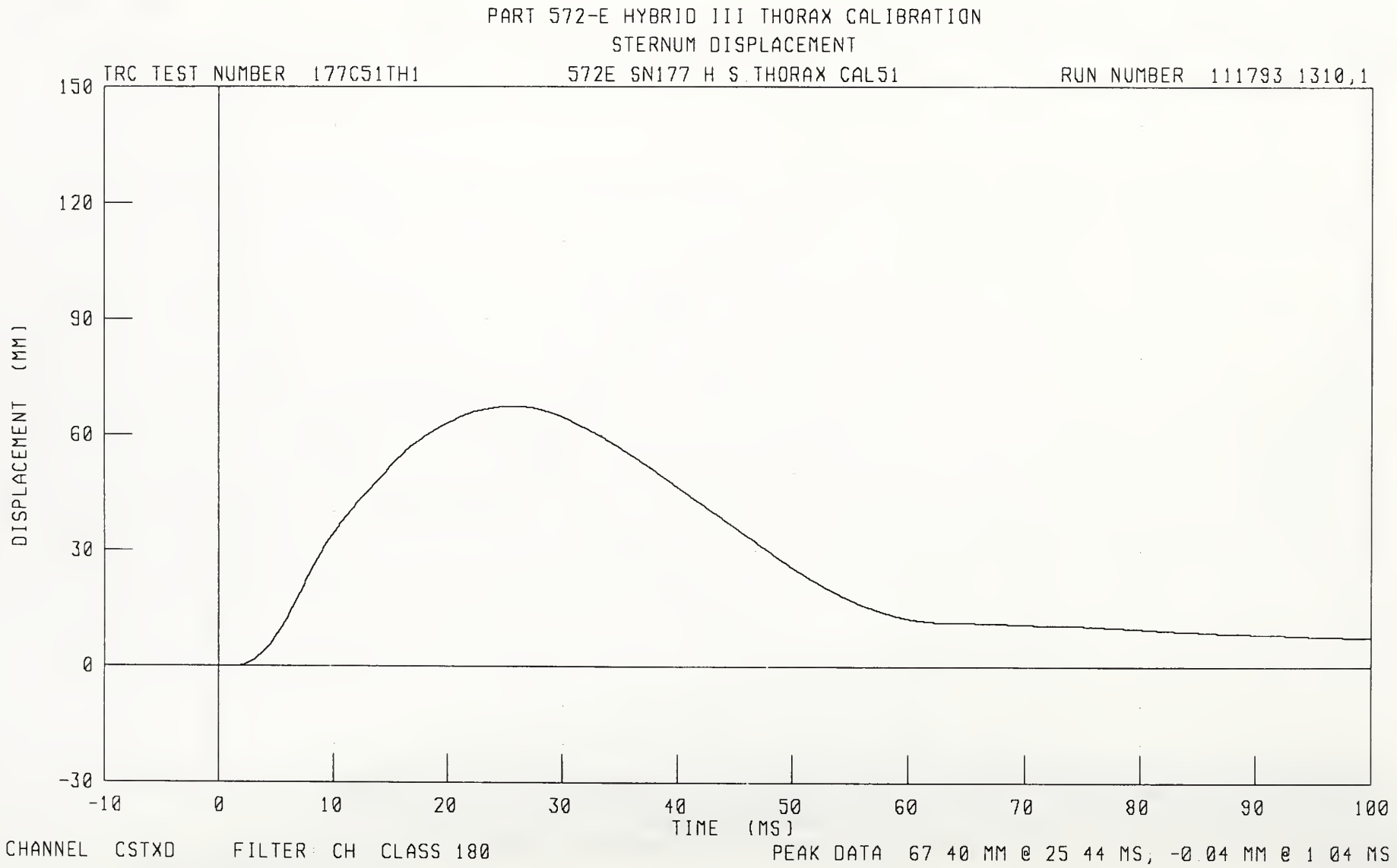
PART 572-E HYBRID III THORAX CALIBRATION

PENDULUM FORCE

TRC TEST NUMBER 177C51TH1 572E SN177 H.S.THORAX CAL51 RUN NUMBER 111793 1310;1

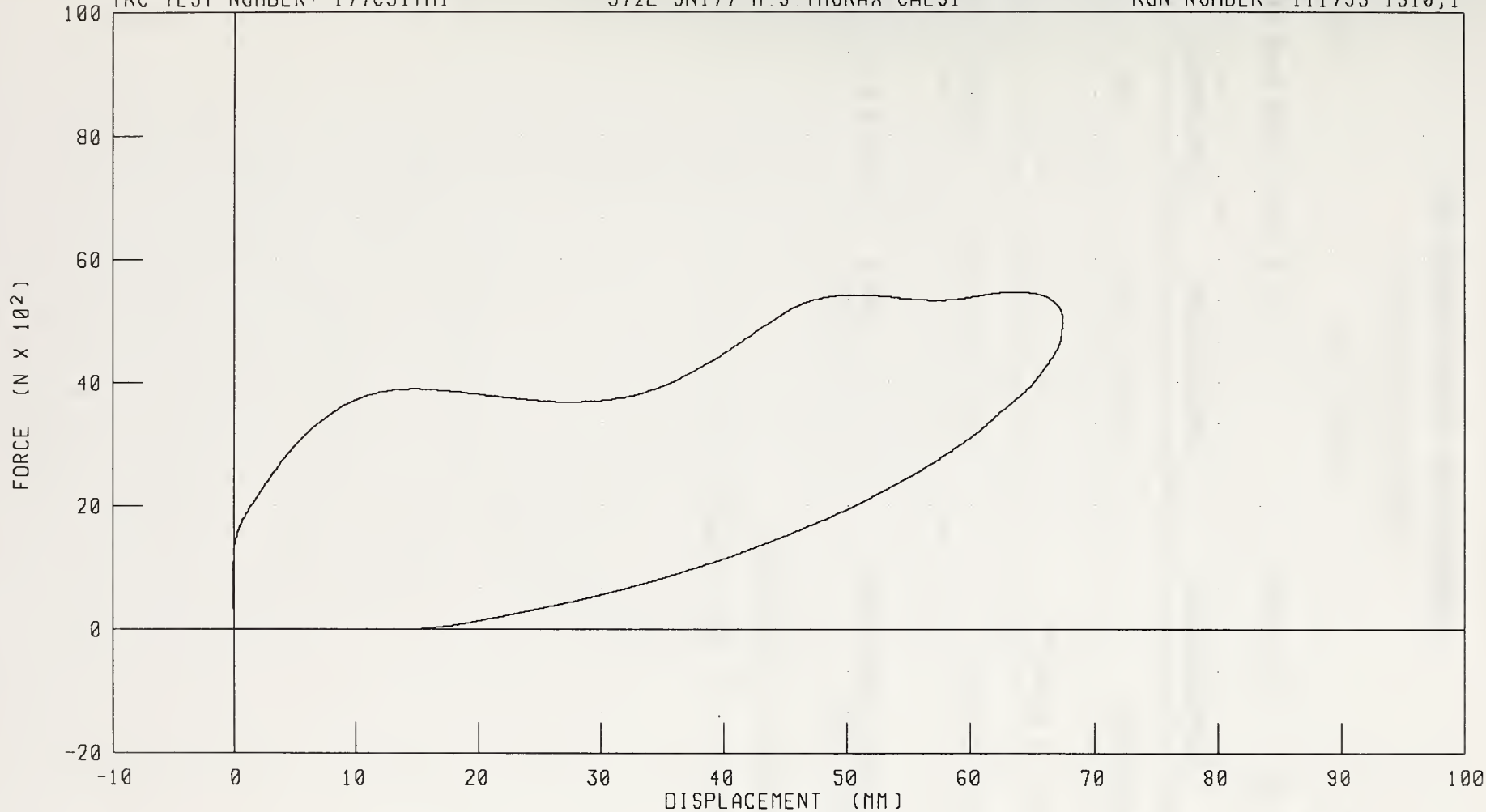


CHANNEL PENXF FILTER CH CLASS 180 PEAK DATA 5463.41 N @ 20.24 MS; -30.33 N @ -0.56 MS


PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT
TRC TEST NUMBER 177C51TH1
572E SN177 H S THORAX CAL51
RUN NUMBER 111793 1310,1
DISPLACEMENT (MM)
150
120
90
60
30
0
-30
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL CSTXD
FILTER CH CLASS 180
PEAK DATA 67 40 MM @ 25 44 MS, -0 04 MM @ 1 04 MS

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

TRC TEST NUMBER: 177C51TH1 572E SN177 H.S THORAX CAL51 RUN NUMBER 111793.1310;1



CHANNEL CSTXD FILTER CH CLASS 180 PEAK DATA 67.40 MM @ 25.44 MS; -0.04 MM @ 1.04 MS
PENXF CH CLASS 180 5463.41 N @ 20.24 MS; -30.33 N @ -0.56 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

HYBRID III 17-NOV-93

TRC INC. 177C51RK1 572E SN177 RIGHT KNEE CAL 51

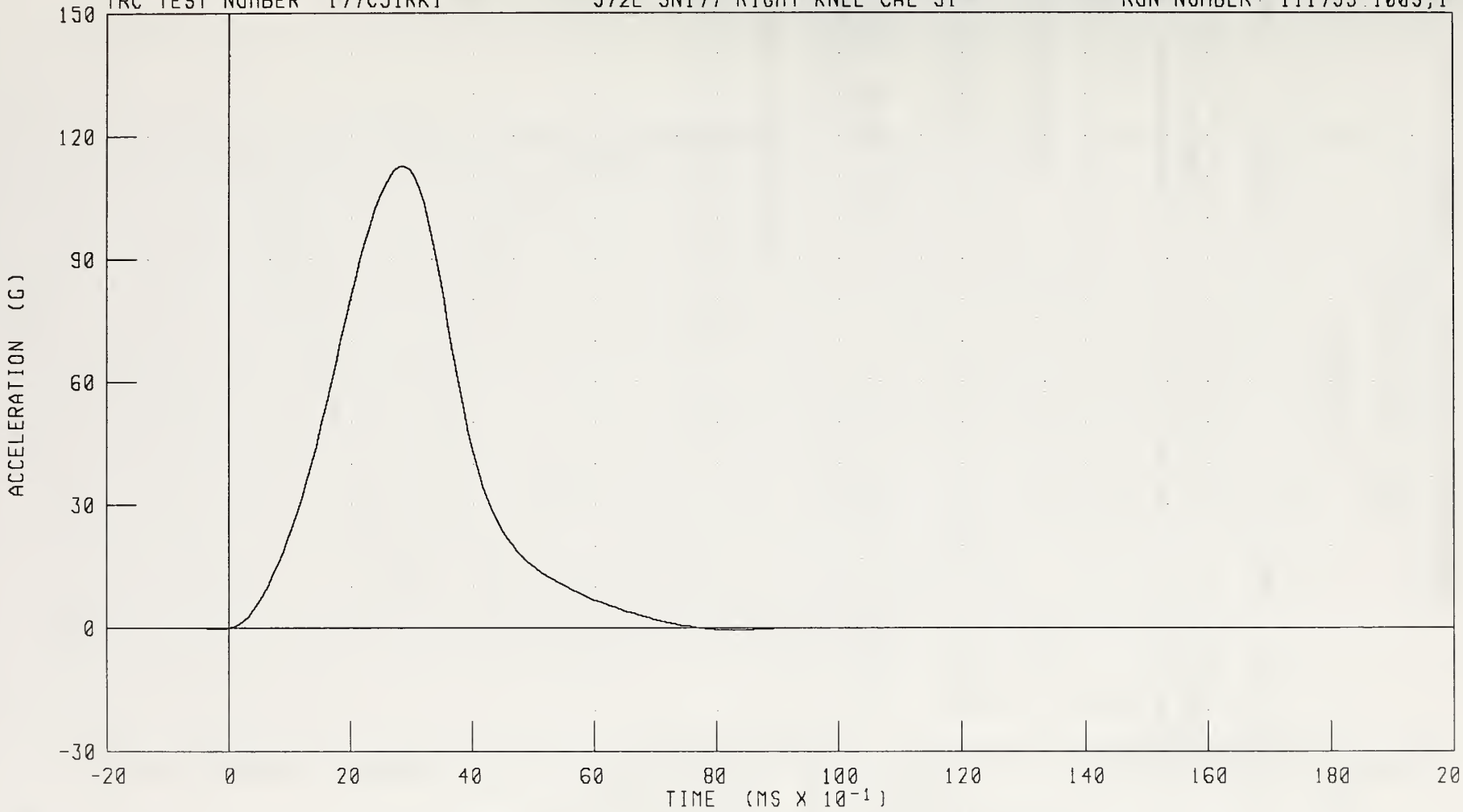
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.07 M/S
PEAK KNEE IMPACT FORCE PROBE WEIGHT	4714 - 5783 N 5.0 KG	5513.8 N

TEST MEETS SPECIFICATIONS

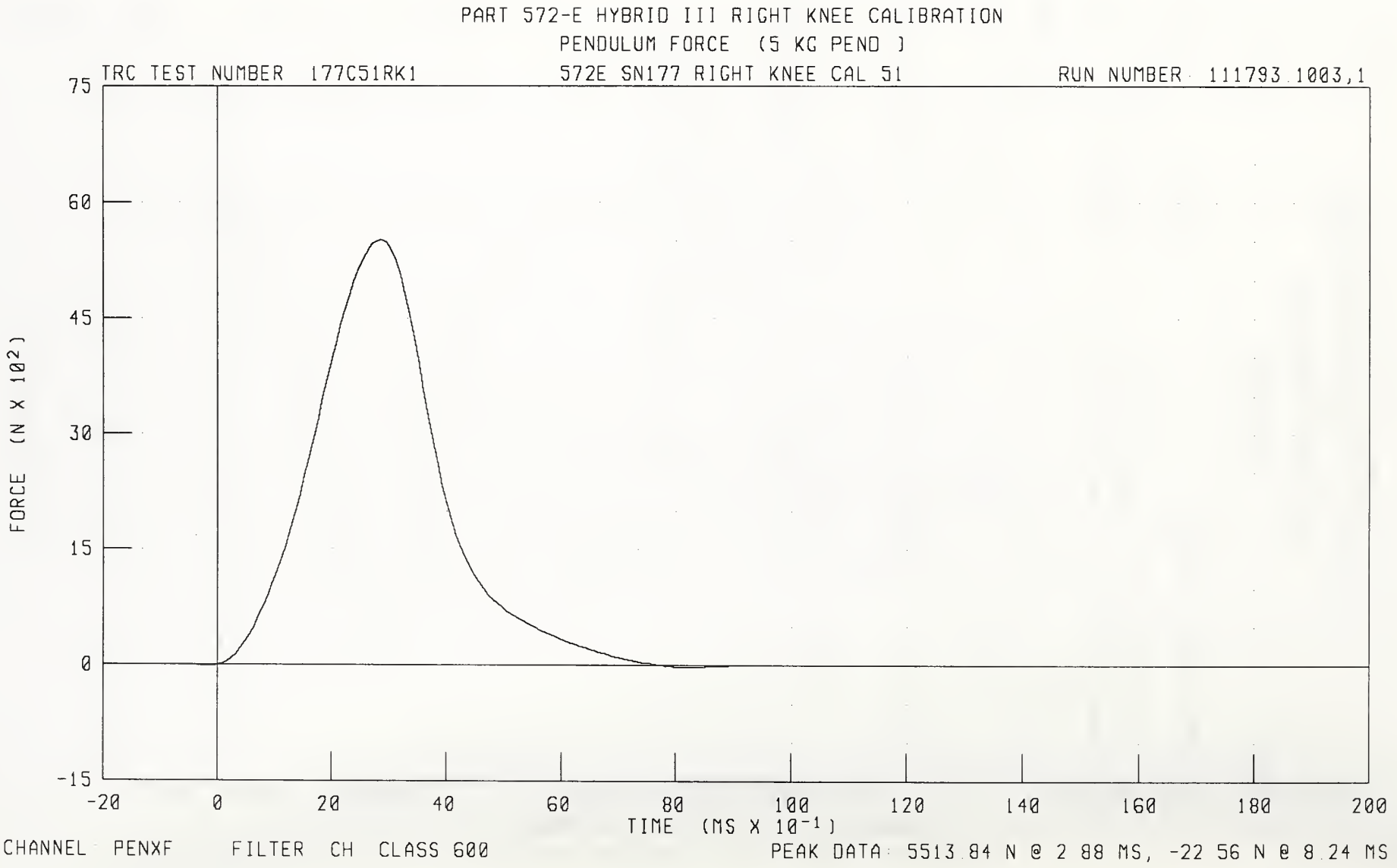
TECHNICIAN Peter Foust

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

TRC TEST NUMBER: 177C51RK1 572E SN177 RIGHT KNEE CAL 51 RUN NUMBER: 111793.1003,1



CHANNEL PENXG FILTER CH CLASS 600 PEAK DATA 112.69 G @ 2.88 MS, -0.46 G @ 8.24 MS


PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND)
TRC TEST NUMBER 177C51RK1
572E SN177 RIGHT KNEE CAL 51
RUN NUMBER 111793.1003,1
FORCE (N X 10²)
75
60
45
30
15
0
-15
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10⁻¹)
CHANNEL PENXF
FILTER CH CLASS 600
PEAK DATA 5513.84 N @ 2.88 MS, -22.56 N @ 8.24 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

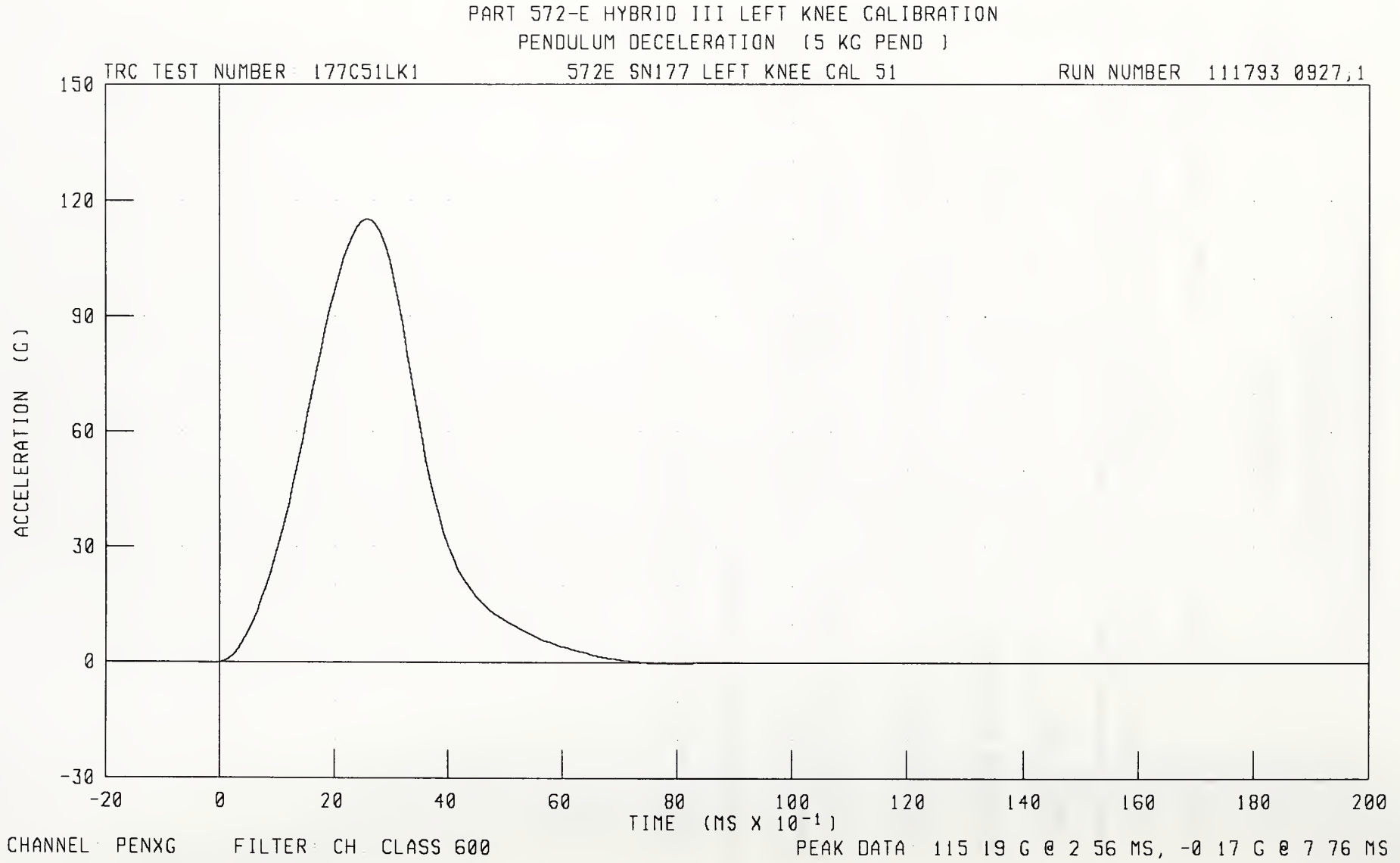
HYBRID III 17-NOV-93

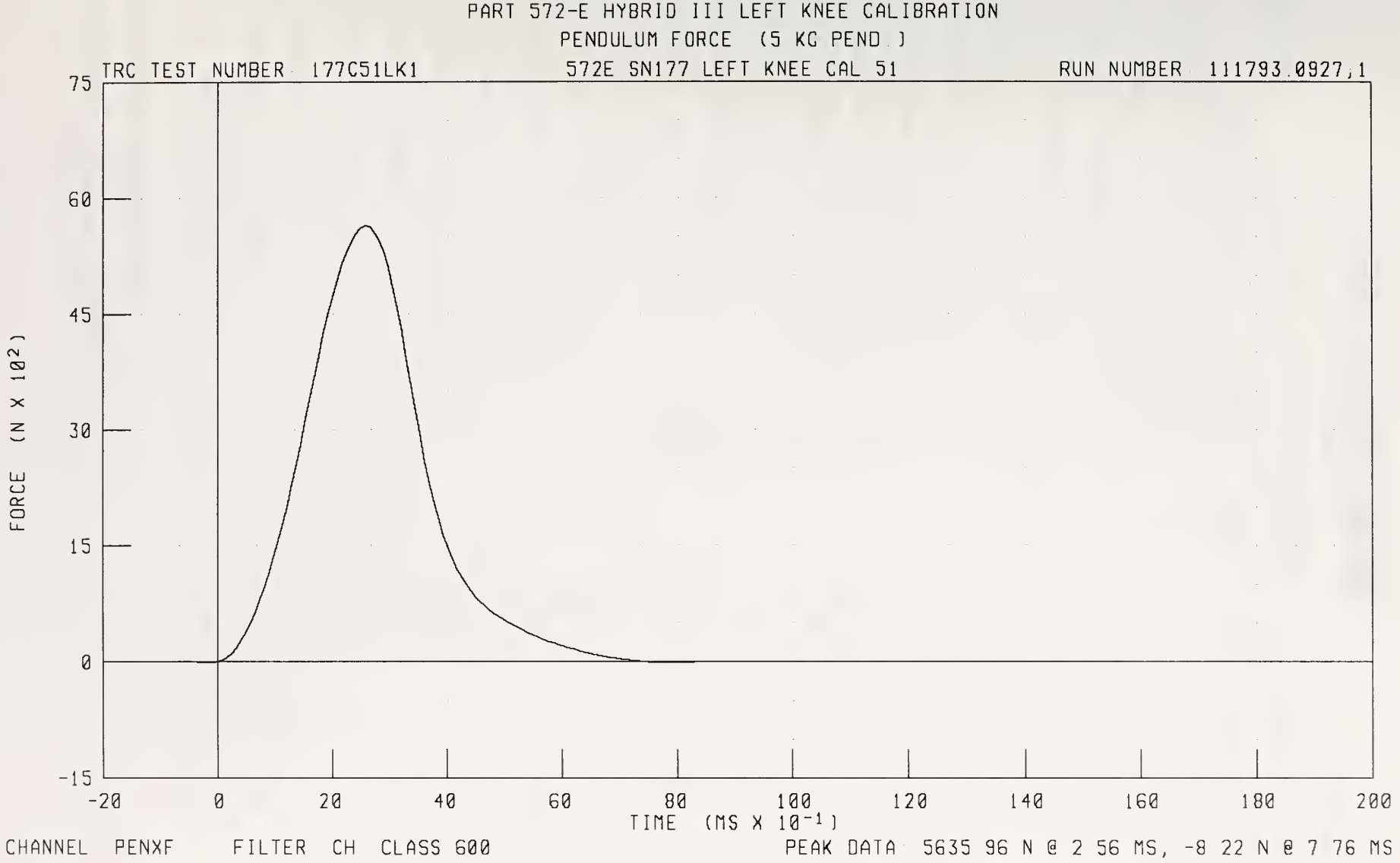
TRC INC. 177C51LK1 572E SN177 LEFT KNEE CAL 51

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.07 M/S
PEAK KNEE IMPACT FORCE	4714 - 5783 N	5635.9 N
PROBE WEIGHT	5.0 KG	

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foss


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND)
TRC TEST NUMBER 177C51LK1
572E SN177 LEFT KNEE CAL 51
RUN NUMBER 111793 0927,1
ACCELERATION (G)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10-1)
CHANNEL PENXG
FILTER CH CLASS 600
PEAK DATA 115 19 G @ 2 56 MS, -0 17 G @ 7 76 MS


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND.)
TRC TEST NUMBER 177C51LK1
572E SN177 LEFT KNEE CAL 51
RUN NUMBER 111793.0927;1
FORCE (N X 10²)
75
60
45
30
15
0
-15
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10⁻¹)
CHANNEL PENXF
FILTER CH CLASS 600
PEAK DATA 5635.96 N @ 2.56 MS, -8.22 N @ 7.76 MS

PRE-TEST CERTIFICATION DATA

PASSENGER DUMMY S/N: 134

TRANSPORTATION RESEARCH CENTER INC.
HYBRID III EXTERNAL DIMENSIONS
134 ARL

17-NOV-93

TRC INC. 134C49ED1 572E SN134 EXT.DIMENSION CAL49

TEST PARAMETER (DIMEN.)	SPECIFICATION	TEST RESULTS
LOCATION FOR CHEST CIRCUMFERENCE (AA)	429 - 434 MM	432. MM
LOCATION FOR WAIST CIRCUMFERENCE (BB)	226 - 231 MM	229. MM
CHEST CIRCUMFERENCE (Y)	970 -1001 MM	980. MM
WAIST CIRCUMFERENCE (Z)	836 - 866 MM	848. MM
CHEST DEPTH (O)	213 - 229 MM	216. MM
H-POINT HEIGHT (C)	84 - 89 MM	84. MM
H-POINT FROM SEATBACK (D)	135 - 140 MM	137. MM
SKULL CAP TO BACKLINE (H)	41 - 46 MM	43. MM
TOTAL SITTING HEIGHT (A)	879 - 889 MM	881. MM
THIGH CLEARANCE (F)	140 - 155 MM	147. MM
BUTTOCK KNEE LENGTH (K)	579 - 605 MM	597. MM
BUTTOCK POPLITEAL LENGTH (N)	452 - 478 MM	472. MM
POPLITEAL HEIGHT (L)	429 - 455 MM	439. MM
KNEE PIVOT HEIGHT (M)	485 - 500 MM	490. MM
FOOT LENGTH (P)	252 - 267 MM	262. MM
FOOT BREADTH (W)	91 - 107 MM	102. MM
SHOULDER PIVOT FROM BACKLINE (E)	84 - 94 MM	89. MM
SHOULDER BREADTH (V)	422 - 437 MM	427. MM
SHOULDER PIVOT HEIGHT (B)	506 - 521 MM	516. MM
ELBOW REST HEIGHT (J)	191 - 211 MM	211. MM
SHOULDER-ELBOW LENGTH (I)	330 - 345 MM	340. MM
BACK OF ELBOW TO WRIST PIVOT (G)	290 - 305 MM	295. MM

TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foust

TRANSPORTATION RESEARCH CENTER INC.

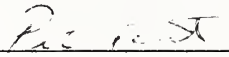
HEAD DROP TEST

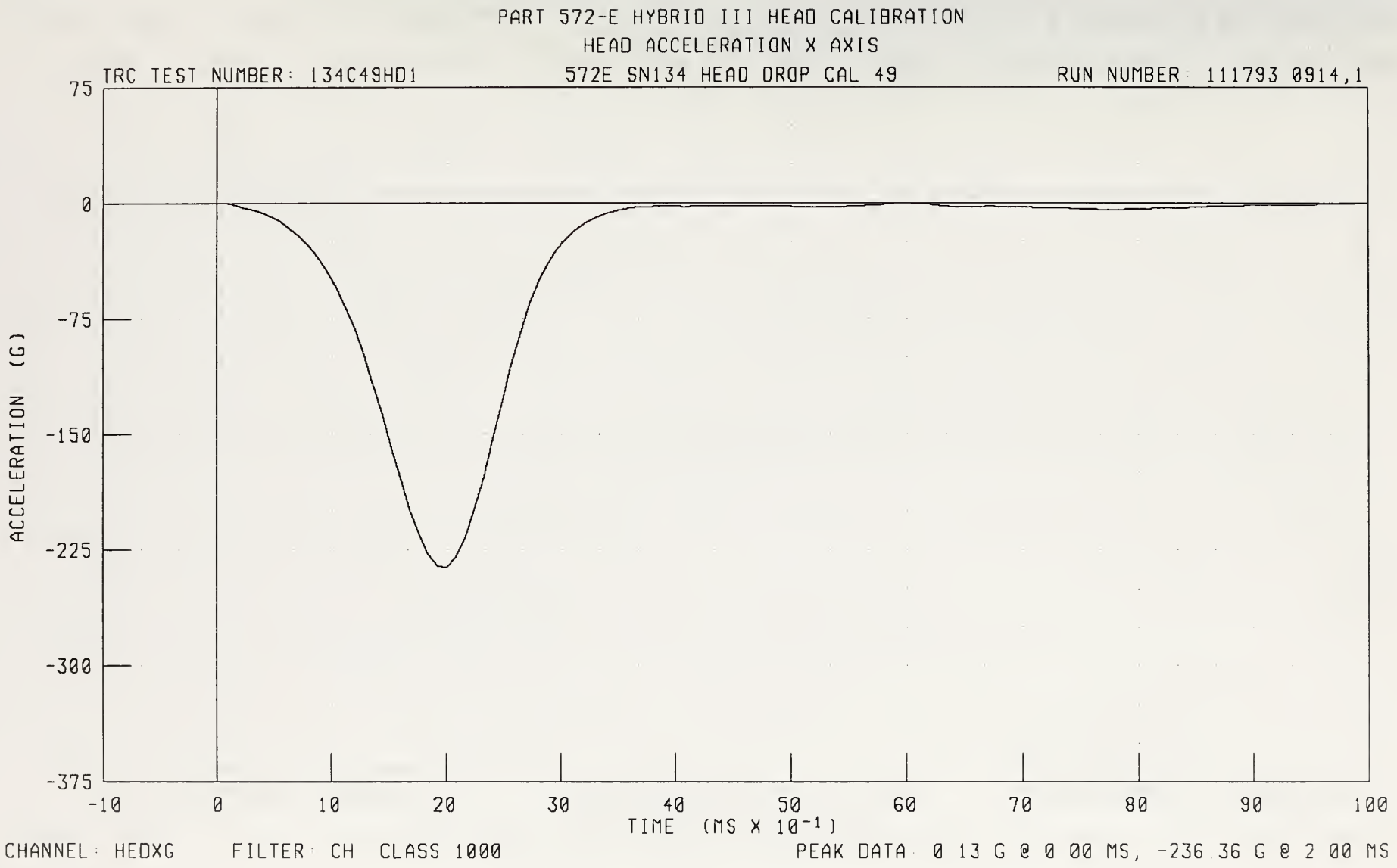
HYBRID III 17-NOV-93

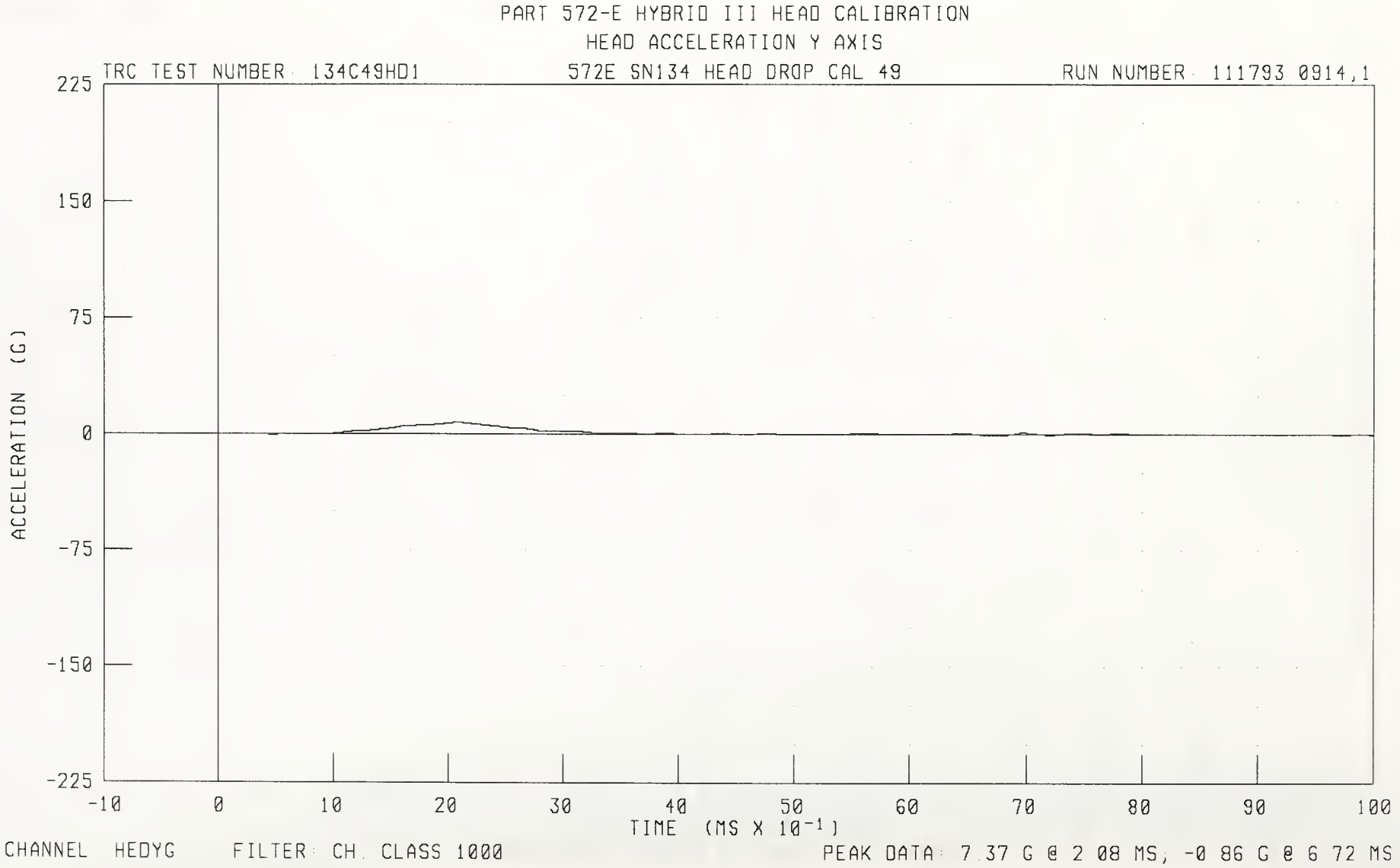
TRC INC. 134C49HD1 572E SN134 HEAD DROP CAL 49

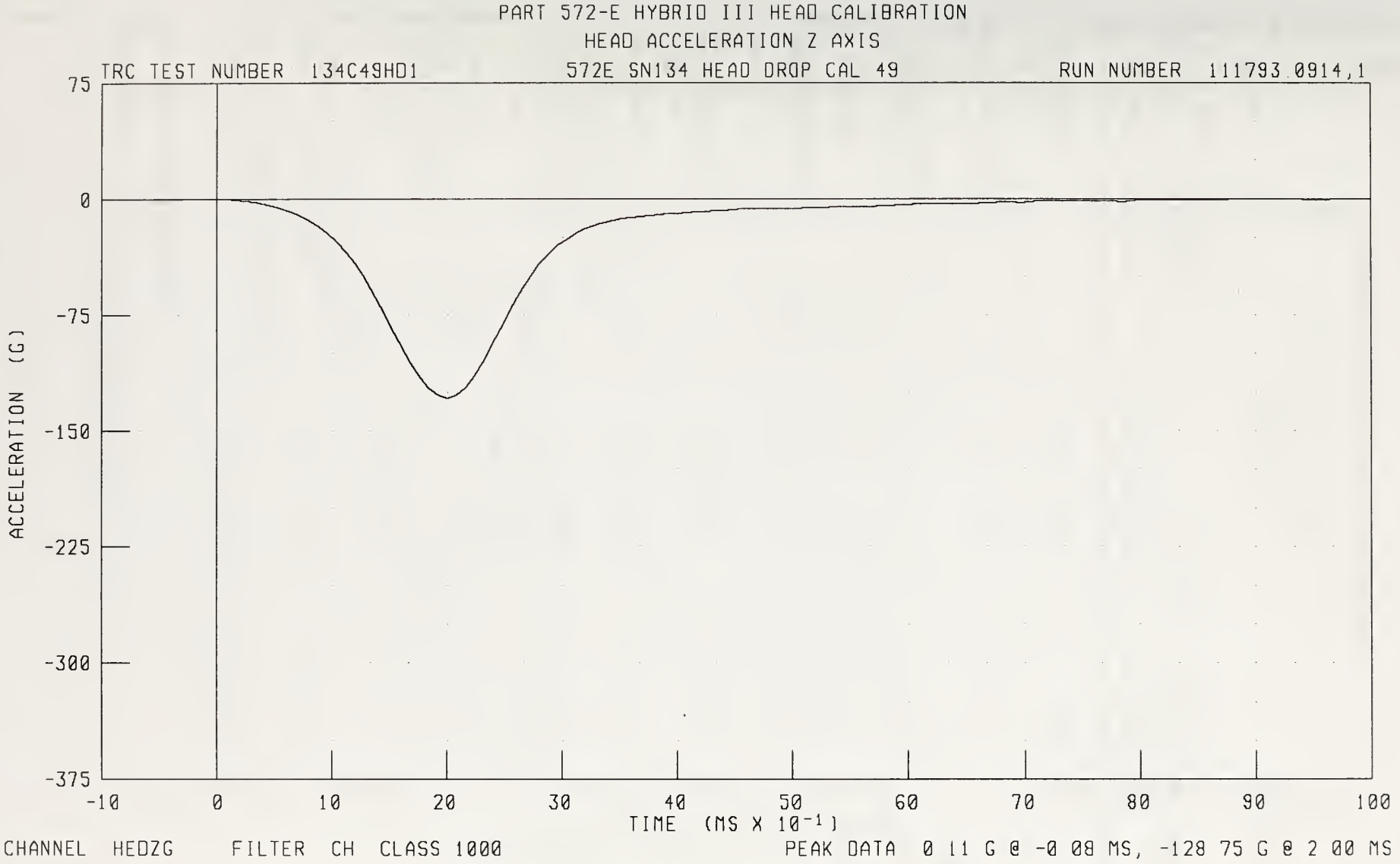
TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PEAK RESULTANT ACCELERATION	225 - 275 G	269.24 G
PEAK LATERAL ACCELERATION	15 G MAX	7.37 G
IS ACCELERATION CURVE UNIMODAL?	YES	YES

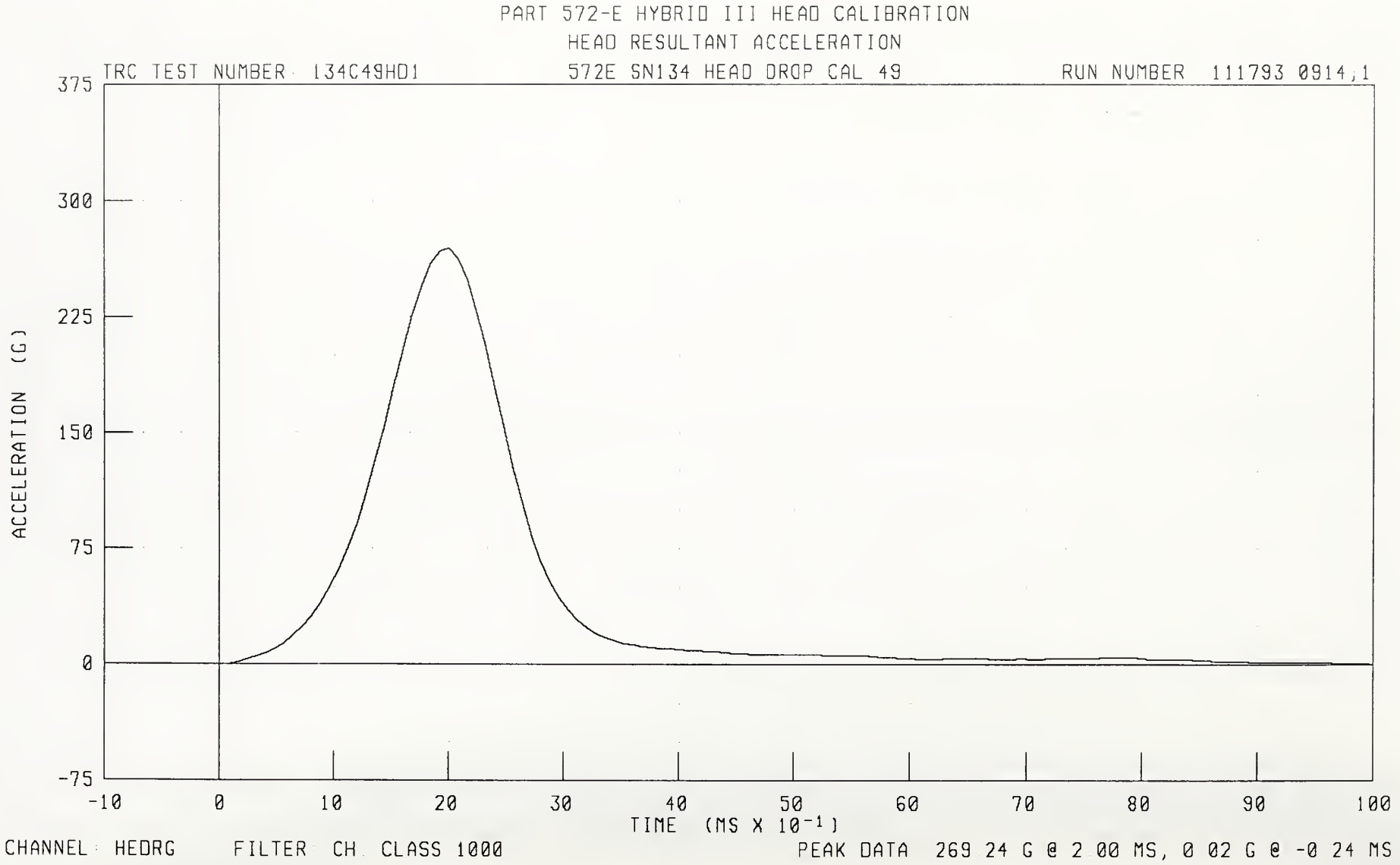
TEST MEETS SPECIFICATIONS

TECHNICIAN 


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION X AXIS
TRC TEST NUMBER: 134C49HD1
572E SN134 HEAD DROP CAL 49
RUN NUMBER: 111793 0914,1
75
0
-75
-150
-225
-300
-375
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL: HEDXG
FILTER: CH CLASS 1000
PEAK DATA: 0 13 G @ 0 00 MS, -236 36 G @ 2 00 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Y AXIS
TRC TEST NUMBER: 134C49HD1
572E SN134 HEAD DROP CAL 49
RUN NUMBER: 111793 0914,1
225
150
75
0
-75
-150
-225
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL: HEDYG
FILTER: CH. CLASS 1000
PEAK DATA: 7.37 G @ 2.08 MS, -0.86 G @ 6.72 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD ACCELERATION Z AXIS
TRC TEST NUMBER 134C49HD1
572E SN134 HEAD DROP CAL 49
RUN NUMBER 111793 0914,1
75
0
-75
-150
-225
-300
-375
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10-1)
CHANNEL HEDZG
FILTER CH CLASS 1000
PEAK DATA 0 11 G @ -0 08 MS, -128 75 G @ 2 00 MS


PART 572-E HYBRID III HEAD CALIBRATION
HEAD RESULTANT ACCELERATION
TRC TEST NUMBER 134C49HD1
572E SN134 HEAD DROP CAL 49
RUN NUMBER 111793 0914,1
375
300
225
150
75
0
-75
ACCELERATION (G)
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS X 10⁻¹)
CHANNEL HEDRG
FILTER CH CLASS 1000
PEAK DATA 269 24 G @ 2 00 MS, 0 02 G @ -0 24 MS

TRANSPORTATION RESEARCH CENTER INC.

NECK FLEXION TEST

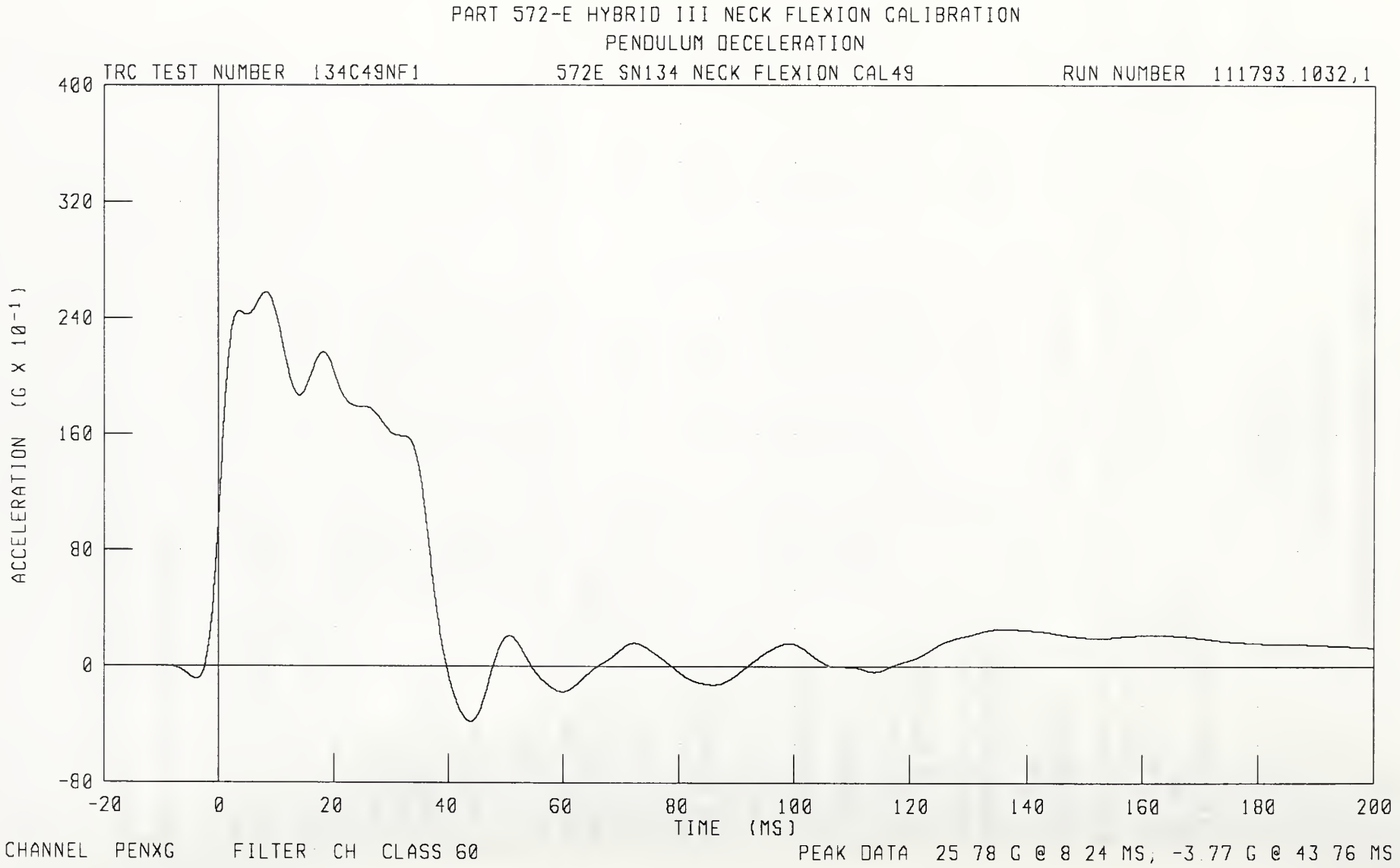
HYBRID III 17-NOV-93

3 AXIS NECK TRANSDUCER
TRC INC. 134C49NF1 572E SN134 NECK FLEXION CAL49

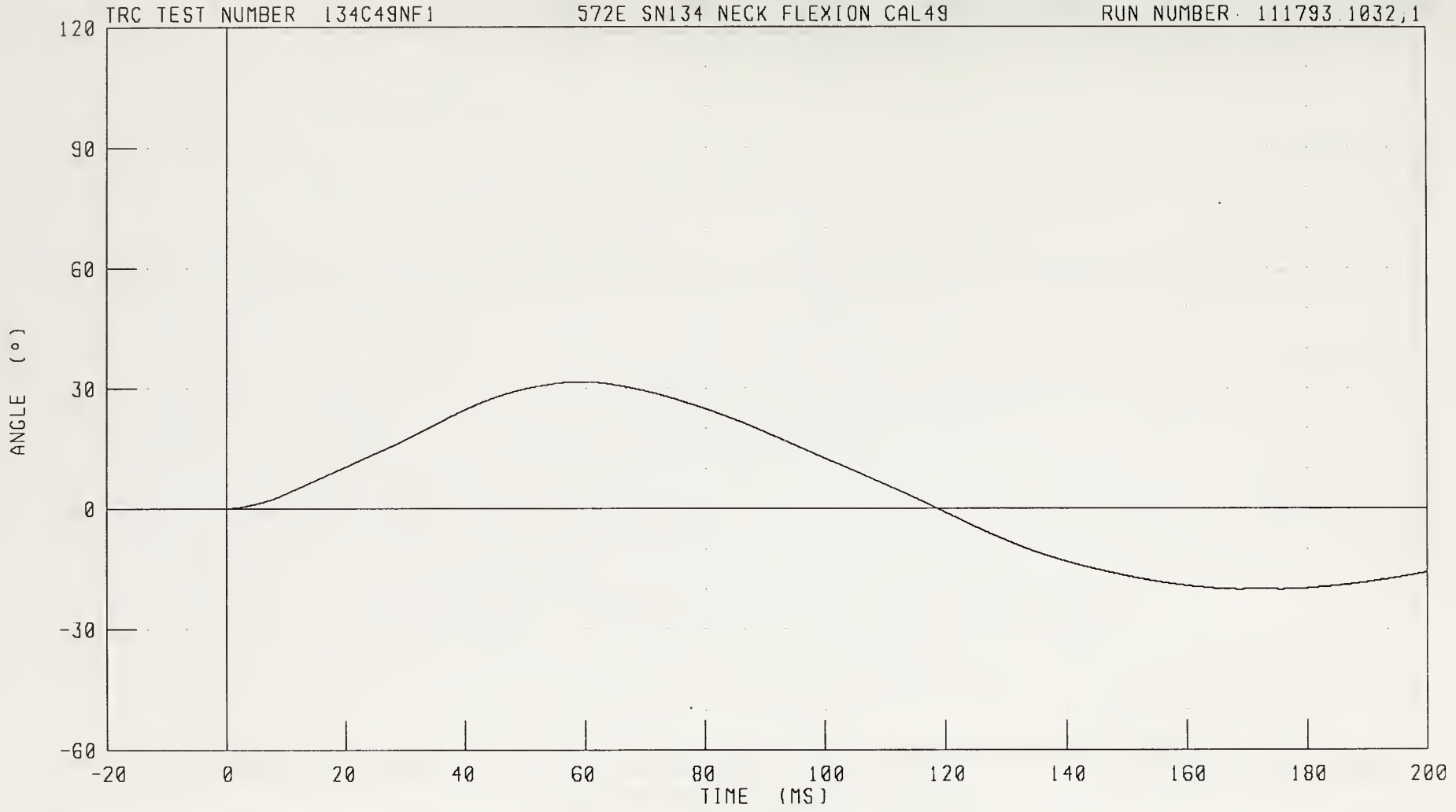
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		6.89 - 7.13 M/S	7.06 M/S
PENDULUM DECELERATION	10 MS	22.50 - 27.50 G	24.32 G
	20 MS	17.60 - 22.60 G	20.37 G
	30 MS	12.50 - 18.50 G	16.12 G
MAX PENDULUM G		29 G MAX	25.78 G
MAX PENDULUM G ABOVE 30 MS		29 G MAX	16.10 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		34 - 42 MS	37.52 MS
D PLANE ROTATION	MAX	64 - 78 DEG.	73.11 DEG.
	TIME	57 - 64 MS	59.20 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MAX	88.2 - 108.5 NM	89.81 NM
	TIME	47 - 58 MS	50.72 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		113 - 128 MS	115.44 MS
POSITIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		97 - 107 MS	103.52 MS

TEST MEETS SPECIFICATIONS

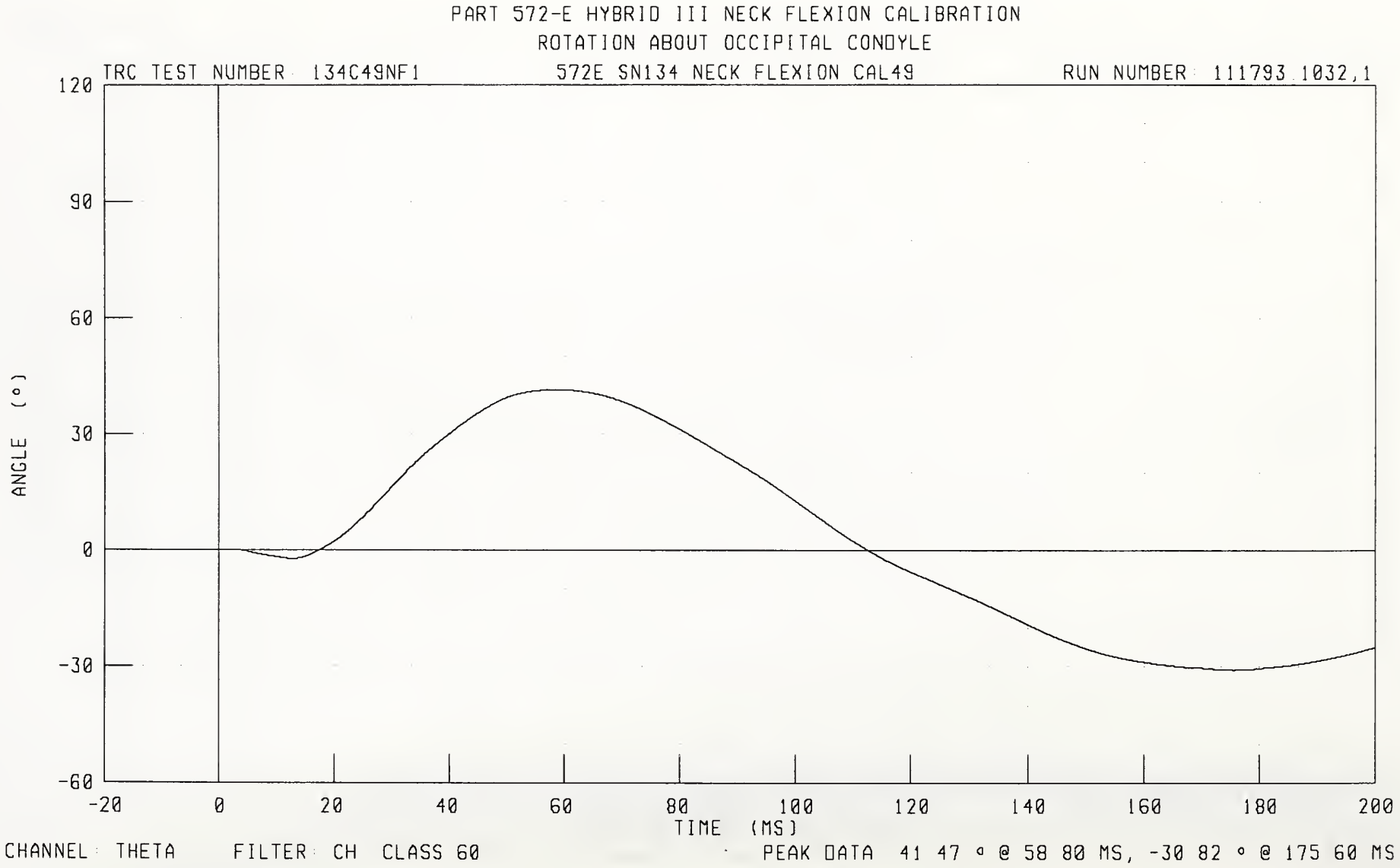
TECHNICIAN 

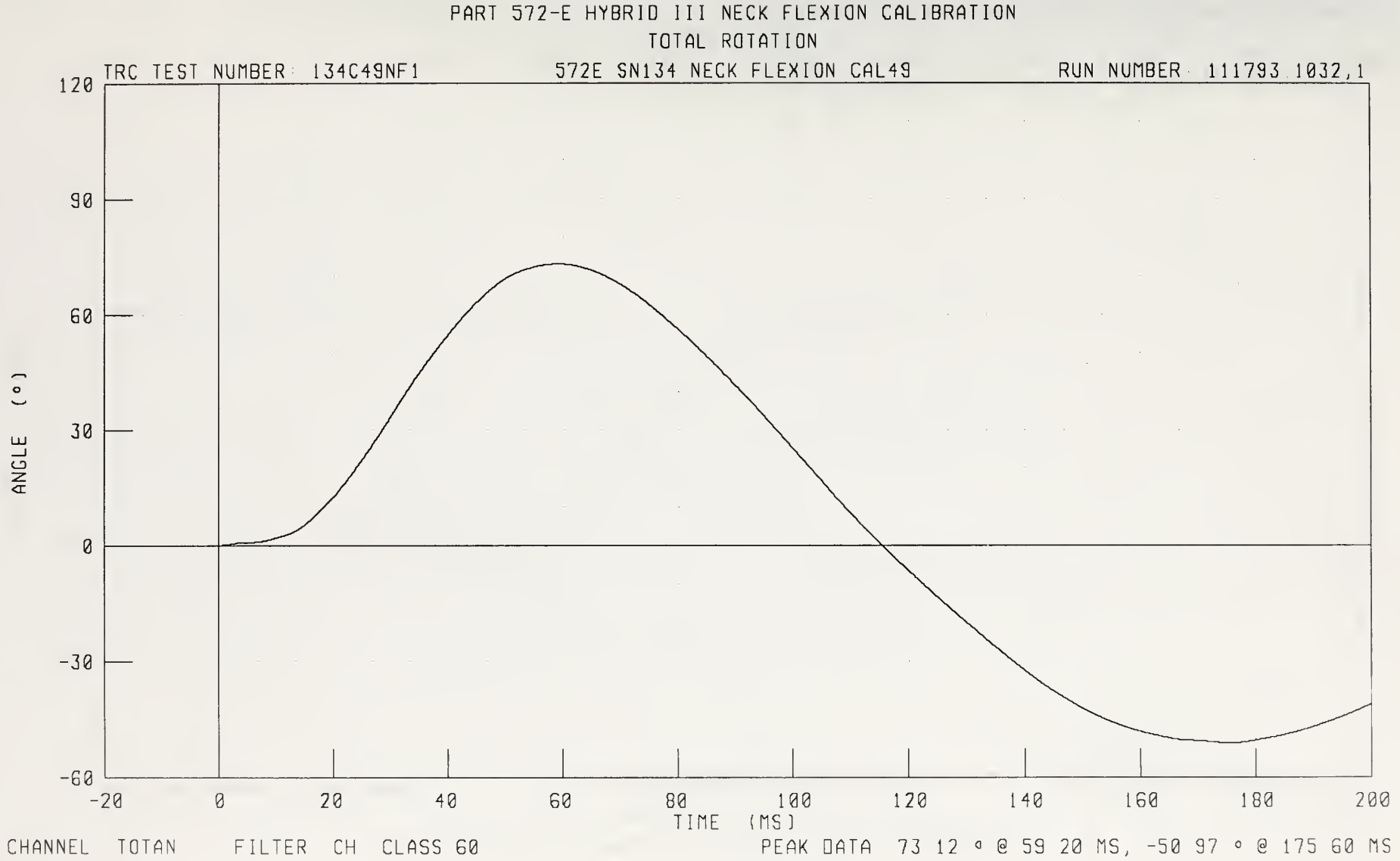

PART 572-E HYBRID III NECK FLEXION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER 134C49NF1
572E SN134 NECK FLEXION CAL49
RUN NUMBER 111793.1032,1
400
320
240
160
80
0
-80
ACCELERATION (G X 10-1)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL PENXG
FILTER CH CLASS 60
PEAK DATA 25.78 G @ 8.24 MS, -3.77 G @ 43.76 MS

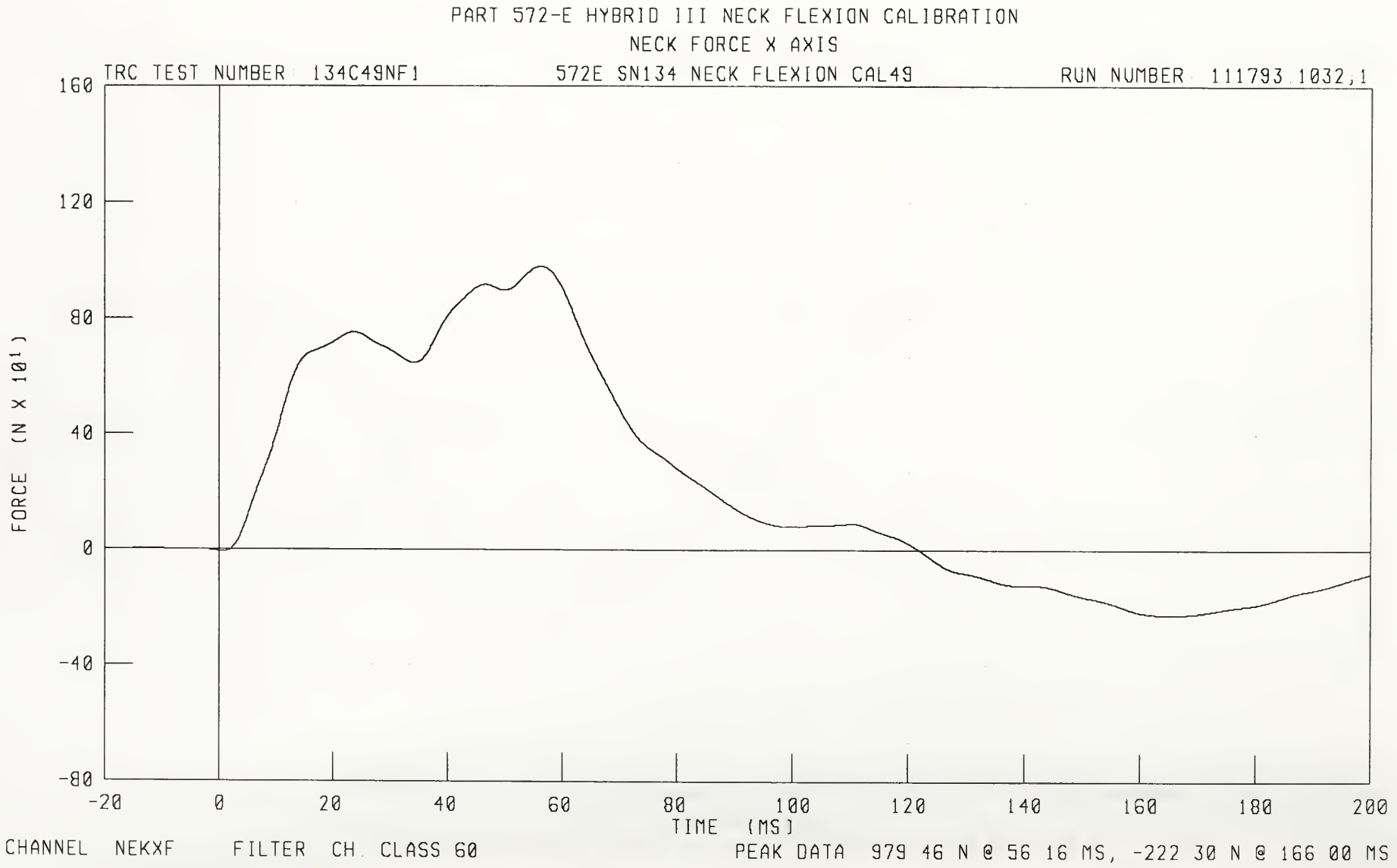
PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT BASE OF NECK

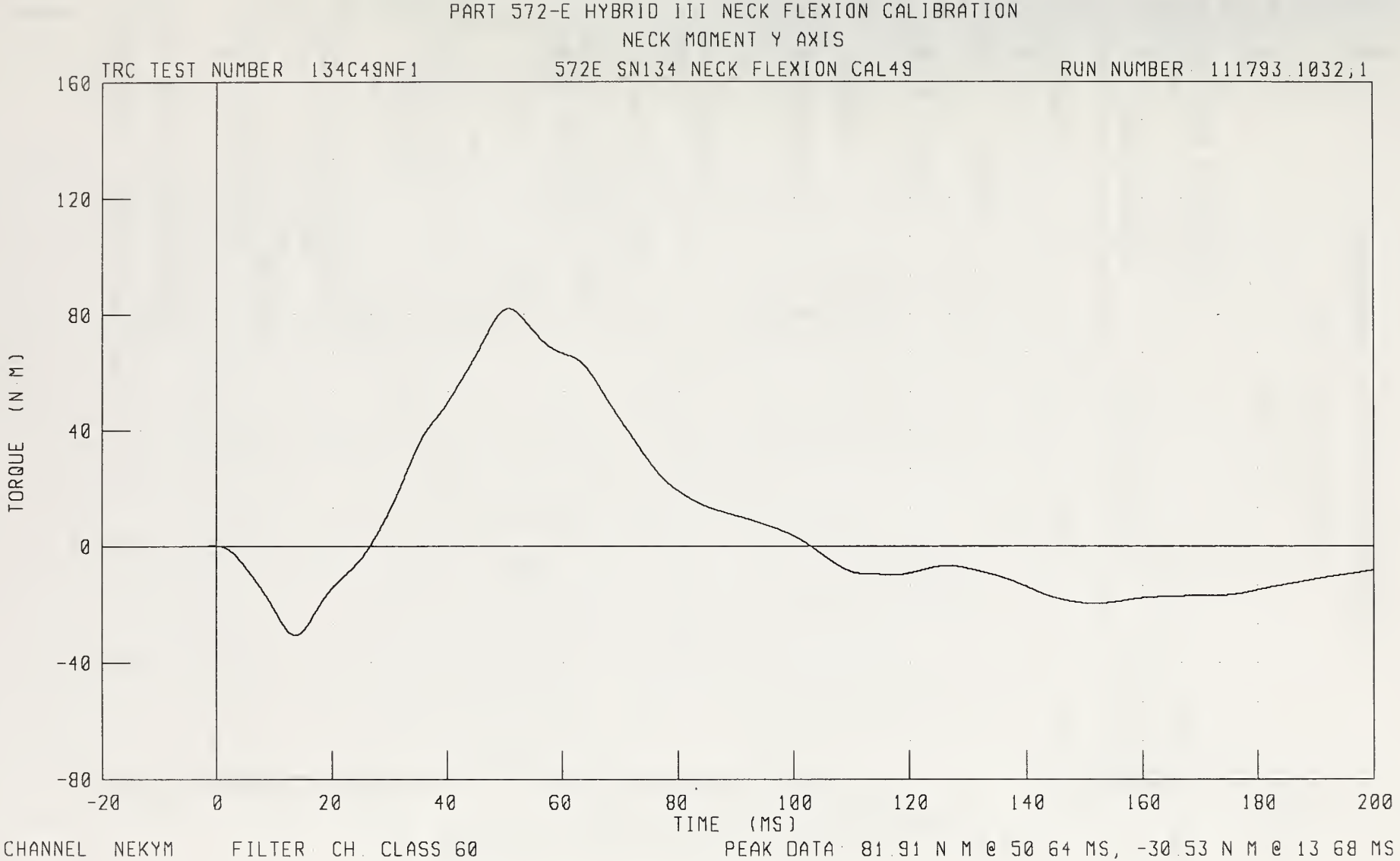


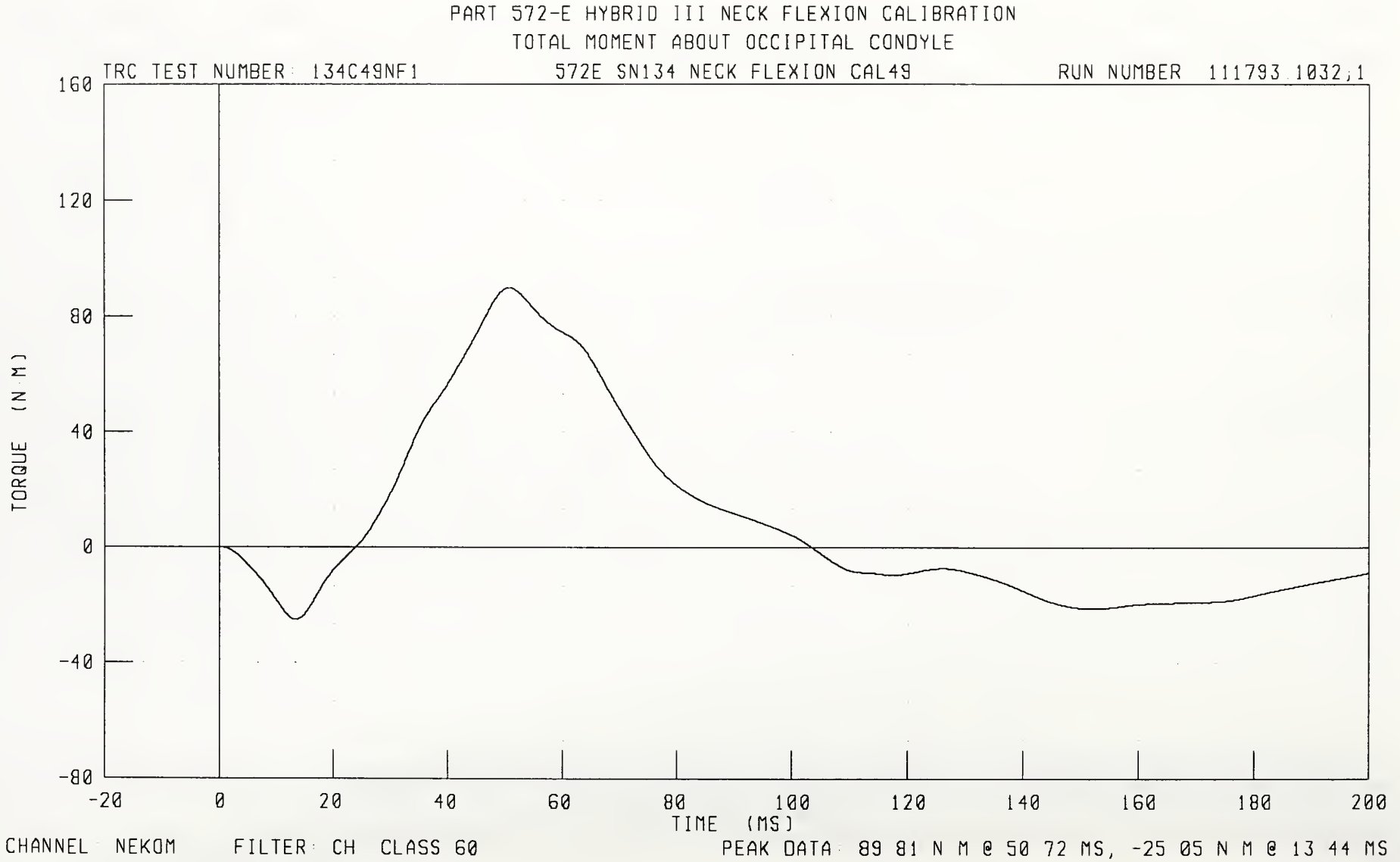
CHANNEL BETA FILTER CH CLASS 60 PEAK DATA 31 65 ° @ 59 36 MS, -20 15 ° @ 168 72 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 134C49NF1
572E SN134 NECK FLEXION CAL49
RUN NUMBER 111793 1032,1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL THETA
FILTER CH CLASS 60
PEAK DATA 41 47 ° @ 58 80 MS, -30 82 ° @ 175 60 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER: 134C49NF1
572E SN134 NECK FLEXION CAL49
RUN NUMBER: 111793.1032,1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL TOTAN
FILTER CH CLASS 60
PEAK DATA 73.12 ° @ 59.20 MS, -50.97 ° @ 175.60 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER 134C49NF1
572E SN134 NECK FLEXION CAL49
RUN NUMBER 111793.1032,1
160
120
80
40
0
-40
-80
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKXF
FILTER CH CLASS 60
PEAK DATA 979.46 N @ 56.16 MS, -222.30 N @ 166.00 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
NECK MOMENT Y AXIS
TRC TEST NUMBER 134C49NF1
572E SN134 NECK FLEXION CAL49
RUN NUMBER 111793.1032,1
160
120
80
40
0
-40
-80
TORQUE (N.M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKYM
FILTER CH CLASS 60
PEAK DATA 81.91 N M @ 50.64 MS, -30.53 N M @ 13.68 MS


PART 572-E HYBRID III NECK FLEXION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER: 134C49NF1
572E SN134 NECK FLEXION CAL49
RUN NUMBER 111793.1032;1
160
120
80
40
0
-40
-80
TORQUE (N M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL: NEKOM
FILTER: CH CLASS 60
PEAK DATA: 89.81 N M @ 50.72 MS, -25.05 N M @ 13.44 MS

TRANSPORTATION RESEARCH CENTER INC.

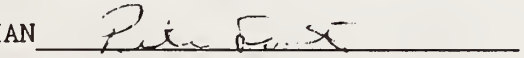
NECK EXTENSION TEST

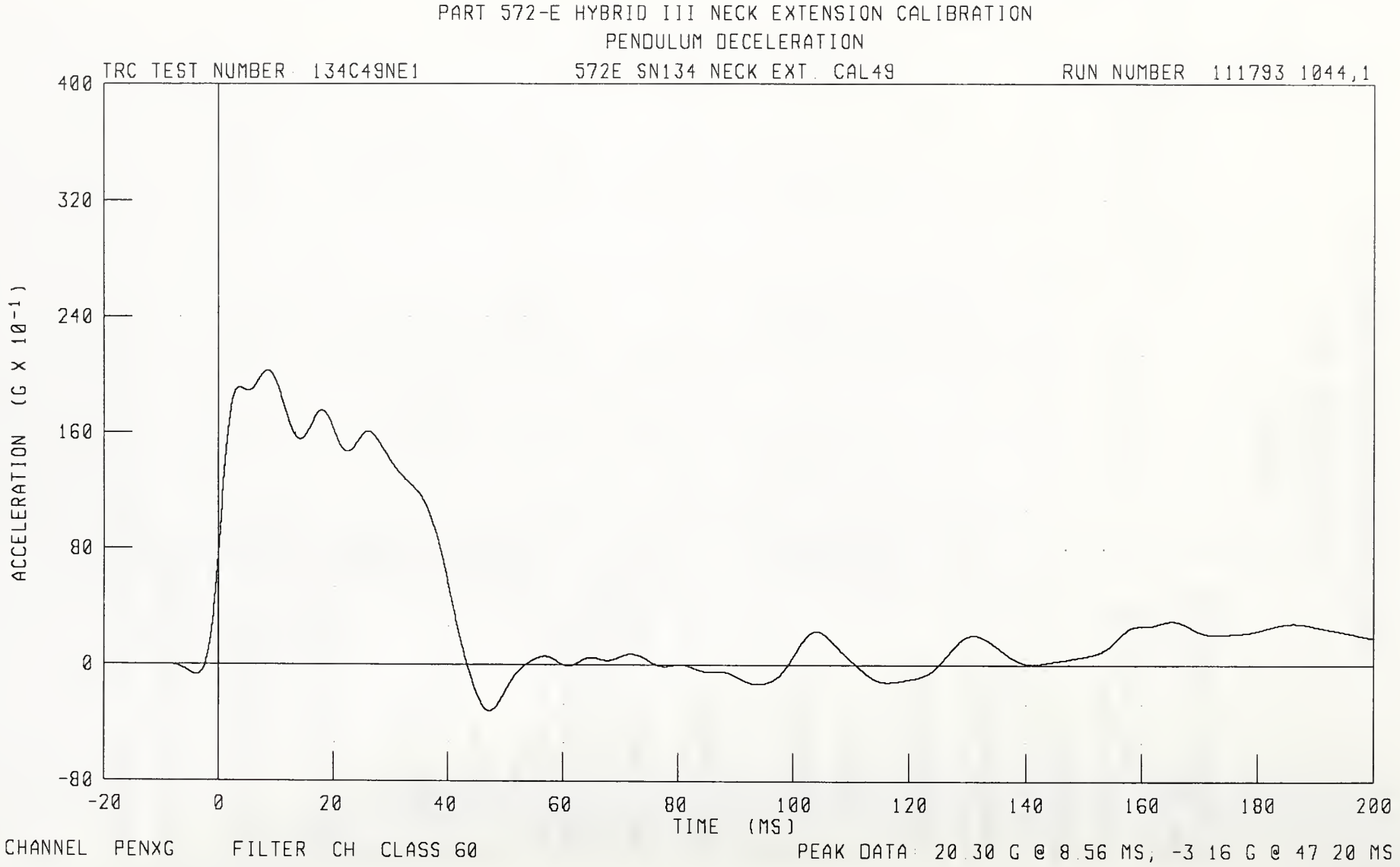
HYBRID III 17-NOV-93

3 AXIS NECK TRANSDUCER
TRC INC. 134C49NE1 572E SN134 NECK EXT. CAL49

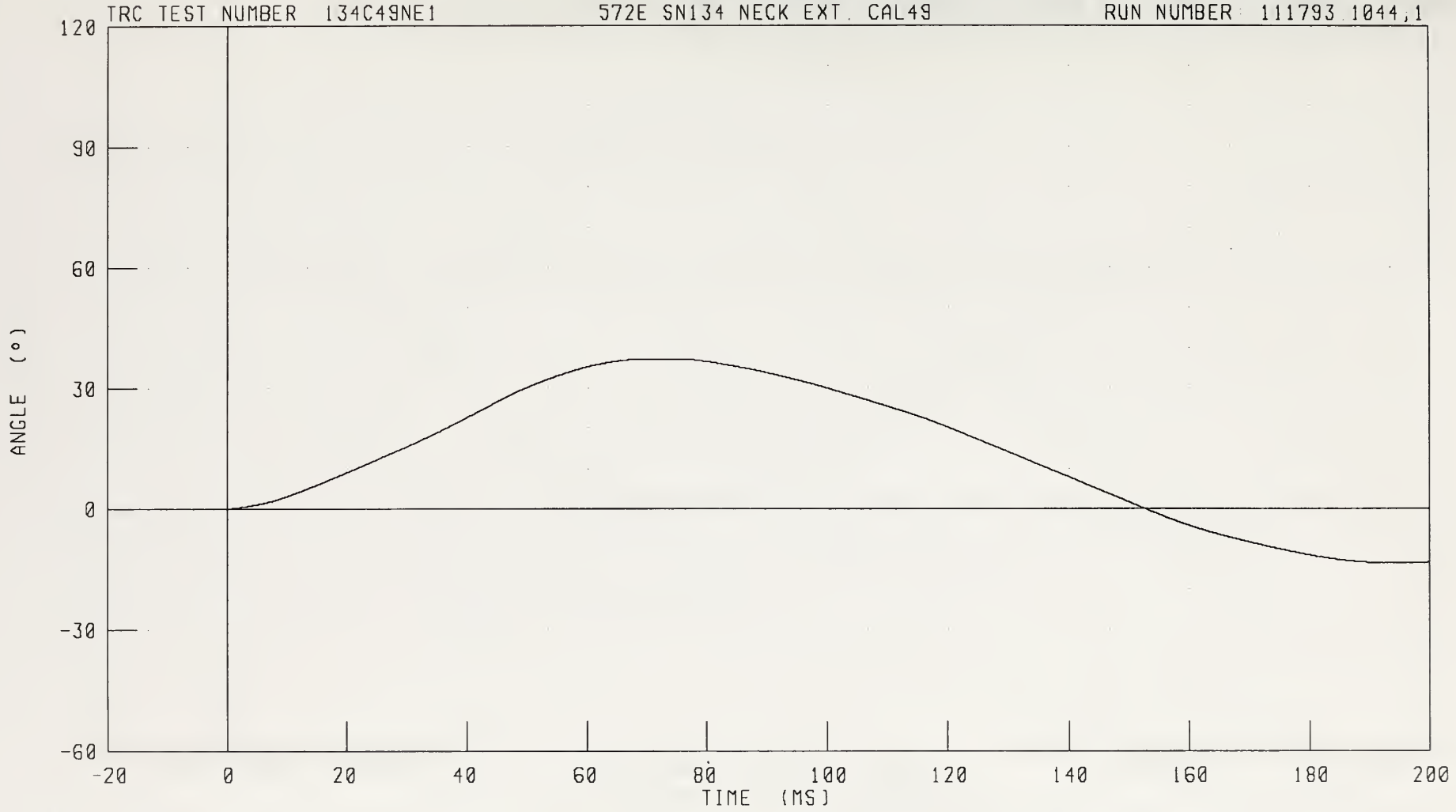
TEST PARAMETER		SPECIFICATION	TEST RESULTS
TEMPERATURE		20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY		10 - 70 %	55.0 %
IMPACT VELOCITY		5.95 - 6.19 M/S	6.02 M/S
PENDULUM DECELERATION	10 MS	17.20 - 21.20 G	19.58 G
	20 MS	14.00 - 19.00 G	16.27 G
	30 MS	11.00 - 16.00 G	14.06 G
MAX PENDULUM G		22 G MAX	20.30 G
MAX PENDULUM G ABOVE 30 MS		22 G MAX	14.02 G
DECELERATION-TIME CURVE DECAY TIME TO 5 G		38 - 46 MS	40.32 MS
D PLANE ROTATION	MAX	81 - 106 DEG.	95.63 DEG.
	TIME	72 - 82 MS	74.88 MS
MOMENT ABOUT OCCIPITAL CONDYLE	MIN	-80.0/-52.9 NM	-72.38 NM
	TIME	65 - 79 MS	70.40 MS
ROTATION ANGLE-TIME CURVE DECAY TIME TO ZERO		147 - 174 MS	151.84 MS
NEGATIVE MOMENT-TIME CURVE DECAY TIME TO ZERO		120 - 148 MS	138.56 MS

TEST MEETS SPECIFICATIONS

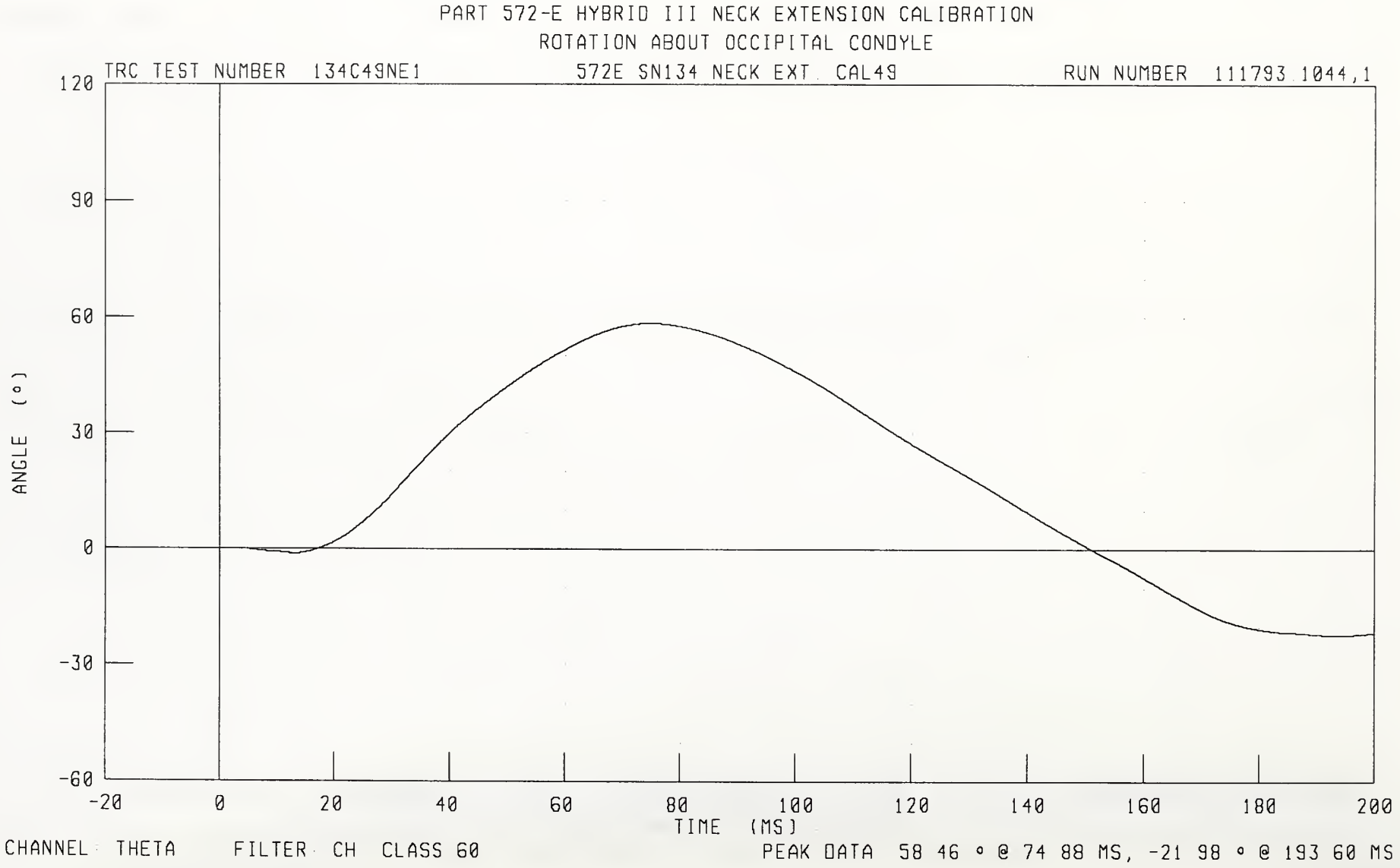
TECHNICIAN 

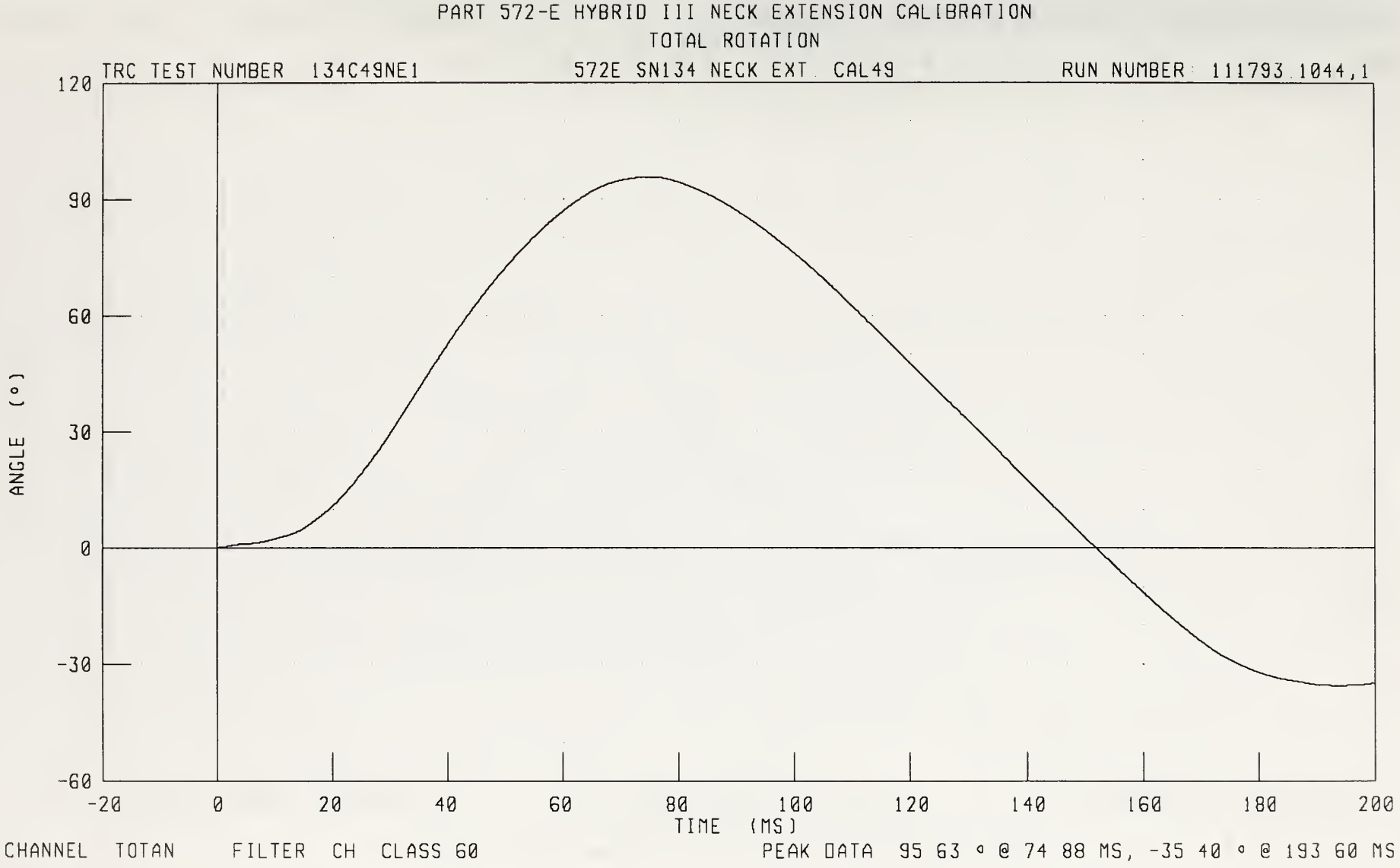

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER 134C49NE1
572E SN134 NECK EXT CAL49
RUN NUMBER 111793 1044,1
400
320
240
160
80
0
-80
ACCELERATION (G X 10-1)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL PENXG
FILTER CH CLASS 60
PEAK DATA 20.30 G @ 8.56 MS, -3.16 G @ 47.20 MS

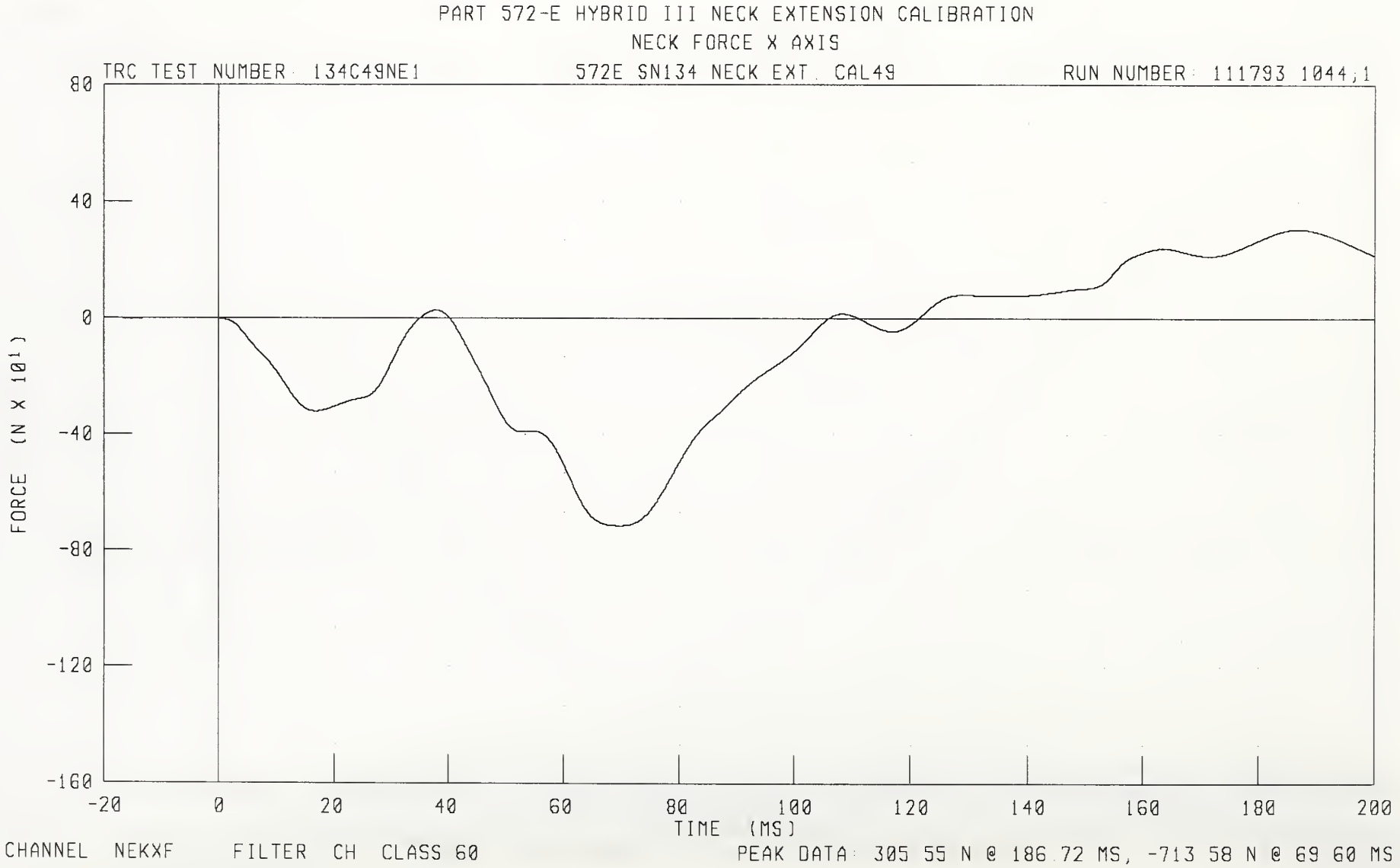
PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT BASE OF NECK



CHANNEL BETA FILTER CH CLASS 60 PEAK DATA 37.17 ° @ 74.64 MS, -13.42 ° @ 193.44 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
ROTATION ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 134C49NE1
572E SN134 NECK EXT CAL49
RUN NUMBER 111793 1044,1
ANGLE (°)
120
90
60
30
0
-30
-60
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL THETA FILTER CH CLASS 60
PEAK DATA 58 46 ° @ 74 88 MS, -21 98 ° @ 193 60 MS

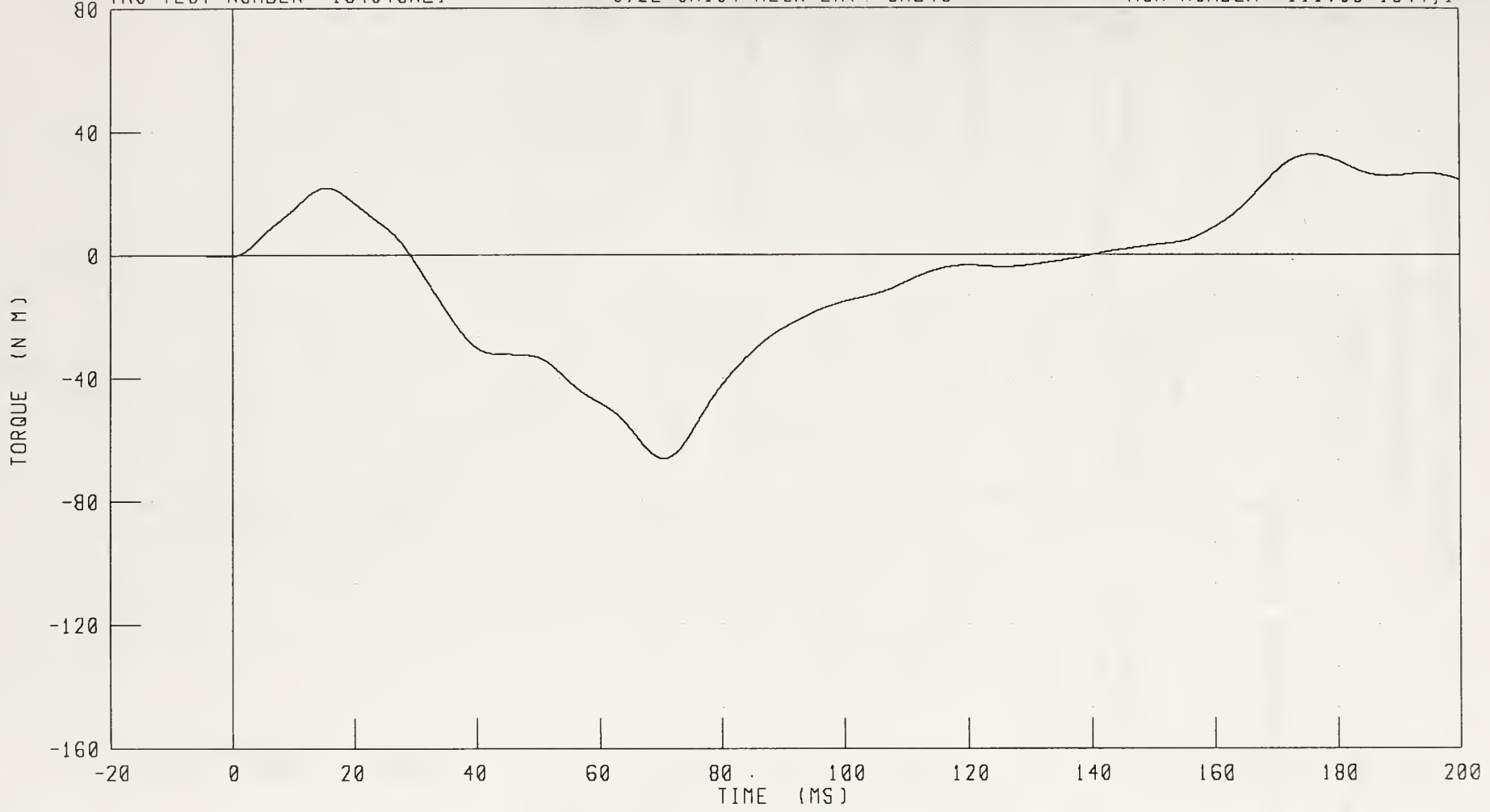

PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL ROTATION
TRC TEST NUMBER 134C49NE1
572E SN134 NECK EXT CAL49
RUN NUMBER: 111793.1044,1
120
90
60
30
0
-30
-60
ANGLE (°)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL TOTAN
FILTER CH CLASS 60
PEAK DATA 95.63 ° @ 74.88 MS, -35.40 ° @ 193.60 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
NECK FORCE X AXIS
TRC TEST NUMBER: 134C49NE1
572E SN134 NECK EXT. CAL49
RUN NUMBER: 111793 1044;1
80
40
0
-40
-80
-120
-160
FORCE (N X 10¹)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKXF
FILTER CH CLASS 60
PEAK DATA: 305 55 N @ 186 72 MS, -713 58 N @ 69 60 MS

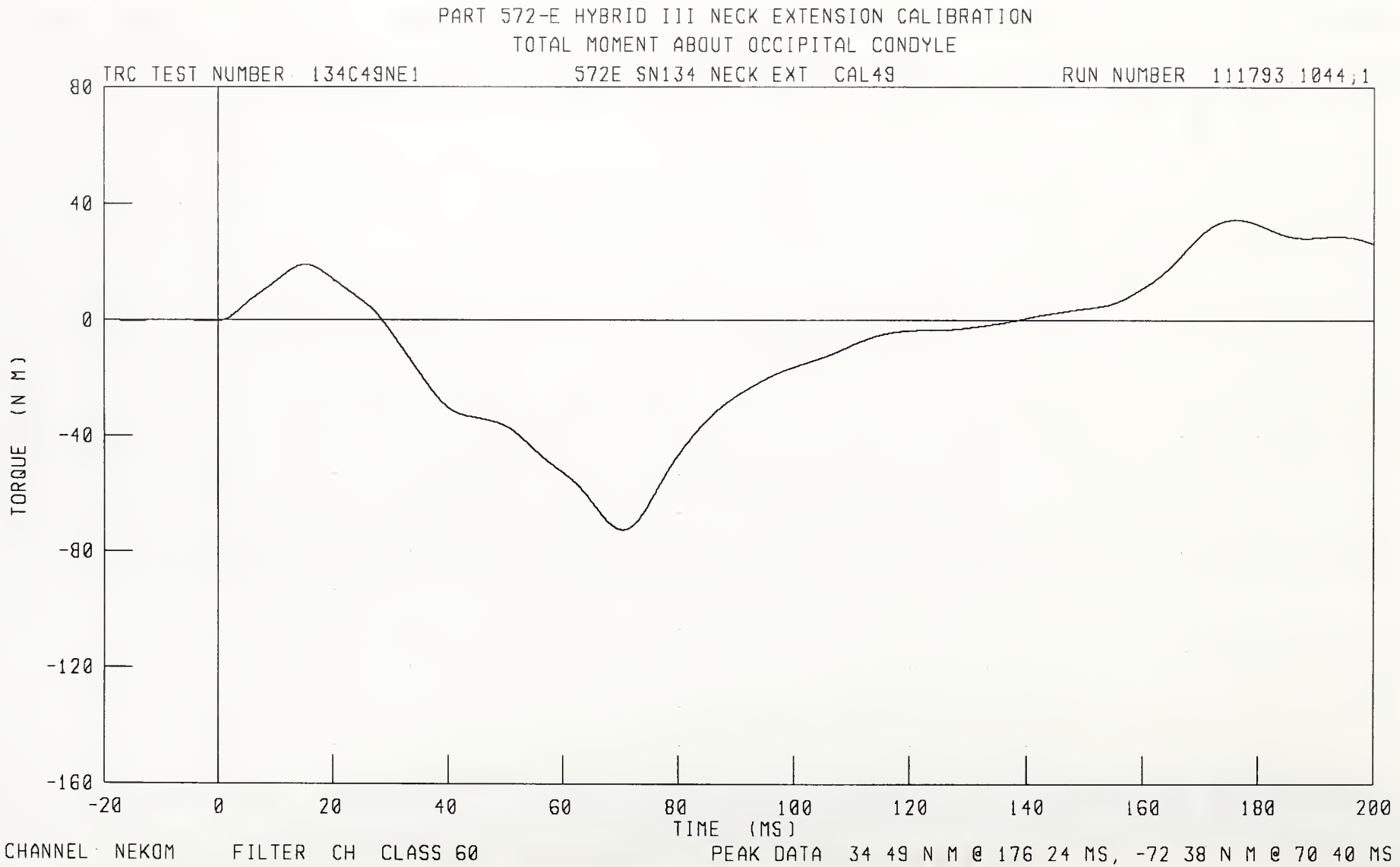
PART 572-E HYBRID III NECK EXTENSION CALIBRATION

NECK MOMENT Y AXIS

TRC TEST NUMBER 134C49NE1 572E SN134 NECK EXT CAL49 RUN NUMBER 111793 1044,1



CHANNEL NEKYM FILTER CH CLASS 60 PEAK DATA 32 44 N M @ 175 92 MS, -66 13 N M @ 70 40 MS


PART 572-E HYBRID III NECK EXTENSION CALIBRATION
TOTAL MOMENT ABOUT OCCIPITAL CONDYLE
TRC TEST NUMBER 134C49NE1
572E SN134 NECK EXT CAL49
RUN NUMBER 111793 1044;1
80
40
0
-40
-80
-120
-160
TORQUE (N M)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS)
CHANNEL NEKOM
FILTER CH CLASS 60
PEAK DATA 34 49 N M @ 176 24 MS, -72 38 N M @ 70 40 MS

TRANSPORTATION RESEARCH CENTER INC.

THORAX IMPACT TEST

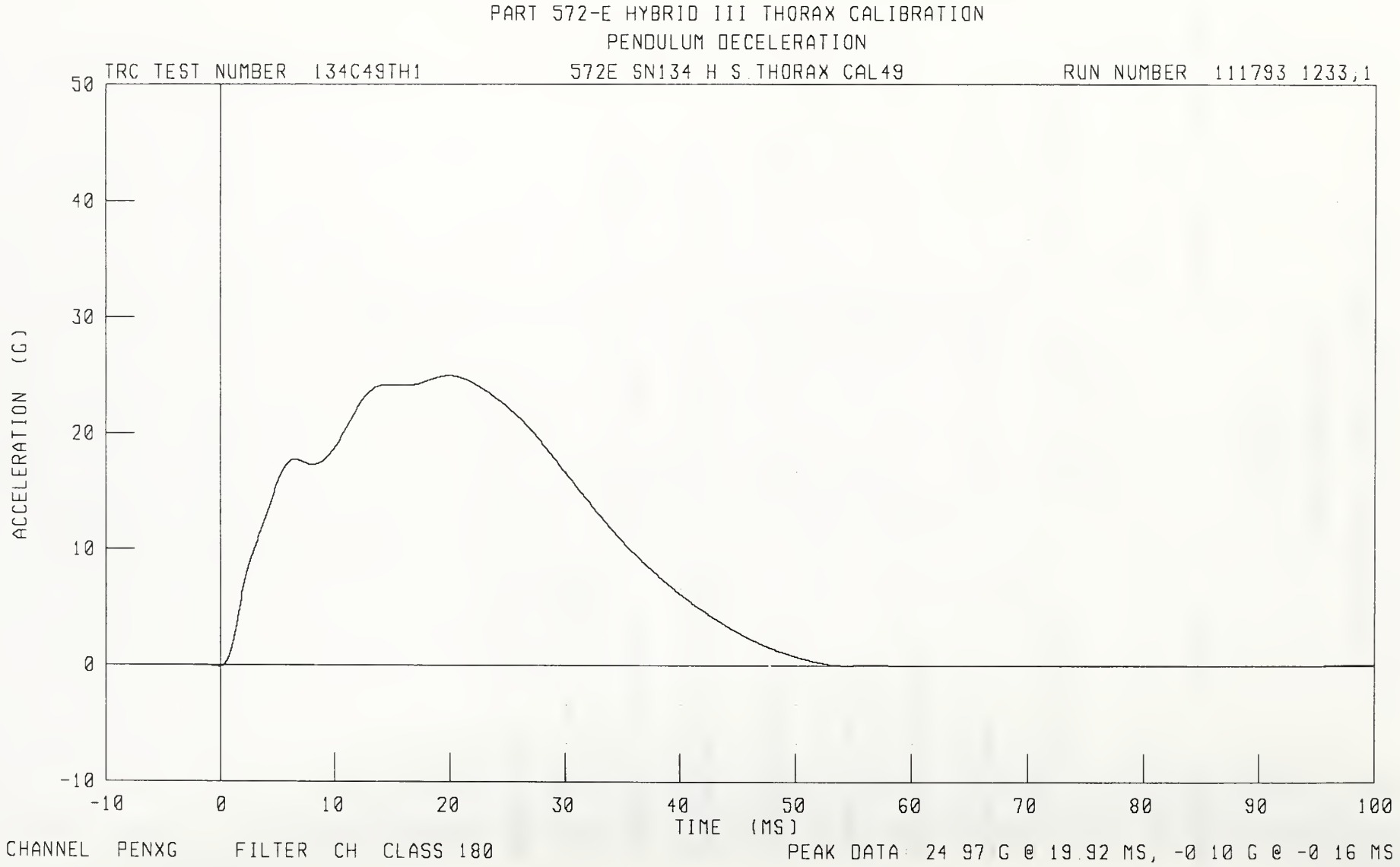
HYBRID III 17-NOV-93

TRC INC. 134C49TH1 572E SN134 H.S.THORAX CAL49

TEST PARAMETER	HIGH SPEED TEST SPECIFICATION	TEST RESULTS
TEMPERATURE	20.6-22.2 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PENDULUM VELOCITY	6.59 - 6.83 M/S	6.68 M/S
MAXIMUM DEFLECTION	63.5 - 72.6 MM	64.3 MM
MAXIMUM RESISTIVE FORCE	5159 - 5894 N	5719. N
INTERNAL HYSTERESIS	69% - 85%	72.5%

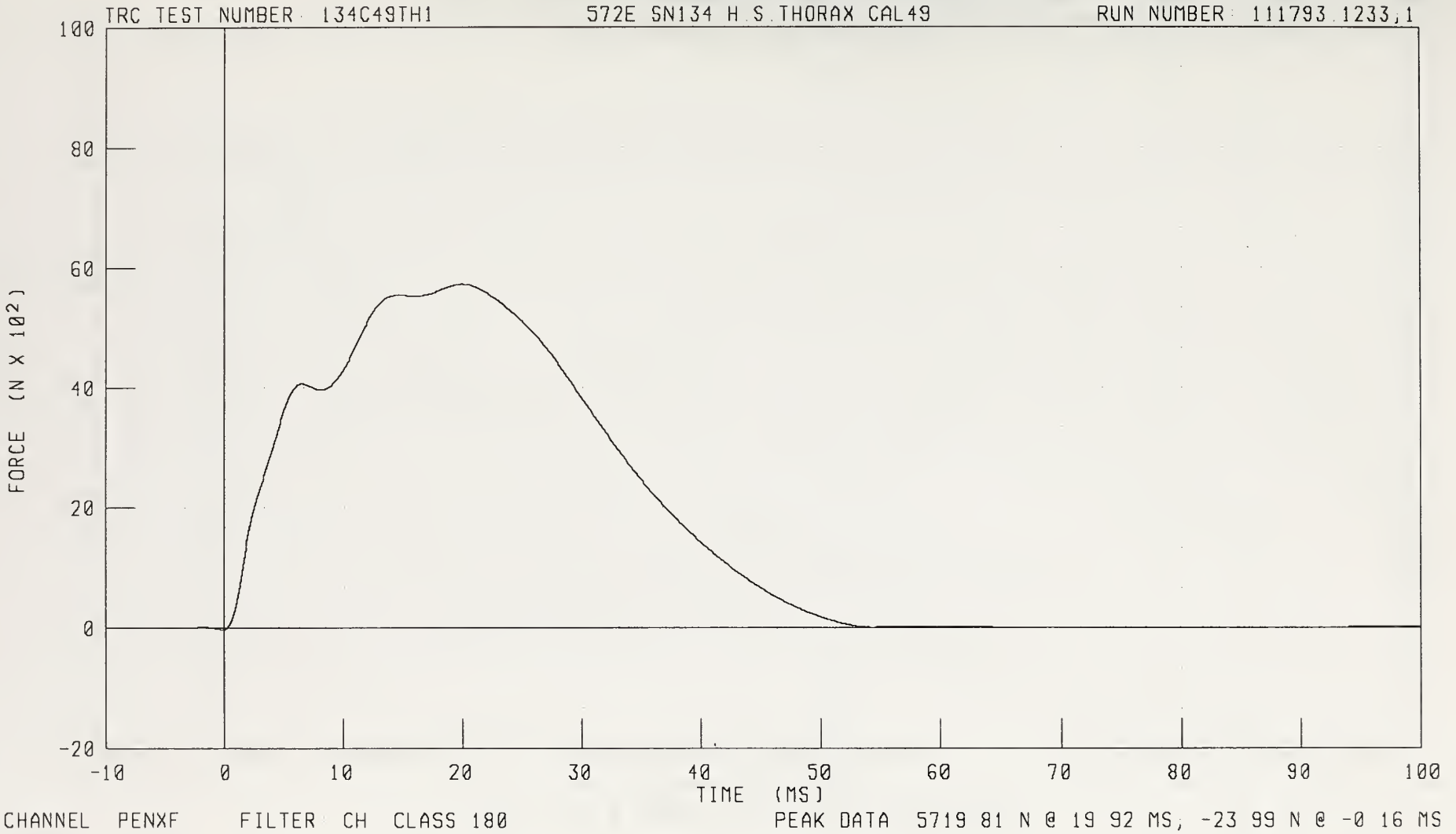
TEST MEETS SPECIFICATIONS

TECHNICIAN Pete Foss


PART 572-E HYBRID III THORAX CALIBRATION
PENDULUM DECELERATION
TRC TEST NUMBER 134C49TH1
572E SN134 H S THORAX CAL49
RUN NUMBER 111793 1233,1
ACCELERATION (G)
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60
70
80
90
100
TIME (MS)
CHANNEL PENXG
FILTER CH CLASS 180
PEAK DATA 24 97 G @ 19 92 MS, -0 10 G @ -0 16 MS

PART 572-E HYBRID III THORAX CALIBRATION

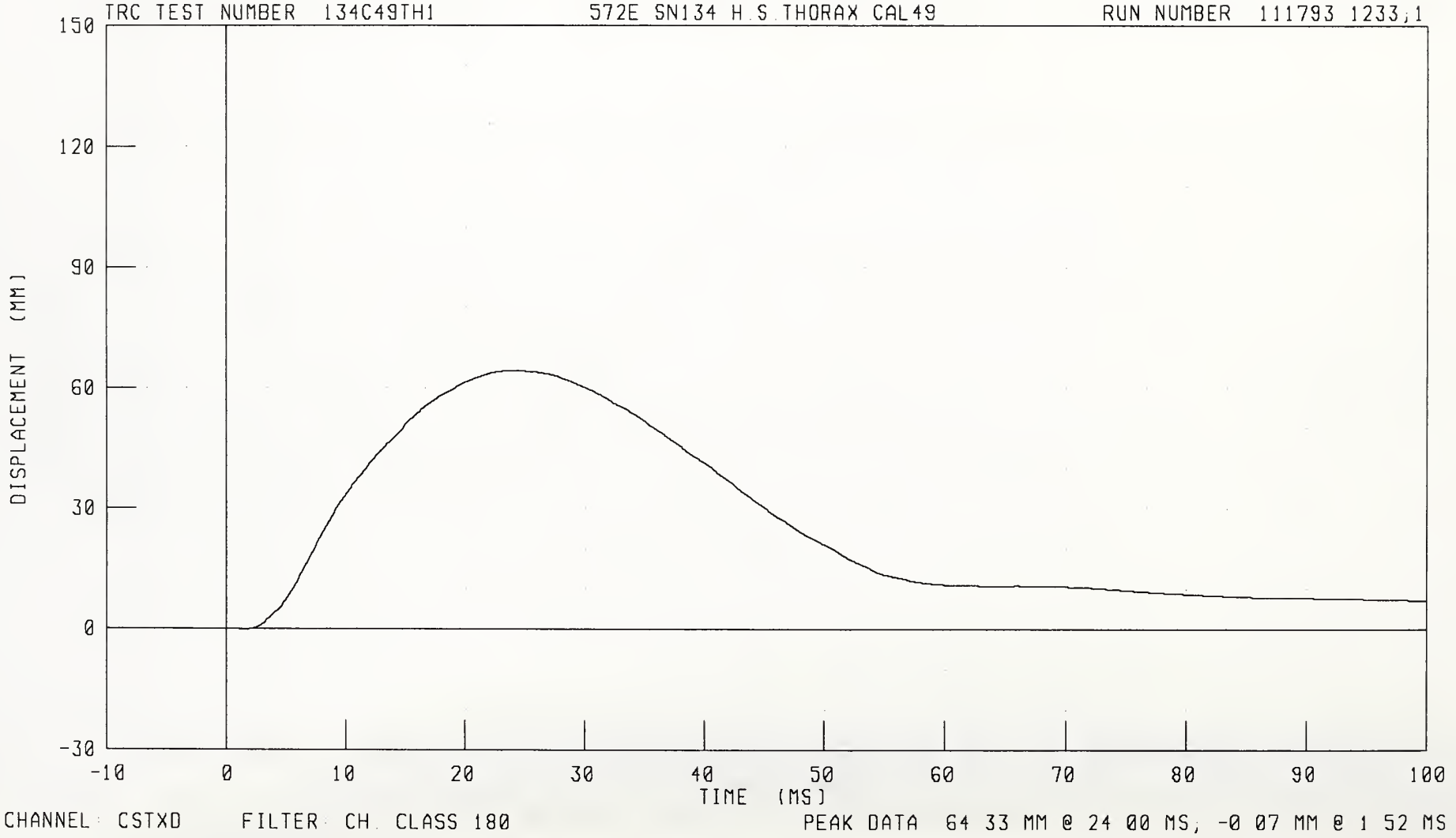
PENDULUM FORCE



CHANNEL PENXF FILTER CH CLASS 180

PEAK DATA 5719.81 N @ 19.92 MS, -23.99 N @ -0.16 MS

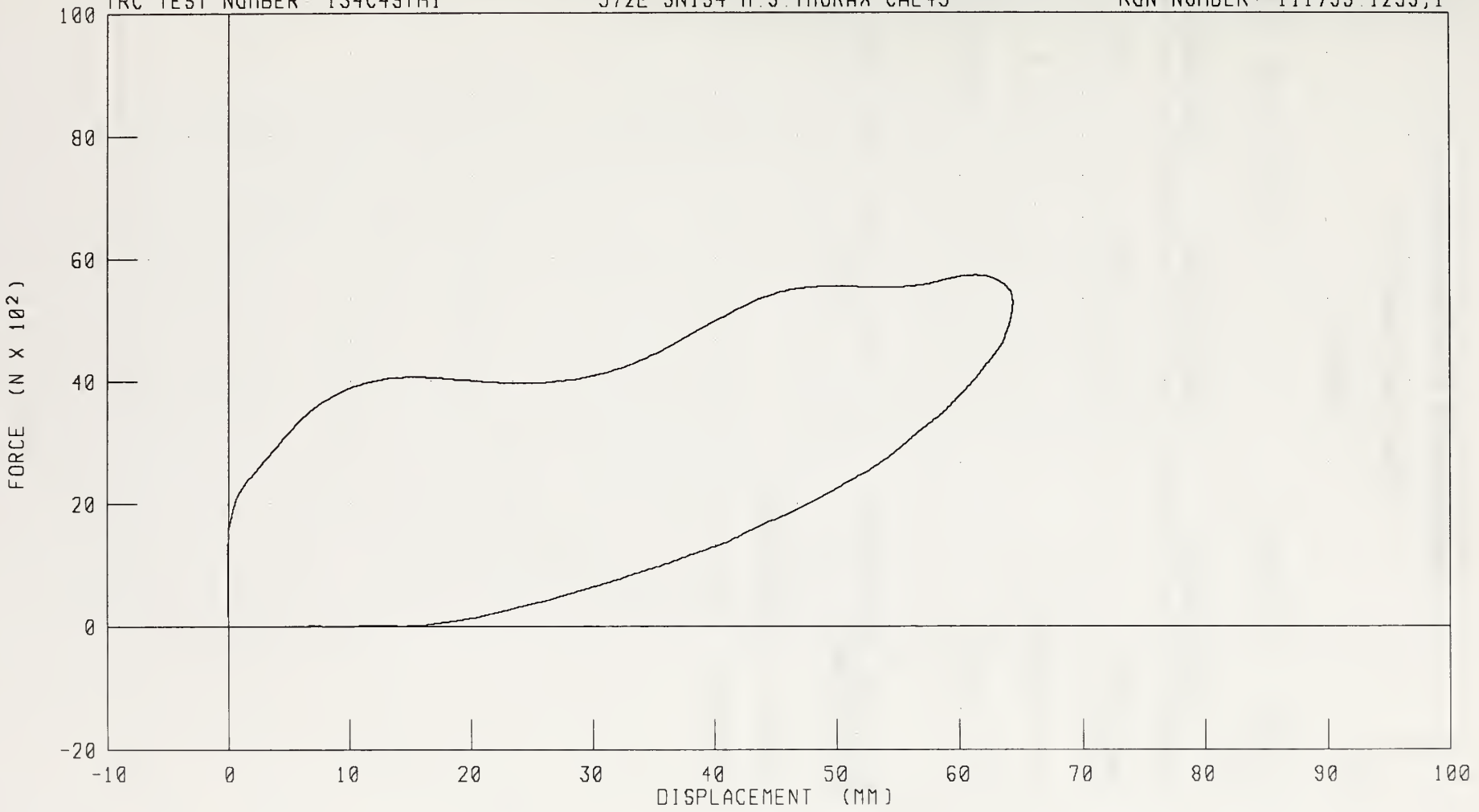
PART 572-E HYBRID III THORAX CALIBRATION
STERNUM DISPLACEMENT



CHANNEL CSTXD FILTER CH CLASS 180 PEAK DATA 64 33 MM @ 24 00 MS, -0 07 MM @ 1 52 MS

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

TRC TEST NUMBER 134C49TH1 572E SN134 H.S THORAX CAL49 RUN NUMBER 111793.1233;1



CHANNEL CSTXD FILTER CH CLASS 180 PEAK DATA 64.33 MM @ 24.00 MS, -0.07 MM @ 1.52 MS
PENXF CH CLASS 180 5719.81 N @ 19.92 MS, -23.99 N @ -0.16 MS

TRANSPORTATION RESEARCH CENTER INC.

RIGHT KNEE IMPACT TEST

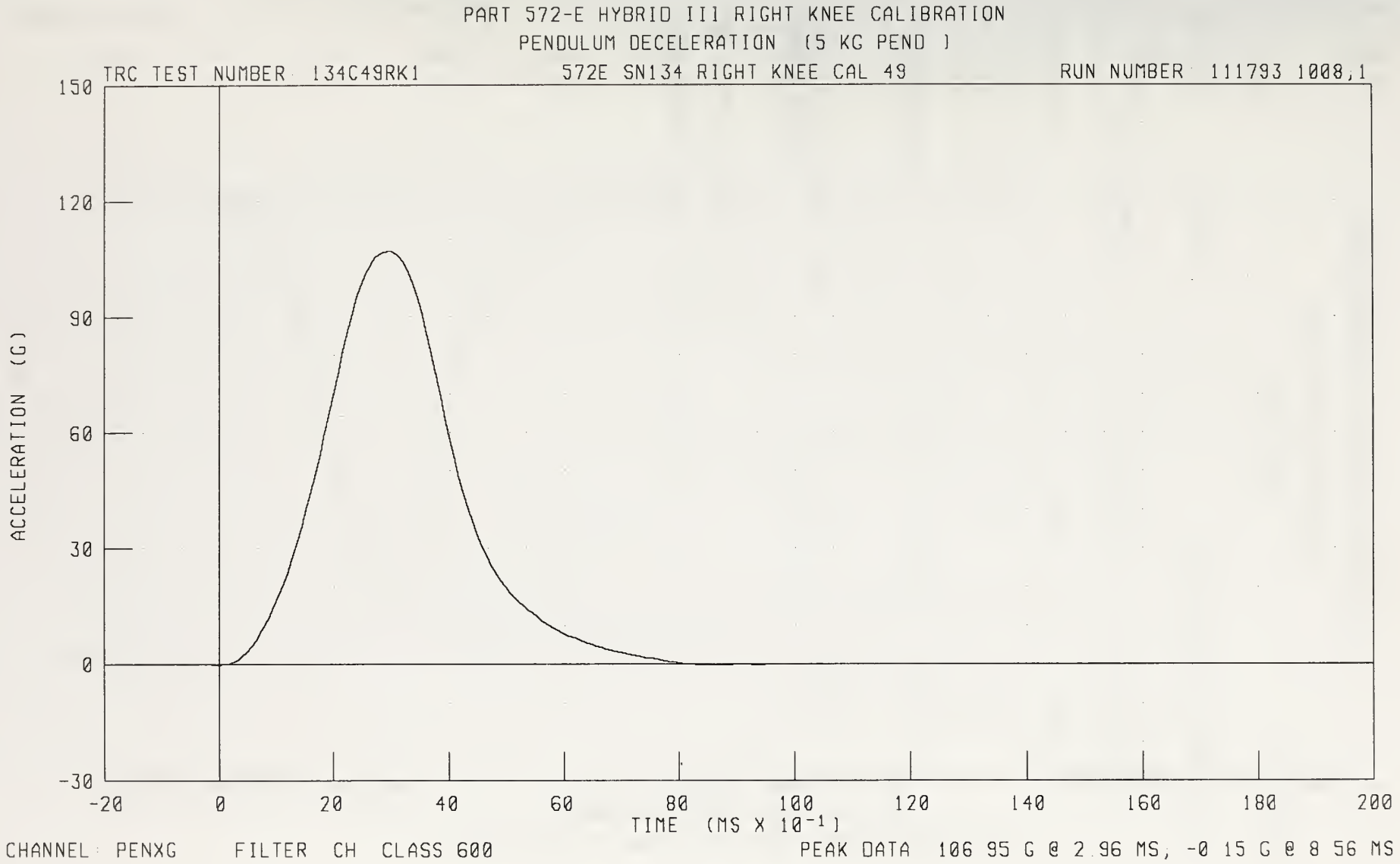
HYBRID III 17-NOV-93

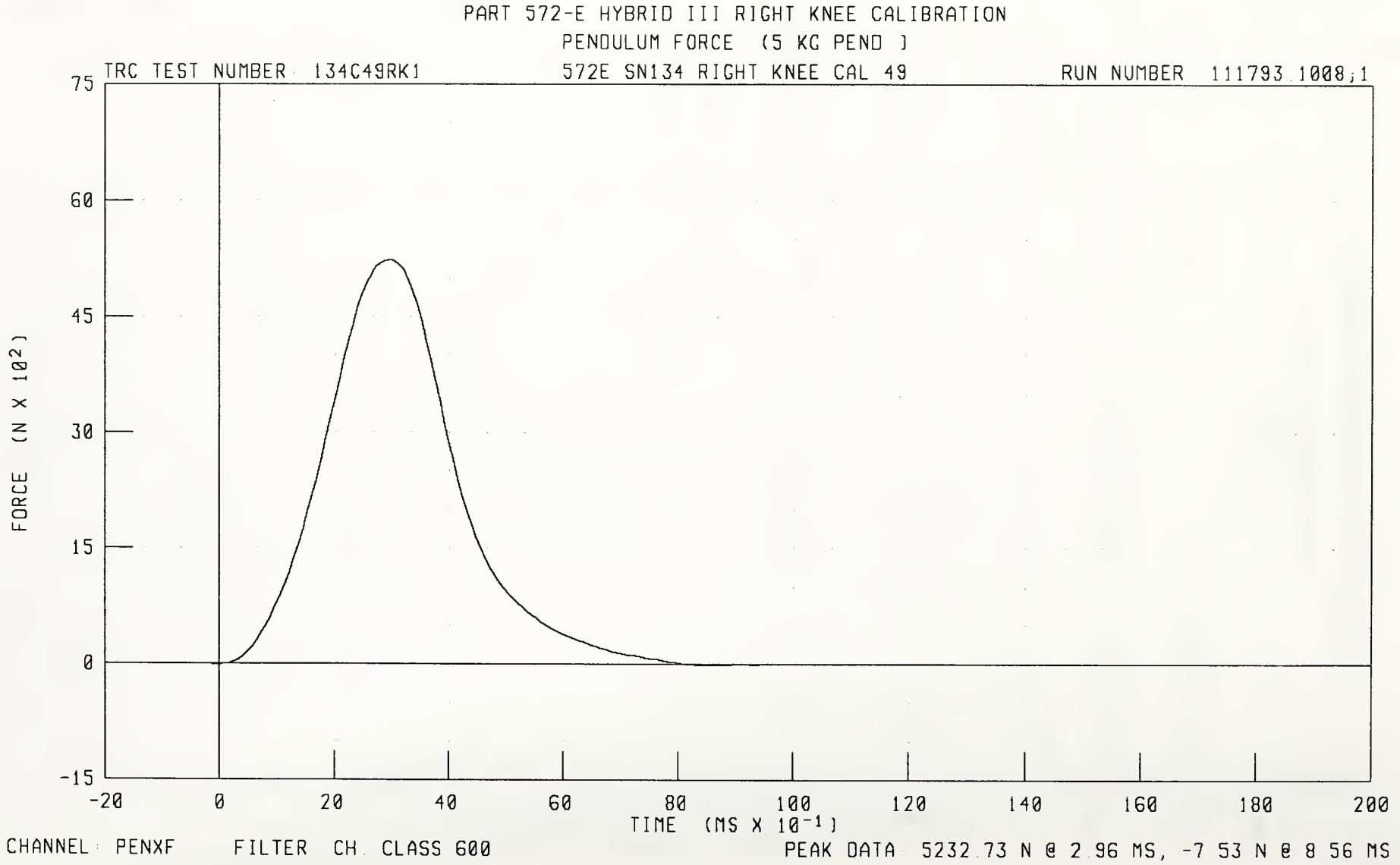
TRC INC. 134C49RK1 572E SN134 RIGHT KNEE CAL 49

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.07 M/S
PEAK KNEE IMPACT FORCE PROBE WEIGHT	4714 - 5783 N 5.0 KG	5232.7 N

TEST MEETS SPECIFICATIONS

TECHNICIAN_____


PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND)
TRC TEST NUMBER 134C49RK1
572E SN134 RIGHT KNEE CAL 49
RUN NUMBER 111793 1008,1
ACCELERATION (G)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10-1)
CHANNEL PENXG
FILTER CH CLASS 600
PEAK DATA 106 95 G @ 2 96 MS, -0 15 G @ 8 56 MS


PART 572-E HYBRID III RIGHT KNEE CALIBRATION
PENDULUM FORCE (5 KG PEND)
TRC TEST NUMBER 134C49RK1
572E SN134 RIGHT KNEE CAL 49
RUN NUMBER 111793.1008;1
75
60
45
30
15
0
-15
FORCE (N X 10²)
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10⁻¹)
CHANNEL PENXF
FILTER CH CLASS 600
PEAK DATA 5232.73 N @ 2.96 MS, -7.53 N @ 8.56 MS

TRANSPORTATION RESEARCH CENTER INC.

LEFT KNEE IMPACT TEST

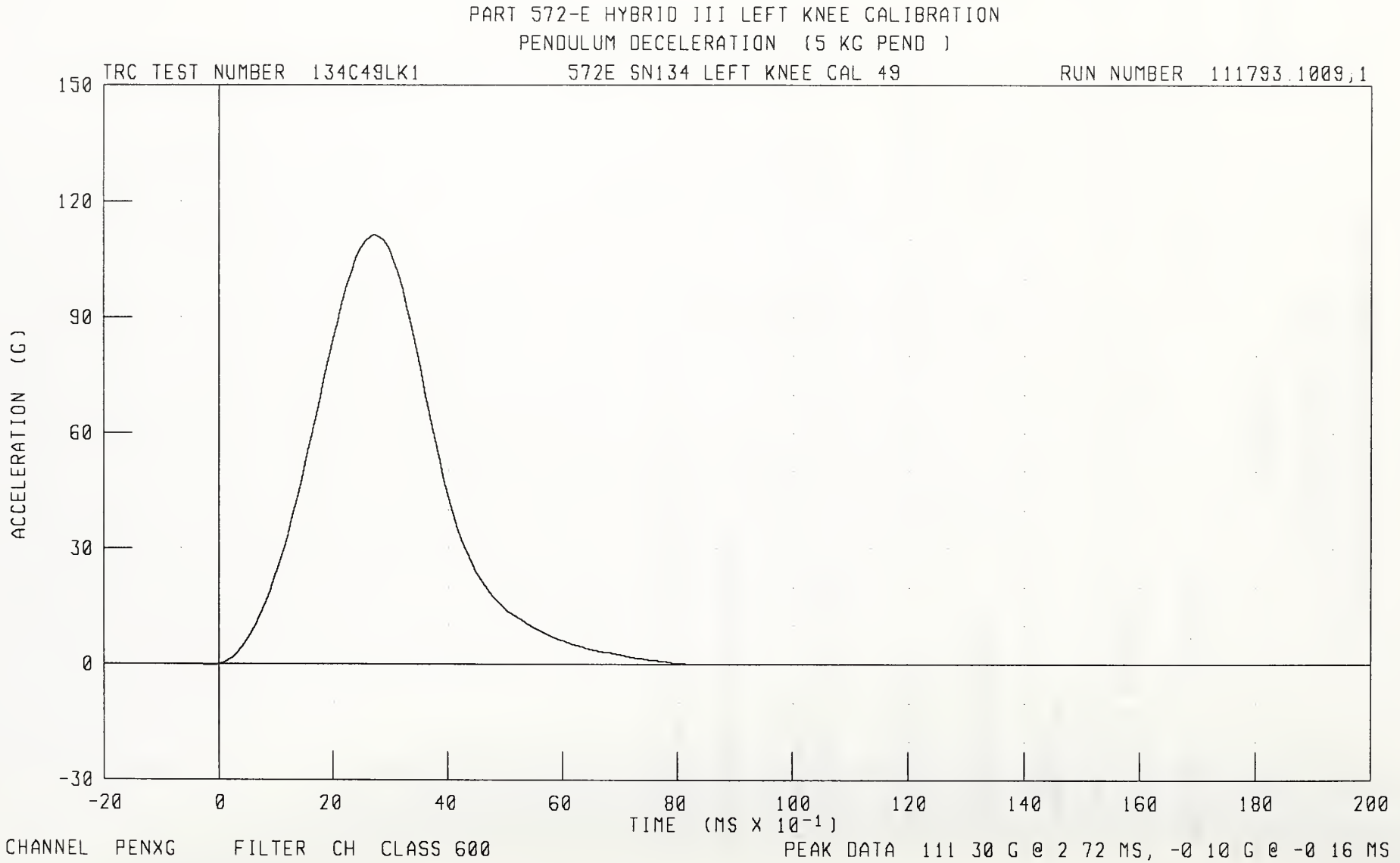
HYBRID III 17-NOV-93

TRC INC. 134C49LK1 572E SN134 LEFT KNEE CAL 49

TEST PARAMETER	SPECIFICATION	TEST RESULTS
TEMPERATURE	18.9-25.6 DEG. C	21.1 DEG. C
RELATIVE HUMIDITY	10 - 70 %	55.0 %
PROBE VELOCITY	2.07 - 2.13 M/S	2.07 M/S
PEAK KNEE IMPACT FORCE	4714 - 5783 N	5445.7 N
PROBE WEIGHT	5.0 KG	

TEST MEETS SPECIFICATIONS

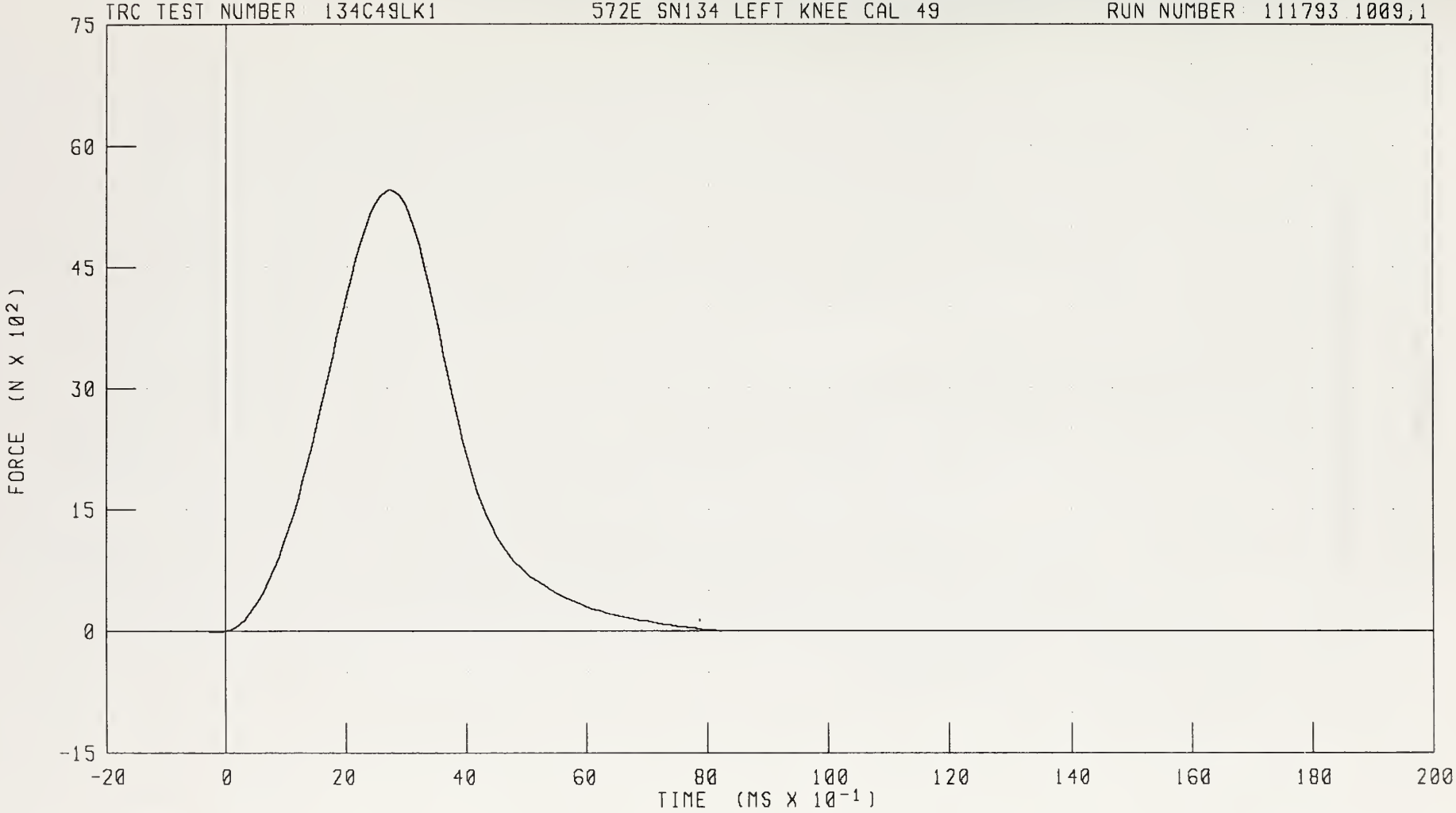
TECHNICIAN 


PART 572-E HYBRID III LEFT KNEE CALIBRATION
PENDULUM DECELERATION (5 KG PEND)
TRC TEST NUMBER 134C49LK1
572E SN134 LEFT KNEE CAL 49
RUN NUMBER 111793.1009,1
ACCELERATION (G)
150
120
90
60
30
0
-30
-20
0
20
40
60
80
100
120
140
160
180
200
TIME (MS X 10⁻¹)
CHANNEL PENXG
FILTER CH CLASS 600
PEAK DATA 111 30 G @ 2 72 MS, -0 10 G @ -0 16 MS

PART 572-E HYBRID III LEFT KNEE CALIBRATION

PENDULUM FORCE (5 KG PEND)

TRC TEST NUMBER 134C49LK1 572E SN134 LEFT KNEE CAL 49 RUN NUMBER 111793 1009,1



CHANNEL PENXF FILTER CH CLASS 600 PEAK DATA 5445.71 N @ 2.72 MS, -4.90 N @ -0.16 MS

APPENDIX D

MISCELLANEOUS TEST INFORMATION

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MANUFACTURER & S/N: ALDERSON RESEARCH LABS #177

SEATING POSITION: DRIVER

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
HEDXG1	HEAD ACCELERATION	X	ENDEVCO	7231C	A45E	REAR
HEDYG1	HEAD ACCELERATION	Y	ENDEVCO	7231C	A76D	LEFT
HEDZG1	HEAD ACCELERATION	Z	ENDEVCO	7231C	A87F	UP
CSTXG1	CHEST ACCELERATION	X	ENDEVCO	7231C	A01E	FORWARD
CSTYG1	CHEST ACCELERATION	Y	ENDEVCO	7231C	A28A	LEFT
CSTZG1	CHEST ACCELERATION	Z	ENDEVCO	7231C	FC02	DOWN
CSTXD1	CHEST DISPLACEMENT	X	SERVO	14CB1-2981	CP2981	OUTWARD
LFMF1	LEFT FEMUR FORCE		GSE	2430	914	TENSION
RFMF1	RIGHT FEMUR FORCE		GSE	2430	905	TENSION

DUMMY INSTRUMENTATION PLACEMENT

DUMMY MANUFACTURER & S/N: ALDERSON RESEARCH LABS #134

SEATING POSITION: RIGHT FRONT PASSENGER

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
HEDXG2	HEAD ACCELERATION	X	ENDEVCO	7231C	A13E	REAR
HEDYG2	HEAD ACCELERATION	Y	ENDEVCO	7231C	A21E	LEFT
HEDZG2	HEAD ACCELERATION	Z	ENDEVCO	7231C	A19E	UP
CSTXG2	CHEST ACCELERATION	X	ENDEVCO	7231C	A17J	FORWARD
CSTYG2	CHEST ACCELERATION	Y	ENDEVCO	7231C	A35D	LEFT
CSTZG2	CHEST ACCELERATION	Z	ENDEVCO	7231C	A18E	DOWN
CSTXD2	CHEST DISPLACEMENT	X	VERNITECH	81422A	85861-25	OUTWARD
LFMF2	LEFT FEMUR FORCE		GSE	2430	608	TENSION
RFMF2	RIGHT FEMUR FORCE		GSE	2430	609	TENSION

VEHICLE INSTRUMENTATION PLACEMENT

MNEMONIC	LOCATION	AXIS	MFR.	MODEL	S/N	ORIENTATION (+ SENSING)
TLRXG1	LEFT REAR SEAT	X	ENDEVCO	2264	AT38	REARWARD
TRRXG1	RIGHT REAR SEAT	X	ENDEVCO	2264	AZ67	REARWARD
ENGXG1	ENGINE TOP	X	ENDEVCO	2264	AU31	FORWARD
ENGXG2	ENGINE BOTTOM	Y	ENDEVCO	2264	BA46	REARWARD
BCRXG1	RIGHT BRAKE CALIPER	X	ENDEVCO	2264	AS95	REARWARD
BCLXG1	LEFT BRAKE CALIPER	X	ENDEVCO	2264	AU09	REARWARD
DPCXG1	INSTRUMENT PANEL CENTER	X	ENDEVCO	2264	AY66	REARWARD
OTHXG1	FRONT BATTERY BOX - LEFT	X	ENDEVCO	2264	AY89	REARWARD
OTHXG2	FRONT BATTERY BOX - RIGHT	X	ENDEVCO	2264	AL42	REARWARD
OTHXG3	REAR BATTERY BOX - CENTER	X	ENDEVCO	2264	BC41J	FORWARD

WEATHER MEASURE
P.O. BOX 41257
SACRAMENTO, CA. 95841
PHONE (916)481-7565

HYGROTHERMOGRAPH
1 DAY

CHART # C311 D HF
PART # 699123

STATION _____ DATE ON _____ DATE OFF _____

OCCUPANT COMPARTMENT THERMOGRAPH